

DESIGN CRITERIA REPORT
PRE-FINAL 90% REMEDIAL DESIGN

REMEDIAL DESIGN SERVICES
SWAN ISLAND BASIN PROJECT AREA
CERCLA DOCKET NO. 10-2021-001

PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

Prepared for:

Swan Island Basin Remedial Design Group

Prepared by:

11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190

With assistance from:

PACIFIC groundwater GROUP · MOTT MACDONALD · BRIDGEWATER GROUP · COAST & HARBOR ENGINEERING

October 2025

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LIST OF ACRONYMS AND ABBREVIATIONS

cy	cubic yard
ft	foot or feet
ACM	active channel margin
AIDP	Archaeological Inadvertent Discovery Plan
ARAR	Applicable or Relevant and Appropriate Requirements
ASAOC	Administrative Settlement Agreement and Order on Consent
BA	Biological Assessment
BEHP	bis(2-ethylhexyl)phthalate
BMP	best management practice
BODR	Basis of Design Report
CCU	Cap Certification Unit
CDTM	Cap Design Technical Memorandum
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFD	Computational Fluid Dynamics
CFR	Code of Federal Regulations
City	City of Portland
COC	contaminant of concern
CQA/QCP	Construction Quality Assurance/Quality Control Plan
CRD	Columbia River Datum
CU	certification unit
CUL	cleanup level
CWA	Clean Water Act
DCR	Design Criteria Report
DDTM	Dredging Design Technical Memorandum
DSAY	Discounted Service Acre Years
DSL	Department of State Lands
EFH	Essential Fish Habitat
ENR	enhanced natural recovery
EPA	U.S. Environmental Protection Agency
ER	Evaluation Report
ESA	Endangered Species Act
FCR	field change request
FEMA	Federal Emergency Management Agency
GAC	granular activated carbon
GDTM	Geotechnical Design Technical Memorandum
HEA	Habitat Equivalency Analysis
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HGL	HydroGeoLogic, Inc.

HIE	Habitat Impact Evaluation
IC	institutional control
ICIAP	Institutional Control Implementation and Assurance Plan
IWWP	in-water work period
MCL	maximum contaminant level
MCLG	maximum contaminant level goals
MNR	monitored natural recovery
NAPL	non-aqueous phase liquid
NAVD88	North American Vertical Datum of 1988
NGVD29	National Geodetic Vertical Datum of 1929
NMFS	National Marine Fisheries Service
O&M	operation and maintenance
OHW	ordinary high water
ORS	Oregon Revised Statutes
PAH	polycyclic aromatic hydrocarbon
PAMP	Project Area Monitoring Plan
PC	Project Coordinator
PCB	polychlorinated biphenyl
PCSWMM	Personal Computer Storm Water Management Model
PDI	Pre-Design Investigation
PHSS	Portland Harbor Superfund Site
PQL	practical quantitation limit
PS	performance standards
PTW	principal threat waste
QA	quality assurance
QC	quality control
RA	remedial action
RAL	remedial action level
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RCU	Riverbank Certification Unit
RD	Remedial Design
RDGC	Remedial Design Guidelines and Considerations
RDTM	Riverbank Design Technical Memorandum
RDWP	Remedial Design Work Plan
RM	river mile
ROD	Record of Decision
RSL	Regional Screening Level

SAR	Sufficiency Assessment Report
SDTM	Structural Design Technical Memorandum
SIB	Swan Island Basin
SMA	sediment management area
SOW	statement of work
TBC	To Be Considered
THPO	Tribal Historic Preservation Officer
TODP	Transportation and Off-Site Disposal Plan
TPH-Dx	total petroleum hydrocarbons - diesel range hydrocarbons
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USGS	U. S. Geological Survey
VE	value engineering

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90% REMEDIAL DESIGN CRITERIA REPORT
SWAN ISLAND BASIN PROJECT AREA
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

1.0 INTRODUCTION

This 90% Remedial Design Criteria Report (DCR) presents the results of the Remedial Design (RD) approach and procedures that will be used to implement the Remedial Action (RA) activities for the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site (PHSS) in Portland, Multnomah County, Oregon. HydroGeoLogic, Inc. (HGL) prepared this DCR on behalf of the SIB RD Group[1] based on the requirements of the PHSS Record of Decision (ROD) (EPA, 2017a) and the Administrative Settlement Agreement and Order on Consent at the Swan Island Basin Project Area (ASAOC) (EPA, 2021a). This DCR includes references to the previously published Pre-Design Investigation (PDI) Evaluation Report (ER), (HGL, 2024a) which was approved by the U.S. Environmental Protection Agency (EPA) in January 2025. References also are made to the Final Sufficiency Assessment Report (SAR) that was submitted to EPA in February 2025 (HGL, 2025a), the Basis of Design Report (BODR) (HGL, 2024b) that was approved by EPA in December 2024, and the Remedial Design Work Plan (RDWP) (HGL, 2025b) that was submitted to and approved by EPA in February 2025.

1.1 PURPOSE AND OBJECTIVES

The purpose and objective of this DCR is to document that the Pre-Final 90% RD meets the requirements of the ASAOC (EPA, 2021a) and the PHSS ROD (EPA, 2017a), including:

- A complete set of certified construction drawings and specifications;
- Updates since the Draft 50% RD either addressing EPA comments and/or refined to reflect the Pre-Final 90% RD details, including:
    - Technical Memoranda: Non-Aqueous Phase Liquid (NAPL), Habitat Impact Evaluation (HIE), Clean Water Act (CWA) Analysis, Cap Design, Dredging Design, Geotechnical Design, Structural Design, and Cost Analysis.
    - Supporting plans: Construction Quality Assurance/Quality Control Plan (CQA/QCP), Waste Designation Memo, Transportation and Off-Site Disposal Plan (TODP), Green Remediation Plan, Institutional Control Implementation and Assurance Plan (ICIAP), Project Area Monitoring Plan (PAMP), and Operation and Maintenance (O&M) Plan, and O&M Manual.
- Additional supporting memoranda: Constructability Assessment and Value Engineering (VE) Study; and
- Updated sufficiency assessment summary table.

[1] Formed under an Administrative Settlement Agreement and Order on Consent to perform the Remedial Design but does not include the Remedial Action.

Per *Remedial Design/Remedial Action Handbook* (EPA, 1995), DCR describes technical parameters used as a basis of design to allow the RA Performing Parties to determine if ROD, applicable or relevant and appropriate requirements (ARARs), and engineering standards and codes are correctly incorporated into site-specific engineering parameters. In accordance with the *Remedial Design/Remedial Action Handbook*, this DCR includes a project description, design requirements and provisions in accordance with ROD Sections 14.2.9 and 14.2.10, and preliminary flow diagrams. Based on the currently proposed design, there are no operation and maintenance provisions with significant influence on the design approach. Any changes to these provisions in the subsequent RD phases will be documented in the O&M Plan and O&M Manual. This DCR also defines the scope and schedule of RA activities, outlines key deliverables, describes the nature of the work to be performed, and identifies major work tasks. These elements will guide the process and work as the design progresses towards the Final 100% RD.

1.2 PROJECT AREA LOCATION AND DESCRIPTION

The SIB Project Area is an active cleanup site located on the northeast side of the Willamette River, spanning approximately 1.1 miles between river miles (RMs) 8.1 and 9.2 (Figure 1-1). This 117-acre area encompasses riverbanks from the top of the bank to the river. A federal navigation channel, with a -45 feet (ft) Columbia River Datum (CRD) authorized depth, exists within the Willamette River and extends from the confluence of the Lower Willamette River with the Columbia River to RM 11.6. The U.S. Army Corps of Engineers (USACE) maintains the navigation channel, which does not extend into the SIB.

As described in Section 2 of the BODR (HGL, 2024b), the SIB Project Area is a roughly rectangular lagoon that is backwatered from the main Willamette River Channel. It is bounded by the uplands of Swan Island to the southwest and Mocks Bottom to the northeast. The entire shoreline was constructed by fill placement and other modifications that occurred over many decades. The Portland Harbor reach of the Willamette River, including the SIB Project Area, has been extensively altered since 1888 (Section 2.1.4 of the BODR; HGL, 2024b). These changes have significantly reshaped the landscape and waterways of the SIB Project Area. Currently, the SIB is an active navigable industrial waterway, and the SIB Project Area hosts light and heavy industrial activities, with limited commercial use. The shoreline supports various industrial structures and activities, reflecting its importance as a hub for industrial operations in the Portland area. This mix of industrial and limited commercial uses characterizes the current state of the SIB Project Area and its immediate surroundings.

Contaminants of concern (COCs) detected above cleanup levels (CULs), remedial action levels (RALs)/practical quantitation limits (PQLs), and/or principal threat waste (PTW) thresholds for the SIB Project Area are described in the PDI ER (HGL, 2024a) and summarized below.

- ROD COCs in sediment included various dioxins/furans, total petroleum hydrocarbons - diesel range hydrocarbons (TPH-Dx), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), metals, and tributyltin.
- ROD COCs in stormwater samples included PCBs, dioxins/furans, pesticides, PAHs, hexachlorobenzene, metals, and bis(2-ethylhexyl)phthalate (BEHP). COCs in stormwater may also present an important recontamination pathway at the SIB Project Area, as discussed in the SAR (HGL, 2025a).

- ROD COCs in stormwater solids included PCBs, dioxins/furans, pesticides, metals, BEHP, and TPH-Dx. COCs in stormwater solids may also present an important recontamination pathway at the SIB Project Area, as discussed in the SAR (HGL, 2025a).
- ROD COCs present in riverbank soils included PCBs, dioxins/furans, pesticides, metals, BEHP, and TPH-Dx. The extent of riverbank contamination may also present an important recontamination pathway at the SIB Project Area, as discussed in the SAR (HGL, 2025a).

1.3 REPORT ORGANIZATIONAL OVERVIEW

This DCR is organized into the following sections:

- Section 1 presents an introduction, including purpose and objectives, project area location and description, and report organizational overview;
- Section 2 presents the RD project overview, including RD activities completed, additional data and analysis informing RD, permitting, and other regulatory requirements;
- Section 3 provides the SIB RD criteria;
- Section 4 describes the RD Deliverables and Sequencing for the Pre-Final 90% RD and Final 100% RD; and
- Section 5 lists the references cited in this DCR.

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2.0 SWAN ISLAND BASIN REMEDIAL DESIGN PROJECT OVERVIEW

This section lists RD activities completed to date, data collections that will be used to inform the RD and permitting, and other regulatory requirements to design and construct the selected remedy.

2.1 REMEDIAL DESIGN ACTIVITIES COMPLETED

This section describes activities conducted and information collected to support the RD for the SIB Project Area. Additional details and results of these activities were documented in the PDI ER (HGL, 2024a), BODR (HGL, 2024b), SAR (HGL, 2025a), and RDWP (HGL, 2025b).

2.1.1 Pre-Design Investigation

The PDI ER, approved by EPA in January 2025, focused on compiling a body of data and analysis to produce a robust, sustainable, and effective remedy for the SIB Project Area. The PDI ER (HGL, 2024a) presented PDI field activities performed to address the existing data gaps and included sediment-related field sampling, porewater upwelling assessment, stormwater and stormwater solids sampling, riverbank evaluation and riverbank soil sampling, bathymetric surveying, geotechnical investigation, structure inspections and condition assessments, utility and debris surveys, hydrodynamics and sediment dynamics surveys, habitat conditions surveys, and facility owner/operator interviews. Each element of the PDI was evaluated to determine whether (1) data gaps previously identified had been adequately addressed and (2) the sufficiency of those results for use in the BODR, SAR, and RD. The evaluation concluded that the data generated during the PDI adequately addressed data gaps and is sufficient to inform the development and evaluation of an RD for the SIB Project Area.

2.1.2 Basis of Design Report

The BODR (HGL, 2024b), approved by EPA in December 2024, refined the conceptual site model, and provided technical underpinnings for the remedial design approach for the SIB Project Area. Considerations included design requirements and performance standards, remedial technology descriptions and considerations for the preferred remedial approach selection, description of the preferred remedial approach, assessment of remediation implementability, and considerations for flood impact, climate change, and habitat impacts. The BODR discussed monitoring and maintenance requirements, an approach to develop conceptual-level quantity and cost analysis, and future design studies and RD sequencing that will be further developed and conducted during the RD. The BODR also provided extensive cap and dredging evaluations that included modeling and design parameters and considerations that will be used as a basis for developing area-specific designs during the RD.

2.1.3 Sufficiency Assessment Report

The SAR (HGL, 2025a) evaluated the upland and in-water pathways to determine whether potential contaminant sources have been adequately investigated and sufficiently controlled so that the RA can proceed with low risk of recontamination. The types of sites identified as potential upland sources of contamination are summarized in Table 2-1. The Final SAR identified the presence of a substantial risk of post-RA recontamination attributable to a combination of sources. The dominant risk of recontamination is the downriver transport of suspended and bedded

sediments containing COCs into the SIB with a notable but much less significant secondary contribution from ongoing stormwater discharges to the SIB. These recontamination risks support the need for EPA and the Oregon Department of Environmental Quality to pursue characterization of uncontrolled sources associated with the identified recontamination pathways followed by implementation of additional source control measures before proceeding with the RA[2].

2.1.4 Remedial Design Work Plan

The RDWP (HGL, 2025b), approved by EPA in February 2025, presented the approach and procedures used to implement the RD activities for the SIB Project Area. It identified plans for implementing RD activities, describes overall management strategy, and proposed a general approach to contracting, construction, operation, maintenance, and monitoring of the RA necessary to implement the RD work. It also described the responsibilities and authority of the organizations and key personnel involved with the development of the RD and describes missing data, upcoming studies, and design phases.

2.2 ADDITIONAL DATA ANALYSES AND EVALUATIONS INFORMING REMEDIAL DESIGN

This section summarizes additional analyses performed, or to be performed, to inform the RD. It also discusses any data insufficiencies, potential problems, and areas requiring clarification.

2.2.1 Sediment Management Area Refinement

EPA's review of the PDI ER prompted additional studies, including archived sediment sample analyses and NAPL testing to support further refinement of the sediment management area (SMA). Section 2.2.1.1 describes archived sediment sample analysis and Section 2.2.1.2 describes NAPL testing that was completed to be responsive to EPA's comments on the PDI ER.

2.2.1.1 Archived Sediment Sample Analysis

In comments on the PDI ER, received from EPA on January 30, 2024 (EPA, 2024), EPA noted that initial PDI sample locations were not analyzed at intervals consistent with identified contamination found at historical cores or in adjacent PDI samples, and as such additional intervals should be taken out of archive and analyzed to accurately bound samples at depth to develop a depth of contamination model and revised SMA boundaries, if applicable. In this comment set, EPA noted a data gap where contaminated intervals may have been omitted and the results of the SMA delineation and associated uncertainty analysis presented in the PDI ER would only be valid if the input data adequately capture the extent of contamination.

Also in this comment set, EPA specified that samples on the Mocks Bottom shoreline, near the head of SIB were only analyzed to a depth of 6 feet (ft) but adjacent cores contained ROD Table

[2] EPA approved the Final SAR on March 28, 2025, with the caveat that the agency does not support the conclusion that additional source control investigation and actions are needed prior to the start of RA. In the comment letter, EPA responded, regarding proceeding with RA, that EPA's assessment is that the deliberately conservative estimates inherent in the SAR must be considered when evaluating recontamination potential. EPA's assessment at this time is that recontamination potential is over-estimated by the SAR, and does not view the SAR results as a reason to delay RD or RA (EPA, 2025a).

21 COCs exceeding RALs/ PTW thresholds to depths between 12 ft and greater than 15 ft. EPA requested, via the comment set, that archived core interval samples located along Mocks Bottom near the head of SIB be analyzed for PCB Aroclors and dioxin/furans (EPA, 2024).

As outlined in field change request form variance number 16 (FCR 16) (HGL, 2024c), a total of 29 samples from the 2022 sediment sampling efforts were retrieved from frozen archive and analyzed for PCB Aroclors and dioxin/furans. No exceedances of RALs/PQLs or PTW thresholds were reported in any of the analyzed samples. The data do not impact the interpolations presented in the PDI ER (HGL, 2024c). Subsequently, there is no change to the SMA boundary for SIB. Further details on the results of the archive sediment sample analysis are provided in Appendix A.

2.2.1.2 Non-Aqueous Phase Liquid Screening

As outlined in the FCR 16, NAPL screening was performed on archived core interval samples where NAPL was observed. The testing was performed to determine the presence of NAPL and, where present, categorically rank the NAPL in accordance with ASTM E3281-21 *Standard Guide for NAPL Mobility and Migration in Sediments – Screening Process to Categorize Samples for Laboratory NAPL Mobility Testing* (ASTM, 2021). Additionally, four archived core interval samples where NAPL was observed were analyzed for ROD Table 21 COCs to support interpretation of the NAPL testing results.

Shake tests were performed on 15 archived sediment core samples. NAPL was not recorded as present in any of the samples. Sheen was observed in 9 of the samples. Following the categorical approach described in ASTM E3281-21 and summarized in FCR 16, the sediment samples are categorized as Category 1 (sample locations with negative shake test results, indicating no sheen or NAPL is present) or Category 2 (sample locations with shake test sheen results, indicating the presence of sheen, but no visible NAPL) because no NAPL layer or blebs were present during the NAPL screen. Based on the screening process described in Step 2 and interpretation of results in Step 3, collection of undisturbed sediment cores for further NAPL mobility testing is not required because the samples were not ranked as Category 3 or 4 (NAPL present). Further details on the results of the NAPL screening are provided in Appendix B.

2.2.2 Habitat Impact Evaluation

This HIE assesses the net effect the RA would have on habitat conditions within the SIB Project Area. The HIE provides the basis for the EPA to determine whether the RA would be "self-mitigating" with respect to impacts to Waters of the U.S. and associated ecological functions. The HIE was conducted to demonstrate that the RA as envisioned in the Draft 50% RD will comply with action-specific or location-specific ARARs pertaining to habitat and ecological functions within the SIB Project Area. The HIE presents the evaluation of the net effect of the RA on habitat conditions by comparing the anticipated post-RA habitat conditions to pre-RA baseline habitat conditions as defined in the PDI ER (HGL, 2024a). Post-RA habitat conditions used in the evaluation reflect the application of required habitat avoidance and minimization measures outlined in the 2021 Programmatic Biological Assessment (BA) (EPA, 2021b), the RDGC (EPA, 2021a), and the PHSS ROD (EPA, 2017a).

The HIE was completed following the guidance in RDGC, in Appendix B Topic 9 – Habitat Mitigation (EPA, 2021a), on how to apply a habitat equivalency analysis (HEA) model approach to perform a quantitative comparison of post-RA habitat conditions to pre-RA baseline habitat conditions. The National Marine Fisheries Service (NMFS) previously prepared a HEA model for the PHSS in cooperation with the Portland Harbor Trustee Council. EPA distributed an updated HEA model template spreadsheet to the SIB RD Team by email on May 20, 2025. The updated HEA model incorporated the time component to ensure that the scoring results consider the temporary functional loss of habitats during RA implementation, and the time required for post-RA habitat conditions to reach full ecological function (0 to 5 years for the habitat types anticipated at the SIB Project Area). The quantitative HEA is the tool EPA uses to evaluate if the RA is "self-mitigating" by comparing pre-RA habitat conditions to post-RA habitat conditions. If the HEA does not confirm that the RA is "self-mitigating," additional compensatory mitigation would be required, and the quantity and type of additional mitigation would be determined by the ecological deficit calculated by the HEA model.

The HEA model reports overall habitat values in units of "Discounted Service Acre Years" (DSAYs), which incorporate consideration of the ecological services provided by specific habitat types, the acreage of habitat that provides those services, and the period over which the services are provided. The results of the baseline habitat condition survey included in the PDI ER (HGL, 2024a) informed the development of inputs to the HEA for pre-RA baseline habitat conditions. Those model inputs include the acreage of habitat units within the SIB Project Area and HEA habitat values for each of those habitat units. Inputs to the HEA model for post-RA habitat conditions were developed based on the Pre-Final 90% RD finished surface conditions superimposed on the map of habitat units. The HEA habitat values for post-RA habitat units were developed using the same approach used for the pre-RA baseline habitat conditions scenario.

Habitat scores based on the HEA methodology were assigned to all habitat areas within the SIB Project Area for a total area of 131.41 acres, which includes both the in-water and riverbank portions of the Project Area. The HEA incorporates changes from pre-RA to post-RA habitat conditions and the variations in habitat score over time related to duration of construction and the time required for post-RA habitats to reach full ecological function (ranges from 0 to 5 years). The HEA score reflecting the post-RA habitat conditions and construction sequence/schedule envisioned by the Pre-Final 90% RD is -36.41 DSAYS.

That HEA result considers the combined effects of RA habitat impacts; impact avoidance, minimization, and mitigation integrated into the RD; and the variability of habitat function over time in response to RA construction duration and the time required for post-RA habitat conditions to reach full function. The negative DSAY score indicates that the remedy as designed is not "self-mitigating" and will require additional compensatory mitigation for impacts to Waters of the U.S. and to Threatened and Endangered Species. The complete HIE Technical Memorandum is included as Appendix C.

The HEA model was used to perform a preliminary evaluation of the habitat impacts and improvements based on the post-RA conditions within the SIB RD as envisioned in the Pre-Fina 90% RD. Design modifications implemented between Pre-Final 90% RD and Final 100% RD may also contribute to improving the HEA score and reducing or eliminating the need for additional compensatory mitigation. If all on-site ecological opportunities are exhausted, and the HEA model

determines there is an ecological deficit, additional compensatory mitigation would be developed either in the form of off-site ecological restoration or through a credit purchase from a mitigation bank.

2.2.3 Flood Impact Evaluation

A flood rise evaluation was performed on the Pre-Final 90% RD to ensure compliance with state regulatory requirements for flood rise management and to be consistent with the Executive Orders for Floodplain Management (Executive Orders 11988 and 13690) and Federal Emergency Management Agency (FEMA) regulations in 44 Code of Federal Regulations (CFR) Part 9 and 44 CFR 60.3(d)(2) and (3). The objective of this evaluation is to ensure the selected remedy does not result in unacceptable flood rise.

Flood impact modeling was conducted using the USACE Hydrologic Engineering Center's River Analysis System (HEC-RAS) and the EPA-approved Corrected Effective Model to evaluate potential flood impact and to demonstrate that the RA in the SIB Project Area does not result in flood rise. Recent changes made to the PHSS HEC-RAS model (CDM Smith, 2024) include:

- Addition of elevation transects to the Existing Conditions Model to capture proposed changes to channel bathymetry as a result of fill in the PHSS remedial areas;
- Calibration of the updated Existing Conditions Model, including assignment of Manning's roughness coefficients and assignment of ineffective flow areas (including SIB); and
- Development of an initial Conservative Future Conditions Model to evaluate potential flood impacts resulting from the combination of all PHSS RAs.

The initial Conservative Future Conditions Model assumed that 3 ft of fill would be applied on current grade to all nearshore SMAs as shown in the ROD, to represent a potential worst-case scenario. From the results of the initial conservative future condition simulations, the updated PHSS Existing and Conservative Future Conditions Model (CDM Smith, 2024) concludes, "*The water surface elevations predicted from this model have a maximum rise of 0.017-feet which is not a cause for concern based on the assumptions included in the simplified conservative future conditions case model.*"

The updated Portland Harbor Existing Conditions Model was used to demonstrate that the proposed RA in SIB is not likely to cause unacceptable flood rise based on the anticipated SIB post-construction elevations. The results of the flood rise analysis are presented as Attachment B of the Riverbank Design Technical Memorandum (RDTM; Appendix D).

2.2.4 Climate Change Impact Assessment

Climate change analysis was performed to confirm resiliency of the cap erosion protection layer to future conditions. The climate change analysis included river conditions and outfall flows. Climate change scenarios for other processes such as winds/wind-waves have not been developed in the industry. Therefore, resiliency of riverbank protection or other cap areas where these processes govern design was ensured through conservatism in the Pre-Final 90% RD, including

use of 100-year return period conditions, and conservative (large) material sizes for bank protection.

Analysis of future river conditions was performed using the U.S. Geological Survey (USGS) Climate Change Model. The USGS model (Delft3D) spans the Pacific Ocean to Oregon City on the Willamette River, and Bonneville Dam on the Columbia River. This model was used to develop boundary conditions for the SIB-nested Delft3D 4 structured hydrodynamic model used during the cap evaluation (Appendix A of RDWP; HGL, 2025b), which provides high resolution hydrodynamics at the SIB. The river discharge inputs from the USGS model were extracted and applied to the SIB-nested Delft3D 4 structured hydrodynamic model. The water levels at the downstream boundary of the nested Delft3D 4 structured hydrodynamic model were taken from the water levels in the USGS model, which predicted how sea level rise affects the Willamette River, both excluding and including higher future river discharges. Modeling included a complete range of scenarios, in terms of higher and lower water levels, as well as current velocities. The modeling scenarios included variants of the following input conditions:

- Pacific Ocean water levels: Typical present-day Pacific Ocean tidal conditions (zero sea level rise), as well as sea level rise of 0.25 meter and 1.0 meter (USACE scenarios included in the USGS model approved by EPA); and
- River discharges: Discharges ranging from zero (pure tidal conditions) to 100-year discharges, for both present-day conditions and future conditions.

The analysis captured the complete range of bed shear stresses resulting from river conditions to ensure that maximum bed shear stresses over cap areas were included in the Pre-Final 90% RD. From each simulation, a maximum bed shear stress map was computed for SIB. The maximum bed shear stress maps were combined to create a map of maximum bed shear stresses from any simulation, which was used to ensure that the erosion protection layer design for caps will be resilient to climate change. These maps are included as figures in the Cap Design Technical Memorandum (CDTM, Appendix E).

Analysis of future City outfall discharge conditions was performed using the Personal Computer Storm Water Management Model (PCSWMM) and Computational Fluid Dynamics (CFD) model (FLOW3D) used in the preliminary cap stability analysis as part of the cap evaluation. The analysis included refinement of the rainfall inputs to the PCSWMM model and use of higher flows to account for future increase in rainfall intensity as input to the CFD model. Conservative water level conditions were used in the outfall CFD modeling (e.g., extreme low water) to ensure cap resiliency under a full range of reasonably anticipated future conditions. Results of the modeling consisted of maximum bed velocity maps that were used to design scour protection around the City outfalls. These maps are included in a figure in the CDTM (Appendix E).

Following analysis of all maximum velocity/bed shear stress calculations for each physical process, the maximum velocity/bed shear stress map computed during the cap evaluation was updated, resulting in a climate-resilient and complete erosion protection design criteria map in the Pre-Final 90% RD. Design criteria for the cap, including climate change effects, are described in the CDTM (Appendix E).

2.2.5 Lagoon Wharf Supplemental Remedial Design

During development of the RD, the SIB RD Team determined that RAOs cannot be achieved with the existing Lagoon Wharf structure in place. Geotechnical issues related to the riverbank (global and local slope stability, liquefaction, and lateral spreading) require a larger solution than modifying or shoring up the existing structure.

- The global stability of the riverbank beneath the existing structure does not meet project design requirements, as the safety factor is well below the required level.
- Similarly, the local stability of the ground beneath the existing structure falls short of project design requirements. Modifying the material beneath the structure—whether adding or removing and replacing—does not result in a stable slope that satisfies design requirements.
- Additionally, the present riverbank configuration fails to meet seismic design standards, and both soil liquefaction and movement towards the water are likely during an earthquake. The existing structure lacks sufficient capacity to withstand these forces.

To mitigate the geotechnical issues while implementing the remedy, the area will require ground improvements and new structures that can stabilize this area.

Upon determining that the Lagoon Wharf needed to be removed and replaced, the facility operator (Vigor) hired their own engineering firm (KPFF) to review the RD Team's findings. This firm's role was expanded to create a cost-effective wharf design that minimizes short- and long-term effects on operations due to implementing the remedy, which requires removing and replacing the existing structure. As KPFF continues design of the replacement wharf structure, the SIB RD team is developing the remedy for the riverbank area beneath the redesigned wharf.

There are two conceptual designs for the Lagoon Wharf replacement structure, one results in a bulkhead wharf and the other a pile supported wharf. Both conceptual designs for the replacement wharf include deep soil mixing and subsequent use of excess deep soil mixing-produced material as backfill in the footprint of the new wharf structure. Additionally, as described in the PDI ER (HGL, 2024a), ROD COCs in riverbank samples collected from beneath Lagoon Wharf are present at concentrations exceeding CULs, RALs, and PTW thresholds. As a supplement to this Pre-Final 90% RD, the RD Team is preparing a technical memorandum that provides the framework for designing deep soil mixing as an effective in situ treatment technology for the range of COCs and concentrations in this location as well as the use of excess deep soil mixing-produced material as environmentally suitable backfill material. The technical memorandum will also provide the details of the riverbank remedy in this location for each conceptual design (e.g., chemical isolation and revetment under pile supported wharf or encapsulation behind bulkhead wharf).

2.3 PERMITTING AND OTHER REGULATORY REQUIREMENTS

CERCLA states that “no federal, state or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site” (42 U.S.C. 9621 (e)). While permits may not be required on-site, proposed remedial activities must nevertheless demonstrate permit equivalency for ARARs identified by EPA. In this case, EPA is the lead agency and is responsible for consulting with Tribes and regulatory stakeholders through the permit equivalency process.

The consultation process enables the agency, Tribes, and stakeholders to review and consider proposals to achieve substantive and demonstrable compliance, consistent with regulatory requirements identified as ARARs.

As discussed in BODR Section 3.2, ARARs are standards set by federal or state environmental laws or facility siting regulations. These requirements must be met during an RA, unless the EPA grants a waiver for a specific ARAR. To Be Considered (TBC) items include advisories, criteria, or guidance developed by the EPA, other federal agencies, or states that may be useful in developing CERCLA remedies (EPA, 2016). TBCs summarized in the RDWP (HGL, 2025b) included EPA Regional Screening Levels (RSLs) for tap water established at a 10^{-6} risk level and Executive Orders on floodplain management and protection of wetlands. ARARs, TBCs, and other standards and requirements are summarized in Tables 25a-c in Appendix II of the ROD (EPA, 2017a) and the application of those to the SIB Project Area are summarized in Table 3-1 of the RDWP (HGL, 2025b). The ROD considers chemical-, location-, and action- specific ARARs and identifies the following 10 key ARARs for the remedy:

1. National Recommended Water Quality Criteria, if more stringent than a promulgated State of Oregon numeric water quality standard, are the required cleanup standards for surface water and groundwater that discharges to the river; they are action-specific standards for minimizing discharges of contaminants during RA construction.
2. Oregon WQSs contain promulgated numeric and narrative water quality standards that protect the designated uses of the river. Relevant numeric standards are CUL for surface water and groundwater discharging to the river. Numeric and narrative water quality standards are action-specific ARARs intended to minimize discharges of contaminants during RA construction.
3. Maximum contaminant levels (MCL) and non-zero maximum contaminant level goals (MCLG) established under the authority of the Safe Drinking Water Act are required CULs for surface water and groundwater discharging to the river. These ARARs are action-specific standards for minimizing discharges of contaminants during RA construction.
4. Oregon Hazardous Substance Remedial Action rules determined the cleanup standards for hazardous substances by establishing acceptable cancer risk levels for human health at $1x10^{-6}$ for individual carcinogens, $1x10^{-5}$ for multiple carcinogens, and an hazard index of 1 for noncarcinogens. These are chemical-specific ARARs.
5. Federal and state solid and hazardous waste regulations such as the Resource Conservation and Recovery Act (RCRA), including land disposal regulations and Toxic Substances Control Act, are action-specific ARARs. They establish standards and best practices for handling, characterizing, treating, storing, transporting, and disposing of dredged sediment off site.
6. The Endangered Species Act (ESA) is an ARAR because listed species migrate through and use the Site, and the Site contains designated critical habitat for such species. Accordingly, the ESA requires reasonable and prudent measures to minimize adverse effects resulting from implementation of the remedy, including the time of year and the duration and extent of in-river work.

7. Section 404 of the CWA is an ARAR because the discharge of dredged or fill material to Waters of the United States during RA construction requires that the remedy avoid or minimize impacts to the aquatic environment and that it mitigate unavoidable impacts.
8. Section 401 of the CWA is an ARAR because remedial activities that displace contaminated sediment cannot entirely avoid releasing contamination to Waters of the United States. Reasonable assurances are required that remedial activity will not violate applicable water quality standards.
9. Section 10 of the Rivers and Harbors Act is an ARAR because it prohibits the creation of any obstruction to the navigable capacity of any waters of the United States, unless affirmatively authorized by Congress.
10. FEMA floodplain regulations are ARARs because they prohibit encroachments that would result in any increase in flood levels during base flood discharge, and they require measures to reduce the risk of flood loss, minimize the impact of floods, and restore and preserve the natural and beneficial values of floodplains.

The sections that follow discuss how the ARARs and TBCs have been incorporated into the RD to ensure substantive compliance with chemical-, location-, and action-specific requirements. Additional discussion is provided for consideration of ARARs related to the CWA Analysis and anticipated permits and access agreements.

2.3.1 Substantive Compliance with Applicable or Relevant and Appropriate Requirements and To Be Considered Items

This section discusses how the RD provides substantive compliance with chemical-, location-, and action-specific ARARs and TBCs. Table 2-2 provides a crosswalk that details which Pre-Final 90% RD components address compliance with ARARs and a general description of how compliance measures are addressed.

2.3.1.1 Compliance with Chemical-Specific ARARs and TBCs

The purpose of the RD/RA effort is to address and mitigate risks to human health and the environment posed by on-site contamination. The ROD documents that CULs were developed in consideration of chemicals-specific ARARs and TBCs, and attainment of CULs over time will achieve compliance with these ARARs and TBCs. Remedial activities at the PHSS will be monitored throughout the RA construction in accordance with the CQA/QCP and post-RA in accordance with the PAMP to track attainment of CULs and thereby document compliance with chemical-specific ARARs and TBCs. Chemical-specific ARARs and TBCs will be achieved at the SIB Project Area over time by implementing a combination of dredging, capping, enhanced natural recovery (ENR), and monitored natural recovery (MNR).

Chemical-specific ARARs and TBCs establish criteria that protects existing and attainable uses of the receiving waters, including identifying Remedial Action Objectives (RAO) and setting standards for the degree of cleanup required for hazardous substances. For COCs in surface water and groundwater, Oregon's numeric water quality standards are applicable as cleanup standards only if they are more stringent than CWA 304(a) recommended criteria; otherwise, the relevant

and appropriate 304(a) criteria are the cleanup standard. As stated in Section 12.2 of the ROD (EPA, 2017a), the ability to meet surface water quality ARARs for some COCs will be limited to the extent that all sources of surface water contamination can be addressed.

The ROD identifies the following chemical-specific ARARs and TBCs to protect surface water, drinking water, and human health and the environment:

- CWA, 33 U.S.C. 1313 and 1314 (Sections 303 and 304); 304{a) list of recommended water quality criteria.
- Safe Drinking Water Act, 42 U.S.C. 300f, 40 CFR Part 141, Subpart 0, App. A. 40 CFR Part 143.
- EPA RSLs for Groundwater, Office of Superfund Remediation and Technology Innovation, Assessment and Remediation Division (November 2015).
- Oregon Environmental Cleanup Law ORS 465.315(b){A) and Oregon Hazardous Substance Remedial Action Rules OAR 340- 122-0040(2)(a) and (c), 0115(2-4).
- Water Pollution Control Act ORS 468B.048 and state-wide numeric water quality criteria set forth in OAR Part 340, Division 41, including, Toxic Substances criterion at OAR Part 340-41-0033 (Tables 30 and 40), and Designated Uses for the Willamette Basin and Numeric Water Quality Criteria specified for the Willamette Basin at OAR 340-041-340 and 340-041-0345.

2.3.1.2 Compliance with Location-Specific ARARs

Location-specific ARARs are evaluated and addressed during design and implementation of the remedy. The following key location-specific ARARs are applicable to RD components at the SIB Project Area:

- ESA and Essential Fish Habitat (EFH) – The remedy will meet the substantive requirements of these ARARs during design, construction, and long-term monitoring. To ensure compliance with ESA and EFH requirements, the RD incorporates habitat avoidance and minimization measures outlined in the 2021 Programmatic BA (EPA, 2021b), the applicable guidelines in the RDGC (EPA, 2021a), and the relevant requirements of the PHSS ROD (EPA, 2017a). In addition, all in-river construction will be coordinated with EPA around fish windows.
- Federal Emergency Management Act – Although not legislated law, federal projects must demonstrate compliance with Executive Order 11988 (Management of Floodplains), as amended by Executive Orders 13690 and 11990 (Protection of Wetlands). FEMA regulations in 44 CFR Part 9 set forth the responsibilities to implement and enforce these executive orders. FEMA regulations found at 44 CFR 60.3(d)(2) and (3) prohibit encroachments that would result in any increase in flood levels during base flood discharge. Section 2.2.3 describes the flood impact evaluation that was performed using the Pre-Final 90% RD details. The objective of the evaluation is to ensure the remedy does not result in unacceptable flood rise, indicating that all substantive requirements of this ARAR will be met during implementation of the remedy.

- Native American Protected Objects and Graves Protection Preparation – During the RI, a cultural resource analysis concluded that Native American archeological artifacts possibly occur at the PHSS, but no gravesites were noted. The remedy will meet the substantive requirements of this ARAR during implementation through coordination and consultation with the Tribes as outlined in a Project Area-specific Archaeological Inadvertent Discovery Plan (AIDP) that will be a required submittal for the RA Contractor as part of the CQA/QCP. If Native American cultural items or gravesites are observed during excavation and other remedial activities at the SIB Project Area, an inventory of such items will be compiled, and following notice and consultation, the items will be returned to the Tribes. If cairn, burial, human remains, funerary objects, or other sacred objects are removed, re-interment will occur under the supervision of the appropriate Tribe. Any proposed excavation by a professional archaeologist of a Native American cairn or burial will require written notification to the State Historic Preservation Office (SHPO)and consultation with the appropriate Tribe. The CQA/QCP (Appendix N, Volume II) includes an example AIDP as an example plan to guide the RA Contractor in developing a Project Area-specific AIDP for the RA to ensure compliance with the substantive requirements of this ARAR. As appropriate, the substantive requirements of this ARAR will be met through development and implementation of the AIDP.
- National Historic Preservation Act (NHPA) and Archaeological Objects and Sites – There are no known historic properties, structures, or objects included in or eligible for the National Register of Historic Places within the SIB Project Area. If there are no eligible properties, structures, or objects within the SIB Project Area the substantive requirements of this ARAR will be met during design and implementation of the remedy. NHPA also protects artifacts, records, and material remains related to a property. The Project Area-specific AIDP for the RA to be prepared by the RA Contractor will guide the process for addressing any cultural resources or other archeological objects discovered during construction. If cultural resources or other archeological objects are discovered that are listed or are eligible for listing on the national register or under state law, it will be necessary to consult with Tribal Historic Preservation Officers (THPO) and the State Historic Preservation Office (SHPO). The SHPO can determine if NHPA applies and can assist in determining if state laws apply under the Oregon Archaeological Objects and Sites requirements.

2.3.1.3 Compliance with Action-Specific ARARs

Action-specific ARARs will be addressed during design, implementation, and as appropriate, as part of long-term monitoring. The ROD identifies the following action-specific ARARs:

- Rivers and Harbors Act – The Rivers and Harbors Act of 1899, Section 10, 33 U.S.C. Section 403 and implementing regulations at 33 CFR Sections 322, 323, and 329 are applicable requirements because work will be conducted in navigable waters of the U.S. This action-specific ARAR will inform development of institutional controls as described in the ICIAP and will guide construction operations in the navigation channel, including placement of pilings and discharge of dredged material that may impair the flow or circulation of waters or the reach of such waters. Remedial actions taken or constructed in the navigation channel cannot interfere permanently with navigational capacity of the river. Contaminated sediments

in the navigation channel must be removed, and a residuals management layer will be placed over the dredged area in a way that does not. interfere with or alter the current navigation depth in the Site area. The SIB Project Area is located outside the federal navigation channel. The federal navigation channel in the Willamette River has an authorized channel depth of -45 ft CRD. While no part of the SIB Project Area extends into the federal navigation channel, RA implementation in SIB will be conducted immediately adjacent to the authorized channel and within the required 50 ft lateral boundary. Contamination at depths greater than the authorized depth of the navigation channel may be capped, and those caps will be constructed below the authorized depth of dredging. This approach will not interfere with future dredging and will be designed to provide an over dredge allowance or buffer zone, as necessary, to protect the remedy from future dredge activities.

- RCRA, Oregon Hazardous Waste and Hazardous Materials, and Toxic Substances Control Act – The substantive requirements of these ARARs will be met through development and implementation of the Waste Designation Memorandum (Appendix F) the TODP (Appendix O, Volume II), and waste-related specifications (Volume III of Pre-Final 90% RD).

  Oregon's hazardous waste and materials regulations are ARARs for the generation, storage, handling, treatment, and disposal of hazardous waste on site and those wastes slated for off-site disposal. Oregon has adopted and incorporates by reference the federal RCRA hazardous waste management program. Any dredged material that will be disposed of in an off-site disposal facility must comply with these standards.

  - General Emissions Standards and Fugitive Emission Requirements – The substantive requirements of these ARARs will be met through implementation of the CQA/QCP (Appendix N, Volume II) and subsequent development of the Air Pollution, Noise, and Light Plan as part of updates to the CQA/QCP to be completed by the RA Contractor. Reasonable precaution to control fugitive emission of air contaminants will be taken in accordance with Oregon regulation OAR 340-226. In addition, emission of airborne particulate matter will be controlled to address OAR 340-208. Dust suppression will be maintained during active operations to minimize air contaminant migration, demonstrating substantive compliance with these ARARs. Air monitoring will be required to ensure that volatile contaminants do not exceed acceptable health-based concentrations for local communities and workers.
  - Marine Mammal Protection Act – The remedy will meet the substantive requirements of the Marine Mammal Protection Act by incorporating into the RD all of the required habitat avoidance and minimization measures outlined in the 2021 Programmatic BA (EPA, 2021b), the applicable guidelines in the RDGC (EPA, 2021a), and the relevant requirements of the PHSS ROD (EPA, 2017a). Adherence to the applicable requirements and guidance in these documents will demonstrate compliance with the ARAR. In addition, EPA's close coordination and communication with the resource agencies throughout the project will ensure that any unforeseen circumstances can be addressed as they arise, and appropriate measures can be taken to ensure minimal disruption to marine mammals and their habitats.
  - Migratory Bird Treaty Act – The substantive requirements of this ARAR will be met by incorporating the required habitat avoidance and minimization measures outlined in the

2021 Programmatic BA (EPA, 2021b), the applicable guidelines in the RDGC (EPA, 2021a), and the relevant requirements of the PHSS ROD (EPA, 2017a). Specific measures relevant to this ARAR focus on the physical configuration and substrate of the active channel margin and establishment of riparian vegetation where feasible on the riverbanks. By complying with these measures, the remedial actions will be carried out in a manner that will avoid adversely affecting migratory bird species.

- Fish and Wildlife Coordination Act – The substantive requirements of this ARAR will be met during design and implementation of the remedy. This statute and implementing regulations require coordination with federal and state agencies to ensure that any modification of a water body affected by any action by a federal agency provides adequate protection of fish and wildlife resources. Compliance with this ARAR will be met through EPA's coordination with the resource agencies.

2.3.2 Clean Water Act Analysis

The CWA Analysis Technical Memorandum (Appendix G) evaluates Project Area-specific requirements of the CWA and State of Oregon water quality standards and how they will be applied to the SIB RD. The analysis is required along with the HIE (Appendix C) to provide EPA with the basis for determining whether the SIB RD requires compensatory mitigation to satisfy CWA requirements. Appendix L of the PHSS Feasibility Study (FS) (EPA, 2016) presents the CWA Section 404(b)(1) evaluation for the PHSS remedial alternatives included in the FS. The SIB Project Area-specific CWA analysis (Appendix G) builds on the Sitewide analysis published in the FS by considering the Project Area-specific baseline habitat conditions reported in the PDI ER (HGL, 2024a) and the Pre-Final 90% RD approach. The SIB Project Area-specific CWA analysis is organized to match the outline of the Sitewide analysis published in the FS to incorporate the FS analysis by reference and, for all applicable sections, amend the Sitewide analysis with Project Area-specific details. The RD applies conventional mitigation sequencing as required by the ROD (EPA, 2017a) and guided by the RDGC (EPA, 2021), in which the design approach considers potential RA impacts to habitats and Waters of the U.S. and seeks to first avoid impacts, then minimize unavoidable impacts, and if unavoidable impacts remain, provide compensatory mitigation. In the ROD and later supported by the RDGC, EPA conveys an expectation that that the RA could be determined to be "self-mitigating" by implementing avoidance and minimization combined with the required nature-based solutions design strategies. Together, the CWA analysis and the HIE assess SIB-specific compliance with CWA and provide a quantitative technical basis for EPA to determine whether the RA will be "self-mitigating" or if compensatory mitigation would be required to address unavoidable net impacts to Waters of the U.S. and associated habitats.

The RD integrates nature-based solutions that will reshape and revegetate degraded riverbanks, mitigate erosion and bank overflow, and allow natural processes to reform the channel and its margins. The RD incorporates elements of all seven Type 3 nature-based solutions, which are those that require the most intense and large-scale interventions or the creation of new habitat: (1) green space; (2) trees and shrubs; (3) soil conservation; (4) blue-green space establishment or restoration; (5) green built environment; (6) natural or semi-natural water storage and transport structures; and (7) infiltration, filtration, and biofiltration structures (European Commission, 2021). Nature-based solutions may be more cost-effective over the long term, more resilient to climate change, and more beneficial to community health and well-being. For these reasons, nature-based solutions are

endorsed by the Council on Environmental Quality and throughout the federal resource and regulatory agencies, including FEMA, USACE, National Oceanic and Atmospheric Administration, and Department of Interior. The CWA Analysis Technical Memorandum concluded that the SIB RD approach includes measures to satisfy requirements for avoidance, minimization, and most of the mitigation needed to address adverse impacts to Waters of the U.S. In parallel with the CWA analysis, the RD includes a HIE (Appendix C) that provides a quantitative HEA that compares baseline pre-RA habitat conditions with anticipated post-RA habitat conditions within the SIB Project Area. The HEA concluded that the Pre-Final 90% RD would result in a negative DSAY score supporting the conclusion that the remedy would need additional compensatory mitigation to address unavoidable impacts. The amount of compensatory mitigation necessary is greatly reduced by the habitat improvements and avoidance and minimization measures incorporated into the Pre-Final 90% RD.

The remedy is designed to meet the substantive requirements of CWA, Section 404 (b)(1), and other applicable federal and state water quality requirements. Section 404 of the CWA "establish[es] a program to regulate discharge of dredged or fill material into waters of the United States, including wetlands. Section 404 requires a permit before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from Section 404 regulation" (EPA, 2024c). The RD incorporates the following approaches to satisfy the CWA requirements for avoidance, minimization, and mitigation of adverse impacts to Waters of the U.S:

- Design decisions involving dredging and material placement in the water (e.g., caps) consider baseline habitat conditions and avoid impacts by selecting suitable substrates appropriate for those habitats. Within the active channel margin (ACM) and shallow zones, the finished depths and composition of the riverbed substrate are designed to minimize impacts and improve habitat conditions. As feasible, the engineered remedy minimizes the placement of rip rap in the ACM and prioritizes the use and beneficial reuse of local sand and gravel to enhance riverine ecosystems.
- Remediation and stabilization of contaminated riverbank soils requires clearing most of the existing riverbank vegetation to achieve RAOs and satisfy ROD requirements. The portion of the riverbanks located below the ordinary high water (OHW) elevation constitutes the Waters of the U.S. and is subject to avoidance, minimization, and mitigation requirements of CWA Section 404(b)(1). Existing riverbank conditions are ecologically degraded. While riprap is needed to achieve geotechnical stability and meet seismic design requirements on riverbank slopes steeper then 3H:1V, the RD minimizes the placement of riprap on the riverbanks to mitigate erosion and instead promotes a nature-based remedy that regrades and reshapes the banks and establishes native plant communities on stable, dynamic, remediated riverbanks. By incorporating nature-based solutions, the RD minimizes impacts to riverbank habitat and achieves a net ecological improvement to riverbank conditions..
- The PHSS HEA model previously developed by NMFS was used to provide a quantitative comparison of pre-RA baseline habitat conditions and post-RA habitat conditions within the SIB Project Area (Appendix C). The HEA modeling analysis determined that the remedy would result in a negative HEA score indicating that additional compensatory mitigation is needed.

- The RD satisfies the requirements of relevant and applicable CWA and State of Oregon water quality standards by incorporating those standards and integrating best practices and engineering controls in RD drawings, specifications, and plans to protect water quality. The CQA/QCP (Appendix N, Volume II) and PAMP (Appendix P, Volume II) include specific water quality monitoring activities designed to achieve compliance with ARARs during the RA construction and post-remedy.

2.3.3 Anticipated Permits, Access Agreements, Easements and Authorizations Required for Remedial Action

Site access is heavily controlled under the Marine Transportation Security Act and the Port's Security Facility Plan as required by 33 CFR Part 105. The SIB RD Performing Parties established access agreements necessary to conduct the RD activities during the PDI. Separate future access agreements or authorizations will be required for all areas of RA operations. Remedial actions must also be coordinated with shoreline property owners and operators to minimize disruption to their operations.

The State of Oregon owns certain submerged and submersible lands in the Project Area and manages them through the Oregon Department of State Lands (DSL). Remedial actions including the placement of caps or in situ remedial technologies requiring long-term maintenance on state-owned lands will require authorization from DSL, in accordance with OAR Chapter 141- Division 145. Riverbank and submerged and submersible lands in the Project Area not owned by the State of Oregon will require an Easement and Equitable Servitudes (EES).

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3.0 REMEDIAL DESIGN CRITERIA

This section describes the engineering design analyses completed in support of the Pre-Final 90% RD. The design components specify performance requirements for project elements where prescriptive requirements are unsuitable. Performance-based specifications outline the criteria that must be met during RA construction, allowing for project-specific methods that leverage contractor expertise and allow for innovation. The RA Contractor will propose these methods in a RA Work Plan (RAWP), subject to EPA approval. This approach encourages creativity and efficiency as well as flexibility during implementation to address changing or unknown conditions while still specifying the criteria that must be met to satisfy project requirements. Prescriptive specifications will be used for inflexible design elements (e.g., minimum cap layer thickness, sequencing, access constraints) and to set project-wide minimum requirements for communications, environmental protection, and health and safety.

This section provides descriptions of the engineering design analyses that are included in this 90% DCR. Plans are included in Volume II of the Pre-Final 90% RD and preliminary drawings and specification are included in Volume III.

3.1 DREDGING DESIGN

The Dredging Design Technical Memorandum (DDTM, Appendix H) describes key criteria and considerations that were made, and analysis that was performed, to develop the 90% dredging design. Criteria and considerations include navigation depth requirements, dredging methodology (mechanical versus hydraulic), equipment selection, water depths and other site access constraints, debris removal, sediment characteristics, and calculated dredging production rates in different areas of the Project Area.

Cap design is also summarized in the DDTM (Appendix H), since the cap overall thickness affects dredging required in navigation areas. The 90% cap design pertaining to dredging efforts consists of a 3-ft cap thickness made up of a chemical isolation layer, erosion protection layer, and habitat layer. See the CDTM (Appendix E) for further details.

Navigation depths are evolving during RD pending results of additional structural and geotechnical analysis. Mechanical dredging is preferred over hydraulic dredging due to a number of factors including:

- The significant quantity and wide distribution of small debris present in SIB which is not likely to be removed during initial debris removal efforts;
- The presence of slurry pipelines during hydraulic dredging which would continuously impact waterway users; and
- The significantly larger dewatering requirements of hydraulic dredging.

Production rates were developed which considered the different equipment and efficiencies of dredging in different areas. Dredging in flat/open areas (low difficulty) was assumed to utilize a larger bucket size, and have a lower cycle time. Dredging in steep areas/banks (medium difficulty) was assumed to require a moderate or small bucket size (depending on reach distance) and have

an average cycle time. Dredging under/around structures (high difficulty) was assumed to require a small or medium bucket size and have a higher cycle time (double that of open water areas). These distinctions ensure the results reflect realistic conditions at the SIB Project Area. The resulting production rate values align with productivity data from published dredging studies.

Three remediation technologies were evaluated. The details within the cap design changed during 90% RD to include two cap types: in shallow water areas, Cap Type 1 consists of 1 ft of sand with granular activated carbon (GAC), followed by 2 ft of habitat gravel; in deep water/navigation areas, Cap Type 2 consists of 1 ft of sand with GAC, followed by 18 inches of angular rock for erosion protection, followed by 6 inches of sand as the habitat layer. The following three technologies were included in the cost comparison exercise (detailed assumptions for cost comparison are provided in the DDTM (Appendix H)):

1. **Dredge to RAL**: This alternative entails dredging 2 ft below the bottom vertical boundary of the SMA to remove COCs at concentrations exceeding RALs. Confirmation sampling and testing will be performed, with the potential for contingency re-dredging being required; however, neither of those costs are included in this alternative due to uncertainty as to whether contingency dredging will be required, and how much will be required. A 1-ft Residuals Management Layer (RML) of clean sand would be placed.
2. **Dredge and Cap**: This alternative entails dredging as needed to achieve appropriate navigation depths and 1-ft FMD clearance. After dredging, the 3-ft cap (either Type 1 or Type 2) will be placed for chemical isolation, erosion protection, and habitat.
3. **Cap Only**: This alternative entails placing the same 3-ft cap (either Type 1 or Type 2) noted above for the Dredge and Cap alternative. The Cap Only alternative would be applied in areas with sufficient existing depth for cap placement while still accommodating navigation and FMD clearance, or in areas with no navigation depth. No cost comparison was made between Cap Type 1 and 2 because they are intended for different locations. If selected, the Cap Only alternative would apply Cap Type 1 near the head of SIB (shallow water, minimal vessel traffic), and Cap Type 2 in SIB navigation areas.

Prior to the analysis, the Dredge to RAL alternative was selected in four distinct polygons within SIB, based strictly on operational purposes. The cost analysis between alternatives was not performed in these Dredge to RAL areas. Results of the assessment included dredging volumes, cap material volumes, costs, and inventory of COCs exceeding RALs removed in each 10-ft by 10-ft grid cell (outside the operationally prescribed Dredge to RAL areas), for each of the three alternatives discussed above. The result of the analysis is a cost-optimized spatial distribution of remedial technologies; however, the optimized spatial distribution is overly complex and requires constructability adjustments, such as removing isolated pockets of one alternative, and avoiding impacts to structures. Therefore, the remedial approaches in the design were further refined based on practical considerations.

The raw calculated (cost-optimized) "quilt" pattern of different technology assignments introduced small, irregular zones where different technology applications would be applied; therefore, the technology assignment map required simplification for constructability purposes. Aside from the operationally prescribed Dredge to RAL areas, the analysis was then repeated using only the

Dredge and Cap, or Cap, as alternatives in each grid cell. Overall results (costs, volumes, COC inventory removed) were very similar to the results when other Dredge to RAL was included.

Unit costs from the cost model were employed in the analysis, including unit costs for dredging, transportation, transload and disposal. Capping costs considered material supply, delivery, and installation. Long-term monitoring/O&M costs were considered and are discussed further in the DDTM, although they were not explicitly used in the alternatives cost comparison. Additional costs that are potentially associated with Dredge to RAL (outside the operationally prescribed Dredge to RAL areas) that were not included in the analysis were incremental impacts to existing structures (a significant factor), confirmation sampling and testing, and contingency re-dredging. The DDTM (Appendix H) includes further details on the cost data used in the analysis.

Analysis shows that a mix of Dredge and Cap (in areas where navigation is needed to support shoreline facility operations) and Cap Only is expected to result in significantly less construction cost and impacts to structures and slopes than Dredge to RAL, due to deep contamination in many areas of SIB. Site-wide application of Cap (rather than Dredge to RAL) outside the operationally prescribed Dredge to RAL areas also removes the need for additional confirmation sampling, testing, and contingency re-dredging, which is anticipated to be a time consuming process within the construction work periods. The reduced amount of dredging and follow-on construction activities associated with the Cap option significantly reduces impacts to businesses operating in the SIB Project Area, while remaining protective of human health and the environment.

The TODP (Appendix O, Volume II) describes the proposed routes for off-site shipments, identification of communities potentially affected by shipments, and plans to minimize impacts to affected communities. Material handling and disposal is further described in the Specifications (Appendix U, Volume III), Specification 35 24 20 – Remedial Dredging, Barge Dewatering, and In-Water Transportation and 35 24 20.01 – Transloading Upland Transportation and Disposal. Process flow diagrams are included in the Drawings (Appendix V, Volume III) to illustrate the sequential steps to dredge material and debris handling and disposal. This includes sediment removal, debris separation, water treatment, and final disposal.

3.2 CAP DESIGN

The CDTM (Appendix E) summarizes cap design efforts and recommendations for the Pre-Final 90% RD. The CDTM details the changes made to the design evaluation approach of area-specific cap assignments. The evolution of the cap design focused on three major areas of:

- Detailed subdivisions of separate riverbank and sediment capping areas;
- Refinements to chemical isolation layer evaluations, considering underlying sediment chemistry, seepage rates, and detailed selection of reactive material sorption parameters; and
- Physical and habitat considerations used in the erosion protection system.

3.2.1 Subdivisions of the Project Area into Certification Units

Between the Draft 50% RD and the Pre-Final 90% RD, underlying sediment concentration considerations were updated to balance the resource-efficiency of the remedy with a conservative design approach. The main update is the shift from Project Area-wide concentrations to area-specific design, as defined by certification units (CUs). CUs were developed in alignment with the Project-Area specific construction verification monitoring, and remedy performance standards (EPA, 2025b; 2025c). CUs were determined using the following chemistry, constructability, and geotechnical considerations:

- **Size:** CUs are not larger in area than 0.5-acre for riverbank certification units (RCUs) and 1.0-acre area for both cap certification units (CCUs) and dredge certification units.

- **Design Concentrations of COCs:** 95th percentile was calculated for all post-dredging analytes. Uniform sediment concentration was assigned for each CU to determine the minimum protective capping alternative using the following considerations:

    - For CUs with maximum reported concentrations of COCs that are less than Project Area-wide 95th percentiles, that maximum concentration of the COC across all depth intervals for ROD Tables 17 and 21 analytes was used in the cap alternative assignments; and

    - For CUs that have COC concentrations exceeding Project Area-wide 95th percentiles, the Project Area-wide 95th percentile value was used instead of the maximum concentration to assign cap alternatives.

- **Requested Navigable Depths and Constructability:** Dredge prisms developed to address requested navigable depths were incorporated into the determination of the 95th percentile values of COCs in sediment and the maximum concentration of COCs within the CUs, alongside other constructability considerations.
- **Physical Design Considerations:** Considerations for CU boundaries were made to include separation based on erosion protection and habitat layer (e.g., unamended habitat mix, revetment, and revegetation).

3.2.2 Chemical Isolation Layer Evaluation

In addition to the CU changes summarized in Section 3.2.1, the inputs to the one-dimensional chemical mass transport modeling were refined to produce a higher degree of efficiency in design. Whereas the 50% RD evaluated whether a particular cap design could contain the maximum sample concentration reported within an area of design, the 90% RD mass transport modeling was used to determine a theoretical maximum contaminant concentration in underlying sediments that each cap alternative could contain for 100 years while remaining protective (maintaining concentrations below the respective CULs).

This produced a performance limit for the particular cap design alternative, such that if the concentrations of any COC exceeded that performance limit, a more protective alternative would be required. This approach allows for a straightforward assignment of the efficient alternative, given area-specific considerations. The changes made for the 90% RD to the underlying sediment

for modeling efforts in evaluating each cap alternative performance include CU-specific chemical concentrations, sediment characteristics (e.g., total organic carbon [TOC], partitioning coefficients), and area-specific upwelling considerations.

3.2.3 Cap Design Alternatives

The 90% RD cap for each CCU is designed to be protective of sediment CULs in the underlying sediment. The cap design evaluation was completed by calculating CUL sediment-porewater equilibrium equivalents (CUL equivalent) using Project Area-specific sediment properties.

The results of the chemical mass transport modeling indicate that a chemical isolation layer composed of 12 inches of 5 percent GAC-amended sand will reliably contain the flux of all modeled COCs at the 95th percentile concentration, including all Table 21 COCs. CUs with lower concentrations of COCs than the 95th percentile values may be effectively addressed with 6 inches of 5 percent GAC-amended sand, 12 inches of unamended sand, or reactive core mats (RCMs) on side slopes.

The following six cap alternatives were assigned based on the CU-specific evaluation:

- **Selected Constructible Alternative 1:** 12 inches of unamended sand with overlying 24 inches of erosion protection layer.
- **Selected Constructible Alternative 2:** 12 inches of 5 percent GAC-amended sand with overlying 24 inches of erosion protection layer.
- **Selected Constructible Alternative 3:** 6 inches of 5 percent GAC-amended sand with overlying 36 inches of stone protection system, including 24 inches of armor and 12 inches of bedding stone.
- **Selected Constructible Alternative 4:** 12 inches of 5 percent GAC-amended sand with overlying 36 inches of stone protection system, including 24 inches of armor and 12 inches of bedding stone.
- **Selected Constructible Alternative 5:** 0.8 inches of RCM with overlying 36 inches of stone protection system in revetment zones, including 24 inches of armor and 12 inches of bedding stone.
- **Selected Constructible Alternative 6:** 1.6 inches of RCM with overlying 36 inches of stone protection system in revetment zones, including 24 inches of armor and 12 inches of bedding stone.

Area-specific cap alternative assignment was completed using a cap assignment matrix that systematically evaluated the protective capability of chemical isolation layer alternatives against CU area-specific concentrations. The matrix analyzed each of the 27 COCs driving cap design in each RCU and CCU, then assigned the minimum protective alternative for each analyte within each CU. After evaluating all assigned alternatives, the matrix identified the most protective alternative for each CU to ensure containment of all analytes.

3.2.4 Erosion Protection Summary

Cap erosion protection requirements are also described in the CDTM (Appendix E) including additional hydrodynamic analysis for conservatism in erosion protection design and evaluation of river currents and water levels including sea level rise and climate change, extreme storm wind-waves over a range of water levels, refined analysis of propeller wash including conservative assumptions to account for future unknown changes in vessel traffic, drydock activities, and future outfall discharges considering climate change. The RD erosion protection analysis also differed from prior analysis presented in the BODR because it was performed using an approximate post-construction elevation surface that was based on preliminary design concepts.

Results of the erosion protection analysis include material stability requirements for in-water cap armor, riverbank armoring at steep slopes, and scour protection requirements surrounding City outfalls. The results are presented in Appendix I in the form of median stable grain sizes of material in different areas (assuming-gravel size materials) for pure static stability of the surface materials, which may not be practical in some areas.

Near the head of SIB, erosion protection and habitat layer consist of a larger-thickness (2-ft) layer of the same material (habitat mix). The habitat mix is <2.5-inch rounded gravel. As a result of changes to the calculation of habitat impacts, the 90% RD applies a habitat layer on top of armor rock. In the SIB bottom capping areas, angular rock-based erosion protection is installed above the chemical isolation layer, but below a habitat layer which consists of 6 inches of imported coarse sand. The bottom-of-basin habitat layer is anticipated to be dynamically stable and provides further protection for the long-term stability of the chemical isolation layer. On side slopes, where a sand layer will not be stable, a rounded rock habitat layer is placed on top of the revetment's angular armor rock.

During Pre-Final 90% RD, erosion protection material types were consolidated into a fewer number of materials being used for several purposes on the project, which are standard Oregon Department of Transportation material specification, for cost efficiency purposes. The erosion protection layer aggregate (approximately 3-inch median diameter angular rock) is a conservative erosion protection solution because the aggregate is larger material than required to resist many of the physical processes, but provides protection against unanticipated anchoring, moving timber/logs in the river, anchor chains being dragged on the bottom, and other unforeseen natural or anthropogenic factors. The 18-inch thickness of the erosion protection layer (rather than 2-ft) allows the introduction of a 6-inch habitat layer into the 3-ft overall cap thickness, preventing further dredging from being required to meet navigation depths and 1-ft future maintenance dredging clearance.

3.2.5 Geotechnical Cap Design Summary

The geotechnical aspects of cap design and the underlying sediment have been considered in the Pre-Final 90% RD. The geotechnical analysis was informed by chemical isolation and erosion protection layer alternatives presented in the CDTM (Appendix E), as well the guidance described in the RDGC (EPA, 2021b) and *Guidance for In-Situ Subaqueous Capping of Contaminated Sediments* (Palermo et al., 1998). Key evaluations for cap stability included bearing capacity analysis, settlement analysis, filter design, liquefaction susceptibility evaluation, and both static

and pseudo-static cap stability analysis. The Geotechnical Design Technical Memorandum (GDTM, Appendix I) presents the results of the analysis.

Bearing capacity of near-surface sediment material was evaluated using methods described in Palermo et al. (1998), based on fundamental bearing failure equations. The analysis provided estimated maximum allowable cap thicknesses for various cap alternatives, all of which had a factor of safety greater than 3.0. Consolidation settlement of the cap supporting sediment material was predicted using the Settle3 model by Rocscience. Settlement analysis indicates that, under a load equivalent to a 3.5-foot lift, approximately 25 inches of consolidation settlement is expected (an increase in the total settlement from the 50% RD). However, time-dependent consolidation analysis estimates that 90 percent of the consolidation settlement will take place over the course of 2.5 years. The filter design analysis results demonstrate that the anticipated cap material types limit the potential for vertical migration of both sediment and cap materials.

The in-water sediment cap slope stability was evaluated using 2D limit-equilibrium analysis with Slide2 by Rocscience, ensuring a minimum static factor of safety of 1.5 and a minimum pseudo-static factor of safety of 1.1. Liquefaction-induced flow failure potential was also assessed using conventional limit equilibrium slope stability analyses. A horizontal seismic coefficient of 0.12 was used for pseudo-static stability analyses, based on half of the mapped peak ground acceleration for a CLE seismic event. The design of in-water caps should follow slope gradients of approximately 3 horizontal to 1 vertical (3H:1V) or flatter. Details of the geotechnical inputs into the cap design are discussed in further detail in the GDTM (Appendix I).

3.3 RIVERBANK DESIGN

The RDTM (Appendix D) summarizes the RD for SIB Project Area riverbanks to reduce migration of COCs in riverbanks to sediment and surface water such that levels are acceptable for human health and ecological exposure (RAO 9). Specifically, the Pre-Final 90% RD evaluates riverbank slopes across the SIB Project Area to understand localized impacts on remedial activities and addresses recontamination risk associated with erosion of contaminated riverbank soil through a combination of soil remediation and riverbank stabilization. The 90% RD accomplishes these objectives using multiple components:

- Removal of a layer of riverbank soils (thickness varies by location);
- Providing a chemical barrier to seepage-based migration of dissolved COCs;
- Placement of vegetation or rock armoring surface treatment, to protect the barrier treatment layer; and
- Long-term monitoring of riverbank areas to assure a protective remedy.

The 90% RD was completed to incorporate the placement of a chemical isolation layer as the long-term barrier to any incidental migration of COCs from riverbank soils. Vegetative covers or rock armoring (depending on location) provide physical protection of the chemical isolation layer.

Additionally, the ROD (EPA, 2017) applies multiple ecological considerations and requirements that have guided the determination of final slope, composition, and surface treatment. The riverbank design must transition continuously to the ACM and in-water remedy elements with

respect to both remedial and ecological requirements and considerations. The RD approach to riverbanks involves removing, grading, and placing material on existing riverbanks, with a focus on maintaining stability both above and below the water level. Significant portions of the existing riverbank slopes are only marginally stable, and slope reconfiguration or stabilization measures will be required to achieve the RAO.

3.3.1 Excavation, Grading, and Backfill Summary

Excavation of the riverbanks is intended to be performed as needed for proper construction of bank remediation. Most areas require an initial removal effort for clearing and grubbing, which entails removal of surface materials such as vegetation, debris, and existing riprap, with no specific excavation depth target. The goal is to develop a smoothly graded slope over which bank protection and planted areas can be constructed.

The design of the slopes of riverbanks is governed by static and seismic geotechnical stability, navigation depth considerations, the presence of in-water structures, and efficient material use. Stability of the structures and slopes was evaluated according to criteria in the RGDC (EPA, 2021b) and is presented in the GDTM (Appendix I). Over the vast majority of the SIB Project Area, the proposed riverbank slope is similar to the existing slope. In these areas, only limited excavation is proposed in some areas to smooth the slope into the design slope from the toe of slope to top of the bank. These slopes typically require modest backfill in some areas as well, resulting in minimal net excavation.

3.3.2 Chemical Isolation Summary

Riverbank concentrations presented in the CDTM (Appendix E) show RAL or PTW threshold exceedances from samples collected within each of the 30 RCUs in the SIB Project Area. Based on Figure 4 of the *Guidelines for Riverbank Characterizations and Evaluations at the Portland Harbor Superfund Site* (RDGC, Appendix D), RCUs will be remediated per ROD Section 14 and design requirements in 14.2.9 (EPA, 2025d).

Groundwater modeling was conducted to support RD of the SIB Project Area riverbanks (see Attachment A of Appendix E). The model predicted higher elevations of the riverbank will experience much less potential seepage of groundwater than the bottom sediments of SIB (due to the total time throughout a year that the riverbank experiences different river surface elevations). The stratigraphy and hydraulic conductivity of riverbank soils may allow exfiltration from the banks at higher flowrates than the bottom of the basin. As a result, the chemical isolation layer for each of the RCUs on the Mocks Bottom riverbank slopes were conservatively designed with the same seepage rates as those used to design the sediment cap for the SIB SMA. However, RCUs on Swan Island riverbank slopes show much less upgradient groundwater head, and those RCUs were designed for approximately 15 percent of the total annual groundwater seepage flux when compared to the Mocks Bottom riverbank slopes.

The CDTM outlines the modeling approach and alternatives evaluated for the chemical isolation layer on riverbanks. The CDTM also presents the assigned cap alternatives for riverbanks based on minimum alternative protectiveness, which includes a geocomposite product that includes a reactive core mat (Cap Alternatives 4 and 5 in Section 3.2).

3.3.3 Permanent Riverbank Erosion Protection Summary

Bank erosion protection is achieved using a combination of rock revetment in the more energetic areas with steeper slopes, up to elevation +20 feet North American Vertical Datum of 1988 (NAVD88) or the approximate OHW elevation. In a few steeper areas, rock revetment is required to extend to top-of-slope. However, the vast majority of the Project Area includes planted vegetation as the bank stabilization for riverbank areas above elevation +20 feet NAVD88.

In areas flatter than 3H:1V and in the low energetic areas predominantly found at the head of the basin, the habitat mix (less than 2-inch rounded gravel) erosion protection layer for the sediment cap extends from deeper water up to elevation +9.4 feet NAVD88, where planted areas begin and continue to top-of-slope. Planted areas include lifts of soil bags wrapped in coir fabric to provide elevation gain and facilitate insertion of flatter areas (5H:1V) above each lift for planting. The lifts themselves are erosion resistant in the short term, due to the bags and coir fabric wrap. In the long term, roots and woody vegetation will provide the structural support and erosion resistance. The planted areas will be covered in jute netting or similar to protect the topsoil during initial plant growth.

3.3.4 Riverbank Habitat Summary

In addition to the primary goal of reducing migration of COCs in riverbank to sediment and surface water, ARARs further shape the riverbank design in the SIB Project Area in terms of habitat goals. The primary habitat goal is to increase marsh area elevations where the river hydrology supports hydrophytic vegetation (between mean daily low water during growing season or +9.4 ft NAVD88 to +15.4 ft NAVD88). Wherever possible, the slopes within these freshwater tidal elevations have been designed as 5H:1V or less to maximize the area that can support hydrophytic wetland vegetation.

Generally, the leave surface of riverbanks will support habitat types in three primary zones that are defined by elevation and the relative access to the water level. These habitat types are: shallows, ACM, and upland riparian riverbank. The elevations are not considered to be a strict boundary, but rather to identify vertical extents on the riverbank where habitat types transition from one to another and maximum species overlap is expected. The placement of the habitat types is guided primarily by the vertical elevation and the associated hydroperiod with adjustments applied horizontally to account for localized site conditions such as stormwater outfalls, groundwater seeps, and proximity to infrastructure.

In the shallows zone, below the mean low water elevation, large wood pieces not including tree tops or root wads are designed to provide cover and foraging for fish. All large wood are placed low on the bank toe and within shallow water zones to ensure submergence throughout most of the year. In the lower ACM, a tidal freshwater wetland marsh is designed for portions of the riverbank where the upper shallows are a minimum of a 5H:1V slope or flatter. This community would include obligate herbaceous species in lower elevations and facultative species in the transition to the scrub-shrub habitat. In the upper ACM, a palustrine scrub-shrub community is designed as the transition between the woody species above OHW and the herbaceous marsh species at the wetted shoreline. The mature height of species in this habitat zone are not expected to exceed 20 ft. Finally, in the riparian riverbank, a riparian tree/shrub community is designed.

This area will be dominated by trees and shrubs, with trees only in the upper portion of the riverbank. An important consideration for this zone is to allow for proper growth of tree roots.

3.4 GEOTECHNICAL DESIGN ANALYSES

Geotechnical analyses were performed to support justification or elimination of the area-specific application of remedial technologies considered during Pre-Final 90% RD and included:

- The geotechnical evaluations required for cap design described in Section 3.2.3, including bearing capacity analysis, settlement analysis, filter design, liquefaction susceptibility evaluation, and both static and pseudo-static cap stability analysis.
- Development of subsurface profiles and cross-sections that illustrate soil stratigraphy and include relevant geotechnical design parameters at key locations throughout the Project Area.
- Development of seismic design parameters for a contingency level event (10% probability of exceedance in 50 years) and other seismic event return periods required for RD.
- Slope stability analysis, static and seismic (pseudo-static), of caps placed on slopes, proposed dredge cuts, and riverbank slopes.
- Seismic hazard analysis, including liquefaction triggering, liquefaction induced settlement, and lateral spreading potential.
- Development of lateral earth pressures for static and seismic loading conditions.

A detailed description of the methodology, assumptions, input parameters, and results of each analysis performed as part of the Pre-Final 90% RD, and geotechnical design recommendations for Pre-Final 90% RD are presented in the GDTM (Appendix I).

3.5 STRUCTURAL DESIGN ANALYSES

The Pre-Final 90% RD includes removal and capping of in situ sediments adjacent to and beneath existing in-water structures and outfalls. At a minimum, localized removal of in situ sediments or existing riprap is required to accommodate capping. Rock revetments constructed from riprap are typically used where capping is placed under structures or on structure-adjacent slopes steeper than 3H:1V. The slope stability impacts due to capping were assessed at each individual structure by examining ground profiles and considering the static and seismic design requirements of the slopes as well as the slope geometry and constructability of the cap. For information regarding the geotechnical design analyses that informed the structural design analyses, please refer to Section 3.4.

The impact on structural performance due to changes in ground-levels around piles and other sub-structure elements was assessed at each individual structure. The Structural Design Technical Memorandum (SDTM) (Appendix J) presents the results of these structural impact analyses. The criteria for assessment of the structures are summarized in Attachment A – Shoreline and Overwater Structures Basis of Design of the SDTM. Structures that were found to be unable to accommodate the proposed capped ground profiles were subject to further assessment comprising one of the following:

- Design of toe walls to accommodate vertical step changes in ground profiles,
- Design of seismic strengthening measures to mitigate increased demands on piles due to changes in ground profiles,
- Design of ground improvements, such as mid-slope pinning walls to resist geotechnical slope failure of steeper slopes, and
- Complete removal and replacement where the existing structure is not considered compatible with the remediated ground profiles.

For this project, a performance-based specifications design approach was used by the RD team to develop design documents for every new or modified structure. The RD documents illustrate and specify the performance requirements for each structural design, and the RA Performing Parties or the RA Contractor (on behalf of the RA Performing Parties) will develop a final detailed design that meets the performance requirements shown in the RD documents. The structural design elements of the Pre-Final 90% RD were presented to shoreline facility owners and operators and are summarized in Attachment B – Structure-Specific Analyses of the SDTM (Appendix J). Drawings and specifications are included in Volume III of the Pre-Final 90% RD.

3.6 GREEN REMEDIATION

The Green Remediation Plan (Appendix Q, Volume II) outlines the evaluation of environmentally responsible remedial actions in accordance with EPA's Principles for Greener Cleanups (EPA, 2009), the Superfund Green Remediation Strategy (EPA, 2010), the ROD (EPA, 2017a), RDGC (EPA, 2021b), and the information described in Appendix M of the Portland Harbor Feasibility Study (EPA, 2016).

The Green Remediation Plan outlines recommendations for best management practices (BMPs) to reduce energy use, air pollutant emissions, water usage, waste output, and habitat impact during RA implementation. A central instrument to evaluate BMPs is the environmental footprint analysis (footprint analysis).

The footprint analysis is the basis for evaluating BMPs that are aimed at achieving the following that can minimize the environmental impact footprint, potentially realize RA cost reductions, and still meet RAOs:

- Increase energy efficiency and reduce energy costs;
- Reduce emissions potentially with the use of construction emission controls and optimizing transportation;
- Reduce water consumption and increase water reuse;
- Increase use of locally sourced and sustainable materials;
- Use of local suppliers where possible;
- Reduce waste generation and identify opportunities for reusing and recycling construction waste;
- Reduce habitat disruptions and impact to aquatic species;
- Increase long-term habitat benefits;
- Restrict machinery and traffic; and

- Reduce land disturbance.

3.7 QUANTITY AND COST ANALYSIS

The Pre-Final 90% RD Cost Analysis Technical Memorandum (Appendix K) provides quantity estimates and cost projection for the RA based on the details of the 90% RD. These cost projections were developed using a probabilistic cost model that helps guide engineering design and strategic decisions throughout the design process, with the level of detail developing as the design progresses.

The Cost Analysis Technical Memorandum details the methodology and assumptions used to analyze costs for the following central work elements:

- Selective dredge and/or cap of submerged sediments;
- Riverbank clearing and excavation to the project limits at the top of bank;
- Dredge water processing and treatment;
- Transport to a transload facility
- Transload processing, upland transport to a disposal site, and disposal;
- Geotechnical stability of all riverbanks;
- Structure replacement and/or removal, where necessary to remediate localized sediments:
  - Lagoon Wharf (removal and new replacement),
  - Berth 306 (removal and new replacement),
  - Berth 307 (removal and new replacement),
  - Berth 308 (removal),
  - U.S. Coast Guard (toe wall, pile sleeves),
  - The Marine Consortium, Inc. Pier (mid-slope pinning walls),
  - Berth 311 (new barge breasting dolphin)
  - Shipyard Commerce Center Floating Dock Bulkhead Wall
  - Port of Portland Dredge Base (new mooring piles for existing barges) ;
- Native vegetation planting on riverbanks where slope stability can be retained;
- Revetment construction on steep banks unable to support vegetation; and
- Indirect costs (engineering, monitoring, administration).

The cost estimate is based on the output of the probabilistic cost model which is intended to capture uncertainty in individual cost and quantity elements in these categories. Uncertainty is represented by an estimated variability of each cost/quantity element and randomized in 10,000 scenarios during model execution. The mean total cost for each element is used for the published cost estimate.

Cost contingency is represented by the upper limits of the cost model's certainty percentage. Instead of a fixed contingency ratio employed by deterministic cost estimates, the probability model narrows the anticipated upper (and potentially lower) cost limits to a range of certainty. The cost model results provide a cost probability distribution that may be used to develop a risk-based cost contingency. For this phase of the design, the highest value within the range of 50% certainty establishes the accepted limit of project contingency.

The Cost Analysis Technical Memorandum also includes a section that lists the current risk register and notes ongoing efforts to assess the conditions, priority and potential cost impact of each risk element.

The factors that most significantly affect cost variability include:

- The quantities and unit costs of dredge material processing;
- Material handling and transport;
- Available transload and disposal sites; and
- Replacement of the Lagoon Wharf structure.

As the design progresses, unit costs for work elements will be continually updated based on the latest cost information available from recent, relevant sources. The risk register is updated in this Pre-Final 90% RD to account for newly recognized risks and includes both a cost analysis of alternatives, as well as an evaluation of each risk register item.

The Pre-Final 90% RD cost projections for the SIB Project Area are based upon a probabilistic cost model and provide a range of possible cost outcomes determined by many factors. The results of the cost analysis are tabulated to show the total projected cost, the subtotals of primary cost categories, and the 95% confidence interval range for cost. The factors that most strongly affect cost uncertainty are structure replacement; and dredge material processing, handling, transport, and disposal.

3.8 VALUE ENGINEERING STUDY

The parameters for conducting a VE Study are documented in EPA memoranda and documents (EPA, 1995 and EPA, 2005). HGL conducted a VE Screening for the Draft 50% RD effort in March 2025. Based on the relatively high cost of several components of the design, the VE Screening report established the need for this formal VE Study. HGL engaged Mike Palermo Consulting, Inc. to conduct the VE Study for the SIB Project Area as part of the Pre-Final 90% RD. Dr. Michael R. Palermo, the sole employee of Mike Palermo Consulting, Inc., conducted the VE Study and prepared the VE Study Report included in Appendix L.

The VE Study Report provides proposed Value Improvement Proposals for the SIB Project Area. The study effort focused on the following aspects of the design:

- Structures - A general review of the approach to protection or demolition of structures;
- Riverbanks - Riverbank stabilization, remediation and restoration;
- Dredging - Debris and sediment material dredging and management; and,
- Capping - Engineered capping material procurement and placement.

A total of 12 Value Improvement Proposals are described in the study report. The proposals were developed based on the review and analysis of the Draft 50% RD and key updated deliverables for the Pre-Final 90% RD and are listed below.

1. Proposal #Structures 1 – Ensure the Specifications allow for use of small-scale spreader or conveyor approaches for placement of capping materials and armor/habitat stone beneath and around structures.

2. Proposal #Riverbanks 1 – Establish an On-Site or Near-Site Combined Materials Staging and Processing Facility for Receipt, Processing, and Distribution of Materials for both Riverbanks and Capping
3. Proposal #Dredging 1 – Modify the Specifications to clarify that contingency dredging requirements only apply to Dredge to RAL DCUs.
4. Proposal #Dredging 2 – Pursue Site-Wide Consortium for Transloading and Transport of Dredged Sediments for Disposal
5. Proposal #Dredging 3 – Require consideration of Redundancy for critical pieces of equipment in all materials handling operations.
6. Proposal #Capping 1 – Modify the Cap Placement Tolerances for the chemical isolation cap layer and apply all tolerances on an area-wide basis for Performance Monitoring Units
7. Proposal #Capping-2 – Modify the Specifications to allow for use of large-scale spreaders for placement of capping materials.
8. Proposal #Capping 3 – Modify the Specifications to allow for Use of Compartmented Bottom Dump Barges or other alternative spreading approaches for placement of armor stone or Habitat stone.
9. Proposal #Capping 4 – Optimize Multi-Purpose Monitoring Stations for Cap Performance Assessment.
10. Proposal #General 1 – Clarify the general sequencing of work.
11. Proposal #General 2 – Advocate for increase in the in-water work periods (IWWPs) or outright elimination of the IWWP restrictions based on a cost comparison plus suggested mitigation and enhancement incentives.
12. Proposal #General 3 – Source Control issues should be resolved by convening an outside expert panel to assess 1) the findings of the SAR as compared to the EPA and State of Oregon comments on the SAR, and 2) the risk of recontamination of the SIB from existing sources.

The complete VE Study Report is included as Appendix L.

3.9 CONSTRUCTABILITY ASSESSMENT

An assessment of constructability considerations identified in the BODR (HGL, 2024b) was conducted on the Pre-Final 90% RD. The assessment specifically reviewed constructability considerations made for technology assignments and construction activity considerations that informed elements of the RD. The following constructability considerations elements were assessed:

- Technology assignments
    - Debris
    - Work around structures
    - Waterways use authorizations and remedial use authorizations requirements
    - Habitat considerations
- Construction activity

  - Construction material
  - Construction equipment
  - Logistics and constraints
  - Dredging productivity
  - Sequencing of the RA

The Constructability Assessment Technical Memorandum (Appendix M) reviewed each element of the RD and discussed those that could exert a significant influence over the success of RA in the SIB Project Area. Summaries are provided of how each of the considerations are addressed in the RD.

3.10 CONSTRUCTION SEQUENCING AND PHASING

The RA work will be sequenced to reduce the likelihood of recontamination of the SIB Project Area during each in-water work period and during the off season between subsequent in-water work periods. The general sequence of work for the RA is expected to start with a pre-construction survey and removal of large debris. Subsequently any required demolition or structural work would occur followed by upland excavation, dredging below the water line, and material placement. A post dredge survey would occur prior to material placement with any necessary re-dredging occurring prior to the placement of material. An end of material placement survey would occur to determine completeness. If additional material placement for the season is not required, the season would culminate with implementation of monitoring and institutional controls to prevent recontamination until the next in-water work window as described in the CQA/QCP (Appendix N, Volume II) and ICIAP (Appendix R, Volume II).

Construction sequence is expected to be specified by the RA Contractor in their RAWP depending on their means and methods, obtaining material, transload capacity, and/or property access. The 90% RA Schedule outlines a potential timeline of work to show feasibility which will be further refined in the Final 100% RA Schedule to provide a feasible sequence of work for the entirety of the RA at the SIB Project Area.

The general sequence expected for RA implementation is expected to be as follows:

- Pre-construction activities
  - Review and incorporation of changes post-100% Remedial Design;
  - Preparation of procurement documents;
  - Procurement activities;
  - Selection of RA Contractor;
  - Development and approval of the RA Contractor's RAWP;
  - Notification to required parties including property owners/operators and agencies;
  - Obtain access agreements, leases, and/or easements;
  - Procurement of placement material and completion of any necessary testing;
  - Pre-construction surveys, inspections, and investigations;
  - Design of contractor-designed elements;
- Construction activities
  - Removal of large debris from the work area;
  - Relocation of floating and temporary structures;

- Structural work (demolition and/or construction);
- Upland excavation (may occur simultaneously with structural work);
- Dredging below 0 ft CRD (+5.28 ft NAVD88) occurring simultaneously with removal of encountered debris, in-water transport, transload of material, disposal, and water treatment and disposal'
- Post-dredge survey;
- Re-dredging and survey, if needed;
- Material placement;
- Post-material placement survey;
- Additional material placement and surveys, if needed;
- Inspections and corrective measures;
- Site cleanup and demobilization of equipment; and
- Project closeout.

Some of the sequenced items may occur simultaneously depending on the means and methods of the RA Contractor, ability of transload site, equipment capabilities, and access to properties.

3.10.1 Remedial Action Schedule

The 90% RA Schedule, illustrated in Figure 3-1, was developed based on estimated dredging production rates from the DDTM (Appendix H) and performing work within the Oregon Department of Fish and Wildlife specified IWWPs. This schedule assumes the availability of necessary materials, equipment, a transload facility, and a disposal facility.
The RA is anticipated to span 2 to 3 years of pre-construction activities, followed by construction work conducted over a minimum of eight IWWPs. The number of IWWPs was estimated using the constraints and assumptions outlined in Section 3.10.2.

To minimize disruption and reduce the risk of recontamination, the work has been sequenced to progress from the head of the basin outward. Demolition and construction of stabilizing infrastructure are grouped by location to streamline operations. The schedule reflects major construction phases identified through experience with similar projects and discussions with contractors. It does not account for potential delays due to unforeseen circumstances at the Project Area.

Effective sequencing of RA activities is critical and will require close coordination among all involved parties. These include, but are not limited to:

- RA Performing Parties
- Remediation Contract Manager
- RA Contractor
- Shoreline facility owners/operators
- Transload site operators
- Entities receiving treated water (if applicable)

- Analytical laboratories
- Material suppliers
- Disposal site operators

The RA schedule sequence was developed using the constraints and assumptions in Section 3.10.2. Where possible, input from shoreline facility owner/operator interviews within the SIB Project Area was incorporated to minimize operational impacts.

3.10.2 Remedial Action Sequence Development

The primary consideration for the RA sequence is to develop a feasible schedule that can be carried out by the RA Contractor that minimizes recontamination of SIB while maintaining efficiency. A framework of constraints and assumptions was developed and is outlined herein. The following constraints were incorporated into the development of the potential sequence and RA schedule:

- IWWP # 1:
    - July 1 through October 31
    - No limitations on work occurring in water or upland
    - 87 working days on average (assuming 5 days per week and excluding Fourth of July and Labor Day)
- IWWP # 2:
    - December 1 through January 31
    - 44 working days on average (assuming 5 days per week and excluding Christmas Day and New Years Day)
    - Work above the approximate OHW mark may continue along with dredging in depths greater than -20 ft National Geodetic Vertical Datum of 1929 (NGVD29).
    - Work in areas between -20 ft NGVD29 and OHW will not be permitted.
- Outside of the two IWWPs the following criteria were implemented:
    - 5-day work week
    - Excludes the following holidays:
        - Memorial Day
        - Thanksgiving Holiday
- Minimum separation requirements:
    - 300 ft between active operations along slopes and or structures.
    - 300 ft between any active dredging and a previously capped area.
    - 900 ft between active operations in open-water areas.

Dredge operations commence at the head of the basin and progress riverward.

Pre-dredge surveys will be conducted immediately prior to dredging activity commencement.

Post-dredge surveys will be conducted prior to cap placement.

The 90% RA Schedule considers the constraints listed above and the development of assumptions to guide the sequencing and schedule of RA activities. Assumptions were applied to outline the guiding principles used in the development of the schedule. The assumptions applied to the 90% RA Schedule include:

- Pre-dredging surveys conducted prior to the start of the IWWPs.
- Structures planned for relocation during dredging activities may be moved prior to the start of the planned IWWP, if possible.
- Placement of revetment, bedding layer, and/or geotextile will only be conducted during the IWWPs.
    - RA Contractor may opt to pause work above the OHW mark to continue working between -20 NGVD29 and OHW during IWWP #1 (July – October) and return to working above OHW outside the IWWPs.
- Structural work occurring over water such as new concrete decks may occur outside of the IWWP.
- Upland restoration, including planting, may occur outside of the IWWP.
- Debris removal and dredging occur concurrently.
- Challenging debris may be removed prior to the start of dredging.
- Timber piles removed prior to dredging.
- Areas of SIB where no dredging will occur must have debris removed prior to cap placement.
- Excavated material, dredged material and debris, will be loaded onto barges (not haul trucks) for the purpose of schedule.
    - Excavated material and production rates were defined as activities occurring from +8 ft NAVD88 to top of bank.
    - Dredged material and production rates were defined as activities occurring below +8 ft NAVD88.
- For the 90% RA Schedule, the excavation and dredge production rates were as follows:
    - 400 cubic yards (cy)/day for excavators on the riverbank (elevation of approximately +8 ft NAVD88 to top of bank);
    - 400 cubic yards (cy)/day for dredger on riverbank or underneath structures;
    - 1,100 cy/day for dredger in the open basin; and
    - Total daily max output of 1,500 cy/day.
    - 1,500 cy/day for dredger was used in Dry Dock 5, Dry Dock 3, and Vigorous areas.
- For the 90% RA Schedule, the capping production rates were as follows:
    - 1,000 cy/day with the following exceptions;
    - 400 cy/day underneath structures

    - 1,500 – 2,000 cy/day in the Dry Dock 5, Dry Dock 3, and Vigorous areas.
- For the 90% RA Schedule, the KPFF B302 to B305 Replacement Study's proposed construction schedules were evaluated. The Bulkhead Wharf option has the shortest durations of four and six years. For the purposes of the 90% RA Schedule, the Accelerated Bulkhead Wharf 4-construction duration was applied. However, the duration for the B302-B305 construction may be longer. All four proposed schedules are outlined below:
    - Baseline Concrete Wharf – 9-year construction duration
    - Accelerated Concrete Wharf – 7-year construction duration
    - Baseline Bulkhead Wharf – 6-year construction duration
    - Accelerated Bulkhead Wharf – 4-year construction duration

3.10.3 Design Considerations

Implementation of the 90% RD was evaluated at each structure by considering the necessary order of work required to successfully execute the RD. An example of the order of work for a structure requiring the demolition and construction with revetment is outlined below:

- Relocate floating structures or barges, if applicable
- Demolition
- Construction of slope stabilizing structures, if applicable
- Excavation and dredging
- Pile driving
- Construction
- Revetment placement
- Capping
- Riverbank restoration

The development of the 90% RA Schedule included the structural work at each location. Structural work includes demolition of a part of a structure or the entirety, construction of new infrastructure, and/or construction of slope stabilizing features. The schedule assumes demolition and/or construction of structures will precede dredging operations.

The following structural work was included in the 90% RA Schedule:

- U.S. Coast Guard
    - Demolition of fender piles
    - Construction of toe wall and fender piles
- Berths 306 and 307
    - Demolition of structure
    - Construction of breasting dolphins and berths
- Berth 308 (demolition only)
- Berth 311
    - Construct berthing dolphin
- Lagoon Wharf (design by others)
    - Demolition of structure

    - Construction of Lagoon Wharf
- Port of Portland Dredge Base
    - Construction (driving piles)
- The Marine Consortium, Inc. Pier
    - Construction of mid-slope pinning wall (2x)
- Shipyard Commerce Center Floating Docks
    - Construct sheet pile wall

3.10.4 Schedule Flexibility

Amendments to certain constraints and assumptions outlined in Sections 3.10.2 and 3.10.3 may permit shortening of the project schedule. Additional dredge floats and cranes incorporated into the project may increase the speed of work completed during each IWWP. Adjusting the delineation line between excavation and dredge production rates may decrease the number of days required as open basin dredge production rates are 1,100 cy/day versus 400 cy/day. Identifying an upland stockpile location within the SIB Project Area in conjunction with an upland transport plan may permit year-round excavation in areas above OHW.

3.10.5 Plan for Obtaining Access/Use Authorizations

The SIB Project Area is located in an area with multiple property owners, privately-owned submerged and submersible land, and submerged and submersible land owned by the State of Oregon, see BODR Figure 2-1 (HGL, 2024b). Site access will be necessary to conduct the RA, which will be accommodated through future access agreements and authorizations. Potentially affected properties have been consulted with during development of the Pre-Final 90% RD.

The RA Performing Parties will coordinate with SIB Project Area property owners and operators to establish access for construction and maintenance of the RA. Depending on the owner and the nature and duration of the access, written agreements or other legal documentation (e.g., leases, easements, deed restrictions) may be required. The RA Performing Parties will engage the State of Oregon, through DSL, and other property owners to identify potential RA constraints and requirements. It is crucial to begin communications early with property owners to avoid potential delays in the RA work.

4.0 REMEDIAL DESIGN DELIVERABLES

This section presents the supporting plans that have been developed with the Pre-Final 90% RD and discusses how the RD deliverables will be refined as the design progresses to the Final 100% RD.

4.1 ENVIRONMENTAL PROTECTION

Plans that address environmental protection measures to be implemented to assure protection of human health and the environment during RA include the CQA/QCP and TODP. Plans are included in Volume II of the Pre-Final 90% RD.

4.1.1 Construction Quality Assurance/Quality Control Plan

The CQA/QCP (Appendix N, Volume II) addresses the following remedy construction QA, water quality, community impact monitoring activities/elements for the SIB Project Area:

- Identify and describe the responsibilities of the organizations and personnel implementing the CQA/QCP;
- Describe the performance standards (PS) required to be met to achieve completing the RA;
- Describe the activities to be performed: (i) to provide confidence that the PS will be met; and (ii) to determine whether PS have been met;
- Describe verification activities, such as inspections, sampling, testing, monitoring, and production controls, under the CQA/QCP;
- Describe industry standards and technical specifications used in implementing the CQA/QCP;
- Describe procedures for tracking construction deficiencies from identification through corrective action;
- Describe procedures for documenting all CQA/QCP activities; and
- Describe procedures for retention of documents and for final storage of documents.

The CQA/QCP provides the organizational hierarchy and QA/QC responsibilities for the RA and discusses what will be measured, how it will be measured, why it is measured, how results of the measurements will be treated (corrective actions for non-conformances), and how the construction monitoring and verification measurements will be documented.

4.1.2 Transportation and Off-Site Disposal Plan

The TODP (Appendix O, Volume II) describes the planned approach to meet the SIB Project Area objectives as they pertain to the safe handling, shipment, and disposition of wastes generated during RA activities. The following objectives are addressed to ensure compliance with the requirements for off-site shipping of RA waste:

- Proposed routes for off-site shipment of material.

- Identification of communities affected by shipment of waste material; and
- Description of plans to minimize impacts on affected communities.

The TODP summarizes waste characterization and designation procedures, and materials and debris handling requirements for the off-site shipment of CERCLA wastes in accordance with applicable state and federal regulations. Potential alternatives for transportation, transloading, and disposal services for dredged and excavated material from the SIB Project Area are presented in the plan as well as route options for transporting dredged material, debris, and water to each of the identified disposal facilities. The TODP identifies the geographical areas outside of the SIB Project Area which would be impacted by transportation of wastes to a disposal facility and the mitigation measures and BMPs to minimize potential impacts.

4.2 REMEDIAL ACTION

Plans described in this section apply to the SIB Project Area post-RA, they include the PAMP, which monitors RA progress towards performance standards and achievement of RAOs; the ICIAP which guides the implementation and continued performance of institutional controls; and the O&M Plan and O&M Manual guide the inspections, reporting, and maintenance activities required to maintain the remedy.

4.2.1 Project Area Monitoring Plan

The PAMP (Appendix P, Volume II) describes the scope and objectives of remedy performance monitoring, including:

- The environmental media to be monitored;
- Data collection parameters, analytical parameters, existing and proposed monitoring devices and locations, and the monitoring schedule;
- Descriptions of how performance monitoring data will be analyzed, interpreted, and reported;
- Descriptions of deliverables that will be generated as part of performance monitoring, including sampling schedules, laboratory records, monitoring reports, and reporting requirement; and
- Descriptions of proposed additional monitoring and data collection actions in the event that results from performance monitoring or other factors indicate changed conditions of significance.

If increasing trends of contaminant concentrations are observed in SIB Project Area performance monitoring media, it may be necessary to perform additional data analyses and/or data collection and monitoring efforts to determine the source of the contamination. The specifics of these efforts will be determined if a recontamination potential assessment is necessary, based on the data gaps and data needs at that time. A summary of these potential activities is included in the PAMP. A summary of Sitewide RAO monitoring is also included in the PAMP to identify the expected RAO monitoring data products that will inform SIB Project Area-specific performance monitoring analysis and objectives.

4.2.2 Institutional Control Implementation and Assurance Plan

The ICIAP (Appendix R, Volume II) presents the institutional control (IC) planning, maintenance, enforcement, modification, and termination for the protection of human health and the environment by limiting exposure to contamination left in place and to protect the long-term integrity of the engineered components of the remedy. The ICIAP is based on the Sitewide ICIAP (City, 2022) and developed in accordance with 1) Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites (EPA, 2012a); and 2) Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites (EPA, 2012b) or as amended or superseded.

The ICIAP lists the IC groups, the key elements of planned ICs, a summary of assurance monitoring and reporting, and modifications or termination of ICs.

4.2.3 Operations and Maintenance Plan and Manual

The O&M Plan (Appendix S, Volume II) defines the inspections and any operational and maintenance activities of the constructed remedy components to ensure/demonstrate that they continue to meet their original design specifications. The O&M Plan includes:

- Description of PS required to be met to implement the ROD;
- Description of activities performed to provide confidence in PS being met and to determine if PS have been met;
- Description of records and reports generated during O&M;
- Description of corrective actions in case of system failure; and
- Description of corrective actions in to be implemented in the event that PS are not achieved and schedule for implementing these corrective actions.

The O&M Manual (Appendix T, Volume II), a companion to the O&M Plan, serves as a guide to the purpose and function of the equipment and systems comprising the remedy. The manual discusses O&M components for each element of the remedy, health and safety requirements, and contingency plan for handling abnormal activities (significant natural event).

The O&M Manual and Plan have been updated for the Pre-Final 90% RD and will continue to be updated throughout the RD, as needed. Upon completion of the RA, the O&M Plan and O&M Manual will be updated based on actual operational experience obtained during implementation of the RA. The completed O&M Plan and O&M Manual normally are submitted as part of RA completion when the remedy transitions to O&M. Both documents should continue to be updated during the O&M period as conditions change (EPA, 2017b).

4.3 REMEDIAL DESIGN DELIVERABLES AND SEQUENCING

This section provides an overview of the RD sequencing. The Draft 50% RD and supporting documents was submitted to EPA on March 13, 2025. This section discusses the progression from the Pre-Final 90% to the Final 100% RD.

4.3.1 Lagoon Wharf Supplemental 90% Remedial Design

As noted in Section 2.2.5, the RD Team is preparing a technical memorandum to address the Lagoon Wharf riverbank soil remedy as a supplement to this Pre-Final 90% RD. The timing of this technical memorandum is based on the progression of the third-party engineer firm's design but can be completed in advance of the design. As such, the SIB RD Team anticipates delivery of this memorandum by early 2026.

4.3.2 Final 100% Remedial Design

The Final 100% RD will address EPA comments on the Pre-Final 90% RD and include final versions of all pre-final deliverables for EPA approval. According to the terms of the ASAOC (Section XXVII. Notice of Work Completion), the SIB RD Performing Parties will request that EPA make the determination that all work has been fully performed in accordance with the terms of the ASAOC and provide written notice of this to the SIB RD Performing Parties, the Settling Federal Agencies, and the Settling Public Entities.

5.0 REFERENCES

ASTM International (ASTM), 2021. E3281-21 Standard Guide for NAPL Mobility and Migration in Sediments – Screening Process to Categorize Samples for Laboratory NAPL Mobility Testing. November 5, 2021.

CDM Smith, 2024. Updated Portland Harbor Superfund Site Existing and Conservative Future Conditions Model. Memo to EPA from CDM Smith. June 17, 2024.

City of Portland (City), 2022. *Programmatic Institutional Control Implementation and Assurance Plan*. September.

European Commission. 2021. *Evaluating the Impact of Nature-Based Solutions: A Handbook for Practitioners*. A. Dumitru and L. Wendling, editors. Directorate-General for Research and Innovation. Luxembourg. March. ISBN 978-92-76-22821-9.

HydroGeoLogic, Inc. (HGL), 2024a. *Pre-Design Investigation Evaluation Report. Revision 2*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. December.

HGL, 2024b. *Basis of Design Report. Revision 1*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. November.

HGL, 2024f. *Field Change Request No. 16 - Archive analysis and non-aqueous phase liquid (NAPL) mobility testing*. July 23.

HGL, 2025a. *Final Sufficiency Assessment Report Revision 1*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. January.

HGL, 2025b. *Remedial Design Work Plan. Revision 1*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. February.

KPFF, 2025. *B302 to B305 Replacement Study Memorandum*. September 4, 2025.

Palermo, M., Maynord, S., Miller, J., and Reible, D., 1998. *Guidance for In-situ Subaqueous Capping of Contaminated Sediments,* EPA 905-896-004. Great Lakes National Program Office, Chicago, IL. September

U.S. Environmental Protection Agency (EPA), 1995 *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. June.

EPA, 2005. Value Engineering (For Fund-Financed Superfund Remedial Design/Remedial Action Projects), OSWER 9355.5-24FS. November.

EPA, 2009. EPA Principles for Greener Cleanups. August 2009, at URL https://www.epa.gov/sites/default/files/2015-10/documents/oswer_greencleanup_principles.pdf.

EPA, 2010. Superfund Green Remediation Strategy, at URL https://www.epa.gov/greenercleanups/superfund-green-remediation-strategy-2010.

EPA, 2012a. Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites, OSWER 9355.0-89, EPA/540/R-09/001. December.

EPA, 2012b. Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites, OSWER 9200.0-77, EPA/540/R-09/02. December.

EPA, 2016. *Portland Harbor RI/FS Feasibility Study Report. Portland Harbor Superfund Site, Portland Oregon*. U.S. Environmental Protection Agency Region 10, Seattle, Washington. June.

EPA, 2017a. *Record of Decision, Portland Harbor Superfund Site, Portland, Oregon*. U.S. Environmental Protection Agency Region 10, Seattle, Washington. January.

EPA, 2017b. *Guidance for Management of Superfund Remedies in Post Construction*. OLEM Directive 9200.3-105. February.

EPA, 2021a. *Administrative Settlement Agreement and Order on Consent for Remedial Design at the Swan Island Basin Project Area*, CERCLA Docket No. 10-2021-001 - 7, Region 10. January.

EPA, 2021b. *Remedial Design Guidelines and Considerations,* Portland Harbor Superfund Site, Portland, Oregon. April.

EPA, 2021c. *Programmatic Biological Assessment Portland Harbor Superfund Site*. U.S. Environmental Protection Agency Region 10, Seattle, Washington. January. July.

EPA, 2024. *EPA Comments on Pre-Design Investigation Evaluation Report, Swan Island Basin Project Area, Dated November 15, 2023*. January 30.

EPA, 2025a. *EPA Comments and Responses on Sufficiency Assessment Report Revision 0 (August 2024) and Sufficiency Assessment Report Revision 1 (February 3, 2025), Swan Island Basin Project Area, Dated March 28, 2025.*

EPA, 2025b. Cap Design Criteria at Portland Harbor. Email from the EPA Region 10 Remedial Project Manager to site performing parties. February 14.

EPA, 2025c. P*ortland Harbor Superfund Site Monitoring Guidelines. Portland Harbor Superfund Site*. Portland, Oregon. April 18.

EPA, 2025d. *Guidelines for Riverbank Characterizations and Evaluations at the Portland Harbor Superfund Site*. U.S. Environmental Protection Agency Region 10. July 14.

TABLES

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Table 2-1
Swan Island Basin Project Area Sufficiency Assessment Summary Matrix
Pre-Final 90% Remedial Design, Swan Island Basin Project Area, Portland, Oregon

Site	DEQ ECSI # (Status)	Project RID	DEQ Status of Site Recontamination Pathways (DEQ, 2016)					HGL Site Status of Potential Recontamination Pathways to Swan Island				Most Recent Data Availability and ROD Table 17 and 21 Contaminants		DEQ Identified COCs (ECSI Summaries, Site Reports)[2]	SIB Project Area Sufficiency Assessment Contaminants (SIB RPCs in All Media)	Milestone Document and Other Information	Rationale for Pathway Rankings
			Overland Flow	Bank Erosion	GW	Stormwater	Overwater Activities/Structures	Riverbank Erosion	GW	Overwater Activities	Stormwater Pathway	COC >CUL	COC>RAL/PTW Threshold (Remediation Required)				
ECSI Shoreline Properties or Outfall Owners that Drain Directly to the SIB Project Area																	
U.S. DOT CG - Marine Safety Unit[3] 6767 N Basin Avenue	1338 (Open)	1207	Low	Low, Excluded	Low, Excluded	Low	Low, Excluded	B	I	B	A	**PDI Site SW** = As, Cu, and Zn. B(b)F, chrysene, hexachlorobenzene. cPAHs. 2,3,7,8-TCDD Eq > CULs.	**PDI Riverbank** = PCBs, TCDD, PeCDD	**SW** = Metals, butyltins, PCBs as Aroclors	Total PCBs, dioxins/furans (TCDD eq, HxCDF, PeCDD, PeCDF, TCDD, TCDF), pesticides (dieldrin), cPAHs, metals (As, Cd, Cu, Pb, Hg, and Zn), TPH-Dx, and BEHP.	Implemented SW SCMs in 2017. SCE investigation transferred to EPA in 2020. Current NPDES 1200Z SW NEC. RPCs > RALs in riverbank and adjacent sediment.	OW Activities: Facility must control sources/releases before RA. RB Erosion: COCs > RALs will be remediated. GW: Incomplete, no plumes identified. SW: Current NPDES 1200Z SW NEC. Cu and Zn in PDI stormwater samples plot in "knee" of DEQ rank order curves.
U.S. Navy and Marine Reserve Center 6735 N Basin Avenue	5109	4537	Low	Low	Low	Low	Low	B	I	B	C(a)	--	**PDI Riverbank:** PCBs, PeCDD	--		No SCE/SCD. No site data, except RB. EPA SCE lead, but no investigation performed since 2015. Reserve Center established in 1976 after land exchange between Navy and Port in 1972. Oily bilge water UST removal under entrance to dock in 1993 with TPH-impacted soil remaining in place at toe of RB covered with 4 ft of rip-rap. Project transfered to DEQ Cleanup program in 2010. EPA concluded more actions needed in 2015. 2017 PHSS ROD RB designation. U.S. Navy contacted DEQ regarding riverbank sampling in 2018, and was referred to EPA. SW discharges to City outfall M-1. RPCs > RALs in RB and adjacent sediment.	OW Activities: Facility must control sources/releases before RA. RB Erosion: COCs > RALs will be remediated. GW: Incomplete, no plumes identified. SW: No available data and CUL exceedances in M-1 outfall discharges.
The Marine Salvage Consortium Inc. (dba Fred Devine Diving and Salvage Co.) 6211 N Ensign Street	2365 (Closed)	1352	Low	Low	Low	Low	Low	B	I	B	A	**Historical SW** = cPAHs > CULs, BEHP, Cu, Zn, PCBs ND with MRLs > CUL, TBT = ND	**PDI RB =** PCBs, PAHs, PeCDD	**SW** = BEHP, PAHs, metals, TPH-Dx **SW Sediment** = PAHs, PCBs, metals		October 2016 SCD for SW. DEQ excluded other pathways because of administrative/commercial upland activities. Current NPDES 1200-Z SW permit (discharge to city outfall M-1 downstream of SIB PDI SW and solids collection in M-1 basin). RPCs > RALs in RB and adjacent sediment.	OW Activities: Facility must control sources/releases before RA. RB Erosion: COCs > RALs will be remediated. GW: Incomplete, no plumes identified. SW: DEQ issued SCD in 2016. Current NPDES 1200Z SW permit.

Table 2-1
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			Overland Flow	Bank Erosion	GW	Stormwater	Overwater Activities/Structures	Riverbank Erosion	GW	Overwater Activities	Stormwater Pathway	COC >CUL	COC>RAL/PTW Threshold (Remediation Required)				
Port of Portland Dredge Base 6208 N Ensign Street	3799 (Open)	49897	NE	NE	NE	NE	NE	B	I	B	A	--	**PDI RB** = PCBs, TCDD, PeCDD	--	Total PCBs, dioxins/furans (TCDD eq, HxCDF, PeCDD, PeCDF, TCDD, TCDF), pesticides (dieldrin, DDx), cPAHs, metals (As, Cd, Cu, Pb, Hg, and Zn), TPH-Dx, and BEHP.	Facility discharges stormwater to City M-1 conveyance system downstream of SIB PDI M-1 SW and SW solids samples. Port MS4 Permit (BMPs). RPCs > RALs in RB and adjacent sediment. EPA considers SW pathway to be controlled.	OW Activities: Facility must control. sources/releases before RA. RB Erosion: COCs > RALs will be remediated. GW: Incomplete, no plumes identified. SW: EPA considers pathway controlled, but no available data and CUL exceedances in M-1 outfall discharges.
ATC Leasing Co LLC (Auto Truck Transport) (formerly Lynden Farms) 6135 and 6147 N Basin Avenue	4461 (Closed)	422	Low, Excluded	Low, Excluded	Low, Excluded	Low	Low, Excluded	B	I	I	A	**PDI Site SW** = As, Cu, hexachlorobenzene, 2,3,7,8-TCDD Eq > CULs.	**PDI RB** = PCBs, TCDD, PeCDD	**Soil** = Heavy oil and PCBs		DEQ, 2016: tank removal and subsequent investigation. PCBs and waste oil detected. No SCE or SCD. Direct discharges to SIB and M2 outfall basin. Current NPDES 1200-Z SW permit -- 2022-2023 results less than geometric mean for benchmarks pH, Cu, Pb, Zn and Fe. EPA considers SW pathway controlled. RPCs > RALs in RB and adjacent sediment.	OW Activities: no overwater activities. RB Erosion: COCs > RALs will be remediated. GW: Incomplete, no plumes identified. SW: Current NPDES 1200Z SW permit. Detected available Table 17 COCs plot in lower portions of DEQ rank order charts.
Barge Eagle Inc. (formerly Port Berth 311 Uplands) 5949 E./N Basin Avenue	271 (Closed)	--	NE	NE	NE	NE	NE	B	I	I	A	**PDI Site SW** = As, Cu, Zn, BEHP, DDT, hexachlorobenzene, cPAHs, 2,3,7,8-TCDD Eq, PCBs > CULs.	--	--		2005 NFA for Port Berth 311 Uplands (current Barge Eagle Inc. property). No SCE or SCD. Direct discharges to SIB. Current NPDES 1200Z SW permit - 2022 and 2023 monitoring waivers for benchmarks pH, TSS, and Cu, Pb, and Zn. EPA considers SW pathway controlled. RPCs > RALs in RB and adjacent sediment.	OW Activities: Facility must control sources/releases before RA. RB Erosion: COCs > RALs will be remediated. GW: Incomplete, no plumes identified. SW: Current NPDES 1200Z SW permit. Detected available Table 17 COCs plot in lower portions of DEQ rank order charts.
Swan Island Dock Co. 5949 E./N Basin Avenue	--		NE	NE	NE	NE	NE	B	I	B	I		**PDI RB** = PCBs, TCDD, PeCDD	--		Prior to SIB PDI, no assessment of OW or RB at Swan Island Dock Co. property. RPCs > RALs in RB and adjacent sediment.	OW Activities: Facility must control sources/releases before RA. RB Erosion: COCs > RALs will be remediated. GW: Incomplete, no plumes identified. SW: Incomplete, no stormwater discharges.
North Basin Watumull LLC (formerly Island Holdings Inc.) 5885 N Basin Avenue	260 (Closed)	2058	NE	NE	Low, Excluded	Low, Excluded	NE	B	I	I	A	**PDI Site SW** = As, Cu, Zn, DDE, DDT, B(b)F, chrysene, indeno(1,2,3-CD)pyrene, hexachlorobenzene, cPAHs, 2,3,7,8-TCDD Eq, PCBs > CULs.	**PDI RB** = PCBs, TCDD, PeCDD	**SW** = 2,4-D		1980 - Alleged release of chemical waste containing 2,4-D to manhole to Willamette River with USCG follow-up. Direct discharge of SW to SIB. 1993 DEQ NFA for Island Holdings Inc. EPA considers SW pathway controlled based on DEQ exclusion. RPCs > RALs in RB.	OW Activities: no overwater activities. RB Erosion: COCs > RALs will be remediated. GW: Incomplete, no plumes identified. SW: Detected available Table 17 COCs plot in lower portions of DEQ rank order charts.
End of Swan Island Lagoon (Vacant Lots 1 and 2 with City of Portland Swan Island Boat Ramp)	3901 (Closed)	1582	Low, Excluded	Low, Excluded	Low, Excluded	Low, Excluded	Low, Excluded	B	I	I	I	**Historical GW** = VOCs **PDI RB** = CUL and two RAL exceedances.	**PDI RB** = TCDD, PeCDD	**Soil GW** = TBT, phthalates, PCBs, pesticides, petroleum hydrocarbons, PAHs, VOCs, metals (As, Cu, Pb, Ni, Zn)		2015 SCE submitted. CPBES terminated voluntary agreement and are not currently in DEQ's Cleanup Program. CPBES plans to transfer Lot 2 to City of Portland Bureau of Parks and Recreation and sell Lot 1.	OW Activities: no overwater activities. RB Erosion: COCs > CULs will be stabilized. GW: Incomplete, no plumes identified. SW: incomplete, no stormwater discharges.

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Pre-Final 90% Remedial Design, Swan Island Basin Project Area, Portland, Oregon

Site	DEQ ECSI # (Status)	Project RID	DEQ Status of Site Recontamination Pathways (DEQ, 2016)					HGL Site Status of Potential Recontamination Pathways to Swan Island				Most Recent Data Availability and ROD Table 17 and 21 Contaminants		DEQ Identified COCs (ECSI Summaries, Site Reports)[2]	SIB Project Area Sufficiency Assessment Contaminants (SIB RPCs in All Media)	Milestone Document and Other Information	Rationale for Pathway Rankings
			Overland Flow	Bank Erosion	GW	Stormwater	Overwater Activities/Structures	Riverbank Erosion	GW	Overwater Activities	Stormwater Pathway	COC >CUL	COC>RAL/PTW Threshold (Remediation Required)				
ECSI Shoreline Properties or Outfall Owners that Drain Directly to the SIB Project Area																	
Shipyard Commerce Center (formerly Portland Shipyard Swan Island Upland Facility [SIUF] Operable Unit [OU1]) 5555 N Channel Avenue	271 (Closed)	2970	NE	Medium, uncontrolled until SCMs implemented	Medium, excluded	Medium, uncontrolled until SCMs implemented	Medium, excluded	B	I	B	B	**SW** = R-1 =As, Cu, Zn; OF-S =As, Cu, Zn, cPAHs, BEHP, PCBs, TBT; Pier C (009) = As, Cu, BEHP, cPAHs, D/F; R(004) = As, Cu, Zn, cPAHs, BEHP, TBT, D/F; G(002) = As, Cu, Zn, cPAHs, BEHP, PCP(1), PCBs; M(001) = As, Cu, Zn, cPAHs, BEHP, PCBs; M1(003) = As, Cu, Zn, cPAHs, BEHP, PCP(1); N Series = As, Cu, BEHP, D/F; OF B = As, Cu, BEHP; OF E = As, Cu, Zn, cPAHs, BEHP, PCP, PCBs, TBT; OF-H = Cu, Zn; OF-L = As, Cu, Zn, cPAHs, BEHP, PCP, PCBs, D/F; OF-N = As, Cu, Zn, cPAHs, BEHP, PCP, D/F; OF-N1 = PCBs; N-Series = Cu, Zn, D/F	**PDI RB** = PCBs, TCDD, PeCDD, PeCDF, DDx	--	Total PCBs, dioxins/furans (TCDD eq, HxCDF, PeCDD, PeCDF, TCDD, TCDF), pesticides (aldrin, dieldrin, lindane, DDE, DDE, DDT, DDx, total chlordane), metals (As, Cd, Cu, Pb, Hg, and Zn), TPH-Dx, TBT, and BEHP.	GW: 2014 OU1 SCD SW: 2016 DEQ Consent Order for implementation of SW SCMs. 2017 SCMs installed (electrocoagulation SW treatment system, CB media filtration systems, downspout treatment measures, and BMPs). 2018 - 2019 SW source control sampling. 2019 to present -Monitoring and Performance Evaluation Reports. 2020-2024 Implementation of SW Contingency SCMs. DEQ still considers SW pathway uncontrolled and design of SCMs (13 outfall discharges rerouted to treatment) is ongoing. DEQ-required D/F SW sampling in 2021 - D/Fs detected. OW: Addressing as part of SW SCMs via NPDES 1200Z SW Permit. RB: 1,100 feet of contaminated RB that will be remediated as part of RA.	OW Activities: Facility must control sources/releases before RA. RB Erosion: COCs > RALs will be remediated. GW: Incomplete, no plumes identified. SW: Detected available Table 17 COCs in discharging OFs 2019-2021 plot in lower portions of DEQ rank order charts, except Cu at Pier C, As at Pier D, Cu at Group P.
Port of Portland (formerly Portland Shipyard SIUF OU3) 5420 N Lagoon Avenue	271 (Closed)	--	NE	Medium, uncontrolled	Medium, excluded	Medium, uncontrolled	Medium, excluded	B	I	B	B	**PDI SW** = As, Cu, Zn, DDD, DDE, BEHP, chrysene, hexachlorobenzene, cPAHs, 2,3,7,8-TCDD Eq.	**PDI RB** = PCBs, TCDD, PeCDD	PCBs, phthalates, PAHs, petroleum hydrocarbons, organotin, metals (As, Cd, Cu, Pb, Hg, Zn)		2013 SCD for SW, GW, RB. 2013 NFA. ROD Riverbank. EPA considers SW pathway controlled. Some RPCs > RALs in adjacent sediment.	OW Activities: Facility must control sources/releases before RA. RB Erosion: COCs > RALs will be remediated. GW: Incomplete, no plumes identified . SW: Detected available Table 17 COCs plot in lower portions of DEQ rank order charts, except Cu and Zn that plot in the knee of curves.
Other Shoreline Properties in SIB Project Area																	
Anchor Park LLC 5036 N Lagoon Avenue	--	--	NE	NE	NE	NE	NE	B	I	I	I	--	**PDI RB** = PeCDD	--		Undeveloped truck trailer storage area.	SW: Incomplete, no discharges. GW: Incomplete, no plumes identified. RB Erosion: COCs > RALs will be remediated. OW activities: Incomplete, no OW activities.
Daimler Truck North America Corp 5/Wind Tunnel 5160 N Lagoon Avenue	--	--	NE	NE	NE	NE	NE	B	I	B	A	**PDI Site SW** = As, Cu, Zn, DDE, chrysene, hexachlorobenzene, indeno(1,2,3-CD)pyrene, cPAHs, 2,3,7,8-TCDD Eq.	**PDI RB** = PCBs, TCDD, PeCDD	--		Oct 19, 2022 Letter from City BES to DTNA - Facility Standard Industrial Classification Code (SIC) does not require NPDES 1200Z Permit. No facility industrial activities listed in Table 2 of the NPDES 1200Z Permit exposed to stormwater. Therefore, no Permit or NEC necessary.	OW Activities: Facility must control sources/releases before RA. RB Erosion: COCs > RALs will be remediated. GW: Incomplete, no plumes identified. SW: Detected available Table 17 COCs plot in lower portions of DEQ rank order charts.

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Site	DEQ ECSI # (Status)	Project RID	DEQ Status of Site Recontamination Pathways (DEQ, 2016)					HGL Site Status of Potential Recontamination Pathways to Swan Island				Most Recent Data Availability and ROD Table 17 and 21 Contaminants		DEQ Identified COCs (ECSI Summaries, Site Reports)[2]	SIB Project Area Sufficiency Assessment Contaminants (SIB RPCs in All Media)	Milestone Document and Other Information	Rationale for Pathway Rankings
			Overland Flow	Bank Erosion	GW	Stormwater	Overwater Activities/Structures	Riverbank Erosion	GW	Overwater Activities	Stormwater Pathway	COC >CUL	COC>RAL/PTW Threshold (Remediation Required)				
City of Portland Municipal Outfalls to SIB Project Area																	
City of Portland Outfalls	2425 (Conditionally Closed pending additional sampling)	3334	--	--	--	--	--	--	--	--	C(a)	--	--	--		April 20, 2021 CSCD. No additional monitoring or responsiveness actions proposed for M-1, M-2, M-3, S-1 and S-2.	
M-1	--	--	--	--	--	--	--	I	I	I	C(a)	**PDI SW** = 2,3,7,8-TCDD Eq, PCBs, DDT, B(a)A, cPAHs, As, Cu, Zn **PDI SW Sediment** = 2,3,7,8-TCDD Eq, PCBs, HxCDF, PeCDD, PeCDF, TCDF, TCDD, BEHP, TPH-Dx, dieldrin, DDx, As, Cd, Hg, Zn	**PDI SW Sediment** = PeCDD	--	Total PCBs, dioxins/furans (TCDD eq, HxCDF, PeCDD, PeCDF, TCDD, TCDF), pesticides (dieldrin, DDx), cPAHs, metals (As, Cd, Cu, Pb, Hg, and/or Zn), TPH-Dx, and BEHP.	Sources identified are in DEQ Cleanup Program, SCMs in place, outfall sampled by LWG in 2007-08 and CPBES in 2007 and 2016 – concentrations below flat portion of DEQ rank-order curves. DEQ estimated low qualitative loading estimate. Most recent data in 2016 prior to PDI. PDI data plot in lower flat portion of rank-order curves. Only 41% of SW lines in basin have been cleaned. Current PDI quantitative modeling indicates recontamination potential.	SW: As, BEHP, Cd, cPAHs, Diesel, HxCDF, PeCDD, Total PCBs, Zn.
M-2	--	--	--	--	--	--	--	I	I	I	C(a)	**PDI SW** = 2,3,7,8-TCDD Eq, PCBs, DDT, cPAHs, As, Cu, Zn **PDI SW Sediment** = 2,3,7,8-TCDD Eq, PCBs, HxCDF, PeCDF, PeCDD, PeCDD, TCDF, TCDD, total chlordanes, dieldrin, BEHP, TPH-Dx, As, Cd, Zn	**PDI SW Sediment** = PeCDD, total PCBs	--		No sources identified, SCMs in place, outfall sampled by LWG in 2007-08 and by City in 2007 and 2016-17 – concentrations below flat portion of rank-order curves. DEQ estimated low qualitative loading estimate. PDI data plot in lower flat portion of rank-order curves, but above some CULs. Only 15% of SW lines in basin have been cleaned. Current PDI quantitative modeling indicates recontamination potential.	SW: As, BEHP, Cd, cPAHs, Diesel, HxCDF, PeCDD, PeCDF, Total PCBs, Zn.
M-3	--	--	--	--	--	--	--	I	I	I	C(a)	**PDI SW** = 2,3,7,8-TCDD Eq, PCBs, DDE, DDT, cPAHs, B(a)A, naphthalene, As, Cu, Zn **PDI SW Sediment** = 2,3,7,8-TCDD Eq, PCBs, HxCDF, PeCDF, PeCDD, PeCDD, TCDF, TCDD, total chlordanes, dieldrin, BEHP, TPH-Dx, As, Cd, Hg, Zn	**PDI SW Sediment** = PeCDD, total PCBs	--		Mostly non-industrial, no sources identified, SCMs in place, outfall sampled by LWG in 2007-08 and by City in 2007 – concentrations below flat portion of rank-order curves. More recent PDI data plot in lower flat portion of rank-order curves but above some CULs. Only 20% of SW lines in basin have been cleaned. Current PDI quantitative modeling indicates recontamination potential.	SW: As, BEHP, Cd, cPAHs, Diesel, Dieldrin, HxCDF, Hg, PeCDD, PeCDF, TCDD, Total PCBs, Zn.
S-1	--	--	--	--	--	--	--	I	I	I	C(a)	**PDI SW** = 2,3,7,8-TCDD Eq, PCBs, DDE, DDT, cPAHs, B(a)A, naphthalene, As, Cu, Zn **PDI SW Sediment** = 2,3,7,8-TCDD Eq, cPAHs, PCBs, HxCDF, PeCDF, PeCDD, PeCDD, TCDF, TCDD, DDx, dieldrin, As, Cd, Cu, Pb, Hg, Zn	**PDI SW Sediment** = PeCDD, TCDD, total PCBs	--		Sources identified are in DEQ Cleanup, SCMs in place, small basin, outfall sampled by City in 2007 and 2011 – concentrations below flat portion of rank-order curves (except PAHs) and site specific PAHs removed with line cleaning. More recent PDI data plot in lower flat portion of rank-order curves, but above some CULs. No records of SW line cleaning from City in this basin. Current PDI quantitative modeling indicates recontamination potential.	SW: As, BEHP, Cd, cPAHs, Diesel, Dieldrin, HxCDF, PeCDD, Total PCBs, Zn.
S-2	--	--	--	--	--	--	--	I	I	I	C(a)	**PDI SW** = 2,3,7,8-TCDD Eq, PCBs, DDE, DDT, cPAHs, B(a)A, naphthalene, As, Cu, Zn **PDI SW Sediment** = 2,3,7,8-TCDD Eq, PCBs, HxCDF, PeCDF, PeCDD, PeCDD, TCDF, TCDD, total chlordanes, dieldrin, BEHP, TPH-Dx, As, Cd, Hg, Zn	**PDI SW Sediment** = PeCDD, TCDD	--		No sources identified, SCMs in place, small basin, outfall sampled by City in 2007 – concentrations below flat portion of rank-order curves. More recent PDI data plot in lower flat portion of rank-order curves, but above some CULs. 11% of SW lines in basin have been cleaned. Current PDI Quantitative modeling indicates recontamination potential.	SW: BEHP, Cd, cPAHs, Diesel, PeCDD, Zn.

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			Overland Flow	Bank Erosion	GW	Stormwater	Overwater Activities/Structures	Riverbank Erosion	GW	Overwater Activities	Stormwater Pathway	COC >CUL	COC>RAL/PTW Threshold (Remediation Required)				
ECSI and/or NPDES 1200Z Upland Sites in City of Portland Outfall M-1 Drainage Basin																	
DTNA Truck Manufacturing Plant LLC (Formerly Freightliner Truck Manufacturing Plant) 6936 N Fathom Street	2366 (Open)	1353	NE	NE	Low	Low, uncontrolled	NE	I	I	I	A	**SW** = As, Cu, Zn, BEHP, aldrin (1/4), cPAHs. Other OCPs ND < CUL. PCBs ND with MRL > CUL. **2007, 2013, 2014 Solids (removed)** = Cd, Pb, Zn, PCBs, BEHP.	--	--	Total PCBs, dioxins/furans (TCDD eq, HxCDF, PeCDD, PeCDF, TCDD, TCDF), pesticides (dieldrin), cPAHs, metals (As, Cd, and Zn), TPH-Dx, and BEHP.	Current NPDES 1200Z SW Permit. 2006-2007, 2009, 2010, 2013, 2014 on-site and off-site (Fathom St) storm line cleaning. 2006 on-site and Ensign Street cleaning after spill. 2014 and 2016 SW and solids COCs > SLVs or CULs: Cd, Cr, Cu, Pb, Zn, phthalates, PAHs, and PCBs. 2016 and 2020: Infiltration planters for on-site SW management and infiltration. 2020 GW SCE - Cocs included As, Cr, Zn, TPH, VOCs, and PAHs. As not migrating to SIB above CUL. VOCs, Cr, Zn, TPH < CULs Phenanthrene slightly > CUL. Data demonstrate to no threat to river. 2022: Mass Reduction Measures Certification Approval and discontinuation of sampling for 2012-2025 NPDES 1200Z SW permit period. GW and SW SCD for site ~~estimated~~ issued in August 2025. Site is 1,400 feet from SIB.	SW: ~~Pending~~ SCD issued on August 12, 2025. Onsite infiltration of SW. NPDES 1200Z Permit with Mass Reduction Measures Certification Approval. GW: SCD issued on August 12, 2025. No offsite plume identified. RB and OW: Incomplete. Not located on SIB riverbank.
Parker Hannefin Corp. 6457 N Basin Avenue	3800 (Open)		NE	NE	NE	NE	NE	I	I	I	A	--	--	PAHs	Total PCBs, dioxins/furans (TCDD eq, HxCDF, PeCDD, PeCDF, TCDD, TCDF), pesticides (dieldrin), cPAHs, metals (As, Cd, and Zn), TPH-Dx, and BEHP.	February 28, 2003 State Fire Marshall lists one spill (diesel fuel) on property in 2000. DEQ Suspect site requiring further investigation. Site Discovery Information Request letter to Port of Portland. No recent information available. EPA considers SW pathway to be controlled.	SW: No information available from DEQ PPR. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Earle J Jorgensen 6550 N Ensign Street	3802 (Open)	49899	NE	NE	NE	NE	NE	I	I	I	A	--	--	--		Site Screening recommended. Unassigned cleanup. No recent information available. EPA considers SW pathway to be controlled.	SW: No information available from DEQ PPR. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
United Parcel Service Portland 6707 N Basin Avenue	3803 (Open)	9329, 49900	NE	NE	NE	NE	NE	I	I	I	A	--	--	--		6707 N Basin Avenue: Unassigned cleanup. UPS. Leaking Underground Storage Tank 26-92-0109; project closed. Current NPDES 1200Z SW NEC. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z NEC. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.

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			Overland Flow	Bank Erosion	GW	Stormwater	Overwater Activities/Structures	Riverbank Erosion	GW	Overwater Activities	Stormwater Pathway	COC >CUL	COC>RAL/PTW Threshold (Remediation Required)				
Reliance Steel & Aluminum Co. dba Tube Service Co. 6650 N Ensign Street	--	--	--	--	--	--	--	I	I	I	B	--	--	--	Total PCBs, dioxins/furans (TCDD eq, HxCDF, PeCDD, PeCDF, TCDD, TCDF), pesticides (dieldrin), cPAHs, metals (As, Cd, and Zn), TPH-Dx, and BEHP.	NPDES 1200Z SW Permit.	SW: Current NPDES 1200Z permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Columbia Distributing 6840 N Cutter Circle	3804 (Open)	4403	NE	NE	NE	NE	NE	I	I	I	A	--	--	--		Unassigned cleanup. No information available. EPA considers SW pathway to be controlled.	SW: No information available from DEQ PPR. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Maletis Beverage 7000 N Cutter Circle	3805 (Open)	49901	NE	NE	NE	NE	NE	I	I	I	B	--	--	--		Unassigned cleanup. NPDES 1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Xpress Global Systems 6840 N Fathom Street	--	--	--	--	--	--	--	I	I	I	B	--	--	--		NPDES 1200Z NEC. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z NEC. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Camco Manufacturing Inc. 6840 N Fathom Street	3806 (Open)	4404	NE	NE	NE	NE	NE	I	I	I	B	--	--	--		Unassigned cleanup. NPDES 1200Z SW NEC for Xpress Global Systems located at this address. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z NEC. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Roadway Express (Currently YRC Inc.) 6845 N Cutter Circle	3807 (Closed)		NE	NE	NE	Low	NE	I	I	I	B	**Soil** = TPH - heavy oil. **2003 - 2018 SW** = Cu, Zn, Hg, OCPs, PCBs, cPAHs ND but MRLs > CULs.	--	**Soil** = Heavy oil		2010 NFA for 2010 soil removal. DEQ, 2013 and 2016 - Need for SCE not needed or low priority. Site is 2,230 feet from SIB.	SW: Current NPDES 1200Z permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. ~~Is~~ Not located on SIB riverbank.

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			Overland Flow	Bank Erosion	GW	Stormwater	Overwater Activities/Structures	Riverbank Erosion	GW	Overwater Activities	Stormwater Pathway	COC >CUL	COC>RAL/PTW Threshold (Remediation Required)				
ECSI and/or NPDES 1200Z Upland Sites in City of Portland Outfall M-2 Drainage Basin																	
GI Trucking (Currently SAIA Motor Freight) 5820 N Basin Avenue	1840 (Closed)	4957	NE	NE	NE	Low	NE	I	I	I	B	**Soil gas and soil** = Diesel and bunker oil **2003 - 2018 SW** = Cu, Zn. Hg, OCPs, PCBs, cPAHs ND but MRLs > CULs.	--	**Soil** = Diesel and bunker oil	Total PCBs, dioxins/furans (TCDD eq, HxCDF, PeCDD, PeCDF, TCDD, TCDF), pesticides (dieldrin), cPAHs, metals (As, Cd, and Zn), TPH-Dx, TBT, and BEHP.	2010 NFA for 2005 soil removal DEQ, 2016 - Need for SCE TBD, low priority. Site is 553 feet from SIB Current NPDES 1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. ~~Is~~ Not located on SIB riverbank.
Stack Metallurgical Services Inc. 5938 N Basin Avenue	--	--	--	--	--	--	--	I	I	I	B	--	--	--		NPDES 1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Anderson Construction 6712 N Cutter Circle	--	--	--	--	--	--	--	I	I	I	B	--	--	--		NPDES 1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Vigor Machine 5926 N Basin Avenue	--	--	--	--	--	--	--	I	I	I	A	--	--	--		NPDES 1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z NEC. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Oregon Transfer Company 5910 N Cutter Circle	--	--	--	--	--	--	--	I	I	I	A	--	--	--		NPDES 1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z NEC. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Project PM LLC 5914 N Basin Avenue	--	--	--	--	--	--	--	I	I	I	A	--	--	--		NPDES 1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z NEC. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.

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Swan Island Basin Project Area Sufficiency Assessment Summary Matrix
Pre-Final 90% Remedial Design, Swan Island Basin Project Area, Portland, Oregon

Site	DEQ ECSI # (Status)	Project RID	DEQ Status of Site Recontamination Pathways (DEQ, 2016)					HGL Site Status of Potential Recontamination Pathways to Swan Island				Most Recent Data Availability and ROD Table 17 and 21 Contaminants		DEQ Identified COCs (ECSI Summaries, Site Reports)[2]	SIB Project Area Sufficiency Assessment Contaminants (SIB RPCs in All Media)	Milestone Document and Other Information	Rationale for Pathway Rankings
			Overland Flow	Bank Erosion	GW	Stormwater	Overwater Activities/Structures	Riverbank Erosion	GW	Overwater Activities	Stormwater Pathway	COC >CUL	COC>RAL/PTW Threshold (Remediation Required)				
ECSI and/or NPDES 1200Z Upland Sites in City of Portland Outfall M-3 Drainage Basin																	
United Parcel Service South 5550 N Basin Avenue	3803 (Closed)	9329, 49900	NE	NE	NE	NE	NE	I	I	I	A	--	--	--		5550 N Basin Avenue : P.I.E Nationwide, Inc. Leaking Underground Storage Tank 26-89-0065; project closed. NPDES 1200Z SW NEC. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z NEC. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
DTNA Corp 10 (Formerly Freightliner Parts Manufacturing Plant) 5400 N Basin Avenue	115 (Closed)	1027	NE	NE	Low	Low	NE	I	I	I	A	**2008-2009, 2014 SCE SW** = As, Cu, Zn, BEHP, cPAHs, PCBs ND but MRLs >CUL, except one detection in 2014. **2002 - 2018 NPDES SW:** Cu, Zn, DDT (2013), cPAHs, **2012 SW Solids (removed)** = Cd, PCBs, BEHP. GW = VOCs	--	**Soil** = PCBs, petroleum hydrocarbons, metals, VOCs, PAHs **GW** = VOCs	Total PCBs, dioxins/furans (TCDD eq, HxCDF, PeCDD, PeCDF, TCDD, TCDF), pesticides (dieldrin, DDx), cPAHs, metals (As, Cd,and Zn), TPH-Dx-and BEHP.	SCD, June 2018. DEQ 2021 CSCD for City Outfalls (M-3). Current NPDES 1200Z SW Permit. BMPs: Monthly sweeping. Annual catch basin cleanouts. Catch basin and roof runoff treatment. Site is 500 feet from SIB.	SW: Current NPDES 1200Z permit.PCBs > PTW threshold in inline solids collected in MH AND479 along N Emerson Street adjacent to DTNA Corp 10. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Fred Meyer – Swan Island 3205 N Webster Street	44 (Closed)	2941	Low	NE	Low, Excluded	Low, Excluded	NE	I	I	I	B	--	**PDI in-line stormwater solids** = PCBs	**Soil** = PCBs, petroleum hydrocarbons		Paved contaminated soil in 1988. DEQ NFA, 1992. Pavement has degraded and exposed contaminated soils along north and south edges of the parcel. PCBs detected above CULs in surface solids along southern part of N. Emerson Street adjacent to this site in 2012. Site is 1,765 feet from SIB. Off-site tracking of PCB-impacted soil. EPA considers SW pathway to be controlled.	SW: PCBs > PTW threshold in inline solids collected in MH AND479. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
DSU Peterbilt & GMC Truck Inc. 4810 N Lagoon Avenue	--	--	--	--	--	--	--	I	I	I	B	--	--	--		NPDES 1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Cummins Inc. dba Cummins Northwest 4711 N Lagoon Avenue	--	--	--	--	--	--	--	I	I	I	B	--	--	--		NPDES 1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank..
Daimler Truck North America Corp 12 4730 N Lagoon Avenue	--	--	--	--	--	--	--	I	I	I	B	--	--	--		NPDES 1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Swan Island Dairy 4950 N Basin Avenue	--	--	--	--	--	--	--	I	I	I	B	--	--	--		NPDES 1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.

Table 2-1
Swan Island Basin Project Area Sufficiency Assessment Summary Matrix
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Site	DEQ ECSI # (Status)	Project RID	DEQ Status of Site Recontamination Pathways (DEQ, 2016)					HGL Site Status of Potential Recontamination Pathways to Swan Island				Most Recent Data Availability and ROD Table 17 and 21 Contaminants		DEQ Identified COCs (ECSI Summaries, Site Reports)[2]	SIB Project Area Sufficiency Assessment Contaminants (SIB RPCs in All Media)	Milestone Document and Other Information	Rationale for Pathway Rankings
			Overland Flow	Bank Erosion	GW	Stormwater	Overwater Activities/Structures	Riverbank Erosion	GW	Overwater Activities	Stormwater Pathway	COC >CUL	COC>RAL/PTW Threshold (Remediation Required)				
Metro Paint Processing Facility 4825 N Basin Avenue	--	--	--	--	--	--	--	I	I	I	A	--	--	--	Total PCBs, dioxins/furans (TCDD eq, HxCDF, PeCDD, PeCDF, TCDD, TCDF), pesticides (dieldrin, DDx), cPAHs, metals (As, Cd, and Zn), TPH-Dx, and BEHP.	NPDES 1200Z NEC. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z NEC. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Premier Press 5000 N Basin Avenue	--	--	--	--	--	--	--	I	I	I	A	--	--	--		NPDES 1200Z NEC. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z NEC. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Rose City Moving & Storage Co 5130 N Basin Avenue	--	--	--	--	--	--	--	I	I	I	A	--	--	--		NPDES 1200Z NEC. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z NEC. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Upland ECSI and/or NPDES 1200Z Sites in City Outfall Basin S-1																	
Chris & Alice LLC (Formerly EWH, LLC, Service Steel) 5555 N Channel Avenue, Bldg. 2	5685 (Open)	5481	NE	NE	NE	Low, uncontrolled	NE	I	I	I	B	**SW** = Cu, Zn, BEHP, cPAHs, PCBs (1), DDE (1). Other OCPs ND < CUL. Other PCB analyses ND MRL > CUL.	--	--	Total PCBs, dioxins/furans (TCDD eq, HxCDF, PeCDD, PeCDF, TCDD, TCDF), pesticides (dieldrin, DDx), cPAHs, metals (As, Cd, and Zn), TPH-Dx, and BEHP.	2012 DEQ Letter Agreement for SW Assessment. SW Assessment in progress. In 2016, DEQ concluded that additional SW SCMs were needed and sources were uncontrolled, but recontamination potential and priority were low. SCMs have been implemented. Effectiveness monitoring in 2021-2022. SCE expected after effectiveness monitoring. 2025: SCE pending. Current NPDES 1200 SW Permit.	SW: Current NPDES 1200Z Permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Estey (Formerly Automatic Vending) 5001 N Lagoon Avenue	1430 (Open)	4055	NE	NE	Low, Excluded	Low, Excluded	NE	I	I	I	B	**SW/GW**: TPH, PCE, TCE, SVOCs, PCBs, metals (As, Cd, Cr, Cu, Pb, Hg, Zn)	--	--		1991: Tank removal, NFA. 2021: Draft Final 2021 GW SCE and SW SCE in progress (two of four required events performed). - 2024: Stormwater and stormwater solids sampling and analysis. 2024: SWPCP issued. 2025: Revised SCE. 2025: SCDE pending.	SW: SCDE pending. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
DSU Peterbilt & GMC Inc. 5555 N Lagoon Avenue	--	--	--	--	--	--	--	I	I	I	B	--	--	--		1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z Permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.

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			Overland Flow	Bank Erosion	GW	Stormwater	Overwater Activities/Structures	Riverbank Erosion	GW	Overwater Activities	Stormwater Pathway	COC >CUL	COC>RAL/PTW Threshold (Remediation Required)				
Upland ECSI and/or NPDES 1200Z Sites in City Outfall Basin S-2																	
Daimler Truck North America Corp 2 5161 N Lagoon Avenue	--	--	--	--	--	--	--	I	I	I	B	--	--	--	Total PCBs, dioxins/furans (HxCDF, PeCDD, PeCDF, TCDD, TCDF), pesticides (aldrin, dieldrin, lindane, DDE, DDE, DDT, DDx, total chlordane), cPAHs, metals (As, Cd, Cu, Pb, Hg, and Zn), TPH-Dx, TBT, and BEHP.	1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z Permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
Daimler Truck North America Corp 3 5411 N Lagoon Avenue	--	--	--	--	--	--	--	I	I	I	B	--	--	--		1200Z SW Permit. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z Permit. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.
AmFor Electronics 5061 N Lagoon Avenue	--	--	--	--	--	--	--	I	I	I	A	--	--	--		1200Z SW NEC. EPA considers SW pathway to be controlled.	SW: Current NPDES 1200Z ~~Permit~~ NEC. GW: Incomplete, no plumes identified. RB and OW: Incomplete. Not located on SIB riverbank.

Notes:
[1] Site status is indicated as follows:
A = Sources are sufficiently controlled.
B = Sources are conditionally controlled.
C = Sources are not sufficiently assessed or controlled, including: (C[u]) Sources not sufficiently controlled because RPCs are present in site media > CUL and/or RALs, there is a direct pathway, and modeling indicates recontamination potential. Sites may require additional assessment.
(C[a]) Sources not sufficiently assessed.

I = Pathway is incomplete
[2] COCs taken from City of Portland Bureau of Environmental Services, 2014a through 2014f; DEQ, 2016; City of Portland Bureau of Environmental Services NPDES 1200Z SW data; and/or relevant site investigation reports from Environmental Data Management System (DEQ, 2024).
[3] The Site is not in the M-1 drainage area.
Shading indicates sites for which source control decisions / no further action determinations have been issued by DEQ.

-- = input not available/applicable
< = less than
> = greater than
As = arsenic
BEHP = bis (2-ethylhexyl) phthalate
Cd = cadmium
Cr = chromium
cPAHs = carcinogenic polycyclic aromatic hydrocarbons
CSCD = conditional source control decision
Cu = copper
CUL = cleanup level
dba = doing business as
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
DDx = DDD+DDE+DDT
D/Fs = dioxins and furans
DEQ = Oregon Department of Environmental Quality
DTNA = Daimler Truck North America LLC
ECSI = Environmental Cleanup Site Information
EPA = U.S. Environmental Protection Agency
Excluded = No source or incomplete pathway
GW = groundwater
Hg = mercury
HGL = HydroGeoLogic, Inc.
I = incomplete pathway (equivalent to "A" designation), therefore no source control action is needed before remedial action
MRL = method reporting limit
ND = not detected
NE = Pathway was not evaluated by DEQ as part of Joint Source Control Strategy work
NEC = no exposure certification
NFA = no further action
NPDES 1200-Z = National Pollutant Discharge Elimination System 1200-Z Industrial Stormwater Program
OCP = organochlorine pesticides
PAHs = polycyclic aromatic hydrocarbons
Pb = lead
PCE = tetrachloroethene
PDI = Pre-Design Investigation
RAL = remedial action level
RB = riverbank
ROD = record of decision
RPC = recontamination potential chemical
SCD = Source Control Decision
SCE = source control evaluation
SCM = source control measure
SMA = sediment management area
SVOC = semi-volatile organic compound
SW = stormwater
SWPCP = stormwater pollution control plan
TBT = tributyltin
TCE = trichloroethene
TCT = Technical Coordinating Team for Portland Harbor Superfund Site
TPH-Dx = total petroleum hydrocarbons (diesel-range)
Uncontrolled = Sources that are yet uncontrolled with a plan and schedule to be implemented
USCG = United States Coast Guard
VOC = volatile organic compounds
Zn = zinc

Table 2-2
Application of the PHSS ROD ARARs and TBC Regulations/Citations and Documentation Anticipated to Demonstrate Compliance
Pre-Final 90% Remedial Design, Swan Island Basin Project Area, Portland, Oregon

Medium	Regulation/Citation	ARAR or TBC?	Design Deliverable that Address Compliance with ARARs	Compliance Measure Implementation Details
Chemical-Specific ARARs (see ROD Table 25a [EPA, 2017] for further details)				
Protection of surface water	CWA, 33 USC 1313 and 1314 (Sections 303 and 304). Most recent 304(a) list of recommended water quality criteria.	Relevant and Appropriate	- Design Criteria Report, Section 2.3 - CWA Analysis Technical Memronduam - CQA/QCP and WQMP (attachment) - PAMP - O&M Plan - ICIAP - Specification Sections: 01 35 43, 01 41 00, 35 24 00, 35 24 20.01, 35 37 10	Using OAR established water quality standards in the project-specific CQA/QCP which is incorporated in CWA Analysis. Developed monitoring requirements for cap performance and riverbank remedy in PAMP; O&M of remedy in O&M Plan, and controls to protect the remedy in ICIAP. Specifications provide requirements to ensure compliance.
	Water Pollution Control Act ORS 468B.048. Statewide Numeric Water Quality Criteria set forth in OAR Part 340, Division 41, including Toxic Substances criterion at OAR Part 340 41 0033 (Tables 30 and 40), and Designated Uses for the Willamette Basin and Numeric Water Quality Criteria specified for the Willamette Basin at OAR 340 041 340 and 340 041 0345.	Applicable, Relevant, and Appropriate		
Measure of protectiveness of human health and the environment in all media	Oregon Environmental Cleanup Law ORS 465.315(b)(A). Oregon Hazardous Substance Remedial Action Rules OAR 340 122 0040(2)(a) and (c), 0115(2 4).	Applicable		
Protection of potential drinking water sources	Safe Drinking Water Act, 42 USC 300f, 40 CFR Part 141, Subpart O, Appendix A. 40 CFR Part 143.	Relevant and Appropriate	N/A for SIB Project Area RD/RA	Develop action-specific standards for minimizing discharges of contaminants during construction that meet MCL goals.
	EPA RSL for Groundwater. Office of Superfund Remediation and Technology Innovation, Assessment and Remediation Division. November 2015.	TBC		Consider RSLs to establish acceptable risk levels where no MCLs or MCLGs are applicable.
Action-Specific ARARs (see ROD Table 25b [EPA, 2017] for further details)				
Actions that discharge dredged or fill material into navigable waters	CWA, Section 404, 33 USC 1344 and Section 404(b)(1) Guidelines, 40 CFR Part 230 (Guidelines for Specification of Disposal Sites for Dredged or Fill Material)	Applicable	- Design Criteria Report, Section 2.3 - CWA Analysis Technical Memronduam - Habitat Impact Evaluation Technical Memorandum - CQA/QCP and WQMP (attachment) - Specification Sections: 01 35 43, 01 41 00, 35 24 00, 35 24 20.01, 35 37 10	Evaluated habitat impacts for RA approaches to demonstrate consistency with CWA Section 404. Provided inputs for HEA model developed by EPA. EPA determination consistent with comprehensive mitigation framework developed in coordination with NMFS and USFWS. CQA/QCP includes monitoring requirements during RA construction. Specifications provide requirements to ensure compliance.
Actions that discharge pollutants to Waters of the United States	CWA, Section 402, 33 USC 1342	Relevant and Appropriate	- Dredging Design Technical Memorandum - CQA/QCP and WQMP (attachment) - Specification Sections: 01 35 43, 01 41 00, 35 24 00, 35 24 20.01	Dredging design describes BMPs for water management. CQA/QCP (WQMP) provides treatment, monitoring, and discharge requirements during RA construction for EPA Section 401 Water Quality Certification or equivalent. Specifications provide requirements to ensure compliance.
Actions that discharge pollutants to Waters of the United States	CWA, 33 USC 1341, (Section 401), 40 CFR Section, 121.2(a)(3), (4) and (5). Also see OAR 340 048 0015 "When Certification Required" pursuant to Oregon state law.	Relevant and Appropriate		
Actions resulting in discharges to Waters of the State of Oregon, including removal and fill activities	ORS 468B.025 and State water quality standards established by rule: OAR 340 041 0002 through 0059, and Willamette Basin Designated Uses and Basin specific water quality standards at OAR 340 041 340 and OAR 340 041 345.	Relevant and Appropriate		
Actions resulting in discharges from removal and fill activities	ORS 196.825(5) Statutory requirement to mitigate for expected adverse effects of removal and fill activities. Applicable substantive mitigation rules are: OAR 141 085 510, 141 085 680, 141 085 0685, 141 085 0690, 141 085 0710, and 141 085 715.	Applicable	- Design Criteria Report, Section 2.3 - CWA Analysis Technical Memronduam - Habitat Impact Evaluation Technical Memorandum - CQA/QCP and WQMP (attachment) - Specification Sections: 01 35 43, 01 41 00, 35 24 00, 35 24 20.01, 35 37 10	Evaluated habitat impacts for RA approaches to demonstrate consistency with CWA Section 404. Provided inputs for HEA model developed by EPA. EPA determination consistent with comprehensive mitigation framework developed in coordination with NMFS and USFWS. CQA/QCP includes monitoring requirements during RA construction. Specifications provide requirements to ensure compliance.

Table 2-2
Application of the PHSS ROD ARARs and TBC Regulations/Citations and Documentation Anticipated to Demonstrate Compliance
Pre-Final 90% Remedial Design, Swan Island Basin Project Area, Portland, Oregon

Medium	Regulation/Citation	ARAR or TBC?	Design Deliverable that Address Compliance with ARARs	Compliance Measure Implementation Details
Action-Specific ARARs (see ROD Table 25b [EPA, 2017] for further details) (Continued)				
Actions in federal navigation channels	River and Harbors Act of 1899, Section 10, 33 USC Section 403 and implementing regulations at 33 CFR Sections 322(e), 323.3, 323.4(b) (c), and 329.	Applicable	- Design Criteria Report, Section 2.3 - CQA/QCP - TODP - ICIAP - Specificaion Sections 01 11 00, 01 31 00, and 02 21 00, 35 37 10	CQA/QCP identifies areas where dedging and capping are assigned with over dredge allowances or buffer zones as specified in Section 3 of RDGC. TODP addresses potential for transport of materials through the federal navigation channel. ICIAP addresses requirements for controls. Specifications provide additional requirements to ensure compliance.
Actions generating pesticide residue	Hazardous Waste and Hazardous Materials II. Identification and Listing of Hazardous Waste OAR 340 101 0033(6) and (7); OAR 340 100 0010(j); and OAR 340 109 0010(3) and (4).	Applicable	- Design Criteria Report, Section 2.3 - Waste Designation Memorandum - Specification Sections 01 41 00, 02 61 00, 35 24 20.01	Identified pesticide constiuents in Waste Designation Memorandum based on RD characterization efforts. Specifications provide requirements to ensure compliance.
Actions handling PCB remediation wastes and PCB containing material	Toxic Substances Control Act,. 15 USC §2601 et seq., 40 CFR Part 761, Subpart D and OAR 340 110 0065 (1) and (2)	Applicable	- Design Criteria Report, Section 2.3 - Waste Designation Memorandum - Specification Sections 01 41 00, 02 61 00, 35 24 20.01	Identified PCBs in Waste Designation Memorandum based on RD characterization efforts. Specifications provide requirements to ensure compliance.
Risk based limits protective of human health for air emissions associated with soil or sediment removal	Clean Air Act, 40 CFR Parts 50 and 52	Relevant and Appropriate	- Design Criteria Report, Section 2.3 - CQA/QCP - Green Remediation Plan - Specification Sections 01 35 29, 01 35 43, 01 41 00, 02 61 00	Developed and incorporated requirement for air pollution monitoring plan, green remediation and emission control considerations for inclusion in RD. Specifications provide requirements to ensure compliance.
Actions generating air emissions	Oregon Air Pollution Control ORS 468A et seq., General Emissions Standards OAR 340 226	Applicable		
Actions that involve handling of dredged sediment or riverbank soils containing asbestos	National Emission Standards for Asbestos, 40 CFR 61.150(a)(1)(i)(v)	Relevant and Appropriate	- CQA/QCP - Waste Designation Memorandum - Specification Sections 01 35 29, 01 41 00, 02 41 00, 02 42 00	Developed and incorporated requirement for air pollution monitoring plan, Waste Designation Memorandum notes the need for asbestos sampling prior to excavation/transport/disposal. Specifications provide requirements to ensure compliance.
	National Emission Standards for Asbestos, 40 CFR 61.150(b)(1) and (2) and (c)	Applicable		
Actions on the riverbanks that expose and manage on site soils containing asbestos	National Emission Standards for Asbestos, 40 CFR 61.151(a)(2) and (3), 40 CFR 61.151(b)(1)(i) through (iii) and 40 CFR 61.151(b)(2)	Applicable		
Actions generating air emissions	Fugitive Emission Requirements OAR 340 208 0205, 0208, and 0209	Applicable	- Design Criteria Report, Section 2.3 - CQA/QCP - Green Remediation Plan - Specification Sections 01 35 29, 01 35 43, 01 41 00, 02 61 00	Developed and incorporated requirement for air pollution monitoring plan, green remediation and emission control considerations for inclusion in RD. Specifications provide requirements to ensure compliance.
Actions that may alter waterbodies and that may effect fish and wildlife	Fish and Wildlife Coordination Act. 16 USC 662 and 663, 50 CFR 6.302(g)	Applicable	- Design Criteria Report, Sections 2.3 and 3.10 - CWA Analysis Technical Memronduam - Habitat Impact Evaluation Technical Memorandum - Specification Sections 01 11 00, 01 14 00, 35 24 20	Defined construction strategies for adherence to timing windows, including fish exclusion plan. Defined reasonable and prudent measures to minimize impacts of RA on essential habitats. Specifications provide requirements to ensure compliance.
Actions that may affect Endangered Species Act listed and State protected fish and wildlife species	Oregon Department of Fish and Wildlife Fish Management Plans for the Willamette River. OAR 635, div 500	Applicable		
Actions that may affect marine mammals	Marine Mammal Protection Act. 16 USC § 1361 et seq. 50 CFR 216	Applicable		
Actions that may affect migratory birds	Migratory Bird Treaty Act. 16 USC §703 50 CFR §10.12	Applicable	- Design Criteria Report, Section 2.3 - Habitat Impact Evaluation Technical Memorandum	Evaluated migratory bird timing windows and incorporate avoidance strategies in RD.
On-site actions that involve generating, handling, and disposal of hazardous waste	OAR 340 100 0001(3) and OAR 340 100 0002(1)	Applicable	- Waste Designation Memorandum - Specification Sections 01 33 16, 01 35 29, 01 35 43, 01 41 00, 02 41 00, 02 42 00, 02 61 00, 35 24 20.01	Waste Designation Memorandum documents RD characterization efforts. Specifications provide requirements to ensure compliance.

Table 2-2
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Action-Specific ARARs (see ROD Table 25b [EPA, 2017] for further details) (Continued)				
Actions generating solid wastes or hazardous wastes for off-site disposal	Solid waste defined in 40 CFR 261.2. Determining if solid waste is hazardous per 40 CFR § 262.11(a c) and OAR 340 102 0011 Hazardous Waste Determination	Applicable	- Waste Designation Memorandum - Specification Sections 01 33 16, 01 35 29, 01 35 43, 01 41 00, 02 41 00, 02 42 00, 02 61 00, 35 24 20.01	Waste Designation Memorandum documents RD characterization efforts. Specifications provide requirements to ensure compliance.
Actions generating dredged material hazardous waste	40 CFR § 261.4(g)	Applicable		
Actions generating RCRA hazardous waste that will be disposed of in a permitted off-site disposal facility	40 CFR § 264.13(a)(1)	Applicable		
Actions generating RCRA hazardous waste	40 CFR § 268.7(a)(1)	Applicable		
	40 CFR § 268.9(a)	Applicable		
Actions generating industrial wastewater	40 CFR § 261.4(a)(2)	Applicable	- Dredging Design Technical Memorandum - CQA/QCP and WQMP (attachment) - Specification Sections: 01 35 43, 01 41 00, 35 24 00, 35 24 20.01	Dredging design describes BMPs for water management. CQA/QCP (WQMP) provides treatment, monitoring, and discharge requirements during RA construction for EPA Section 401 Water Quality Certification or equivalent. Specifications provide requirements to ensure compliance.
Actions requiring temporary storage of hazardous waste	OAR 340 102 0034 40 CFR § 262.34(a); 40 CFR § 262.34(a)(1)(i); 40 CFR § 262.34(a)(2) and (3) 40 CFR § 262.34(c)(1)	Applicable	- Specifications Sections 01 14 00, 01 35 43, 01 41 26, 01 52 00, 01 74 23, 35 24 20.01, 35 37 10	Specifications provide requirements to ensure compliance.
Actions resulting in the storage of solid waste	OAR 340 093 0210 and 0220	Applicable		
	OAR 340 095 0010, 0020, 0030, 0050(1) & (2), 0070(2)	Applicable		
Actions transporting hazardous materials	49 CFR § 171.1(b)	Applicable	- Waste Designation Memorandum - TODP - Specification Sections 01 14 00, 01 35 43, 01 55 26, 02 61 00, 35 24 20, 35 24 20.01	Waste Designation Memorandum documents RD characterization efforts. TODP discusses transportation and disposal of waste. Specifications provide requirements to ensure compliance.
Location-Specific ARARs (see ROD Table 25c [EPA, 2017] for further details)				
Actions that involve storage and treatment of hazardous waste at the transloading facility	40 CFR Part 264, Subparts B, C, F, G, I, J, K, L, M, AA, BB, CC, and DD	Applicable	- Waste Designation Memorandum - TODP - Specification Sections 01 14 00, 01 35 43, 01 55 26, 02 61 00, 35 24 20, 35 24 20.01	Waste Designation Memorandum documents RD characterization efforts. TODP discusses transloading facility. Specifications provide requirements to ensure compliance.
Presence of archaeologically or historically sensitive area	Native American Graves Protection and Reparation Act, 25 USC 3001 3013, 43 CFR 10	Applicable	- CQA/QCP with AIDP template	Includes AIDP example as a guide for the RA contractor that will be responsible for preparing the AIDP in advance of RA construction.
	Indian Graves and Protected Objects ORS 97.740 760	Relevant and Appropriate		
	Archaeological Objects and Sites ORS 358.905 955 ORS 390.235	Relevant and Appropriate		
Presence of archaeologically or historically sensitive area	National Historic Preservation Act. 16 USC 470 et seq. 36 CFR Part 800	Applicable		
	Archaeological and Historic Preservation Act. 16 USC 469a 1	Applicable		
Presence of floodplain as designated on FEMA Flood Insurance map	44 CFR 60.3(d)(2) and (3)	Relevant and Appropriate	- Design Criteria Report, Sections 2.2.3 and 2.3 - CWA Analysis Technical Memorandum	Defines FEMA regulated floodplain as it pertains to SIB Project Area. Conducted flood impact evaluation to demonstrate that RA will not result in unacceptable flood rise or loss of flood storage.
Presence of floodplain as designated on map	FEMA regulations at 44 CFR 9 (which sets forth the policy, procedure and responsibilities to implement and enforce Executive Orders 11988 (Management of Floodplain) as amended by Executive Order 13690 and 11990 (Protection of Wetlands)	Regulations: Relevant and Appropriate Executive Order: TBC		

Table 2-2
Application of the PHSS ROD ARARs and TBC Regulations/Citations and Documentation Anticipated to Demonstrate Compliance
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Location-Specific ARARs (see ROD Table 25c [EPA, 2017] for further details) (Continued)				
Presence of wetlands	Executive Order for Wetlands Protection. Executive Order 11990 (1977)	TBC	- Design Criteria Report, Section 2.3 - CWA Analysis Technical Memorandum - Habitat Impact Evaluation Technical Memorandum	Reviewed and evaluated SIB Project Area for any nascent wetlands. Discuss in CWA analysis, Habitat Impact Evaluation if present.
Presence of state listed threatened or endangered wildlife species	Protection and Conservation Programs ORS. 496.171 to 496.182. Survival Guidelines OAR 635 100 0135	Relevant and Appropriate	- Design Criteria Report, Section 2.3 - CWA Analysis Technical Memorandum - Habitat Impact Evaluation Technical Memorandum	CWA analysis and Habitat Impact Evaluation discuss state and federally protected species. Discuss preferred habitats and the presence or absence. Define construction strategies for adherence to timing windows, including fish exclusion plan. Define reasonable and prudent measures to minimize impacts of RA on essential habitats.
Presence of essential fish habitat	Magnuson Stevens Fishery Conservation and Management Act. 50 CFR Part.600.920	Applicable		
Presence of federally endangered or threatened species	Endangered Species Act. 16 USC 1536 (a)(2), Listing of endangered or threatened species per 50 CFR 17.11 and 17.12 or designation of critical habitat of such species listed in 50 CFR 17.95	Applicable		

Notes:
EPA, 2017. *Record of Decision, Portland Harbor Superfund Site,* Portland, Oregon. EPA Region 10, Seattle, Washington. January.

AIDP = Archaeological Inadvertent Discovery Plan
ARAR = Applicable or Relevant and Appropriate Requirements
CFR = Code of Federal Regulations
COC = contaminant of concern
CQA/QCP = Construction Quality Assurance/Quality Control Plan
CWA = Clean Water Act
EPA = U.S. Environmental Protection Agency
FEMA = Federal Emergency Management Agency
HEA = Habitat Equivalency Analysis
ICIAP = Institutional Control Implementation and Assurance Plan
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
N/A = not applicable
NMFS = National Marine Fisheries Service
OAR = Oregon Administrative Rule
ORS = Oregon Revised Statute
O&M = operation and maintenance
PAMP = Project Area Monitoring Plan
PCB = polychlorinated biphenyls
PHSS = Portland Harbor Superfund Site
RA = remedial action
RCRA = Resource Conservation and Recovery Act
RD = Remedial Design
RDGC = Remedial Design Guidelines and Considerations
ROD = Record of Decision
RSL = Regional Screening Level
SIB = Swan Island Basin
SMA = sediment management area
TBC = To Be Considered
TODP = Transportation and Off-Site Disposal Plan
USC = U.S. Code
USFWS = U.S. Fish and Wildlife Service
WQMP = Water Quality Monitoring Plan

FIGURES

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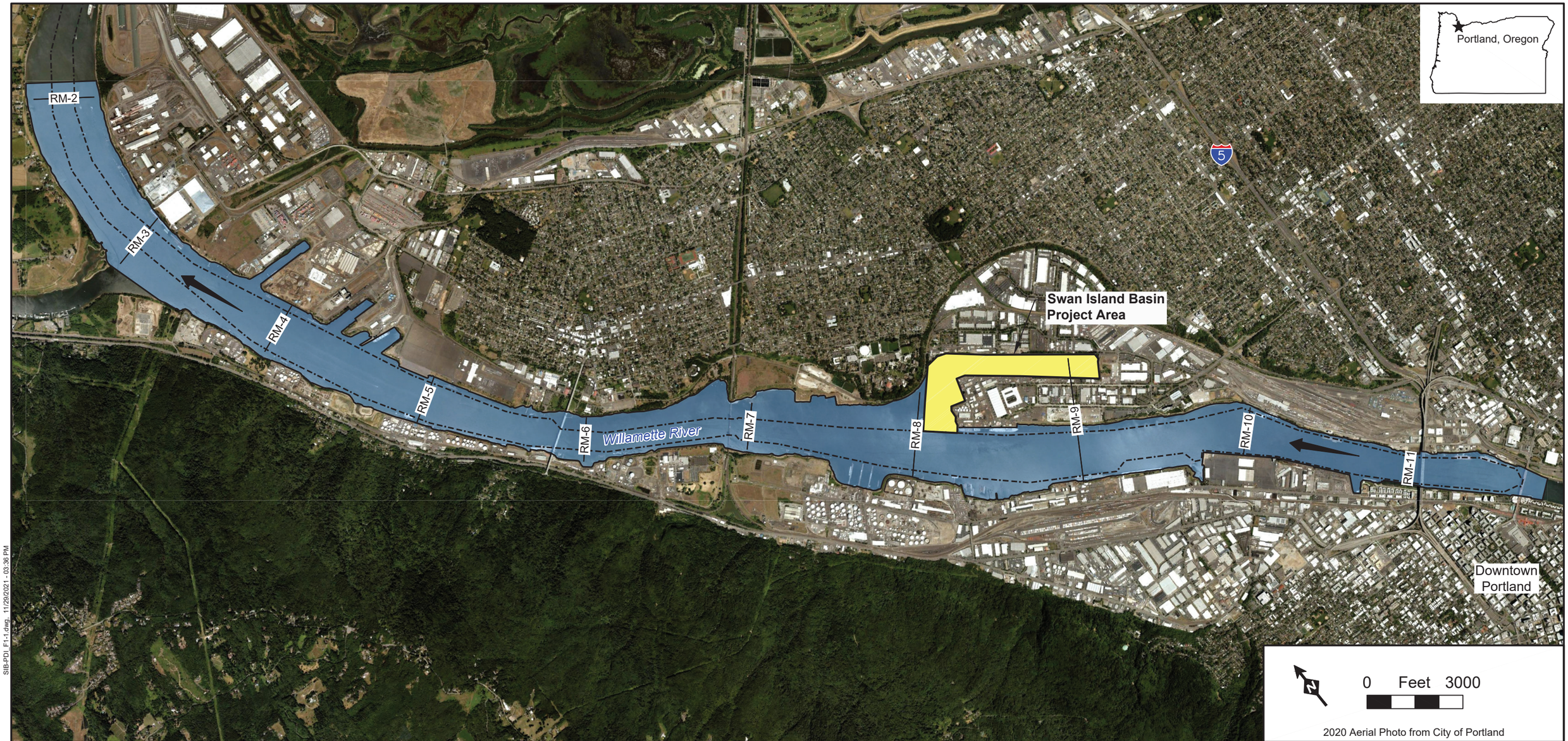

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Federal Navigation Channel (USACE 2020)

River Flow Direction

Swan Island Basin Project Area

Portland Harbor Superfund Site Boundary (River Mile 1.9 to 11.8)

Notes:
NOAA - National Oceanic and Atmospheric Administration
RM - River Mile
SIB - Swan Island Basin
USACE - U.S. Army Corps of Engineers

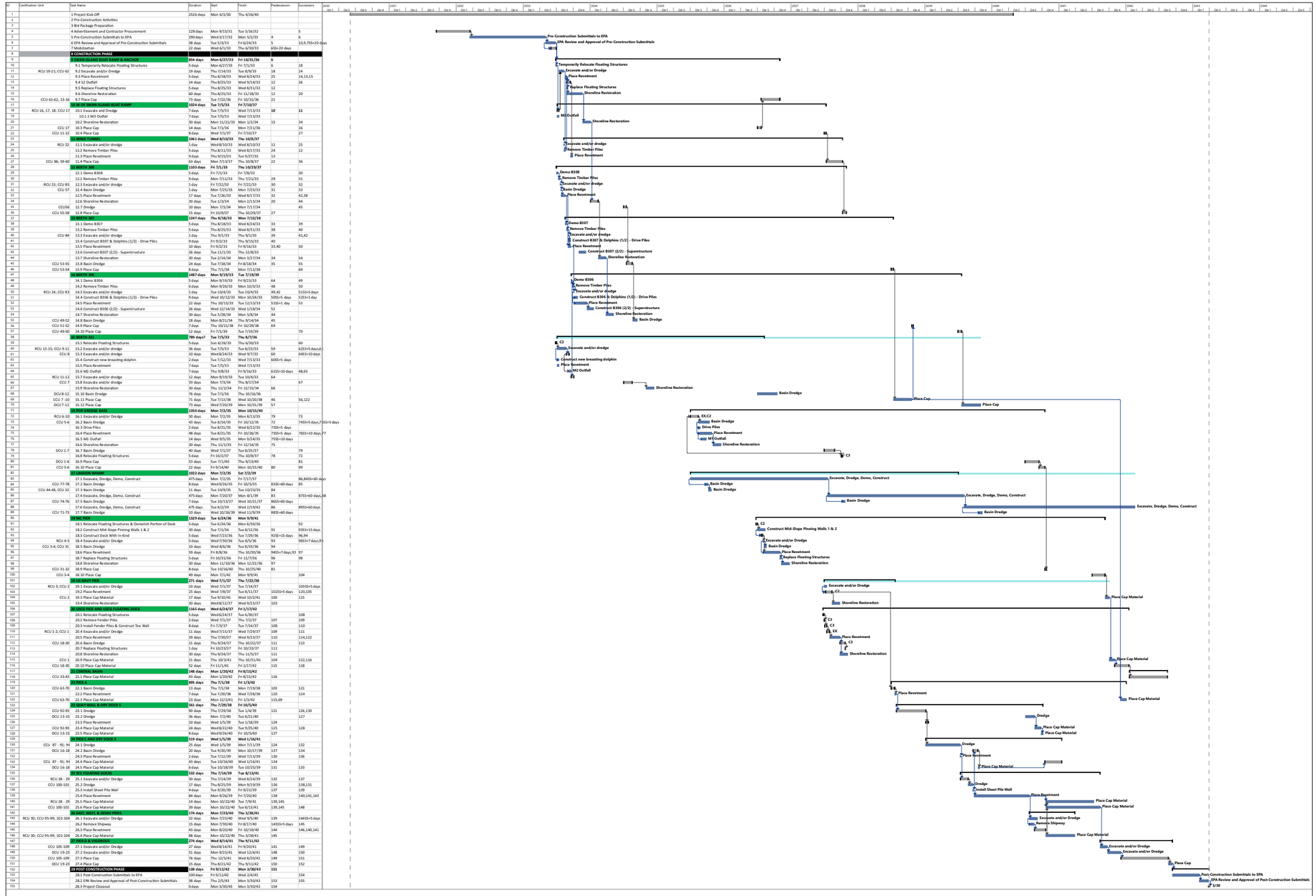
Source:
NOAA, 2016. Booklet Chart, Willamette River – Swan Island Basin, NOAA Chart 18527 at URL: https://www.charts.noaa.gov/BookletChart/18527_BookletChart.pdf - Navigation Channel

Figure 1-1
SIB Project Area Location Map

Prepared 11/26/2024
90% Design Criteria Report
Swan Island Remedial Design Group

HGL · Mott MacDonald · Coast & Harbor Engineering · Pacific Groundwater Group · Bridgewater Group

ID	Certification Unit	Task Name	Duration	Start	Finish	Predecessors	Successors
1		1 Project Kick-Off	2526 days	Mon 6/3/30	Thu 4/26/40		
2		2 Pre-Construction Activities					
3		3 Bid Package Preparation					
4		4 Advertisement and Contractor Procurement	128 days	Mon 9/15/31	Tue 3/16/32		5
5		5 Pre-Construction Submittals to EPA	290 days	Wed 3/17/32	Mon 5/2/33	4	6
6		6 EPA Review and Approval of Pre-Construction Submittals	38 days	Tue 5/3/33	Fri 6/24/33	5	10,9,755+20 days
7		7 Mobilization	22 days	Wed 6/1/33	Thu 6/30/33	655+20 days	
8		**8 CONSTRUCTION PHASE**					
9		**9 MAIN ISLAND BOAT RAMP & ANCHOR**	**804 days**	**Mon 6/27/33**	**Fri 10/31/36**	**6**	
10		9.1 Temporarily Relocate Floating Structures	5 days	Mon 6/27/33	Fri 7/1/33	6	18
11	RCU 19-21; CCU 62	9.2 Excavate and/or Dredge	19 days	Thu 7/14/33	Tue 8/8/33	18	24
12		9.3 Place Revetment	5 days	Thu 8/18/33	Wed 8/24/33	25	14,13,15
13		9.4 S2 Outfall	14 days	Thu 8/25/33	Wed 9/14/33	12	26
14		9.5 Replace Floating Structures	5 days	Thu 8/25/33	Wed 8/31/33	12	
15		9.6 Shoreline Restoration	60 days	Thu 8/25/33	Fri 11/10/33	12	20
16	CCU 61-62, 13-16	9.7 Place Cap	73 days	Tue 7/22/36	Fri 10/31/36	21	
17		**10 W OF SWAN ISLAND BOAT RAMP**	**1024 days**	**Tue 7/5/33**	**Fri 7/10/37**		
18	RCU 16, 17, 18; CCU 17	10.1 Excavate and Dredge	7 days	Tue 7/5/33	Wed 7/13/33	**10**	**11**
19		10.1.1 M3 Outfall	7 days	Tue 7/5/33	Wed 7/13/33		
20		10.2 Shoreline Restoration	30 days	Mon 11/21/33	Mon 1/2/34	15	34
21	CCU 17	10.3 Place Cap	14 days	Tue 7/1/36	Mon 7/21/36		16
22	CCU 11-12	10.4 Place Cap	8 days	Wed 7/1/37	Fri 7/10/37		27
23		**11 WIND TUNNEL**	**1061 days**	**Wed 8/10/33**	**Thu 10/8/37**		
24	RCU 22	11.1 Excavate and/or dredge	1 day	Wed 8/10/33	Wed 8/10/33	11	25
25		11.2 Remove Timber Piles	5 days	Thu 8/11/33	Wed 8/17/33	24	12
26		11.3 Place Revetment	9 days	Thu 9/15/33	Tue 9/27/33	13	
27	CCU 86; 59-60	11.4 Place Cap	63 days	Mon 7/13/37	Thu 10/8/37	22	36
28		**12 BERTH 308**	**1103 days**	**Fri 7/1/33**	**Thu 10/29/37**		
29		12.1 Demo B308	5 days	Fri 7/1/33	Fri 7/8/33		30
30		12.2 Remove Timber Piles	9 days	Mon 7/11/33	Thu 7/21/33	29	31
31	RCU 23; CCU 85	12.3 Excavate and/or dredge	1 day	Fri 7/22/33	Fri 7/22/33	30	32
32	CCU 57	12.4 Basin Dredge	1 day	Mon 7/25/33	Mon 7/25/33	31	33
33		12.5 Place Revetment	17 days	Tue 7/26/33	Wed 8/17/33	32	42,38
34		12.6 Shoreline Restoration	30 days	Tue 1/3/34	Mon 2/13/34	20	44
35	CCU56	12.7 Dredge	10 days	Mon 7/3/34	Mon 7/17/34		45
36	CCU 55-58	12.8 Place Cap	15 days	Fri 10/9/37	Thu 10/28/37	27	
37		**13 BERTH 307**	**1247 days**	**Thu 8/18/33**	**Mon 7/12/38**		
38		13.1 Demo B307	5 days	Thu 8/18/33	Wed 8/24/33	33	39
39		13.2 Remove Timber Piles	5 days	Thu 8/25/33	Wed 8/31/33	38	40
40	CCU 84	13.3 Excavate and/or dredge	1 day	Thu 9/1/33	Thu 9/1/33	39	41,42
41		13.4 Construct B307 & Dolphins (1/2) - Drive Piles	9 days	Fri 9/2/33	Thu 9/15/33	40	
42		13.5 Place Revetment	10 days	Fri 9/2/33	Fri 9/16/33	33,40	50
43		13.6 Construct B307 (2/2) - Superstructure	26 days	Tue 11/1/33	Thu 12/8/33		
44		13.7 Shoreline Restoration	30 days	Tue 2/14/34	Mon 3/27/34	34	54
45	CCU 53-55	13.8 Basin Dredge	24 days	Tue 7/18/34	Fri 8/18/34	35	55
46	CCU 53-54	13.9 Place Cap	8 days	Thu 7/1/38	Mon 7/12/38		69
47		**14 BERTH 306**	**1487 days**	**Mon 9/19/33**	**Tue 7/19/39**		
48		14.1 Demo B306	5 days	Mon 9/19/33	Fri 9/23/33	64	49
49		14.2 Remove Timber Piles	6 days	Mon 9/26/33	Mon 10/3/33	48	50
50	RCU 24; CCU 83	14.3 Excavate and/or dredge	1 day	Tue 10/4/33	Tue 10/4/33	49,42	51SS+5 days
51		14.4 Construct B306 & Dolphins (1/2) - Drive Piles	9 days	Wed 10/12/33	Mon 10/24/33	50SS+5 days	52SS+1 day
52		14.5 Place Revetment	22 days	Thu 10/13/33	Tue 11/13/33	51SS+1 day	53
53		14.6 Construct B306 (2/2) - Superstructure	26 days	Wed 12/14/33	Wed 1/18/34	52	
54		14.7 Shoreline Restoration	30 days	Tue 3/28/34	Mon 5/8/34	44	
55	CCU 49-52	14.8 Basin Dredge	18 days	Mon 8/21/34	Thu 9/14/34	45	
56	CCU 51-52	14.9 Place Cap	7 days	Thu 10/21/38	Fri 10/29/38	69	
57	CCU 49-50	14.10 Place Cap	12 days	Fri 7/1/39	Tue 7/19/39		70
58		**15 BERTH 305**	**789 days?**	**Tue 7/3/33**	**Thu 8/7/36**		
59		15.1 Relocate Floating Structures	5 days	Sun 6/26/33	Thu 6/30/33		60
60	RCU 13-15; CCU 9-11	15.2 Excavate and/or dredge	36 days	Tue 7/5/33	Tue 8/23/33	59	62SS+5 days,6
61	CCU 8	15.3 Excavate and/or dredge	10 days	Wed8/24/33	Wed 9/7/33	60	64SS+10 days
62		15.4 Construct new breasting dolphin	2 days	Tue 7/12/33	Wed 7/13/33	60SS+5 days	
63		15.5 Place Revetment	7 days	Tue 7/5/33	Wed 7/13/33		
64		15.6 M2 Outfall	7 days	Thu 9/8/33	Fri 9/16/33	61SS+10 days	48,65
65	RCU 11-12	15.7 Excavate and/or dredge	12 days	Mon 9/19/33	Tue 10/4/33	64	
66	CCU 7	15.8 Excavate and/or dredge	33 days	Mon 7/3/34	Thu 8/17/34		67
67		15.9 Shoreline Restoration	30 days	Thu 11/2/34	Fri 12/15/34	66	
68	DCU 8-12	15.10 Basin Dredge	76 days	Tue 7/1/36	Thu 10/16/36		
69	CCU 7 -10	15.11 Place Cap	71 days	Tue 7/13/38	Wed 10/20/38	46	56,122
70	DCU 7-12	15.12 Place Cap	70 days	Wed 7/20/39	Mon 10/21/39	57	
71		**16 POP ENSIGN BASE**	**1350 days**	**Mon 7/2/35**	**Mon 10/15/40**		
72	RCU 6-10	16.1 Excavate and/or Dredge	30 days	Mon 7/2/35	Mon 8/13/35	79	73
73	CCU 5-6	16.2 Basin Dredge	43 days	Tue 8/24/35	Fri 10/22/35	72	74SS+5 days,75SS+5 days
74		16.3 Drive Piles	2 days	Tue 8/21/35	Wed 8/22/35	73SS+5 days	
75		16.4 Place Revetment	48 days	Tue 8/21/35	Fri 10/26/35	73SS+5 days	76SS+10 days,77
76		16.5 M1 Outfall	14 days	Wed 9/5/35	Mon 9/24/35	75SS+10 days	
77		16.6 Shoreline Restoration	30 days	Thu 11/1/35	Fri 12/14/35	75	
78	DCU 1-7	16.7 Basin Dredge	40 days	Wed 7/1/37	Tue 8/25/37		79
79		16.8 Relocate Floating Structures	5 days	Fri 10/2/37	Thu 10/8/37	78	72
80	DCU 1-6	16.9 Place Cap	53 days	Sun 7/1/40	Thu 9/13/40		81
81	CCU 5-6	16.10 Place Cap	22 days	Fri 9/14/40	Mon 10/15/40	80	99
82		**17 LAGOON WHARF**	**1022 days**	**Mon 7/2/35**	**Sat 7/2/39**		
83		17.1 Excavate, Dredge, Demo, Construct	475 days	Mon 7/2/35	Fri 7/17/37		86,84SS+60 days
84	CCU 77-78	17.2 Basin Dredge	8 days	Wed 9/26/35	Fri 10/5/35	83SS+60 days	85
85	CCU 44-48, CCU 32	17.3 Basin Dredge	11 days	Tue 10/9/35	Tue 10/23/35	84	
86		17.4 Excavate, Dredge, Demo, Construct	475 days	Mon 7/20/37	Mon 8/1/39	83	87SS+60 days,88
87	CCU 74-76	17.5 Basin Dredge	7 days	Tue 10/13/37	Wed 10/21/37	86SS+60 days	
88		17.6 Excavate, Dredge, Demo, Construct	475 days	Tue 8/2/39	Wed 2/19/42	86	89SS+60 days
89	CCU 71-73	17.7 Basin Dredge	10 days	Wed 10/26/39	Wed 11/8/39	88SS+60 days	
90		**18 MC PIER**	**1329 days**	**Tue 6/24/36**	**Mon 9/9/41**		
91		18.1 Relocate Floating Structures & Demolish Portion of Deck	5 days	Tue 6/24/36	Mon 6/30/36		92
92		18.2 Construct Mid-Slope Pinning Walls 1 & 2	30 days	Tue 7/1/36	Tue 8/12/36	91	93SS+15 days
93		18.3 Construct Deck With In-Kind	5 days	Wed 7/23/36	Tue 7/29/36	92SS+15 days	96,94
94	RCU 4-5	18.4 Excavate and/or Dredge	5 days	Wed 7/30/36	Tue 8/3/36	93	96SS+7 days,9
95	CCU 3-4; CCU 31	18.5 Basin Dredge	10 days	Wed 8/6/36	Tue 8/18/36	94	
96		18.6 Place Revetment	59 days	Fri 8/8/36	Thu 10/30/36	94SS+7 days,93	97
97		18.7 Replace Floating Structures	5 days	Fri 10/31/36	Fri 11/7/36	96	98
98		18.8 Shoreline Restoration	30 days	Mon 11/10/36	Mon 12/22/36	97	
99	CCU 31-32	18.9 Place Cap	8 days	Tue 10/14/40	Thu 10/25/40	81	
100	CCU 3-4	18.10 Place Cap	49 days	Mon 7/1/41	Mon 9/9/41		104
101		**19 US NAVY PIER**	**271 days**	**Wed 7/1/37**	**Thu 7/22/38**		
102	RCU 3; CCU 2	19.1 Excavate and/or Dredge	10 days	Wed 7/1/37	Tue 7/14/37		103SS+5 days
103		19.2 Place Revetment	25 days	Wed 7/8/37	Tue 8/11/37	102SS+5 days	120,105
104	CCU 2	19.3 Place Cap Material	17 days	Tue 9/10/41	Wed 10/2/41	100	115
105		19.4 Shoreline Restoration	30 days	Wed8/12/37	Wed 9/22/37	103	
106		**20 USCG PIER AND USCG FLOATING DOCK**	**1165 days**	**Wed 6/24/37**	**Fri 1/17/42**		
107		20.1 Relocate Floating Structures	5 days	Wed6/24/37	Tue 6/30/37		108
108		20.2 Remove Fender Piles	2 days	Wed 7/1/37	Thu 7/2/37	107	109
109		20.3 Install Fender Piles & Construct Toe Wall	8 days	Fri 7/3/37	Tue 7/14/37	108	110
110	RCU 1-2; CCU 1	20.4 Excavate and/or Dredge	11 days	Wed7/15/37	Wed 7/29/37	109	111
111		20.5 Place Revetment	39 days	Thu 7/30/37	Wed 9/23/37	110	114,112
112	CCU 18-30	20.6 Basin Dredge	21 days	Thu 9/24/37	Thu 10/22/37	111	113
113		20.7 Replace Floating Structures	1 day	Fri 10/23/37	Fri 10/23/37	112	
114		20.8 Shoreline Restoration	30 days	Thu 9/24/37	Thu 11/3/37	111	
115	CCU 1	20.9 Place Cap Material	21 days	Thu 10/1/41	Thu 10/31/41	104	122,116
116	CCU 18-30	20.10 Place Cap Material	52 days	Fri 11/1/41	Fri 1/17/42	115	118
117		**21 CENTRAL BASIN**	**148 days**	**Mon 1/20/42**	**Fri 8/15/42**		
118	CCU 33-43	21.1 Place Cap Material	43 days	Mon 1/20/42	Fri 8/15/42	116	
119		**22 PIER A**	**895 days**	**Thu 7/1/38**	**Fri 1/3/42**		
120	CCU 63-70	22.1 Basin Dredge	13 days	Thu 7/1/38	Mon 7/18/38	103	121
121		22.2 Place Revetment	7 days	Tue 7/20/38	Wed 7/28/38	120	124
122	CCU 63-70	22.3 Place Cap Material	23 days	Mon 12/24/41	Fri 1/3/42	115,69	
123		**23 QUAY WALL & DRY DOCK 5**	**541 days**	**Thu 7/29/38**	**Fri 10/5/40**		
124	CCU 92-93	23.1 Dredge	90 days	Thu 7/29/38	Tue 1/4/39	121	126,130
125	DCU 13-15	23.2 Dredge	36 days	Mon 7/2/40	Tue 8/21/40		127
126		23.3 Place Revetment	10 days	Wed 1/5/39	Tue 1/18/39	124	
127	CCU 92-93	23.4 Place Cap Material	24 days	Wed8/22/40	Tue 9/25/40	125	128
128	DCU 13-15	23.5 Place Cap Material	8 days	Wed9/26/40	Fri 10/5/40	127	
129		**24 PIER C AND DRY DOCK 3**	**519 days**	**Wed 1/5/39**	**Wed 1/16/41**		
130	CCU 87 - 91; 94	24.1 Dredge	25 days	Wed 1/5/39	Mon 7/11/39	124	132
131	DCU 16-18	24.2 Basin Dredge	20 days	Tue 9/20/39	Mon 10/17/39	137	134
132		24.3 Place Revetment	2 days	Tue 7/12/39	Wed 7/13/39	130	136
133	CCU 87 - 91; 94	24.4 Place Cap Material	43 days	Tue 10/16/40	Wed 1/16/41	134	
134	DCU 16-18	24.5 Place Cap Material	6 days	Tue 10/18/39	Tue 10/25/39	131	133
135		**25 SCC FLOATING DOCKS**	**532 days**	**Thu 7/14/39**	**Tue 8/13/41**		
136	RCU 28 - 29	25.1 Excavate and/or Dredge	30 days	Thu 7/14/39	Wed 8/24/39	132	137
137	CCU 100-101	25.2 Dredge	17 days	Thu 8/25/39	Mon 9/18/39	136	138,131
138		25.3 Install Sheet Pile Wall	4 days	Tue 9/26/39	Fri 9/29/39	137	139
139		25.4 Place Revetment	84 days	Mon 9/26/39	Fri 7/20/40	138	140,141,143
140	RCU 28 - 29	25.5 Place Cap Material	14 days	Mon 10/22/40	Tue 7/9/41	139,145	
141	CCU 100-101	25.6 Place Cap Material	39 days	Mon 10/22/40	Tue 8/13/41	139,145	148
142		**26 EAST, WEST, & DEMO PIERS**	**174 days**	**Mon 7/23/40**	**Thu 3/28/41**		
143	RCU 30; CCU 95-99; 102-104	26.1 Excavate and/or Dredge	32 days	Mon 7/23/40	Wed 9/5/40	139	144SS+5 days
144		26.2 Remove Shipway	15 days	Mon 7/30/40	Fri 8/17/40	143SS+5 days	145
145		26.3 Place Revetment	43 days	Mon 8/20/40	Fri 10/19/40	144	146,140,141
146	RCU 30; CCU 95-99; 102-104	26.4 Place Cap Material	88 days	Mon 10/22/40	Thu 3/28/41	145	
147		**27 PIER D & VIGOROUS**	**274 days**	**Wed 8/14/41**	**Thu 9/11/42**		
148	CCU 105-109	27.1 Excavate and/or Dredge	27 days	Wed8/14/41	Fri 9/20/41	141	149
149	DCU 19-23	27.2 Excavate and/or Dredge	51 days	Mon 9/23/41	Wed 12/4/41	148	150
150	CCU 105-109	27.3 Place Cap	76 days	Thu 12/5/41	Wed 8/20/42	149	151
151	DCU 19-23	27.4 Place Cap	15 days	Thu 8/21/42	Thu 9/11/42	150	152
152		**28 POST CONSTRUCTION PHASE**	**138 days**	**Fri 9/12/42**	**Mon 3/30/43**	**151**	
153		28.1 Post-Construction Submittals to EPA	100 days	Fri 9/12/42	Wed 2/4/43		154
154		28.2 EPA Review and Approval of Post-Construction Submittals	38 days	Thu 2/5/43	Mon 3/30/43	153	155
155		28.3 Project Closeout	0 days	Mon 3/30/43	Mon 3/30/43	154	



Project: RA Schedule 90p_2025
Date: Thu 10/23/25

Task · Split · Milestone · Summary · Project Summary · Inactive Task · Inactive Milestone · Inactive Summary · Manual Task · Duration-only · Manual Summary Rollup · Manual Summary · Start-only · Finish-only · External Tasks · External Milestone · Deadline · Progress · Manual Progress

Page 1

Figure 3-1
90% RA Schedule

Prepared on 10/23/2025
90% Design Criteria Report
Swan Island Basin Remedial Design Group

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

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APPENDICES

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APPENDIX A

ARCHIVED SEDIMENT SAMPLE ANALYSIS TECHNICAL MEMORANDUM

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ARCHIVED SEDIMENT SAMPLE ANALYSIS TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

1.0 INTRODUCTION

This Archived Sediment Sample Analysis Technical Memorandum presents the results of additional sediment samples analyzed to support refinement of the Sediment Management Area (SMA) subject to Remedial Action for the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site in Portland, Multnomah County, Oregon. Pacific Groundwater Group, Mott MacDonald, and HydroGeoLogic, Inc. (HGL) performed the work on behalf of the SIB Remedial Design (RD) Group based on the requirements of the Portland Harbor Superfund Site Record of Decision (ROD) (EPA, 2017) and the Administrative Settlement Agreement and Order on Consent (ASAOC) (EPA, 2021a). The work was performed in accordance with the Pre-Design PDI) Work Plan (HGL, 2022) and field change request form variance number 16 (FCR 16) (HGL, 2024a).

1.1 SCOPE AND OBJECTIVES

During review of the PDI Evaluation Report (ER) (HGL, 2024b), the U.S. Environmental Protection Agency (EPA) commented that initial PDI sample locations were not analyzed at intervals consistent with identified contamination found at historical cores or in adjacent PDI samples, and as such additional intervals should be taken out of archive and analyzed to accurately bound samples at depth to develop a depth of contamination model and revised SMA boundaries, if applicable (EPA, 2024). EPA noted a data gap where contaminated intervals may have been omitted and the results of the SMA delineation and associated uncertainty analysis presented in the PDI ER would only be valid if the input data adequately capture the extent of contamination.

Also in this comment set, EPA specified that samples on the Mocks Bottom shoreline, near the head of SIB were only analyzed to a depth of 6 feet (ft) but adjacent cores contained ROD Table 21 contaminants of concern (COCs) exceeding remedial action levels (RALs)/principal threat waste (PTW) thresholds to depths between 12 ft and greater than 15 ft. EPA requested that archived core interval samples located along Mocks Bottom near the head of SIB be analyzed for polychlorinated biphenyls (PCB) Aroclors and dioxin/furans (EPA, 2024).

This memorandum presents the results of the archived core interval analyses conducted to inform the presence or absence of ROD COC exceedances at depths below 6 ft as well as in surface sediments. The results also inform the surface sediment concentration uncertainty in grid cells along Mocks Bottom as well as the horizontal extent of subsurface sediment contamination to verify the interpolation of the complete sediment dataset that was used to prepare the refined SMA boundary for SIB (HGL, 2024b).

CORPORATE HEADQUARTERS
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

1.2 PROJECT AREA BACKGROUND

The SIB Project Area is the active cleanup area designated in the ROD between approximately River Mile (RM) 8.1 and RM 9.2 on the northeast side of the Willamette River. The SIB Project Area is approximately 1.1 miles in length, 117 acres in size, and includes riverbanks from top of the bank to the river (Figure 1-1).

2.0 SEDIMENT CHEMISTRY TESTING

A total of 29 samples from the 2022 sediment sampling efforts were retrieved from frozen archive for cores B31, B32, B33, B34, and B35 along Mocks Bottom near the head of SIB (Figure 2-1). The archived samples from depth intervals from each core that were analyzed are as follows (in ft):

- B31: 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-13.7
- B32: 6-7, 7-8, 8-9
- B33: 6-7, 7-8, 8-9
- B34: 0-1, 6-7, 7-8, 8-9, 9-9.7
- B35: 0-1, 6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-14.7

The analytical laboratories and analyses are as follows:

- Analytical Resources, LLC (ARI) in Tukwila, Washington – PCBs as Aroclors; and
- Cape Fear Analytical, LLC (CFA) in Wilmington, North Carolina – polychlorinated dibenzodioxins (PCDD)/polychlorinated dibenzofurans (PCDF).

The frozen sample volumes were retrieved from archive and analyzed in accordance with the PDI Work Plan (HGL, 2022).

2.1 DATA MANAGEMENT

The laboratory analytical data were reported by analytical laboratories in an Electronic Data Deliverable that is compatible with the Environmental Quality Information System (EQuIS) data management program using the valid values presented in Appendix A of the Program Data Management Plan (EPA, 2021b).

Following data validation, results requiring reporting as totals were calculated in accordance with Section 6 and Table A-2 of the Program Data Management Plan (EPA, 2021b) and imported into the project database[1].

2.2 DATA VALIDATION

The Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) Worksheet #36 (Appendix B of the PDI Work Plan; HGL, 2022) describes the data validation procedures used to verify and validate analytical data.

[1] The project database and associated analysis uses data submitted to the Portland Harbor Interim Database on December 4, 2024.

Surface and subsurface sediment and sediment elutriate data were validated in accordance with the QAPP (HGL, 2022) by HGL chemists. As a result of validation, data qualifiers were applied to sample results. The data qualifiers include the following:

- UJ: The analyte was analyzed for but was not detected. The associated value is approximate and may be inaccurate or imprecise. The associated value is the adjusted method detection limit or the reported concentration (results qualified as artifacts due to blank contamination).
- U: The analyte was analyzed for but was not detected above the level of the adjusted MDL or the reported concentration (results qualified as artifacts due to blank contamination).
- J: The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- (no qualifier): The result is a detection above the reporting limit (RL) and is not affected by any QC discrepancies.

In addition to these qualifier definitions, the following key validation qualifier notes were provided in FCR 16 for EPA review and approval and apply to the qualified dataset summarized in this memorandum. PCDD/PCDF analysis of the archived samples was performed outside of the hold time (1 year, frozen to 10 degrees Celsius) and as such were qualified J for detections or UJ for non-detections.

2.3 DATA QUALITY AND USABILITY

The UFP-QAPP Worksheet #37 Data Usability Assessment provides guidelines for evaluating field investigation and laboratory compliance with the requirements listed in the UFP-QAPP and other project planning documents. Samples were collected, analyzed, and managed in compliance with field and laboratory testing criteria, and are acceptable for use in SMA refinement and RD development.

As noted in Section 2.2, PCDD/PCDF results were qualified (J for detections or UJ for non-detections) but are considered to be of sufficient quality to supplement the refinement of the extent of contamination when used in conjunction with PCB Aroclor analysis results, which do not have a hold time.

Analyzed samples with reporting limits of non-detect results exceeding ROD Table 17 cleanup levels (CULs) but below RAL or PTW thresholds include 1,2,3,7,8-PeCDD and 2,3,7,8-TCDD. Since the purpose of this evaluation is to evaluate the data for RAL[2] and PTW threshold exceedances, the reporting limits exceeding CULs do not impact the usability of the data.

[2] The EPA-prescribed PQL values are used in place of the RALs for TCDD and PeCDD (EPA, 2022). EPA published the memorandum "Evaluation of consistently and reliably attainable practical quantitation limits for 2,3,7,8-TCDD and 1,2,3,7,8-PeCDD for use in SMA delineation at the Portland Harbor Superfund Site" dated September 16, 2022 (EPA, 2022). EPA's evaluation found that analytical labs can meet the PQLs of 1 picogram per gram (pg/g) for 2,3,7,8-TCDD and 2.5 pg/g for 1,2,3,7,8-PeCDD. PQLs were attained for all 2,3,7,8-TCDD and 1,2,3,7,8-PeCDD results.

3.0 RESULTS

Table 3-1 presents the results of the laboratory analysis for PCB Aroclors and PCDD/PCDF. The laboratory analytical report is included as Attachment A and the data validation reports are included in Attachment B.

As summarized in Table 3-1, no exceedances of RALs/PQLs or PTW thresholds were reported in any of the analyzed samples. The data do not materially impact the interpolations presented in the PDI ER (HGL, 2024b). Subsequently, there is no change to the SMA boundary for SIB.

4.0 REFERENCES

HydroGeoLogic, Inc. (HGL), 2022. *Pre-Design Investigation Work Plan, Revision 3,* CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Overland Park, Kansas. May.

HGL, 2024a. *Field Change Request No. 16 - Archive analysis and non-aqueous phase liquid (NAPL) mobility testing*. CERCLA Docket No. 10- 2021-001. July 23.

HGL, 2024b. *Pre-Design Investigation Report*, *Revision 2*, Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. December 2024.

U. S. Environmental Protection Agency (EPA), 2017. *Record of Decision*, Portland Harbor Superfund Site, Portland Oregon. United States Environmental Protection Agency Region 10, Seattle, Washington. January.

EPA, 2021a. *Administrative Settlement Agreement and Order on Consent for Remedial Design*. Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10. January 20.

EPA, 2021b. *Program Data Management Plan: Portland Harbor Remedial Design Investigation* - Portland Harbor Superfund Site. October.

EPA, 2022. "Evaluation of consistently and reliably attained practical quantitation limits for 2,3,7,8-TCDD and 1,2,3,7,8-PeCDD for use in Sediment Management Area delineation at the Portland Harbor Superfund Site". Memorandum from Portland Harbor Remedial Project Managers, Superfund and Emergency Management Division to Portland Harbor Site File. September 16.

EPA, 2024. *EPA Comments on Pre-Design Investigation Evaluation Report, Swan Island Basin Project Area, Dated November 15, 2023*. January 30.

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Attachment B Archive Sediment Sample Analysis Data Validation Reports

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TABLES

Table 3-1
Archived Sediment Sample Analysis Results Summary
Archived Sediment Sample Analysis Technical Memorandum, Swan Island Basin Project Area, Portland, Oregon

							Location ID	SIB-SC-B31	SIB-SC-B31	SIB-SC-B31	SIB-SC-B31	SIB-SC-B31	SIB-SC-B31	SIB-SC-B31
							Sample ID	SIB-SC-B31-10-11-07/10/2022	SIB-SC-B31-11-12-07/10/2022	SIB-SC-B31-12-13-07/10/2022	SIB-SC-B31-13-13.7-07/10/2022	SIB-SC-B31-6-7-07/10/2022	SIB-SC-B31-7-8-07/10/2022	SIB-SC-B31-8-9-07/10/2022
Method	**Chemical**	**CAS No.**	**Unit**	**CUL**	**RAL**	**PTW**								
E1613B	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN (HpCDF)	67562-39-4	pg/g	NE	NE	NE		0.0791 UJ	0.188 UJ	0.118 UJ	0.0751 UJ	0.254 UJ	0.148 UJ	0.23 UJ
E1613B	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	35822-46-9	pg/g	NE	NE	NE		0.271 J	1.18 J	0.96 J	1.32 J	0.602 J	0.631 J	1.25 J
E1613B	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	55673-89-7	pg/g	NE	NE	NE		0.122 UJ	0.279 UJ	0.171 UJ	0.122 UJ	0.396 UJ	0.221 UJ	0.359 UJ
E1613B	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	70648-26-9	pg/g	0.4	NE	400		0.0743 UJ	0.0739 UJ	0.0642 UJ	0.104 UJ	0.116 UJ	0.129 UJ	0.0966 UJ
E1613B	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	39227-28-6	pg/g	NE	NE	NE		0.137 UJ	0.221 UJ	0.143 UJ	0.166 UJ	0.202 UJ	0.203 UJ	0.26 UJ
E1613B	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	57117-44-9	pg/g	NE	NE	NE		0.0765 UJ	0.0737 UJ	0.0644 UJ	0.105 UJ	0.117 UJ	0.134 UJ	0.102 UJ
E1613B	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	57653-85-7	pg/g	NE	NE	NE		0.151 UJ	0.231 UJ	0.14 UJ	0.161 UJ	0.214 UJ	0.215 UJ	0.274 UJ
E1613B	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	72918-21-9	pg/g	NE	NE	NE		0.106 UJ	0.114 UJ	0.0968 UJ	0.158 UJ	0.171 UJ	0.181 UJ	0.155 UJ
E1613B	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	19408-74-3	pg/g	NE	NE	NE		0.144 UJ	0.225 UJ	0.141 UJ	0.163 UJ	0.208 UJ	0.209 UJ	0.268 UJ
E1613B	1,2,3,7,8-PENTACHLORODIBENZOFURAN	57117-41-6	pg/g	NE	NE	NE		0.0974 UJ	0.087 UJ	0.0793 UJ	0.0948 UJ	0.134 J	0.128 UJ	0.105 UJ
E1613B	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	40321-76-4	pg/g	0.2	2.5	10		0.122 UJ	0.171 UJ	0.114 UJ	0.151 UJ	0.141 UJ	0.194 UJ	0.154 UJ
E1613B	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	60851-34-5	pg/g	NE	NE	NE		0.0693 UJ	0.0787 UJ	0.0678 UJ	0.107 UJ	0.126 UJ	0.132 UJ	0.109 UJ
E1613B	2,3,4,7,8-PENTACHLORODIBENZOFURAN	57117-31-4	pg/g	0.3	200	200		0.1 UJ	0.0888 UJ	0.0823 UJ	0.0998 UJ	0.103 UJ	0.134 UJ	0.109 UJ
E1613B	2,3,7,8-TETRACHLORODIBENZOFURAN	51207-31-9	pg/g	0.4066	NE	600		0.165 UJ	0.151 UJ	0.159 UJ	0.171 UJ	0.186 J	0.199 UJ	0.287 J
E1613B	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1746-01-6	pg/g	0.2	1	10		0.207 UJ	0.303 UJ	0.213 UJ	0.223 UJ	0.2 UJ	0.225 UJ	0.192 UJ
E1613B	Heptachlorodibenzo-P-Dioxin	37871-00-4	pg/g	NE	NE	NE		0.791 J	3.49 J	2.06 J	3.17 J	1.92 J	1.24 J	3.38 J
E1613B	HEXACHLORODIBENZOFURAN	55684-94-1	pg/g	NE	NE	NE		0.0936 J	0.217 J	0.0895 J	0.149 J	0.134 J	0.293 J	0.258 J
E1613B	HEXACHLORODIBENZO-P-DIOXIN	34465-46-8	pg/g	NE	NE	NE		0.221 J	1.08 J	0.183 J	1.16 J	0.48 J	0.269 J	0.822 J
E1613B	OCTACHLORODIBENZOFURAN	39001-02-0	pg/g	NE	NE	NE		0.331 UJ	0.482 UJ	0.473 J	0.434 UJ	0.482 J	0.783 J	0.693 J
E1613B	OCTACHLORODIBENZO-P-DIOXIN	3268-87-9	pg/g	NE	NE	NE		0.675 UJ	23 J	25.6 J	17.3 J	9.35 J	0.922 UJ	16.5 J
E1613B	PENTACHLORO DIBENZOFURAN	30402-15-4	pg/g	NE	NE	NE		0.0396 U	0.087 U	0.0793 U	0.0464 U	0.134 J	0.128 U	0.0359 U
E1613B	PENTACHLORODIBENSO-P-DIOXIN	36088-22-9	pg/g	NE	NE	NE		0.122 U	0.173 J	0.114 U	0.151 U	0.141 U	0.243 J	0.154 U
E1613B	TETRACHLORINATED DIBENZOFURANS, (TOTAL)	TCDF	pg/g	NE	NE	NE		0.165 U	0.151 U	0.159 U	0.171 U	0.4 J	0.635 J	0.543 J
E1613B	TETRACHLORODIBENZO-P-DIOXIN	41903-57-5	pg/g	NE	NE	NE		0.311 J	0.733 J	0.328 J	0.317 J	0.27 J	0.233 J	0.411 J
E1613B	Total Dioxin/Furan TEQ 1998 (Avian) (Calculated U = 1/2)	3333-30-1	pg/g	NE	NE	NE		0.232	0.337	0.242	0.292	0.279	0.476	0.309
E1613B	TOTAL HpCDFs	38998-75-3	pg/g	NE	NE	NE		0.116 J	0.245 J	0.493 J	0.293 J	0.46 J	0.287 J	0.309 J
CALC_TEQ	2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), (ND=0.5)	TCDD_TEQ(0.5)	pg/g	10	NE	NE		0.23 J	0.33 J	0.24 J	0.28 J	0.28 J	0.31 J	0.3 J
E1613B	2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), WHO TEF 2005 (ND=0)	TEQ	pg/g	NE	NE	NE		0.00466	0.0294	0.0208	0.0363	0.0316	0.283	0.0568
SW8082A	Aroclor 1262	37324-23-5	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1016 (AROCLOR 1016)	12674-11-2	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1221 (AROCLOR 1221)	11104-28-2	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1232 (AROCLOR 1232)	11141-16-5	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1242 (AROCLOR 1242)	53469-21-9	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1248 (AROCLOR 1248)	12672-29-6	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1254 (AROCLOR 1254)	11097-69-1	µg/kg	NE	NE	NE		2 U	3.3 J	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1260 (AROCLOR 1260)	11096-82-5	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1268 (AROCLOR 1268)	11100-14-4	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U
CALC_SUM	Total PCB Aroclors (Calculated U = 1/2)	TAROCLOR	µg/kg	9	75	200		2 U	**11.3 J**	2 U	2 U	2 U	2 U	2 U

Table 3-1
Archived Sediment Sample Analysis Results Summary
Archived Sediment Sample Analysis Technical Memorandum, Swan Island Basin Project Area, Portland, Oregon

							Location ID	SIB-SC-B31	SIB-SC-B32	SIB-SC-B32	SIB-SC-B32	SIB-SC-B33	SIB-SC-B33	SIB-SC-B33	SIB-SC-B34
							Sample ID	SIB-SC-B31-9-10-07/10/2022	SIB-SC-B32-6-7-07/25/2022	SIB-SC-B32-7-8-07/25/2022	SIB-SC-B32-8-9-07/25/2022	SIB-SC-B33-6-7-08/21/2022	SIB-SC-B33-7-8-08/21/2022	SIB-SC-B33-8-9-08/21/2022	SIB-SC-B34-0-1-08/22/2022
Method	**Chemical**	**CAS No.**	**Unit**	**CUL**	**RAL**	**PTW**									
E1613B	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN (HpCDF)	67562-39-4	pg/g	NE	NE	NE		0.136 UJ	0.181 UJ	0.171 UJ	0.158 UJ	0.152 UJ	0.102 UJ	0.107 UJ	0.106 UJ
E1613B	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	35822-46-9	pg/g	NE	NE	NE		0.653 J	2.83 J	1.35 J	3.56 J	1.69 J	0.417 J	2.28 J	0.8 J
E1613B	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	55673-89-7	pg/g	NE	NE	NE		0.197 UJ	0.264 UJ	0.259 UJ	0.238 UJ	0.251 UJ	0.159 UJ	0.163 UJ	0.16 UJ
E1613B	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	70648-26-9	pg/g	0.4	NE	400		0.0709 UJ	0.119 UJ	0.0918 UJ	0.0754 UJ	0.126 UJ	0.124 UJ	0.114 UJ	0.0977 UJ
E1613B	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	39227-28-6	pg/g	NE	NE	NE		0.188 UJ	0.252 UJ	0.176 UJ	0.268 UJ	0.279 UJ	0.197 UJ	0.233 UJ	0.229 UJ
E1613B	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	57117-44-9	pg/g	NE	NE	NE		0.0699 UJ	0.127 UJ	0.095 UJ	0.0738 UJ	0.131 UJ	0.118 UJ	0.112 UJ	0.107 UJ
E1613B	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	57653-85-7	pg/g	NE	NE	NE		0.189 UJ	0.266 UJ	0.179 UJ	0.288 UJ	0.283 UJ	0.193 UJ	0.251 UJ	0.249 UJ
E1613B	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	72918-21-9	pg/g	NE	NE	NE		0.0961 UJ	0.166 UJ	0.131 UJ	0.11 UJ	0.205 UJ	0.186 UJ	0.162 UJ	0.143 UJ
E1613B	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	19408-74-3	pg/g	NE	NE	NE		0.188 UJ	0.445 J	0.257 J	0.492 J	0.281 UJ	0.195 UJ	0.349 J	0.239 UJ
E1613B	1,2,3,7,8-PENTACHLORODIBENZOFURAN	57117-41-6	pg/g	NE	NE	NE		0.111 UJ	0.112 UJ	0.0986 UJ	0.0848 UJ	0.108 UJ	0.106 UJ	0.101 UJ	0.126 UJ
E1613B	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	40321-76-4	pg/g	0.2	2.5	10		0.153 UJ	0.177 UJ	0.158 UJ	0.22 UJ	0.209 UJ	0.137 UJ	0.189 UJ	0.158 UJ
E1613B	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	60851-34-5	pg/g	NE	NE	NE		0.0727 UJ	0.126 UJ	0.0954 UJ	0.0778 UJ	0.136 UJ	0.126 UJ	0.114 UJ	0.102 UJ
E1613B	2,3,4,7,8-PENTACHLORODIBENZOFURAN	57117-31-4	pg/g	0.3	200	200		0.108 UJ	0.109 UJ	0.1 UJ	0.086 J	0.109 UJ	0.101 UJ	0.0963 UJ	0.136 UJ
E1613B	2,3,7,8-TETRACHLORODIBENZOFURAN	51207-31-9	pg/g	0.4066	NE	600		0.228 J	0.158 UJ	0.171 J	0.177 UJ	0.317 J	0.207 J	0.205 UJ	0.311 UJ
E1613B	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1746-01-6	pg/g	0.2	1	10		0.21 UJ	0.262 UJ	0.181 UJ	0.32 UJ	0.267 UJ	0.275 UJ	0.267 UJ	0.393 UJ
E1613B	Heptachlorodibenzo-P-Dioxin	37871-00-4	pg/g	NE	NE	NE		2.04 J	7.62 J	3.77 J	9.69 J	4.89 J	1.03 J	6.47 J	2 J
E1613B	HEXACHLORODIBENZOFURAN	55684-94-1	pg/g	NE	NE	NE		0.316 J	0.119 U	0.0918 U	0.198 J	0.126 U	0.118 U	0.154 J	0.0977 U
E1613B	HEXACHLORODIBENZO-P-DIOXIN	34465-46-8	pg/g	NE	NE	NE		0.439 J	3.41 J	1.74 J	5.01 J	2.01 J	0.267 J	3.08 J	0.889 J
E1613B	OCTACHLORODIBENZOFURAN	39001-02-0	pg/g	NE	NE	NE		0.354 J	0.417 UJ	0.297 UJ	0.47 UJ	0.461 UJ	0.413 UJ	0.329 UJ	0.433 UJ
E1613B	OCTACHLORODIBENZO-P-DIOXIN	3268-87-9	pg/g	NE	NE	NE		6.77 J	23.1 J	16.8 J	29.6 J	16.2 J	2.98 J	22 J	0.738 UJ
E1613B	PENTACHLORO DIBENZOFURAN	30402-15-4	pg/g	NE	NE	NE		0.0322 U	0.109 U	0.0243 U	0.086 J	0.227 J	0.101 U	0.0558 J	0.0529 U
E1613B	PENTACHLORODIBENSO-P-DIOXIN	36088-22-9	pg/g	NE	NE	NE		0.153 U	0.928 J	0.468 J	1.3 J	0.52 J	0.137 U	0.981 J	0.158 U
E1613B	TETRACHLORINATED DIBENZOFURANS, (TOTAL)	TCDF	pg/g	NE	NE	NE		0.419 J	0.238 J	0.341 J	0.326 J	0.546 J	0.207 J	0.7 J	0.311 U
E1613B	TETRACHLORODIBENZO-P-DIOXIN	41903-57-5	pg/g	NE	NE	NE		0.465 J	0.409 J	0.38 J	0.84 J	0.487 J	0.275 U	0.949 J	0.393 U
E1613B	Total Dioxin/Furan TEQ 1998 (Avian) (Calculated U = 1/2)	3333-30-1	pg/g	NE	NE	NE		0.287	0.382	0.289	0.57	0.389	0.308	0.372	0.384
E1613B	TOTAL HpCDFs	38998-75-3	pg/g	NE	NE	NE		0.415 J	0.227 J	0.225 J	0.276 J	0.319 J	0.151 J	0.343 J	0.176 J
CALC_TEQ	2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), (ND=0.5)	TCDD_TEQ(0.5)	pg/g	10	NE	NE		0.28 J	0.38 J	0.29 J	0.45 J	0.38 J	0.31 J	0.37 J	0.38 J
E1613B	2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), WHO TEF 2005 (ND=0)	TEQ	pg/g	NE	NE	NE		0.0464	0.082	0.0637	0.358	0.0606	0.0273	0.0678	0.0114
SW8082A	Aroclor 1262	37324-23-5	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1016 (AROCLOR 1016)	12674-11-2	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1221 (AROCLOR 1221)	11104-28-2	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1232 (AROCLOR 1232)	11141-16-5	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1242 (AROCLOR 1242)	53469-21-9	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1248 (AROCLOR 1248)	12672-29-6	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1254 (AROCLOR 1254)	11097-69-1	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1260 (AROCLOR 1260)	11096-82-5	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1268 (AROCLOR 1268)	11100-14-4	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
CALC_SUM	Total PCB Aroclors (Calculated U = 1/2)	TAROCLOR	µg/kg	9	75	200		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U

Table 3-1
Archived Sediment Sample Analysis Results Summary
Archived Sediment Sample Analysis Technical Memorandum, Swan Island Basin Project Area, Portland, Oregon

							Location ID	SIB-SC-B34	SIB-SC-B34	SIB-SC-B34	SIB-SC-B34	SIB-SC-B35	SIB-SC-B35	SIB-SC-B35	SIB-SC-B35
							Sample ID	SIB-SC-B34-6-7-08/22/2022	SIB-SC-B34-7-8-08/22/2022	SIB-SC-B34-8-9-08/22/2022	SIB-SC-B34-9-9.7-08/22/2022	SIB-SC-B35-0-1-07/07/2022	SIB-SC-B35-10-11-07/07/2022	SIB-SC-B35-11-12-07/07/2022	SIB-SC-B35-12-13-07/07/2022
Method	**Chemical**	**CAS No.**	**Unit**	**CUL**	**RAL**	**PTW**									
E1613B	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN (HpCDF)	67562-39-4	pg/g	NE	NE	NE		0.112 UJ	0.0951 UJ	0.162 UJ	0.118 UJ	0.185 UJ	0.15 UJ	0.12 UJ	0.163 UJ
E1613B	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	35822-46-9	pg/g	NE	NE	NE		2.05 J	2.36 J	1.86 J	0.922 J	1.37 J	0.735 J	0.766 J	0.648 J
E1613B	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	55673-89-7	pg/g	NE	NE	NE		0.168 UJ	0.142 UJ	0.259 UJ	0.175 UJ	0.291 UJ	0.247 UJ	0.197 UJ	0.279 UJ
E1613B	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	70648-26-9	pg/g	0.4	NE	400		0.109 UJ	0.105 UJ	0.0826 UJ	0.0605 UJ	0.0846 UJ	0.138 UJ	0.137 UJ	0.0761 UJ
E1613B	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	39227-28-6	pg/g	NE	NE	NE		0.36 UJ	0.26 UJ	0.169 UJ	0.182 UJ	0.211 UJ	0.261 UJ	0.269 UJ	0.251 UJ
E1613B	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	57117-44-9	pg/g	NE	NE	NE		0.113 UJ	0.107 UJ	0.0804 UJ	0.0611 UJ	0.091 UJ	0.136 UJ	0.13 UJ	0.0723 UJ
E1613B	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	57653-85-7	pg/g	NE	NE	NE		0.37 UJ	0.252 UJ	0.176 UJ	0.183 UJ	0.227 UJ	0.261 UJ	0.267 UJ	0.257 UJ
E1613B	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	72918-21-9	pg/g	NE	NE	NE		0.155 UJ	0.157 UJ	0.116 UJ	0.0874 UJ	0.132 UJ	0.198 UJ	0.209 UJ	0.112 UJ
E1613B	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	19408-74-3	pg/g	NE	NE	NE		0.364 UJ	0.256 UJ	0.172 UJ	0.182 UJ	0.219 UJ	0.261 UJ	0.267 UJ	0.255 UJ
E1613B	1,2,3,7,8-PENTACHLORODIBENZOFURAN	57117-41-6	pg/g	NE	NE	NE		0.116 UJ	0.119 UJ	0.0842 UJ	0.0848 UJ	0.0943 UJ	0.147 UJ	0.169 UJ	0.124 UJ
E1613B	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	40321-76-4	pg/g	0.2	2.5	10		0.237 UJ	0.232 UJ	0.125 UJ	0.158 UJ	0.158 UJ	0.183 UJ	0.215 UJ	0.203 UJ
E1613B	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	60851-34-5	pg/g	NE	NE	NE		0.105 UJ	0.105 UJ	0.0814 UJ	0.0625 UJ	0.0858 UJ	0.14 UJ	0.141 UJ	0.0787 UJ
E1613B	2,3,4,7,8-PENTACHLORODIBENZOFURAN	57117-31-4	pg/g	0.3	200	200		0.109 UJ	0.124 UJ	0.0798 UJ	0.0874 UJ	0.0981 UJ	0.147 UJ	0.157 UJ	0.12 UJ
E1613B	2,3,7,8-TETRACHLORODIBENZOFURAN	51207-31-9	pg/g	0.4066	NE	600		0.291 UJ	0.258 UJ	0.2 UJ	0.191 UJ	0.203 UJ	0.339 UJ	0.293 UJ	0.313 UJ
E1613B	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1746-01-6	pg/g	0.2	1	10		0.343 UJ	0.385 UJ	0.267 UJ	0.253 UJ	0.285 UJ	0.405 UJ	0.392 UJ	0.319 UJ
E1613B	Heptachlorodibenzo-P-Dioxin	37871-00-4	pg/g	NE	NE	NE		5.46 J	6.51 J	5.31 J	2.85 J	4.68 J	2.03 J	2.56 J	1.84 J
E1613B	HEXACHLORODIBENZOFURAN	55684-94-1	pg/g	NE	NE	NE		0.135 J	0.105 U	0.102 J	0.0605 U	0.243 J	0.136 U	0.229 J	0.0723 U
E1613B	HEXACHLORODIBENZO-P-DIOXIN	34465-46-8	pg/g	NE	NE	NE		2.02 J	3.22 J	2.28 J	1.13 J	1.91 J	0.418 J	0.957 J	0.466 J
E1613B	OCTACHLORODIBENZOFURAN	39001-02-0	pg/g	NE	NE	NE		0.448 UJ	0.423 UJ	0.347 UJ	0.325 UJ	0.364 UJ	0.536 UJ	0.533 UJ	0.658 UJ
E1613B	OCTACHLORODIBENZO-P-DIOXIN	3268-87-9	pg/g	NE	NE	NE		17.4 J	22.7 J	15.9 J	7.29 J	14.8 J	6.11 J	7.88 J	7.95 J
E1613B	PENTACHLORO DIBENZOFURAN	30402-15-4	pg/g	NE	NE	NE		0.0564 U	0.0463 U	0.0347 U	0.0848 U	0.0414 U	0.0693 U	0.0601 U	0.12 U
E1613B	PENTACHLORODIBENSO-P-DIOXIN	36088-22-9	pg/g	NE	NE	NE		0.558 J	0.817 J	0.611 J	0.179 J	0.49 J	0.183 U	0.215 U	0.203 U
E1613B	TETRACHLORINATED DIBENZOFURANS, (TOTAL)	TCDF	pg/g	NE	NE	NE		0.291 U	0.258 U	0.325 J	0.191 U	0.249 J	0.339 U	0.293 U	0.313 U
E1613B	TETRACHLORODIBENZO-P-DIOXIN	41903-57-5	pg/g	NE	NE	NE		0.514 J	0.883 J	0.553 J	0.486 J	0.506 J	0.504 J	0.478 J	0.319 U
E1613B	Total Dioxin/Furan TEQ 1998 (Avian) (Calculated U = 1/2)	3333-30-1	pg/g	NE	NE	NE		0.431	0.45	0.315	0.283	0.327	0.417	0.429	0.364
E1613B	TOTAL HpCDFs	38998-75-3	pg/g	NE	NE	NE		0.301 J	0.17 J	0.259 J	0.118 U	0.185 U	0.165 J	0.247 J	0.179 J
CALC_TEQ	2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), (ND=0.5)	TCDD_TEQ(0.5)	pg/g	10	NE	NE		0.43 J	0.44 J	0.29 J	0.28 J	0.32 J	0.42 J	0.43 J	0.36 J
E1613B	2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), WHO TEF 2005 (ND=0)	TEQ	pg/g	NE	NE	NE		0.0288	0.0581	0.0672	0.0114	0.0281	0.0108	0.0125	0.0107
SW8082A	Aroclor 1262	37324-23-5	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1016 (AROCLOR 1016)	12674-11-2	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1221 (AROCLOR 1221)	11104-28-2	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1232 (AROCLOR 1232)	11141-16-5	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1242 (AROCLOR 1242)	53469-21-9	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1248 (AROCLOR 1248)	12672-29-6	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1254 (AROCLOR 1254)	11097-69-1	µg/kg	NE	NE	NE		2 U	2 U	2 U	14.2	2 U	2 U	2 U	2 U
SW8082A	PCB-1260 (AROCLOR 1260)	11096-82-5	µg/kg	NE	NE	NE		2 U	2 U	2 U	9	2 U	2 U	2 U	2 U
SW8082A	PCB-1268 (AROCLOR 1268)	11100-14-4	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
CALC_SUM	Total PCB Aroclors (Calculated U = 1/2)	TAROCLOR	µg/kg	9	75	200		2 U	2 U	2 U	**30.2**	2 U	2 U	2 U	2 U

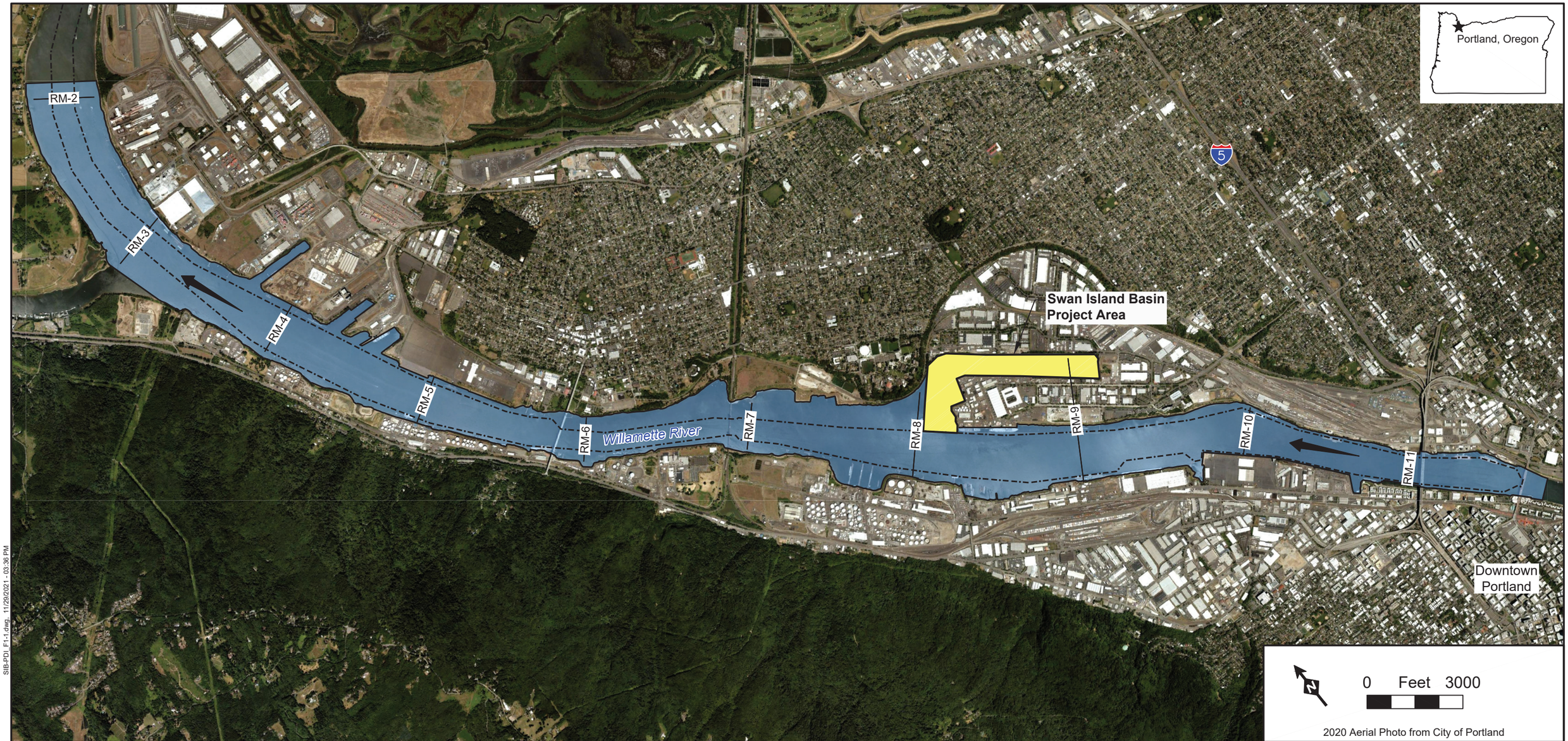
Table 3-1
Archived Sediment Sample Analysis Results Summary
Archived Sediment Sample Analysis Technical Memorandum, Swan Island Basin Project Area, Portland, Oregon

							Location ID	SIB-SC-B35	SIB-SC-B35	SIB-SC-B35	SIB-SC-B35	SIB-SC-B35	SIB-SC-B35
							Sample ID	SIB-SC-B35-13-14-07/07/2022	SIB-SC-B35-14-14.7-07/07/2022	SIB-SC-B35-6-7-07/07/2022	SIB-SC-B35-7-8-07/07/2022	SIB-SC-B35-8-9-07/07/2022	SIB-SC-B35-9-10-07/07/2022
Method	**Chemical**	**CAS No.**	**Unit**	**CUL**	**RAL**	**PTW**							
E1613B	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN (HpCDF)	67562-39-4	pg/g	NE	NE	NE		0.157 UJ	0.105 UJ	0.113 UJ	0.257 UJ	0.191 UJ	0.158 UJ
E1613B	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	35822-46-9	pg/g	NE	NE	NE		0.536 UJ	1.15 J	1.77 J	2.38 J	1.6 J	1.38 J
E1613B	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	55673-89-7	pg/g	NE	NE	NE		0.237 UJ	0.161 UJ	0.175 UJ	0.389 UJ	0.292 UJ	0.261 UJ
E1613B	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	70648-26-9	pg/g	0.4	NE	400		0.119 UJ	0.0763 UJ	0.146 UJ	0.136 UJ	0.113 UJ	0.107 UJ
E1613B	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	39227-28-6	pg/g	NE	NE	NE		0.323 UJ	0.211 UJ	0.246 UJ	0.403 UJ	0.238 UJ	0.267 UJ
E1613B	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	57117-44-9	pg/g	NE	NE	NE		0.119 UJ	0.0732 UJ	0.138 UJ	0.133 UJ	0.111 UJ	0.107 UJ
E1613B	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	57653-85-7	pg/g	NE	NE	NE		0.339 UJ	0.203 UJ	0.242 UJ	0.401 UJ	0.238 UJ	0.267 UJ
E1613B	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	72918-21-9	pg/g	NE	NE	NE		0.197 UJ	0.117 UJ	0.226 UJ	0.209 UJ	0.154 UJ	0.166 UJ
E1613B	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	19408-74-3	pg/g	NE	NE	NE		0.331 UJ	0.207 UJ	0.244 UJ	0.401 UJ	0.238 UJ	0.267 UJ
E1613B	1,2,3,7,8-PENTACHLORODIBENZOFURAN	57117-41-6	pg/g	NE	NE	NE		0.134 UJ	0.0845 UJ	0.114 UJ	0.0893 UJ	0.0961 UJ	0.135 UJ
E1613B	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	40321-76-4	pg/g	0.2	2.5	10		0.215 UJ	0.179 UJ	0.19 UJ	0.263 UJ	0.16 UJ	0.194 UJ
E1613B	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	60851-34-5	pg/g	NE	NE	NE		0.127 UJ	0.0767 UJ	0.154 UJ	0.139 UJ	0.109 UJ	0.111 UJ
E1613B	2,3,4,7,8-PENTACHLORODIBENZOFURAN	57117-31-4	pg/g	0.3	200	200		0.123 UJ	0.0843 UJ	0.103 UJ	0.0841 UJ	0.0983 UJ	0.134 UJ
E1613B	2,3,7,8-TETRACHLORODIBENZOFURAN	51207-31-9	pg/g	0.4066	NE	600		0.275 UJ	0.205 UJ	0.286 J	0.309 UJ	0.25 UJ	0.303 UJ
E1613B	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1746-01-6	pg/g	0.2	1	10		0.359 UJ	0.271 UJ	0.316 UJ	0.403 UJ	0.332 UJ	0.468 UJ
E1613B	Heptachlorodibenzo-P-Dioxin	37871-00-4	pg/g	NE	NE	NE		1.07 J	4.09 J	5.35 J	7.1 J	5.09 J	4.25 J
E1613B	HEXACHLORODIBENZOFURAN	55684-94-1	pg/g	NE	NE	NE		0.119 U	0.0732 U	0.138 U	0.157 J	0.109 U	0.107 U
E1613B	HEXACHLORODIBENZO-P-DIOXIN	34465-46-8	pg/g	NE	NE	NE		0.532 J	1.54 J	2.25 J	2.38 J	1.88 J	1.49 J
E1613B	OCTACHLORODIBENZOFURAN	39001-02-0	pg/g	NE	NE	NE		0.534 UJ	0.379 UJ	0.403 UJ	0.574 UJ	0.385 UJ	0.59 UJ
E1613B	OCTACHLORODIBENZO-P-DIOXIN	3268-87-9	pg/g	NE	NE	NE		3.16 J	9.63 J	22.5 J	22.3 J	17.4 J	14 J
E1613B	PENTACHLORO DIBENZOFURAN	30402-15-4	pg/g	NE	NE	NE		0.123 U	0.0427 U	0.0451 U	0.058 U	0.0485 U	0.134 U
E1613B	PENTACHLORODIBENSO-P-DIOXIN	36088-22-9	pg/g	NE	NE	NE		0.215 U	0.223 J	0.459 J	0.711 J	0.268 J	0.201 J
E1613B	TETRACHLORINATED DIBENZOFURANS, (TOTAL)	TCDF	pg/g	NE	NE	NE		0.275 U	0.205 U	0.575 J	0.309 U	0.276 J	0.303 U
E1613B	TETRACHLORODIBENZO-P-DIOXIN	41903-57-5	pg/g	NE	NE	NE		0.359 U	0.763 J	0.605 J	0.805 J	0.693 J	0.691 J
E1613B	Total Dioxin/Furan TEQ 1998 (Avian) (Calculated U = 1/2)	3333-30-1	pg/g	NE	NE	NE		0.404	0.315	0.397	0.489	0.361	0.455
E1613B	TOTAL HpCDFs	38998-75-3	pg/g	NE	NE	NE		0.157 U	0.205 J	0.308 J	0.315 J	0.292 J	0.217 J
CALC_TEQ	2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), (ND=0.5)	TCDD_TEQ(0.5)	pg/g	10	NE	NE		0.4 J	0.31 J	0.39 J	0.49 J	0.36 J	0.45 J
E1613B	2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), WHO TEF 2005 (ND=0)	TEQ	pg/g	NE	NE	NE		0.000948	0.0165	0.056	0.0336	0.0241	0.0202
SW8082A	Aroclor 1262	37324-23-5	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1016 (AROCLOR 1016)	12674-11-2	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1221 (AROCLOR 1221)	11104-28-2	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1232 (AROCLOR 1232)	11141-16-5	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1242 (AROCLOR 1242)	53469-21-9	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1248 (AROCLOR 1248)	12672-29-6	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1254 (AROCLOR 1254)	11097-69-1	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1260 (AROCLOR 1260)	11096-82-5	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U
SW8082A	PCB-1268 (AROCLOR 1268)	11100-14-4	µg/kg	NE	NE	NE		2 U	2 U	2 U	2 U	2 U	2 U
CALC_SUM	Total PCB Aroclors (Calculated U = 1/2)	TAROCLOR	µg/kg	9	75	200		2 U	2 U	2 U	2 U	2 U	2 U

Table 3-1
Archived Sediment Sample Analysis Results Summary
Archived Sediment Sample Analysis Technical Memorandum, Swan Island Basin Project Area, Portland, Oregon

Notes:
Concentration exceeds CUL
Laboratory method detection limit exceeds CUL
µg/kg - micrograms per kilogram
pg/g - picogram per gram
CAS - Chemical Abstracts Service
CUL - cleanup level
EPA - U.S. Environmental Protection Agency
J - estimated concentration
NA - not analyzed
NE - none established
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
PQL - practical quantitation limit
PTW - principal threat waste threshold
RAL - remedial action level
TCDD - tetrachlorodibenzo-p-dioxin
TEQ - toxic equivalent
U - analyte not detected above laboratory reporting limit
WHO = World Health Organization

FIGURES



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- Federal Navigation Channel (USACE 2020)
- River Flow Direction
- Swan Island Basin Project Area
- Portland Harbor Superfund Site Boundary (River Mile 1.9 to 11.8)

Notes:
NOAA - National Oceanic and Atmospheric Administration
RM - River Mile
SIB - Swan Island Basin
USACE - U.S. Army Corps of Engineers

Source:
NOAA, 2016. Booklet Chart, Willamette River – Swan Island Basin, NOAA Chart 18527 at URL: https://www.charts.noaa.gov/BookletChart/18527_BookletChart.pdf - Navigation Channel

Figure 1-1
SIB Project Area Location Map

Prepared on 11/29/2021
Archived Sediment Sample Technical Memorandum
Swan Island Basin Remedial Design Group

PACIFIC groundwater GROUP
HGL
MOTT MACDONALD
BRIDGEWATER GROUP

K:\VANET\JK1106 Portland Harbor Short Cressman\GIS_RD\mxds\Sediment\SamplingReport\SedimentSamplingReport_AGP\SedimentSamplingReport_AGP.aprx 5/3/2024

Core ID	Archive sample intervals (in feet)
B31	6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-13.7
B32	6-7, 7-8, 8-9
B33	6-7, 7-8, 8-9
B34	6-7, 7-8, 8-9, 9-9.7
B35	6-7, 7-8, 8-9, 9-10, 10-11, 11-12, 12-13, 13-14, 14-14.7

- Project Area Grid
- River Mile (RM)
- Swan Island Sediment Decision Unit (SDU)
- ROD Sediment Management Area (SMA)
- Federal Navigation Channel (USACE, 2020)
- Docks and Structures
- Tax Lot Boundary
- Ordinary High Water (City of Portland, 2013)

- FCR #16 Archive Analysis Samples

Sediment Investigation Sample Locations

- Core
- Grab
- Bulk Sediment and Water
- Target Grab Location Not Sampled
- Target Core Location Not Sampled

M Project Area Grid Label

River Flow Direction

Notes:
PTW – Principal Threat Waste
ROD – Record of Decision
SCC – Shipyard Commerce Center
USACE – U.S. Army Corps of Engineers

0 Feet 400

2021 Aerial Photo from City of Portland

Figure 2-1
Archived Sediment Cores Analyzed

Prepared on: 12/16/2024
Archived Sediment Sample Technical Memorandum
Swan Island Basin Remedial Design

PACIFIC groundwater GROUP
HGL
MOTT MACDONALD
BRIDGEWATER GROUP

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ATTACHMENTS

ATTACHMENT A
ARCHIVE SEDIMENT SAMPLE ANALYSIS
LABORATORY DATA PACKAGES

Analytical Resources, LLC
Analytical Chemists and Consultants
Tukwila, WA

30 August 2024

Andrea Fletcher
HydroGeoLogic, Inc.
6340 Glenwood, Building 7, Suite 200
Overland Park, KS 66202

RE: Portland Harbor Superfund Site 2024 (Portland Harbor Superfund Site)

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
24H0046	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC



Kelly Bottem, Client Services Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

PJLA Testing
DoD ELAP 66169

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

24H0046

ALS Environmental Chain of Custody

1317 South 13th Avenue • Kelso, WA 98626 • 1-360-577-7222 • FAX 1-360-636-1068

ALS Contact: Karen Melerine

Project Number: K2407814
Project Manager: Karen Melerine
QAP: LAB QAP

Lab Code	Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Lab ID	Relinquish 2 None
K2407814-001	SIB-SC-B31-6-7-07/10/2022		Sediment	7/10/22	1318	ARI	X
K2407814-002	SIB-SC-B31-7-8-07/10/2022		Sediment	7/10/22	1321	ARI	X
K2407814-003	SIB-SC-B31-8-9-07/10/2022		Sediment	7/10/22	1324	ARI	X
K2407814-004	SIB-SC-B31-9-10-07/10/2022		Sediment	7/10/22	1327	ARI	X
K2407814-005	SIB-SC-B31-10-11-07/10/2022		Sediment	7/10/22	1330	ARI	X
K2407814-006	SIB-SC-B31-11-12-07/10/2022		Sediment	7/10/22	1333	ARI	X
K2407814-007	SIB-SC-B31-12-13-07/10/2022		Sediment	7/10/22	1336	ARI	X
K2407814-008	SIB-SC-B31-13-13.7-07/10/2022		Sediment	7/10/22	1339	ARI	X
K2407814-009	SIB-SC-B32-6-7-07/25/2022		Sediment	7/25/22	1438	ARI	X
K2407814-010	SIB-SC-B32-7-8-07/25/2022		Sediment	7/25/22	1441	ARI	X
K2407814-011	SIB-SC-B32-8-9-07/25/2022		Sediment	7/25/22	1444	ARI	X
K2407814-012	SIB-SC-B33-6-7-08/21/2022		Sediment	8/21/22	1433	ARI	X

To be analyzed for 8082 PCB Aroclors
Will report directly to HGL

Special Instructions/Comments
Please provide the electronic (PDF and EDD) report to the following e-mail address: afletcher@hgl.com, lnyland@hgl.com

Contact: HGL - Andrea Fletcher with any questions: afletcher@hgl.com, 913-378-2316

H - Test is On Hold P - Test is Authorized for Prep Only

Turnaround Requirements
____**RUSH** (Surcharges Apply)
PLEASE CIRCLE WORK DAYS
1 2 3 4 5
__X__ **STANDARD**
Requested FAX Date: _____
Requested Report Date: 08/19/24

Report Requirements
____ I. Results Only
____ II. Results + QC Summaries
____ III. Results + QC and Calibration Summaries
_X___ IV. Data Validation Report with Raw Data
PQL/MDL/J Y
EDD Y

Invoice Information
PO#
Bill to

Relinquished By: M. Mulligan 8/1/24 Received By: 8-2-24 10:51 Airbill Number:

24H0046

ALS Environmental Chain of Custody

1317 South 13th Avenue • Kelso, WA 98626 • 1-360-577-7222 • FAX 1-360-636-1068

ALS Contact: Karen Melerine

Project Number: K2407814
Project Manager: Karen Melerine
QAP: LAB QAP

Lab Code	Sample ID	# of Cont.	Matrix	Sample Date	Time	Lab ID	Relinquish 2 None
K2407814-013	SIB-SC-B33-7-8-08/21/2022		Sediment	8/21/22	1436	ARI	X
K2407814-014	SIB-SC-B33-8-9-08/21/2022		Sediment	8/21/22	1439	ARI	X
K2407814-015	SIB-SC-B34-0-1-08/22/2022		Sediment	8/22/22	1430	ARI	X
K2407814-016	SIB-SC-B34-6-7-08/22/2022		Sediment	8/22/22	1448	ARI	X
K2407814-017	SIB-SC-B34-7-8-08/22/2022		Sediment	8/22/22	1451	ARI	X
K2407814-018	SIB-SC-B34-8-9-08/22/2022		Sediment	8/22/22	1454	ARI	X
K2407814-019	SIB-SC-B34-9-9.7-08/22/2022		Sediment	8/22/22	1457	ARI	X
K2407814-020	SIB-SC-B35-0-1-07/07/2022		Sediment	7/7/22	1510	ARI	X
K2407814-021	SIB-SC-B35-6-7-07/07/2022		Sediment	7/7/22	1528	ARI	X
K2407814-022	SIB-SC-B35-7-8-07/07/2022		Sediment	7/7/22	1531	ARI	X
K2407814-023	SIB-SC-B35-8-9-07/07/2022		Sediment	7/7/22	1534	ARI	X
K2407814-024	SIB-SC-B35-9-10-07/07/2022		Sediment	7/7/22	1537	ARI	X

Special Instructions/Comments
Please provide the electronic (PDF and EDD) report to the following e-mail address: afletcher@hgl.com, lnyland@hgl.com

Contact: HGL - Andrea Fletcher with any questions: afletcher@hgl.com, 913-378-2316

H - Test is On Hold P - Test is Authorized for Prep Only

Turnaround Requirements
_____ **RUSH** (Surcharges Apply)
PLEASE CIRCLE WORK DAYS
1 2 3 4 5
_X___ **STANDARD**
Requested FAX Date: _____
Requested Report Date: 08/19/24

Report Requirements
____ I. Results Only
____ II. Results + QC Summaries
____ III. Results + QC and Calibration Summaries
__X__ IV. Data Validation Report with Raw Data
PQL/MDL/J Y
EDD Y

Invoice Information
PO#
Bill to

Relinquished By: M. Mulligan 8/1/24 Received By: 8-2-24 10:51 Airbill Number:

24H0046

ALS Environmental Chain of Custody

1317 South 13th Avenue • Kelso, WA 98626 • 1-360-577-7222 • FAX 1-360-636-1068

ALS Contact: Karen Melerine

Project Number: K2407814
Project Manager: Karen Melerine
QAP: LAB QAP

Lab Code	Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Lab ID	Relinquish 2 None
K2407814-025	SIB-SC-B35-10-11-07/07/2022	1	Sediment	7/7/22	1540	ARI	X
K2407814-026	SIB-SC-B35-11-12-07/07/2022		Sediment	7/7/22	1543	ARI	X
K2407814-027	SIB-SC-B35-12-13-07/07/2022		Sediment	7/7/22	1546	ARI	X
K2407814-028	SIB-SC-B35-13-14-07/07/2022		Sediment	7/7/22	1549	ARI	X
K2407814-029	SIB-SC-B35-14-14.7-07/07/2022		Sediment	7/7/22	1552	ARI	X
K2407814-030	SIB-SC-E24-7-8-07/12/2022		Sediment	7/12/22	1001	ARI	X
K2407814-031	SIB-SC-E24-8-9-07/12/2022		Sediment	7/12/22	1004	ARI	X
K2407814-032	SIB-SC-E24-9-10-07/12/2022		Sediment	7/12/22	1007	ARI	X
K2407814-033	SIB-SC-J06-8-9-07/26/2022		Sediment	7/26/22	1454	ARI	X

Test Comments

Relinquish 2 - None

K2407814-001,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33 8082 PCB Aroclors,shipping to ARI

Pulled from frozen archive 7/30/24

Special Instructions/Comments

Please provide the electronic (PDF and EDD) report to the following e-mail address: afletcher@hgl.com, lnyland@hgl.com

Contact: HGL - Andrea Fletcher with any questions: afletcher@hgl.com, 913-378-2316

H - Test is On Hold P - Test is Authorized for Prep Only

Turnaround Requirements

_____ **RUSH** (Surcharges Apply)

PLEASE CIRCLE WORK DAYS

1 2 3 4 5

_X___ **STANDARD**

Requested FAX Date: _____

Requested Report Date: 08/19/24

Report Requirements

____ I. Results Only

____ II. Results + QC Summaries

____ III. Results + QC and Calibration Summaries

__X__ IV. Data Validation Report with Raw Data

PQL/MDL/J Y

EDD Y

Invoice Information

PO#

Bill to

Relinquished By: M. Mulligan 8/1/24 Received By: 8-2-24 1051 Airbill Number:

2/Ho 046

K2407814

X **Ship To: ARI**
Analytical Resources, Incorporated
4611 So. 134th Place
Suite 100
Tukwila, WA 98168

PC KSM Date 07/31/24

SMO mm Date 8/1/24

Instructions:

Ice	X
Dry Ice	
No Ice	

Shipping:

Overnight	X
2nd Day	
Ground	

Bill to Client Account use HGL account number

FedEx number, 129909129 with an internal billing code of DT2002.03.03.01.01

Comments:

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SIB-SC-B31-6-7-07/10/2022	24H0046-01	Solid	10-Jul-2022 13:18	02-Aug-2024 10:51
SIB-SC-B31-7-8-07/10/2022	24H0046-02	Solid	10-Jul-2022 13:21	02-Aug-2024 10:51
SIB-SC-B31-8-9-07/10/2022	24H0046-03	Solid	10-Jul-2022 13:24	02-Aug-2024 10:51
SIB-SC-B31-9-10-07/10/2022	24H0046-04	Solid	10-Jul-2022 13:27	02-Aug-2024 10:51
SIB-SC-B31-10-11-07/10/2022	24H0046-05	Solid	10-Jul-2022 13:30	02-Aug-2024 10:51
SIB-SC-B31-11-12-07/10/2022	24H0046-06	Solid	10-Jul-2022 13:33	02-Aug-2024 10:51
SIB-SC-B31-12-13-07/10/2022	24H0046-07	Solid	10-Jul-2022 13:36	02-Aug-2024 10:51
SIB-SC-B31-13-13.7-07/10/2022	24H0046-08	Solid	10-Jul-2022 13:39	02-Aug-2024 10:51
SIB-SC-B32-6-7-07/25/2022	24H0046-09	Solid	25-Jul-2022 14:38	02-Aug-2024 10:51
SIB-SC-B32-7-8-07/25/2022	24H0046-10	Solid	25-Jul-2022 14:41	02-Aug-2024 10:51
SIB-SC-B32-8-9-07/25/2022	24H0046-11	Solid	25-Jul-2022 14:44	02-Aug-2024 10:51
SIB-SC-B33-6-7-08/21/2022	24H0046-12	Solid	21-Aug-2022 14:33	02-Aug-2024 10:51
SIB-SC-B33-7-8-08/21/2022	24H0046-13	Solid	21-Aug-2022 14:36	02-Aug-2024 10:51
SIB-SC-B33-8-9-08/21/2022	24H0046-14	Solid	21-Aug-2022 14:39	02-Aug-2024 10:51
SIB-SC-B34-0-1-08/22/2022	24H0046-15	Solid	22-Aug-2022 14:30	02-Aug-2024 10:51
SIB-SC-B34-6-7-08/22/2022	24H0046-16	Solid	22-Aug-2022 14:48	02-Aug-2024 10:51
SIB-SC-B34-7-8-08/22/2022	24H0046-17	Solid	22-Aug-2022 14:51	02-Aug-2024 10:51
SIB-SC-B34-8-9-08/22/2022	24H0046-18	Solid	22-Aug-2022 14:54	02-Aug-2024 10:51
SIB-SC-B34-9-9.7-08/22/2022	24H0046-19	Solid	22-Aug-2022 14:57	02-Aug-2024 10:51
SIB-SC-B35-0-1-07/07/2022	24H0046-20	Solid	07-Jul-2022 15:10	02-Aug-2024 10:51
SIB-SC-B35-6-7-07/07/2022	24H0046-21	Solid	07-Jul-2022 15:28	02-Aug-2024 10:51
SIB-SC-B35-7-8-07/07/2022	24H0046-22	Solid	07-Jul-2022 15:31	02-Aug-2024 10:51
SIB-SC-B35-8-9-07/07/2022	24H0046-23	Solid	07-Jul-2022 15:34	02-Aug-2024 10:51
SIB-SC-B35-9-10-07/07/2022	24H0046-24	Solid	07-Jul-2022 15:37	02-Aug-2024 10:51
SIB-SC-B35-10-11-07/07/2022	24H0046-25	Solid	07-Jul-2022 15:40	02-Aug-2024 10:51
SIB-SC-B35-11-12-07/07/2022	24H0046-26	Solid	07-Jul-2022 15:43	02-Aug-2024 10:51
SIB-SC-B35-12-13-07/07/2022	24H0046-27	Solid	07-Jul-2022 15:46	02-Aug-2024 10:51
SIB-SC-B35-13-14-07/07/2022	24H0046-28	Solid	07-Jul-2022 15:49	02-Aug-2024 10:51
SIB-SC-B35-14-14.7-07/07/2022	24H0046-29	Solid	07-Jul-2022 15:52	02-Aug-2024 10:51
SIB-SC-E24-7-8-07/12/2022	24H0046-30	Solid	12-Jul-2022 10:01	02-Aug-2024 10:51
SIB-SC-E24-8-9-07/12/2022	24H0046-31	Solid	12-Jul-2022 10:04	02-Aug-2024 10:51
SIB-SC-E24-9-10-07/12/2022	24H0046-32	Solid	12-Jul-2022 10:07	02-Aug-2024 10:51
SIB-SC-J06-8-9-07/26/2022	24H0046-33	Solid	26-Jul-2022 14:54	02-Aug-2024 10:51

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Work Order Case Narrative

Client: HydroGeoLogic, Inc
Project: Portland Harbor
Work Order: 24H0046

Sample receipt

Samples as listed on the preceding page were received August 2, 2024 under ARI work order 24H0046. For details regarding sample receipt, please refer to the Cooler Receipt Form.

PCB Aroclors - EPA Method SW8082A

The sample(s) were extracted and analyzed outside the recommended holding times. The samples were stored frozen at ALS Labs.

Initial and continuing calibrations were within method requirements with the exception of CCV7 which fails low on the front column for aroclor 1248 and CCV8 fails high on the front column for 1260. The other columns are in control in SMH0291.

Aroclor 1260 fails low on front column ICV2, aroclor 1260 fails low for CCV4 front column and 1260 fails low for CCV6 front columnin SMH0341.

ICV2 CCV2 CCV4 for aroclor 1260 fails for first column low in SMH0380.

Internal standard areas were within limits with the exception of HBBP which fails low on one column in samples 24H0046-17 and CCV7 and CCV8 for SMH0291.

Internal standard HBBP fails high in front column ICV1 and HBBP fails high in front column for CCV1,CCV2 in SMH0341.

The surrogate percent recoveries were within control limits with the exception of surrogates flagged on the associated forms. Sample 24H0046-30 was re-analyzed at a dilution with surrogate recoveries in control. Both sets of data have been reported.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The matrix spike/matrix spike duplicate (MS/MSD) percent recoveries and relative percent difference (RPD) were within advisory control limits with the exception of analytes flagged on the associated forms.

Analytical Resources, LLC
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: ALS Enviromental Project Name: K2407814

COC No(s): NA Delivered by: Fed-Ex UPS Courier Hand Delivered Other:

Assigned ARI Job No: 24H0046 Tracking No: 7253 3368 9644 NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 1051 3.6

If cooler temperature is out of compliance fill out form 00070F Temp Gun ID#: 100970

Cooler Accepted by: RL Date: 8-2-24 Time: 1051

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used?	Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:		
Was sufficient ice used (if appropriate)?	NA	YES	NO
How were bottles sealed in plastic bags?	Individually	Grouped	Not
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		

Were the sample(s) split by ARI? NA YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: _____ Date: 8/2/24 Time: 1149 Labels checked by: _____

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Analytical Resources, LLC
Analytical Chemists and Consultants

Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B31-6-7-07/10/2022

24H0046-01 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/10/2022 13:18
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 18:47

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-01 A 01
	Preparation Batch: BMH0085	Sample Size: 17.07 g (wet)	Dry Weight:12.50 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 73.23
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-01 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-01 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*77.1*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*83.1*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*72.5*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*74.5*	*%*	H

Analytical Resources, LLC
Analytical Chemists and Consultants

Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B31-7-8-07/10/2022

24H0046-02 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/10/2022 13:21
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 19:08

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-02 A 01
	Preparation Batch: BMH0085	Sample Size: 16.54 g (wet)	Dry Weight:12.50 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 75.59
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-02 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-02 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*69.3*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*74.4*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*65.6*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*68.3*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B31-8-9-07/10/2022

24H0046-03 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/10/2022 13:24
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 19:29

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-03 A 01
	Preparation Batch: BMH0085	Sample Size: 17.16 g (wet)	Dry Weight:12.50 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 72.84
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-03 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-03 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*74.7*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*80.1*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*71.5*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*71.4*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B31-9-10-07/10/2022

24H0046-04 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/10/2022 13:27
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 19:50

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-04 A 01
	Preparation Batch: BMH0085	Sample Size: 17.26 g (wet)	Dry Weight:12.50 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 72.44
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-04 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-04 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*69.5*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*76.8*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*67.3*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*68.4*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B31-10-11-07/10/2022

24H0046-05 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/10/2022 13:30
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 20:10

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-05 A 01
	Preparation Batch: BMH0085	Sample Size: 17.4 g (wet)	Dry Weight:12.53 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 72.03
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-05 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-05 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*71.8*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*76.2*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*68.6*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*69.2*	*%*	H

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HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B31-11-12-07/10/2022

24H0046-06 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/10/2022 13:33
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 20:31

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-06 A 01
	Preparation Batch: BMH0085	Sample Size: 17.48 g (wet)	Dry Weight:12.52 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 71.60
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-06 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-06 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	**3.3**	ug/kg	H, J
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*74.5*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*82.1*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*72.1*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*71.9*	*%*	H

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HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B31-12-13-07/10/2022

24H0046-07 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/10/2022 13:36
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 20:52

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-07 A 01
	Preparation Batch: BMH0085	Sample Size: 17.52 g (wet)	Dry Weight:12.50 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 71.34
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-07 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-07 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*57.8*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*61.8*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*57.0*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*57.7*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B31-13-13.7-07/10/2022

24H0046-08 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/10/2022 13:39
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 21:13

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-08 A 01
	Preparation Batch: BMH0085	Sample Size: 19.23 g (wet)	Dry Weight:12.51 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 65.07
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-08 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-08 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*74.1*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*79.9*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*72.2*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*73.5*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B32-6-7-07/25/2022

24H0046-09 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/25/2022 14:38
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 21:34

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-09 A 01
	Preparation Batch: BMH0085	Sample Size: 18.76 g (wet)	Dry Weight:12.52 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 66.73
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-09 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-09 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl				*40-126 %*		*65.0*	*%*	H
Surrogate: Tetrachlorometaxylene				*44-120 %*		*75.8*	*%*	H
Surrogate: Decachlorobiphenyl [2C]				*40-126 %*		*64.3*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]				*44-120 %*		*68.6*	*%*	H

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B32-7-8-07/25/2022

24H0046-10 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/25/2022 14:41
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 21:55

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-10 A 01
	Preparation Batch: BMH0085	Sample Size: 18.44 g (wet)	Dry Weight:12.51 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 67.83
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-10 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-10 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*52.9*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*58.9*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*53.0*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*54.6*	*%*	H

Analytical Resources, LLC
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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B32-8-9-07/25/2022

24H0046-11 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/25/2022 14:44

Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 22:57

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-11 A 01
	Preparation Batch: BMH0085	Sample Size: 19.03 g (wet)	Dry Weight:12.51 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 65.74
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-11 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-11 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl				*40-126 %*		*52.5*	*%*	H
Surrogate: Tetrachlorometaxylene				*44-120 %*		*62.7*	*%*	H
Surrogate: Decachlorobiphenyl [2C]				*40-126 %*		*51.9*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]				*44-120 %*		*55.9*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B33-6-7-08/21/2022

24H0046-12 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 08/21/2022 14:33
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 23:18

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-12 A 01
	Preparation Batch: BMH0085	Sample Size: 18.72 g (wet)	Dry Weight:12.52 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 66.89
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-12 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-12 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*53.5*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*62.4*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*53.3*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*56.3*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B33-7-8-08/21/2022

24H0046-13 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 08/21/2022 14:36

Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 08:38

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-13 A 01
	Preparation Batch: BMH0085	Sample Size: 18.33 g (wet)	Dry Weight:12.51 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 68.26
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-13 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-13 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*82.6*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*80.6*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*77.2*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*76.5*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B33-8-9-08/21/2022

24H0046-14 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 08/21/2022 14:39
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 00:00

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-14 A 01
	Preparation Batch: BMH0085	Sample Size: 18.87 g (wet)	Dry Weight:12.50 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 66.25
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-14 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-14 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*65.8*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*79.5*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*63.5*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*68.1*	*%*	H

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HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B34-0-1-08/22/2022

24H0046-15 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 08/22/2022 14:30
Instrument: ECD7 Analyst: NRB — Analyzed: 08/27/2024 00:21

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-15 A 01
	Preparation Batch: BMH0085	Sample Size: 19.3 g (wet)	Dry Weight:12.51 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 64.83
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-15 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-15 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*56.9*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*65.5*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*57.1*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*61.0*	*%*	H

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HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B34-6-7-08/22/2022

24H0046-16 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 08/22/2022 14:48
Instrument: ECD7 Analyst: NRB — Analyzed: 08/27/2024 00:42

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-16 A 01
	Preparation Batch: BMH0085	Sample Size: 18.48 g (wet)	Dry Weight:12.50 g
	Prepared: 08/07/2024	Final Volume: 2.5 mL	% Solids: 67.64
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-16 A 01
	Cleanup Batch: CMH0118	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-16 A 01
	Cleanup Batch: CMH0119	Initial Volume: 2.5 uL	
	Cleaned: 15-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*76.0*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*90.3*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*74.9*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*80.3*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B34-7-8-08/22/2022

24H0046-17 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 08/22/2022 14:51
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 11:46

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-17 A 01
	Preparation Batch: BMH0086	Sample Size: 18.83 g (wet)	Dry Weight:12.50 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 66.37
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-17 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-17 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-17 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*110*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*86.2*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*90.1*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*90.8*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B34-8-9-08/22/2022

24H0046-18 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 08/22/2022 14:54
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 12:07

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-18 A 01
	Preparation Batch: BMH0086	Sample Size: 18.95 g (wet)	Dry Weight:12.52 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 66.08
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-18 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-18 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-18 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*81.8*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*66.4*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*69.1*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*69.9*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B34-9-9.7-08/22/2022

24H0046-19 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 08/22/2022 14:57

Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 12:28

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-19 A 01
	Preparation Batch: BMH0086	Sample Size: 18.37 g (wet)	Dry Weight:12.50 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 68.04
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-19 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-19 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-19 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	**14.2**	ug/kg	H
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	**9.0**	ug/kg	P1, H
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*114*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*88.8*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*95.5*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*95.2*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B35-0-1-07/07/2022

24H0046-20 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/07/2022 15:10
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 12:49

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-20 A 01
	Preparation Batch: BMH0086	Sample Size: 19.86 g (wet)	Dry Weight:12.53 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 63.10
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-20 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-20 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-20 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*103*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*82.7*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*87.5*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*83.2*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B35-6-7-07/07/2022

24H0046-21 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/07/2022 15:28
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 13:55

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-21 A 01
	Preparation Batch: BMH0086	Sample Size: 19.08 g (wet)	Dry Weight:12.51 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 65.55
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-21 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-21 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-21 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*64.0*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*68.1*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*66.6*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*72.5*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B35-7-8-07/07/2022

24H0046-22 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/07/2022 15:31
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 14:12

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-22 A 01
	Preparation Batch: BMH0086	Sample Size: 19.46 g (wet)	Dry Weight:12.52 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 64.34
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-22 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-22 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-22 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*96.2*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*81.6*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*88.4*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*81.8*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B35-8-9-07/07/2022

24H0046-23 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/07/2022 15:34
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 14:33

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-23 A 01
	Preparation Batch: BMH0086	Sample Size: 18.77 g (wet)	Dry Weight:12.53 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 66.73
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-23 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-23 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-23 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*106*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*87.2*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*99.4*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*92.8*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B35-9-10-07/07/2022

24H0046-24 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/07/2022 15:37
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 14:54

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-24 A 01
	Preparation Batch: BMH0086	Sample Size: 18.83 g (wet)	Dry Weight:12.50 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 66.37
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-24 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-24 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-24 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*97.0*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*86.3*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*92.2*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*84.2*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B35-10-11-07/07/2022

24H0046-25 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/07/2022 15:40
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 15:15

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-25 A 01
	Preparation Batch: BMH0086	Sample Size: 18.87 g (wet)	Dry Weight:12.51 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 66.28
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-25 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-25 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-25 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*98.9*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*84.2*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*92.8*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*89.3*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B35-11-12-07/07/2022

24H0046-26 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/07/2022 15:43
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 15:36

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-26 A 01
	Preparation Batch: BMH0086	Sample Size: 19.59 g (wet)	Dry Weight:12.51 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 63.88
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-26 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-26 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-26 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*109*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*89.1*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*99.6*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*85.8*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B35-12-13-07/07/2022

24H0046-27 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/07/2022 15:46
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 15:57

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-27 A 01
	Preparation Batch: BMH0086	Sample Size: 20.7 g (wet)	Dry Weight:12.53 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 60.54
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-27 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-27 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-27 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*93.9*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*73.9*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*84.2*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*80.6*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B35-13-14-07/07/2022

24H0046-28 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/07/2022 15:49
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 16:18

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-28 A 01
	Preparation Batch: BMH0086	Sample Size: 20.36 g (wet)	Dry Weight:12.52 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 61.50
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-28 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-28 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-28 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*109*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*89.7*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*96.8*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*94.2*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-B35-14-14.7-07/07/2022

24H0046-29 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/07/2022 15:52
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 16:38

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-29 A 01
	Preparation Batch: BMH0086	Sample Size: 20.68 g (wet)	Dry Weight:12.50 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 60.44
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-29 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-29 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-29 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*103*	*%*	H
Surrogate: Tetrachlorometaxylene					*44-120 %*	*83.8*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*89.4*	*%*	H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*87.5*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-E24-7-8-07/12/2022

24H0046-30 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/12/2022 10:01
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 16:59

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-30 A 01
	Preparation Batch: BMH0086	Sample Size: 23.46 g (wet)	Dry Weight:12.51 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 53.33
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-30 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-30 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-30 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	**72.0**	ug/kg	P1, H
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	**152**	ug/kg	H, P1
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	**82.4**	ug/kg	H, P1
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*146*	*%*	H, *, P1
Surrogate: Tetrachlorometaxylene					*44-120 %*	*45.0*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*37.9*	*%*	*, P1, H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*59.6*	*%*	H

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HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-E24-7-8-07/12/2022

24H0046-30RE1 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/12/2022 10:01

Instrument: ECD7 Analyst: NRB — Analyzed: 08/29/2024 14:57

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-30RE1 A 01
	Preparation Batch: BMH0086	Sample Size: 23.46 g (wet)	Dry Weight:12.51 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 53.33
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-30RE1 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-30RE1 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-30RE1 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	5	10.0	20.0	10.0	< 10.0	ug/kg	H, U
Aroclor 1221	11104-28-2	5	10.0	20.0	10.0	< 10.0	ug/kg	H, U
Aroclor 1232	11141-16-5	5	10.0	20.0	10.0	< 10.0	ug/kg	H, U
Aroclor 1242	53469-21-9	5	10.0	20.0	10.0	< 10.0	ug/kg	H, U
Aroclor 1248	12672-29-6	5	10.0	20.0	10.0	**32.7**	ug/kg	H, P1, D
Aroclor 1254	11097-69-1	5	10.0	20.0	10.0	**70.2**	ug/kg	H, P1, D
Aroclor 1260	11096-82-5	5	10.0	20.0	10.0	**37.6**	ug/kg	H, D
Aroclor 1262	37324-23-5	5	10.0	20.0	10.0	< 10.0	ug/kg	H, U
Aroclor 1268	11100-14-4	5	10.0	20.0	10.0	< 10.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*52.7*	*%*	H, P1
Surrogate: Tetrachlorometaxylene					*44-120 %*	*18.1*	*%*	*, H, P1
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*17.8*	*%*	*, H, P1
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*26.6*	*%*	*, H, P1

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-E24-8-9-07/12/2022

24H0046-31 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/12/2022 10:04

Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 14:16

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-31 A 01
	Preparation Batch: BMH0086	Sample Size: 23.9 g (wet)	Dry Weight:12.50 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 52.30
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-31 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-31 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-31 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	**101**	ug/kg	H, P1
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	**172**	ug/kg	H, P1
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	**87.9**	ug/kg	H
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*146*	*%*	H, P1, *
Surrogate: Tetrachlorometaxylene					*44-120 %*	*45.9*	*%*	H, P1
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*21.4*	*%*	H, *, P1
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*67.6*	*%*	H, P1

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-E24-9-10-07/12/2022

24H0046-32 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/12/2022 10:07
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 14:36

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-32 A 01
	Preparation Batch: BMH0086	Sample Size: 23.23 g (wet)	Dry Weight:12.50 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 53.82
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-32 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-32 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-32 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	**54.7**	ug/kg	H
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	**123**	ug/kg	P1, H
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	**62.5**	ug/kg	H
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*98.8*	*%*	H, P1
Surrogate: Tetrachlorometaxylene					*44-120 %*	*47.4*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*59.4*	*%*	H, P1
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*61.5*	*%*	H

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Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-J06-8-9-07/26/2022

24H0046-33 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/26/2022 14:54
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 14:57

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-33 A 01
	Preparation Batch: BMH0086	Sample Size: 20 g (wet)	Dry Weight:11.89 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 59.46
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-33 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-33 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-33 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	100	210	420	210	< 210	ug/kg	H, U
Aroclor 1221	11104-28-2	100	210	420	210	< 210	ug/kg	H, U
Aroclor 1232	11141-16-5	100	210	420	210	< 210	ug/kg	H, U
Aroclor 1242	53469-21-9	100	210	420	210	< 210	ug/kg	H, U
Aroclor 1248	12672-29-6	100	210	420	210	**3390**	ug/kg	H, P1, D
Aroclor 1254	11097-69-1	100	210	420	210	**4640**	ug/kg	H, P1, D
Aroclor 1260	11096-82-5	100	210	420	210	**1580**	ug/kg	H, D
Aroclor 1262	37324-23-5	100	210	420	210	< 210	ug/kg	H, U
Aroclor 1268	11100-14-4	100	210	420	210	< 210	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*		*D1*	H, D1
Surrogate: Tetrachlorometaxylene					*44-120 %*		*D1*	D1, H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*		*D1*	H, D1
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*		*D1*	D1, H

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0085 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BMH0085-BLK1)	Prepared: 07-Aug-2024 Analyzed: 26-Aug-2024 16:42										
Aroclor 1016	ND	2.0	2.0	ug/kg							U
Aroclor 1221	ND	2.0	2.0	ug/kg							U
Aroclor 1232	ND	2.0	2.0	ug/kg							U
Aroclor 1242	ND	2.0	2.0	ug/kg							U
Aroclor 1248	ND	2.0	2.0	ug/kg							U
Aroclor 1254	ND	2.0	2.0	ug/kg							U
Aroclor 1260	ND	2.0	2.0	ug/kg							U
Aroclor 1262	ND	2.0	2.0	ug/kg							U
Aroclor 1268	ND	2.0	2.0	ug/kg							U
Surrogate: Decachlorobiphenyl	6.62			ug/kg	*8.00*		*82.7*	*40-126*			
Surrogate: Tetrachlorometaxylene	6.73			ug/kg	*8.00*		*84.2*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	5.32			ug/kg	*8.00*		*66.5*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	5.83			ug/kg	*8.00*		*72.9*	*44-120*			

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0085 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BMH0085-BS1)	Prepared: 07-Aug-2024 Analyzed: 26-Aug-2024 17:03										
Aroclor 1016	110	2.0	2.0	ug/kg	101		109	56-120			
Aroclor 1260	107	2.0	2.0	ug/kg	101		106	58-120			
Surrogate: Decachlorobiphenyl	7.27			ug/kg	*8.00*		*90.9*	*40-126*			
Surrogate: Tetrachlorometaxylene	7.25			ug/kg	*8.00*		*90.6*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	6.14			ug/kg	*8.00*		*76.8*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	6.31			ug/kg	*8.00*		*78.9*	*44-120*			

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0085 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BMH0085-BSD1)				Prepared: 07-Aug-2024 Analyzed: 26-Aug-2024 17:23							
Aroclor 1016	121	2.0	2.0	ug/kg	101		120	56-120	9.74	30	
Aroclor 1260	111	2.0	2.0	ug/kg	101		110	58-120	3.37	30	
Surrogate: Decachlorobiphenyl	7.25			ug/kg	*8.00*		*90.7*	*40-126*			
Surrogate: Tetrachlorometaxylene	7.75			ug/kg	*8.00*		*96.9*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	6.66			ug/kg	*8.00*		*83.2*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	6.71			ug/kg	*8.00*		*83.9*	*44-120*			

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0085 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BMH0085-MS1)	**Source: 24H0046-02**			Prepared: 07-Aug-2024 Analyzed: 26-Aug-2024 17:44							
Aroclor 1016	109	2.0	2.0	ug/kg	101	ND	108	56-120			
Aroclor 1260	91.0	2.0	2.0	ug/kg	101	ND	90.3	58-120			
Surrogate: Decachlorobiphenyl	6.12			ug/kg	*8.00*		*76.6*	*40-126*			
Surrogate: Tetrachlorometaxylene	7.15			ug/kg	*8.00*		*89.3*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	6.29			ug/kg	*8.00*		*78.6*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	6.18			ug/kg	*8.00*		*77.3*	*44-120*			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0085 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BMH0085-MSD1)	**Source: 24H0046-02**			Prepared: 07-Aug-2024 Analyzed: 26-Aug-2024 18:05							
Aroclor 1016	84.2	2.0	2.0	ug/kg	101	ND	83.4	56-120	25.80	30	
Aroclor 1260	69.3	2.0	2.0	ug/kg	101	ND	68.7	58-120	27.10	30	
Surrogate: Decachlorobiphenyl	4.56			ug/kg	*8.00*		*57.0*	*40-126*			
Surrogate: Tetrachlorometaxylene	5.09			ug/kg	*8.00*		*63.6*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	4.77			ug/kg	*8.00*		*59.6*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	4.53			ug/kg	*8.00*		*56.7*	*44-120*			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0085 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Reference (BMH0085-SRM1)	Prepared: 07-Aug-2024 Analyzed: 26-Aug-2024 18:26										
Aroclor 1260 [2C]	102	10.0	10.0	ug/kg	108		94.6	38-167			P1
Surrogate: Decachlorobiphenyl	29.4			ug/kg	*40.0*		*73.5*	*40-126*			
Surrogate: Tetrachlorometaxylene	33.0			ug/kg	*40.0*		*82.4*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	27.5			ug/kg	*40.0*		*68.8*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	30.8			ug/kg	*40.0*		*77.0*	*44-120*			

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Aroclor PCB - Quality Control

Batch BMH0086 - EPA 8082A

Instrument: ECD7 Analyst: NRB/AA

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BMH0086-BLK1)				Prepared: 09-Aug-2024 Analyzed: 20-Aug-2024 10:02							
Aroclor 1016	ND	2.0	2.0	ug/kg							U
Aroclor 1221	ND	2.0	2.0	ug/kg							U
Aroclor 1232	ND	2.0	2.0	ug/kg							U
Aroclor 1242	ND	2.0	2.0	ug/kg							U
Aroclor 1248	ND	2.0	2.0	ug/kg							U
Aroclor 1254	ND	2.0	2.0	ug/kg							U
Aroclor 1260	ND	2.0	2.0	ug/kg							U
Aroclor 1262	ND	2.0	2.0	ug/kg							U
Aroclor 1268	ND	2.0	2.0	ug/kg							U
Surrogate: Decachlorobiphenyl	8.16			ug/kg	*8.00*		*102*	*40-126*			
Surrogate: Tetrachlorometaxylene	7.19			ug/kg	*8.00*		*89.9*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	7.73			ug/kg	*8.00*		*96.7*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	7.32			ug/kg	*8.00*		*91.5*	*44-120*			

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0086 - EPA 8082A

Instrument: ECD7 Analyst: NRB/AA

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BMH0086-BS1)				Prepared: 09-Aug-2024 Analyzed: 20-Aug-2024 10:22							
Aroclor 1016	96.6	2.0	2.0	ug/kg	101		95.8	56-120			
Aroclor 1260	106	2.0	2.0	ug/kg	101		105	58-120			
Surrogate: Decachlorobiphenyl	8.82			ug/kg	*8.00*		*110*	*40-126*			
Surrogate: Tetrachlorometaxylene	7.98			ug/kg	*8.00*		*99.8*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	8.30			ug/kg	*8.00*		*104*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	8.14			ug/kg	*8.00*		*102*	*44-120*			

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0086 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BMH0086-MS1)	**Source: 24H0046-33**			Prepared: 09-Aug-2024 Analyzed: 26-Aug-2024 15:18							
Aroclor 1016	1320	105	105	ug/kg	530	ND	249	56-120			P1, D
Aroclor 1260 [2C]	1690	105	105	ug/kg	530	1580	20.8	58-120			D
Surrogate: Decachlorobiphenyl	53.3			ug/kg	*42.0*		*127*	*40-126*			
Surrogate: Tetrachlorometaxylene	24.3			ug/kg	*42.0*		*57.9*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	42.9			ug/kg	*42.0*		*102*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	30.2			ug/kg	*42.0*		*71.9*	*44-120*			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0086 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BMH0086-MSD1)	**Source: 24H0046-33**			Prepared: 09-Aug-2024 Analyzed: 26-Aug-2024 15:39							
Aroclor 1016	1630	105	105	ug/kg	530	ND	308	56-120	21.20	30	*, P1, D
Aroclor 1260 [2C]	3610	105	105	ug/kg	530	1580	383	58-120	72.70	30	*, D
Surrogate: Decachlorobiphenyl	57.7			ug/kg	*42.0*		*137*	*40-126*			*
Surrogate: Tetrachlorometaxylene	23.1			ug/kg	*42.0*		*54.9*	*44-120*			*P1*
Surrogate: Decachlorobiphenyl [2C]	60.1			ug/kg	*42.0*		*143*	*40-126*			*
Surrogate: Tetrachlorometaxylene [2C]	33.0			ug/kg	*42.0*		*78.4*	*44-120*			*P1*

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0086 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Reference (BMH0086-SRM1)	Prepared: 09-Aug-2024 Analyzed: 26-Aug-2024 13:34										
Aroclor 1260 [2C]	131	10.0	10.0	ug/kg	108		122	38-167			P1
Surrogate: Decachlorobiphenyl	34.4			ug/kg	*40.0*		*86.0*	*40-126*			
Surrogate: Tetrachlorometaxylene	34.4			ug/kg	*40.0*		*86.0*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	33.3			ug/kg	*40.0*		*83.2*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	36.8			ug/kg	*40.0*		*92.1*	*44-120*			

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Certified Analyses included in this Report

Analyte	Certifications
EPA 8082A in Solid	
Aroclor 1016	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1016 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1221	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1221 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1232	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1232 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1242	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1242 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1248	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1248 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1254	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1254 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1260	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1260 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1262	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1262 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1268	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1268 [2C]	WADOE,DoD-ELAP,NELAP,ADEC

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	03/28/2025
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program, PJLA Testing	66169	02/28/2025
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006-012	05/12/2025
WADOE	WA Dept of Ecology	C558	06/30/2025
WA-DW	Ecology - Drinking Water	C558	06/30/2025

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Notes and Definitions

*	Flagged value is not within established control limits.
D	The reported value is from a dilution
D1	Surrogate was not detected due to sample extract dilution
H	Hold time violation - Hold time was exceeded.
J	Estimated concentration value detected below the reporting limit.
P1	The reported value is greater than 40% difference between the concentrations determined on two GC columns where applicable.
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

CFA | Cape Fear Analytical LLC
an affiliate of The GEL Group INC

3306 Kitty Hawk Road, Suite 120 Wilmington, NC 28405
P 910.795.0421
www.capefearanalytical.com

August 26, 2024

Mr. Alan Sprott
Vigor Industrial, LLC
5555 North Channel Avenue
Portland, Oregon 97217

Re: Swan Island Basin Portland Harbor
Work Order: 22893

Dear Mr. Sprott:

Cape Fear Analytical LLC (CFA) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 01, 2024, September 19, 2022 and July 12, 2022. This original data report has been prepared and reviewed in accordance with CFA's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at 910-795-0421.

Sincerely,

Cynde Larkins

Cynde Larkins
Project Manager

Enclosures

problem solved

ALS Environmental Chain of Custody

1317 South 13th Avenue • Kelso, WA 98626 • 1-360-577-7222 • FAX 1-360-636-1068

ALS Contact: Karen Melerine

Project Number: K2407818
Project Manager: Karen Melerine
QAP: LAB QAP

CFA WO # 22893

Lab Code	Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Lab ID	Relinquish None
K2407818-001	SIB-SC-B31-6-7-07/10/2022	1	Sediment	7/10/22	1318	Cape Fear	X
K2407818-002	SIB-SC-B31-7-8-07/10/2022		Sediment	7/10/22	1321	Cape Fear	X
K2407818-003	SIB-SC-B31-8-9-07/10/2022		Sediment	7/10/22	1324	Cape Fear	X
K2407818-004	SIB-SC-B31-9-10-07/10/2022		Sediment	7/10/22	1327	Cape Fear	X
K2407818-005	SIB-SC-B31-10-11-07/10/2022		Sediment	7/10/22	1330	Cape Fear	X
K2407818-006	SIB-SC-B31-11-12-07/10/2022		Sediment	7/10/22	1333	Cape Fear	X
K2407818-007	SIB-SC-B31-12-13-07/10/2022		Sediment	7/10/22	1336	Cape Fear	X
K2407818-008	SIB-SC-B31-13-13.7-07/10/2022		Sediment	7/10/22	1339	Cape Fear	X
K2407818-009	SIB-SC-E24-7-8-07/12/2022		Sediment	7/12/22	1001	Cape Fear	X
K2407818-010	SIB-SC-E24-8-9-07/12/2022		Sediment	7/12/22	1004	Cape Fear	X
K2407818-011	SIB-SC-E24-9-10-07/12/2022		Sediment	7/12/22	1007	Cape Fear	X

To be analyzed for Dioxin/Furans
Will report directly to HGL

Reissued from K2207710 & K2207947 Pulled from frozen archive 7/30/24

temp. @ CFA = 5.6°C

Special Instructions/Comments
Please provide the electronic (PDF and EDD) report to the following e-mail address: afletcher@hgl.com, lnyland@hgl.com

Contact: HGL - Andrea Fletcher with any questions: afletcher@hgl.com, 913-378-2316

H - Test is On Hold P - Test is Authorized for Prep Only

Turnaround Requirements
____**RUSH** (Surcharges Apply)
PLEASE CIRCLE WORK DAYS
1 2 3 4 5
__X__ **STANDARD**
Requested FAX Date: _____
Requested Report Date: 08/19/24

Report Requirements
____ I. Results Only
____ II. Results + QC Summaries
____ III. Results + QC and Calibration Summaries
__X__ IV. Data Validation Report with Raw Data
PQL/MDL/J Y
EDD Y

Invoice Information
PO#
Bill to

Relinquished By: Hayleigh Keith 7/31/24
Received By: Kyle Bellamy 8/1/24 @1020
Airbill Number: _____

~~WO 20383~~ 02 05AUG24
WO#22893

orbislogic HGL

CFA
Wilmington, NC

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately

Page: 5 of 138

COC Number: 20220930-SIB-SED

Company: HydroGeoLogic, Inc.	Report To: Andrea Fletcher	Requested Due Date:	Quote Reference:		
Address: 6340 Glenwood, Blding 7, Ste. 200	Copy To: Jeff Gadt	*TAT: 7	Project Manager: Cynde Larkins		
Overland Park, KS 66202	Invoice To: Jeff Gadt	Standard TAT	Project #: DT2002.03.03.01.01		
Phone: 913-488-0024 Fax: 913-317-8860	jgadt@hgl.com		Matrix: SEDIMENT		
Email Address: afletcher@hgl.com	Project Name: HGL-SIB-PDI		Sampling Team Members:		
	Project Number: DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796		

Valid Matrix Codes

Matrix	Code
Soil	SO
Sediment	SE
Surface Water	SW
Wastewater	WW
Groundwater	GW
Stormwater	ST

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE G = Grab C = Composite	DATE COLLECTED MM/DD/YYYY	TIME COLLECTED (Military time)	Preservatives: # Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	Requested Analysis: PCB Congeners	Dioxin/Furan	Archive	MS/MSD	N	N	N	N	N	Filtered (Y/N)	REMARKS / Lab ID
1	SIB-SC-B25-7-8-07/25//2022	SE	C	7/25/2022	13:01	1	X									X								-8.7
2	SIB-SC-B25-8-9-07/25//2022	SE	C	7/25/2022	13:04	1	X									X								
3	SIB-SC-B25-9-9.7-07/25//2022	SE	C	7/25/2022	13:07	1	X									X								
4	SIB-SC-B32-0-1-07/25/2022	SE	C	7/25/2022	14:20	1	X									X								
5	SIB-SC-B32-1-2-07/25/2022	SE	C	7/25/2022	14:23	2	X								X	X								
6	SIB-SC-B32-2-3-07/25/2022	SE	C	7/25/2022	14:26	2	X								X	X								
7	SIB-SC-B32-3-4-07/25/2022	SE	C	7/25/2022	14:29	2	X								X	X								
8	SIB-SC-B32-4-5-07/25/2022	SE	C	7/25/2022	14:32	2	X								X	X								
9	SIB-SC-B32-5-6-07/25/2022	SE	C	7/25/2022	14:35	2	X								X	X								
10	SIB-SC-B32-6-7-07/25//2022	SE	C	7/25/2022	14:38	1	X									X								

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS	ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
		9/16/2022	34		Joss Moore MM	9/16/2022	1600		9/19/22	8:45

SAMPLE CONDITION: SAMPLE NOTES:

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER

DATE Signed: 9/16/2022

Additional Comments:

WO#22893 CLOSAUG24 ~~20385~~

CFA WO# ~~20446~~ AZ 25 OCT 22

orbislogic HGL

CFA Wilmington, NC

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately

Page: 6 of 138

COC Number: 20220930-SIB-SED

Company:	HydroGeoLogic, Inc.	Report To:	Andrea Fletcher	Requested Due Date:	Quote Reference:
Address:	6340 Glenwood, Blding 7, Ste. 200	Copy To:	Jeff Gadt	*TAT: 7	Project Manager: Cynde Larkins
	Overland Park, KS 66202	Invoice To:	Jeff Gadt	Standard TAT	Project #: DT2002.03.03.01.01
Phone: 913-488-0024	Fax: 913-317-8860		jgadt@hgl.com		Matrix: SEDIMENT
Email Address:	afletcher@hgl.com	Project Name:	HGL-SIB-PDI		Sampling Team Members:
		Project Number:	DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796

Valid Matrix Codes

Matrix	Code
Soil	SO
Sediment	SE
Surface Water	SW
Wastewater	WW
Groundwater	GW
Stormwater	ST

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE G = Grab C = Composite	DATE COLLECTED MM/DD/YYYY	TIME COLLECTED (Military time)	Preservatives: # Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	Requested Analysis: PCB Congeners	Dioxin/Furan	Archive	MS/MSD	Filtered (Y/N)	REMARKS / Lab ID
														N	N	N	N	N	N	N	N	N	N	N	
1	SIB-SC-B32-7-8-07/25//2022	SE	C	7/25/2022	14:41	1	X									X			-870
2	SIB-SC-B32-8-9-07/25//2022	SE	C	7/25/2022	14:44	1	X									X			↓
3	SIB-SC-H08-0-1-07/26/2022	SE	C	7/26/2022	10:10	1	X									X			-15.20
4	SIB-SC-H08-1-2-07/26/2022	SE	C	7/26/2022	10:13	2	X								X	X			
5	FD-20-07/26/2022	SE	C	7/26/2022	10:37	1	X								X				
6	SIB-SC-H08-2-3-07/26/2022	SE	C	7/26/2022	10:16	3	X								X	X	X		
7	SIB-SC-H08-3-4-07/26/2022	SE	C	7/26/2022	10:19	2	X								X	X			
8	SIB-SC-H08-4-5-07/26/2022	SE	C	7/26/2022	10:22	2	X								X	X			
9	SIB-SC-H08-5-6-07/26/2022	SE	C	7/26/2022	10:25	2	X								X	X			
10	SIB-SC-H08-6-7-07/26//2022	SE	C	7/26/2022	10:28	1	X									X			↓

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS	ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
		9/16/2022	34		Joss Moore MM	9/16/2022	1600		9/19/22	8:45

SAMPLE CONDITION: SAMPLE NOTES:

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER: Joss Moore

DATE Signed: 9/16/2022

Additional Comments:

~~WO 20403~~ CZ 05AUG24

WO #22893

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CFA Wilmington, NC

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately

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COC Number: 20220930-SIB-SED

Company:	HydroGeoLogic, Inc.	Report To:	Andrea Fletcher	Requested Due Date:	Quote Reference:
Address:	6340 Glenwood, Blding 7, Ste. 200	Copy To:	Jeff Gadt	*TAT: 7	Project Manager: Cynde Larkins
	Overland Park, KS 66202	Invoice To:	Jeff Gadt	Standard TAT	Project #: DT2002.03.03.01.01
Phone:	913-488-0024 Fax: 913-317-8860		jgadt@hgl.com		Matrix: SEDIMENT
Email Address:	afletcher@hgl.com	Project Name:	HGL-SIB-PDI		Sampling Team Members:
		Project Number:	DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796

Valid Matrix Codes

Matrix	Code
Soil	SO
Sediment	SE
Surface Water	SW
Wastewater	WW
Groundwater	GW
Stormwater	ST

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE G = Grab C = Composite	DATE COLLECTED MM/DD/YYYY	TIME COLLECTED (Military time)	Preservatives: # Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	Requested Analysis: PCB Congeners	Dioxin/Furan	Archive	MS/MSD	Filtered (Y/N)	REMARKS / Lab ID
														N	N	N	N	N	
1	SIB-SC-M05-1-2-08/22/2022	SE	C	8/22/2022	13:43	2	X								X	X			#8 -3.5°
2	SIB-SC-M05-2-3-08/22/2022	SE	C	8/22/2022	13:46	2	X								X	X			
3	SIB-SC-M05-3-4-08/22/2022	SE	C	8/22/2022	13:49	2	X								X	X			
4	SIB-SC-M05-4-5-08/22/2022	SE	C	8/22/2022	13:52	2	X								X	X			
5	SIB-SC-M05-5-6-08/22/2022	SE	C	8/22/2022	13:55	2	X								X	X			
6	SIB-SC-M05-6-7-08/22/2022	SE	C	8/22/2022	13:58	1	X									X			
7	SIB-SC-M05-7-8-08/22/2022	SE	C	8/22/2022	14:01	1	X									X			
8	SIB-SC-M05-8-9-08/22/2022	SE	C	8/22/2022	14:04	1	X									X			
9	SIB-SC-B34-0-1-08/22/2022	SE	C	8/22/2022	14:30	1	X									X			-1.4°
10	SIB-SC-B34-1-2-08/22/2022	SE	C	8/22/2022	14:33	2	X								X	X			

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS	ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
		9/16/2022	34		Joss Moore MM	9/16/2022	1600		9/19	8:45

SAMPLE CONDITION:		SAMPLE NOTES:
Temp in C		
Received on Ice	Y / N	
Sealed Cooler	Y / N	
Sample Intact	Y / N	

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER

DATE Signed: 9/16/2022

Additional Comments:

~~WO 20403~~ cf 05AUG24

WO #22893

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CFA
Wilmington, NC

CHAIN-OF-CUSTODY / Analytical Request Document

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Page: 118 of 138

COC Number: 20220930-SIB-SED

Company: HydroGeoLogic, Inc.	Report To: Andrea Fletcher	Requested Due Date:	Quote Reference:		
Address: 6340 Glenwood, Blding 7, Ste. 200	Copy To: Jeff Gadt	*TAT: 7	Project Manager: Cynde Larkins		
Overland Park, KS 66202	Invoice To: Jeff Gadt	Standard TAT	Project #: DT2002.03.03.01.01		
Phone: 913-488-0024 Fax: 913-317-8860	jgadt@hgl.com		Matrix: SEDIMENT		
Email Address: afletcher@hgl.com	Project Name: HGL-SIB-PDI		Sampling Team Members:		
	Project Number: DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796		

Valid Matrix Codes

Matrix	Code
Soil	SO
Sediment	SE
Surface Water	SW
Wastewater	WW
Groundwater	GW
Stormwater	ST

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE G = Grab C = Composite	DATE COLLECTED MM/DD/YYYY	TIME COLLECTED (Military time)	Preservatives: # Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	Requested Analysis: PCB Congeners	Dioxin/Furan	Archive	MS/MSD	Filtered (Y/N)	REMARKS / Lab ID
														N	N	N	N	N	
1	SIB-SC-B34-2-3-08/22/2022	SE	C	8/22/2022	14:36	2	X								X	X			-1,4
2	SIB-SC-B34-3-4-08/22/2022	SE	C	8/22/2022	14:39	2	X								X	X			
3	SIB-SC-B34-4-5-08/22/2022	SE	C	8/22/2022	14:42	2	X								X	X			
4	SIB-SC-B34-5-6-08/22/2022	SE	C	8/22/2022	14:45	2	X								X	X			
5	SIB-SC-B34-6-7-08/22/2022	SE	C	8/22/2022	14:48	1	X									X			
6	SIB-SC-B34-7-8-08/22/2022	SE	C	8/22/2022	14:51	1	X									X			
7	SIB-SC-B34-8-9-08/22/2022	SE	C	8/22/2022	14:54	1	X									X			
8	SIB-SC-B34-9-9.7-08/22/2022	SE	C	8/22/2022	14:57	1	X									X			
9	SIB-SC-C26-0-1-08/23/2022	SE	C	8/23/2022	9:25	2	X								X	X			-9.4
10	SIB-SC-C26-1-2-08/23/2022	SE	C	8/23/2022	9:28	2	X								X	X			

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS	ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
		9/16/2022	34		Joss Moore MM	9/16/2022	1600	Melissa O'Toole	9/19/22	8:45

SAMPLE CONDITION: SAMPLE NOTES:

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER: Joss Moore

DATE Signed: 9/16/2022

Additional Comments:

WO# 22893

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CHAIN-OF-CUSTODY / Analytical Request Document

~~CFA WO# 20010~~ Archived

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CFA Wilmington, NC

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COC Number: 20220711-SIB-SED

Company: HydroGeoLogic, Inc.	Report To: Andrea Fletcher	Requested Due Date:	Quote Reference:		
Address: 6340 Glenwood, Blding 7, Ste. 200	Copy To: Jeff Gadt	*TAT: 7	Project Manager: Cynde Larkins		
Overland Park, KS 66202	Invoice To: Jeff Gadt	Standard TAT	Project #: DT2002.03.03.01.01		
Phone: 913-488-0024 Fax: 913-317-8860	jgadt@hgl.com		Matrix: SEDIMENT		
Email Address: afletcher@hgl.com	Project Name: HGL-SIB-PDI		Sampling Team Members:		
	Project Number: DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796		

Valid Matrix Codes: Soil SO; Sediment SE; Surface Water SW; Wastewater WW; Groundwater GW; Stormwater ST

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE G = Grab C = Composite	DATE COLLECTED MM/DD/YYYY	TIME COLLECTED (Military time)	Preservatives: # Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	Requested Analysis: PCB Congeners	Dioxin/Furan	Archive	MS/MSD	Filtered (Y/N)	REMARKS / Lab ID
1	SIB-SC-C35-4-5-07/07/2022	SE	C	7/7/2022	14:28	2	X							X	X				5.7
2	SIB-SC-C35-5-6-07/07/2022	SE	C	7/7/2022	14:31	2	X							X	X				
3	SIB-SC-C35-6-7-07/07/2022	SE	C	7/7/2022	14:34	2	X									X			
4	SIB-SC-C35-7-8-07/07/2022	SE	C	7/7/2022	14:37	2	X									X			
5	SIB-SC-C35-8-9-07/07/2022	SE	C	7/7/2022	14:40	2	X									X			
6	SIB-SC-C35-9-10-07/07/2022	SE	C	7/7/2022	14:43	2	X									X			
7	SIB-SC-C35-10-11-07/07/2022	SE	C	7/7/2022	14:46	2	X									X			
8	SIB-SC-C35-11-12-07/07/2022	SE	C	7/7/2022	14:49	2	X									X			
9	SIB-SC-C35-12-13-07/07/2022	SE	C	7/7/2022	14:52	2	X									X			
10	SIB-SC-B35-0-1-07/07/2022	SE	C	7/7/2022	15:10	2	X									X			5.1

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS	ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
			4		Joss Moore MM	7/11/22	1100		7/12/22	1100

SAMPLE CONDITION: SAMPLE NOTES:

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

Additional Comments:

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER

DATE Signed: 7/11/22

WO # 22893
CFA WO # ~~20010~~ C205A4024
Archived

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CFA
Wilmington, NC

CHAIN-OF-CUSTODY / Analytical Request Document

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COC Number: 20220711-SIB-SED

Company: HydroGeoLogic, Inc.	Report To: Andrea Fletcher	Requested Due Date:	Quote Reference:
Address: 6340 Glenwood, Blding 7, Ste. 200	Copy To: Jeff Gadt	*TAT: 7	Project Manager: Cynde Larkins
Overland Park, KS 66202	Invoice To: Jeff Gadt	Standard TAT	Project #: DT2002.03.03.01.01
Phone: 913-488-0024 Fax: 913-317-8860	jgadt@hgl.com		Matrix: SEDIMENT
Email Address: afletcher@hgl.com	Project Name: HGL-SIB-PDI		Sampling Team Members:
	Project Number: DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796

Valid Matrix Codes

Matrix	Code
Soil	SO
Sediment	SE
Surface Water	SW
Wastewater	WW
Groundwater	GW
Stormwater	ST

Requested Analysis: N N N N N N N N N ← Filtered (Y/N)

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE G = Grab C = Composite	DATE COLLECTED MM/DD/YYYY	TIME COLLECTED (Military time)	# Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	PCB Congeners	Dioxin/Furan	Archive	MS/MSD	REMARKS / Lab ID
1	SIB-SC-B35-1-2-07/07/2022	SE	C	7/7/2022	15:13	2	X							X	X			5.1°
2	SIB-SC-B35-2-3-07/07/2022	SE	C	7/7/2022	15:16	2	X							X	X			
3	SIB-SC-B35-3-4-07/07/2022	SE	C	7/7/2022	15:19	2	X							X	X			
4	SIB-SC-B35-4-5-07/07/2022	SE	C	7/7/2022	15:22	2	X							X	X			
5	FD-03-07/07/2022	SE	C	7/7/2022	15:55	2	X							X	X			
6	SIB-SC-B35-5-6-07/07/2022	SE	C	7/7/2022	15:25	2	X							X	X			
7	SIB-SC-B35-6-7-07/07/2022	SE	C	7/7/2022	15:28	2	X									X		
8	SIB-SC-B35-7-8-07/07/2022	SE	C	7/7/2022	15:31	2	X									X		
9	SIB-SC-B35-8-9-07/07/2022	SE	C	7/7/2022	15:34	2	X									X		
10	SIB-SC-B35-9-10-07/07/2022	SE	C	7/7/2022	15:37	2	X									X		

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS	ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
			4		Joss Moore MM	7/4/22	1100	[signature]	7/12/22	10:05

SAMPLE CONDITION: SAMPLE NOTES:

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

Additional Comments:

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER [signature] DATE Signed: 7/4/22

WO #22893
CFA WO ~~#2000~~ Archived 05 Aug 24

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CFA
Wilmington, NC

CHAIN-OF-CUSTODY / Analytical Request Document

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Page: 5 of 19

COC Number: 20220711-SIB-SED

Company: HydroGeoLogic, Inc.	Report To: Andrea Fletcher	Requested Due Date:	Quote Reference:
Address: 6340 Glenwood, Blding 7, Ste. 200	Copy To: Jeff Gadt	*TAT: 7	Project Manager: Cynde Larkins
Overland Park, KS 66202	Invoice To: Jeff Gadt	Standard TAT	Project #: DT2002.03.03.01.01
Phone: 913-488-0024 Fax: 913-317-8860	jgadt@hgl.com		Matrix: SEDIMENT
Email Address: afletcher@hgl.com	Project Name: HGL-SIB-PDI		Sampling Team Members:
	Project Number: DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796

Valid Matrix Codes

Matrix	Code
Soil	SO
Sediment	SE
Surface Water	SW
Wastewater	WW
Groundwater	GW
Stormwater	ST

Preservatives / Requested Analysis

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE G = Grab C = Composite	DATE COLLECTED MM/DD/YYYY	TIME COLLECTED (Military time)	# Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	PCB Congeners (N)	Dioxin/Furan (N)	Archive (N)	MS/MSD (N)	N	N	N	N	N				Filtered (Y/N) REMARKS / Lab ID
1	SIB-SC-B35-10-11-07/07/2022	SE	C	7/7/2022	15:40	2	X									X										S10
2	SIB-SC-B35-11-12-07/07/2022	SE	C	7/7/2022	15:43	2	X									X										
3	SIB-SC-B35-12-13-07/07/2022	SE	C	7/7/2022	15:46	2	X									X										
4	SIB-SC-B35-13-14-07/07/2022	SE	C	7/7/2022	15:49	2	X									X										
5	SIB-SC-B35-14-14.7-07/07/2022	SE	C	7/7/2022	15:52	2	X									X										
6	SIB-SC-E35-0-1-07/08/2022	SE	C	7/8/2022	8:50	2	X									X										
7	SIB-SC-E35-1-2-07/08/2022	SE	C	7/8/2022	8:53	2	X							X	X											
8	SIB-SC-E35-2-3-07/08/2022	SE	C	7/8/2022	8:56	2	X							X	X											
9	FD-04-07/08/2022	SE	C	7/8/2022	9:35	2	X							X	X											
10	SIB-SC-E35-3-4-07/08/2022	SE	C	7/8/2022	8:59	2	X							X	X		X									

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS	ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
			4		Joss Moore HM	7/11/22	1150	[illegible]	7/12/22	1005

SAMPLE CONDITION: SAMPLE NOTES:

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

Additional Comments:

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER [signature] DATE Signed: 7/4/22

SAMPLE RECEIPT CHECKLIST

Cape Fear Analytical

Client: ALS for HYGL	Work Order: 22893
Shipping Company: FED EX	Date/Time Received: 8/1/2024 10:20

Suspected Hazard Information	Yes	NA	No
Shipped as DOT Hazardous?			✓
Samples identified as Foreign Soil?			✓

DOE Site Sample Packages	Yes	NA	No*
Screened <0.5 mR/hr?			✓
Samples < 2x background?			✓

* Notify RSO of any responses in this column immediately.

Air Sample Receipt Specifics	Yes	NA	No
Air sample in shipment?			✓

Air Witness: _____

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: seals broken damaged container leaking container other(describe)
2	Custody seal/s present on cooler?	✓			Seal intact? Yes No
3	Chain of Custody documents included with shipment?	✓			
4	Samples requiring cold preservation within 0-6°C?	✓			Preservation Method: Temperature Blank present: (Yes) No ice bags loose ice blue ice dry ice none other (describe) 5.7 - .1 = 5.6°C
5	Aqueous samples found to have visible solids?		✓		Sample IDs, containers affected:
5	Samples requiring chemical preservation at proper pH?		✓		Sample IDs, containers affected and pH observed: If preservative added, Lot#:
7	Samples requiring preservation have no residual chlorine?		✓		Sample IDs, containers affected: If preservative added, Lot#:
8	Samples received within holding time?	✓			Sample IDs, tests affected:
9	Sample IDs on COC match IDs on containers?	✓			Sample IDs, containers affected:
10	Date & time of COC match date & time on containers?			✓	Sample IDs, containers affected: DATE + TIME ARE MISSING ON JARS
11	Number of containers received match number indicated on COC?	✓			List type and number of containers / Sample IDs, containers affected:
12	COC form is properly signed in relinquished/received sections?	✓			

Comments:

Checklist performed by: Initials: KS Date: 8/1/2024

CF-UD-F-7

SAMPLE RECEIPT CHECKLIST

Cape Fear Analytical

Client: HYGL

Work Order: ~~20383~~ 05AUG24 22893

Shipping Company: Fed Ex

Date/Time Received: 19SEP22 0845

Suspected Hazard Information	Yes	NA	No
Shipped as DOT Hazardous?			✓
Samples identified as Foreign Soil?			✓

DOE Site Sample Packages	Yes	NA	No*
Screened <0.5 mR/hr?		✓	
Samples < 2x background?		✓	

* Notify RSO of any responses in this column immediately.

Air Sample Receipt Specifics	Yes	NA	No
Air sample in shipment?			✓

Air Witness: _____

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: seals broken damaged container leaking container other(describe)
2	Custody seal/s present on cooler?	✓			Seal intact? (Yes) No
3	Chain of Custody documents included with shipment?	✓			
4	Samples requiring cold preservation within 0-6°C?			✓	Preservation Method: ice bags loose ice blue ice dry ice none other (describe) -15.1-0.0=-15.1 -15.4-0.0=15.4 -7.6-0-12=-7.6 Temperature Blank present: (Yes) No -11.1-0.0=-11.1 -8.7-0.0=-8.7 -15.8-0.0=-15.8
5	Aqueous samples found to have visible solids?		✓		Sample IDs, containers affected:
5	Samples requiring chemical preservation at proper pH?		✓		Sample IDs, containers affected and pH observed: If preservative added, Lot#:
7	Samples requiring preservation have no residual chlorine?		✓		Sample IDs, containers affected: If preservative added, Lot#:
8	Samples received within holding time?	✓			Sample IDs, tests affected:
9	Sample IDs on COC match IDs on containers?			✓	Sample IDs, containers affected: see below
10	Date & time of COC match date & time on containers?	✓			Sample IDs, containers affected:
11	Number of containers received match number indicated on COC?	✓			List type and number of containers / Sample IDs, containers affected: 77 jars for archive
12	COC form is properly signed in relinquished/received sections?	✓			

Comments:

E 33-07/25/2022 MS/MSD on label

E33-8-9-07/25/2022 MS/MSD on COC

Checklist performed by: Initials: HZ Date: 250CT22

SAMPLE RECEIPT CHECKLIST

Cape Fear Analytical

22893

Client: HYGL	Work Order: ~~20403~~ CF 05AUG24
Shipping Company: FedEx	Date/Time Received: 19 SEP 22 0845

Suspected Hazard Information	Yes	NA	No
Shipped as DOT Hazardous?			✓
Samples identified as Foreign Soil?			✓

DOE Site Sample Packages	Yes	NA	No*
Screened <0.5 mR/hr?		✓	
Samples < 2x background?		✓	

* Notify RSO of any responses in this column immediately.

Air Sample Receipt Specifics	Yes	NA	No
Air sample in shipment?			✓

Air Witness: _____

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: seals broken damaged container leaking container other(describe)
2	Custody seal/s present on cooler?	✓			Seal intact? Yes No
3	Chain of Custody documents included with shipment?	✓			
4	Samples requiring cold preservation within 0-6°C?			✓	Preservation Method: ice bags loose ice blue ice dry ice none other (describe) Temperature Blank present: Yes No -9.9-0.0=-9.9° -15.3-0.0=-15.3° -3.5-0.0=-3.5° -1.9-0.0=-1.9° -15.2-0.0=-15.2°
5	Aqueous samples found to have visible solids?		✓		Sample IDs, containers affected:
5	Samples requiring chemical preservation at proper pH?		✓		Sample IDs, containers affected and pH observed: If preservative added, Lot#:
7	Samples requiring preservation have no residual chlorine?		✓		Sample IDs, containers affected: If preservative added, Lot#:
8	Samples received within holding time?	✓			Sample IDs, tests affected:
9	Sample IDs on COC match IDs on containers?	✓			Sample IDs, containers affected:
10	Date & time of COC match date & time on containers?	✓			Sample IDs, containers affected:
11	Number of containers received match number indicated on COC?	✓			List type and number of containers / Sample IDs, containers affected: 69 jars for archive
12	COC form is properly signed in relinquished/received sections?	✓			

Comments:

M05-0-1 container arrived cracked, transferred to new 8oz

D/F F05-3-4
D/F M04-1-2
D/F M04-2-3
D/F M04-3-4

} container arrived cracked, transferred to new 4oz

SAMPLE RECEIPT CHECKLIST

Cape Fear Analytical

22893

Client: HGI	Work Order: ~~20010~~ CJ 05AUG24
Shipping Company: FedEx	Date/Time Received: 7/12/22 10:05

Suspected Hazard Information	Yes	NA	No
Shipped as DOT Hazardous?			✓
Samples identified as Foreign Soil?			✓

DOE Site Sample Packages	Yes	NA	No*
Screened <0.5 mR/hr?		✓	
Samples < 2x background?			

* Notify RSO of any responses in this column immediately.

Air Sample Receipt Specifics	Yes	NA	No
Air sample in shipment?			✓

Air Witness:

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: seals broken damaged container leaking container other(describe)
2	Custody seal/s present on cooler?	✓			Seal intact? Yes No
3	Chain of Custody documents included with shipment?	✓			
4	Samples requiring cold preservation within 0-6°C?	✓			Preservation Method: ice bags loose ice blue ice dry ice none other (describe) Temperature Blank present: Yes No 5.6+0.1=5.7° (temp blank) 5.5-0.1=5.4°, 12 7/12/22
5	Aqueous samples found to have visible solids?		✓		Sample IDs, containers affected: 3.6+0.1=3.7° (temp blank), 5.2+-0.1=5.1
5	Samples requiring chemical preservation at proper pH?		✓		Sample IDs, containers affected and pH observed: If preservative added, Lot#:
7	Samples requiring preservation have no residual chlorine?		✓		Sample IDs, containers affected: If preservative added, Lot#:
8	Samples received within holding time?	✓			Sample IDs, tests affected:
9	Sample IDs on COC match IDs on containers?	✓			Sample IDs, containers affected:
10	Date & time of COC match date & time on containers?	✓			Sample IDs, containers affected:
11	Number of containers received match number indicated on COC?			✓	List type and number of containers / Sample IDs, containers affected: 375 4oz clear, 7 8oz clear see below, received 382 total jars,
12	COC form is properly signed in relinquished/received sections?	✓			

Comments:

Samples E-31-2-3, E-32-5-6, D-36-4-5, E-35-3-4, D30-3-4, E28-5-6 no 7/12/22, B-31-2-3, all received 3 jars - 2 for sample 1 for MS/MSD (8oz)

1 jar of B31-1-2, 1 jar of F27 4-5 and both jars of F27 2-3 arrived broken. All samples transferred to clean, new jar.

F27-1-2 arrived with cracked lids on both jars.

High Resolution Dioxins and Furans Analysis

Case Narrative

HDOX Case Narrative
HydroGeoLogic, Incorporated (HYGL)
SDG 22893

Method/Analysis Information

Product:	**Dioxins/Furans by EPA Method 1613B in Solids**
Analytical Method:	EPA Method 1613B
Extraction Method:	SW846 3540C
Analytical Batch Number:	56596, 56683
Clean Up Batch Number:	56595, 56681
Extraction Batch Number:	56594, 56680

Sample Analysis

Samples were received within temperature requirements at 5.6 °C (22893001, 22893002, 22893003, 22893004, 22893005, 22893006, 22893007, 22893008, 22893009, 22893010, 22893011), -8.7 °C (22893012, 22893013, 22893014), -1.9 °C (22893015, 22893016, 22893017, 22893018, 22893019) and 5.1 °C (22893020, 22893021, 22893022, 22893023, 22893024, 22893025, 22893026, 22893027, 22893028, 22893029).
The following samples were analyzed using the analytical protocol as established in EPA Method 1613B:

Sample ID	Client ID
12037162	Method Blank (MB)
12037163	Laboratory Control Sample (LCS)
12037164	Laboratory Control Sample Duplicate (LCSD)
12037165	22893001(SIB-SC-B31-6-7-07/10/2022) Matrix Spike (MS)
12037166	22893001(SIB-SC-B31-6-7-07/10/2022) Matrix Spike Duplicate (MSD)
12037217	Method Blank (MB)
12037218	Laboratory Control Sample (LCS)
12037219	Laboratory Control Sample Duplicate (LCSD)
22893001	SIB-SC-B31-6-7-07/10/2022
22893002	SIB-SC-B31-7-8-07/10/2022
22893003	SIB-SC-B31-8-9-07/10/2022
22893004	SIB-SC-B31-9-10-07/10/2022
22893005	SIB-SC-B31-10-11-07/10/2022
22893006	SIB-SC-B31-11-12-07/10/2022
22893007	SIB-SC-B31-12-13-07/10/2022
22893008	SIB-SC-B31-13-13.7-07/10/2022
22893009	SIB-SC-E24-7-8-07/12/2022
22893010	SIB-SC-E24-8-9-07/12/2022
22893011	SIB-SC-E24-9-10-07/12/2022
22893012	SIB-SC-B32-6-7-07/25/2022

22893013 SIB-SC-B32-7-8-07/25/2022
22893014 SIB-SC-B32-8-9-07/25/2022
22893015 SIB-SC-B34-0-1-08/22/2022
22893016 SIB-SC-B34-6-7-08/22/2022
22893017 SIB-SC-B34-7-8-08/22/2022
22893018 SIB-SC-B34-8-9-08/22/2022
22893019 SIB-SC-B34-9-9.7-08/22/2022
22893020 SIB-SC-B35-0-1-07/07/2022
22893021 SIB-SC-B35-6-7-07/07/2022
22893022 SIB-SC-B35-7-8-07/07/2022
22893023 SIB-SC-B35-8-9-07/07/2022
22893024 SIB-SC-B35-9-10-07/07/2022
22893025 SIB-SC-B35-10-11-07/07/2022
22893026 SIB-SC-B35-11-12-07/07/2022
22893027 SIB-SC-B35-12-13-07/07/2022
22893028 SIB-SC-B35-13-14-07/07/2022
22893029 SIB-SC-B35-14-14.7-07/07/2022

The samples in this SDG were analyzed on a "dry weight" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by Cape Fear Analytical LLC (CFA) as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with CF-OA-E-020 REV# 8.

Raw data reports are processed and reviewed by the analyst using the TargetLynx software package.

Calibration Information

Initial Calibration
All initial calibration requirements have been met for this sample delivery group (SDG).

Continuing Calibration Verification (CCV) Requirements
All associated calibration verification standard(s) (CVS) met the acceptance criteria.

Quality Control (QC) Information

Certification Statement
The test results presented in this document are certified to meet all requirements of the 2009 TNI Standard.

Method Blank (MB) Statement
The MB(s) analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries
All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Laboratory Control Sample Duplicate (LCSD) Recovery
The LCSD spike recoveries met the acceptance limits.

LCS/LCSD Relative Percent Difference (RPD) Statement
The RPD(s) between the LCS and LCSD met the acceptance limits.

QC Sample Designation
Sample 22893001 (SIB-SC-B31-6-7-07/10/2022)- Batch 56596 was selected for analysis as the matrix spike and matrix spike duplicate. A sample of similar matrix, not associated with this SDG, was selected for analysis as the matrix spike and matrix spike duplicate- Batch 56683.

Matrix Spike (MS) Recovery Statement
The MS recoveries were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement
The MSD recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement
The RPD(s) between the MS and MSD met the acceptance limits.

Technical Information

Holding Time Specifications
CFA assigns holding times based on the associated methodology, which assigns the date and time from sample collection. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Manual Integrations

Certain standards and QC samples required manual integrations to correctly position the baseline as set in the calibration standard injections. Where manual integrations were performed, copies of all manual integration peak profiles are included in the raw data section of this fraction. Manual integrations were required for data files in this SDG.

Sample Preparation

No difficulties were encountered during sample preparation.

System Configuration

This analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
HRP722_2	Primary Dioxin Analysis	Dioxin Analysis	DB-5MS	60m x 0.25mm, 0.25um
HRP757_3	Confirmation Analysis	TCDF Confirmation	DB-225	30m x 0.25mm, 0.25um

Sample Data Summary

Cape Fear Analytical, LLC

3306 Kitty Hawk Road Suite 120, Wilmington, NC 28405 - (910) 795-0421 - www.capefearanalytical.com

Qualifier Definition Report
for

HYGL001 HydroGeoLogic, Incorporated

Client SDG: 22893 CFA Work Order: 22893

The Qualifiers in this report are defined as follows:

U Analyte was analyzed for, but not detected above the specified detection limit.

J Value is estimated

B The target analyte was detected in the associated blank.

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a surrogate compound

K Estimated Maximum Possible Concentration

DL Indicates that sample is diluted.

RA Indicates that sample is re-analyzed without re-extraction.

RE Indicates that sample is re-extracted.

Review/Validation

Cape Fear Analytical requires all analytical data to be verified by a qualified data reviewer.

The following data validator verified the information presented in this case narrative:

Signature:  **Name: Alexis Finks**

Date: 26 AUG 2024 **Title: Data Validator**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893001**	**Date Collected:**	**07/10/2022 13:18**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**28.9**
Client ID:	**SIB-SC-B31-6-7-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/16/2024 20:35**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-4**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.08 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.200	pg/g	0.200	0.500
40321-76-4	1,2,3,7,8-PeCDD	U	0.141	pg/g	0.141	2.50
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.202	pg/g	0.202	5.00
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.214	pg/g	0.214	5.00
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.208	pg/g	0.208	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	0.602	pg/g	0.342	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD	BJ	9.35	pg/g	0.781	9.99
51207-31-9	2,3,7,8-TCDF	JK	0.186	pg/g	0.162	0.999
57117-41-6	1,2,3,7,8-PeCDF	JK	0.134	pg/g	0.0949	5.00
57117-31-4	2,3,4,7,8-PeCDF	U	0.103	pg/g	0.103	5.00
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.116	pg/g	0.116	5.00
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.117	pg/g	0.117	5.00
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.126	pg/g	0.126	5.00
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.171	pg/g	0.171	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	0.254	pg/g	0.254	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.396	pg/g	0.396	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF	JK	0.482	pg/g	0.468	9.99
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.270	pg/g	0.200	0.999
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.141	pg/g	0.141	5.00
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	0.480	pg/g	0.202	5.00
37871-00-4	Total Heptachlorodibenzo-p-dioxin	J	1.92	pg/g	0.342	5.00
TCDF	Total Tetrachlorodibenzofuran	JK	0.400	pg/g	0.162	0.999
30402-15-4	Total Pentachlorodibenzofuran	BJK	0.134	pg/g	0.0949	5.00
55684-94-1	Total Hexachlorodibenzofuran	BJK	0.134	pg/g	0.116	5.00
38998-75-3	Total Heptachlorodibenzofuran	BJ	0.460	pg/g	0.254	5.00
TEQ	TEQ WHO2005 ND=0		0.0316	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.279	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		127	200	pg/g	63.3	(25%-164%)
13C-1,2,3,7,8-PeCDD		119	200	pg/g	59.6	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		124	200	pg/g	62.2	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		134	200	pg/g	67.2	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		123	200	pg/g	61.5	(23%-140%)
13C-OCDD		163	400	pg/g	40.9	(17%-157%)
13C-2,3,7,8-TCDF		136	200	pg/g	67.9	(24%-169%)
13C-1,2,3,7,8-PeCDF		138	200	pg/g	69.0	(24%-185%)
13C-2,3,4,7,8-PeCDF		117	200	pg/g	58.5	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		138	200	pg/g	69.0	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		139	200	pg/g	69.5	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		136	200	pg/g	68.2	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		131	200	pg/g	65.6	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893001**	**Date Collected:**	**07/10/2022 13:18**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**28.9**
Client ID:	**SIB-SC-B31-6-7-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/16/2024 20:35**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-4**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.08 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		120	200	pg/g	59.9	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		110	200	pg/g	55.1	(26%-138%)
37Cl-2,3,7,8-TCDD		15.9	20.0	pg/g	79.3	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893002**	**Date Collected:**	**07/10/2022 13:21**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**29.1**
Client ID:	**SIB-SC-B31-7-8-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/16/2024 23:01**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-7**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.16 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.225	pg/g	0.225	0.498
40321-76-4	1,2,3,7,8-PeCDD	BJK	0.243	pg/g	0.194	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.203	pg/g	0.203	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.215	pg/g	0.215	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.209	pg/g	0.209	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	0.631	pg/g	0.420	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD	BJ	5.67	pg/g	0.922	9.96
51207-31-9	2,3,7,8-TCDF	U	0.199	pg/g	0.199	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.128	pg/g	0.128	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.134	pg/g	0.134	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	BJK	0.145	pg/g	0.129	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.134	pg/g	0.134	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	BJK	0.147	pg/g	0.132	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.181	pg/g	0.181	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJ	0.287	pg/g	0.148	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.221	pg/g	0.221	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	JK	0.783	pg/g	0.554	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.233	pg/g	0.225	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	BJK	0.243	pg/g	0.194	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	0.269	pg/g	0.203	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	1.24	pg/g	0.420	4.98
TCDF	Total Tetrachlorodibenzofuran	J	0.635	pg/g	0.199	0.996
30402-15-4	Total Pentachlorodibenzofuran	U	0.128	pg/g	0.128	4.98
55684-94-1	Total Hexachlorodibenzofuran	BJK	0.293	pg/g	0.129	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJ	0.287	pg/g	0.148	4.98
TEQ	TEQ WHO2005 ND=0		0.283	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.476	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		126	199	pg/g	63.5	(25%-164%)
13C-1,2,3,7,8-PeCDD		121	199	pg/g	60.7	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		132	199	pg/g	66.5	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		129	199	pg/g	64.8	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		127	199	pg/g	63.7	(23%-140%)
13C-OCDD		173	398	pg/g	43.5	(17%-157%)
13C-2,3,7,8-TCDF		135	199	pg/g	67.5	(24%-169%)
13C-1,2,3,7,8-PeCDF		141	199	pg/g	71.0	(24%-185%)
13C-2,3,4,7,8-PeCDF		124	199	pg/g	62.3	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		136	199	pg/g	68.3	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		142	199	pg/g	71.3	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		141	199	pg/g	70.8	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		132	199	pg/g	66.2	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893002**	**Date Collected:**	**07/10/2022 13:21**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**29.1**
Client ID:	**SIB-SC-B31-7-8-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/16/2024 23:01**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-7**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.16 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		119	199	pg/g	59.7	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		114	199	pg/g	57.2	(26%-138%)
37Cl-2,3,7,8-TCDD		15.7	19.9	pg/g	78.8	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893003**	**Date Collected:**	**07/10/2022 13:24**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**29.5**
Client ID:	**SIB-SC-B31-8-9-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/16/2024 23:50**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-8**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.22 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.192	pg/g	0.192	0.499
40321-76-4	1,2,3,7,8-PeCDD	U	0.154	pg/g	0.154	2.50
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.260	pg/g	0.260	4.99
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.274	pg/g	0.274	4.99
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.268	pg/g	0.268	4.99
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	1.25	pg/g	0.493	4.99
3268-87-9	1,2,3,4,6,7,8,9-OCDD		16.5	pg/g	0.629	9.98
51207-31-9	2,3,7,8-TCDF	JK	0.287	pg/g	0.154	0.998
57117-41-6	1,2,3,7,8-PeCDF	U	0.105	pg/g	0.105	4.99
57117-31-4	2,3,4,7,8-PeCDF	U	0.109	pg/g	0.109	4.99
70648-26-9	1,2,3,4,7,8-HxCDF	BJ	0.104	pg/g	0.0966	4.99
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.102	pg/g	0.102	4.99
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.109	pg/g	0.109	4.99
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.155	pg/g	0.155	4.99
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	0.230	pg/g	0.230	4.99
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.359	pg/g	0.359	4.99
39001-02-0	1,2,3,4,6,7,8,9-OCDF	J	0.693	pg/g	0.391	9.98
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	J	0.411	pg/g	0.192	0.998
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.154	pg/g	0.154	4.99
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	0.822	pg/g	0.260	4.99
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	3.38	pg/g	0.493	4.99
TCDF	Total Tetrachlorodibenzofuran	JK	0.543	pg/g	0.154	0.998
30402-15-4	Total Pentachlorodibenzofuran	U	0.0359	pg/g	0.0359	4.99
55684-94-1	Total Hexachlorodibenzofuran	BJK	0.258	pg/g	0.0966	4.99
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.309	pg/g	0.230	4.99
TEQ	TEQ WHO2005 ND=0		0.0568	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.309	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		137	200	pg/g	68.8	(25%-164%)
13C-1,2,3,7,8-PeCDD		130	200	pg/g	65.2	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		136	200	pg/g	68.2	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		151	200	pg/g	75.7	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		140	200	pg/g	70.1	(23%-140%)
13C-OCDD		193	399	pg/g	48.5	(17%-157%)
13C-2,3,7,8-TCDF		144	200	pg/g	72.1	(24%-169%)
13C-1,2,3,7,8-PeCDF		150	200	pg/g	74.9	(24%-185%)
13C-2,3,4,7,8-PeCDF		132	200	pg/g	66.2	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		154	200	pg/g	77.3	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		157	200	pg/g	78.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		156	200	pg/g	78.1	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		149	200	pg/g	74.5	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893003**	**Date Collected:**	**07/10/2022 13:24**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**29.5**
Client ID:	**SIB-SC-B31-8-9-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/16/2024 23:50**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-8**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.22 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		134	200	pg/g	67.1	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		126	200	pg/g	63.1	(26%-138%)
37Cl-2,3,7,8-TCDD		15.4	20.0	pg/g	77.4	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893004**	**Date Collected:**	**07/10/2022 13:27**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**29.7**
Client ID:	**SIB-SC-B31-9-10-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 00:39**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-9**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.25 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.210	pg/g	0.210	0.499
40321-76-4	1,2,3,7,8-PeCDD	U	0.153	pg/g	0.153	2.50
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.188	pg/g	0.188	4.99
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.189	pg/g	0.189	4.99
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.188	pg/g	0.188	4.99
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	0.653	pg/g	0.262	4.99
3268-87-9	1,2,3,4,6,7,8,9-OCDD	BJ	6.77	pg/g	0.623	9.99
51207-31-9	2,3,7,8-TCDF	JK	0.228	pg/g	0.168	0.999
57117-41-6	1,2,3,7,8-PeCDF	U	0.111	pg/g	0.111	4.99
57117-31-4	2,3,4,7,8-PeCDF	U	0.108	pg/g	0.108	4.99
70648-26-9	1,2,3,4,7,8-HxCDF	BJ	0.108	pg/g	0.0709	4.99
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.0699	pg/g	0.0699	4.99
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.0727	pg/g	0.0727	4.99
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.0961	pg/g	0.0961	4.99
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.415	pg/g	0.136	4.99
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.197	pg/g	0.197	4.99
39001-02-0	1,2,3,4,6,7,8,9-OCDF	J	0.354	pg/g	0.350	9.99
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.465	pg/g	0.210	0.999
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.153	pg/g	0.153	4.99
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	0.439	pg/g	0.188	4.99
37871-00-4	Total Heptachlorodibenzo-p-dioxin	J	2.04	pg/g	0.262	4.99
TCDF	Total Tetrachlorodibenzofuran	JK	0.419	pg/g	0.168	0.999
30402-15-4	Total Pentachlorodibenzofuran	U	0.0322	pg/g	0.0322	4.99
55684-94-1	Total Hexachlorodibenzofuran	BJK	0.316	pg/g	0.0699	4.99
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.415	pg/g	0.136	4.99
TEQ	TEQ WHO2005 ND=0		0.0464	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.287	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		147	200	pg/g	73.8	(25%-164%)
13C-1,2,3,7,8-PeCDD		143	200	pg/g	71.5	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		153	200	pg/g	76.7	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		155	200	pg/g	77.8	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		146	200	pg/g	73.0	(23%-140%)
13C-OCDD		201	399	pg/g	50.4	(17%-157%)
13C-2,3,7,8-TCDF		157	200	pg/g	78.7	(24%-169%)
13C-1,2,3,7,8-PeCDF		165	200	pg/g	82.7	(24%-185%)
13C-2,3,4,7,8-PeCDF		146	200	pg/g	73.0	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		163	200	pg/g	81.8	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		170	200	pg/g	85.0	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		163	200	pg/g	81.8	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		157	200	pg/g	78.6	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893004**	**Date Collected:**	**07/10/2022 13:27**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**29.7**
Client ID:	**SIB-SC-B31-9-10-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 00:39**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-9**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.25 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		135	200	pg/g	67.7	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		136	200	pg/g	68.1	(26%-138%)
37Cl-2,3,7,8-TCDD		16.6	20.0	pg/g	83.0	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893005**	**Date Collected:**	**07/10/2022 13:30**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**28.4**
Client ID:	**SIB-SC-B31-10-11-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 01:28**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-10**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.03 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.207	pg/g	0.207	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.122	pg/g	0.122	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.137	pg/g	0.137	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.151	pg/g	0.151	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.144	pg/g	0.144	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	0.271	pg/g	0.233	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD	BJ	2.65	pg/g	0.675	9.96
51207-31-9	2,3,7,8-TCDF	U	0.165	pg/g	0.165	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.0974	pg/g	0.0974	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.100	pg/g	0.100	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.0743	pg/g	0.0743	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.0765	pg/g	0.0765	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.0693	pg/g	0.0693	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.106	pg/g	0.106	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.116	pg/g	0.0791	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.122	pg/g	0.122	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.331	pg/g	0.331	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.311	pg/g	0.207	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.122	pg/g	0.122	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	0.221	pg/g	0.137	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	0.791	pg/g	0.233	4.98
TCDF	Total Tetrachlorodibenzofuran	U	0.165	pg/g	0.165	0.996
30402-15-4	Total Pentachlorodibenzofuran	U	0.0396	pg/g	0.0396	4.98
55684-94-1	Total Hexachlorodibenzofuran	BJK	0.0936	pg/g	0.0693	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.116	pg/g	0.0791	4.98
TEQ	TEQ WHO2005 ND=0		0.00466	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.232	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		140	199	pg/g	70.3	(25%-164%)
13C-1,2,3,7,8-PeCDD		132	199	pg/g	66.5	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		143	199	pg/g	71.9	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		147	199	pg/g	73.7	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		136	199	pg/g	68.5	(23%-140%)
13C-OCDD		186	398	pg/g	46.7	(17%-157%)
13C-2,3,7,8-TCDF		148	199	pg/g	74.5	(24%-169%)
13C-1,2,3,7,8-PeCDF		153	199	pg/g	76.6	(24%-185%)
13C-2,3,4,7,8-PeCDF		132	199	pg/g	66.4	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		153	199	pg/g	76.8	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		150	199	pg/g	75.4	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		155	199	pg/g	77.9	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		147	199	pg/g	73.8	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893005**	**Date Collected:**	**07/10/2022 13:30**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**28.4**
Client ID:	**SIB-SC-B31-10-11-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 01:28**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-10**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.03 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		131	199	pg/g	65.8	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		122	199	pg/g	61.4	(26%-138%)
37Cl-2,3,7,8-TCDD		16.1	19.9	pg/g	80.7	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893006**	**Date Collected:**	**07/10/2022 13:33**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**29.4**
Client ID:	**SIB-SC-B31-11-12-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 02:17**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-11**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.22 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.303	pg/g	0.303	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.171	pg/g	0.171	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.221	pg/g	0.221	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.231	pg/g	0.231	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.225	pg/g	0.225	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	1.18	pg/g	0.370	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD		23.0	pg/g	0.631	9.96
51207-31-9	2,3,7,8-TCDF	U	0.151	pg/g	0.151	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.0870	pg/g	0.0870	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.0888	pg/g	0.0888	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	BJK	0.0816	pg/g	0.0739	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.0737	pg/g	0.0737	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.0787	pg/g	0.0787	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.114	pg/g	0.114	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJ	0.245	pg/g	0.188	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.279	pg/g	0.279	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.482	pg/g	0.482	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.733	pg/g	0.303	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	BJ	0.173	pg/g	0.171	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	1.08	pg/g	0.221	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	J	3.49	pg/g	0.370	4.98
TCDF	Total Tetrachlorodibenzofuran	U	0.151	pg/g	0.151	0.996
30402-15-4	Total Pentachlorodibenzofuran	U	0.0870	pg/g	0.0870	4.98
55684-94-1	Total Hexachlorodibenzofuran	BJK	0.217	pg/g	0.0737	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJ	0.245	pg/g	0.188	4.98
TEQ	TEQ WHO2005 ND=0		0.0294	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.337	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		135	199	pg/g	68.0	(25%-164%)
13C-1,2,3,7,8-PeCDD		136	199	pg/g	68.1	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		135	199	pg/g	67.7	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		143	199	pg/g	71.8	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		134	199	pg/g	67.4	(23%-140%)
13C-OCDD		177	398	pg/g	44.3	(17%-157%)
13C-2,3,7,8-TCDF		146	199	pg/g	73.2	(24%-169%)
13C-1,2,3,7,8-PeCDF		153	199	pg/g	76.9	(24%-185%)
13C-2,3,4,7,8-PeCDF		138	199	pg/g	69.2	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		148	199	pg/g	74.4	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		150	199	pg/g	75.1	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		148	199	pg/g	74.4	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		141	199	pg/g	70.6	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893006**	**Date Collected:**	**07/10/2022 13:33**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**29.4**
Client ID:	**SIB-SC-B31-11-12-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 02:17**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-11**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.22 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		123	199	pg/g	62.0	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		120	199	pg/g	60.5	(26%-138%)
37Cl-2,3,7,8-TCDD		17.1	19.9	pg/g	85.8	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893007**	**Date Collected:**	**07/10/2022 13:36**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**27.9**
Client ID:	**SIB-SC-B31-12-13-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 03:06**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-12**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**13.95 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.213	pg/g	0.213	0.497
40321-76-4	1,2,3,7,8-PeCDD	U	0.114	pg/g	0.114	2.48
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.143	pg/g	0.143	4.97
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.140	pg/g	0.140	4.97
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.141	pg/g	0.141	4.97
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	0.960	pg/g	0.268	4.97
3268-87-9	1,2,3,4,6,7,8,9-OCDD		25.6	pg/g	0.944	9.94
51207-31-9	2,3,7,8-TCDF	U	0.159	pg/g	0.159	0.994
57117-41-6	1,2,3,7,8-PeCDF	U	0.0793	pg/g	0.0793	4.97
57117-31-4	2,3,4,7,8-PeCDF	U	0.0823	pg/g	0.0823	4.97
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.0642	pg/g	0.0642	4.97
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.0644	pg/g	0.0644	4.97
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.0678	pg/g	0.0678	4.97
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.0968	pg/g	0.0968	4.97
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.336	pg/g	0.118	4.97
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.171	pg/g	0.171	4.97
39001-02-0	1,2,3,4,6,7,8,9-OCDF	J	0.473	pg/g	0.374	9.94
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	J	0.328	pg/g	0.213	0.994
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.114	pg/g	0.114	4.97
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	0.183	pg/g	0.140	4.97
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	2.06	pg/g	0.268	4.97
TCDF	Total Tetrachlorodibenzofuran	U	0.159	pg/g	0.159	0.994
30402-15-4	Total Pentachlorodibenzofuran	U	0.0793	pg/g	0.0793	4.97
55684-94-1	Total Hexachlorodibenzofuran	BJK	0.0895	pg/g	0.0642	4.97
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.493	pg/g	0.118	4.97
TEQ	TEQ WHO2005 ND=0		0.0208	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.242	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		143	199	pg/g	71.8	(25%-164%)
13C-1,2,3,7,8-PeCDD		138	199	pg/g	69.4	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		148	199	pg/g	74.2	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		154	199	pg/g	77.7	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		144	199	pg/g	72.5	(23%-140%)
13C-OCDD		202	398	pg/g	50.9	(17%-157%)
13C-2,3,7,8-TCDF		151	199	pg/g	76.1	(24%-169%)
13C-1,2,3,7,8-PeCDF		156	199	pg/g	78.3	(24%-185%)
13C-2,3,4,7,8-PeCDF		144	199	pg/g	72.4	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		157	199	pg/g	78.9	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		163	199	pg/g	82.2	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		159	199	pg/g	80.2	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		152	199	pg/g	76.5	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893007**	**Date Collected:**	**07/10/2022 13:36**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**27.9**
Client ID:	**SIB-SC-B31-12-13-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 03:06**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-12**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**13.95 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		136	199	pg/g	68.6	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		131	199	pg/g	66.0	(26%-138%)
37Cl-2,3,7,8-TCDD		16.1	19.9	pg/g	80.8	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893008**	**Date Collected:**	**07/10/2022 13:39**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**25.2**
Client ID:	**SIB-SC-B31-13-13.7-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 03:54**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-13**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**13.42 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.223	pg/g	0.223	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.151	pg/g	0.151	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.166	pg/g	0.166	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.161	pg/g	0.161	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.163	pg/g	0.163	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	1.32	pg/g	0.516	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD		17.3	pg/g	0.474	9.96
51207-31-9	2,3,7,8-TCDF	U	0.171	pg/g	0.171	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.0948	pg/g	0.0948	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.0998	pg/g	0.0998	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	BJ	0.149	pg/g	0.104	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.105	pg/g	0.105	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.107	pg/g	0.107	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.158	pg/g	0.158	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJ	0.293	pg/g	0.0751	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.122	pg/g	0.122	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.434	pg/g	0.434	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.317	pg/g	0.223	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.151	pg/g	0.151	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	1.16	pg/g	0.161	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	3.17	pg/g	0.516	4.98
TCDF	Total Tetrachlorodibenzofuran	U	0.171	pg/g	0.171	0.996
30402-15-4	Total Pentachlorodibenzofuran	U	0.0464	pg/g	0.0464	4.98
55684-94-1	Total Hexachlorodibenzofuran	BJ	0.149	pg/g	0.104	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJ	0.293	pg/g	0.0751	4.98
TEQ	TEQ WHO2005 ND=0		0.0363	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.292	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		145	199	pg/g	72.6	(25%-164%)
13C-1,2,3,7,8-PeCDD		139	199	pg/g	69.6	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		145	199	pg/g	72.9	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		150	199	pg/g	75.2	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		140	199	pg/g	70.4	(23%-140%)
13C-OCDD		195	398	pg/g	49.0	(17%-157%)
13C-2,3,7,8-TCDF		153	199	pg/g	76.9	(24%-169%)
13C-1,2,3,7,8-PeCDF		160	199	pg/g	80.2	(24%-185%)
13C-2,3,4,7,8-PeCDF		146	199	pg/g	73.4	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		151	199	pg/g	75.8	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		159	199	pg/g	79.9	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		155	199	pg/g	78.0	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		145	199	pg/g	73.0	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893008**	**Date Collected:**	**07/10/2022 13:39**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**25.2**
Client ID:	**SIB-SC-B31-13-13.7-07/10/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 03:54**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-13**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**13.42 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		132	199	pg/g	66.3	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		127	199	pg/g	63.9	(26%-138%)
37Cl-2,3,7,8-TCDD		16.2	19.9	pg/g	81.2	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893009**	**Date Collected:**	**07/12/2022 10:01**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**47.8**
Client ID:	**SIB-SC-E24-7-8-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 06:26**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-2**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**19.23 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.301	pg/g	0.301	0.498
40321-76-4	1,2,3,7,8-PeCDD	BJK	0.903	pg/g	0.484	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	JK	1.07	pg/g	0.402	4.98
57653-85-7	1,2,3,6,7,8-HxCDD		5.88	pg/g	0.414	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	JK	2.18	pg/g	0.408	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD		133	pg/g	1.45	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD		1360	pg/g	1.87	9.96
51207-31-9	2,3,7,8-TCDF	K	1.74	pg/g	0.377	0.996
57117-41-6	1,2,3,7,8-PeCDF	J	0.789	pg/g	0.309	4.98
57117-31-4	2,3,4,7,8-PeCDF	JK	2.58	pg/g	0.311	4.98
70648-26-9	1,2,3,4,7,8-HxCDF		6.33	pg/g	0.377	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	JK	2.19	pg/g	0.367	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	JK	2.27	pg/g	0.341	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	J	1.37	pg/g	0.426	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF		31.6	pg/g	0.490	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	J	3.09	pg/g	0.661	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF		96.8	pg/g	0.807	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	1.52	pg/g	0.301	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	4.90	pg/g	0.484	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	37.5	pg/g	0.402	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin		259	pg/g	1.45	4.98
TCDF	Total Tetrachlorodibenzofuran	JK	11.7	pg/g	0.377	0.996
30402-15-4	Total Pentachlorodibenzofuran	JK	17.8	pg/g	0.0502	4.98
55684-94-1	Total Hexachlorodibenzofuran	JK	58.2	pg/g	0.341	4.98
38998-75-3	Total Heptachlorodibenzofuran	J	119	pg/g	0.490	4.98
TEQ	TEQ WHO2005 ND=0		6.12	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		6.28	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		131	199	pg/g	65.9	(25%-164%)
13C-1,2,3,7,8-PeCDD		110	199	pg/g	55.4	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		139	199	pg/g	69.9	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		137	199	pg/g	68.6	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		168	199	pg/g	84.6	(23%-140%)
13C-OCDD		274	398	pg/g	68.7	(17%-157%)
13C-2,3,7,8-TCDF		136	199	pg/g	68.5	(24%-169%)
13C-1,2,3,7,8-PeCDF		124	199	pg/g	62.4	(24%-185%)
13C-2,3,4,7,8-PeCDF		110	199	pg/g	55.3	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		136	199	pg/g	68.5	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		137	199	pg/g	68.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		145	199	pg/g	72.9	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		139	199	pg/g	70.0	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893009**	**Date Collected:**	**07/12/2022 10:01**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**47.8**
Client ID:	**SIB-SC-E24-7-8-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 06:26**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-2**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**19.23 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		144	199	pg/g	72.4	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		162	199	pg/g	81.3	(26%-138%)
37Cl-2,3,7,8-TCDD		16.7	19.9	pg/g	83.9	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893009**	**Date Collected:**	**07/12/2022 10:01**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**47.8**
Client ID:	**SIB-SC-E24-7-8-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/19/2024 15:36**	**Analyst:**	**GM1**	**Instrument:**	**HRP757**
Data File:	**e19aug24b-4**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**19.23 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
51207-31-9	2,3,7,8-TCDF		1.83	pg/g	0.406	0.996

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.
J Value is estimated
B The target analyte was detected in the associated blank.
K Estimated Maximum Possible Concentration

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893010**	**Date Collected:**	**07/12/2022 10:04**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**51.6**
Client ID:	**SIB-SC-E24-8-9-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 07:15**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-3**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**20.7 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		0.782	pg/g	0.509	0.499
40321-76-4	1,2,3,7,8-PeCDD	K	2.70	pg/g	0.489	2.50
39227-28-6	1,2,3,4,7,8-HxCDD	JK	3.14	pg/g	0.731	4.99
57653-85-7	1,2,3,6,7,8-HxCDD		18.5	pg/g	0.755	4.99
19408-74-3	1,2,3,7,8,9-HxCDD	K	7.84	pg/g	0.741	4.99
35822-46-9	1,2,3,4,6,7,8-HpCDD		404	pg/g	1.37	4.99
3268-87-9	1,2,3,4,6,7,8,9-OCDD		3950	pg/g	1.98	9.98
51207-31-9	2,3,7,8-TCDF		4.05	pg/g	0.727	0.998
57117-41-6	1,2,3,7,8-PeCDF	J	1.89	pg/g	0.301	4.99
57117-31-4	2,3,4,7,8-PeCDF		6.02	pg/g	0.323	4.99
70648-26-9	1,2,3,4,7,8-HxCDF		15.6	pg/g	0.309	4.99
57117-44-9	1,2,3,6,7,8-HxCDF		5.35	pg/g	0.345	4.99
60851-34-5	2,3,4,6,7,8-HxCDF		5.76	pg/g	0.355	4.99
72918-21-9	1,2,3,7,8,9-HxCDF	J	3.03	pg/g	0.393	4.99
67562-39-4	1,2,3,4,6,7,8-HpCDF		96.1	pg/g	0.647	4.99
55673-89-7	1,2,3,4,7,8,9-HpCDF		7.08	pg/g	0.782	4.99
39001-02-0	1,2,3,4,6,7,8,9-OCDF		298	pg/g	0.892	9.98
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	6.46	pg/g	0.509	0.998
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	19.7	pg/g	0.489	4.99
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	131	pg/g	0.731	4.99
37871-00-4	Total Heptachlorodibenzo-p-dioxin		837	pg/g	1.37	4.99
TCDF	Total Tetrachlorodibenzofuran	JK	36.7	pg/g	0.727	0.998
30402-15-4	Total Pentachlorodibenzofuran	JK	48.3	pg/g	0.0563	4.99
55684-94-1	Total Hexachlorodibenzofuran	JK	156	pg/g	0.309	4.99
38998-75-3	Total Heptachlorodibenzofuran	J	363	pg/g	0.647	4.99
TEQ	TEQ WHO2005 ND=0		18.0	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		18.0	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		141	200	pg/g	70.8	(25%-164%)
13C-1,2,3,7,8-PeCDD		118	200	pg/g	59.0	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		144	200	pg/g	72.2	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		139	200	pg/g	69.5	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		172	200	pg/g	86.4	(23%-140%)
13C-OCDD		335	399	pg/g	84.0	(17%-157%)
13C-2,3,7,8-TCDF		149	200	pg/g	74.5	(24%-169%)
13C-1,2,3,7,8-PeCDF		132	200	pg/g	66.0	(24%-185%)
13C-2,3,4,7,8-PeCDF		119	200	pg/g	59.5	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		149	200	pg/g	74.7	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		143	200	pg/g	71.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		151	200	pg/g	75.4	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		152	200	pg/g	76.2	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893010**	**Date Collected:**	**07/12/2022 10:04**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**51.6**
Client ID:	**SIB-SC-E24-8-9-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 07:15**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-3**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**20.7 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		150	200	pg/g	75.1	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		173	200	pg/g	86.9	(26%-138%)
37Cl-2,3,7,8-TCDD		16.5	20.0	pg/g	82.5	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893010**	**Date Collected:**	**07/12/2022 10:04**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**51.6**
Client ID:	**SIB-SC-E24-8-9-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/19/2024 16:02**	**Analyst:**	**GM1**	**Instrument:**	**HRP757**
Data File:	**e19aug24b-5**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**20.7 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
51207-31-9	2,3,7,8-TCDF		4.25	pg/g	0.473	0.998

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

J Value is estimated

K Estimated Maximum Possible Concentration

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893011**	**Date Collected:**	**07/12/2022 10:07**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**49.7**
Client ID:	**SIB-SC-E24-9-10-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 08:04**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-4**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**19.91 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	J	0.317	pg/g	0.216	0.499
40321-76-4	1,2,3,7,8-PeCDD	BJK	1.23	pg/g	0.277	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	J	1.36	pg/g	0.359	4.99
57653-85-7	1,2,3,6,7,8-HxCDD		8.21	pg/g	0.369	4.99
19408-74-3	1,2,3,7,8,9-HxCDD	JK	3.55	pg/g	0.363	4.99
35822-46-9	1,2,3,4,6,7,8-HpCDD		172	pg/g	1.18	4.99
3268-87-9	1,2,3,4,6,7,8,9-OCDD		2010	pg/g	1.55	9.98
51207-31-9	2,3,7,8-TCDF	K	1.25	pg/g	0.371	0.998
57117-41-6	1,2,3,7,8-PeCDF	J	0.978	pg/g	0.238	4.99
57117-31-4	2,3,4,7,8-PeCDF	J	2.48	pg/g	0.236	4.99
70648-26-9	1,2,3,4,7,8-HxCDF		6.50	pg/g	0.202	4.99
57117-44-9	1,2,3,6,7,8-HxCDF	J	3.18	pg/g	0.195	4.99
60851-34-5	2,3,4,6,7,8-HxCDF	J	2.83	pg/g	0.202	4.99
72918-21-9	1,2,3,7,8,9-HxCDF	J	1.34	pg/g	0.261	4.99
67562-39-4	1,2,3,4,6,7,8-HpCDF		46.9	pg/g	0.403	4.99
55673-89-7	1,2,3,4,7,8,9-HpCDF	J	3.81	pg/g	0.529	4.99
39001-02-0	1,2,3,4,6,7,8,9-OCDF		133	pg/g	0.752	9.98
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	3.07	pg/g	0.216	0.998
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	8.58	pg/g	0.277	4.99
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	57.9	pg/g	0.359	4.99
37871-00-4	Total Heptachlorodibenzo-p-dioxin		345	pg/g	1.18	4.99
TCDF	Total Tetrachlorodibenzofuran	JK	14.6	pg/g	0.371	0.998
30402-15-4	Total Pentachlorodibenzofuran	JK	23.4	pg/g	0.0337	4.99
55684-94-1	Total Hexachlorodibenzofuran	JK	72.8	pg/g	0.195	4.99
38998-75-3	Total Heptachlorodibenzofuran	JK	167	pg/g	0.403	4.99
TEQ	TEQ WHO2005 ND=0		8.03	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		8.03	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		137	200	pg/g	68.9	(25%-164%)
13C-1,2,3,7,8-PeCDD		124	200	pg/g	62.0	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		143	200	pg/g	71.5	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		141	200	pg/g	70.5	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		173	200	pg/g	86.6	(23%-140%)
13C-OCDD		291	399	pg/g	72.9	(17%-157%)
13C-2,3,7,8-TCDF		142	200	pg/g	71.3	(24%-169%)
13C-1,2,3,7,8-PeCDF		135	200	pg/g	67.6	(24%-185%)
13C-2,3,4,7,8-PeCDF		119	200	pg/g	59.8	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		148	200	pg/g	74.3	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		145	200	pg/g	72.4	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		151	200	pg/g	75.7	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		149	200	pg/g	74.6	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893011**	**Date Collected:**	**07/12/2022 10:07**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**49.7**
Client ID:	**SIB-SC-E24-9-10-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 08:04**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-4**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**19.91 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		146	200	pg/g	73.2	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		163	200	pg/g	81.6	(26%-138%)
37Cl-2,3,7,8-TCDD		15.9	20.0	pg/g	79.5	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893011**	**Date Collected:**	**07/12/2022 10:07**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**49.7**
Client ID:	**SIB-SC-E24-9-10-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/19/2024 16:29**	**Analyst:**	**GM1**	**Instrument:**	**HRP757**
Data File:	**e19aug24b-6**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**19.91 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
51207-31-9	2,3,7,8-TCDF		1.41	pg/g	0.423	0.998

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.
J Value is estimated
B The target analyte was detected in the associated blank.
K Estimated Maximum Possible Concentration

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893012**	**Date Collected:**	**07/25/2022 14:38**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**32.4**
Client ID:	**SIB-SC-B32-6-7-07/25/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 08:53**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-5**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.89 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.262	pg/g	0.262	0.497
40321-76-4	1,2,3,7,8-PeCDD	U	0.177	pg/g	0.177	2.48
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.252	pg/g	0.252	4.97
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.266	pg/g	0.266	4.97
19408-74-3	1,2,3,7,8,9-HxCDD	J	0.445	pg/g	0.258	4.97
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	2.83	pg/g	0.260	4.97
3268-87-9	1,2,3,4,6,7,8,9-OCDD		23.1	pg/g	0.632	9.94
51207-31-9	2,3,7,8-TCDF	U	0.158	pg/g	0.158	0.994
57117-41-6	1,2,3,7,8-PeCDF	U	0.112	pg/g	0.112	4.97
57117-31-4	2,3,4,7,8-PeCDF	U	0.109	pg/g	0.109	4.97
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.119	pg/g	0.119	4.97
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.127	pg/g	0.127	4.97
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.126	pg/g	0.126	4.97
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.166	pg/g	0.166	4.97
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.227	pg/g	0.181	4.97
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.264	pg/g	0.264	4.97
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.417	pg/g	0.417	9.94
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.409	pg/g	0.262	0.994
36088-22-9	Total Pentachlorodibenzo-p-dioxin	BJK	0.928	pg/g	0.177	4.97
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	3.41	pg/g	0.252	4.97
37871-00-4	Total Heptachlorodibenzo-p-dioxin	J	7.62	pg/g	0.260	4.97
TCDF	Total Tetrachlorodibenzofuran	J	0.238	pg/g	0.158	0.994
30402-15-4	Total Pentachlorodibenzofuran	U	0.109	pg/g	0.109	4.97
55684-94-1	Total Hexachlorodibenzofuran	U	0.119	pg/g	0.119	4.97
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.227	pg/g	0.181	4.97
TEQ	TEQ WHO2005 ND=0		0.0820	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.382	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		140	199	pg/g	70.4	(25%-164%)
13C-1,2,3,7,8-PeCDD		147	199	pg/g	74.0	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		142	199	pg/g	71.7	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		140	199	pg/g	70.6	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		158	199	pg/g	79.6	(23%-140%)
13C-OCDD		250	397	pg/g	62.9	(17%-157%)
13C-2,3,7,8-TCDF		142	199	pg/g	71.6	(24%-169%)
13C-1,2,3,7,8-PeCDF		165	199	pg/g	83.1	(24%-185%)
13C-2,3,4,7,8-PeCDF		144	199	pg/g	72.2	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		146	199	pg/g	73.6	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		147	199	pg/g	73.7	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		150	199	pg/g	75.2	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		144	199	pg/g	72.3	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893012**	**Date Collected:**	**07/25/2022 14:38**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**32.4**
Client ID:	**SIB-SC-B32-6-7-07/25/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 08:53**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-5**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.89 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		141	199	pg/g	71.0	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		144	199	pg/g	72.6	(26%-138%)
37Cl-2,3,7,8-TCDD		15.6	19.9	pg/g	78.7	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893013**	**Date Collected:**	**07/25/2022 14:41**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**30.8**
Client ID:	**SIB-SC-B32-7-8-07/25/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 09:41**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-6**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.52 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.181	pg/g	0.181	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.158	pg/g	0.158	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.176	pg/g	0.176	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.179	pg/g	0.179	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	J	0.257	pg/g	0.177	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	1.35	pg/g	0.251	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD		16.8	pg/g	0.486	9.96
51207-31-9	2,3,7,8-TCDF	JK	0.171	pg/g	0.162	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.0986	pg/g	0.0986	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.100	pg/g	0.100	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.0918	pg/g	0.0918	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.0950	pg/g	0.0950	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.0954	pg/g	0.0954	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.131	pg/g	0.131	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.225	pg/g	0.171	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.259	pg/g	0.259	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.297	pg/g	0.297	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.380	pg/g	0.181	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	BJK	0.468	pg/g	0.158	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	1.74	pg/g	0.176	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	J	3.77	pg/g	0.251	4.98
TCDF	Total Tetrachlorodibenzofuran	JK	0.341	pg/g	0.162	0.996
30402-15-4	Total Pentachlorodibenzofuran	U	0.0243	pg/g	0.0243	4.98
55684-94-1	Total Hexachlorodibenzofuran	U	0.0918	pg/g	0.0918	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.225	pg/g	0.171	4.98
TEQ	TEQ WHO2005 ND=0		0.0637	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.289	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		142	199	pg/g	71.3	(25%-164%)
13C-1,2,3,7,8-PeCDD		161	199	pg/g	80.8	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		148	199	pg/g	74.5	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		146	199	pg/g	73.2	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		162	199	pg/g	81.4	(23%-140%)
13C-OCDD		249	398	pg/g	62.4	(17%-157%)
13C-2,3,7,8-TCDF		147	199	pg/g	73.9	(24%-169%)
13C-1,2,3,7,8-PeCDF		173	199	pg/g	87.1	(24%-185%)
13C-2,3,4,7,8-PeCDF		158	199	pg/g	79.4	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		154	199	pg/g	77.2	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		156	199	pg/g	78.3	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		157	199	pg/g	79.1	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		150	199	pg/g	75.5	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893013**	**Date Collected:**	**07/25/2022 14:41**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**30.8**
Client ID:	**SIB-SC-B32-7-8-07/25/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 09:41**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-6**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.52 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		143	199	pg/g	72.0	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		146	199	pg/g	73.4	(26%-138%)
37Cl-2,3,7,8-TCDD		15.5	19.9	pg/g	77.9	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893014**	**Date Collected:**	**07/25/2022 14:44**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**35.6**
Client ID:	**SIB-SC-B32-8-9-07/25/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 10:30**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-7**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**15.54 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.320	pg/g	0.320	0.500
40321-76-4	1,2,3,7,8-PeCDD	BJ	0.226	pg/g	0.220	2.50
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.268	pg/g	0.268	5.00
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.288	pg/g	0.288	5.00
19408-74-3	1,2,3,7,8,9-HxCDD	JK	0.492	pg/g	0.278	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	3.56	pg/g	0.308	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		29.6	pg/g	0.648	10.0
51207-31-9	2,3,7,8-TCDF	U	0.177	pg/g	0.177	1.00
57117-41-6	1,2,3,7,8-PeCDF	U	0.0848	pg/g	0.0848	5.00
57117-31-4	2,3,4,7,8-PeCDF	JK	0.0860	pg/g	0.0838	5.00
70648-26-9	1,2,3,4,7,8-HxCDF	BJ	0.0960	pg/g	0.0754	5.00
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.0738	pg/g	0.0738	5.00
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.0778	pg/g	0.0778	5.00
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.110	pg/g	0.110	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJ	0.276	pg/g	0.158	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.238	pg/g	0.238	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.470	pg/g	0.470	10.0
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.840	pg/g	0.320	1.00
36088-22-9	Total Pentachlorodibenzo-p-dioxin	BJ	1.30	pg/g	0.220	5.00
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	5.01	pg/g	0.268	5.00
37871-00-4	Total Heptachlorodibenzo-p-dioxin	J	9.69	pg/g	0.308	5.00
TCDF	Total Tetrachlorodibenzofuran	JK	0.326	pg/g	0.177	1.00
30402-15-4	Total Pentachlorodibenzofuran	BJK	0.0860	pg/g	0.0838	5.00
55684-94-1	Total Hexachlorodibenzofuran	BJ	0.198	pg/g	0.0738	5.00
38998-75-3	Total Heptachlorodibenzofuran	BJ	0.276	pg/g	0.158	5.00
TEQ	TEQ WHO2005 ND=0		0.358	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.570	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		120	200	pg/g	60.2	(25%-164%)
13C-1,2,3,7,8-PeCDD		132	200	pg/g	65.9	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		125	200	pg/g	62.5	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		128	200	pg/g	64.2	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		137	200	pg/g	68.5	(23%-140%)
13C-OCDD		196	400	pg/g	49.0	(17%-157%)
13C-2,3,7,8-TCDF		126	200	pg/g	62.8	(24%-169%)
13C-1,2,3,7,8-PeCDF		144	200	pg/g	72.1	(24%-185%)
13C-2,3,4,7,8-PeCDF		132	200	pg/g	66.1	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		133	200	pg/g	66.3	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		129	200	pg/g	64.6	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		134	200	pg/g	67.0	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		128	200	pg/g	64.0	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893014**	**Date Collected:**	**07/25/2022 14:44**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**35.6**
Client ID:	**SIB-SC-B32-8-9-07/25/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 10:30**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-7**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**15.54 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		125	200	pg/g	62.4	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		123	200	pg/g	61.5	(26%-138%)
37Cl-2,3,7,8-TCDD		15.3	20.0	pg/g	76.7	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893015**	**Date Collected:**	**08/22/2022 14:30**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**35.6**
Client ID:	**SIB-SC-B34-0-1-08/22/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 11:19**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-8**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**15.57 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.393	pg/g	0.393	0.499
40321-76-4	1,2,3,7,8-PeCDD	U	0.158	pg/g	0.158	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.229	pg/g	0.229	4.99
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.249	pg/g	0.249	4.99
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.239	pg/g	0.239	4.99
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	0.800	pg/g	0.293	4.99
3268-87-9	1,2,3,4,6,7,8,9-OCDD	BJ	5.62	pg/g	0.738	9.97
51207-31-9	2,3,7,8-TCDF	U	0.311	pg/g	0.311	0.997
57117-41-6	1,2,3,7,8-PeCDF	U	0.126	pg/g	0.126	4.99
57117-31-4	2,3,4,7,8-PeCDF	U	0.136	pg/g	0.136	4.99
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.0977	pg/g	0.0977	4.99
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.107	pg/g	0.107	4.99
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.102	pg/g	0.102	4.99
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.143	pg/g	0.143	4.99
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.176	pg/g	0.106	4.99
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.160	pg/g	0.160	4.99
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.433	pg/g	0.433	9.97
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	U	0.393	pg/g	0.393	0.997
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.158	pg/g	0.158	4.99
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	0.889	pg/g	0.229	4.99
37871-00-4	Total Heptachlorodibenzo-p-dioxin	J	2.00	pg/g	0.293	4.99
TCDF	Total Tetrachlorodibenzofuran	U	0.311	pg/g	0.311	0.997
30402-15-4	Total Pentachlorodibenzofuran	U	0.0529	pg/g	0.0529	4.99
55684-94-1	Total Hexachlorodibenzofuran	U	0.0977	pg/g	0.0977	4.99
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.176	pg/g	0.106	4.99
TEQ	TEQ WHO2005 ND=0		0.0114	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.384	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		143	199	pg/g	71.7	(25%-164%)
13C-1,2,3,7,8-PeCDD		151	199	pg/g	75.6	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		141	199	pg/g	70.5	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		151	199	pg/g	75.8	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		162	199	pg/g	81.2	(23%-140%)
13C-OCDD		258	399	pg/g	64.7	(17%-157%)
13C-2,3,7,8-TCDF		149	199	pg/g	74.8	(24%-169%)
13C-1,2,3,7,8-PeCDF		167	199	pg/g	83.8	(24%-185%)
13C-2,3,4,7,8-PeCDF		154	199	pg/g	77.0	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		149	199	pg/g	74.8	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		153	199	pg/g	76.5	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		151	199	pg/g	75.7	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		149	199	pg/g	74.8	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893015**	**Date Collected:**	**08/22/2022 14:30**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**35.6**
Client ID:	**SIB-SC-B34-0-1-08/22/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 11:19**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-8**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**15.57 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		150	199	pg/g	75.2	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		148	199	pg/g	74.1	(26%-138%)
37Cl-2,3,7,8-TCDD		15.4	19.9	pg/g	77.2	(35%-197%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.
J Value is estimated
B The target analyte was detected in the associated blank.
K Estimated Maximum Possible Concentration

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893016**	**Date Collected:**	**08/22/2022 14:48**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**31.9**
Client ID:	**SIB-SC-B34-6-7-08/22/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 12:08**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-9**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.75 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.343	pg/g	0.343	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.237	pg/g	0.237	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.360	pg/g	0.360	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.370	pg/g	0.370	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.364	pg/g	0.364	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	2.05	pg/g	0.333	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD		17.4	pg/g	0.719	9.96
51207-31-9	2,3,7,8-TCDF	U	0.291	pg/g	0.291	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.116	pg/g	0.116	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.109	pg/g	0.109	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.109	pg/g	0.109	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.113	pg/g	0.113	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.105	pg/g	0.105	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.155	pg/g	0.155	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.301	pg/g	0.112	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.168	pg/g	0.168	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.448	pg/g	0.448	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	J	0.514	pg/g	0.343	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	BJK	0.558	pg/g	0.237	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	2.02	pg/g	0.360	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	5.46	pg/g	0.333	4.98
TCDF	Total Tetrachlorodibenzofuran	U	0.291	pg/g	0.291	0.996
30402-15-4	Total Pentachlorodibenzofuran	U	0.0564	pg/g	0.0564	4.98
55684-94-1	Total Hexachlorodibenzofuran	BJK	0.135	pg/g	0.105	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.301	pg/g	0.112	4.98
TEQ	TEQ WHO2005 ND=0		0.0288	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.431	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		138	199	pg/g	69.5	(25%-164%)
13C-1,2,3,7,8-PeCDD		143	199	pg/g	72.0	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		140	199	pg/g	70.1	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		148	199	pg/g	74.1	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		161	199	pg/g	81.0	(23%-140%)
13C-OCDD		251	398	pg/g	63.1	(17%-157%)
13C-2,3,7,8-TCDF		146	199	pg/g	73.4	(24%-169%)
13C-1,2,3,7,8-PeCDF		162	199	pg/g	81.4	(24%-185%)
13C-2,3,4,7,8-PeCDF		148	199	pg/g	74.3	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		147	199	pg/g	73.6	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		151	199	pg/g	76.0	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		152	199	pg/g	76.4	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		150	199	pg/g	75.4	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893016**	**Date Collected:**	**08/22/2022 14:48**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**31.9**
Client ID:	**SIB-SC-B34-6-7-08/22/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 12:08**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-9**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.75 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		146	199	pg/g	73.2	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		149	199	pg/g	74.9	(26%-138%)
37Cl-2,3,7,8-TCDD		15.2	19.9	pg/g	76.1	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893017**	**Date Collected:**	**08/22/2022 14:51**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**33.6**
Client ID:	**SIB-SC-B34-7-8-08/22/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 12:57**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-10**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**15.07 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.385	pg/g	0.385	0.499
40321-76-4	1,2,3,7,8-PeCDD	U	0.232	pg/g	0.232	2.50
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.260	pg/g	0.260	4.99
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.252	pg/g	0.252	4.99
19408-74-3	1,2,3,7,8,9-HxCDD	J	0.260	pg/g	0.256	4.99
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	2.36	pg/g	0.286	4.99
3268-87-9	1,2,3,4,6,7,8,9-OCDD		22.7	pg/g	0.767	9.99
51207-31-9	2,3,7,8-TCDF	U	0.258	pg/g	0.258	0.999
57117-41-6	1,2,3,7,8-PeCDF	U	0.119	pg/g	0.119	4.99
57117-31-4	2,3,4,7,8-PeCDF	U	0.124	pg/g	0.124	4.99
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.105	pg/g	0.105	4.99
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.107	pg/g	0.107	4.99
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.105	pg/g	0.105	4.99
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.157	pg/g	0.157	4.99
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.170	pg/g	0.0951	4.99
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.142	pg/g	0.142	4.99
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.423	pg/g	0.423	9.99
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.883	pg/g	0.385	0.999
36088-22-9	Total Pentachlorodibenzo-p-dioxin	BJK	0.817	pg/g	0.232	4.99
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	3.22	pg/g	0.252	4.99
37871-00-4	Total Heptachlorodibenzo-p-dioxin	J	6.51	pg/g	0.286	4.99
TCDF	Total Tetrachlorodibenzofuran	U	0.258	pg/g	0.258	0.999
30402-15-4	Total Pentachlorodibenzofuran	U	0.0463	pg/g	0.0463	4.99
55684-94-1	Total Hexachlorodibenzofuran	U	0.105	pg/g	0.105	4.99
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.170	pg/g	0.0951	4.99
TEQ	TEQ WHO2005 ND=0		0.0581	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.450	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		153	200	pg/g	76.5	(25%-164%)
13C-1,2,3,7,8-PeCDD		156	200	pg/g	78.1	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		152	200	pg/g	76.2	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		157	200	pg/g	78.8	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		166	200	pg/g	83.1	(23%-140%)
13C-OCDD		257	399	pg/g	64.3	(17%-157%)
13C-2,3,7,8-TCDF		161	200	pg/g	80.4	(24%-169%)
13C-1,2,3,7,8-PeCDF		180	200	pg/g	90.3	(24%-185%)
13C-2,3,4,7,8-PeCDF		153	200	pg/g	76.8	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		156	200	pg/g	78.4	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		167	200	pg/g	83.6	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		163	200	pg/g	81.5	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		157	200	pg/g	78.7	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893017**	**Date Collected:**	**08/22/2022 14:51**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**33.6**
Client ID:	**SIB-SC-B34-7-8-08/22/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 12:57**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-10**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**15.07 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		149	200	pg/g	74.7	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		154	200	pg/g	77.1	(26%-138%)
37Cl-2,3,7,8-TCDD		16.1	20.0	pg/g	80.6	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893018**	**Date Collected:**	**08/22/2022 14:54**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**34**
Client ID:	**SIB-SC-B34-8-9-08/22/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 13:45**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-11**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**15.19 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.267	pg/g	0.267	0.499
40321-76-4	1,2,3,7,8-PeCDD	U	0.125	pg/g	0.125	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.169	pg/g	0.169	4.99
57653-85-7	1,2,3,6,7,8-HxCDD	JK	0.212	pg/g	0.176	4.99
19408-74-3	1,2,3,7,8,9-HxCDD	JK	0.202	pg/g	0.172	4.99
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	1.86	pg/g	0.214	4.99
3268-87-9	1,2,3,4,6,7,8,9-OCDD		15.9	pg/g	0.397	9.98
51207-31-9	2,3,7,8-TCDF	U	0.200	pg/g	0.200	0.998
57117-41-6	1,2,3,7,8-PeCDF	U	0.0842	pg/g	0.0842	4.99
57117-31-4	2,3,4,7,8-PeCDF	U	0.0798	pg/g	0.0798	4.99
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.0826	pg/g	0.0826	4.99
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.0804	pg/g	0.0804	4.99
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.0814	pg/g	0.0814	4.99
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.116	pg/g	0.116	4.99
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.259	pg/g	0.162	4.99
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.259	pg/g	0.259	4.99
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.347	pg/g	0.347	9.98
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	J	0.553	pg/g	0.267	0.998
36088-22-9	Total Pentachlorodibenzo-p-dioxin	BJK	0.611	pg/g	0.125	4.99
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	2.28	pg/g	0.169	4.99
37871-00-4	Total Heptachlorodibenzo-p-dioxin	J	5.31	pg/g	0.214	4.99
TCDF	Total Tetrachlorodibenzofuran	J	0.325	pg/g	0.200	0.998
30402-15-4	Total Pentachlorodibenzofuran	U	0.0347	pg/g	0.0347	4.99
55684-94-1	Total Hexachlorodibenzofuran	BJK	0.102	pg/g	0.0804	4.99
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.259	pg/g	0.162	4.99
TEQ	TEQ WHO2005 ND=0		0.0672	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.315	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		149	200	pg/g	74.9	(25%-164%)
13C-1,2,3,7,8-PeCDD		144	200	pg/g	72.3	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		147	200	pg/g	73.5	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		149	200	pg/g	74.8	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		159	200	pg/g	79.5	(23%-140%)
13C-OCDD		246	399	pg/g	61.7	(17%-157%)
13C-2,3,7,8-TCDF		151	200	pg/g	75.8	(24%-169%)
13C-1,2,3,7,8-PeCDF		163	200	pg/g	81.9	(24%-185%)
13C-2,3,4,7,8-PeCDF		143	200	pg/g	71.6	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		151	200	pg/g	75.9	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		160	200	pg/g	80.2	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		160	200	pg/g	80.2	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		151	200	pg/g	75.8	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893018**	**Date Collected:**	**08/22/2022 14:54**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**34**
Client ID:	**SIB-SC-B34-8-9-08/22/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 13:45**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-11**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**15.19 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		150	200	pg/g	75.4	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		145	200	pg/g	72.5	(26%-138%)
37Cl-2,3,7,8-TCDD		15.5	20.0	pg/g	77.6	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893019**	**Date Collected:**	**08/22/2022 14:57**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**34.5**
Client ID:	**SIB-SC-B34-9-9.7-08/22/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 14:34**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-12**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**15.34 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.253	pg/g	0.253	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.158	pg/g	0.158	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.182	pg/g	0.182	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.183	pg/g	0.183	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.182	pg/g	0.182	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	0.922	pg/g	0.213	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD	BJ	7.29	pg/g	0.378	9.96
51207-31-9	2,3,7,8-TCDF	U	0.191	pg/g	0.191	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.0848	pg/g	0.0848	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.0874	pg/g	0.0874	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.0605	pg/g	0.0605	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.0611	pg/g	0.0611	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.0625	pg/g	0.0625	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.0874	pg/g	0.0874	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	0.118	pg/g	0.118	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.175	pg/g	0.175	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.325	pg/g	0.325	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.486	pg/g	0.253	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	BJ	0.179	pg/g	0.158	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	1.13	pg/g	0.182	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	2.85	pg/g	0.213	4.98
TCDF	Total Tetrachlorodibenzofuran	U	0.191	pg/g	0.191	0.996
30402-15-4	Total Pentachlorodibenzofuran	U	0.0848	pg/g	0.0848	4.98
55684-94-1	Total Hexachlorodibenzofuran	U	0.0605	pg/g	0.0605	4.98
38998-75-3	Total Heptachlorodibenzofuran	U	0.118	pg/g	0.118	4.98
TEQ	TEQ WHO2005 ND=0		0.0114	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.283	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		147	199	pg/g	73.9	(25%-164%)
13C-1,2,3,7,8-PeCDD		147	199	pg/g	74.0	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		143	199	pg/g	71.6	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		150	199	pg/g	75.2	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		152	199	pg/g	76.2	(23%-140%)
13C-OCDD		232	398	pg/g	58.2	(17%-157%)
13C-2,3,7,8-TCDF		151	199	pg/g	76.0	(24%-169%)
13C-1,2,3,7,8-PeCDF		167	199	pg/g	83.8	(24%-185%)
13C-2,3,4,7,8-PeCDF		141	199	pg/g	70.8	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		150	199	pg/g	75.4	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		158	199	pg/g	79.3	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		154	199	pg/g	77.1	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		151	199	pg/g	75.7	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893019**	**Date Collected:**	**08/22/2022 14:57**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**09/19/2022 08:45**	**%Moisture:**	**34.5**
Client ID:	**SIB-SC-B34-9-9.7-08/22/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 14:34**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-12**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**15.34 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		142	199	pg/g	71.2	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		140	199	pg/g	70.5	(26%-138%)
37Cl-2,3,7,8-TCDD		15.8	19.9	pg/g	79.5	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893020**	**Date Collected:**	**07/07/2022 15:10**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**37.2**
Client ID:	**SIB-SC-B35-0-1-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 15:23**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-13**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**16.01 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.285	pg/g	0.285	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.158	pg/g	0.158	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.211	pg/g	0.211	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.227	pg/g	0.227	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.219	pg/g	0.219	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	1.37	pg/g	0.247	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD		14.8	pg/g	0.746	9.95
51207-31-9	2,3,7,8-TCDF	U	0.203	pg/g	0.203	0.995
57117-41-6	1,2,3,7,8-PeCDF	U	0.0943	pg/g	0.0943	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.0981	pg/g	0.0981	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	BJK	0.0995	pg/g	0.0846	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.0910	pg/g	0.0910	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.0858	pg/g	0.0858	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.132	pg/g	0.132	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	0.185	pg/g	0.185	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.291	pg/g	0.291	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.364	pg/g	0.364	9.95
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.506	pg/g	0.285	0.995
36088-22-9	Total Pentachlorodibenzo-p-dioxin	BJK	0.490	pg/g	0.158	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	1.91	pg/g	0.211	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	4.68	pg/g	0.247	4.98
TCDF	Total Tetrachlorodibenzofuran	J	0.249	pg/g	0.203	0.995
30402-15-4	Total Pentachlorodibenzofuran	U	0.0414	pg/g	0.0414	4.98
55684-94-1	Total Hexachlorodibenzofuran	BJK	0.243	pg/g	0.0846	4.98
38998-75-3	Total Heptachlorodibenzofuran	U	0.185	pg/g	0.185	4.98
TEQ	TEQ WHO2005 ND=0		0.0281	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.327	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		136	199	pg/g	68.1	(25%-164%)
13C-1,2,3,7,8-PeCDD		134	199	pg/g	67.4	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		135	199	pg/g	67.9	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		146	199	pg/g	73.2	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		148	199	pg/g	74.1	(23%-140%)
13C-OCDD		223	398	pg/g	56.1	(17%-157%)
13C-2,3,7,8-TCDF		143	199	pg/g	71.7	(24%-169%)
13C-1,2,3,7,8-PeCDF		154	199	pg/g	77.6	(24%-185%)
13C-2,3,4,7,8-PeCDF		134	199	pg/g	67.2	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		144	199	pg/g	72.3	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		148	199	pg/g	74.2	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		148	199	pg/g	74.3	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		144	199	pg/g	72.2	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893020**	**Date Collected:**	**07/07/2022 15:10**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**37.2**
Client ID:	**SIB-SC-B35-0-1-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 15:23**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-13**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**16.01 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		139	199	pg/g	69.9	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		135	199	pg/g	67.7	(26%-138%)
37Cl-2,3,7,8-TCDD		15.6	19.9	pg/g	78.2	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893021**	**Date Collected:**	**07/07/2022 15:28**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**34.5**
Client ID:	**SIB-SC-B35-6-7-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 10:55**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-4**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**15.28 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.316	pg/g	0.316	0.499
40321-76-4	1,2,3,7,8-PeCDD	U	0.190	pg/g	0.190	2.50
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.246	pg/g	0.246	4.99
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.242	pg/g	0.242	4.99
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.244	pg/g	0.244	4.99
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	1.77	pg/g	0.527	4.99
3268-87-9	1,2,3,4,6,7,8,9-OCDD		22.5	pg/g	0.693	9.99
51207-31-9	2,3,7,8-TCDF	J	0.286	pg/g	0.226	0.999
57117-41-6	1,2,3,7,8-PeCDF	U	0.114	pg/g	0.114	4.99
57117-31-4	2,3,4,7,8-PeCDF	U	0.103	pg/g	0.103	4.99
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.146	pg/g	0.146	4.99
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.138	pg/g	0.138	4.99
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.154	pg/g	0.154	4.99
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.226	pg/g	0.226	4.99
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.308	pg/g	0.113	4.99
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.175	pg/g	0.175	4.99
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.403	pg/g	0.403	9.99
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	J	0.605	pg/g	0.316	0.999
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	0.459	pg/g	0.190	4.99
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	2.25	pg/g	0.242	4.99
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	5.35	pg/g	0.527	4.99
TCDF	Total Tetrachlorodibenzofuran	J	0.575	pg/g	0.226	0.999
30402-15-4	Total Pentachlorodibenzofuran	U	0.0451	pg/g	0.0451	4.99
55684-94-1	Total Hexachlorodibenzofuran	U	0.138	pg/g	0.138	4.99
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.308	pg/g	0.113	4.99
TEQ	TEQ WHO2005 ND=0		0.0560	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.397	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		145	200	pg/g	72.8	(25%-164%)
13C-1,2,3,7,8-PeCDD		159	200	pg/g	79.6	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		132	200	pg/g	66.3	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		175	200	pg/g	87.6	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		147	200	pg/g	73.4	(23%-140%)
13C-OCDD		233	399	pg/g	58.3	(17%-157%)
13C-2,3,7,8-TCDF		142	200	pg/g	70.8	(24%-169%)
13C-1,2,3,7,8-PeCDF		174	200	pg/g	86.9	(24%-185%)
13C-2,3,4,7,8-PeCDF		157	200	pg/g	78.5	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		135	200	pg/g	67.7	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		163	200	pg/g	81.4	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		151	200	pg/g	75.6	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		143	200	pg/g	71.4	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893021**	**Date Collected:**	**07/07/2022 15:28**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**34.5**
Client ID:	**SIB-SC-B35-6-7-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 10:55**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-4**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**15.28 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		134	200	pg/g	67.0	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		137	200	pg/g	68.5	(26%-138%)
37Cl-2,3,7,8-TCDD		15.2	20.0	pg/g	76.2	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893022**	**Date Collected:**	**07/07/2022 15:31**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**35.3**
Client ID:	**SIB-SC-B35-7-8-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 11:44**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-5**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**15.5 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.403	pg/g	0.403	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.263	pg/g	0.263	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.403	pg/g	0.403	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.401	pg/g	0.401	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.401	pg/g	0.401	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	2.38	pg/g	0.560	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD		22.3	pg/g	1.42	9.96
51207-31-9	2,3,7,8-TCDF	U	0.309	pg/g	0.309	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.0893	pg/g	0.0893	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.0841	pg/g	0.0841	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.136	pg/g	0.136	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.133	pg/g	0.133	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.139	pg/g	0.139	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.209	pg/g	0.209	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJ	0.315	pg/g	0.257	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.389	pg/g	0.389	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.574	pg/g	0.574	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.805	pg/g	0.403	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	0.711	pg/g	0.263	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	2.38	pg/g	0.401	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	7.10	pg/g	0.560	4.98
TCDF	Total Tetrachlorodibenzofuran	U	0.309	pg/g	0.309	0.996
30402-15-4	Total Pentachlorodibenzofuran	U	0.0580	pg/g	0.0580	4.98
55684-94-1	Total Hexachlorodibenzofuran	BJ	0.157	pg/g	0.133	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJ	0.315	pg/g	0.257	4.98
TEQ	TEQ WHO2005 ND=0		0.0336	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.489	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		145	199	pg/g	73.0	(25%-164%)
13C-1,2,3,7,8-PeCDD		166	199	pg/g	83.1	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		140	199	pg/g	70.1	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		171	199	pg/g	85.9	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		141	199	pg/g	70.9	(23%-140%)
13C-OCDD		235	399	pg/g	59.0	(17%-157%)
13C-2,3,7,8-TCDF		139	199	pg/g	69.8	(24%-169%)
13C-1,2,3,7,8-PeCDF		174	199	pg/g	87.4	(24%-185%)
13C-2,3,4,7,8-PeCDF		161	199	pg/g	80.9	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		136	199	pg/g	68.3	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		161	199	pg/g	80.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		146	199	pg/g	73.3	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		143	199	pg/g	71.8	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893022**	**Date Collected:**	**07/07/2022 15:31**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**35.3**
Client ID:	**SIB-SC-B35-7-8-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 11:44**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-5**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**15.5 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		132	199	pg/g	66.2	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		131	199	pg/g	65.5	(26%-138%)
37Cl-2,3,7,8-TCDD		14.7	19.9	pg/g	74.0	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893023**	**Date Collected:**	**07/07/2022 15:34**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**34.2**
Client ID:	**SIB-SC-B35-8-9-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 12:33**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-6**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**15.3 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.332	pg/g	0.332	0.496
40321-76-4	1,2,3,7,8-PeCDD	U	0.160	pg/g	0.160	2.48
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.238	pg/g	0.238	4.96
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.238	pg/g	0.238	4.96
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.238	pg/g	0.238	4.96
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	1.60	pg/g	0.552	4.96
3268-87-9	1,2,3,4,6,7,8,9-OCDD		17.4	pg/g	1.40	9.93
51207-31-9	2,3,7,8-TCDF	U	0.250	pg/g	0.250	0.993
57117-41-6	1,2,3,7,8-PeCDF	U	0.0961	pg/g	0.0961	4.96
57117-31-4	2,3,4,7,8-PeCDF	U	0.0983	pg/g	0.0983	4.96
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.113	pg/g	0.113	4.96
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.111	pg/g	0.111	4.96
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.109	pg/g	0.109	4.96
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.154	pg/g	0.154	4.96
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJ	0.292	pg/g	0.191	4.96
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.292	pg/g	0.292	4.96
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.385	pg/g	0.385	9.93
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	J	0.693	pg/g	0.332	0.993
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	0.268	pg/g	0.160	4.96
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	1.88	pg/g	0.238	4.96
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	5.09	pg/g	0.552	4.96
TCDF	Total Tetrachlorodibenzofuran	J	0.276	pg/g	0.250	0.993
30402-15-4	Total Pentachlorodibenzofuran	U	0.0485	pg/g	0.0485	4.96
55684-94-1	Total Hexachlorodibenzofuran	U	0.109	pg/g	0.109	4.96
38998-75-3	Total Heptachlorodibenzofuran	BJ	0.292	pg/g	0.191	4.96
TEQ	TEQ WHO2005 ND=0		0.0241	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.361	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		145	199	pg/g	72.9	(25%-164%)
13C-1,2,3,7,8-PeCDD		157	199	pg/g	79.1	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		144	199	pg/g	72.3	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		165	199	pg/g	82.9	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		146	199	pg/g	73.3	(23%-140%)
13C-OCDD		254	397	pg/g	64.0	(17%-157%)
13C-2,3,7,8-TCDF		137	199	pg/g	69.1	(24%-169%)
13C-1,2,3,7,8-PeCDF		169	199	pg/g	84.9	(24%-185%)
13C-2,3,4,7,8-PeCDF		149	199	pg/g	75.1	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		129	199	pg/g	64.9	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		153	199	pg/g	77.2	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		148	199	pg/g	74.7	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		139	199	pg/g	70.0	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893023**	**Date Collected:**	**07/07/2022 15:34**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**34.2**
Client ID:	**SIB-SC-B35-8-9-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 12:33**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-6**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**15.3 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		127	199	pg/g	63.9	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		133	199	pg/g	67.2	(26%-138%)
37Cl-2,3,7,8-TCDD		14.2	19.9	pg/g	71.7	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893024**	**Date Collected:**	**07/07/2022 15:37**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**32.6**
Client ID:	**SIB-SC-B35-9-10-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 13:21**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-7**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**14.9 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.468	pg/g	0.468	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.194	pg/g	0.194	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.267	pg/g	0.267	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.267	pg/g	0.267	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.267	pg/g	0.267	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	1.38	pg/g	0.416	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD		14.0	pg/g	1.10	9.96
51207-31-9	2,3,7,8-TCDF	U	0.303	pg/g	0.303	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.135	pg/g	0.135	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.134	pg/g	0.134	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.107	pg/g	0.107	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.107	pg/g	0.107	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.111	pg/g	0.111	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.166	pg/g	0.166	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.217	pg/g	0.158	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.261	pg/g	0.261	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.590	pg/g	0.590	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	J	0.691	pg/g	0.468	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	0.201	pg/g	0.194	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	1.49	pg/g	0.267	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	J	4.25	pg/g	0.416	4.98
TCDF	Total Tetrachlorodibenzofuran	U	0.303	pg/g	0.303	0.996
30402-15-4	Total Pentachlorodibenzofuran	U	0.134	pg/g	0.134	4.98
55684-94-1	Total Hexachlorodibenzofuran	U	0.107	pg/g	0.107	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.217	pg/g	0.158	4.98
TEQ	TEQ WHO2005 ND=0		0.0202	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.455	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		134	199	pg/g	67.2	(25%-164%)
13C-1,2,3,7,8-PeCDD		160	199	pg/g	80.1	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		138	199	pg/g	69.1	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		157	199	pg/g	78.9	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		134	199	pg/g	67.4	(23%-140%)
13C-OCDD		216	398	pg/g	54.2	(17%-157%)
13C-2,3,7,8-TCDF		126	199	pg/g	63.4	(24%-169%)
13C-1,2,3,7,8-PeCDF		164	199	pg/g	82.5	(24%-185%)
13C-2,3,4,7,8-PeCDF		152	199	pg/g	76.3	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		125	199	pg/g	62.8	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		157	199	pg/g	78.6	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		144	199	pg/g	72.5	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		136	199	pg/g	68.1	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893024**	**Date Collected:**	**07/07/2022 15:37**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**32.6**
Client ID:	**SIB-SC-B35-9-10-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 13:21**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-7**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**14.9 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		120	199	pg/g	60.3	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		121	199	pg/g	60.9	(26%-138%)
37Cl-2,3,7,8-TCDD		13.9	19.9	pg/g	69.6	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893025**	**Date Collected:**	**07/07/2022 15:40**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**33.9**
Client ID:	**SIB-SC-B35-10-11-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 14:10**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-8**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**15.18 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.405	pg/g	0.405	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.183	pg/g	0.183	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.261	pg/g	0.261	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.261	pg/g	0.261	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.261	pg/g	0.261	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	0.735	pg/g	0.470	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD	J	6.11	pg/g	0.956	9.96
51207-31-9	2,3,7,8-TCDF	U	0.339	pg/g	0.339	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.147	pg/g	0.147	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.147	pg/g	0.147	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.138	pg/g	0.138	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.136	pg/g	0.136	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.140	pg/g	0.140	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.198	pg/g	0.198	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.165	pg/g	0.150	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.247	pg/g	0.247	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.536	pg/g	0.536	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.504	pg/g	0.405	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.183	pg/g	0.183	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	0.418	pg/g	0.261	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	2.03	pg/g	0.470	4.98
TCDF	Total Tetrachlorodibenzofuran	U	0.339	pg/g	0.339	0.996
30402-15-4	Total Pentachlorodibenzofuran	U	0.0693	pg/g	0.0693	4.98
55684-94-1	Total Hexachlorodibenzofuran	U	0.136	pg/g	0.136	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.165	pg/g	0.150	4.98
TEQ	TEQ WHO2005 ND=0		0.0108	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.417	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		130	199	pg/g	65.1	(25%-164%)
13C-1,2,3,7,8-PeCDD		153	199	pg/g	76.7	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		133	199	pg/g	66.7	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		156	199	pg/g	78.2	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		134	199	pg/g	67.1	(23%-140%)
13C-OCDD		226	399	pg/g	56.7	(17%-157%)
13C-2,3,7,8-TCDF		127	199	pg/g	63.9	(24%-169%)
13C-1,2,3,7,8-PeCDF		158	199	pg/g	79.2	(24%-185%)
13C-2,3,4,7,8-PeCDF		143	199	pg/g	71.6	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		121	199	pg/g	60.6	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		153	199	pg/g	76.5	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		140	199	pg/g	70.1	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		134	199	pg/g	67.5	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893025**	**Date Collected:**	**07/07/2022 15:40**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**33.9**
Client ID:	**SIB-SC-B35-10-11-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 14:10**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-8**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**15.18 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		123	199	pg/g	61.9	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		126	199	pg/g	63.4	(26%-138%)
37Cl-2,3,7,8-TCDD		13.4	19.9	pg/g	67.2	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893026**	**Date Collected:**	**07/07/2022 15:43**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**36.2**
Client ID:	**SIB-SC-B35-11-12-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 14:59**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-9**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**15.75 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.392	pg/g	0.392	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.215	pg/g	0.215	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.269	pg/g	0.269	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.267	pg/g	0.267	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.267	pg/g	0.267	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	0.766	pg/g	0.452	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD	J	7.88	pg/g	1.38	9.95
51207-31-9	2,3,7,8-TCDF	U	0.293	pg/g	0.293	0.995
57117-41-6	1,2,3,7,8-PeCDF	U	0.169	pg/g	0.169	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.157	pg/g	0.157	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.137	pg/g	0.137	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.130	pg/g	0.130	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.141	pg/g	0.141	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.209	pg/g	0.209	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.247	pg/g	0.120	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.197	pg/g	0.197	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.533	pg/g	0.533	9.95
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.478	pg/g	0.392	0.995
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.215	pg/g	0.215	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	0.957	pg/g	0.267	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	2.56	pg/g	0.452	4.98
TCDF	Total Tetrachlorodibenzofuran	U	0.293	pg/g	0.293	0.995
30402-15-4	Total Pentachlorodibenzofuran	U	0.0601	pg/g	0.0601	4.98
55684-94-1	Total Hexachlorodibenzofuran	BJK	0.229	pg/g	0.130	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.247	pg/g	0.120	4.98
TEQ	TEQ WHO2005 ND=0		0.0125	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.429	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		141	199	pg/g	70.9	(25%-164%)
13C-1,2,3,7,8-PeCDD		162	199	pg/g	81.1	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		128	199	pg/g	64.1	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		163	199	pg/g	81.7	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		136	199	pg/g	68.5	(23%-140%)
13C-OCDD		222	398	pg/g	55.6	(17%-157%)
13C-2,3,7,8-TCDF		135	199	pg/g	68.0	(24%-169%)
13C-1,2,3,7,8-PeCDF		170	199	pg/g	85.4	(24%-185%)
13C-2,3,4,7,8-PeCDF		160	199	pg/g	80.4	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		126	199	pg/g	63.2	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		146	199	pg/g	73.3	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		138	199	pg/g	69.2	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		138	199	pg/g	69.1	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893026**	**Date Collected:**	**07/07/2022 15:43**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**36.2**
Client ID:	**SIB-SC-B35-11-12-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 14:59**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-9**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**15.75 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		125	199	pg/g	62.8	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		130	199	pg/g	65.1	(26%-138%)
37Cl-2,3,7,8-TCDD		14.5	19.9	pg/g	72.7	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893027**	**Date Collected:**	**07/07/2022 15:46**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**40.5**
Client ID:	**SIB-SC-B35-12-13-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 15:48**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-10**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**16.88 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.319	pg/g	0.319	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.203	pg/g	0.203	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.251	pg/g	0.251	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.257	pg/g	0.257	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.255	pg/g	0.255	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	0.648	pg/g	0.466	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD	J	7.95	pg/g	1.12	9.96
51207-31-9	2,3,7,8-TCDF	U	0.313	pg/g	0.313	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.124	pg/g	0.124	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.120	pg/g	0.120	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.0761	pg/g	0.0761	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.0723	pg/g	0.0723	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.0787	pg/g	0.0787	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.112	pg/g	0.112	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.179	pg/g	0.163	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.279	pg/g	0.279	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.658	pg/g	0.658	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	U	0.319	pg/g	0.319	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.203	pg/g	0.203	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	0.466	pg/g	0.251	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	1.84	pg/g	0.466	4.98
TCDF	Total Tetrachlorodibenzofuran	U	0.313	pg/g	0.313	0.996
30402-15-4	Total Pentachlorodibenzofuran	U	0.120	pg/g	0.120	4.98
55684-94-1	Total Hexachlorodibenzofuran	U	0.0723	pg/g	0.0723	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.179	pg/g	0.163	4.98
TEQ	TEQ WHO2005 ND=0		0.0107	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.364	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		137	199	pg/g	68.9	(25%-164%)
13C-1,2,3,7,8-PeCDD		156	199	pg/g	78.1	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		121	199	pg/g	60.8	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		167	199	pg/g	83.6	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		132	199	pg/g	66.1	(23%-140%)
13C-OCDD		228	399	pg/g	57.3	(17%-157%)
13C-2,3,7,8-TCDF		129	199	pg/g	64.7	(24%-169%)
13C-1,2,3,7,8-PeCDF		162	199	pg/g	81.3	(24%-185%)
13C-2,3,4,7,8-PeCDF		155	199	pg/g	77.9	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		121	199	pg/g	60.9	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		149	199	pg/g	74.9	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		141	199	pg/g	70.8	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		131	199	pg/g	66.0	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893027**	**Date Collected:**	**07/07/2022 15:46**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**40.5**
Client ID:	**SIB-SC-B35-12-13-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 15:48**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-10**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**16.88 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		126	199	pg/g	63.3	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		120	199	pg/g	60.2	(26%-138%)
37Cl-2,3,7,8-TCDD		13.5	19.9	pg/g	67.7	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893028**	**Date Collected:**	**07/07/2022 15:49**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**39.5**
Client ID:	**SIB-SC-B35-13-14-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 16:37**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-11**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**16.6 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.359	pg/g	0.359	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.215	pg/g	0.215	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.323	pg/g	0.323	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.339	pg/g	0.339	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.331	pg/g	0.331	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	0.536	pg/g	0.536	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD	BJK	3.16	pg/g	0.805	9.96
51207-31-9	2,3,7,8-TCDF	U	0.275	pg/g	0.275	0.996
57117-41-6	1,2,3,7,8-PeCDF	U	0.134	pg/g	0.134	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.123	pg/g	0.123	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.119	pg/g	0.119	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.119	pg/g	0.119	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.127	pg/g	0.127	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.197	pg/g	0.197	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	U	0.157	pg/g	0.157	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.237	pg/g	0.237	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.534	pg/g	0.534	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	U	0.359	pg/g	0.359	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.215	pg/g	0.215	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	0.532	pg/g	0.323	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	J	1.07	pg/g	0.536	4.98
TCDF	Total Tetrachlorodibenzofuran	U	0.275	pg/g	0.275	0.996
30402-15-4	Total Pentachlorodibenzofuran	U	0.123	pg/g	0.123	4.98
55684-94-1	Total Hexachlorodibenzofuran	U	0.119	pg/g	0.119	4.98
38998-75-3	Total Heptachlorodibenzofuran	U	0.157	pg/g	0.157	4.98
TEQ	TEQ WHO2005 ND=0		0.000948	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.404	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		136	199	pg/g	68.4	(25%-164%)
13C-1,2,3,7,8-PeCDD		156	199	pg/g	78.3	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		132	199	pg/g	66.4	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		174	199	pg/g	87.5	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		140	199	pg/g	70.2	(23%-140%)
13C-OCDD		221	399	pg/g	55.5	(17%-157%)
13C-2,3,7,8-TCDF		131	199	pg/g	65.8	(24%-169%)
13C-1,2,3,7,8-PeCDF		161	199	pg/g	81.0	(24%-185%)
13C-2,3,4,7,8-PeCDF		151	199	pg/g	76.0	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		131	199	pg/g	65.7	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		162	199	pg/g	81.4	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		148	199	pg/g	74.1	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		138	199	pg/g	69.2	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893028**	**Date Collected:**	**07/07/2022 15:49**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**39.5**
Client ID:	**SIB-SC-B35-13-14-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 16:37**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-11**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**16.6 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		125	199	pg/g	62.9	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		127	199	pg/g	63.6	(26%-138%)
37Cl-2,3,7,8-TCDD		13.8	19.9	pg/g	69.1	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893029**	**Date Collected:**	**07/07/2022 15:52**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**39.8**
Client ID:	**SIB-SC-B35-14-14.7-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 17:25**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-12**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**16.68 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.271	pg/g	0.271	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.179	pg/g	0.179	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.211	pg/g	0.211	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.203	pg/g	0.203	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.207	pg/g	0.207	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	1.15	pg/g	0.486	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD	J	9.63	pg/g	0.606	9.97
51207-31-9	2,3,7,8-TCDF	U	0.205	pg/g	0.205	0.997
57117-41-6	1,2,3,7,8-PeCDF	U	0.0845	pg/g	0.0845	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.0843	pg/g	0.0843	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.0763	pg/g	0.0763	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.0732	pg/g	0.0732	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.0767	pg/g	0.0767	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.117	pg/g	0.117	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.205	pg/g	0.105	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.161	pg/g	0.161	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.379	pg/g	0.379	9.97
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.763	pg/g	0.271	0.997
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	0.223	pg/g	0.179	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	1.54	pg/g	0.203	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	4.09	pg/g	0.486	4.98
TCDF	Total Tetrachlorodibenzofuran	U	0.205	pg/g	0.205	0.997
30402-15-4	Total Pentachlorodibenzofuran	U	0.0427	pg/g	0.0427	4.98
55684-94-1	Total Hexachlorodibenzofuran	U	0.0732	pg/g	0.0732	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.205	pg/g	0.105	4.98
TEQ	TEQ WHO2005 ND=0		0.0165	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.315	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		137	199	pg/g	68.5	(25%-164%)
13C-1,2,3,7,8-PeCDD		157	199	pg/g	78.9	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		133	199	pg/g	66.6	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		165	199	pg/g	82.8	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		138	199	pg/g	69.3	(23%-140%)
13C-OCDD		229	399	pg/g	57.4	(17%-157%)
13C-2,3,7,8-TCDF		134	199	pg/g	67.2	(24%-169%)
13C-1,2,3,7,8-PeCDF		165	199	pg/g	83.0	(24%-185%)
13C-2,3,4,7,8-PeCDF		148	199	pg/g	74.4	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		132	199	pg/g	66.2	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		158	199	pg/g	79.1	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		148	199	pg/g	74.4	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		138	199	pg/g	69.1	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893029**	**Date Collected:**	**07/07/2022 15:52**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**07/12/2022 10:05**	**%Moisture:**	**39.8**
Client ID:	**SIB-SC-B35-14-14.7-07/07/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 17:25**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-12**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**16.68 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		125	199	pg/g	62.7	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		132	199	pg/g	66.0	(26%-138%)
37Cl-2,3,7,8-TCDD		14.2	19.9	pg/g	71.0	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Quality Control Summary

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12037163	LCS for batch 56594	13C-2,3,7,8-TCDD		68.3	(20%-175%)
		13C-1,2,3,7,8-PeCDD		64.7	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		65.7	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		74.9	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		68.1	(22%-166%)
		13C-OCDD		48.1	(13%-199%)
		13C-2,3,7,8-TCDF		72.5	(22%-152%)
		13C-1,2,3,7,8-PeCDF		74.2	(21%-192%)
		13C-2,3,4,7,8-PeCDF		64.7	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		74.1	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		78.6	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		75.3	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		71.2	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		63.4	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		59.8	(20%-186%)
		37Cl-2,3,7,8-TCDD		79.1	(31%-191%)
12037164	LCSD for batch 56594	13C-2,3,7,8-TCDD		63.9	(20%-175%)
		13C-1,2,3,7,8-PeCDD		58.1	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		63.2	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		64.4	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		62.2	(22%-166%)
		13C-OCDD		43.0	(13%-199%)
		13C-2,3,7,8-TCDF		66.8	(22%-152%)
		13C-1,2,3,7,8-PeCDF		65.6	(21%-192%)
		13C-2,3,4,7,8-PeCDF		56.0	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		67.6	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		70.3	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		68.4	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		65.0	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		59.3	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		54.6	(20%-186%)
		37Cl-2,3,7,8-TCDD		79.9	(31%-191%)
12037162	MB for batch 56594	13C-2,3,7,8-TCDD		70.2	(25%-164%)
		13C-1,2,3,7,8-PeCDD		65.5	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		70.8	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		73.2	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		71.5	(23%-140%)
		13C-OCDD		49.1	(17%-157%)
		13C-2,3,7,8-TCDF		73.8	(24%-169%)
		13C-1,2,3,7,8-PeCDF		76.0	(24%-185%)
		13C-2,3,4,7,8-PeCDF		65.0	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		77.4	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		77.2	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		78.7	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		75.0	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		67.8	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		62.8	(26%-138%)
		37Cl-2,3,7,8-TCDD		83.3	(35%-197%)
22893001	SIB-SC-B31-6-7-07/10/2022	13C-2,3,7,8-TCDD		63.3	(25%-164%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
22893001	SIB-SC-B31-6-7-07/10/2022	13C-1,2,3,7,8-PeCDD		59.6	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		62.2	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		67.2	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		61.5	(23%-140%)
		13C-OCDD		40.9	(17%-157%)
		13C-2,3,7,8-TCDF		67.9	(24%-169%)
		13C-1,2,3,7,8-PeCDF		69.0	(24%-185%)
		13C-2,3,4,7,8-PeCDF		58.5	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		69.0	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		69.5	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		68.2	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		65.6	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		59.9	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		55.1	(26%-138%)
		37Cl-2,3,7,8-TCDD		79.3	(35%-197%)
12037165	SIB-SC-B31-6-7-07/10/2022(22893001MS)	13C-2,3,7,8-TCDD		70.3	(25%-164%)
		13C-1,2,3,7,8-PeCDD		64.9	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		72.1	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		72.8	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		73.0	(23%-140%)
		13C-OCDD		51.5	(17%-157%)
		13C-2,3,7,8-TCDF		72.6	(24%-169%)
		13C-1,2,3,7,8-PeCDF		72.2	(24%-185%)
		13C-2,3,4,7,8-PeCDF		61.6	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		76.5	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		78.4	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		76.6	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		79.1	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		66.6	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		65.5	(26%-138%)
		37Cl-2,3,7,8-TCDD		82.1	(35%-197%)
12037166	SIB-SC-B31-6-7-07/10/2022(22893001MSD)	13C-2,3,7,8-TCDD		70.7	(25%-164%)
		13C-1,2,3,7,8-PeCDD		70.4	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		69.1	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		75.1	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		69.6	(23%-140%)
		13C-OCDD		48.5	(17%-157%)
		13C-2,3,7,8-TCDF		74.3	(24%-169%)
		13C-1,2,3,7,8-PeCDF		81.5	(24%-185%)
		13C-2,3,4,7,8-PeCDF		70.4	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		75.4	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		76.9	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		74.7	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		73.5	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		65.0	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		62.3	(26%-138%)
		37Cl-2,3,7,8-TCDD		82.0	(35%-197%)
22893002	SIB-SC-B31-7-8-07/10/2022	13C-2,3,7,8-TCDD		63.5	(25%-164%)
		13C-1,2,3,7,8-PeCDD		60.7	(25%-181%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
22893002	SIB-SC-B31-7-8-07/10/2022	13C-1,2,3,4,7,8-HxCDD		66.5	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		64.8	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		63.7	(23%-140%)
		13C-OCDD		43.5	(17%-157%)
		13C-2,3,7,8-TCDF		67.5	(24%-169%)
		13C-1,2,3,7,8-PeCDF		71.0	(24%-185%)
		13C-2,3,4,7,8-PeCDF		62.3	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		68.3	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		71.3	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		70.8	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		66.2	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		59.7	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		57.2	(26%-138%)
		37Cl-2,3,7,8-TCDD		78.8	(35%-197%)
22893003	SIB-SC-B31-8-9-07/10/2022	13C-2,3,7,8-TCDD		68.8	(25%-164%)
		13C-1,2,3,7,8-PeCDD		65.2	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		68.2	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		75.7	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		70.1	(23%-140%)
		13C-OCDD		48.5	(17%-157%)
		13C-2,3,7,8-TCDF		72.1	(24%-169%)
		13C-1,2,3,7,8-PeCDF		74.9	(24%-185%)
		13C-2,3,4,7,8-PeCDF		66.2	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		77.3	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		78.8	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		78.1	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		74.5	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		67.1	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		63.1	(26%-138%)
		37Cl-2,3,7,8-TCDD		77.4	(35%-197%)
22893004	SIB-SC-B31-9-10-07/10/2022	13C-2,3,7,8-TCDD		73.8	(25%-164%)
		13C-1,2,3,7,8-PeCDD		71.5	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		76.7	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		77.8	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		73.0	(23%-140%)
		13C-OCDD		50.4	(17%-157%)
		13C-2,3,7,8-TCDF		78.7	(24%-169%)
		13C-1,2,3,7,8-PeCDF		82.7	(24%-185%)
		13C-2,3,4,7,8-PeCDF		73.0	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		81.8	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		85.0	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		81.8	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		78.6	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		67.7	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		68.1	(26%-138%)
		37Cl-2,3,7,8-TCDD		83.0	(35%-197%)
22893005	SIB-SC-B31-10-11-07/10/2022	13C-2,3,7,8-TCDD		70.3	(25%-164%)
		13C-1,2,3,7,8-PeCDD		66.5	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		71.9	(32%-141%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
22893005	SIB-SC-B31-10-11-07/10/2022	13C-1,2,3,6,7,8-HxCDD		73.7	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		68.5	(23%-140%)
		13C-OCDD		46.7	(17%-157%)
		13C-2,3,7,8-TCDF		74.5	(24%-169%)
		13C-1,2,3,7,8-PeCDF		76.6	(24%-185%)
		13C-2,3,4,7,8-PeCDF		66.4	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		76.8	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		75.4	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		77.9	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		73.8	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		65.8	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		61.4	(26%-138%)
		37Cl-2,3,7,8-TCDD		80.7	(35%-197%)
22893006	SIB-SC-B31-11-12-07/10/2022	13C-2,3,7,8-TCDD		68.0	(25%-164%)
		13C-1,2,3,7,8-PeCDD		68.1	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		67.7	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		71.8	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		67.4	(23%-140%)
		13C-OCDD		44.3	(17%-157%)
		13C-2,3,7,8-TCDF		73.2	(24%-169%)
		13C-1,2,3,7,8-PeCDF		76.9	(24%-185%)
		13C-2,3,4,7,8-PeCDF		69.2	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		74.4	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		75.1	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		74.4	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		70.6	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		62.0	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		60.5	(26%-138%)
		37Cl-2,3,7,8-TCDD		85.8	(35%-197%)
22893007	SIB-SC-B31-12-13-07/10/2022	13C-2,3,7,8-TCDD		71.8	(25%-164%)
		13C-1,2,3,7,8-PeCDD		69.4	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		74.2	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		77.7	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		72.5	(23%-140%)
		13C-OCDD		50.9	(17%-157%)
		13C-2,3,7,8-TCDF		76.1	(24%-169%)
		13C-1,2,3,7,8-PeCDF		78.3	(24%-185%)
		13C-2,3,4,7,8-PeCDF		72.4	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		78.9	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		82.2	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		80.2	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		76.5	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		68.6	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		66.0	(26%-138%)
		37Cl-2,3,7,8-TCDD		80.8	(35%-197%)
22893008	SIB-SC-B31-13-13.7-07/10/2022	13C-2,3,7,8-TCDD		72.6	(25%-164%)
		13C-1,2,3,7,8-PeCDD		69.6	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		72.9	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		75.2	(28%-130%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
22893008	SIB-SC-B31-13-13.7-07/10/2022	13C-1,2,3,4,6,7,8-HpCDD		70.4	(23%-140%)
		13C-OCDD		49.0	(17%-157%)
		13C-2,3,7,8-TCDF		76.9	(24%-169%)
		13C-1,2,3,7,8-PeCDF		80.2	(24%-185%)
		13C-2,3,4,7,8-PeCDF		73.4	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		75.8	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		79.9	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		78.0	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		73.0	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		66.3	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		63.9	(26%-138%)
		37Cl-2,3,7,8-TCDD		81.2	(35%-197%)
22893009	SIB-SC-E24-7-8-07/12/2022	13C-2,3,7,8-TCDD		65.9	(25%-164%)
		13C-1,2,3,7,8-PeCDD		55.4	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		69.9	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		68.6	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		84.6	(23%-140%)
		13C-OCDD		68.7	(17%-157%)
		13C-2,3,7,8-TCDF		68.5	(24%-169%)
		13C-1,2,3,7,8-PeCDF		62.4	(24%-185%)
		13C-2,3,4,7,8-PeCDF		55.3	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		68.5	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		68.8	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		72.9	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		70.0	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		72.4	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		81.3	(26%-138%)
		37Cl-2,3,7,8-TCDD		83.9	(35%-197%)
22893010	SIB-SC-E24-8-9-07/12/2022	13C-2,3,7,8-TCDD		70.8	(25%-164%)
		13C-1,2,3,7,8-PeCDD		59.0	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		72.2	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		69.5	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		86.4	(23%-140%)
		13C-OCDD		84.0	(17%-157%)
		13C-2,3,7,8-TCDF		74.5	(24%-169%)
		13C-1,2,3,7,8-PeCDF		66.0	(24%-185%)
		13C-2,3,4,7,8-PeCDF		59.5	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		74.7	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		71.8	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		75.4	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		76.2	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		75.1	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		86.9	(26%-138%)
		37Cl-2,3,7,8-TCDD		82.5	(35%-197%)
22893011	SIB-SC-E24-9-10-07/12/2022	13C-2,3,7,8-TCDD		68.9	(25%-164%)
		13C-1,2,3,7,8-PeCDD		62.0	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		71.5	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		70.5	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		86.6	(23%-140%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
22893011	SIB-SC-E24-9-10-07/12/2022	13C-OCDD		72.9	(17%-157%)
		13C-2,3,7,8-TCDF		71.3	(24%-169%)
		13C-1,2,3,7,8-PeCDF		67.6	(24%-185%)
		13C-2,3,4,7,8-PeCDF		59.8	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		74.3	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		72.4	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		75.7	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		74.6	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		73.2	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		81.6	(26%-138%)
		37Cl-2,3,7,8-TCDD		79.5	(35%-197%)
22893012	SIB-SC-B32-6-7-07/25/2022	13C-2,3,7,8-TCDD		70.4	(25%-164%)
		13C-1,2,3,7,8-PeCDD		74.0	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		71.7	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		70.6	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		79.6	(23%-140%)
		13C-OCDD		62.9	(17%-157%)
		13C-2,3,7,8-TCDF		71.6	(24%-169%)
		13C-1,2,3,7,8-PeCDF		83.1	(24%-185%)
		13C-2,3,4,7,8-PeCDF		72.2	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		73.6	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		73.7	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		75.2	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		72.3	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		71.0	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		72.6	(26%-138%)
		37Cl-2,3,7,8-TCDD		78.7	(35%-197%)
22893013	SIB-SC-B32-7-8-07/25/2022	13C-2,3,7,8-TCDD		71.3	(25%-164%)
		13C-1,2,3,7,8-PeCDD		80.8	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		74.5	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		73.2	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		81.4	(23%-140%)
		13C-OCDD		62.4	(17%-157%)
		13C-2,3,7,8-TCDF		73.9	(24%-169%)
		13C-1,2,3,7,8-PeCDF		87.1	(24%-185%)
		13C-2,3,4,7,8-PeCDF		79.4	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		77.2	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		78.3	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		79.1	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		75.5	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		72.0	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		73.4	(26%-138%)
		37Cl-2,3,7,8-TCDD		77.9	(35%-197%)
22893014	SIB-SC-B32-8-9-07/25/2022	13C-2,3,7,8-TCDD		60.2	(25%-164%)
		13C-1,2,3,7,8-PeCDD		65.9	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		62.5	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		64.2	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		68.5	(23%-140%)
		13C-OCDD		49.0	(17%-157%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
22893014	SIB-SC-B32-8-9-07/25/2022	13C-2,3,7,8-TCDF		62.8	(24%-169%)
		13C-1,2,3,7,8-PeCDF		72.1	(24%-185%)
		13C-2,3,4,7,8-PeCDF		66.1	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		66.3	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		64.6	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		67.0	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		64.0	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		62.4	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		61.5	(26%-138%)
		37Cl-2,3,7,8-TCDD		76.7	(35%-197%)
22893015	SIB-SC-B34-0-1-08/22/2022	13C-2,3,7,8-TCDD		71.7	(25%-164%)
		13C-1,2,3,7,8-PeCDD		75.6	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		70.5	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		75.8	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		81.2	(23%-140%)
		13C-OCDD		64.7	(17%-157%)
		13C-2,3,7,8-TCDF		74.8	(24%-169%)
		13C-1,2,3,7,8-PeCDF		83.8	(24%-185%)
		13C-2,3,4,7,8-PeCDF		77.0	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		74.8	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		76.5	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		75.7	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		74.8	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		75.2	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		74.1	(26%-138%)
		37Cl-2,3,7,8-TCDD		77.2	(35%-197%)
22893016	SIB-SC-B34-6-7-08/22/2022	13C-2,3,7,8-TCDD		69.5	(25%-164%)
		13C-1,2,3,7,8-PeCDD		72.0	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		70.1	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		74.1	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		81.0	(23%-140%)
		13C-OCDD		63.1	(17%-157%)
		13C-2,3,7,8-TCDF		73.4	(24%-169%)
		13C-1,2,3,7,8-PeCDF		81.4	(24%-185%)
		13C-2,3,4,7,8-PeCDF		74.3	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		73.6	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		76.0	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		76.4	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		75.4	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		73.2	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		74.9	(26%-138%)
		37Cl-2,3,7,8-TCDD		76.1	(35%-197%)
22893017	SIB-SC-B34-7-8-08/22/2022	13C-2,3,7,8-TCDD		76.5	(25%-164%)
		13C-1,2,3,7,8-PeCDD		78.1	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		76.2	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		78.8	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		83.1	(23%-140%)
		13C-OCDD		64.3	(17%-157%)
		13C-2,3,7,8-TCDF		80.4	(24%-169%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
22893017	SIB-SC-B34-7-8-08/22/2022	13C-1,2,3,7,8-PeCDF		90.3	(24%-185%)
		13C-2,3,4,7,8-PeCDF		76.8	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		78.4	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		83.6	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		81.5	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		78.7	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		74.7	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		77.1	(26%-138%)
		37Cl-2,3,7,8-TCDD		80.6	(35%-197%)
22893018	SIB-SC-B34-8-9-08/22/2022	13C-2,3,7,8-TCDD		74.9	(25%-164%)
		13C-1,2,3,7,8-PeCDD		72.3	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		73.5	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		74.8	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		79.5	(23%-140%)
		13C-OCDD		61.7	(17%-157%)
		13C-2,3,7,8-TCDF		75.8	(24%-169%)
		13C-1,2,3,7,8-PeCDF		81.9	(24%-185%)
		13C-2,3,4,7,8-PeCDF		71.6	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		75.9	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		80.2	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		80.2	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		75.8	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		75.4	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		72.5	(26%-138%)
		37Cl-2,3,7,8-TCDD		77.6	(35%-197%)
22893019	SIB-SC-B34-9-9.7-08/22/2022	13C-2,3,7,8-TCDD		73.9	(25%-164%)
		13C-1,2,3,7,8-PeCDD		74.0	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		71.6	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		75.2	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		76.2	(23%-140%)
		13C-OCDD		58.2	(17%-157%)
		13C-2,3,7,8-TCDF		76.0	(24%-169%)
		13C-1,2,3,7,8-PeCDF		83.8	(24%-185%)
		13C-2,3,4,7,8-PeCDF		70.8	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		75.4	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		79.3	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		77.1	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		75.7	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		71.2	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		70.5	(26%-138%)
		37Cl-2,3,7,8-TCDD		79.5	(35%-197%)
22893020	SIB-SC-B35-0-1-07/07/2022	13C-2,3,7,8-TCDD		68.1	(25%-164%)
		13C-1,2,3,7,8-PeCDD		67.4	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		67.9	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		73.2	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		74.1	(23%-140%)
		13C-OCDD		56.1	(17%-157%)
		13C-2,3,7,8-TCDF		71.7	(24%-169%)
		13C-1,2,3,7,8-PeCDF		77.6	(24%-185%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
22893020	SIB-SC-B35-0-1-07/07/2022	13C-2,3,4,7,8-PeCDF		67.2	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		72.3	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		74.2	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		74.3	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		72.2	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		69.9	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		67.7	(26%-138%)
		37Cl-2,3,7,8-TCDD		78.2	(35%-197%)
12037218	LCS for batch 56680	13C-2,3,7,8-TCDD		69.1	(20%-175%)
		13C-1,2,3,7,8-PeCDD		76.9	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		66.7	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		86.6	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		67.1	(22%-166%)
		13C-OCDD		50.3	(13%-199%)
		13C-2,3,7,8-TCDF		69.1	(22%-152%)
		13C-1,2,3,7,8-PeCDF		83.6	(21%-192%)
		13C-2,3,4,7,8-PeCDF		78.3	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		67.9	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		82.2	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		76.6	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		71.1	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		64.6	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		64.7	(20%-186%)
		37Cl-2,3,7,8-TCDD		72.1	(31%-191%)
12037219	LCSD for batch 56680	13C-2,3,7,8-TCDD		73.7	(20%-175%)
		13C-1,2,3,7,8-PeCDD		80.0	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		71.9	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		84.0	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		69.4	(22%-166%)
		13C-OCDD		51.9	(13%-199%)
		13C-2,3,7,8-TCDF		70.6	(22%-152%)
		13C-1,2,3,7,8-PeCDF		88.1	(21%-192%)
		13C-2,3,4,7,8-PeCDF		82.9	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		68.0	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		86.1	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		77.7	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		73.4	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		65.6	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		65.4	(20%-186%)
		37Cl-2,3,7,8-TCDD		71.6	(31%-191%)
12037217	MB for batch 56680	13C-2,3,7,8-TCDD		70.7	(25%-164%)
		13C-1,2,3,7,8-PeCDD		77.2	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		68.6	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		81.6	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		68.3	(23%-140%)
		13C-OCDD		54.6	(17%-157%)
		13C-2,3,7,8-TCDF		68.0	(24%-169%)
		13C-1,2,3,7,8-PeCDF		83.3	(24%-185%)
		13C-2,3,4,7,8-PeCDF		75.4	(21%-178%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12037217	MB for batch 56680	13C-1,2,3,4,7,8-HxCDF		65.3	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		79.8	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		74.6	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		70.2	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		65.4	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		63.9	(26%-138%)
		37Cl-2,3,7,8-TCDD		70.7	(35%-197%)
22893021	SIB-SC-B35-6-7-07/07/2022	13C-2,3,7,8-TCDD		72.8	(25%-164%)
		13C-1,2,3,7,8-PeCDD		79.6	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		66.3	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		87.6	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		73.4	(23%-140%)
		13C-OCDD		58.3	(17%-157%)
		13C-2,3,7,8-TCDF		70.8	(24%-169%)
		13C-1,2,3,7,8-PeCDF		86.9	(24%-185%)
		13C-2,3,4,7,8-PeCDF		78.5	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		67.7	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		81.4	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		75.6	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		71.4	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		67.0	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		68.5	(26%-138%)
		37Cl-2,3,7,8-TCDD		76.2	(35%-197%)
22893022	SIB-SC-B35-7-8-07/07/2022	13C-2,3,7,8-TCDD		73.0	(25%-164%)
		13C-1,2,3,7,8-PeCDD		83.1	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		70.1	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		85.9	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		70.9	(23%-140%)
		13C-OCDD		59.0	(17%-157%)
		13C-2,3,7,8-TCDF		69.8	(24%-169%)
		13C-1,2,3,7,8-PeCDF		87.4	(24%-185%)
		13C-2,3,4,7,8-PeCDF		80.9	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		68.3	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		80.8	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		73.3	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		71.8	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		66.2	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		65.5	(26%-138%)
		37Cl-2,3,7,8-TCDD		74.0	(35%-197%)
22893023	SIB-SC-B35-8-9-07/07/2022	13C-2,3,7,8-TCDD		72.9	(25%-164%)
		13C-1,2,3,7,8-PeCDD		79.1	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		72.3	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		82.9	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		73.3	(23%-140%)
		13C-OCDD		64.0	(17%-157%)
		13C-2,3,7,8-TCDF		69.1	(24%-169%)
		13C-1,2,3,7,8-PeCDF		84.9	(24%-185%)
		13C-2,3,4,7,8-PeCDF		75.1	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		64.9	(26%-152%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
22893023	SIB-SC-B35-8-9-07/07/2022	13C-1,2,3,6,7,8-HxCDF		77.2	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		74.7	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		70.0	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		63.9	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		67.2	(26%-138%)
		37Cl-2,3,7,8-TCDD		71.7	(35%-197%)
22893024	SIB-SC-B35-9-10-07/07/2022	13C-2,3,7,8-TCDD		67.2	(25%-164%)
		13C-1,2,3,7,8-PeCDD		80.1	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		69.1	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		78.9	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		67.4	(23%-140%)
		13C-OCDD		54.2	(17%-157%)
		13C-2,3,7,8-TCDF		63.4	(24%-169%)
		13C-1,2,3,7,8-PeCDF		82.5	(24%-185%)
		13C-2,3,4,7,8-PeCDF		76.3	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		62.8	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		78.6	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		72.5	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		68.1	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		60.3	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		60.9	(26%-138%)
		37Cl-2,3,7,8-TCDD		69.6	(35%-197%)
22893025	SIB-SC-B35-10-11-07/07/2022	13C-2,3,7,8-TCDD		65.1	(25%-164%)
		13C-1,2,3,7,8-PeCDD		76.7	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		66.7	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		78.2	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		67.1	(23%-140%)
		13C-OCDD		56.7	(17%-157%)
		13C-2,3,7,8-TCDF		63.9	(24%-169%)
		13C-1,2,3,7,8-PeCDF		79.2	(24%-185%)
		13C-2,3,4,7,8-PeCDF		71.6	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		60.6	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		76.5	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		70.1	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		67.5	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		61.9	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		63.4	(26%-138%)
		37Cl-2,3,7,8-TCDD		67.2	(35%-197%)
22893026	SIB-SC-B35-11-12-07/07/2022	13C-2,3,7,8-TCDD		70.9	(25%-164%)
		13C-1,2,3,7,8-PeCDD		81.1	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		64.1	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		81.7	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		68.5	(23%-140%)
		13C-OCDD		55.6	(17%-157%)
		13C-2,3,7,8-TCDF		68.0	(24%-169%)
		13C-1,2,3,7,8-PeCDF		85.4	(24%-185%)
		13C-2,3,4,7,8-PeCDF		80.4	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		63.2	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		73.3	(26%-123%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
22893026	SIB-SC-B35-11-12-07/07/2022	13C-2,3,4,6,7,8-HxCDF		69.2	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		69.1	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		62.8	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		65.1	(26%-138%)
		37Cl-2,3,7,8-TCDD		72.7	(35%-197%)
22893027	SIB-SC-B35-12-13-07/07/2022	13C-2,3,7,8-TCDD		68.9	(25%-164%)
		13C-1,2,3,7,8-PeCDD		78.1	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		60.8	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		83.6	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		66.1	(23%-140%)
		13C-OCDD		57.3	(17%-157%)
		13C-2,3,7,8-TCDF		64.7	(24%-169%)
		13C-1,2,3,7,8-PeCDF		81.3	(24%-185%)
		13C-2,3,4,7,8-PeCDF		77.9	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		60.9	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		74.9	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		70.8	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		66.0	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		63.3	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		60.2	(26%-138%)
		37Cl-2,3,7,8-TCDD		67.7	(35%-197%)
22893028	SIB-SC-B35-13-14-07/07/2022	13C-2,3,7,8-TCDD		68.4	(25%-164%)
		13C-1,2,3,7,8-PeCDD		78.3	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		66.4	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		87.5	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		70.2	(23%-140%)
		13C-OCDD		55.5	(17%-157%)
		13C-2,3,7,8-TCDF		65.8	(24%-169%)
		13C-1,2,3,7,8-PeCDF		81.0	(24%-185%)
		13C-2,3,4,7,8-PeCDF		76.0	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		65.7	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		81.4	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		74.1	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		69.2	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		62.9	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		63.6	(26%-138%)
		37Cl-2,3,7,8-TCDD		69.1	(35%-197%)
22893029	SIB-SC-B35-14-14.7-07/07/2022	13C-2,3,7,8-TCDD		68.5	(25%-164%)
		13C-1,2,3,7,8-PeCDD		78.9	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		66.6	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		82.8	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		69.3	(23%-140%)
		13C-OCDD		57.4	(17%-157%)
		13C-2,3,7,8-TCDF		67.2	(24%-169%)
		13C-1,2,3,7,8-PeCDF		83.0	(24%-185%)
		13C-2,3,4,7,8-PeCDF		74.4	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		66.2	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		79.1	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		74.4	(28%-136%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22893

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
22893029	SIB-SC-B35-14-14.7-07/07/2022	13C-1,2,3,7,8,9-HxCDF		69.1	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		62.7	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		66.0	(26%-138%)
		37Cl-2,3,7,8-TCDD		71.0	(35%-197%)

* Recovery outside Acceptance Limits
# Column to be used to flag recovery values
D Sample Diluted

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: 22893 **Sample Type:** Laboratory Control Sample

Client ID: LCS for batch 56594 **Matrix:** SOIL

Lab Sample ID: 12037163

Instrument: HRP722 **Analysis Date:** 08/16/2024 18:11 **Dilution:** 1

Analyst: MC1 **Prep Batch ID:** 56594

Batch ID: 56596

CAS No.		Parmname	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits
1746-01-6	LCS	2,3,7,8-TCDD	20.0	20.4	102	67-158
40321-76-4	LCS	1,2,3,7,8-PeCDD	100	109	109	70-142
39227-28-6	LCS	1,2,3,4,7,8-HxCDD	100	105	105	70-164
57653-85-7	LCS	1,2,3,6,7,8-HxCDD	100	113	113	76-134
19408-74-3	LCS	1,2,3,7,8,9-HxCDD	100	112	112	64-162
35822-46-9	LCS	1,2,3,4,6,7,8-HpCDD	100	98.7	98.7	70-140
3268-87-9	LCS	1,2,3,4,6,7,8,9-OCDD	200	198	98.9	78-144
51207-31-9	LCS	2,3,7,8-TCDF	20.0	22.0	110	75-158
57117-41-6	LCS	1,2,3,7,8-PeCDF	100	102	102	80-134
57117-31-4	LCS	2,3,4,7,8-PeCDF	100	110	110	68-160
70648-26-9	LCS	1,2,3,4,7,8-HxCDF	100	106	106	72-134
57117-44-9	LCS	1,2,3,6,7,8-HxCDF	100	105	105	84-130
60851-34-5	LCS	2,3,4,6,7,8-HxCDF	100	106	106	70-156
72918-21-9	LCS	1,2,3,7,8,9-HxCDF	100	103	103	78-130
67562-39-4	LCS	1,2,3,4,6,7,8-HpCDF	100	103	103	82-122
55673-89-7	LCS	1,2,3,4,7,8,9-HpCDF	100	106	106	78-138
39001-02-0	LCS	1,2,3,4,6,7,8,9-OCDF	200	205	103	63-170

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: 22893 **Sample Type:** Laboratory Control Sample Duplicate

Client ID: LCSD for batch 56594 **Matrix:** SOIL

Lab Sample ID: 12037164

Instrument: HRP722 **Analysis Date:** 08/16/2024 18:57 **Dilution:** 1

Analyst: MC1 **Prep Batch ID:** 56594

Batch ID: 56596

CAS No.		Parmname	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
1746-01-6	LCSD	2,3,7,8-TCDD	20.0	20.5	102	67-158	0.451	0-20
40321-76-4	LCSD	1,2,3,7,8-PeCDD	100	107	107	70-142	1.91	0-20
39227-28-6	LCSD	1,2,3,4,7,8-HxCDD	100	103	103	70-164	2.64	0-20
57653-85-7	LCSD	1,2,3,6,7,8-HxCDD	100	111	111	76-134	2.22	0-20
19408-74-3	LCSD	1,2,3,7,8,9-HxCDD	100	110	110	64-162	1.90	0-20
35822-46-9	LCSD	1,2,3,4,6,7,8-HpCDD	100	98.3	98.3	70-140	0.434	0-20
3268-87-9	LCSD	1,2,3,4,6,7,8,9-OCDD	200	199	99.5	78-144	0.564	0-20
51207-31-9	LCSD	2,3,7,8-TCDF	20.0	20.8	104	75-158	5.23	0-20
57117-41-6	LCSD	1,2,3,7,8-PeCDF	100	98.5	98.5	80-134	3.10	0-20
57117-31-4	LCSD	2,3,4,7,8-PeCDF	100	106	106	68-160	3.29	0-20
70648-26-9	LCSD	1,2,3,4,7,8-HxCDF	100	101	101	72-134	4.35	0-20
57117-44-9	LCSD	1,2,3,6,7,8-HxCDF	100	107	107	84-130	1.98	0-20
60851-34-5	LCSD	2,3,4,6,7,8-HxCDF	100	101	101	70-156	4.09	0-20
72918-21-9	LCSD	1,2,3,7,8,9-HxCDF	100	102	102	78-130	1.23	0-20
67562-39-4	LCSD	1,2,3,4,6,7,8-HpCDF	100	98.1	98.1	82-122	5.36	0-20
55673-89-7	LCSD	1,2,3,4,7,8,9-HpCDF	100	105	105	78-138	1.12	0-20
39001-02-0	LCSD	1,2,3,4,6,7,8,9-OCDF	200	211	105	63-170	2.57	0-20

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: 22893
Client ID: SIB-SC-B31-6-7-07/10/2022(22893001MS)
Lab Sample ID: 12037165
Instrument: HRP722
Analyst: MC1

Sample Type: Matrix Spike
Matrix: Sediment
%Moisture: 28.9
Analysis Date: 08/16/2024 21:24
Dilution: 1
Prep Batch ID: 56594
Batch ID: 56596

CAS No.		Parmname		Sample Conc. pg/g	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits
1746-01-6	MS	2,3,7,8-TCDD	U	0.000	20.0	19.3	96.4	70-130
40321-76-4	MS	1,2,3,7,8-PeCDD	U	0.000	100	107	107	70-130
39227-28-6	MS	1,2,3,4,7,8-HxCDD	U	0.000	100	103	103	70-130
57653-85-7	MS	1,2,3,6,7,8-HxCDD	U	0.000	100	108	108	70-130
19408-74-3	MS	1,2,3,7,8,9-HxCDD	U	0.000	100	104	104	70-130
35822-46-9	MS	1,2,3,4,6,7,8-HpCDD	J	0.602	100	97.6	97	70-130
3268-87-9	MS	1,2,3,4,6,7,8,9-OCDD	BJ	9.35	200	202	96.5	70-130
51207-31-9	MS	2,3,7,8-TCDF	JK	0.186	20.0	20.9	103	70-130
57117-41-6	MS	1,2,3,7,8-PeCDF	JK	0.134	100	99.2	99.1	70-130
57117-31-4	MS	2,3,4,7,8-PeCDF	U	0.000	100	106	106	70-130
70648-26-9	MS	1,2,3,4,7,8-HxCDF	U	0.000	100	99.5	99.5	70-130
57117-44-9	MS	1,2,3,6,7,8-HxCDF	U	0.000	100	99.1	99.1	70-130
60851-34-5	MS	2,3,4,6,7,8-HxCDF	U	0.000	100	101	101	70-130
72918-21-9	MS	1,2,3,7,8,9-HxCDF	U	0.000	100	96.1	96.1	70-130
67562-39-4	MS	1,2,3,4,6,7,8-HpCDF	U	0.000	100	98.2	98.2	70-130
55673-89-7	MS	1,2,3,4,7,8,9-HpCDF	U	0.000	100	101	101	70-130
39001-02-0	MS	1,2,3,4,6,7,8,9-OCDF	JK	0.482	200	203	101	70-130

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: 22893
Client ID: SIB-SC-B31-6-7-07/10/2022(22893001MSD)
Lab Sample ID: 12037166
Instrument: HRP722
Analyst: MC1

Sample Type: Matrix Spike Duplicate
Matrix: Sediment
%Moisture: 28.9
Analysis Date: 08/16/2024 22:13
Dilution: 1
Prep Batch ID: 56594
Batch ID: 56596

CAS No.		Parmname		Sample Conc. pg/g	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
1746-01-6	MSD	2,3,7,8-TCDD	U	0.000	20.0	20.5	102	70-130	6.00	0-20
40321-76-4	MSD	1,2,3,7,8-PeCDD	U	0.000	99.9	109	109	70-130	1.44	0-20
39227-28-6	MSD	1,2,3,4,7,8-HxCDD	U	0.000	99.9	105	105	70-130	1.51	0-20
57653-85-7	MSD	1,2,3,6,7,8-HxCDD	U	0.000	99.9	110	110	70-130	1.89	0-20
19408-74-3	MSD	1,2,3,7,8,9-HxCDD	U	0.000	99.9	113	113	70-130	8.20	0-20
35822-46-9	MSD	1,2,3,4,6,7,8-HpCDD	J	0.602	99.9	101	100	70-130	3.06	0-20
3268-87-9	MSD	1,2,3,4,6,7,8,9-OCDD	BJ	9.35	200	222	106	70-130	9.33	0-20
51207-31-9	MSD	2,3,7,8-TCDF	JK	0.186	20.0	21.8	108	70-130	4.39	0-20
57117-41-6	MSD	1,2,3,7,8-PeCDF	JK	0.134	99.9	97.7	97.6	70-130	1.57	0-20
57117-31-4	MSD	2,3,4,7,8-PeCDF	U	0.000	99.9	108	108	70-130	2.38	0-20
70648-26-9	MSD	1,2,3,4,7,8-HxCDF	U	0.000	99.9	104	104	70-130	4.32	0-20
57117-44-9	MSD	1,2,3,6,7,8-HxCDF	U	0.000	99.9	106	107	70-130	7.15	0-20
60851-34-5	MSD	2,3,4,6,7,8-HxCDF	U	0.000	99.9	103	103	70-130	2.00	0-20
72918-21-9	MSD	1,2,3,7,8,9-HxCDF	U	0.000	99.9	104	104	70-130	7.88	0-20
67562-39-4	MSD	1,2,3,4,6,7,8-HpCDF	U	0.000	99.9	101	101	70-130	2.72	0-20
55673-89-7	MSD	1,2,3,4,7,8,9-HpCDF	U	0.000	99.9	107	107	70-130	5.43	0-20
39001-02-0	MSD	1,2,3,4,6,7,8,9-OCDF	JK	0.482	200	206	103	70-130	1.60	0-20

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: 22893 **Sample Type:** Laboratory Control Sample

Client ID: LCS for batch 56680 **Matrix:** SOIL

Lab Sample ID: 12037218

Instrument: HRP722 **Analysis Date:** 08/25/2024 08:31 **Dilution:** 1

Analyst: GM1 **Prep Batch ID:** 56680

Batch ID: 56683

CAS No.		Parmname	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits
1746-01-6	LCS	2,3,7,8-TCDD	20.0	18.7	93.5	67-158
40321-76-4	LCS	1,2,3,7,8-PeCDD	100	104	104	70-142
39227-28-6	LCS	1,2,3,4,7,8-HxCDD	100	98.6	98.6	70-164
57653-85-7	LCS	1,2,3,6,7,8-HxCDD	100	105	105	76-134
19408-74-3	LCS	1,2,3,7,8,9-HxCDD	100	103	103	64-162
35822-46-9	LCS	1,2,3,4,6,7,8-HpCDD	100	101	101	70-140
3268-87-9	LCS	1,2,3,4,6,7,8,9-OCDD	200	202	101	78-144
51207-31-9	LCS	2,3,7,8-TCDF	20.0	21.2	106	75-158
57117-41-6	LCS	1,2,3,7,8-PeCDF	100	99.8	99.8	80-134
57117-31-4	LCS	2,3,4,7,8-PeCDF	100	106	106	68-160
70648-26-9	LCS	1,2,3,4,7,8-HxCDF	100	107	107	72-134
57117-44-9	LCS	1,2,3,6,7,8-HxCDF	100	109	109	84-130
60851-34-5	LCS	2,3,4,6,7,8-HxCDF	100	105	105	70-156
72918-21-9	LCS	1,2,3,7,8,9-HxCDF	100	104	104	78-130
67562-39-4	LCS	1,2,3,4,6,7,8-HpCDF	100	101	101	82-122
55673-89-7	LCS	1,2,3,4,7,8,9-HpCDF	100	106	106	78-138
39001-02-0	LCS	1,2,3,4,6,7,8,9-OCDF	200	241	121	63-170

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: 22893 **Sample Type:** Laboratory Control Sample Duplicate

Client ID: LCSD for batch 56680 **Matrix:** SOIL

Lab Sample ID: 12037219

Instrument: HRP722 **Analysis Date:** 08/25/2024 09:17 **Dilution:** 1

Analyst: GM1 **Prep Batch ID:** 56680

Batch ID: 56683

CAS No.		Parmname	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
1746-01-6	LCSD	2,3,7,8-TCDD	20.0	18.3	91.5	67-158	2.22	0-20
40321-76-4	LCSD	1,2,3,7,8-PeCDD	100	107	107	70-142	2.16	0-20
39227-28-6	LCSD	1,2,3,4,7,8-HxCDD	100	97.2	97.2	70-164	1.48	0-20
57653-85-7	LCSD	1,2,3,6,7,8-HxCDD	100	103	103	76-134	1.67	0-20
19408-74-3	LCSD	1,2,3,7,8,9-HxCDD	100	106	106	64-162	2.39	0-20
35822-46-9	LCSD	1,2,3,4,6,7,8-HpCDD	100	101	101	70-140	0.195	0-20
3268-87-9	LCSD	1,2,3,4,6,7,8,9-OCDD	200	198	99.1	78-144	1.69	0-20
51207-31-9	LCSD	2,3,7,8-TCDF	20.0	21.1	105	75-158	0.426	0-20
57117-41-6	LCSD	1,2,3,7,8-PeCDF	100	98.1	98.1	80-134	1.66	0-20
57117-31-4	LCSD	2,3,4,7,8-PeCDF	100	107	107	68-160	0.822	0-20
70648-26-9	LCSD	1,2,3,4,7,8-HxCDF	100	105	105	72-134	1.84	0-20
57117-44-9	LCSD	1,2,3,6,7,8-HxCDF	100	107	107	84-130	1.61	0-20
60851-34-5	LCSD	2,3,4,6,7,8-HxCDF	100	102	102	70-156	3.15	0-20
72918-21-9	LCSD	1,2,3,7,8,9-HxCDF	100	99.8	99.8	78-130	3.85	0-20
67562-39-4	LCSD	1,2,3,4,6,7,8-HpCDF	100	102	102	82-122	1.55	0-20
55673-89-7	LCSD	1,2,3,4,7,8,9-HpCDF	100	106	106	78-138	0.0359	0-20
39001-02-0	LCSD	1,2,3,4,6,7,8,9-OCDF	200	228	114	63-170	5.49	0-20

Method Blank Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Matrix:**	**SOIL**
Client ID:	**MB for batch 56594**	**Instrument ID:**	**HRP722**	**Data File:**	**f16aug24a_2-3**
Lab Sample ID:	**12037162**	**Prep Date:**	**15-AUG-24**	**Analyzed:**	**08/16/24 19:46**
Column:					

This method blank applies to the following samples and quality control samples:

	Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01	LCS for batch 56594	12037163	f16aug24a_2-1	08/16/24	1811
02	LCSD for batch 56594	12037164	f16aug24a_2-2	08/16/24	1857
03	SIB-SC-B31-6-7-07/10/2022(22893001MS)	12037165	f16aug24a_2-5	08/16/24	2124
04	SIB-SC-B31-6-7-07/10/2022(22893001MSD)	12037166	f16aug24a_2-6	08/16/24	2213
05	SIB-SC-B31-6-7-07/10/2022	22893001	f16aug24a_2-4	08/16/24	2035
06	SIB-SC-B31-7-8-07/10/2022	22893002	f16aug24a_2-7	08/16/24	2301
07	SIB-SC-B31-8-9-07/10/2022	22893003	f16aug24a_2-8	08/16/24	2350
08	SIB-SC-B31-9-10-07/10/2022	22893004	f16aug24a_2-9	08/17/24	0039
09	SIB-SC-B31-10-11-07/10/2022	22893005	f16aug24a_2-10	08/17/24	0128
10	SIB-SC-B31-11-12-07/10/2022	22893006	f16aug24a_2-11	08/17/24	0217
11	SIB-SC-B31-12-13-07/10/2022	22893007	f16aug24a_2-12	08/17/24	0306
12	SIB-SC-B31-13-13.7-07/10/2022	22893008	f16aug24a_2-13	08/17/24	0354
13	SIB-SC-E24-7-8-07/12/2022	22893009	f16aug24a_3-2	08/17/24	0626
14	SIB-SC-E24-7-8-07/12/2022	22893009	e19aug24b-4	08/19/24	1536
15	SIB-SC-E24-8-9-07/12/2022	22893010	f16aug24a_3-3	08/17/24	0715
16	SIB-SC-E24-8-9-07/12/2022	22893010	e19aug24b-5	08/19/24	1602
17	SIB-SC-E24-9-10-07/12/2022	22893011	f16aug24a_3-4	08/17/24	0804
18	SIB-SC-E24-9-10-07/12/2022	22893011	e19aug24b-6	08/19/24	1629
19	SIB-SC-B32-6-7-07/25/2022	22893012	f16aug24a_3-5	08/17/24	0853
20	SIB-SC-B32-7-8-07/25/2022	22893013	f16aug24a_3-6	08/17/24	0941
21	SIB-SC-B32-8-9-07/25/2022	22893014	f16aug24a_3-7	08/17/24	1030
22	SIB-SC-B34-0-1-08/22/2022	22893015	f16aug24a_3-8	08/17/24	1119
23	SIB-SC-B34-6-7-08/22/2022	22893016	f16aug24a_3-9	08/17/24	1208
24	SIB-SC-B34-7-8-08/22/2022	22893017	f16aug24a_3-10	08/17/24	1257
25	SIB-SC-B34-8-9-08/22/2022	22893018	f16aug24a_3-11	08/17/24	1345
26	SIB-SC-B34-9-9.7-08/22/2022	22893019	f16aug24a_3-12	08/17/24	1434
27	SIB-SC-B35-0-1-07/07/2022	22893020	f16aug24a_3-13	08/17/24	1523

Method Blank Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Matrix:**	**SOIL**
Client ID:	**MB for batch 56680**	**Instrument ID:**	**HRP722**	**Data File:**	**f23aug24a_6-3**
Lab Sample ID:	**12037217**	**Prep Date:**	**20-AUG-24**	**Analyzed:**	**08/25/24 10:06**
Column:					

This method blank applies to the following samples and quality control samples:

	Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01	LCS for batch 56680	12037218	f23aug24a_6-1	08/25/24	0831
02	LCSD for batch 56680	12037219	f23aug24a_6-2	08/25/24	0917
03	SIB-SC-B35-6-7-07/07/2022	22893021	f23aug24a_6-4	08/25/24	1055
04	SIB-SC-B35-7-8-07/07/2022	22893022	f23aug24a_6-5	08/25/24	1144
05	SIB-SC-B35-8-9-07/07/2022	22893023	f23aug24a_6-6	08/25/24	1233
06	SIB-SC-B35-9-10-07/07/2022	22893024	f23aug24a_6-7	08/25/24	1321
07	SIB-SC-B35-10-11-07/07/2022	22893025	f23aug24a_6-8	08/25/24	1410
08	SIB-SC-B35-11-12-07/07/2022	22893026	f23aug24a_6-9	08/25/24	1459
09	SIB-SC-B35-12-13-07/07/2022	22893027	f23aug24a_6-10	08/25/24	1548
10	SIB-SC-B35-13-14-07/07/2022	22893028	f23aug24a_6-11	08/25/24	1637
11	SIB-SC-B35-14-14.7-07/07/2022	22893029	f23aug24a_6-12	08/25/24	1725

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037162**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 56594**				
Client ID:	**MB for batch 56594**			**Prep Basis:**	**As Received**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/16/2024 19:46**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-3**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.181	pg/g	0.181	0.500
40321-76-4	1,2,3,7,8-PeCDD	JK	0.162	pg/g	0.151	2.50
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.141	pg/g	0.141	5.00
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.144	pg/g	0.144	5.00
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.142	pg/g	0.142	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	0.226	pg/g	0.226	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD	J	1.15	pg/g	0.476	10.0
51207-31-9	2,3,7,8-TCDF	U	0.161	pg/g	0.161	1.00
57117-41-6	1,2,3,7,8-PeCDF	U	0.121	pg/g	0.121	5.00
57117-31-4	2,3,4,7,8-PeCDF	U	0.125	pg/g	0.125	5.00
70648-26-9	1,2,3,4,7,8-HxCDF	JK	0.138	pg/g	0.0994	5.00
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.0992	pg/g	0.0992	5.00
60851-34-5	2,3,4,6,7,8-HxCDF	JK	0.104	pg/g	0.0986	5.00
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.145	pg/g	0.145	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF	JK	0.404	pg/g	0.246	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.396	pg/g	0.396	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.472	pg/g	0.472	10.0
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	U	0.181	pg/g	0.181	1.00
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	0.162	pg/g	0.151	5.00
34465-46-8	Total Hexachlorodibenzo-p-dioxin	U	0.141	pg/g	0.141	5.00
37871-00-4	Total Heptachlorodibenzo-p-dioxin	U	0.226	pg/g	0.226	5.00
TCDF	Total Tetrachlorodibenzofuran	U	0.161	pg/g	0.161	1.00
30402-15-4	Total Pentachlorodibenzofuran	JK	0.0300	pg/g	0.0290	5.00
55684-94-1	Total Hexachlorodibenzofuran	JK	0.404	pg/g	0.0986	5.00
38998-75-3	Total Heptachlorodibenzofuran	JK	0.404	pg/g	0.246	5.00
TEQ	TEQ WHO2005 ND=0		0.191	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.346	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		140	200	pg/g	70.2	(25%-164%)
13C-1,2,3,7,8-PeCDD		131	200	pg/g	65.5	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		142	200	pg/g	70.8	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		146	200	pg/g	73.2	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		143	200	pg/g	71.5	(23%-140%)
13C-OCDD		196	400	pg/g	49.1	(17%-157%)
13C-2,3,7,8-TCDF		148	200	pg/g	73.8	(24%-169%)
13C-1,2,3,7,8-PeCDF		152	200	pg/g	76.0	(24%-185%)
13C-2,3,4,7,8-PeCDF		130	200	pg/g	65.0	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		155	200	pg/g	77.4	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		154	200	pg/g	77.2	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		157	200	pg/g	78.7	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		150	200	pg/g	75.0	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037162**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 56594**				
Client ID:	**MB for batch 56594**			**Prep Basis:**	**As Received**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/16/2024 19:46**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-3**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		136	200	pg/g	67.8	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		126	200	pg/g	62.8	(26%-138%)
37Cl-2,3,7,8-TCDD		16.7	20.0	pg/g	83.3	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037163**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 56594**				
Client ID:	**LCS for batch 56594**			**Prep Basis:**	**As Received**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/16/2024 18:11**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-1**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		20.4	pg/g	0.226	0.500
40321-76-4	1,2,3,7,8-PeCDD		109	pg/g	0.248	2.50
39227-28-6	1,2,3,4,7,8-HxCDD		105	pg/g	0.320	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		113	pg/g	0.336	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		112	pg/g	0.328	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		98.7	pg/g	0.760	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		198	pg/g	1.50	10.0
51207-31-9	2,3,7,8-TCDF		22.0	pg/g	0.184	1.00
57117-41-6	1,2,3,7,8-PeCDF		102	pg/g	0.312	5.00
57117-31-4	2,3,4,7,8-PeCDF		110	pg/g	0.320	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		106	pg/g	0.420	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		105	pg/g	0.418	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		106	pg/g	0.442	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		103	pg/g	0.612	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		103	pg/g	0.630	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		106	pg/g	0.958	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		205	pg/g	1.05	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		137	200	pg/g	68.3	(20%-175%)
13C-1,2,3,7,8-PeCDD		129	200	pg/g	64.7	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		131	200	pg/g	65.7	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		150	200	pg/g	74.9	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		136	200	pg/g	68.1	(22%-166%)
13C-OCDD		192	400	pg/g	48.1	(13%-199%)
13C-2,3,7,8-TCDF		145	200	pg/g	72.5	(22%-152%)
13C-1,2,3,7,8-PeCDF		148	200	pg/g	74.2	(21%-192%)
13C-2,3,4,7,8-PeCDF		129	200	pg/g	64.7	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		148	200	pg/g	74.1	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		157	200	pg/g	78.6	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		151	200	pg/g	75.3	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		142	200	pg/g	71.2	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		127	200	pg/g	63.4	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		120	200	pg/g	59.8	(20%-186%)
37Cl-2,3,7,8-TCDD		15.8	20.0	pg/g	79.1	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037164**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 56594**				
Client ID:	**LCSD for batch 56594**			**Prep Basis:**	**As Received**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/16/2024 18:57**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-2**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		20.5	pg/g	0.250	0.500
40321-76-4	1,2,3,7,8-PeCDD		107	pg/g	0.280	2.50
39227-28-6	1,2,3,4,7,8-HxCDD		103	pg/g	0.290	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		111	pg/g	0.308	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		110	pg/g	0.300	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		98.3	pg/g	0.790	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		199	pg/g	0.978	10.0
51207-31-9	2,3,7,8-TCDF		20.8	pg/g	0.194	1.00
57117-41-6	1,2,3,7,8-PeCDF		98.5	pg/g	0.276	5.00
57117-31-4	2,3,4,7,8-PeCDF		106	pg/g	0.274	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		101	pg/g	0.442	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		107	pg/g	0.436	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		101	pg/g	0.444	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		102	pg/g	0.620	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		98.1	pg/g	0.628	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		105	pg/g	0.968	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		211	pg/g	0.966	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		128	200	pg/g	63.9	(20%-175%)
13C-1,2,3,7,8-PeCDD		116	200	pg/g	58.1	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		126	200	pg/g	63.2	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		129	200	pg/g	64.4	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		124	200	pg/g	62.2	(22%-166%)
13C-OCDD		172	400	pg/g	43.0	(13%-199%)
13C-2,3,7,8-TCDF		134	200	pg/g	66.8	(22%-152%)
13C-1,2,3,7,8-PeCDF		131	200	pg/g	65.6	(21%-192%)
13C-2,3,4,7,8-PeCDF		112	200	pg/g	56.0	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		135	200	pg/g	67.6	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		141	200	pg/g	70.3	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		137	200	pg/g	68.4	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		130	200	pg/g	65.0	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		119	200	pg/g	59.3	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		109	200	pg/g	54.6	(20%-186%)
37Cl-2,3,7,8-TCDD		16.0	20.0	pg/g	79.9	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037165**	**Date Collected:**	**07/10/2022 13:18**	**Matrix:**	**Sediment**
Client Sample:	**QC for batch 56594**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**28.9**
Client ID:	**SIB-SC-B31-6-7-07/10/2022(2289300**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/16/2024 21:24**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-5**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.07 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		19.3	pg/g	0.222	0.500
40321-76-4	1,2,3,7,8-PeCDD		107	pg/g	0.252	2.50
39227-28-6	1,2,3,4,7,8-HxCDD		103	pg/g	0.300	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		108	pg/g	0.320	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		104	pg/g	0.310	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		97.6	pg/g	0.784	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		202	pg/g	0.892	10.0
51207-31-9	2,3,7,8-TCDF		20.9	pg/g	0.224	1.00
57117-41-6	1,2,3,7,8-PeCDF		99.2	pg/g	0.272	5.00
57117-31-4	2,3,4,7,8-PeCDF		106	pg/g	0.276	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		99.5	pg/g	0.350	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		99.1	pg/g	0.378	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		101	pg/g	0.392	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		96.1	pg/g	0.510	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		98.2	pg/g	0.696	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		101	pg/g	1.01	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		203	pg/g	0.956	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		141	200	pg/g	70.3	(25%-164%)
13C-1,2,3,7,8-PeCDD		130	200	pg/g	64.9	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		144	200	pg/g	72.1	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		146	200	pg/g	72.8	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		146	200	pg/g	73.0	(23%-140%)
13C-OCDD		206	400	pg/g	51.5	(17%-157%)
13C-2,3,7,8-TCDF		145	200	pg/g	72.6	(24%-169%)
13C-1,2,3,7,8-PeCDF		144	200	pg/g	72.2	(24%-185%)
13C-2,3,4,7,8-PeCDF		123	200	pg/g	61.6	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		153	200	pg/g	76.5	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		157	200	pg/g	78.4	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		153	200	pg/g	76.6	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		158	200	pg/g	79.1	(29%-147%)
13C-1,2,3,4,6,7,8-HpCDF		133	200	pg/g	66.6	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		131	200	pg/g	65.5	(26%-138%)
37Cl-2,3,7,8-TCDD		16.4	20.0	pg/g	82.1	(35%-197%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037166**	**Date Collected:**	**07/10/2022 13:18**	**Matrix:**	**Sediment**
Client Sample:	**QC for batch 56594**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**28.9**
Client ID:	**SIB-SC-B31-6-7-07/10/2022(2289300**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/16/2024 22:13**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_2-6**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**14.08 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		20.5	pg/g	0.244	0.500
40321-76-4	1,2,3,7,8-PeCDD		109	pg/g	0.163	2.50
39227-28-6	1,2,3,4,7,8-HxCDD		105	pg/g	0.472	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		110	pg/g	0.468	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		113	pg/g	0.470	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		101	pg/g	0.633	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		222	pg/g	0.993	9.99
51207-31-9	2,3,7,8-TCDF		21.8	pg/g	0.199	0.999
57117-41-6	1,2,3,7,8-PeCDF		97.7	pg/g	0.232	5.00
57117-31-4	2,3,4,7,8-PeCDF		108	pg/g	0.254	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		104	pg/g	0.428	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		106	pg/g	0.420	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		103	pg/g	0.462	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		104	pg/g	0.629	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		101	pg/g	0.532	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		107	pg/g	0.837	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		206	pg/g	0.791	9.99

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		141	200	pg/g	70.7	(25%-164%)
13C-1,2,3,7,8-PeCDD		141	200	pg/g	70.4	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		138	200	pg/g	69.1	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		150	200	pg/g	75.1	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		139	200	pg/g	69.6	(23%-140%)
13C-OCDD		194	400	pg/g	48.5	(17%-157%)
13C-2,3,7,8-TCDF		149	200	pg/g	74.3	(24%-169%)
13C-1,2,3,7,8-PeCDF		163	200	pg/g	81.5	(24%-185%)
13C-2,3,4,7,8-PeCDF		141	200	pg/g	70.4	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		151	200	pg/g	75.4	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		154	200	pg/g	76.9	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		149	200	pg/g	74.7	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		147	200	pg/g	73.5	(29%-147%)
13C-1,2,3,4,6,7,8-HpCDF		130	200	pg/g	65.0	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		125	200	pg/g	62.3	(26%-138%)
37Cl-2,3,7,8-TCDD		16.4	20.0	pg/g	82.0	(35%-197%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037217**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 56680**				
Client ID:	**MB for batch 56680**			**Prep Basis:**	**As Received**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 10:06**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-3**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.318	pg/g	0.318	0.500
40321-76-4	1,2,3,7,8-PeCDD	U	0.164	pg/g	0.164	2.50
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.224	pg/g	0.224	5.00
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.226	pg/g	0.226	5.00
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.226	pg/g	0.226	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	0.206	pg/g	0.206	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD	J	0.496	pg/g	0.416	10.0
51207-31-9	2,3,7,8-TCDF	U	0.224	pg/g	0.224	1.00
57117-41-6	1,2,3,7,8-PeCDF	JK	0.138	pg/g	0.122	5.00
57117-31-4	2,3,4,7,8-PeCDF	JK	0.134	pg/g	0.122	5.00
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.176	pg/g	0.176	5.00
57117-44-9	1,2,3,6,7,8-HxCDF	JK	0.174	pg/g	0.157	5.00
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.168	pg/g	0.168	5.00
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.266	pg/g	0.266	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF	J	0.288	pg/g	0.158	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.256	pg/g	0.256	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.446	pg/g	0.446	10.0
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	U	0.318	pg/g	0.318	1.00
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.164	pg/g	0.164	5.00
34465-46-8	Total Hexachlorodibenzo-p-dioxin	U	0.224	pg/g	0.224	5.00
37871-00-4	Total Heptachlorodibenzo-p-dioxin	U	0.206	pg/g	0.206	5.00
TCDF	Total Tetrachlorodibenzofuran	U	0.224	pg/g	0.224	1.00
30402-15-4	Total Pentachlorodibenzofuran	JK	0.272	pg/g	0.0526	5.00
55684-94-1	Total Hexachlorodibenzofuran	JK	0.174	pg/g	0.157	5.00
38998-75-3	Total Heptachlorodibenzofuran	J	0.288	pg/g	0.158	5.00
TEQ	TEQ WHO2005 ND=0		0.0648	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.384	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		141	200	pg/g	70.7	(25%-164%)
13C-1,2,3,7,8-PeCDD		154	200	pg/g	77.2	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		137	200	pg/g	68.6	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		163	200	pg/g	81.6	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		137	200	pg/g	68.3	(23%-140%)
13C-OCDD		218	400	pg/g	54.6	(17%-157%)
13C-2,3,7,8-TCDF		136	200	pg/g	68.0	(24%-169%)
13C-1,2,3,7,8-PeCDF		167	200	pg/g	83.3	(24%-185%)
13C-2,3,4,7,8-PeCDF		151	200	pg/g	75.4	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		131	200	pg/g	65.3	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		160	200	pg/g	79.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		149	200	pg/g	74.6	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		140	200	pg/g	70.2	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037217**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 56680**				
Client ID:	**MB for batch 56680**			**Prep Basis:**	**As Received**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 10:06**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-3**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		131	200	pg/g	65.4	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		128	200	pg/g	63.9	(26%-138%)
37Cl-2,3,7,8-TCDD		14.1	20.0	pg/g	70.7	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037218**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 56680**				
Client ID:	**LCS for batch 56680**			**Prep Basis:**	**As Received**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 08:31**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-1**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		18.7	pg/g	0.292	0.500
40321-76-4	1,2,3,7,8-PeCDD		104	pg/g	0.364	2.50
39227-28-6	1,2,3,4,7,8-HxCDD		98.6	pg/g	0.546	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		105	pg/g	0.552	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		103	pg/g	0.548	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		101	pg/g	1.29	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		202	pg/g	2.02	10.0
51207-31-9	2,3,7,8-TCDF		21.2	pg/g	0.312	1.00
57117-41-6	1,2,3,7,8-PeCDF		99.8	pg/g	0.464	5.00
57117-31-4	2,3,4,7,8-PeCDF		106	pg/g	0.446	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		107	pg/g	0.738	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		109	pg/g	0.704	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		105	pg/g	0.740	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		104	pg/g	1.24	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		101	pg/g	1.18	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		106	pg/g	1.79	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		241	pg/g	1.77	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		138	200	pg/g	69.1	(20%-175%)
13C-1,2,3,7,8-PeCDD		154	200	pg/g	76.9	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		133	200	pg/g	66.7	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		173	200	pg/g	86.6	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		134	200	pg/g	67.1	(22%-166%)
13C-OCDD		201	400	pg/g	50.3	(13%-199%)
13C-2,3,7,8-TCDF		138	200	pg/g	69.1	(22%-152%)
13C-1,2,3,7,8-PeCDF		167	200	pg/g	83.6	(21%-192%)
13C-2,3,4,7,8-PeCDF		157	200	pg/g	78.3	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		136	200	pg/g	67.9	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		164	200	pg/g	82.2	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		153	200	pg/g	76.6	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		142	200	pg/g	71.1	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		129	200	pg/g	64.6	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		129	200	pg/g	64.7	(20%-186%)
37Cl-2,3,7,8-TCDD		14.4	20.0	pg/g	72.1	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037219**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 56680**				
Client ID:	**LCSD for batch 56680**			**Prep Basis:**	**As Received**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 09:17**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-2**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		18.3	pg/g	0.376	0.500
40321-76-4	1,2,3,7,8-PeCDD		107	pg/g	0.336	2.50
39227-28-6	1,2,3,4,7,8-HxCDD		97.2	pg/g	0.648	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		103	pg/g	0.676	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		106	pg/g	0.662	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		101	pg/g	1.12	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		198	pg/g	3.24	10.0
51207-31-9	2,3,7,8-TCDF		21.1	pg/g	0.400	1.00
57117-41-6	1,2,3,7,8-PeCDF		98.1	pg/g	0.676	5.00
57117-31-4	2,3,4,7,8-PeCDF		107	pg/g	0.658	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		105	pg/g	0.826	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		107	pg/g	0.756	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		102	pg/g	0.892	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		99.8	pg/g	1.34	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		102	pg/g	1.03	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		106	pg/g	1.72	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		228	pg/g	2.40	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		147	200	pg/g	73.7	(20%-175%)
13C-1,2,3,7,8-PeCDD		160	200	pg/g	80.0	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		144	200	pg/g	71.9	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		168	200	pg/g	84.0	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		139	200	pg/g	69.4	(22%-166%)
13C-OCDD		208	400	pg/g	51.9	(13%-199%)
13C-2,3,7,8-TCDF		141	200	pg/g	70.6	(22%-152%)
13C-1,2,3,7,8-PeCDF		176	200	pg/g	88.1	(21%-192%)
13C-2,3,4,7,8-PeCDF		166	200	pg/g	82.9	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		136	200	pg/g	68.0	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		172	200	pg/g	86.1	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		155	200	pg/g	77.7	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		147	200	pg/g	73.4	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		131	200	pg/g	65.6	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		131	200	pg/g	65.4	(20%-186%)
37Cl-2,3,7,8-TCDD		14.3	20.0	pg/g	71.6	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

CFA | Cape Fear Analytical LLC
an affiliate of The GEL Group INC

3306 Kitty Hawk Road, Suite 120 Wilmington, NC 28405
P 910.795.0421
www.capefearanalytical.com

August 29, 2024

Mr. Alan Sprott
Vigor Industrial, LLC
5555 North Channel Avenue
Portland, Oregon 97217

Re: Swan Island Basin Portland Harbor
Work Order: 22921

Dear Mr. Sprott:

Cape Fear Analytical LLC (CFA) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 09, 2024. This original data report has been prepared and reviewed in accordance with CFA's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at 910-795-0421.

Sincerely,

Cynde Larkins

Cynde Larkins
Project Manager

Enclosures

problem solved

ALS Environmental Chain of Custody

1317 South 13th Avenue • Kelso, WA 98626 • 1-360-577-7222 • FAX 1-360-636-1068

ALS Contact: Karen Melerine

HYGL
CFA WO # 22921

Project Number: K2408062
Project Manager: Karen Melerine
QAP: LAB QAP

Lab Code	Sample ID	# of Cont.	Matrix	Sample Date	Time	Lab ID	Relinquish None
K2408062-001	SIB-SC-B33-6-7-08/21/2022	1	Sediment	8/21/22	1433	Cape Fear	X
K2408062-002	SIB-SC-B33-7-8-08/21/2022	↓	Sediment	8/21/22	1436	Cape Fear	X
K2408062-003	SIB-SC-B33-8-9-08/21/2022	↓	Sediment	8/21/22	1439	Cape Fear	X

Will report directly to HGL

Test Comments
Relinquish - None K2408062-001, 002, 003 shipping to Cape Fear for Dioxins/Furans

Folder Comments:
Reissued from K2407814. Pulled from frozen archive 8/6/24

Special Instructions/Comments
Please provide the electronic (PDF and EDD) report to the following e-mail address: afletcher@hgl.com, lnyland@hgl.com

contact: HGL - Andrea Fletcher with any questions: afletcher@hgl.com, 913-378-2316

H - Test is On Hold P - Test is Authorized for Prep Only

Turnaround Requirements
____**RUSH** (Surcharges Apply)
PLEASE CIRCLE WORK DAYS
1 2 3 4 5
_X___ **STANDARD**
Requested FAX Date: _____
Requested Report Date: 08/26/24

Report Requirements
____ I. Results Only
____ II. Results + QC Summaries
____ III. Results + QC and Calibration Summaries
__X__ IV. Data Validation Report with Raw Data
PQL/MDL/J Y
EDD Y

Invoice Information
PO#
Bill to

Relinquished By: Hayleigh Smith 8/8/24
Received By: Cynde Yarkins 09AUG24 @ 1050 temp. = 4.6°C
Airbill Number:

SAMPLE RECEIPT CHECKLIST

Cape Fear Analytical

Client: HYGL	Work Order: 22921
Shipping Company: FedEx	Date/Time Received: 09AUG24 1050

Suspected Hazard Information	Yes	NA	No
Shipped as DOT Hazardous?			✓
Samples identified as Foreign Soil?			✓

DOE Site Sample Packages	Yes	NA	No*
Screened <0.5 mR/hr?		✓	
Samples < 2x background?		✓	

* Notify RSO of any responses in this column immediately.

Air Sample Receipt Specifics	Yes	NA	No
Air sample in shipment?			✓

Air Witness: _____

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: seals broken damaged container leaking container other(describe)
2	Custody seal/s present on cooler?	✓			Seal intact? (Yes) No
3	Chain of Custody documents included with shipment?	✓			
4	Samples requiring cold preservation within 0-6°C?	✓			Preservation Method: ice bags loose ice (blue ice) dry ice none other (describe) Temperature Blank present: (Yes) No 4.8° - 0.2 = 4.6°C
5	Aqueous samples found to have visible solids?		✓		Sample IDs, containers affected:
5	Samples requiring chemical preservation at proper pH?		✓		Sample IDs, containers affected and pH observed: If preservative added, Lot#:
7	Samples requiring preservation have no residual chlorine?		✓		Sample IDs, containers affected: If preservative added, Lot#:
8	Samples received within holding time?	✓			Sample IDs, tests affected:
9	Sample IDs on COC match IDs on containers?	✓			Sample IDs, containers affected:
10	Date & time of COC match date & time on containers?			✓	Sample IDs, containers affected: Not noted on labels
11	Number of containers received match number indicated on COC?	✓			List type and number of containers / Sample IDs, containers affected: 3-2oz. clear glass soil jars, 1 per sample
12	COC form is properly signed in relinquished/received sections?				

Comments:

Checklist performed by: Initials: CJ Date: 09AUG24

CF-UD-F-7

High Resolution Dioxins and Furans Analysis

Case Narrative

HDOX Case Narrative
HydroGeoLogic, Incorporated (HYGL)
SDG 22921

Method/Analysis Information

Product:	**Dioxins/Furans by EPA Method 1613B in Solids**
Analytical Method:	EPA Method 1613B
Extraction Method:	SW846 3540C
Analytical Batch Number:	56683
Clean Up Batch Number:	56681
Extraction Batch Number:	56680

Sample Analysis

Samples were received within temperature requirements at 4.6 °C.
(22921001,22921002,22921003).
The following samples were analyzed using the analytical protocol as established in EPA Method 1613B:

Sample ID	Client ID
12037217	Method Blank (MB)
12037218	Laboratory Control Sample (LCS)
12037219	Laboratory Control Sample Duplicate (LCSD)
22921001	SIB-SC-B33-6-7-08/21/2022
22921002	SIB-SC-B33-7-8-08/21/2022
22921003	SIB-SC-B33-8-9-08/21/2022

The samples in this SDG were analyzed on a "dry weight" basis.

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by Cape Fear Analytical LLC (CFA) as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with CF-OA-E-020 REV# 8.

Raw data reports are processed and reviewed by the analyst using the TargetLynx software package.

Calibration Information

Initial Calibration
All initial calibration requirements have been met for this sample delivery group (SDG).

Continuing Calibration Verification (CCV) Requirements
All associated calibration verification standard(s) (CVS) met the acceptance criteria.

Quality Control (QC) Information

Certification Statement
The test results presented in this document are certified to meet all requirements of the 2009 TNI Standard.

Method Blank (MB) Statement
The MB(s) analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries
All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Laboratory Control Sample Duplicate (LCSD) Recovery
The LCSD spike recoveries met the acceptance limits.

LCS/LCSD Relative Percent Difference (RPD) Statement
The RPD(s) between the LCS and LCSD met the acceptance limits.

QC Sample Designation
A sample of similar matrix, not associated with this SDG, was selected for analysis as the matrix spike and matrix spike duplicate.

Technical Information

Holding Time Specifications
CFA assigns holding times based on the associated methodology, which assigns the date and time from sample collection. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Manual Integrations

Certain standards and QC samples required manual integrations to correctly position the baseline as set in the calibration standard injections. Where manual integrations were performed, copies of all manual integration peak profiles are included in the raw data section of this fraction. Manual integrations were required for data files in this SDG.

Sample Preparation

No difficulties were encountered during sample preparation.

System Configuration

This analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
HRP722_2	Primary Dioxin Analysis	Dioxin Analysis	DB-5MS	60m x 0.25mm, 0.25um

Sample Data Summary

Cape Fear Analytical, LLC
3306 Kitty Hawk Road Suite 120, Wilmington, NC 28405 - (910) 795-0421 - www.capefearanalytical.com

Qualifier Definition Report
for

HYGL001 HydroGeoLogic, Incorporated

Client SDG: 22921 CFA Work Order: 22921

The Qualifiers in this report are defined as follows:

U Analyte was analyzed for, but not detected above the specified detection limit.
J Value is estimated
B The target analyte was detected in the associated blank.
* A quality control analyte recovery is outside of specified acceptance criteria
** Analyte is a surrogate compound
K Estimated Maximum Possible Concentration

DL Indicates that sample is diluted.
RA Indicates that sample is re-analyzed without re-extraction.
RE Indicates that sample is re-extracted.

Review/Validation

Cape Fear Analytical requires all analytical data to be verified by a qualified data reviewer.

The following data validator verified the information presented in this case narrative:

Signature:  **Name: Erin Suhrie**

Date: 29 AUG 2024 **Title: Data Validator**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22921**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22921001**	**Date Collected:**	**08/21/2022 14:33**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/09/2024 10:50**	**%Moisture:**	**32.8**
Client ID:	**SIB-SC-B33-6-7-08/21/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/24/2024 07:00**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_3-2**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**14.92 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.267	pg/g	0.267	0.499
40321-76-4	1,2,3,7,8-PeCDD	U	0.209	pg/g	0.209	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.279	pg/g	0.279	4.99
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.283	pg/g	0.283	4.99
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.281	pg/g	0.281	4.99
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	1.69	pg/g	0.433	4.99
3268-87-9	1,2,3,4,6,7,8,9-OCDD		16.2	pg/g	1.02	9.97
51207-31-9	2,3,7,8-TCDF	JK	0.317	pg/g	0.213	0.997
57117-41-6	1,2,3,7,8-PeCDF	BJ	0.132	pg/g	0.108	4.99
57117-31-4	2,3,4,7,8-PeCDF	U	0.109	pg/g	0.109	4.99
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.126	pg/g	0.126	4.99
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.131	pg/g	0.131	4.99
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.136	pg/g	0.136	4.99
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.205	pg/g	0.205	4.99
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.319	pg/g	0.152	4.99
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.251	pg/g	0.251	4.99
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.461	pg/g	0.461	9.97
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.487	pg/g	0.267	0.997
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	0.520	pg/g	0.209	4.99
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	2.01	pg/g	0.279	4.99
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	4.89	pg/g	0.433	4.99
TCDF	Total Tetrachlorodibenzofuran	JK	0.546	pg/g	0.213	0.997
30402-15-4	Total Pentachlorodibenzofuran	BJK	0.227	pg/g	0.0530	4.99
55684-94-1	Total Hexachlorodibenzofuran	U	0.126	pg/g	0.126	4.99
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.319	pg/g	0.152	4.99
TEQ	TEQ WHO2005 ND=0		0.0606	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.389	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		135	199	pg/g	67.6	(25%-164%)
13C-1,2,3,7,8-PeCDD		142	199	pg/g	71.3	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		136	199	pg/g	68.0	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		166	199	pg/g	83.3	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		133	199	pg/g	66.6	(23%-140%)
13C-OCDD		204	399	pg/g	51.2	(17%-157%)
13C-2,3,7,8-TCDF		133	199	pg/g	66.8	(24%-169%)
13C-1,2,3,7,8-PeCDF		158	199	pg/g	79.1	(24%-185%)
13C-2,3,4,7,8-PeCDF		142	199	pg/g	71.2	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		139	199	pg/g	69.8	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		156	199	pg/g	78.0	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		150	199	pg/g	75.4	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		139	199	pg/g	69.7	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22921**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22921001**	**Date Collected:**	**08/21/2022 14:33**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/09/2024 10:50**	**%Moisture:**	**32.8**
Client ID:	**SIB-SC-B33-6-7-08/21/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/24/2024 07:00**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_3-2**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**14.92 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		126	199	pg/g	63.1	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		122	199	pg/g	61.0	(26%-138%)
37Cl-2,3,7,8-TCDD		13.8	19.9	pg/g	69.2	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22921**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22921002**	**Date Collected:**	**08/21/2022 14:36**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/09/2024 10:50**	**%Moisture:**	**31.6**
Client ID:	**SIB-SC-B33-7-8-08/21/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/24/2024 07:48**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_3-3**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**14.68 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.275	pg/g	0.275	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.137	pg/g	0.137	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.197	pg/g	0.197	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.193	pg/g	0.193	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.195	pg/g	0.195	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	JK	0.417	pg/g	0.289	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD	BJ	2.98	pg/g	0.839	9.97
51207-31-9	2,3,7,8-TCDF	JK	0.207	pg/g	0.199	0.997
57117-41-6	1,2,3,7,8-PeCDF	U	0.106	pg/g	0.106	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.101	pg/g	0.101	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.124	pg/g	0.124	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.118	pg/g	0.118	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.126	pg/g	0.126	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.186	pg/g	0.186	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.151	pg/g	0.102	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.159	pg/g	0.159	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.413	pg/g	0.413	9.97
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	U	0.275	pg/g	0.275	0.997
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.137	pg/g	0.137	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	J	0.267	pg/g	0.193	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	JK	1.03	pg/g	0.289	4.98
TCDF	Total Tetrachlorodibenzofuran	JK	0.207	pg/g	0.199	0.997
30402-15-4	Total Pentachlorodibenzofuran	U	0.101	pg/g	0.101	4.98
55684-94-1	Total Hexachlorodibenzofuran	U	0.118	pg/g	0.118	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.151	pg/g	0.102	4.98
TEQ	TEQ WHO2005 ND=0		0.0273	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.308	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		131	199	pg/g	65.9	(25%-164%)
13C-1,2,3,7,8-PeCDD		145	199	pg/g	72.8	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		142	199	pg/g	71.1	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		152	199	pg/g	76.5	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		129	199	pg/g	64.9	(23%-140%)
13C-OCDD		200	399	pg/g	50.3	(17%-157%)
13C-2,3,7,8-TCDF		129	199	pg/g	64.7	(24%-169%)
13C-1,2,3,7,8-PeCDF		156	199	pg/g	78.5	(24%-185%)
13C-2,3,4,7,8-PeCDF		142	199	pg/g	71.0	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		133	199	pg/g	66.8	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		152	199	pg/g	76.3	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		144	199	pg/g	72.2	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		137	199	pg/g	68.7	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22921**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22921002**	**Date Collected:**	**08/21/2022 14:36**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/09/2024 10:50**	**%Moisture:**	**31.6**
Client ID:	**SIB-SC-B33-7-8-08/21/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/24/2024 07:48**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_3-3**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**14.68 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		127	199	pg/g	63.8	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		127	199	pg/g	63.5	(26%-138%)
37Cl-2,3,7,8-TCDD		14.2	19.9	pg/g	71.4	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22921**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22921003**	**Date Collected:**	**08/21/2022 14:39**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/09/2024 10:50**	**%Moisture:**	**36.3**
Client ID:	**SIB-SC-B33-8-9-08/21/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/24/2024 08:37**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_3-4**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**15.75 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.267	pg/g	0.267	0.498
40321-76-4	1,2,3,7,8-PeCDD	U	0.189	pg/g	0.189	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.233	pg/g	0.233	4.98
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.251	pg/g	0.251	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	J	0.349	pg/g	0.243	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD	J	2.28	pg/g	0.399	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD		22.0	pg/g	1.28	9.97
51207-31-9	2,3,7,8-TCDF	U	0.205	pg/g	0.205	0.997
57117-41-6	1,2,3,7,8-PeCDF	U	0.101	pg/g	0.101	4.98
57117-31-4	2,3,4,7,8-PeCDF	U	0.0963	pg/g	0.0963	4.98
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.114	pg/g	0.114	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	U	0.112	pg/g	0.112	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.114	pg/g	0.114	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.162	pg/g	0.162	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF	BJK	0.343	pg/g	0.107	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.163	pg/g	0.163	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.329	pg/g	0.329	9.97
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	0.949	pg/g	0.267	0.997
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	0.981	pg/g	0.189	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	3.08	pg/g	0.233	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin	J	6.47	pg/g	0.399	4.98
TCDF	Total Tetrachlorodibenzofuran	JK	0.700	pg/g	0.205	0.997
30402-15-4	Total Pentachlorodibenzofuran	BJK	0.0558	pg/g	0.0321	4.98
55684-94-1	Total Hexachlorodibenzofuran	BJK	0.154	pg/g	0.112	4.98
38998-75-3	Total Heptachlorodibenzofuran	BJK	0.343	pg/g	0.107	4.98
TEQ	TEQ WHO2005 ND=0		0.0678	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.372	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		141	199	pg/g	70.8	(25%-164%)
13C-1,2,3,7,8-PeCDD		149	199	pg/g	74.9	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		145	199	pg/g	72.9	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		159	199	pg/g	80.0	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		145	199	pg/g	72.8	(23%-140%)
13C-OCDD		235	399	pg/g	58.8	(17%-157%)
13C-2,3,7,8-TCDF		137	199	pg/g	68.7	(24%-169%)
13C-1,2,3,7,8-PeCDF		168	199	pg/g	84.2	(24%-185%)
13C-2,3,4,7,8-PeCDF		150	199	pg/g	75.1	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		136	199	pg/g	68.0	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		161	199	pg/g	80.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		151	199	pg/g	75.6	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		144	199	pg/g	72.2	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22921**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22921003**	**Date Collected:**	**08/21/2022 14:39**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/09/2024 10:50**	**%Moisture:**	**36.3**
Client ID:	**SIB-SC-B33-8-9-08/21/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/24/2024 08:37**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_3-4**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**15.75 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		135	199	pg/g	67.8	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		132	199	pg/g	66.1	(26%-138%)
37Cl-2,3,7,8-TCDD		14.5	19.9	pg/g	72.8	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Quality Control Summary

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22921

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
22921001	SIB-SC-B33-6-7-08/21/2022	13C-2,3,7,8-TCDD		67.6	(25%-164%)
		13C-1,2,3,7,8-PeCDD		71.3	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		68.0	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		83.3	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		66.6	(23%-140%)
		13C-OCDD		51.2	(17%-157%)
		13C-2,3,7,8-TCDF		66.8	(24%-169%)
		13C-1,2,3,7,8-PeCDF		79.1	(24%-185%)
		13C-2,3,4,7,8-PeCDF		71.2	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		69.8	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		78.0	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		75.4	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		69.7	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		63.1	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		61.0	(26%-138%)
		37Cl-2,3,7,8-TCDD		69.2	(35%-197%)
22921002	SIB-SC-B33-7-8-08/21/2022	13C-2,3,7,8-TCDD		65.9	(25%-164%)
		13C-1,2,3,7,8-PeCDD		72.8	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		71.1	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		76.5	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		64.9	(23%-140%)
		13C-OCDD		50.3	(17%-157%)
		13C-2,3,7,8-TCDF		64.7	(24%-169%)
		13C-1,2,3,7,8-PeCDF		78.5	(24%-185%)
		13C-2,3,4,7,8-PeCDF		71.0	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		66.8	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		76.3	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		72.2	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		68.7	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		63.8	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		63.5	(26%-138%)
		37Cl-2,3,7,8-TCDD		71.4	(35%-197%)
22921003	SIB-SC-B33-8-9-08/21/2022	13C-2,3,7,8-TCDD		70.8	(25%-164%)
		13C-1,2,3,7,8-PeCDD		74.9	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		72.9	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		80.0	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		72.8	(23%-140%)
		13C-OCDD		58.8	(17%-157%)
		13C-2,3,7,8-TCDF		68.7	(24%-169%)
		13C-1,2,3,7,8-PeCDF		84.2	(24%-185%)
		13C-2,3,4,7,8-PeCDF		75.1	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		68.0	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		80.8	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		75.6	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		72.2	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		67.8	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		66.1	(26%-138%)
		37Cl-2,3,7,8-TCDD		72.8	(35%-197%)
12037218	LCS for batch 56680	13C-2,3,7,8-TCDD		69.1	(20%-175%)

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22921

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits
12037218	LCS for batch 56680	13C-1,2,3,7,8-PeCDD		76.9	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		66.7	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		86.6	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		67.1	(22%-166%)
		13C-OCDD		50.3	(13%-199%)
		13C-2,3,7,8-TCDF		69.1	(22%-152%)
		13C-1,2,3,7,8-PeCDF		83.6	(21%-192%)
		13C-2,3,4,7,8-PeCDF		78.3	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		67.9	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		82.2	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		76.6	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		71.1	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		64.6	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		64.7	(20%-186%)
		37Cl-2,3,7,8-TCDD		72.1	(31%-191%)
12037219	LCSD for batch 56680	13C-2,3,7,8-TCDD		73.7	(20%-175%)
		13C-1,2,3,7,8-PeCDD		80.0	(21%-227%)
		13C-1,2,3,4,7,8-HxCDD		71.9	(21%-193%)
		13C-1,2,3,6,7,8-HxCDD		84.0	(25%-163%)
		13C-1,2,3,4,6,7,8-HpCDD		69.4	(22%-166%)
		13C-OCDD		51.9	(13%-199%)
		13C-2,3,7,8-TCDF		70.6	(22%-152%)
		13C-1,2,3,7,8-PeCDF		88.1	(21%-192%)
		13C-2,3,4,7,8-PeCDF		82.9	(13%-328%)
		13C-1,2,3,4,7,8-HxCDF		68.0	(19%-202%)
		13C-1,2,3,6,7,8-HxCDF		86.1	(21%-159%)
		13C-2,3,4,6,7,8-HxCDF		77.7	(22%-176%)
		13C-1,2,3,7,8,9-HxCDF		73.4	(17%-205%)
		13C-1,2,3,4,6,7,8-HpCDF		65.6	(21%-158%)
		13C-1,2,3,4,7,8,9-HpCDF		65.4	(20%-186%)
		37Cl-2,3,7,8-TCDD		71.6	(31%-191%)
12037217	MB for batch 56680	13C-2,3,7,8-TCDD		70.7	(25%-164%)
		13C-1,2,3,7,8-PeCDD		77.2	(25%-181%)
		13C-1,2,3,4,7,8-HxCDD		68.6	(32%-141%)
		13C-1,2,3,6,7,8-HxCDD		81.6	(28%-130%)
		13C-1,2,3,4,6,7,8-HpCDD		68.3	(23%-140%)
		13C-OCDD		54.6	(17%-157%)
		13C-2,3,7,8-TCDF		68.0	(24%-169%)
		13C-1,2,3,7,8-PeCDF		83.3	(24%-185%)
		13C-2,3,4,7,8-PeCDF		75.4	(21%-178%)
		13C-1,2,3,4,7,8-HxCDF		65.3	(26%-152%)
		13C-1,2,3,6,7,8-HxCDF		79.8	(26%-123%)
		13C-2,3,4,6,7,8-HxCDF		74.6	(28%-136%)
		13C-1,2,3,7,8,9-HxCDF		70.2	(29%-147%)
		13C-1,2,3,4,6,7,8-HpCDF		65.4	(28%-143%)
		13C-1,2,3,4,7,8,9-HpCDF		63.9	(26%-138%)
		37Cl-2,3,7,8-TCDD		70.7	(35%-197%)

* Recovery outside Acceptance Limits

Hi-Res Dioxins/Furans
Surrogate Recovery Report

SDG Number: 22921

Matrix Type: SOLID

Sample ID	Client ID	Surrogate	QUAL	Recovery (%)	Acceptance Limits

* Recovery outside Acceptance Limits
# Column to be used to flag recovery values
D Sample Diluted

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: 22921 **Sample Type:** Laboratory Control Sample
Client ID: LCS for batch 56680 **Matrix:** SOIL
Lab Sample ID: 12037218
Instrument: HRP722 **Analysis Date:** 08/25/2024 08:31 **Dilution:** 1
Analyst: GM1 **Prep Batch ID:** 56680
Batch ID: 56683

CAS No.		Parmname	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits
1746-01-6	LCS	2,3,7,8-TCDD	20.0	18.7	93.5	67-158
40321-76-4	LCS	1,2,3,7,8-PeCDD	100	104	104	70-142
39227-28-6	LCS	1,2,3,4,7,8-HxCDD	100	98.6	98.6	70-164
57653-85-7	LCS	1,2,3,6,7,8-HxCDD	100	105	105	76-134
19408-74-3	LCS	1,2,3,7,8,9-HxCDD	100	103	103	64-162
35822-46-9	LCS	1,2,3,4,6,7,8-HpCDD	100	101	101	70-140
3268-87-9	LCS	1,2,3,4,6,7,8,9-OCDD	200	202	101	78-144
51207-31-9	LCS	2,3,7,8-TCDF	20.0	21.2	106	75-158
57117-41-6	LCS	1,2,3,7,8-PeCDF	100	99.8	99.8	80-134
57117-31-4	LCS	2,3,4,7,8-PeCDF	100	106	106	68-160
70648-26-9	LCS	1,2,3,4,7,8-HxCDF	100	107	107	72-134
57117-44-9	LCS	1,2,3,6,7,8-HxCDF	100	109	109	84-130
60851-34-5	LCS	2,3,4,6,7,8-HxCDF	100	105	105	70-156
72918-21-9	LCS	1,2,3,7,8,9-HxCDF	100	104	104	78-130
67562-39-4	LCS	1,2,3,4,6,7,8-HpCDF	100	101	101	82-122
55673-89-7	LCS	1,2,3,4,7,8,9-HpCDF	100	106	106	78-138
39001-02-0	LCS	1,2,3,4,6,7,8,9-OCDF	200	241	121	63-170

Hi-Res Dioxins/Furans

Quality Control Summary
Spike Recovery Report

SDG Number: 22921 **Sample Type:** Laboratory Control Sample Duplicate

Client ID: LCSD for batch 56680 **Matrix:** SOIL

Lab Sample ID: 12037219

Instrument: HRP722 **Analysis Date:** 08/25/2024 09:17 **Dilution:** 1

Analyst: GM1 **Prep Batch ID:** 56680

Batch ID: 56683

CAS No.		Parmname	Amount Added pg/g	Spike Conc. pg/g	Recovery %	Acceptance Limits	RPD %	Acceptance Limits
1746-01-6	LCSD	2,3,7,8-TCDD	20.0	18.3	91.5	67-158	2.22	0-20
40321-76-4	LCSD	1,2,3,7,8-PeCDD	100	107	107	70-142	2.16	0-20
39227-28-6	LCSD	1,2,3,4,7,8-HxCDD	100	97.2	97.2	70-164	1.48	0-20
57653-85-7	LCSD	1,2,3,6,7,8-HxCDD	100	103	103	76-134	1.67	0-20
19408-74-3	LCSD	1,2,3,7,8,9-HxCDD	100	106	106	64-162	2.39	0-20
35822-46-9	LCSD	1,2,3,4,6,7,8-HpCDD	100	101	101	70-140	0.195	0-20
3268-87-9	LCSD	1,2,3,4,6,7,8,9-OCDD	200	198	99.1	78-144	1.69	0-20
51207-31-9	LCSD	2,3,7,8-TCDF	20.0	21.1	105	75-158	0.426	0-20
57117-41-6	LCSD	1,2,3,7,8-PeCDF	100	98.1	98.1	80-134	1.66	0-20
57117-31-4	LCSD	2,3,4,7,8-PeCDF	100	107	107	68-160	0.822	0-20
70648-26-9	LCSD	1,2,3,4,7,8-HxCDF	100	105	105	72-134	1.84	0-20
57117-44-9	LCSD	1,2,3,6,7,8-HxCDF	100	107	107	84-130	1.61	0-20
60851-34-5	LCSD	2,3,4,6,7,8-HxCDF	100	102	102	70-156	3.15	0-20
72918-21-9	LCSD	1,2,3,7,8,9-HxCDF	100	99.8	99.8	78-130	3.85	0-20
67562-39-4	LCSD	1,2,3,4,6,7,8-HpCDF	100	102	102	82-122	1.55	0-20
55673-89-7	LCSD	1,2,3,4,7,8,9-HpCDF	100	106	106	78-138	0.0359	0-20
39001-02-0	LCSD	1,2,3,4,6,7,8,9-OCDF	200	228	114	63-170	5.49	0-20

Method Blank Summary

SDG Number:	**22921**	**Client:**	**HYGL001**	**Matrix:**	**SOIL**
Client ID:	**MB for batch 56680**	**Instrument ID:**	**HRP722**	**Data File:**	**f23aug24a_6-3**
Lab Sample ID:	**12037217**	**Prep Date:**	**20-AUG-24**	**Analyzed:**	**08/25/24 10:06**
Column:					

This method blank applies to the following samples and quality control samples:

	Client Sample ID	Lab Sample ID	File ID	Date Analyzed	Time Analyzed
01	LCS for batch 56680	12037218	f23aug24a_6-1	08/25/24	0831
02	LCSD for batch 56680	12037219	f23aug24a_6-2	08/25/24	0917
03	SIB-SC-B33-6-7-08/21/2022	22921001	f23aug24a_3-2	08/24/24	0700
04	SIB-SC-B33-7-8-08/21/2022	22921002	f23aug24a_3-3	08/24/24	0748
05	SIB-SC-B33-8-9-08/21/2022	22921003	f23aug24a_3-4	08/24/24	0837

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22921**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037217**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 56680**				
Client ID:	**MB for batch 56680**			**Prep Basis:**	**As Received**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 10:06**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-3**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.318	pg/g	0.318	0.500
40321-76-4	1,2,3,7,8-PeCDD	U	0.164	pg/g	0.164	2.50
39227-28-6	1,2,3,4,7,8-HxCDD	U	0.224	pg/g	0.224	5.00
57653-85-7	1,2,3,6,7,8-HxCDD	U	0.226	pg/g	0.226	5.00
19408-74-3	1,2,3,7,8,9-HxCDD	U	0.226	pg/g	0.226	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD	U	0.206	pg/g	0.206	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD	J	0.496	pg/g	0.416	10.0
51207-31-9	2,3,7,8-TCDF	U	0.224	pg/g	0.224	1.00
57117-41-6	1,2,3,7,8-PeCDF	JK	0.138	pg/g	0.122	5.00
57117-31-4	2,3,4,7,8-PeCDF	JK	0.134	pg/g	0.122	5.00
70648-26-9	1,2,3,4,7,8-HxCDF	U	0.176	pg/g	0.176	5.00
57117-44-9	1,2,3,6,7,8-HxCDF	JK	0.174	pg/g	0.157	5.00
60851-34-5	2,3,4,6,7,8-HxCDF	U	0.168	pg/g	0.168	5.00
72918-21-9	1,2,3,7,8,9-HxCDF	U	0.266	pg/g	0.266	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF	J	0.288	pg/g	0.158	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF	U	0.256	pg/g	0.256	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF	U	0.446	pg/g	0.446	10.0
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	U	0.318	pg/g	0.318	1.00
36088-22-9	Total Pentachlorodibenzo-p-dioxin	U	0.164	pg/g	0.164	5.00
34465-46-8	Total Hexachlorodibenzo-p-dioxin	U	0.224	pg/g	0.224	5.00
37871-00-4	Total Heptachlorodibenzo-p-dioxin	U	0.206	pg/g	0.206	5.00
TCDF	Total Tetrachlorodibenzofuran	U	0.224	pg/g	0.224	1.00
30402-15-4	Total Pentachlorodibenzofuran	JK	0.272	pg/g	0.0526	5.00
55684-94-1	Total Hexachlorodibenzofuran	JK	0.174	pg/g	0.157	5.00
38998-75-3	Total Heptachlorodibenzofuran	J	0.288	pg/g	0.158	5.00
TEQ	TEQ WHO2005 ND=0		0.0648	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		0.384	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		141	200	pg/g	70.7	(25%-164%)
13C-1,2,3,7,8-PeCDD		154	200	pg/g	77.2	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		137	200	pg/g	68.6	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		163	200	pg/g	81.6	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		137	200	pg/g	68.3	(23%-140%)
13C-OCDD		218	400	pg/g	54.6	(17%-157%)
13C-2,3,7,8-TCDF		136	200	pg/g	68.0	(24%-169%)
13C-1,2,3,7,8-PeCDF		167	200	pg/g	83.3	(24%-185%)
13C-2,3,4,7,8-PeCDF		151	200	pg/g	75.4	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		131	200	pg/g	65.3	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		160	200	pg/g	79.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		149	200	pg/g	74.6	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		140	200	pg/g	70.2	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22921**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037217**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 56680**				
Client ID:	**MB for batch 56680**			**Prep Basis:**	**As Received**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 10:06**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-3**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		131	200	pg/g	65.4	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		128	200	pg/g	63.9	(26%-138%)
37Cl-2,3,7,8-TCDD		14.1	20.0	pg/g	70.7	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22921**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037218**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 56680**				
Client ID:	**LCS for batch 56680**			**Prep Basis:**	**As Received**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 08:31**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-1**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		18.7	pg/g	0.292	0.500
40321-76-4	1,2,3,7,8-PeCDD		104	pg/g	0.364	2.50
39227-28-6	1,2,3,4,7,8-HxCDD		98.6	pg/g	0.546	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		105	pg/g	0.552	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		103	pg/g	0.548	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		101	pg/g	1.29	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		202	pg/g	2.02	10.0
51207-31-9	2,3,7,8-TCDF		21.2	pg/g	0.312	1.00
57117-41-6	1,2,3,7,8-PeCDF		99.8	pg/g	0.464	5.00
57117-31-4	2,3,4,7,8-PeCDF		106	pg/g	0.446	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		107	pg/g	0.738	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		109	pg/g	0.704	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		105	pg/g	0.740	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		104	pg/g	1.24	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		101	pg/g	1.18	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		106	pg/g	1.79	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		241	pg/g	1.77	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		138	200	pg/g	69.1	(20%-175%)
13C-1,2,3,7,8-PeCDD		154	200	pg/g	76.9	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		133	200	pg/g	66.7	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		173	200	pg/g	86.6	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		134	200	pg/g	67.1	(22%-166%)
13C-OCDD		201	400	pg/g	50.3	(13%-199%)
13C-2,3,7,8-TCDF		138	200	pg/g	69.1	(22%-152%)
13C-1,2,3,7,8-PeCDF		167	200	pg/g	83.6	(21%-192%)
13C-2,3,4,7,8-PeCDF		157	200	pg/g	78.3	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		136	200	pg/g	67.9	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		164	200	pg/g	82.2	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		153	200	pg/g	76.6	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		142	200	pg/g	71.1	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		129	200	pg/g	64.6	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		129	200	pg/g	64.7	(20%-186%)
37Cl-2,3,7,8-TCDD		14.4	20.0	pg/g	72.1	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22921**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**12037219**			**Matrix:**	**SOIL**
Client Sample:	**QC for batch 56680**				
Client ID:	**LCSD for batch 56680**			**Prep Basis:**	**As Received**
Batch ID:	**56683**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/25/2024 09:17**	**Analyst:**	**GM1**	**Instrument:**	**HRP722**
Data File:	**f23aug24a_6-2**			**Dilution:**	**1**
Prep Batch:	**56680**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**20-AUG-24**	**Prep Aliquot:**	**10 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		18.3	pg/g	0.376	0.500
40321-76-4	1,2,3,7,8-PeCDD		107	pg/g	0.336	2.50
39227-28-6	1,2,3,4,7,8-HxCDD		97.2	pg/g	0.648	5.00
57653-85-7	1,2,3,6,7,8-HxCDD		103	pg/g	0.676	5.00
19408-74-3	1,2,3,7,8,9-HxCDD		106	pg/g	0.662	5.00
35822-46-9	1,2,3,4,6,7,8-HpCDD		101	pg/g	1.12	5.00
3268-87-9	1,2,3,4,6,7,8,9-OCDD		198	pg/g	3.24	10.0
51207-31-9	2,3,7,8-TCDF		21.1	pg/g	0.400	1.00
57117-41-6	1,2,3,7,8-PeCDF		98.1	pg/g	0.676	5.00
57117-31-4	2,3,4,7,8-PeCDF		107	pg/g	0.658	5.00
70648-26-9	1,2,3,4,7,8-HxCDF		105	pg/g	0.826	5.00
57117-44-9	1,2,3,6,7,8-HxCDF		107	pg/g	0.756	5.00
60851-34-5	2,3,4,6,7,8-HxCDF		102	pg/g	0.892	5.00
72918-21-9	1,2,3,7,8,9-HxCDF		99.8	pg/g	1.34	5.00
67562-39-4	1,2,3,4,6,7,8-HpCDF		102	pg/g	1.03	5.00
55673-89-7	1,2,3,4,7,8,9-HpCDF		106	pg/g	1.72	5.00
39001-02-0	1,2,3,4,6,7,8,9-OCDF		228	pg/g	2.40	10.0

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		147	200	pg/g	73.7	(20%-175%)
13C-1,2,3,7,8-PeCDD		160	200	pg/g	80.0	(21%-227%)
13C-1,2,3,4,7,8-HxCDD		144	200	pg/g	71.9	(21%-193%)
13C-1,2,3,6,7,8-HxCDD		168	200	pg/g	84.0	(25%-163%)
13C-1,2,3,4,6,7,8-HpCDD		139	200	pg/g	69.4	(22%-166%)
13C-OCDD		208	400	pg/g	51.9	(13%-199%)
13C-2,3,7,8-TCDF		141	200	pg/g	70.6	(22%-152%)
13C-1,2,3,7,8-PeCDF		176	200	pg/g	88.1	(21%-192%)
13C-2,3,4,7,8-PeCDF		166	200	pg/g	82.9	(13%-328%)
13C-1,2,3,4,7,8-HxCDF		136	200	pg/g	68.0	(19%-202%)
13C-1,2,3,6,7,8-HxCDF		172	200	pg/g	86.1	(21%-159%)
13C-2,3,4,6,7,8-HxCDF		155	200	pg/g	77.7	(22%-176%)
13C-1,2,3,7,8,9-HxCDF		147	200	pg/g	73.4	(17%-205%)
13C-1,2,3,4,6,7,8-HpCDF		131	200	pg/g	65.6	(21%-158%)
13C-1,2,3,4,7,8,9-HpCDF		131	200	pg/g	65.4	(20%-186%)
37Cl-2,3,7,8-TCDD		14.3	20.0	pg/g	71.6	(31%-191%)

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

ATTACHMENT B
ARCHIVE SEDIMENT SAMPLE ANALYSIS
DATA VALIDATION REPORTS

Gas Chromatography
PCB Aroclors (EPA Method SW8082A)
Stage 2A Review
Data Quality Control (QC)

Site: PHSS-SIB PDI	SDG #: 24H0046
Laboratory: ARI	Date: 10/02/2024
HydroGeoLogic, Inc. Reviewer: Fern Carter Peer Reviewer: Ken Rapuano (10.2.24)	Project: DT2002

Client Sample ID	Laboratory Sample ID	Analyses	Matrix
SIB-SC-B31-6-7-07/10/2022	24H0046-01	PCB Aroclors	Solid
SIB-SC-B31-7-8-07/10/2022	24H0046-02	PCB Aroclors	Solid
SIB-SC-B31-8-9-07/10/2022	24H0046-03	PCB Aroclors	Solid
SIB-SC-B31-9-10-07/10/2022	24H0046-04	PCB Aroclors	Solid
SIB-SC-B31-10-11-07/10/2022	24H0046-05	PCB Aroclors	Solid
SIB-SC-B31-11-12-07/10/2022	24H0046-06	PCB Aroclors	Solid
SIB-SC-B31-12-13-07/10/2022	24H0046-07	PCB Aroclors	Solid
SIB-SC-B31-13-13.7-07/10/2022	24H0046-08	PCB Aroclors	Solid
SIB-SC-B32-6-7-07/25/2022	24H0046-09	PCB Aroclors	Solid
SIB-SC-B32-7-8-07/25/2022	24H0046-10	PCB Aroclors	Solid
SIB-SC-B32-8-9-07/25/2022	24H0046-11	PCB Aroclors	Solid
SIB-SC-B33-6-7-08/21/2022	24H0046-12	PCB Aroclors	Solid
SIB-SC-B33-7-8-08/21/2022	24H0046-13	PCB Aroclors	Solid
SIB-SC-B33-8-9-08/21/2022	24H0046-14	PCB Aroclors	Solid
SIB-SC-B34-0-1-08/22/2022	24H0046-15	PCB Aroclors	Solid
SIB-SC-B34-6-7-08/22/2022	24H0046-16	PCB Aroclors	Solid
SIB-SC-B34-7-8-08/22/2022	24H0046-17	PCB Aroclors	Solid
SIB-SC-B34-8-9-08/22/2022	24H0046-18	PCB Aroclors	Solid
SIB-SC-B34-9-9.7-08/22/2022	24H0046-19	PCB Aroclors	Solid
SIB-SC-B35-0-1-07/07/2022	24H0046-20	PCB Aroclors	Solid
SIB-SC-B35-6-7-07/07/2022	24H0046-21	PCB Aroclors	Solid
SIB-SC-B35-7-8-07/07/2022	24H0046-22	PCB Aroclors	Solid
SIB-SC-B35-8-9-07/07/2022	24H0046-23	PCB Aroclors	Solid
SIB-SC-B35-9-10-07/07/2022	24H0046-24	PCB Aroclors	Solid
SIB-SC-B35-10-11-07/07/2022	24H0046-25	PCB Aroclors	Solid
SIB-SC-B35-11-12-07/07/2022	24H0046-26	PCB Aroclors	Solid
SIB-SC-B35-12-13-07/07/2022	24H0046-27	PCB Aroclors	Solid
SIB-SC-B35-13-14-07/07/2022	24H0046-28	PCB Aroclors	Solid
SIB-SC-B35-14-14.7-07/07/2022	24H0046-29	PCB Aroclors	Solid
SIB-SC-E24-7-8-07/12/2022	24H0046-30	PCB Aroclors	Solid
SIB-SC-E24-7-8-07/12/2022	24H0046-30RE1	PCB Aroclors (5x dilution)	Solid
SIB-SC-E24-8-9-07/12/2022	24H0046-31	PCB Aroclors	Solid

Client Sample ID	Laboratory Sample ID	Analyses	Matrix
SIB-SC-E24-9-10-07/12/2022	24H0046-32	PCB Aroclors	Solid
SIB-SC-J06-8-9-07/26/2022	24H0046-33	PCB Aroclors	Solid

The following Stage 2A review was performed on the requested analyses. No results were rejected, and analytical completeness is 100%.

Narrative and Completeness Review – The case narrative and data package were checked for completeness. The narrative noted internal standard and ICV/CCV discrepancies. All this has been noted but falls outside of a 2A validation.

Qualification: None required.

Sample Delivery and Condition – All samples arrived intact at the laboratory with temperatures between 0-6°C or frozen and were properly preserved. Lab noted cooler arrived without signed and dated custody seals, and without a temperature blank. No additional qualification required.

Qualification: None required.

Holding Times –The narrative noted that PCB Aroclors samples were frozen to extend holding times; this is in accordance with the QAPP archiving protocols. All Aroclor samples were extracted approximately 12 months beyond the 1-year holding time for frozen Aroclors sample preparation. There is no holding time for PCBs in soil/sediment samples and no qualification is required.

Qualification: None required.

Method Blanks – All method blanks were free from contamination.

Qualification: None required.

Rinsate Blanks – Equipment rinse blanks EB01-07/12/2022, EB05-07/26/2022, and EB08-08/21/2022 (results reported in SDGs 22G0258, 22G0436, and 22H0491) are associated with all sample results reported in this SDG. All rinse blanks were free from contamination.

Qualification: None required.

Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) – All LCS/LCSD %Rs and RPDs were within QAPP control limits. A standard reference material was also reported for each preparation batch; all SRM %Rs met the control limits.

Qualification: None required.

Surrogates – All surrogate %R were within QAPP control limits except for:

- The original analysis of sample SIB-SC-E24-7-8-07/12/2022 showed a high %R for surrogate decachlorobiphenyl on column 1 and a low %R on column 2. All detected results reported for this analysis are reported from column 2 and should be qualified J-SSL. All non-detected results reported for this analysis are reported from column 1 and do not require qualification.
- The 5x diluted analysis of sample SIB-SC-E24-7-8-07/12/2022 had three of the four reported surrogate %Rs below the control limits; no results from this analysis are reported and all results for this analysis should be qualified DNR-EXC.
- Sample SIB-SC-E24-8-9-07/12/2022 had a high %R for surrogate decachlorobiphenyl on column 1 and a low %R for surrogate decachlorobiphenyl on column 2. All detected results reported for

this analysis are reported from column 2 and should be qualified J-SSL. All non-detected results reported for this analysis are reported from column 1 and do not require qualification.

- Sample SIB-SC-J06-8-9-07/26/2022 did not report surrogate values due to intense dilution effects. This sample was analyzed at a 100x dilution.

Qualification: **The following results were adjusted to change the reported_result field from Yes to No: all results from the 5x diluted analysis of sample SIB-SC-E24-7-8-07/12/2022. These results are qualified DNR-EXC.**

The following detected results were qualified J-SSL: Aroclors 1248, 1254, and 1260 for samples SIB-SC-E24-8-9-07/12/2022 and the original analysis of sample SIB-SC-E24-7-8-07/12/2022.

- **Aroclors 1248, 1254, and 1260 for the 5x dilution reanalysis of sample SIB-SC-E24-7-8-07/12/2022 with reason code SSL.**

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – The MS and MSD performed on sample SIB-SC-B31-7-8-07/10/2022 had all %Rs and RPDs in control. The MS and MSD performed on sample SIB-SC-J06-8-9-07/26/2022 had a low %R for Aroclor-1260 in the MS and high %Rs for Aroclor 1016 in the MS and for Aroclors 1016 and 1260 in the MSD; the Aroclor 1260 RPD was above the control limit. The parent sample was analyzed at 100x dilution due to elevated concentrations of multiple Aroclors and matrix effects. The matrix effects confirmed are in the MS/MSD; however, since the parent sample was diluted 100x, these matrix effects should be mitigated and in the judgment of the HGL reviewer, no qualification is required.

The laboratory included a standard reference matrix sample in each preparation batch. All SRM %Rs were in control.

Qualification: None required.

Field Duplicate – A field duplicate was not submitted with the samples in this SDG.

Qualification: None required.

Laboratory Duplicate – A laboratory duplicate was not performed in this SDG.

Qualification: None required.

Compound Quantitation – Analyte results were reported with the associated DL, LOD, and LOQ in the DoD format instead of with the associated MDL and RL. Non-detected results were reported on the hardcopy as <#, where # corresponds to the LOD. The HGL reviewer confirmed that the value associated with non-detected results in the EDD is the MDL, in accordance with the project reporting requirements. Analytes detected between the MDL and LOQ were reported as J-qualified results by the laboratory. These J qualifiers were retained unless superseded by a more severe qualifier.

Qualification: None required.

Qualification Summary Table (concentrations in µg/kg):

Sample	Analyte	Lab Value	Lab Qualifier	Validated Value	Validated Qualifier	Reason Code
SIB-SC-E24-8-9-07/12/2022	Aroclor 1248	101	H, P1	101	J	SSL
	Aroclor 1254	172		172		
	Aroclor 1260	87.9	H	87.9		
SIB-SC-E24-7-8-07/12/2022 (original)	Aroclor 1248	72.0	H, P1	72.0	J	SSL
	Aroclor 1254	152		152		
	Aroclor 1260	82.4		82.4		
SIB-SC-E24-7-8-07/12/2022 (5x dilution)	All results	varies	varies	varies	DNR	EXC

High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry
PCCDs/PCDFs (EPA Method 1613B)
Stage 2A Review
Data Quality Control (QC)

Site: PHSS-Swan Island Basin	SDG #: 22893
Laboratory: CFA	Project #: DT2002.03.03.01.01
HydroGeoLogic, Inc. Validator: Zach Barton	Validation Date: 09-20-2024
HGL Peer Reviewer: Ken Rapuano	Peer Review Date: 9.30.24

Client Sample ID	Laboratory Sample ID	Matrix
SIB-SC-B31-6-7-07/10/2022	22893001	Sediment
SIB-SC-B31-7-8-07/10/2022	22893002	Sediment
SIB-SC-B31-8-9-07/10/2022	22893003	Sediment
SIB-SC-B31-9-10-07/10/2022	22893004	Sediment
SIB-SC-B31-10-11-07/10/2022	22893005	Sediment
SIB-SC-B31-11-12-07/10/2022	22893006	Sediment
SIB-SC-B31-12-13-07/10/2022	22893007	Sediment
SIB-SC-B31-13-13.7-07/10/2022	22893008	Sediment
SIB-SC-E24-7-8-07/12/2022	22893009	Sediment
SIB-SC-E24-8-9-07/12/2022	22893010	Sediment
SIB-SC-E24-9-10-07/12/2022	22893011	Sediment
SIB-SC-B32-6-7-07/25/2022	22893012	Sediment
SIB-SC-B32-7-8-07/25/2022	22893013	Sediment
SIB-SC-B32-8-9-07/25/2022	22893014	Sediment
SIB-SC-B34-0-1-08/22/2022	22893015	Sediment
SIB-SC-B34-6-7-08/22/2022	22893016	Sediment
SIB-SC-B34-7-8-08/22/2022	22893017	Sediment
SIB-SC-B34-8-9-08/22/2022	22893018	Sediment
SIB-SC-B34-9-9.7-08/22/2022	22893019	Sediment
SIB-SC-B35-0-1-07/07/2022	22893020	Sediment
SIB-SC-B35-6-7-07/07/2022	22893021	Sediment
SIB-SC-B35-7-8-07/07/2022	22893022	Sediment
SIB-SC-B35-8-9-07/07/2022	22893023	Sediment
SIB-SC-B35-9-10-07/07/2022	22893024	Sediment
SIB-SC-B35-10-11-07/07/2022	22893025	Sediment
SIB-SC-B35-11-12-07/07/2022	22893026	Sediment
SIB-SC-B35-12-13-07/07/2022	22893027	Sediment
SIB-SC-B35-13-14-07/07/2022	22893028	Sediment
SIB-SC-B35-14-14.7-07/07/2022	22893029	Sediment

The following Stage 2A review was performed on the requested analyses. No results were rejected, and analytical completeness is 100%.

Narrative and Completeness Review – The case narrative and data package were checked for completeness. No completeness issues were noted.

Qualification: None required.

Sample Delivery and Condition – All samples arrived at the laboratory with temperatures within 0-6°C or were frozen. Some sample containers were cracked and the samples were transferred to new containers. Some samples were noted to be missing the dates and times, in which case the laboratory logged these samples in accordance with the information on the custody form.

Qualification: None required.

Holding Times – All samples were frozen. The samples collected in July 2022 were prepared more than 1 year outside of 1 year holding time for frozen samples. Due to the stable nature of PCDD/PCDFs, it is the judgment that all results from July 2022 samples can be accepted with the qualification of J-HTPX (detections) or UJ-HTPX (non-detections). The samples collected in August 2022 were prepared within 2 years of collection and all results from August 2022 should be qualified J-HTP (detections) or UJ-HTP (non-detections).

Qualification: **All results for July 2022 samples are qualified of J-HTPX (detections) or UJ-HTPX (non-detections)**. **All results for August 2022 samples are qualified of J-HTP (detections) or UJ-HTP (non-detections)**.

Method Blanks – The method blank for preparation batch 56594 was contaminated with several analytes, including:

- 0.162 pg/g of 1,2,3,7,8-PeCDD, leading to a qualification limit of 0.81 pg/g
- 1.15 pg/g of 1,2,3,4,6,7,8,9-OCDD, leading to a qualification limit of 5.75 pg/g
- 0.138 pg/g of 1,2,3,4,7,8-HxCDF, leading to a qualification limit of 0.69 pg/g
- 0.104 pg/g of 2,3,4,6,7,8-HxCDF, leading to a qualification limit of 0.52 pg/g
- 0.404 pg/g of 1,2,3,4,6,7,8-HpCDF, leading to a qualification limit of 2.02 pg/g

The following detected results were below the associated qualification limit and should be qualified U:

- The 1,2,3,7,8-PeCDD results for samples SIB-SC-B31-7-8-07/10/2022 and SIB-SC-B32-8-9-07/25/2022
- The 1,2,3,4,6,7,8,9-OCDD results for samples SIB-SC-B31-7-8-07/10/2022, SIB-SC-B31-10-11-07/10/2022, and SIB-SC-B34-0-1-08/22/2022
- The 1,2,3,4,7,8-HxCDF results for samples SIB-SC-B31-7-8-07/10/2022, SIB-SC-B31-8-9-07/10/2022, SIB-SC-B31-9-10-07/10/2022, SIB-SC-B31-11-12-07/10/2022, SIB-SC-B31-13-13.7-07/10/2022, SIB-SC-B32-8-9-07/25/2022, and SIB-SC-B35-0-1-07/07/2022
- The 2,3,4,6,7,8-HxCDF results for sample SIB-SC-B31-7-8-07/10/2022
- The 1,2,3,4,6,7,8-HpCDF result for samples SIB-SC-B31-6-7-07/10/2022, SIB-SC-B31-7-8-07/10/2022, SIB-SC-B31-8-9-07/10/2022, SIB-SC-B31-9-10-07/10/2022, SIB-SC-B31-10-11-07/10/2022, SIB-SC-B31-11-12-07/10/2022, SIB-SC-B31-12-13-07/10/2022, SIB-SC-B31-13-13.7-07/10/2022, SIB-SC-B32-7-8-07/25/2022, SIB-SC-B34-0-1-08/22/2022, SIB-SC-B34-8-9-08/22/2022, SIB-SC-B34-9-9.7-08/22/2022, and SIB-SC-B35-0-1-07/07/2022

The method blank for batch 56680 was contaminated with several analytes, including:

- 0.496 pg/g of 1,2,3,4,6,7,8,9-OCDD, leading to a qualification limit of 2.48 pg/g
- 0.138 pg/g of 1,2,3,7,8-PeCDF, leading to a qualification limit of 0.69 pg/g
- 0.134 pg/g of 2,3,4,7,8-PeCDF, leading to a qualification limit of 0.67 pg/g
- 0.174 pg/g of 1,2,3,6,7,8-HxCDF, leading to a qualification limit of 0.87 pg/g
- 0.288 pg/g of 1,2,3,4,6,7,8-HpCDF, leading to a qualification limit of 1.44 pg/g

The 1,2,3,4,6,7,8-HpCDF results for samples SIB-SC-B35-6-7-07/07/2022, SIB-SC-B35-7-8-07/07/2022, SIB-SC-B35-8-9-07/07/2022, SIB-SC-B35-9-10-07/07/2022, SIB-SC-B35-10-11-07/07/2022, SIB-SC-B35-11-12-07/07/2022, SIB-SC-B35-12-13-07/07/2022, and SIB-SC-B35-14-14.7-07/07/2022 should be qualified U.

Qualification: **The following results were qualified U-MBL; the detect_flag for the affected results is changed from Y to N.**

- **The 1,2,3,7,8-PeCDD results for samples SIB-SC-B31-7-8-07/10/2022 and SIB-SC-B32-8-9-07/25/2022**
- **The 1,2,3,4,6,7,8,9-OCDD results for samples SIB-SC-B31-7-8-07/10/2022, SIB-SC-B31-10-11-07/10/2022, and SIB-SC-B34-0-1-08/22/2022**
- **1,2,3,4,7,8-HxCDF results for samples SIB-SC-B31-7-8-07/10/2022, SIB-SC-B31-8-9-07/10/2022, SIB-SC-B31-9-10-07/10/2022, SIB-SC-B31-11-12-07/10/2022, SIB-SC-B31-13-13.7-07/10/2022, SIB-SC-B32-8-9-07/25/2022, and SIB-SC-B35-0-1-07/07/2022**
- **The 2,3,4,6,7,8-HxCDF result for sample SIB-SC-B31-7-8-07/10/2022**
- **The 1,2,3,4,6,7,8-HpCDF results for samples SIB-SC-B31-6-7-07/10/2022, SIB-SC-B31-7-8-07/10/2022, SIB-SC-B31-8-9-07/10/2022, SIB-SC-B31-9-10-07/10/2022, SIB-SC-B31-10-11-07/10/2022, SIB-SC-B31-11-12-07/10/2022, SIB-SC-B31-12-13-07/10/2022, SIB-SC-B31-13-13.7-07/10/2022, SIB-SC-B32-7-8-07/25/2022, SIB-SC-B34-0-1-08/22/2022, SIB-SC-B34-8-9-08/22/2022, SIB-SC-B34-9-9.7-08/22/2022, and SIB-SC-B35-0-1-07/07/2022**
- **The 1,2,3,4,6,7,8-HpCDF results for samples SIB-SC-B35-6-7-07/07/2022, SIB-SC-B35-7-8-07/07/2022, SIB-SC-B35-8-9-07/07/2022, SIB-SC-B35-9-10-07/07/2022, SIB-SC-B35-10-11-07/07/2022, SIB-SC-B35-11-12-07/07/2022, SIB-SC-B35-11-12-07/07/2022, SIB-SC-B35-14-14.7-07/07/2022 should be qualified U.**

Rinsate Blanks – Equipment rinse blank EB01-07/12/2022 (results reported in SDG 20046) is associated with all sample collected on July 7, 10, and 12, 2022 and equipment blank EB05-07/26/2022 (results reported in SDG 20123) is associated with all samples collected on July 25, 2022. Both equipment blanks were free from contamination.

Equipment rinse blank EB09-08242022 (results reported in SDG 20283) is associated with all samples in this SDG that were collected on 8/22/22. This rinse blank was contaminated with 14 PCDD/PCDFs. The OCDD and 1,2,3,4,6,7,8-HpCDF results are attributable to aqueous preparation batch contamination and are not considered to be the result of cross-contamination in the field; however, this equipment blank was contaminated with 12 other PCDD/PCDF analytes. Due to the differences in preparation factors between aqueous and solid samples, the HGL reviewer determined that a concentration reported as X pg/L in the rinse blank corresponds approximately to a relative soil concentration of X/10 pg/g. The contamination in the equipment blank and the corresponding soil action levels are presented in the following table.

Analyte	Aqueous Concentration (pg/L)	Equivalent Soil Concentration (pg/g)	Soil Qualification Level (pg/g)
1,2,3,7,8-PeCDD	2.36	0.236	1.18
1,2,3,4,7,8-HxCDD	1.58	0.158	0.790
1,2,3,6,7,8-HxCDD	1.58	0.158	0.790
1,2,3,7,8,9-HxCDD	1.84	0.184	0.920
1,2,3,4,6,7,8-HpCDD	1.39	0.139	0.695
1,2,3,7,8-PeCDF	2.78	0.278	1.39
2,3,4,7,8-PeCDF	2.34	0.234	1.17
1,2,3,4,7,8-HxCDF	2.32	0.232	1.16
1,2,3,6,7,8-HxCDF	1.97	0.197	0.985
2,3,4,6,7,8-HxCDF	1.15	0.115	0.575
1,2,3,7,8,9-HxCDF	1.37	0.137	0.685
1,2,3,4,7,8,9-HpCDF	1.37	0.137	0.685

The 1,2,3,7,8,9-HxCDD result for sample SIB-SC-B34-7-8-08/22/2022 and the 1,2,3,6,7,8-HxCDD and 1,2,3,7,8,9-HxCDD results for sample SIB-SC-B34-8-9-08/22/2022 should be qualified U. All other results associated with this equipment rinse blank were non-detections or detected results greater than the qualification level.

Qualification: **The 1,2,3,7,8,9-HxCDD result for sample SIB-SC-B34-7-8-08/22/2022 and the 1,2,3,6,7,8-HxCDD and 1,2,3,7,8,9-HxCDD results for sample SIB-SC-B34-8-9-08/22/2022 are qualified U-EBL.**

Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) – LCS/LCSD %Rs were within QAPP control limits. All RPDs were within QAPP control limits.

Qualification: None required.

Surrogates – All surrogates were within control limits.

Qualification: None required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – An MS/MSD was performed using sample SIB-SC-B31-6-7-07/10/2022. All %Rs and RPDs were within control limits.

Qualification: None required.

Field Duplicate – No field duplicates were submitted with this SDG.

Qualification: None required.

Compound Quantitation – Analyte non-detections were reported as the EDL and qualified U. Analytes detected between the EDL and PQL were reported as J-qualified results by the laboratory. These J qualifiers were retained unless superseded by a more severe qualifier.

If a detected analyte has an ion ratio outside the characteristic ion ratio window, the result is reported as an estimated maximum potential concentration. All results reported as an EMPC (a "K" flag is present in the laboratory qualifier) are qualified J-EMPC unless superseded by a higher priority qualifier.

2,3,7,8-TCDF is not fully resolved on the DB-5MS column; when detected above the PQL on the DB-5MS column, the result was confirmed on a DB-225 column using the instrument ID listed in the case narrative. In cases where two results are reported for 2,3,7,8-TCDF for a sample, the result from the DB-225 column is selected for use and the result from the DB-5MS is qualified DNR-EXC.

Qualification: **The following results are qualified:**

- **All results reported with a laboratory qualifier of only K are qualified J with reason code EMPC. All results reported with a laboratory qualifier of BJK or JK are qualified as simply J to remove non-standard informational qualifiers and to be replaced with a valid final qualifier.**
- **All 2,3,7,8-TCDF results reported from the DB-5MS column that are paired with a 2,3,7,8-TCDF result from the DB-225 column are qualified DNR, reason code EXC; note that the reportable_result field for these results are populated with "Yes" by the laboratory and are changed to "No" for the affected results.**

Qualification Summary Table (results in pg/g):

In addition to the qualifiers assigned below, all detected results <PQL retain the J qualifier assigned by the laboratory. All non-standard qualifiers assigned by the laboratory are removed and are not included as the final qualifier.

Sample	Analyte	Lab Value	Lab Qualifier	Validated Value	Validated Qualifier	Reason Code
SIB-SC-B31-6-7-07/10/2022	1,2,3,7,8-PeCDF	0.134	JK	0.134	J	HTPX, EMPC
	2,3,7,8-TCDF	0.186	JK	0.186	J	HTPX, EMPC
	OCDF	0.482	JK	0.482	J	HTPX, EMPC
SIB-SC-B31-7-8-07/10/2022	1,2,3,4,6,7,8-HpCDF	0.287	BJ	0.287	U	HTPX, MBL
	1,2,3,4,6,7,8-HpCDD	0.631	JK	0.631	J	HTPX, EMPC
	1,2,3,4,7,8-HxCDF	0.145	BJK	0.145	UJ	HTPX, EMPC, MBL
	1,2,3,7,8-PECDD	0.243	BJK	0.243	UJ	HTPX, EMPC, MBL
	2,3,4,6,7,8-HxCDF	0.147	BJK	0.147	UJ	HTPX, EMPC, MBL
	OCDF	0.783	JK	0.783	J	HTPX, EMPC
	OCDD	5.67	BJ	5.67	U	HTPX, MBL
SIB-SC-B31-8-9-07/10/2022	1,2,3,4,6,7,8-HpCDD	1.25	JK	1.25	J	HTPX, EMPC
	1,2,3,4,7,8-HxCDF	0.104	BJ	0.104	U	HTPX, MBL
	2,3,7,8-TCDF	0.287	JK	0.287	J	HTPX, EMPC
SIB-SC-B31-9-10-07/10/2022	1,2,3,4,6,7,8-HpCDF	0.415	BJK	0.415	UJ	HTPX, EMPC, MBL
	1,2,3,4,7,8-HxCDF	0.108	BJ	0.108	U	HTPX, MBL
	2,3,7,8-TCDF	0.228	JK	0.228	J	HTPX, EMPC
SIB-SC-B31-10-11-07/10/2022	1,2,3,4,6,7,8-HpCDF	0.116	BJK	0.116	UJ	HTPX, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	0.271	JK	0.271	J	HTPX, EMPC
	OCDD	2.65	BJ	2.65	U	HTPX, MBL
SIB-SC-B31-11-12-07/10/2022	1,2,3,4,6,7,8-HpCDF	0.245	BJ	0.245	U	HTPX, MBL
	1,2,3,4,7,8-HxCDF	0.0816	BJK	0.0816	UJ	HTPX, EMPC, MBL

Sample	Analyte	Lab Value	Lab Qualifier	Validated Value	Validated Qualifier	Reason Code
SIB-SC-B31-12-13-07/10/2022	1,2,3,4,6,7,8-HpCDF	0.336	BJK	0.336	UJ	HTPX, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	0.96	JK	0.96	J	HTPX, EMPC
SIB-SC-B31-13-13.7-07/10/2022	1,2,3,4,6,7,8-HpCDF	0.293	BJ	0.293	U	MBL
	1,2,3,4,6,7,8-HpCDD	1.32	JK	1.32	J	HTPX, EMPC
	1,2,3,4,7,8-HxCDF	0.149	BJ	0.149	U	HTPX, MBL
SIB-SC-E24-7-8-07/12/2022	1,2,3,4,7,8-HxCDD	1.07	JK	1.07	J	HTPX, EMPC
	1,2,3,6,7,8-HxCDF	2.19	JK	2.19	J	HTPX, EMPC
	1,2,3,7,8,9-HxCDD	2.18	JK	2.18	J	HTPX, EMPC
	1,2,3,7,8-PECDD	0.903	BJK	0.903	J	HTPX, EMPC
	2,3,4,6,7,8-HxCDF	2.27	JK	2.27	J	HTPX, EMPC
	2,3,4,7,8-PeCDF	2.58	JK	2.58	J	HTPX, EMPC
	2,3,7,8-TCDF (initial analysis)	1.74	K	1.74	DNR	EXC
SIB-SC-E24-8-9-07/12/2022	1,2,3,4,7,8-HxCDD	3.14	JK	3.14	J	HTPX, EMPC
	1,2,3,7,8,9-HxCDD	7.84	K	7.84	J	HTPX, EMPC
	1,2,3,7,8-PECDD	2.7	K	2.7	J	HTPX, EMPC
	2,3,7,8-TCDF (initial analysis)	4.05	--	4.05	DNR	EXC
SIB-SC-E24-9-10-07/12/2022	1,2,3,7,8,9-HxCDD	3.55	JK	3.55	J	HTPX, EMPC
	1,2,3,7,8-PECDD	1.23	BJK	1.23	J	HTPX, EMPC
	2,3,7,8-TCDF (initial analysis)	1.25	K	1.25	DNR	EXC
SIB-SC-B32-6-7-07/25/2022	1,2,3,4,6,7,8-HpCDF	0.227	BJK	0.227	UJ	HTPX, EMPC, MBL
SIB-SC-B32-7-8-07/25/2022	1,2,3,4,6,7,8-HpCDF	0.225	BJK	0.225	UJ	HTPX, EMPC, MBL
	2,3,7,8-TCDF	0.171	JK	0.171	J	HTPX, EMPC
SIB-SC-B32-8-9-07/25/2022	1,2,3,4,6,7,8-HpCDF	0.276	BJ	0.276	U	HTPX, MBL
	1,2,3,4,7,8-HxCDF	0.096	BJ	0.096	U	HTPX, MBL
	1,2,3,7,8,9-HxCDD	0.492	JK	0.492	J	HTPX, EMPC
	1,2,3,7,8-PECDD	0.226	BJ	0.226	U	HTPX, MBL

Sample	Analyte	Lab Value	Lab Qualifier	Validated Value	Validated Qualifier	Reason Code
	2,3,4,7,8-PeCDF	0.086	JK	0.086	J	HTPX, EMPC
SIB-SC-B34-0-1-08/22/2022	1,2,3,4,6,7,8-HpCDF	0.176	BJK	0.176	UJ	HTP, EMPC, MBL
	OCDD	5.62	BJ	5.62	U	HTP, MBL
SIB-SC-B34-6-7-08/22/2022	1,2,3,4,6,7,8-HpCDF	0.301	BJK	0.301	UJ	HTP, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	2.05	JK	2.05	J	HTP, EMPC
SIB-SC-B34-7-8-08/22/2022	1,2,3,4,6,7,8-HpCDF	0.17	BJK	0.17	UJ	HTP, EMPC, MBL
	1,2,3,7,8,9-HxCDD	0.26	J	0.26	UJ	HTP, EBL
SIB-SC-B34-8-9-08/22/2022	1,2,3,4,6,7,8-HpCDF	0.259	BJK	0.259	UJ	HTP, EMPC, MBL
	1,2,3,6,7,8-HxCDD	0.212	JK	0.212	UJ	HTPX, EMPC, EBL
	1,2,3,7,8,9-HxCDD	0.202	JK	0.202	UJ	HTPX, EMPC, EBL
SIB-SC-B35-0-1-07/07/2022	1,2,3,4,7,8-HxCDF	0.0995	BJK	0.0995	UJ	HTPX, EMPC, MBL
SIB-SC-B35-6-7-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.308	BJK	0.308	UJ	HTPX, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	1.77	JK	1.77	J	HTPX, EMPC
SIB-SC-B35-7-8-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.315	BJ	0.315	U	HTPX, MBL
	1,2,3,4,6,7,8-HpCDD	2.38	JK	2.38	J	HTPX, EMPC
SIB-SC-B35-8-9-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.292	BJ	0.292	U	HTPX, MBL
SIB-SC-B35-9-10-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.217	BJK	0.217	UJ	HTPX, EMPC, MBL
SIB-SC-B35-10-11-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.165	BJK	0.165	UJ	HTPX, EMPC, MBL
SIB-SC-B35-11-12-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.247	BJK	0.247	UJ	HTPX, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	0.766	JK	0.766	J	HTPX, EMPC
SIB-SC-B35-12-13-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.179	BJK	0.179	UJ	HTPX, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	0.648	JK	0.648	J	HTPX, EMPC
SIB-SC-B35-13-14-07/07/2022	OCDD	3.16	BJK	3.16	J	HTPX, EMPC
SIB-SC-B35-14-14.7-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.205	BJK	0.205	UJ	HTPX, EMPC, MBL

Sample	Analyte	Lab Value	Lab Qualifier	Validated Value	Validated Qualifier	Reason Code
	1,2,3,4,6,7,8-HpCDD	1.15	JK	1.15	J	HTPX, EMPC
All other results (July 2022 samples)	Detections	varies	varies	varies	J	HTPX
	Non-detections	varies	varies	varies	UJ	HTPX
All other results (August 2022 samples)	Detections	varies	varies	varies	J	HTP
	Non-detections	varies	varies	varies	UJ	HTP

High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry
PCCDs/PCDFs (EPA Method 1613B)
Stage 2A Review
Data Quality Control (QC)

Site: PHSS-Swan Island Basin	SDG #: 22921
Laboratory: CFA	Project #: DT2002.03.03.01.01
HydroGeoLogic, Inc. Validator: Fern Carter	Validation Date: 09-27-2024
HGL Peer Reviewer: Ken Rapuano	Peer Review Date: 9.30.24

Client Sample ID	Laboratory Sample ID	Matrix
SIB-SC-B33-6-7-08/21/2022	22921001	Sediment
SIB-SC-B33-7-8-08/21/2022	22921002	Sediment
SIB-SC-B33-8-9-08/21/2022	22921003	Sediment

The following Stage 2A review was performed on the requested analyses. No results were rejected, and analytical completeness is 100%.

Narrative and Completeness Review – The case narrative and data package were checked for completeness. No completeness issues were noted.

Qualification: None required.

Sample Delivery and Condition – All samples arrived intact at the laboratory with temperatures between 0-6°C or frozen, and were properly preserved. Samples were noted to be missing date & times on arrival to the laboratory and were logged in accordance with information on the custody form.

Qualification: None required.

Holding Times – All samples were frozen and analyzed outside of 1 year holding time for frozen samples, but exceeded holding time by less than 1 additional year. All results should be qualified J-HTP (detections) or UJ-HTP (non-detections).

Qualification: **All results are qualified of J-HTP (detections) or UJ-HTP (non-detections)**.

Method Blanks – The MB for batch 56680 was contaminated with several analytes:

- 0.496 pg/g OCDD, leading to a qualification limit of 2.48 pg/g
- 0.138 pg/g 1,2,3,7,8-PeCDF, leading to a qualification limit of 0.690 pg/g
- 0.134 pg/g 2,3,4,7,8-PeCDF, leading to a qualification limit of 0.670 pg/g
- 0.174 pg/g 1,2,3,6,7,8-HxCDF, leading to a qualification limit of 0.870 pg/g
- 0.288 pg/g 1,2,3,4,6,7,8-HpCDF, leading to a qualification limit of 1.44 pg/g

The following detected results were below the associated qualification limit and should be qualified U:

- The 1,2,3,7,8-PeCDF results for SIB-SC-B33-6-7-08/21/2022
- The 1,2,3,4,6,7,8-HpCDF results for all samples

Qualification: **The following results were qualified U-MBL; the detect flag for the affected results is changed from Y to N.**

- **The 1,2,3,7,8-PeCDF results for sample SIB-SC-B33-6-7-08/21/2022**
- **The 1,2,3,4,6,7,8-HpCDF results for samples SIB-S SC-B33-6-7-08/21/2022, SIB-SC-B33-7-8-08/21/2022, and SIB-SC-B33-8-9-08/21/2022**

Rinsate Blanks – Equipment rinse blank EB08-08/21/2022 (results reported in SDG 20283) is associated with all samples in this SDG (samples collected on 8/21/2022). The rinse blank was contaminated with 4.36 pg/L OCDD. The OCDD result is attributable to aqueous preparation batch contamination and is not considered to be the result of cross contamination in the field.

Qualification: None required.

Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) – LCS/LCSD %Rs were within QAPP control limits. All RPDs were within QAPP control limits.

Qualification: None required.

Surrogates – All surrogates were within control limits.

Qualification: None required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – MS/MSD analyses were not performed for this SDG.

Qualification: None required.

Field Blank – No field blanks were submitted with this SDG.

Qualification: None required.

Field Duplicate – No field duplicates were submitted with this SDG.

Qualification: None required.

Compound Quantitation – Analyte non-detections were reported as the EDL and qualified U. Analytes detected between the EDL and PQL were reported as J-qualified results by the laboratory. These J qualifiers were retained unless superseded by a more severe qualifier.

If a detected analyte has an ion ratio outside the characteristic ion ratio window, the result is reported as an estimated maximum potential concentration. All results reported as an EMPC (a "K" flag is present in the laboratory qualifier) are qualified J-EMPC unless superseded by a higher priority qualifier.

Qualification: **The following results are qualified:**

- **All results reported with a laboratory qualifier of only K are qualified J with reason code EMPC. All results reported with a laboratory qualifier of BJK or JK are qualified as J to remove non-standard informational qualifiers and to be replaced with a valid final qualifier.**

Qualification Summary Table (results in pg/g):

Sample	Analyte	Lab Value	Lab Qualifier	Validated Value	Validated Qualifier	Reason Code
All samples	1,2,3,4,6,7,8-HpCDF	varies	BJK	varies	UJ	HTP, MBL, EMPC
SIB-SC-B33-6-7-08/21/2022	1,2,3,7,8-PeCDF	0.132	BJ	0.132	U	HTP, MBL
	1,2,3,4,6,7,8-HpCDD	1.69	JK	1.69	J	HTP, EMPC
	2,3,7,8-TCDF	0.317	JK	0.317	J	HTP, EMPC
SIB-SC-B33-7-8-08/21/2022	1,2,3,4,6,7,8-HpCDD	0.417	JK	0.417	J	HTP, EMPC
	2,3,7,8-TCDF	0.207	JK	0.207	J	HTP, EMPC
All other results (August 2022 samples)	Detections	varies	varies	varies	J	HTP
	Non-detections	varies	varies	varies	UJ	HTP

APPENDIX B

NON-AQUEOUS PHASE LIQUID SCREENING TECHNICAL MEMORANDUM

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NON-AQUEOUS PHASE LIQUID SCREENING TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
REMEDIAL DESIGN SERVICES, SWAN ISLAND BASIN PROJECT AREA
CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

1.0 INTRODUCTION

This Non-aqueous Phase Liquid (NAPL) Screening Technical Memorandum presents the results of NAPL screening conducted on sediment core samples collected and archived in 2022 from 10 locations at the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site in Portland, Multnomah County, Oregon. The HydroGeoLogic, Inc. (HGL) team performed the work on behalf of the SIB Remedial Design (RD) Group. The samples were collected in accordance with the final Pre-Design Investigation (PDI) Work Plan, which the U.S. Environmental Protection Agency (EPA) approved in May 2022 (HGL, 2022) and testing and analysis was performed in general accordance with field change request (FCR) form variance number 16, approved by EPA in July 2024 (HGL, 2024a).

1.1 OBJECTIVES AND SCOPE

In the summer of 2022, the HGL Team conducted a site-specific sediment chemistry investigation consisting of surface grab samples, sediment cores, and bulk sediment and water samples. Sediment samples were collected during a single field mobilization with initial laboratory analysis and archiving of samples for subsequent laboratory analysis. Sediment cores were divided into 1 foot sample intervals and sediment from sample intervals was homogenized and placed into laboratory-provided jars. Samples were analyzed and archived.

Hydrocarbon field screening (visual screening for stains, NAPL, and/or sheens indicative of residual hydrocarbons) was performed for sediment cores during core processing. Sediment descriptions, including visual observations of sheen and NAPL presence/absence were recorded for stratigraphic intervals for each core. Visual observations of NAPL presence occurred at the following locations within the following depths or depth intervals (Table 1-1, Figure 1-1, Attachment A): C20 (2.6-3ft), C27 (2-5.1 ft), D18 (1.6ft), E24 (8-10ft), E33 (3.5ft), F21 (4.2-5ft), G07 (1.6-2.2 ft), I08 (4.6-51ft), J06 (8.7ft), K04 (0.1-3ft) (HGL, 2024b). Observations of NAPL presence were typically described as ‘blebs’ and no clear pattern of NAPL spatially or by depth was observed. These observations were visual descriptions of the sediment core itself. Photographs of the cores are included as Attachment A.

The objective of the screening is to further evaluate sediment samples corresponding to intervals with visual observations of NAPL presence and assign NAPL Categories (1 to 4) to samples in accordance with ASTM E3281-21. ASTM E3281-21 is a four-step process for screening and selection of locations for laboratory NAPL mobility testing. Step 1 is screening using visual observations and was performed in the field during core processing as described above. Step 2 is

screening using shake tests. Step 3 is assignment and ranking using NAPL categories, and Step 4 uses the results of the screening process to select depths and locations for laboratory mobility testing using undisturbed cores via methods outlined in ASTM E3282-22.

In addition to conducting shake tests, analysis of Record of Decision (ROD) Table 21 contaminants of concern (COCs) was performed on four archived sediment core samples on which shake tests were also conducted. The laboratory analysis provides supplemental data of the chemical composition and contamination levels in these samples, further supporting the interpretation of the NAPL mobility screening results.

1.2 PROJECT AREA BACKGROUND

The SIB Project Area is the active cleanup area designated in the ROD between approximately River Mile (RM) 8.1 and RM 9.2 on the northeast side of the Willamette River. The SIB Project Area is approximately 1.1 miles in length, 117 acres in size, and includes riverbanks from top of the bank to the river.

2.0 NON-AQUEOUS PHASE LIQUID SCREENING OF ARCHIVED SEDIMENT SAMPLES

2.1 STEP 1: SCREENING WITH VISUAL OBSERVATIONS

Hydrocarbon field screening (visual screening for stains, NAPL, and/or sheens indicative of residual hydrocarbons) was performed for sediment cores during core processing. Sediment descriptions, including visual observations of sheen and NAPL were recorded for stratigraphic intervals for each core. The visual observations correspond to the following locations and sediment core sampling intervals:

- C20 (2-3 ft)
- C27 (2-3, 3-4, 4-5, 5-5.5 ft)
- D18 (1-2 ft)
- E24 (7-8, 8-9, 9-10 ft)
- E33 (3-4 ft)
- F21 (4-5 ft)
- G07 (1-2 ft)
- I08 (4-5, 5-6 ft)
- J06 (8-9 ft)
- K04 (1-2, 2-3 ft)

2.2 STEP 2: SCREENING USING LABORATORY TESTING

The 17 archived sediment core samples with observed NAPL presence collected in 2022 from 10 locations in SIB (Figure 1-1) were sent to Integrated Geosciences Laboratories, LLC (IGL). Step 2 of ASTM E3281-21 is screening using shake tests. A deviation from FCR 16 occurred during the execution of Step 2 shake tests, when the laboratory inadvertently performed centrifuge analysis on the samples rather than the shake test. The laboratory later performed the requested shake tests on

15 of the 17 samples. Both sets of results are reported here for Step 2 (Tables 2-1 and 2-2). A deviation occurred when the laboratory had inadequate sample volume to perform shakes tests on samples K04 (1-2 ft) and K04 (2-3 ft) following the centrifuge testing. Accordingly, for these two samples, the results of the centrifuge analysis, rather than shake tests, are used for screening per ASTM E3281-21. As discussed below, the centrifuge tests are comparable to shake test results with regards to NAPL presence/absence determination.

2.2.1 Shake Test Method

IGL performed shake tests in accordance with ASTM Method E3281-21 on 15 of the archived sediment core samples. One-hundred gram aliquots of sediment[1] and water, at a 1:2 ratio, were placed in a clear container and gently shaken for 30 seconds[2]. Visual observations of sheen and NAPL were recorded.

NAPL presence was not observed for the 15 shake test samples. The results are presented in Table 2-1; the complete laboratory report is included as Attachment B-1. Sheen was observed in the following samples:

- C20 (2-3 ft)
- E24 (7-8, 8-9, 9-10 ft)
- F21 (4-5 ft)
- G07 (1-2 ft)
- I08 (4-5, 5-6 ft)
- J06 (8-9 ft)

Although blebs were not observed in the shake test results for these samples, the shake tests were performed on homogenized sample intervals rather than at specific depths as described in ASTM E3281-21. This caused the shake tests to be representative of a larger interval than is ideal and may explain the discrepancy between blebs observed in visual field observations versus the shake test results. The fact that NAPL was not observed in shake tests also likely indicates that field-observed blebs are isolated, few, and insignificant.

2.2.2 Centrifuge Method

IGL performed ASTM Method D425 centrifuge testing on all 17 of the archived sediment core samples. In the laboratory method, samples were inserted into centrifuge cups and centrifuged for 1 hour at a force equal to 1000 times that of gravity at a controlled temperature of 20 ± 1 degrees Celsius (°C). Fluids produced during centrifuging were collected and volumes measured in accordance with the laboratory standard operating procedure (IGL, 2019).

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[1] Due to limited sample volume 60 gram, 60 gram, and 30 gram aliquots were used for samples SIB-SC-D18-1-2-07/19/2022, SIB-SC-E33-3-4-07/25/2022, and SIB-SC-F21-4-5-07/13/2022, respectively.

[2] Note: the shake testing laboratory data package included in Attachment B-1 erroneously reported the shake time in minutes rather than seconds.

Residual fluid saturations were measured using Dean-Stark extraction and sample properties were characterized at completion of the centrifuge run. The results are presented in Table 2-2; the complete laboratory report is included as Attachment B-2. Results are summarized below:

- The archive sediment samples did not show visible presence of NAPL in the expressed fluid.
- For the archived sediment samples expressed water was described as clear with no hydrocarbon odor.
- Although the method returns quantitative measurements of NAPL saturation levels, these measurements are typically made on undisturbed cores collected per ASTM E3282-22, and the samples analyzed were homogenized from core sample intervals and therefore not undisturbed. The NAPL saturation levels, however, did not change following centrifuging.

2.3 STEP 3: ASSIGNMENT OF NAPL CATEGORIES

In Step 3, results from Steps 1 and 2 are used to assign one of four categories per ASTM 3281-21:

- Category 1 – sample locations with negative shake test results, indicating no sheen or NAPL is present
- Category 2 – sample locations with shake test sheen results, indicating the presence of sheen, but no visible NAPL
- Category 3 – sample locations with shake test bleb results, indicating the presence of some visible NAPL
- Category 4 – sample locations with shake test layer results, indicating the presence of relatively more NAPL

If any samples fell into Category 3 or 4, they would be ranked from the most NAPL to the least NAPL. Based on these rankings, undisturbed cores would be collected from the highest ranked intervals from multiple locations to maximize the geographic extent of laboratory testing per ASTM E3282-22 to determine if NAPL is mobile or immobile at the pore scale and, if needed, at the body scale.

Following the categorical approach described in ASTM E3281-21, the sediment samples are categorized as Category 1 or 2 because no NAPL layer or blebs was present following the shake testing and centrifuge testing (Table 2-1).

2.4 STEP 4: SELECTING LOCATIONS AND DEPTH INTERVALS FOR LABORATORY NAPL MOBILITY TESTING

Based on the screening process described in Step 2 and interpretation of results in Step 3, collection of undisturbed sediment cores for further NAPL mobility testing is not required because the samples were not ranked as Category 3 or 4 (NAPL present).

3.0 SEDIMENT CHEMISTRY TESTING

3.1 METHODS

As discussed in Section 2.1, visual observations from field logging correspond to the following locations and sediment core sampling intervals:

- C20 (2-3 ft)
- C27 (2-3, 3-4, 4-5, 5-5.5 ft)
- D18 (1-2 ft)
- E24 (7-8, 8-9, 9-10 ft)
- E33 (3-4 ft)
- F21 (4-5 ft)
- G07 (1-2 ft)
- I08 (4-5, 5-6 ft)
- J06 (8-9 ft)
- K04 (1-2, 2-3 ft)

Sediment samples from these intervals were analyzed as part of the PDI, with the exception of four archived samples: SIB-SC-E24-7-8-07/12/2022, SIB-SC-E24-8-9-07/12/2022, SIB-SC-E24-9-10-07/12/2022, and SIB-SC-J06-8-9-07/26/2022. These four archived sediment samples were analyzed per FCR 16 for ROD Table 21 COCs. The analysis focused on detecting and quantifying key COCs, including polychlorinated biphenyls (PCBs), dioxins/furans, and polycyclic aromatic hydrocarbons (PAHs).

The frozen sample volumes were retrieved from archive and analyzed in accordance with the PDI Work Plan (HGL, 2022). Analyses for organochlorine pesticides and PAHs were conducted by ALS Kelso, analysis of dioxins/furans was conducted by Cape Fear Analytical, LLC, and analysis for PCB Aroclors was conducted by Analytical Resources, LLC. One exception is noted for SIB-SC-J06-8-9-07/26/2022, where the available sample volume for dioxins/furans analysis was delivered to the analytical laboratory from the archived sample repository but was subsequently misplaced and the analysis could not be completed.

Details of the analytical chemistry work are described in the following Uniform Federal Policy – Quality Assurance Project Plan (UFP-QAPP) worksheets (Appendix B of PDI Work Plan; HGL, 2022):

- Analytes, analytical methods, and laboratories (Worksheet #15 and Worksheets #19 and #30);
- Sample containers, preservation, and hold times (Worksheets #19 and #30); and
- Detection and reporting limits (Worksheet #15).

Due to the age of the archived samples, the analysis was performed outside the standard hold time, with the samples having been stored frozen at -10°C. As described in FCR 16, results from the analysis were qualified with J (detections) or UJ (non-detections) qualifiers, indicating that while

detection may be uncertain, the data is still of sufficient quality to support the overall interpretation of the contamination at the site.

These analytical results will be used in conjunction with the NAPL screening data to support the interpretation of the results.

3.2 RESULTS

Table 3-1 presents a summary of exceedances for dioxins/furans, PCB Aroclors, and PAHs for the archived samples analyzed. Table 3-2 presents a comparison of concentrations of the same analytes for samples bounding the preceding and underlying intervals by location (SIB-SC-E24 and SIB-SC-J06). The laboratory analytical report is included as Attachment C and the data validation reports are included in Attachment D.

In sediment core E24, COC concentrations in the archived analysis intervals (7-8, 8-9, 9-10 ft) were similar to those in the preceding shallower interval that was analyzed (5-6 ft) and the underlying interval that was analyzed (11-12, 12-13 ft). Visual observations of sheen or NAPL were not noted in the preceding or underlying intervals (HGL, 2024b).

In sediment core J06, where data were available to compare (see Section 3.1 for discussion of dioxins/furans analysis), the total PCB Aroclor concentration was higher in the archived interval analyzed at 10,200 micrograms per kilogram (µg/kg) than the preceding interval (5-6 ft; 4,860 µg/kg) or the underlying interval (10-11 ft; 5,890 µg/kg). Total PAH and total carcinogenic PAH concentrations increased minimally from the preceding interval but were lower than the underlying interval. Visual observations of sheen or NAPL were not noted in the preceding or underlying intervals (HGL, 2024b).

4.0 REMEDIAL DESIGN IN AREAS WHERE NON-AQUEOUS PHASE LIQUID WAS OBSERVED DURING PRE-DESIGN INVESTIGATION

Of the 10 PDI core locations with visual observations of NAPL (only sheens observed), 6 core locations (C20, C27, K04, J06, G07, I08, J08, K04) will be dredged to below the deepest interval of observed NAPL (Figure 1-1). In these six core locations, dredge depths will also extend below the deepest principal threat waste (PTW) threshold exceedance.

The remaining four core locations with visual observations of NAPL may leave both NAPL-sheened and PTW threshold-exceeding sediments in place. Two of the core locations (E24 and E33) fall outside any proposed dredge area, with the observed impacts several feet below the sediment surface to be capped (Table 1-1; Figure 1-1). At the remaining two core locations, NAPL sheen was observed within intervals that intersect the edges of dredge prisms: the observation of sheen at D18 was between 1 and 2 ft below mudline, with the proposed dredge depth removing 1.6 ft of sediment, and the observation of sheen at F21 was between 4 and 5 ft below mudline, with a design dredge depth of 3.9 ft at that location (Figure 1-1). To address any potential for NAPL transfer to the water column from the post-dredge surface at these two locations, the Remedial Action (RA) Contractor will place 3 inches of organoclay-containing granules within a 50-ft radius centered on these two core locations after dredging.

For precautions regarding NAPL during dredging, the Water Quality Monitoring Plan (WQMP; Attachment C of Volume II, Appendix N) Section 3.2 and Table 1-2 provide triggers and actions to be taken during dredging if visible oil or sheen (NAPL) is encountered during RA. The WQMP further states that the RA Contractor will be responsible for updating the WQMP prior to implementing in-water construction activities to address any additional NAPL considerations. As described in Appendix E Cap Design Tech Memo, if any NAPL is observed at the water surface after dredging activities have been completed in an area, a contingency cap containing organoclay absorbent will be placed on the sediment surface in the area of the NAPL.

5.0 REFERENCES

ASTM International (ASTM), 2021. *ASTM E3281-21, Standard Guide for NAPL Mobility and Migration in Sediments – Screening Process to Categorize Samples for Laboratory NAPL Mobility Testing*. November 5.

ASTM, 2022. *ASTM E3282-22, Standard Guide for NAPL Mobility and Migration in Sediments – Evaluation Metrics.* July 14.

HydroGeoLogic, Inc. (HGL), 2022. *Pre-Design Investigation Work Plan, Revision 3,* CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Overland Park, Kansas. May.

HGL, 2024a. *Field Change Request No. 16 - Archive analysis and non-aqueous phase liquid (NAPL) mobility testing.* CERCLA Docket No. 10- 2021-001. July 23, 2024.

HGL, 2024b. *Pre-Design Investigation Evaluation Report, Revision 1*, Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. April.

Integrated Geosciences Laboratories, LLC (IGL), 2019. *Free Product (NAPL) Mobility – Centrifugal Method Standard Operating Procedure, Revision No. 1.1*. September 1.

U. S. Environmental Protection Agency (EPA), 2022. *Evaluation of consistently and reliably attained practical quantitation limits for 2,3,7,8-TCDD and 1,2,3,7,8-PeCDD for use in Sediment Management Area delineation at the Portland Harbor Superfund Site*. Memorandum from Portland Harbor Remedial Project Managers, Superfund and Emergency Management Division to Portland Harbor Site File. September 16.

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Attachment B-2 Centrifuge Testing Laboratory Data Package
Attachment C Archive Sediment Sample Analysis Laboratory Data Packages
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TABLES

Table 1-1
Summary of Hydrocarbon Screening Observations during PDI
Non-Aqueous Phase Liquid Mobility Testing Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Location Code	Easting (ft) (NAD83)[1]	Northing (ft) (NAD83)[1]	Depth Interval of Sheen Observation (ft)	Sheen Category[2]	NAPL[3]	Description From Core Log
SIB-SC-C20	7635071.94	700356.76	0-2.6	none	No	-
			2.6-3	**moderate**	Yes	"abundant NAPL blebs"
			3-8.5	none	No	-
SIB-SC-C27	7635846.16	699730.29	0-2	none	No	-
			2-5.1	**moderate**	Yes	"trace NAPL blebs"
SIB-SC-D18	7634722.92	700480.31	0-1.6	none	No	-
			1.6	**slight**	Yes	"isolated NAPL (1 cm bleb) with associated sheen"
			1.6-10.8	none	No	-
SIB-SC-E24	7635307.23	699787.11	0-7.8	none	No	-
			7.8-8	**heavy**	No	-
			8-10	**heavy**	Yes	"abundant blebs of free product heavy range fuel"
			10-13	none	No	-
SIB-SC-E33	7636367.43	698935.36	0-3.5	none	No	-
			3.50	**slight**	Yes	"isolated bleb of NAPL"
			3.5-19	none	No	-
SIB-SC-F21	7634901.2	699978.87	0-4.2	none	No	-
			4.2-5	**heavy**	Yes	"isolated NAPL"
SIB-SC-G07	7633166.34	701204.65	0-1.6	none	No	-
			1.6-2.2	**slight**	Yes	"isolated 3 mm NAPL blebs"
			2.2-7	none	No	-
SIB-SC-I08	7633116.78	700820.99	0-4.6	none	No	-
			4.6-5.1	**moderate**	Yes	"free products"
			5.1-7.6	none	No	-
			7.6-14.3	slight	No	-
SIB-SC-J06	7632769.18	700930.47	0-8.7	none	No	-
			8.7	**moderate**	Yes	"free product/NAPL with sand blast grit discontinuous lenses"
			8.7-11.5	none	No	-
SIB-SC-K04	7632436.59	701019.94	0-0.1	none	No	-
			0.1-3	**slight**	Yes	“few free product blebs "
			3-11.3	none	No	-

Notes:

[1] Horizontal Projection: NAD83 Oregon State Plane North (international ft)

[2] Sheet categories:

Heavy = Heavy sheen with color/iridescence

Moderate = Light to heavy sheen, may have some color/iridescence

Slight = Light, colorless, dull sheen

None = No visible sheen

[3] NAPL column:

Yes = core log is consistent with observations of a separate liquid phase in the sediment sample.

No = no observation of NAPL.

cm = centimeter

ft = feet

mm = millimeter

NAD83 = North American Datum of 1983

NAPL = non-aqueous phase liquid

PDI = Pre-Design Investigation

Table 2-1
NAPL Sediment-Water Shake Test Results Summary
Non-Aqueous Phase Liquid Mobility Testing Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Field Sample ID	Field Log Sheen Code[1]	ASTM E3281 - 21 NAPL SEDIMENT - WATER SHAKE TEST				
		Date of Test	NAPL Observed	Sheen Observed	Sheen Description	Category
SIB-SC-C20-2-3-08/24/2022	moderate	10/22/2024	No	Yes	Reflective silver color sheen	2
SIB-SC-C27-2-3-08/23/2022	moderate	10/22/2024	No	No	No Sheen	1
SIB-SC-C27-3-4-08/23/2022	moderate	10/22/2024	No	No	No Sheen	1
SIB-SC-C27-4-5-08/23/2022	moderate	10/22/2024	No	No	No Sheen	1
SIB-SC-C27-5-5.5-08/23/2022	moderate	10/22/2024	No	No	No Sheen	1
SIB-SC-D18-1-2-07/19/2022	moderate	10/22/2024	No	No	No Sheen	1
SIB-SC-E24-7-8-07/12/2022	heavy	10/22/2024	No	Yes	Reflective silver color sheen	2
SIB-SC-E24-8-9-7/12/2022	heavy	10/22/2024	No	Yes	Light brown sheen	2
SIB-SC-E24-9-10-07/12/2022	heavy	10/22/2024	No	Yes	Rainbow colored sheen with shiny surface	2
SIB-SC-E33-3-4-07/25/2022	slight	10/22/2024	No	No	No Sheen	1
SIB-SC-F21-4-5-07/13/2022	heavy	10/22/2024	No	Yes	Very light gray colored sheen	2
SIB-SC-G07-1-2-07/14/2022	slight	10/22/2024	No	Yes	Shiny rainbow-colored sheen	2
SIB-SC-I08-4-5-07/28/2022	slight	10/22/2024	No	Yes	Reflective silver color sheen	2
SIB-SC-I08-5-6-07/28/2022	slight	10/22/2024	No	Yes	Reflective silver color sheen	2
SIB-SC-J06-8-9-07/26/2022	moderate	10/22/2024	No	Yes	Rainbow colored sheen with shiny surface	2
SIB-SC-K04-1-2-07/27/2022	slight	--	--	--	--	1 or 2
SIB-SC-K04-2-3-07/27/2022	slight	--	--	--	--	1 or 2

Notes:

[1] Sheen Code recorded on field logs during 2022 Pre-Design Investigation (HGL, 2024a)

ID = Identification

NAPL = non-aqueous phase liquid

Sample volume was not available for samples from core K04 at 1-2 foot and 2-3 foot depths, and Category based on Centrifuge Testing results.

Table 2-2
NAPL Mobility Testing Results Summary
Non-Aqueous Phase Liquid Mobility Testing Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Field Sample ID	Sheen Code[1]	ASTM D425M, DEAN-STARK PORE FLUID SATURATIONS (3), % Pv				NAPL (Soi) Saturation - NAPL (Sor) Saturation	Notes
		Initial Fluid Saturations		After Centrifuge at 1000xG			
		WATER (Swi) SATURATION	NAPL (Soi) SATURATION	WATER (Srw) SATURATION	NAPL (Sor) SATURATION		
SIB-SC-C20-2-3-08/24/2022	moderate	80.9	1.46	48.48	1.46	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-C27-2-3-08/23/2022	moderate	84.0	1.13	44.98	1.13	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-C27-3-4-08/23/2022	moderate	82.1	1.96	47.42	1.96	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-C27-4-5-08/23/2022	moderate	86.6	0.31	47.49	0.31	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-C27-5-5.5-08/23/2022	moderate	78.9	1.37	35.15	1.37	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-D18-1-2-07/19/2022	moderate	82.5	1.78	42.09	1.78	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-E24-7-8-07/12/2022	heavy	88.2	1.76	41.29	1.76	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-E24-8-9-7/12/2022	heavy	83.9	1.10	41.19	1.10	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-E24-9-10-07/12/2022	heavy	82.4	1.82	44.90	1.82	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-E33-3-4-07/25/2022	slight	82.5	2.05	42.14	2.05	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-F21-4-5-07/13/2022	heavy	67.0	4.10	30.76	4.10	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-G07-1-2-07/14/2022	slight	81.8	1.65	41.54	1.65	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-I08-4-5-07/28/2022	slight	85.8	2.68	43.91	2.68	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-I08-5-6-07/28/2022	slight	82.1	5.25	43.65	5.25	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-J06-8-9-07/26/2022	moderate	82.1	1.99	44.27	1.99	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-K04-1-2-07/27/2022	slight	66.9	0.26	22.98	0.26	0.00	No Visible NAPL produced. Clear water with NO HC odor.
SIB-SC-K04-2-3-07/27/2022	slight	75.2	0.48	33.30	0.48	0.00	No Visible NAPL produced. Clear water with NO HC odor.

Notes:

[1] Sheen Code recorded during 2022 Pre-Design Investigation (HGL, 2024a)

% = percent

HC = hydrocarbon

ID = Identification

NAPL = non-aqueous phase liquid

Pv = Pore Volume

Soi = Initial NAPL Saturation as received prior to centrifuging at 1000G for 1 hour

Sor = Residual NAPL Saturation after centrifuging at 1000G for duration of 1hour

Srw = Residual Water Saturation after centrifuging at 1000G

Table 3-1
Archived Sediment Sample Analysis Results Summary
Non-Aqueous Phase Liquid Mobility Testing Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

							Location ID	**SIB-SC-E24**	**SIB-SC-E24**	**SIB-SC-E24**	**SIB-SC-J06**
							Sample ID	**SIB-SC-E24-7-8-07/12/2022**	**SIB-SC-E24-8-9-07/12/2022**	**SIB-SC-E24-9-10-07/12/2022**	**SIB-SC-J06-8-9-07/26/2022**
Method	**Chemical**	**CAS No.**	**Unit**	**CUL**	**RAL/ PQL**	**PTW**					
E1613B	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	67562-39-4	pg/g	NE	NE	NE		31.6 J	96.1 J	46.9 J	NA
E1613B	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	35822-46-9	pg/g	NE	NE	NE		133 J	404 J	172 J	NA
E1613B	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	55673-89-7	pg/g	NE	NE	NE		3.09 J	7.08 J	3.81 J	NA
E1613B	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	70648-26-9	pg/g	0.4	NE	400		**6.33 J**	**15.6 J**	**6.5 J**	NA
E1613B	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	39227-28-6	pg/g	NE	NE	NE		1.07 J	3.14 J	1.36 J	NA
E1613B	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	57117-44-9	pg/g	NE	NE	NE		2.19 J	5.35 J	3.18 J	NA
E1613B	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	57653-85-7	pg/g	NE	NE	NE		5.88 J	18.5 J	8.21 J	NA
E1613B	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	72918-21-9	pg/g	NE	NE	NE		1.37 J	3.03 J	1.34 J	NA
E1613B	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	19408-74-3	pg/g	NE	NE	NE		2.18 J	7.84 J	3.55 J	NA
E1613B	1,2,3,7,8-PENTACHLORODIBENZOFURAN	57117-41-6	pg/g	NE	NE	NE		0.789 J	1.89 J	0.978 J	NA
E1613B	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	40321-76-4	pg/g	0.2	2.5	10		**0.903 J**	**2.7 J**	**1.23 J**	NA
E1613B	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	60851-34-5	pg/g	NE	NE	NE		2.27 J	5.76 J	2.83 J	NA
E1613B	2,3,4,7,8-PENTACHLORODIBENZOFURAN	57117-31-4	pg/g	0.3	200	200		**2.58 J**	**6.02 J**	**2.48 J**	NA
E1613B	2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), WHO TEF 2005 (ND=0)	TEQ	pg/g	NE	NE	NE		6.12	18	8.03	NA
E1613B	2,3,7,8-TETRACHLORODIBENZOFURAN	51207-31-9	pg/g	0.4066	NE	600		**1.83 J**	**4.25 J**	**1.41 J**	NA
E1613B	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD)	1746-01-6	pg/g	0.2	1	10		0.301 UJ	**0.782 J**	**0.317 J**	NA
E1613B	Heptachlorodibenzo-P-Dioxin	37871-00-4	pg/g	NE	NE	NE		259	837	345	NA
E1613B	HEXACHLORODIBENZOFURAN	55684-94-1	pg/g	NE	NE	NE		58.2 J	156 J	72.8 J	NA
E1613B	HEXACHLORODIBENZO-P-DIOXIN	34465-46-8	pg/g	NE	NE	NE		37.5 J	131 J	57.9 J	NA
E1613B	OCTACHLORODIBENZOFURAN	39001-02-0	pg/g	NE	NE	NE		96.8 J	298 J	133 J	NA
E1613B	OCTACHLORODIBENZO-P-DIOXIN	3268-87-9	pg/g	NE	NE	NE		1360 J	3950 J	2010 J	NA
E1613B	PENTACHLORO DIBENZOFURAN	30402-15-4	pg/g	NE	NE	NE		17.8 J	48.3 J	23.4 J	NA
E1613B	PENTACHLORODIBENSO-P-DIOXIN	36088-22-9	pg/g	NE	NE	NE		4.9 J	19.7 J	8.58 J	NA
E1613B	TETRACHLORINATED DIBENZOFURANS, (TOTAL)	TCDF	pg/g	NE	NE	NE		11.7 J	36.7 J	14.6 J	NA
E1613B	TETRACHLORODIBENZO-P-DIOXIN	41903-57-5	pg/g	NE	NE	NE		1.52 J	6.46 J	3.07 J	NA
E1613B	Total Dioxin/Furan TEQ 1998 (Avian) (Calculated U = 1/2)	3333-30-1	pg/g	NE	NE	NE		6.28	18	8.03	NA
E1613B	TOTAL HpCDFs	38998-75-3	pg/g	NE	NE	NE		119 J	363 J	167 J	NA
CALC_TEQ	2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), (ND=0.5)	TCDD_TEQ(0.5)	pg/g	10	NE	NE		6.3 J	**18 J**	8 J	NA
E1699M	ALDRIN	309-00-2	µg/kg	2	NE	NE		0.15 UJ	0.16 UJ	0.16 UJ	0.13 UJ
E1699M	DIELDRIN	60-57-1	ug/kg	0.07	NE	NE		0.021 UJ	0.022 UJ	0.022 UJ	0.019 UJ
E1699M	GAMMA BHC (LINDANE)	58-89-9	ug/kg	5	NE	NE		0.058 UJ	0.061 UJ	0.061 UJ	0.052 UJ
E1699M	ALPHA-CHLORDANE	5103-71-9	ug/kg	NE	NE	NE		0.18 J	0.2 J	0.18 J	0.57 J
E1699M	BETA-CHLORDANE	5103-74-2	ug/kg	NE	NE	NE		0.48 J	0.85 J	0.65 J	2.1 J
E1699M	CIS-NONACHLOR	5103-73-1	ug/kg	NE	NE	NE		0.19 UJ	0.19 UJ	0.19 UJ	0.16 UJ
E1699M	TRANS-NONACHLOR	39765-80-5	ug/kg	NE	NE	NE		0.17 J	0.19 J	0.13 J	0.44 J
E1699M	Oxychlordane	26940-75-0	ug/kg	NE	NE	NE		0.25 R	0.26 UJ	0.26 UJ	0.22 UJ
CALC_SUM	Total Chlordane (Calculated U = 1/2)	CHLORDANET	ug/kg	1.4	NE	NE		0.93 JA	**1.5 J**	1.2 J	**3.3 J**
E1699M	2,4'-DDD	53-19-0	ug/kg	NE	NE	NE		0.12 UJ	0.13 UJ	0.13 UJ	25 J
E1699M	P,P'-DDD	72-54-8	ug/kg	NE	NE	NE		6.1 J	0.068 UJ	0.069 UJ	84 J
CALC_SUM	Total DDD (Calculated U = 1/2)	TDDD	ug/kg	114	NE	NE		6.2 J	0.13 UJ	0.13 UJ	109 J
E1699M	P,P'-DDE	72-55-9	ug/kg	NE	NE	NE		5 J	5.6 J	4.6 J	22 J
E1699M	O,P'-DDE	3424-82-6	ug/kg	NE	NE	NE		0.48 J	0.7 J	0.39 J	1.6 J
CALC_SUM	Total DDE (Calculated U = 1/2)	TDDE	ug/kg	50	NE	NE		5.5 J	6.3 J	5 J	23.6 J
E1699M	O,P'-DDT	789-02-6	ug/kg	NE	NE	NE		0.18 UJ	0.19 UJ	0.19 UJ	0.16 UJ
E1699M	P,P'-DDT	50-29-3	ug/kg	NE	NE	NE		0.088 UJ	0.091 UJ	0.092 UJ	0.078 UJ
CALC_SUM	Total DDT (Calculated U = 1/2)	TDDT	ug/kg	246	NE	NE		0.18 UJ	0.19 UJ	0.19 UJ	0.16 UJ
CALC_SUM	Total DDx (Calculated U = 1/2)	TDDTS	ug/kg	6.1	160	7050		**11.8 J**	**6.5 J**	5.2 J	**133 J**
SW8082A	Aroclor 1262	37324-23-5	ug/kg	NE	NE	NE		2 U	2 U	2 U	210 U
SW8082A	PCB-1016 (AROCLOR 1016)	12674-11-2	ug/kg	NE	NE	NE		2 U	2 U	2 U	210 U
SW8082A	PCB-1221 (AROCLOR 1221)	11104-28-2	ug/kg	NE	NE	NE		2 U	2 U	2 U	210 U
SW8082A	PCB-1232 (AROCLOR 1232)	11141-16-5	ug/kg	NE	NE	NE		2 U	2 U	2 U	210 U
SW8082A	PCB-1242 (AROCLOR 1242)	53469-21-9	ug/kg	NE	NE	NE		2 U	2 U	2 U	210 U
SW8082A	PCB-1248 (AROCLOR 1248)	12672-29-6	ug/kg	NE	NE	NE		72 J	101 J	54.7	3390
SW8082A	PCB-1254 (AROCLOR 1254)	11097-69-1	ug/kg	NE	NE	NE		152 J	172 J	123	4640
SW8082A	PCB-1260 (AROCLOR 1260)	11096-82-5	ug/kg	NE	NE	NE		82.4 J	87.9 J	62.5	1580
SW8082A	PCB-1268 (AROCLOR 1268)	11100-14-4	ug/kg	NE	NE	NE		2 U	2 U	2 U	210 U
CALC_SUM	Total PCB Aroclors (Calculated U = 1/2)	TAROCLOR	ug/kg	9	75	200		**312 J**	**367 J**	**246**	**10200**
SW8270D-SIM	2-METHYLNAPHTHALENE	91-57-6	ug/kg	NE	NE	NE		93 J	220 J	300 J	350 J
SW8270D-SIM	ACENAPHTHENE	83-32-9	ug/kg	NE	NE	NE		260 J	550 J	260 J	650 J
SW8270D-SIM	ACENAPHTHYLENE	208-96-8	ug/kg	NE	NE	NE		71 J	150 J	89 J	240 J
SW8270D-SIM	ANTHRACENE	120-12-7	ug/kg	NE	NE	NE		190 J	460 J	240 J	1300 J
SW8270D-SIM	BENZO(A)ANTHRACENE	56-55-3	ug/kg	NE	NE	NE		480 J	610 J	300 J	4700 J
SW8270D-SIM	BENZO(A)PYRENE	50-32-8	ug/kg	NE	NE	NE		440 J	530 J	350 J	4300 J
SW8270D-SIM	BENZO(B)FLUORANTHENE	205-99-2	ug/kg	NE	NE	NE		480 J	510 J	340 J	4900 J
SW8270D-SIM	BENZO(G,H,I)PERYLENE	191-24-2	ug/kg	NE	NE	NE		250 J	300 J	240 J	2100 J
SW8270D-SIM	BENZO(K)FLUORANTHENE	207-08-9	ug/kg	NE	NE	NE		180 J	150 J	110 J	1500 J
SW8270D-SIM	CHRYSENE	218-01-9	ug/kg	NE	NE	NE		730 J	1000 J	510 J	5600 J
SW8270D-SIM	DIBENZ(A,H)ANTHRACENE	53-70-3	ug/kg	NE	NE	NE		72 J	94 J	60 J	700 J
SW8270D-SIM	FLUORANTHENE	206-44-0	ug/kg	NE	NE	NE		1100 J	920 J	600 J	9400 J
SW8270D-SIM	FLUORENE	86-73-7	ug/kg	NE	NE	NE		310 J	930 J	440 J	1300 J
SW8270D-SIM	INDENO(1,2,3-C,D)PYRENE	193-39-5	ug/kg	NE	NE	NE		270 J	290 J	240 J	2500 J
SW8270D-SIM	NAPHTHALENE	91-20-3	ug/kg	NE	NE	140000		170 J	130 J	240 J	180 J
SW8270D-SIM	PHENANTHRENE	85-01-8	ug/kg	NE	NE	NE		1600 J	3200 J	1600 J	9000 J
SW8270D-SIM	PYRENE	129-00-0	ug/kg	NE	NE	NE		1200 J	1500 J	850 J	10000 J
CALC_TEQ	Total cPAH/BaPEq TEQ (EPA 1993) (Calculated U = 1/2)	TOT_CPAH_0.5-ND	ug/kg	774	NE	774000		638 J	768 J	500 J	**6230 J**
CALC_SUM	Total PAH (Calculated U = 1/2)	TPAH(U=0.5)	ug/kg	23000	30000	NE		7900 J	11500 J	6770 J	**58700 J**

Notes:
*Analyzed under FCR 16
Concentration exceeds CUL
Concentration exceeds CUL and RAL/PQL
Concentration exceeds CUL, RAL/PQL, PTW threshold
µg/kg - micrograms per kilogram
pg/g - picogram per gram

BaPEq - benzo(a)pyrene equivalent
CALC SUM - summed analyte group
CALC TEQ - results multiplied by TEF to calculate TEQ
CAS - Chemical Abstracts Service
cPAH - carcinogenic polycyclic aromatic hydrocarbon
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethylene
DDT - dichlorodiphenyltrichloroethane
DDx - DDD + DDE + DDT
CUL - cleanup level
HpCDF - Heptachlorodibenzofuran
J - estimated concentration
NA - not analyzed/applicable
NE - none established
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
PQL - practical quantitation limit
PTW - principal threat waste
RAL - remedial action level
SIM - selected ion monitoring
TEF - toxicity equivalency factor
TEQ - toxic equivalent
U - analyte not detected above laboratory reporting limit
WHO - World Health Organization

Table 3-2
Sediment Sample Analytical Data Comparison by Core Location
Non-Aqueous Phase Liquid Mobility Testing Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

							Location ID	SIB-SC-E24	SIB-SC-E24*	SIB-SC-E24*	SIB-SC-E24*	SIB-SC-E24	SIB-SC-E24	SIB-SC-J06	SIB-SC-J06*	SIB-SC-J06
							Sample ID	SIB-SC-E24-5-6-07/12/2022	SIB-SC-E24-7-8-07/12/2022	SIB-SC-E24-8-9-07/12/2022	SIB-SC-E24-9-10-07/12/2022	SIB-SC-E24-11-12-07/12/2022	SIB-SC-E24-12-13-07/12/2022	SIB-SC-J06-5-6-07/26/2022	SIB-SC-J06-8-9-07/26/2022	SIB-SC-J06-10-11-07/26/2022
Method	Chemical	CAS No.	Unit	CUL	RAL/PQL	PTW										
E1613B	1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	67562-39-4	pg/g	NE	NE	NE		19.1	105	96.1 J	46.9 J	75.5	148	534	NA	9750
E1613B	1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	35822-46-9	pg/g	NE	NE	NE		82.4	414	404 J	172 J	337	721	2870	NA	17600
E1613B	1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	55673-89-7	pg/g	NE	NE	NE		1.67 J	7.76	7.08 J	3.81 J	6.1	12	39.2	NA	445
E1613B	1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	70648-26-9	pg/g	0.4	NE	400		**3.15 J**	**14.7**	**15.6 J**	**6.5 J**	**15.3**	**16.9**	**44.1**	NA	**115**
E1613B	1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	39227-28-6	pg/g	NE	NE	NE		0.89 J	3.13 J	3.14 J	1.36 J	2.05 J	4.53 J	23.4 J	NA	85.1 J
E1613B	1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	57117-44-9	pg/g	NE	NE	NE		0.228 U	4.61 J	5.35 J	3.18 J	7.18	8.66	21.5 J	NA	53.8
E1613B	1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	57653-85-7	pg/g	NE	NE	NE		2.53 J	15	18.5 J	8.21 J	15.1	29.1	78.9	NA	530
E1613B	1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	72918-21-9	pg/g	NE	NE	NE		0.297 U	2.82 J	3.03 J	1.34 J	3.05 J	3.38 J	9.02 J	NA	18.7 J
E1613B	1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	19408-74-3	pg/g	NE	NE	NE		1.4 J	7.59	7.84 J	3.55 J	6.85	11.2	48.3	NA	82.8
E1613B	1,2,3,7,8-PENTACHLORODIBENZOFURAN	57117-41-6	pg/g	NE	NE	NE		0.186 U	1.48 J	1.89 J	0.978 J	5.97	3.03 J	10.9 J	NA	4.65 J
E1613B	1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	40321-76-4	pg/g	0.2	2.5	10		**0.513 J**	**1.95 J**	**2.7 J**	**1.23 J**	**2.05 J**	**2.96**	**12 J**	NA	**10.5 J**
E1613B	2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	60851-34-5	pg/g	NE	NE	NE		0.23 U	5.59	5.76 J	2.83 J	5.76	8.74	23.6 J	NA	130
E1613B	2,3,4,7,8-PENTACHLORODIBENZOFURAN	57117-31-4	pg/g	0.3	200	200		**0.94 J**	**4.61 J**	**6.02 J**	**2.48 J**	**7.17**	**7.19**	**19.8 J**	NA	**20.7 J**
E1613B	2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), WHO TEF 2005 (ND=0)	TEQ	pg/g	NE	NE	NE		3.2	16.2	18	8.03	16.6	25.8	96.7	NA	471
E1613B	2,3,7,8-TETRACHLORODIBENZOFURAN	51207-31-9	pg/g	0.4066	NE	600		**0.641 J**	**2.91**	**4.25 J**	**1.41 J**	**7.63**	**3.11 J**	**16.5 J**	NA	**5.6 J**
E1613B	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN	1746-01-6	pg/g	0.2	1	10		0.337 U	**0.684**	**0.782 J**	**0.317 J**	**0.663**	**1.04**	**4.93**	NA	**3.37 J**
E1613B	Heptachlorodibenzo-P-Dioxin	37871-00-4	pg/g	NE	NE	NE		172	828	837	345	658	1330	5700	NA	33200
E1613B	HEXACHLORODIBENZOFURAN	55684-94-1	pg/g	NE	NE	NE		30.3 J	163 J	156 J	72.8 J	133 J	222 J	686 J	NA	5600 J
E1613B	HEXACHLORODIBENZO-P-DIOXIN	34465-46-8	pg/g	NE	NE	NE		19.6 J	107 J	131 J	57.9 J	99.7 J	182 J	901 J	NA	2740 J
E1613B	OCTACHLORODIBENZOFURAN	39001-02-0	pg/g	NE	NE	NE		69.7	387	298 J	133 J	204	380	2650	NA	55300 J
E1613B	OCTACHLORODIBENZO-P-DIOXIN	3268-87-9	pg/g	NE	NE	NE		734	3830	3950 J	2010 J	3490	6940 J	39300 J	NA	180000 J
E1613B	PENTACHLORO DIBENZOFURAN	30402-15-4	pg/g	NE	NE	NE		8.96 J	57.9 J	48.3 J	23.4 J	62.9 J	91.9 J	304 J	NA	347 J
E1613B	PENTACHLORODIBENSO-P-DIOXIN	36088-22-9	pg/g	NE	NE	NE		2.52 J	14.8 J	19.7 J	8.58 J	15.8 J	25.4 J	178 J	NA	227 J
E1613B	TETRACHLORINATED DIBENZOFURANS, (TOTAL)	TCDF	pg/g	NE	NE	NE		2.6 J	24.1 J	36.7 J	14.6 J	35.5	39.1	227 J	NA	141 J
E1613B	TETRACHLORODIBENZO-P-DIOXIN	41903-57-5	pg/g	NE	NE	NE		1.18 J	6.75 J	6.46 J	3.07 J	5.37 J	9.09 J	50.1 J	NA	72.7 J
E1613B	Total Dioxin/Furan TEQ 1998 (Avian) (Calculated U = 1/2)	3333-30-1	pg/g	NE	NE	NE		3.37	16.2	18	8.03	16.6	25.8	96.7	NA	471
E1613B	TOTAL HpCDFs	38998-75-3	pg/g	NE	NE	NE		73.6 J	419 J	363 J	167 J	260	498 J	2280 J	NA	39500 J
CALC_TEQ	2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), (ND=0.5)	TCDD_TEQ(0.5)	pg/g	10	NE	NE		**16.2 J**	6.3 J	**18 J**	8 J	**16.6 J**	**25.8 J**	**96.7 J**	NA	**471 J**
SW8082A	Aroclor 1262	37324-23-5	µg/kg	NE	NE	NE		2.9 U	2 U	2 U	2 U	0.6 U	0.6 U	11.8 U	210 U	58.9 U
SW8082A	PCB-1016 (AROCLOR 1016)	12674-11-2	µg/kg	NE	NE	NE		7.8 U	2 U	2 U	2 U	1.5 U	1.6 U	31.2 U	210 U	156 U
SW8082A	PCB-1221 (AROCLOR 1221)	11104-28-2	µg/kg	NE	NE	NE		7.8 U	2 U	2 U	2 U	1.5 U	1.6 U	31.2 U	210 U	156 U
SW8082A	PCB-1232 (AROCLOR 1232)	11141-16-5	µg/kg	NE	NE	NE		7.8 U	2 U	2 U	2 U	1.5 U	1.6 U	31.2 U	210 U	156 U
SW8082A	PCB-1242 (AROCLOR 1242)	53469-21-9	µg/kg	NE	NE	NE		7.8 U	2 U	2 U	2 U	1.5 U	1.6 U	31.2 U	210 U	156 U
SW8082A	PCB-1248 (AROCLOR 1248)	12672-29-6	µg/kg	NE	NE	NE		7.8 U	72 J	101 J	54.7	90.3	72.1	1390	3390	1920
SW8082A	PCB-1254 (AROCLOR 1254)	11097-69-1	µg/kg	NE	NE	NE		58.9	152 J	172 J	123	150	121	2540	4640	2750
SW8082A	PCB-1260 (AROCLOR 1260)	11096-82-5	µg/kg	NE	NE	NE		51.1	82.4 J	87.9 J	62.5	104	104	853	1580	851
SW8082A	PCB-1268 (AROCLOR 1268)	11100-14-4	µg/kg	NE	NE	NE		2.9 U	2 U	2 U	2 U	0.6 U	0.6 U	11.8 U	210 U	58.9 U
CALC_SUM	Total PCB Aroclors (Calculated U = 1/2)	TAROCLOR	µg/kg	9	75	200		**132**	**312 J**	**367 J**	**246**	**348**	**301**	**4860**	**10200**	**5890**
SW8270D-SIM	2-METHYLNAPHTHALENE	91-57-6	µg/kg	NE	NE	NE		0.79 U	93 J	220 J	300 J	65	28	95	350 J	2300
SW8270D-SIM	ACENAPHTHENE	83-32-9	µg/kg	NE	NE	NE		7.7 J	260 J	550 J	260 J	87	23	610	650 J	880
SW8270D-SIM	ACENAPHTHYLENE	208-96-8	µg/kg	NE	NE	NE		7.3 J	71 J	150 J	89 J	23	15	160	240 J	350
SW8270D-SIM	ANTHRACENE	120-12-7	µg/kg	NE	NE	NE		15	190 J	460 J	240 J	67	38	960	1300 J	2500
SW8270D-SIM	BENZO(A)ANTHRACENE	56-55-3	µg/kg	NE	NE	NE		60	480 J	610 J	300 J	190	100	4700	4700 J	6100
SW8270D-SIM	BENZO(A)PYRENE	50-32-8	µg/kg	NE	NE	NE		90	440 J	530 J	350 J	210	150	4100	4300 J	4900
SW8270D-SIM	BENZO(B)FLUORANTHENE	205-99-2	µg/kg	NE	NE	NE		150	480 J	510 J	340 J	240	170	5300	4900 J	5800
SW8270D-SIM	BENZO(G,H,I)PERYLENE	191-24-2	µg/kg	NE	NE	NE		85	250 J	300 J	240 J	200	160	1900	2100 J	3200
SW8270D-SIM	BENZO(K)FLUORANTHENE	207-08-9	µg/kg	NE	NE	NE		54	180 J	150 J	110 J	88	64	1800	1500 J	2100
SW8270D-SIM	CHRYSENE	218-01-9	µg/kg	NE	NE	NE		110	730 J	1000 J	510 J	280	170	4800	5600 J	7600
SW8270D-SIM	DIBENZ(A,H)ANTHRACENE	53-70-3	µg/kg	NE	NE	NE		12	72 J	94 J	60 J	30	22	640	700 J	930
SW8270D-SIM	FLUORANTHENE	206-44-0	µg/kg	NE	NE	NE		160	1100 J	920 J	600 J	630	330	9900	9400 J	17000
SW8270D-SIM	FLUORENE	86-73-7	µg/kg	NE	NE	NE		1.3 U	310 J	930 J	440 J	68	22	1000	1300 J	1800
SW8270D-SIM	INDENO(1,2,3-C,D)PYRENE	193-39-5	µg/kg	NE	NE	NE		81	270 J	290 J	240 J	180	140	2600	2500 J	3300

Table 3-2
Sediment Sample Analytical Data Comparison by Core Location
Non-Aqueous Phase Liquid Mobility Testing Technical Memorandum;
Swan Island Basin Project Area, Portland, Oregon

							Location ID	SIB-SC-E24	SIB-SC-E24*	SIB-SC-E24*	SIB-SC-E24*	SIB-SC-E24	SIB-SC-E24	SIB-SC-J06	SIB-SC-J06*	SIB-SC-J06
							Sample ID	SIB-SC-E24-5-6-07/12/2022	SIB-SC-E24-7-8-07/12/2022	SIB-SC-E24-8-9-07/12/2022	SIB-SC-E24-9-10-07/12/2022	SIB-SC-E24-11-12-07/12/2022	SIB-SC-E24-12-13-07/12/2022	SIB-SC-J06-5-6-07/26/2022	SIB-SC-J06-8-9-07/26/2022	SIB-SC-J06-10-11-07/26/2022
SW8270D-SIM	NAPHTHALENE	91-20-3	µg/kg	NE	NE	140000		1.1 U	170 J	130 J	240 J	100	45	0.82 U	180 J	4 U
SW8270D-SIM	PHENANTHRENE	85-01-8	µg/kg	NE	NE	NE		68	1600 J	3200 J	1600 J	490	160	7200	9000 J	16000
SW8270D-SIM	PYRENE	129-00-0	µg/kg	NE	NE	NE		190	1200 J	1500 J	850 J	600	320	9600	10000 J	16000
CALC_SUM	Total PAH (Calculated U = 1/2)	TPAH(U=0.5)	µg/kg	23000	30000	NE		1090 J	7900 J	11500 J	6770 J	3550	1960	**6020**	**6230 J**	**7380**
CALC_TEQ	Total cPAH/BaPEq TEQ (EPA 1993) (Calculated U = 1/2)	TOT_CPAH_0.5-ND	µg/kg	774	NE	774000		132	638 J	768 J	500 J	302	214	**55400**	**58700 J**	**90800**

Notes:
*Analyzed under FCR 16
Concentration exceeds CUL
Concentration exceeds CUL and RAL/PQL
Concentration exceeds CUL, RAL/PQL, PTW threshold
µg/kg - micrograms per kilogram
pg/g - picogram per gram

BaPEq - benzo(a)pyrene equivalent
CALC SUM - summed analyte group
CALC TEQ - results multiplied by TEF to calculate TEQ
CAS - Chemical Abstracts Service
cPAH - carcinogenic polycyclic aromatic hydrocarbon
CUL - cleanup level
HpCDF - Heptachlorodibenzofuran
J - estimated concentration
NA - not analyzed/applicable
NE - none established
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
PQL - practical quantitation limit
PTW - principal threat waste
RAL - remedial action level
SIM - selected ion monitoring
TEF - toxicity equivalency factor
TEQ - toxic equivalent
U - analyte not detected above laboratory reporting limit
WHO - World Health Organization

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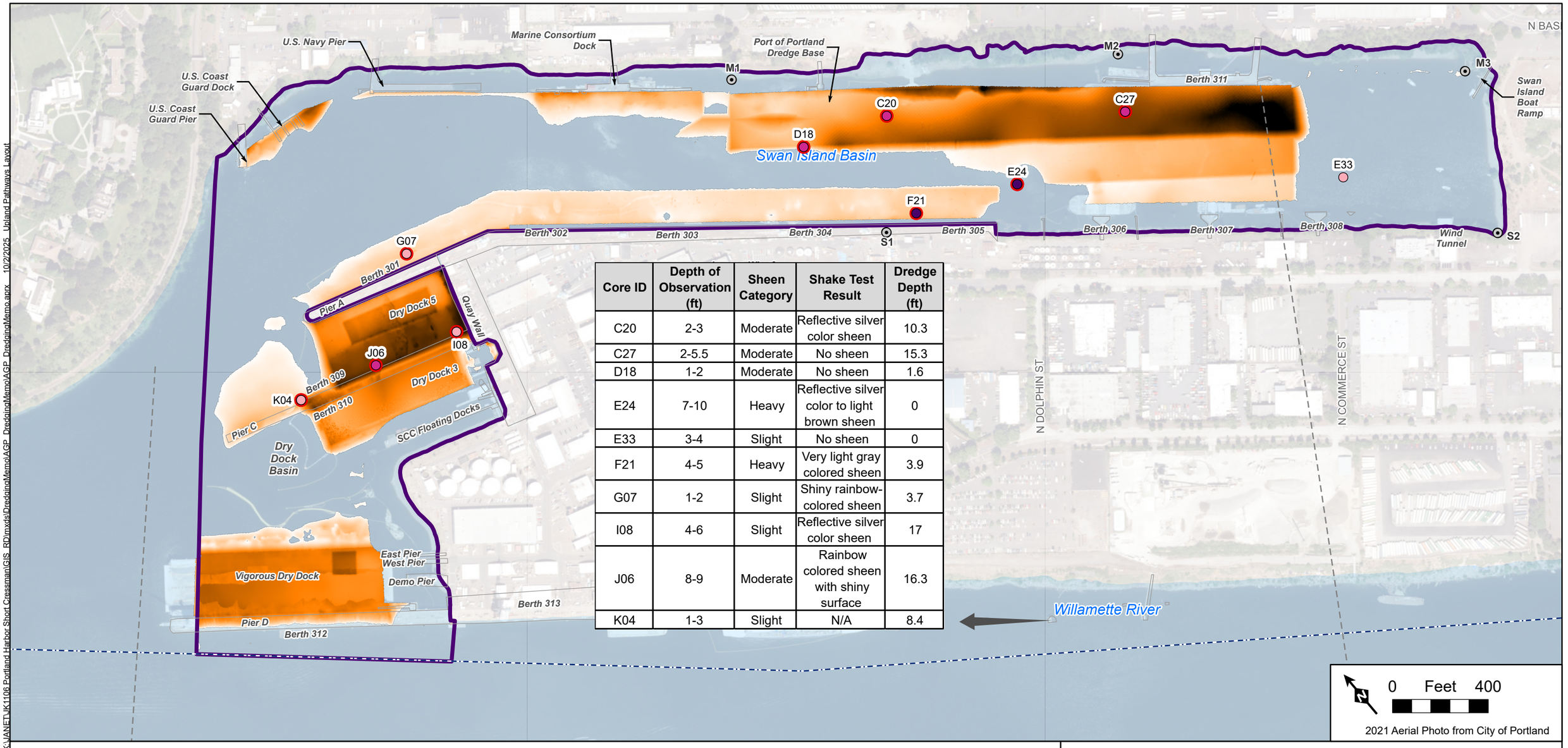
FIGURE



Core ID	Depth of Observation (ft)	Sheen Category	Shake Test Result	Dredge Depth (ft)
C20	2-3	Moderate	Reflective silver color sheen	10.3
C27	2-5.5	Moderate	No sheen	15.3
D18	1-2	Moderate	No sheen	1.6
E24	7-10	Heavy	Reflective silver color to light brown sheen	0
E33	3-4	Slight	No sheen	0
F21	4-5	Heavy	Very light gray colored sheen	3.9
G07	1-2	Slight	Shiny rainbow-colored sheen	3.7
I08	4-6	Slight	Reflective silver color sheen	17
J06	8-9	Moderate	Rainbow colored sheen with shiny surface	16.3
K04	1-3	Slight	N/A	8.4

Swan Island Sediment Decision Unit (SDU)
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures

River Flow Direction

Sheen Category
- Heavy – heavy sheen with color/iridescence
- Moderate – light to heavy sheen, may have some color/iridescence
- Slight – light, colorless, dull sheen
- NAPL Observed

Dredge Depth [ft]
19.0
17.0
15.0
13.0
11.0
9.0
7.0
5.0
3.0
1.0

Notes:
ft – feet below mudline
N/A – not applicable/no shake test performed
NAPL – Non-Aqueous Phase Liquid
SIB – Swan Island Basin

Figure 1-1

NAPL Observations from SIB Pre-Design Investigation

Prepared on: 10/2/2025
Non-Aqueous Phase Liquid Screening
Technical Memorandum
Swan Island Basin Remedial Design Group

HGL MOTT MACDONALD COAST & HARBOR ENGINEERING PACIFIC groundwater GROUP BRIDGEWATER GROUP

K:\JANET\JK1106 Portland Harbor Short Cressman\GIS_RD\mxds\DredgingMemo\AGP_DredgingMemo\AGP_DredgingMemo.aprx 10/2/2025 Upland Pathways Layout

ATTACHMENTS

ATTACHMENT A
SEDIMENT CORE PHOTOGRAPHS

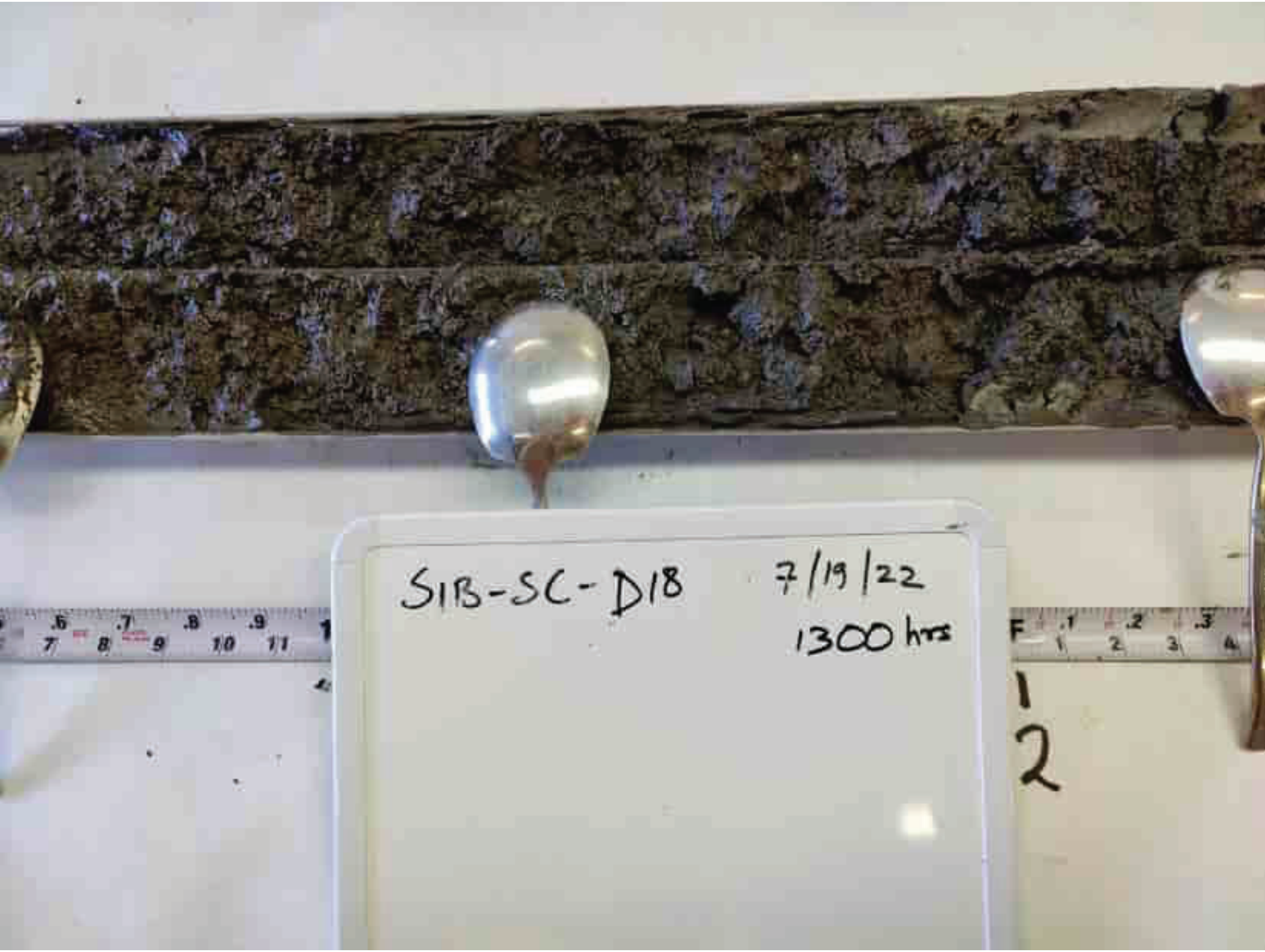

SIB-SC-C20
08/24/22
09:00hrs


SIB-SC-C27
08/23/22
1045hrs


SIB-SC-C27
08/23/22
1045hrs


SIB-SC-C27
08/23/22
1045hrs


SIB-SC-C27
08/23/22
1045hrs
3.5


SIB-SC-D18
7/19/22
1300 hrs



SIB-SC-E24



SIB-SC-E24



SIB-SC-E24

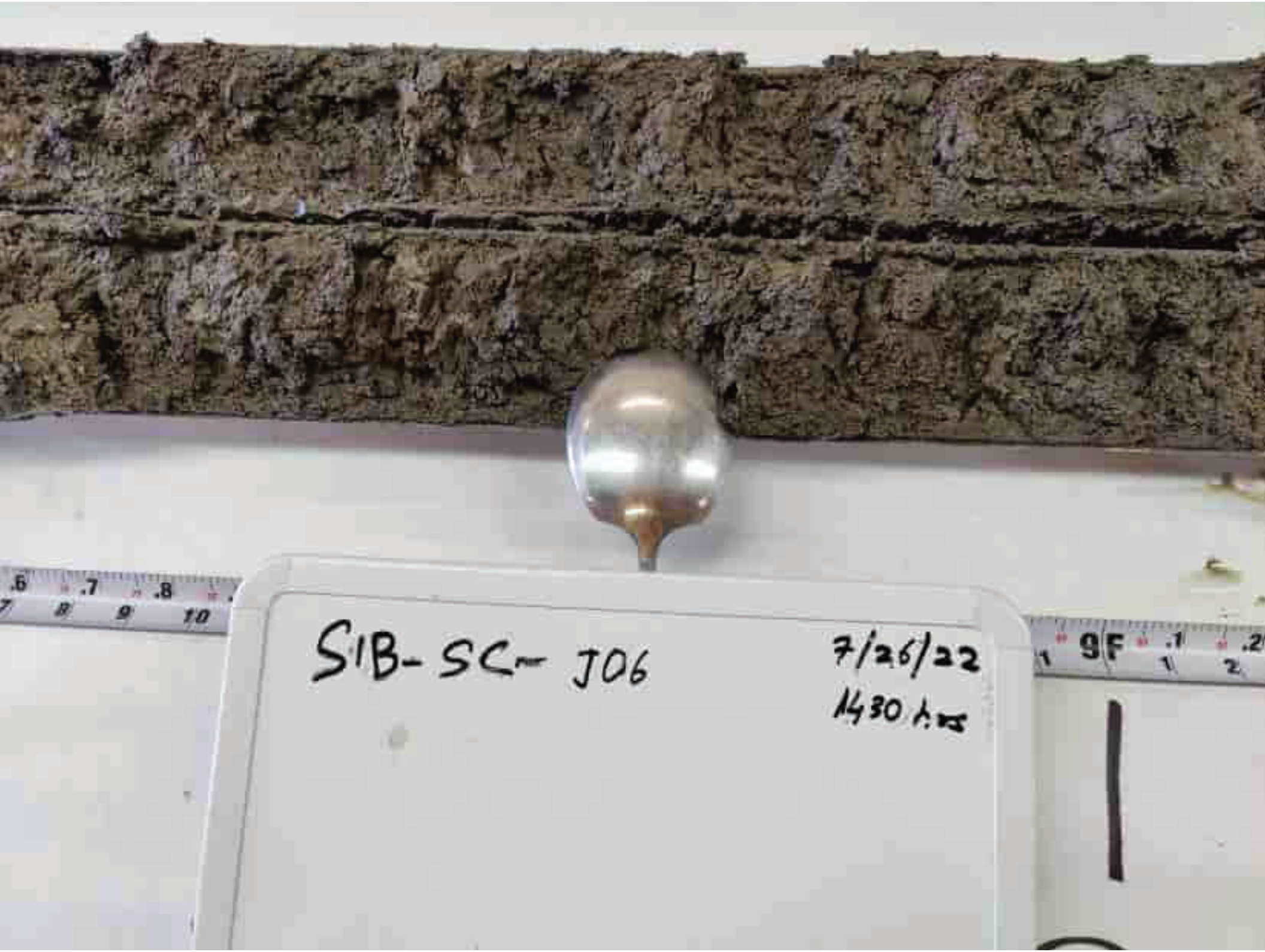

S1B-SC-E33
7/25/22
1115 hrs
4F
1
4


SIB-SC-F21
7/24/22
0800 hrs
1
5

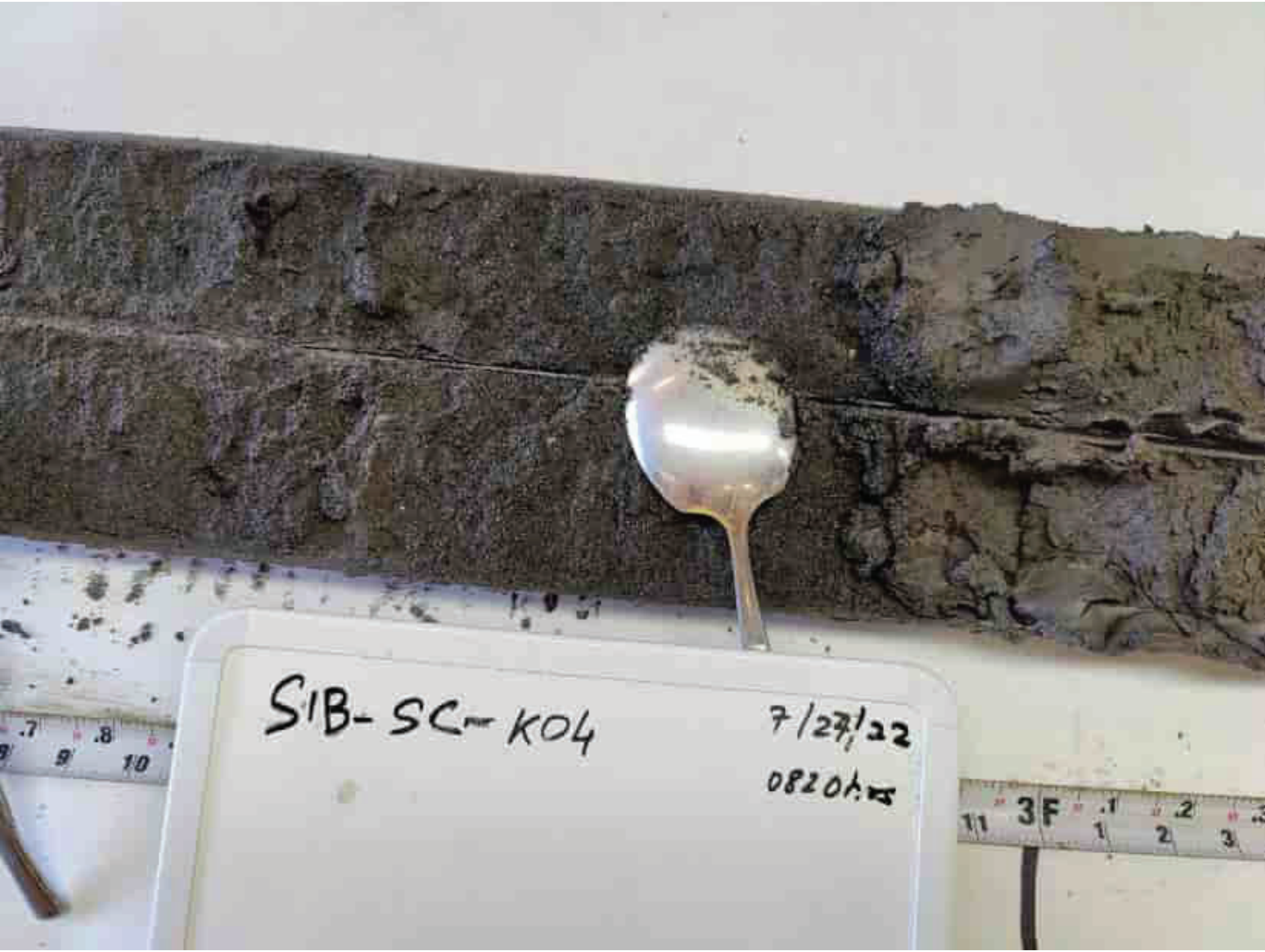

1F
2F
DUPLICATE
SIB-SC-G07
7/14/22
1100 hrs


SIB-SC-I08
7/28/22
0920 hrs
1
5


SIB-SC-I08
7/28/22
0920 hrs
16


SIB-SC- J06
7/26/22
1430 hrs


S1B-SC-K04
7/27/22
0820hrs


SIB-SC-K04
7/27/22
0820hrs

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ATTACHMENT B-1
SHAKE TESTING LABORATORY DATA PACKAGE

INTEGRATED GEOSCIENCES LABORATORIES, LLC
*Environmental * Geotechnical * Core Analysis*

6016 Centralcrest Street • Houston, Texas 77092
Telephone (713) 316-1800 • Fax (877) 255-9953

October 30, 2024

Andrea Fletcher,
Chemistry and Data Management Manager,
HydroGeologic, Inc.
6340 Glenwood, Blding. 7, Ste. 200,
Overland Park, KS 66202.

Re: IGS Labs File No: **2410-103**
Project Name: **HGL-SIB-PDI**
Project Number: **DT2002.03.03.01.01**
Site Location: **OR.**

Subject: Final Report: NAPL Sediment – Water Shake Test – ASTM D3282-21a.

Dear Andrea Fletcher,

Please find enclosed report for Physical Properties Analysis conducted on fifteen (15) soil samples received from your **"HGL-SIB-PDI"** project. All analyses were performed by applicable ASTM, EPA, or API methodologies. The samples are currently in storage and will be retained for thirty days past the completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples.

Integrated Geosciences Laboratories appreciate the opportunity to be of service. If you have any questions or require additional information, please contact me or Emeka Anazodo at (713) 316-1800.

Sincerely,

Adebowale Ogunsola
Operations Manager
Integrated Geosciences Laboratories, LLC.

+1 (713) 316-1800
(website: https://www.igslaboratories.com)

Integrated Geosciences Laboratories, LLC.

Project Name: HGL-SIB-PDI
Project Number: DT2002.03.03.01.01
Site Location: OR

IGS Labs File No: 2410-103
Client: HydroGeologic, Inc.
Date Received: 10/22/2024

TEST PROGRAM - 20240801

Serial Number	Sample ID	Date; Time Sampled	Depth (feet)	Matix Type	NAPL Sediment-Water Shake Test ASTM E3281-21a	Comments
Date Received: 20240801						
1	SIB-SC-C20-2-3-08/24/2022	8/24/2022	N/A	Soil	X	1- [8oz glass jar]
2	SIB-SC-C27-2-3-08/23/2022	8/23/2022	N/A	Soil	X	1- [8oz glass jar]
3	SIB-SC-C27-3-4-08/23/2022	8/23/2022	N/A	Soil	X	1- [8oz glass jar]
4	SIB-SC-C27-4-5-08/23/2022	8/23/2022	N/A	Soil	X	1- [8oz glass jar]
5	SIB-SC-C27-5-5.5-08/23/2022	8/23/2022	N/A	Soil	X	1- [8oz glass jar]
6	SIB-SC-D18-1-2-07/19/2022	7/19/2022	N/A	Soil	X	1- [8oz glass jar]
7	SIB-SC-E24-7-8-07/12/2022	7/12/2022	N/A	Soil	X	1- [8oz glass jar]
8	SIB-SC-E24-8-9-7/12/2022	7/12/2022	N/A	Soil	X	1- [8oz glass jar]
9	SIB-SC-E24-9-10-07/12/2022	7/12/2022	N/A	Soil	X	1- [8oz glass jar]
10	SIB-SC-E33-3-4-07/25/2022	7/25/2022	N/A	Soil	X	1- [8oz glass jar]
11	SIB-SC-F21-4-5-07/13/2022	7/13/2022	N/A	Soil	X	1- [8oz glass jar]
12	SIB-SC-G07-1-2-07/14/2022	7/14/2022	N/A	Soil	X	1- [8oz glass jar]
13	SIB-SC-I08-4-5-07/28/2022	7/28/2022	N/A	Soil	X	1- [8oz glass jar]
14	SIB-SC-I08-5-6-07/28/2022	7/28/2022	N/A	Soil	X	1- [8oz glass jar]
15	SIB-SC-J06-8-9-07/26/2022	8/23/2022	N/A	Soil	X	1- [8oz glass jar]
	TOTAL				**15**	**15**

Laboratory Test Program Notes

1. Standard TAT for basic analysis is 10-15 business days.

Integrated Geosciences Laboratories, LLC.

NAPL SEDIMENT - WATER SHAKE TEST

(Screening method - ASTM E3281 - 21a: NAPL Presence)

IGS Labs File No:	**2408-76**	**Project Name:**	**HGL-SIB-PDI**
Client:	**HydroGeologic, Inc.**	**Project Number:**	**DT2002.03.03.01.01**
Report Date:	**08/27/24**	**Site Location:**	**OR**

Sample Information						
• Sample ID:	**SIB-SC-C20-2-3-08/24/2022**	**SIB-SC-C27-2-3-08/23/2022**	**SIB-SC-C27-3-4-08/23/2022**	**SIB-SC-C27-4-5-08/23/2022**	**SIB-SC-C27-5-5.5-08/23/2022**
• Date of Test:	10/22/2024	10/22/2024	10/22/2024	10/22/2024	10/22/2024
• Testing Laboratory/Location:	IGS Laboratories, llc.	IGS Laboratories, llc.	IGS Laboratories, llc.	IGS Laboratories, llc.	IGS Laboratories, llc.
• Operator Initial:	AO	AO	AO	AO	AO
• Sediment Type (e.g., sand, clay):	SltyClay	SltyClay	SltyClay	SltyClay	SltySand
• Sediment Weight (g):	100	100	100	100	100
• NAPL Type (e.g., diesel, crude oil):	Unknown	Unknown	Unknown	Unknown	Unknown
• NAPL Volume (mL):	N/A	N/A	N/A	N/A	N/A
Test Setup Parameters					
• NAPL to Sediment Ratio (mL/g):	N/A	N/A	N/A	N/A	N/A
• Shaking Time (minutes):	30	30	30	30	30
• Temperature (°C):					
• Shaking Speed (rpm):	Manual	Manual	Manual	Manual	Manual
• Test Duration (hours):	24	24	24	24	24
Pre-Test Measurements					
Measurement Unit Value					
Sediment Initial Moisture Content %	70.4	78.1	90.8	89.0	38.1
Observations/Notes					
• Visual Observations (e.g., sediment type,color, odor, NAPL or Stain.	SltyClay, dk gray with v. fnt odor. No visual evidence of NAPL observed.	SltyClay, dk gray with NO odor. No visual evidence of NAPL observed.	SltyClay, dk gray with NO odor. No visual evidence of NAPL observed.	SltyClay, dk gray with NO odor. No visual evidence of NAPL observed.	SltyClay, dk gray with NO odor. No visual evidence of NAPL observed.
• Shake Test Observations (Negative, shake test sheen, blebs, layer	Shake test sheen; reflective silver color sheen on the water surface. No NAPL, blebs or layer observed.	Negative; No sheen or NAPL observed.	Negative; No sheen or NAPL observed.	Negative; No sheen or NAPL observed.	Negative; No sheen or NAPL observed.

Integrated Geosciences Laboratories, LLC.

NAPL SEDIMENT - WATER SHAKE TEST

(Screening method - ASTM E3281 - 21a: NAPL Presence)

IGS Labs File No:	**IGS Labs File No:**	**2408-76**	**Project Name:**	**HGL-SIB-PDI**
Client:	**Client:**	**HydroGeologic, Inc.**	**Project Number:**	**DT2002.03.03.01.01**
Report Date:	**Report Date:**	**08/27/24**	**Site Location:**	**OR**

Sample Information						
• Sample ID:	**SIB-SC-D18-1-2-07/19/2022**	**SIB-SC-E24-7-8-07/12/2022**	**SIB-SC-E24-8-9-7/12/2022**	**SIB-SC-E24-9-10-07/12/2022**	**SIB-SC-E33-3-4-07/25/2022**
• Date of Test:	10/22/2024	10/24/2024	10/24/2024	10/24/2024	10/24/2024
• Testing Laboratory/Location:	IGS Laboratories, llc.	IGS Laboratories, llc.	IGS Laboratories, llc.	IGS Laboratories, llc.	IGS Laboratories, llc.
• Operator Initial:	AO	AO	AO	AO	AO
• Sediment Type (e.g., sand, clay):	Clay	SltyClay	SltyClay	SltyClay	SltyClay
• Sediment Weight (g):	60 (limited sample)	100	100	100	60 (limited sample)
• NAPL Type (e.g., diesel, crude oil):	Unknown	Unknown	Unknown	Unknown	Unknown
• NAPL Volume (mL):	N/A	N/A	N/A	N/A	N/A
Test Setup Parameters					
• NAPL to Sediment Ratio (mL/g):	N/A	N/A	N/A	N/A	N/A
• Shaking Time (minutes):	30	30	30	30	30
• Temperature (°C):					
• Shaking Speed (rpm):	Manual	Manual	Manual	Manual	Manual
• Test Duration (hours):	24	24	24	24	24
Pre-Test Measurements					
Measurement Unit Value					
Sediment Initial Moisture Content %	67.0	81.8	86.6	46.4	92.4
Observations/Notes					
• Visual Observations (e.g., sediment type,color, odor, NAPL or Stain.	Clay, dk gray with NO odor. No visual evidence of NAPL observed.	SltyClay, dk gray with v. fnt odor. No visual evidence of NAPL observed.	SltyClay, dk gray with v. fnt odor. No visual evidence of NAPL observed.	SltyClay, dk gray with v. fnt odor. No visual evidence of NAPL observed.	SltyClay, dk gray with NO odor. No visual evidence of NAPL observed.
• Shake Test Observations (Negative, shake test sheen, blebs, layer	Negative; No sheen or NAPL observed.	Shake test sheen; reflective silver color sheen on the water surface. No NAPL, blebs or layer observed.	Shake test sheen; light brown sheen is present on the surface of the water but no NAPL or blebs or layer observed. No NAPL, blebs or layer observed.	Shake test sheen; rainbow colored sheen with shiny surface is present on the surface of the water but no NAPL or blebs or layer observed. No NAPL, blebs or layer observed.	Negative; No sheen or NAPL observed.

Integrated Geosciences Laboratories, LLC.

NAPL SEDIMENT - WATER SHAKE TEST

(Screening method - ASTM E3281 - 21a: NAPL Presence)

IGS Labs File No:	**IGS Labs File No:**	**2408-76**	**Project Name:**	**HGL-SIB-PDI**
Client:	**Client:**	**HydroGeologic, Inc.**	**Project Number:**	**DT2002.03.03.01.01**
Report Date:	**Report Date:**	**08/27/24**	**Site Location:**	**OR**

Sample Information					
• Sample ID:	**SIB-SC-F21-4-5-07/13/2022**	**SIB-SC-J06-8-9-07/26/2022**	**SIB-SC-G07-1-2**	**SIB-SC-I08-4-5**	**SIB-SC-I08-5-6**
• Date of Test:	10/24/2024	10/24/2024	10/25/2024	10/25/2024	10/25/2024
• Testing Laboratory/Location:	IGS Laboratories, llc.	IGS Laboratories, llc.	IGS Laboratories, llc.	IGS Laboratories, llc.	IGS Laboratories, llc.
• Operator Initial:	AO	AO	AO	AO	AO
• Sediment Type (e.g., sand, clay):	Sand	SltyClay	SltyClay	SltyClay	SltyClay
• Sediment Weight (g):	30 (limited sample)	100	100	100	100
• NAPL Type (e.g., diesel, crude oil):	Unknown	Unknown	Unknown	Unknown	Unknown
• NAPL Volume (mL):	N/A	N/A	N/A	N/A	N/A
Test Setup Parameters					
• NAPL to Sediment Ratio (mL/g):	N/A	N/A	N/A	N/A	N/A
• Shaking Time (minutes):	30	30	30	30	30
• Temperature (°C):					
• Shaking Speed (rpm):	Manual	Manual	Manual	Manual	Manual
• Test Duration (hours):	24	24	24	24	24
Pre-Test Measurements					
Measurement Unit Value					
Sediment Initial Moisture Content %	12.9	64.6	89.1	90.3	78.1
Observations/Notes					
• Visual Observations (e.g., sediment type,color, odor, NAPL or Stain.	Sand, dk brwn, no odor	SltyClay, dk gray with faint odor. No visual evidence of NAPL observed.	SltyClay, dk gray with faint odor. No visual evidence of NAPL observed.	SltyClay, dk gray with faint odor. No visual evidence of NAPL observed.	SltyClay, dk gray with faint odor. No visual evidence of NAPL observed.
• Shake Test Observations (Negative, shake test sheen, blebs, layer	Shake test sheen; very light gray colored sheen on the water surface. No NAPL, blebs or layer observed.	Shake test sheen; rainbow colored sheen with shiny surface is present on the surface of the water but no NAPL or blebs or layer observed. No NAPL, blebs or layer observed.	Shake test sheen; shiny rainbow-colored sheen on the water surface. No NAPL, blebs or layer observed.	Shake test sheen; reflective silver color sheen on the water surface. No NAPL, blebs or layer observed.	Shake test sheen; reflective silver color sheen on the water surface. No NAPL, blebs or layer observed.

ALS Environmental Chain of Custody

1317 South 13th Avenue • Kelso, WA 98626 • 1-360-577-7222 • FAX 1-360-636-1068

ALS Contact: Karen Melerine

Project Number: K2407820
Project Manager: Karen Melerine
QAP: LAB QAP

Lab Code	Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Lab ID	Relinquish None
K2407820-001	SIB-SC-C20-2-3-08/24/2022		Sediment	8/24/22	0906	Integrated	X
K2407820-002	SIB-SC-C27-2-3-08/23/2022		Sediment	8/23/22	1051	Integrated	X
K2407820-003	SIB-SC-C27-3-4-08/23/2022		Sediment	8/23/22	1054	Integrated	X
K2407820-004	SIB-SC-C27-4-5-08/23/2022		Sediment	8/23/22	1057	Integrated	X
K2407820-005	SIB-SC-C27-5-5.5-08/23/2022		Sediment	8/23/22	1100	Integrated	X
K2407820-006	SIB-SC-E24-7-8-07/12/2022		Sediment	7/12/22	1001	Integrated	X
K2407820-007	SIB-SC-E24-8-9-07/12/2022		Sediment	7/12/22	1004	Integrated	X
K2407820-008	SIB-SC-E24-9-10-07/12/2022		Sediment	7/12/22	1007	Integrated	X
K2407820-009	SIB-SC-F21-4-5-07/13/2022		Sediment	7/13/22	1412	Integrated	X
K2407820-010	SIB-SC-G07-1-2-07/14/2022		Sediment	7/14/22	1103	Integrated	X
K2407820-011	SIB-SC-I08-4-5-07/28/2022		Sediment	7/28/22	0932	Integrated	X
K2407820-012	SIB-SC-I08-5-6-07/28/2022		Sediment	7/28/22	0935	Integrated	X

To be analyzed for shake test
Will report directly to HGL

Pulled from frozen archive 7/30/24

2407-76

Special Instructions/Comments
Please provide the electronic (PDF and EDD) report to the following e-mail address: afletcher@hgl.com, lnyland@hgl.com

contact: HGL - Andrea Fletcher with any questions:
afletcher@hgl.com, 913-378-2316

H - Test is On Hold P - Test is Authorized for Prep Only

Turnaround Requirements
_____**RUSH** (Surcharges Apply)
PLEASE CIRCLE WORK DAYS
1 2 3 4 5
_X___ **STANDARD**
Requested FAX Date: _____
Requested Report Date: 08/19/24

Report Requirements
____ I. Results Only
____ II. Results + QC Summaries
____ III. Results + QC and Calibration Summaries
__X__ IV. Data Validation Report with Raw Data
PQL/MDL/J Y
EDD Y

Invoice Information
PO#
Bill to

Relinquished By: M. Mulligan 8/1/24 Received By: IAS labs, LLC 8/1/24 Airbill Number: _____

24 08-75

orbislogic HGL

CFA
Wilmington, NC

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately

Page: 7 of 9

COC Number: 20220720-SIB-SED

Company: HydroGeoLogic, Inc.	Report To: Andrea Fletcher	Requested Due Date:	Quote Reference:
Address: 6340 Glenwood, Blding 7, Ste. 200	Copy To: Jeff Gadt	*TAT: 7	Project Manager: Cynde Larkins
Overland Park, KS 66202	Invoice To: Jeff Gadt	Standard TAT	Project #: DT2002.03.03.01.01
Phone: 913-488-0024 Fax: 913-317-8860	jgadt@hgl.com		Matrix: SEDIMENT
Email Address: afletcher@hgl.com	Project Name: HGL-SIB-PDI		Sampling Team Members:
	Project Number: DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796

Valid Matrix Codes

Matrix	Code
Soil	SO
Sediment	SE
Surface Water	SW
Wastewater	WW
Groundwater	GW
Stormwater	ST

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE G = Grab C = Composite	DATE COLLECTED MM/DD/YYYY	TIME COLLECTED (Military time)	Preservatives: # Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	Requested Analysis: PCB Congeners	Dioxin/Furan	Archive	MS/MSD	Filtered (Y/N)	REMARKS / Lab ID
						N	N	N	N	N	N	N	N	N	N	N	N		
1	SIB-SC-D17-12-13-07/19/2022	SE	C	7/19/2022	11:51	1	X									X			3.9°
2	SIB-SC-D17-13-14-07/19/2022	SE	C	7/19/2022	11:54	1	X									X			
3	SIB-SC-D17-14-15-07/19/2022	SE	C	7/19/2022	11:57	1	X									X			
4	SIB-SC-D18-0-1-07/19/2022	SE	C	7/19/2022	13:00	2	X								X	X			
5	SIB-SC-D18-1-2-07/19/2022	SE	C	7/19/2022	13:03	2	X								X	X			
6	SIB-SC-D18-2-3-07/19/2022	SE	C	7/19/2022	13:06	2	X								X	X			
7	SIB-SC-D18-3-4-07/19/2022	SE	C	7/19/2022	13:09	2	X								X	X			
8	SIB-SC-D18-4-5-07/19/2022	SE	C	7/19/2022	13:12	2	X								X	X			
9	SIB-SC-D18-5-6-07/19/2022	SE	C	7/19/2022	13:15	2	X								X	X			
10	SIB-SC-D18-6-7-07/19/2022	SE	C	7/19/2022	13:18											X			

CF 01AUG24

CF 01AUG24

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS
		7/20/22	2

ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
	Joss Moore HGL	7/20/22	1000	[illegible]	7/21/24	10:17
	Cynde Larkins	01AUG24	1700			
				IGS labs	8/1/24	

SAMPLE CONDITION: SAMPLE NOTES:

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

Additional Comments:

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER: [signature]

DATE Signed: 7/20/22

2408-76

20384 #2 2504

WO#20447

orbislogic HGL

CFA Wilmington, NC

CHAIN-OF-CUSTODY / Analytical Request Document

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Page: 11 of 138

COC Number: 20220930-SIB-SED

Company: HydroGeoLogic, Inc.	Report To: Andrea Fletcher	Requested Due Date:	Quote Reference:
Address: 6340 Glenwood, Blding 7, Ste. 200	Copy To: Jeff Gadt	*TAT: 7	Project Manager: Cynde Larkins
Overland Park, KS 66202	Invoice To: Jeff Gadt	Standard TAT	Project #: DT2002.03.03.01.01
Phone: 913-488-0024 Fax: 913-317-8860	jgadt@hgl.com		Matrix: SEDIMENT
Email Address: afletcher@hgl.com	Project Name: HGL-SIB-PDI		Sampling Team Members:
	Project Number: DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796

Valid Matrix Codes

Matrix	Code
Soil	SO
Sediment	SE
Surface Water	SW
Wastewater	WW
Groundwater	GW
Stormwater	ST

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE (G = Grab, C = Composite)	DATE COLLECTED (MM/DD/YYYY)	TIME COLLECTED (Military time)	Preservatives: # Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	Requested Analysis: PCB Congeners	Dioxin/Furan	Archive	MS/MSD	Filtered (Y/N)	REMARKS / Lab ID
														N	N	N	N		
1	SIB-SC-J06-4-5-07/26/2022	SE	C	7/26/2022	14:42	2	X								X	X			-7.6
2	SIB-SC-J06-5-6-07/26/2022	SE	C	7/26/2022	14:45	2	X								X	X			
3	SIB-SC-J06-6-7-07/26//2022	SE	C	7/26/2022	14:48	1	X									X			
4	SIB-SC-J06-7-8-07/26//2022	SE	C	7/26/2022	14:51	1	X									X			
5	SIB-SC-J06-8-9-07/26//2022	SE	C	7/26/2022	14:54	1	X									X			NOT RECEIVED
6	SIB-SC-J06-9-10-07/26//2022	SE	C	7/26/2022	14:57	1	X									X			
7	SIB-SC-J06-10-11-07/26/2022	SE	C	7/26/2022	15:00	1	X									X			
8	SIB-SC-J06-11-11.5-07/26/2022	SE	C	7/26/2022	15:03	1	X									X			
9	SIB-SC-K04-0-1-07/27/2022	SE	C	7/27/2022	8:20	1	X									X			-0.7
10	SIB-SC-K04-1-2-07/27/2022	SE	C	7/27/2022	8:23	2	X								X	X			

CF 30 JUL 24

CF 30 JUL 24

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS
		9/16/2022	34

ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
	Joss Moore MM	9/16/2022	1600			
	Cynde Larkins	30 JUL 24	1640	IGS, LLC	7/31/24	0800

SAMPLE CONDITION: SAMPLE NOTES:

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

Additional Comments:

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER: Joss Moore

DATE Signed: 9/16/2022

andrea

2408-76

WO 20383

orbislogic HGL

CFA
Wilmington, NC

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately

Page: 2 of 138

COC Number: 20220930-SIB-SED

Company: HydroGeoLogic, Inc.	Report To: Andrea Fletcher	Requested Due Date:	Quote Reference:
Address: 6340 Glenwood, Blding 7, Ste. 200	Copy To: Jeff Gadt	*TAT: 7	Project Manager: Cynde Larkins
Overland Park, KS 66202	Invoice To: Jeff Gadt	Standard TAT	Project #: DT2002.03.03.01.01
Phone: 913-488-0024 Fax: 913-317-8860	jgadt@hgl.com		Matrix: SEDIMENT
Email Address: afletcher@hgl.com	Project Name: HGL-SIB-PDI		Sampling Team Members:
	Project Number: DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796

Valid Matrix Codes

Matrix	Code
Soil	SO
Sediment	SE
Surface Water	SW
Wastewater	WW
Groundwater	GW
Stormwater	ST

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE G = Grab C = Composite	DATE COLLECTED MM/DD/YYYY	TIME COLLECTED (Military time)	Preservatives: # Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	Requested Analysis: PCB Congeners	Dioxin/Furan	Archive	MS/MSD	Filtered (Y/N)	REMARKS / Lab ID
						N	N	N	N	N	N	N	N	N	N	N	N		
1	SIB-SC-C12-10-11-07/25/2022 ✓	SE	C	7/25/2022	10:40	1	X									X			-15.1
2	SIB-SC-C12-11-12-07/25/2022 ✓	SE	C	7/25/2022	10:43	1	X									X			↓
3	SIB-SC-C12-12-13-07/25/2022 ✓	SE	C	7/25/2022	10:46	1	X									X			
4	SIB-SC-E33-0-1-07/25/2022 ✓	SE	C	7/25/2022	11:15	1	X									X			-15.40
5	SIB-SC-E33-1-2-07/25/2022 ✓	SE	C	7/25/2022	11:18	2	X								X	X			
6	SIB-SC-E33-2-3-07/25/2022 ✓	SE	C	7/25/2022	11:21	2	X								X	X			
7	SIB-SC-E33-3-4-07/25/2022 ✓	SE	C	7/25/2022	11:24	2	X								X	X			
8	SIB-SC-E33-4-5-07/25/2022 ✓	SE	C	7/25/2022	11:27	2	X								X	X			
9	SIB-SC-E33-5-6-07/25/2022 ✓	SE	C	7/25/2022	11:30	2	X								X	X			
10	SIB-SC-E33-6-7-07/25//2022 ✓	SE	C	7/25/2022	11:33	2	X								X	X			

CK 01AUG24

CK 01AUG24

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS
		9/16/2022	34

ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
	Joss Moore MM	9/16/2022	1600		9/16/22	8:45
	Cynde Larkins	01AUG24	1700	IGS	8/1/24	

SAMPLE CONDITION: **SAMPLE NOTES:**

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

Additional Comments:

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER: Joss Moore

DATE Signed: 9/16/2022

PHOTOGRAPH LOG

Project Name:	Site Location:	Project No.
NAPL Sediment-Water Shake Test	SIB Project Area	DT2002

Photo No. 1	Date: 10/22/2024	
Sample ID: SIB-SC-C20-2-3-08/24/2022 **Sample Depth:** 2-3 ft **Testing Laboratory:** IGS Laboratories, llc. **Operator Initial:** AO		

Photo No. 2	Date: 10/22/2024	
Sample ID: SIB-SC-C27-2-3-08/23/2022 **Sample Depth:** 2-3 ft **Testing Laboratory:** IGS Laboratories, llc. **Operator Initial:** AO		

PHOTOGRAPH LOG

Project Name:	Site Location:	Project No.
NAPL Sediment-Water Shake Test	SIB Project Area	DT2002

Photo No.	Date:
3	10/22/2024

Sample ID:
SIB-SC-C27-3-4-08/23/2022

Sample Depth:
3-4 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO



Photo No.	Date:
4	10/22/2024

Sample ID:
SIB-SC-C27-4-5-08/23/2022

Sample Depth:
4-5 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO



PHOTOGRAPH LOG

Project Name:	Site Location:	Project No.
NAPL Sediment-Water Shake Test	SIB Project Area	DT2002

Photo No. 5	Date: 10/22/2024

Sample ID:
SIB-SC-C27-5-5.5-08/23/2022

Sample Depth:
5-5.5 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO



Photo No. 6	Date: 10/22/2024

Sample ID:
SIB-SC-D18-1-2-07/19/2022

Sample Depth:
1-2 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO



PHOTOGRAPH LOG

Project Name:	Site Location:	Project No.
NAPL Sediment-Water Shake Test	SIB Project Area	DT2002

Photo No. 7	Date: 10/24/2024

Sample ID:
SIB-SC-E24-7-8-07/12/2022

Sample Depth:
7-8 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO



Photo No. 8	Date: 10/24/2024

Sample ID:
SIB-SC-E24-8-9-7/12/2022

Sample Depth:
8-9 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO



PHOTOGRAPH LOG

Project Name:	Site Location:	Project No.
NAPL Sediment-Water Shake Test	SIB Project Area	DT2002

Photo No.	Date:	
9	10/24/2024	

Sample ID:
SIB-SC-E24-9-10-07/12/2022

Sample Depth:
9-10 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO

Photo No.	Date:	
10	10/24/2024	

Sample ID:
SIB-SC-E33-3-4-07/25/2022

Sample Depth:
3-4 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO

PHOTOGRAPH LOG

Project Name:	Site Location:	Project No.
NAPL Sediment-Water Shake Test	SIB Project Area	DT2002

Photo No.	Date:	
11	10/24/2024	

Sample ID:
SIB-SC-F21-4-5-07/13/2022

Sample Depth:
4-5 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO

Photo No.	Date:	
12	10/25/2024	

Sample ID:
SIB-SC-G07-1-2

Sample Depth:
1-2 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO

PHOTOGRAPH LOG

Project Name:	Site Location:	Project No.
NAPL Sediment-Water Shake Test	SIB Project Area	DT2002

Photo No. 13	Date: 10/25/2024

Sample ID:
SIB-SC-I08-5-6

Sample Depth:
5-6 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO



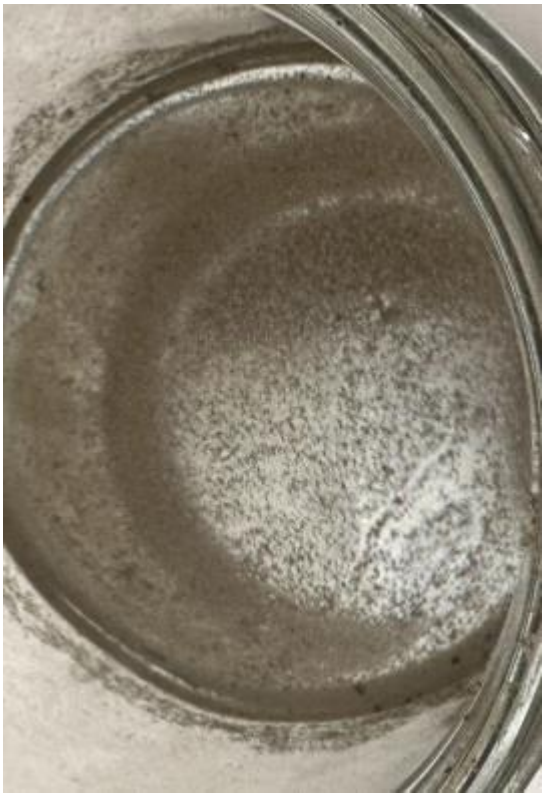
Photo No. 14	Date: 10/25/2024

Sample ID:
SIB-SC-I08-4-5

Sample Depth:
4-5 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO



PHOTOGRAPH LOG

Project Name:	Site Location:	Project No.
NAPL Sediment-Water Shake Test	SIB Project Area	DT2002

Photo No.	Date:
15	10/24/2024

Sample ID:
SIB-SC-J06-8-9-07/26/2022

Sample Depth:
8-9 ft

Testing Laboratory:
IGS Laboratories, llc.

Operator Initial:
AO



ATTACHMENT B-2
CENTRIFUGE TESTING LABORATORY DATA PACKAGE

INTEGRATED GEOSCIENCES LABORATORIES, LLC
*Environmental * Geotechnical * Core Analysis*

6016 Centralcrest Street • Houston, Texas 77092
Telephone (713) 316-1800 • Fax (877) 255-9953

August 28, 2024

Andrea Fletcher,
Chemistry and Data Management Manager,
HydroGeologic, Inc.
6340 Glenwood, Blding. 7, Ste. 200,
Overland Park, KS 66202.

Re: IGS Labs File No: **2408-76**
Project Name: **HGL-SIB-PDI**
Project Number: **DT2002.03.03.01.01**
Site Location: **OR.**

Subject: Final Report: Free Product Mobility Package – mod. ASTM D425, API RP40.

Dear Andrea Fletcher,

Please find enclosed report for Physical Properties Analysis conducted on seventeen (17) soil samples received from your **"HGL-SIB-PDI"** project. All analyses were performed by applicable ASTM, EPA, or API methodologies. The samples are currently in storage and will be retained for thirty days past the completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples.

Integrated Geosciences Laboratories appreciate the opportunity to be of service. If you have any questions or require additional information, please contact me or Emeka Anazodo at (713) 316-1800.

Sincerely,

Adebowale Ogunsola
Operations Manager
Integrated Geosciences Laboratories, LLC.

+1 (713) 316-1800
(website: https://www.igslaboratories.com)

Integrated Geosciences Laboratories, LLC.

Project Name: HGL-SIB-PDI
Project Number: DT2002.03.03.01.01
Site Location: OR

IGS Labs File No: 2408-76
Client: HydroGeologic, Inc.
Date Received: 8/1/2024

TEST PROGRAM - 20240801

Serial Number	Sample ID	Date; Time Sampled		Depth (feet)	Matix Type	Free Product Mobility Package mod. ASTM D425, API RP40	Comments
Date Received: 20240801							
1	SIB-SC-C20-2-3-08/24/2022	8/24/2022		N/A	Soil	X	1- [8oz glass jar]
2	SIB-SC-C27-2-3-08/23/2022	8/23/2022		N/A	Soil	X	1- [8oz glass jar]
3	SIB-SC-C27-3-4-08/23/2022	8/23/2022		N/A	Soil	X	1- [8oz glass jar]
4	SIB-SC-C27-4-5-08/23/2022	8/23/2022		N/A	Soil	X	1- [8oz glass jar]
5	SIB-SC-C27-5-5.5-08/23/2022	8/23/2022		N/A	Soil	X	1- [8oz glass jar]
6	SIB-SC-D18-1-2-07/19/2022	7/19/2022		N/A	Soil	X	1- [8oz glass jar]
7	SIB-SC-E24-7-8-07/12/2022	7/12/2022		N/A	Soil	X	1- [8oz glass jar]
8	SIB-SC-E24-8-9-7/12/2022	7/12/2022		N/A	Soil	X	1- [8oz glass jar]
9	SIB-SC-E24-9-10-07/12/2022	7/12/2022		N/A	Soil	X	1- [8oz glass jar]
10	SIB-SC-E33-3-4-07/25/2022	7/25/2022		N/A	Soil	X	1- [8oz glass jar]
11	SIB-SC-F21-4-5-07/13/2022	7/13/2022		N/A	Soil	X	1- [8oz glass jar]
12	SIB-SC-G07-1-2-07/14/2022	7/14/2022		N/A	Soil	X	1- [8oz glass jar]
13	SIB-SC-I08-4-5-07/28/2022	7/28/2022		N/A	Soil	X	1- [8oz glass jar]
14	SIB-SC-I08-5-6-07/28/2022	7/28/2022		N/A	Soil	X	1- [8oz glass jar]
15	SIB-SC-J06-8-9-07/26/2022	8/23/2022		N/A	Soil	X	1- [8oz glass jar]
16	SIB-SC-K04-1-2-07/27/2022	7/27/2022		N/A	Soil	X	1- [8oz glass jar]
17	SIB-SC-K04-2-3-07/27/2022	7/27/2022		N/A	Soil	X	1- [8oz glass jar]
	TOTAL					**17**	**17**

Laboratory Test Program Notes

1. Standard TAT for basic analysis is 10-15 business days.
2. Free Product Mobility Package: Applied Centrifugal force demonstrates product mobility; includes residual saturation by Dean Stark, total porosity, grain and bulk density.

CLIENT CONFIDENTIAL

Integrated Geosciences Laboratories, LLC.

FREE PRODUCT MOBILITY: INITIAL AND RESIDUAL SATURATIONS

(Centrifugal method: samples spun under air)

IGS Labs File No: 2408-76
Client: HydroGeologic, Inc.
Report Date: 08/27/24

Project Name: HGL-SIB-PDI
Project Number: DT2002.03.03.01.01
Site Location: OR

METHODS:	API RP 40	API RP 40	ASTM D425M, DEAN-STARK
			PORE FLUID SATURATIONS (3), % Pv

SAMPLE ID.	IGS Labs PLUG ID	DEPTH, ft.	SAMPLE ORIENTATION (1)	ANALYSIS DATE	TOTAL SAMPLE VOLUME		DENSITY		TOTAL POROSITY (2), %Vb	Initial Fluid Saturations		After Centrifuge at 1000xG	
					INITIAL cc	FINAL cc	DRY BULK, g/cc	GRAIN, g/cc		WATER (Swi) SATURATION	NAPL (Soi) SATURATION	WATER (Srw) SATURATION	NAPL (Sor) SATURATION
SIB-SC-C20-2-3-08/24/2022	1	N/A	V	20240819	63.5	46.87	0.83	2.63	68.5	80.9	1.46	48.48	1.46
	NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample slightly shrunk												
SIB-SC-C27-2-3-08/23/2022	2	N/A	V	20240819	61.5	41.18	0.72	2.62	72.4	84.0	1.13	44.98	1.13
	NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample slightly shrunk												
SIB-SC-C27-3-4-08/23/2022	3	N/A	V	20240819	65.3	45.36	0.72	2.58	72.0	82.1	1.96	47.42	1.96
	NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample slightly shrunk												
SIB-SC-C27-4-5-08/23/2022	4	N/A	V	20240819	62.5	47.07	0.81	2.60	68.8	86.6	0.31	47.49	0.31
	NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample slightly shrunk												
SIB-SC-C27-5-5.5-08/23/2022	5	N/A	V	20240819	63.8	56.74	1.11	2.68	58.4	78.9	1.37	35.15	1.37
	NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample intact.												
SIB-SC-D18-1-2-07/19/2022	6	N/A	V	20240819	59.0	39.48	0.75	2.66	71.7	82.5	1.78	42.09	1.78
	NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample slightly shrunk												
SIB-SC-E24-7-8-07/12/2022	7	N/A	V	20240819	57.0	44.55	0.85	2.66	68.0	88.2	1.76	41.29	1.76
	NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample slightly shrunk												
SIB-SC-E24-8-9-7/12/2022	8	N/A	V	20240819	63.0	40.12	0.66	2.63	74.8	83.9	1.10	41.19	1.10
	NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample slightly shrunk												
SIB-SC-E24-9-10-07/12/2022	9	N/A	V	20240819	63.3	41.76	0.73	2.65	72.5	82.4	1.82	44.90	1.82
	NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample slightly shrunk												
SIB-SC-E33-3-4-07/25/2022	10	N/A	V	20240819	61.3	40.39	0.67	2.60	74.4	82.5	2.05	42.14	2.05
	NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample slightly shrunk												

Integrated Geosciences Laboratories, LLC.

FREE PRODUCT MOBILITY: INITIAL AND RESIDUAL SATURATIONS

(Centrifugal method: samples spun under air)

IGS Labs File No: 2408-76
Client: HydroGeologic, Inc.
Report Date: 08/27/24

Project Name: HGL-SIB-PDI
Project Number: DT2002.03.03.01.01
Site Location: OR

METHODS:					API RP 40		API RP 40		ASTM D425M, DEAN-STARK				
									PORE FLUID SATURATIONS (3), % Pv				
	IGS Labs		SAMPLE		TOTAL SAMPLE VOLUME		DENSITY		TOTAL	Initial Fluid Saturations		After Centrifuge at 1000xG	
SAMPLE ID.	PLUG ID	DEPTH, ft.	ORIENTATION (1)	ANALYSIS DATE	INITIAL cc	FINAL cc	DRY BULK, g/cc	GRAIN, g/cc	POROSITY (2), %Vb	WATER (Swi) SATURATION	NAPL (Soi) SATURATION	WATER (Srw) SATURATION	NAPL (Sor) SATURATION
SIB-SC-F21-4-5-07/13/2022	11	N/A	V	20240819	62.7	58.65	1.46	2.71	46.2	67.0	4.10	30.76	4.10
NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample intact.													
SIB-SC-G07-1-2-07/14/2022	12	N/A	V	20240819	21.3	14.43	0.75	2.59	71.2	81.8	1.65	41.54	1.65
NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample slightly shrunk													
SIB-SC-I08-4-5-07/28/2022	13	N/A	V	20240819	65.1	45.21	0.77	2.59	70.3	85.8	2.68	43.91	2.68
NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample intact.													
SIB-SC-I08-5-6-07/28/2022	14	N/A	V	20240819	60.7	46.76	0.88	2.61	66.5	82.1	5.25	43.65	5.25
NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample slightly shrunk													
SIB-SC-J06-8-9-07/26/2022	15	N/A	V	20240819	61.3	45.97	0.86	2.65	67.6	82.1	1.99	44.27	1.99
NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample slightly shrunk													
SIB-SC-K04-1-2-07/27/2022	16	N/A	V	20240819	64.8	58.94	1.29	2.68	51.7	66.9	0.26	22.98	0.26
NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample intact.													
SIB-SC-K04-2-3-07/27/2022	17	N/A	V	20240819	62.2	58.64	1.33	2.69	50.7	75.2	0.48	33.30	0.48
NOTE: No Visible NAPL produced. Clear water with NO HC odor. Sample intact.													

(1) Sample Orientation: H = horizontal; V = vertical; R = remold
(2) Total Porosity = all interconnected pore channels.
(3) Fluid density used to calculate pore fluid saturations: Water = 0.9987 g/cc, NAPL = 0.866 g/cc.
Swi = Initial Water Saturation as received prior to centrifuging at 1000G, Soi = Initial NAPL Saturation as received prior to centrifuging at 1000G for 1 hour.
Srw = Residual Water Saturation after centrifuging at 1000G, Sor = Residual NAPL Saturation after centrifuging at 1000G for duration of 1hour
Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

2407-76

20384

WO# 20447

orbislogic HGL

CFA
Wilmington, NC

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately

Page: 11 of 138

COC Number: 20220930-SIB-SED

Company:	HydroGeoLogic, Inc.	Report To:	Andrea Fletcher	Requested Due Date:	Quote Reference:
Address:	6340 Glenwood, Blding 7, Ste. 200	Copy To:	Jeff Gadt	*TAT: 7	Project Manager: Cynde Larkins
	Overland Park, KS 66202	Invoice To:	Jeff Gadt	Standard TAT	Project #: DT2002.03.03.01.01
Phone: 913-488-0024	Fax: 913-317-8860		jgadt@hgl.com		Matrix: SEDIMENT
Email Address:	afletcher@hgl.com	Project Name:	HGL-SIB-PDI		Sampling Team Members:
		Project Number:	DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796

Valid Matrix Codes

Matrix	Code
Soil	SO
Sediment	SE
Surface Water	SW
Wastewater	WW
Groundwater	GW
Stormwater	ST

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE (G = Grab, C = Composite)	DATE COLLECTED MM/DD/YYYY	TIME COLLECTED (Military time)	Preservatives: # Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	Requested Analysis: PCB Congeners	Dioxin/Furan	Archive	MS/MSD	Filtered (Y/N)	REMARKS / Lab ID
														N	N	N	N		
1	SIB-SC-J06-4-5-07/26/2022	SE	C	7/26/2022	14:42	2	X								X	X			-760
2	SIB-SC-J06-5-6-07/26/2022	SE	C	7/26/2022	14:45	2	X								X	X			
3	SIB-SC-J06-6-7-07/26//2022	SE	C	7/26/2022	14:48	1	X									X			
4	SIB-SC-J06-7-8-07/26//2022	SE	C	7/26/2022	14:51	1	X									X			
5	SIB-SC-J06-8-9-07/26//2022	SE	C	7/26/2022	14:54	1	X									X			
6	SIB-SC-J06-9-10-07/26//2022	SE	C	7/26/2022	14:57	1	X									X			
7	SIB-SC-J06-10-11-07/26/2022	SE	C	7/26/2022	15:00	1	X									X			
8	SIB-SC-J06-11-11.5-07/26/2022	SE	C	7/26/2022	15:03	1	X									X			
9	SIB-SC-K04-0-1-07/27/2022	SE	C	7/27/2022	8:20	1	X									X			-0.7
10	SIB-SC-K04-1-2-07/27/2022	SE	C	7/27/2022	8:23	2	X								X	X			

CF 30 JUL 24

CF 30 JUL 24

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS	ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
		9/16/2022	34		Joss Moore MM	9/16/2022	1600			
					Cynde Larkins	30 JUL 24	1640			
								IGS, LLC	7/31/24	0800

SAMPLE CONDITION: SAMPLE NOTES:

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER

DATE Signed: 9/16/2022

Additional Comments:

ATTACHMENT C
ARCHIVE SEDIMENT SAMPLE ANALYSIS LABORATORY DATA PACKAGES
AVAILABLE ELECTRONICALLY ONLY:

ATTACHMENT C LAB DATA PACKAGES.PDF

CFA | Cape Fear Analytical LLC
an affiliate of The GEL Group INC

3306 Kitty Hawk Road, Suite 120 Wilmington, NC 28405
P 910.795.0421
www.capefearanalytical.com

August 26, 2024

Mr. Alan Sprott
Vigor Industrial, LLC
5555 North Channel Avenue
Portland, Oregon 97217

Re: Swan Island Basin Portland Harbor
Work Order: 22893

Dear Mr. Sprott:

Cape Fear Analytical LLC (CFA) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on August 01, 2024, September 19, 2022 and July 12, 2022. This original data report has been prepared and reviewed in accordance with CFA's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at 910-795-0421.

Sincerely,

Cynde Larkins

Cynde Larkins
Project Manager

Enclosures

problem solved

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893009**	**Date Collected:**	**07/12/2022 10:01**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**47.8**
Client ID:	**SIB-SC-E24-7-8-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 06:26**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-2**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**19.23 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	U	0.301	pg/g	0.301	0.498
40321-76-4	1,2,3,7,8-PeCDD	BJK	0.903	pg/g	0.484	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	JK	1.07	pg/g	0.402	4.98
57653-85-7	1,2,3,6,7,8-HxCDD		5.88	pg/g	0.414	4.98
19408-74-3	1,2,3,7,8,9-HxCDD	JK	2.18	pg/g	0.408	4.98
35822-46-9	1,2,3,4,6,7,8-HpCDD		133	pg/g	1.45	4.98
3268-87-9	1,2,3,4,6,7,8,9-OCDD		1360	pg/g	1.87	9.96
51207-31-9	2,3,7,8-TCDF	K	1.74	pg/g	0.377	0.996
57117-41-6	1,2,3,7,8-PeCDF	J	0.789	pg/g	0.309	4.98
57117-31-4	2,3,4,7,8-PeCDF	JK	2.58	pg/g	0.311	4.98
70648-26-9	1,2,3,4,7,8-HxCDF		6.33	pg/g	0.377	4.98
57117-44-9	1,2,3,6,7,8-HxCDF	JK	2.19	pg/g	0.367	4.98
60851-34-5	2,3,4,6,7,8-HxCDF	JK	2.27	pg/g	0.341	4.98
72918-21-9	1,2,3,7,8,9-HxCDF	J	1.37	pg/g	0.426	4.98
67562-39-4	1,2,3,4,6,7,8-HpCDF		31.6	pg/g	0.490	4.98
55673-89-7	1,2,3,4,7,8,9-HpCDF	J	3.09	pg/g	0.661	4.98
39001-02-0	1,2,3,4,6,7,8,9-OCDF		96.8	pg/g	0.807	9.96
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	1.52	pg/g	0.301	0.996
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	4.90	pg/g	0.484	4.98
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	37.5	pg/g	0.402	4.98
37871-00-4	Total Heptachlorodibenzo-p-dioxin		259	pg/g	1.45	4.98
TCDF	Total Tetrachlorodibenzofuran	JK	11.7	pg/g	0.377	0.996
30402-15-4	Total Pentachlorodibenzofuran	JK	17.8	pg/g	0.0502	4.98
55684-94-1	Total Hexachlorodibenzofuran	JK	58.2	pg/g	0.341	4.98
38998-75-3	Total Heptachlorodibenzofuran	J	119	pg/g	0.490	4.98
TEQ	TEQ WHO2005 ND=0		6.12	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		6.28	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		131	199	pg/g	65.9	(25%-164%)
13C-1,2,3,7,8-PeCDD		110	199	pg/g	55.4	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		139	199	pg/g	69.9	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		137	199	pg/g	68.6	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		168	199	pg/g	84.6	(23%-140%)
13C-OCDD		274	398	pg/g	68.7	(17%-157%)
13C-2,3,7,8-TCDF		136	199	pg/g	68.5	(24%-169%)
13C-1,2,3,7,8-PeCDF		124	199	pg/g	62.4	(24%-185%)
13C-2,3,4,7,8-PeCDF		110	199	pg/g	55.3	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		136	199	pg/g	68.5	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		137	199	pg/g	68.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		145	199	pg/g	72.9	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		139	199	pg/g	70.0	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893009**	**Date Collected:**	**07/12/2022 10:01**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**47.8**
Client ID:	**SIB-SC-E24-7-8-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 06:26**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-2**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**19.23 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		144	199	pg/g	72.4	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		162	199	pg/g	81.3	(26%-138%)
37Cl-2,3,7,8-TCDD		16.7	19.9	pg/g	83.9	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893009**	**Date Collected:**	**07/12/2022 10:01**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**47.8**
Client ID:	**SIB-SC-E24-7-8-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/19/2024 15:36**	**Analyst:**	**GM1**	**Instrument:**	**HRP757**
Data File:	**e19aug24b-4**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**19.23 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
51207-31-9	2,3,7,8-TCDF		1.83	pg/g	0.406	0.996

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.
J Value is estimated
B The target analyte was detected in the associated blank.
K Estimated Maximum Possible Concentration

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893010**	**Date Collected:**	**07/12/2022 10:04**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**51.6**
Client ID:	**SIB-SC-E24-8-9-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 07:15**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-3**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**20.7 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD		0.782	pg/g	0.509	0.499
40321-76-4	1,2,3,7,8-PeCDD	K	2.70	pg/g	0.489	2.50
39227-28-6	1,2,3,4,7,8-HxCDD	JK	3.14	pg/g	0.731	4.99
57653-85-7	1,2,3,6,7,8-HxCDD		18.5	pg/g	0.755	4.99
19408-74-3	1,2,3,7,8,9-HxCDD	K	7.84	pg/g	0.741	4.99
35822-46-9	1,2,3,4,6,7,8-HpCDD		404	pg/g	1.37	4.99
3268-87-9	1,2,3,4,6,7,8,9-OCDD		3950	pg/g	1.98	9.98
51207-31-9	2,3,7,8-TCDF		4.05	pg/g	0.727	0.998
57117-41-6	1,2,3,7,8-PeCDF	J	1.89	pg/g	0.301	4.99
57117-31-4	2,3,4,7,8-PeCDF		6.02	pg/g	0.323	4.99
70648-26-9	1,2,3,4,7,8-HxCDF		15.6	pg/g	0.309	4.99
57117-44-9	1,2,3,6,7,8-HxCDF		5.35	pg/g	0.345	4.99
60851-34-5	2,3,4,6,7,8-HxCDF		5.76	pg/g	0.355	4.99
72918-21-9	1,2,3,7,8,9-HxCDF	J	3.03	pg/g	0.393	4.99
67562-39-4	1,2,3,4,6,7,8-HpCDF		96.1	pg/g	0.647	4.99
55673-89-7	1,2,3,4,7,8,9-HpCDF		7.08	pg/g	0.782	4.99
39001-02-0	1,2,3,4,6,7,8,9-OCDF		298	pg/g	0.892	9.98
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	6.46	pg/g	0.509	0.998
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	19.7	pg/g	0.489	4.99
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	131	pg/g	0.731	4.99
37871-00-4	Total Heptachlorodibenzo-p-dioxin		837	pg/g	1.37	4.99
TCDF	Total Tetrachlorodibenzofuran	JK	36.7	pg/g	0.727	0.998
30402-15-4	Total Pentachlorodibenzofuran	JK	48.3	pg/g	0.0563	4.99
55684-94-1	Total Hexachlorodibenzofuran	JK	156	pg/g	0.309	4.99
38998-75-3	Total Heptachlorodibenzofuran	J	363	pg/g	0.647	4.99
TEQ	TEQ WHO2005 ND=0		18.0	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		18.0	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		141	200	pg/g	70.8	(25%-164%)
13C-1,2,3,7,8-PeCDD		118	200	pg/g	59.0	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		144	200	pg/g	72.2	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		139	200	pg/g	69.5	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		172	200	pg/g	86.4	(23%-140%)
13C-OCDD		335	399	pg/g	84.0	(17%-157%)
13C-2,3,7,8-TCDF		149	200	pg/g	74.5	(24%-169%)
13C-1,2,3,7,8-PeCDF		132	200	pg/g	66.0	(24%-185%)
13C-2,3,4,7,8-PeCDF		119	200	pg/g	59.5	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		149	200	pg/g	74.7	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		143	200	pg/g	71.8	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		151	200	pg/g	75.4	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		152	200	pg/g	76.2	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893010**	**Date Collected:**	**07/12/2022 10:04**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**51.6**
Client ID:	**SIB-SC-E24-8-9-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 07:15**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-3**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**20.7 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		150	200	pg/g	75.1	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		173	200	pg/g	86.9	(26%-138%)
37Cl-2,3,7,8-TCDD		16.5	20.0	pg/g	82.5	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893010**	**Date Collected:**	**07/12/2022 10:04**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**51.6**
Client ID:	**SIB-SC-E24-8-9-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/19/2024 16:02**	**Analyst:**	**GM1**	**Instrument:**	**HRP757**
Data File:	**e19aug24b-5**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**20.7 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
51207-31-9	2,3,7,8-TCDF		4.25	pg/g	0.473	0.998

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.

J Value is estimated

K Estimated Maximum Possible Concentration

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893011**	**Date Collected:**	**07/12/2022 10:07**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**49.7**
Client ID:	**SIB-SC-E24-9-10-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 08:04**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-4**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**19.91 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
1746-01-6	2,3,7,8-TCDD	J	0.317	pg/g	0.216	0.499
40321-76-4	1,2,3,7,8-PeCDD	BJK	1.23	pg/g	0.277	2.49
39227-28-6	1,2,3,4,7,8-HxCDD	J	1.36	pg/g	0.359	4.99
57653-85-7	1,2,3,6,7,8-HxCDD		8.21	pg/g	0.369	4.99
19408-74-3	1,2,3,7,8,9-HxCDD	JK	3.55	pg/g	0.363	4.99
35822-46-9	1,2,3,4,6,7,8-HpCDD		172	pg/g	1.18	4.99
3268-87-9	1,2,3,4,6,7,8,9-OCDD		2010	pg/g	1.55	9.98
51207-31-9	2,3,7,8-TCDF	K	1.25	pg/g	0.371	0.998
57117-41-6	1,2,3,7,8-PeCDF	J	0.978	pg/g	0.238	4.99
57117-31-4	2,3,4,7,8-PeCDF	J	2.48	pg/g	0.236	4.99
70648-26-9	1,2,3,4,7,8-HxCDF		6.50	pg/g	0.202	4.99
57117-44-9	1,2,3,6,7,8-HxCDF	J	3.18	pg/g	0.195	4.99
60851-34-5	2,3,4,6,7,8-HxCDF	J	2.83	pg/g	0.202	4.99
72918-21-9	1,2,3,7,8,9-HxCDF	J	1.34	pg/g	0.261	4.99
67562-39-4	1,2,3,4,6,7,8-HpCDF		46.9	pg/g	0.403	4.99
55673-89-7	1,2,3,4,7,8,9-HpCDF	J	3.81	pg/g	0.529	4.99
39001-02-0	1,2,3,4,6,7,8,9-OCDF		133	pg/g	0.752	9.98
41903-57-5	Total Tetrachlorodibenzo-p-dioxin	JK	3.07	pg/g	0.216	0.998
36088-22-9	Total Pentachlorodibenzo-p-dioxin	JK	8.58	pg/g	0.277	4.99
34465-46-8	Total Hexachlorodibenzo-p-dioxin	JK	57.9	pg/g	0.359	4.99
37871-00-4	Total Heptachlorodibenzo-p-dioxin		345	pg/g	1.18	4.99
TCDF	Total Tetrachlorodibenzofuran	JK	14.6	pg/g	0.371	0.998
30402-15-4	Total Pentachlorodibenzofuran	JK	23.4	pg/g	0.0337	4.99
55684-94-1	Total Hexachlorodibenzofuran	JK	72.8	pg/g	0.195	4.99
38998-75-3	Total Heptachlorodibenzofuran	JK	167	pg/g	0.403	4.99
TEQ	TEQ WHO2005 ND=0		8.03	pg/g		
3333-30-1	TEQ WHO2005 ND=0.5		8.03	pg/g		

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-2,3,7,8-TCDD		137	200	pg/g	68.9	(25%-164%)
13C-1,2,3,7,8-PeCDD		124	200	pg/g	62.0	(25%-181%)
13C-1,2,3,4,7,8-HxCDD		143	200	pg/g	71.5	(32%-141%)
13C-1,2,3,6,7,8-HxCDD		141	200	pg/g	70.5	(28%-130%)
13C-1,2,3,4,6,7,8-HpCDD		173	200	pg/g	86.6	(23%-140%)
13C-OCDD		291	399	pg/g	72.9	(17%-157%)
13C-2,3,7,8-TCDF		142	200	pg/g	71.3	(24%-169%)
13C-1,2,3,7,8-PeCDF		135	200	pg/g	67.6	(24%-185%)
13C-2,3,4,7,8-PeCDF		119	200	pg/g	59.8	(21%-178%)
13C-1,2,3,4,7,8-HxCDF		148	200	pg/g	74.3	(26%-152%)
13C-1,2,3,6,7,8-HxCDF		145	200	pg/g	72.4	(26%-123%)
13C-2,3,4,6,7,8-HxCDF		151	200	pg/g	75.7	(28%-136%)
13C-1,2,3,7,8,9-HxCDF		149	200	pg/g	74.6	(29%-147%)

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893011**	**Date Collected:**	**07/12/2022 10:07**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**49.7**
Client ID:	**SIB-SC-E24-9-10-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/17/2024 08:04**	**Analyst:**	**MC1**	**Instrument:**	**HRP722**
Data File:	**f16aug24a_3-4**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**19.91 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits
13C-1,2,3,4,6,7,8-HpCDF		146	200	pg/g	73.2	(28%-143%)
13C-1,2,3,4,7,8,9-HpCDF		163	200	pg/g	81.6	(26%-138%)
37Cl-2,3,7,8-TCDD		15.9	20.0	pg/g	79.5	(35%-197%)

Comments:

U **Analyte was analyzed for, but not detected above the specified detection limit.**
J **Value is estimated**
B **The target analyte was detected in the associated blank.**
K **Estimated Maximum Possible Concentration**

Hi-Res Dioxins/Furans
Certificate of Analysis
Sample Summary

SDG Number:	**22893**	**Client:**	**HYGL001**	**Project:**	**HYGL00122**
Lab Sample ID:	**22893011**	**Date Collected:**	**07/12/2022 10:07**	**Matrix:**	**Sediment**
Client Sample:	**1613B Soil**	**Date Received:**	**08/01/2024 10:20**	**%Moisture:**	**49.7**
Client ID:	**SIB-SC-E24-9-10-07/12/2022**			**Prep Basis:**	**Dry Weight**
Batch ID:	**56596**	**Method:**	**EPA Method 1613B**		
Run Date:	**08/19/2024 16:29**	**Analyst:**	**GM1**	**Instrument:**	**HRP757**
Data File:	**e19aug24b-6**			**Dilution:**	**1**
Prep Batch:	**56594**	**Prep Method:**	**SW846 3540C**		
Prep Date:	**15-AUG-24**	**Prep Aliquot:**	**19.91 g**		

CAS No.	Parmname	Qual	Result	Units	EDL	PQL
51207-31-9	2,3,7,8-TCDF		1.41	pg/g	0.423	0.998

Surrogate/Tracer recovery	Qual	Result	Nominal	Units	Recovery%	Acceptable Limits

Comments:

U Analyte was analyzed for, but not detected above the specified detection limit.
J Value is estimated
B The target analyte was detected in the associated blank.
K Estimated Maximum Possible Concentration

Analytical Resources, LLC
Analytical Chemists and Consultants
Tukwila, WA

30 August 2024

Andrea Fletcher
HydroGeoLogic, Inc.
6340 Glenwood, Building 7, Suite 200
Overland Park, KS 66202

RE: Portland Harbor Superfund Site 2024 (Portland Harbor Superfund Site)

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
24H0046	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC



Kelly Bottem, Client Services Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

PJLA Testing
DoD ELAP 66169

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

Analytical Resources, LLC
Analytical Chemists and Consultants

Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-E24-7-8-07/12/2022

24H0046-30 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/12/2022 10:01
Instrument: ECD7 Analyst: NRB — Analyzed: 08/20/2024 16:59

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-30 A 01
	Preparation Batch: BMH0086	Sample Size: 23.46 g (wet)	Dry Weight:12.51 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 53.33
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-30 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-30 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-30 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	**72.0**	ug/kg	P1, H
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	**152**	ug/kg	H, P1
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	**82.4**	ug/kg	H, P1
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*146*	*%*	H, *, P1
Surrogate: Tetrachlorometaxylene					*44-120 %*	*45.0*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*37.9*	*%*	*, P1, H
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*59.6*	*%*	H

Analytical Resources, LLC
Analytical Chemists and Consultants

Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-E24-7-8-07/12/2022

24H0046-30RE1 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/12/2022 10:01
Instrument: ECD7 Analyst: NRB — Analyzed: 08/29/2024 14:57

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-30RE1 A 01
	Preparation Batch: BMH0086	Sample Size: 23.46 g (wet)	Dry Weight:12.51 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 53.33
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-30RE1 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-30RE1 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-30RE1 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	5	10.0	20.0	10.0	< 10.0	ug/kg	H, U
Aroclor 1221	11104-28-2	5	10.0	20.0	10.0	< 10.0	ug/kg	H, U
Aroclor 1232	11141-16-5	5	10.0	20.0	10.0	< 10.0	ug/kg	H, U
Aroclor 1242	53469-21-9	5	10.0	20.0	10.0	< 10.0	ug/kg	H, U
Aroclor 1248	12672-29-6	5	10.0	20.0	10.0	**32.7**	ug/kg	H, P1, D
Aroclor 1254	11097-69-1	5	10.0	20.0	10.0	**70.2**	ug/kg	H, P1, D
Aroclor 1260	11096-82-5	5	10.0	20.0	10.0	**37.6**	ug/kg	H, D
Aroclor 1262	37324-23-5	5	10.0	20.0	10.0	< 10.0	ug/kg	H, U
Aroclor 1268	11100-14-4	5	10.0	20.0	10.0	< 10.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*52.7*	*%*	H, P1
Surrogate: Tetrachlorometaxylene					*44-120 %*	*18.1*	*%*	*, H, P1
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*17.8*	*%*	*, H, P1
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*26.6*	*%*	*, H, P1

Analytical Resources, LLC
Analytical Chemists and Consultants

Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-E24-8-9-07/12/2022

24H0046-31 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/12/2022 10:04

Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 14:16

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-31 A 01
	Preparation Batch: BMH0086	Sample Size: 23.9 g (wet)	Dry Weight:12.50 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 52.30
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-31 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-31 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-31 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	**101**	ug/kg	H, P1
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	**172**	ug/kg	H, P1
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	**87.9**	ug/kg	H
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*146*	*%*	H, P1, *
Surrogate: Tetrachlorometaxylene					*44-120 %*	*45.9*	*%*	H, P1
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*21.4*	*%*	H, *, P1
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*67.6*	*%*	H, P1

Analytical Resources, LLC
Analytical Chemists and Consultants

Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-E24-9-10-07/12/2022

24H0046-32 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/12/2022 10:07
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 14:36

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-32 A 01
	Preparation Batch: BMH0086	Sample Size: 23.23 g (wet)	Dry Weight:12.50 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 53.82
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-32 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-32 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-32 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1221	11104-28-2	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1232	11141-16-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1242	53469-21-9	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1248	12672-29-6	1	2.0	4.0	2.0	**54.7**	ug/kg	H
Aroclor 1254	11097-69-1	1	2.0	4.0	2.0	**123**	ug/kg	P1, H
Aroclor 1260	11096-82-5	1	2.0	4.0	2.0	**62.5**	ug/kg	H
Aroclor 1262	37324-23-5	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Aroclor 1268	11100-14-4	1	2.0	4.0	2.0	< 2.0	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*	*98.8*	*%*	H, P1
Surrogate: Tetrachlorometaxylene					*44-120 %*	*47.4*	*%*	H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*	*59.4*	*%*	H, P1
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*	*61.5*	*%*	H

Analytical Resources, LLC
Analytical Chemists and Consultants

Analytical Report

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

SIB-SC-J06-8-9-07/26/2022

24H0046-33 (Solid)

Aroclor PCB

Method: EPA 8082A — Sampled: 07/26/2022 14:54
Instrument: ECD7 Analyst: NRB — Analyzed: 08/26/2024 14:57

Sample Preparation:	Preparation Method: EPA 3546 (Microwave)		Extract ID: 24H0046-33 A 01
	Preparation Batch: BMH0086	Sample Size: 20 g (wet)	Dry Weight:11.89 g
	Prepared: 08/09/2024	Final Volume: 2.5 mL	% Solids: 59.46
Sample Cleanup:	Cleanup Method: Silica Gel		Extract ID: 24H0046-33 A 01
	Cleanup Batch: CMH0114	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfuric Acid		Extract ID:24H0046-33 A 01
	Cleanup Batch: CMH0112	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	
Sample Cleanup:	Cleanup Method: Sulfur		Extract ID:24H0046-33 A 01
	Cleanup Batch: CMH0113	Initial Volume: 2.5 uL	
	Cleaned: 14-Aug-2024	Final Volume: 2.5 uL	

Analyte	CAS Number	Dilution	Detection Limit	LOQ	LOD	Result	Units	Notes
Aroclor 1016	12674-11-2	100	210	420	210	< 210	ug/kg	H, U
Aroclor 1221	11104-28-2	100	210	420	210	< 210	ug/kg	H, U
Aroclor 1232	11141-16-5	100	210	420	210	< 210	ug/kg	H, U
Aroclor 1242	53469-21-9	100	210	420	210	< 210	ug/kg	H, U
Aroclor 1248	12672-29-6	100	210	420	210	**3390**	ug/kg	H, P1, D
Aroclor 1254	11097-69-1	100	210	420	210	**4640**	ug/kg	H, P1, D
Aroclor 1260	11096-82-5	100	210	420	210	**1580**	ug/kg	H, D
Aroclor 1262	37324-23-5	100	210	420	210	< 210	ug/kg	H, U
Aroclor 1268	11100-14-4	100	210	420	210	< 210	ug/kg	H, U
Surrogate: Decachlorobiphenyl					*40-126 %*		*D1*	H, D1
Surrogate: Tetrachlorometaxylene					*44-120 %*		*D1*	D1, H
Surrogate: Decachlorobiphenyl [2C]					*40-126 %*		*D1*	H, D1
Surrogate: Tetrachlorometaxylene [2C]					*44-120 %*		*D1*	D1, H

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0085 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BMH0085-BLK1)	Prepared: 07-Aug-2024 Analyzed: 26-Aug-2024 16:42										
Aroclor 1016	ND	2.0	2.0	ug/kg							U
Aroclor 1221	ND	2.0	2.0	ug/kg							U
Aroclor 1232	ND	2.0	2.0	ug/kg							U
Aroclor 1242	ND	2.0	2.0	ug/kg							U
Aroclor 1248	ND	2.0	2.0	ug/kg							U
Aroclor 1254	ND	2.0	2.0	ug/kg							U
Aroclor 1260	ND	2.0	2.0	ug/kg							U
Aroclor 1262	ND	2.0	2.0	ug/kg							U
Aroclor 1268	ND	2.0	2.0	ug/kg							U
Surrogate: Decachlorobiphenyl	6.62			ug/kg	*8.00*		*82.7*	*40-126*			
Surrogate: Tetrachlorometaxylene	6.73			ug/kg	*8.00*		*84.2*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	5.32			ug/kg	*8.00*		*66.5*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	5.83			ug/kg	*8.00*		*72.9*	*44-120*			

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Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0085 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BMH0085-BS1)	Prepared: 07-Aug-2024 Analyzed: 26-Aug-2024 17:03										
Aroclor 1016	110	2.0	2.0	ug/kg	101		109	56-120			
Aroclor 1260	107	2.0	2.0	ug/kg	101		106	58-120			
Surrogate: Decachlorobiphenyl	7.27			ug/kg	*8.00*		*90.9*	*40-126*			
Surrogate: Tetrachlorometaxylene	7.25			ug/kg	*8.00*		*90.6*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	6.14			ug/kg	*8.00*		*76.8*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	6.31			ug/kg	*8.00*		*78.9*	*44-120*			

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Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0085 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (BMH0085-BSD1)	Prepared: 07-Aug-2024 Analyzed: 26-Aug-2024 17:23										
Aroclor 1016	121	2.0	2.0	ug/kg	101		120	56-120	9.74	30	
Aroclor 1260	111	2.0	2.0	ug/kg	101		110	58-120	3.37	30	
Surrogate: Decachlorobiphenyl	7.25			ug/kg	*8.00*		*90.7*	*40-126*			
Surrogate: Tetrachlorometaxylene	7.75			ug/kg	*8.00*		*96.9*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	6.66			ug/kg	*8.00*		*83.2*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	6.71			ug/kg	*8.00*		*83.9*	*44-120*			

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
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Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0085 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BMH0085-MS1)	**Source: 24H0046-02**			Prepared: 07-Aug-2024 Analyzed: 26-Aug-2024 17:44							
Aroclor 1016	109	2.0	2.0	ug/kg	101	ND	108	56-120			
Aroclor 1260	91.0	2.0	2.0	ug/kg	101	ND	90.3	58-120			
Surrogate: Decachlorobiphenyl	6.12			ug/kg	*8.00*		*76.6*	*40-126*			
Surrogate: Tetrachlorometaxylene	7.15			ug/kg	*8.00*		*89.3*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	6.29			ug/kg	*8.00*		*78.6*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	6.18			ug/kg	*8.00*		*77.3*	*44-120*			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0085 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BMH0085-MSD1)	**Source: 24H0046-02**			Prepared: 07-Aug-2024 Analyzed: 26-Aug-2024 18:05							
Aroclor 1016	84.2	2.0	2.0	ug/kg	101	ND	83.4	56-120	25.80	30	
Aroclor 1260	69.3	2.0	2.0	ug/kg	101	ND	68.7	58-120	27.10	30	
Surrogate: Decachlorobiphenyl	4.56			ug/kg	*8.00*		*57.0*	*40-126*			
Surrogate: Tetrachlorometaxylene	5.09			ug/kg	*8.00*		*63.6*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	4.77			ug/kg	*8.00*		*59.6*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	4.53			ug/kg	*8.00*		*56.7*	*44-120*			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0085 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Reference (BMH0085-SRM1)	Prepared: 07-Aug-2024 Analyzed: 26-Aug-2024 18:26										
Aroclor 1260 [2C]	102	10.0	10.0	ug/kg	108		94.6	38-167			P1
Surrogate: Decachlorobiphenyl	29.4			ug/kg	*40.0*		*73.5*	*40-126*			
Surrogate: Tetrachlorometaxylene	33.0			ug/kg	*40.0*		*82.4*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	27.5			ug/kg	*40.0*		*68.8*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	30.8			ug/kg	*40.0*		*77.0*	*44-120*			

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
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Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Aroclor PCB - Quality Control

Batch BMH0086 - EPA 8082A

Instrument: ECD7 Analyst: NRB/AA

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BMH0086-BLK1)				Prepared: 09-Aug-2024 Analyzed: 20-Aug-2024 10:02							
Aroclor 1016	ND	2.0	2.0	ug/kg							U
Aroclor 1221	ND	2.0	2.0	ug/kg							U
Aroclor 1232	ND	2.0	2.0	ug/kg							U
Aroclor 1242	ND	2.0	2.0	ug/kg							U
Aroclor 1248	ND	2.0	2.0	ug/kg							U
Aroclor 1254	ND	2.0	2.0	ug/kg							U
Aroclor 1260	ND	2.0	2.0	ug/kg							U
Aroclor 1262	ND	2.0	2.0	ug/kg							U
Aroclor 1268	ND	2.0	2.0	ug/kg							U
Surrogate: Decachlorobiphenyl	8.16			ug/kg	*8.00*		*102*	*40-126*			
Surrogate: Tetrachlorometaxylene	7.19			ug/kg	*8.00*		*89.9*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	7.73			ug/kg	*8.00*		*96.7*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	7.32			ug/kg	*8.00*		*91.5*	*44-120*			

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0086 - EPA 8082A

Instrument: ECD7 Analyst: NRB/AA

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BMH0086-BS1)	Prepared: 09-Aug-2024 Analyzed: 20-Aug-2024 10:22										
Aroclor 1016	96.6	2.0	2.0	ug/kg	101		95.8	56-120			
Aroclor 1260	106	2.0	2.0	ug/kg	101		105	58-120			
Surrogate: Decachlorobiphenyl	8.82			ug/kg	*8.00*		*110*	*40-126*			
Surrogate: Tetrachlorometaxylene	7.98			ug/kg	*8.00*		*99.8*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	8.30			ug/kg	*8.00*		*104*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	8.14			ug/kg	*8.00*		*102*	*44-120*			

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
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Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0086 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BMH0086-MS1)	**Source: 24H0046-33**			Prepared: 09-Aug-2024 Analyzed: 26-Aug-2024 15:18							
Aroclor 1016	1320	105	105	ug/kg	530	ND	249	56-120			P1, D
Aroclor 1260 [2C]	1690	105	105	ug/kg	530	1580	20.8	58-120			D
Surrogate: Decachlorobiphenyl	53.3			ug/kg	*42.0*		*127*	*40-126*			
Surrogate: Tetrachlorometaxylene	24.3			ug/kg	*42.0*		*57.9*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	42.9			ug/kg	*42.0*		*102*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	30.2			ug/kg	*42.0*		*71.9*	*44-120*			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0086 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BMH0086-MSD1)	**Source: 24H0046-33**			Prepared: 09-Aug-2024 Analyzed: 26-Aug-2024 15:39							
Aroclor 1016	1630	105	105	ug/kg	530	ND	308	56-120	21.20	30	*, P1, D
Aroclor 1260 [2C]	3610	105	105	ug/kg	530	1580	383	58-120	72.70	30	*, D
Surrogate: Decachlorobiphenyl	57.7			ug/kg	*42.0*		*137*	*40-126*			*
Surrogate: Tetrachlorometaxylene	23.1			ug/kg	*42.0*		*54.9*	*44-120*			*P1*
Surrogate: Decachlorobiphenyl [2C]	60.1			ug/kg	*42.0*		*143*	*40-126*			*
Surrogate: Tetrachlorometaxylene [2C]	33.0			ug/kg	*42.0*		*78.4*	*44-120*			*P1*

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Analysis by: Analytical Resources, LLC

Aroclor PCB - Quality Control

Batch BMH0086 - EPA 8082A

Instrument: ECD7 Analyst: NRB

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Reference (BMH0086-SRM1)	Prepared: 09-Aug-2024 Analyzed: 26-Aug-2024 13:34										
Aroclor 1260 [2C]	131	10.0	10.0	ug/kg	108		122	38-167			P1
Surrogate: Decachlorobiphenyl	34.4			ug/kg	*40.0*		*86.0*	*40-126*			
Surrogate: Tetrachlorometaxylene	34.4			ug/kg	*40.0*		*86.0*	*44-120*			
Surrogate: Decachlorobiphenyl [2C]	33.3			ug/kg	*40.0*		*83.2*	*40-126*			
Surrogate: Tetrachlorometaxylene [2C]	36.8			ug/kg	*40.0*		*92.1*	*44-120*			

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
6340 Glenwood, Building 7, Suite 200	Project Number: Portland Harbor Superfund Site	**Reported:**
Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Certified Analyses included in this Report

Analyte	Certifications
EPA 8082A in Solid	
Aroclor 1016	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1016 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1221	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1221 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1232	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1232 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1242	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1242 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1248	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1248 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1254	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1254 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1260	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1260 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1262	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1262 [2C]	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1268	WADOE,DoD-ELAP,NELAP,ADEC
Aroclor 1268 [2C]	WADOE,DoD-ELAP,NELAP,ADEC

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	03/28/2025
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program, PJLA Testing	66169	02/28/2025
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006-012	05/12/2025
WADOE	WA Dept of Ecology	C558	06/30/2025
WA-DW	Ecology - Drinking Water	C558	06/30/2025

HydroGeoLogic, Inc.	Project: Portland Harbor Superfund Site 2024	
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Overland Park KS, 66202	Project Manager: Andrea Fletcher	30-Aug-2024 15:39

Notes and Definitions

*	Flagged value is not within established control limits.
D	The reported value is from a dilution
D1	Surrogate was not detected due to sample extract dilution
H	Hold time violation - Hold time was exceeded.
J	Estimated concentration value detected below the reporting limit.
P1	The reported value is greater than 40% difference between the concentrations determined on two GC columns where applicable.
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

September 23, 2024

Analytical Report for Service Request No: K2407810
Revised Service Request No: K2407810.01

Andrea Fletcher
HydroGeoLogic, Inc.
6340 Glenwood, Suite 200 Building
#7
Overland Park, KS 66202

RE: HGL-SIB-PDI / DT2002.03.03.01.01

Dear Andrea,

Enclosed is the revised report of the sample(s) submitted to our laboratory July 13, 2022. For your reference, these analyses have been assigned our service request number **K2407810.**

The report was updated to include revised raw data for EPA 1699M samples due to an error for the ICV values.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

We apologize for any inconvenience this may have created.

Please contact me if you have any questions. My extension is 3363. You may also contact me via email at karen.melerine@ALSGlobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Karen Melerine

Karen Melerine
Project Manager

REVISED
11:07 am, Sep 23, 2024

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Client: HydroGeoLogic, Inc. (HGL)
Project: HGL-SIB-PDI
Sample Matrix: Sediment

Service Request: K2407810
Date Received: 07/13/2022 - 07/27/2022

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier level IV requested by the client.

Sample Receipt:

Four sediment samples were received for analysis at ALS Environmental on 07/13/2022 - 07/27/2022. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Semivolatiles by GC/MS:

Method 1699M, 08/06/2024:The upper control criterion was exceeded for 2,4'-DDT and 4,4'-DDT in Laboratory Control Sample (LCS) KQ2411800-03. The analytes in question were not detected in the associated field samples. The error associated with elevated recovery indicated a high bias. The sample data was not significantly affected. No further corrective action was appropriate.
Method 1699M, 08/06/2024:The control criteria were exceeded for some surrogates in several samples due to matrix interference. The presence of non-target background components prevented adequate resolution of the surrogate. Accurate quantitation was not possible. No further corrective action was appropriate.
Method 1699M, 08/20/2024:The internal standard recovery of Pyrene-d10 in the diluted analysis for sample SIB-SC-J06-8-9-07/26/2022 was outside control criteria because of matrix interference.

Method 8270D, 08/05/2024: Benzo(a)pyrene was flagged as outside the control criterion for Continuing Calibration Verification (CCV) KQ2412273-02. In accordance with the EPA Method, 80% or more of the CCV analytes must have passed within 20% of the true value. The remaining analytes are allowed a 40% difference as per the ALS SOP. The CCV met these criteria. No further corrective action was required.
Method 8270D, 08/05/2024: Sample SIB-SC-J06-8-9-07/26/2022 required dilution due to the presence of elevated levels of several target analytes. The reporting limits are adjusted to reflect the dilution.

Approved by Karen Melrose Date 09/23/2024

Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

KCISO K2407810

Field Sample ID	PAH (8270D)	OCP (1699M)	
SIB-SC-E24-7-8-07122022	X	X	K2207947-035
SIB-SC-E24-8-9-07122022	X	X	K2207947-036
SIB-SC-E24-9-10-07122022	X	X	K2207947-037
SIB-SC-J06-8-9-07262022	X	X	K2208387-133

K2407810
K2207947

orbislogic HGL

ALS Kelso, WA

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately

Page: 7 of 11

COC Number: 20220713-SIB-SED

Company: HydroGeoLogic, Inc.	Report To: Andrea Fletcher	Requested Due Date:	Quote Reference:
Address: 6340 Glenwood, Biding 7, Ste. 200	Copy To: Jeff Gadt	*TAT: Standard TAT	Project Manager:
Overland Park, KS 66202	Invoice To: Jeff Gadt		Project #: DT2002.03.03.01.01
Phone: 913-486-0024 Fax: 913-317-8860	jgadt@hgl.com		Matrix: SEDIMENT
Email Address: afletcher@hgl.com	Project Name: HGL-SIB-PDI		Sampling Team Members:
	Project Number: DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796

Valid Matrix Codes

Matrix	Code
Soil	SO
Sediment	SE
Surface Water	SW
Wastewater	WW
Groundwater	GW
Stormwater	ST

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE (G = Grab, C = Composite)	DATE COLLECTED (MM/DD/YYYY)	TIME COLLECTED (Military time)	Preservatives: # Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	Requested Analysis: Diesel (NWTPHDx)	SVOCs (8270D)	PAHs (8270 SIM)	Pesticides (SVM)	Tributyltin	TOC	Archive	MS/MSD				Filtered (Y/N)	REMARKS / Lab ID
														N	N	N	N	N	N	N	N	N				
1	SIB-SC-E24-4-5-07/12/2022	SE	C	7/12/2022	9:52	2	X							X	X	X	X	X	X							
2	SIB-SC-E24-5-6-07/12/2022	SE	C	7/12/2022	9:55	2	X							X	X	X	X	X	X							
3	SIB-SC-E24-6-7-07/12/2022	SE	C	7/12/2022	9:58	2	X													X						
4	SIB-SC-E24-7-8-07/12/2022	SE	C	7/12/2022	10:01	2	X													X						
5	SIB-SC-E24-8-9-07/12/2022	SE	C	7/12/2022	10:04	2	X													X						
6	SIB-SC-E24-9-10-07/12/2022	SE	C	7/12/2022	10:07	2	X													X						
7	SIB-SC-E24-10-11-07/12/2022	SE	C	7/12/2022	10:10	2	X													X						
8	SIB-SC-E24-11-12-07/12/2022	SE	C	7/12/2022	10:13	2	X													X						
9	SIB-SC-E24-12-13-07/12/2022	SE	C	7/12/2022	10:16	2	X													X						
10	SIB-SC-E23-0-1-07/12/2022	SE	C	7/12/2022	10:50	2	X													X						

SHIPMENT METHOD	AIRBILL NO.	SHIPPING DATE	NO. OF COOLERS	ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
					Joss Moore GHL	7/13/22	1200	[signature] ALS	7/13/22	1210
					[signature] ALS	7/13/22	1250	[signature] ALS	7/13/22	1250

SAMPLE CONDITION:

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

SAMPLE NOTES:

Additional Comments:

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER [signature] DATE Signed 7/13/22

Cooler Receipt and Preservation Form

407810 PM KC

Client HGL Service Request K22 07947

Received: 7/13/22 Opened: 7/13/22 By: AP Unloaded: 7/13/22 By: AP

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* (*Courier*) *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 2 front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
5.9		IR02					

4. Was a Temperature Blank present in cooler? NA (Y) N If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA (Y) N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. (NA) Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

6. Packing material: *Inserts* (*Baggies*) (*Bubble Wrap*) *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N
15. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? (NA) Y N Under filled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample-ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: _____

1/13/22

PM lcl

Cooler Receipt and Preservation Form

Client HGL Service Request K22 K2407810

Received: 7/13/22 Opened: 7/13/22 By: NP Unloaded: 7/13/22 By: NP

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* (*Courier*) *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 2 front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified if out of temp	Tracking Number (NA)	Filed
3.8		1R02	20722071355B-SED				
2.5		1R02	217				
5.4			3 of 7				
3.3			5 of 7				
2.9		√	6 of 7				

4. Was a Temperature Blank present in cooler? NA (Y) N If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA (Y) N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. (NA) Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

6. Packing material: *Inserts* (*Baggies*) (*Bubble Wrap*) *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N
15. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? (NA) Y N Under filled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: _____

1/13/22

~~K2208387~~
K2407810

orbislogic HGL

ALS
Kelso, WA

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately

Page: 11 of 11

COC Number: 20220727-SIB-SED

Company: HydroGeoLogic, Inc	Report To: Andrea Fletcher	Requested Due Date:	Quote Reference:
Address: 6340 Glenwood, Blding 7, Ste. 200	Copy To: Jeff Gadt	*TAT:	Project Manager:
Overland Park, KS 66202	Invoice To: Jeff Gadt	Standard TAT	Project #: DT2002.03.03.01.01
Phone: 913-488-0024 Fax: 913-317-8860	jgadt@hgl.com		Matrix: SEDIMENT
Email Address: afletcher@hgl.com	Project Name: HGL-SIB-PDI		Sampling Team Members:
	Project Number: DT2002.03.03.01.01	State Location: OR	Orbislogic: 503-320-1796

Valid Matrix Codes

Matrix	Code
Soil	SO
Sediment	SE
Surface Water	SW
Wastewater	WW
Groundwater	GW
Stormwater	ST

Requested Analysis: N N N N N N N N N ← Filtered (Y/N)

ITEM NUMBER	SAMPLE ID	MATRIX CODE	SAMPLE TYPE G = Grab C = Composite	DATE COLLECTED MM/DD/YYYY	TIME COLLECTED (Military time)	# Containers	Unpreserved	Deionized water	HNO3	HCl	NaOH	Na2S2O3	Methanol	Diesel (NWTPH0Dx)	SVOCs (8270D)	PAHs (8270-SIM)	Pesticides (SVM)	Tributyltin	TOC	Archive	MS/MSD					REMARKS / Lab ID
1	SIB-SC-J06-4-5-07/26/2022	SE	C	7/26/2022	14:42	2	X							X	X	X	X	X	X							
2	SIB-SC-J06-5-6-07/26/2022	SE	C	7/26/2022	14:45	2	X							X	X	X	X	X	X							
3	SIB-SC-J06-6-7-07/26//2022	SE	C	7/26/2022	14:48	1	X													X						
4	SIB-SC-J06-7-8-07/26//2022	SE	C	7/26/2022	14:51	1	X													X						
5	SIB-SC-J06-8-9-07/26//2022	SE	C	7/26/2022	14:54	1	X													X						
6	SIB-SC-J06-9-10-07/26//2022	SE	C	7/26/2022	14:57	1	X													X						
7	SIB-SC-J06-10-11-07/26/2022	SE	C	7/26/2022	15:00	1	X													X						
8	SIB-SC-J06-11-11.5-07/26/2022	SE	C	7/26/2022	15:03	1	X													X						
9		SE	C	7/26/2022																						
10		SE	C	7/26/2022																						

131 132 133 134 135 136

SHIPMENT METHOD	AIRBILL NO	SHIPPING DATE	NO. OF COOLERS	ITEM #	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
			5		Joss Moore MM	7/27/22	1000	[signature] ALS	7/27/22	10:22
					[signature] ALS	7/27/22	1340	[signature] ALS	7/27/22	1340

SAMPLE CONDITION: **SAMPLE NOTES:**

Temp in C	
Received on Ice	Y / N
Sealed Cooler	Y / N
Sample Intact	Y / N

Additional Comments:

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joss Moore (Orbislogic)

SIGNATURE of SAMPLER: [signature]

DATE Signed: 7/27/22

K2407810 PM KL

Cooler Receipt and Preservation Form

Client HGL Service Request K22 08387

Received: 7/27/22 Opened: 7/27/22 By: AR Unloaded: 7/27/22 By: AR

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 2 front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp Indicate with "X"	PM Notified If out of temp	COC# Tracking Number NA	Filed
2.5		IR07	7 of 6			20220727-STB-SGD	
4.4		IR07	5 of 6				
1.9		IR07	3 of 6				
3.2		IR07	6 of 6				
2.4		IR07	1 of 6			✓	

4. Was a Temperature Blank present in cooler? NA (Y) N If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA (Y) N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. (NA) Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

6. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N
15. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? (NA) Y N Under filled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: _____

1/13/22 *Page* *of*

Total Solids

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Analytical Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	07/12/22 - 07/26/22
Sample Matrix:	Sediment	**Date Received:**	07/13/22 - 07/27/22
Analysis Method:	160.3 Modified	**Units:**	Percent
Prep Method:	None	**Basis:**	As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
SIB-SC-E24-7-8-07/12/2022	K2407810-001	**52.4**	-	-	1	07/31/24 11:27	
SIB-SC-E24-8-9-07/12/2022	K2407810-002	**50.7**	-	-	1	07/31/24 11:27	
SIB-SC-E24-9-10-07/12/2022	K2407810-003	**50.5**	-	-	1	07/31/24 11:27	
SIB-SC-J06-8-9-07/26/2022	K2407810-004	**60.2**	-	-	1	07/31/24 11:27	

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QA/QC Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	07/12/22
Sample Matrix:	Sediment	**Date Received:**	07/13/22
		Date Analyzed:	07/31/24

Replicate Sample Summary
Inorganic Parameters

Sample Name:	SIB-SC-E24-7-8-07/12/2022	**Units:**	Percent
Lab Code:	K2407810-001	**Basis:**	As Received

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample K2407810-001DUP Result	Average	RPD	RPD Limit
Solids, Total	160.3 Modified	-	52.4	50.9	51.7	3	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Organochlorine Pesticides by GC/MS/MS

ALS Environmental—Kelso Laboratory
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Analytical Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	07/12/22 10:01
Sample Matrix:	Sediment	**Date Received:**	07/13/22 12:50
Sample Name:	SIB-SC-E24-7-8-07/12/2022	**Units:**	ug/Kg
Lab Code:	K2407810-001	**Basis:**	Dry

Organochlorine Pesticides by GC/MS/MS

Analysis Method: 1699M
Prep Method: EPA 3541

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aldrin	ND U	0.19	0.15	1	08/06/24 16:26	8/1/24	
gamma-BHC (Lindane)	ND U	0.19	0.058	1	08/06/24 16:26	8/1/24	
cis-Chlordane	**0.18 J**	0.37	0.12	1	08/06/24 16:26	8/1/24	
trans-Chlordane	**0.48**	0.37	0.12	1	08/06/24 16:26	8/1/24	
2,4'-DDD	ND U	0.19	0.12	1	08/06/24 16:26	8/1/24	
4,4'-DDD	**6.1**	0.19	0.065	1	08/06/24 16:26	8/1/24	
2,4'-DDE	**0.48**	0.19	0.15	1	08/06/24 16:26	8/1/24	
4,4'-DDE	**5.0**	0.19	0.13	1	08/06/24 16:26	8/1/24	
2,4'-DDT	ND U	0.19	0.18	1	08/06/24 16:26	8/1/24	*
4,4'-DDT	ND U	0.19	0.088	1	08/06/24 16:26	8/1/24	*
Dieldrin	ND U	0.093	0.021	1	08/06/24 16:26	8/1/24	
cis-Nonachlor	ND U	0.19	0.19	1	08/06/24 16:26	8/1/24	
trans-Nonachlor	**0.17 J**	0.37	0.11	1	08/06/24 16:26	8/1/24	
Oxychlordane	ND U	0.37	0.25	1	08/06/24 16:26	8/1/24	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
S_Aldrin-13C12	32	12 - 88	08/06/24 16:26	
S_4,4'DDD-d4	62	9 - 159	08/06/24 16:26	
S_4,4'-DDT-d4	108	5 - 187	08/06/24 16:26	
S_Endrin-13C12	130	14 - 141	08/06/24 16:26	
S_GBHCD6	16	5 - 90	08/06/24 16:26	
S_Oxychlordane-13C10	29	5 - 86	08/06/24 16:26	

Analytical Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	07/12/22 10:04
Sample Matrix:	Sediment	**Date Received:**	07/13/22 12:50
Sample Name:	SIB-SC-E24-8-9-07/12/2022	**Units:**	ug/Kg
Lab Code:	K2407810-002	**Basis:**	Dry

Organochlorine Pesticides by GC/MS/MS

Analysis Method: 1699M
Prep Method: EPA 3541

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aldrin	ND	U	0.19	0.16	1	08/06/24 16:44	8/1/24	
gamma-BHC (Lindane)	ND	U	0.19	0.061	1	08/06/24 16:44	8/1/24	
cis-Chlordane	**0.20**	**J**	0.39	0.13	1	08/06/24 16:44	8/1/24	
trans-Chlordane	**0.85**		0.39	0.13	1	08/06/24 16:44	8/1/24	
2,4'-DDD	ND	U	0.19	0.13	1	08/06/24 16:44	8/1/24	
4,4'-DDD	ND	U	0.19	0.068	1	08/06/24 16:44	8/1/24	
2,4'-DDE	**0.70**		0.19	0.16	1	08/06/24 16:44	8/1/24	
4,4'-DDE	**5.6**		0.19	0.14	1	08/06/24 16:44	8/1/24	
2,4'-DDT	ND	U	0.19	0.19	1	08/06/24 16:44	8/1/24	*
4,4'-DDT	ND	U	0.19	0.091	1	08/06/24 16:44	8/1/24	*
Dieldrin	ND	U	0.097	0.022	1	08/06/24 16:44	8/1/24	
cis-Nonachlor	ND	U	0.19	0.19	1	08/06/24 16:44	8/1/24	
trans-Nonachlor	**0.19**	**J**	0.39	0.12	1	08/06/24 16:44	8/1/24	
Oxychlordane	ND	U	0.39	0.26	1	08/06/24 16:44	8/1/24	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
S_Aldrin-13C12	53	12 - 88	08/06/24 16:44	
S_4,4'DDD-d4	76	9 - 159	08/06/24 16:44	
S_4,4'-DDT-d4	56	5 - 187	08/06/24 16:44	
S_Endrin-13C12	156	14 - 141	08/06/24 16:44	*
S_GBHCD6	30	5 - 90	08/06/24 16:44	
S_Oxychlordane-13C10	36	5 - 86	08/06/24 16:44	

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Analytical Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	07/12/22 10:07
Sample Matrix:	Sediment	**Date Received:**	07/13/22 12:50
Sample Name:	SIB-SC-E24-9-10-07/12/2022	**Units:**	ug/Kg
Lab Code:	K2407810-003	**Basis:**	Dry

Organochlorine Pesticides by GC/MS/MS

Analysis Method: 1699M
Prep Method: EPA 3541

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aldrin	ND	U	0.20	0.16	1	08/06/24 17:02	8/1/24	
gamma-BHC (Lindane)	ND	U	0.20	0.061	1	08/06/24 17:02	8/1/24	
cis-Chlordane	**0.18**	**J**	0.39	0.13	1	08/06/24 17:02	8/1/24	
trans-Chlordane	**0.65**		0.39	0.13	1	08/06/24 17:02	8/1/24	
2,4'-DDD	ND	U	0.20	0.13	1	08/06/24 17:02	8/1/24	
4,4'-DDD	ND	U	0.20	0.069	1	08/06/24 17:02	8/1/24	
2,4'-DDE	**0.39**		0.20	0.16	1	08/06/24 17:02	8/1/24	
4,4'-DDE	**4.6**		0.20	0.14	1	08/06/24 17:02	8/1/24	
2,4'-DDT	ND	U	0.20	0.19	1	08/06/24 17:02	8/1/24	*
4,4'-DDT	ND	U	0.20	0.092	1	08/06/24 17:02	8/1/24	*
Dieldrin	ND	U	0.098	0.022	1	08/06/24 17:02	8/1/24	
cis-Nonachlor	ND	U	0.20	0.19	1	08/06/24 17:02	8/1/24	
trans-Nonachlor	**0.13**	**J**	0.39	0.12	1	08/06/24 17:02	8/1/24	
Oxychlordane	ND	U	0.39	0.26	1	08/06/24 17:02	8/1/24	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
S_Aldrin-13C12	29	12 - 88	08/06/24 17:02	
S_4,4'DDD-d4	89	9 - 159	08/06/24 17:02	
S_4,4'-DDT-d4	76	5 - 187	08/06/24 17:02	
S_Endrin-13C12	172	14 - 141	08/06/24 17:02	*
S_GBHCD6	23	5 - 90	08/06/24 17:02	
S_Oxychlordane-13C10	32	5 - 86	08/06/24 17:02	

Analytical Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	07/26/22 14:54
Sample Matrix:	Sediment	**Date Received:**	07/27/22 13:40
Sample Name:	SIB-SC-J06-8-9-07/26/2022	**Units:**	ug/Kg
Lab Code:	K2407810-004	**Basis:**	Dry

Organochlorine Pesticides by GC/MS/MS

Analysis Method: 1699M
Prep Method: EPA 3541

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aldrin	ND U	0.16	0.13	1	08/06/24 17:21	8/1/24	
gamma-BHC (Lindane)	ND U	0.16	0.052	1	08/06/24 17:21	8/1/24	
cis-Chlordane	**0.57**	0.33	0.11	1	08/06/24 17:21	8/1/24	
trans-Chlordane	**2.1**	0.33	0.11	1	08/06/24 17:21	8/1/24	
2,4'-DDD	**30**	1.6	1.1	10	08/20/24 19:49	8/1/24	
4,4'-DDD	**84**	1.6	0.58	10	08/20/24 19:49	8/1/24	
2,4'-DDE	**1.6**	0.16	0.13	1	08/06/24 17:21	8/1/24	
4,4'-DDE	**29**	1.6	1.2	10	08/20/24 19:49	8/1/24	
2,4'-DDT	ND U	0.16	0.16	1	08/06/24 17:21	8/1/24	*
4,4'-DDT	ND U	0.16	0.078	1	08/06/24 17:21	8/1/24	*
Dieldrin	ND U	0.082	0.019	1	08/06/24 17:21	8/1/24	
cis-Nonachlor	ND U	0.16	0.16	1	08/06/24 17:21	8/1/24	
trans-Nonachlor	**0.44**	0.33	0.096	1	08/06/24 17:21	8/1/24	
Oxychlordane	ND U	0.33	0.22	1	08/06/24 17:21	8/1/24	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
S_Aldrin-13C12	35	12 - 88	08/06/24 17:21	
S_4,4'DDD-d4	96	9 - 159	08/06/24 17:21	
S_4,4'-DDT-d4	1334	5 - 187	08/06/24 17:21	*
S_Endrin-13C12	165	14 - 141	08/06/24 17:21	*
S_GBHCD6	29	5 - 90	08/06/24 17:21	
S_Oxychlordane-13C10	30	5 - 86	08/06/24 17:21	

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Analytical Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KQ2411800-04	**Basis:**	Dry

Organochlorine Pesticides by GC/MS/MS

Analysis Method: 1699M
Prep Method: EPA 3541

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
Aldrin	ND U	0.095	0.079	1	08/06/24 12:46	8/1/24	
gamma-BHC (Lindane)	ND U	0.095	0.031	1	08/06/24 12:46	8/1/24	
cis-Chlordane	ND U	0.19	0.062	1	08/06/24 12:46	8/1/24	
trans-Chlordane	ND U	0.19	0.064	1	08/06/24 12:46	8/1/24	
2,4'-DDD	ND U	0.095	0.063	1	08/06/24 12:46	8/1/24	
4,4'-DDD	ND U	0.095	0.035	1	08/06/24 12:46	8/1/24	
2,4'-DDE	ND U	0.095	0.079	1	08/06/24 12:46	8/1/24	
4,4'-DDE	ND U	0.095	0.070	1	08/06/24 12:46	8/1/24	
2,4'-DDT	ND U	0.095	0.094	1	08/06/24 12:46	8/1/24	
4,4'-DDT	ND U	0.095	0.047	1	08/06/24 12:46	8/1/24	
Dieldrin	ND U	0.048	0.011	1	08/06/24 12:46	8/1/24	
cis-Nonachlor	ND U	0.097	0.097	1	08/06/24 12:46	8/1/24	
trans-Nonachlor	ND U	0.19	0.058	1	08/06/24 12:46	8/1/24	
Oxychlordane	ND U	0.20	0.13	1	08/06/24 12:46	8/1/24	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
S_Aldrin-13C12	44	12 - 88	08/06/24 12:46	
S_4,4'DDD-d4	50	9 - 159	08/06/24 12:46	
S_4,4'-DDT-d4	48	5 - 187	08/06/24 12:46	
S_Endrin-13C12	73	14 - 141	08/06/24 12:46	
S_GBHCD6	28	5 - 90	08/06/24 12:46	
S_Oxychlordane-13C10	44	5 - 86	08/06/24 12:46	

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01
Sample Matrix: Sediment

SURROGATE RECOVERY SUMMARY
Organochlorine Pesticides by GC/MS/MS

Analysis Method: 1699M
Extraction Method: EPA 3541

Sample Name	Lab Code	S_4,4'DDD-d4 9 - 159	S_4,4'-DDT-d4 5 - 187	S_Aldrin-13C12 12 - 88
SIB-SC-E24-7-8-07/12/2022	K2407810-001	62	108	32
SIB-SC-E24-8-9-07/12/2022	K2407810-002	76	56	53
SIB-SC-E24-9-10-07/12/2022	K2407810-003	89	76	29
SIB-SC-J06-8-9-07/26/2022	K2407810-004	96	1334 *	35
SIB-SC-E24-7-8-07/12/2022 MS	KQ2411800-01	86	95	45
SIB-SC-E24-7-8-07/12/2022 DMS	KQ2411800-02	73	243 *	45
Lab Control Sample	KQ2411800-03	60	52	50
Method Blank	KQ2411800-04	50	48	44

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01
Sample Matrix: Sediment

SURROGATE RECOVERY SUMMARY
Organochlorine Pesticides by GC/MS/MS

Analysis Method: 1699M
Extraction Method: EPA 3541

Sample Name	Lab Code	S_Endrin-13C12 14 - 141	S_GBHCD6 5 - 90	S_Oxychlordane-13C10 5 - 86
SIB-SC-E24-7-8-07/12/2022	K2407810-001	130	16	29
SIB-SC-E24-8-9-07/12/2022	K2407810-002	156 *	30	36
SIB-SC-E24-9-10-07/12/2022	K2407810-003	172 *	23	32
SIB-SC-J06-8-9-07/26/2022	K2407810-004	165 *	29	30
SIB-SC-E24-7-8-07/12/2022	KQ2411800-01	157 *	33	49
SIB-SC-E24-7-8-07/12/2022	KQ2411800-02	134	27	50
Lab Control Sample	KQ2411800-03	88	32	45
Method Blank	KQ2411800-04	73	28	44

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QA/QC Report

Client: HydroGeoLogic, Inc. (HGL) **Service Request:**K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01 **Date Analyzed:**08/06/24 10:25

Internal Standard Area and RT SUMMARY
Organochlorine Pesticides by GC/MS/MS

File ID: J:\MS42\Data\080624\080624F005.D **Lab Code:**KQ2412943-01
Instrument ID: K-MS-42 **Analysis Lot:**851162
Analysis Method: 1699M **Signal ID:**1

		Pyrene-d10	
		Area	**RT**
	Result ==>	24,454,030	8.778
	Upper Limit ==>	48,908,061	9.28
	Lower Limit ==>	12,227,015	8.28
Associated Analyses			
Method Blank	KQ2411800-04	37162275	8.765
Lab Control Sample	KQ2411800-03	37451566	8.762
SIB-SC-E24-7-8-07/12/2022MS	KQ2411800-01	25382232	8.785
SIB-SC-E24-7-8-07/12/2022DMS	KQ2411800-02	29654247	8.791
SIB-SC-E24-7-8-07/12/2022	K2407810-001	46159105	8.791
SIB-SC-E24-8-9-07/12/2022	K2407810-002	16325829	8.832
SIB-SC-E24-9-10-07/12/2022	K2407810-003	38549367	8.798
SIB-SC-J06-8-9-07/26/2022	K2407810-004	28861913	8.845

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QA/QC Report

Client: HydroGeoLogic, Inc. (HGL) **Service Request:**K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01 **Date Analyzed:**08/20/24 15:13

Internal Standard Area and RT SUMMARY
Organochlorine Pesticides by GC/MS/MS

File ID: J:\MS47\data\082024\082024F015.D **Lab Code:**KQ2413061-01
Instrument ID: K-MS-47 **Analysis Lot:**851396
Analysis Method: 1699M **Signal ID:**1

		Pyrene-d10	
		Area	**RT**
	Result ==>	9,947,083	9.716
	Upper Limit ==>	19,894,167	10.22
	Lower Limit ==>	4,973,542	9.22
Associated Analyses			
SIB-SC-J06-8-9-07/26/2022	K2407810-004	74101549*	9.722

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	07/12/22
Sample Matrix:	Sediment	**Date Received:**	07/13/22
		Date Analyzed:	08/6/24
		Date Extracted:	08/1/24

Duplicate Matrix Spike Summary
Organochlorine Pesticides by GC/MS/MS

Sample Name:	SIB-SC-E24-7-8-07/12/2022	**Units:**	ug/Kg
Lab Code:	K2407810-001	**Basis:**	Dry
Analysis Method:	1699M		
Prep Method:	EPA 3541		

		Matrix Spike KQ2411800-01			**Duplicate Matrix Spike** KQ2411800-02					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Aldrin	ND U	33.3 E	3.73	892 *	26.4 E	3.64	723 *	41-137	23	40
gamma-BHC (Lindane)	ND U	3.51	3.73	94	3.11	3.64	85	60-109	12	40
cis-Chlordane	0.18 J	2.99	3.73	75	2.56	3.64	65	60-124	16	40
trans-Chlordane	0.48	3.46	3.73	80	3.70	3.64	88	64-128	7	40
2,4'-DDD	ND U	5.11	3.73	137 *	5.90	3.64	162 *	49-126	14	40
4,4'-DDD	6.1	9.47	3.73	91	12.0	3.64	163 *	56-122	24	40
2,4'-DDE	0.48	2.84	3.73	63	3.83	3.64	92	41-122	30	40
4,4'-DDE	5.0	7.47	3.73	67	8.43	3.64	95	39-130	12	40
2,4'-DDT	ND U	2.95	3.73	79	1.34	3.64	37 *	53-116	75*	40
4,4'-DDT	ND U	3.29	3.73	88	ND U	3.64	0 *	57-118	NC	40
Dieldrin	ND U	2.40	3.73	64	2.98	3.64	82	38-122	22	40
cis-Nonachlor	ND U	1.68	3.73	45 *	1.77	3.64	49 *	52-129	6	40
trans-Nonachlor	0.17 J	2.45	3.73	61	2.93	3.64	76	48-134	18	40
Oxychlordane	ND U	ND U	3.73	0 *	ND U	3.64	0 *	59-141	NC	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Analyzed:**	08/06/24
Sample Matrix:	Sediment	**Date Extracted:**	08/01/24

Lab Control Sample Summary
Organochlorine Pesticides by GC/MS/MS

Analysis Method:	1699M	**Units:**	ug/Kg
Prep Method:	EPA 3541	**Basis:**	Dry
		Analysis Lot:	851162

Lab Control Sample
KQ2411800-03

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
2,4'-DDD	2.23	2.00	111	49-126
2,4'-DDE	1.78	2.00	89	41-122
2,4'-DDT	2.48	2.00	124 *	53-116
4,4'-DDD	2.29	2.00	115	56-122
4,4'-DDE	2.09	2.00	104	39-130
4,4'-DDT	2.89	2.00	144 *	57-118
Aldrin	1.86	2.00	93	41-137
cis-Chlordane	1.91	2.00	95	60-124
cis-Nonachlor	1.89	2.00	94	52-129
Dieldrin	1.38	2.00	69	38-122
gamma-BHC (Lindane)	2.01	2.00	101	60-109
Oxychlordane	2.23	2.00	111	59-141
trans-Chlordane	2.04	2.00	102	64-128
trans-Nonachlor	1.65	2.00	82	48-134

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Analyzed:**	08/06/24 12:46
Sample Matrix:	Sediment	**Date Extracted:**	08/01/24

Method Blank Summary
Organochlorine Pesticides by GC/MS/MS

Sample Name:	Method Blank	**Instrument ID:**	K-MS-42
Lab Code:	KQ2411800-04	**File ID:**	J:\MS42\Data\080624\080624F008.D
Analysis Method:	1699M	**Analysis Lot:**	851162,851396
Prep Method:	EPA 3541	**Extraction Lot:**	442451

This Method Blank applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Lab Control Sample	KQ2411800-03	J:\MS42\Data\080624\080624F010.D	08/06/24 13:23
SIB-SC-E24-7-8-07/12/2022MS	KQ2411800-01	J:\MS42\Data\080624\080624F013.D	08/06/24 14:17
SIB-SC-E24-7-8-07/12/2022DMS	KQ2411800-02	J:\MS42\Data\080624\080624F014.D	08/06/24 14:36
SIB-SC-E24-7-8-07/12/2022	K2407810-001	J:\MS42\Data\080624\080624F020.D	08/06/24 16:26
SIB-SC-E24-8-9-07/12/2022	K2407810-002	J:\MS42\Data\080624\080624F021.D	08/06/24 16:44
SIB-SC-E24-9-10-07/12/2022	K2407810-003	J:\MS42\Data\080624\080624F022.D	08/06/24 17:02
SIB-SC-J06-8-9-07/26/2022	K2407810-004	J:\MS42\Data\080624\080624F023.D	08/06/24 17:21
SIB-SC-J06-8-9-07/26/2022	K2407810-004	J:\MS47\data\082024\082024F029.D	08/20/24 19:49

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Analyzed:**	08/06/24 13:23
Sample Matrix:	Sediment	**Date Extracted:**	08/01/24

Lab Control Sample Summary
Organochlorine Pesticides by GC/MS/MS

Sample Name:	Lab Control Sample	**Instrument ID:**	K-MS-42
Lab Code:	KQ2411800-03	**File ID:**	J:\MS42\Data\080624\080624F010.D
Analysis Method:	1699M	**Analysis Lot:**	851162,851396
Prep Method:	EPA 3541	**Extraction Lot:**	442451

This Lab Control Sample applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Method Blank	KQ2411800-04	J:\MS42\Data\080624\080624F008.D	08/06/24 12:46
SIB-SC-E24-7-8-07/12/2022MS	KQ2411800-01	J:\MS42\Data\080624\080624F013.D	08/06/24 14:17
SIB-SC-E24-7-8-07/12/2022DMS	KQ2411800-02	J:\MS42\Data\080624\080624F014.D	08/06/24 14:36
SIB-SC-E24-7-8-07/12/2022	K2407810-001	J:\MS42\Data\080624\080624F020.D	08/06/24 16:26
SIB-SC-E24-8-9-07/12/2022	K2407810-002	J:\MS42\Data\080624\080624F021.D	08/06/24 16:44
SIB-SC-E24-9-10-07/12/2022	K2407810-003	J:\MS42\Data\080624\080624F022.D	08/06/24 17:02
SIB-SC-J06-8-9-07/26/2022	K2407810-004	J:\MS42\Data\080624\080624F023.D	08/06/24 17:21
SIB-SC-J06-8-9-07/26/2022	K2407810-004	J:\MS47\data\082024\082024F029.D	08/20/24 19:49

Client: HydroGeoLogic, Inc. (HGL) **Service Request:**K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01 **Date Analyzed:**08/06/24 10:25

Tune Summary
Organochlorine Pesticides by GC/MS/MS

File ID: J:\MS42\Data\080624\080624F005.D **Analytical Method:** 1699M
Instrument ID: K-MS-42 **Analysis Lot:** 851162

Sample Name	Lab Code	File ID:	Date Analyzed:	Q
Continuing Calibration Verification	KQ2412943-01	J:\MS42\Data\080624\080624F005.D	08/06/24 10:25	
Method Blank	KQ2411800-04	J:\MS42\Data\080624\080624F008.D	08/06/24 12:46	
Lab Control Sample	KQ2411800-03	J:\MS42\Data\080624\080624F010.D	08/06/24 13:23	
SIB-SC-E24-7-8-07/12/2022	KQ2411800-01	J:\MS42\Data\080624\080624F013.D	08/06/24 14:17	
SIB-SC-E24-7-8-07/12/2022	KQ2411800-02	J:\MS42\Data\080624\080624F014.D	08/06/24 14:36	
SIB-SC-E24-7-8-07/12/2022	K2407810-001	J:\MS42\Data\080624\080624F020.D	08/06/24 16:26	
SIB-SC-E24-8-9-07/12/2022	K2407810-002	J:\MS42\Data\080624\080624F021.D	08/06/24 16:44	
SIB-SC-E24-9-10-07/12/2022	K2407810-003	J:\MS42\Data\080624\080624F022.D	08/06/24 17:02	
SIB-SC-J06-8-9-07/26/2022	K2407810-004	J:\MS42\Data\080624\080624F023.D	08/06/24 17:21	

Client: HydroGeoLogic, Inc. (HGL) **Service Request:**K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01 **Date Analyzed:**08/20/24 15:13

Tune Summary
Organochlorine Pesticides by GC/MS/MS

File ID: J:\MS47\data\082024\082024F015.D **Analytical Method:** 1699M
Instrument ID: K-MS-47 **Analysis Lot:** 851396

Sample Name	Lab Code	File ID:	Date Analyzed:	Q
Continuing Calibration Verification	KQ2413061-01	J:\MS47\data\082024\082024F015.D	08/20/24 15:13	
SIB-SC-J06-8-9-07/26/2022	K2407810-004	J:\MS47\data\082024\082024F029.D	08/20/24 19:49	

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 7/24/2024

Initial Calibration Summary
Organochlorine Pesticides by GC/MS/MS

Calibration ID: KC2400368 **Signal ID:** 1
Instrument ID: K-MS-42

#	Lab Code	Sample Name	File Location	Acquisition Date
01	KC2400368-01	OC PEST ICAL 0.5ppb SVM71-30A	J:\MS42\Data\072424\072424F011.D	07/24/2024 17:27
02	KC2400368-02	OC PEST ICAL 1ppb SVM71-30B	J:\MS42\Data\072424\072424F012.D	07/24/2024 17:46
03	KC2400368-03	OC PEST ICAL 2ppb SVM71-30C	J:\MS42\Data\072424\072424F013.D	07/24/2024 18:04
04	KC2400368-04	OC PEST ICAL 5ppb SVM71-30D	J:\MS42\Data\072424\072424F014.D	07/24/2024 18:22
05	KC2400368-05	OC PEST ICAL 10ppb SVM71-30E	J:\MS42\Data\072424\072424F015.D	07/24/2024 18:41
06	KC2400368-06	OC PEST ICAL 20ppb SVM71-30F	J:\MS42\Data\072424\072424F016.D	07/24/2024 18:59
07	KC2400368-07	OC PEST ICAL 40ppb SVM71-30G	J:\MS42\Data\072424\072424F017.D	07/24/2024 19:17
08	KC2400368-08	OC PEST ICAL 60ppb SVM71-30H	J:\MS42\Data\072424\072424F018.D	07/24/2024 19:35
09	KC2400368-09	OC PEST ICAL 80ppb SVM71-30I	J:\MS42\Data\072424\072424F019.D	07/24/2024 19:54
10	KC2400368-10	OC PEST ICAL 100ppb SVM71-30J	J:\MS42\Data\072424\072424F020.D	07/24/2024 20:12

Analyte

2,4'-DDD

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.136	02	1	1.443	03	2	1.391	04	5	1.408
05	10	1.685	06	20	1.438	07	40	1.447	08	60	1.609
09	80	1.364	10	100	1.436						

2,4'-DDE

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.487	02	1	1.901	03	2	1.772	04	5	1.888
05	10	1.767	06	20	1.737	07	40	1.722	08	60	2.161
09	80	1.789	10	100	1.646						

2,4'-DDT

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.295	02	1	1.277	03	2	1.354	04	5	1.337
05	10	1.282	06	20	1.621	07	40	1.702	08	60	1.58
09	80	1.561	10	100	1.631						

4,4'-DDD

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	0.8916	02	1	1.001	03	2	0.9416	04	5	1.061
05	10	1.057	06	20	1.108	07	40	1.183	08	60	1.096
09	80	1.125	10	100	1.12						

4,4'-DDE

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.015	02	1	1.256	03	2	1.247	04	5	1.296
05	10	1.527	06	20	1.347	07	40	1.154	08	60	1.494
09	80	1.243	10	100	1.153						

4,4'-DDT

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	0.952	02	1	0.9839	03	2	1.049	04	5	1.033
05	10	1.166	06	20	1.196	07	40	1.291	08	60	1.129

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 7/24/2024

Initial Calibration Summary
Organochlorine Pesticides by GC/MS/MS

Calibration ID: KC2400368 **Signal ID:** 1
Instrument ID: K-MS-42

Analyte

4,4'-DDT

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
09	80	1.229	10	100	1.288						

Aldrin

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	3.278	02	1	2.043	03	2	1.273	04	5	0.7442
05	10	0.6697	06	20	0.5124	07	40	0.5407	08	60	0.5349
09	80	0.5317	10	100	0.5436						

Dieldrin

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	2.111	02	1	1.893	03	2	1.901	04	5	1.998
05	10	2.184	06	20	2.419	07	40	2.4	08	60	2.738
09	80	2.365	10	100	2.284						

Oxychlordane

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	2.403	02	1	2.386	03	2	2.425	04	5	2.557
05	10	2.867	06	20	2.564	07	40	2.701	08	60	2.427
09	80	2.716	10	100	2.799						

S_4,4'-DDT-d4

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	5	1.356	02	5	1.294	03	5	1.237	04	5	1.34
05	5	1.382	06	5	1.276	07	5	1.214	08	5	1.322
09	5	1.24	10	5	1.379						

S_4,4'DDD-d4

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	5	2.512	02	5	1.956	03	5	1.987	04	5	1.958
05	5	1.913	06	5	2.158	07	5	1.949	08	5	2.169
09	5	2.082	10	5	2.487						

S_Aldrin-13C12

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	20	0.7065	02	20	0.5844	03	20	0.6021	04	20	0.6077
05	20	0.4581	06	20	0.6418	07	20	0.4343	08	20	0.6096
09	20	0.4454	10	20	0.4724						

S_Endrin-13C12

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	20	0.101	02	20	0.08823	03	20	0.08548	04	20	0.08305
05	20	0.08447	06	20	0.08084	07	20	0.07179	08	20	0.09306
09	20	0.07273	10	20	0.09194						

S_GBHCD6

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	20	1.445	02	20	1.355	03	20	1.239	04	20	1.413

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 7/24/2024

Initial Calibration Summary
Organochlorine Pesticides by GC/MS/MS

Calibration ID: KC2400368 **Signal ID:** 1
Instrument ID: K-MS-42

Analyte

S_GBHCD6

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
05	20	1.054	06	20	1.475	07	20	1.086	08	20	1.636
09	20	0.9896	10	20	1.102						

S_Oxychlordane-13C10

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	20	0.3783	02	20	0.3498	03	20	0.3413	04	20	0.348
05	20	0.2861	06	20	0.3963	07	20	0.3115	08	20	0.4846
09	20	0.2987	10	20	0.3402						

cis-Chlordane

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.217	02	1	1.215	03	2	1.181	04	5	1.307
05	10	1.29	06	20	1.237	07	40	1.387	08	60	1.175
09	80	1.379	10	100	1.323						

cis-Nonachlor

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	0.8416	02	1	0.7046	03	2	0.6859	04	5	0.7547
05	10	0.8189	06	20	0.7534	07	40	0.882	08	60	0.6652
09	80	0.8162	10	100	0.8507						

gamma-BHC (Lindane)

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.129	02	1	1.069	03	2	1.031	04	5	1.094
05	10	1.154	06	20	1.175	07	40	1.17	08	60	1.299
09	80	1.45	10	100	1.488						

trans-Chlordane

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.001	02	1	1.092	03	2	0.9821	04	5	1.045
05	10	1.123	06	20	1.005	07	40	1.109	08	60	0.9635
09	80	1.116	10	100	1.071						

trans-Nonachlor

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	0.9079	02	1	0.7766	03	2	0.8748	04	5	0.8876
05	10	0.9846	06	20	0.8824	07	40	0.934	08	60	0.8282
09	80	0.9087	10	100	1.057						

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 7/24/2024

Initial Calibration Summary
Organochlorine Pesticides by GC/MS/MS

Calibration ID: KC2400368 **Signal ID:** 1
Instrument ID: K-MS-42

		Calibration Evaluation				Calibration Evaluation	
Analyte Name	Compound Type	Fit Type	Eval	Eval Result	Control Criteria	Average RRF	Minimum RRF
2,4'-DDD	TRG	Average RF	% RSD	10.1	≤20	1.436	0.01
2,4'-DDE	TRG	Average RF	% RSD	9.9	≤20	1.787	0.01
2,4'-DDT	TRG	Average RF	% RSD	11.5	≤20	1.464	0.01
4,4'-DDD	TRG	Average RF	% RSD	8.5	≤20	1.059	0.01
4,4'-DDE	TRG	Average RF	% RSD	12.2	≤20	1.273	0.01
4,4'-DDT	TRG	Average RF	% RSD	10.8	≤20	1.132	0.01
Aldrin	TRG	Quadratic	COD	0.9995	≥	1.067	0.01
Dieldrin	TRG	Average RF	% RSD	11.9	≤20	2.229	0.01
Oxychlordane	TRG	Average RF	% RSD	6.8	≤20	2.584	0.01
S_4,4'-DDT-d4	SURR	Average RF	% RSD	4.7	≤	1.304	0.01
S_4,4'DDD-d4	SURR	Average RF	% RSD	10.4	≤	2.117	0.01
S_Aldrin-13C12	SURR	Average RF	% RSD	17.2	≤	0.5562	0.01
S_Endrin-13C12	SURR	Average RF	% RSD	10.5	≤	0.08525	0.01
S_GBHCD6	SURR	Average RF	% RSD	16.9	≤	1.28	0.01
S_Oxychlordane-13C10	SURR	Average RF	% RSD	16.1	≤	0.3535	0.01
cis-Chlordane	TRG	Average RF	% RSD	6.1	≤20	1.271	0.01
cis-Nonachlor	TRG	Average RF	% RSD	9.7	≤20	0.7773	0.01
gamma-BHC (Lindane)	TRG	Average RF	% RSD	13.0	≤20	1.206	0.01
trans-Chlordane	TRG	Average RF	% RSD	5.7	≤20	1.051	0.01
trans-Nonachlor	TRG	Average RF	% RSD	8.6	≤20	0.9042	0.01

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 8/20/2024

Initial Calibration Summary
Organochlorine Pesticides by GC/MS/MS

Calibration ID: KC2400398 **Signal ID:** 1
Instrument ID: K-MS-47

#	Lab Code	Sample Name	File Location	Acquisition Date
01	KC2400398-01	OC PEST ICAL 0.5ppb SVM71-99A	J:\MS47\data\082024\082024F005.D	08/20/2024 11:55
02	KC2400398-02	OC PEST ICAL 1ppb SVM71-99B	J:\MS47\data\082024\082024F006.D	08/20/2024 12:15
03	KC2400398-03	OC PEST ICAL 2ppb SVM71-99C	J:\MS47\data\082024\082024F007.D	08/20/2024 12:35
04	KC2400398-04	OC PEST ICAL 5ppb SVM71-99D	J:\MS47\data\082024\082024F008.D	08/20/2024 12:54
05	KC2400398-05	OC PEST ICAL 10ppb SVM71-99E	J:\MS47\data\082024\082024F009.D	08/20/2024 13:14
06	KC2400398-06	OC PEST ICAL 20ppb SVM71-99F	J:\MS47\data\082024\082024F010.D	08/20/2024 13:34
07	KC2400398-07	OC PEST ICAL 40ppb SVM71-99G	J:\MS47\data\082024\082024F011.D	08/20/2024 13:54
08	KC2400398-08	OC PEST ICAL 60ppb SVM71-99H	J:\MS47\data\082024\082024F012.D	08/20/2024 14:13
09	KC2400398-09	OC PEST ICAL 80ppb SVM71-99I	J:\MS47\data\082024\082024F013.D	08/20/2024 14:33
10	KC2400398-10	OC PEST ICAL 100ppb SVM71-99J	J:\MS47\data\082024\082024F014.D	08/20/2024 14:53

Analyte

2,4'-DDD

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.109	02	1	1.22	03	2	1.19	04	5	1.202
05	10	1.297	06	20	1.356	07	40	1.228	08	60	1.345
09	80	1.306	10	100	1.297						

2,4'-DDE

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.7	02	1	1.777	03	2	1.689	04	5	1.694
05	10	1.995	06	20	1.806	07	40	1.698	08	60	1.924
09	80	1.849	10	100	1.793						

2,4'-DDT

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	0.8975	02	1	1.336	03	2	1.379	04	5	1.317
05	10	1.548	06	20	1.445	07	40	1.357	08	60	1.488
09	80	1.552	10	100	1.484						

4,4'-DDD

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	0.8605	02	1	0.9244	03	2	0.8942	04	5	0.9377
05	10	1.052	06	20	1.07	07	40	0.9822	08	60	1.149
09	80	1.102	10	100	1.119						

4,4'-DDE

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.117	02	1	1.298	03	2	1.251	04	5	1.273
05	10	1.357	06	20	1.475	07	40	1.388	08	60	1.391
09	80	1.358	10	100	1.438						

4,4'-DDT

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.149	02	1	1.062	03	2	1.159	04	5	1.152
05	10	1.161	06	20	1.2	07	40	1.188	08	60	1.162

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 8/20/2024

Initial Calibration Summary
Organochlorine Pesticides by GC/MS/MS

Calibration ID: KC2400398 **Signal ID:** 1
Instrument ID: K-MS-47

Analyte

4,4'-DDT

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
09	80	1.199	10	100	1.209						

Aldrin

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	4.484	02	1	2.304	03	2	1.56	04	5	1.076
05	10	0.8878	06	20	0.7691	07	40	0.7457	08	60	0.7447
09	80	0.7134	10	100	0.6801						

Dieldrin

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.645	02	1	1.799	03	2	1.784	04	5	1.847
05	10	2.086	06	20	2.177	07	40	2.175	08	60	2.405
09	80	2.371	10	100	2.598						

Oxychlordane

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	1.941	02	1	2.253	03	2	2.335	04	5	2.319
05	10	2.578	06	20	2.541	07	40	2.512	08	60	2.567
09	80	2.756	10	100	2.808						

S_4,4'-DDT-d4

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	5	1.561	02	5	1.385	03	5	1.224	04	5	1.453
05	5	1.373	06	5	1.393	07	5	1.331	08	5	1.409
09	5	1.394	10	5	1.435						

S_4,4'DDD-d4

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	5	2.477	02	5	2.642	03	5	2.405	04	5	2.711
05	5	2.629	06	5	2.652	07	5	2.653	08	5	2.743
09	5	2.973	10	5	3.019						

S_Aldrin-13C12

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	20	0.9557	02	20	1.075	03	20	0.9125	04	20	0.9855
05	20	0.9999	06	20	0.9878	07	20	0.8948	08	20	0.9415
09	20	1.011	10	20	0.9605						

S_Endrin-13C12

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	20	0.177	02	20	0.1857	03	20	0.1626	04	20	0.1784
05	20	0.1719	06	20	0.1661	07	20	0.1634	08	20	0.1638
09	20	0.1696	10	20	0.1555						

S_GBHCD6

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	20	1.78	02	20	1.864	03	20	1.591	04	20	1.758

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 8/20/2024

Initial Calibration Summary
Organochlorine Pesticides by GC/MS/MS

Calibration ID: KC2400398 **Signal ID:** 1
Instrument ID: K-MS-47

Analyte

S_GBHCD6

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
05	20	1.757	06	20	1.622	07	20	1.534	08	20	1.623
09	20	1.686	10	20	1.569						

S_Oxychlordane-13C10

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	20	0.5287	02	20	0.5418	03	20	0.4865	04	20	0.5497
05	20	0.5355	06	20	0.5127	07	20	0.4865	08	20	0.5163
09	20	0.5198	10	20	0.495						

cis-Chlordane

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	3.053	02	1	3.223	03	2	3.225	04	5	3.234
05	10	3.737	06	20	3.785	07	40	3.787	08	60	3.862
09	80	3.949	10	100	3.859						

cis-Nonachlor

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	0.7789	02	1	0.7803	03	2	0.7948	04	5	0.842
05	10	0.9388	06	20	0.9483	07	40	0.9358	08	60	1.006
09	80	0.951	10	100	1.039						

gamma-BHC (Lindane)

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	2.13	02	1	2.283	03	2	2.356	04	5	2.538
05	10	2.723	06	20	2.634	07	40	2.673	08	60	2.75
09	80	2.868	10	100	2.834						

trans-Nonachlor

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	0.5	0.9436	02	1	1.088	03	2	1.086	04	5	1.09
05	10	1.253	06	20	1.291	07	40	1.416	08	60	1.373
09	80	1.356	10	100	1.487						

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 8/20/2024

Initial Calibration Summary
Organochlorine Pesticides by GC/MS/MS

Calibration ID: KC2400398 **Signal ID:** 1
Instrument ID: K-MS-47

		Calibration Evaluation				Calibration Evaluation	
Analyte Name	Compound Type	Fit Type	Eval	Eval Result	Control Criteria	Average RRF	Minimum RRF
2,4'-DDD	TRG	Average RF	% RSD	6.2	≤20	1.255	0.01
2,4'-DDE	TRG	Average RF	% RSD	5.9	≤20	1.792	0.01
2,4'-DDT	TRG	Average RF	% RSD	13.7	≤20	1.38	0.01
4,4'-DDD	TRG	Average RF	% RSD	10.1	≤20	1.009	0.01
4,4'-DDE	TRG	Average RF	% RSD	7.8	≤20	1.335	0.01
4,4'-DDT	TRG	Average RF	% RSD	3.6	≤20	1.164	0.01
Aldrin	TRG	Quadratic	COD	0.9992	≥	1.396	0.01
Dieldrin	TRG	Average RF	% RSD	15.0	≤20	2.089	0.01
Oxychlordane	TRG	Average RF	% RSD	10.4	≤20	2.461	0.01
S_4,4'-DDT-d4	SURR	Average RF	% RSD	6.2	≤	1.396	0.01
S_4,4'DDD-d4	SURR	Average RF	% RSD	7.1	≤	2.69	0.01
S_Aldrin-13C12	SURR	Average RF	% RSD	5.3	≤	0.9724	0.01
S_Endrin-13C12	SURR	Average RF	% RSD	5.3	≤	0.1694	0.01
S_GBHCD6	SURR	Average RF	% RSD	6.4	≤	1.679	0.01
S_Oxychlordane-13C10	SURR	Average RF	% RSD	4.3	≤	0.5173	0.01
cis-Chlordane	TRG	Average RF	% RSD	9.6	≤20	3.571	0.01
cis-Nonachlor	TRG	Average RF	% RSD	10.6	≤20	0.9016	0.01
gamma-BHC (Lindane)	TRG	Average RF	% RSD	9.6	≤20	2.579	0.01
trans-Nonachlor	TRG	Average RF	% RSD	14.3	≤20	1.238	0.01

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 7/24/2024

Initial Calibration Verification Summary
Organochlorine Pesticides by GC/MS/MS

Calibration ID: KC2400368 **Signal ID:** 1
Instrument ID: K-MS-42

#	Lab Code	Sample Name	File Location	Acquisition Date
11	KC2400368-11	OC PEST ICV 20ppb SVM71-30K	J:\MS42\Data\072424\072424F021.D	07/24/2024 20:30

Analyte Name	Expected	Result	Average RF	SSV RF	% D	Criteria	Curve Fit
Aldrin	20.0	20.3	1.067E0	5.635E-1	1.37	±30	Quadratic
gamma-BHC (Lindane)	20.0	21.7	1.206E0	1.306E0	8.34	±30	Average RF
cis-Chlordane	20.0	17.0	1.271E0	1.083E0	-14.804	±30	Average RF
trans-Chlordane	20.0	16.2	1.051E0	8.514E-1	-18.984	±30	Average RF
2,4'-DDD	20.0	19.9	1.436E0	1.425E0	-0.740	±30	Average RF
4,4'-DDD	20.0	18.0	1.059E0	9.545E-1	-9.828	±30	Average RF
2,4'-DDE	20.0	23.3	1.787E0	2.079E0	16.35	±30	Average RF
4,4'-DDE	20.0	20.3	1.273E0	1.295E0	1.75	±30	Average RF
2,4'-DDT	20.0	19.7	1.464E0	1.445E0	-1.281	±30	Average RF
4,4'-DDT	20.0	19.4	1.132E0	1.1E0	-2.777	±30	Average RF
Dieldrin	20.0	16.2	2.229E0	1.81E0	-18.794	±30	Average RF
cis-Nonachlor	20.0	16.7	7.773E-1	6.487E-1	-16.546	±30	Average RF
trans-Nonachlor	20.0	16.8	9.042E-1	7.603E-1	-15.918	±30	Average RF
Oxychlordane	20.0	20.2	2.584E0	2.609E0	0.965	±30	Average RF

Analyte Name	Expected	Result	Average RF	SSV RF	Rec.	Criteria	Curve Fit
S_Aldrin-13C12	20.0	18.4	5.562E-1	5.111E-1	92.0	50-200	Average RF
S_4,4'DDD-d4	5.00	4.39	2.117E0	1.859E0	87.8	50-200	Average RF
S_4,4'-DDT-d4	5.00	4.59	1.304E0	1.196E0	91.8	50-200	Average RF
S_Endrin-13C12	20.0	19.7	8.525E-2	8.417E-2	98.5	50-200	Average RF
S_GBHCD6	20.0	19.5	1.28E0	1.249E0	97.5	50-200	Average RF
S_Oxychlordane-13C10	20.0	22.2	3.535E-1	3.916E-1	111	50-200	Average RF

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 8/20/2024

Initial Calibration Verification Summary
Organochlorine Pesticides by GC/MS/MS

Calibration ID: KC2400398 **Signal ID:** 1
Instrument ID: K-MS-47

#	Lab Code	Sample Name	File Location	Acquisition Date
11	KC2400398-11	OC PEST ICV 20ppb SVM71-99K	J:\MS47\data\082024\082024F015.D	08/20/2024 15:13

Analyte Name	Expected	Result	Average RF	SSV RF	% D	Criteria	Curve Fit
Aldrin	20.0	17.1	1.396E0	6.978E-1	-14.478	±30	Quadratic
gamma-BHC (Lindane)	20.0	19.2	2.579E0	2.479E0	-3.886	±30	Average RF
cis-Chlordane	20.0	19.4	3.571E0	3.456E0	-3.231	±30	Average RF
2,4'-DDD	20.0	19.0	1.255E0	1.193E0	-4.955	±30	Average RF
4,4'-DDD	20.0	18.1	1.009E0	9.134E-1	-9.469	±30	Average RF
2,4'-DDE	20.0	18.9	1.792E0	1.698E0	-5.274	±30	Average RF
4,4'-DDE	20.0	17.8	1.335E0	1.184E0	-11.247	±30	Average RF
2,4'-DDT	20.0	22.0	1.38E0	1.52E0	10.09	±30	Average RF
4,4'-DDT	20.0	21.0	1.164E0	1.222E0	4.99	±30	Average RF
Dieldrin	20.0	18.3	2.089E0	1.913E0	-8.435	±30	Average RF
cis-Nonachlor	20.0	21.1	9.016E-1	9.53E-1	5.70	±30	Average RF
trans-Nonachlor	20.0	21.8	1.238E0	1.353E0	9.24	±30	Average RF
Oxychlordane	20.0	19.8	2.461E0	2.432E0	-1.188	±30	Average RF

Analyte Name	Expected	Result	Average RF	SSV RF	Rec.	Criteria	Curve Fit
S_Aldrin-13C12	20.0	23.3	9.724E-1	1.133E0	117	50-200	Average RF
S_4,4'DDD-d4	5.00	5.76	2.69E0	3.097E0	115	50-200	Average RF
S_4,4'-DDT-d4	5.00	4.65	1.396E0	1.298E0	93.0	50-200	Average RF
S_Endrin-13C12	20.0	20.2	1.694E-1	1.714E-1	101	50-200	Average RF
S_GBHCD6	20.0	23.6	1.679E0	1.979E0	118	50-200	Average RF
S_Oxychlordane-13C10	20.0	22.0	5.173E-1	5.688E-1	110	50-200	Average RF

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01 **Date Analyzed:** 08/06/24 10:25

Continuing Calibration Verification (CCV) Summary
Organochlorine Pesticides by GC/MS/MS

Analysis Method: 1699M **Calibration Date:** 7/24/2024
File ID: J:\MS42\Data\080624\080624F005.D **Calibration ID:** KC2400368
Signal ID: 1 **Analysis Lot:** 851162
Units: ng/ml

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
Aldrin	20.0	20.3	1.0671	0.5634	NA	1.3	±25	Quadratic
gamma-BHC (Lindane)	20.0	17.7	1.2059	1.0668	-11.5	NA	±25	Average RF
cis-Chlordane	20.0	19.2	1.2711	1.2195	-4.1	NA	±25	Average RF
trans-Chlordane	20.0	21.2	1.0509	1.1127	5.9	NA	±25	Average RF
2,4'-DDD	20.0	21.6	1.4356	1.5539	8.2	NA	±25	Average RF
4,4'-DDD	20.0	21.3	1.0585	1.1257	6.3	NA	±25	Average RF
2,4'-DDE	20.0	18.5	1.7871	1.6502	-7.7	NA	±25	Average RF
4,4'-DDE	20.0	20.4	1.2731	1.2961	1.8	NA	±25	Average RF
2,4'-DDT	20.0	19.0	1.4639	1.3933	-4.8	NA	±25	Average RF
4,4'-DDT	20.0	19.0	1.1316	1.0735	-5.1	NA	±25	Average RF
Dieldrin	20.0	20.6	2.2292	2.3016	3.2	NA	±25	Average RF
cis-Nonachlor	20.0	20.5	0.7773	0.7985	2.7	NA	±25	Average RF
trans-Nonachlor	20.0	18.8	0.9042	0.8505	-5.9	NA	±25	Average RF
Oxychlordane	20.0	23.7	2.5845	3.0644	18.6	NA	±25	Average RF

Analyte Name	Expected	Result	Average RF	CCV RF	Rec.	% Drift	Criteria	Curve Fit
S_Aldrin-13C12	20.0	17.0	0.5562	0.4724	84.9	NA	50-200	Average RF
S_4,4'DDD-d4	5.00	4.65	2.1172	1.967	92.9	NA	50-200	Average RF
S_4,4'-DDT-d4	5.00	5.72	1.3039	1.4914	114	NA	50-200	Average RF
S_Endrin-13C12	20.0	19.1	0.0853	0.0813	95.4	NA	50-200	Average RF
S_GBHCD6	20.0	17.2	1.2796	1.1013	86.1	NA	50-200	Average RF
S_Oxychlordane-13C10	20.0	16.9	0.3535	0.2981	84.3	NA	50-200	Average RF

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01 **Date Analyzed:** 08/20/24 15:13

Continuing Calibration Verification (CCV) Summary
Organochlorine Pesticides by GC/MS/MS

Analysis Method: 1699M **Calibration Date:** 8/20/2024
File ID: J:\MS47\data\082024\082024F015.D **Calibration ID:** KC2400398
Signal ID: 1 **Analysis Lot:** 851396
Units: ng/ml

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
Aldrin	20.0	17.1	1.3965	0.6978	NA	-14.5	±25	Quadratic
gamma-BHC (Lindane)	20.0	19.2	2.5789	2.4783	-3.9	NA	±25	Average RF
cis-Chlordane	20.0	19.4	3.5713	3.4559	-3.2	NA	±25	Average RF
2,4'-DDD	20.0	19.0	1.2552	1.193	-5.0	NA	±25	Average RF
4,4'-DDD	20.0	18.1	1.009	0.9134	-9.5	NA	±25	Average RF
2,4'-DDE	20.0	18.9	1.7925	1.6979	-5.3	NA	±25	Average RF
4,4'-DDE	20.0	17.8	1.3345	1.1844	-11.2	NA	±25	Average RF
2,4'-DDT	20.0	22.0	1.3803	1.5196	10.1	NA	±25	Average RF
4,4'-DDT	20.0	21.0	1.1641	1.2222	5.0	NA	±25	Average RF
Dieldrin	20.0	18.3	2.0887	1.9125	-8.4	NA	±25	Average RF
cis-Nonachlor	20.0	21.1	0.9016	0.953	5.7	NA	±25	Average RF
trans-Nonachlor	20.0	21.8	1.2383	1.3527	9.2	NA	±25	Average RF
Oxychlordane	20.0	19.8	2.4612	2.432	-1.2	NA	±25	Average RF

Analyte Name	Expected	Result	Average RF	CCV RF	Rec.	% Drift	Criteria	Curve Fit
S_Aldrin-13C12	20.0	23.3	0.9724	1.1327	116	NA	50-200	Average RF
S_4,4'DDD-d4	5.00	5.76	2.6903	3.0967	115	NA	50-200	Average RF
S_4,4'-DDT-d4	5.00	4.65	1.3958	1.2978	93.0	NA	50-200	Average RF
S_Endrin-13C12	20.0	20.2	0.1694	0.1714	101	NA	50-200	Average RF
S_GBHCD6	20.0	23.6	1.6785	1.979	118	NA	50-200	Average RF
S_Oxychlordane-13C10	20.0	22.0	0.5173	0.5688	110	NA	50-200	Average RF

Client: HydroGeoLogic, Inc. (HGL) **Service Request:**K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01

Analysis Run Log
Organochlorine Pesticides by GC/MS/MS

Analysis Method: 1699M **Analysis Lot:**851162
Instrument ID:K-MS-42

Raw Data File	Sample Name	Lab Code	Date Analyzed	Time Analyzed	Q
J:\MS42\Data\080624\080624F005.D	Continuing Calibration Verification	KQ2412943-01	8/6/2024	10:25	
J:\MS42\Data\080624\080624F008.D	Method Blank	KQ2411800-04	8/6/2024	12:46	
J:\MS42\Data\080624\080624F009.D	ZZZZZZZ	ZZZZZZZ	8/6/2024	13:04	
J:\MS42\Data\080624\080624F010.D	Lab Control Sample	KQ2411800-03	8/6/2024	13:23	
J:\MS42\Data\080624\080624F011.D	ZZZZZZZ	ZZZZZZZ	8/6/2024	13:41	
J:\MS42\Data\080624\080624F012.D	ZZZZZZZ	ZZZZZZZ	8/6/2024	13:59	
J:\MS42\Data\080624\080624F013.D	SIB-SC-E24-7-8-07/12/2022 MS	KQ2411800-01	8/6/2024	14:17	
J:\MS42\Data\080624\080624F014.D	SIB-SC-E24-7-8-07/12/2022 DMS	KQ2411800-02	8/6/2024	14:36	
J:\MS42\Data\080624\080624F016.D	ZZZZZZZ	ZZZZZZZ	8/6/2024	15:12	
J:\MS42\Data\080624\080624F017.D	ZZZZZZZ	ZZZZZZZ	8/6/2024	15:31	
J:\MS42\Data\080624\080624F018.D	ZZZZZZZ	ZZZZZZZ	8/6/2024	15:49	
J:\MS42\Data\080624\080624F019.D	ZZZZZZZ	ZZZZZZZ	8/6/2024	16:07	
J:\MS42\Data\080624\080624F020.D	SIB-SC-E24-7-8-07/12/2022	K2407810-001	8/6/2024	16:26	
J:\MS42\Data\080624\080624F021.D	SIB-SC-E24-8-9-07/12/2022	K2407810-002	8/6/2024	16:44	
J:\MS42\Data\080624\080624F022.D	SIB-SC-E24-9-10-07/12/2022	K2407810-003	8/6/2024	17:02	
J:\MS42\Data\080624\080624F023.D	SIB-SC-J06-8-9-07/26/2022	K2407810-004	8/6/2024	17:21	

Client: HydroGeoLogic, Inc. (HGL) **Service Request:**K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01

Analysis Run Log
Organochlorine Pesticides by GC/MS/MS

Analysis Method: 1699M **Analysis Lot:**851396
Instrument ID:K-MS-47

Raw Data File	Sample Name	Lab Code	Date Analyzed	Time Analyzed	Q
J:\MS47\data\082024\082024F015.D	Continuing Calibration Verification	KQ2413061-01	8/20/2024	15:13	
J:\MS47\data\082024\082024F018.D	ZZZZZZZ	ZZZZZZZ	8/20/2024	16:12	
J:\MS47\data\082024\082024F019.D	ZZZZZZZ	ZZZZZZZ	8/20/2024	16:31	
J:\MS47\data\082024\082024F020.D	ZZZZZZZ	ZZZZZZZ	8/20/2024	16:51	
J:\MS47\data\082024\082024F021.D	ZZZZZZZ	ZZZZZZZ	8/20/2024	17:11	
J:\MS47\data\082024\082024F023.D	ZZZZZZZ	ZZZZZZZ	8/20/2024	17:50	
J:\MS47\data\082024\082024F024.D	ZZZZZZZ	ZZZZZZZ	8/20/2024	18:10	
J:\MS47\data\082024\082024F025.D	ZZZZZZZ	ZZZZZZZ	8/20/2024	18:30	
J:\MS47\data\082024\082024F026.D	ZZZZZZZ	ZZZZZZZ	8/20/2024	18:50	
J:\MS47\data\082024\082024F027.D	ZZZZZZZ	ZZZZZZZ	8/20/2024	19:09	
J:\MS47\data\082024\082024F028.D	ZZZZZZZ	ZZZZZZZ	8/20/2024	19:29	
J:\MS47\data\082024\082024F029.D	SIB-SC-J06-8-9-07/26/2022	K2407810-004	8/20/2024	19:49	

Prep Summary Report

Client: HydroGeoLogic, Inc. (HGL) **Service Request:**K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01
Sample Matrix: Sediment

Organochlorine Pesticides by GC/MS/MS

Prep Method: EPA 3541 **Extraction Lot:** 442451
Analytical Method: 1699M **Extraction Date:** 08/01/24 12:33

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
SIB-SC-E24-7-8-07/12/2022	K2407810-001	7/12/22	7/13/22	10.279 g	1 mL	52.4
SIB-SC-E24-8-9-07/12/2022	K2407810-002	7/12/22	7/13/22	10.190 g	1 mL	50.7
SIB-SC-E24-9-10-07/12/2022	K2407810-003	7/12/22	7/13/22	10.129 g	1 mL	50.5
SIB-SC-J06-8-9-07/26/2022	K2407810-004	7/26/22	7/27/22	10.096 g	1 mL	60.2
Matrix Spike	KQ2411800-01MS	7/12/22	7/13/22	10.227 g	1 mL	52.4
Duplicate Matrix Spike	KQ2411800-02DMS	7/12/22	7/13/22	10.475 g	1 mL	52.4
Lab Control Sample	KQ2411800-03LCS	NA	NA	10 g	1 mL	
Method Blank	KQ2411800-04MB	NA	NA	10.4750 g	1 mL	

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	07/12/22 10:01
Sample Matrix:	Sediment	**Date Received:**	07/13/22 12:50
Sample Name:	SIB-SC-E24-7-8-07/12/2022	**Units:**	ug/Kg
Lab Code:	K2407810-001	**Basis:**	Dry

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3546

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	**93**	9.5	0.71	1	08/05/24 13:20	8/1/24	
Acenaphthene	**260**	9.5	0.57	1	08/05/24 13:20	8/1/24	
Acenaphthylene	**71**	9.5	0.54	1	08/05/24 13:20	8/1/24	
Anthracene	**190**	9.5	0.55	1	08/05/24 13:20	8/1/24	
Benz(a)anthracene	**480**	9.5	0.44	1	08/05/24 13:20	8/1/24	
Benzo(a)pyrene	**440**	9.5	0.72	1	08/05/24 13:20	8/1/24	*
Benzo(b)fluoranthene	**480**	9.5	0.72	1	08/05/24 13:20	8/1/24	
Benzo(g,h,i)perylene	**250**	9.5	0.76	1	08/05/24 13:20	8/1/24	
Benzo(k)fluoranthene	**180**	9.5	0.46	1	08/05/24 13:20	8/1/24	
Chrysene	**730**	9.5	0.59	1	08/05/24 13:20	8/1/24	
Dibenz(a,h)anthracene	**72**	9.5	0.44	1	08/05/24 13:20	8/1/24	
Fluoranthene	**1100**	9.5	1.2	1	08/05/24 13:20	8/1/24	
Fluorene	**310**	9.5	1.1	1	08/05/24 13:20	8/1/24	
Indeno(1,2,3-cd)pyrene	**270**	9.5	0.69	1	08/05/24 13:20	8/1/24	
Naphthalene	**170**	9.5	0.89	1	08/05/24 13:20	8/1/24	
Phenanthrene	**1600**	9.5	1.2	1	08/05/24 13:20	8/1/24	
Pyrene	**1200**	9.5	0.61	1	08/05/24 13:20	8/1/24	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	95	28 - 112	08/05/24 13:20	
Fluorene-d10	87	34 - 106	08/05/24 13:20	
Terphenyl-d14	82	32 - 122	08/05/24 13:20	

Analytical Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	07/12/22 10:04
Sample Matrix:	Sediment	**Date Received:**	07/13/22 12:50
Sample Name:	SIB-SC-E24-8-9-07/12/2022	**Units:**	ug/Kg
Lab Code:	K2407810-002	**Basis:**	Dry

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3546

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	**220**	9.8	0.73	1	08/05/24 13:47	8/1/24	
Acenaphthene	**550**	9.8	0.59	1	08/05/24 13:47	8/1/24	
Acenaphthylene	**150**	9.8	0.55	1	08/05/24 13:47	8/1/24	
Anthracene	**460**	9.8	0.57	1	08/05/24 13:47	8/1/24	
Benz(a)anthracene	**610**	9.8	0.45	1	08/05/24 13:47	8/1/24	
Benzo(a)pyrene	**530**	9.8	0.75	1	08/05/24 13:47	8/1/24	*
Benzo(b)fluoranthene	**510**	9.8	0.75	1	08/05/24 13:47	8/1/24	
Benzo(g,h,i)perylene	**300**	9.8	0.79	1	08/05/24 13:47	8/1/24	
Benzo(k)fluoranthene	**150**	9.8	0.47	1	08/05/24 13:47	8/1/24	
Chrysene	**1000**	9.8	0.61	1	08/05/24 13:47	8/1/24	
Dibenz(a,h)anthracene	**94**	9.8	0.45	1	08/05/24 13:47	8/1/24	
Fluoranthene	**920**	9.8	1.3	1	08/05/24 13:47	8/1/24	
Fluorene	**930**	9.8	1.2	1	08/05/24 13:47	8/1/24	
Indeno(1,2,3-cd)pyrene	**290**	9.8	0.71	1	08/05/24 13:47	8/1/24	
Naphthalene	**130**	9.8	0.92	1	08/05/24 13:47	8/1/24	
Phenanthrene	**3200**	9.8	1.2	1	08/05/24 13:47	8/1/24	
Pyrene	**1500**	9.8	0.63	1	08/05/24 13:47	8/1/24	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	93	28 - 112	08/05/24 13:47	
Fluorene-d10	94	34 - 106	08/05/24 13:47	
Terphenyl-d14	80	32 - 122	08/05/24 13:47	

Analytical Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	07/12/22 10:07
Sample Matrix:	Sediment	**Date Received:**	07/13/22 12:50
Sample Name:	SIB-SC-E24-9-10-07/12/2022	**Units:**	ug/Kg
Lab Code:	K2407810-003	**Basis:**	Dry

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3546

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	**300**	9.5	0.71	1	08/05/24 14:14	8/1/24	
Acenaphthene	**260**	9.5	0.57	1	08/05/24 14:14	8/1/24	
Acenaphthylene	**89**	9.5	0.53	1	08/05/24 14:14	8/1/24	
Anthracene	**240**	9.5	0.55	1	08/05/24 14:14	8/1/24	
Benz(a)anthracene	**300**	9.5	0.44	1	08/05/24 14:14	8/1/24	
Benzo(a)pyrene	**350**	9.5	0.72	1	08/05/24 14:14	8/1/24	*
Benzo(b)fluoranthene	**340**	9.5	0.72	1	08/05/24 14:14	8/1/24	
Benzo(g,h,i)perylene	**240**	9.5	0.76	1	08/05/24 14:14	8/1/24	
Benzo(k)fluoranthene	**110**	9.5	0.46	1	08/05/24 14:14	8/1/24	
Chrysene	**510**	9.5	0.59	1	08/05/24 14:14	8/1/24	
Dibenz(a,h)anthracene	**60**	9.5	0.44	1	08/05/24 14:14	8/1/24	
Fluoranthene	**600**	9.5	1.2	1	08/05/24 14:14	8/1/24	
Fluorene	**440**	9.5	1.1	1	08/05/24 14:14	8/1/24	
Indeno(1,2,3-cd)pyrene	**240**	9.5	0.69	1	08/05/24 14:14	8/1/24	
Naphthalene	**240**	9.5	0.89	1	08/05/24 14:14	8/1/24	
Phenanthrene	**1600**	9.5	1.2	1	08/05/24 14:14	8/1/24	
Pyrene	**850**	9.5	0.61	1	08/05/24 14:14	8/1/24	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	99	28 - 112	08/05/24 14:14	
Fluorene-d10	93	34 - 106	08/05/24 14:14	
Terphenyl-d14	86	32 - 122	08/05/24 14:14	

Analytical Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	07/26/22 14:54
Sample Matrix:	Sediment	**Date Received:**	07/27/22 13:40
Sample Name:	SIB-SC-J06-8-9-07/26/2022	**Units:**	ug/Kg
Lab Code:	K2407810-004	**Basis:**	Dry

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3546

Analyte Name	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	**350**	7.8	0.58	1	08/05/24 14:40	8/1/24	
Acenaphthene	**650**	7.8	0.47	1	08/05/24 14:40	8/1/24	
Acenaphthylene	**240**	7.8	0.44	1	08/05/24 14:40	8/1/24	
Anthracene	**1300**	7.8	0.46	1	08/05/24 14:40	8/1/24	
Benz(a)anthracene	**4700**	78	3.6	10	08/05/24 15:15	8/1/24	
Benzo(a)pyrene	**4300**	78	6.0	10	08/05/24 15:15	8/1/24	*
Benzo(b)fluoranthene	**4900**	78	6.0	10	08/05/24 15:15	8/1/24	
Benzo(g,h,i)perylene	**2100**	7.8	0.63	1	08/05/24 14:40	8/1/24	
Benzo(k)fluoranthene	**1500**	7.8	0.38	1	08/05/24 14:40	8/1/24	
Chrysene	**5600**	78	4.9	10	08/05/24 15:15	8/1/24	
Dibenz(a,h)anthracene	**700**	7.8	0.36	1	08/05/24 14:40	8/1/24	
Fluoranthene	**9400**	78	9.9	10	08/05/24 15:15	8/1/24	
Fluorene	**1300**	7.8	0.90	1	08/05/24 14:40	8/1/24	
Indeno(1,2,3-cd)pyrene	**2500**	7.8	0.57	1	08/05/24 14:40	8/1/24	
Naphthalene	**180**	7.8	0.74	1	08/05/24 14:40	8/1/24	
Phenanthrene	**9000**	78	9.3	10	08/05/24 15:15	8/1/24	
Pyrene	**10000**	78	5.1	10	08/05/24 15:15	8/1/24	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	92	28 - 112	08/05/24 15:15	
Fluorene-d10	96	34 - 106	08/05/24 14:40	
Terphenyl-d14	84	32 - 122	08/05/24 14:40	

Analytical Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KQ2411801-04	**Basis:**	Dry

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Prep Method: EPA 3546

Analyte Name	Result		MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	ND	U	4.7	0.37	1	08/05/24 11:33	8/1/24	
Acenaphthene	ND	U	4.7	0.30	1	08/05/24 11:33	8/1/24	
Acenaphthylene	ND	U	4.7	0.28	1	08/05/24 11:33	8/1/24	
Anthracene	ND	U	4.7	0.29	1	08/05/24 11:33	8/1/24	
Benz(a)anthracene	**0.35**	**J**	4.7	0.23	1	08/05/24 11:33	8/1/24	
Benzo(a)pyrene	ND	U	4.7	0.38	1	08/05/24 11:33	8/1/24	
Benzo(b)fluoranthene	ND	U	4.7	0.38	1	08/05/24 11:33	8/1/24	
Benzo(g,h,i)perylene	ND	U	4.7	0.40	1	08/05/24 11:33	8/1/24	
Benzo(k)fluoranthene	ND	U	4.7	0.24	1	08/05/24 11:33	8/1/24	
Chrysene	ND	U	4.7	0.31	1	08/05/24 11:33	8/1/24	
Dibenz(a,h)anthracene	ND	U	4.7	0.23	1	08/05/24 11:33	8/1/24	
Fluoranthene	ND	U	4.7	0.63	1	08/05/24 11:33	8/1/24	
Fluorene	ND	U	4.7	0.57	1	08/05/24 11:33	8/1/24	
Indeno(1,2,3-cd)pyrene	ND	U	4.7	0.36	1	08/05/24 11:33	8/1/24	
Naphthalene	**0.49**	**J**	4.7	0.47	1	08/05/24 11:33	8/1/24	
Phenanthrene	ND	U	4.7	0.59	1	08/05/24 11:33	8/1/24	
Pyrene	**0.36**	**J**	4.7	0.32	1	08/05/24 11:33	8/1/24	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Fluoranthene-d10	98	28 - 112	08/05/24 11:33	
Fluorene-d10	90	34 - 106	08/05/24 11:33	
Terphenyl-d14	85	32 - 122	08/05/24 11:33	

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01
Sample Matrix: Sediment

SURROGATE RECOVERY SUMMARY
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D
Extraction Method: EPA 3546

Sample Name	Lab Code	Fluoranthene-d10 28 - 112	Fluorene-d10 34 - 106	Terphenyl-d14 32 - 122
SIB-SC-E24-7-8-07/12/2022	K2407810-001	95	87	82
SIB-SC-E24-8-9-07/12/2022	K2407810-002	93	94	80
SIB-SC-E24-9-10-07/12/2022	K2407810-003	99	93	86
SIB-SC-J06-8-9-07/26/2022	K2407810-004	92	96	84
SIB-SC-E24-7-8-07/12/2022 MS	KQ2411801-01	99	82	79
SIB-SC-E24-7-8-07/12/2022 DMS	KQ2411801-02	86	82	74
Lab Control Sample	KQ2411801-03	96	85	87
Method Blank	KQ2411801-04	98	90	85

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: HydroGeoLogic, Inc. (HGL) **Service Request:**K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01 **Date Analyzed:**08/05/24 10:05

Internal Standard Area and RT SUMMARY
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

File ID: J:\MS14\DATA\080524\0805F002.D\ **Lab Code:**KQ2412273-02
Instrument ID: K-MS-14 **Analysis Lot:**849989
Analysis Method: 8270D **Signal ID:**1

		Acenaphthene-d10		Chrysene-d12		Naphthalene-d8	
		Area	**RT**	**Area**	**RT**	**Area**	**RT**
	Result ==>	136,308	6.18	322,421	9.92	279,198	4.57
	Upper Limit ==>	272,616	6.68	644,842	10.42	558,396	5.07
	Lower Limit ==>	68,154	5.68	161,211	9.42	139,599	4.07
Associated Analyses							
Method Blank	KQ2411801-04	146981	6.18	311041	9.91	272353	4.56
Lab Control Sample	KQ2411801-03	135558	6.18	276115	9.91	269812	4.56
SIB-SC-E24-7-8-07/12/2022MS	KQ2411801-01	124301	6.18	279653	9.93	261258	4.56
SIB-SC-E24-7-8-07/12/2022DMS	KQ2411801-02	126438	6.18	284343	9.93	258937	4.56
SIB-SC-E24-7-8-07/12/2022	K2407810-001	127467	6.19	280553	9.93	257911	4.56
SIB-SC-E24-8-9-07/12/2022	K2407810-002	122692	6.19	283332	9.94	244624	4.56
SIB-SC-E24-9-10-07/12/2022	K2407810-003	131921	6.19	288087	9.94	260636	4.57
SIB-SC-J06-8-9-07/26/2022	K2407810-004	125663	6.19	280445	9.96	226502	4.57
SIB-SC-J06-8-9-07/26/2022	K2407810-004	133697	6.19	256797	9.93	238346	4.58

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: HydroGeoLogic, Inc. (HGL) **Service Request:**K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01 **Date Analyzed:**08/05/24 10:05

Internal Standard Area and RT SUMMARY
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

File ID: J:\MS14\DATA\080524\0805F002.D\ **Lab Code:**KQ2412273-02
Instrument ID: K-MS-14 **Analysis Lot:**849989
Analysis Method: 8270D **Signal ID:**1

		Perylene-d12		Phenanthrene-d10	
		Area	**RT**	**Area**	**RT**
	Result ==>	381,000	12.92	249,760	7.43
	Upper Limit ==>	762,000	13.42	499,520	7.93
	Lower Limit ==>	190,500	12.42	124,880	6.93
Associated Analyses					
Method Blank	KQ2411801-04	339212	12.92	284281	7.43
Lab Control Sample	KQ2411801-03	313707	12.92	262466	7.43
SIB-SC-E24-7-8-07/12/2022MS	KQ2411801-01	335137	12.98	239923	7.43
SIB-SC-E24-7-8-07/12/2022DMS	KQ2411801-02	328125	13.00	256932	7.43
SIB-SC-E24-7-8-07/12/2022	K2407810-001	331456	13.00	258283	7.44
SIB-SC-E24-8-9-07/12/2022	K2407810-002	321745	13.03	259435	7.44
SIB-SC-E24-9-10-07/12/2022	K2407810-003	331075	13.01	265895	7.44
SIB-SC-J06-8-9-07/26/2022	K2407810-004	329316	13.06	258885	7.45
SIB-SC-J06-8-9-07/26/2022	K2407810-004	309910	12.98	256455	7.44

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Collected:**	07/12/22
Sample Matrix:	Sediment	**Date Received:**	07/13/22
		Date Analyzed:	08/5/24
		Date Extracted:	08/1/24

Duplicate Matrix Spike Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Sample Name:	SIB-SC-E24-7-8-07/12/2022	**Units:**	ug/Kg
Lab Code:	K2407810-001	**Basis:**	Dry
Analysis Method:	8270D		
Prep Method:	EPA 3546		

		Matrix Spike KQ2411801-01			**Duplicate Matrix Spike** KQ2411801-02					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
2-Methylnaphthalene	93	1050	943	102 *	726	940	67	28-98	37	40
Acenaphthene	260	842	943	62	866	940	65	30-101	3	40
Acenaphthylene	71	734	943	70	739	940	71	32-97	<1	40
Anthracene	190	940	943	79	982	940	84	27-116	4	40
Benz(a)anthracene	480	1090	943	65	1160	940	72	27-127	6	40
Benzo(a)pyrene	440	1230	943	83	1310	940	92	25-129	6	40
Benzo(b)fluoranthene	480	1110	943	67	1170	940	74	21-130	6	40
Benzo(g,h,i)perylene	250	879	943	67	890	940	68	17-130	1	40
Benzo(k)fluoranthene	180	895	943	76	901	940	77	22-126	<1	40
Chrysene	730	1290	943	59	1370	940	68	25-132	7	40
Dibenz(a,h)anthracene	72	854	943	83	879	940	86	32-116	3	40
Fluoranthene	1100	1590	943	53	1590	940	53	10-138	<1	40
Fluorene	310	985	943	72	1020	940	76	23-116	4	40
Indeno(1,2,3-cd)pyrene	270	1040	943	81	1100	940	88	17-138	6	40
Naphthalene	170	750	943	62	726	940	60	29-88	3	40
Phenanthrene	1600	1910	943	36	2060	940	52	10-128	8	40
Pyrene	1200	1590	943	38	1720	940	52	16-134	8	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Analyzed:**	08/05/24
Sample Matrix:	Sediment	**Date Extracted:**	08/01/24

Lab Control Sample Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method:	8270D	**Units:**	ug/Kg
Prep Method:	EPA 3546	**Basis:**	Dry
		Analysis Lot:	849989

Lab Control Sample
KQ2411801-03

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
2-Methylnaphthalene	366	500	73	43-92
Acenaphthene	362	500	72	44-95
Acenaphthylene	390	500	78	44-93
Anthracene	406	500	81	46-100
Benz(a)anthracene	442	500	88	52-105
Benzo(a)pyrene	503	500	101	52-111
Benzo(b)fluoranthene	455	500	91	52-114
Benzo(g,h,i)perylene	384	500	77	45-107
Benzo(k)fluoranthene	454	500	91	52-112
Chrysene	437	500	87	51-110
Dibenz(a,h)anthracene	463	500	93	44-110
Fluoranthene	424	500	85	49-102
Fluorene	398	500	80	45-98
Indeno(1,2,3-cd)pyrene	474	500	95	44-117
Naphthalene	358	500	72	42-88
Phenanthrene	376	500	75	41-99
Pyrene	406	500	81	48-104

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Analyzed:**	08/05/24 11:33
Sample Matrix:	Sediment	**Date Extracted:**	08/01/24

Method Blank Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Sample Name:	Method Blank	**Instrument ID:**	K-MS-14
Lab Code:	KQ2411801-04	**File ID:**	J:\MS14\DATA\080524\0805F005.D\
Analysis Method:	8270D	**Analysis Lot:**	849989
Prep Method:	EPA 3546	**Extraction Lot:**	442452

This Method Blank applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Lab Control Sample	KQ2411801-03	J:\MS14\DATA\080524\0805F006.D\	08/05/24 11:59
SIB-SC-E24-7-8-07/12/2022MS	KQ2411801-01	J:\MS14\DATA\080524\0805F007.D\	08/05/24 12:26
SIB-SC-E24-7-8-07/12/2022DMS	KQ2411801-02	J:\MS14\DATA\080524\0805F008.D\	08/05/24 12:53
SIB-SC-E24-7-8-07/12/2022	K2407810-001	J:\MS14\DATA\080524\0805F009.D\	08/05/24 13:20
SIB-SC-E24-8-9-07/12/2022	K2407810-002	J:\MS14\DATA\080524\0805F010.D\	08/05/24 13:47
SIB-SC-E24-9-10-07/12/2022	K2407810-003	J:\MS14\DATA\080524\0805F011.D\	08/05/24 14:14
SIB-SC-J06-8-9-07/26/2022	K2407810-004	J:\MS14\DATA\080524\0805F012.D\	08/05/24 14:40
SIB-SC-J06-8-9-07/26/2022	K2407810-004	J:\MS14\DATA\080524\0805F013.D\	08/05/24 15:15

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	HydroGeoLogic, Inc. (HGL)	**Service Request:**	K2407810
Project:	HGL-SIB-PDI/DT2002.03.03.01.01	**Date Analyzed:**	08/05/24 11:59
Sample Matrix:	Sediment	**Date Extracted:**	08/01/24

Lab Control Sample Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Sample Name:	Lab Control Sample	**Instrument ID:**	K-MS-14
Lab Code:	KQ2411801-03	**File ID:**	J:\MS14\DATA\080524\0805F006.D\
Analysis Method:	8270D	**Analysis Lot:**	849989
Prep Method:	EPA 3546	**Extraction Lot:**	442452

This Lab Control Sample applies to the following analyses.

Sample Name	Lab Code	File ID	Date Analyzed
Method Blank	KQ2411801-04	J:\MS14\DATA\080524\0805F005.D\	08/05/24 11:33
SIB-SC-E24-7-8-07/12/2022MS	KQ2411801-01	J:\MS14\DATA\080524\0805F007.D\	08/05/24 12:26
SIB-SC-E24-7-8-07/12/2022DMS	KQ2411801-02	J:\MS14\DATA\080524\0805F008.D\	08/05/24 12:53
SIB-SC-E24-7-8-07/12/2022	K2407810-001	J:\MS14\DATA\080524\0805F009.D\	08/05/24 13:20
SIB-SC-E24-8-9-07/12/2022	K2407810-002	J:\MS14\DATA\080524\0805F010.D\	08/05/24 13:47
SIB-SC-E24-9-10-07/12/2022	K2407810-003	J:\MS14\DATA\080524\0805F011.D\	08/05/24 14:14
SIB-SC-J06-8-9-07/26/2022	K2407810-004	J:\MS14\DATA\080524\0805F012.D\	08/05/24 14:40
SIB-SC-J06-8-9-07/26/2022	K2407810-004	J:\MS14\DATA\080524\0805F013.D\	08/05/24 15:15

Client: HydroGeoLogic, Inc. (HGL) **Service Request:**K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01 **Date Analyzed:**08/05/24 09:39

Tune Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

File ID: J:\MS14\DATA\080524\0805F001.D\ **Analytical Method:** 8270D
Instrument ID: K-MS-14 **Analysis Lot:** 849989

Target Mass	Relative to Mass	Lower Limit %	Upper Limit %	Relative Abundance %	Raw Abundance	Result Pass/Fail
51	198	10	80	24.6	499012	Pass
68	69	0	2	0.5	2781	Pass
69	198	0	100	27.1	548941	Pass
70	69	0	2	0.5	2680	Pass
127	198	10	80	41.4	839868	Pass
197	198	0	2	0.8	16617	Pass
198	442	30	100	40.1	2027349	Pass
199	198	5	9	7.4	150749	Pass
275	198	10	60	40.3	817621	Pass
365	442	1	50	2.7	136789	Pass
441	443	0.01	100	73.6	874240	Pass
442	442	30	100	100.0	5061632	Pass
443	442	15	24	23.5	1187584	Pass

Sample Name	Lab Code	File ID:	Date Analyzed:	Q
Continuing Calibration Verification	KQ2412273-02	J:\MS14\DATA\080524\0805F002.D\	08/05/24 10:05	
Method Blank	KQ2411801-04	J:\MS14\DATA\080524\0805F005.D\	08/05/24 11:33	
Lab Control Sample	KQ2411801-03	J:\MS14\DATA\080524\0805F006.D\	08/05/24 11:59	
SIB-SC-E24-7-8-07/12/2022	KQ2411801-01	J:\MS14\DATA\080524\0805F007.D\	08/05/24 12:26	
SIB-SC-E24-7-8-07/12/2022	KQ2411801-02	J:\MS14\DATA\080524\0805F008.D\	08/05/24 12:53	
SIB-SC-E24-7-8-07/12/2022	K2407810-001	J:\MS14\DATA\080524\0805F009.D\	08/05/24 13:20	
SIB-SC-E24-8-9-07/12/2022	K2407810-002	J:\MS14\DATA\080524\0805F010.D\	08/05/24 13:47	
SIB-SC-E24-9-10-07/12/2022	K2407810-003	J:\MS14\DATA\080524\0805F011.D\	08/05/24 14:14	
SIB-SC-J06-8-9-07/26/2022	K2407810-004	J:\MS14\DATA\080524\0805F012.D\	08/05/24 14:40	
SIB-SC-J06-8-9-07/26/2022	K2407810-004	J:\MS14\DATA\080524\0805F013.D\	08/05/24 15:15	

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 4/1/2024

Initial Calibration Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2400163 **Signal ID:** 1
Instrument ID: K-MS-14

#	Lab Code	Sample Name	File Location	Acquisition Date
01	KC2400163-01	PAH ICAL .002PPM SVM71-42A	J:\MS14\DATA\040124\0809F004.D	04/01/2024 13:54
02	KC2400163-02	PAH ICAL .004PPM SVM71-42B	J:\MS14\DATA\040124\0809F005.D	04/01/2024 14:20
03	KC2400163-03	PAH ICAL .008PPM SVM71-42C	J:\MS14\DATA\040124\0809F006.D	04/01/2024 14:46
04	KC2400163-04	PAH ICAL .02PPM SVM71-42D	J:\MS14\DATA\040124\0809F007.D	04/01/2024 15:12
05	KC2400163-05	PAH ICAL .1PPM SVM71-42E	J:\MS14\DATA\040124\0809F008.D	04/01/2024 15:38
06	KC2400163-06	PAH ICAL .2PPM SVM71-42F	J:\MS14\DATA\040124\0809F009.D	04/01/2024 16:05
07	KC2400163-07	PAH ICAL .4PPM SVM71-42G	J:\MS14\DATA\040124\0809F010.D	04/01/2024 16:30
08	KC2400163-08	PAH ICAL 1PPM SVM71-42H	J:\MS14\DATA\040124\0809F011.D	04/01/2024 16:57
09	KC2400163-09	PAH ICAL 1.6PPM SVM71-42I	J:\MS14\DATA\040124\0809F012.D	04/01/2024 17:24
10	KC2400163-10	PAH ICAL 2PPM SVM71-42J	J:\MS14\DATA\040124\0809F013.D	04/01/2024 17:49

Analyte

2-Methylnaphthalene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	0.7848	02	4.000	0.6989	03	8.000	0.691	04	20.000	0.6824
05	100.000	0.6292	06	200.000	0.5947	07	400.000	0.5759	08	1000.000	0.535
09	1600.000	0.5204	10	2000.000	0.5109						

Acenaphthene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.251	02	4.000	1.207	03	8.000	1.194	04	20.000	1.191
05	100.000	1.186	06	200.000	1.162	07	400.000	1.202	08	1000.000	1.044
09	1600.000	0.9928	10	2000.000	0.9968						

Acenaphthylene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.959	02	4.000	1.852	03	8.000	1.797	04	20.000	1.787
05	100.000	1.851	06	200.000	1.853	07	400.000	1.86	08	1000.000	1.694
09	1600.000	1.598	10	2000.000	1.537						

Anthracene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.085	02	4.000	0.9952	03	8.000	0.9886	04	20.000	0.9696
05	100.000	1.024	06	200.000	1.032	07	400.000	1.033	08	1000.000	0.9269
09	1600.000	0.8544	10	2000.000	0.8178						

Benz(a)anthracene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.555	02	4.000	1.301	03	8.000	1.278	04	20.000	1.208
05	100.000	1.263	06	200.000	1.298	07	400.000	1.335	08	1000.000	1.291
09	1600.000	1.254	10	2000.000	1.228						

Benzo(a)pyrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	0.9338	02	4.000	0.8201	03	8.000	0.8425	04	20.000	0.8968
05	100.000	1.039	06	200.000	1.12	07	400.000	1.171	08	1000.000	1.159

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 4/1/2024

Initial Calibration Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2400163 **Signal ID:** 1
Instrument ID: K-MS-14

Analyte

Benzo(a)pyrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
09	1600.000	1.136	10	2000.000	1.117						

Benzo(b)fluoranthene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.305	02	4.000	1.129	03	8.000	1.181	04	20.000	1.22
05	100.000	1.353	06	200.000	1.392	07	400.000	1.392	08	1000.000	1.318
09	1600.000	1.279	10	2000.000	1.253						

Benzo(g,h,i)perylene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.522	02	4.000	1.354	03	8.000	1.353	04	20.000	1.383
05	100.000	1.478	06	200.000	1.496	07	400.000	1.49	08	1000.000	1.382
09	1600.000	1.326	10	2000.000	1.293						

Benzo(k)fluoranthene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.156	02	4.000	1.014	03	8.000	1.099	04	20.000	1.202
05	100.000	1.33	06	200.000	1.324	07	400.000	1.333	08	1000.000	1.268
09	1600.000	1.203	10	2000.000	1.18						

Chrysene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.297	02	4.000	1.21	03	8.000	1.225	04	20.000	1.256
05	100.000	1.287	06	200.000	1.298	07	400.000	1.306	08	1000.000	1.217
09	1600.000	1.16	10	2000.000	1.133						

Dibenz(a,h)anthracene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.177	02	4.000	1.07	03	8.000	1.072	04	20.000	1.093
05	100.000	1.266	06	200.000	1.291	07	400.000	1.329	08	1000.000	1.272
09	1600.000	1.243	10	2000.000	1.211						

Fluoranthene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.372	02	4.000	1.268	03	8.000	1.267	04	20.000	1.29
05	100.000	1.301	06	200.000	1.269	07	400.000	1.21	08	1000.000	1.081
09	1600.000	0.9999	10	2000.000	0.9448						

Fluoranthene-d10

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.172	02	4.000	1.093	03	8.000	1.101	04	20.000	1.103
05	100.000	1.139	06	200.000	1.161	07	400.000	1.159	08	1000.000	1.07
09	1600.000	0.9974	10	2000.000	0.9485						

Fluorene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.499	02	4.000	1.428	03	8.000	1.397	04	20.000	1.401

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 4/1/2024

Initial Calibration Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2400163 **Signal ID:** 1
Instrument ID: K-MS-14

Analyte

Fluorene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
05	100.000	1.394	06	200.000	1.346	07	400.000	1.31	08	1000.000	1.174
09	1600.000	1.111	10	2000.000	1.076						

Fluorene-d10

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.356	02	4.000	1.22	03	8.000	1.192	04	20.000	1.19
05	100.000	1.197	06	200.000	1.172	07	400.000	1.153	08	1000.000	1.05
09	1600.000	1.005	10	2000.000	0.975						

Indeno(1,2,3-cd)pyrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.027	02	4.000	0.9044	03	8.000	0.8944	04	20.000	0.9225
05	100.000	1.078	06	200.000	1.141	07	400.000	1.186	08	1000.000	1.176
09	1600.000	1.152	10	2000.000	1.155						

Naphthalene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.033	02	4.000	1.037	03	8.000	0.9632	04	20.000	1.026
05	100.000	0.9805	06	200.000	0.9658	07	400.000	0.9478	08	1000.000	0.8929
09	1600.000	0.8817	10	2000.000	0.861						

Phenanthrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.238	02	4.000	1.132	03	8.000	1.129	04	20.000	1.106
05	100.000	1.089	06	200.000	1.075	07	400.000	1.046	08	1000.000	0.9325
09	1600.000	0.8678	10	2000.000	0.8273						

Pyrene

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.481	02	4.000	1.305	03	8.000	1.321	04	20.000	1.323
05	100.000	1.345	06	200.000	1.35	07	400.000	1.377	08	1000.000	1.204
09	1600.000	1.14	10	2000.000	1.098						

Terphenyl-d14

#	Amount	RF	#	Amount	RF	#	Amount	RF	#	Amount	RF
01	2.000	1.225	02	4.000	1.129	03	8.000	1.109	04	20.000	1.135
05	100.000	1.137	06	200.000	1.149	07	400.000	1.154	08	1000.000	1.04
09	1600.000	1.004	10	2000.000	0.9713						

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 4/1/2024

Initial Calibration Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2400163 **Signal ID:** 1
Instrument ID: K-MS-14

		Calibration Evaluation				Calibration Evaluation	
Analyte Name	Compound Type	Fit Type	Eval	Eval Result	Control Criteria	Average RRF	Minimum RRF
2-Methylnaphthalene	TRG	Average RF	% RSD	14.6	≤20	0.6223	0.40
Acenaphthene	TRG	Average RF	% RSD	8.3	≤20	1.143	0.90
Acenaphthylene	TRG	Average RF	% RSD	7.3	≤20	1.779	0.90
Anthracene	TRG	Average RF	% RSD	8.6	≤20	0.9726	0.70
Benz(a)anthracene	TRG	Average RF	% RSD	7.4	≤20	1.301	0.80
Benzo(a)pyrene	TRG	Average RF	% RSD	13.4	≤20	1.024	0.70
Benzo(b)fluoranthene	TRG	Average RF	% RSD	6.8	≤20	1.282	0.70
Benzo(g,h,i)perylene	TRG	Average RF	% RSD	5.8	≤20	1.408	0.50
Benzo(k)fluoranthene	TRG	Average RF	% RSD	8.7	≤20	1.211	0.70
Chrysene	TRG	Average RF	% RSD	4.9	≤20	1.239	0.70
Dibenz(a,h)anthracene	TRG	Average RF	% RSD	7.9	≤20	1.202	0.40
Fluoranthene	TRG	Average RF	% RSD	11.8	≤20	1.2	0.60
Fluoranthene-d10	SURR	Average RF	% RSD	6.7	≤20	1.094	0.01
Fluorene	TRG	Average RF	% RSD	11.0	≤20	1.314	0.90
Fluorene-d10	SURR	Average RF	% RSD	9.8	≤20	1.151	0.01
Indeno(1,2,3-cd)pyrene	TRG	Average RF	% RSD	11.1	≤20	1.064	0.50
Naphthalene	TRG	Average RF	% RSD	6.7	≤20	0.9589	0.70
Phenanthrene	TRG	Average RF	% RSD	12.4	≤20	1.044	0.70
Pyrene	TRG	Average RF	% RSD	8.9	≤20	1.294	0.60
Terphenyl-d14	SURR	Average RF	% RSD	7.0	≤20	1.105	0.01

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI **Calibration Date:** 4/1/2024

Initial Calibration Verification Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Calibration ID: KC2400163 **Signal ID:** 1
Instrument ID: K-MS-14

#	Lab Code	Sample Name	File Location	Acquisition Date
11	KC2400163-11	PAH ICV .4PPM SVM71-42J	J:\MS14\DATA\040124\0809F014.D	04/01/2024 18:15

Analyte Name	Expected	Result	Average RF	SSV RF	% D	Criteria	Curve Fit
2-Methylnaphthalene	400	358	6.223E-1	5.565E-1	-10.572	±30	Average RF
Acenaphthene	400	355	1.143E0	1.015E0	-11.225	±30	Average RF
Acenaphthylene	400	401	1.779E0	1.782E0	0.178	±30	Average RF
Anthracene	400	393	9.726E-1	9.557E-1	-1.742	±30	Average RF
Benz(a)anthracene	400	372	1.301E0	1.209E0	-7.068	±30	Average RF
Benzo(a)pyrene	400	421	1.024E0	1.077E0	5.18	±30	Average RF
Benzo(b)fluoranthene	400	395	1.282E0	1.267E0	-1.207	±30	Average RF
Benzo(g,h,i)perylene	400	376	1.408E0	1.323E0	-6.030	±30	Average RF
Benzo(k)fluoranthene	400	403	1.211E0	1.22E0	0.740	±30	Average RF
Chrysene	400	378	1.239E0	1.172E0	-5.403	±30	Average RF
Dibenz(a,h)anthracene	400	397	1.202E0	1.194E0	-0.722	±30	Average RF
Fluoranthene	400	372	1.2E0	1.116E0	-7.038	±30	Average RF
Fluorene	400	366	1.314E0	1.203E0	-8.402	±30	Average RF
Indeno(1,2,3-cd)pyrene	400	408	1.064E0	1.086E0	2.11	±30	Average RF
Naphthalene	400	372	9.589E-1	8.922E-1	-6.950	±30	Average RF
Phenanthrene	400	370	1.044E0	9.647E-1	-7.609	±30	Average RF
Pyrene	400	375	1.294E0	1.214E0	-6.199	±30	Average RF

Analyte Name	Expected	Result	Average RF	SSV RF	% D	Criteria	Curve Fit
Fluoranthene-d10	400	413	1.094E0	1.129E0	3.18	±30	Average RF
Fluorene-d10	400	395	1.151E0	1.138E0	-1.171	±30	Average RF
Terphenyl-d14	400	409	1.105E0	1.13E0	2.27	±30	Average RF

Client: HydroGeoLogic, Inc. (HGL) **Service Request:** K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01 **Date Analyzed:** 08/05/24 10:05

Continuing Calibration Verification (CCV) Summary
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: 8270D **Calibration Date:** 4/1/2024
File ID: J:\MS14\DATA\080524\0805F002.D\ **Calibration ID:** KC2400163
Signal ID: 1 **Analysis Lot:** 849989
Units: ng/mL

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
2-Methylnaphthalene	400	395	0.6223	0.6148	-1.2	NA	±20	Average RF
Acenaphthene	400	409	1.1428	1.1689	2.3	NA	±20	Average RF
Acenaphthylene	400	427	1.7789	1.9009	6.9	NA	±20	Average RF
Anthracene	400	438	0.9726	1.0647	9.5	NA	±20	Average RF
Benz(a)anthracene	400	440	1.3012	1.4316	10.0	NA	±20	Average RF
Benzo(a)pyrene	400	489	1.0236	1.2522	22.3*	NA	±20	Average RF
Benzo(b)fluoranthene	400	443	1.2822	1.4203	10.8	NA	±20	Average RF
Benzo(g,h,i)perylene	400	389	1.4077	1.3695	-2.7	NA	±20	Average RF
Benzo(k)fluoranthene	400	438	1.2109	1.3247	9.4	NA	±20	Average RF
Chrysene	400	437	1.2388	1.3538	9.3	NA	±20	Average RF
Dibenz(a,h)anthracene	400	452	1.2025	1.3601	13.1	NA	±20	Average RF
Fluoranthene	400	435	1.2002	1.305	8.7	NA	±20	Average RF
Fluorene	400	413	1.3138	1.3567	3.3	NA	±20	Average RF
Indeno(1,2,3-cd)pyrene	400	445	1.0637	1.1838	11.3	NA	±20	Average RF
Naphthalene	400	411	0.9589	0.9846	2.7	NA	±20	Average RF
Phenanthrene	400	406	1.0442	1.0604	1.6	NA	±20	Average RF
Pyrene	400	347	1.2944	1.1224	-13.3	NA	±20	Average RF

Analyte Name	Expected	Result	Average RF	CCV RF	% D	% Drift	Criteria	Curve Fit
Fluoranthene-d10	400	464	1.0943	1.2683	15.9	NA	±20	Average RF
Fluorene-d10	400	421	1.151	1.2102	5.1	NA	±20	Average RF
Terphenyl-d14	400	386	1.1052	1.0673	-3.4	NA	±20	Average RF

Client: HydroGeoLogic, Inc. (HGL) **Service Request:**K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01

Analysis Run Log
Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Analysis Method: **Analysis Lot:**849989
Instrument ID:K-MS-14

Raw Data File	Sample Name	Lab Code	Date Analyzed	Time Analyzed	Q
J:\MS14\DATA\080524\0805F001.D\	ZZZZZZZ	ZZZZZZZ	8/5/2024	09:39:00	
J:\MS14\DATA\080524\0805F002.D\	Continuing Calibration Verification	KQ2412273-02	8/5/2024	10:05:00	
J:\MS14\DATA\080524\0805F005.D\	Method Blank	KQ2411801-04	8/5/2024	11:33:00	
J:\MS14\DATA\080524\0805F006.D\	Lab Control Sample	KQ2411801-03	8/5/2024	11:59:00	
J:\MS14\DATA\080524\0805F007.D\	SIB-SC-E24-7-8-07/12/2022 MS	KQ2411801-01	8/5/2024	12:26:00	
J:\MS14\DATA\080524\0805F008.D\	SIB-SC-E24-7-8-07/12/2022 DMS	KQ2411801-02	8/5/2024	12:53:00	
J:\MS14\DATA\080524\0805F009.D\	SIB-SC-E24-7-8-07/12/2022	K2407810-001	8/5/2024	13:20:00	
J:\MS14\DATA\080524\0805F010.D\	SIB-SC-E24-8-9-07/12/2022	K2407810-002	8/5/2024	13:47:00	
J:\MS14\DATA\080524\0805F011.D\	SIB-SC-E24-9-10-07/12/2022	K2407810-003	8/5/2024	14:14:00	
J:\MS14\DATA\080524\0805F012.D\	SIB-SC-J06-8-9-07/26/2022	K2407810-004	8/5/2024	14:40:00	
J:\MS14\DATA\080524\0805F013.D\	SIB-SC-J06-8-9-07/26/2022	K2407810-004	8/5/2024	15:15:00	

Prep Summary Report

Client: HydroGeoLogic, Inc. (HGL) **Service Request:**K2407810
Project: HGL-SIB-PDI/DT2002.03.03.01.01
Sample Matrix: Sediment

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

Prep Method: EPA 3546 **Extraction Lot:** 442452
Analytical Method: 8270D **Extraction Date:** 08/01/24 12:40

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Amount	Percent Solids
SIB-SC-E24-7-8-07/12/2022	K2407810-001	7/12/22	7/13/22	10.079 g	10 mL	52.4
SIB-SC-E24-8-9-07/12/2022	K2407810-002	7/12/22	7/13/22	10.089 g	10 mL	50.7
SIB-SC-E24-9-10-07/12/2022	K2407810-003	7/12/22	7/13/22	10.464 g	10 mL	50.5
SIB-SC-J06-8-9-07/26/2022	K2407810-004	7/26/22	7/27/22	10.614 g	10 mL	60.2
Matrix Spike	KQ2411801-01MS	7/12/22	7/13/22	10.116 g	10 mL	52.4
Duplicate Matrix Spike	KQ2411801-02DMS	7/12/22	7/13/22	10.151 g	10 mL	52.4
Lab Control Sample	KQ2411801-03LCS	NA	NA	10.00 g	10 mL	
Method Blank	KQ2411801-04MB	NA	NA	10.6140 g	10 mL	

Raw Data

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Total Solids

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Benchsheet

Service Request #:	**K2407810, KQ2411768, K2407792, K2407629**	**Run #:**	**849107**
Test:	**TS**	**Balance ID:**	**K-BALANCE-50**
Method:	**160.3 Modified**		

Matrix	Lab Code	Tare (g)	Wet Wt. (g)	Tare + Dry Wt. (g)	Dry Weight (g)	% Total Solids	RPD
Sediment	K2407810-001	1.254	10.569	6.796	5.54	52.4	
Sediment	K2407810-001DUP	1.254	10.510	6.603	5.35	50.9	3
Sediment	K2407810-002	1.251	11.371	7.017	5.77	50.7	
Sediment	K2407810-003	1.245	10.136	6.368	5.12	50.5	
Sediment	K2407810-004	1.253	10.285	7.446	6.19	60.2	
Biosolids Solids	K2407792-001	1.245	10.401	2.030	0.785	7.55	
Misc. Solid	K2407629-001	1.246	1.884	2.955	1.71	90.7	
Misc. Solid	K2407629-002	1.245	2.572	3.298	2.05	79.8	
Misc. Solid	K2407629-003	1.246	4.351	4.647	3.40	78.2	
Misc. Solid	K2407629-004	1.250	2.380	2.905	1.66	69.5	

	Oven ID	Temp In	Temp Out	Date In	Time In	Date Out	Time Out	Thermometer ID
Oven1	**k-oven-07**	**105**	**105**	**7/31/2024**	**11:27**	**8/1/2024**	**05:30**	

	Cal EQID	Cal Start Value	Cal End Value	Start Date	Start Time	End Date	End Time
Calibration1	**K-BALANCE-50**	**1.000, 100.000**	**1.000, 100.000**	**7/31/2024**	**10:00**	**7/31/2024**	**11:27**
Calibration2	**K-BALANCE-55**	**0.999/100.000**	**1.000/100.000**	**8/1/2024**	**05:40**	**8/1/2024**	**05:41**

Comments: ZZB SN: 11012 FINISHED BY TR SN11010 Reviewed by MM 8/2

Organochlorine Pesticides by GC/MS/MS

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Preparation Information Benchsheet

Prep Run#: 442451
Team: Semivoa GCMS/DCLOKE
Number of Copies to make: 1

Prep WorkFlow: OrgExtS(14)
Prep Method: EPA 3541

Status: Prepped
Prep Date/Time: 8/1/24 12:33

#	Lab Code	Client ID	B#	Method /Test	pH	Matrix	Amt. Ext.	Final Vol	Sample Description
1	KQ2411800-04	MB		1699M/OC_Pest_MS		Solid	10.4750g	1.00mL	
2	KQ2411800-03	LCS		1699M/OC_Pest_MS		Solid	10g	1.00mL	
3	KQ2411800-01	K2407810-001 MS	.01	1699M/OC_Pest_MS		Solid	10.227g	1.00mL	ZBIBI k-balance-50
4	KQ2411800-02	K2407810-001 DMS	.01	1699M/OC_Pest_MS		Solid	10.475g	1.00mL	ZBIBI k-balance-50
5	K2407810-001	SIB-SC-E24-7-8-07/12/2022	.01	1699M/OC_Pest_MS		Sediment	10.279g	1.00mL	ZBIBI k-balance-50
6	K2407810-002	SIB-SC-E24-8-9-07/12/2022	.01	1699M/OC_Pest_MS		Sediment	10.190g	1.00mL	ZBIBI k-balance-50
7	K2407810-003	SIB-SC-E24-9-10-07/12/2022	.01	1699M/OC_Pest_MS		Sediment	10.129g	1.00mL	ZBIBI k-balance-50
8	K2407810-004	SIB-SC-J06-8-9-07/26/2022	.01	1699M/OC_Pest_MS		Sediment	10.096g	1.00mL	ZBIBI k-balance-50

Spiking Solutions

Name: Pesticide/OC_Pest Surrogate Inventory ID 233906 Logbook Ref: SVM71-31F Expires On: 08/28/2024

K2407810-001 100.00µL K2407810-002 100.00µL K2407810-003 100.00µL K2407810-004 100.00µL KQ2411800-01 100.00µL KQ2411800-02 100.00µL
KQ2411800-03 100.00µL KQ2411800-04 100.00µL

Name: Pesticide/OC_Pest Spike Inventory ID 234628 Logbook Ref: SVM71-51K Expires On: 09/30/2024

KQ2411800-01 100.00µL KQ2411800-02 100.00µL KQ2411800-03 100.00µL

Preparation Steps

Step:	Weigh	Step:	Extraction	Step:	Final Volume
Started:	7/31/24 10:04	Started:	8/1/24 12:33	Started:	8/2/24 06:43
Finished:	7/31/24 10:04	Finished:	8/1/24 15:15	Finished:	8/5/24 12:28
By:	DCLOKE	By:	DCLOKE	By:	SMATZ
Comments		Comments		Comments	

Comments: K-Tundra Top Shelf IS=SVM70-76A

Reviewed By: SM JC Date: 8/5/24 Spike Witness: PCOOK Date:

Chain of Custody

Relinquished By: JC Date: 8/5/24
Received By: eb Date: 8/5/24

Extracts Examined: Yes (No)

Preparation Information Benchsheet

Prep Run#: 442451
Team: Semivoa GCMS/DCLOKE
Number of Copies to make: 1

Prep WorkFlow: OrgExtS(14)
Prep Method: EPA 3541

Status: Draft
Prep Date/Time: ~~7/31/24 10:04 AM~~ 8/1/24 1233 PM

#	Lab Code	Client ID	B#	√	Method /Test	Matrix	Amt. Ext. g	pH n/a	Int. Vol mL	Final Vol mL	Surr Amt µL	Spike Amt µL
1	**KQ2411800-04**	MB	—	—	1699M / OC_Pest_MS	Solid	10.475		10	1	100	—
2	**KQ2411800-03**	LCS	—	—	1699M / OC_Pest_MS	Solid	10					100
3	**KQ2411800-01**	K2407810-001 MS	.01	✓	1699M / OC_Pest_MS	Solid	*					
4	**KQ2411800-02**	K2407810-001 DMS	.01	✓	1699M / OC_Pest_MS	Solid						
5	**K2407810-001**	SIB-SC-E24-7-8-07/12/2022	.01	✓	1699M / OC_Pest_MS	Sediment						—
6	**K2407810-002**	SIB-SC-E24-8-9-07/12/2022	.01	✓	1699M / OC_Pest_MS	Sediment						—
7	**K2407810-003**	SIB-SC-E24-9-10-07/12/2022	.01	✓	1699M / OC_Pest_MS	Sediment						—
8	**K2407810-004**	SIB-SC-J06-8-9-07/26/2022	.01	✓	1699M / OC_Pest_MS	Sediment						—

Comments: * See pre prep worksheet

Surrogate ID: [OC Pest Surr] SUM71-31F 200ppb Acc. Xp: 8/28/24 100µL Spike ID: [OC Pest MS] SUM71-51K 200ppb Acc. Xp: 9/30/24. 100µL.

Witnessed By: Paige Cooley

Analyst: Tiffany Wells Assisted By:

Pre-Prep Information Benchsheet

Prep Run #: 442451 **Container Lot No:** 100923-1SR **Prep Due Date:** Jul-19-2022

#	Lab Code	Bottle	Test Name	Weight	Sample Comments	Test Comments
1	K2407810-001	.01	OC_Pest_MS : 1699M/	10.279g		ZBIBI k-balance-50
2	K2407810-001 MS KQ2411800-01	.01	OC_Pest_MS : 1699M/	10.227g		ZBIBI k-balance-50
3	K2407810-001 DMS KQ2411800-02	.01	OC_Pest_MS : 1699M/	10.475g		ZBIBI k-balance-50
4	K2407810-002	.01	OC_Pest_MS : 1699M/	10.190g		ZBIBI k-balance-50
5	K2407810-003	.01	OC_Pest_MS : 1699M/	10.129g		ZBIBI k-balance-50
6	K2407810-004	.01	OC_Pest_MS : 1699M/	10.096g		ZBIBI k-balance-50

Relinquished By:	Date/Time:	Received By:	Date/Time:
ZZB	7/31/24 1200	Delaney Udell	1218 7/31/24

ALS Environmental

Appendix from EXT-3541
For Extracting OC Pesticides by GCMS in Soil or Tissue by EPA Method 3541

Service Request K2407810 **Workgroup** KQ2411800

Sulfate Lot #202309552 DCM (GC^2) Lot #24E3162008 Glass Wool Lot # 29022999

Soxtherm(s) unit I.D# 12, 14 Syringe Volume(s) and ID: 2 mL 8/1 100µL # 34

Soxtherm Start (Time/Date/Initial): 1233 8/1/24 DC

Soxtherm Stop (Time/Date/Initial): 1515 8/1/24 DC

N-Evap (Time/Date/Initial): 0643 8/2/24 JC N-Evap Therm. ID: X-SVM-007

Temp as measured: 20 °C Correction factor: 0 °C Adjusted temp: 20 °C

GPC Clean-up (3640): Start 0911 8/2/24 JC (Time/Date/Initial) GPC 8

S-Evap (Time/Date/Initial): 08:54 8/5/24 SM S-Evap Therm. ID: X-SVM-008

Temp as measured: 25 °C Correction factor: 0 °C Adjusted temp: 25 °C

Hexane Exchange(Time/Date/Initial): 09:11 8/5/24 SM Hexane Lot #24C1162011

N-Evap (Time/Date/Initial): 09:32 8/5/24 SM N-Evap Therm. ID: X-SVM-007

Temp as measured: 20 °C Correction factor: 0 °C Adjusted temp: 20 °C

Carbon Clean-up (Time/Date/Initial): 10:54 8/5/24 SM

Carbon Column Lot # 330578 1:1 Hexane/DCM Lot # 19EXH01-24E

Turbovap (Time/Date/Initial): 11:15 8/5/24 SM Turbovap ID: V-Turbovap-05

Temp as measured: 27 °C Correction factor: 0 °C Adjusted temp: 27 °C Hexane Exchange(Time/Date/Initial): 11:42 8/5/24 SM Hexane Lot #24C1162011

Pipet Lots: Intermediate Volume BD406 Final Volume 09424546

Extract Archive Storage: Tramp

Completed (Time/Date/Initial): 12:28 8/5/24 SM

Bench Sheet Review Check List	
☐	Hold Times Met (if no, Reason: pulled from frozen archive)
☒	Prep date, dept, method, product code correct in stealth
☒	Spike Information correct
☒	Weights/Volumes and units correct on raw and final bench sheets
☒	Sample IDs have been checked—Bottle numbers appended if required
☒	Names present for: Started by, Completed by, relinquished by, and witnessed by.
☒	Training has been circled
☒	Extract Storage recorded
☒	Additional Prep Sheet completely filled out (NA or line out Blanks)
☒	All clean-ups have been noted on additional prep sheet
☒	Signed service request with Form V, if applicable, has been attached

1st 08/20/24
2nd 08/20/24

Validation Report

Data File: J:\MS42\Data\080624\080624F020.D
Lab ID: K2407810-001
RunType: N/A
Matrix: Sediment

Date Acquired: 8/6/24 16:26
Batch ID: 851162
Analysis Method: 1699M/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
Preparation Hold Time		X
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery	X	
Lab Control Sample Recovery		X
Method Blank	X	
Method Blank Surrogates	X	
Internal Standards	X	
Surrogates	X	
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Sample Exceptions

Exception Categories	Result	Corrective Action
Preparation Hold Time	Prep Date/Time: 08/01/2024 1233 Hold Date/Time: 07/26/2022 2359	Frozen Sample Used

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Lab Control Sample Recovery	2,4'-DDT	124	53	116	High bias, samples<MRL
	4,4'-DDT	144	57	118	High bias, samples<MRL

Primary Review: _____

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Secondary Review: _____

1st 08/20/24
2nd 08/20/24

Quantitation Report

Data File:	J:\MS42\Data\080624\080624F020.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 16:26	**Vial:**	14
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-001	**Raw Units:**	ng/ml

Bottle ID:	K2407810-001.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	851162	**Prep Lot:**	442451	**Report Group:**	K2407810
Analysis	1699M	**Prep Method:**	EPA 3541		
		Prep Date:	8/1/24		

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400368
		Report List ID:	25424

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	8.791	+0.01	46159105.464	100	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec	% Rec Criteria	Rpt?
S_Aldrin-13C12	7.220	+0.01	1661177.461	6.470	32	12 - 88	Y
S_4,4'DDD-d4	10.566	+0.03	3043510.932	3.114	62	9 - 159	Y
S_4,4'-DDT-d4	11.818	+0.01	3255966.563	5.410	108	5 - 187	Y
S_Endrin-13C12	10.164	+0.02	1020898.486	25.942	130	14 - 141	Y
S_GBHCD6	5.503	+0.01	1933842.105	3.274	16	5 - 90	Y
S_Oxychlordane-13C10	7.988	+0.02	935696.436	5.735	29	5 - 86	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Aldrin	7.230	+0.01	0	0	0	U	Y
gamma-BHC (Lindane)	5.556	+0.01	0	0	0	U	Y
cis-Chlordane	8.850	+0.01	56336.907	0.947	0.18	J	Y
trans-Chlordane	8.530	+0.02	126189.829	2.567	0.48		Y
2,4'-DDD	9.578	+0.02	0	0	0	U	Y
4,4'-DDD	10.641	+0.02	21139596.320	32.808	6.1		Y
2,4'-DDE	8.554	+0.02	2831597.165	2.603	0.48		Y
4,4'-DDE	9.390	+0.01	20727382.489	26.748	5.0		Y
2,4'-DDT	10.635	-0.06	0	0	0	U	Y
4,4'-DDT	11.834	-0.05	0	0	0	U	Y
Dieldrin	9.515	-0.05	0	0	0	U	Y
cis-Nonachlor	10.638	+0.02	25884.544	0.712	0.13	U	Y
trans-Nonachlor	8.918	+0.02	38542.195	0.911	0.17	J	Y
Oxychlordane	7.989	+0.01	0	0	0	U	Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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1st 08/20/24

2nd 08/20/24

Data File:	J:\MS42\Data\080624\080624F020.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 16:26	**Vial:**	14
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-001	**Raw Units:**	ng/ml

Prep Amount:	10.279 g	**Dilution:**	1
Prep Final Amount:	1.00 mL	**Basis Factor:**	52.40

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/20/24 17:33

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MassHunter Quantitative Analysis Sample Report

Data File	J:\MS42\Data\080624\080624F020.D		
Batch File	J:\MS42\Data\080624\QuantResults\080624 OC PEST.batch.bin		
Acq. Date-Time	8/6/2024 4:26:14 PM	**Acq Operator**	EBruno
Name	K2407810-001	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	8/19/2024 3:52:06 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	072424 OC PEST ICAL.batch.bin	**Vial**	14
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.226	289.8 -> 254.8	1632446	20.0000 ng/ml	0.016
γ-BHC-d6(IS)	5.503	223.9 -> 187.0	1933842	20.0000 ng/ml	0.011
Heptachlor-13C10(IS)	6.580	276.8 -> 241.8	2405817	20.0000 ng/ml	0.020
Chorpyrifos-d10(IS)	6.961	199.9 -> 171.9	3360055	20.0000 ng/ml	0.013
Aldrin-13C(IS)	7.220	269.8 -> 200.0	1648147	20.0000 ng/ml	0.013
Octachlorostyrene-13C8(IS)	7.749	315.8 -> 245.8	901158	20.0000 ng/ml	0.019
Isodrin-13C12(IS)	7.809	199.9 -> 130.1	1869551 *m*	20.0000 ng/ml	0.017
Oxychlordane-13C10(IS)	7.988	190.0 -> 125.0	935696	20.0000 ng/ml	0.027
Heptachlor epoxide-13C10(IS)	7.990	362.8 -> 270.0	546461	20.0000 ng/ml	0.023
Pyrene-d10	8.791	212.0 -> 208.0	46159105	100.0000 ng/ml	0.027
Endrin-13C12(IS)	10.164	269.8 -> 200.0	1020898	20.0000 ng/ml	0.033
4,4'-DDD d4(IS)	10.566	243.0 -> 173.1	3043511 *m*	5.0000 ng/ml	0.040
4,4'-DDT-d4(IS)	11.818	243.0 -> 173.1	3255967	5.0000 ng/ml	0.026
Endrin ketone-13C12(IS)	13.100	327.9 -> 291.8	67976	20.0000 ng/ml	0.024
Methoxychlor-d6(IS)	13.414	233.0 -> 141.0	5189653	20.0000 ng/ml	0.020
Mirex-13C10(IS)	14.342	276.8 -> 241.8	672764	5.0000 ng/ml	0.013

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	1632446	2.801 ng/ml	
		Spiked Amount =	20.0	Recovery =	*14.0 %*
γ-BHC-d6	5.491	223.9 -> 187.0	1933842	3.274 ng/ml	
		Spiked Amount =	20.0	Recovery =	*16.4 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	2405817	7.090 ng/ml	
		Spiked Amount =	20.0	Recovery =	*35.5 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	3360055	23.104 ng/ml	
		Spiked Amount =	20.0	Recovery =	*115.5 %*
Aldrin-13C	7.207	269.8 -> 200.0	1661177	6.470 ng/ml	
		Spiked Amount =	20.0	Recovery =	*32.4 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	901158	3.894 ng/ml	
		Spiked Amount =	20.0	Recovery =	*19.5 %*
Isodrin-13C12	7.789	199.9 -> 130.1	1843994 *m*	6.701 ng/ml	
		Spiked Amount =	20.0	Recovery =	*33.5 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	935696	5.735 ng/ml	
		Spiked Amount =	20.0	Recovery =	*28.7 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	546461	5.917 ng/ml	
		Spiked Amount =	20.0	Recovery =	*29.6 %*
Endrin-13C12	10.131	269.8 -> 200.0	1020898	25.942 ng/ml	
		Spiked Amount =	20.0	Recovery =	*129.7 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	3043511 *m*	3.114 ng/ml	
		Spiked Amount =	5.0	Recovery =	*62.3 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	3255967	5.410 ng/ml	
		Spiked Amount =	5.0	Recovery =	*108.2 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	67976	8.183 ng/ml	
		Spiked Amount =	20.0	Recovery =	*40.9 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	5189653	15.548 ng/ml	
		Spiked Amount =	20.0	Recovery =	*77.7 %*

MassHunter Quantitative Analysis Sample Report

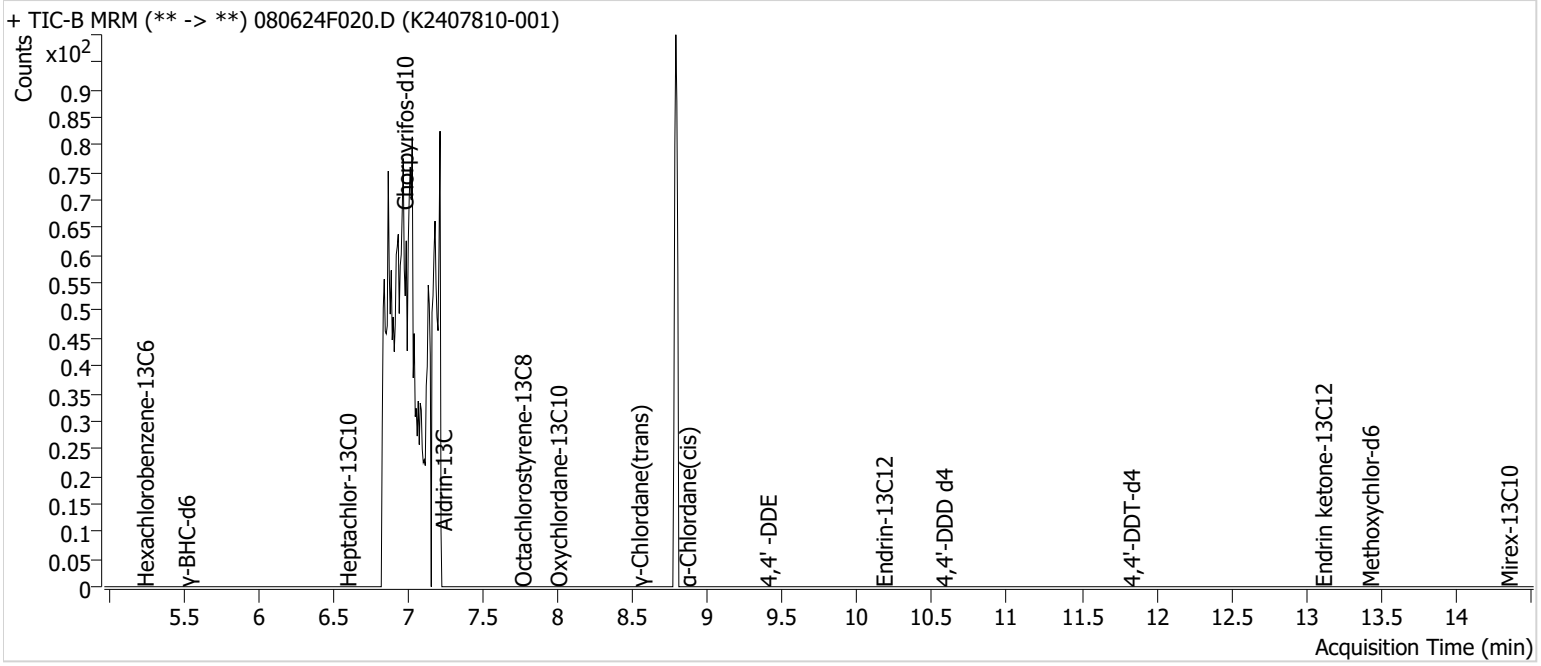
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	672764	0.758 ng/ml
		Spiked Amount = 5.0		Recovery = *15.2 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.235	283.8 -> 213.9	177089	1.422 ng/ml	92
β-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
γ-BHC(Lindane)	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
δ-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Heptachlor	Heptachlor-13C10(IS)		271.7 -> 236.9		ND ng/ml	
Chorpyrifos	Chorpyrifos-d10(IS)		196.9 -> 169.0		ND ng/ml	
Aldrin	Aldrin-13C(IS)		254.9 -> 220.0		ND ng/ml	
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.755	342.8 -> 307.8	34442	0.311 ng/ml	98
Isodrin	Isodrin-13C12(IS)		193.0 -> 123.0		ND ng/ml	
Oxychlordane	Oxychlordane-13C10(IS)		114.9 -> 51.1		ND ng/ml	
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)		352.8 -> 262.9		ND ng/ml	
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.530	271.8 -> 236.9	126190	2.567 ng/ml	69
2,4'-DDE	4,4'-DDD d4(IS)	8.554	246.0 -> 176.2	2831597	2.603 ng/ml	95
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.850	271.8 -> 236.9	56337	0.947 ng/ml	57
Endosulfan I	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
trans-Nanochlor	Oxychlordane-13C10(IS)	8.918	271.8 -> 236.9	38542	0.911 ng/ml	80
4,4' -DDE	4,4'-DDD d4(IS)	9.390	246.0 -> 176.2	20727382	26.748 ng/ml	99
Dieldrin	Endrin-13C12(IS)		262.9 -> 193.0		ND ng/ml	
2,4'-DDD	4,4'-DDD d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin	Endrin-13C12(IS)		262.8 -> 193.0		ND ng/ml	
Endosulfan II	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
cis-Nonachlor	Oxychlordane-13C10(IS)	10.638	271.8 -> 236.9	25885	0.712 ng/ml	13
4,4'-DDD	4,4'-DDD d4(IS)	10.641	235.0 -> 165.1	21139596	32.808 ng/ml	95
2,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin aldehyde	Endrin-13C12(IS)		249.9 -> 214.9		ND ng/ml	
Endosulfan sulfate	Endrin-13C12(IS)		271.9 -> 237.0		ND ng/ml	
4,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin ketone	Endrin ketone-13C12(IS)		147.0 -> 111.0		ND ng/ml	
Methoxychlor	Methoxychlor-d6(IS)		227.0 -> 141.1		ND ng/ml	
Mirex	Mirex-13C10(IS)		271.8 -> 236.8		ND ng/ml	

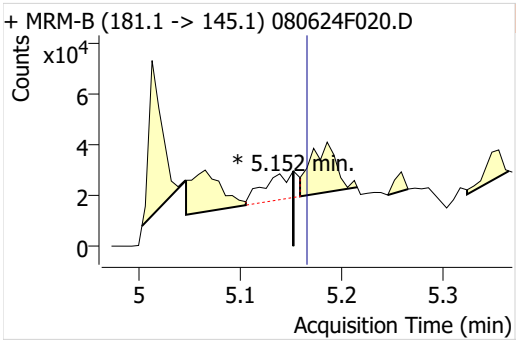
(m) = manual integration ND = Not Detected NC = Not Calculated

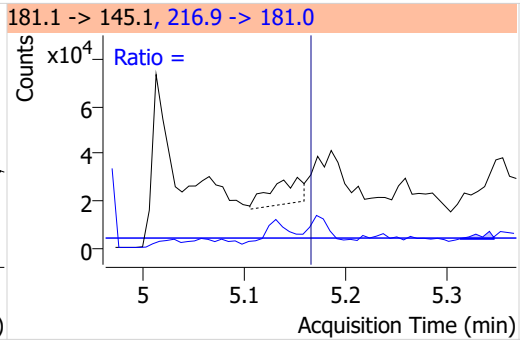
Sample Chromatogram

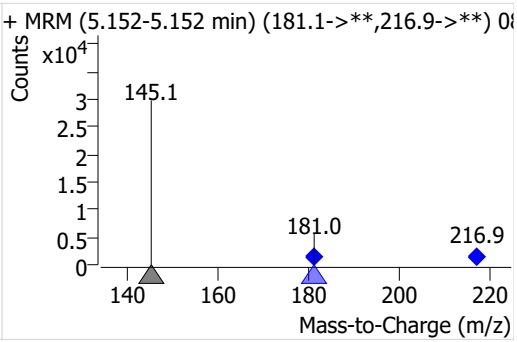
MassHunter Quantitative Analysis Sample Report



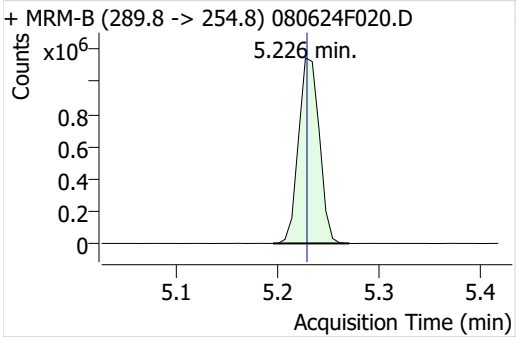
α-BHC

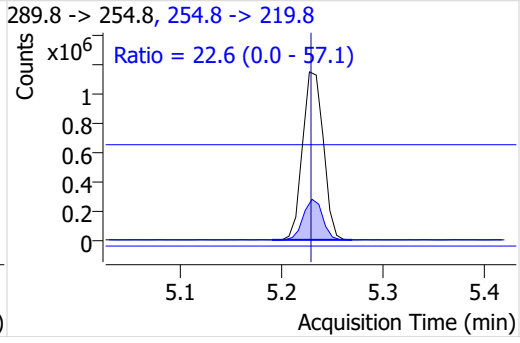


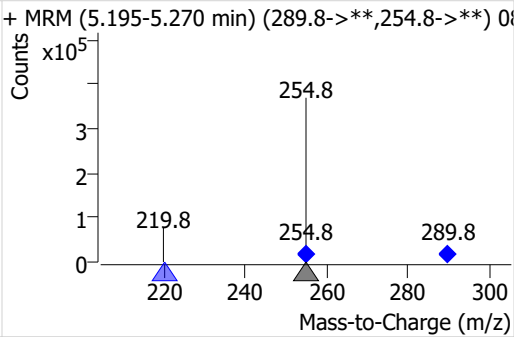




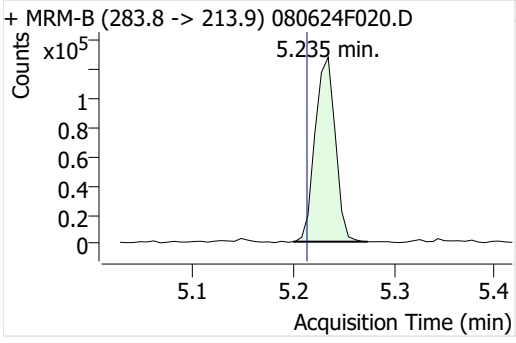
Hexachlorobenzene-13C6

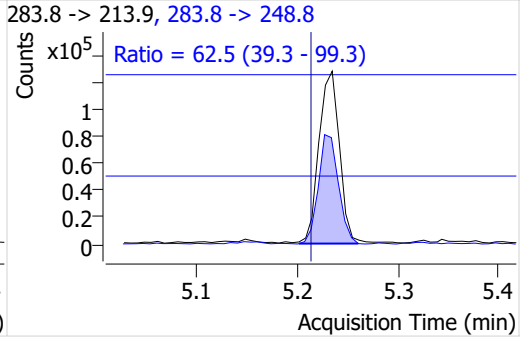


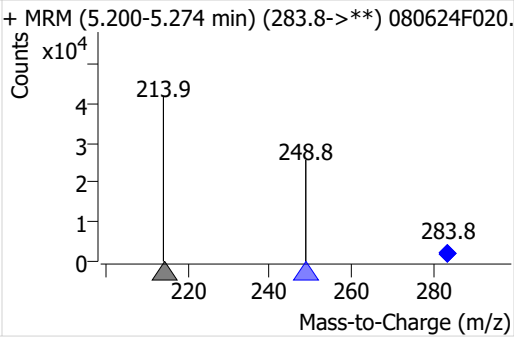




Hexachlorobenzene







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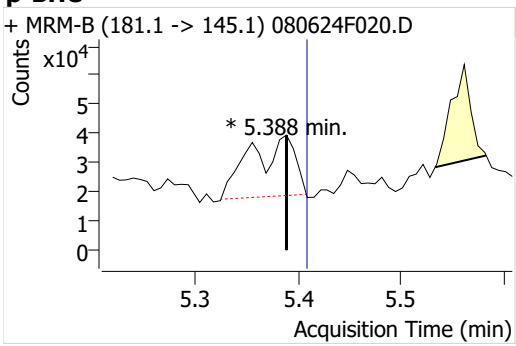
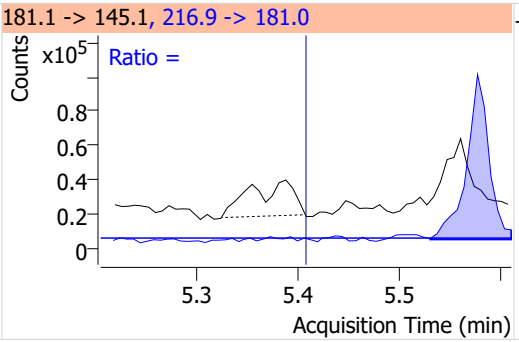
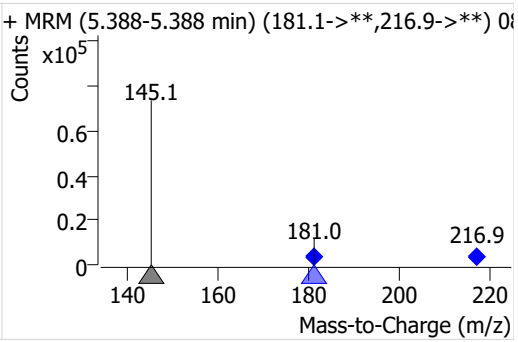
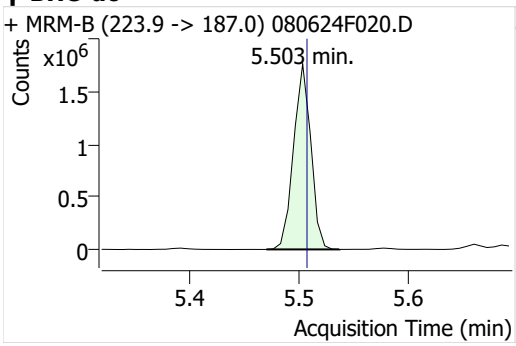
β-BHC

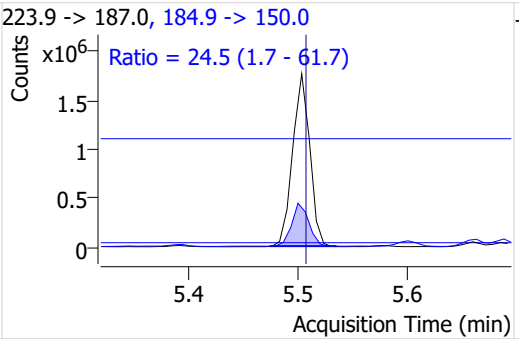


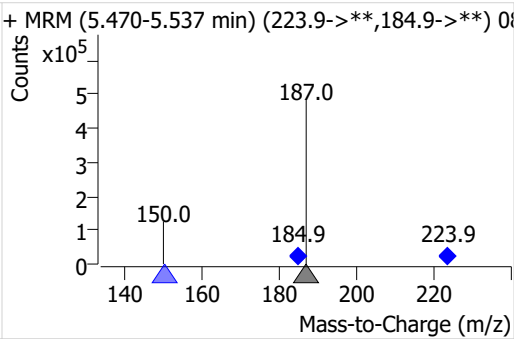




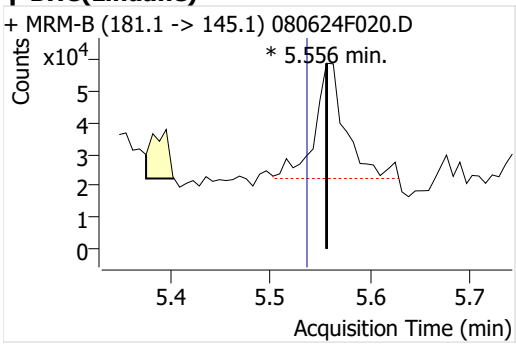
γ-BHC-d6

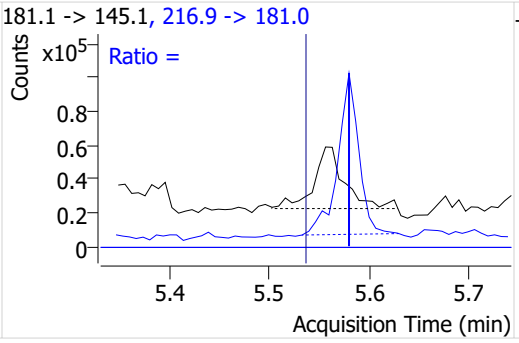


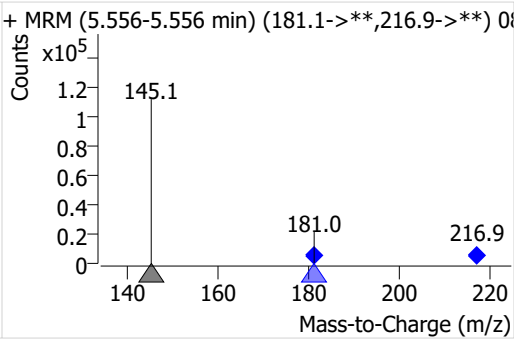




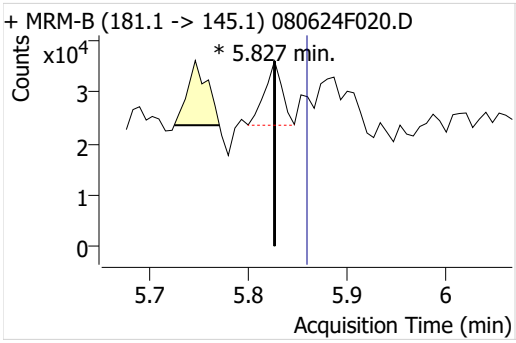
γ-BHC(Lindane)

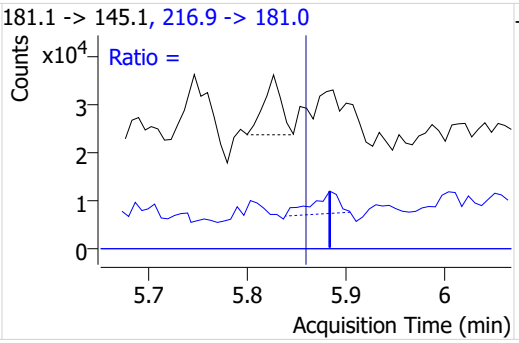


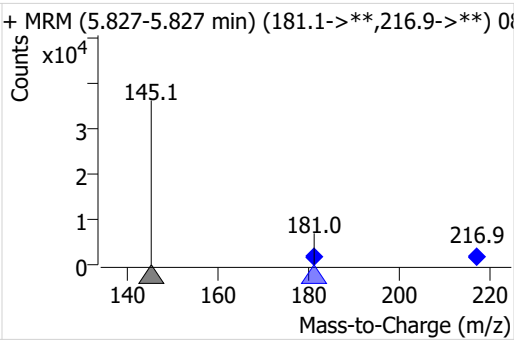




δ-BHC







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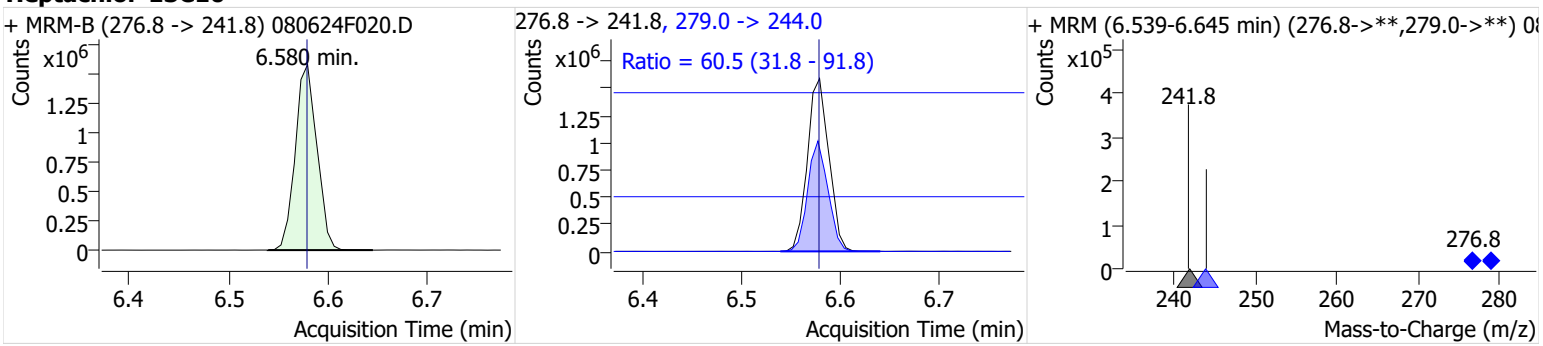
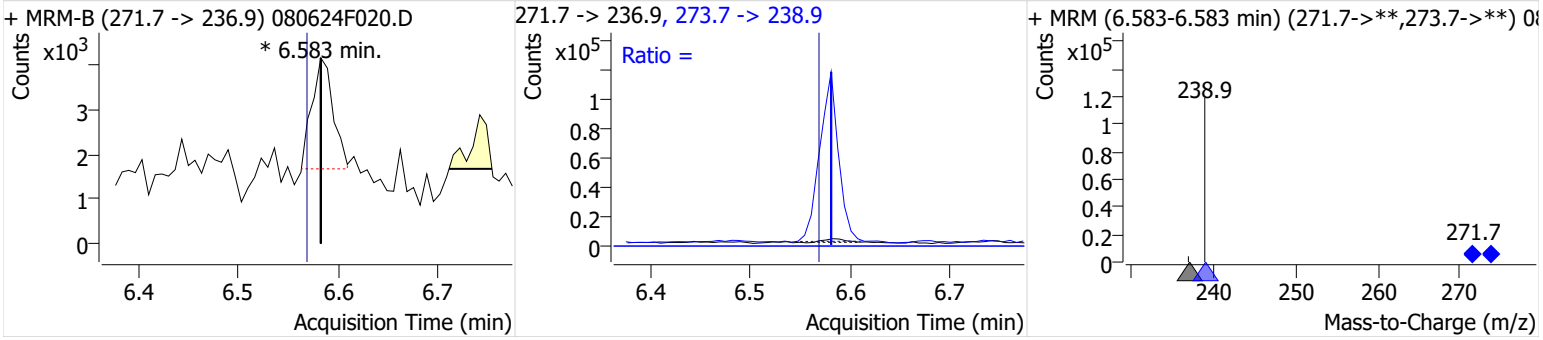
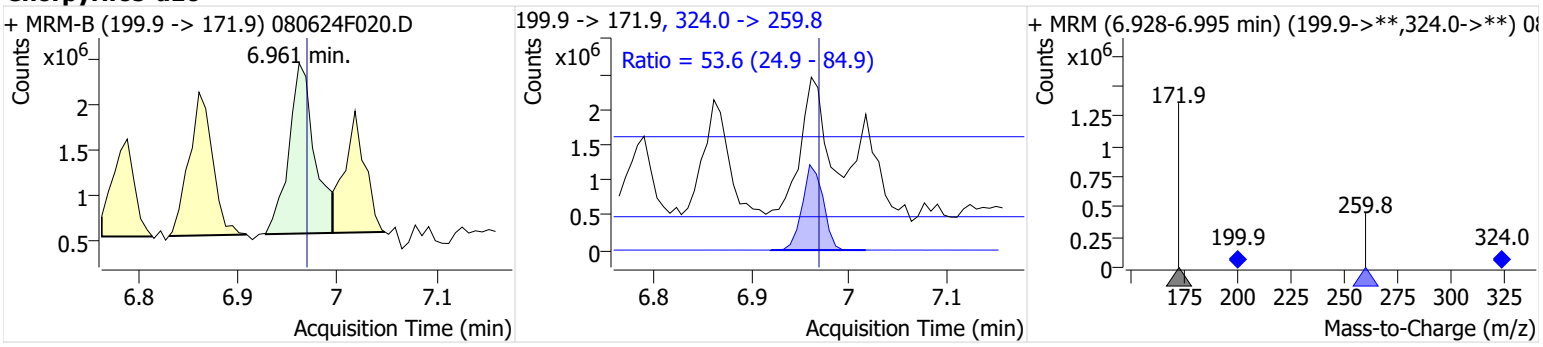
Heptachlor-13C10



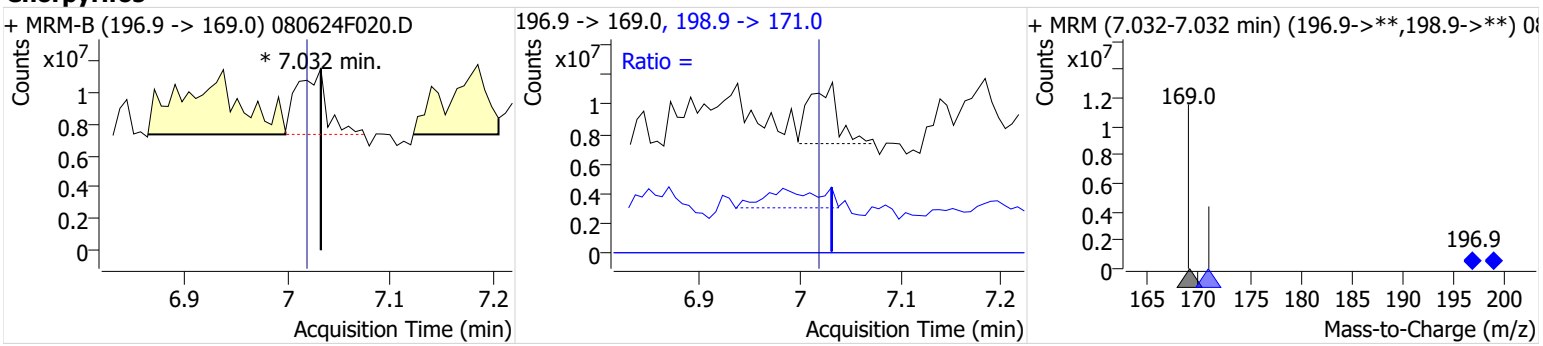
Heptachlor



Chorpyrifos-d10



Chorpyrifos



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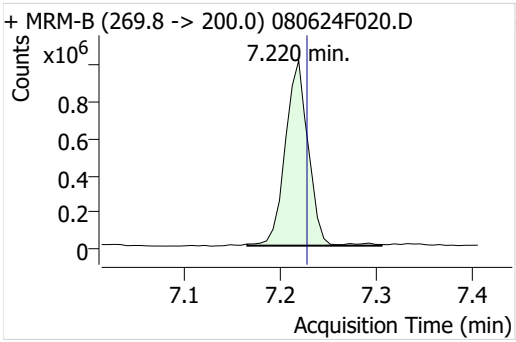
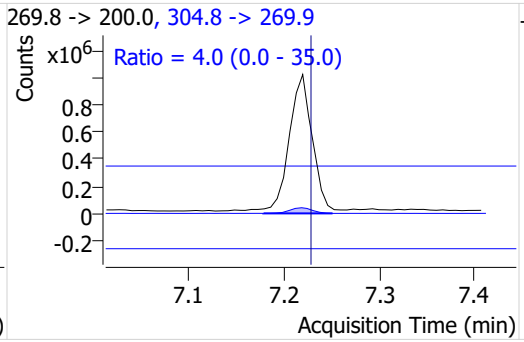
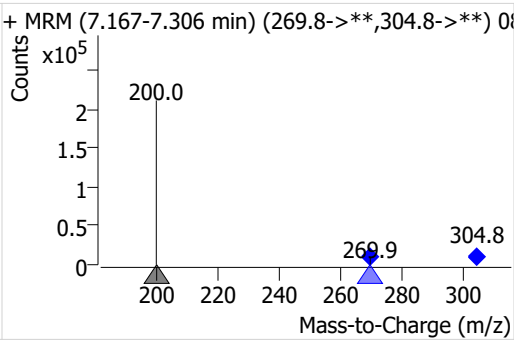
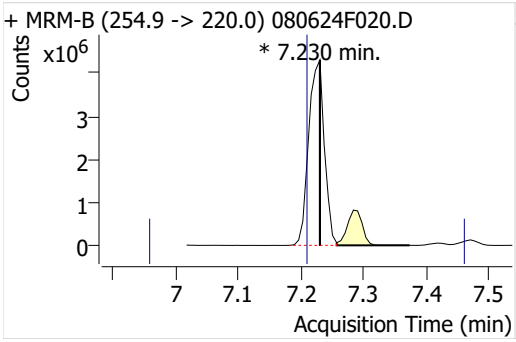
Aldrin-13C

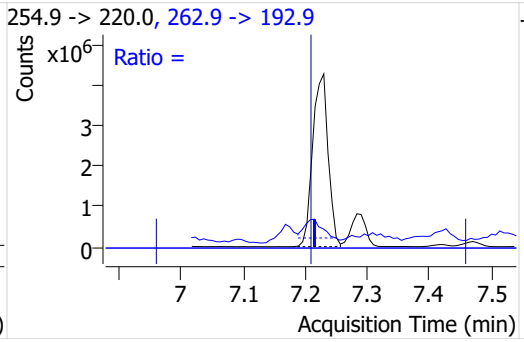


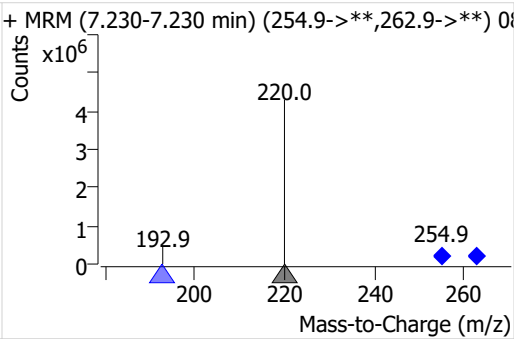




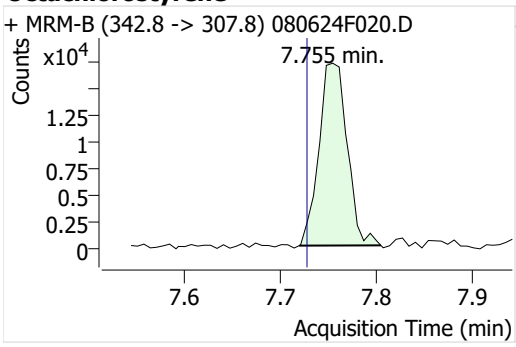
Aldrin

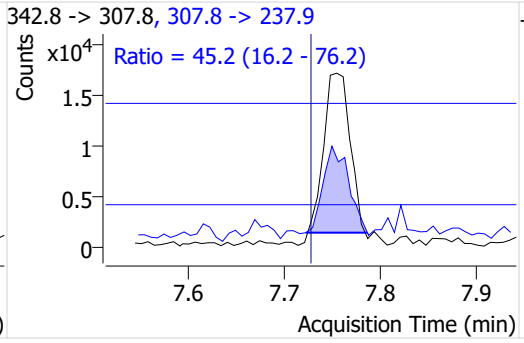


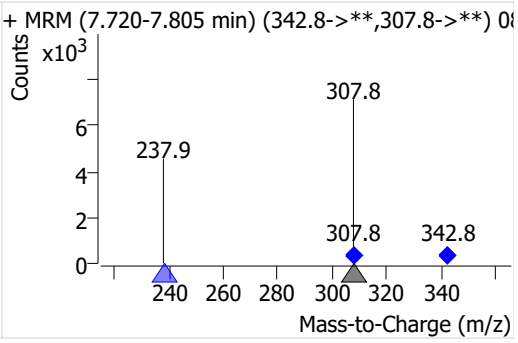




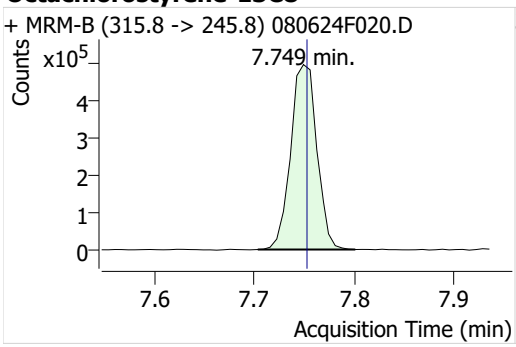
Octachlorostyrene

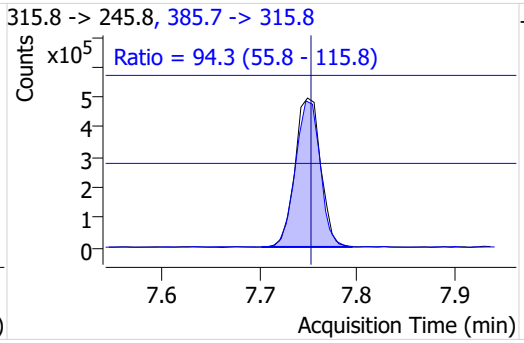


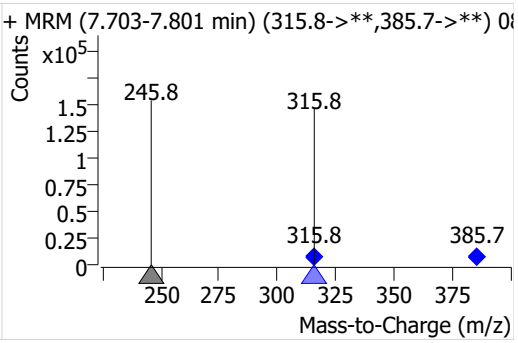




Octachlorostyrene-13C8







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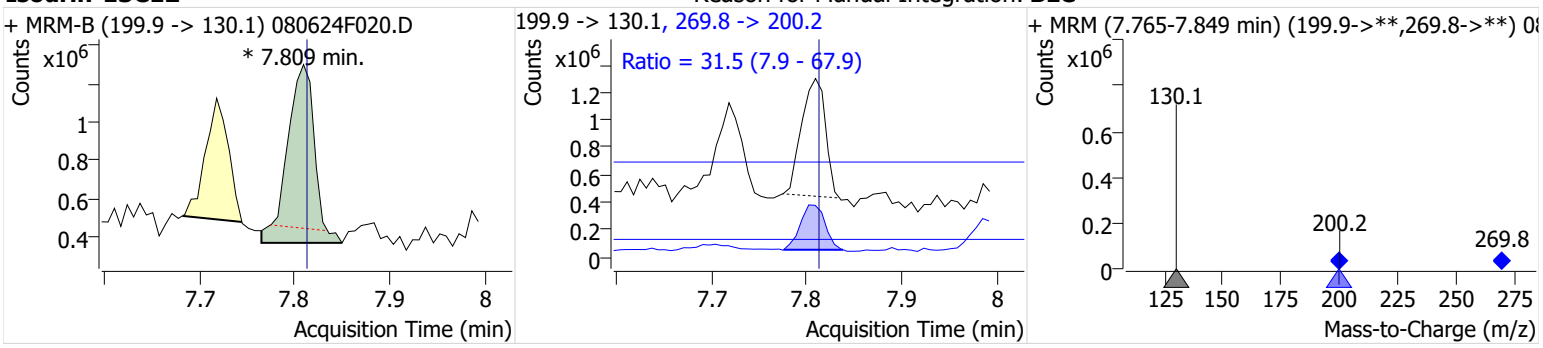
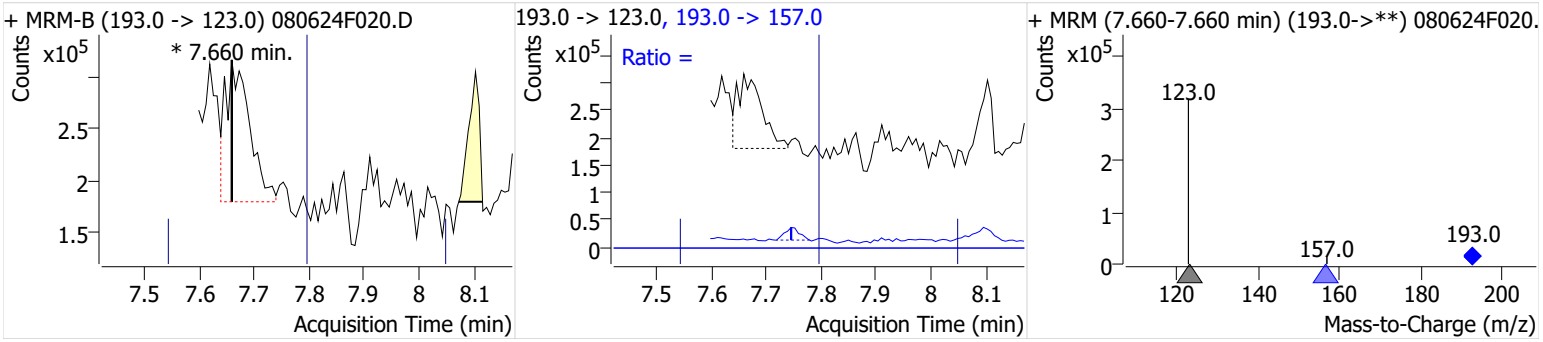
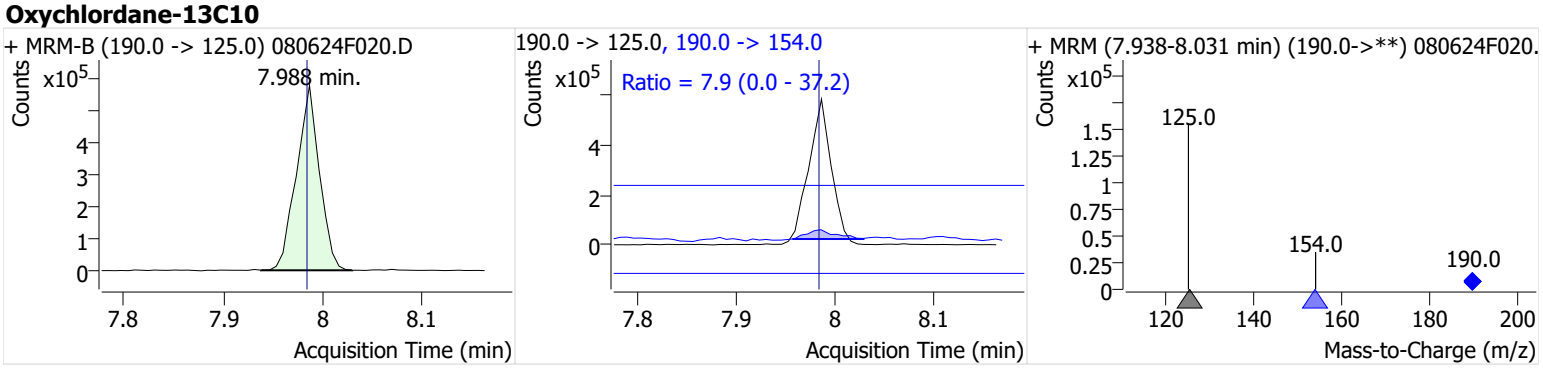
Isodrin-13C12 Reason for Manual Integration: **BLC**



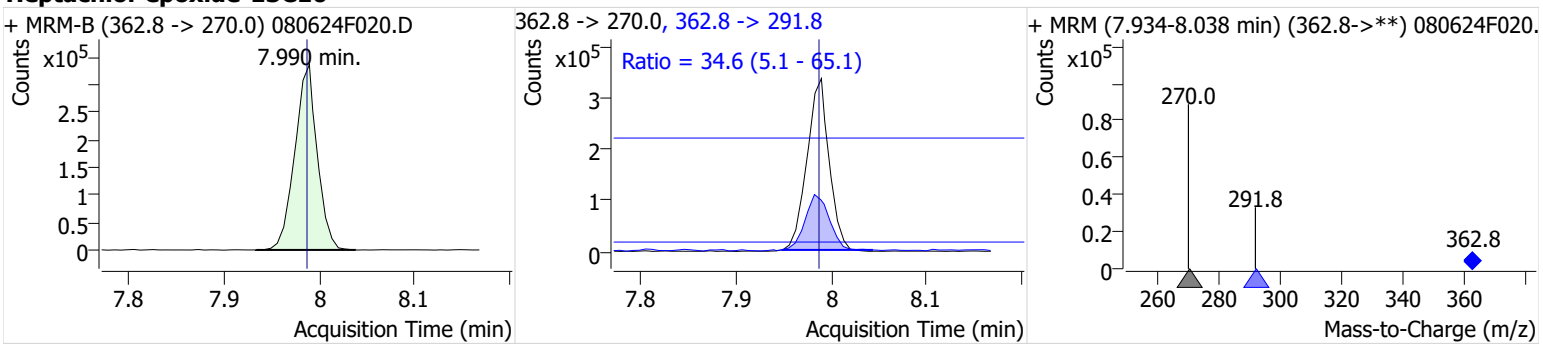
Isodrin



Oxychlordane-13C10



Heptachlor epoxide-13C10



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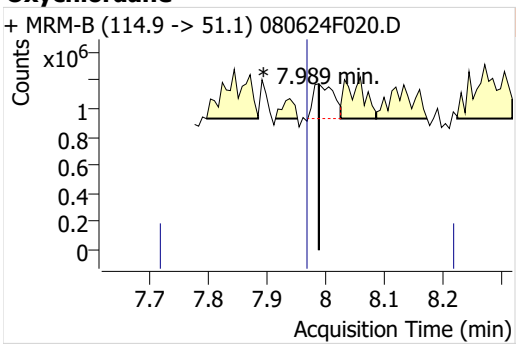
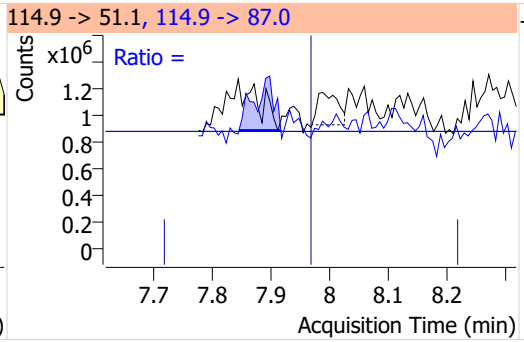
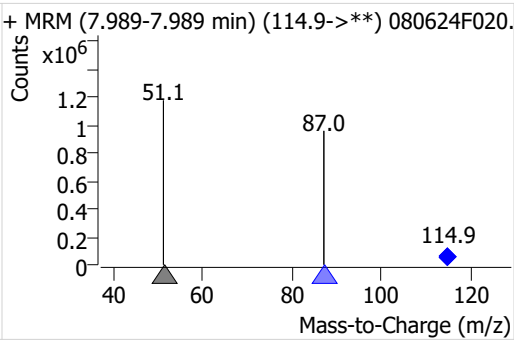
Oxychlordane







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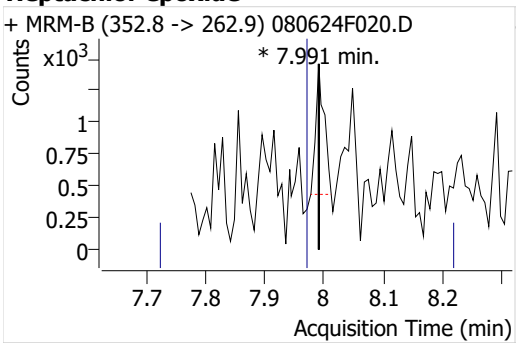
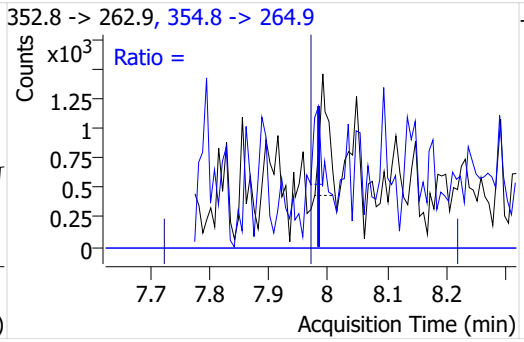
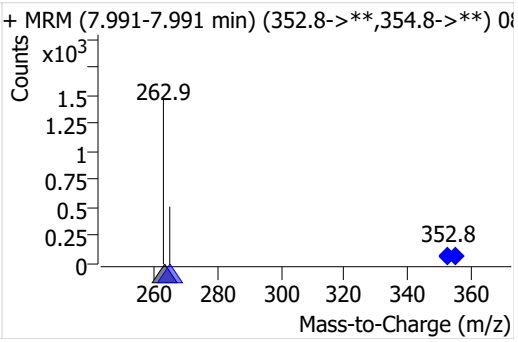
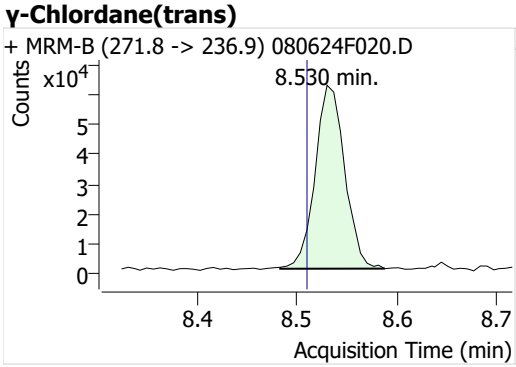
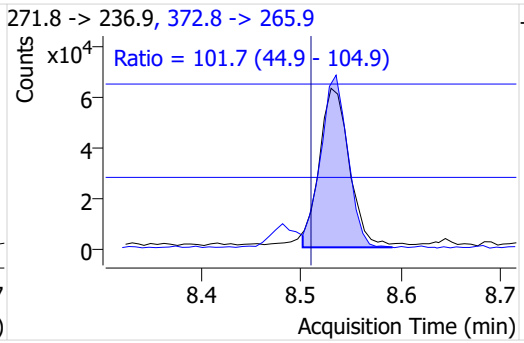


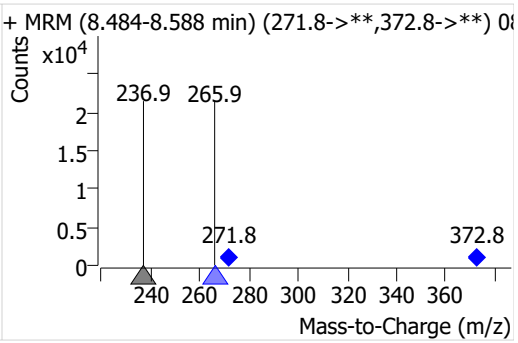




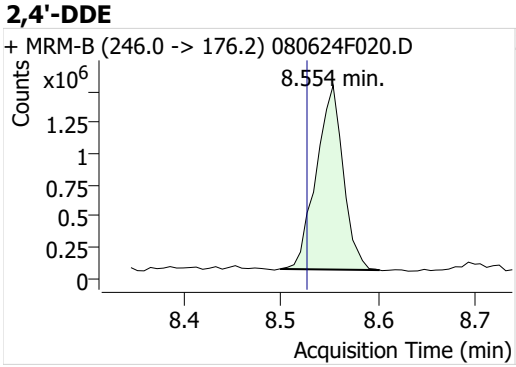
γ-Chlordane(trans)

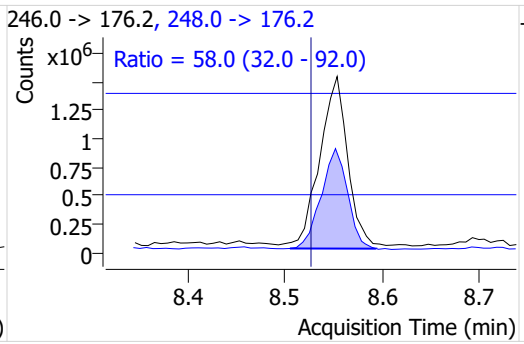


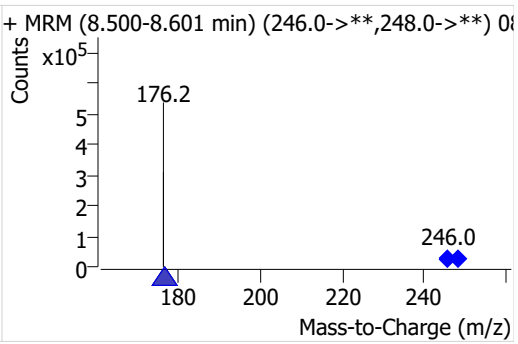




2,4'-DDE







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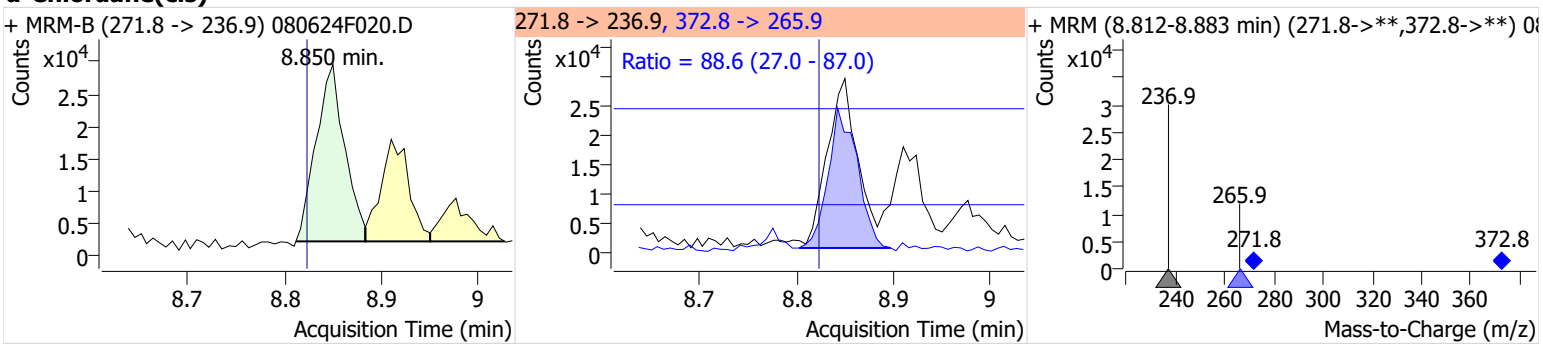
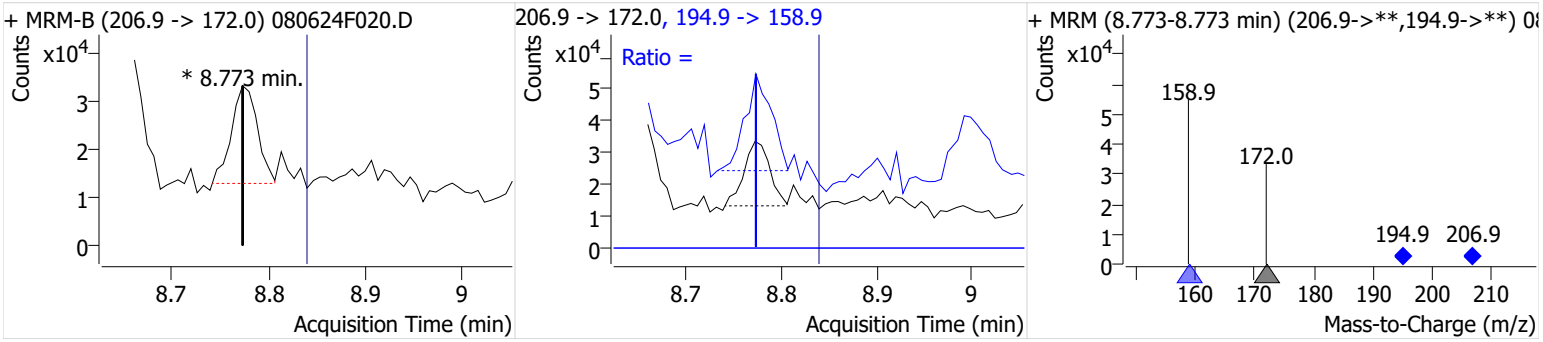
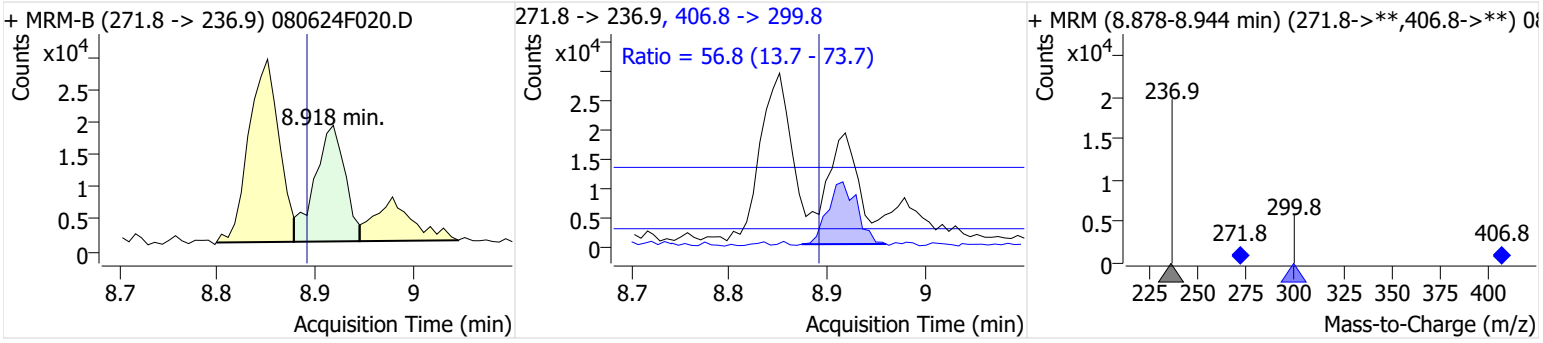
α-Chlordane(cis)



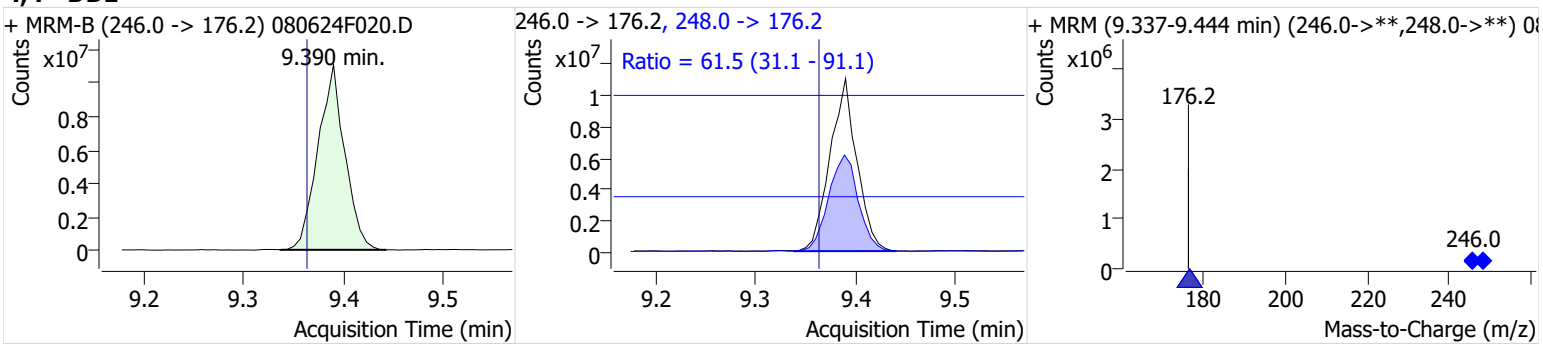
Endosulfan I



trans-Nanochlor



4,4' -DDE



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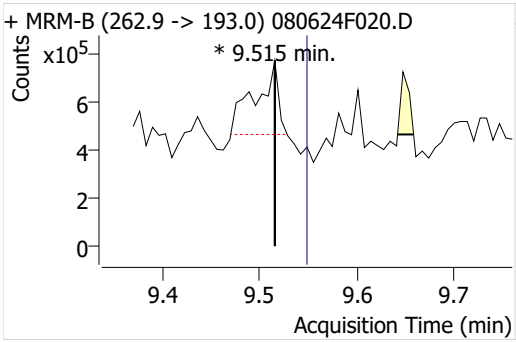
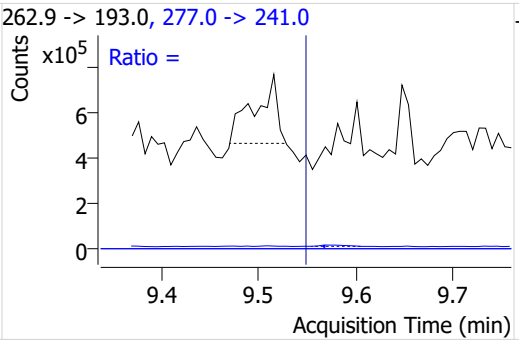
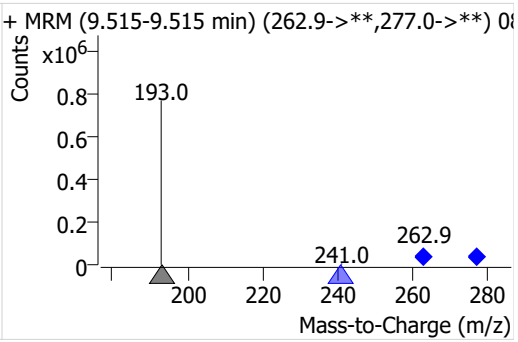
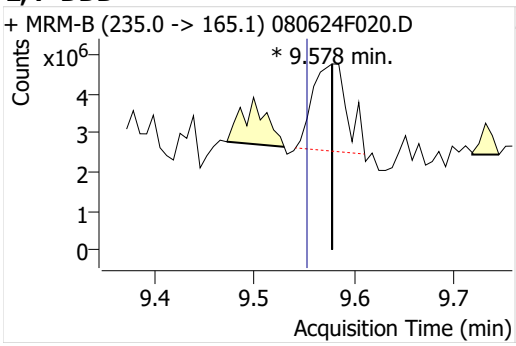
Dieldrin

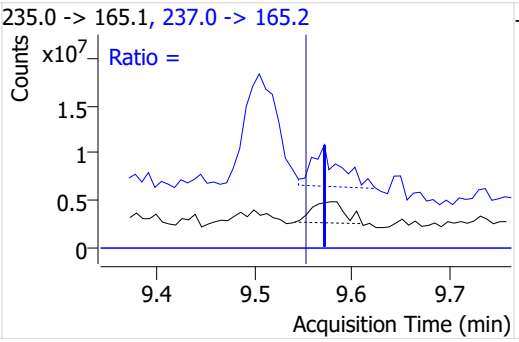


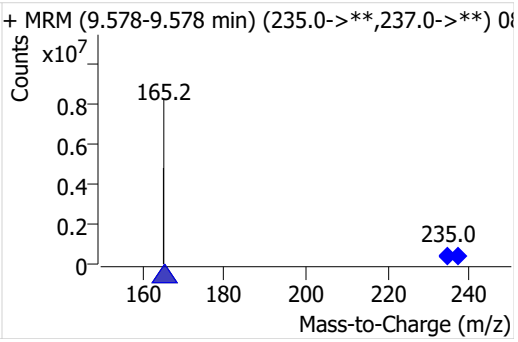




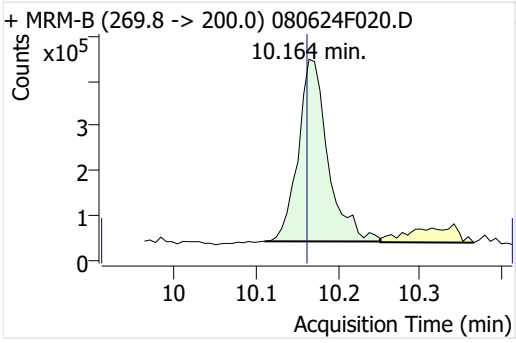
2,4'-DDD

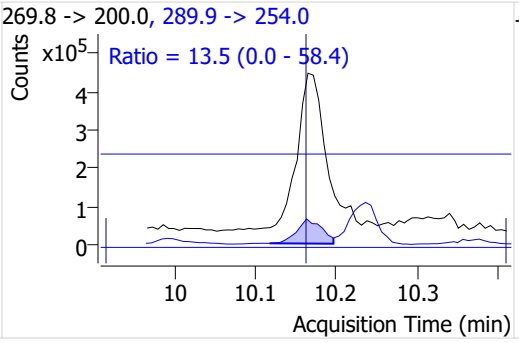


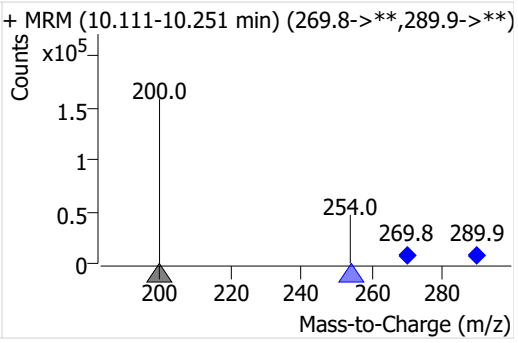




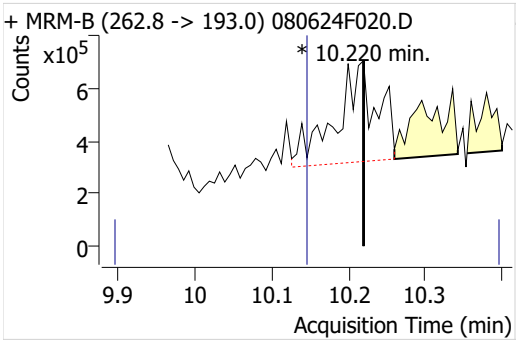
Endrin-13C12

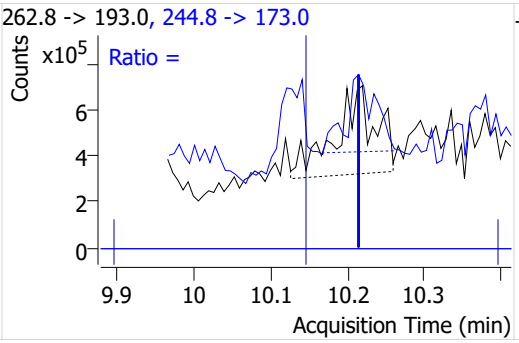


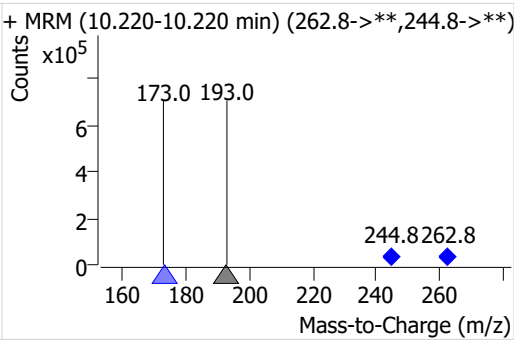




Endrin







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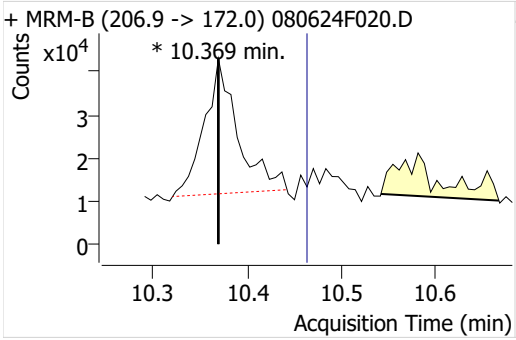
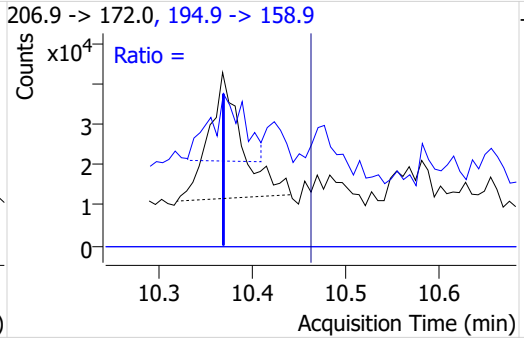
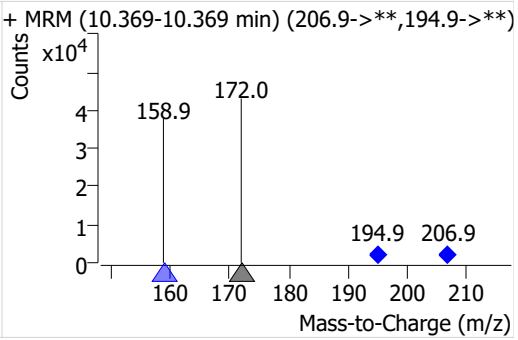
Endosulfan II

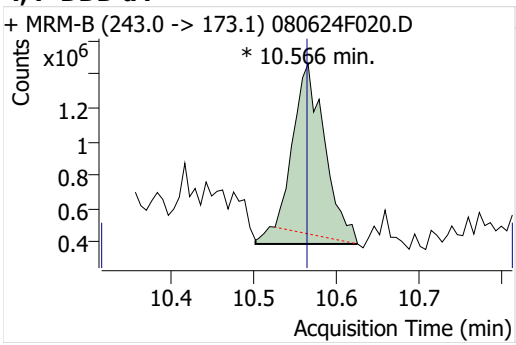


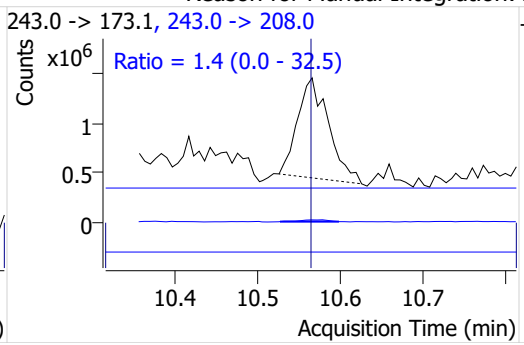


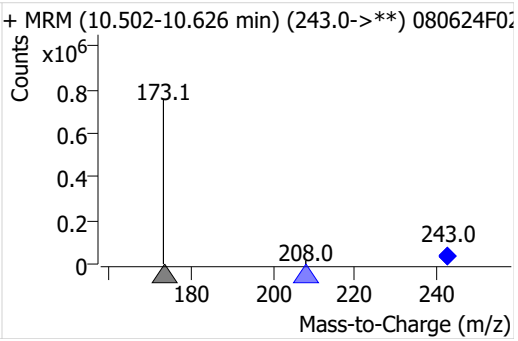


4,4'-DDD d4

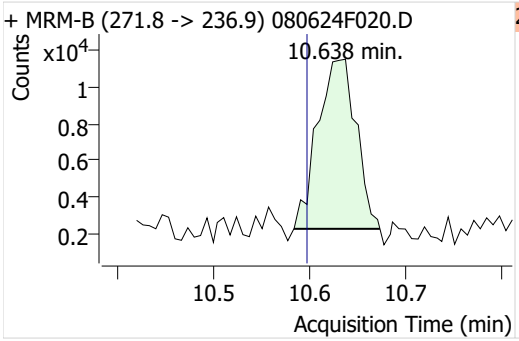
Reason for Manual Integration: **BLC**

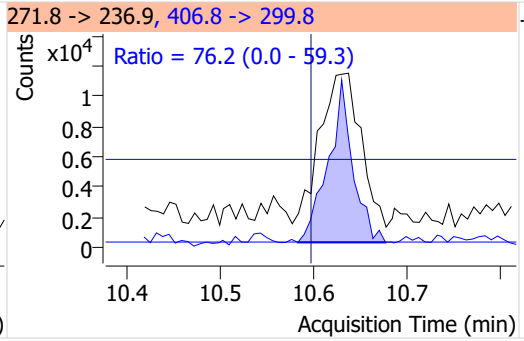


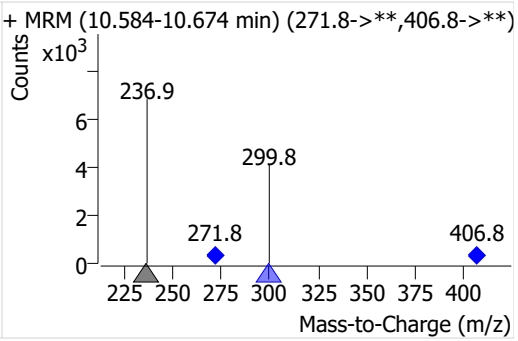




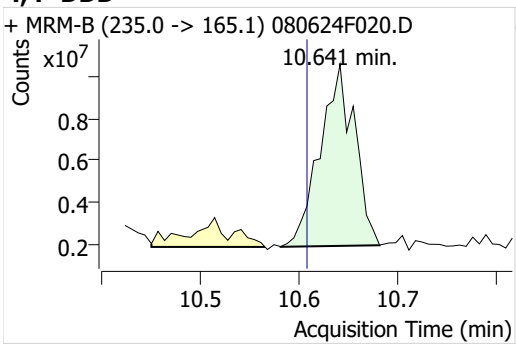
cis-Nonachlor

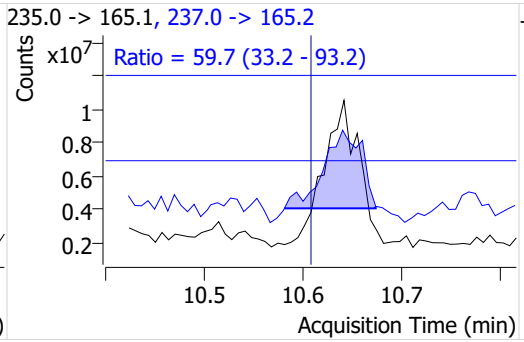


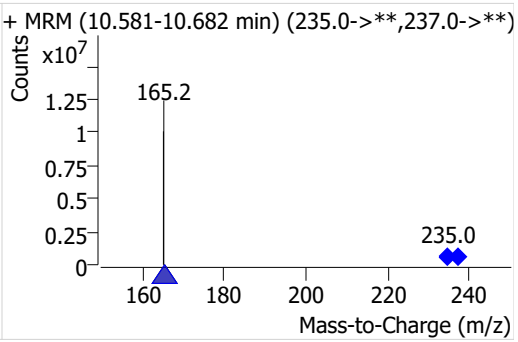




4,4'-DDD







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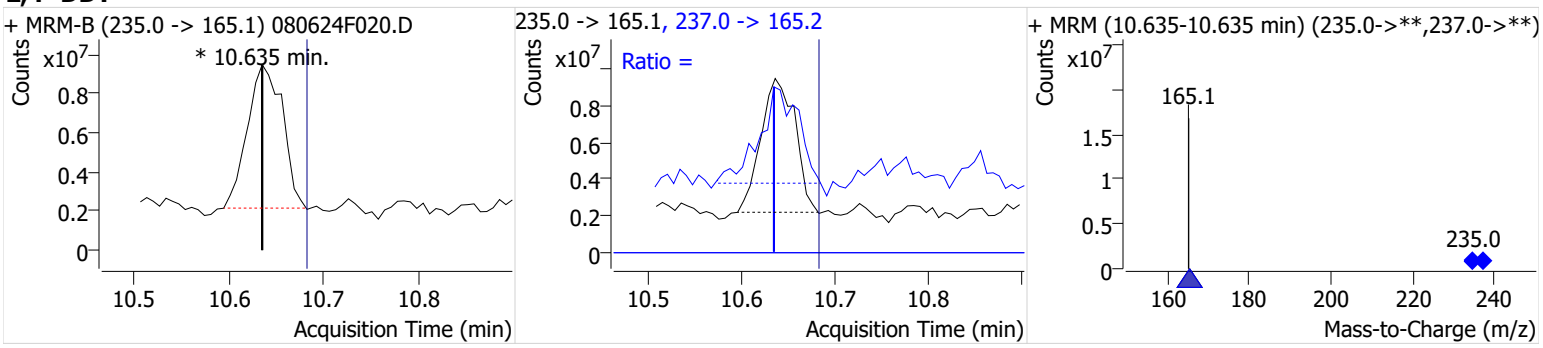
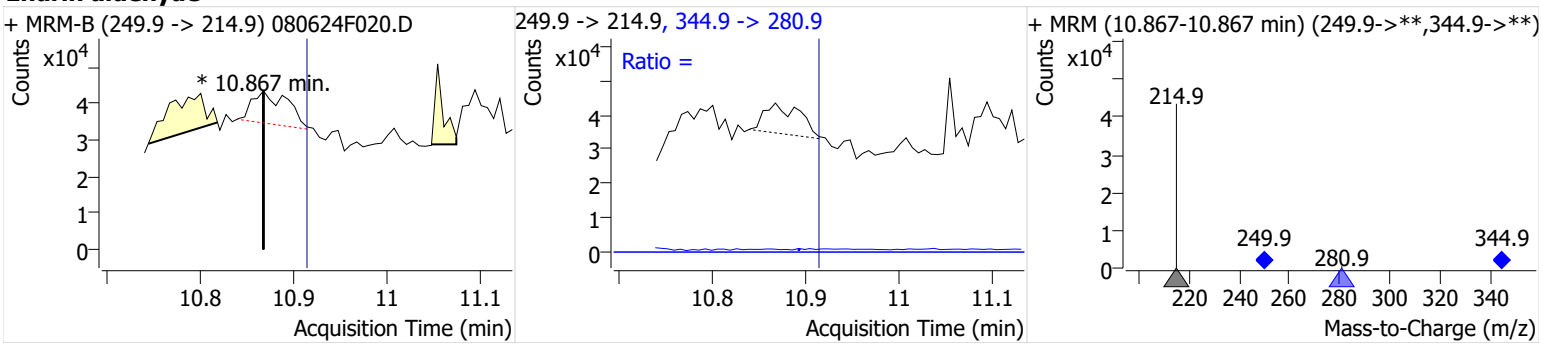
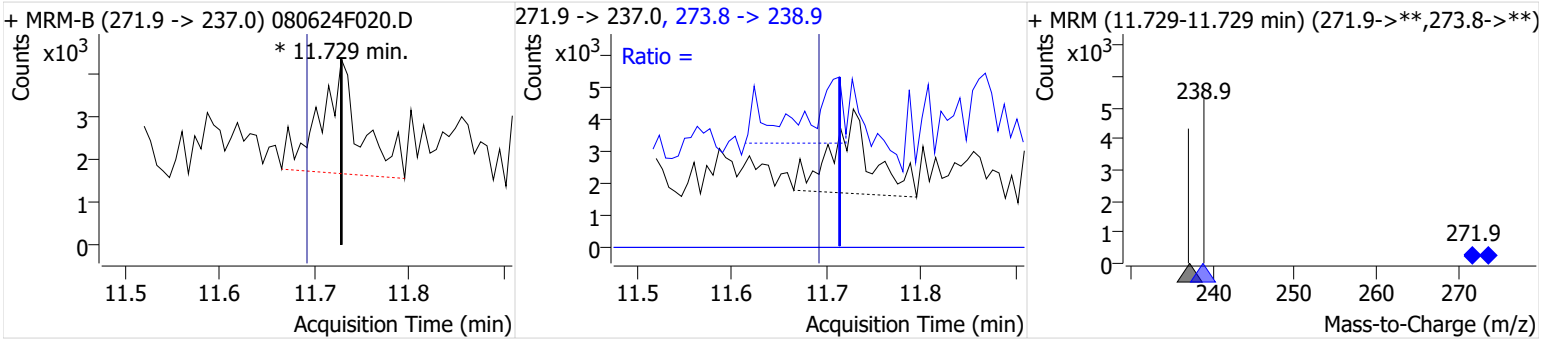
2,4'-DDT



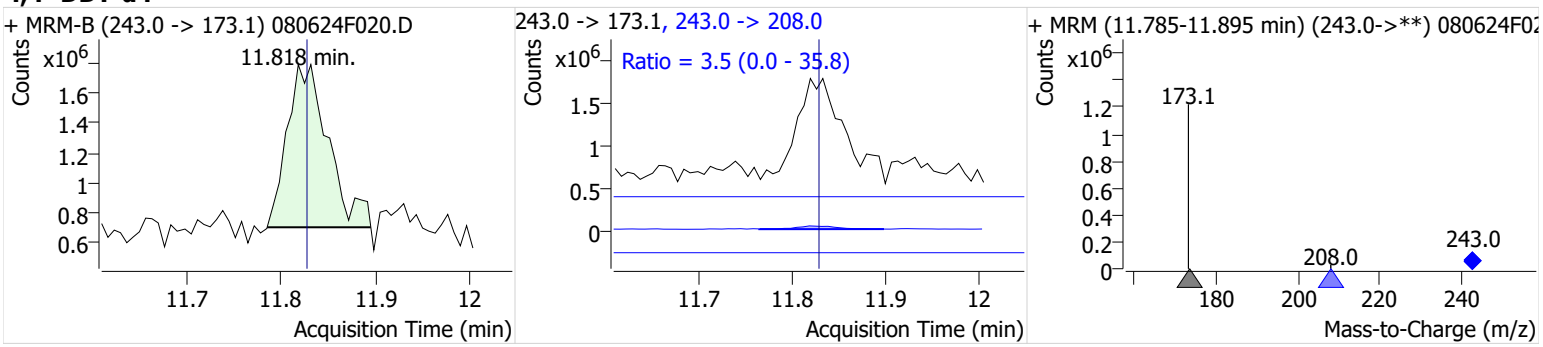
Endrin aldehyde



Endosulfan sulfate

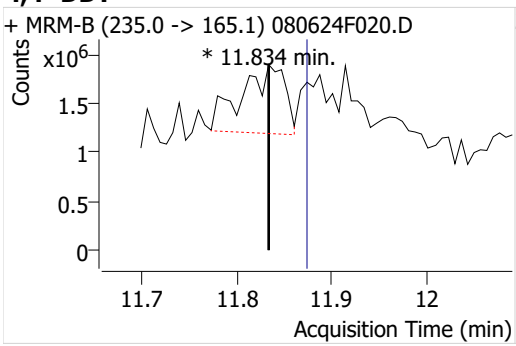


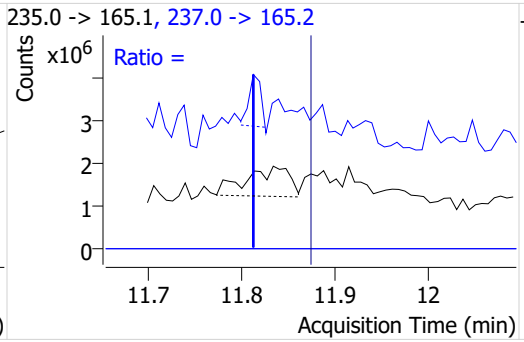
4,4'-DDT-d4

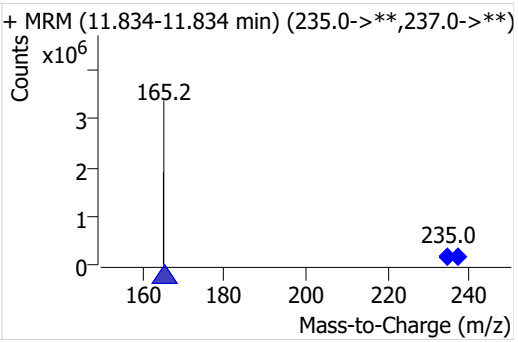


MassHunter Quantitative Analysis Sample Report

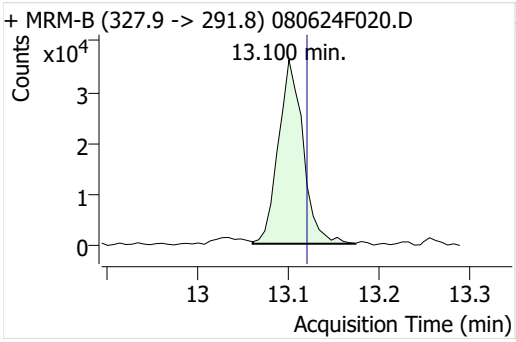
4,4'-DDT

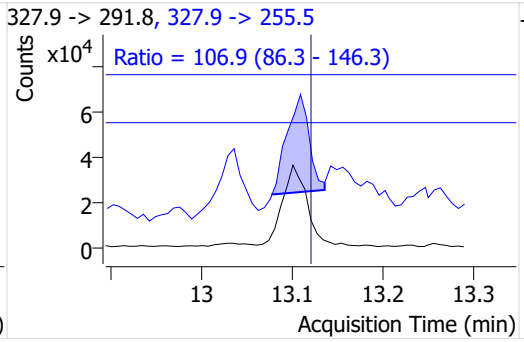


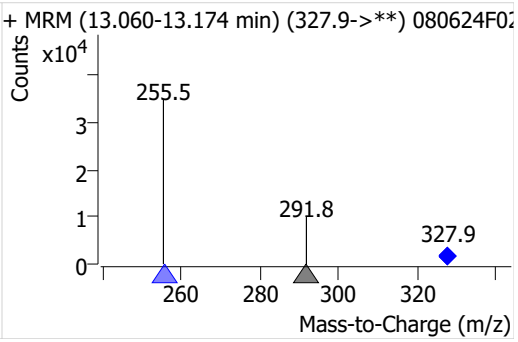




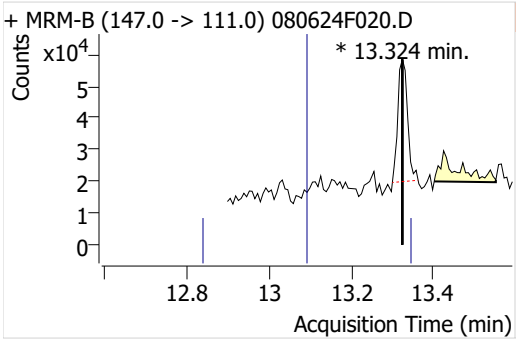
Endrin ketone-13C12

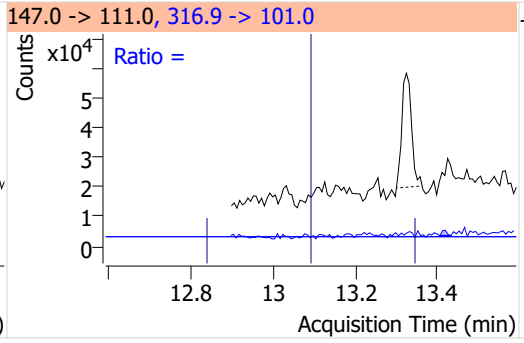


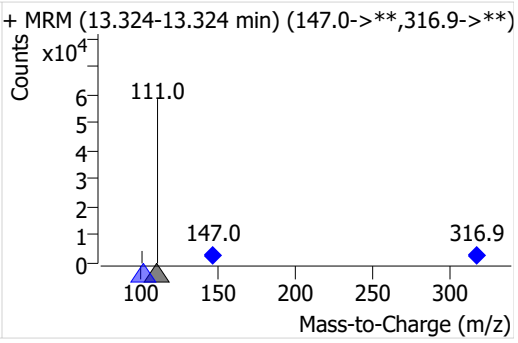




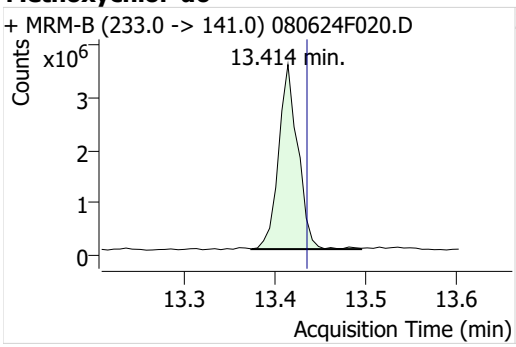
Endrin ketone

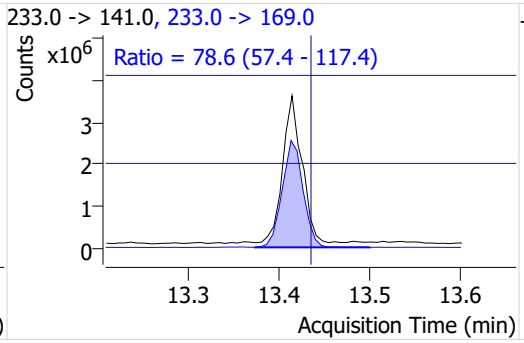


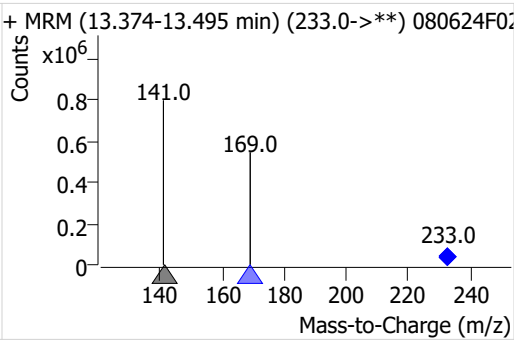




Methoxychlor-d6

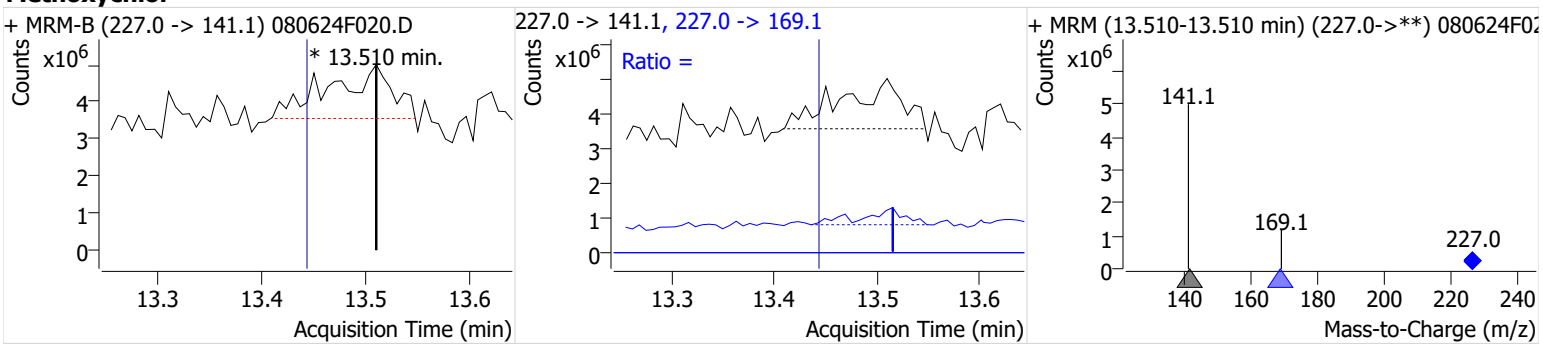




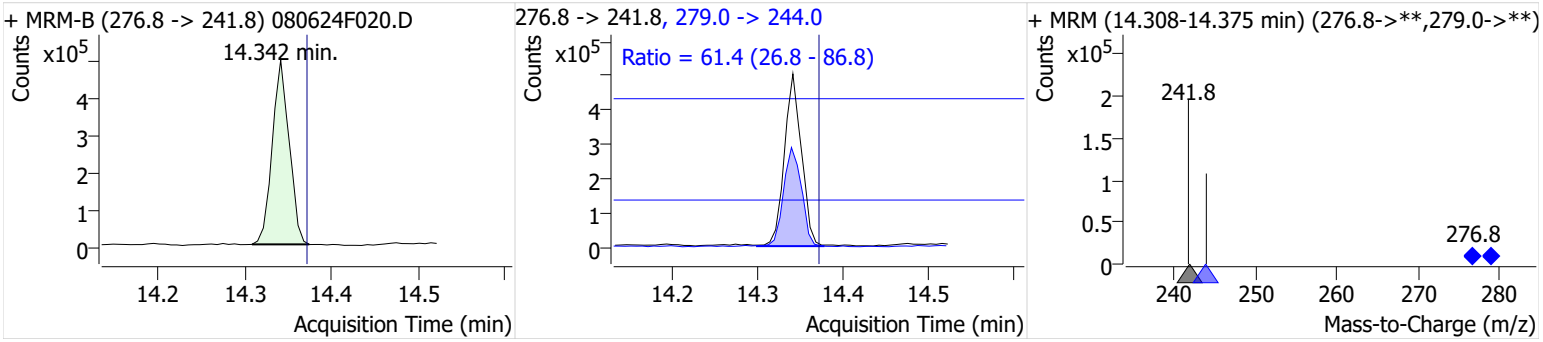


MassHunter Quantitative Analysis Sample Report

Methoxychlor



Mirex-13C10



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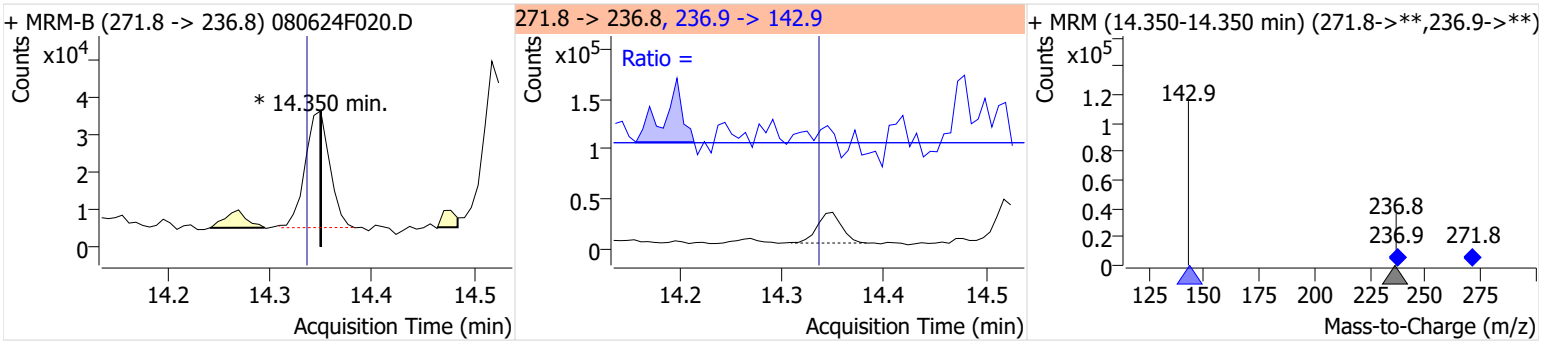
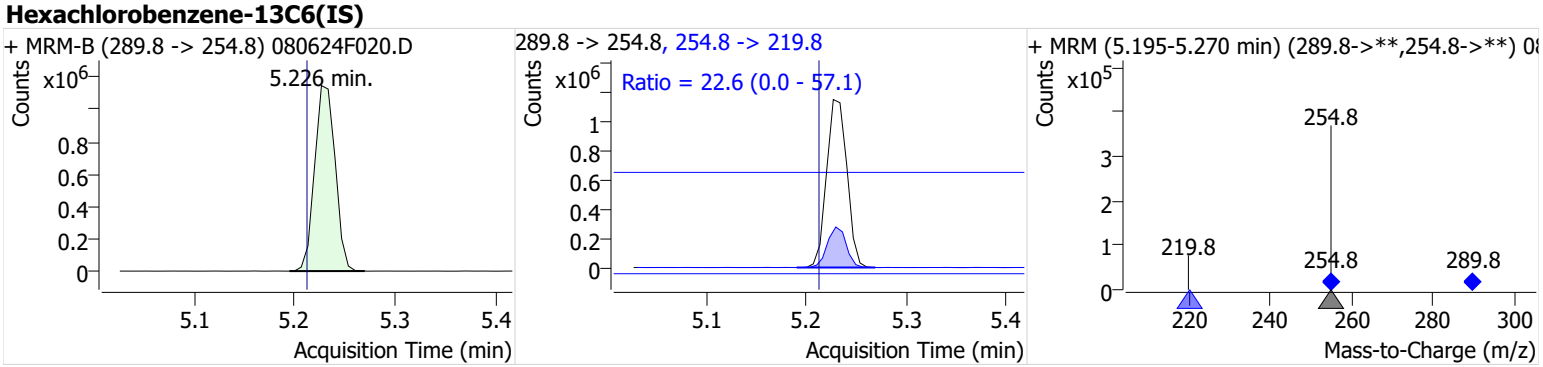
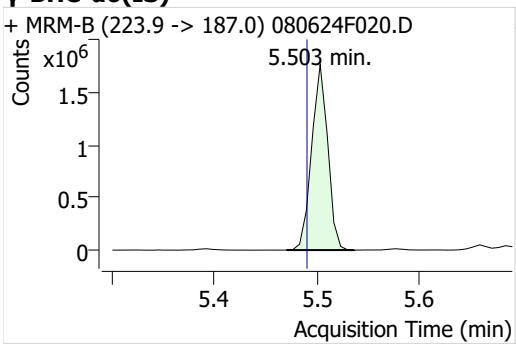


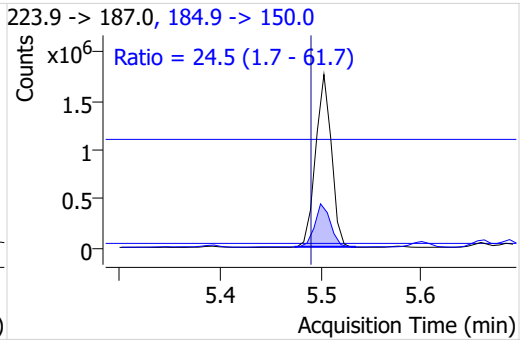
Hexachlorobenzene-13C6(IS)

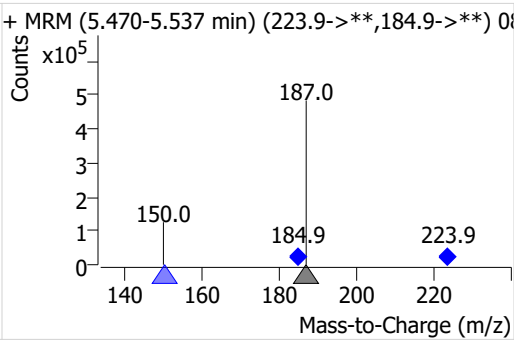


MassHunter Quantitative Analysis Sample Report

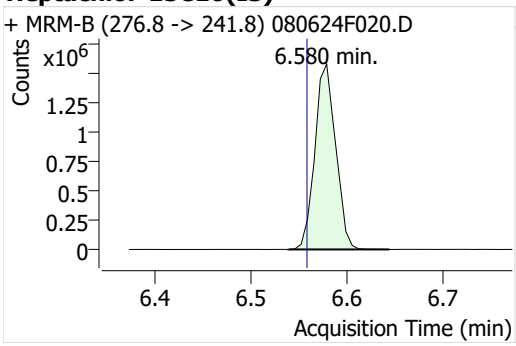
γ-BHC-d6(IS)

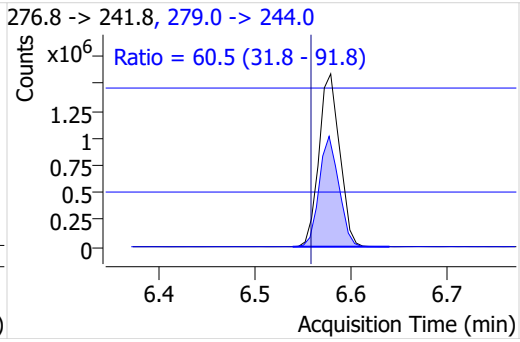


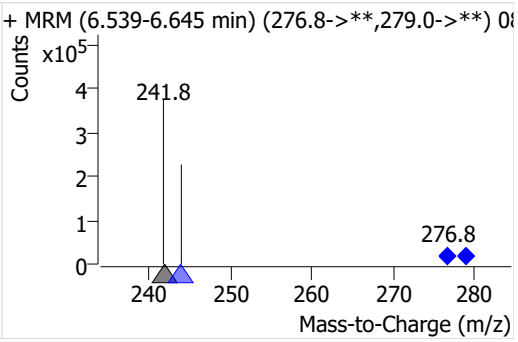




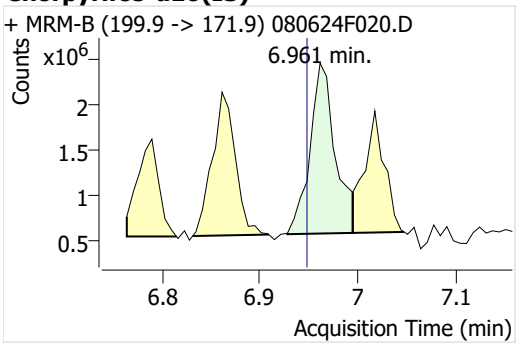
Heptachlor-13C10(IS)

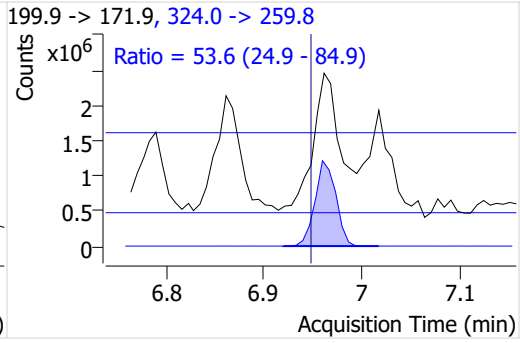


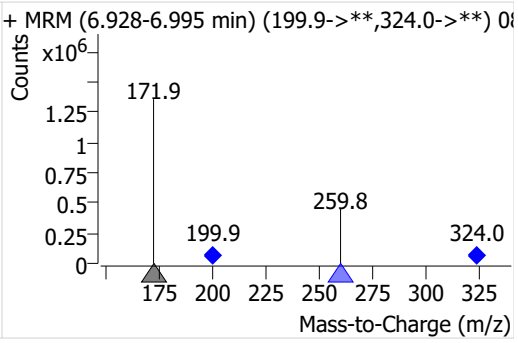




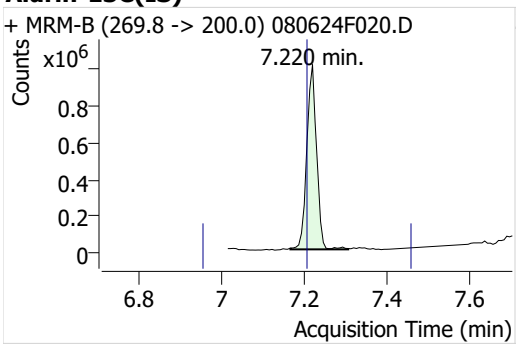
Chorpyrifos-d10(IS)

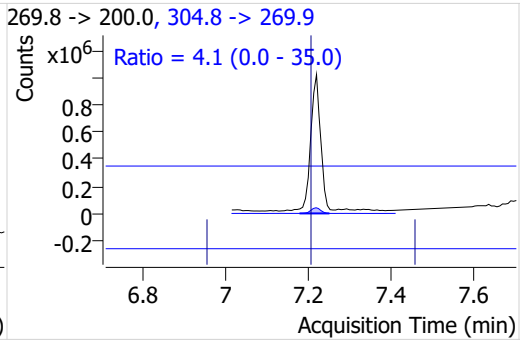


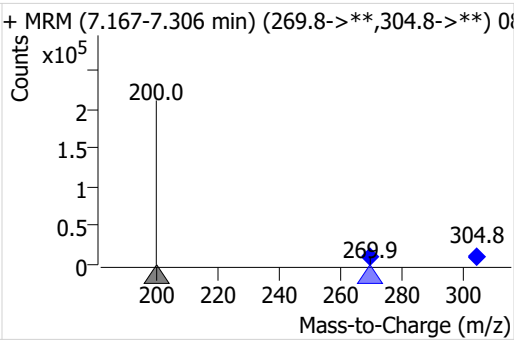




Aldrin-13C(IS)

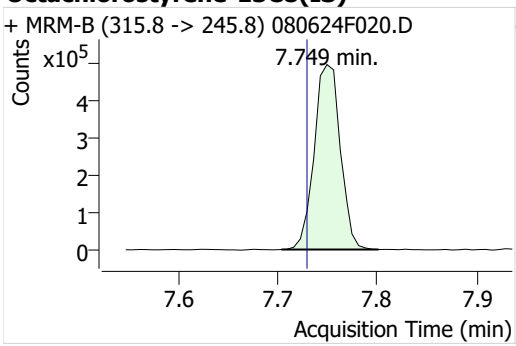


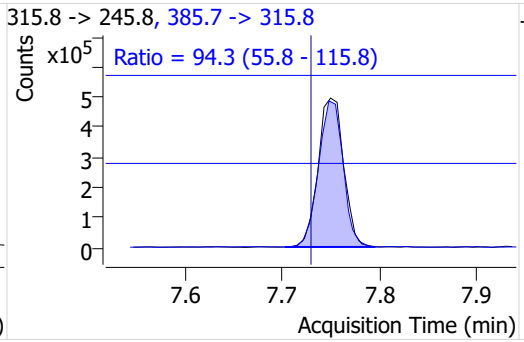


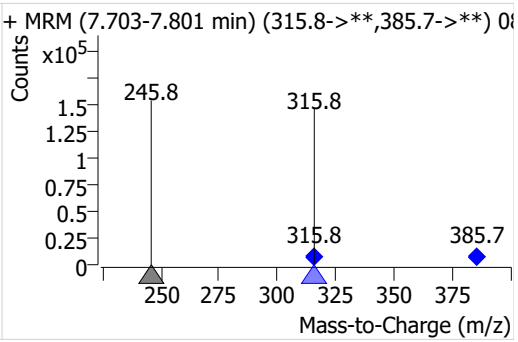


MassHunter Quantitative Analysis Sample Report

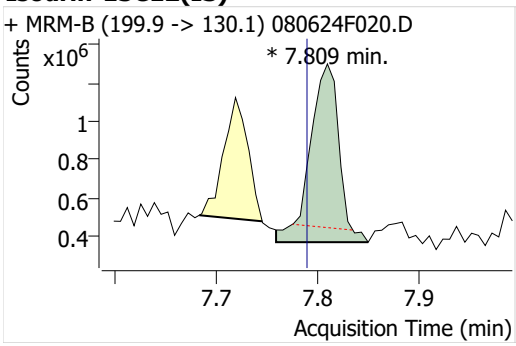
Octachlorostyrene-13C8(IS)

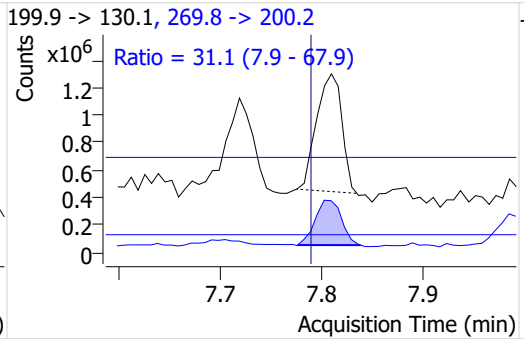


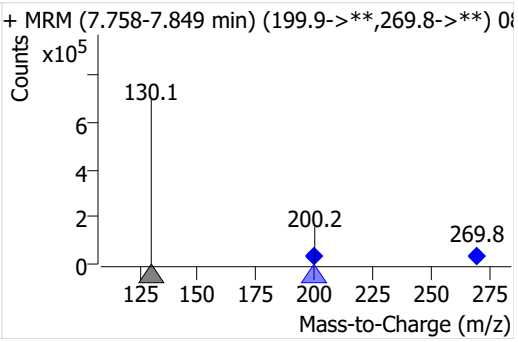




Isodrin-13C12(IS)







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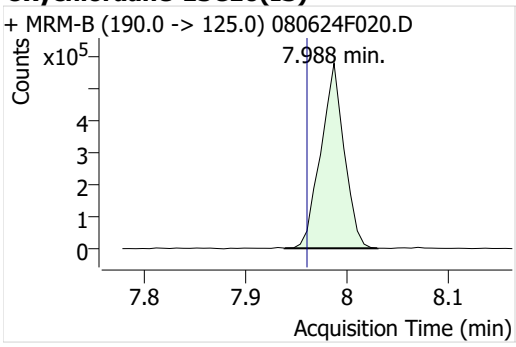
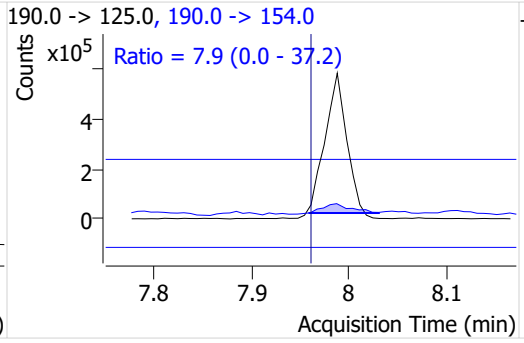
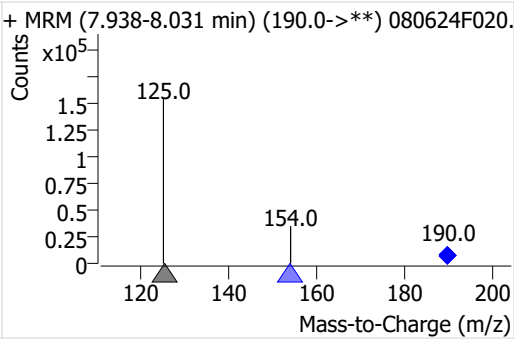
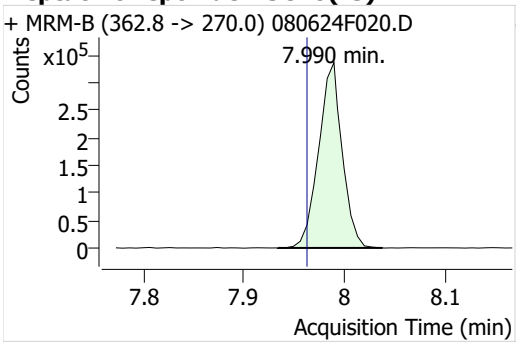
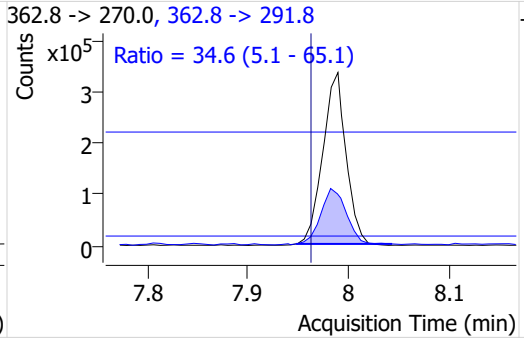


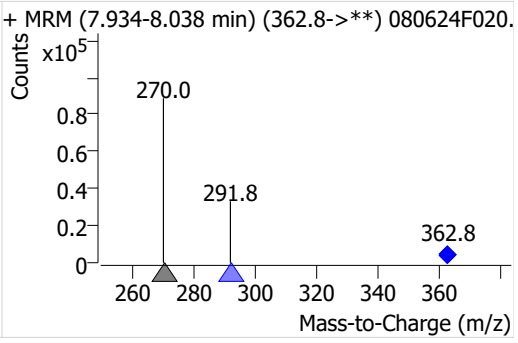




Heptachlor epoxide-13C10(IS)







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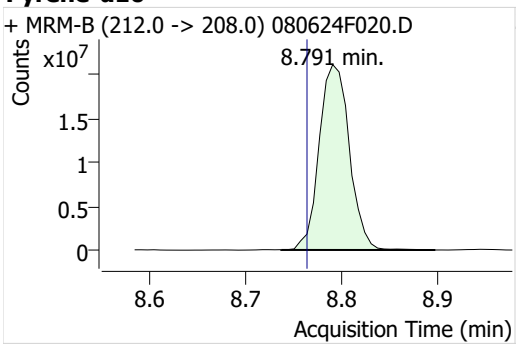
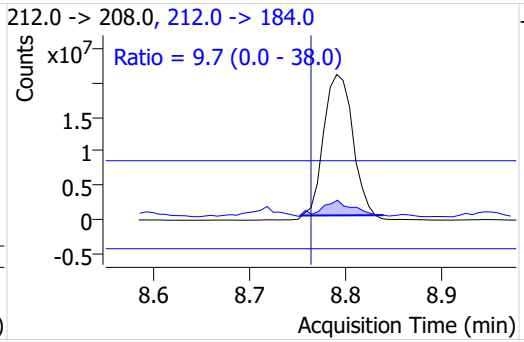
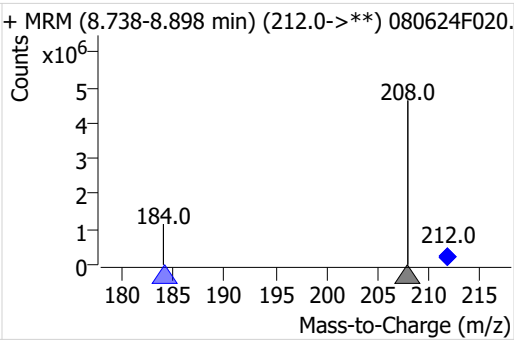
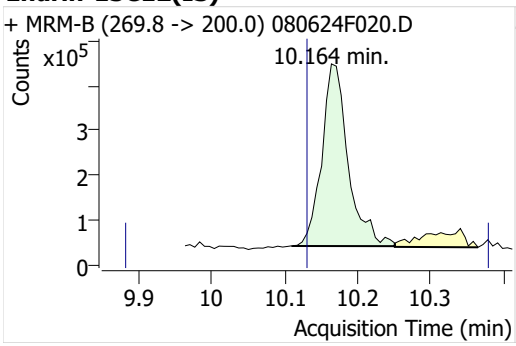
Pyrene-d10

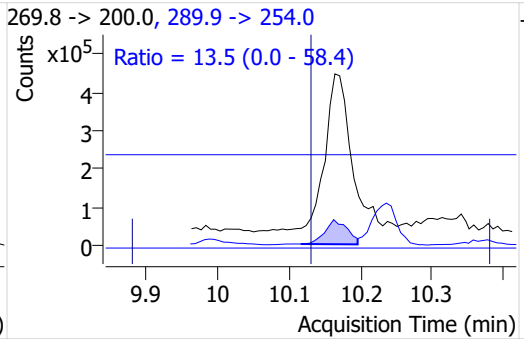


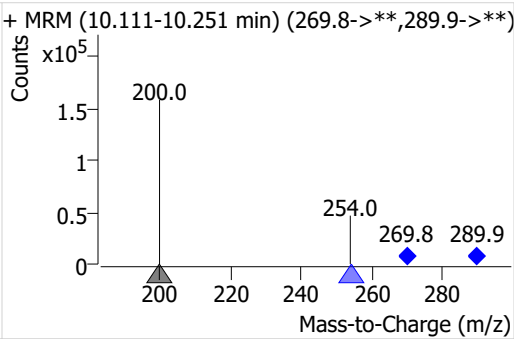




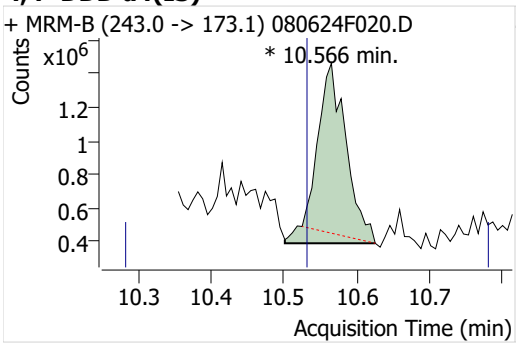
Endrin-13C12(IS)

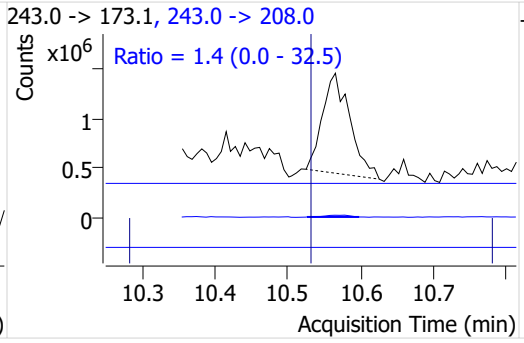


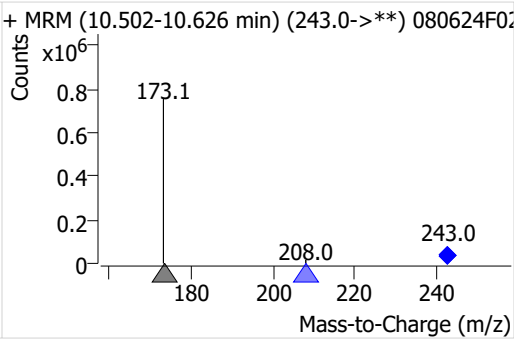




4,4'-DDD d4(IS)







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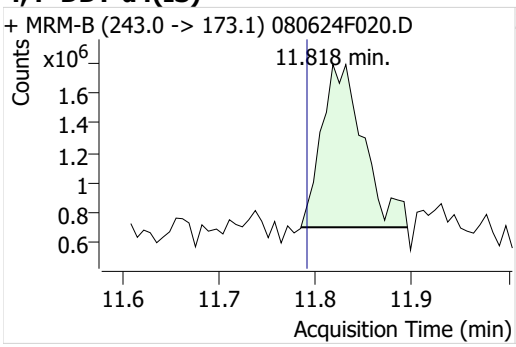

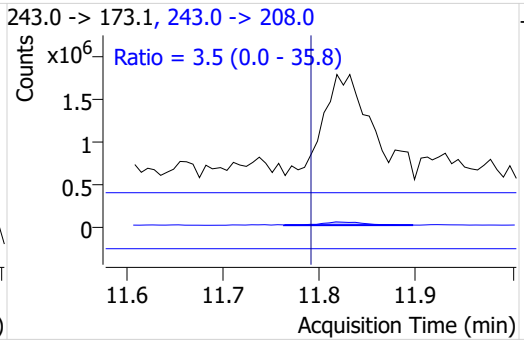

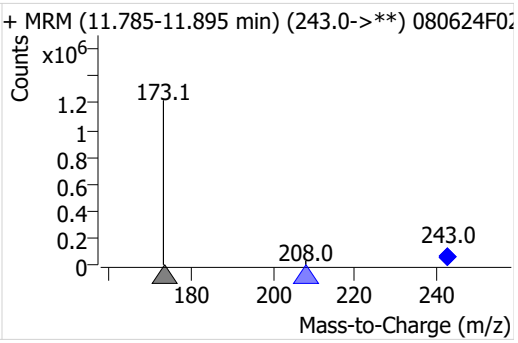

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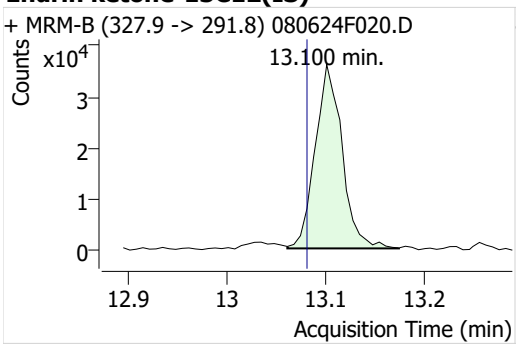
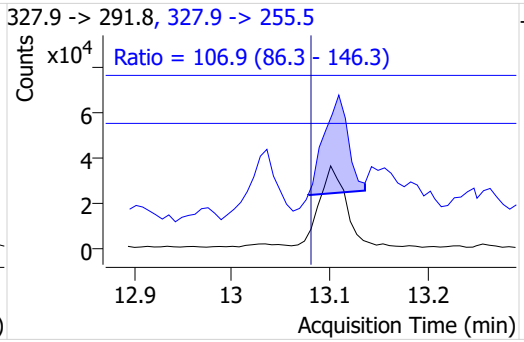
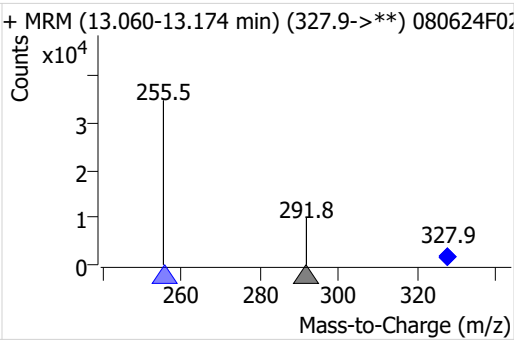
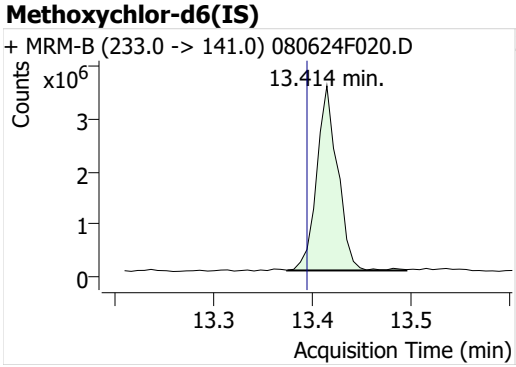
Endrin ketone-13C12(IS)

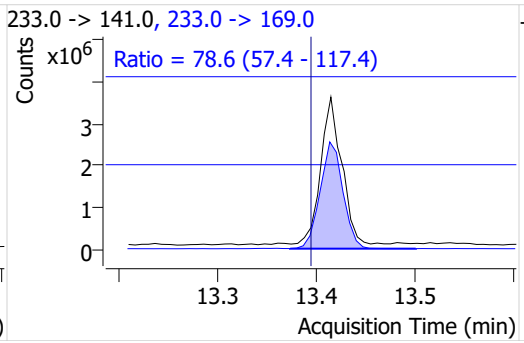


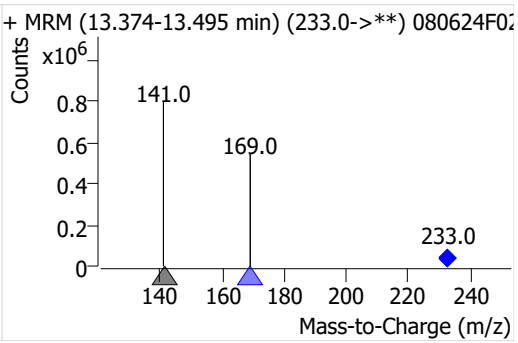




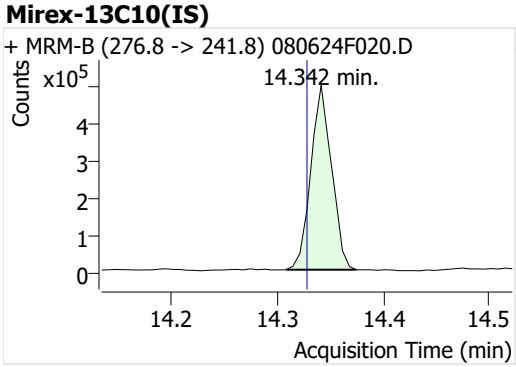
Methoxychlor-d6(IS)

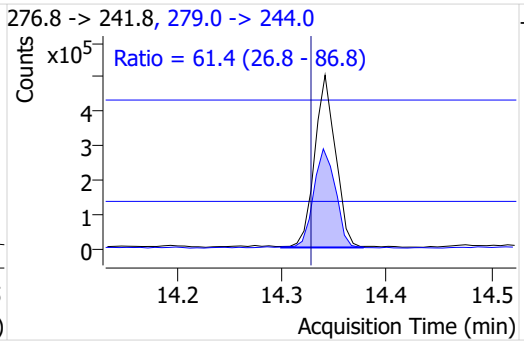


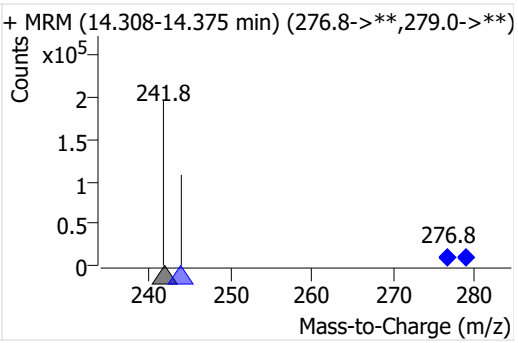




Mirex-13C10(IS)







1st 08/20/24
2nd 08/20/24

Validation Report

Data File: J:\MS42\Data\080624\080624F021.D
Lab ID: K2407810-002
RunType: N/A
Matrix: Sediment

Date Acquired: 8/6/24 16:44
Batch ID: 851162
Analysis Method: 1699M/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
Preparation Hold Time		X
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery	X	
Lab Control Sample Recovery		X
Method Blank	X	
Method Blank Surrogates	X	
Internal Standards	X	
Surrogates		X
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Sample Exceptions

Exception Categories	Result	Corrective Action
Preparation Hold Time	Prep Date/Time: 08/01/2024 1233 Hold Date/Time: 07/26/2022 2359	Frozen Sample Used

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Lab Control Sample Recovery	2,4'-DDT	124	53	116	High bias, samples<MRL
	4,4'-DDT	144	57	118	High bias, samples<MRL
Surrogates	S_Endrin-13C12	156	14	141	Matrix

Primary Review: _____

Printed: 8/20/24 17:33
\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

Secondary Review: _____

1st 08/20/24
2nd 08/20/24

Quantitation Report

Data File:	J:\MS42\Data\080624\080624F021.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 16:44	**Vial:**	15
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-002	**Raw Units:**	ng/ml

Bottle ID:	K2407810-002.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	851162	**Prep Lot:**	442451	**Report Group:**	K2407810
Analysis	1699M	**Prep Method:**	EPA 3541		
		Prep Date:	8/1/24		

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400368
		Report List ID:	25424

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	8.832	+0.05	16325828.571	100	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec		% Rec Criteria	Rpt?
S_Aldrin-13C12	7.233	+0.03	959513.330	10.566	53		12 - 88	Y
S_4,4'DDD-d4	10.599	+0.06	1306988.210	3.781	76		9 - 159	Y
S_4,4'-DDT-d4	11.845	+0.04	591943.248	2.781	56		5 - 187	Y
S_Endrin-13C12	10.191	+0.05	433641.065	31.156	156	*	14 - 141	Y
S_GBHCD6	5.524	+0.03	1265678.183	6.059	30		5 - 90	Y
S_Oxychlordane-13C10	8.011	+0.04	413393.183	7.163	36		5 - 86	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Aldrin	7.250	+0.03	0	0	0	U	Y
gamma-BHC (Lindane)	5.577	+0.03	0	0	0	U	Y
cis-Chlordane	8.877	+0.04	27082.252	1.031	0.20	J	Y
trans-Chlordane	8.557	+0.05	95928.754	4.416	0.85		Y
2,4'-DDD	9.618	+0.06	0	0	0	U	Y
4,4'-DDD	10.554	-0.07	0	0	0	U	Y
2,4'-DDE	8.574	+0.04	1683567.297	3.604	0.70		Y
4,4'-DDE	9.424	+0.05	9692336.343	29.126	5.6		Y
2,4'-DDT	10.662	-0.03	0	0	0	U	Y
4,4'-DDT	11.841	-0.04	0	0	0	U	Y
Dieldrin	9.581	+0.02	0	0	0	U	Y
cis-Nonachlor	10.665	+0.05	0	0	0	U	Y
trans-Nonachlor	8.944	+0.05	18086.867	0.968	0.19	J	Y
Oxychlordane	7.832	-0.14	0	0	0	U	Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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1st 08/20/24

2nd 08/20/24

Data File:	J:\MS42\Data\080624\080624F021.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 16:44	**Vial:**	15
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-002	**Raw Units:**	ng/ml

Prep Amount:	10.190 g	**Dilution:**	1
Prep Final Amount:	1.00 mL	**Basis Factor:**	50.70

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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MassHunter Quantitative Analysis Sample Report

Data File	J:\MS42\Data\080624\080624F021.D		
Batch File	J:\MS42\Data\080624\QuantResults\080624 OC PEST.batch.bin		
Acq. Date-Time	8/6/2024 4:44:33 PM	**Acq Operator**	EBruno
Name	K2407810-002	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	8/19/2024 3:52:06 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	072424 OC PEST ICAL.batch.bin	**Vial**	15
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.266	289.8 -> 254.8	905519	20.0000 ng/ml	0.052
γ-BHC-d6(IS)	5.524	223.9 -> 187.0	1265678	20.0000 ng/ml	0.032
Heptachlor-13C10(IS)	6.599	276.8 -> 241.8	1526486	20.0000 ng/ml	0.036
Chorpyrifos-d10(IS)	6.981	199.9 -> 171.9	2140450	20.0000 ng/ml	0.036
Aldrin-13C(IS)	7.233	269.8 -> 200.0	983891	20.0000 ng/ml	0.029
Octachlorostyrene-13C8(IS)	7.769	315.8 -> 245.8	462511	20.0000 ng/ml	0.039
Isodrin-13C12(IS)	7.829	199.9 -> 130.1	1439699 ***m***	20.0000 ng/ml	0.040
Oxychlordane-13C10(IS)	8.011	190.0 -> 125.0	413393	20.0000 ng/ml	0.050
Heptachlor epoxide-13C10(IS)	8.013	362.8 -> 270.0	241135	20.0000 ng/ml	0.050
Pyrene-d10	8.832	212.0 -> 208.0	16325829	100.0000 ng/ml	0.074
Endrin-13C12(IS)	10.191	269.8 -> 200.0	433641 ***m***	20.0000 ng/ml	0.056
4,4'-DDD d4(IS)	10.599	243.0 -> 173.1	1306988	5.0000 ng/ml	0.067
4,4'-DDT-d4(IS)	11.845	243.0 -> 173.1	591943	5.0000 ng/ml	0.066
Endrin ketone-13C12(IS)	13.114	327.9 -> 291.8	28743	20.0000 ng/ml	0.038
Methoxychlor-d6(IS)	13.421	233.0 -> 141.0	3289423	20.0000 ng/ml	0.030
Mirex-13C10(IS)	14.348	276.8 -> 241.8	349521	5.0000 ng/ml	0.023

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	905519	4.393 ng/ml	
		Spiked Amount =	20.0	Recovery =	*22.0 %*
γ-BHC-d6	5.491	223.9 -> 187.0	1265678	6.059 ng/ml	
		Spiked Amount =	20.0	Recovery =	*30.3 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	1526486	12.719 ng/ml	
		Spiked Amount =	20.0	Recovery =	*63.6 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	2140450	41.614 ng/ml	
		Spiked Amount =	20.0	Recovery =	*208.1 %*
Aldrin-13C	7.207	269.8 -> 200.0	959513	10.566 ng/ml	
		Spiked Amount =	20.0	Recovery =	*52.8 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	462511	5.651 ng/ml	
		Spiked Amount =	20.0	Recovery =	*28.3 %*
Isodrin-13C12	7.789	199.9 -> 130.1	1439699	14.793 ng/ml	
		Spiked Amount =	20.0	Recovery =	*74.0 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	413393	7.163 ng/ml	
		Spiked Amount =	20.0	Recovery =	*35.8 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	241135	7.382 ng/ml	
		Spiked Amount =	20.0	Recovery =	*36.9 %*
Endrin-13C12	10.131	269.8 -> 200.0	433641 ***m***	31.156 ng/ml	
		Spiked Amount =	20.0	Recovery =	*155.8 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	1306988	3.781 ng/ml	
		Spiked Amount =	5.0	Recovery =	*75.6 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	591943	2.781 ng/ml	
		Spiked Amount =	5.0	Recovery =	*55.6 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	28743	9.783 ng/ml	
		Spiked Amount =	20.0	Recovery =	*48.9 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	3289423	27.863 ng/ml	
		Spiked Amount =	20.0	Recovery =	*139.3 %*

MassHunter Quantitative Analysis Sample Report

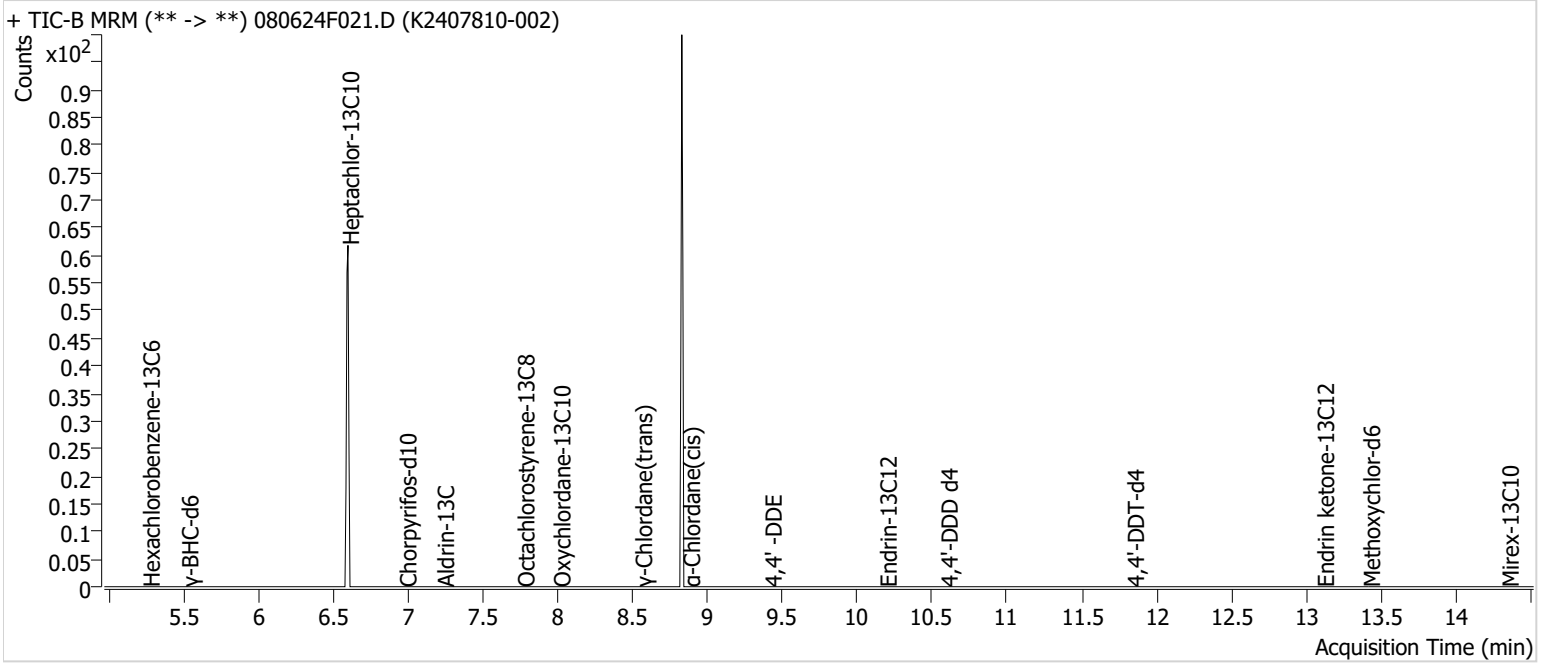
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	349521 *m*	1.113 ng/ml
		Spiked Amount = 5.0	Recovery = *22.3 %*	

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.267	283.8 -> 213.9	92713	1.342 ng/ml	100
β-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
γ-BHC(Lindane)	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
δ-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Heptachlor	Heptachlor-13C10(IS)		271.7 -> 236.9		ND ng/ml	
Chorpyrifos	Chorpyrifos-d10(IS)		196.9 -> 169.0		ND ng/ml	
Aldrin	Aldrin-13C(IS)		254.9 -> 220.0		ND ng/ml	
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.780	342.8 -> 307.8	25511	0.449 ng/ml	65
Isodrin	Isodrin-13C12(IS)		193.0 -> 123.0		ND ng/ml	
Oxychlordane	Oxychlordane-13C10(IS)		114.9 -> 51.1		ND ng/ml	
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)		352.8 -> 262.9		ND ng/ml	
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.557	271.8 -> 236.9	95929	4.416 ng/ml	56
2,4'-DDE	4,4'-DDD d4(IS)	8.574	246.0 -> 176.2	1683567	3.604 ng/ml	88
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.877	271.8 -> 236.9	27082	1.031 ng/ml	34
Endosulfan I	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
trans-Nanochlor	Oxychlordane-13C10(IS)	8.944	271.8 -> 236.9	18087 *m*	0.968 ng/ml	58
4,4' -DDE	4,4'-DDD d4(IS)	9.424	246.0 -> 176.2	9692336	29.126 ng/ml	100
Dieldrin	Endrin-13C12(IS)		262.9 -> 193.0		ND ng/ml	
2,4'-DDD	4,4'-DDD d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin	Endrin-13C12(IS)		262.8 -> 193.0		ND ng/ml	
Endosulfan II	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
cis-Nonachlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
4,4'-DDD	4,4'-DDD d4(IS)		235.0 -> 165.1		ND ng/ml	
2,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin aldehyde	Endrin-13C12(IS)		249.9 -> 214.9		ND ng/ml	
Endosulfan sulfate	Endrin-13C12(IS)		271.9 -> 237.0		ND ng/ml	
4,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin ketone	Endrin ketone-13C12(IS)		147.0 -> 111.0		ND ng/ml	
Methoxychlor	Methoxychlor-d6(IS)		227.0 -> 141.1		ND ng/ml	
Mirex	Mirex-13C10(IS)		271.8 -> 236.8		ND ng/ml	

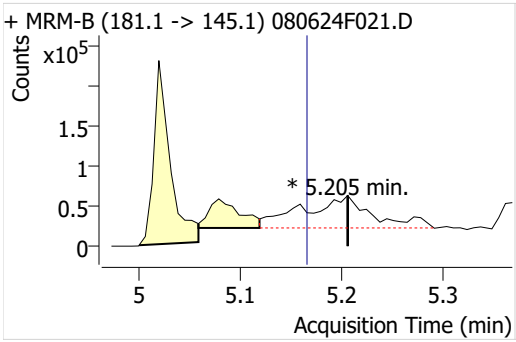
(m) = manual integration ND = Not Detected NC = Not Calculated

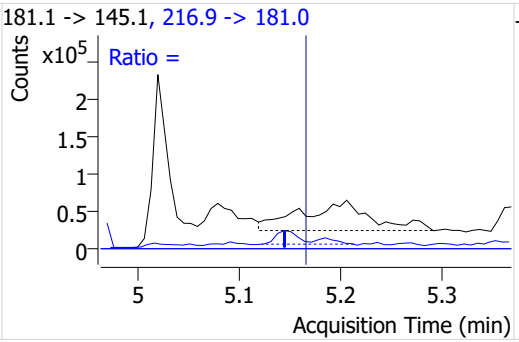
Sample Chromatogram

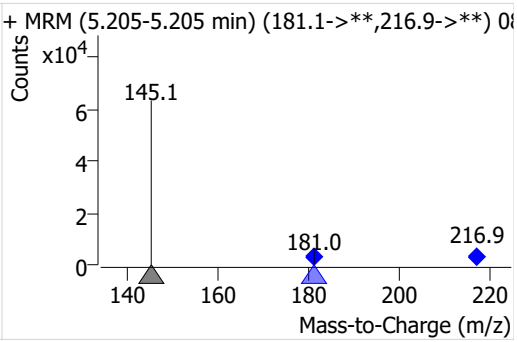
MassHunter Quantitative Analysis Sample Report



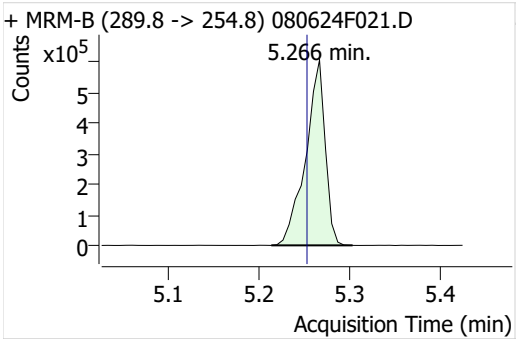
α-BHC

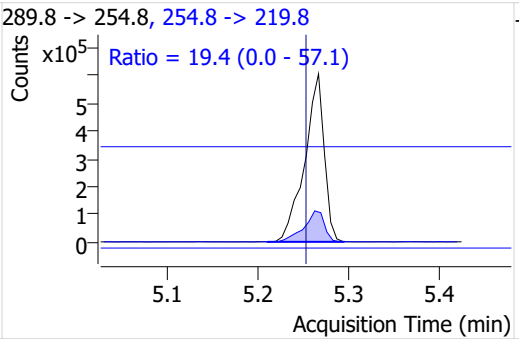


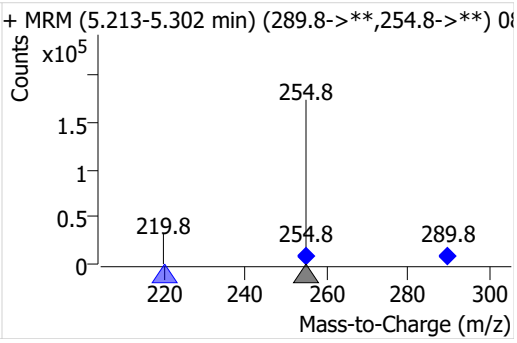




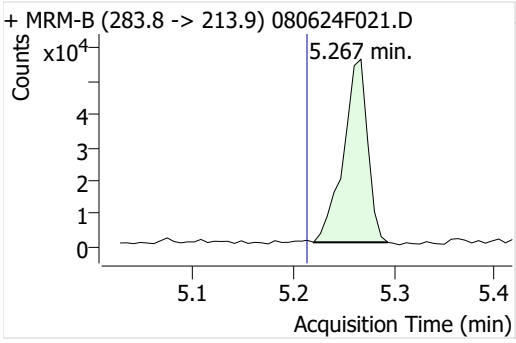
Hexachlorobenzene-13C6

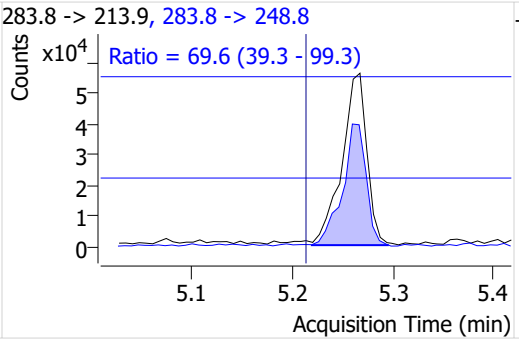


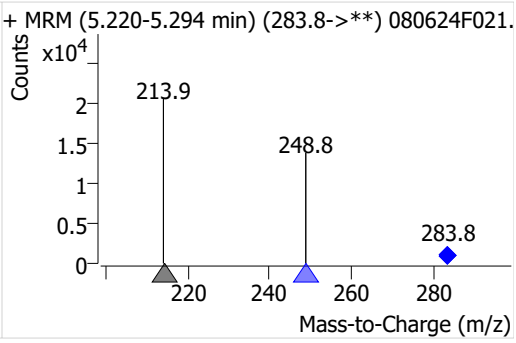




Hexachlorobenzene







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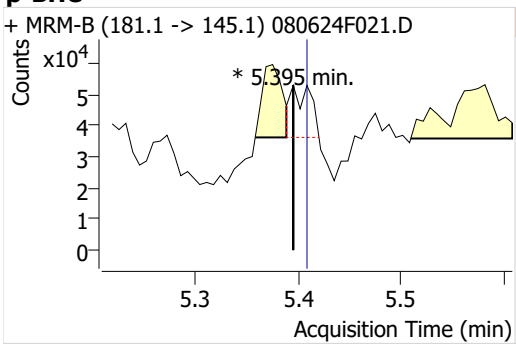
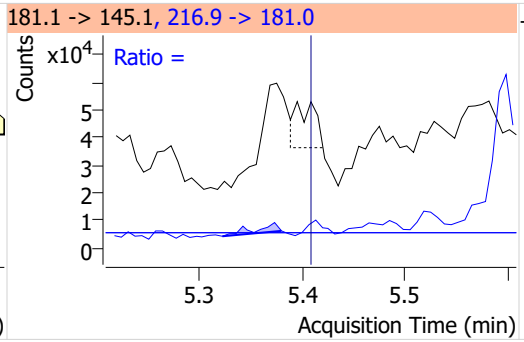
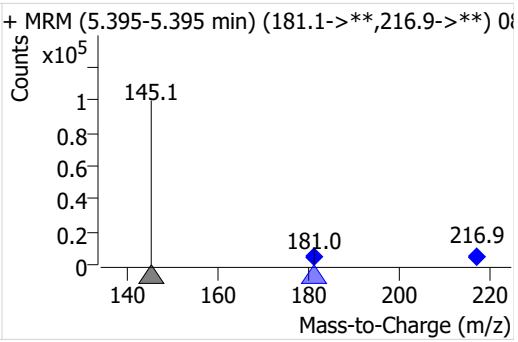
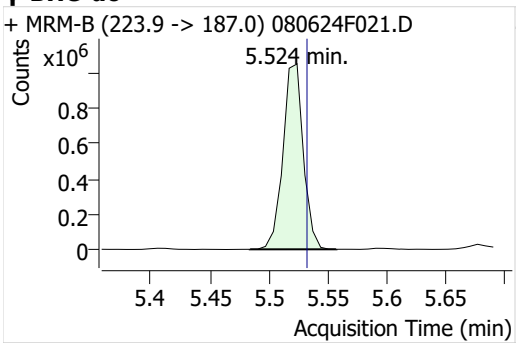
β-BHC

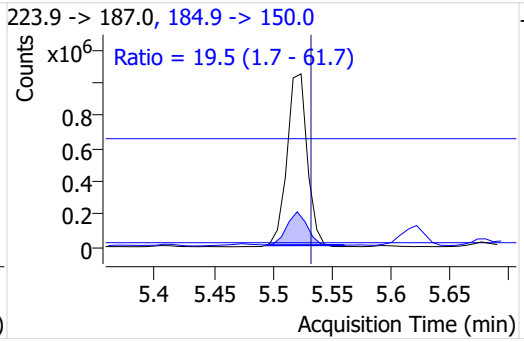


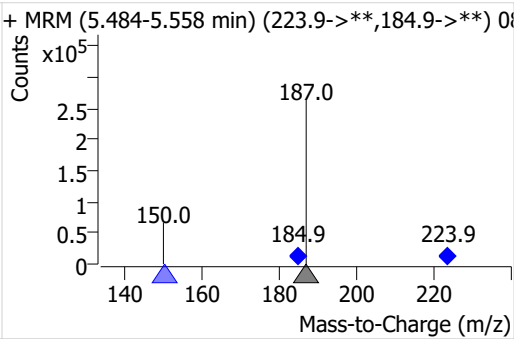




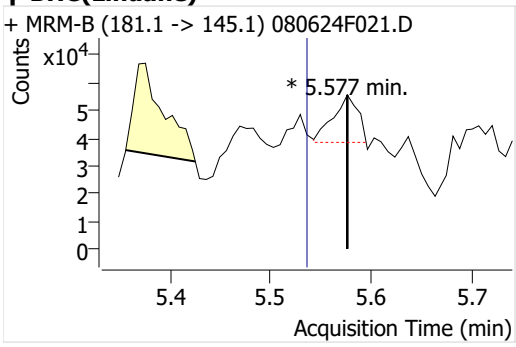
γ-BHC-d6

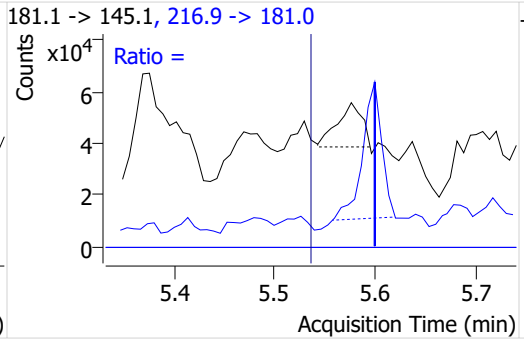


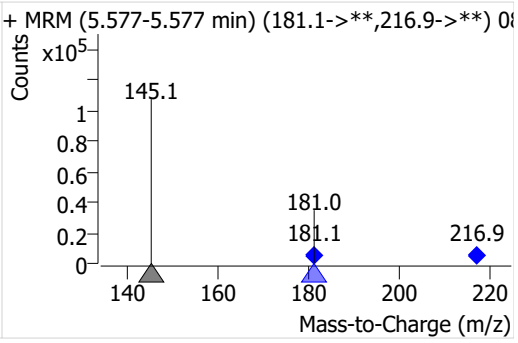




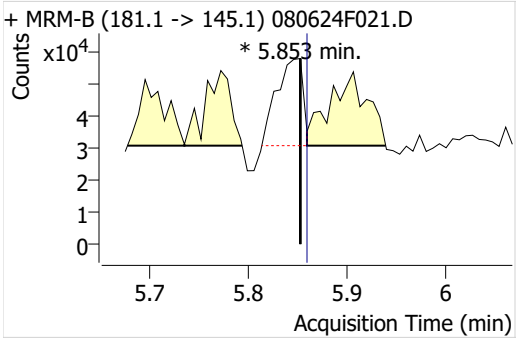
γ-BHC(Lindane)

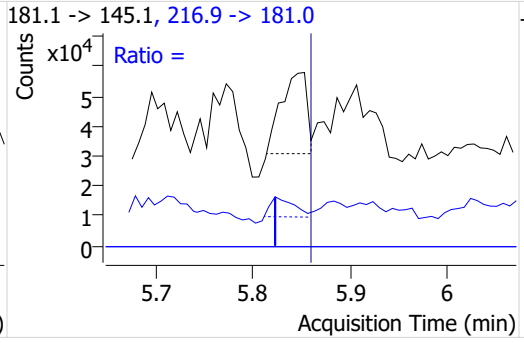


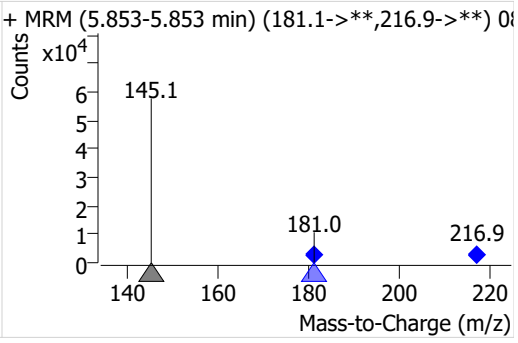




δ-BHC

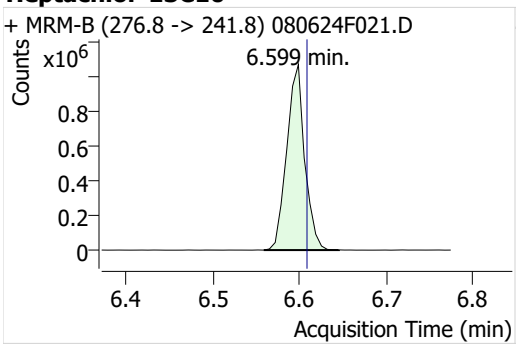


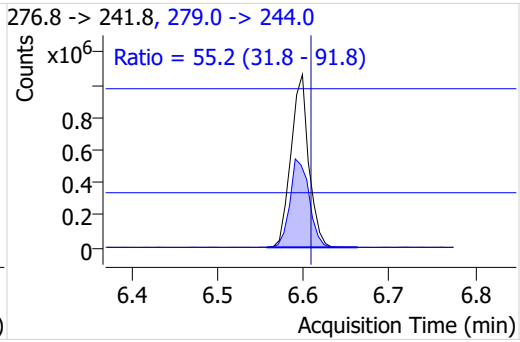


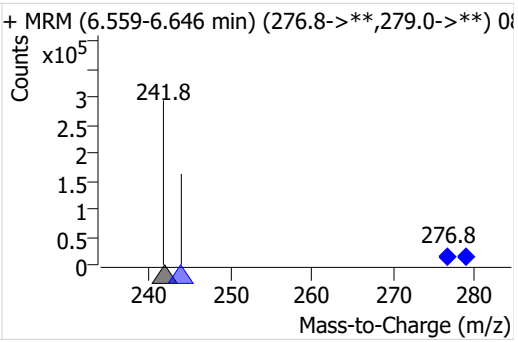


MassHunter Quantitative Analysis Sample Report

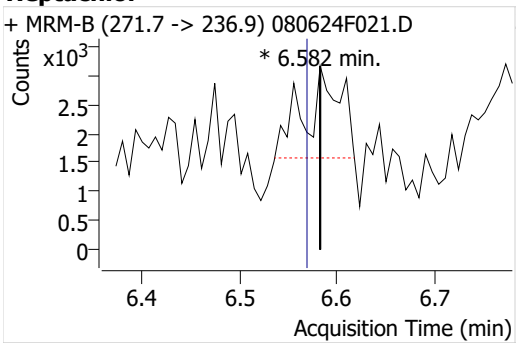
Heptachlor-13C10

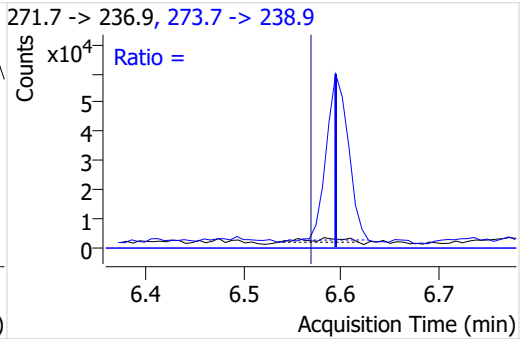


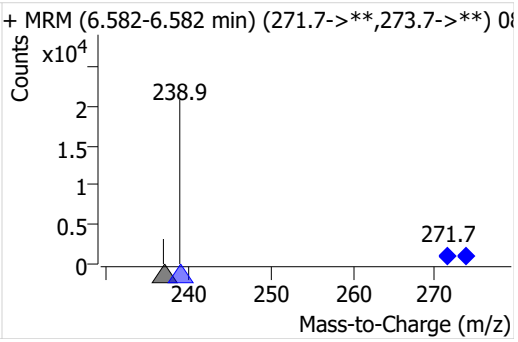




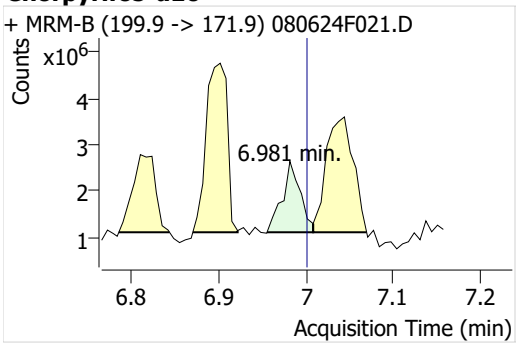
Heptachlor

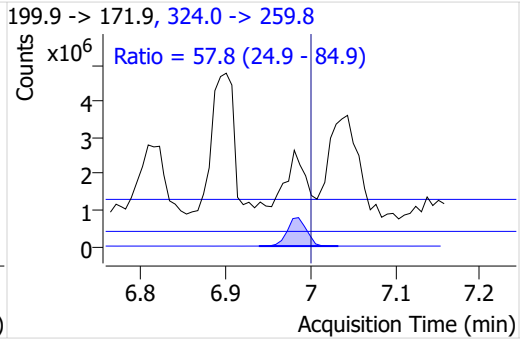


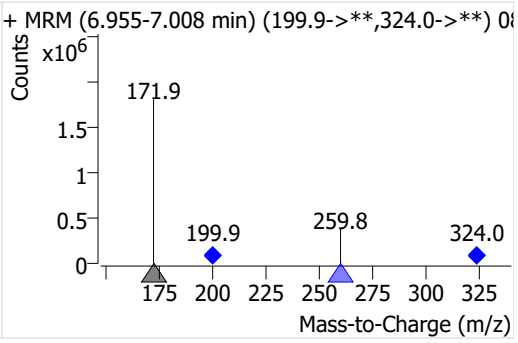




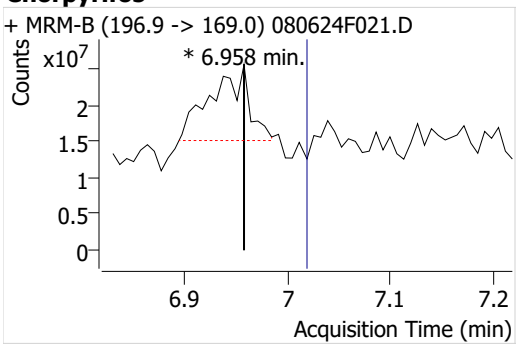
Chorpyrifos-d10

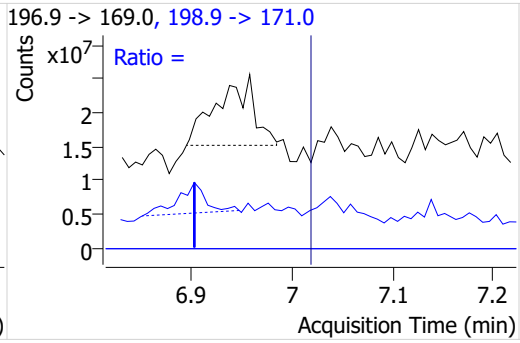


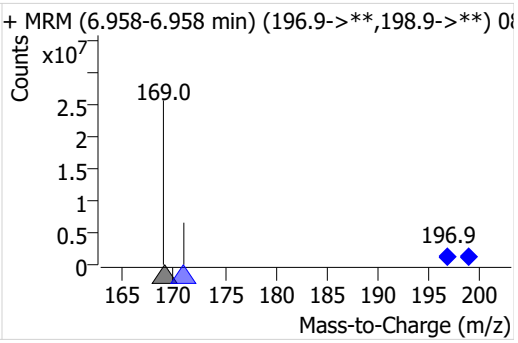




Chorpyrifos







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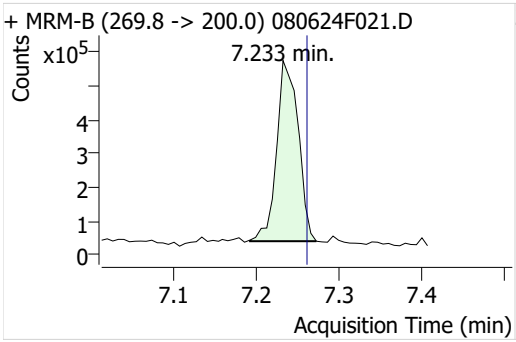
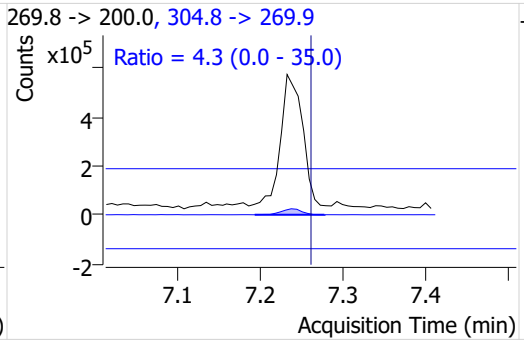
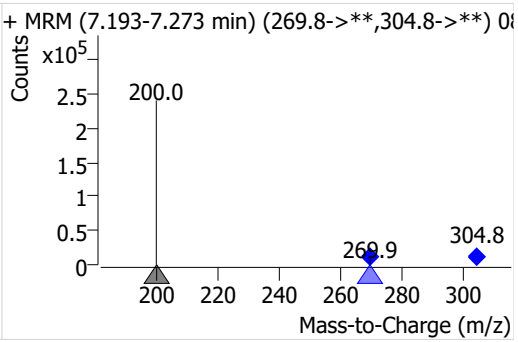
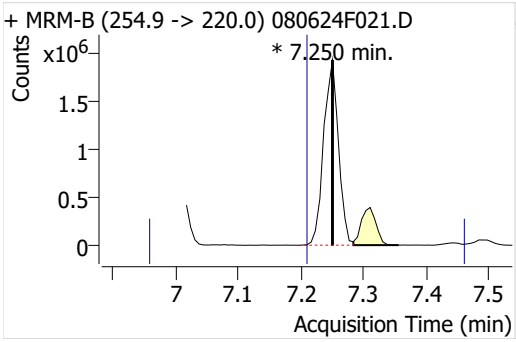
Aldrin-13C

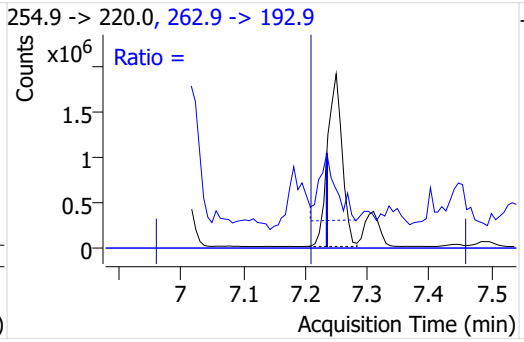


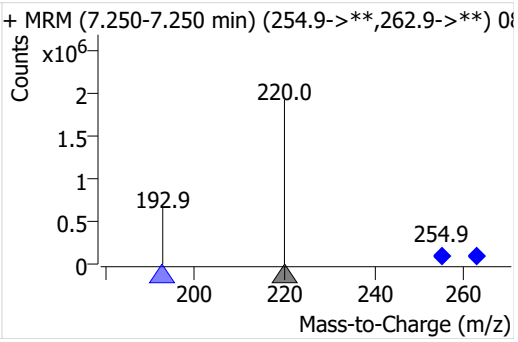




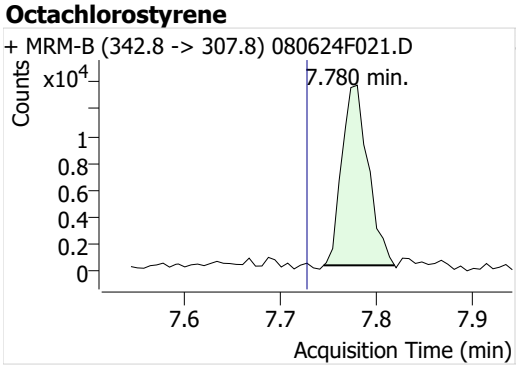
Aldrin

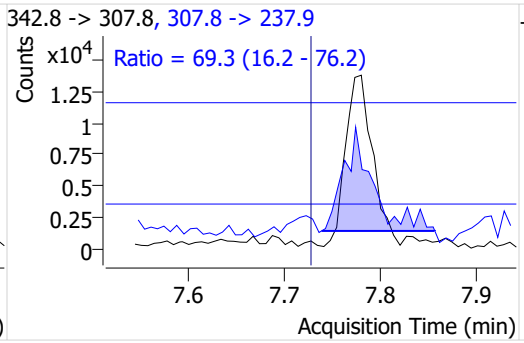


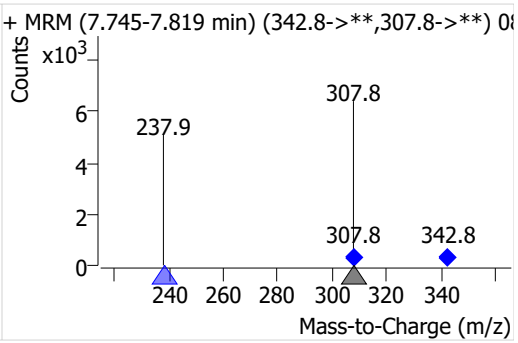




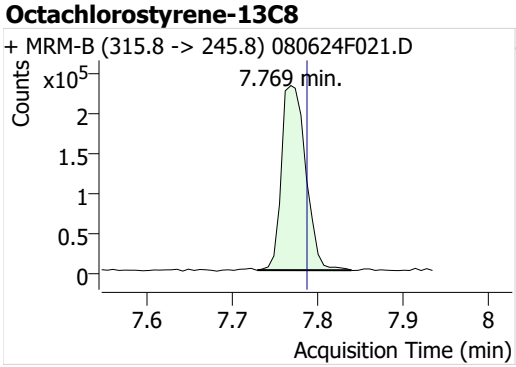
Octachlorostyrene

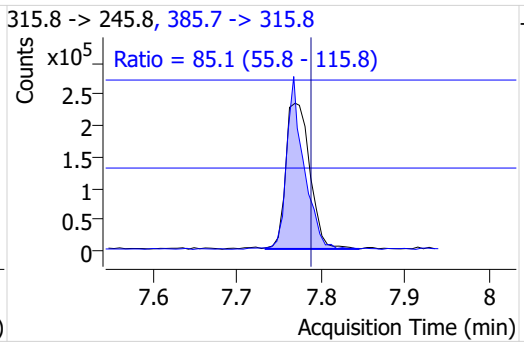


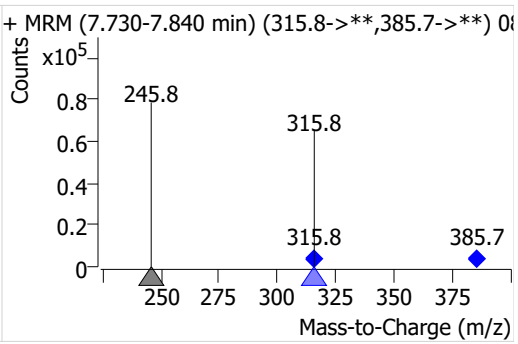




Octachlorostyrene-13C8







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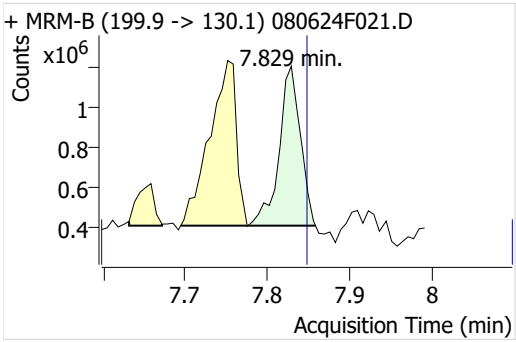
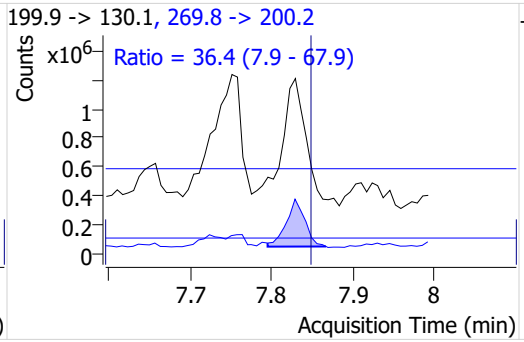
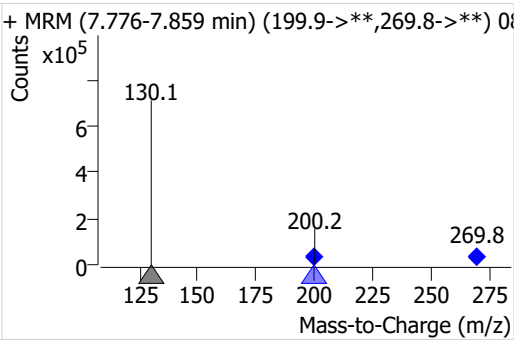
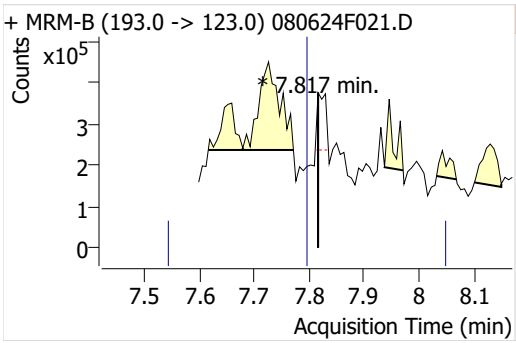
Isodrin-13C12

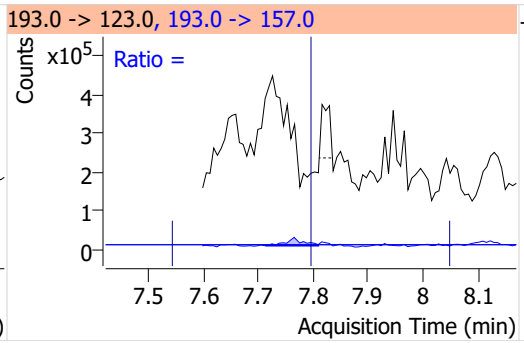


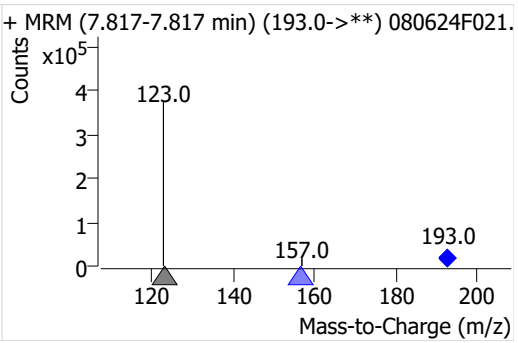




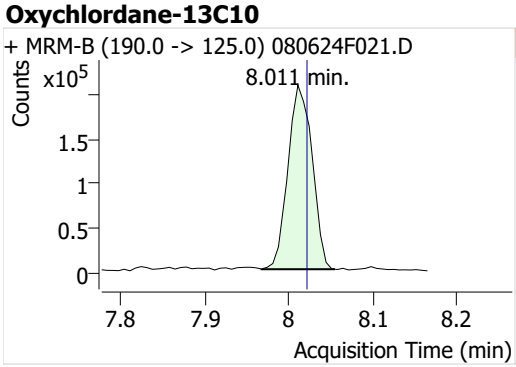
Isodrin

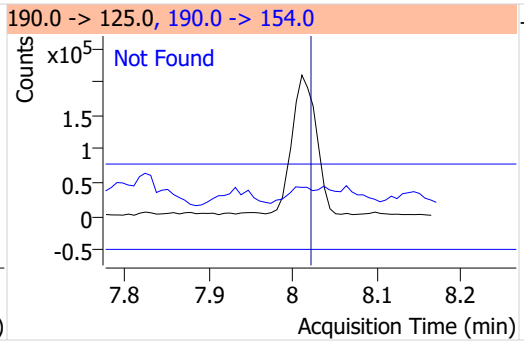


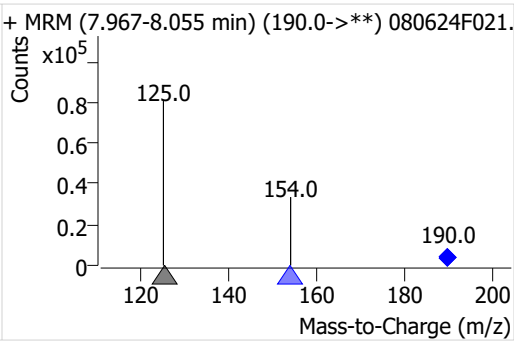




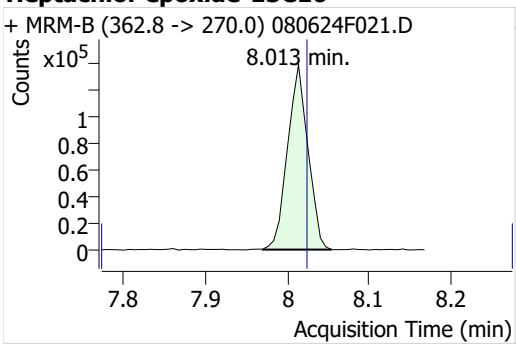
Oxychlordane-13C10

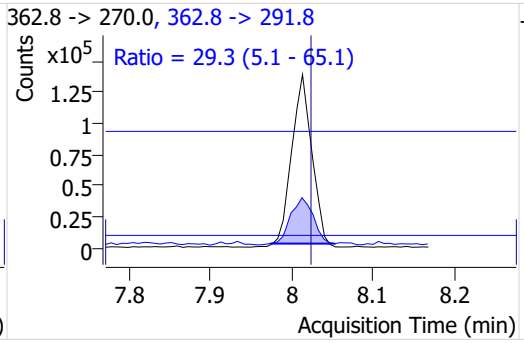


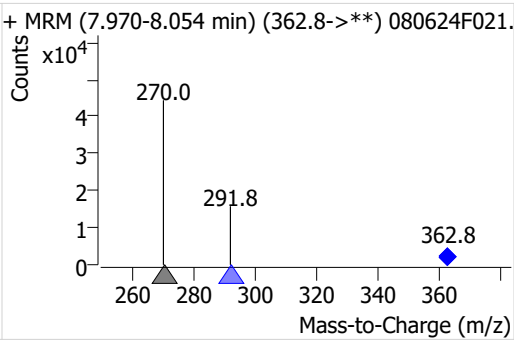




Heptachlor epoxide-13C10







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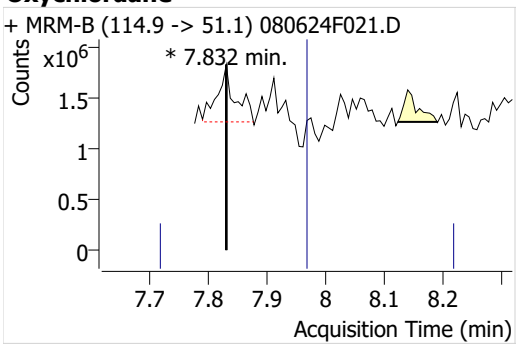
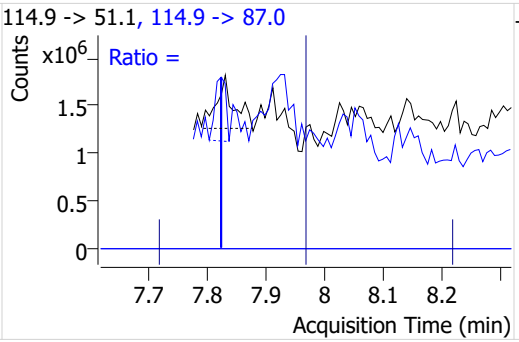
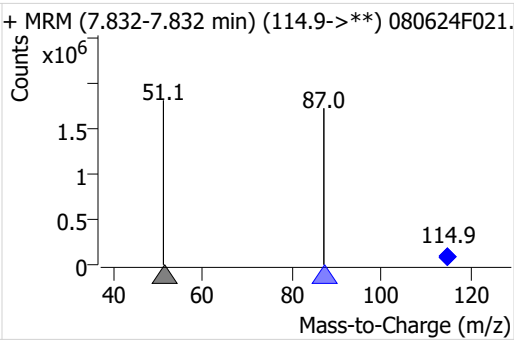
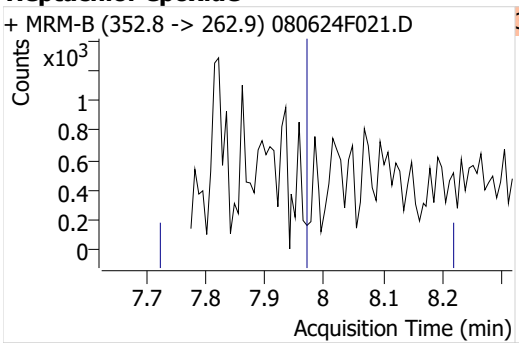
Oxychlordane

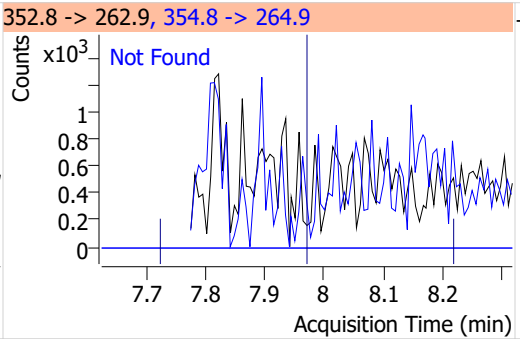


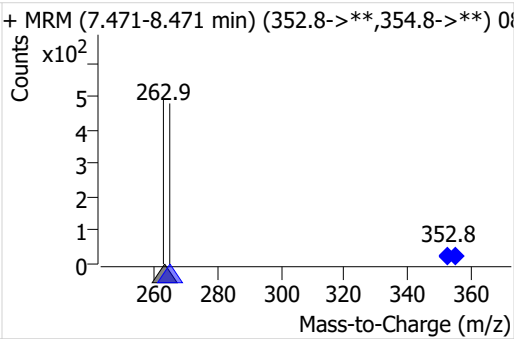




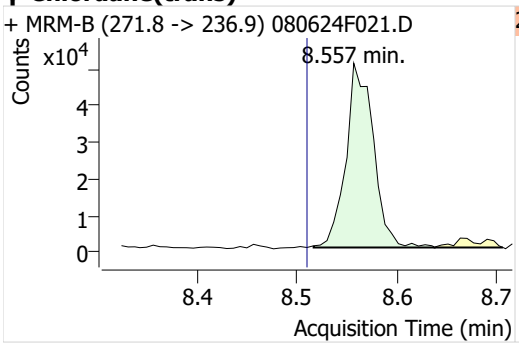
Heptachlor epoxide

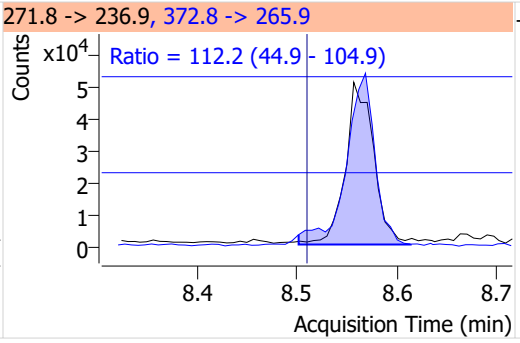


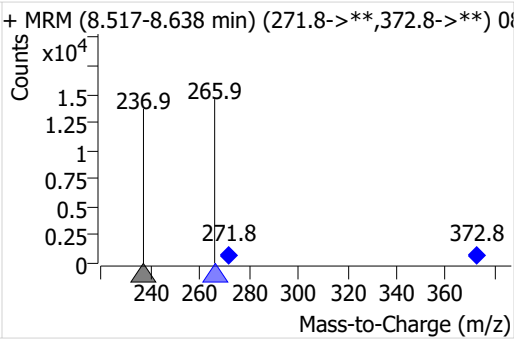




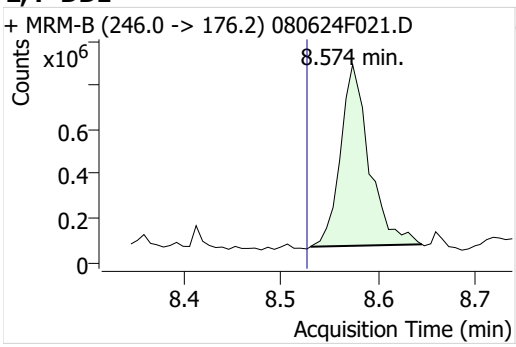
γ-Chlordane(trans)

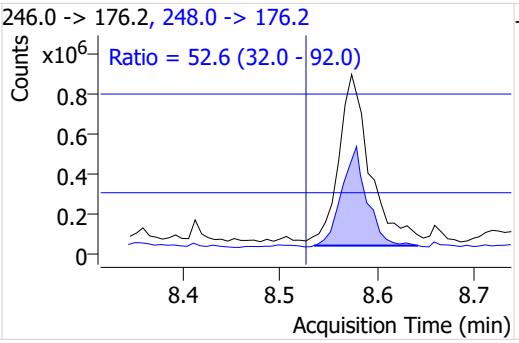


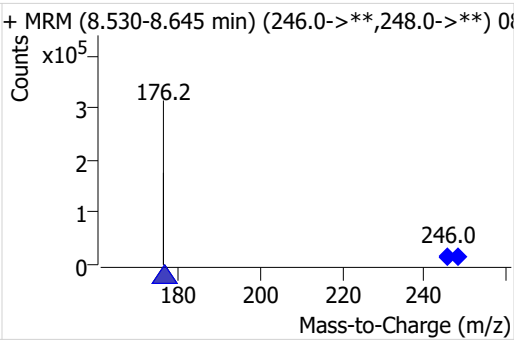




2,4'-DDE







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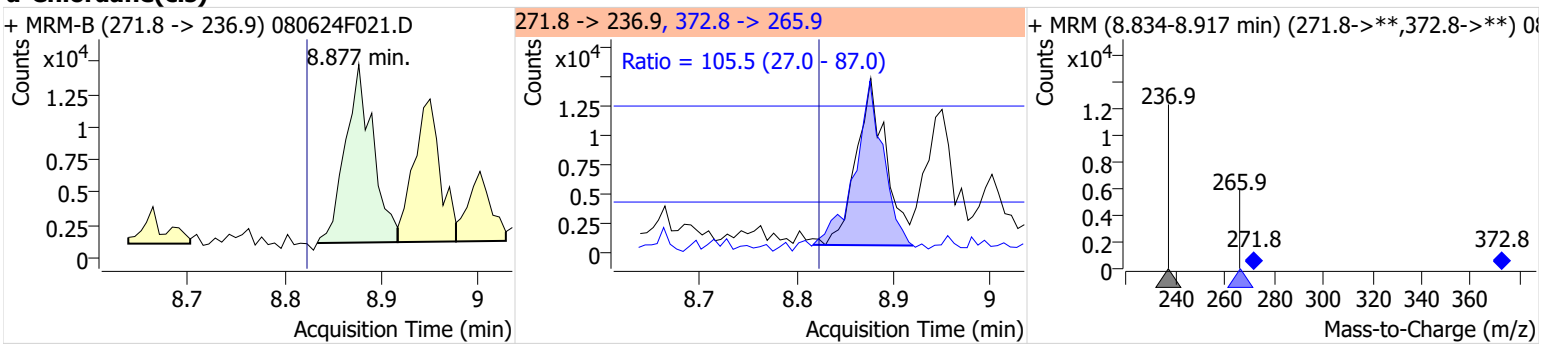
α-Chlordane(cis)



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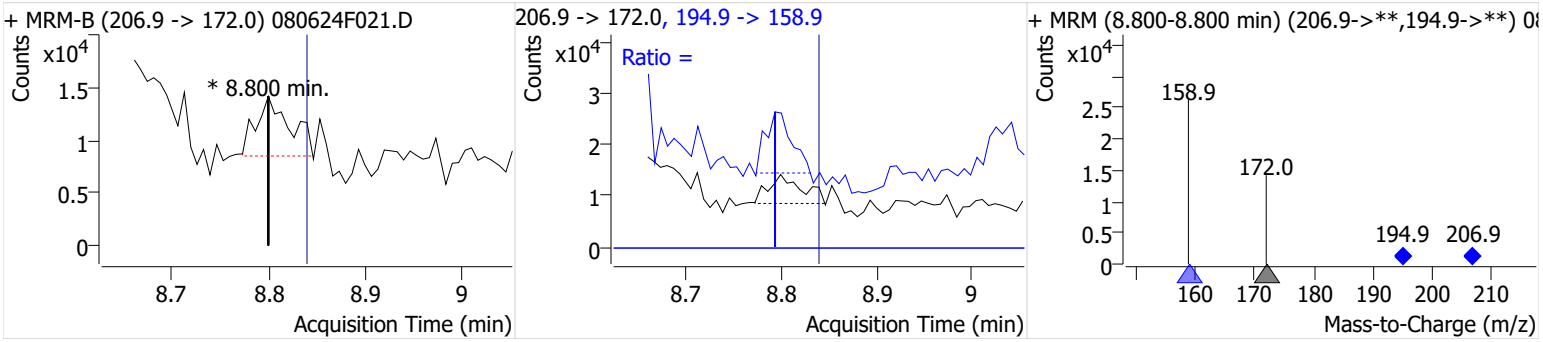
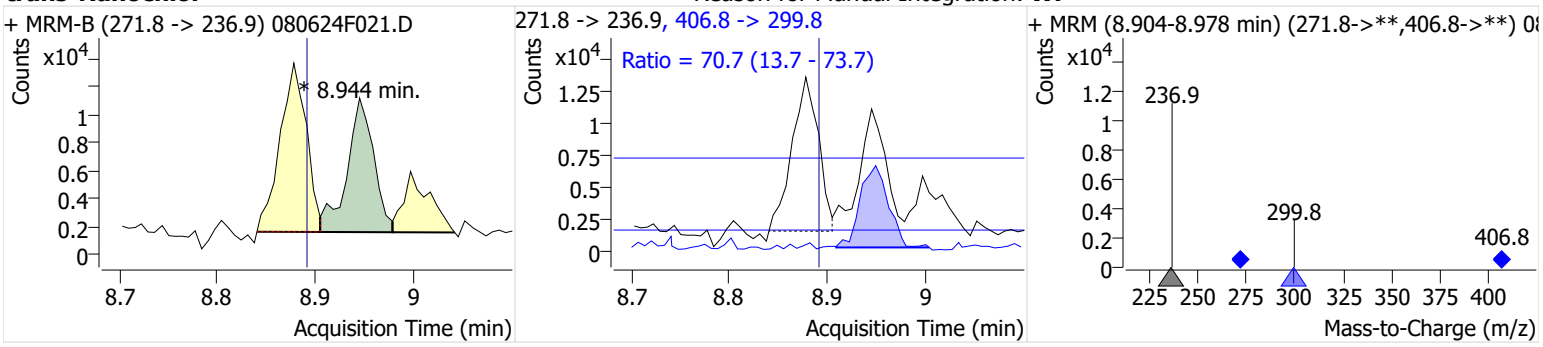
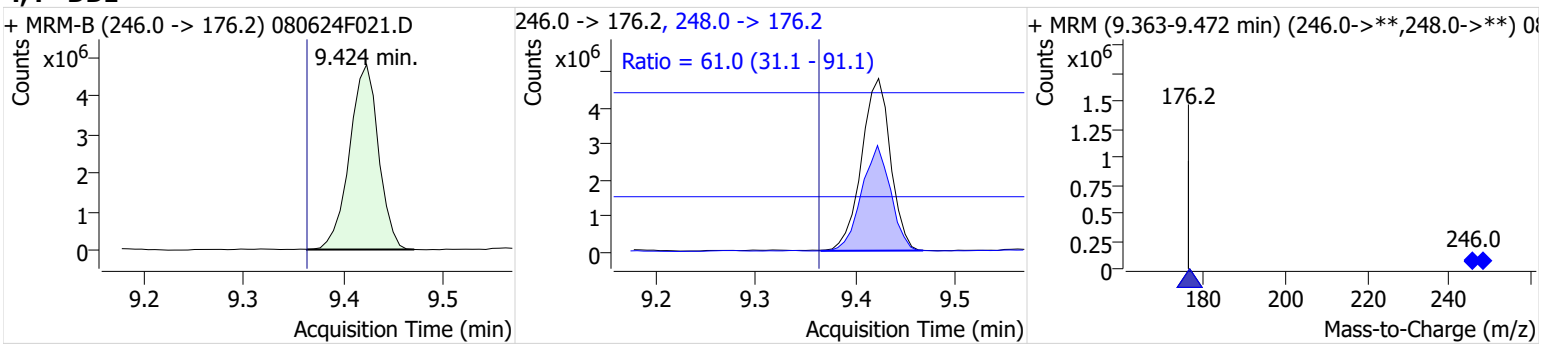


trans-Nanochlor Reason for Manual Integration: **WP**

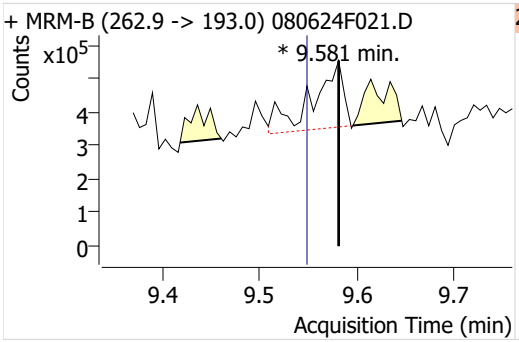


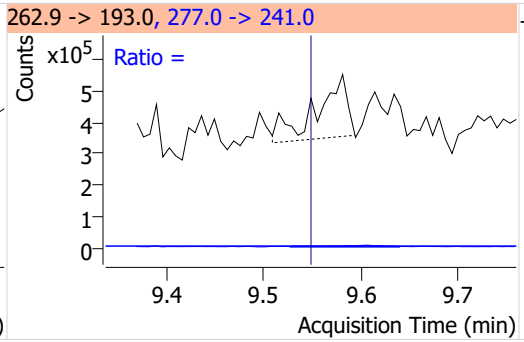
4,4' -DDE

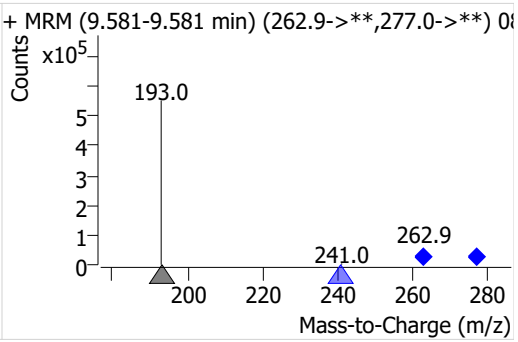


MassHunter Quantitative Analysis Sample Report

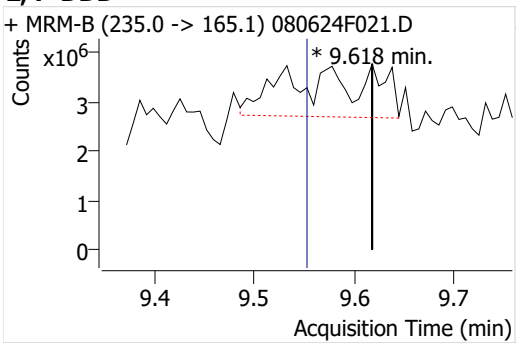
Dieldrin

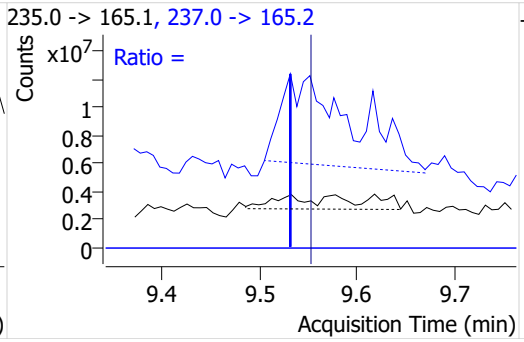


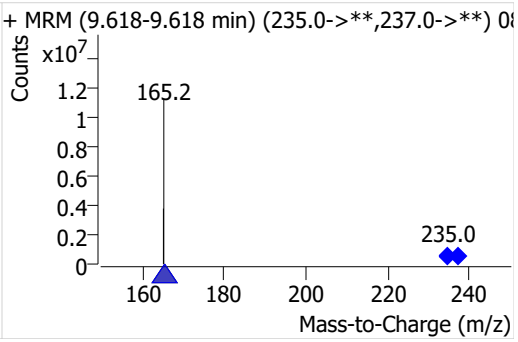




2,4'-DDD

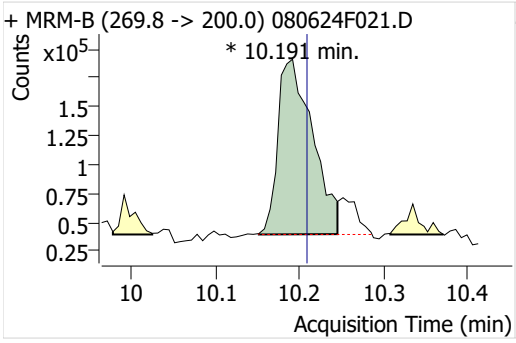


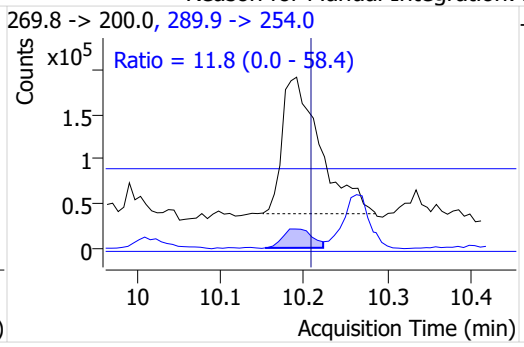


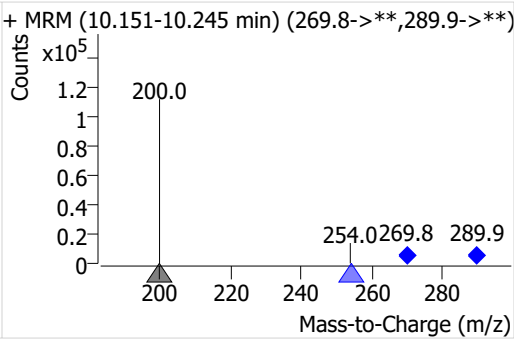


Endrin-13C12

Reason for Manual Integration: **BLC**







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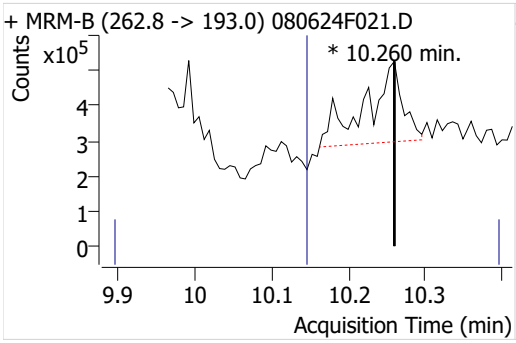

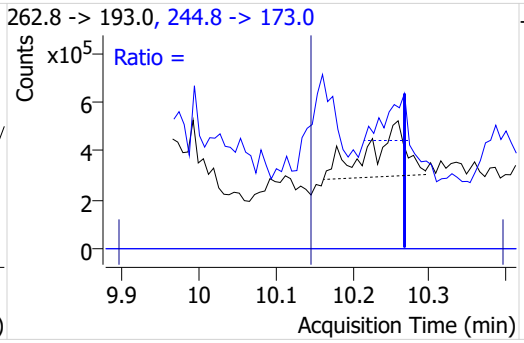

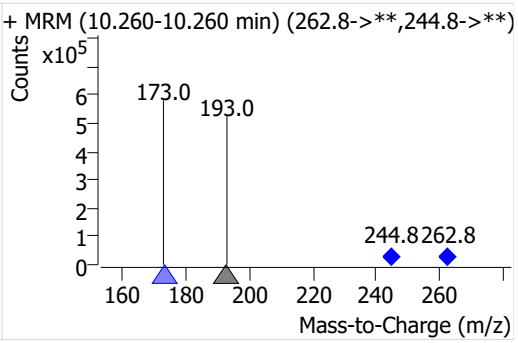

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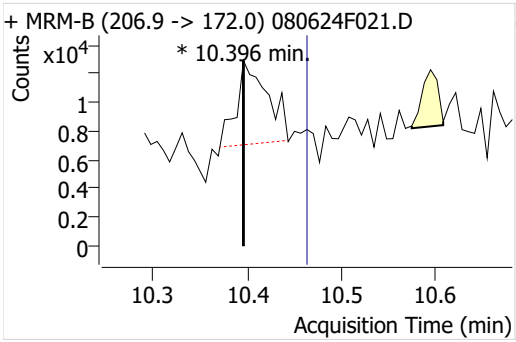
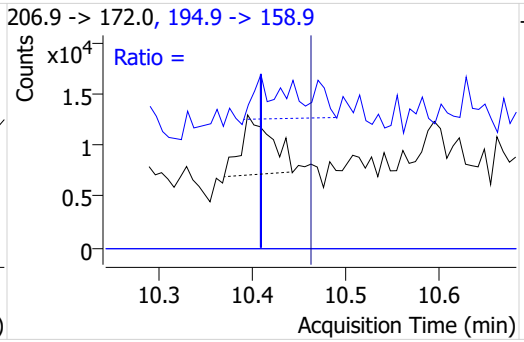
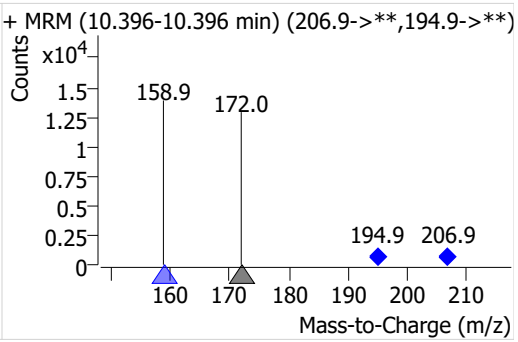
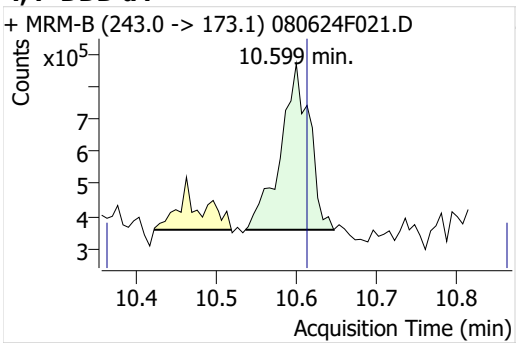
Endosulfan II

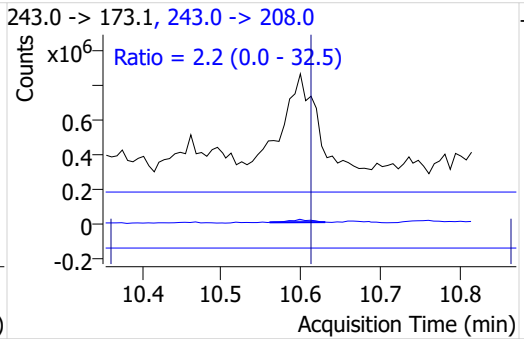


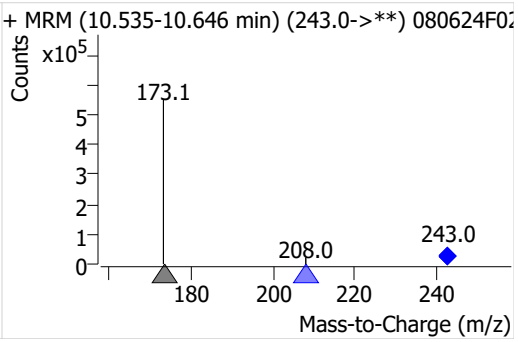




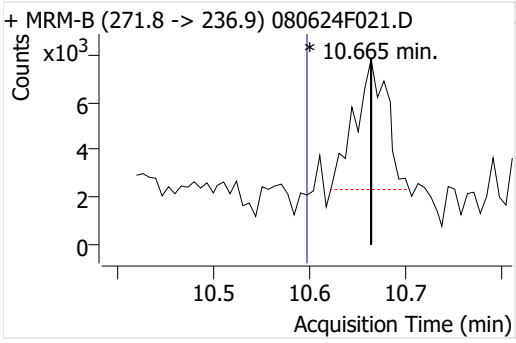
4,4'-DDD d4

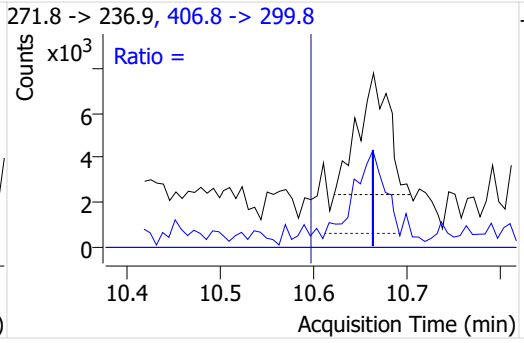


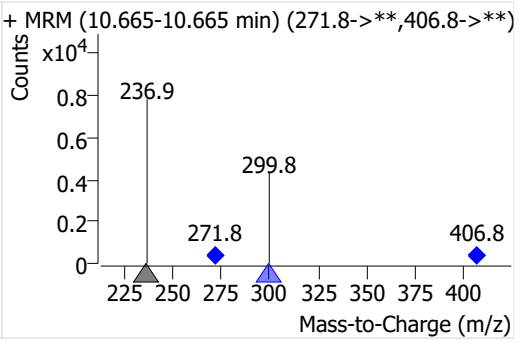




cis-Nonachlor







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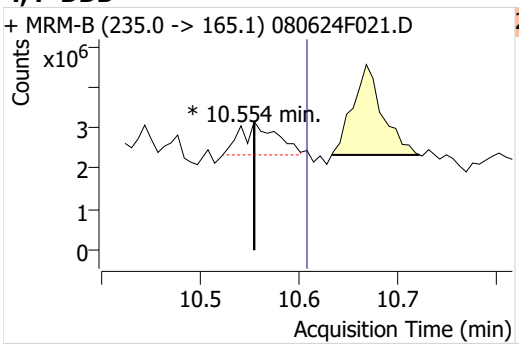

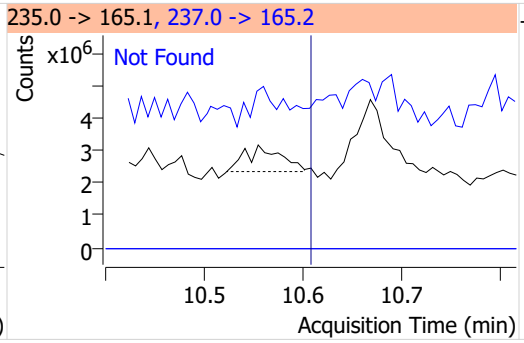

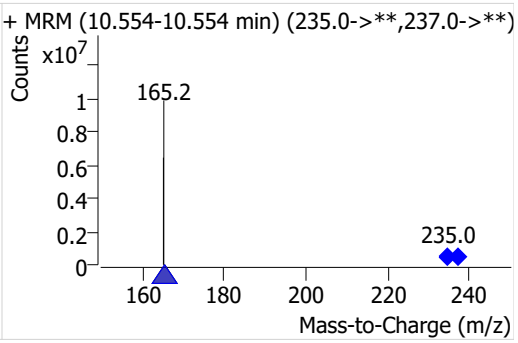

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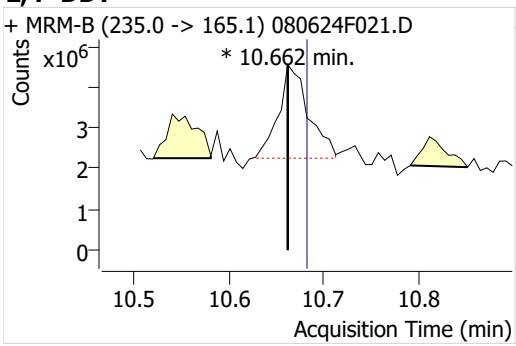
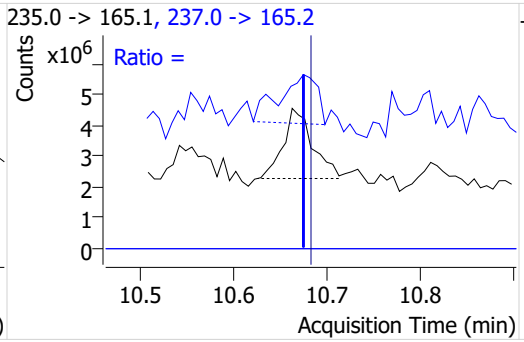
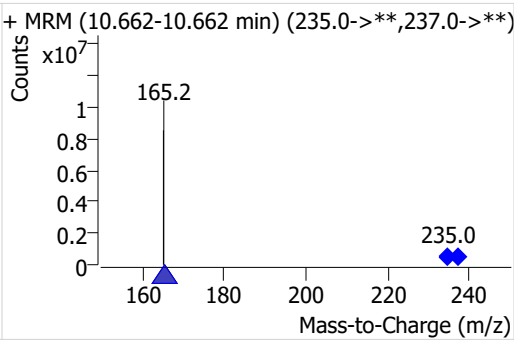
2,4'-DDT







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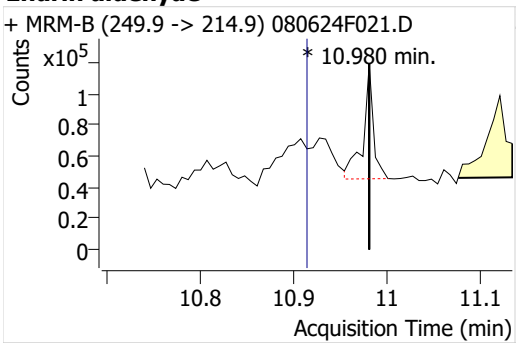
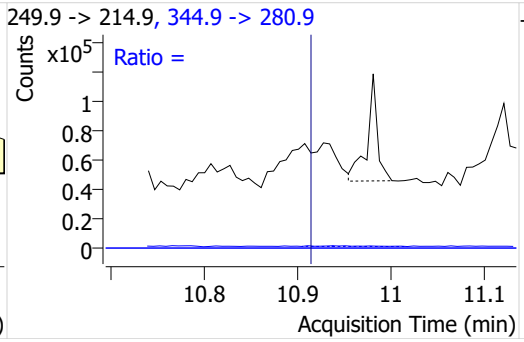
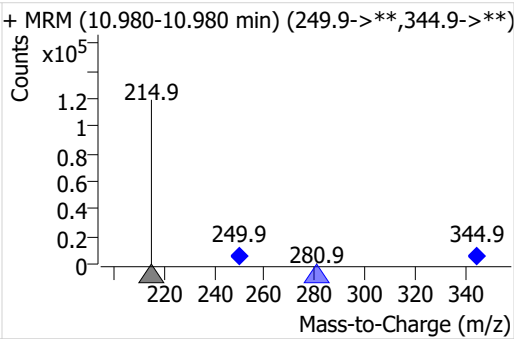
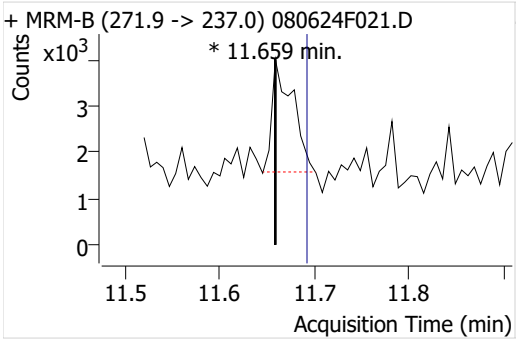
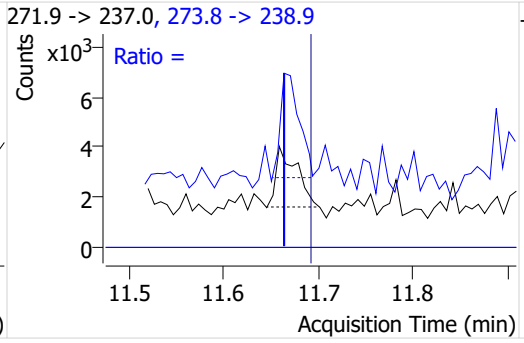


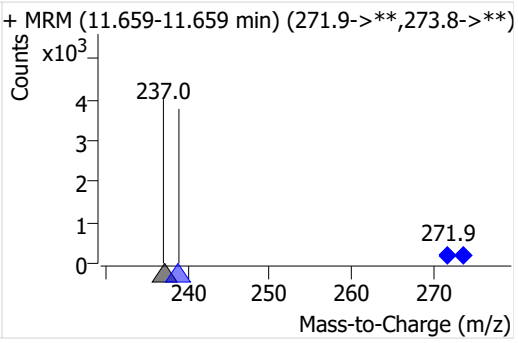




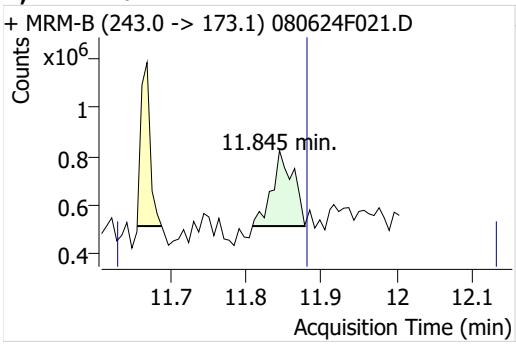
Endosulfan sulfate

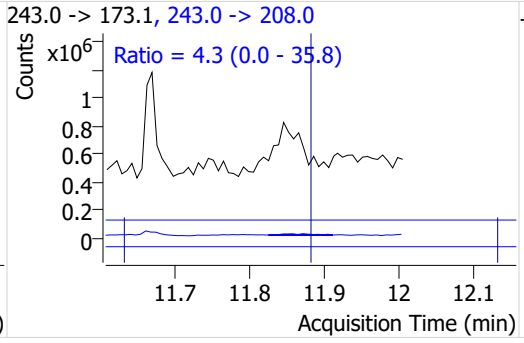


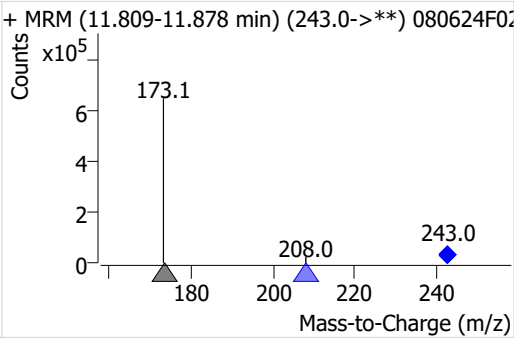




4,4'-DDT-d4







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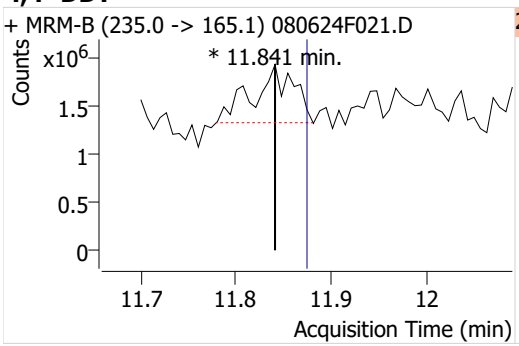
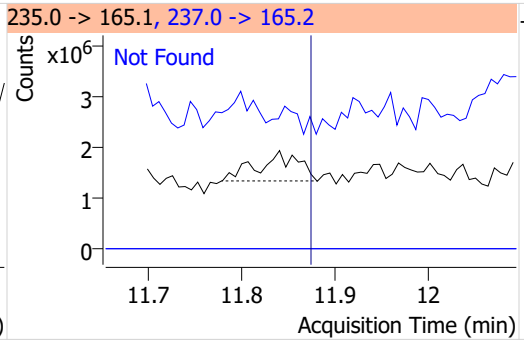
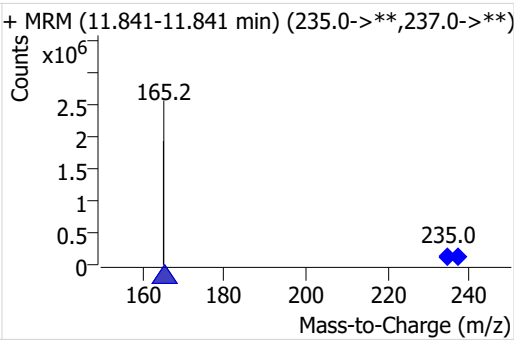
4,4'-DDT







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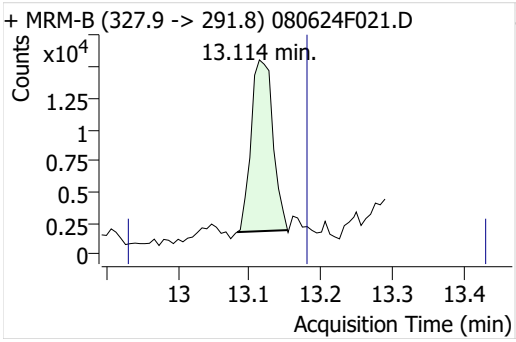
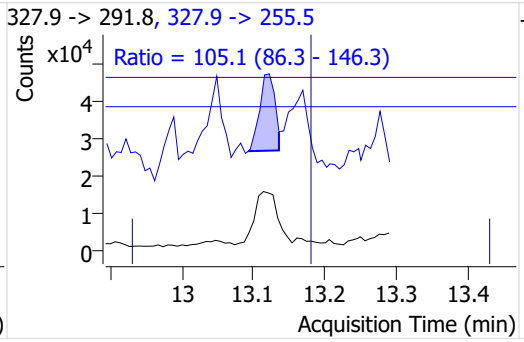
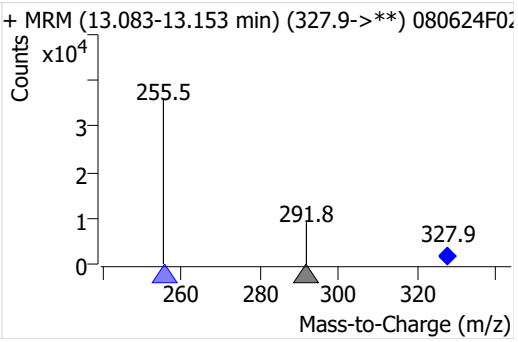
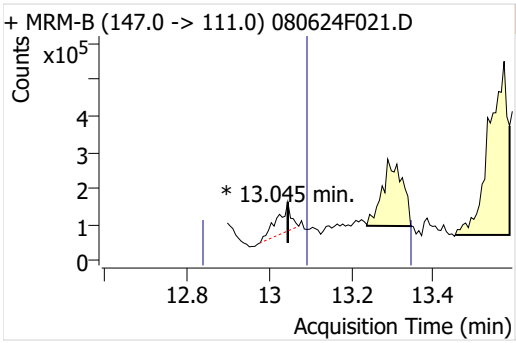
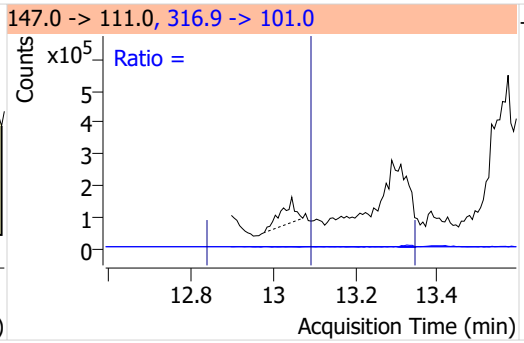


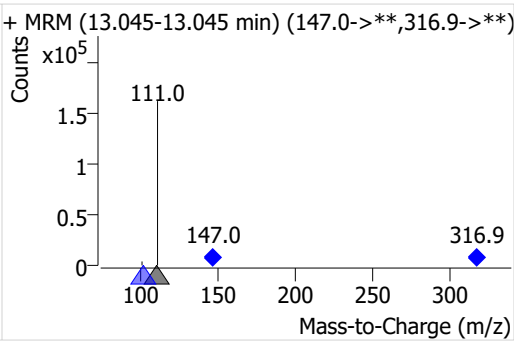




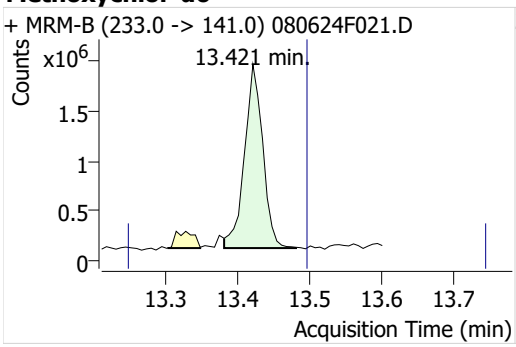
Endrin ketone

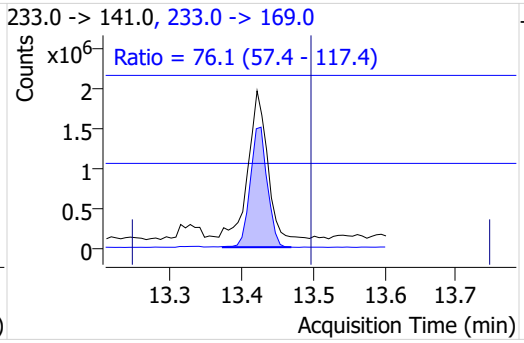


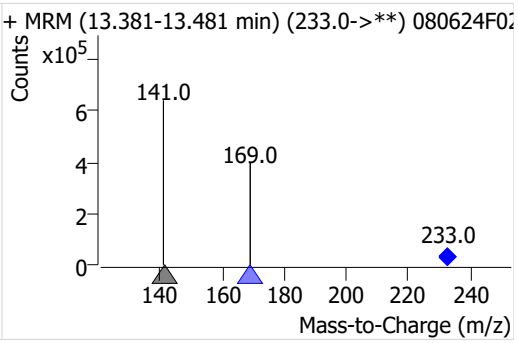




Methoxychlor-d6







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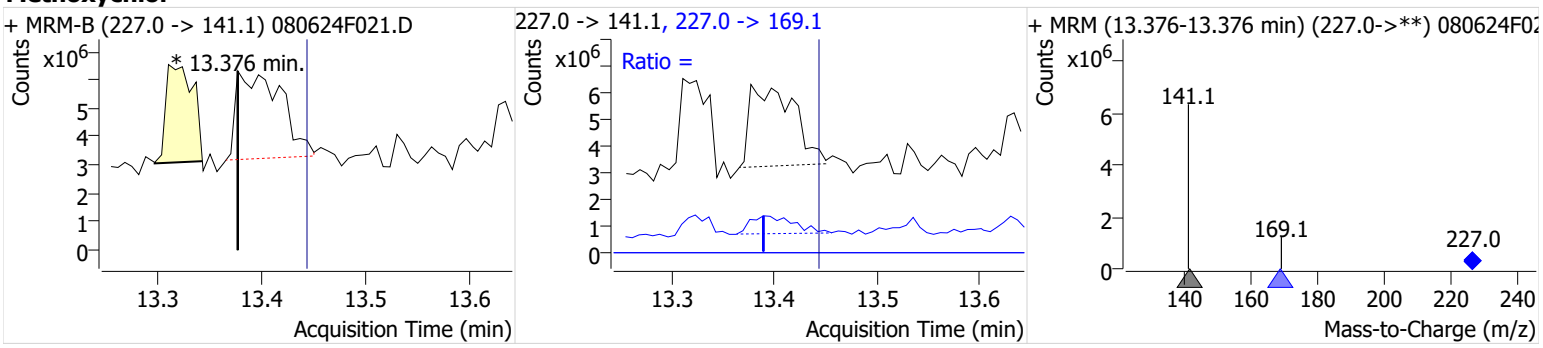
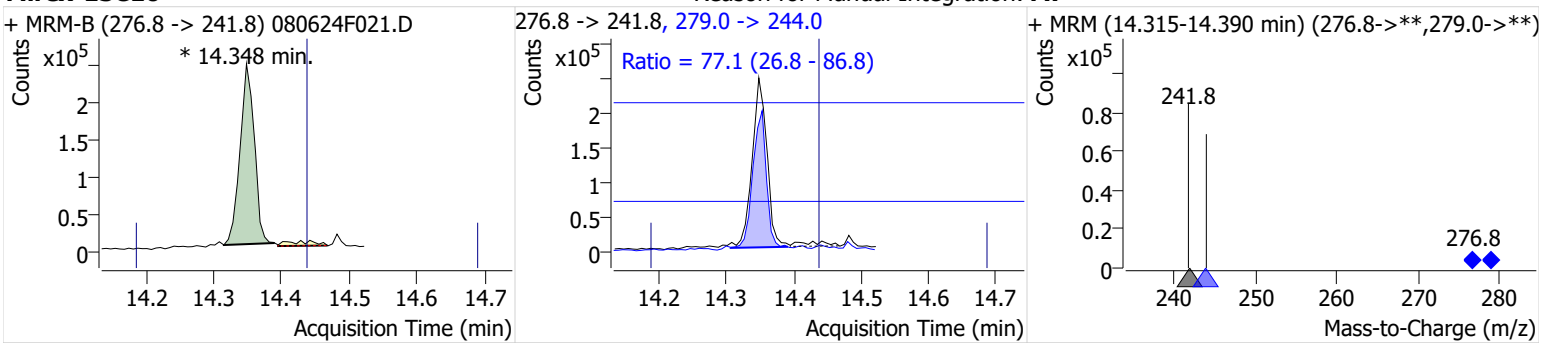
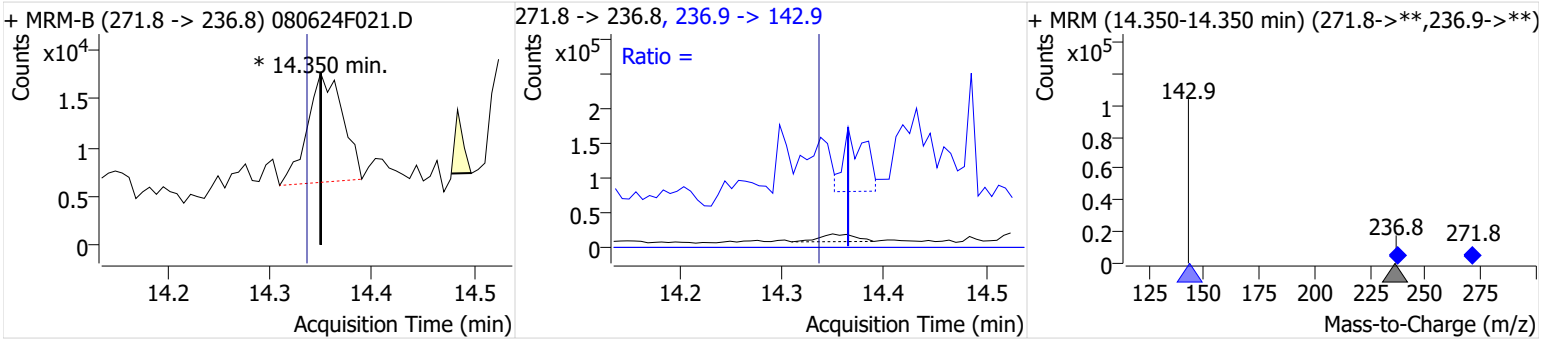
Methoxychlor



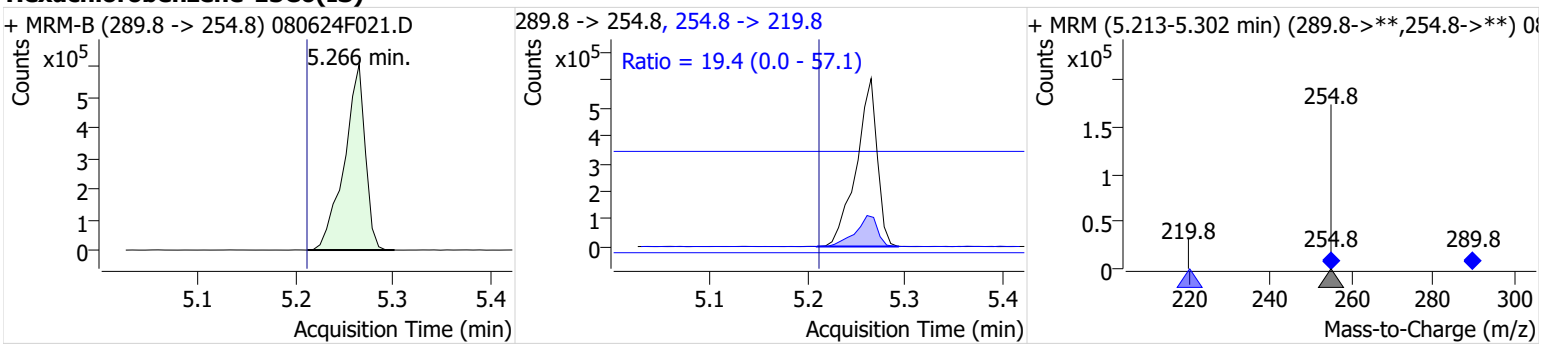
Mirex-13C10 Reason for Manual Integration: **MP**



Mirex

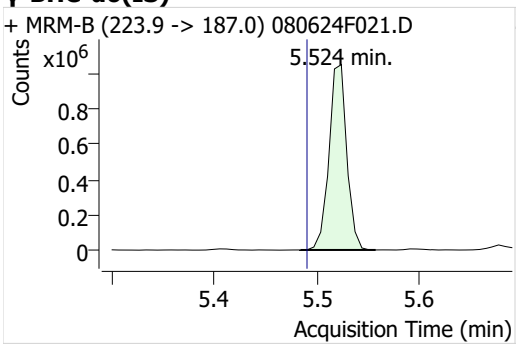


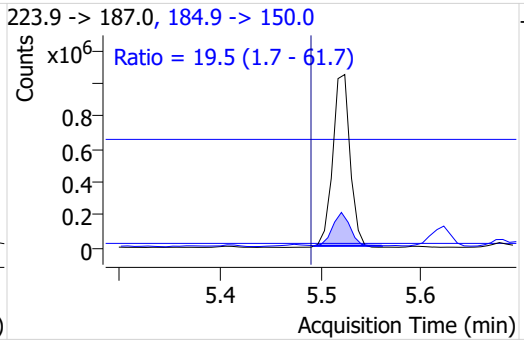
Hexachlorobenzene-13C6(IS)

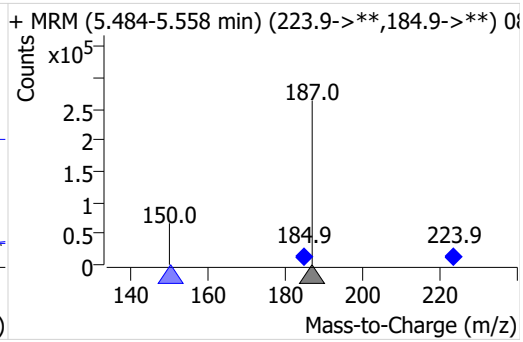


MassHunter Quantitative Analysis Sample Report

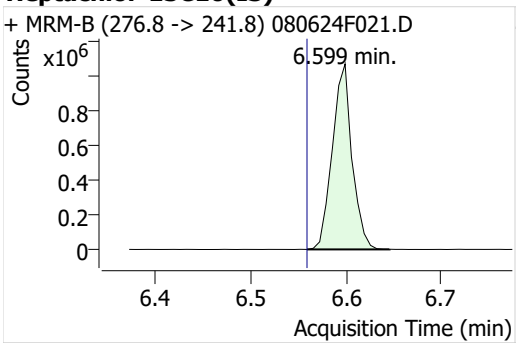
γ-BHC-d6(IS)

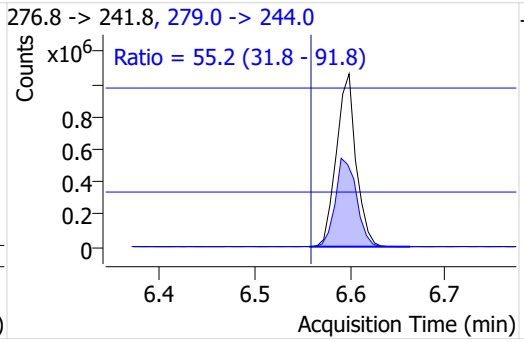


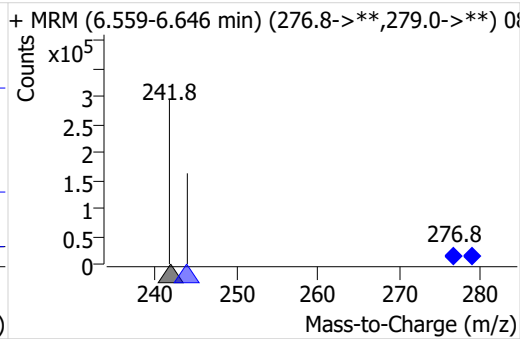




Heptachlor-13C10(IS)







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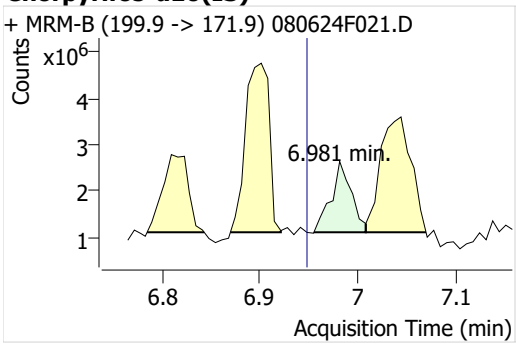

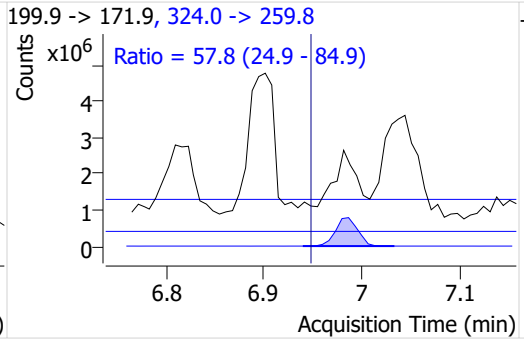

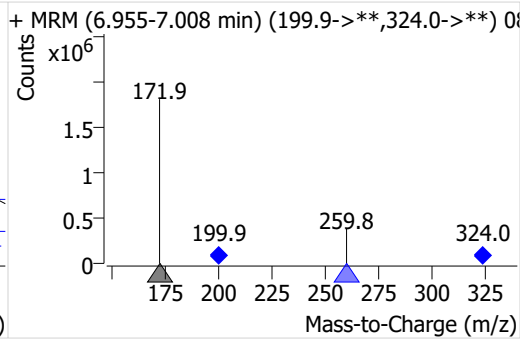

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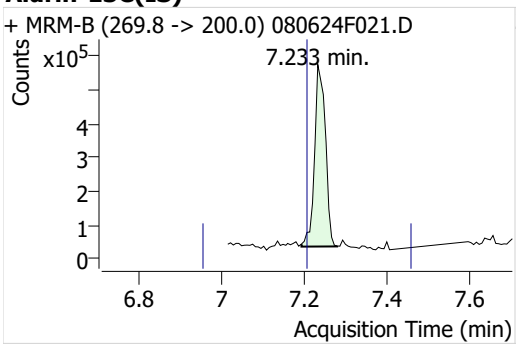
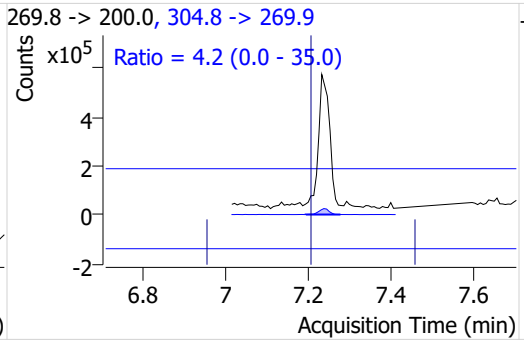
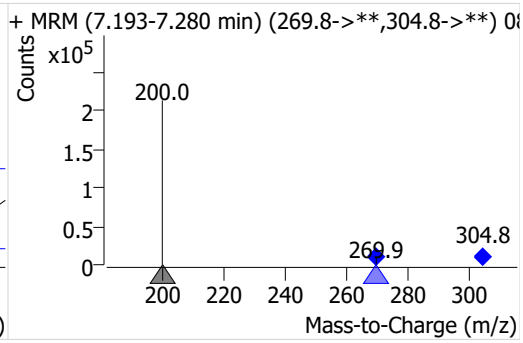
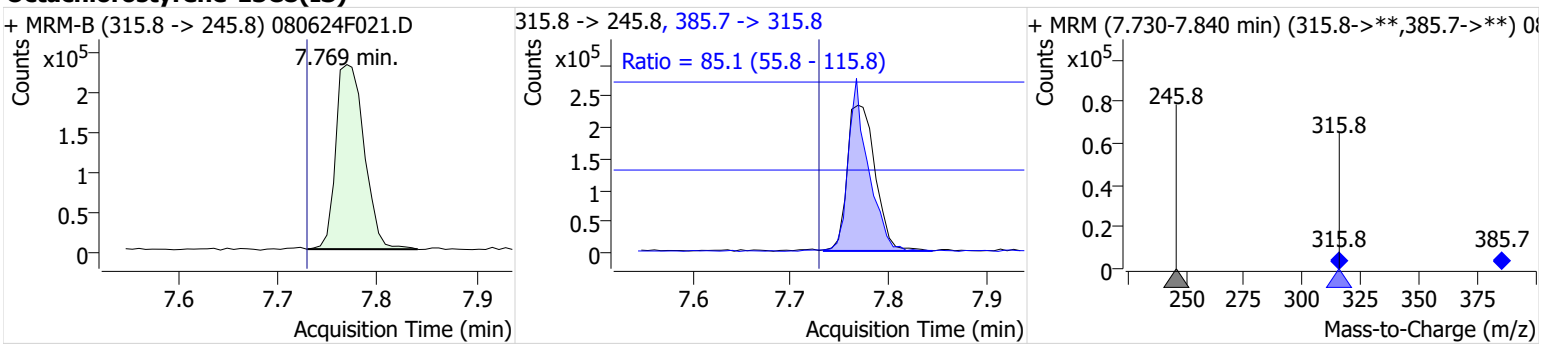




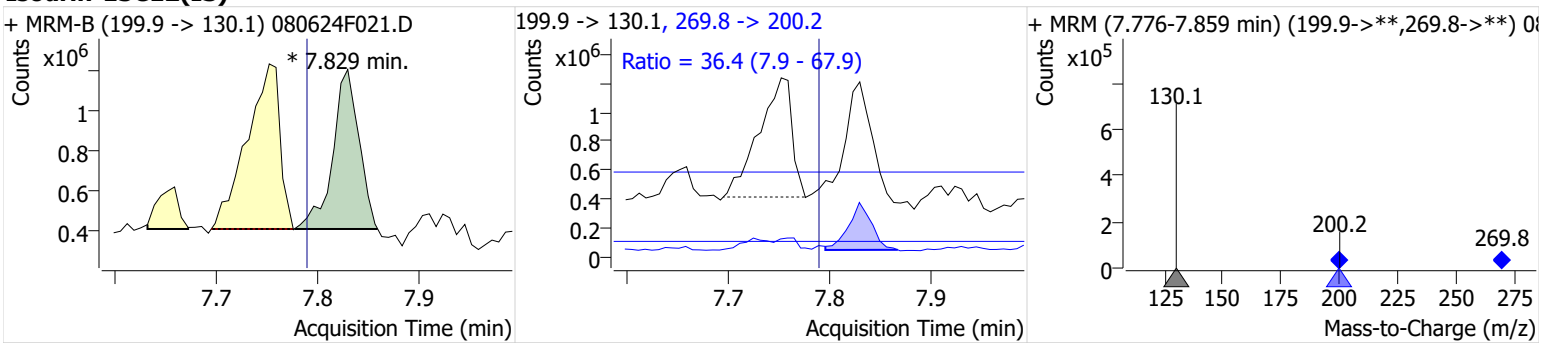


MassHunter Quantitative Analysis Sample Report

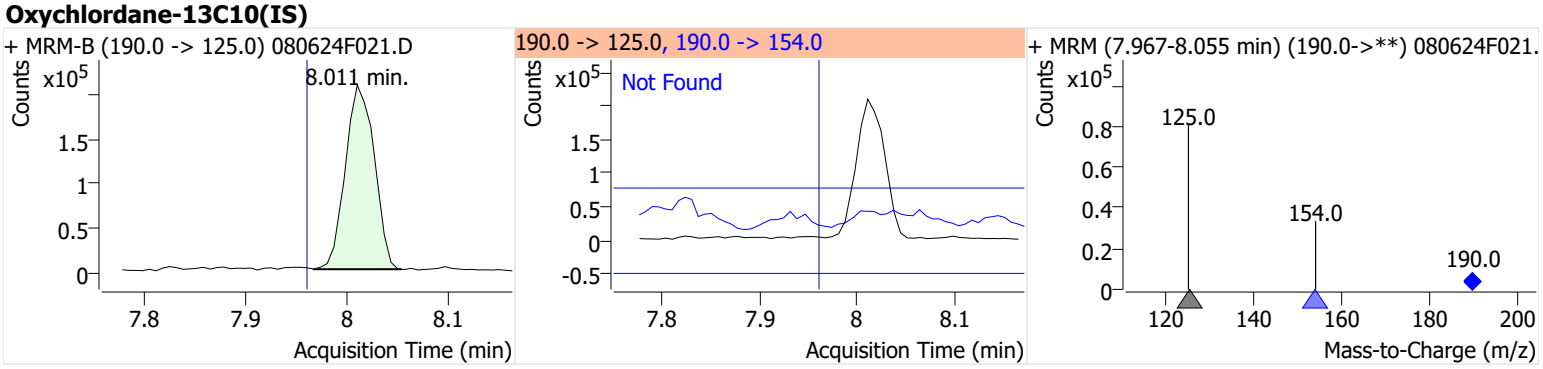
Octachlorostyrene-13C8(IS)



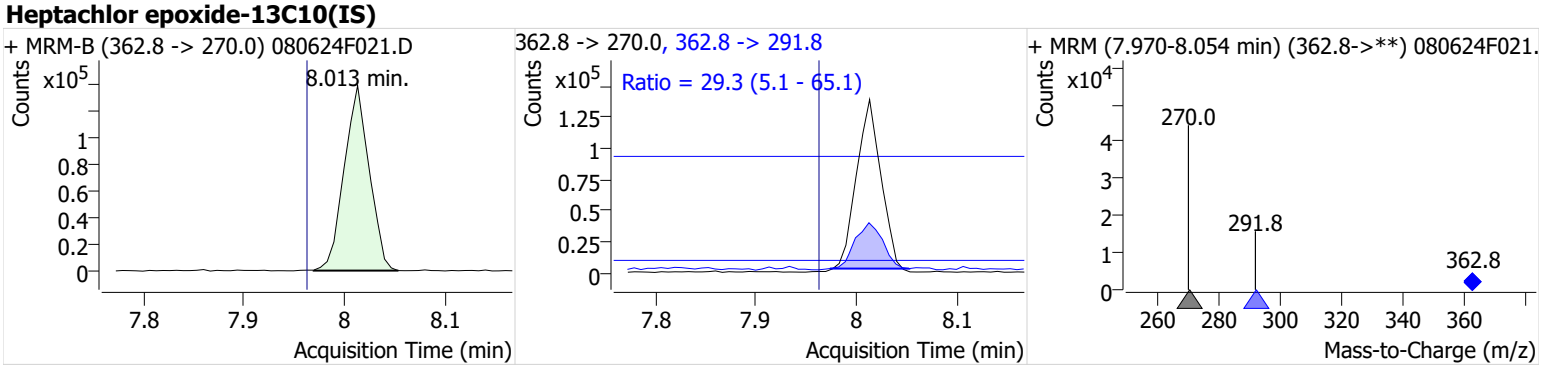
Isodrin-13C12(IS)



Oxychlordane-13C10(IS)

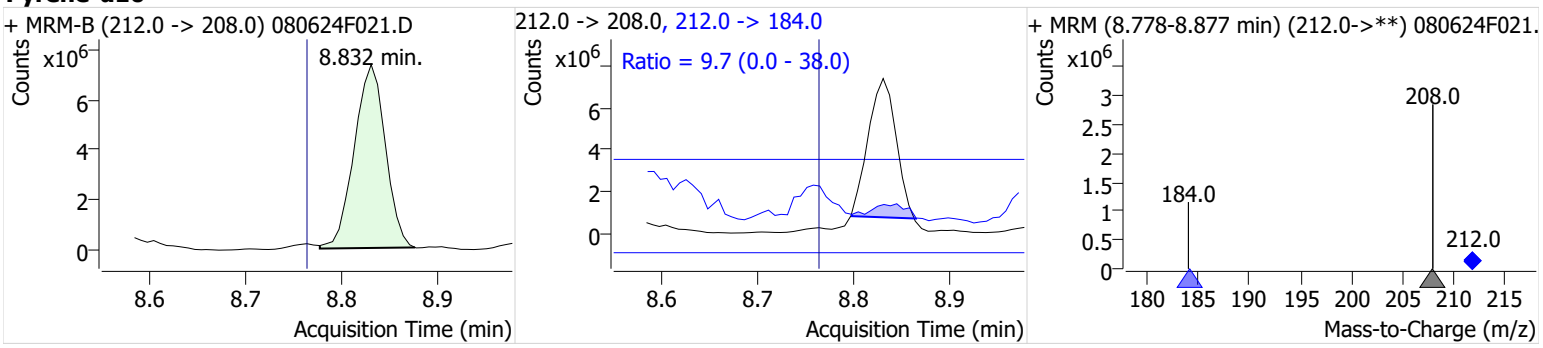


Heptachlor epoxide-13C10(IS)

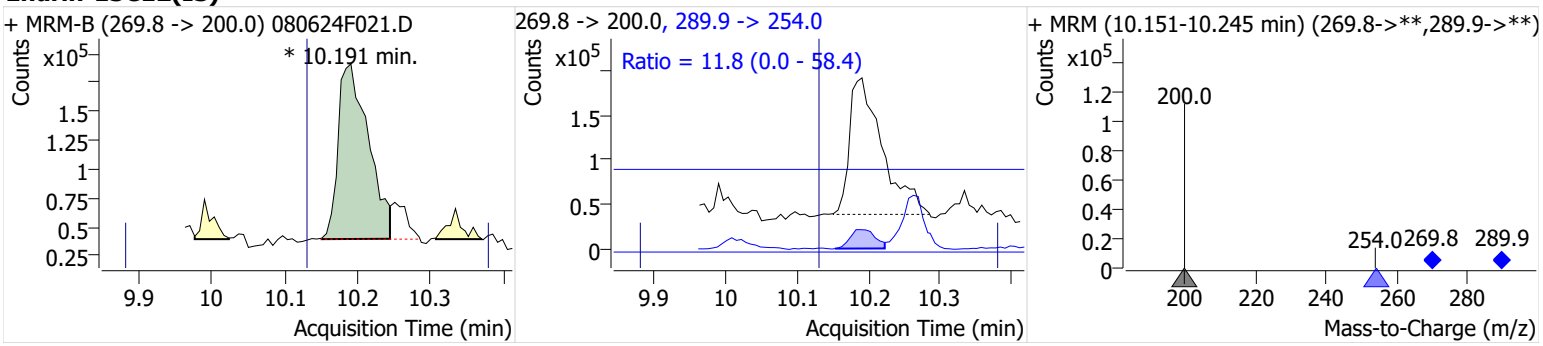


MassHunter Quantitative Analysis Sample Report

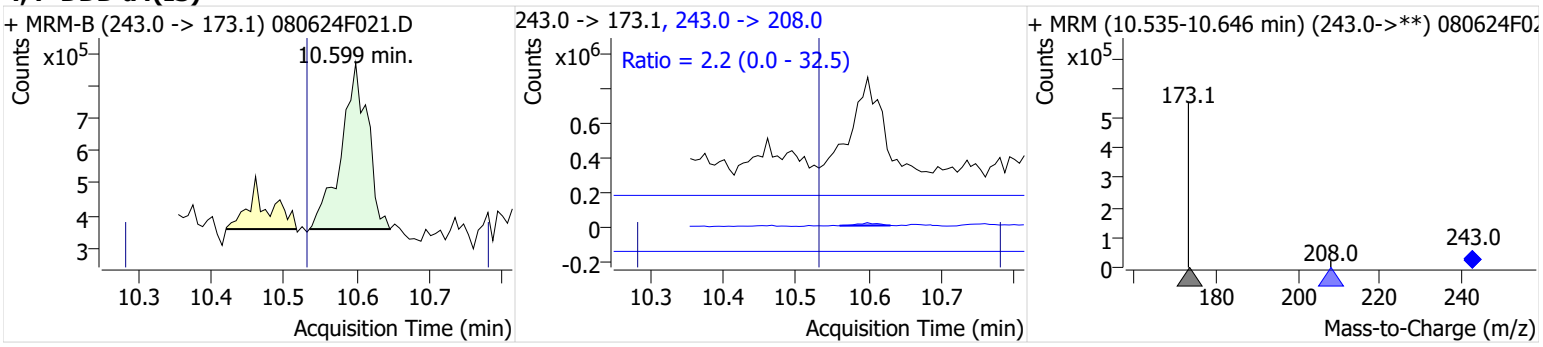
Pyrene-d10



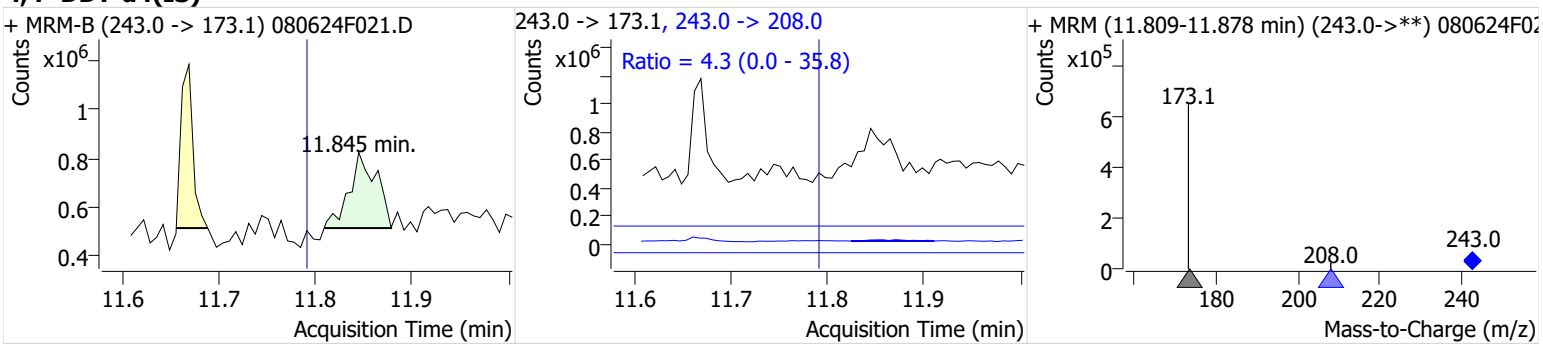
Endrin-13C12(IS)



4,4'-DDD d4(IS)

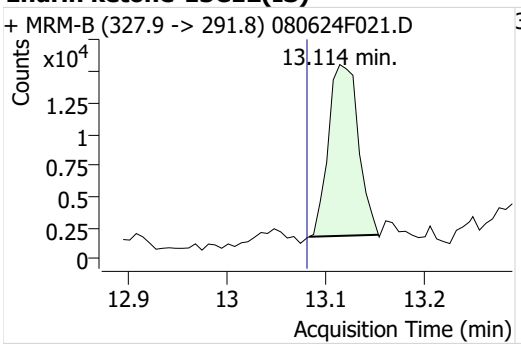


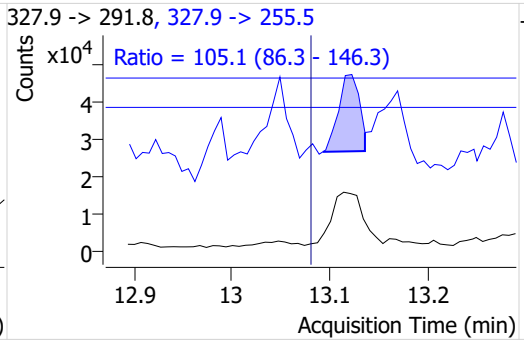
4,4'-DDT-d4(IS)

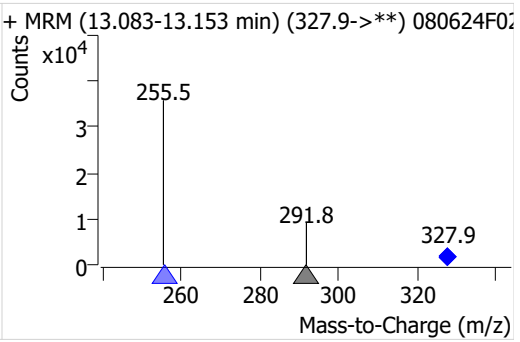


MassHunter Quantitative Analysis Sample Report

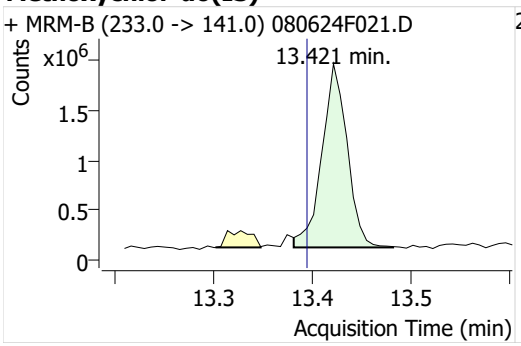
Endrin ketone-13C12(IS)

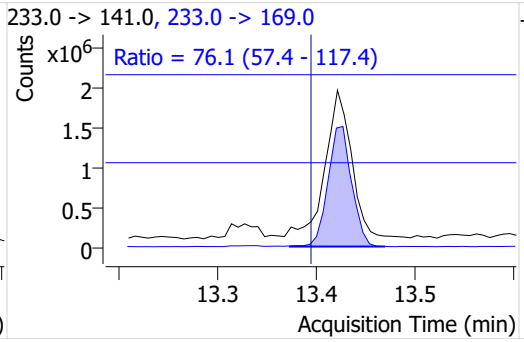


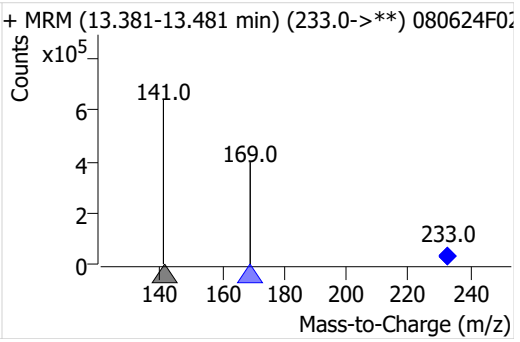




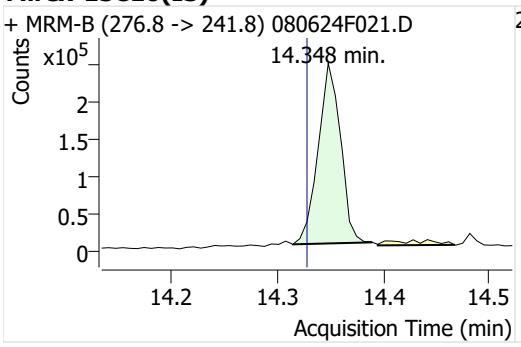
Methoxychlor-d6(IS)

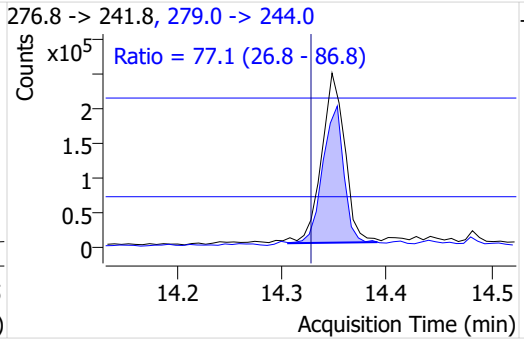


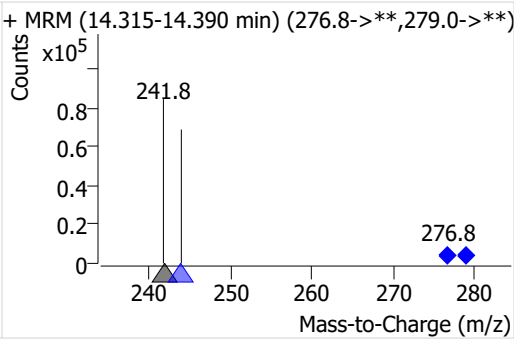




Mirex-13C10(IS)







1st 08/20/24
2nd 08/20/24

Validation Report

Data File: J:\MS42\Data\080624\080624F022.D
Lab ID: K2407810-003
RunType: N/A
Matrix: Sediment

Date Acquired: 8/6/24 17:02
Batch ID: 851162
Analysis Method: 1699M/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
Preparation Hold Time		X
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery	X	
Lab Control Sample Recovery		X
Method Blank	X	
Method Blank Surrogates	X	
Internal Standards	X	
Surrogates		X
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Sample Exceptions

Exception Categories	Result	Corrective Action
Preparation Hold Time	Prep Date/Time: 08/01/2024 1233 Hold Date/Time: 07/26/2022 2359	Frozen Sample Used

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Lab Control Sample Recovery	2,4'-DDT	124	53	116	High bias, samples<MRL
	4,4'-DDT	144	57	118	High bias, samples<MRL
Surrogates	S_Endrin-13C12	172	14	141	Matrix

Primary Review: _____

Secondary Review: _____

Printed: 8/20/24 17:33
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1st 08/20/24
2nd 08/20/24

Quantitation Report

Data File:	J:\MS42\Data\080624\080624F022.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 17:02	**Vial:**	16
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-003	**Raw Units:**	ng/ml

Bottle ID:	K2407810-003.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	851162	**Prep Lot:**	442451	**Report Group:**	K2407810
Analysis	1699M	**Prep Method:**	EPA 3541		
		Prep Date:	8/1/24		

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400368
		Report List ID:	25424

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	8.798	+0.02	38549367.447	100	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec		% Rec Criteria	Rpt?
S_Aldrin-13C12	7.220	+0.01	1225286.964	5.714	29		12 - 88	Y
S_4,4'DDD-d4	10.572	+0.03	3645353.829	4.466	89		9 - 159	Y
S_4,4'-DDT-d4	11.818	+0.01	1920022.146	3.820	76		5 - 187	Y
S_Endrin-13C12	10.178	+0.03	1129138.200	34.357	172	*	14 - 141	Y
S_GBHCD6	5.503	+0.01	2282952.585	4.628	23		5 - 90	Y
S_Oxychlordane-13C10	7.988	+0.02	865949.853	6.355	32		5 - 86	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Aldrin	7.222	+0.01	0	0	0	U	Y
gamma-BHC (Lindane)	5.556	+0.01	19039.076	0.138	0.027	U	Y
cis-Chlordane	8.857	+0.02	50100.776	0.910	0.18	J	Y
trans-Chlordane	8.530	+0.02	151538.328	3.330	0.65		Y
2,4'-DDD	9.578	+0.02	0	0	0	U	Y
4,4'-DDD	10.648	+0.03	0	0	0	U	Y
2,4'-DDE	8.547	+0.01	2606697.350	2.001	0.39		Y
4,4'-DDE	9.390	+0.01	21658035.679	23.335	4.6		Y
2,4'-DDT	10.642	-0.05	0	0	0	U	Y
4,4'-DDT	11.774	-0.11	0	0	0	U	Y
Dieldrin	9.455	-0.11	0	0	0	U	Y
cis-Nonachlor	10.631	+0.01	28025.649	0.833	0.16	U	Y
trans-Nonachlor	8.911	+0.01	26056.489	0.666	0.13	J	Y
Oxychlordane	7.838	-0.14	0	0	0	U	Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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1st 08/20/24

2nd 08/20/24

Data File:	J:\MS42\Data\080624\080624F022.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 17:02	**Vial:**	16
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-003	**Raw Units:**	ng/ml

Prep Amount:	10.129 g	**Dilution:**	1
Prep Final Amount:	1.00 mL	**Basis Factor:**	50.50

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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MassHunter Quantitative Analysis Sample Report

Data File	J:\MS42\Data\080624\080624F022.D		
Batch File	J:\MS42\Data\080624\QuantResults\080624 OC PEST.batch.bin		
Acq. Date-Time	8/6/2024 5:02:55 PM	**Acq Operator**	EBruno
Name	K2407810-003	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	8/19/2024 3:52:06 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	072424 OC PEST ICAL.batch.bin	**Vial**	16
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.226	289.8 -> 254.8	1583423	20.0000 ng/ml	0.016
γ-BHC-d6(IS)	5.503	223.9 -> 187.0	2282953	20.0000 ng/ml	0.011
Heptachlor-13C10(IS)	6.580	276.8 -> 241.8	2293949	20.0000 ng/ml	0.020
Chorpyrifos-d10(IS)	6.968	199.9 -> 171.9	2940034	20.0000 ng/ml	0.019
Aldrin-13C(IS)	7.220	269.8 -> 200.0	1217109	20.0000 ng/ml	0.016
Octachlorostyrene-13C8(IS)	7.749	315.8 -> 245.8	1037086	20.0000 ng/ml	0.023
Isodrin-13C12(IS)	7.809	199.9 -> 130.1	1911197	20.0000 ng/ml	0.020
Oxychlordane-13C10(IS)	7.988	190.0 -> 125.0	865950	20.0000 ng/ml	0.027
Heptachlor epoxide-13C10(IS)	7.990	362.8 -> 270.0	566868	20.0000 ng/ml	0.023
Pyrene-d10	8.798	212.0 -> 208.0	38549367	100.0000 ng/ml	0.034
Endrin-13C12(IS)	10.178	269.8 -> 200.0	1129138	20.0000 ng/ml	0.043
4,4'-DDD d4(IS)	10.572	243.0 -> 173.1	3645354	5.0000 ng/ml	0.037
4,4'-DDT-d4(IS)	11.818	243.0 -> 173.1	1920022	5.0000 ng/ml	0.030
Endrin ketone-13C12(IS)	13.107	327.9 -> 291.8	85599	20.0000 ng/ml	0.028
Methoxychlor-d6(IS)	13.421	233.0 -> 141.0	5544413	20.0000 ng/ml	0.026
Mirex-13C10(IS)	14.342	276.8 -> 241.8	1027997	5.0000 ng/ml	0.016

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	1583423	3.253 ng/ml	
		Spiked Amount =	20.0	Recovery =	*16.3 %*
γ-BHC-d6	5.491	223.9 -> 187.0	2282953	4.628 ng/ml	
		Spiked Amount =	20.0	Recovery =	*23.1 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	2293949	8.095 ng/ml	
		Spiked Amount =	20.0	Recovery =	*40.5 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	2940034	24.207 ng/ml	
		Spiked Amount =	20.0	Recovery =	*121.0 %*
Aldrin-13C	7.207	269.8 -> 200.0	1225287	5.714 ng/ml	
		Spiked Amount =	20.0	Recovery =	*28.6 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	1037086	5.367 ng/ml	
		Spiked Amount =	20.0	Recovery =	*26.8 %*
Isodrin-13C12	7.789	199.9 -> 130.1	1911197	8.317 ng/ml	
		Spiked Amount =	20.0	Recovery =	*41.6 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	865950	6.355 ng/ml	
		Spiked Amount =	20.0	Recovery =	*31.8 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	566868	7.349 ng/ml	
		Spiked Amount =	20.0	Recovery =	*36.7 %*
Endrin-13C12	10.131	269.8 -> 200.0	1129138	34.357 ng/ml	
		Spiked Amount =	20.0	Recovery =	*171.8 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	3645354	4.466 ng/ml	
		Spiked Amount =	5.0	Recovery =	*89.3 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1920022	3.820 ng/ml	
		Spiked Amount =	5.0	Recovery =	*76.4 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	85599	12.339 ng/ml	
		Spiked Amount =	20.0	Recovery =	*61.7 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	5544413	19.890 ng/ml	
		Spiked Amount =	20.0	Recovery =	*99.4 %*

MassHunter Quantitative Analysis Sample Report

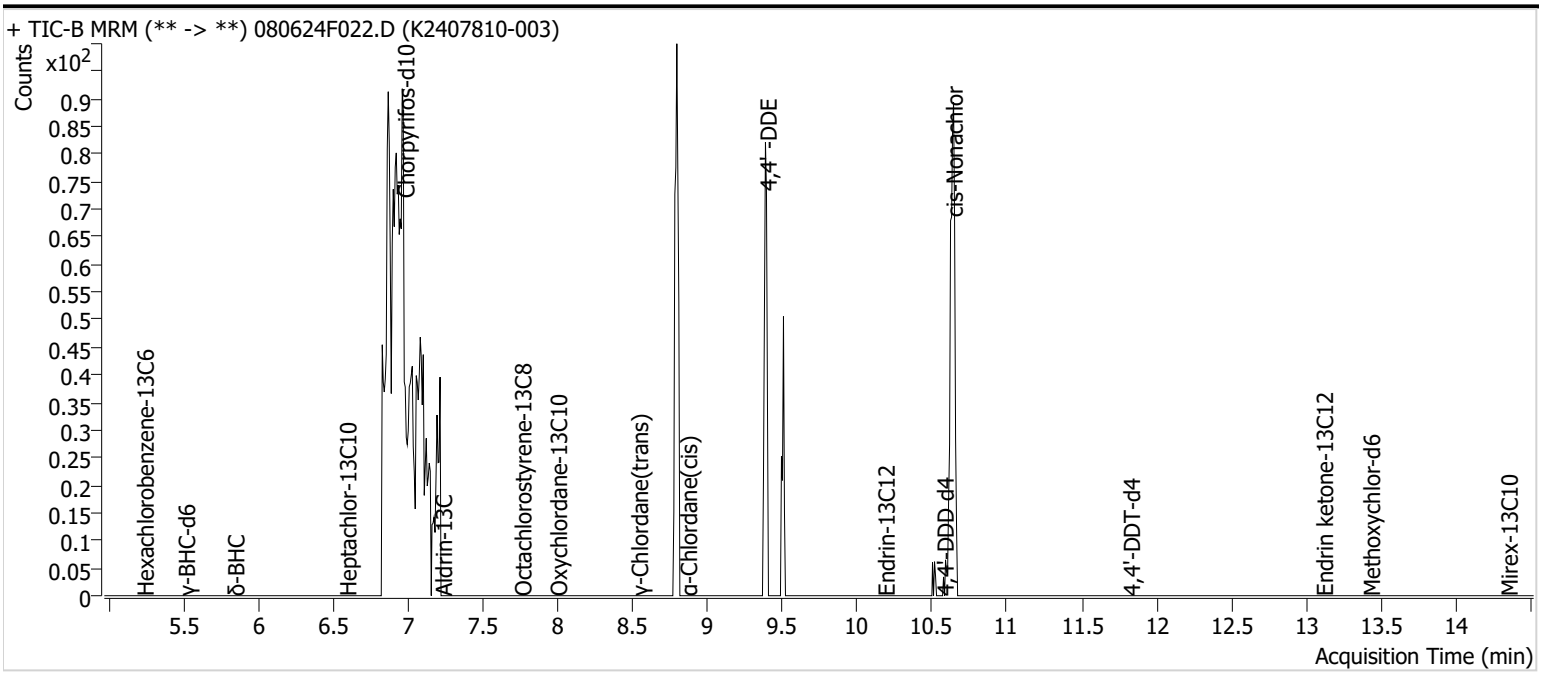
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	1027997	1.387 ng/ml
		Spiked Amount =	5.0	Recovery = *27.7 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.228	283.8 -> 213.9	145340	1.203 ng/ml	98
β-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.556	181.1 -> 145.1	19039	0.138 ng/ml	1
δ-BHC	γ-BHC-d6(IS)	5.833	181.1 -> 145.1	31530	0.315 ng/ml	17
Heptachlor	Heptachlor-13C10(IS)		271.7 -> 236.9		ND ng/ml	
Chorpyrifos	Chorpyrifos-d10(IS)		196.9 -> 169.0		ND ng/ml	
Aldrin	Aldrin-13C(IS)		254.9 -> 220.0		ND ng/ml	
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.755	342.8 -> 307.8	52260	0.410 ng/ml	98
Isodrin	Isodrin-13C12(IS)		193.0 -> 123.0		ND ng/ml	
Oxychlordane	Oxychlordane-13C10(IS)		114.9 -> 51.1		ND ng/ml	
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)		352.8 -> 262.9		ND ng/ml	
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.530	271.8 -> 236.9	151538	3.330 ng/ml	74
2,4'-DDE	4,4'-DDD d4(IS)	8.547	246.0 -> 176.2	2606697	2.001 ng/ml	95
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.857	271.8 -> 236.9	50101 ***m***	0.910 ng/ml	41
Endosulfan I	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
trans-Nanochlor	Oxychlordane-13C10(IS)	8.911	271.8 -> 236.9	26056	0.666 ng/ml	58
4,4' -DDE	4,4'-DDD d4(IS)	9.390	246.0 -> 176.2	21658036	23.335 ng/ml	98
Dieldrin	Endrin-13C12(IS)		262.9 -> 193.0		ND ng/ml	
2,4'-DDD	4,4'-DDD d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin	Endrin-13C12(IS)		262.8 -> 193.0		ND ng/ml	
Endosulfan II	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
cis-Nonachlor	Oxychlordane-13C10(IS)	10.631	271.8 -> 236.9	28026	0.833 ng/ml	1
4,4'-DDD	4,4'-DDD d4(IS)		235.0 -> 165.1		ND ng/ml	
2,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin aldehyde	Endrin-13C12(IS)		249.9 -> 214.9		ND ng/ml	
Endosulfan sulfate	Endrin-13C12(IS)		271.9 -> 237.0		ND ng/ml	
4,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin ketone	Endrin ketone-13C12(IS)		147.0 -> 111.0		ND ng/ml	
Methoxychlor	Methoxychlor-d6(IS)		227.0 -> 141.1		ND ng/ml	
Mirex	Mirex-13C10(IS)		271.8 -> 236.8		ND ng/ml	

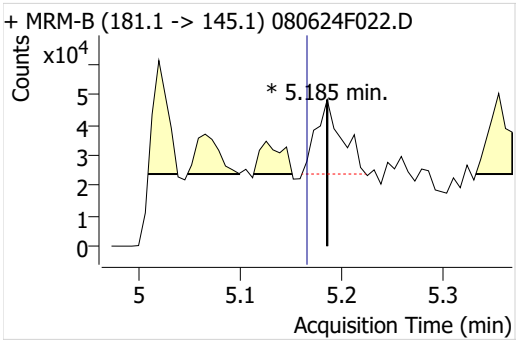
(m) = manual integration ND = Not Detected NC = Not Calculated

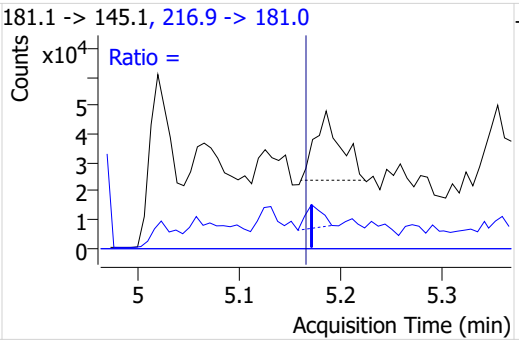
Sample Chromatogram

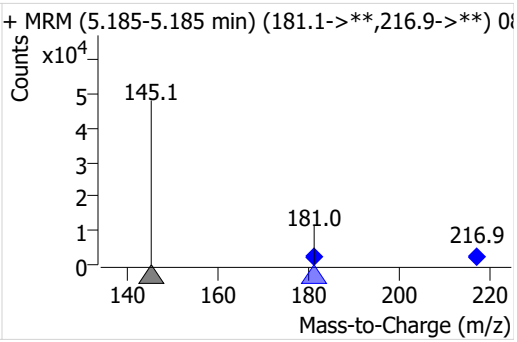
MassHunter Quantitative Analysis Sample Report



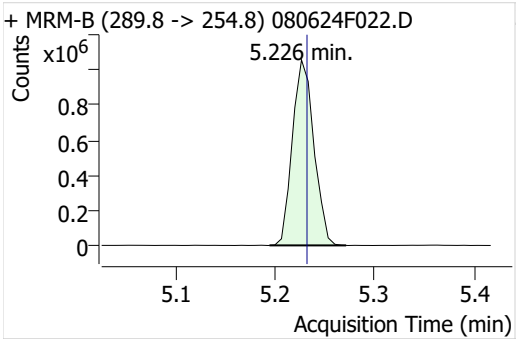
α-BHC

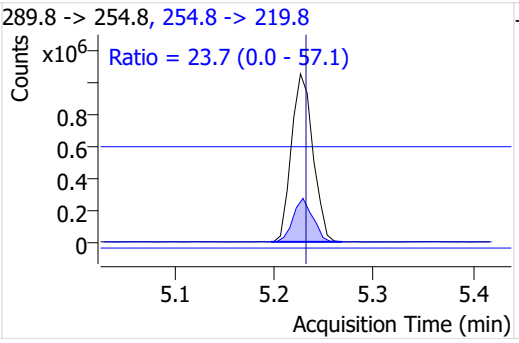


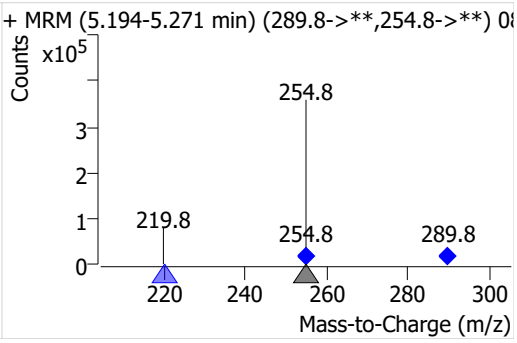




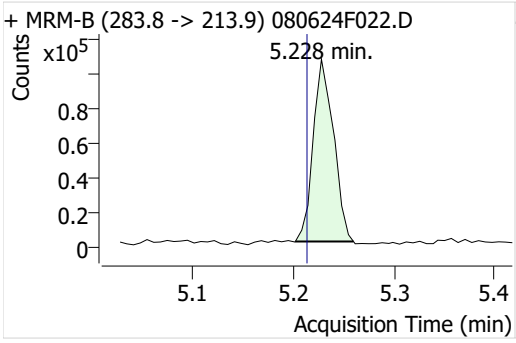
Hexachlorobenzene-13C6

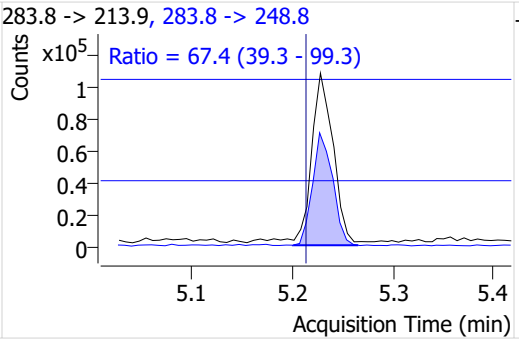


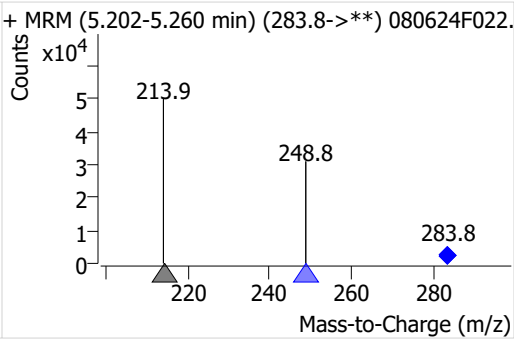




Hexachlorobenzene







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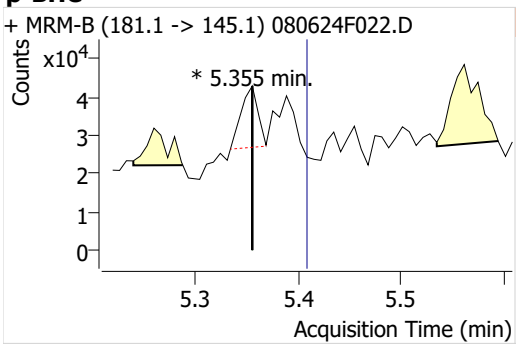
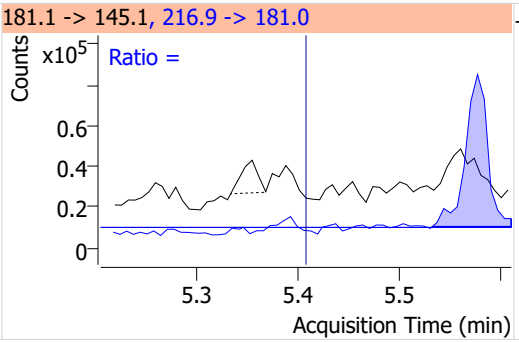
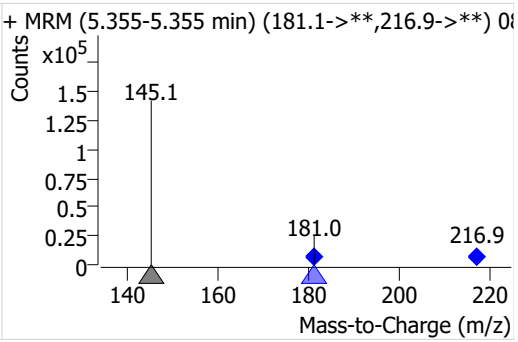
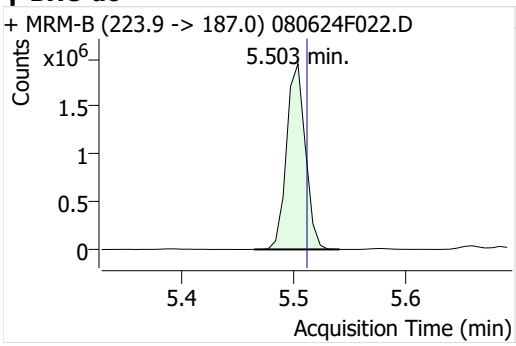
β-BHC

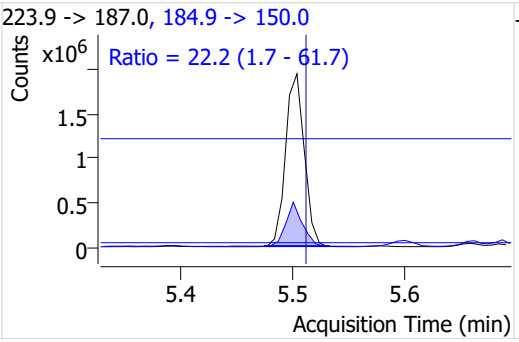


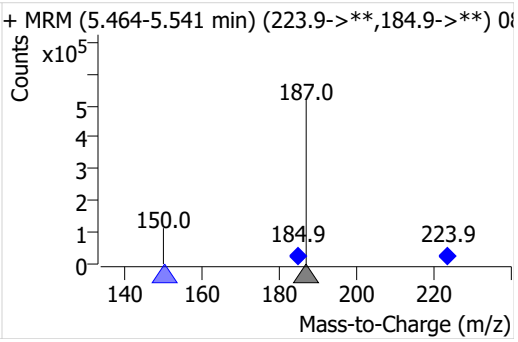




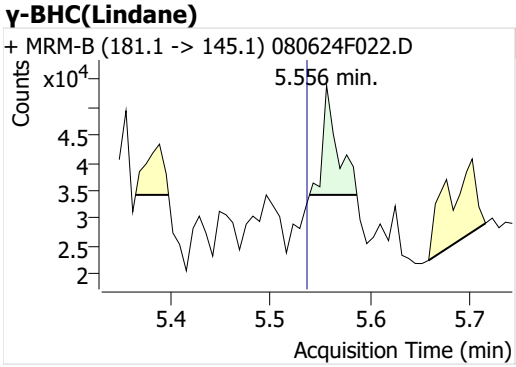
γ-BHC-d6

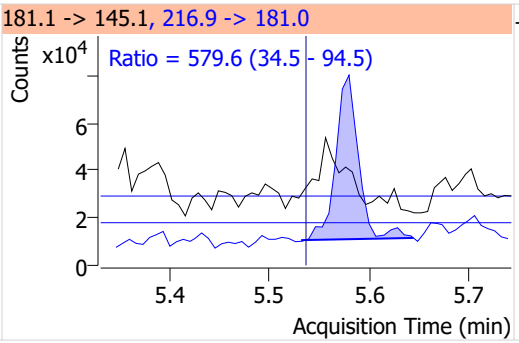


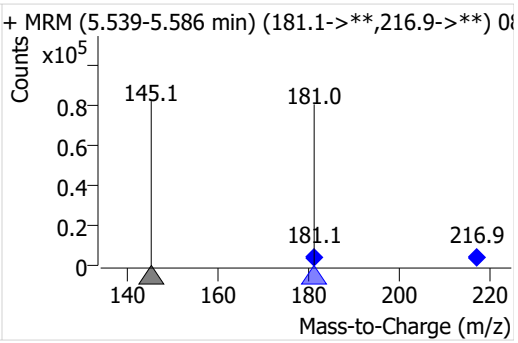




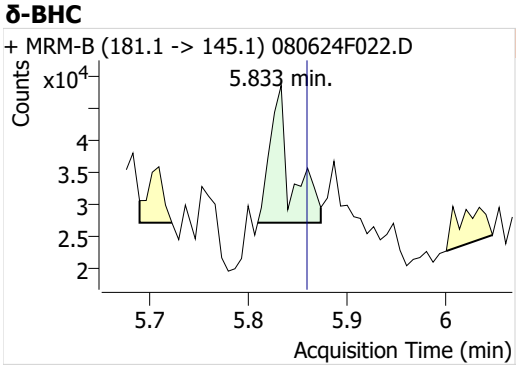
γ-BHC(Lindane)

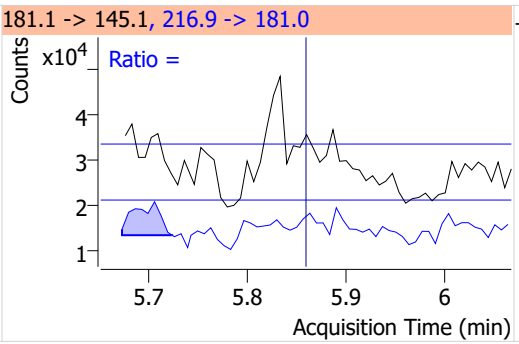


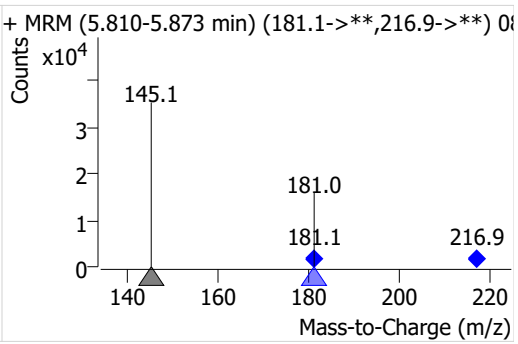




δ-BHC







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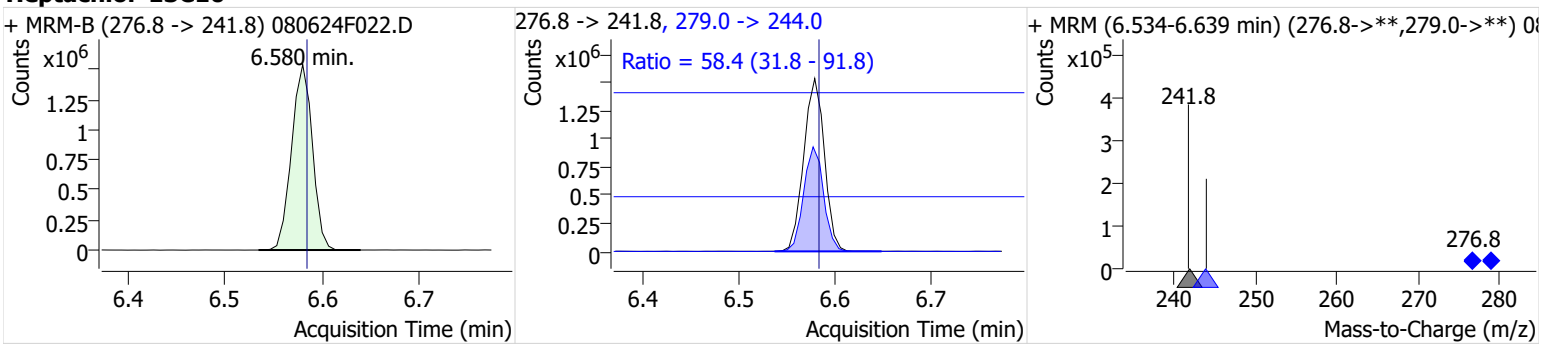
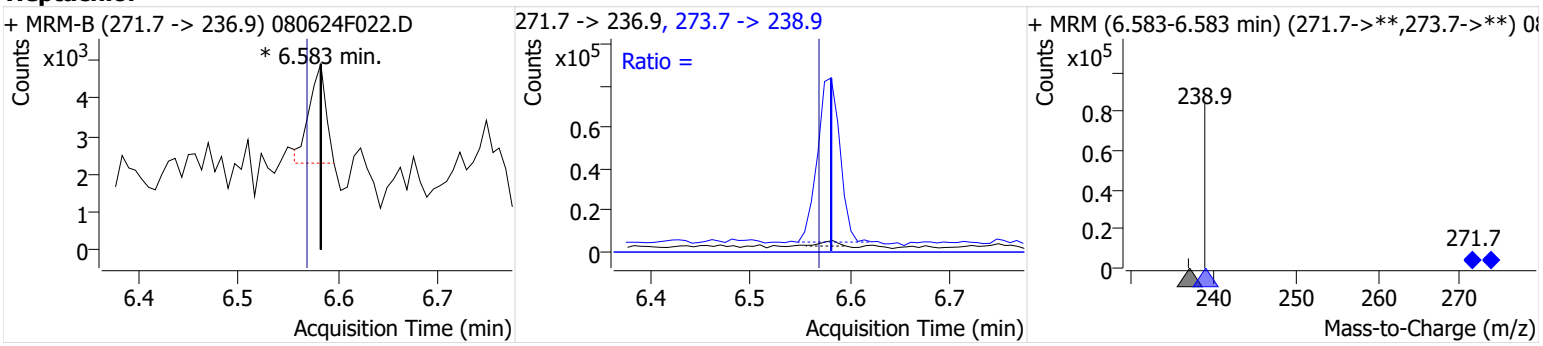
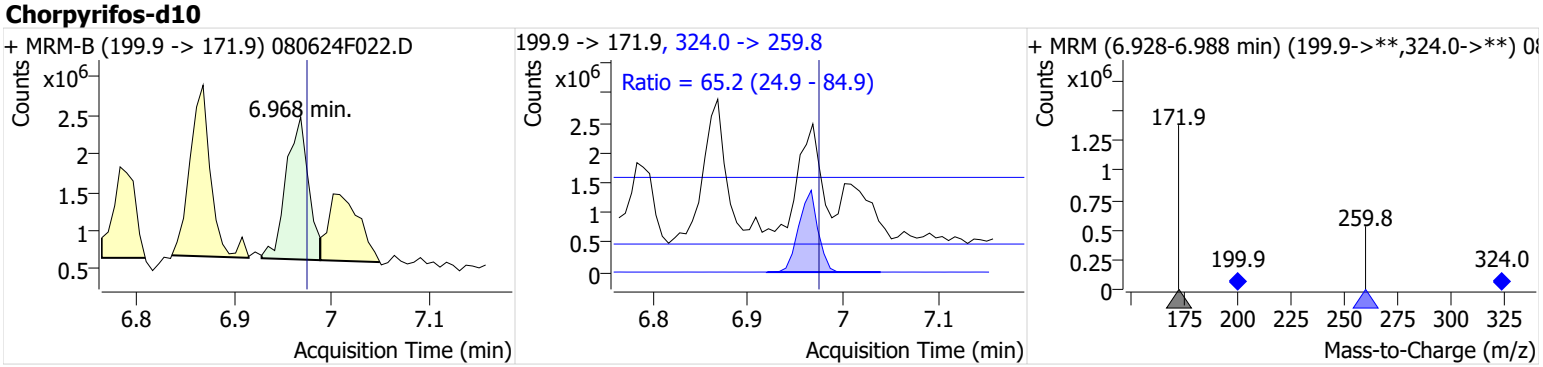
Heptachlor-13C10



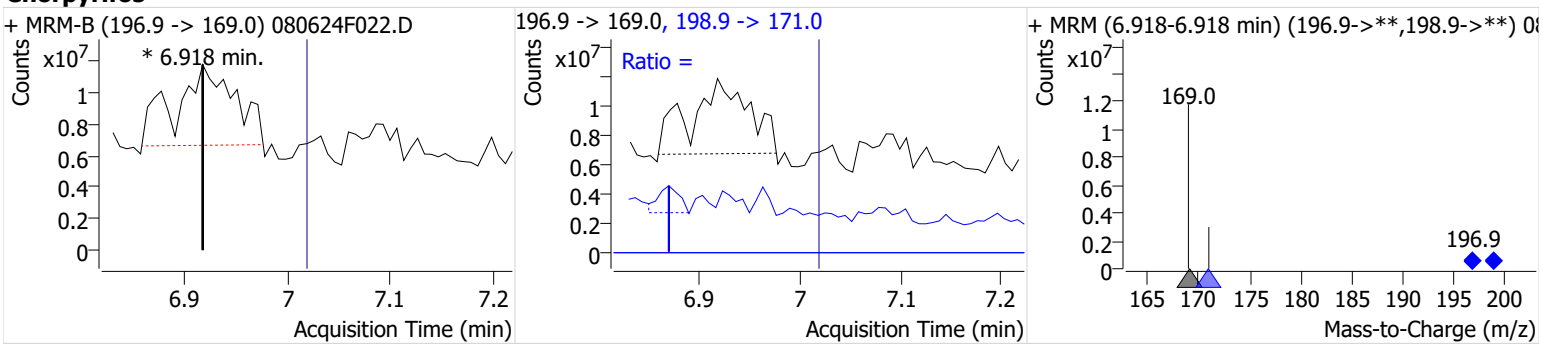
Heptachlor



Chorpyrifos-d10

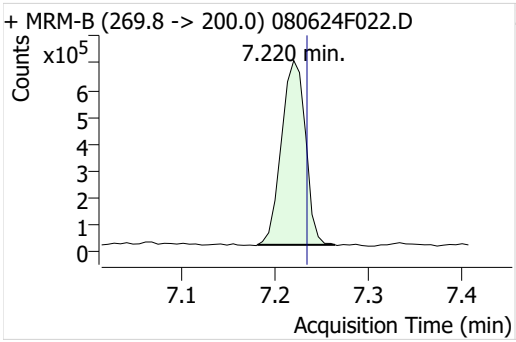


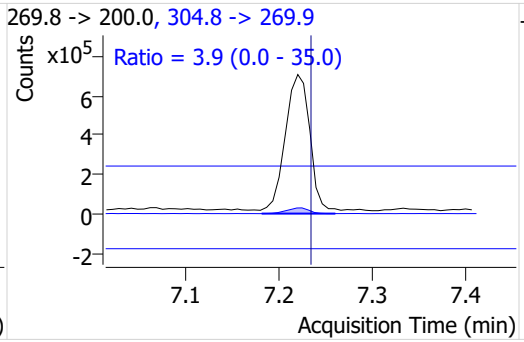
Chorpyrifos

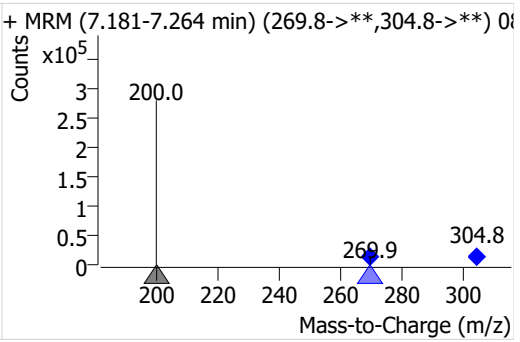


MassHunter Quantitative Analysis Sample Report

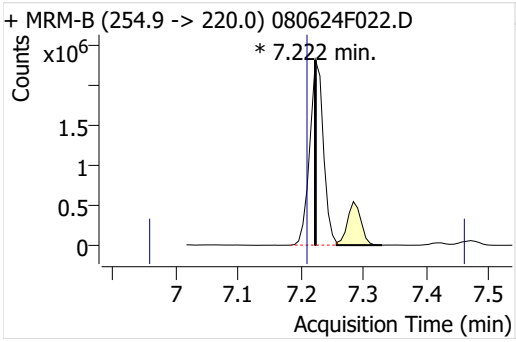
Aldrin-13C

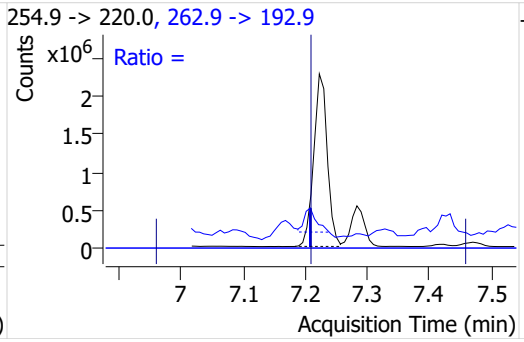


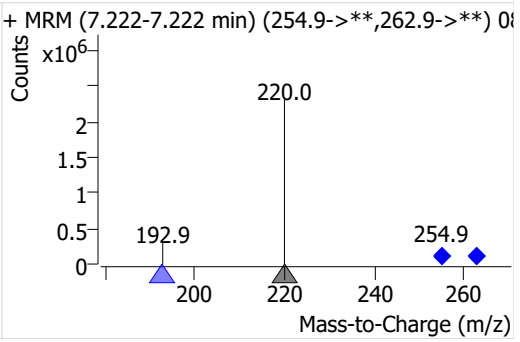




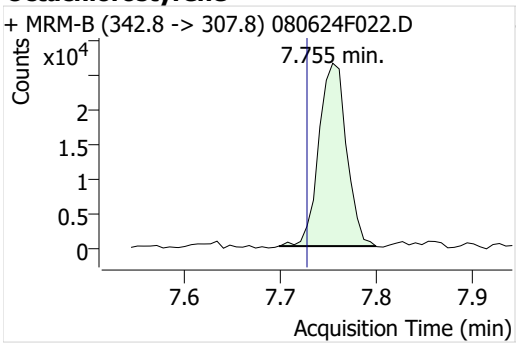
Aldrin

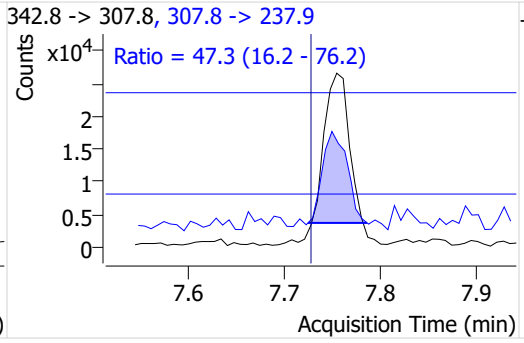


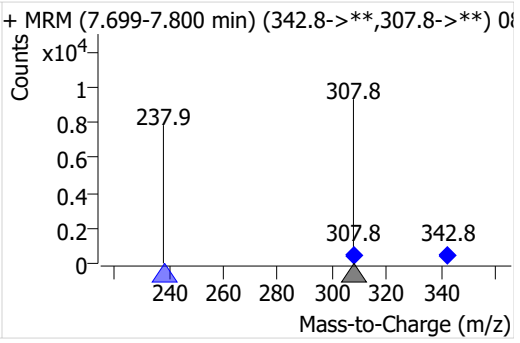




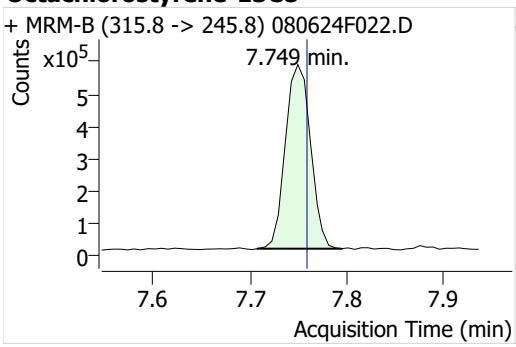
Octachlorostyrene

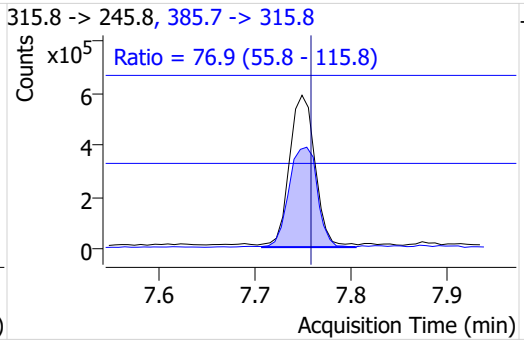


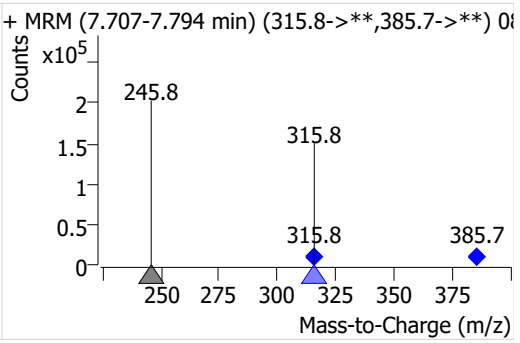




Octachlorostyrene-13C8







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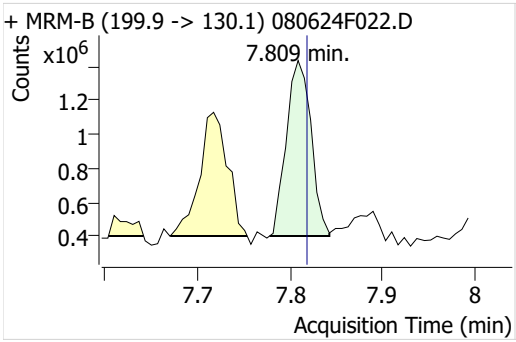
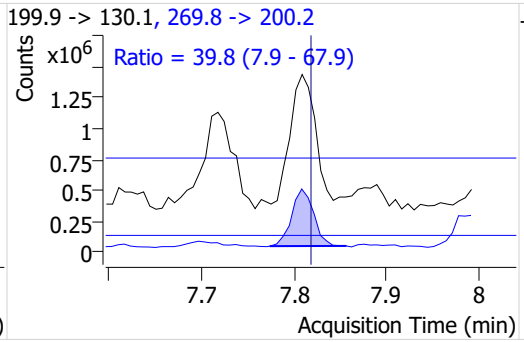
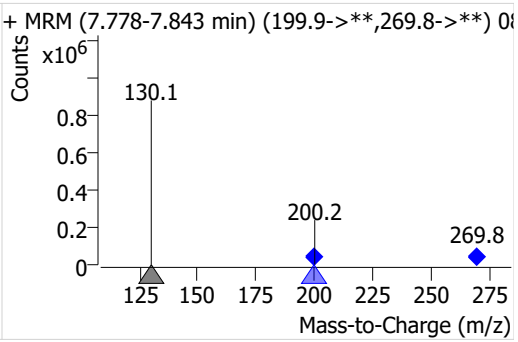
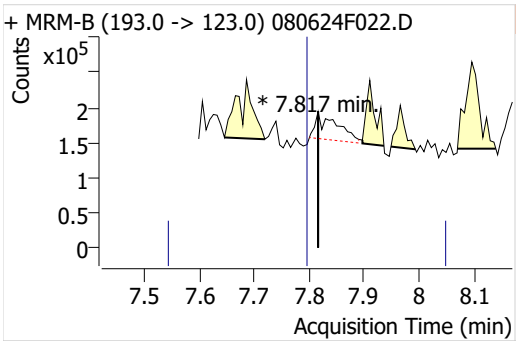
Isodrin-13C12

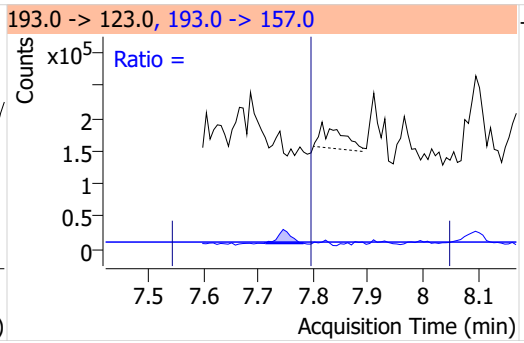


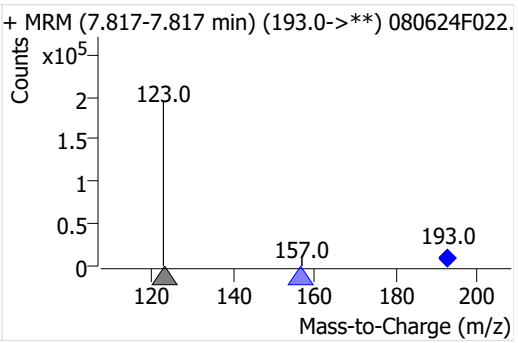




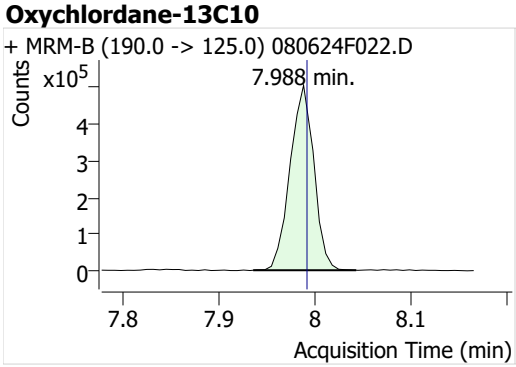
Isodrin

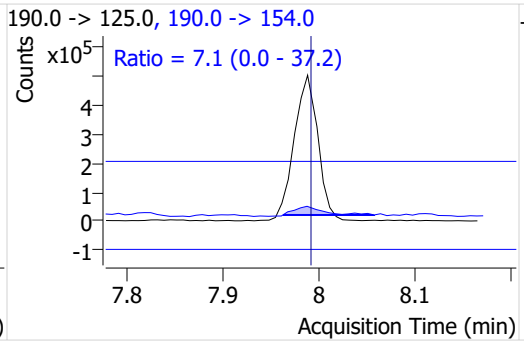


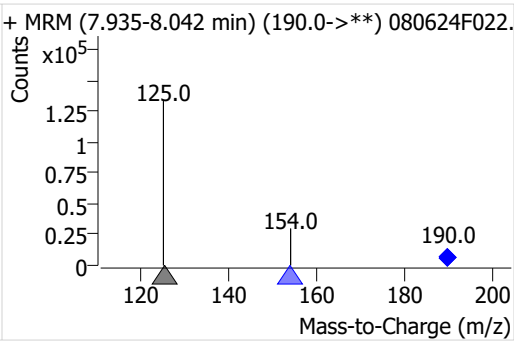




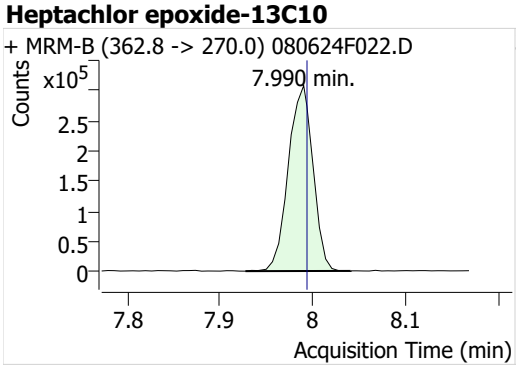
Oxychlordane-13C10

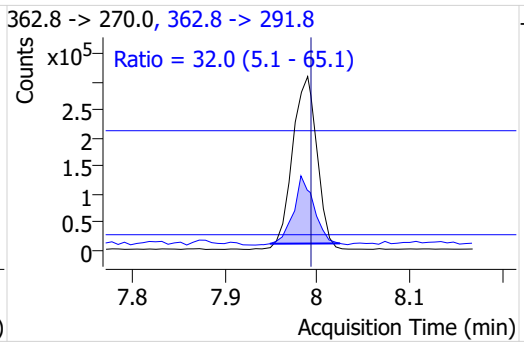


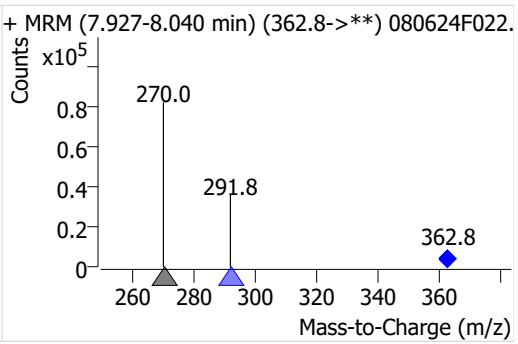




Heptachlor epoxide-13C10







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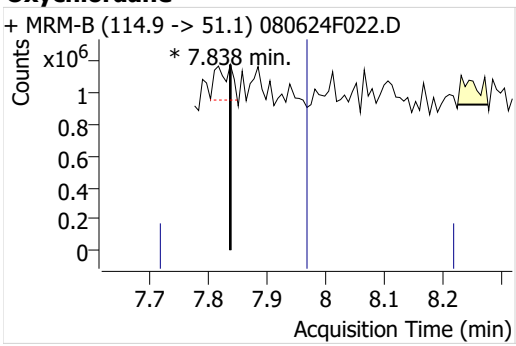
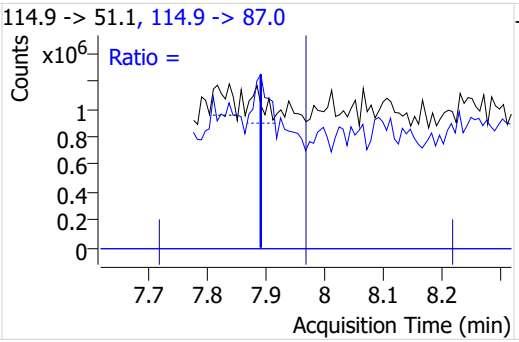
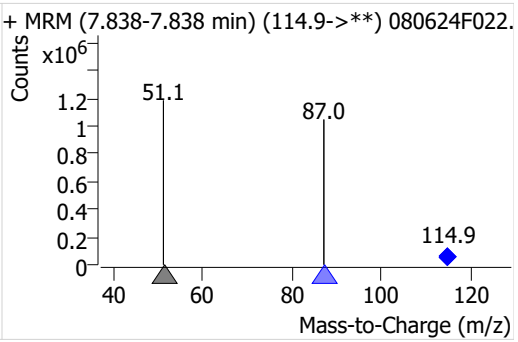
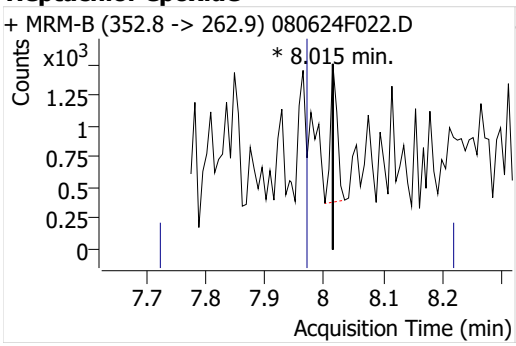
Oxychlordane

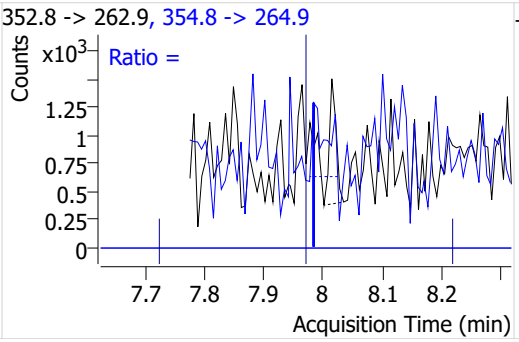


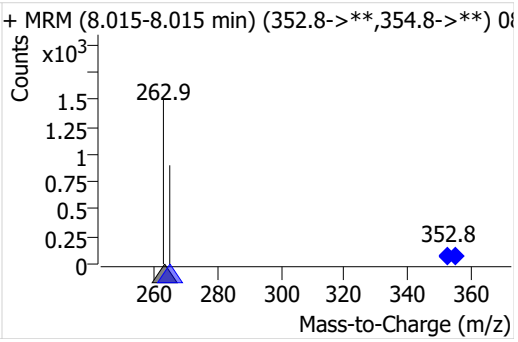




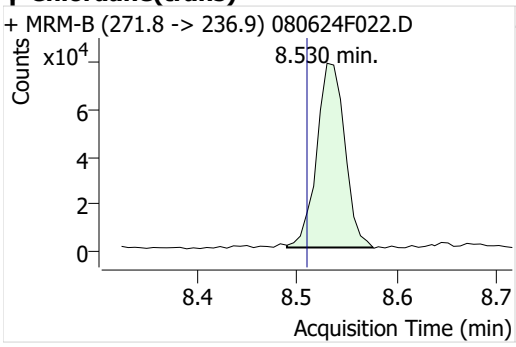
Heptachlor epoxide

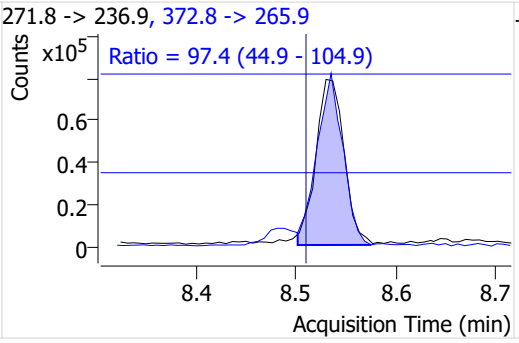


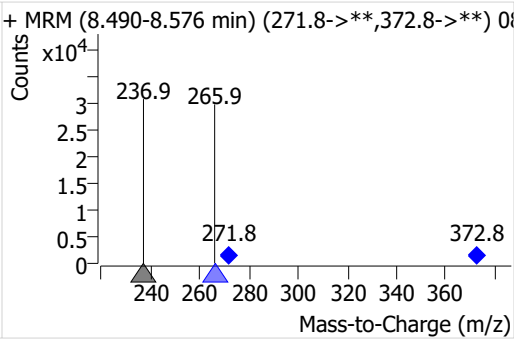




γ-Chlordane(trans)







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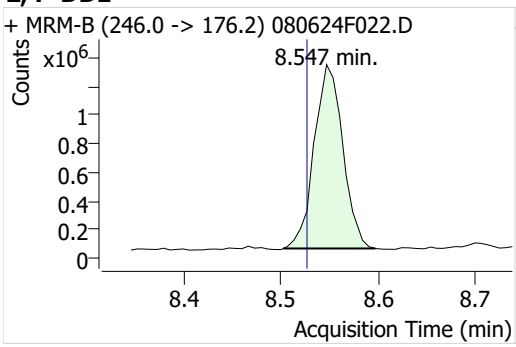
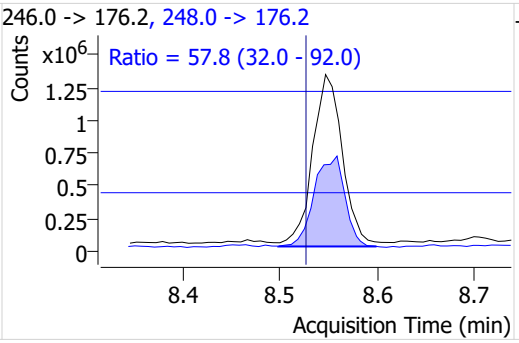
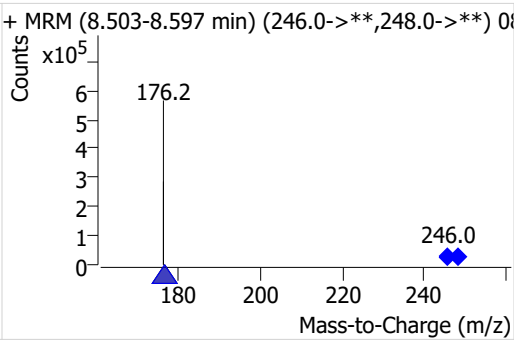
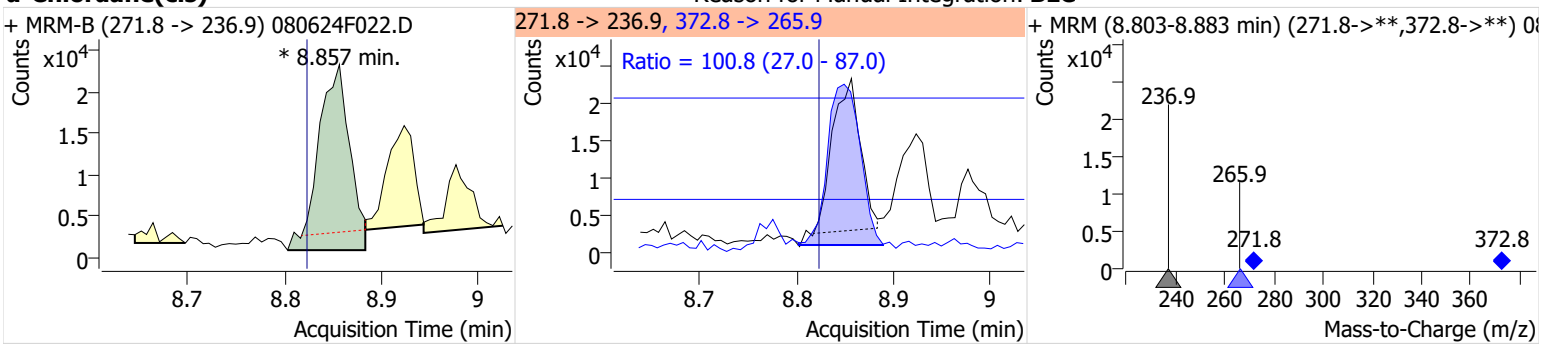






MassHunter Quantitative Analysis Sample Report

α-Chlordane(cis) Reason for Manual Integration: **BLC**



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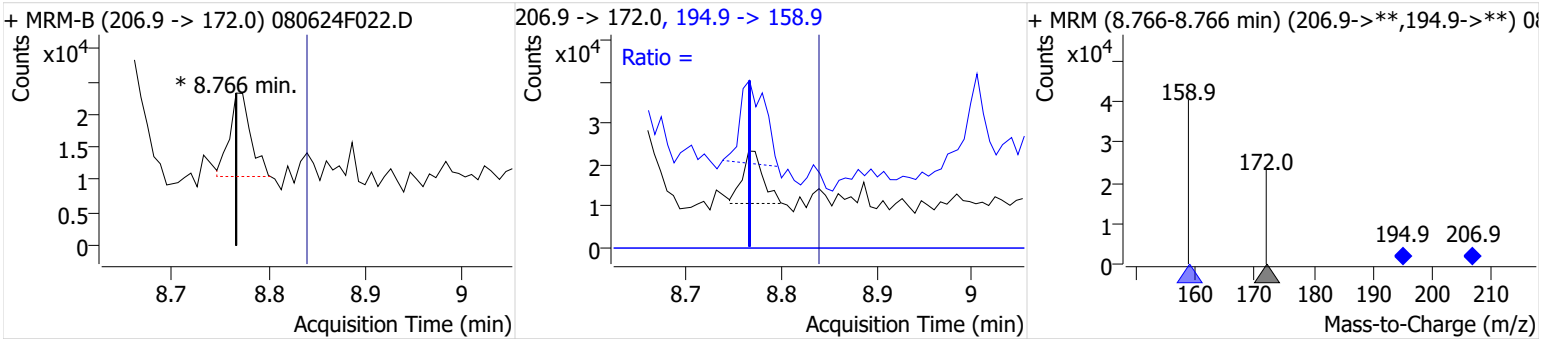
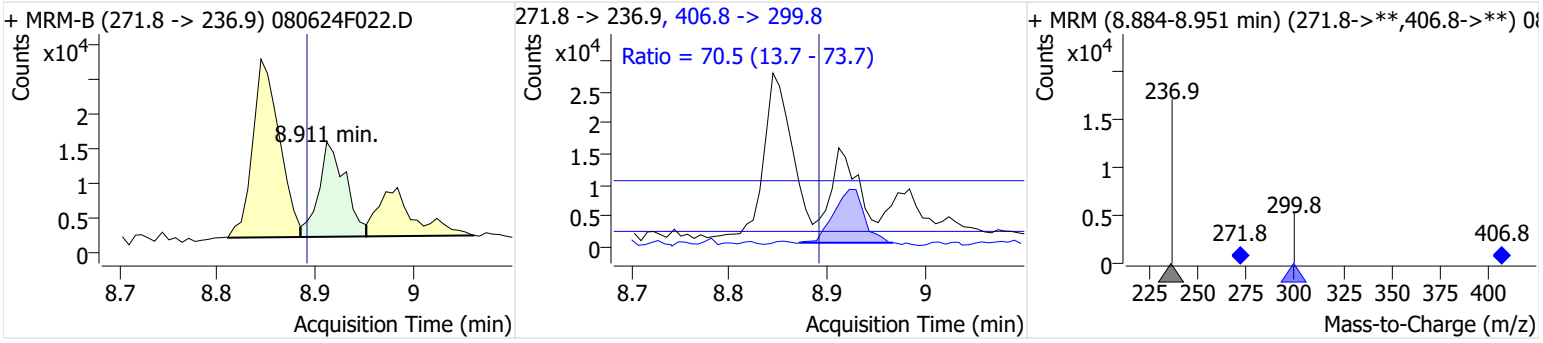


trans-Nanochlor



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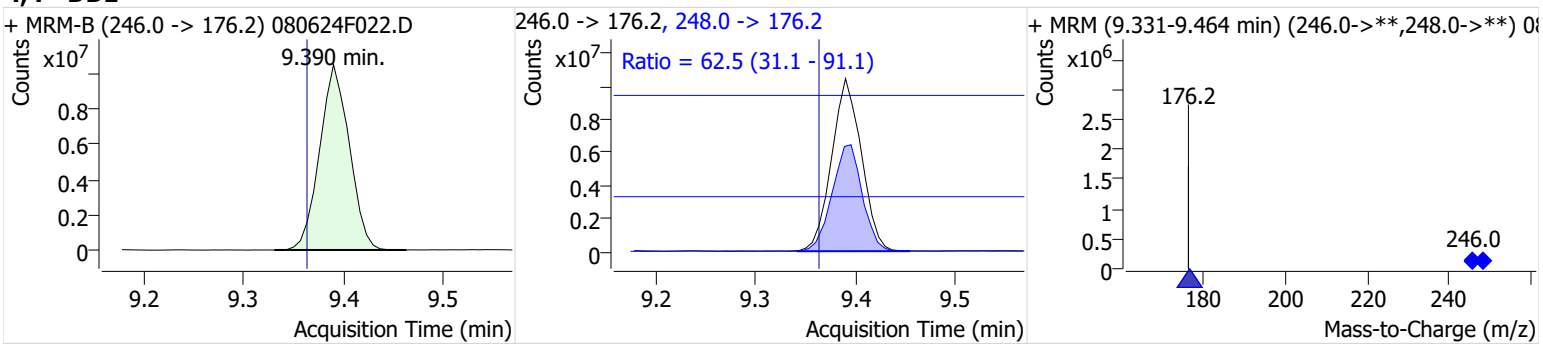

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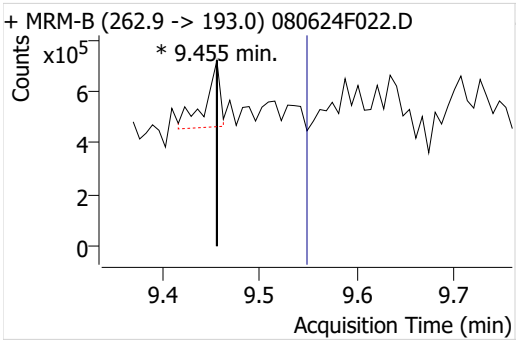
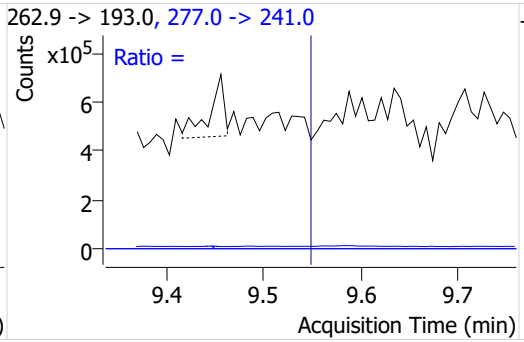
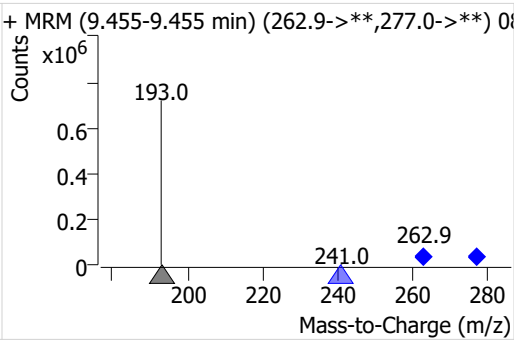
Dieldrin







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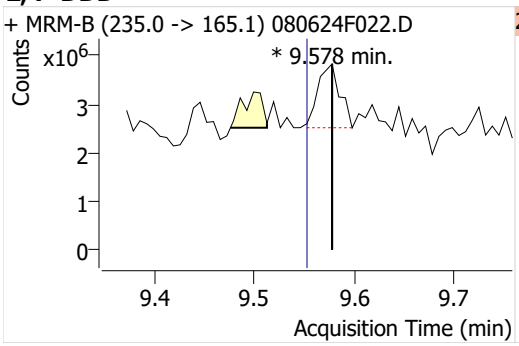
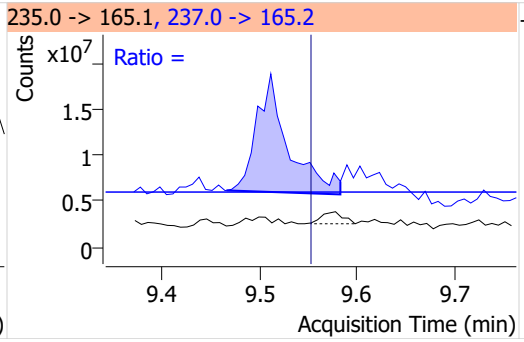
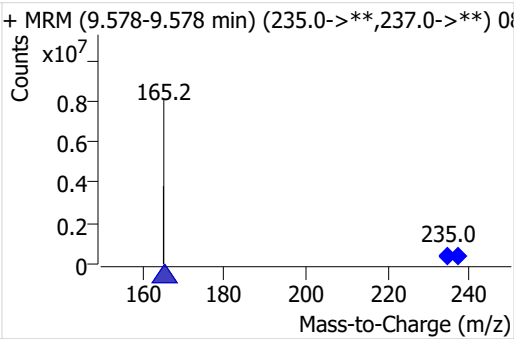
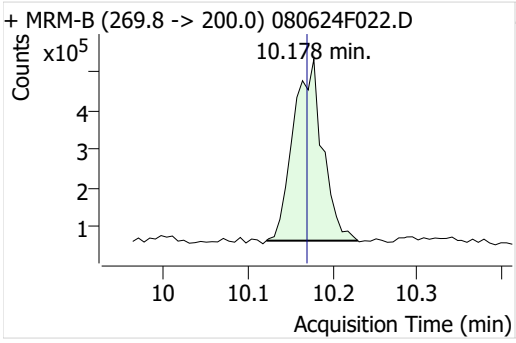
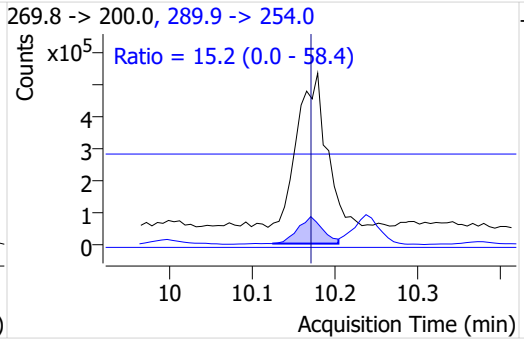


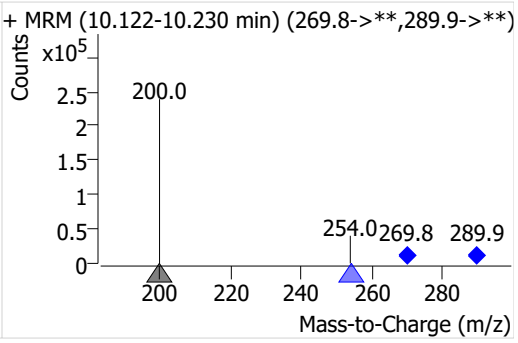




Endrin-13C12







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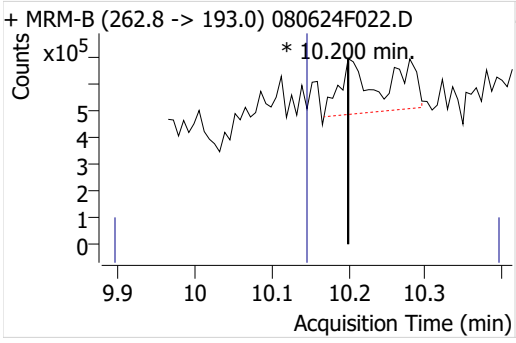

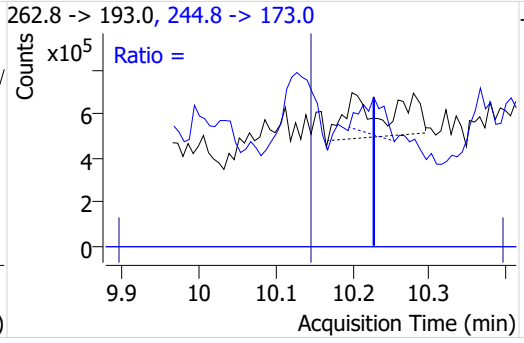

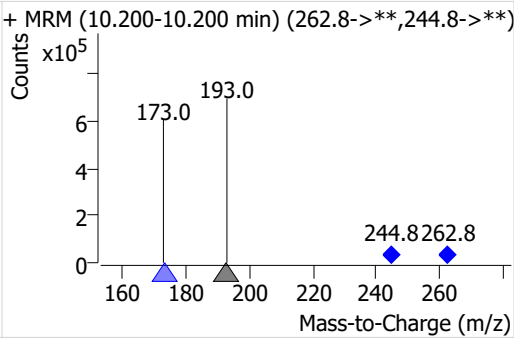

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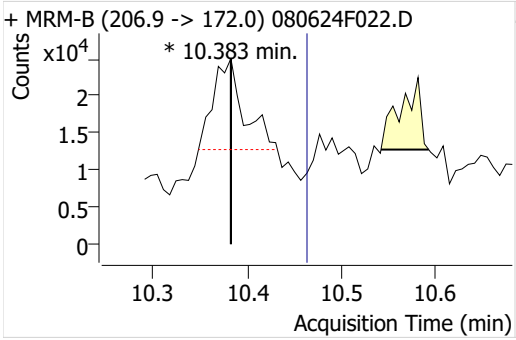
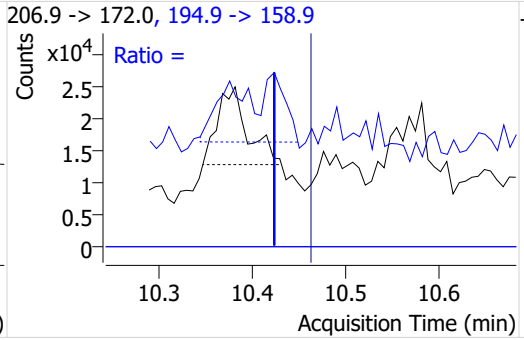
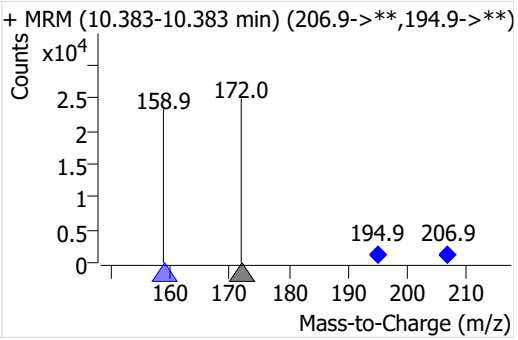
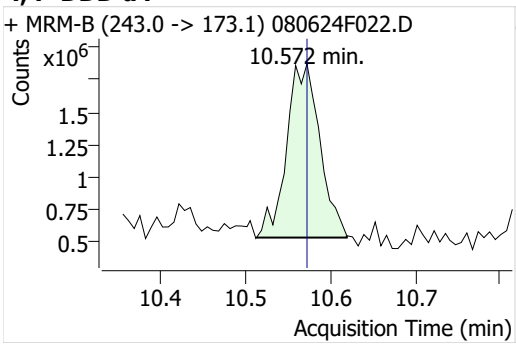
Endosulfan II

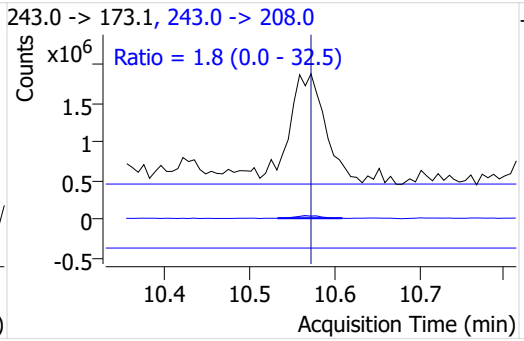


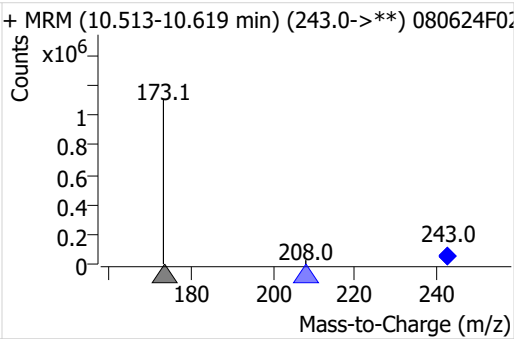




4,4'-DDD d4







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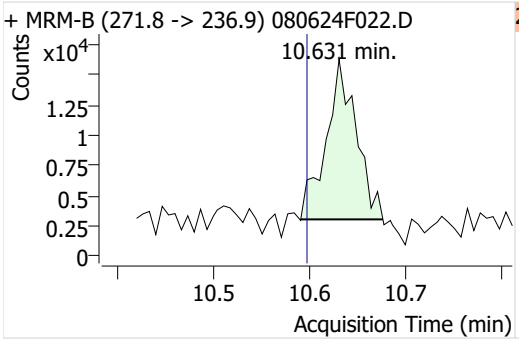
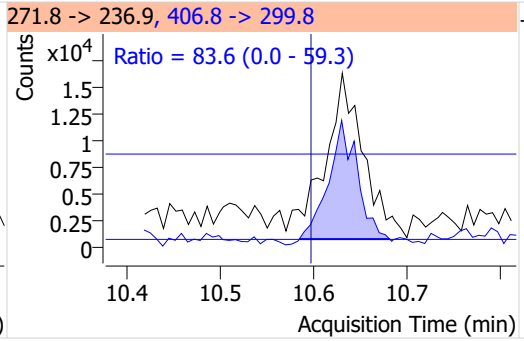
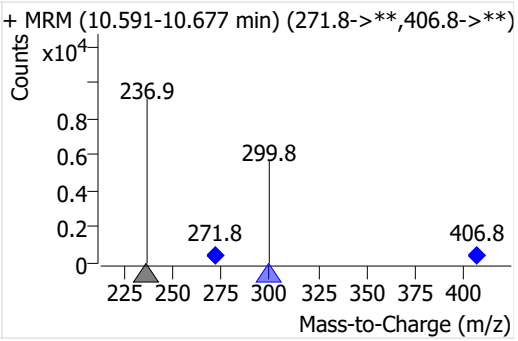
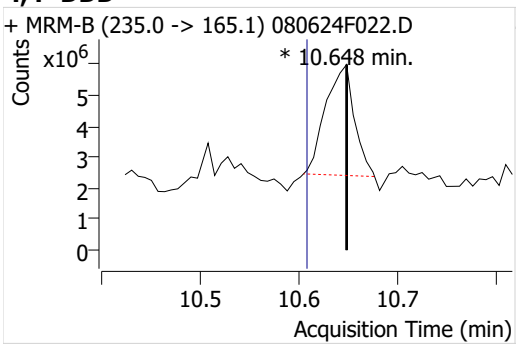
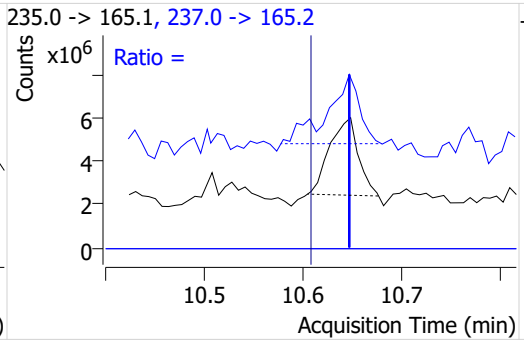


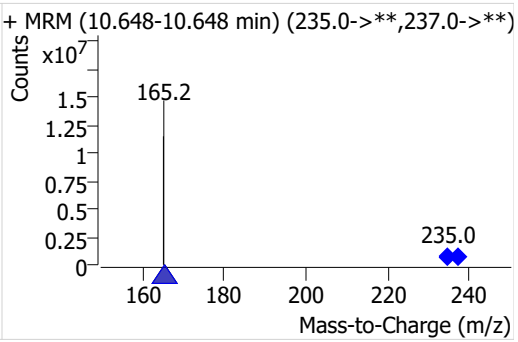




4,4'-DDD

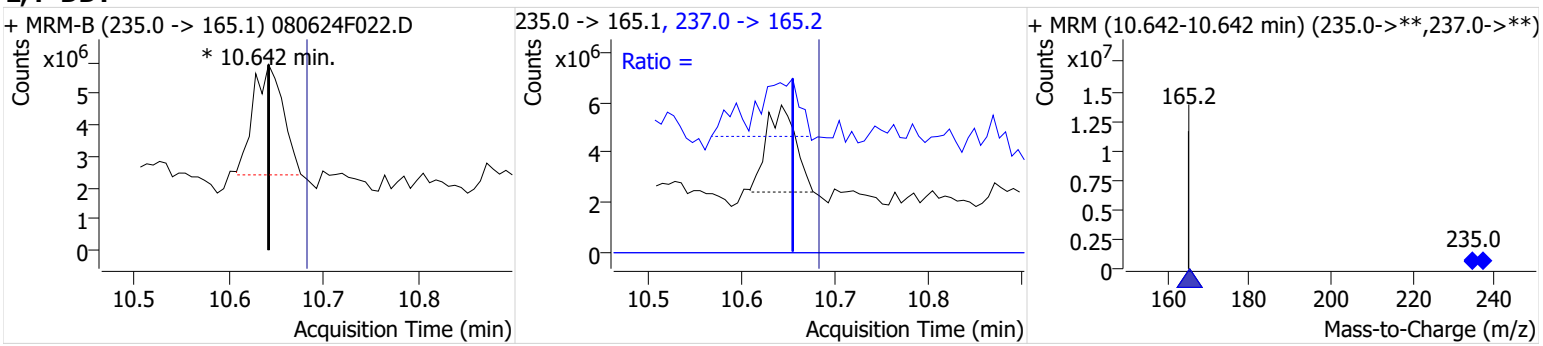




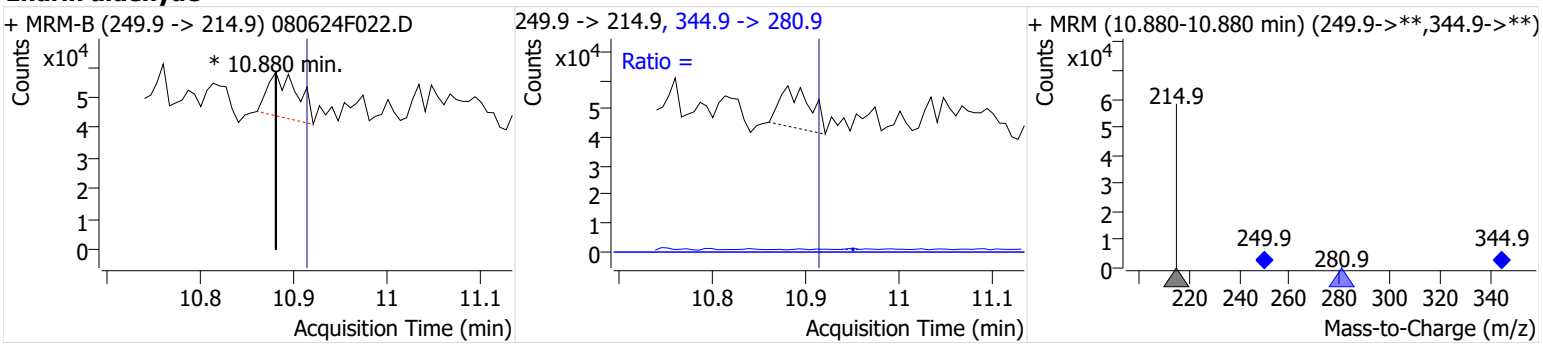


MassHunter Quantitative Analysis Sample Report

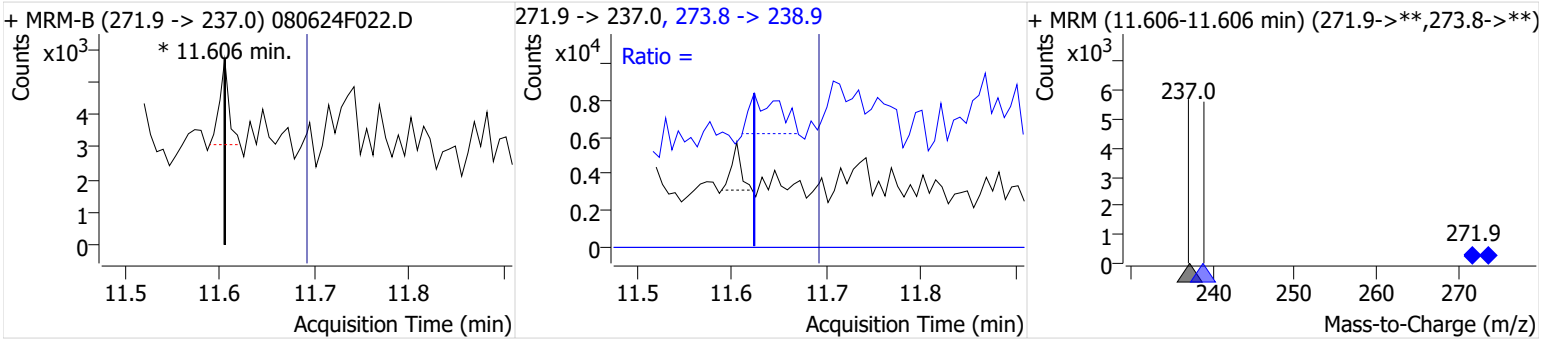
2,4'-DDT



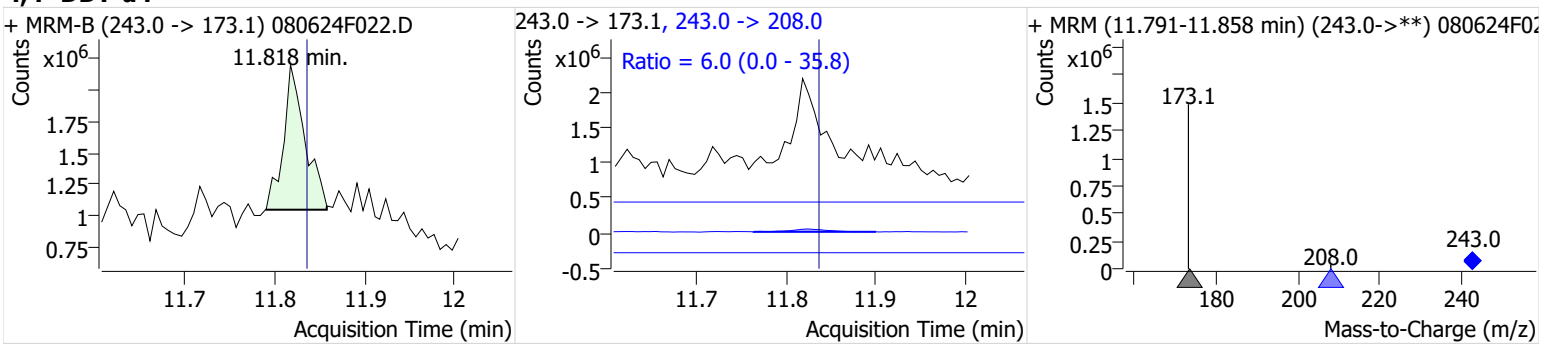
Endrin aldehyde



Endosulfan sulfate

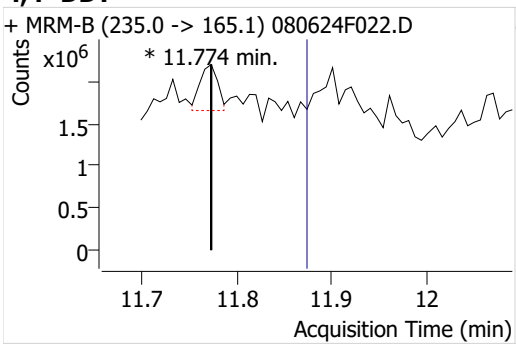


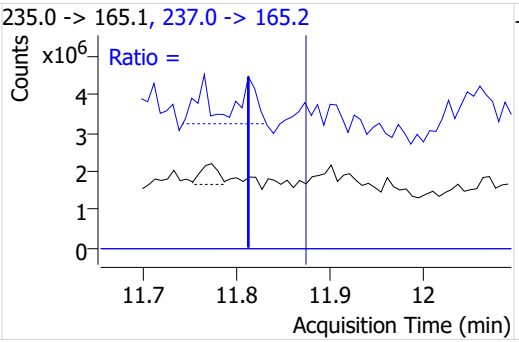
4,4'-DDT-d4

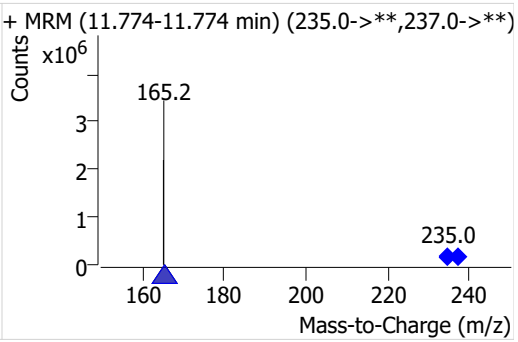


MassHunter Quantitative Analysis Sample Report

4,4'-DDT







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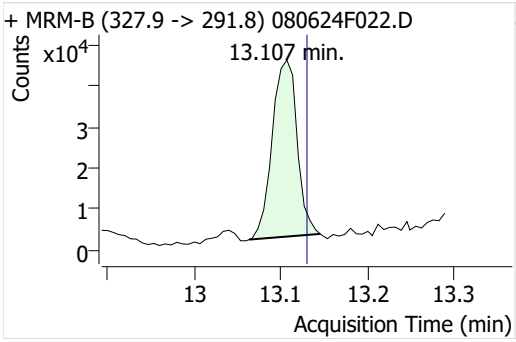
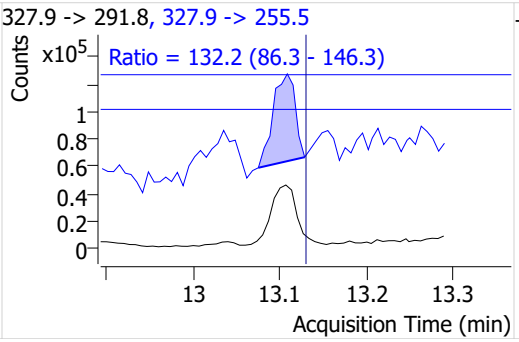
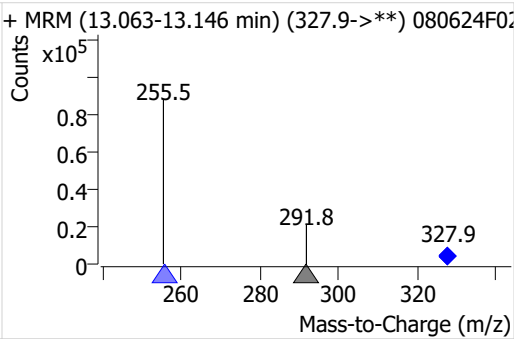
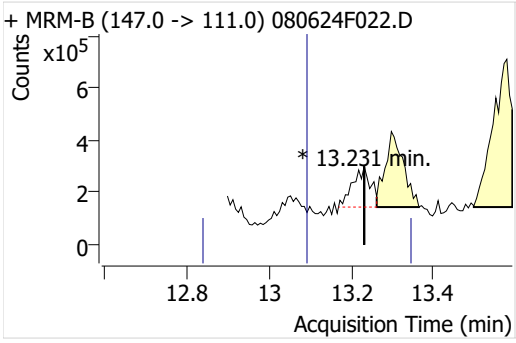
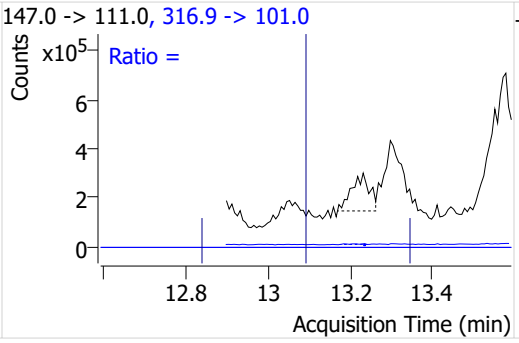


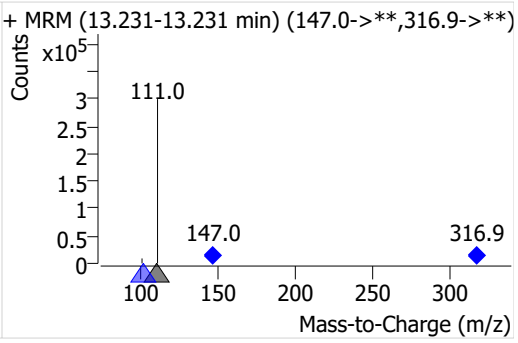




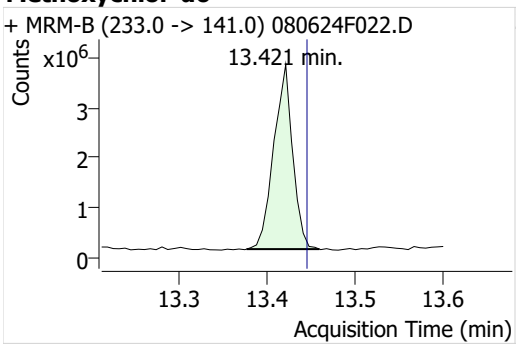
Endrin ketone

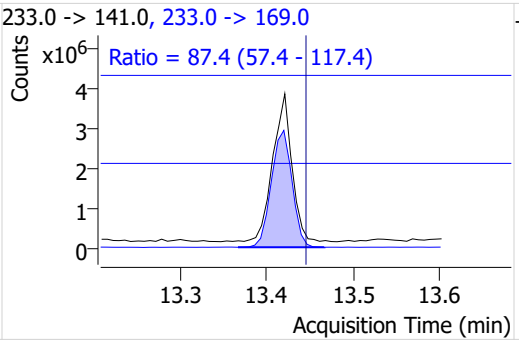


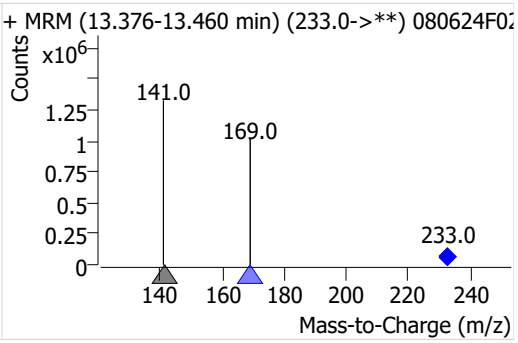




Methoxychlor-d6







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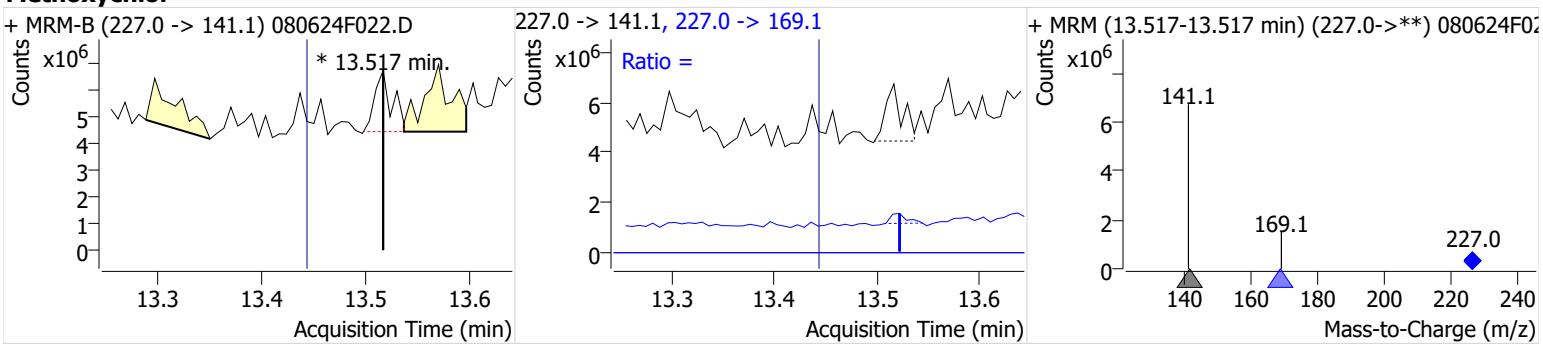
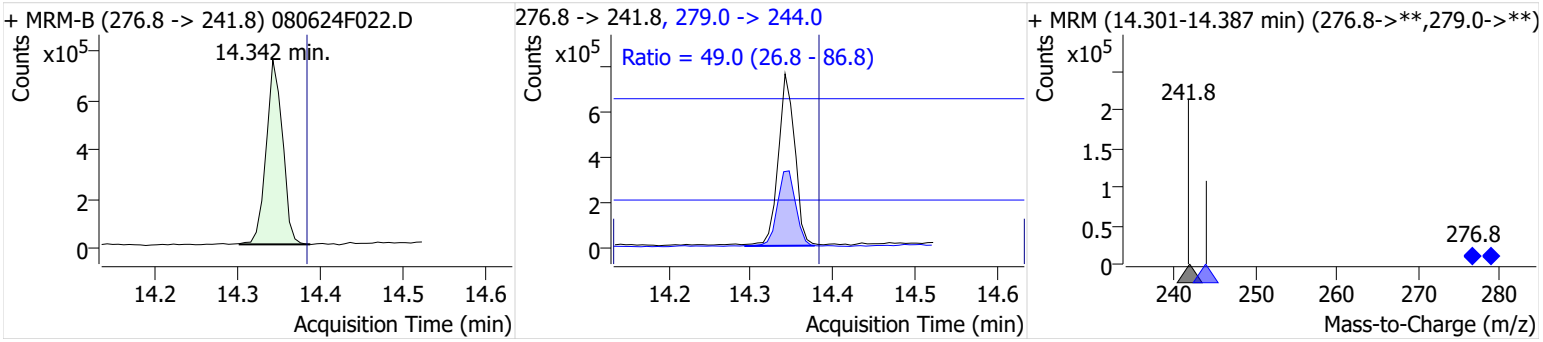
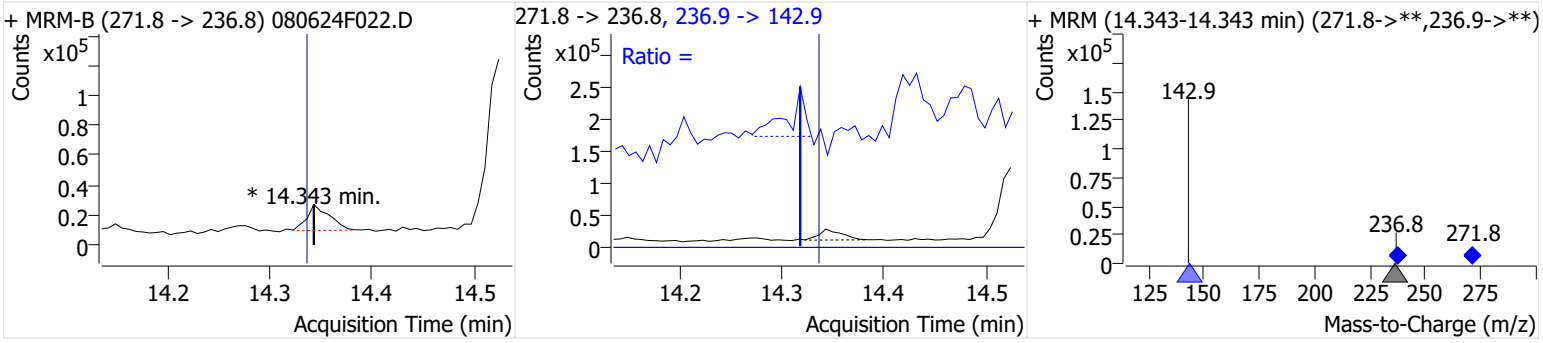
Methoxychlor



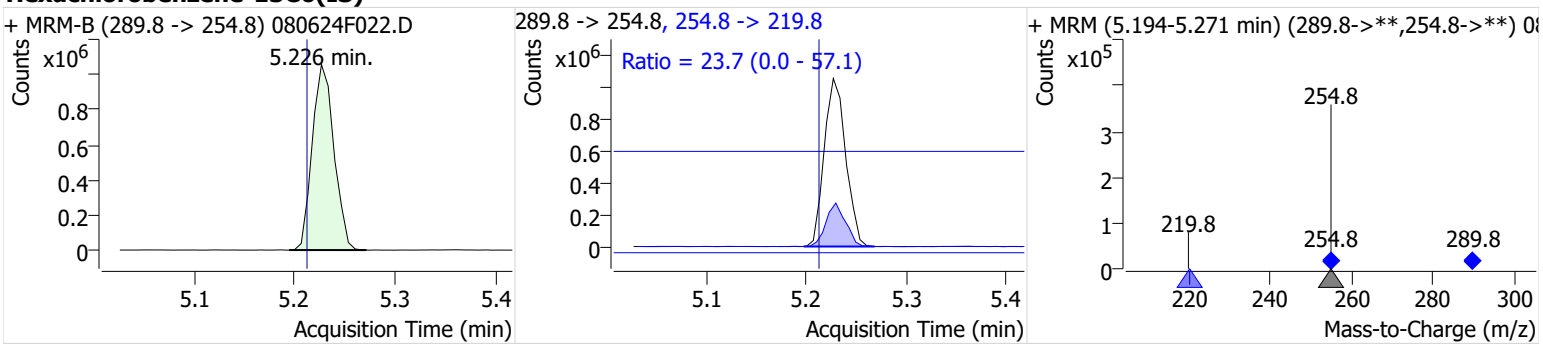
Mirex-13C10



Mirex



Hexachlorobenzene-13C6(IS)



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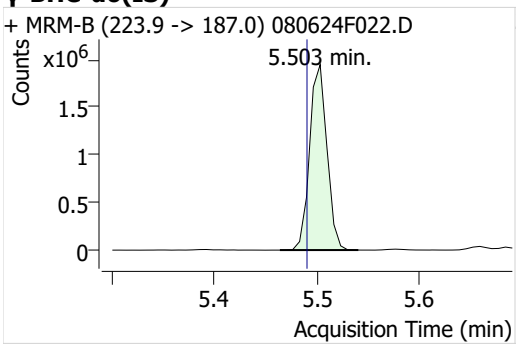
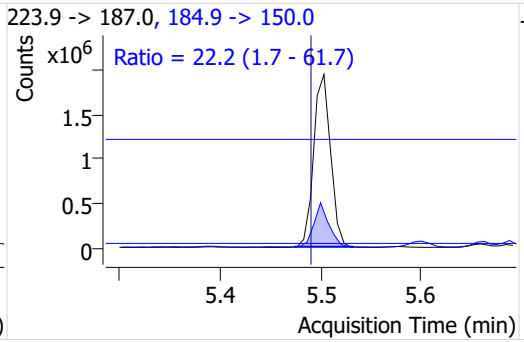
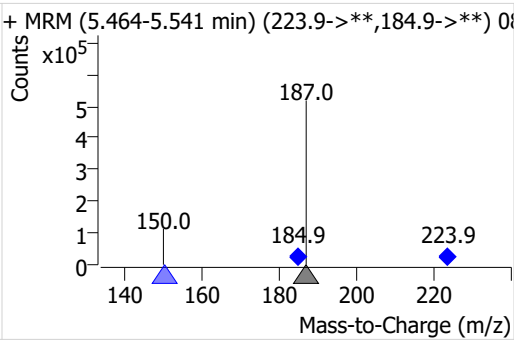
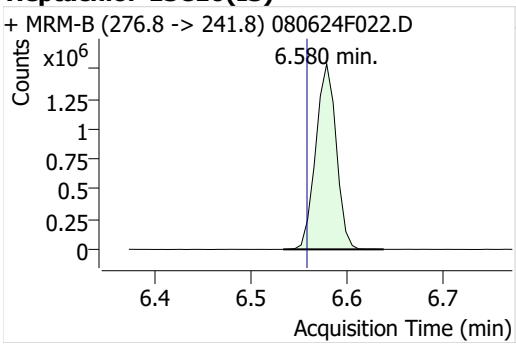
γ-BHC-d6(IS)

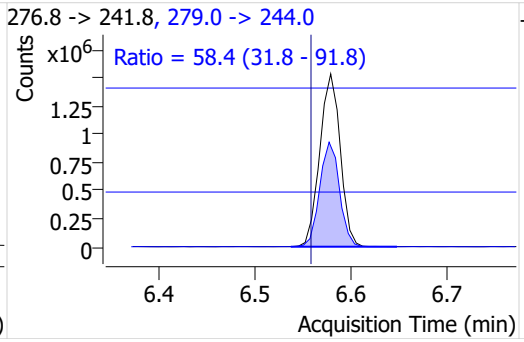


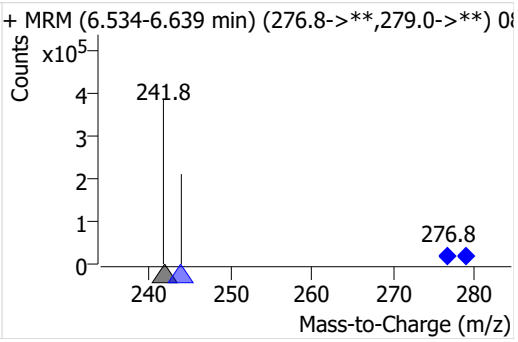




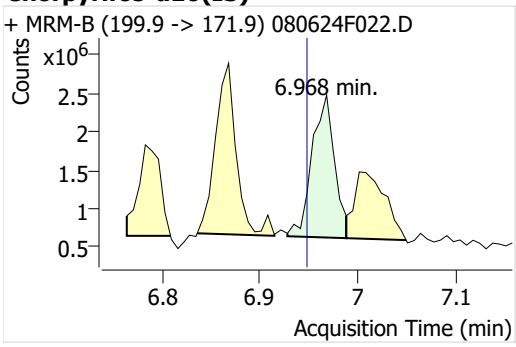
Heptachlor-13C10(IS)

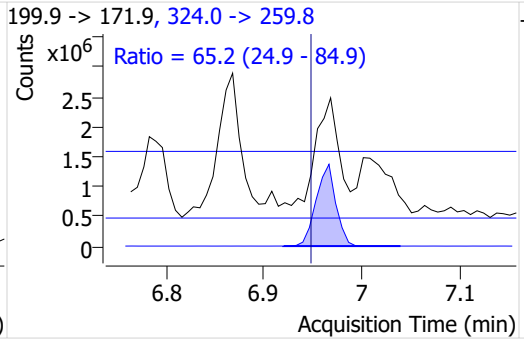


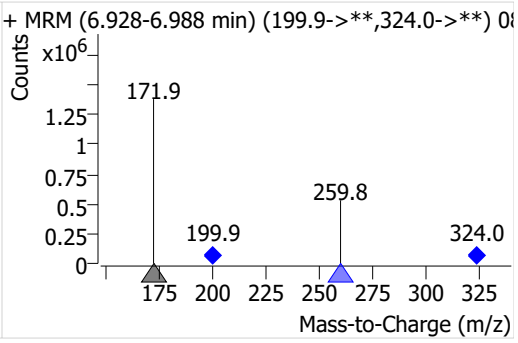




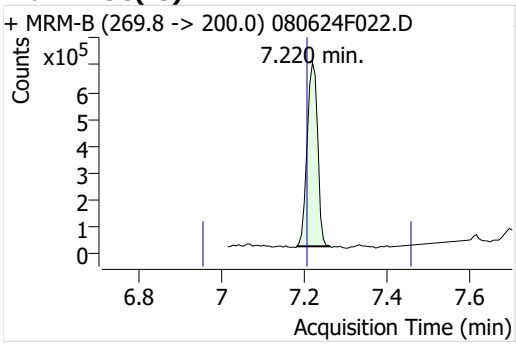
Chorpyrifos-d10(IS)

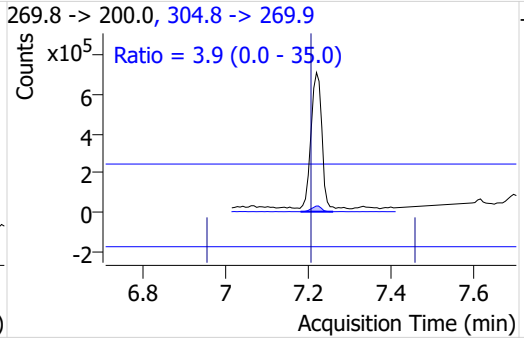


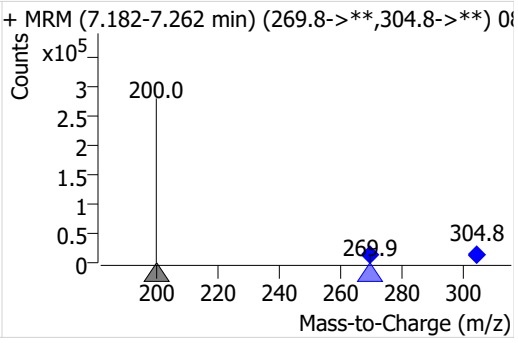




Aldrin-13C(IS)

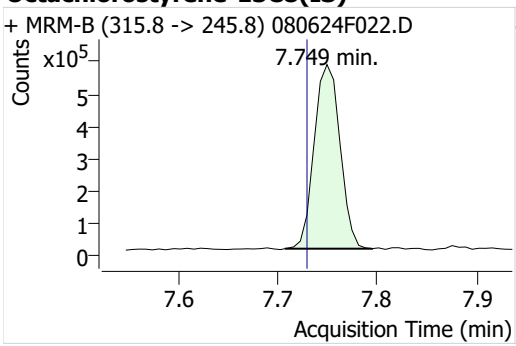


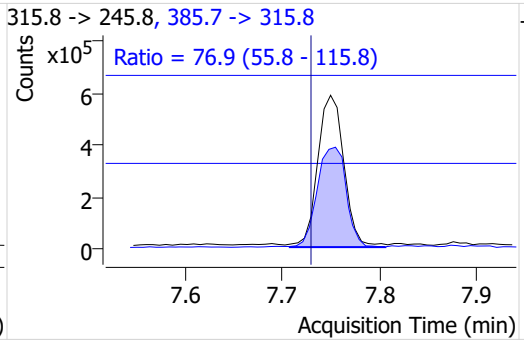


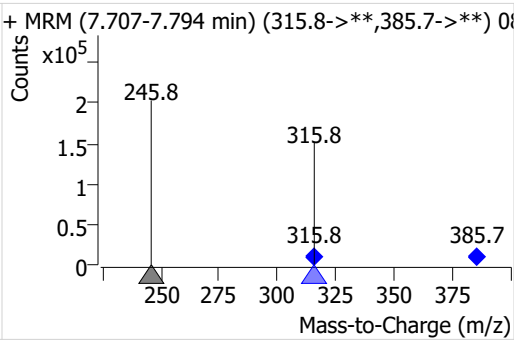


MassHunter Quantitative Analysis Sample Report

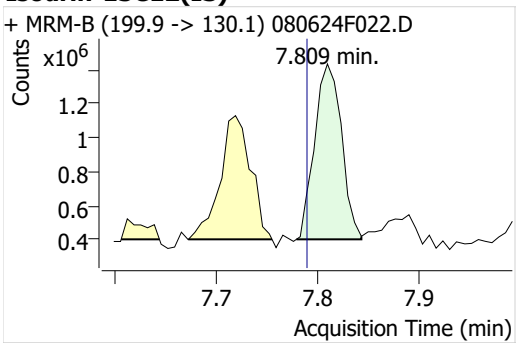
Octachlorostyrene-13C8(IS)

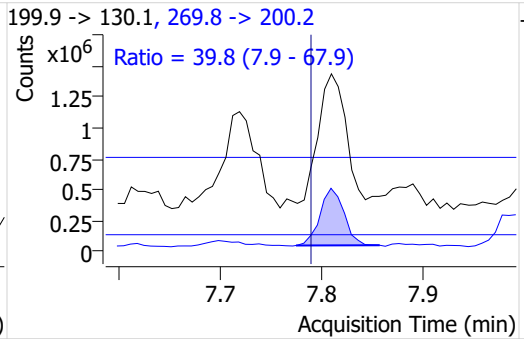


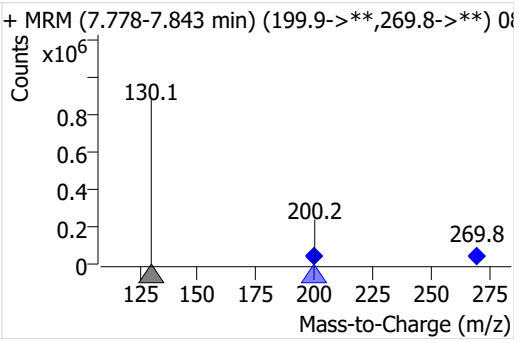




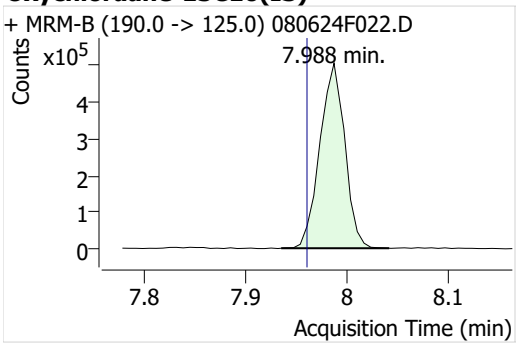
Isodrin-13C12(IS)

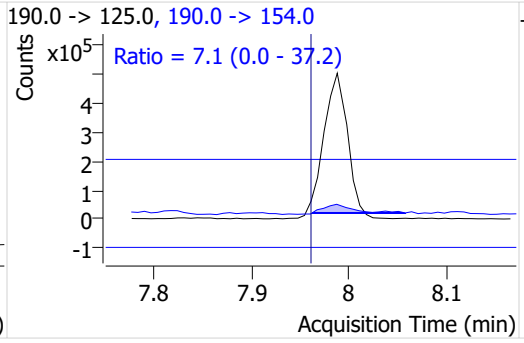


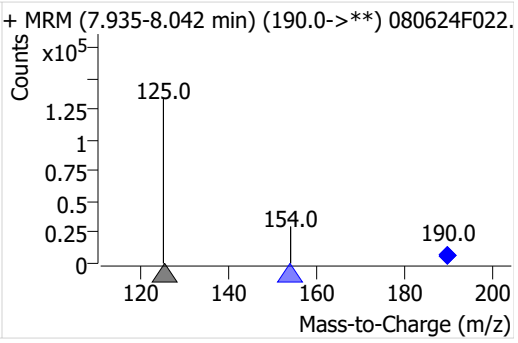




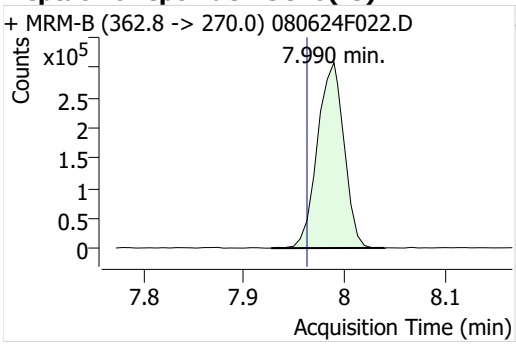
Oxychlordane-13C10(IS)

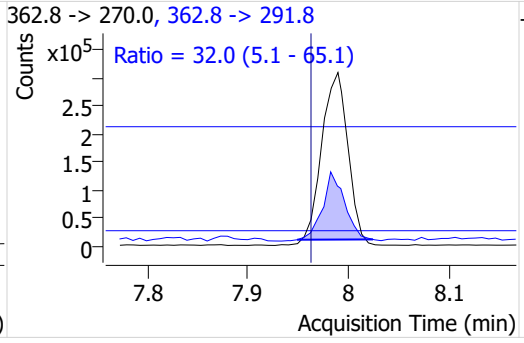


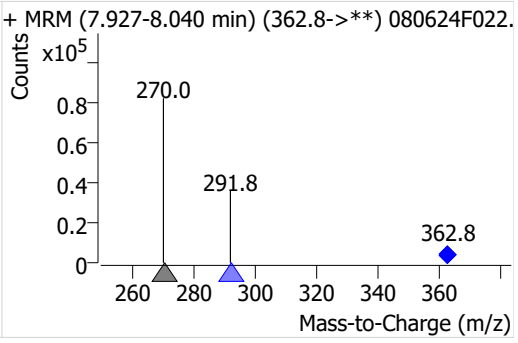




Heptachlor epoxide-13C10(IS)

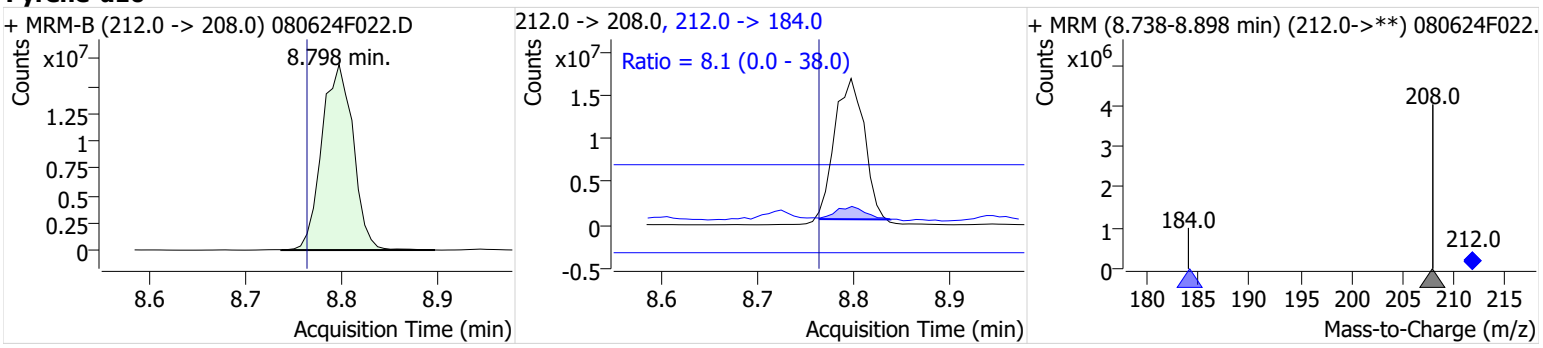




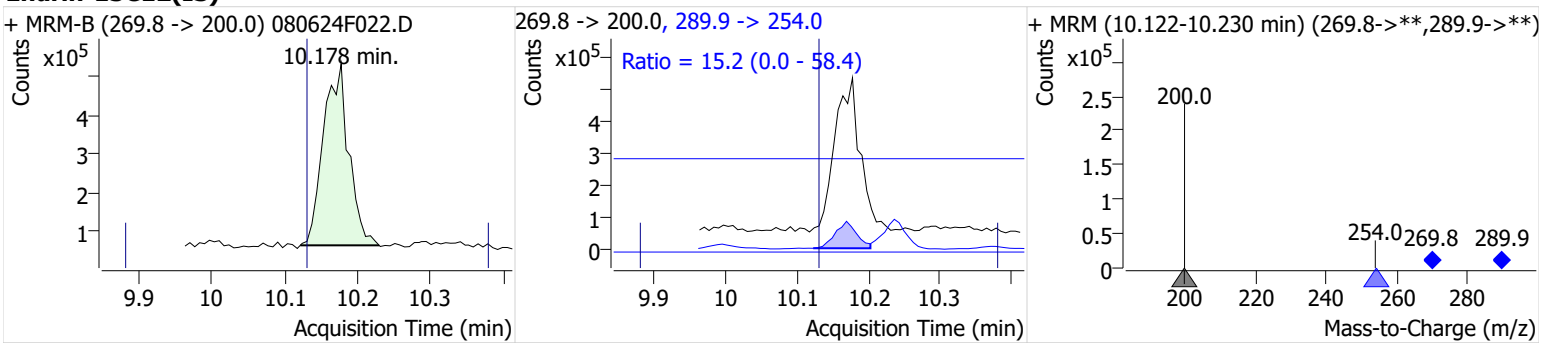


MassHunter Quantitative Analysis Sample Report

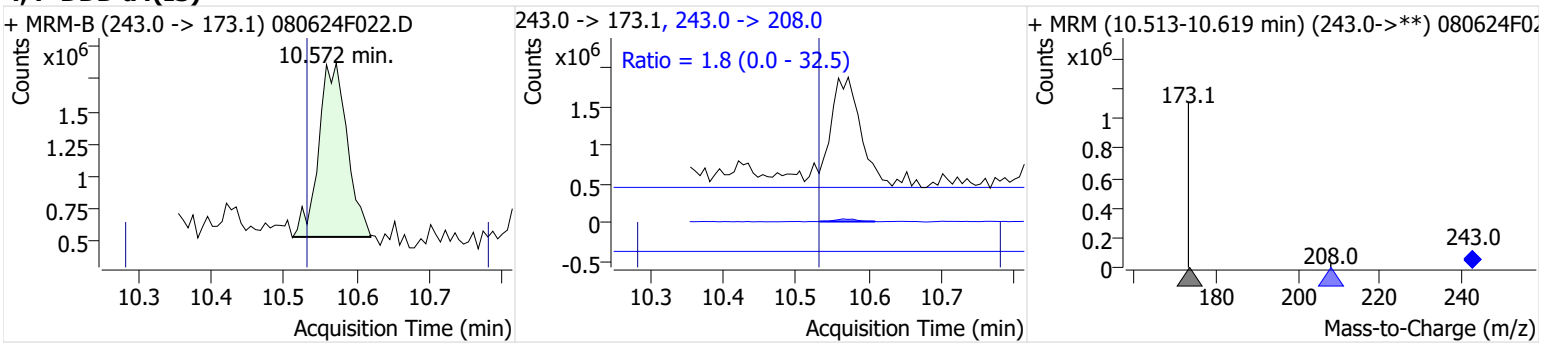
Pyrene-d10



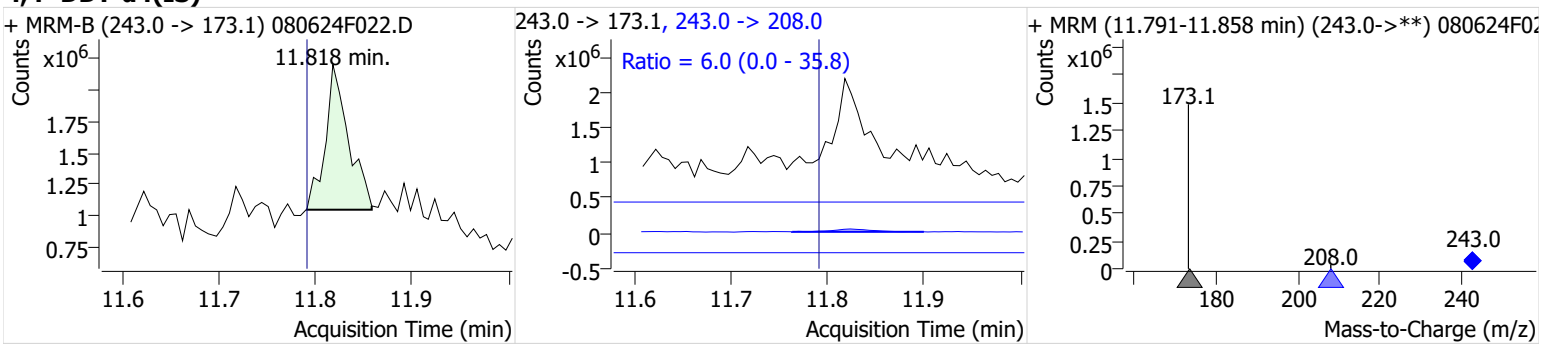
Endrin-13C12(IS)



4,4'-DDD d4(IS)

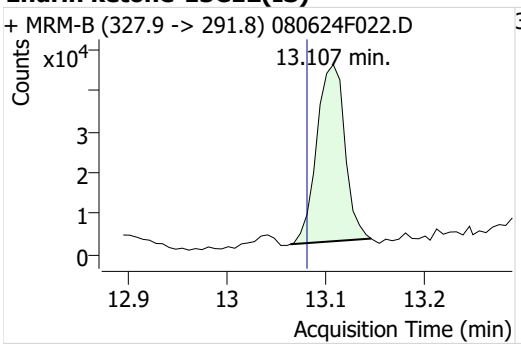


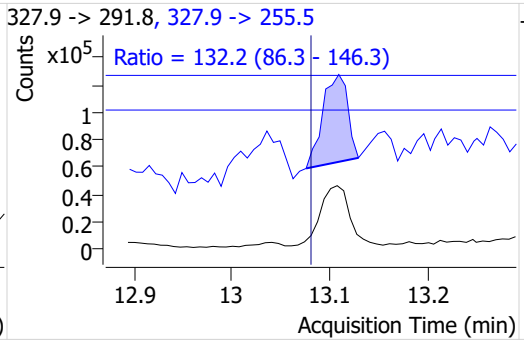
4,4'-DDT-d4(IS)

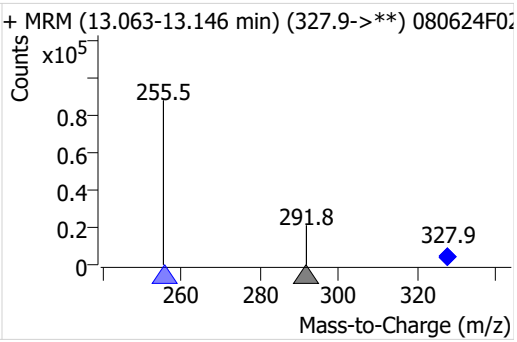


MassHunter Quantitative Analysis Sample Report

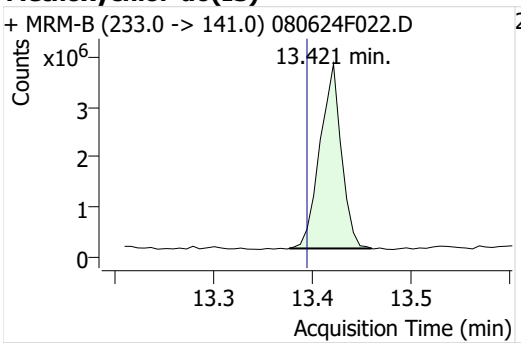
Endrin ketone-13C12(IS)

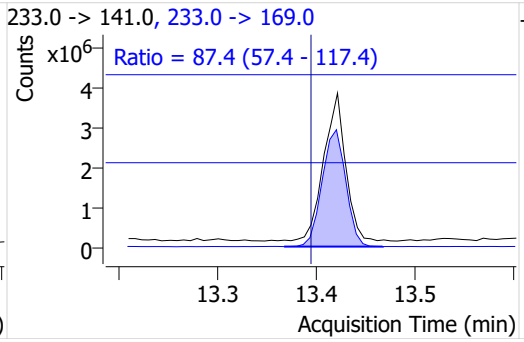


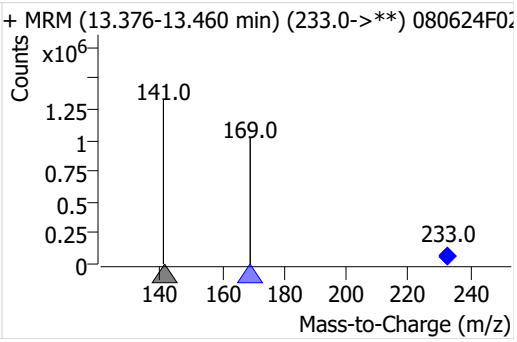




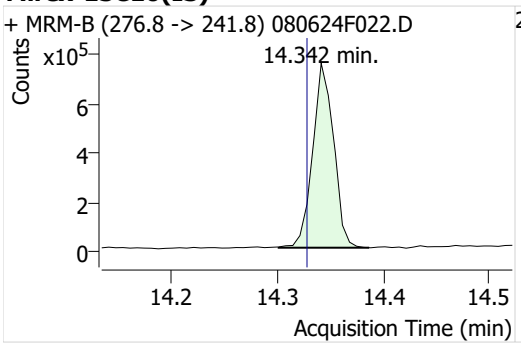
Methoxychlor-d6(IS)

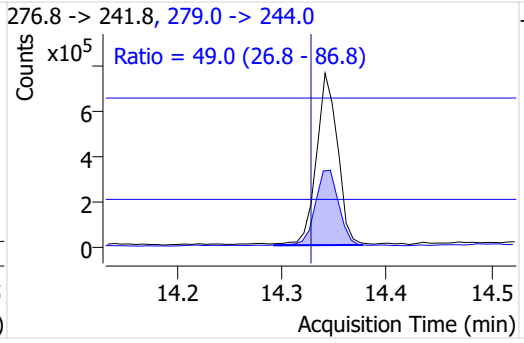


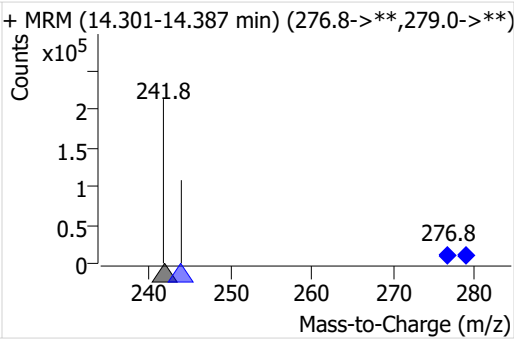




Mirex-13C10(IS)







1st 08/20/24
2nd 08/20/24

Validation Report

Data File: J:\MS42\Data\080624\080624F023.D
Lab ID: K2407810-004.R01
RunType: N/A
Matrix: Sediment

Date Acquired: 8/6/24 17:21
Batch ID: 851162
Analysis Method: 1699M/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
Preparation Hold Time		X
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery	X	
Lab Control Sample Recovery		X
Method Blank	X	
Method Blank Surrogates	X	
Internal Standards	X	
Surrogates		X
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level		X

Sample Exceptions

Exception Categories	Result	Corrective Action
Preparation Hold Time	Prep Date/Time: 08/01/2024 1233 Hold Date/Time: 08/09/2022 2359	Frozen Sample Used

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Lab Control Sample Recovery	2,4'-DDT	124	53	116	High bias, samples<MRL
	4,4'-DDT	144	57	118	High bias, samples<MRL
Surrogates	S_4,4'-DDT-d4	1334	5	187	Matrix
	S_Endrin-13C12	165	14	141	Matrix
Above Highest ICAL Level	2,4'-DDD	83460397.21 57982		79358454.88 44667	See Dilution
	4,4'-DDD	263225023.4 53149		61895110.45 47966	See Dilution
	4,4'-DDE	63902443.40 68878		63723717.74 68573	See Dilution

Primary Review: _____

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Secondary Review: _____

1st 08/20/24
2nd 08/20/24

Quantitation Report

Data File:	J:\MS42\Data\080624\080624F023.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 17:21	**Vial:**	17
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-004.R01	**Raw Units:**	ng/ml

Bottle ID:	K2407810-004.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	7/26/22	**Receive Date:**	7/27/22

Analysis Lot:	851162	**Prep Lot:**	442451	**Report Group:**	K2407810
Analysis	1699M	**Prep Method:**	EPA 3541		
		Prep Date:	8/1/24		

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400368
		Report List ID:	25424

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	8.845	+0.07	28861912.603	100	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec		% Rec Criteria	Rpt?
S_Aldrin-13C12	7.260	+0.05	1125451.097	7.011	35		12 - 88	Y
S_4,4'DDD-d4	10.613	+0.07	2940796.565	4.813	96		9 - 159	Y
S_4,4'-DDT-d4	11.899	+0.09	25099868.632	66.694	1334	*	5 - 187	Y
S_Endrin-13C12	10.204	+0.06	814346.846	33.095	165	*	14 - 141	Y
S_GBHCD6	5.511	+0.01	2104931.409	5.700	29		5 - 90	Y
S_Oxychlordane-13C10	8.024	+0.06	606325.014	5.943	30		5 - 86	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Aldrin	7.263	+0.05	0	0	0	U	Y
gamma-BHC (Lindane)	5.583	+0.04	0	0	0	U	Y
cis-Chlordane	8.903	+0.07	132424.980	3.437	0.57		Y
trans-Chlordane	8.570	+0.06	404667.292	12.702	2.1		Y
2,4'-DDD	9.618	+0.06	83460397.216	98.842	16	E	N
4,4'-DDD	10.675	+0.05	263225023.453	422.791	70	E	N
2,4'-DDE	8.590	+0.06	10103983.020	9.613	1.6		Y
4,4'-DDE	9.424	+0.05	63902443.407	85.344	14	E	N
2,4'-DDT	10.676	-0.02	0	0	0	U	Y
4,4'-DDT	11.940	+0.06	0	0	0	U	Y
Dieldrin	9.549	-0.01	0	0	0	U	Y
cis-Nonachlor	10.564	-0.05	0	0	0	U	Y
trans-Nonachlor	8.965	+0.07	73581.279	2.684	0.44		Y
Oxychlordane	7.919	-0.06	0	0	0	U	Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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1st 08/20/24

2nd 08/20/24

Data File:	J:\MS42\Data\080624\080624F023.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 17:21	**Vial:**	17
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-004.R01	**Raw Units:**	ng/ml

Prep Amount:	10.096 g	**Dilution:**	1
Prep Final Amount:	1.00 mL	**Basis Factor:**	60.20

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/21/24 18:15

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MassHunter Quantitative Analysis Sample Report

Data File	J:\MS42\Data\080624\080624F023.D		
Batch File	J:\MS42\Data\080624\QuantResults\080624 OC PEST.batch.bin		
Acq. Date-Time	8/6/2024 5:21:15 PM	**Acq Operator**	EBruno
Name	K2407810-004	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	8/21/2024 11:08:30 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method	072424 OC PEST ICAL.batch.bin	**Vial**	17
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.246	289.8 -> 254.8	2006253	20.0000 ng/ml	0.031
γ-BHC-d6(IS)	5.511	223.9 -> 187.0	2104931	20.0000 ng/ml	0.018
Heptachlor-13C10(IS)	6.592	276.8 -> 241.8	2104488	20.0000 ng/ml	0.033
Chorpyrifos-d10(IS)	6.981	199.9 -> 171.9	5507024 *m*	20.0000 ng/ml	0.046
Aldrin-13C(IS)	7.260	269.8 -> 200.0	1188181	20.0000 ng/ml	0.052
Octachlorostyrene-13C8(IS)	7.794	315.8 -> 245.8	895969	20.0000 ng/ml	0.064
Isodrin-13C12(IS)	7.917	199.9 -> 130.1	26174648 *m*	20.0000 ng/ml	0.142
Oxychlordane-13C10(IS)	8.024	190.0 -> 125.0	606325	20.0000 ng/ml	0.063
Heptachlor epoxide-13C10(IS)	8.020	362.8 -> 270.0	443457	20.0000 ng/ml	0.060
Pyrene-d10	8.845	212.0 -> 208.0	28861913	100.0000 ng/ml	0.041
Endrin-13C12(IS)	10.204	269.8 -> 200.0	814347	20.0000 ng/ml	0.109
4,4'-DDD d4(IS)	10.613	243.0 -> 173.1	2940797	5.0000 ng/ml	0.077
4,4'-DDT-d4(IS)	11.899	243.0 -> 173.1	25099869	5.0000 ng/ml	0.139
Endrin ketone-13C12(IS)	13.127	327.9 -> 291.8	58890 *m*	20.0000 ng/ml	0.071
Methoxychlor-d6(IS)	13.434	233.0 -> 141.0	3911864	20.0000 ng/ml	0.043
Mirex-13C10(IS)	14.355	276.8 -> 241.8	453458	5.0000 ng/ml	0.026

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	2006253	5.505 ng/ml	
		Spiked Amount =	20.0	Recovery =	*27.5 %*
γ-BHC-d6	5.491	223.9 -> 187.0	2104931	5.700 ng/ml	
		Spiked Amount =	20.0	Recovery =	*28.5 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	2104488	9.919 ng/ml	
		Spiked Amount =	20.0	Recovery =	*49.6 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	5507024 *m*	60.562 ng/ml	
		Spiked Amount =	20.0	Recovery =	*302.8 %*
Aldrin-13C	7.207	269.8 -> 200.0	1125451	7.011 ng/ml	
		Spiked Amount =	20.0	Recovery =	*35.1 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	895969	6.192 ng/ml	
		Spiked Amount =	20.0	Recovery =	*31.0 %*
Isodrin-13C12	7.789	199.9 -> 130.1	26100549	151.702 ng/ml	
		Spiked Amount =	20.0	Recovery =	*758.5 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	606325	5.943 ng/ml	
		Spiked Amount =	20.0	Recovery =	*29.7 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	443457	7.679 ng/ml	
		Spiked Amount =	20.0	Recovery =	*38.4 %*
Endrin-13C12	10.131	269.8 -> 200.0	814347	33.095 ng/ml	
		Spiked Amount =	20.0	Recovery =	*165.5 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	2940797	4.813 ng/ml	
		Spiked Amount =	5.0	Recovery =	*96.3 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	25099869	66.694 ng/ml	
		Spiked Amount =	5.0	Recovery =	*1333.9 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	54782	10.547 ng/ml	
		Spiked Amount =	20.0	Recovery =	*52.7 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	3911864	18.743 ng/ml	
		Spiked Amount =	20.0	Recovery =	*93.7 %*

MassHunter Quantitative Analysis Sample Report

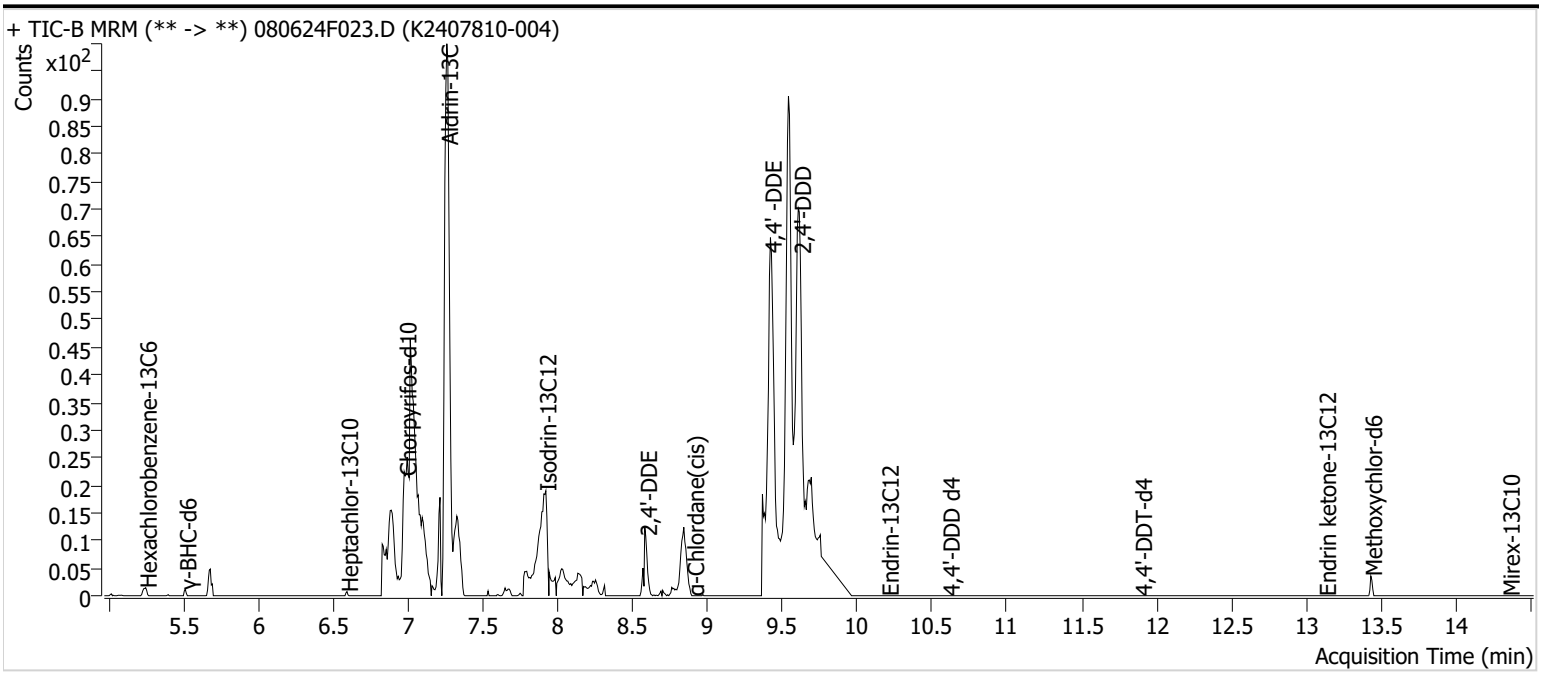
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	453458	0.817 ng/ml
		Spiked Amount = 5.0		Recovery = *16.3 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.241	283.8 -> 213.9	357317	2.334 ng/ml	90
β-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
γ-BHC(Lindane)	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
δ-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Heptachlor	Heptachlor-13C10(IS)		271.7 -> 236.9		ND ng/ml	
Chorpyrifos	Chorpyrifos-d10(IS)		196.9 -> 169.0		ND ng/ml	
Aldrin	Aldrin-13C(IS)		254.9 -> 220.0		ND ng/ml	
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.794	342.8 -> 307.8	74013	0.672 ng/ml	100
Isodrin	Isodrin-13C12(IS)		193.0 -> 123.0		ND ng/ml	
Oxychlordane	Oxychlordane-13C10(IS)		114.9 -> 51.1		ND ng/ml	
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)		352.8 -> 262.9		ND ng/ml	
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.570	271.8 -> 236.9	404667	12.702 ng/ml	58
2,4'-DDE	4,4'-DDD d4(IS)	8.590	246.0 -> 176.2	10103983	9.613 ng/ml	98
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.903	271.8 -> 236.9	132425	3.437 ng/ml	72
Endosulfan I	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
trans-Nanochlor	Oxychlordane-13C10(IS)	8.965	271.8 -> 236.9	73581 ***m***	2.684 ng/ml	57
4,4' -DDE	4,4'-DDD d4(IS)	9.424	246.0 -> 176.2	63902443	85.344 ng/ml	100
Dieldrin	Endrin-13C12(IS)		262.9 -> 193.0		ND ng/ml	
2,4'-DDD	4,4'-DDD d4(IS)	9.618	235.0 -> 165.1	83460397	98.842 ng/ml	95
Endrin	Endrin-13C12(IS)		262.8 -> 193.0		ND ng/ml	
Endosulfan II	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
cis-Nonachlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
4,4'-DDD	4,4'-DDD d4(IS)	10.675	235.0 -> 165.1	263225023	422.791 ng/ml	93
2,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin aldehyde	Endrin-13C12(IS)		249.9 -> 214.9		ND ng/ml	
Endosulfan sulfate	Endrin-13C12(IS)		271.9 -> 237.0		ND ng/ml	
4,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin ketone	Endrin ketone-13C12(IS)		147.0 -> 111.0		ND ng/ml	
Methoxychlor	Methoxychlor-d6(IS)		227.0 -> 141.1		ND ng/ml	
Mirex	Mirex-13C10(IS)		271.8 -> 236.8		ND ng/ml	

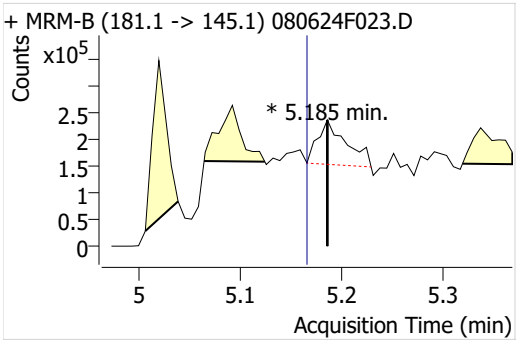
(m) = manual integration ND = Not Detected NC = Not Calculated

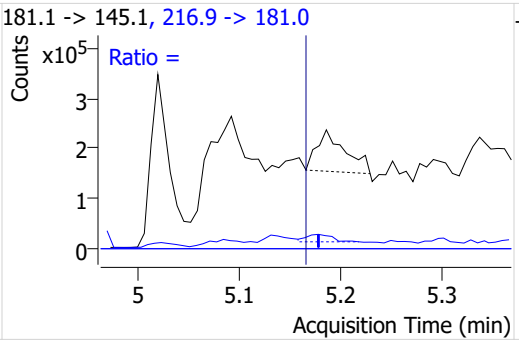
Sample Chromatogram

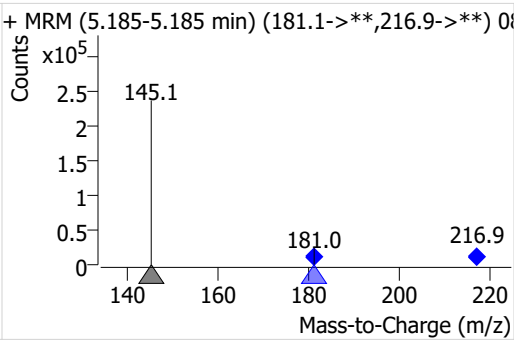
MassHunter Quantitative Analysis Sample Report



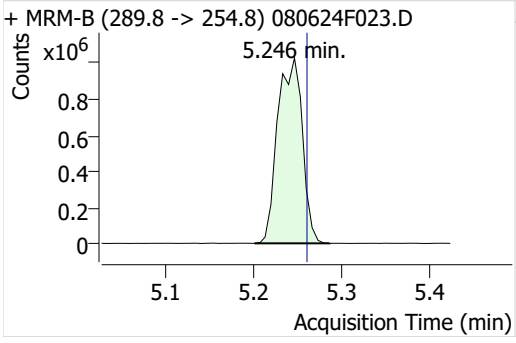
α-BHC

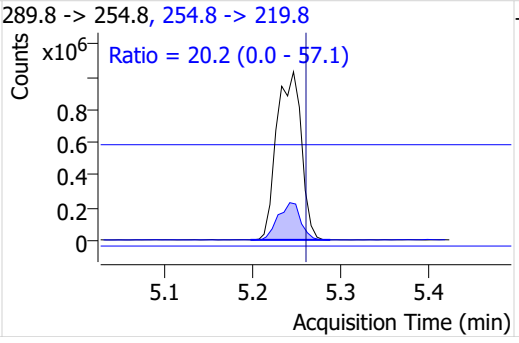


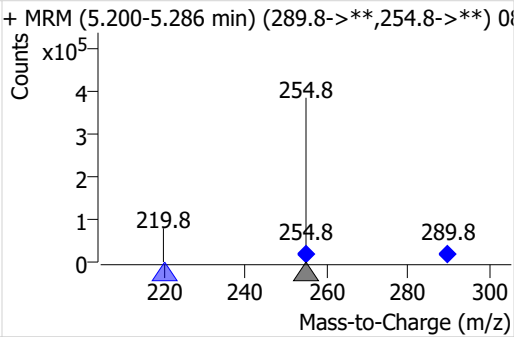




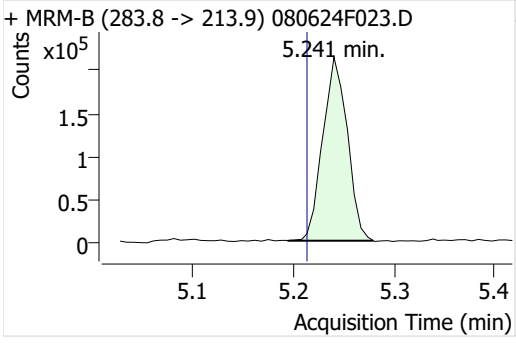
Hexachlorobenzene-13C6

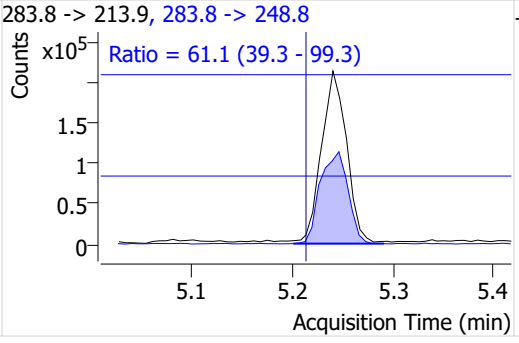


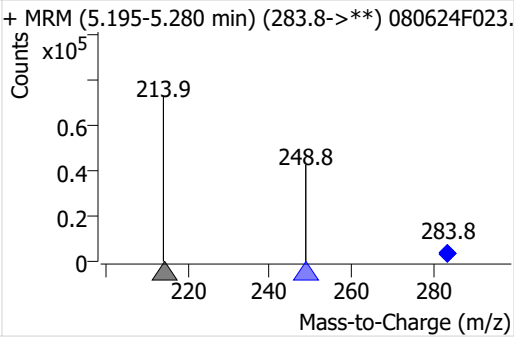




Hexachlorobenzene

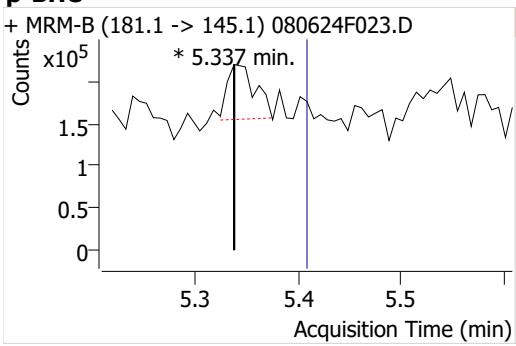


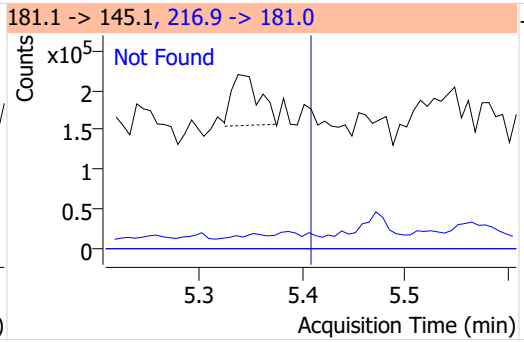


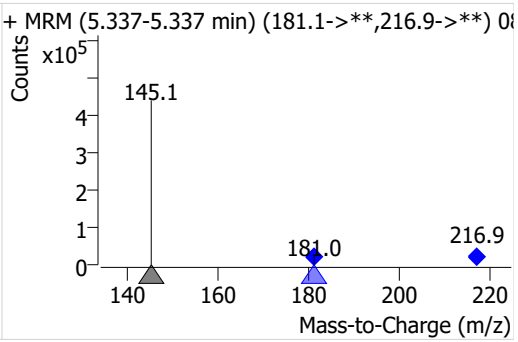


MassHunter Quantitative Analysis Sample Report

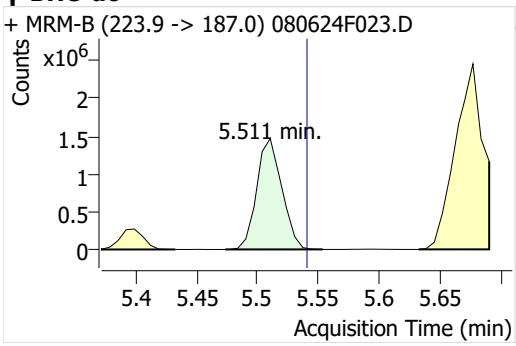
β-BHC

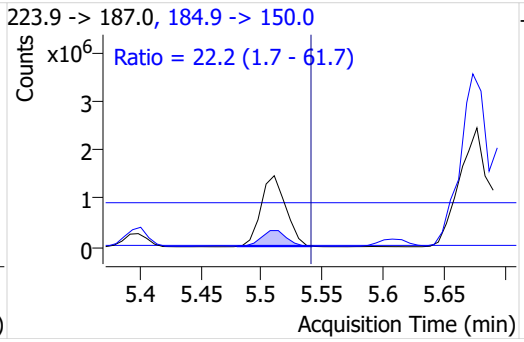


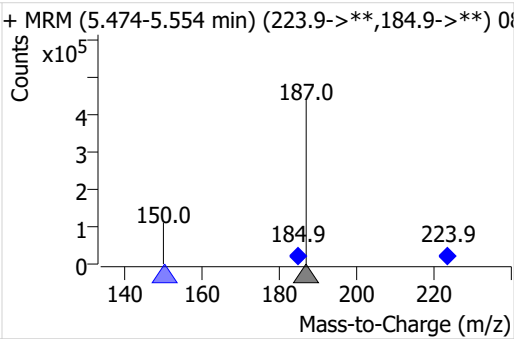




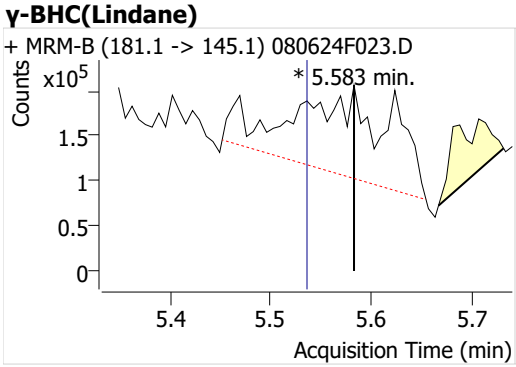
γ-BHC-d6

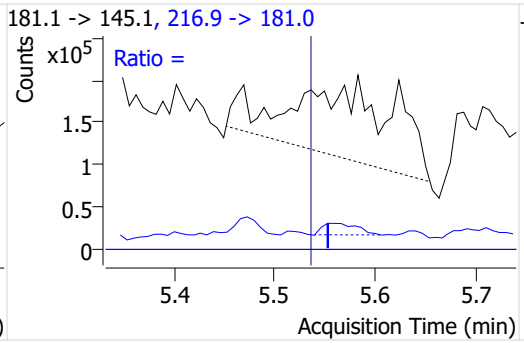


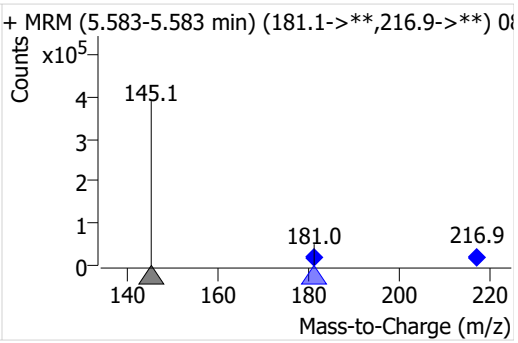




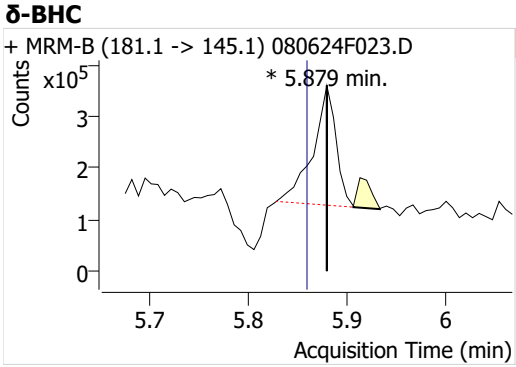
γ-BHC(Lindane)

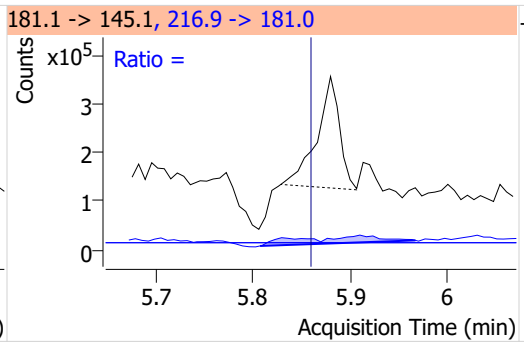


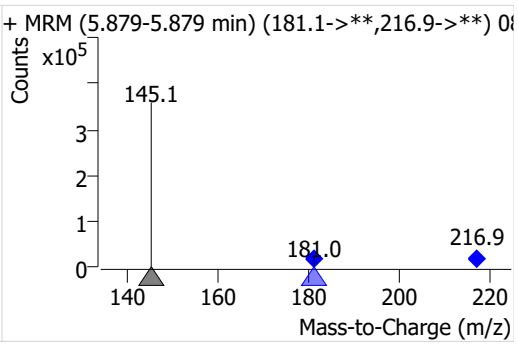




δ-BHC

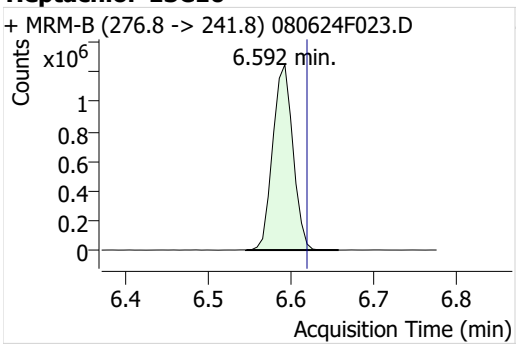


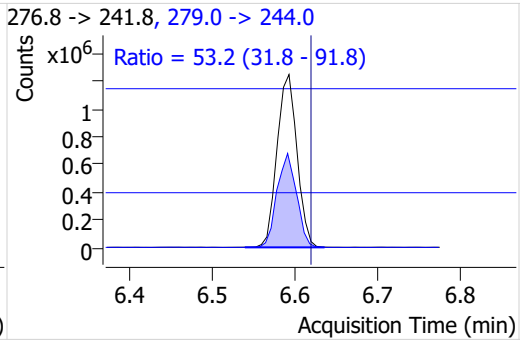


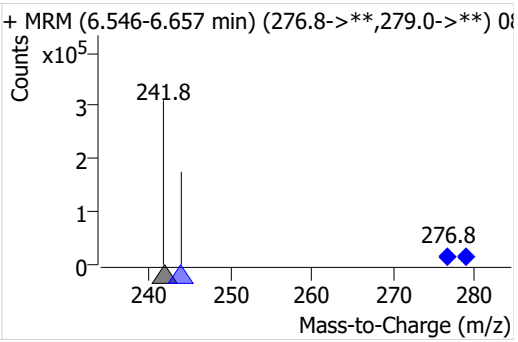


MassHunter Quantitative Analysis Sample Report

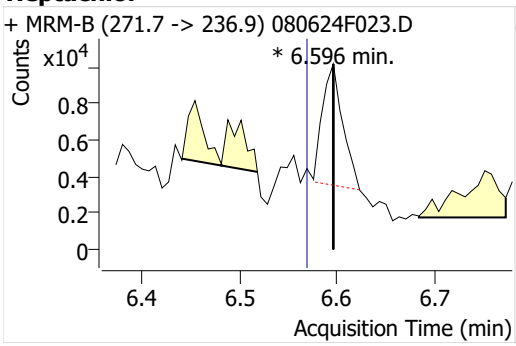
Heptachlor-13C10

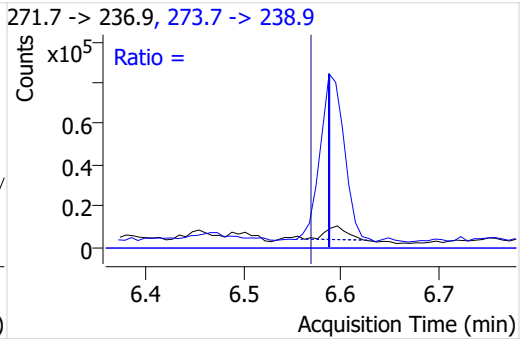


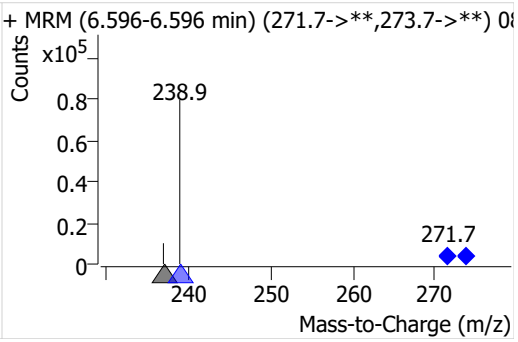




Heptachlor

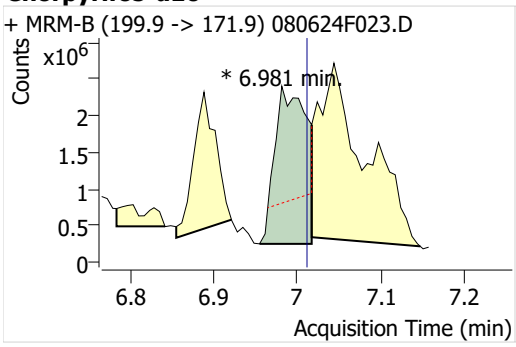


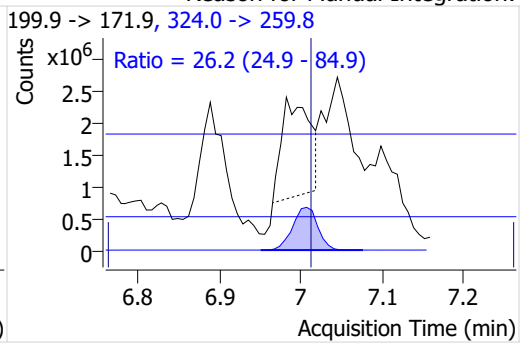


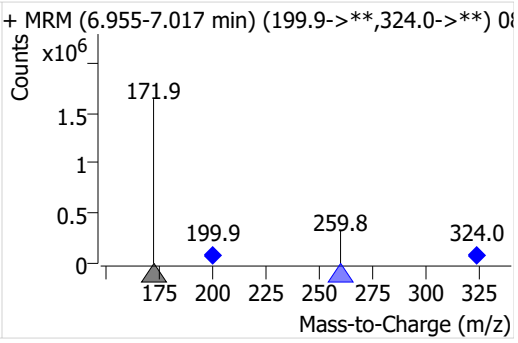


Chorpyrifos-d10

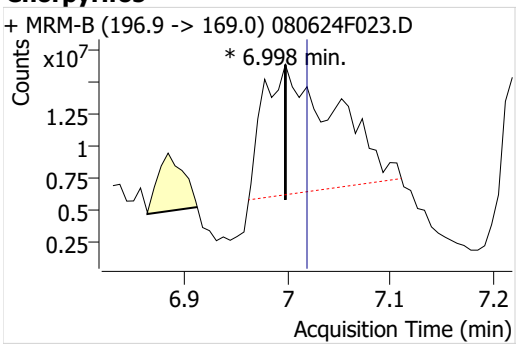
Reason for Manual Integration: **BLC**

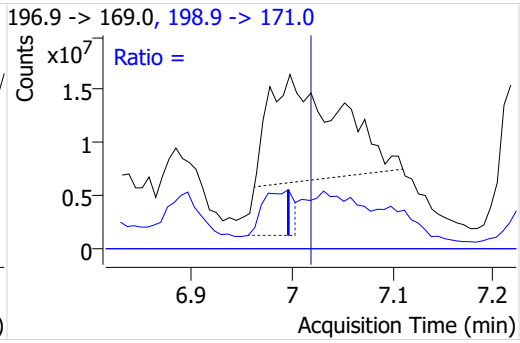


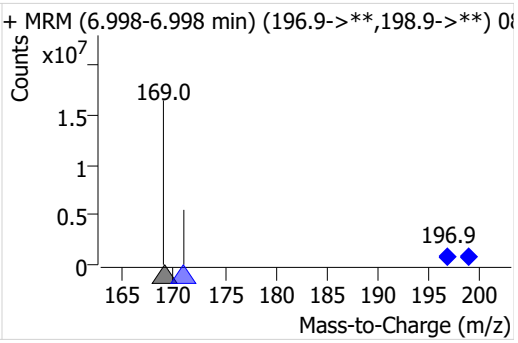




Chorpyrifos

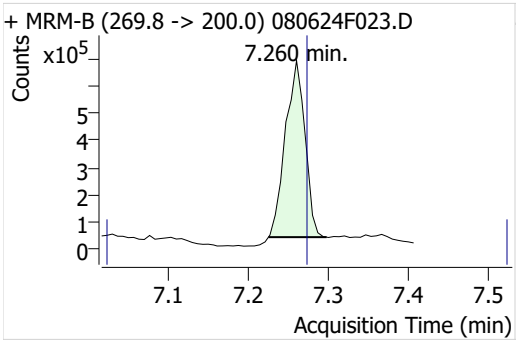


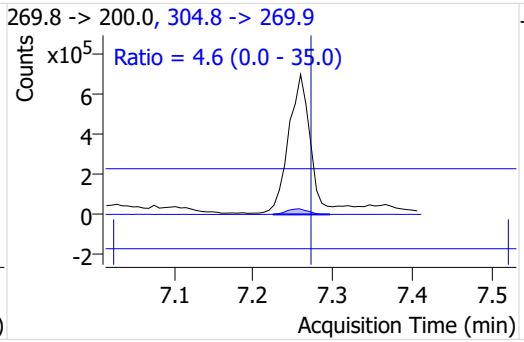


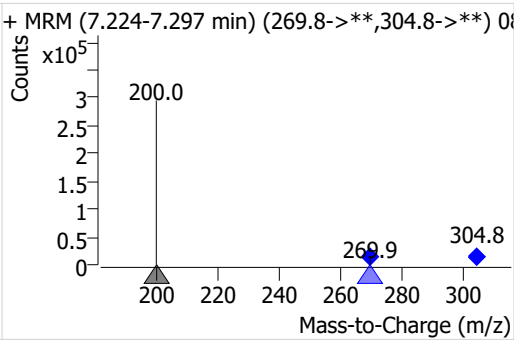


MassHunter Quantitative Analysis Sample Report

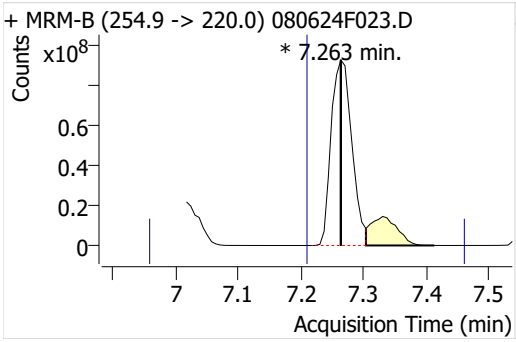
Aldrin-13C

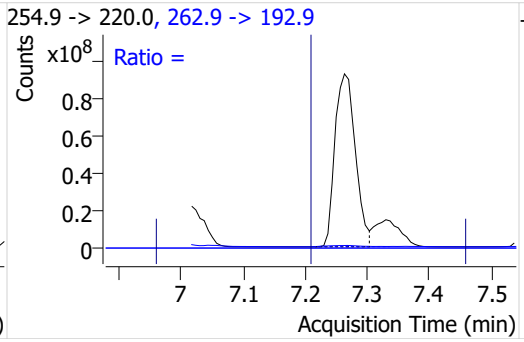


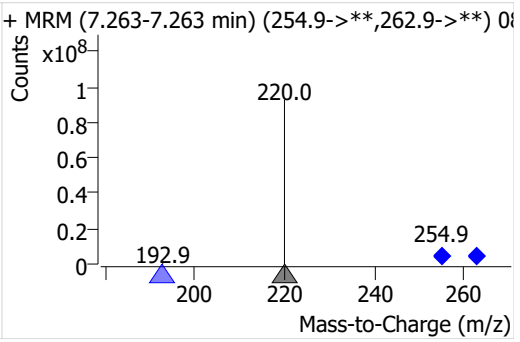




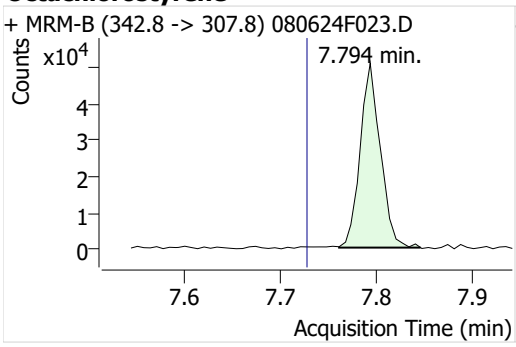
Aldrin

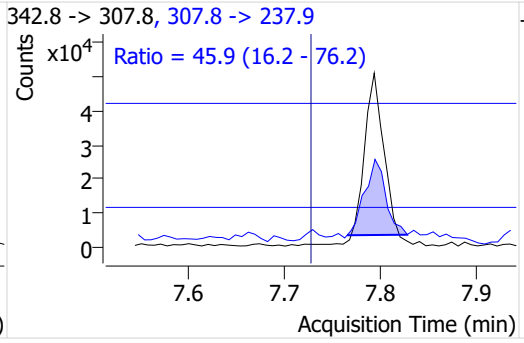


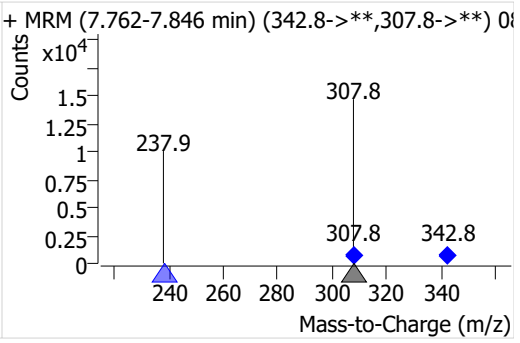




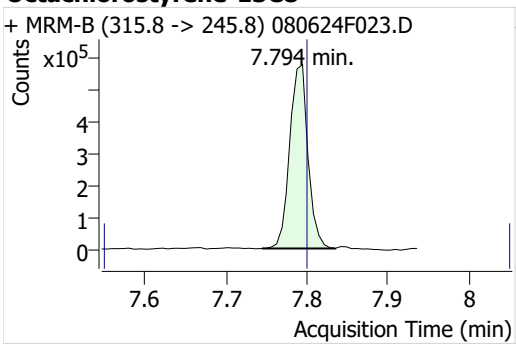
Octachlorostyrene

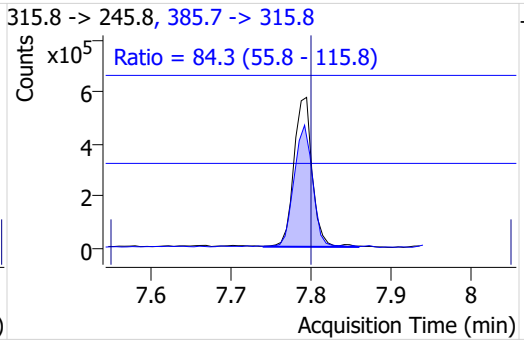


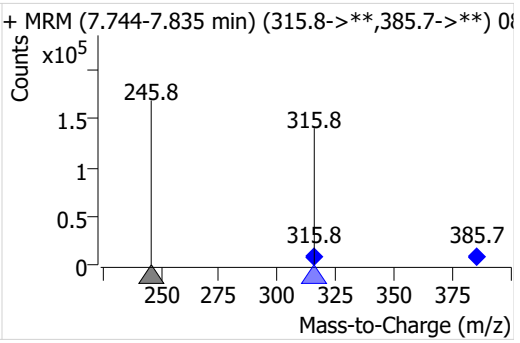




Octachlorostyrene-13C8







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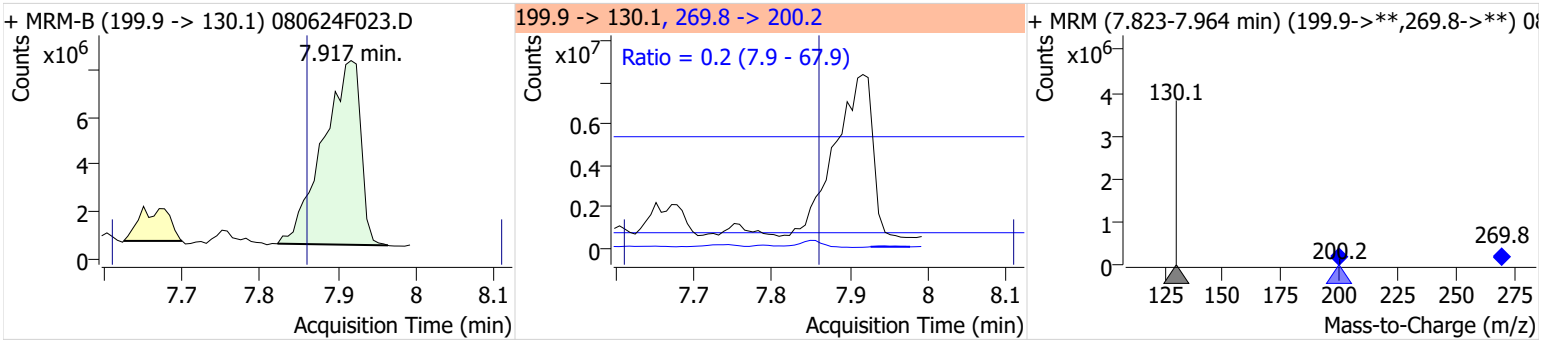
Isodrin-13C12



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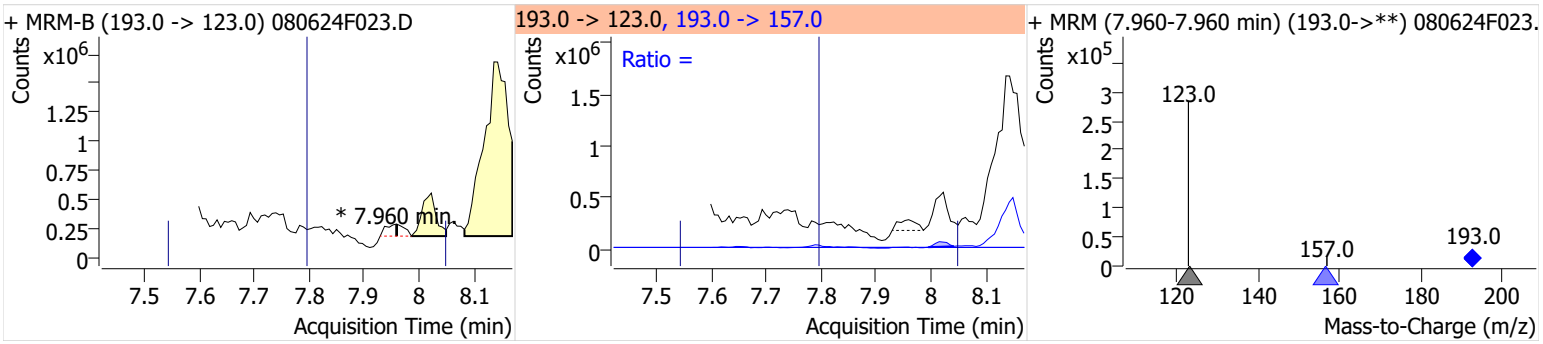
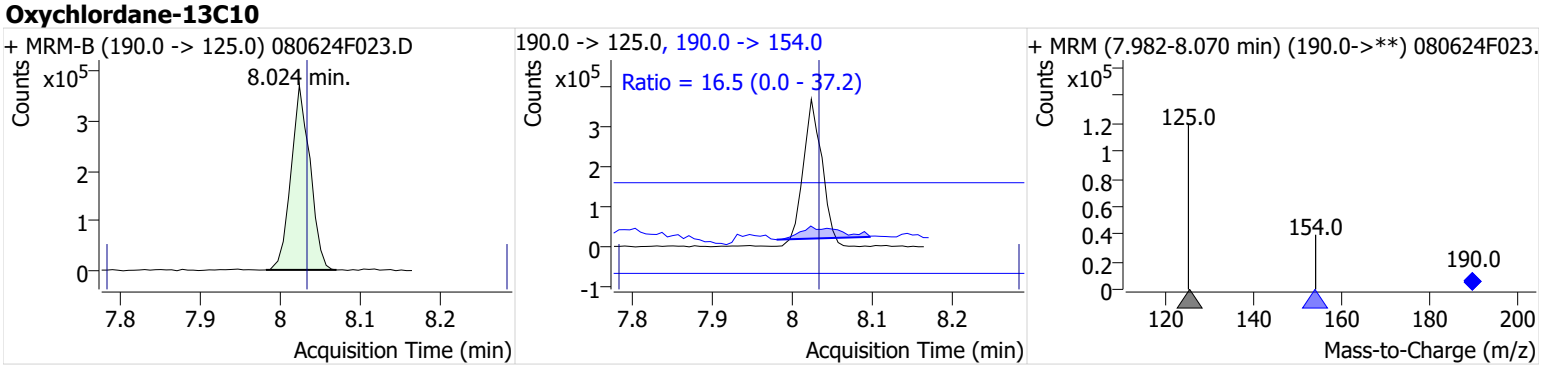
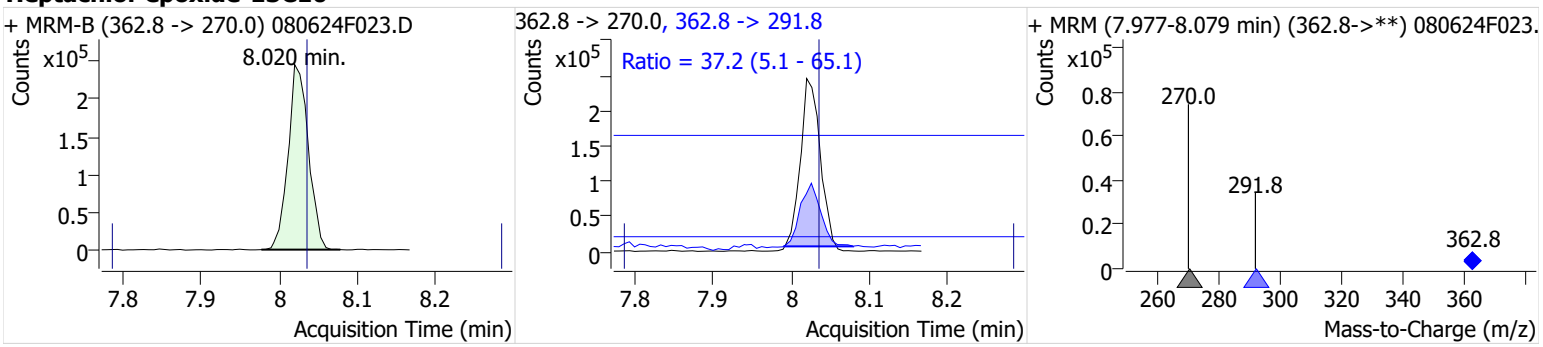


Oxychlordane-13C10



Heptachlor epoxide-13C10



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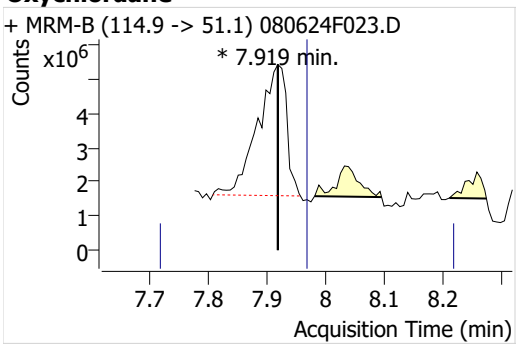
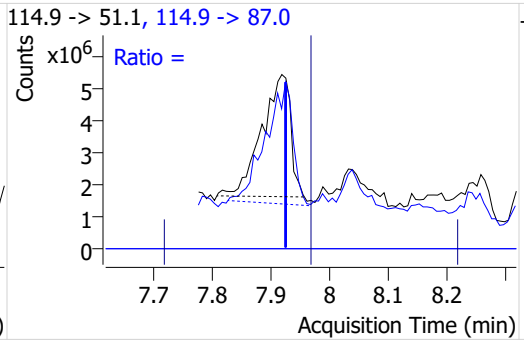
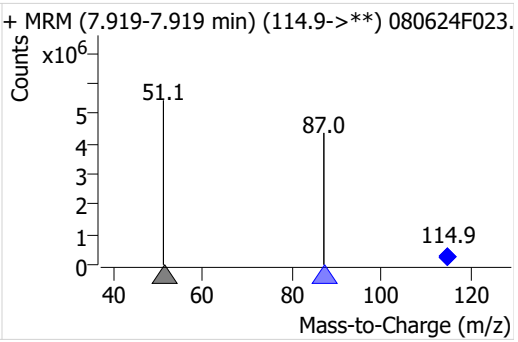
Oxychlordane







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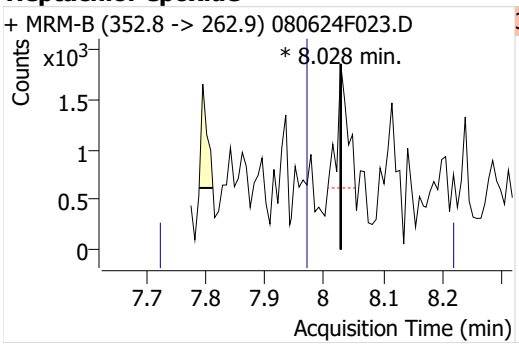
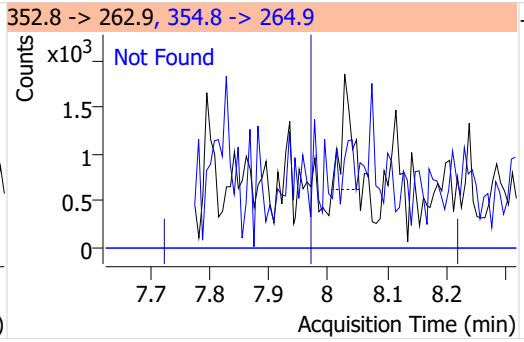
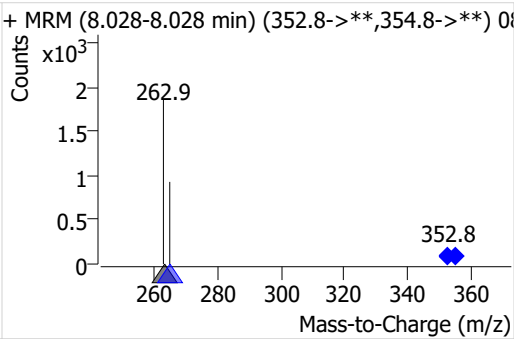
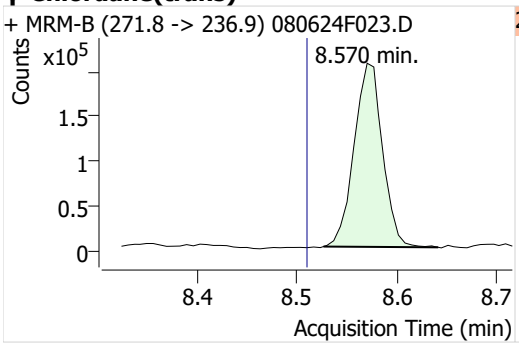
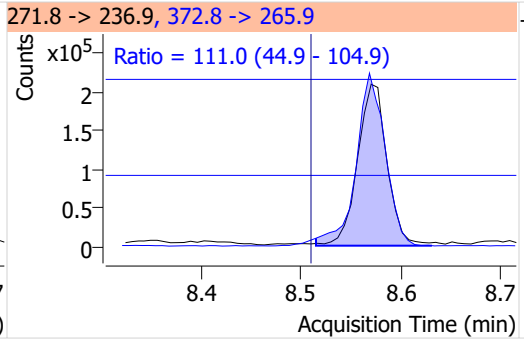


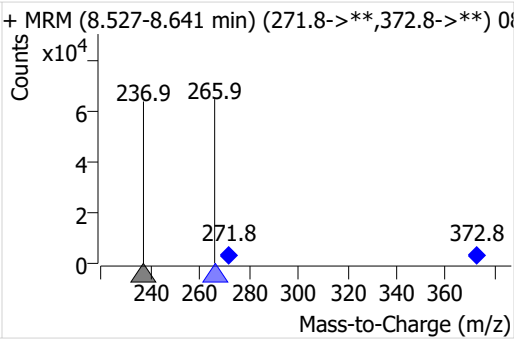




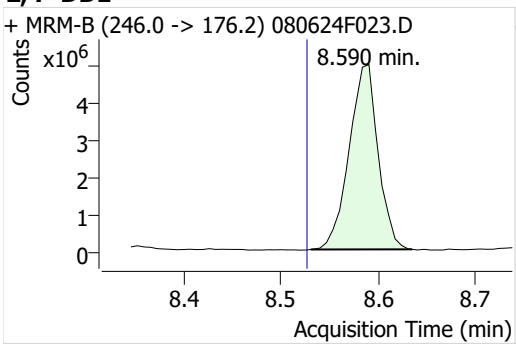
γ-Chlordane(trans)

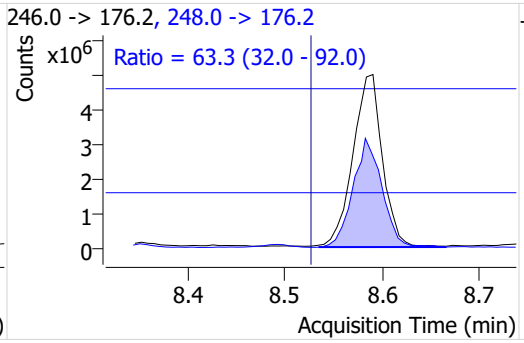


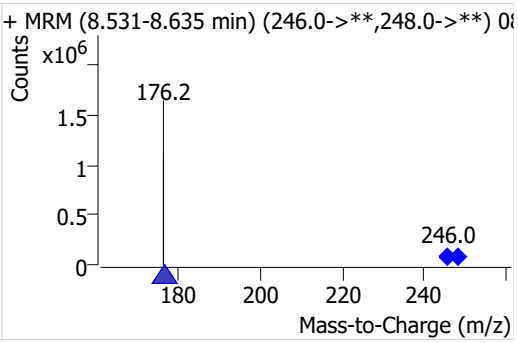




2,4'-DDE







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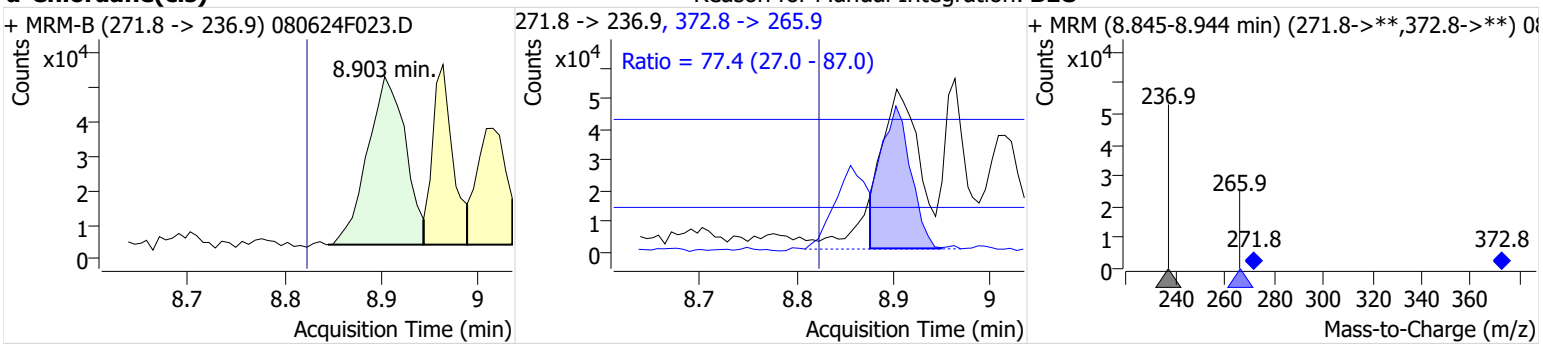
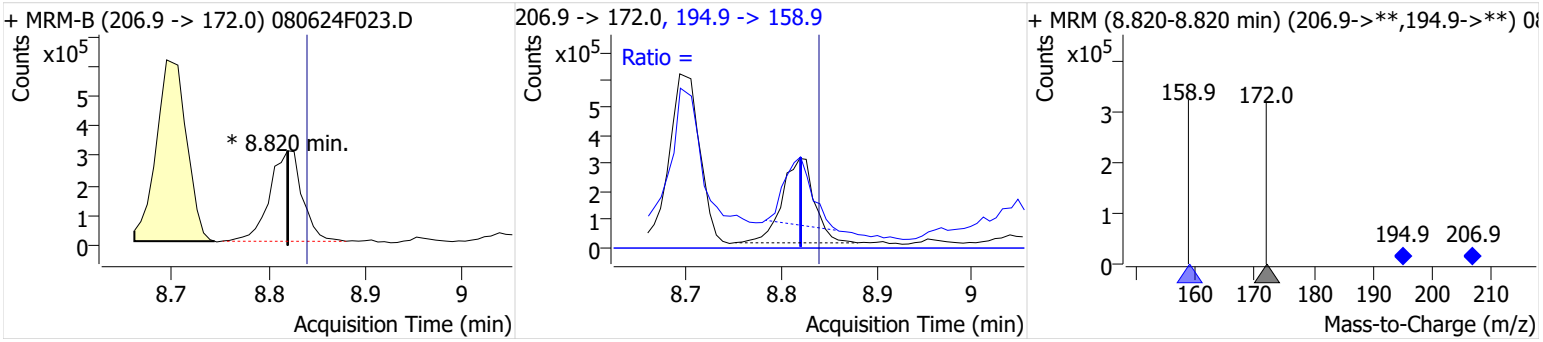
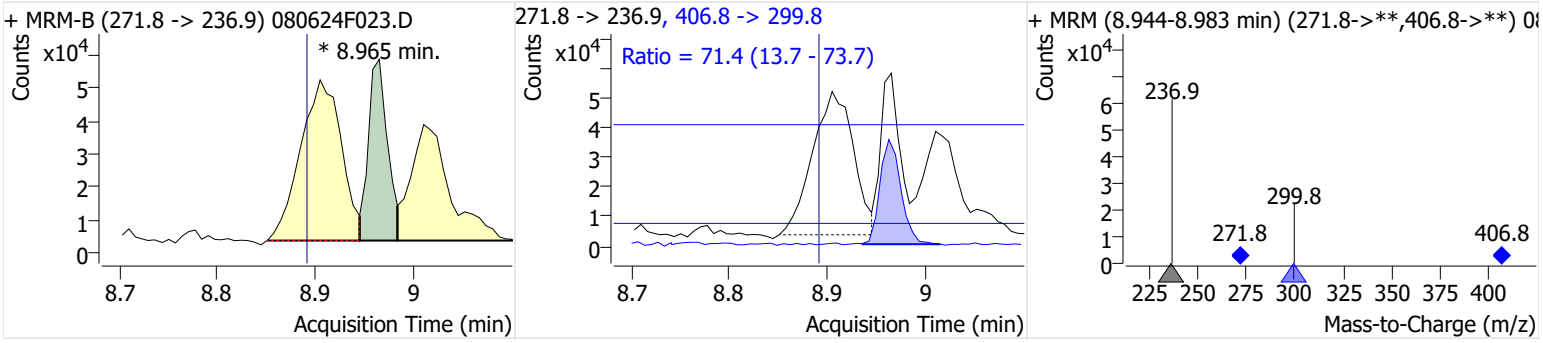
α-Chlordane(cis) Reason for Manual Integration: **BLC**



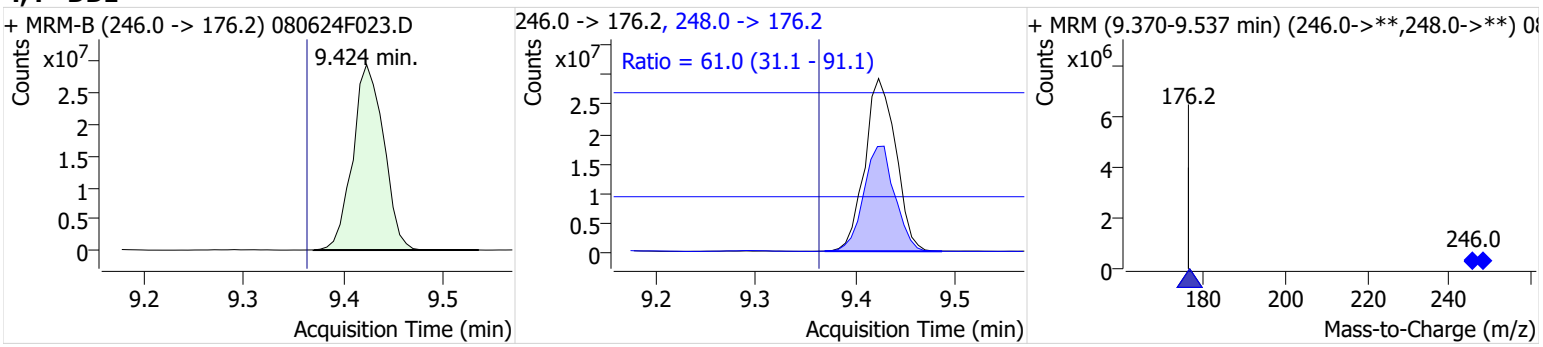
Endosulfan I



trans-Nanochlor



4,4' -DDE



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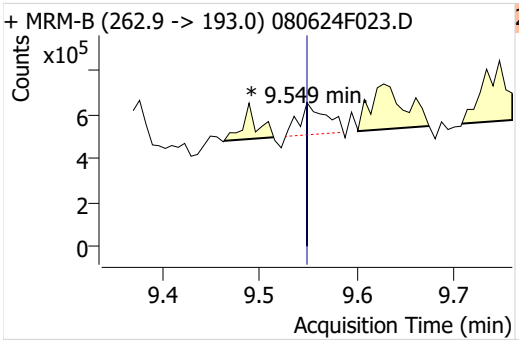
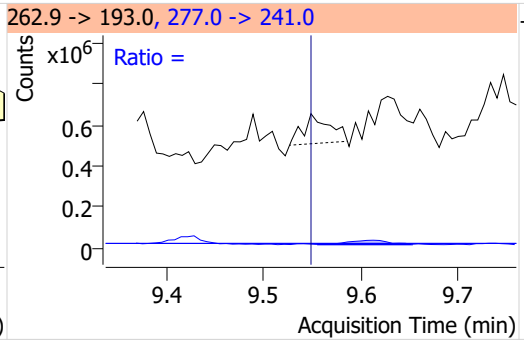
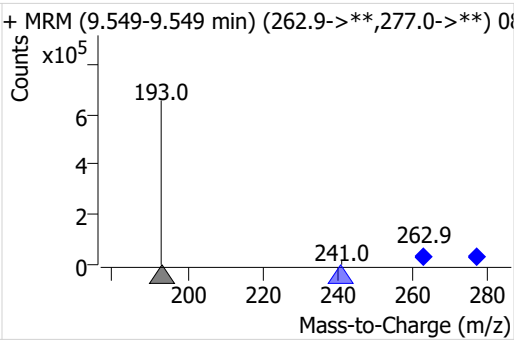
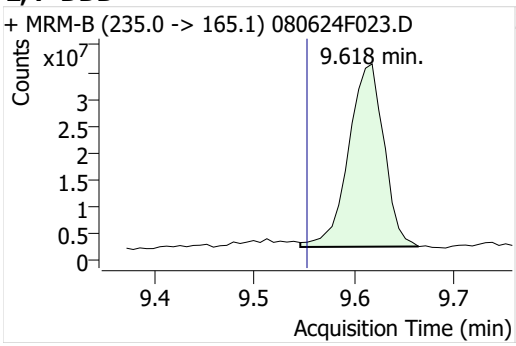
Dieldrin

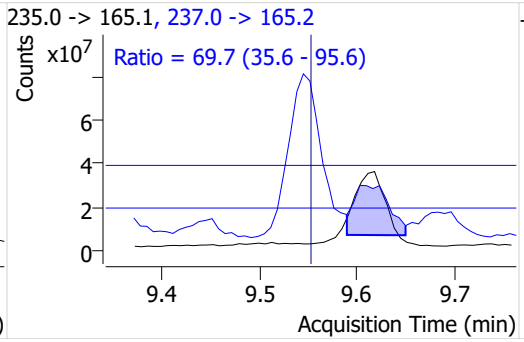


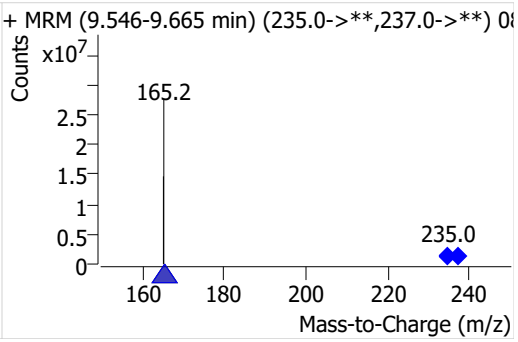




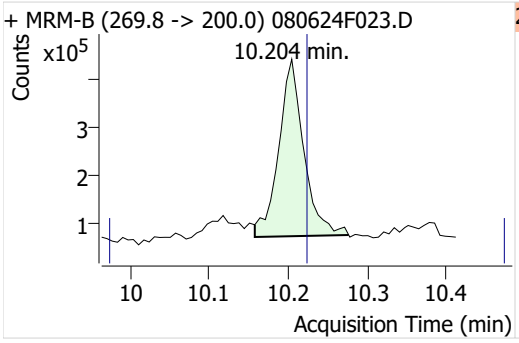
2,4'-DDD

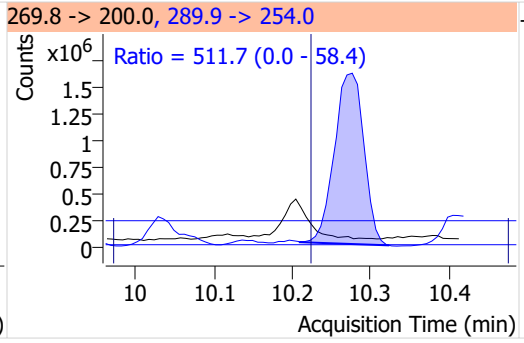


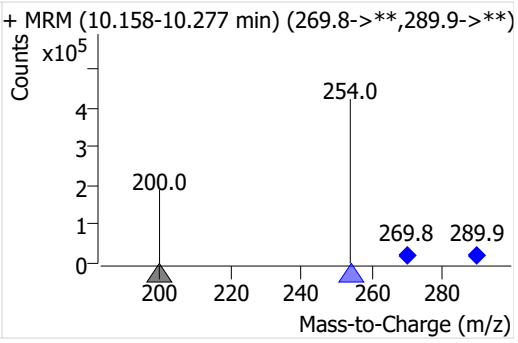




Endrin-13C12







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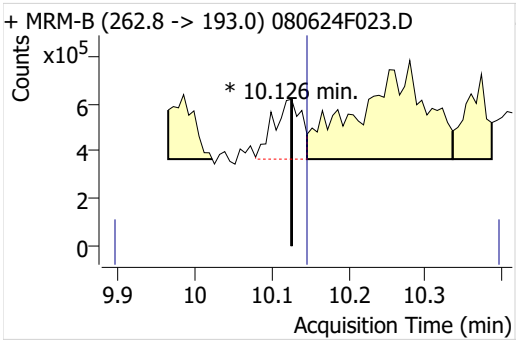

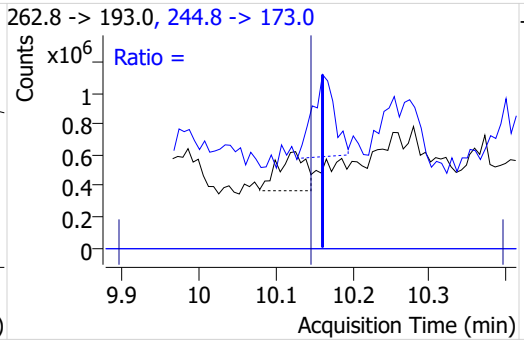

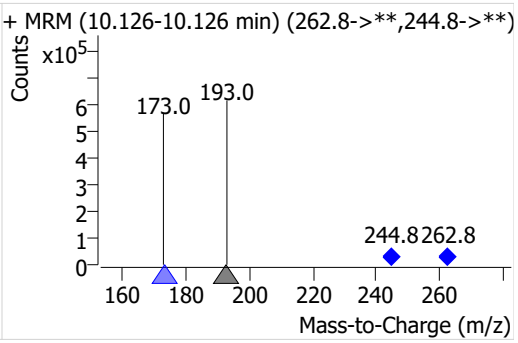

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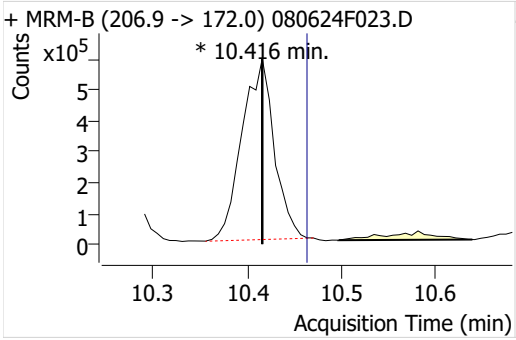
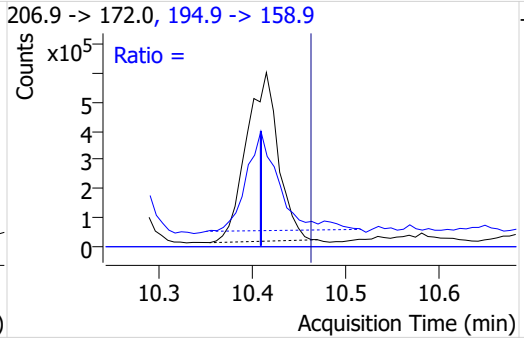
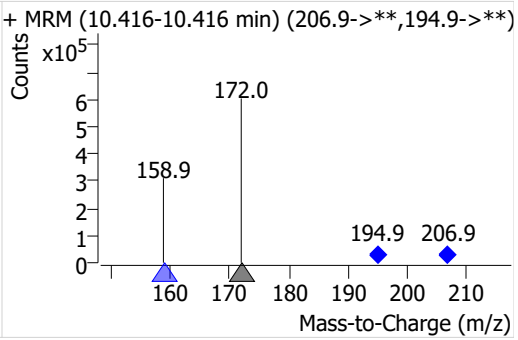
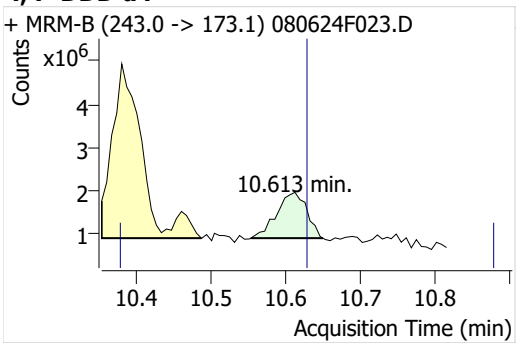
Endosulfan II

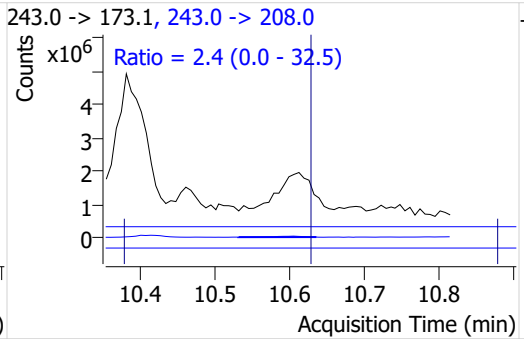


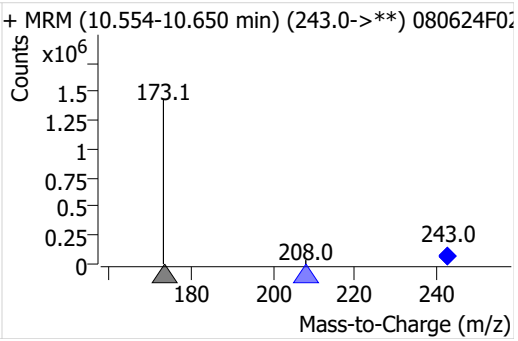




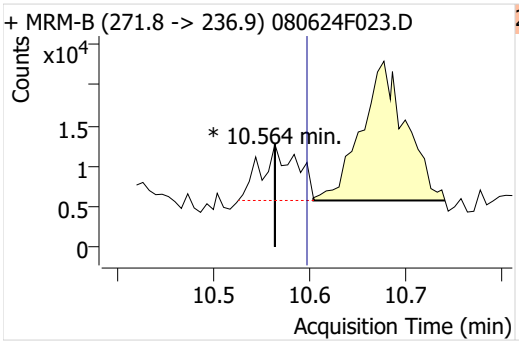
4,4'-DDD d4

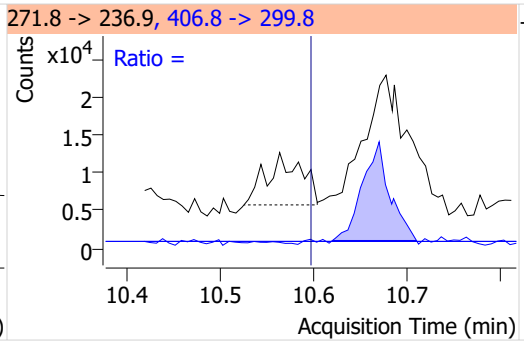


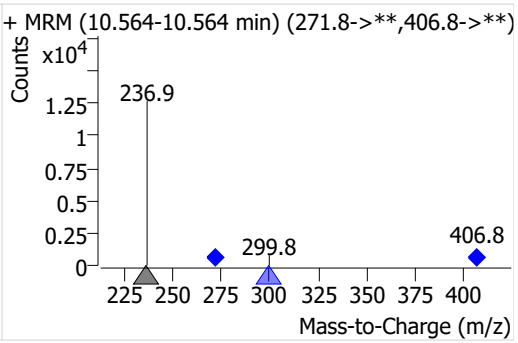




cis-Nonachlor







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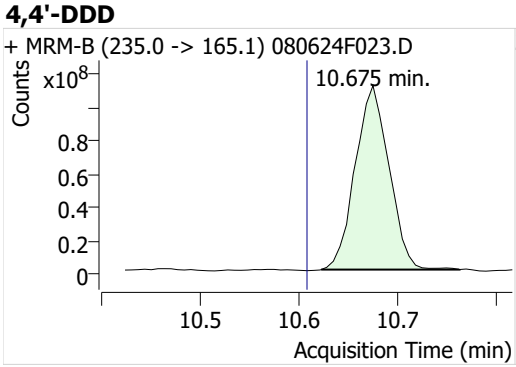

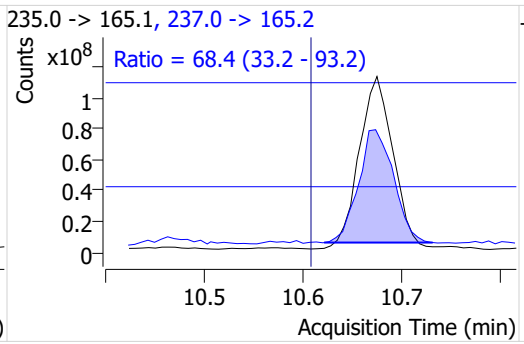

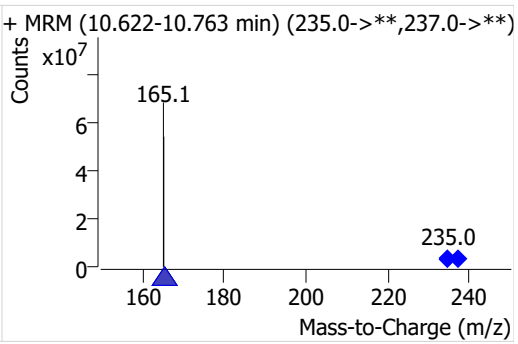

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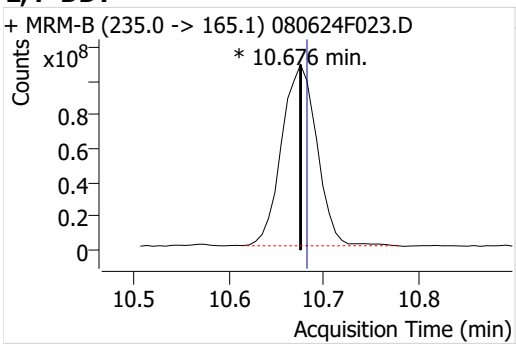
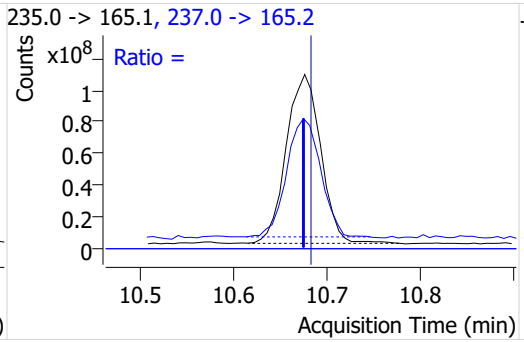
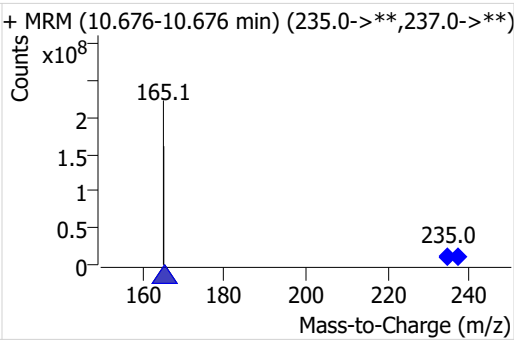
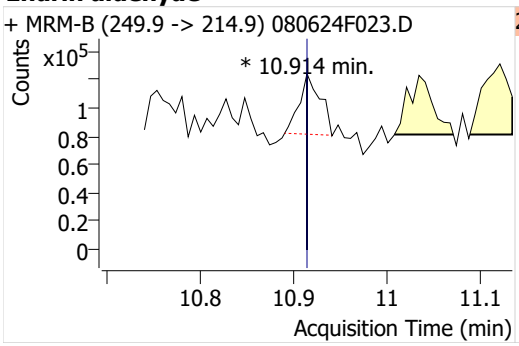
2,4'-DDT

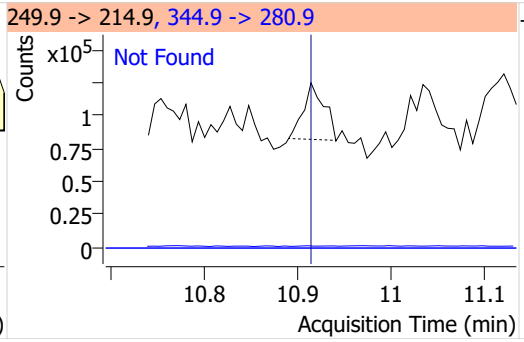


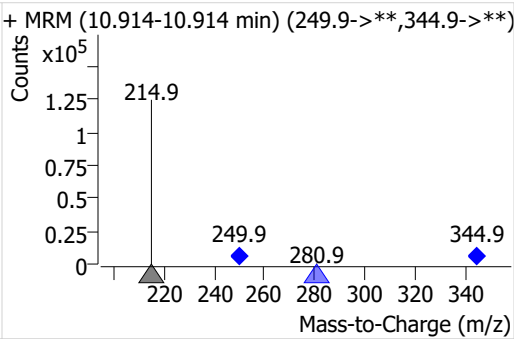




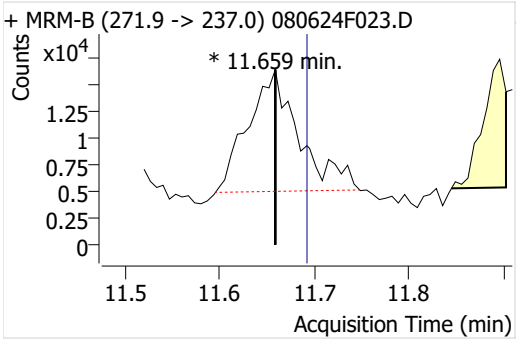
Endrin aldehyde

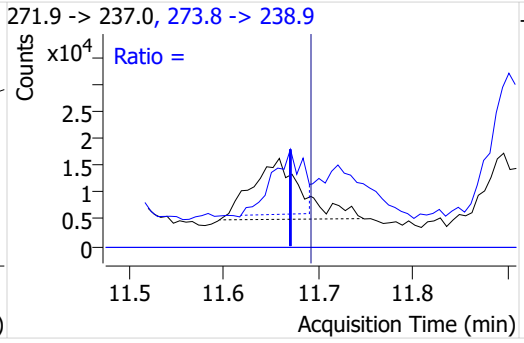


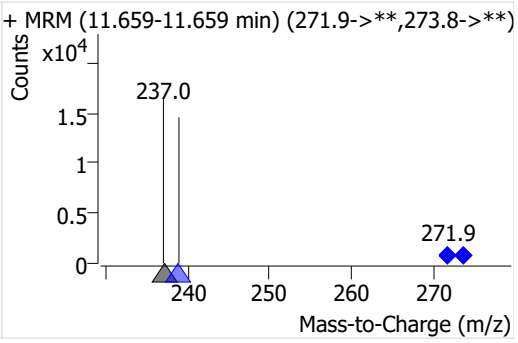




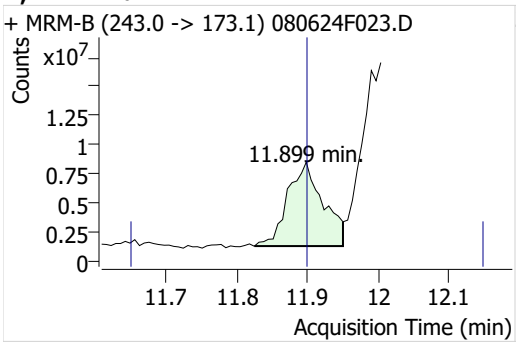
Endosulfan sulfate

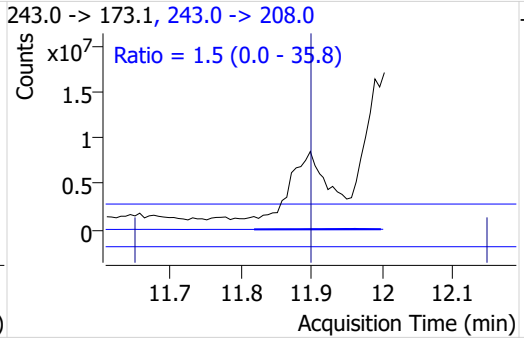


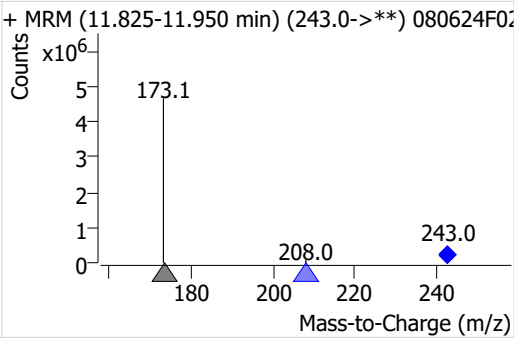




4,4'-DDT-d4







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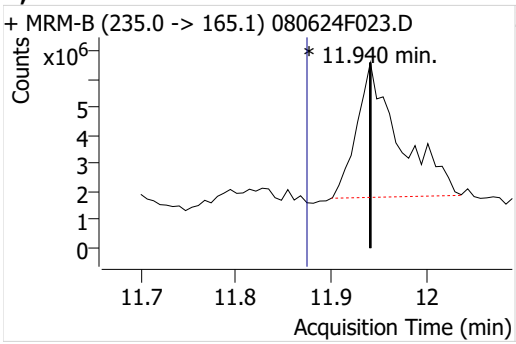
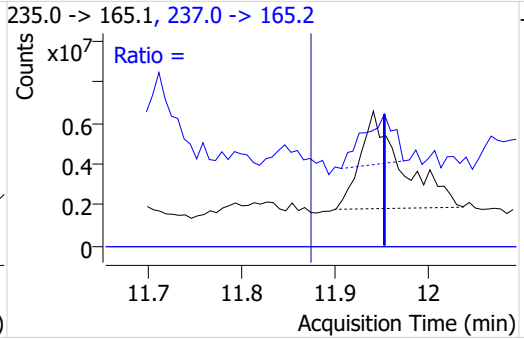
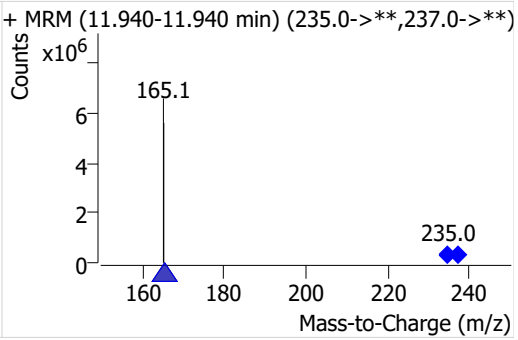
4,4'-DDT







Endrin ketone-13C12

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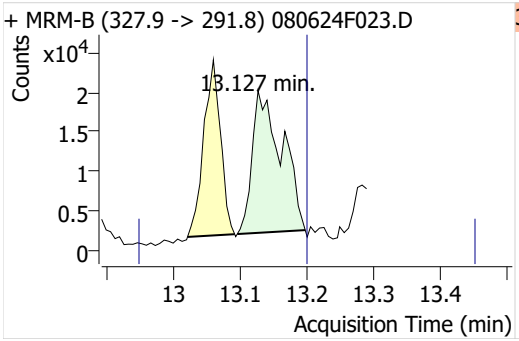

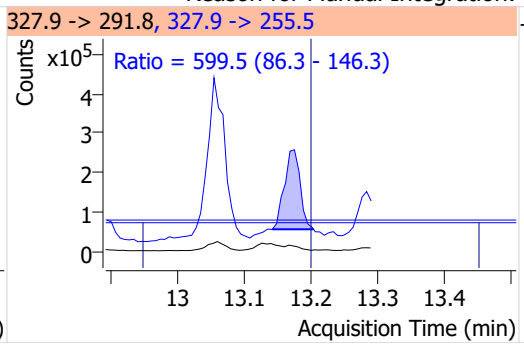

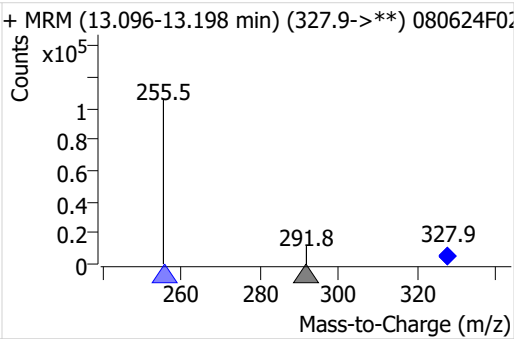

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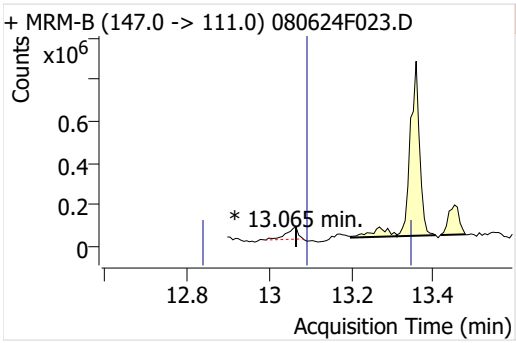
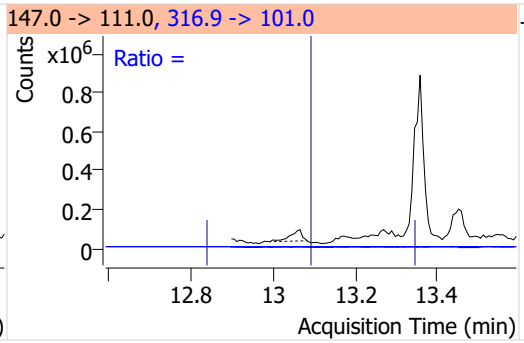
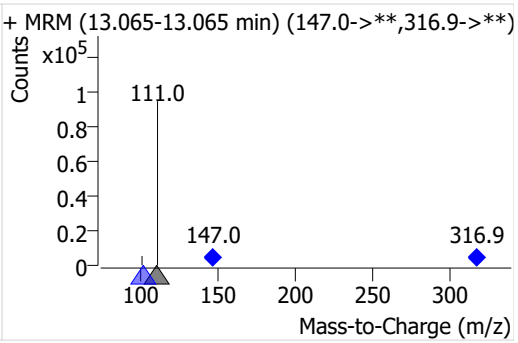
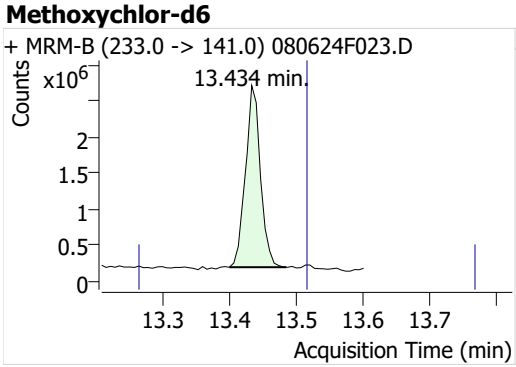
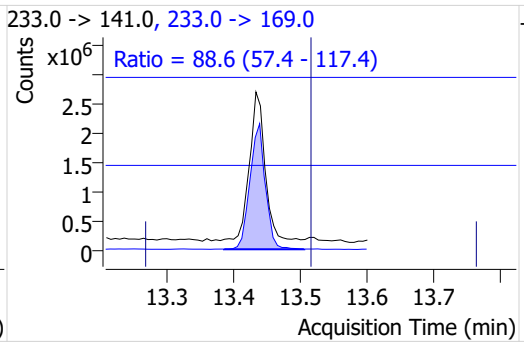


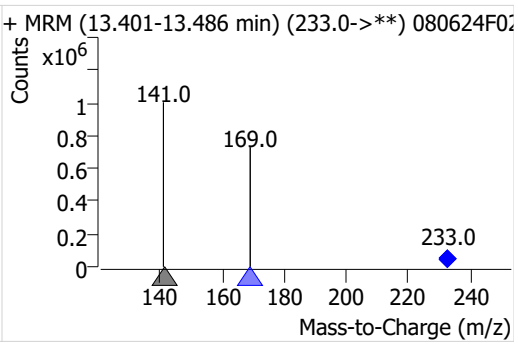




Methoxychlor-d6







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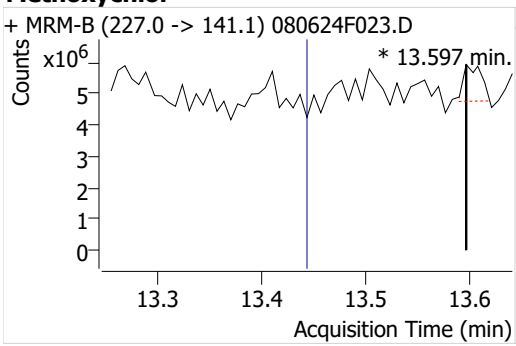
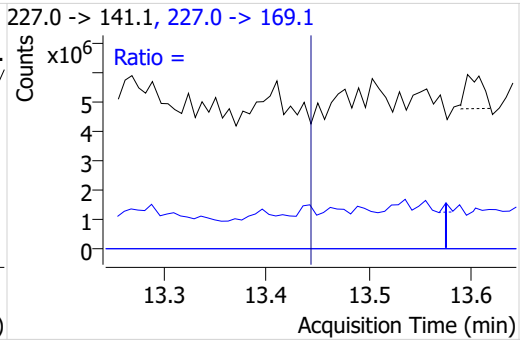
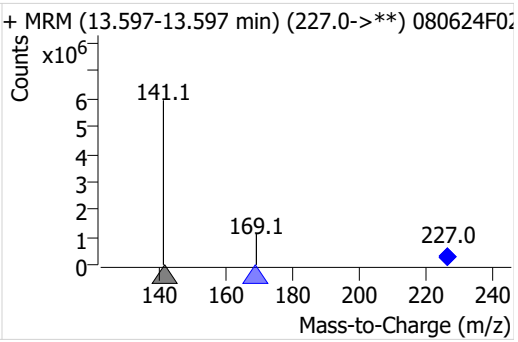
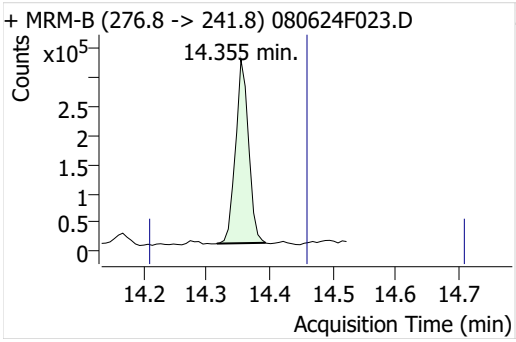
Methoxychlor

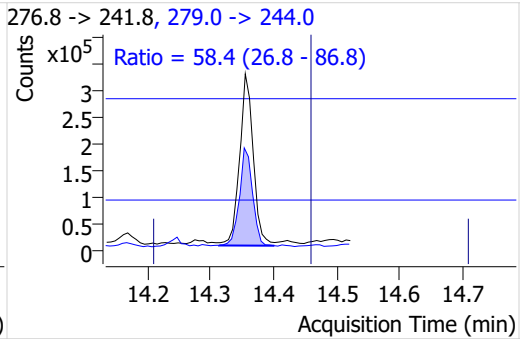


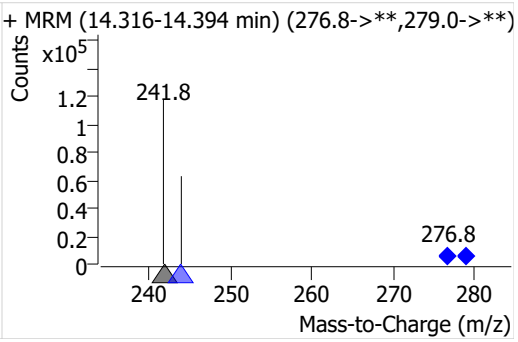




Mirex-13C10







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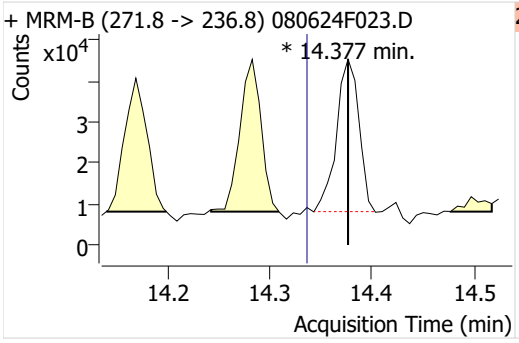
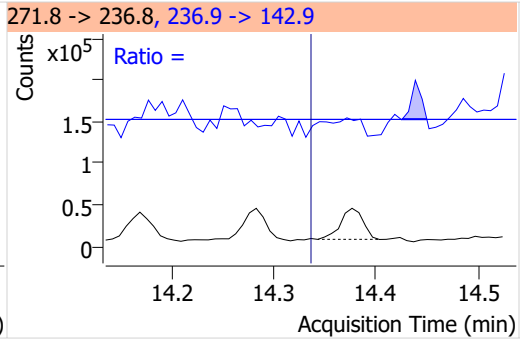
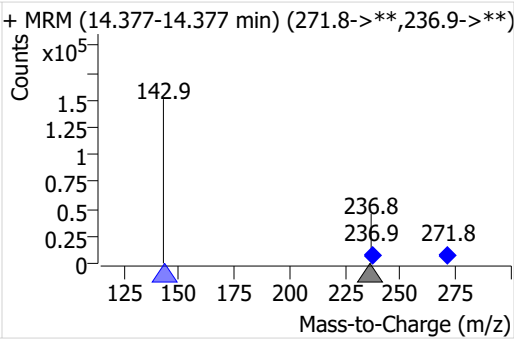
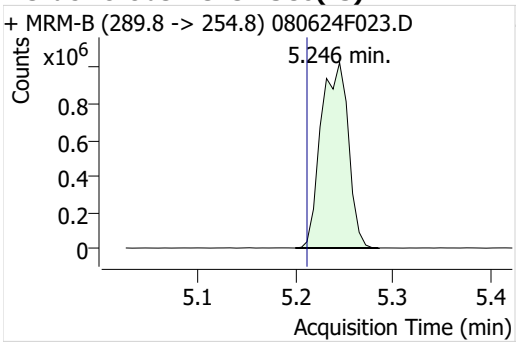
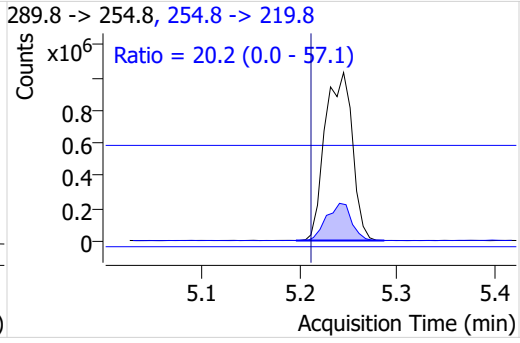


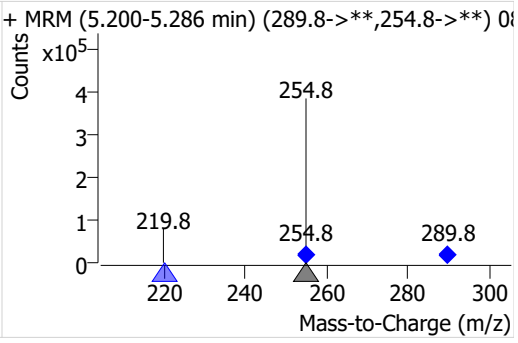




Hexachlorobenzene-13C6(IS)







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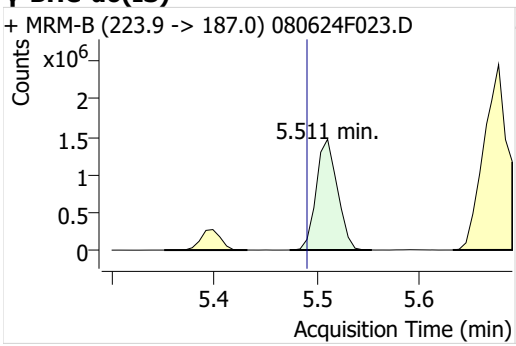
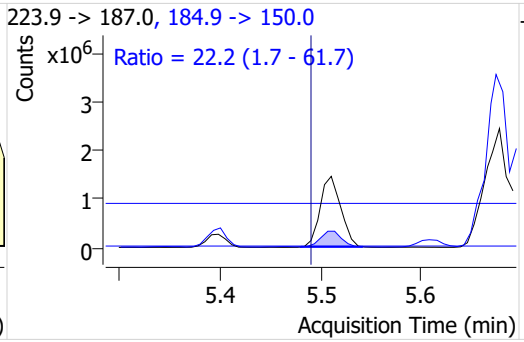
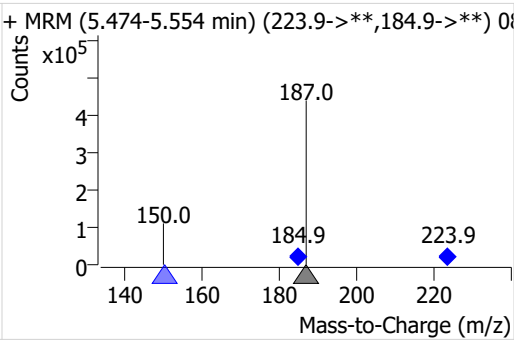
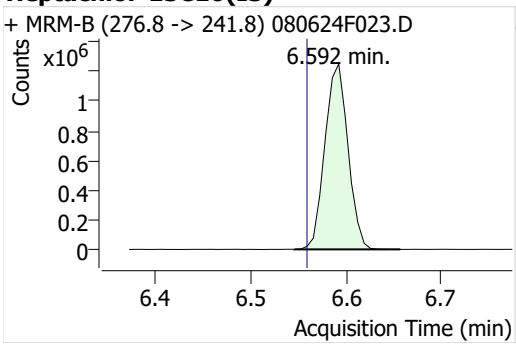
γ-BHC-d6(IS)

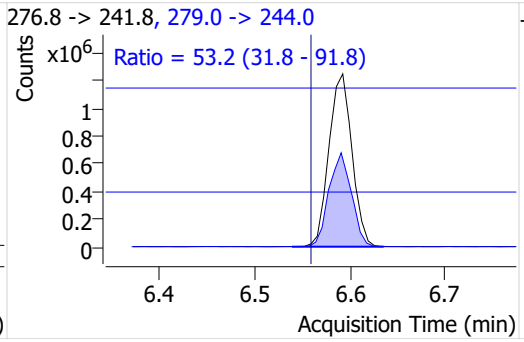


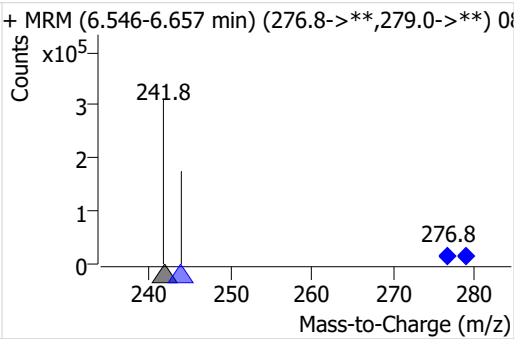




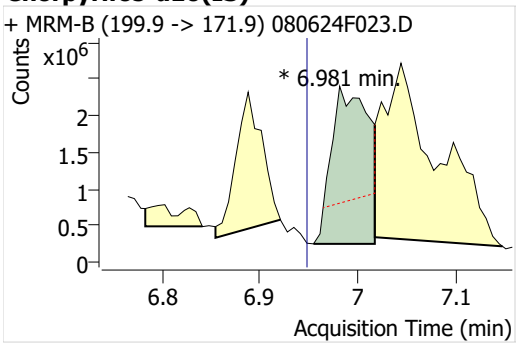
Heptachlor-13C10(IS)

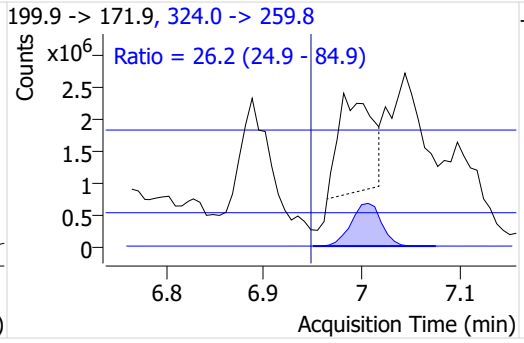


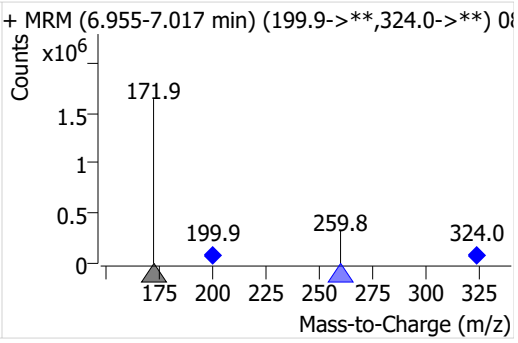




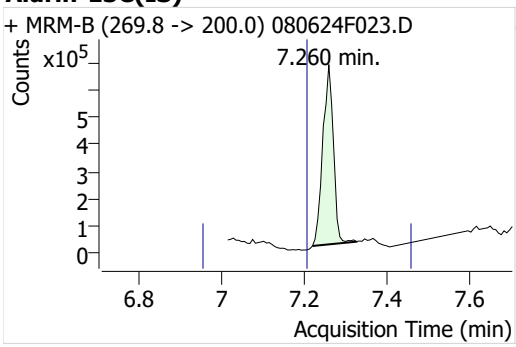
Chorpyrifos-d10(IS)

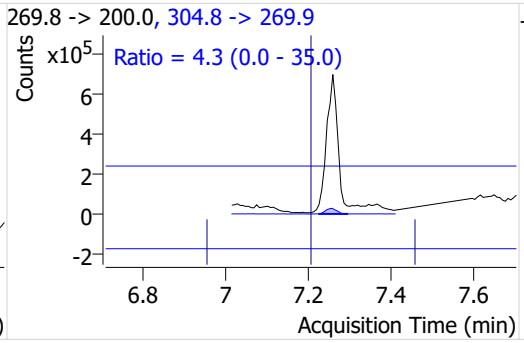


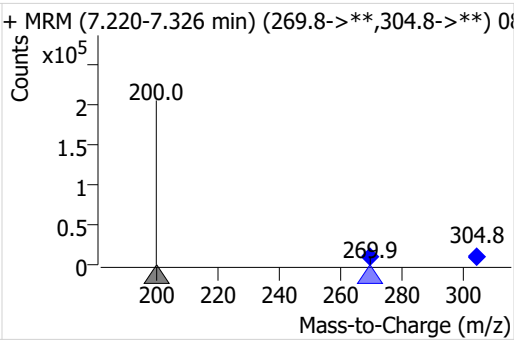




Aldrin-13C(IS)







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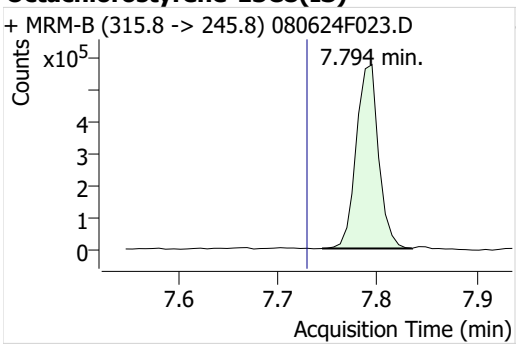
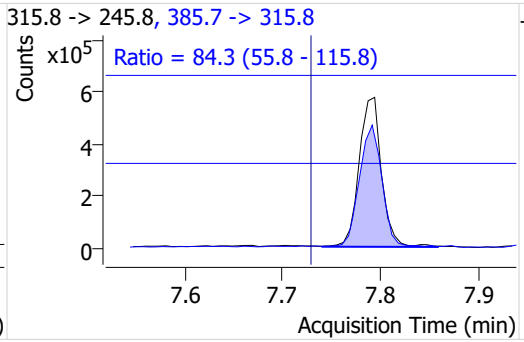
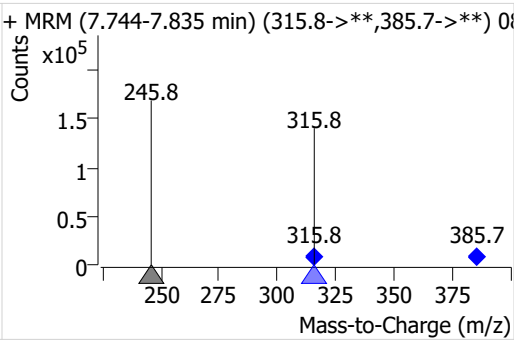
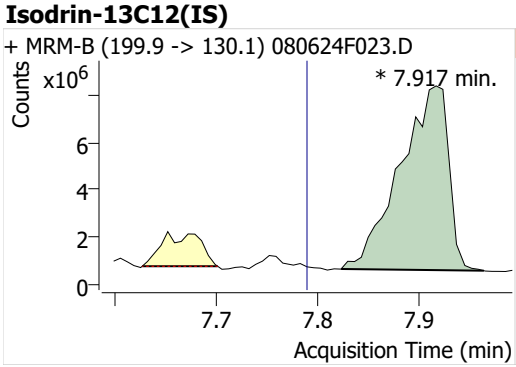
Octachlorostyrene-13C8(IS)

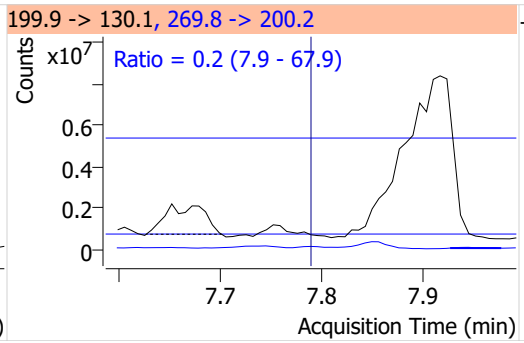


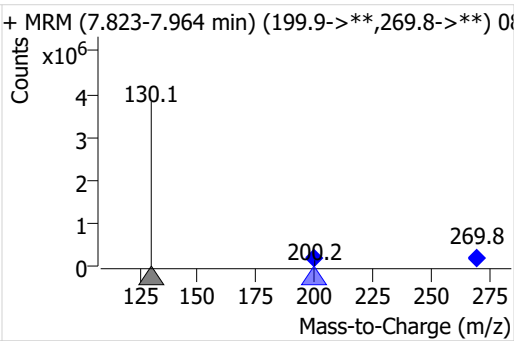




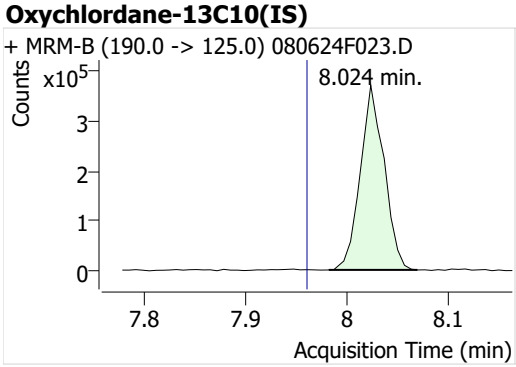
Isodrin-13C12(IS)

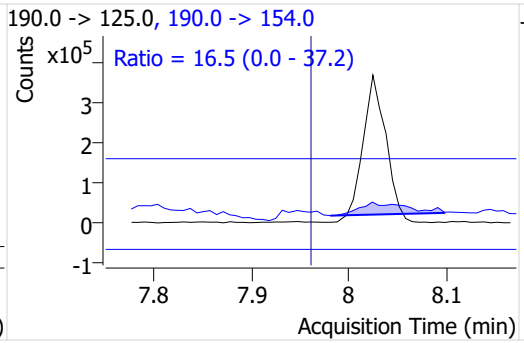


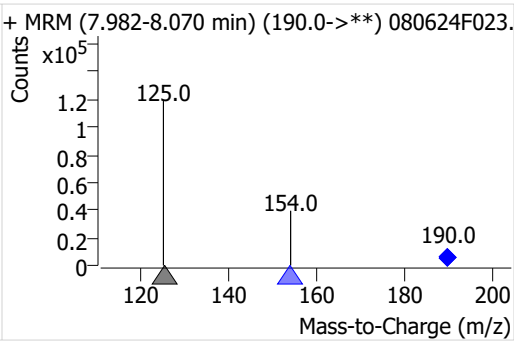




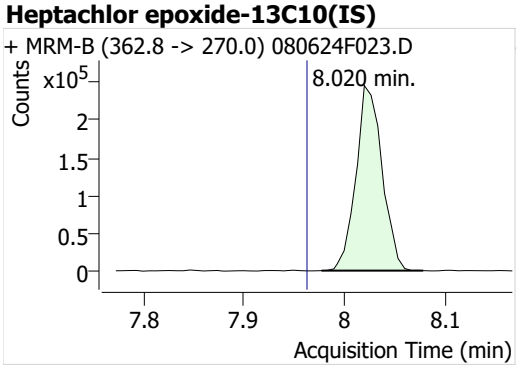
Oxychlordane-13C10(IS)

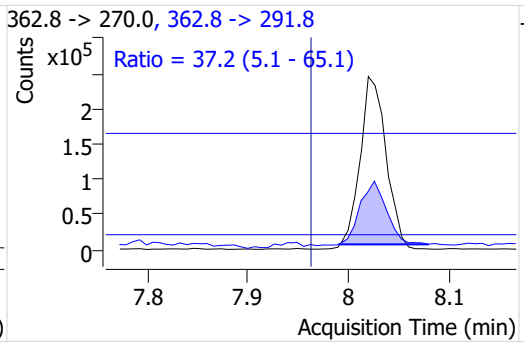


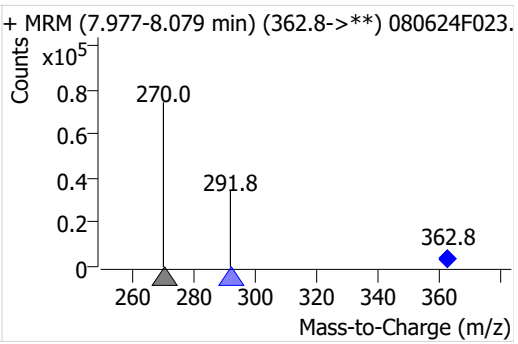




Heptachlor epoxide-13C10(IS)







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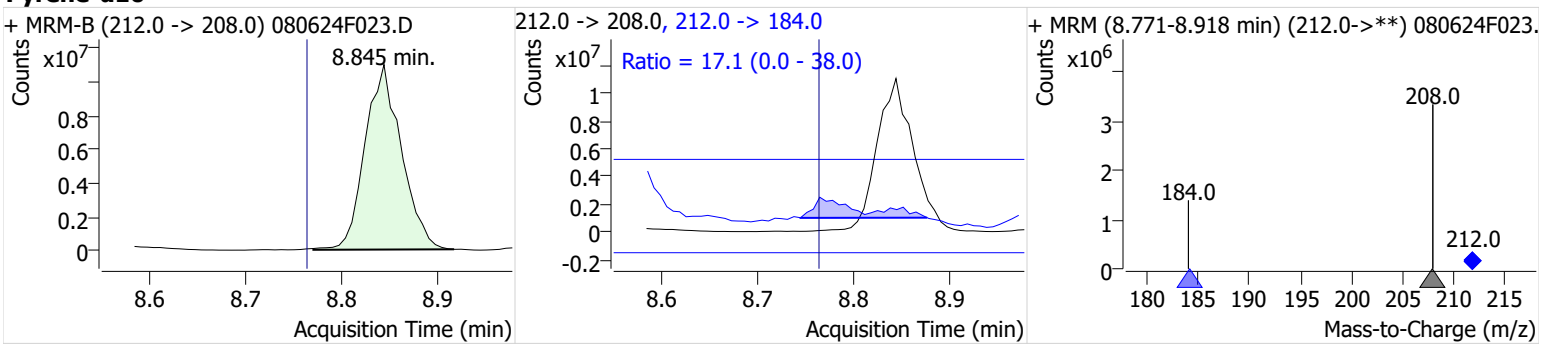
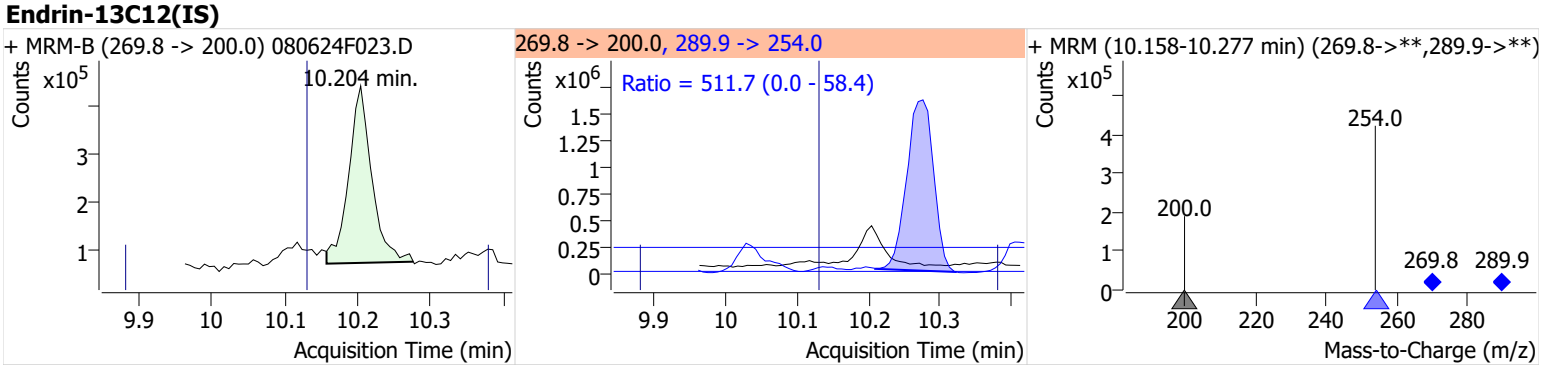
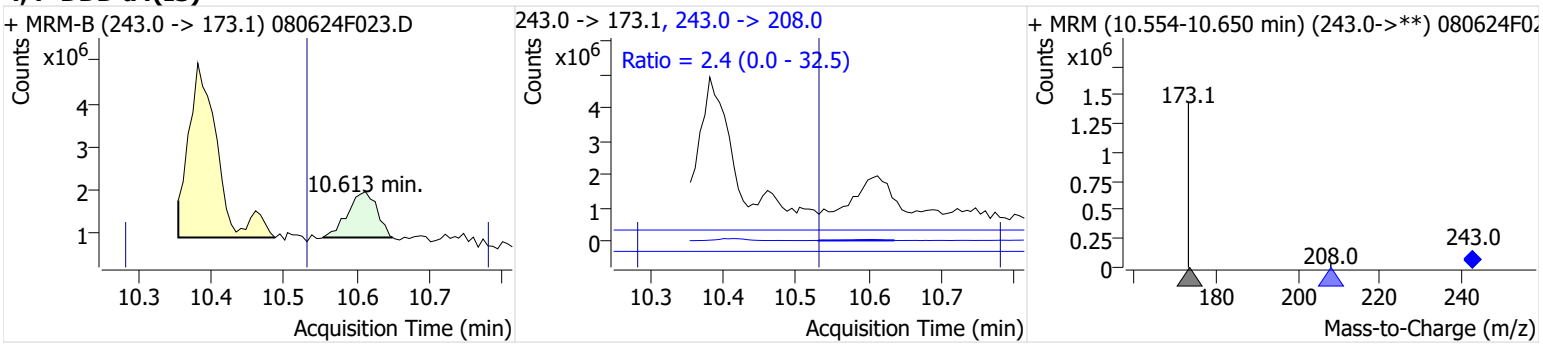
Pyrene-d10



Endrin-13C12(IS)



4,4'-DDD d4(IS)



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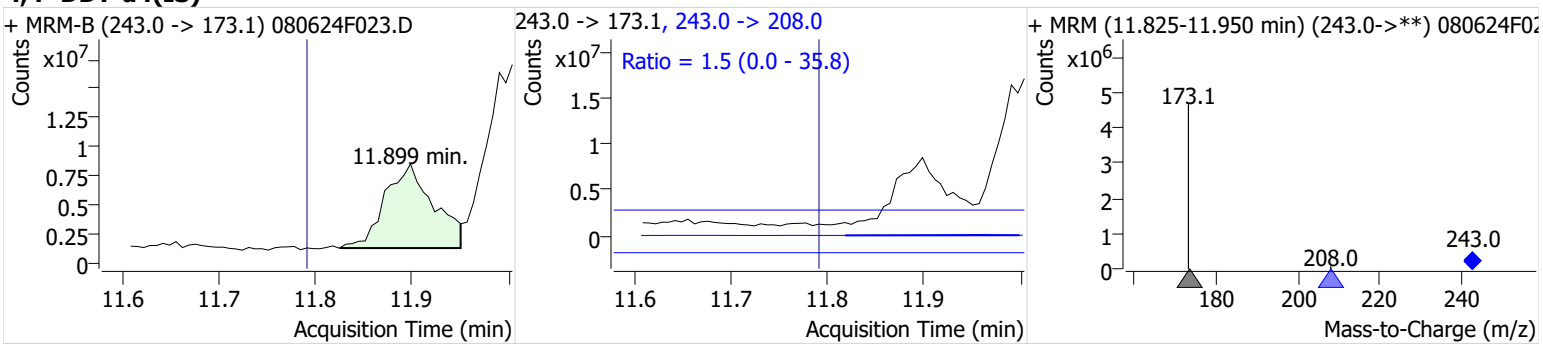

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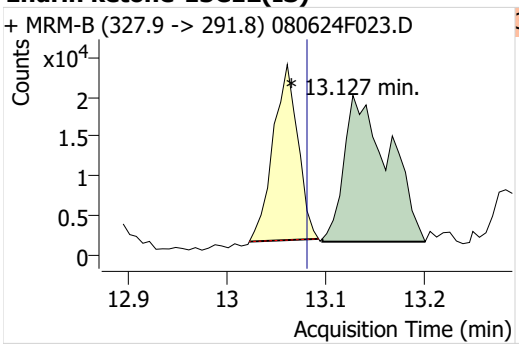
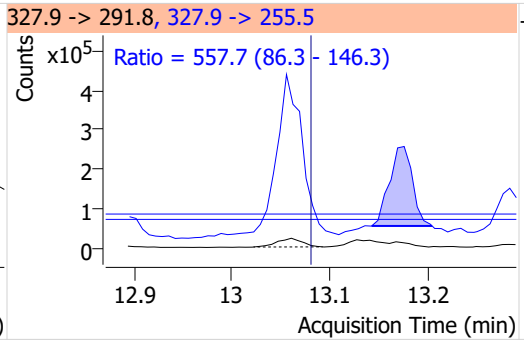
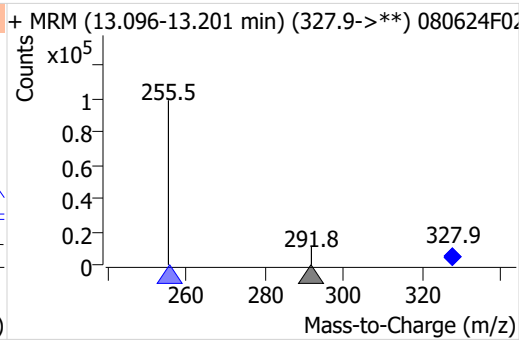
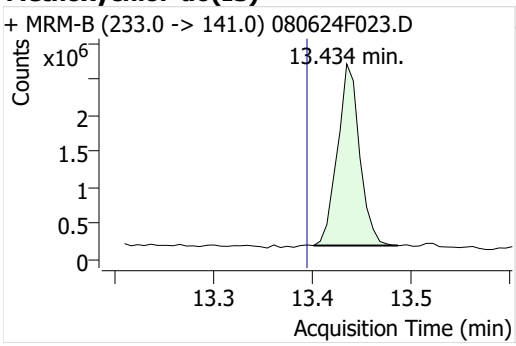
Endrin ketone-13C12(IS)

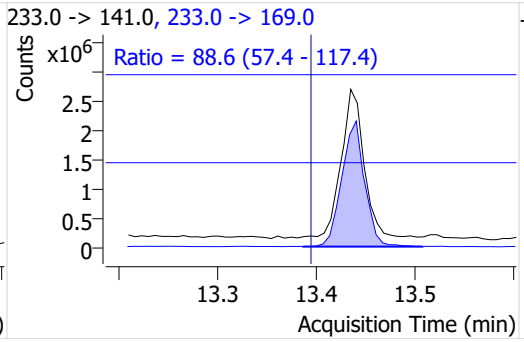


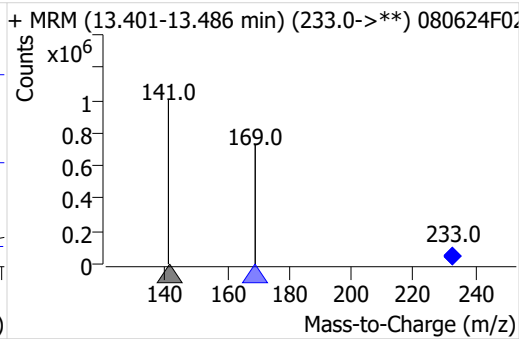




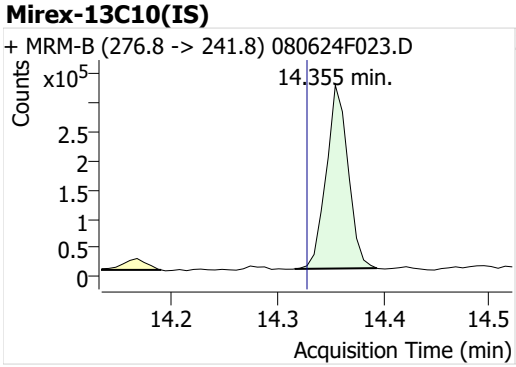
Methoxychlor-d6(IS)

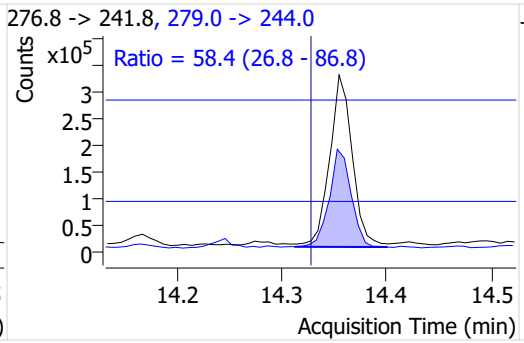


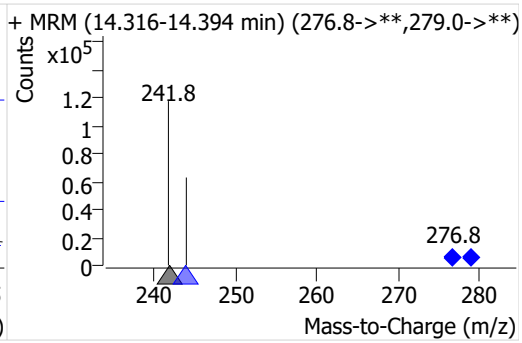




Mirex-13C10(IS)







1st 08/21/24
2nd 08/21/24

Validation Report

Data File: J:\MS47\data\082024\082024F029.D
Lab ID: K2407810-004
RunType: N/A
Matrix: Sediment

Date Acquired: 8/20/24 19:49
Batch ID: 851396
Analysis Method: 1699M/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
Preparation Hold Time		X
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery	X	
Lab Control Sample Recovery		X
Method Blank	X	
Method Blank Surrogates	X	
Internal Standards		X
Surrogates		X
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Sample Exceptions

Exception Categories	Result	Corrective Action
Preparation Hold Time	Prep Date/Time: 08/01/2024 1233 Hold Date/Time: 08/09/2022 2359	Frozen Sample Used

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Lab Control Sample Recovery	2,4'-DDT	124	53	116	High bias, samples<MRL
	4,4'-DDT	144	57	118	High bias, samples<MRL
Internal Standards	Pyrene-d10	74101549	4973542	19894167	Matrix
Surrogates	S_4,4'-DDT-d4	0	5	187	not reported from this dilution

Primary Review: _____

Secondary Review: _____

Printed: 9/18/24 9:37
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1st 08/21/24
2nd 08/21/24

Quantitation Report

Data File:	J:\MS47\data\082024\082024F029.D	**Instrument:**	K-MS-47
Acqu Date:	8/20/24 19:49	**Vial:**	13
Run Type:	N/A	**Dilution:**	10
Lab ID:	K2407810-004	**Raw Units:**	ng/ml

Bottle ID:	K2407810-004.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	7/26/22	**Receive Date:**	7/27/22

Analysis Lot:	851396	**Prep Lot:**	442451	**Report Group:**	K2407810
Analysis	1699M	**Prep Method:**	EPA 3541		
		Prep Date:	8/1/24		

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400398
		Report List ID:	25424

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	9.722	+0.01	74101549.320	100	* HIGH

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec		% Rec Criteria	Rpt?
S_Aldrin-13C12	7.969	+0.01	559713.195	0.777	39		12 - 88	N
S_4,4'DDD-d4	11.644		373890.666	0.188	38		9 - 159	N
S_4,4'-DDT-d4	12.927	+0.09	0	0.000	0	*	5 - 187	N
S_Endrin-13C12	11.235	+0.01	142667.296	1.137	57		14 - 141	N
S_GBHCD6	6.018	+0.01	718599.076	0.578	29		5 - 90	N
S_Oxychlordane-13C10	8.815	+0.01	250879.996	0.655	33		5 - 86	N

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Aldrin	7.964		0	0.000	0	U	N
gamma-BHC (Lindane)	6.070		0	0.000	0	U	N
cis-Chlordane	9.780	+0.01	204141.145	4.557	0.75	U	N
2,4'-DDD	10.565	+0.01	17213809.800	183.400	30		Y
4,4'-DDD	11.713		38439743.185	509.486	84		Y
2,4'-DDE	9.434	+0.00	2982079.634	22.248	3.7		N
4,4'-DDE	10.360	+0.01	17422463.933	174.588	29		Y
2,4'-DDT	11.720	-0.09	0	0.000	0	U	N
4,4'-DDT	12.903	+0.01	0	0.000	0	U	N
Dieldrin	10.568	-0.01	0	0.000	0	U	N
cis-Nonachlor	11.723		0	0.000	0	U	N
trans-Nonachlor	9.848	+0.01	36240.792	2.333	0.38	U	N
Oxychlordane	8.823	+0.01	0	0.000	0	U	N

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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MassHunter Quantitative Analysis Sample Report

Data File	J:\MS47\data\082024\082024F029.D		
Batch File	J:\MS47\data\082024\QuantResults\082024 OC PEST.batch.bin		
Acq. Date-Time	8/20/2024 7:49:24 PM	**Acq Operator**	
Name	K2407810-004 10X	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	9/18/2024 9:11:00 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method	082024 OC PEST ICAL.batch.bin	**Vial**	24
Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.711	289.8 -> 254.8	800267	20.0000 ng/ml	0.005
gamma-BHC-d6(IS)	6.018	223.9 -> 187.0	718599	20.0000 ng/ml	0.005
Heptachlor-13C10(IS)	7.242	276.8 -> 241.8	857482	20.0000 ng/ml	0.006
Chorpyrifos-d10(IS)	7.642	199.9 -> 171.9	2302341 *m*	20.0000 ng/ml	0.006
Aldrin-13C(IS)	7.969	269.8 -> 200.0	563170	20.0000 ng/ml	0.012
Octachlorostyrene-13C8(IS)	8.545	315.8 -> 245.8	409546	20.0000 ng/ml	0.009
Isodrin-13C12(IS)	8.660	199.9 -> 130.1	31134476	20.0000 ng/ml	0.027
Oxychlordane-13C10(IS)	8.815	190.0 -> 125.0	250880	20.0000 ng/ml	0.013
Heptachlor epoxide-13C10(IS)	8.817	362.8 -> 270.0	197869	20.0000 ng/ml	0.006
Pyrene-d10	9.722	212.0 -> 208.0	74101549	100.0000 ng/ml	0.007
Endrin-13C12(IS)	11.235	269.8 -> 200.0	142667	20.0000 ng/ml	0.036
4,4'-DDD d4(IS)	11.644	243.0 -> 173.1	373891	5.0000 ng/ml	0.003
4,4'-DDT-d4(IS)		243.0 -> 173.1		ND ng/ml	
Endrin ketone-13C12(IS)	13.845	327.9 -> 291.8	18888	20.0000 ng/ml	0.010
Methoxychlor-d6(IS)	14.049	233.0 -> 141.0	351085	20.0000 ng/ml	0.004
Mirex-13C10(IS)	14.915	276.8 -> 241.8	155986	5.0000 ng/ml	0.001

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.704	289.8 -> 254.8	800267	0.612 ng/ml	
		Spiked Amount =	20.0	Recovery =	*3.1 %*
gamma-BHC-d6	6.012	223.9 -> 187.0	718599	0.578 ng/ml	
		Spiked Amount =	20.0	Recovery =	*2.9 %*
Heptachlor-13C10	7.235	276.8 -> 241.8	857482	0.987 ng/ml	
		Spiked Amount =	20.0	Recovery =	*4.9 %*
Chorpyrifos-d10	7.649	199.9 -> 171.9	2302341 *m*	7.698 ng/ml	
		Spiked Amount =	20.0	Recovery =	*38.5 %*
Aldrin-13C	7.956	269.8 -> 200.0	559713	0.777 ng/ml	
		Spiked Amount =	20.0	Recovery =	*3.9 %*
Octachlorostyrene-13C8	8.538	315.8 -> 245.8	409546	0.498 ng/ml	
		Spiked Amount =	20.0	Recovery =	*2.5 %*
Isodrin-13C12	8.613	199.9 -> 130.1	31134476	55.554 ng/ml	
		Spiked Amount =	20.0	Recovery =	*277.8 %*
Oxychlordane-13C10	8.802	190.0 -> 125.0	250880	0.655 ng/ml	
		Spiked Amount =	20.0	Recovery =	*3.3 %*
Heptachlor epoxide-13C10	8.811	362.8 -> 270.0	197869	0.873 ng/ml	
		Spiked Amount =	20.0	Recovery =	*4.4 %*
Endrin-13C12	11.222	269.8 -> 200.0	142667	1.137 ng/ml	
		Spiked Amount =	20.0	Recovery =	*5.7 %*
4,4'-DDD d4	11.644	243.0 -> 173.1	373891	0.188 ng/ml	
		Spiked Amount =	5.0	Recovery =	*3.8 %*
4,4'-DDT-d4		243.0 -> 173.1		0.000 ng/ml	
		Spiked Amount =	5.0	Recovery =	*NC %*
Endrin ketone-13C12	13.832	327.9 -> 291.8	18888	0.844 ng/ml	
		Spiked Amount =	20.0	Recovery =	*4.2 %*
Methoxychlor-d6	14.055	233.0 -> 141.0	351085	0.791 ng/ml	
		Spiked Amount =	20.0	Recovery =	*4.0 %*

MassHunter Quantitative Analysis Sample Report

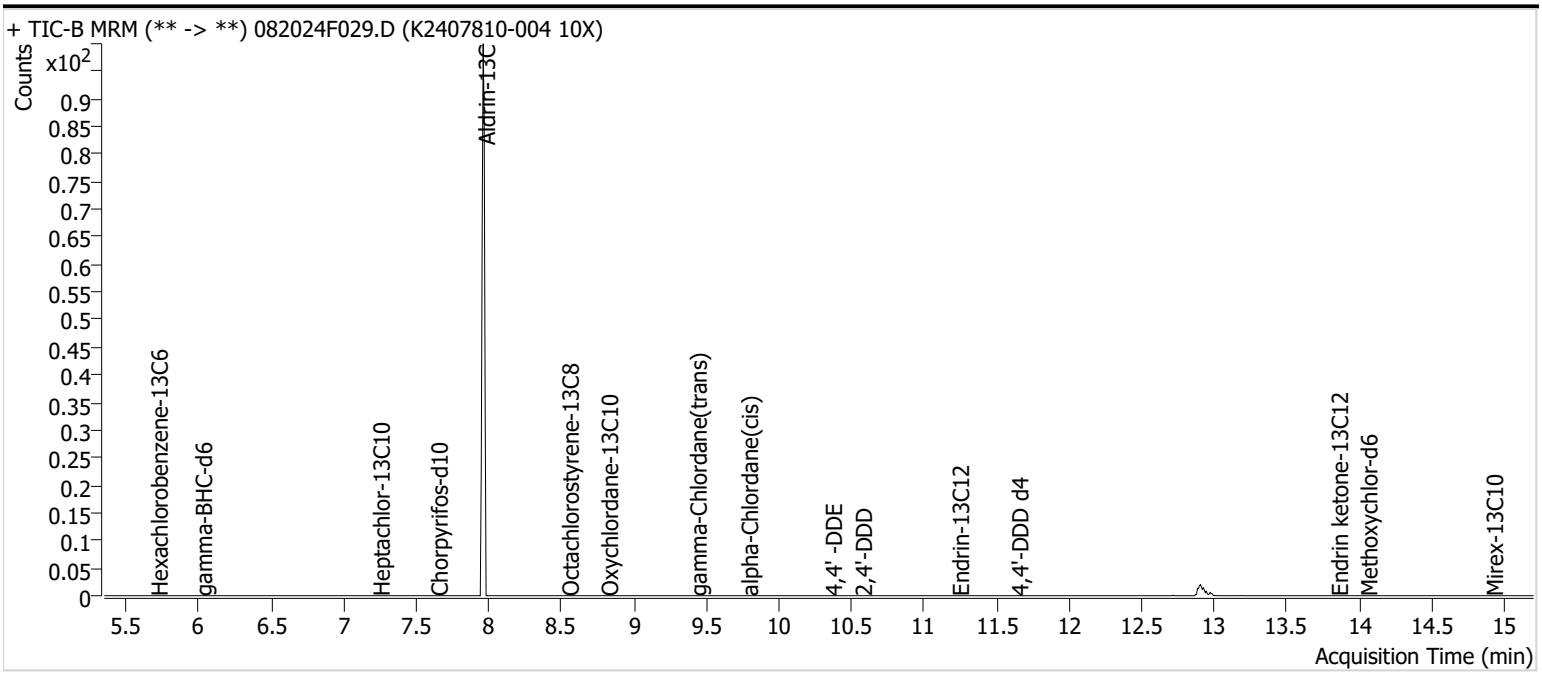
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.915	276.8 -> 241.8	155986	0.060 ng/ml
		Spiked Amount = 5.0		Recovery = *1.2 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.713	283.8 -> 213.9	159128	2.289 ng/ml	90
beta-BHC	gamma-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
gamma-BHC(Lindane)	gamma-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
delta-BHC	gamma-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Heptachlor	Heptachlor-13C10(IS)		271.7 -> 236.9		ND ng/ml	
Chorpyrifos	Chorpyrifos-d10(IS)		196.9 -> 169.0		ND ng/ml	
Aldrin	Aldrin-13C(IS)		254.9 -> 220.0		ND ng/ml	
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.551	342.8 -> 307.8	30397	0.732 ng/ml	88
Isodrin	Isodrin-13C12(IS)		193.0 -> 123.0		ND ng/ml	
Oxychlordane	Oxychlordane-13C10(IS)		114.9 -> 51.1		ND ng/ml	
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)		352.8 -> 262.9		ND ng/ml	
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.425	271.8 -> 236.9	173173	9.709 ng/ml	69
2,4'-DDE	4,4'-DDD d4(IS)	9.434	246.0 -> 176.2	2982080	22.248 ng/ml	96
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.780	271.8 -> 236.9	204141	4.557 ng/ml	69
Endosulfan I	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
trans-Nanochlor	Oxychlordane-13C10(IS)	9.848	271.8 -> 236.9	36241 ***m***	2.333 ng/ml	65
4,4' -DDE	4,4'-DDD d4(IS)	10.360	246.0 -> 176.2	17422464	174.588 ng/ml	96
2,4'-DDD	4,4'-DDD d4(IS)	10.565	235.0 -> 165.1	17213810	183.400 ng/ml	80
Dieldrin	Endrin-13C12(IS)		262.9 -> 193.0		ND ng/ml	
Endrin	Endrin-13C12(IS)		262.8 -> 193.0		ND ng/ml	
Endosulfan II	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
4,4'-DDD	4,4'-DDD d4(IS)	11.713	235.0 -> 165.1	38439743	509.486 ng/ml	99
cis-Nonachlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
2,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin aldehyde	Endrin-13C12(IS)		249.9 -> 214.9		ND ng/ml	
Endosulfan sulfate	Endrin-13C12(IS)		271.9 -> 237.0		ND ng/ml	
4,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin ketone	Endrin ketone-13C12(IS)		147.0 -> 111.0		ND ng/ml	
Methoxychlor	Methoxychlor-d6(IS)		227.0 -> 141.1		ND ng/ml	
Mirex	Mirex-13C10(IS)		271.8 -> 236.8		ND ng/ml	

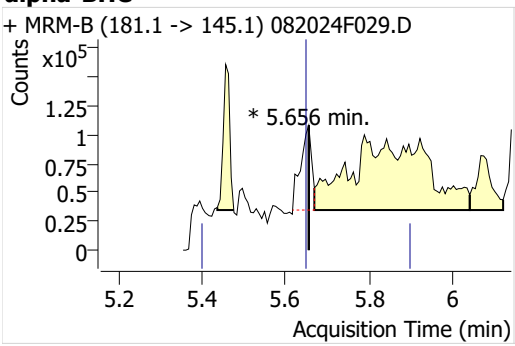
(m) = manual integration ND = Not Detected NC = Not Calculated

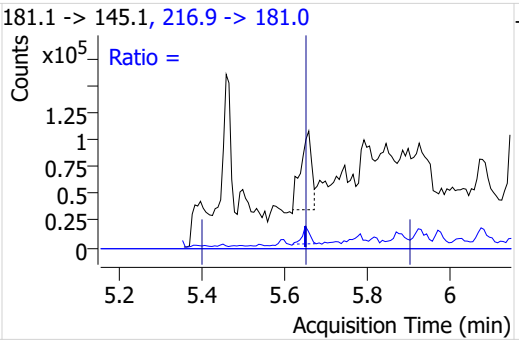
Sample Chromatogram

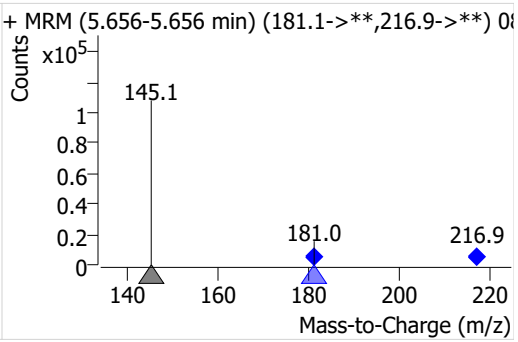
MassHunter Quantitative Analysis Sample Report



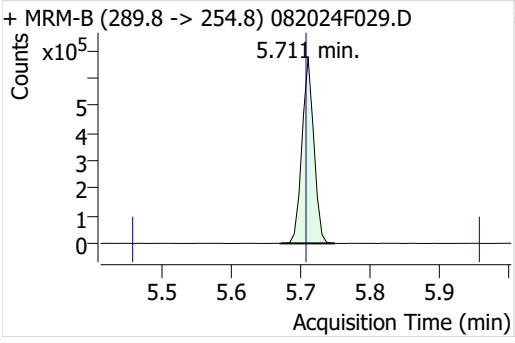
alpha-BHC

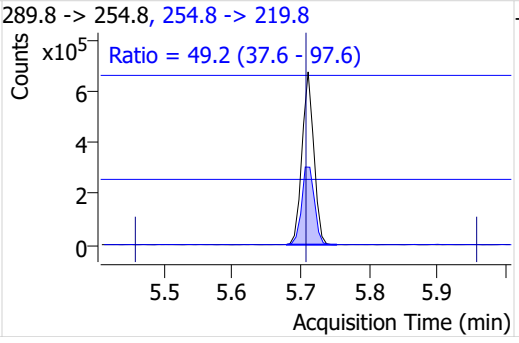


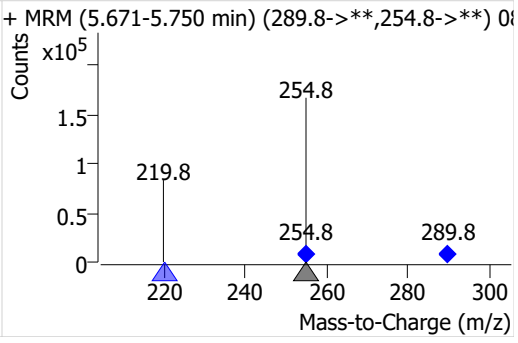




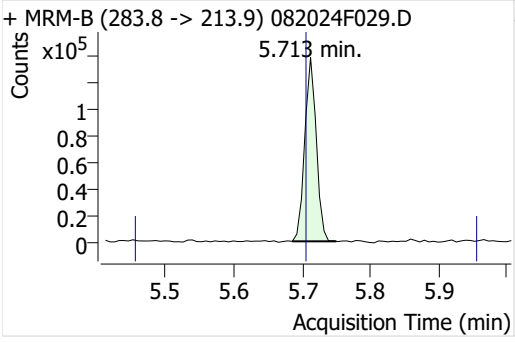
Hexachlorobenzene-13C6

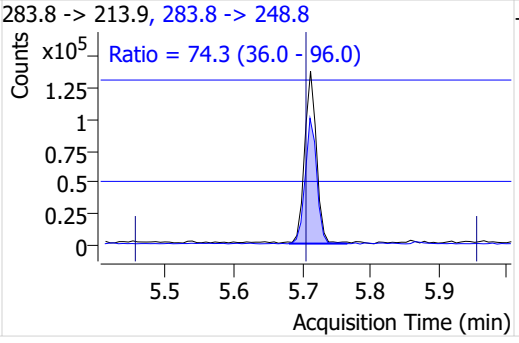


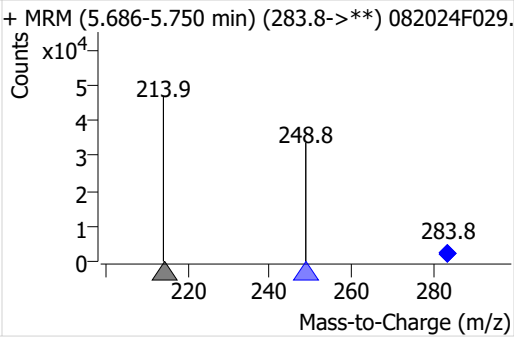




Hexachlorobenzene

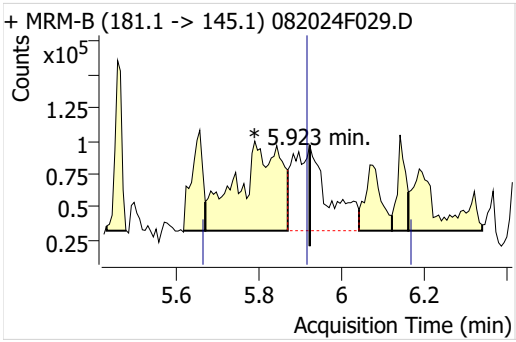


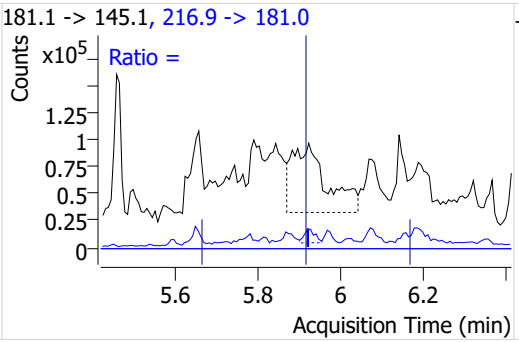


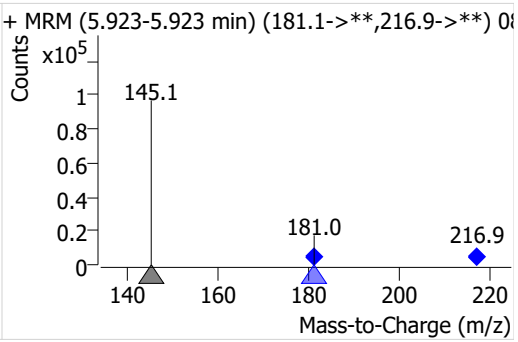


MassHunter Quantitative Analysis Sample Report

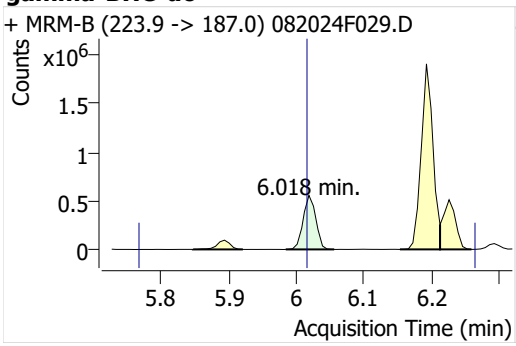
beta-BHC

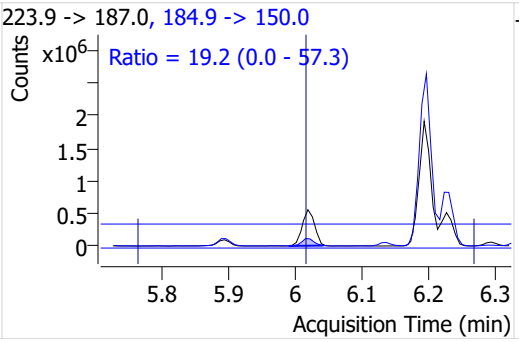


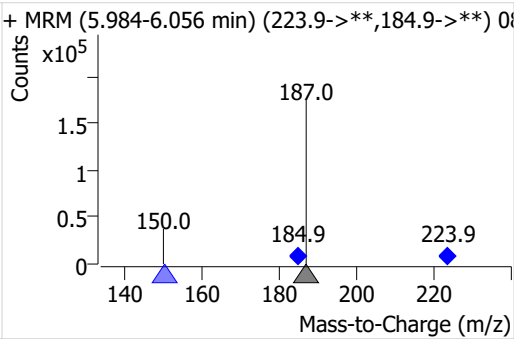




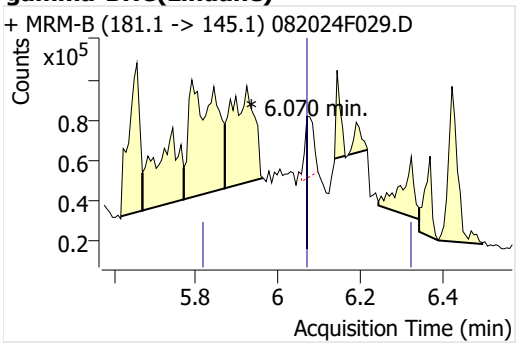
gamma-BHC-d6

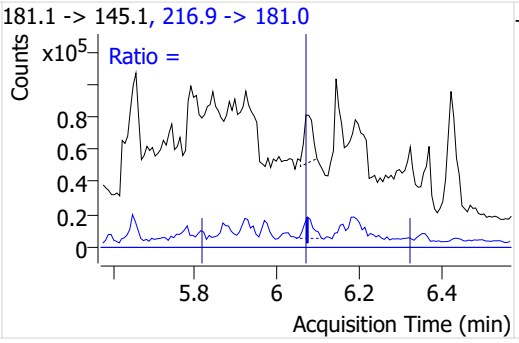


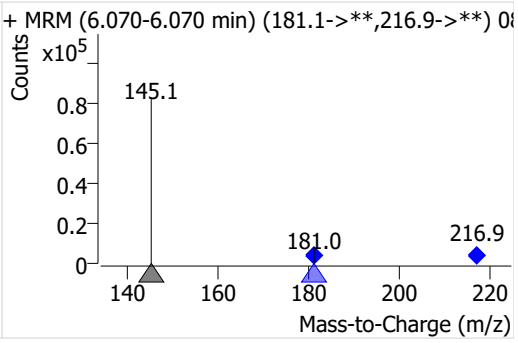




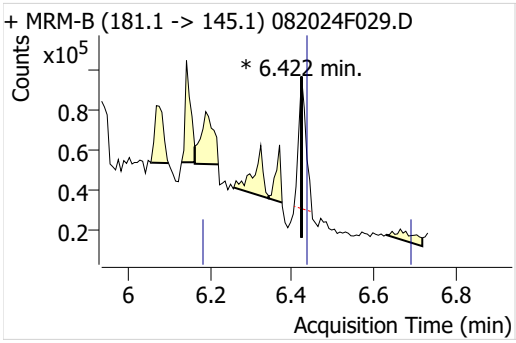
gamma-BHC(Lindane)

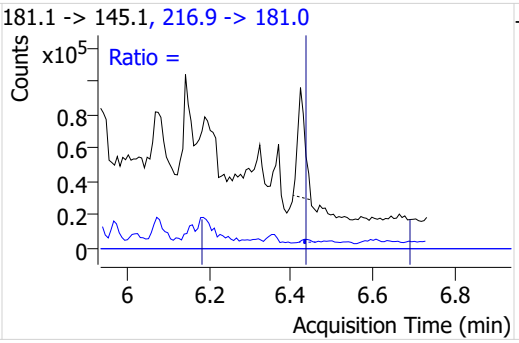


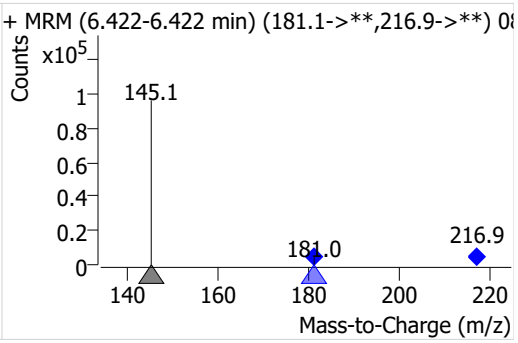




delta-BHC

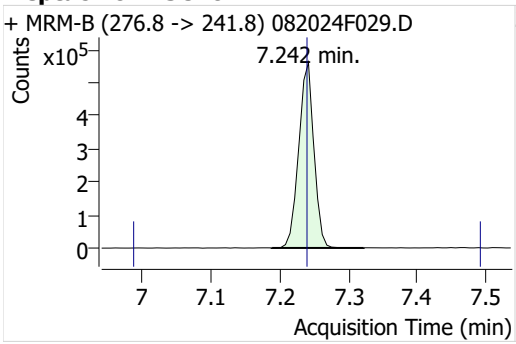


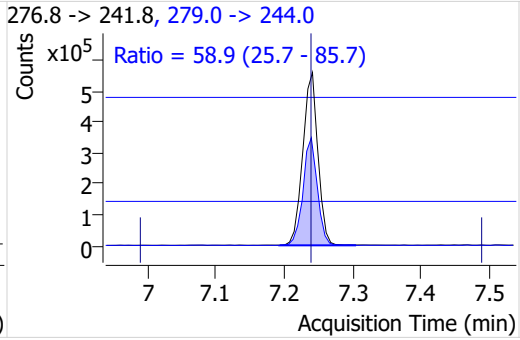


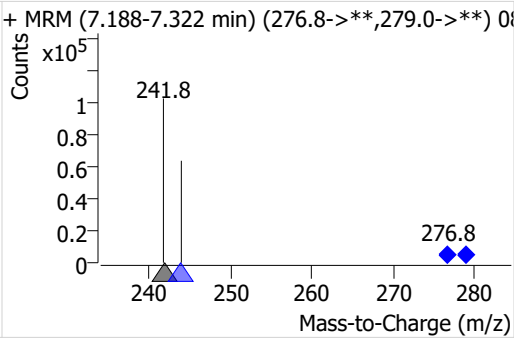


MassHunter Quantitative Analysis Sample Report

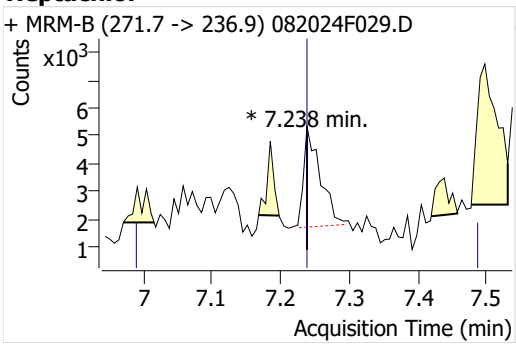
Heptachlor-13C10

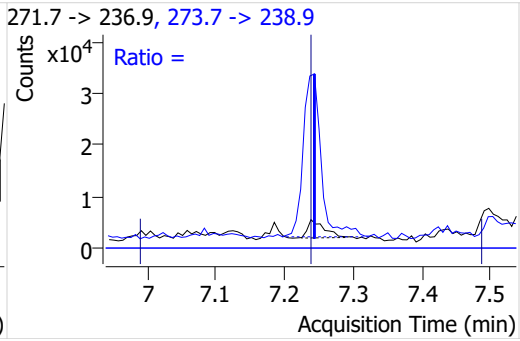


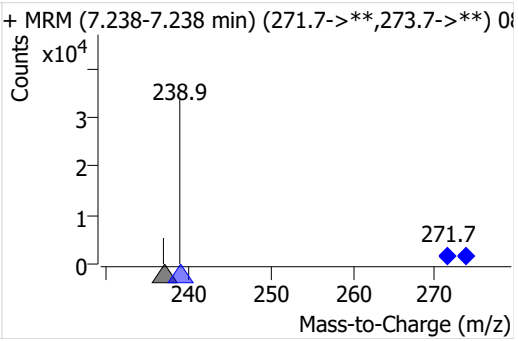




Heptachlor

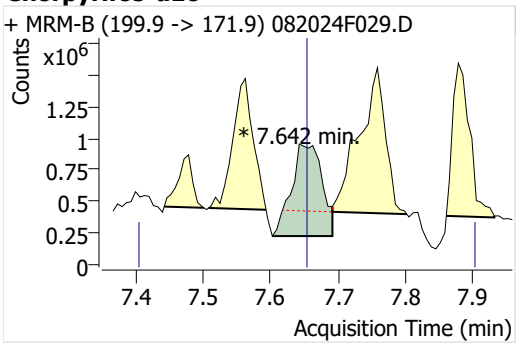


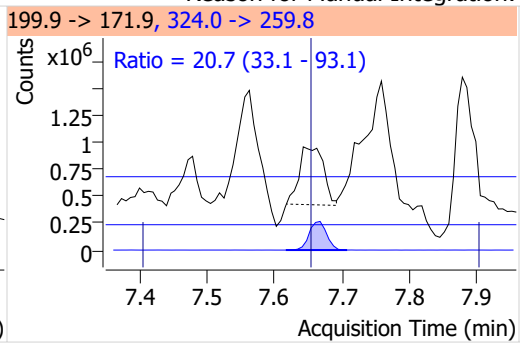


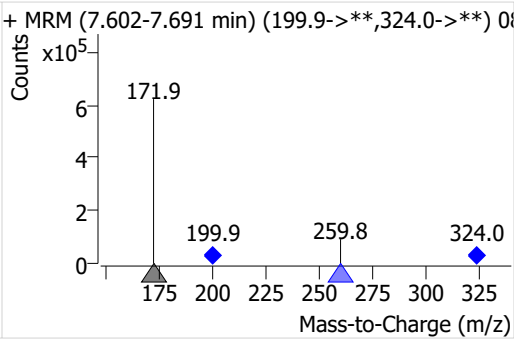


Chorpyrifos-d10

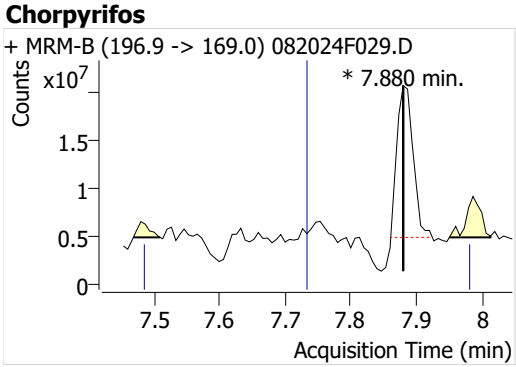
Reason for Manual Integration: **Baseline Correction**

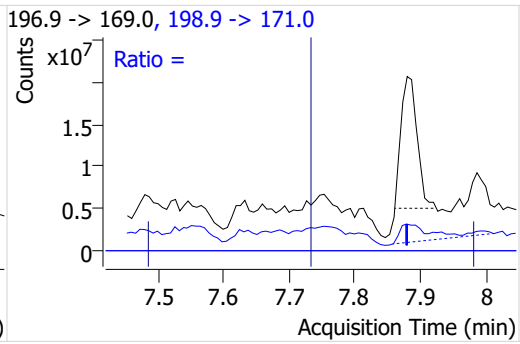


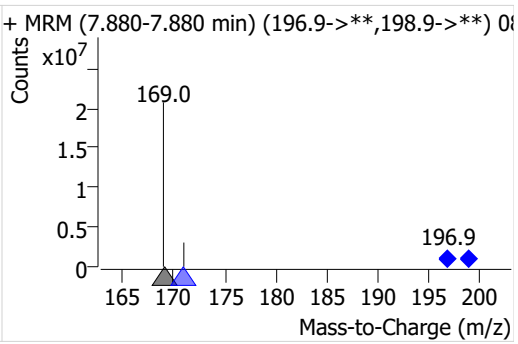




Chorpyrifos

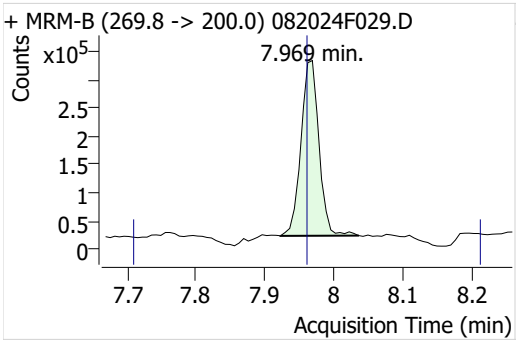


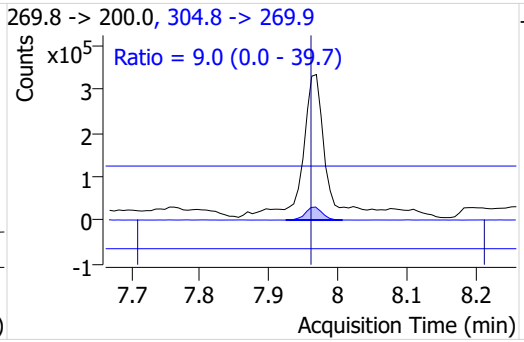


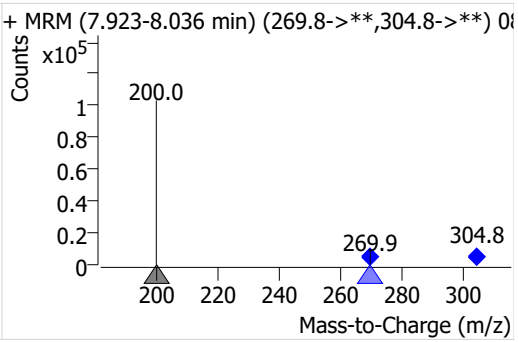


MassHunter Quantitative Analysis Sample Report

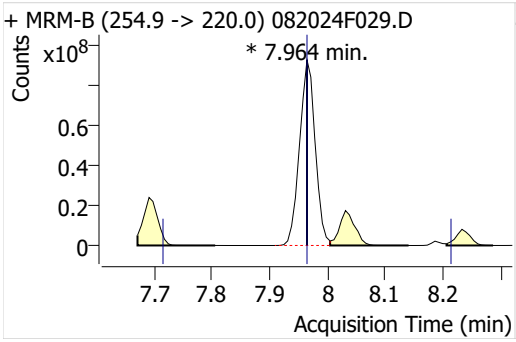
Aldrin-13C

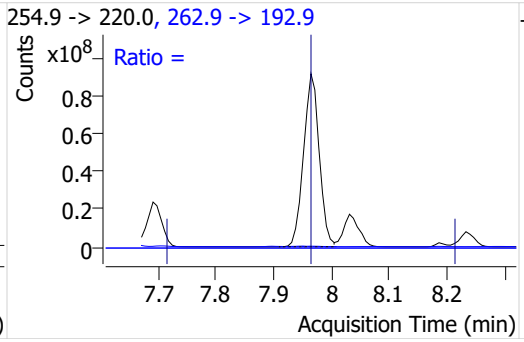


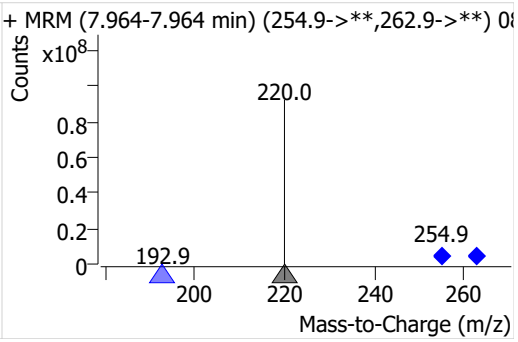




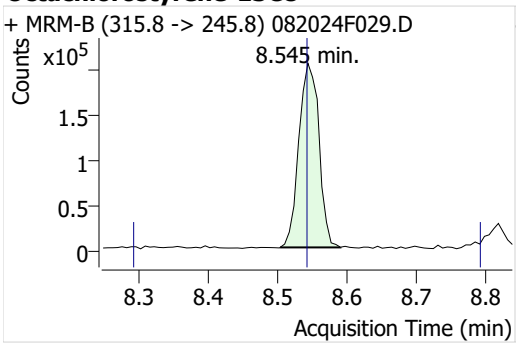
Aldrin

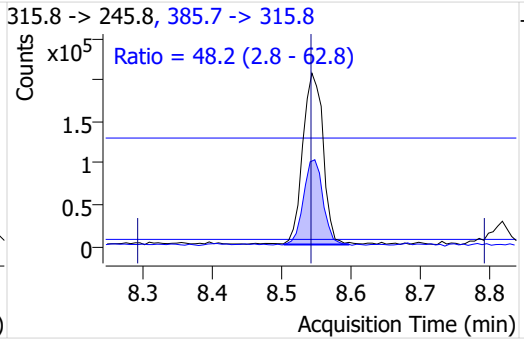


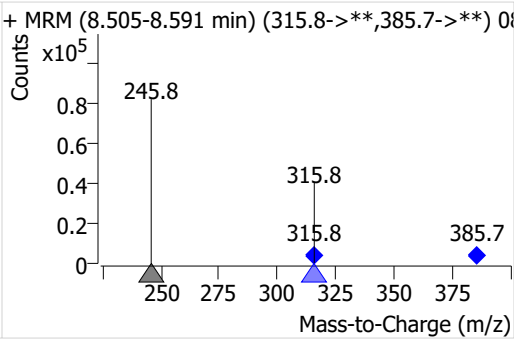




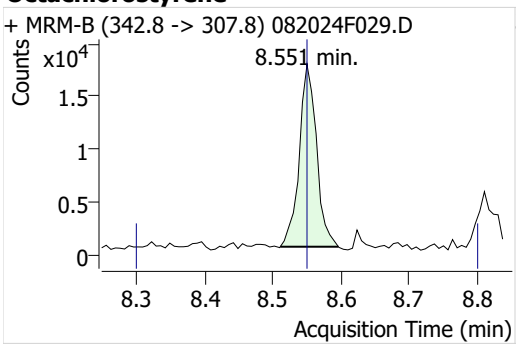
Octachlorostyrene-13C8

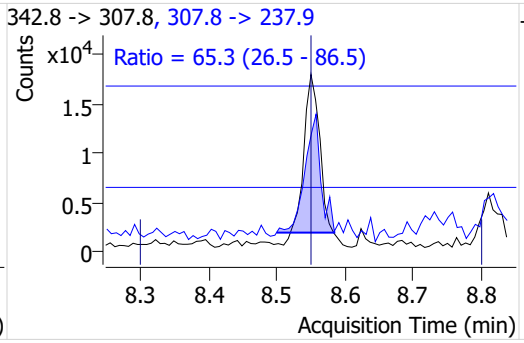


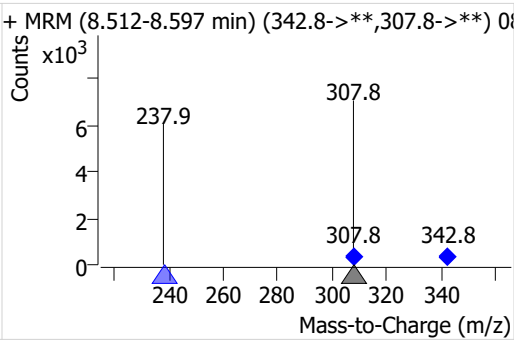




Octachlorostyrene

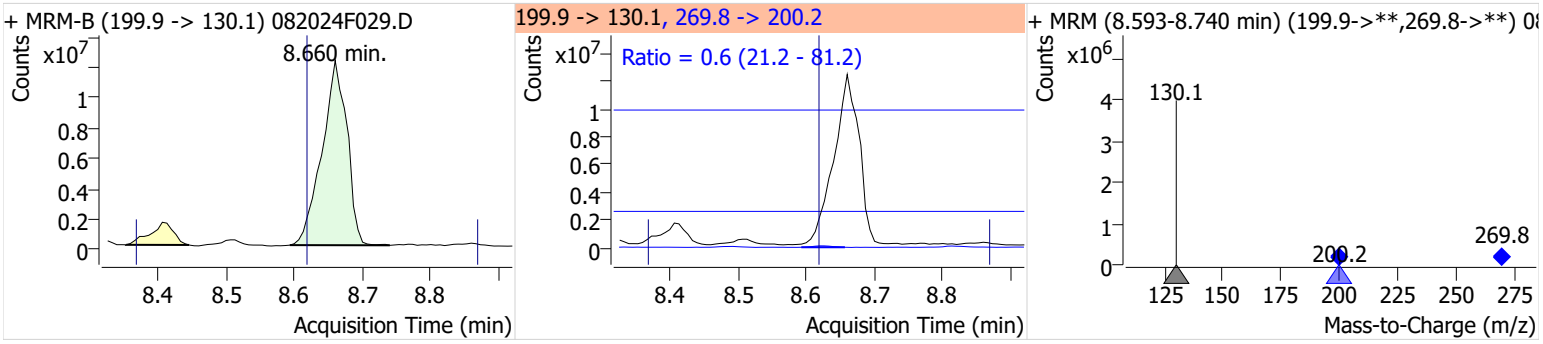




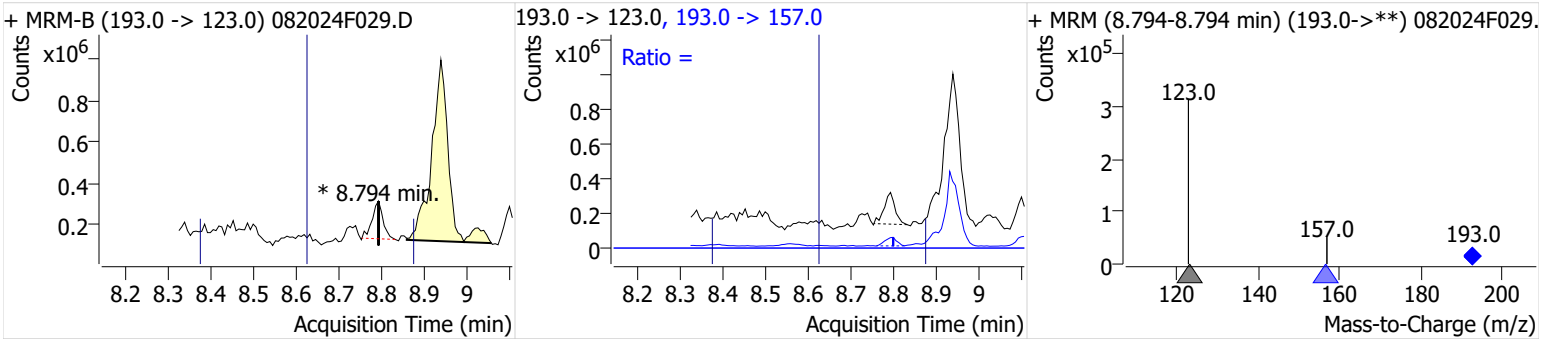


MassHunter Quantitative Analysis Sample Report

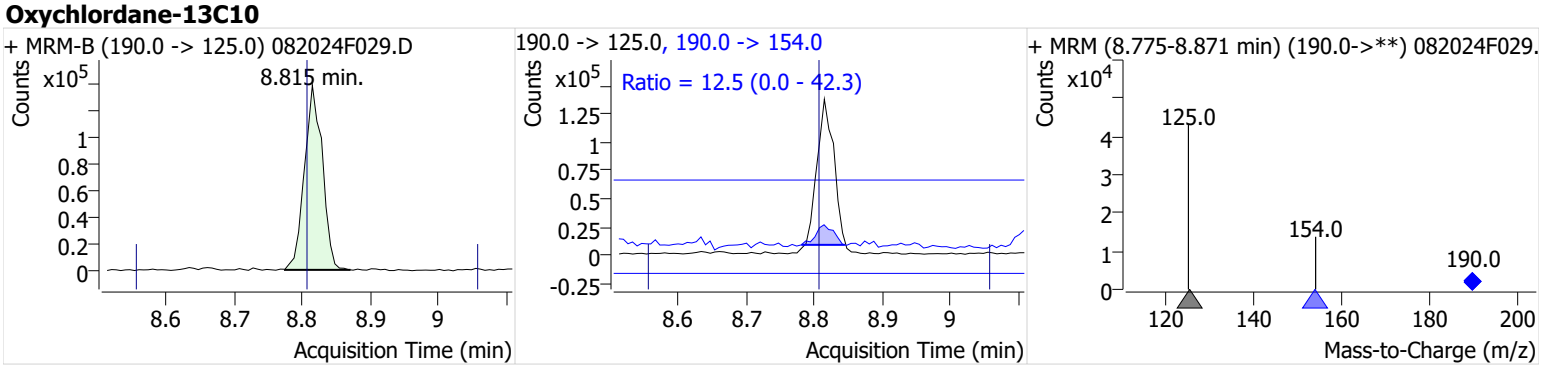
Isodrin-13C12



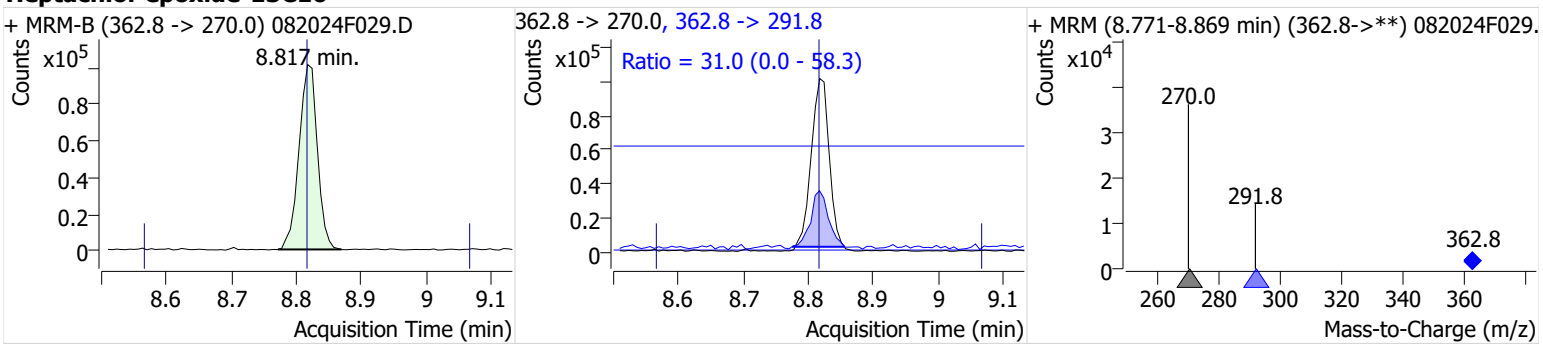
Isodrin



Oxychlordane-13C10

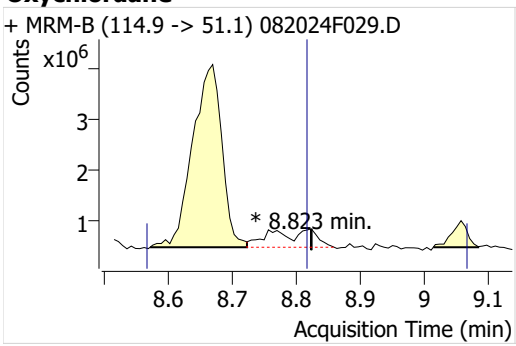


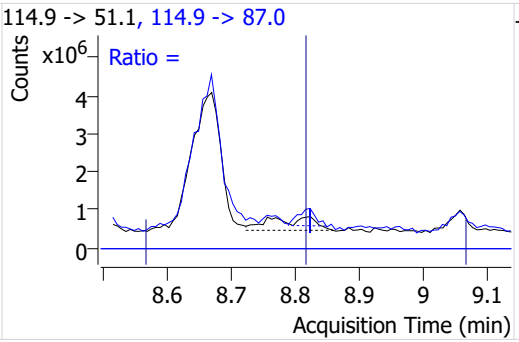
Heptachlor epoxide-13C10

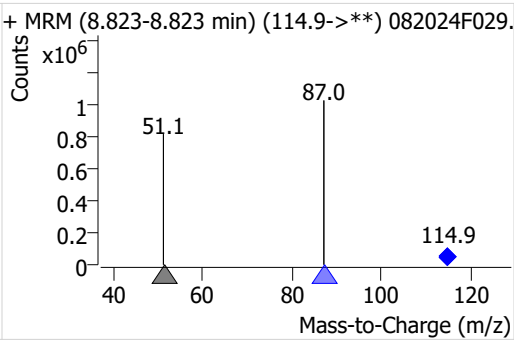


MassHunter Quantitative Analysis Sample Report

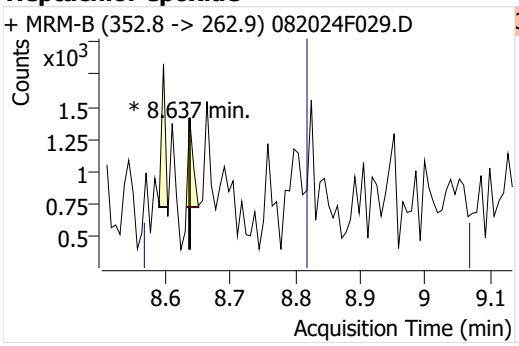
Oxychlordane

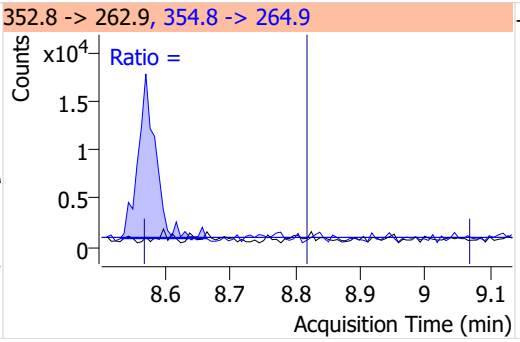


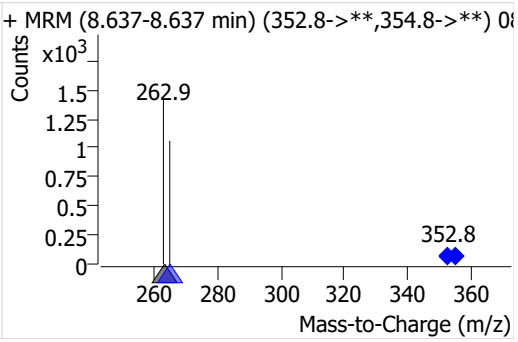




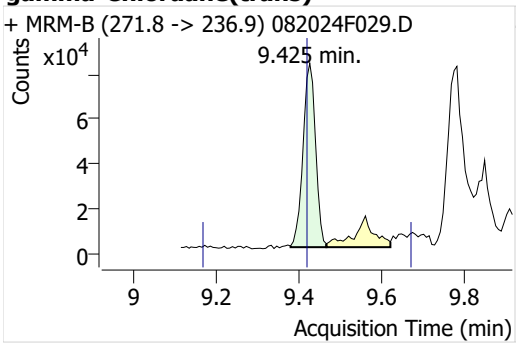
Heptachlor epoxide

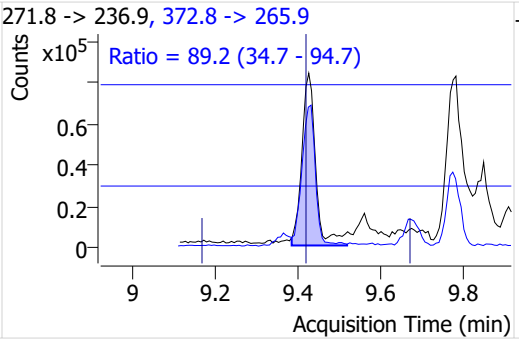


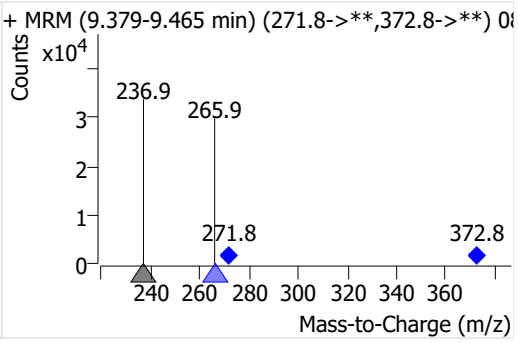




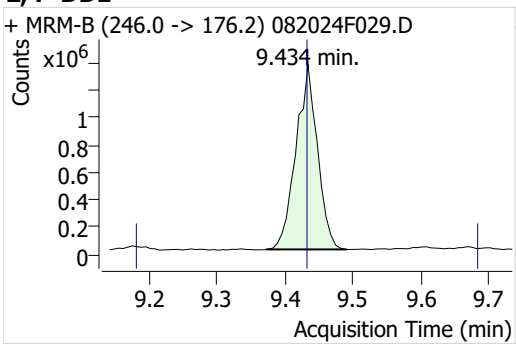
gamma-Chlordane(trans)

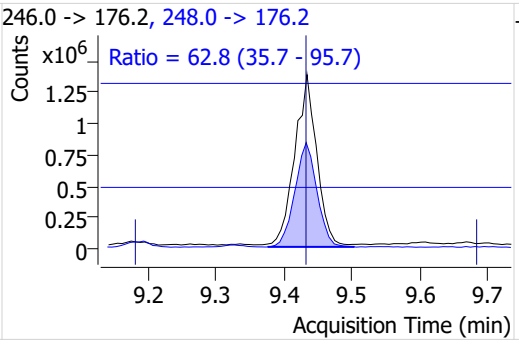


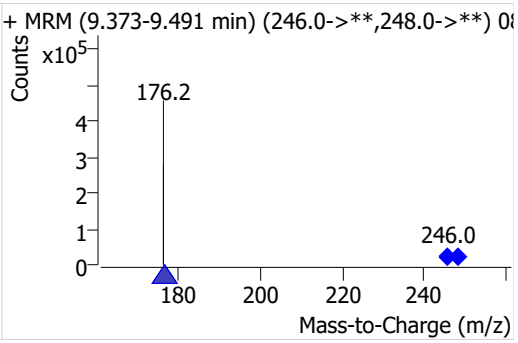




2,4'-DDE







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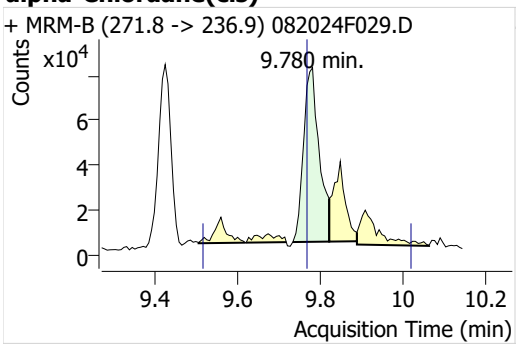
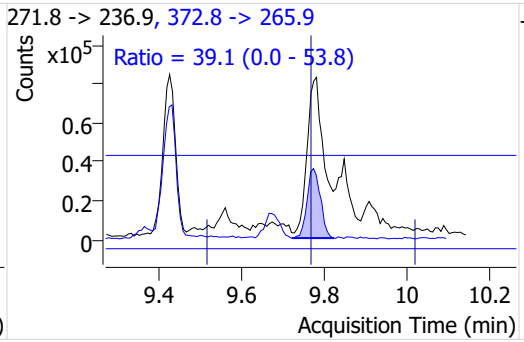
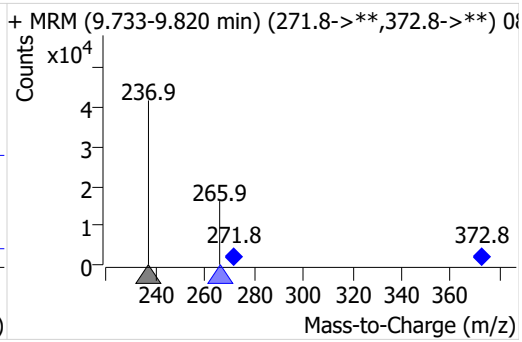
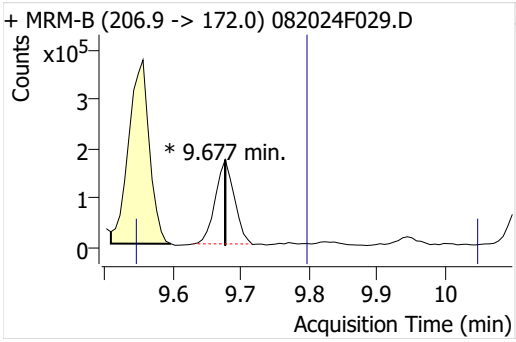
alpha-Chlordane(cis)

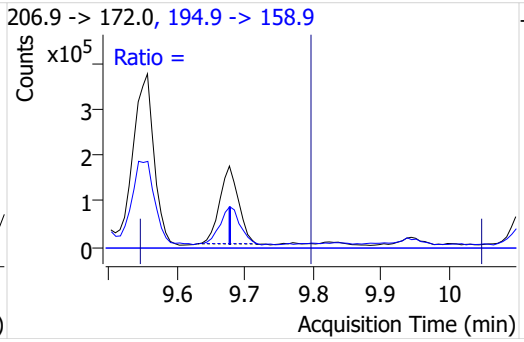


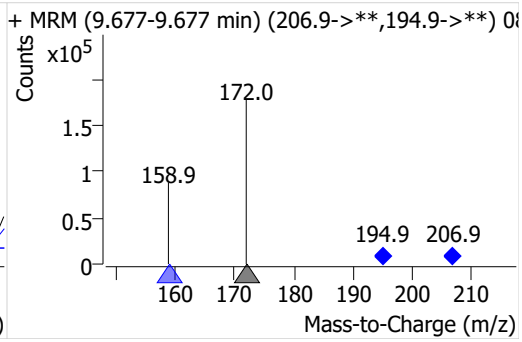




Endosulfan I

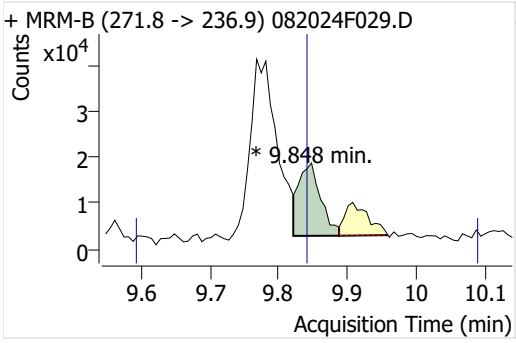


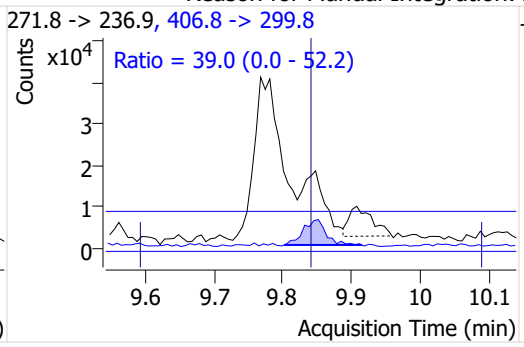


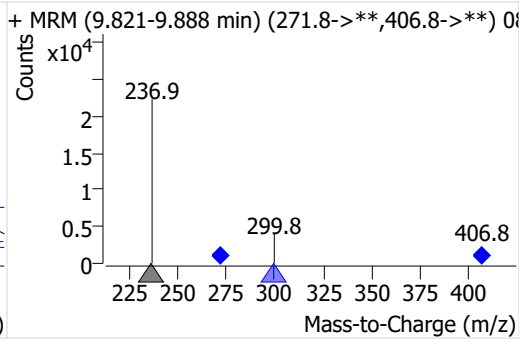


trans-Nanochlor

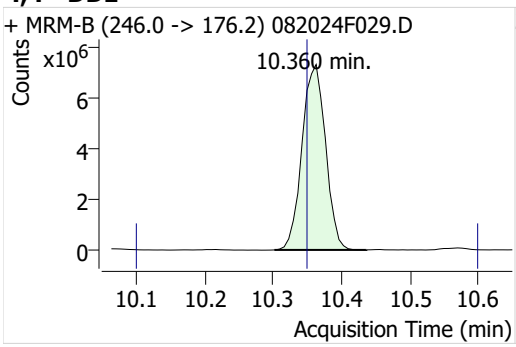
Reason for Manual Integration: **Baseline Correction**

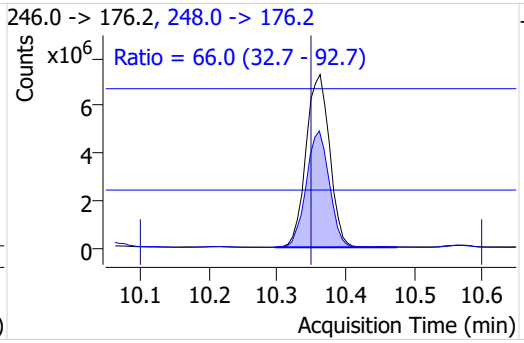


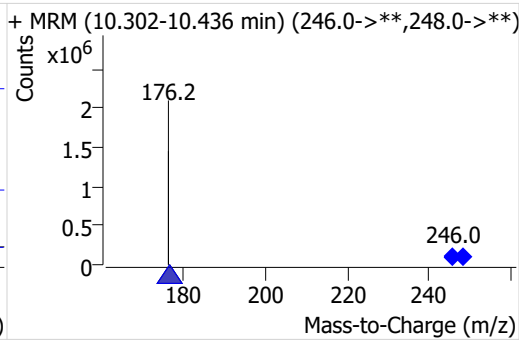




4,4' -DDE

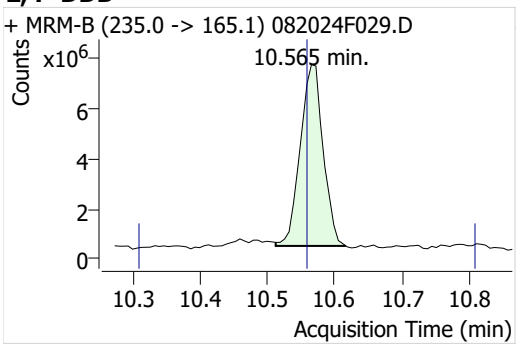


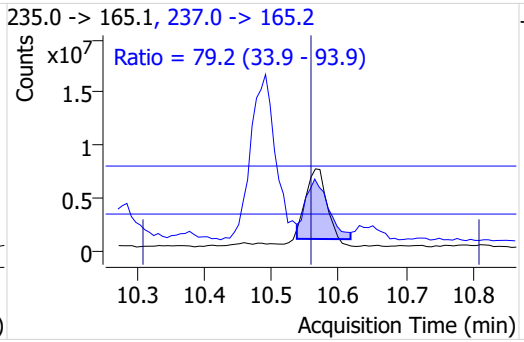


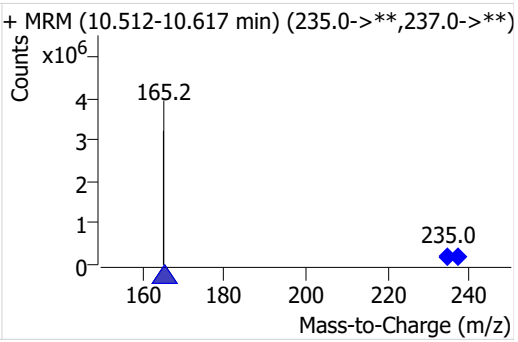


MassHunter Quantitative Analysis Sample Report

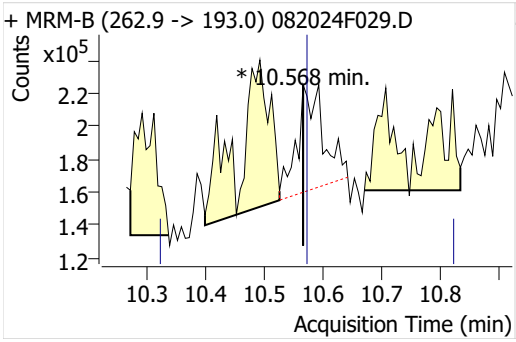
2,4'-DDD

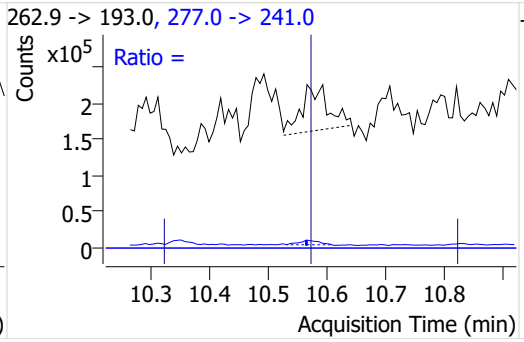


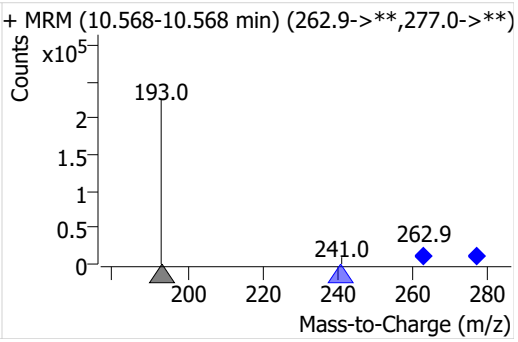




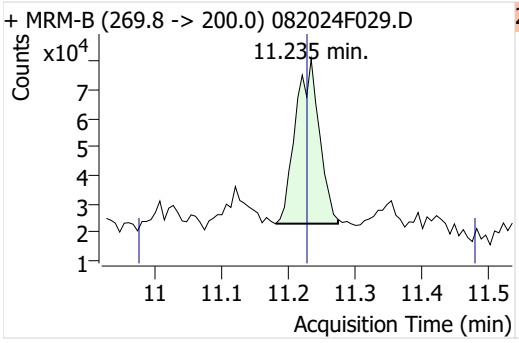
Dieldrin

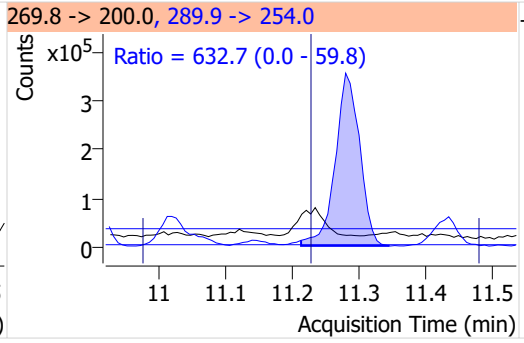


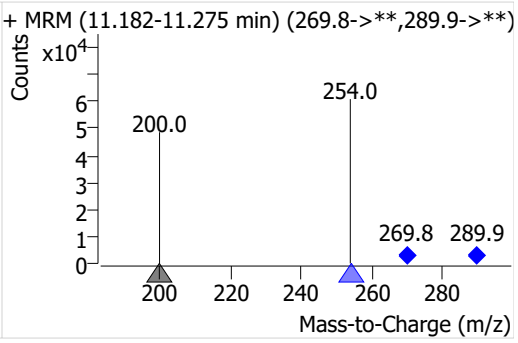




Endrin-13C12







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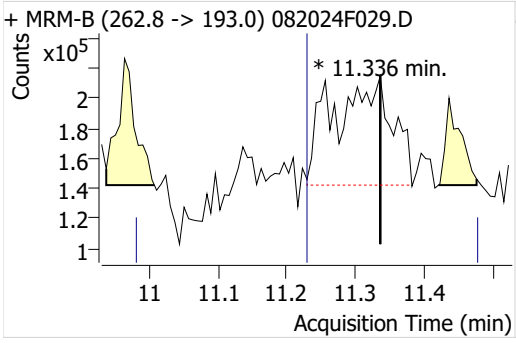

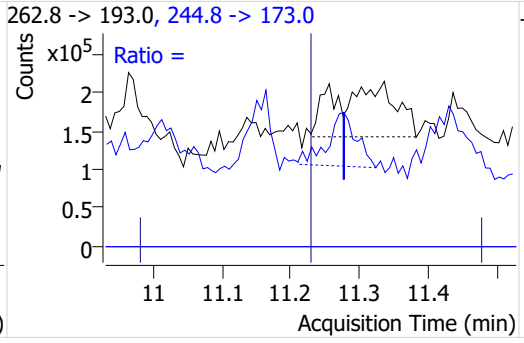

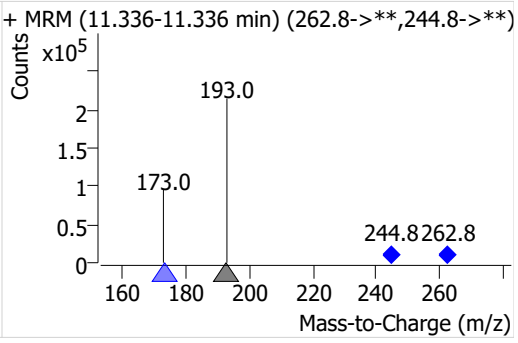

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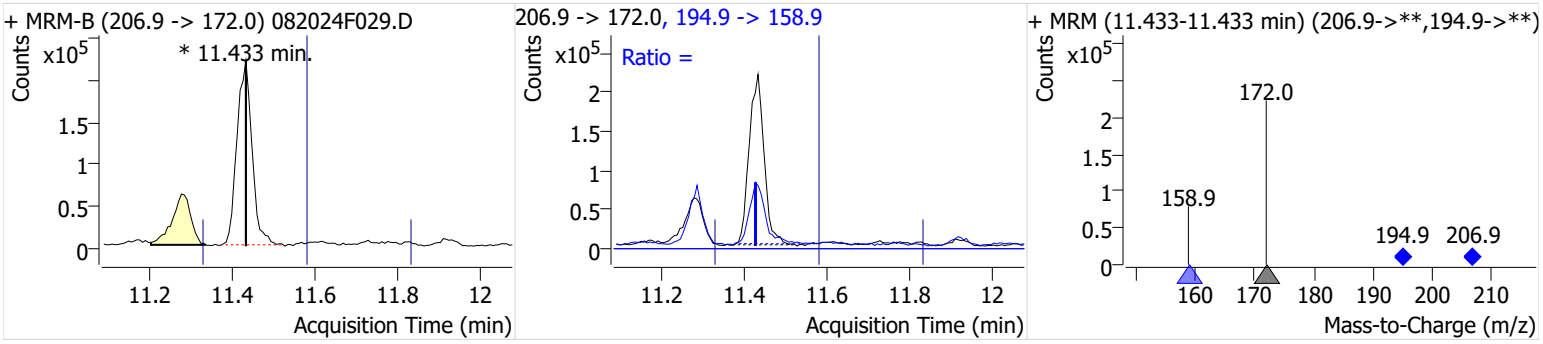
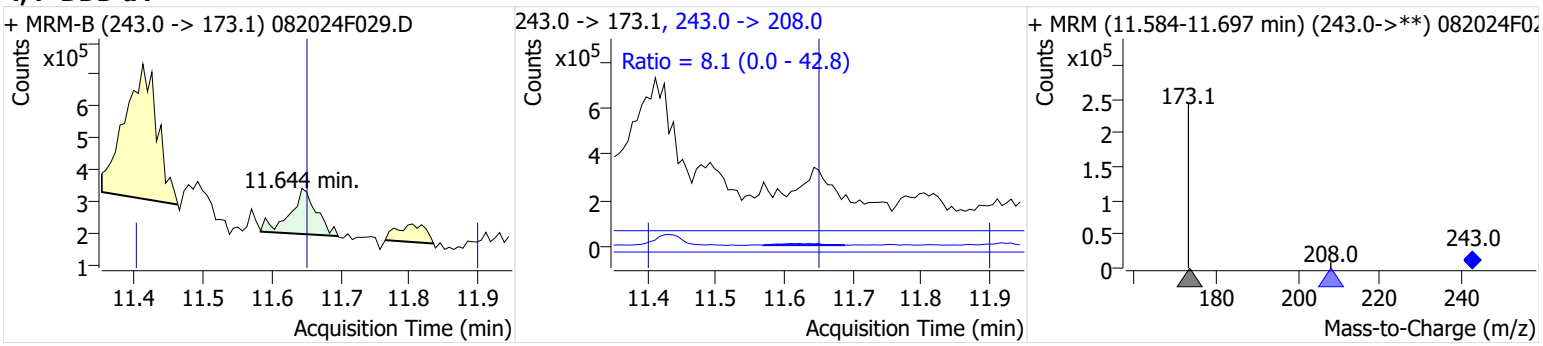
Endosulfan II



4,4'-DDD d4



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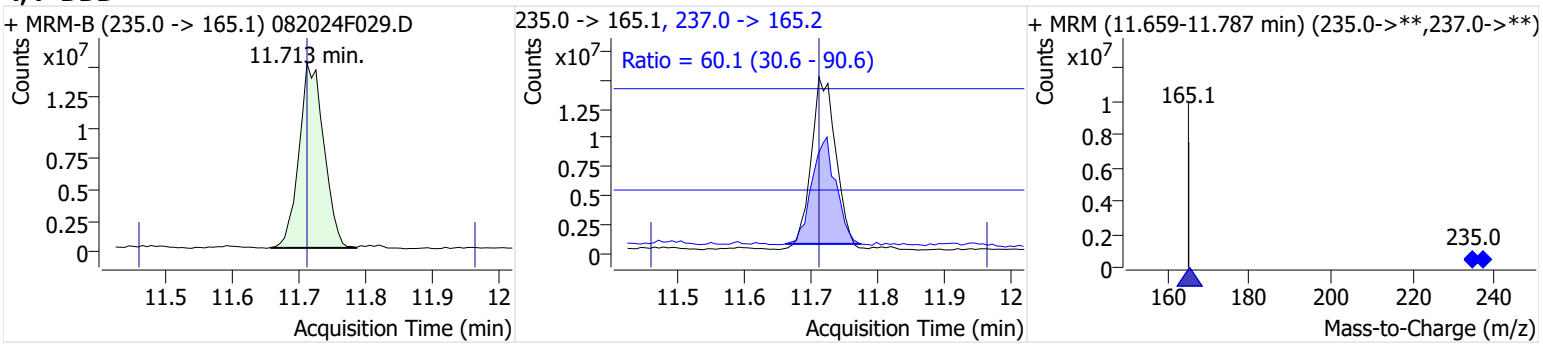
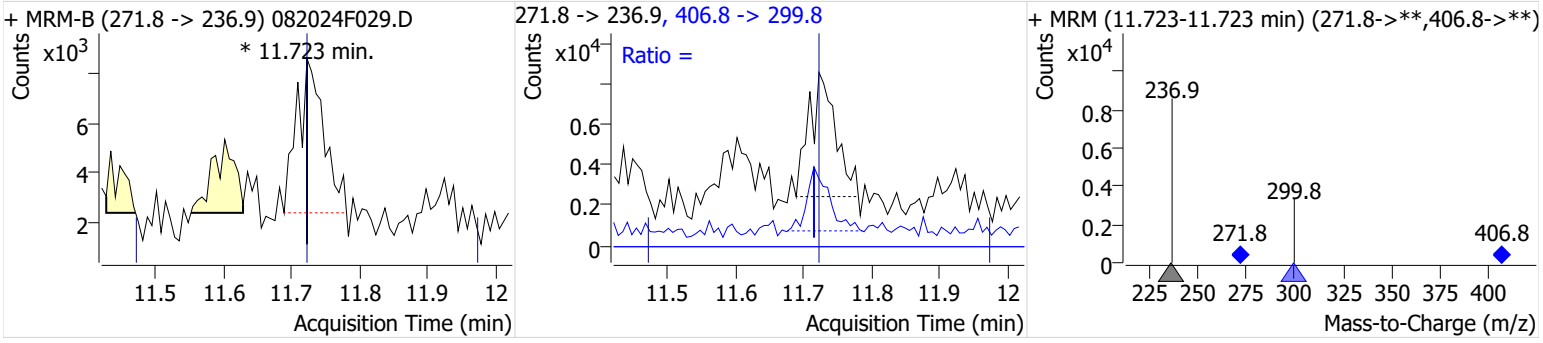
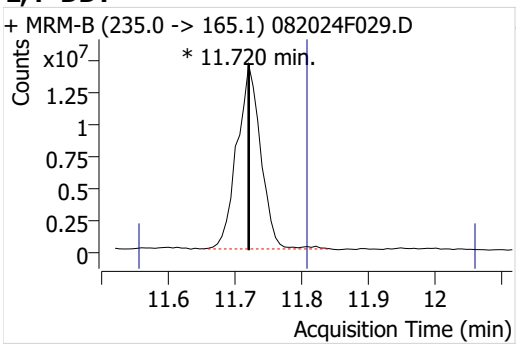


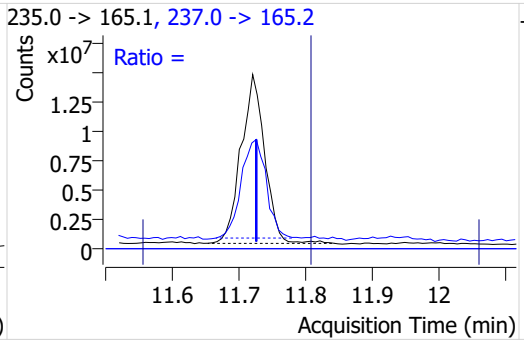
cis-Nonachlor

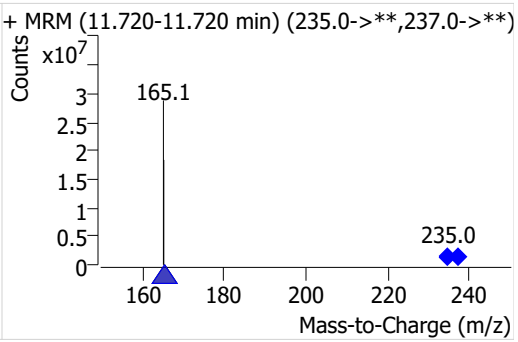


MassHunter Quantitative Analysis Sample Report

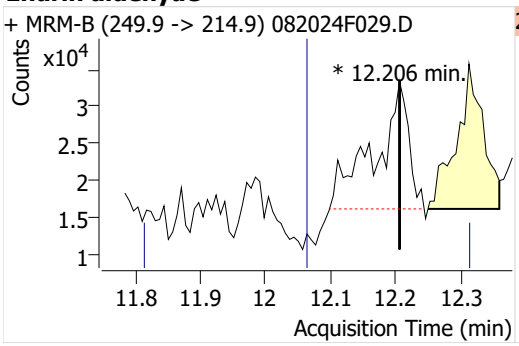
2,4'-DDT

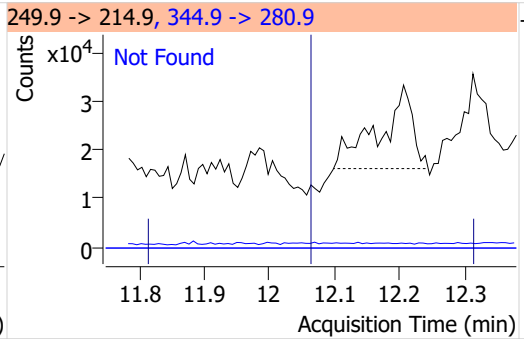


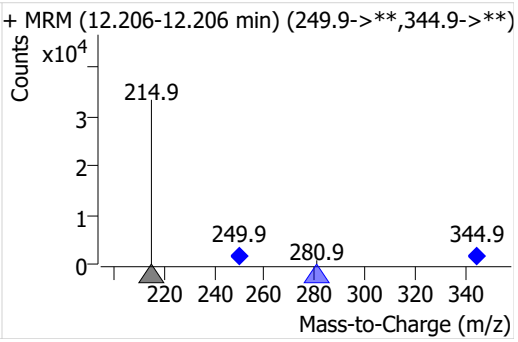




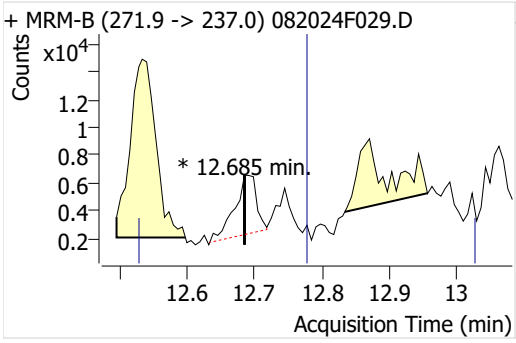
Endrin aldehyde

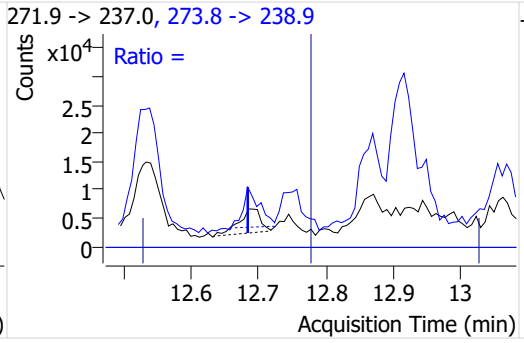


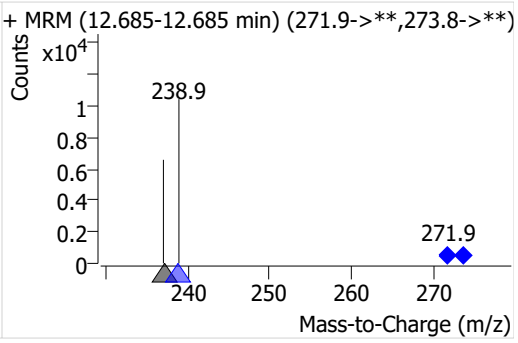




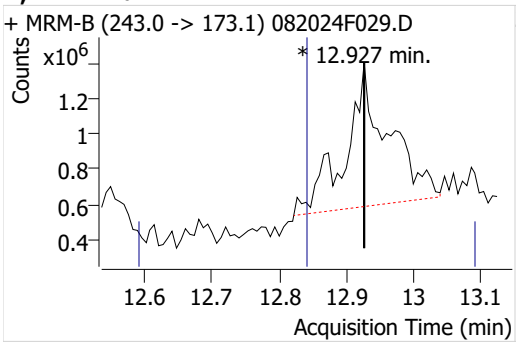
Endosulfan sulfate

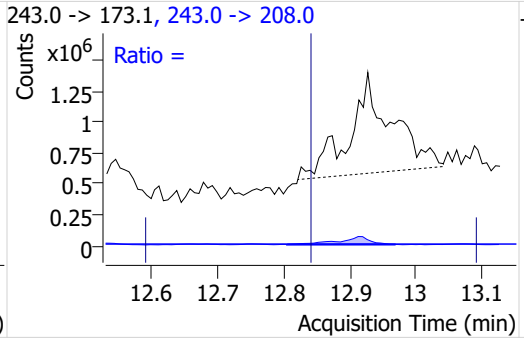


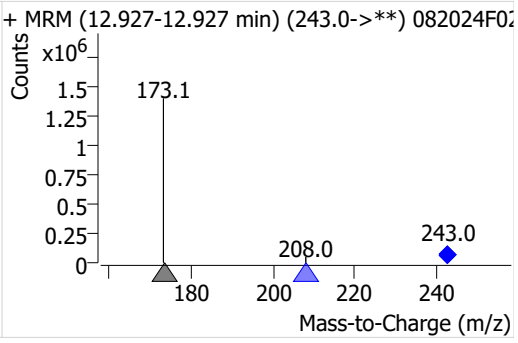




4,4'-DDT-d4







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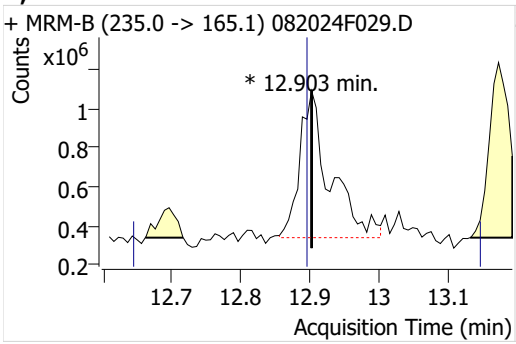
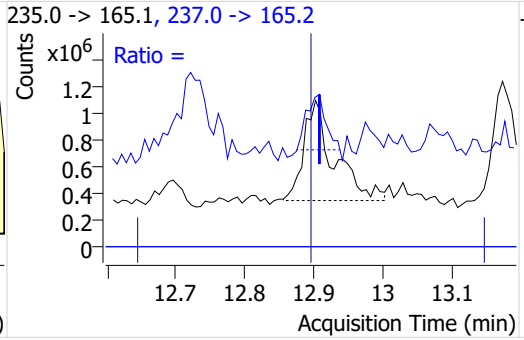
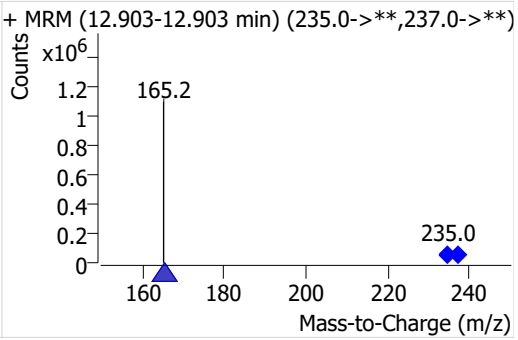
4,4'-DDT







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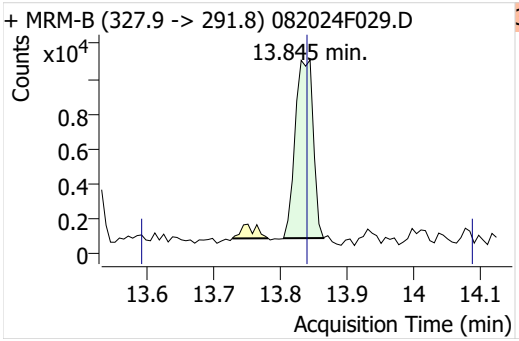
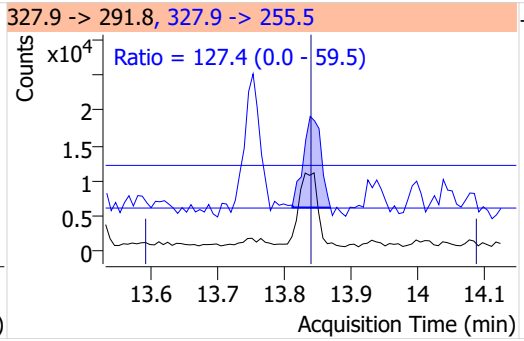
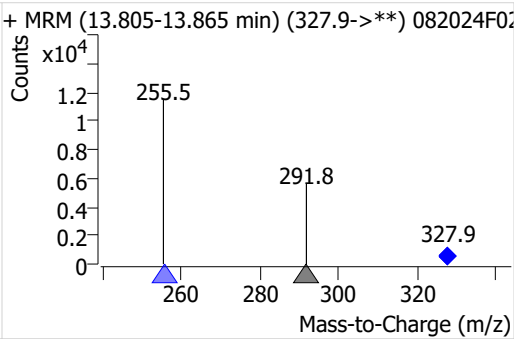
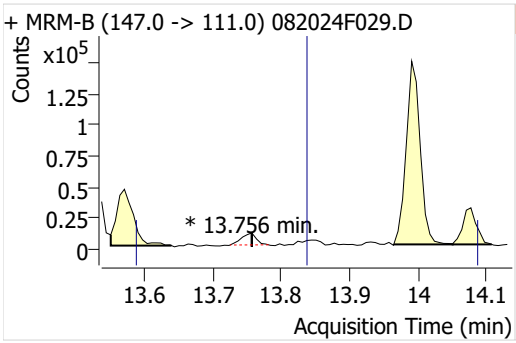
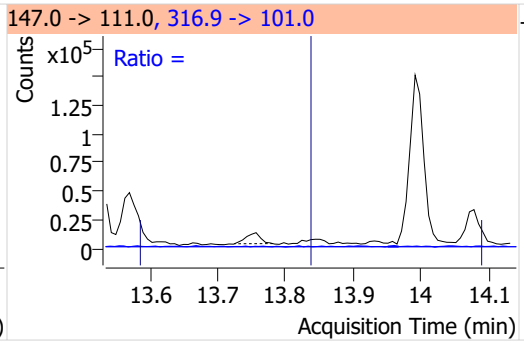


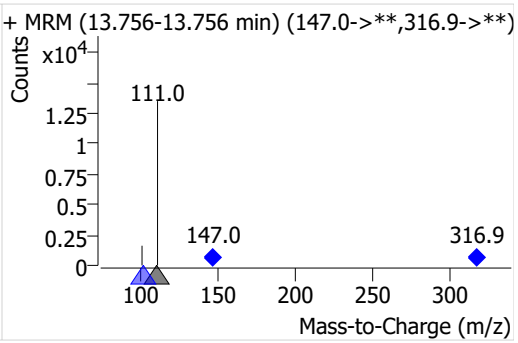




Endrin ketone







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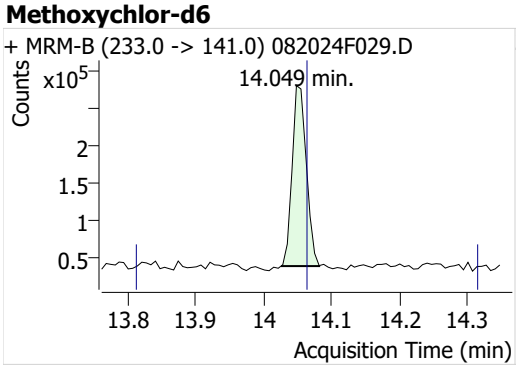

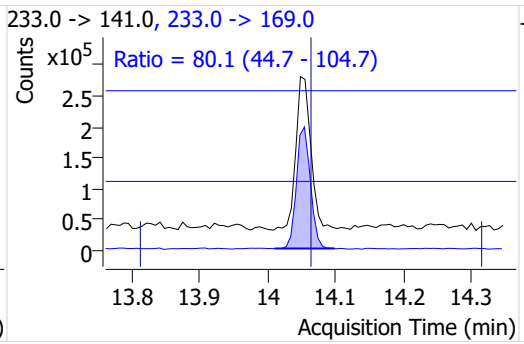

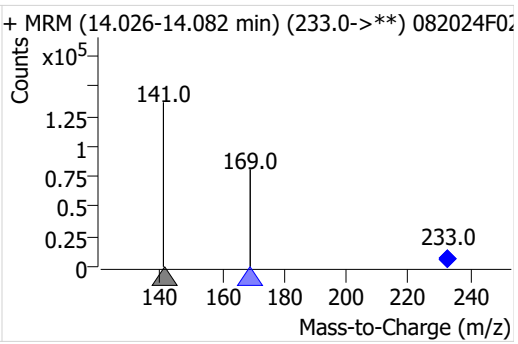

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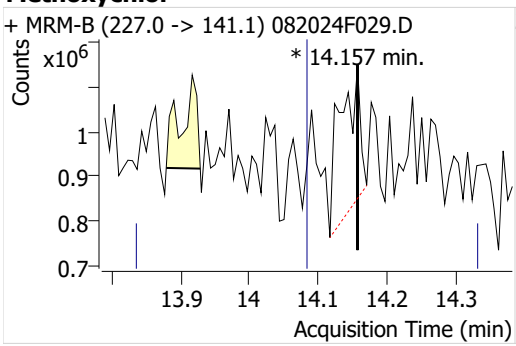
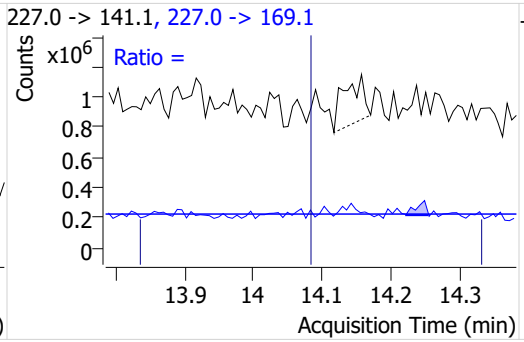
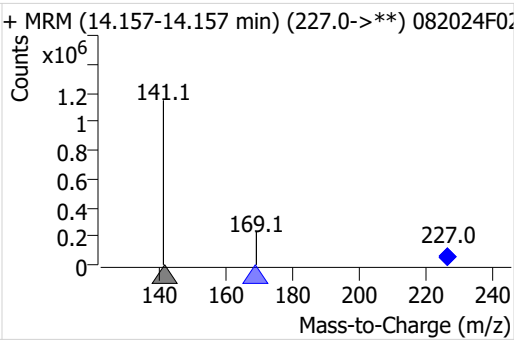
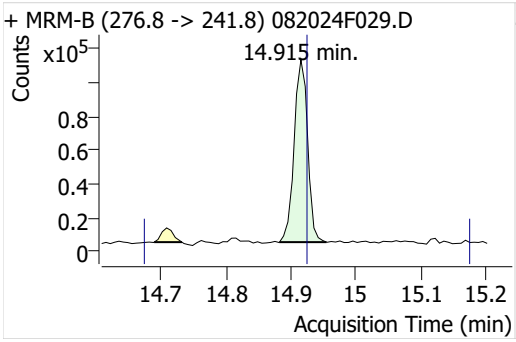
Methoxychlor

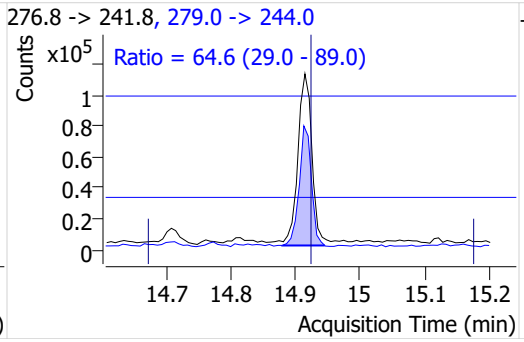


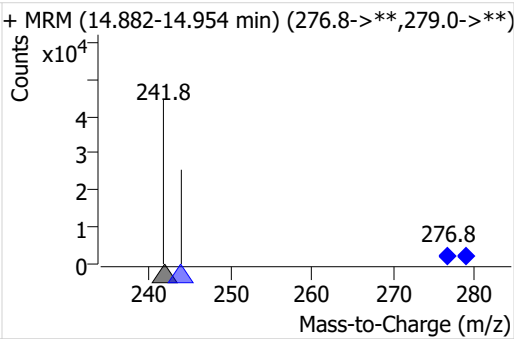




Mirex-13C10







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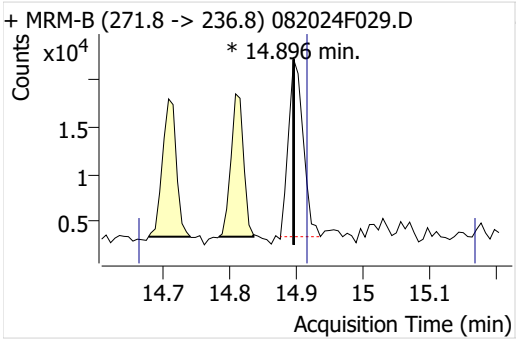
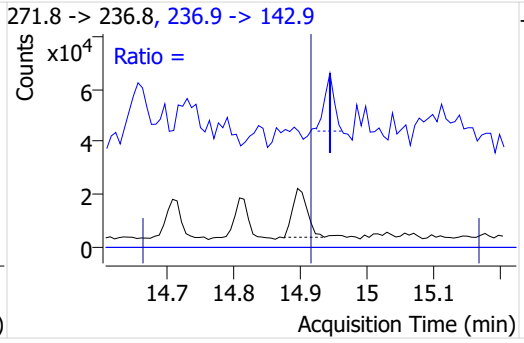
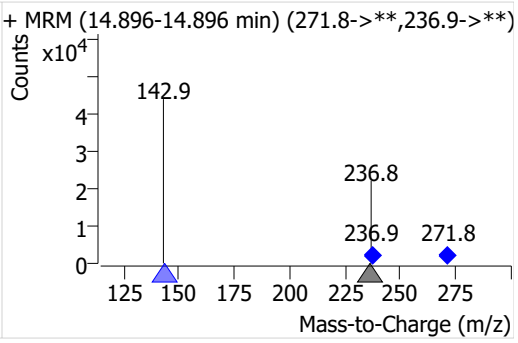
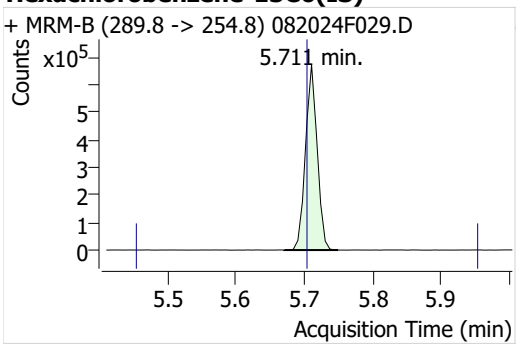
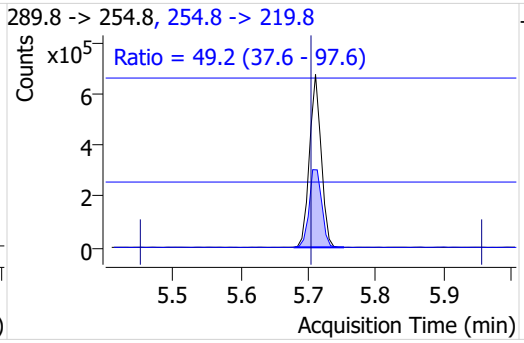


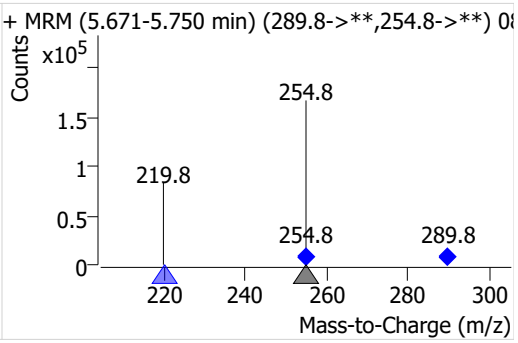




Hexachlorobenzene-13C6(IS)

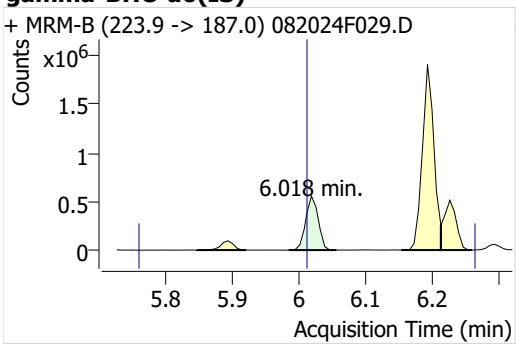


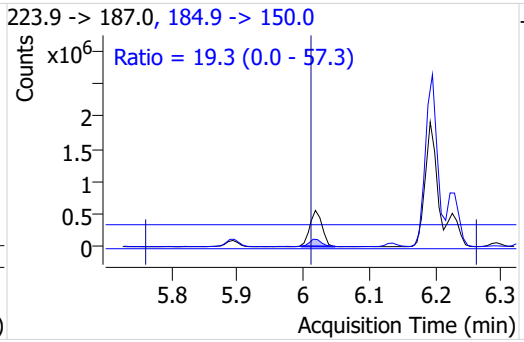


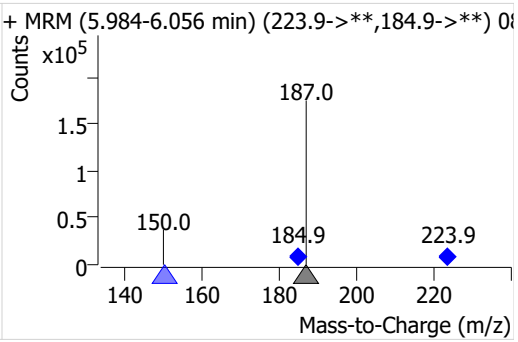


MassHunter Quantitative Analysis Sample Report

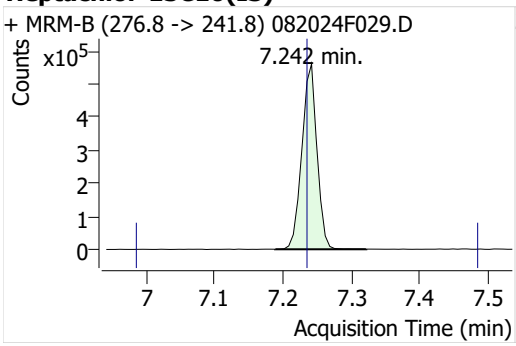
gamma-BHC-d6(IS)

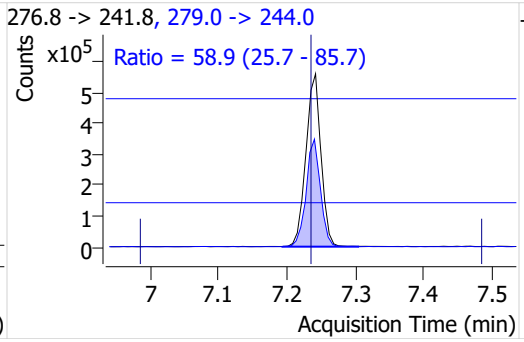


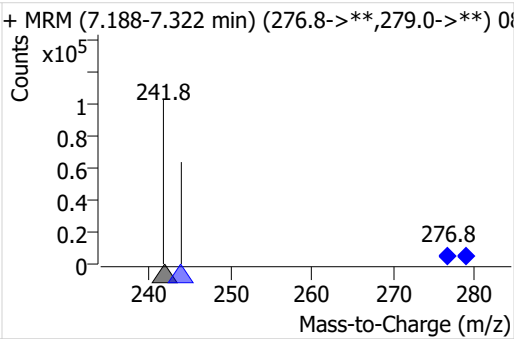




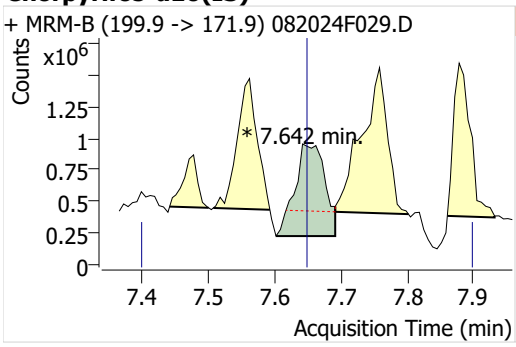
Heptachlor-13C10(IS)

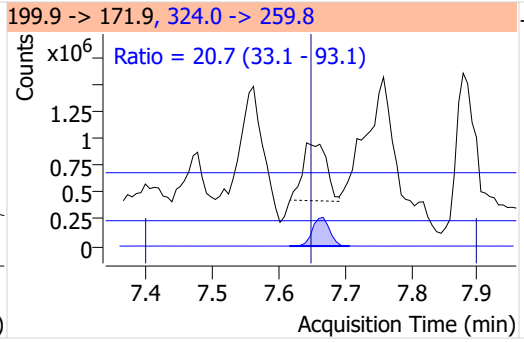


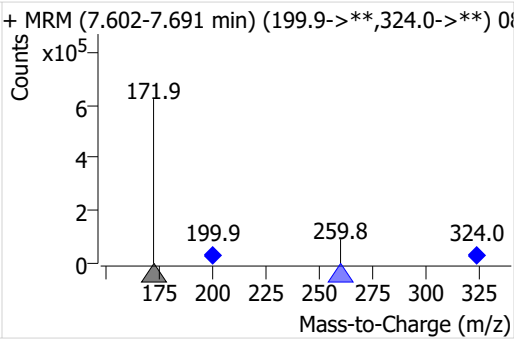




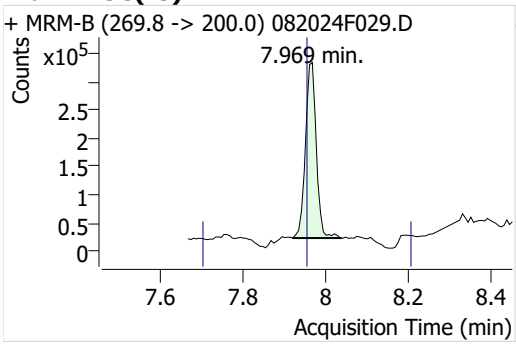
Chorpyrifos-d10(IS)

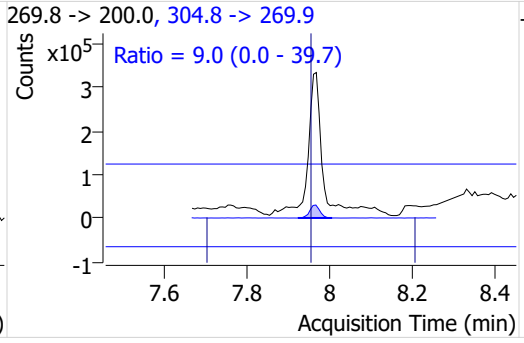


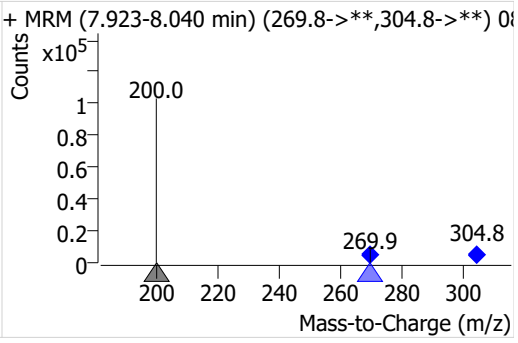




Aldrin-13C(IS)

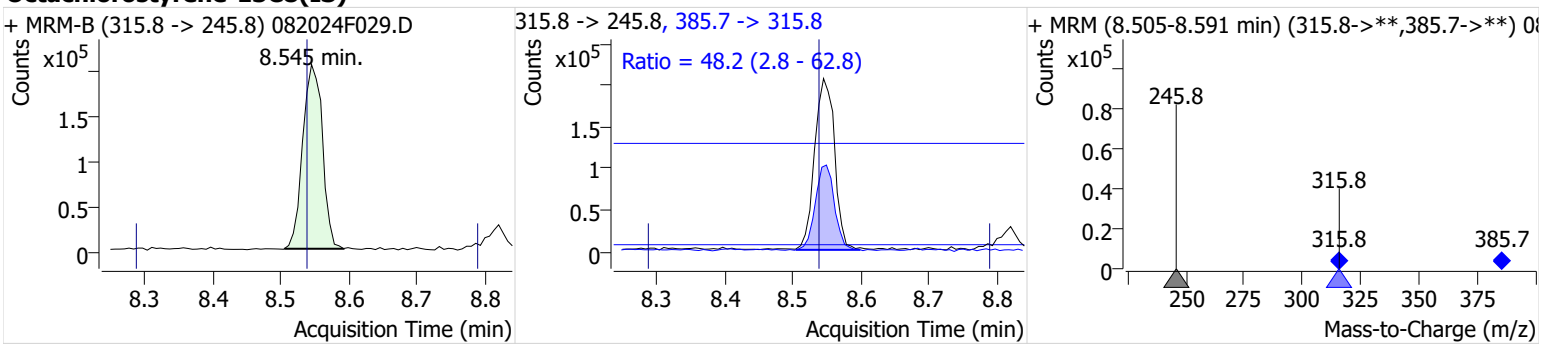




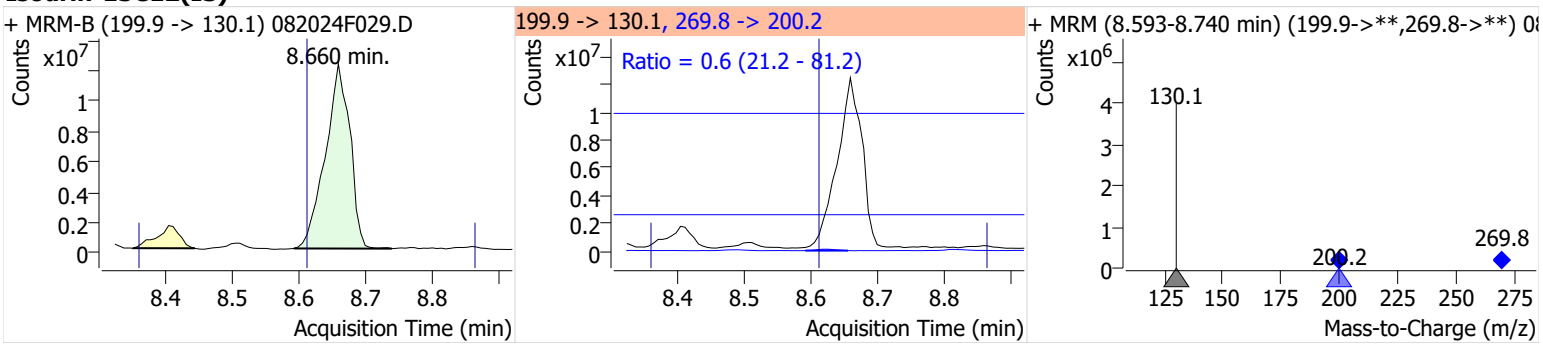


MassHunter Quantitative Analysis Sample Report

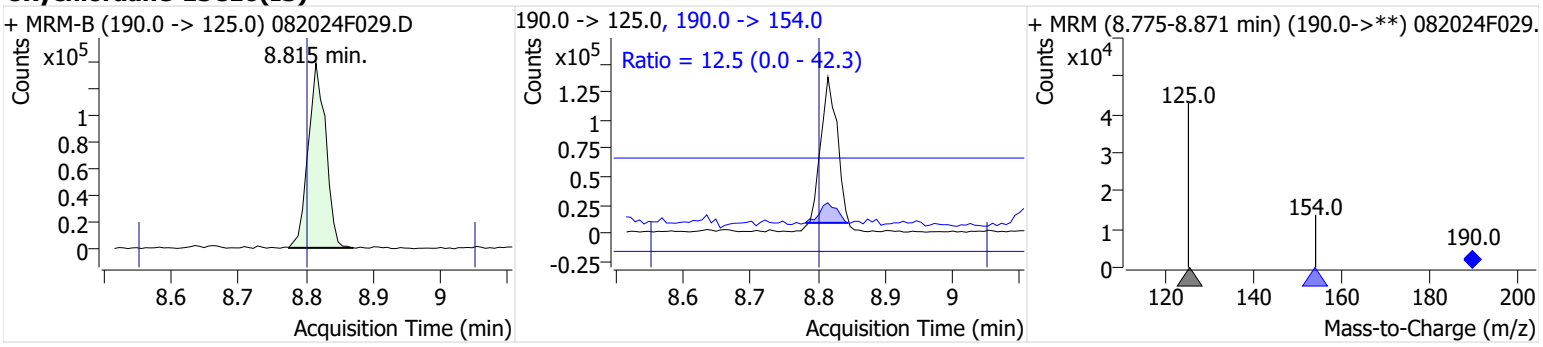
Octachlorostyrene-13C8(IS)



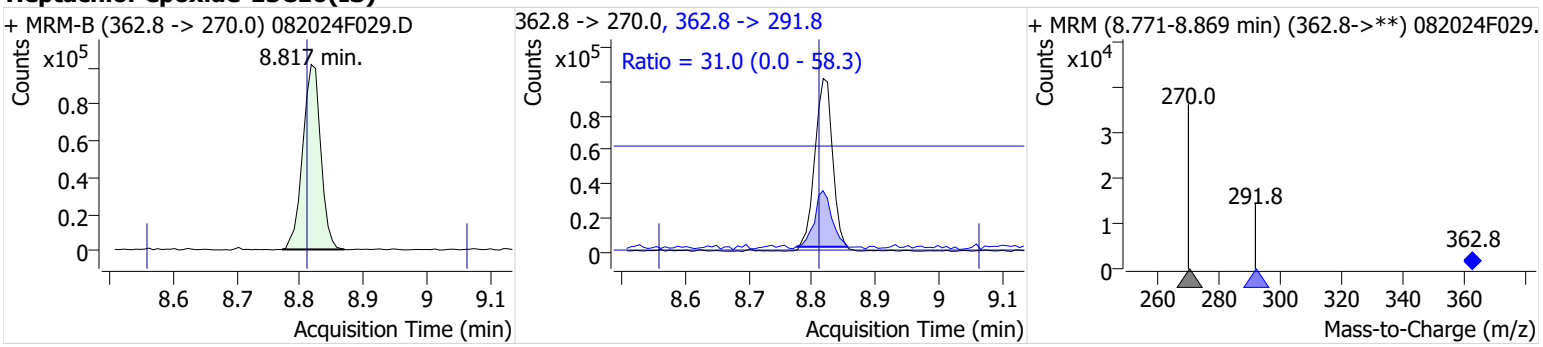
Isodrin-13C12(IS)



Oxychlordane-13C10(IS)

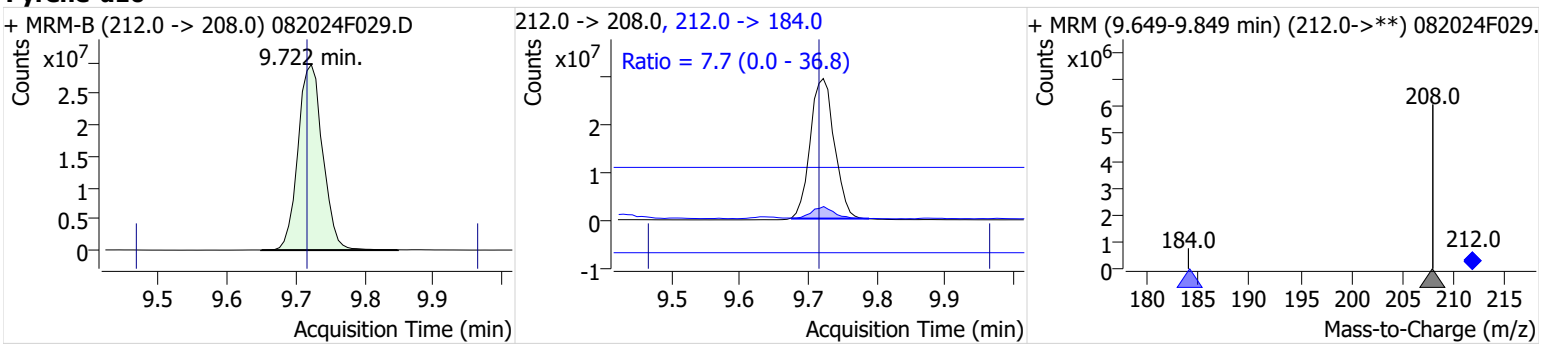


Heptachlor epoxide-13C10(IS)

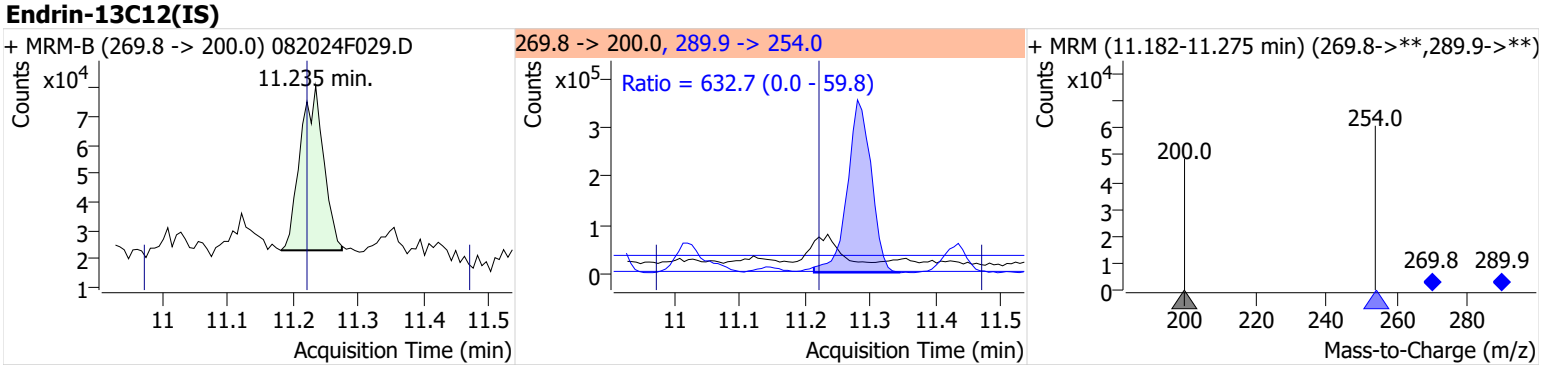


MassHunter Quantitative Analysis Sample Report

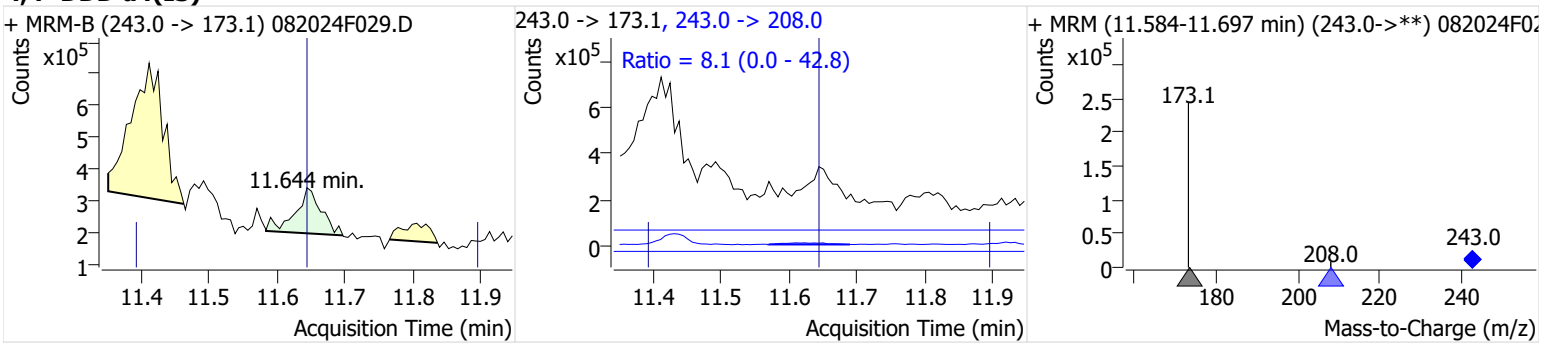
Pyrene-d10



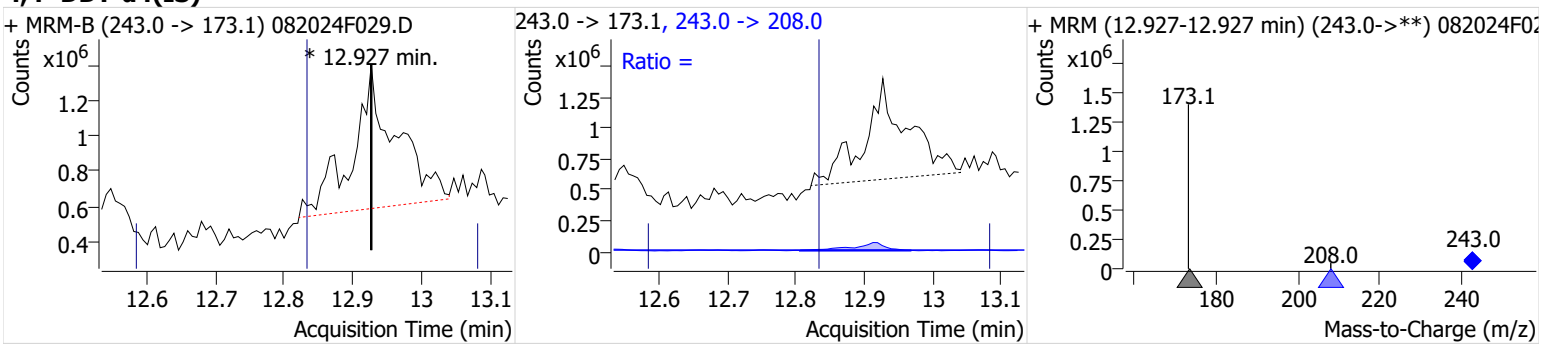
Endrin-13C12(IS)



4,4'-DDD d4(IS)

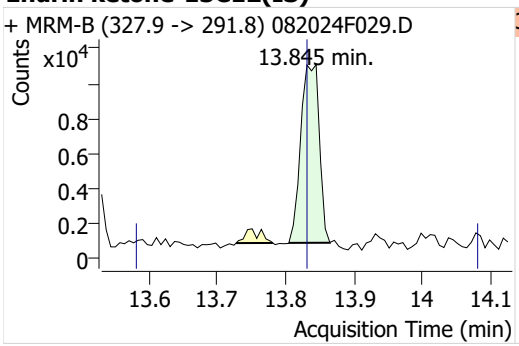


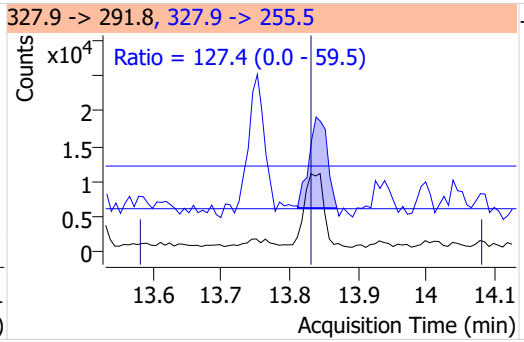
4,4'-DDT-d4(IS)

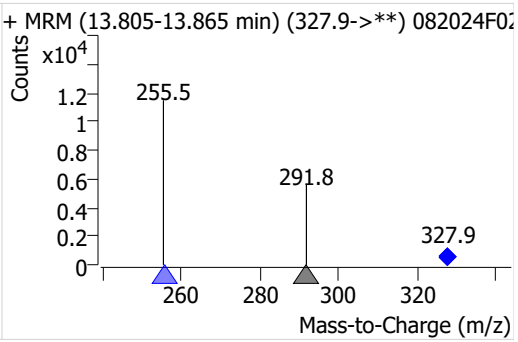


MassHunter Quantitative Analysis Sample Report

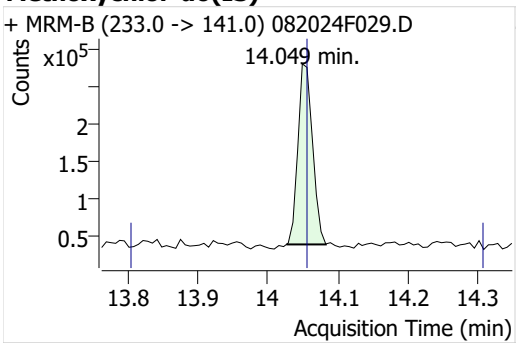
Endrin ketone-13C12(IS)

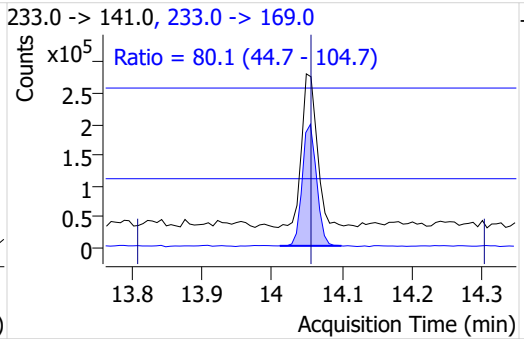


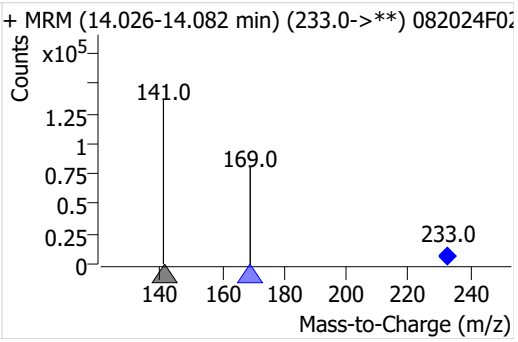




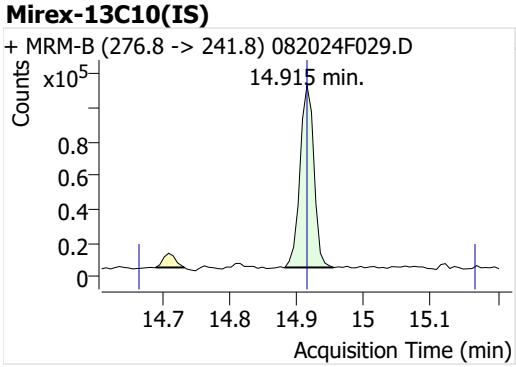
Methoxychlor-d6(IS)

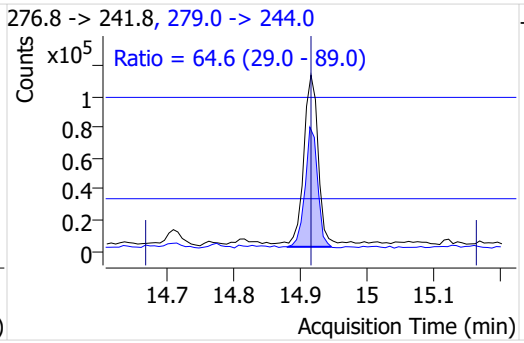


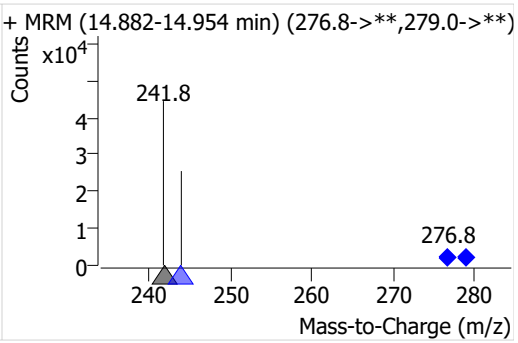




Mirex-13C10(IS)







1st 08/20/24
2nd 08/20/24

Validation Report

Data File: J:\MS42\Data\080624\080624F008.D
Lab ID: KQ2411800-04
RunType: MB
Matrix: Sediment

Date Acquired: 8/6/24 12:46
Batch ID: 851162
Analysis Method: 1699M/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery	X	
Internal Standards	X	
Surrogates	X	
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Primary Review: _____

Printed: 8/20/24 17:33
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Secondary Review: _____

1st 08/20/24
2nd 08/20/24

Quantitation Report

Data File:	J:\MS42\Data\080624\080624F008.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 12:46	**Vial:**	3
Run Type:	MB	**Dilution:**	1
Lab ID:	KQ2411800-04	**Raw Units:**	ng/ml

Bottle ID:		**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	851162	**Prep Lot:**	442451	**Report Group:**	KQ2411800
Analysis	1699M	**Prep Method:**	EPA 3541		
		Prep Date:	8/1/24		

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400368
		Report List ID:	25424

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	8.765	-0.01	37162275.346	100	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec	% Rec Criteria	Rpt?
S_Aldrin-13C12	7.200	-0.01	1838361.477	8.894	44	12 - 88	Y
S_4,4'DDD-d4	10.532	-0.01	1970939.421	2.505	50	9 - 159	Y
S_4,4'-DDT-d4	11.785	-0.02	1169791.529	2.414	48	5 - 187	Y
S_Endrin-13C12	10.138	-0.01	459893.832	14.516	73	14 - 141	Y
S_GBHCD6	5.484	-0.01	2640414.282	5.553	28	5 - 90	Y
S_Oxychlordane-13C10	7.961	-0.01	1148120.692	8.740	44	5 - 86	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Aldrin	7.195	-0.02	0	0	0	U	Y
gamma-BHC (Lindane)	5.536	-0.01	1758.253	0.011	0.0011	U	Y
cis-Chlordane	8.823	-0.01	0	0	0	U	Y
trans-Chlordane	8.503	-0.01	0	0	0	U	Y
2,4'-DDD	9.553	-0.01	0	0	0	U	Y
4,4'-DDD	10.608	-0.01	8103.709	0.019	0.0018	U	Y
2,4'-DDE	8.520	-0.01	0	0	0	U	Y
4,4'-DDE	9.357	-0.02	10249.470	0.020	0.0019	U	Y
2,4'-DDT	10.608	-0.08	0	0	0	U	Y
4,4'-DDT	11.860	-0.02	0	0	0	U	Y
Dieldrin	9.529	-0.03	0	0	0	U	Y
cis-Nonachlor	10.446	-0.17	0	0	0	U	Y
trans-Nonachlor	8.871	-0.03	0	0	0	U	Y
Oxychlordane	7.975		0	0	0	U	Y

1st 08/20/24

2nd 08/20/24

Data File:	J:\MS42\Data\080624\080624F008.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 12:46	**Vial:**	3
Run Type:	MB	**Dilution:**	1
Lab ID:	KQ2411800-04	**Raw Units:**	ng/ml

Prep Amount:	10.4750 g	**Dilution:**	1
Prep Final Amount:	1.00 mL	**Basis Factor:**	100.00

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/20/24 17:33

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MassHunter Quantitative Analysis Sample Report

Data File	J:\MS42\Data\080624\080624F008.D		
Batch File	J:\MS42\Data\080624\QuantResults\080624 OC PEST.batch.bin		
Acq. Date-Time	8/6/2024 12:46:32 PM	**Acq Operator**	EBruno
Name	KQ2411800-04 MB	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	8/19/2024 3:52:05 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	072424 OC PEST ICAL.batch.bin	**Vial**	4
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.211	289.8 -> 254.8	2508572	20.0000 ng/ml	0.001
γ-BHC-d6(IS)	5.484	223.9 -> 187.0	2640414	20.0000 ng/ml	0.005
Heptachlor-13C10(IS)	6.565	276.8 -> 241.8	2294113	20.0000 ng/ml	0.006
Chorpyrifos-d10(IS)	6.941	199.9 -> 171.9	1813434	20.0000 ng/ml	0.008
Aldrin-13C(IS)	7.200	269.8 -> 200.0	1838529	20.0000 ng/ml	0.007
Octachlorostyrene-13C8(IS)	7.722	315.8 -> 245.8	1385703	20.0000 ng/ml	0.004
Isodrin-13C12(IS)	7.785	199.9 -> 130.1	2029841	20.0000 ng/ml	0.005
Oxychlordane-13C10(IS)	7.961	190.0 -> 125.0	1148121	20.0000 ng/ml	0.000
Heptachlor epoxide-13C10(IS)	7.963	362.8 -> 270.0	675488	20.0000 ng/ml	0.000
Pyrene-d10	8.765	212.0 -> 208.0	37162275	100.0000 ng/ml	0.001
Endrin-13C12(IS)	10.138	269.8 -> 200.0	459894	20.0000 ng/ml	0.003
4,4'-DDD d4(IS)	10.532	243.0 -> 173.1	1970939	5.0000 ng/ml	0.000
4,4'-DDT-d4(IS)	11.785	243.0 -> 173.1	1169792	5.0000 ng/ml	0.004
Endrin ketone-13C12(IS)	13.080	327.9 -> 291.8	102206	20.0000 ng/ml	0.003
Methoxychlor-d6(IS)	13.394	233.0 -> 141.0	4548365	20.0000 ng/ml	0.003
Mirex-13C10(IS)	14.328	276.8 -> 241.8	1500457	5.0000 ng/ml	0.001

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	2508572	5.346 ng/ml	
		Spiked Amount =	20.0	Recovery =	*26.7 %*
γ-BHC-d6	5.491	223.9 -> 187.0	2640414	5.553 ng/ml	
		Spiked Amount =	20.0	Recovery =	*27.8 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	2294113	8.398 ng/ml	
		Spiked Amount =	20.0	Recovery =	*42.0 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	1813434	15.488 ng/ml	
		Spiked Amount =	20.0	Recovery =	*77.4 %*
Aldrin-13C	7.207	269.8 -> 200.0	1838361	8.894 ng/ml	
		Spiked Amount =	20.0	Recovery =	*44.5 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	1385703	7.438 ng/ml	
		Spiked Amount =	20.0	Recovery =	*37.2 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2029841	9.163 ng/ml	
		Spiked Amount =	20.0	Recovery =	*45.8 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1148121	8.740 ng/ml	
		Spiked Amount =	20.0	Recovery =	*43.7 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	675488	9.085 ng/ml	
		Spiked Amount =	20.0	Recovery =	*45.4 %*
Endrin-13C12	10.131	269.8 -> 200.0	459894	14.516 ng/ml	
		Spiked Amount =	20.0	Recovery =	*72.6 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	1970939	2.505 ng/ml	
		Spiked Amount =	5.0	Recovery =	*50.1 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1169792	2.414 ng/ml	
		Spiked Amount =	5.0	Recovery =	*48.3 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	102206	15.283 ng/ml	
		Spiked Amount =	20.0	Recovery =	*76.4 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	4548365	16.926 ng/ml	
		Spiked Amount =	20.0	Recovery =	*84.6 %*

MassHunter Quantitative Analysis Sample Report

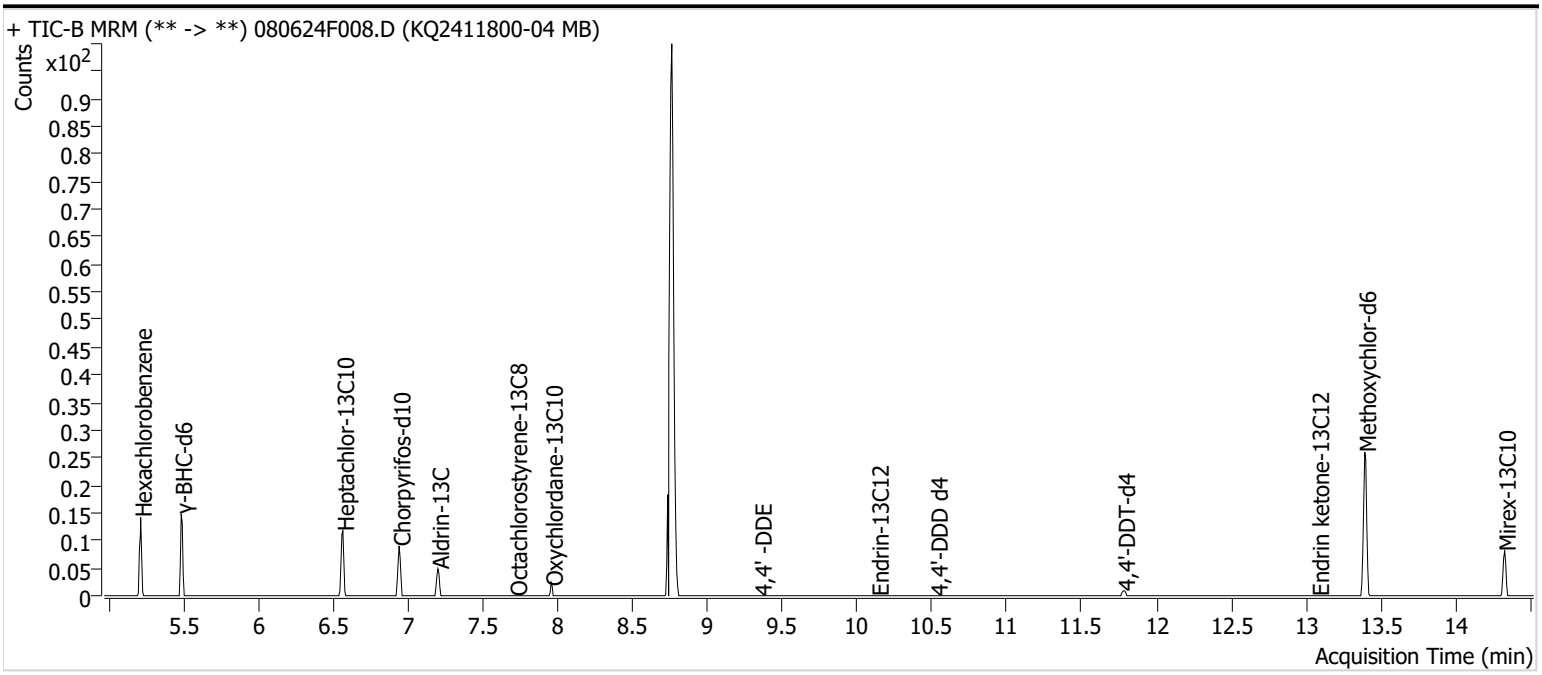
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	1500457	2.099 ng/ml
		Spiked Amount = 5.0		Recovery = *42.0 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.214	283.8 -> 213.9	93602	0.489 ng/ml	98
β-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	1758	0.011 ng/ml	29
δ-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Heptachlor	Heptachlor-13C10(IS)		271.7 -> 236.9		ND ng/ml	
Chorpyrifos	Chorpyrifos-d10(IS)		196.9 -> 169.0		ND ng/ml	
Aldrin	Aldrin-13C(IS)		254.9 -> 220.0		ND ng/ml	
Octachlorostyrene	Octachlorostyrene-13C8(IS)		342.8 -> 307.8		ND ng/ml	
Isodrin	Isodrin-13C12(IS)	7.726	193.0 -> 123.0	64721	0.607 ng/ml	68
Oxychlordane	Oxychlordane-13C10(IS)		114.9 -> 51.1		ND ng/ml	
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)		352.8 -> 262.9		ND ng/ml	
γ-Chlordane(trans)	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
2,4'-DDE	4,4'-DDD d4(IS)		246.0 -> 176.2		ND ng/ml	
α-Chlordane(cis)	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
Endosulfan I	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
trans-Nanochlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
4,4' -DDE	4,4'-DDD d4(IS)	9.357	246.0 -> 176.2	10249	0.020 ng/ml	91
Dieldrin	Endrin-13C12(IS)		262.9 -> 193.0		ND ng/ml	
2,4'-DDD	4,4'-DDD d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin	Endrin-13C12(IS)		262.8 -> 193.0		ND ng/ml	
Endosulfan II	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
cis-Nonachlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
4,4'-DDD	4,4'-DDD d4(IS)	10.608	235.0 -> 165.1	8104	0.019 ng/ml	99
2,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin aldehyde	Endrin-13C12(IS)		249.9 -> 214.9		ND ng/ml	
Endosulfan sulfate	Endrin-13C12(IS)		271.9 -> 237.0		ND ng/ml	
4,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin ketone	Endrin ketone-13C12(IS)		147.0 -> 111.0		ND ng/ml	
Methoxychlor	Methoxychlor-d6(IS)		227.0 -> 141.1		ND ng/ml	
Mirex	Mirex-13C10(IS)		271.8 -> 236.8		ND ng/ml	

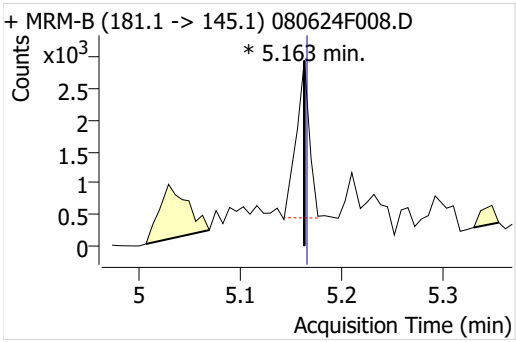
(m) = manual integration ND = Not Detected NC = Not Calculated

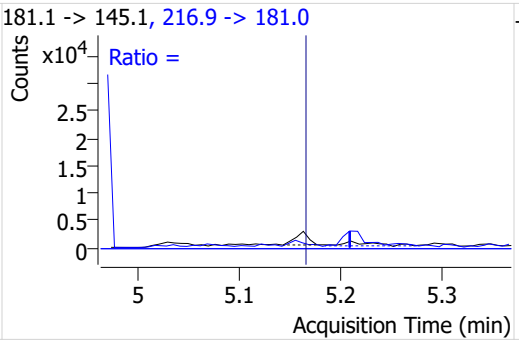
Sample Chromatogram

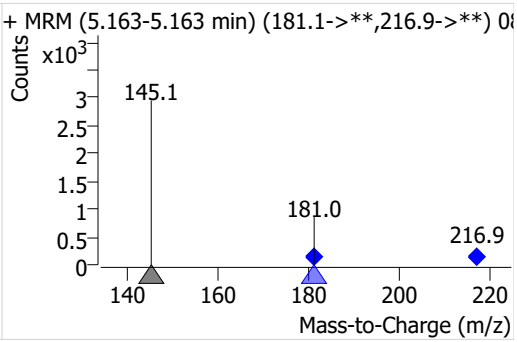
MassHunter Quantitative Analysis Sample Report



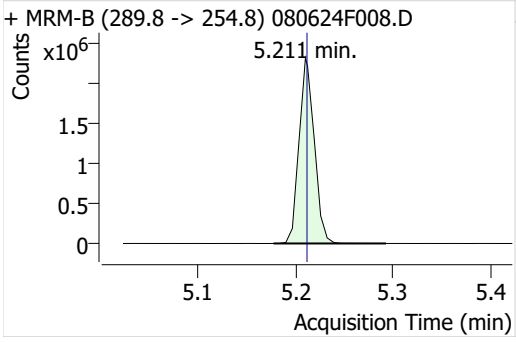
α-BHC

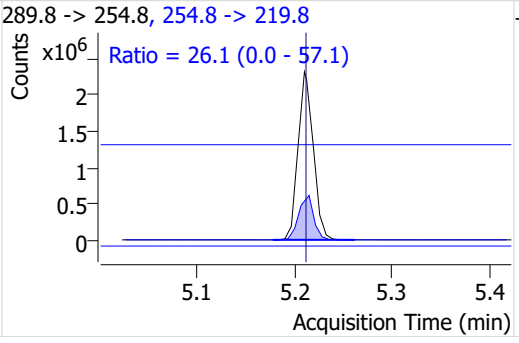


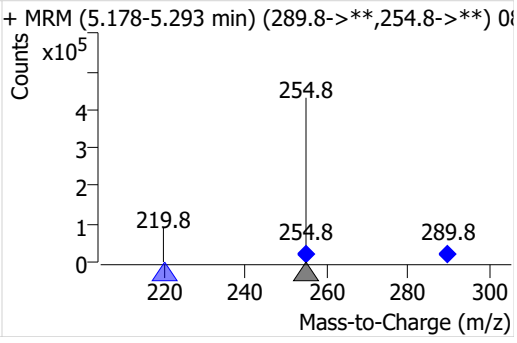




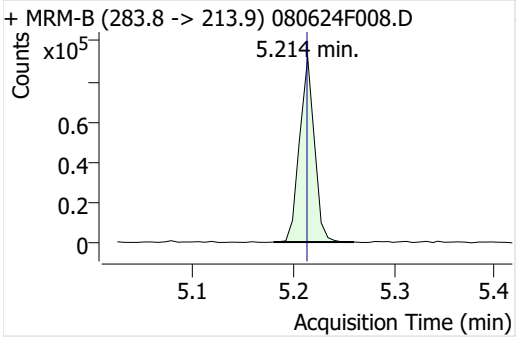
Hexachlorobenzene-13C6

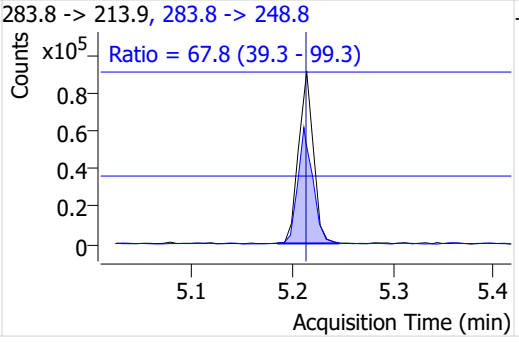


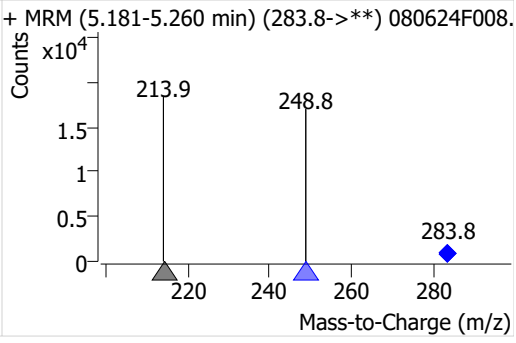




Hexachlorobenzene

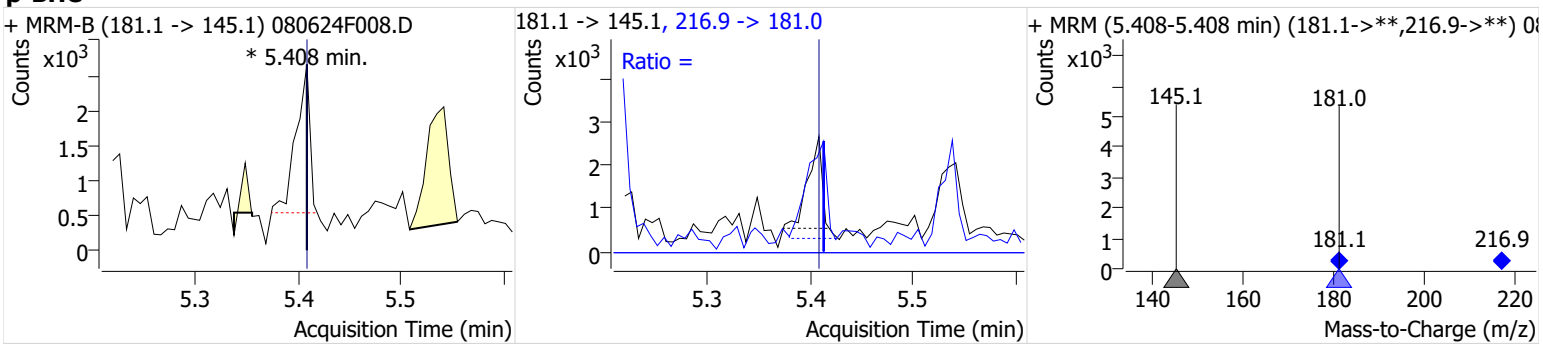




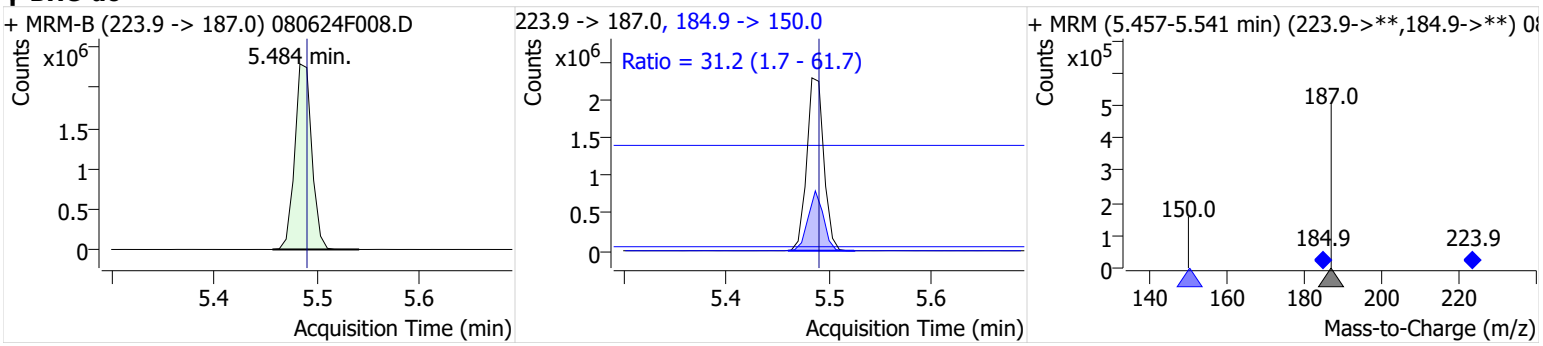


MassHunter Quantitative Analysis Sample Report

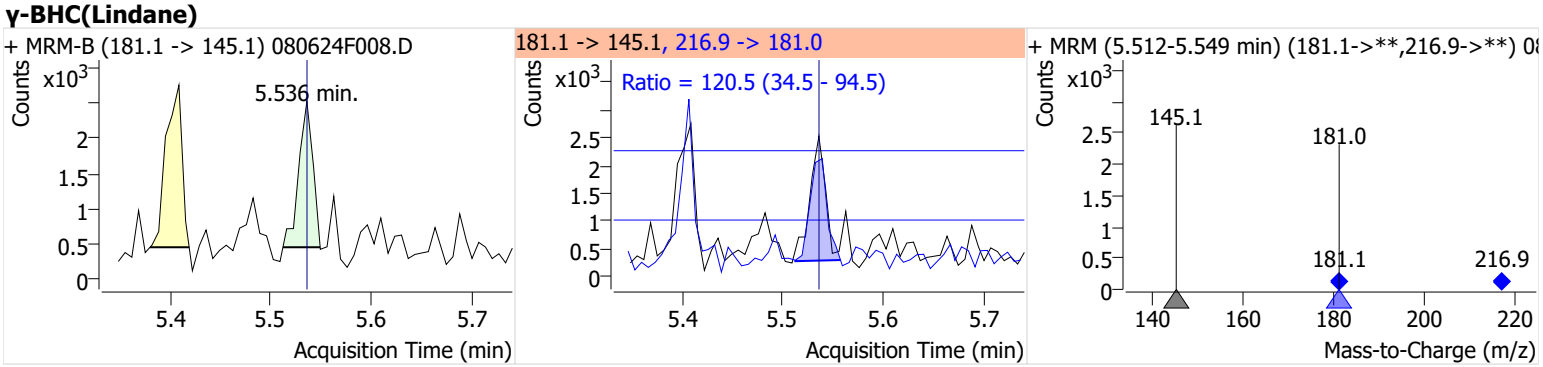
β-BHC



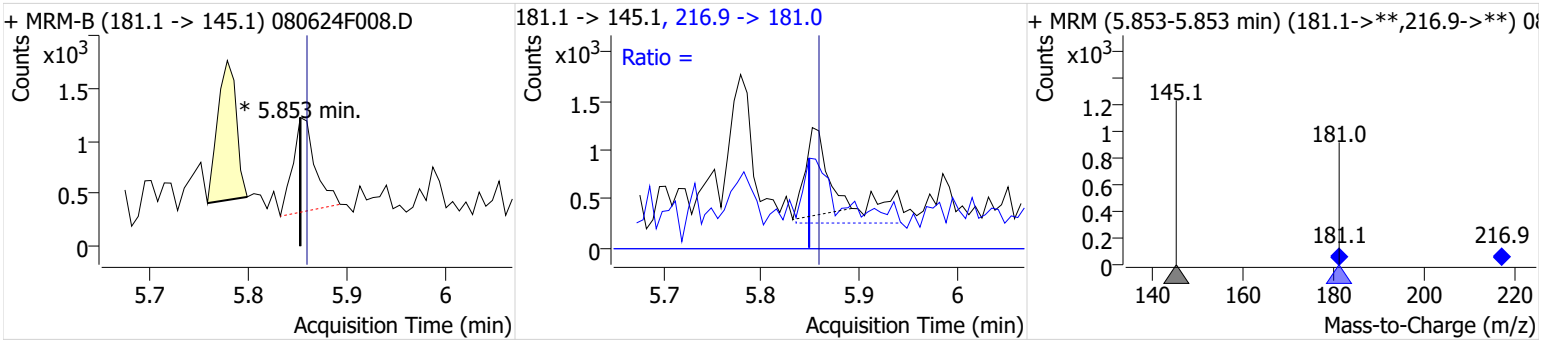
γ-BHC-d6



γ-BHC(Lindane)

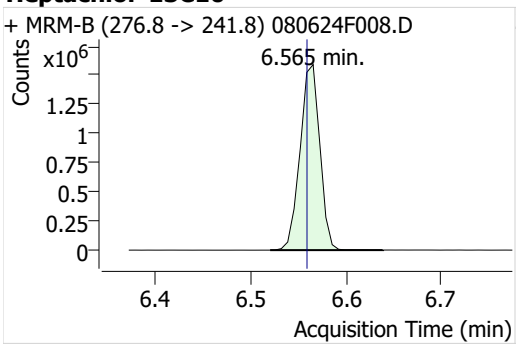


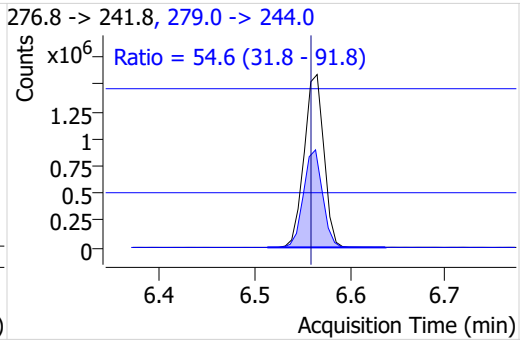
δ-BHC

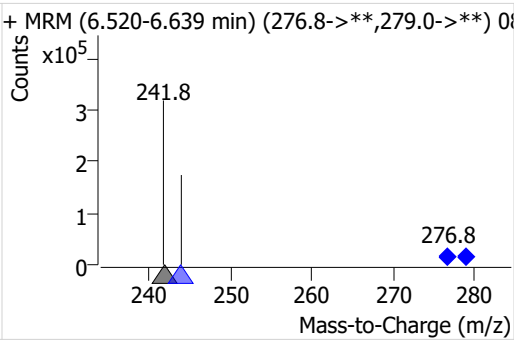


MassHunter Quantitative Analysis Sample Report

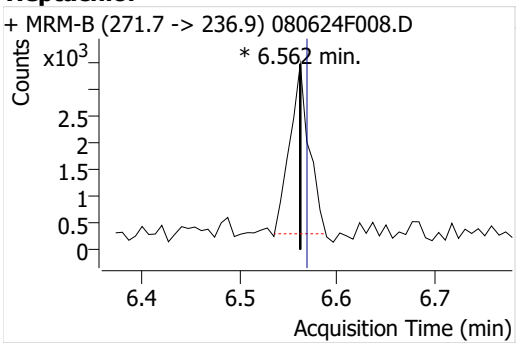
Heptachlor-13C10

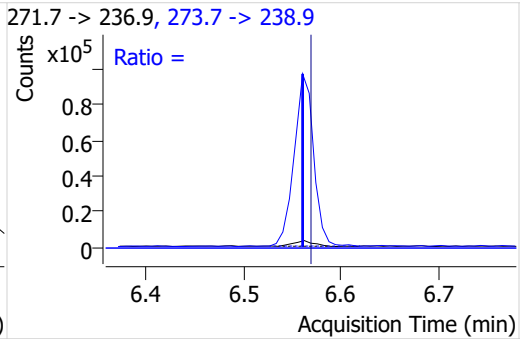


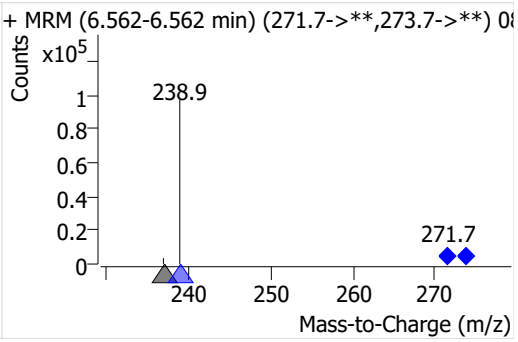




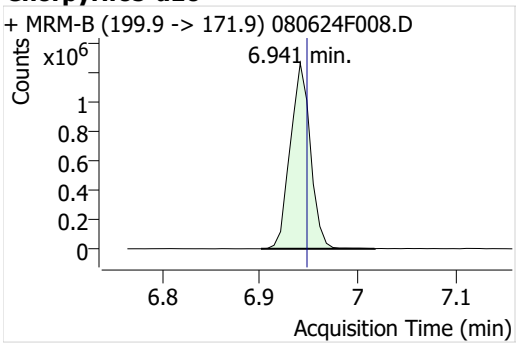
Heptachlor

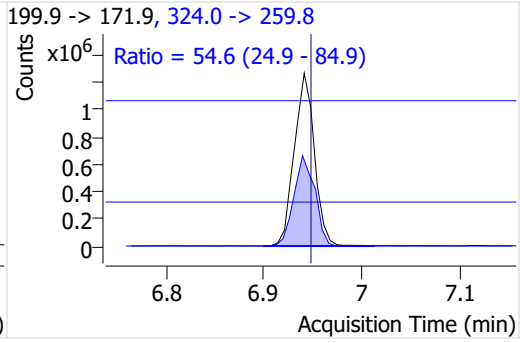


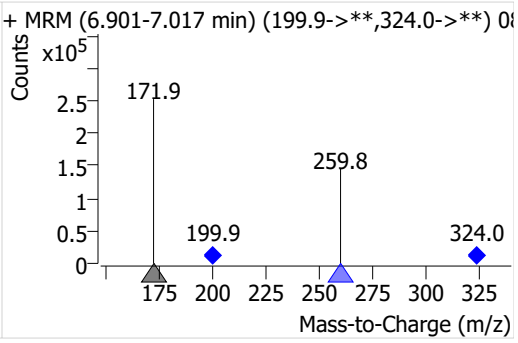




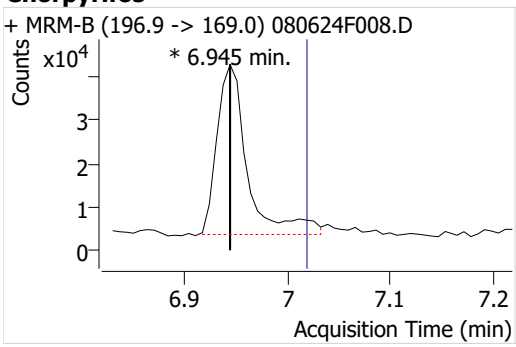
Chorpyrifos-d10

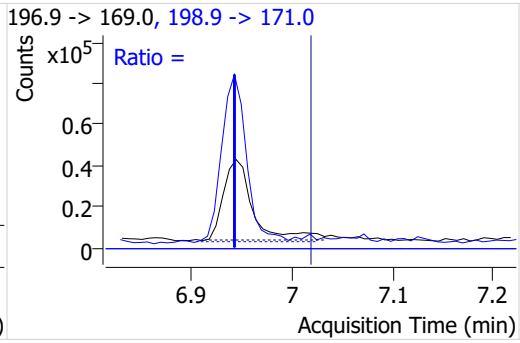


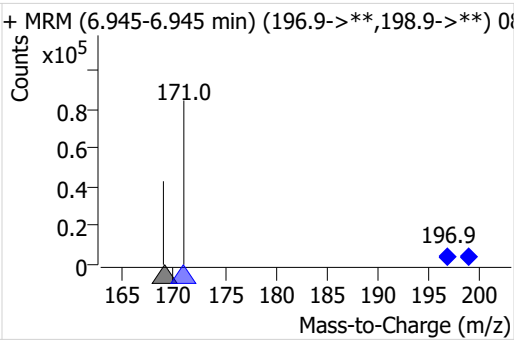




Chorpyrifos

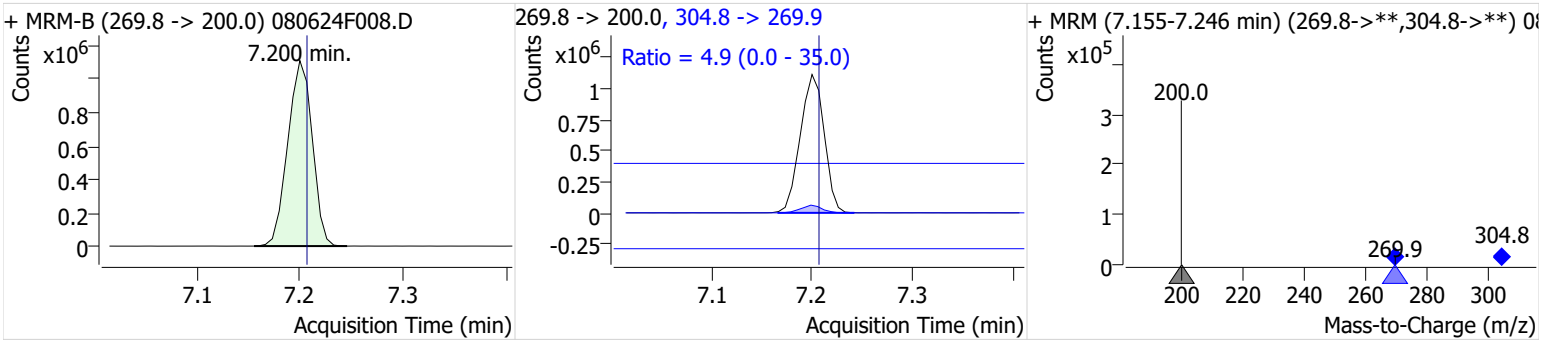




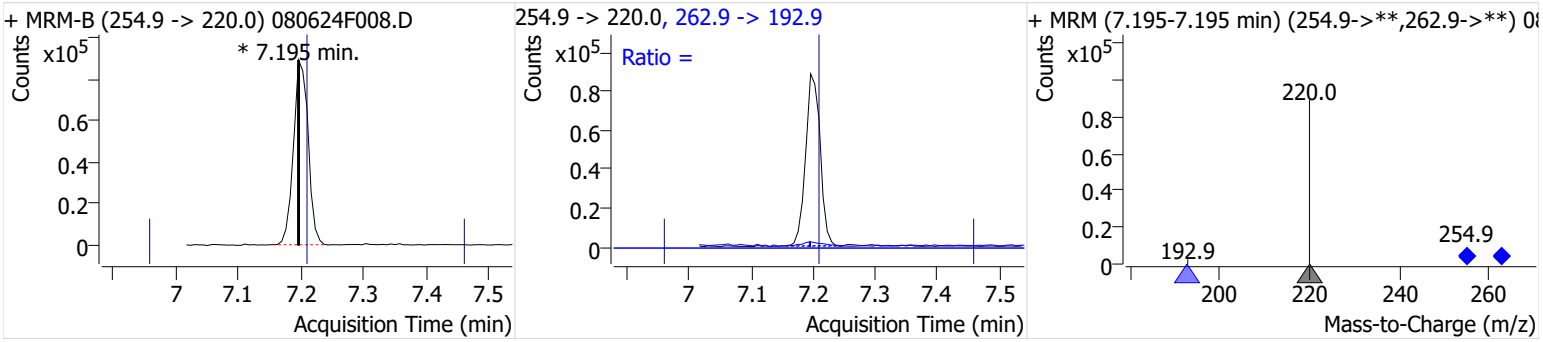


MassHunter Quantitative Analysis Sample Report

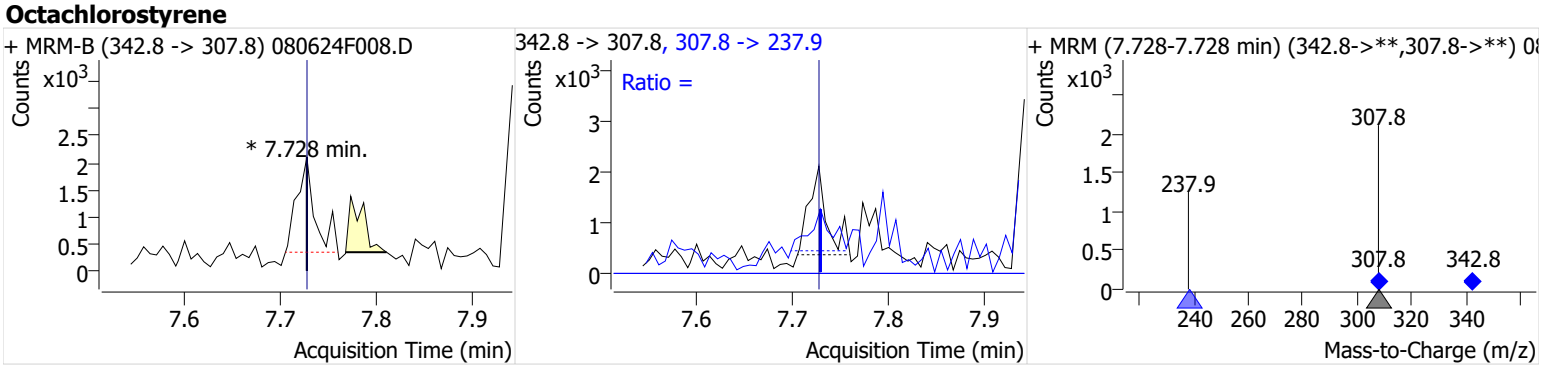
Aldrin-13C



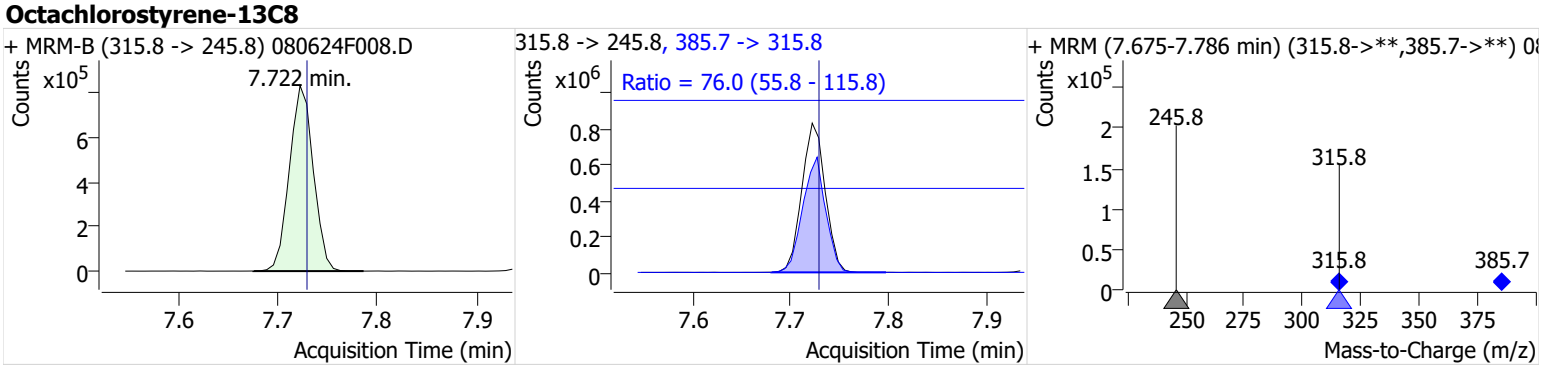
Aldrin



Octachlorostyrene

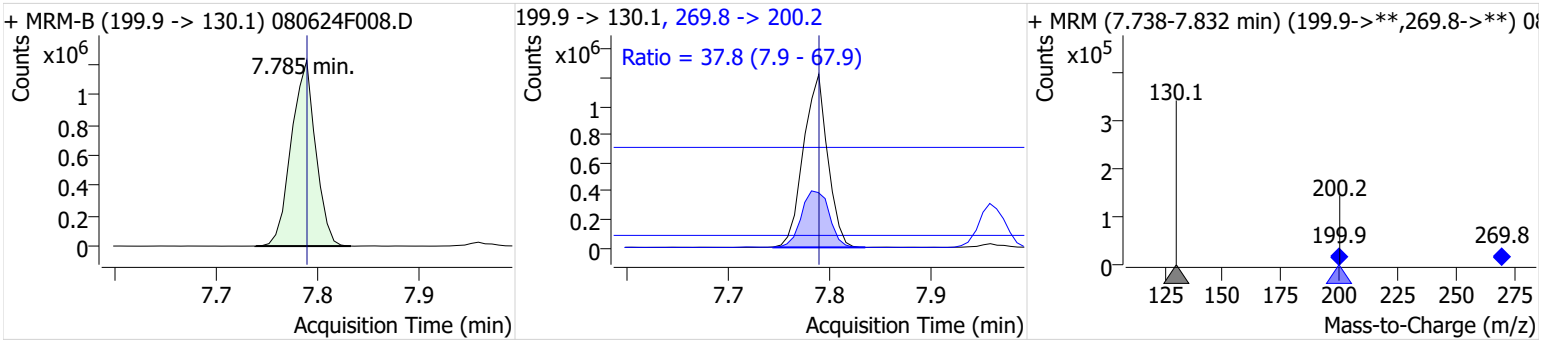


Octachlorostyrene-13C8

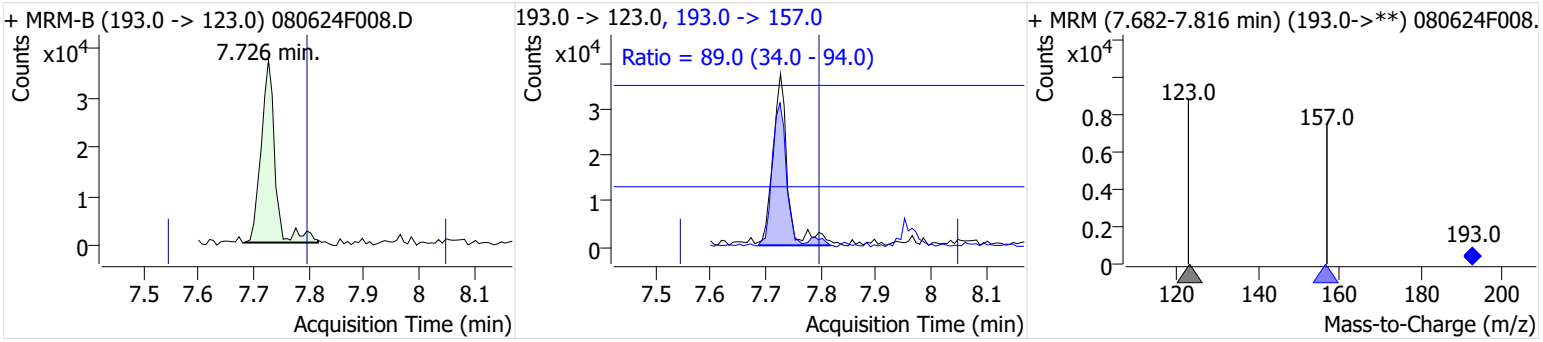


MassHunter Quantitative Analysis Sample Report

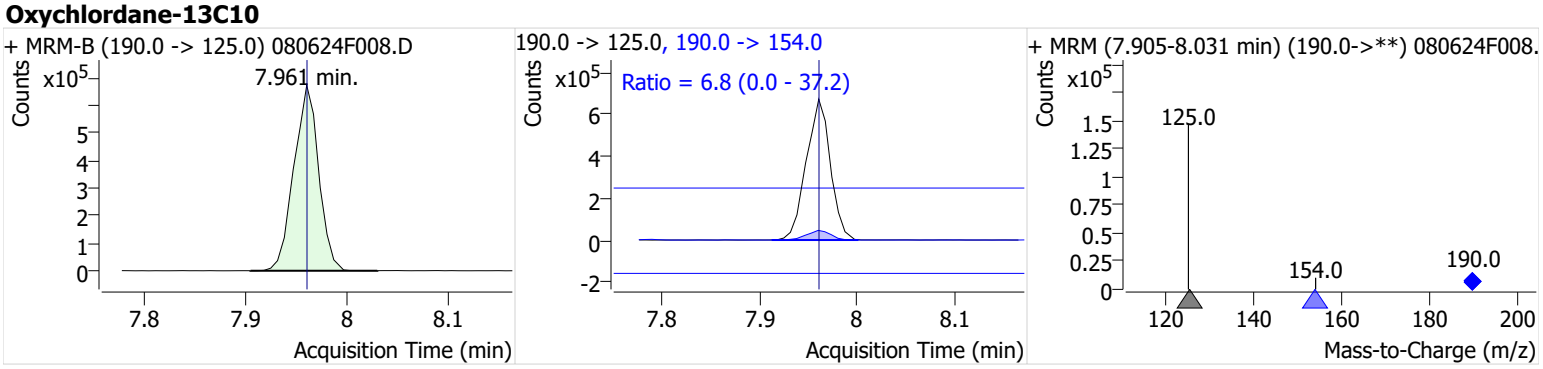
Isodrin-13C12



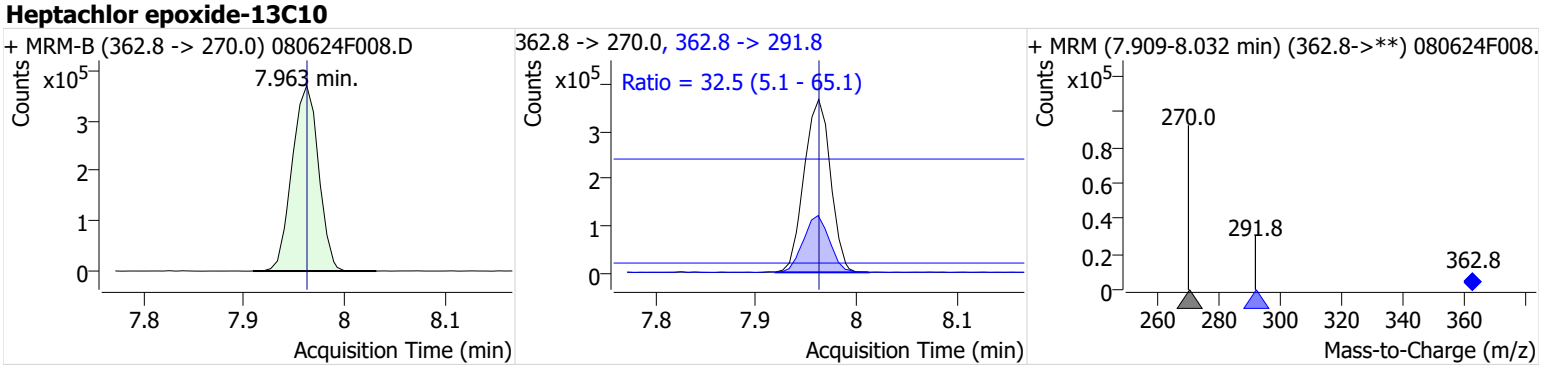
Isodrin



Oxychlordane-13C10

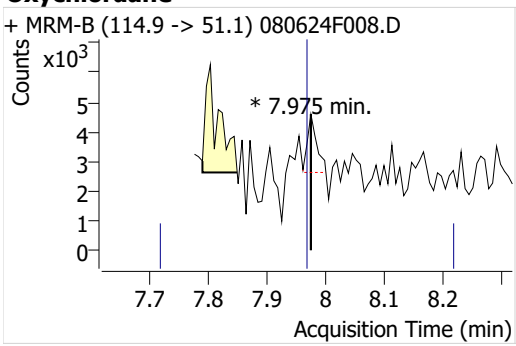


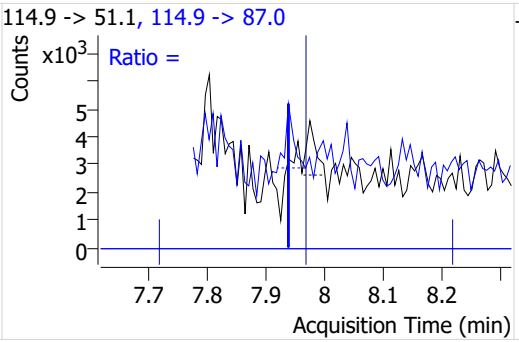
Heptachlor epoxide-13C10

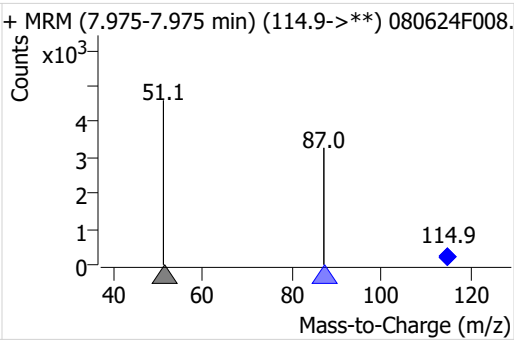


MassHunter Quantitative Analysis Sample Report

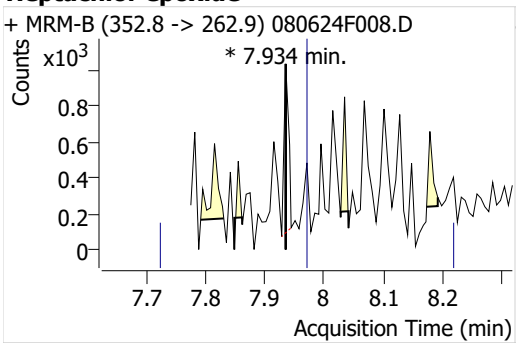
Oxychlordane

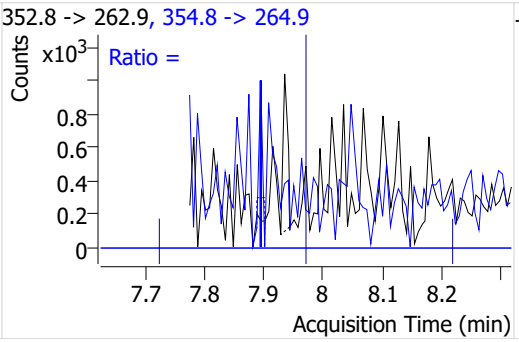


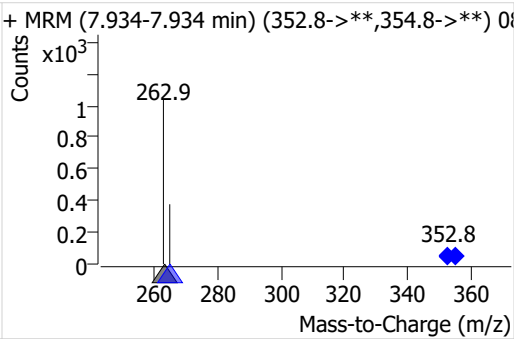




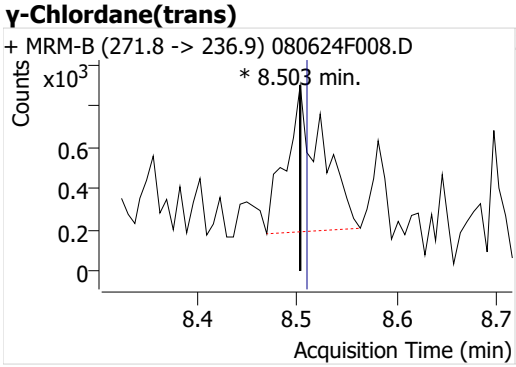
Heptachlor epoxide

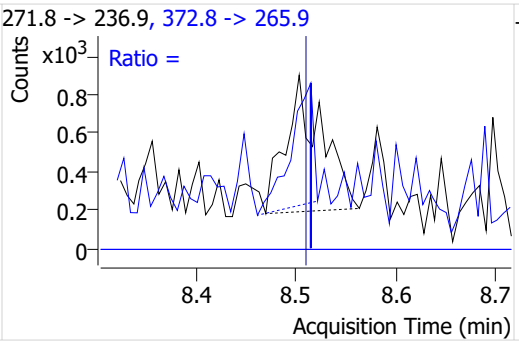


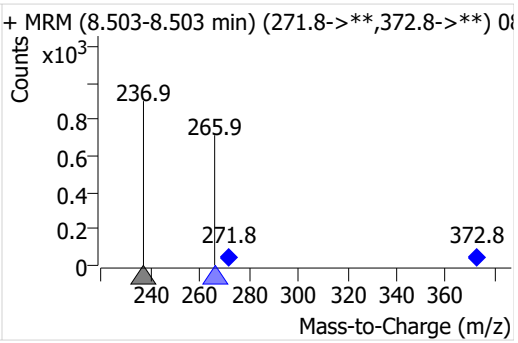




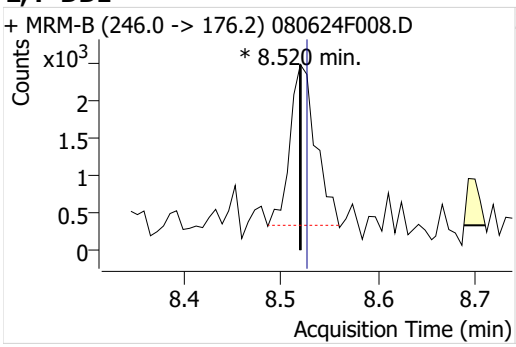
γ-Chlordane(trans)

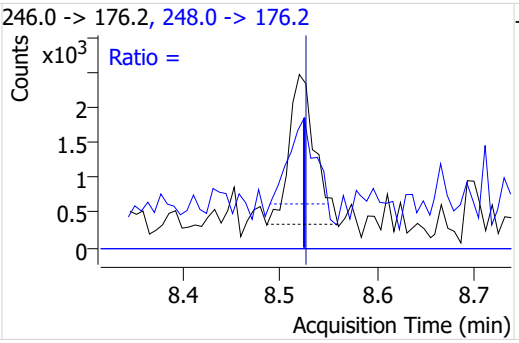


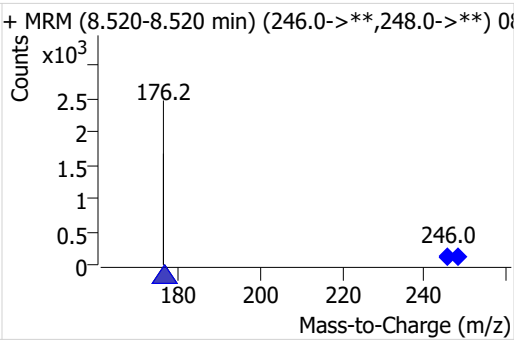




2,4'-DDE

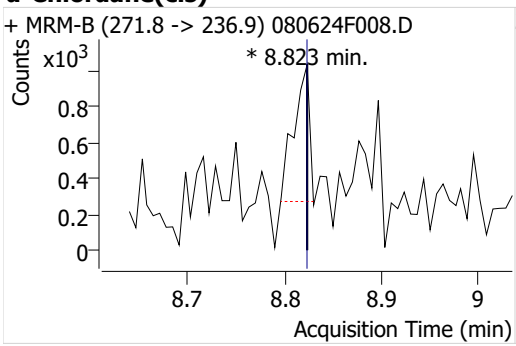


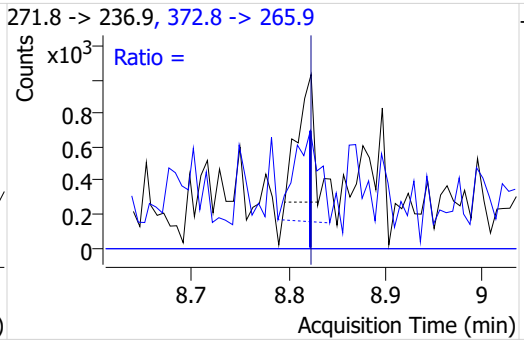


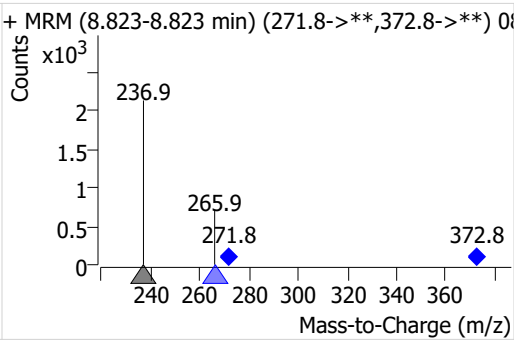


MassHunter Quantitative Analysis Sample Report

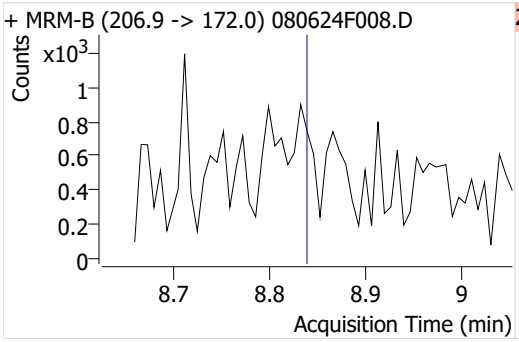
α-Chlordane(cis)

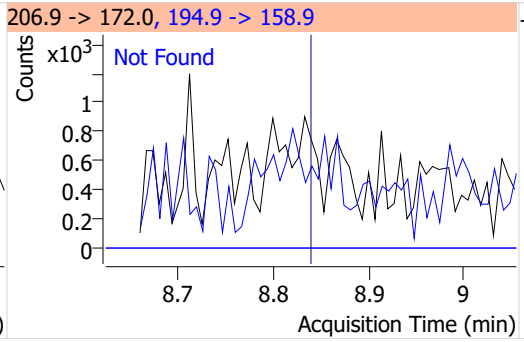


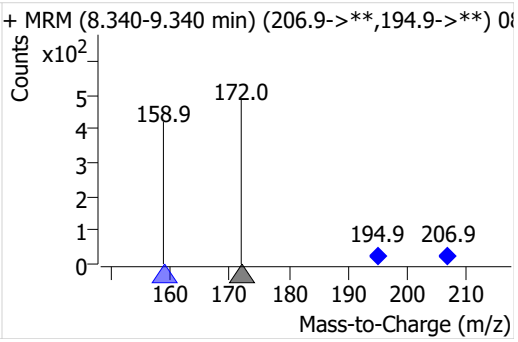




Endosulfan I







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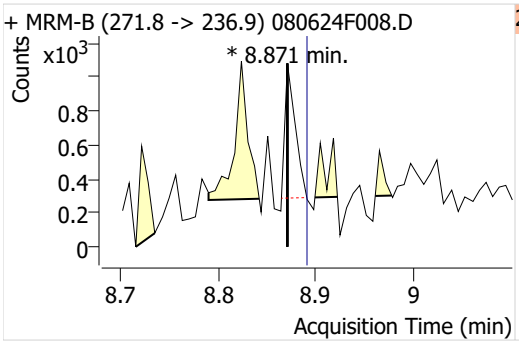

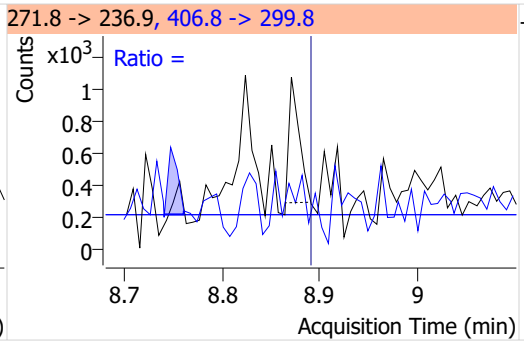

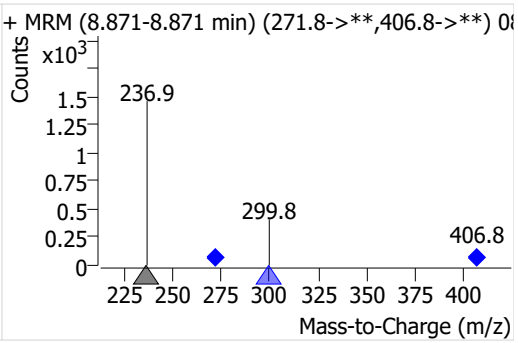

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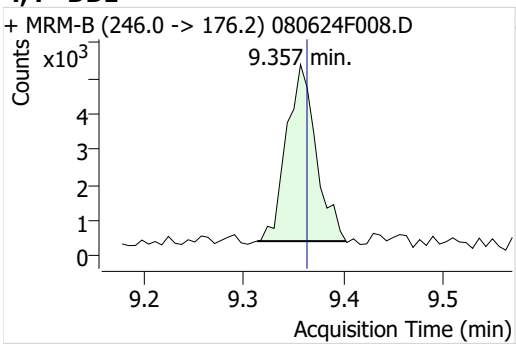

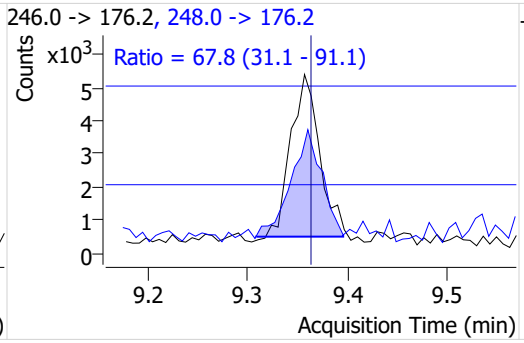

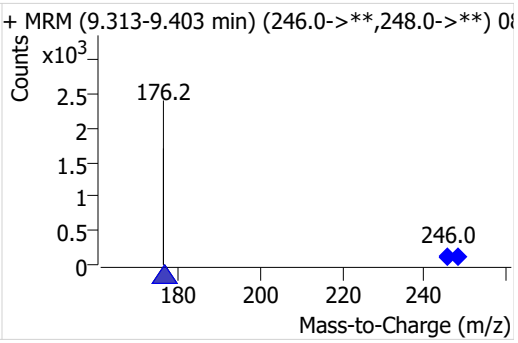

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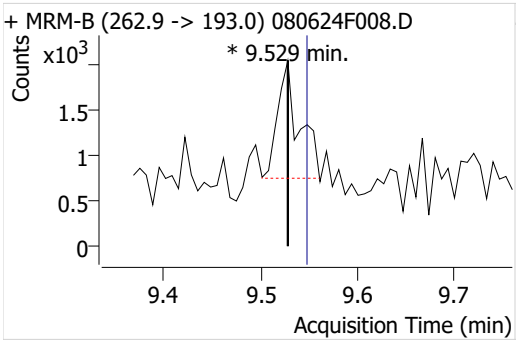
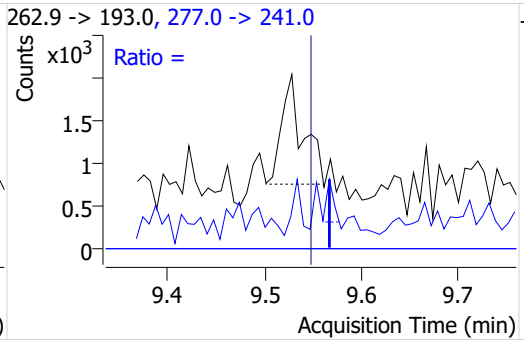
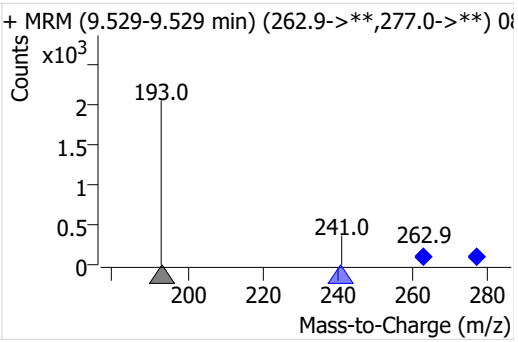
Dieldrin







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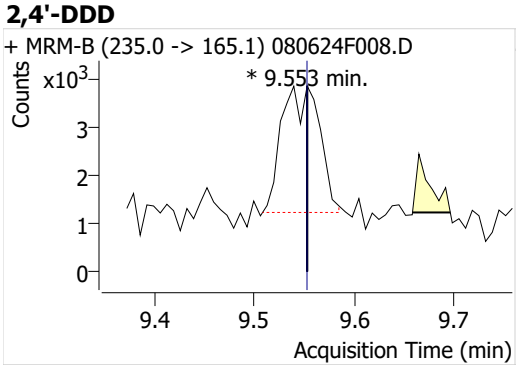

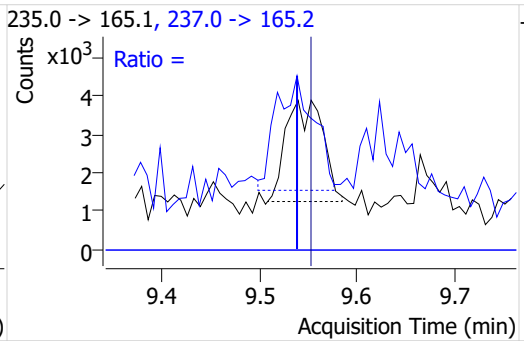

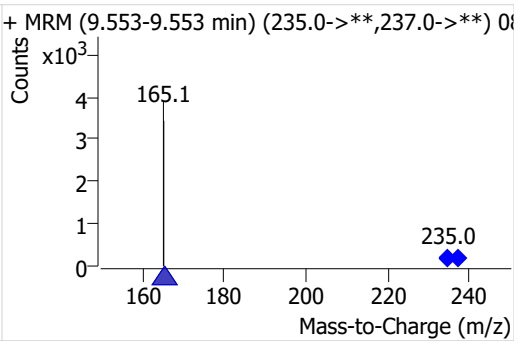

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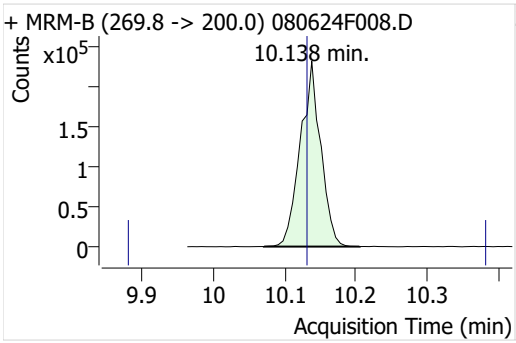

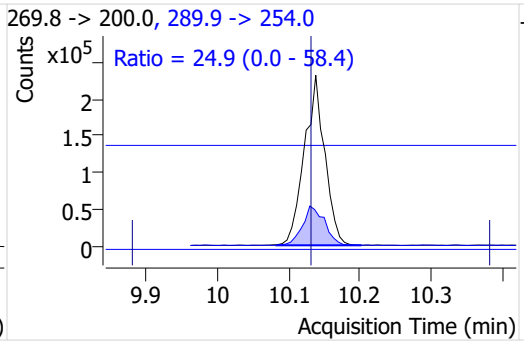

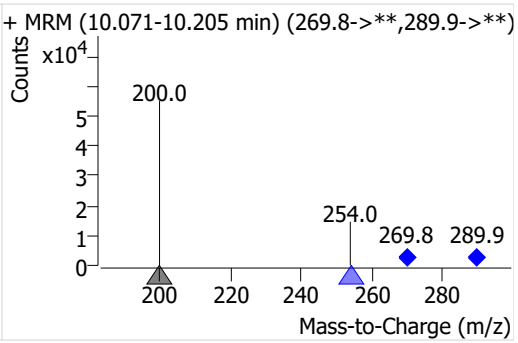

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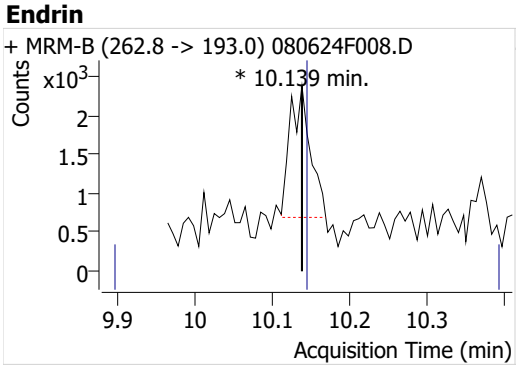

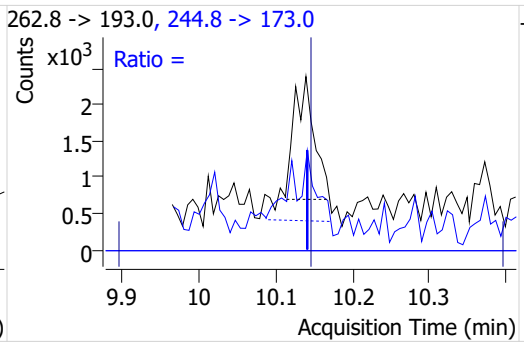

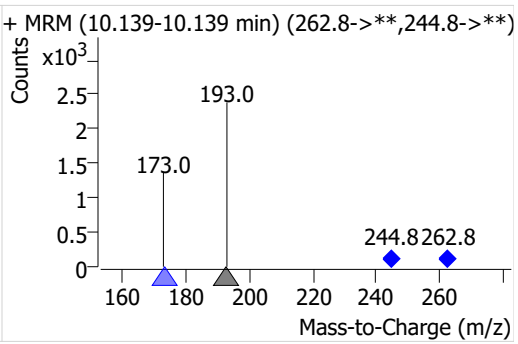

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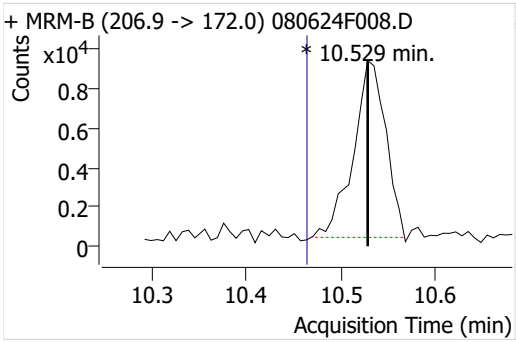
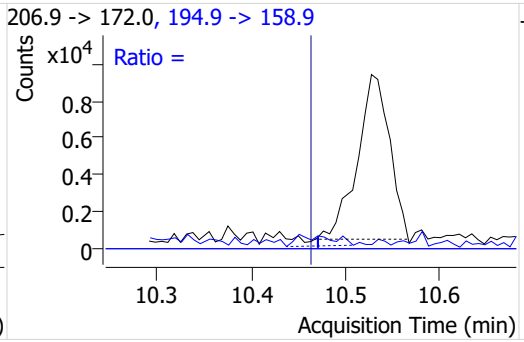
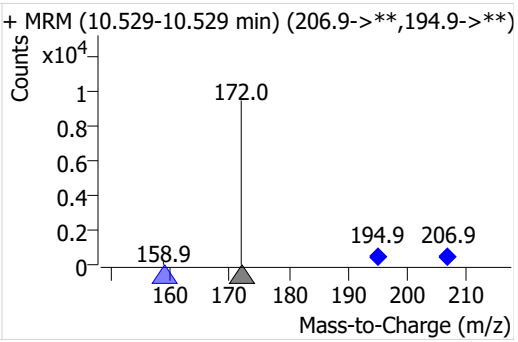
Endosulfan II







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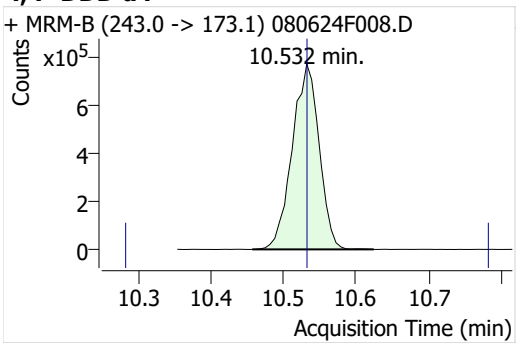

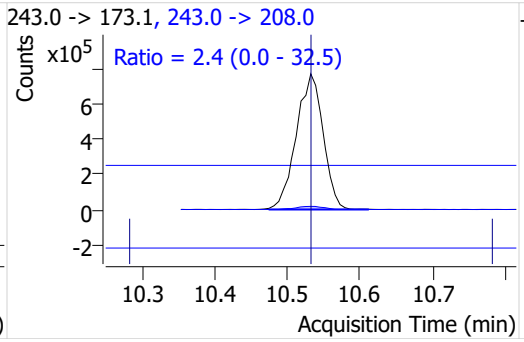

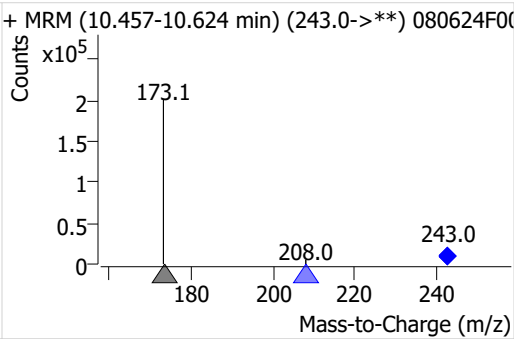

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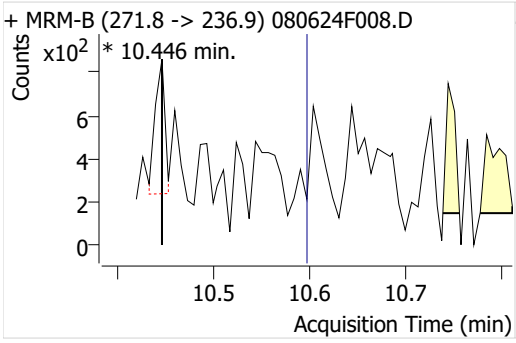

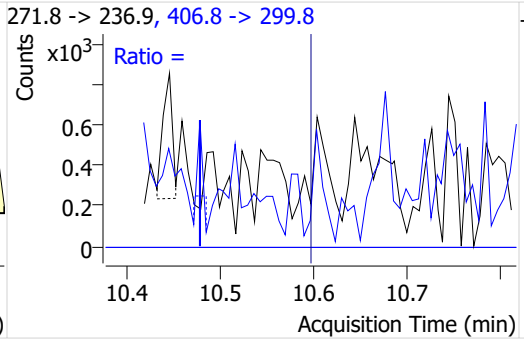

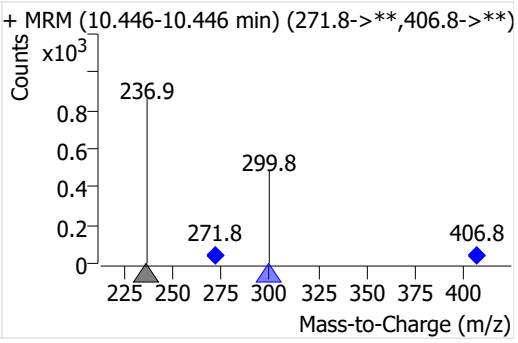

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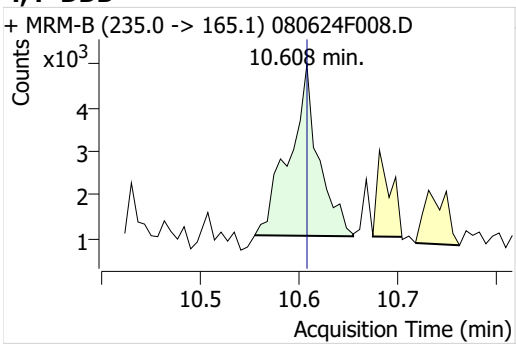

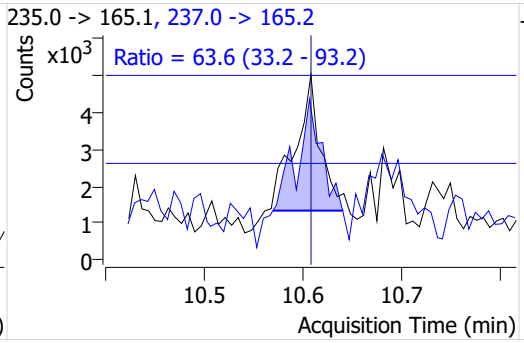

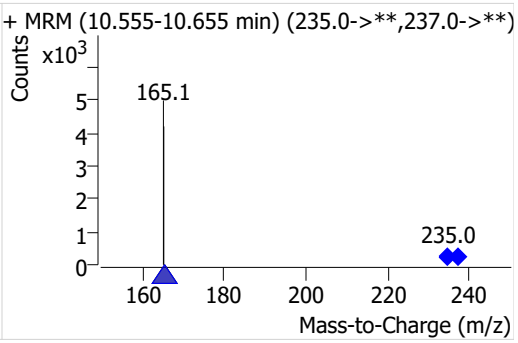

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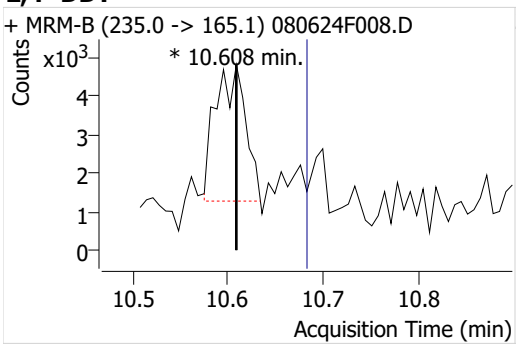
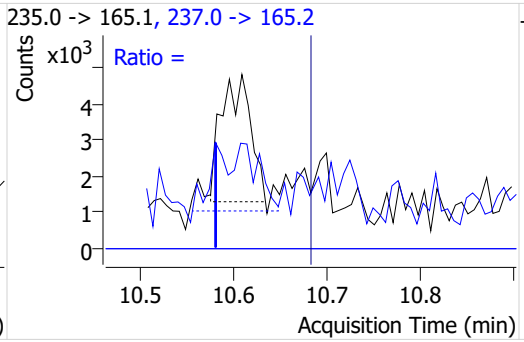
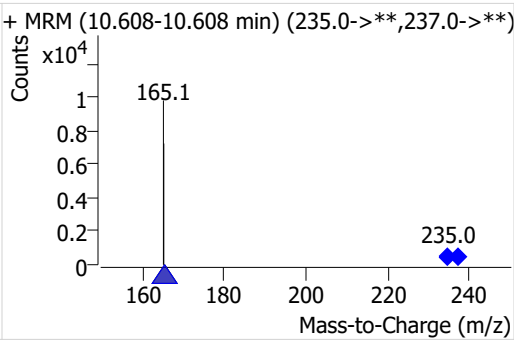
2,4'-DDT







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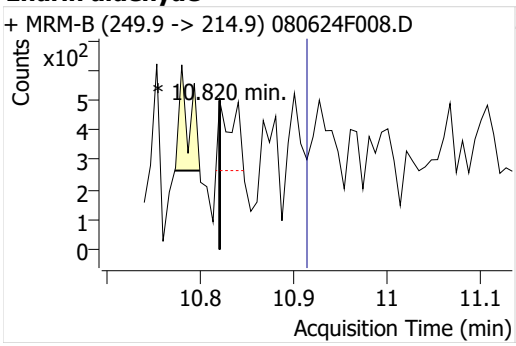

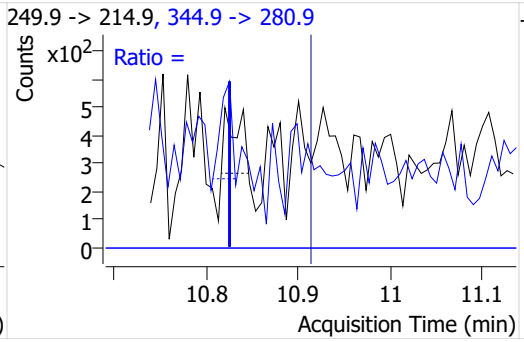

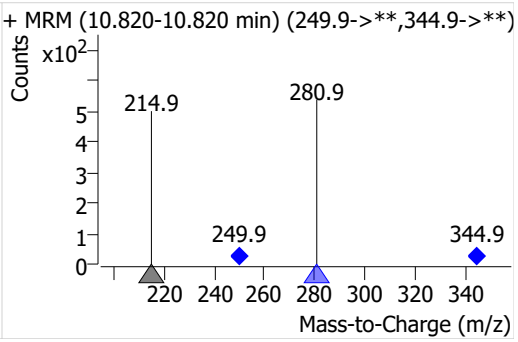

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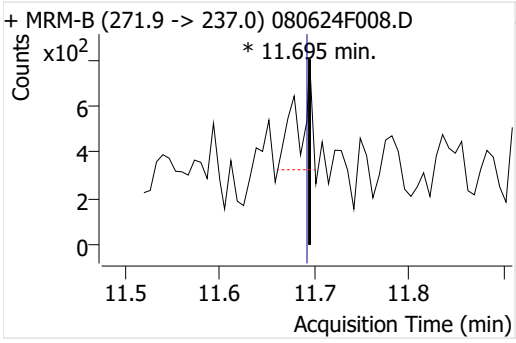

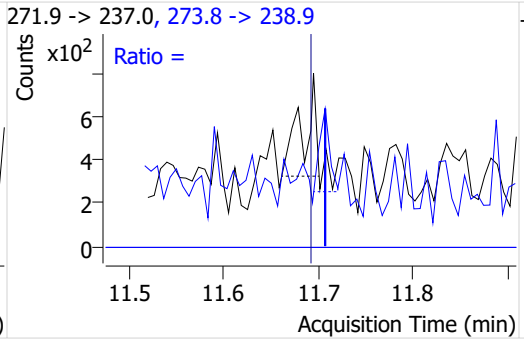

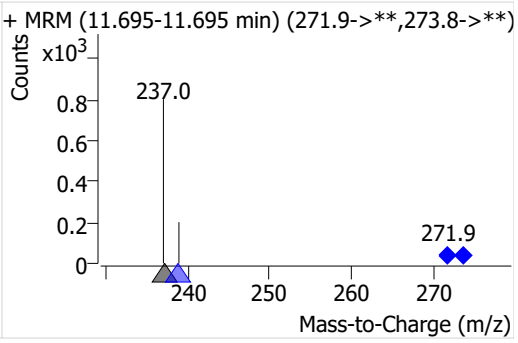

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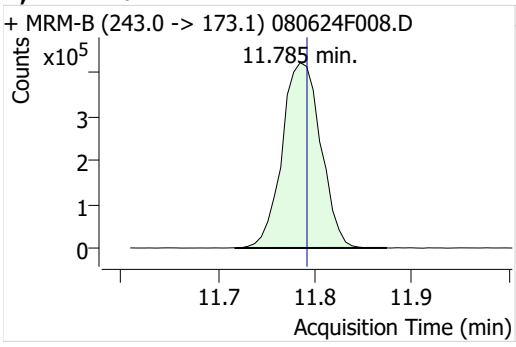

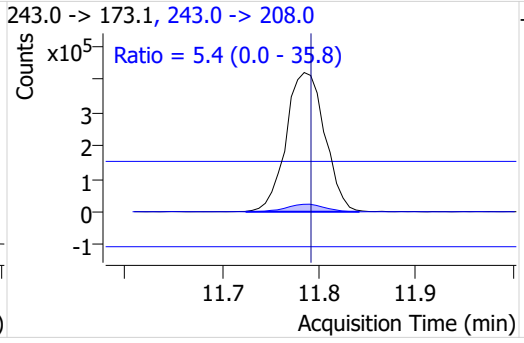

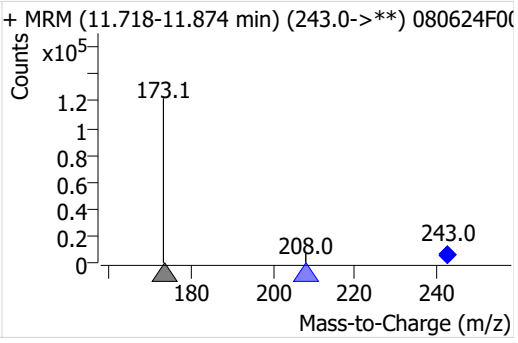

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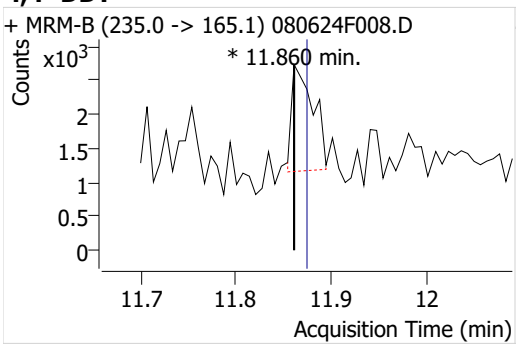
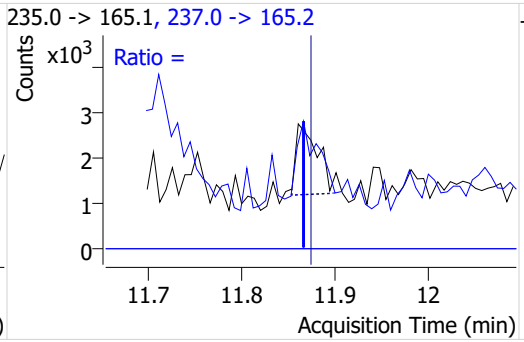
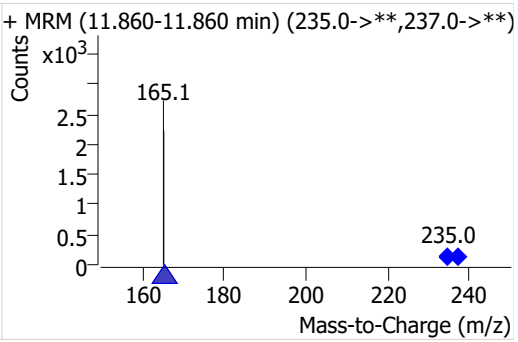
4,4'-DDT







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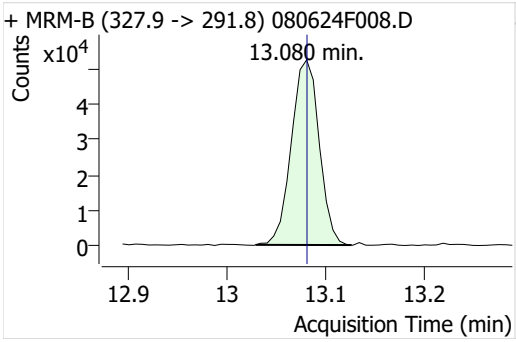

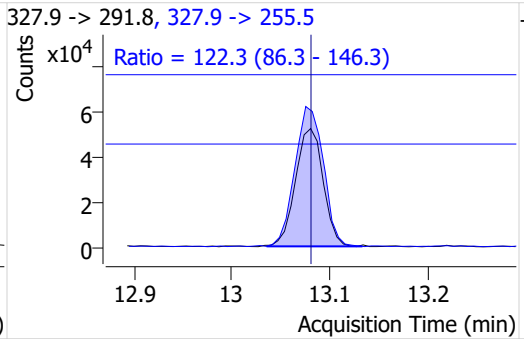

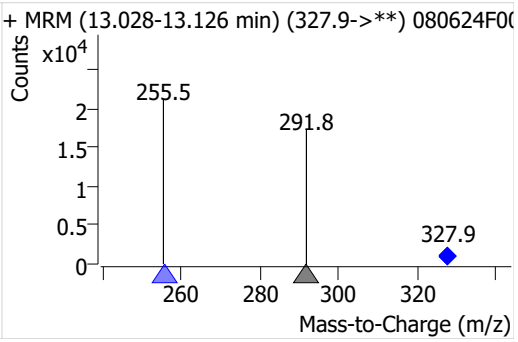

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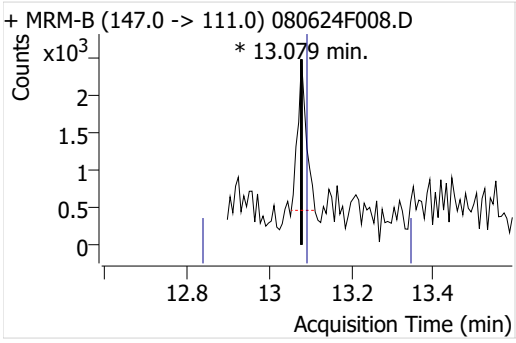
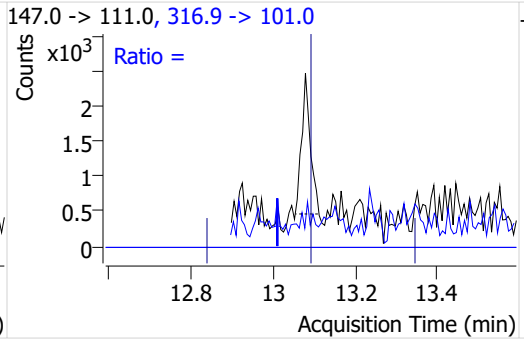
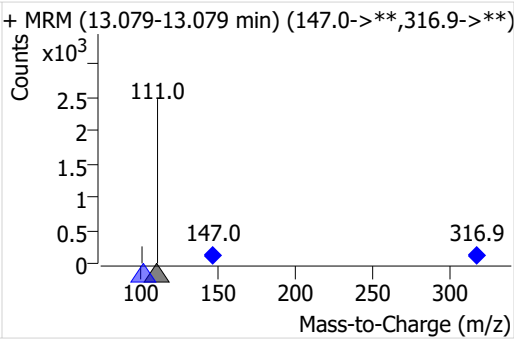
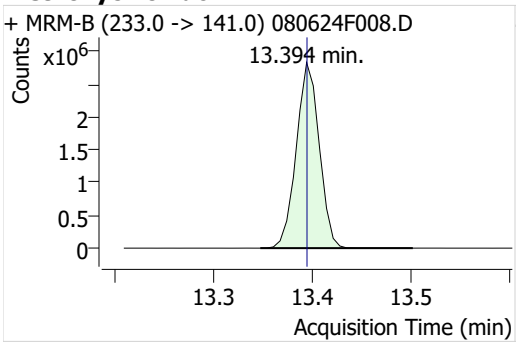
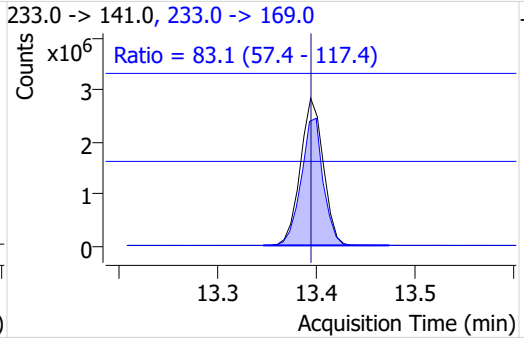


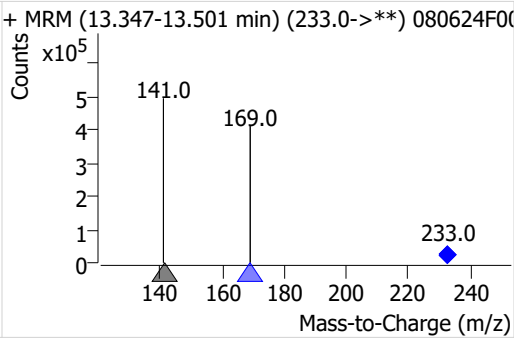




Methoxychlor-d6

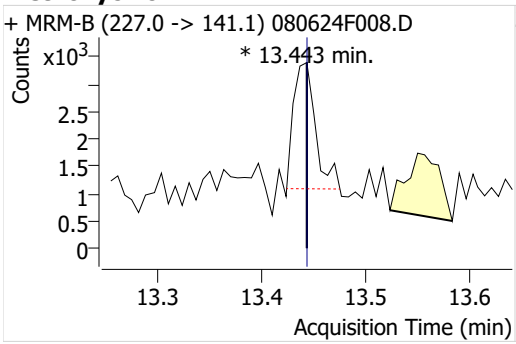


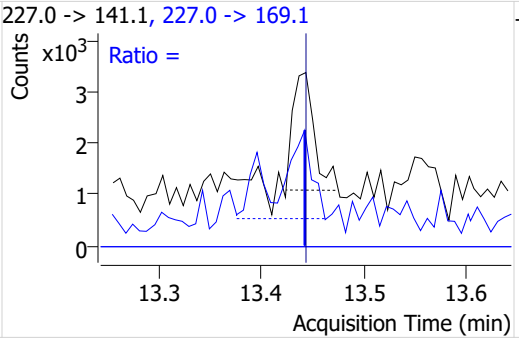


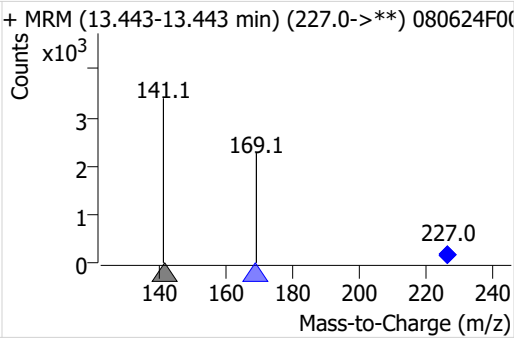


MassHunter Quantitative Analysis Sample Report

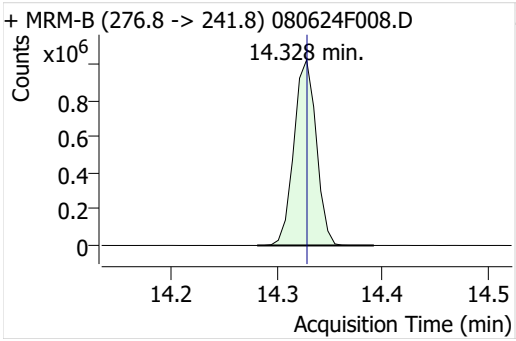
Methoxychlor

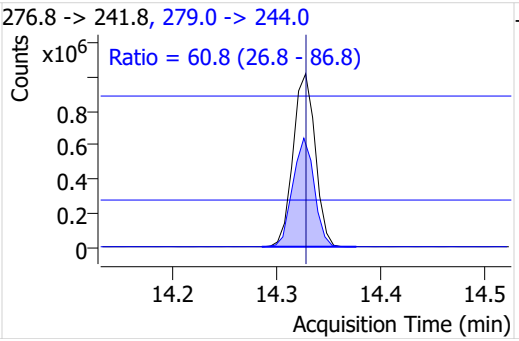


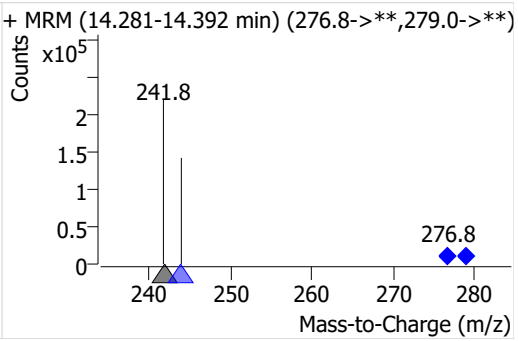




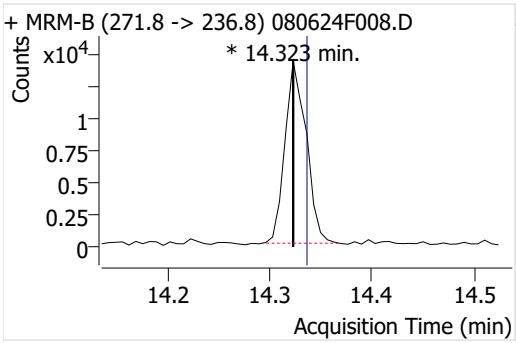
Mirex-13C10

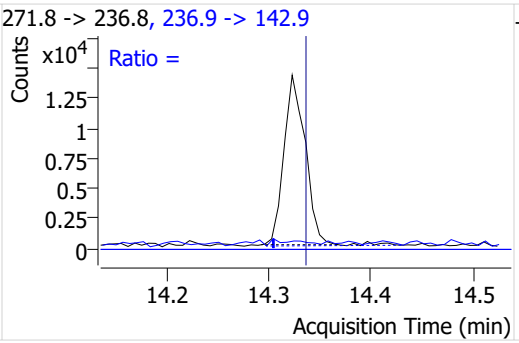


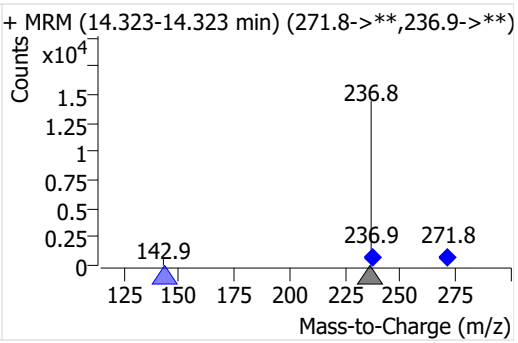




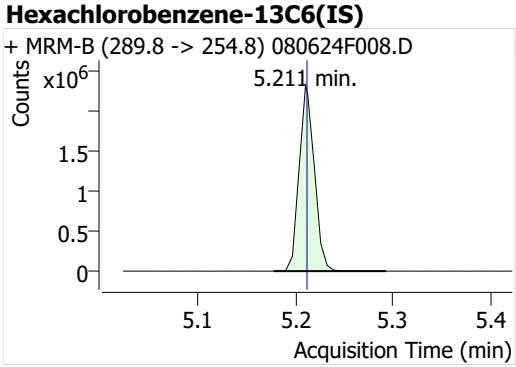
Mirex

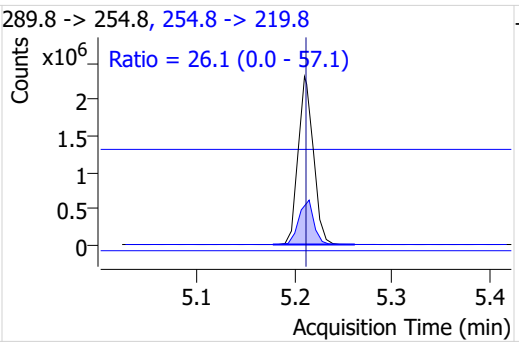


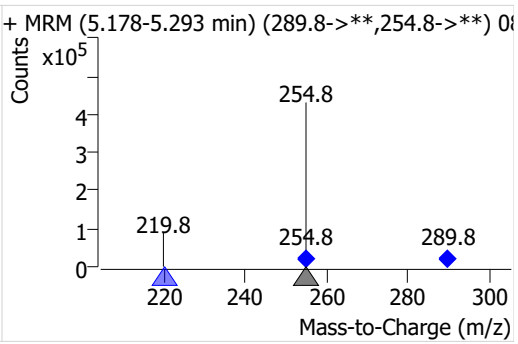




Hexachlorobenzene-13C6(IS)







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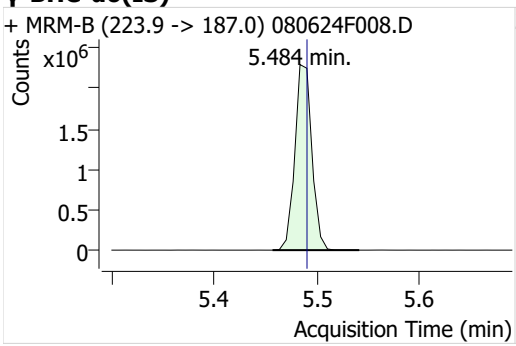
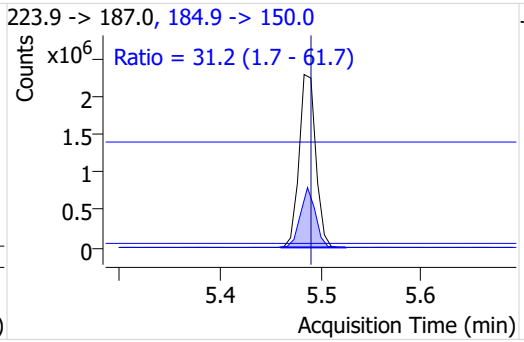
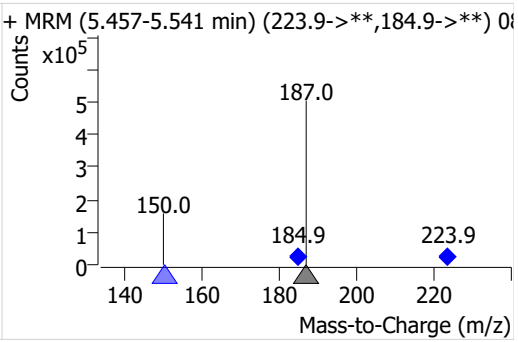
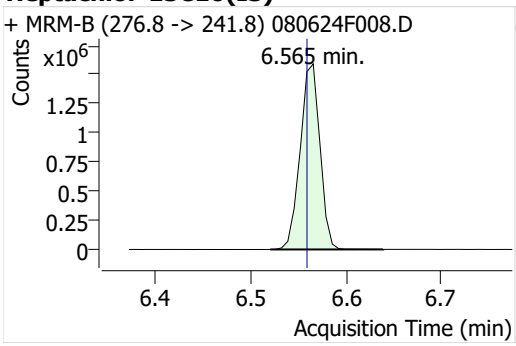
γ-BHC-d6(IS)

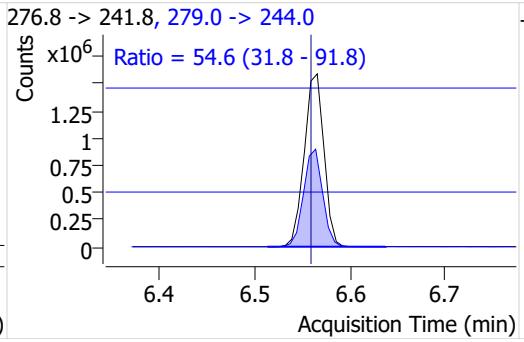


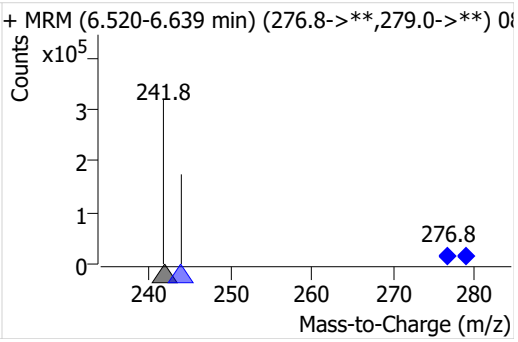




Heptachlor-13C10(IS)







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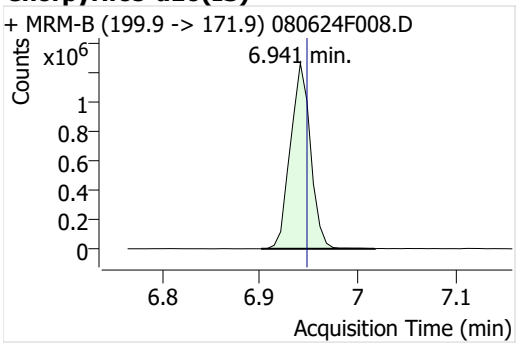

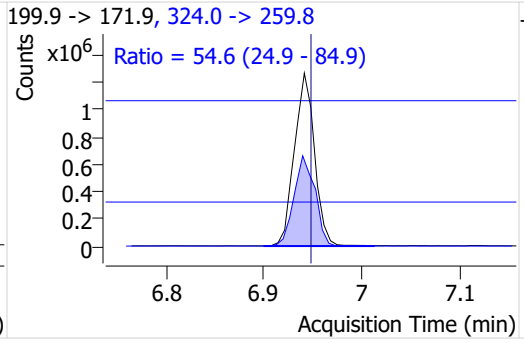

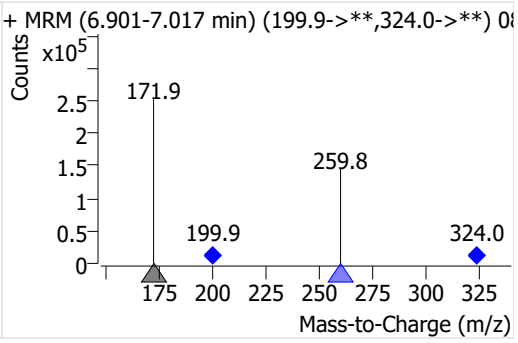

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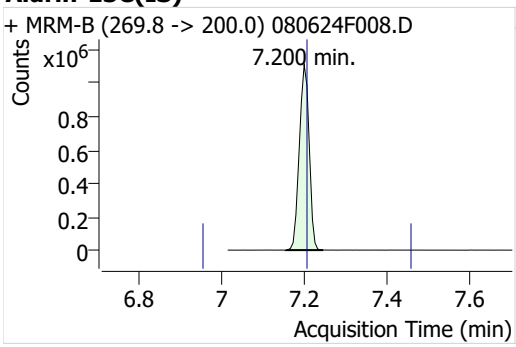

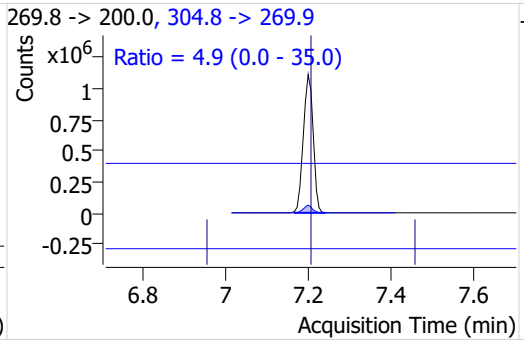

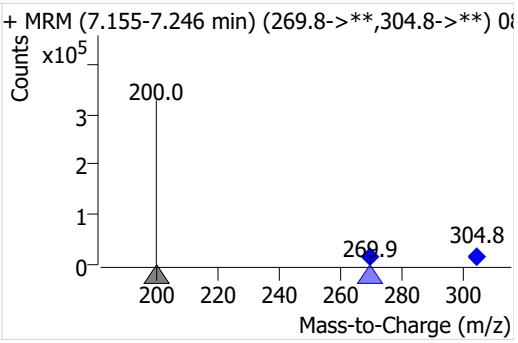

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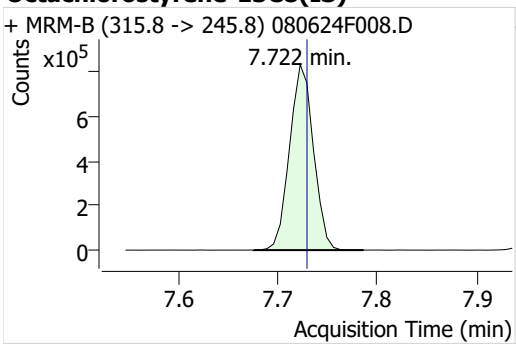
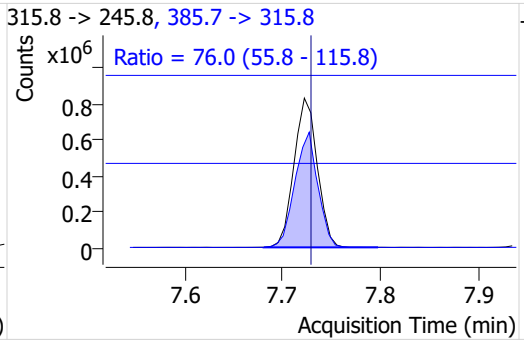
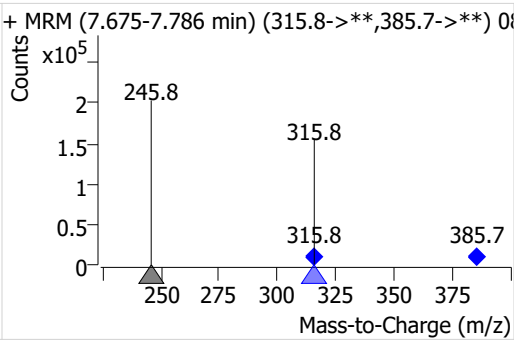
Octachlorostyrene-13C8(IS)







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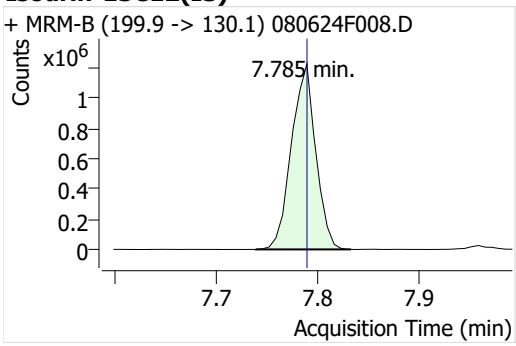

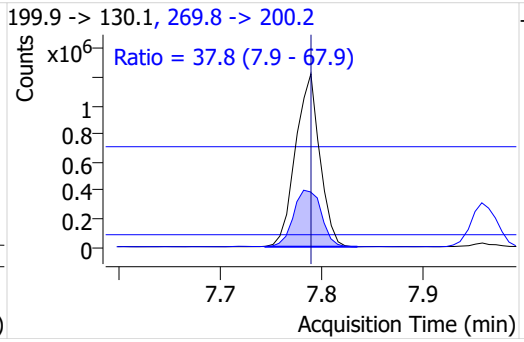

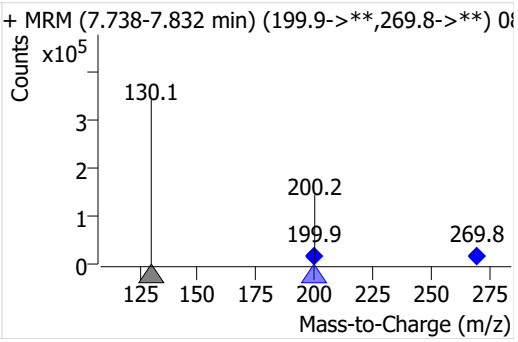

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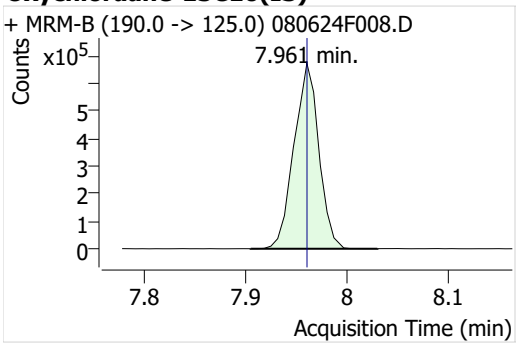

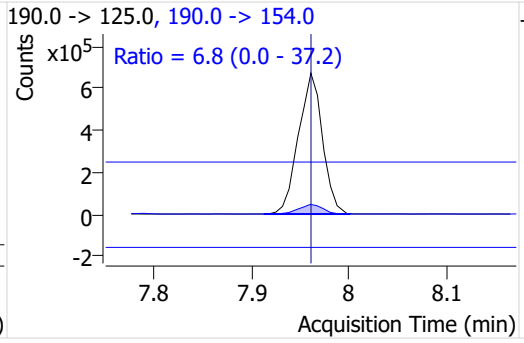

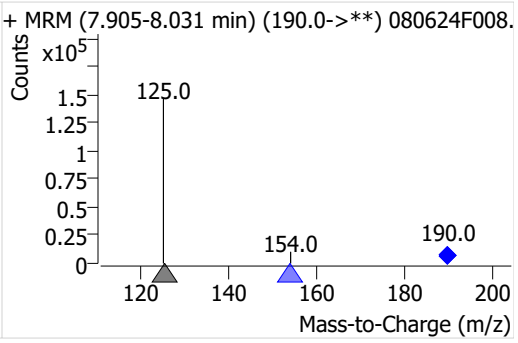

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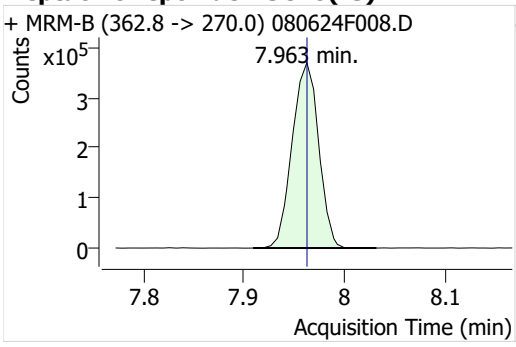

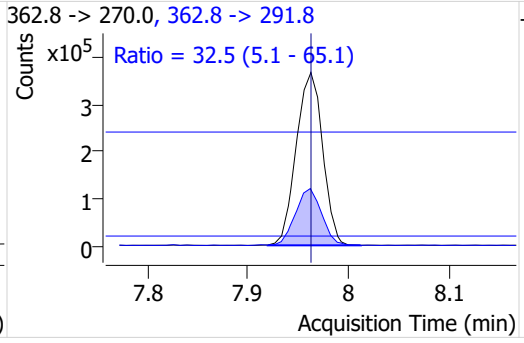

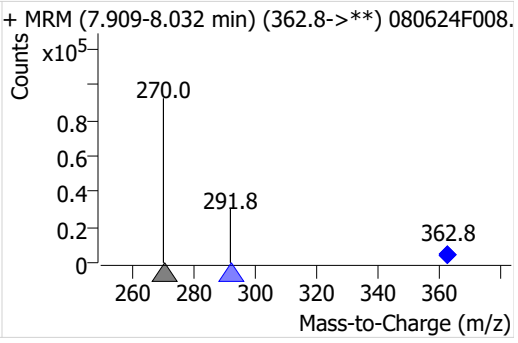

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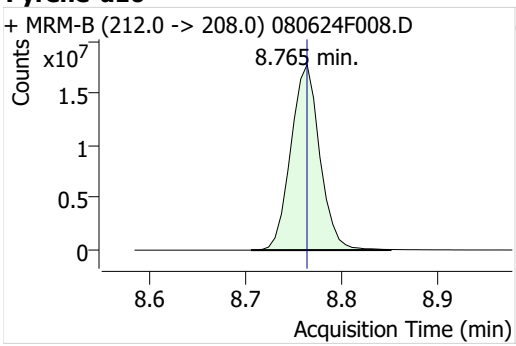
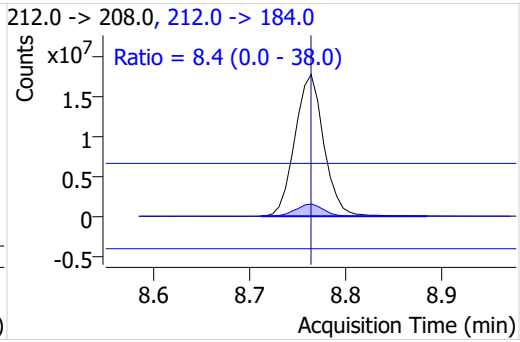
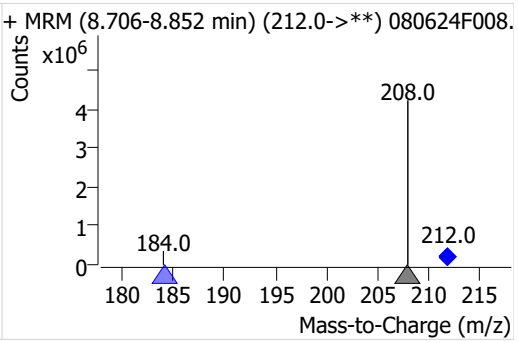
Pyrene-d10







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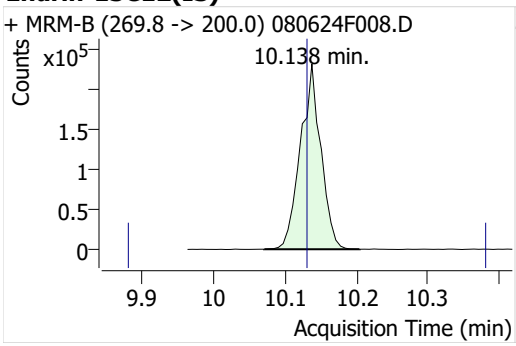

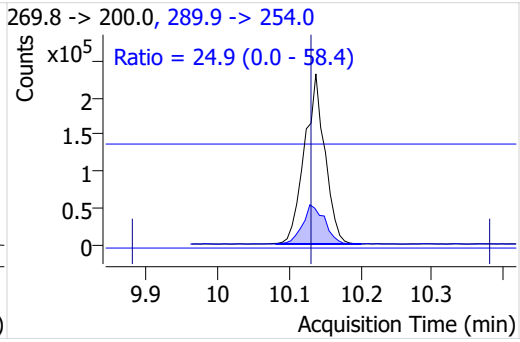

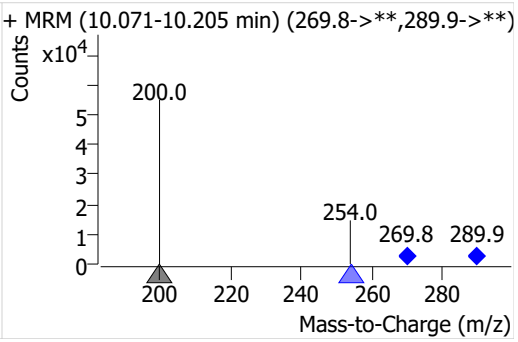

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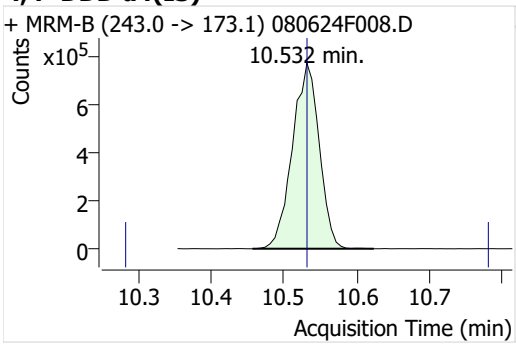

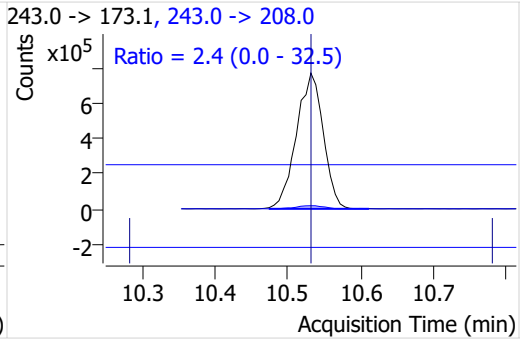

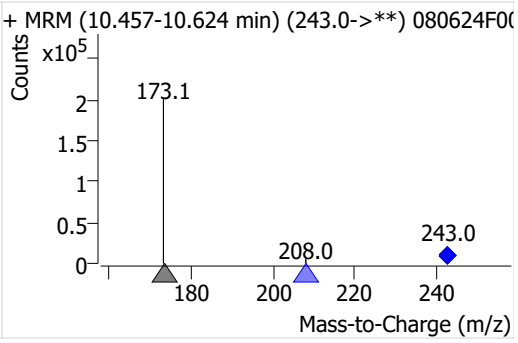

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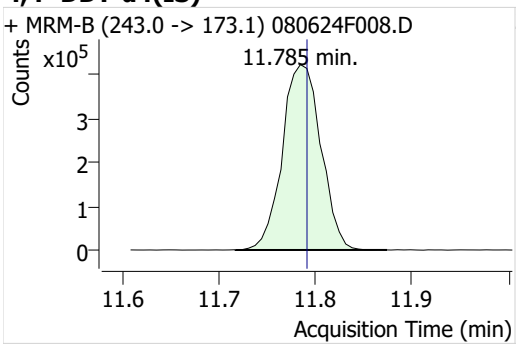

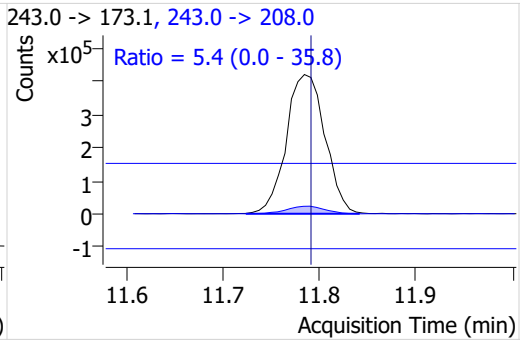

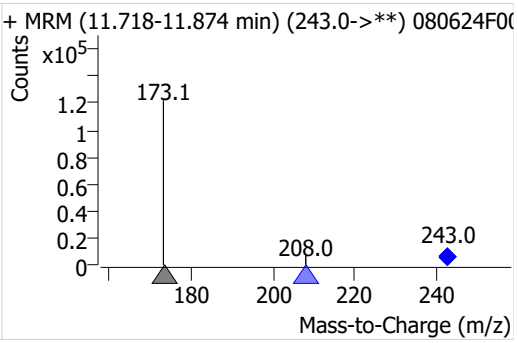

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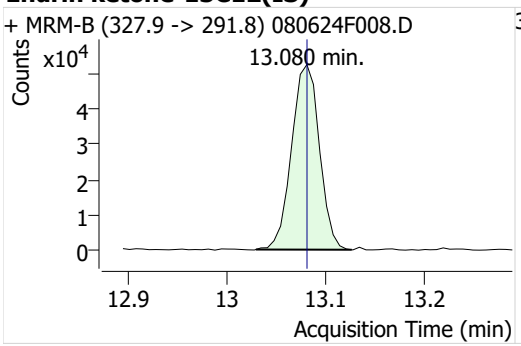
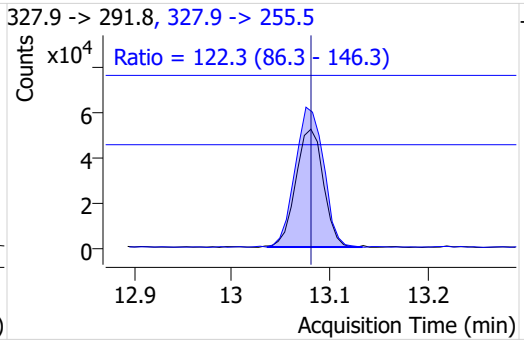
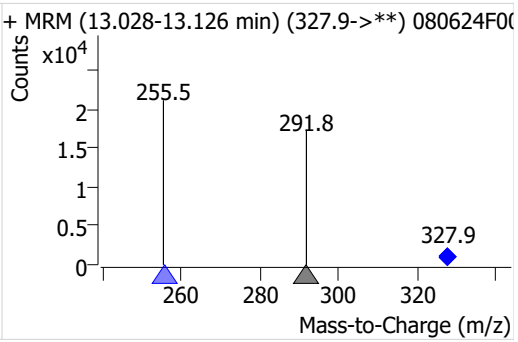
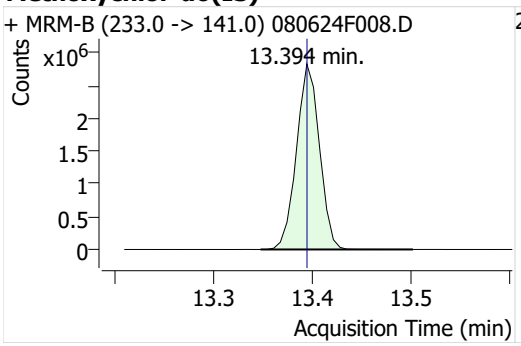
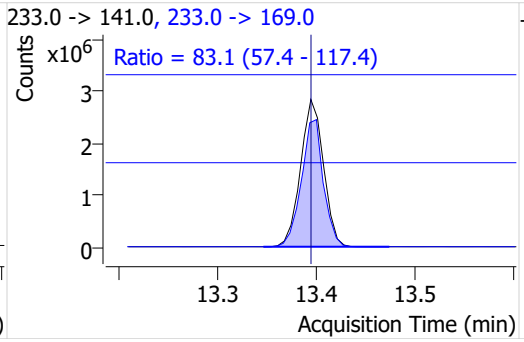


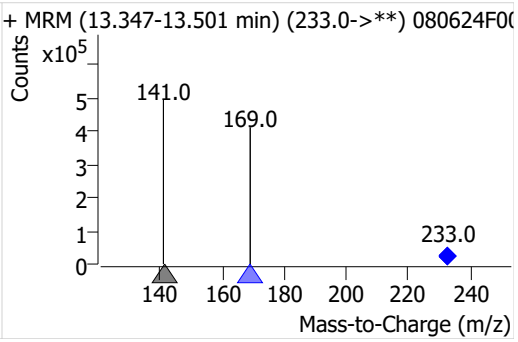




Methoxychlor-d6(IS)







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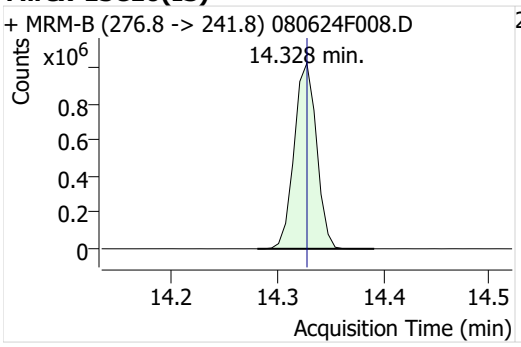

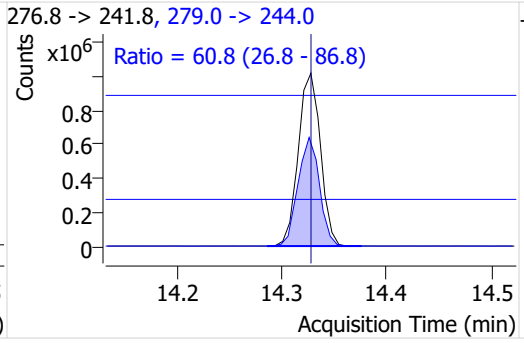

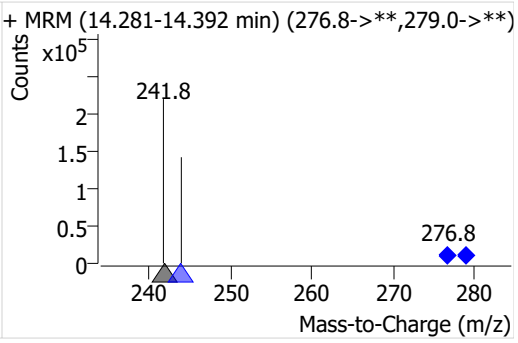

1st 08/20/24
2nd 08/20/24

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Matrix: Sediment

Date Acquired: 8/6/24 13:23
Batch ID: 851162
Analysis Method: 1699M/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery	X	
Internal Standards	X	
Surrogates	X	
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Primary Review: _____

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Secondary Review: _____

1st 08/20/24
2nd 08/20/24

Quantitation Report

Data File:	J:\MS42\Data\080624\080624F010.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 13:23	**Vial:**	5
Run Type:	LCS	**Dilution:**	1
Lab ID:	KQ2411800-03	**Raw Units:**	ng/ml

Bottle ID:		**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	851162	**Prep Lot:**	442451	**Report Group:**	KQ2411800
Analysis	1699M	**Prep Method:**	EPA 3541		
		Prep Date:	8/1/24		

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400368
		Report List ID:	25424

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	8.762	-0.02	37451566.210	100	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec	% Rec Criteria	Rpt?
S_Aldrin-13C12	7.200	-0.01	2076994.479	9.970	50	12 - 88	Y
S_4,4'DDD-d4	10.532	-0.01	2387840.810	3.011	60	9 - 159	Y
S_4,4'-DDT-d4	11.798	-0.01	1279436.458	2.620	52	5 - 187	Y
S_Endrin-13C12	10.138	-0.01	563153.575	17.638	88	14 - 141	Y
S_GBHCD6	5.490	-0.01	3094570.759	6.457	32	5 - 90	Y
S_Oxychlordane-13C10	7.961	-0.01	1203204.774	9.089	45	5 - 86	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Aldrin	7.202	-0.01	1082591.890	18.561	1.86		Y
gamma-BHC (Lindane)	5.536	-0.01	3754319.924	20.122	2.01		Y
cis-Chlordane	8.823	-0.01	1458278.409	19.071	1.91		Y
trans-Chlordane	8.504	-0.01	1287148.160	20.360	2.04		Y
2,4'-DDD	9.546	-0.01	15255871.031	22.251	2.23		Y
4,4'-DDD	10.601	-0.02	11586291.714	22.919	2.29		Y
2,4'-DDE	8.527	-0.01	15175287.291	17.781	1.78		Y
4,4'-DDE	9.357	-0.02	12702140.511	20.893	2.09		Y
2,4'-DDT	10.682	-0.01	9274810.854	24.760	2.48		Y
4,4'-DDT	11.881		8362485.989	28.879	2.89		Y
Dieldrin	9.549	-0.01	867468.961	13.820	1.38		Y
cis-Nonachlor	10.591	-0.03	883075.716	18.884	1.89		Y
trans-Nonachlor	8.891	-0.01	896694.049	16.485	1.65		Y
Oxychlordane	7.969	-0.01	3463462.708	22.275	2.23		Y

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

1st 08/20/24

2nd 08/20/24

Data File:	J:\MS42\Data\080624\080624F010.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 13:23	**Vial:**	5
Run Type:	LCS	**Dilution:**	1
Lab ID:	KQ2411800-03	**Raw Units:**	ng/ml

Prep Amount:	10 g	**Dilution:**	1
Prep Final Amount:	1.00 mL	**Basis Factor:**	100.00

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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MassHunter Quantitative Analysis Sample Report

Data File	J:\MS42\Data\080624\080624F010.D		
Batch File	J:\MS42\Data\080624\QuantResults\080624 OC PEST.batch.bin		
Acq. Date-Time	8/6/2024 1:23:08 PM	**Acq Operator**	EBruno
Name	KQ2411800-03 LCS	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	8/19/2024 3:52:06 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	072424 OC PEST ICAL.batch.bin	**Vial**	6
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.213	289.8 -> 254.8	2668059	20.0000 ng/ml	0.001
γ-BHC-d6(IS)	5.490	223.9 -> 187.0	3094571	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	6.560	276.8 -> 241.8	2437514	20.0000 ng/ml	0.000
Chorpyrifos-d10(IS)	6.941	199.9 -> 171.9	2220249	20.0000 ng/ml	0.007
Aldrin-13C(IS)	7.200	269.8 -> 200.0	2077001	20.0000 ng/ml	0.007
Octachlorostyrene-13C8(IS)	7.722	315.8 -> 245.8	1534187	20.0000 ng/ml	0.004
Isodrin-13C12(IS)	7.782	199.9 -> 130.1	1926738	20.0000 ng/ml	0.004
Oxychlordane-13C10(IS)	7.961	190.0 -> 125.0	1203205	20.0000 ng/ml	0.000
Heptachlor epoxide-13C10(IS)	7.963	362.8 -> 270.0	772430	20.0000 ng/ml	0.003
Pyrene-d10	8.762	212.0 -> 208.0	37451566	100.0000 ng/ml	0.002
Endrin-13C12(IS)	10.138	269.8 -> 200.0	563154	20.0000 ng/ml	0.009
4,4'-DDD d4(IS)	10.532	243.0 -> 173.1	2387841	5.0000 ng/ml	0.000
4,4'-DDT-d4(IS)	11.798	243.0 -> 173.1	1279436	5.0000 ng/ml	0.001
Endrin ketone-13C12(IS)	13.080	327.9 -> 291.8	143664	20.0000 ng/ml	0.001
Methoxychlor-d6(IS)	13.394	233.0 -> 141.0	6242081	20.0000 ng/ml	0.001
Mirex-13C10(IS)	14.328	276.8 -> 241.8	1824349	5.0000 ng/ml	0.001

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	2668059	5.642 ng/ml	
		Spiked Amount =	20.0	Recovery =	*28.2 %*
γ-BHC-d6	5.491	223.9 -> 187.0	3094571	6.457 ng/ml	
		Spiked Amount =	20.0	Recovery =	*32.3 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	2437514	8.854 ng/ml	
		Spiked Amount =	20.0	Recovery =	*44.3 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	2220249	18.816 ng/ml	
		Spiked Amount =	20.0	Recovery =	*94.1 %*
Aldrin-13C	7.207	269.8 -> 200.0	2076994	9.970 ng/ml	
		Spiked Amount =	20.0	Recovery =	*49.9 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	1534187	8.172 ng/ml	
		Spiked Amount =	20.0	Recovery =	*40.9 %*
Isodrin-13C12	7.789	199.9 -> 130.1	1926738	8.630 ng/ml	
		Spiked Amount =	20.0	Recovery =	*43.2 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1203205	9.089 ng/ml	
		Spiked Amount =	20.0	Recovery =	*45.4 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	772430	10.308 ng/ml	
		Spiked Amount =	20.0	Recovery =	*51.5 %*
Endrin-13C12	10.131	269.8 -> 200.0	563154	17.638 ng/ml	
		Spiked Amount =	20.0	Recovery =	*88.2 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	2387841	3.011 ng/ml	
		Spiked Amount =	5.0	Recovery =	*60.2 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1279436	2.620 ng/ml	
		Spiked Amount =	5.0	Recovery =	*52.4 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	143664	21.316 ng/ml	
		Spiked Amount =	20.0	Recovery =	*106.6 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	6242081	23.049 ng/ml	
		Spiked Amount =	20.0	Recovery =	*115.2 %*

MassHunter Quantitative Analysis Sample Report

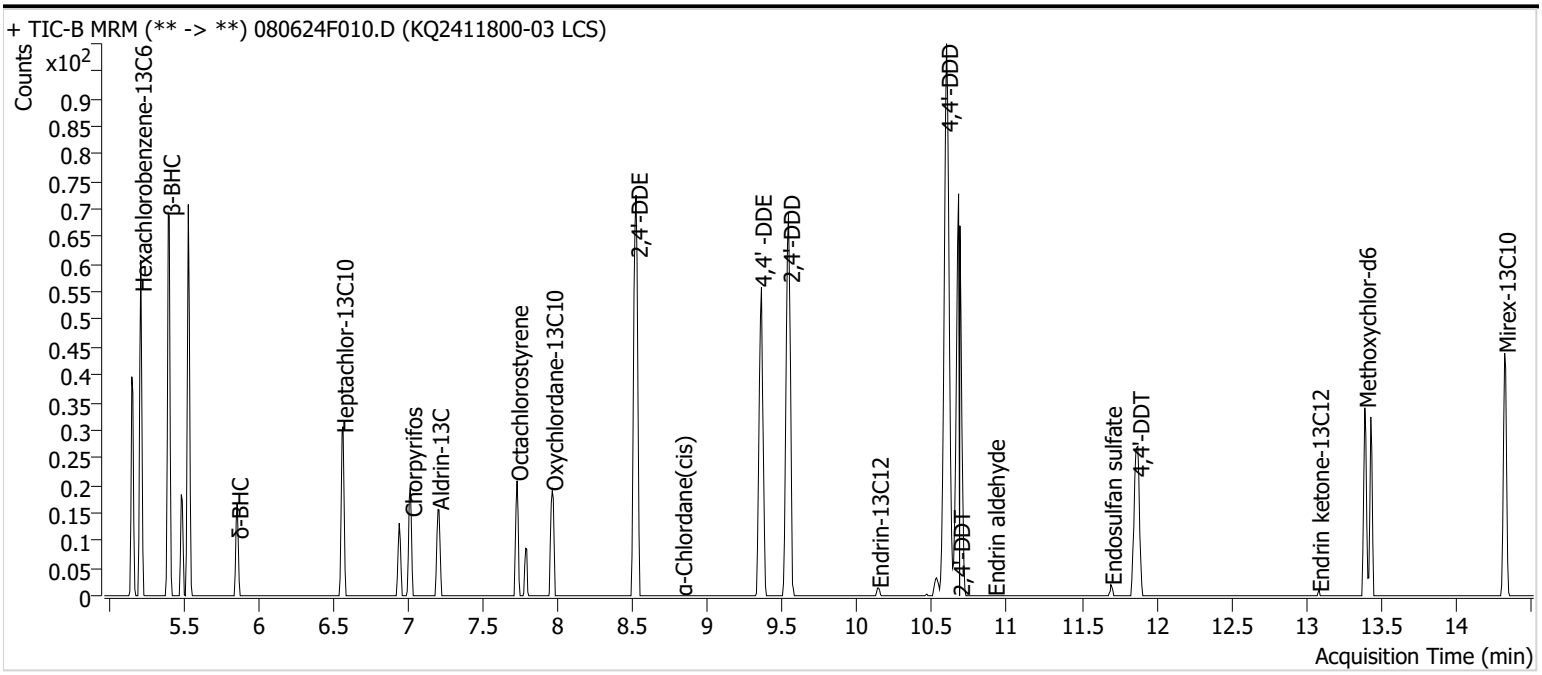
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	1824349	2.533 ng/ml
		Spiked Amount = 5.0		Recovery = *50.7 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.158	181.1 -> 145.1	4533868	20.782 ng/ml	99
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.215	283.8 -> 213.9	4611671	22.651 ng/ml	94
β-BHC	γ-BHC-d6(IS)	5.402	181.1 -> 145.1	3693048	25.274 ng/ml	94
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	3754320	20.122 ng/ml	84
δ-BHC	γ-BHC-d6(IS)	5.860	181.1 -> 145.1	2104864	15.498 ng/ml	86
Heptachlor	Heptachlor-13C10(IS)	6.570	271.7 -> 236.9	2449390	18.675 ng/ml	94
Chorpyrifos	Chorpyrifos-d10(IS)	7.019	196.9 -> 169.0	2815499	18.632 ng/ml	99
Aldrin	Aldrin-13C(IS)	7.202	254.9 -> 220.0	1082592	18.561 ng/ml	94
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.728	342.8 -> 307.8	3813936	20.230 ng/ml	97
Isodrin	Isodrin-13C12(IS)	7.797	193.0 -> 123.0	2017024	19.934 ng/ml	97
Oxychlordane	Oxychlordane-13C10(IS)	7.969	114.9 -> 51.1	3463463	22.275 ng/ml	100
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.971	352.8 -> 262.9	838990	20.511 ng/ml	96
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.504	271.8 -> 236.9	1287148	20.360 ng/ml	87
2,4'-DDE	4,4'-DDD d4(IS)	8.527	246.0 -> 176.2	15175287	17.781 ng/ml	89
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.823	271.8 -> 236.9	1458278	19.071 ng/ml	80
Endosulfan I	Endrin-13C12(IS)	8.840	206.9 -> 172.0	564621	11.155 ng/ml	99
trans-Nanochlor	Oxychlordane-13C10(IS)	8.891	271.8 -> 236.9	896694	16.485 ng/ml	69
4,4' -DDE	4,4'-DDD d4(IS)	9.357	246.0 -> 176.2	12702141	20.893 ng/ml	99
Dieldrin	Endrin-13C12(IS)	9.549	262.9 -> 193.0	867469	13.820 ng/ml	97
2,4'-DDD	4,4'-DDD d4(IS)	9.546	235.0 -> 165.1	15255871	22.251 ng/ml	100
Endrin	Endrin-13C12(IS)	10.153	262.8 -> 193.0	610597	17.546 ng/ml	86
Endosulfan II	Endrin-13C12(IS)	10.464	206.9 -> 172.0	405980	15.103 ng/ml	98
cis-Nonachlor	Oxychlordane-13C10(IS)	10.591	271.8 -> 236.9	883076	18.884 ng/ml	72
4,4'-DDD	4,4'-DDD d4(IS)	10.601	235.0 -> 165.1	11586292	22.919 ng/ml	93
2,4'-DDT	4,4'-DDT-d4(IS)	10.682	235.0 -> 165.1	9274811	24.760 ng/ml	100
Endrin aldehyde	Endrin-13C12(IS)	10.914	249.9 -> 214.9	142701	14.354 ng/ml	88
Endosulfan sulfate	Endrin-13C12(IS)	11.696	271.9 -> 237.0	1141703	16.152 ng/ml	100
4,4'-DDT	4,4'-DDT-d4(IS)	11.881	235.0 -> 165.1	8362486	28.879 ng/ml	93
Endrin ketone	Endrin ketone-13C12(IS)	13.092	147.0 -> 111.0	578905	17.953 ng/ml	95
Methoxychlor	Methoxychlor-d6(IS)	13.437	227.0 -> 141.1	6802854	20.917 ng/ml	93
Mirex	Mirex-13C10(IS)	14.337	271.8 -> 236.8	7029978	18.701 ng/ml	96

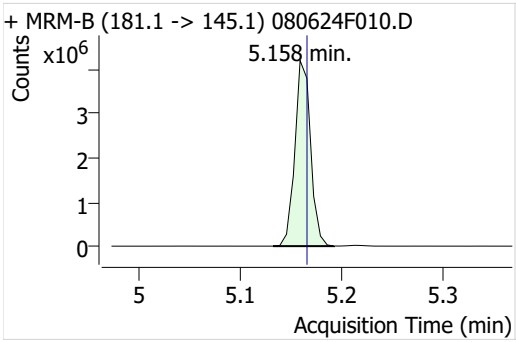
(m) = manual integration ND = Not Detected NC = Not Calculated

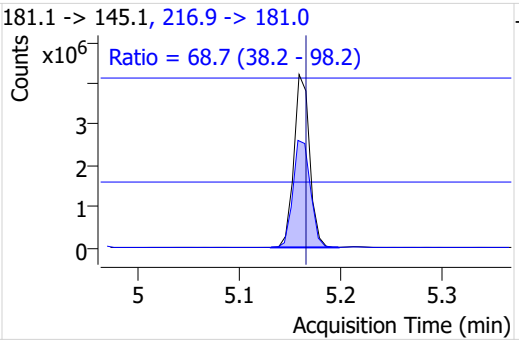
Sample Chromatogram

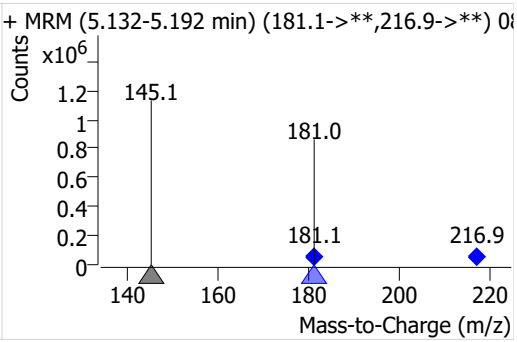
MassHunter Quantitative Analysis Sample Report



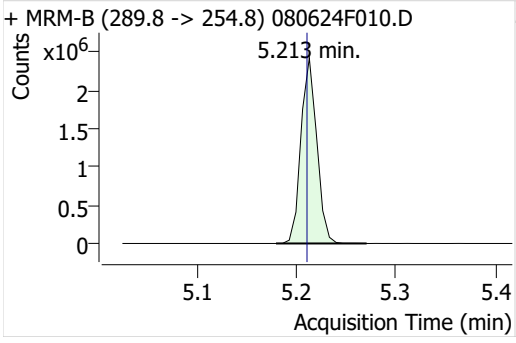
α-BHC

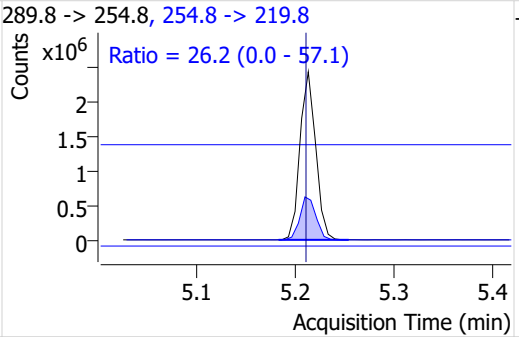


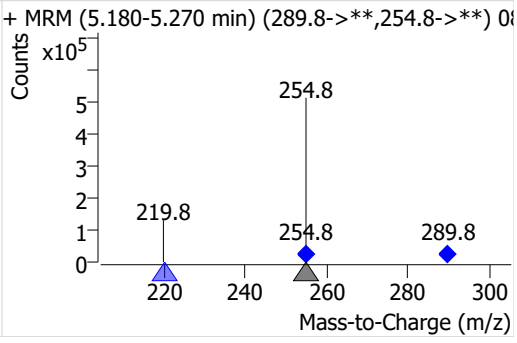




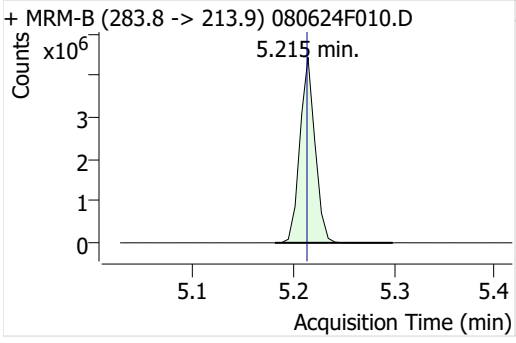
Hexachlorobenzene-13C6

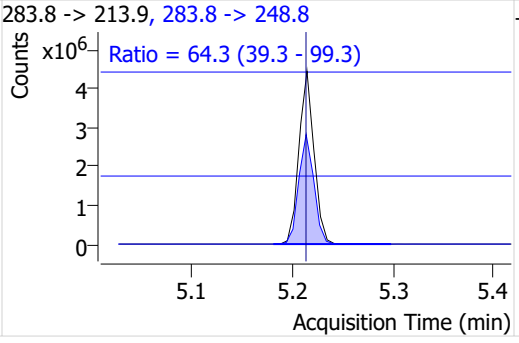


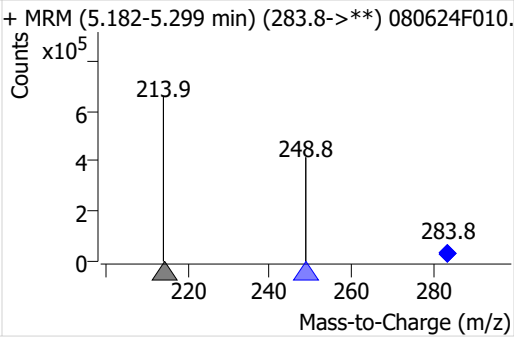




Hexachlorobenzene







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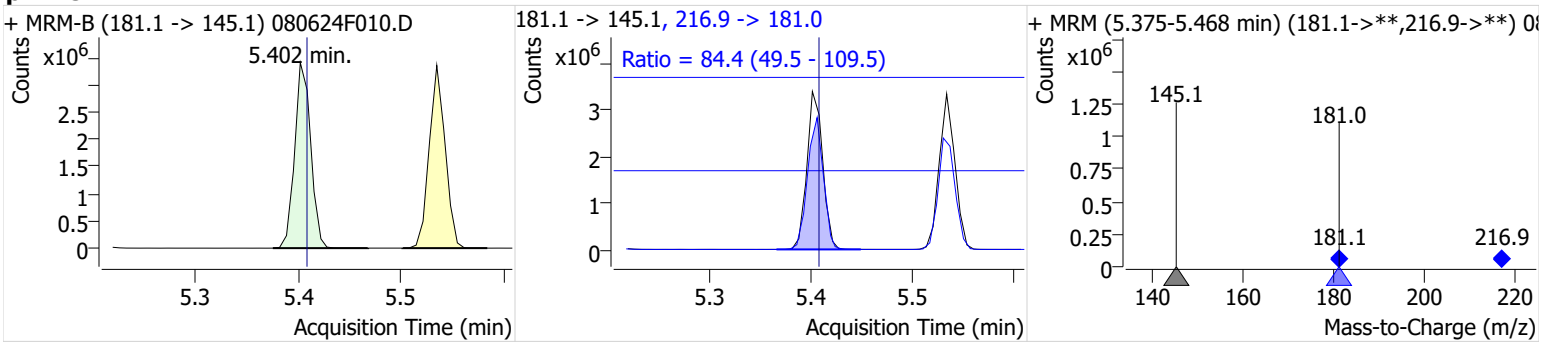
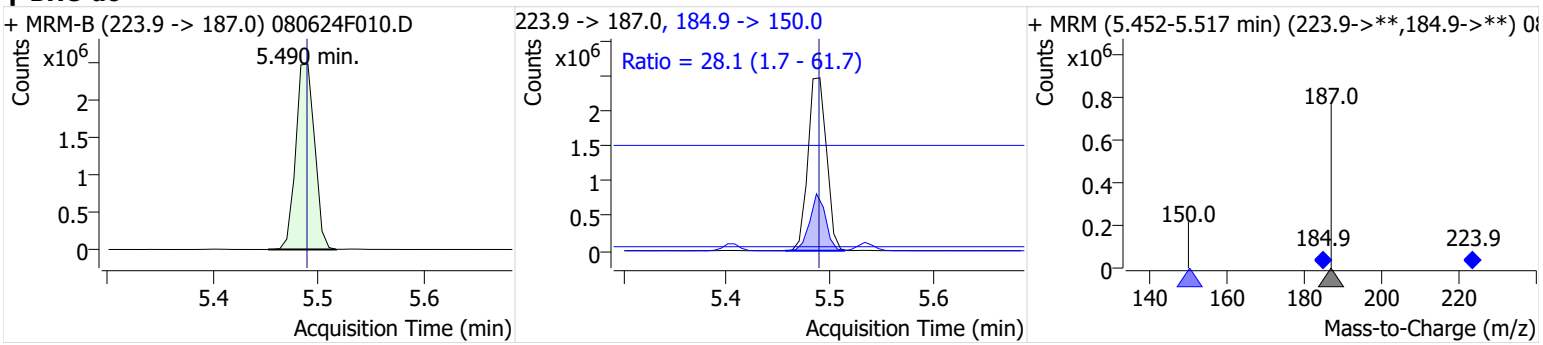
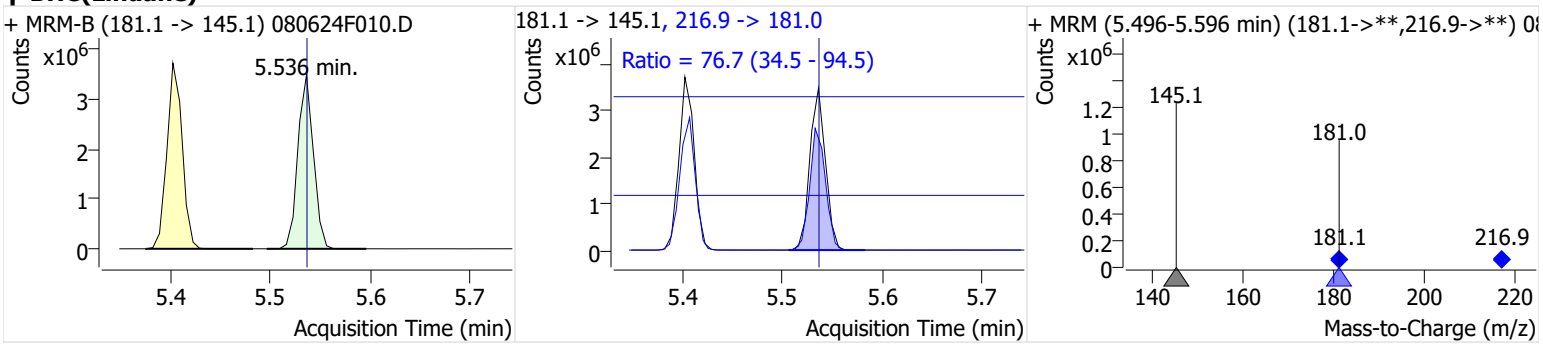
β-BHC



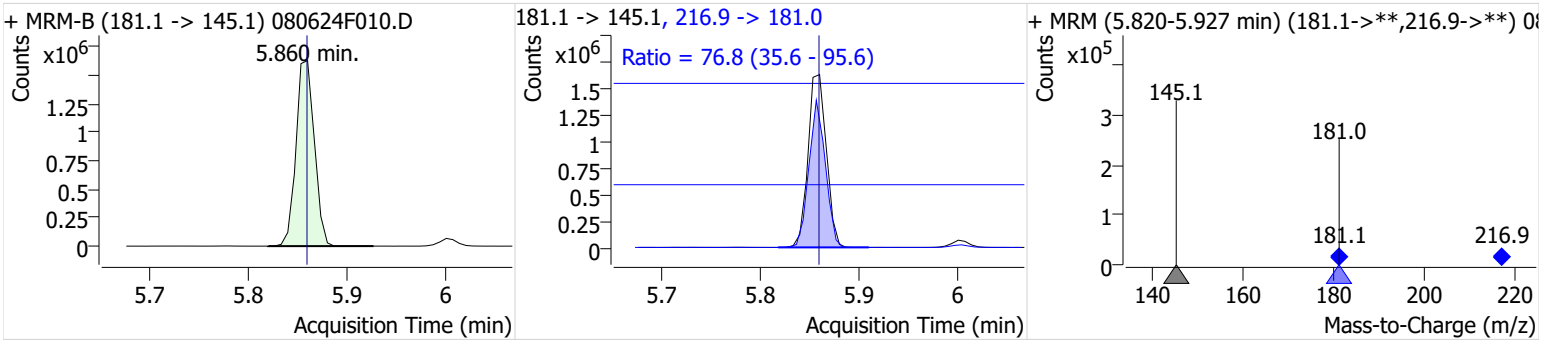
γ-BHC-d6



γ-BHC(Lindane)



δ-BHC



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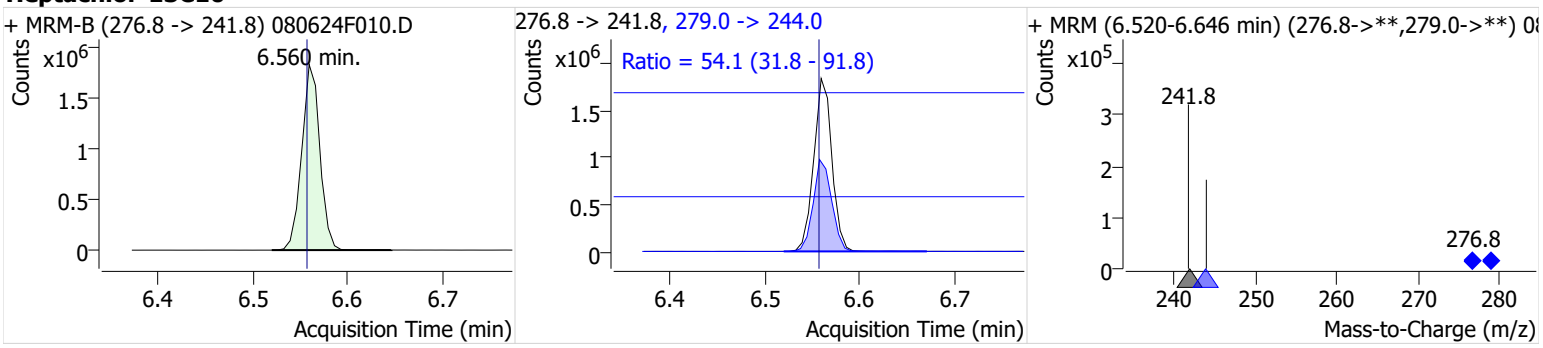
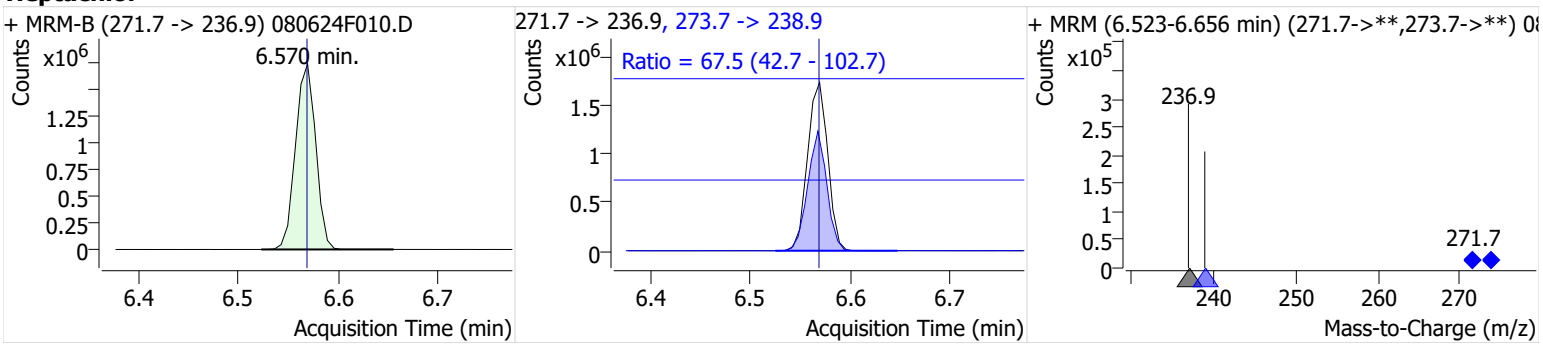
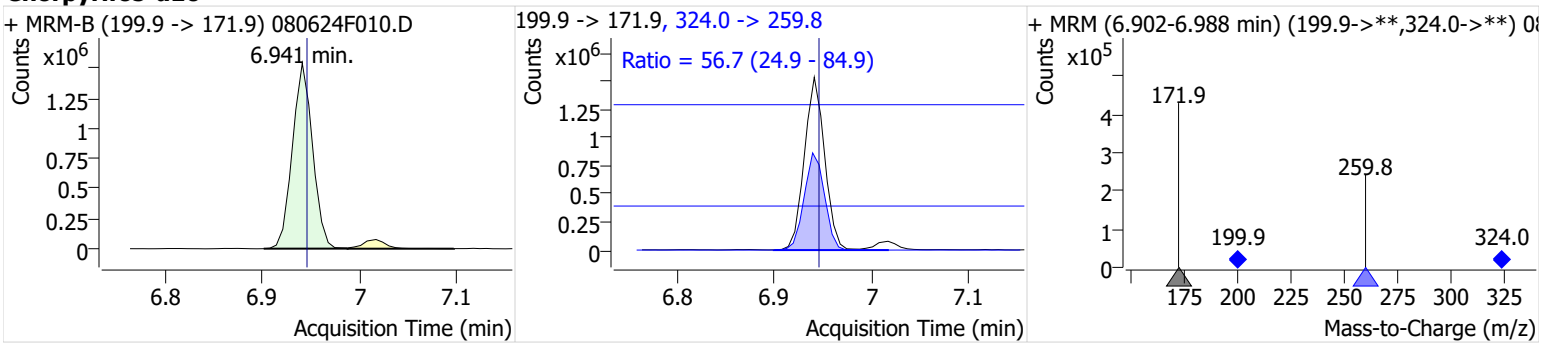
Heptachlor-13C10



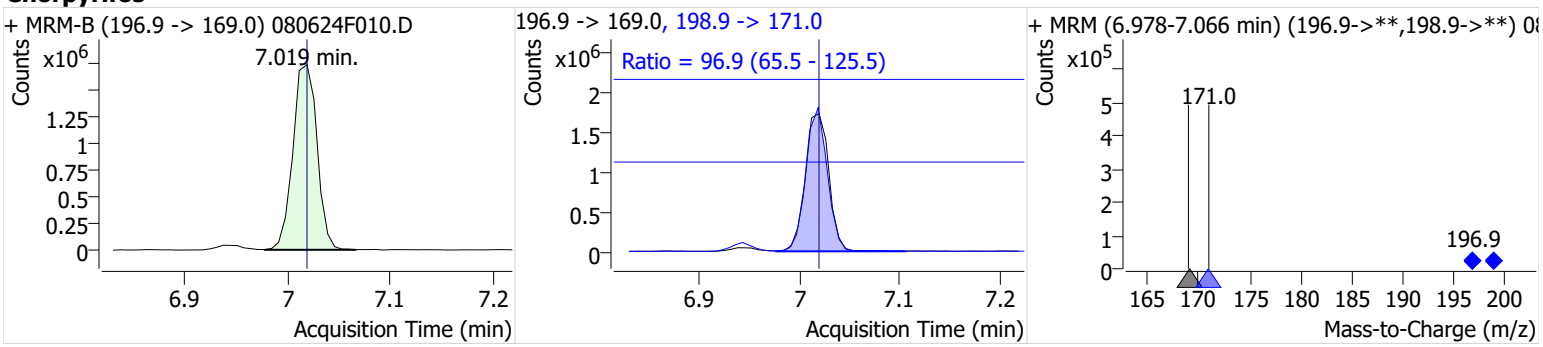
Heptachlor



Chorpyrifos-d10

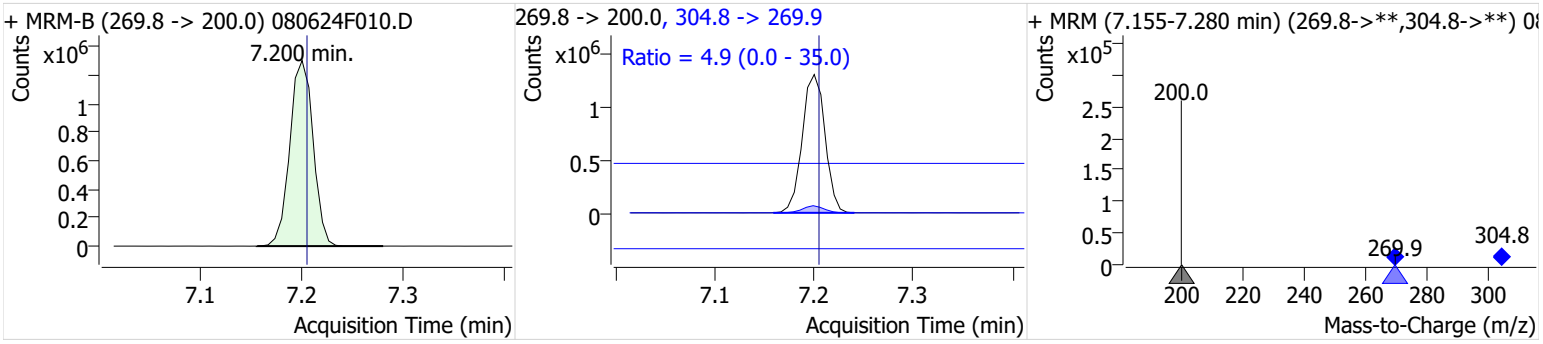


Chorpyrifos

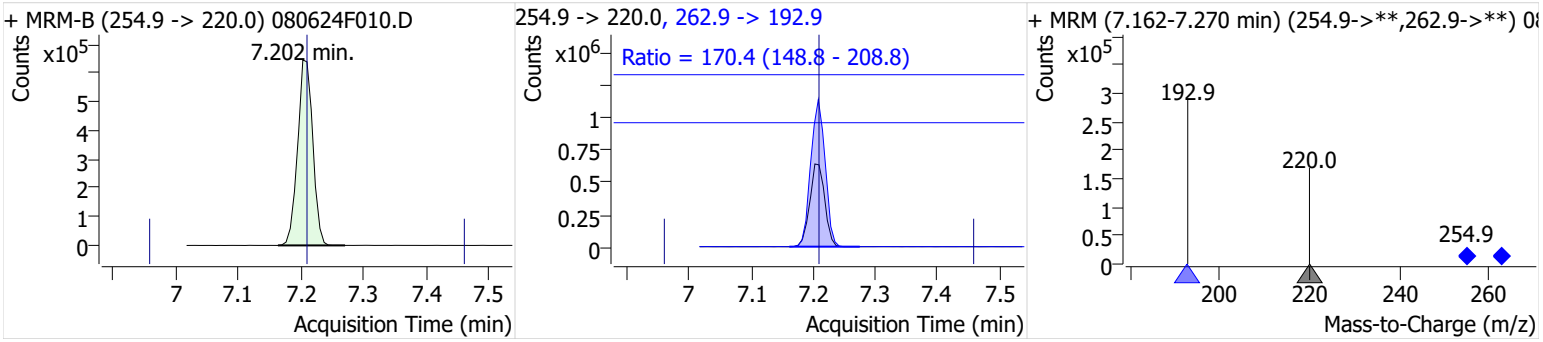


MassHunter Quantitative Analysis Sample Report

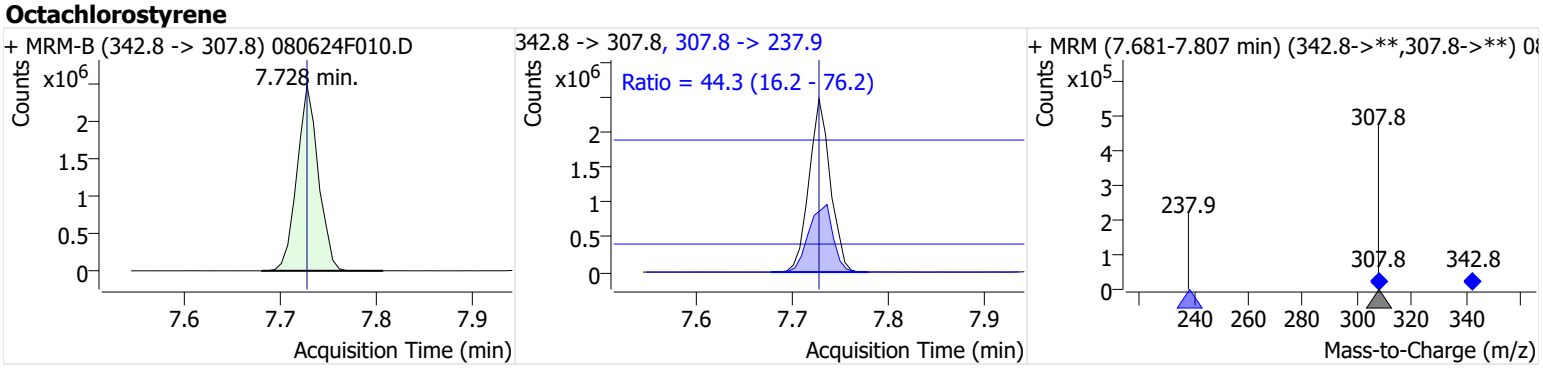
Aldrin-13C



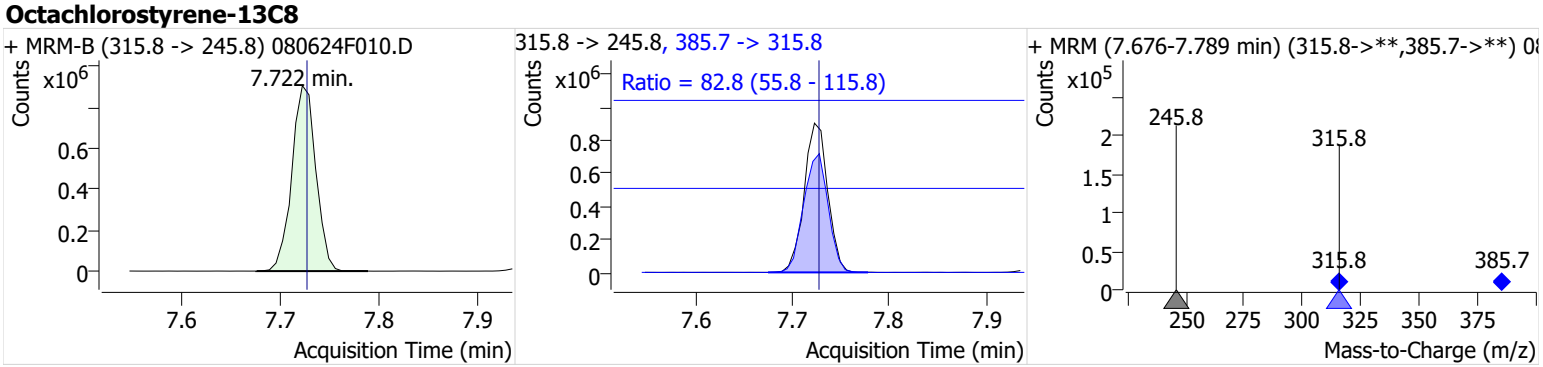
Aldrin



Octachlorostyrene



Octachlorostyrene-13C8



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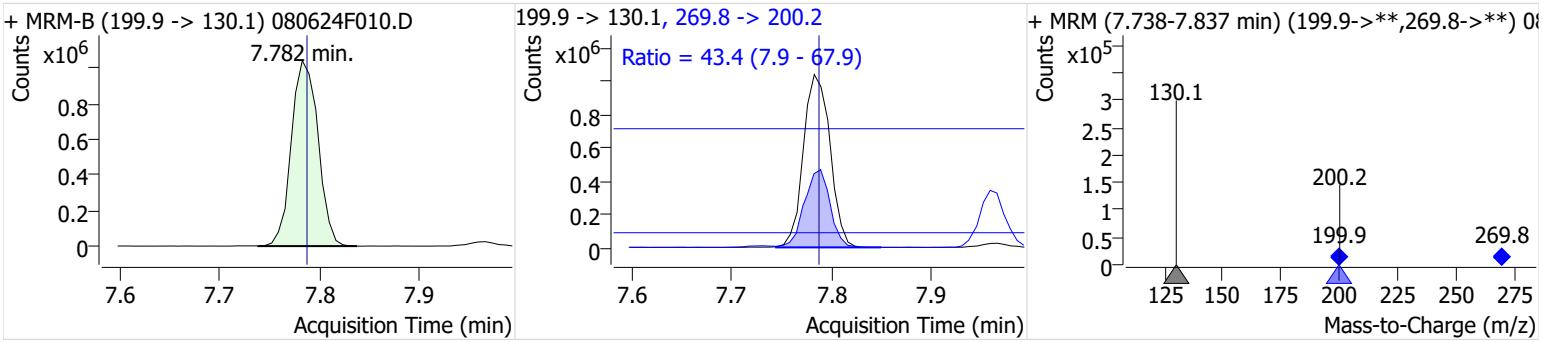
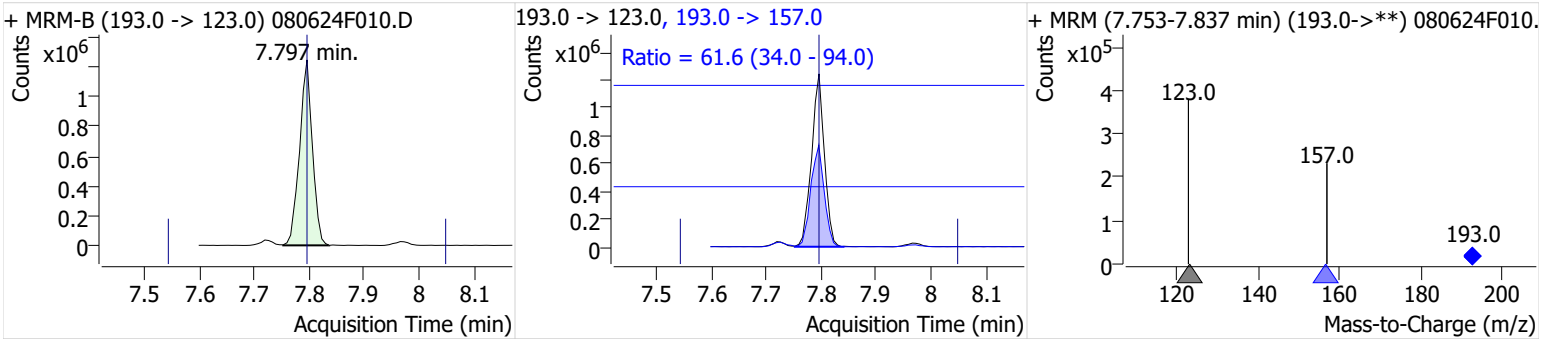
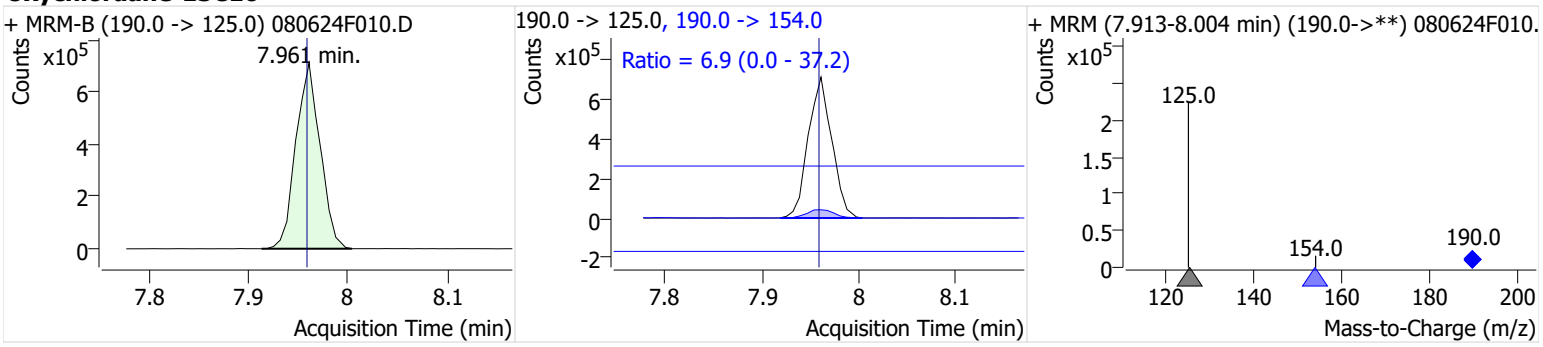
Isodrin-13C12



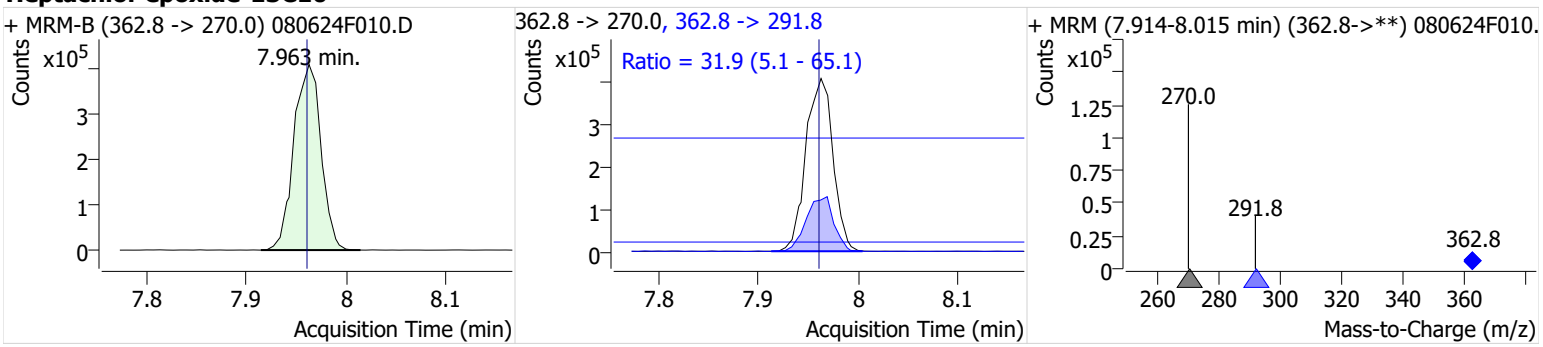
Isodrin



Oxychlordane-13C10



Heptachlor epoxide-13C10



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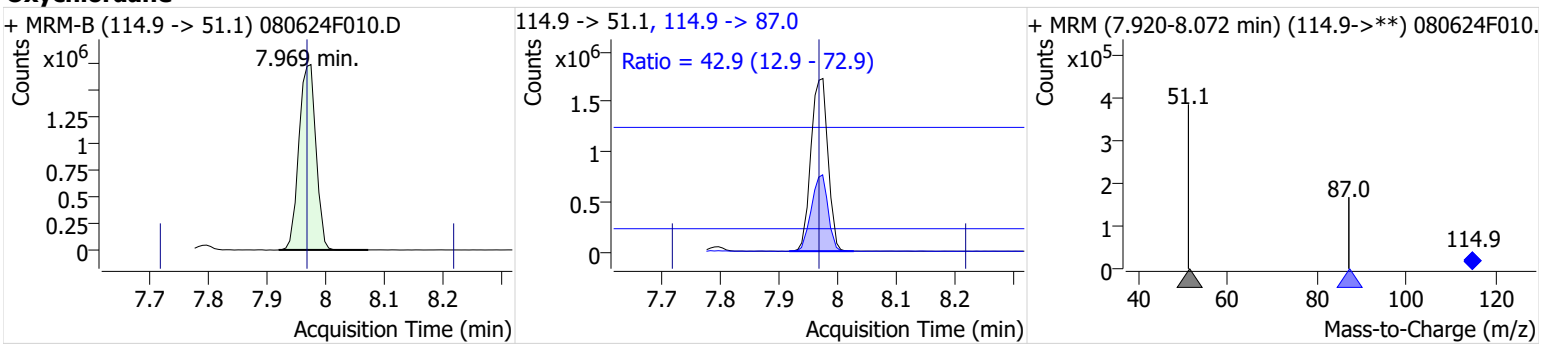
Oxychlordane



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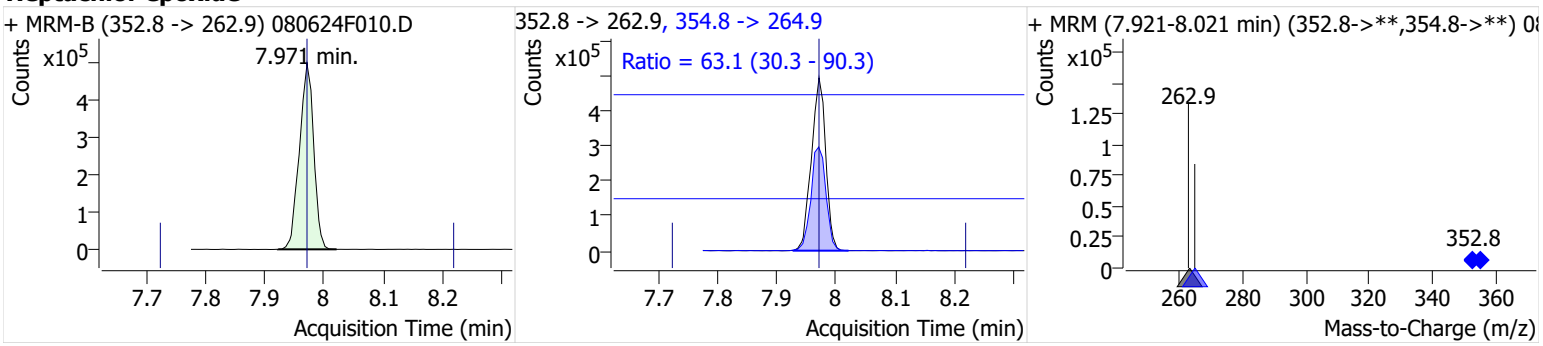
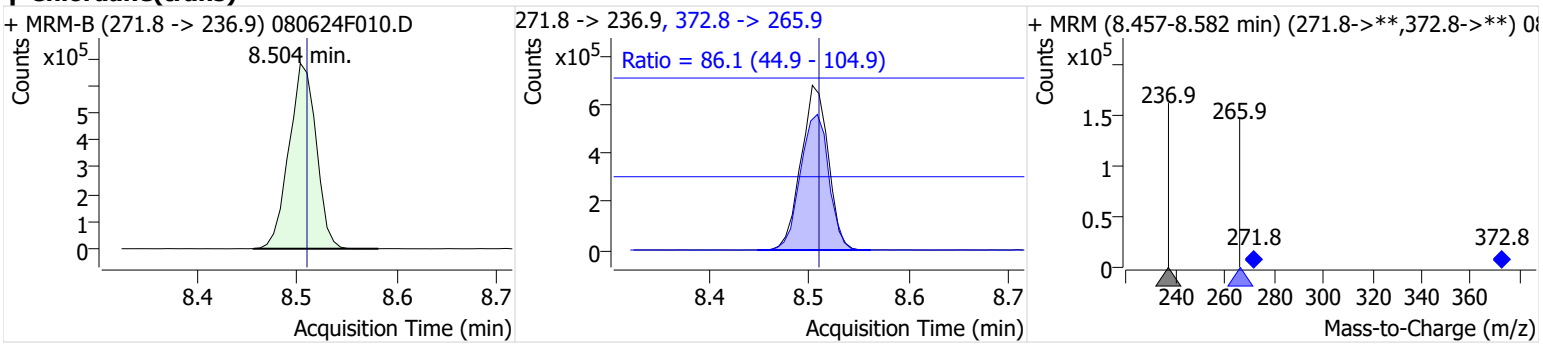
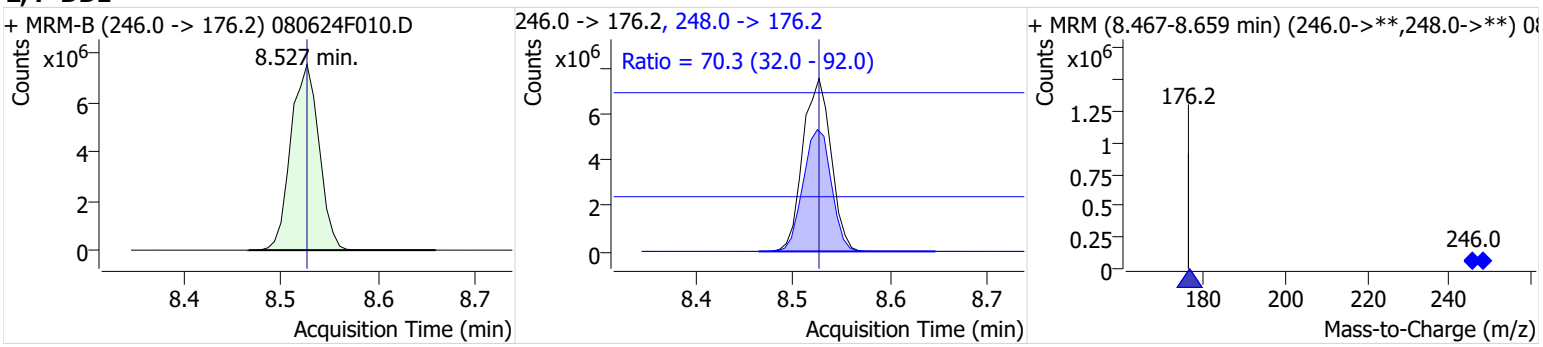


γ-Chlordane(trans)



2,4'-DDE



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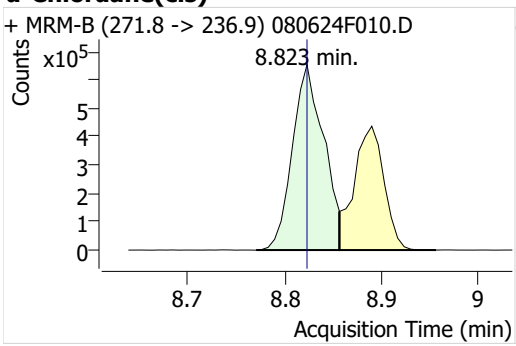
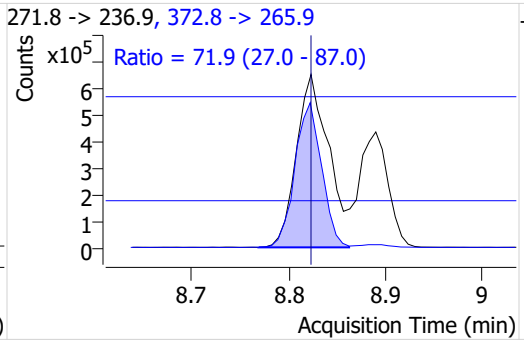
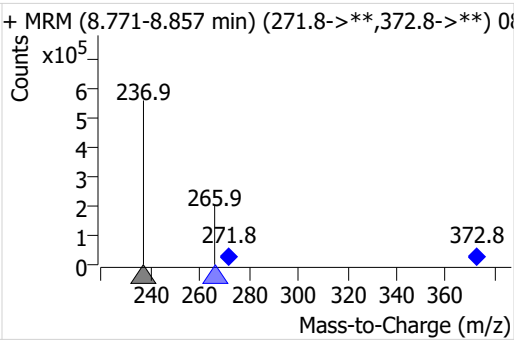
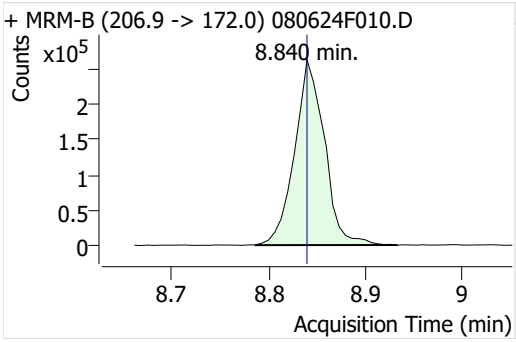
α-Chlordane(cis)

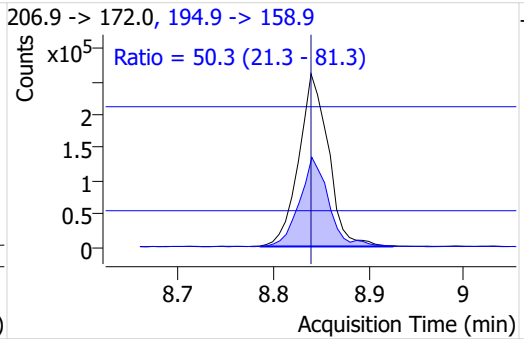


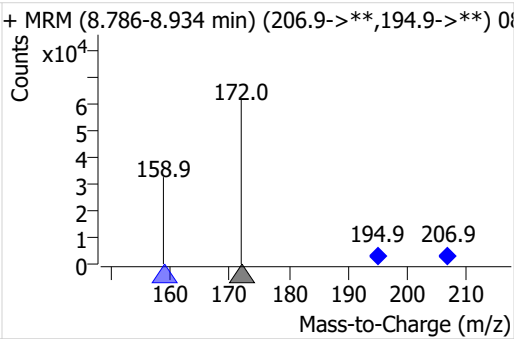




Endosulfan I







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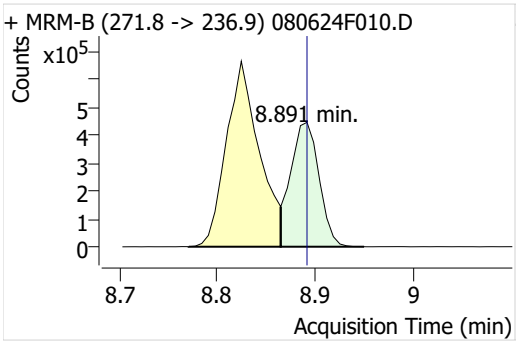
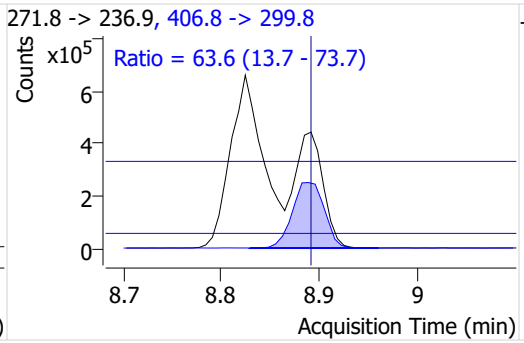
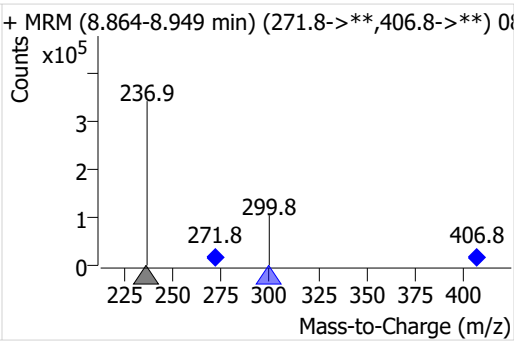
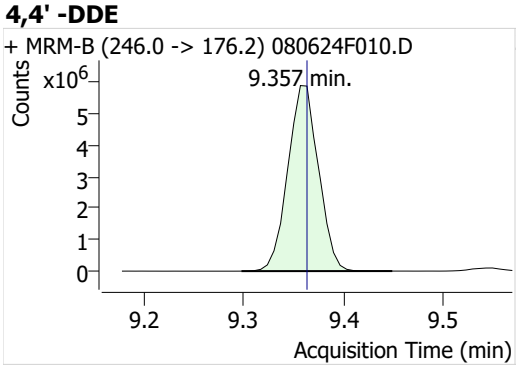
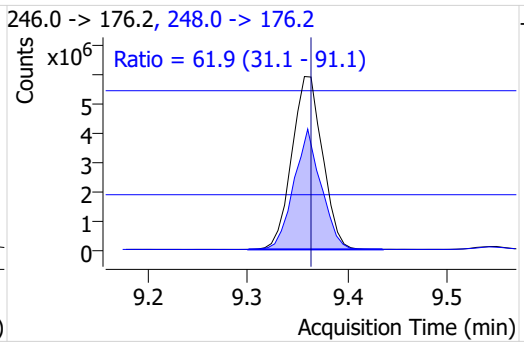


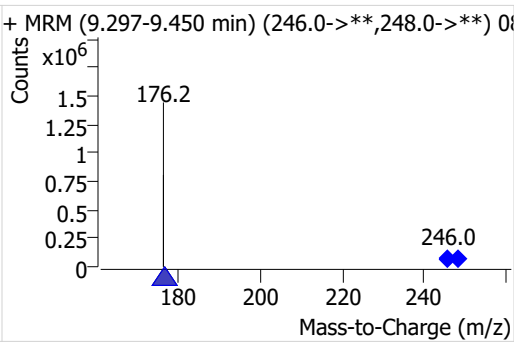




4,4' -DDE







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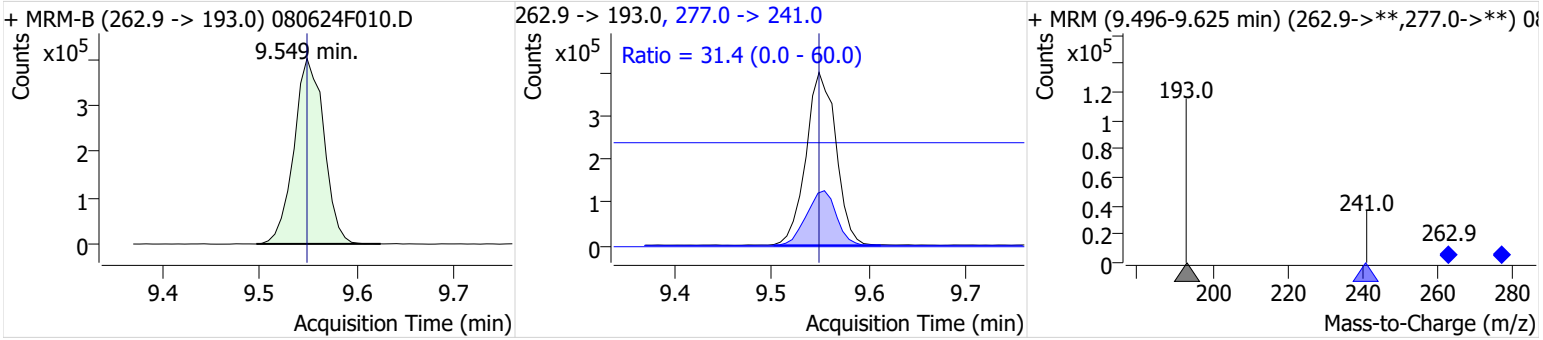
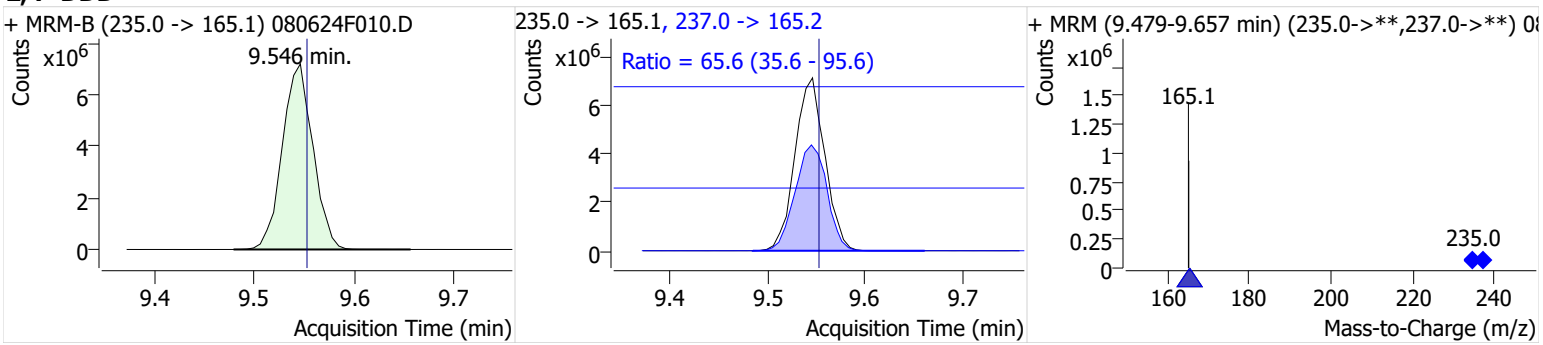
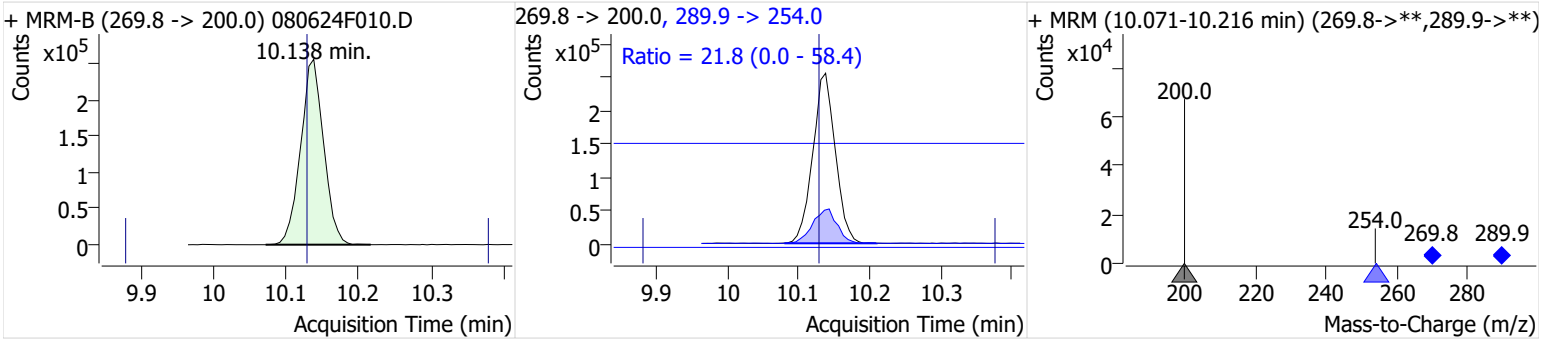
Dieldrin



2,4'-DDD



Endrin-13C12



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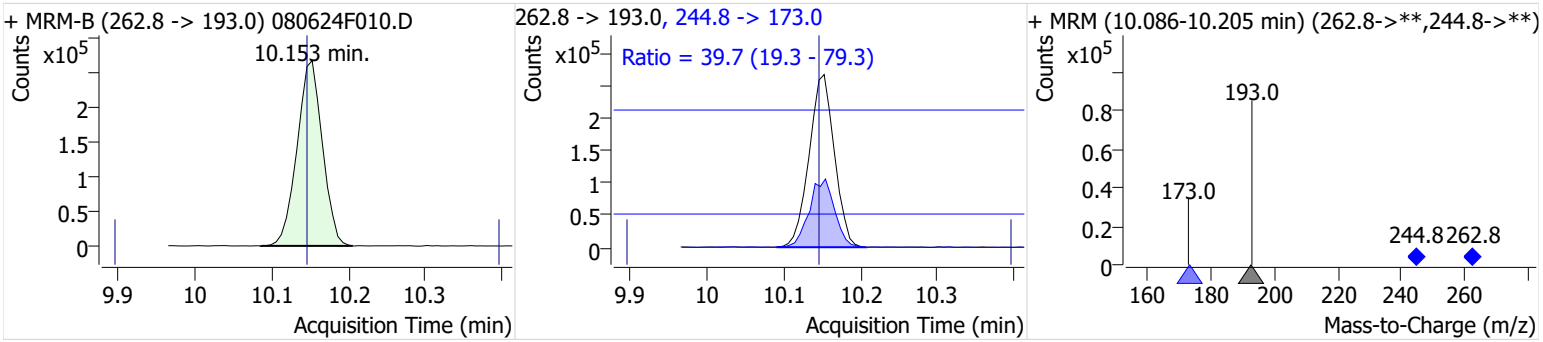

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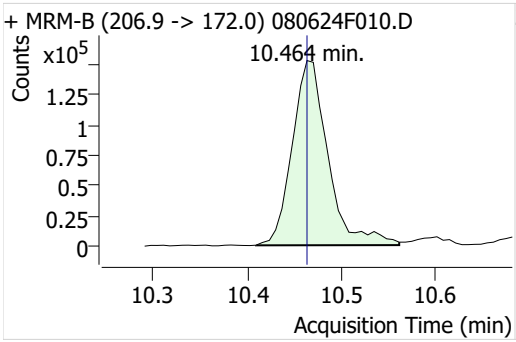
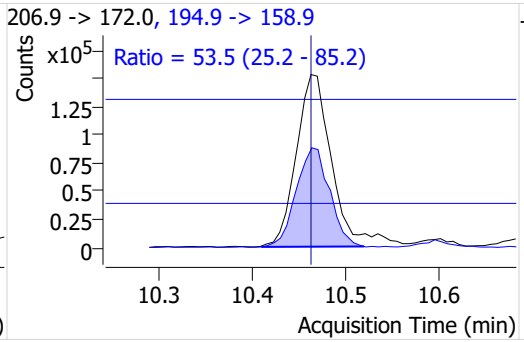
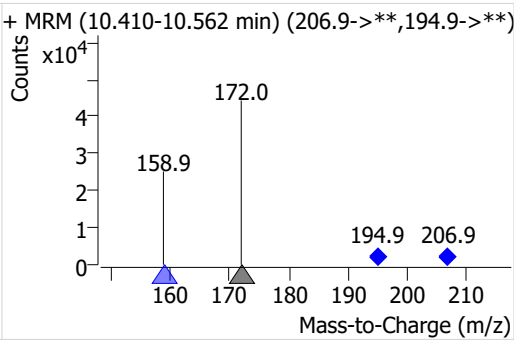
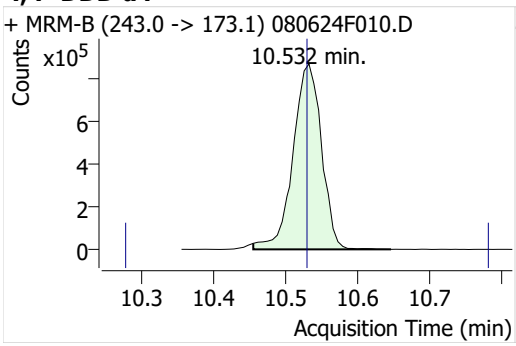
Endosulfan II

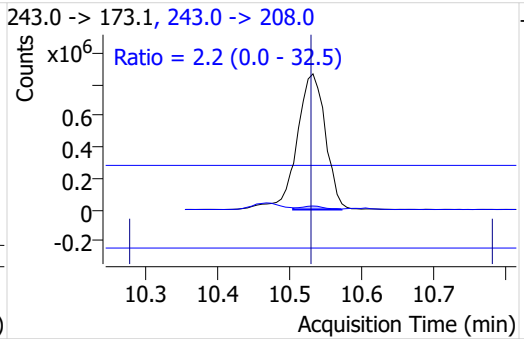


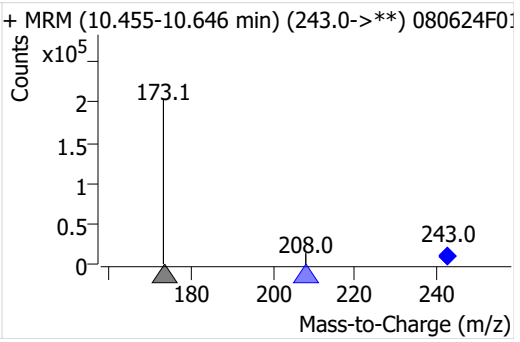




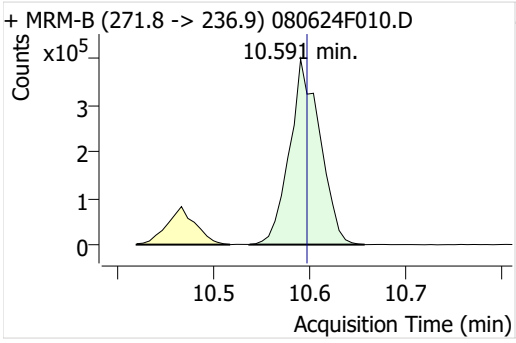
4,4'-DDD d4

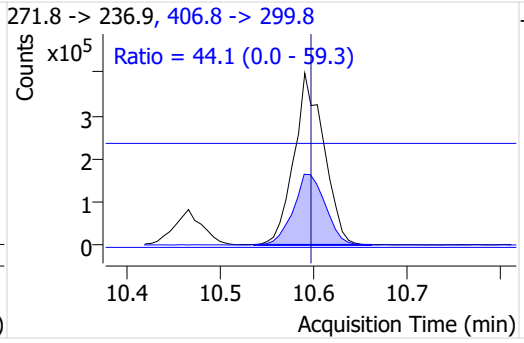


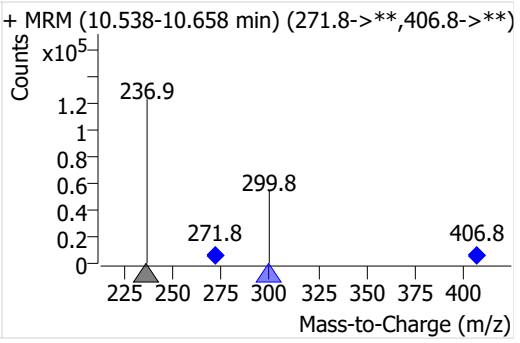




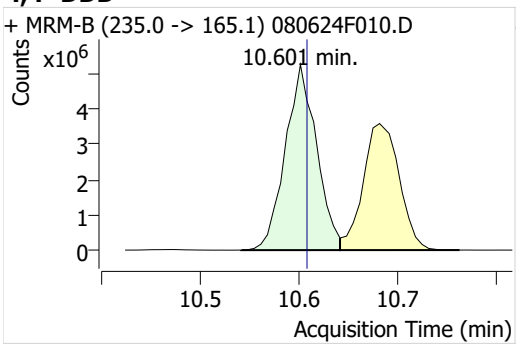
cis-Nonachlor

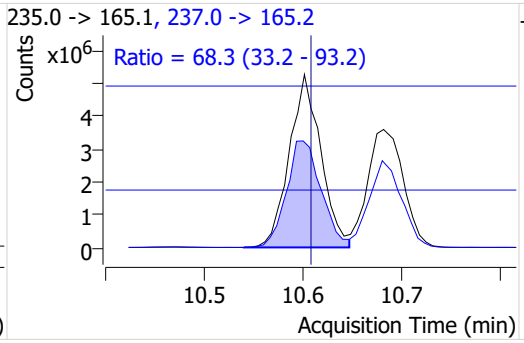


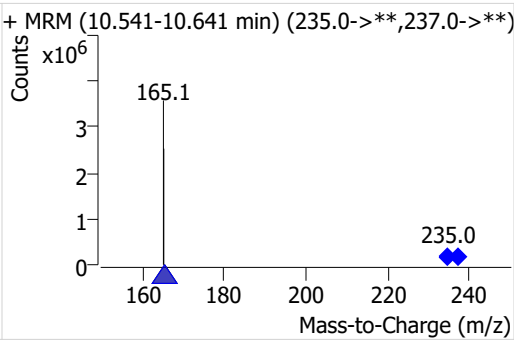




4,4'-DDD







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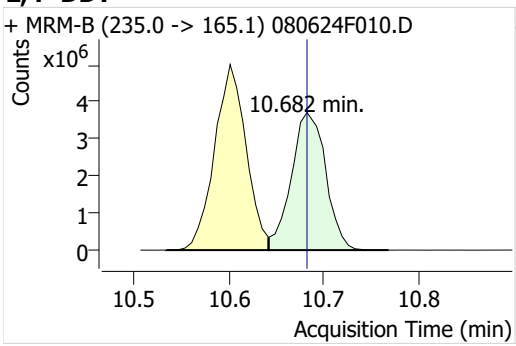
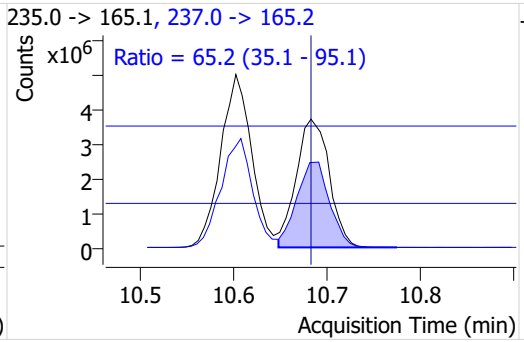
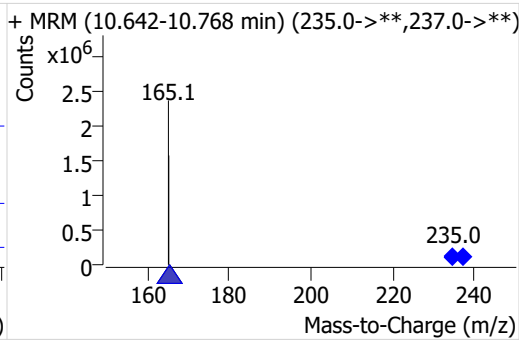
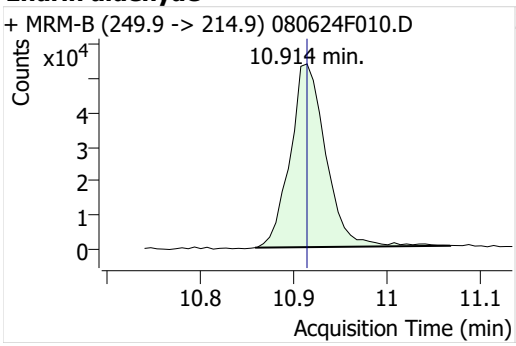
2,4'-DDT

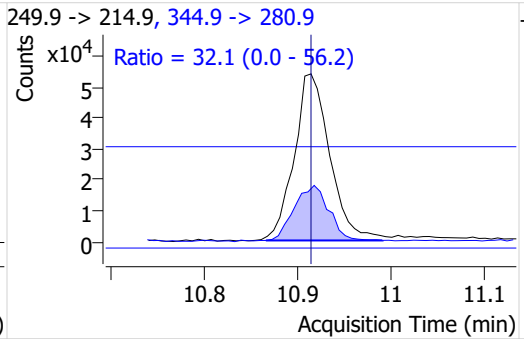


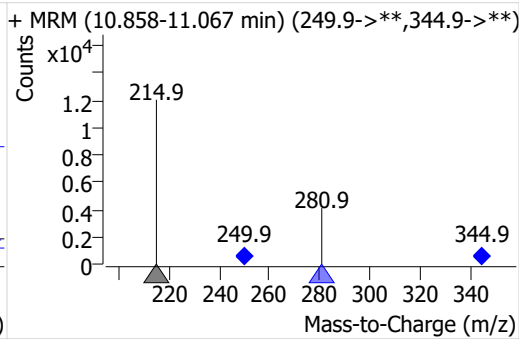




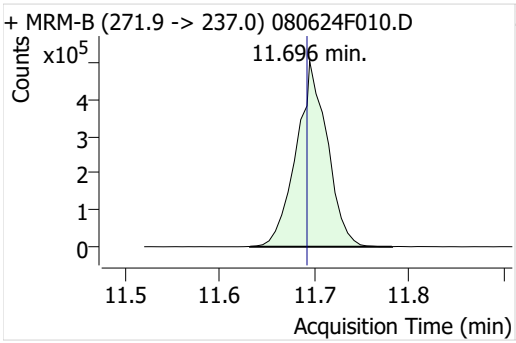
Endrin aldehyde

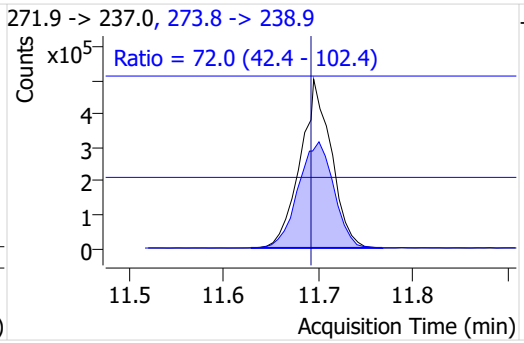


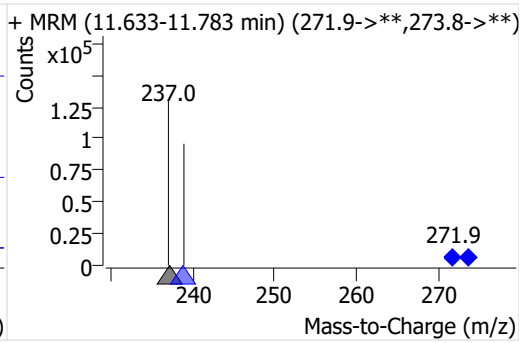




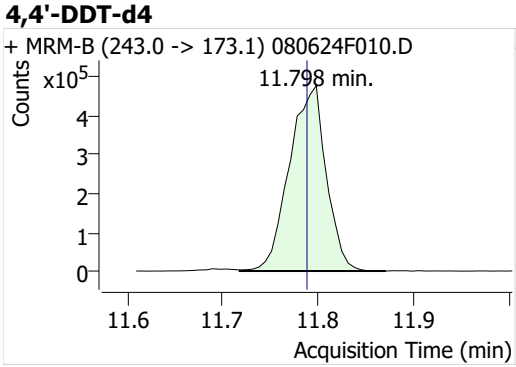
Endosulfan sulfate

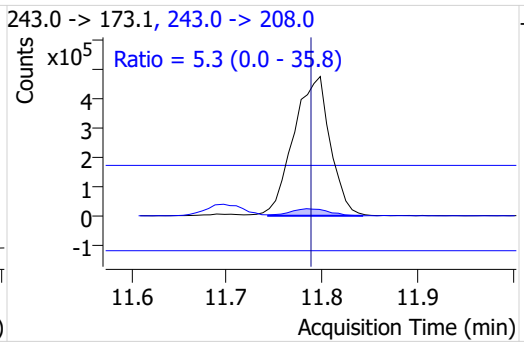


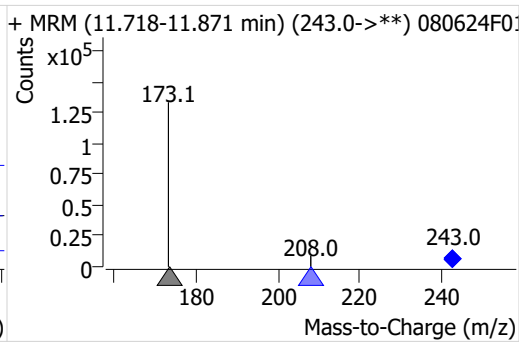




4,4'-DDT-d4







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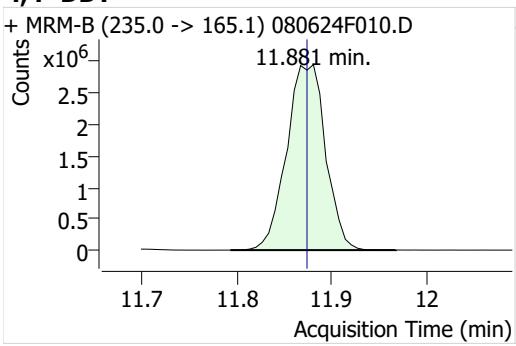
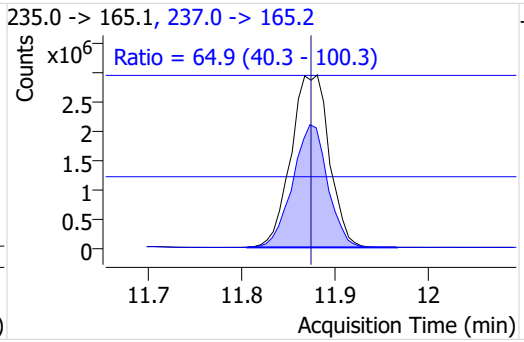
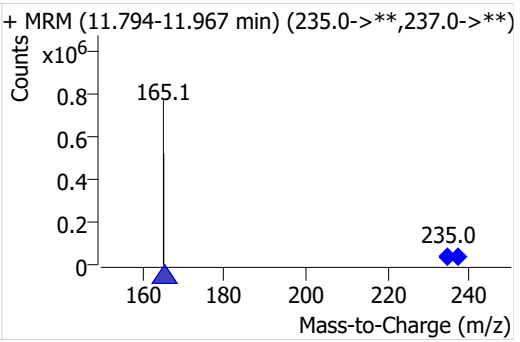
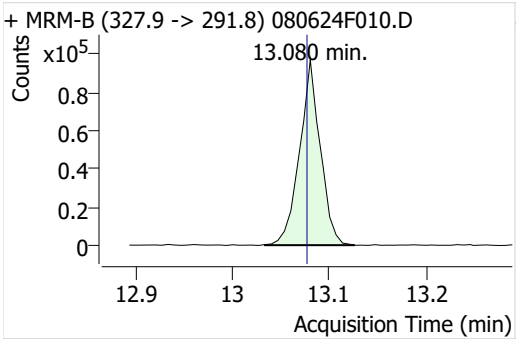
4,4'-DDT

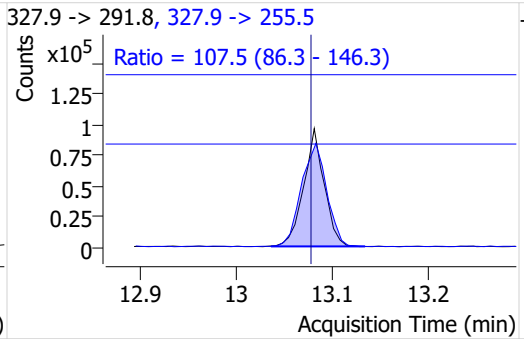


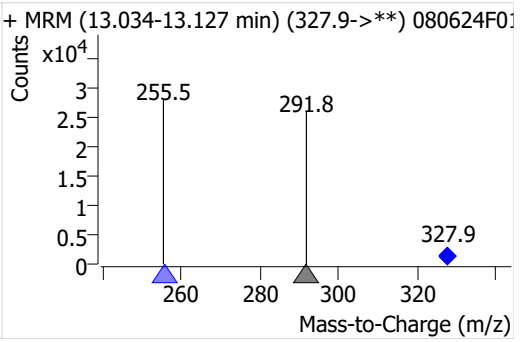




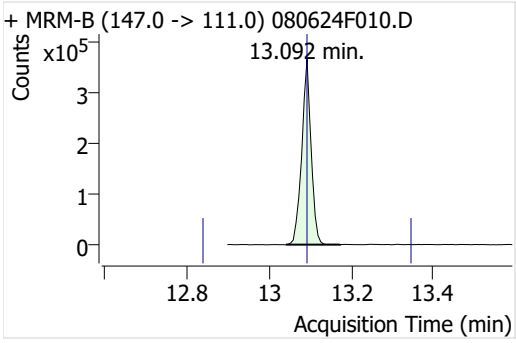
Endrin ketone-13C12

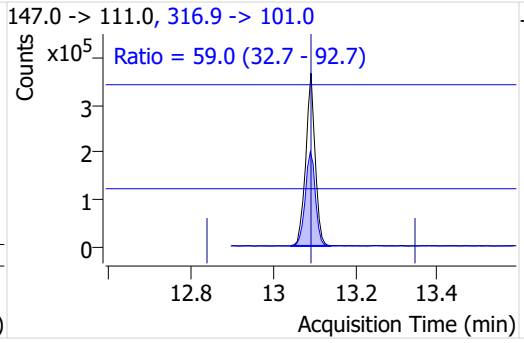


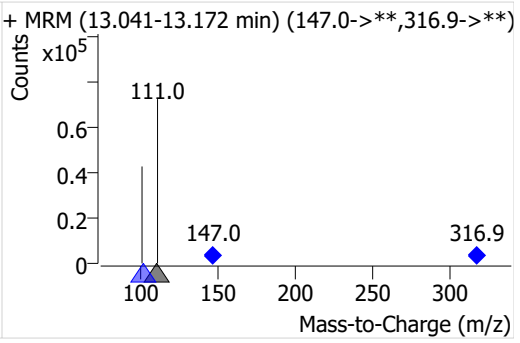




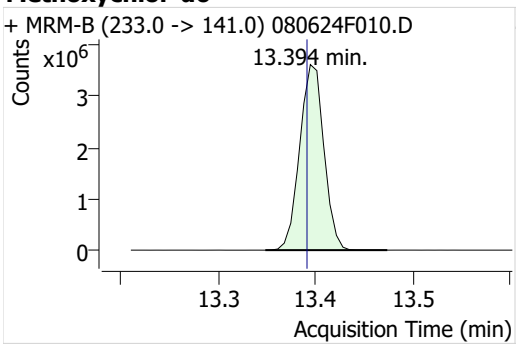
Endrin ketone

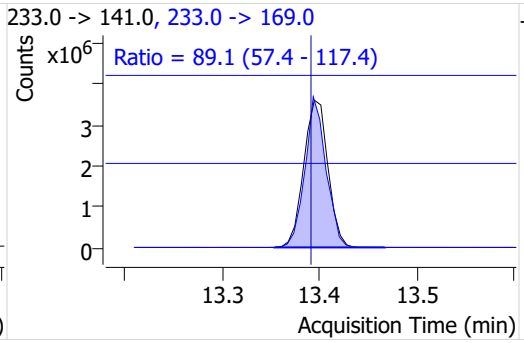


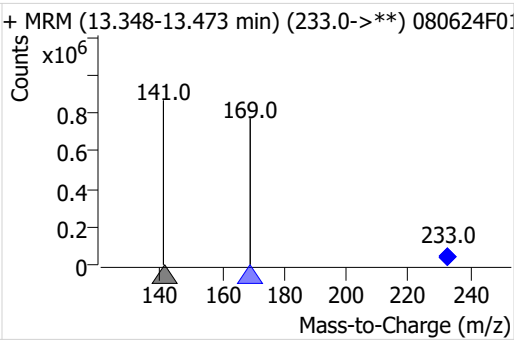




Methoxychlor-d6







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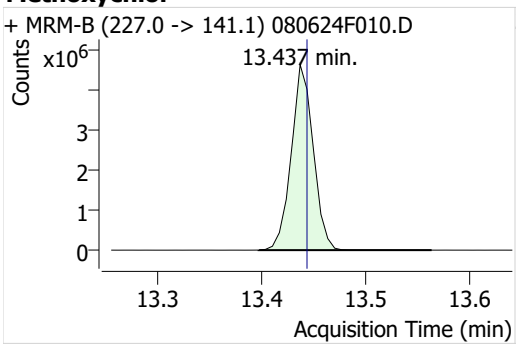
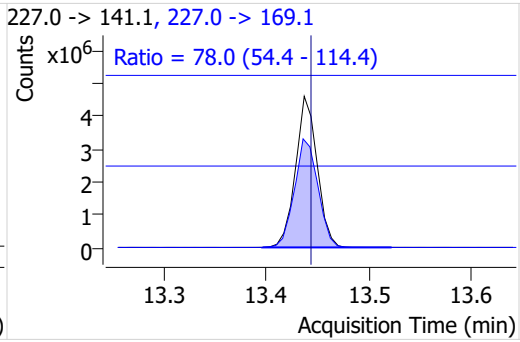
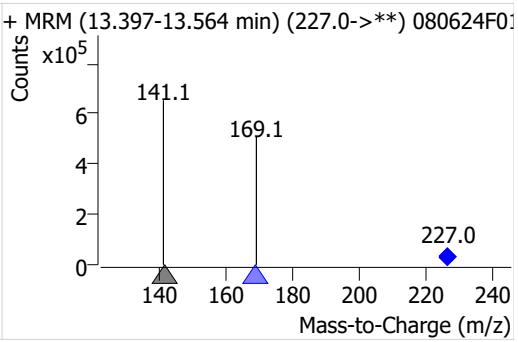
Methoxychlor







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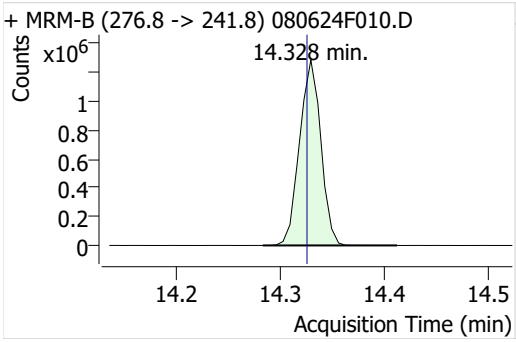

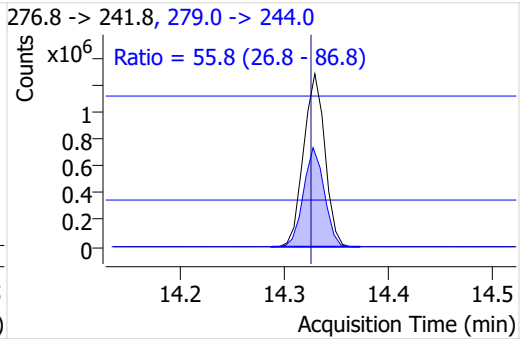

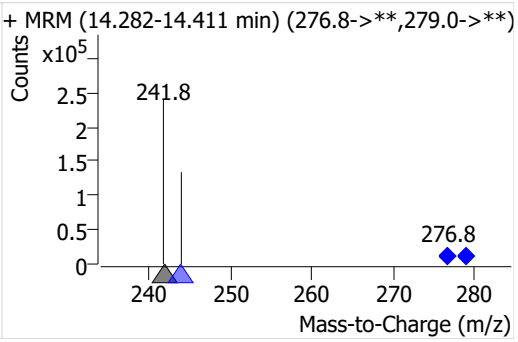

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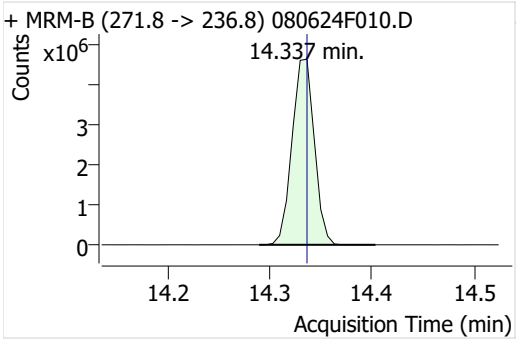
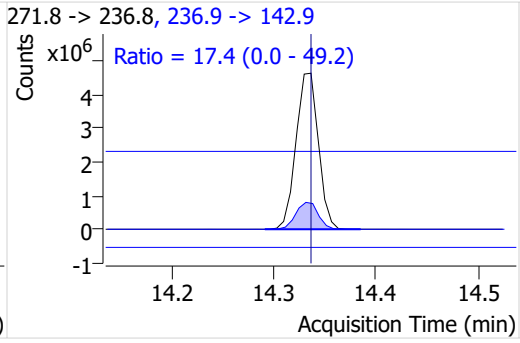
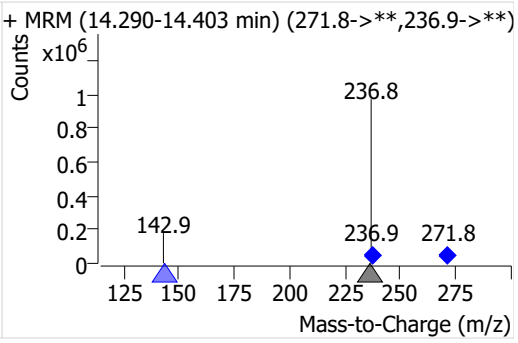
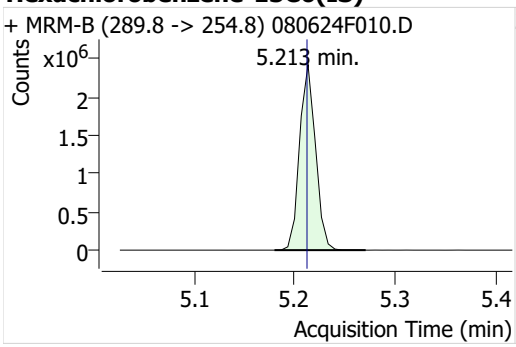
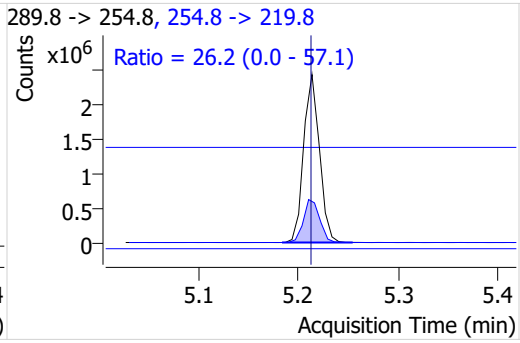


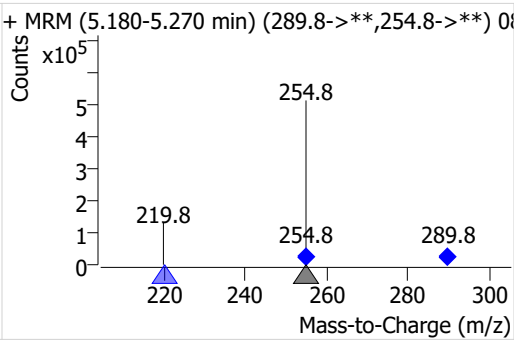




Hexachlorobenzene-13C6(IS)

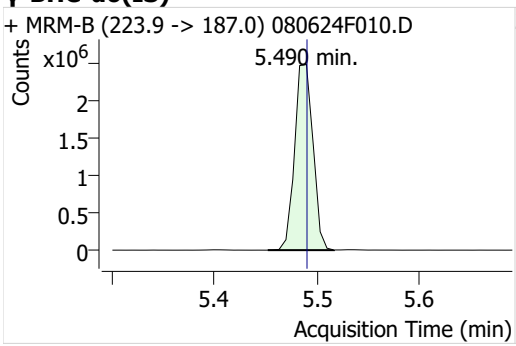


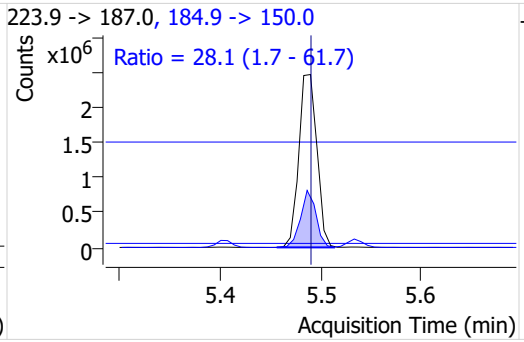


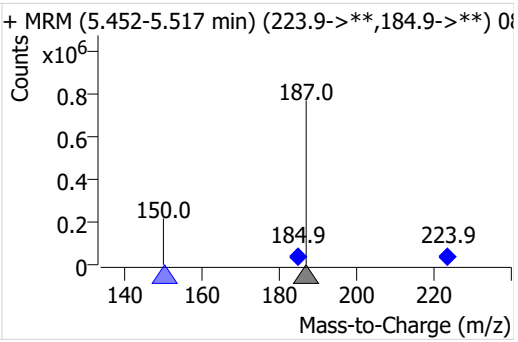


MassHunter Quantitative Analysis Sample Report

γ-BHC-d6(IS)







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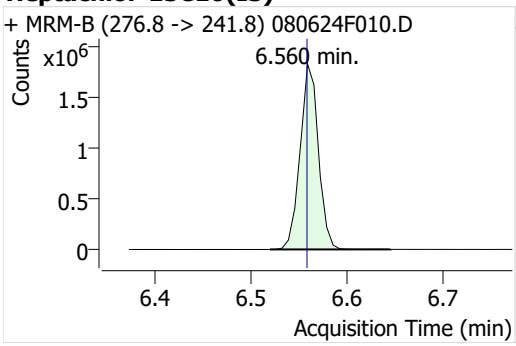
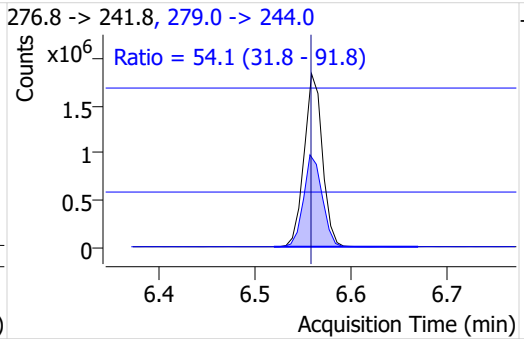
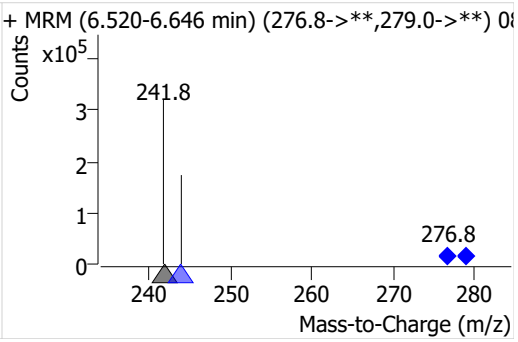
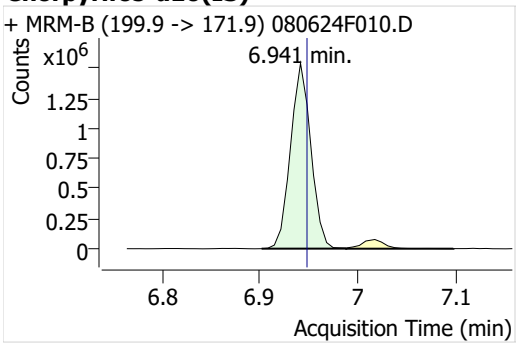
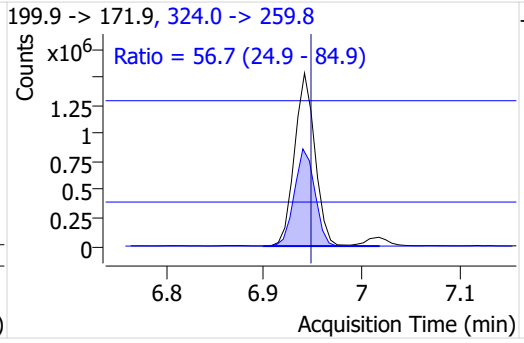


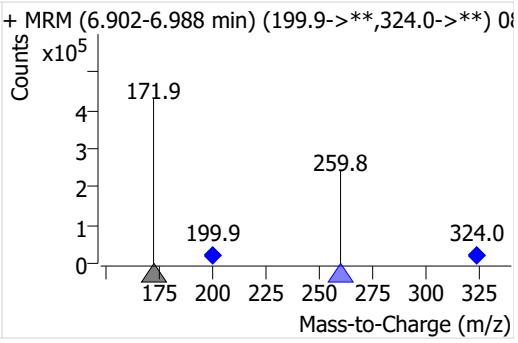




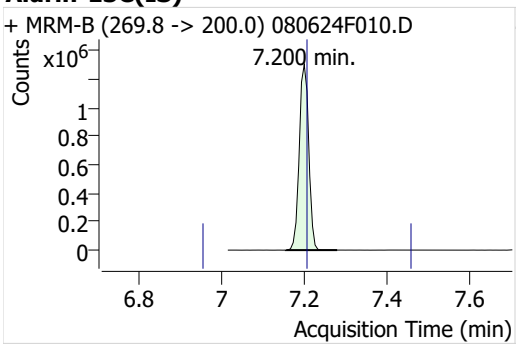
Chorpyrifos-d10(IS)

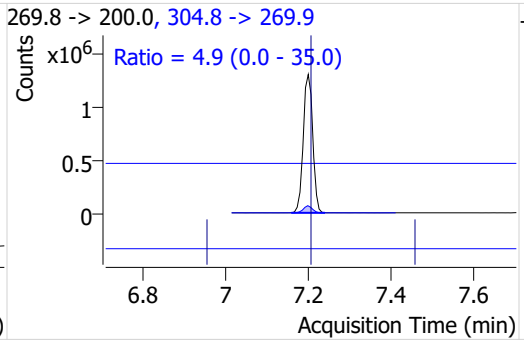


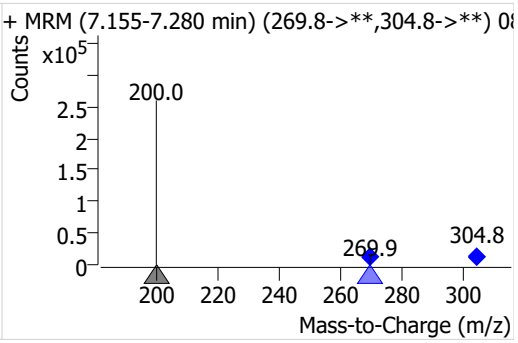




Aldrin-13C(IS)

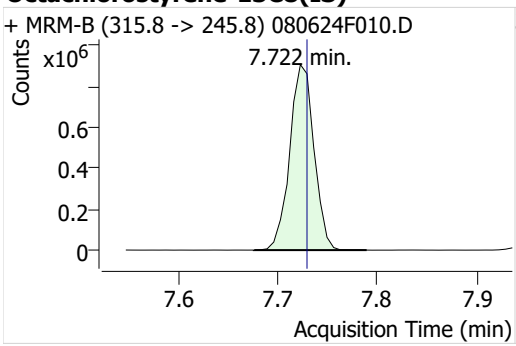


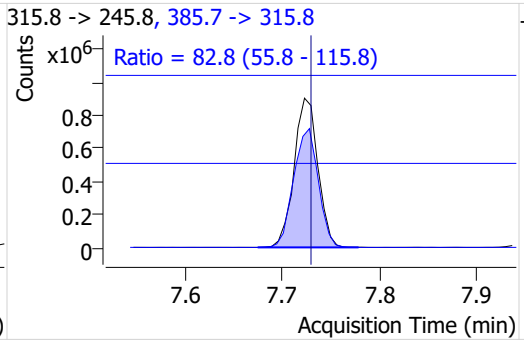


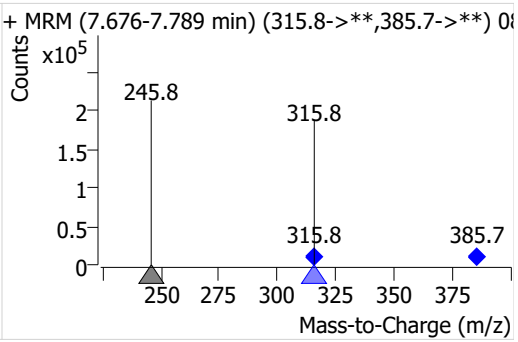


MassHunter Quantitative Analysis Sample Report

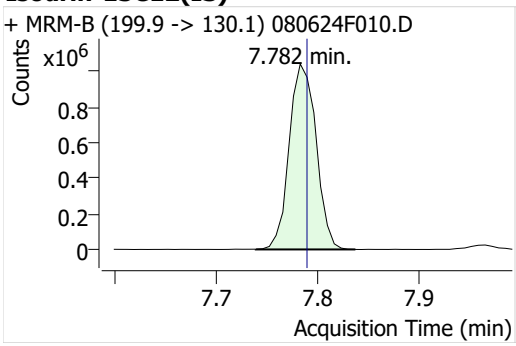
Octachlorostyrene-13C8(IS)

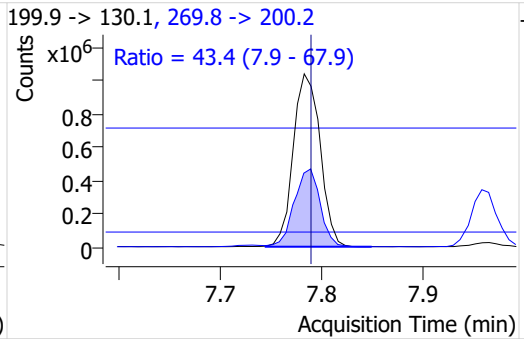


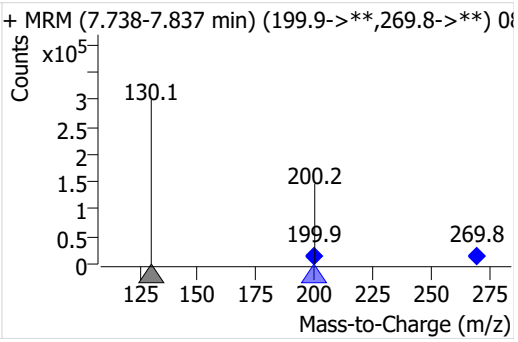




Isodrin-13C12(IS)







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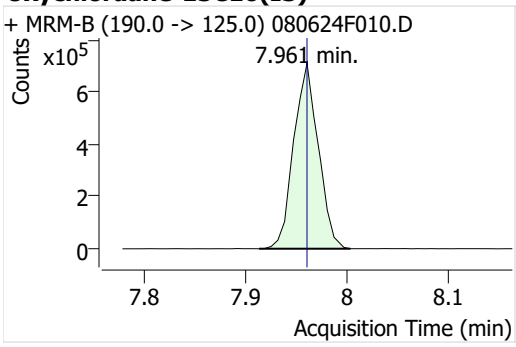
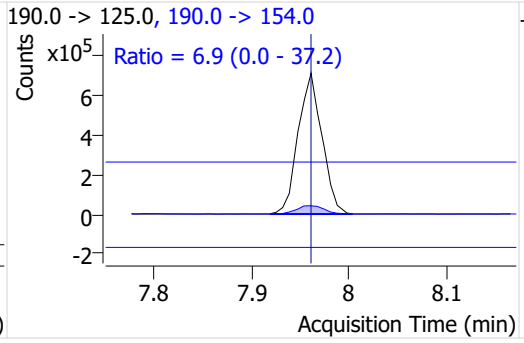
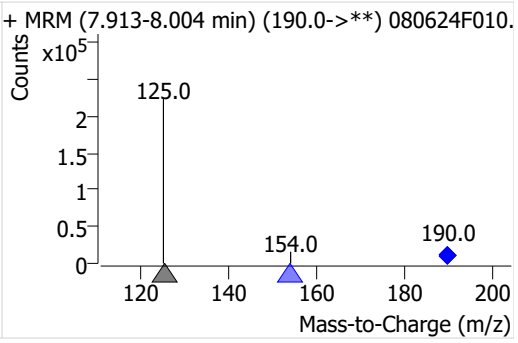
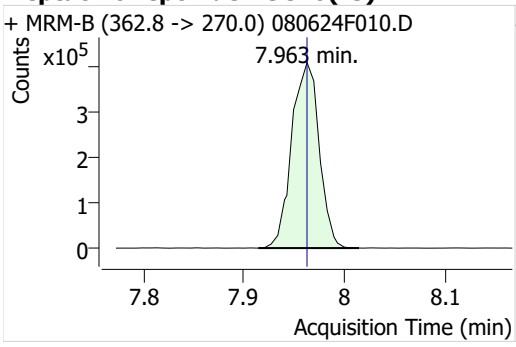
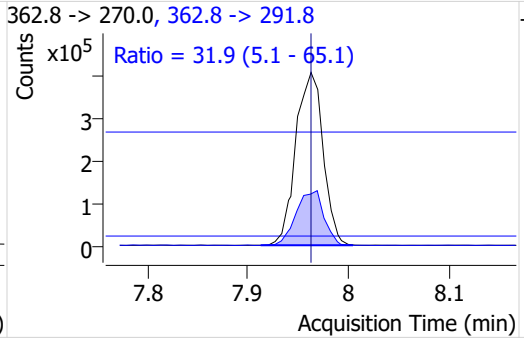


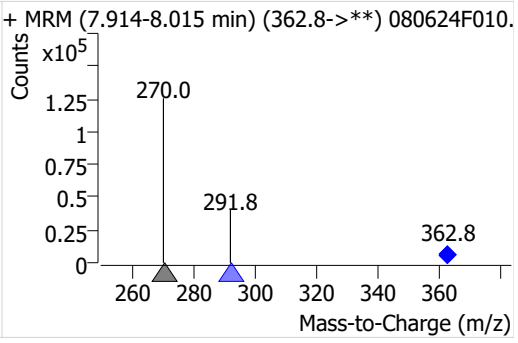




Heptachlor epoxide-13C10(IS)







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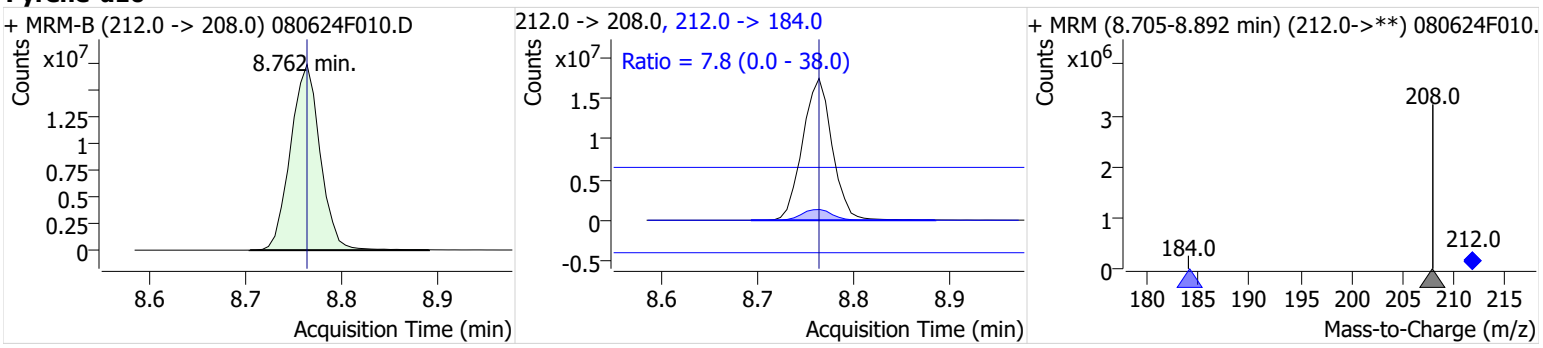
Pyrene-d10



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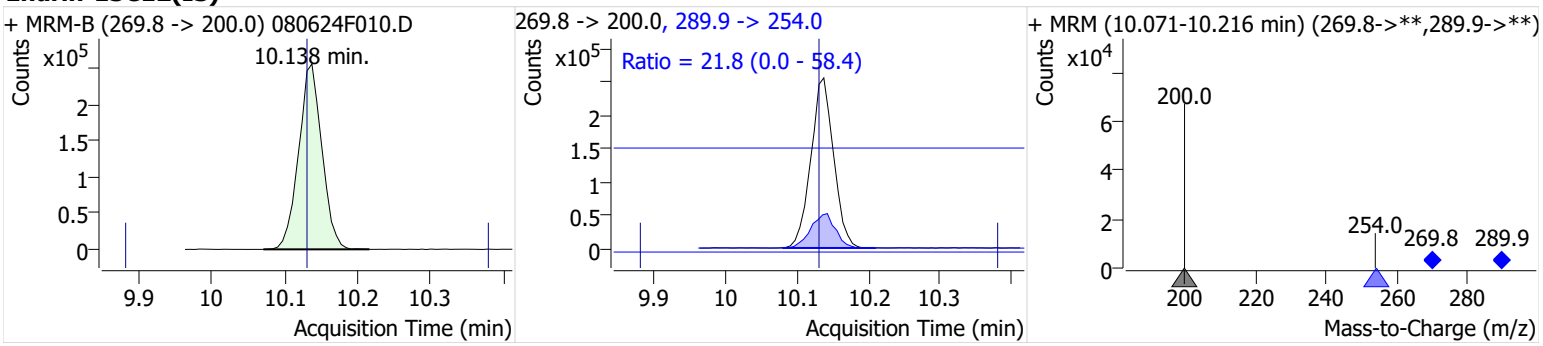
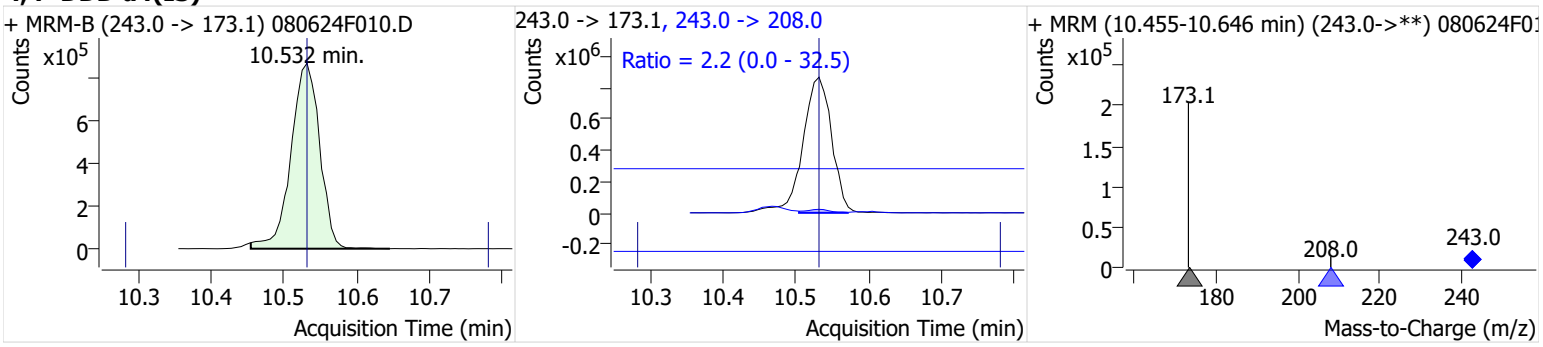


4,4'-DDD d4(IS)



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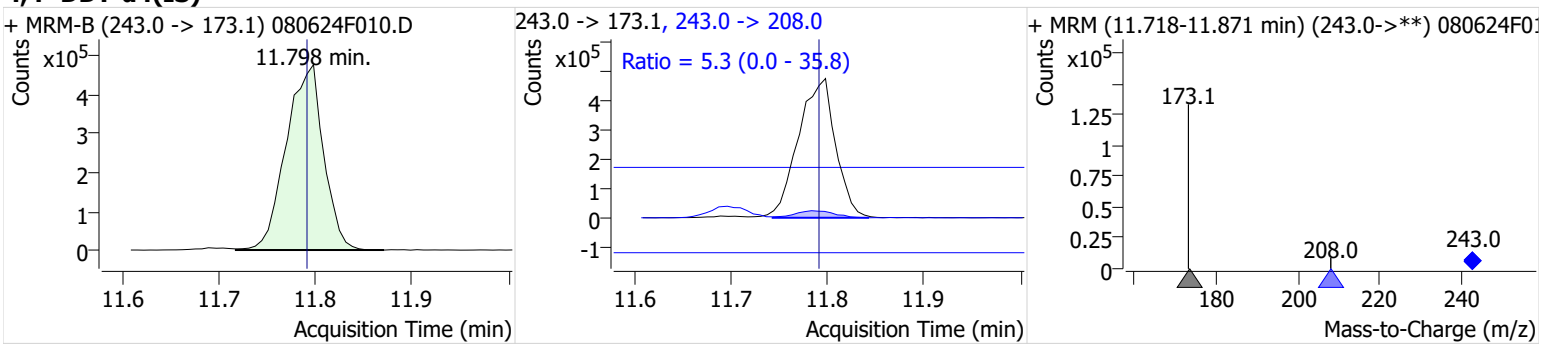
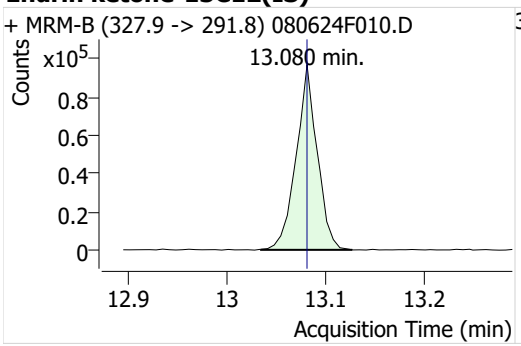
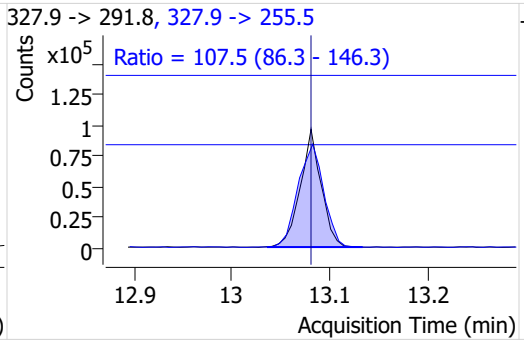
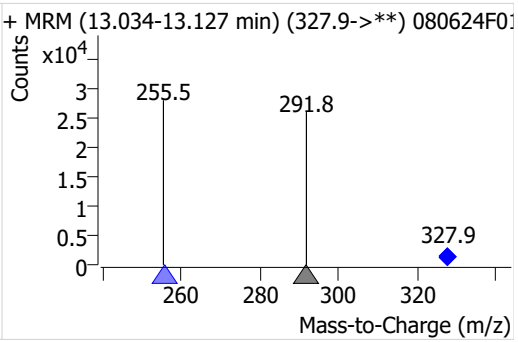


MassHunter Quantitative Analysis Sample Report

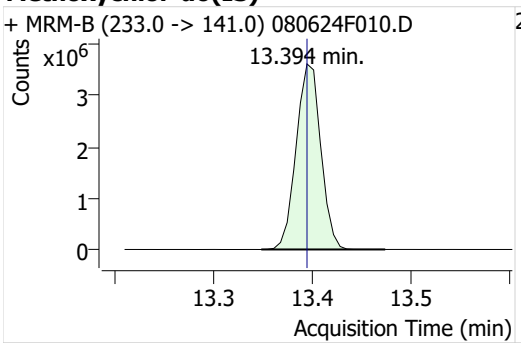
Endrin ketone-13C12(IS)

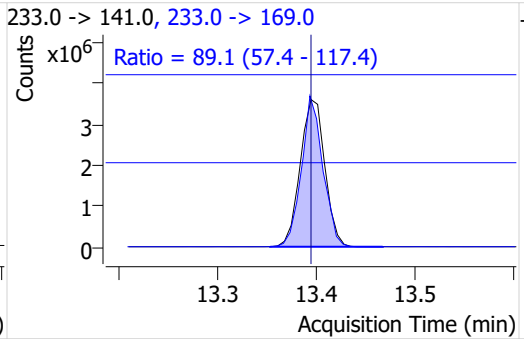


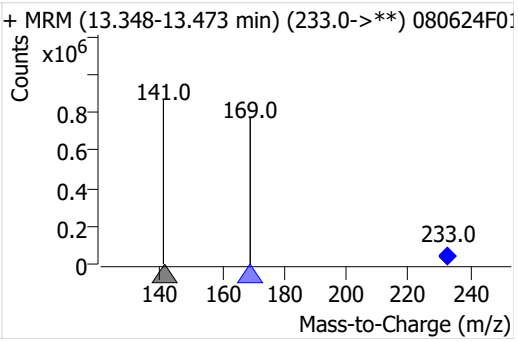




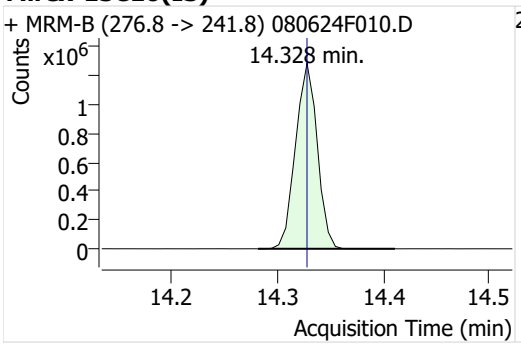
Methoxychlor-d6(IS)

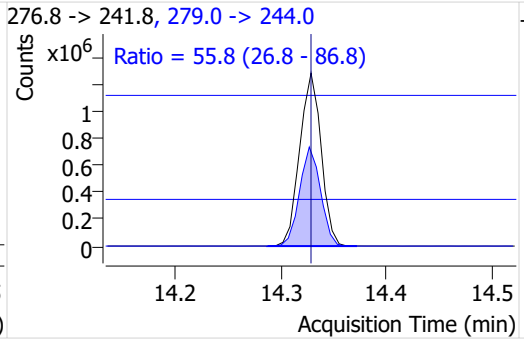


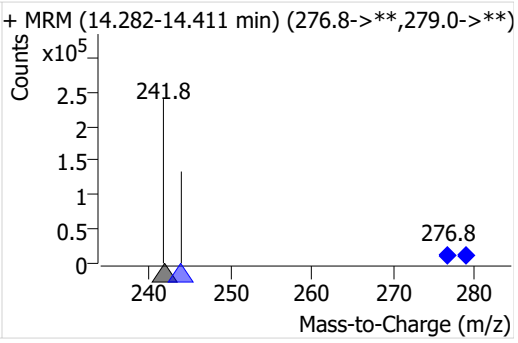




Mirex-13C10(IS)







1st 08/20/24
2nd 08/20/24

Validation Report

Data File: J:\MS42\Data\080624\080624F013.D
Lab ID: KQ2411800-01
RunType: MS
Matrix: Sediment

Date Acquired: 8/6/24 14:17
Batch ID: 851162
Analysis Method: 1699M/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery	X	
Internal Standards	X	
Surrogates		X
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level		X

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Surrogates	S_Endrin-13C12	157	14	141	Matrix
Above Highest ICAL Level	Aldrin	6531673.506 91718		5729740.042 95895	E-flag

Primary Review: _____

Printed: 8/20/24 17:33
\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

Secondary Review: _____

1st 08/20/24
2nd 08/20/24

Quantitation Report

Data File:	J:\MS42\Data\080624\080624F013.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 14:17	**Vial:**	8
Run Type:	MS	**Dilution:**	1
Lab ID:	KQ2411800-01	**Raw Units:**	ng/ml

Bottle ID:	K2407810-001.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	851162	**Prep Lot:**	442451	**Report Group:**	KQ2411800
Analysis	1699M	**Prep Method:**	EPA 3541		
		Prep Date:	8/1/24		

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400368
		Report List ID:	25424

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	8.785	+0.01	25382231.789	100	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec		% Rec Criteria	Rpt?
S_Aldrin-13C12	7.213	+0.01	1264768.983	8.958	45		12 - 88	Y
S_4,4'DDD-d4	10.552	+0.01	2313768.977	4.306	86		9 - 159	Y
S_4,4'-DDT-d4	11.812	+0.01	1572992.127	4.753	95		5 - 187	Y
S_Endrin-13C12	10.158	+0.01	679643.458	31.407	157	*	14 - 141	Y
S_GBHCD6	5.504	+0.01	2144559.527	6.603	33		5 - 90	Y
S_Oxychlordane-13C10	7.981	+0.01	886138.659	9.877	49		5 - 86	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Aldrin	7.222	+0.01	6531673.507	178.354	33.3	E	Y
gamma-BHC (Lindane)	5.550	+0.01	2433639.698	18.821	3.51		Y
cis-Chlordane	8.843	+0.01	901484.339	16.007	2.99		Y
trans-Chlordane	8.524	+0.01	862351.319	18.521	3.46		Y
2,4'-DDD	9.566	+0.01	18180614.708	27.366	5.11		Y
4,4'-DDD	10.628	+0.01	24860716.734	50.752	9.47		Y
2,4'-DDE	8.547	+0.01	12571574.314	15.202	2.84		Y
4,4'-DDE	9.384	+0.01	23584299.344	40.033	7.47		Y
2,4'-DDT	10.706	+0.01	7258933.060	15.815	2.95		Y
4,4'-DDT	11.887	+0.01	6246363.135	17.605	3.29		Y
Dieldrin	9.569	+0.01	974724.747	12.867	2.40		Y
cis-Nonachlor	10.618		309623.474	8.990	1.68		Y
trans-Nonachlor	8.911	+0.01	525679.837	13.122	2.45		Y
Oxychlordane	7.982	+0.01	0	0	0	U	Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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1st 08/20/24

2nd 08/20/24

Data File:	J:\MS42\Data\080624\080624F013.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 14:17	**Vial:**	8
Run Type:	MS	**Dilution:**	1
Lab ID:	KQ2411800-01	**Raw Units:**	ng/ml

Prep Amount:	10.227 g	**Dilution:**	1
Prep Final Amount:	1.00 mL	**Basis Factor:**	52.40

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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Data File	J:\MS42\Data\080624\080624F013.D		
Batch File	J:\MS42\Data\080624\QuantResults\080624 OC PEST.batch.bin		
Acq. Date-Time	8/6/2024 2:17:59 PM	**Acq Operator**	EBruno
Name	KQ2411800-01_K2407810-001MS	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	8/19/2024 3:52:06 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	072424 OC PEST ICAL.batch.bin	**Vial**	9
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.232	289.8 -> 254.8	1834173	20.0000 ng/ml	0.018
γ-BHC-d6(IS)	5.504	223.9 -> 187.0	2144560	20.0000 ng/ml	0.012
Heptachlor-13C10(IS)	6.579	276.8 -> 241.8	1843477	20.0000 ng/ml	0.019
Chorpyrifos-d10(IS)	6.961	199.9 -> 171.9	1906562	20.0000 ng/ml	0.013
Aldrin-13C(IS)	7.213	269.8 -> 200.0	1260774	20.0000 ng/ml	0.009
Octachlorostyrene-13C8(IS)	7.742	315.8 -> 245.8	1031696	20.0000 ng/ml	0.016
Isodrin-13C12(IS)	7.802	199.9 -> 130.1	2138527 *m*	20.0000 ng/ml	0.017
Oxychlordane-13C10(IS)	7.981	190.0 -> 125.0	886139	20.0000 ng/ml	0.023
Heptachlor epoxide-13C10(IS)	7.976	362.8 -> 270.0	481829	20.0000 ng/ml	0.017
Pyrene-d10	8.785	212.0 -> 208.0	25382232	100.0000 ng/ml	0.024
Endrin-13C12(IS)	10.158	269.8 -> 200.0	679643	20.0000 ng/ml	0.029
4,4'-DDD d4(IS)	10.552	243.0 -> 173.1	2313769	5.0000 ng/ml	0.023
4,4'-DDT-d4(IS)	11.812	243.0 -> 173.1	1567676 *m*	5.0000 ng/ml	0.016
Endrin ketone-13C12(IS)	13.094	327.9 -> 291.8	50803	20.0000 ng/ml	0.014
Methoxychlor-d6(IS)	13.408	233.0 -> 141.0	2865914	20.0000 ng/ml	0.013
Mirex-13C10(IS)	14.335	276.8 -> 241.8	454763	5.0000 ng/ml	0.006

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	1834173	5.723 ng/ml	
		Spiked Amount =	20.0	Recovery =	*28.6 %*
γ-BHC-d6	5.491	223.9 -> 187.0	2144560	6.603 ng/ml	
		Spiked Amount =	20.0	Recovery =	*33.0 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	1843477	9.880 ng/ml	
		Spiked Amount =	20.0	Recovery =	*49.4 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	1906562	23.841 ng/ml	
		Spiked Amount =	20.0	Recovery =	*119.2 %*
Aldrin-13C	7.207	269.8 -> 200.0	1264769	8.958 ng/ml	
		Spiked Amount =	20.0	Recovery =	*44.8 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	1031696	8.108 ng/ml	
		Spiked Amount =	20.0	Recovery =	*40.5 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2138527 *m*	14.134 ng/ml	
		Spiked Amount =	20.0	Recovery =	*70.7 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	886139	9.877 ng/ml	
		Spiked Amount =	20.0	Recovery =	*49.4 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	481829	9.487 ng/ml	
		Spiked Amount =	20.0	Recovery =	*47.4 %*
Endrin-13C12	10.131	269.8 -> 200.0	679643	31.407 ng/ml	
		Spiked Amount =	20.0	Recovery =	*157.0 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	2313769	4.306 ng/ml	
		Spiked Amount =	5.0	Recovery =	*86.1 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1572992 *m*	4.753 ng/ml	
		Spiked Amount =	5.0	Recovery =	*95.1 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	50803	11.122 ng/ml	
		Spiked Amount =	20.0	Recovery =	*55.6 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	2865914	15.614 ng/ml	
		Spiked Amount =	20.0	Recovery =	*78.1 %*

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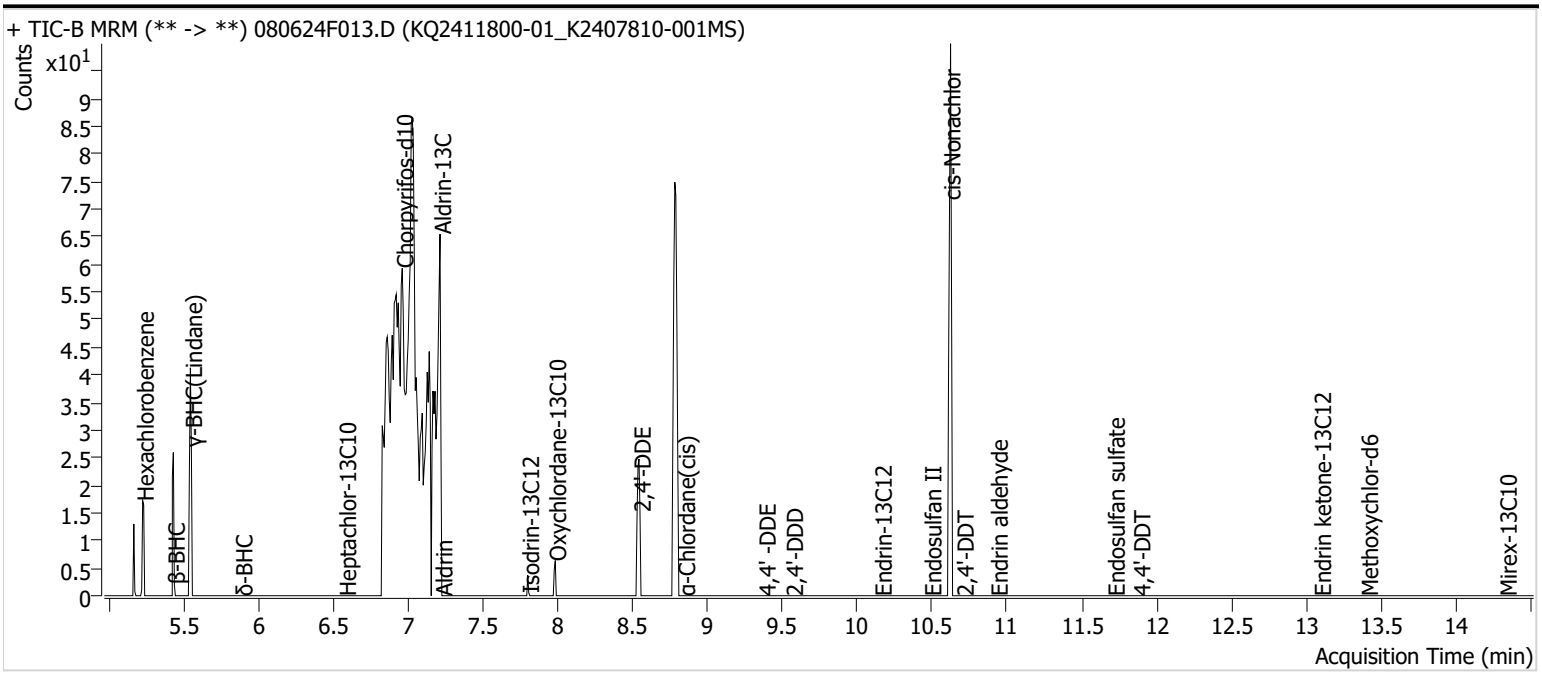
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	454763	0.932 ng/ml
		Spiked Amount = 5.0		Recovery = *18.6 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.172	181.1 -> 145.1	2678622	17.717 ng/ml	72
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.227	283.8 -> 213.9	2969461	21.216 ng/ml	94
β-BHC	γ-BHC-d6(IS)	5.435	181.1 -> 145.1	1758886	17.370 ng/ml	78
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.550	181.1 -> 145.1	2433640	18.821 ng/ml	58
δ-BHC	γ-BHC-d6(IS)	5.886	181.1 -> 145.1	1254580	13.329 ng/ml	61
Heptachlor	Heptachlor-13C10(IS)	6.582	271.7 -> 236.9	1812474	18.272 ng/ml	98
Chorpyrifos	Chorpyrifos-d10(IS)		196.9 -> 169.0		ND ng/ml	
Aldrin	Aldrin-13C(IS)	7.222	254.9 -> 220.0	6531674	178.354 ng/ml	1
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.748	342.8 -> 307.8	2460568	19.408 ng/ml	99
Isodrin	Isodrin-13C12(IS)	7.810	193.0 -> 123.0	1891521	16.842 ng/ml	87
Oxychlordane	Oxychlordane-13C10(IS)		114.9 -> 51.1		ND ng/ml	
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.995	352.8 -> 262.9	485283	19.019 ng/ml	91
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.524	271.8 -> 236.9	862351	18.521 ng/ml	61
2,4'-DDE	4,4'-DDD d4(IS)	8.547	246.0 -> 176.2	12571574	15.202 ng/ml	98
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.843	271.8 -> 236.9	901484	16.007 ng/ml	83
Endosulfan I	Endrin-13C12(IS)	8.860	206.9 -> 172.0	371959	6.089 ng/ml	93
trans-Nanochlor	Oxychlordane-13C10(IS)	8.911	271.8 -> 236.9	525680	13.122 ng/ml	58
4,4' -DDE	4,4'-DDD d4(IS)	9.384	246.0 -> 176.2	23584299	40.033 ng/ml	92
Dieldrin	Endrin-13C12(IS)	9.569	262.9 -> 193.0	974725 ***m***	12.867 ng/ml	89
2,4'-DDD	4,4'-DDD d4(IS)	9.566	235.0 -> 165.1	18180615	27.366 ng/ml	58
Endrin	Endrin-13C12(IS)	10.173	262.8 -> 193.0	1114456 ***m***	26.536 ng/ml	38
Endosulfan II	Endrin-13C12(IS)	10.491	206.9 -> 172.0	279974	8.630 ng/ml	84
cis-Nonachlor	Oxychlordane-13C10(IS)	10.618	271.8 -> 236.9	309623	8.990 ng/ml	1
4,4'-DDD	4,4'-DDD d4(IS)	10.628	235.0 -> 165.1	24860717	50.752 ng/ml	93
2,4'-DDT	4,4'-DDT-d4(IS)	10.706	235.0 -> 165.1	7258933	15.815 ng/ml	90
Endrin aldehyde	Endrin-13C12(IS)	10.934	249.9 -> 214.9	159992	13.335 ng/ml	73
Endosulfan sulfate	Endrin-13C12(IS)	11.716	271.9 -> 237.0	1163850	13.643 ng/ml	100
4,4'-DDT	4,4'-DDT-d4(IS)	11.887	235.0 -> 165.1	6246363	17.605 ng/ml	68
Endrin ketone	Endrin ketone-13C12(IS)	13.105	147.0 -> 111.0	212187	18.608 ng/ml	93
Methoxychlor	Methoxychlor-d6(IS)	13.450	227.0 -> 141.1	5159598 ***m***	34.554 ng/ml	78
Mirex	Mirex-13C10(IS)	14.343	271.8 -> 236.8	1980235	21.133 ng/ml	97

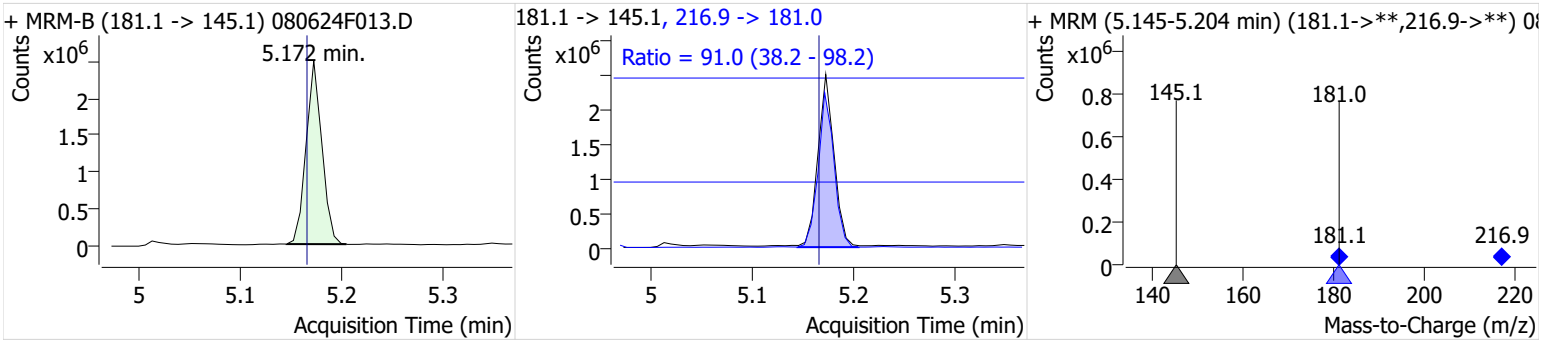
(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram

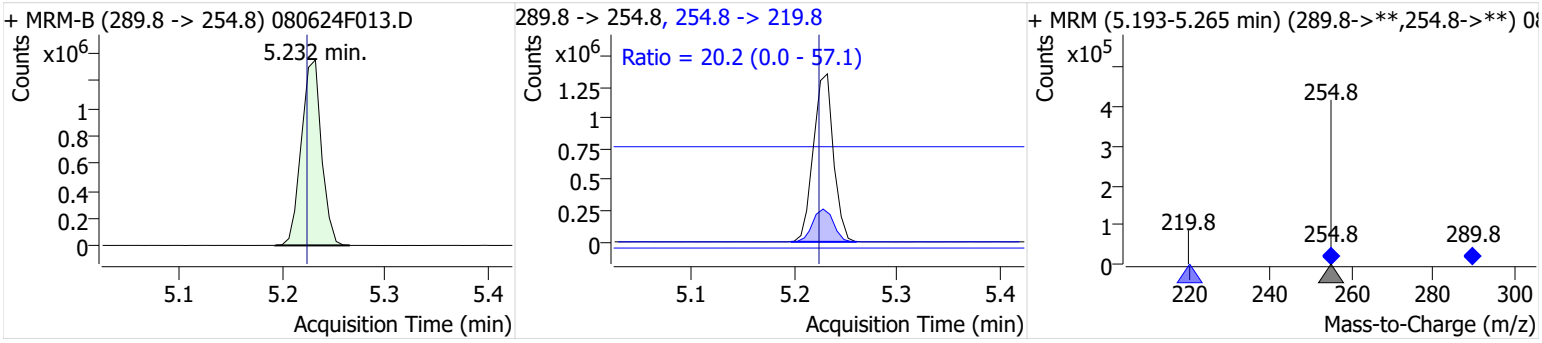
MassHunter Quantitative Analysis Sample Report



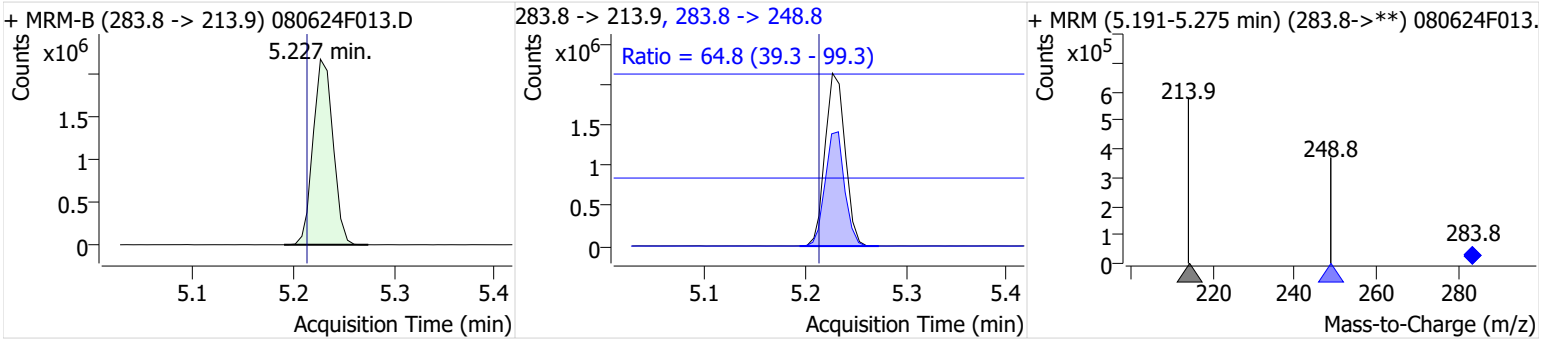
α-BHC



Hexachlorobenzene-13C6



Hexachlorobenzene



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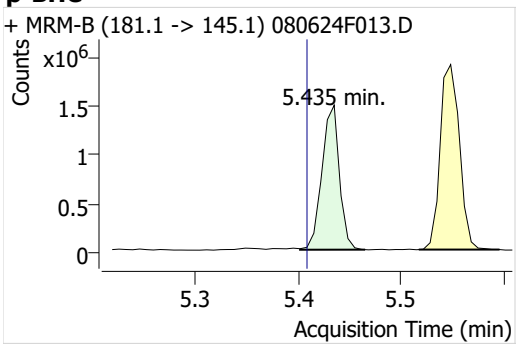
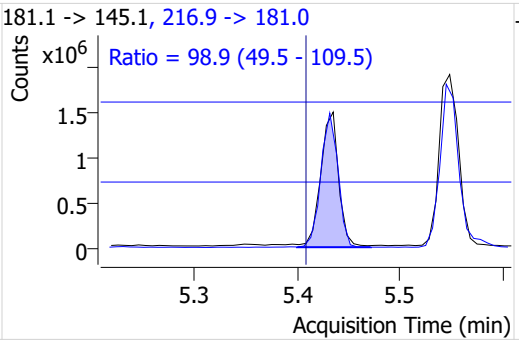
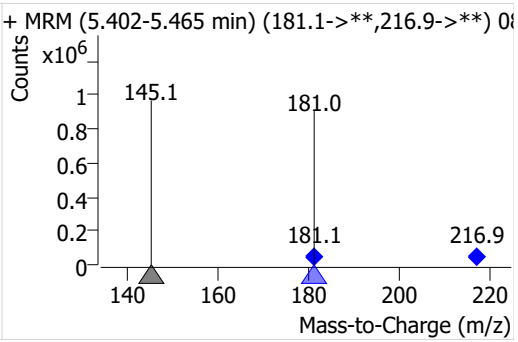
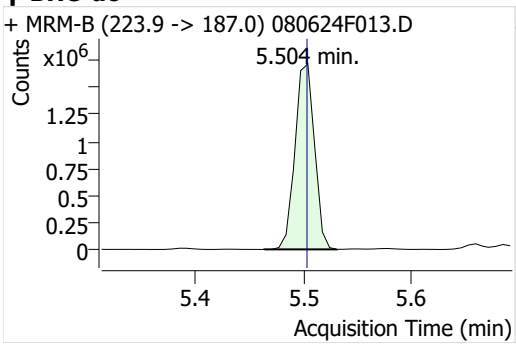
β-BHC

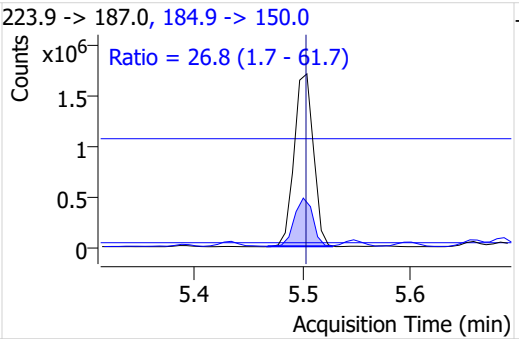


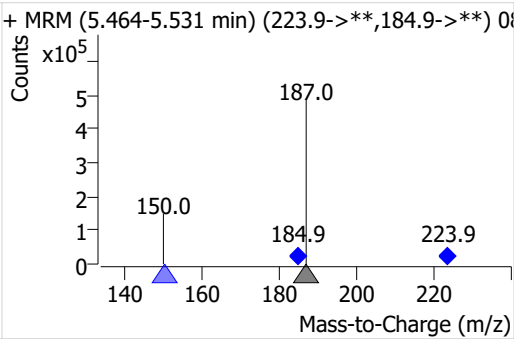




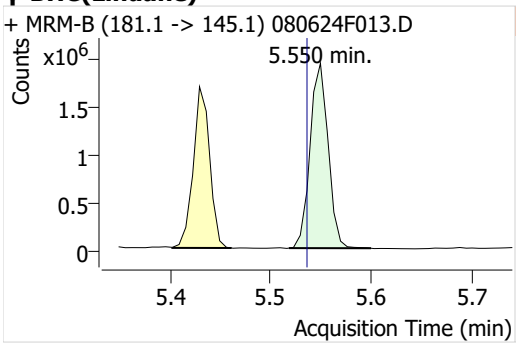
γ-BHC-d6

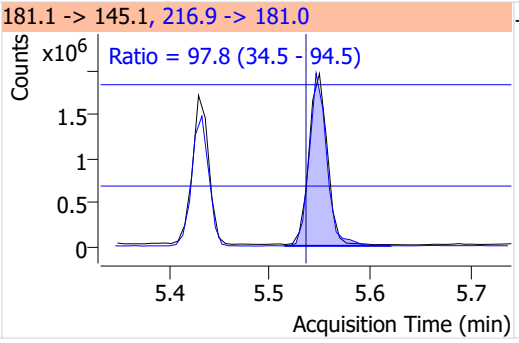


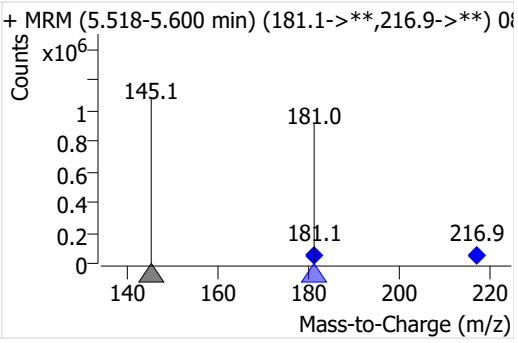




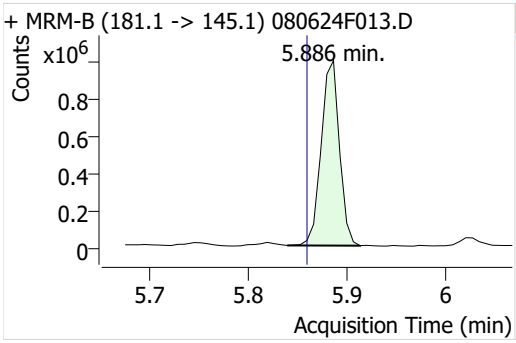
γ-BHC(Lindane)

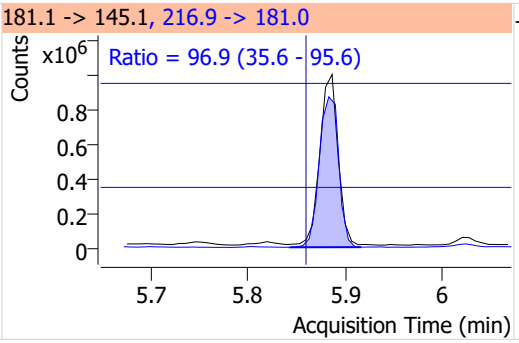


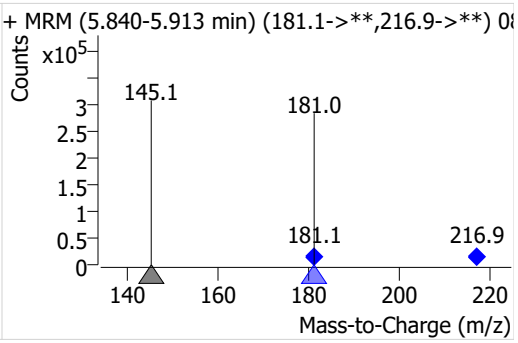




δ-BHC

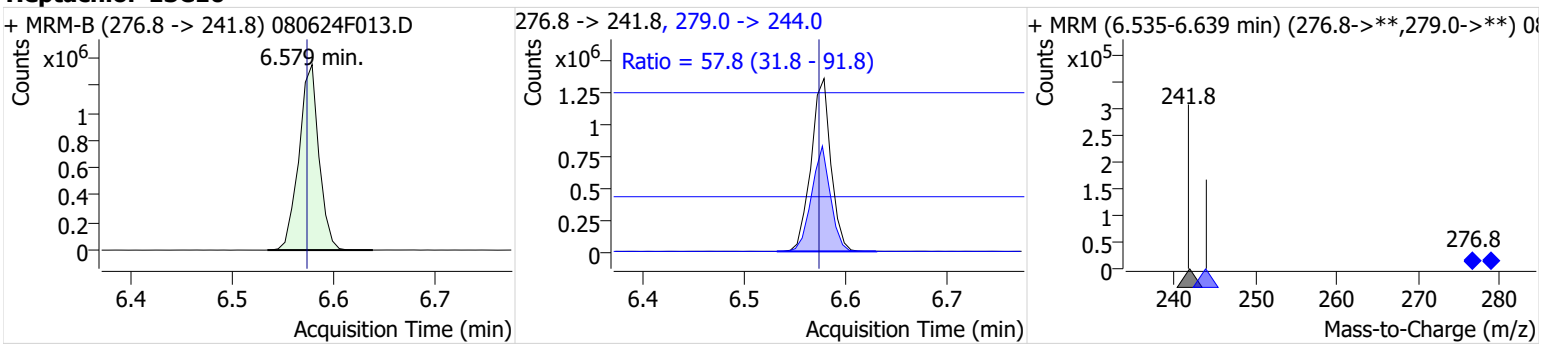




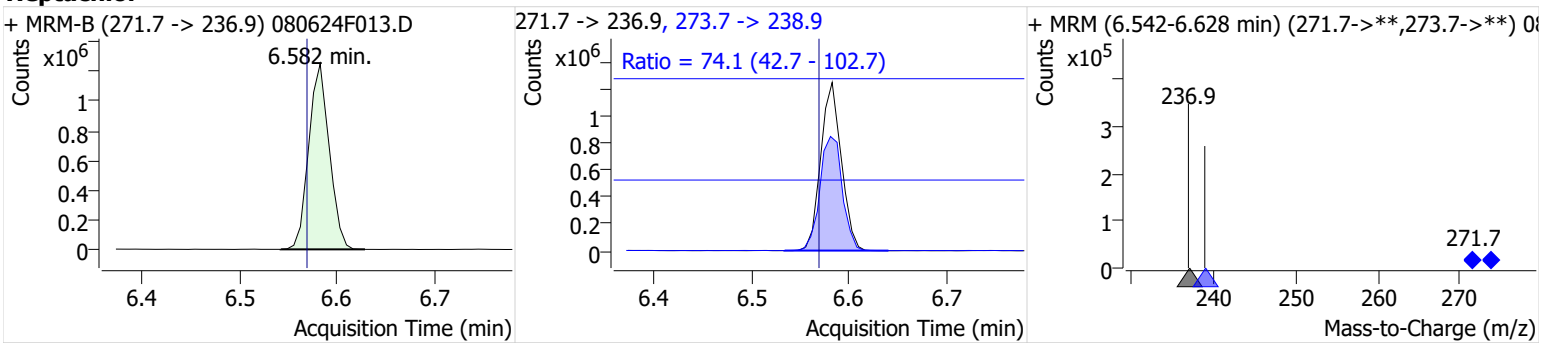


MassHunter Quantitative Analysis Sample Report

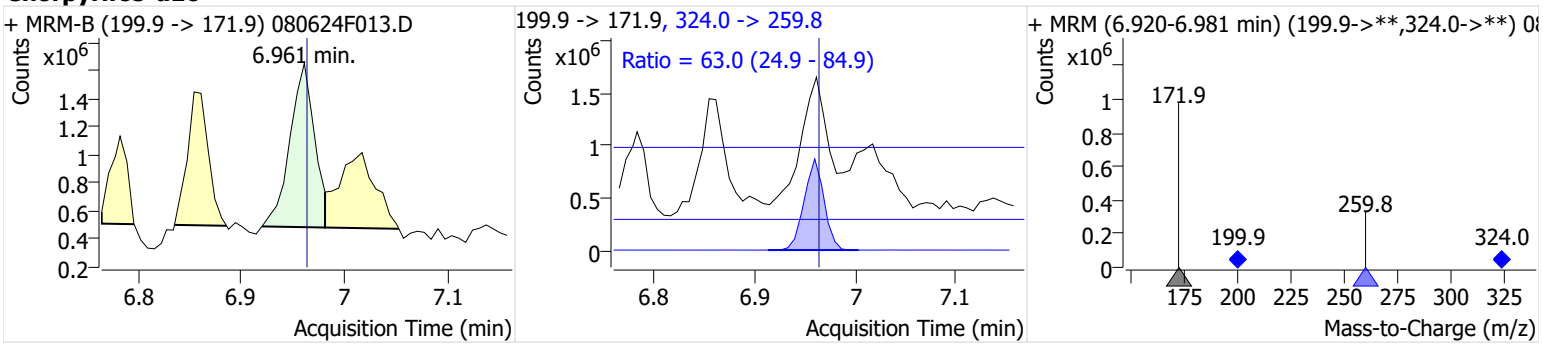
Heptachlor-13C10



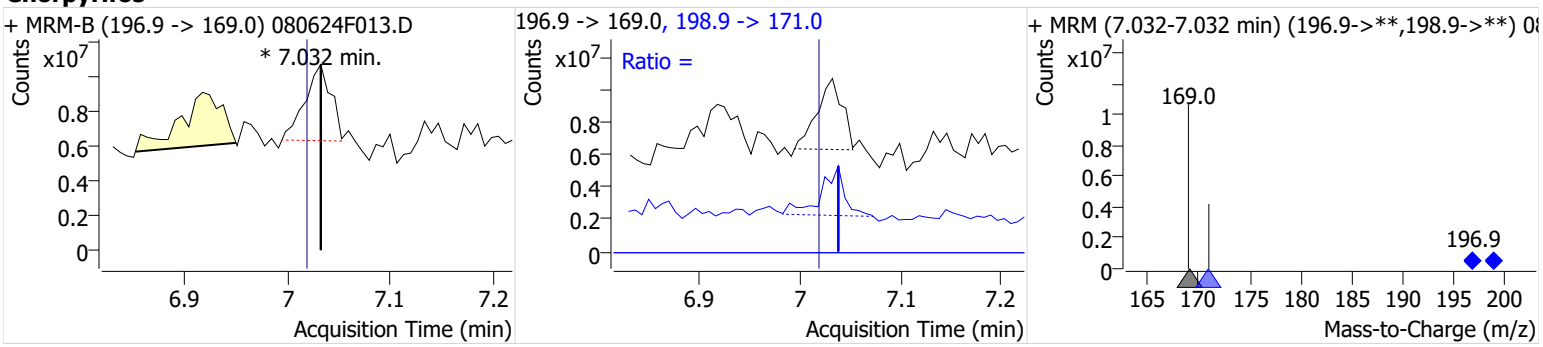
Heptachlor



Chorpyrifos-d10

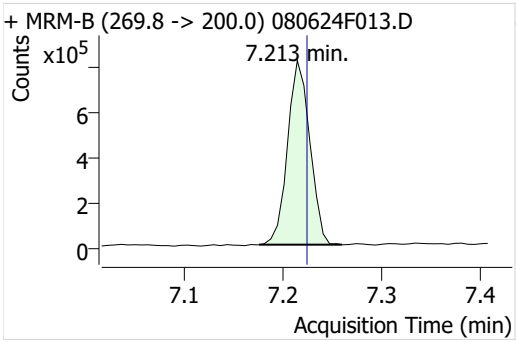


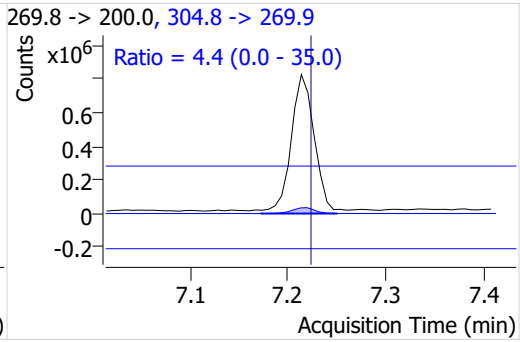
Chorpyrifos

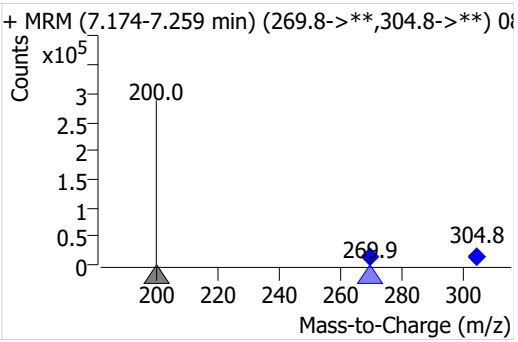


MassHunter Quantitative Analysis Sample Report

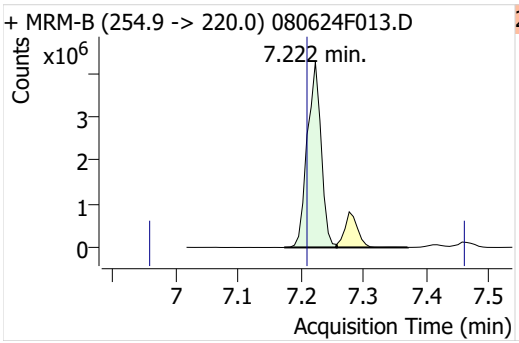
Aldrin-13C

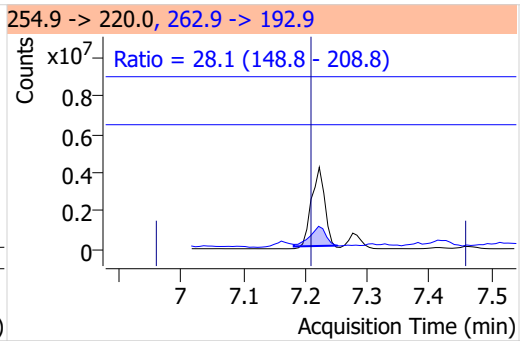


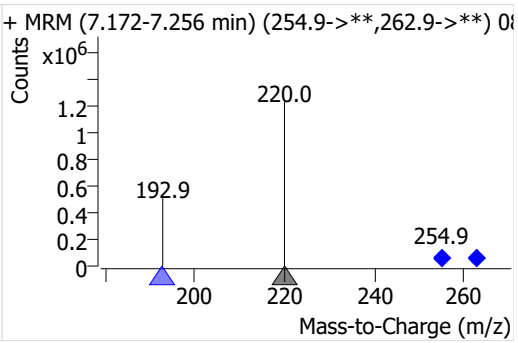




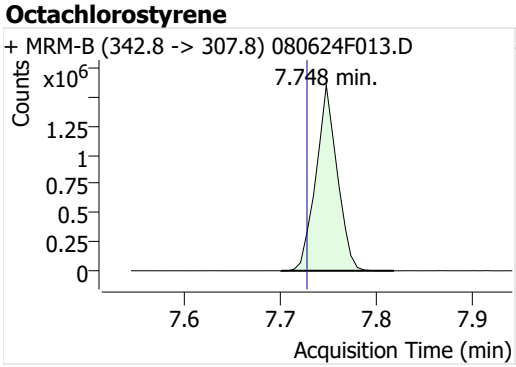
Aldrin

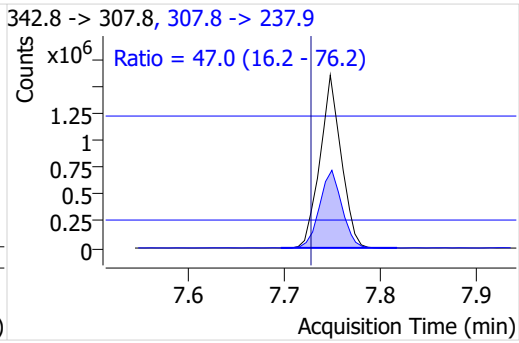


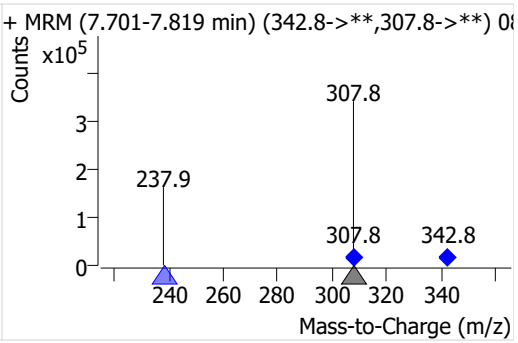




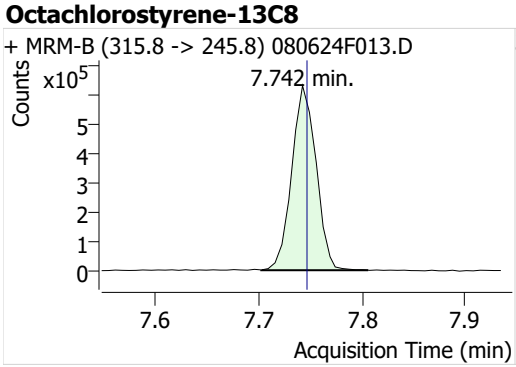
Octachlorostyrene

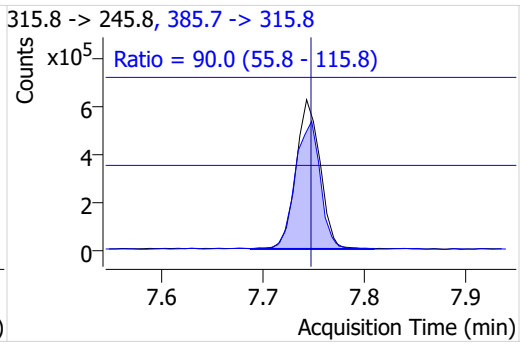


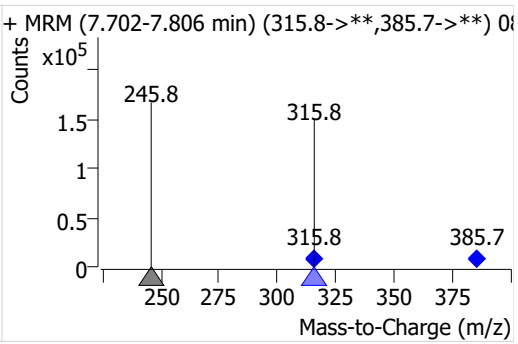




Octachlorostyrene-13C8







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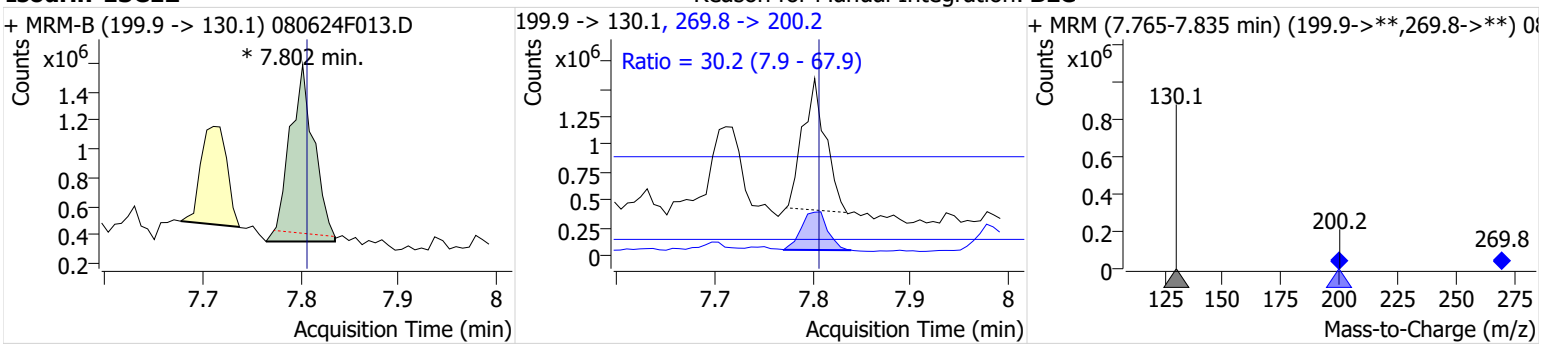
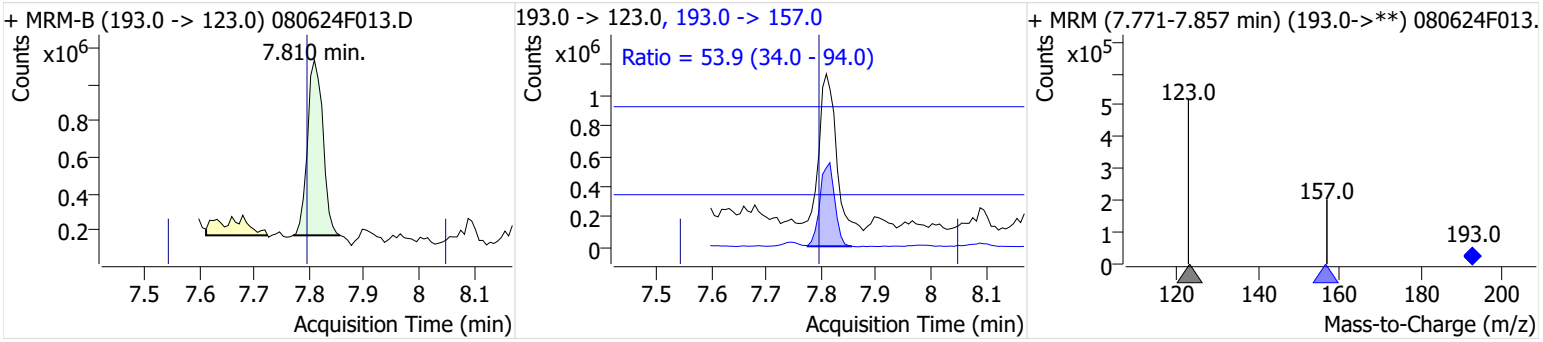
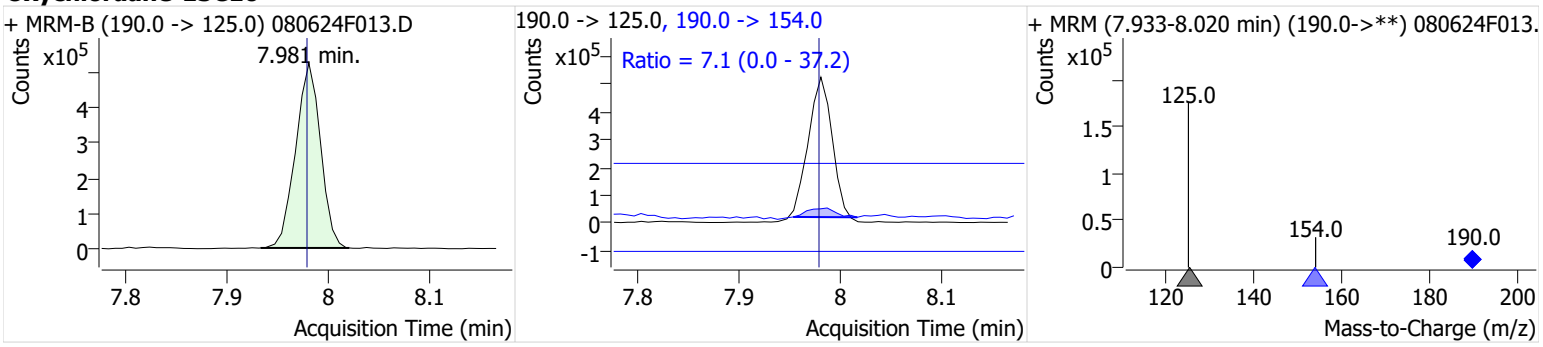
Isodrin-13C12 Reason for Manual Integration: **BLC**



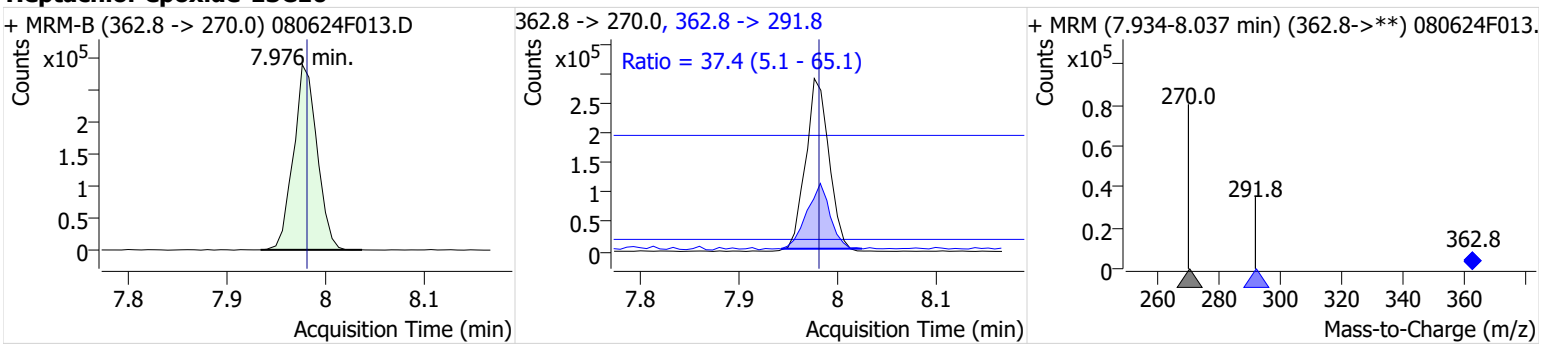
Isodrin



Oxychlordane-13C10



Heptachlor epoxide-13C10



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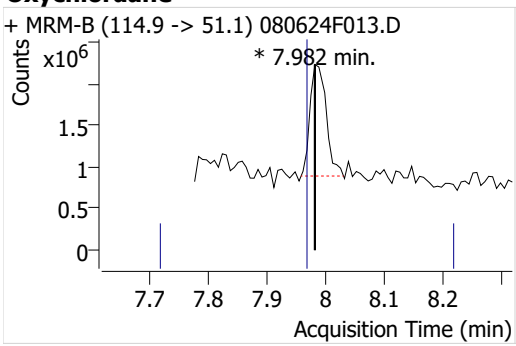
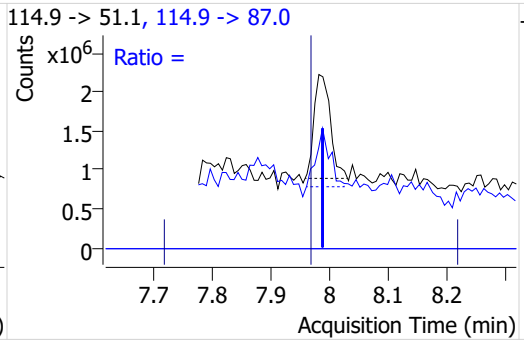
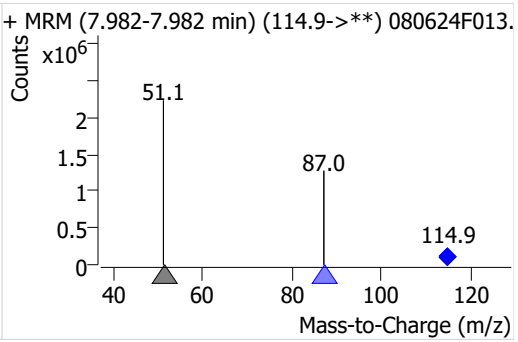
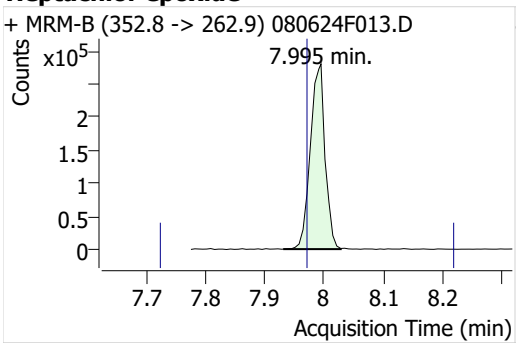
Oxychlordane

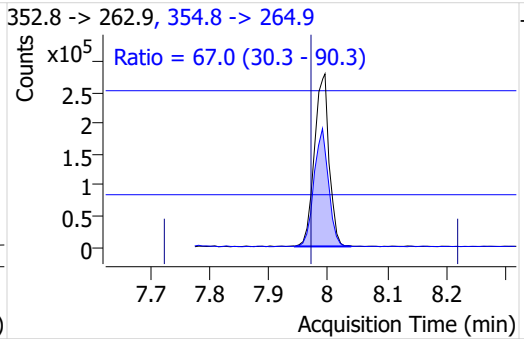


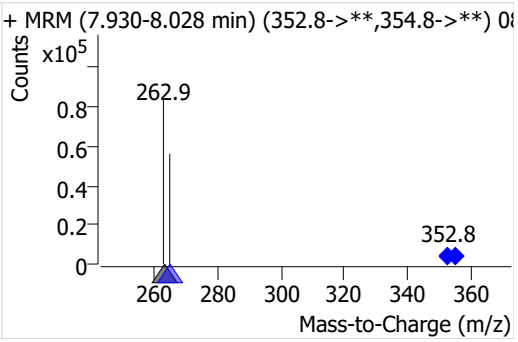




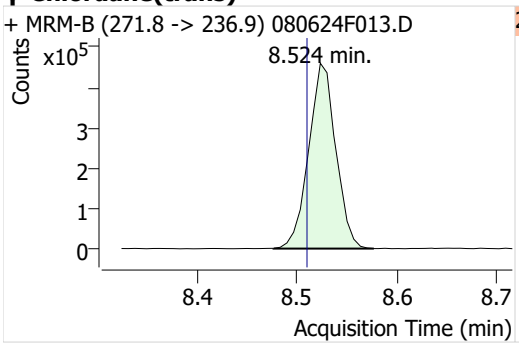
Heptachlor epoxide

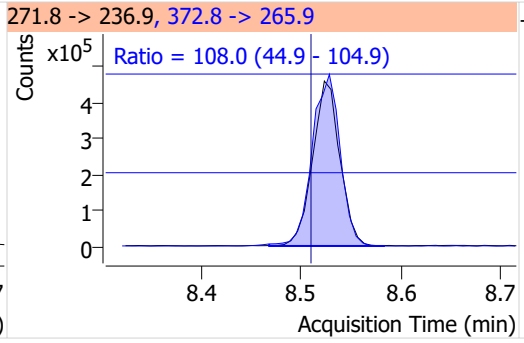


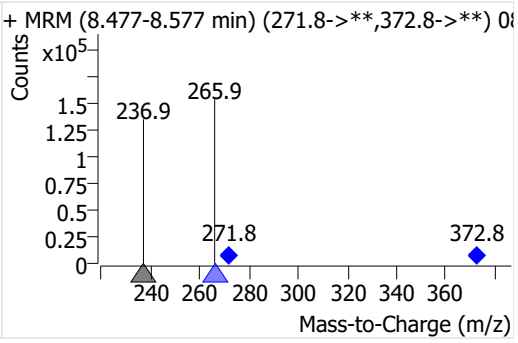




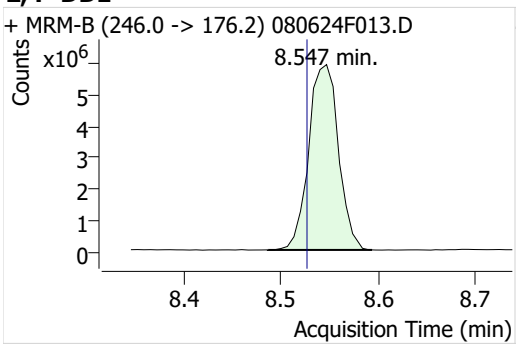
γ-Chlordane(trans)

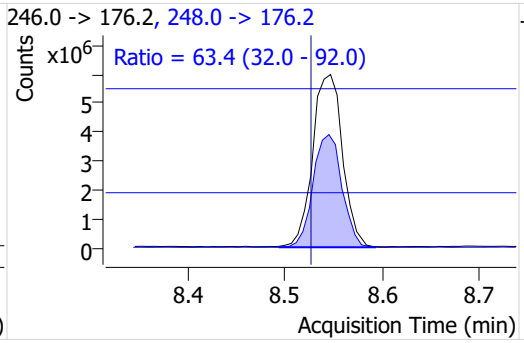


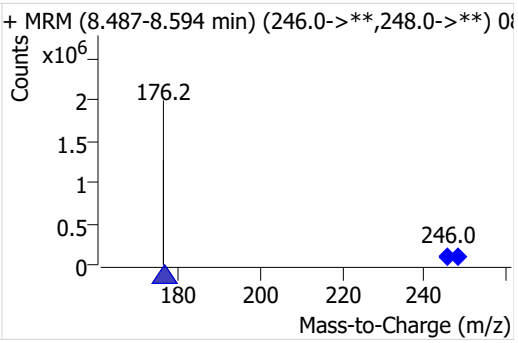




2,4'-DDE







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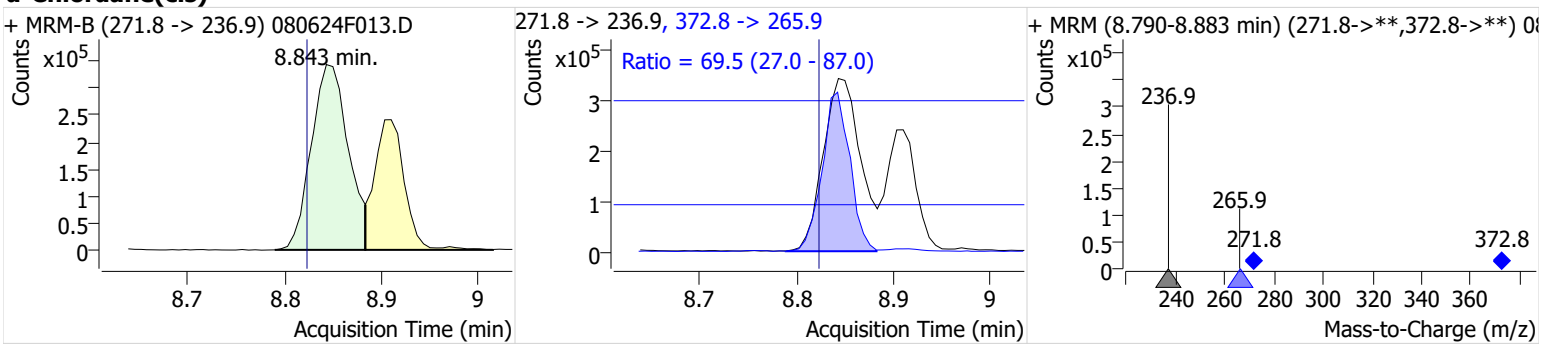
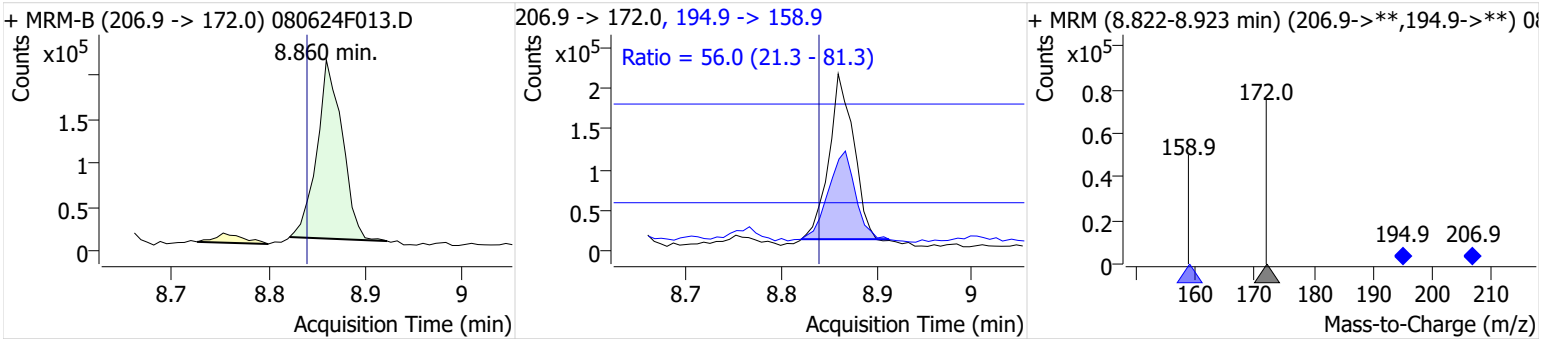
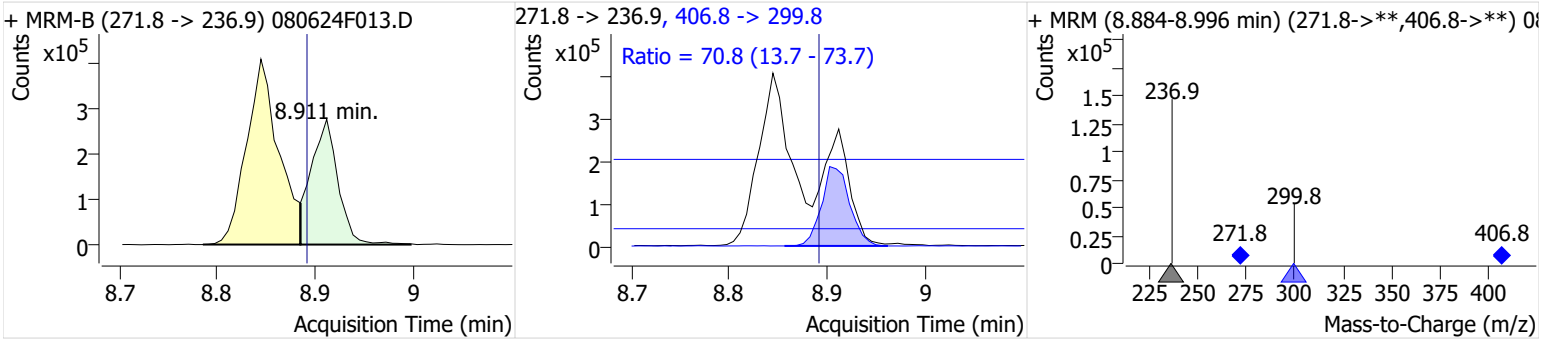
α-Chlordane(cis)



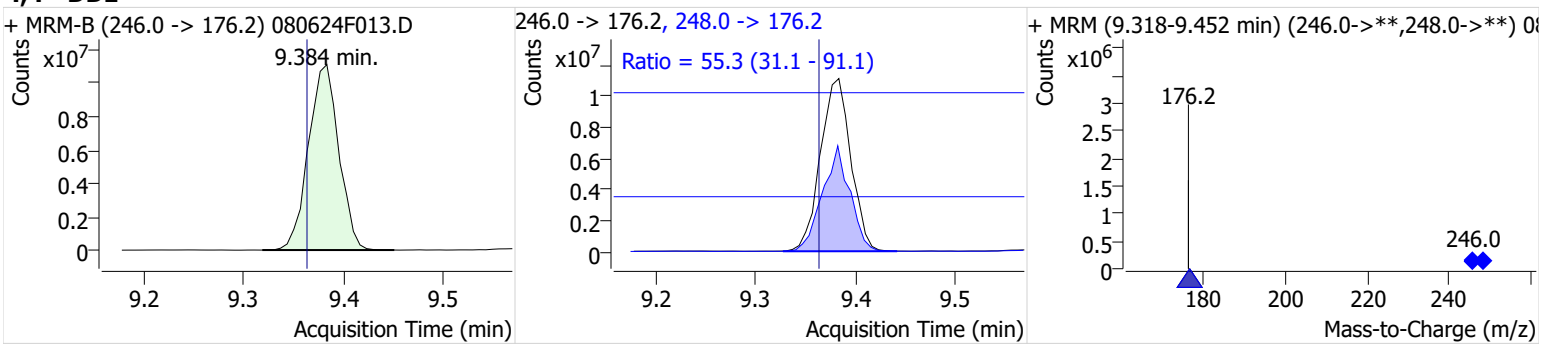
Endosulfan I



trans-Nanochlor



4,4' -DDE



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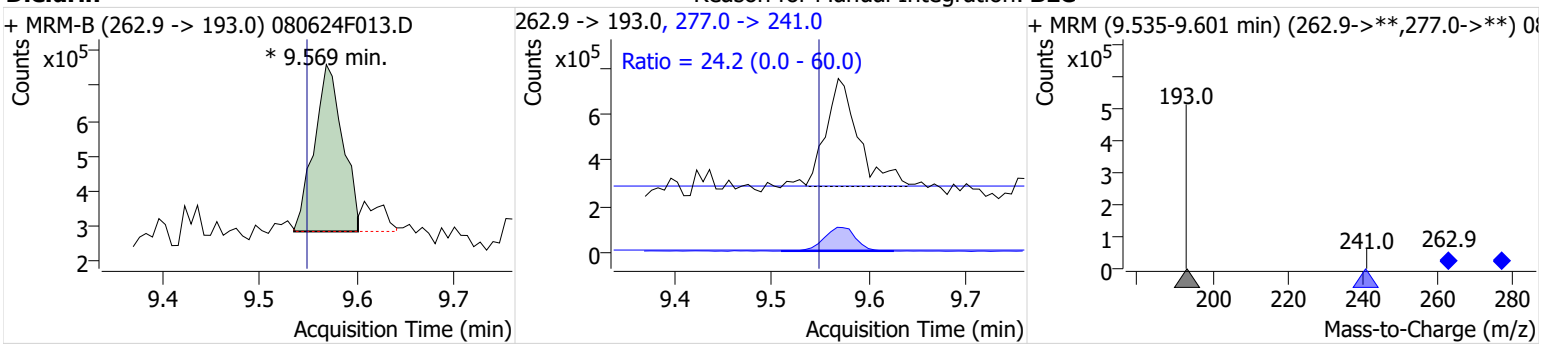
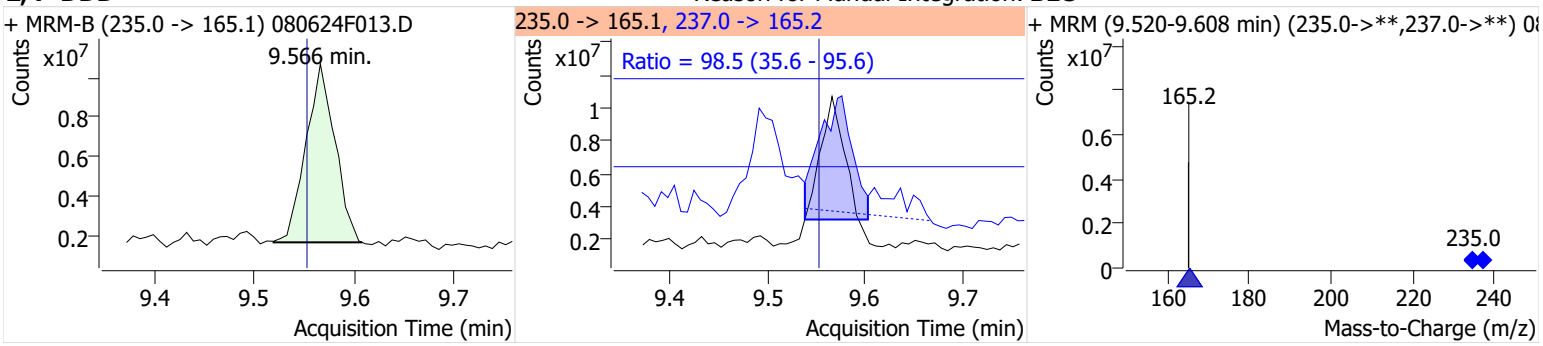
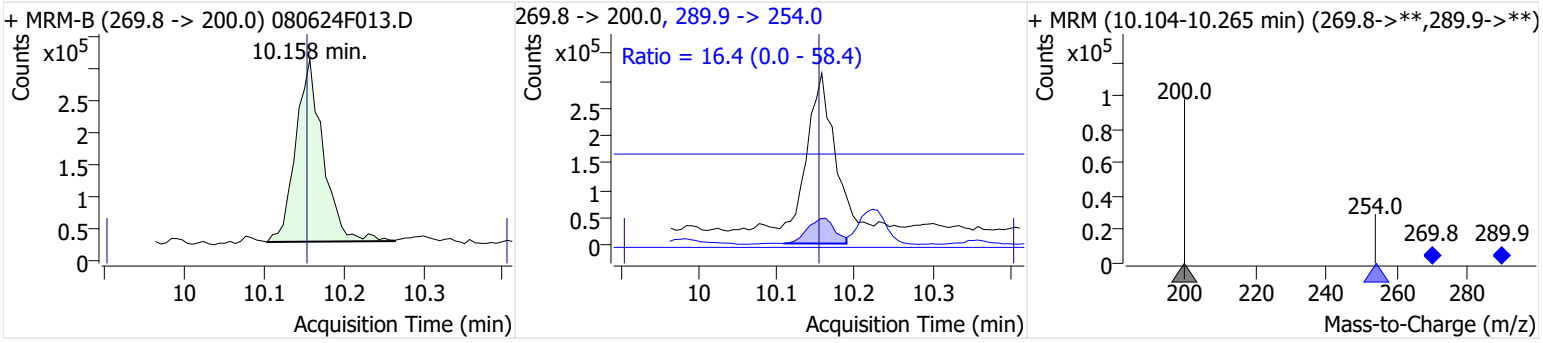
Dieldrin Reason for Manual Integration: **BLC**



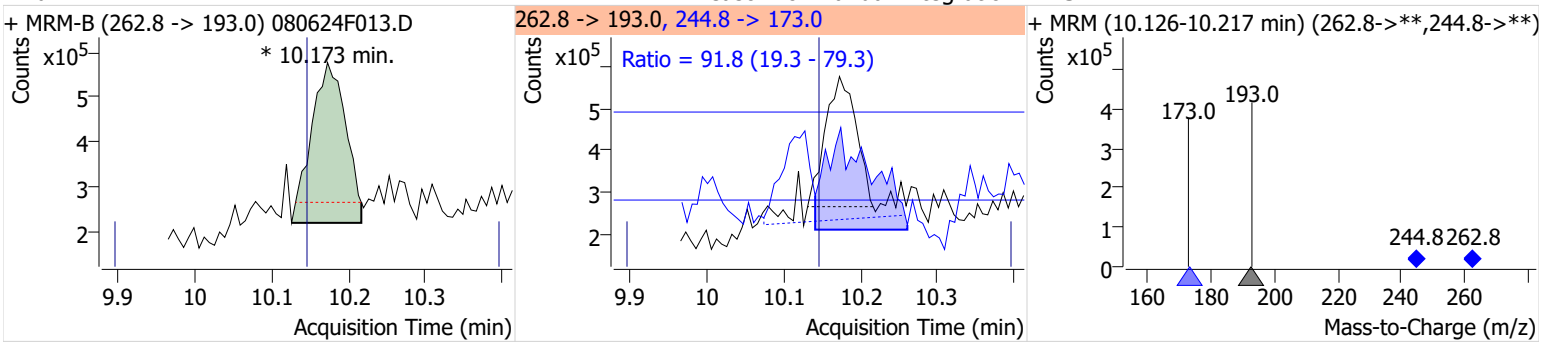
2,4'-DDD Reason for Manual Integration: **BLC**



Endrin-13C12



Endrin Reason for Manual Integration: **BLC**



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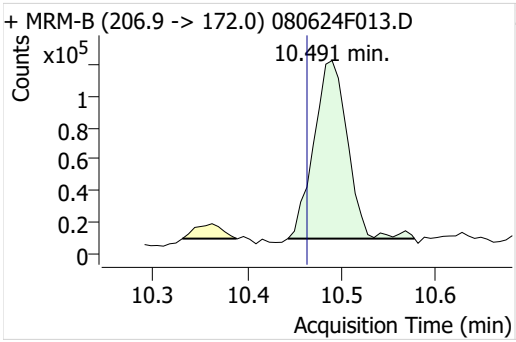
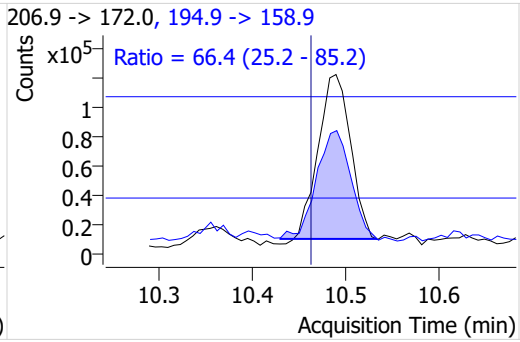
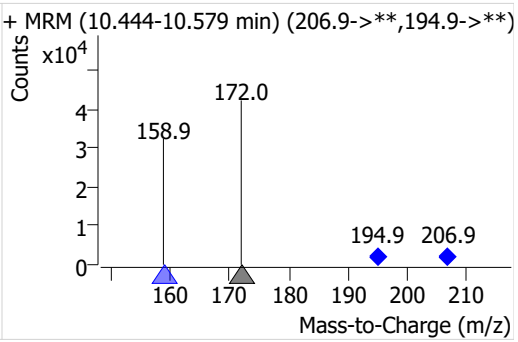
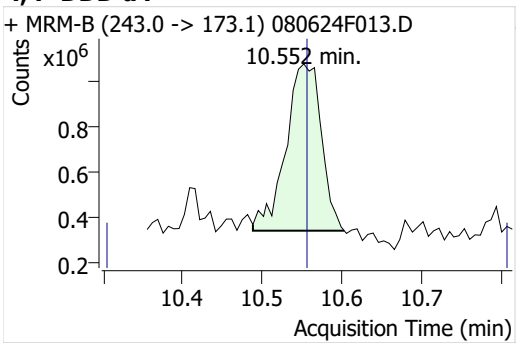
Endosulfan II

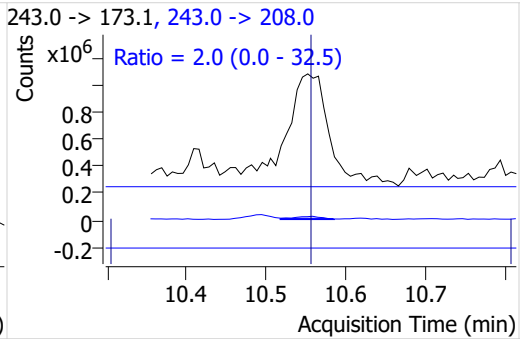


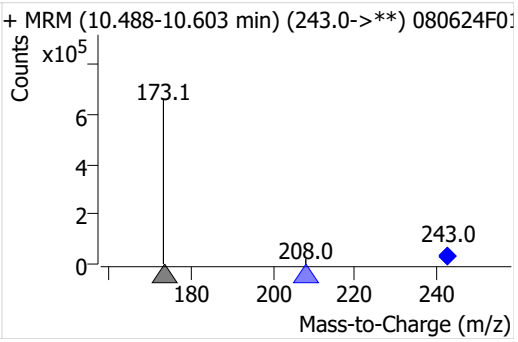




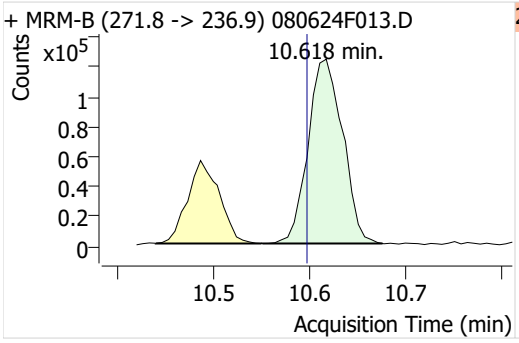
4,4'-DDD d4

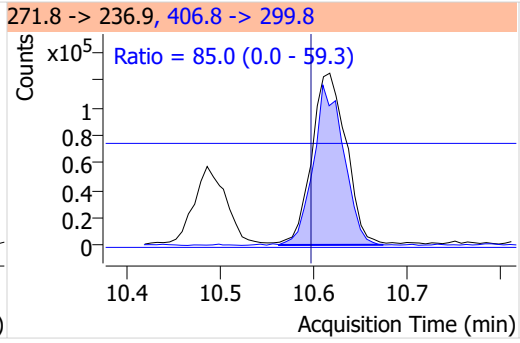


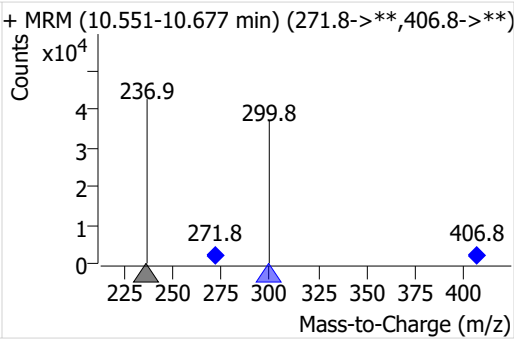




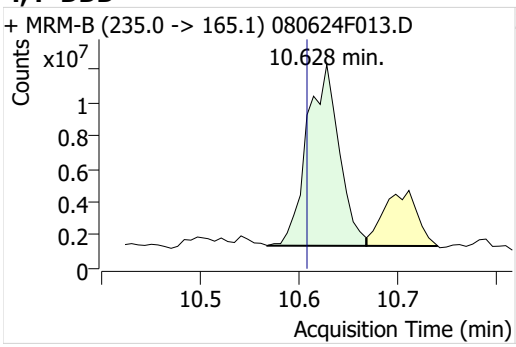
cis-Nonachlor

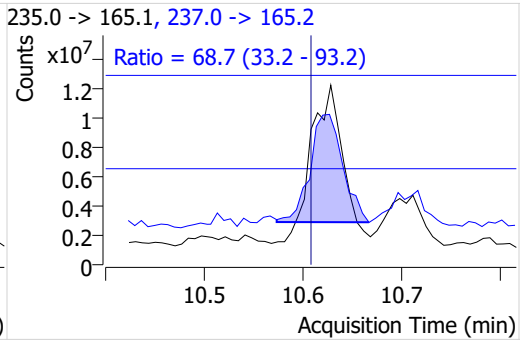


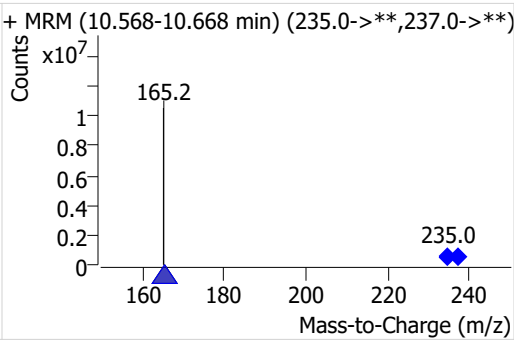




4,4'-DDD







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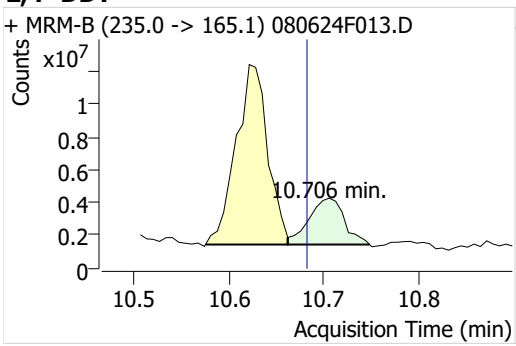
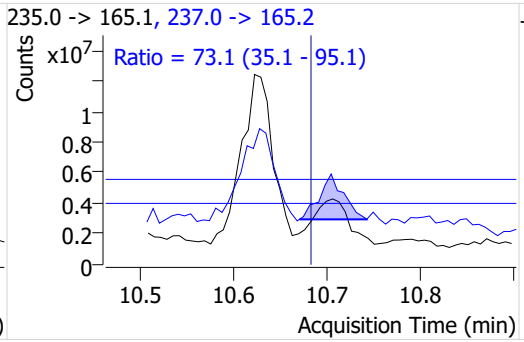
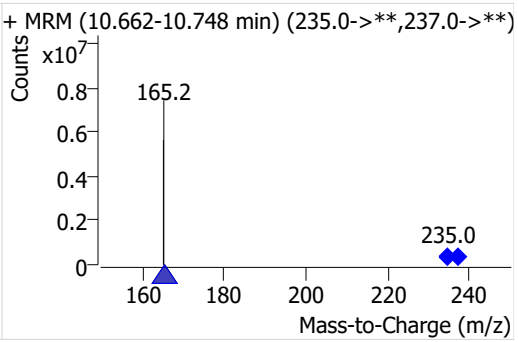
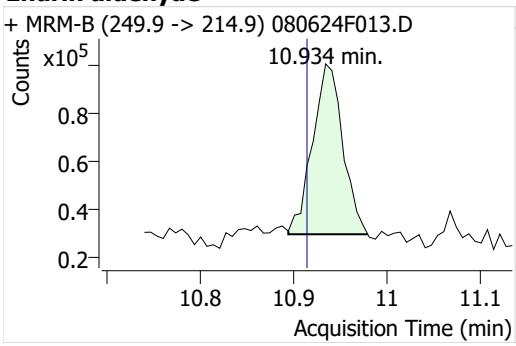
2,4'-DDT

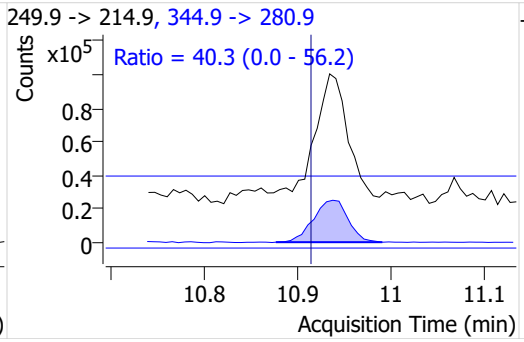


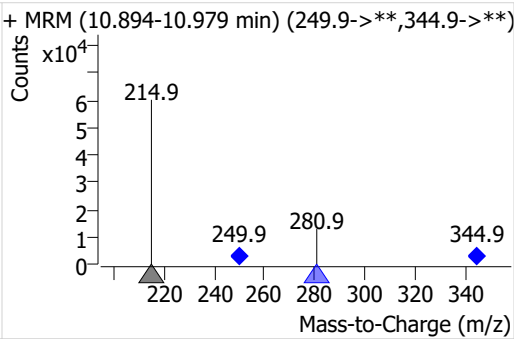




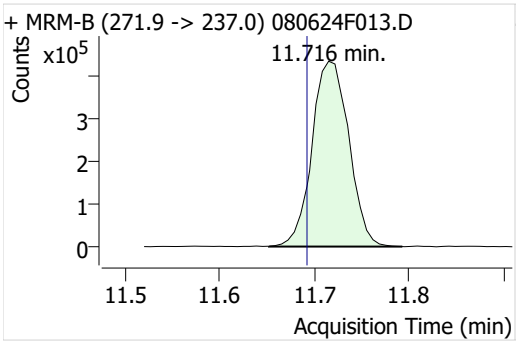
Endrin aldehyde

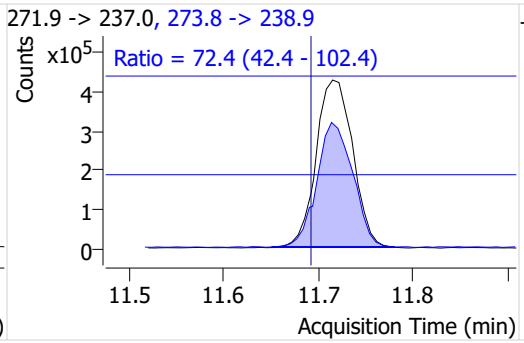


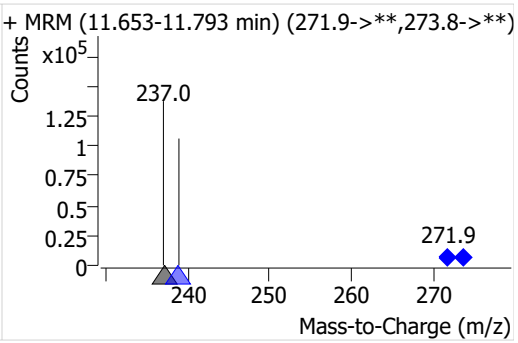




Endosulfan sulfate

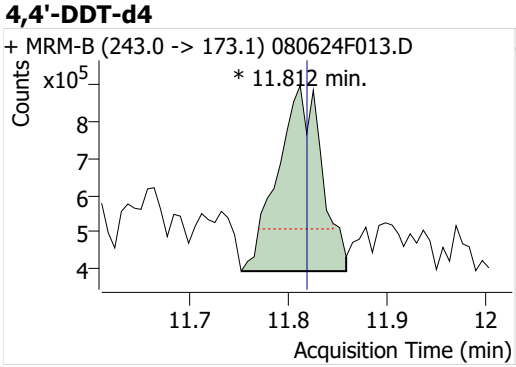


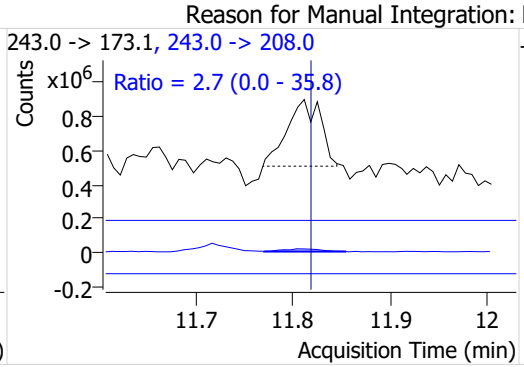


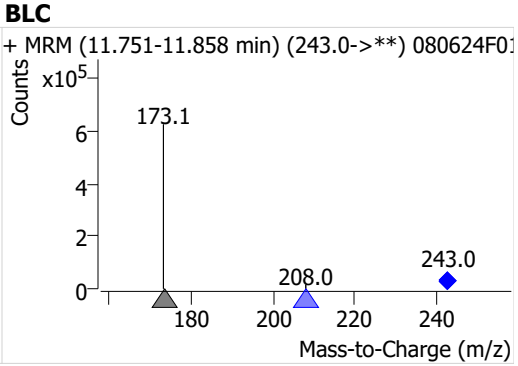


4,4'-DDT-d4

Reason for Manual Integration: **BLC**

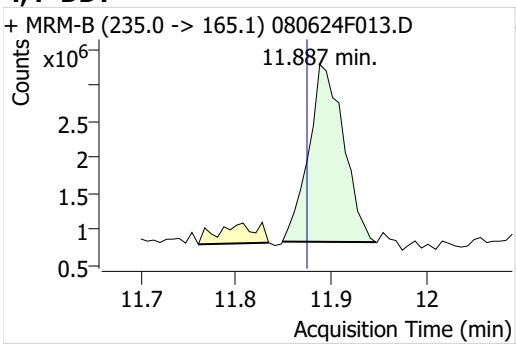


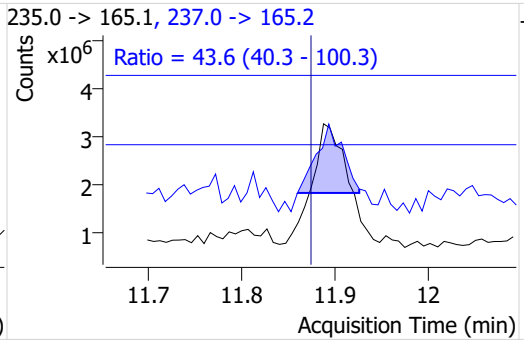


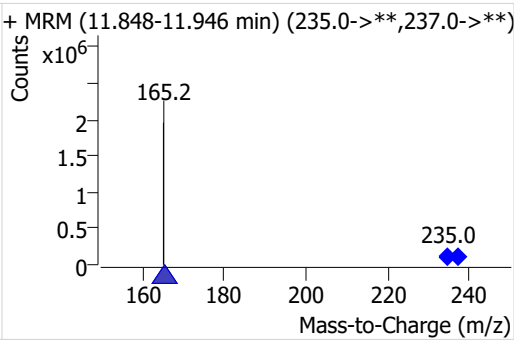


MassHunter Quantitative Analysis Sample Report

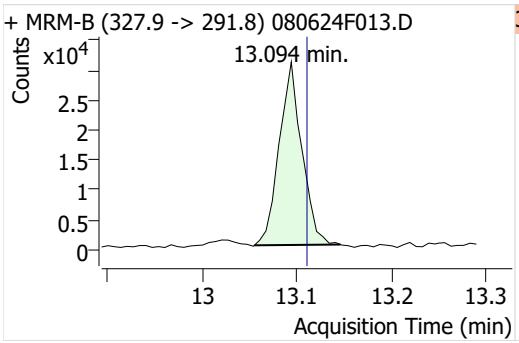
4,4'-DDT

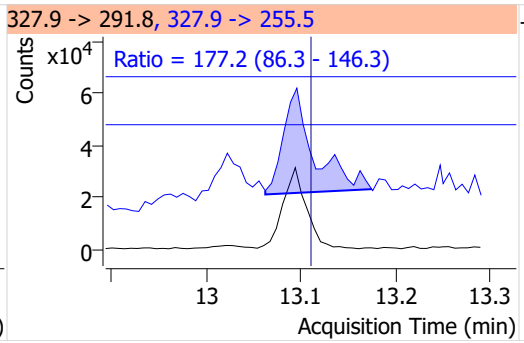


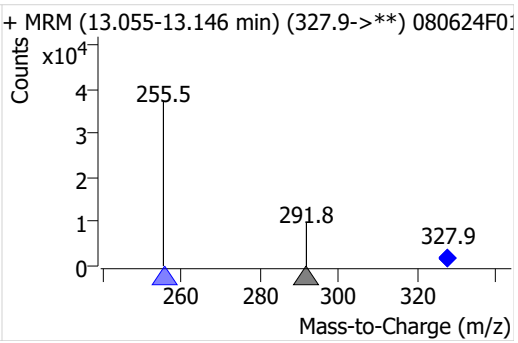




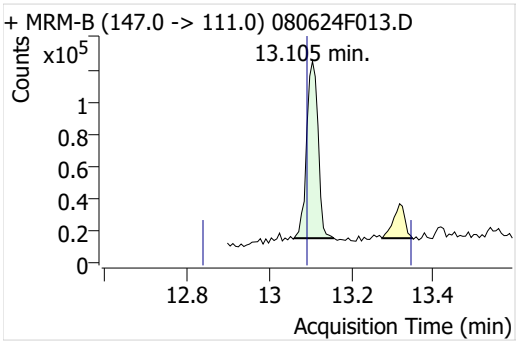
Endrin ketone-13C12

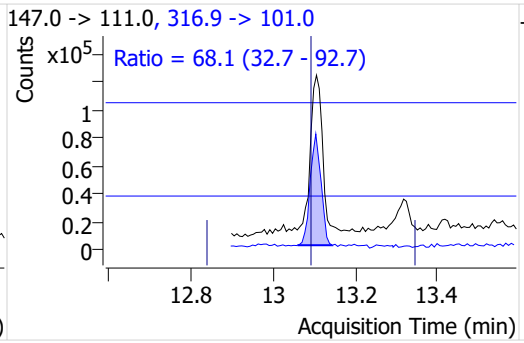


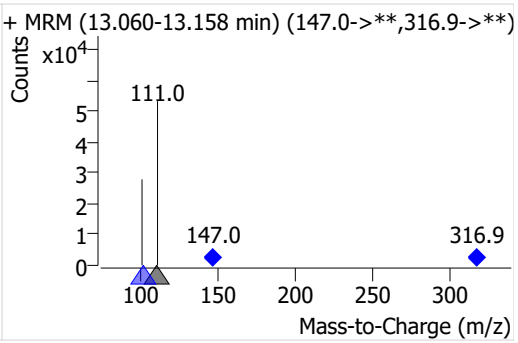




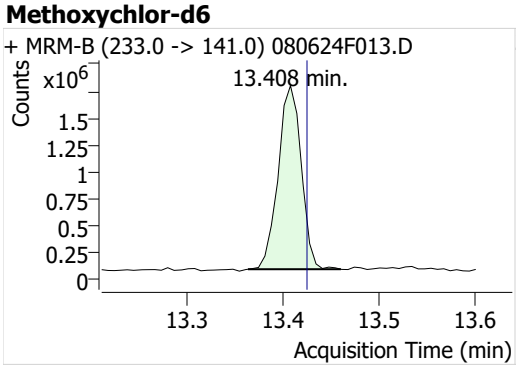
Endrin ketone

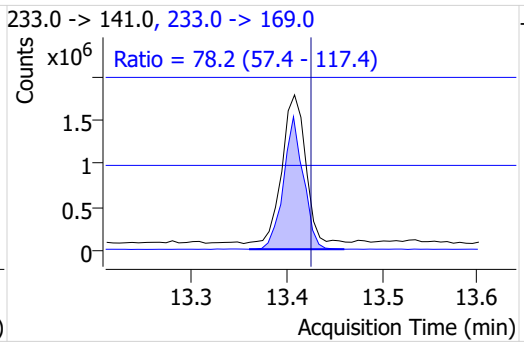


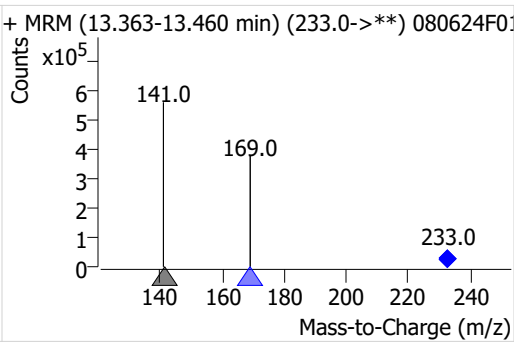




Methoxychlor-d6

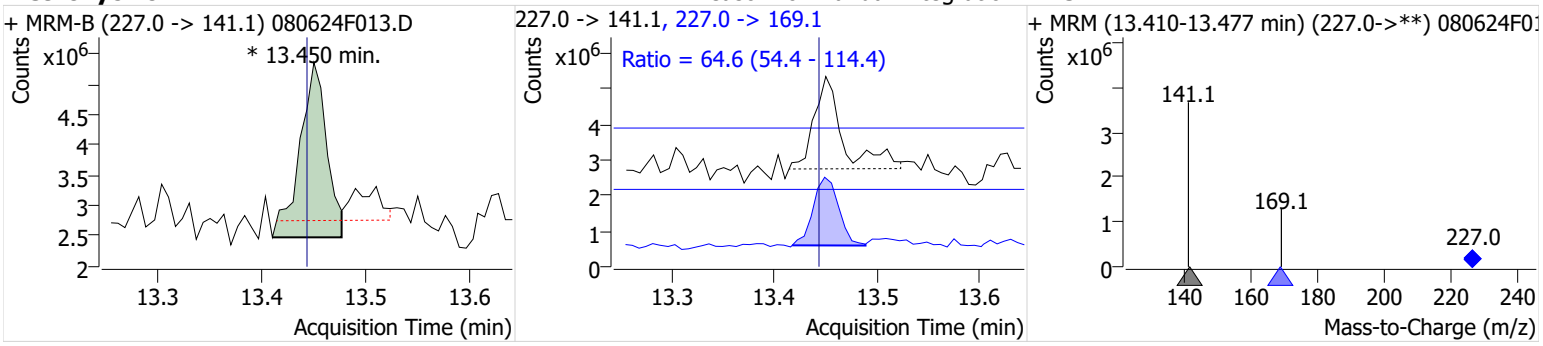




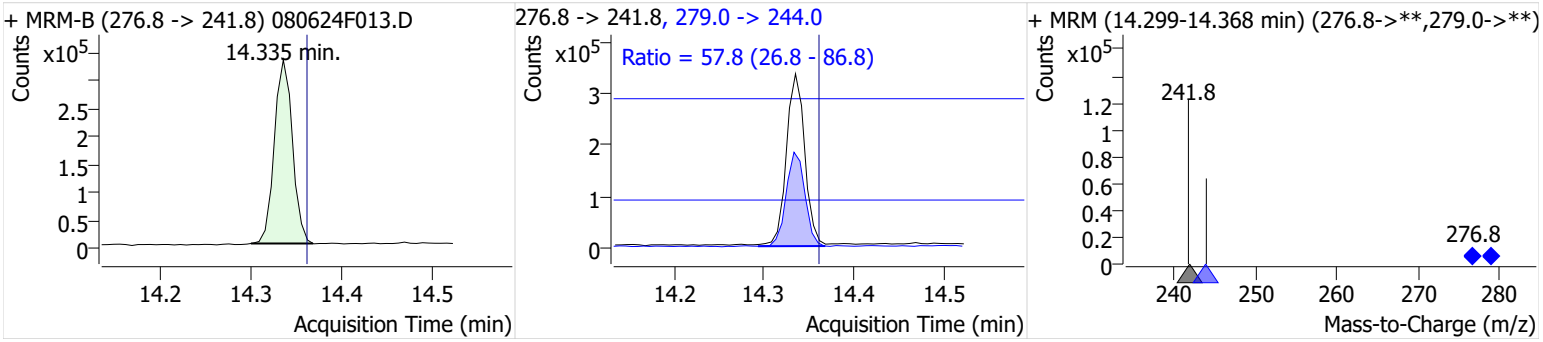


MassHunter Quantitative Analysis Sample Report

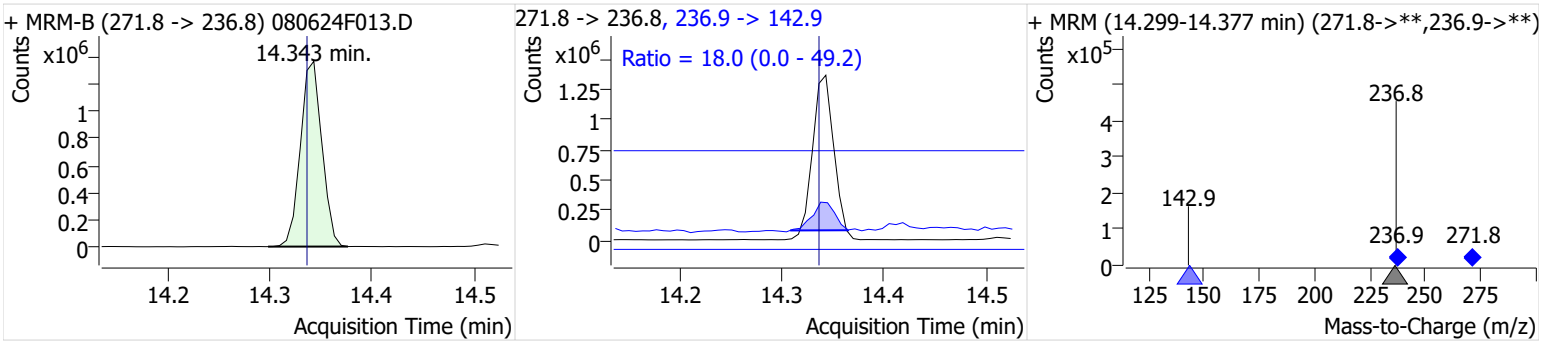
Methoxychlor Reason for Manual Integration: **BLC**



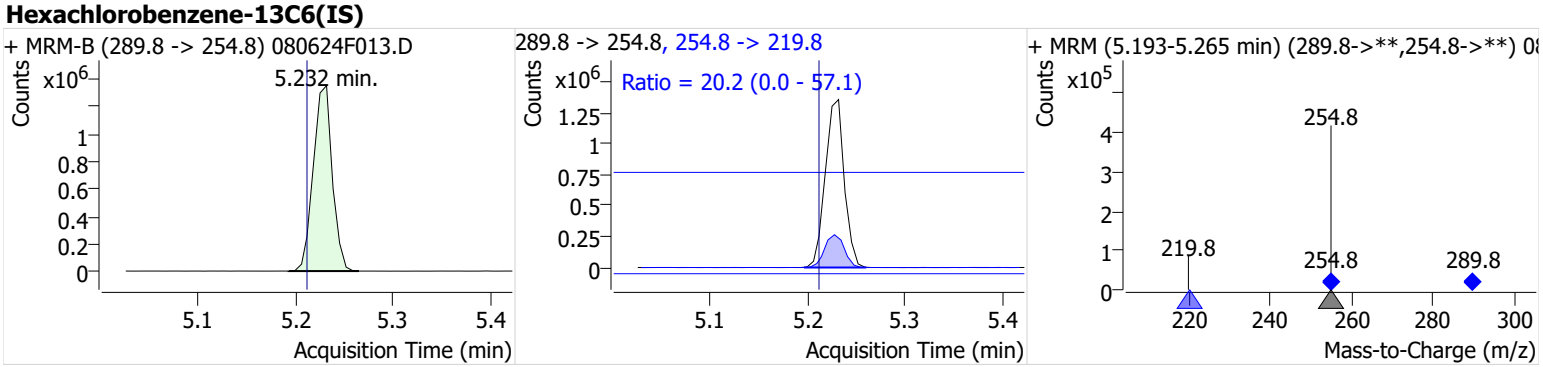
Mirex-13C10



Mirex

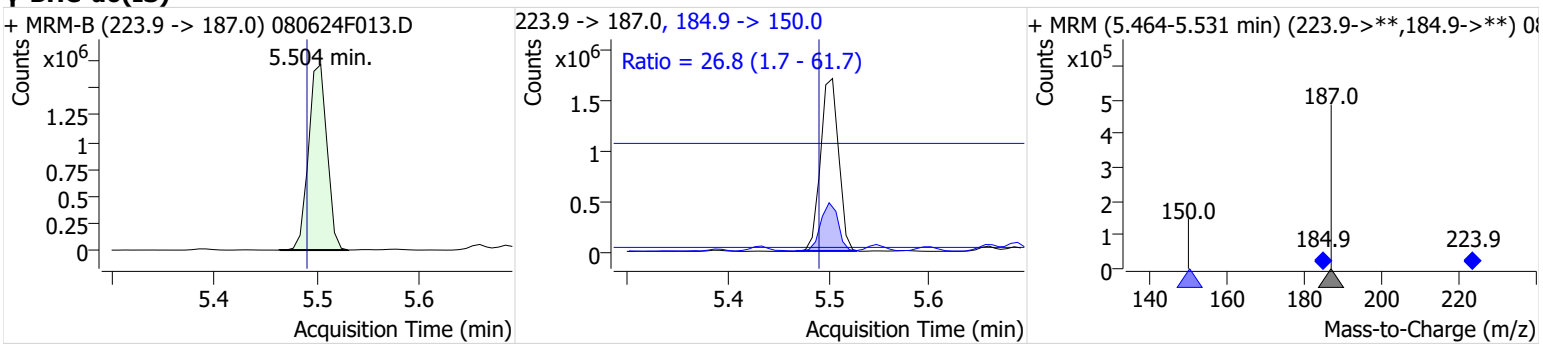


Hexachlorobenzene-13C6(IS)

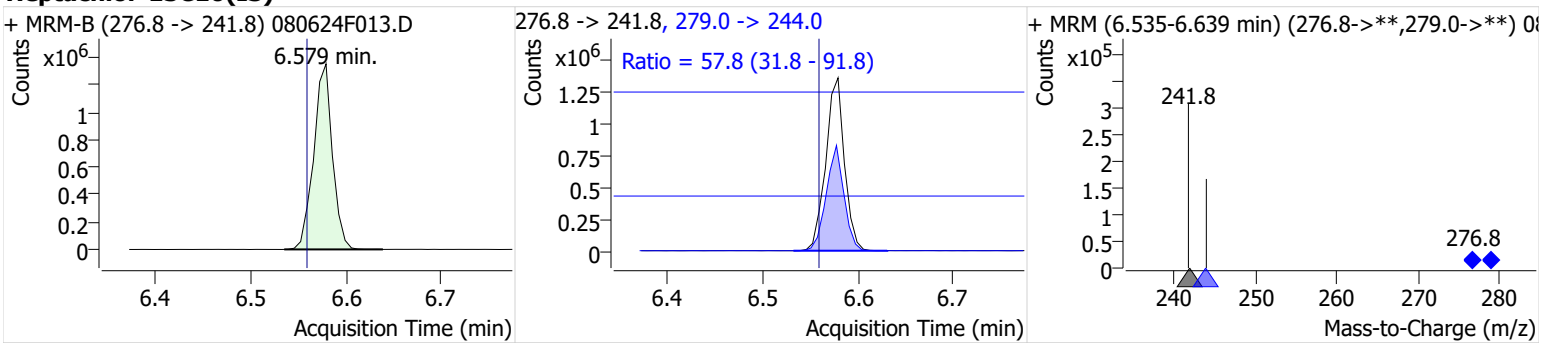


MassHunter Quantitative Analysis Sample Report

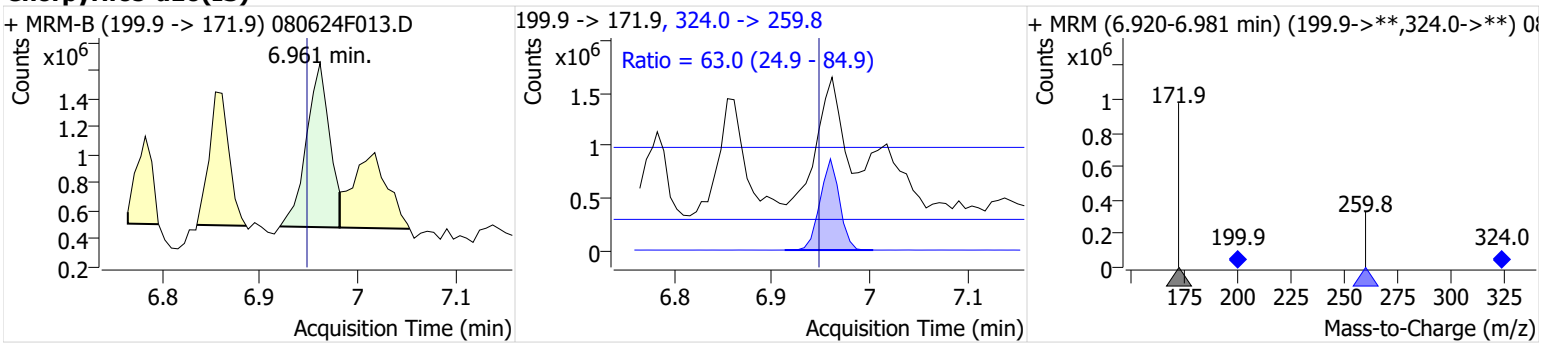
γ-BHC-d6(IS)



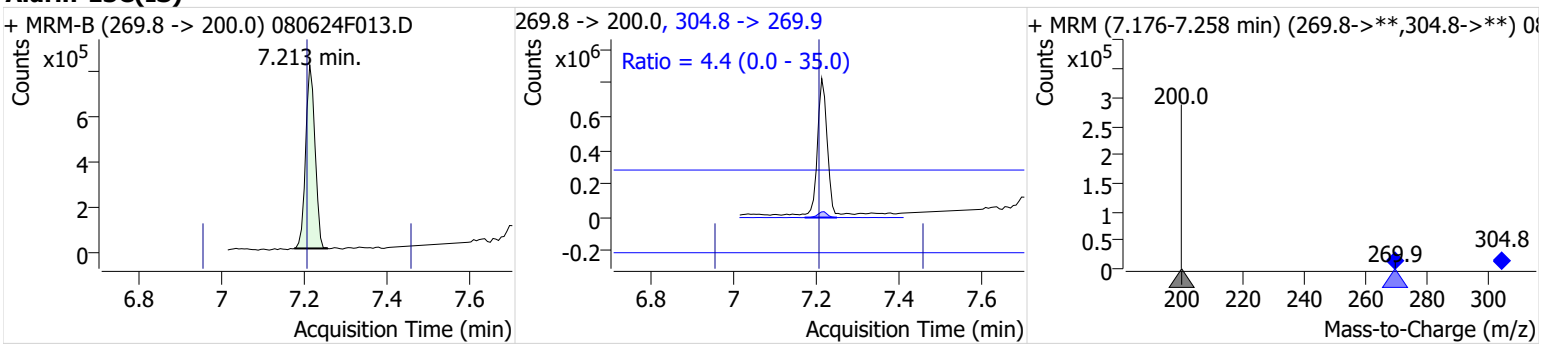
Heptachlor-13C10(IS)



Chorpyrifos-d10(IS)

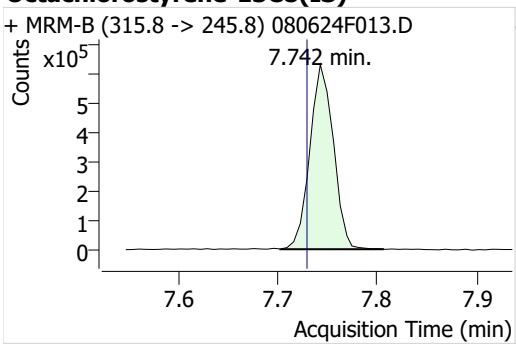


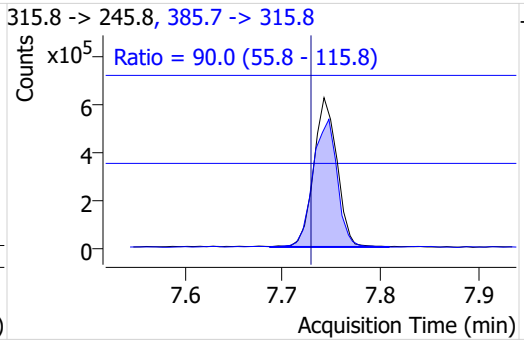
Aldrin-13C(IS)

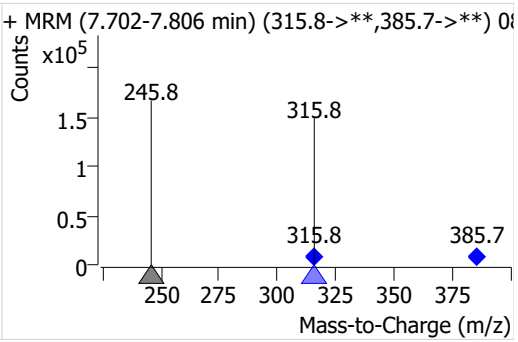


MassHunter Quantitative Analysis Sample Report

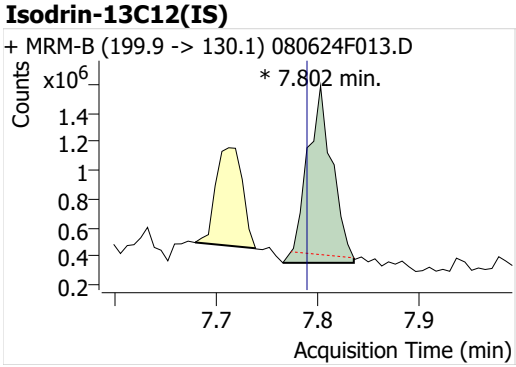
Octachlorostyrene-13C8(IS)

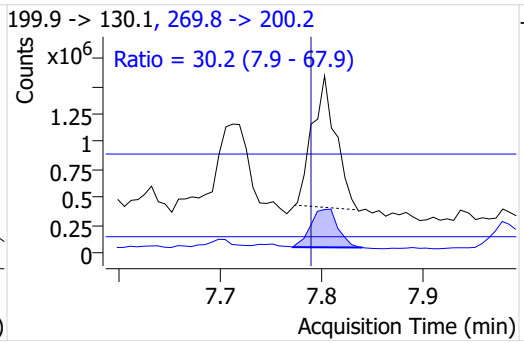


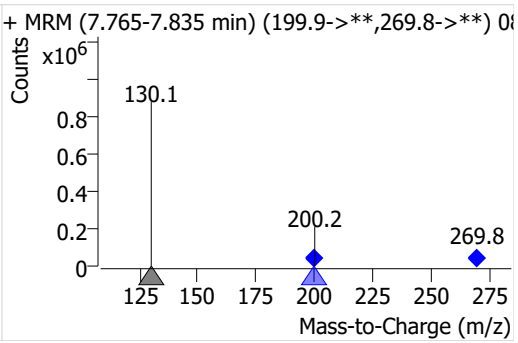




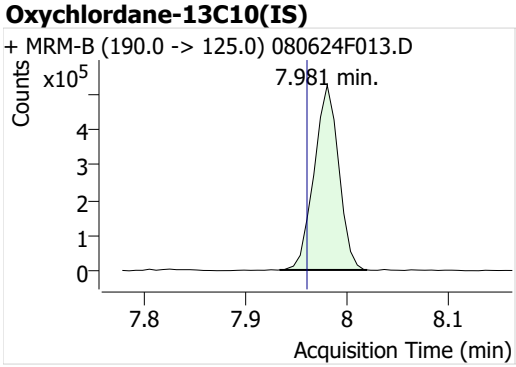
Isodrin-13C12(IS)

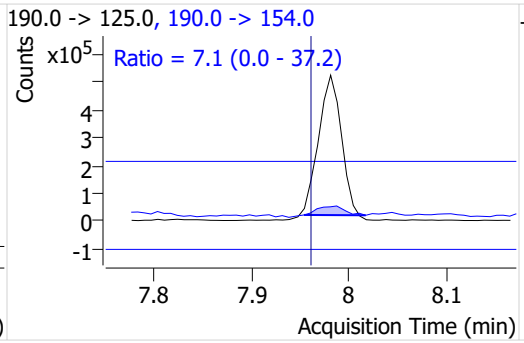


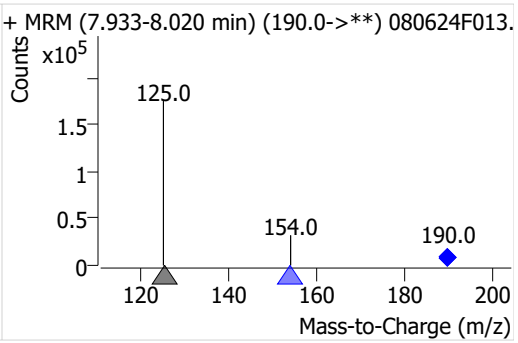




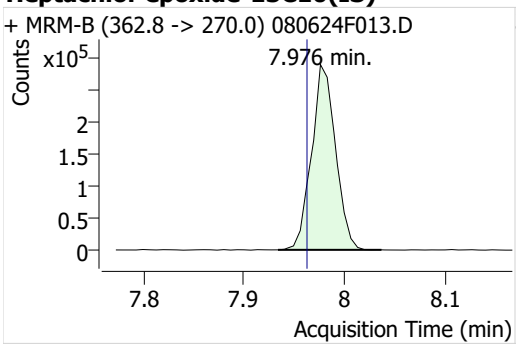
Oxychlordane-13C10(IS)

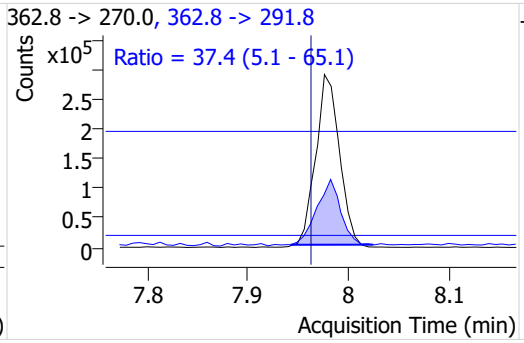


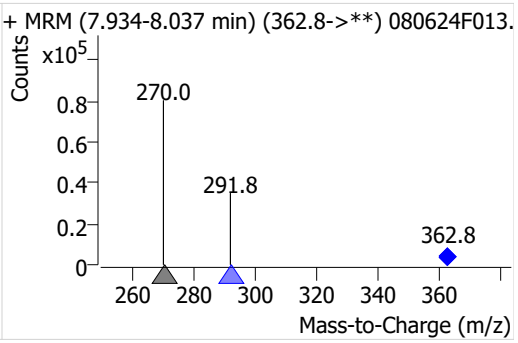




Heptachlor epoxide-13C10(IS)

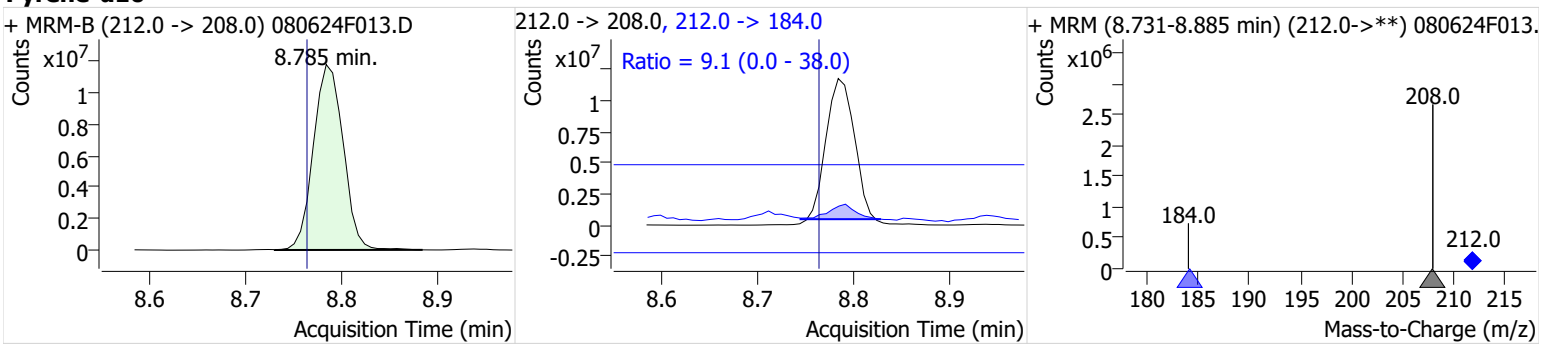




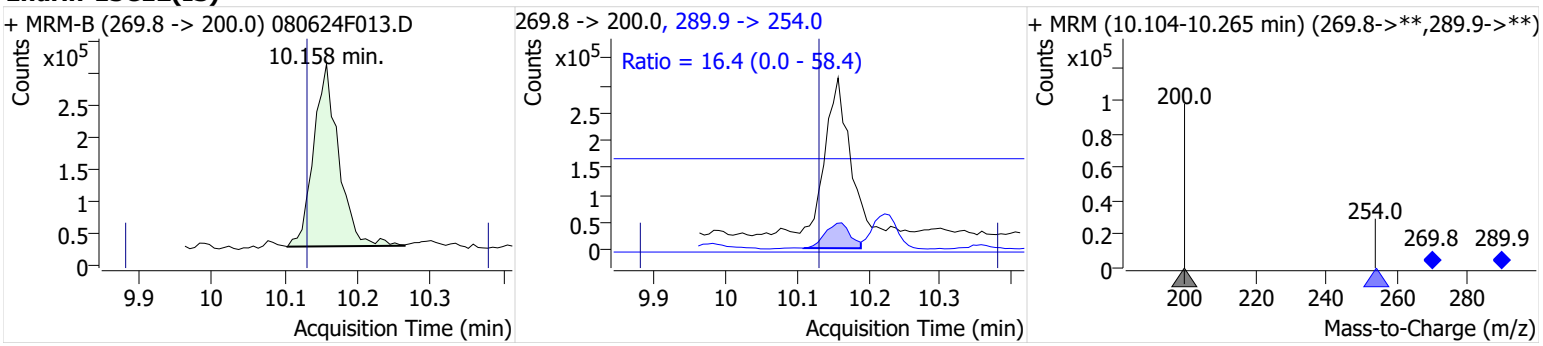


MassHunter Quantitative Analysis Sample Report

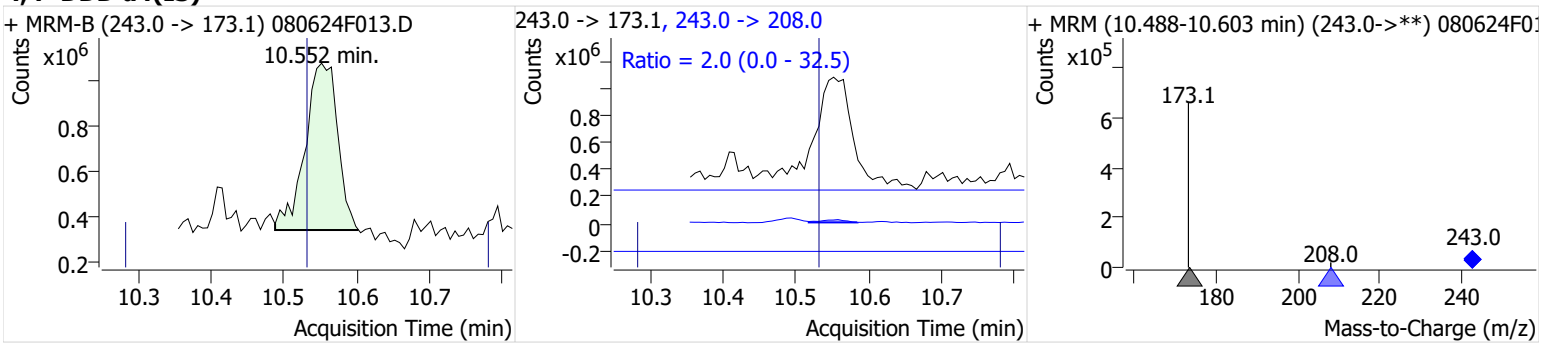
Pyrene-d10



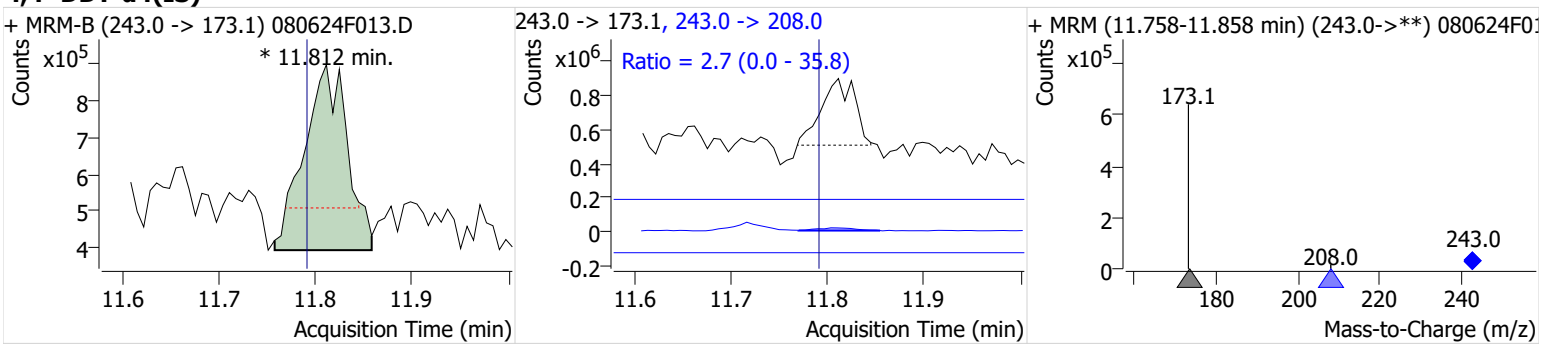
Endrin-13C12(IS)



4,4'-DDD d4(IS)

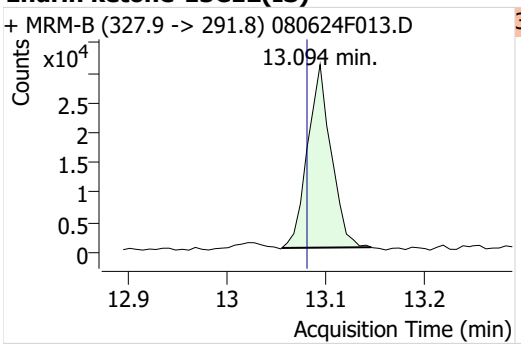


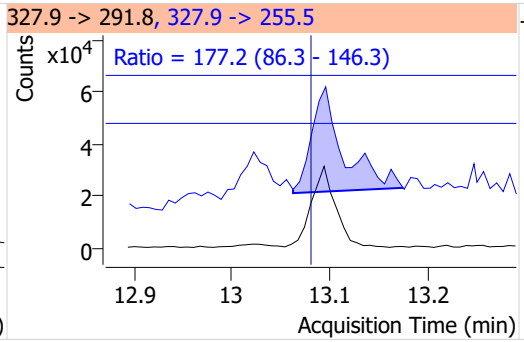
4,4'-DDT-d4(IS)

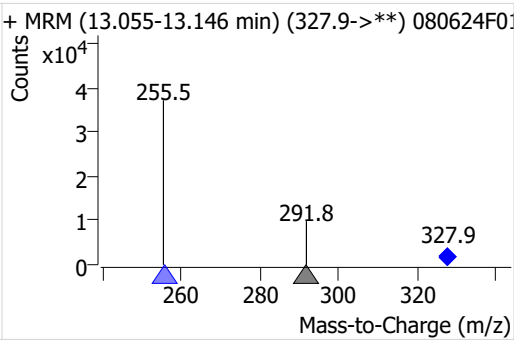


MassHunter Quantitative Analysis Sample Report

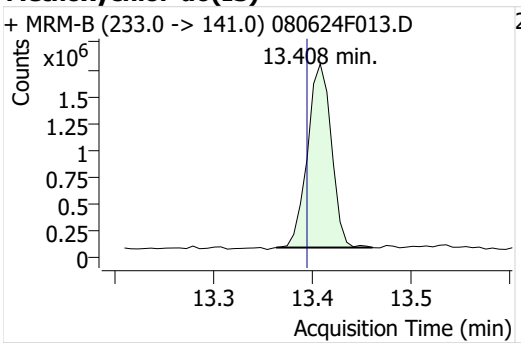
Endrin ketone-13C12(IS)

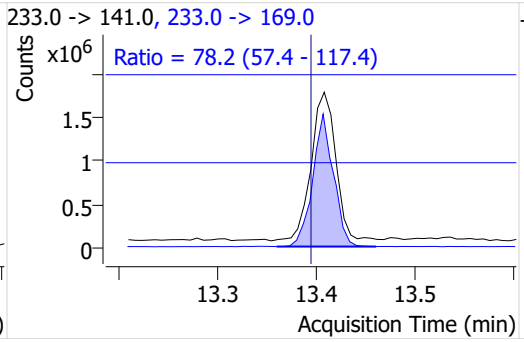


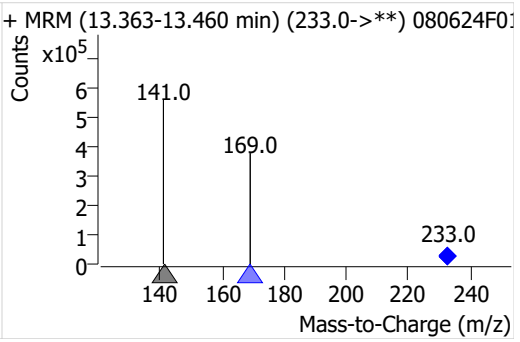




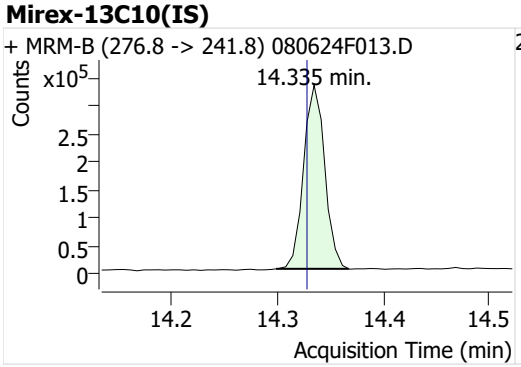
Methoxychlor-d6(IS)

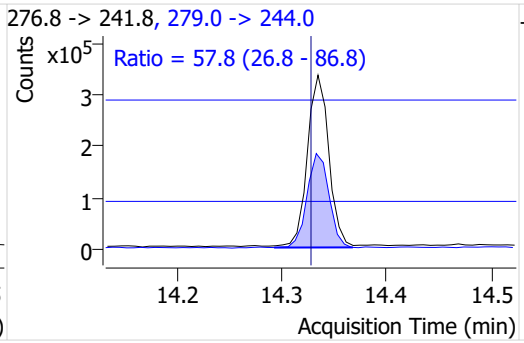


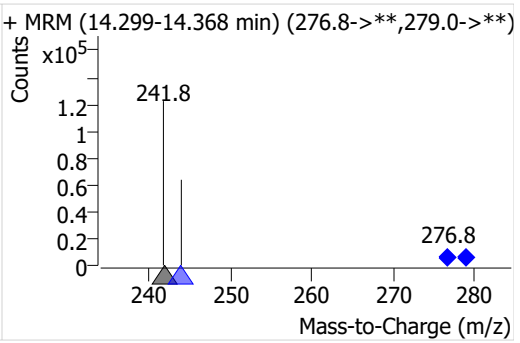




Mirex-13C10(IS)







1st 08/20/24
2nd 08/20/24

Validation Report

Data File: J:\MS42\Data\080624\080624F014.D
Lab ID: KQ2411800-02
RunType: DMS
Matrix: Sediment

Date Acquired: 8/6/24 14:36
Batch ID: 851162
Analysis Method: 1699M/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery	X	
Internal Standards	X	
Surrogates		X
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level		X

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Surrogates	S_4,4'-DDT-d4	243	5	187	Matrix
Above Highest ICAL Level	Aldrin	6068941.755 04029		5729740.042 95895	E-flag

Primary Review: _____

Printed: 8/20/24 17:33
\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

Secondary Review: _____

1st 08/20/24
2nd 08/20/24

Quantitation Report

Data File:	J:\MS42\Data\080624\080624F014.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 14:36	**Vial:**	9
Run Type:	DMS	**Dilution:**	1
Lab ID:	KQ2411800-02	**Raw Units:**	ng/ml

Bottle ID:	K2407810-001.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	851162	**Prep Lot:**	442451	**Report Group:**	KQ2411800
Analysis	1699M	**Prep Method:**	EPA 3541		
		Prep Date:	8/1/24		

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400368
		Report List ID:	25424

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	8.791	+0.01	29654247.089	100	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec		% Rec Criteria	Rpt?
S_Aldrin-13C12	7.213	+0.01	1496858.347	9.075	45		12 - 88	Y
S_4,4'DDD-d4	10.552	+0.01	2296903.604	3.658	73		9 - 159	Y
S_4,4'-DDT-d4	11.832	+0.03	4699338.738	12.153	243	*	5 - 187	Y
S_Endrin-13C12	10.164	+0.02	678584.551	26.841	134		14 - 141	Y
S_GBHCD6	5.497		2058618.418	5.425	27		5 - 90	Y
S_Oxychlordane-13C10	7.988	+0.02	1049074.215	10.008	50		5 - 86	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Aldrin	7.222	+0.01	6068941.755	144.674	26.4	E	Y
gamma-BHC (Lindane)	5.549	+0.01	2122064.234	17.097	3.11		Y
cis-Chlordane	8.857	+0.02	935778.908	14.036	2.56		Y
trans-Chlordane	8.530	+0.02	1118930.716	20.299	3.70		Y
2,4'-DDD	9.566	+0.01	21348836.401	32.371	5.90		Y
4,4'-DDD	10.621		32157757.333	66.131	12.0		Y
2,4'-DDE	8.547	+0.01	17250118.106	21.012	3.83		Y
4,4'-DDE	9.384	+0.01	27047647.350	46.249	8.43		Y
2,4'-DDT	10.712	+0.02	10132187.072	7.364	1.34		Y
4,4'-DDT	11.894	+0.01	0	0	0	U	Y
Dieldrin	9.569	+0.01	1238636.236	16.376	2.98		Y
cis-Nonachlor	10.625	+0.01	397053.649	9.738	1.77		Y
trans-Nonachlor	8.918	+0.02	762876.717	16.085	2.93		Y
Oxychlordane	7.989	+0.01	0	0	0	U	Y

1st 08/20/24

2nd 08/20/24

Data File:	J:\MS42\Data\080624\080624F014.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 14:36	**Vial:**	9
Run Type:	DMS	**Dilution:**	1
Lab ID:	KQ2411800-02	**Raw Units:**	ng/ml

Prep Amount:	10.475 g	**Dilution:**	1
Prep Final Amount:	1.00 mL	**Basis Factor:**	52.40

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/20/24 17:33

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MassHunter Quantitative Analysis Sample Report

Data File	J:\MS42\Data\080624\080624F014.D		
Batch File	J:\MS42\Data\080624\QuantResults\080624 OC PEST.batch.bin		
Acq. Date-Time	8/6/2024 2:36:20 PM	**Acq Operator**	EBruno
Name	KQ2411800-02_K2407810-001DMS	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	8/19/2024 3:52:06 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	072424 OC PEST ICAL.batch.bin	**Vial**	10
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.226	289.8 -> 254.8	1934605	20.0000 ng/ml	0.016
γ-BHC-d6(IS)	5.497	223.9 -> 187.0	2058618	20.0000 ng/ml	0.008
Heptachlor-13C10(IS)	6.573	276.8 -> 241.8	2107355	20.0000 ng/ml	0.016
Chorpyrifos-d10(IS)	6.961	199.9 -> 171.9	2337917	20.0000 ng/ml	0.013
Aldrin-13C(IS)	7.213	269.8 -> 200.0	1488103	20.0000 ng/ml	0.010
Octachlorostyrene-13C8(IS)	7.749	315.8 -> 245.8	930971	20.0000 ng/ml	0.019
Isodrin-13C12(IS)	7.802	199.9 -> 130.1	2119265 *m*	20.0000 ng/ml	0.013
Oxychlordane-13C10(IS)	7.988	190.0 -> 125.0	1049074	20.0000 ng/ml	0.023
Heptachlor epoxide-13C10(IS)	7.983	362.8 -> 270.0	666695	20.0000 ng/ml	0.020
Pyrene-d10	8.791	212.0 -> 208.0	29654247	100.0000 ng/ml	0.027
Endrin-13C12(IS)	10.164	269.8 -> 200.0	678585	20.0000 ng/ml	0.029
4,4'-DDD d4(IS)	10.552	243.0 -> 173.1	2296904	5.0000 ng/ml	0.023
4,4'-DDT-d4(IS)	11.832	243.0 -> 173.1	4699339 *m*	5.0000 ng/ml	0.036
Endrin ketone-13C12(IS)	13.094	327.9 -> 291.8	76830	20.0000 ng/ml	0.013
Methoxychlor-d6(IS)	13.408	233.0 -> 141.0	3149528	20.0000 ng/ml	0.013
Mirex-13C10(IS)	14.342	276.8 -> 241.8	606022	5.0000 ng/ml	0.013

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	1934605	5.166 ng/ml	
		Spiked Amount =	20.0	Recovery =	*25.8 %*
γ-BHC-d6	5.491	223.9 -> 187.0	2058618	5.425 ng/ml	
		Spiked Amount =	20.0	Recovery =	*27.1 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	2107355	9.667 ng/ml	
		Spiked Amount =	20.0	Recovery =	*48.3 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	2337917	25.024 ng/ml	
		Spiked Amount =	20.0	Recovery =	*125.1 %*
Aldrin-13C	7.207	269.8 -> 200.0	1496858	9.075 ng/ml	
		Spiked Amount =	20.0	Recovery =	*45.4 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	930971	6.262 ng/ml	
		Spiked Amount =	20.0	Recovery =	*31.3 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2119265 *m*	11.989 ng/ml	
		Spiked Amount =	20.0	Recovery =	*59.9 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1049074	10.008 ng/ml	
		Spiked Amount =	20.0	Recovery =	*50.0 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	666695	11.236 ng/ml	
		Spiked Amount =	20.0	Recovery =	*56.2 %*
Endrin-13C12	10.131	269.8 -> 200.0	678585	26.841 ng/ml	
		Spiked Amount =	20.0	Recovery =	*134.2 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	2296904	3.658 ng/ml	
		Spiked Amount =	5.0	Recovery =	*73.2 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	4699339 *m*	12.153 ng/ml	
		Spiked Amount =	5.0	Recovery =	*243.1 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	76830	14.397 ng/ml	
		Spiked Amount =	20.0	Recovery =	*72.0 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	3149528	14.688 ng/ml	
		Spiked Amount =	20.0	Recovery =	*73.4 %*

MassHunter Quantitative Analysis Sample Report

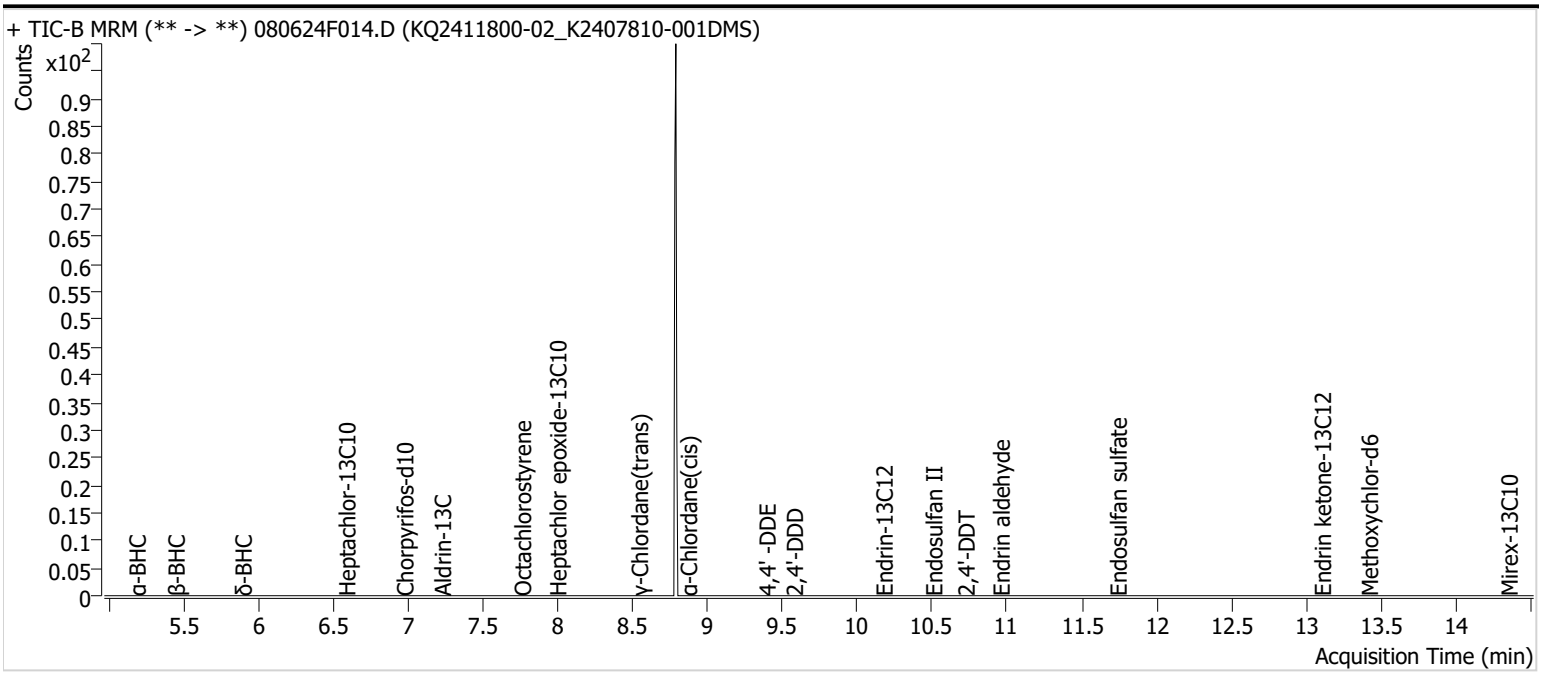
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	606022	1.063 ng/ml
		Spiked Amount = 5.0		Recovery = *21.3 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.172	181.1 -> 145.1	2931797	20.201 ng/ml	69
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.228	283.8 -> 213.9	3260553	22.086 ng/ml	95
β-BHC	γ-BHC-d6(IS)	5.434	181.1 -> 145.1	1715084	17.644 ng/ml	77
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.549	181.1 -> 145.1	2122064	17.097 ng/ml	54
δ-BHC	γ-BHC-d6(IS)	5.880	181.1 -> 145.1	1212889	13.424 ng/ml	60
Heptachlor	Heptachlor-13C10(IS)	6.583	271.7 -> 236.9	2480549	21.875 ng/ml	88
Chorpyrifos	Chorpyrifos-d10(IS)		196.9 -> 169.0		ND ng/ml	
Aldrin	Aldrin-13C(IS)	7.222	254.9 -> 220.0	6068942	144.674 ng/ml	2
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.748	342.8 -> 307.8	2411512	21.079 ng/ml	96
Isodrin	Isodrin-13C12(IS)	7.810	193.0 -> 123.0	1822584	16.376 ng/ml	95
Oxychlordane	Oxychlordane-13C10(IS)		114.9 -> 51.1		ND ng/ml	
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.995	352.8 -> 262.9	725713	20.555 ng/ml	97
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.530	271.8 -> 236.9	1118931	20.299 ng/ml	59
2,4'-DDE	4,4'-DDD d4(IS)	8.547	246.0 -> 176.2	17250118	21.012 ng/ml	100
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.857	271.8 -> 236.9	935779	14.036 ng/ml	86
Endosulfan I	Endrin-13C12(IS)	8.873	206.9 -> 172.0	424791	6.965 ng/ml	97
trans-Nanochlor	Oxychlordane-13C10(IS)	8.918	271.8 -> 236.9	762877	16.085 ng/ml	66
4,4' -DDE	4,4'-DDD d4(IS)	9.384	246.0 -> 176.2	27047647	46.249 ng/ml	95
Dieldrin	Endrin-13C12(IS)	9.569	262.9 -> 193.0	1238636 ***m***	16.376 ng/ml	91
2,4'-DDD	4,4'-DDD d4(IS)	9.566	235.0 -> 165.1	21348836	32.371 ng/ml	30
Endrin	Endrin-13C12(IS)	10.173	262.8 -> 193.0	1375805 ***m***	32.810 ng/ml	96
Endosulfan II	Endrin-13C12(IS)	10.497	206.9 -> 172.0	428494	13.229 ng/ml	85
cis-Nonachlor	Oxychlordane-13C10(IS)	10.625	271.8 -> 236.9	397054	9.738 ng/ml	3
4,4'-DDD	4,4'-DDD d4(IS)	10.621	235.0 -> 165.1	32157757	66.131 ng/ml	98
2,4'-DDT	4,4'-DDT-d4(IS)	10.712	235.0 -> 165.1	10132187	7.364 ng/ml	82
Endrin aldehyde	Endrin-13C12(IS)	10.947	249.9 -> 214.9	218182	18.214 ng/ml	73
Endosulfan sulfate	Endrin-13C12(IS)	11.729	271.9 -> 237.0	1196180	14.044 ng/ml	91
4,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin ketone	Endrin ketone-13C12(IS)	13.112	147.0 -> 111.0	552651	32.047 ng/ml	67
Methoxychlor	Methoxychlor-d6(IS)	13.463	227.0 -> 141.1	8590143 ***m***	52.348 ng/ml	50
Mirex	Mirex-13C10(IS)	14.343	271.8 -> 236.8	2678499	21.450 ng/ml	99

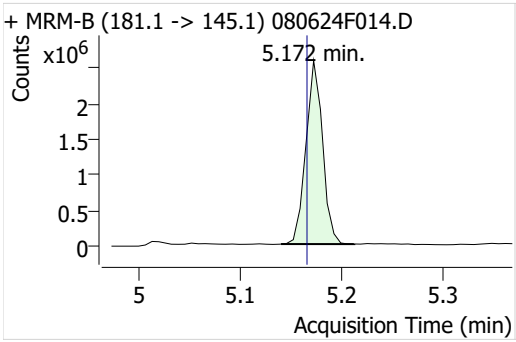
(m) = manual integration ND = Not Detected NC = Not Calculated

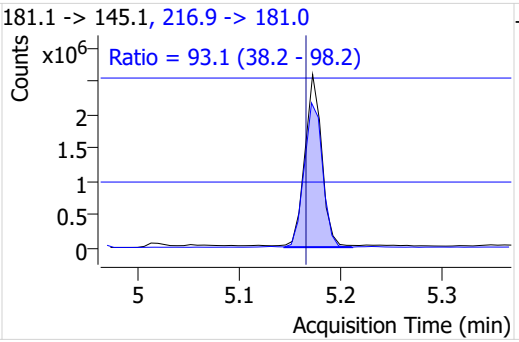
Sample Chromatogram

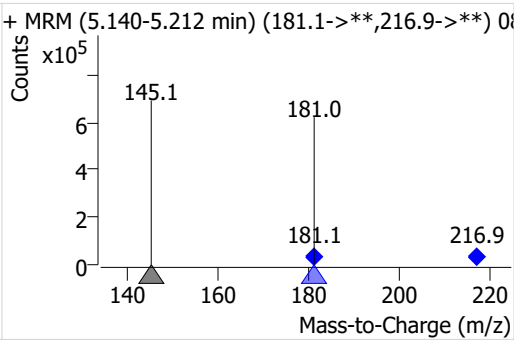
MassHunter Quantitative Analysis Sample Report



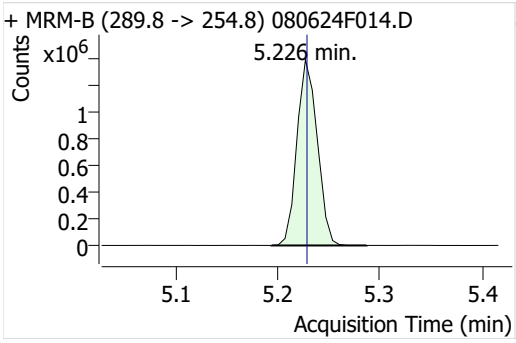
α-BHC

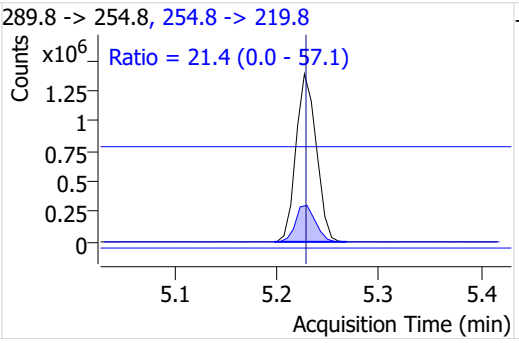


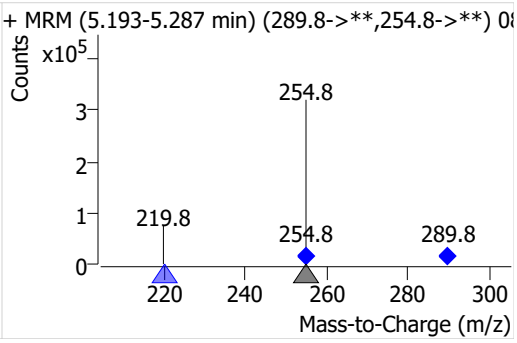




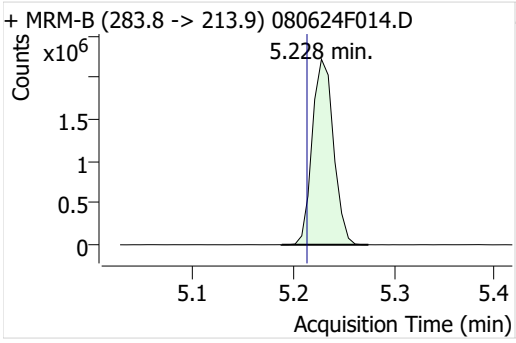
Hexachlorobenzene-13C6

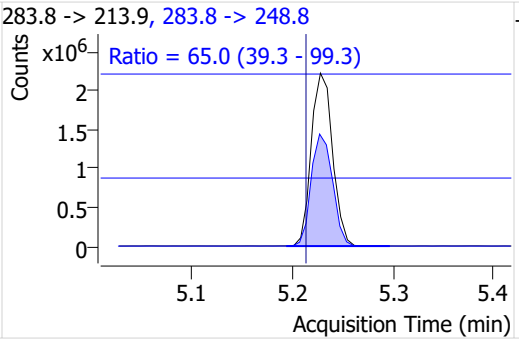


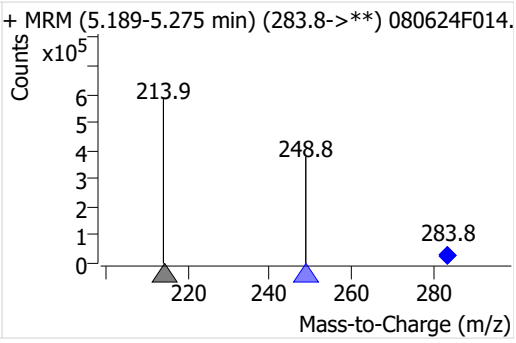




Hexachlorobenzene







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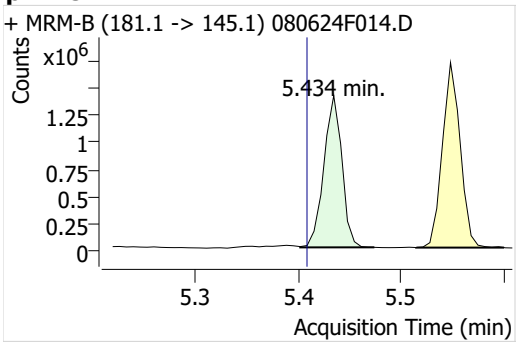
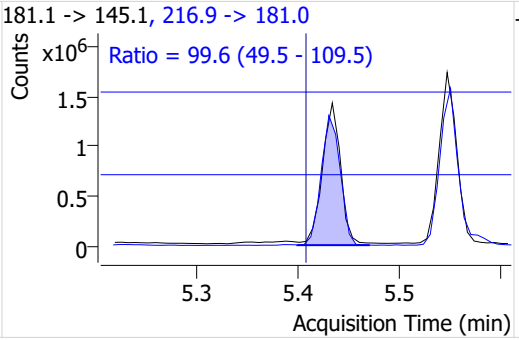
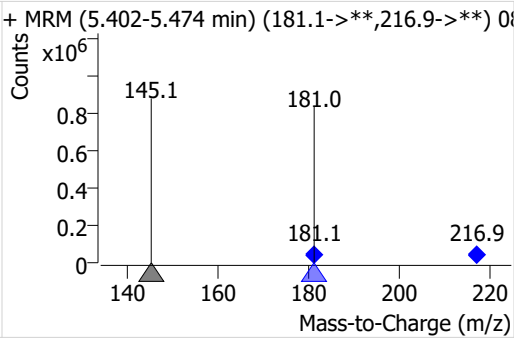
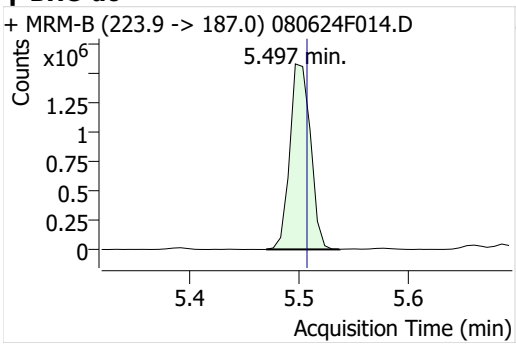
β-BHC

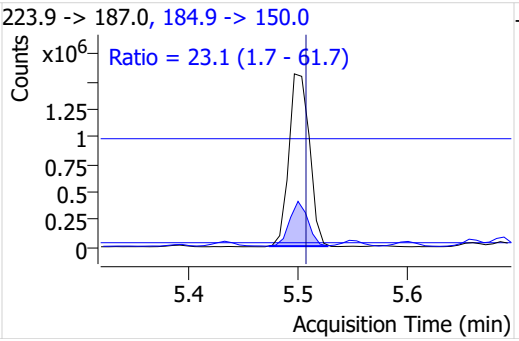


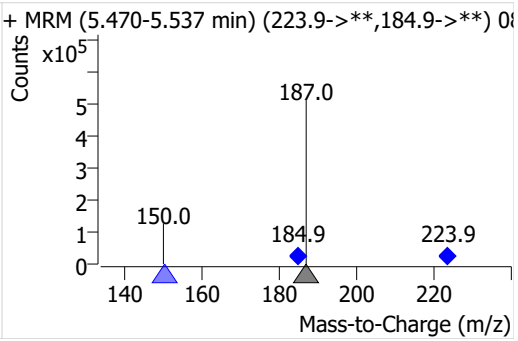




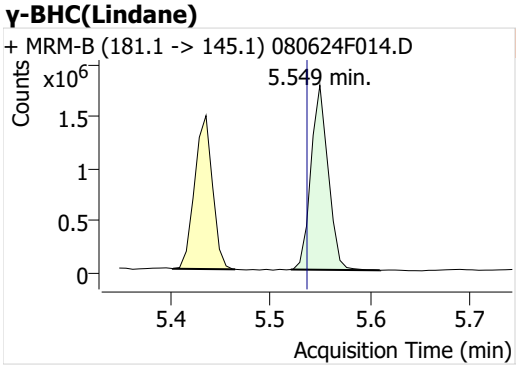
γ-BHC-d6

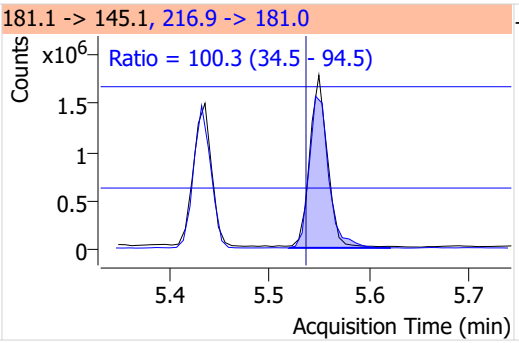


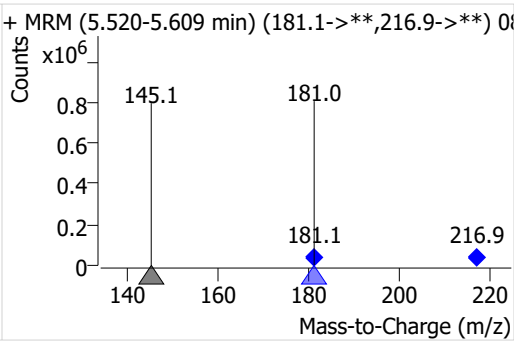




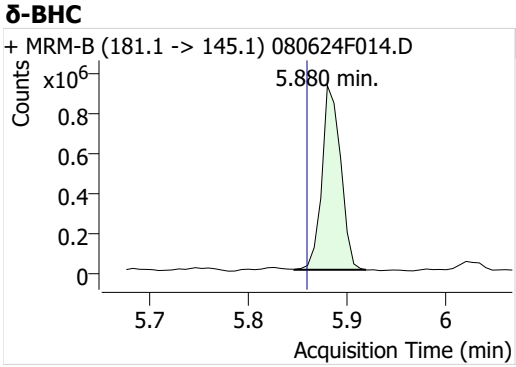
γ-BHC(Lindane)

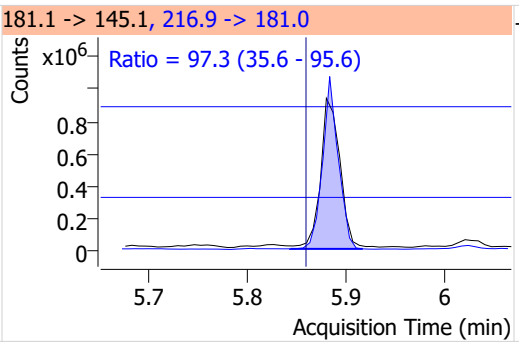


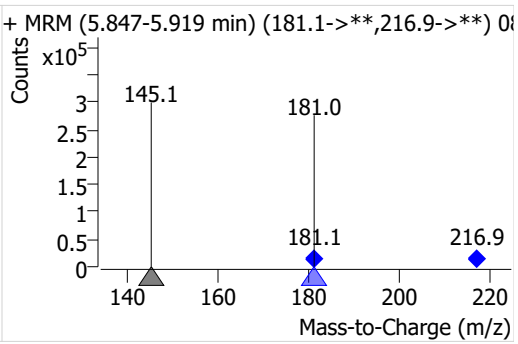




δ-BHC







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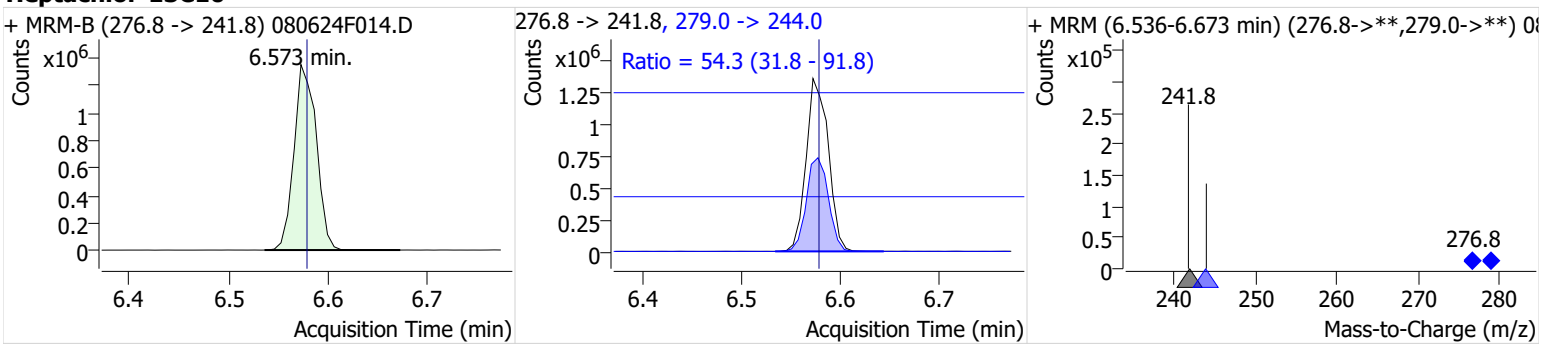
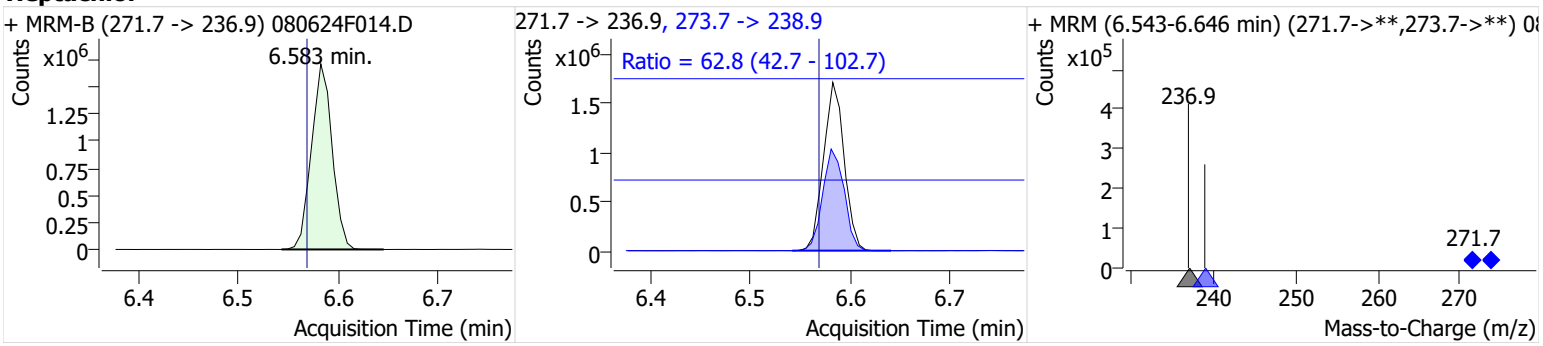
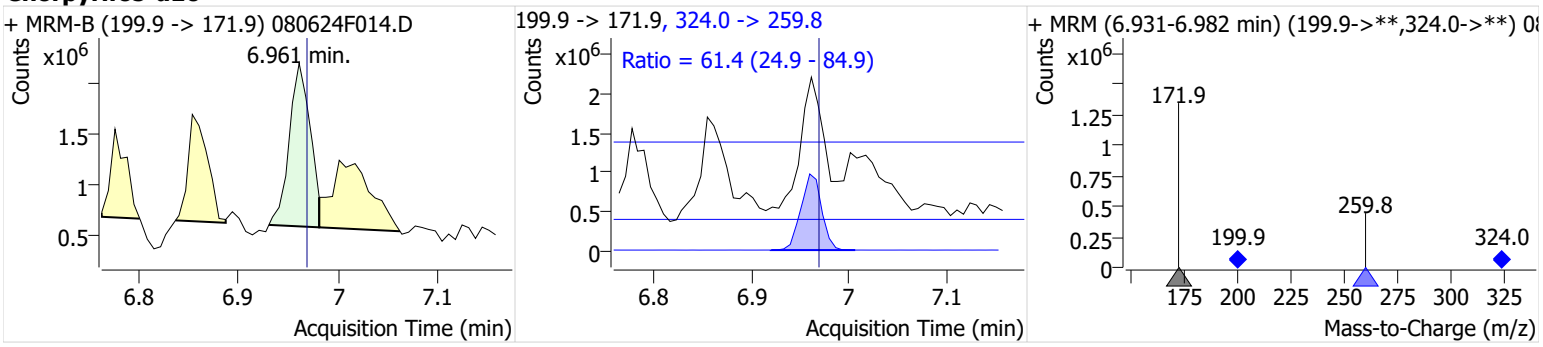
Heptachlor-13C10



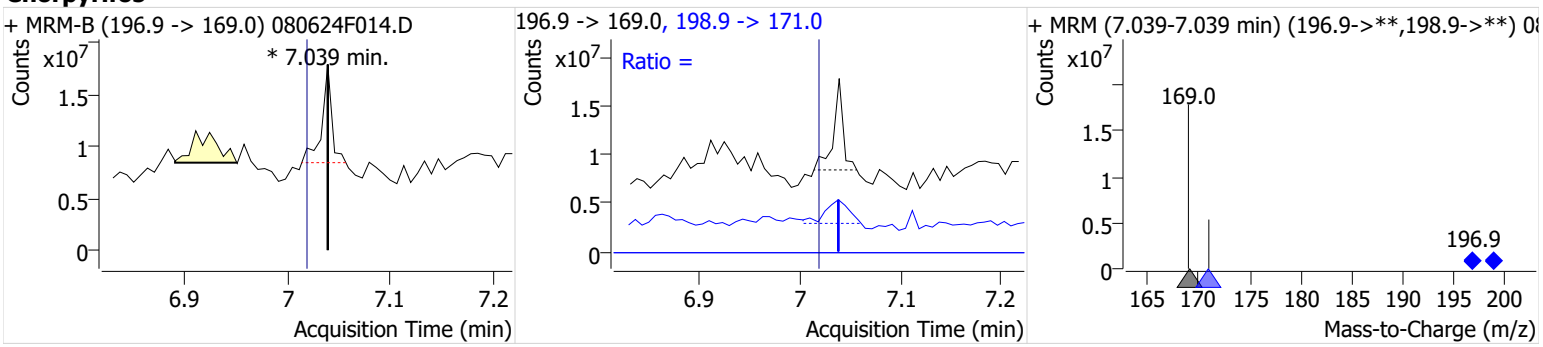
Heptachlor



Chorpyrifos-d10



Chorpyrifos



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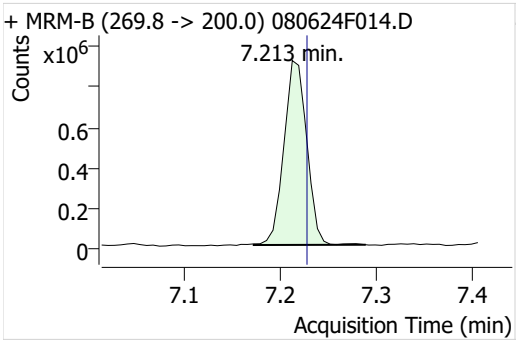
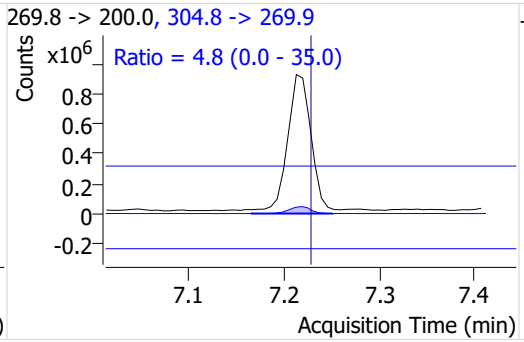
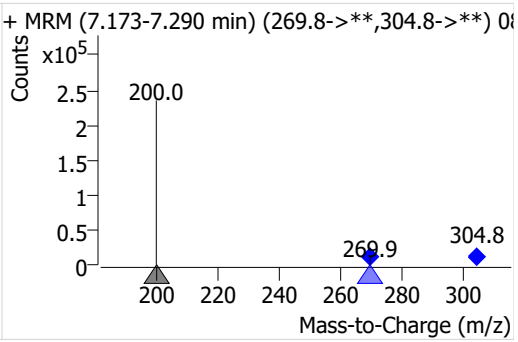
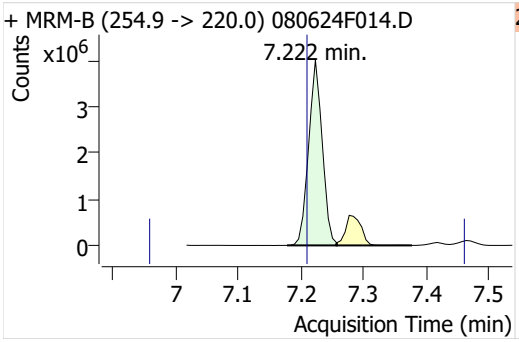
Aldrin-13C

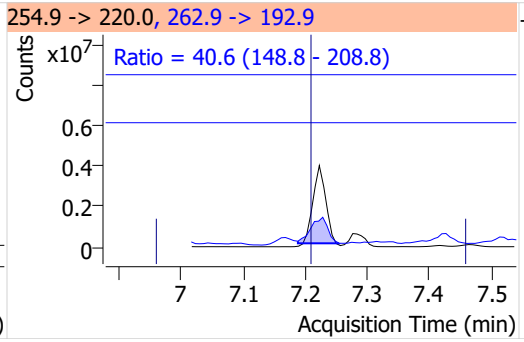


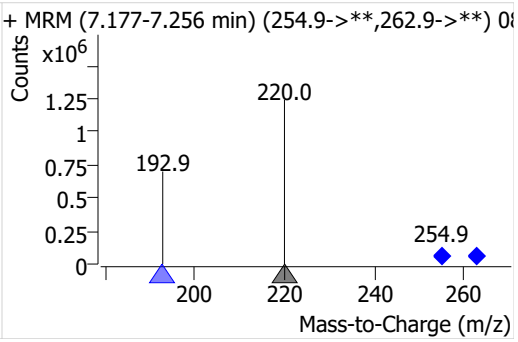




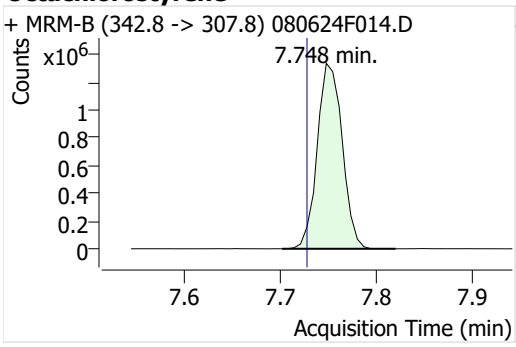
Aldrin

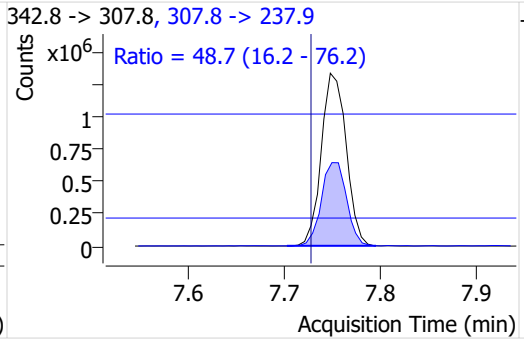


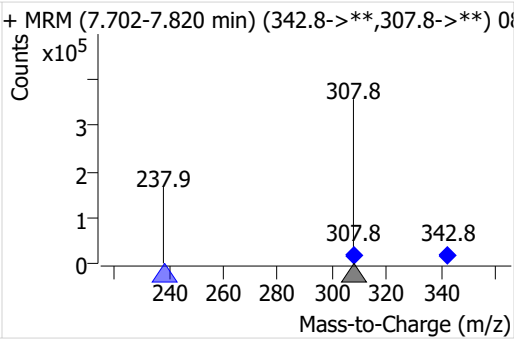




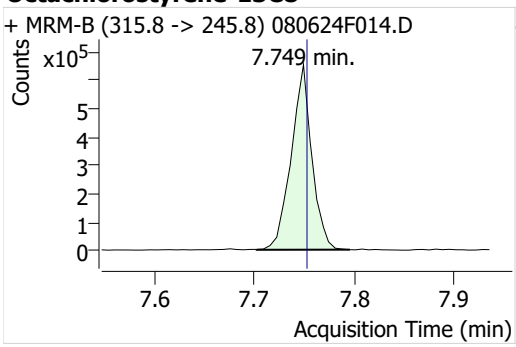
Octachlorostyrene

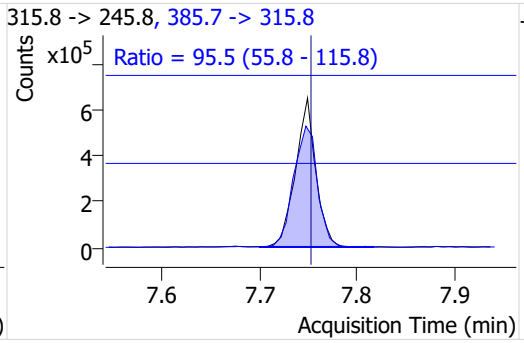


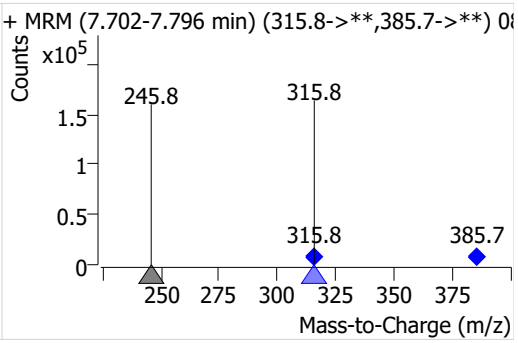




Octachlorostyrene-13C8







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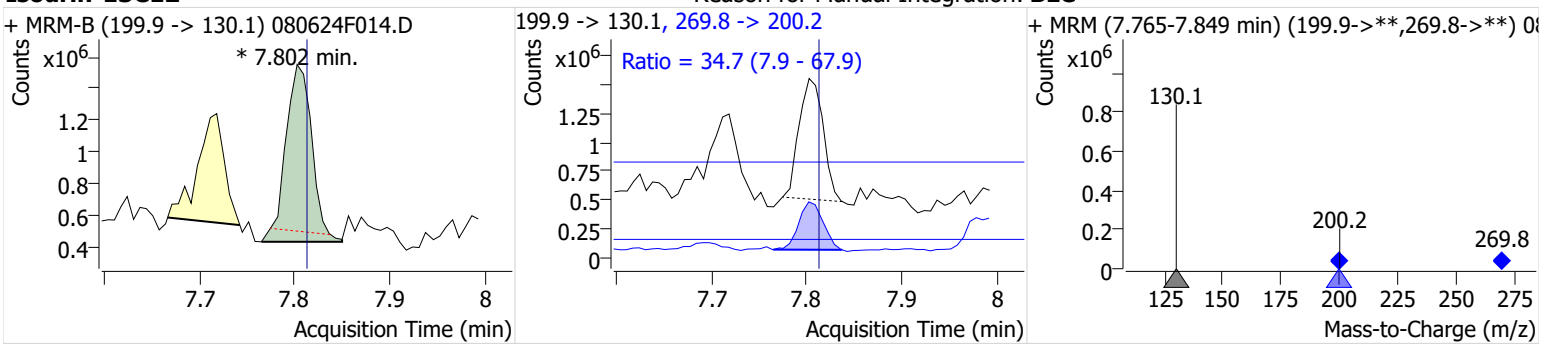
Isodrin-13C12 Reason for Manual Integration: **BLC**



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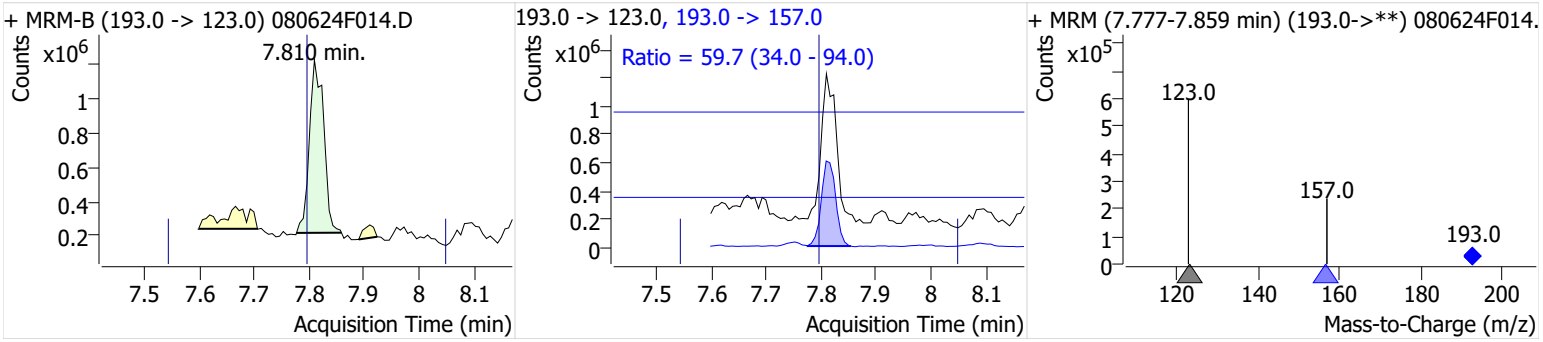
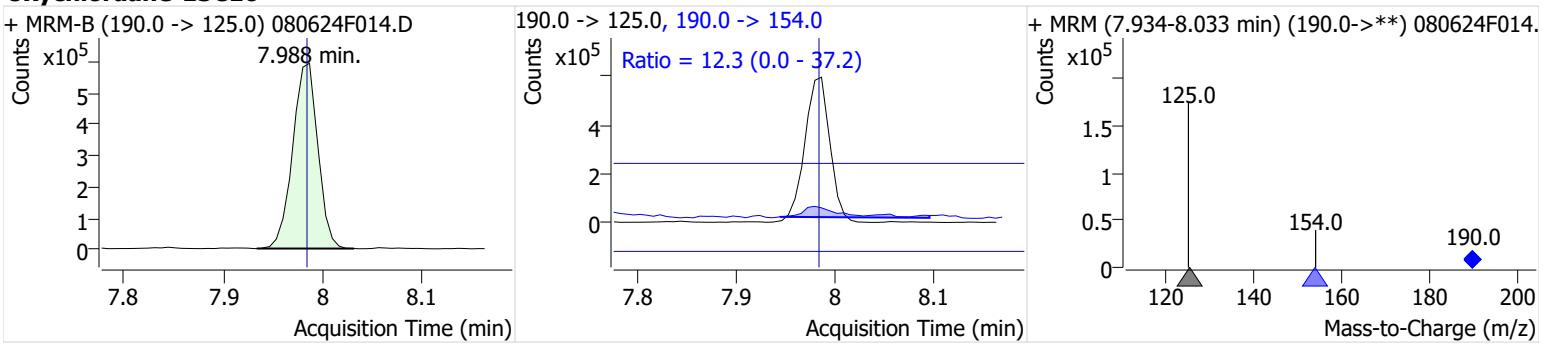
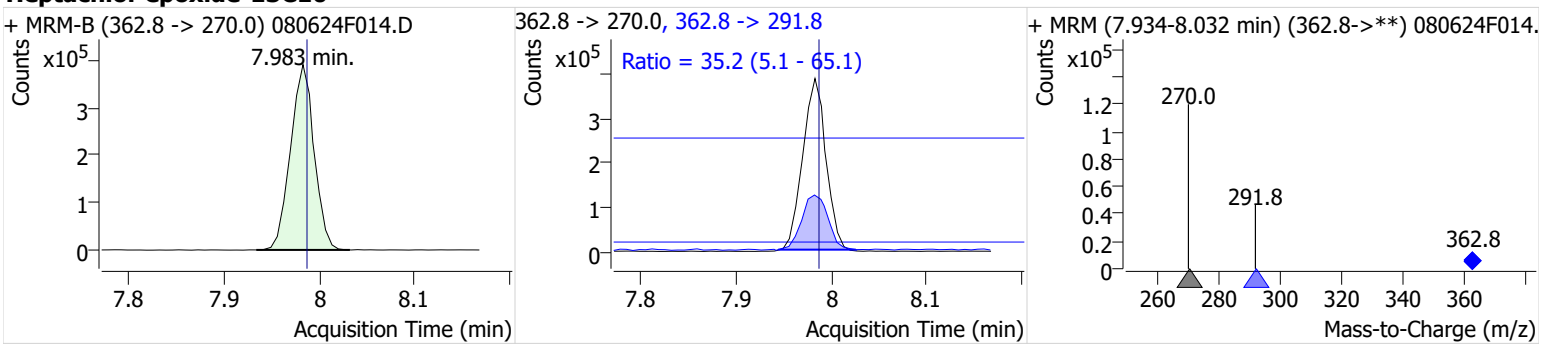


Oxychlordane-13C10



Heptachlor epoxide-13C10



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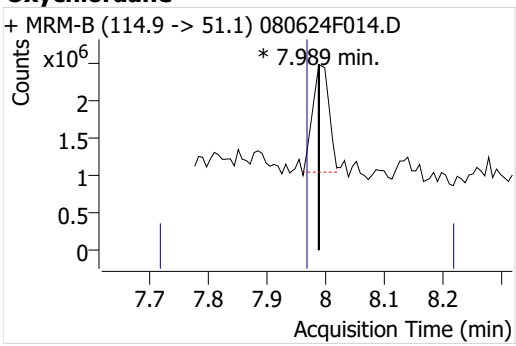
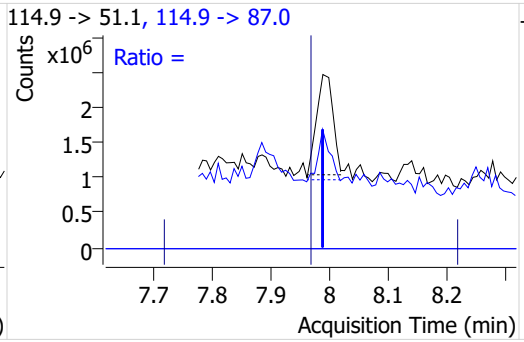
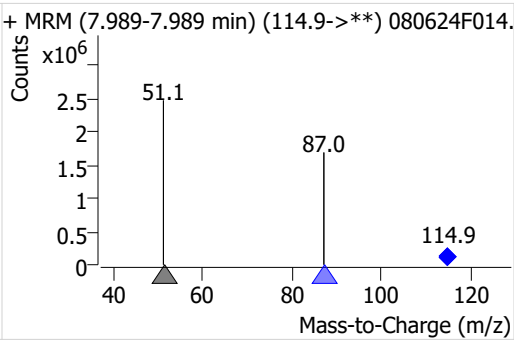
Oxychlordane







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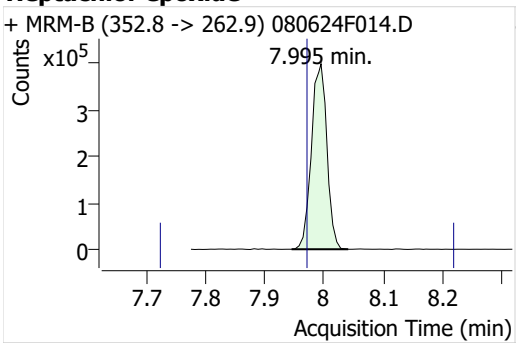
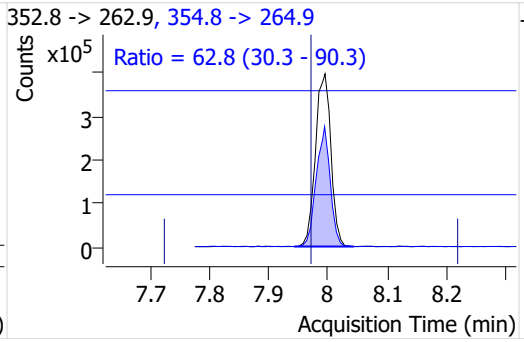
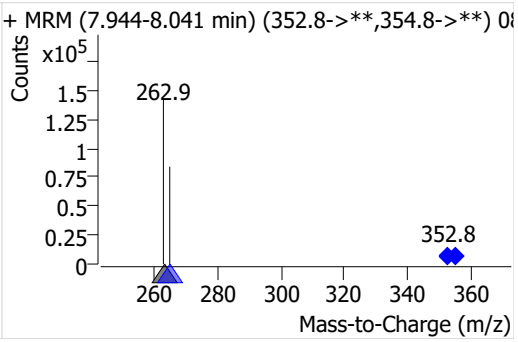
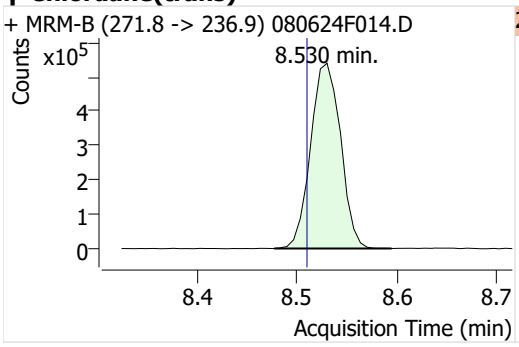
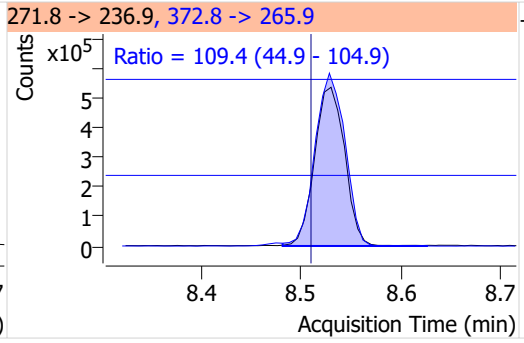


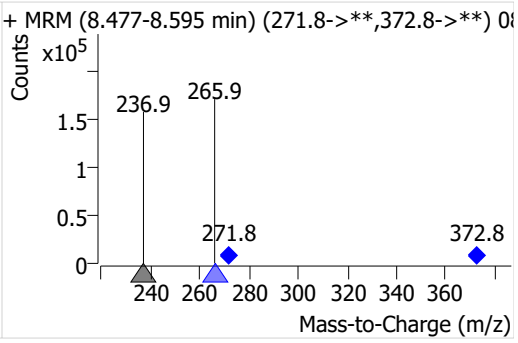




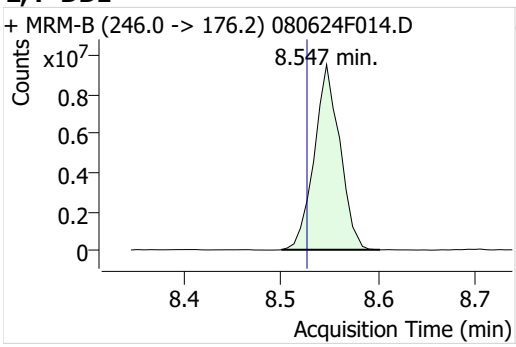
γ-Chlordane(trans)

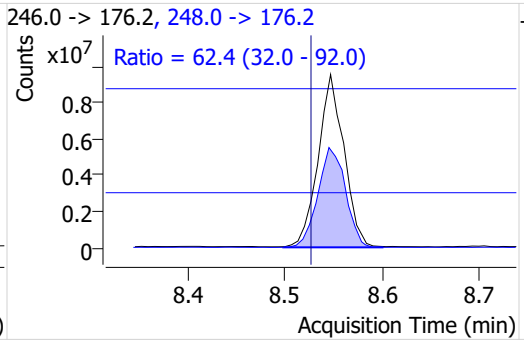


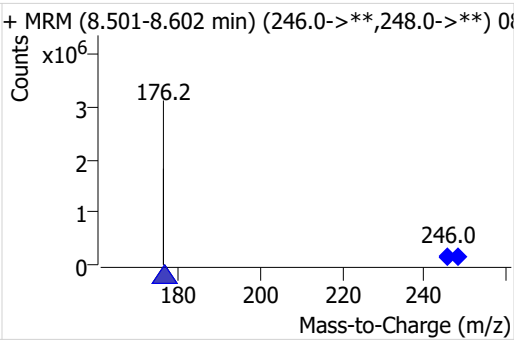




2,4'-DDE







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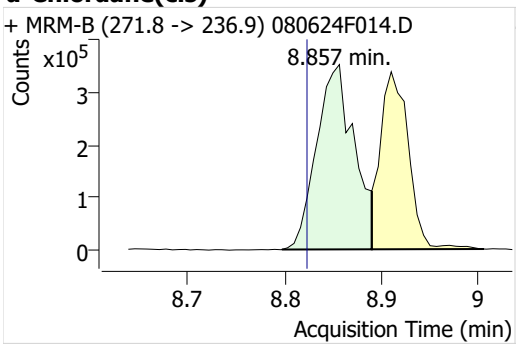
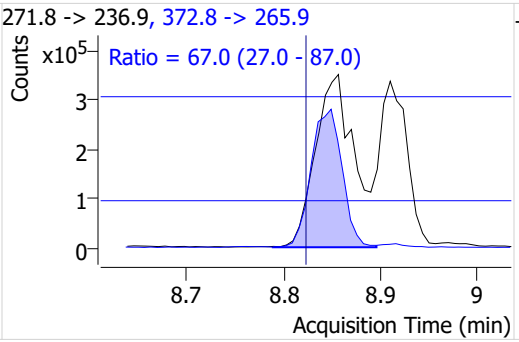
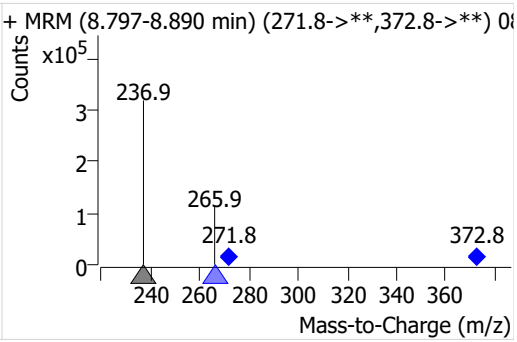
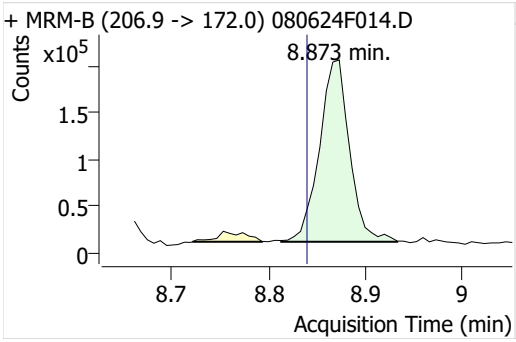
α-Chlordane(cis)

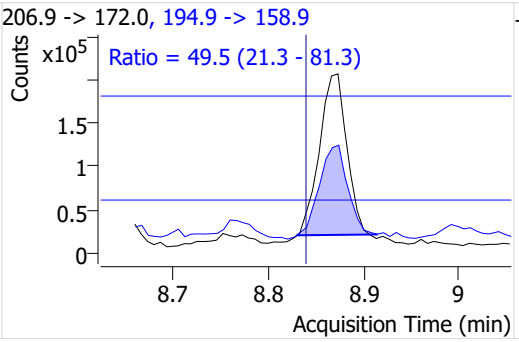


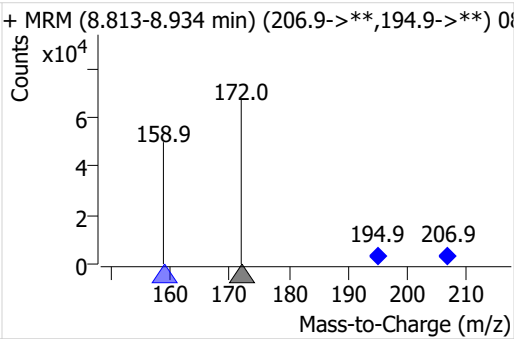




Endosulfan I







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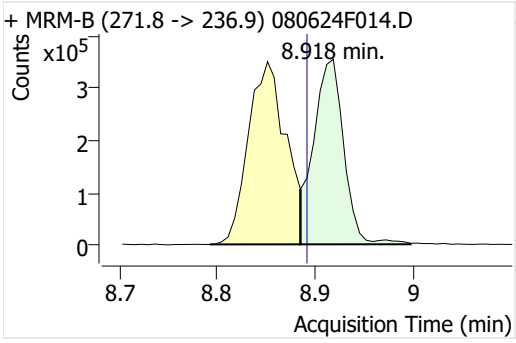
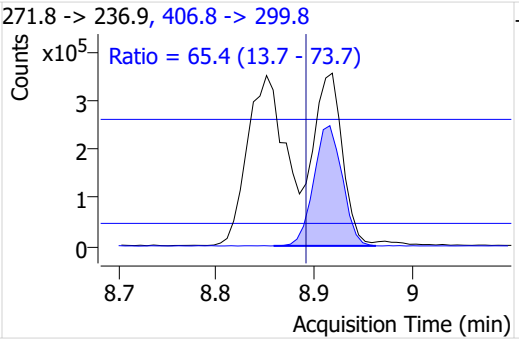
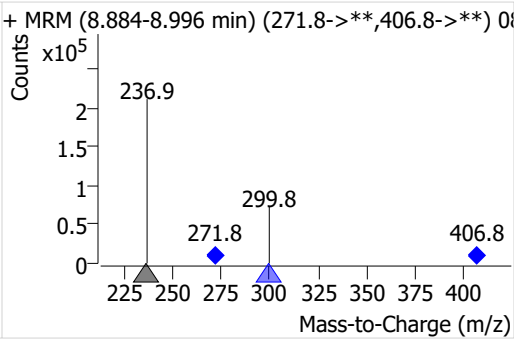
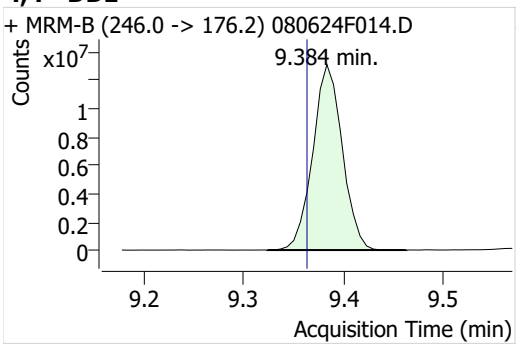
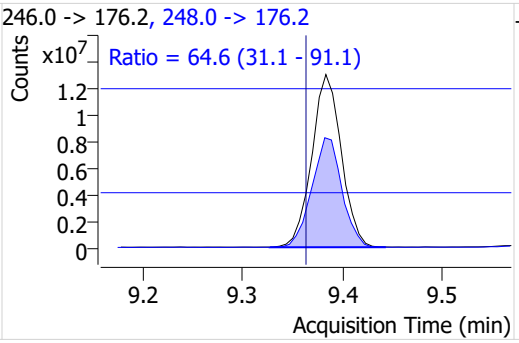


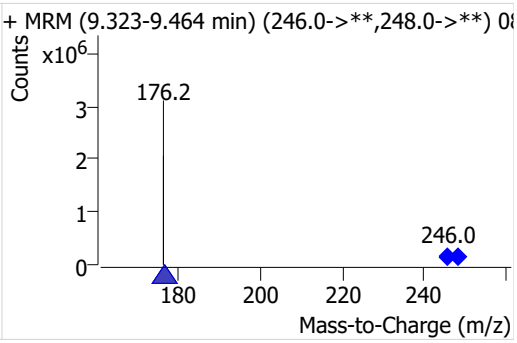




4,4' -DDE

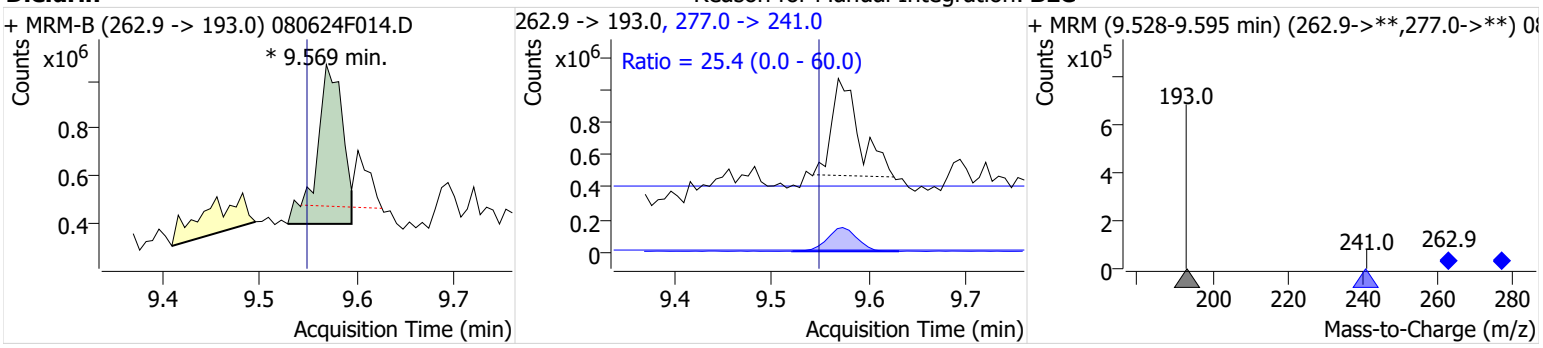




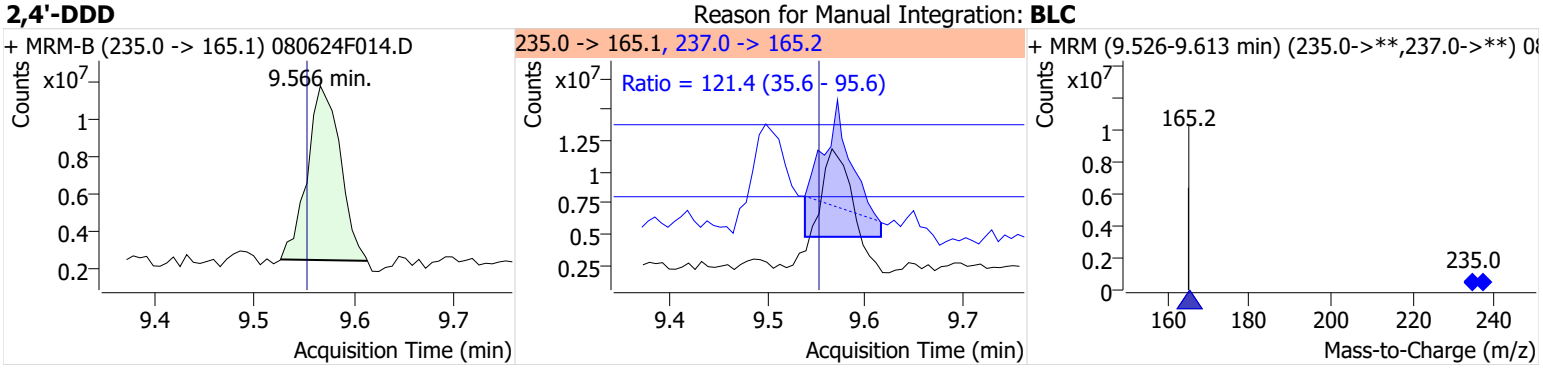


MassHunter Quantitative Analysis Sample Report

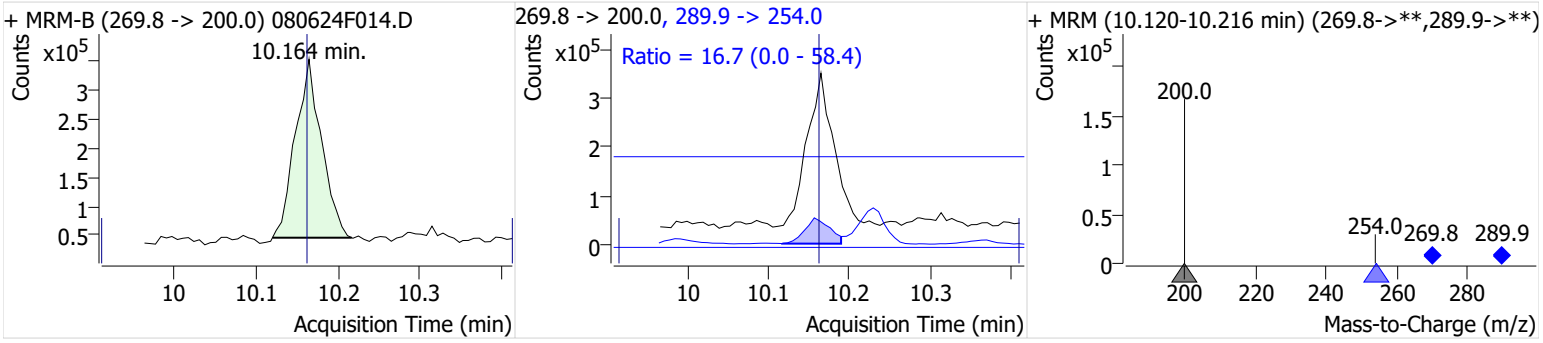
Dieldrin Reason for Manual Integration: **BLC**



2,4'-DDD Reason for Manual Integration: **BLC**



Endrin-13C12



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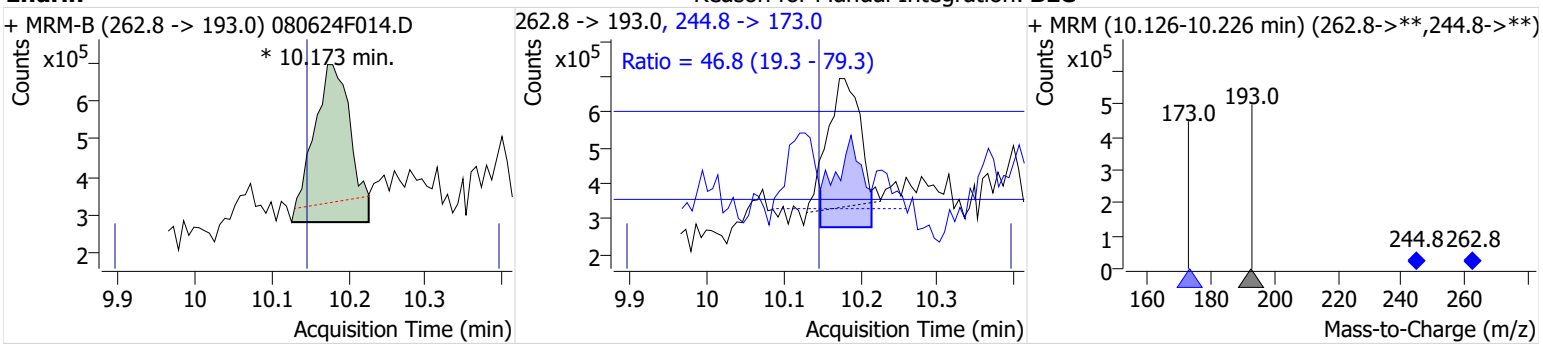

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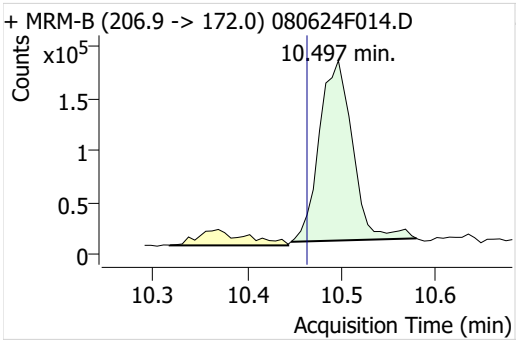
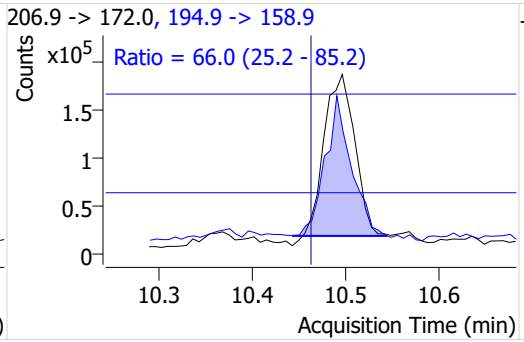
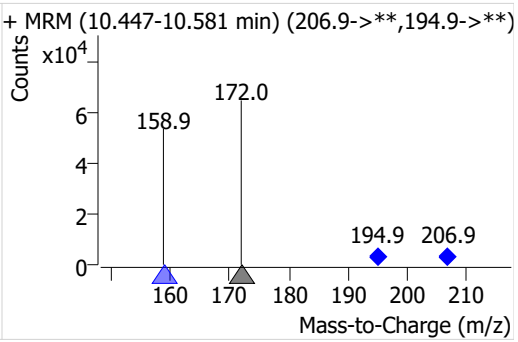
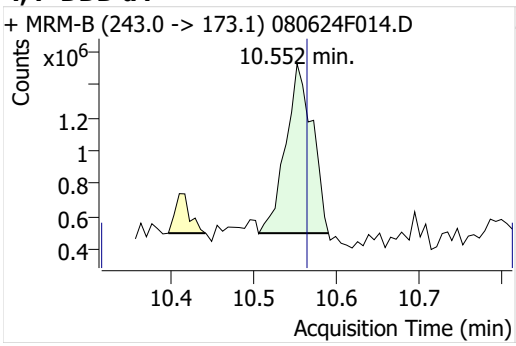
Endosulfan II

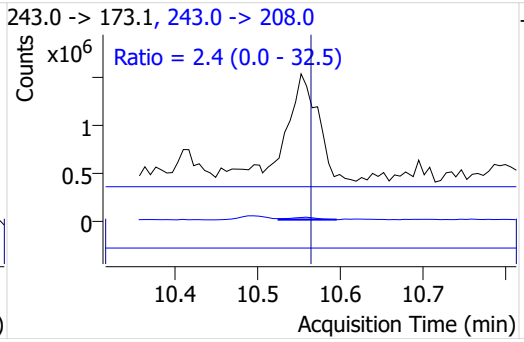


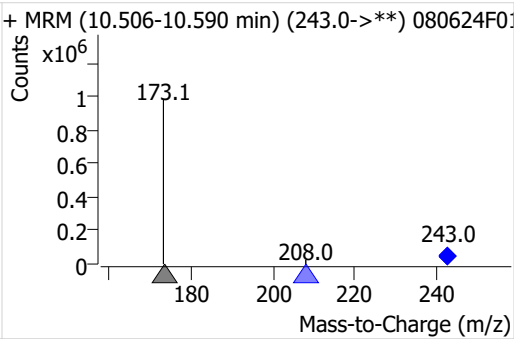




4,4'-DDD d4







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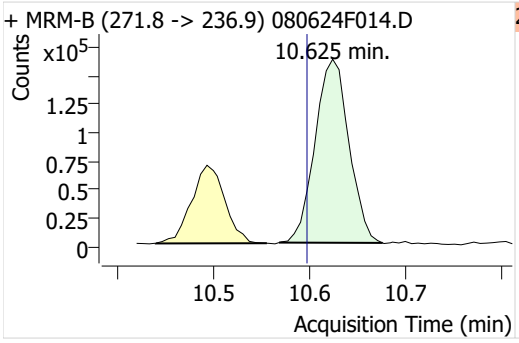
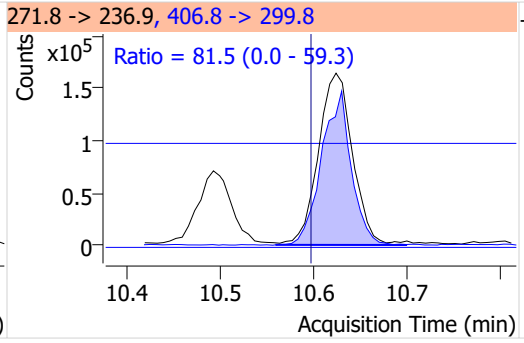
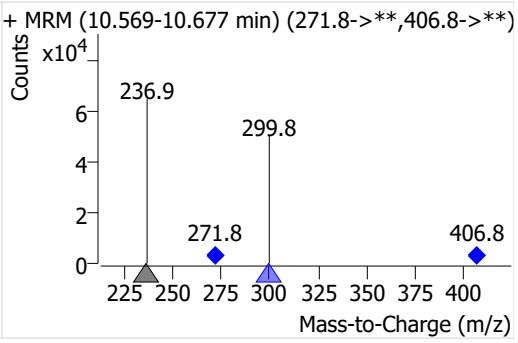
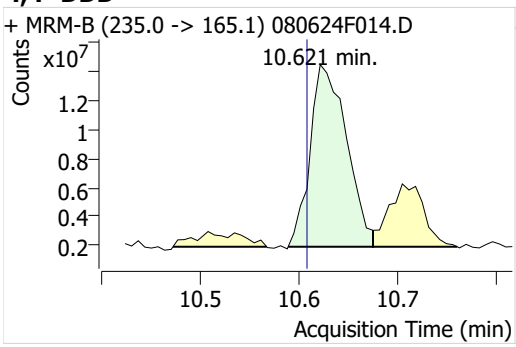
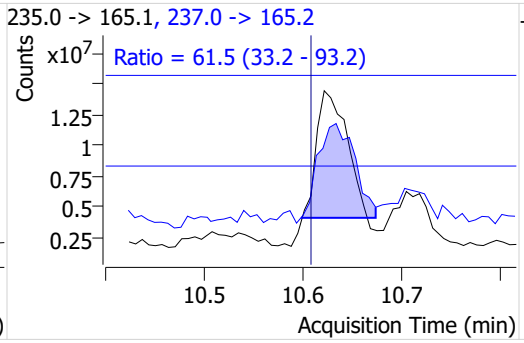


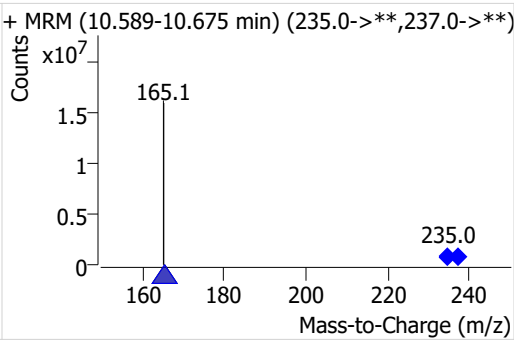




4,4'-DDD







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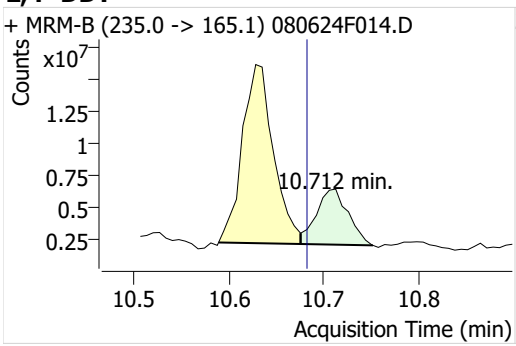
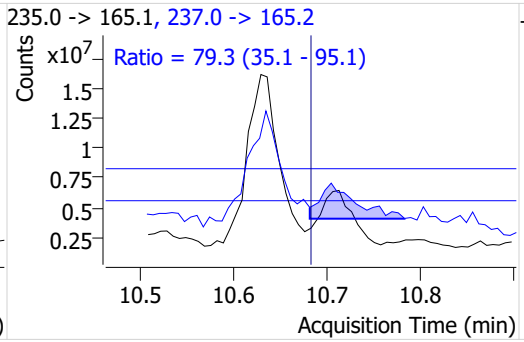
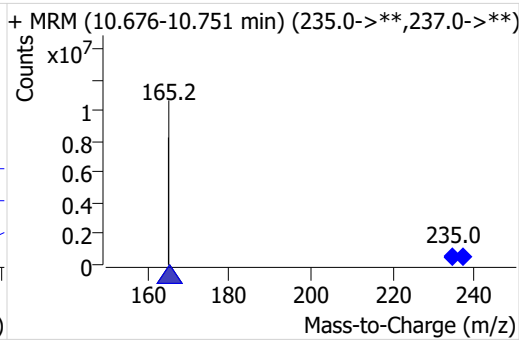
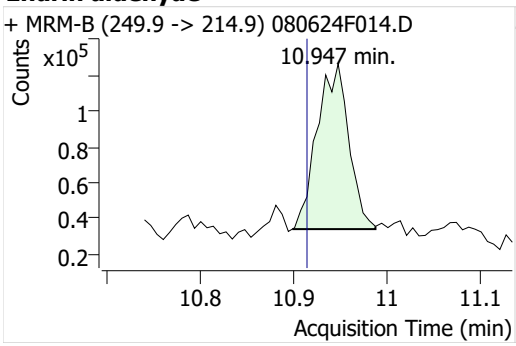
2,4'-DDT

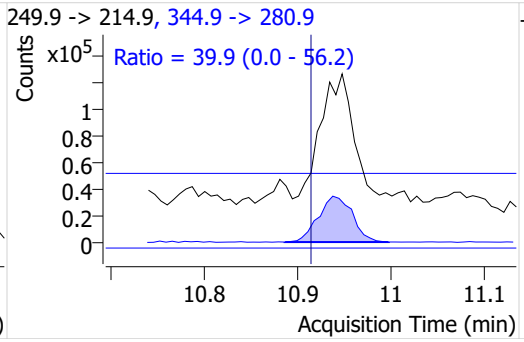


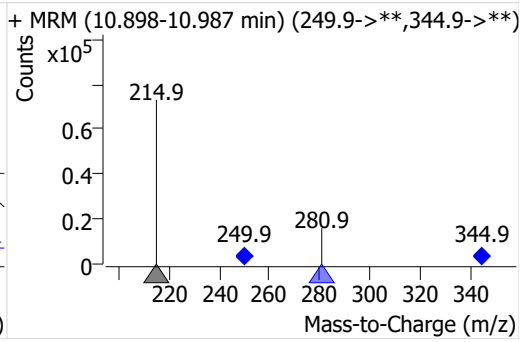




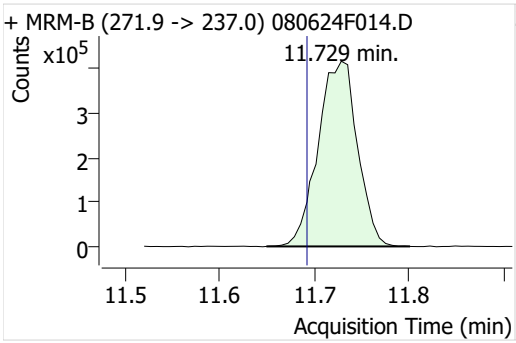
Endrin aldehyde

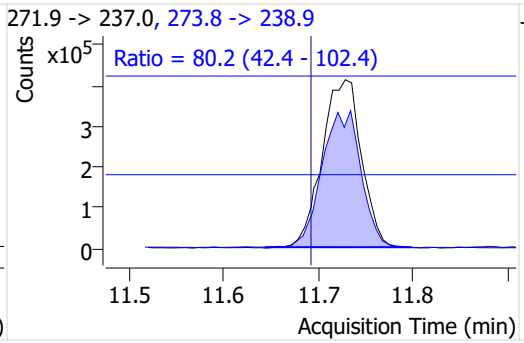


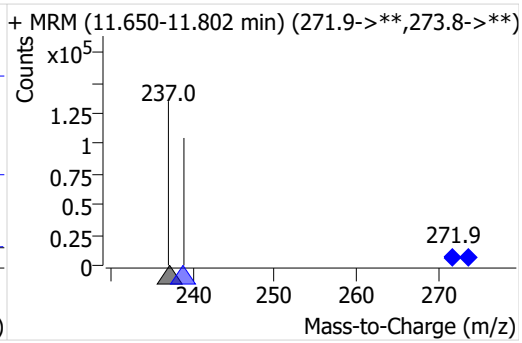




Endosulfan sulfate

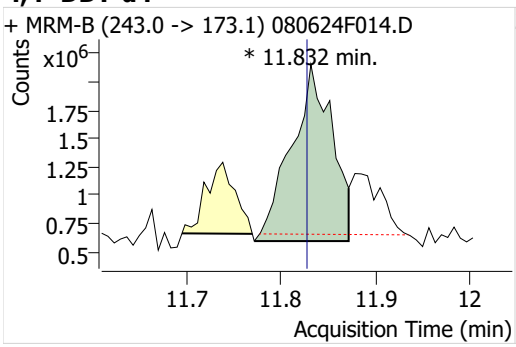


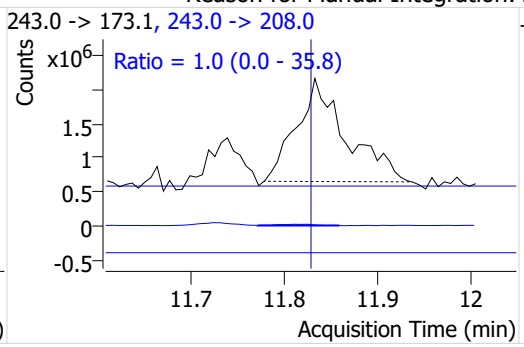


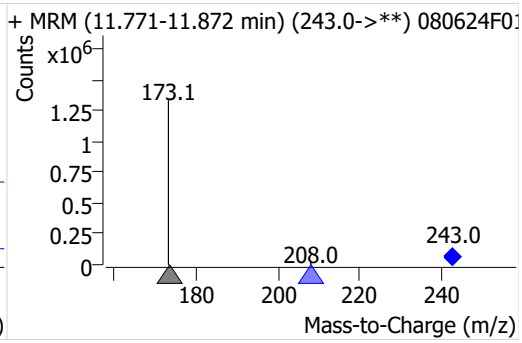


4,4'-DDT-d4

Reason for Manual Integration: **BLC**







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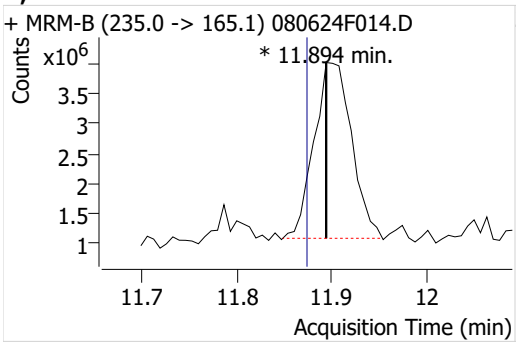
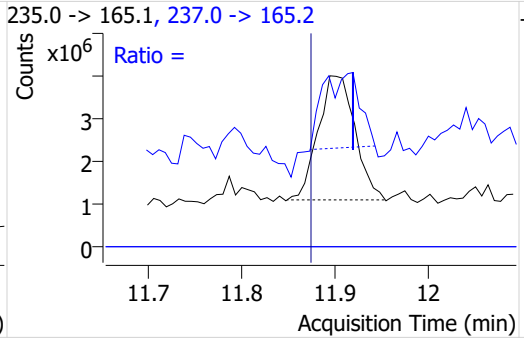
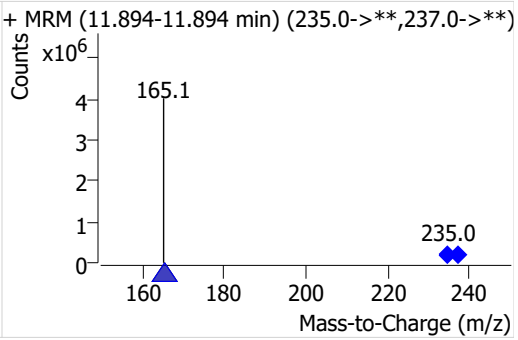
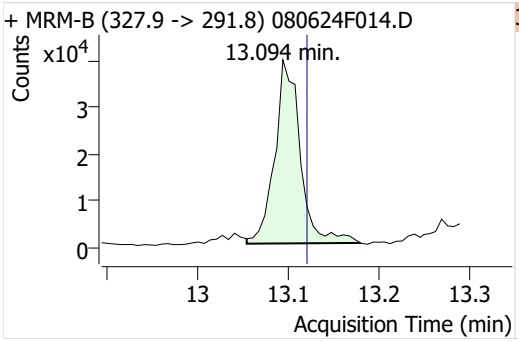
4,4'-DDT

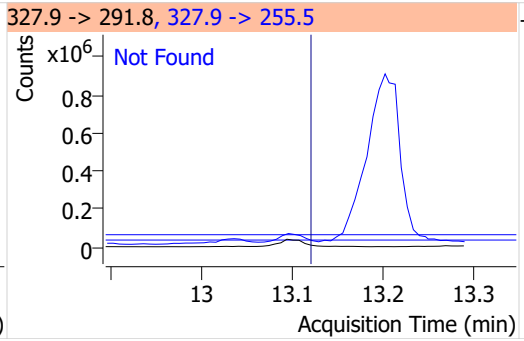


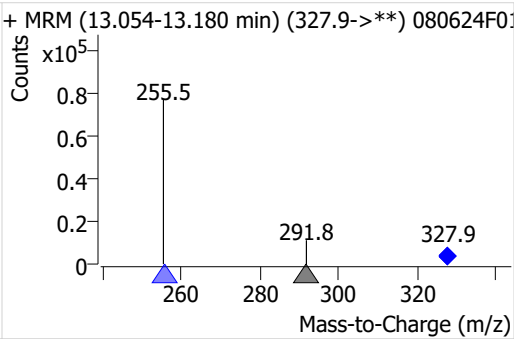




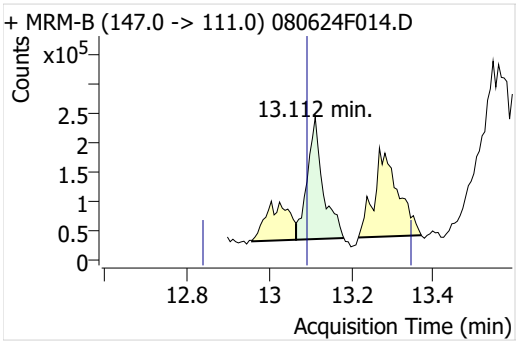
Endrin ketone-13C12

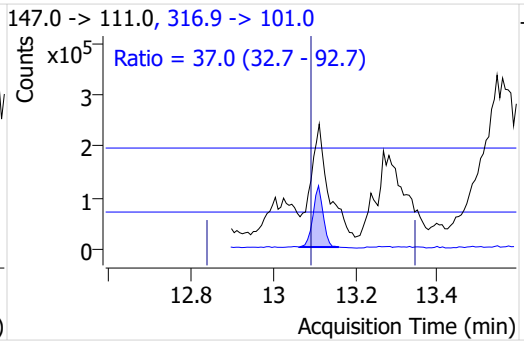


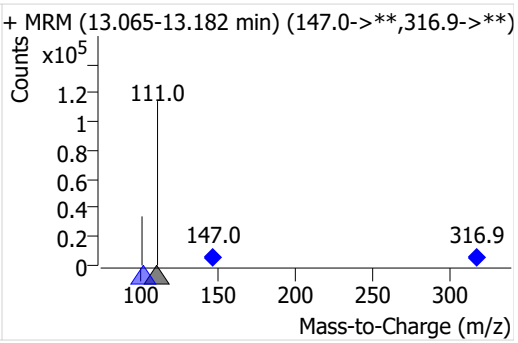




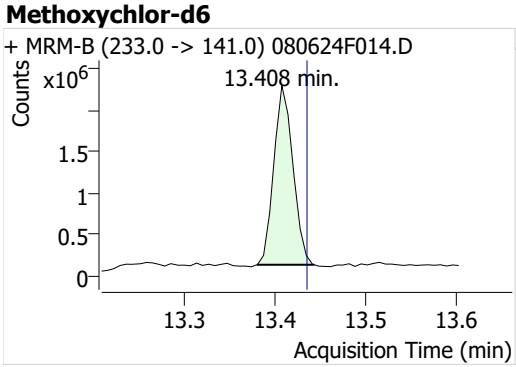
Endrin ketone

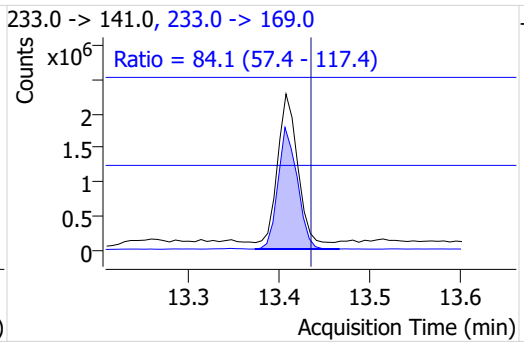


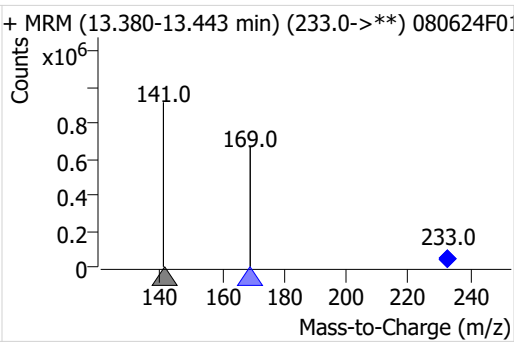




Methoxychlor-d6







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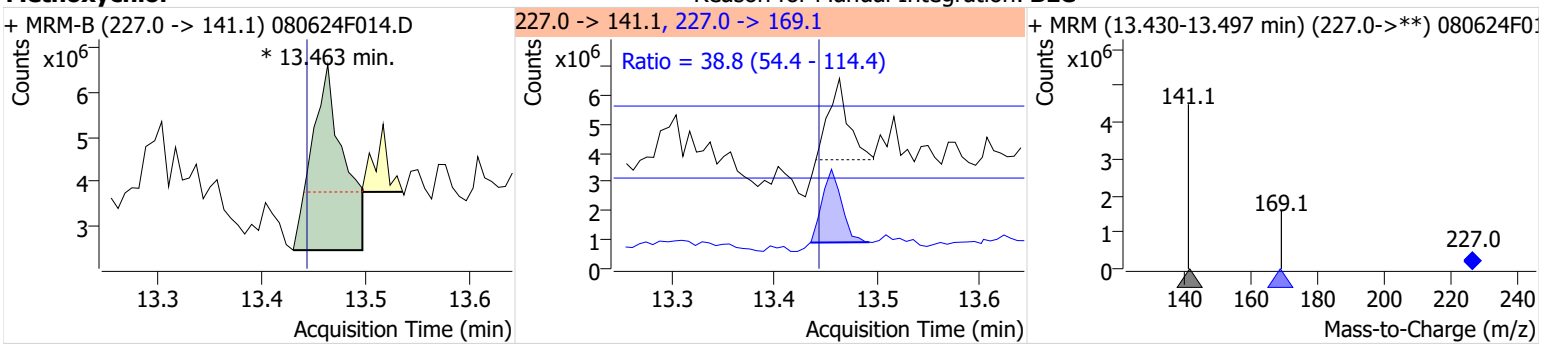
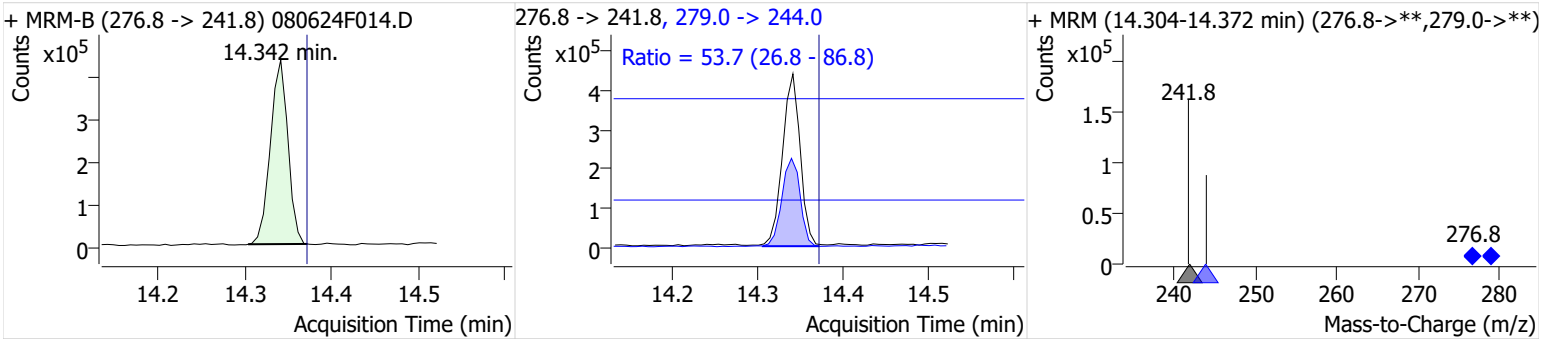
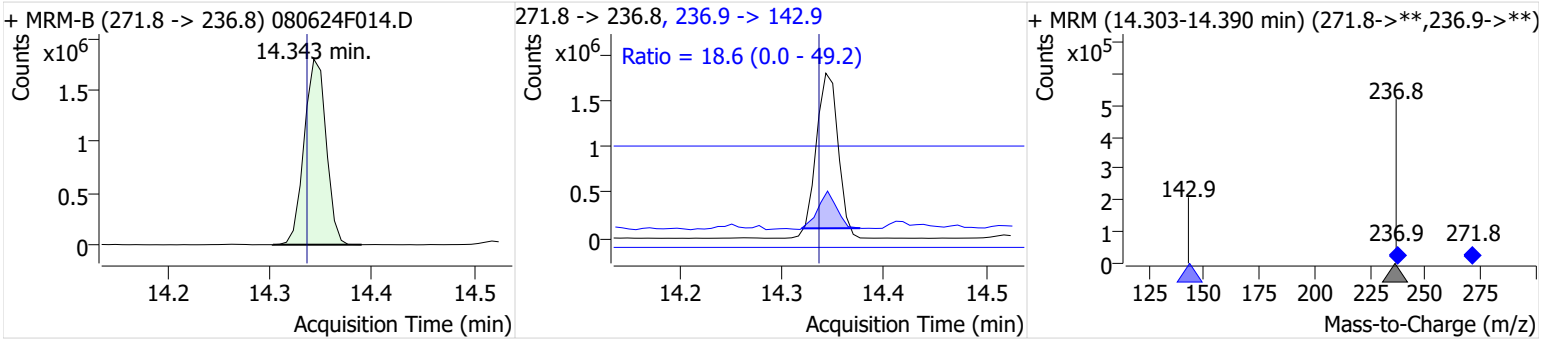
Methoxychlor Reason for Manual Integration: **BLC**



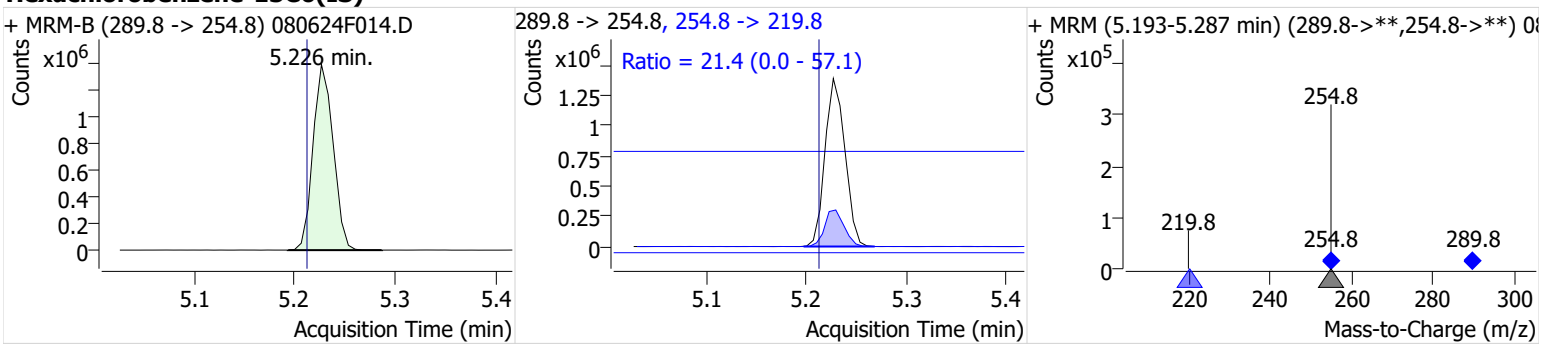
Mirex-13C10



Mirex



Hexachlorobenzene-13C6(IS)



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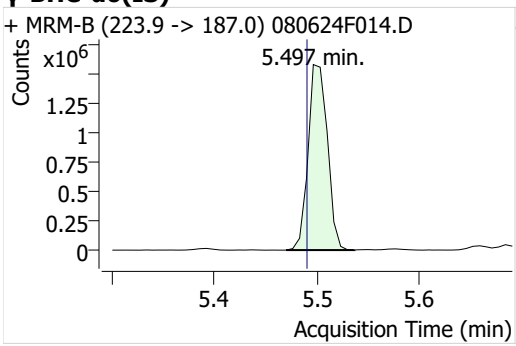
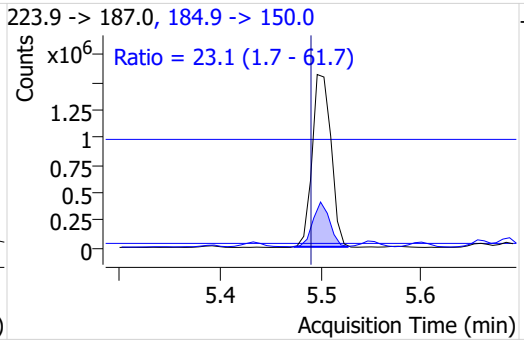
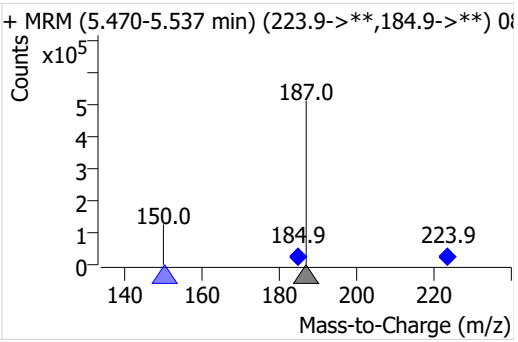
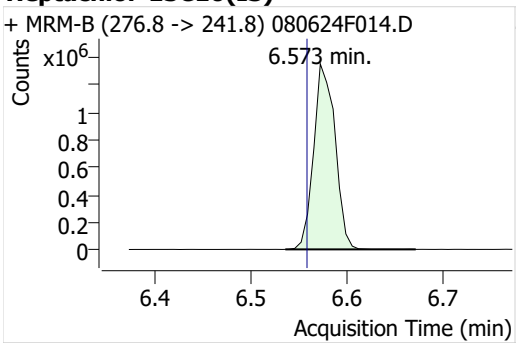
γ-BHC-d6(IS)

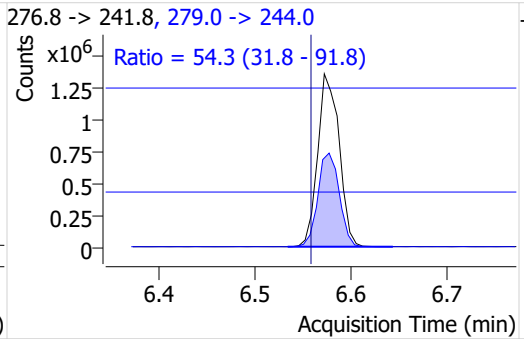


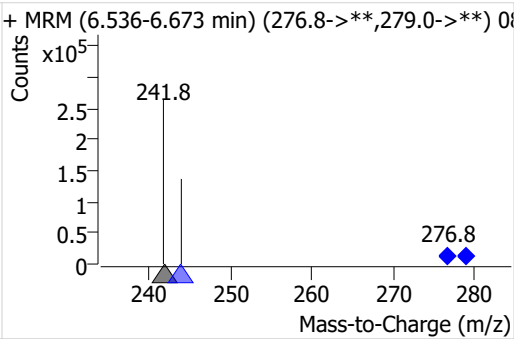




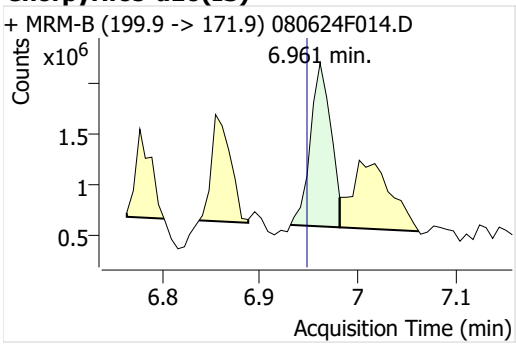
Heptachlor-13C10(IS)

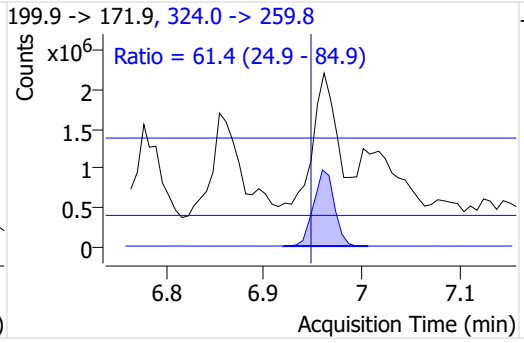


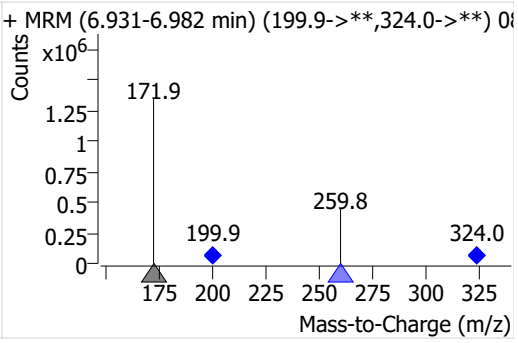




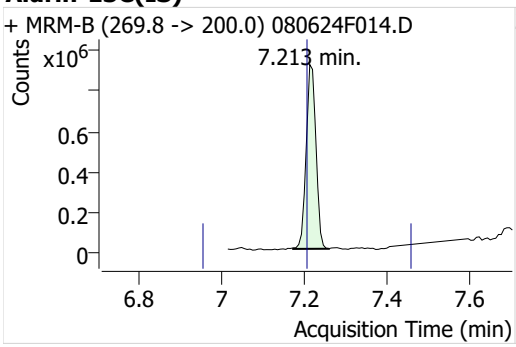
Chorpyrifos-d10(IS)

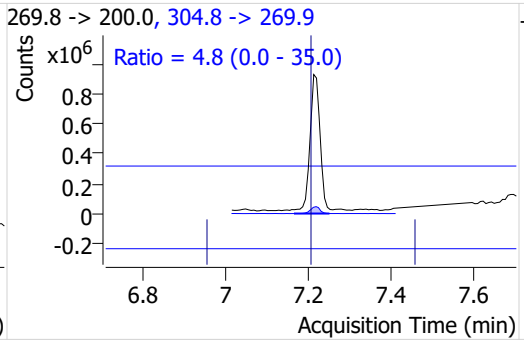


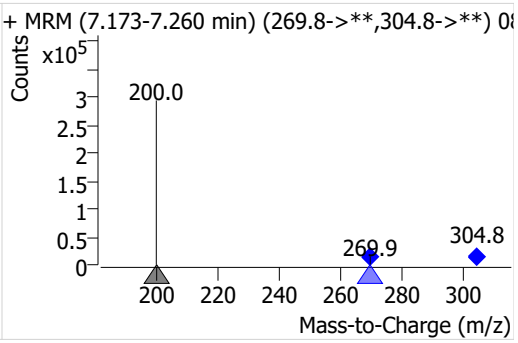




Aldrin-13C(IS)

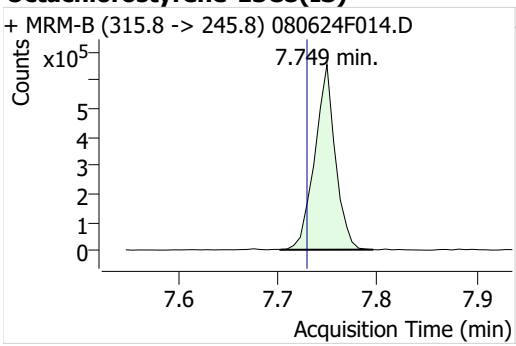


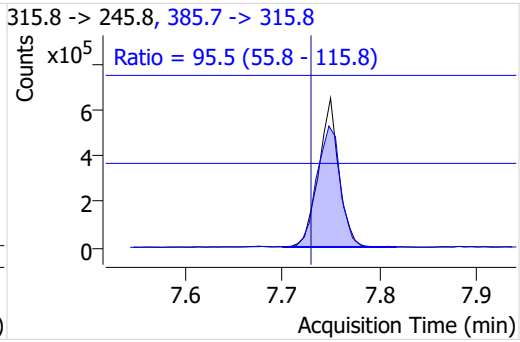


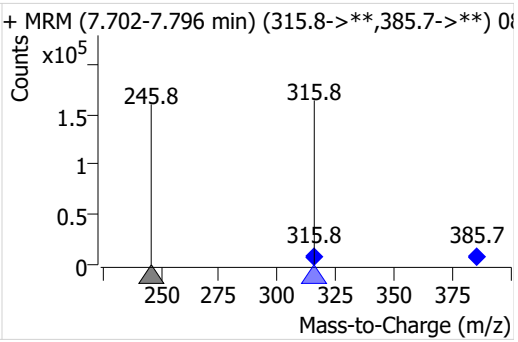


MassHunter Quantitative Analysis Sample Report

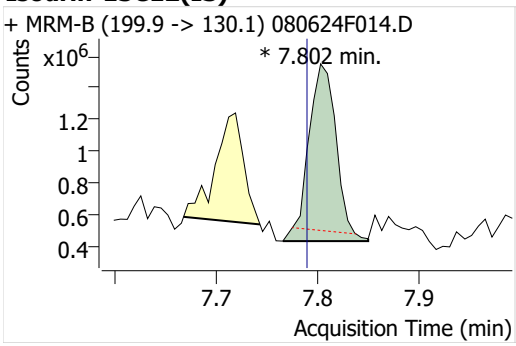
Octachlorostyrene-13C8(IS)

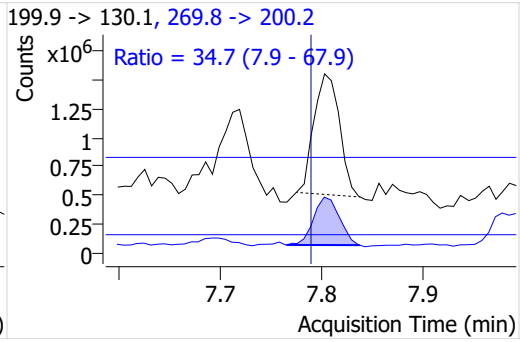


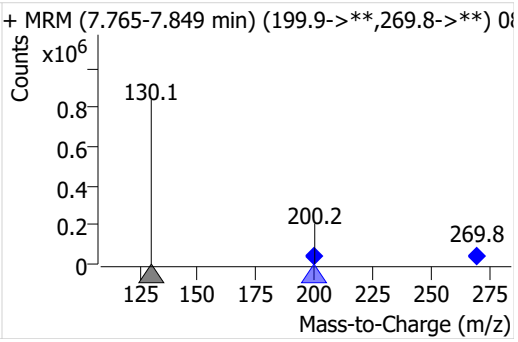




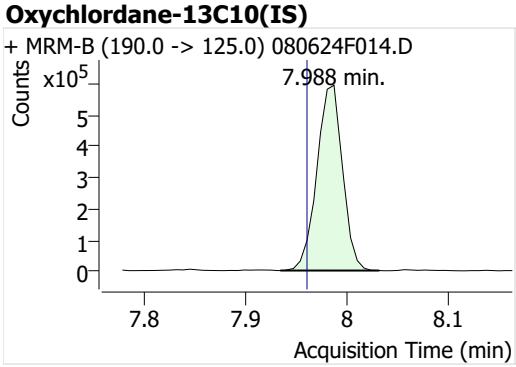
Isodrin-13C12(IS)

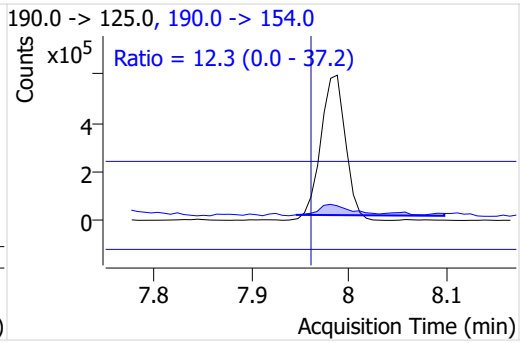


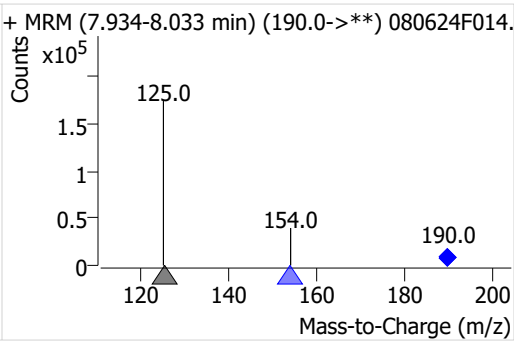




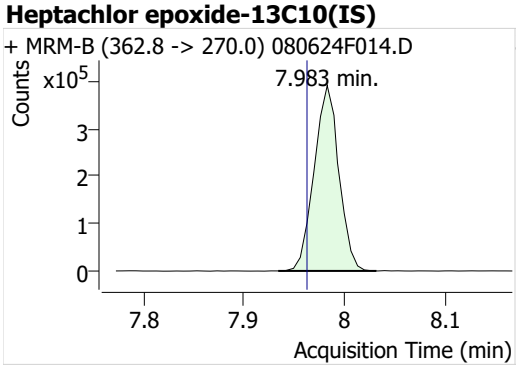
Oxychlordane-13C10(IS)

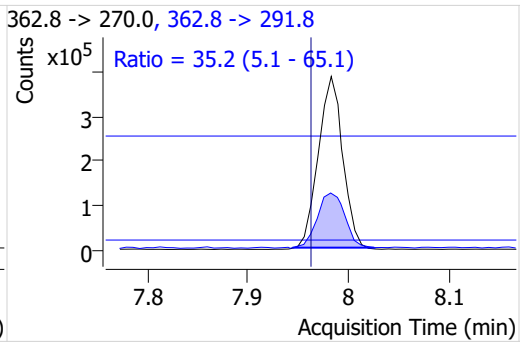


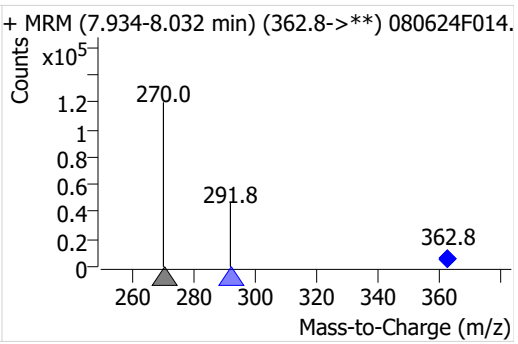




Heptachlor epoxide-13C10(IS)







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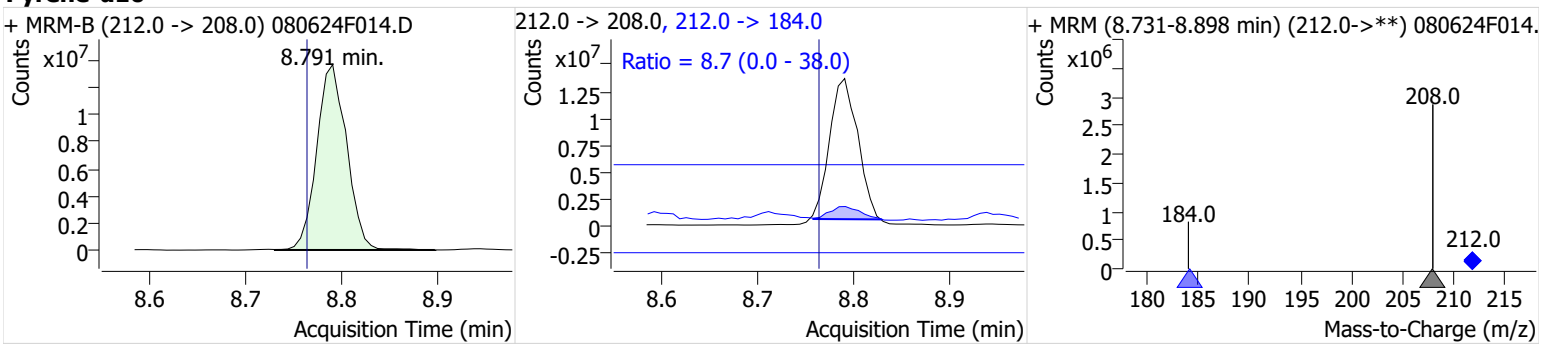
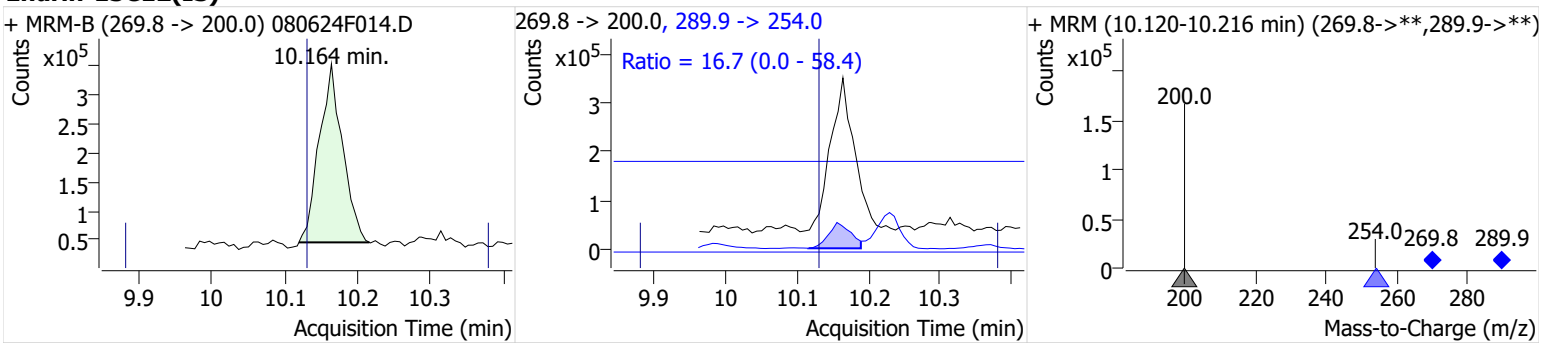
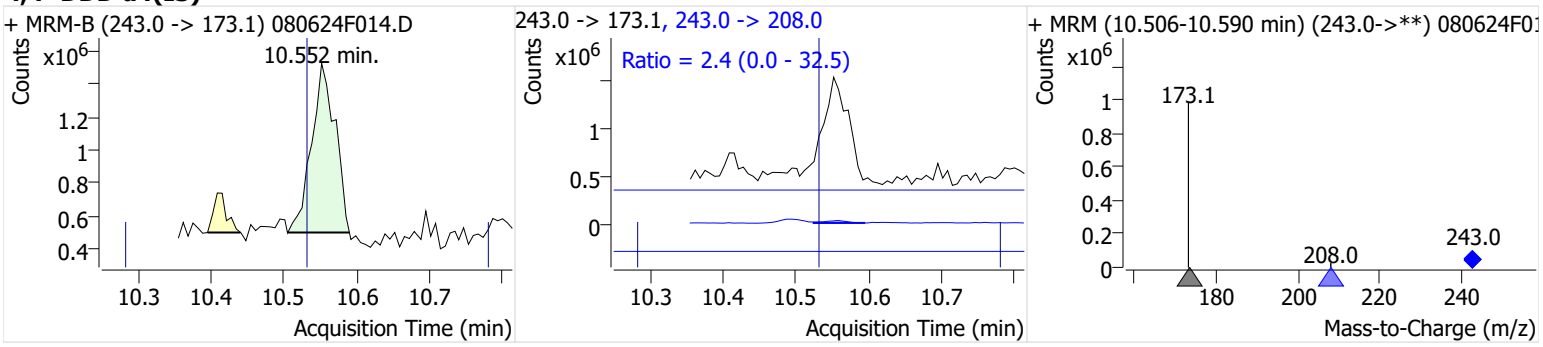
Pyrene-d10



Endrin-13C12(IS)



4,4'-DDD d4(IS)



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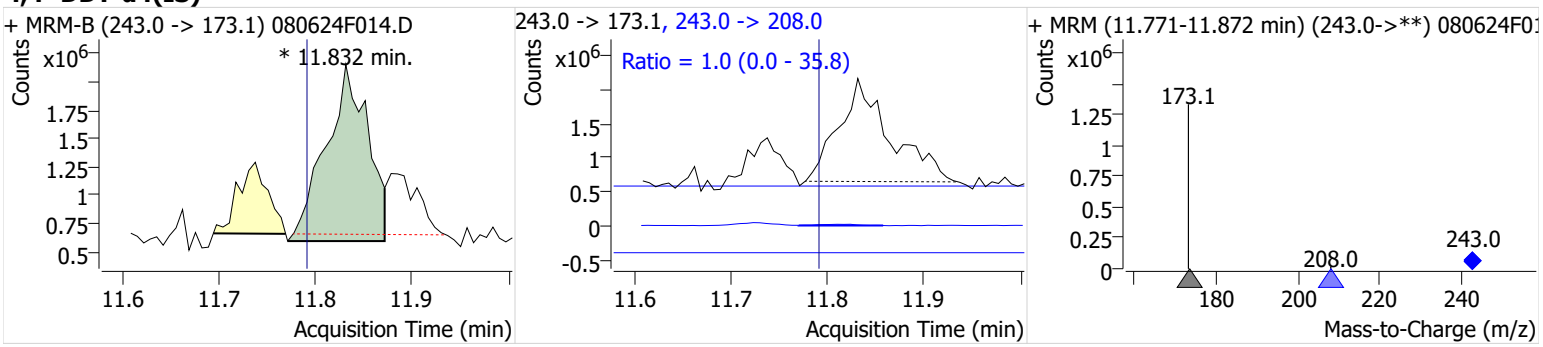

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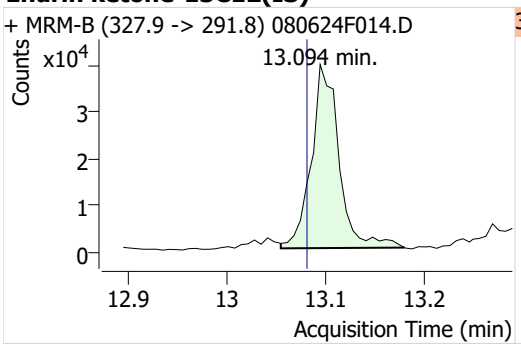
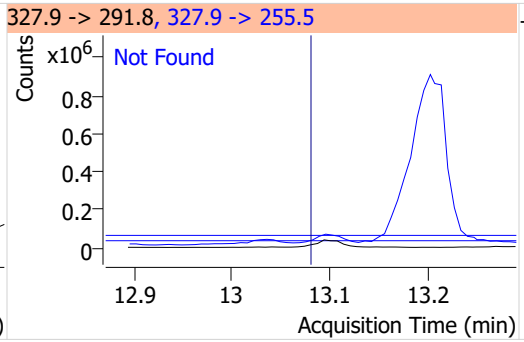
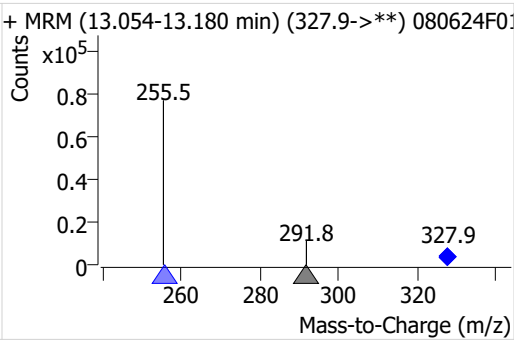
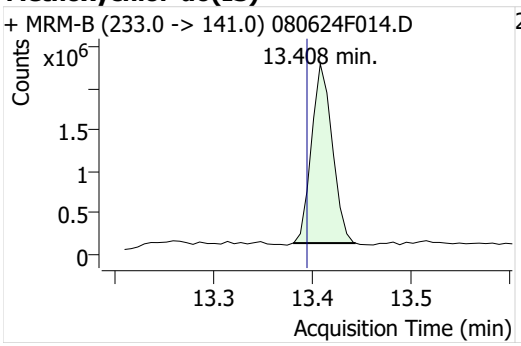
Endrin ketone-13C12(IS)

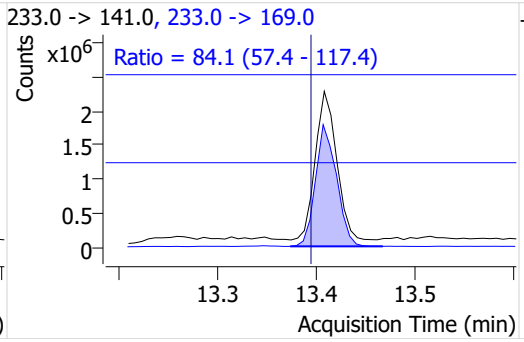


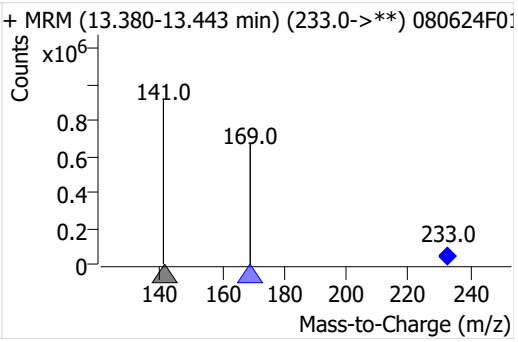




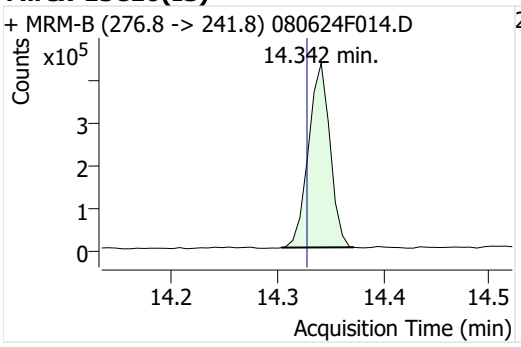
Methoxychlor-d6(IS)

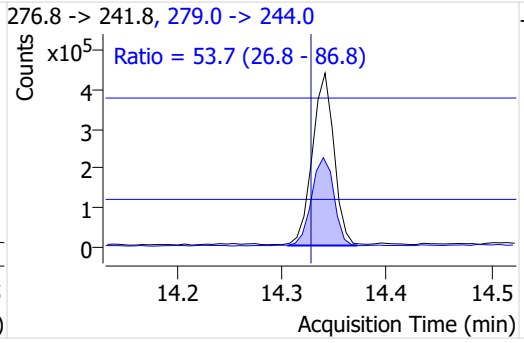


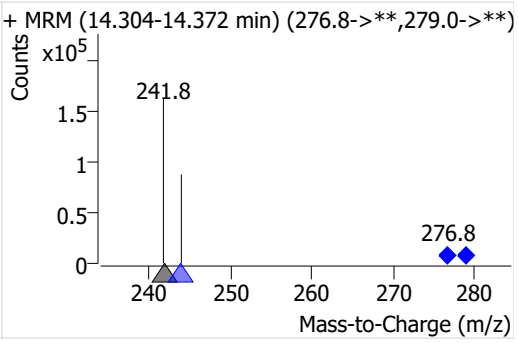




Mirex-13C10(IS)







1st 08/20/24
2nd 08/20/24

Validation Report

Data File: J:\MS42\Data\080624\080624F005.D
Lab ID: KQ2412943-01
RunType: CCV
Matrix: Sediment

Date Acquired: 8/6/24 10:25
Batch ID: 851162
Analysis Method: 1699M/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Internal Standards	X	

Primary Review: _____

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Secondary Review: _____

1st 08/20/24
2nd 08/20/24

Validation Report

Data File: J:\MS42\Data\080624\080624F005.D
Lab ID: KQ2412943-01
RunType: CCV
Matrix: Sediment

Date Acquired: 8/6/24 10:25
Batch ID: 851162
Analysis Method: ALS SOP/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Internal Standards	X	

Primary Review: _____

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Secondary Review: _____

1st 08/20/24
2nd 08/20/24

Quantitation Report

Data File:	J:\MS42\Data\080624\080624F005.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 10:25	**Vial:**	2
Run Type:	CCV	**Dilution:**	1
Lab ID:	KQ2412943-01	**Raw Units:**	ng/ml

Bottle ID:		**Tier:**	II	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	7/22/24	**Receive Date:**	7/26/24

Analysis Lot:	851162	**Prep Lot:**		**Report Group:**	KQ2412943
Analysis	ALS SOP	**Prep Method:**			
		Prep Date:			

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400368
		Report List ID:	24064

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	8.778		24454030.434	100	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
S_Aldrin-13C12	7.207		2310186.351	16.984	Y
S_4,4'DDD-d4	10.539		2405020.940	4.645	Y
S_4,4'-DDT-d4	11.805		1823556.564	5.719	Y
S_Endrin-13C12	10.144		397855.618	19.083	Y
S_Endrinket13C12	13.087		87523.938	19.889	Y
S_GBHCD6	5.497		5386285.865	17.213	Y
S_Heptachlor-13C10	6.573		3087464.925	17.175	Y
S_Oxychlordane-13C10	7.967		1457834.172	16.865	Y

Target Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
Aldrin	7.216		1302742.848	20.268	Y
beta-BHC	5.408		5310914.236	20.882	Y
gamma-BHC (Lindane)	5.543		5745934.720	17.693	Y
cis-Chlordane	8.837		1777794.812	19.188	Y
trans-Chlordane	8.510		1622162.082	21.177	Y
2,4'-DDD	9.560		14948576.428	21.647	Y
4,4'-DDD	10.621		10829751.235	21.270	Y
2,4'-DDE	8.534		15874617.913	18.467	Y
4,4'-DDE	9.377		12468610.047	20.362	Y
2,4'-DDT	10.692		10163198.756	19.036	Y
4,4'-DDT	11.881		7830160.892	18.972	Y
Dieldrin	9.562		915713.422	20.649	Y

1st 08/20/24

2nd 08/20/24

Data File:	J:\MS42\Data\080624\080624F005.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 10:25	**Vial:**	2
Run Type:	CCV	**Dilution:**	1
Lab ID:	KQ2412943-01	**Raw Units:**	ng/ml

Target Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
Endrin Ketone	13.092		440103.524	22.402	Y
Heptachlor	6.576		3636938.995	21.892	Y
cis-Nonachlor	10.618		1164054.521	20.545	Y
trans-Nonachlor	8.898		1239930.355	18.813	Y
Oxychlordane	7.975		4467381.681	23.714	Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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1st 08/20/24
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Quantitation Report

Data File:	J:\MS42\Data\080624\080624F005.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 10:25	**Vial:**	1
Run Type:	CCV	**Dilution:**	1
Lab ID:	KQ2412943-01	**Raw Units:**	ng/ml

Bottle ID:		**Tier:**	II	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	7/22/24	**Receive Date:**	7/26/24

Analysis Lot:	851162	**Prep Lot:**		**Report Group:**	KQ2412943
Analysis	1699M	**Prep Method:**			
		Prep Date:			

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400368
		Report List ID:	25424

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	8.778		24454030.434	100	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
S_Aldrin-13C12	7.207		2310186.351	16.984	Y
S_4,4'DDD-d4	10.539		2405020.940	4.645	Y
S_4,4'-DDT-d4	11.805		1823556.564	5.719	Y
S_Endrin-13C12	10.144		397855.618	19.083	Y
S_GBHCD6	5.497		5386285.865	17.213	Y
S_Oxychlordane-13C10	7.967		1457834.172	16.865	Y

Target Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
Aldrin	7.216		1302742.848	20.268	Y
gamma-BHC (Lindane)	5.543		5745934.720	17.693	Y
cis-Chlordane	8.837		1777794.812	19.188	Y
trans-Chlordane	8.510		1622162.082	21.177	Y
2,4'-DDD	9.560		14948576.428	21.647	Y
4,4'-DDD	10.621		10829751.235	21.270	Y
2,4'-DDE	8.534		15874617.913	18.467	Y
4,4'-DDE	9.377		12468610.047	20.362	Y
2,4'-DDT	10.692		10163198.756	19.036	Y
4,4'-DDT	11.881		7830160.892	18.972	Y
Dieldrin	9.562		915713.422	20.649	Y
cis-Nonachlor	10.618		1164054.521	20.545	Y
trans-Nonachlor	8.898		1239930.355	18.813	Y
Oxychlordane	7.975		4467381.681	23.714	Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
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D: Result from dilution
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d: Compound manually deleted
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*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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1st 08/20/24

2nd 08/20/24

Data File:	J:\MS42\Data\080624\080624F005.D	**Instrument:**	K-MS-42
Acqu Date:	8/6/24 10:25	**Vial:**	1
Run Type:	CCV	**Dilution:**	1
Lab ID:	KQ2412943-01	**Raw Units:**	ng/ml

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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MassHunter Quantitative Analysis Sample Report

Data File	J:\MS42\Data\080624\080624F005.D		
Batch File	J:\MS42\Data\080624\QuantResults\080624 OC PEST.batch.bin		
Acq. Date-Time	8/6/2024 10:25:34 AM	**Acq Operator**	EBruno
Name	OC PEST CCV 20ppb SVM71-93A	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	8/19/2024 3:52:05 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	072424 OC PEST ICAL.batch.bin	**Vial**	1
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.220	289.8 -> 254.8	4761205	20.0000 ng/ml	0.006
γ-BHC-d6(IS)	5.497	223.9 -> 187.0	5386286	20.0000 ng/ml	0.005
Heptachlor-13C10(IS)	6.573	276.8 -> 241.8	3087465	20.0000 ng/ml	0.013
Chorpyrifos-d10(IS)	6.955	199.9 -> 171.9	1911011	20.0000 ng/ml	0.006
Aldrin-13C(IS)	7.207	269.8 -> 200.0	2312387	20.0000 ng/ml	0.003
Octachlorostyrene-13C8(IS)	7.736	315.8 -> 245.8	2000834	20.0000 ng/ml	0.006
Isodrin-13C12(IS)	7.796	199.9 -> 130.1	2421604	20.0000 ng/ml	0.007
Oxychlordane-13C10(IS)	7.967	190.0 -> 125.0	1457834	20.0000 ng/ml	0.006
Heptachlor epoxide-13C10(IS)	7.976	362.8 -> 270.0	794210	20.0000 ng/ml	0.010
Pyrene-d10	8.778	212.0 -> 208.0	24454030	100.0000 ng/ml	0.014
Endrin-13C12(IS)	10.144	269.8 -> 200.0	397856	20.0000 ng/ml	0.016
4,4'-DDD d4(IS)	10.539	243.0 -> 173.1	2405021	5.0000 ng/ml	0.010
4,4'-DDT-d4(IS)	11.805	243.0 -> 173.1	1823557	5.0000 ng/ml	0.013
Endrin ketone-13C12(IS)	13.087	327.9 -> 291.8	87524	20.0000 ng/ml	0.008
Methoxychlor-d6(IS)	13.401	233.0 -> 141.0	3512898	20.0000 ng/ml	0.010
Mirex-13C10(IS)	14.335	276.8 -> 241.8	1827876	5.0000 ng/ml	0.006

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	4761205	15.419 ng/ml	
		Spiked Amount =	20.0	Recovery =	*77.1 %*
γ-BHC-d6	5.491	223.9 -> 187.0	5386286	17.213 ng/ml	
		Spiked Amount =	20.0	Recovery =	*86.1 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	3087465	17.175 ng/ml	
		Spiked Amount =	20.0	Recovery =	*85.9 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	1911011	24.804 ng/ml	
		Spiked Amount =	20.0	Recovery =	*124.0 %*
Aldrin-13C	7.207	269.8 -> 200.0	2310186	16.984 ng/ml	
		Spiked Amount =	20.0	Recovery =	*84.9 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	2000834	16.321 ng/ml	
		Spiked Amount =	20.0	Recovery =	*81.6 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2421604	16.612 ng/ml	
		Spiked Amount =	20.0	Recovery =	*83.1 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1457834	16.865 ng/ml	
		Spiked Amount =	20.0	Recovery =	*84.3 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	794210	16.232 ng/ml	
		Spiked Amount =	20.0	Recovery =	*81.2 %*
Endrin-13C12	10.131	269.8 -> 200.0	397856	19.083 ng/ml	
		Spiked Amount =	20.0	Recovery =	*95.4 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	2405021	4.645 ng/ml	
		Spiked Amount =	5.0	Recovery =	*92.9 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1823557	5.719 ng/ml	
		Spiked Amount =	5.0	Recovery =	*114.4 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	87524	19.889 ng/ml	
		Spiked Amount =	20.0	Recovery =	*99.4 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	3512898	19.866 ng/ml	
		Spiked Amount =	20.0	Recovery =	*99.3 %*

MassHunter Quantitative Analysis Sample Report

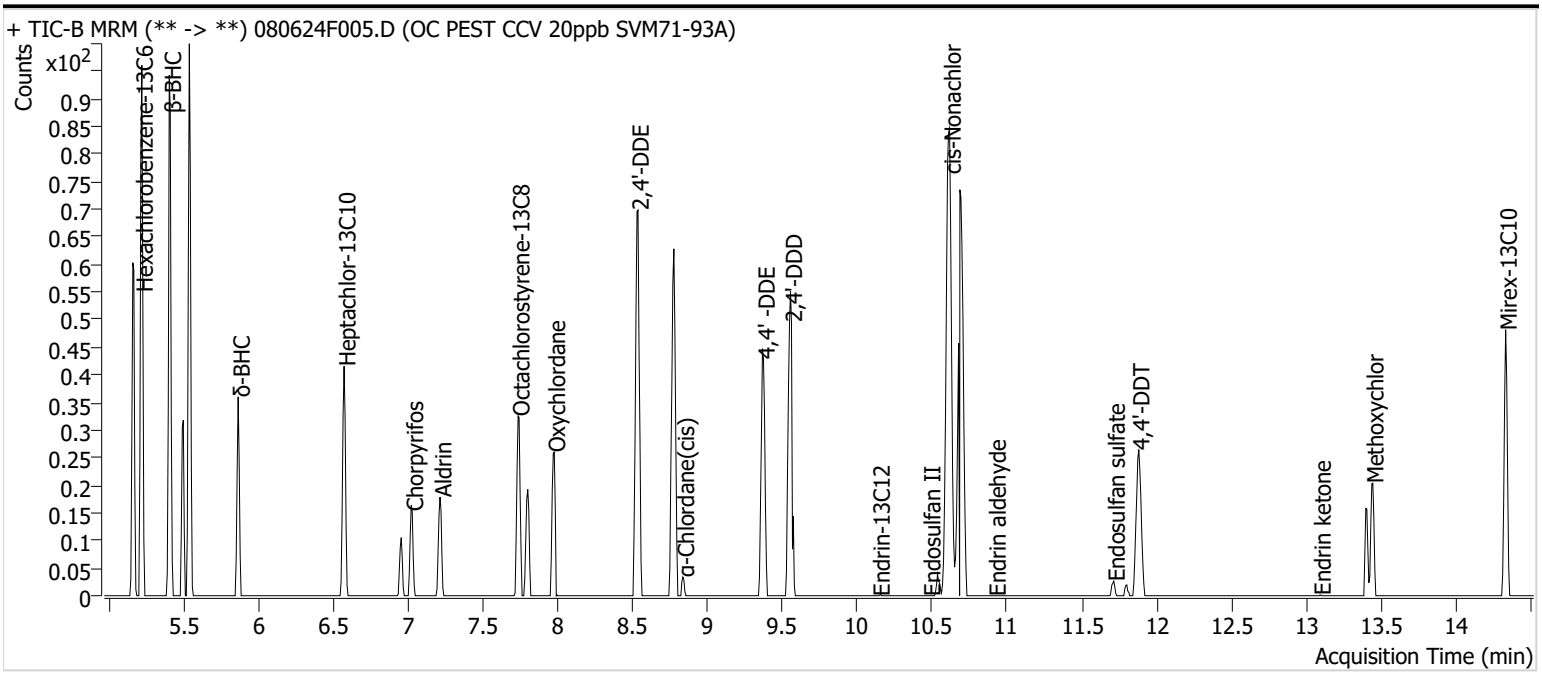
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	1827876	3.887 ng/ml
		Spiked Amount =	5.0	Recovery = *77.7 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.172	181.1 -> 145.1	7381246	19.438 ng/ml	93
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.221	283.8 -> 213.9	8354359	22.994 ng/ml	95
β-BHC	γ-BHC-d6(IS)	5.408	181.1 -> 145.1	5310914	20.882 ng/ml	99
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.543	181.1 -> 145.1	5745935	17.693 ng/ml	87
δ-BHC	γ-BHC-d6(IS)	5.867	181.1 -> 145.1	4622725	19.555 ng/ml	96
Heptachlor	Heptachlor-13C10(IS)	6.576	271.7 -> 236.9	3636939	21.892 ng/ml	93
Chorpyrifos	Chorpyrifos-d10(IS)	7.026	196.9 -> 169.0	2598459	19.978 ng/ml	99
Aldrin	Aldrin-13C(IS)	7.216	254.9 -> 220.0	1302743	20.268 ng/ml	89
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.742	342.8 -> 307.8	5467554	22.237 ng/ml	96
Isodrin	Isodrin-13C12(IS)	7.810	193.0 -> 123.0	2928306	23.026 ng/ml	98
Oxychlordane	Oxychlordane-13C10(IS)	7.975	114.9 -> 51.1	4467382	23.714 ng/ml	100
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.977	352.8 -> 262.9	953259	22.665 ng/ml	97
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.510	271.8 -> 236.9	1622162	21.177 ng/ml	81
2,4'-DDE	4,4'-DDD d4(IS)	8.534	246.0 -> 176.2	15874618	18.467 ng/ml	100
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.837	271.8 -> 236.9	1777795	19.188 ng/ml	92
Endosulfan I	Endrin-13C12(IS)	8.853	206.9 -> 172.0	677708	18.952 ng/ml	98
trans-Nanochlor	Oxychlordane-13C10(IS)	8.898	271.8 -> 236.9	1239930	18.813 ng/ml	89
4,4' -DDE	4,4'-DDD d4(IS)	9.377	246.0 -> 176.2	12468610	20.362 ng/ml	97
Dieldrin	Endrin-13C12(IS)	9.562	262.9 -> 193.0	915713	20.649 ng/ml	100
2,4'-DDD	4,4'-DDD d4(IS)	9.560	235.0 -> 165.1	14948576	21.647 ng/ml	89
Endrin	Endrin-13C12(IS)	10.159	262.8 -> 193.0	473434	19.257 ng/ml	89
Endosulfan II	Endrin-13C12(IS)	10.484	206.9 -> 172.0	344971	18.165 ng/ml	98
cis-Nonachlor	Oxychlordane-13C10(IS)	10.618	271.8 -> 236.9	1164055	20.545 ng/ml	85
4,4'-DDD	4,4'-DDD d4(IS)	10.621	235.0 -> 165.1	10829751	21.270 ng/ml	95
2,4'-DDT	4,4'-DDT-d4(IS)	10.692	235.0 -> 165.1	10163199	19.036 ng/ml	98
Endrin aldehyde	Endrin-13C12(IS)	10.920	249.9 -> 214.9	154784	22.039 ng/ml	89
Endosulfan sulfate	Endrin-13C12(IS)	11.716	271.9 -> 237.0	1182861	23.687 ng/ml	100
4,4'-DDT	4,4'-DDT-d4(IS)	11.881	235.0 -> 165.1	7830161	18.972 ng/ml	93
Endrin ketone	Endrin ketone-13C12(IS)	13.092	147.0 -> 111.0	440104	22.402 ng/ml	91
Methoxychlor	Methoxychlor-d6(IS)	13.443	227.0 -> 141.1	4231158	23.117 ng/ml	95
Mirex	Mirex-13C10(IS)	14.337	271.8 -> 236.8	8291011	22.014 ng/ml	94

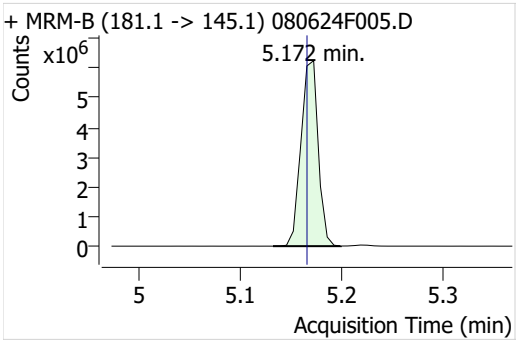
(m) = manual integration ND = Not Detected NC = Not Calculated

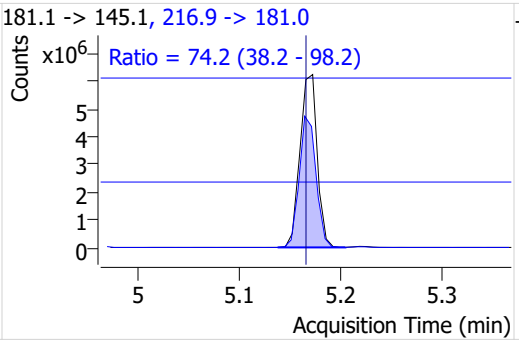
Sample Chromatogram

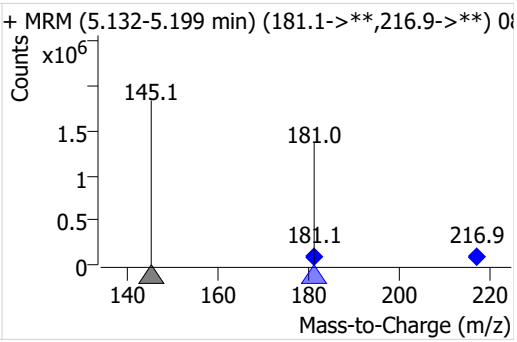
MassHunter Quantitative Analysis Sample Report



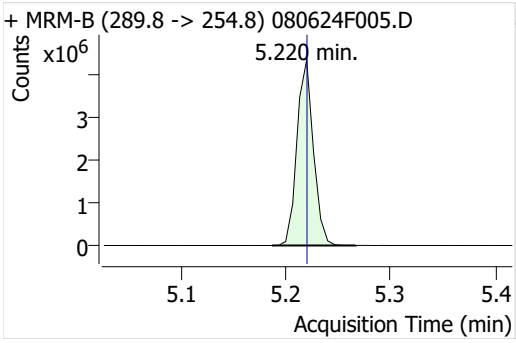
α-BHC

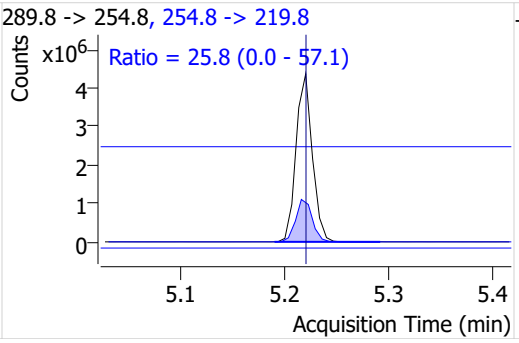


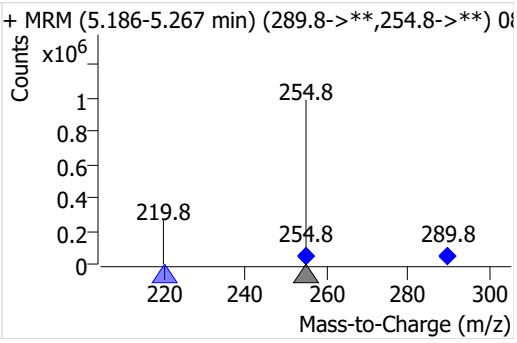




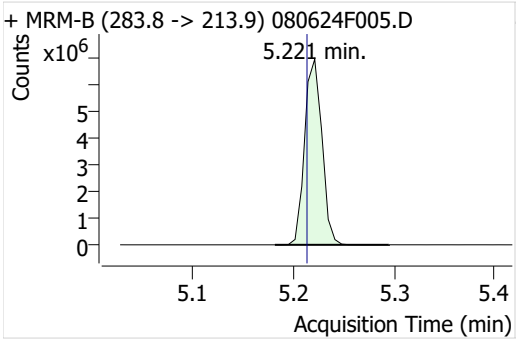
Hexachlorobenzene-13C6

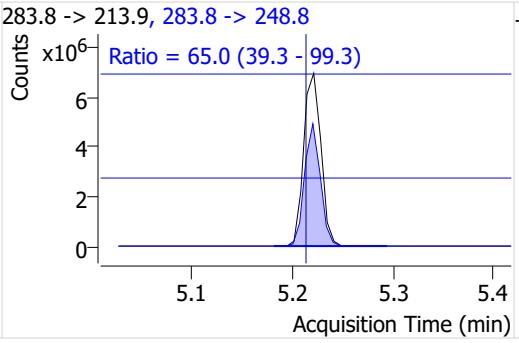


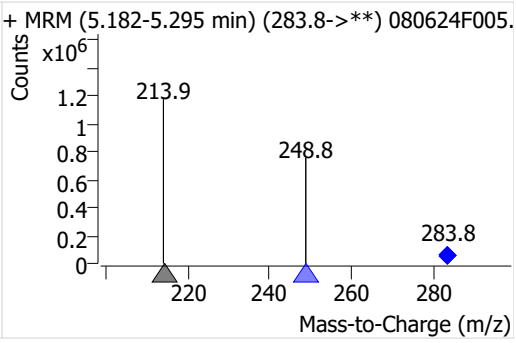




Hexachlorobenzene

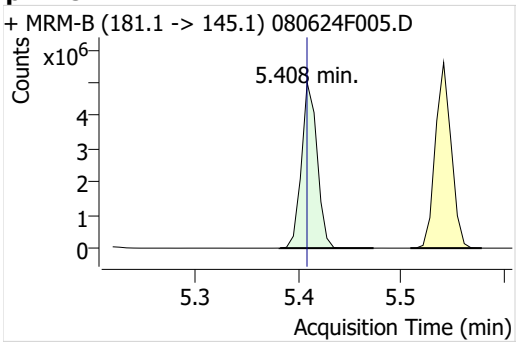


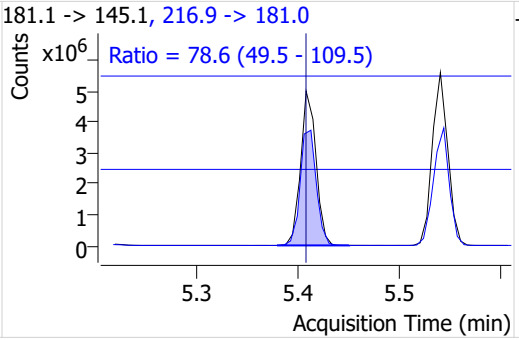


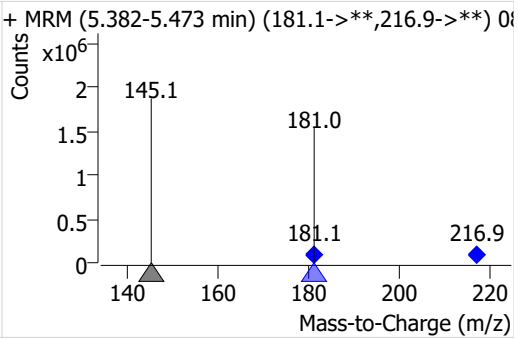


MassHunter Quantitative Analysis Sample Report

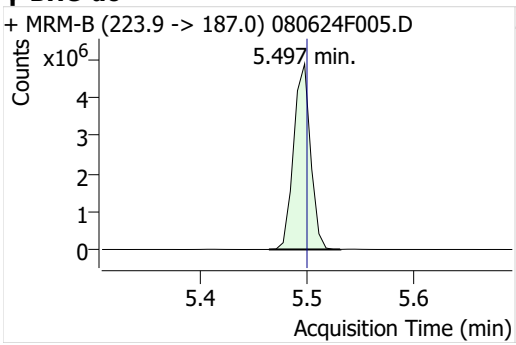
β-BHC

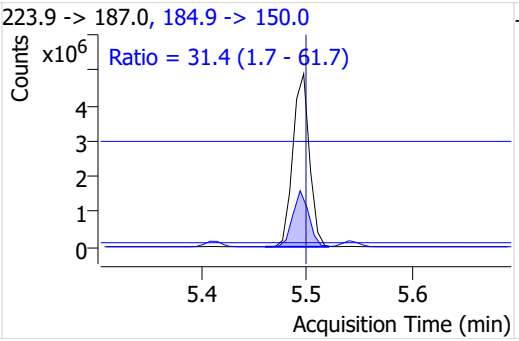


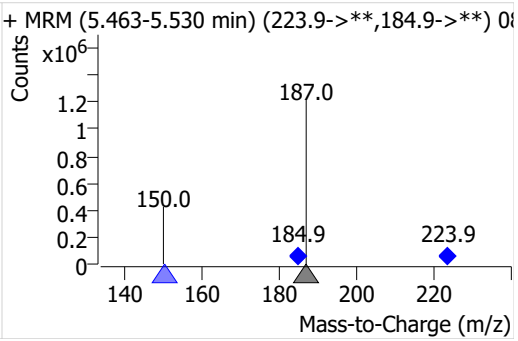




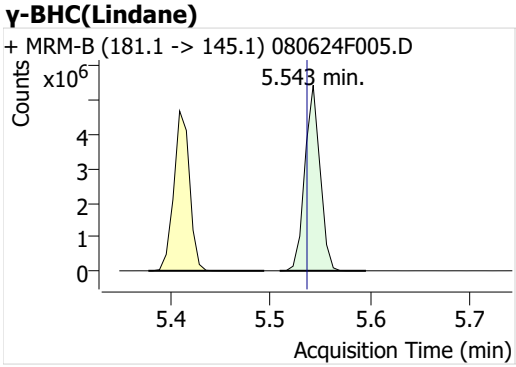
γ-BHC-d6

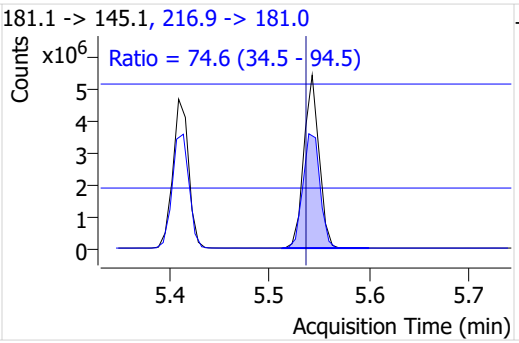


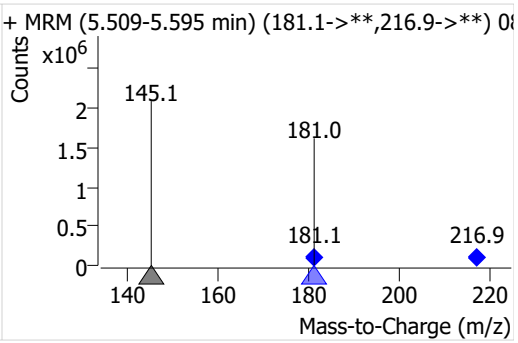




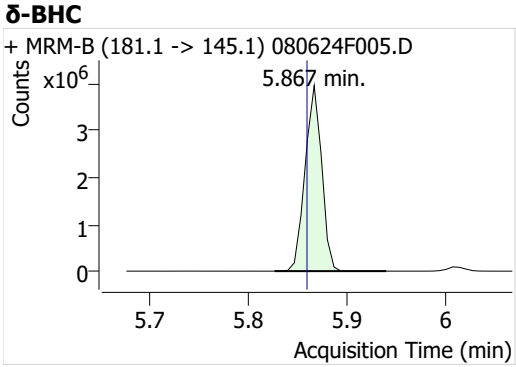
γ-BHC(Lindane)

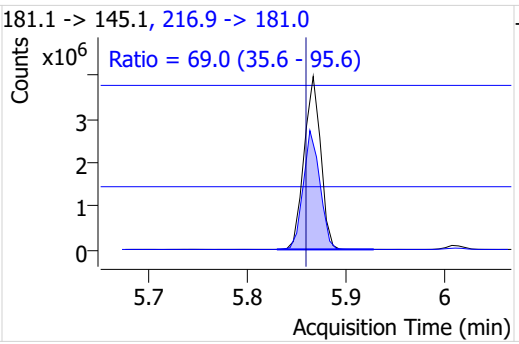


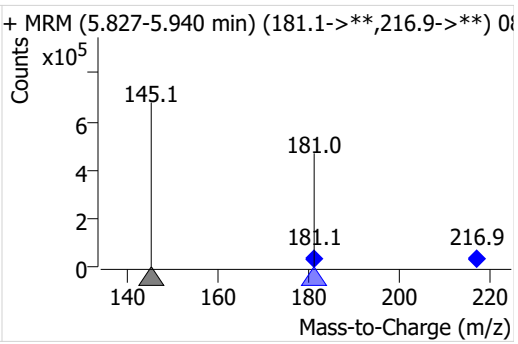




δ-BHC

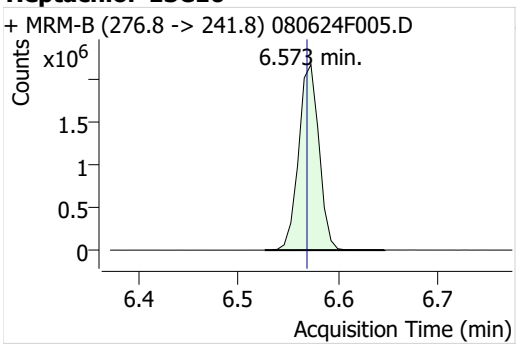


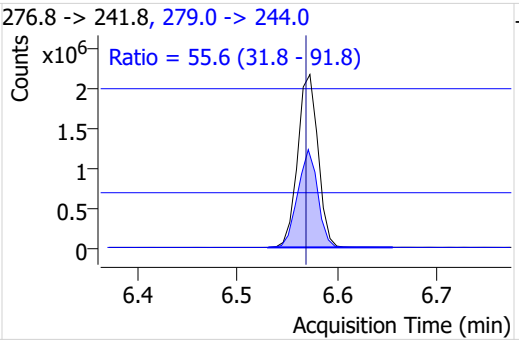


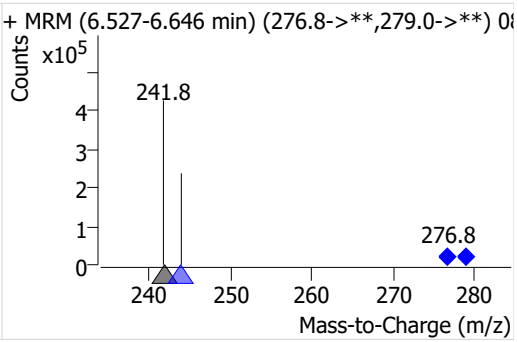


MassHunter Quantitative Analysis Sample Report

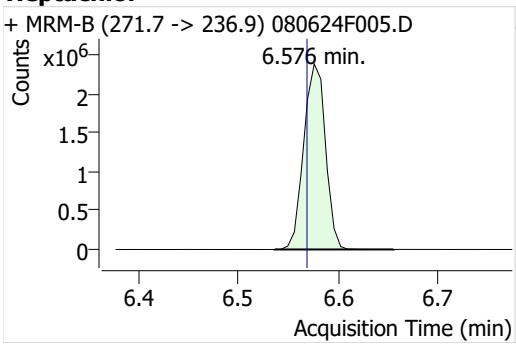
Heptachlor-13C10

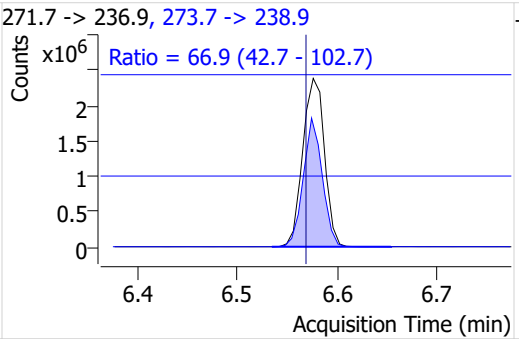


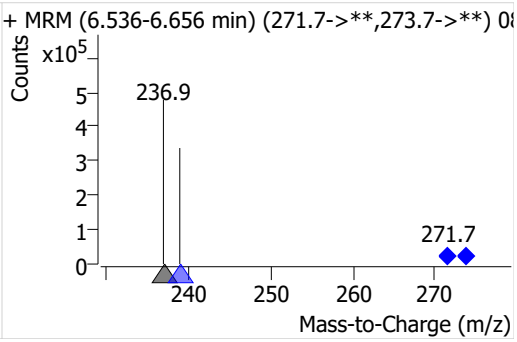




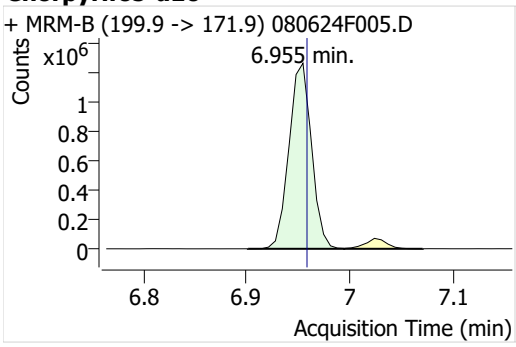
Heptachlor

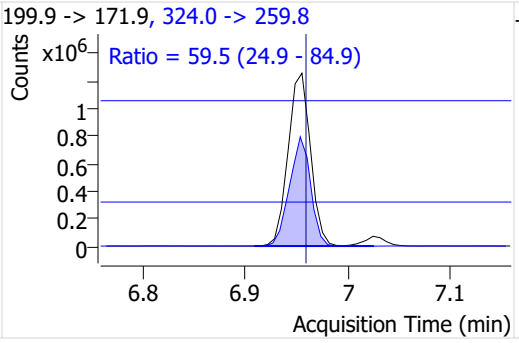


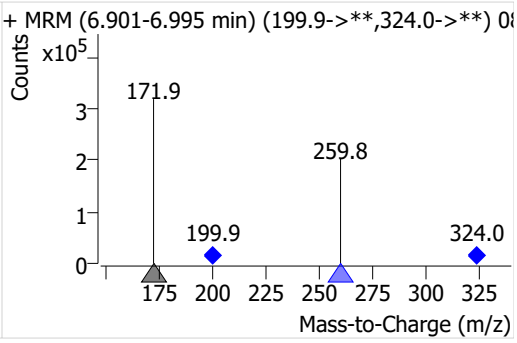




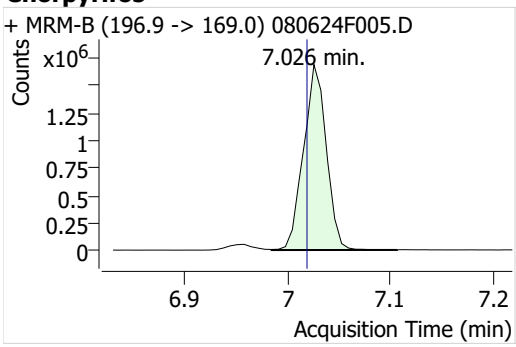
Chorpyrifos-d10

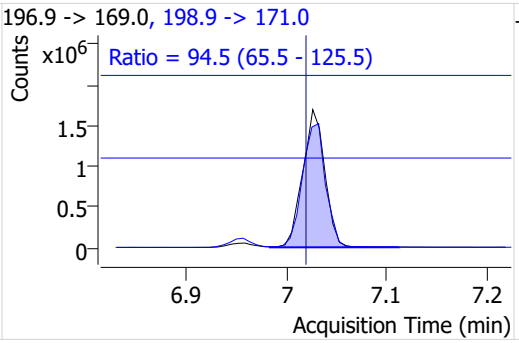


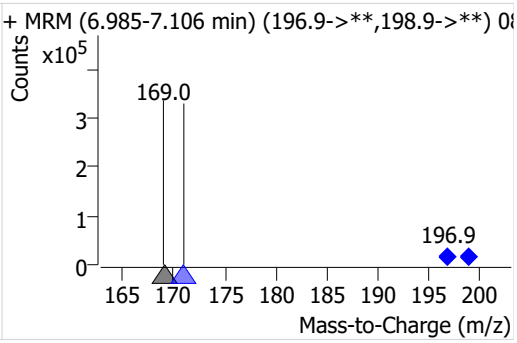




Chorpyrifos

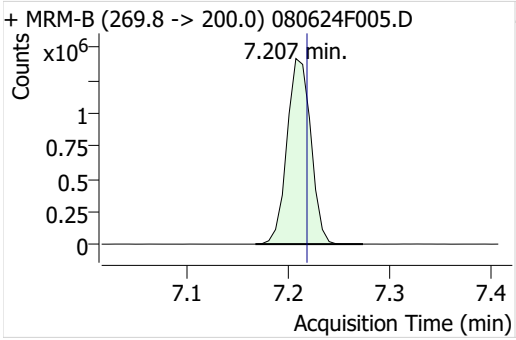


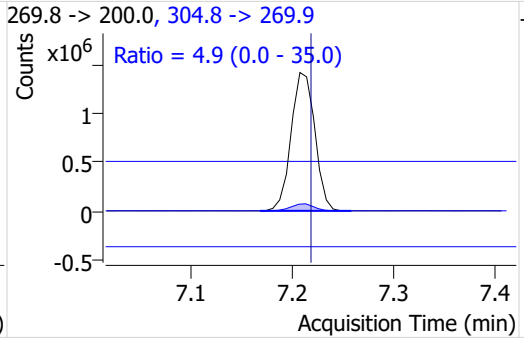


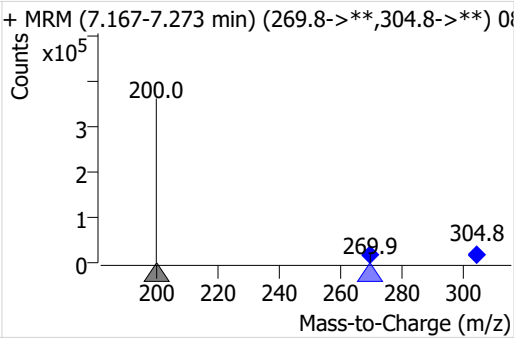


MassHunter Quantitative Analysis Sample Report

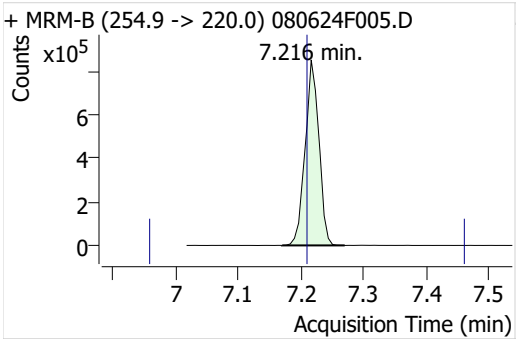
Aldrin-13C

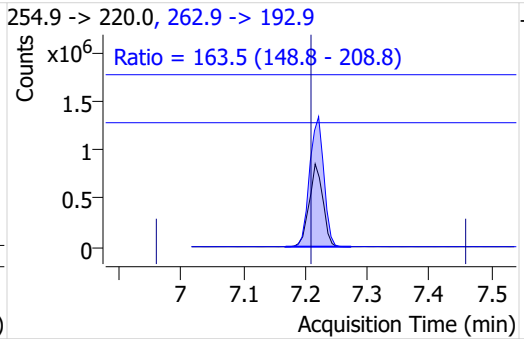


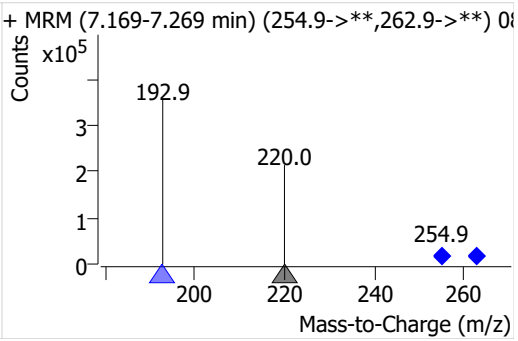




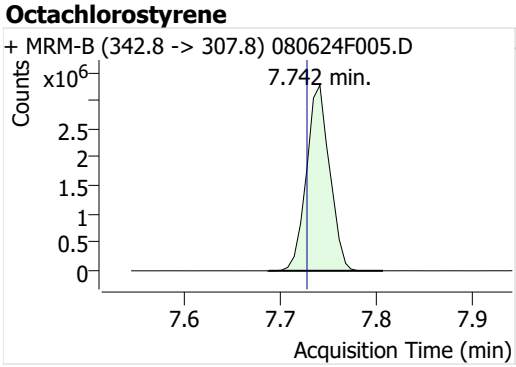
Aldrin

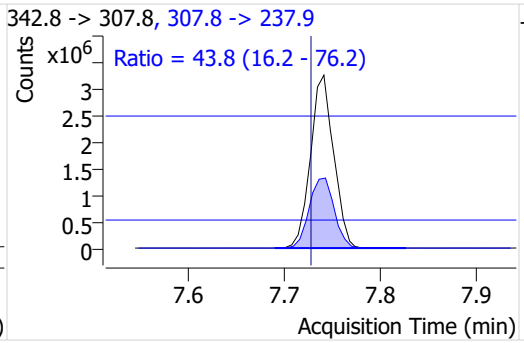


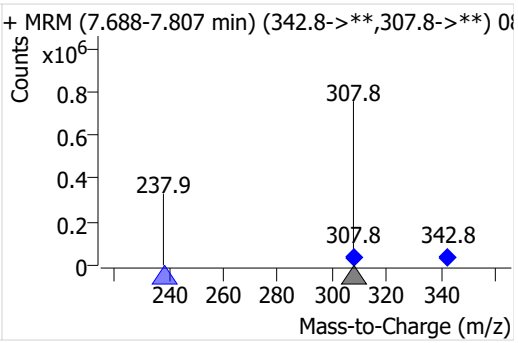




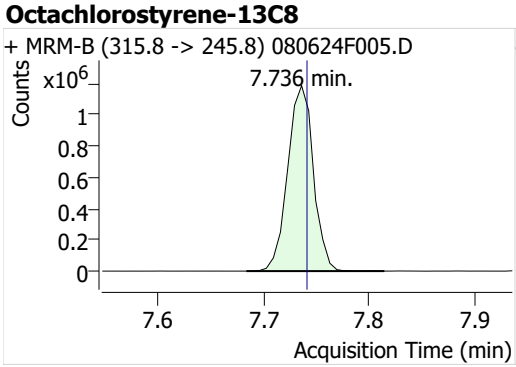
Octachlorostyrene

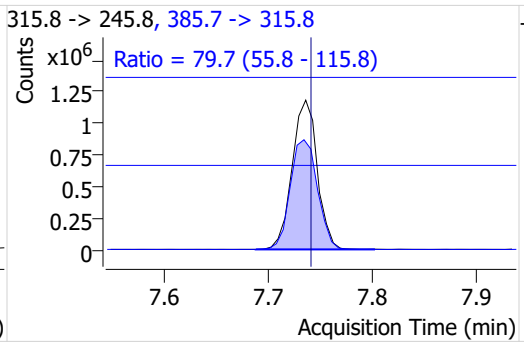


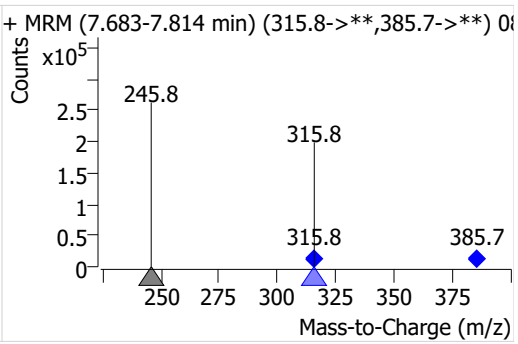




Octachlorostyrene-13C8

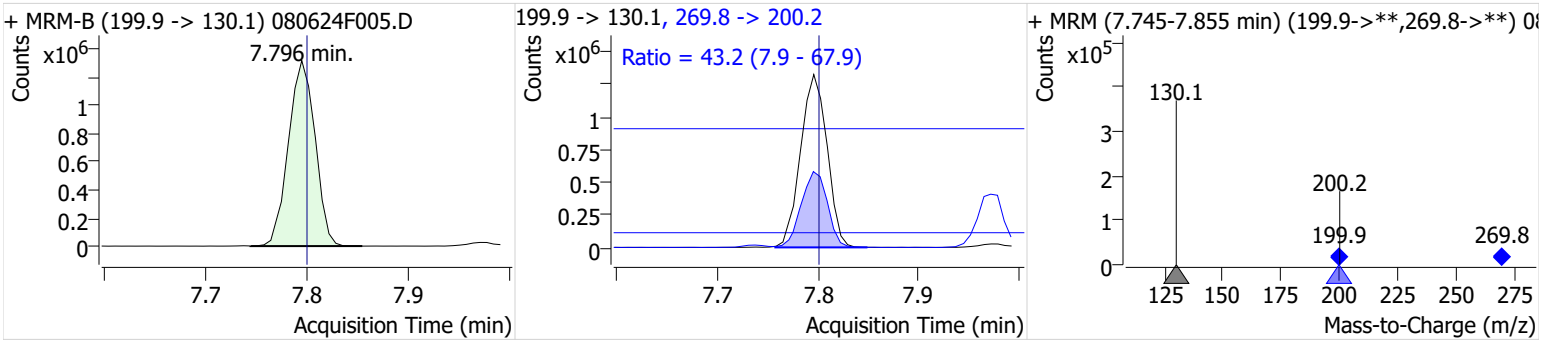




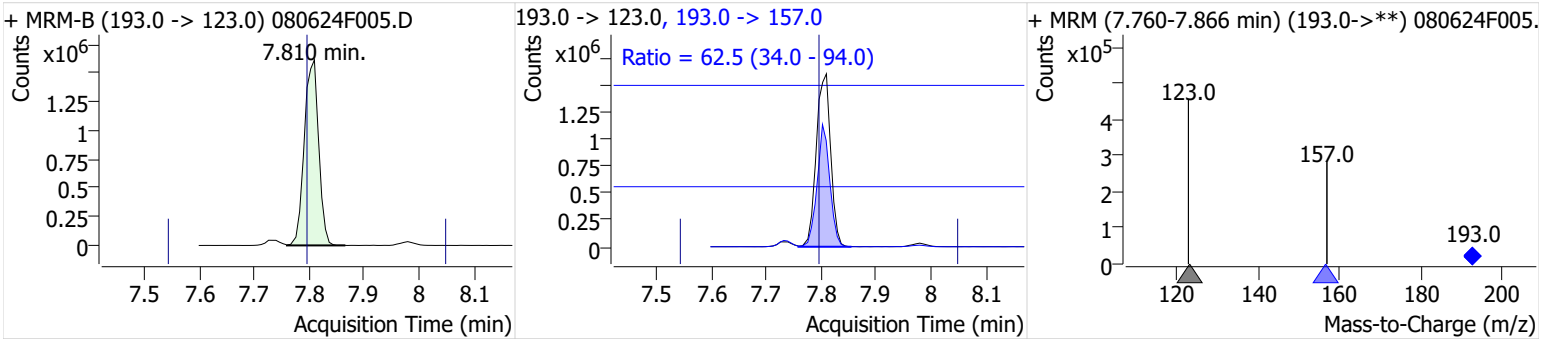


MassHunter Quantitative Analysis Sample Report

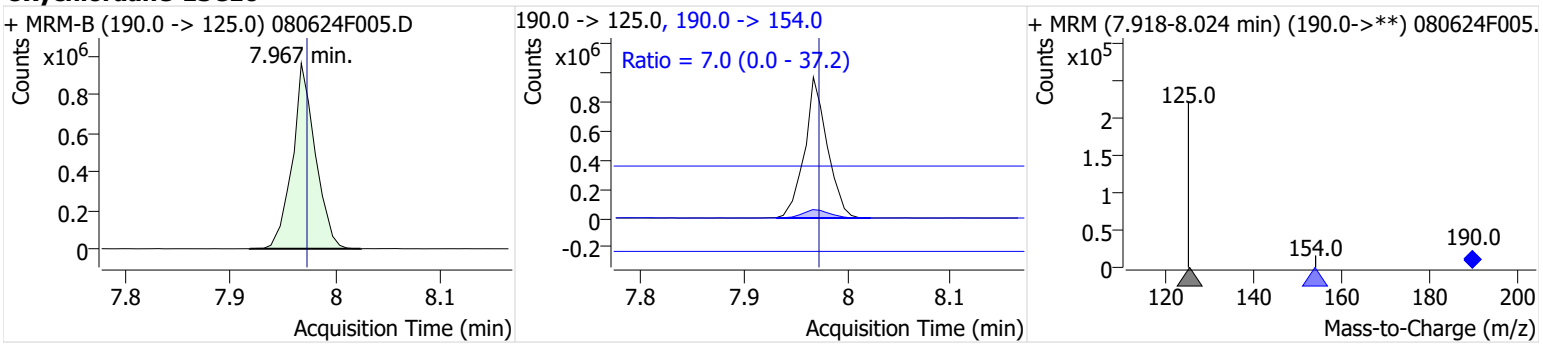
Isodrin-13C12



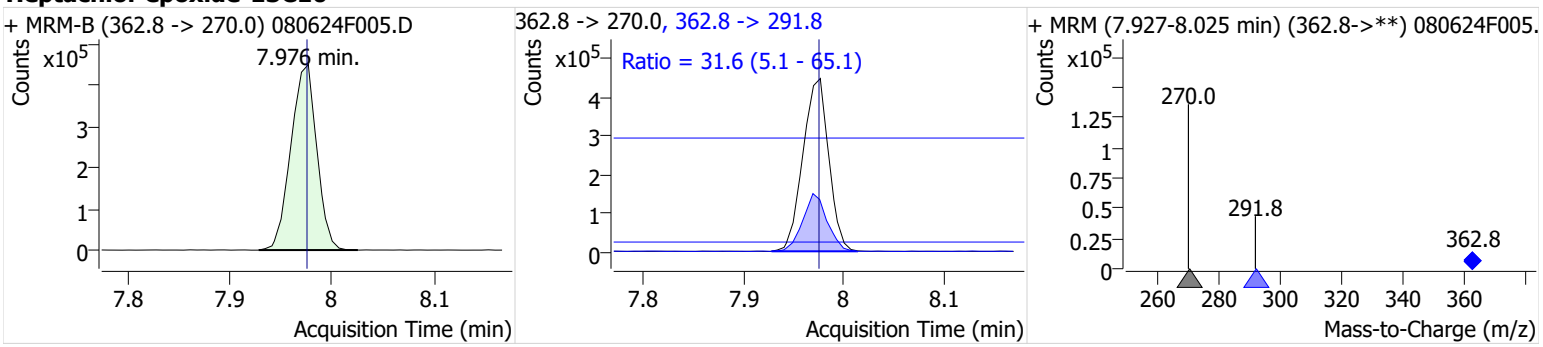
Isodrin



Oxychlordane-13C10

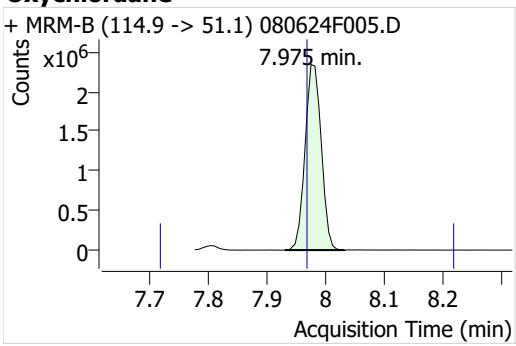


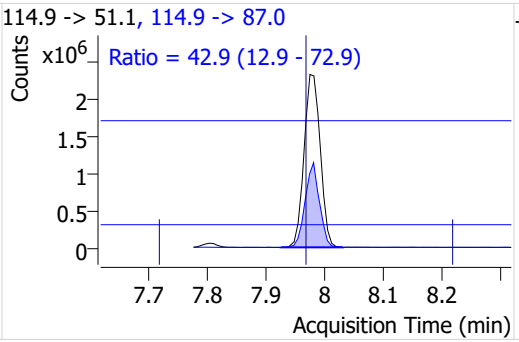
Heptachlor epoxide-13C10

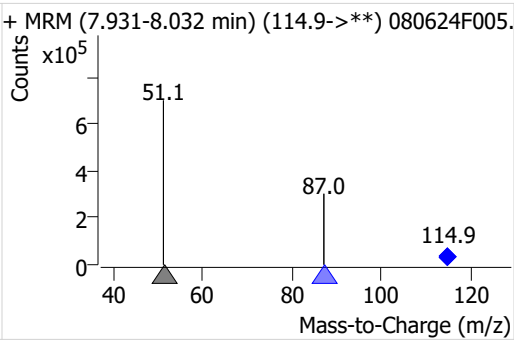


MassHunter Quantitative Analysis Sample Report

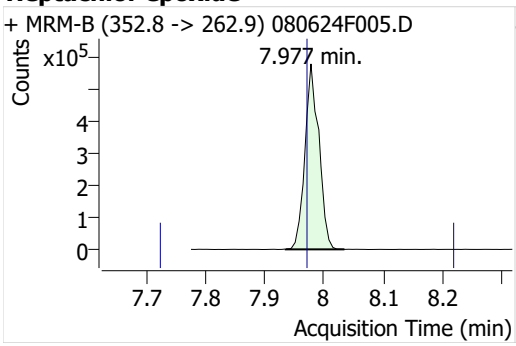
Oxychlordane

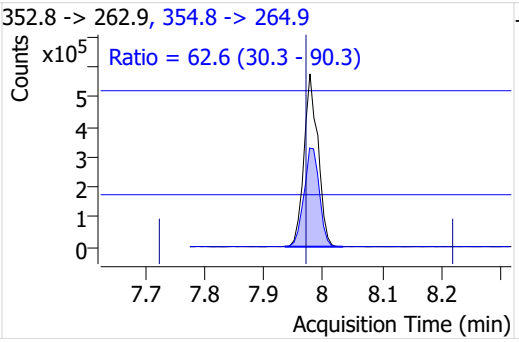


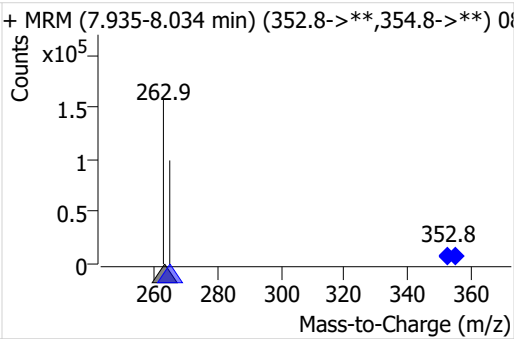




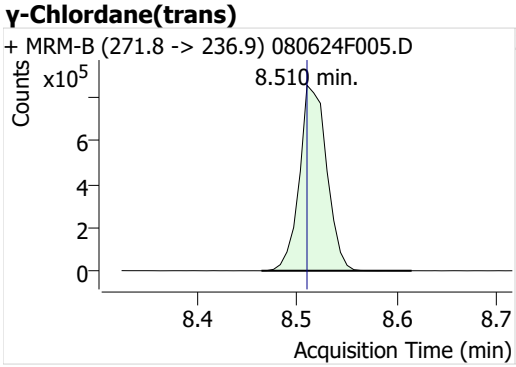
Heptachlor epoxide

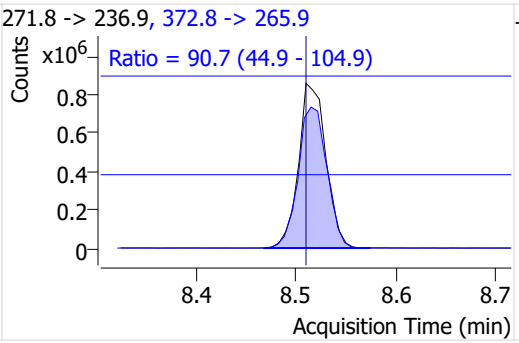


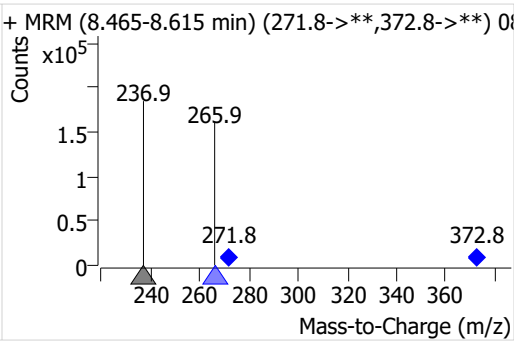




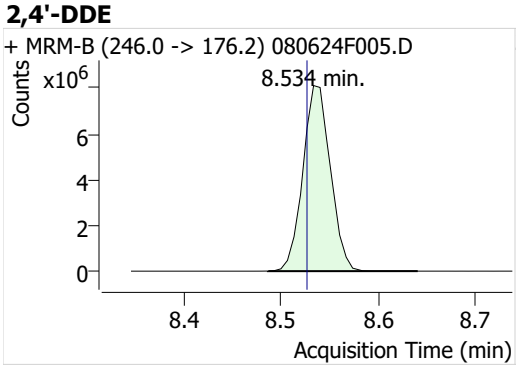
γ-Chlordane(trans)

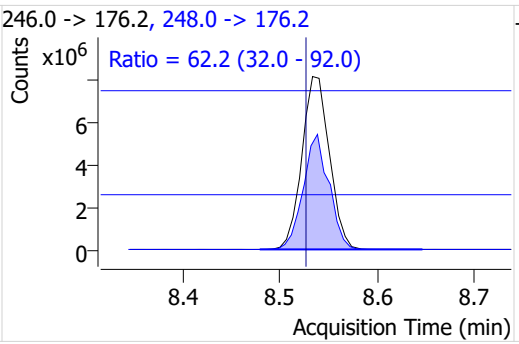


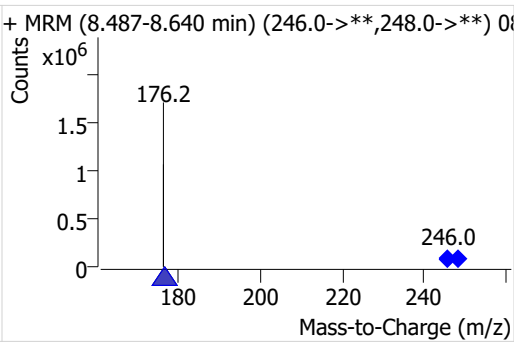




2,4'-DDE







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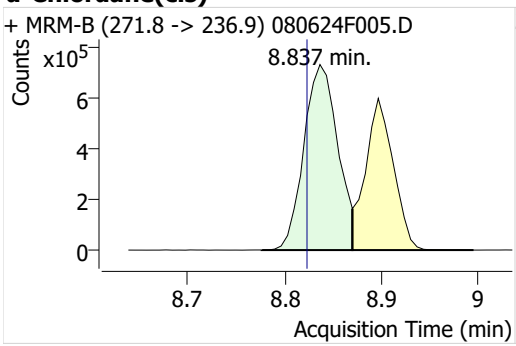
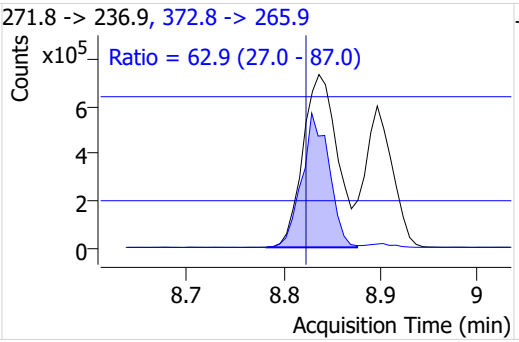
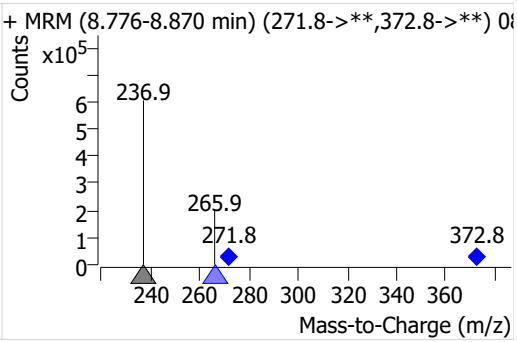
α-Chlordane(cis)







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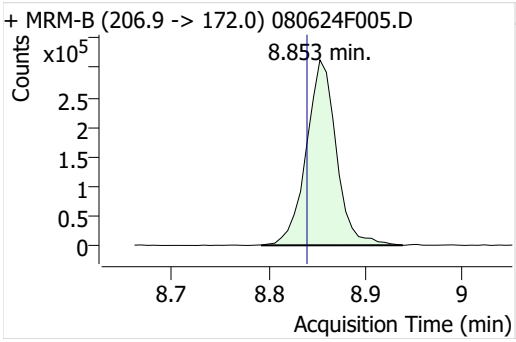
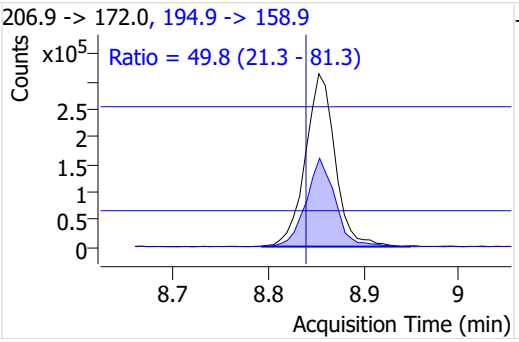
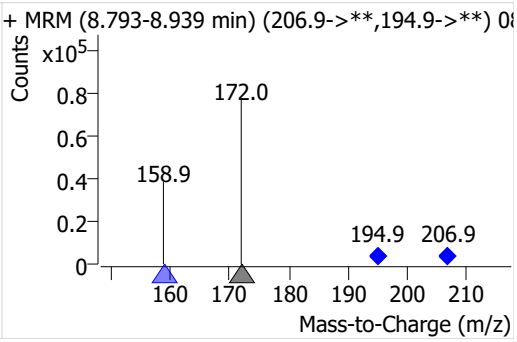
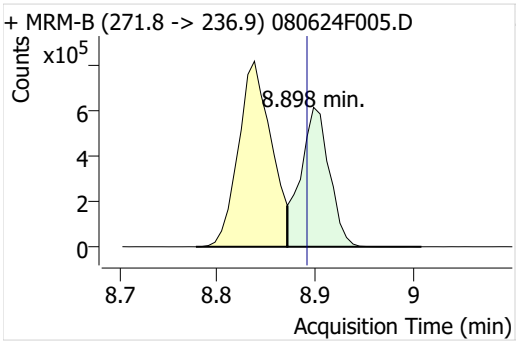
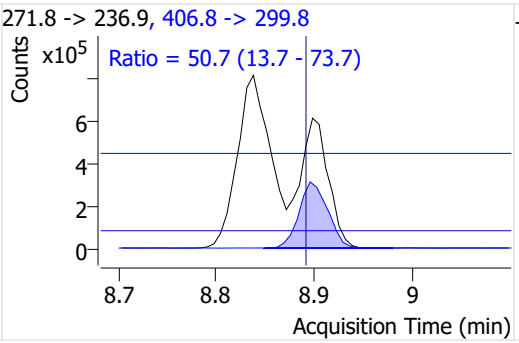


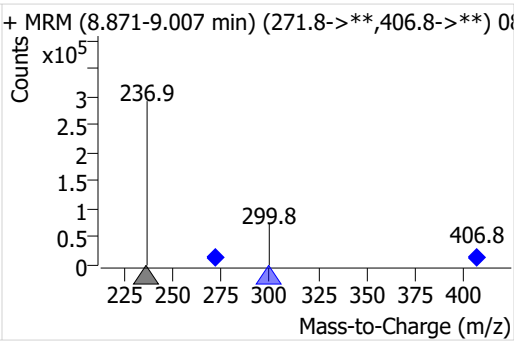




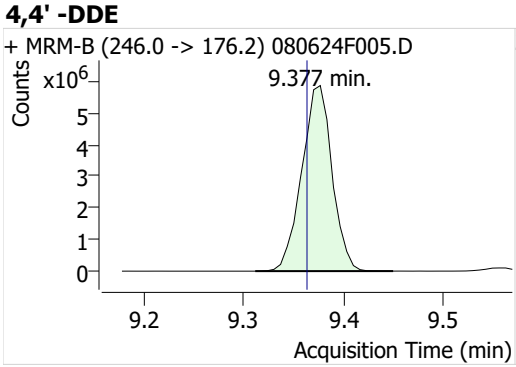
trans-Nanochlor

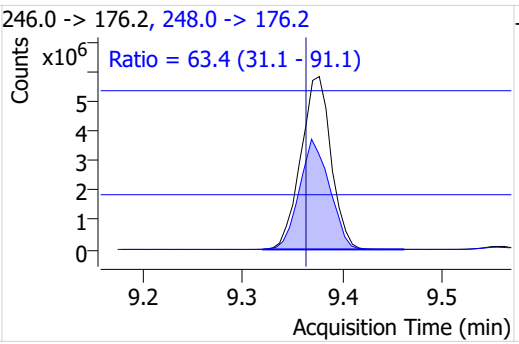


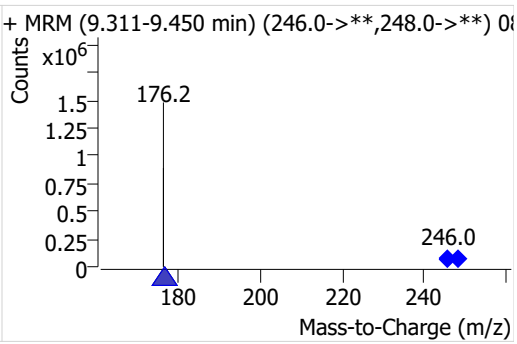




4,4' -DDE







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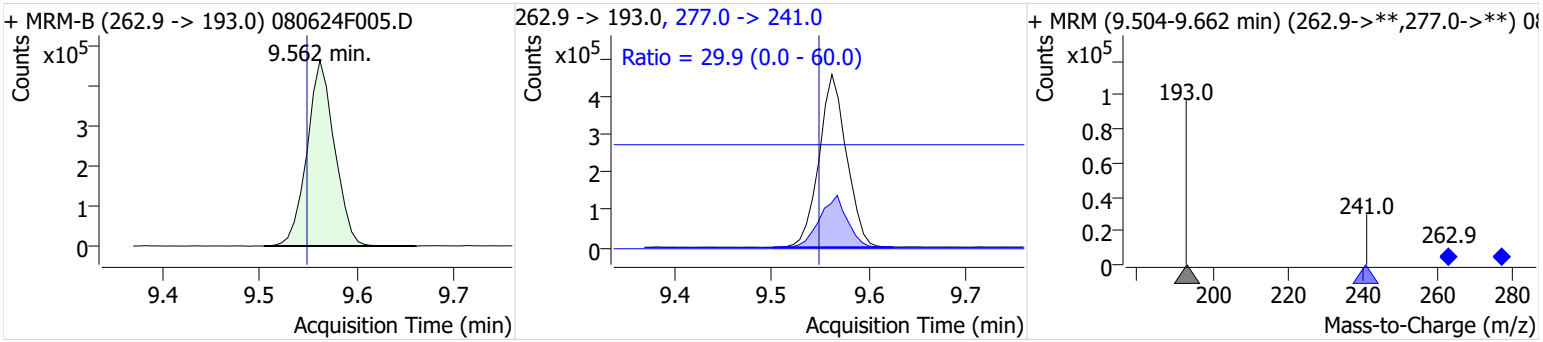
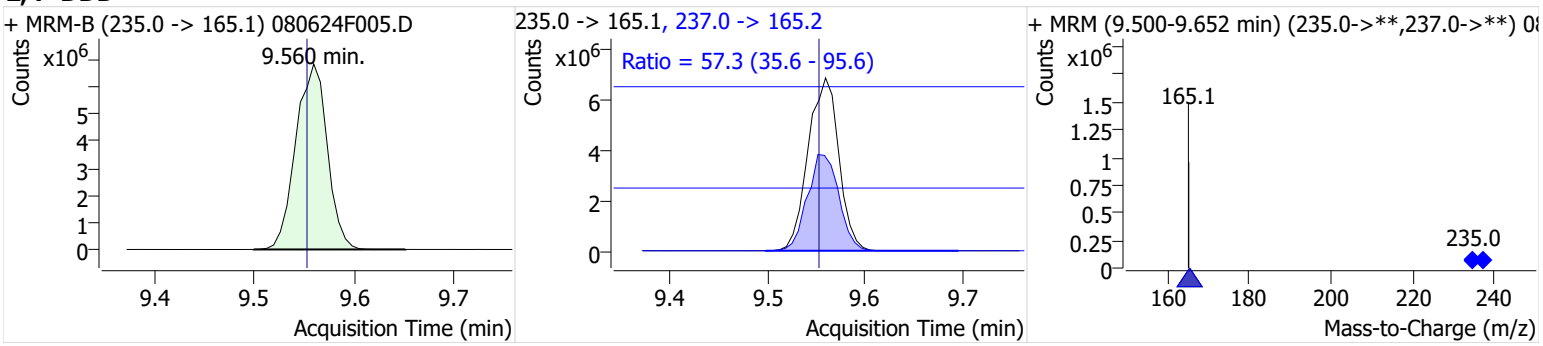
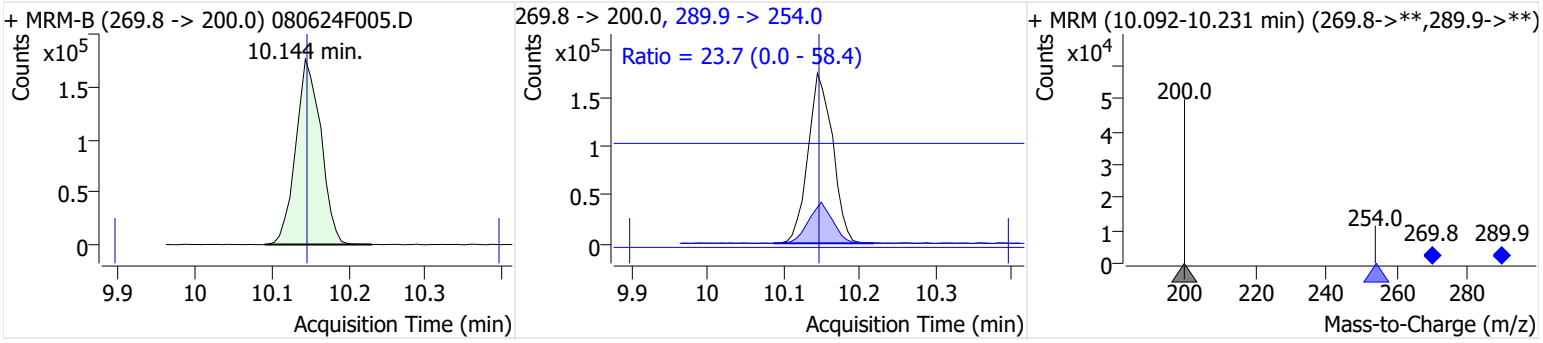
Dieldrin



2,4'-DDD



Endrin-13C12



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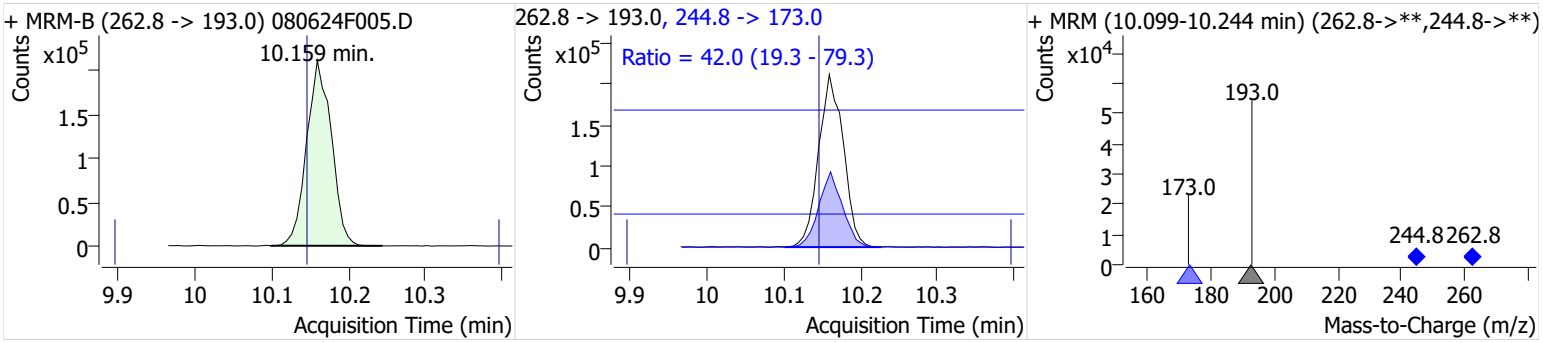

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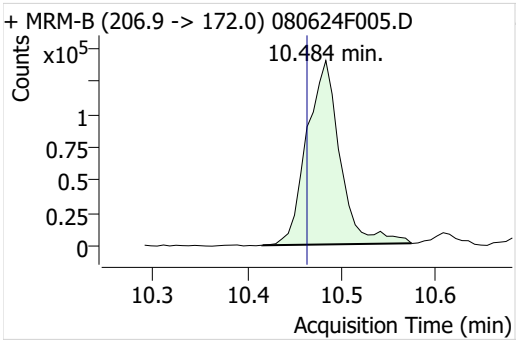

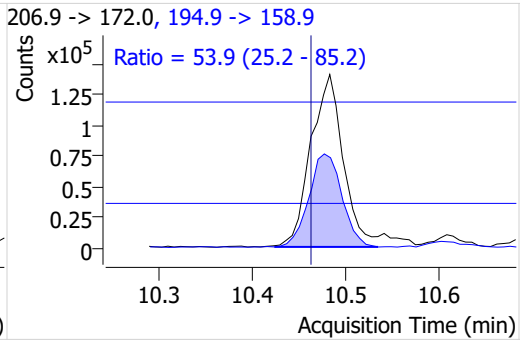

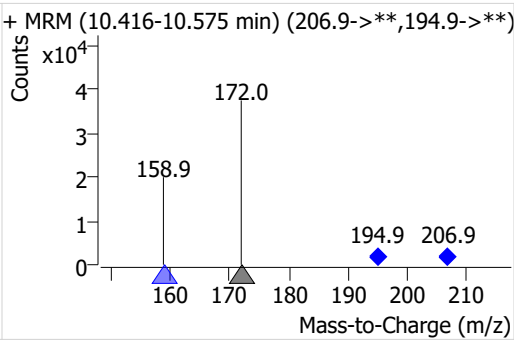

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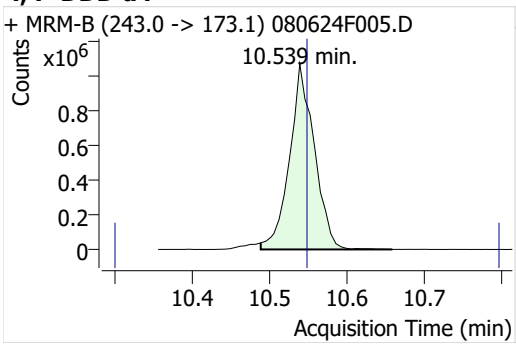
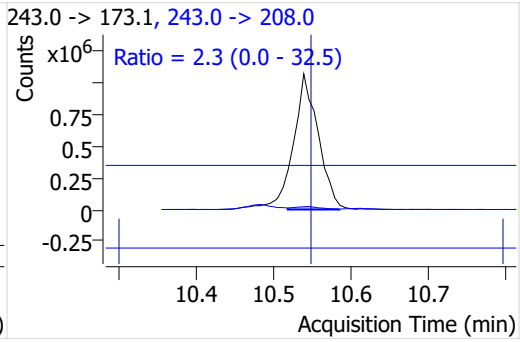
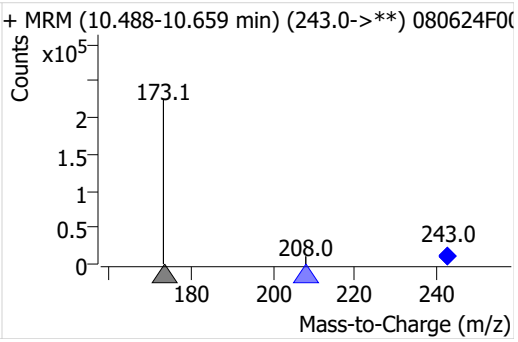
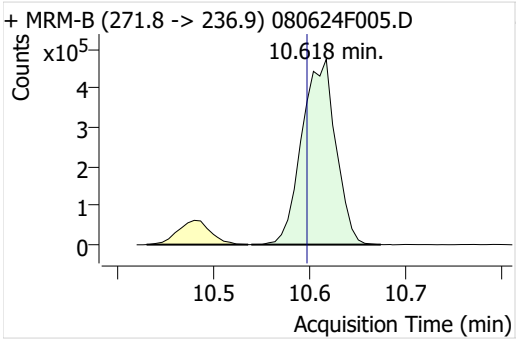
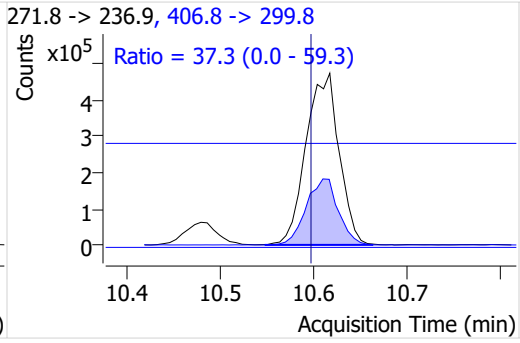


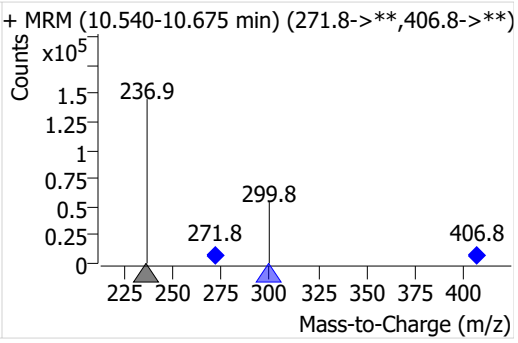




cis-Nonachlor







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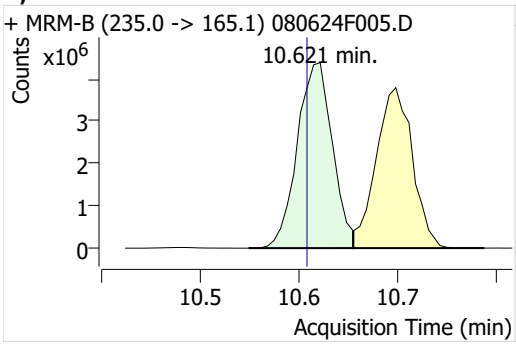

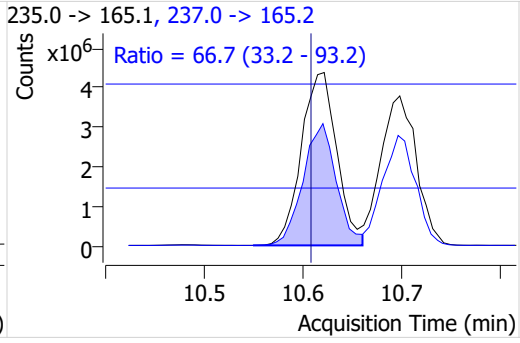

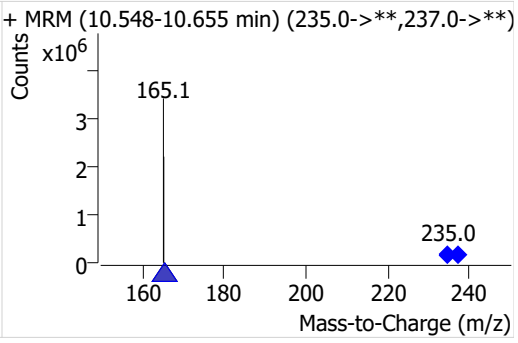

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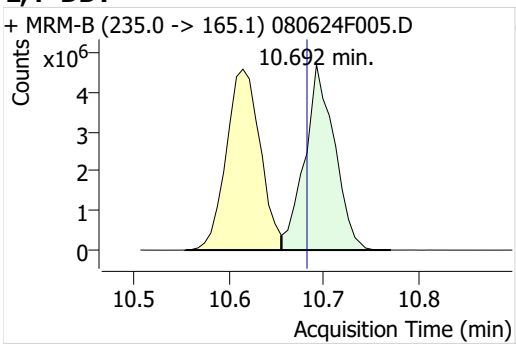
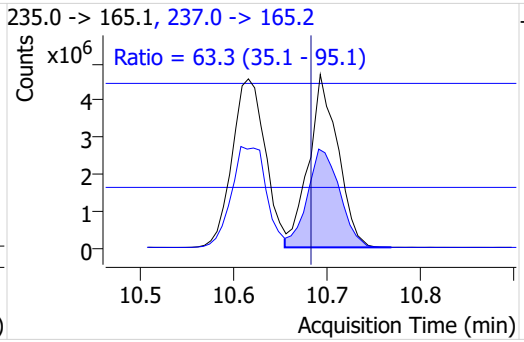
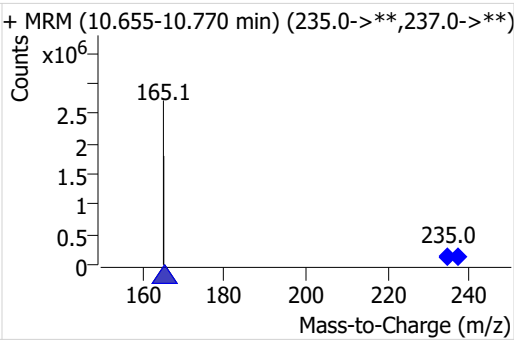
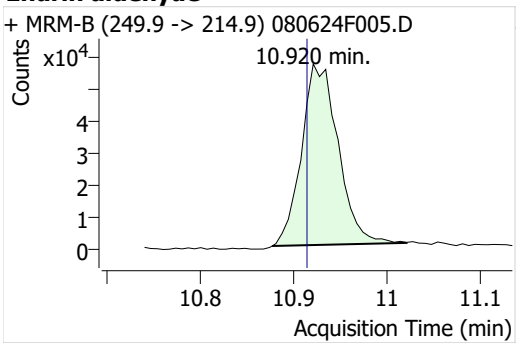
2,4'-DDT

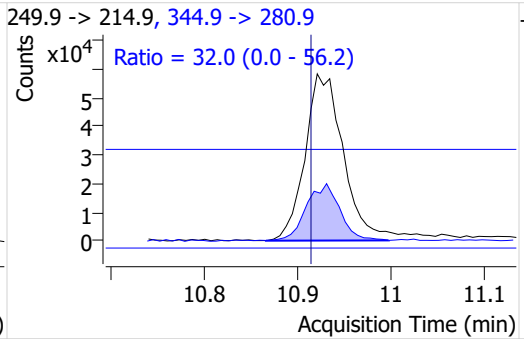


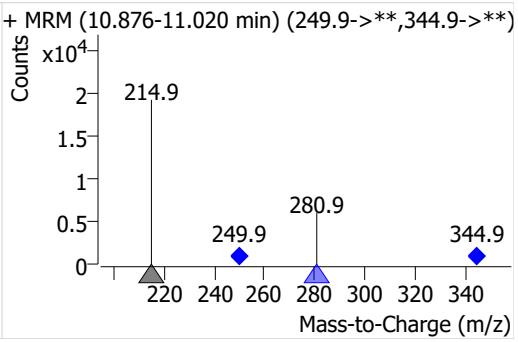




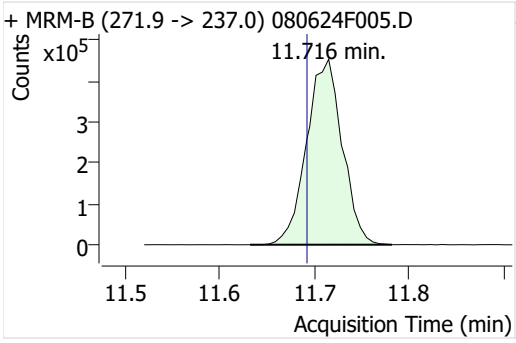
Endrin aldehyde

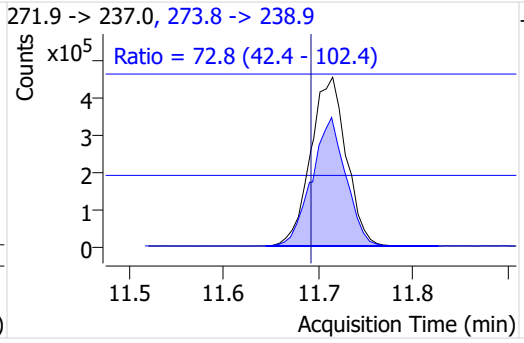


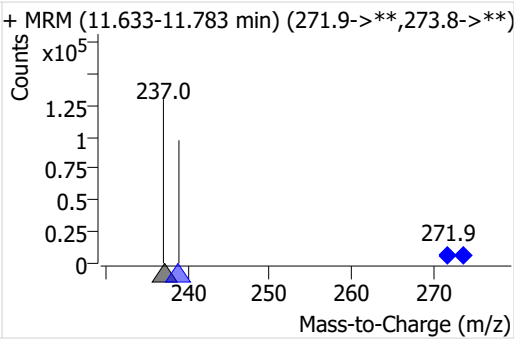




Endosulfan sulfate







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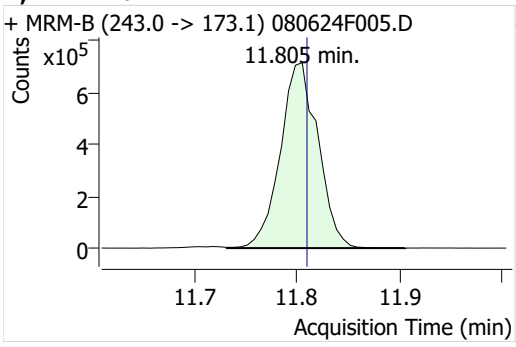

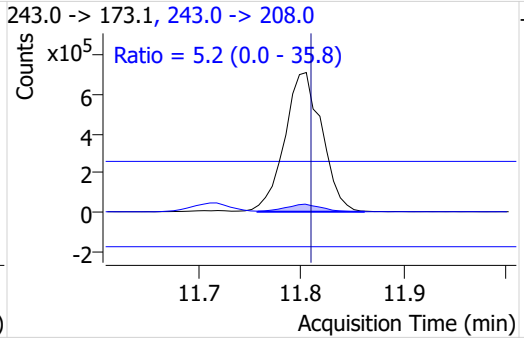

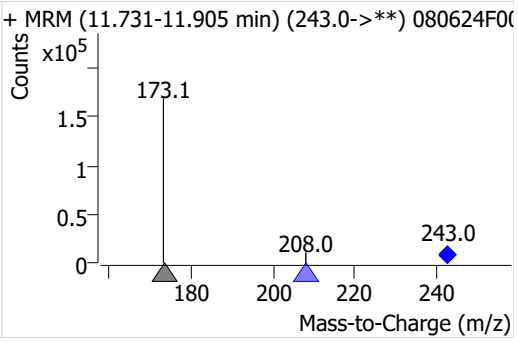

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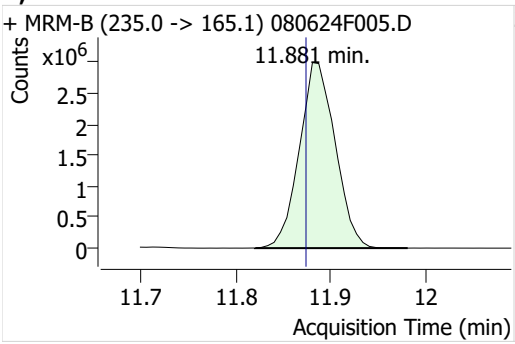
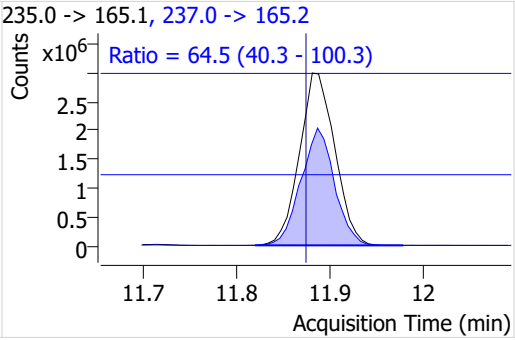
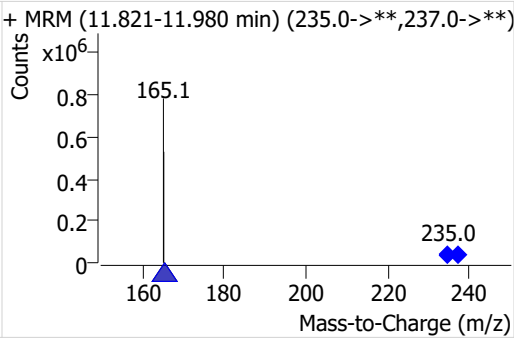
4,4'-DDT







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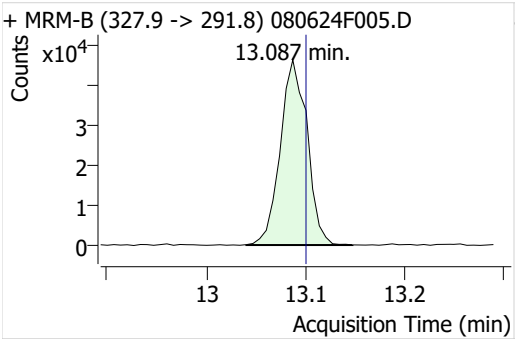
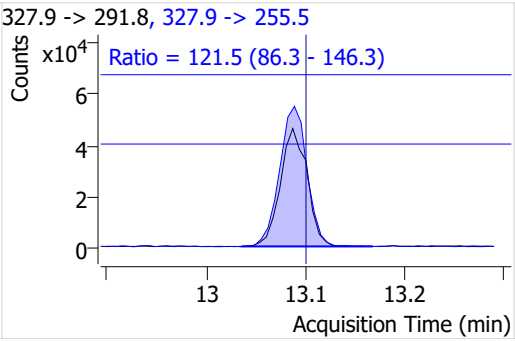
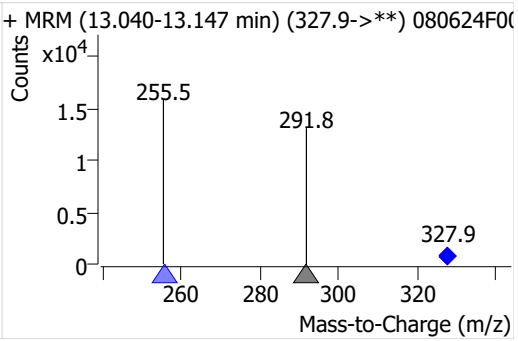
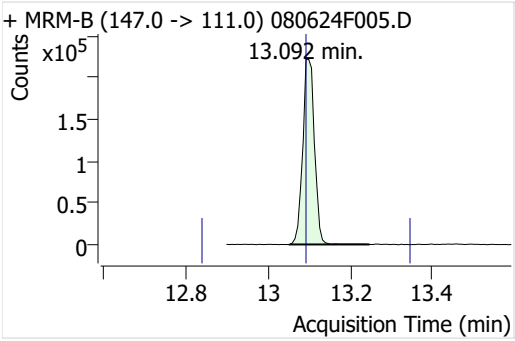
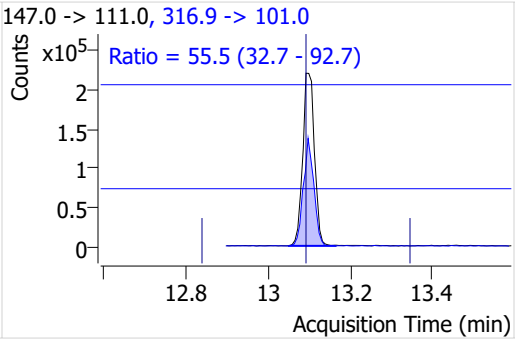


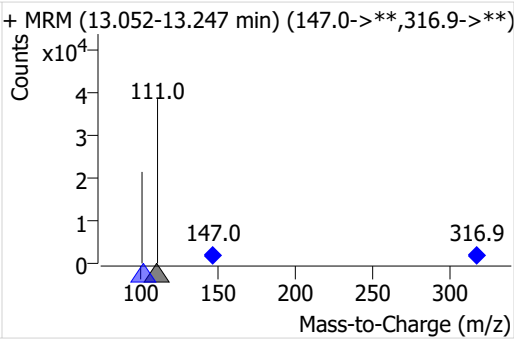




Endrin ketone







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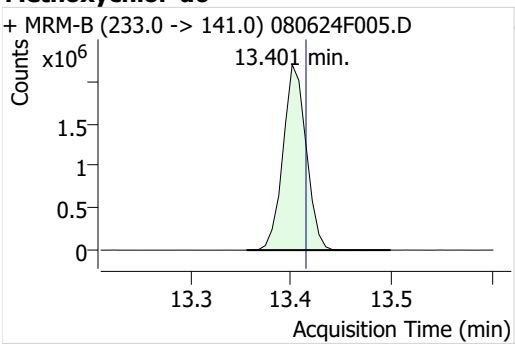

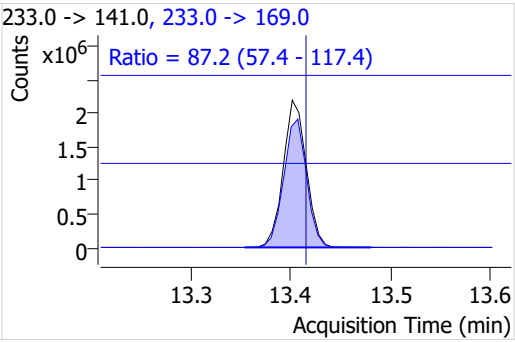

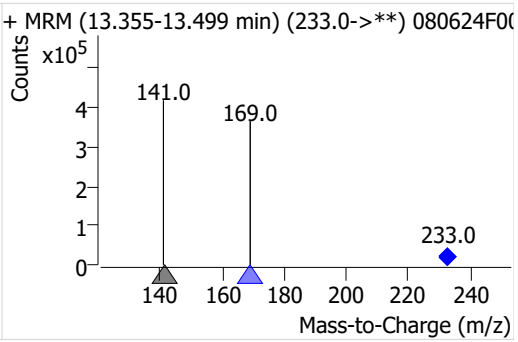

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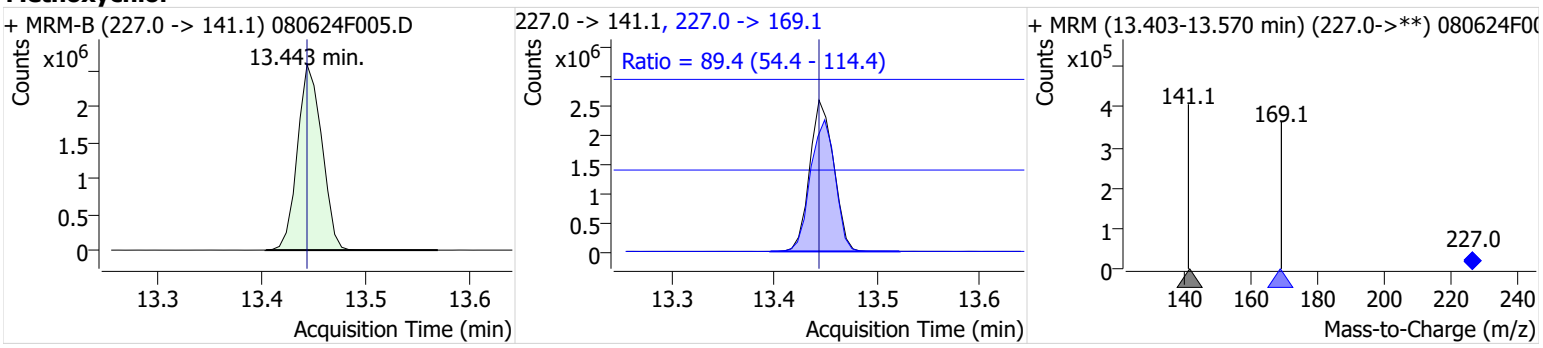
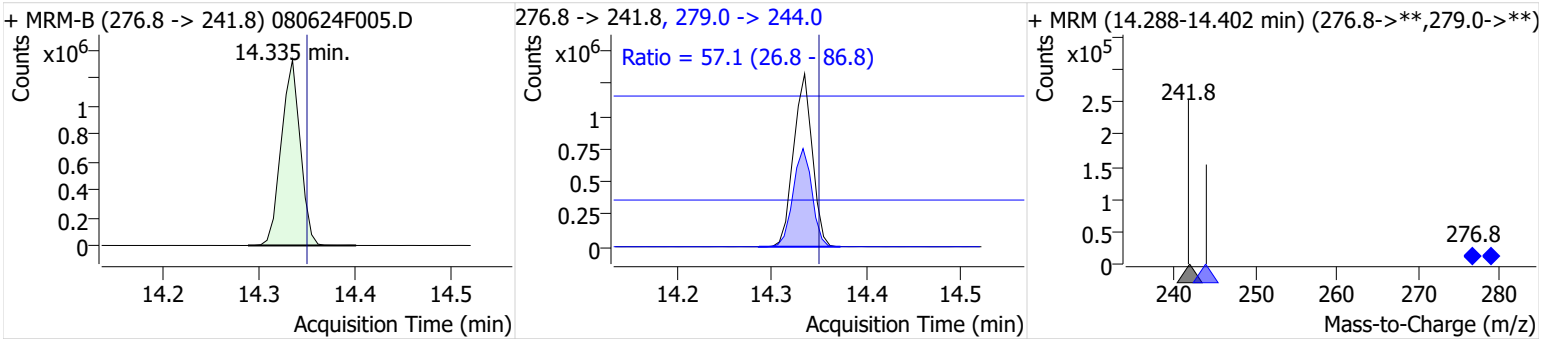
Methoxychlor



Mirex-13C10



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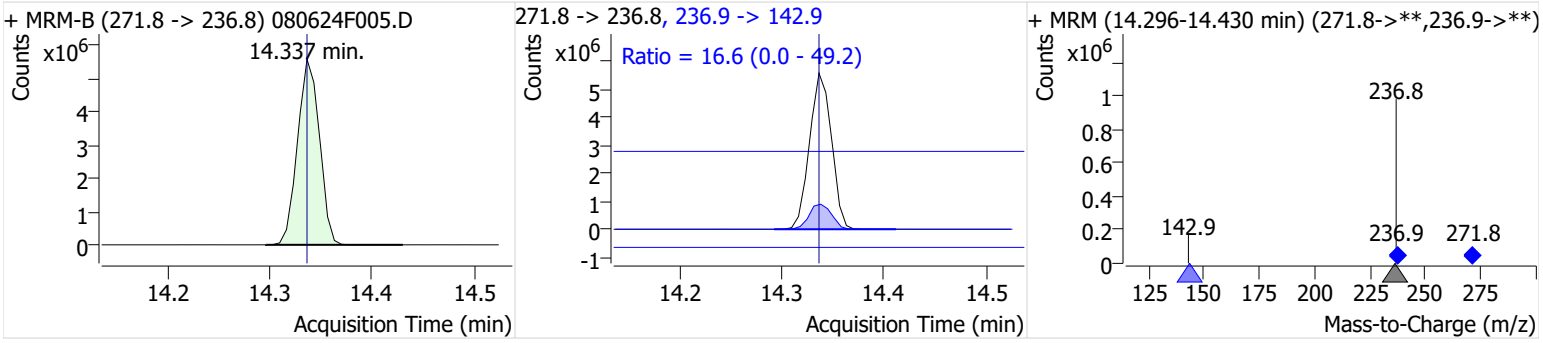

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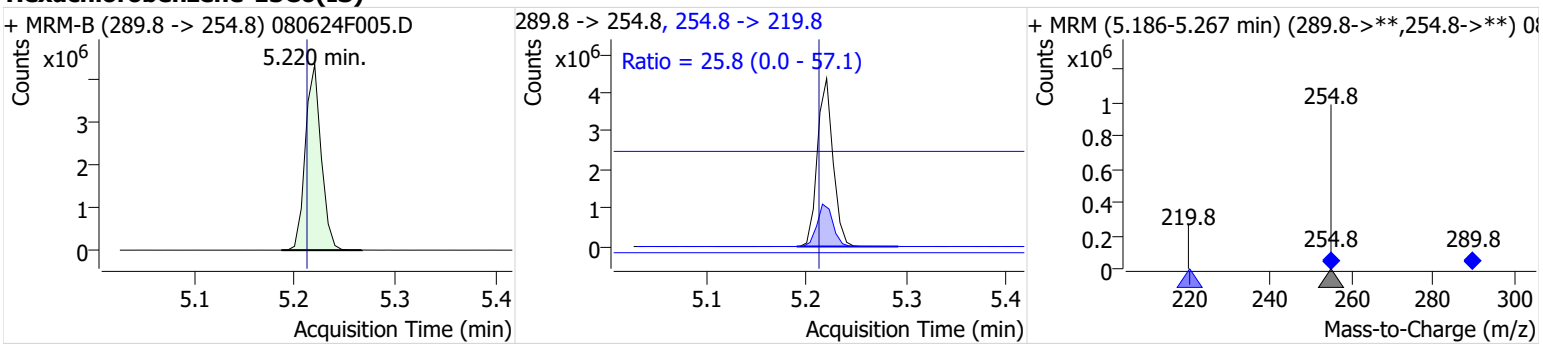
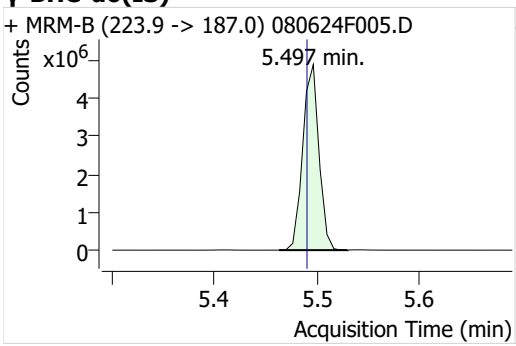
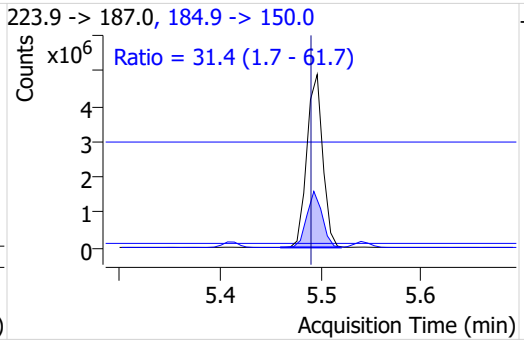
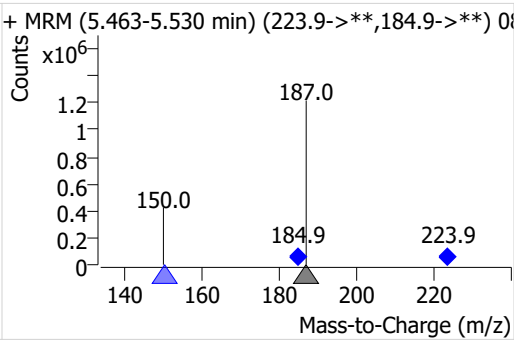


MassHunter Quantitative Analysis Sample Report

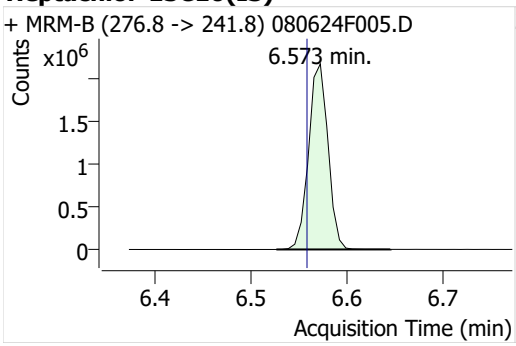
γ-BHC-d6(IS)

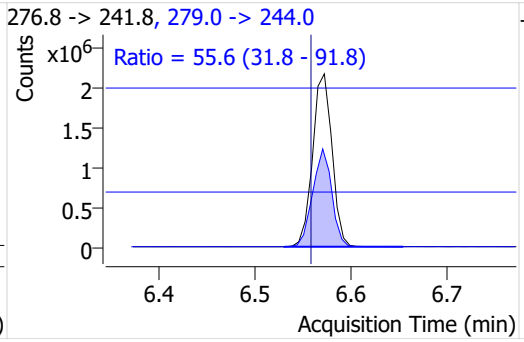


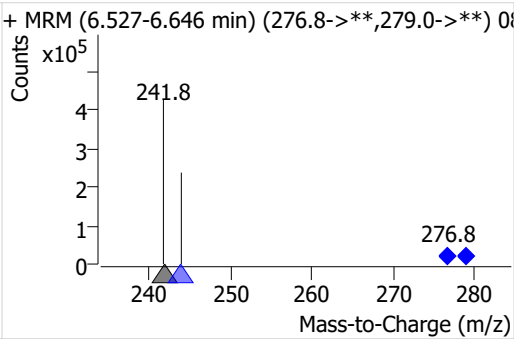




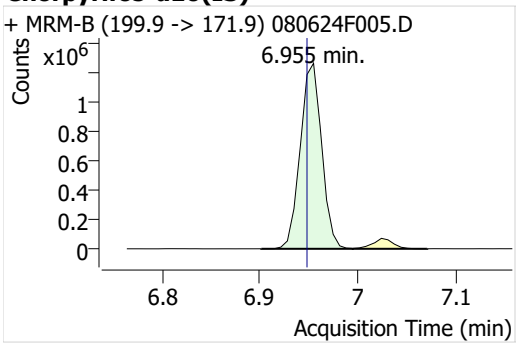
Heptachlor-13C10(IS)

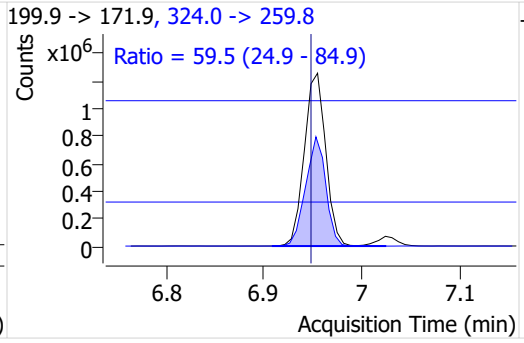


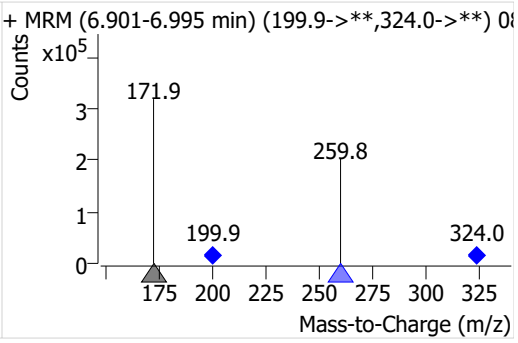




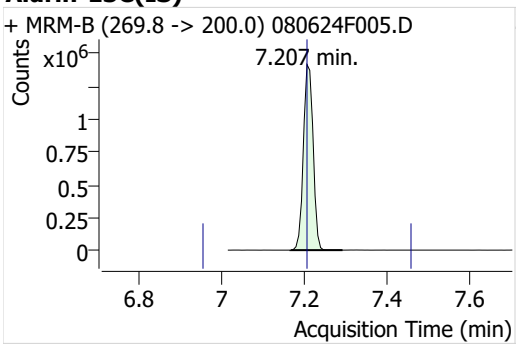
Chorpyrifos-d10(IS)

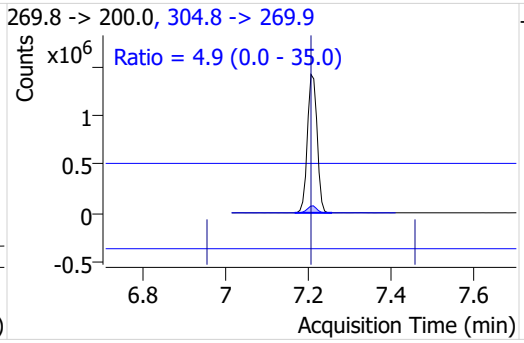


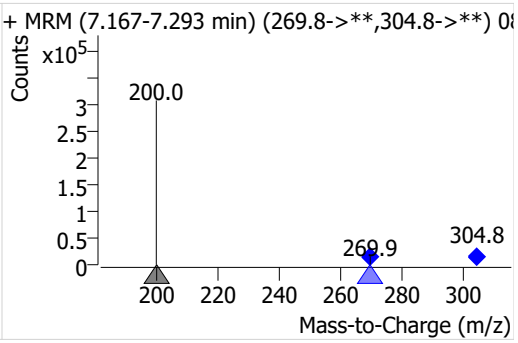




Aldrin-13C(IS)

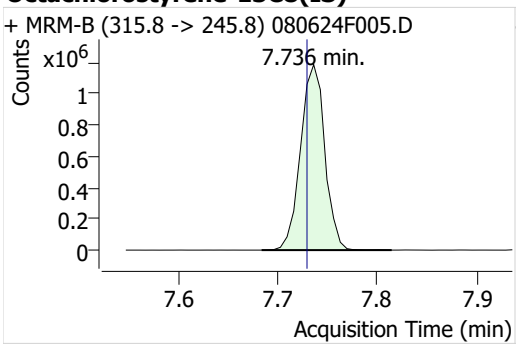


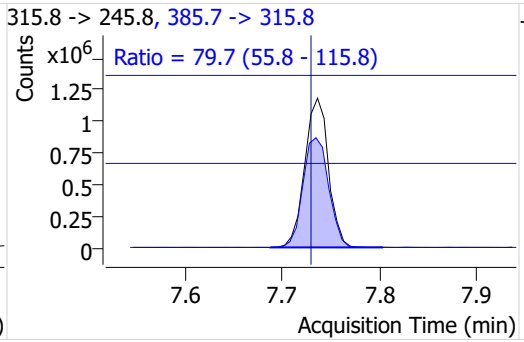


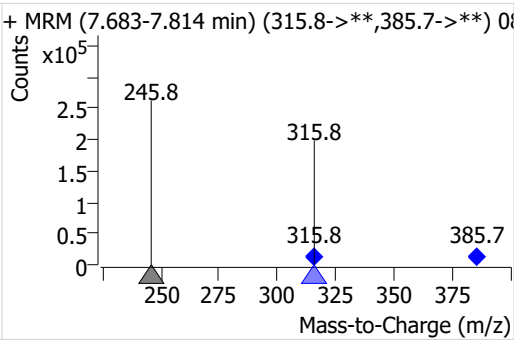


MassHunter Quantitative Analysis Sample Report

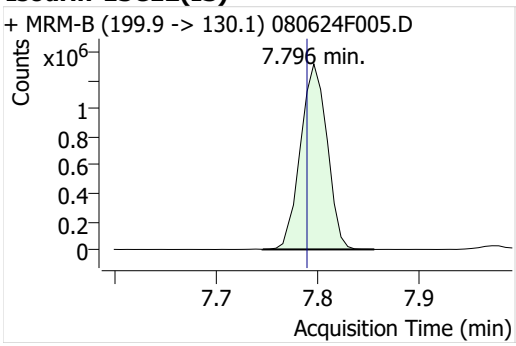
Octachlorostyrene-13C8(IS)

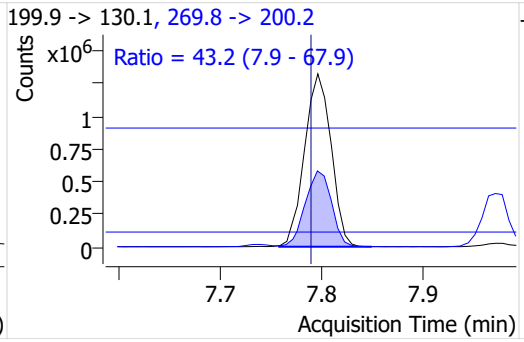


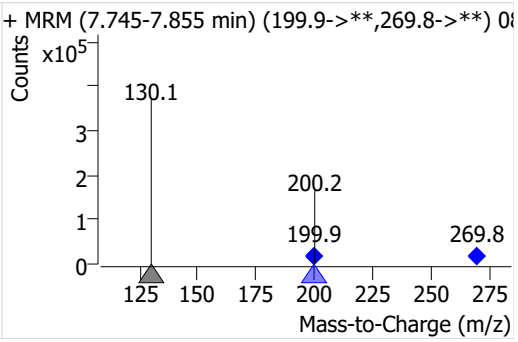




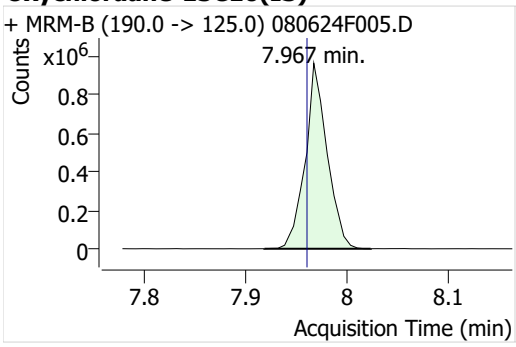
Isodrin-13C12(IS)

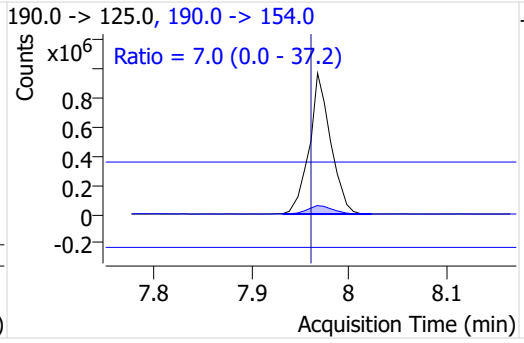


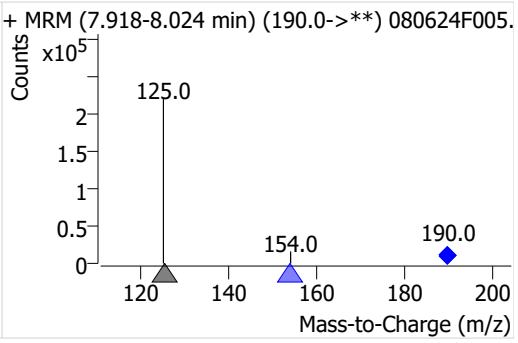




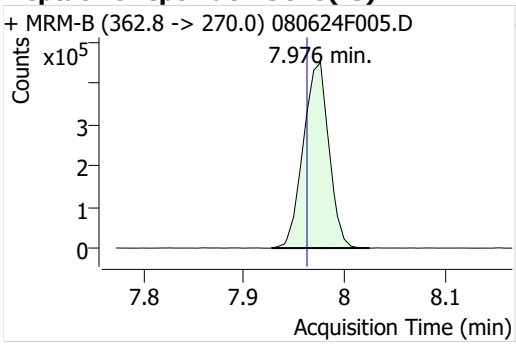
Oxychlordane-13C10(IS)

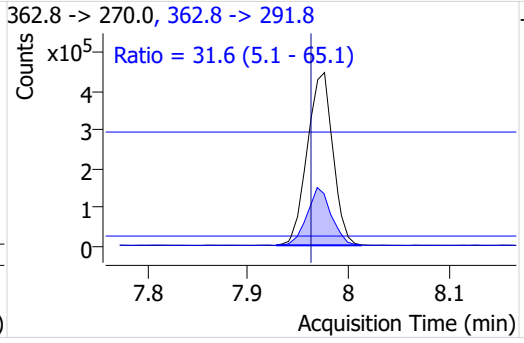


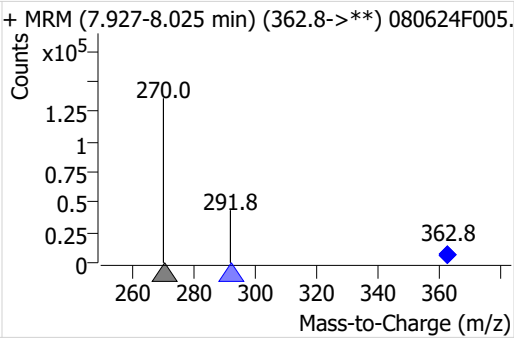




Heptachlor epoxide-13C10(IS)

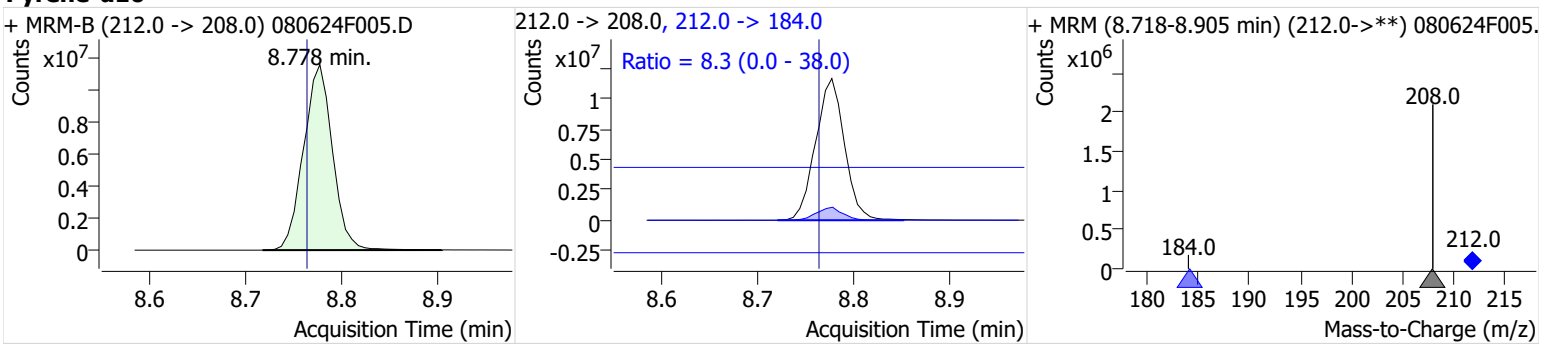




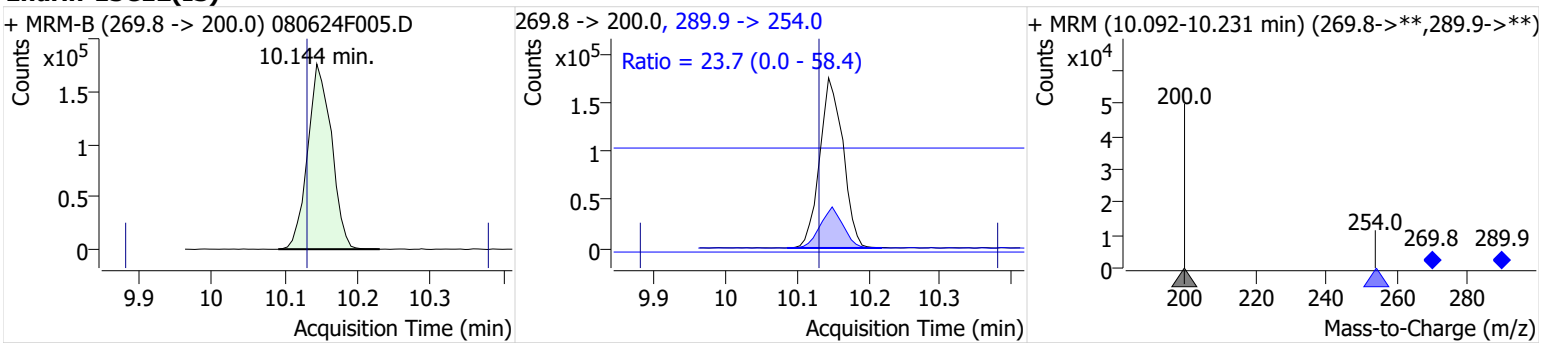


MassHunter Quantitative Analysis Sample Report

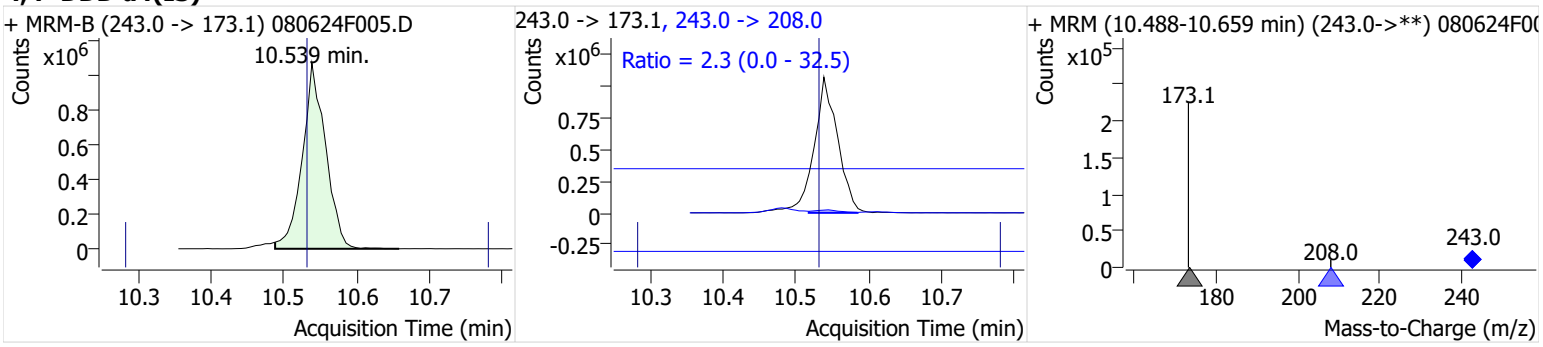
Pyrene-d10



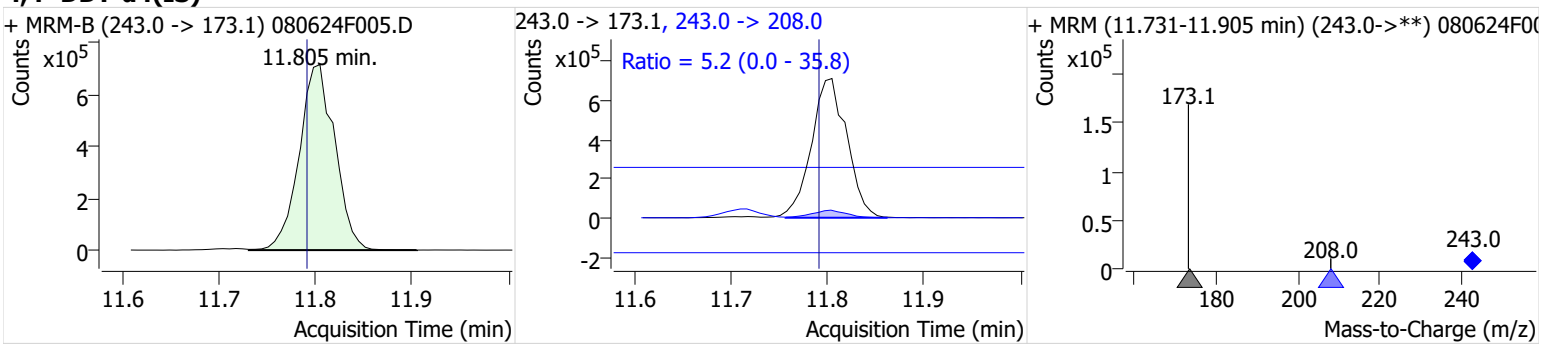
Endrin-13C12(IS)



4,4'-DDD d4(IS)

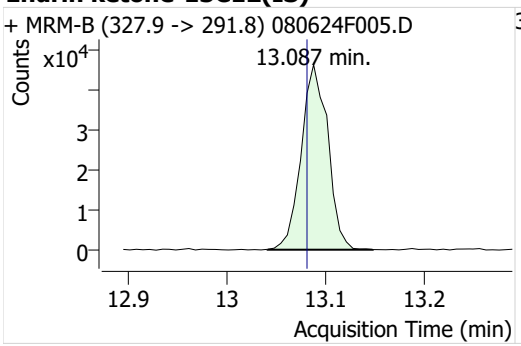


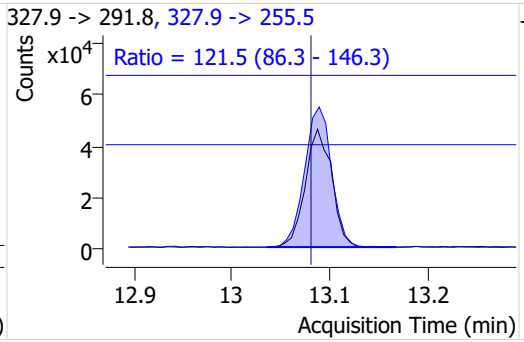
4,4'-DDT-d4(IS)

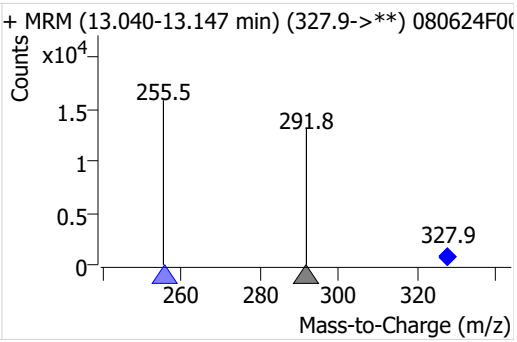


MassHunter Quantitative Analysis Sample Report

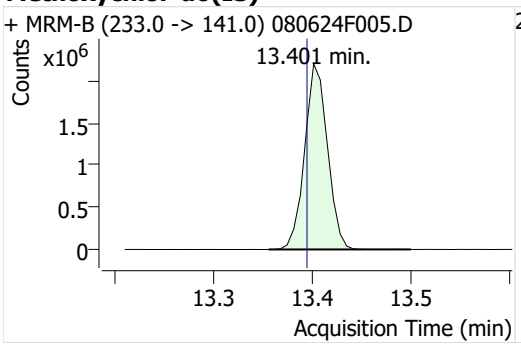
Endrin ketone-13C12(IS)

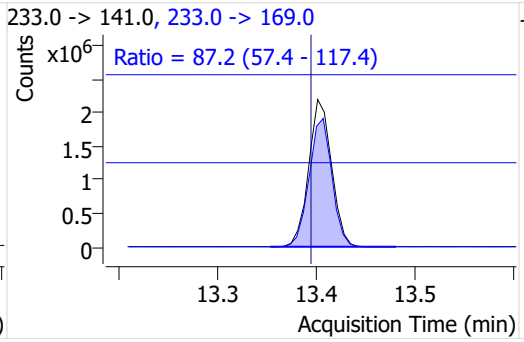


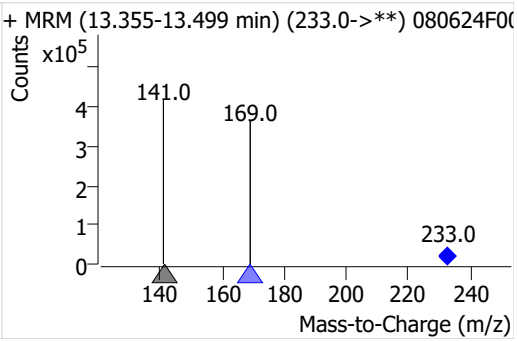




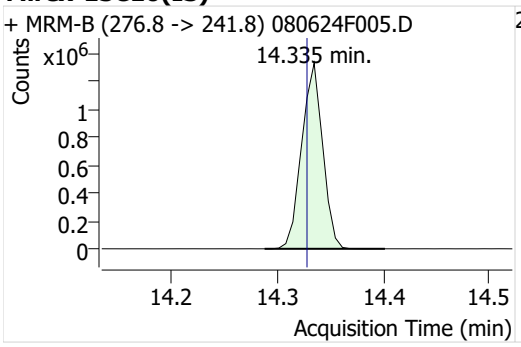
Methoxychlor-d6(IS)

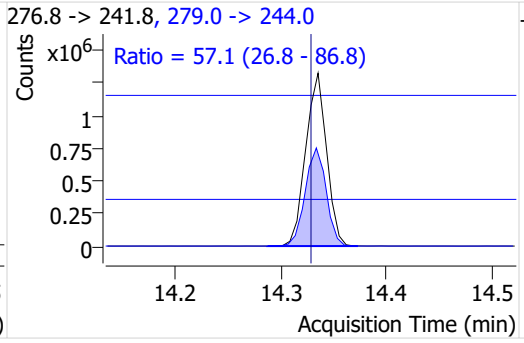


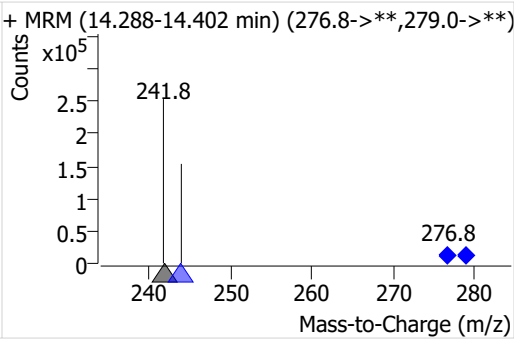




Mirex-13C10(IS)







1st 08/21/24
2nd 08/21/24

Validation Report

Data File: J:\MS47\data\082024\082024F015.D
Lab ID: KQ2413061-01
RunType: CCV
Matrix: Sediment

Date Acquired: 8/20/24 15:13
Batch ID: 851396
Analysis Method: 1699M/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Internal Standards	X	

Primary Review: _____

Printed: 9/18/24 9:37
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Secondary Review: _____

1st 08/21/24
2nd 08/21/24

Validation Report

Data File: J:\MS47\data\082024\082024F015.D
Lab ID: KQ2413061-01
RunType: CCV
Matrix: Sediment

Date Acquired: 8/20/24 15:13
Batch ID: 851396
Analysis Method: ALS SOP/OC_Pest_MS

Validations

Validation Categories	Pass	Fail
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Internal Standards	X	

Primary Review: _____

Secondary Review: _____

1st 08/21/24
2nd 08/21/24

Quantitation Report

Data File:	J:\MS47\data\082024\082024F015.D	**Instrument:**	K-MS-47
Acqu Date:	8/20/24 15:13	**Vial:**	2
Run Type:	CCV	**Dilution:**	1
Lab ID:	KQ2413061-01	**Raw Units:**	ng/ml

Bottle ID:		**Tier:**	II	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	8/2/24	**Receive Date:**	8/6/24

Analysis Lot:	851396	**Prep Lot:**		**Report Group:**	KQ2413061
Analysis	ALS SOP	**Prep Method:**			
		Prep Date:			

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400398
		Report List ID:	24064

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	9.716		9947083.288	100	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
S_Aldrin-13C12	7.956		2253444.621	23.297	Y
S_4,4'DDD-d4	11.644		1540170.474	5.755	Y
S_4,4'-DDT-d4	12.834		645465.715	4.649	Y
S_Endrin-13C12	11.222		341009.026	20.237	Y
S_Endrinket13C12	13.832		63583.248	21.176	Y
S_GBHCD6	6.012		3936967.843	23.580	Y
S_Heptachlor-13C10	7.235		2469281.267	21.179	Y
S_Oxychlordane-13C10	8.802		1131613.328	21.993	Y

Target Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
Aldrin	7.964		1572620.903	17.104	Y
beta-BHC	5.916		11736923.814	19.042	Y
gamma-BHC (Lindane)	6.070		9757135.355	19.220	Y
cis-Chlordane	9.767		3910768.949	19.354	Y
gamma-Chlordane	9.419		1417242.800	17.615	Y
2,4'-DDD	10.559		7349559.515	19.009	Y
4,4'-DDD	11.713		5627301.011	18.106	Y
2,4'-DDE	9.433		10460445.721	18.945	Y
4,4'-DDE	10.349		7296802.760	17.751	Y
2,4'-DDT	11.807		3923374.287	22.018	Y
4,4'-DDT	12.896		3155580.052	20.998	Y
Dieldrin	10.574		652180.483	18.313	Y

1st 08/21/24

2nd 08/21/24

Data File:	J:\MS47\data\082024\082024F015.D	**Instrument:**	K-MS-47
Acqu Date:	8/20/24 15:13	**Vial:**	2
Run Type:	CCV	**Dilution:**	1
Lab ID:	KQ2413061-01	**Raw Units:**	ng/ml

Target Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
Endrin Ketone	13.837		253180.694	18.121	Y
Heptachlor	7.238		2480734.678	19.608	Y
cis-Nonachlor	11.723		1078391.720	21.140	Y
trans-Nonachlor	9.841		1530709.285	21.848	Y
Oxychlordane	8.816		2752039.358	19.762	Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

1st 08/21/24
2nd 08/21/24

Quantitation Report

Data File:	J:\MS47\data\082024\082024F015.D	**Instrument:**	K-MS-47
Acqu Date:	8/20/24 15:13	**Vial:**	1
Run Type:	CCV	**Dilution:**	1
Lab ID:	KQ2413061-01	**Raw Units:**	ng/ml

Bottle ID:		**Tier:**	II	**Matrix:**	Sediment
Prod Code:	OC_Pest_MS	**Collect Date:**	8/2/24	**Receive Date:**	8/6/24

Analysis Lot:	851396	**Prep Lot:**		**Report Group:**	KQ2413061
Analysis	1699M	**Prep Method:**			
		Prep Date:			

Title:	Organochlorine Pesticides by GC/MS/MS	**Calibration ID:**	KC2400398
		Report List ID:	25424

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Pyrene-d10	9.716		9947083.288	100	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
S_Aldrin-13C12	7.956		2253444.621	23.297	Y
S_4,4'DDD-d4	11.644		1540170.474	5.755	Y
S_4,4'-DDT-d4	12.834		645465.715	4.649	Y
S_Endrin-13C12	11.222		341009.026	20.237	Y
S_GBHCD6	6.012		3936967.843	23.580	Y
S_Oxychlordane-13C10	8.802		1131613.328	21.993	Y

Target Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
Aldrin	7.964		1572620.903	17.104	Y
gamma-BHC (Lindane)	6.070		9757135.355	19.220	Y
cis-Chlordane	9.767		3910768.949	19.354	Y
2,4'-DDD	10.559		7349559.515	19.009	Y
4,4'-DDD	11.713		5627301.011	18.106	Y
2,4'-DDE	9.433		10460445.721	18.945	Y
4,4'-DDE	10.349		7296802.760	17.751	Y
2,4'-DDT	11.807		3923374.287	22.018	Y
4,4'-DDT	12.896		3155580.052	20.998	Y
Dieldrin	10.574		652180.483	18.313	Y
cis-Nonachlor	11.723		1078391.720	21.140	Y
trans-Nonachlor	9.841		1530709.285	21.848	Y
Oxychlordane	8.816		2752039.358	19.762	Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
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E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 9/18/24 9:37
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1st 08/20/24
2nd 08/21/24

MassHunter Quantitative Analysis Sample Report

Data File	J:\MS47\data\082024\082024F015.D		
Batch File	J:\MS47\data\082024\QuantResults\082024 OC PEST.batch.bin		
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Name	OC PEST ICV 20ppb SVM71-99K	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	9/18/2024 9:11:00 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method	082024 OC PEST ICAL.batch.bin	**Vial**	13
Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.704	289.8 -> 254.8	3945413	20.0000 ng/ml	0.001
gamma-BHC-d6(IS)	6.012	223.9 -> 187.0	3936968	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	7.235	276.8 -> 241.8	2469281	20.0000 ng/ml	0.001
Chorpyrifos-d10(IS)	7.649	199.9 -> 171.9	883267	20.0000 ng/ml	0.003
Aldrin-13C(IS)	7.956	269.8 -> 200.0	2253664	20.0000 ng/ml	0.000
Octachlorostyrene-13C8(IS)	8.538	315.8 -> 245.8	2624536	20.0000 ng/ml	0.001
Isodrin-13C12(IS)	8.613	199.9 -> 130.1	1809236	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	8.802	190.0 -> 125.0	1131613	20.0000 ng/ml	0.006
Heptachlor epoxide-13C10(IS)	8.811	362.8 -> 270.0	675393	20.0000 ng/ml	0.000
Pyrene-d10	9.716	212.0 -> 208.0	9947083	100.0000 ng/ml	0.003
Endrin-13C12(IS)	11.222	269.8 -> 200.0	341009	20.0000 ng/ml	0.003
4,4'-DDD d4(IS)	11.644	243.0 -> 173.1	1540170	5.0000 ng/ml	0.030
4,4'-DDT-d4(IS)	12.834	243.0 -> 173.1	645466	5.0000 ng/ml	0.001
Endrin ketone-13C12(IS)	13.832	327.9 -> 291.8	63583	20.0000 ng/ml	0.000
Methoxychlor-d6(IS)	14.055	233.0 -> 141.0	1160642	20.0000 ng/ml	0.004
Mirex-13C10(IS)	14.915	276.8 -> 241.8	1786984	5.0000 ng/ml	0.001

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**
Hexachlorobenzene-13C6	5.704	289.8 -> 254.8	3945413	22.469 ng/ml
		Spiked Amount = 20.0		Recovery = *112.3 %*
gamma-BHC-d6	6.012	223.9 -> 187.0	3936968	23.580 ng/ml
		Spiked Amount = 20.0		Recovery = *117.9 %*
Heptachlor-13C10	7.235	276.8 -> 241.8	2469281	21.179 ng/ml
		Spiked Amount = 20.0		Recovery = *105.9 %*
Chorpyrifos-d10	7.649	199.9 -> 171.9	883267	22.000 ng/ml
		Spiked Amount = 20.0		Recovery = *110.0 %*
Aldrin-13C	7.956	269.8 -> 200.0	2253445	23.297 ng/ml
		Spiked Amount = 20.0		Recovery = *116.5 %*
Octachlorostyrene-13C8	8.538	315.8 -> 245.8	2624536	23.789 ng/ml
		Spiked Amount = 20.0		Recovery = *118.9 %*
Isodrin-13C12	8.613	199.9 -> 130.1	1809236	24.049 ng/ml
		Spiked Amount = 20.0		Recovery = *120.2 %*
Oxychlordane-13C10	8.802	190.0 -> 125.0	1131613	21.993 ng/ml
		Spiked Amount = 20.0		Recovery = *110.0 %*
Heptachlor epoxide-13C10	8.811	362.8 -> 270.0	675393	22.206 ng/ml
		Spiked Amount = 20.0		Recovery = *111.0 %*
Endrin-13C12	11.222	269.8 -> 200.0	341009	20.237 ng/ml
		Spiked Amount = 20.0		Recovery = *101.2 %*
4,4'-DDD d4	11.644	243.0 -> 173.1	1540170	5.755 ng/ml
		Spiked Amount = 5.0		Recovery = *115.1 %*
4,4'-DDT-d4	12.834	243.0 -> 173.1	645466	4.649 ng/ml
		Spiked Amount = 5.0		Recovery = *93.0 %*
Endrin ketone-13C12	13.832	327.9 -> 291.8	63583	21.176 ng/ml
		Spiked Amount = 20.0		Recovery = *105.9 %*
Methoxychlor-d6	14.055	233.0 -> 141.0	1160642	19.481 ng/ml
		Spiked Amount = 20.0		Recovery = *97.4 %*

MassHunter Quantitative Analysis Sample Report

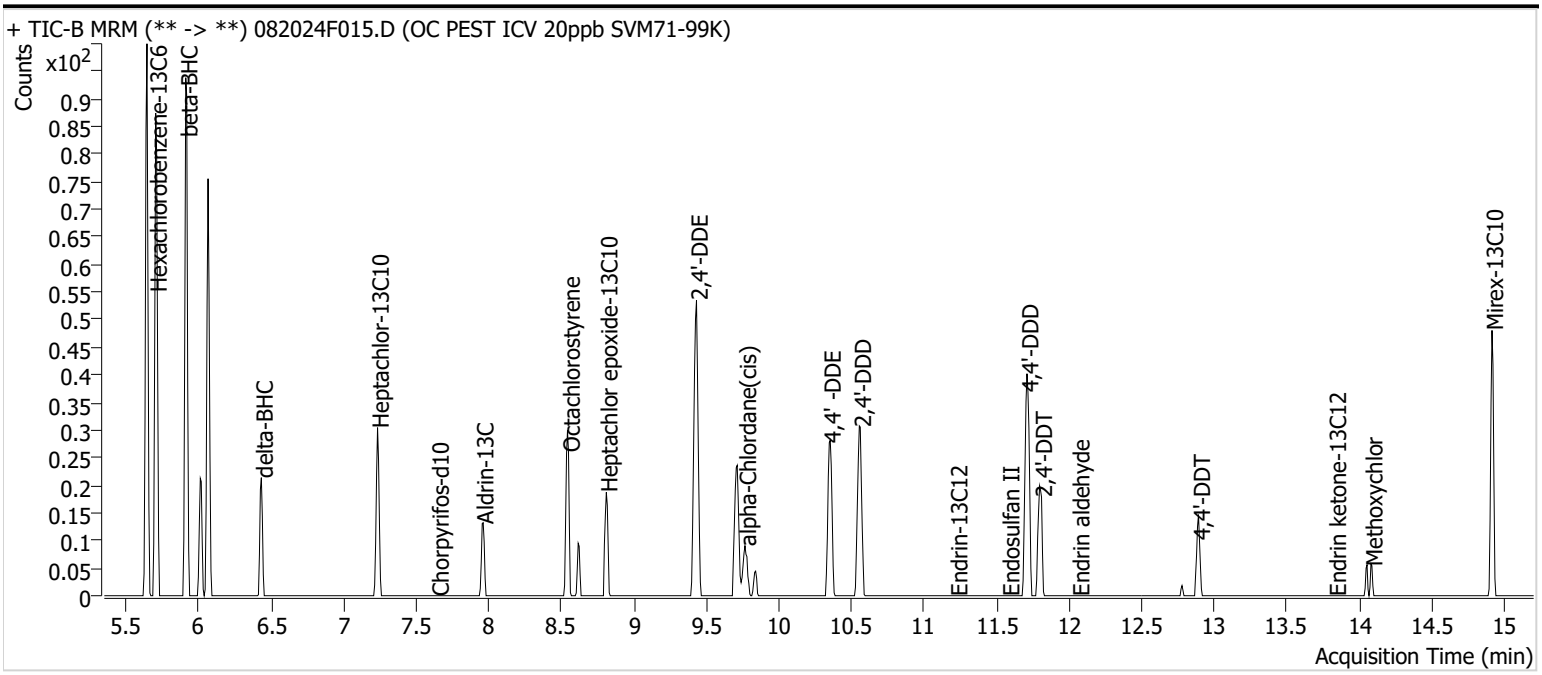
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.915	276.8 -> 241.8	1786984	5.125 ng/ml
		Spiked Amount =	5.0	Recovery = *102.5 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)	5.649	181.1 -> 145.1	12276037	18.588 ng/ml	100
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.706	283.8 -> 213.9	7100665	20.713 ng/ml	100
beta-BHC	gamma-BHC-d6(IS)	5.916	181.1 -> 145.1	11736924	19.042 ng/ml	100
gamma-BHC(Lindane)	gamma-BHC-d6(IS)	6.070	181.1 -> 145.1	9757135	19.220 ng/ml	100
delta-BHC	gamma-BHC-d6(IS)	6.436	181.1 -> 145.1	3468966	19.112 ng/ml	100
Heptachlor	Heptachlor-13C10(IS)	7.238	271.7 -> 236.9	2480735	19.608 ng/ml	100
Chorpyrifos	Chorpyrifos-d10(IS)	7.733	196.9 -> 169.0	871811	15.569 ng/ml	100
Aldrin	Aldrin-13C(IS)	7.964	254.9 -> 220.0	1572621	17.104 ng/ml	100
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.551	342.8 -> 307.8	4975489	18.702 ng/ml	100
Isodrin	Isodrin-13C12(IS)	8.627	193.0 -> 123.0	1978801	19.898 ng/ml	100
Oxychlordane	Oxychlordane-13C10(IS)	8.816	114.9 -> 51.1	2752039	19.762 ng/ml	100
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	8.818	352.8 -> 262.9	699757	18.561 ng/ml	100
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.419	271.8 -> 236.9	1417243	17.615 ng/ml	100
2,4'-DDE	4,4'-DDD d4(IS)	9.433	246.0 -> 176.2	10460446	18.945 ng/ml	100
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.767	271.8 -> 236.9	3910769	19.354 ng/ml	100
Endosulfan I	Endrin-13C12(IS)	9.797	206.9 -> 172.0	609135	22.060 ng/ml	100
trans-Nanochlor	Oxychlordane-13C10(IS)	9.841	271.8 -> 236.9	1530709	21.848 ng/ml	100
4,4' -DDE	4,4'-DDD d4(IS)	10.349	246.0 -> 176.2	7296803	17.751 ng/ml	100
2,4'-DDD	4,4'-DDD d4(IS)	10.559	235.0 -> 165.1	7349560	19.009 ng/ml	100
Dieldrin	Endrin-13C12(IS)	10.574	262.9 -> 193.0	652180	18.313 ng/ml	100
Endrin	Endrin-13C12(IS)	11.230	262.8 -> 193.0	372889	18.687 ng/ml	100
Endosulfan II	Endrin-13C12(IS)	11.580	206.9 -> 172.0	301433	22.216 ng/ml	100
4,4'-DDD	4,4'-DDD d4(IS)	11.713	235.0 -> 165.1	5627301	18.106 ng/ml	100
cis-Nonachlor	Oxychlordane-13C10(IS)	11.723	271.8 -> 236.9	1078392	21.140 ng/ml	100
2,4'-DDT	4,4'-DDT-d4(IS)	11.807	235.0 -> 165.1	3923374	22.018 ng/ml	100
Endrin aldehyde	Endrin-13C12(IS)	12.064	249.9 -> 214.9	150779	20.376 ng/ml	100
Endosulfan sulfate	Endrin-13C12(IS)	12.778	271.9 -> 237.0	788335	18.864 ng/ml	100
4,4'-DDT	4,4'-DDT-d4(IS)	12.896	235.0 -> 165.1	3155580	20.998 ng/ml	100
Endrin ketone	Endrin ketone-13C12(IS)	13.837	147.0 -> 111.0	253181	18.121 ng/ml	100
Methoxychlor	Methoxychlor-d6(IS)	14.084	227.0 -> 141.1	1173655	18.908 ng/ml	100
Mirex	Mirex-13C10(IS)	14.916	271.8 -> 236.8	7097223	19.669 ng/ml	100

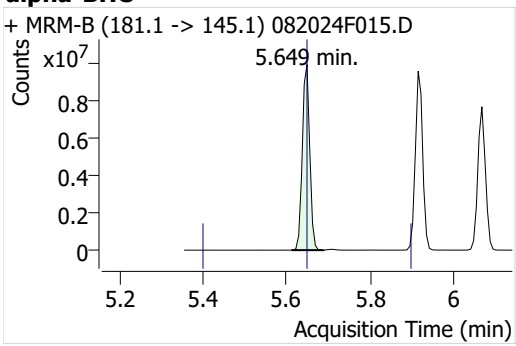
(m) = manual integration ND = Not Detected NC = Not Calculated

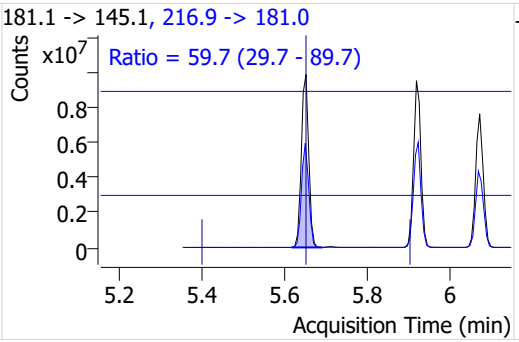
Sample Chromatogram

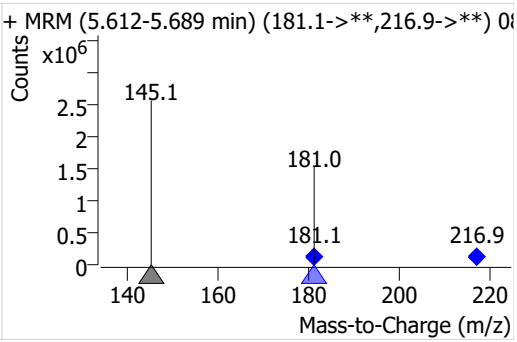
MassHunter Quantitative Analysis Sample Report



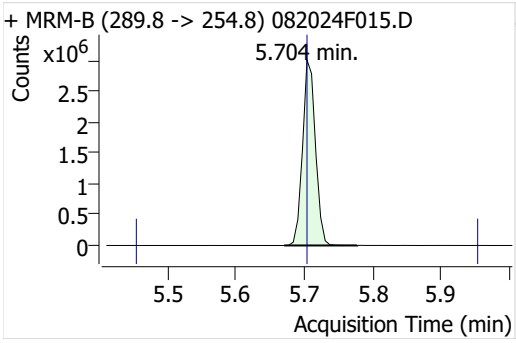
alpha-BHC

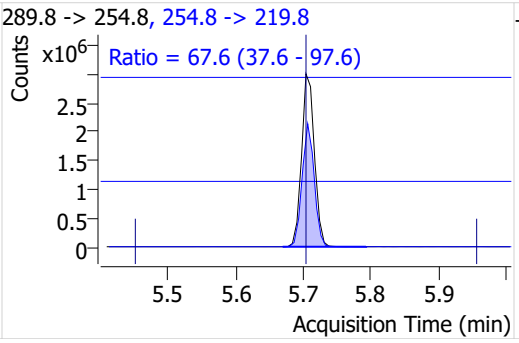


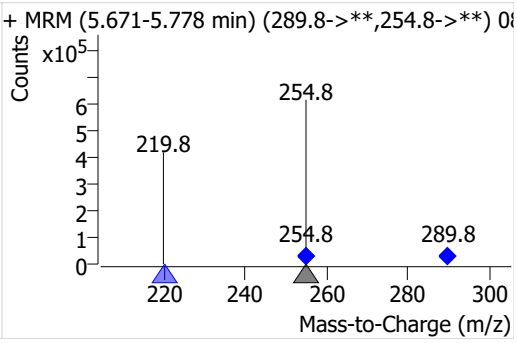




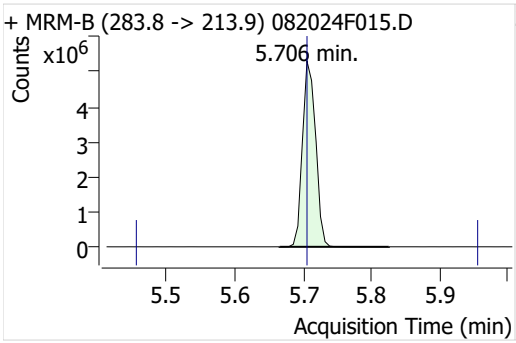
Hexachlorobenzene-13C6

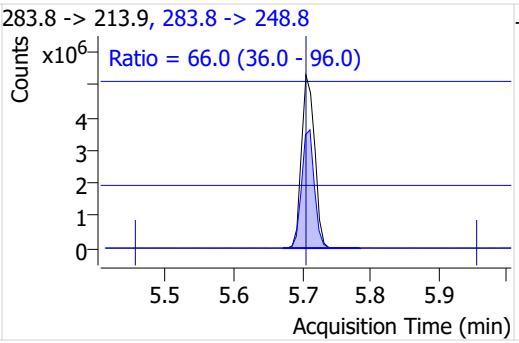


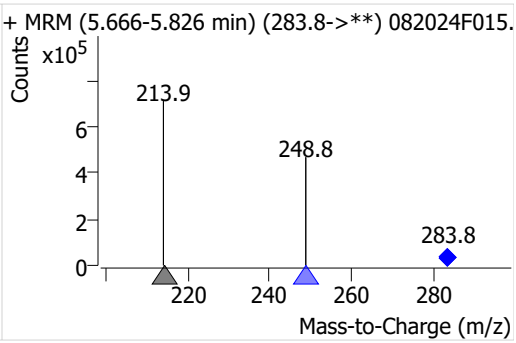




Hexachlorobenzene

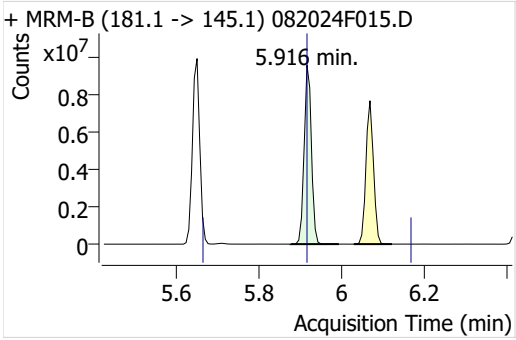


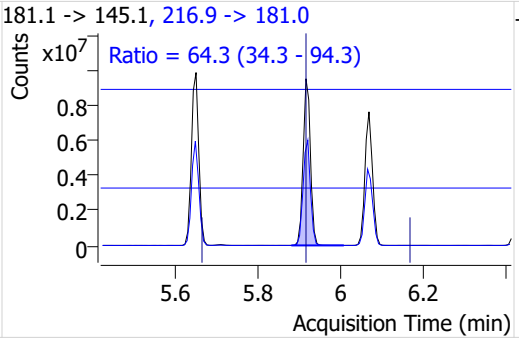


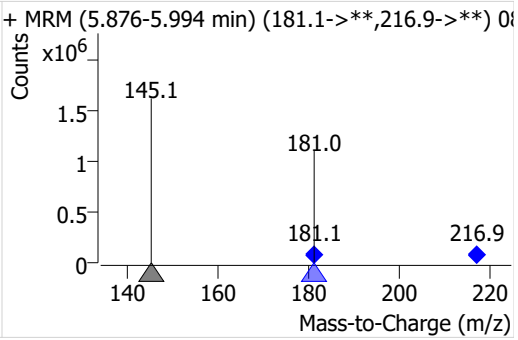


MassHunter Quantitative Analysis Sample Report

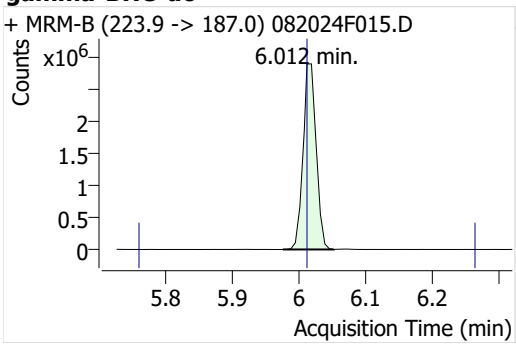
beta-BHC

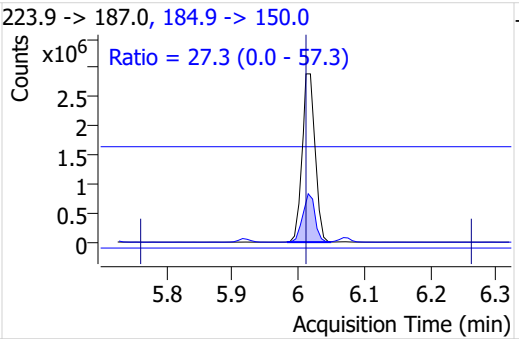


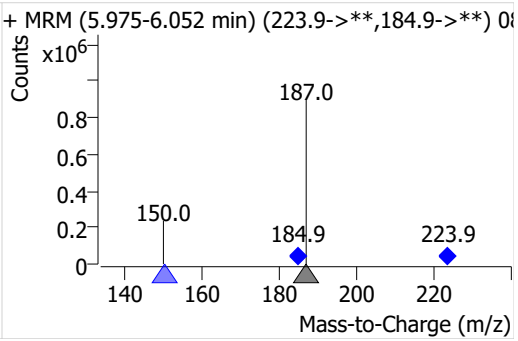




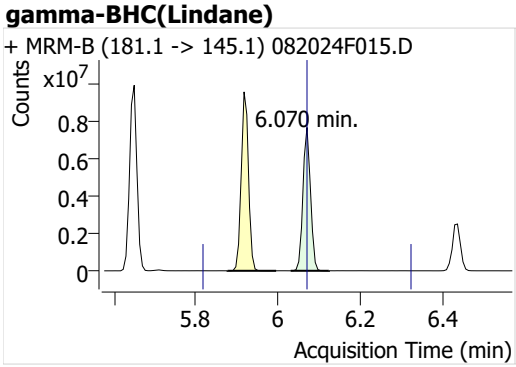
gamma-BHC-d6

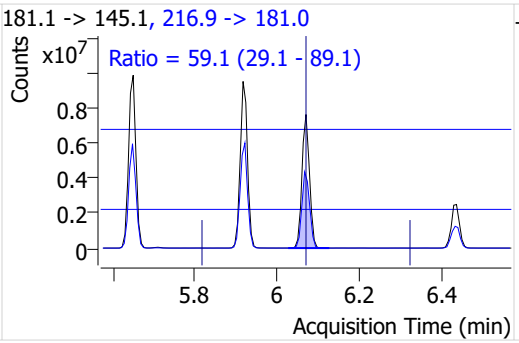


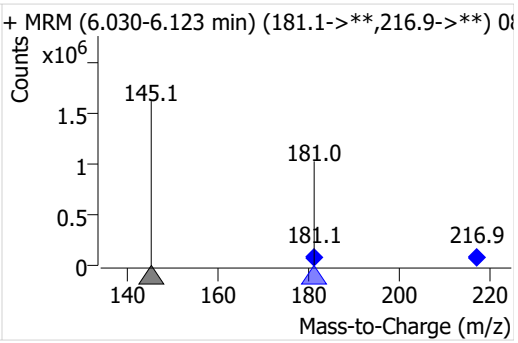




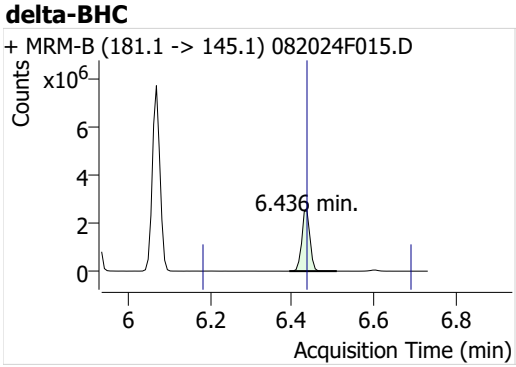
gamma-BHC(Lindane)

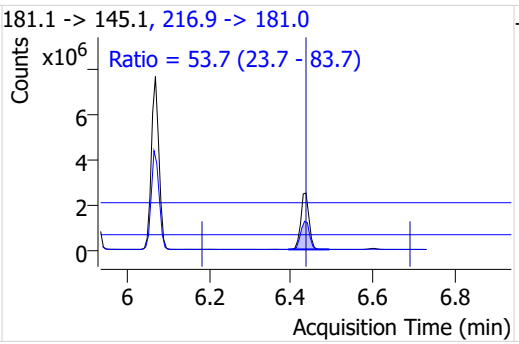


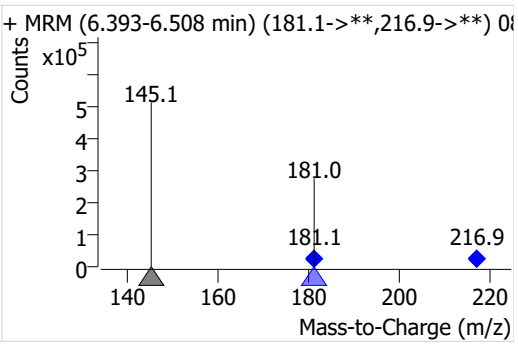




delta-BHC

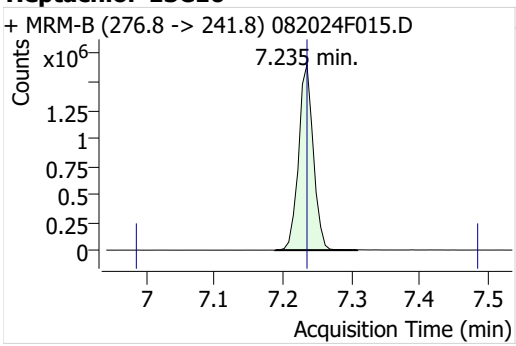


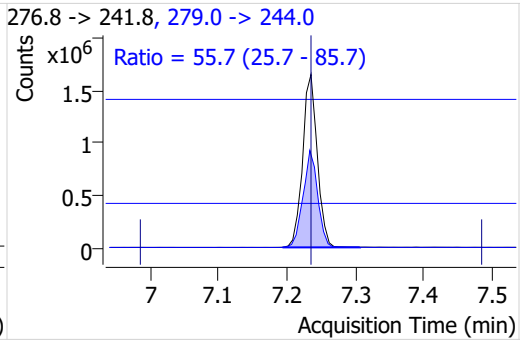


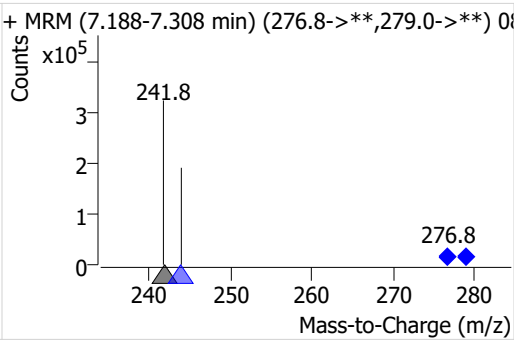


MassHunter Quantitative Analysis Sample Report

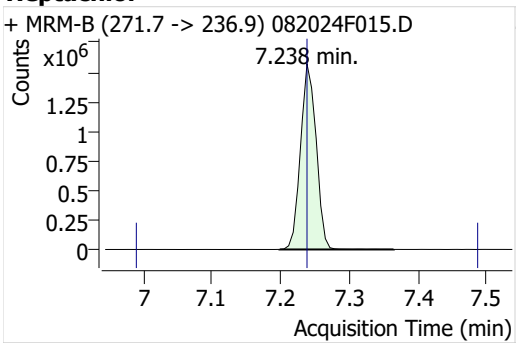
Heptachlor-13C10

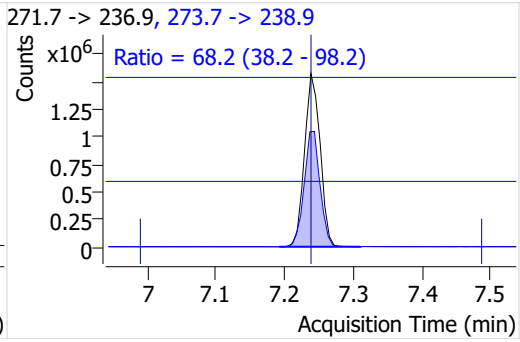


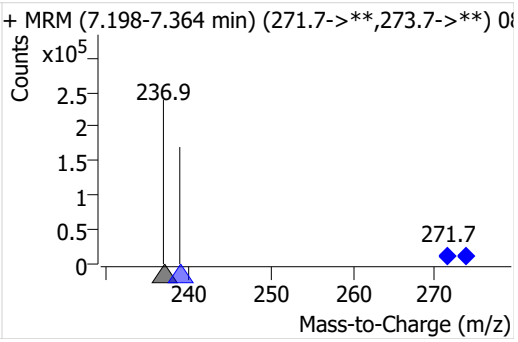




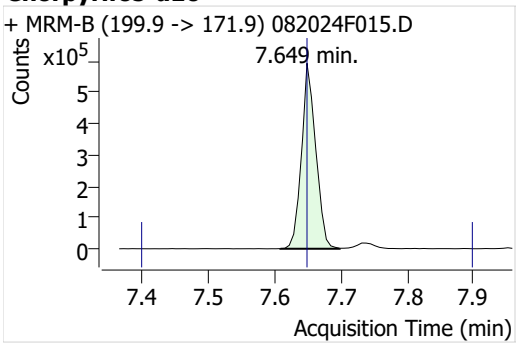
Heptachlor

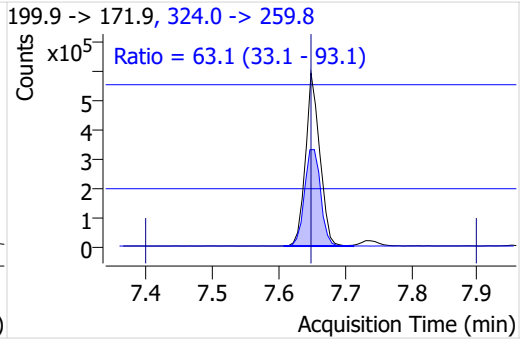


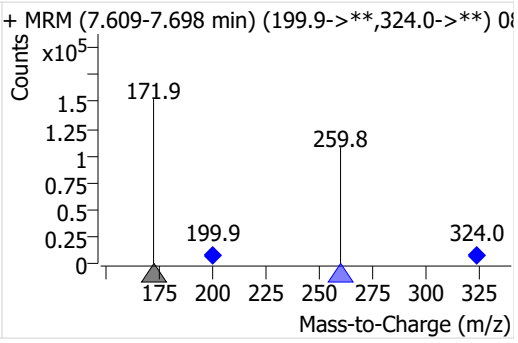




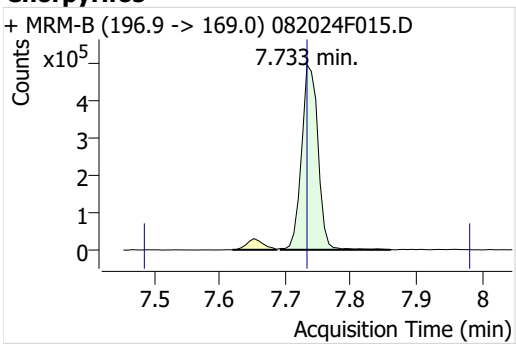
Chorpyrifos-d10

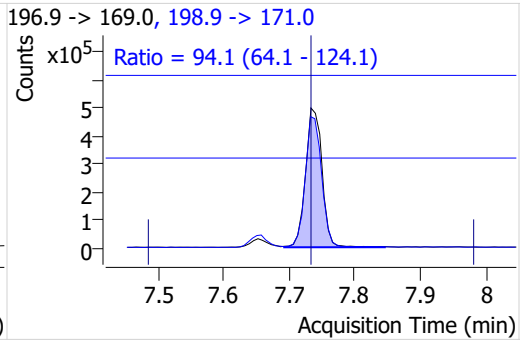


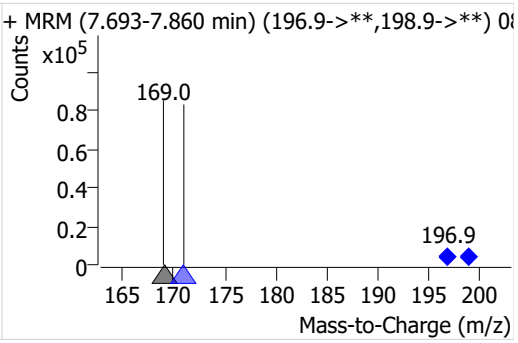




Chorpyrifos

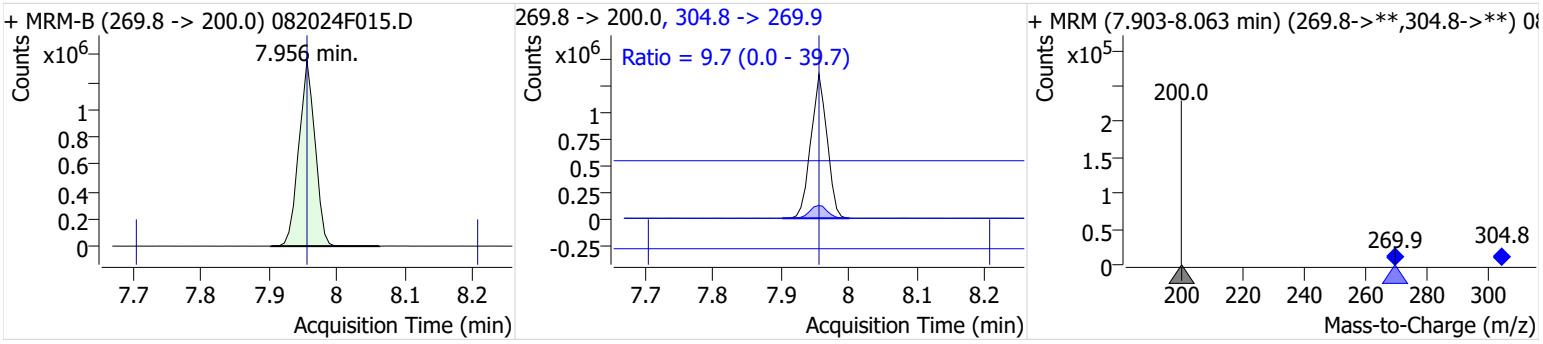




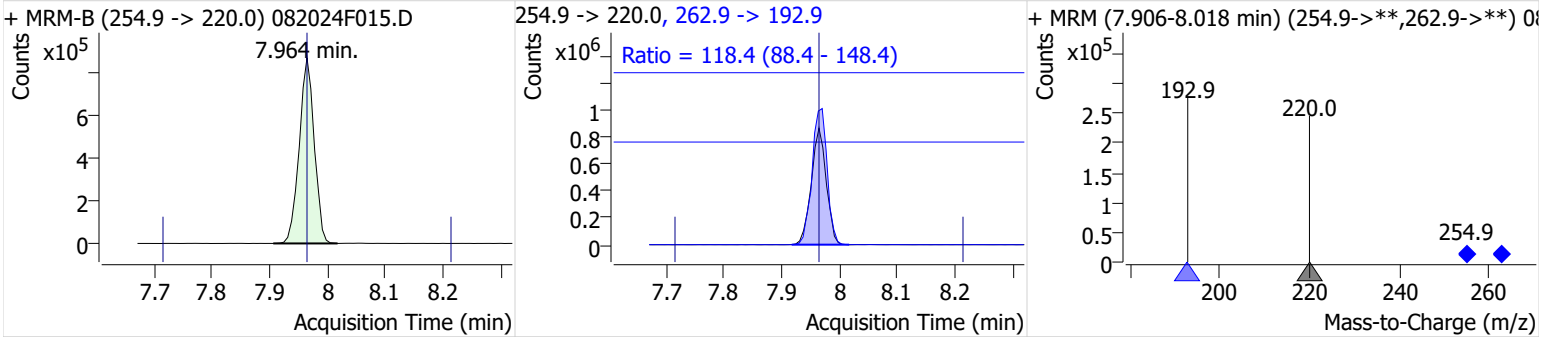


MassHunter Quantitative Analysis Sample Report

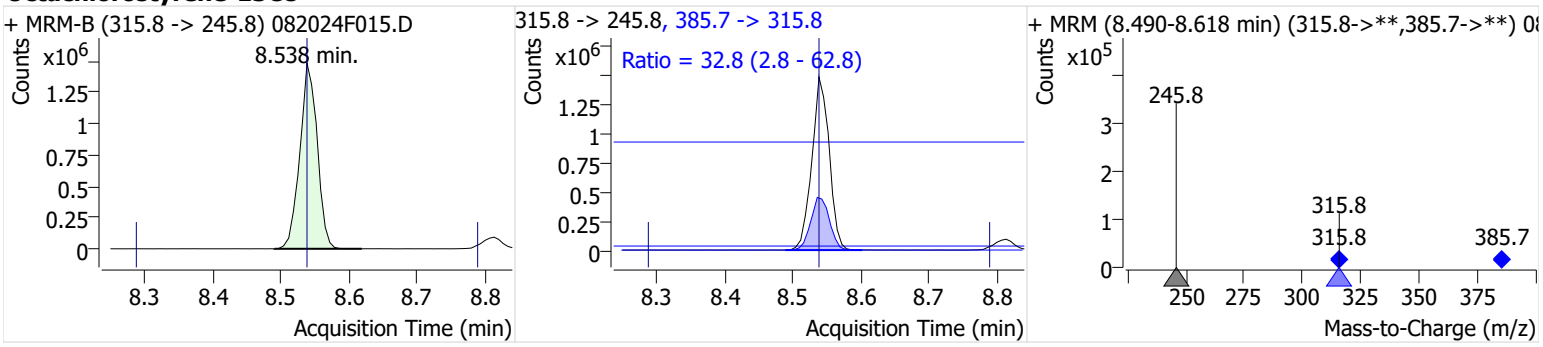
Aldrin-13C



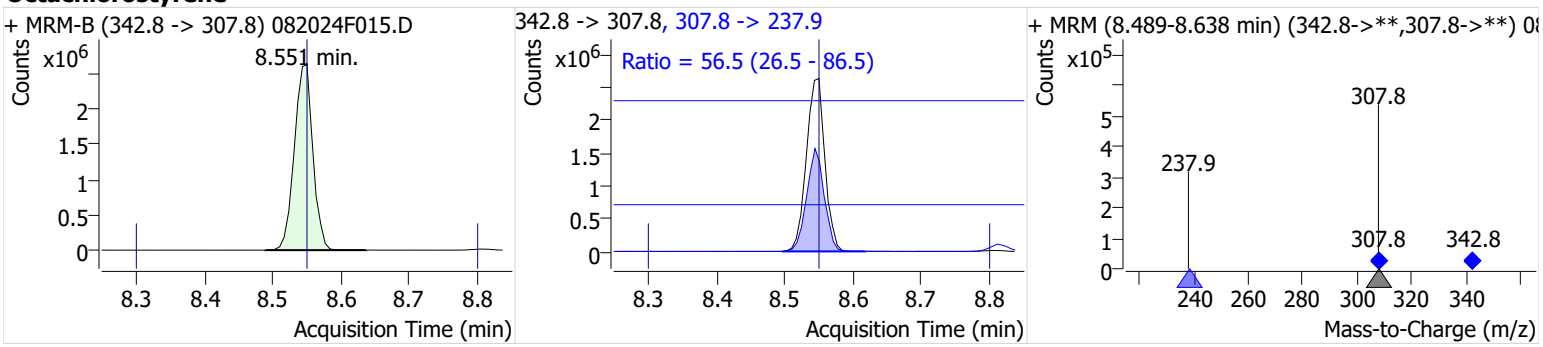
Aldrin



Octachlorostyrene-13C8



Octachlorostyrene



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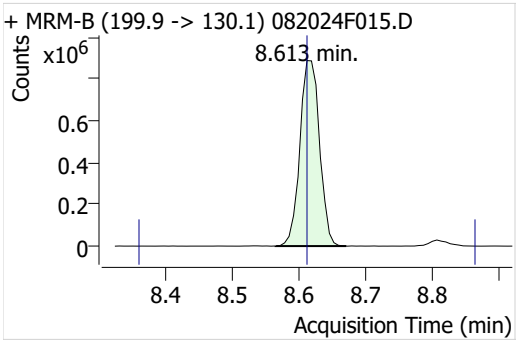
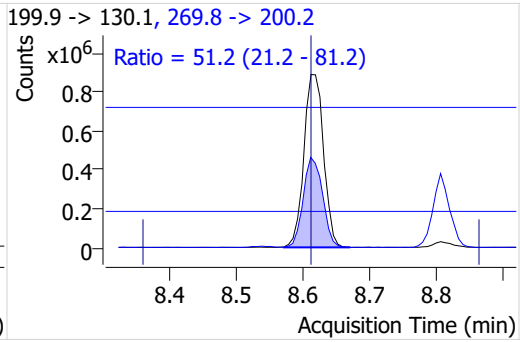
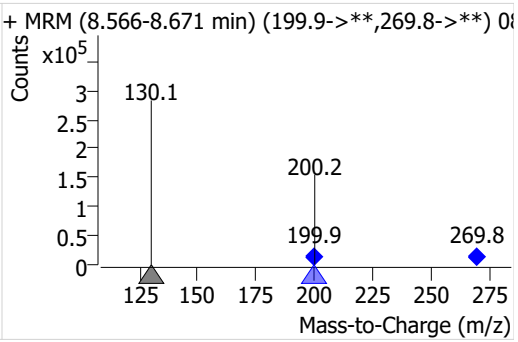
Isodrin-13C12







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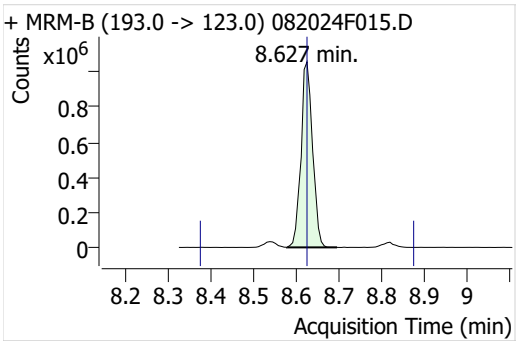
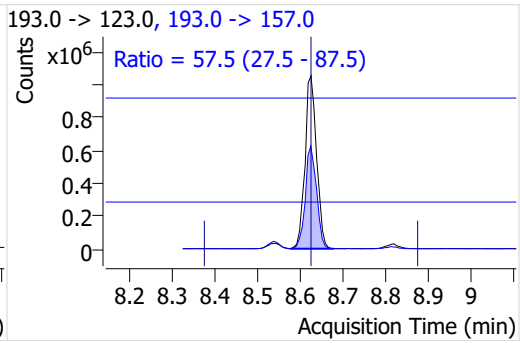
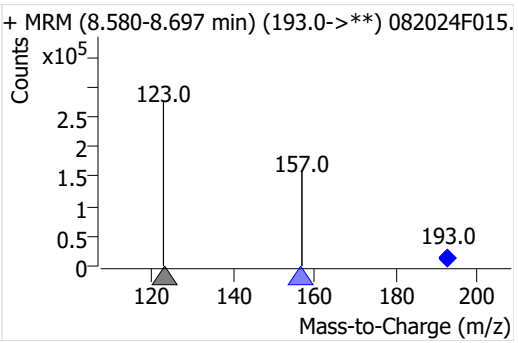
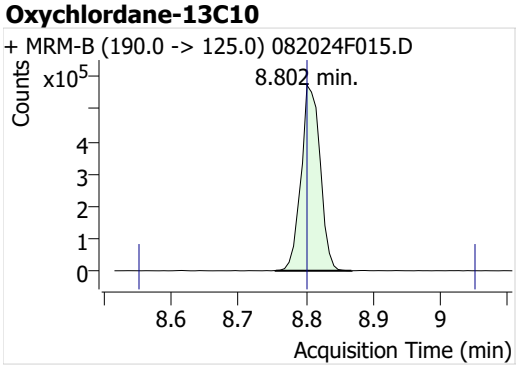
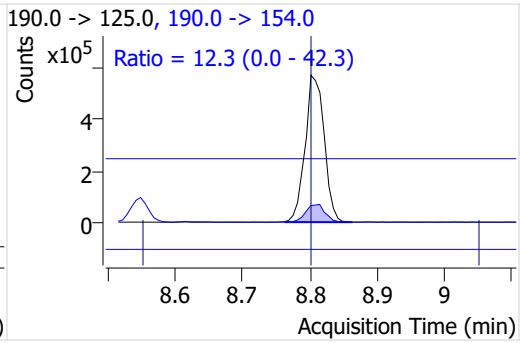


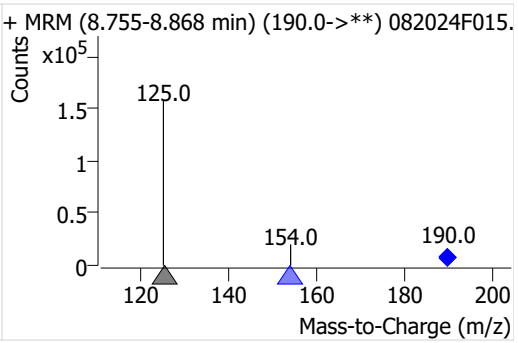




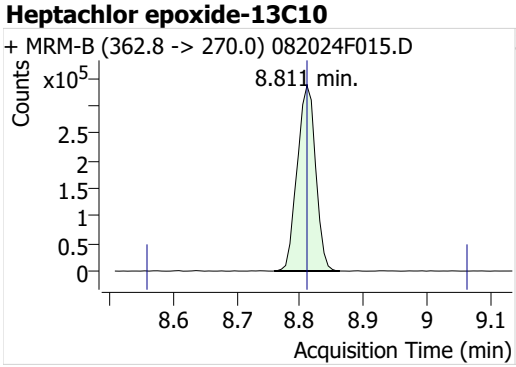
Oxychlordane-13C10

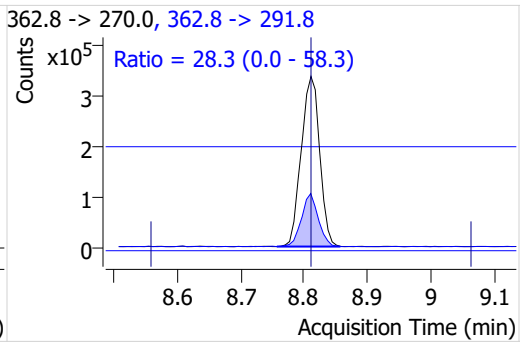


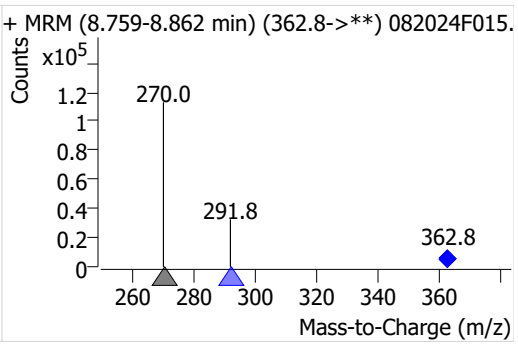




Heptachlor epoxide-13C10







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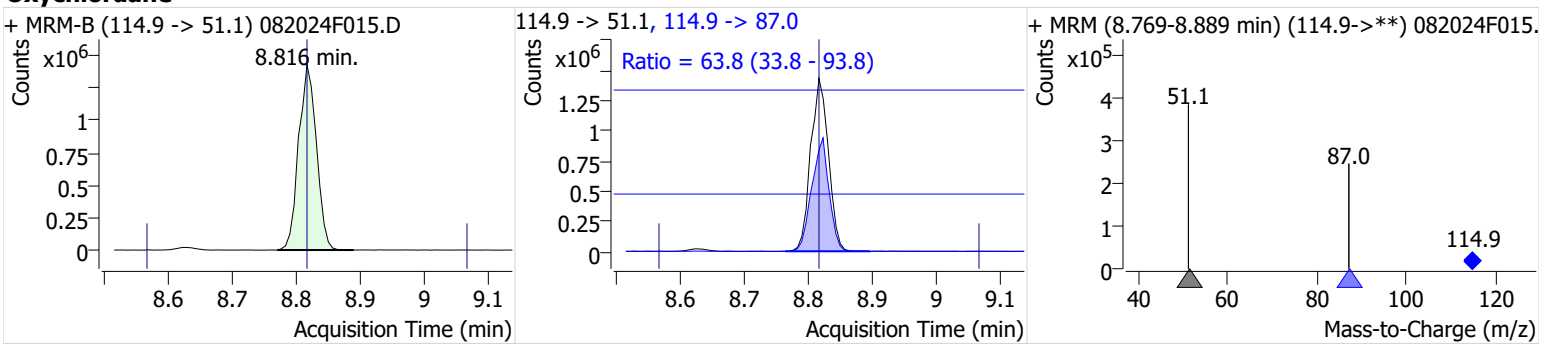
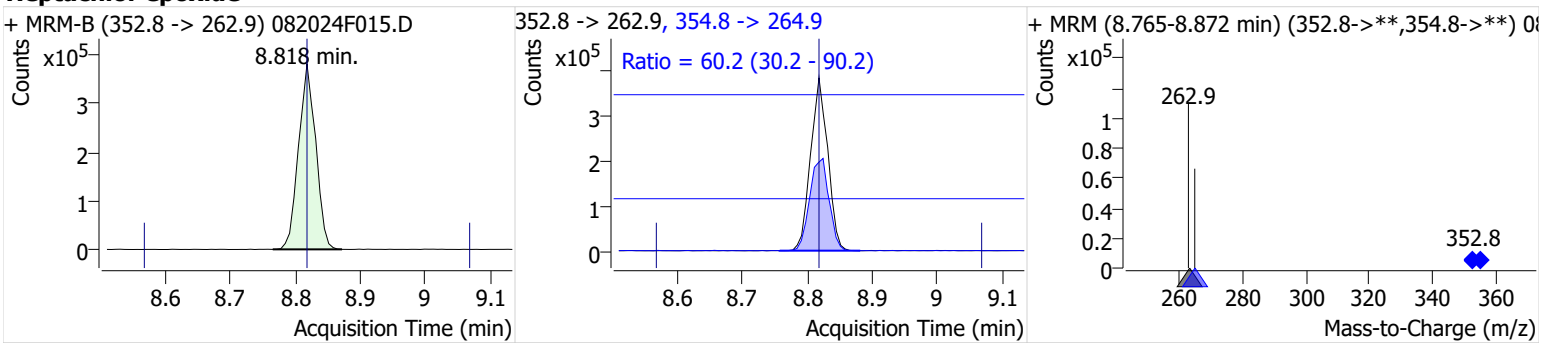
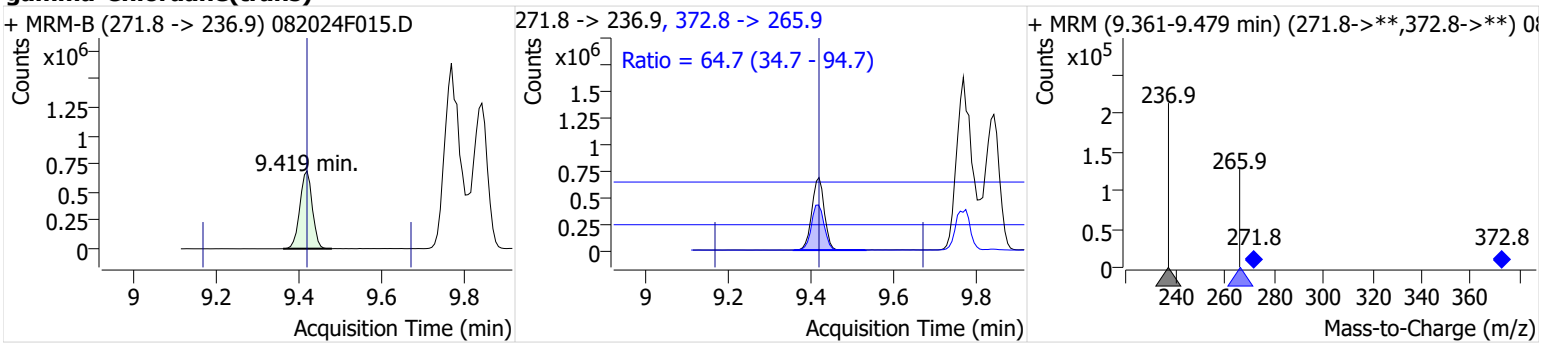
Oxychlordane



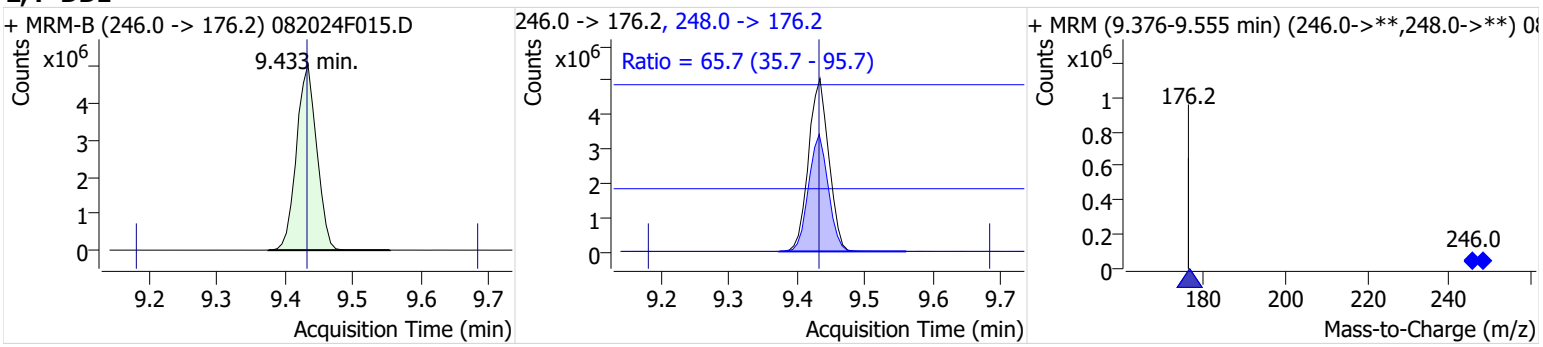
Heptachlor epoxide



gamma-Chlordane(trans)



2,4'-DDE



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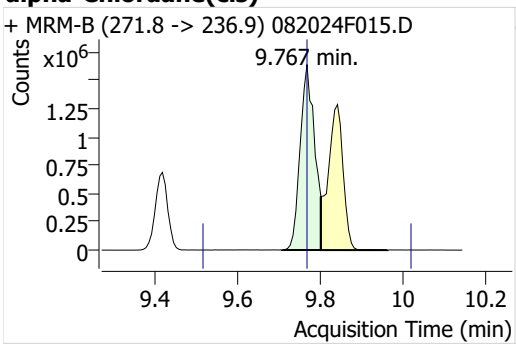
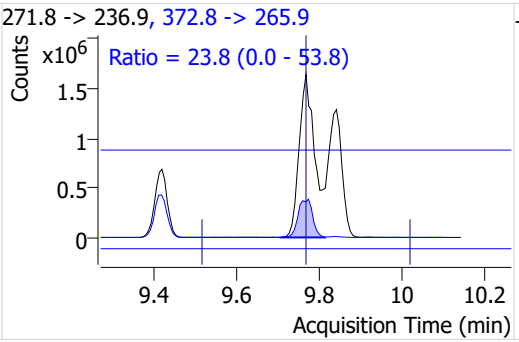
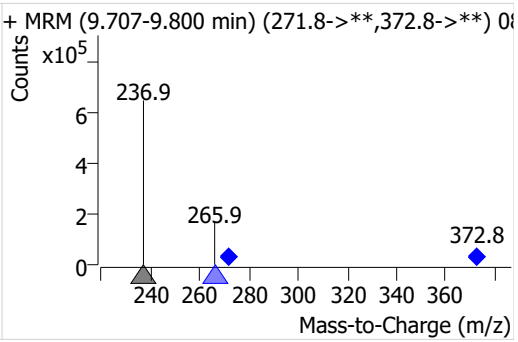
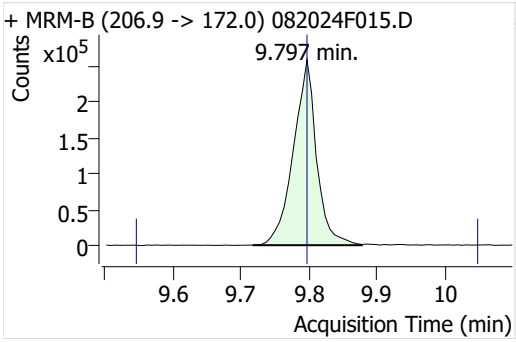
alpha-Chlordane(cis)

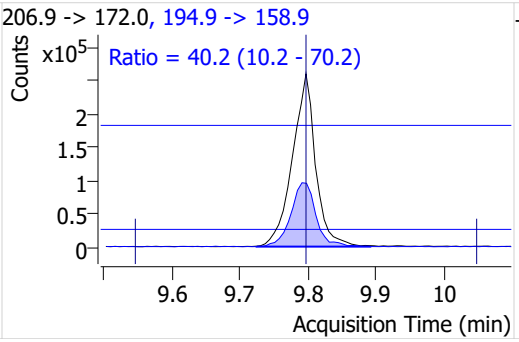


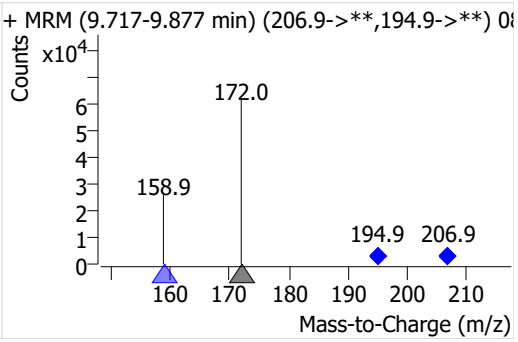




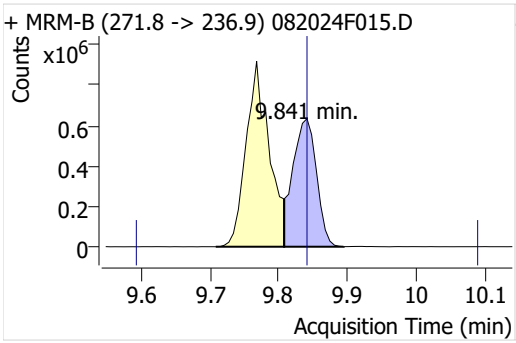
Endosulfan I

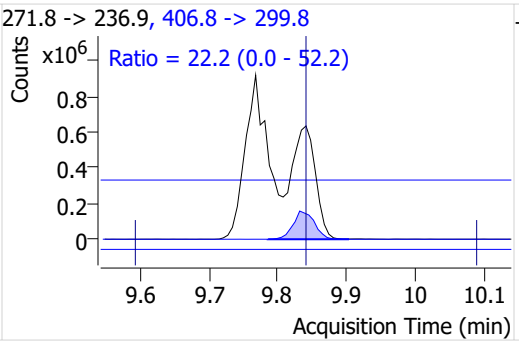


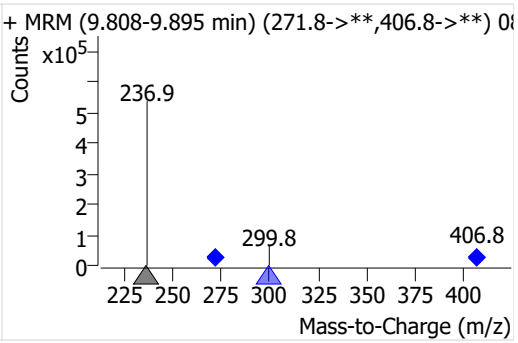




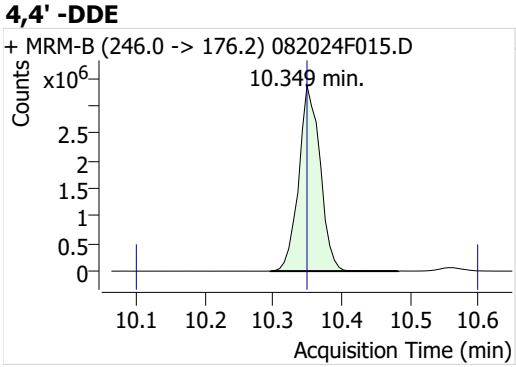
trans-Nanochlor

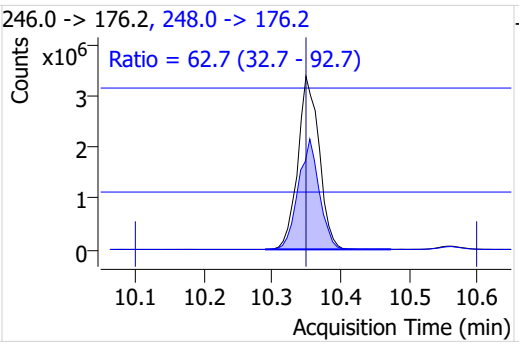


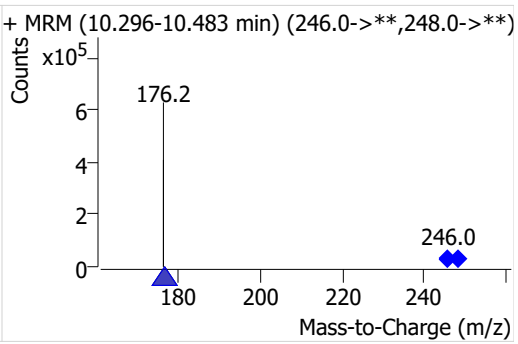




4,4' -DDE







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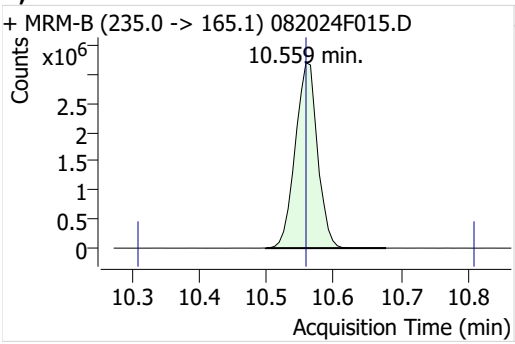
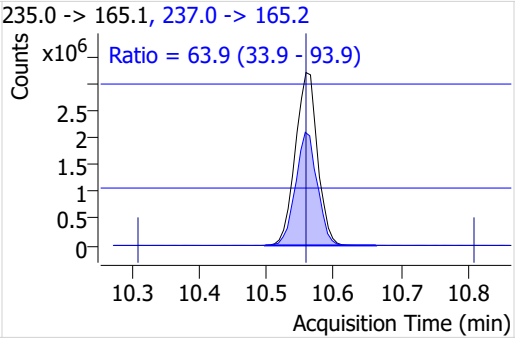
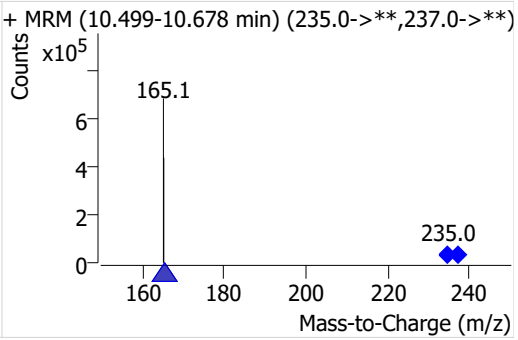
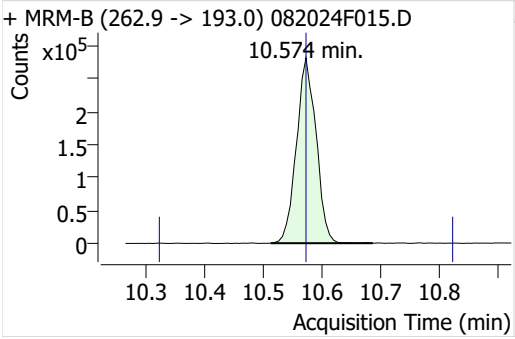
2,4'-DDD

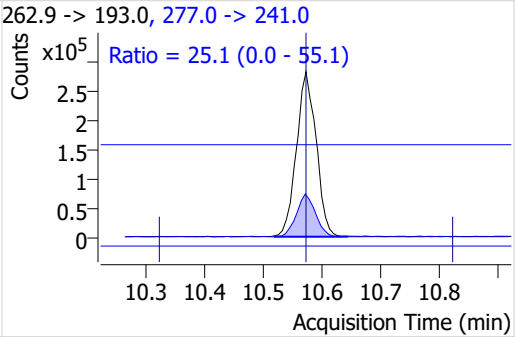


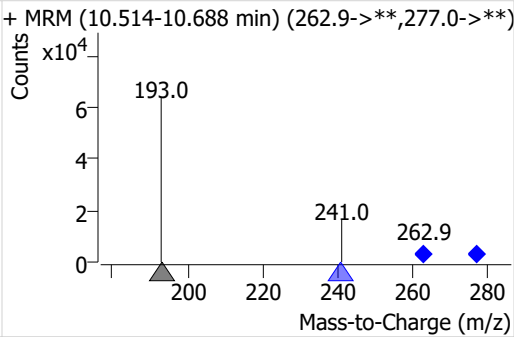




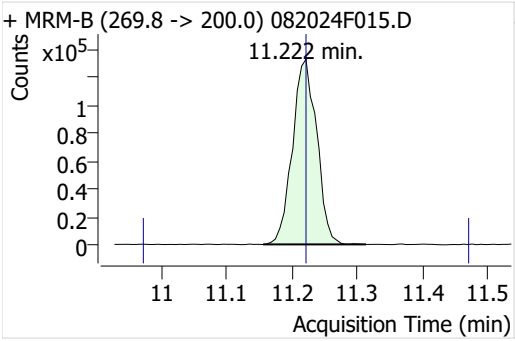
Dieldrin

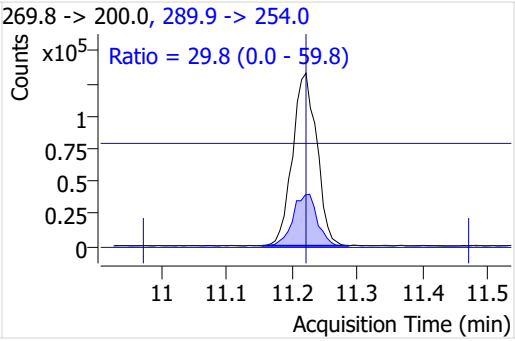


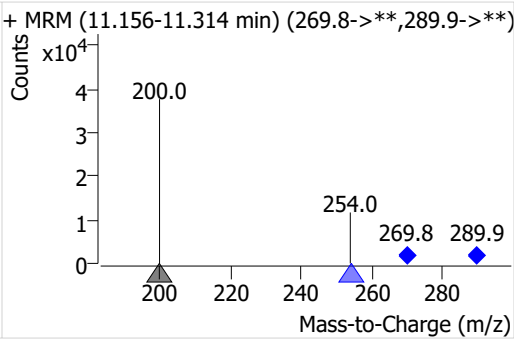




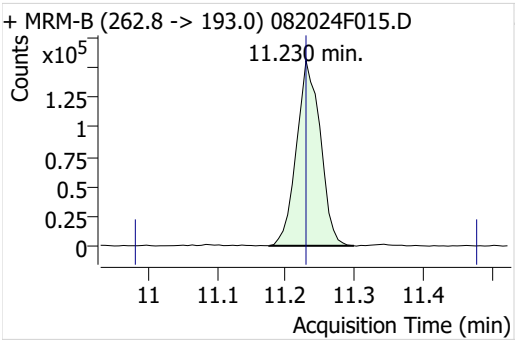
Endrin-13C12

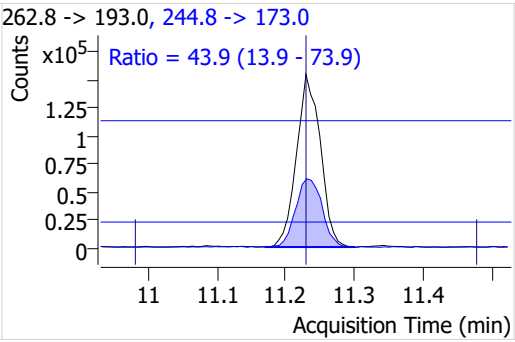


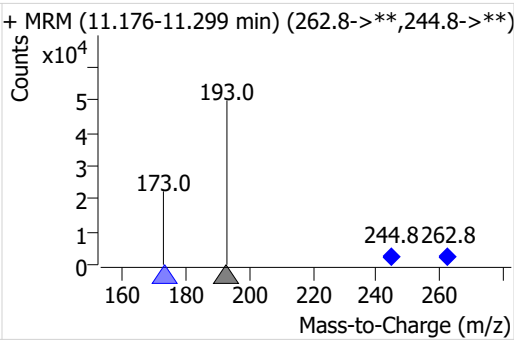




Endrin







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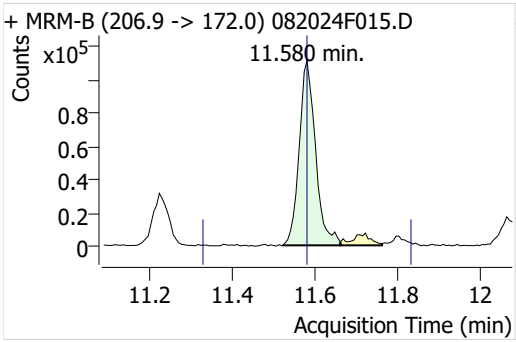
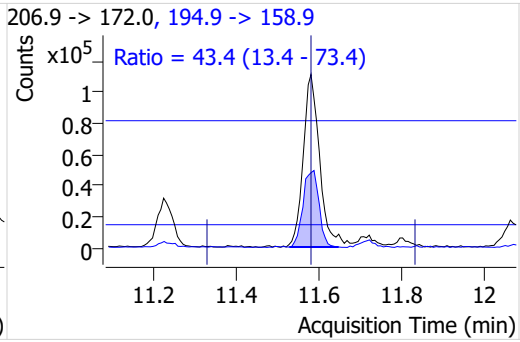
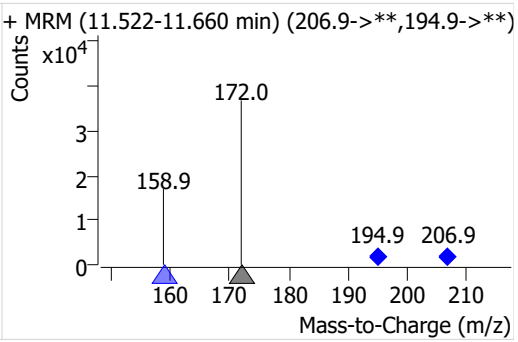
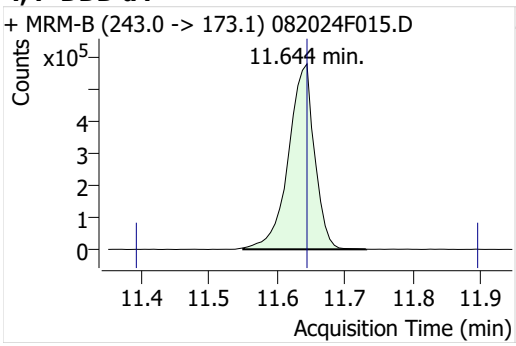
Endosulfan II

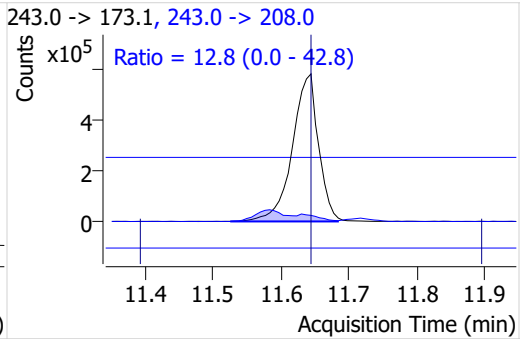


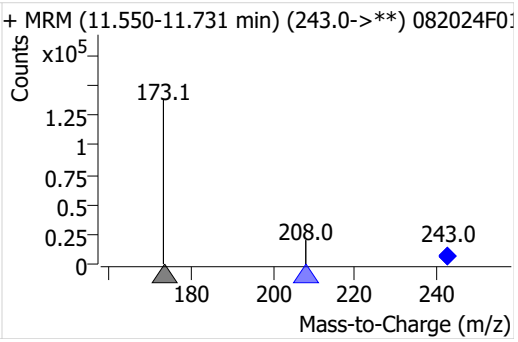




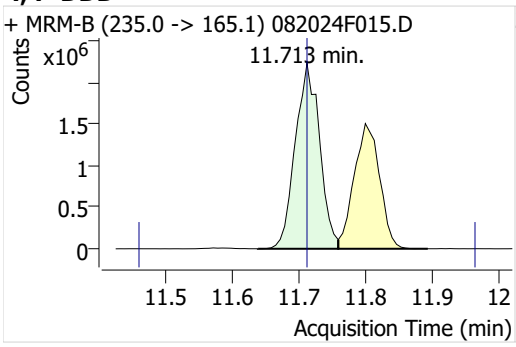
4,4'-DDD d4

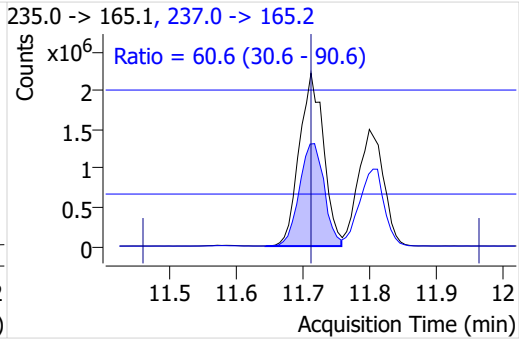


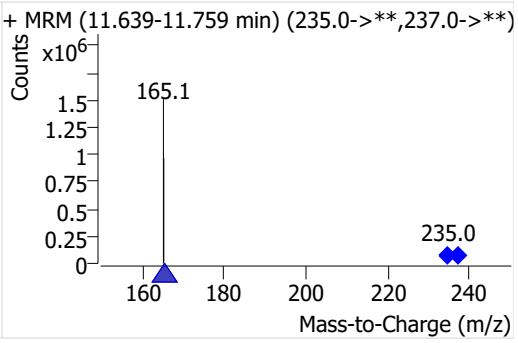




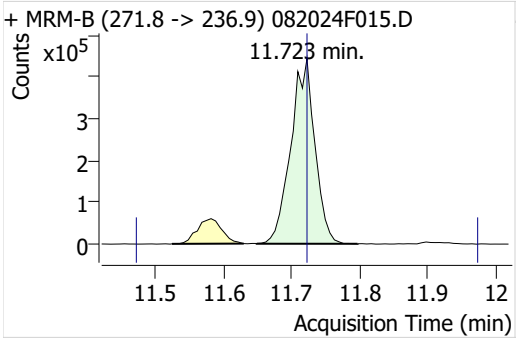
4,4'-DDD

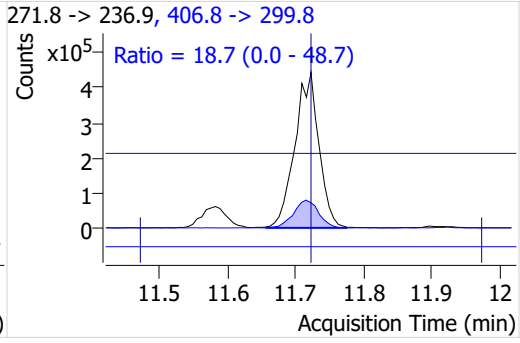


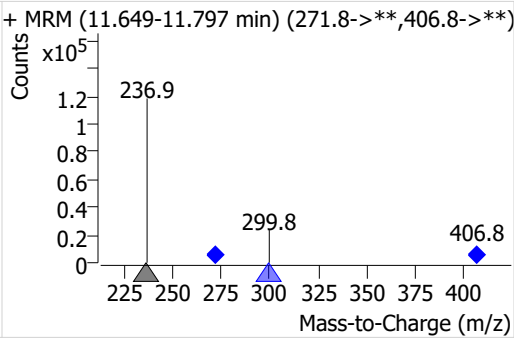




cis-Nonachlor







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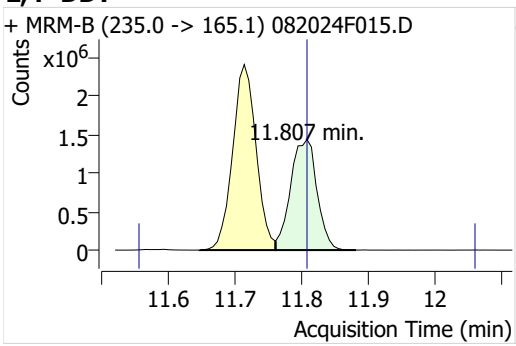
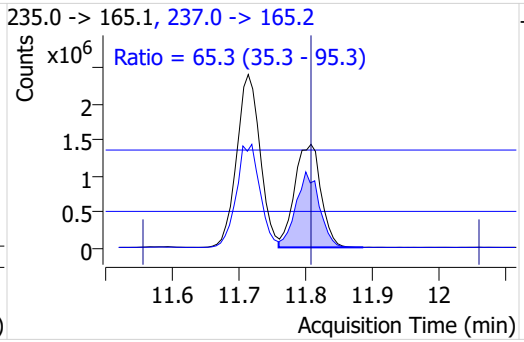
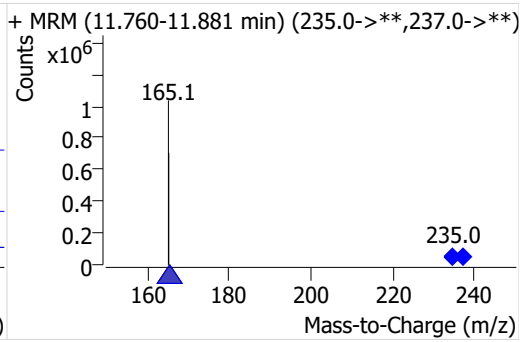
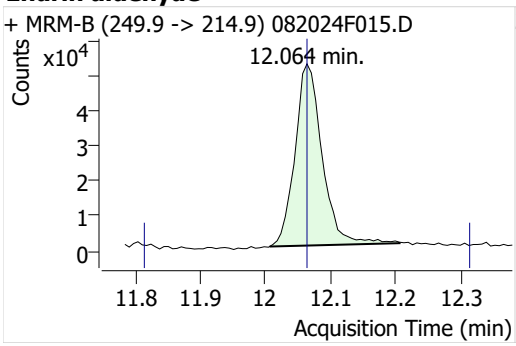
2,4'-DDT

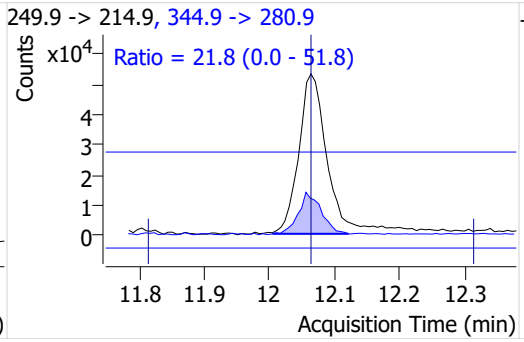


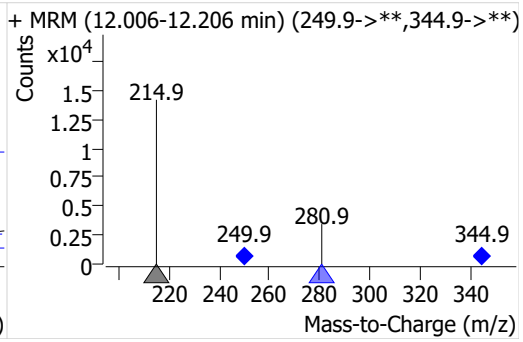




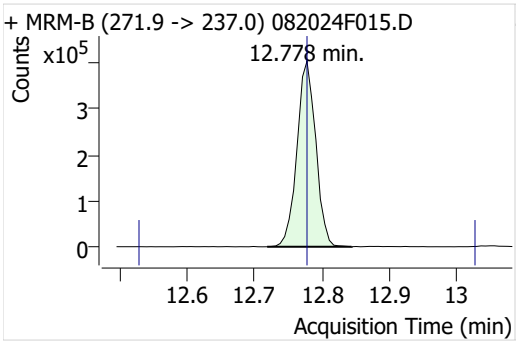
Endrin aldehyde

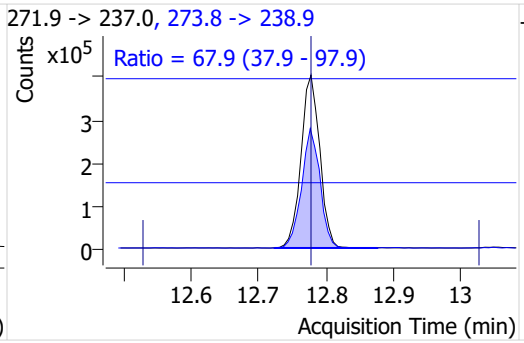


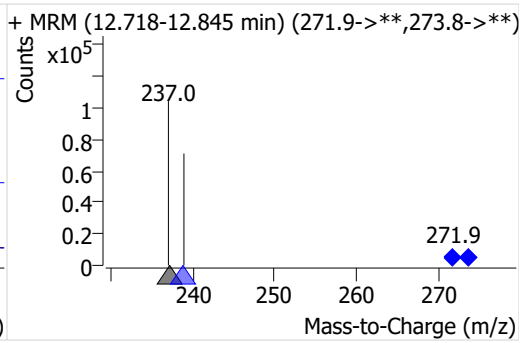




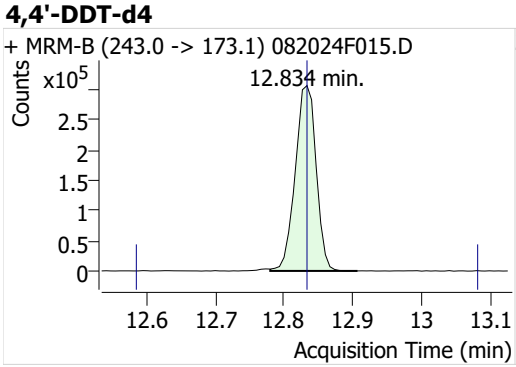
Endosulfan sulfate

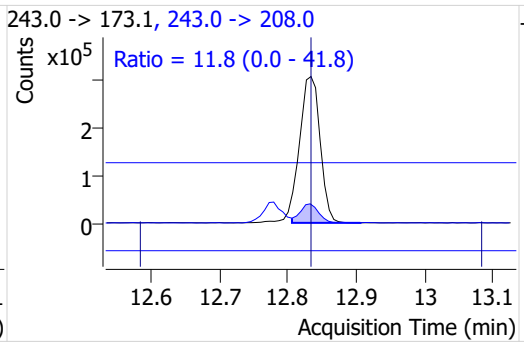


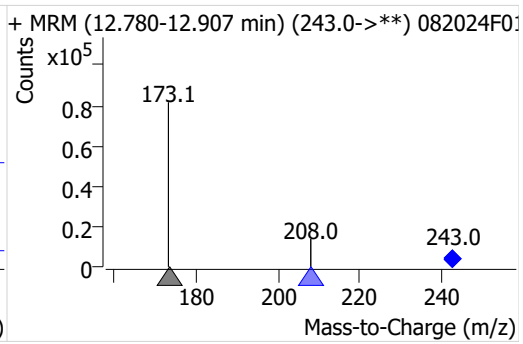




4,4'-DDT-d4







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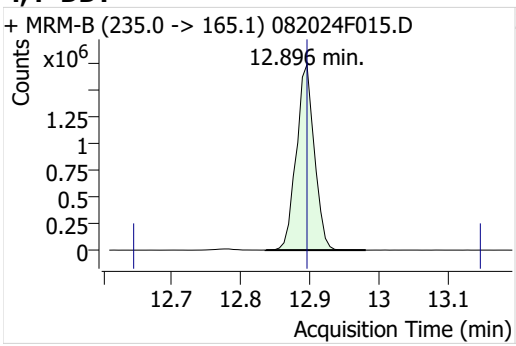
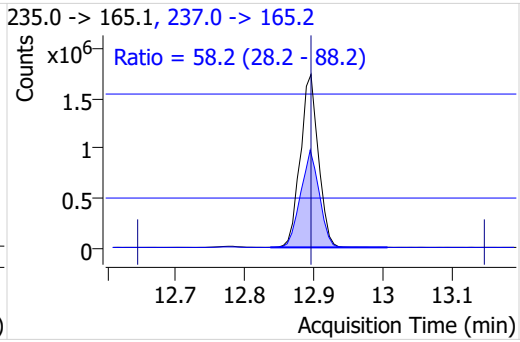
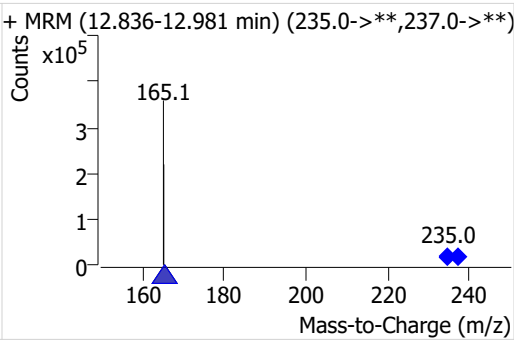
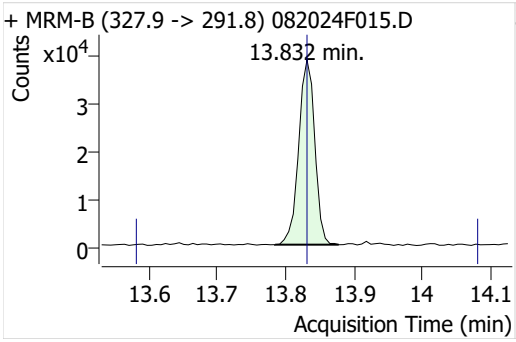
4,4'-DDT

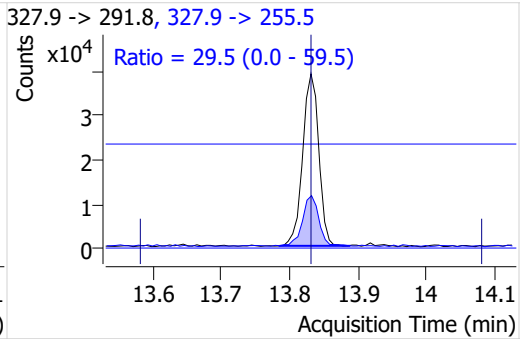


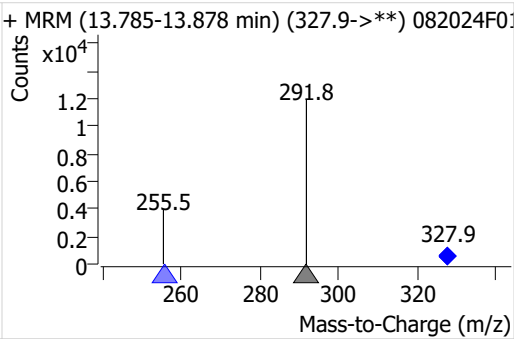




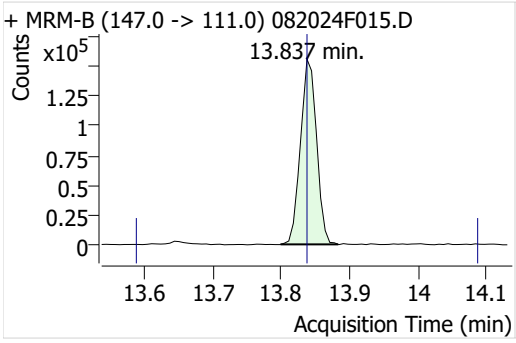
Endrin ketone-13C12

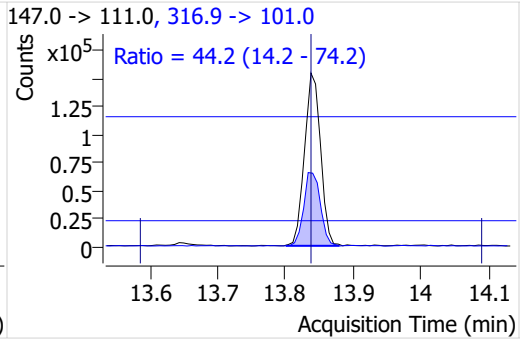


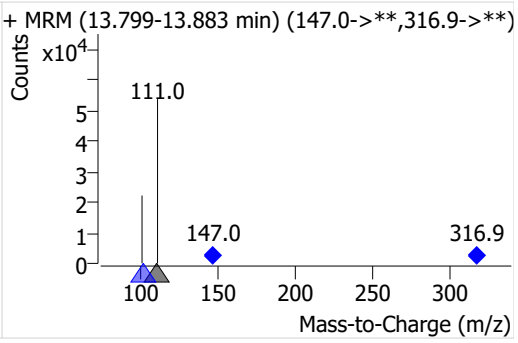




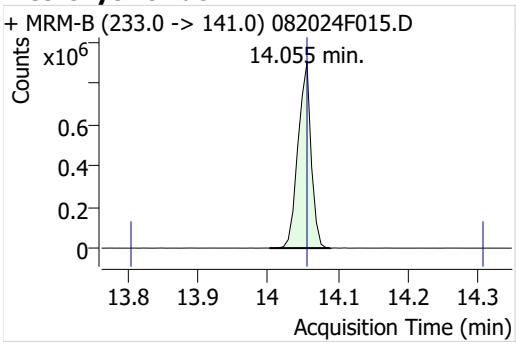
Endrin ketone

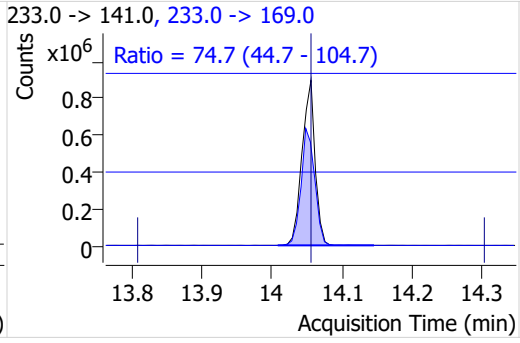


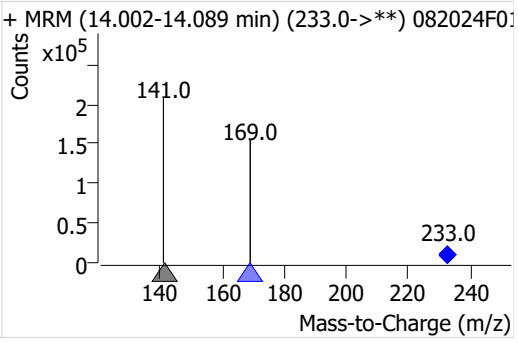




Methoxychlor-d6







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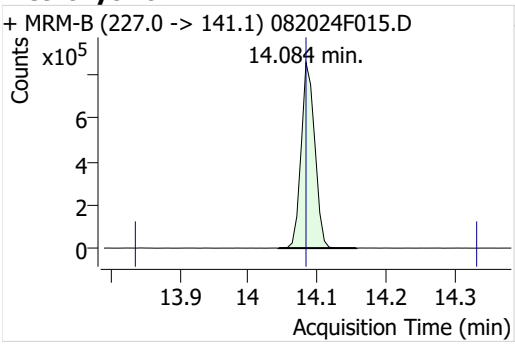
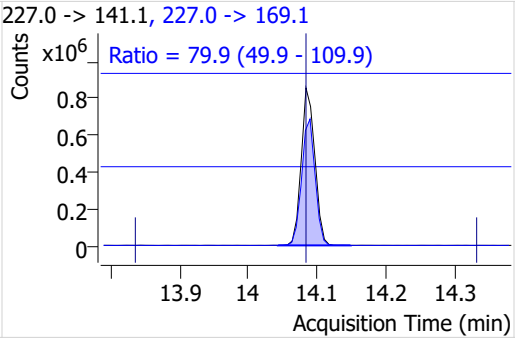
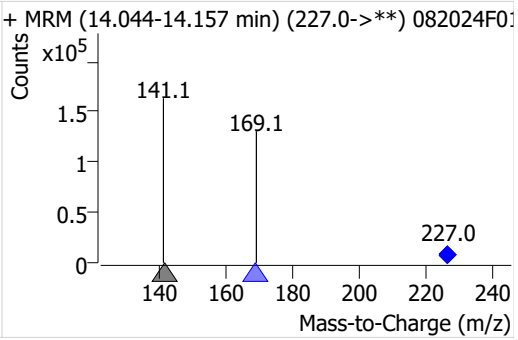
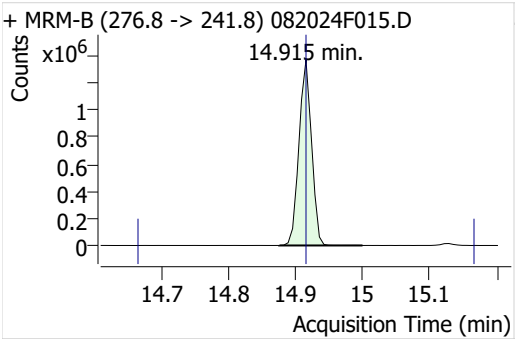
Methoxychlor

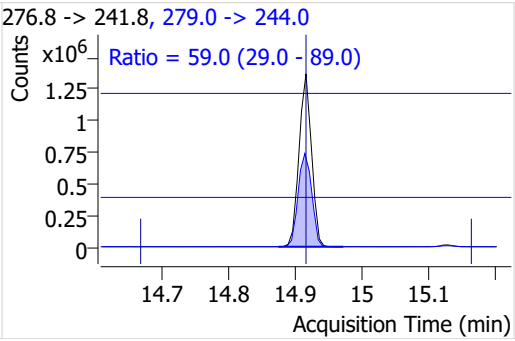


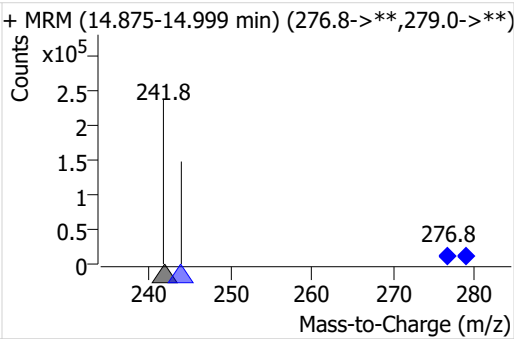




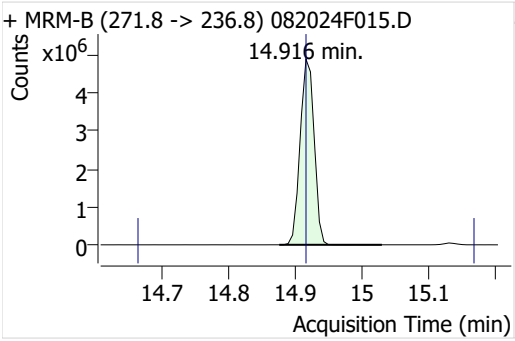
Mirex-13C10

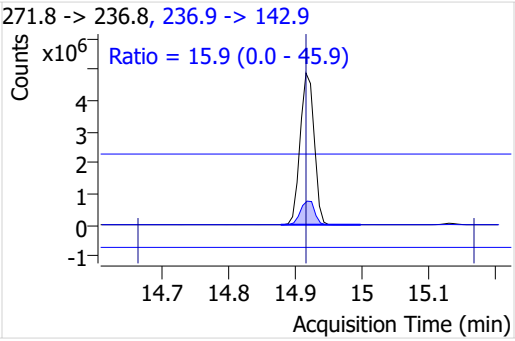


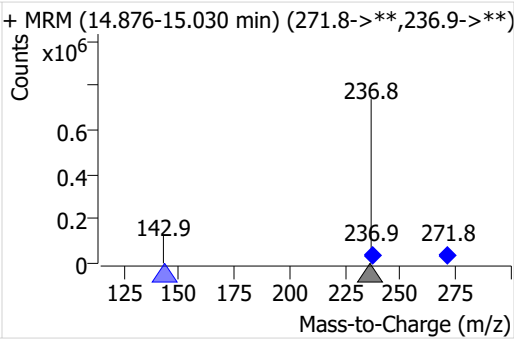




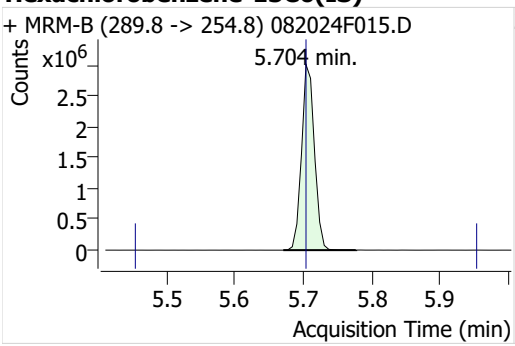
Mirex

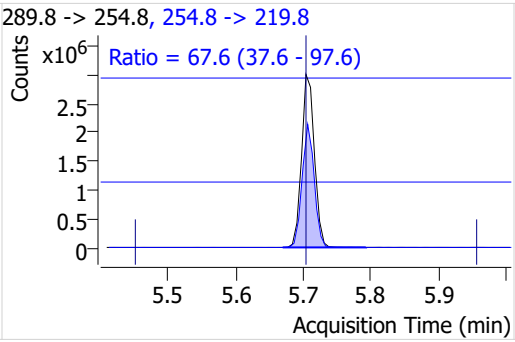


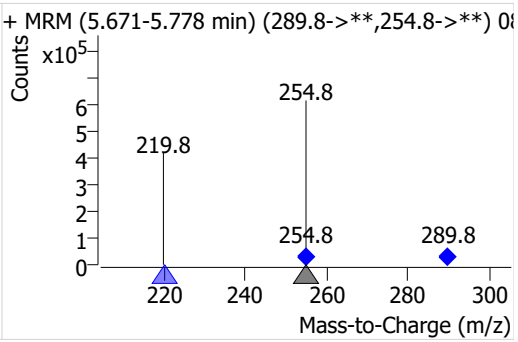




Hexachlorobenzene-13C6(IS)







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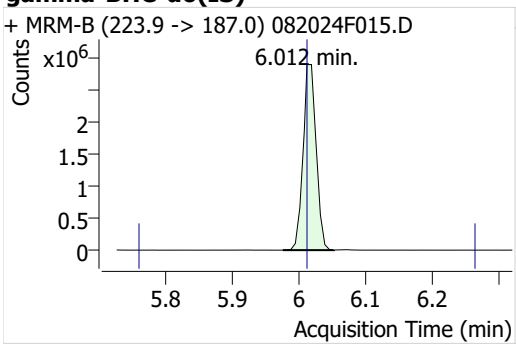
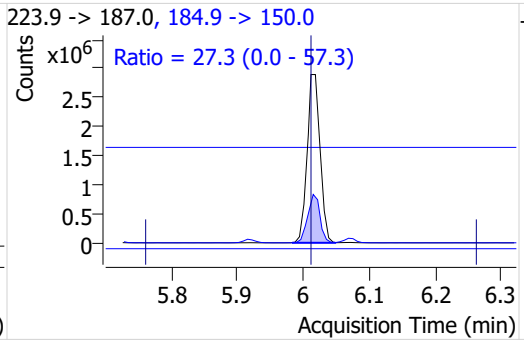
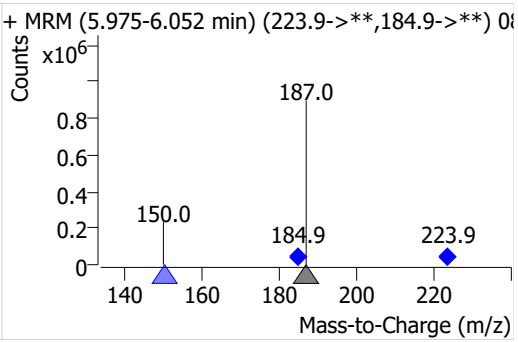
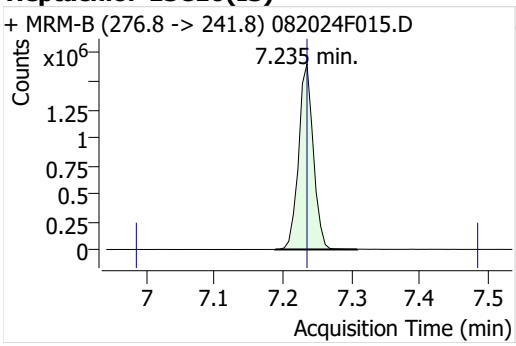
gamma-BHC-d6(IS)

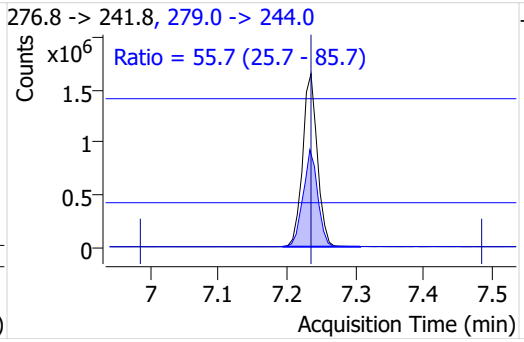


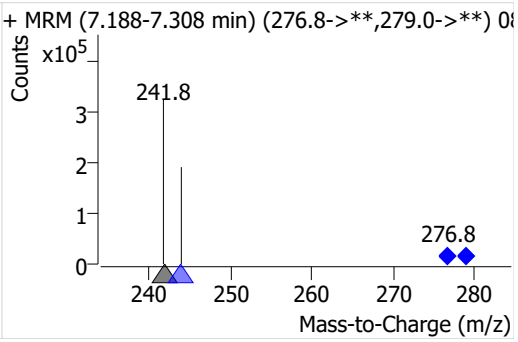




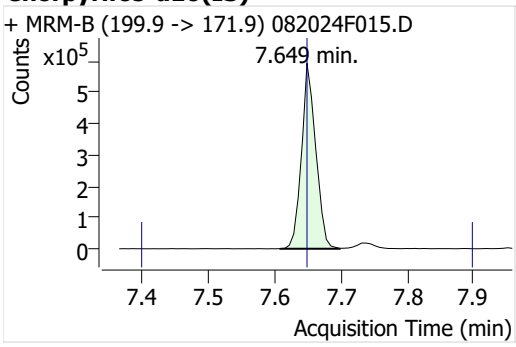
Heptachlor-13C10(IS)

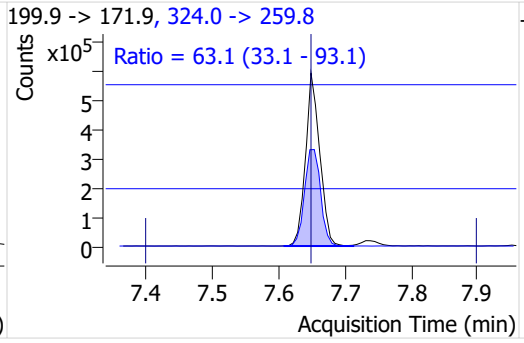


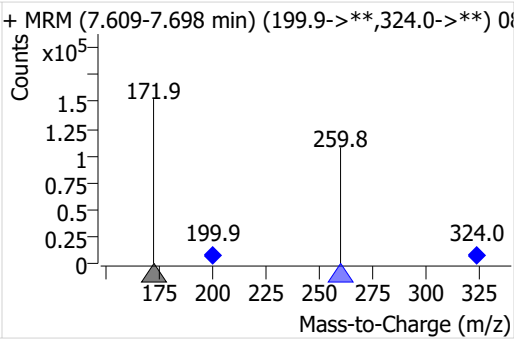




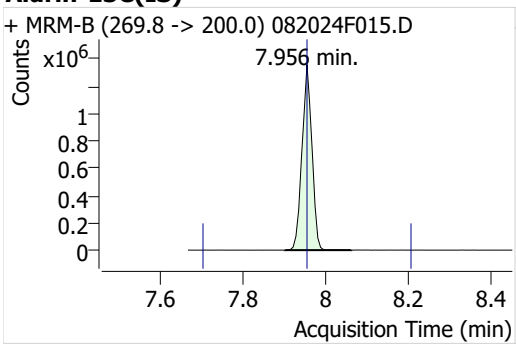
Chorpyrifos-d10(IS)

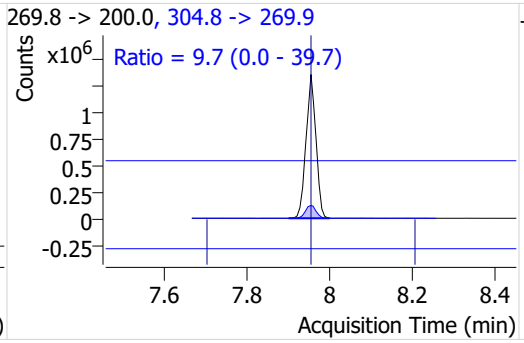


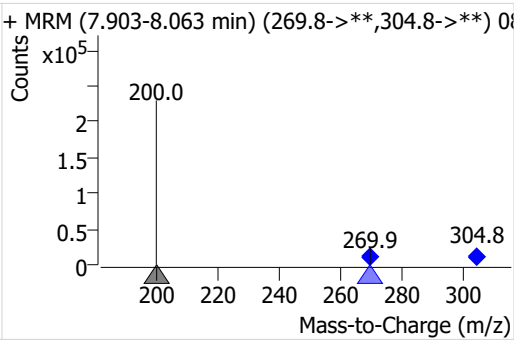




Aldrin-13C(IS)







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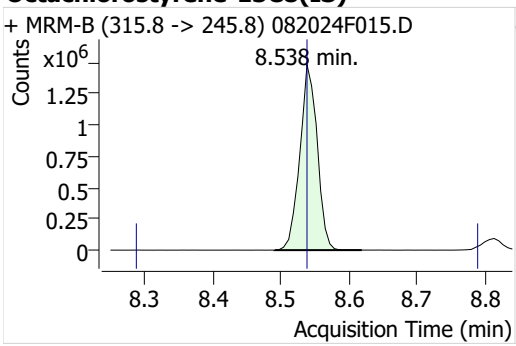
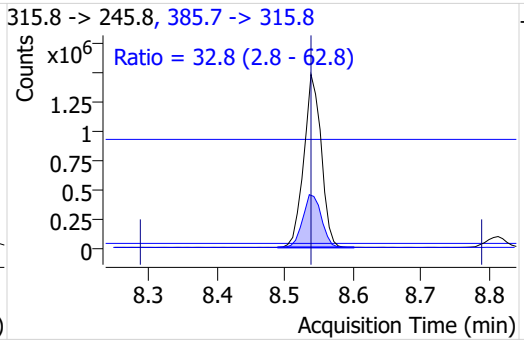
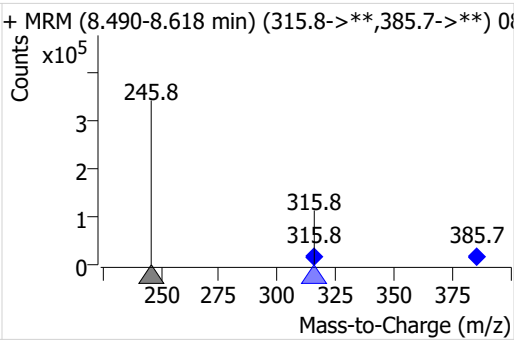
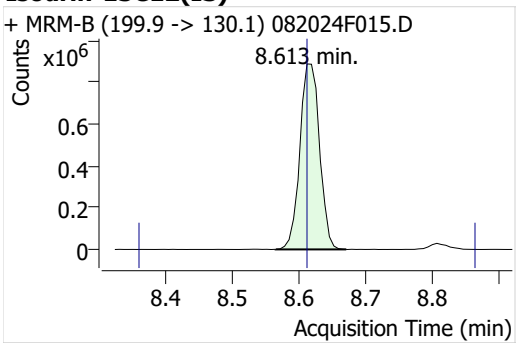
Octachlorostyrene-13C8(IS)

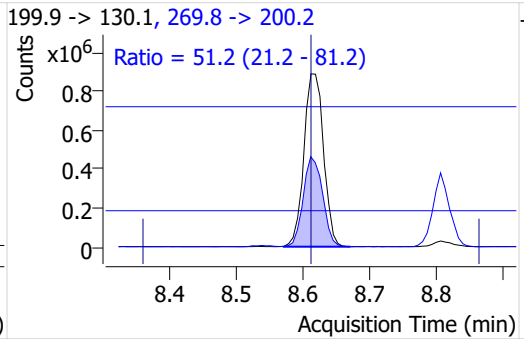


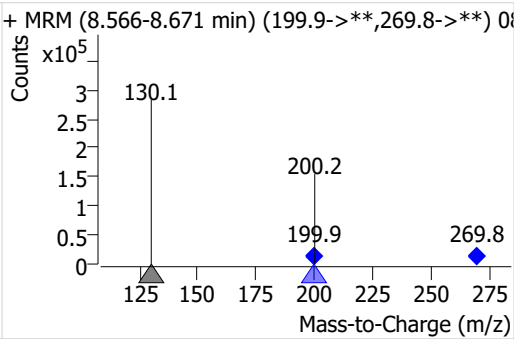




Isodrin-13C12(IS)







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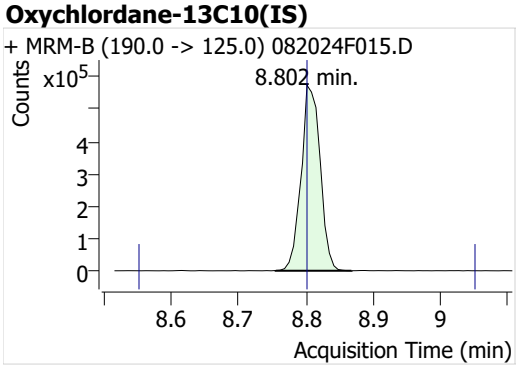
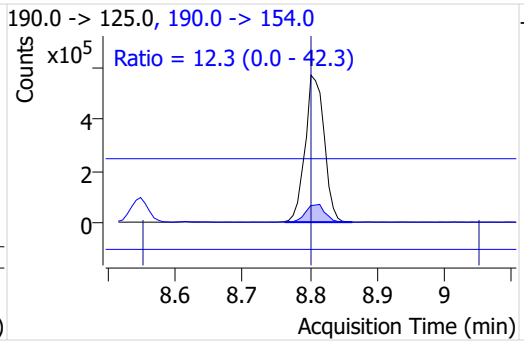
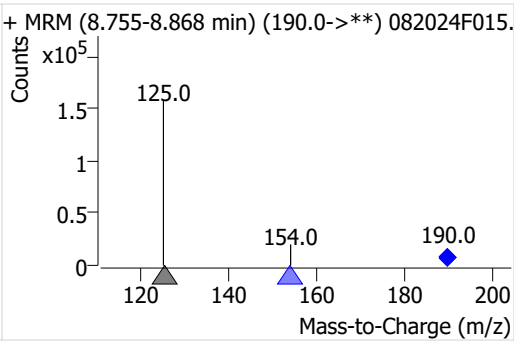
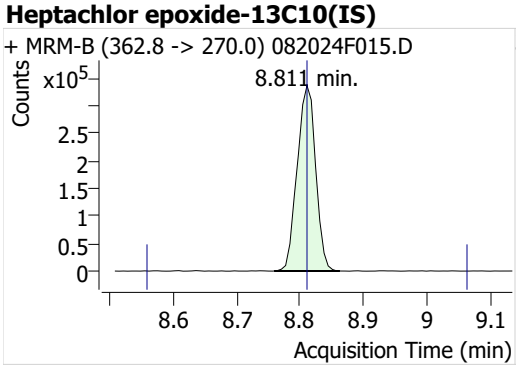
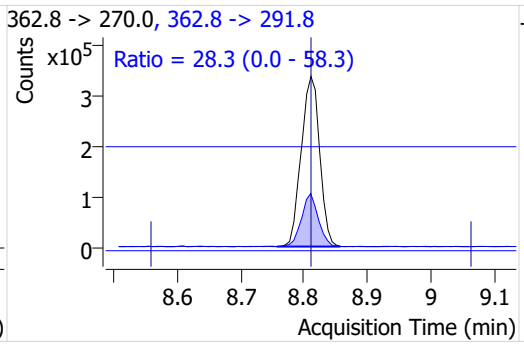


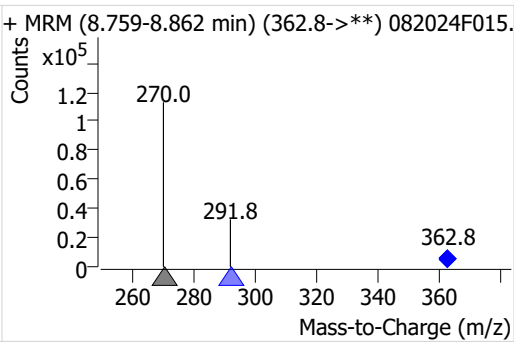




Heptachlor epoxide-13C10(IS)

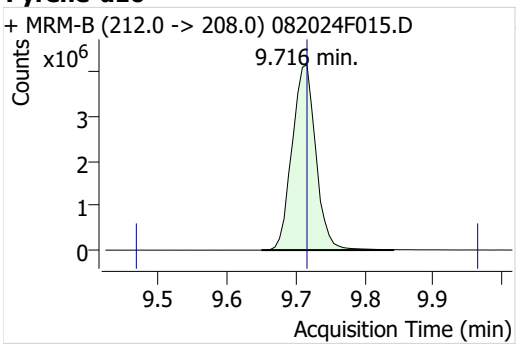


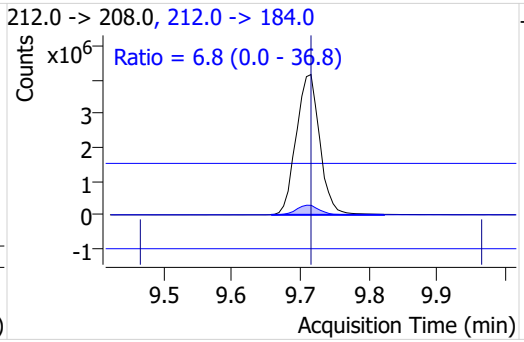


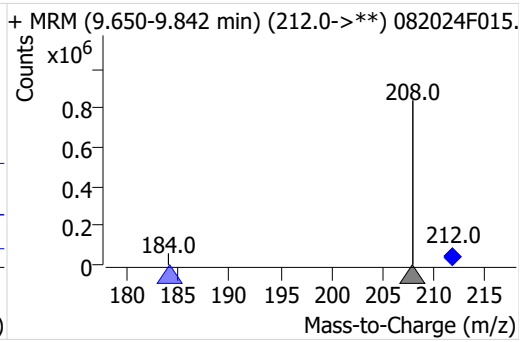


MassHunter Quantitative Analysis Sample Report

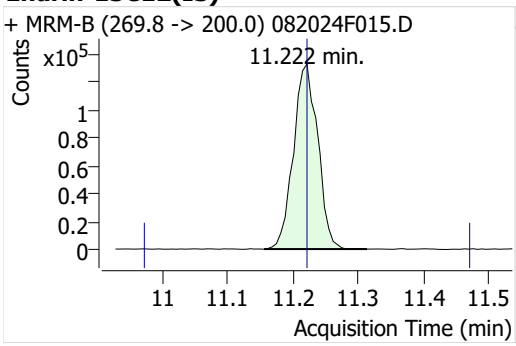
Pyrene-d10

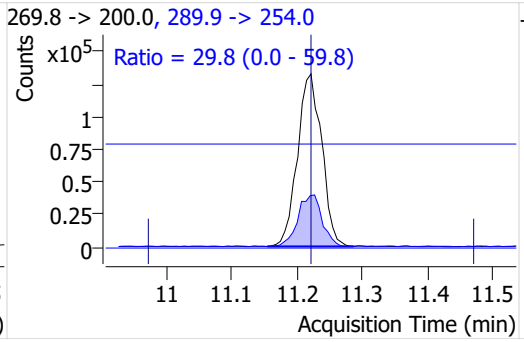


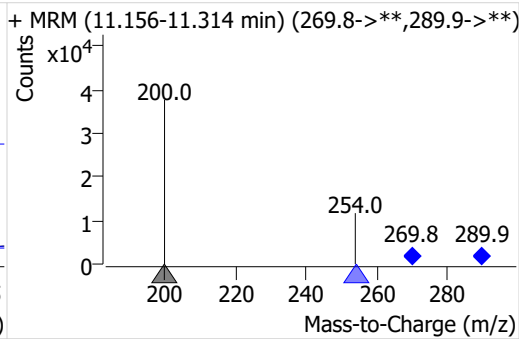




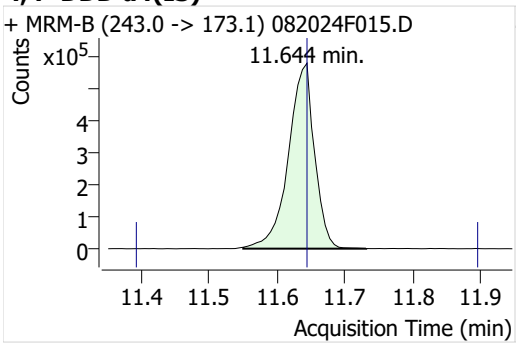
Endrin-13C12(IS)

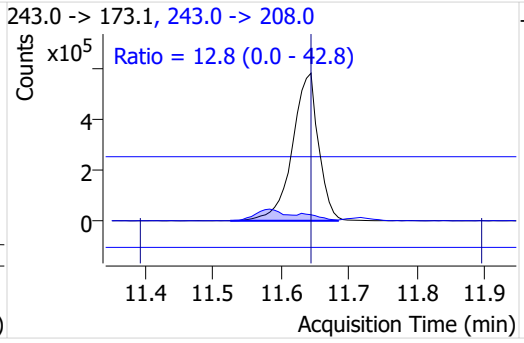


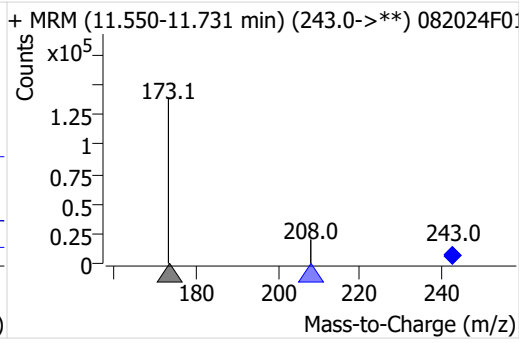




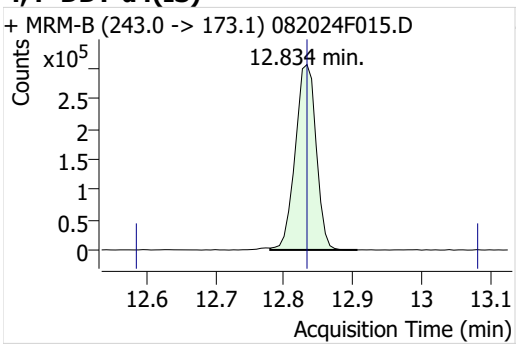
4,4'-DDD d4(IS)

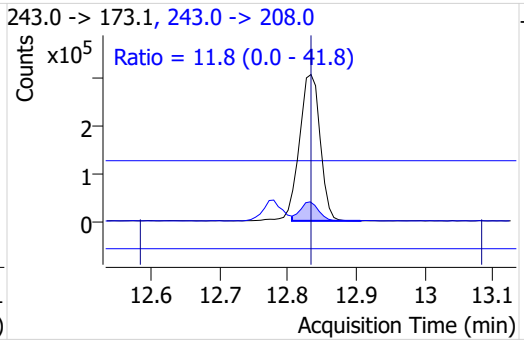


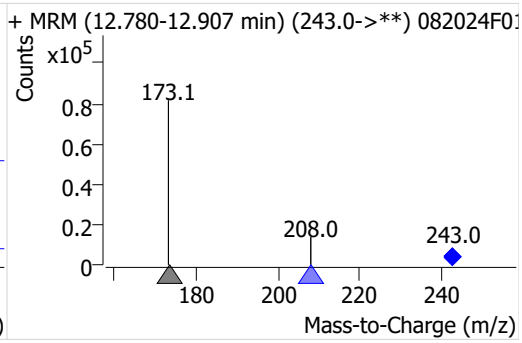




4,4'-DDT-d4(IS)

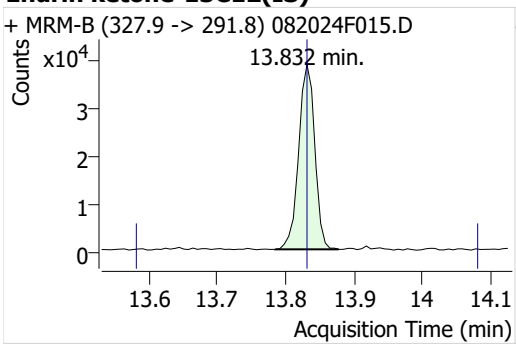


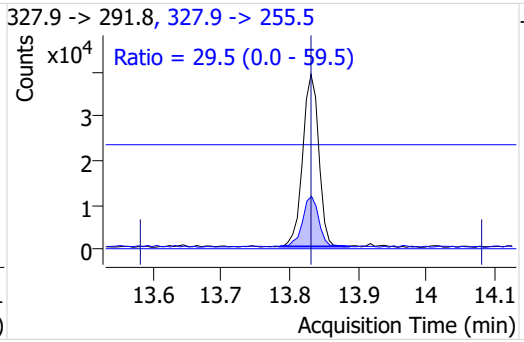


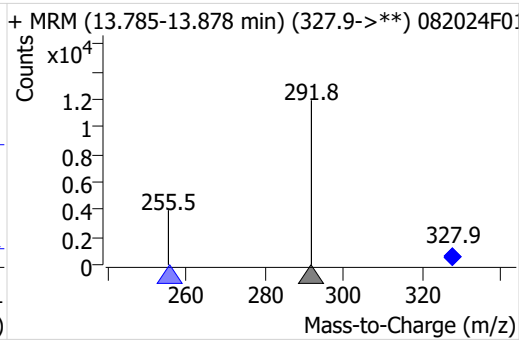


MassHunter Quantitative Analysis Sample Report

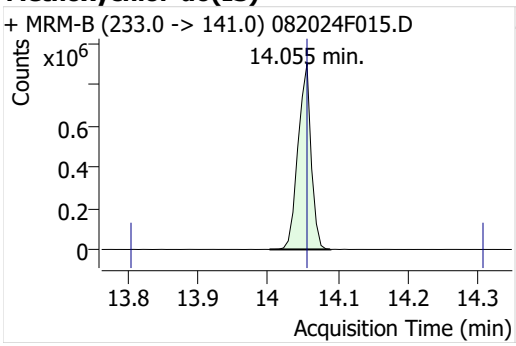
Endrin ketone-13C12(IS)

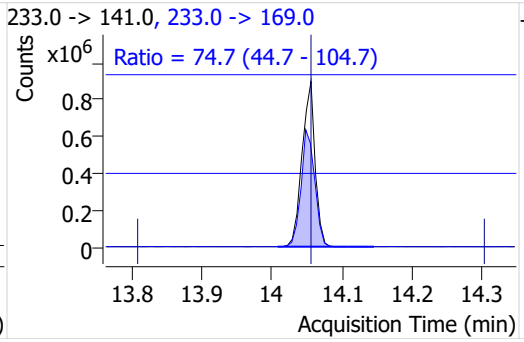


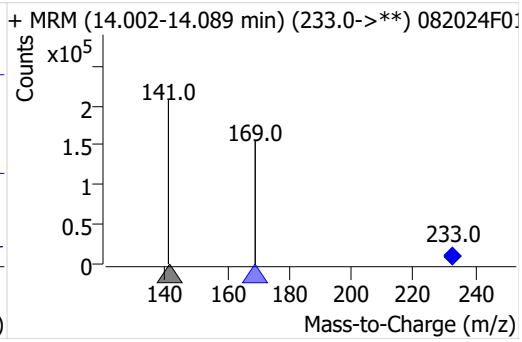




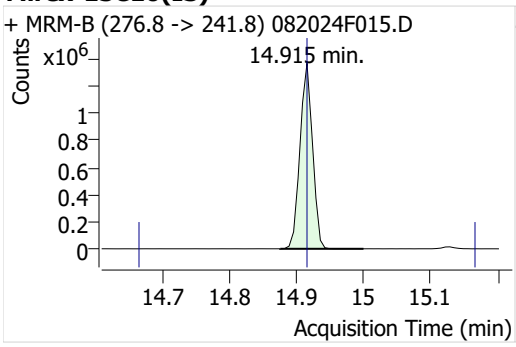
Methoxychlor-d6(IS)

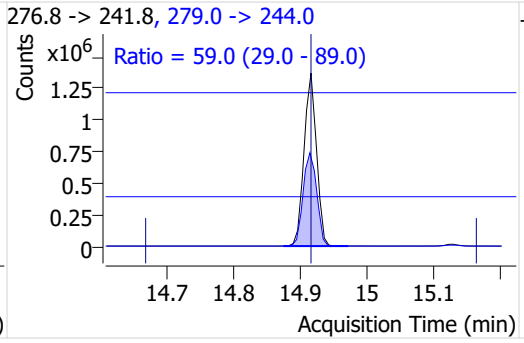


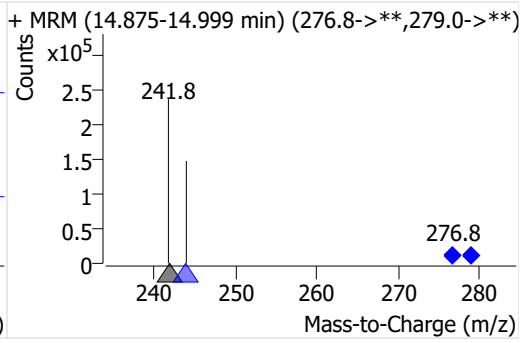




Mirex-13C10(IS)







MassHunter Quantitative Analysis Injection Log Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin				
Analysis Time	7/25/2024 7:23:51 AM	**Analyst Name**	CORP\alkls.nouser	**Report Generator Name**	CORP\alkls.nouser
Calibration Last Update	7/25/2024 7:23:43 AM	**Analyze Quant Version**	10.2	**Report Quant Version**	10.2

Sequence Table

Data File	Name	Type	Vial	Vol.	Level	Acq. Method File	Acq. Date-Time
072424F008.D	D/E Bkdwn std 10,20ppb SVM71-30L	Sample	1	1		OC Pest_dMRM	7/24/2024 4:32:46 PM
072424F010.D	IB	Sample	2	1		OC Pest_dMRM	7/24/2024 5:09:21 PM
072424F011.D	OC PEST ICAL 0.5ppb SVM71-30A	Cal	3	1	0.5	OC Pest_dMRM	7/24/2024 5:27:42 PM
072424F012.D	OC PEST ICAL 1ppb SVM71-30B	Cal	4	1	1	OC Pest_dMRM	7/24/2024 5:46:04 PM
072424F013.D	OC PEST ICAL 2ppb SVM71-30C	Cal	5	1	2	OC Pest_dMRM	7/24/2024 6:04:22 PM
072424F014.D	OC PEST ICAL 5ppb SVM71-30D	Cal	6	1	5	OC Pest_dMRM	7/24/2024 6:22:41 PM
072424F015.D	OC PEST ICAL 10ppb SVM71-30E	Cal	7	1	10	OC Pest_dMRM	7/24/2024 6:41:02 PM
072424F016.D	OC PEST ICAL 20ppb SVM71-30F	Cal	8	1	20	OC Pest_dMRM	7/24/2024 6:59:18 PM
072424F017.D	OC PEST ICAL 40ppb SVM71-30G	Cal	9	1	40	OC Pest_dMRM	7/24/2024 7:17:37 PM
072424F018.D	OC PEST ICAL 60ppb SVM71-30H	Cal	10	1	60	OC Pest_dMRM	7/24/2024 7:35:53 PM
072424F019.D	OC PEST ICAL 80ppb SVM71-30I	Cal	11	1	80	OC Pest_dMRM	7/24/2024 7:54:15 PM
072424F020.D	OC PEST ICAL 100ppb SVM71-30J	Cal	12	1	100	OC Pest_dMRM	7/24/2024 8:12:33 PM
072424F021.D	OC PEST ICV 20ppb SVM71-30K	QC	13	1	20	OC Pest_dMRM	7/24/2024 8:30:48 PM

OC Pest ICAL
KC2400368
7-30-24 eb

8/6/24

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Full List

Generated at 7:12 AM on 7/30/2024

1st 07/30/24
2nd 08/01/24

Triple Quadrupole GC/MS System Verification - Tune

Instrument Name	MS42 / US1711V008	**MS Model**	7010B
Tune Date & Time	7/24/2024 2:54:45 PM	**Source**	EI High Efficiency
Tune File	D:\MassHunter\GCMS\1\7010\atunes.eihs.tune.xml Modified		

Instrument Actuals

Ionization mode	EI+		
Source Temp.	280 °C		
MS1 Quad Temp.	150 °C		
MS2 Quad Temp.	150 °C		
Filament Current	100.1 µA		

Vacuum

Rough Vac	1.30E+2 mTorr
High Vac	9.79E-5 Torr
Turbo 1 Speed	100.0 %
Turbo 1 Power	26.8 W

GC Gas Flow

Quench Flow	2.250 mL/min	Column 1	0.800 mL/min
Collision Cell	1.500 mL/min	Column 2	0.000 mL/min

MS1 Checktune Results

	Value	Limit	Result
Low mass assignment (target 69.00, actual 68.90)	0.10	<= 0.20	OK
Mid mass assignment (target 264.00, actual 263.90)	0.10	<= 0.20	OK
High mass assignment (target 502.00, actual 501.90)	0.10	<= 0.20	OK
Low mass isotope position (target 70.00, actual 69.90)	0.10	<= 0.20	OK
Mid mass isotope position (target 265.00, actual 264.90)	0.10	<= 0.20	OK
High mass isotope position (target 503.00, actual 502.90)	0.10	<= 0.20	OK
Low mass isotope ratio	1.14%	>= 0.5% and <= 1.6%	OK
Mid mass isotope ratio	5.69%	>= 4.2% and <= 6.9%	OK
High mass isotope ratio	9.96%	>= 7.9% and <= 12.3%	OK
Ratio of mid mass to low mass	16.82%	>= 5.0%	OK
Ratio of high mass to low mass	3.53%	>= 0.8%	OK
Low mass precursor ratio	0.47%	<= 3.00%	OK
Mid mass precursor ratio	0.18%	<= 6.00%	OK
High mass precursor ratio	0.11%	<= 12.00%	OK

MS2 Checktune Results

Low mass assignment (target 69.00, actual 69.00)	0.00	<= 0.20	OK
Mid mass assignment (target 264.00, actual 264.00)	0.00	<= 0.20	OK
High mass assignment (target 502.00, actual 501.97)	0.03	<= 0.20	OK
Low mass isotope position (target 70.00, actual 70.00)	0.00	<= 0.20	OK
Mid mass isotope position (target 265.00, actual 265.00)	0.00	<= 0.20	OK
High mass isotope position (target 503.00, actual 503.02)	0.02	<= 0.20	OK
Low mass isotope ratio	1.20%	>= 0.5% and <= 1.6%	OK
Mid mass isotope ratio	5.46%	>= 4.2% and <= 6.9%	OK
High mass isotope ratio	9.03%	>= 7.9% and <= 12.3%	OK
Low mass precursor ratio	0.01%	<= 3.00%	OK
Mid mass precursor ratio	0.00%	<= 6.00%	OK
High mass precursor ratio	0.16%	<= 12.00%	OK

Detector

EMV	1267	<= 2900	OK
Maximum gain factor	2233	>= 100	OK

1st 07/30/24
2nd 08/01/24

Triple Quadrupole GC/MS System Verification - Tune

Instrument Name	MS42 / US1711V008	**MS Model**	7010B
Tune Date & Time	7/24/2024 2:54:45 PM	**Source**	EI High Efficiency
Tune File	D:\MassHunter\GCMS\1\7010\atunes.eihs.tune.xml Modified		

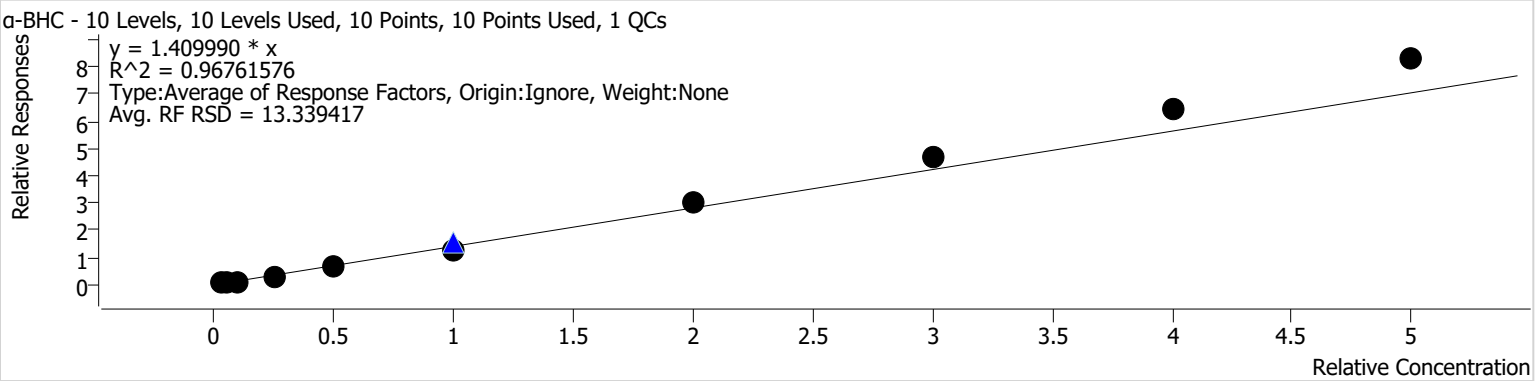
Air and Water Check	Abundance	Relative Abundance	Limit	Result
PFTBA (69.00)	6718877			
Water	55079	0.82%	<= 20.00%	OK
Oxygen	118804	1.77%	<= 2.50%	OK
Nitrogen	442782	6.59%	<= 10.00%	OK

* Nitrogen values are calculated from oxygen abundance

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

α-BHC **Relative Standard Error** 13.3



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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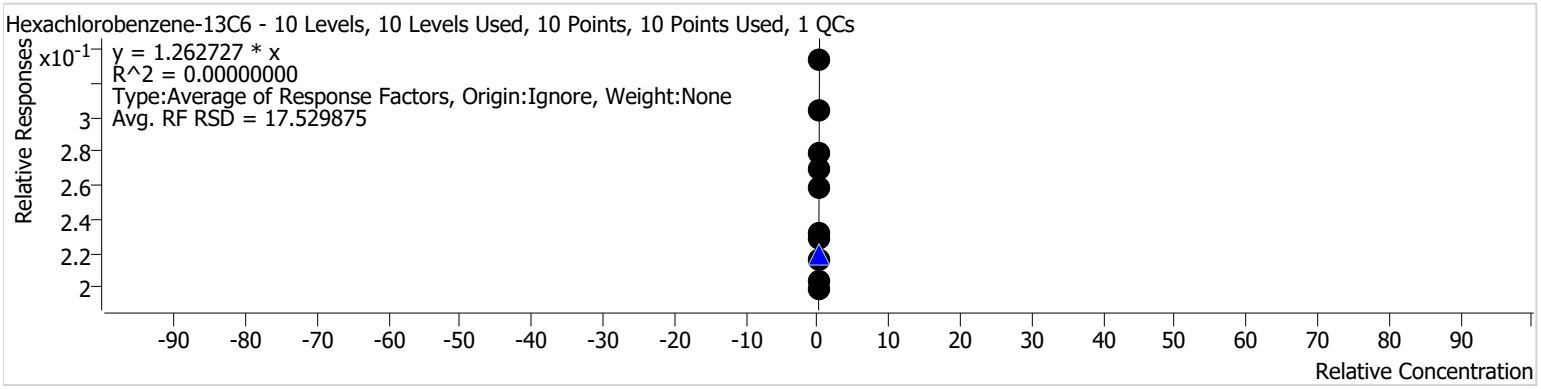
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	274078.540
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	653634.927
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	1658679.667
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	4178572.961
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	6549819.520
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	7860311.674
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	15753601.323
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	21587964.267
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	38744363.072
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	40948410.100

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Hexachlorobenzene-13C6 Relative Standard Error



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7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	20.0000	5748583.852
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	20.0000	5098997.858
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	20.0000	5103926.508
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	4595140.439
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	4538681.815
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7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	20.0000	4703090.102
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	20.0000	4710911.526
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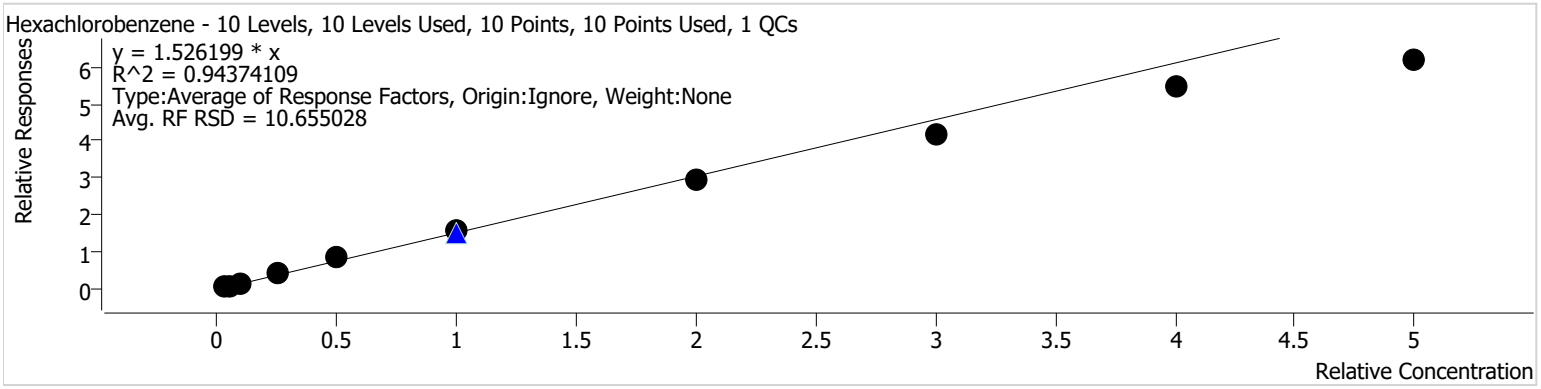
MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Hexachlorobenzene **Relative Standard Error** 10.7



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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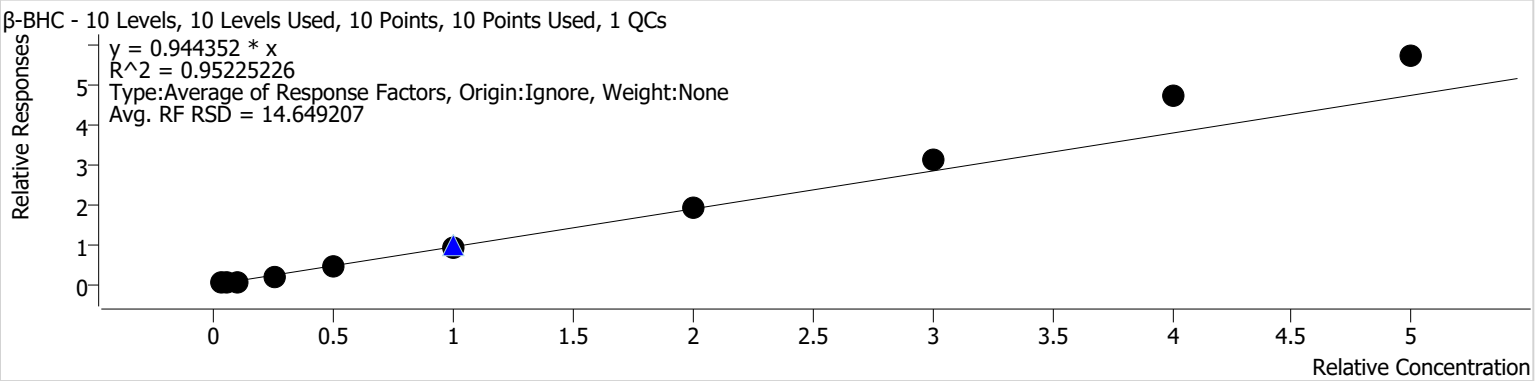
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	402359.873
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	814149.160
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	1944015.926
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	5110038.089
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	7175080.989
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	7014077.458
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	14026534.488
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	19748919.518
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	35519760.174
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	31404454.559

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

β-BHC **Relative Standard Error** 14.6

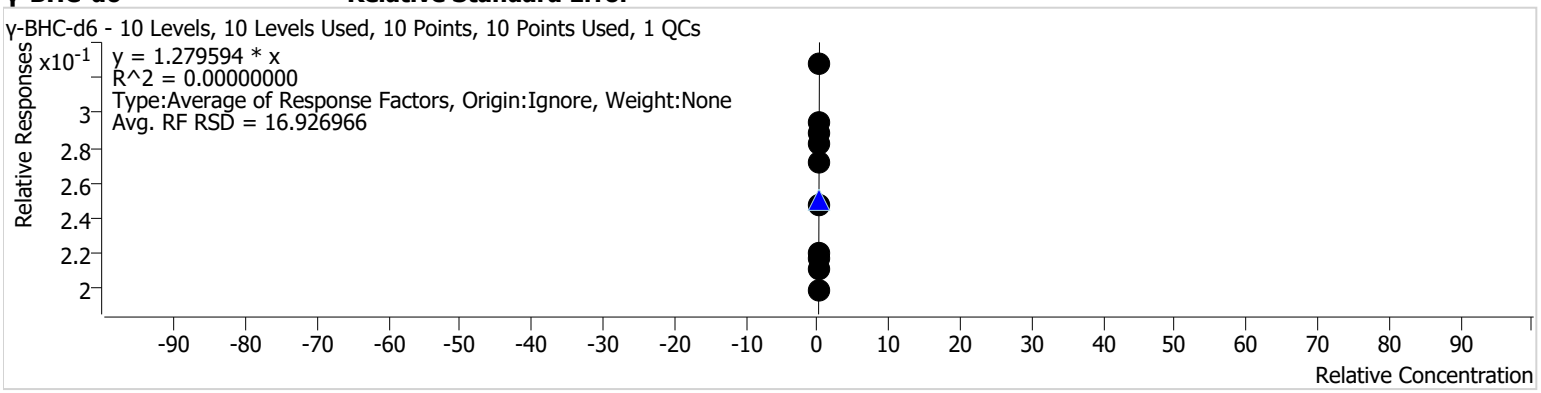


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	92536.753
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	197187.901
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	454321.455
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	1040115.043
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	2885873.438
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	4510800.250
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	5196016.478
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	10048547.708
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	14283234.230
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	28311904.247
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	27792907.559

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

γ-BHC-d6 **Relative Standard Error**

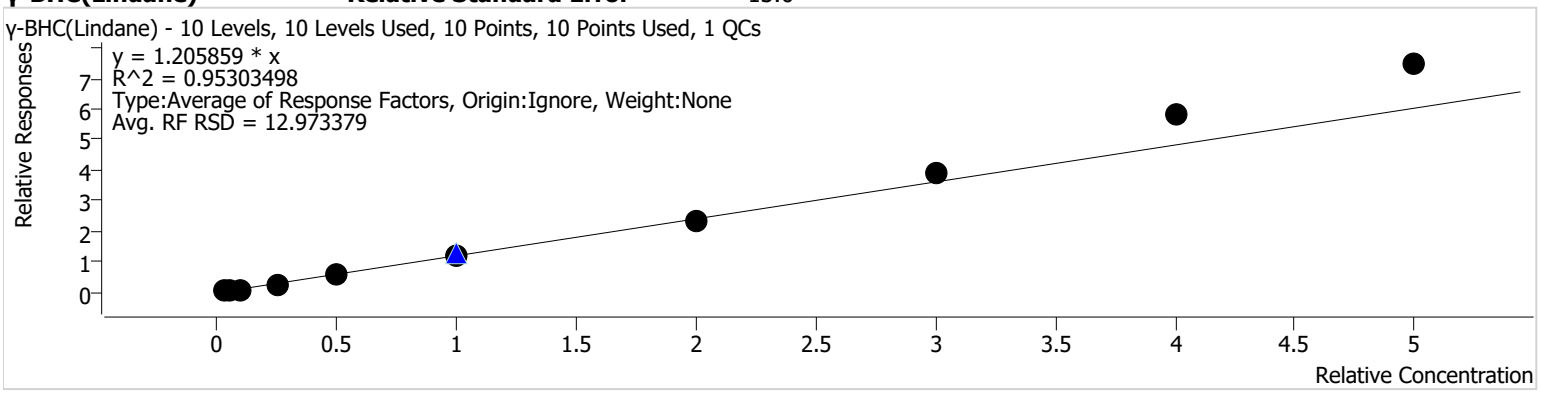


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	20.0000	4440191.546
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	20.0000	5029595.405
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	20.0000	5942633.236
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	20.0000	4897497.854
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	20.0000	5433471.110
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	5031514.504
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	5181653.727
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	20.0000	5192064.866
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	20.0000	5153254.573
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	20.0000	4625100.018
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	20.0000	5985788.183

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

γ-BHC(Lindane) **Relative Standard Error** 13.0

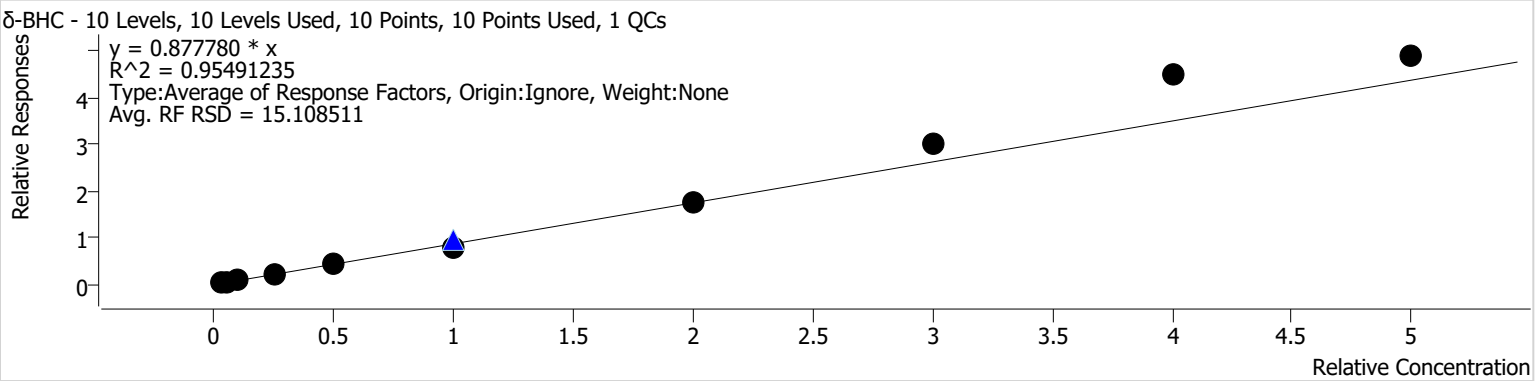


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	125314.758
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	268793.467
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	560420.846
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	1409608.422
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	3428017.763
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	5911437.411
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	6769676.852
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	12148461.351
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	18026514.641
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	34715047.073
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	36429805.061

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

δ-BHC **Relative Standard Error** 15.1

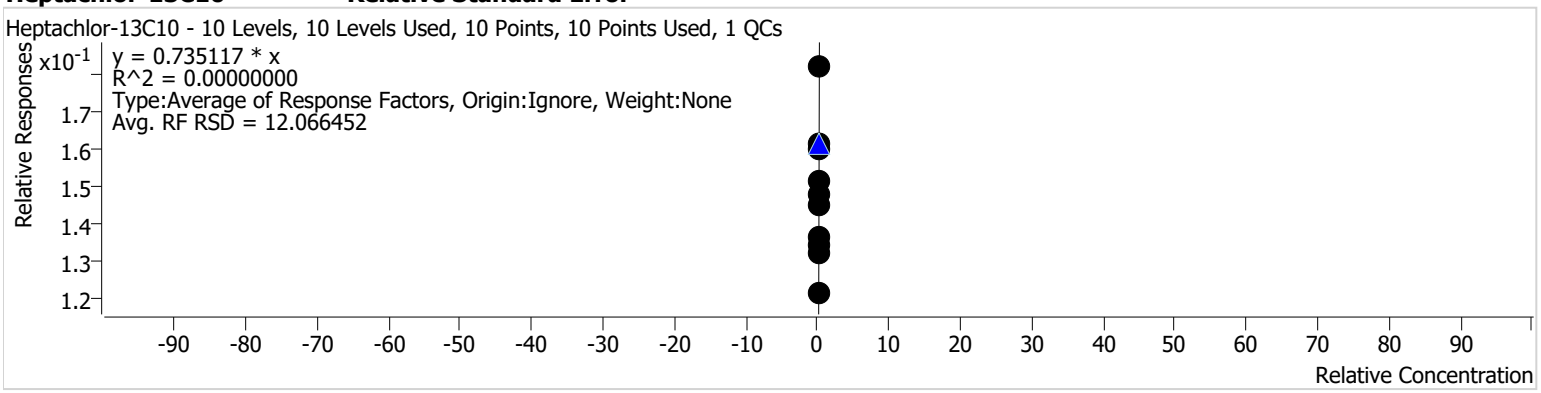


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	86281.062
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	170244.618
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	437365.915
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	1059098.460
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	2622600.005
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	4072381.219
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	4943399.615
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	9107073.784
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	14106394.103
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	27152102.936
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	23919781.678

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Heptachlor-13C10 **Relative Standard Error**

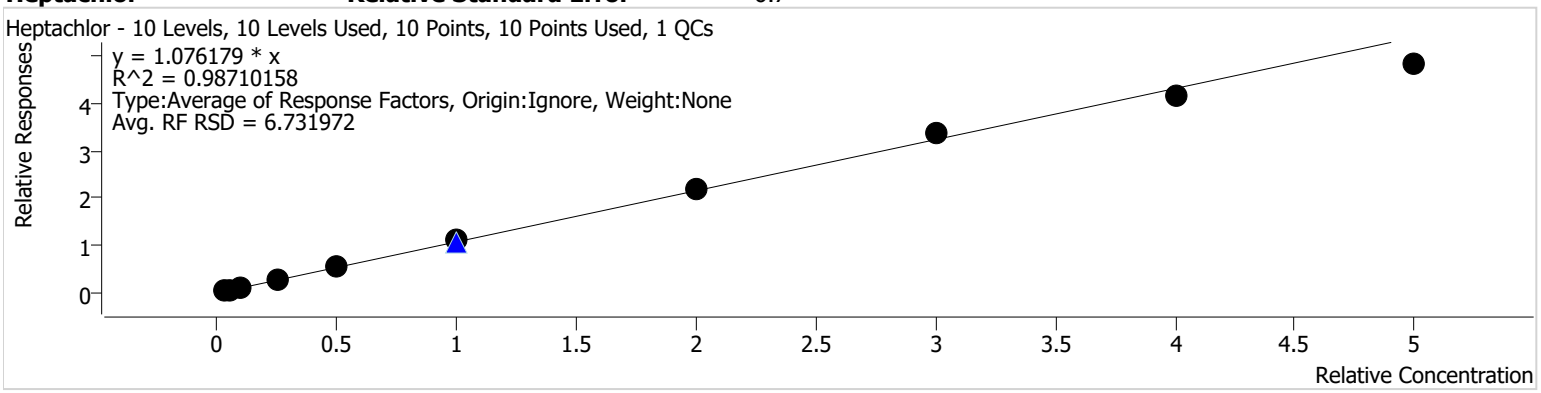


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	20.0000	2456263.515
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	20.0000	2809451.742
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	20.0000	3715806.834
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	20.0000	3208947.910
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	20.0000	3240174.246
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	2319788.328
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	3344477.310
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	20.0000	2902622.648
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	20.0000	2941620.328
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	20.0000	2577470.054
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	20.0000	4045129.579

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Heptachlor **Relative Standard Error** 6.7

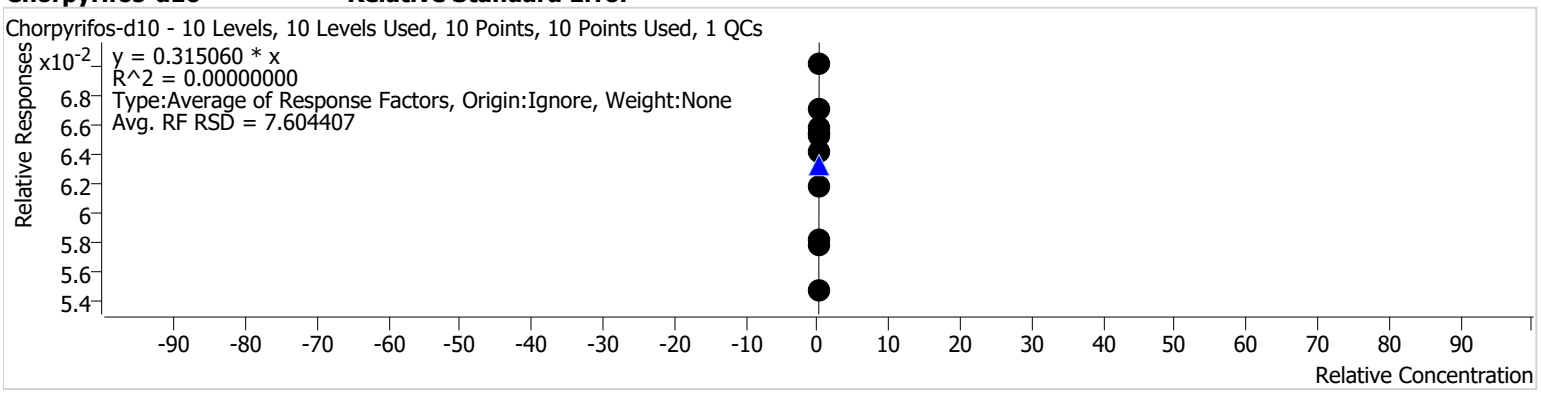


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	61970.755
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	139658.804
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	358553.886
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	869161.853
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	2133039.917
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	2567799.761
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	3588429.456
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	6402489.364
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	8646926.632
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	16730987.975
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	15398936.176

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Chorpyrifos-d10 **Relative Standard Error**

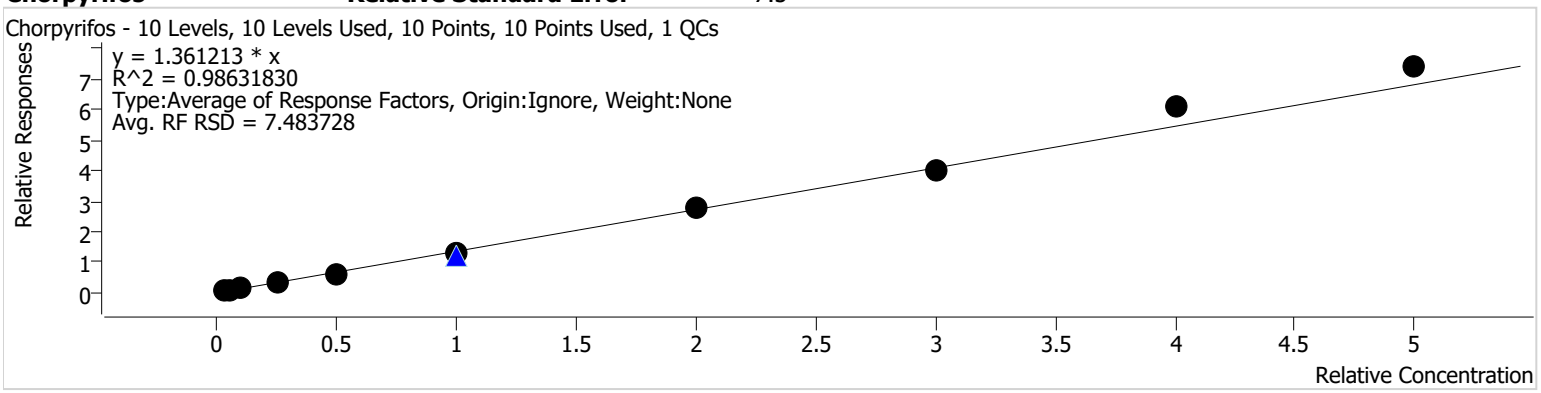


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	20.0000	888074.372
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	20.0000	1209399.642
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	20.0000	1889887.430
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	20.0000	1373888.676
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	20.0000	1434382.808
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	1194320.358
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	1312494.199
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	20.0000	1390093.472
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	20.0000	1200120.741
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	20.0000	907022.415
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	20.0000	1653060.278

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Chorpyrifos **Relative Standard Error** 7.5

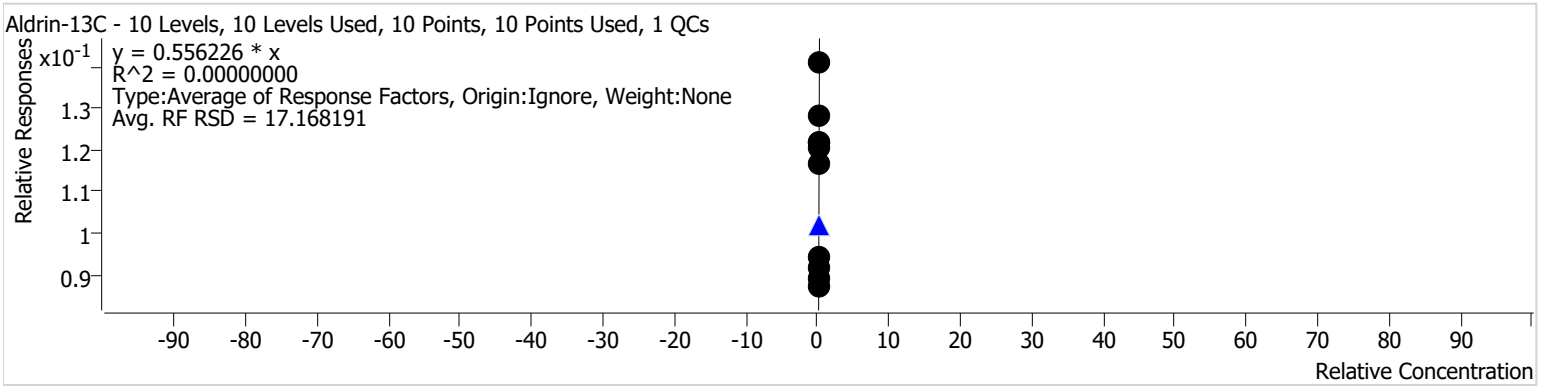


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	32159.521
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	79939.590
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	178620.304
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	388022.427
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	1179055.761
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	1550248.761
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	1542906.516
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	3904251.320
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	3616803.189
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	10145586.331
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	10231791.346

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Aldrin-13C **Relative Standard Error**

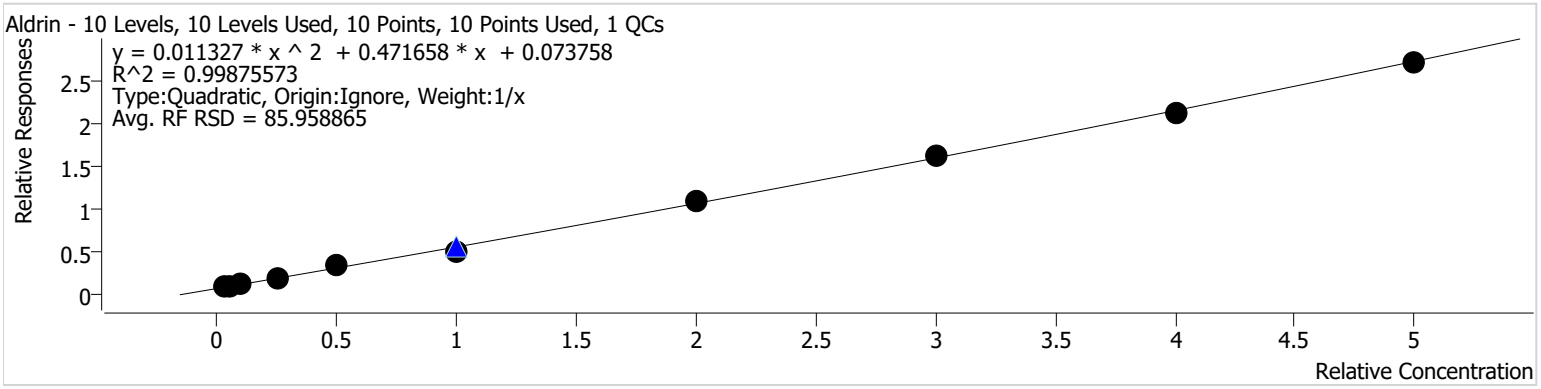


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	20.0000	2170046.839
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	20.0000	2168858.719
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	20.0000	2583262.696
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	20.0000	2099260.475
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	20.0000	2640600.705
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	2189294.812
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	2120749.495
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	20.0000	2076175.170
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	20.0000	2215655.514
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	20.0000	1723047.185
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	20.0000	2694289.488

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Aldrin **Relative Standard Error** 15.7



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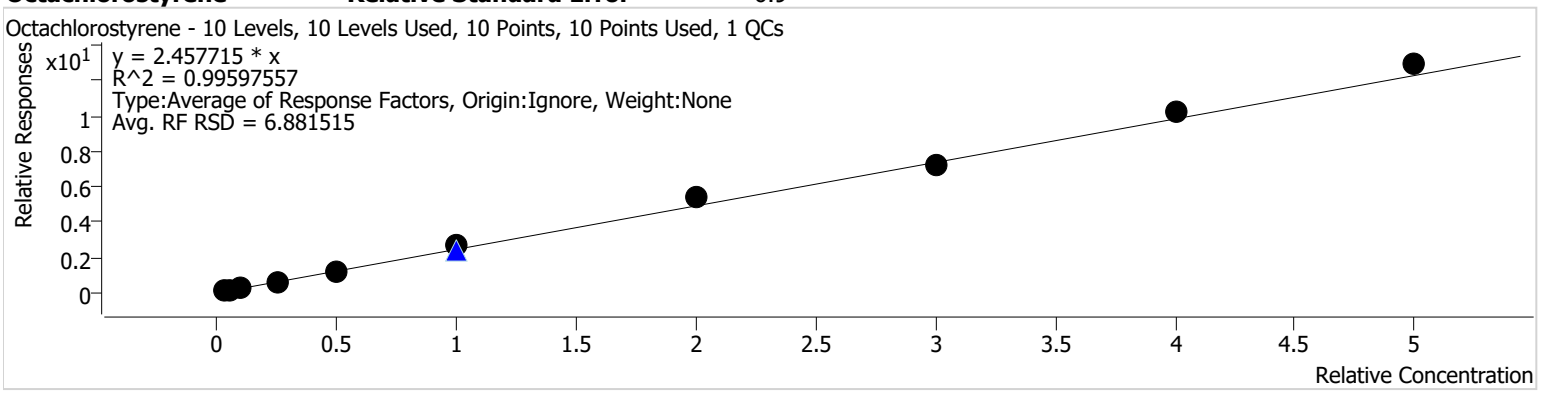
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	221347.194
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	335928.826
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	412291.065
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	864757.864
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	1122005.039
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	1195475.144
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	2245207.967
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	2767811.166
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	5729740.043
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	5705631.917

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Octachlorostyrene **Relative Standard Error** 6.9



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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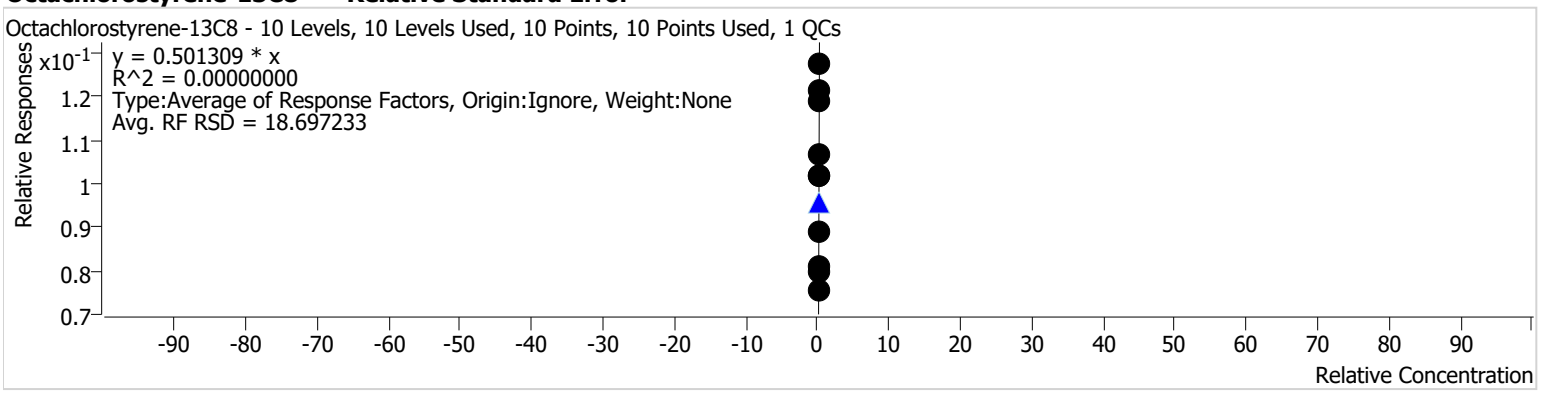
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	243906.689
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	548078.286
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	1092009.983
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	3005945.113
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	4735909.608
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	4715375.791
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	9677692.608
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	13022144.006
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	24820445.438
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	22782613.812

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Octachlorostyrene-13C8 **Relative Standard Error**



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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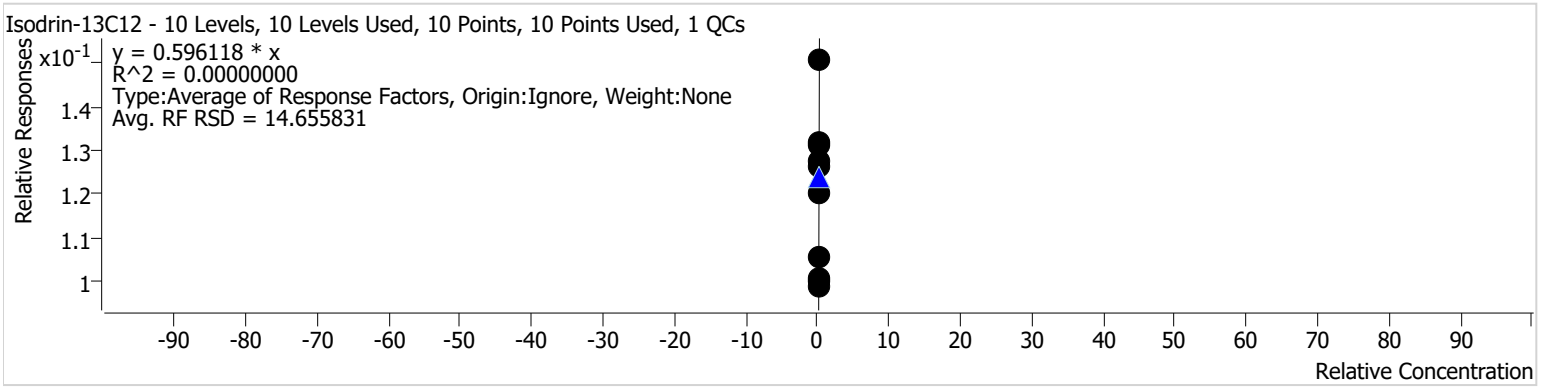
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	20.0000	2207795.365
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	20.0000	2499757.261
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	20.0000	1768809.737
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	20.0000	2336106.560
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	1740272.492
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	1981522.983
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	20.0000	1795098.869
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	20.0000	1862260.671
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	20.0000	1799910.593
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	20.0000	2439039.981

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Isodrin-13C12 **Relative Standard Error**

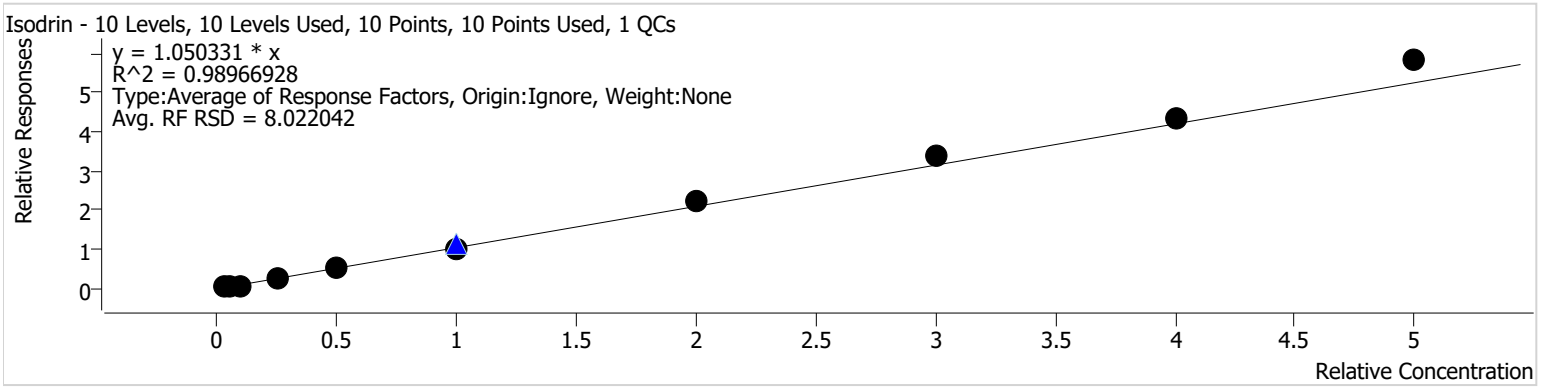


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	20.0000	2022596.505
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	20.0000	2371452.870
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	20.0000	2978035.503
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	20.0000	2231415.756
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	20.0000	2774203.725
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	2236610.031
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	2571200.181
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	20.0000	2389475.842
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	20.0000	2188070.840
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	20.0000	2128197.419
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	20.0000	2978196.714

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Isodrin **Relative Standard Error** 8.0



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	108929.977
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	253088.673
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	599035.289
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	1506325.119
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	2290407.501
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	3002379.368
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	5266814.972
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	7238212.149
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	12959553.639
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	12952616.247

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
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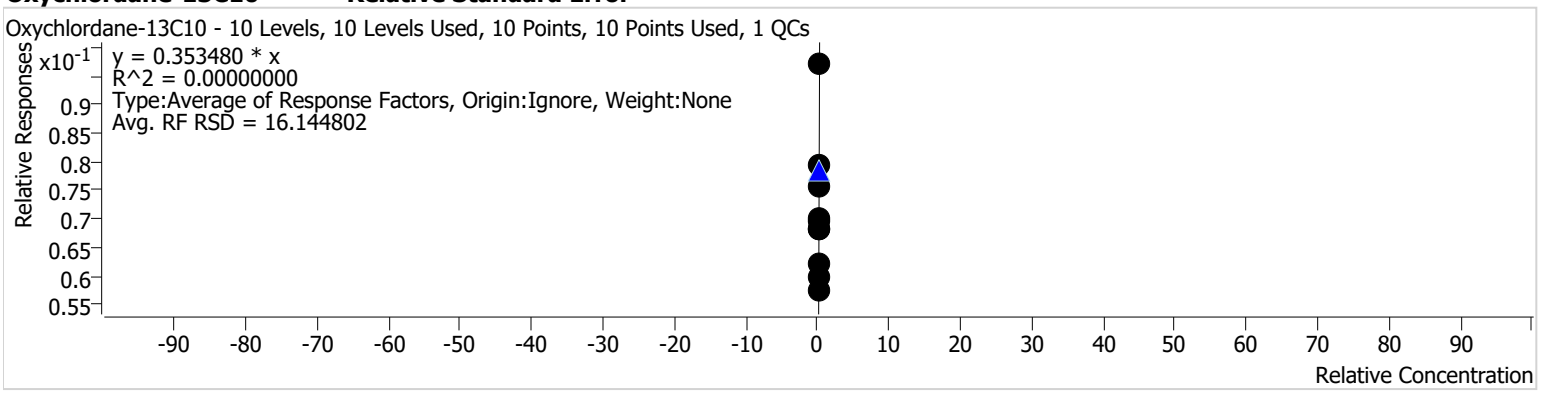
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Oxychlordane-13C10 **Relative Standard Error**

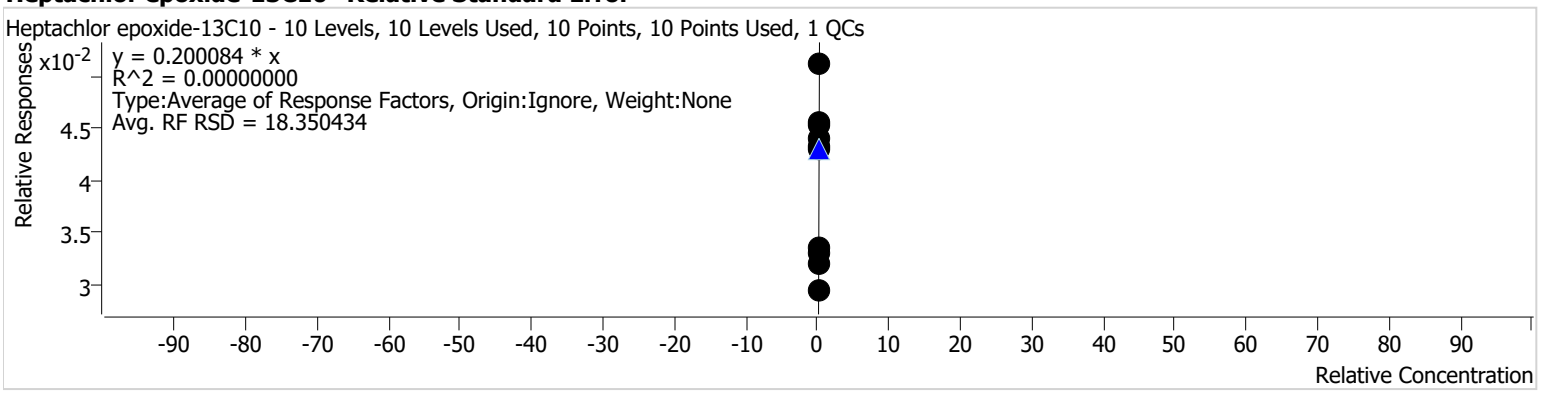


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	20.0000	1162060.797
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	20.0000	1298266.781
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	20.0000	1613385.347
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	20.0000	1511897.620
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	20.0000	1496887.855
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	1352053.340
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	1624690.235
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	20.0000	1488843.511
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	20.0000	1268866.005
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	20.0000	1369596.819
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	20.0000	1806551.196

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Heptachlor epoxide-13C10 Relative Standard Error



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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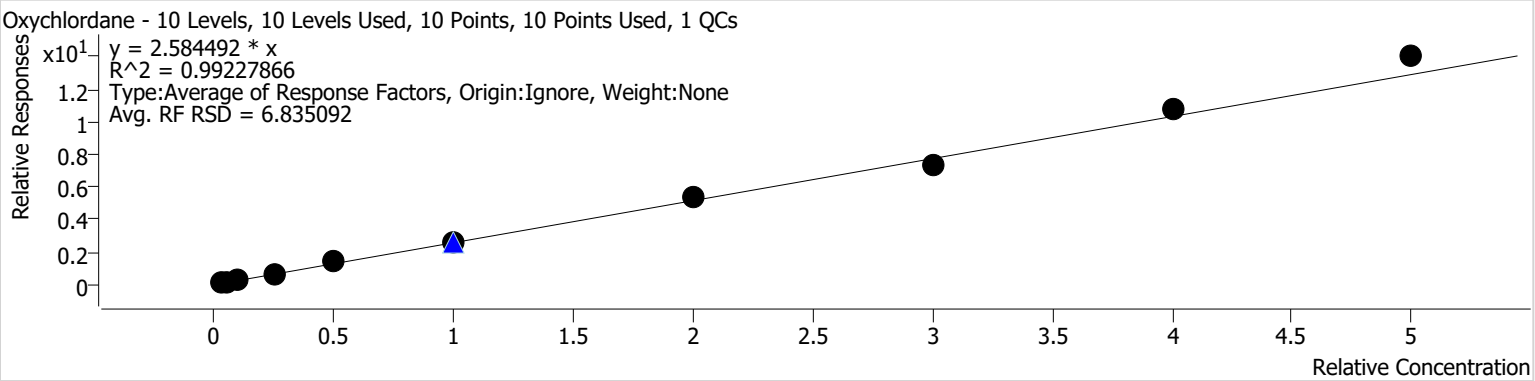
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	20.0000	840390.542
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	20.0000	946805.768
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	20.0000	710348.261
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	20.0000	940906.609
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	751030.161
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	892081.805
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	20.0000	791028.001
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	20.0000	788571.036
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	20.0000	645338.462
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	20.0000	886505.394

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Oxychlordane **Relative Standard Error** 6.8



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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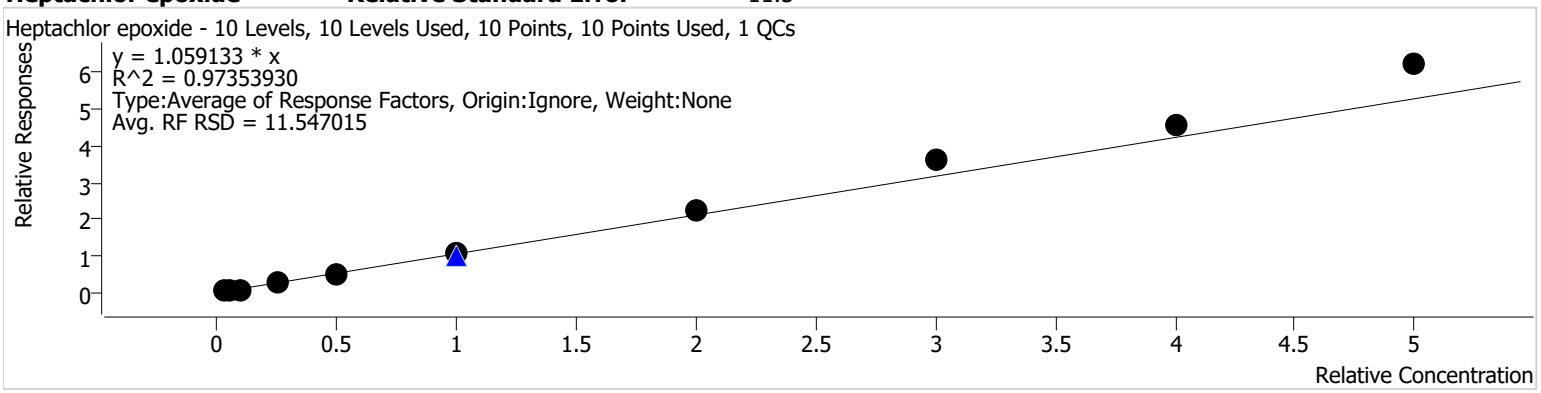
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	154861.435
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	363033.065
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	811024.483
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	2312949.301
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	3466285.339
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	4239517.072
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	8044094.057
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	9971735.062
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	19625877.389
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	21160212.296

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Heptachlor epoxide **Relative Standard Error** 11.5



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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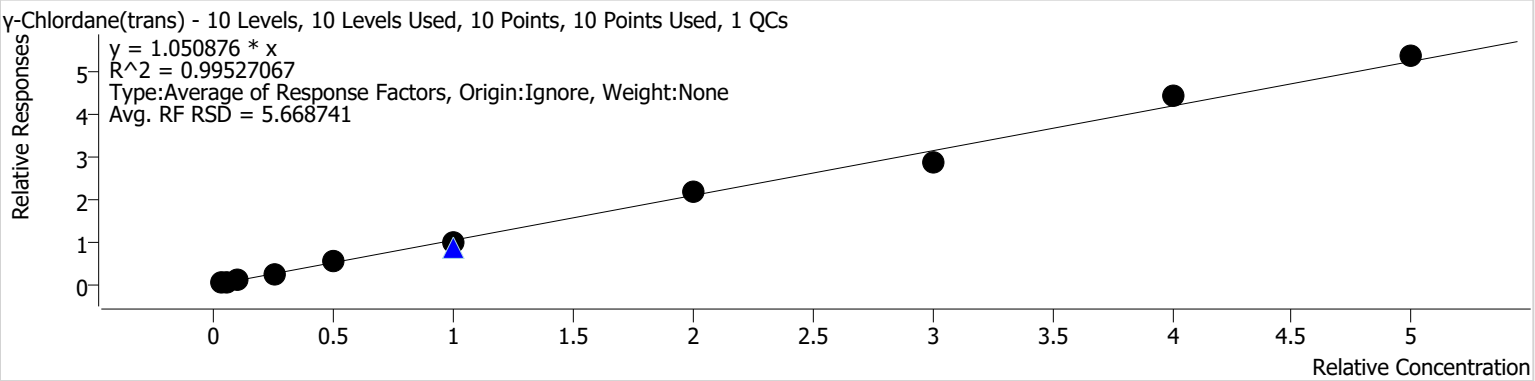
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	41366.256
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	87688.505
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	192495.149
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	484231.751
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	816073.803
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	904735.146
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	1786525.683
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	2337487.081
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	4045920.008
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	4415694.710

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

γ-Chlordane(trans) **Relative Standard Error** 5.7

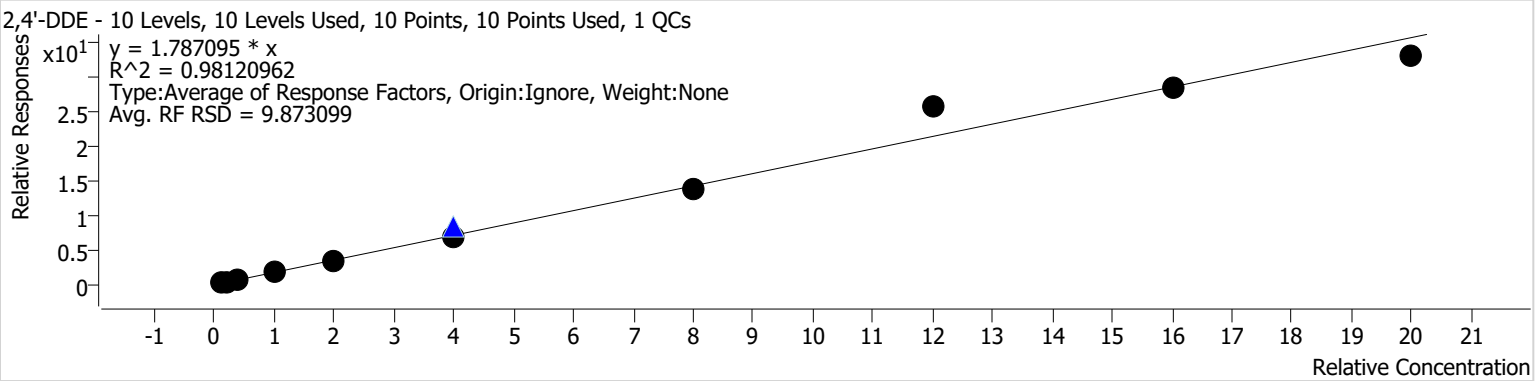


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	29086.593
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	70906.107
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	147003.384
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	331497.397
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	906194.577
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	1359154.958
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	1383226.204
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	3302005.509
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	3958845.583
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	8064239.808
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	8097414.386

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

2,4'-DDE **Relative Standard Error** 9.9

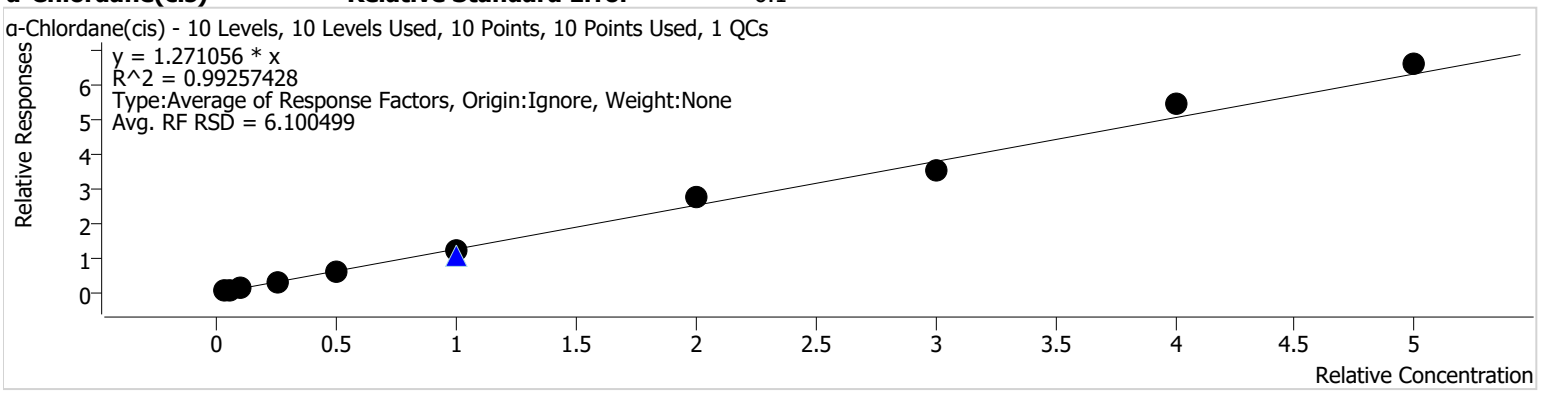


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	286895.092
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	690168.372
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	1544941.670
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	3369812.237
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	9528163.577
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	12790018.759
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	16039434.719
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	32085795.993
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	39744128.512
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	90133797.701
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	90959981.049

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

α-Chlordane(cis) **Relative Standard Error** 6.1



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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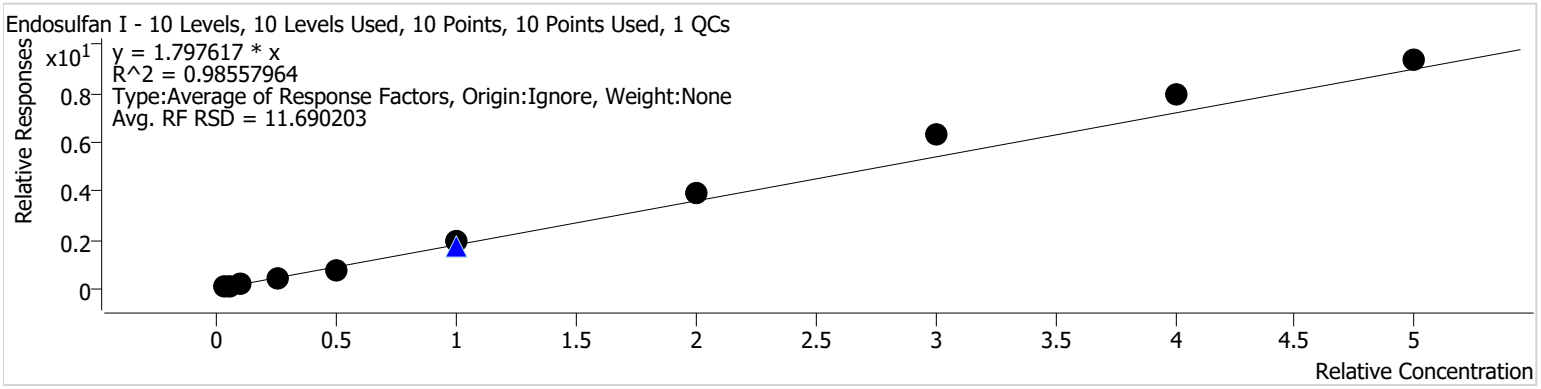
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	78851.098
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	176748.122
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	414539.846
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	1040883.003
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	1672460.030
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	1759363.724
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	4129802.085
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	4826509.785
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	9967919.530
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	9997654.215

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Endosulfan I **Relative Standard Error** 11.7

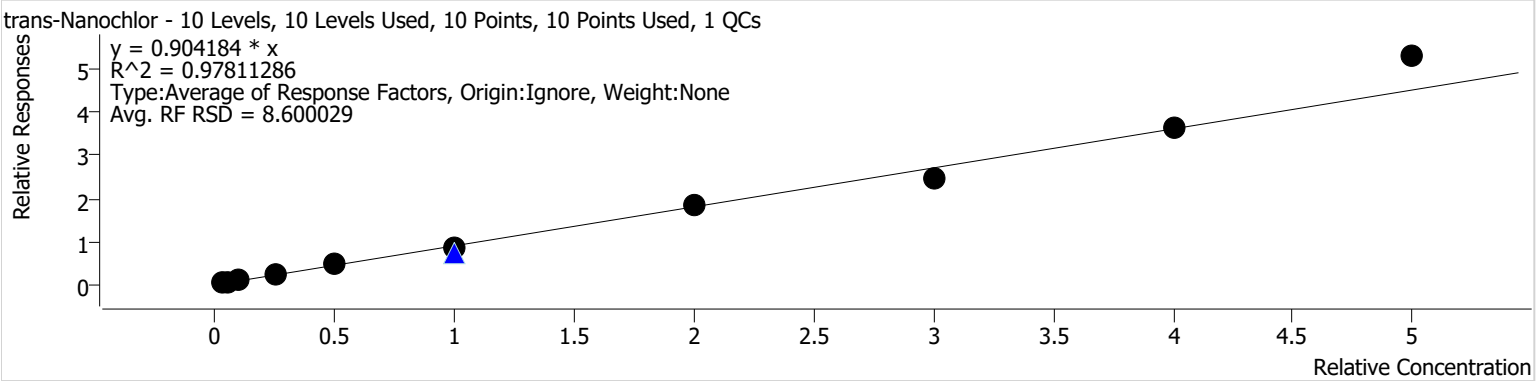


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	12657.393
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	26949.533
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	57632.571
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	136582.548
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	353931.485
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	540931.651
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	589164.690
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	1346528.648
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	1651860.268
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	3501284.736
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	3806913.285

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

trans-Nanochlor **Relative Standard Error** 8.6



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	50410.128
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	130947.591
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	281566.490
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	794287.292
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	1193099.698
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	1235174.057
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	2781147.635
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	3402958.477
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	6566129.980
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	7990574.342

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
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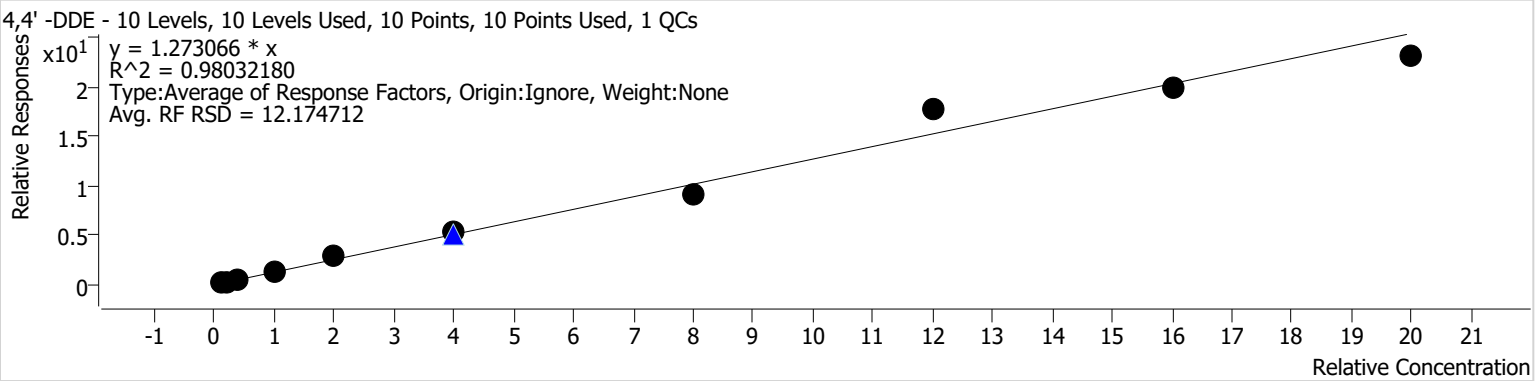
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

4,4' -DDE **Relative Standard Error** 12.2



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	455709.999
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	1086617.737
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	2312876.665
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	8236910.875
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	9913551.309
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	9991452.148
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	21507417.089
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	27471430.033
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	62621543.559
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	63723717.747

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
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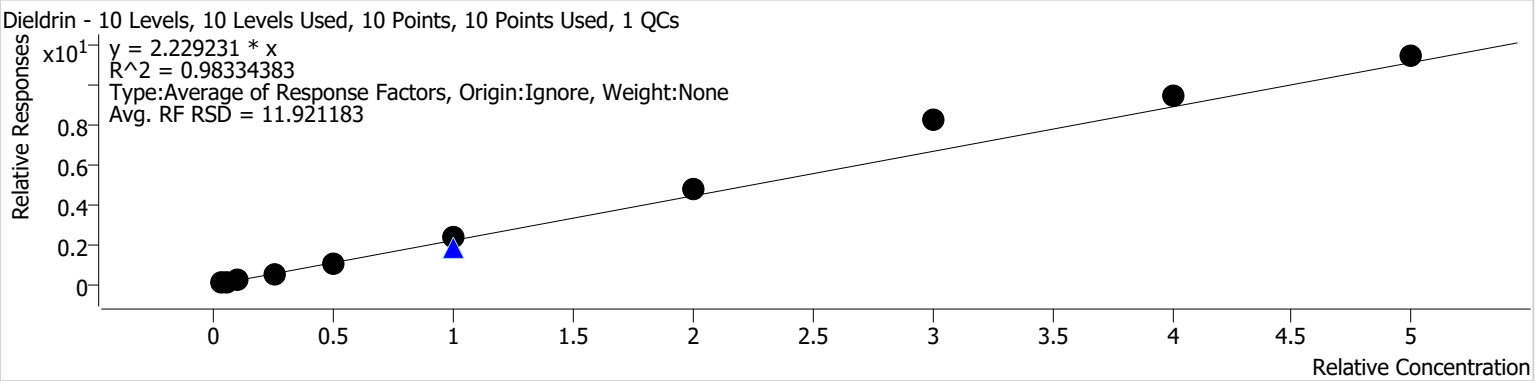
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Dieldrin **Relative Standard Error** 11.9



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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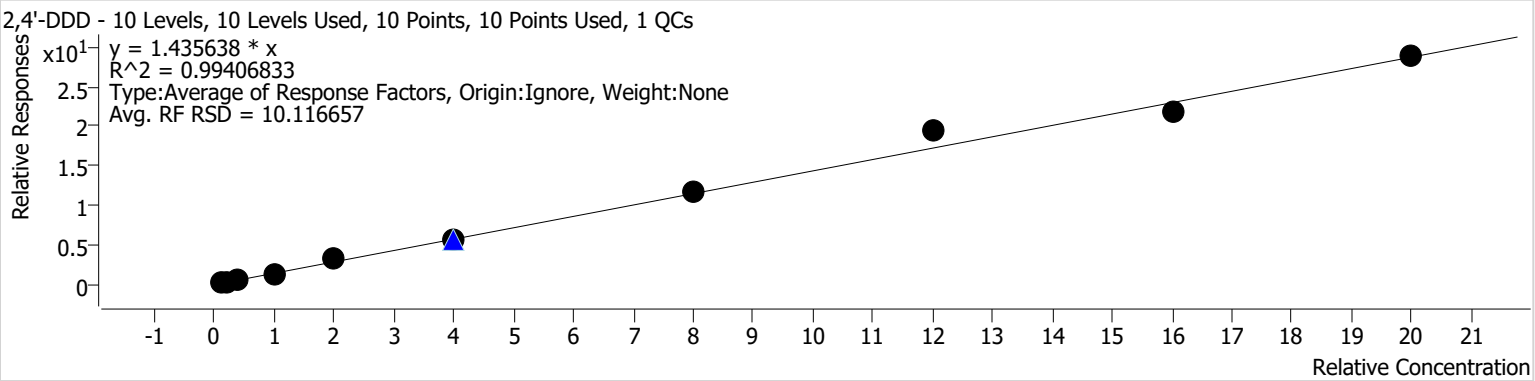
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	30997.725
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	71250.561
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	151258.353
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	520192.902
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	667048.696
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	632204.453
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	1647035.071
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	2160699.188
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	4161190.291
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	4666722.168

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

2,4'-DDD **Relative Standard Error** 10.1



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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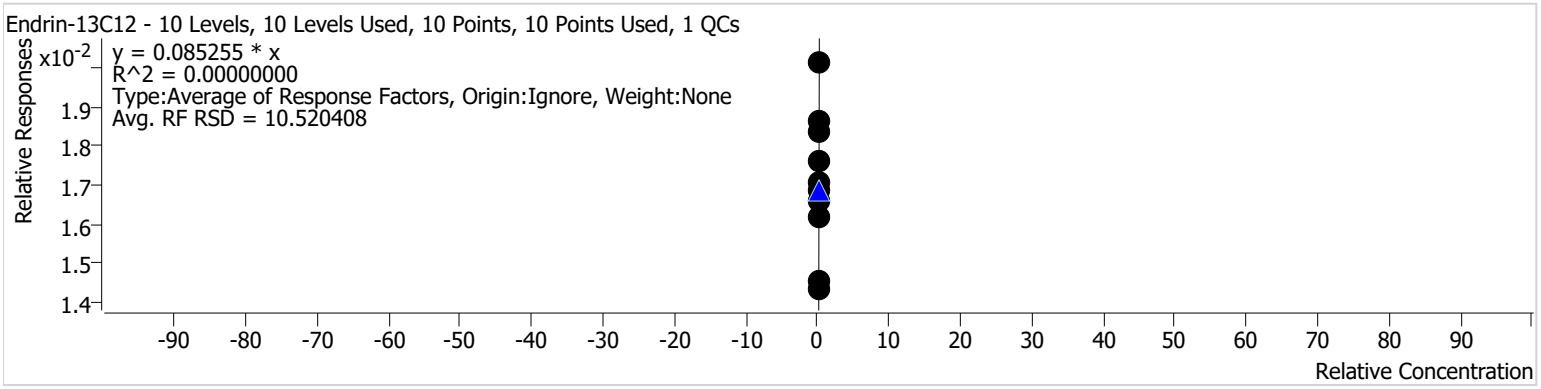
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	523680.209
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	1212336.075
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	2513503.423
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	9086196.058
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	10586370.677
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	10991996.702
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	26953350.516
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	29590413.221
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	68738219.126
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	79358454.884

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Endrin-13C12 **Relative Standard Error**

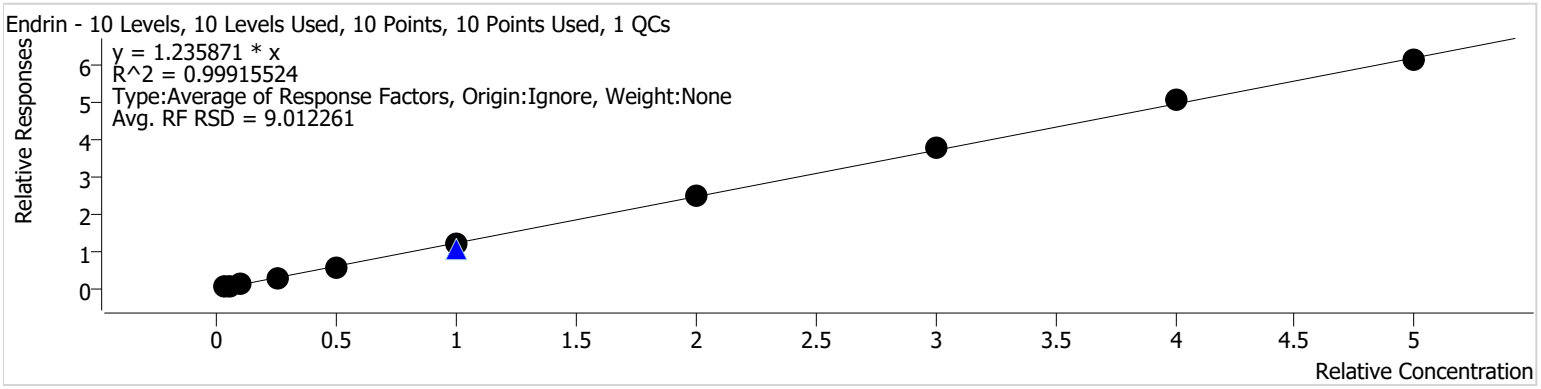


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	20.0000	310094.732
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	20.0000	327427.821
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	20.0000	476321.852
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	20.0000	408601.818
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	20.0000	374902.107
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	275781.528
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	349231.549
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	20.0000	343173.272
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	20.0000	302794.877
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	20.0000	263044.316
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	20.0000	439930.301

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Endrin **Relative Standard Error** 9.0



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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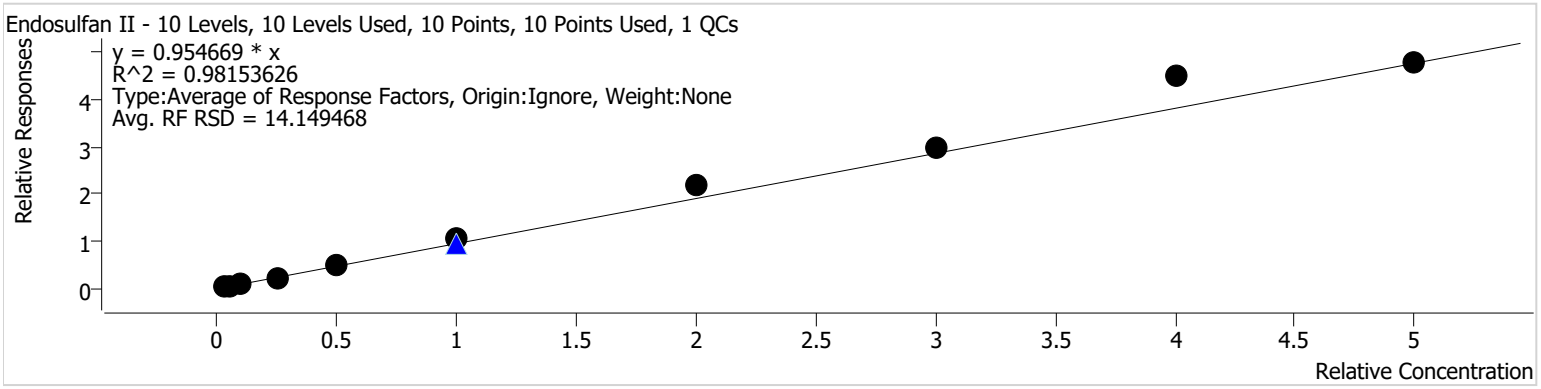
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	19857.911
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	42439.142
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	90013.319
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	266848.927
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	325653.078
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	382538.075
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	861616.897
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	996689.508
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	2232454.917
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	2490042.630

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Endosulfan II **Relative Standard Error** 14.1

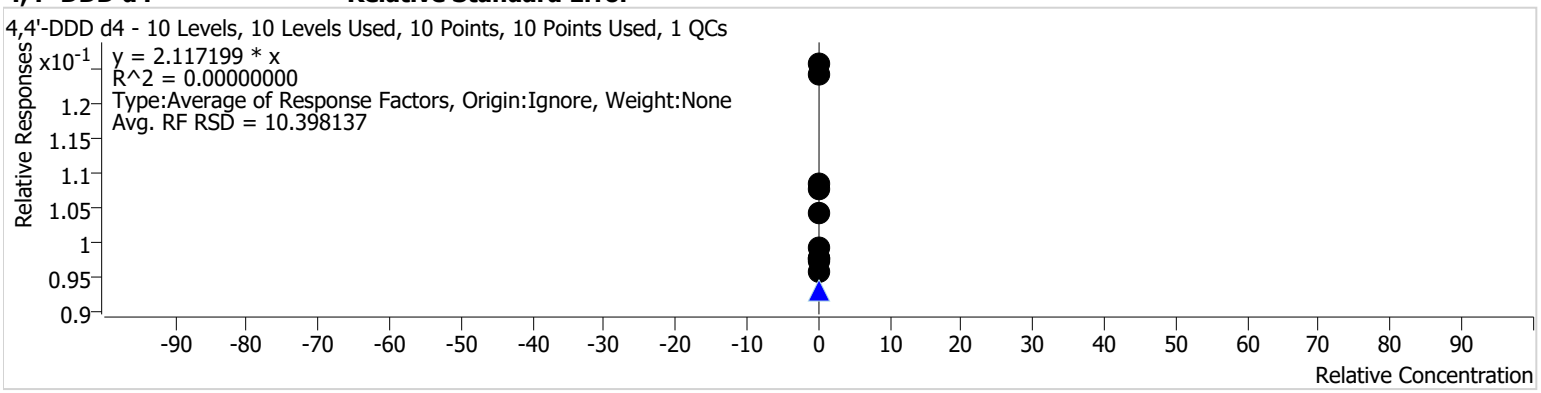


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	5891.933
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	11969.119
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	32529.233
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	71155.779
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	233664.892
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	297720.122
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	323152.836
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	755436.434
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	787049.384
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	1979842.674
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	1969729.724

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

4,4'-DDD d4 **Relative Standard Error**



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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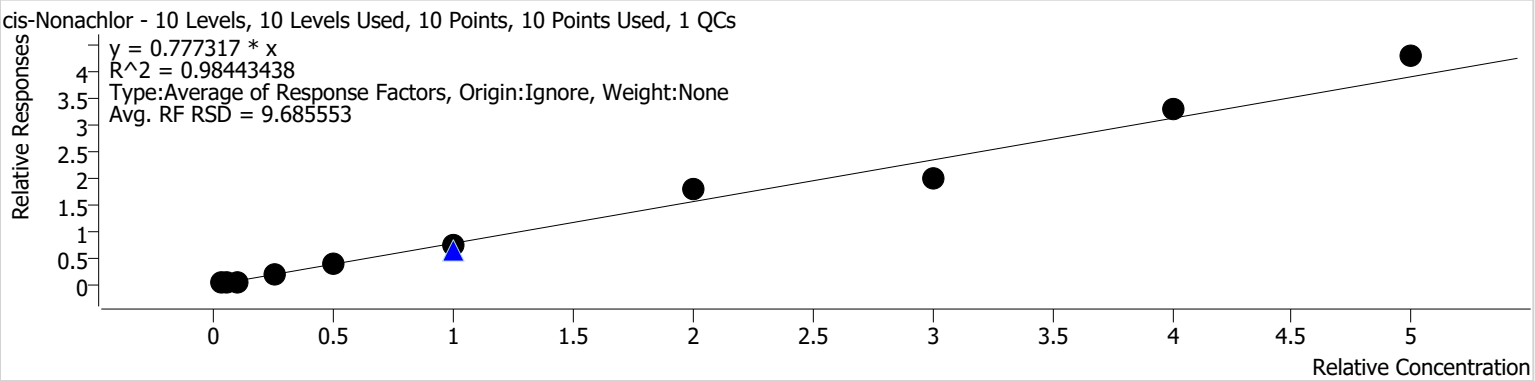
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	5.0000	1814845.187
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	5.0000	2696720.789
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	5.0000	2762753.085
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	5.0000	2179089.813
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	5.0000	1840566.080
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	5.0000	1928410.436
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	5.0000	2329030.680
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	1785010.747
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	5.0000	1532652.358
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	5.0000	3148920.529

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

cis-Nonachlor **Relative Standard Error** 9.7

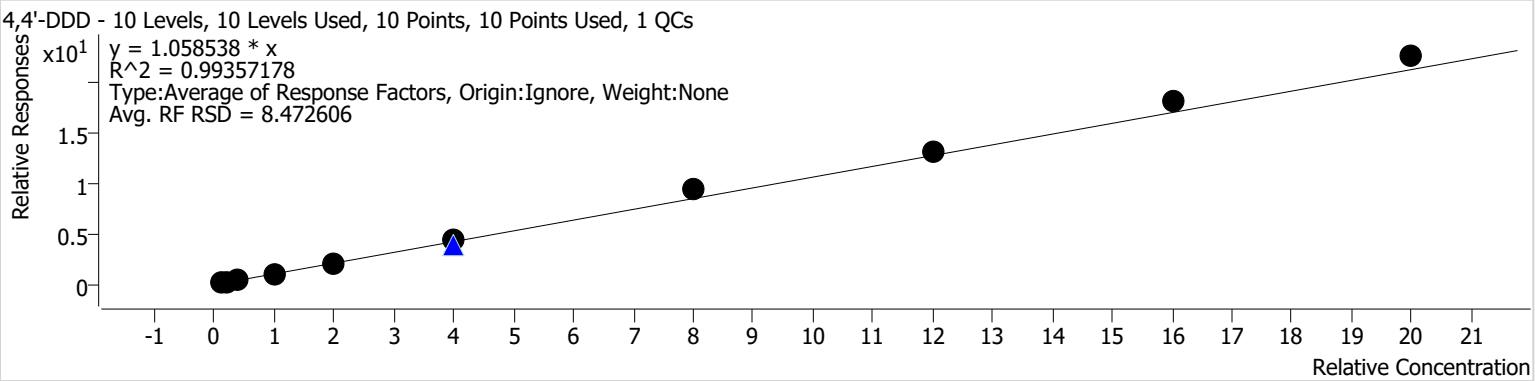


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	24450.344
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	45737.169
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	102676.890
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	239392.447
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	660606.184
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	1018698.066
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	1053935.897
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	2626342.408
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	2733045.667
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	5897751.827
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	6430612.619

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

4,4'-DDD **Relative Standard Error** 8.5

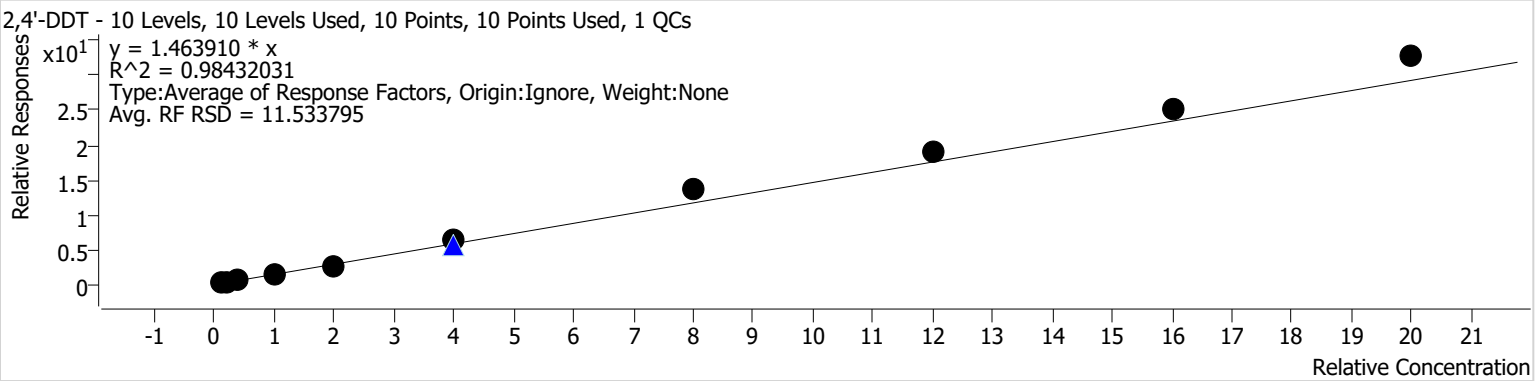


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	171999.233
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	363374.466
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	820773.259
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	1894192.980
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	5703067.884
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	8157694.741
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	7362704.523
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	22036371.624
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	20162153.245
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	56695753.266
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	61895110.455

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

2,4'-DDT **Relative Standard Error** 11.5

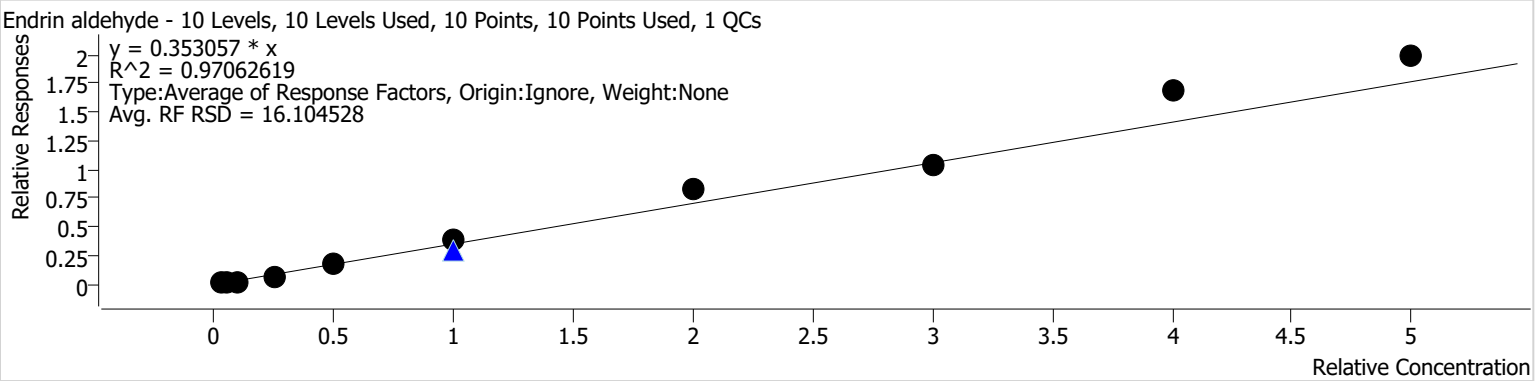


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	134838.275
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	306602.936
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	734483.137
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	1632826.393
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	4993568.719
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	7055012.130
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	7173750.463
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	19742558.995
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	17713282.227
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	46846054.346
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	49979069.848

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Endrin aldehyde **Relative Standard Error** 16.1



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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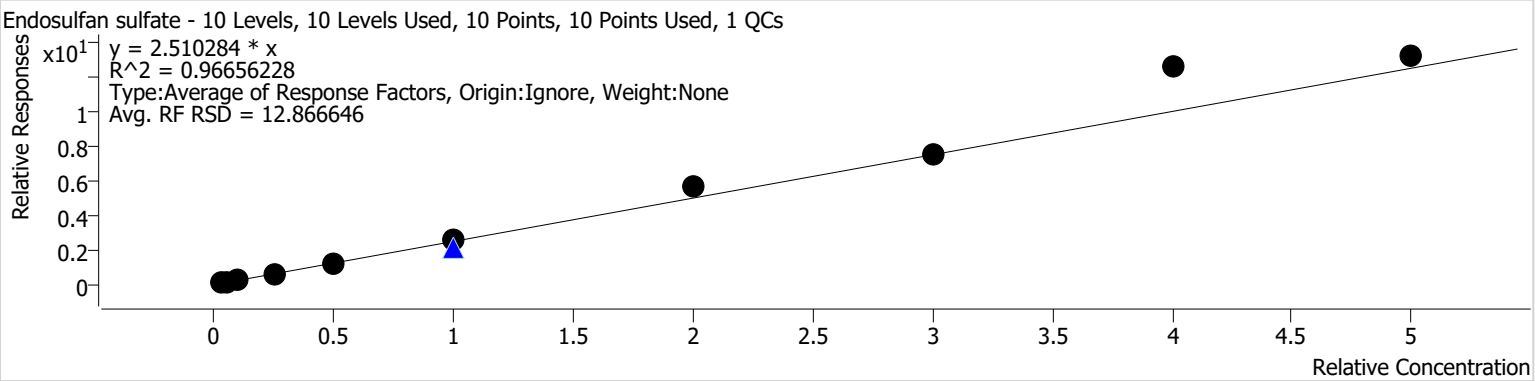
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	5953.694
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	10813.317
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	21405.099
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	83111.664
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	110388.344
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	103205.861
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	282543.190
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	274139.174
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	745980.862
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	808756.801

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Endosulfan sulfate **Relative Standard Error** 12.9



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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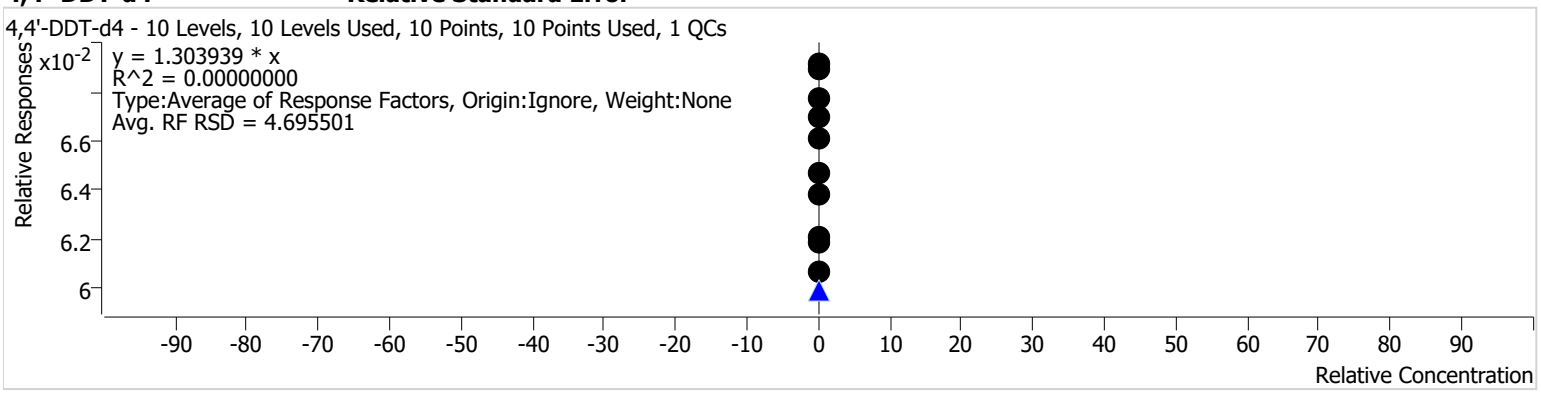
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	36828.011
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	83092.134
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	172636.724
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	587574.043
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	716451.947
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	754704.690
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	1938436.477
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	1994375.857
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	5600921.353
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	5392406.088

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

4,4'-DDT-d4 **Relative Standard Error**

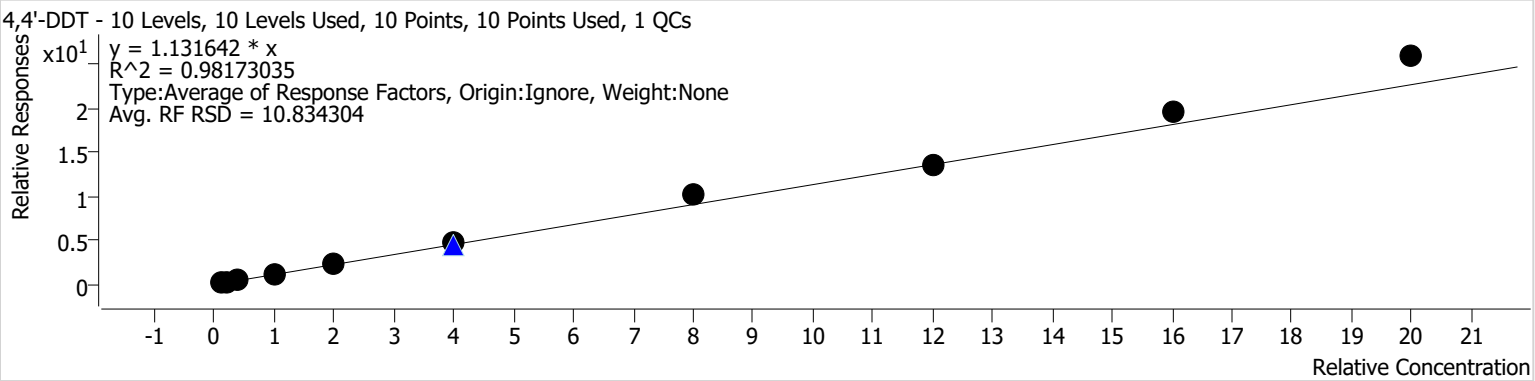


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	5.0000	1041141.636
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	5.0000	1200163.730
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	5.0000	1948311.247
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	5.0000	1532419.437
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	5.0000	1355778.956
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	5.0000	1088325.861
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	5.0000	1240997.970
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	5.0000	1450311.810
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	1221550.448
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	5.0000	934197.274
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	5.0000	1875510.291

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

4,4'-DDT **Relative Standard Error** 10.8

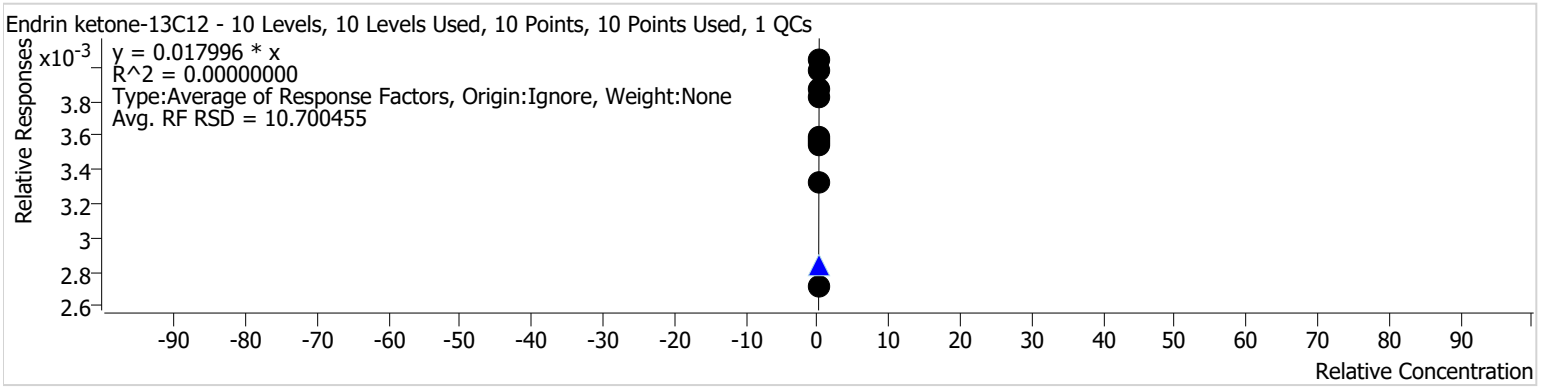


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	99114.916
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	236163.692
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	568721.457
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	1262039.754
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	4544177.318
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	5207557.829
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	5461472.989
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	14981779.413
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	12654089.273
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	36866174.821
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	39466414.241

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Endrin ketone-13C12 **Relative Standard Error**

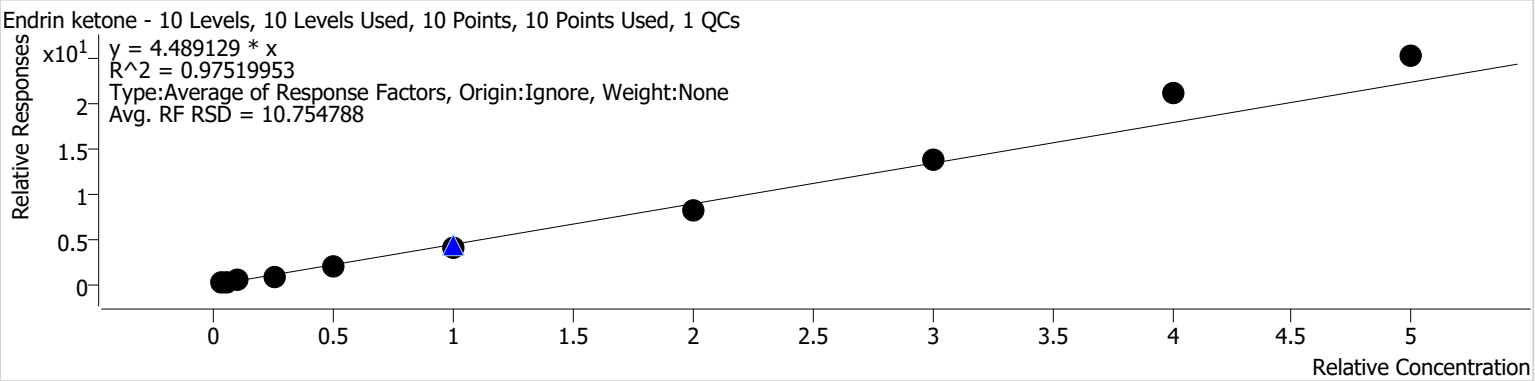


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	20.0000	61966.579
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	20.0000	66551.407
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	20.0000	112025.294
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	20.0000	78988.926
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	20.0000	72844.617
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	66028.677
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	59041.800
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	20.0000	84729.926
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	20.0000	65033.092
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	20.0000	54121.953
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	20.0000	81878.154

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Endrin ketone **Relative Standard Error** 10.8



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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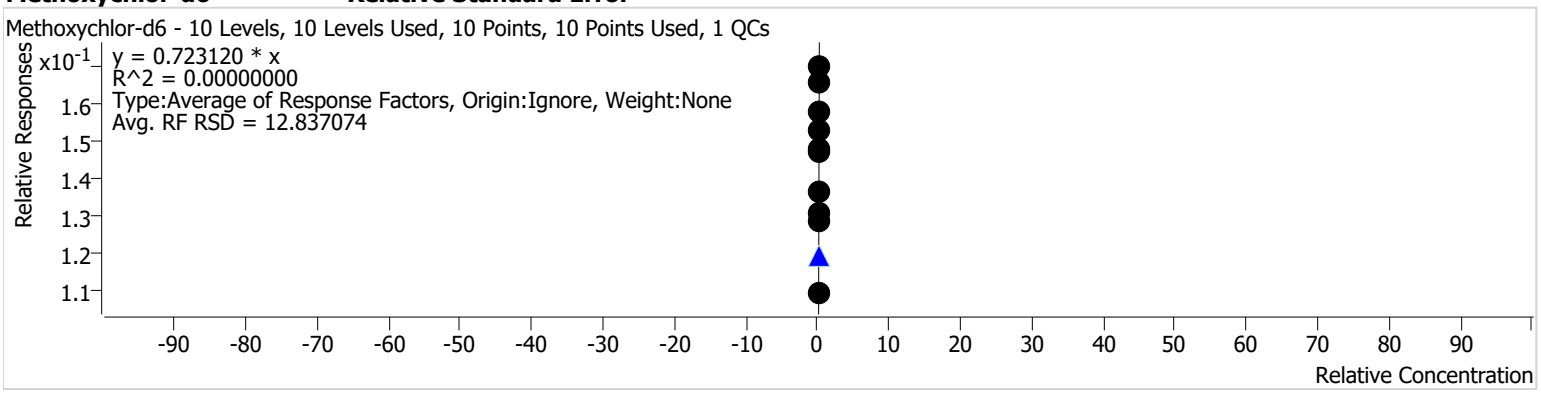
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	14325.882
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	31944.952
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	65616.523
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	220104.951
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	269376.687
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	258638.382
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	708515.885
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	748951.952
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	1742310.268
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	1991887.019

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Methoxychlor-d6 **Relative Standard Error**



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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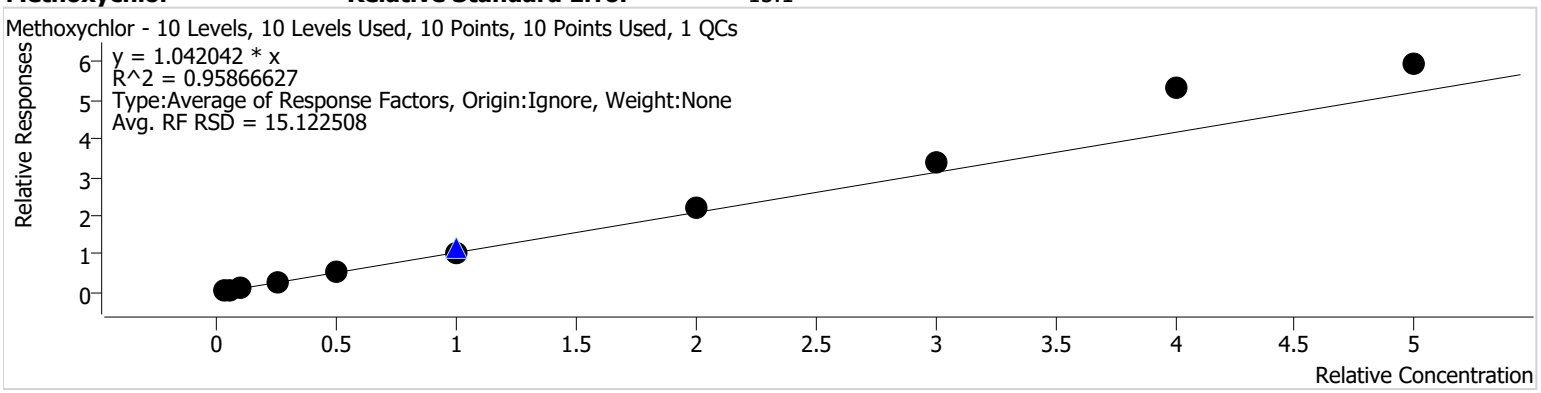
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	20.0000	2429285.418
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	20.0000	4676582.921
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	20.0000	3781502.657
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	20.0000	2990211.760
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	2690616.369
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	2471989.904
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	20.0000	3646198.919
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	20.0000	2697603.493
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	20.0000	1814078.554
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	20.0000	3314601.555

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Methoxychlor **Relative Standard Error** 15.1



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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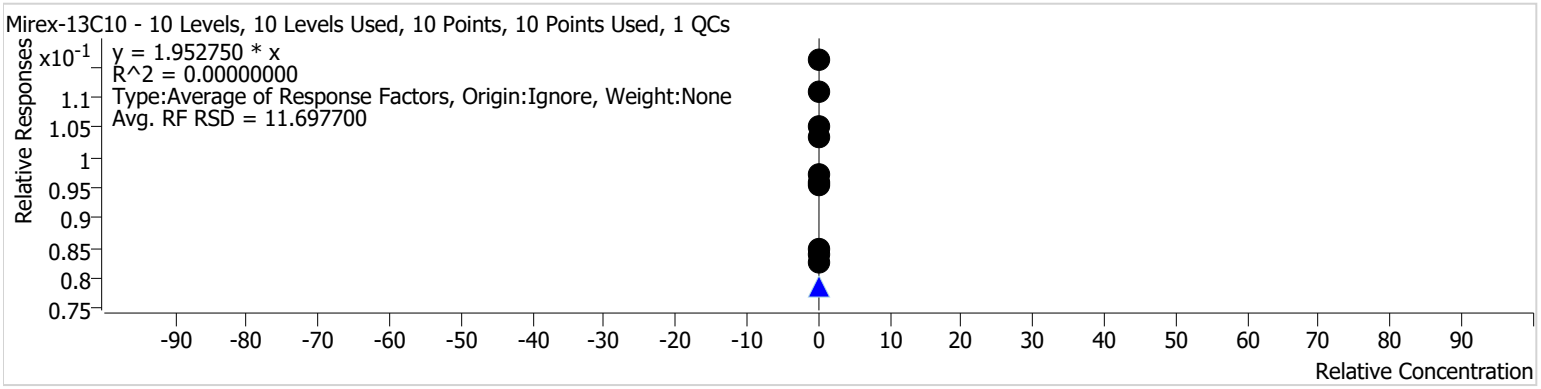
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	103201.019
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	274743.724
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	697573.113
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	2431005.077
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	2745254.363
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	2964653.894
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	8077652.621
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	6184696.069
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	17574653.546
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	22394980.698

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Mirex-13C10 **Relative Standard Error**

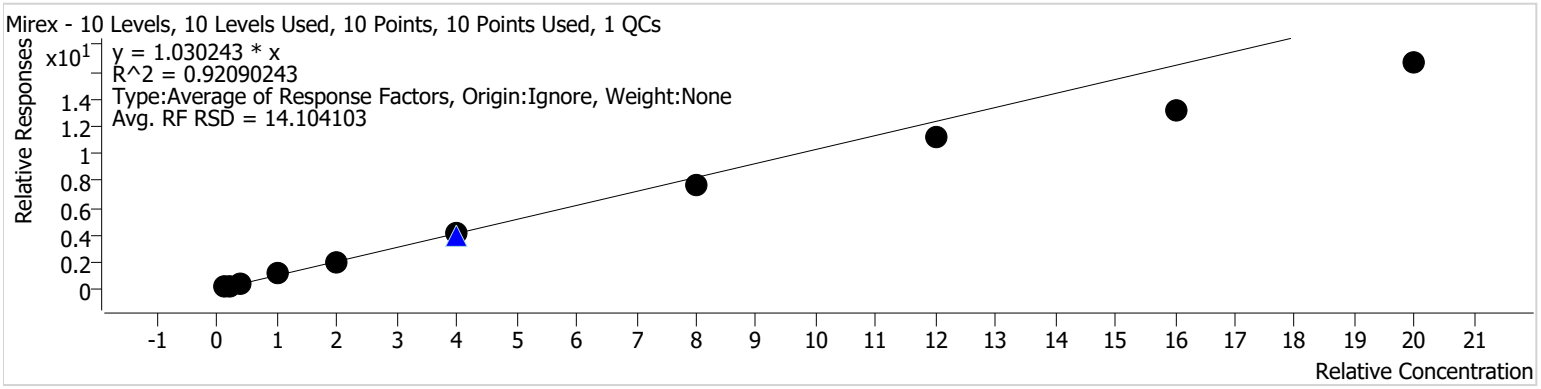


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	5.0000	1588590.968
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	5.0000	1563062.307
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	5.0000	2694998.934
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	5.0000	2465250.368
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	5.0000	1815460.937
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	5.0000	1796077.325
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	5.0000	1628811.400
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	5.0000	2290296.551
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	1773965.194
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	5.0000	1639109.097
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	5.0000	2569861.930

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/6/2024 2:12:06 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/6/2024 2:12:37 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/6/2024 2:11:59 PM	**Batch State**	Processed
Analyze Quant Version	10.2	**Report Quant Version**	10.2

Mirex **Relative Standard Error** 14.1



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
7/24/2024 5:27 PM	J:\MS42\Data\072424\072424F011.D	Calibration	0.5	True	0.5000	195205.415
7/24/2024 5:46 PM	J:\MS42\Data\072424\072424F012.D	Calibration	1	True	1.0000	379672.735
7/24/2024 6:04 PM	J:\MS42\Data\072424\072424F013.D	Calibration	2	True	2.0000	828174.980
7/24/2024 6:22 PM	J:\MS42\Data\072424\072424F014.D	Calibration	5	True	5.0000	2011692.953
7/24/2024 6:41 PM	J:\MS42\Data\072424\072424F015.D	Calibration	10	True	10.0000	5466945.821
7/24/2024 6:59 PM	J:\MS42\Data\072424\072424F016.D	Calibration	20	True	20.0000	7323543.715
7/24/2024 8:30 PM	J:\MS42\Data\072424\072424F021.D	QC	20	True	20.0000	6488565.316
7/24/2024 7:17 PM	J:\MS42\Data\072424\072424F017.D	Calibration	40	True	40.0000	17389279.653
7/24/2024 7:35 PM	J:\MS42\Data\072424\072424F018.D	Calibration	60	True	60.0000	18405405.392
7/24/2024 7:54 PM	J:\MS42\Data\072424\072424F019.D	Calibration	80	True	80.0000	33952928.213
7/24/2024 8:12 PM	J:\MS42\Data\072424\072424F020.D	Calibration	100	True	100.0000	41438077.803

MassHunter Quantitative Analysis Sample Report

Data File	J:\MS42\Data\072424\072424F008.D		
Batch File	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Acq. Date-Time	7/24/2024 4:32:46 PM	**Acq Operator**	EBruno
Name	D/E Bkdwn std 10,20ppb SVM71-30L	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	7/25/2024 7:23:51 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method		**Vial**	1
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)		289.8 -> 254.8		ND ng/ml	
γ-BHC-d6(IS)		223.9 -> 187.0		ND ng/ml	
Heptachlor-13C10(IS)		276.8 -> 241.8		ND ng/ml	
Chorpyrifos-d10(IS)		199.9 -> 171.9		ND ng/ml	
Aldrin-13C(IS)		269.8 -> 200.0		ND ng/ml	
Octachlorostyrene-13C8(IS)		315.8 -> 245.8		ND ng/ml	
Isodrin-13C12(IS)		199.9 -> 130.1		ND ng/ml	
Oxychlordane-13C10(IS)		190.0 -> 125.0		ND ng/ml	
Heptachlor epoxide-13C10(IS)		362.8 -> 270.0		ND ng/ml	
Pyrene-d10	8.771	212.0 -> 208.0	19429103	100.0000 ng/ml	0.007
Endrin-13C12(IS)		269.8 -> 200.0		ND ng/ml	
4,4'-DDD d4(IS)		243.0 -> 173.1		ND ng/ml	
4,4'-DDT-d4(IS)		243.0 -> 173.1		ND ng/ml	
Endrin ketone-13C12(IS)		327.9 -> 291.8		ND ng/ml	
Methoxychlor-d6(IS)		233.0 -> 141.0		ND ng/ml	
Mirex-13C10(IS)		276.8 -> 241.8		ND ng/ml	

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6		289.8 -> 254.8		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
γ-BHC-d6		223.9 -> 187.0		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Heptachlor-13C10		276.8 -> 241.8		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Chorpyrifos-d10		199.9 -> 171.9		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Aldrin-13C		269.8 -> 200.0		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Octachlorostyrene-13C8		315.8 -> 245.8		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Isodrin-13C12		199.9 -> 130.1		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Oxychlordane-13C10		190.0 -> 125.0		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Endrin-13C12		269.8 -> 200.0		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
4,4'-DDD d4		243.0 -> 173.1		ND ng/ml	
		Spiked Amount =	5.0	Recovery =	*NC %*
Endrin ketone-13C12		327.9 -> 291.8		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Methoxychlor-d6		233.0 -> 141.0		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*

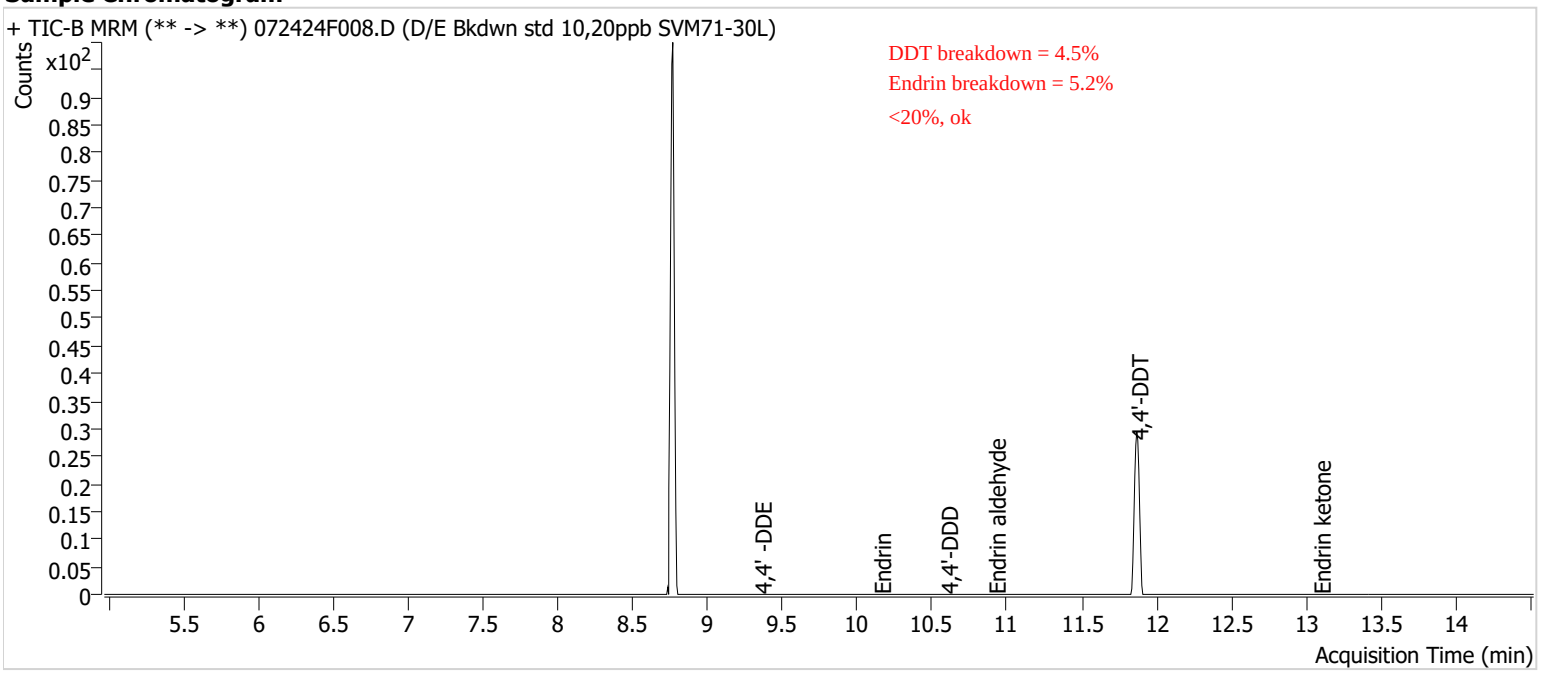
Target Compounds	**ISTD**	**RT**	**Transition**	**Resp.**	**Conc. Units**	**Qvalue**
α-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)		283.8 -> 213.9		ND ng/ml	
β-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	

MassHunter Quantitative Analysis Sample Report

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
γ-BHC(Lindane)	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
δ-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Heptachlor	Heptachlor-13C10(IS)		271.7 -> 236.9		ND ng/ml	
Chorpyrifos	Chorpyrifos-d10(IS)		196.9 -> 169.0		ND ng/ml	
Aldrin	Aldrin-13C(IS)		254.9 -> 220.0		ND ng/ml	
Octachlorostyrene	Octachlorostyrene-13C8(IS)		342.8 -> 307.8		ND ng/ml	
Isodrin	Isodrin-13C12(IS)		193.0 -> 123.0		ND ng/ml	
Oxychlordane	Oxychlordane-13C10(IS)		114.9 -> 51.1		ND ng/ml	
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)		352.8 -> 262.9		ND ng/ml	
γ-Chlordane(trans)	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
2,4'-DDE	4,4'-DDD d4(IS)		246.0 -> 176.2		ND ng/ml	
α-Chlordane(cis)	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
Endosulfan I	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
trans-Nanochlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
4,4' -DDE	4,4'-DDD d4(IS)	9.357	246.0 -> 176.2	98460	NC ng/ml	99
Dieldrin	Endrin-13C12(IS)		262.9 -> 193.0		ND ng/ml	
2,4'-DDD	4,4'-DDD d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin	Endrin-13C12(IS)	10.153	262.8 -> 193.0	420724	NC ng/ml	92
Endosulfan II	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
cis-Nonachlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
4,4'-DDD	4,4'-DDD d4(IS)	10.601	235.0 -> 165.1	140197	NC ng/ml	99
2,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin aldehyde	Endrin-13C12(IS)	10.920	249.9 -> 214.9	6287	NC ng/ml	64
Endosulfan sulfate	Endrin-13C12(IS)		271.9 -> 237.0		ND ng/ml	
4,4'-DDT	4,4'-DDT-d4(IS)	11.874	235.0 -> 165.1	5045318	NC ng/ml	91
Endrin ketone	Endrin ketone-13C12(IS)	13.092	147.0 -> 111.0	16687	NC ng/ml	81
Methoxychlor	Methoxychlor-d6(IS)		227.0 -> 141.1		ND ng/ml	
Mirex	Mirex-13C10(IS)		271.8 -> 236.8		ND ng/ml	

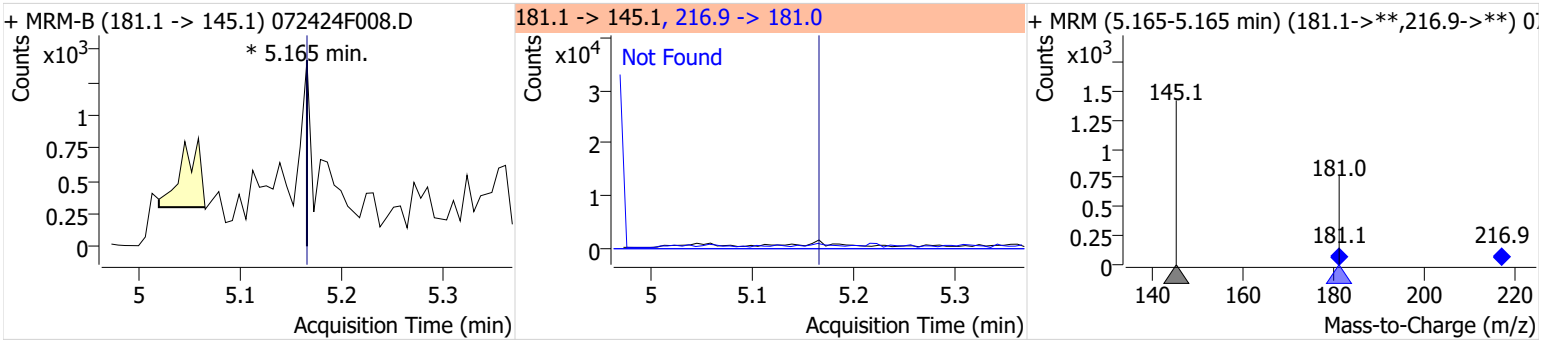
(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram

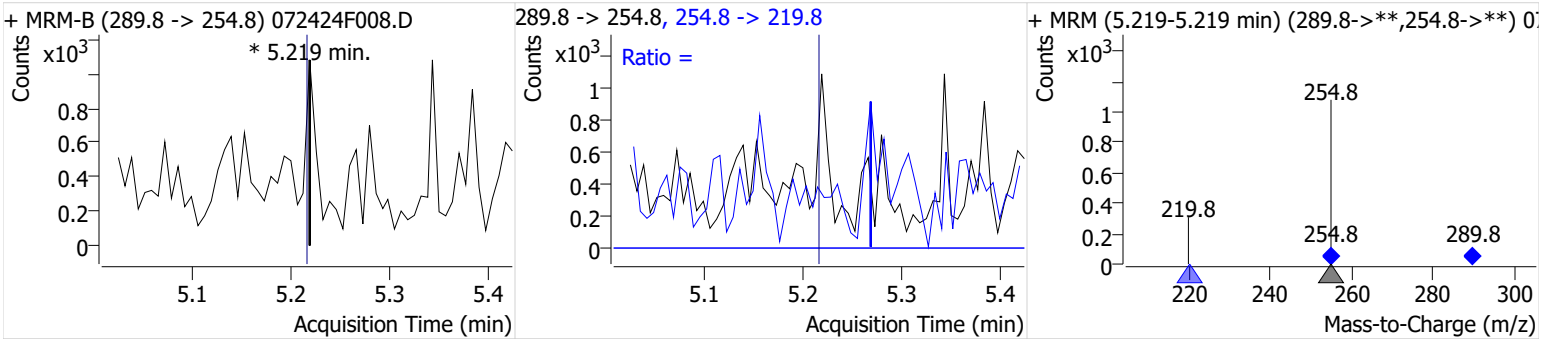


MassHunter Quantitative Analysis Sample Report

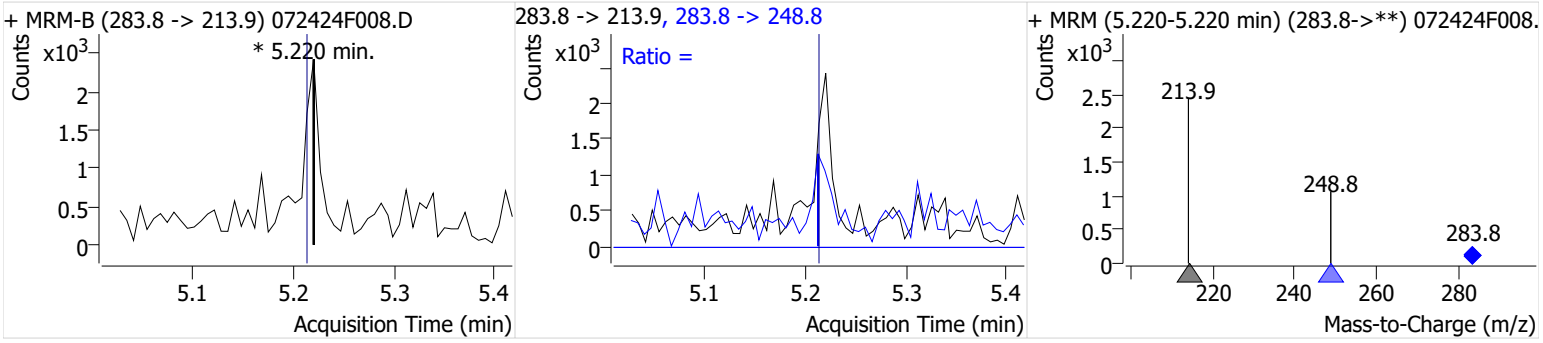
α-BHC



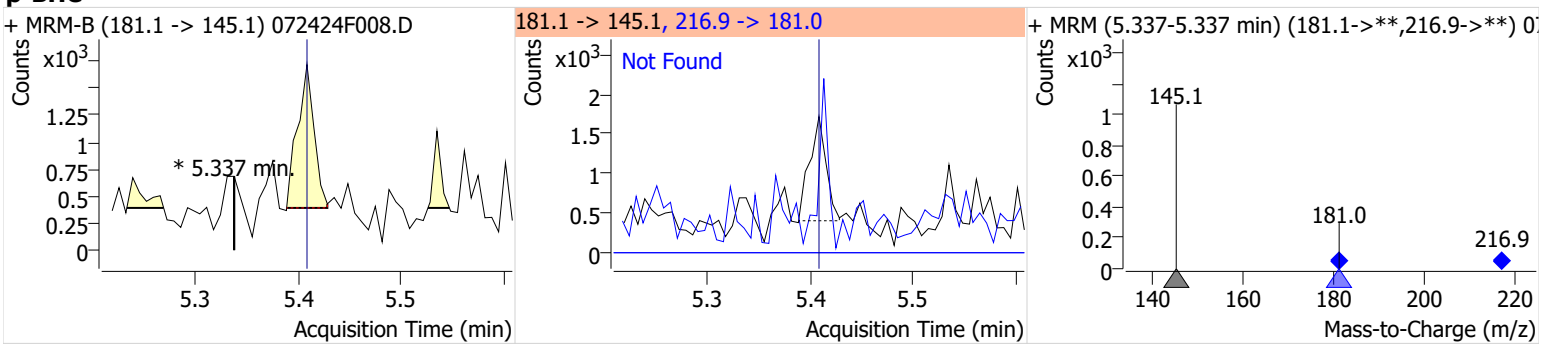
Hexachlorobenzene-13C6



Hexachlorobenzene



β-BHC



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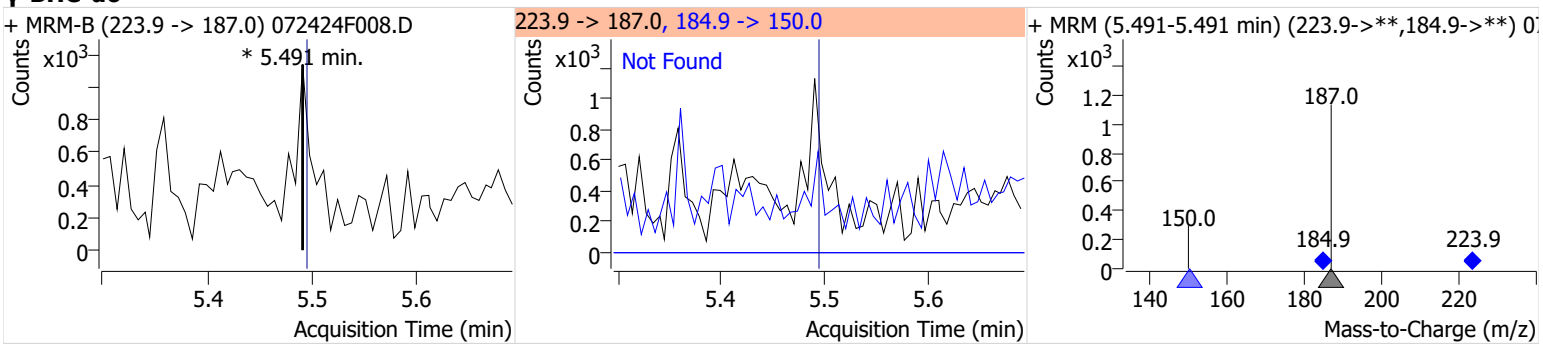
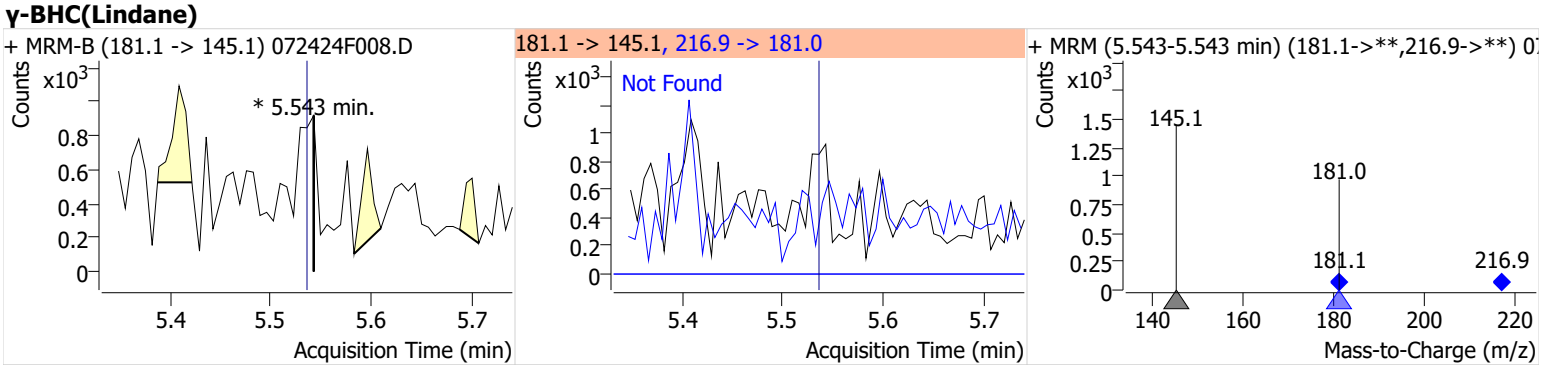
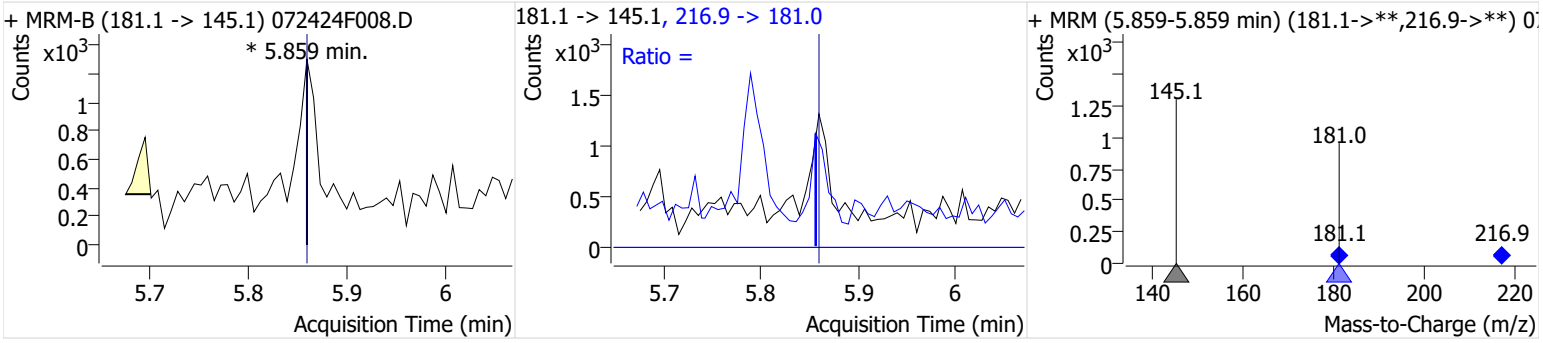
γ-BHC-d6



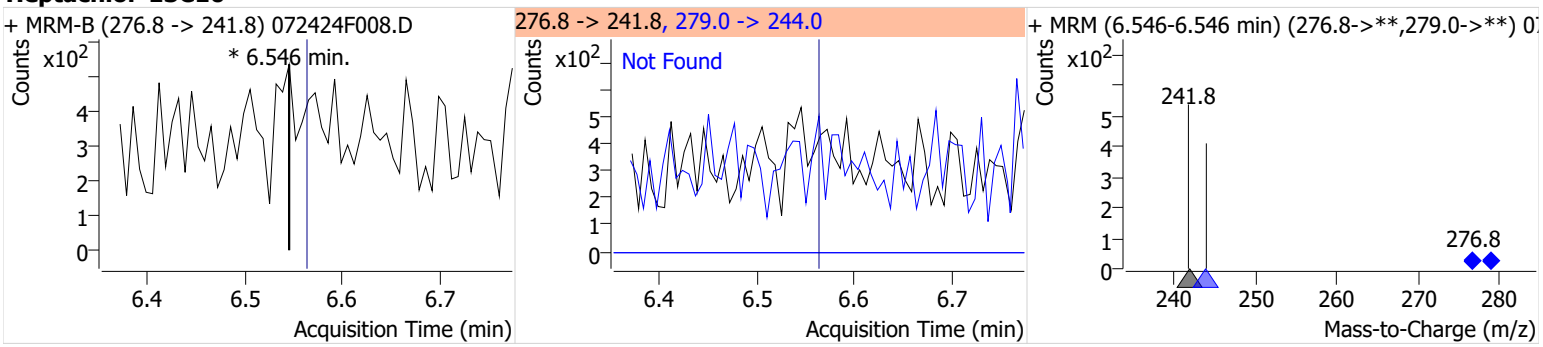
γ-BHC(Lindane)



δ-BHC

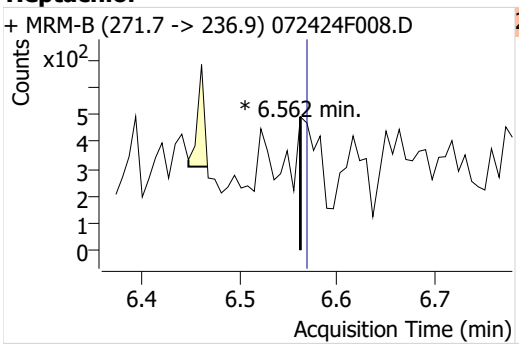


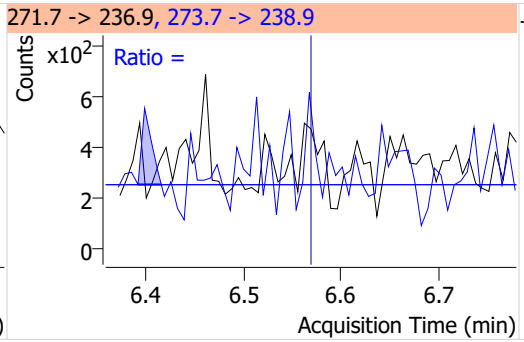
Heptachlor-13C10

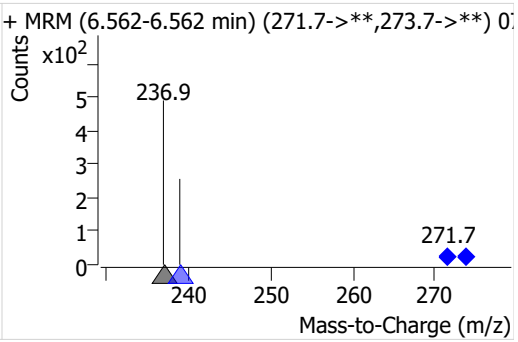


MassHunter Quantitative Analysis Sample Report

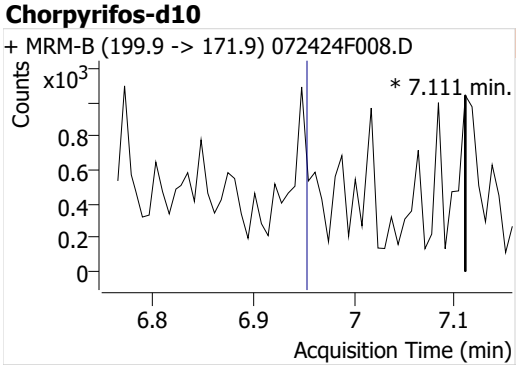
Heptachlor

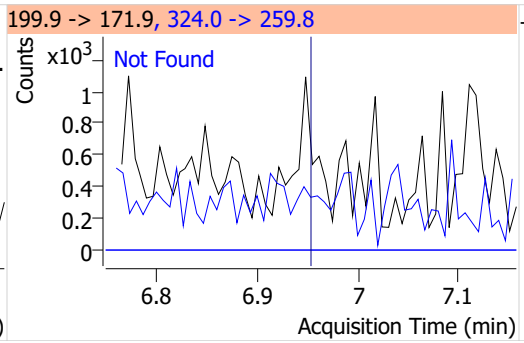


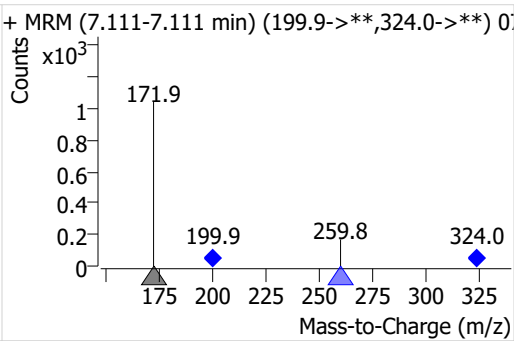




Chorpyrifos-d10







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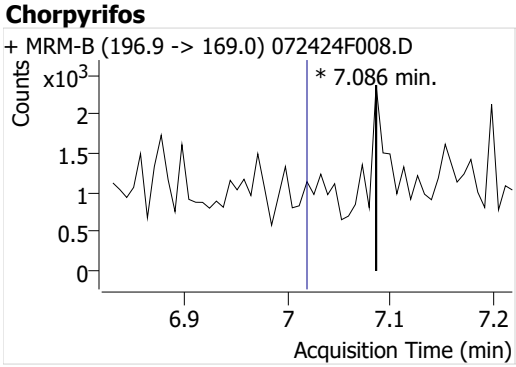
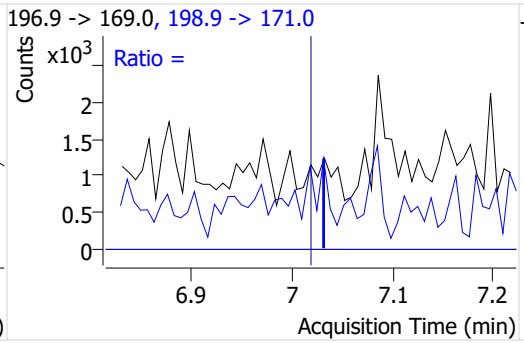
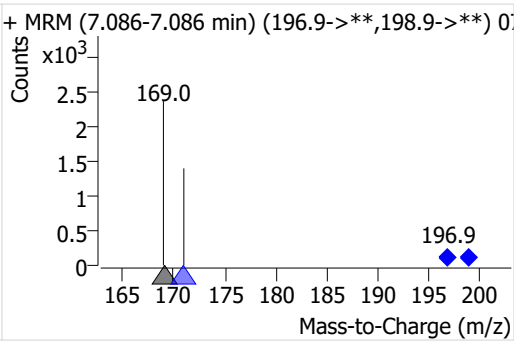
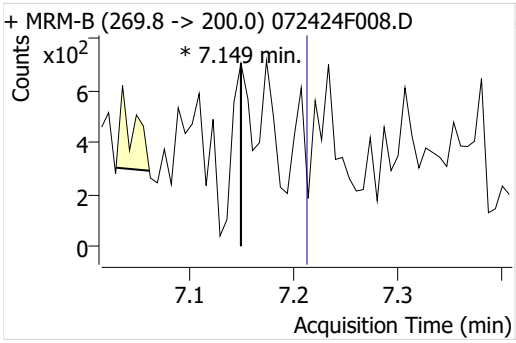
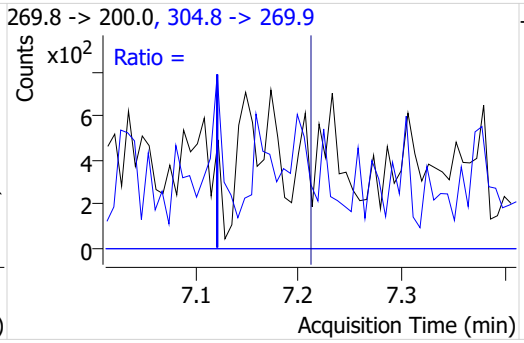


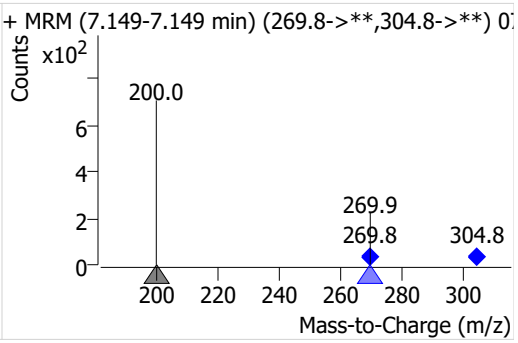




Aldrin-13C







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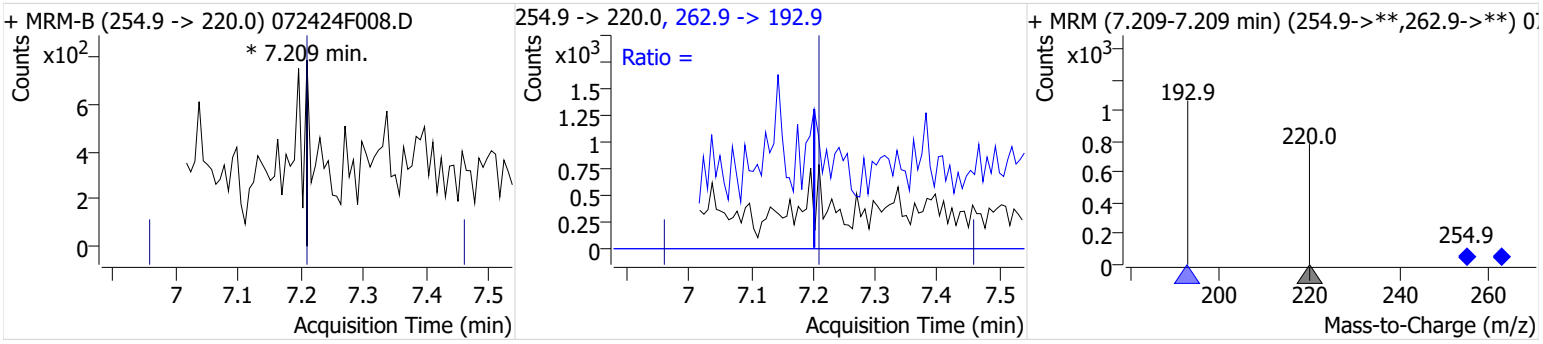
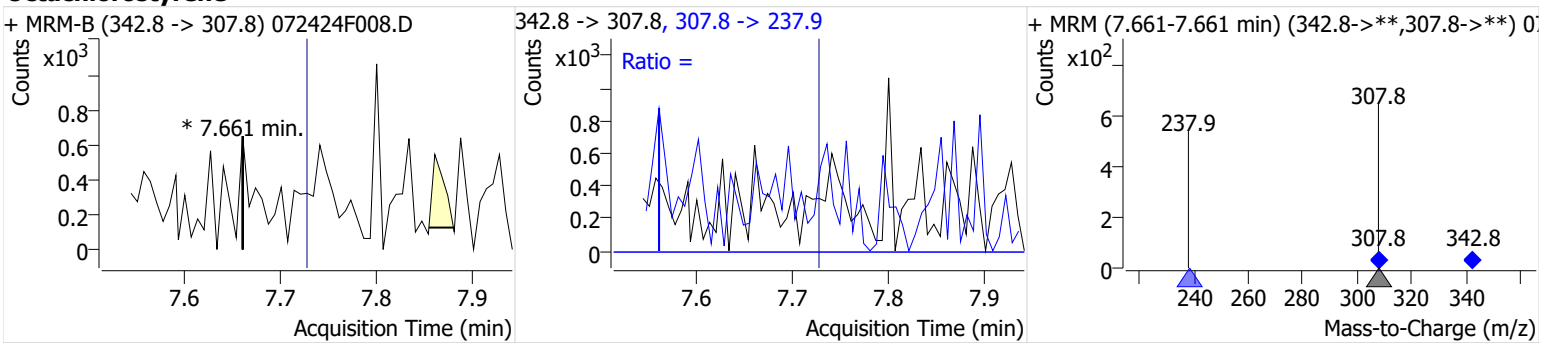
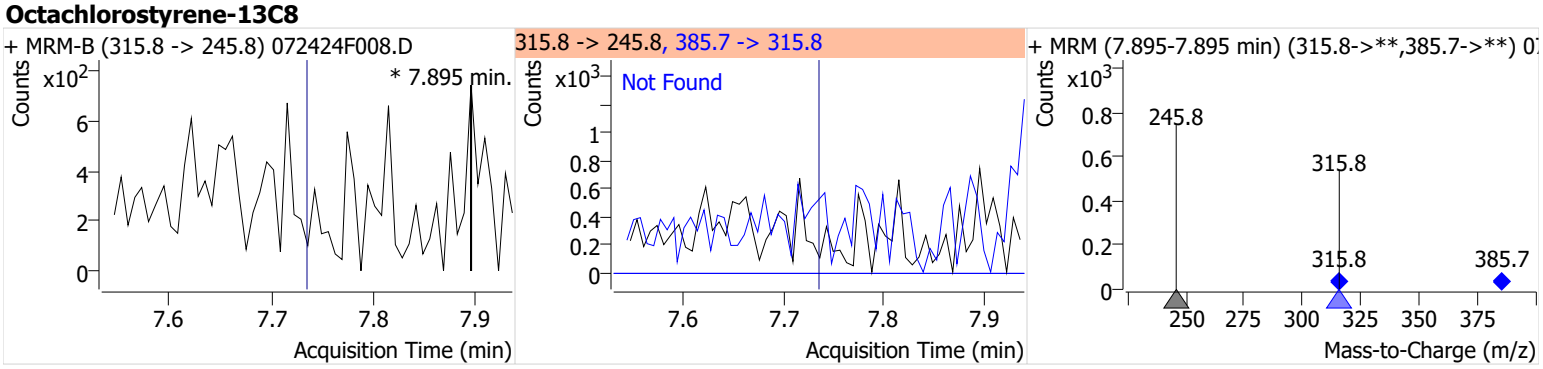
Aldrin



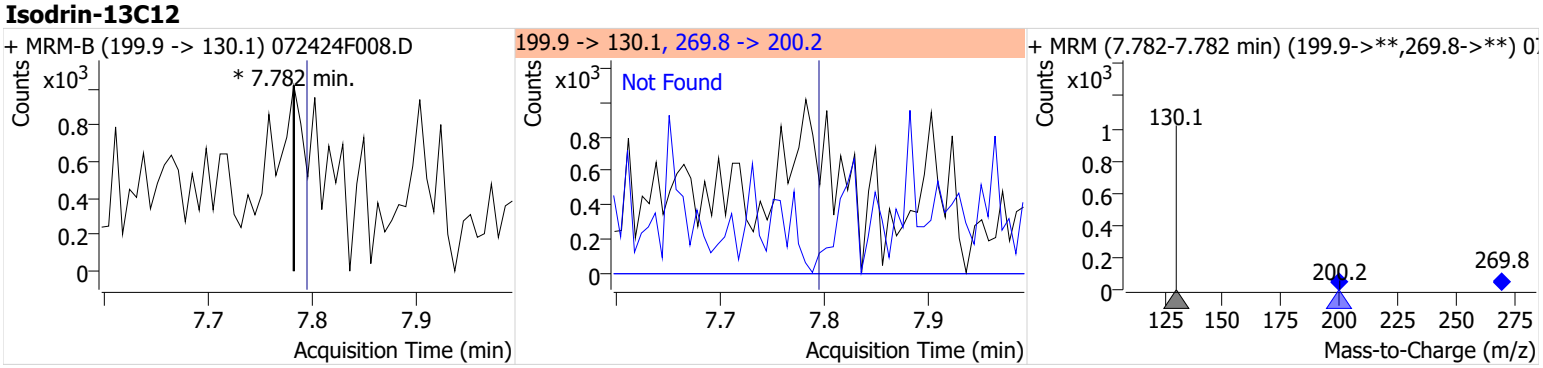
Octachlorostyrene



Octachlorostyrene-13C8



Isodrin-13C12



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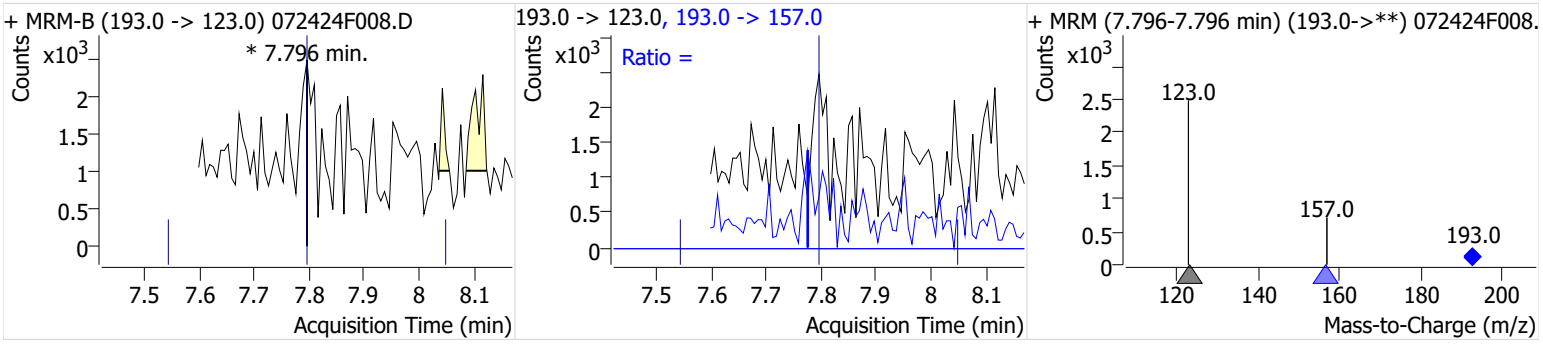
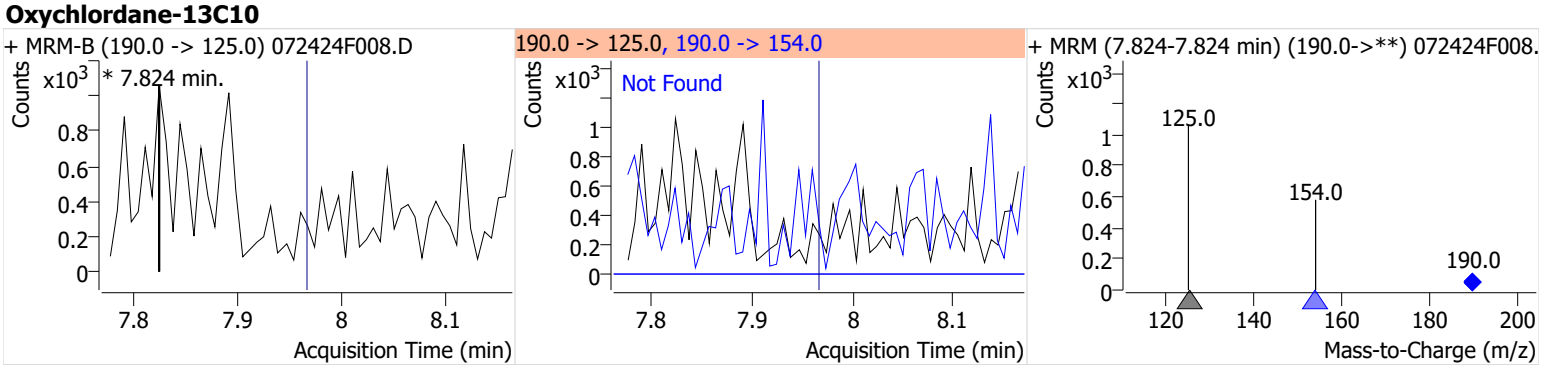
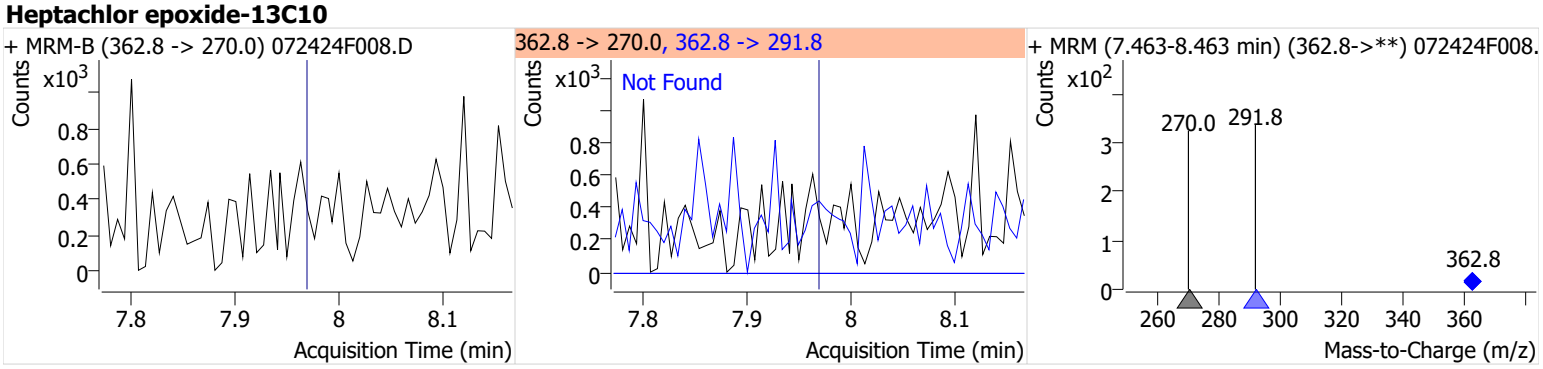
Isodrin



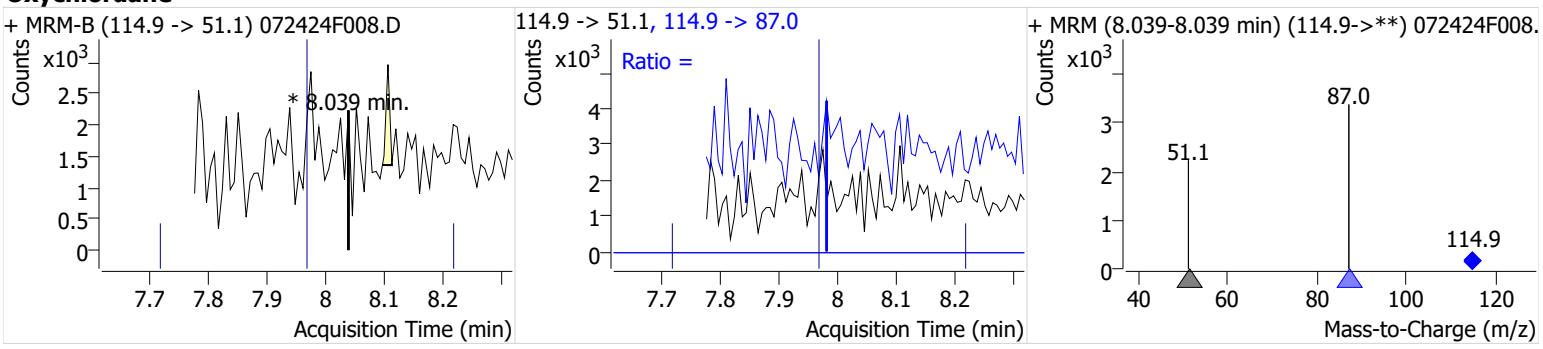
Oxychlordane-13C10



Heptachlor epoxide-13C10



Oxychlordane



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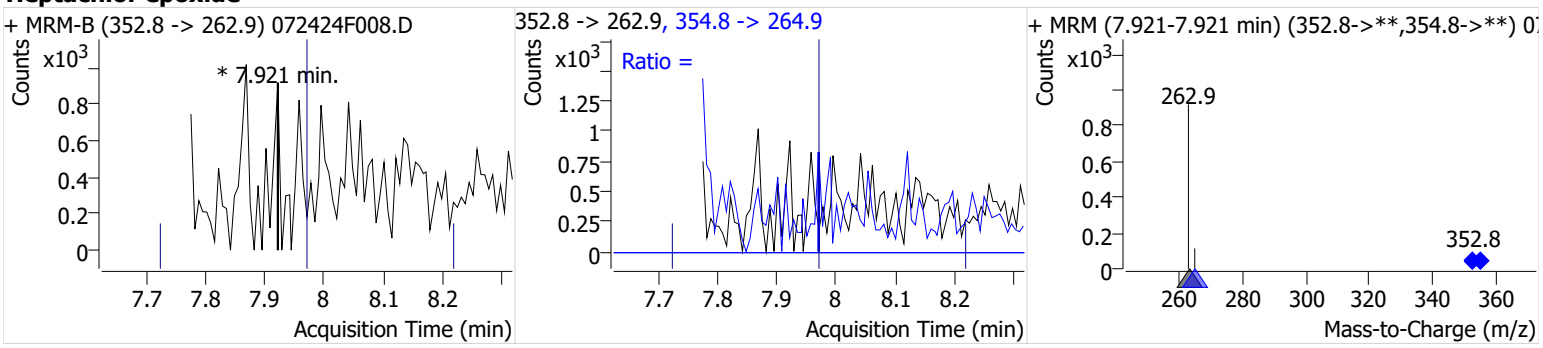
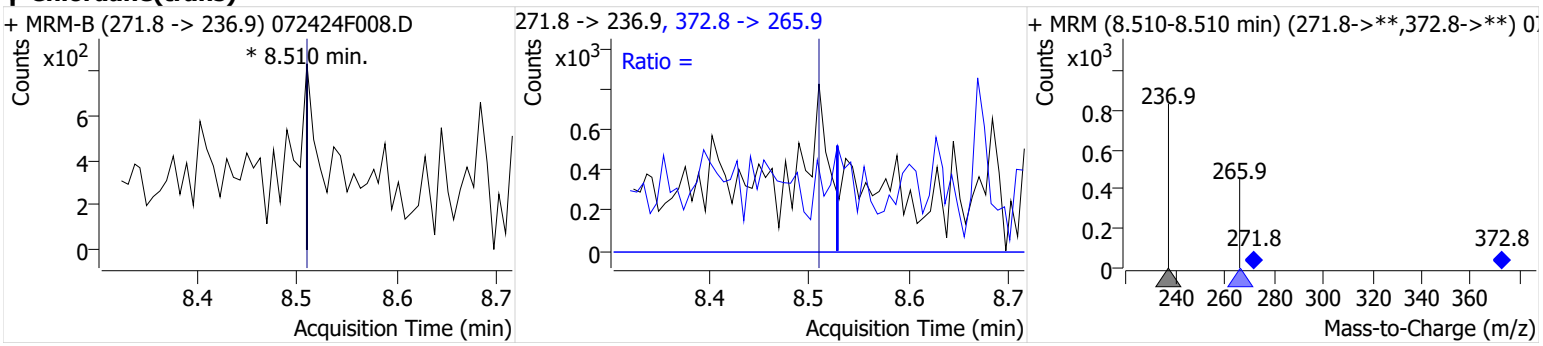
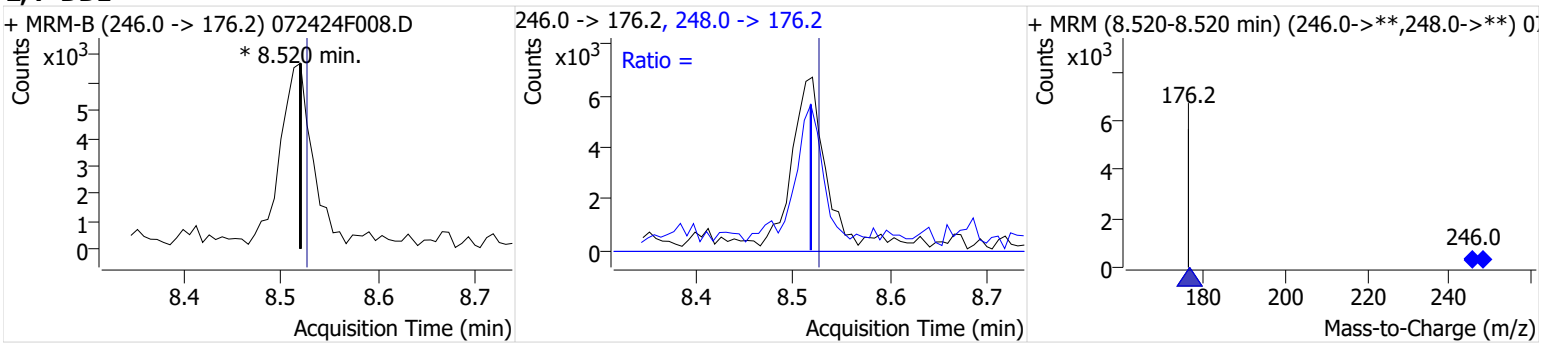
Heptachlor epoxide



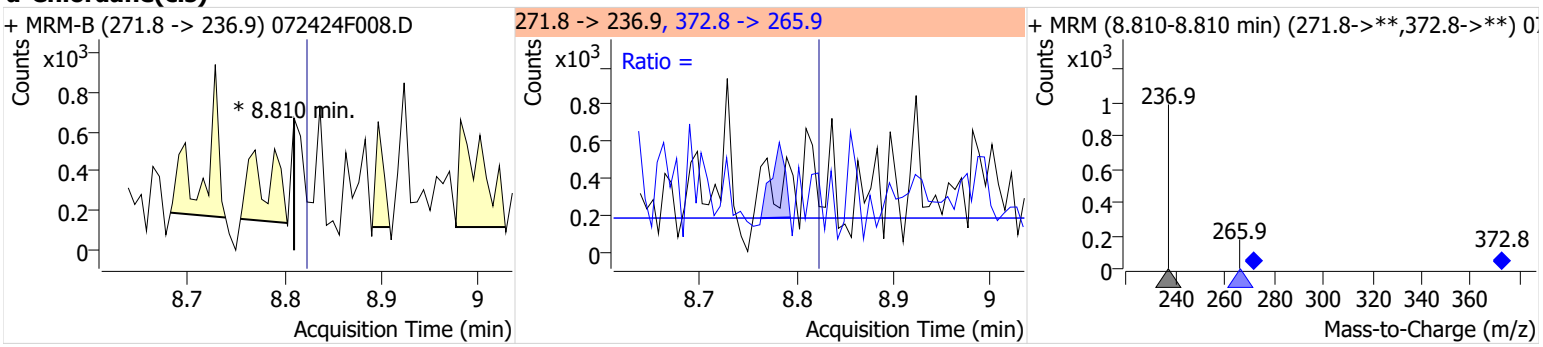
γ-Chlordane(trans)



2,4'-DDE



α-Chlordane(cis)



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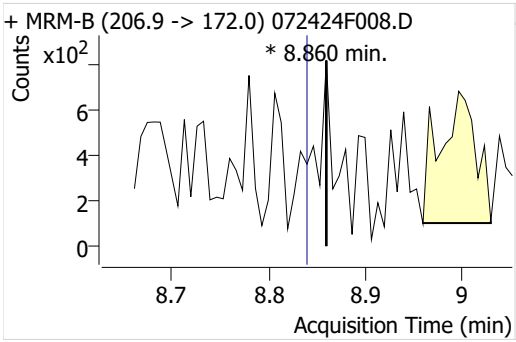
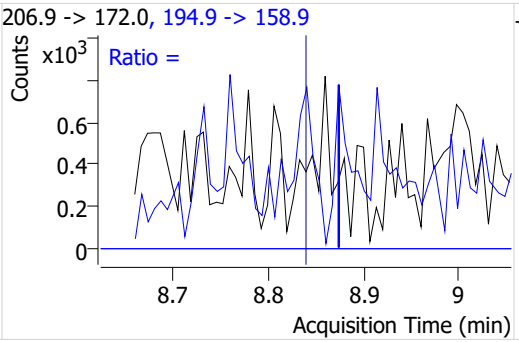
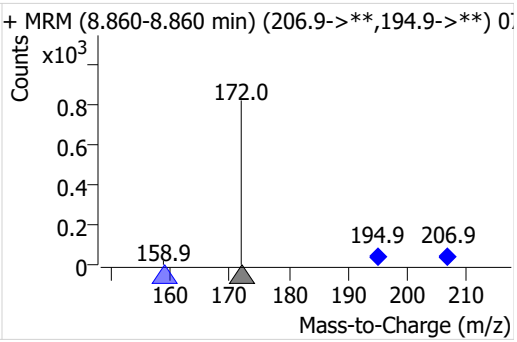
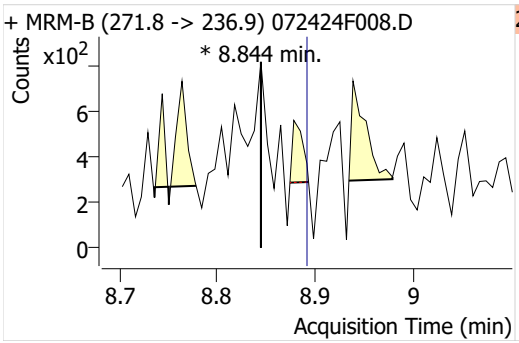
Endosulfan I

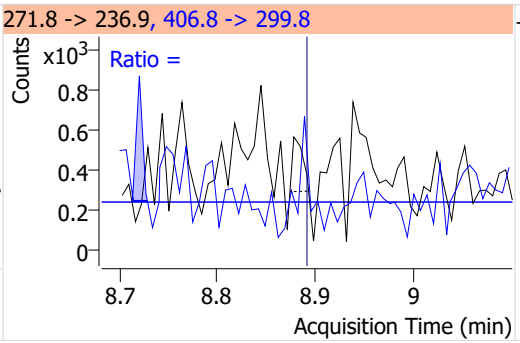


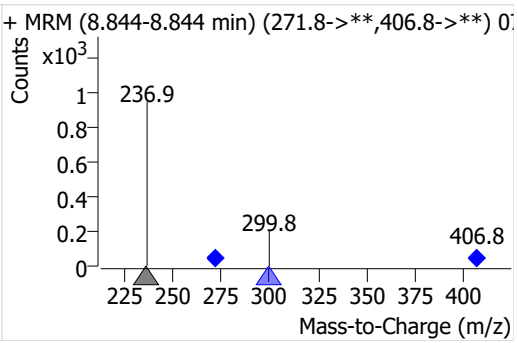




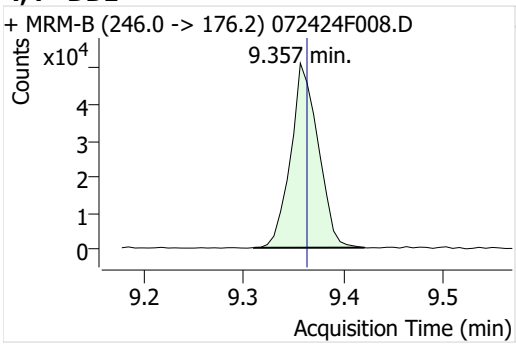
trans-Nanochlor

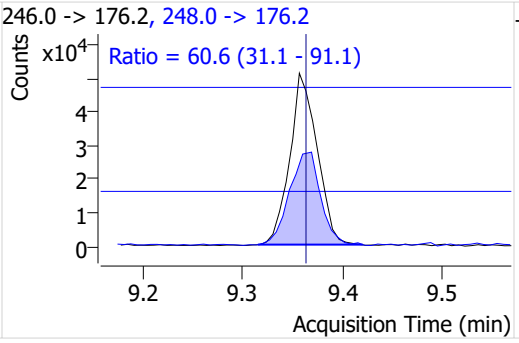


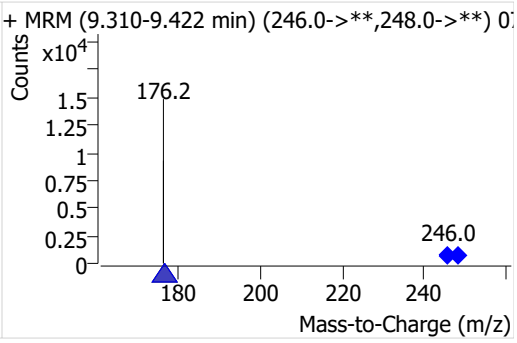




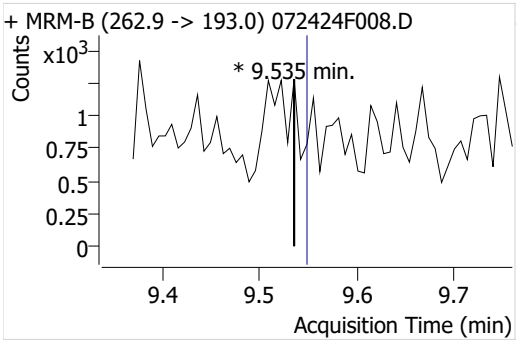
4,4' -DDE

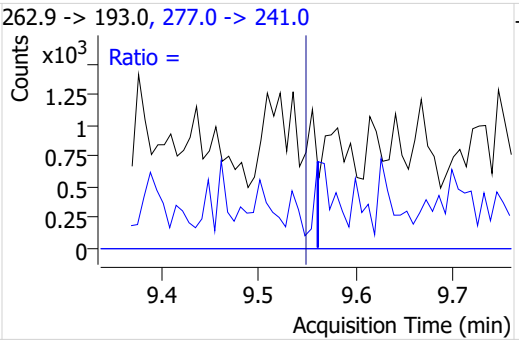


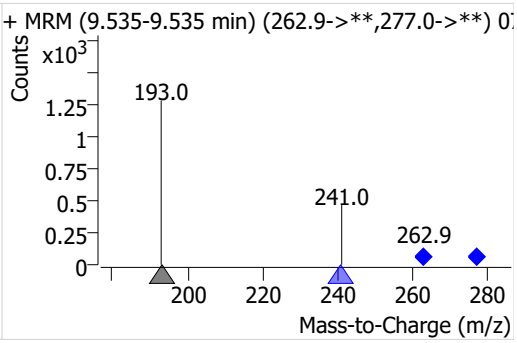




Dieldrin







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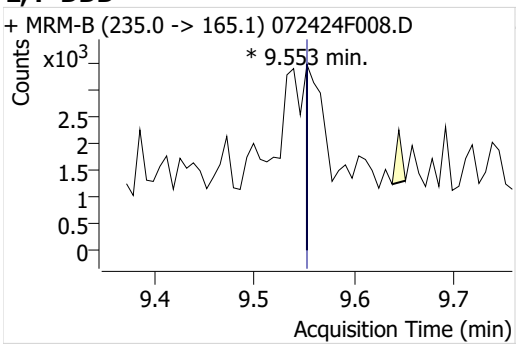
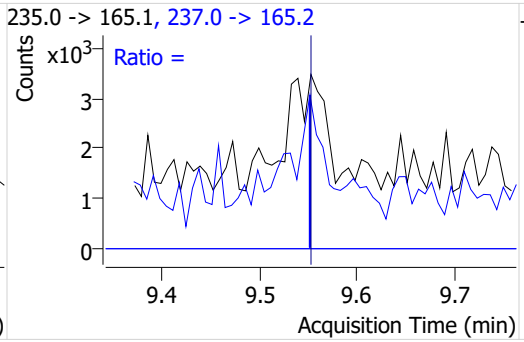
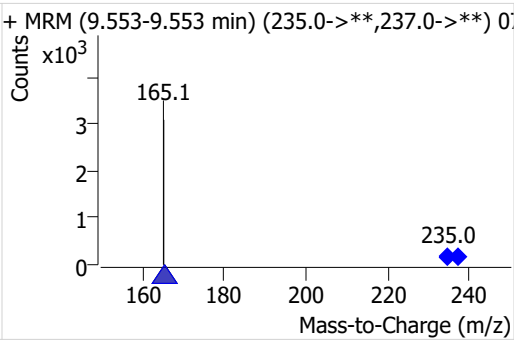
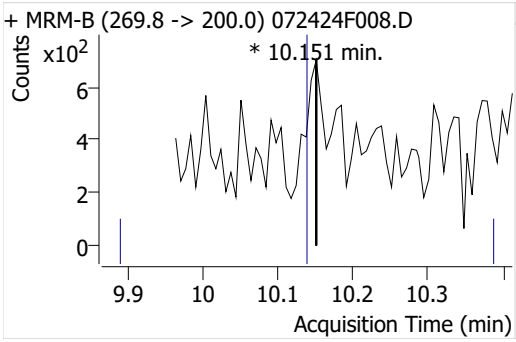
2,4'-DDD

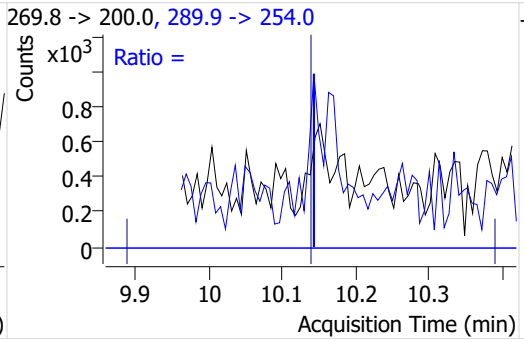


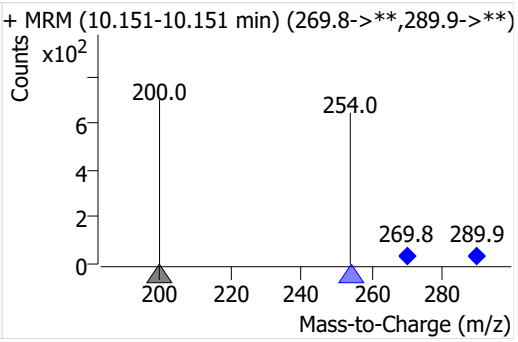




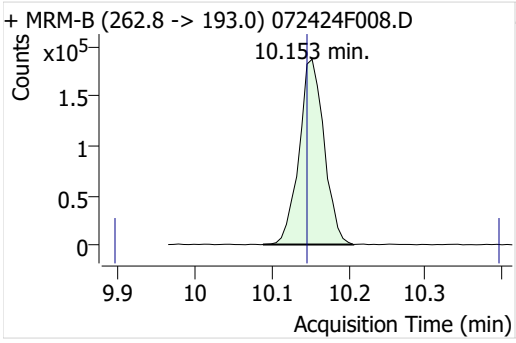
Endrin-13C12

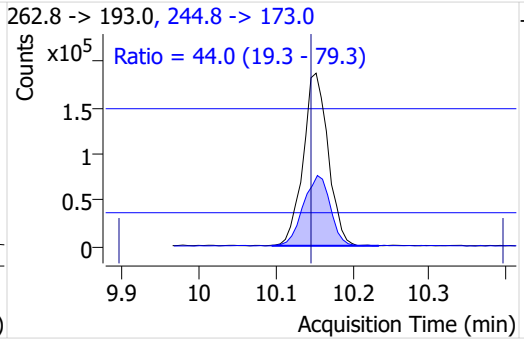


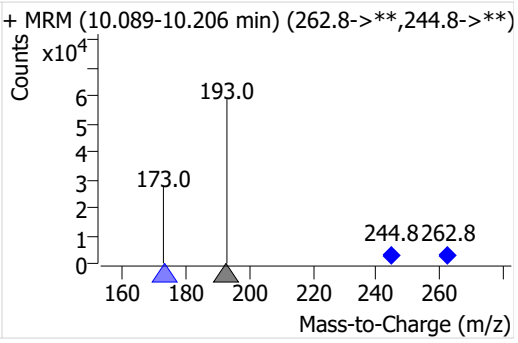




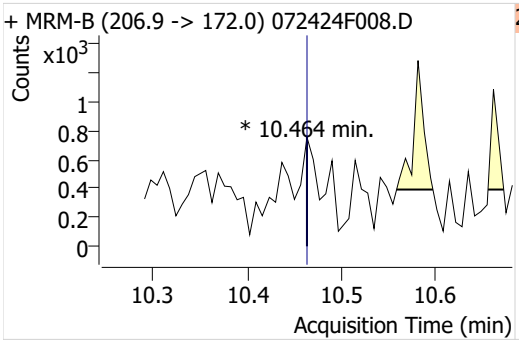
Endrin

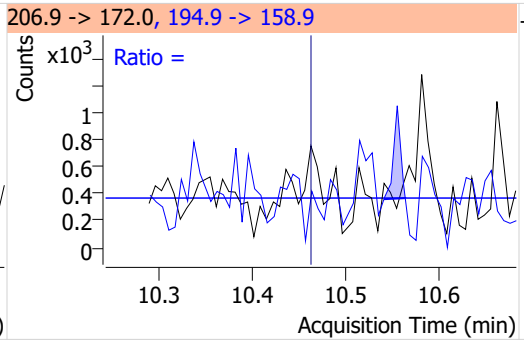


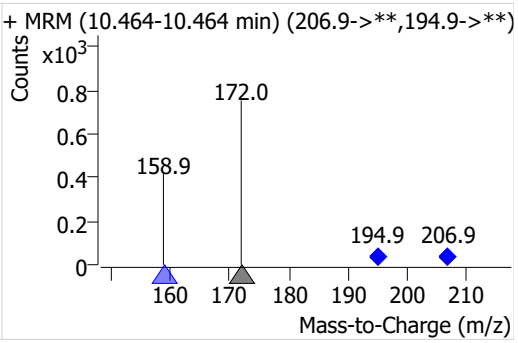




Endosulfan II







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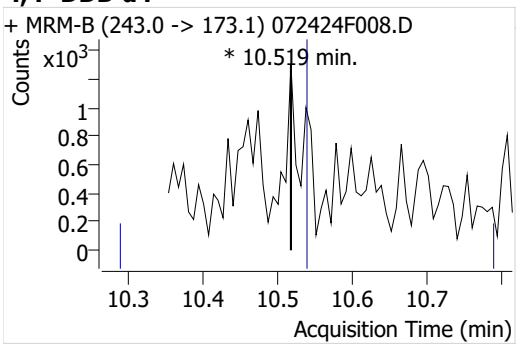
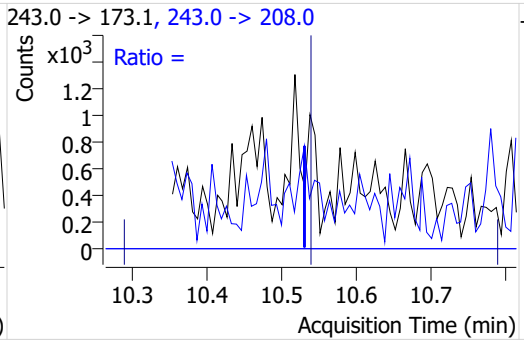
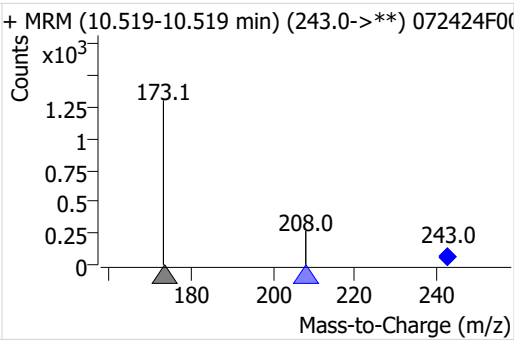
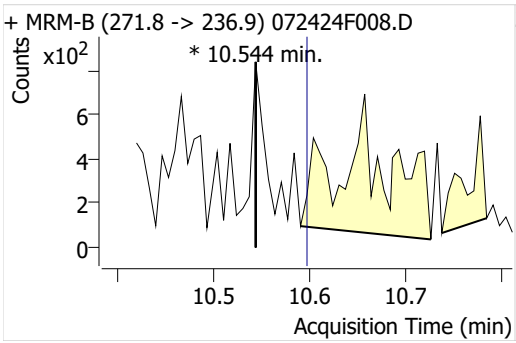
4,4'-DDD d4

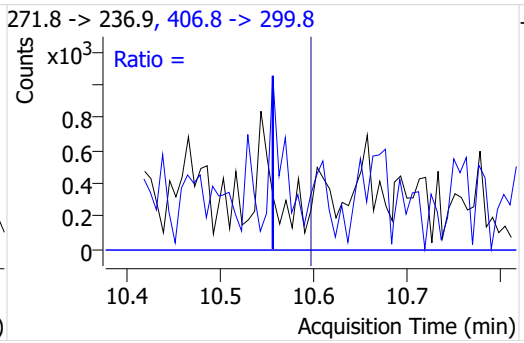


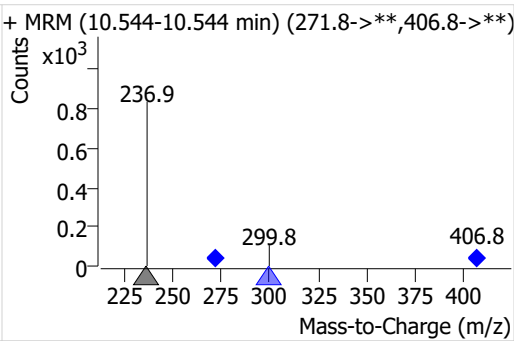




cis-Nonachlor







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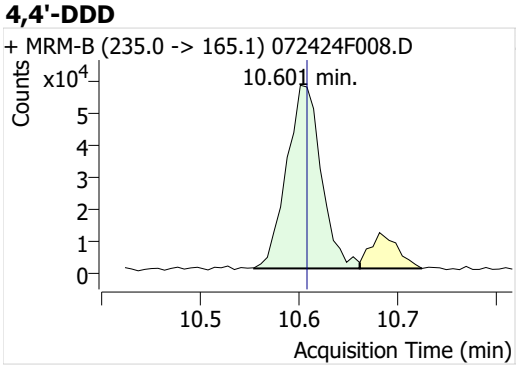

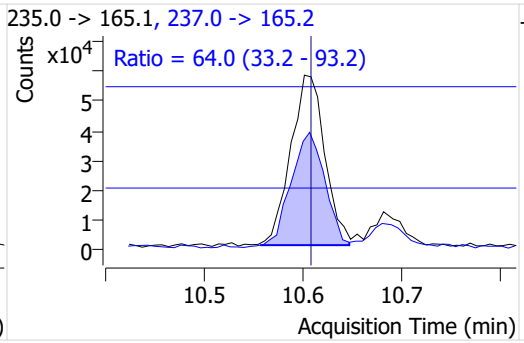

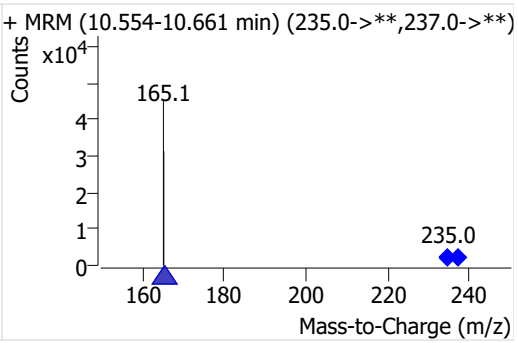

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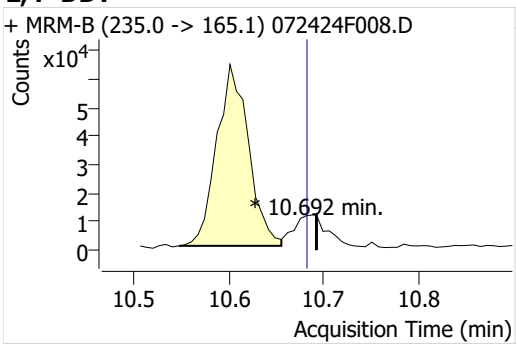

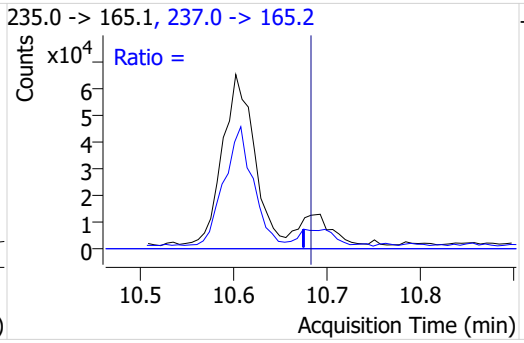

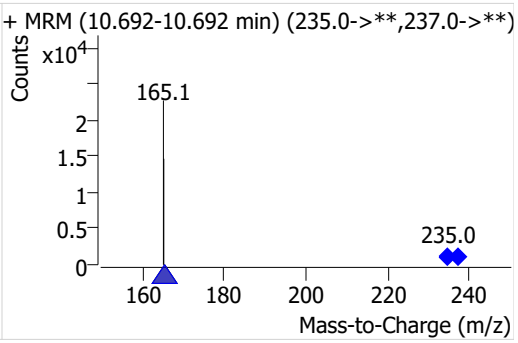

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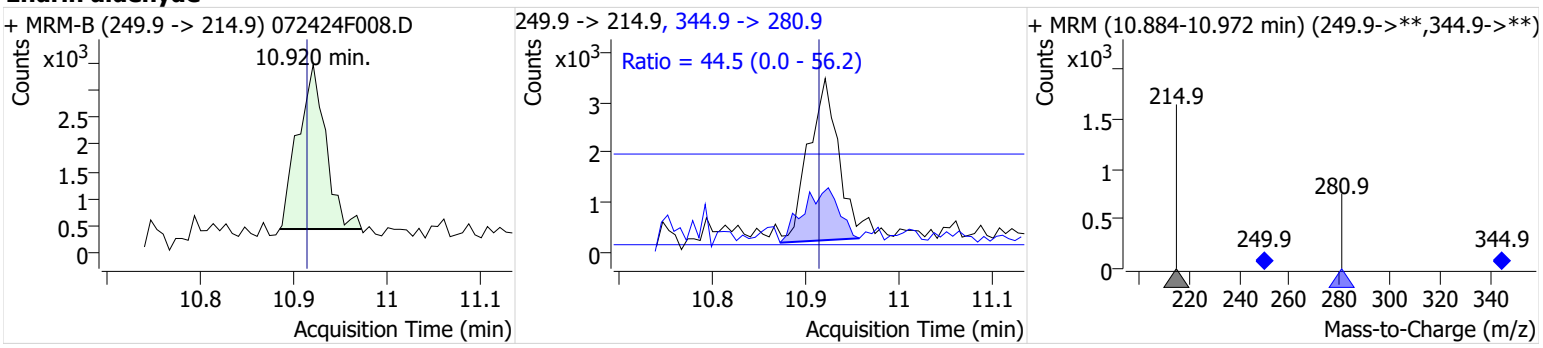
Endrin aldehyde



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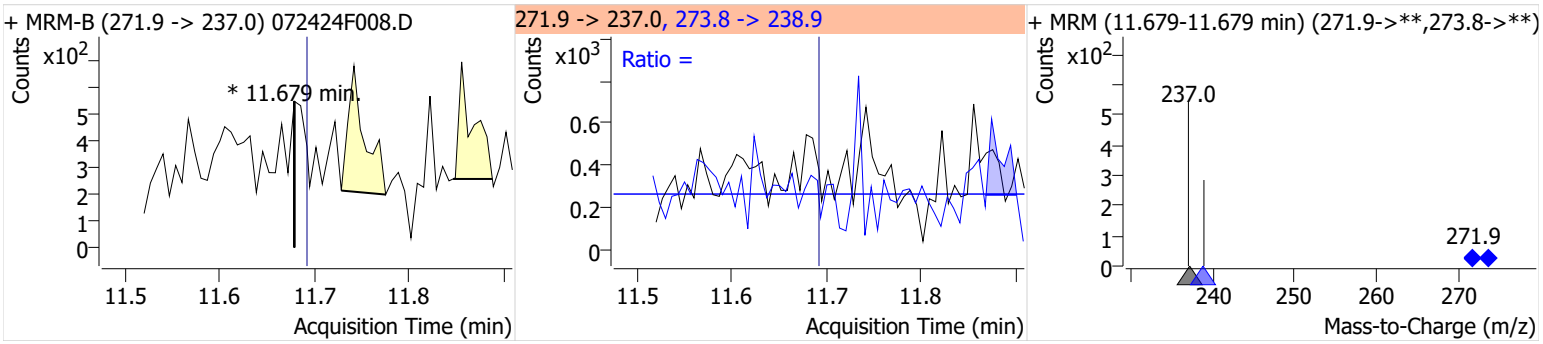

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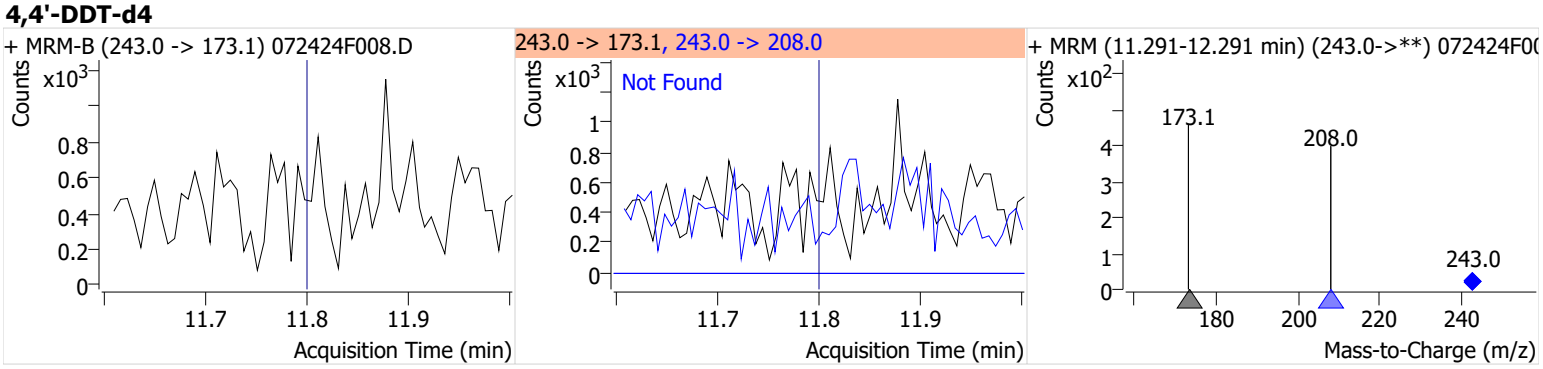

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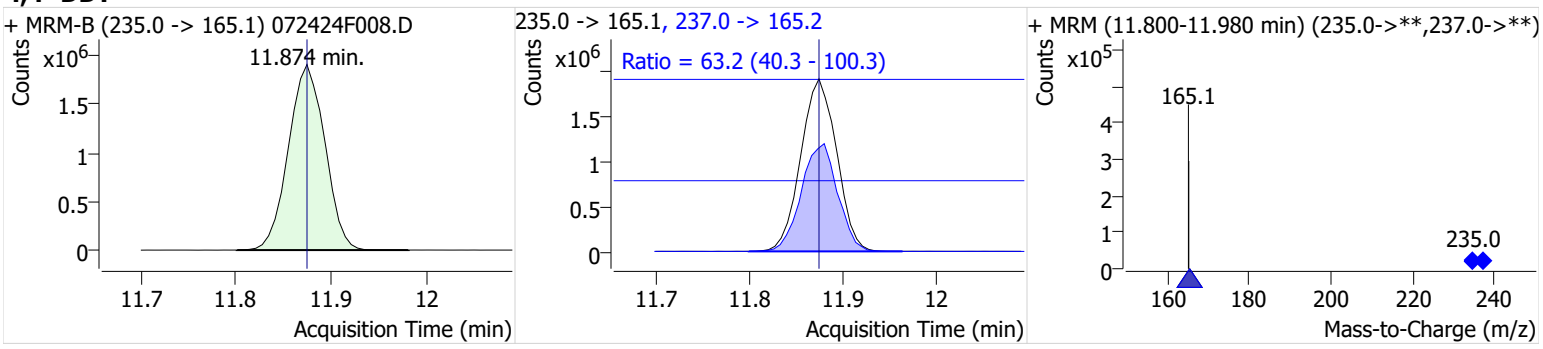

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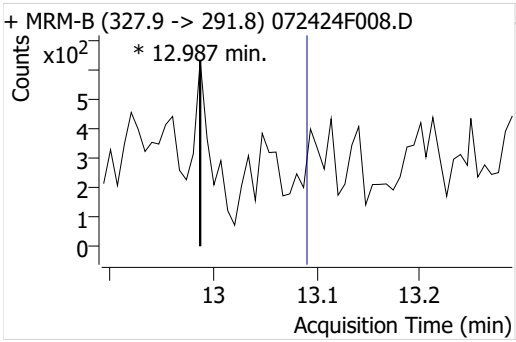
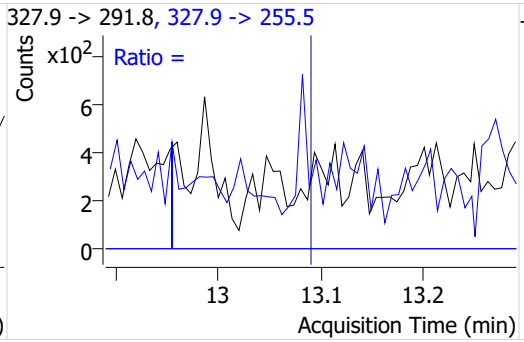
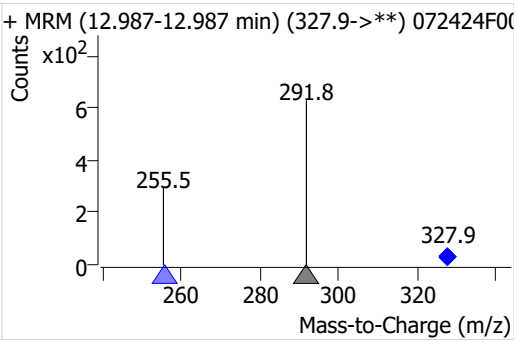
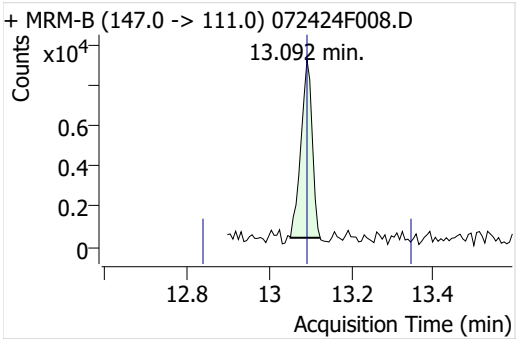
Endrin ketone-13C12

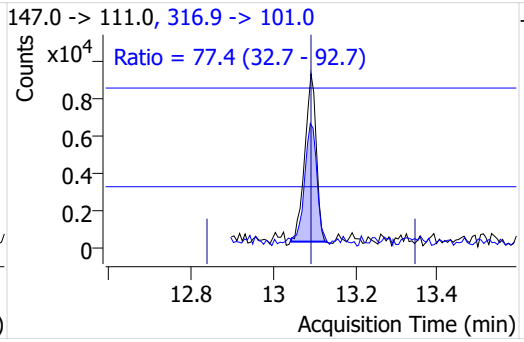


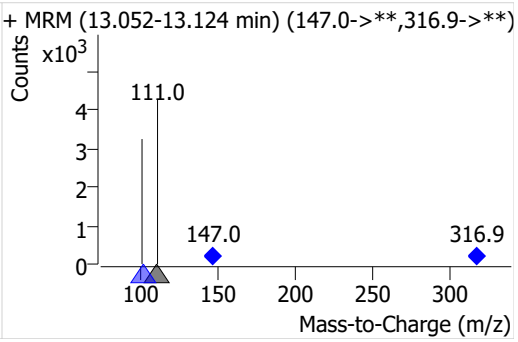




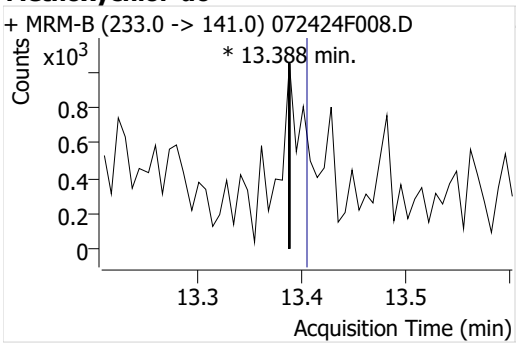
Endrin ketone

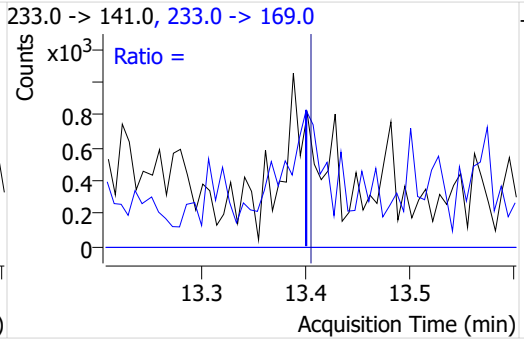


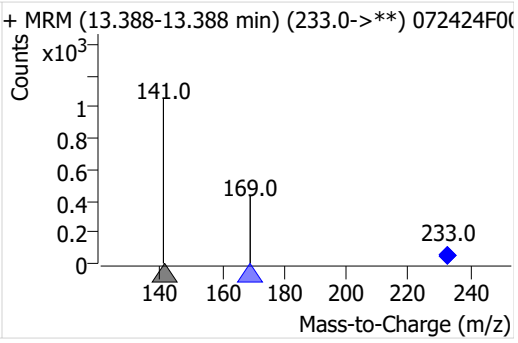




Methoxychlor-d6







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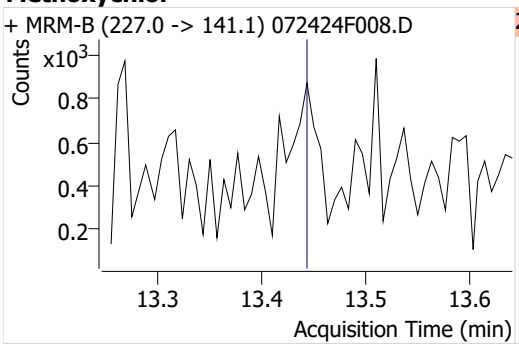

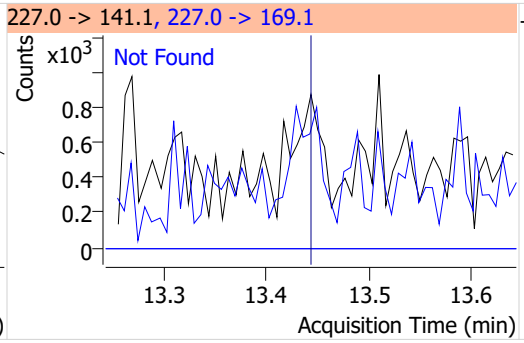

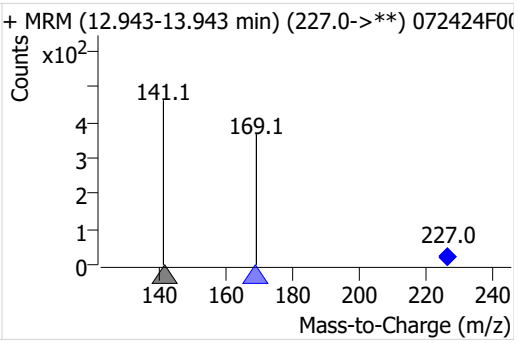

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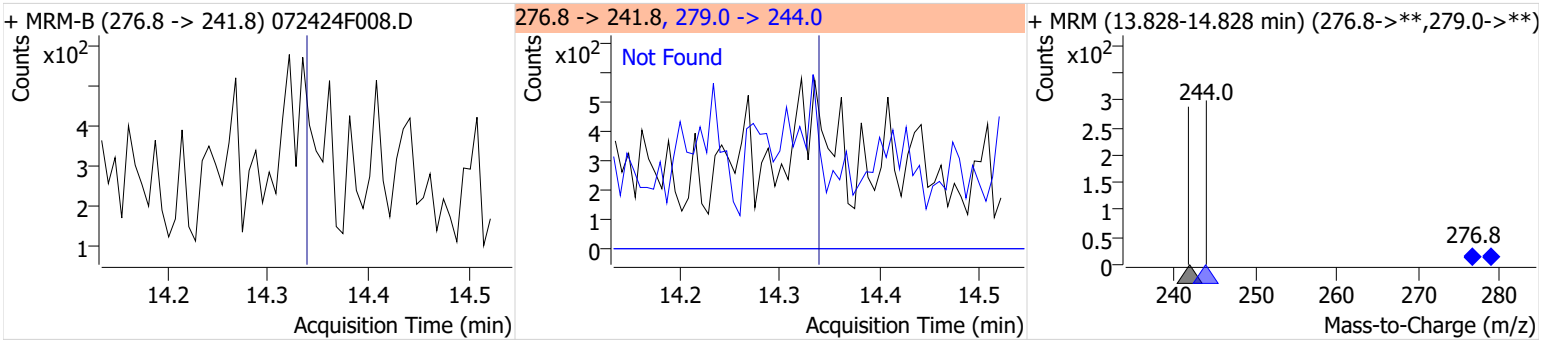
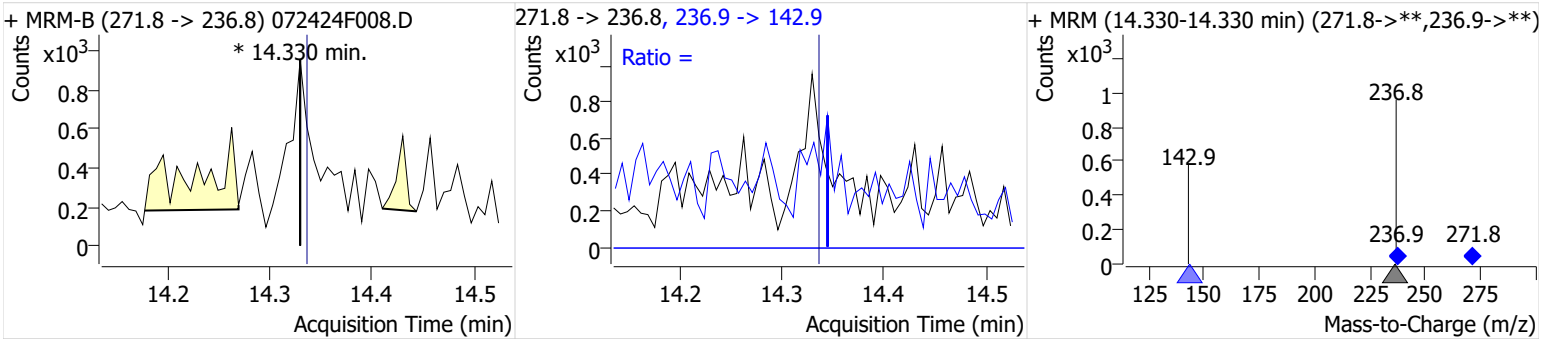
Mirex-13C10



Mirex



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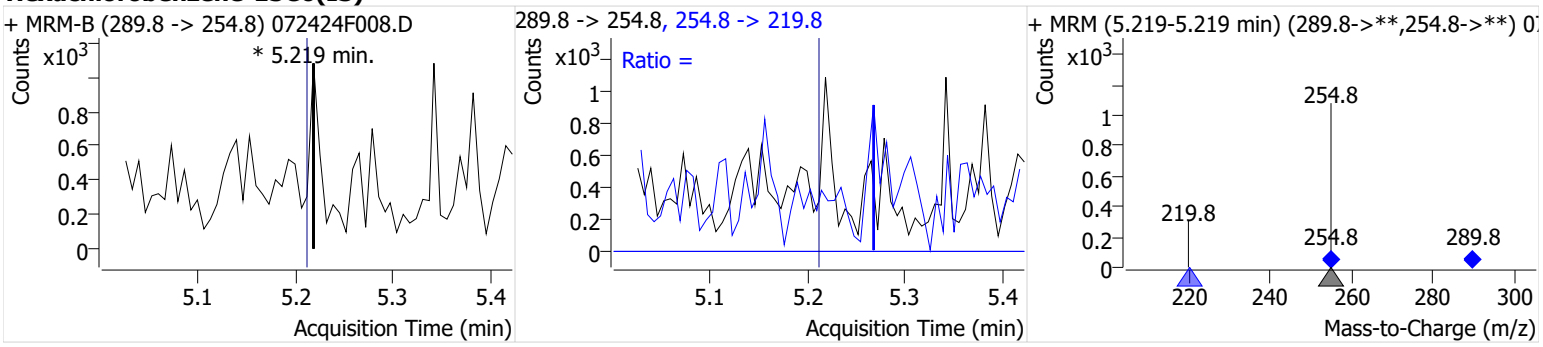
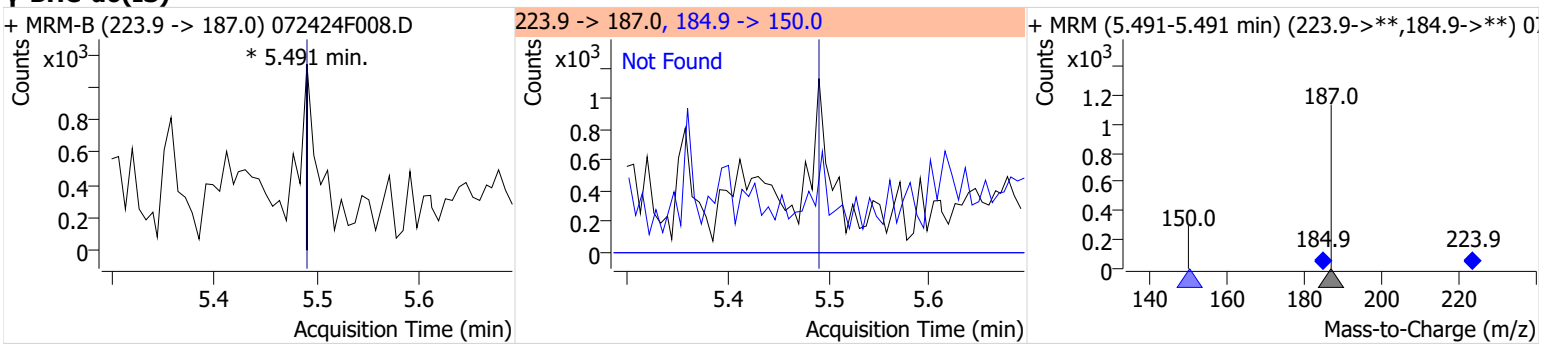


γ-BHC-d6(IS)



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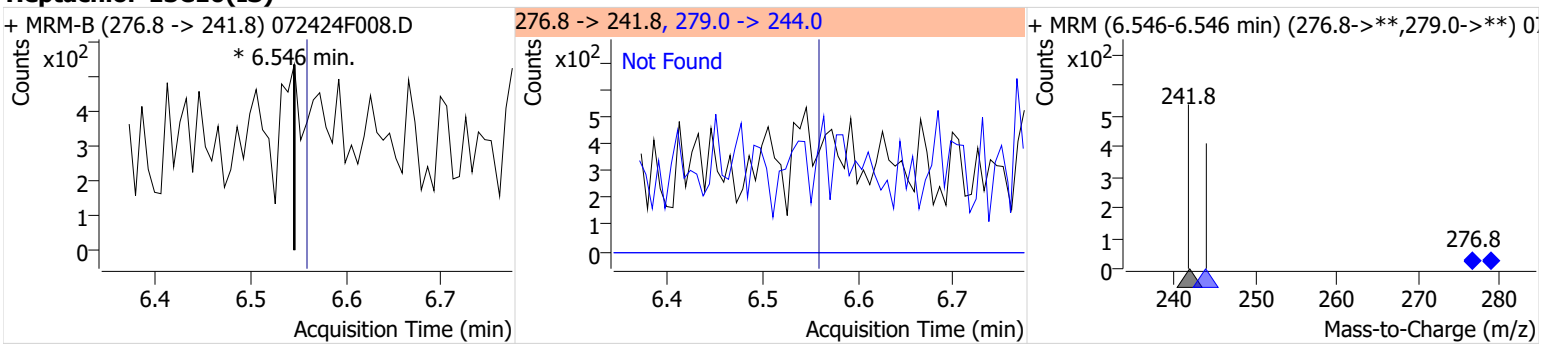
Heptachlor-13C10(IS)



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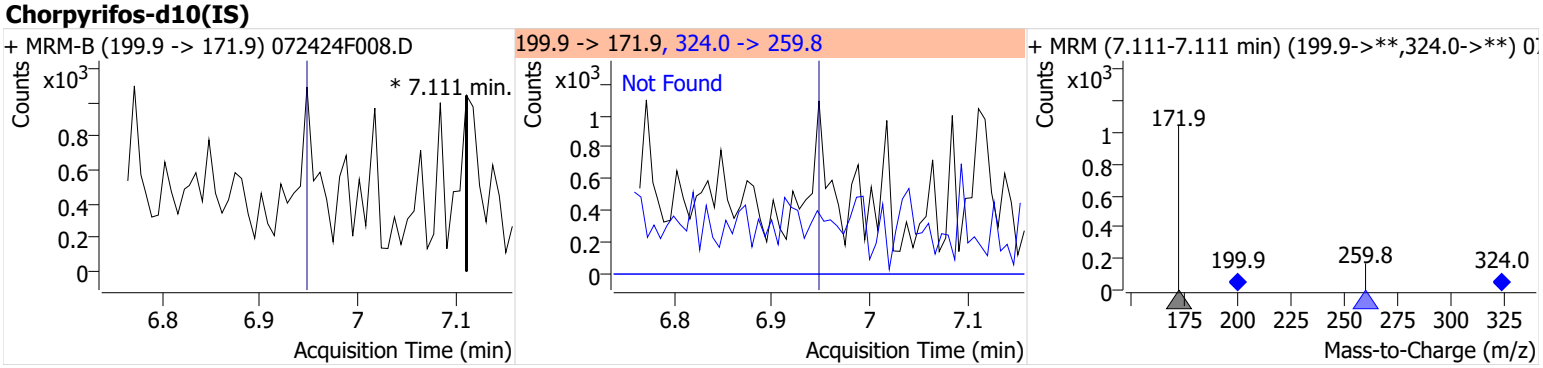

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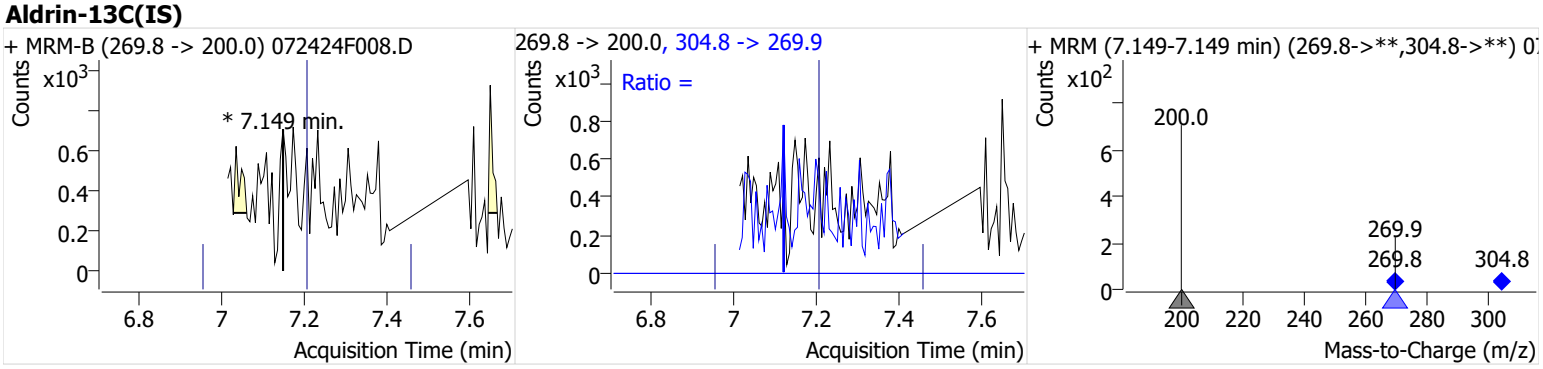

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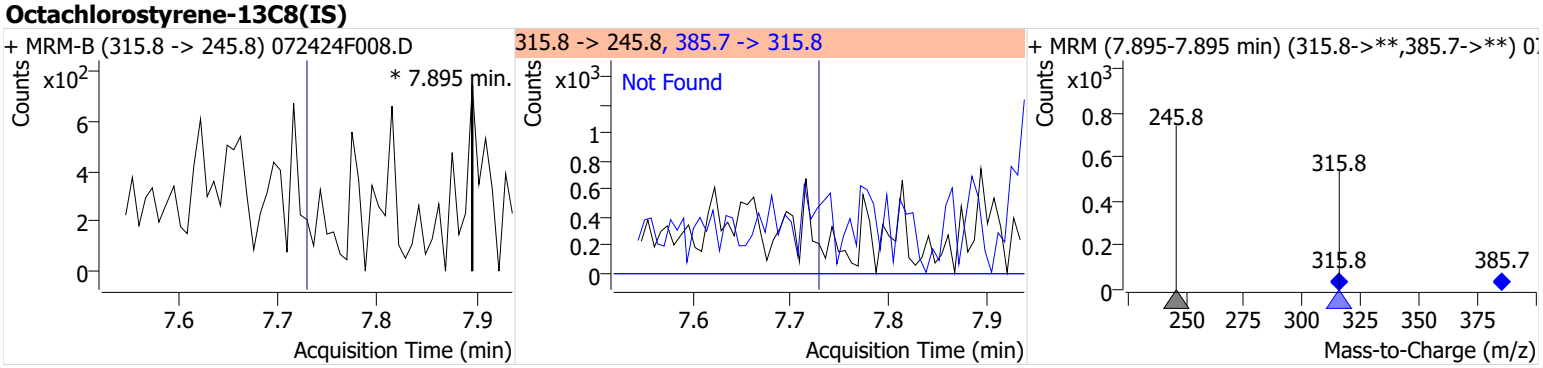

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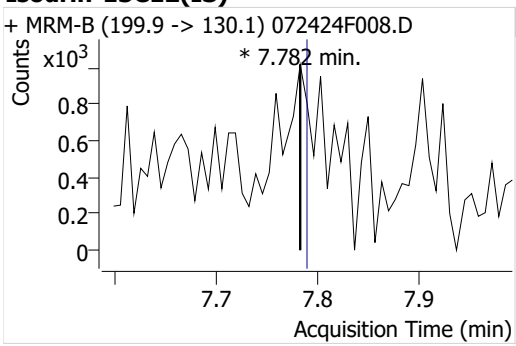
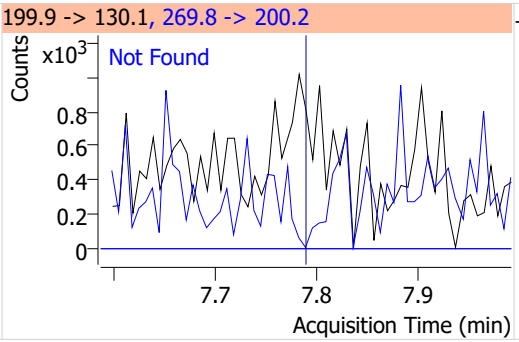
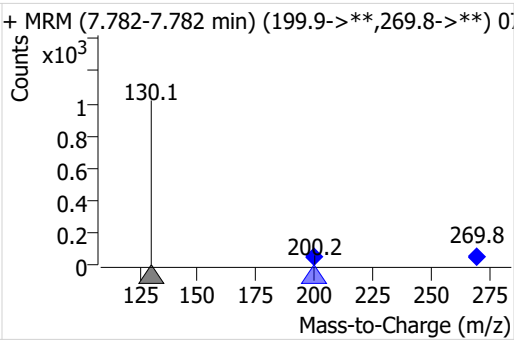
Isodrin-13C12(IS)







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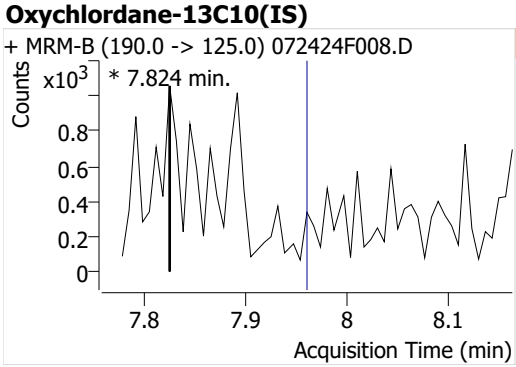

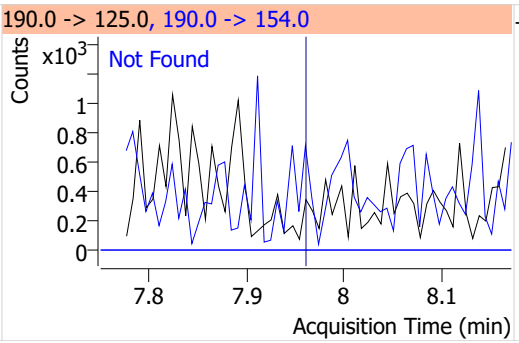

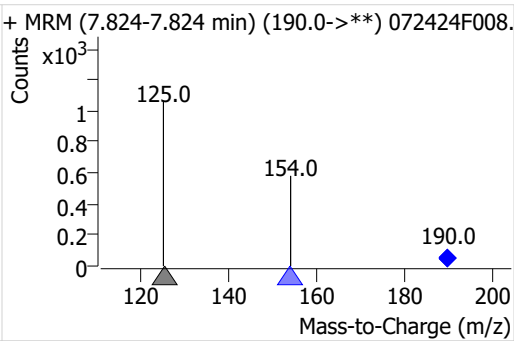

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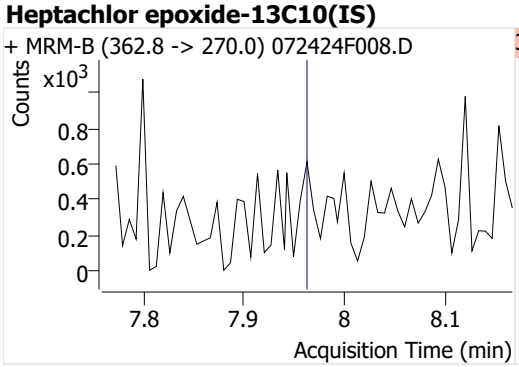

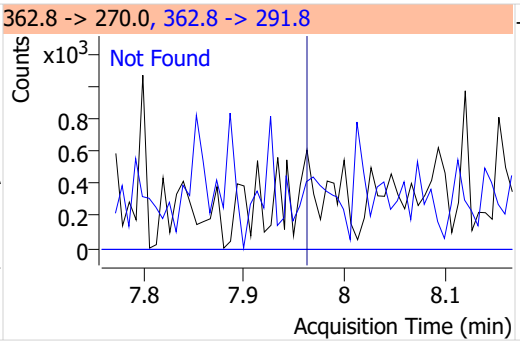

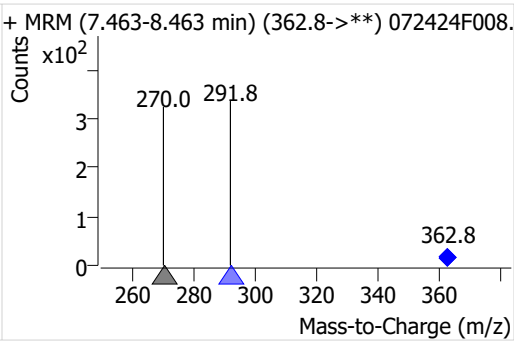

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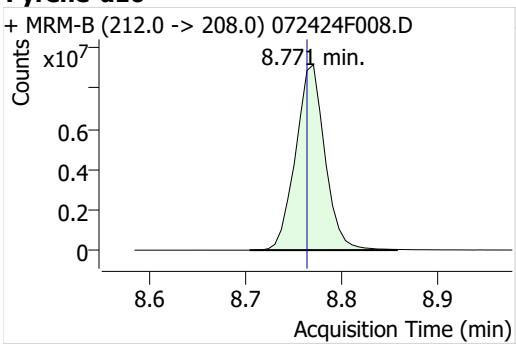

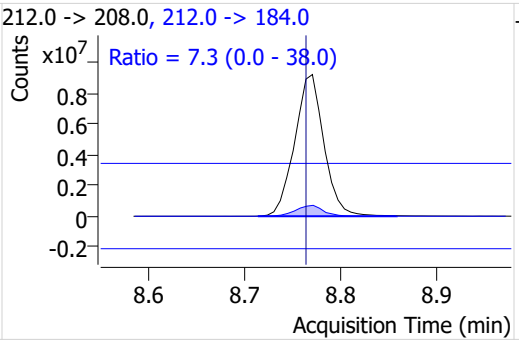

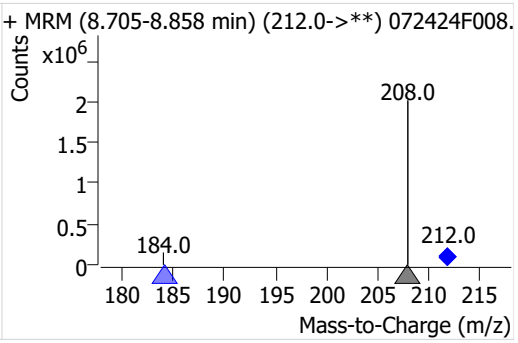

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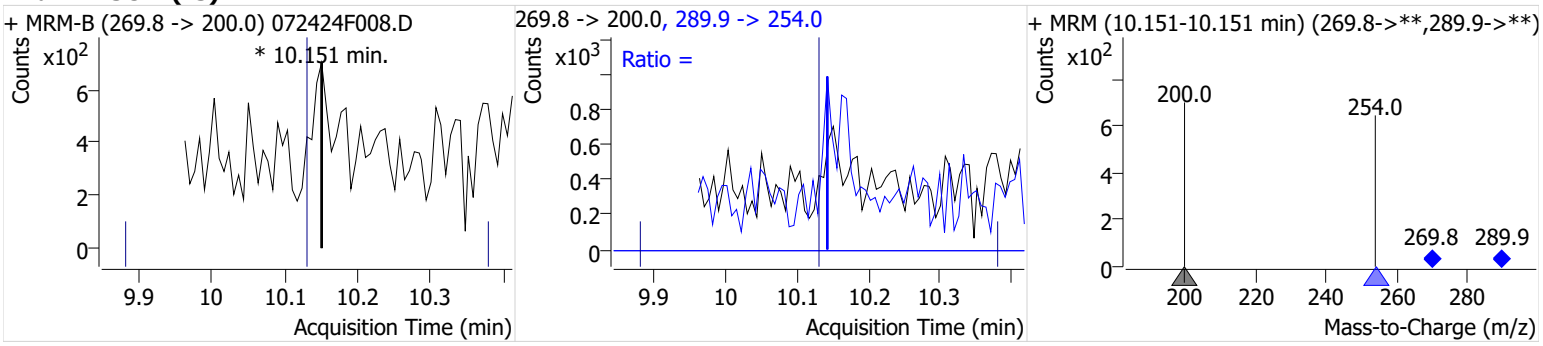
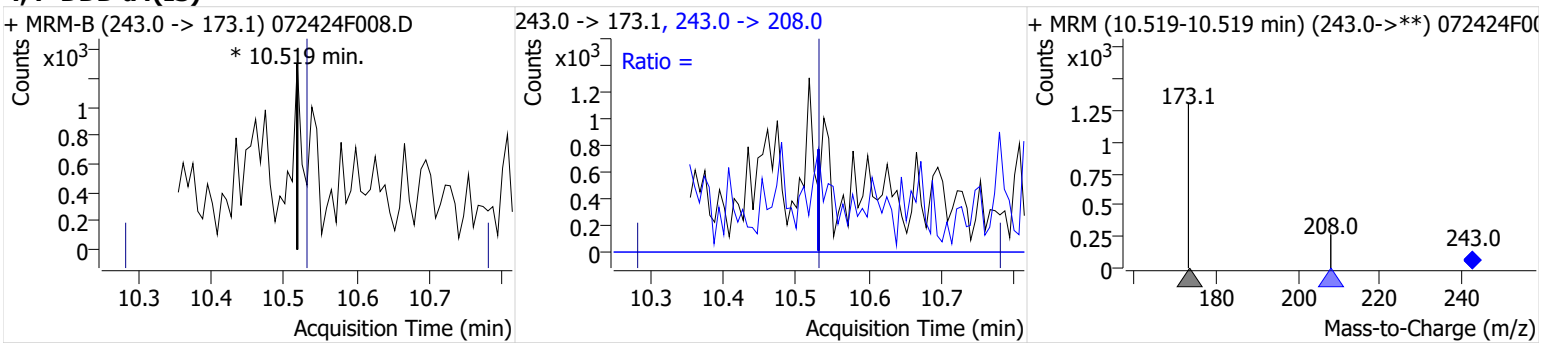
Endrin-13C12(IS)



4,4'-DDD d4(IS)



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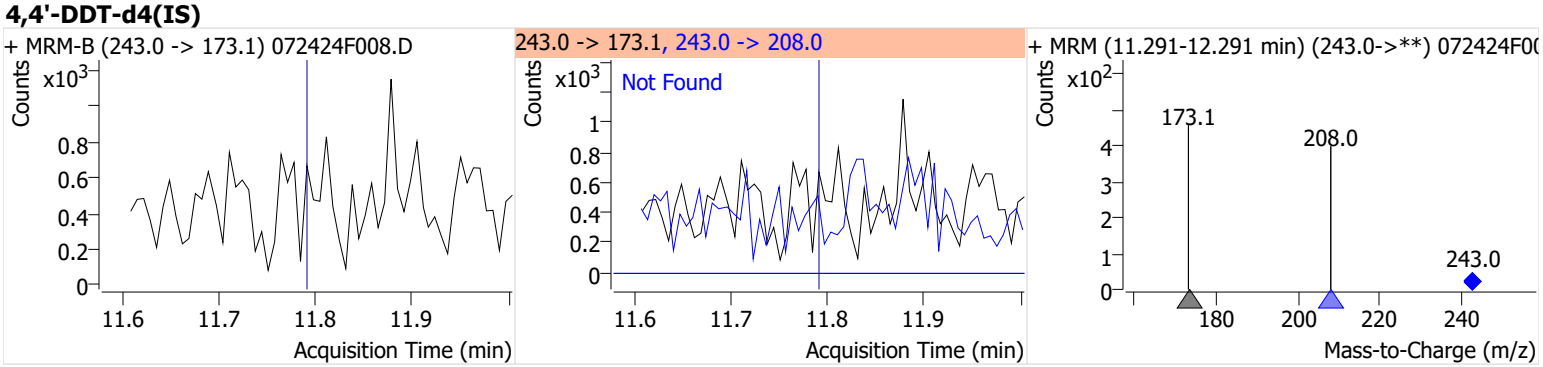

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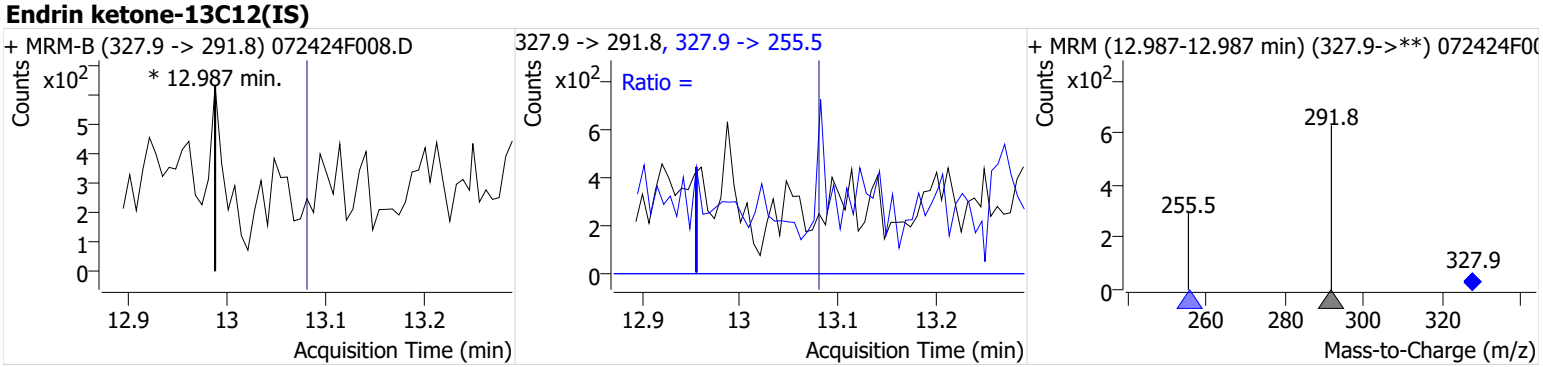

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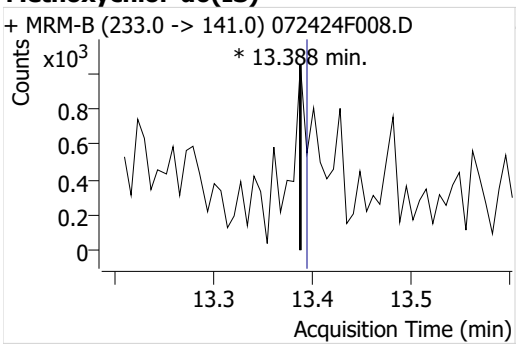
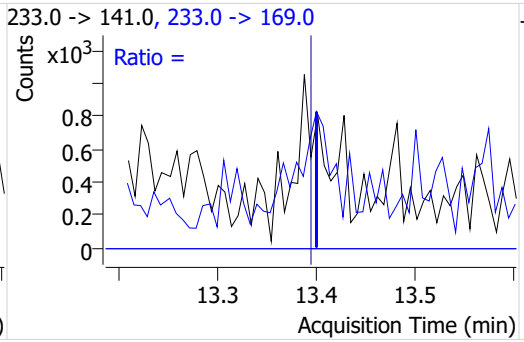
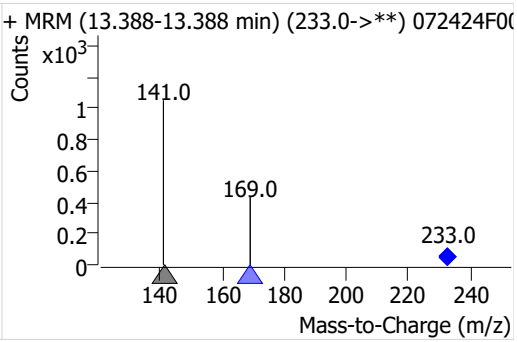
Methoxychlor-d6(IS)







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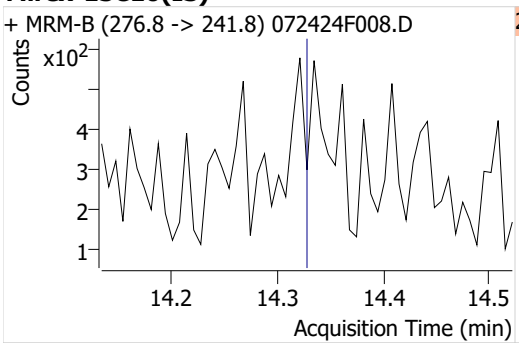

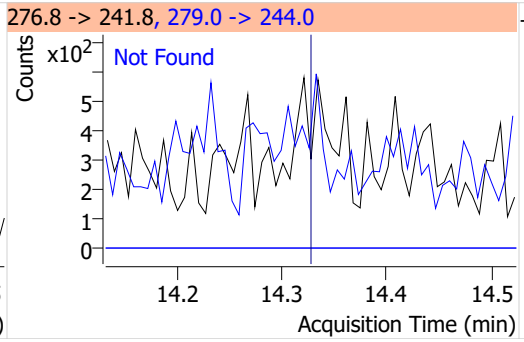

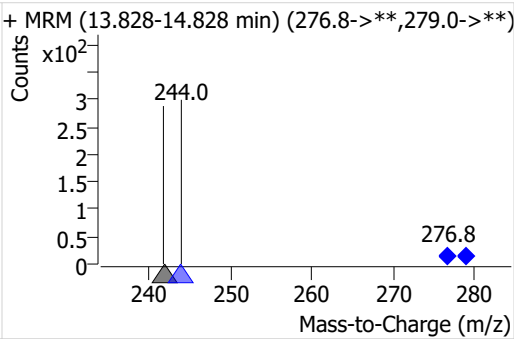

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Name	IB	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	7/25/2024 7:23:51 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method		**Vial**	2
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)		289.8 -> 254.8		ND ng/ml	
γ-BHC-d6(IS)		223.9 -> 187.0		ND ng/ml	
Heptachlor-13C10(IS)		276.8 -> 241.8		ND ng/ml	
Chorpyrifos-d10(IS)		199.9 -> 171.9		ND ng/ml	
Aldrin-13C(IS)		269.8 -> 200.0		ND ng/ml	
Octachlorostyrene-13C8(IS)		315.8 -> 245.8		ND ng/ml	
Isodrin-13C12(IS)		199.9 -> 130.1		ND ng/ml	
Oxychlordane-13C10(IS)		190.0 -> 125.0		ND ng/ml	
Heptachlor epoxide-13C10(IS)		362.8 -> 270.0		ND ng/ml	
Pyrene-d10	8.765	212.0 -> 208.0	23846935	100.0000 ng/ml	0.000
Endrin-13C12(IS)		269.8 -> 200.0		ND ng/ml	
4,4'-DDD d4(IS)		243.0 -> 173.1		ND ng/ml	
4,4'-DDT-d4(IS)		243.0 -> 173.1		ND ng/ml	
Endrin ketone-13C12(IS)		327.9 -> 291.8		ND ng/ml	
Methoxychlor-d6(IS)		233.0 -> 141.0		ND ng/ml	
Mirex-13C10(IS)		276.8 -> 241.8		ND ng/ml	

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6		289.8 -> 254.8		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
γ-BHC-d6		223.9 -> 187.0		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Heptachlor-13C10		276.8 -> 241.8		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Chorpyrifos-d10		199.9 -> 171.9		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Aldrin-13C		269.8 -> 200.0		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Isodrin-13C12		199.9 -> 130.1		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Heptachlor epoxide-13C10		362.8 -> 270.0		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
4,4'-DDD d4		243.0 -> 173.1		ND ng/ml	
		Spiked Amount =	5.0	Recovery =	*NC %*
4,4'-DDT-d4		243.0 -> 173.1		ND ng/ml	
		Spiked Amount =	5.0	Recovery =	*NC %*
Endrin ketone-13C12		327.9 -> 291.8		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Methoxychlor-d6		233.0 -> 141.0		ND ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Mirex-13C10		276.8 -> 241.8		ND ng/ml	
		Spiked Amount =	5.0	Recovery =	*NC %*

Target Compounds	**ISTD**	**RT**	**Transition**	**Resp.**	**Conc. Units**	**Qvalue**
α-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)		283.8 -> 213.9		ND ng/ml	
β-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	

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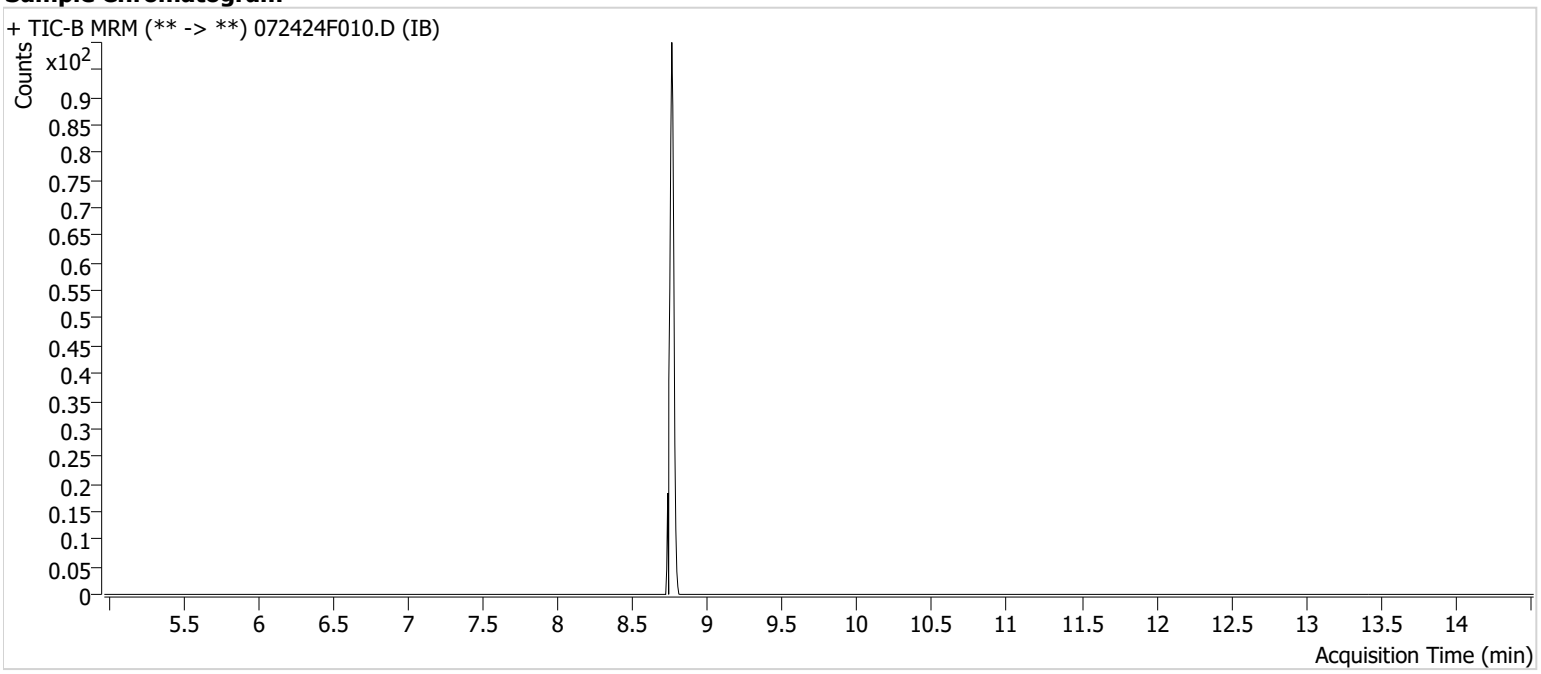
Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
γ-BHC(Lindane)	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
δ-BHC	γ-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Heptachlor	Heptachlor-13C10(IS)		271.7 -> 236.9		ND ng/ml	
Chorpyrifos	Chorpyrifos-d10(IS)		196.9 -> 169.0		ND ng/ml	
Aldrin	Aldrin-13C(IS)		254.9 -> 220.0		ND ng/ml	
Octachlorostyrene	Octachlorostyrene-13C8(IS)		342.8 -> 307.8		ND ng/ml	
Isodrin	Isodrin-13C12(IS)		193.0 -> 123.0		ND ng/ml	
Oxychlordane	Oxychlordane-13C10(IS)		114.9 -> 51.1		ND ng/ml	
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)		352.8 -> 262.9		ND ng/ml	
γ-Chlordane(trans)	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
2,4'-DDE	4,4'-DDD d4(IS)		246.0 -> 176.2		ND ng/ml	
α-Chlordane(cis)	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
Endosulfan I	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
trans-Nanochlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
4,4' -DDE	4,4'-DDD d4(IS)		246.0 -> 176.2		ND ng/ml	
Dieldrin	Endrin-13C12(IS)		262.9 -> 193.0		ND ng/ml	
2,4'-DDD	4,4'-DDD d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin	Endrin-13C12(IS)		262.8 -> 193.0		ND ng/ml	
Endosulfan II	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
cis-Nonachlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
4,4'-DDD	4,4'-DDD d4(IS)		235.0 -> 165.1		ND ng/ml	
2,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin aldehyde	Endrin-13C12(IS)		249.9 -> 214.9		ND ng/ml	
Endosulfan sulfate	Endrin-13C12(IS)		271.9 -> 237.0		ND ng/ml	
4,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin ketone	Endrin ketone-13C12(IS)		147.0 -> 111.0		ND ng/ml	
Methoxychlor	Methoxychlor-d6(IS)		227.0 -> 141.1		ND ng/ml	
Mirex	Mirex-13C10(IS)		271.8 -> 236.8		ND ng/ml	

(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram



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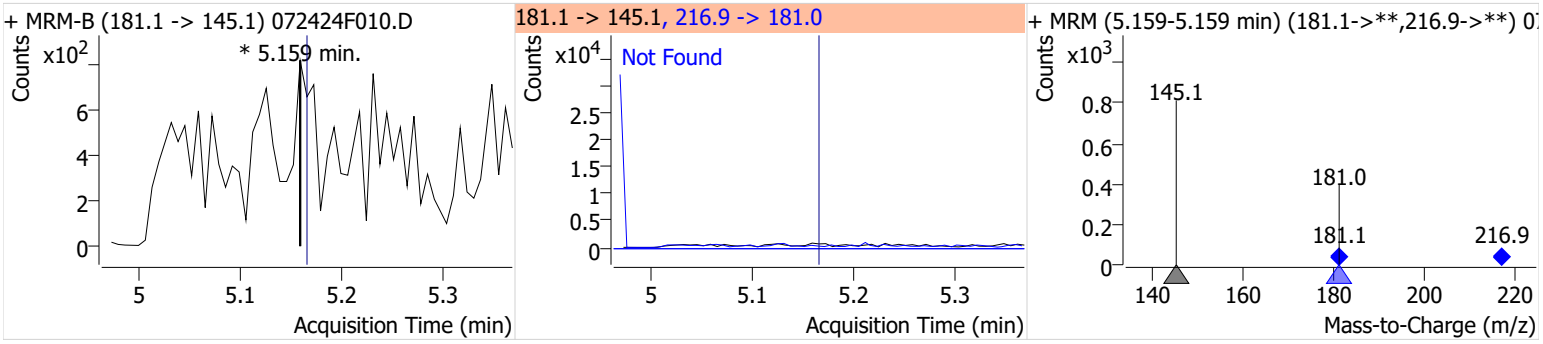
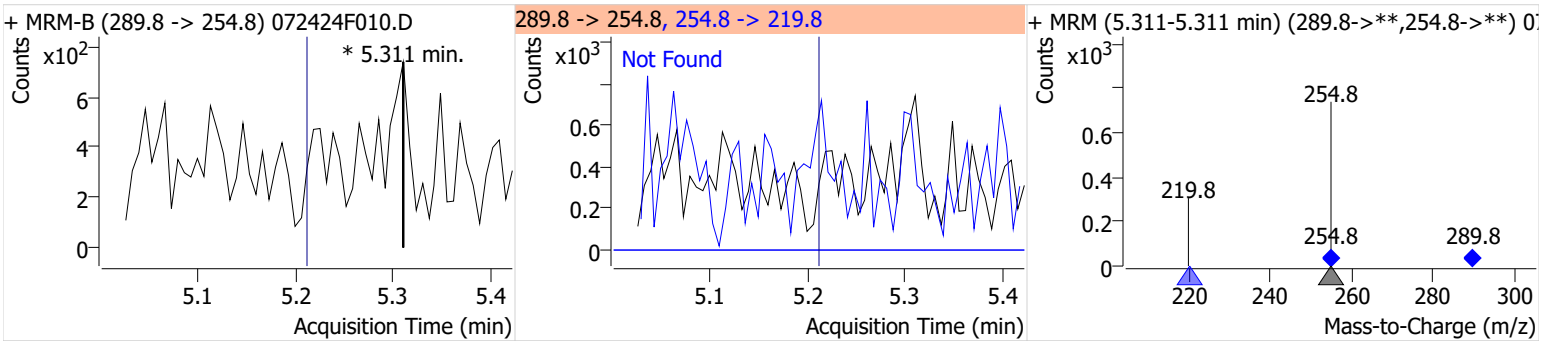
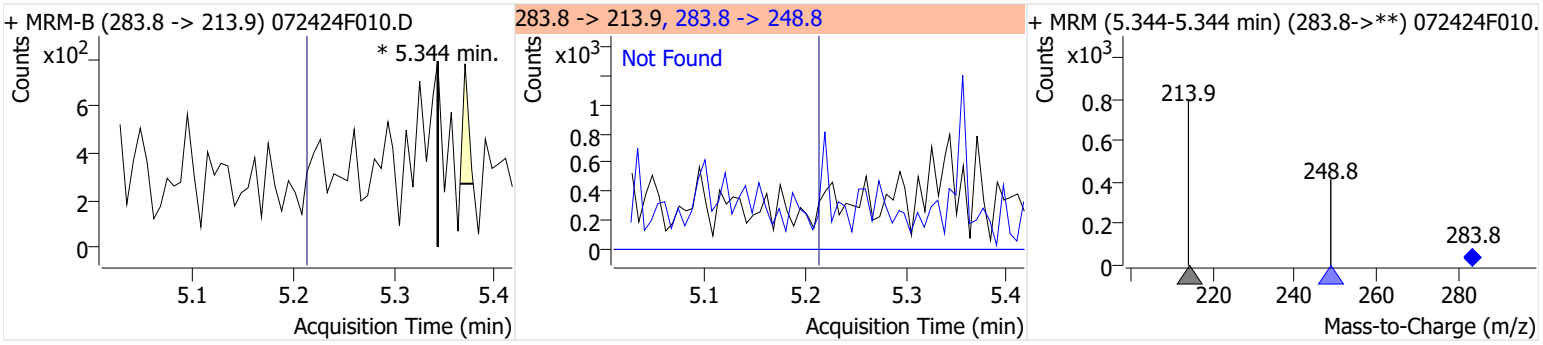
α-BHC



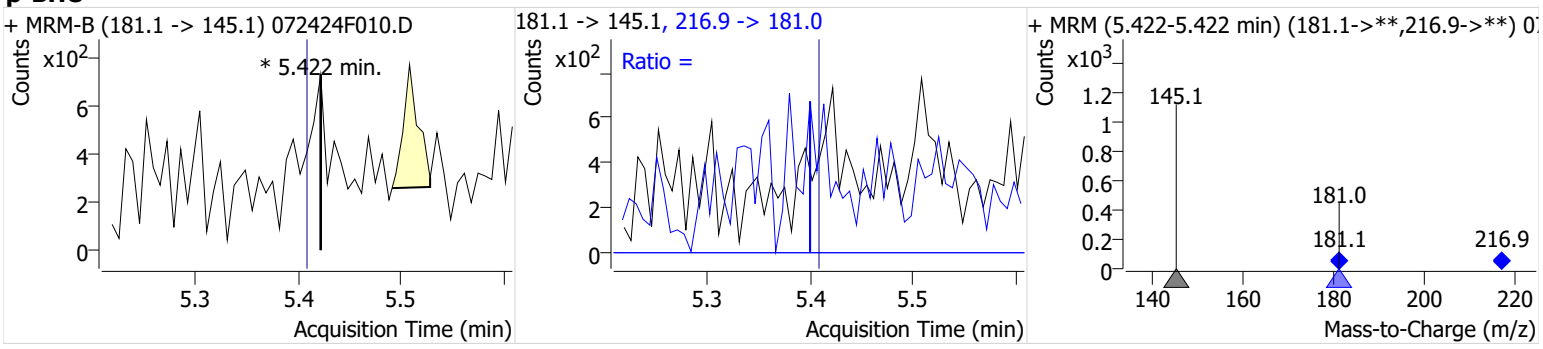
Hexachlorobenzene-13C6



Hexachlorobenzene



β-BHC



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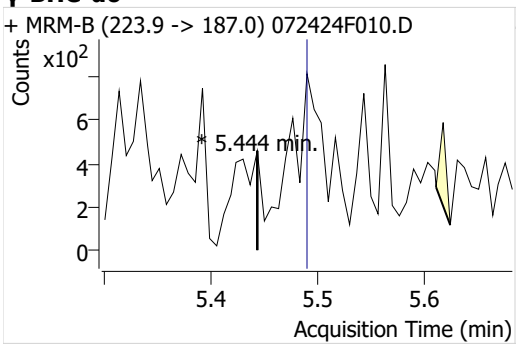
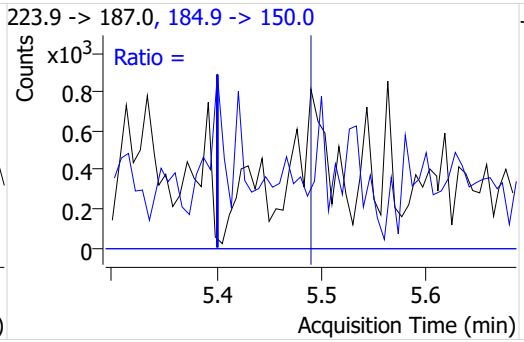
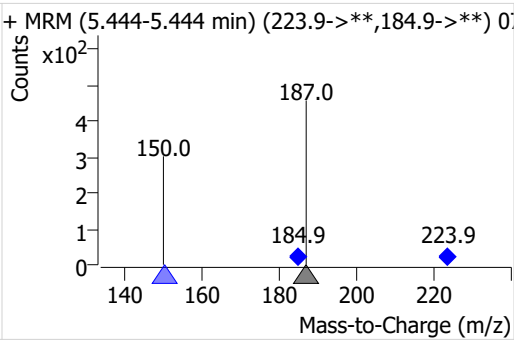
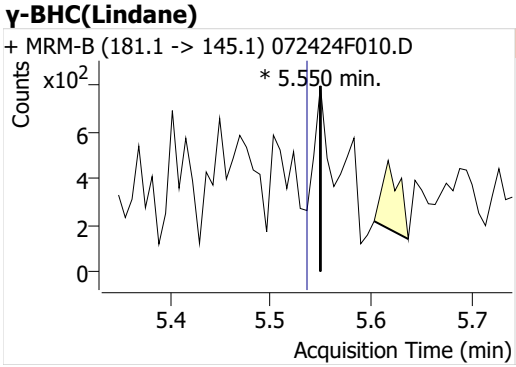
γ-BHC-d6

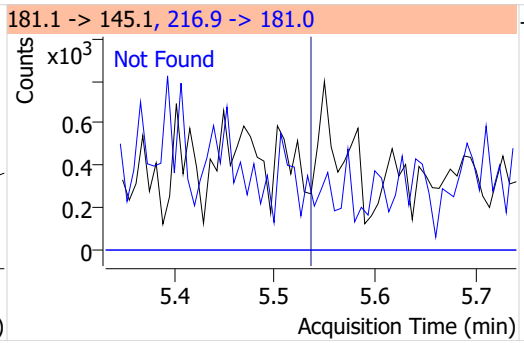


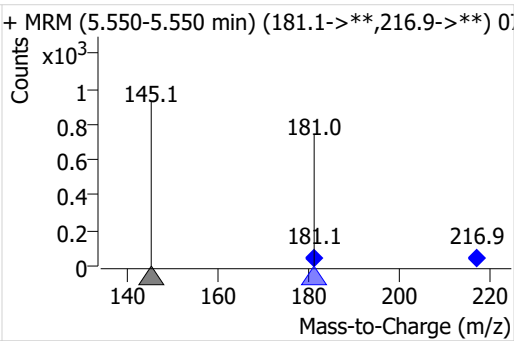




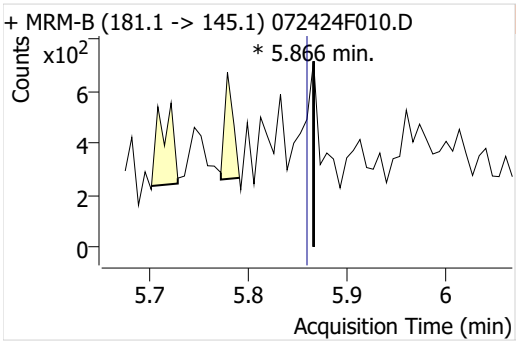
γ-BHC(Lindane)

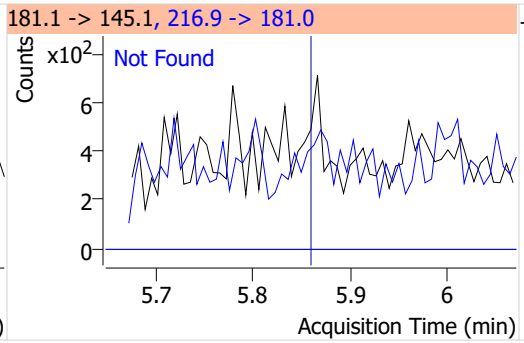


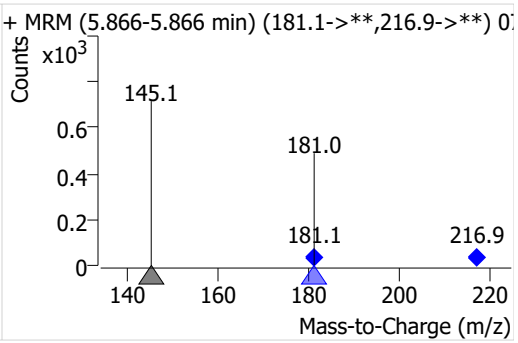




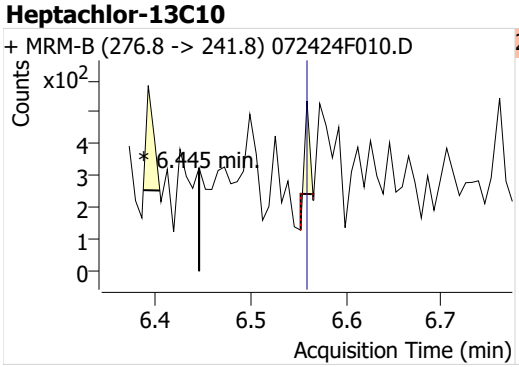
δ-BHC

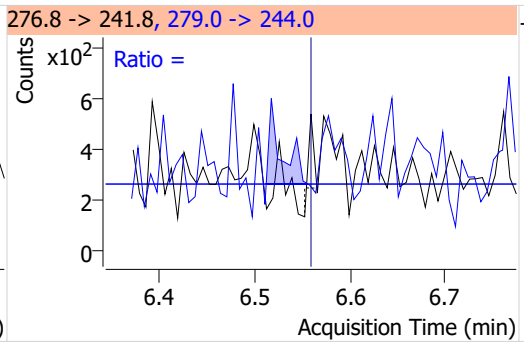


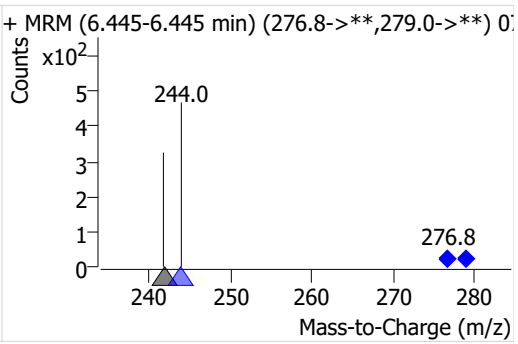




Heptachlor-13C10







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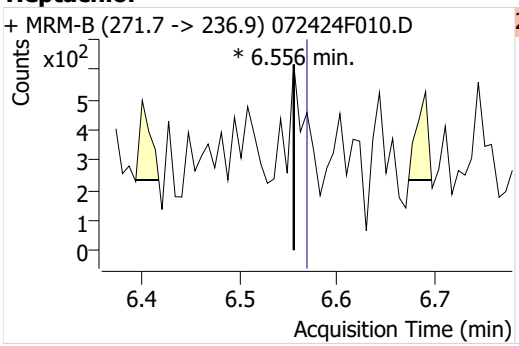
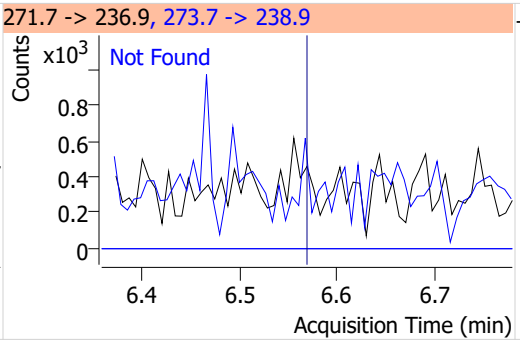
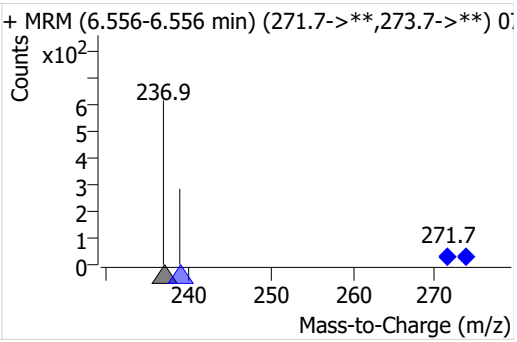
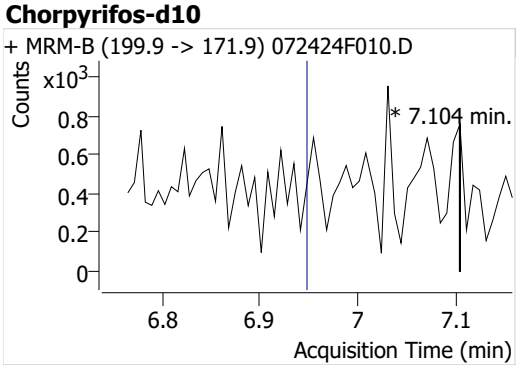
Heptachlor

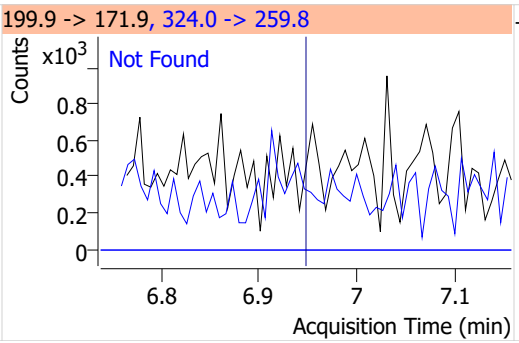


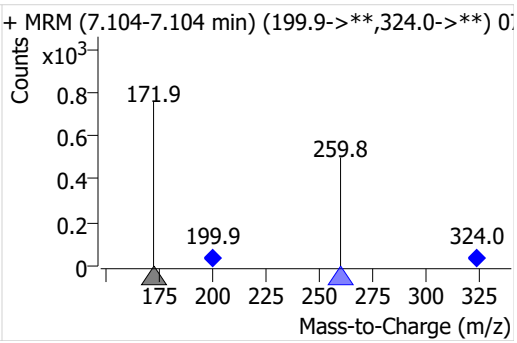




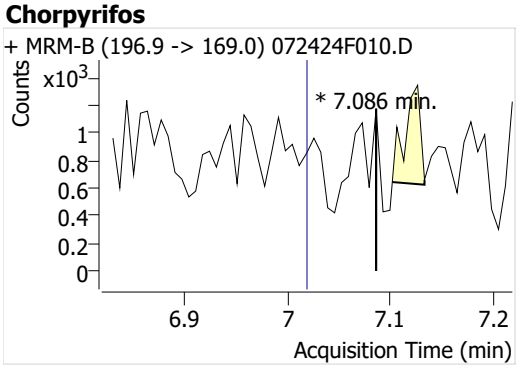
Chorpyrifos-d10

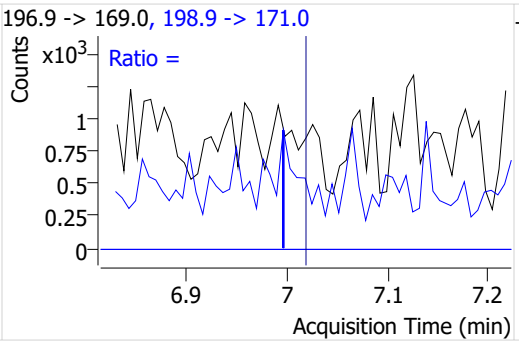


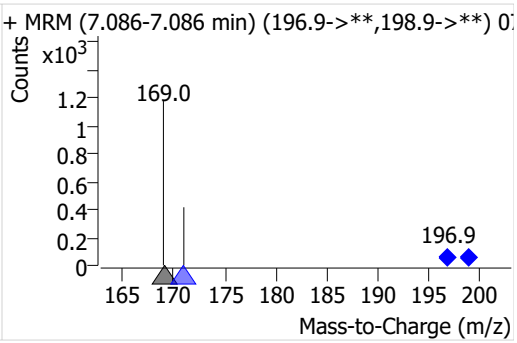




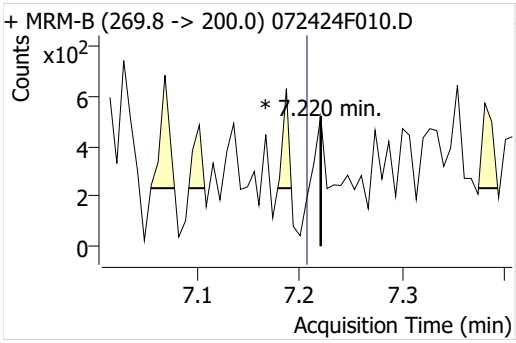
Chorpyrifos

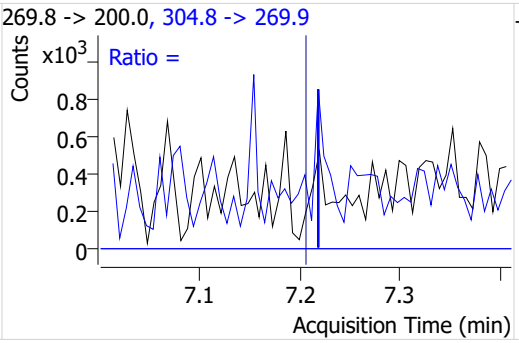


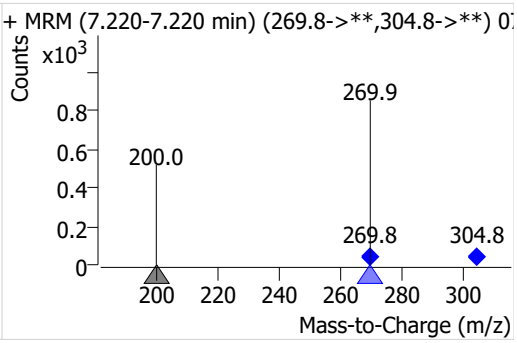




Aldrin-13C







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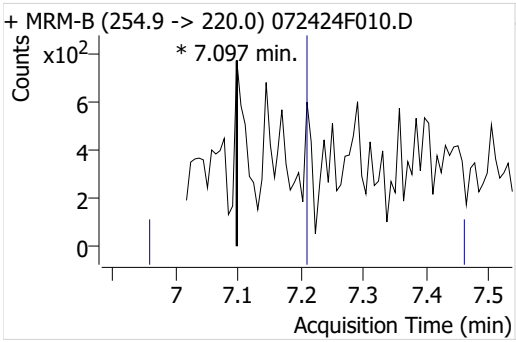
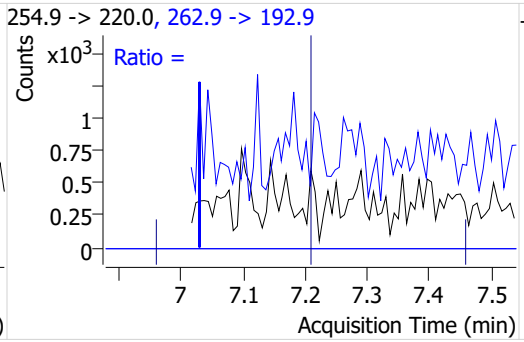
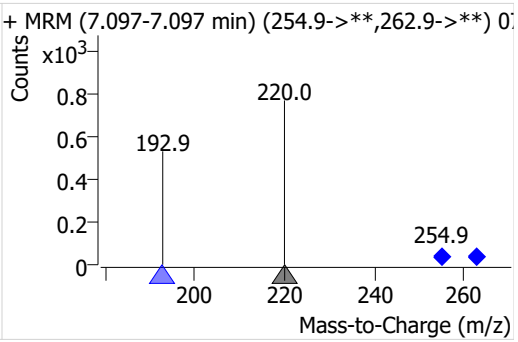
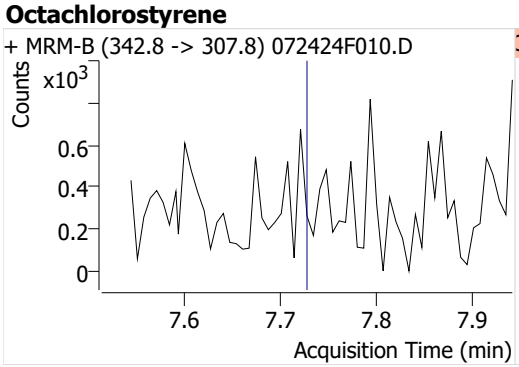
Aldrin

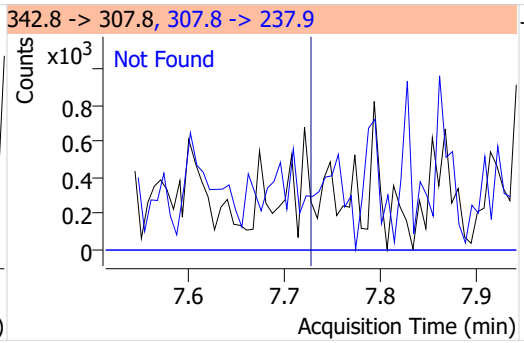


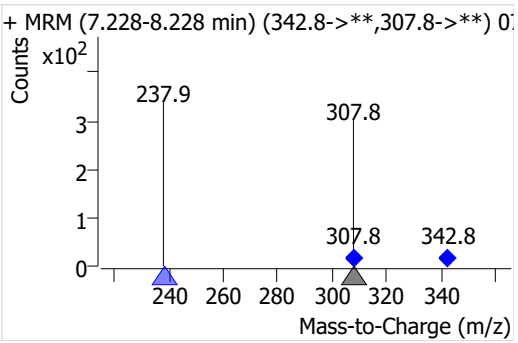




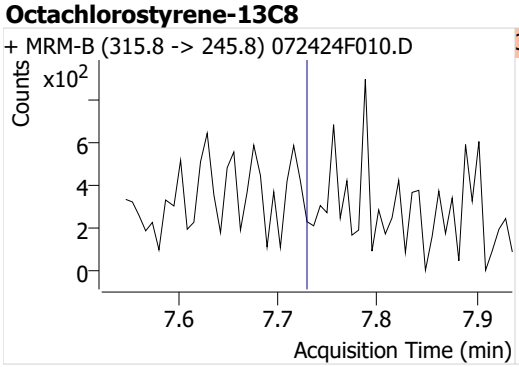
Octachlorostyrene

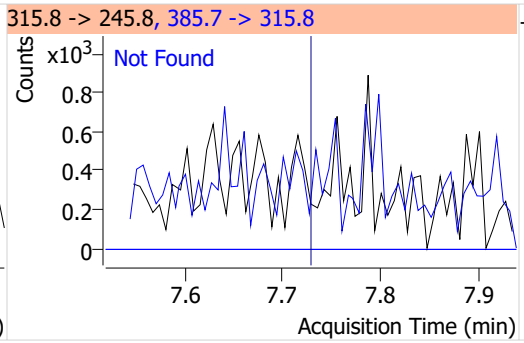


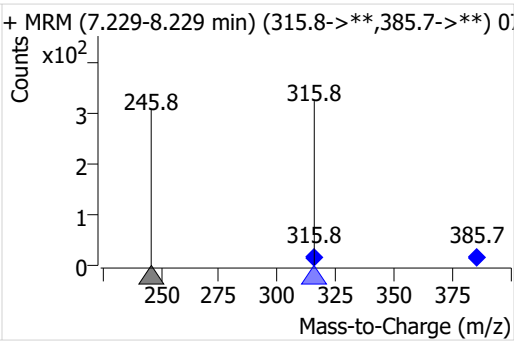




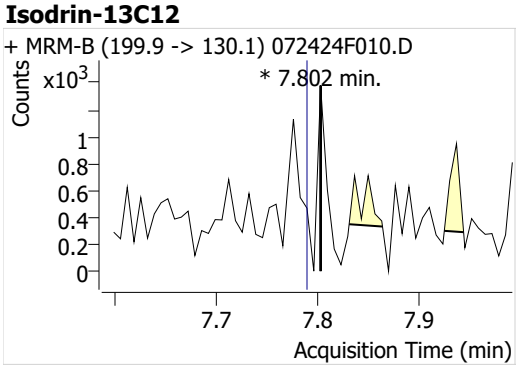
Octachlorostyrene-13C8

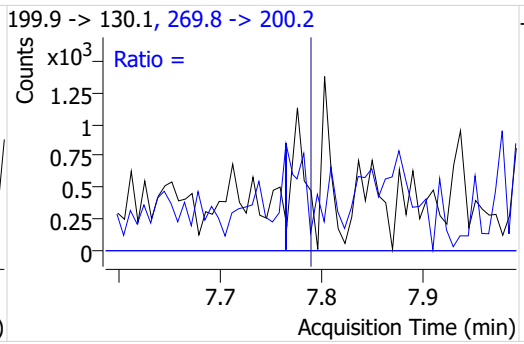


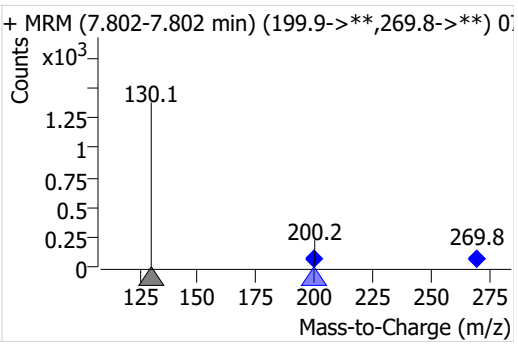




Isodrin-13C12

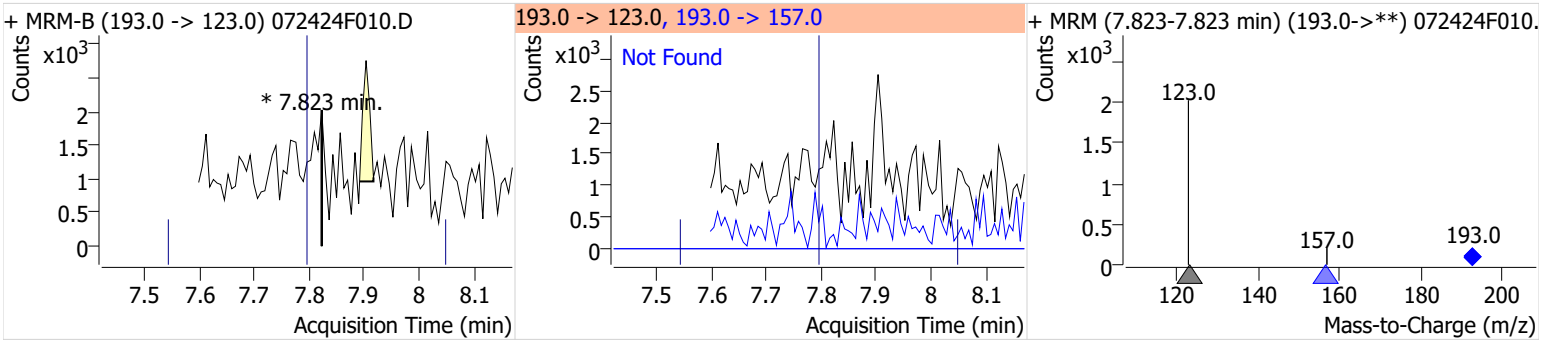




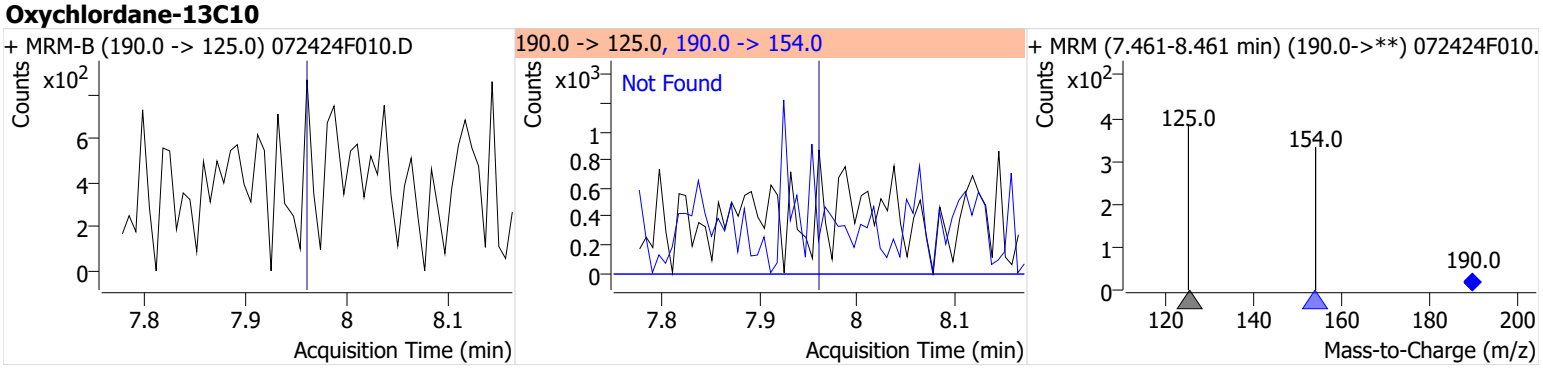


MassHunter Quantitative Analysis Sample Report

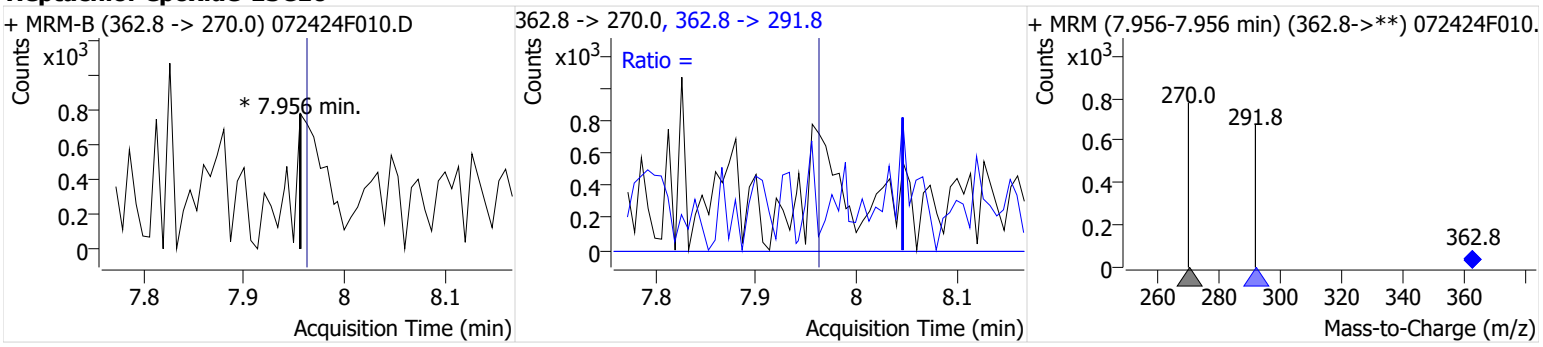
Isodrin



Oxychlordane-13C10



Heptachlor epoxide-13C10



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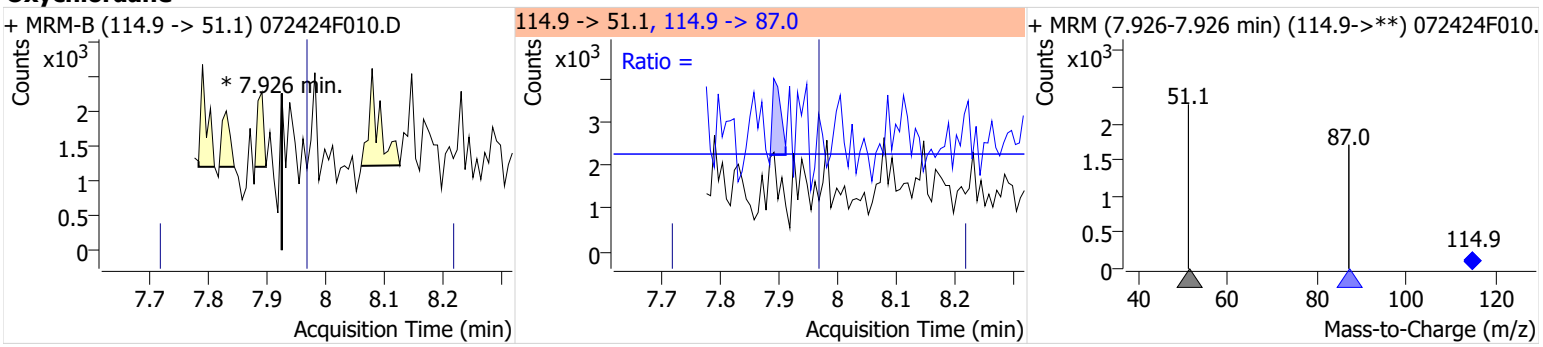

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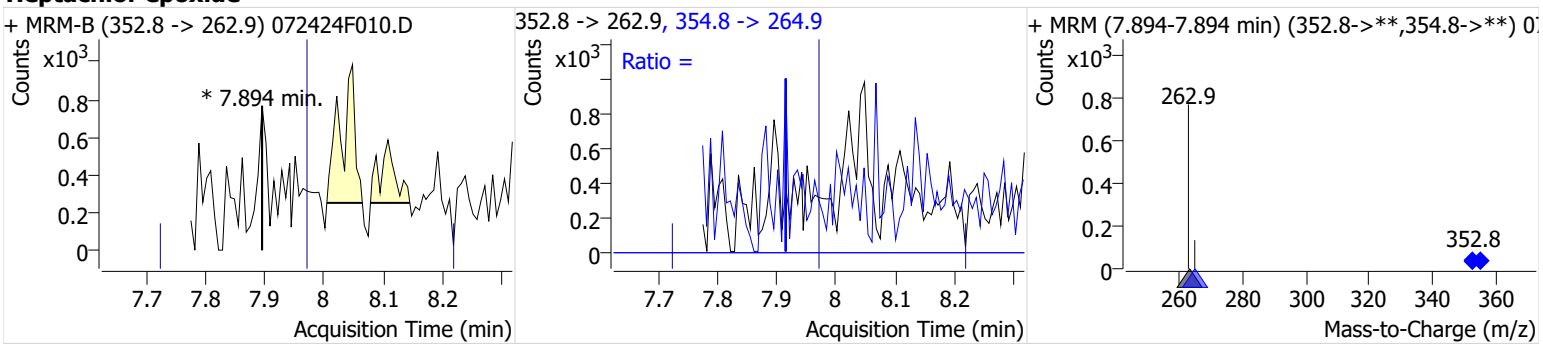
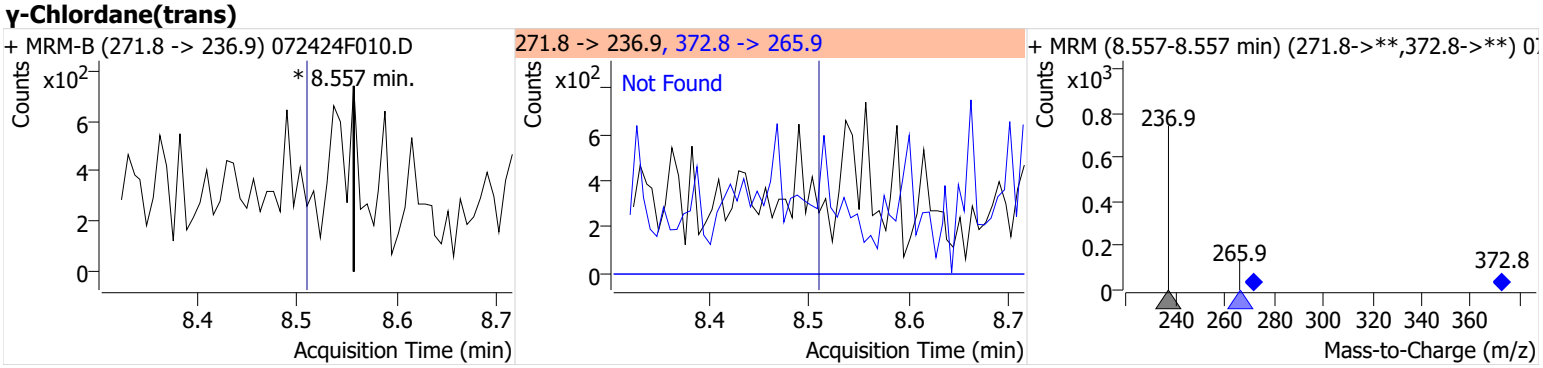
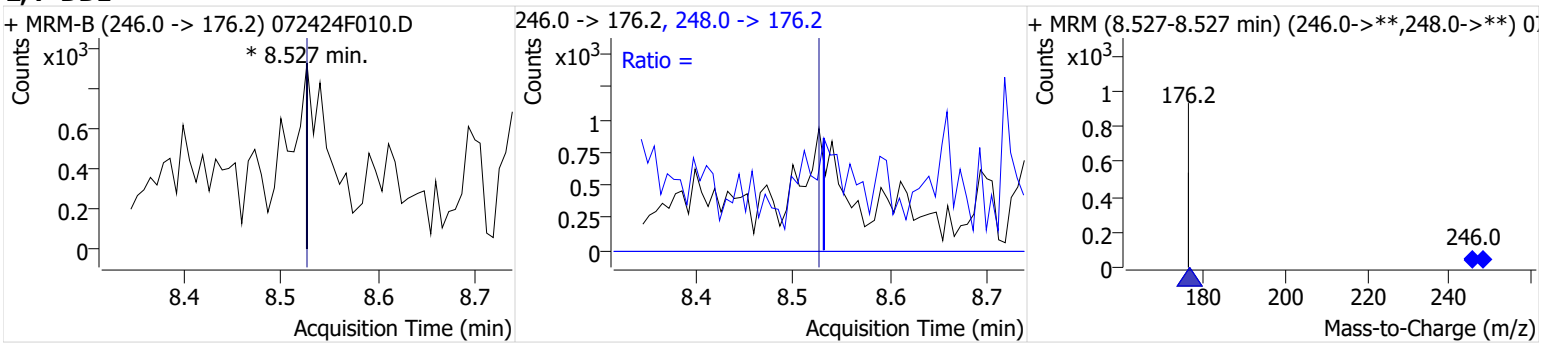
Heptachlor epoxide



γ-Chlordane(trans)



2,4'-DDE



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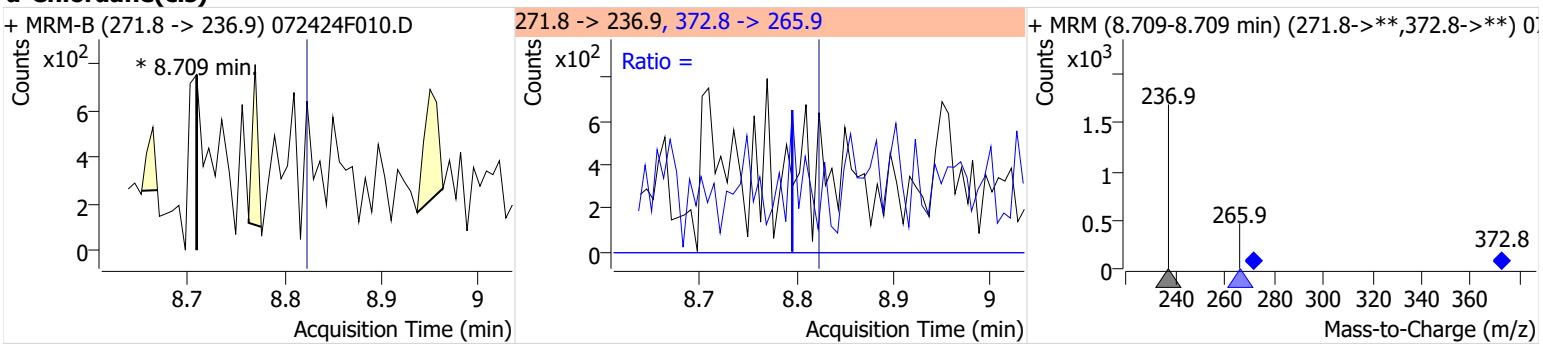

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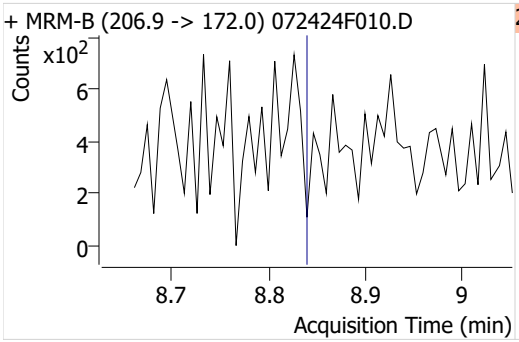
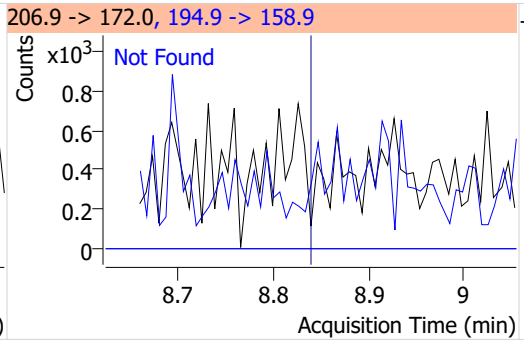
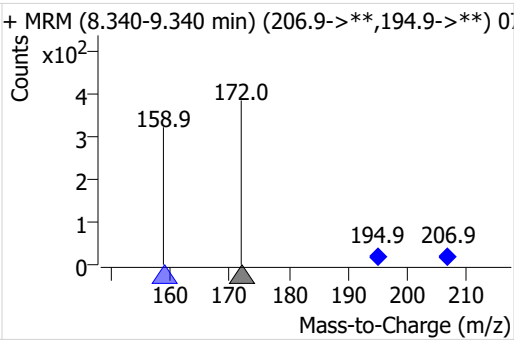
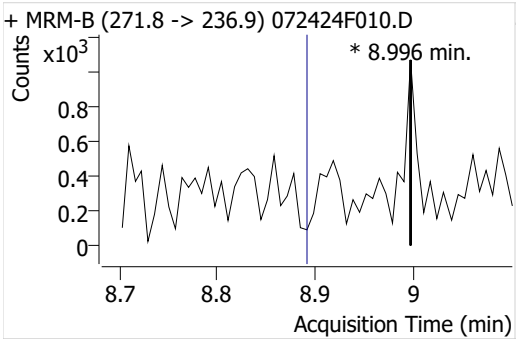
Endosulfan I

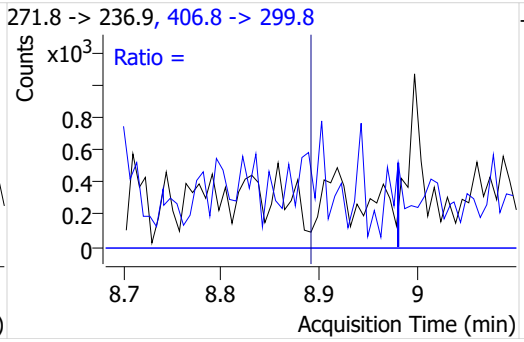


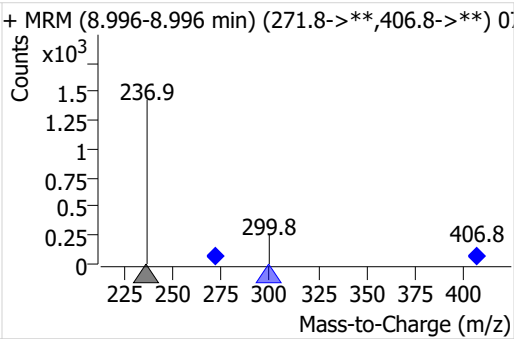




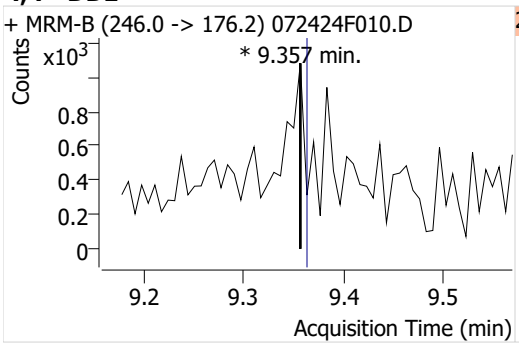
trans-Nanochlor

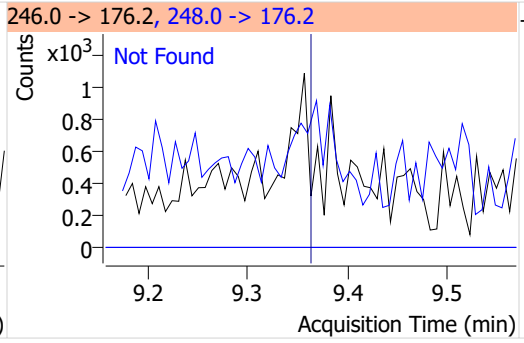


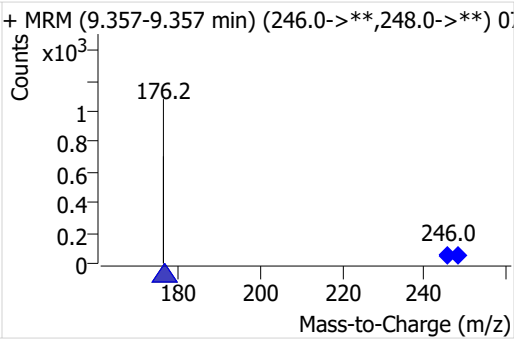




4,4' -DDE







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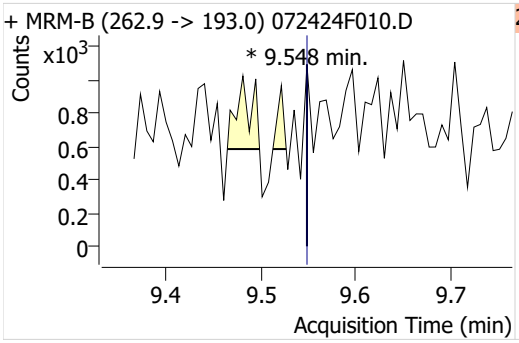
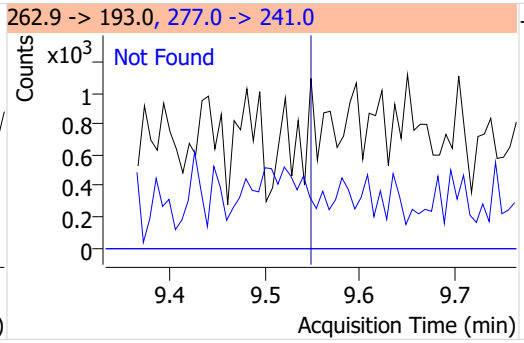
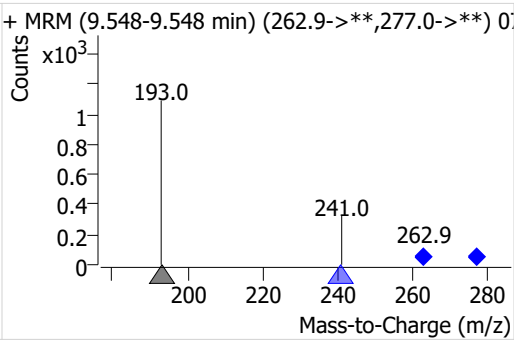
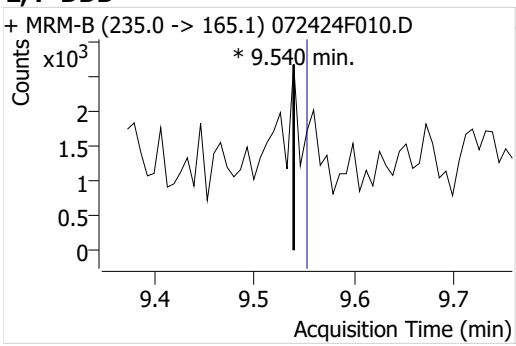


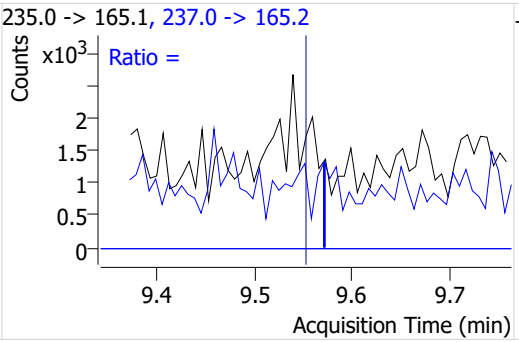


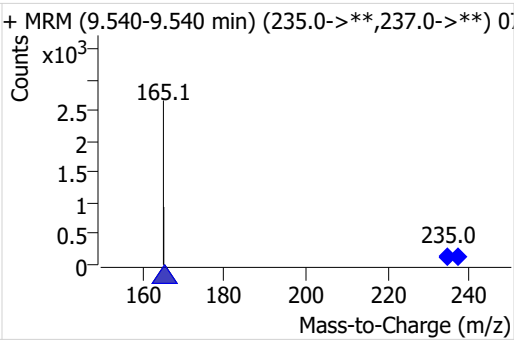


MassHunter Quantitative Analysis Sample Report

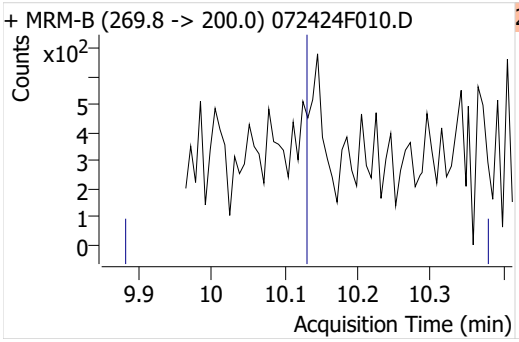
2,4'-DDD

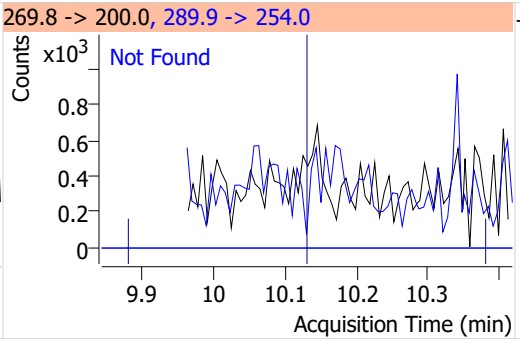


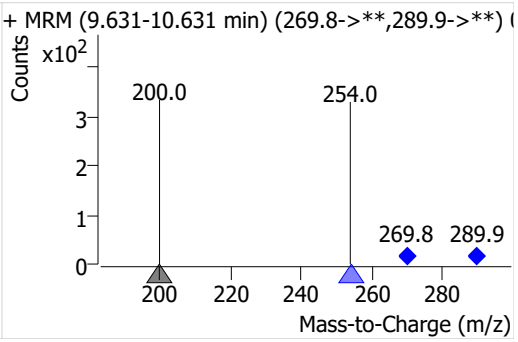




Endrin-13C12







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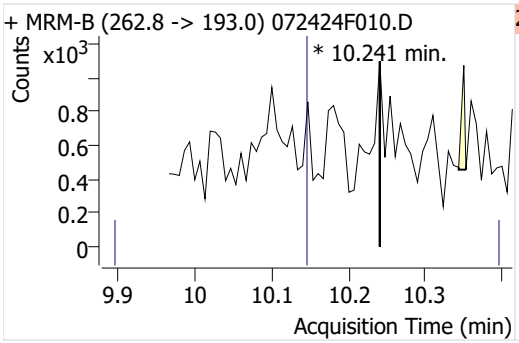
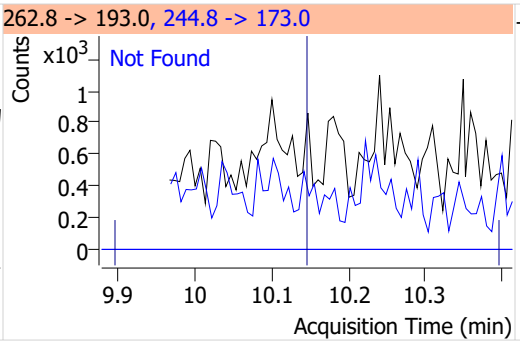
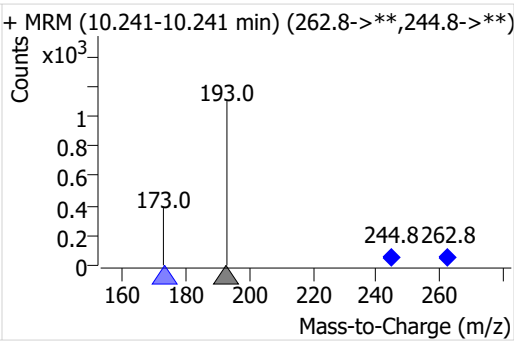
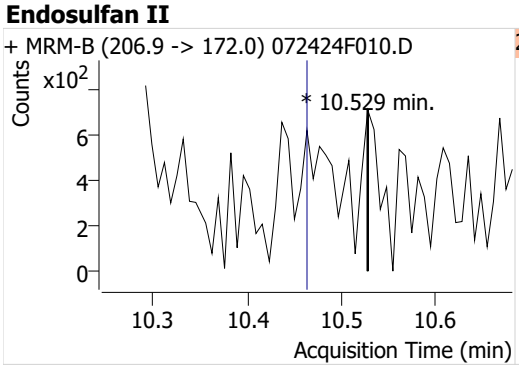
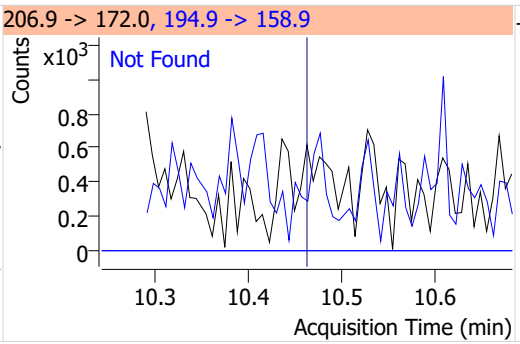


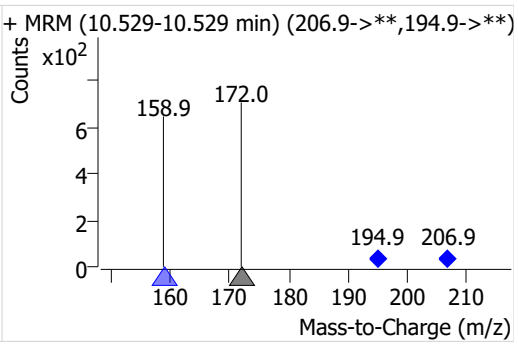




Endosulfan II

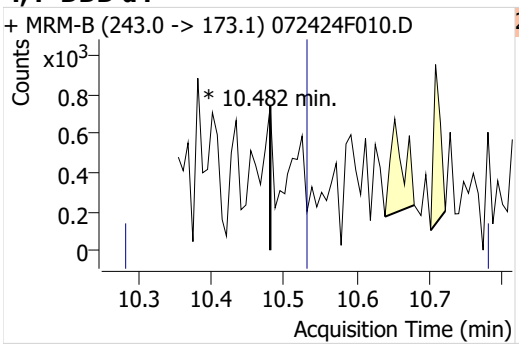


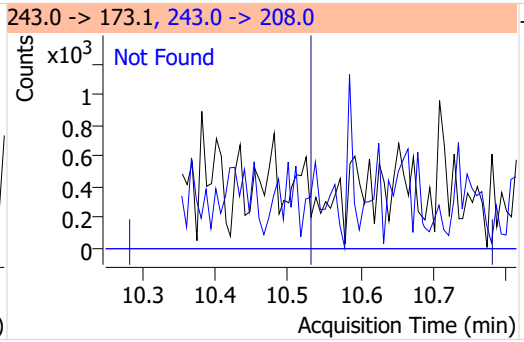


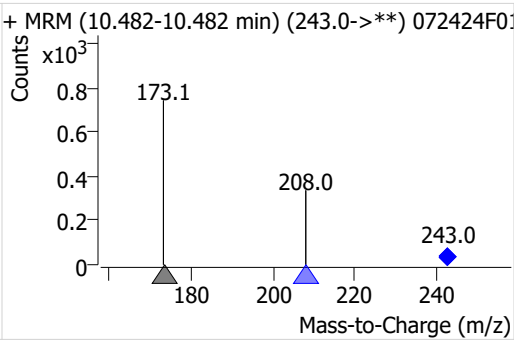


MassHunter Quantitative Analysis Sample Report

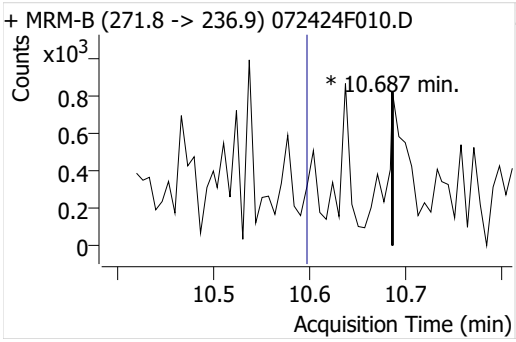
4,4'-DDD d4

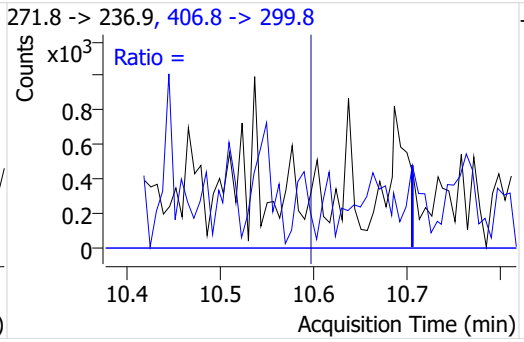


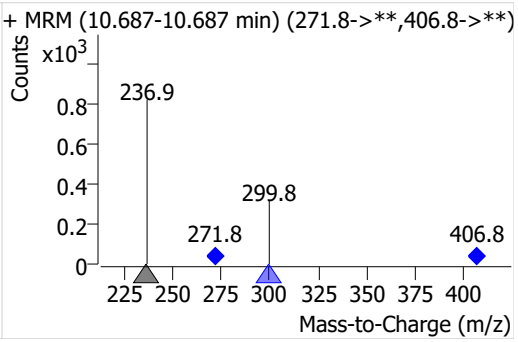




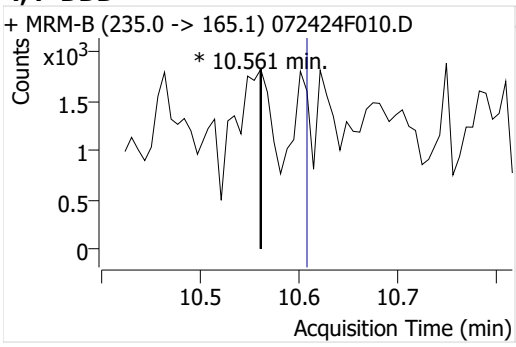
cis-Nonachlor

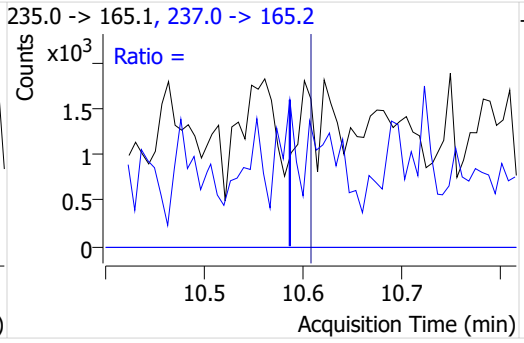


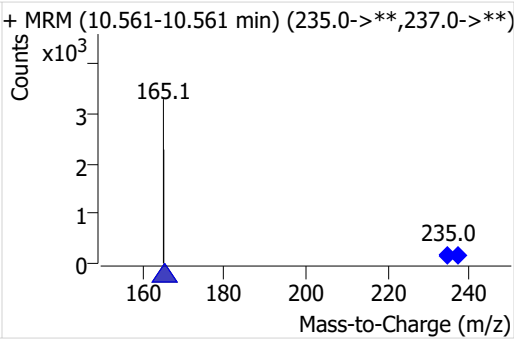




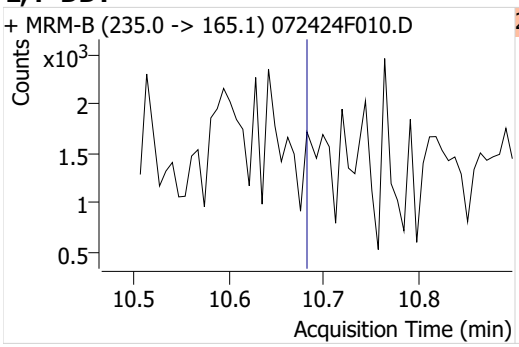
4,4'-DDD

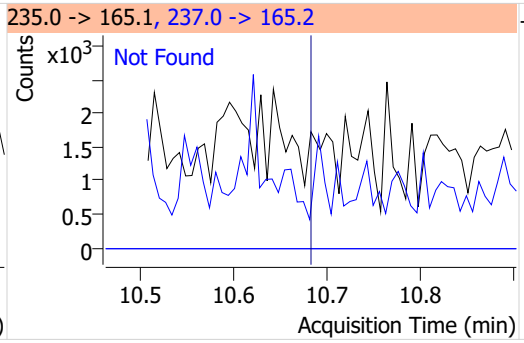


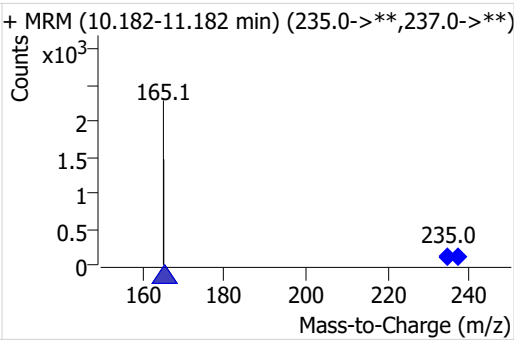




2,4'-DDT







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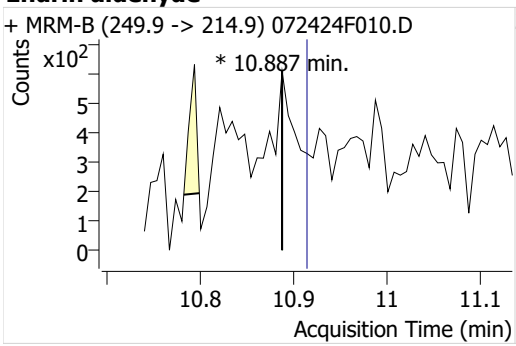
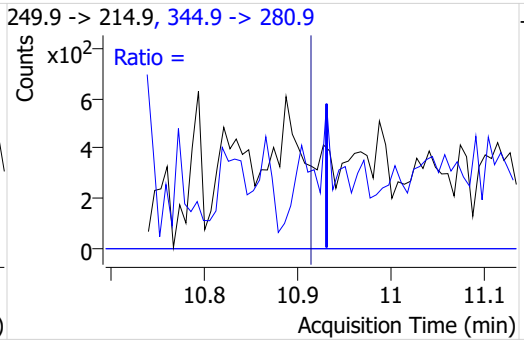
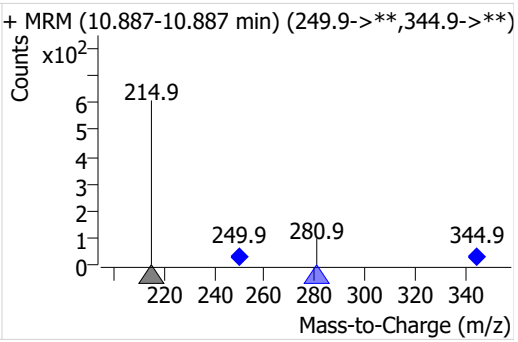
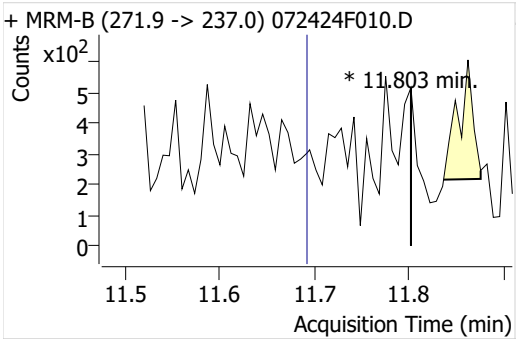
Endrin aldehyde

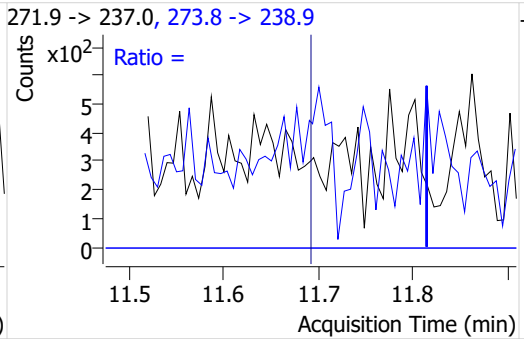


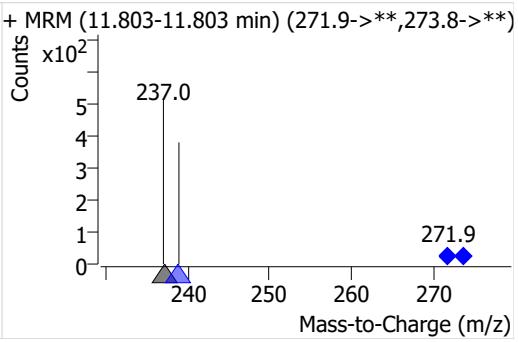




Endosulfan sulfate







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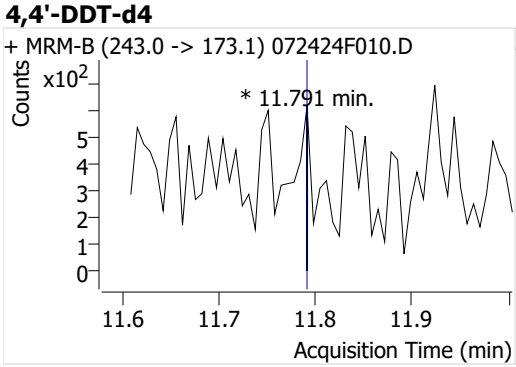
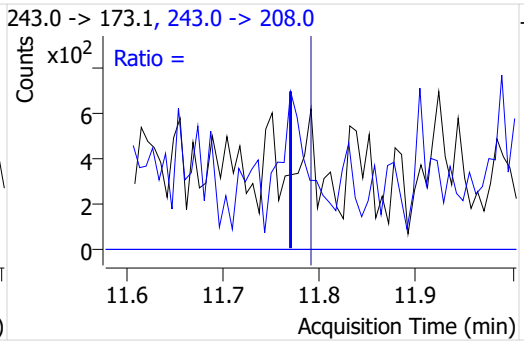
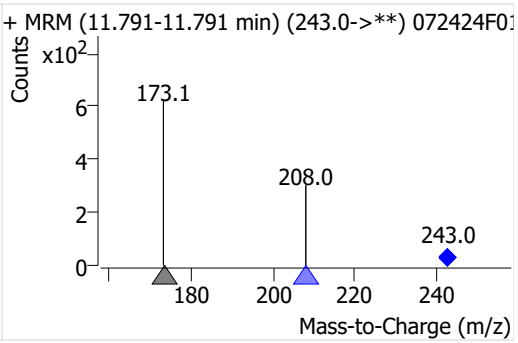
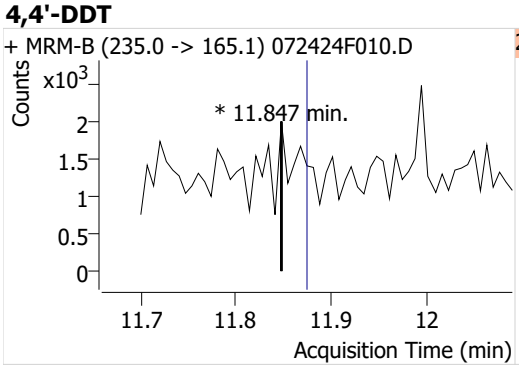
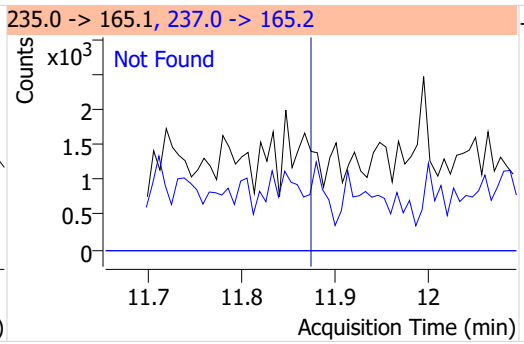


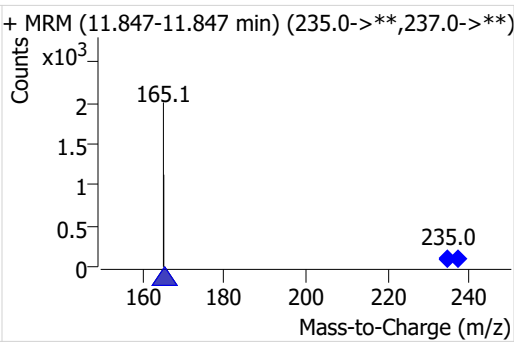




4,4'-DDT

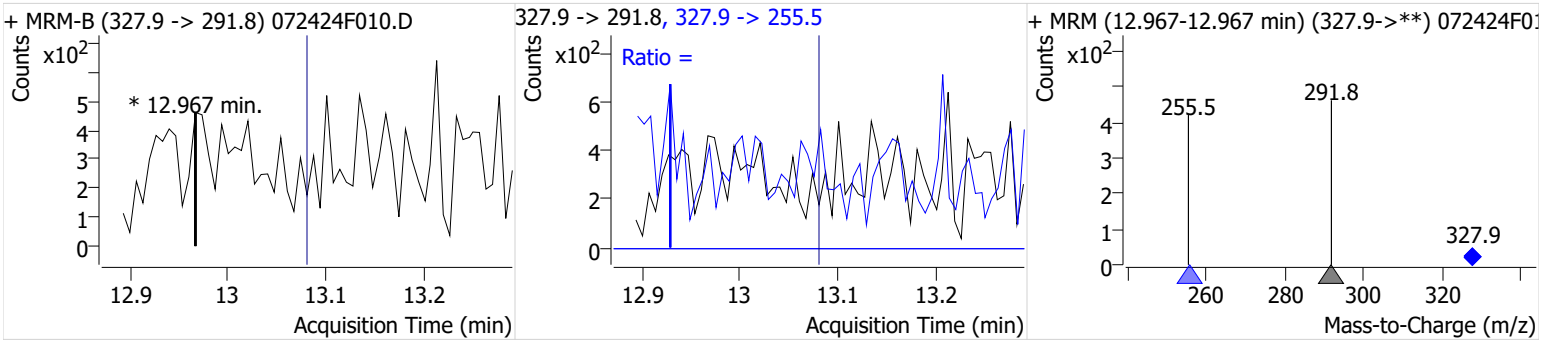




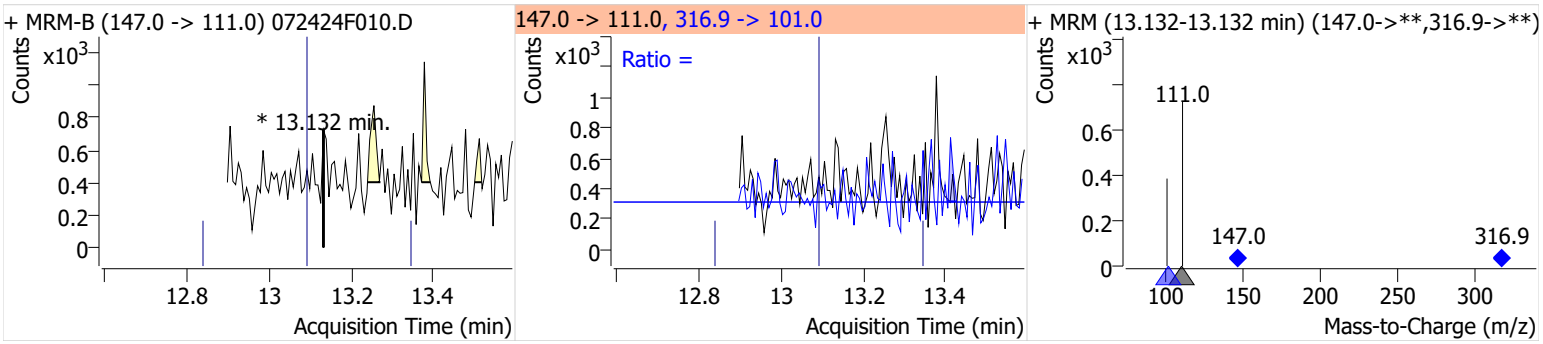


MassHunter Quantitative Analysis Sample Report

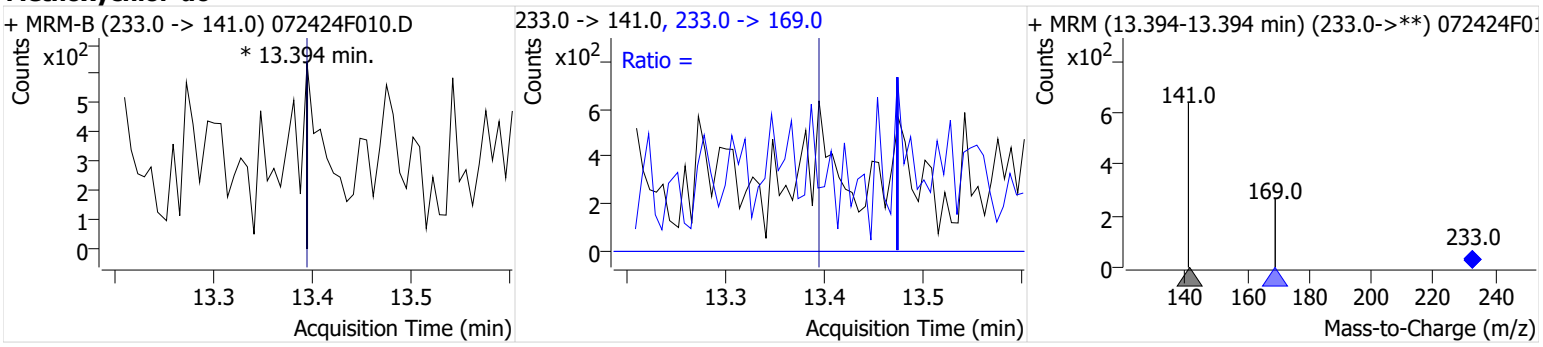
Endrin ketone-13C12



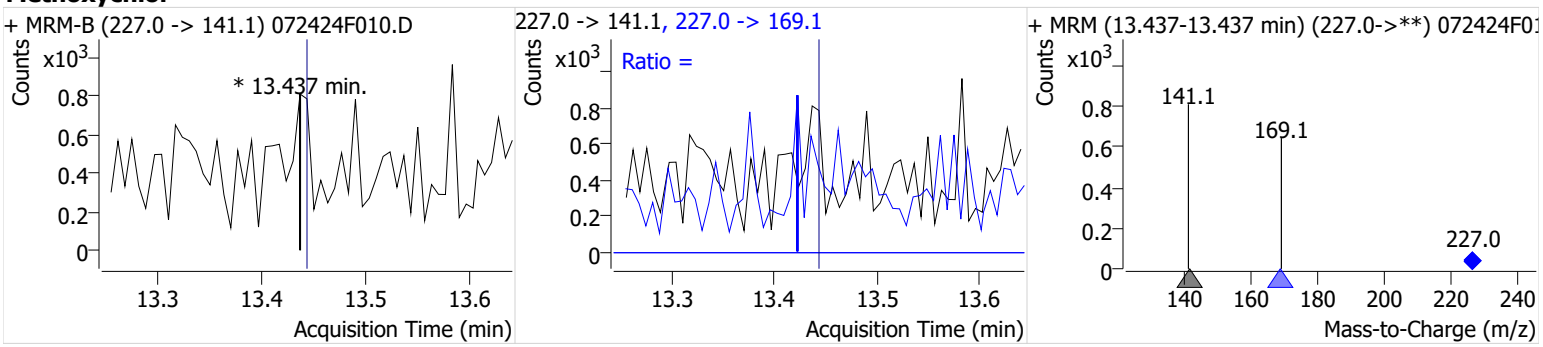
Endrin ketone



Methoxychlor-d6

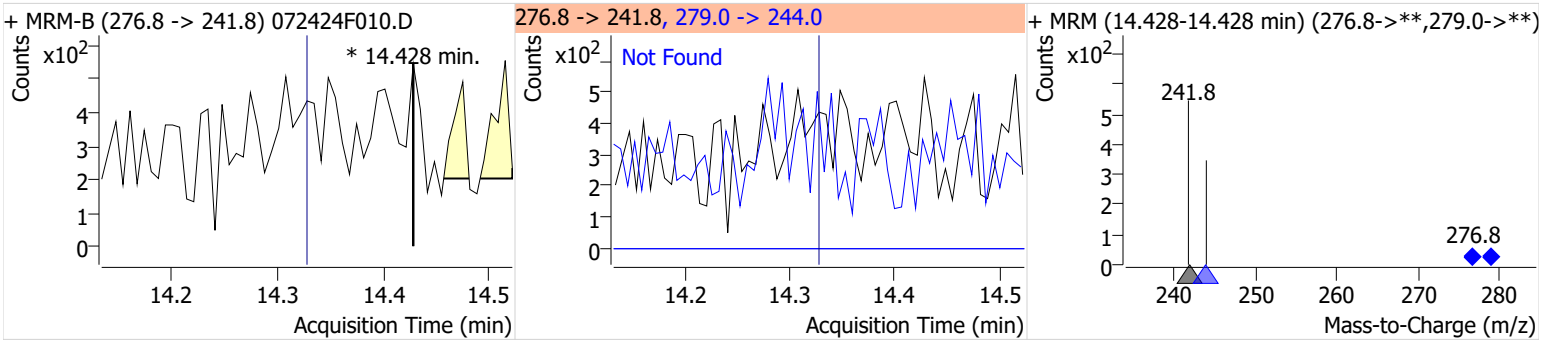


Methoxychlor

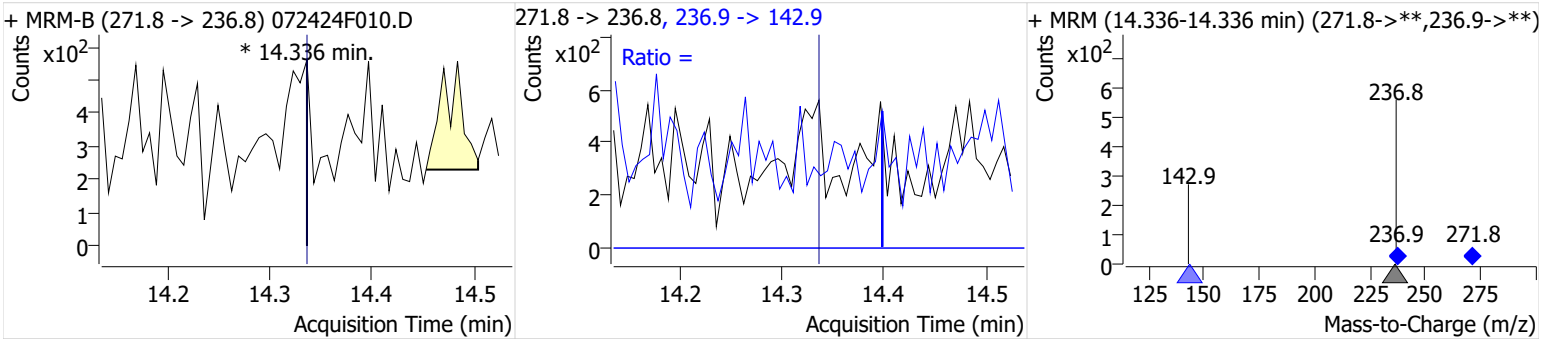


MassHunter Quantitative Analysis Sample Report

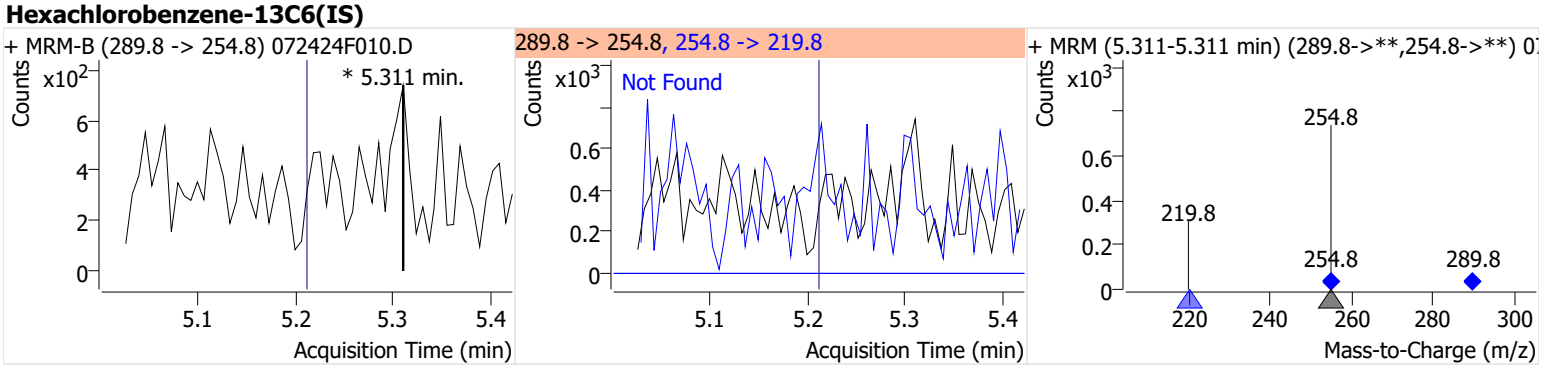
Mirex-13C10



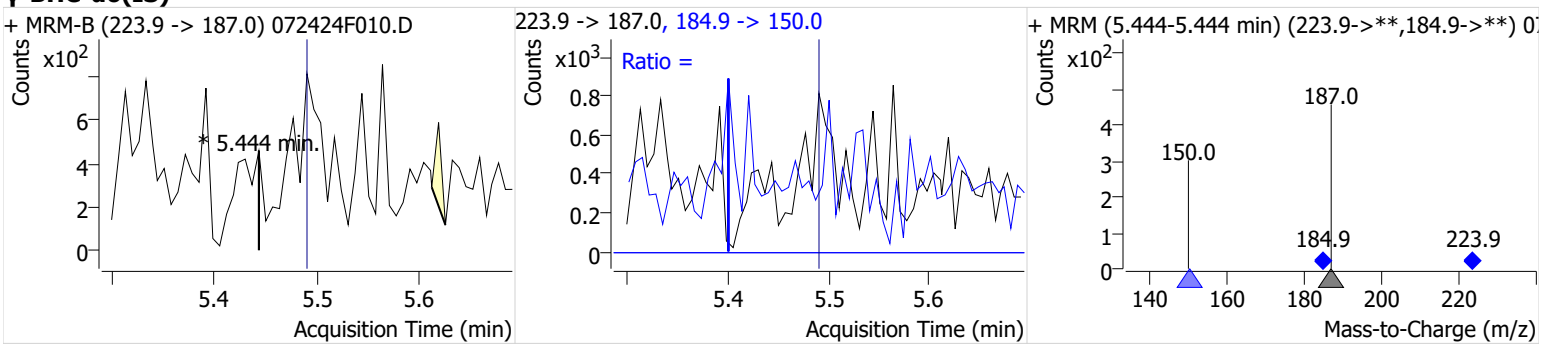
Mirex



Hexachlorobenzene-13C6(IS)



γ-BHC-d6(IS)



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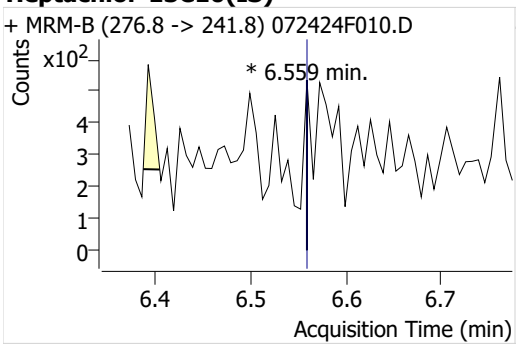
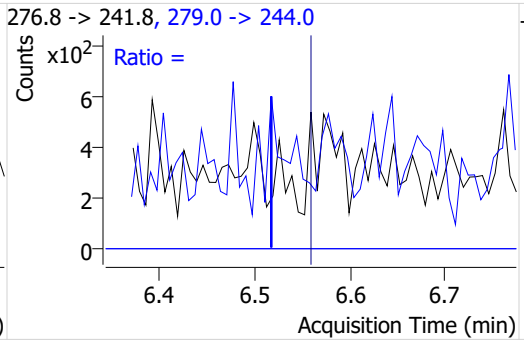
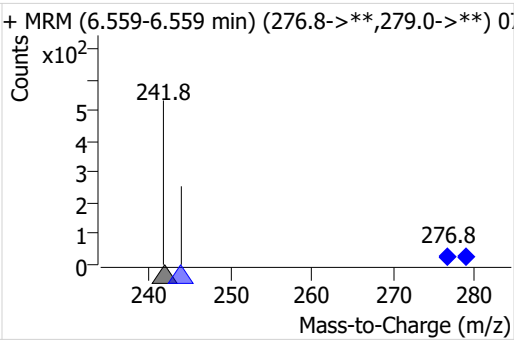
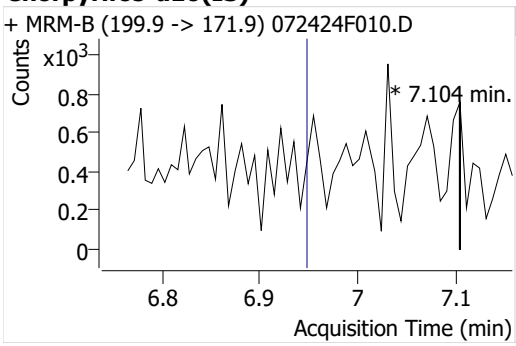
Heptachlor-13C10(IS)

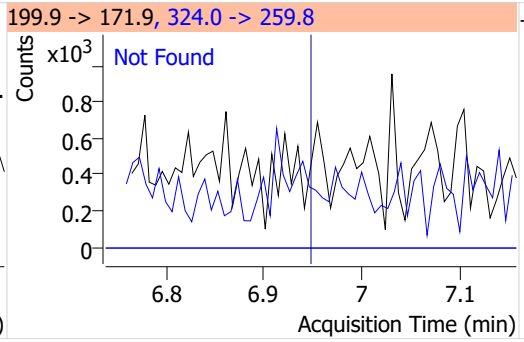


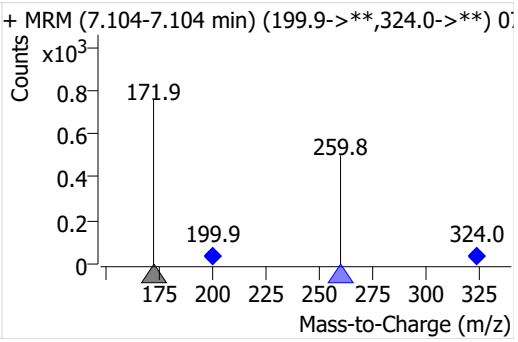




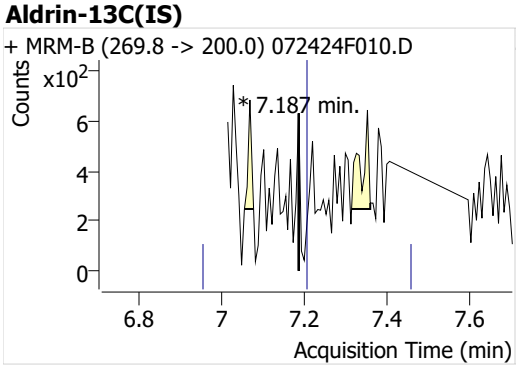
Chorpyrifos-d10(IS)

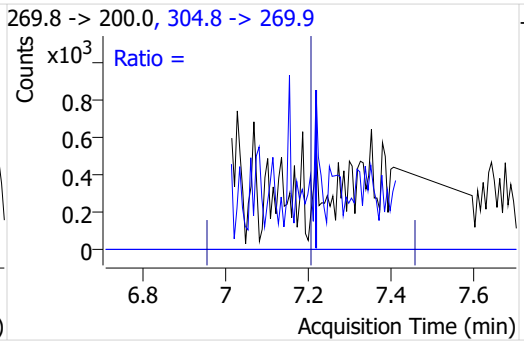


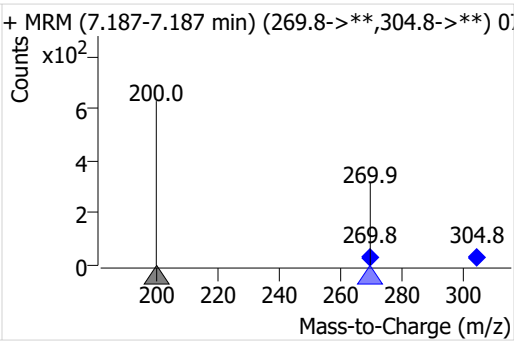




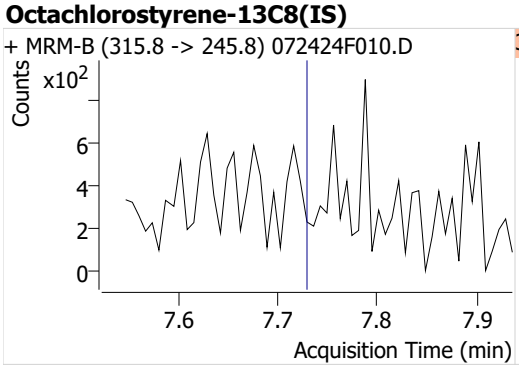
Aldrin-13C(IS)

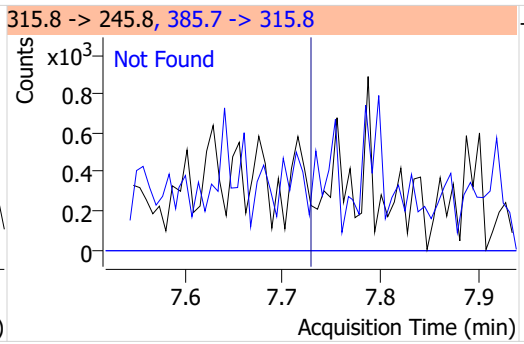


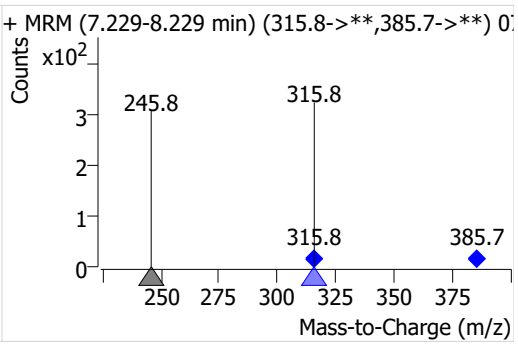




Octachlorostyrene-13C8(IS)







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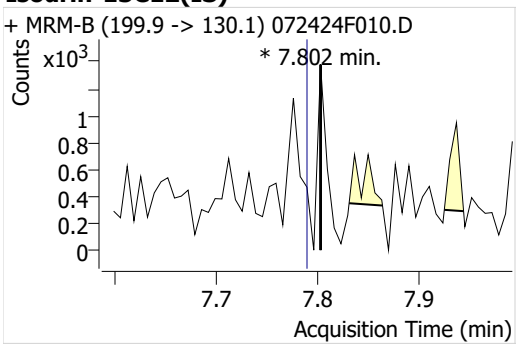
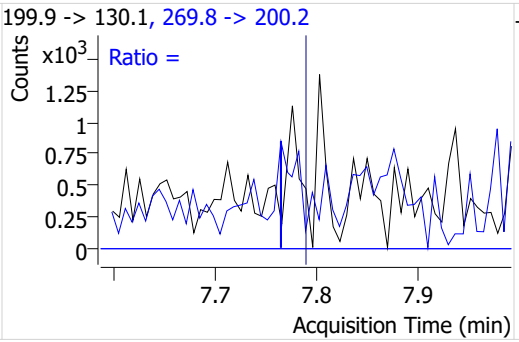
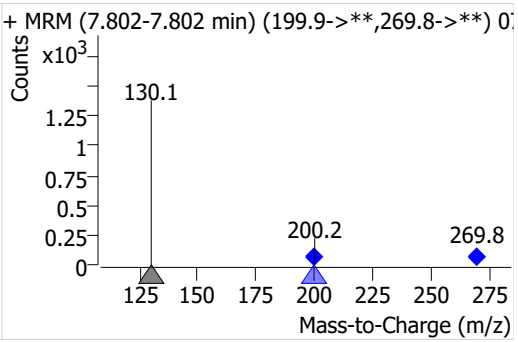
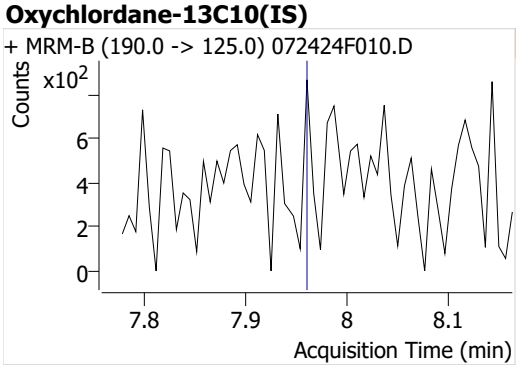
Isodrin-13C12(IS)

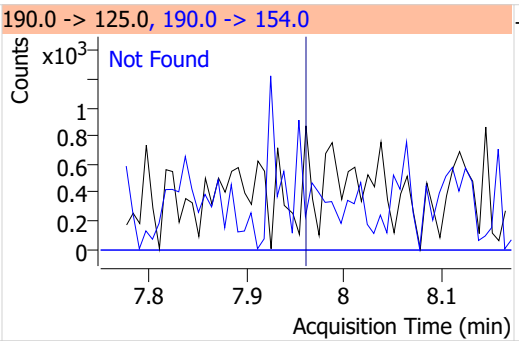


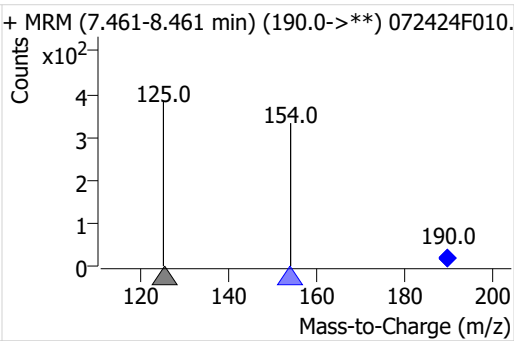




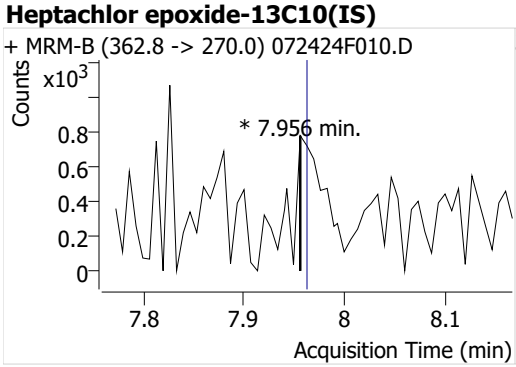
Oxychlordane-13C10(IS)

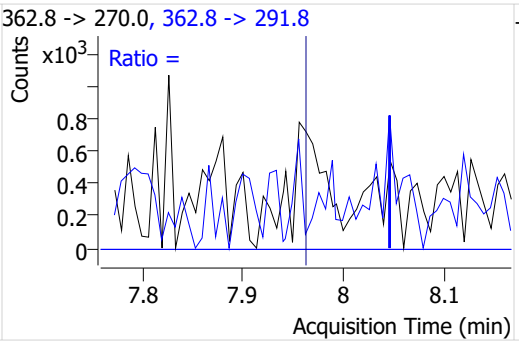


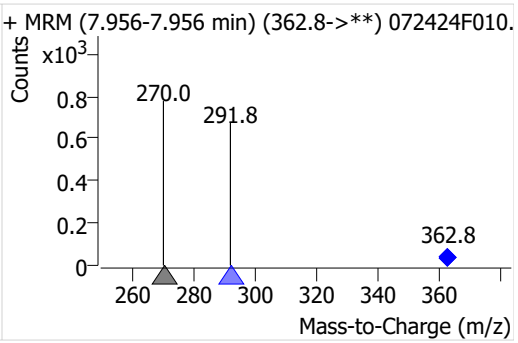




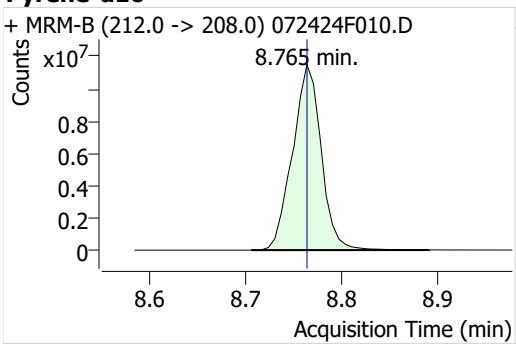
Heptachlor epoxide-13C10(IS)

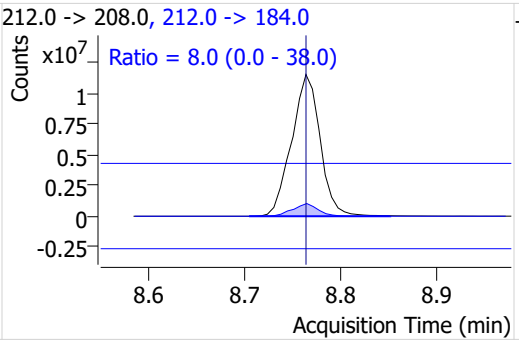


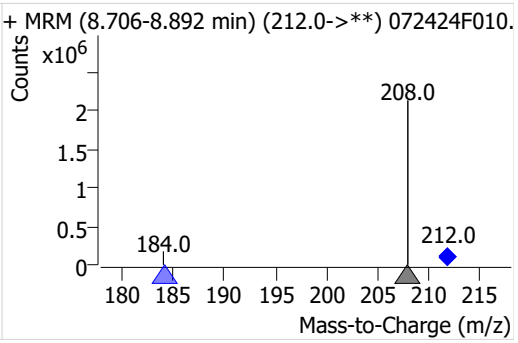




Pyrene-d10







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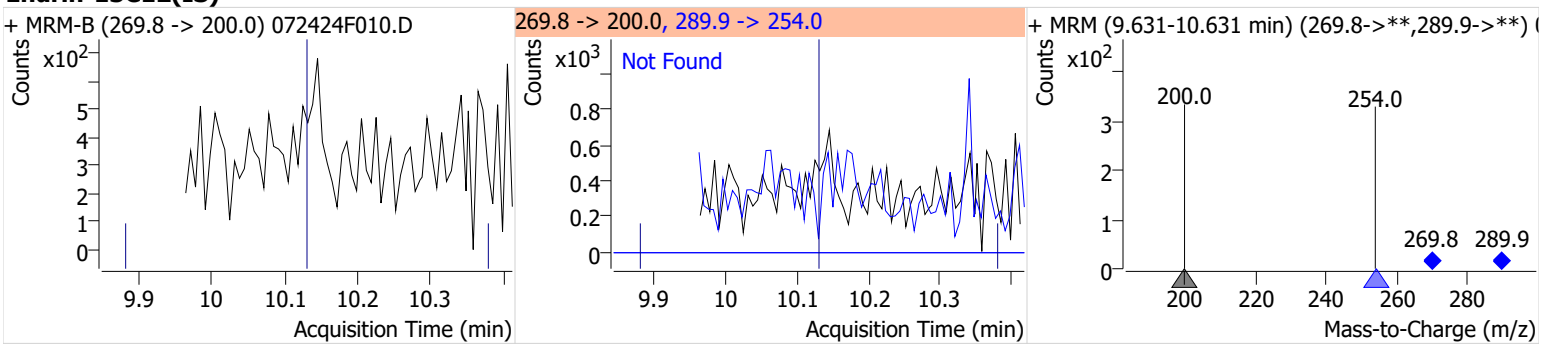
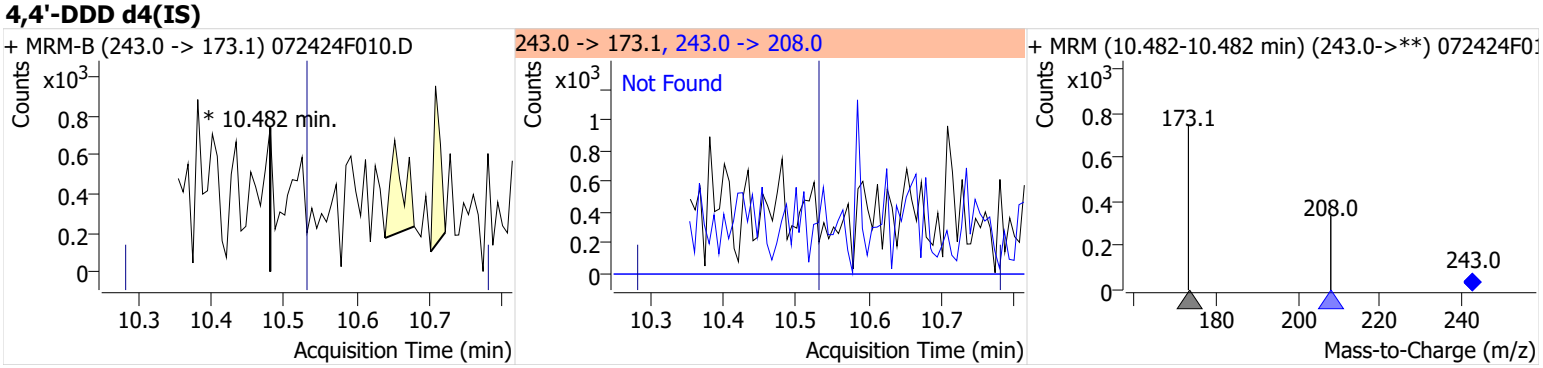
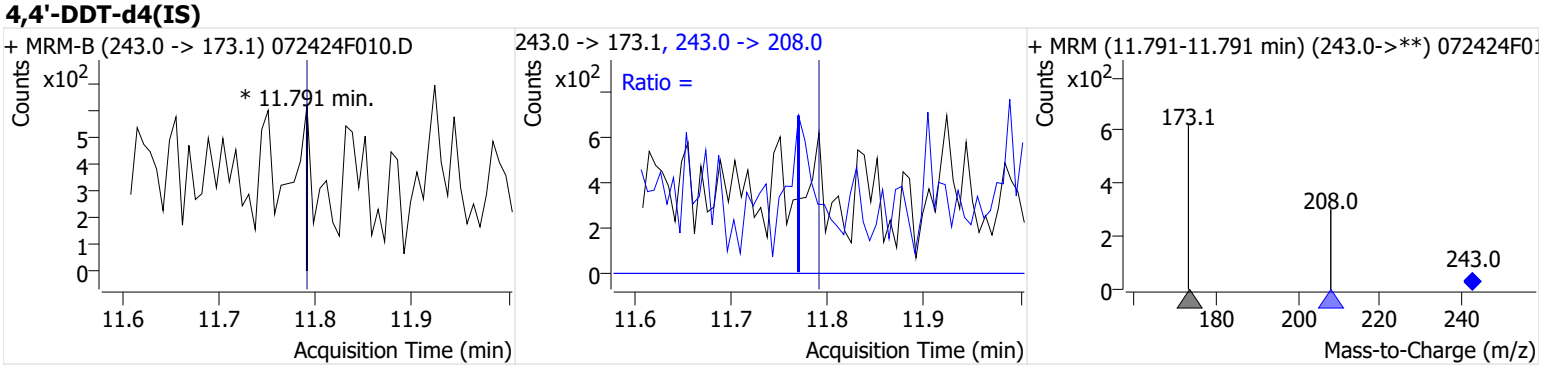
Endrin-13C12(IS)



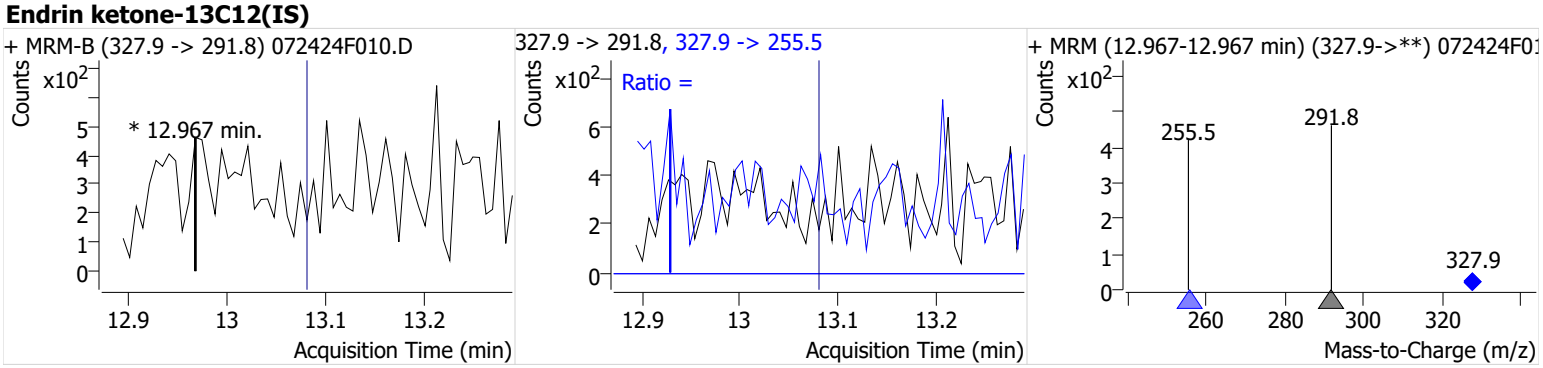
4,4'-DDD d4(IS)



4,4'-DDT-d4(IS)



Endrin ketone-13C12(IS)



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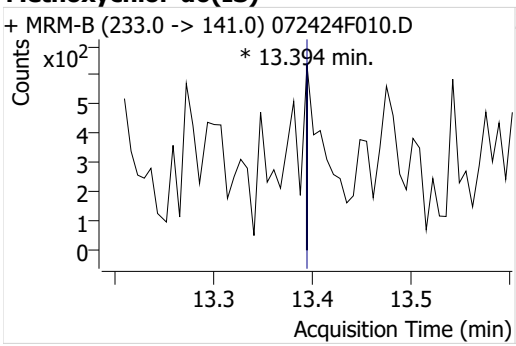
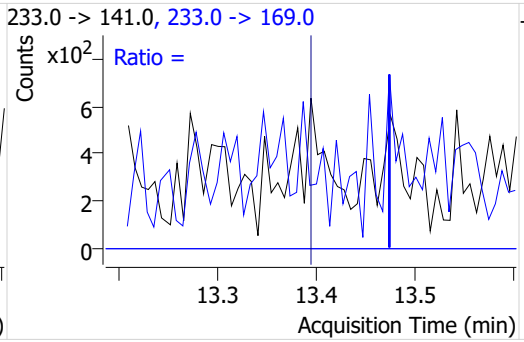
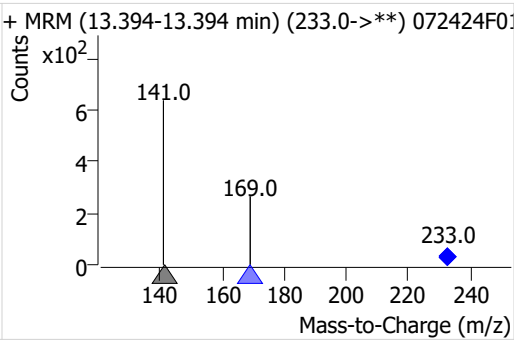
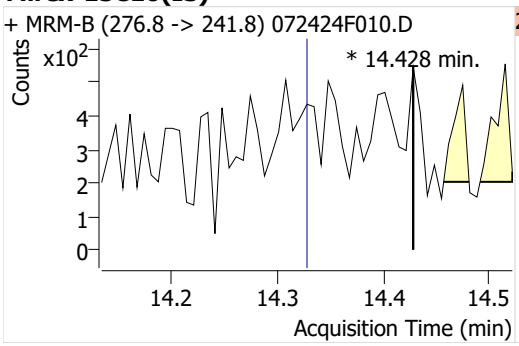
Methoxychlor-d6(IS)

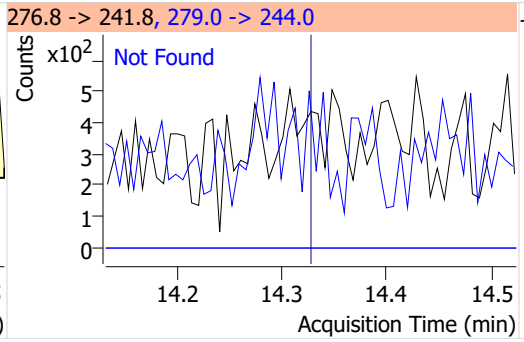


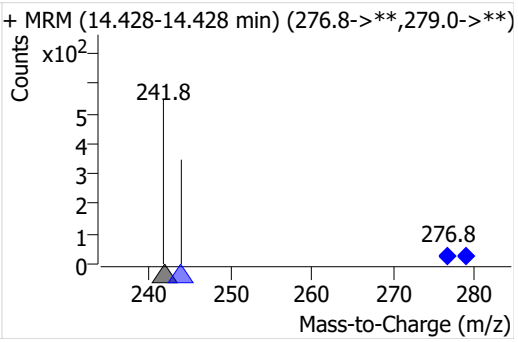




Mirex-13C10(IS)







1st 07/30/24
2nd 08/01/24

MassHunter Quantitative Analysis Sample Report

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Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.213	289.8 -> 254.8	4669409	20.0000 ng/ml	0.002
γ-BHC-d6(IS)	5.490	223.9 -> 187.0	4440192	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	6.566	276.8 -> 241.8	2456264	20.0000 ng/ml	0.006
Chorpyrifos-d10(IS)	6.941	199.9 -> 171.9	888074	20.0000 ng/ml	0.007
Aldrin-13C(IS)	7.200	269.8 -> 200.0	2169338	20.0000 ng/ml	0.007
Octachlorostyrene-13C8(IS)	7.722	315.8 -> 245.8	1866822	20.0000 ng/ml	0.008
Isodrin-13C12(IS)	7.782	199.9 -> 130.1	2022597	20.0000 ng/ml	0.007
Oxychlordane-13C10(IS)	7.961	190.0 -> 125.0	1162061	20.0000 ng/ml	0.000
Heptachlor epoxide-13C10(IS)	7.963	362.8 -> 270.0	784241	20.0000 ng/ml	0.000
Pyrene-d10	8.765	212.0 -> 208.0	15358761	100.0000 ng/ml	0.003
Endrin-13C12(IS)	10.138	269.8 -> 200.0	310095	20.0000 ng/ml	0.006
4,4'-DDD d4(IS)	10.525	243.0 -> 173.1	1929166	5.0000 ng/ml	0.007
4,4'-DDT-d4(IS)	11.792	243.0 -> 173.1	1041142	5.0000 ng/ml	0.004
Endrin ketone-13C12(IS)	13.080	327.9 -> 291.8	61967	20.0000 ng/ml	0.001
Methoxychlor-d6(IS)	13.394	233.0 -> 141.0	2252837	20.0000 ng/ml	0.001
Mirex-13C10(IS)	14.328	276.8 -> 241.8	1588591	5.0000 ng/ml	0.001

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	4669409	24.077 ng/ml	
		Spiked Amount =	20.0	Recovery =	*120.4 %*
γ-BHC-d6	5.491	223.9 -> 187.0	4440192	22.593 ng/ml	
		Spiked Amount =	20.0	Recovery =	*113.0 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	2456264	21.755 ng/ml	
		Spiked Amount =	20.0	Recovery =	*108.8 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	888074	18.353 ng/ml	
		Spiked Amount =	20.0	Recovery =	*91.8 %*
Aldrin-13C	7.207	269.8 -> 200.0	2170047	25.402 ng/ml	
		Spiked Amount =	20.0	Recovery =	*127.0 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	1866822	24.246 ng/ml	
		Spiked Amount =	20.0	Recovery =	*121.2 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2022597	22.091 ng/ml	
		Spiked Amount =	20.0	Recovery =	*110.5 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1162061	21.405 ng/ml	
		Spiked Amount =	20.0	Recovery =	*107.0 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	784241	25.520 ng/ml	
		Spiked Amount =	20.0	Recovery =	*127.6 %*
Endrin-13C12	10.131	269.8 -> 200.0	310095	23.682 ng/ml	
		Spiked Amount =	20.0	Recovery =	*118.4 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	1929166	5.933 ng/ml	
		Spiked Amount =	5.0	Recovery =	*118.7 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1041142	5.199 ng/ml	
		Spiked Amount =	5.0	Recovery =	*104.0 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	61967	22.420 ng/ml	
		Spiked Amount =	20.0	Recovery =	*112.1 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	2252837	20.284 ng/ml	
		Spiked Amount =	20.0	Recovery =	*101.4 %*

MassHunter Quantitative Analysis Sample Report

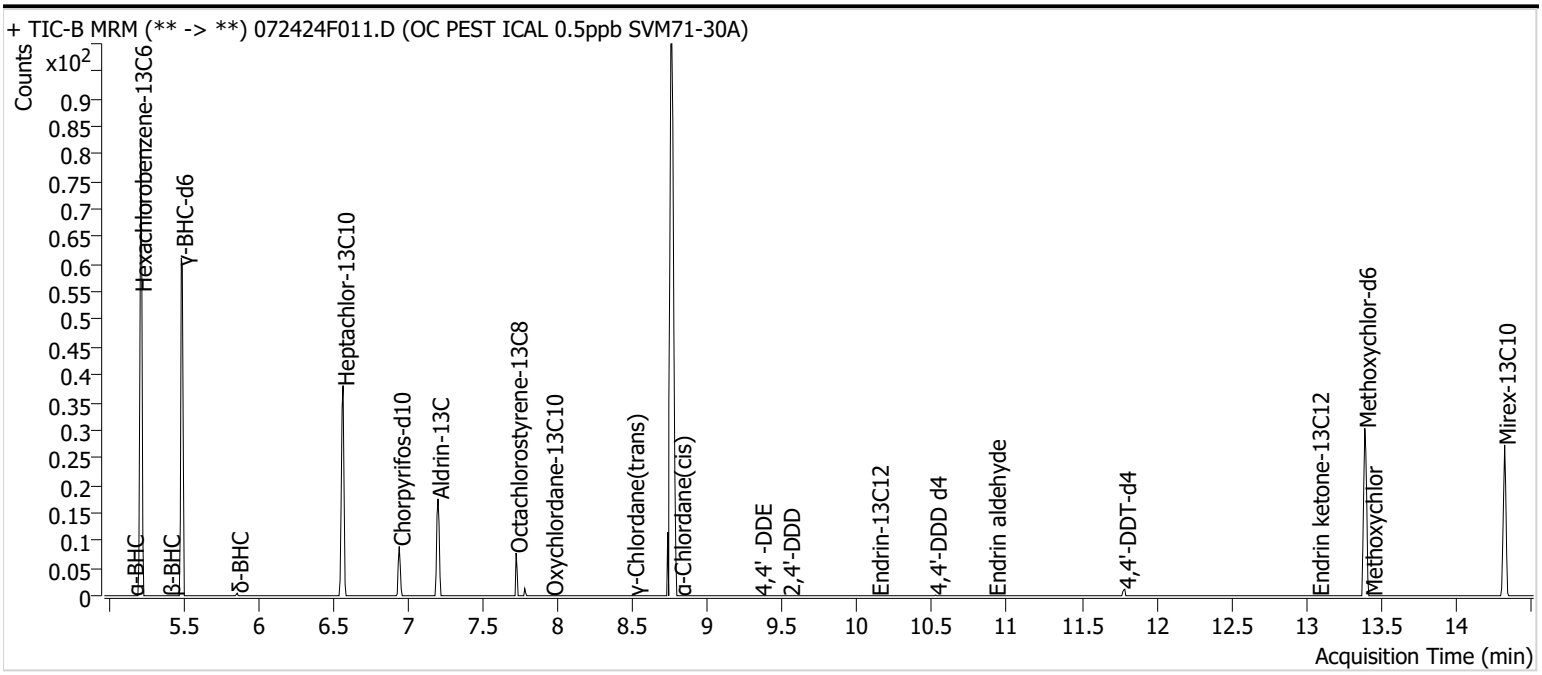
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	1588591	5.378 ng/ml
		Spiked Amount = 5.0		Recovery = *107.6 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.158	181.1 -> 145.1	160754	0.514 ng/ml	98
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.215	283.8 -> 213.9	193926	0.544 ng/ml	98
β-BHC	γ-BHC-d6(IS)	5.402	181.1 -> 145.1	92537	0.441 ng/ml	100
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	125315	0.468 ng/ml	93
δ-BHC	γ-BHC-d6(IS)	5.860	181.1 -> 145.1	86281	0.443 ng/ml	93
Heptachlor	Heptachlor-13C10(IS)	6.570	271.7 -> 236.9	61971	0.469 ng/ml	1
Chorpyrifos	Chorpyrifos-d10(IS)	7.012	196.9 -> 169.0	32160	0.532 ng/ml	84
Aldrin	Aldrin-13C(IS)	7.202	254.9 -> 220.0	177764	0.347 ng/ml	1
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.728	342.8 -> 307.8	108382	0.472 ng/ml	99
Isodrin	Isodrin-13C12(IS)	7.790	193.0 -> 123.0	53446	0.503 ng/ml	98
Oxychlordane	Oxychlordane-13C10(IS)	7.969	114.9 -> 51.1	69808	0.465 ng/ml	95
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.964	352.8 -> 262.9	17021	0.410 ng/ml	92
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.504	271.8 -> 236.9	29087	0.476 ng/ml	93
2,4'-DDE	4,4'-DDD d4(IS)	8.527	246.0 -> 176.2	286895	0.416 ng/ml	94
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.817	271.8 -> 236.9	35369	0.479 ng/ml	84
Endosulfan I	Endrin-13C12(IS)	8.847	206.9 -> 172.0	12657	0.454 ng/ml	89
trans-Nanochlor	Oxychlordane-13C10(IS)	8.884	271.8 -> 236.9	26376	0.502 ng/ml	99
4,4' -DDE	4,4'-DDD d4(IS)	9.357	246.0 -> 176.2	195786	0.399 ng/ml	95
Dieldrin	Endrin-13C12(IS)	9.555	262.9 -> 193.0	16362	0.473 ng/ml	99
2,4'-DDD	4,4'-DDD d4(IS)	9.546	235.0 -> 165.1	219151	0.396 ng/ml	97
Endrin	Endrin-13C12(IS)	10.146	262.8 -> 193.0	11764 ***m***	0.614 ng/ml	95
Endosulfan II	Endrin-13C12(IS)	10.464	206.9 -> 172.0	5892	0.398 ng/ml	67
cis-Nonachlor	Oxychlordane-13C10(IS)	10.605	271.8 -> 236.9	24450	0.541 ng/ml	93
4,4'-DDD	4,4'-DDD d4(IS)	10.601	235.0 -> 165.1	171999	0.421 ng/ml	100
2,4'-DDT	4,4'-DDT-d4(IS)	10.676	235.0 -> 165.1	134838	0.442 ng/ml	99
Endrin aldehyde	Endrin-13C12(IS)	10.920	249.9 -> 214.9	2075	0.379 ng/ml	44
Endosulfan sulfate	Endrin-13C12(IS)	11.696	271.9 -> 237.0	16415	0.422 ng/ml	97
4,4'-DDT	4,4'-DDT-d4(IS)	11.874	235.0 -> 165.1	99115	0.421 ng/ml	90
Endrin ketone	Endrin ketone-13C12(IS)	13.092	147.0 -> 111.0	7744	0.557 ng/ml	86
Methoxychlor	Methoxychlor-d6(IS)	13.437	227.0 -> 141.1	45257	0.386 ng/ml	93
Mirex	Mirex-13C10(IS)	14.330	271.8 -> 236.8	195205	0.596 ng/ml	88

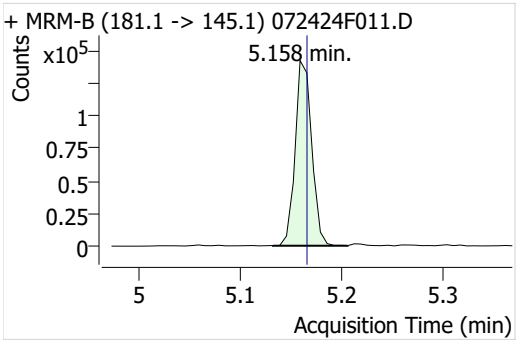
(m) = manual integration ND = Not Detected NC = Not Calculated

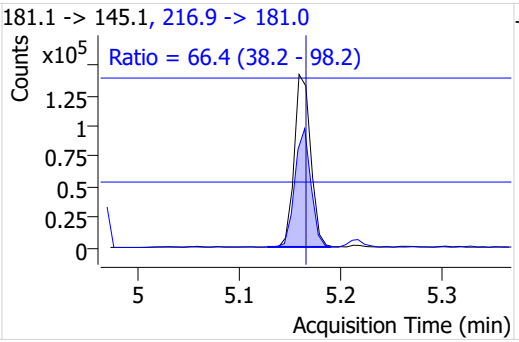
Sample Chromatogram

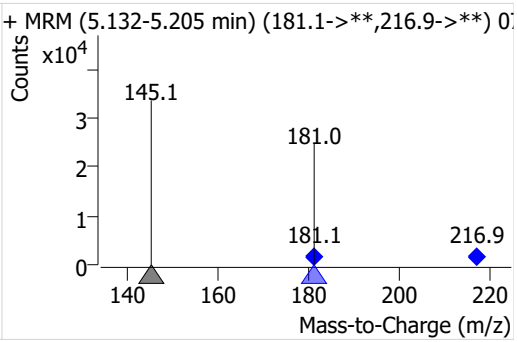
MassHunter Quantitative Analysis Sample Report



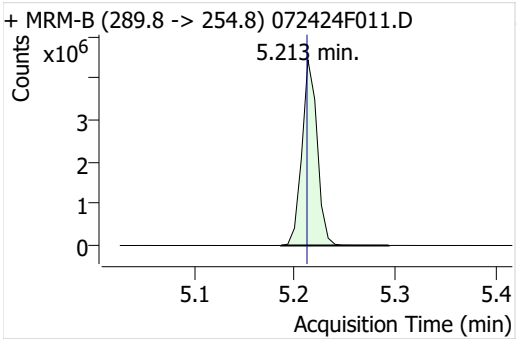
α-BHC

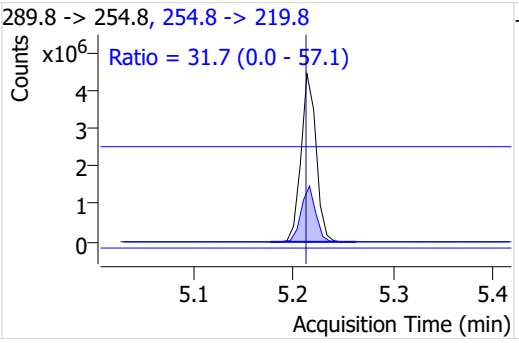


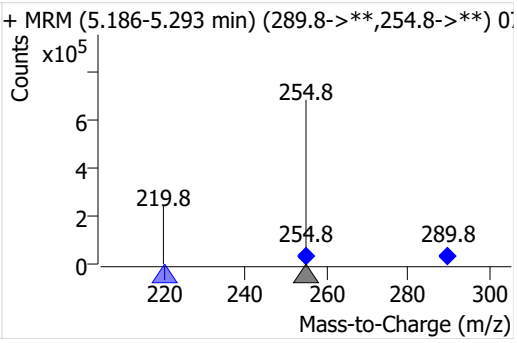




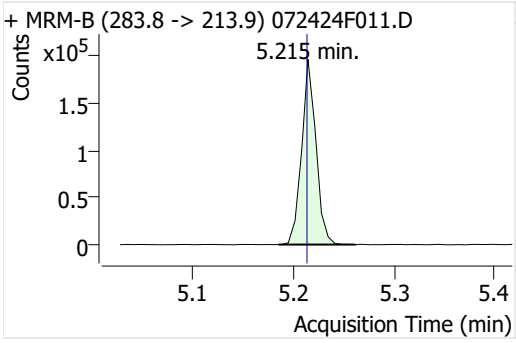
Hexachlorobenzene-13C6

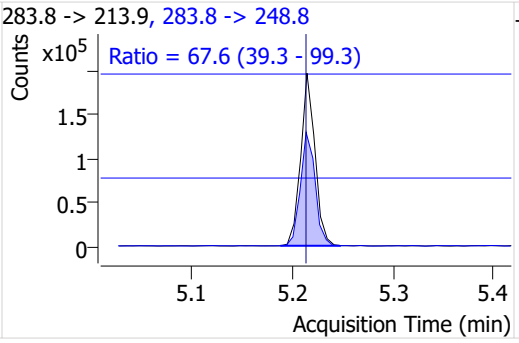


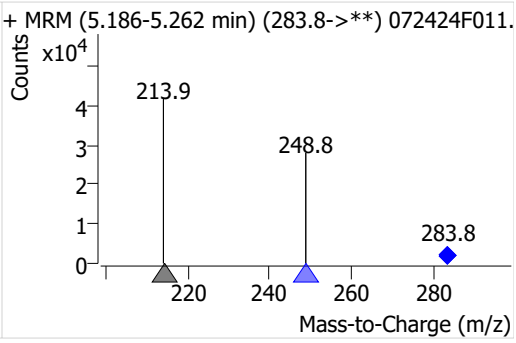




Hexachlorobenzene

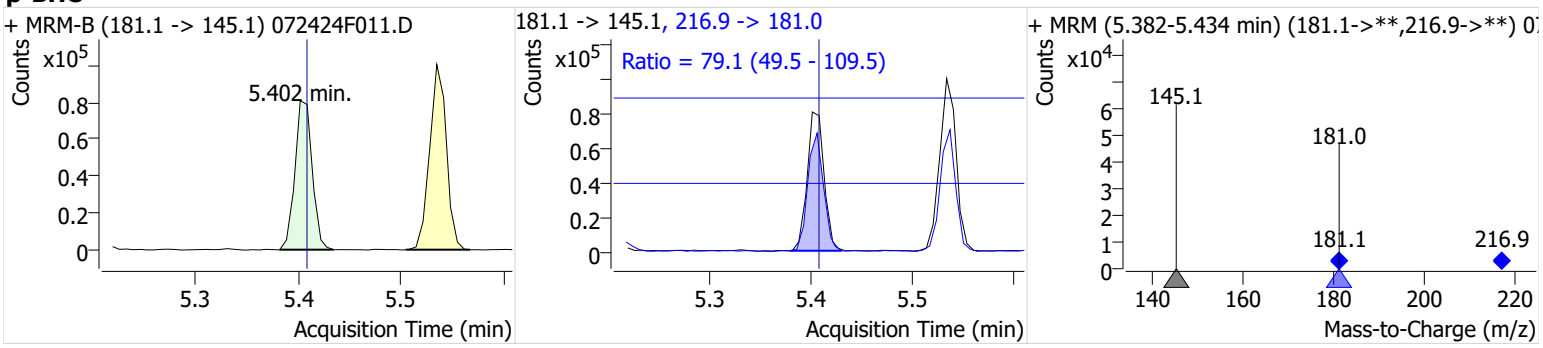




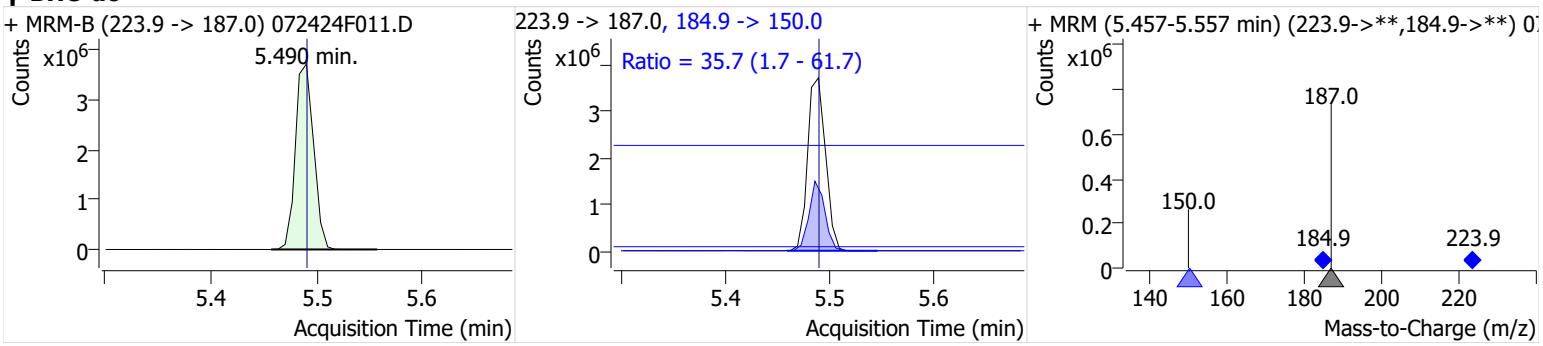


MassHunter Quantitative Analysis Sample Report

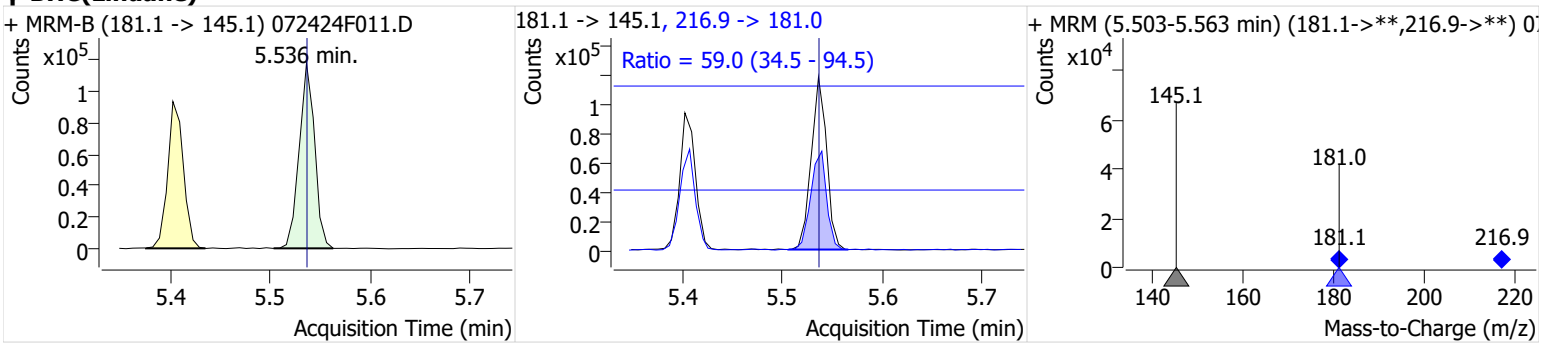
β-BHC



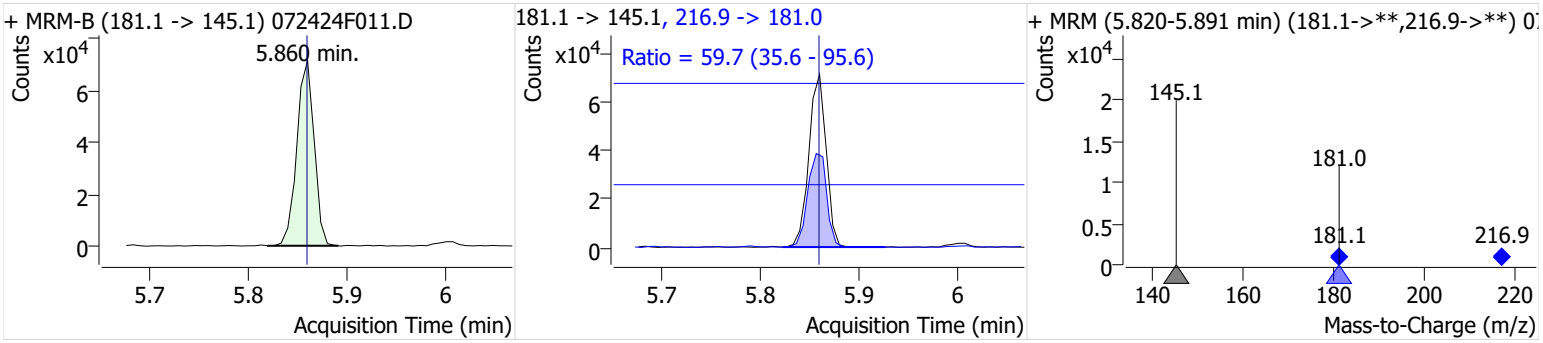
γ-BHC-d6



γ-BHC(Lindane)

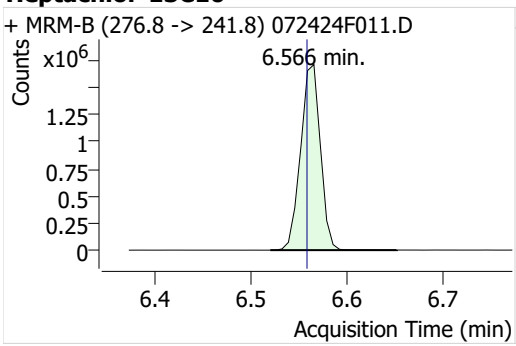


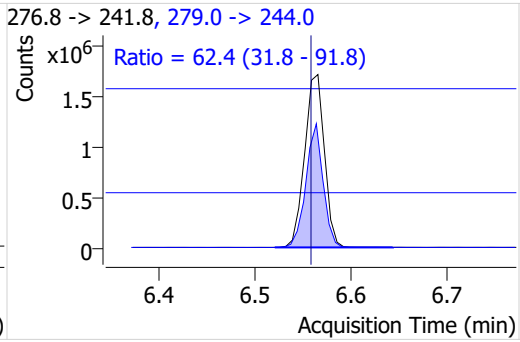
δ-BHC

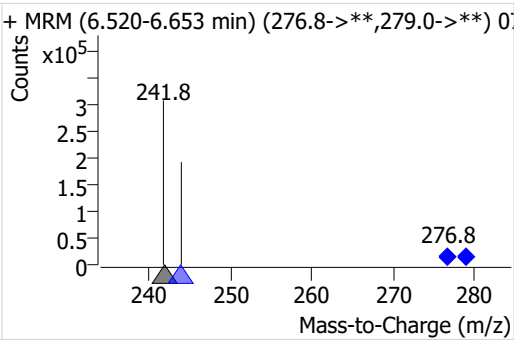


MassHunter Quantitative Analysis Sample Report

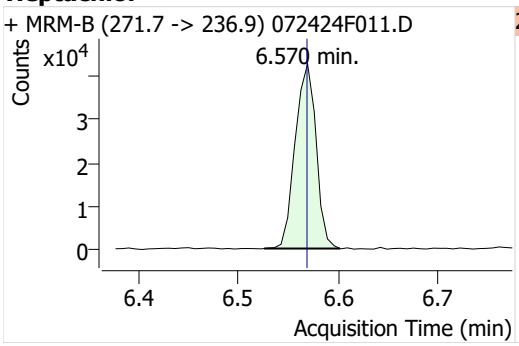
Heptachlor-13C10

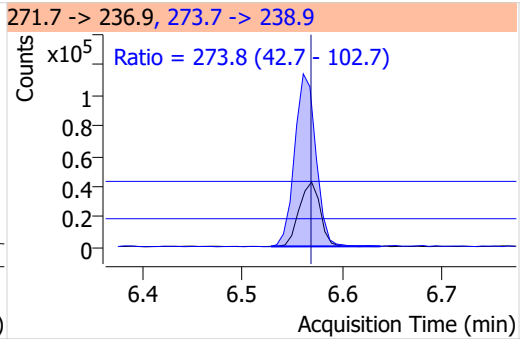


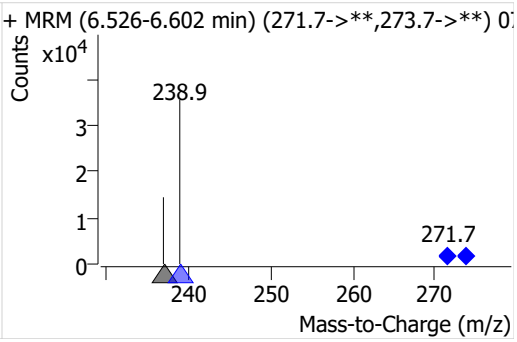




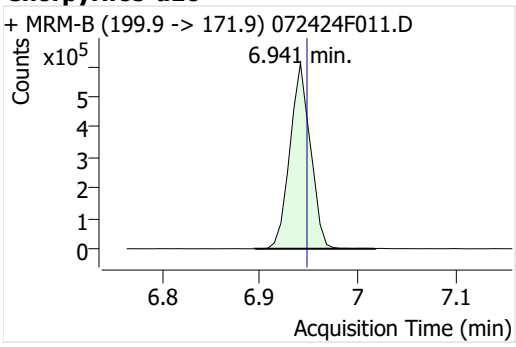
Heptachlor

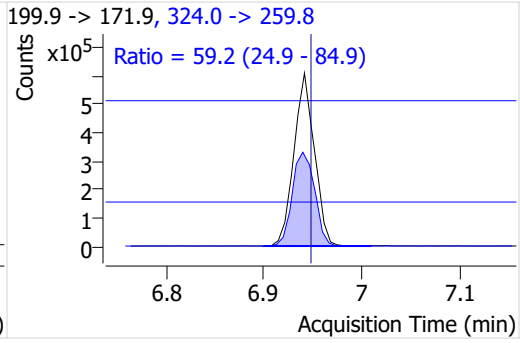


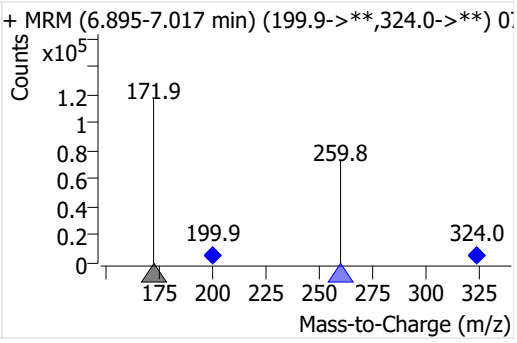




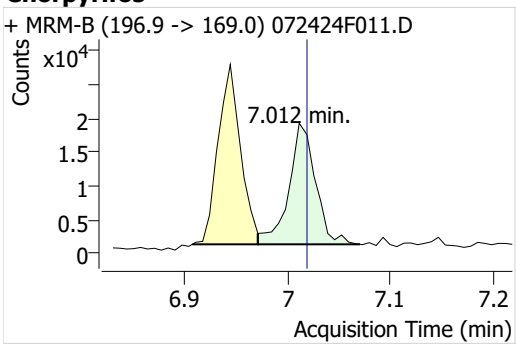
Chorpyrifos-d10

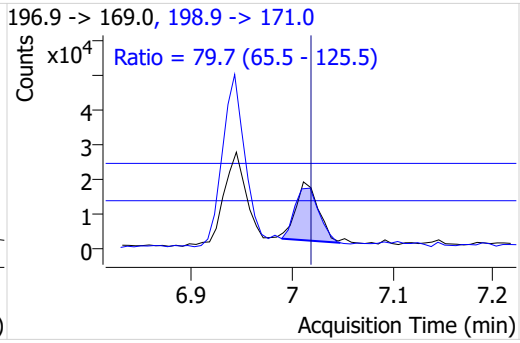


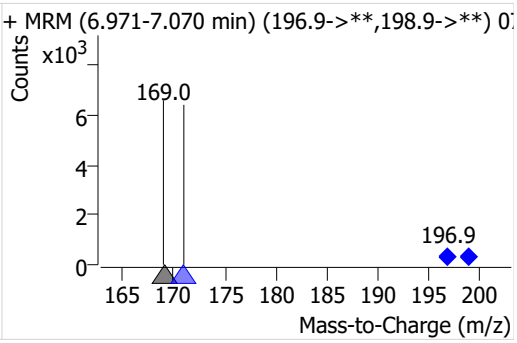




Chorpyrifos

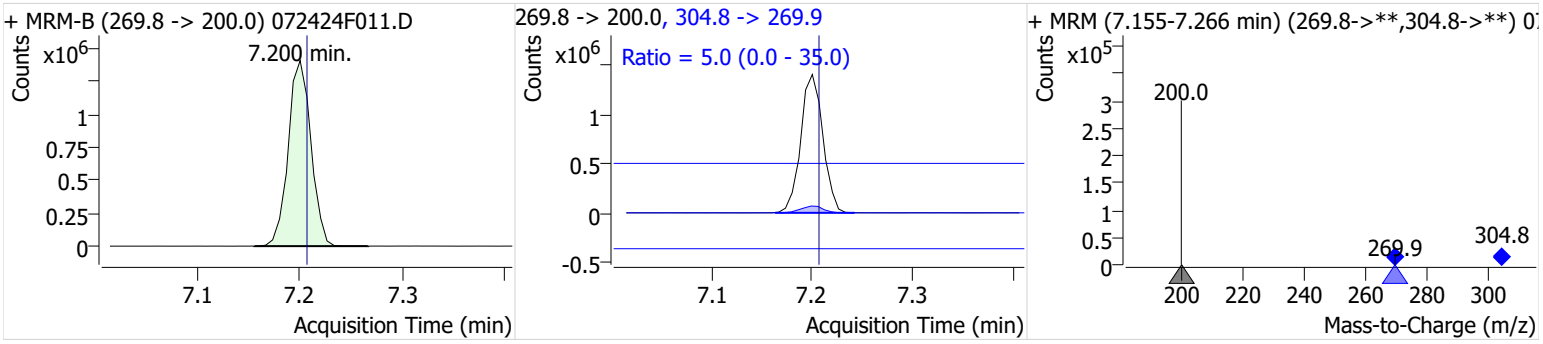




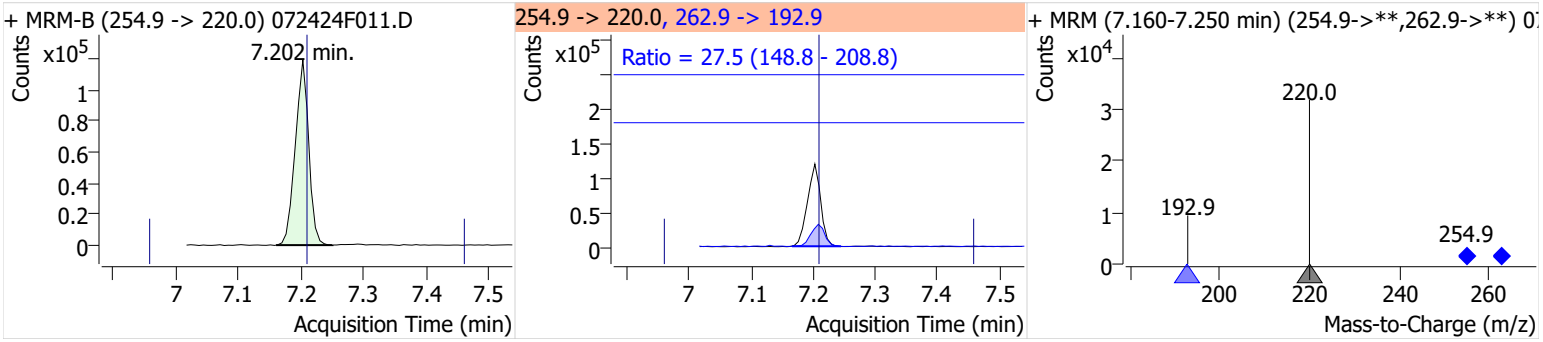


MassHunter Quantitative Analysis Sample Report

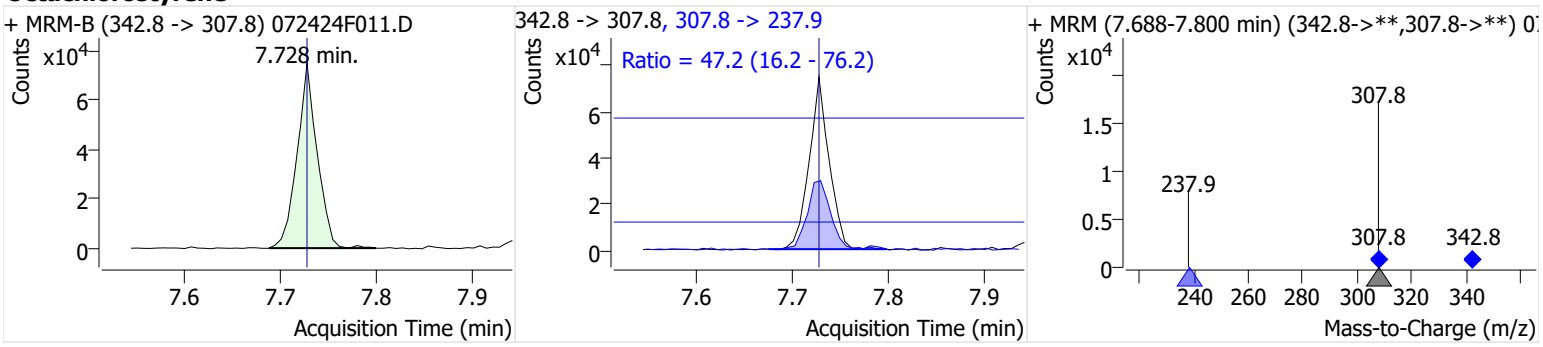
Aldrin-13C



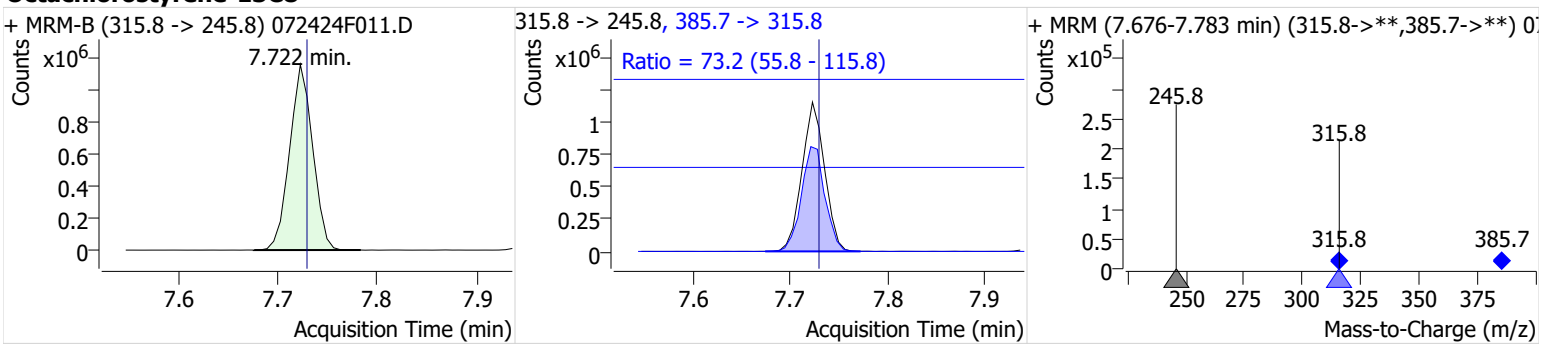
Aldrin



Octachlorostyrene

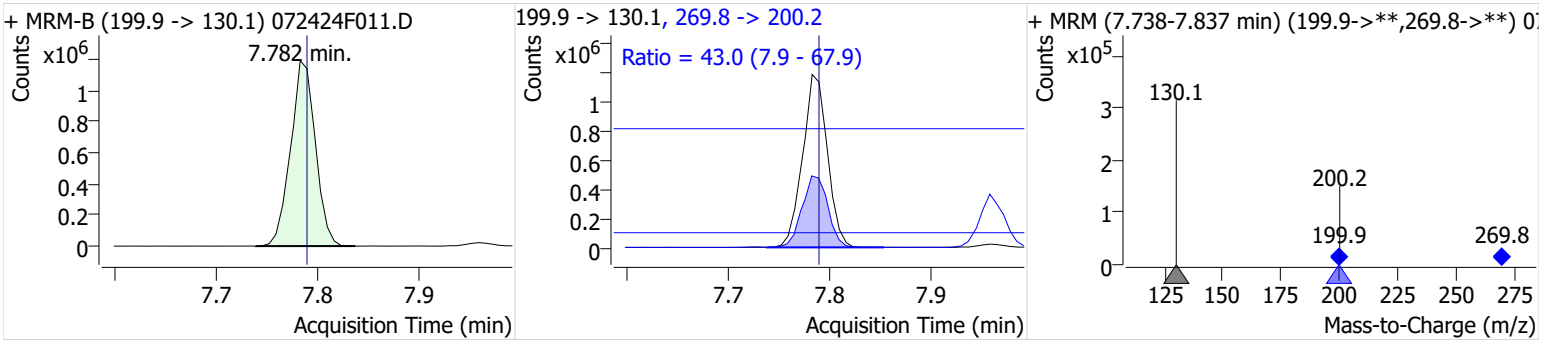


Octachlorostyrene-13C8

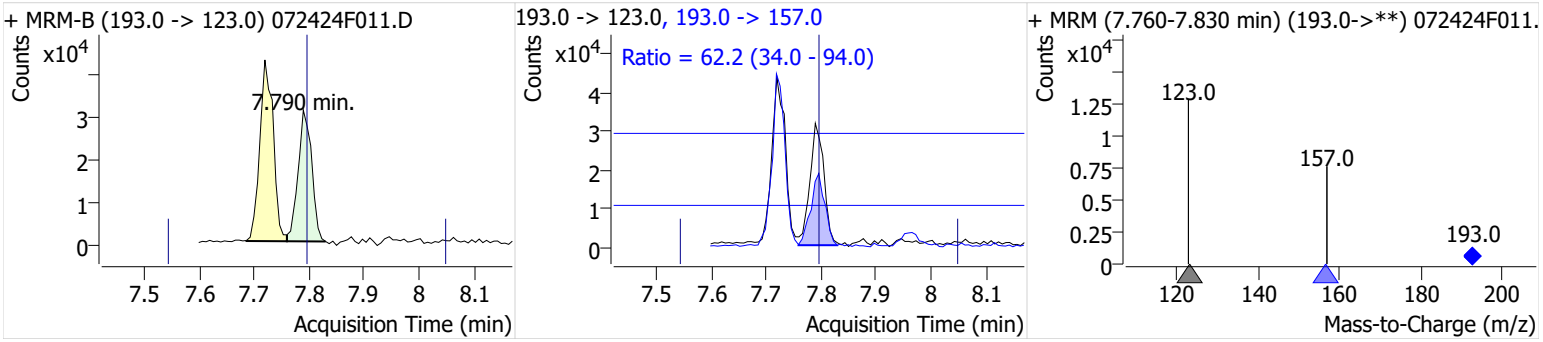


MassHunter Quantitative Analysis Sample Report

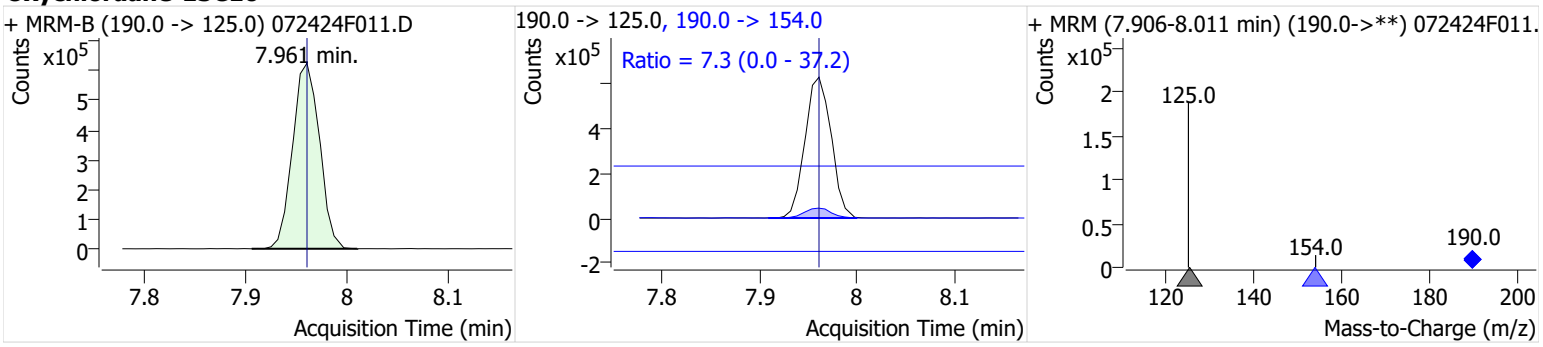
Isodrin-13C12



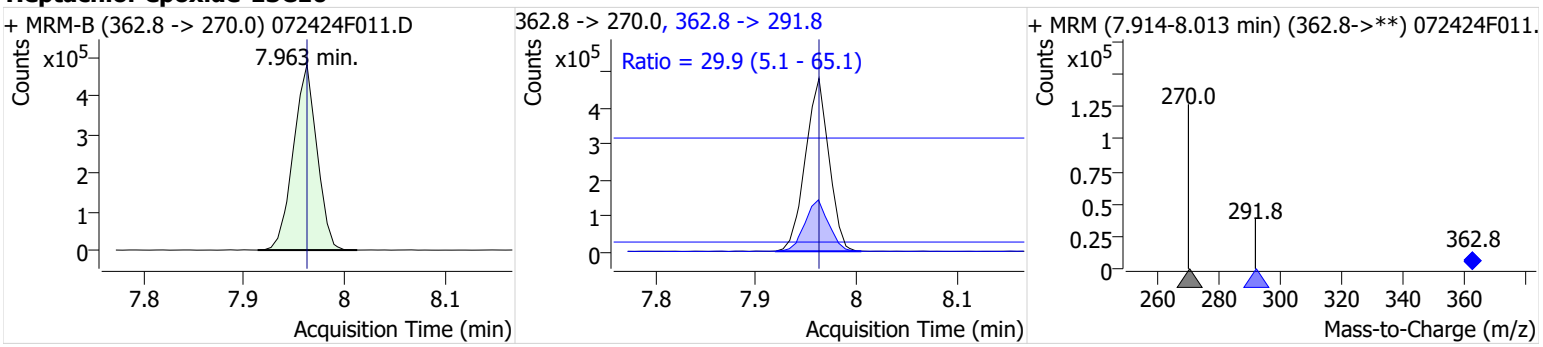
Isodrin



Oxychlordane-13C10

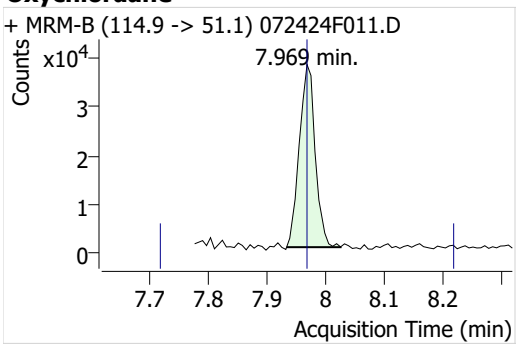


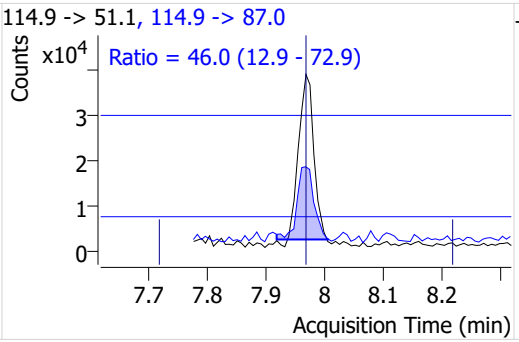
Heptachlor epoxide-13C10

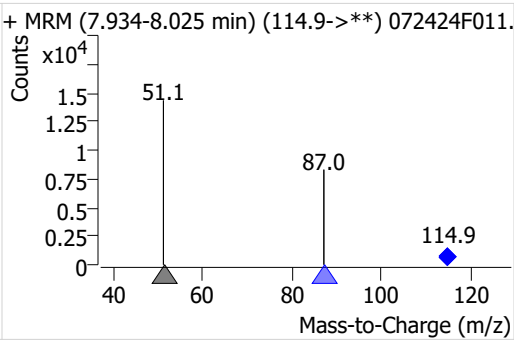


MassHunter Quantitative Analysis Sample Report

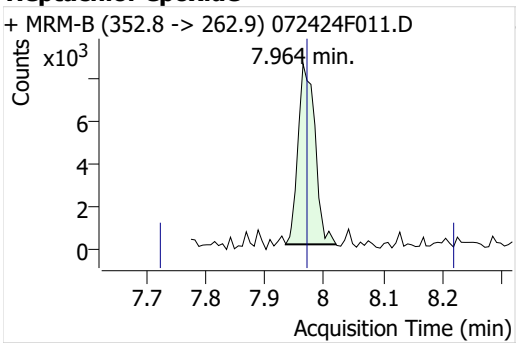
Oxychlordane

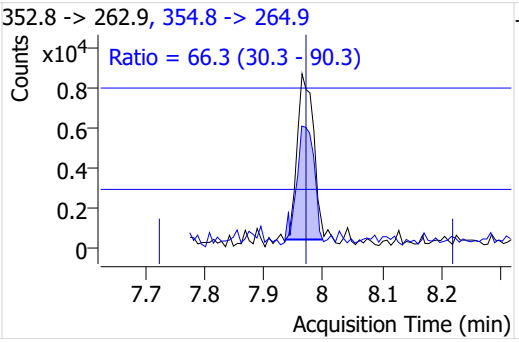


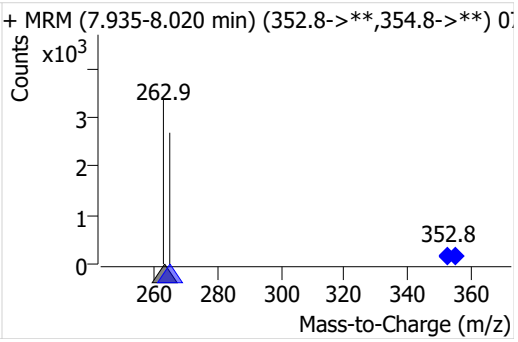




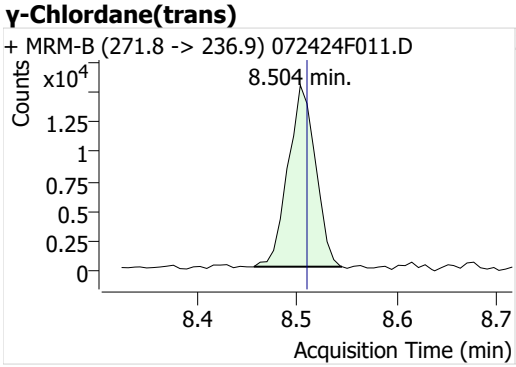
Heptachlor epoxide

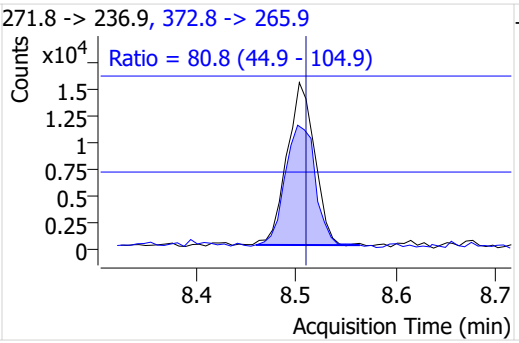


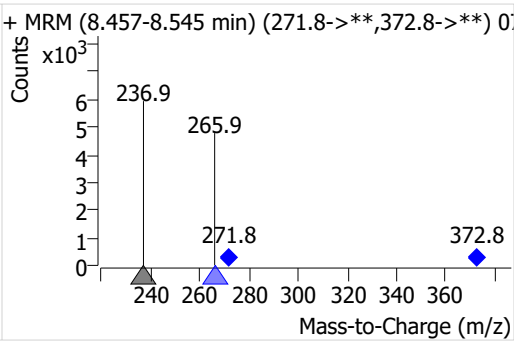




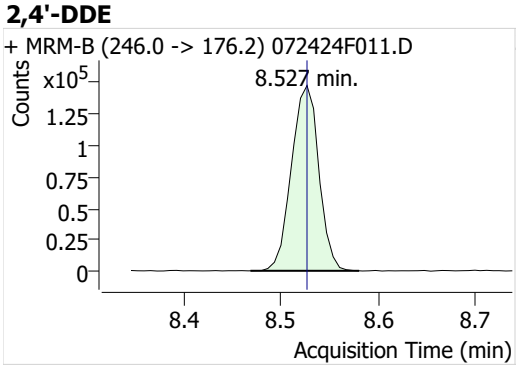
γ-Chlordane(trans)

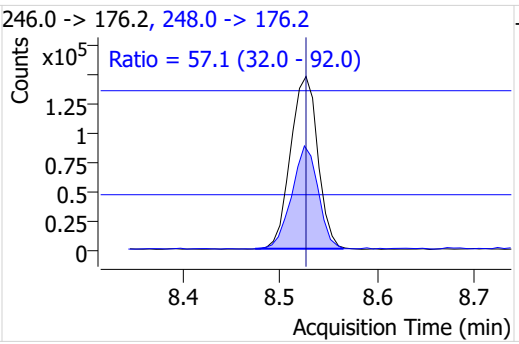


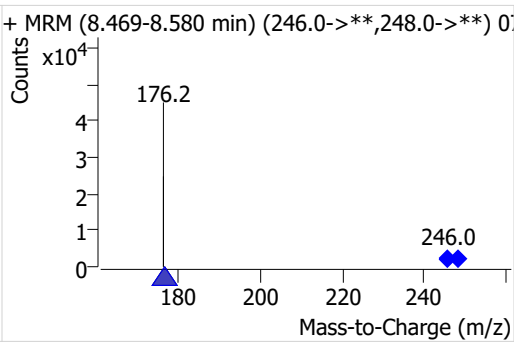




2,4'-DDE

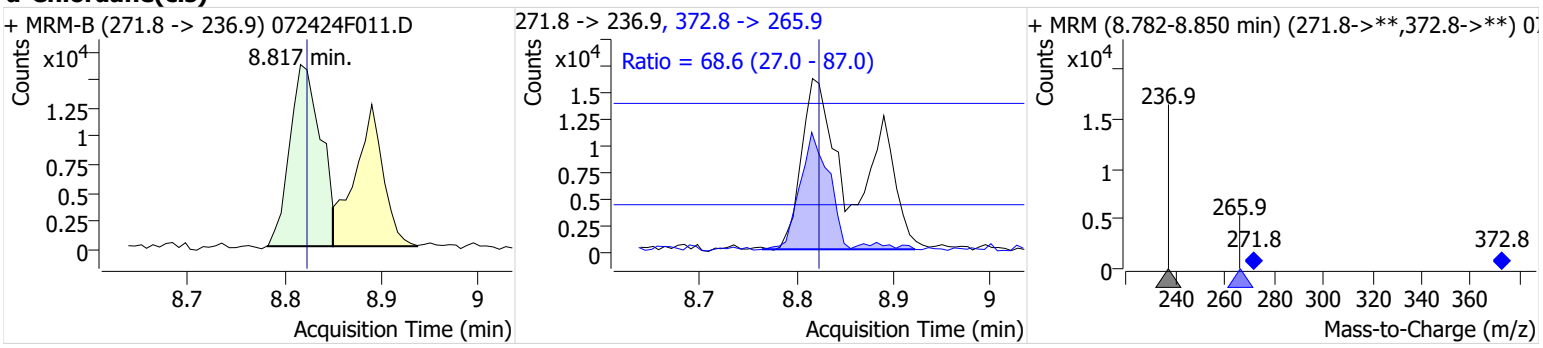






MassHunter Quantitative Analysis Sample Report

α-Chlordane(cis)



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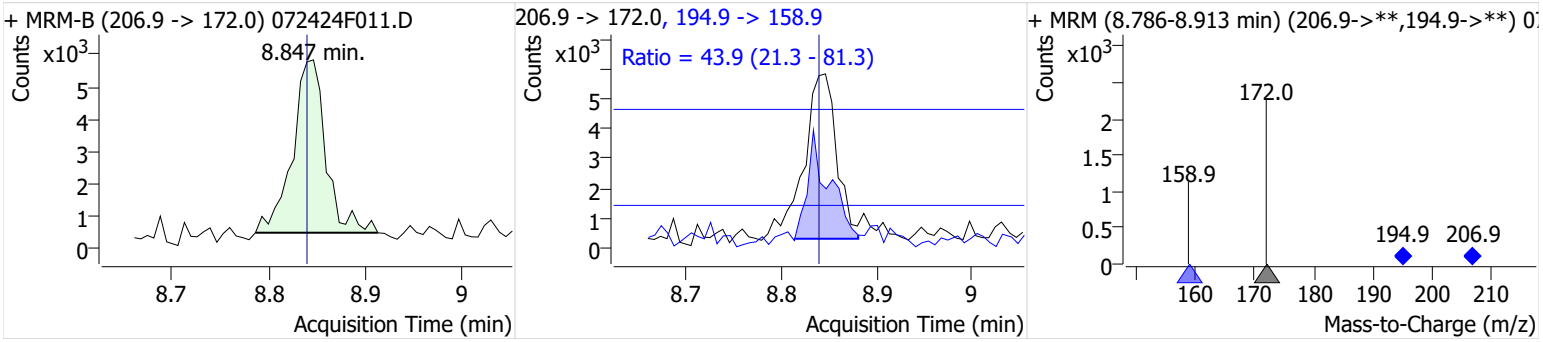
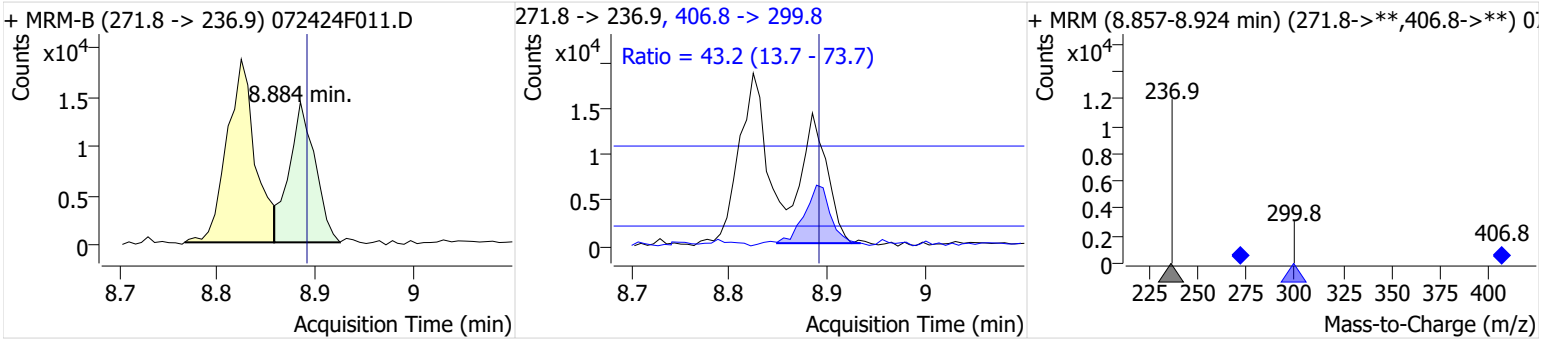
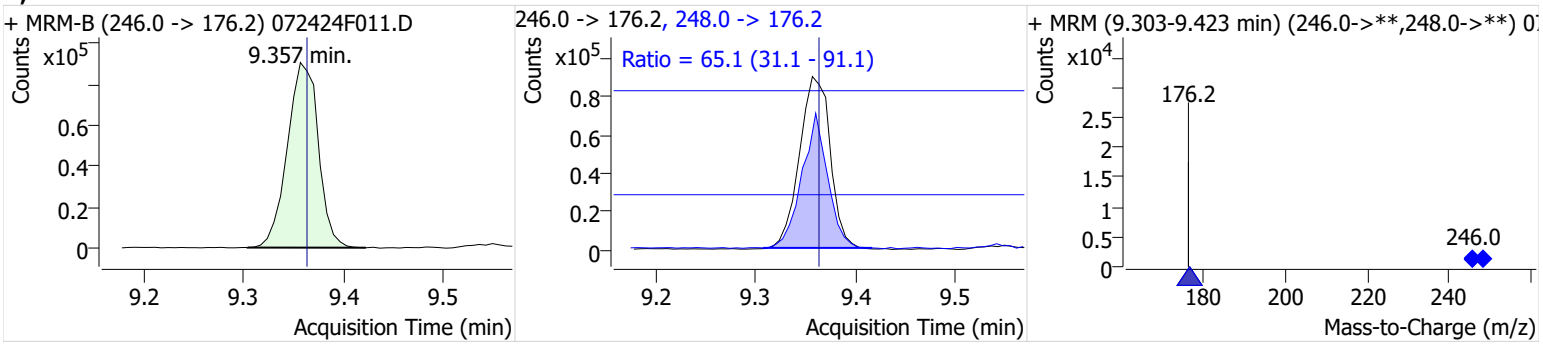


trans-Nanochlor

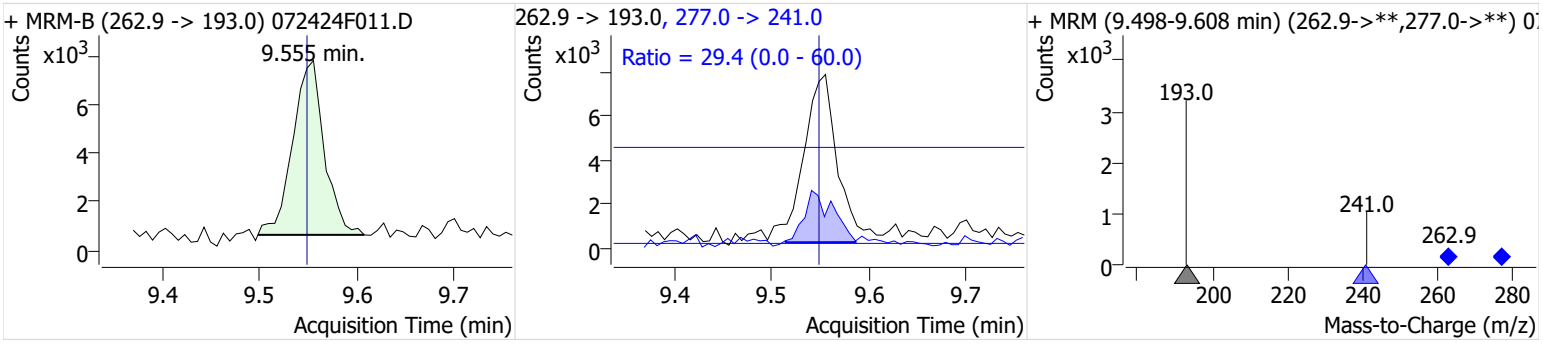


4,4' -DDE



MassHunter Quantitative Analysis Sample Report

Dieldrin



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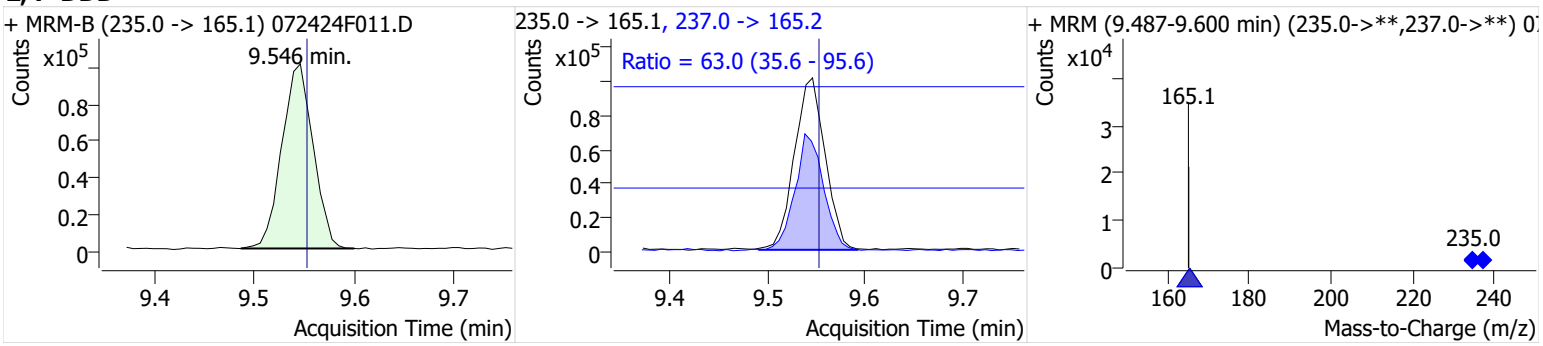
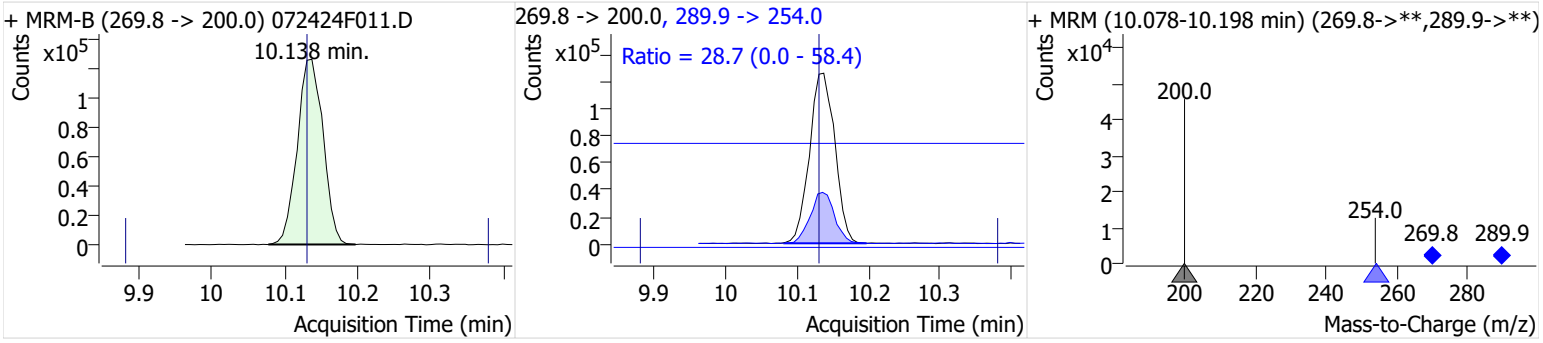


Endrin-13C12



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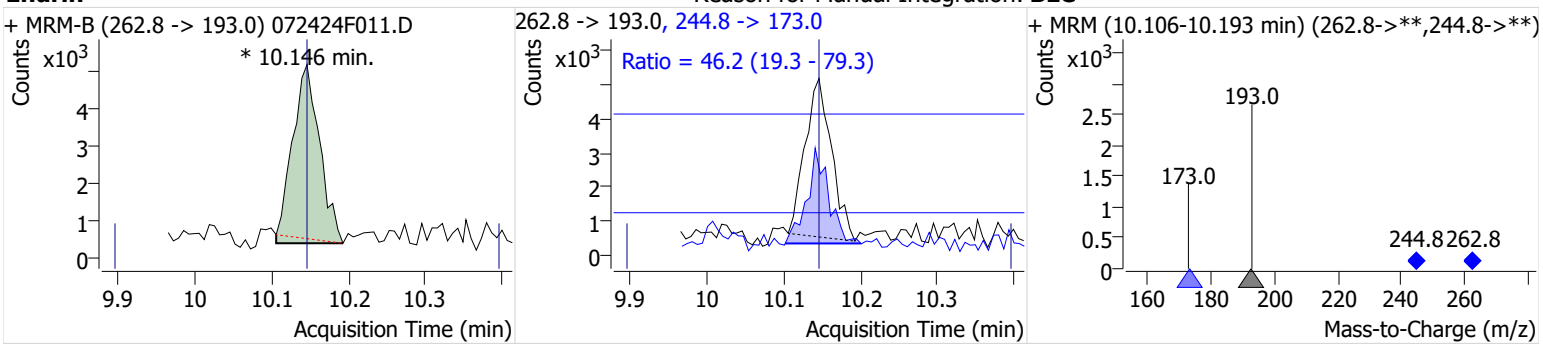

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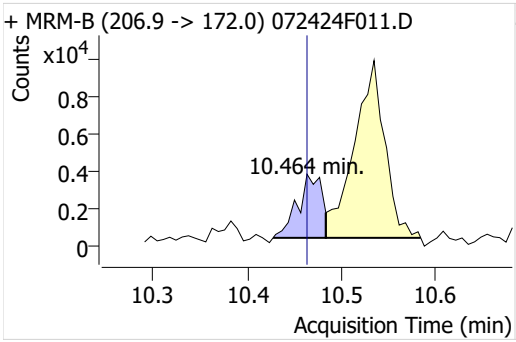
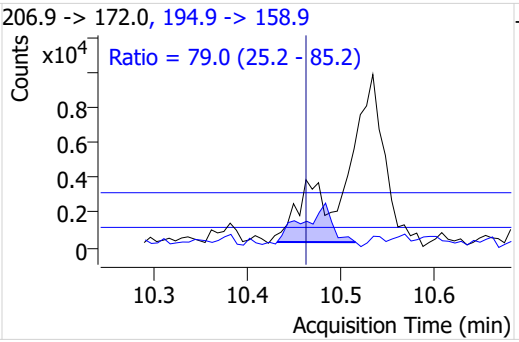
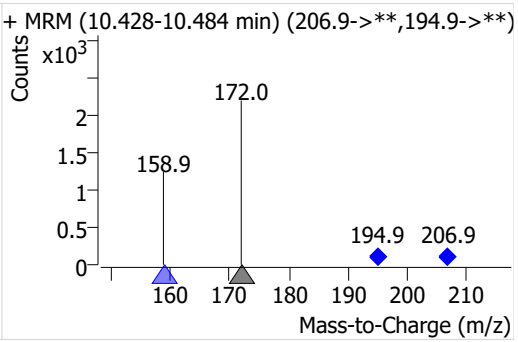
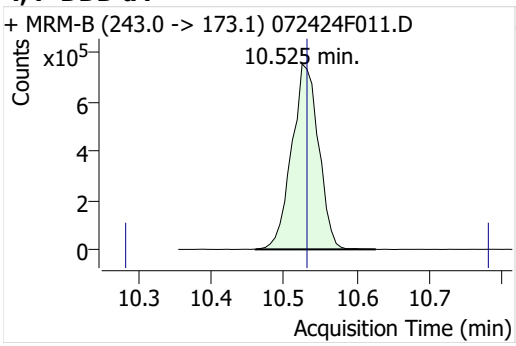
Endosulfan II

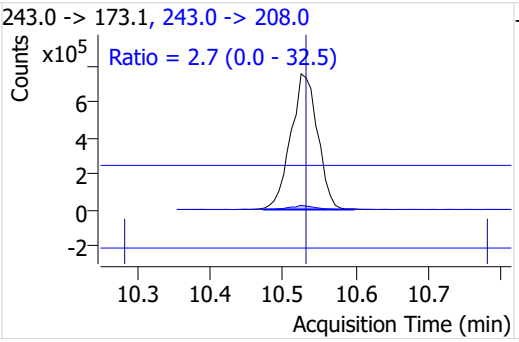


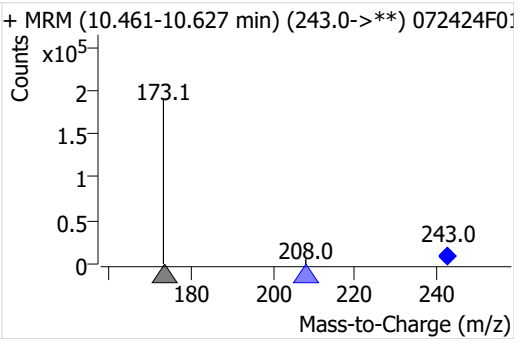




4,4'-DDD d4







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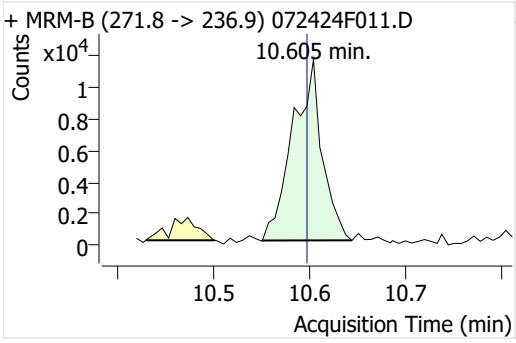
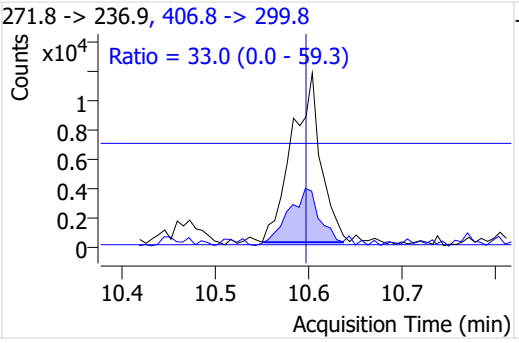
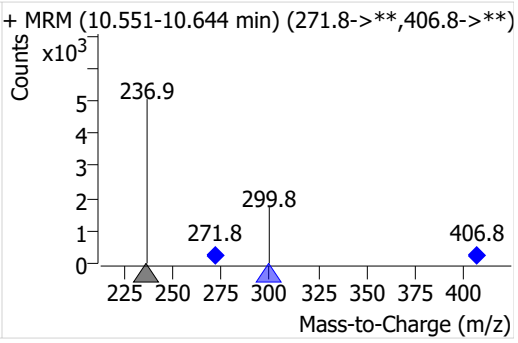
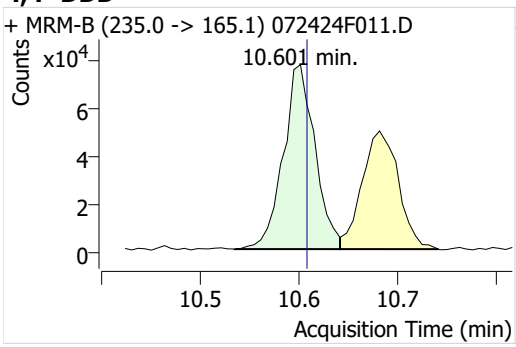
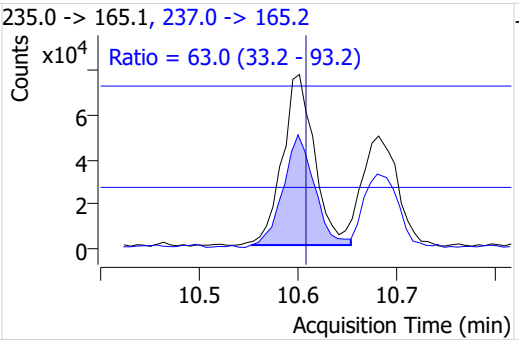


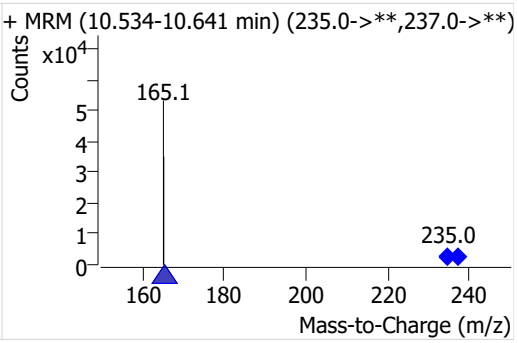




4,4'-DDD







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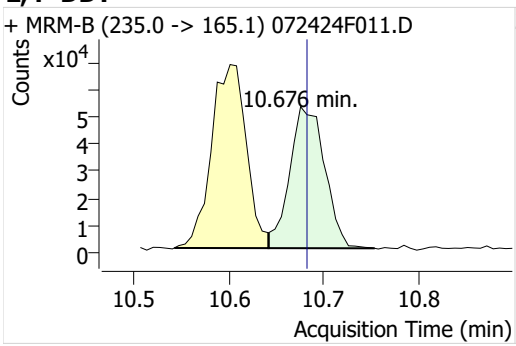
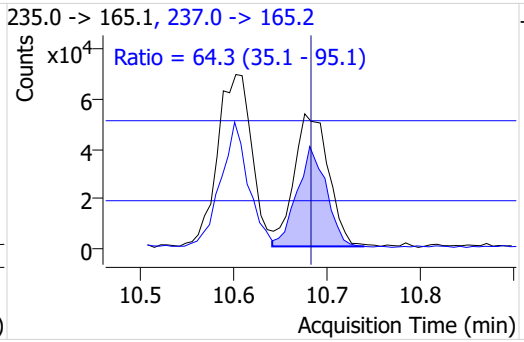
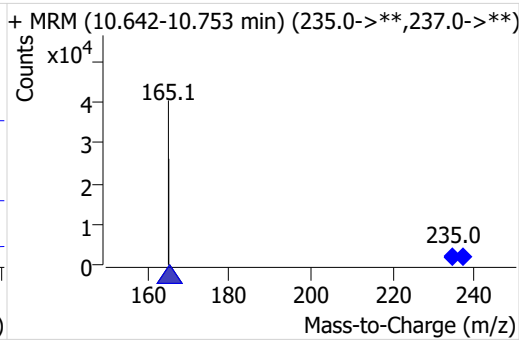
2,4'-DDT







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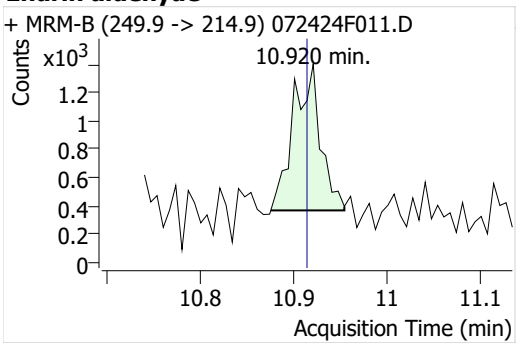

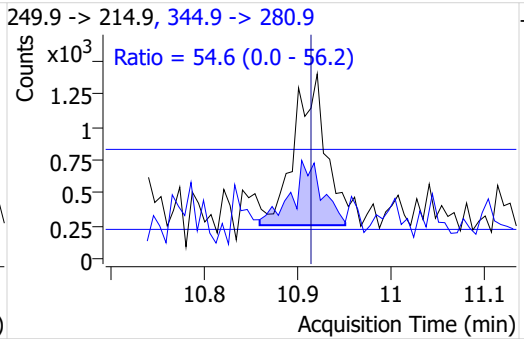

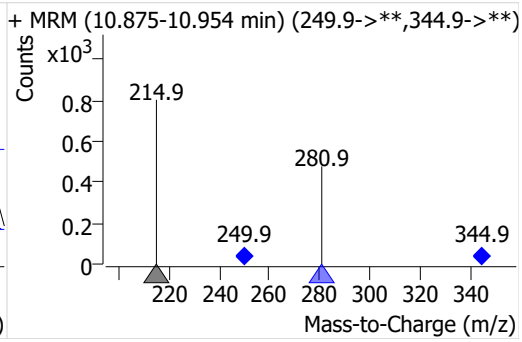

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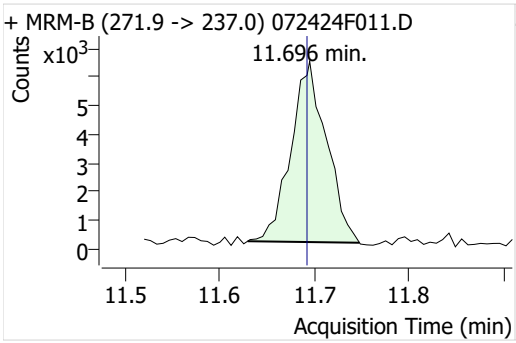

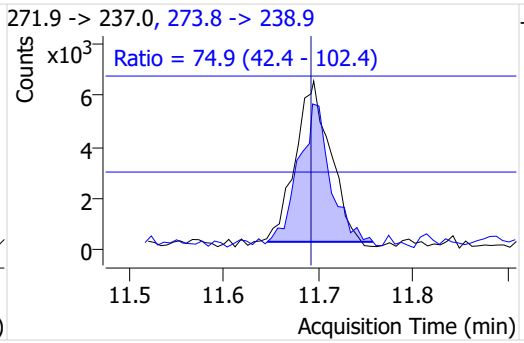

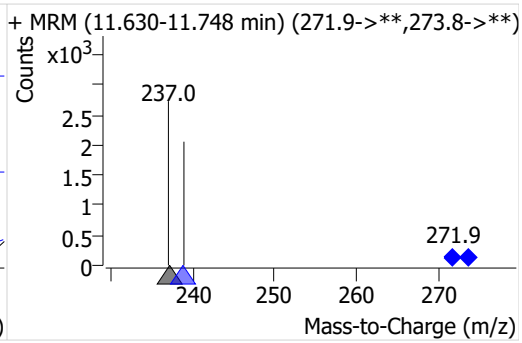

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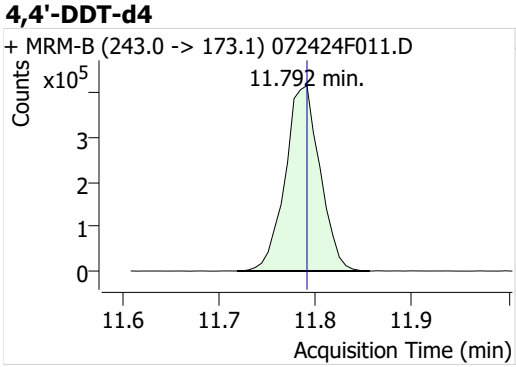
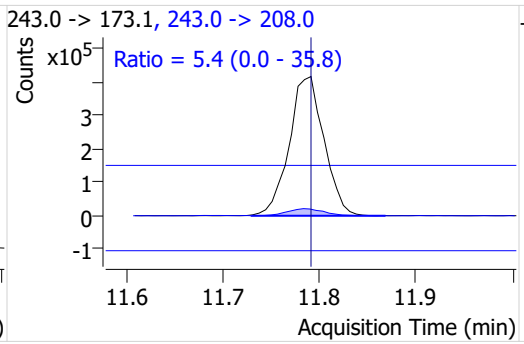
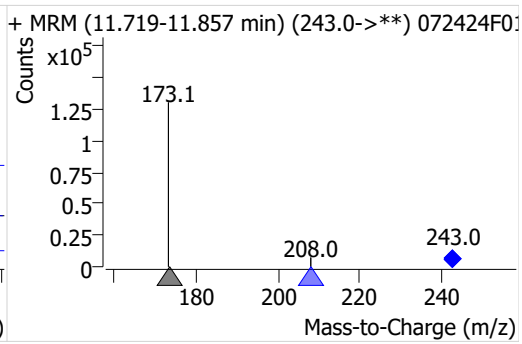
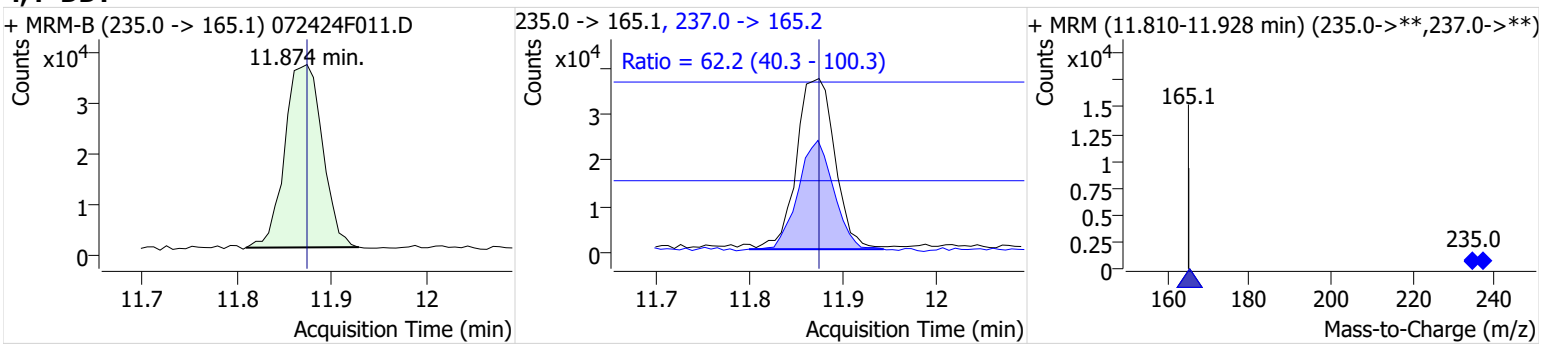






MassHunter Quantitative Analysis Sample Report

4,4'-DDT



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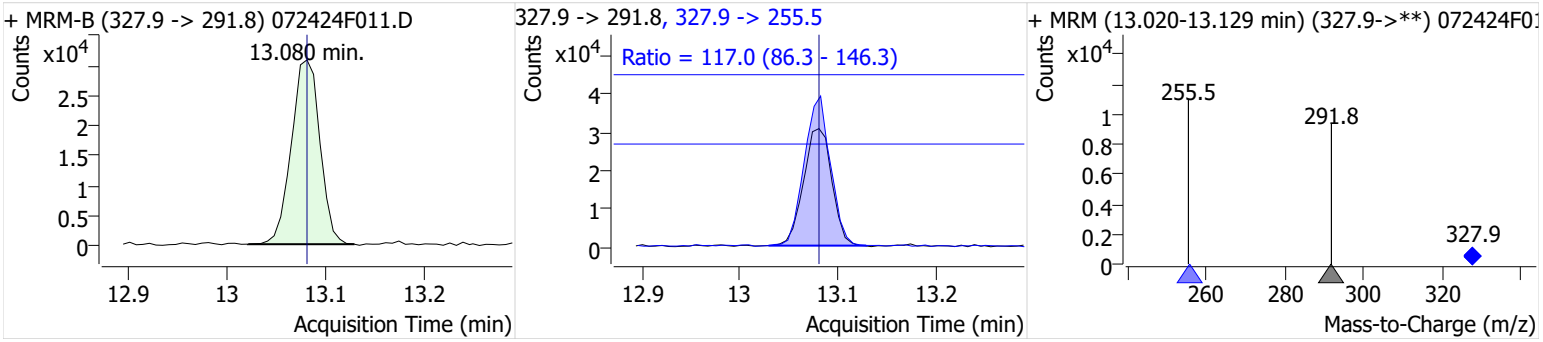

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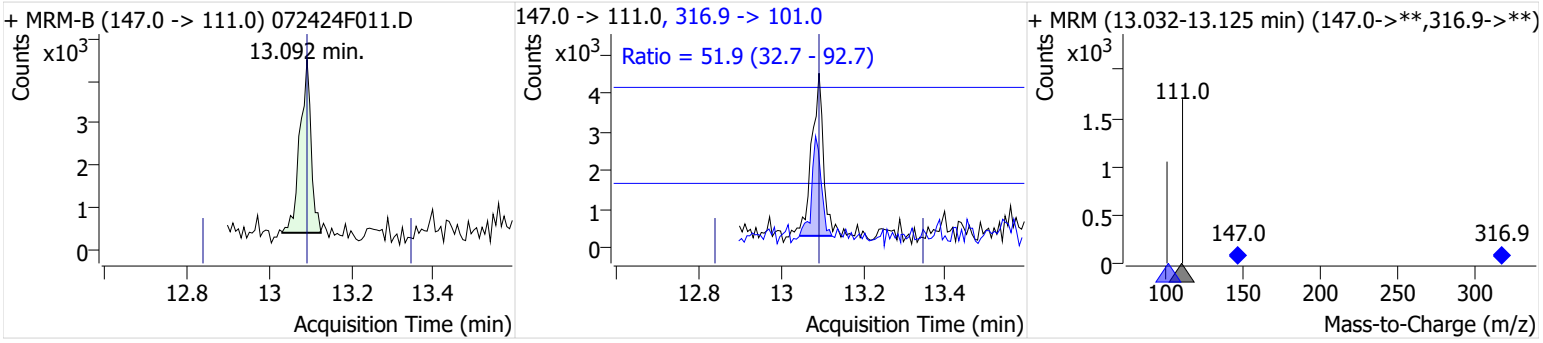
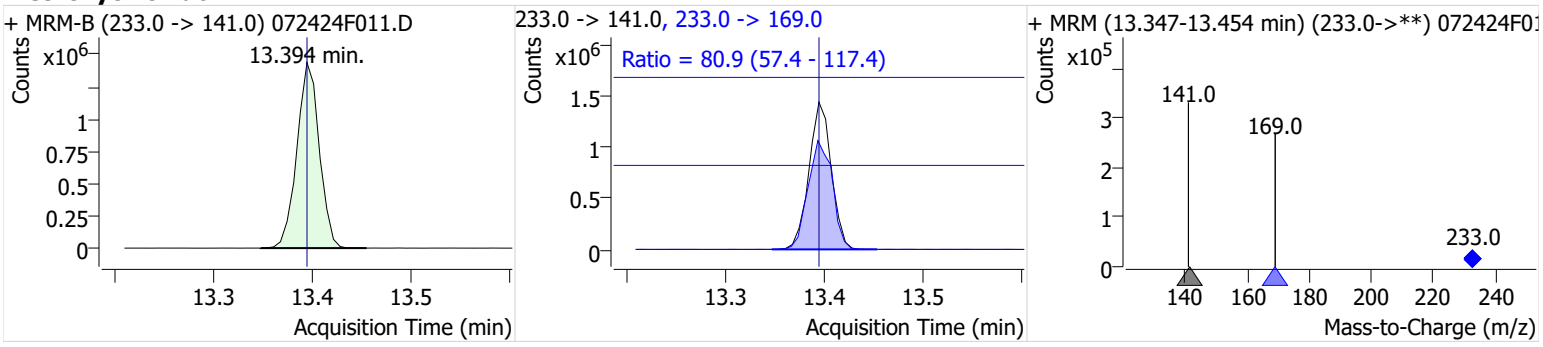
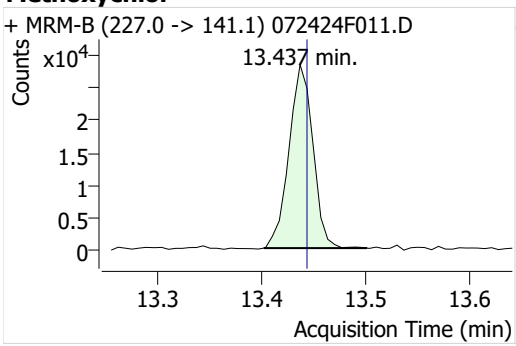


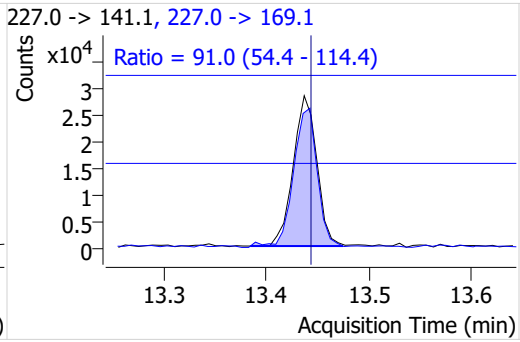
Methoxychlor-d6

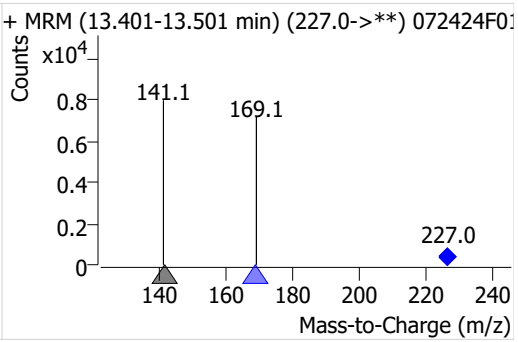


MassHunter Quantitative Analysis Sample Report

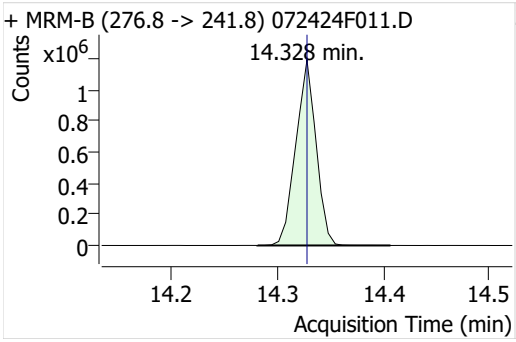
Methoxychlor

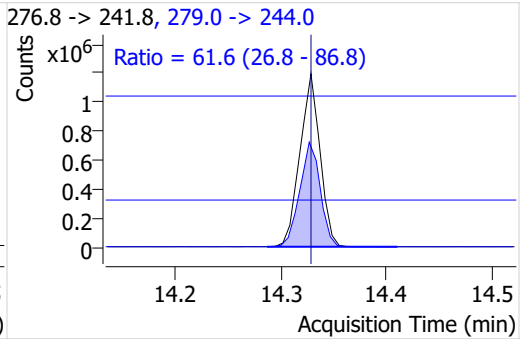


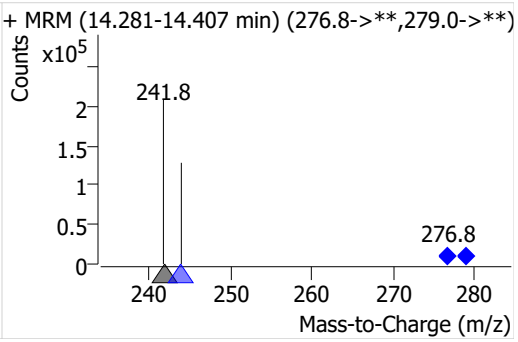




Mirex-13C10







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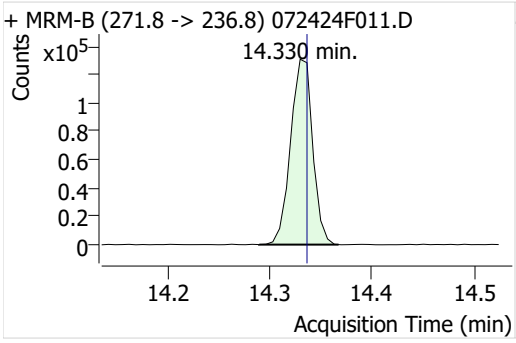
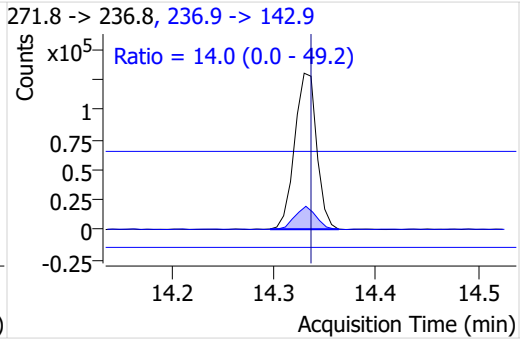
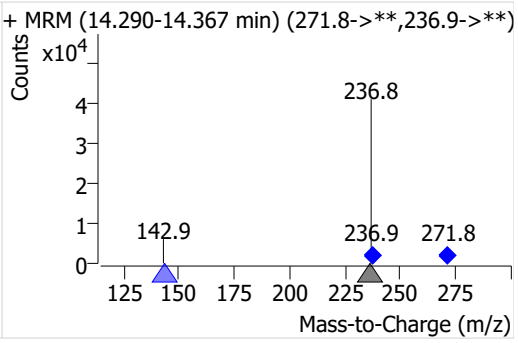
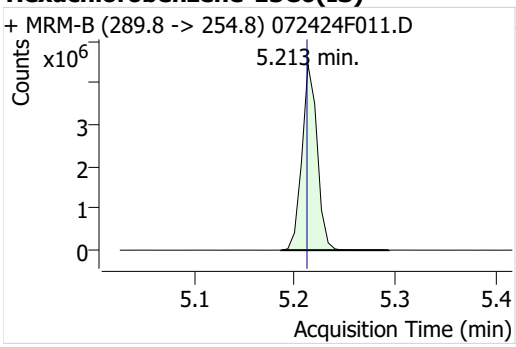
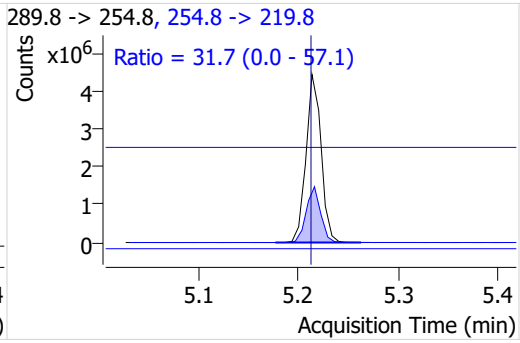


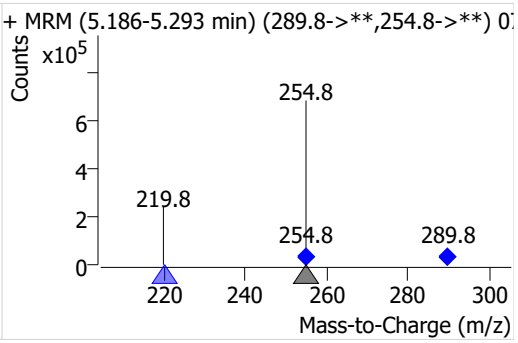




Hexachlorobenzene-13C6(IS)







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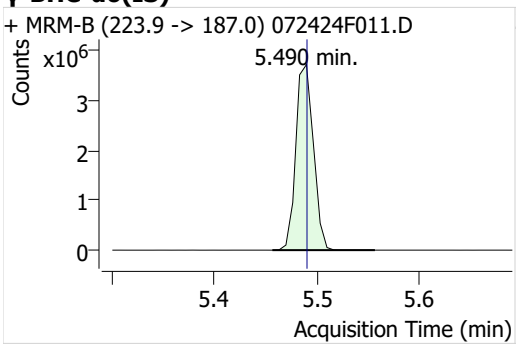
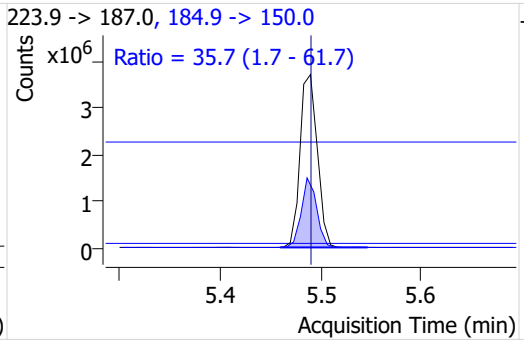
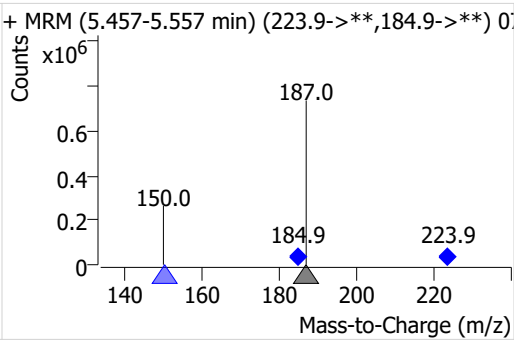
γ-BHC-d6(IS)







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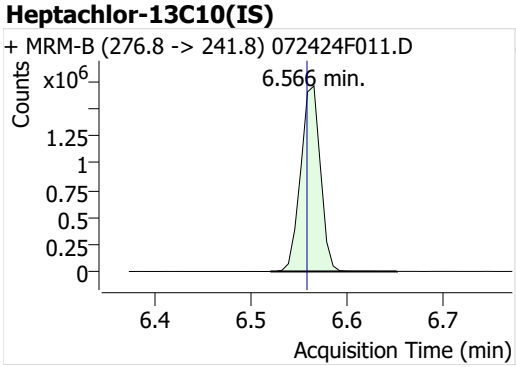
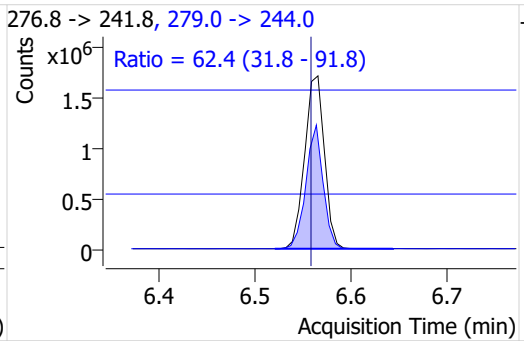
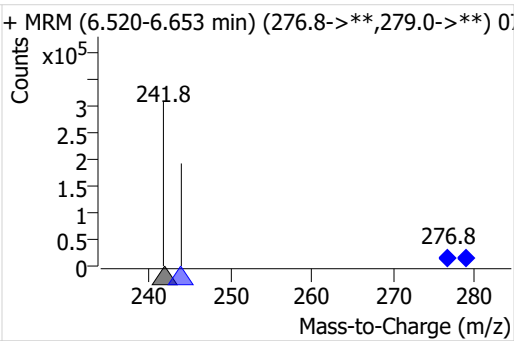
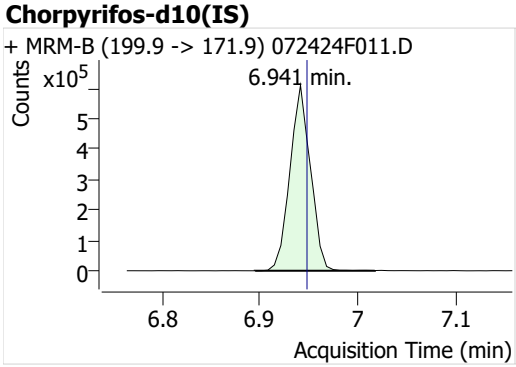
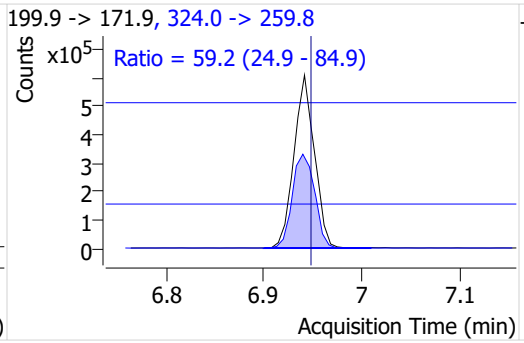


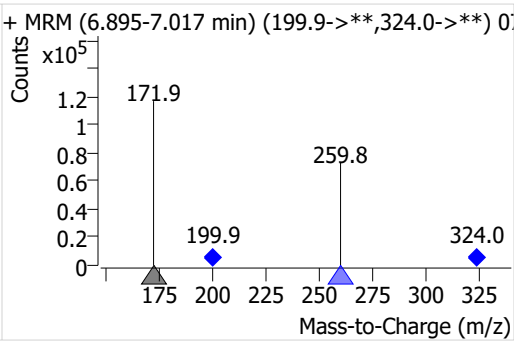




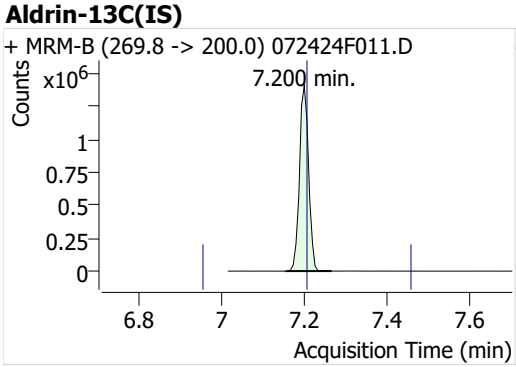
Chorpyrifos-d10(IS)

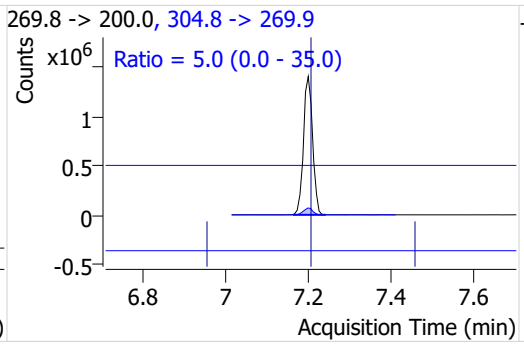


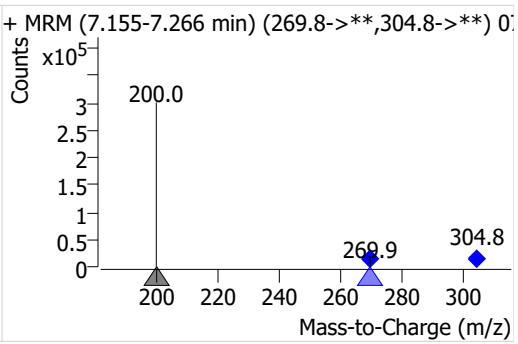




Aldrin-13C(IS)







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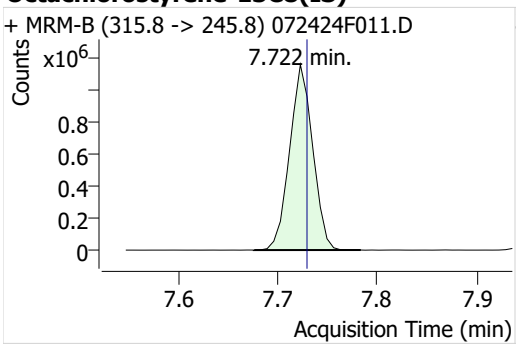
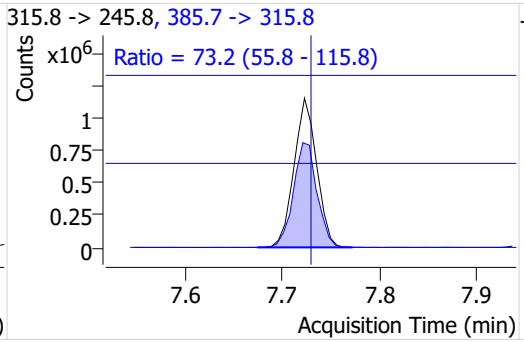
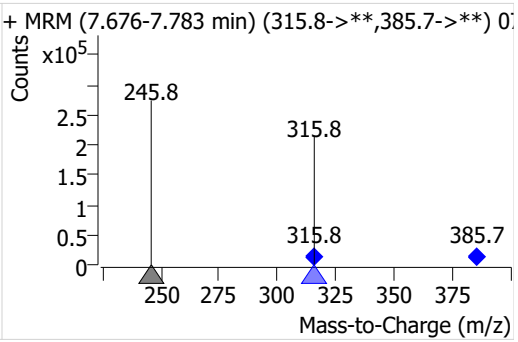
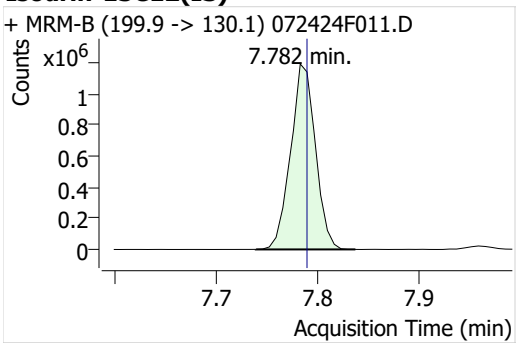
Octachlorostyrene-13C8(IS)

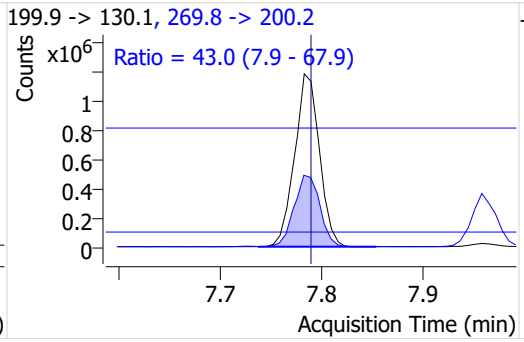


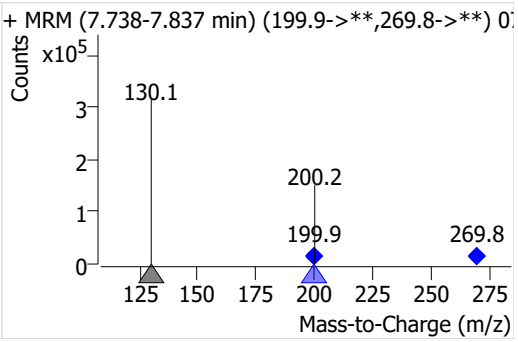




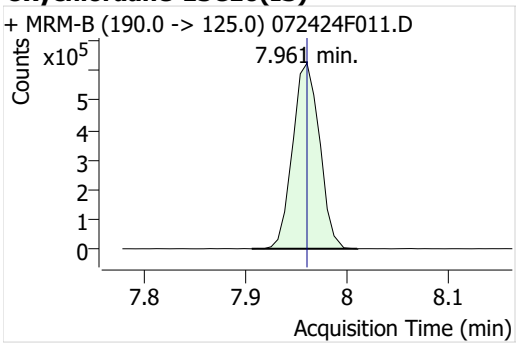
Isodrin-13C12(IS)

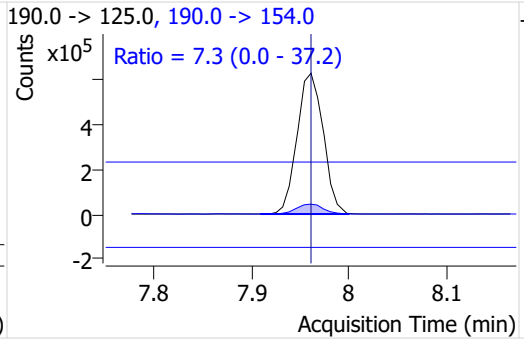


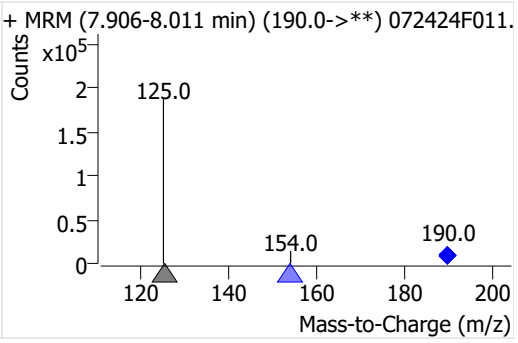




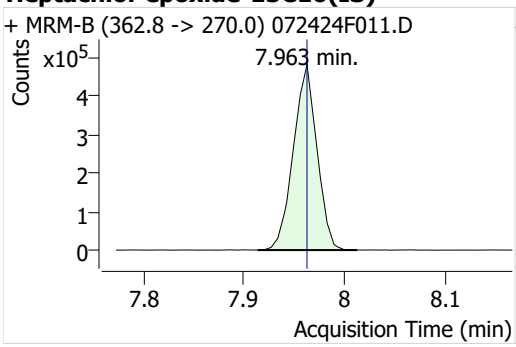
Oxychlordane-13C10(IS)

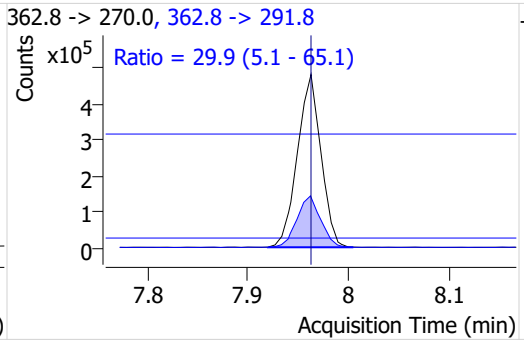


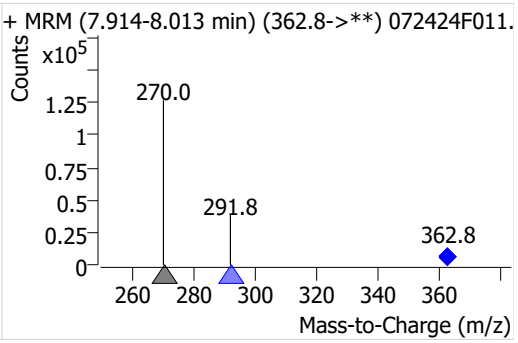




Heptachlor epoxide-13C10(IS)







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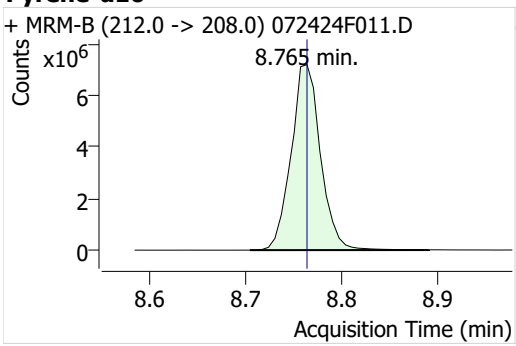
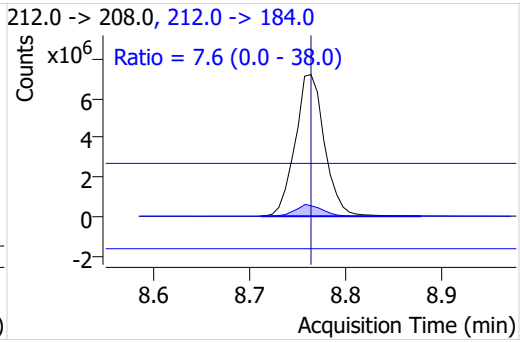
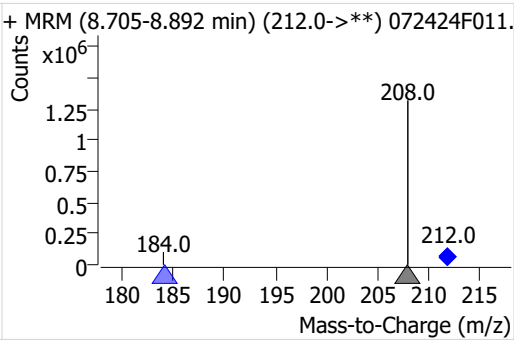
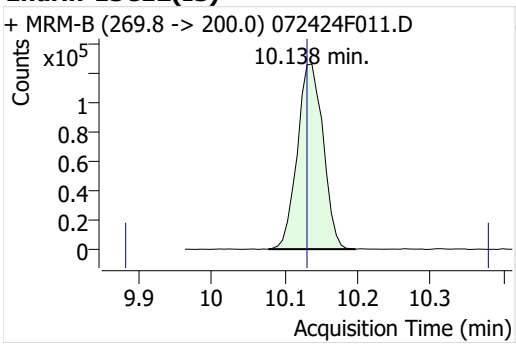
Pyrene-d10

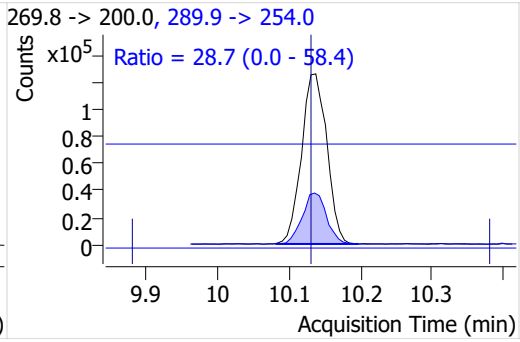


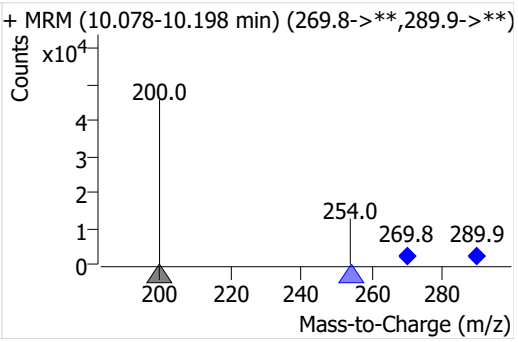




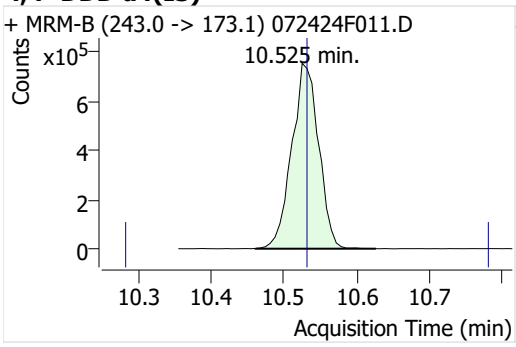
Endrin-13C12(IS)

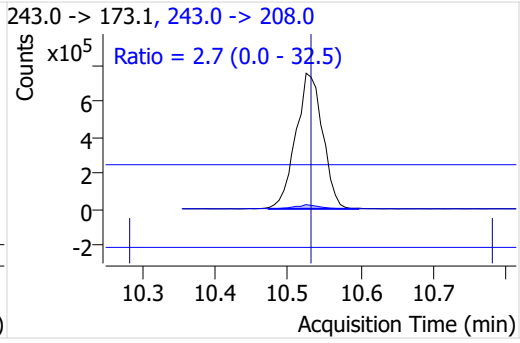


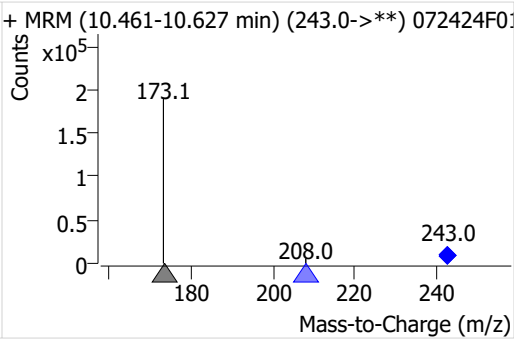




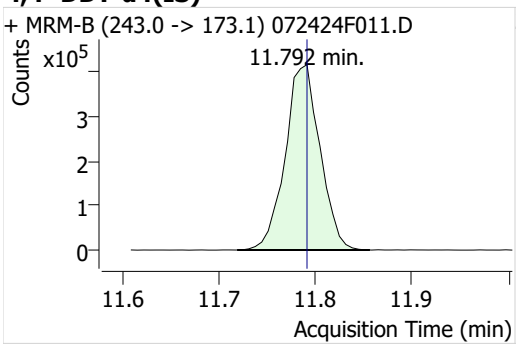
4,4'-DDD d4(IS)

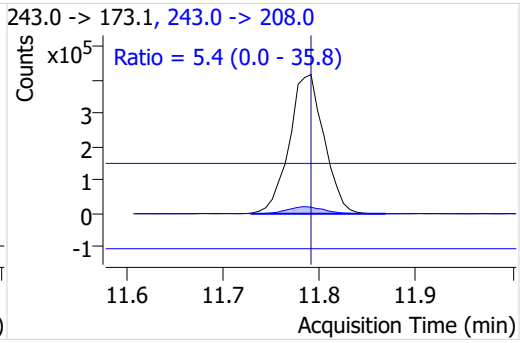


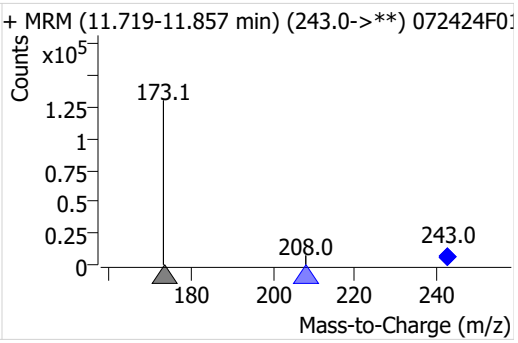




4,4'-DDT-d4(IS)







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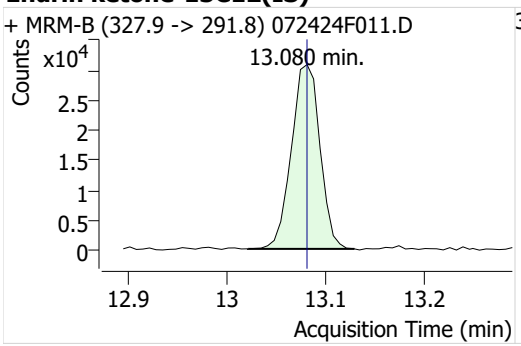
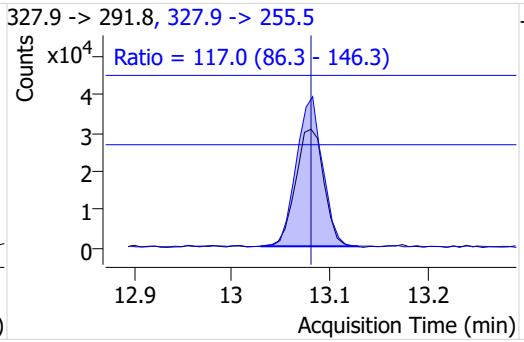
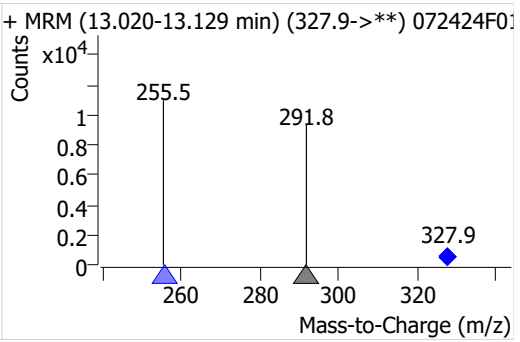
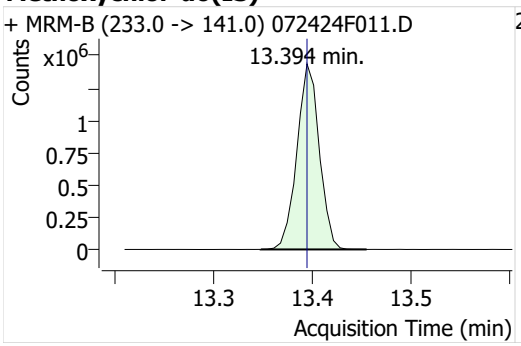
Endrin ketone-13C12(IS)

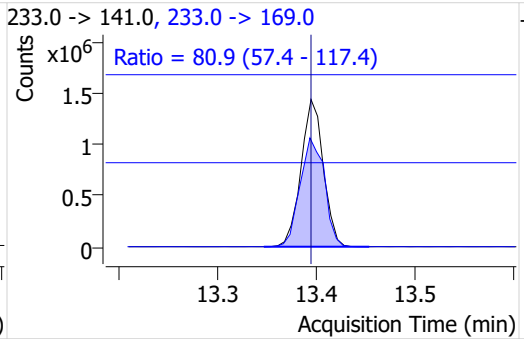


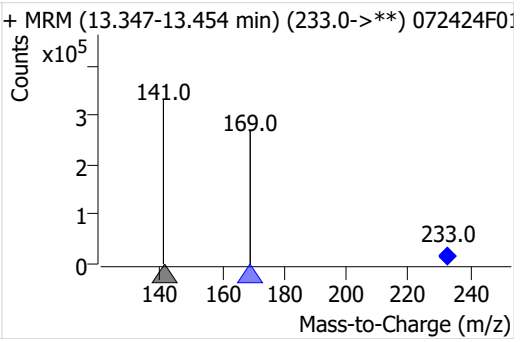




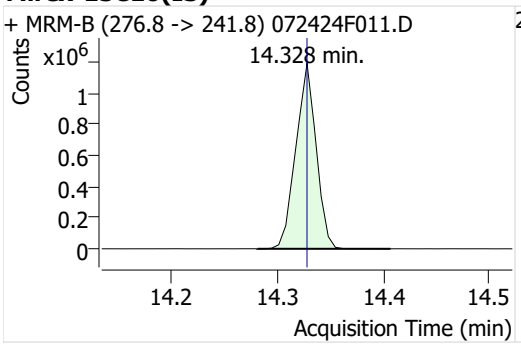
Methoxychlor-d6(IS)

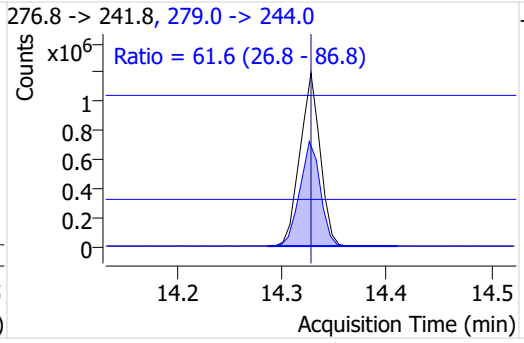


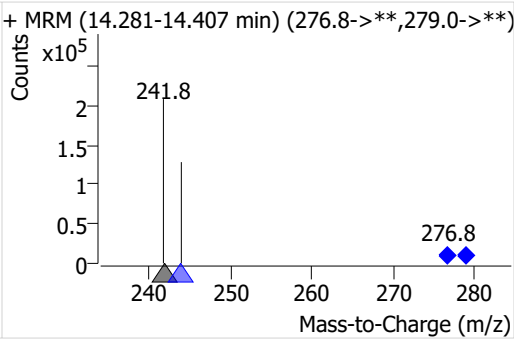




Mirex-13C10(IS)







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Name	OC PEST ICAL 1ppb SVM71-30B	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	7/25/2024 7:23:51 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method		**Vial**	4
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.212	289.8 -> 254.8	5180700	20.0000 ng/ml	0.001
γ-BHC-d6(IS)	5.491	223.9 -> 187.0	5029595	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	6.559	276.8 -> 241.8	2809452	20.0000 ng/ml	0.003
Chorpyrifos-d10(IS)	6.941	199.9 -> 171.9	1209400	20.0000 ng/ml	0.008
Aldrin-13C(IS)	7.200	269.8 -> 200.0	2167109	20.0000 ng/ml	0.007
Octachlorostyrene-13C8(IS)	7.722	315.8 -> 245.8	2207795	20.0000 ng/ml	0.004
Isodrin-13C12(IS)	7.789	199.9 -> 130.1	2371453	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	7.961	190.0 -> 125.0	1298267	20.0000 ng/ml	0.000
Heptachlor epoxide-13C10(IS)	7.963	362.8 -> 270.0	840391	20.0000 ng/ml	0.000
Pyrene-d10	8.771	212.0 -> 208.0	18556114	100.0000 ng/ml	0.004
Endrin-13C12(IS)	10.138	269.8 -> 200.0	327428	20.0000 ng/ml	0.009
4,4'-DDD d4(IS)	10.539	243.0 -> 173.1	1814845	5.0000 ng/ml	0.006
4,4'-DDT-d4(IS)	11.791	243.0 -> 173.1	1200164	5.0000 ng/ml	0.003
Endrin ketone-13C12(IS)	13.080	327.9 -> 291.8	66551	20.0000 ng/ml	0.001
Methoxychlor-d6(IS)	13.401	233.0 -> 141.0	2429285	20.0000 ng/ml	0.006
Mirex-13C10(IS)	14.328	276.8 -> 241.8	1563062	5.0000 ng/ml	0.003

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	5180700	22.110 ng/ml
		Spiked Amount = 20.0		Recovery = *110.6 %*
γ-BHC-d6	5.491	223.9 -> 187.0	5029595	21.182 ng/ml
		Spiked Amount = 20.0		Recovery = *105.9 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	2809452	20.596 ng/ml
		Spiked Amount = 20.0		Recovery = *103.0 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	1209400	20.687 ng/ml
		Spiked Amount = 20.0		Recovery = *103.4 %*
Aldrin-13C	7.207	269.8 -> 200.0	2168859	21.013 ng/ml
		Spiked Amount = 20.0		Recovery = *105.1 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	2207795	23.734 ng/ml
		Spiked Amount = 20.0		Recovery = *118.7 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2371453	21.439 ng/ml
		Spiked Amount = 20.0		Recovery = *107.2 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1298267	19.793 ng/ml
		Spiked Amount = 20.0		Recovery = *99.0 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	840391	22.635 ng/ml
		Spiked Amount = 20.0		Recovery = *113.2 %*
Endrin-13C12	10.131	269.8 -> 200.0	327428	20.697 ng/ml
		Spiked Amount = 20.0		Recovery = *103.5 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	1814845	4.619 ng/ml
		Spiked Amount = 5.0		Recovery = *92.4 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1200164	4.960 ng/ml
		Spiked Amount = 5.0		Recovery = *99.2 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	66551	19.930 ng/ml
		Spiked Amount = 20.0		Recovery = *99.6 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	2429285	18.104 ng/ml
		Spiked Amount = 20.0		Recovery = *90.5 %*

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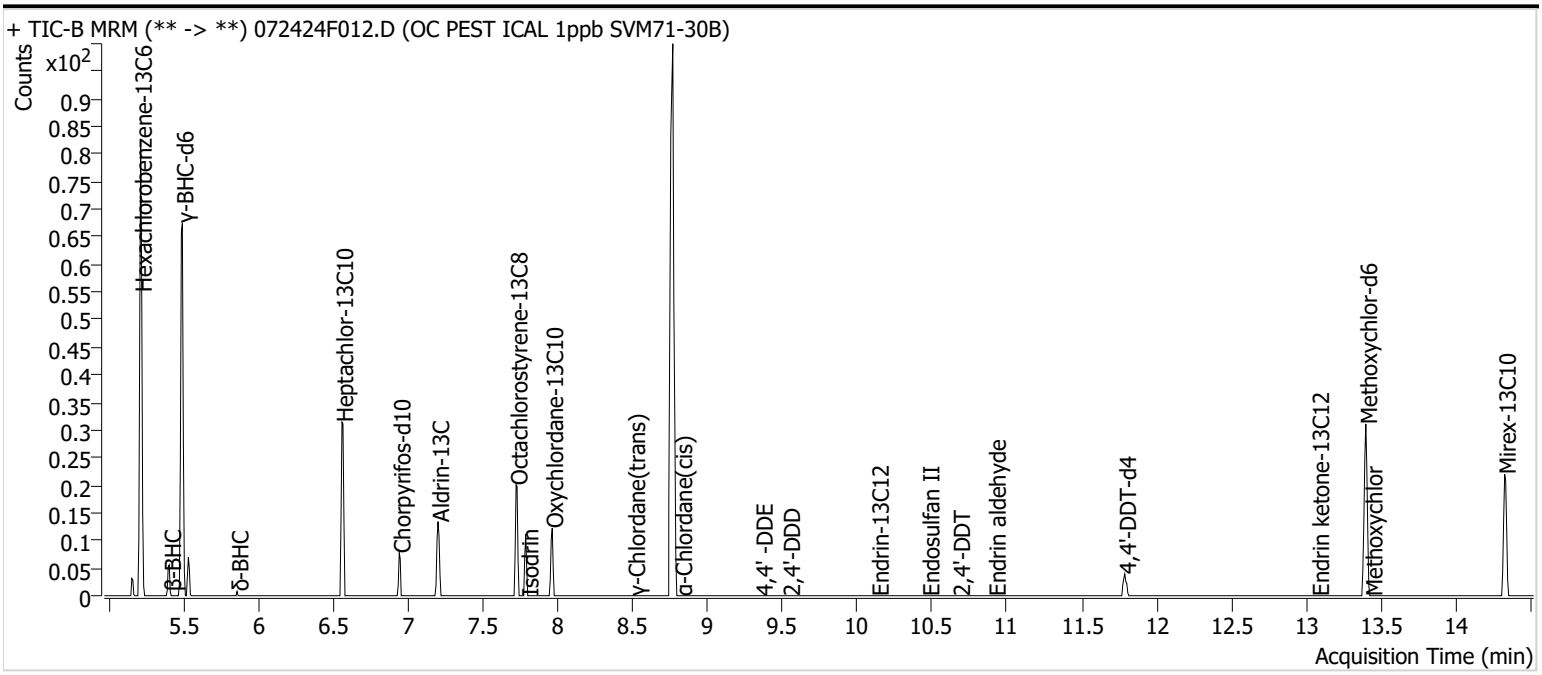
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	1563062	4.380 ng/ml
		Spiked Amount = 5.0		Recovery = *87.6 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.159	181.1 -> 145.1	274079	0.773 ng/ml	83
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.214	283.8 -> 213.9	402360	1.018 ng/ml	96
β-BHC	γ-BHC-d6(IS)	5.408	181.1 -> 145.1	197188	0.830 ng/ml	99
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	268793	0.886 ng/ml	100
δ-BHC	γ-BHC-d6(IS)	5.859	181.1 -> 145.1	170245	0.771 ng/ml	91
Heptachlor	Heptachlor-13C10(IS)	6.569	271.7 -> 236.9	139659	0.924 ng/ml	1
Chorpyrifos	Chorpyrifos-d10(IS)	7.019	196.9 -> 169.0	79940	0.971 ng/ml	91
Aldrin	Aldrin-13C(IS)	7.202	254.9 -> 220.0	221347	1.202 ng/ml	4
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.728	342.8 -> 307.8	243907	0.899 ng/ml	96
Isodrin	Isodrin-13C12(IS)	7.796	193.0 -> 123.0	108930	0.875 ng/ml	95
Oxychlordane	Oxychlordane-13C10(IS)	7.968	114.9 -> 51.1	154861	0.923 ng/ml	100
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.971	352.8 -> 262.9	41366	0.929 ng/ml	99
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.510	271.8 -> 236.9	70906	1.039 ng/ml	96
2,4'-DDE	4,4'-DDD d4(IS)	8.527	246.0 -> 176.2	690168	1.064 ng/ml	98
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.823	271.8 -> 236.9	78851	0.956 ng/ml	94
Endosulfan I	Endrin-13C12(IS)	8.840	206.9 -> 172.0	26950	0.916 ng/ml	93
trans-Nanochlor	Oxychlordane-13C10(IS)	8.891	271.8 -> 236.9	50410	0.859 ng/ml	84
4,4' -DDE	4,4'-DDD d4(IS)	9.363	246.0 -> 176.2	455710	0.986 ng/ml	97
Dieldrin	Endrin-13C12(IS)	9.555	262.9 -> 193.0	30998	0.849 ng/ml	97
2,4'-DDD	4,4'-DDD d4(IS)	9.546	235.0 -> 165.1	523680	1.005 ng/ml	92
Endrin	Endrin-13C12(IS)	10.146	262.8 -> 193.0	19858	0.981 ng/ml	97
Endosulfan II	Endrin-13C12(IS)	10.477	206.9 -> 172.0	11969 ***m***	0.766 ng/ml	71
cis-Nonachlor	Oxychlordane-13C10(IS)	10.598	271.8 -> 236.9	45737	0.906 ng/ml	90
4,4'-DDD	4,4'-DDD d4(IS)	10.608	235.0 -> 165.1	363374	0.946 ng/ml	100
2,4'-DDT	4,4'-DDT-d4(IS)	10.682	235.0 -> 165.1	306603	0.873 ng/ml	97
Endrin aldehyde	Endrin-13C12(IS)	10.920	249.9 -> 214.9	5954	1.030 ng/ml	94
Endosulfan sulfate	Endrin-13C12(IS)	11.702	271.9 -> 237.0	36828	0.896 ng/ml	97
4,4'-DDT	4,4'-DDT-d4(IS)	11.867	235.0 -> 165.1	236164	0.869 ng/ml	93
Endrin ketone	Endrin ketone-13C12(IS)	13.092	147.0 -> 111.0	14326	0.959 ng/ml	96
Methoxychlor	Methoxychlor-d6(IS)	13.437	227.0 -> 141.1	103201	0.815 ng/ml	97
Mirex	Mirex-13C10(IS)	14.337	271.8 -> 236.8	379673	1.179 ng/ml	92

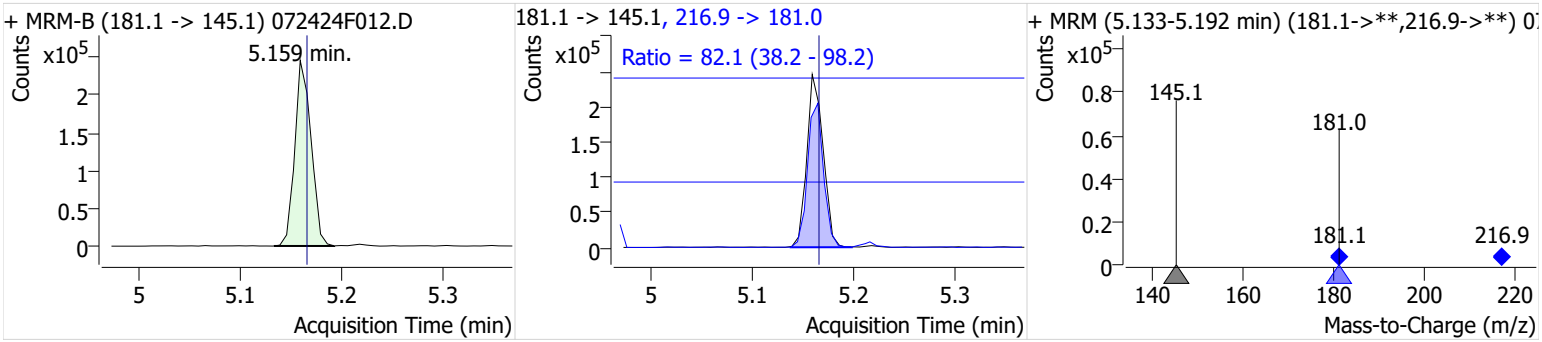
(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram

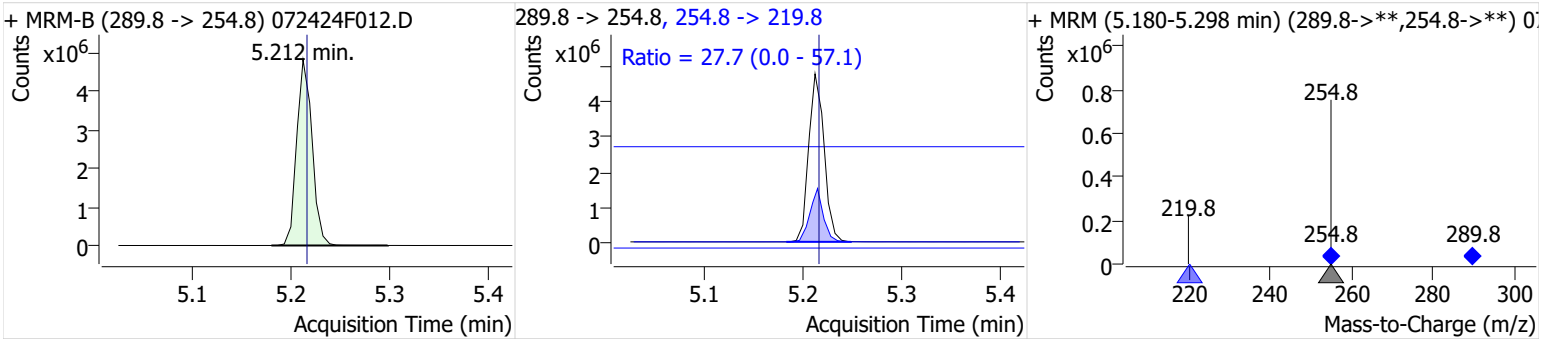
MassHunter Quantitative Analysis Sample Report



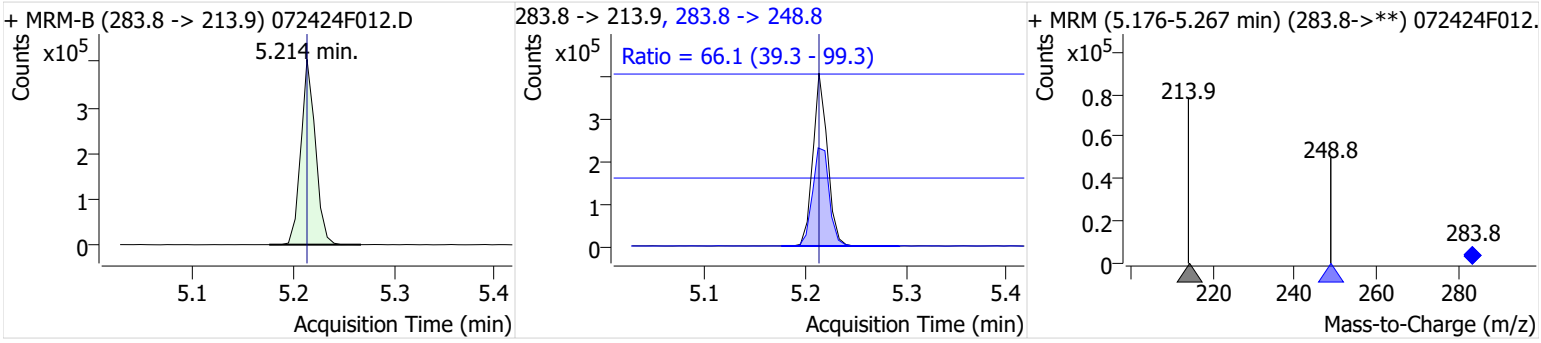
α-BHC



Hexachlorobenzene-13C6

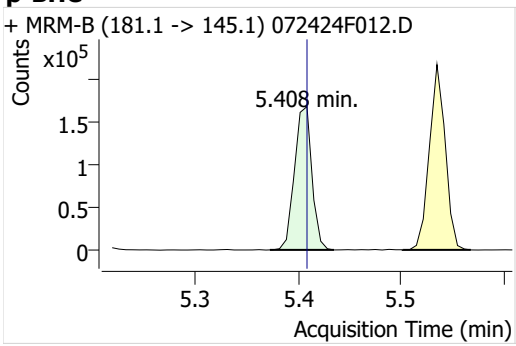


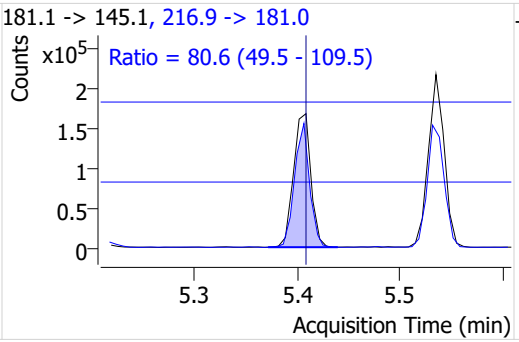
Hexachlorobenzene

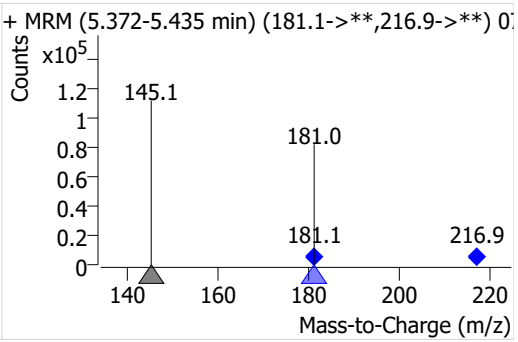


MassHunter Quantitative Analysis Sample Report

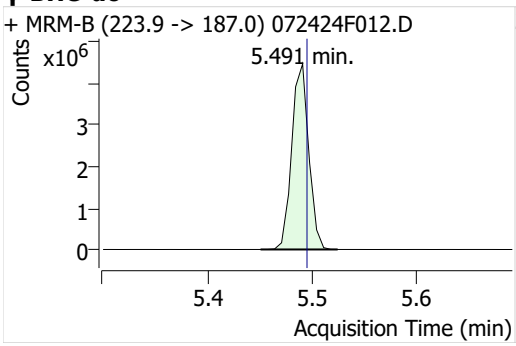
β-BHC

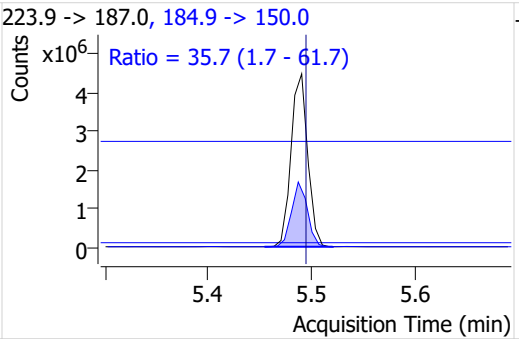


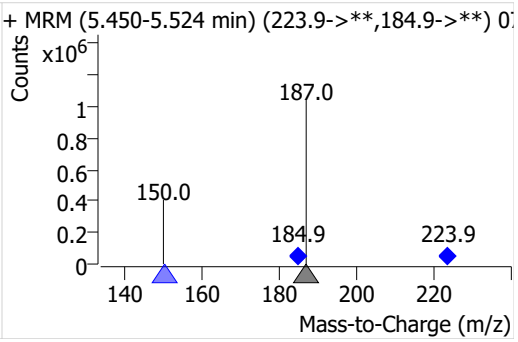




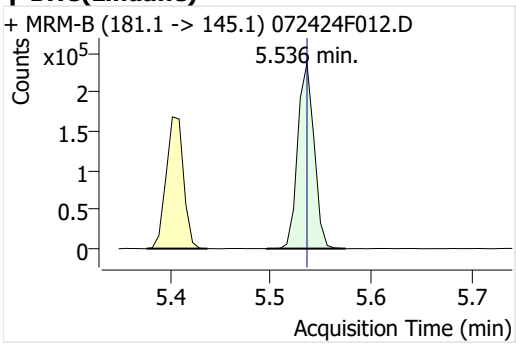
γ-BHC-d6

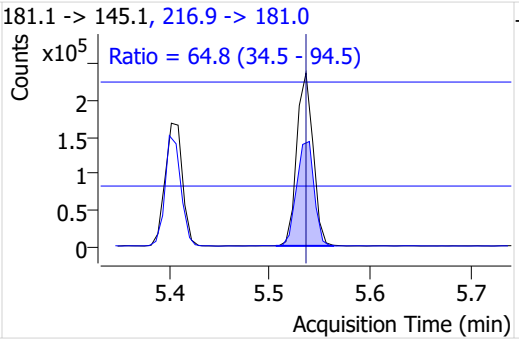


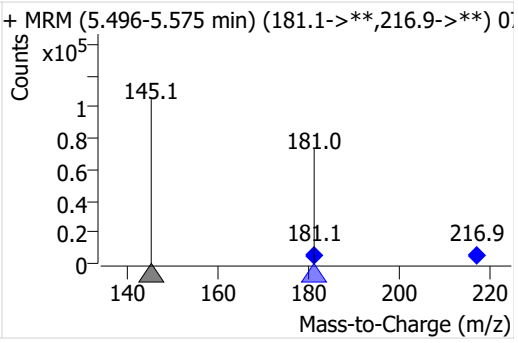




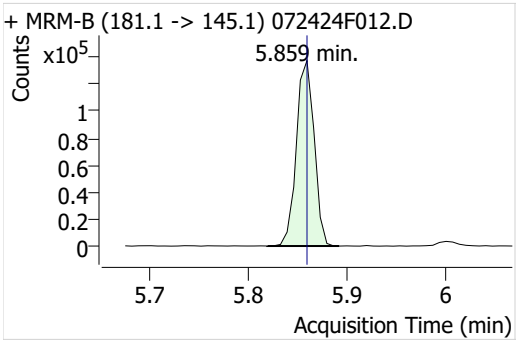
γ-BHC(Lindane)

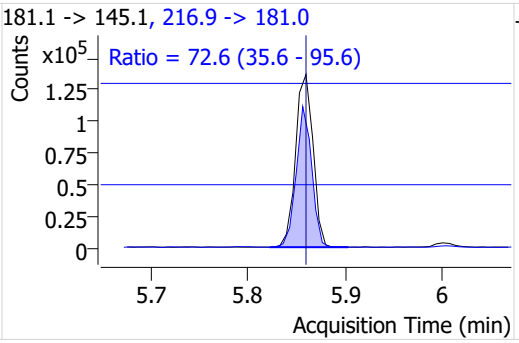


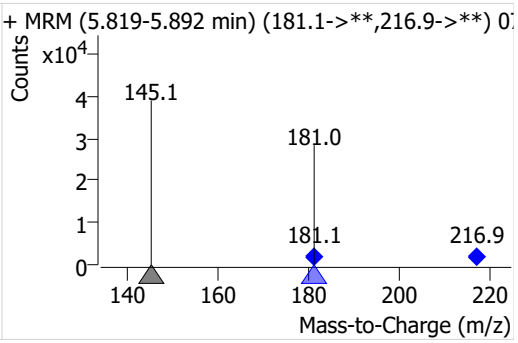




δ-BHC

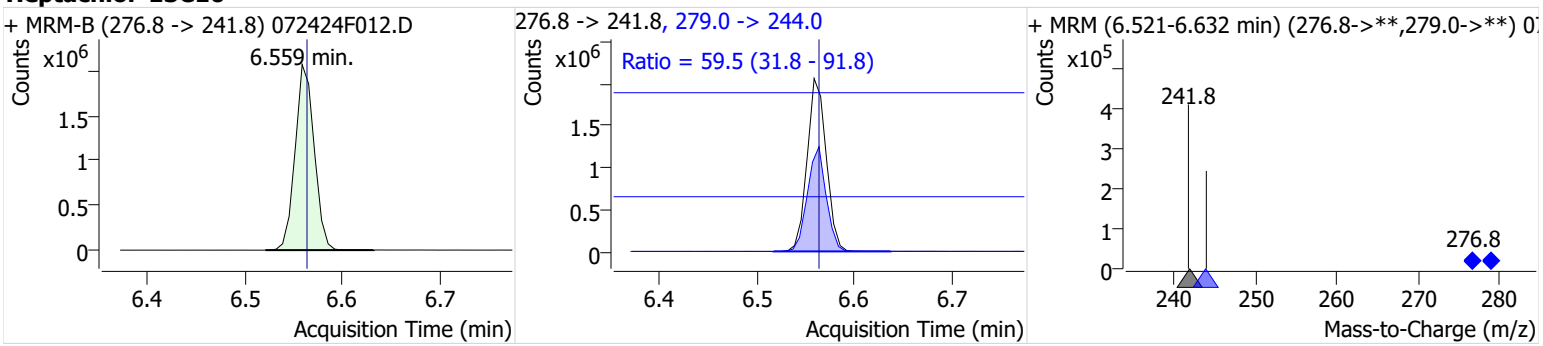




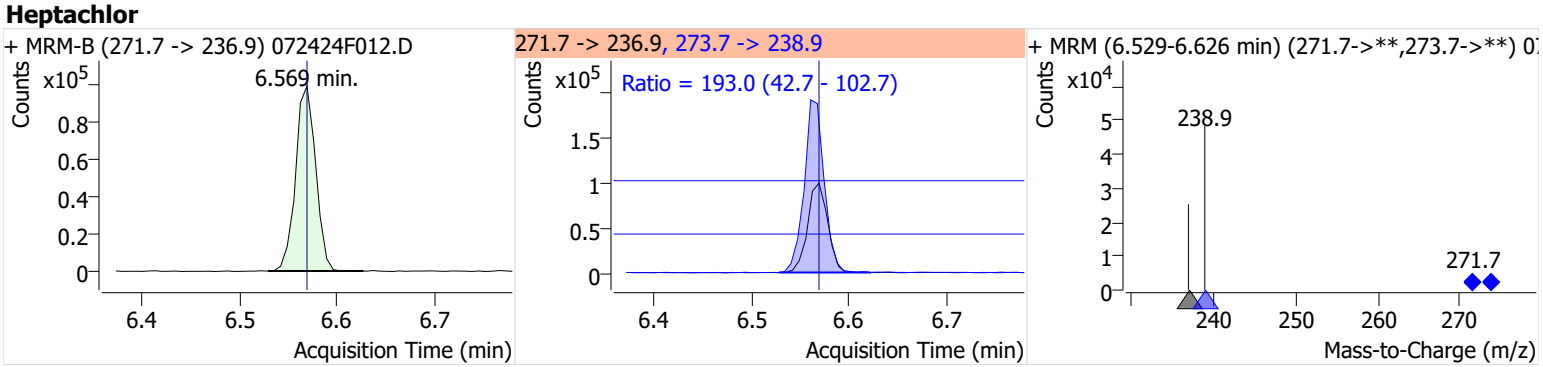


MassHunter Quantitative Analysis Sample Report

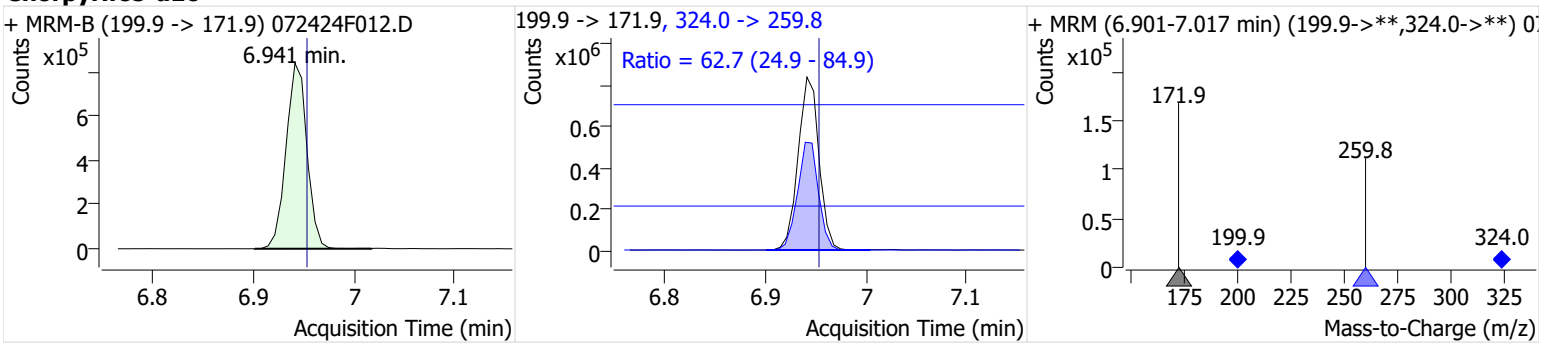
Heptachlor-13C10



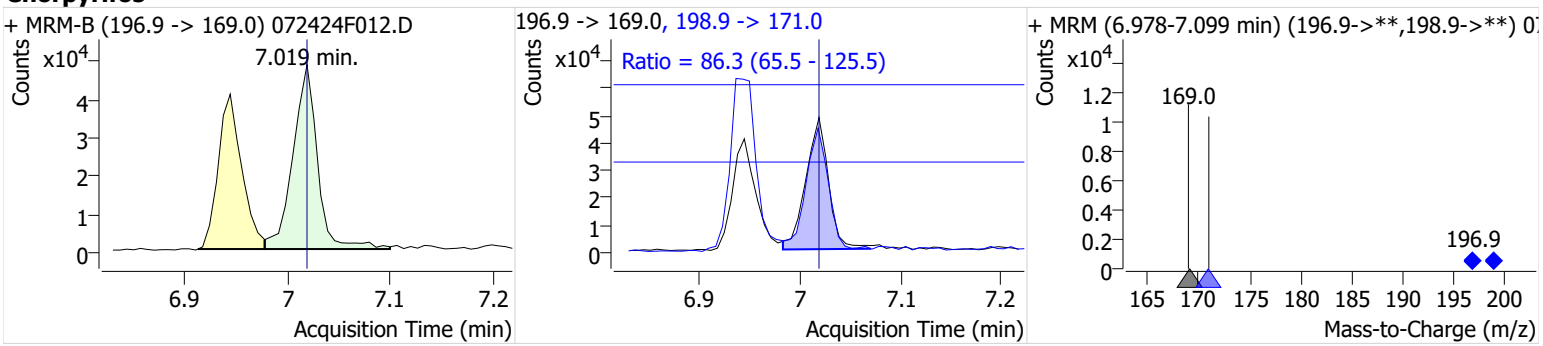
Heptachlor



Chorpyrifos-d10

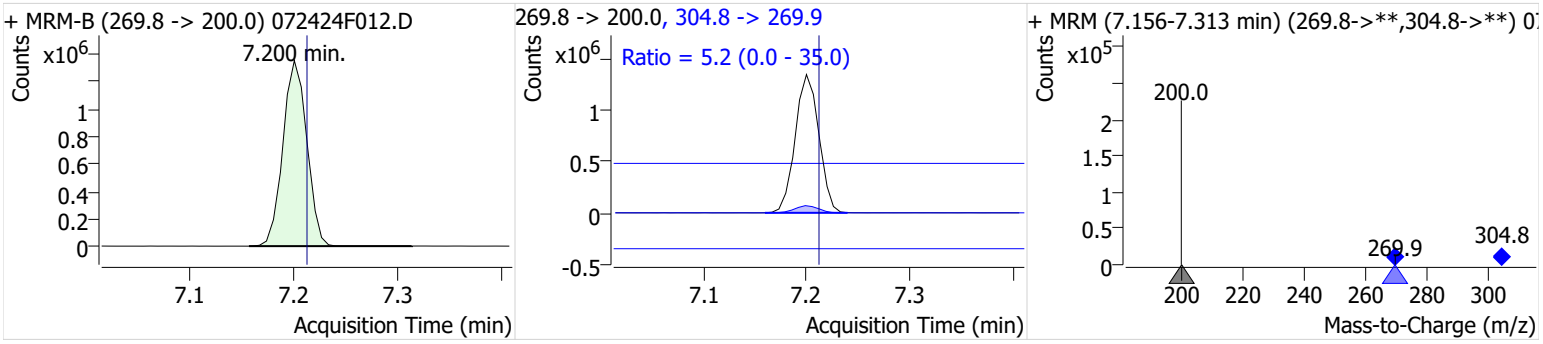


Chorpyrifos

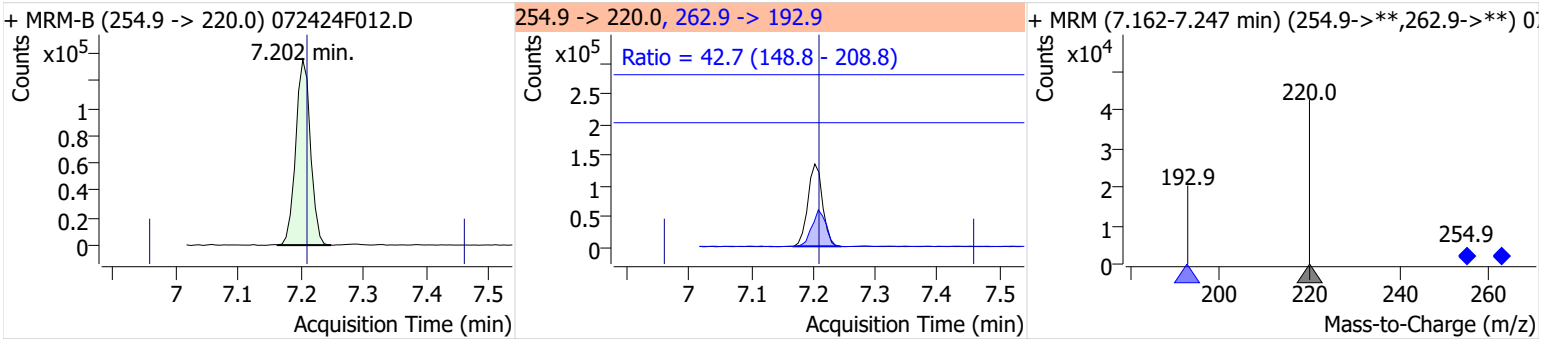


MassHunter Quantitative Analysis Sample Report

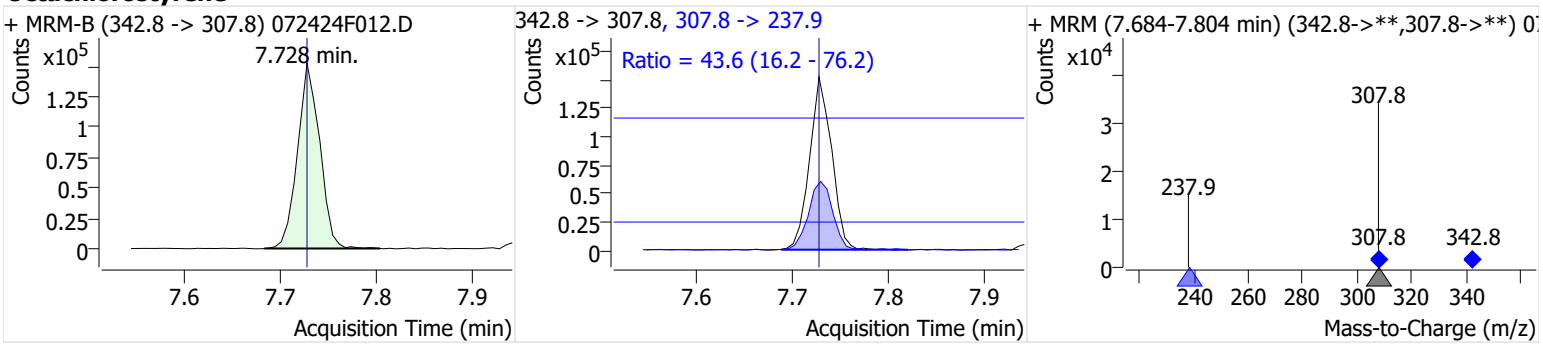
Aldrin-13C



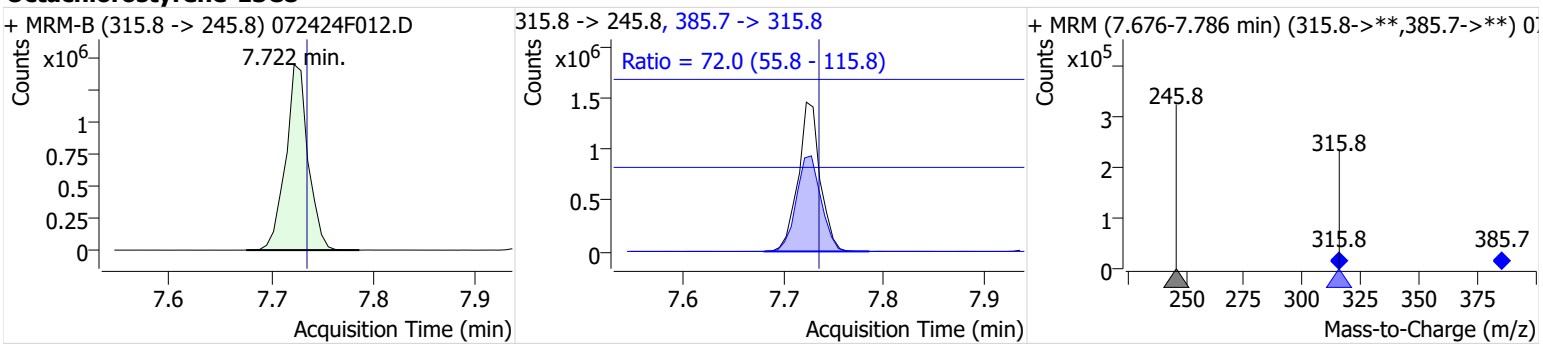
Aldrin



Octachlorostyrene

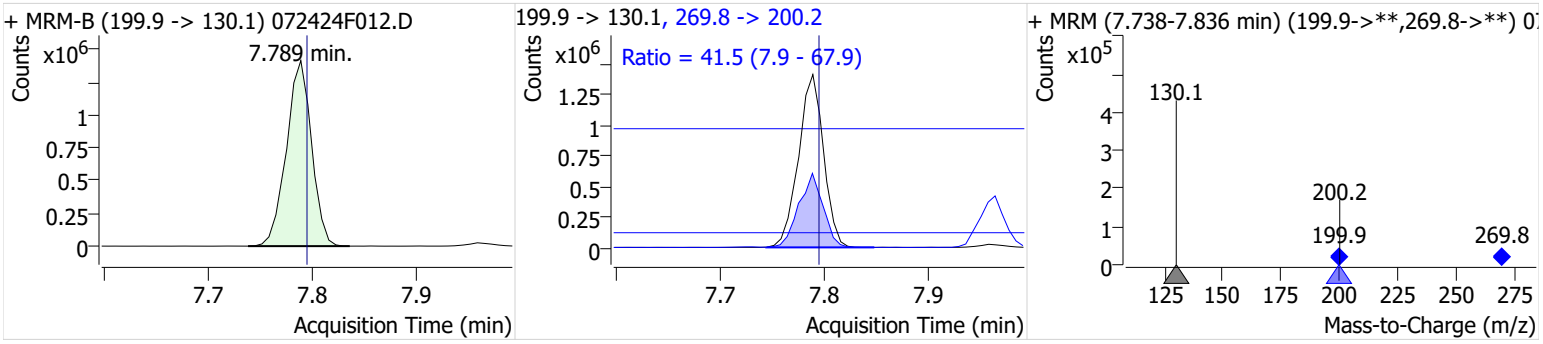


Octachlorostyrene-13C8

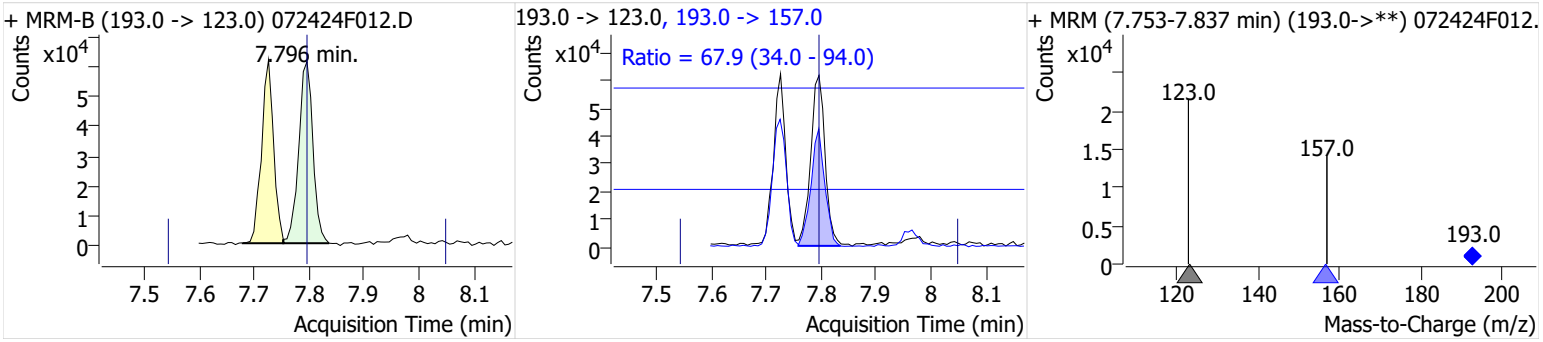


MassHunter Quantitative Analysis Sample Report

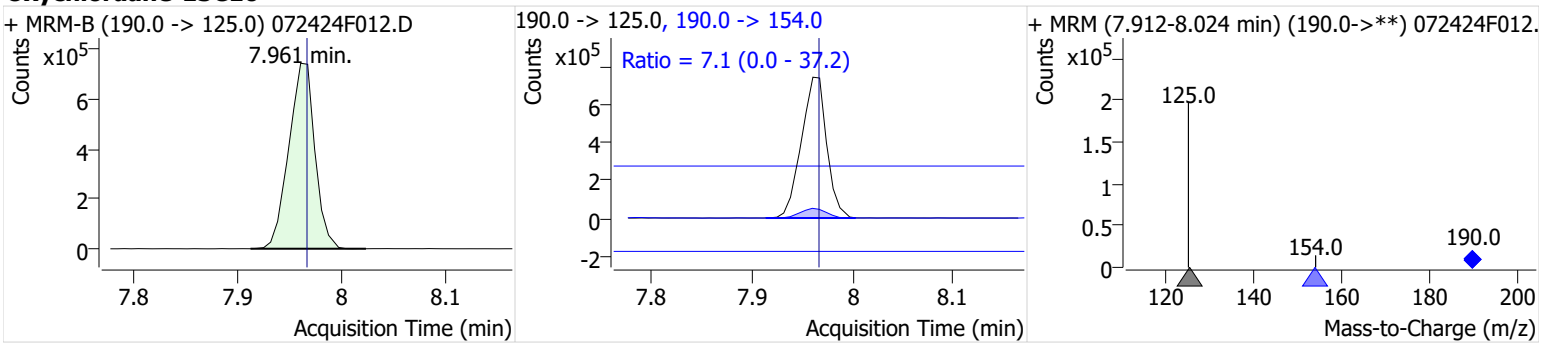
Isodrin-13C12



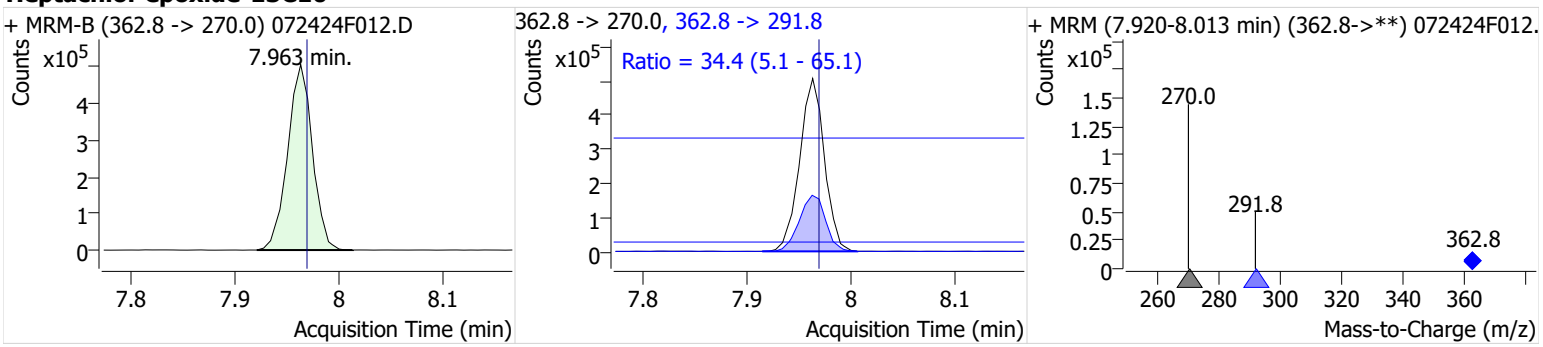
Isodrin



Oxychlordane-13C10

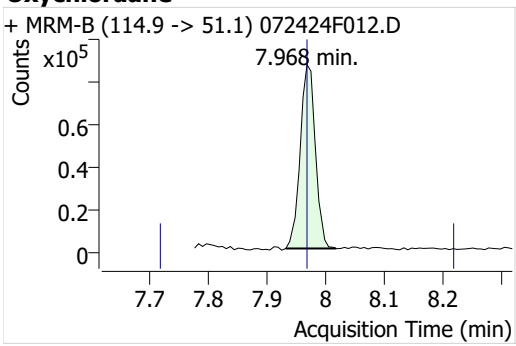


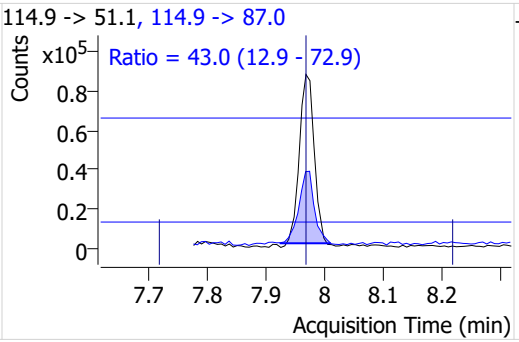
Heptachlor epoxide-13C10

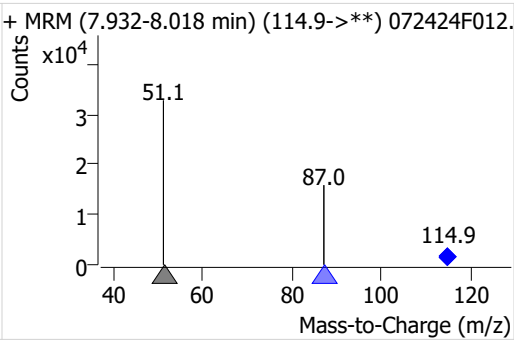


MassHunter Quantitative Analysis Sample Report

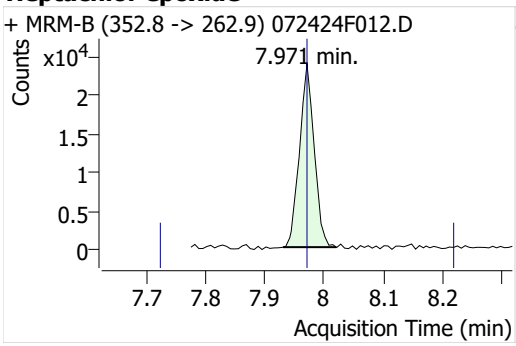
Oxychlordane

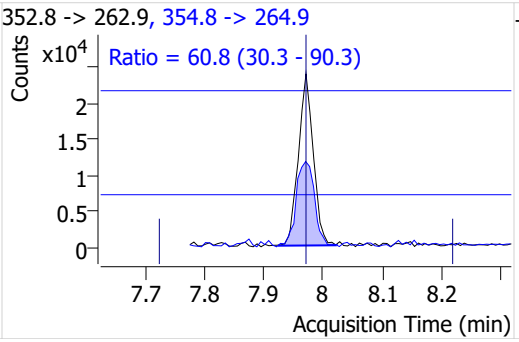


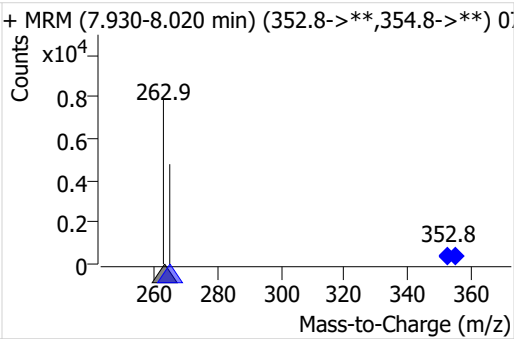




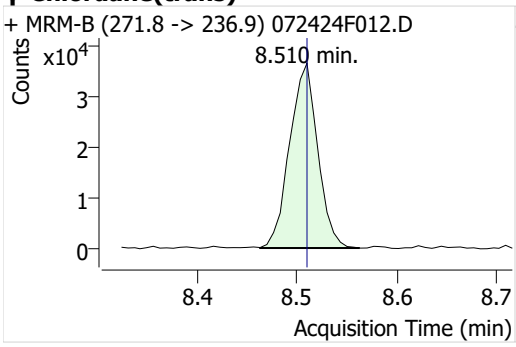
Heptachlor epoxide

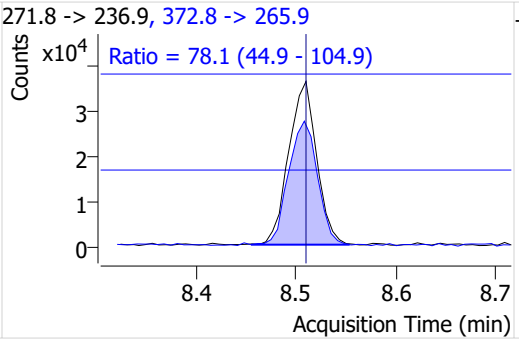


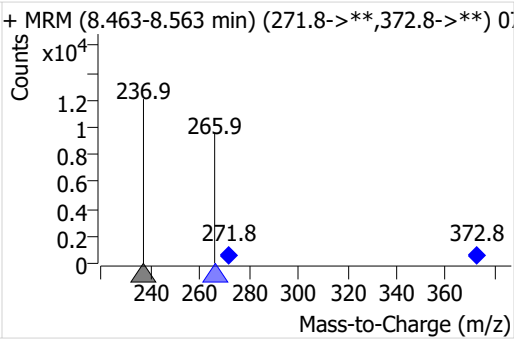




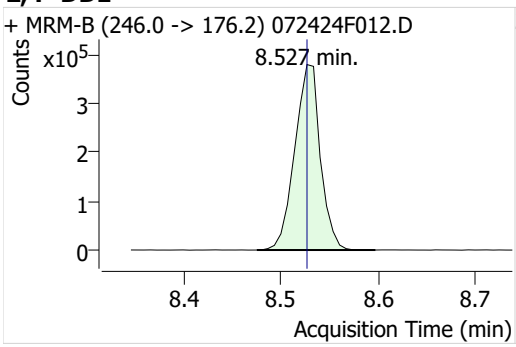
γ-Chlordane(trans)

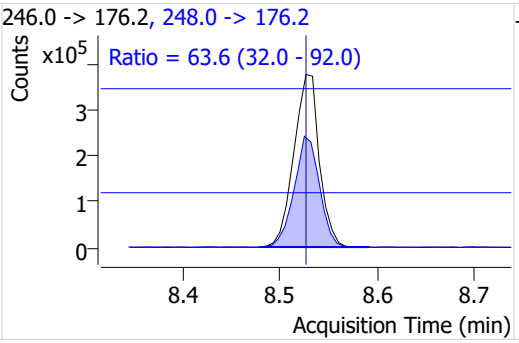


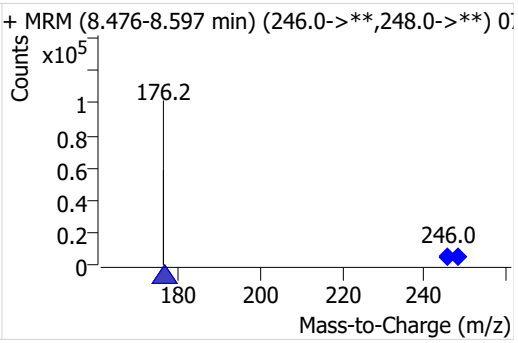




2,4'-DDE

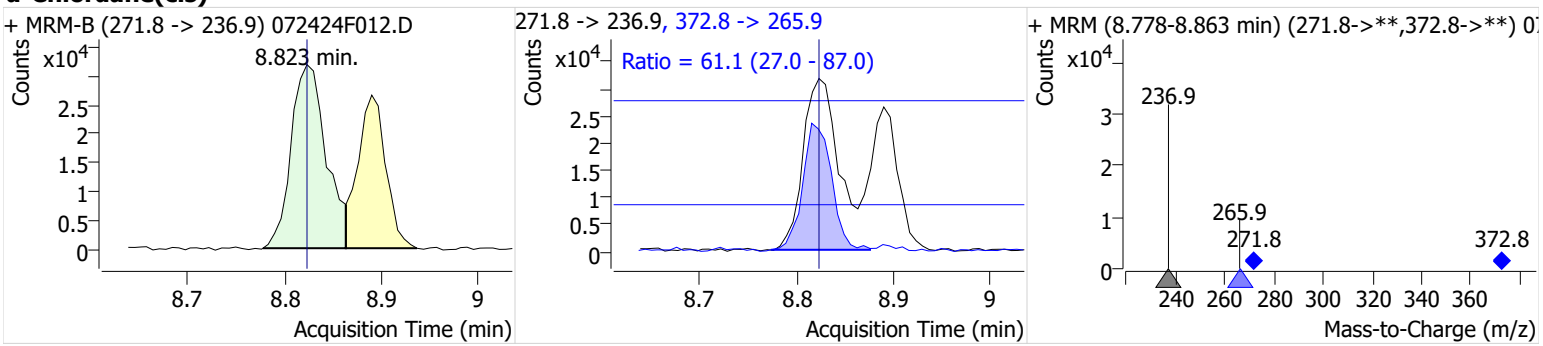




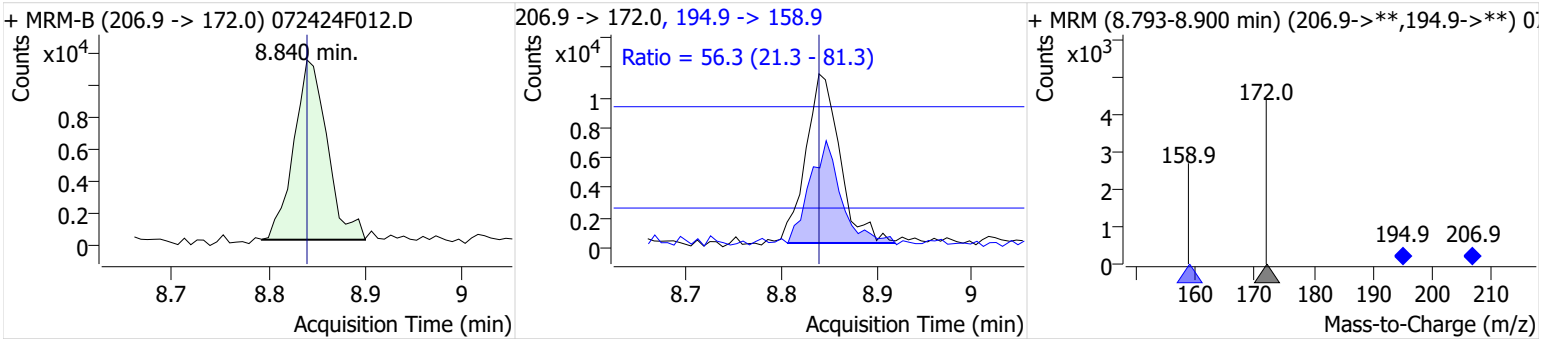


MassHunter Quantitative Analysis Sample Report

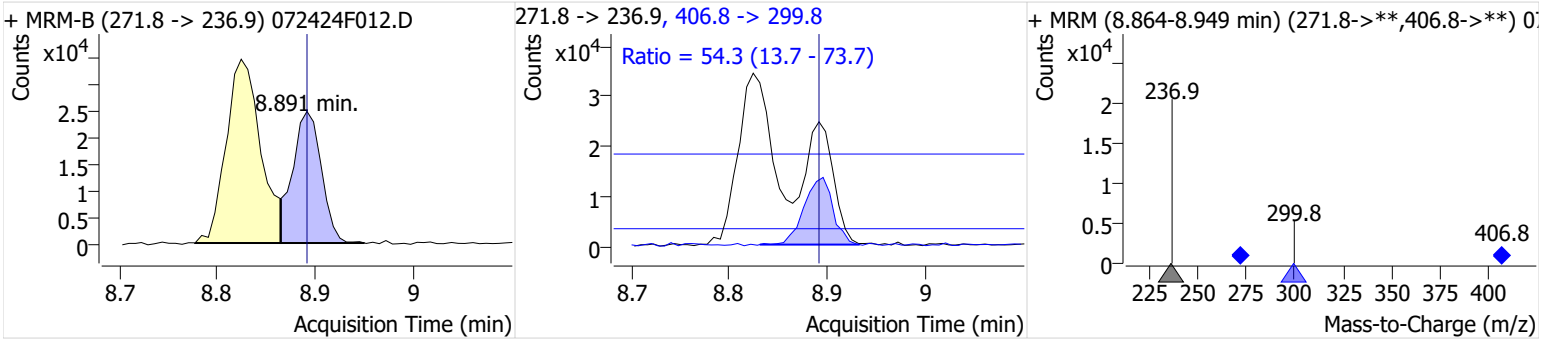
α-Chlordane(cis)



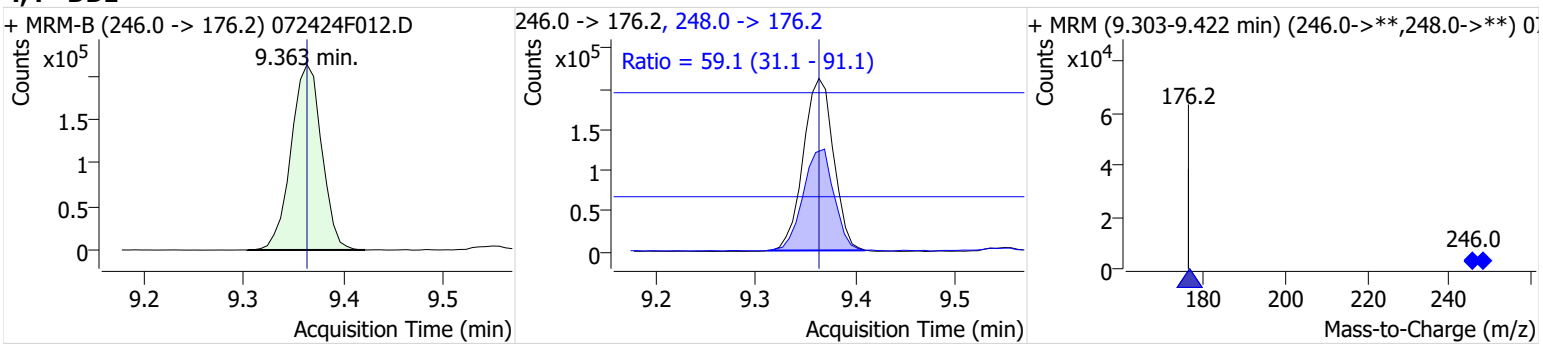
Endosulfan I



trans-Nanochlor

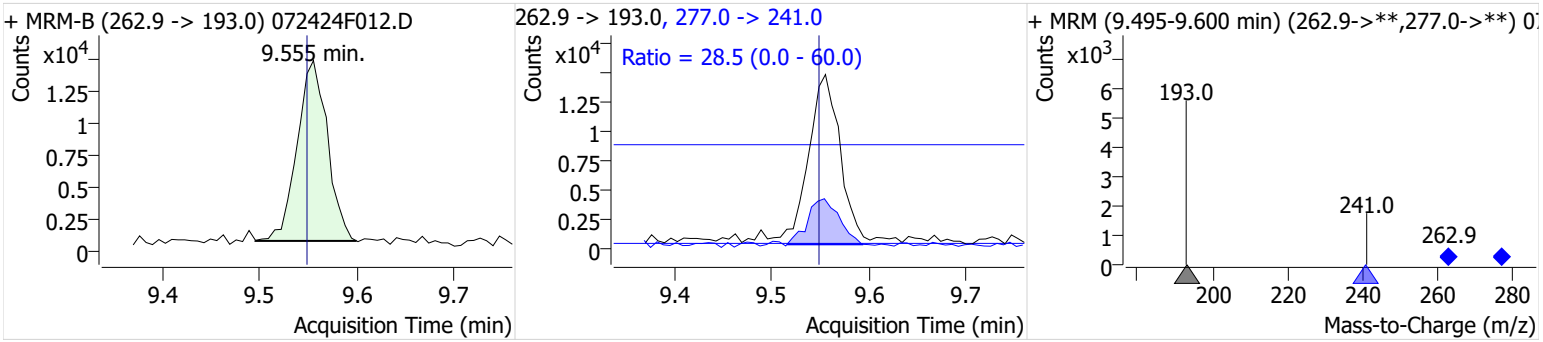


4,4' -DDE

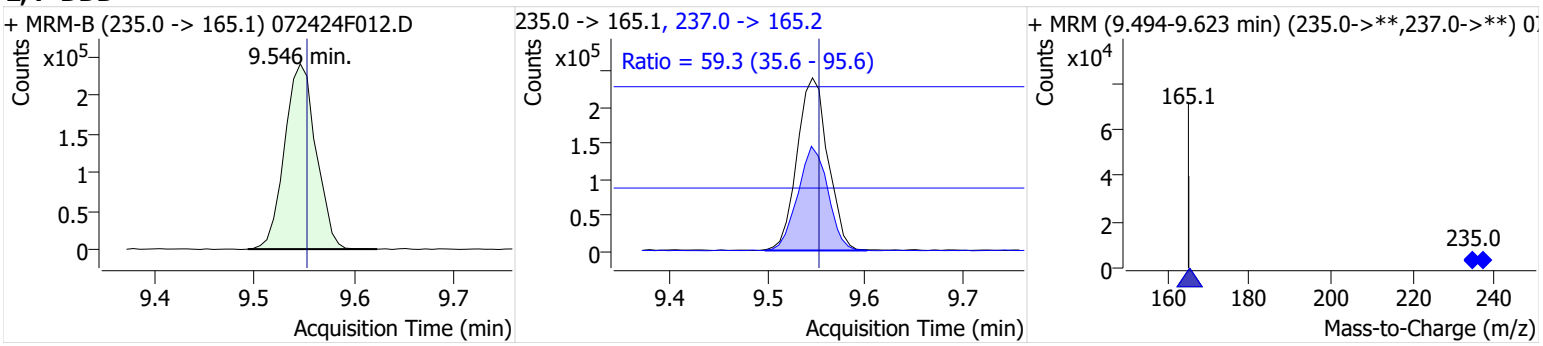


MassHunter Quantitative Analysis Sample Report

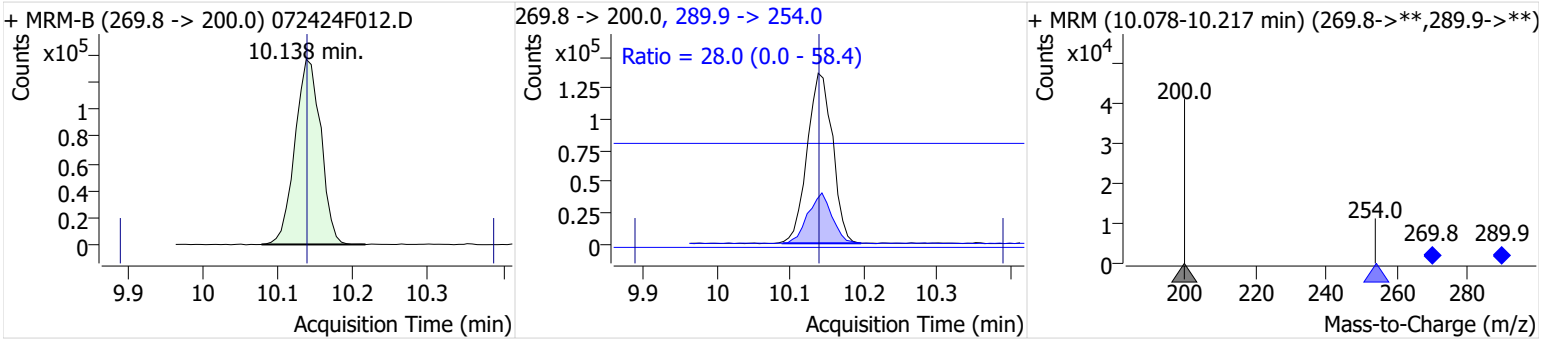
Dieldrin



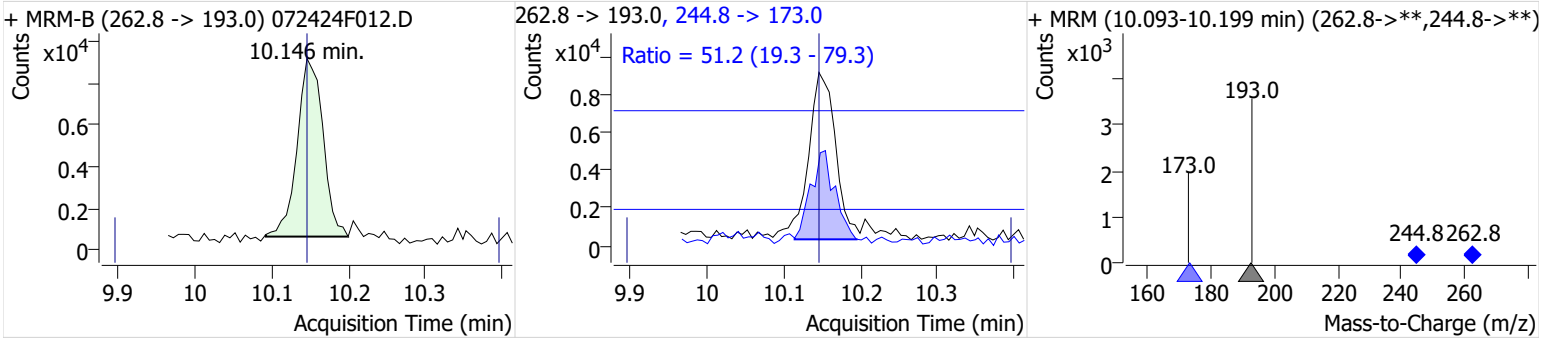
2,4'-DDD



Endrin-13C12

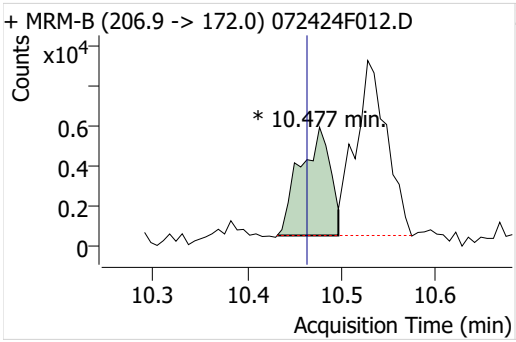


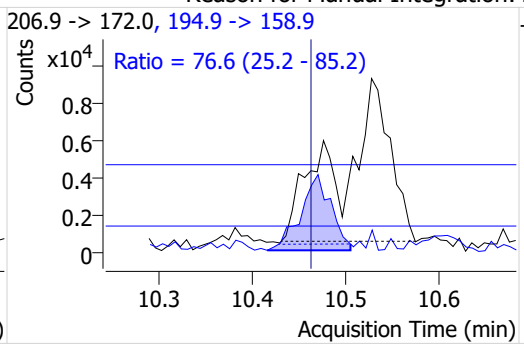
Endrin

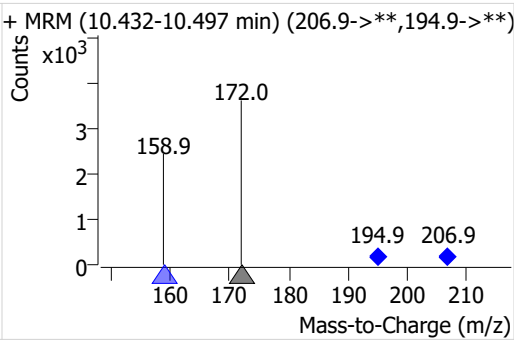


MassHunter Quantitative Analysis Sample Report

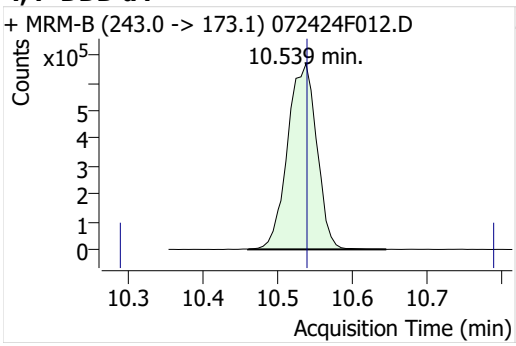
Endosulfan II Reason for Manual Integration: **BLC**

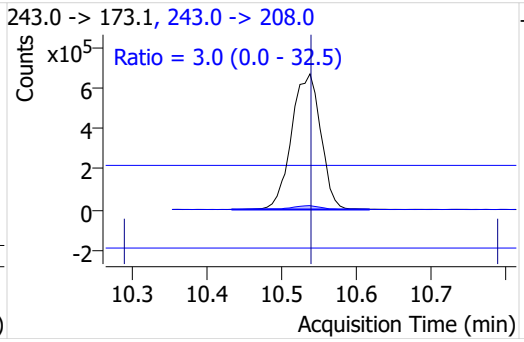


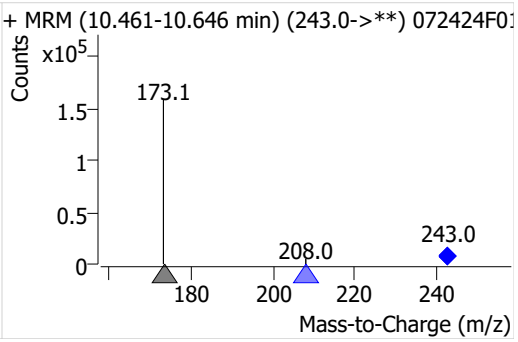




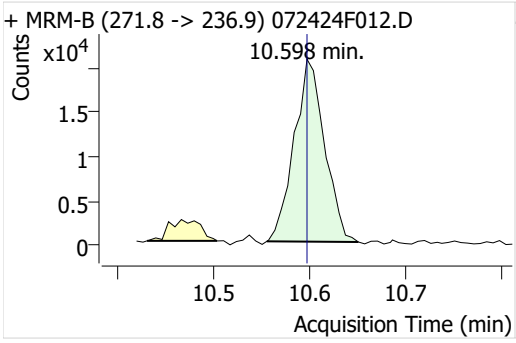
4,4'-DDD d4

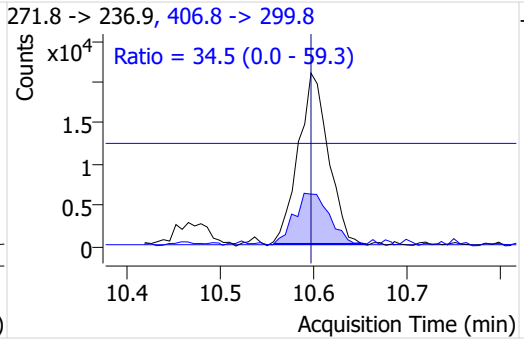


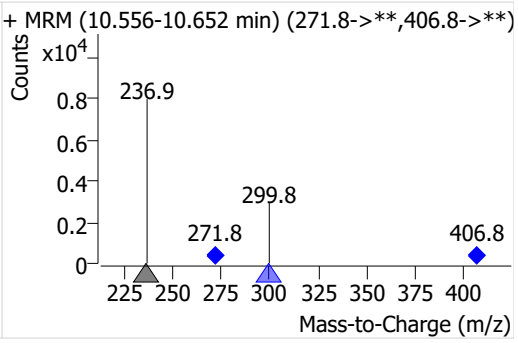




cis-Nonachlor







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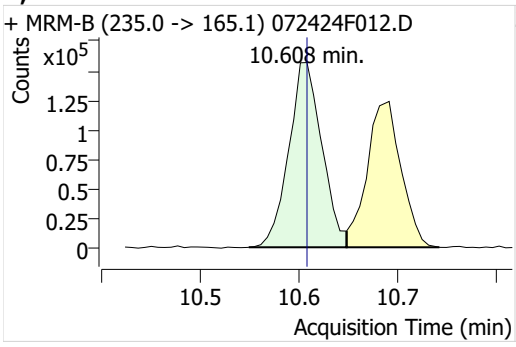

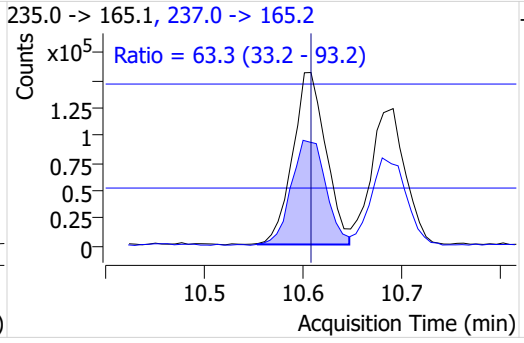

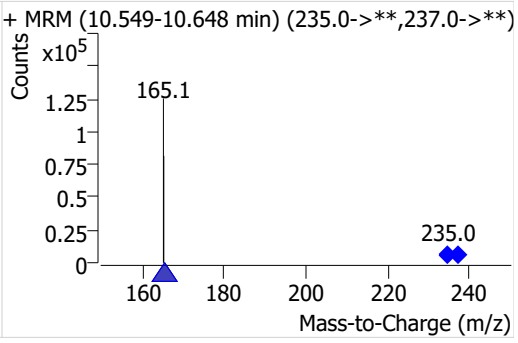

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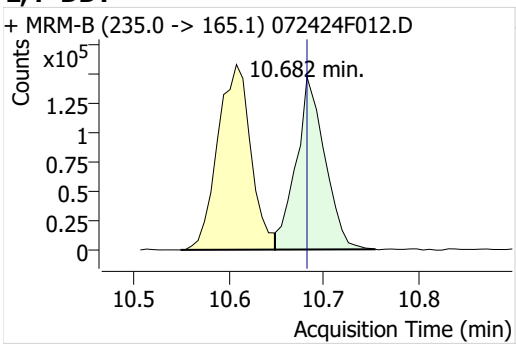
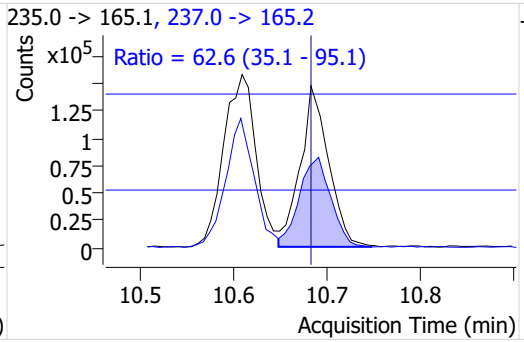
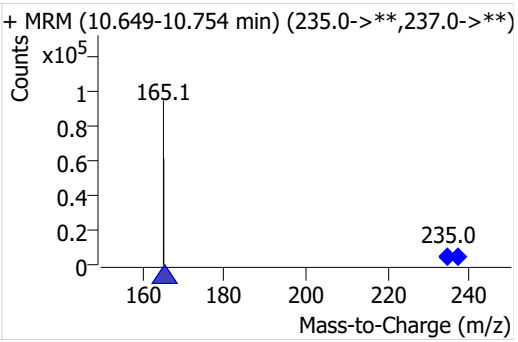
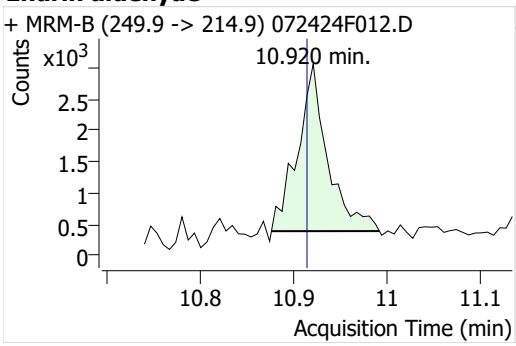
2,4'-DDT

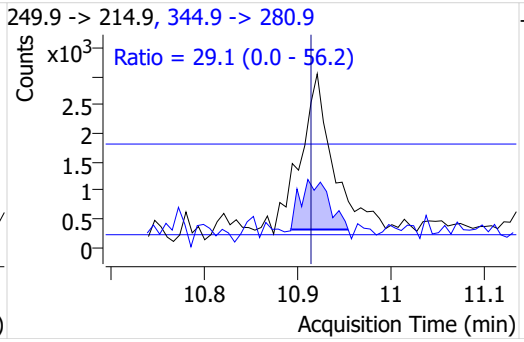


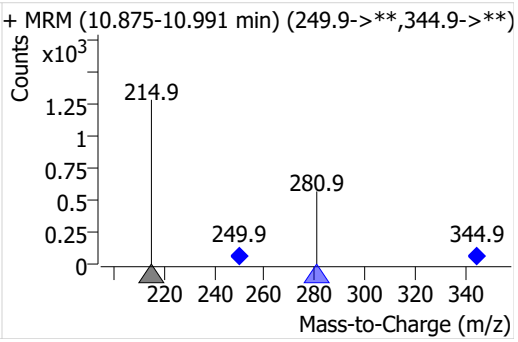




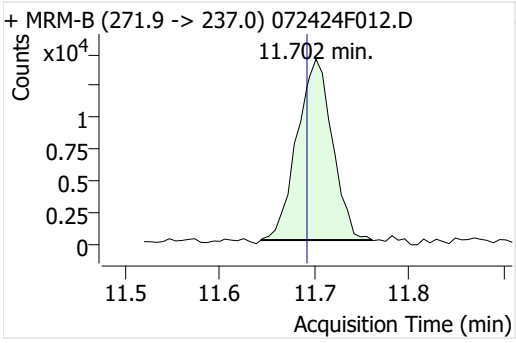
Endrin aldehyde

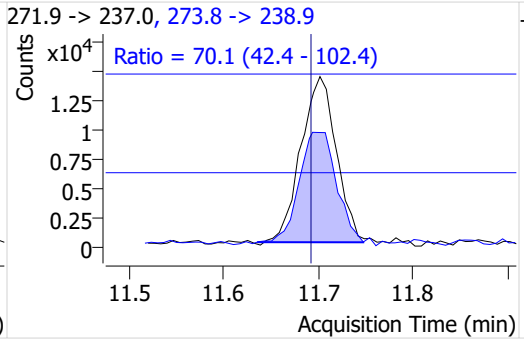


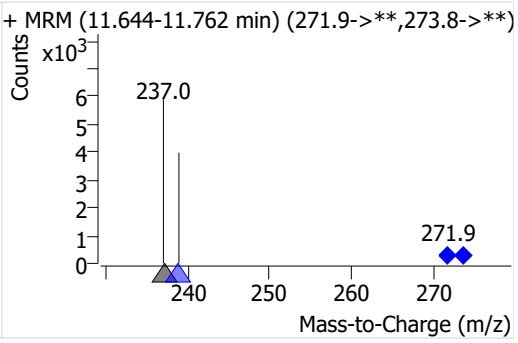




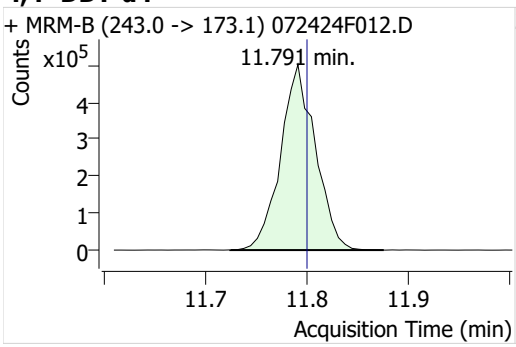
Endosulfan sulfate

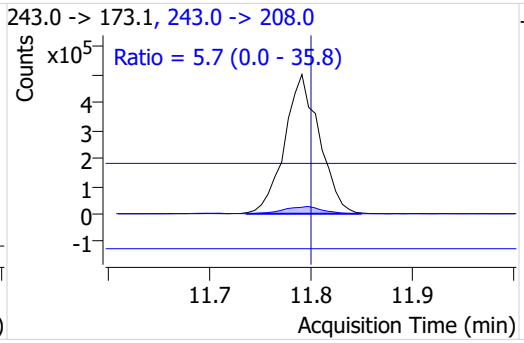


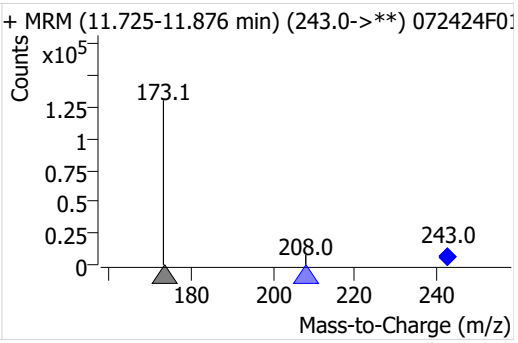




4,4'-DDT-d4







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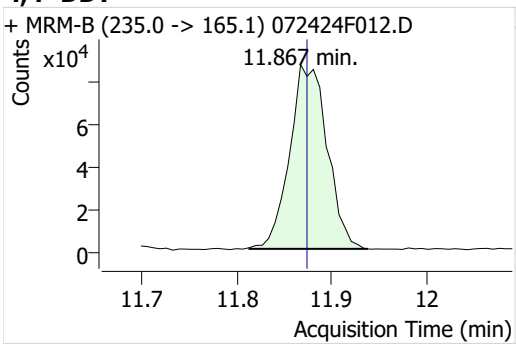
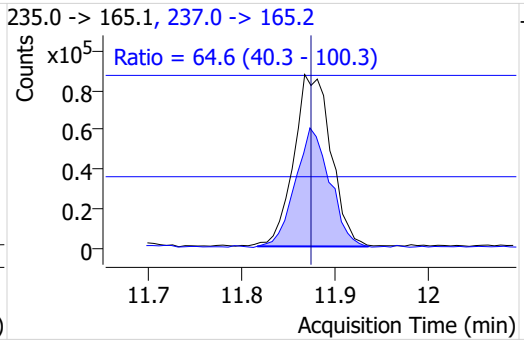
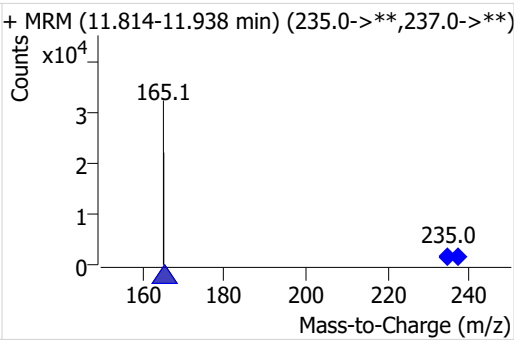
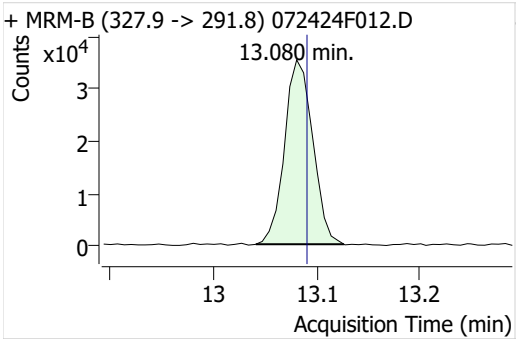
4,4'-DDT

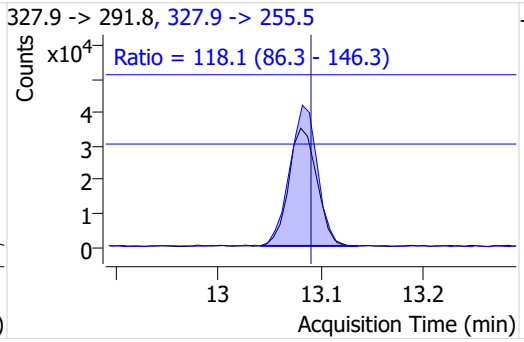


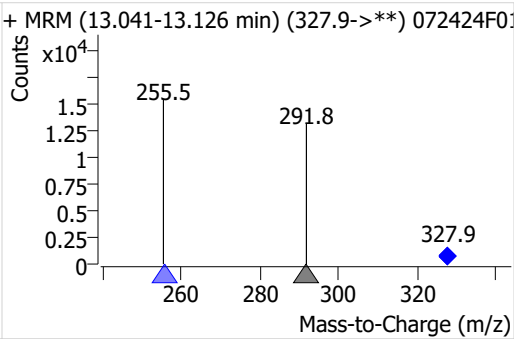




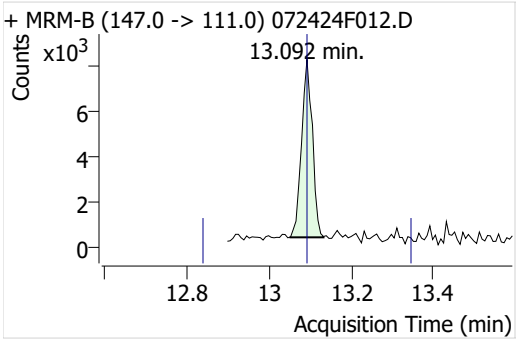
Endrin ketone-13C12

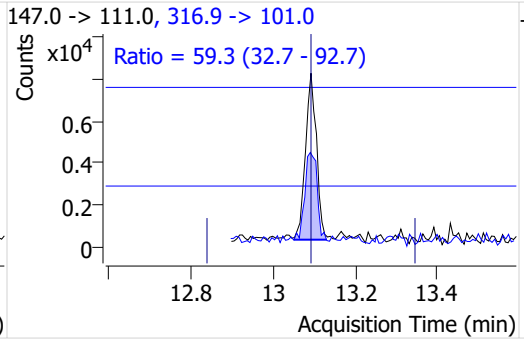


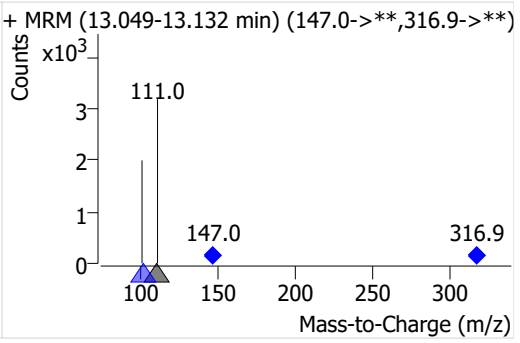




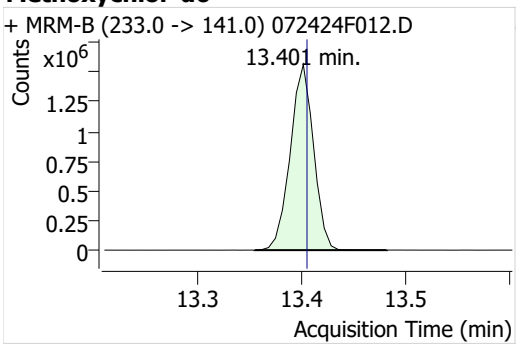
Endrin ketone

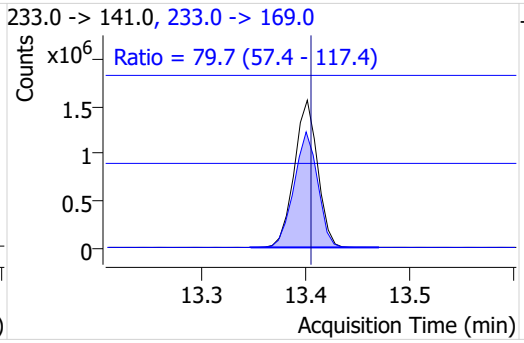


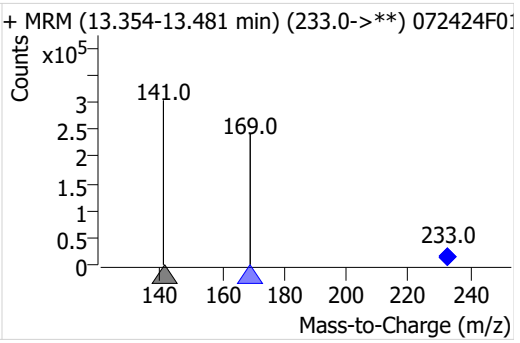




Methoxychlor-d6







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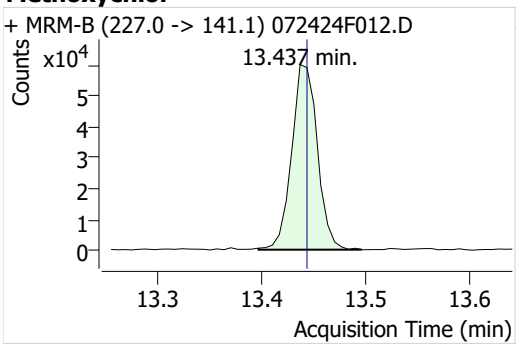
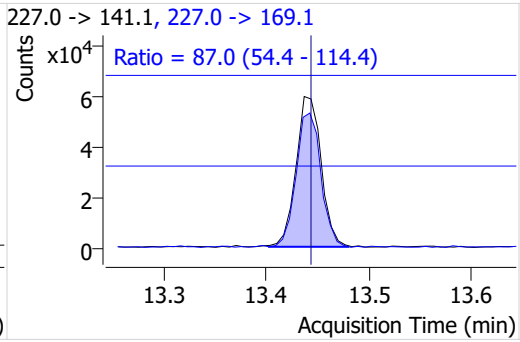
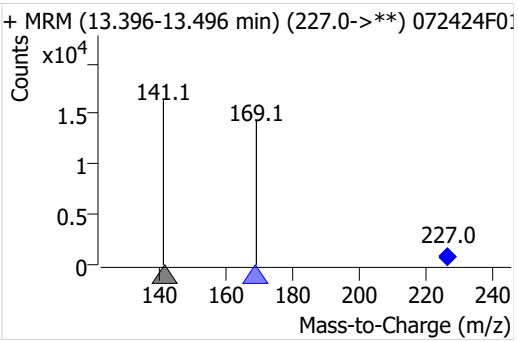
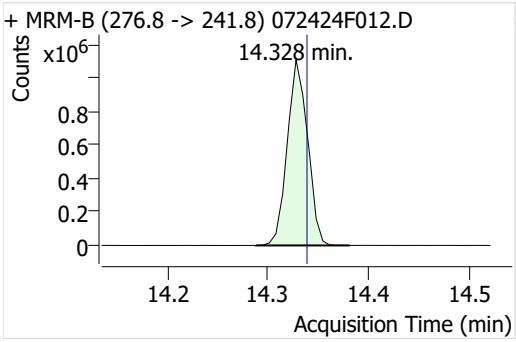
Methoxychlor

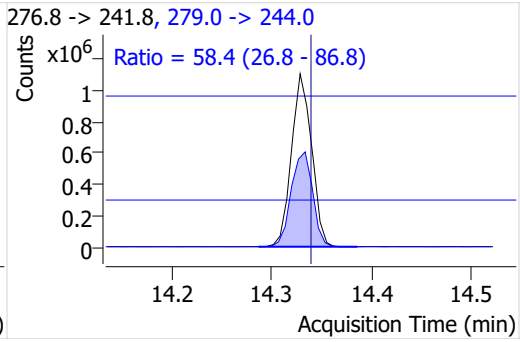


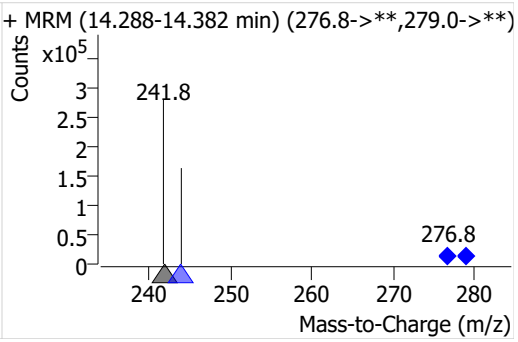




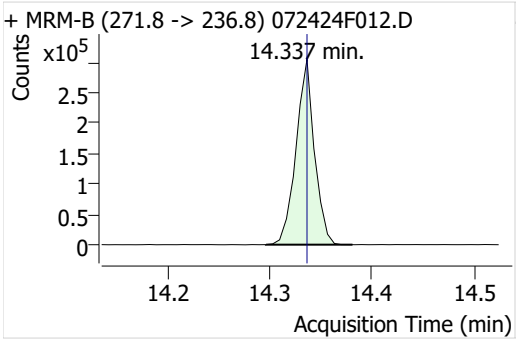
Mirex-13C10

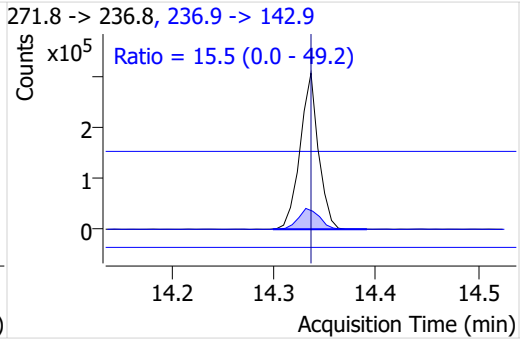


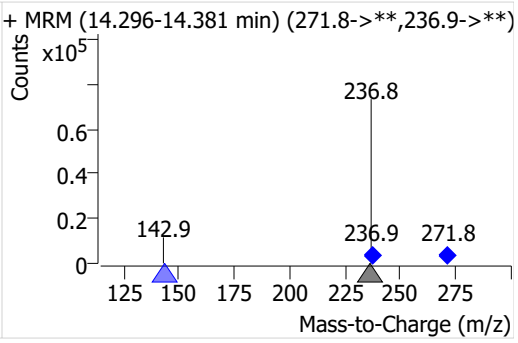




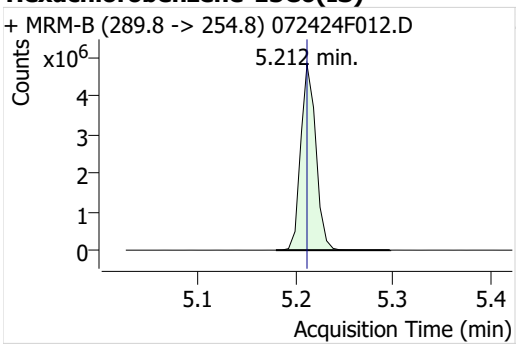
Mirex

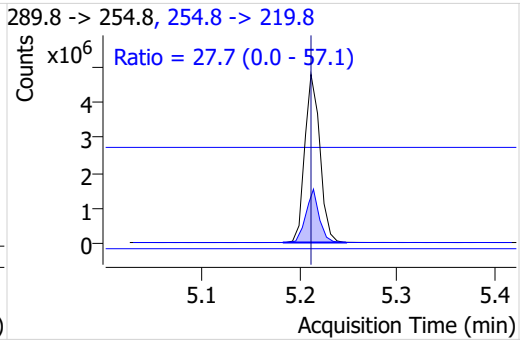


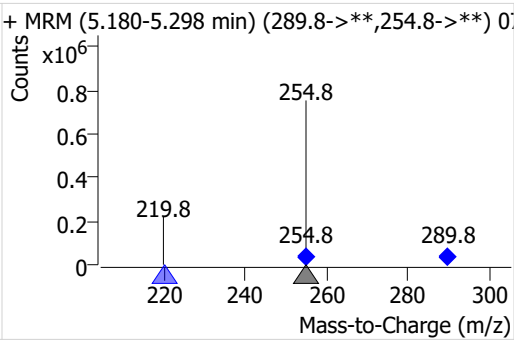




Hexachlorobenzene-13C6(IS)







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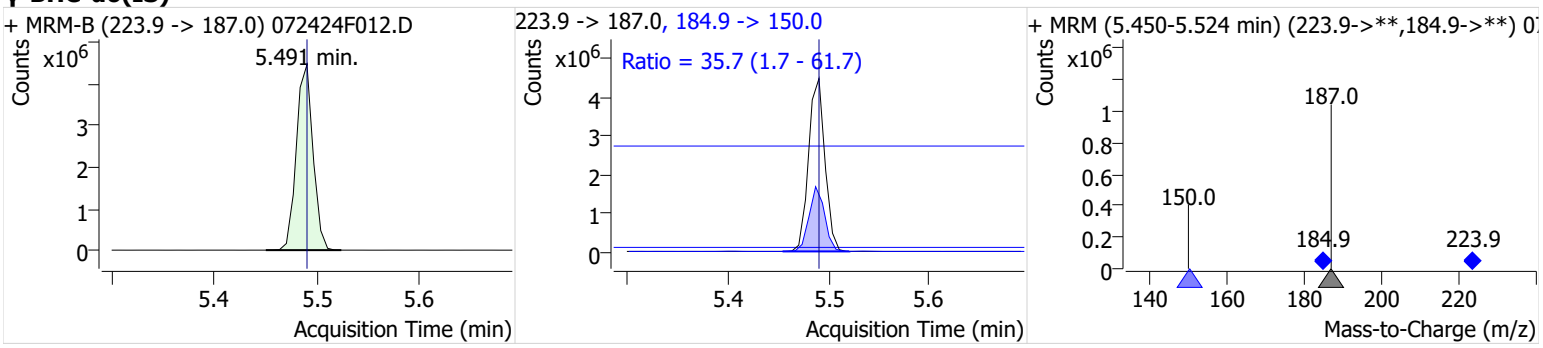
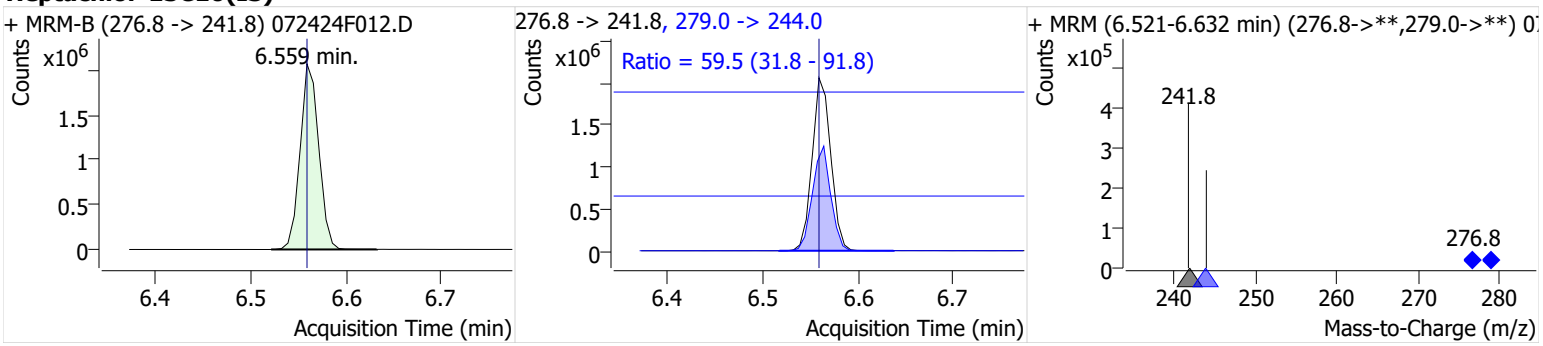
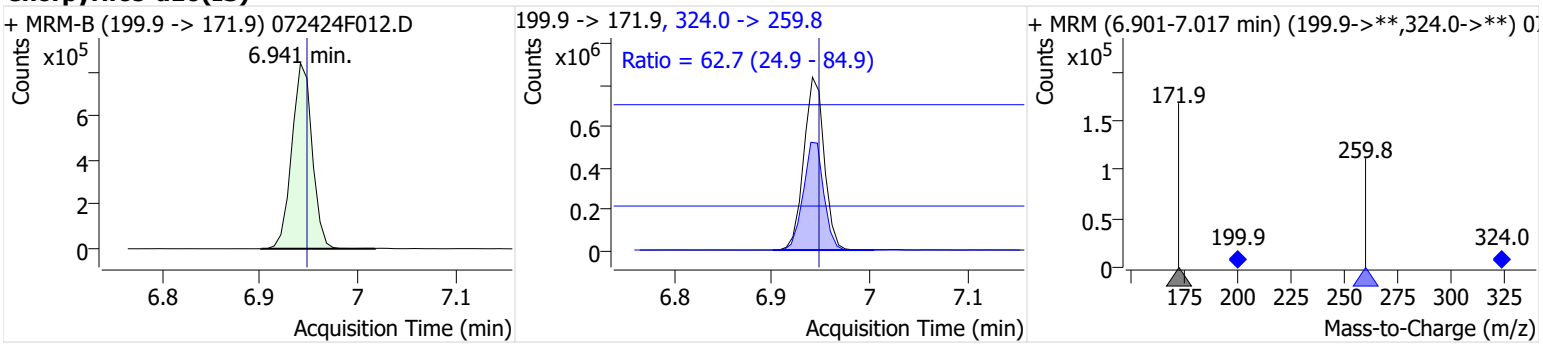
γ-BHC-d6(IS)



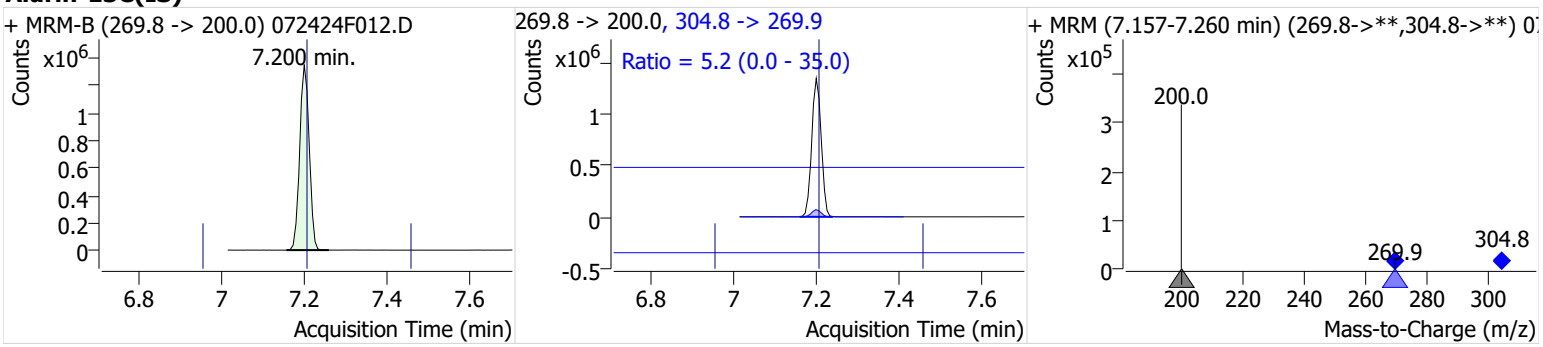
Heptachlor-13C10(IS)



Chorpyrifos-d10(IS)



Aldrin-13C(IS)



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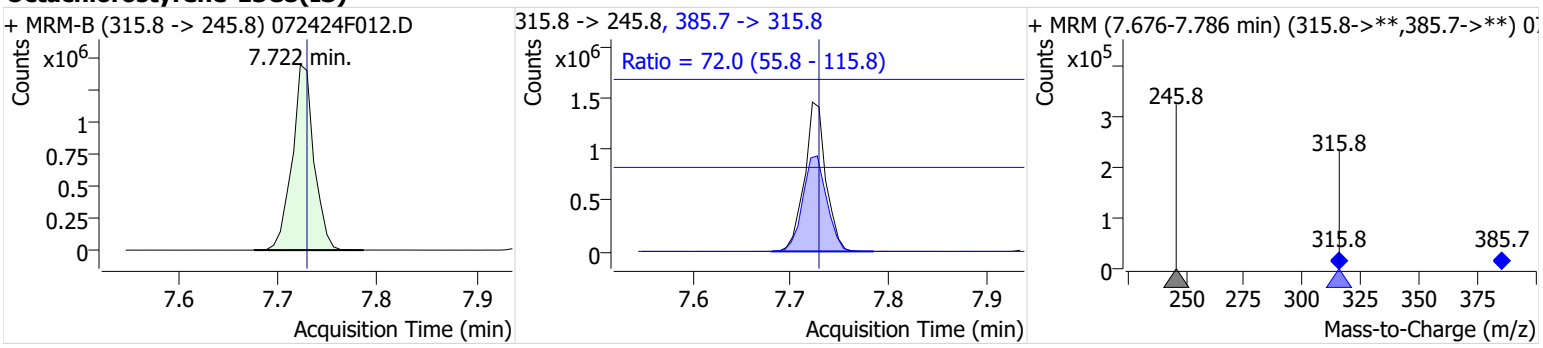
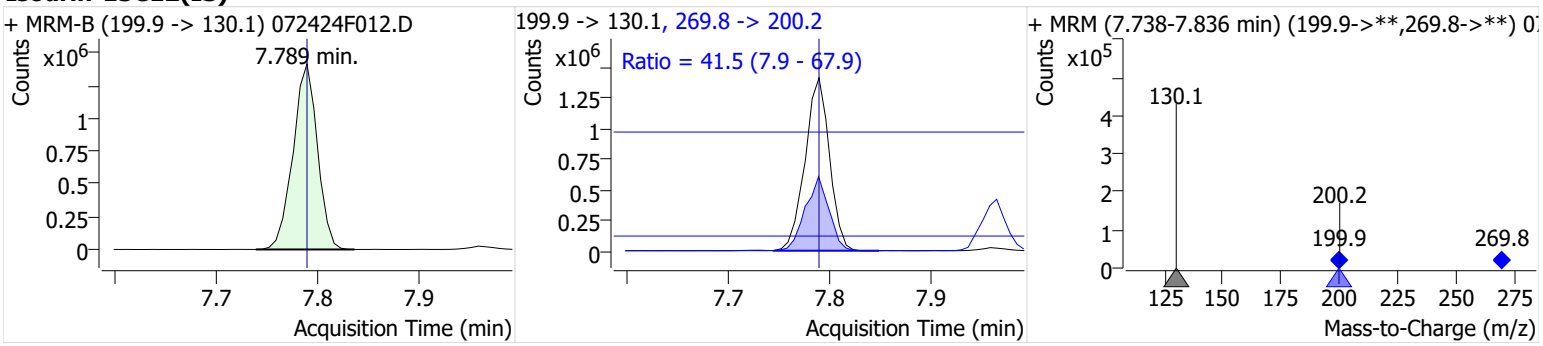
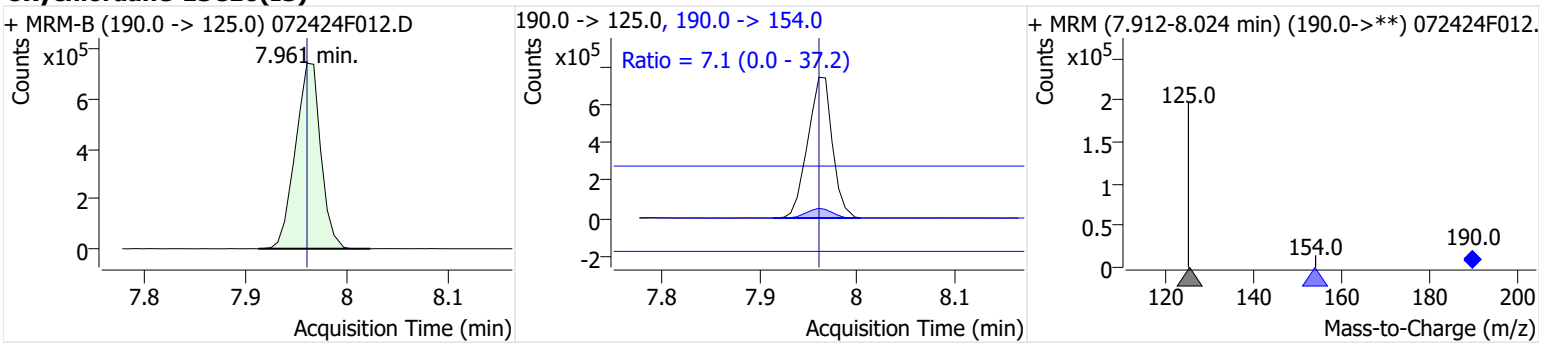
Octachlorostyrene-13C8(IS)



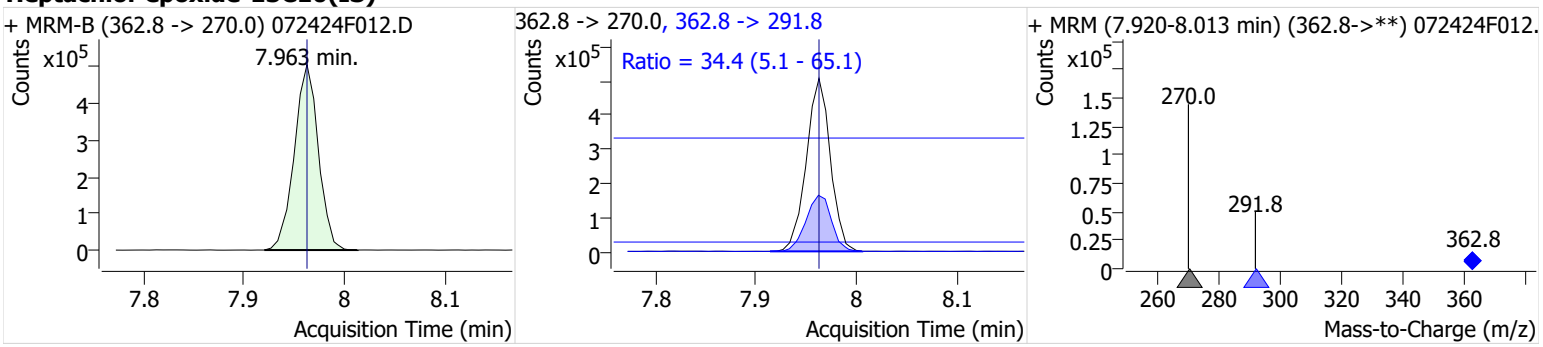
Isodrin-13C12(IS)



Oxychlordane-13C10(IS)



Heptachlor epoxide-13C10(IS)



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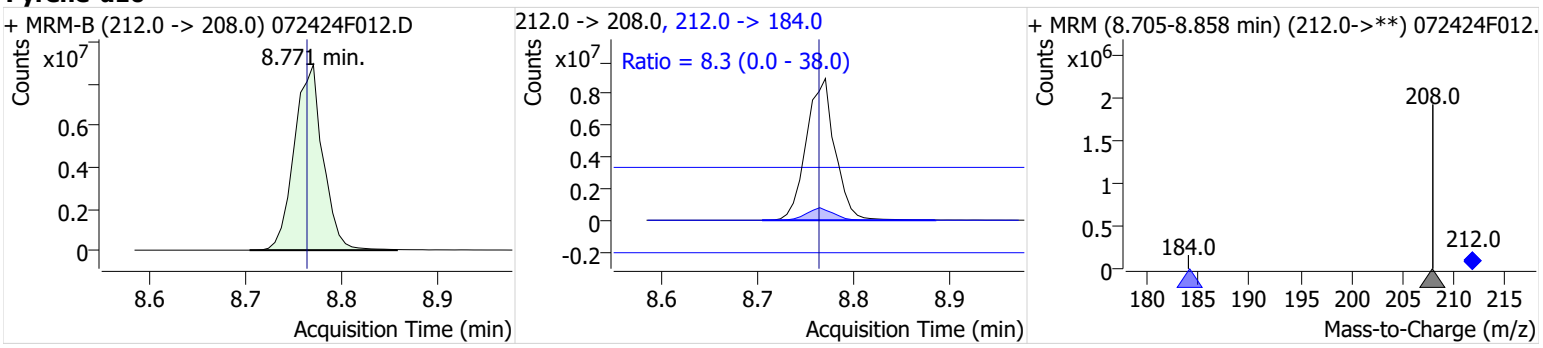
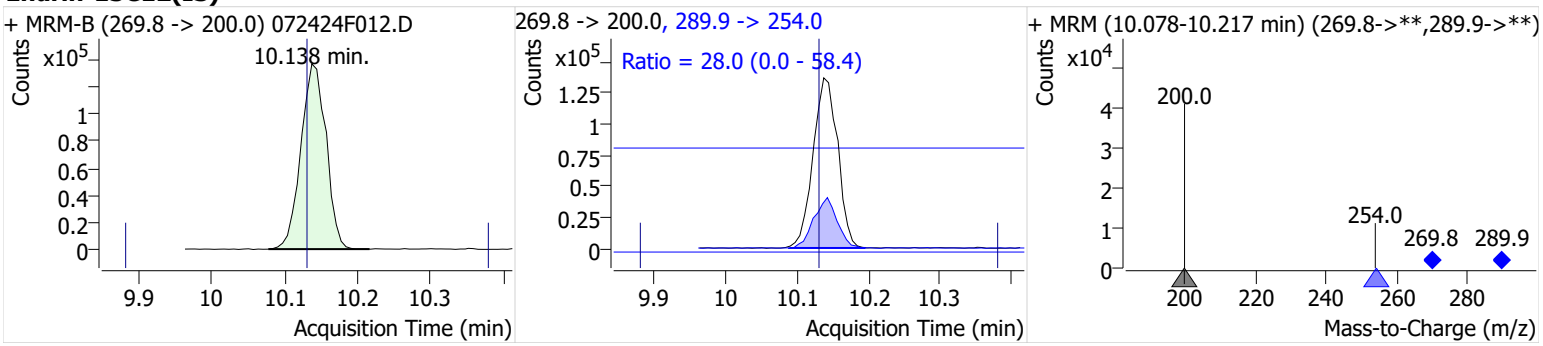
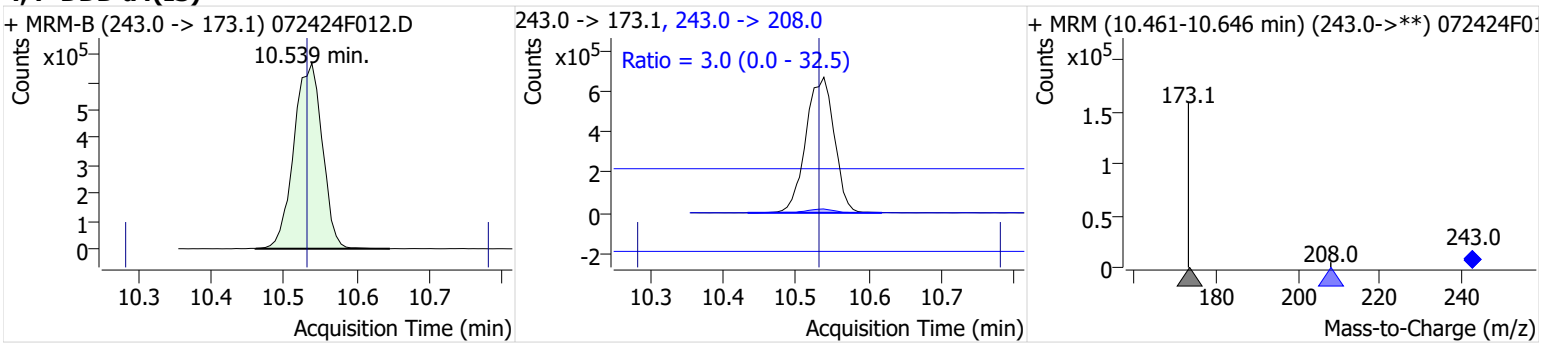
Pyrene-d10



Endrin-13C12(IS)



4,4'-DDD d4(IS)



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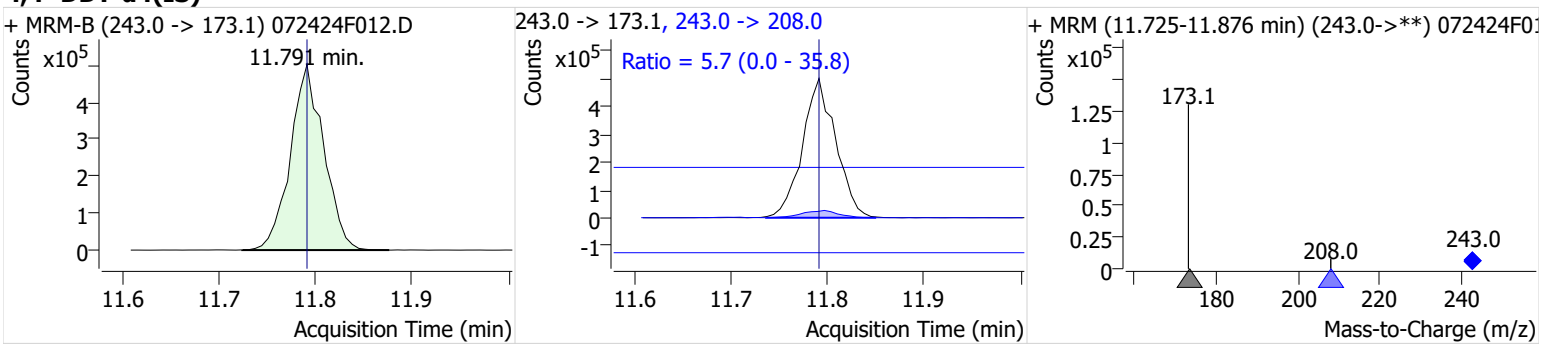
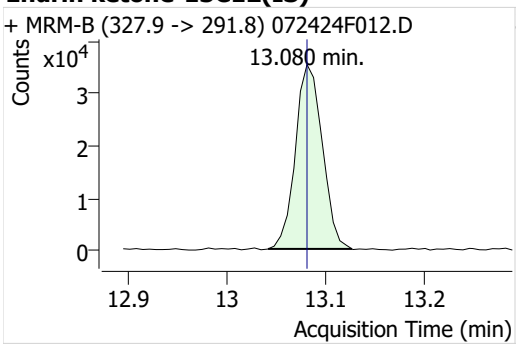
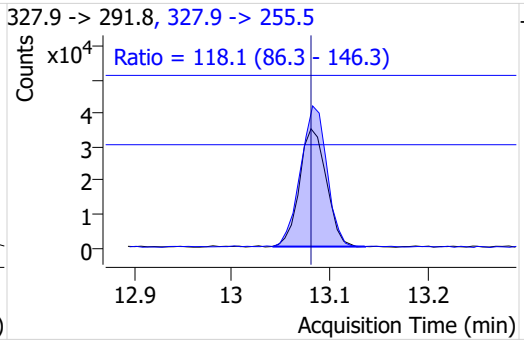
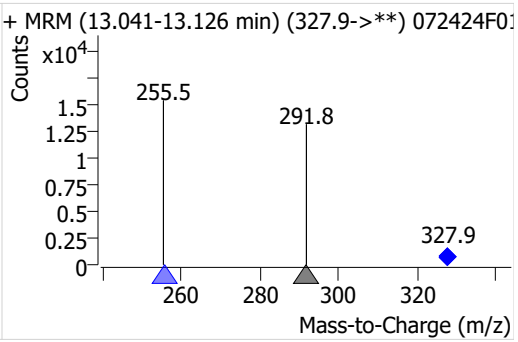


MassHunter Quantitative Analysis Sample Report

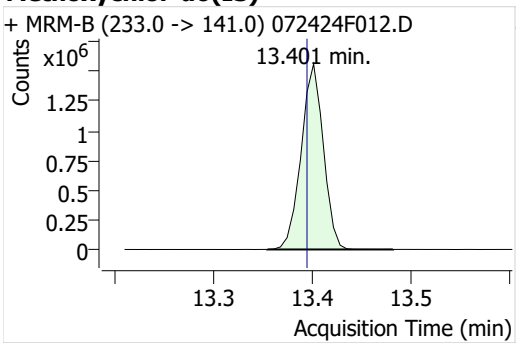
Endrin ketone-13C12(IS)

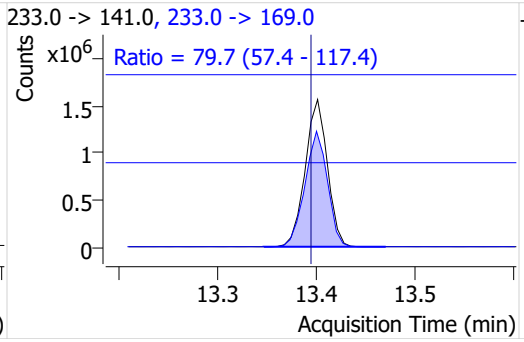


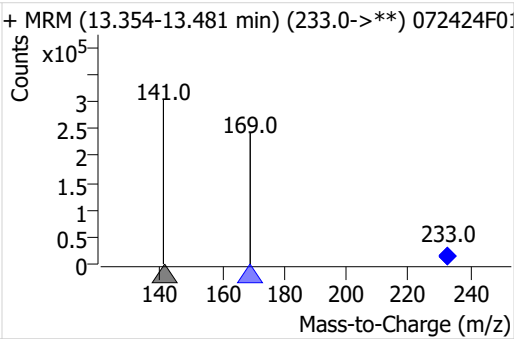




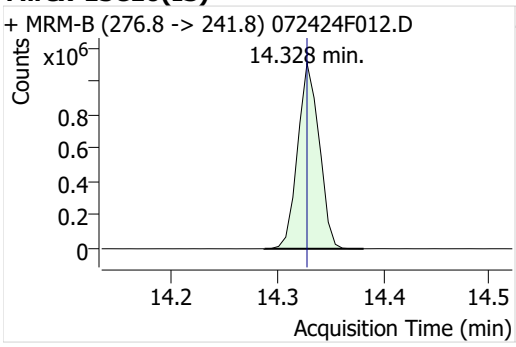
Methoxychlor-d6(IS)

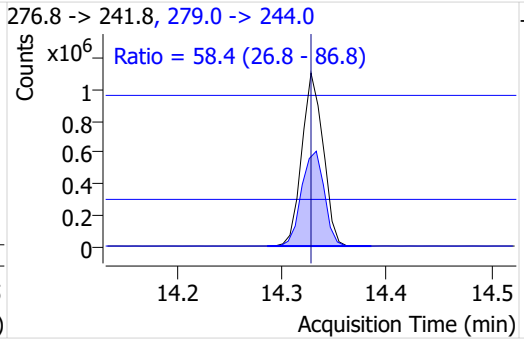


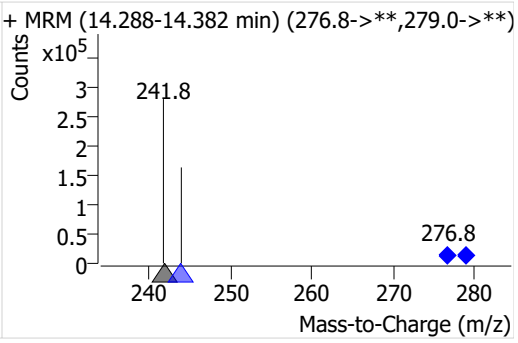




Mirex-13C10(IS)







MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Acq. Date-Time	7/24/2024 6:04:22 PM	**Acq Operator**	EBruno
Name	OC PEST ICAL 2ppb SVM71-30C	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	7/25/2024 7:23:51 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method		**Vial**	5
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.213	289.8 -> 254.8	5103927	20.0000 ng/ml	0.002
γ-BHC-d6(IS)	5.490	223.9 -> 187.0	5433471	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	6.565	276.8 -> 241.8	3240174	20.0000 ng/ml	0.006
Chorpyrifos-d10(IS)	6.941	199.9 -> 171.9	1434383	20.0000 ng/ml	0.004
Aldrin-13C(IS)	7.207	269.8 -> 200.0	2638224	20.0000 ng/ml	0.001
Octachlorostyrene-13C8(IS)	7.729	315.8 -> 245.8	2336107	20.0000 ng/ml	0.001
Isodrin-13C12(IS)	7.789	199.9 -> 130.1	2774204	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	7.967	190.0 -> 125.0	1496888	20.0000 ng/ml	0.003
Heptachlor epoxide-13C10(IS)	7.963	362.8 -> 270.0	940907	20.0000 ng/ml	0.000
Pyrene-d10	8.771	212.0 -> 208.0	21928760	100.0000 ng/ml	0.004
Endrin-13C12(IS)	10.138	269.8 -> 200.0	374902	20.0000 ng/ml	0.006
4,4'-DDD d4(IS)	10.539	243.0 -> 173.1	2179090	5.0000 ng/ml	0.003
4,4'-DDT-d4(IS)	11.791	243.0 -> 173.1	1355779	5.0000 ng/ml	0.001
Endrin ketone-13C12(IS)	13.080	327.9 -> 291.8	72845	20.0000 ng/ml	0.001
Methoxychlor-d6(IS)	13.394	233.0 -> 141.0	2990212	20.0000 ng/ml	0.003
Mirex-13C10(IS)	14.328	276.8 -> 241.8	1815461	5.0000 ng/ml	0.001

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	5103927	18.432 ng/ml	
		Spiked Amount =	20.0	Recovery =	*92.2 %*
γ-BHC-d6	5.491	223.9 -> 187.0	5433471	19.364 ng/ml	
		Spiked Amount =	20.0	Recovery =	*96.8 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	3240174	20.100 ng/ml	
		Spiked Amount =	20.0	Recovery =	*100.5 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	1434383	20.761 ng/ml	
		Spiked Amount =	20.0	Recovery =	*103.8 %*
Aldrin-13C	7.207	269.8 -> 200.0	2640601	21.649 ng/ml	
		Spiked Amount =	20.0	Recovery =	*108.2 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	2336107	21.251 ng/ml	
		Spiked Amount =	20.0	Recovery =	*106.3 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2774204	21.222 ng/ml	
		Spiked Amount =	20.0	Recovery =	*106.1 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1496888	19.311 ng/ml	
		Spiked Amount =	20.0	Recovery =	*96.6 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	940907	21.445 ng/ml	
		Spiked Amount =	20.0	Recovery =	*107.2 %*
Endrin-13C12	10.131	269.8 -> 200.0	374902	20.053 ng/ml	
		Spiked Amount =	20.0	Recovery =	*100.3 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	2179090	4.694 ng/ml	
		Spiked Amount =	5.0	Recovery =	*93.9 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1355779	4.742 ng/ml	
		Spiked Amount =	5.0	Recovery =	*94.8 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	72845	18.459 ng/ml	
		Spiked Amount =	20.0	Recovery =	*92.3 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	2990212	18.857 ng/ml	
		Spiked Amount =	20.0	Recovery =	*94.3 %*

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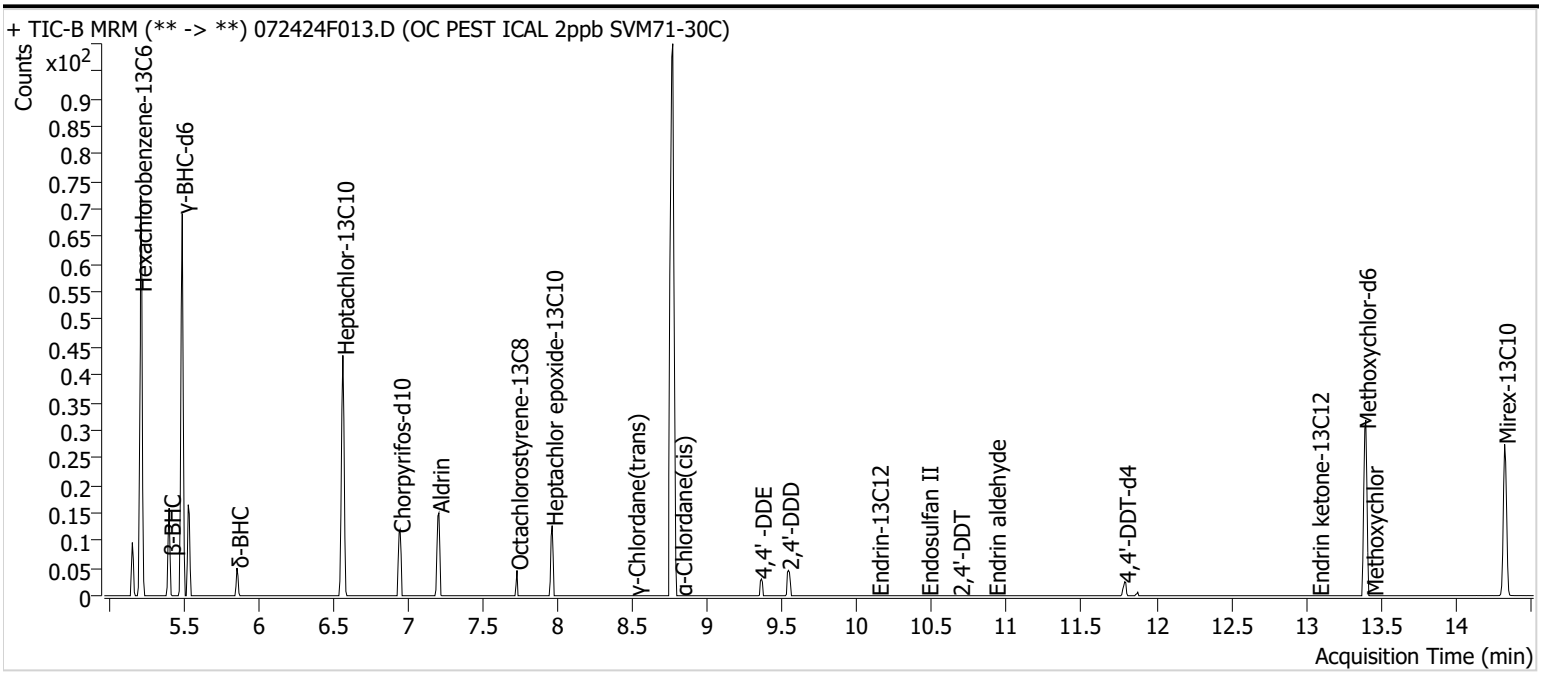
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	1815461	4.305 ng/ml
		Spiked Amount = 5.0		Recovery = *86.1 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.163	181.1 -> 145.1	653635	1.706 ng/ml	92
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.214	283.8 -> 213.9	814149	2.090 ng/ml	96
β-BHC	γ-BHC-d6(IS)	5.408	181.1 -> 145.1	454321	1.771 ng/ml	99
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	560421	1.711 ng/ml	90
δ-BHC	γ-BHC-d6(IS)	5.859	181.1 -> 145.1	437366	1.834 ng/ml	93
Heptachlor	Heptachlor-13C10(IS)	6.569	271.7 -> 236.9	358554	2.057 ng/ml	41
Chorpyrifos	Chorpyrifos-d10(IS)	7.019	196.9 -> 169.0	178620	1.830 ng/ml	100
Aldrin	Aldrin-13C(IS)	7.202	254.9 -> 220.0	335929	2.266 ng/ml	21
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.735	342.8 -> 307.8	548078	1.909 ng/ml	97
Isodrin	Isodrin-13C12(IS)	7.796	193.0 -> 123.0	253089	1.737 ng/ml	99
Oxychlordane	Oxychlordane-13C10(IS)	7.968	114.9 -> 51.1	363033	1.877 ng/ml	95
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.971	352.8 -> 262.9	87689	1.760 ng/ml	99
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.510	271.8 -> 236.9	147003	1.869 ng/ml	87
2,4'-DDE	4,4'-DDD d4(IS)	8.527	246.0 -> 176.2	1544942	1.984 ng/ml	98
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.823	271.8 -> 236.9	176748	1.858 ng/ml	90
Endosulfan I	Endrin-13C12(IS)	8.847	206.9 -> 172.0	57633	1.710 ng/ml	94
trans-Nanochlor	Oxychlordane-13C10(IS)	8.891	271.8 -> 236.9	130948	1.935 ng/ml	97
4,4' -DDE	4,4'-DDD d4(IS)	9.357	246.0 -> 176.2	1086618	1.958 ng/ml	98
Dieldrin	Endrin-13C12(IS)	9.555	262.9 -> 193.0	71251	1.705 ng/ml	98
2,4'-DDD	4,4'-DDD d4(IS)	9.540	235.0 -> 165.1	1212336	1.938 ng/ml	97
Endrin	Endrin-13C12(IS)	10.153	262.8 -> 193.0	42439	1.832 ng/ml	100
Endosulfan II	Endrin-13C12(IS)	10.471	206.9 -> 172.0	32529	1.818 ng/ml	97
cis-Nonachlor	Oxychlordane-13C10(IS)	10.598	271.8 -> 236.9	102677	1.765 ng/ml	93
4,4'-DDD	4,4'-DDD d4(IS)	10.601	235.0 -> 165.1	820773	1.779 ng/ml	96
2,4'-DDT	4,4'-DDT-d4(IS)	10.682	235.0 -> 165.1	734483	1.850 ng/ml	95
Endrin aldehyde	Endrin-13C12(IS)	10.920	249.9 -> 214.9	10813	1.634 ng/ml	98
Endosulfan sulfate	Endrin-13C12(IS)	11.702	271.9 -> 237.0	83092	1.766 ng/ml	96
4,4'-DDT	4,4'-DDT-d4(IS)	11.881	235.0 -> 165.1	568721	1.853 ng/ml	95
Endrin ketone	Endrin ketone-13C12(IS)	13.085	147.0 -> 111.0	31945	1.954 ng/ml	99
Methoxychlor	Methoxychlor-d6(IS)	13.443	227.0 -> 141.1	274744	1.763 ng/ml	94
Mirex	Mirex-13C10(IS)	14.336	271.8 -> 236.8	828175	2.214 ng/ml	91

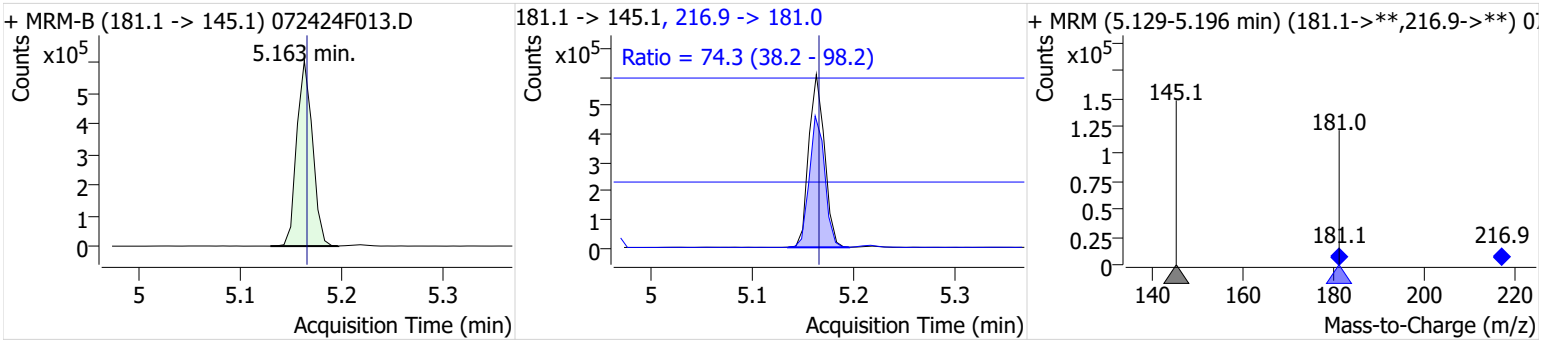
(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram

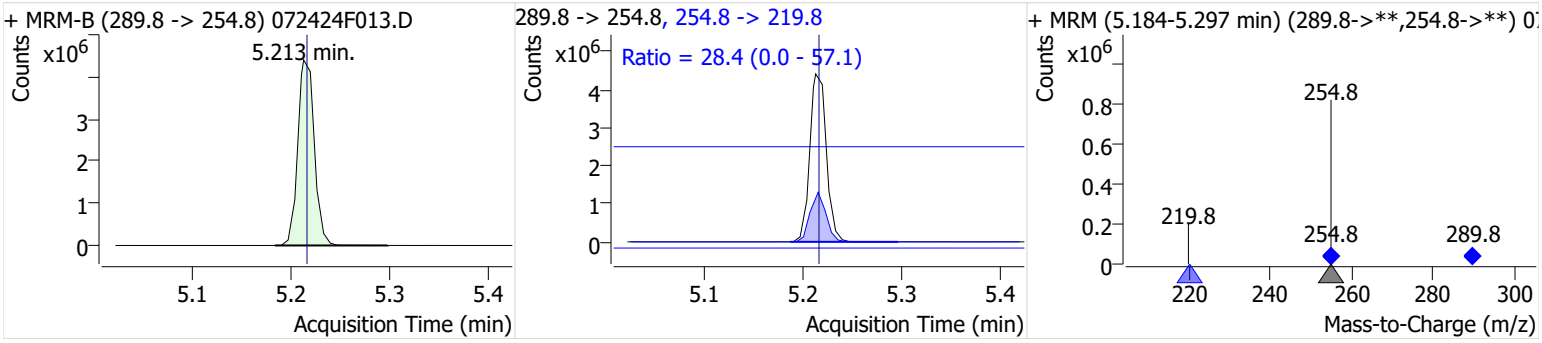
MassHunter Quantitative Analysis Sample Report



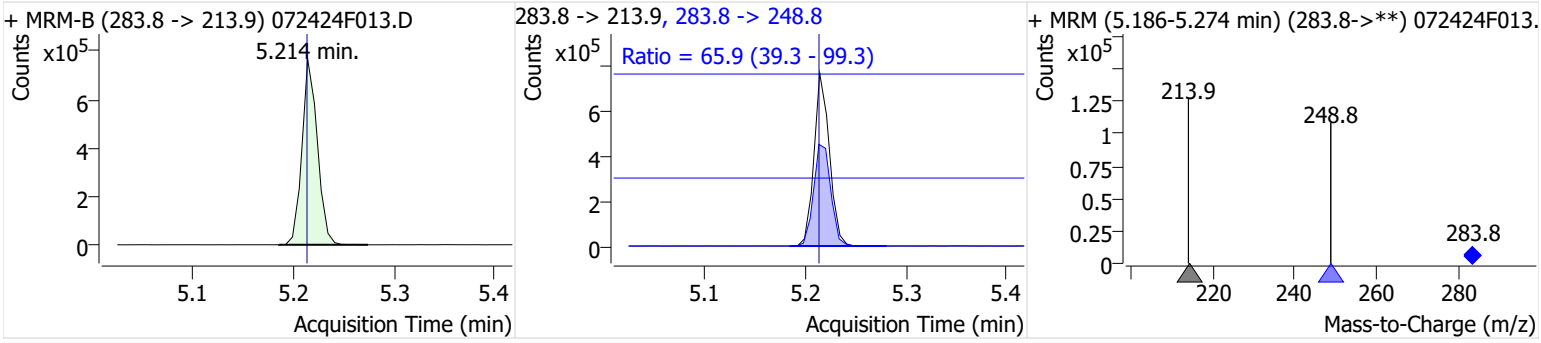
α-BHC



Hexachlorobenzene-13C6



Hexachlorobenzene



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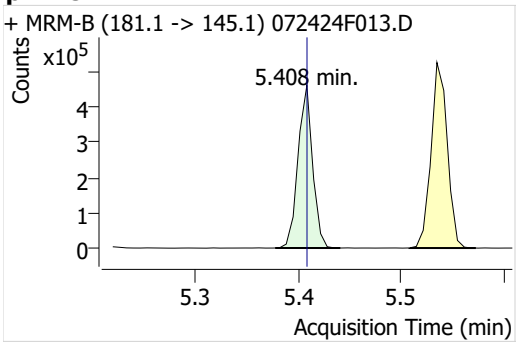
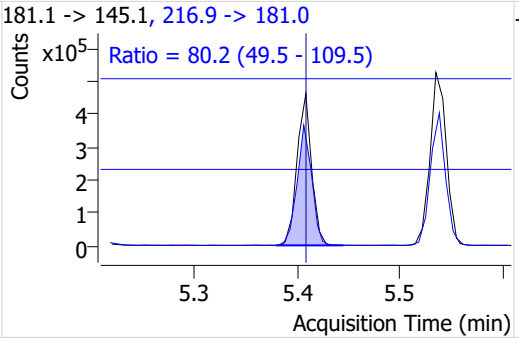
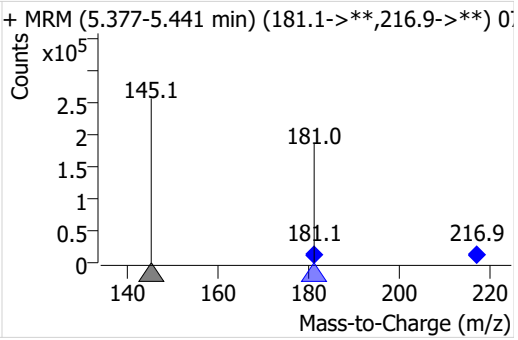
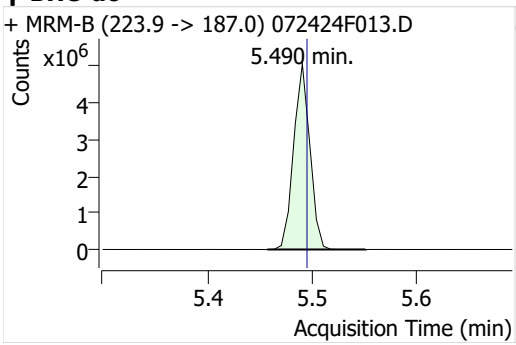
β-BHC

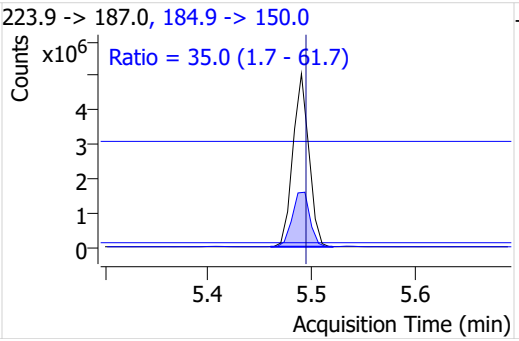


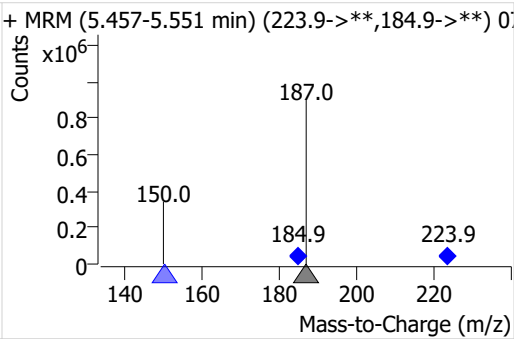




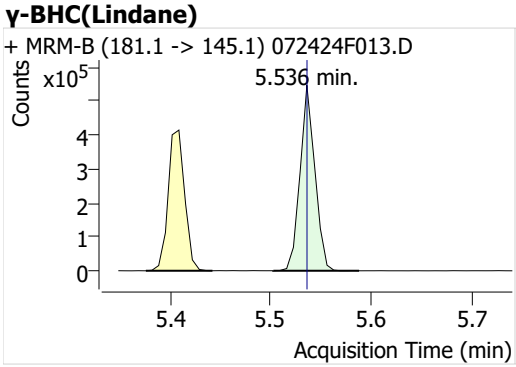
γ-BHC-d6

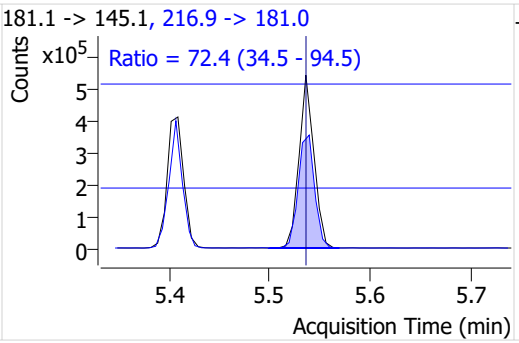


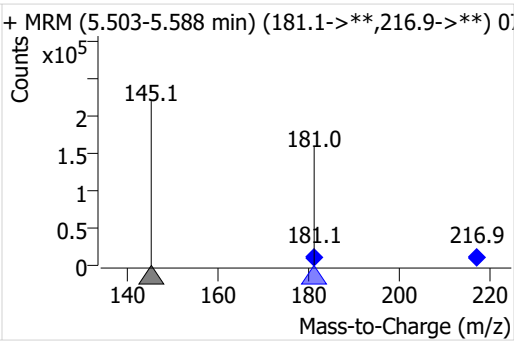




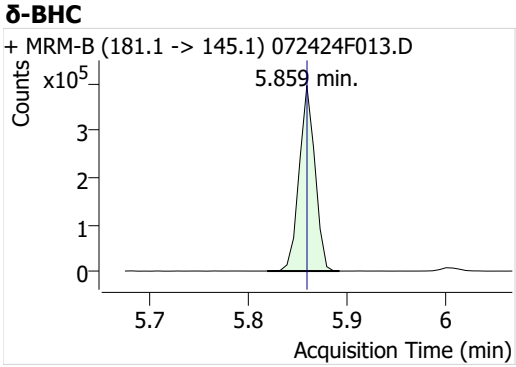
γ-BHC(Lindane)

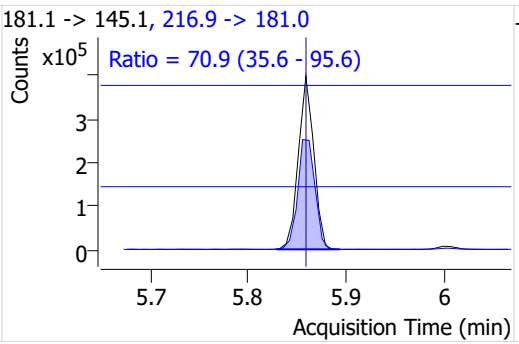


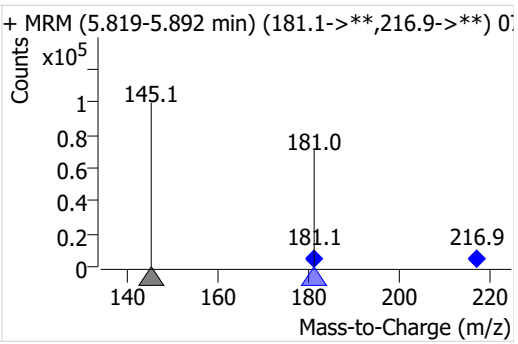




δ-BHC







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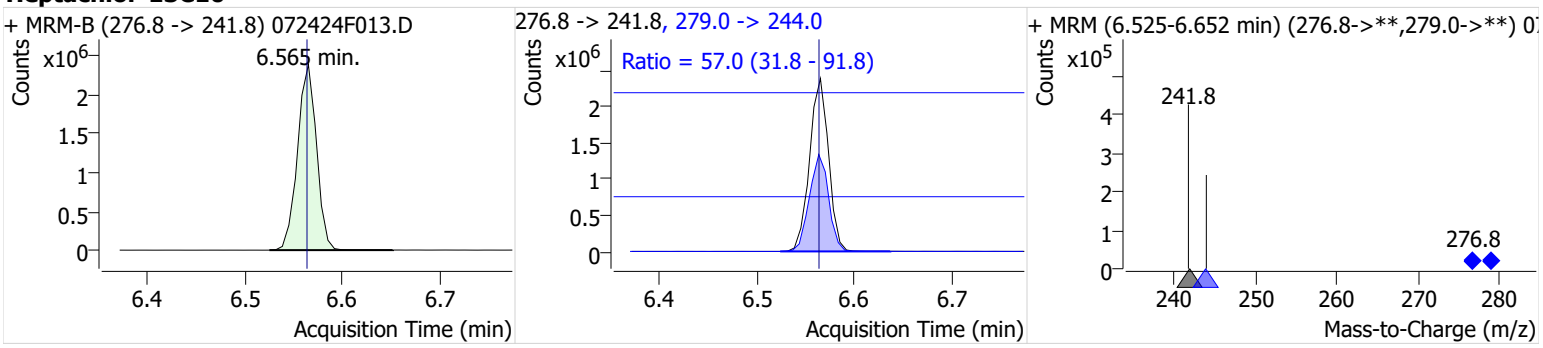
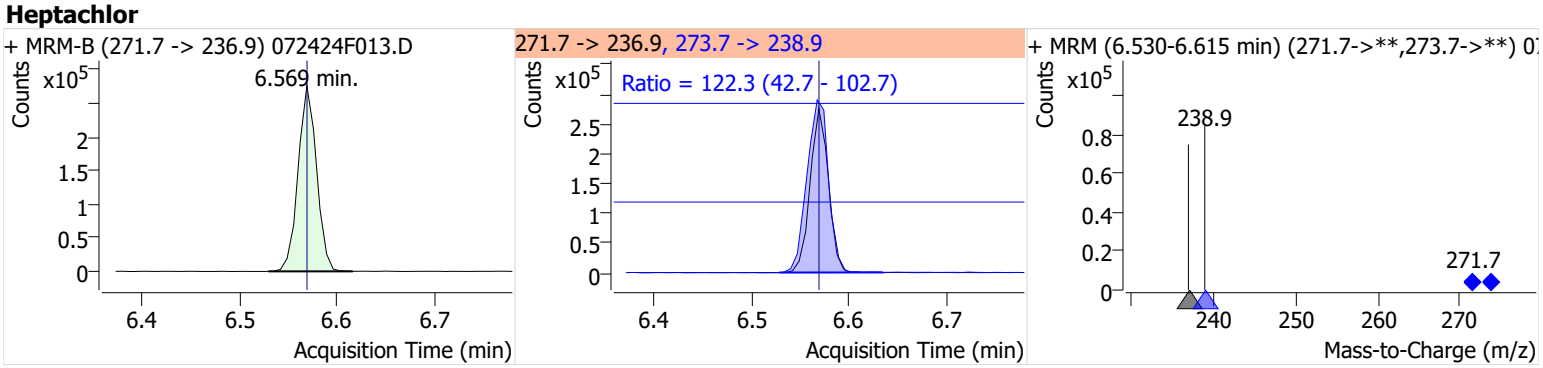
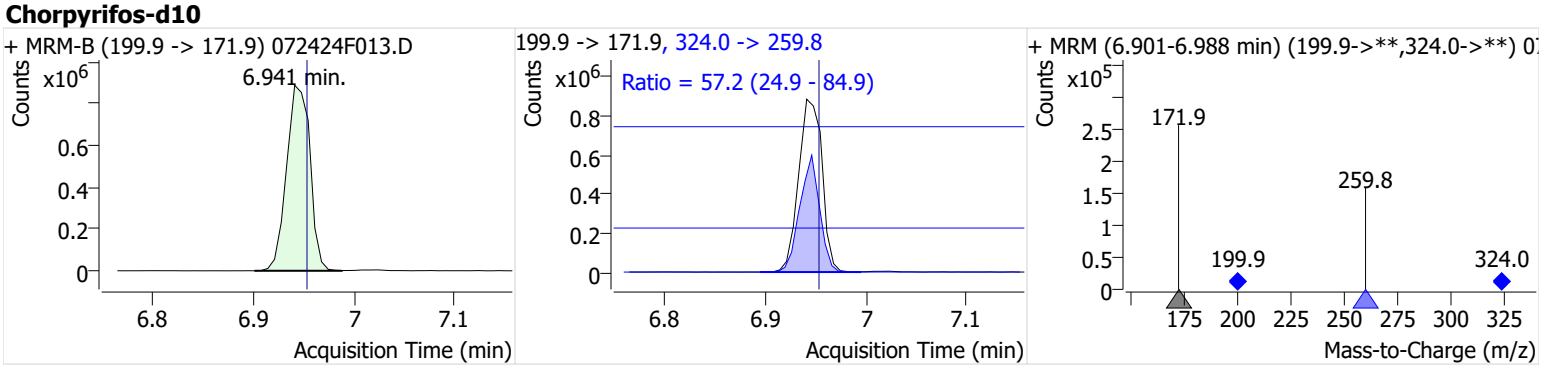
Heptachlor-13C10



Heptachlor



Chorpyrifos-d10



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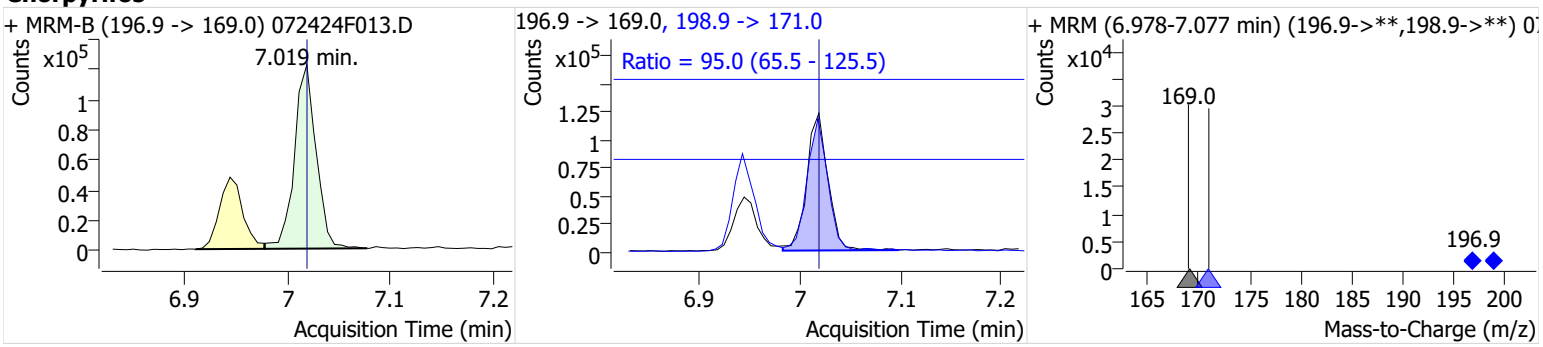

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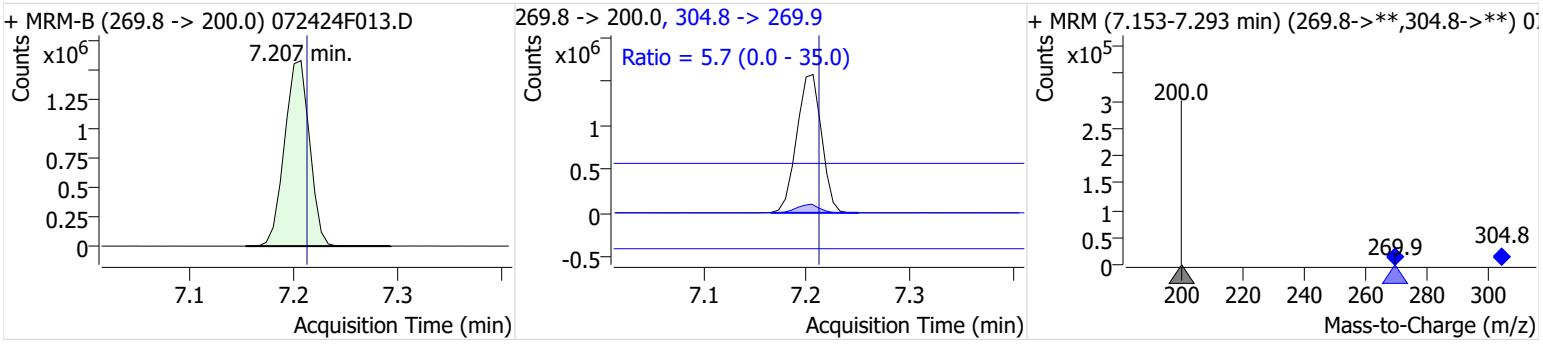
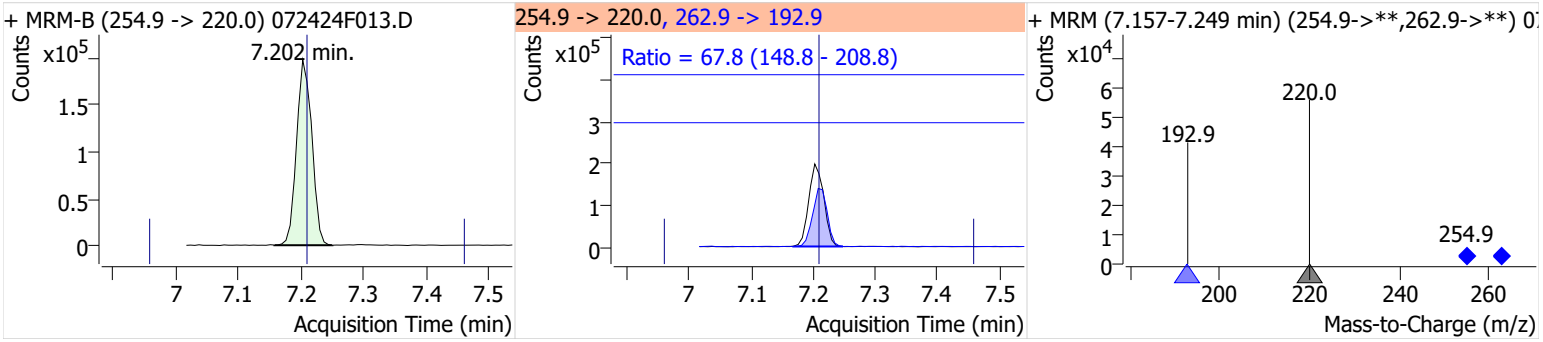
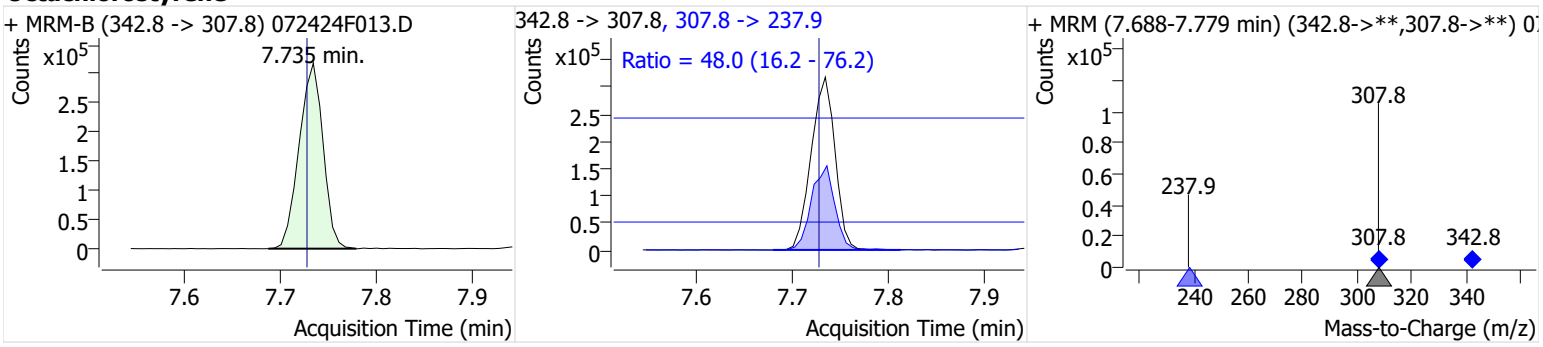
Aldrin-13C



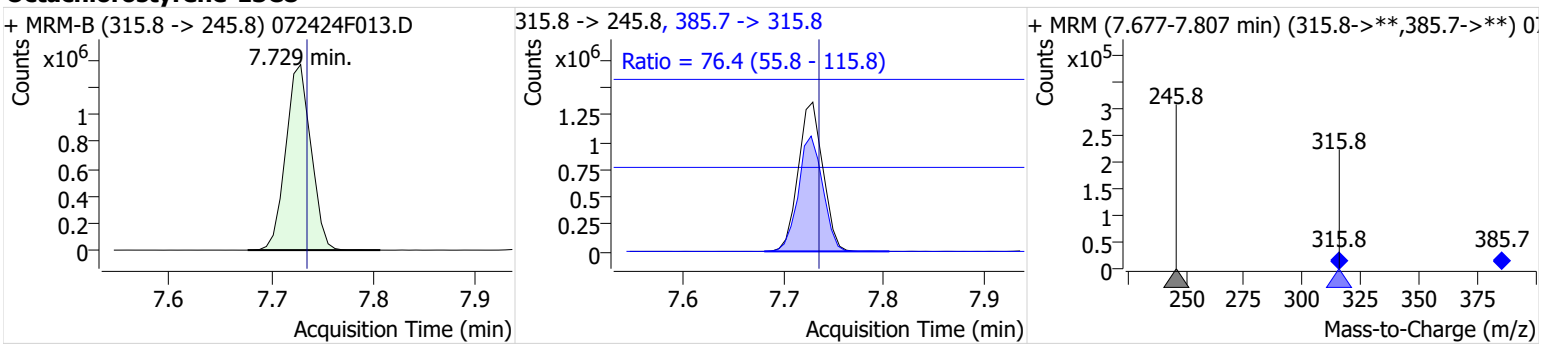
Aldrin



Octachlorostyrene



Octachlorostyrene-13C8



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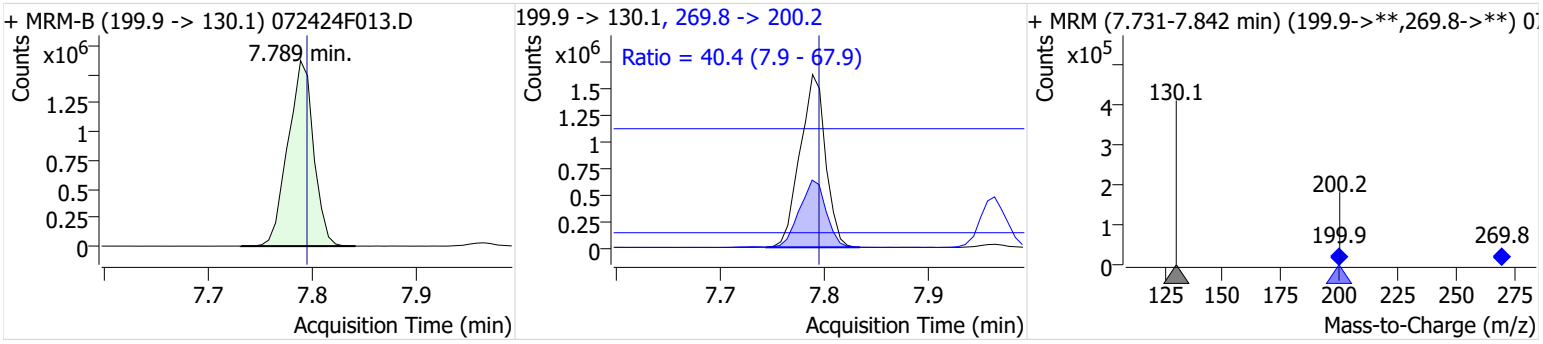
Isodrin-13C12



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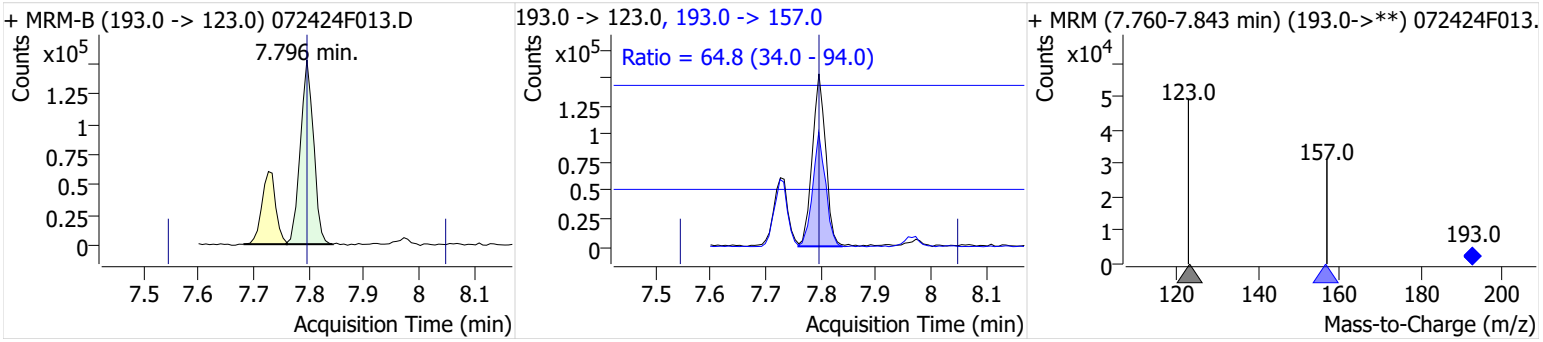
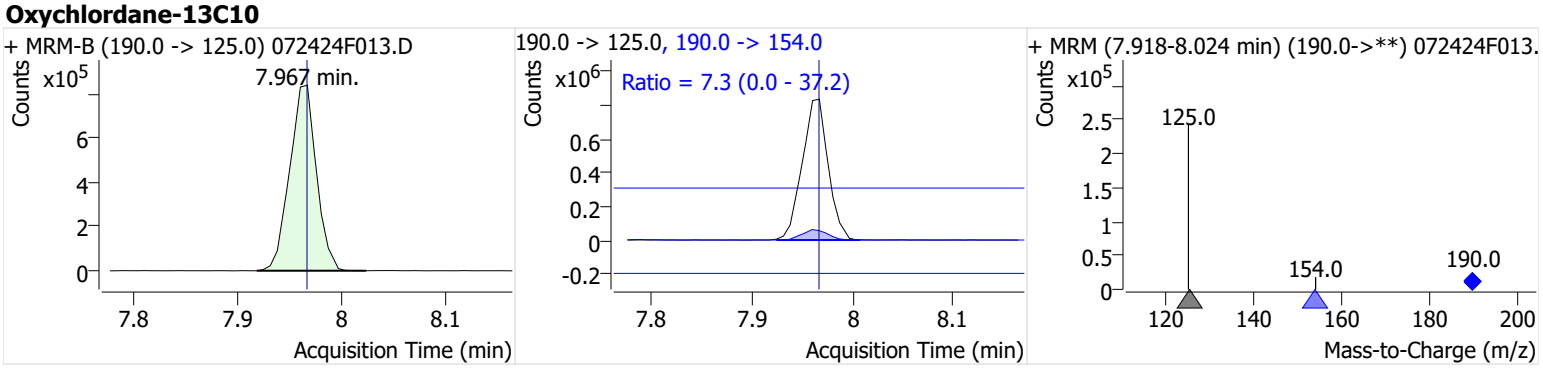
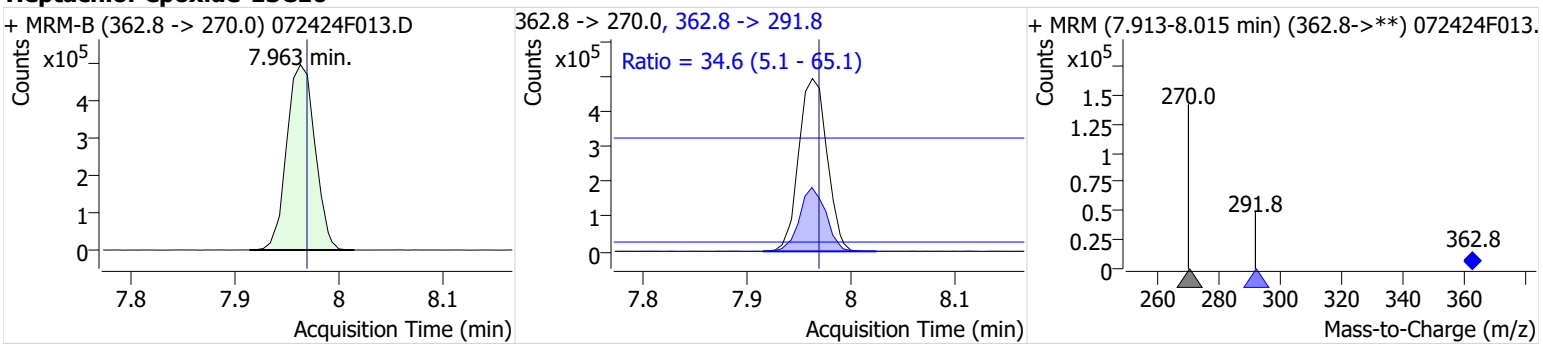


Oxychlordane-13C10



Heptachlor epoxide-13C10



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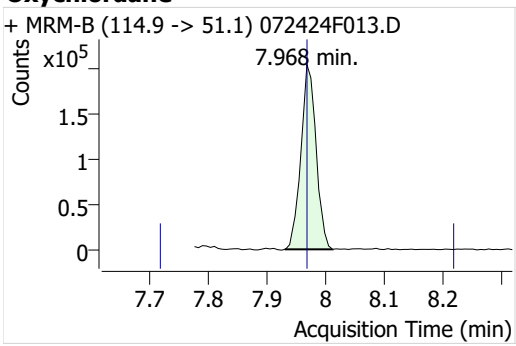
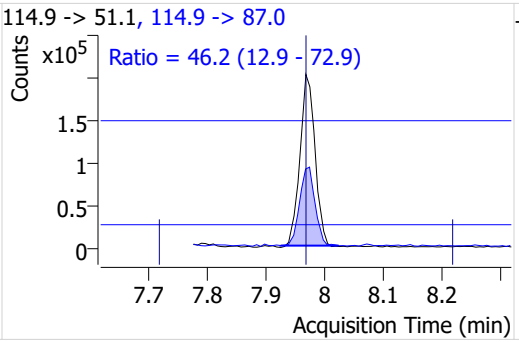
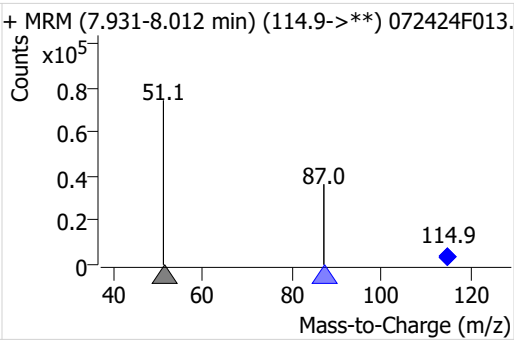
Oxychlordane







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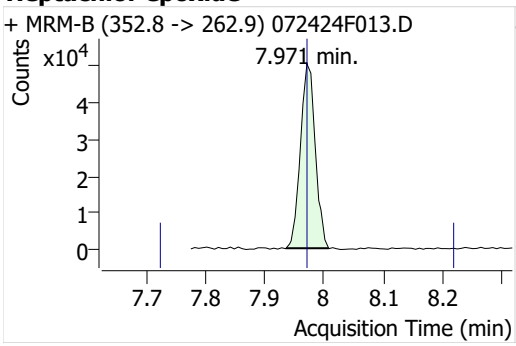
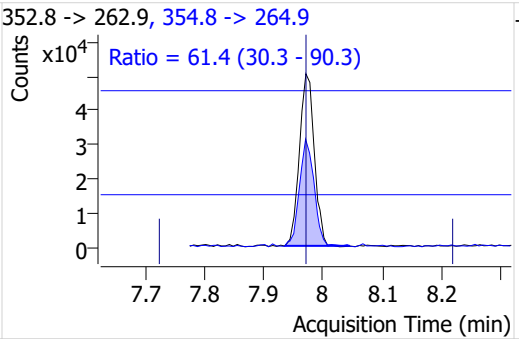
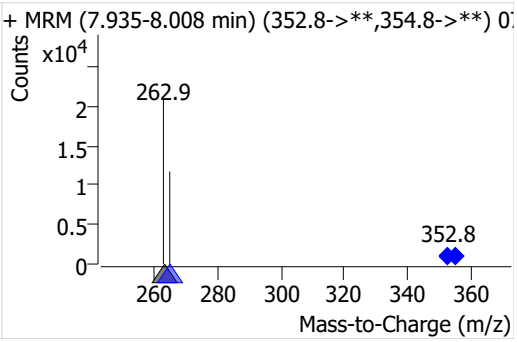
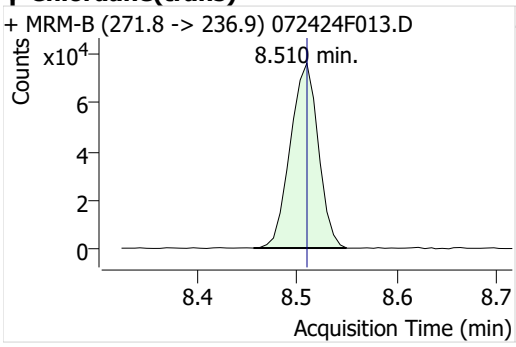
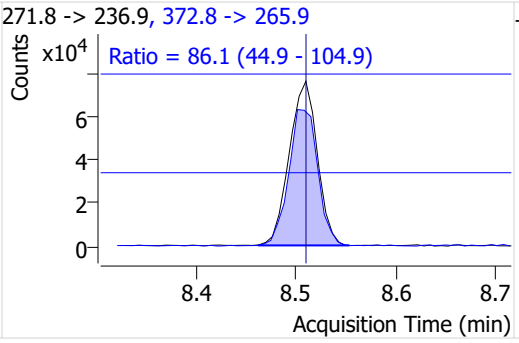


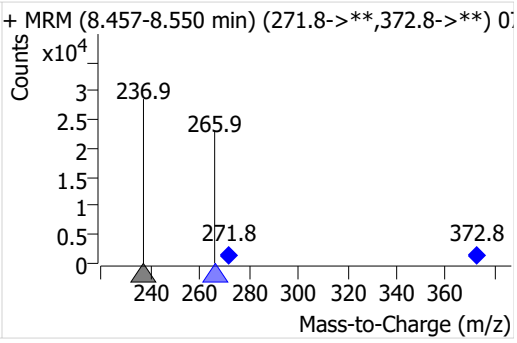




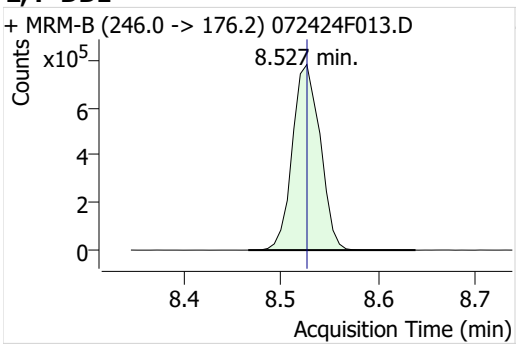
γ-Chlordane(trans)

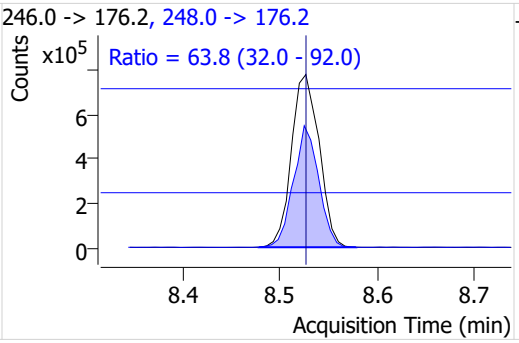


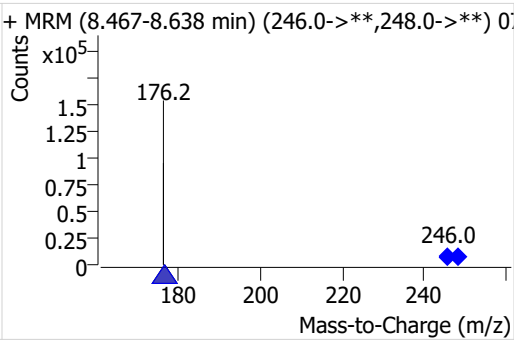




2,4'-DDE







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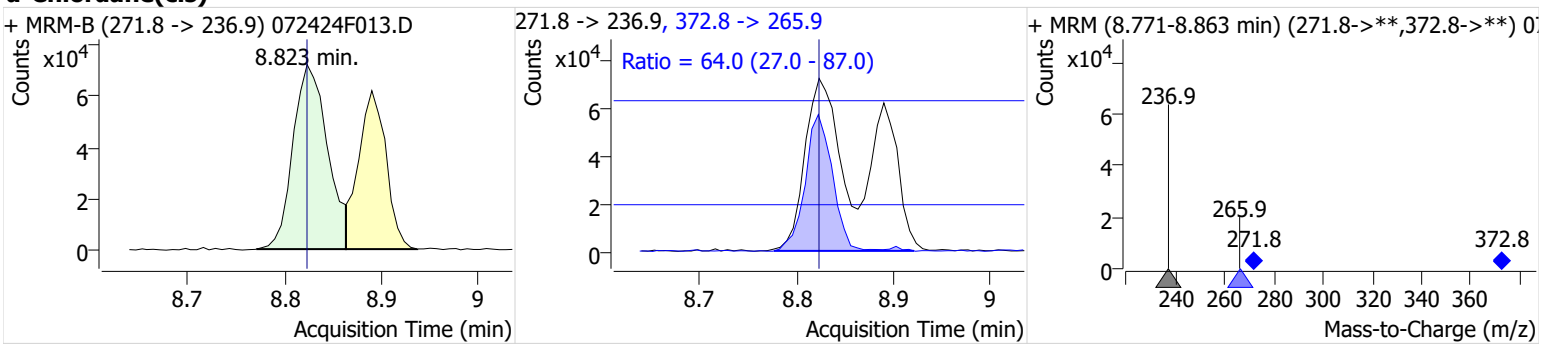
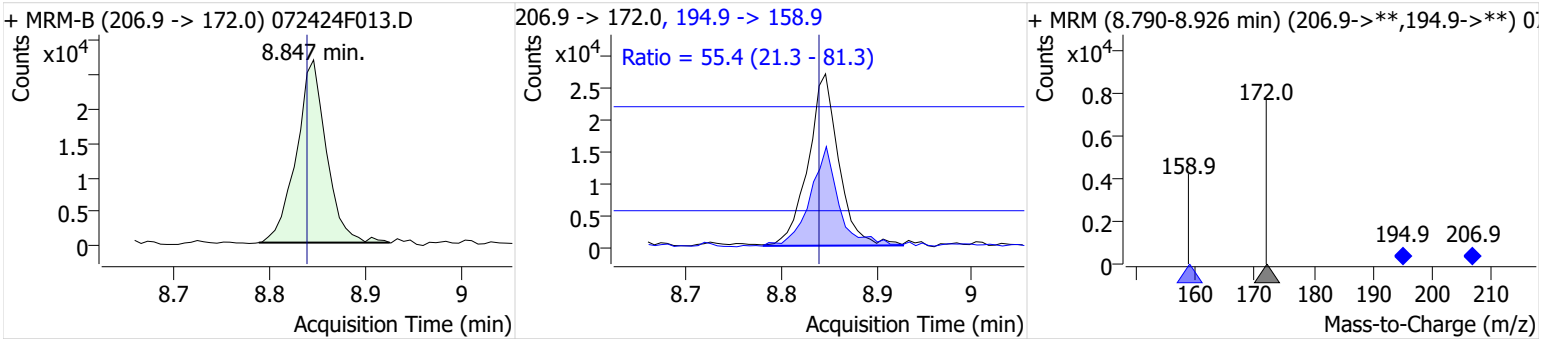
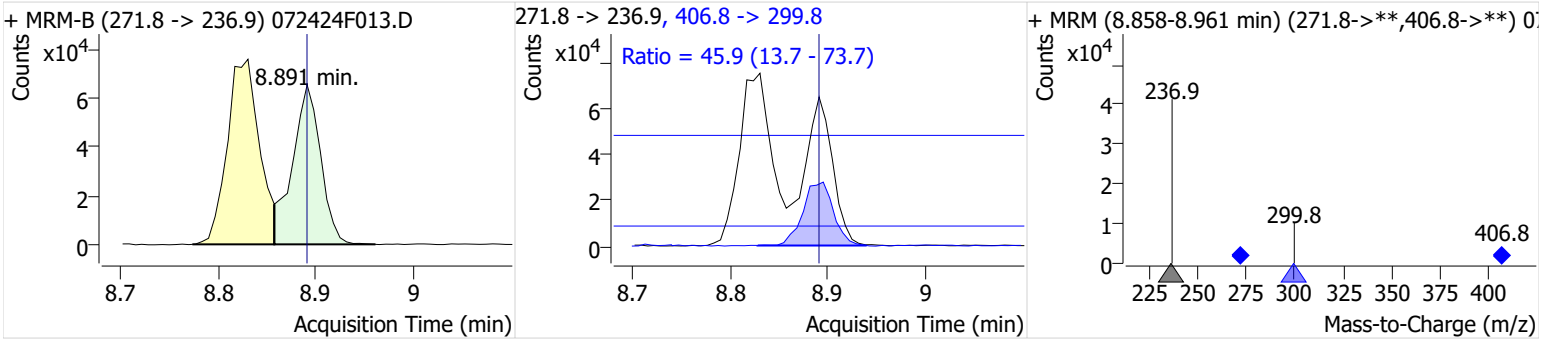


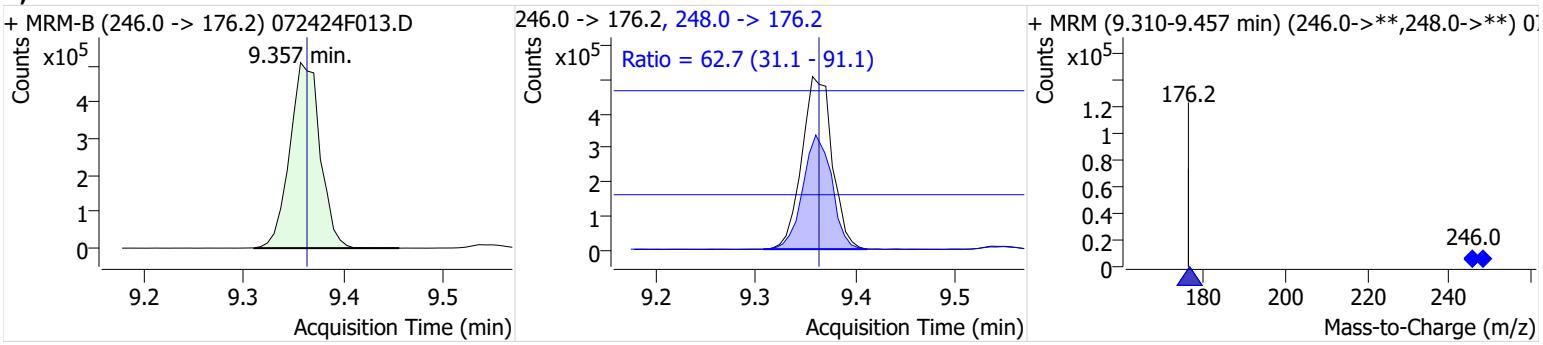
Endosulfan I



trans-Nanochlor



4,4' -DDE



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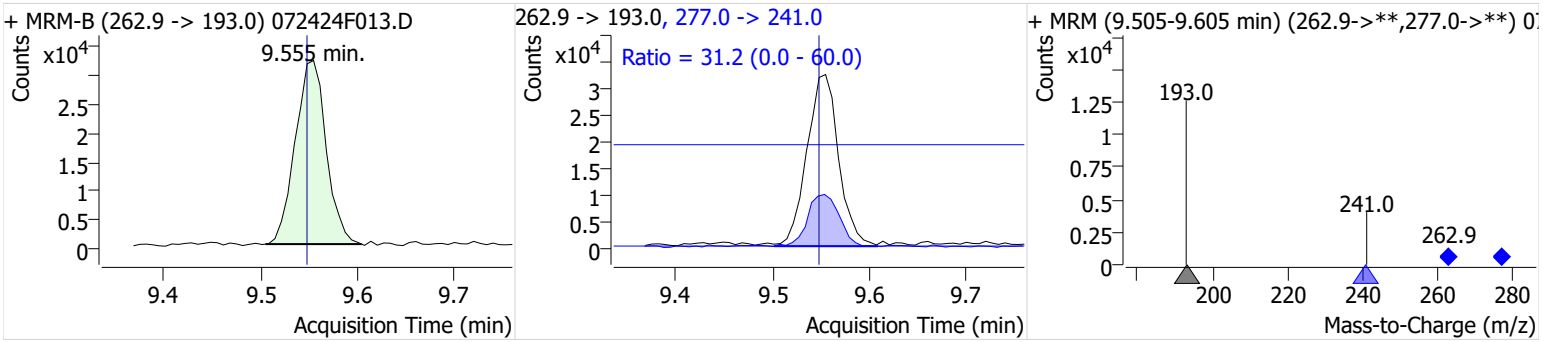
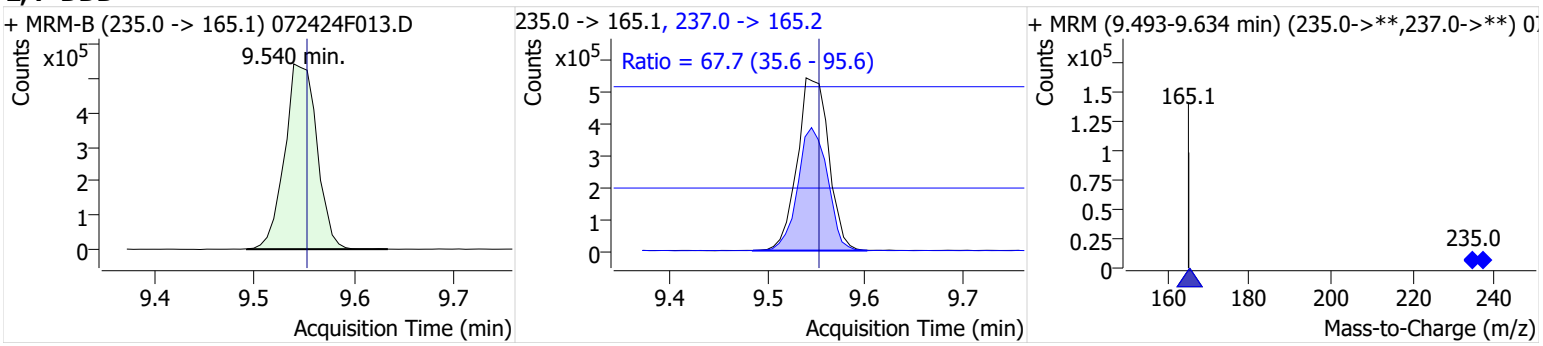
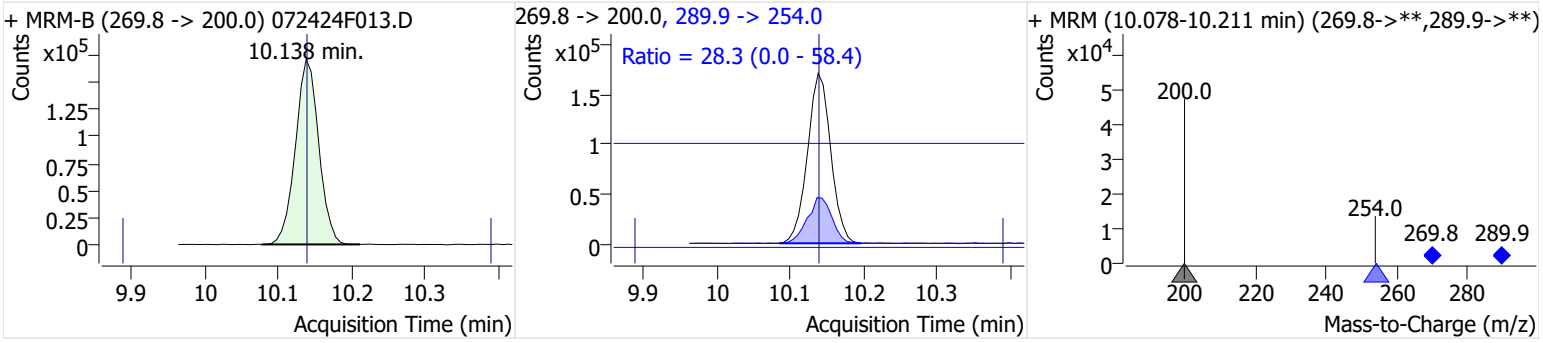
Dieldrin



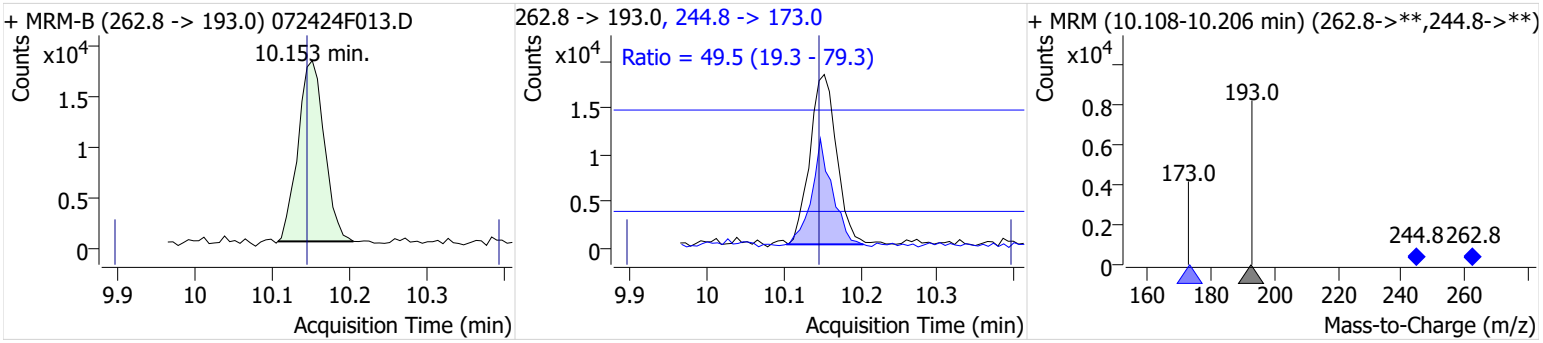
2,4'-DDD



Endrin-13C12



Endrin



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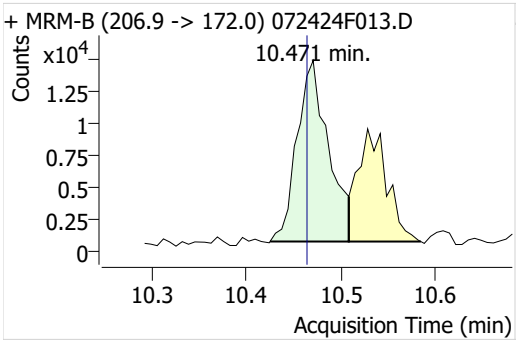
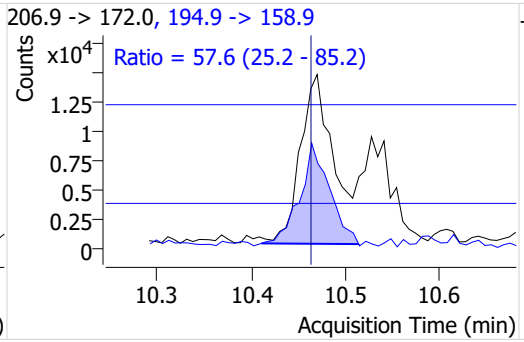
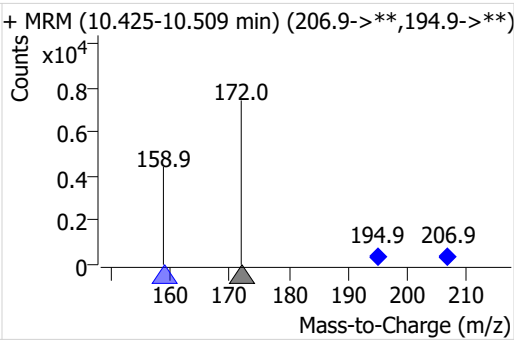
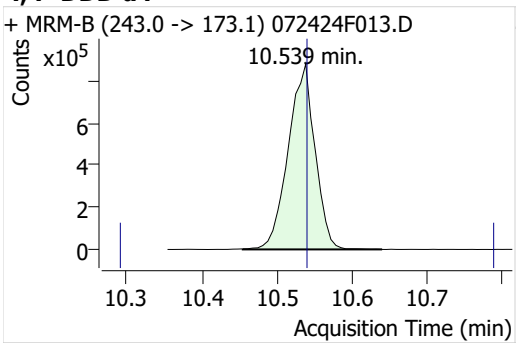
Endosulfan II

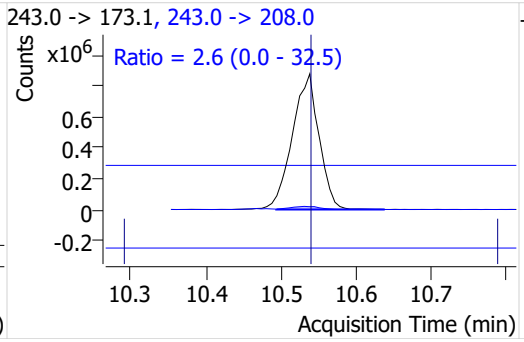


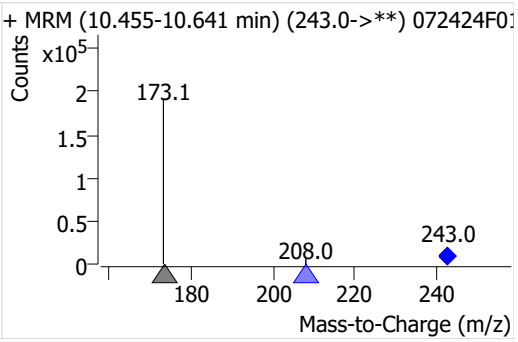




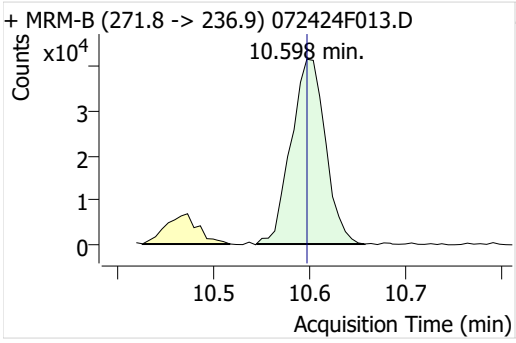
4,4'-DDD d4

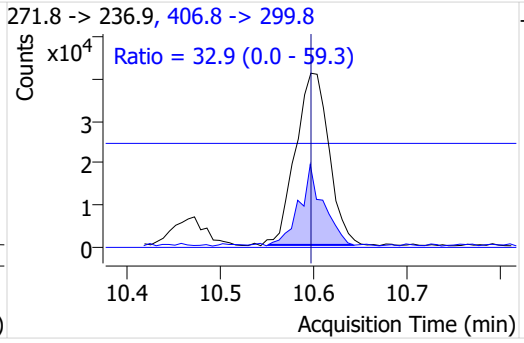


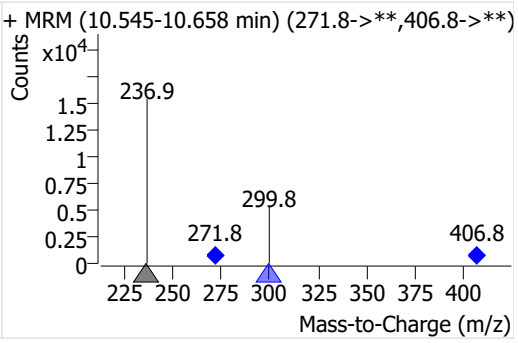




cis-Nonachlor







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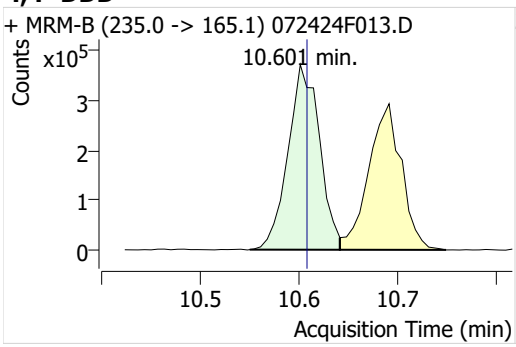

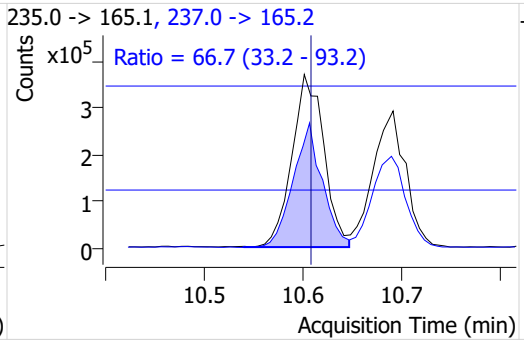

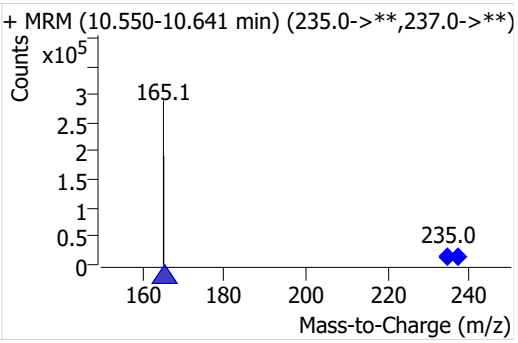

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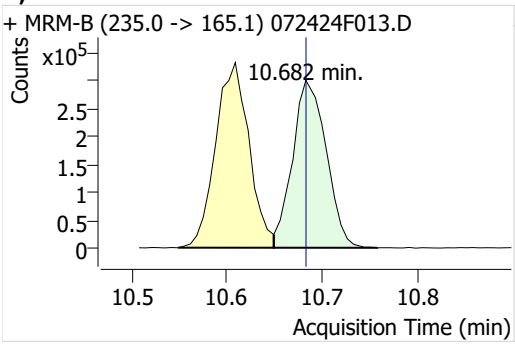
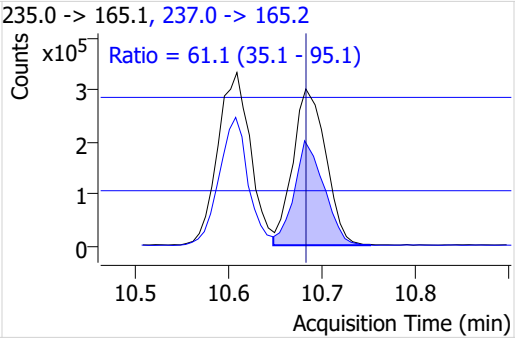
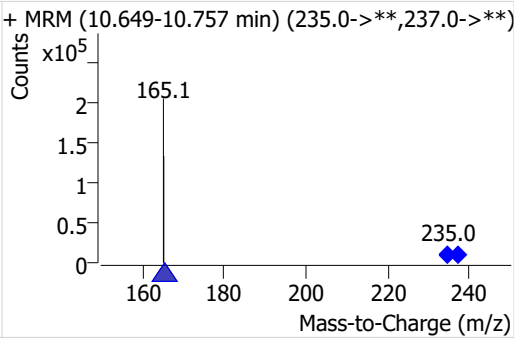
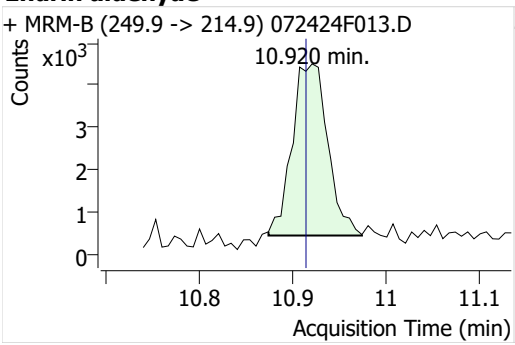
2,4'-DDT

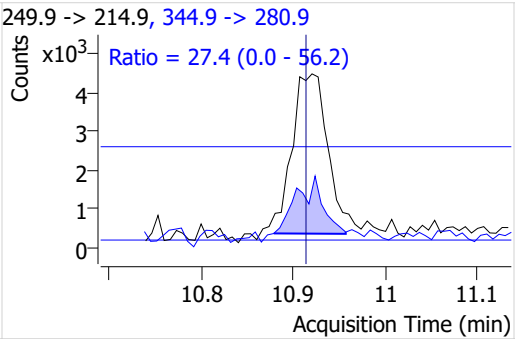


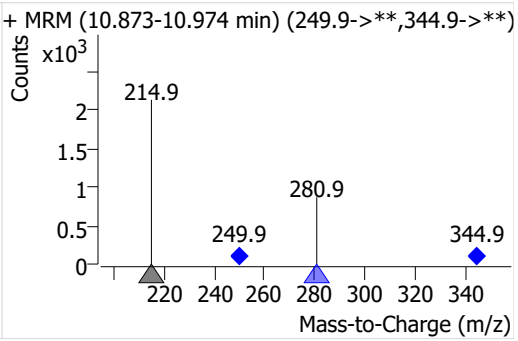




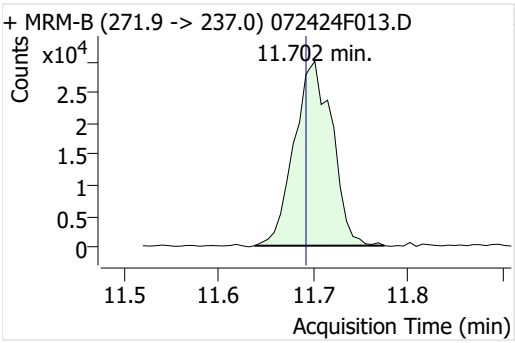
Endrin aldehyde

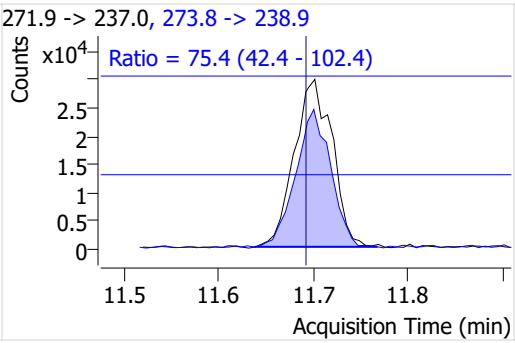


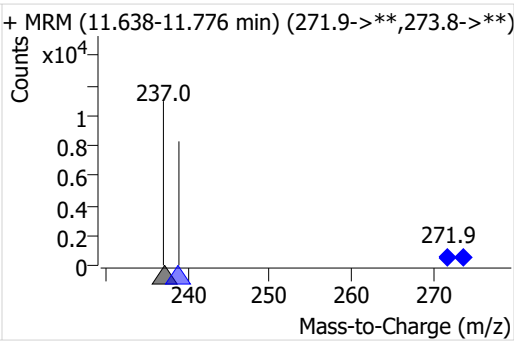




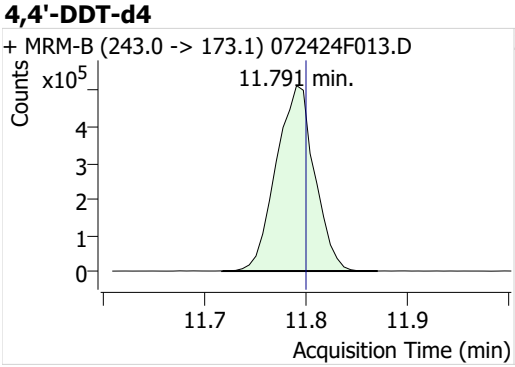
Endosulfan sulfate

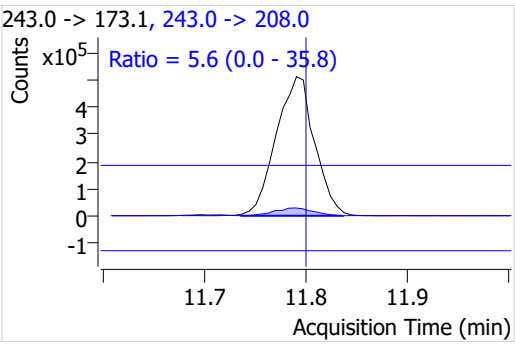


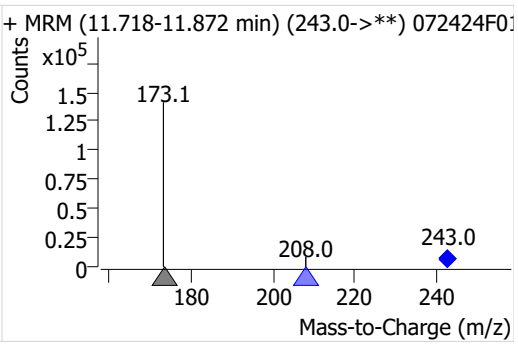




4,4'-DDT-d4







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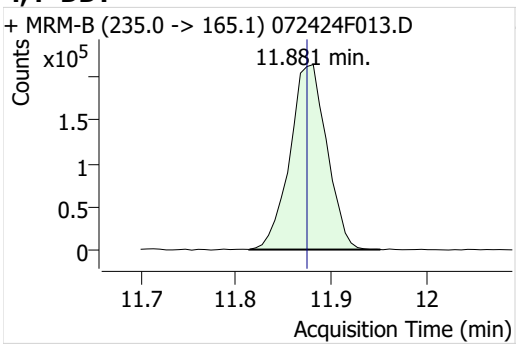
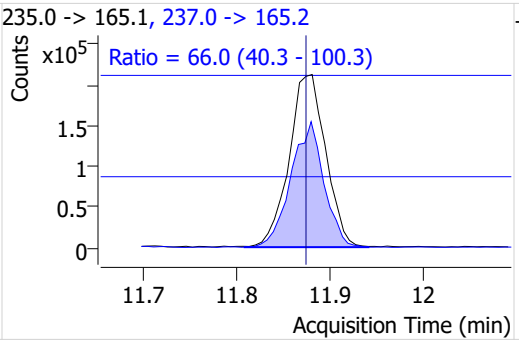
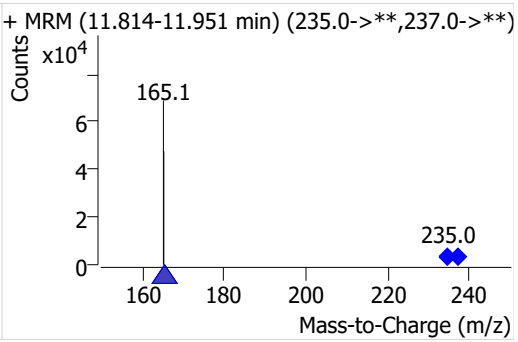
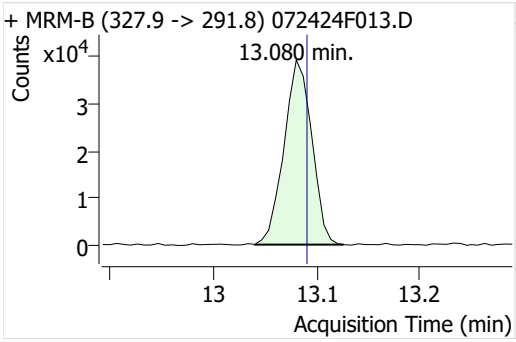
4,4'-DDT

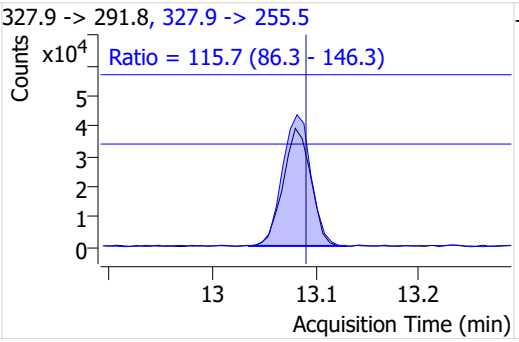


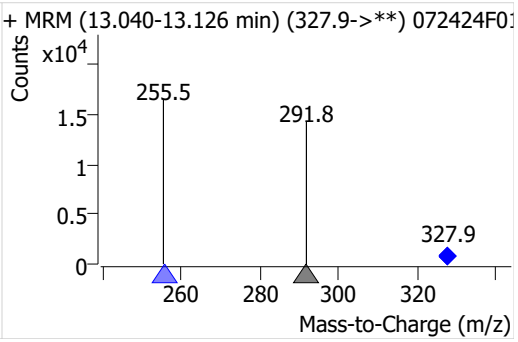




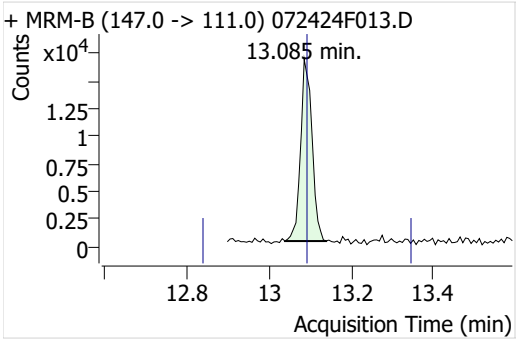
Endrin ketone-13C12

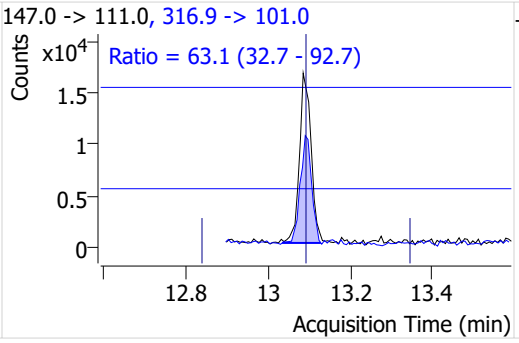


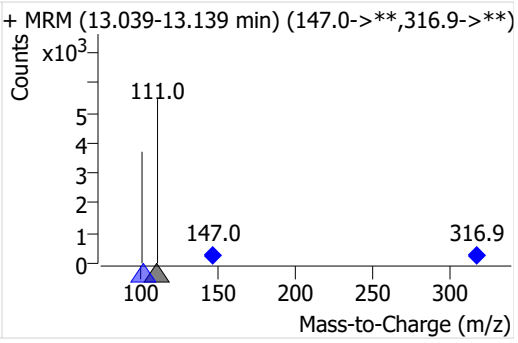




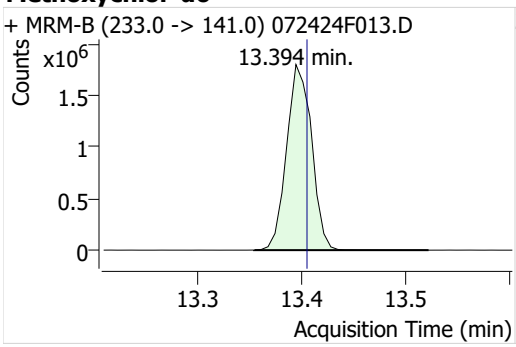
Endrin ketone

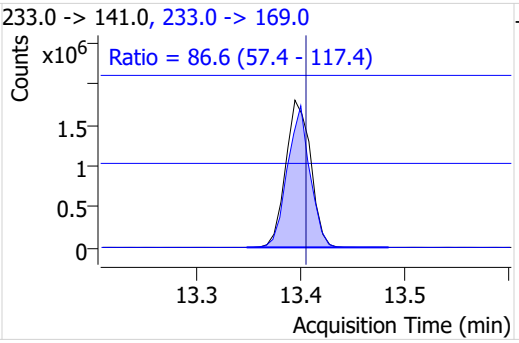


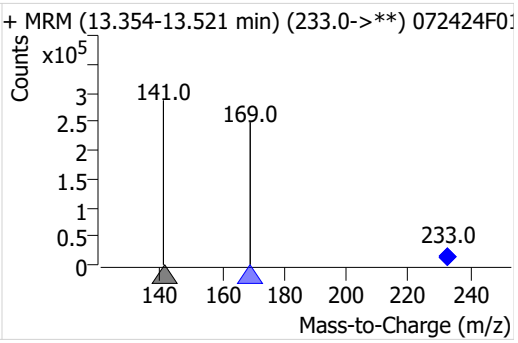




Methoxychlor-d6







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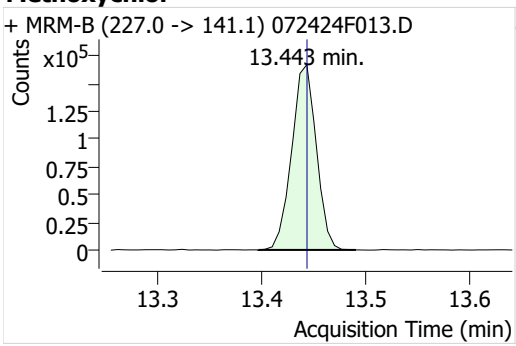
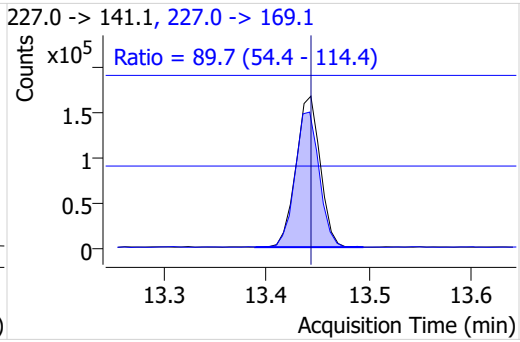
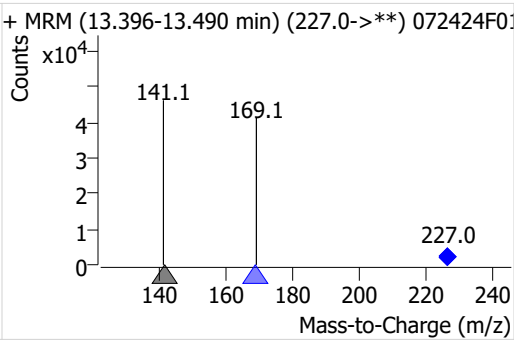
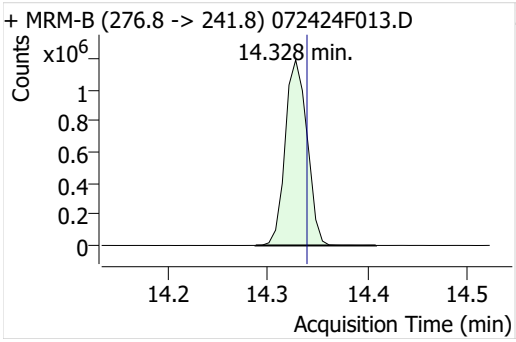
Methoxychlor

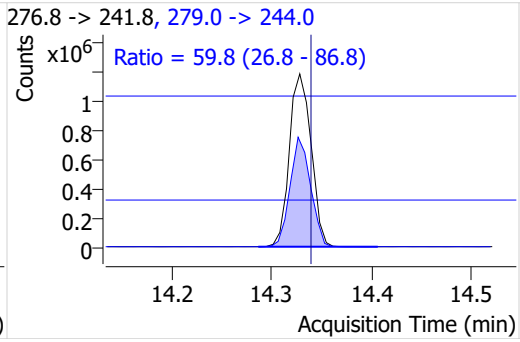


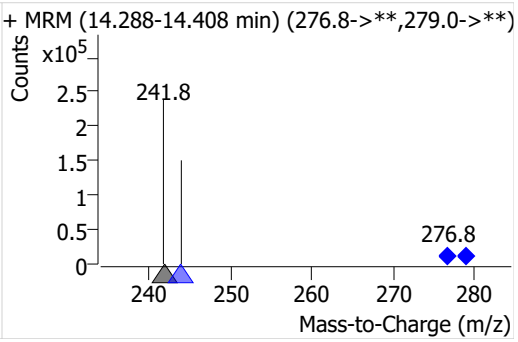




Mirex-13C10







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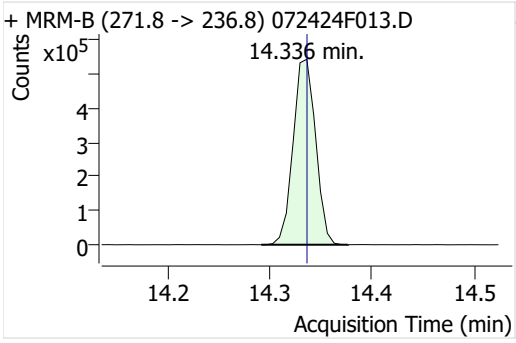
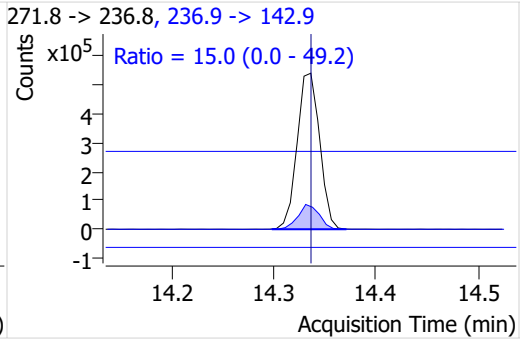
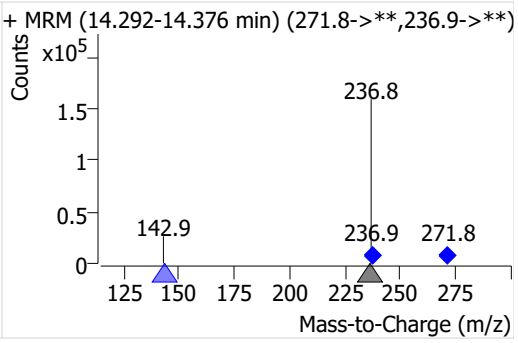
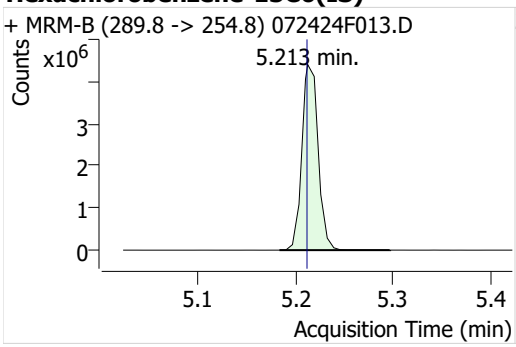
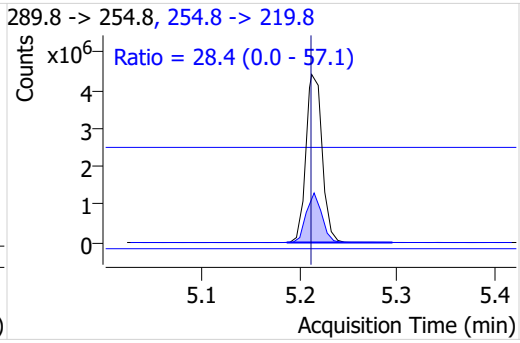


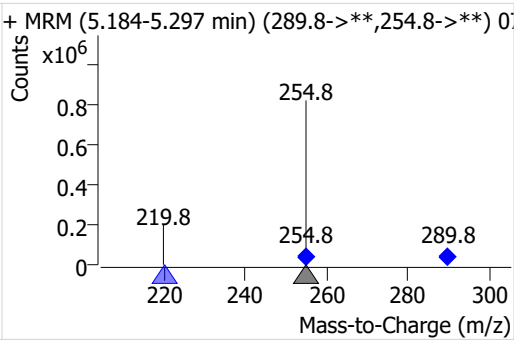




Hexachlorobenzene-13C6(IS)







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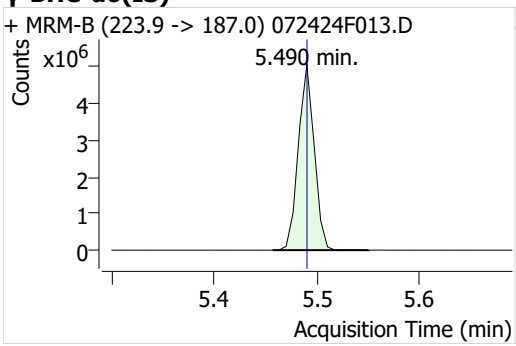
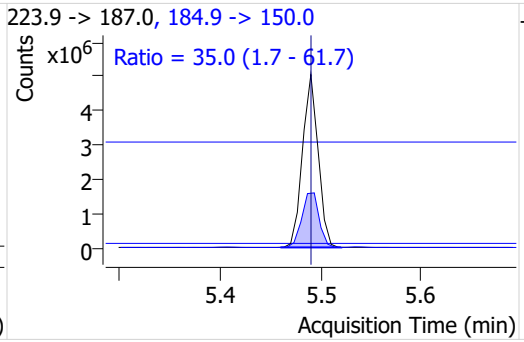
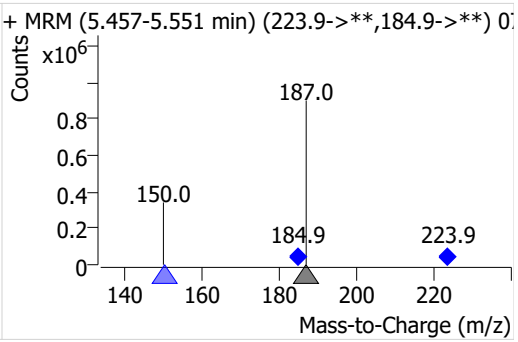
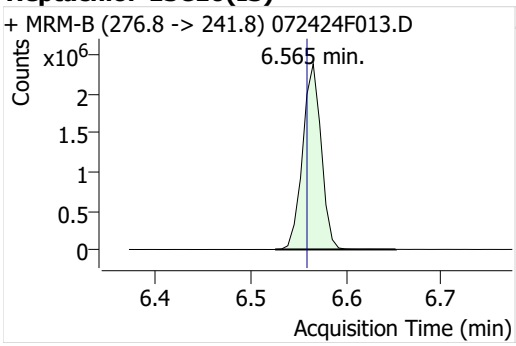
γ-BHC-d6(IS)

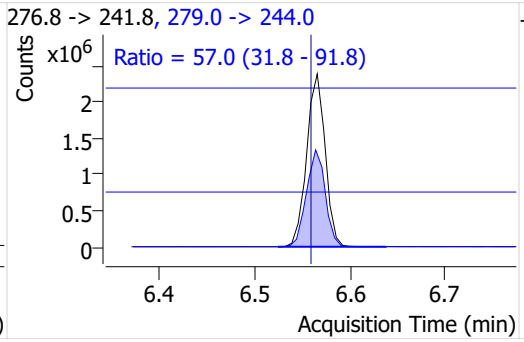


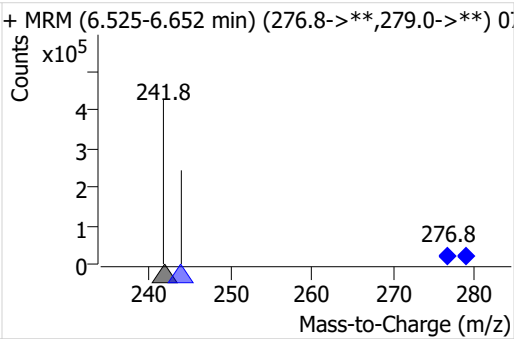




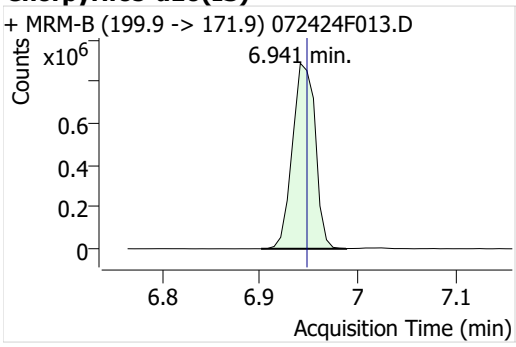
Heptachlor-13C10(IS)

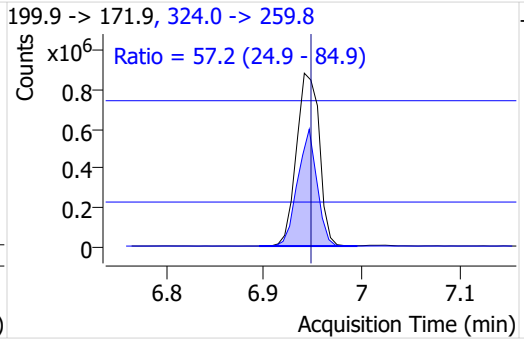


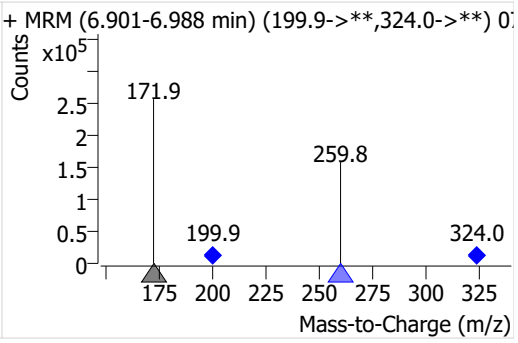




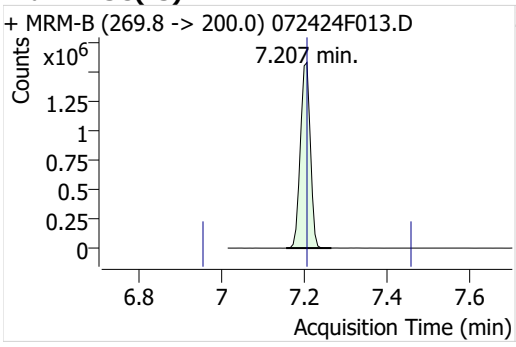
Chorpyrifos-d10(IS)

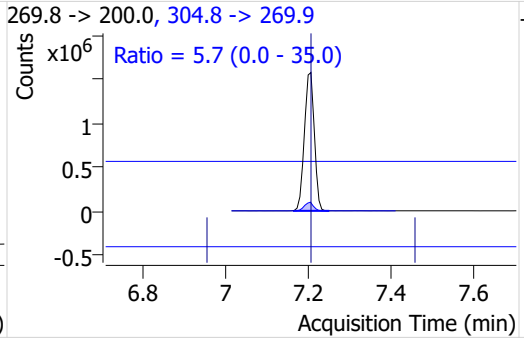


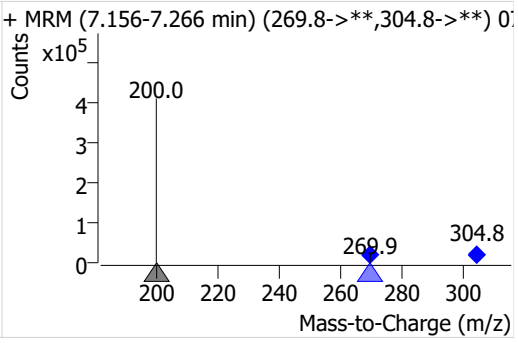




Aldrin-13C(IS)







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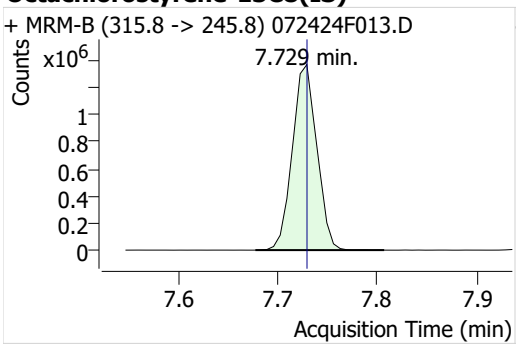
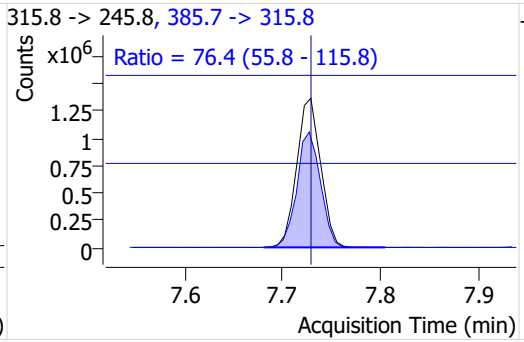
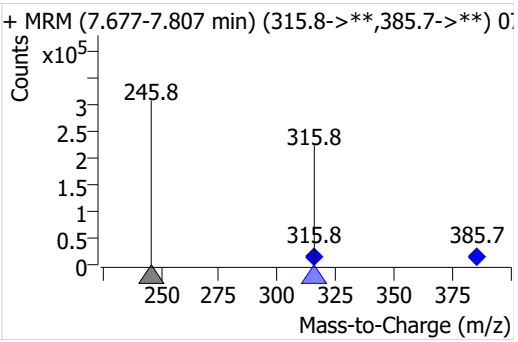
Octachlorostyrene-13C8(IS)







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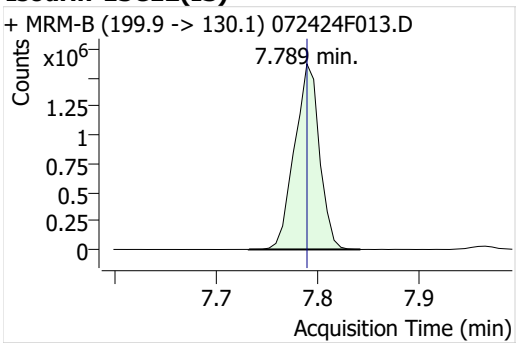
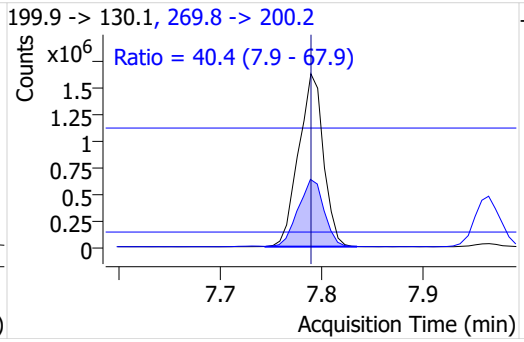
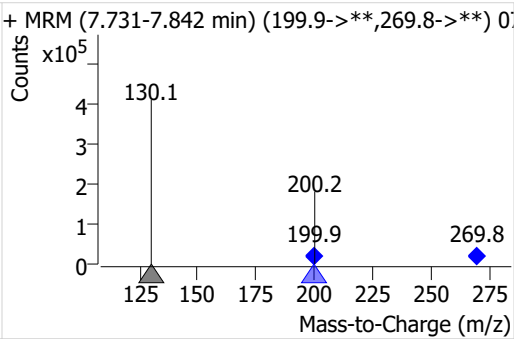
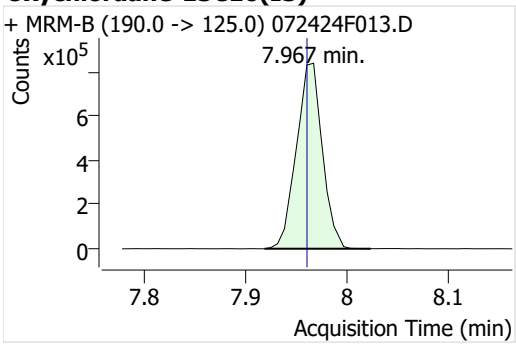
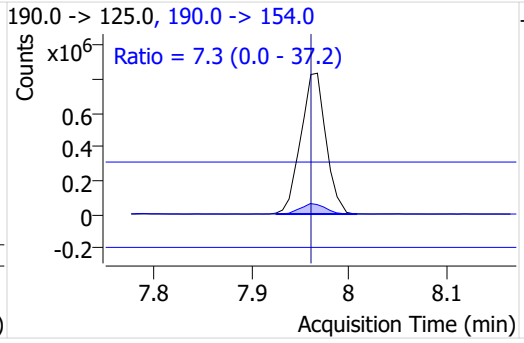


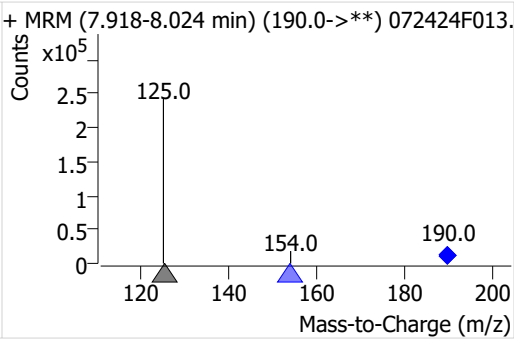




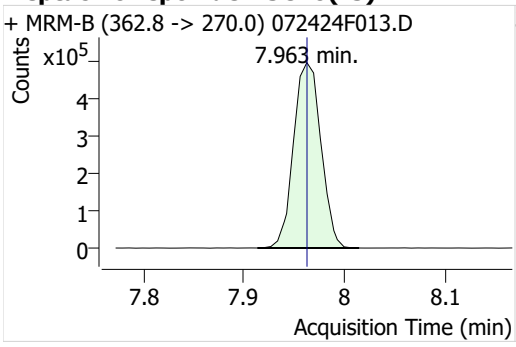
Oxychlordane-13C10(IS)

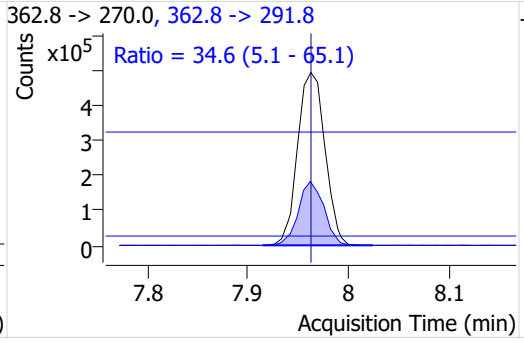


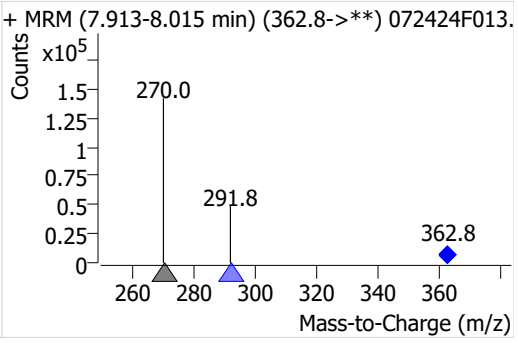




Heptachlor epoxide-13C10(IS)







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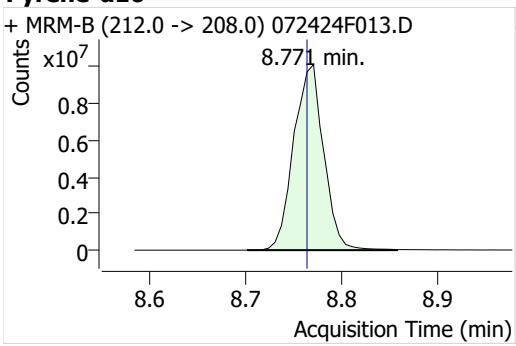
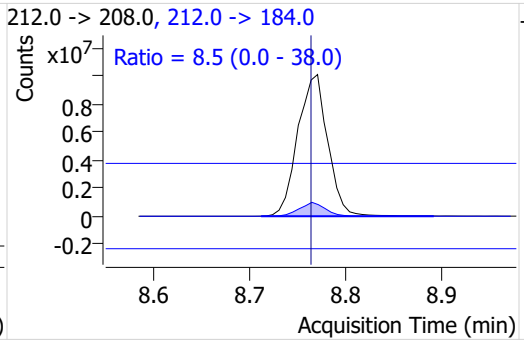
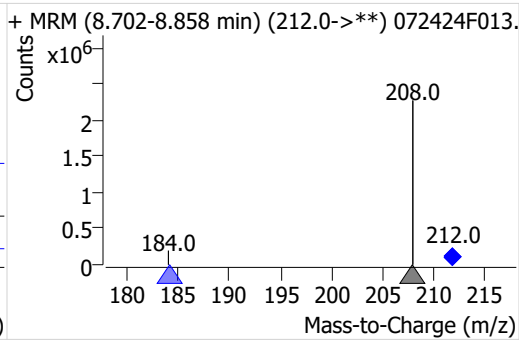
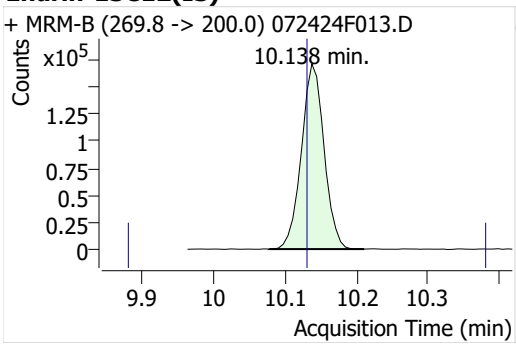
Pyrene-d10

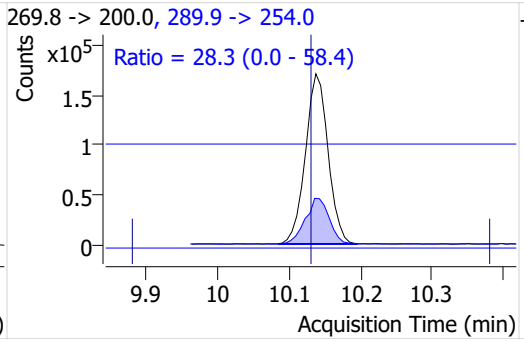


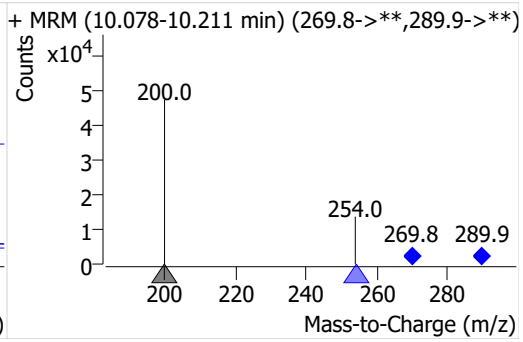




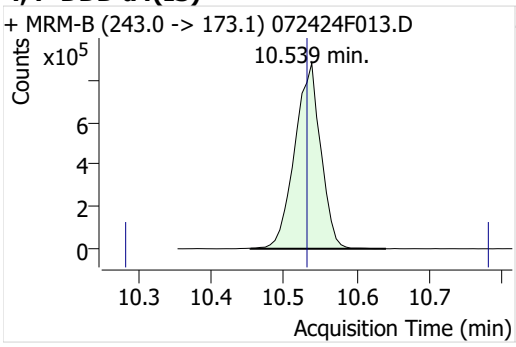
Endrin-13C12(IS)

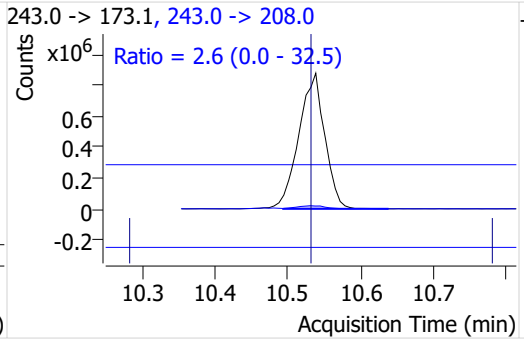


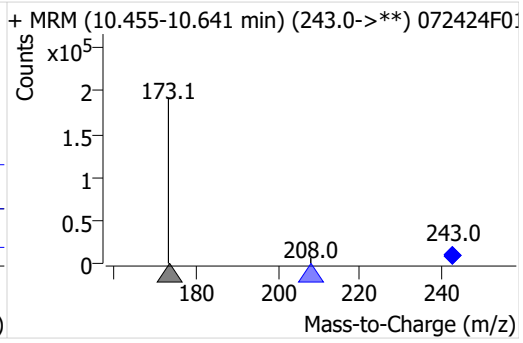




4,4'-DDD d4(IS)







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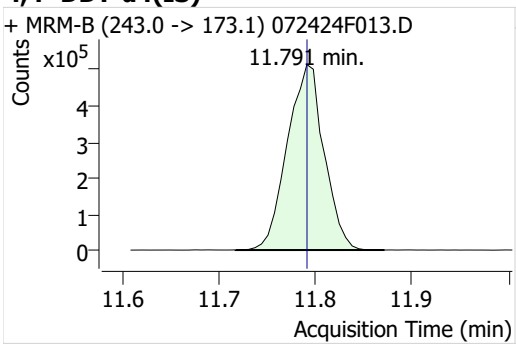

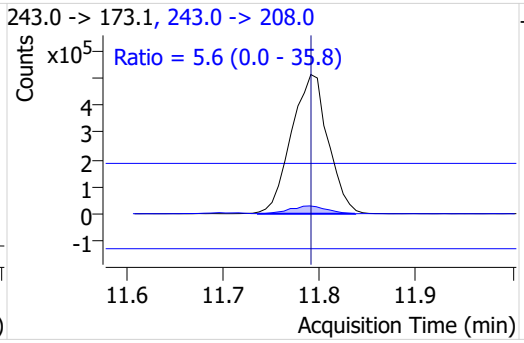

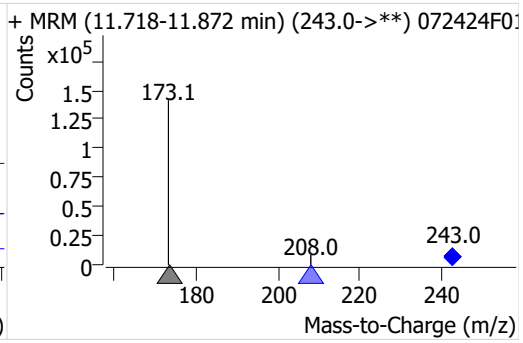

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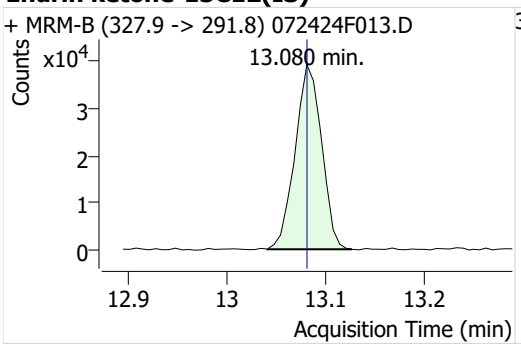
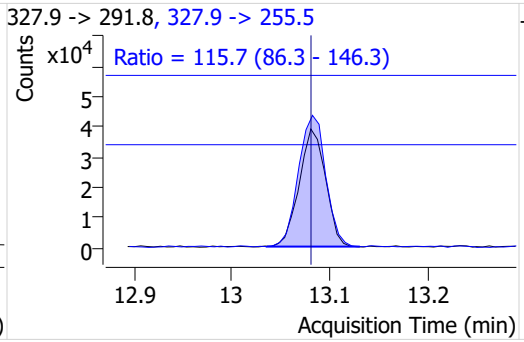
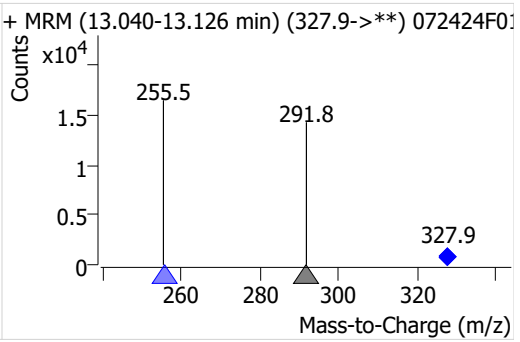
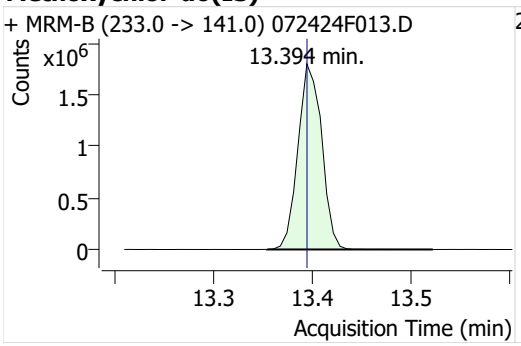
Endrin ketone-13C12(IS)

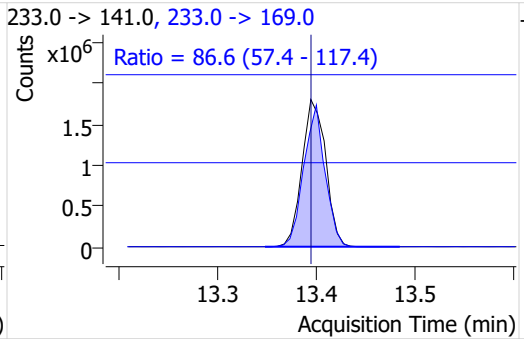


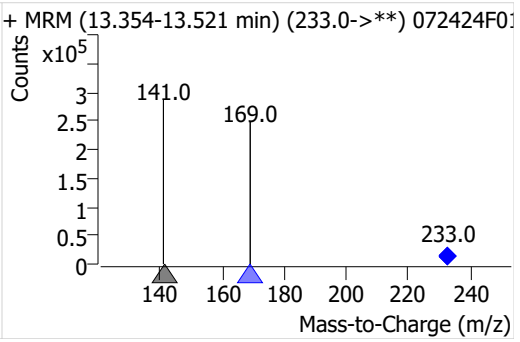




Methoxychlor-d6(IS)







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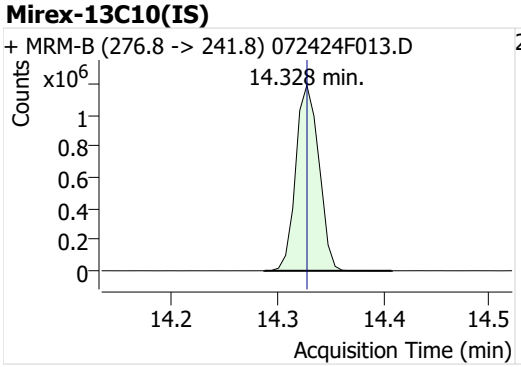

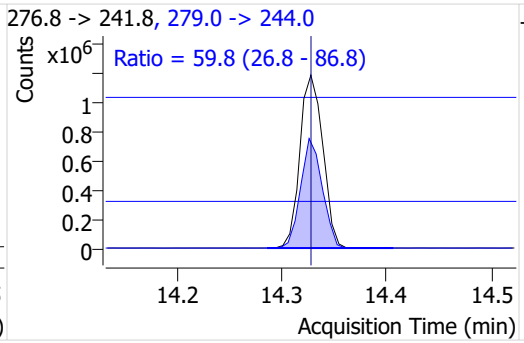

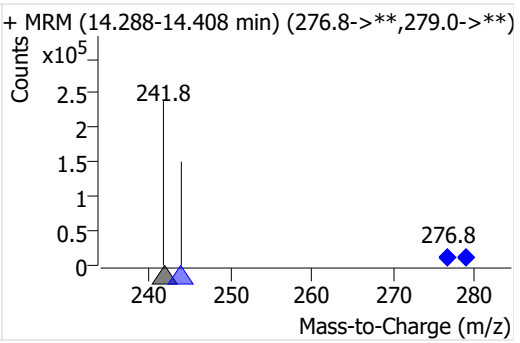

MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Acq. Date-Time	7/24/2024 6:22:41 PM	**Acq Operator**	EBruno
Name	OC PEST ICAL 5ppb SVM71-30D	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	7/25/2024 7:23:51 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method		**Vial**	6
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.219	289.8 -> 254.8	4703090	20.0000 ng/ml	0.005
γ-BHC-d6(IS)	5.491	223.9 -> 187.0	5153255	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	6.566	276.8 -> 241.8	2941620	20.0000 ng/ml	0.006
Chorpyrifos-d10(IS)	6.948	199.9 -> 171.9	1200121	20.0000 ng/ml	0.001
Aldrin-13C(IS)	7.207	269.8 -> 200.0	2215909	20.0000 ng/ml	0.001
Octachlorostyrene-13C8(IS)	7.722	315.8 -> 245.8	1862261	20.0000 ng/ml	0.008
Isodrin-13C12(IS)	7.789	199.9 -> 130.1	2188071	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	7.961	190.0 -> 125.0	1268866	20.0000 ng/ml	0.003
Heptachlor epoxide-13C10(IS)	7.970	362.8 -> 270.0	788571	20.0000 ng/ml	0.003
Pyrene-d10	8.765	212.0 -> 208.0	18230541	100.0000 ng/ml	0.003
Endrin-13C12(IS)	10.131	269.8 -> 200.0	302795	20.0000 ng/ml	0.003
4,4'-DDD d4(IS)	10.532	243.0 -> 173.1	1785011	5.0000 ng/ml	0.000
4,4'-DDT-d4(IS)	11.791	243.0 -> 173.1	1221550	5.0000 ng/ml	0.001
Endrin ketone-13C12(IS)	13.087	327.9 -> 291.8	65033	20.0000 ng/ml	0.001
Methoxychlor-d6(IS)	13.394	233.0 -> 141.0	2697603	20.0000 ng/ml	0.003
Mirex-13C10(IS)	14.328	276.8 -> 241.8	1773965	5.0000 ng/ml	0.001

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	4703090	20.430 ng/ml	
		Spiked Amount =	20.0	Recovery =	*102.2 %*
γ-BHC-d6	5.491	223.9 -> 187.0	5153255	22.091 ng/ml	
		Spiked Amount =	20.0	Recovery =	*110.5 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	2941620	21.950 ng/ml	
		Spiked Amount =	20.0	Recovery =	*109.7 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	1200121	20.895 ng/ml	
		Spiked Amount =	20.0	Recovery =	*104.5 %*
Aldrin-13C	7.207	269.8 -> 200.0	2215656	21.850 ng/ml	
		Spiked Amount =	20.0	Recovery =	*109.3 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	1862261	20.377 ng/ml	
		Spiked Amount =	20.0	Recovery =	*101.9 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2188071	20.134 ng/ml	
		Spiked Amount =	20.0	Recovery =	*100.7 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1268866	19.690 ng/ml	
		Spiked Amount =	20.0	Recovery =	*98.5 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	788571	21.619 ng/ml	
		Spiked Amount =	20.0	Recovery =	*108.1 %*
Endrin-13C12	10.131	269.8 -> 200.0	302795	19.482 ng/ml	
		Spiked Amount =	20.0	Recovery =	*97.4 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	1785011	4.625 ng/ml	
		Spiked Amount =	5.0	Recovery =	*92.5 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1221550	5.139 ng/ml	
		Spiked Amount =	5.0	Recovery =	*102.8 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	65033	19.823 ng/ml	
		Spiked Amount =	20.0	Recovery =	*99.1 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	2697603	20.463 ng/ml	
		Spiked Amount =	20.0	Recovery =	*102.3 %*

MassHunter Quantitative Analysis Sample Report

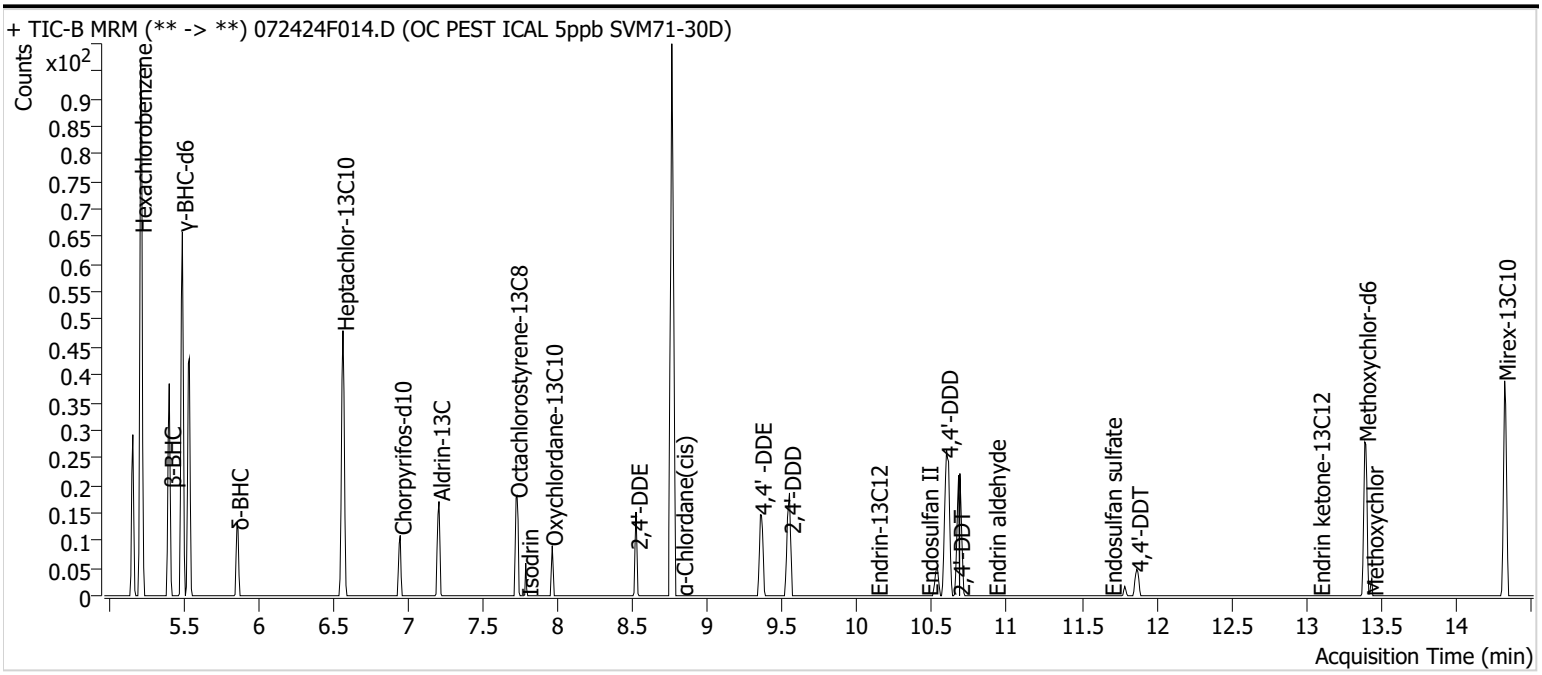
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	1773965	5.060 ng/ml
		Spiked Amount =	5.0	Recovery = *101.2 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.165	181.1 -> 145.1	1658680	4.566 ng/ml	96
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.214	283.8 -> 213.9	1944016	5.417 ng/ml	99
β-BHC	γ-BHC-d6(IS)	5.408	181.1 -> 145.1	1040115	4.275 ng/ml	98
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	1409608	4.537 ng/ml	96
δ-BHC	γ-BHC-d6(IS)	5.859	181.1 -> 145.1	1059098	4.683 ng/ml	93
Heptachlor	Heptachlor-13C10(IS)	6.569	271.7 -> 236.9	869162	5.491 ng/ml	85
Chorpyrifos	Chorpyrifos-d10(IS)	7.019	196.9 -> 169.0	388022	4.750 ng/ml	94
Aldrin	Aldrin-13C(IS)	7.209	254.9 -> 220.0	412291	4.735 ng/ml	55
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.735	342.8 -> 307.8	1092010	4.772 ng/ml	95
Isodrin	Isodrin-13C12(IS)	7.796	193.0 -> 123.0	599035	5.213 ng/ml	97
Oxychlordane	Oxychlordane-13C10(IS)	7.968	114.9 -> 51.1	811024	4.946 ng/ml	100
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.971	352.8 -> 262.9	192495	4.610 ng/ml	99
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.504	271.8 -> 236.9	331497	4.972 ng/ml	94
2,4'-DDE	4,4'-DDD d4(IS)	8.527	246.0 -> 176.2	3369812	5.282 ng/ml	98
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.830	271.8 -> 236.9	414540	5.141 ng/ml	95
Endosulfan I	Endrin-13C12(IS)	8.847	206.9 -> 172.0	136583	5.019 ng/ml	94
trans-Nanochlor	Oxychlordane-13C10(IS)	8.884	271.8 -> 236.9	281566	4.908 ng/ml	95
4,4' -DDE	4,4'-DDD d4(IS)	9.357	246.0 -> 176.2	2312877	5.089 ng/ml	95
Dieldrin	Endrin-13C12(IS)	9.555	262.9 -> 193.0	151258	4.482 ng/ml	98
2,4'-DDD	4,4'-DDD d4(IS)	9.553	235.0 -> 165.1	2513503	4.904 ng/ml	100
Endrin	Endrin-13C12(IS)	10.153	262.8 -> 193.0	90013	4.811 ng/ml	95
Endosulfan II	Endrin-13C12(IS)	10.471	206.9 -> 172.0	71156	4.923 ng/ml	97
cis-Nonachlor	Oxychlordane-13C10(IS)	10.604	271.8 -> 236.9	239392	4.854 ng/ml	99
4,4'-DDD	4,4'-DDD d4(IS)	10.601	235.0 -> 165.1	1894193	5.012 ng/ml	99
2,4'-DDT	4,4'-DDT-d4(IS)	10.682	235.0 -> 165.1	1632826	4.565 ng/ml	99
Endrin aldehyde	Endrin-13C12(IS)	10.920	249.9 -> 214.9	21405	4.005 ng/ml	97
Endosulfan sulfate	Endrin-13C12(IS)	11.696	271.9 -> 237.0	172637	4.542 ng/ml	99
4,4'-DDT	4,4'-DDT-d4(IS)	11.874	235.0 -> 165.1	1262040	4.565 ng/ml	89
Endrin ketone	Endrin ketone-13C12(IS)	13.092	147.0 -> 111.0	65617	4.495 ng/ml	95
Methoxychlor	Methoxychlor-d6(IS)	13.443	227.0 -> 141.1	697573	4.963 ng/ml	94
Mirex	Mirex-13C10(IS)	14.337	271.8 -> 236.8	2011693	5.504 ng/ml	95

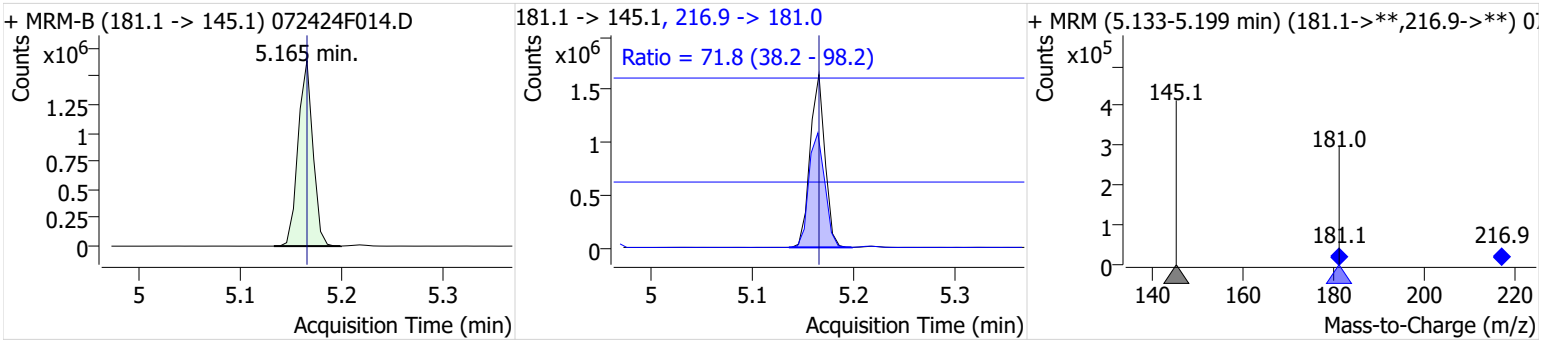
(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram

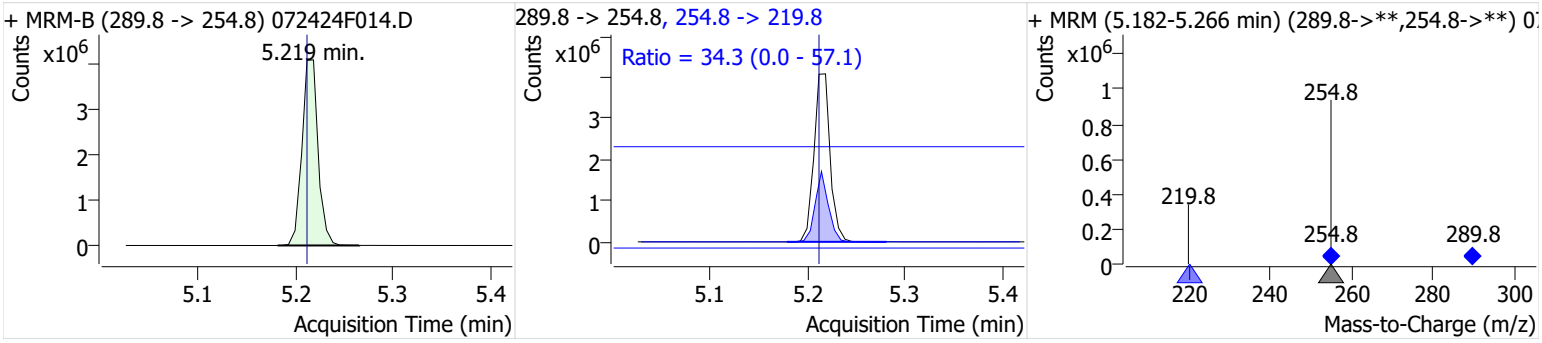
MassHunter Quantitative Analysis Sample Report



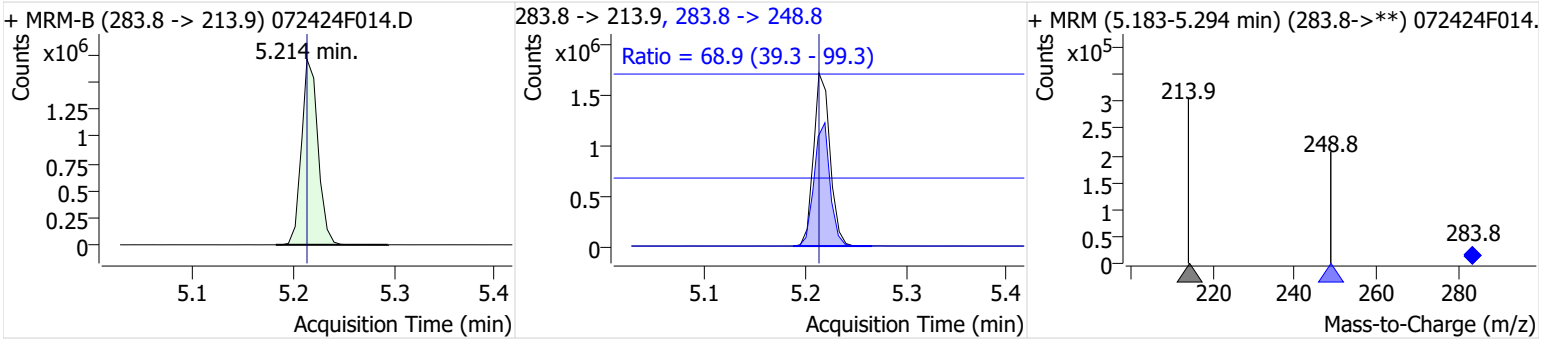
α-BHC



Hexachlorobenzene-13C6

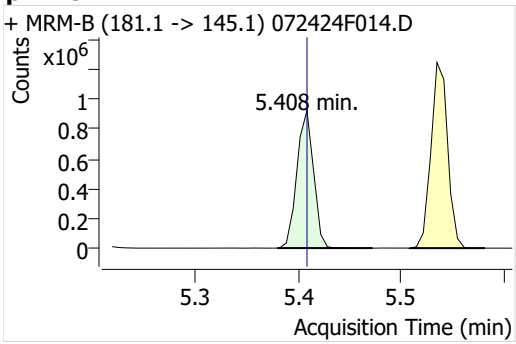


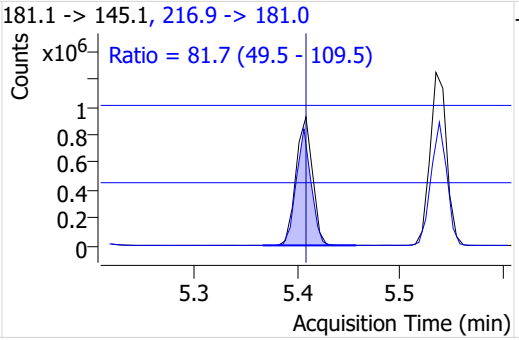
Hexachlorobenzene

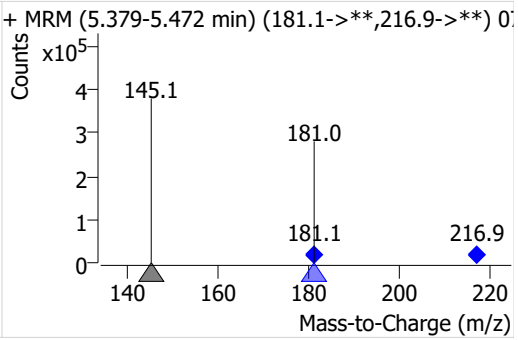


MassHunter Quantitative Analysis Sample Report

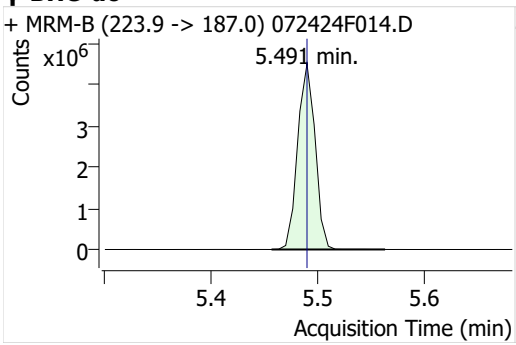
β-BHC

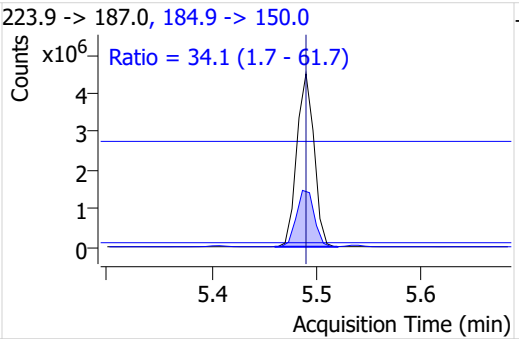


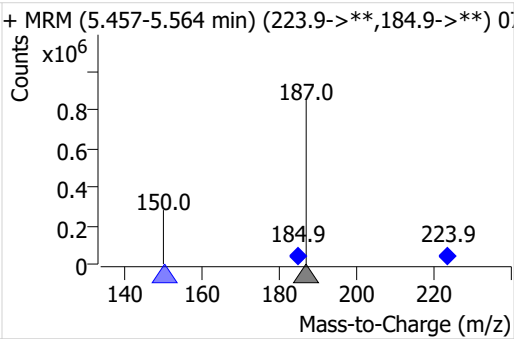




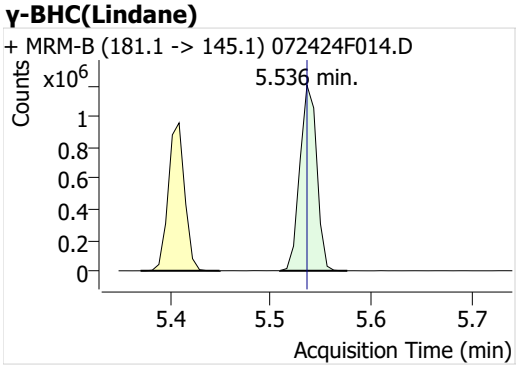
γ-BHC-d6

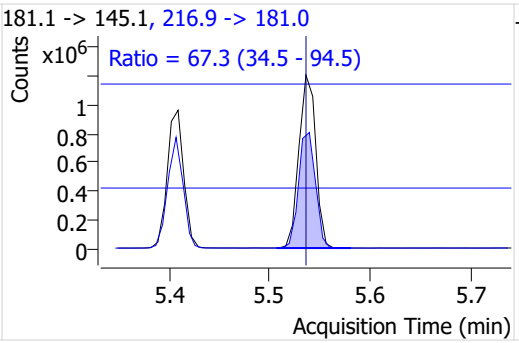


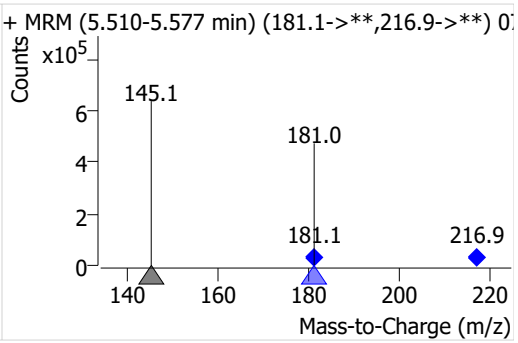




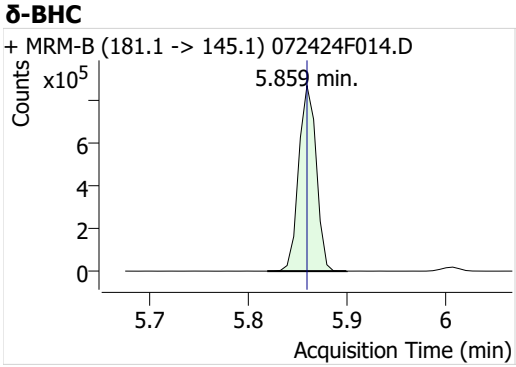
γ-BHC(Lindane)

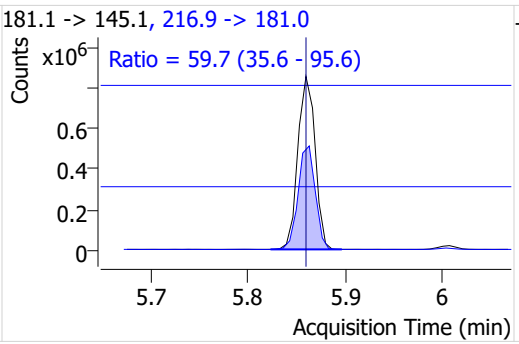


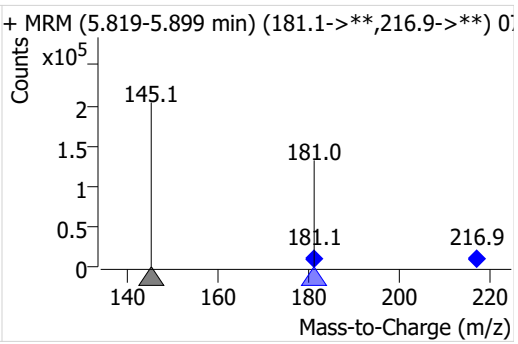




δ-BHC

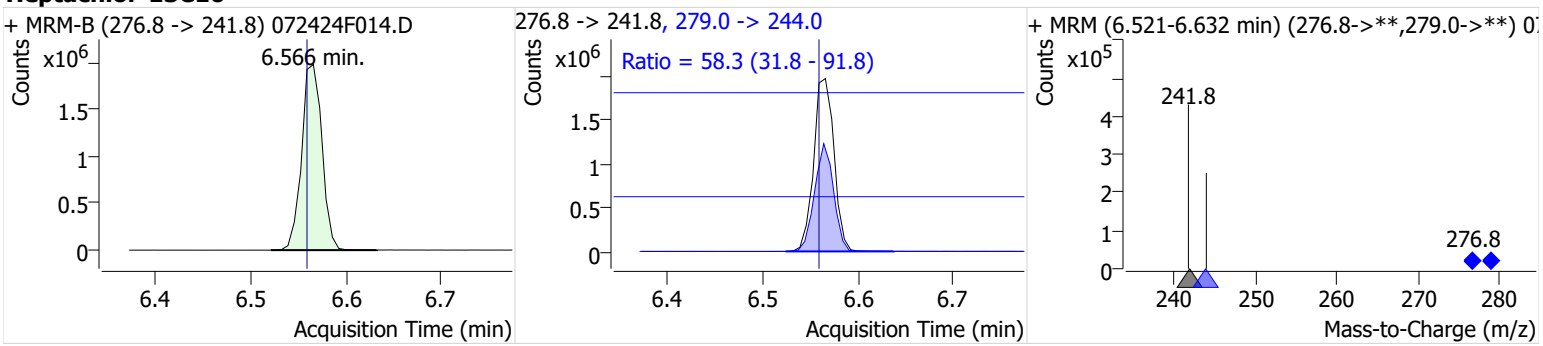




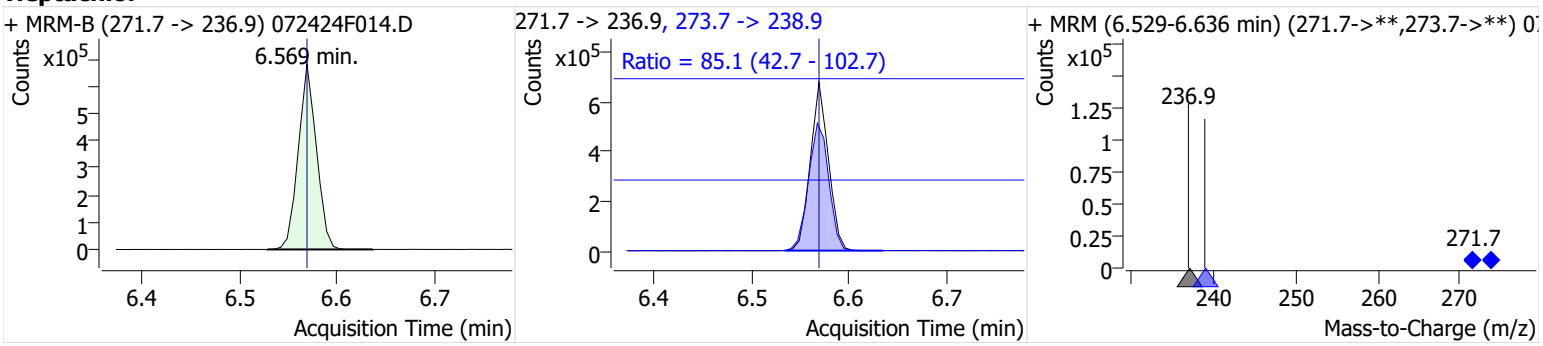


MassHunter Quantitative Analysis Sample Report

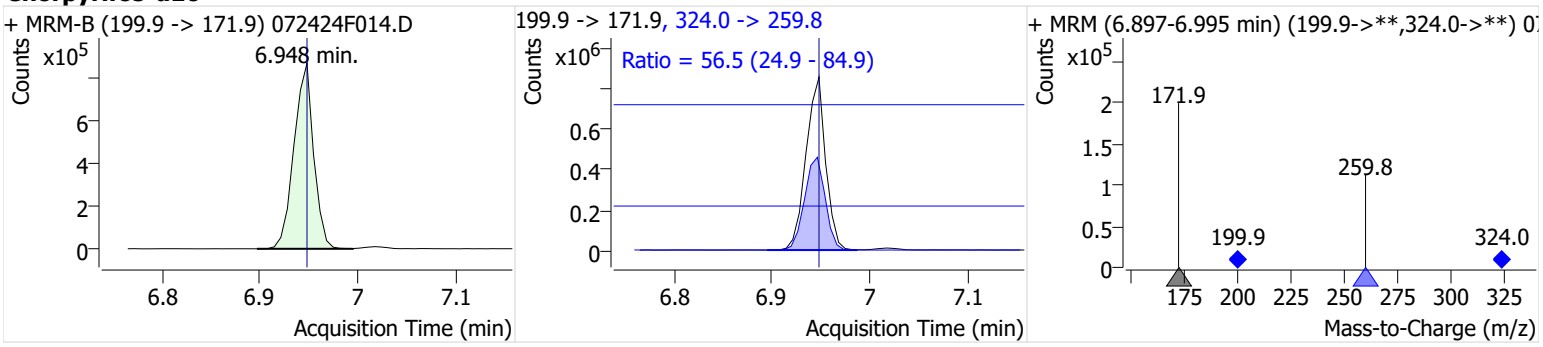
Heptachlor-13C10



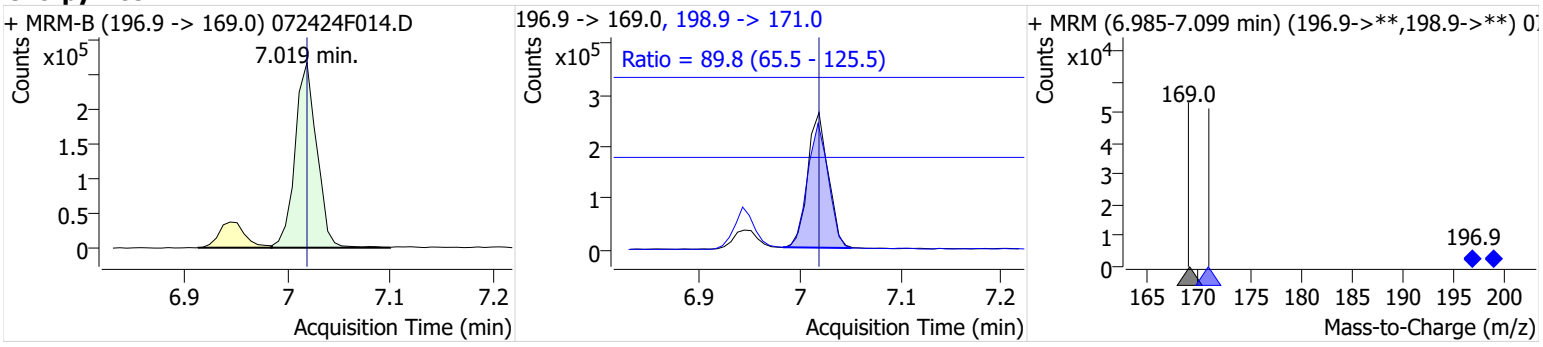
Heptachlor



Chorpyrifos-d10

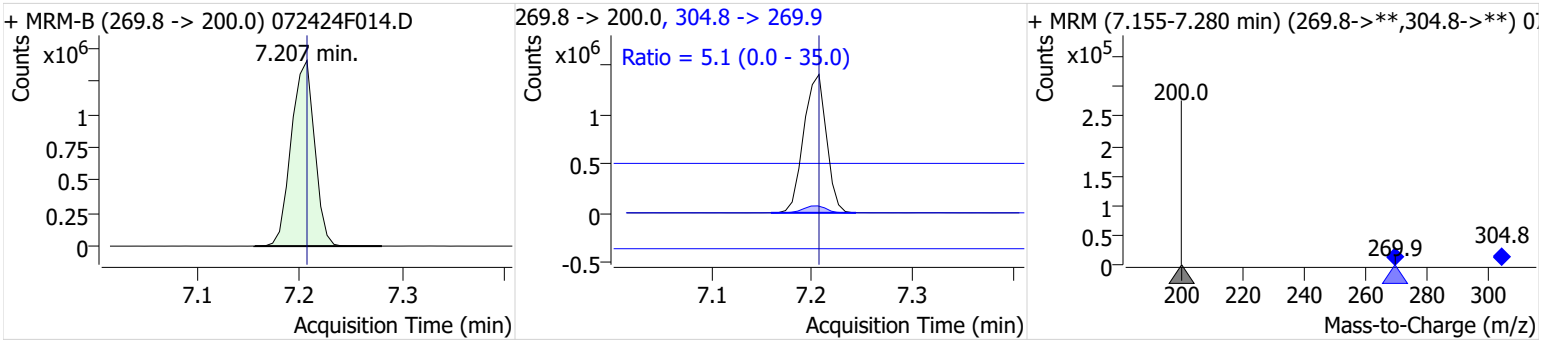


Chorpyrifos

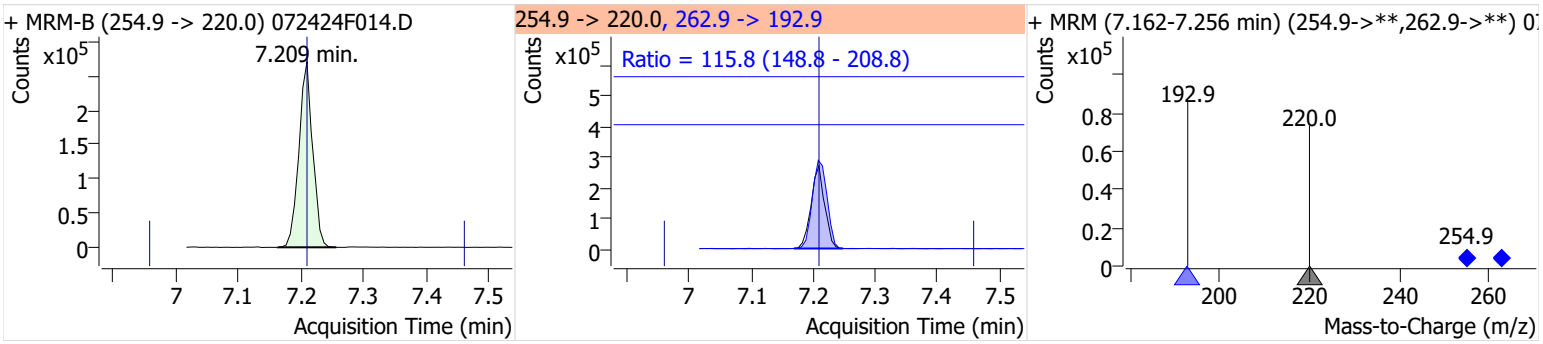


MassHunter Quantitative Analysis Sample Report

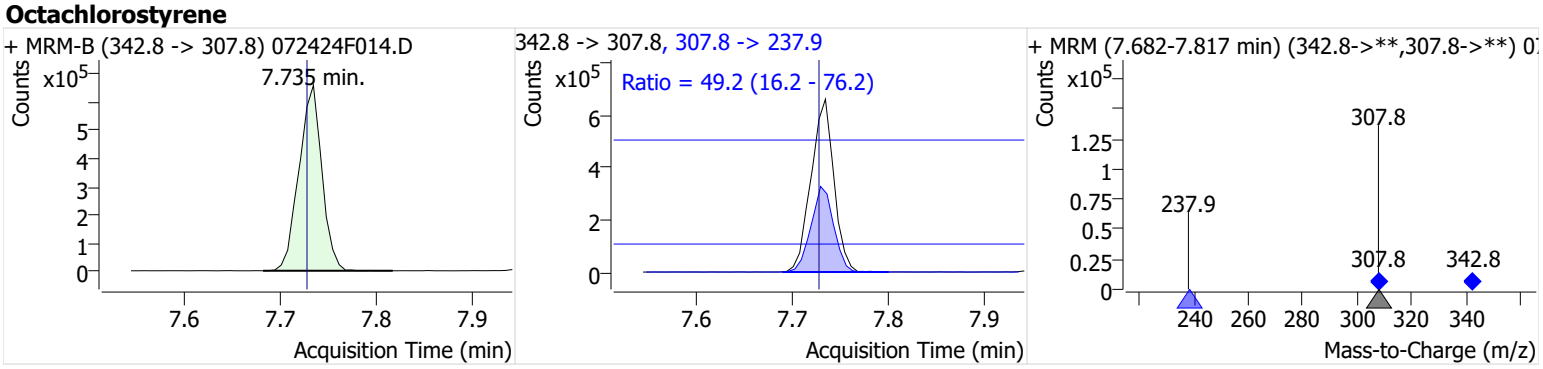
Aldrin-13C



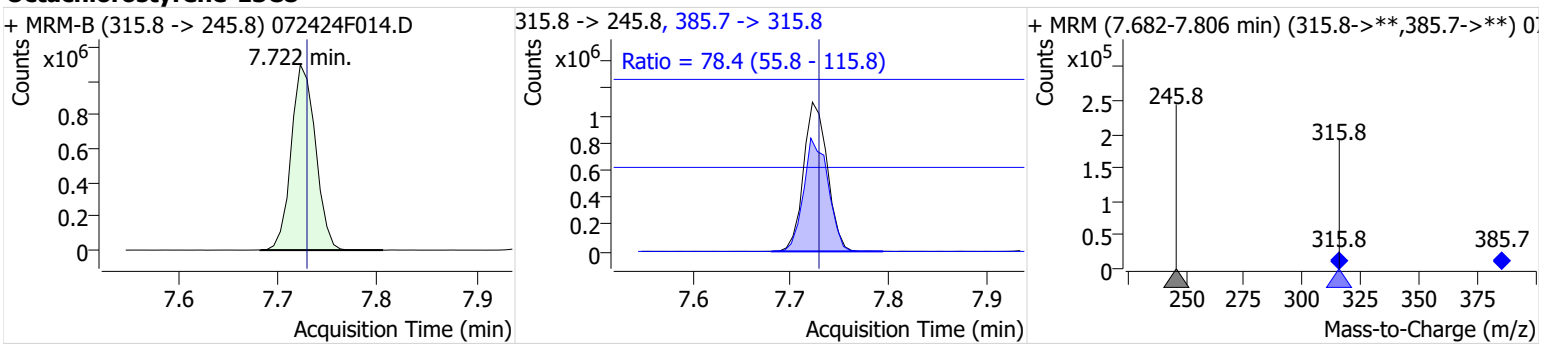
Aldrin



Octachlorostyrene

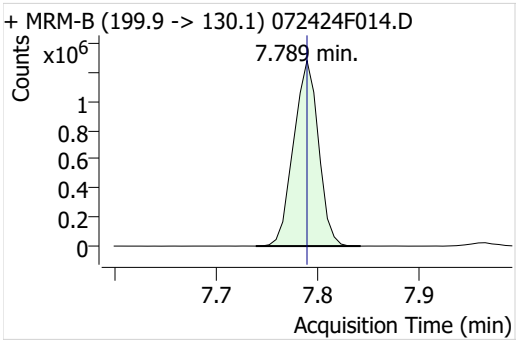


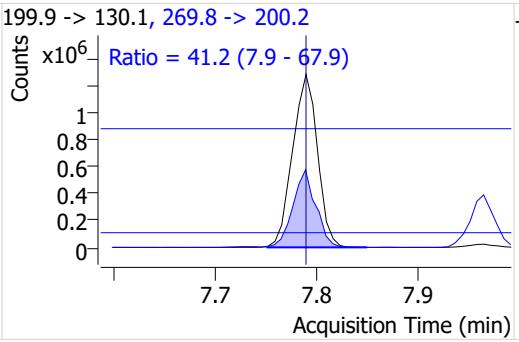
Octachlorostyrene-13C8

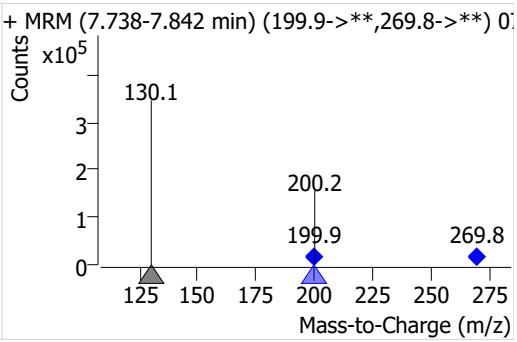


MassHunter Quantitative Analysis Sample Report

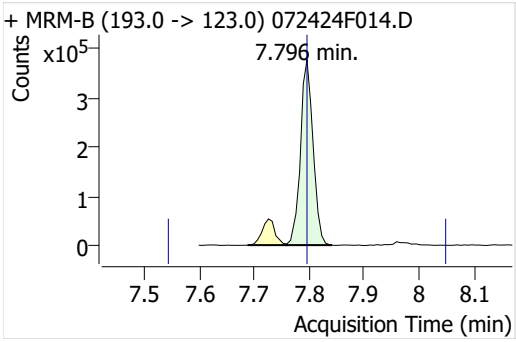
Isodrin-13C12

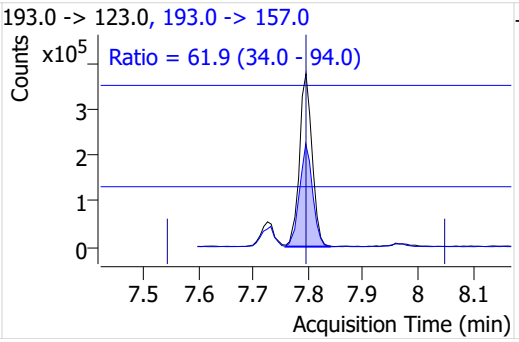


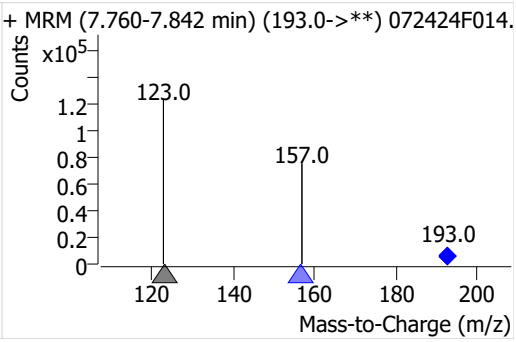




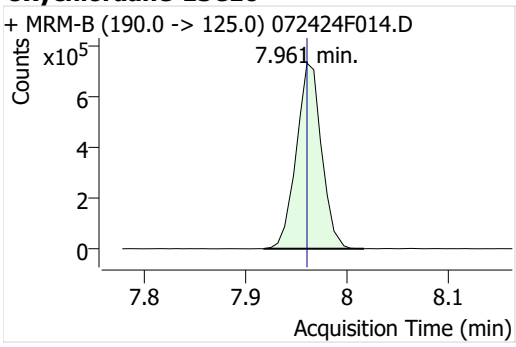
Isodrin

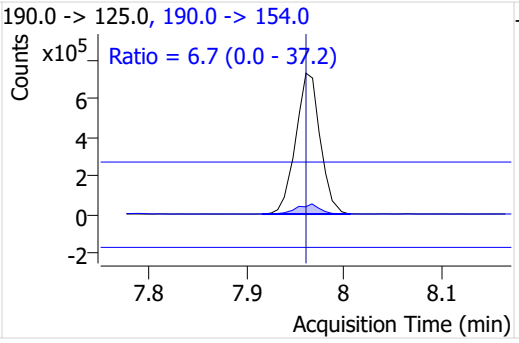


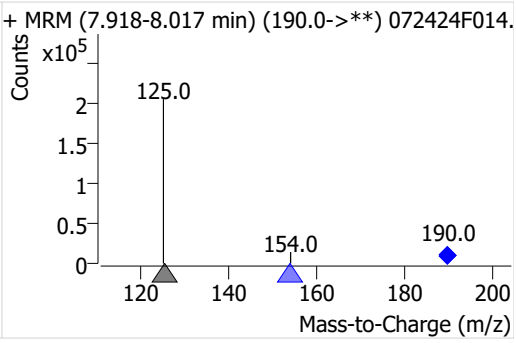




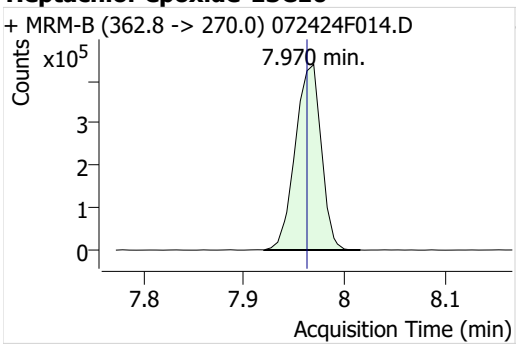
Oxychlordane-13C10

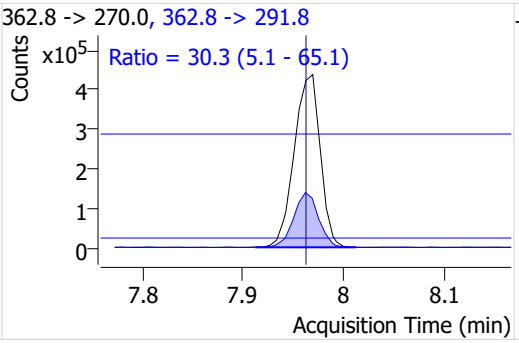


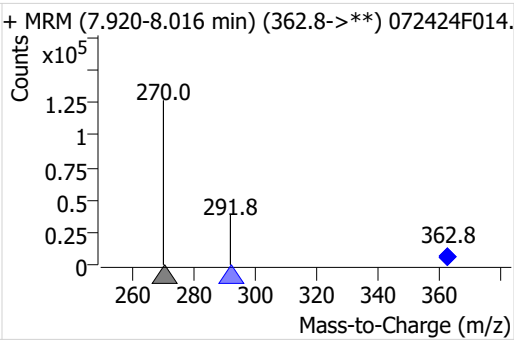




Heptachlor epoxide-13C10







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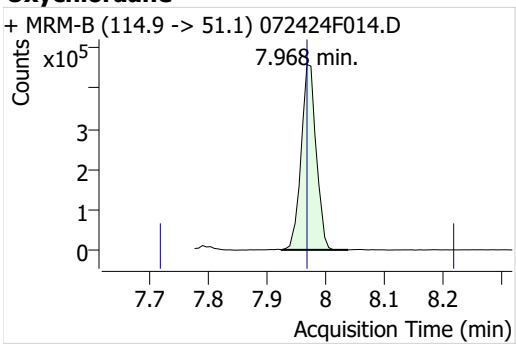
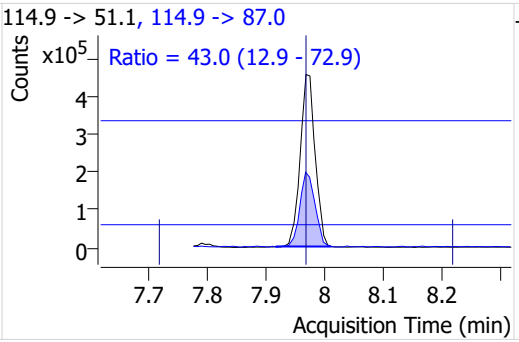
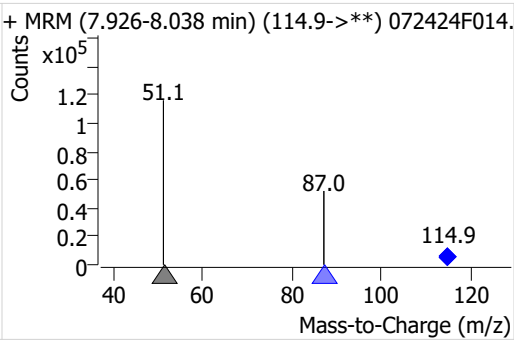
Oxychlordane







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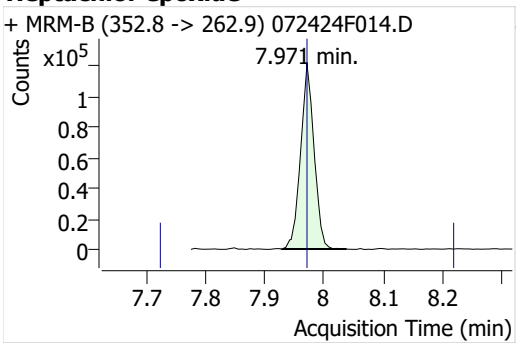
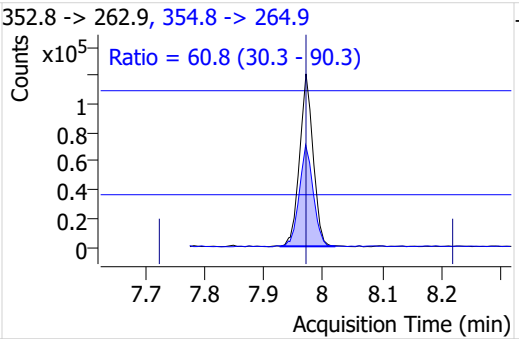
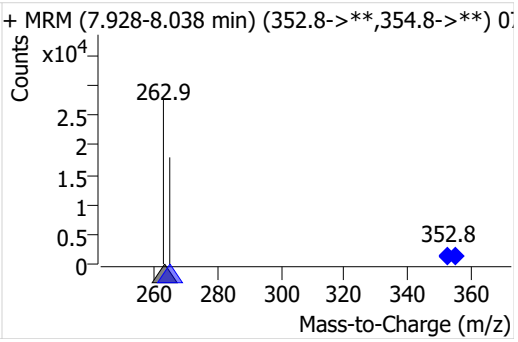
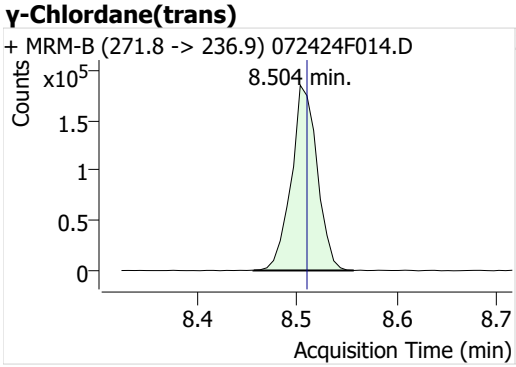
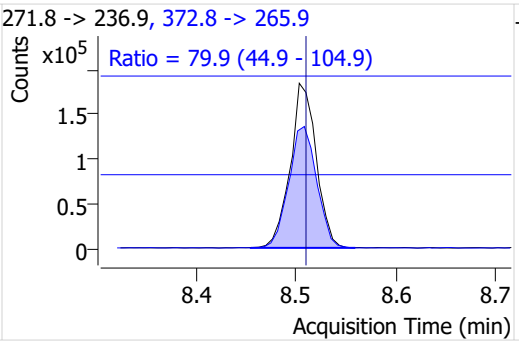


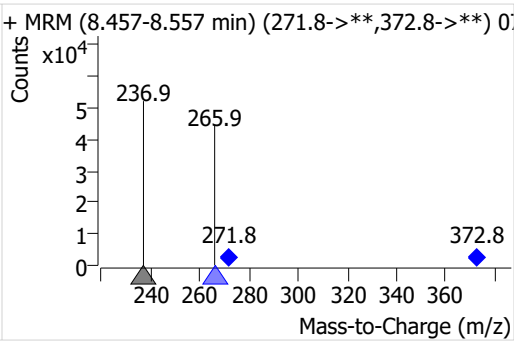




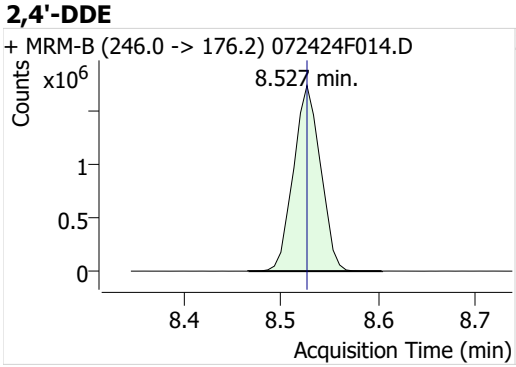
γ-Chlordane(trans)

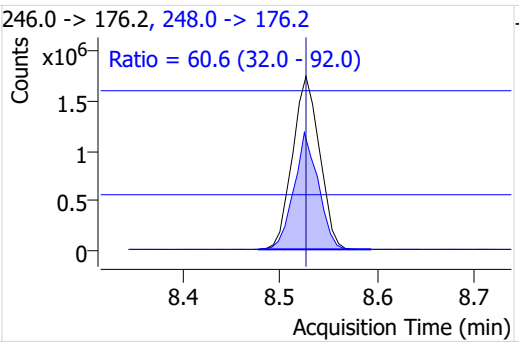


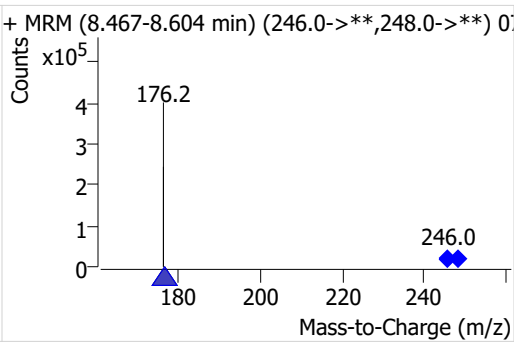




2,4'-DDE







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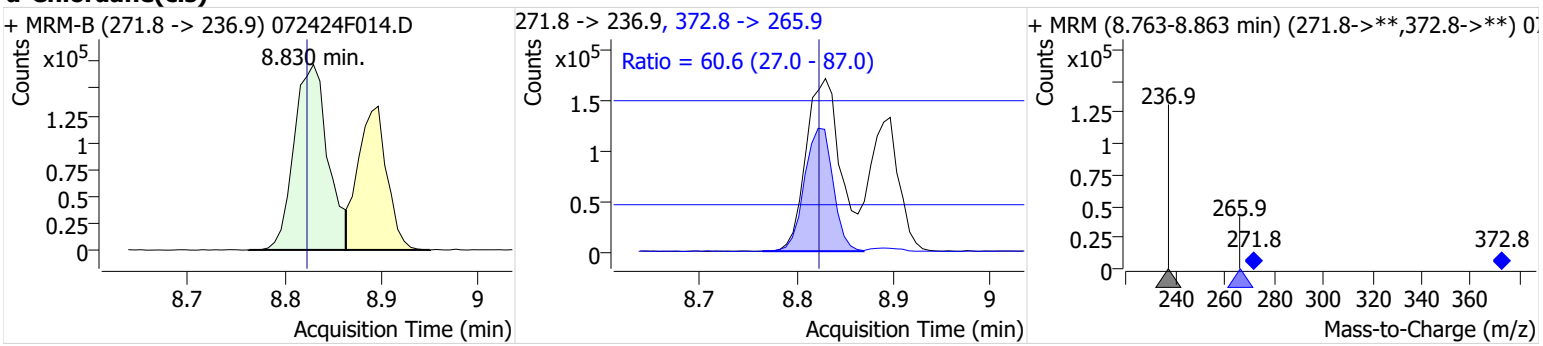
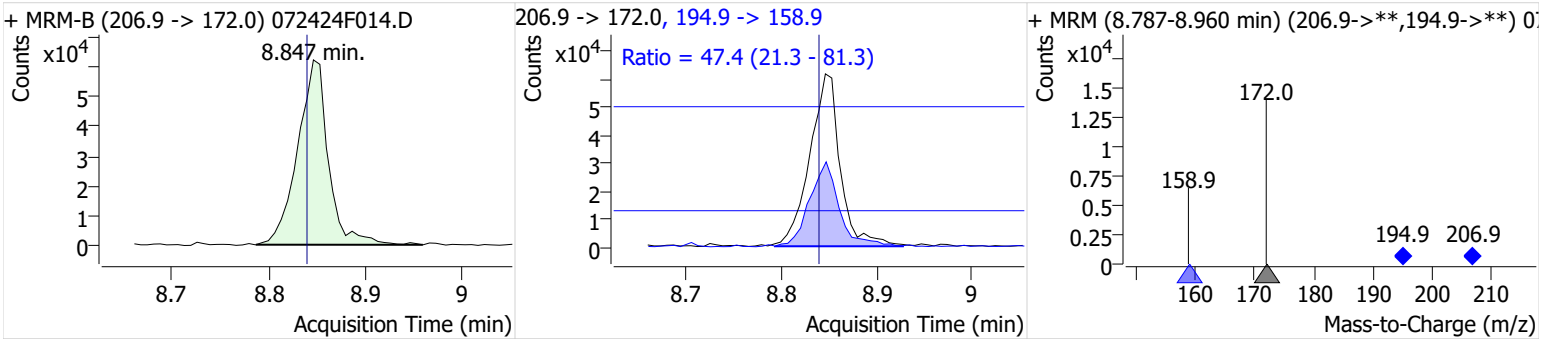
α-Chlordane(cis)



Endosulfan I



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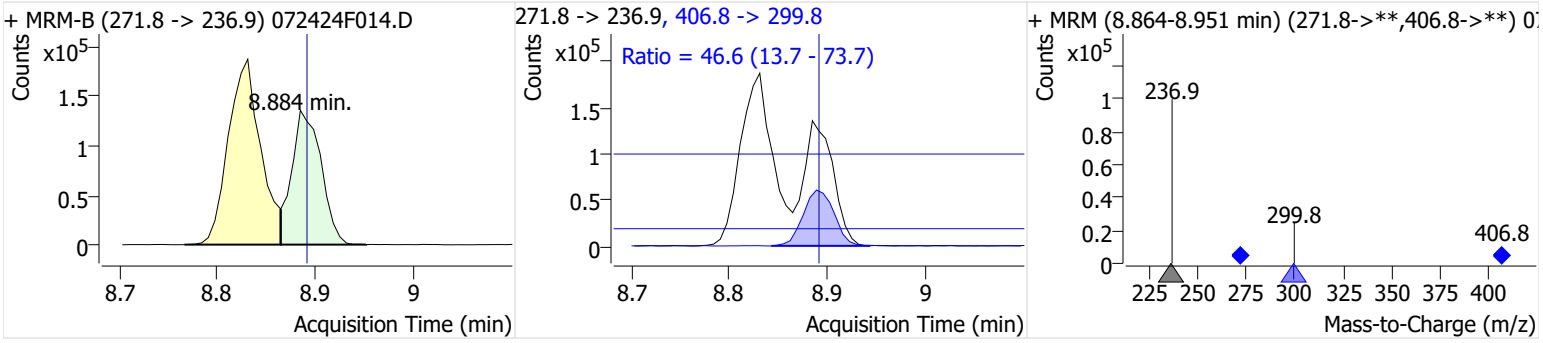
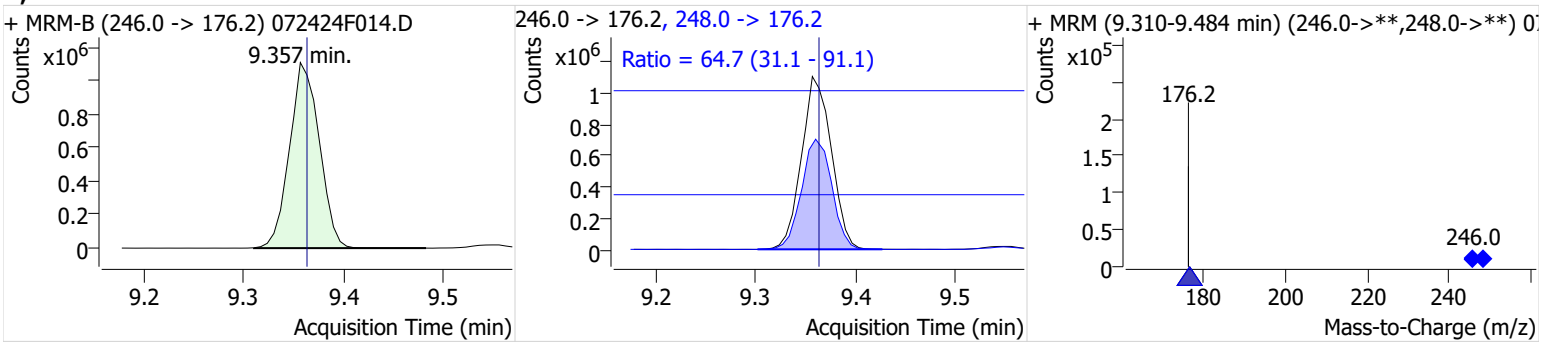


4,4' -DDE



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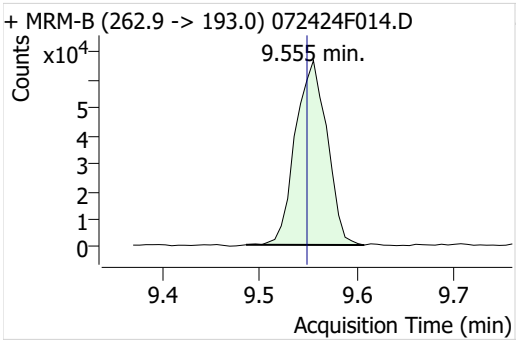
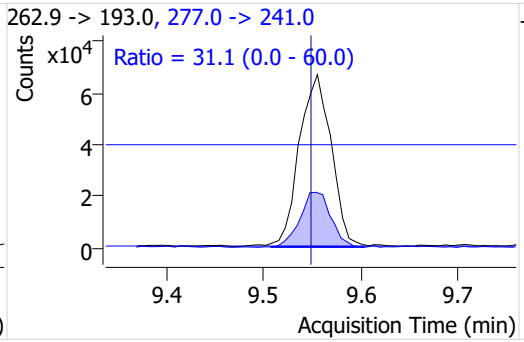
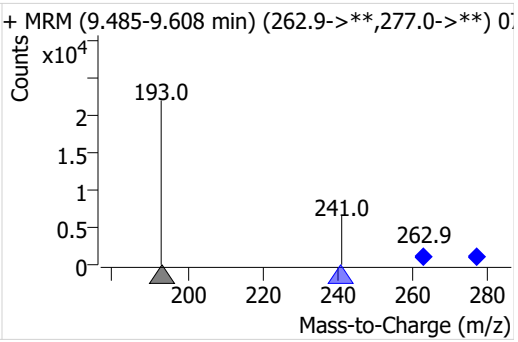
Dieldrin







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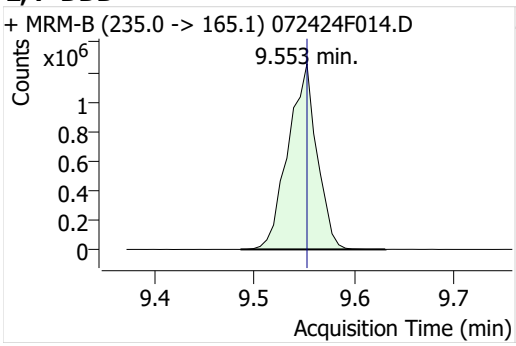
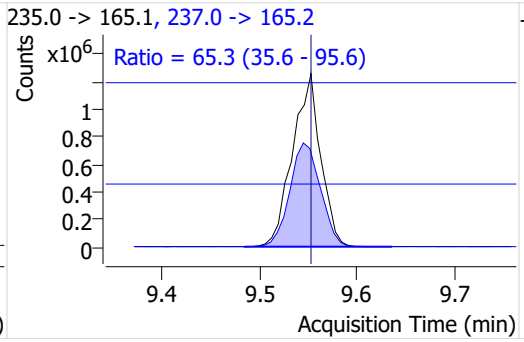
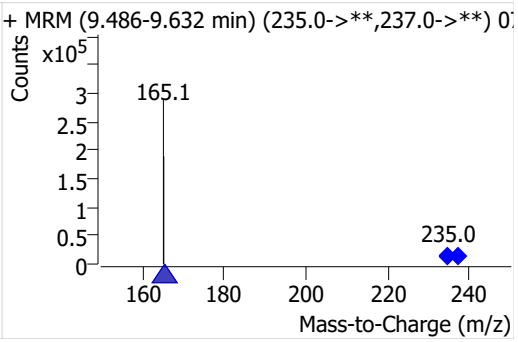
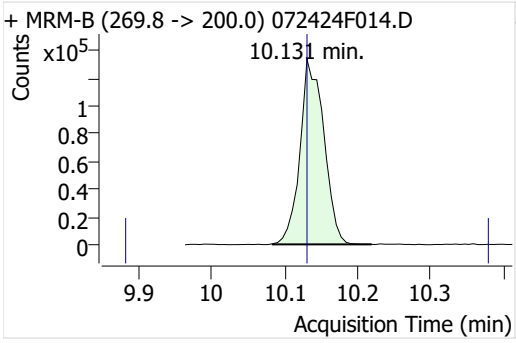
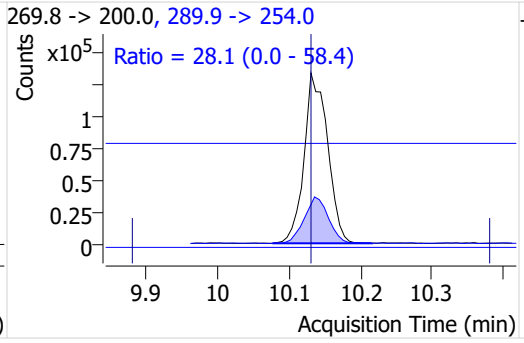


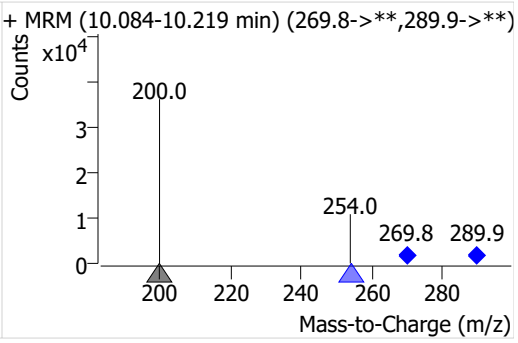




Endrin-13C12







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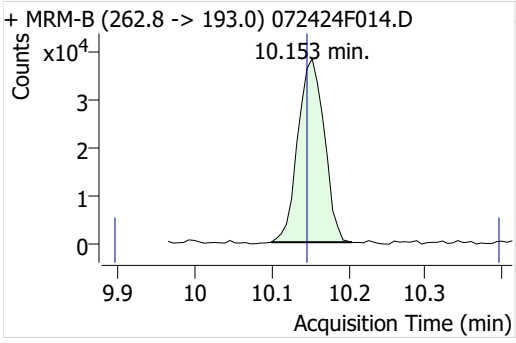

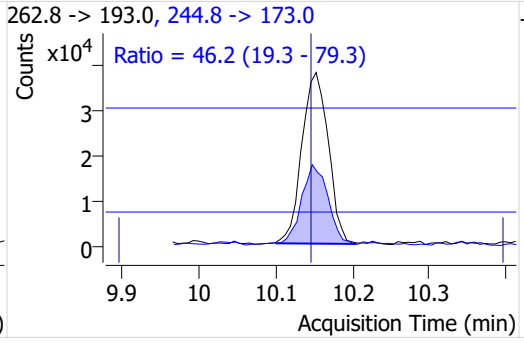

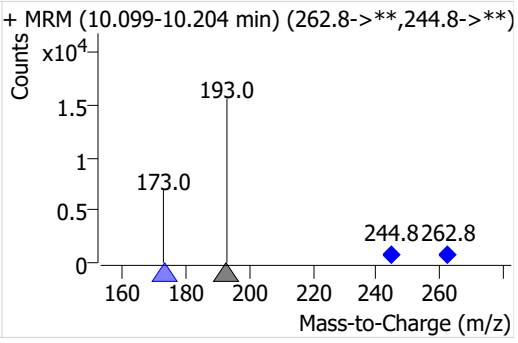

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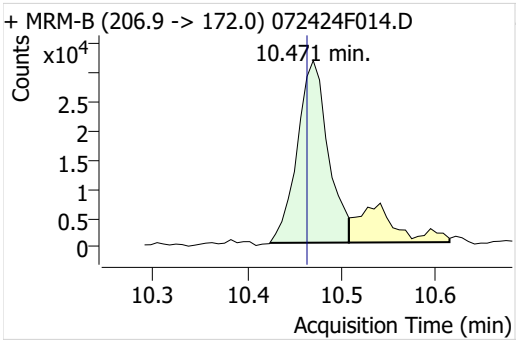
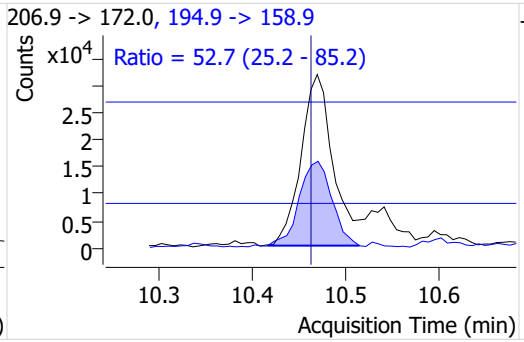
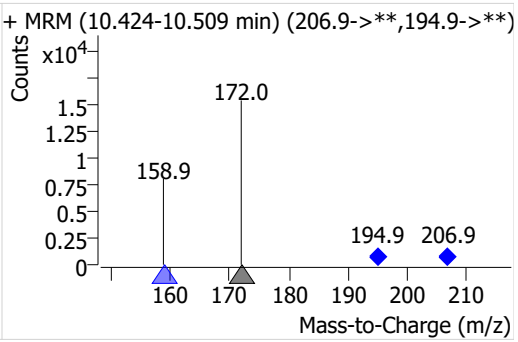
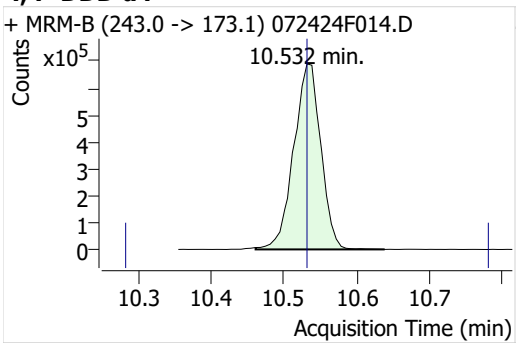
Endosulfan II

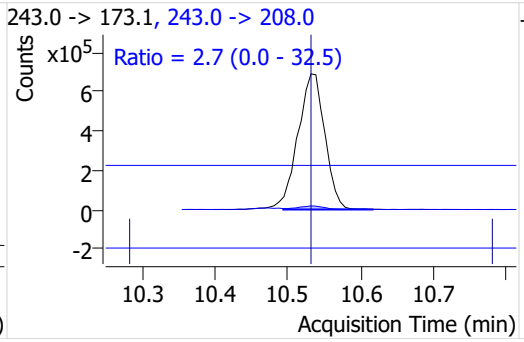


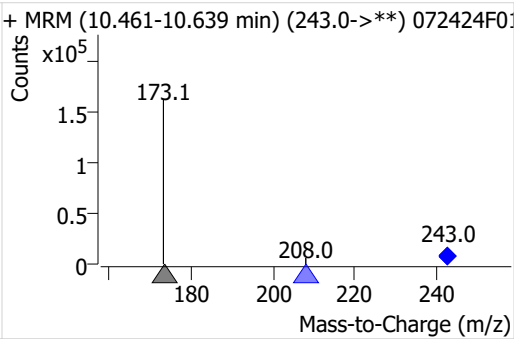




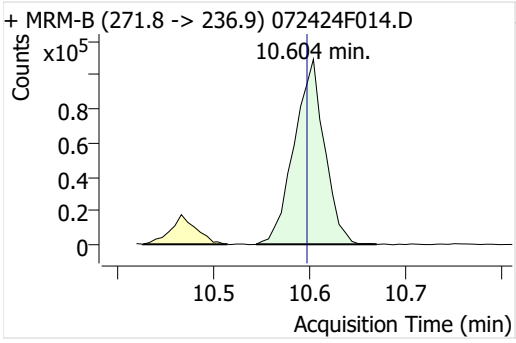
4,4'-DDD d4

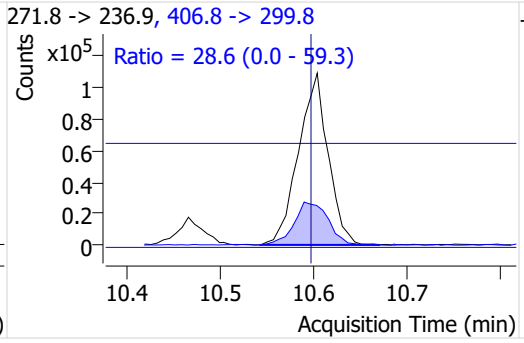


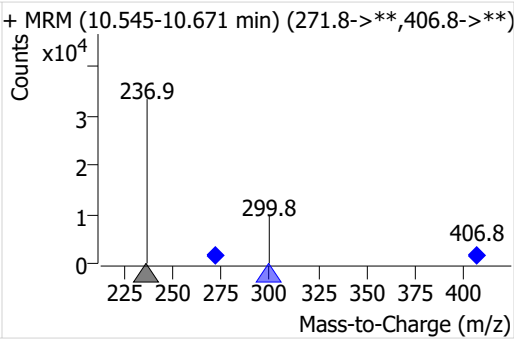




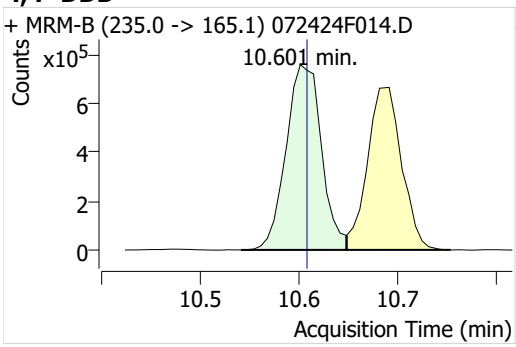
cis-Nonachlor

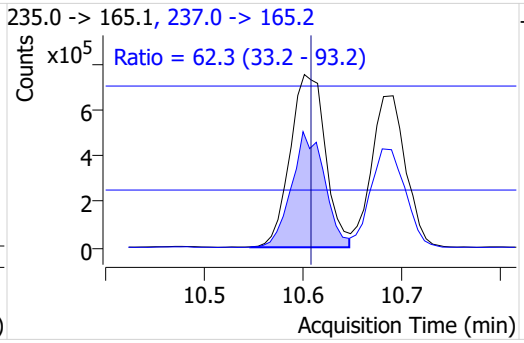


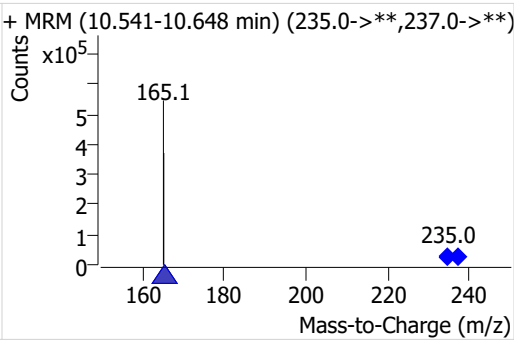




4,4'-DDD







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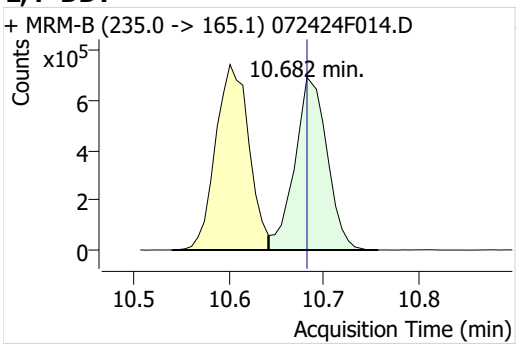
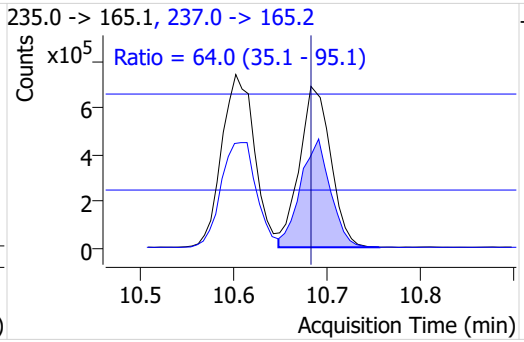
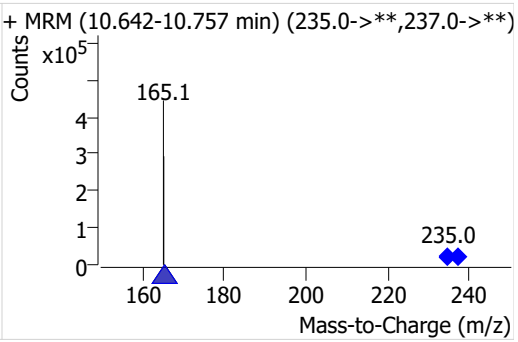
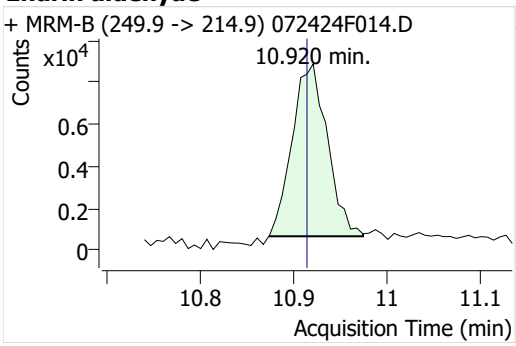
2,4'-DDT

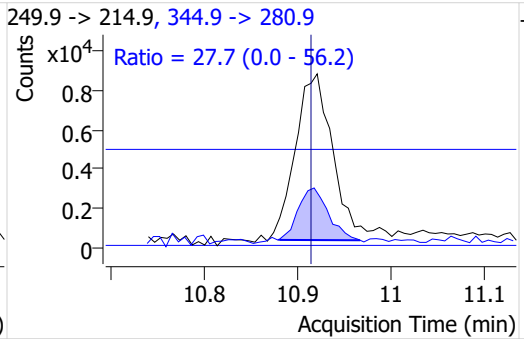


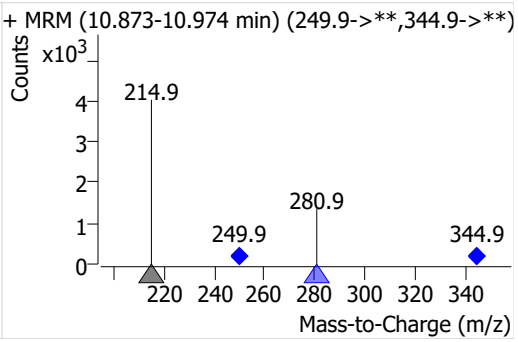




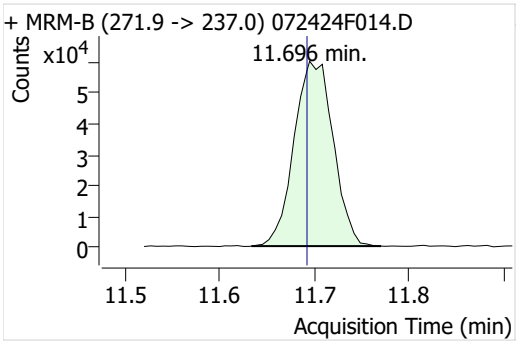
Endrin aldehyde

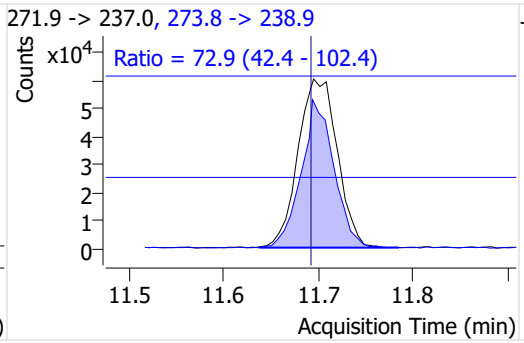


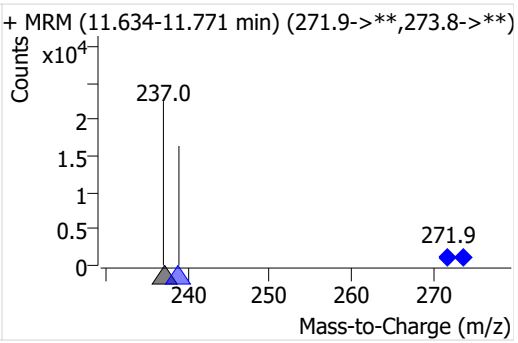




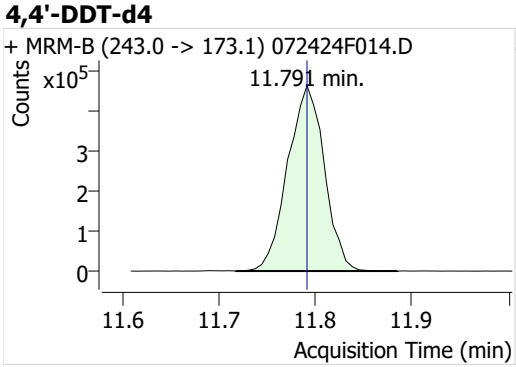
Endosulfan sulfate

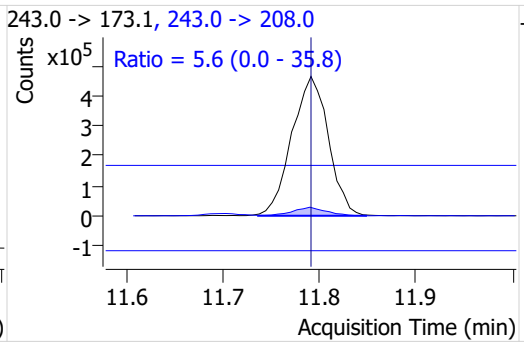


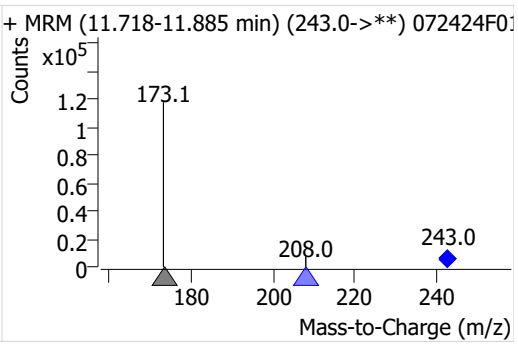




4,4'-DDT-d4







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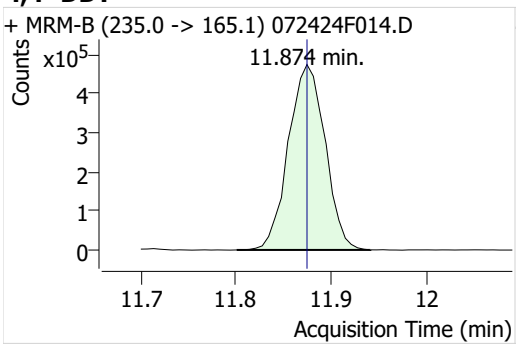
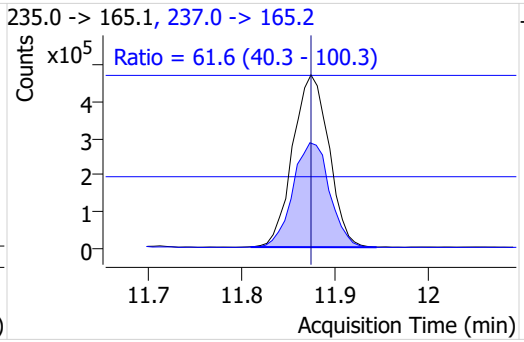
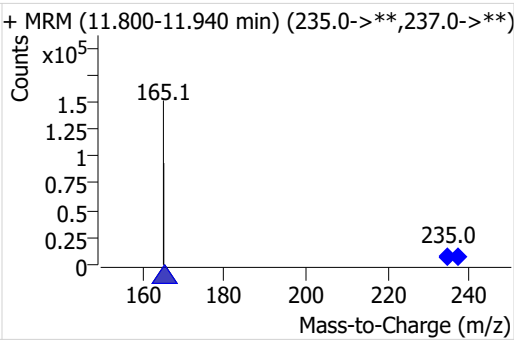
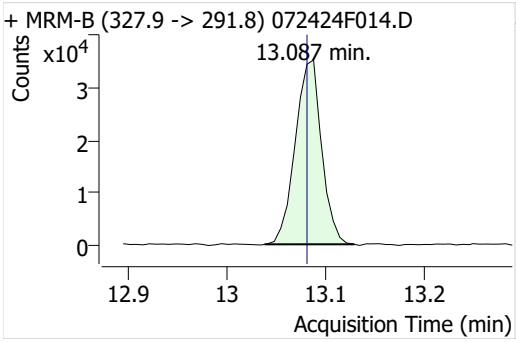
4,4'-DDT

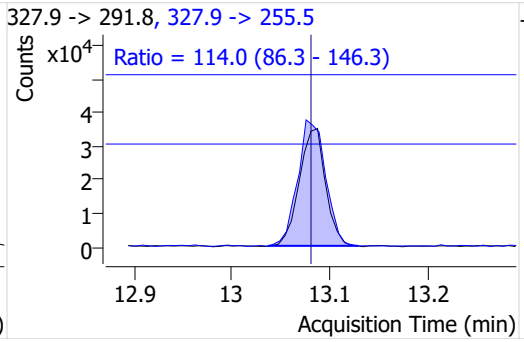


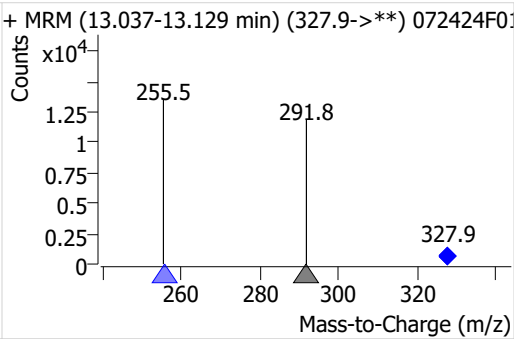




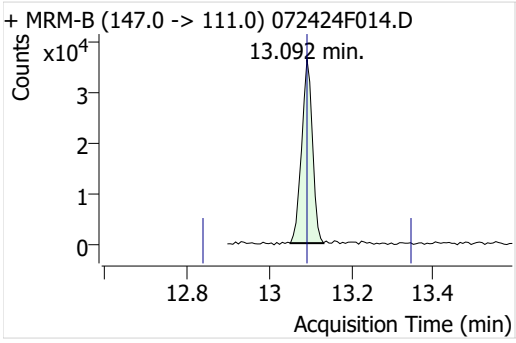
Endrin ketone-13C12

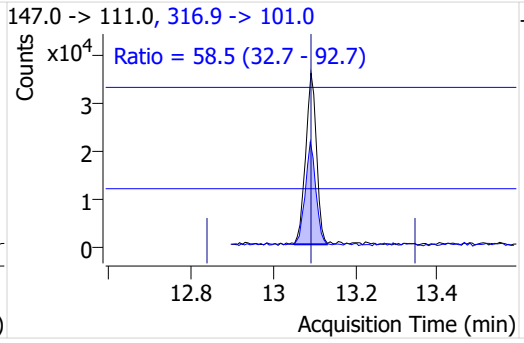


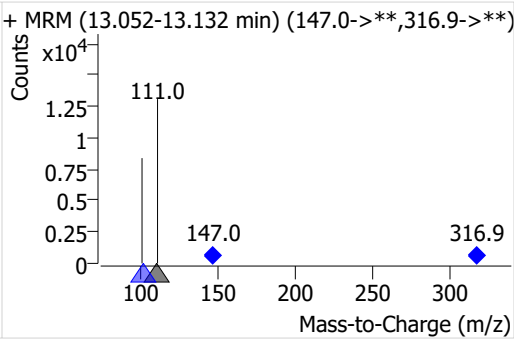




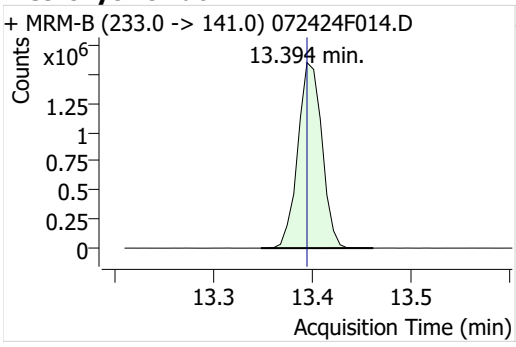
Endrin ketone

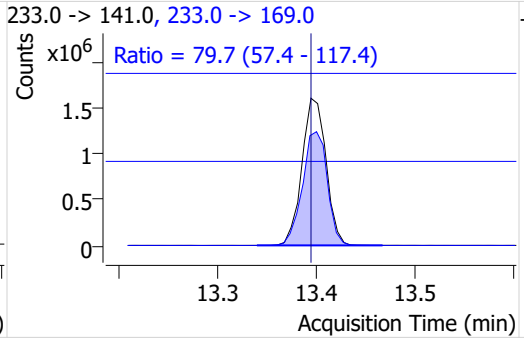


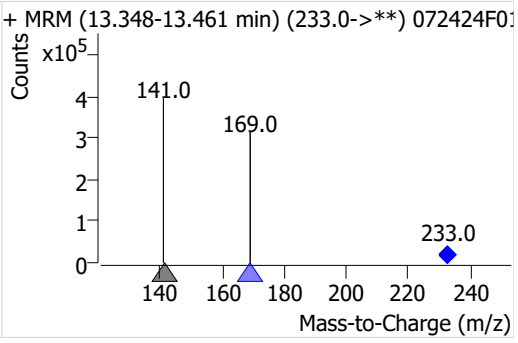




Methoxychlor-d6







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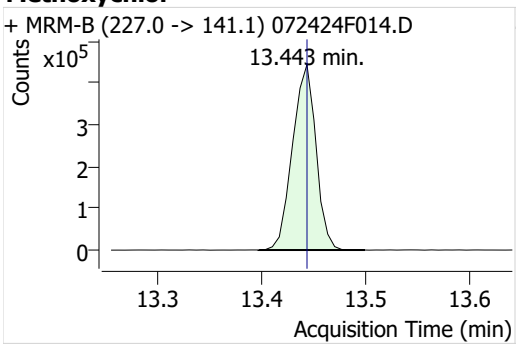
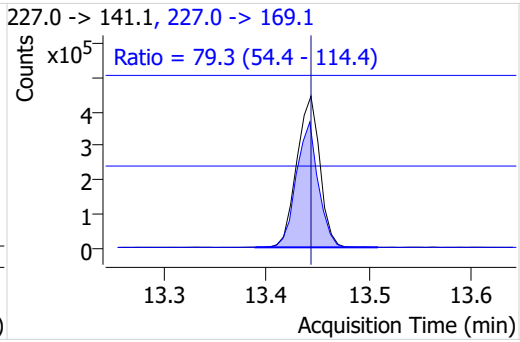
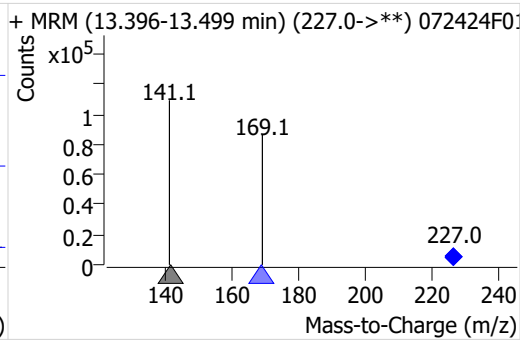
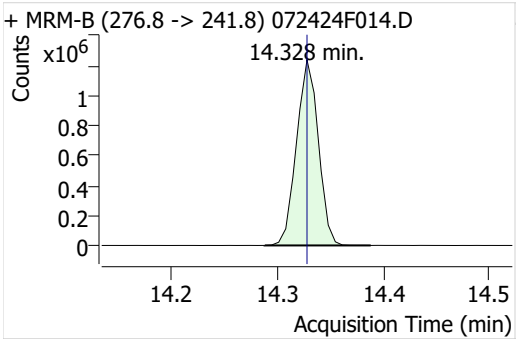
Methoxychlor

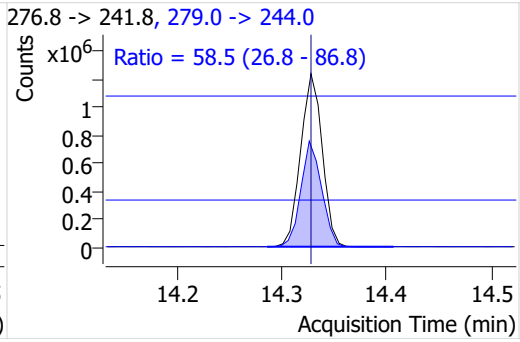


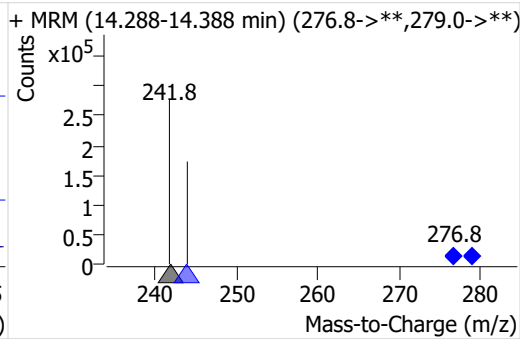




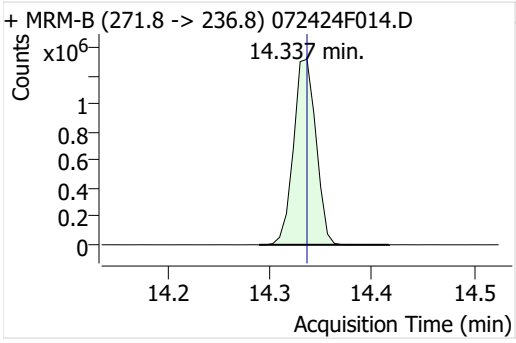
Mirex-13C10

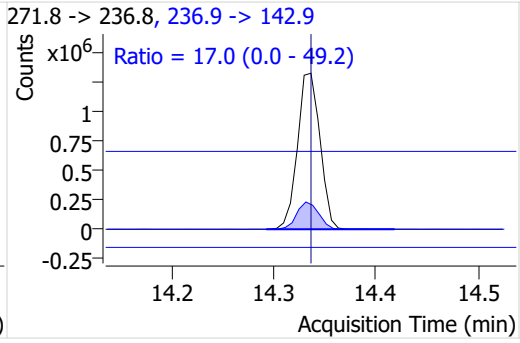


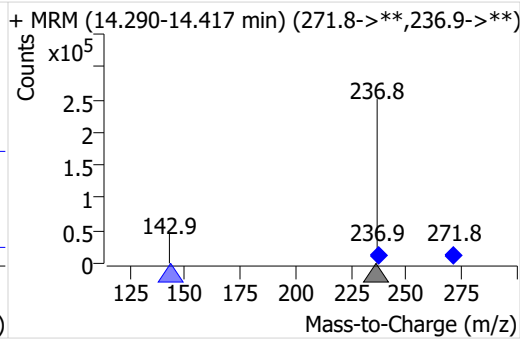




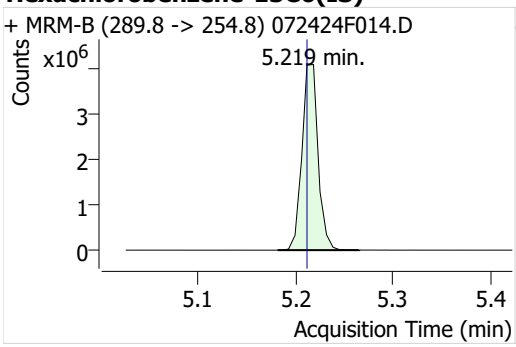
Mirex

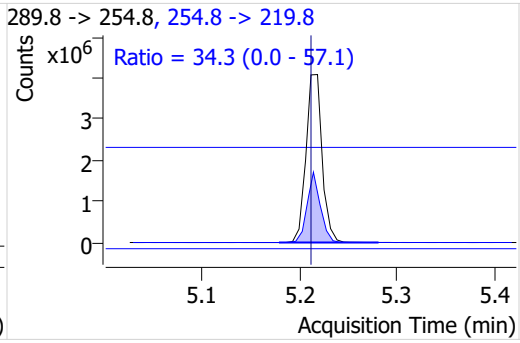


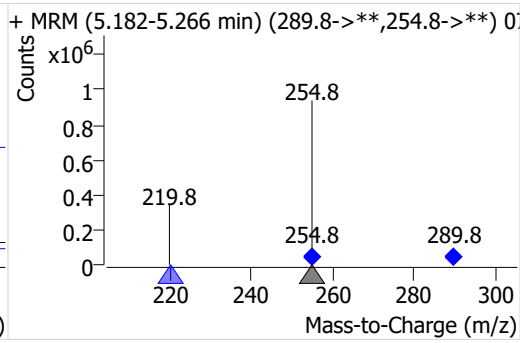




Hexachlorobenzene-13C6(IS)







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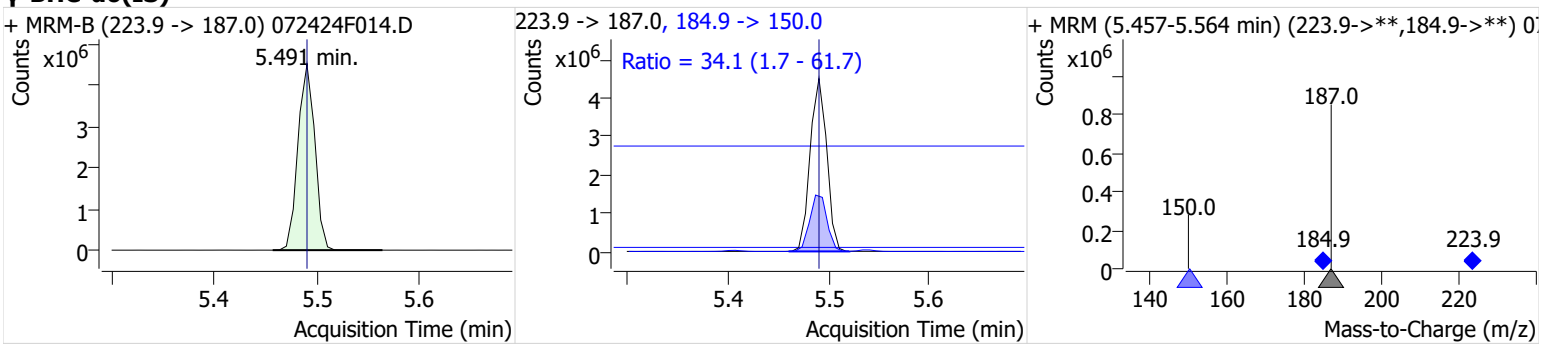
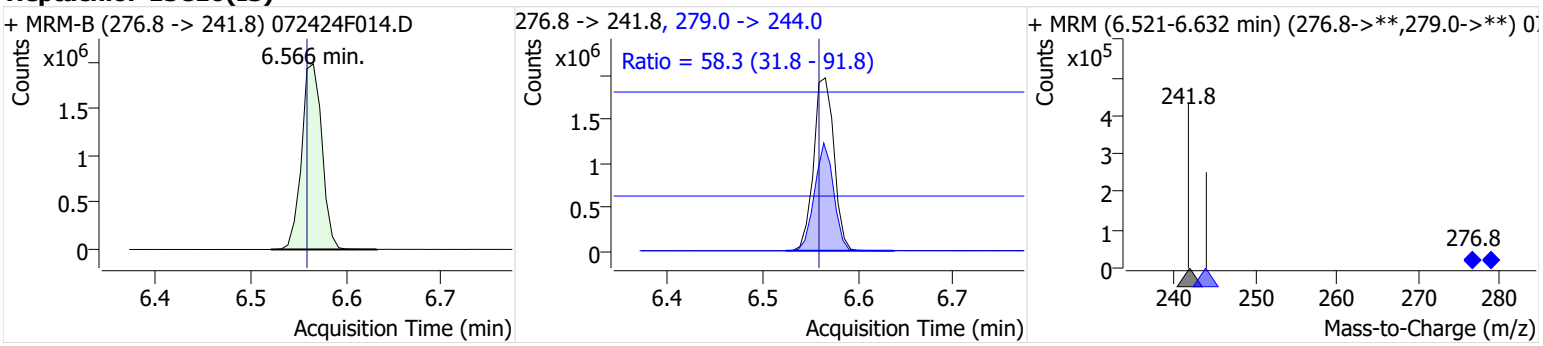
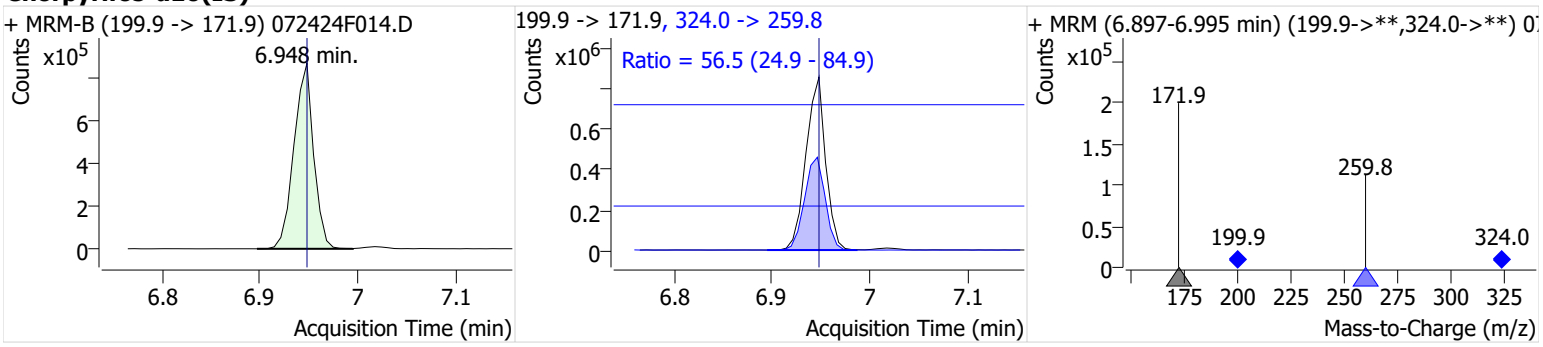
γ-BHC-d6(IS)



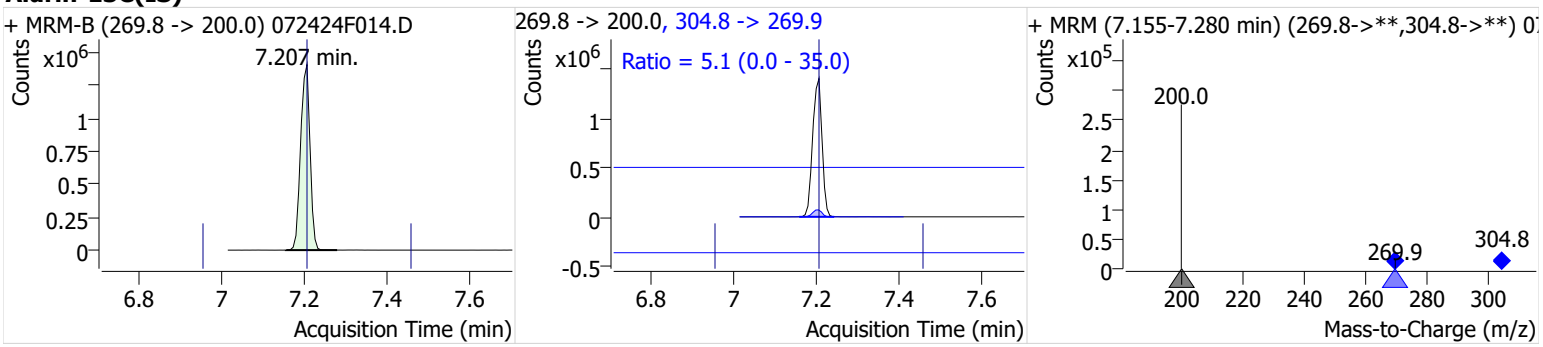
Heptachlor-13C10(IS)



Chorpyrifos-d10(IS)



Aldrin-13C(IS)



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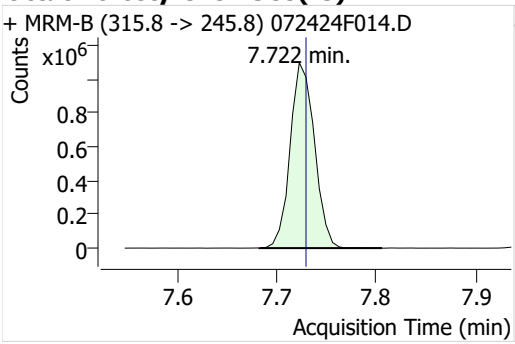
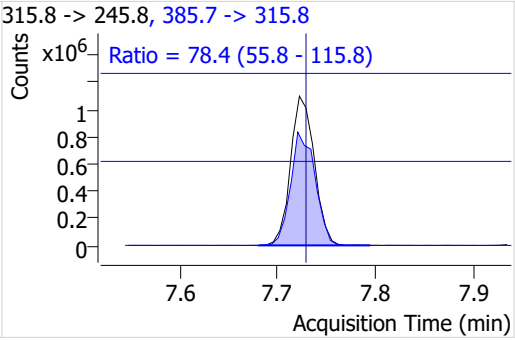
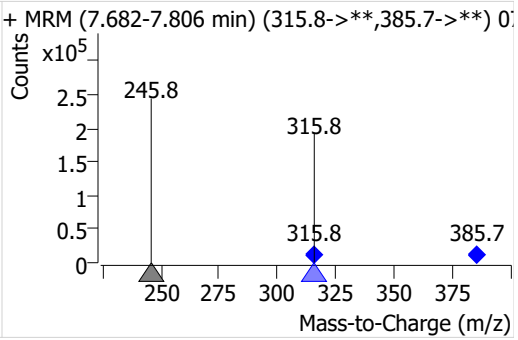
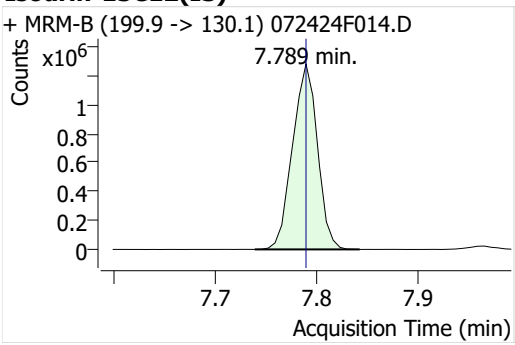
Octachlorostyrene-13C8(IS)

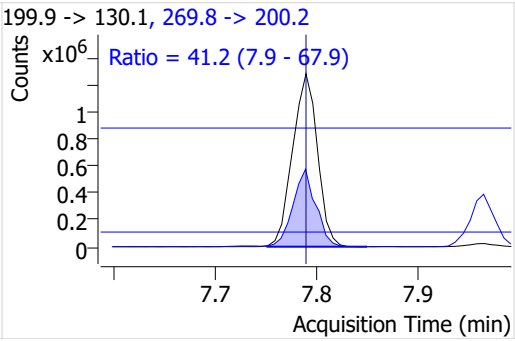


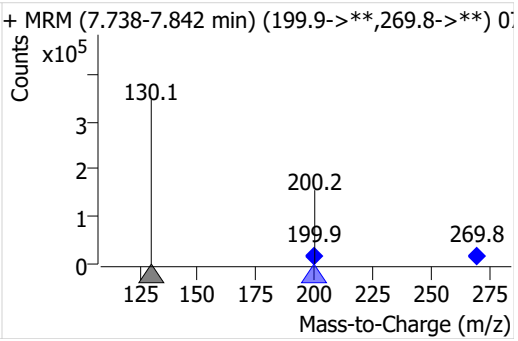




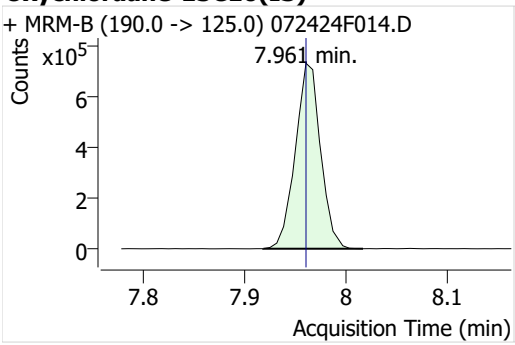
Isodrin-13C12(IS)

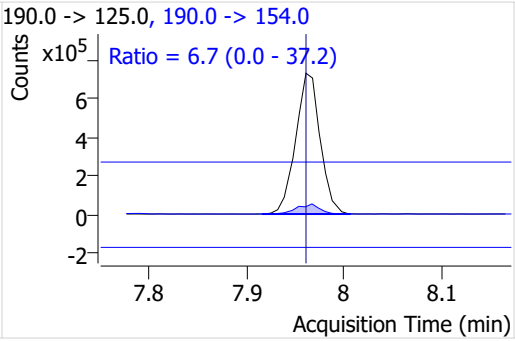


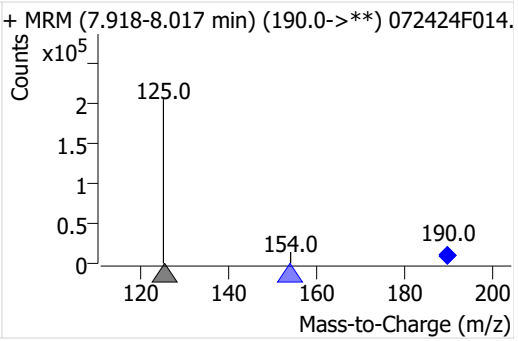




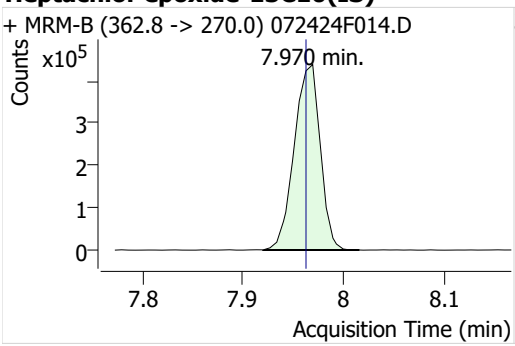
Oxychlordane-13C10(IS)

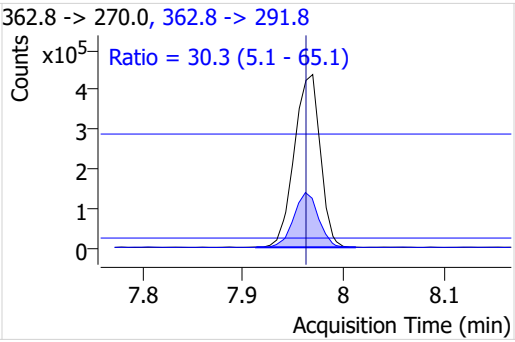


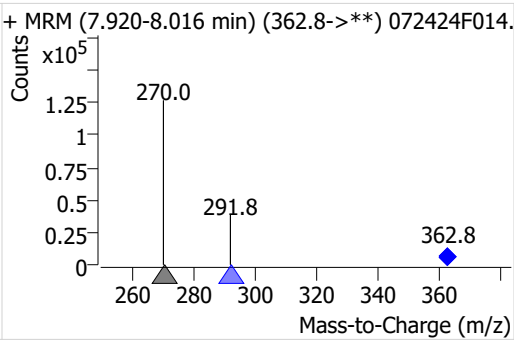




Heptachlor epoxide-13C10(IS)







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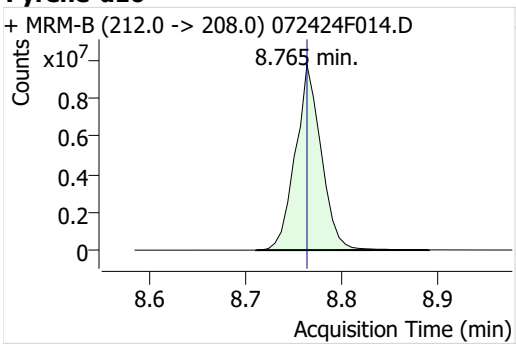
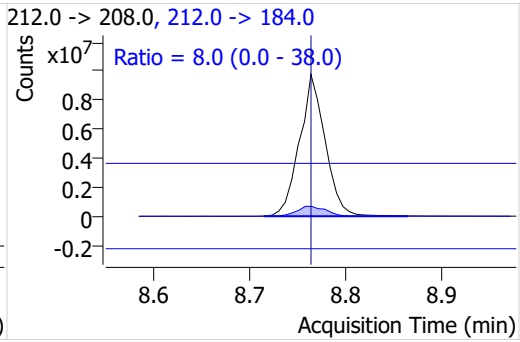
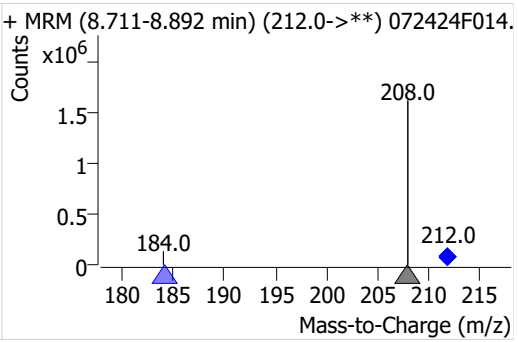
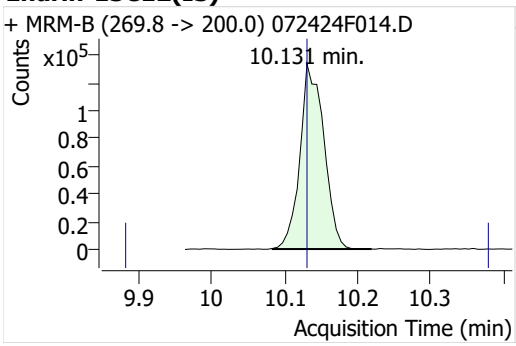
Pyrene-d10

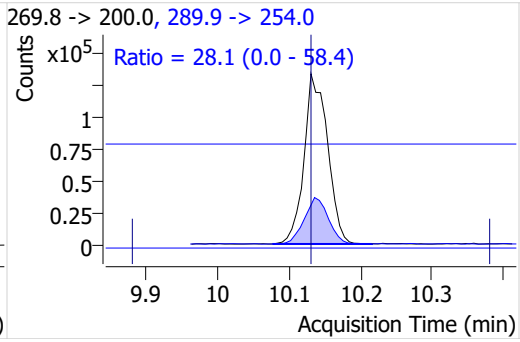


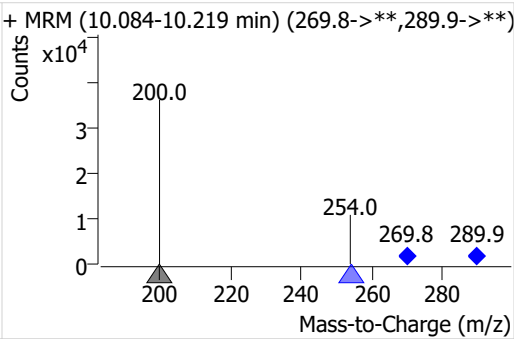




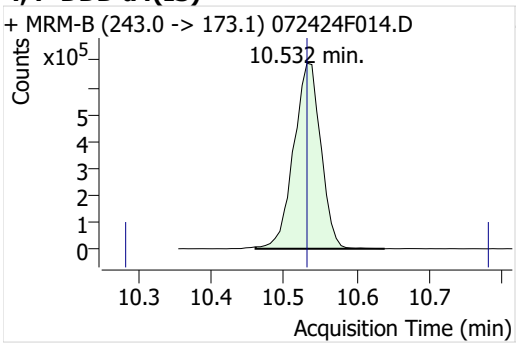
Endrin-13C12(IS)

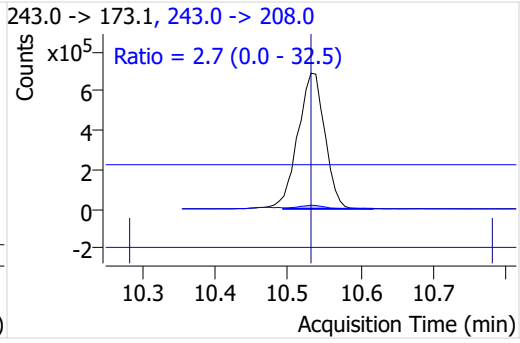


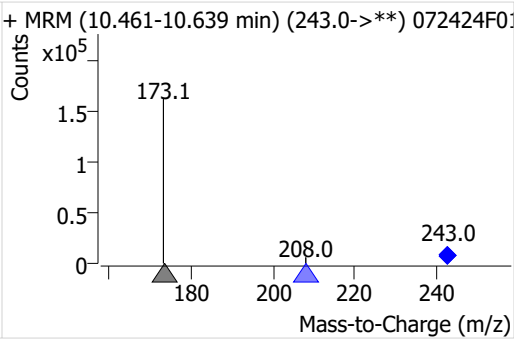




4,4'-DDD d4(IS)







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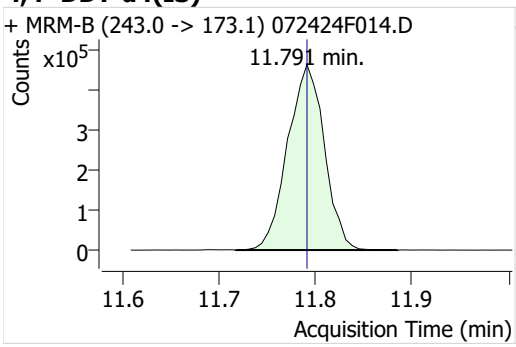
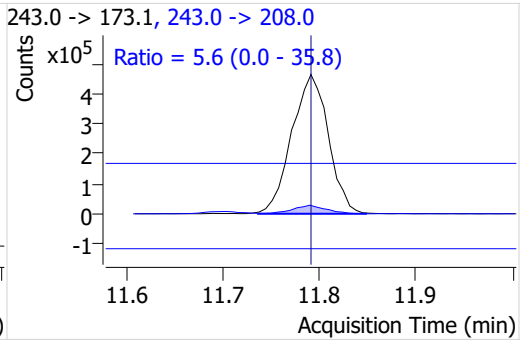
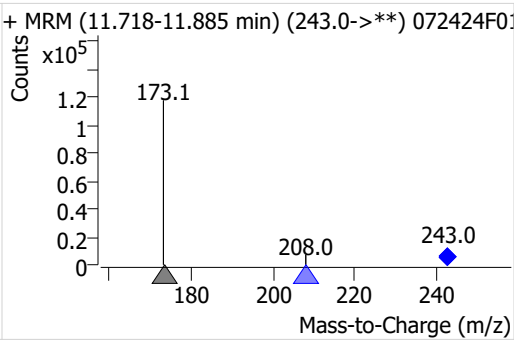
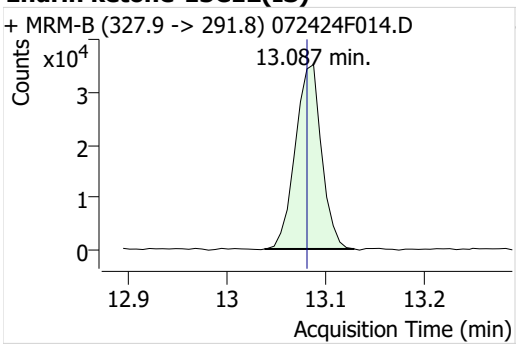


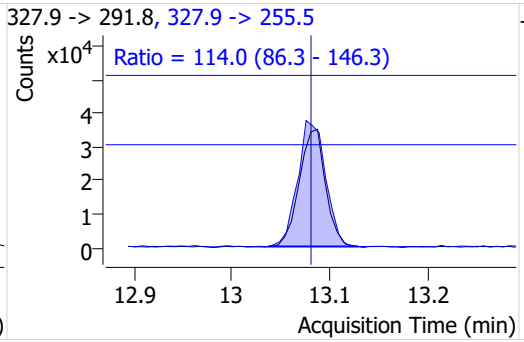


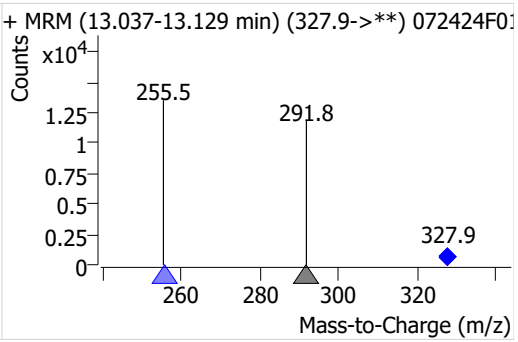


MassHunter Quantitative Analysis Sample Report

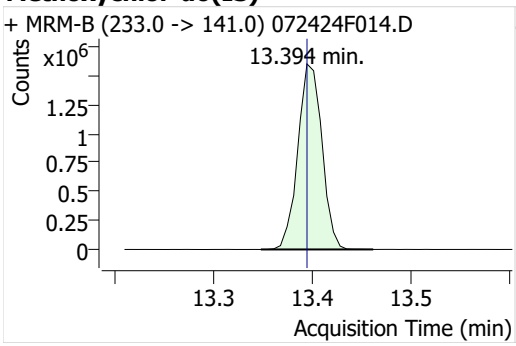
Endrin ketone-13C12(IS)

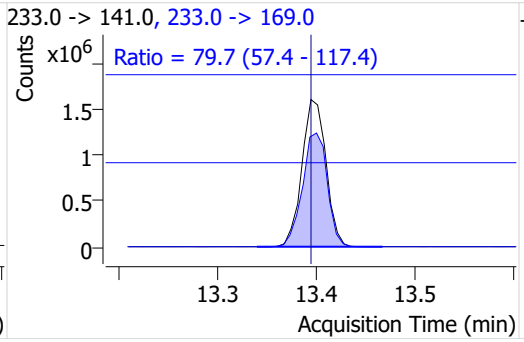


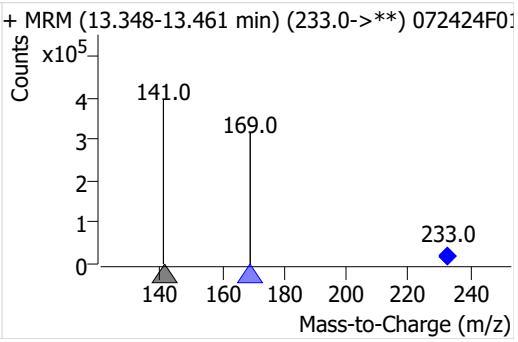




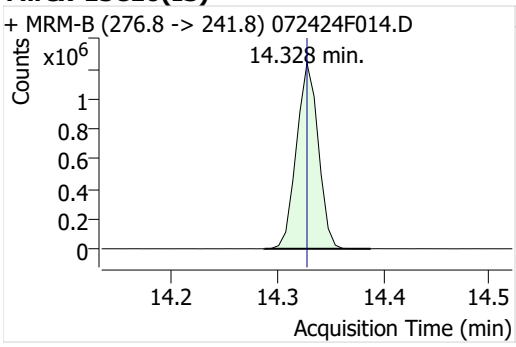
Methoxychlor-d6(IS)

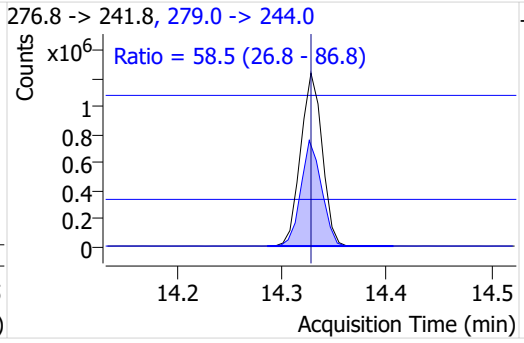


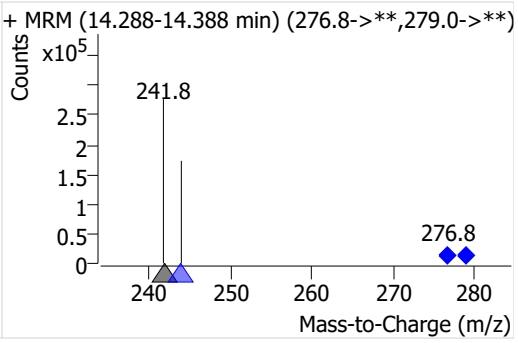




Mirex-13C10(IS)







MassHunter Quantitative Analysis Sample Report

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Name	OC PEST ICAL 10ppb SVM71-30E	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	7/25/2024 7:23:51 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method		**Vial**	7
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.213	289.8 -> 254.8	5748584	20.0000 ng/ml	0.002
γ-BHC-d6(IS)	5.491	223.9 -> 187.0	5942633	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	6.565	276.8 -> 241.8	3715807	20.0000 ng/ml	0.009
Chorpyrifos-d10(IS)	6.941	199.9 -> 171.9	1889887	20.0000 ng/ml	0.004
Aldrin-13C(IS)	7.207	269.8 -> 200.0	2582649	20.0000 ng/ml	0.001
Octachlorostyrene-13C8(IS)	7.729	315.8 -> 245.8	2499757	20.0000 ng/ml	0.001
Isodrin-13C12(IS)	7.789	199.9 -> 130.1	2978036	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	7.961	190.0 -> 125.0	1613385	20.0000 ng/ml	0.000
Heptachlor epoxide-13C10(IS)	7.963	362.8 -> 270.0	946806	20.0000 ng/ml	0.003
Pyrene-d10	8.765	212.0 -> 208.0	28194735	100.0000 ng/ml	0.001
Endrin-13C12(IS)	10.145	269.8 -> 200.0	476322	20.0000 ng/ml	0.013
4,4'-DDD d4(IS)	10.532	243.0 -> 173.1	2696721	5.0000 ng/ml	0.003
4,4'-DDT-d4(IS)	11.798	243.0 -> 173.1	1948311	5.0000 ng/ml	0.006
Endrin ketone-13C12(IS)	13.080	327.9 -> 291.8	112025	20.0000 ng/ml	0.001
Methoxychlor-d6(IS)	13.394	233.0 -> 141.0	4676583	20.0000 ng/ml	0.001
Mirex-13C10(IS)	14.328	276.8 -> 241.8	2694999	5.0000 ng/ml	0.002

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	5748584	16.147 ng/ml	
		Spiked Amount =	20.0	Recovery =	*80.7 %*
γ-BHC-d6	5.491	223.9 -> 187.0	5942633	16.472 ng/ml	
		Spiked Amount =	20.0	Recovery =	*82.4 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	3715807	17.928 ng/ml	
		Spiked Amount =	20.0	Recovery =	*89.6 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	1889887	21.275 ng/ml	
		Spiked Amount =	20.0	Recovery =	*106.4 %*
Aldrin-13C	7.207	269.8 -> 200.0	2583263	16.472 ng/ml	
		Spiked Amount =	20.0	Recovery =	*82.4 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	2499757	17.686 ng/ml	
		Spiked Amount =	20.0	Recovery =	*88.4 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2978036	17.719 ng/ml	
		Spiked Amount =	20.0	Recovery =	*88.6 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1613385	16.188 ng/ml	
		Spiked Amount =	20.0	Recovery =	*80.9 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	946806	16.783 ng/ml	
		Spiked Amount =	20.0	Recovery =	*83.9 %*
Endrin-13C12	10.131	269.8 -> 200.0	476322	19.816 ng/ml	
		Spiked Amount =	20.0	Recovery =	*99.1 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	2696721	4.518 ng/ml	
		Spiked Amount =	5.0	Recovery =	*90.4 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1948311	5.299 ng/ml	
		Spiked Amount =	5.0	Recovery =	*106.0 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	112025	22.079 ng/ml	
		Spiked Amount =	20.0	Recovery =	*110.4 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	4676583	22.938 ng/ml	
		Spiked Amount =	20.0	Recovery =	*114.7 %*

MassHunter Quantitative Analysis Sample Report

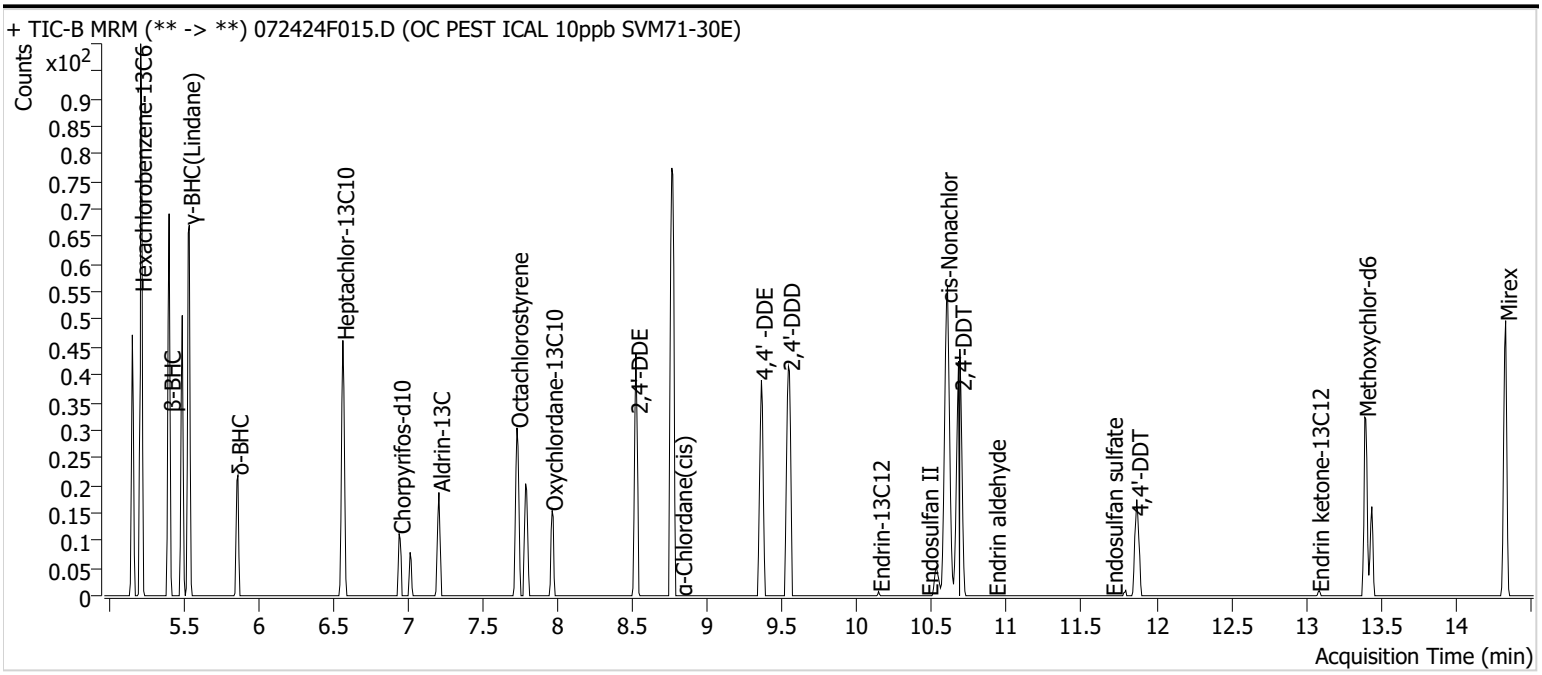
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	2694999	4.970 ng/ml
		Spiked Amount =	5.0	Recovery = *99.4 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.163	181.1 -> 145.1	4178573	9.974 ng/ml	97
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.214	283.8 -> 213.9	5110038	11.649 ng/ml	95
β-BHC	γ-BHC-d6(IS)	5.408	181.1 -> 145.1	2885873	10.285 ng/ml	97
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	3428018	9.567 ng/ml	99
δ-BHC	γ-BHC-d6(IS)	5.859	181.1 -> 145.1	2622600	10.055 ng/ml	97
Heptachlor	Heptachlor-13C10(IS)	6.569	271.7 -> 236.9	2133040	10.668 ng/ml	99
Chorpyrifos	Chorpyrifos-d10(IS)	7.019	196.9 -> 169.0	1179056	9.166 ng/ml	92
Aldrin	Aldrin-13C(IS)	7.209	254.9 -> 220.0	864758	10.927 ng/ml	79
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.728	342.8 -> 307.8	3005945	9.785 ng/ml	99
Isodrin	Isodrin-13C12(IS)	7.796	193.0 -> 123.0	1506325	9.631 ng/ml	98
Oxychlordane	Oxychlordane-13C10(IS)	7.975	114.9 -> 51.1	2312949	11.094 ng/ml	99
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.977	352.8 -> 262.9	484232	9.658 ng/ml	100
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.503	271.8 -> 236.9	906195	10.690 ng/ml	97
2,4'-DDE	4,4'-DDD d4(IS)	8.527	246.0 -> 176.2	9528164	9.885 ng/ml	94
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.823	271.8 -> 236.9	1040883	10.151 ng/ml	99
Endosulfan I	Endrin-13C12(IS)	8.847	206.9 -> 172.0	353931	8.267 ng/ml	95
trans-Nanochlor	Oxychlordane-13C10(IS)	8.891	271.8 -> 236.9	794287	10.890 ng/ml	90
4,4' -DDE	4,4'-DDD d4(IS)	9.364	246.0 -> 176.2	8236911	11.996 ng/ml	99
Dieldrin	Endrin-13C12(IS)	9.555	262.9 -> 193.0	520193	9.798 ng/ml	99
2,4'-DDD	4,4'-DDD d4(IS)	9.546	235.0 -> 165.1	9086196	11.735 ng/ml	95
Endrin	Endrin-13C12(IS)	10.153	262.8 -> 193.0	266849	9.066 ng/ml	98
Endosulfan II	Endrin-13C12(IS)	10.471	206.9 -> 172.0	233665	10.277 ng/ml	91
cis-Nonachlor	Oxychlordane-13C10(IS)	10.598	271.8 -> 236.9	660606	10.535 ng/ml	97
4,4'-DDD	4,4'-DDD d4(IS)	10.608	235.0 -> 165.1	5703068	9.989 ng/ml	99
2,4'-DDT	4,4'-DDT-d4(IS)	10.692	235.0 -> 165.1	4993569	8.754 ng/ml	99
Endrin aldehyde	Endrin-13C12(IS)	10.920	249.9 -> 214.9	83112	9.884 ng/ml	98
Endosulfan sulfate	Endrin-13C12(IS)	11.702	271.9 -> 237.0	587574	9.828 ng/ml	98
4,4'-DDT	4,4'-DDT-d4(IS)	11.874	235.0 -> 165.1	4544177	10.305 ng/ml	96
Endrin ketone	Endrin ketone-13C12(IS)	13.099	147.0 -> 111.0	220105	8.753 ng/ml	98
Methoxychlor	Methoxychlor-d6(IS)	13.443	227.0 -> 141.1	2431005	9.977 ng/ml	99
Mirex	Mirex-13C10(IS)	14.336	271.8 -> 236.8	5466946	9.845 ng/ml	96

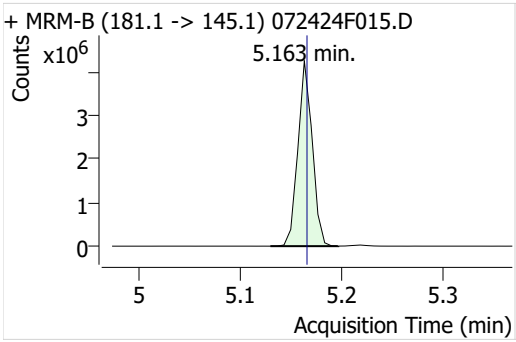
(m) = manual integration ND = Not Detected NC = Not Calculated

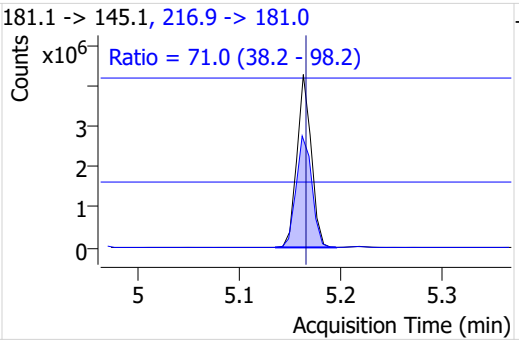
Sample Chromatogram

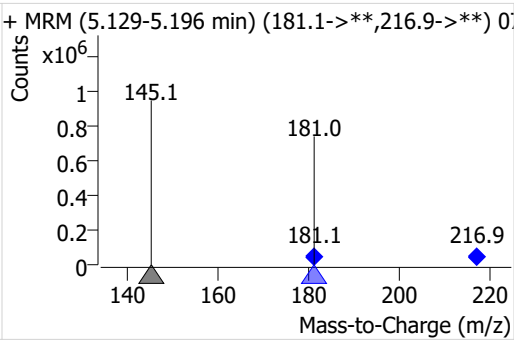
MassHunter Quantitative Analysis Sample Report



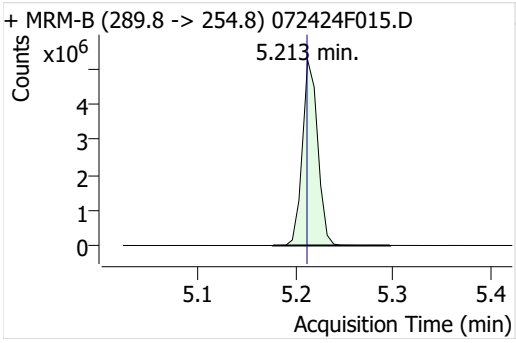
α-BHC

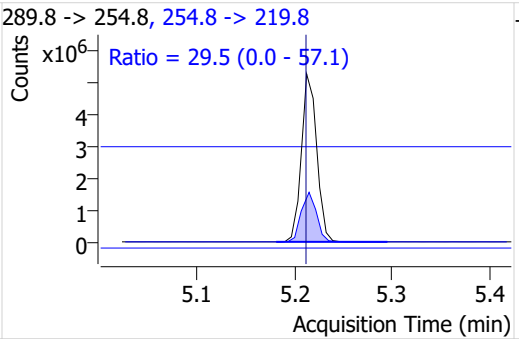


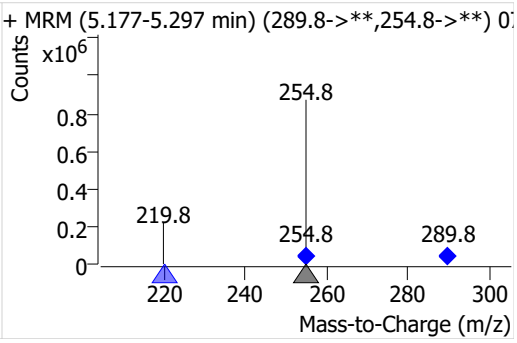




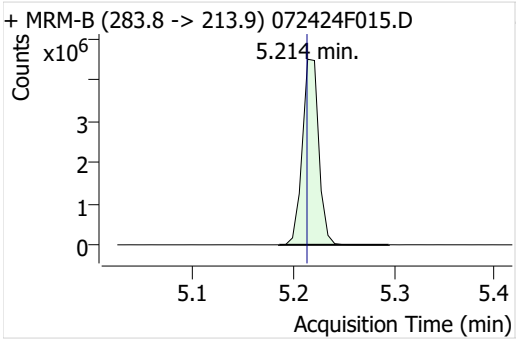
Hexachlorobenzene-13C6

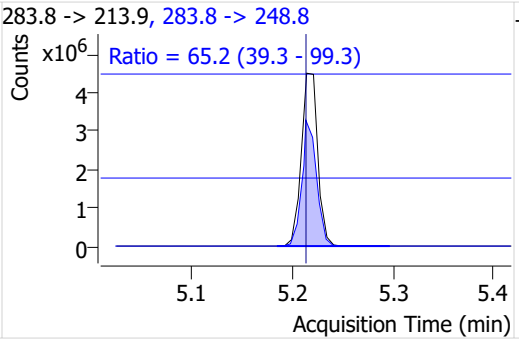


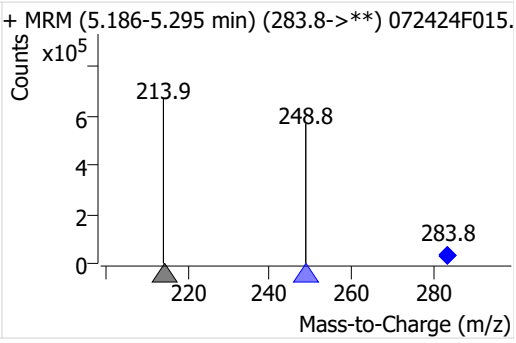




Hexachlorobenzene







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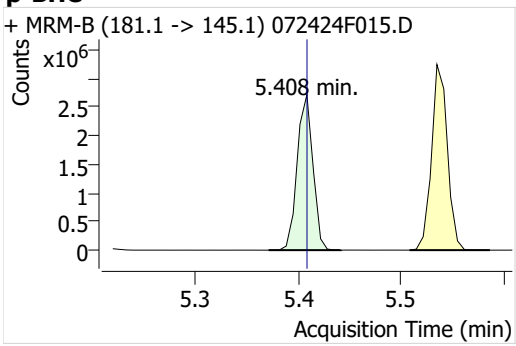
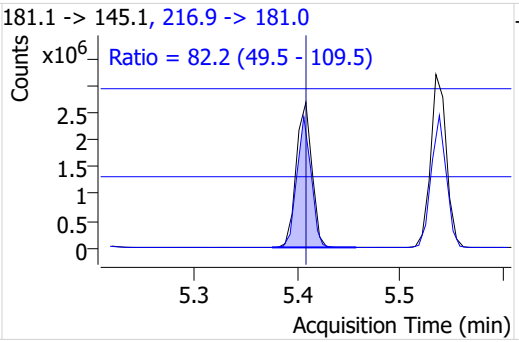
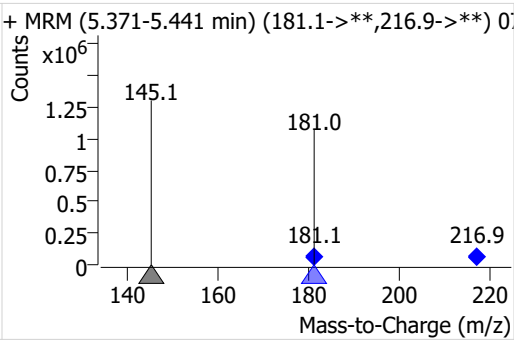
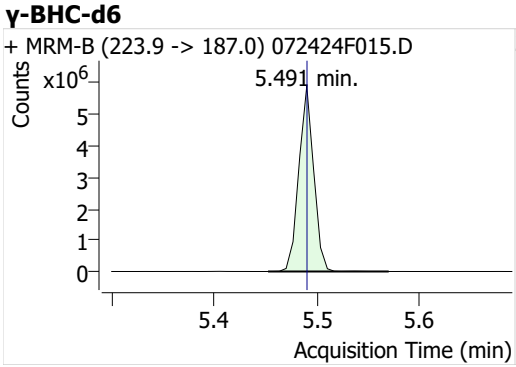
β-BHC

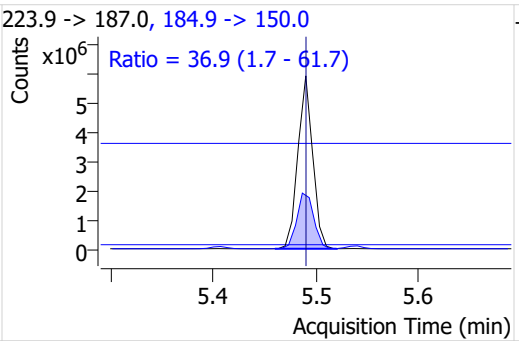


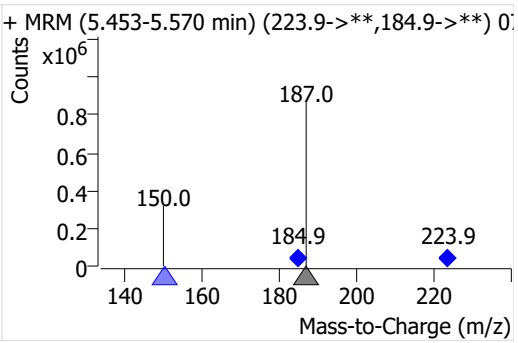




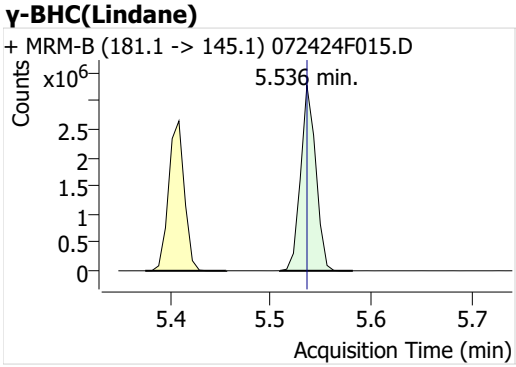
γ-BHC-d6

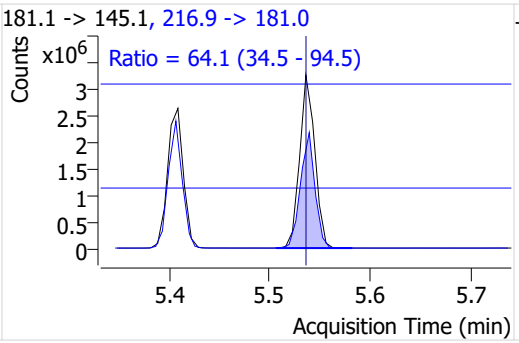


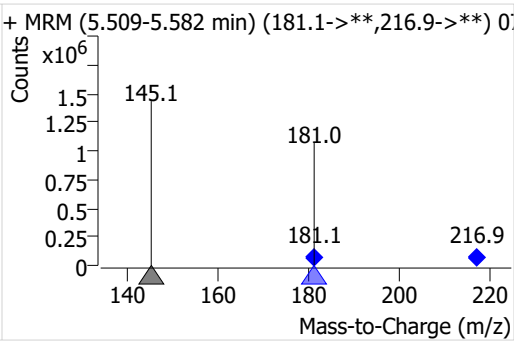




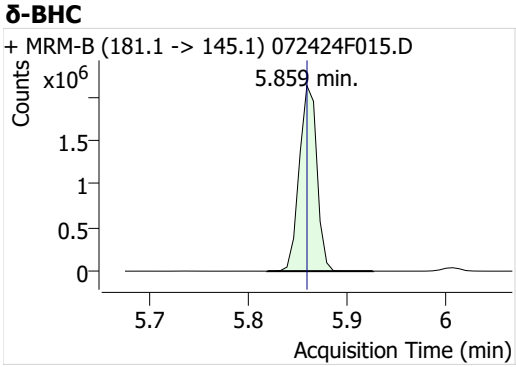
γ-BHC(Lindane)

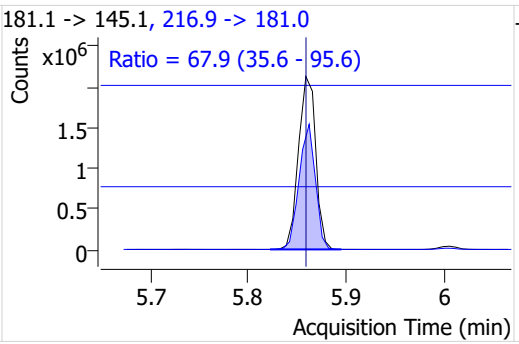


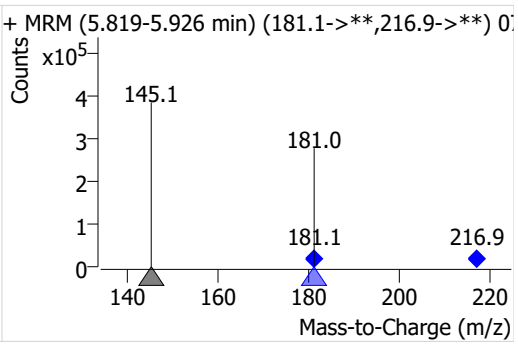




δ-BHC

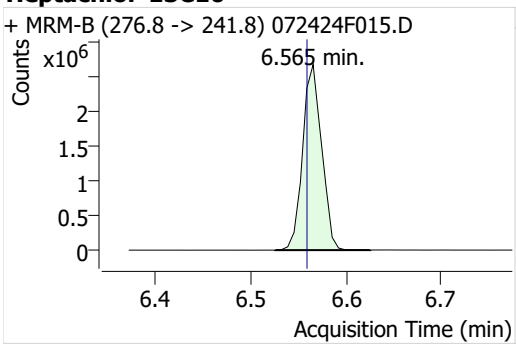


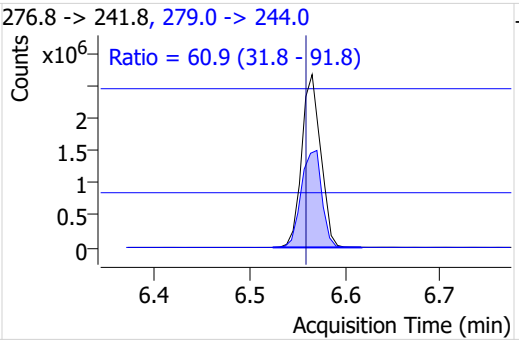


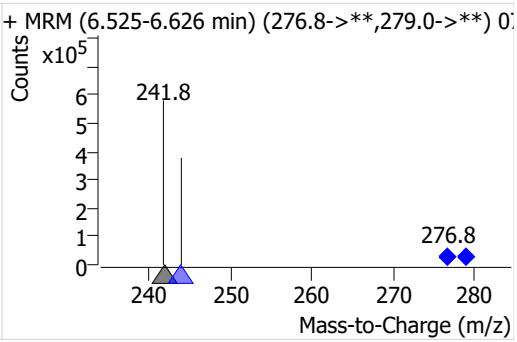


MassHunter Quantitative Analysis Sample Report

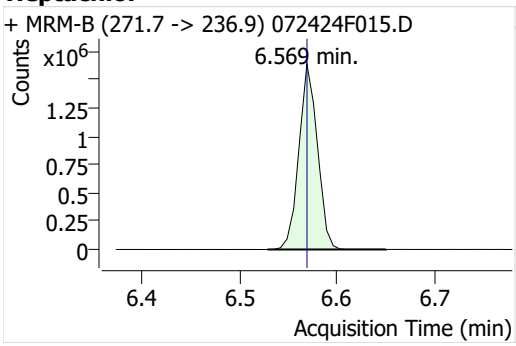
Heptachlor-13C10

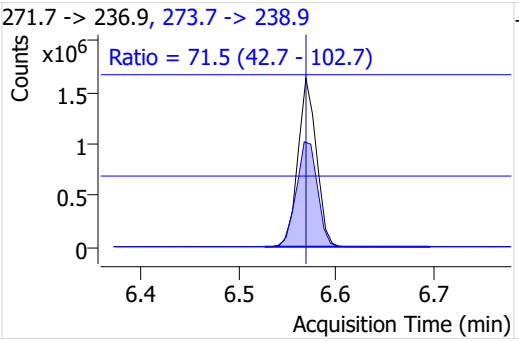


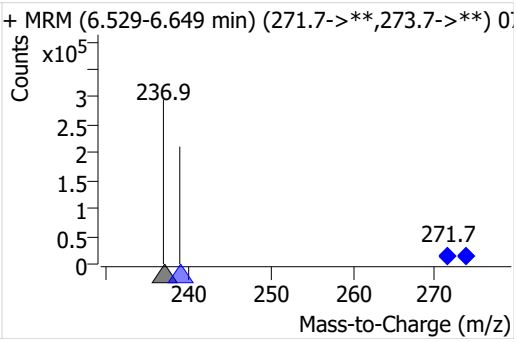




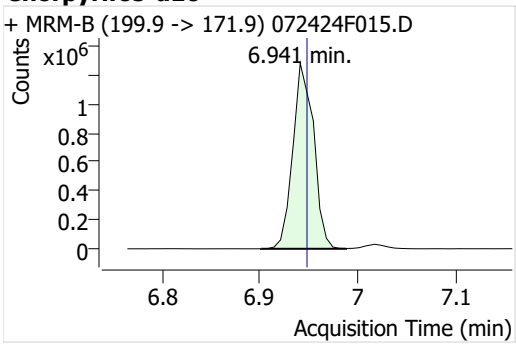
Heptachlor

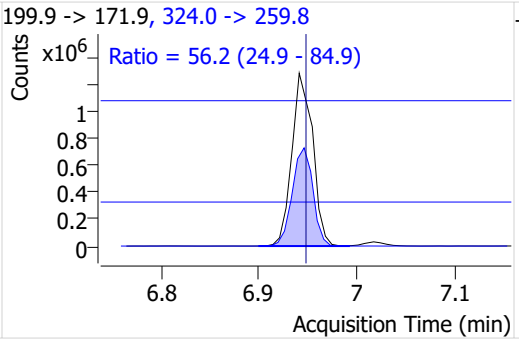


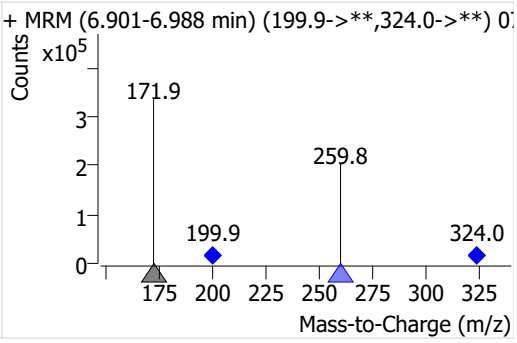




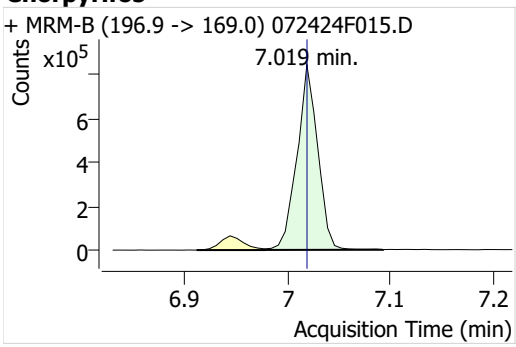
Chorpyrifos-d10

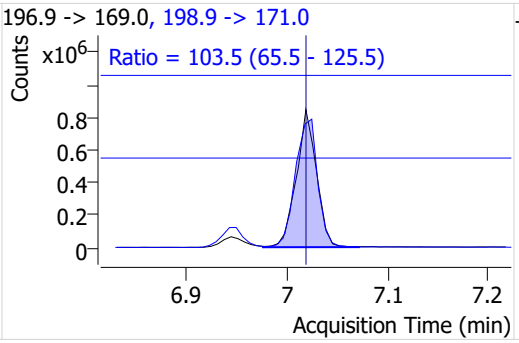


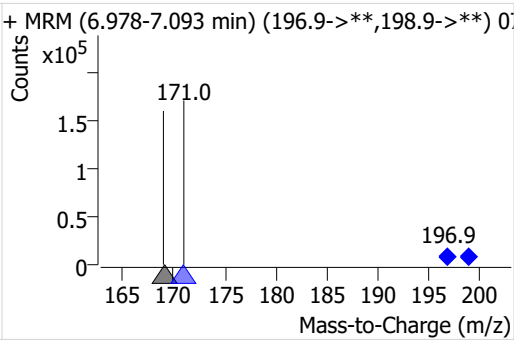




Chorpyrifos

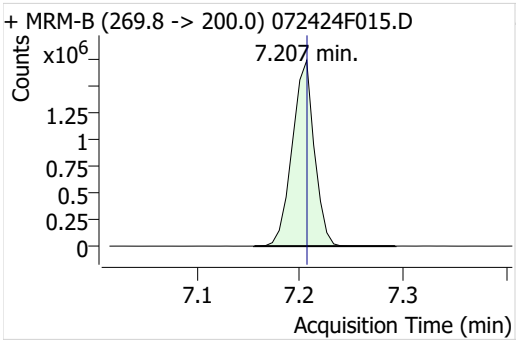


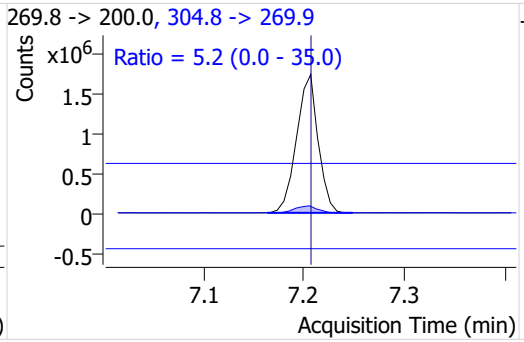


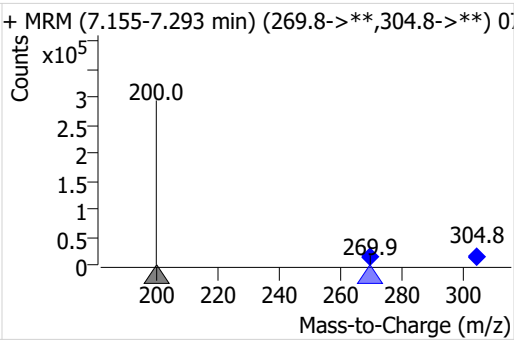


MassHunter Quantitative Analysis Sample Report

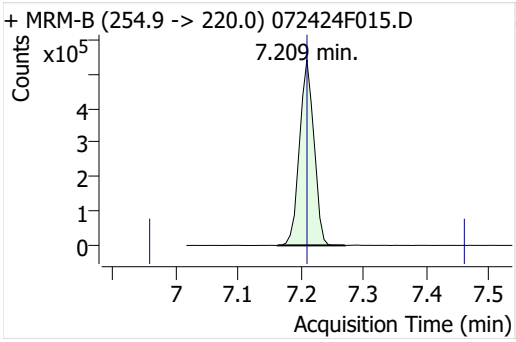
Aldrin-13C

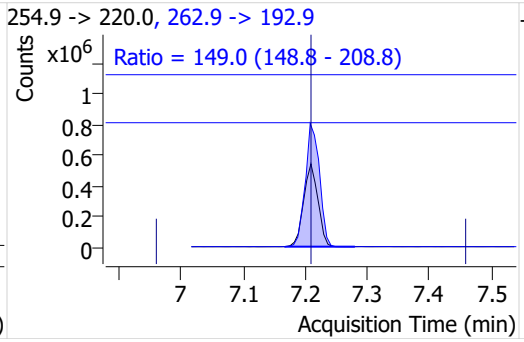


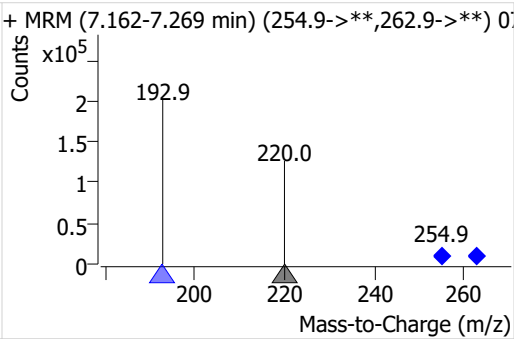




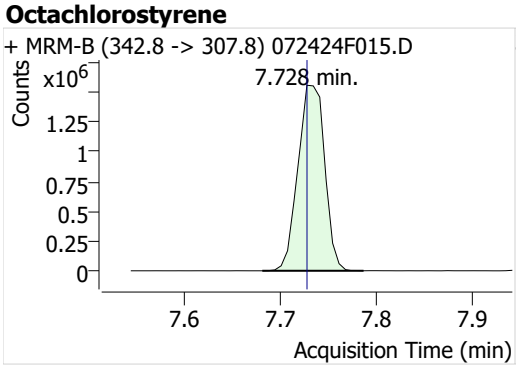
Aldrin

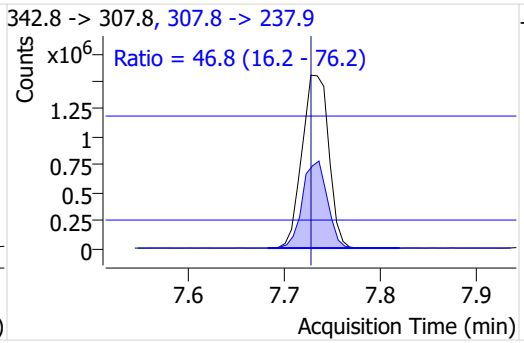


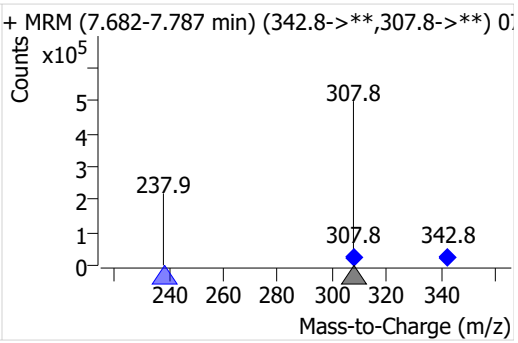




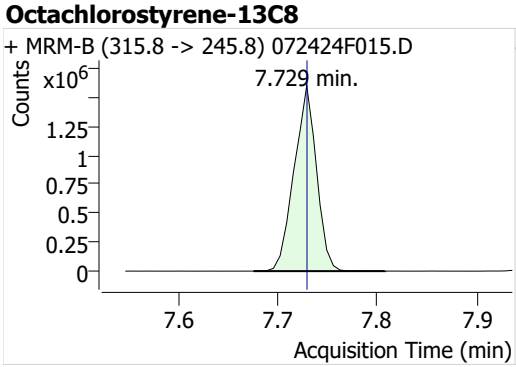
Octachlorostyrene

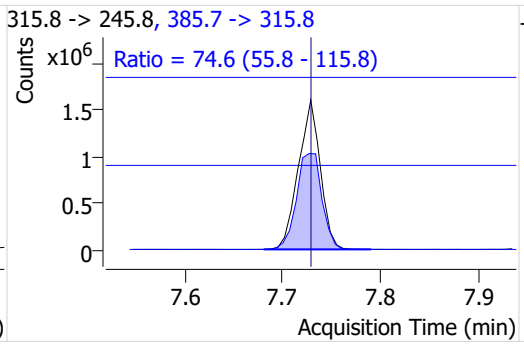


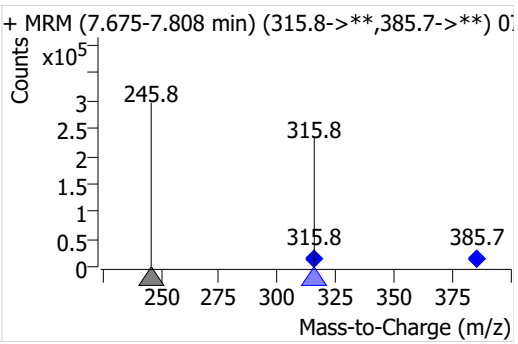




Octachlorostyrene-13C8







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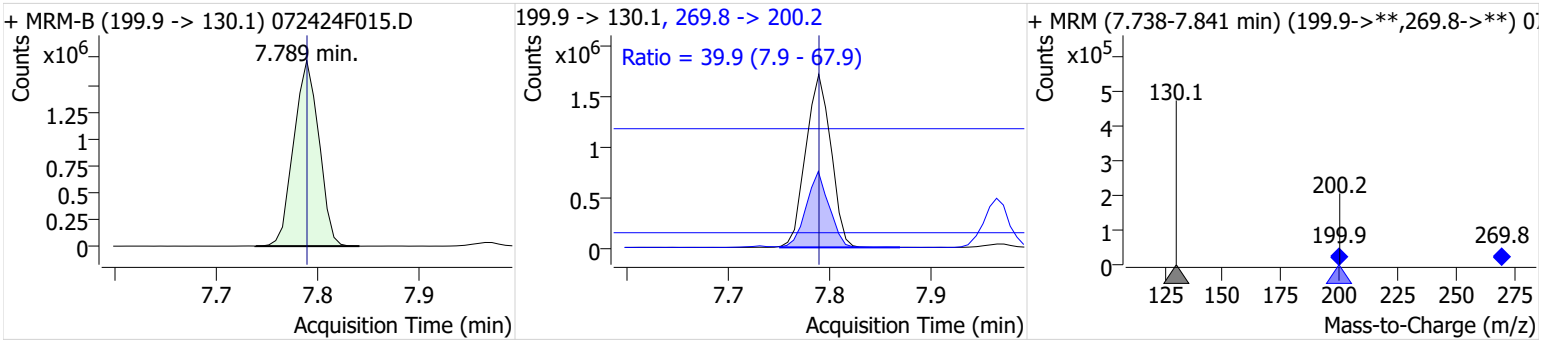
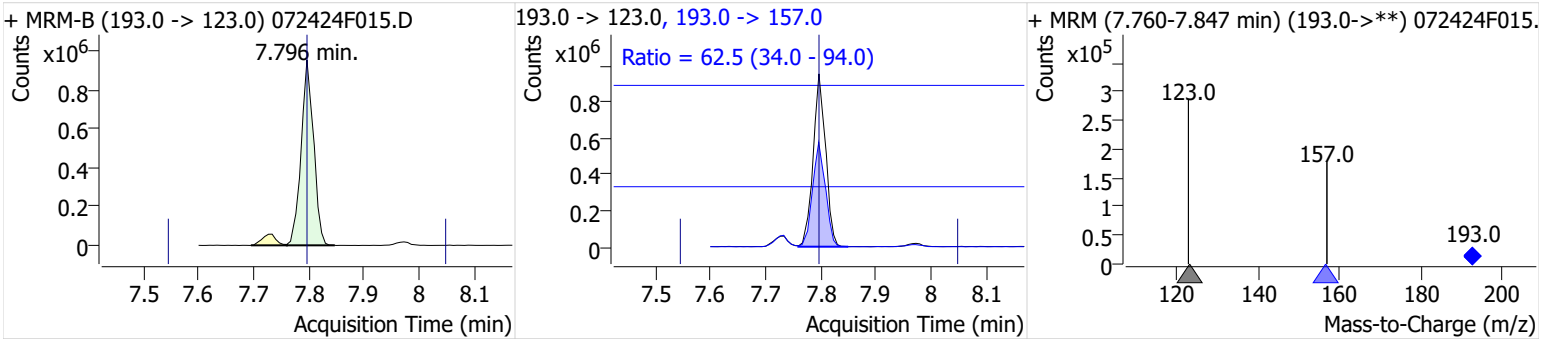
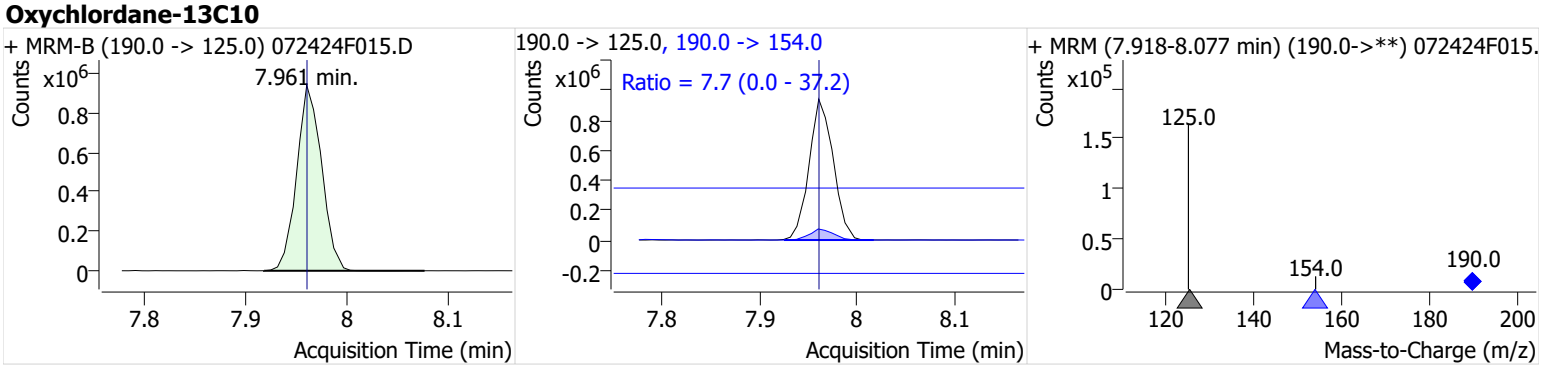
Isodrin-13C12



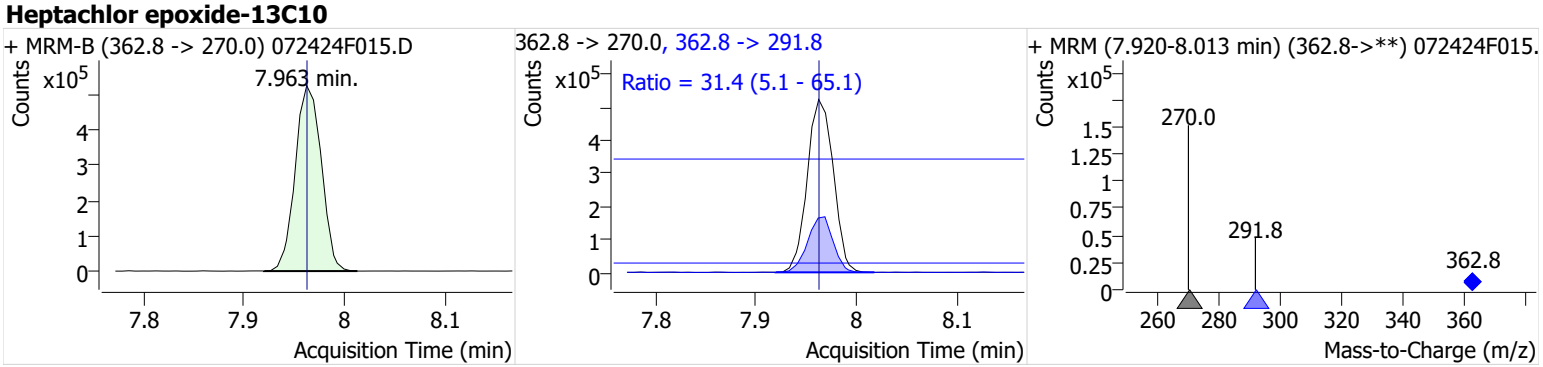
Isodrin



Oxychlordane-13C10

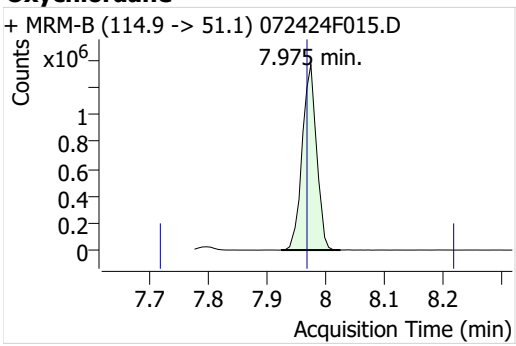


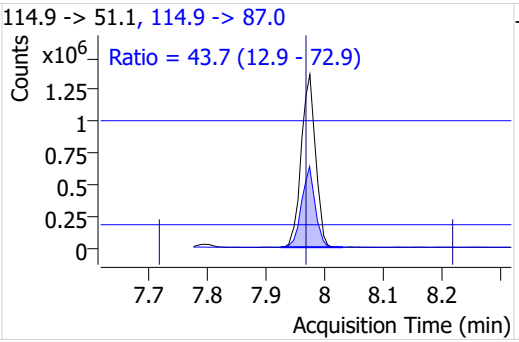
Heptachlor epoxide-13C10

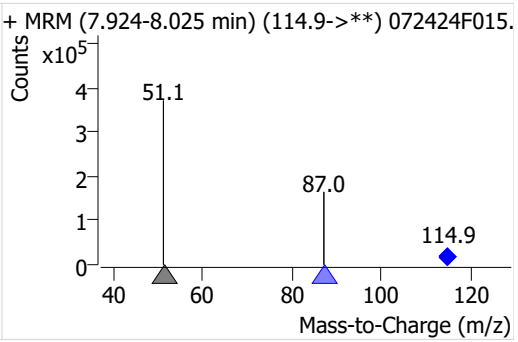


MassHunter Quantitative Analysis Sample Report

Oxychlordane







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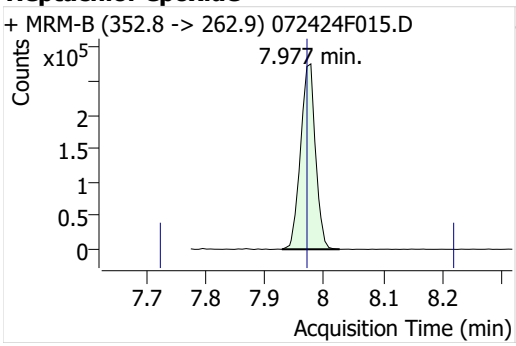
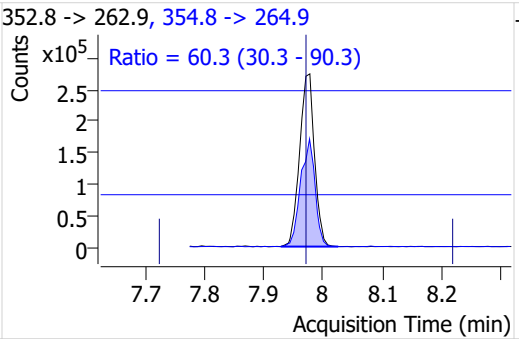
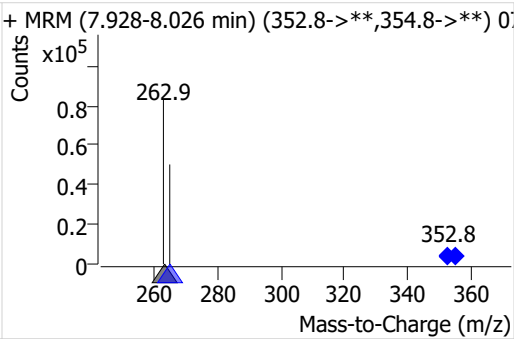
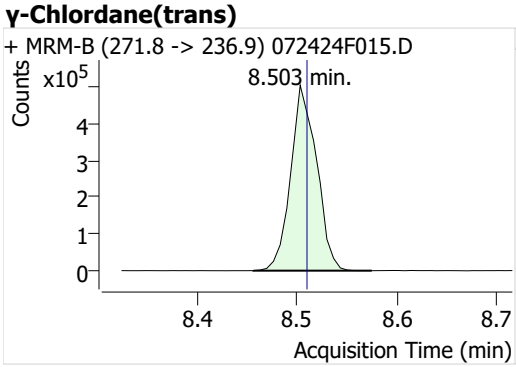
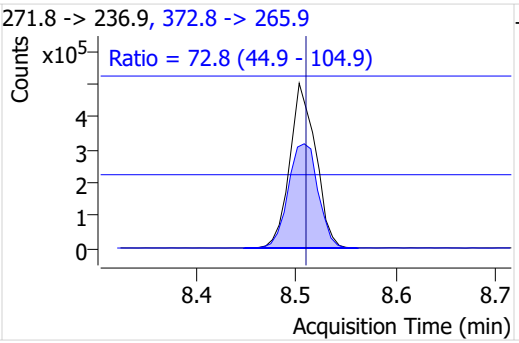


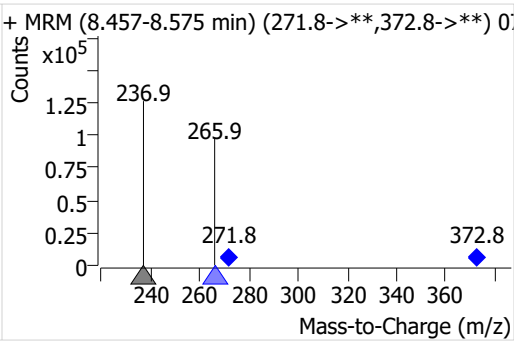




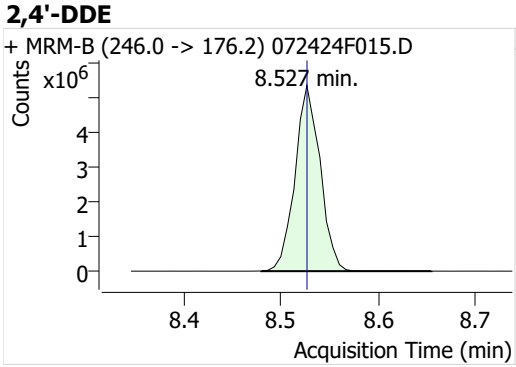
γ-Chlordane(trans)

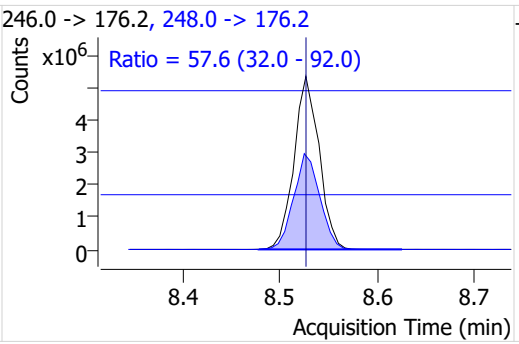


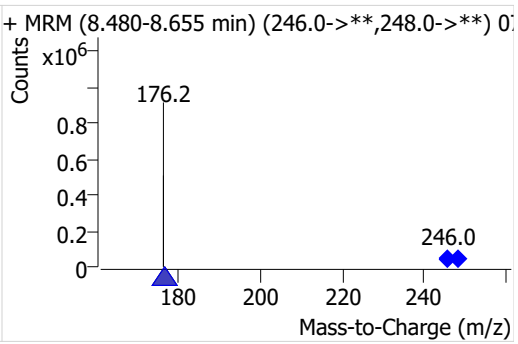




2,4'-DDE







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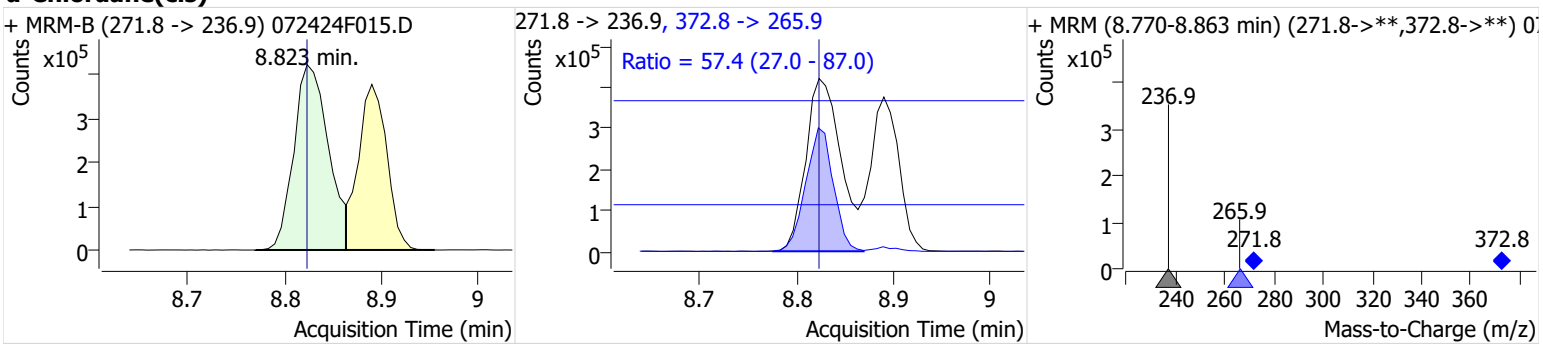
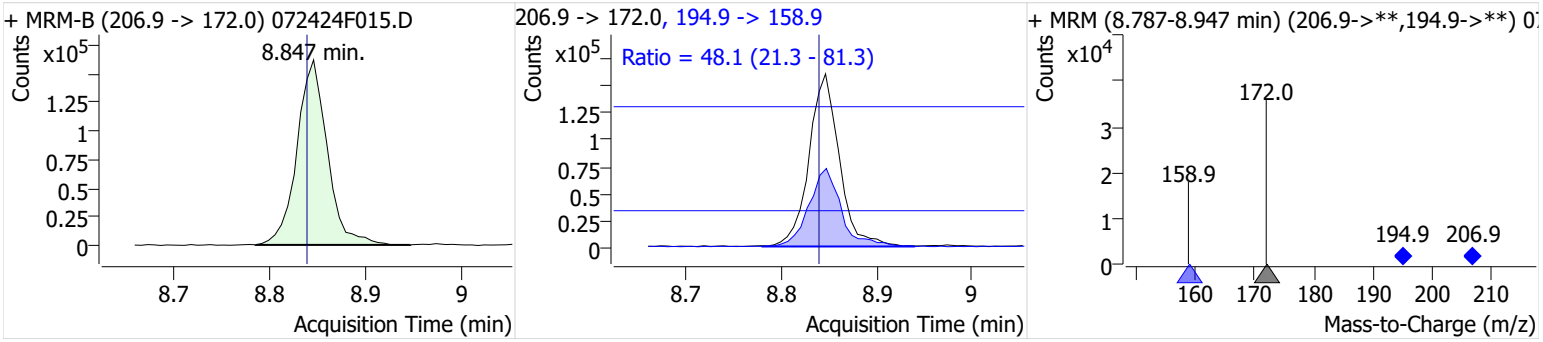
α-Chlordane(cis)



Endosulfan I



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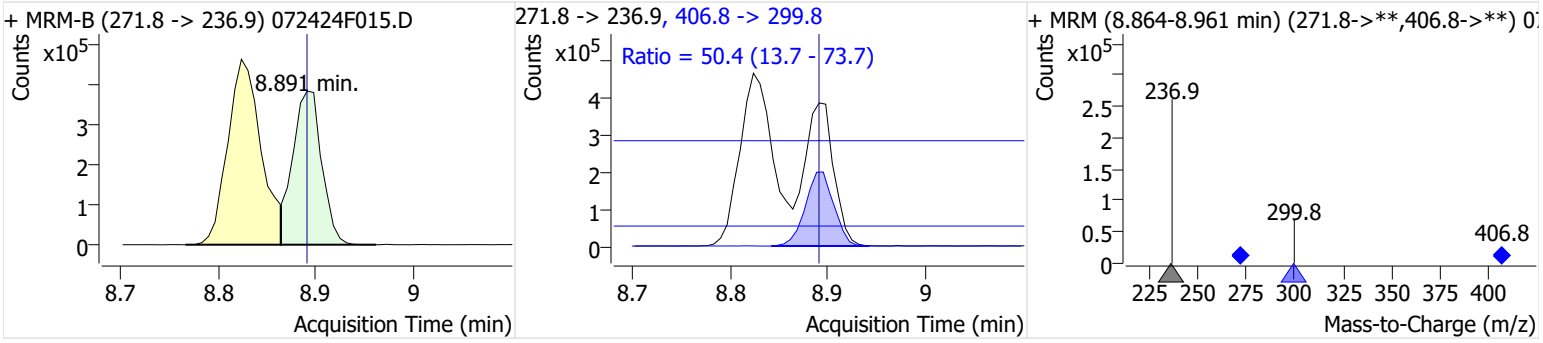
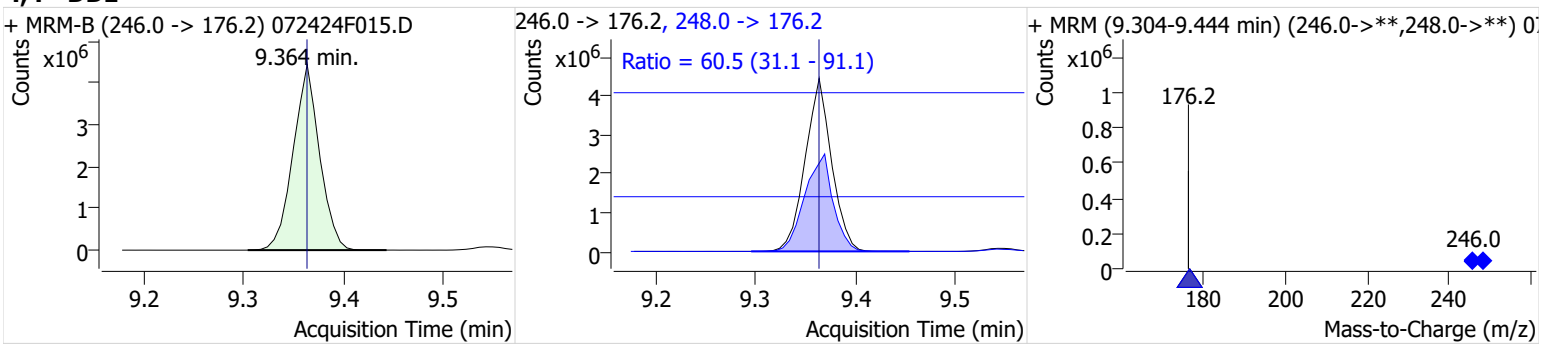


4,4' -DDE



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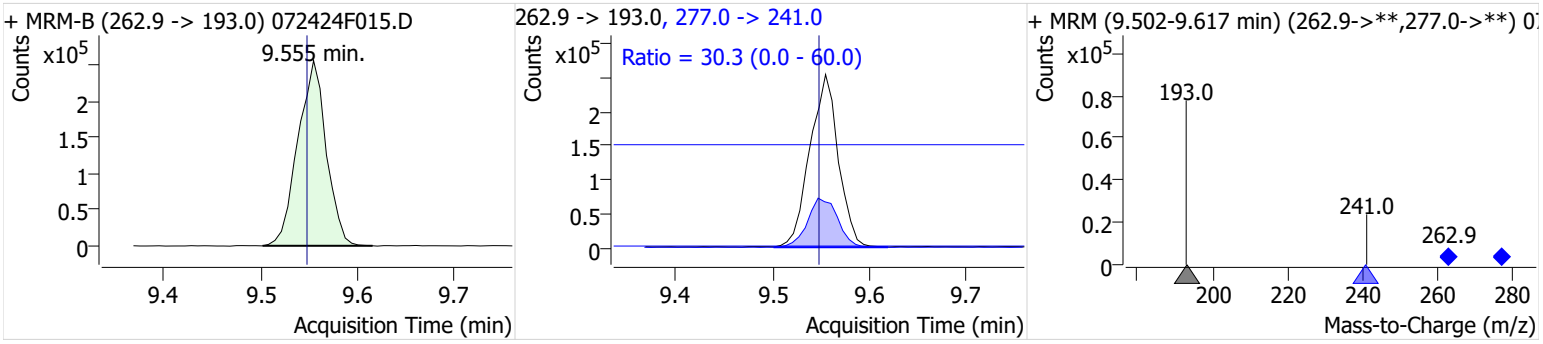
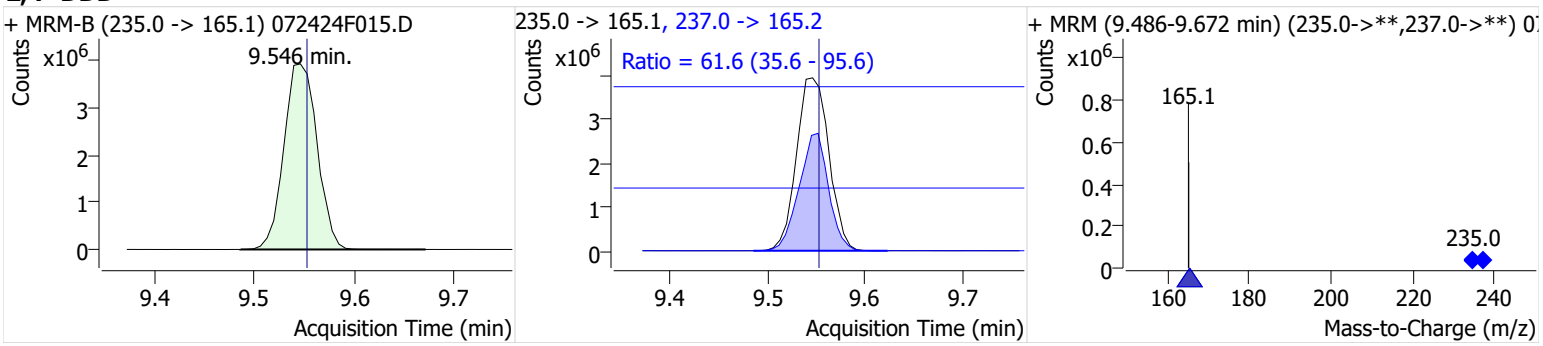
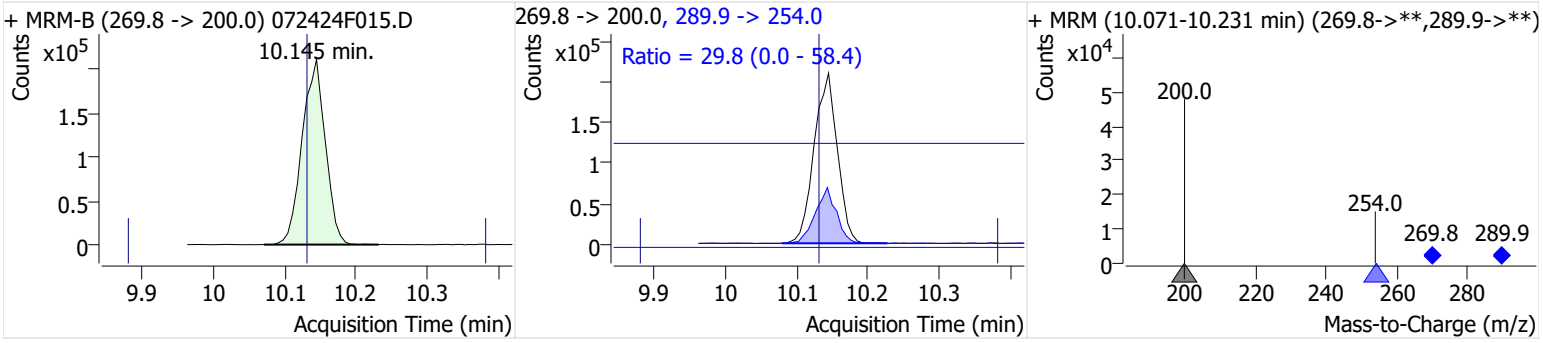
Dieldrin



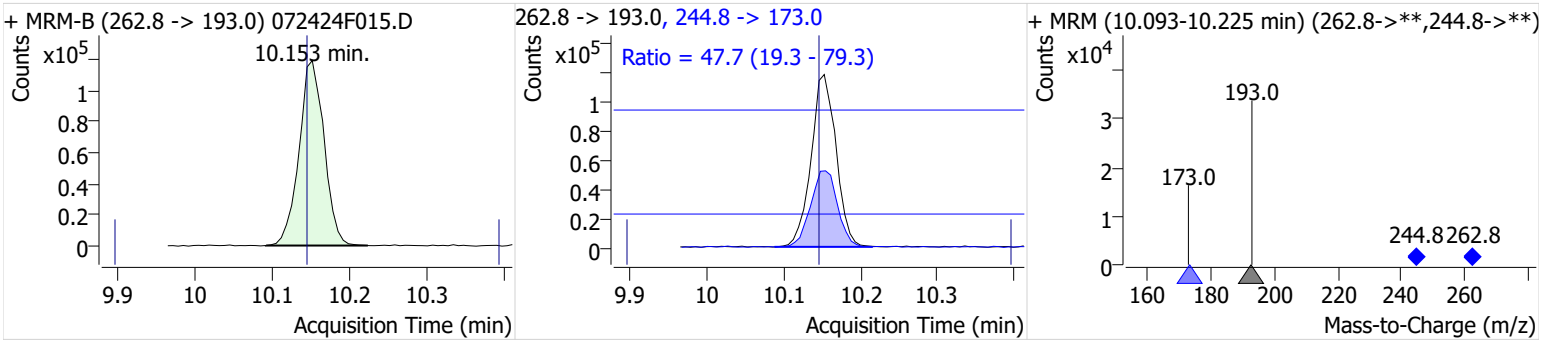
2,4'-DDD



Endrin-13C12



Endrin



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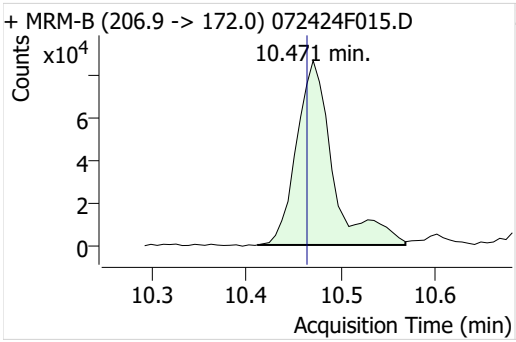
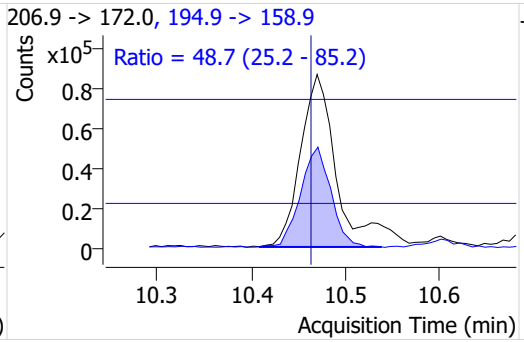
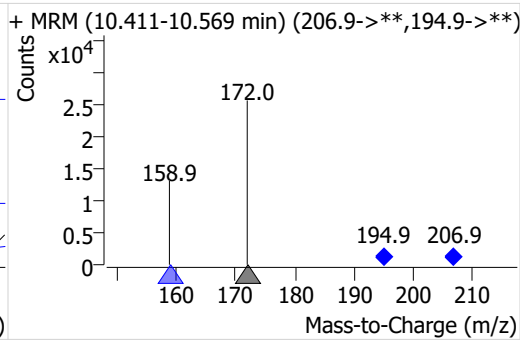
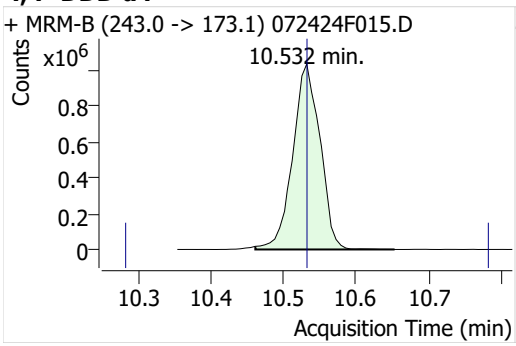
Endosulfan II

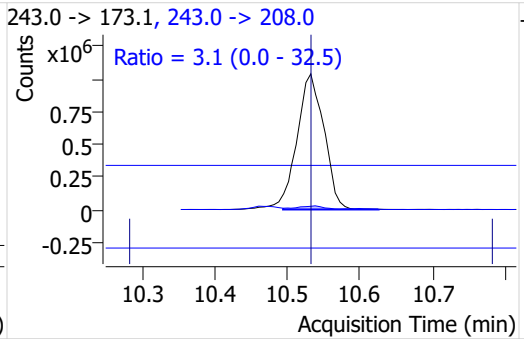


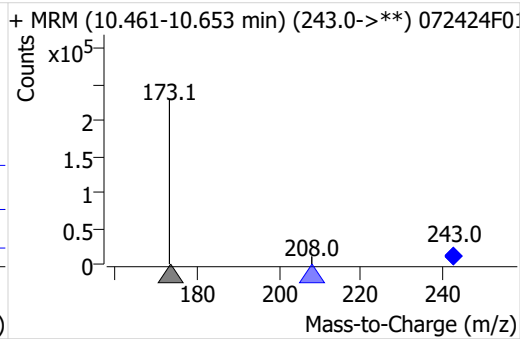




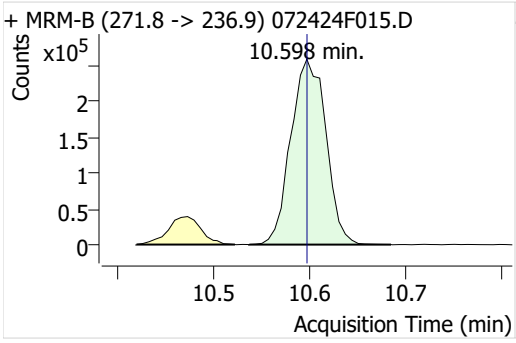
4,4'-DDD d4

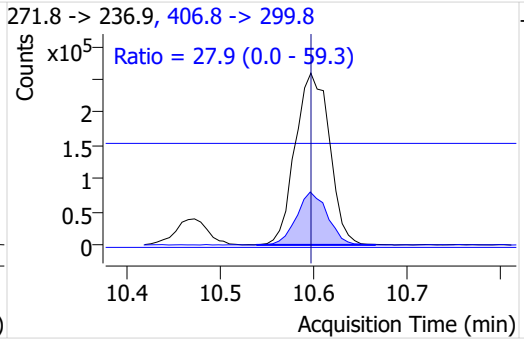


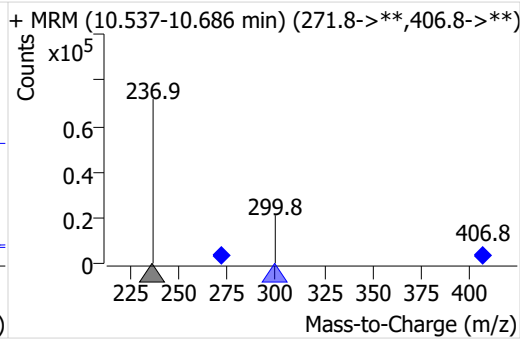




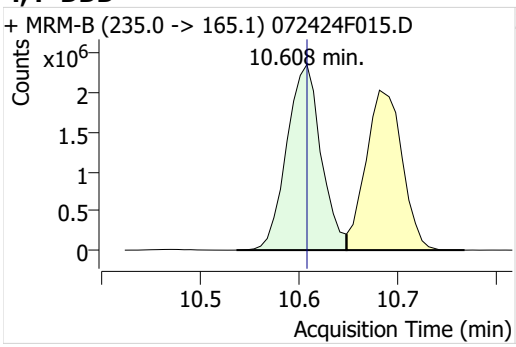
cis-Nonachlor

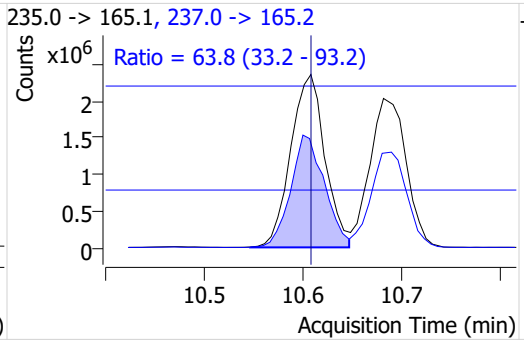


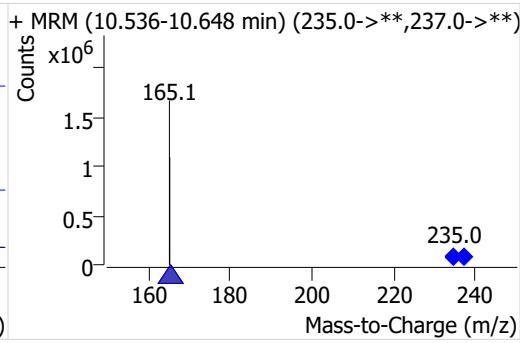




4,4'-DDD







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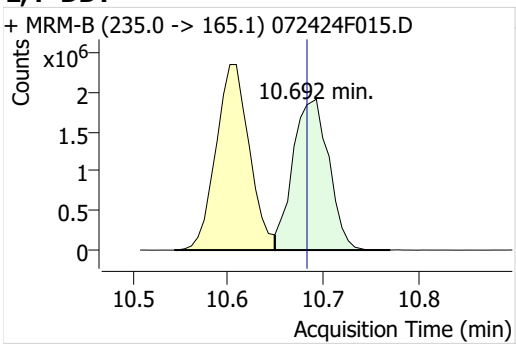
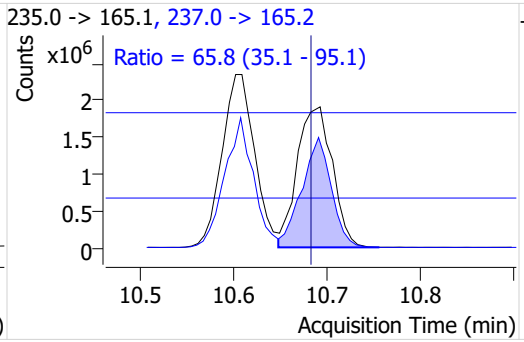
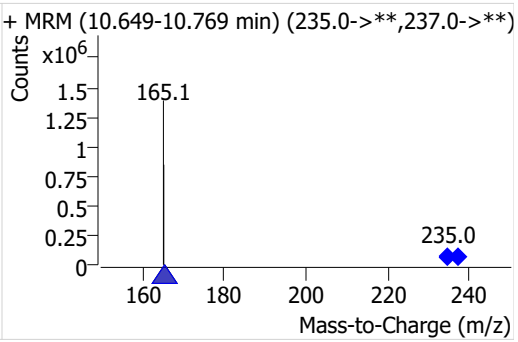
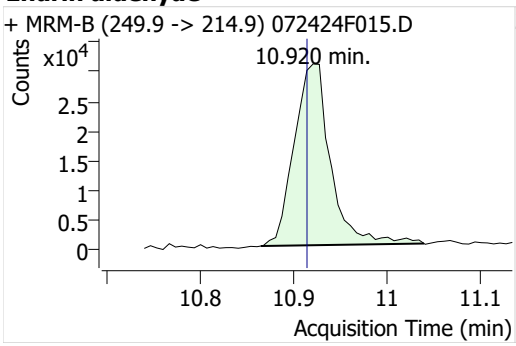
2,4'-DDT

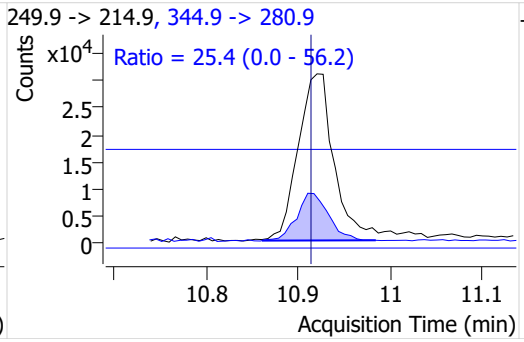


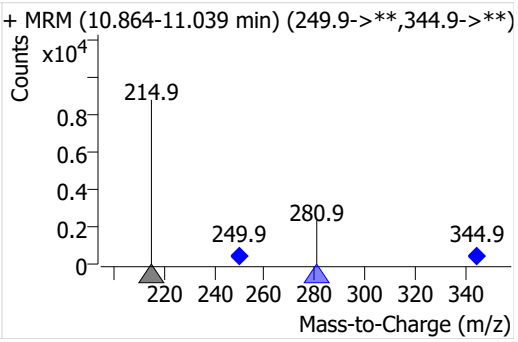




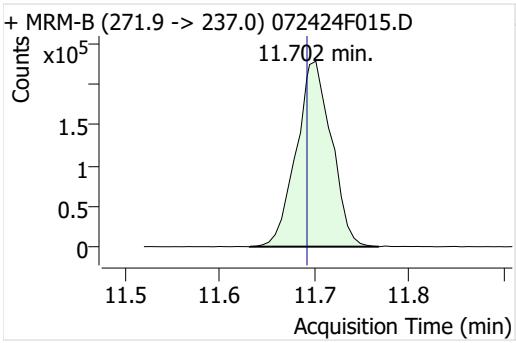
Endrin aldehyde

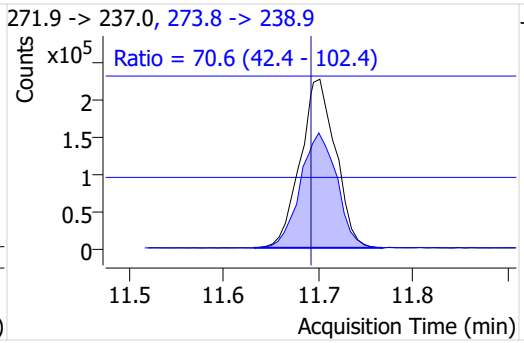


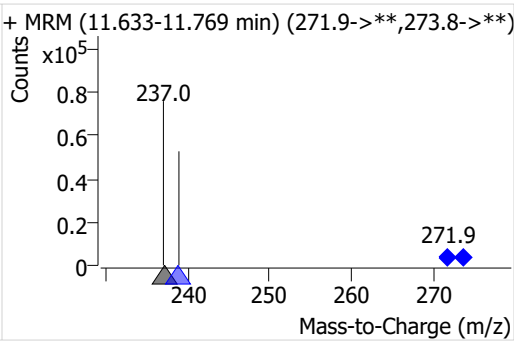




Endosulfan sulfate







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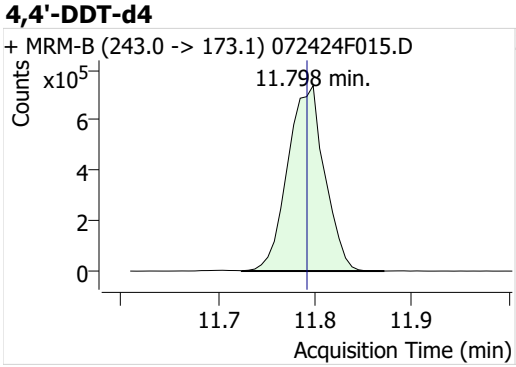

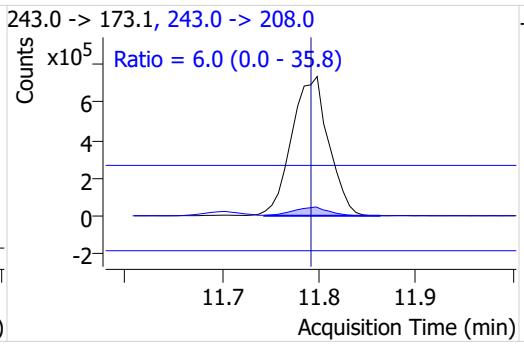

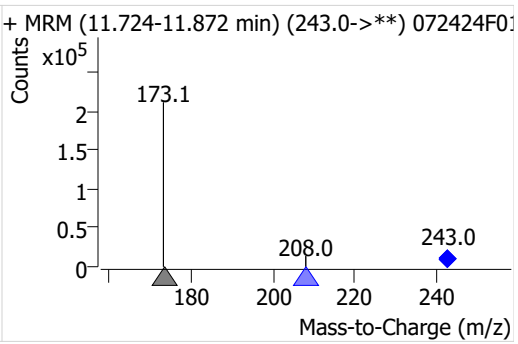

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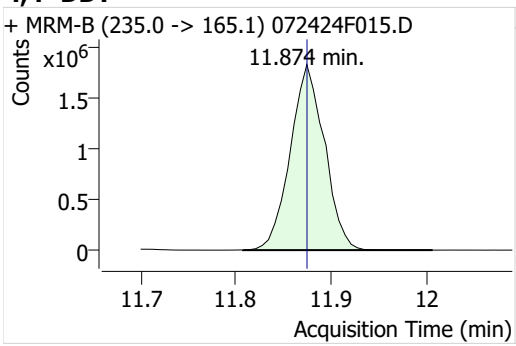
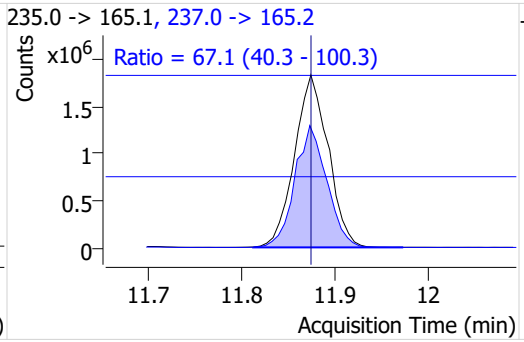
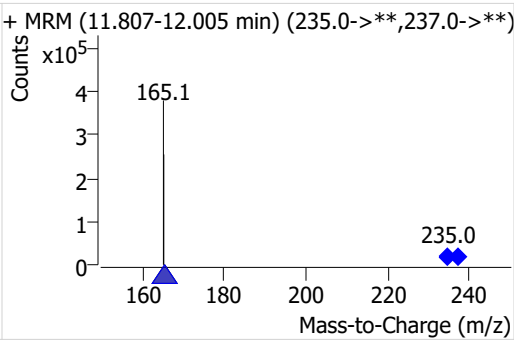
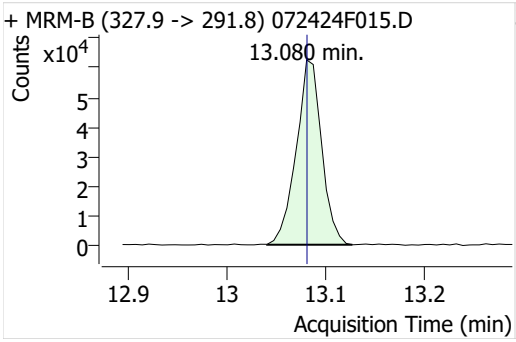
4,4'-DDT

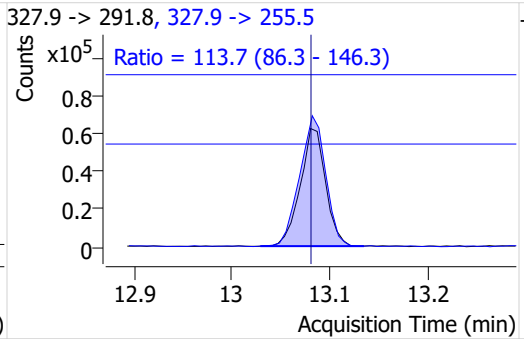


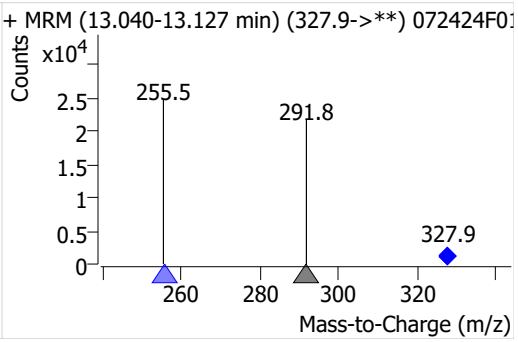




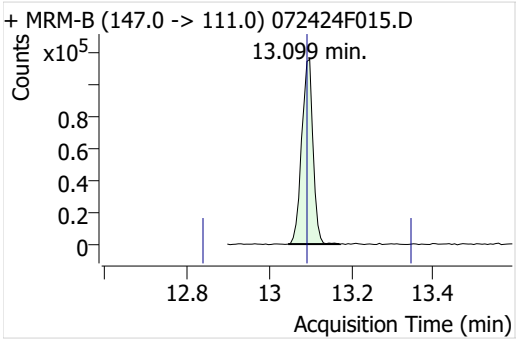
Endrin ketone-13C12

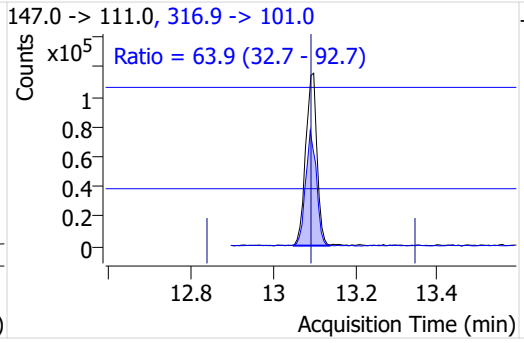


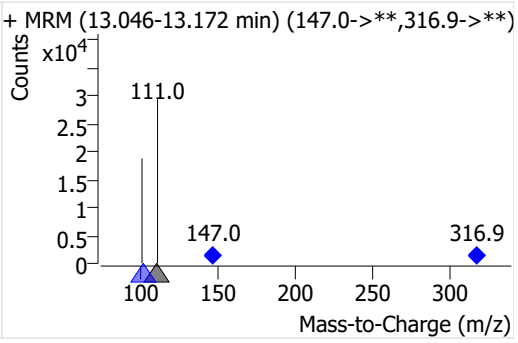




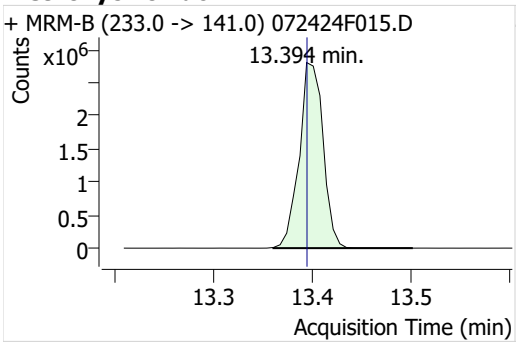
Endrin ketone

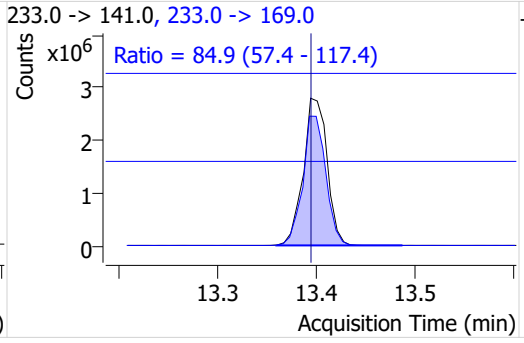


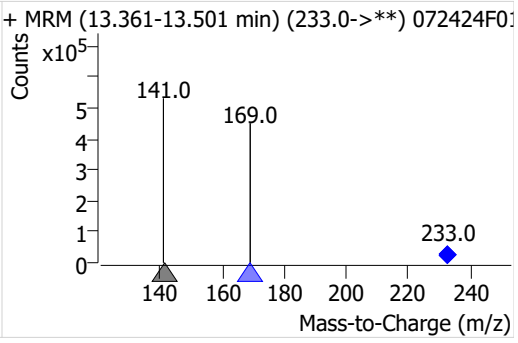




Methoxychlor-d6







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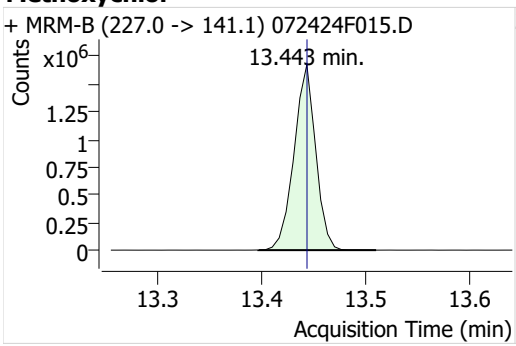
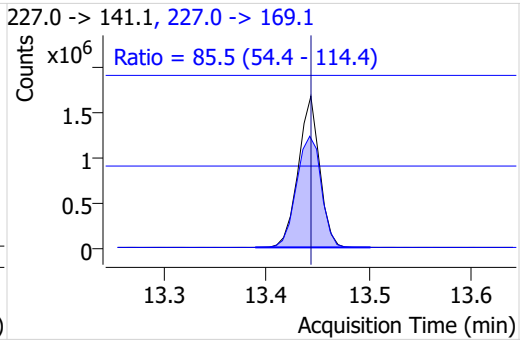
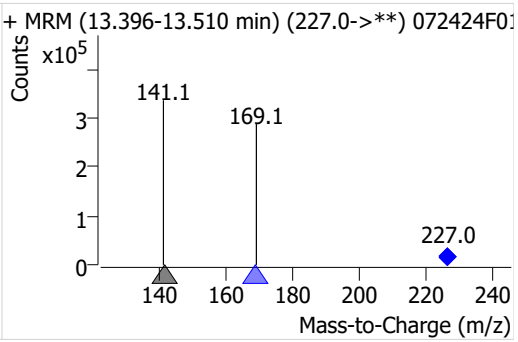
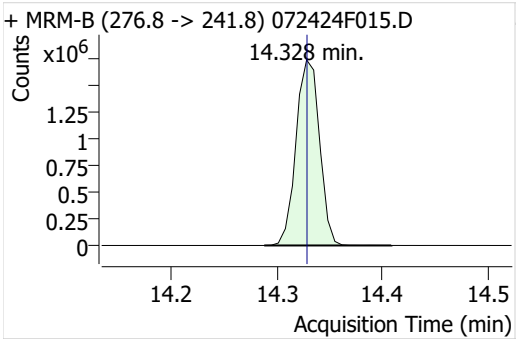
Methoxychlor

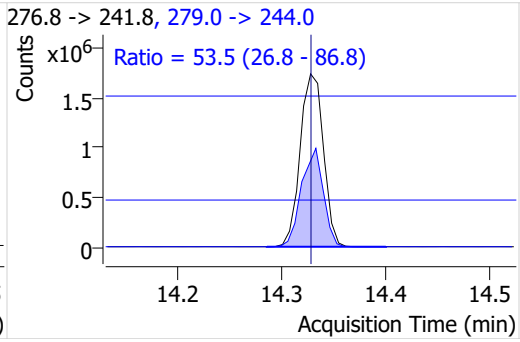


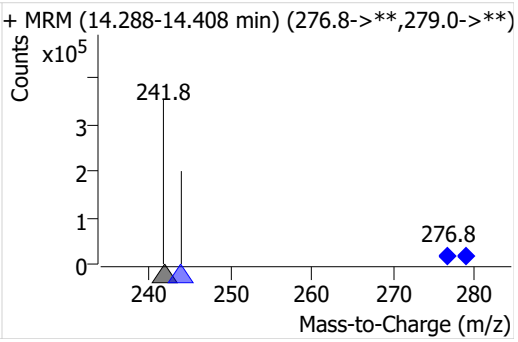




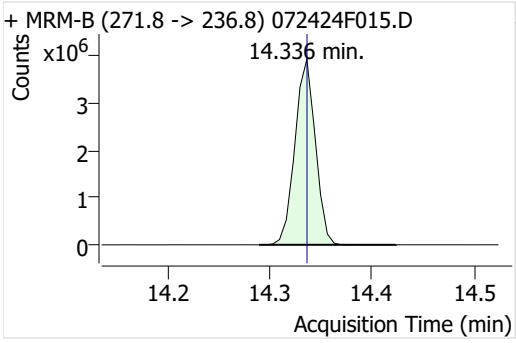
Mirex-13C10

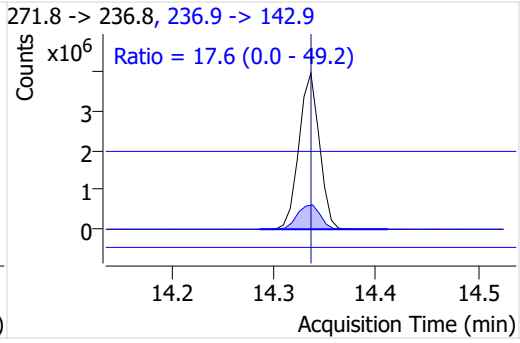


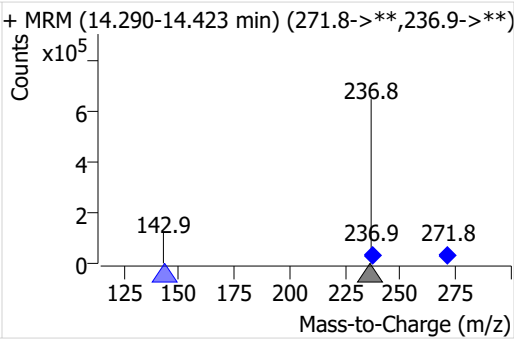




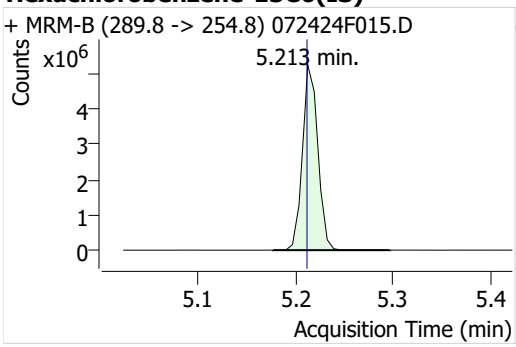
Mirex

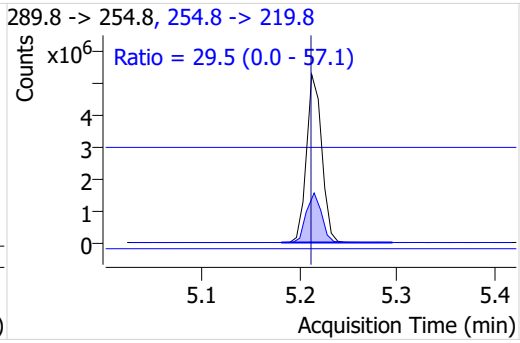


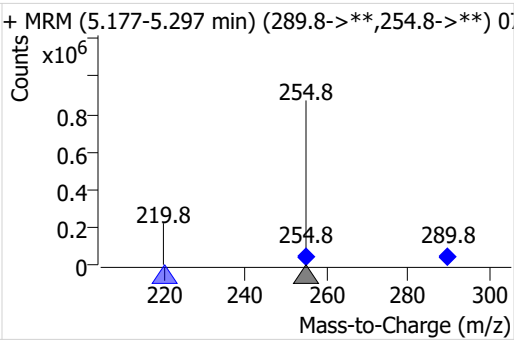




Hexachlorobenzene-13C6(IS)







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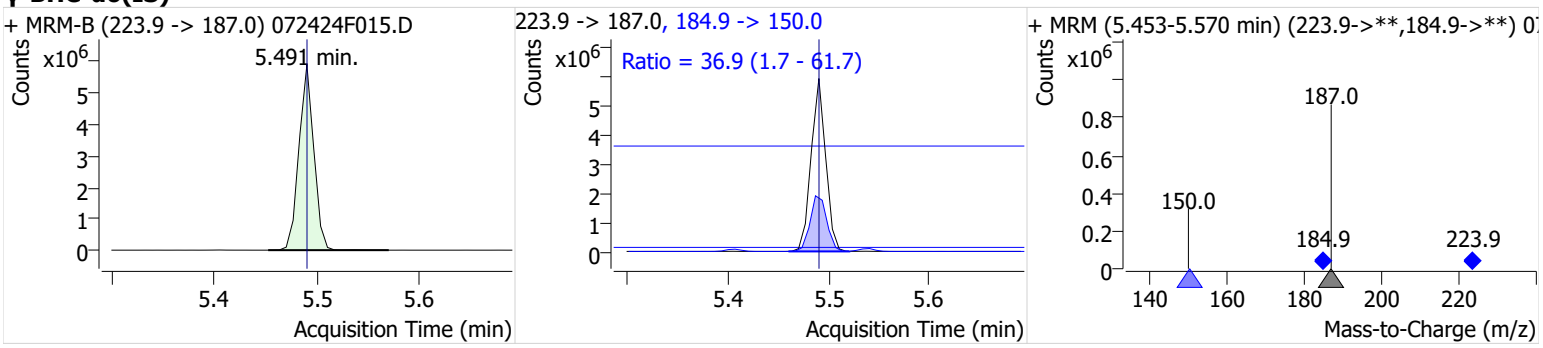
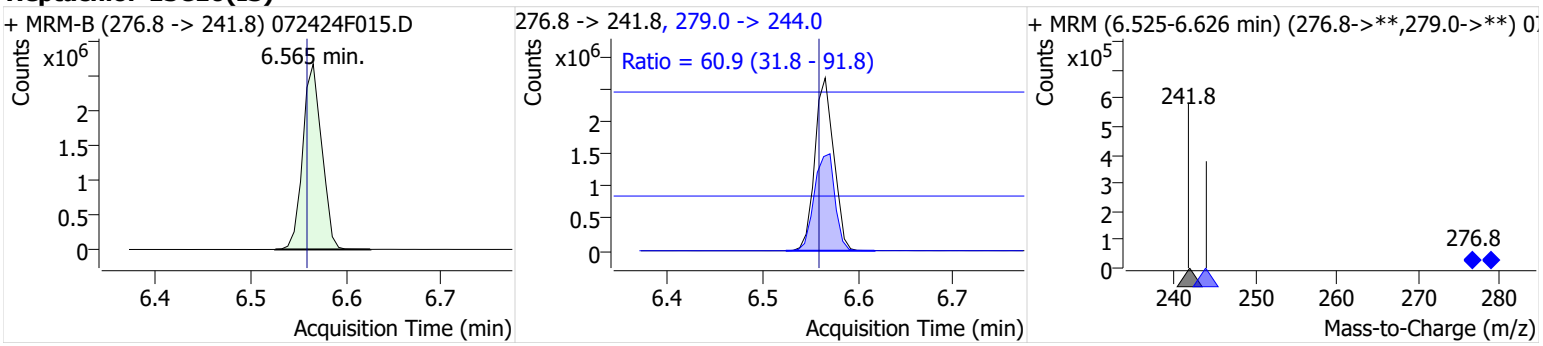
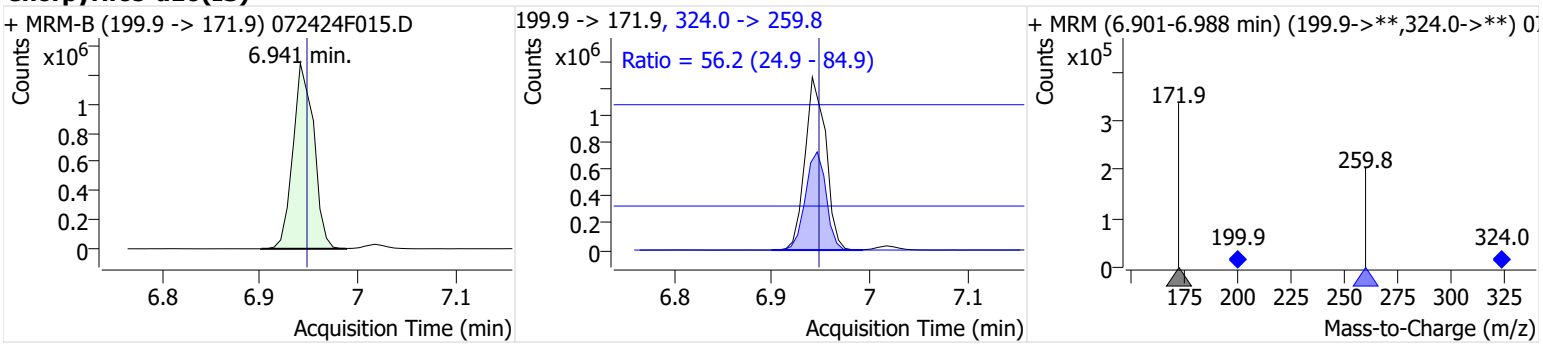
γ-BHC-d6(IS)



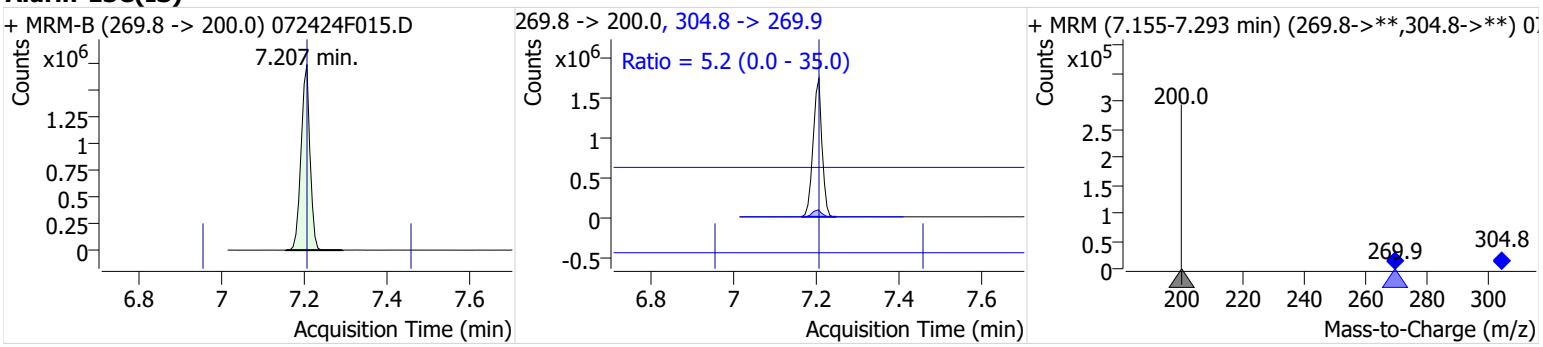
Heptachlor-13C10(IS)



Chorpyrifos-d10(IS)



Aldrin-13C(IS)



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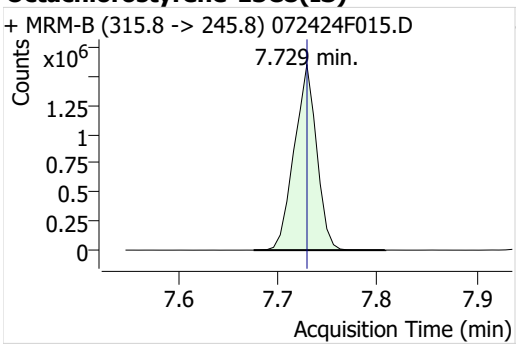
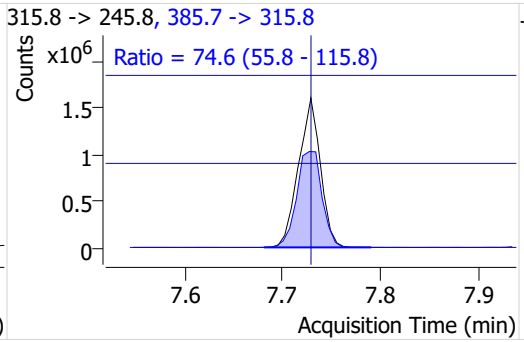
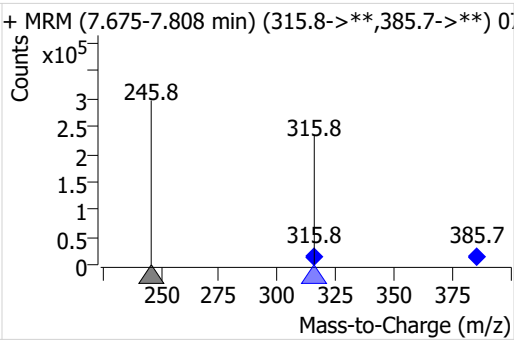
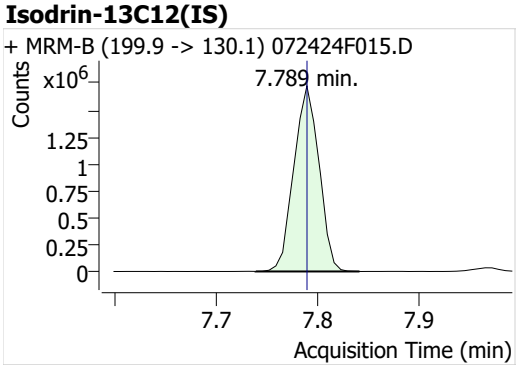
Octachlorostyrene-13C8(IS)

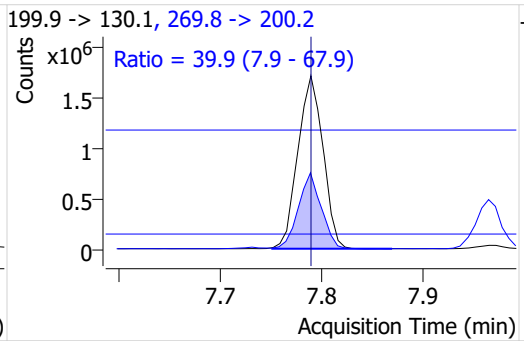


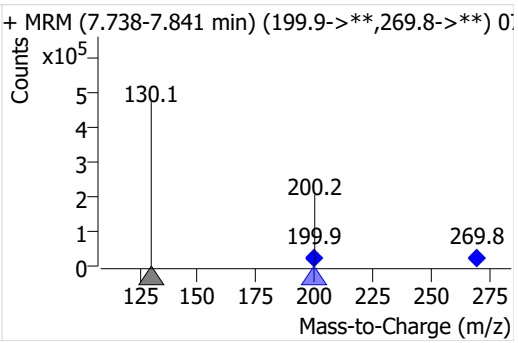




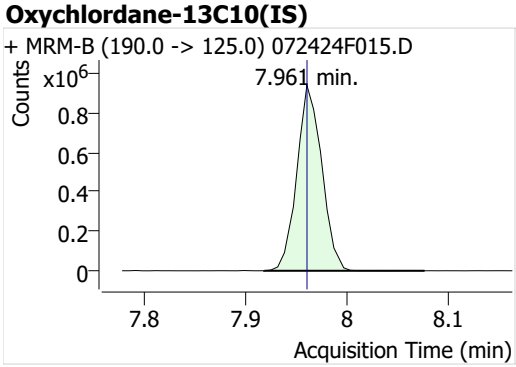
Isodrin-13C12(IS)

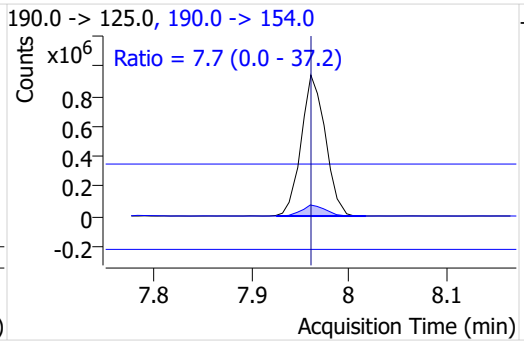


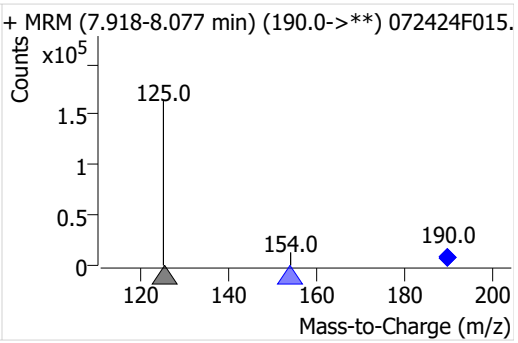




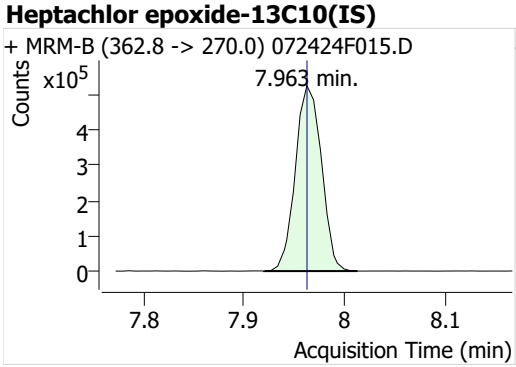
Oxychlordane-13C10(IS)

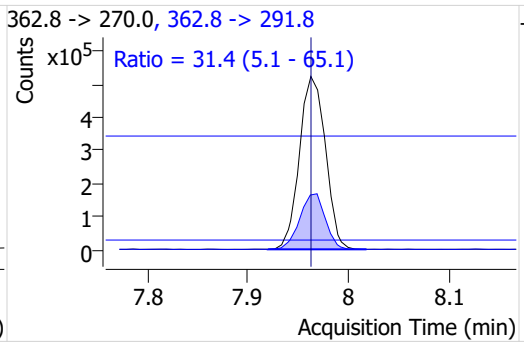


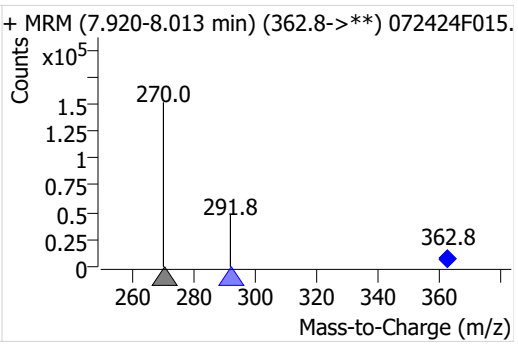




Heptachlor epoxide-13C10(IS)







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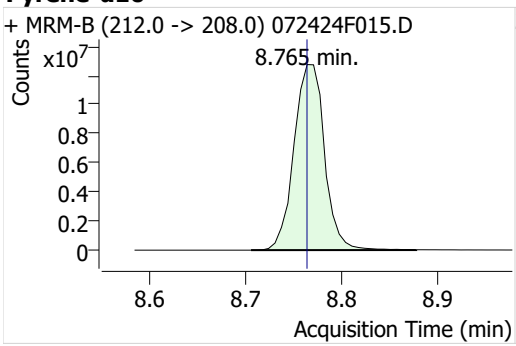
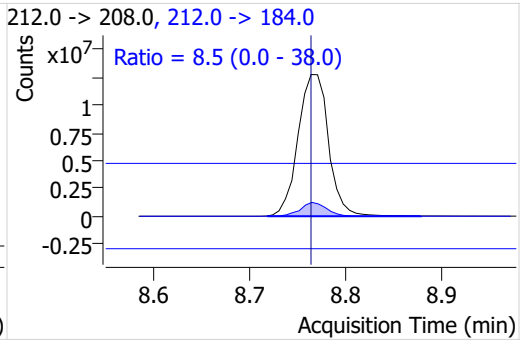
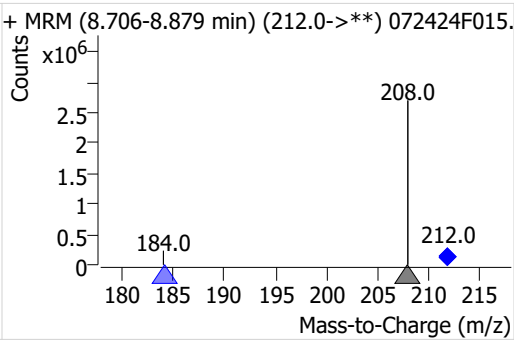
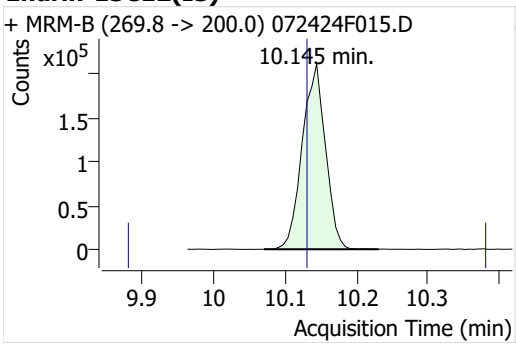
Pyrene-d10

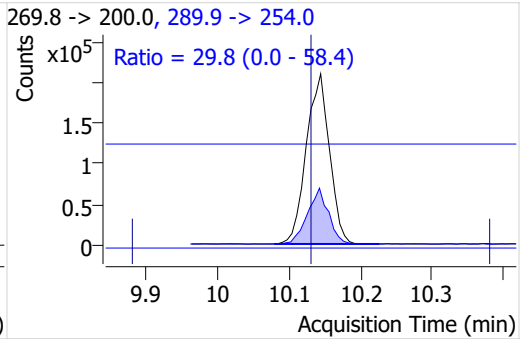


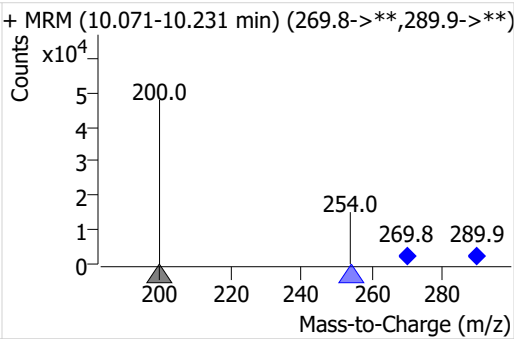




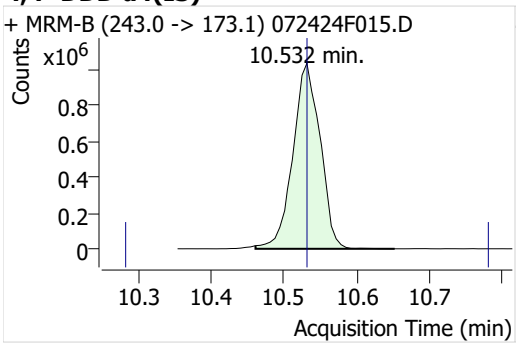
Endrin-13C12(IS)

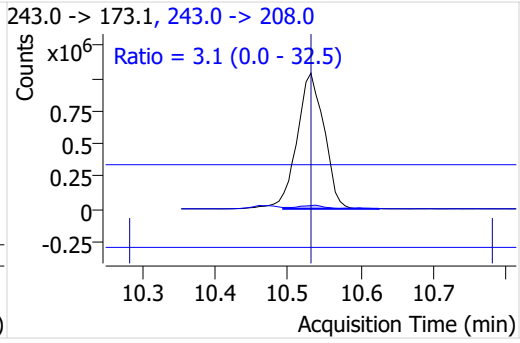


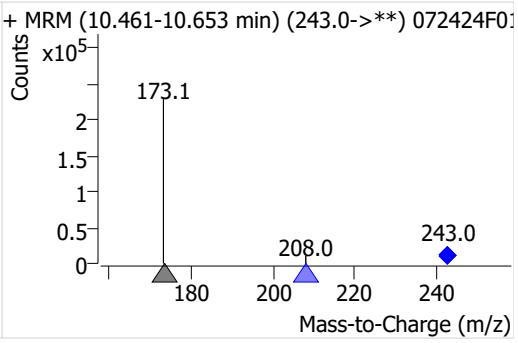




4,4'-DDD d4(IS)







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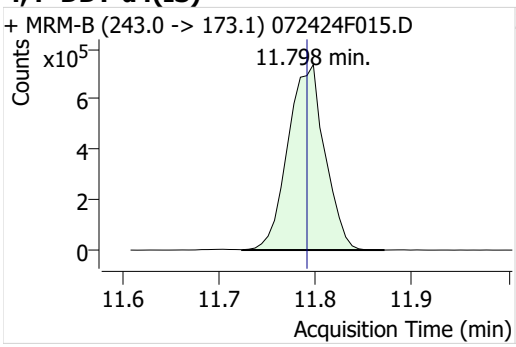

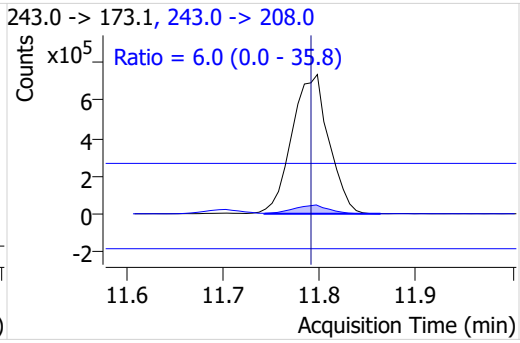

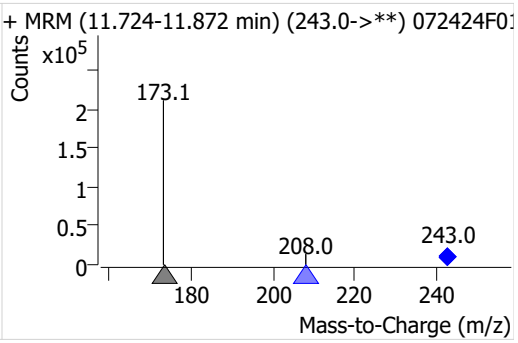

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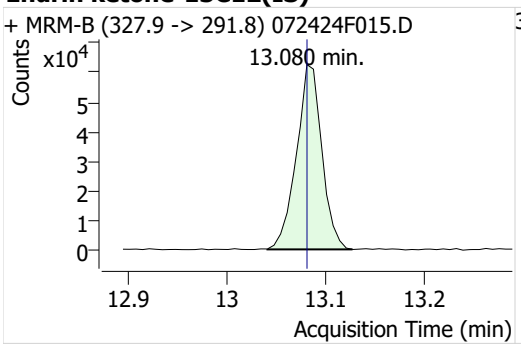
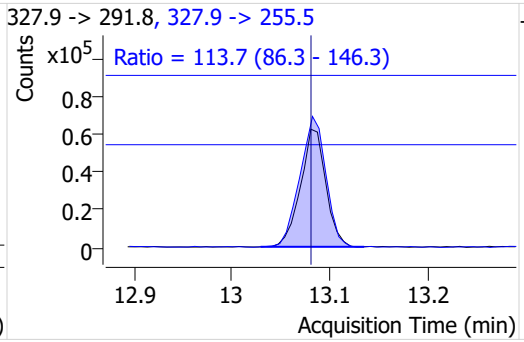
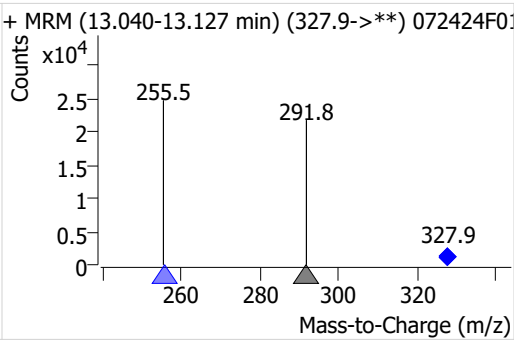
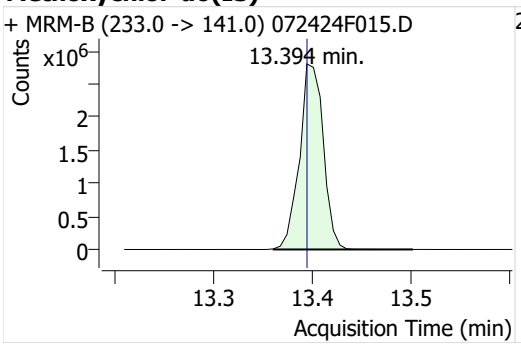
Endrin ketone-13C12(IS)

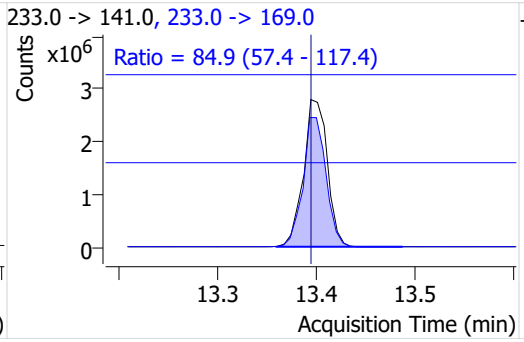


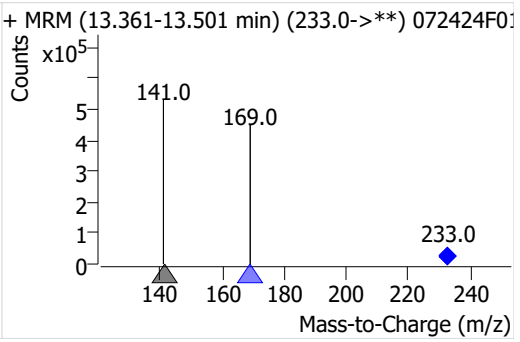




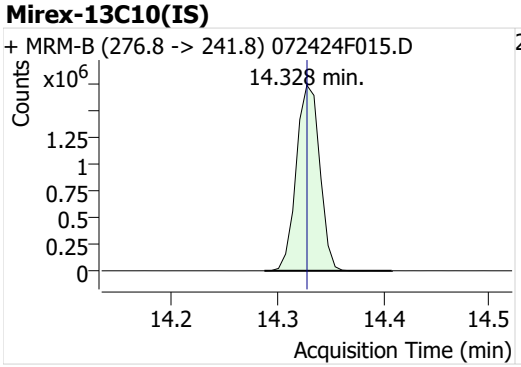
Methoxychlor-d6(IS)

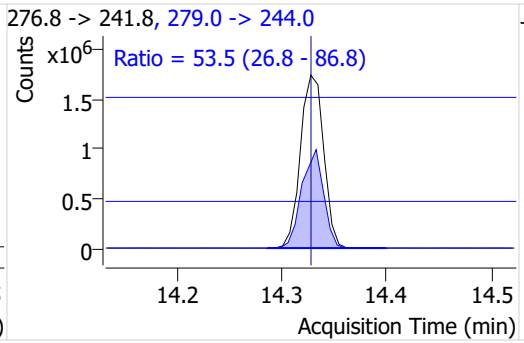


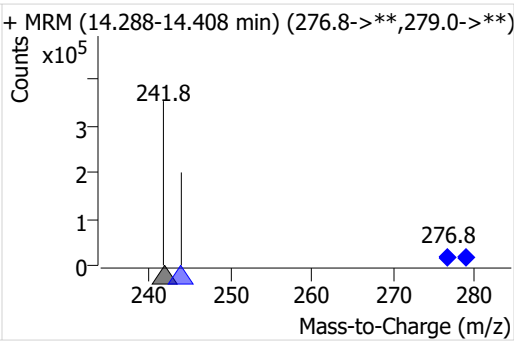




Mirex-13C10(IS)







MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Acq. Date-Time	7/24/2024 6:59:18 PM	**Acq Operator**	EBruno
Name	OC PEST ICAL 20ppb SVM71-30F	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	7/25/2024 7:23:51 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method		**Vial**	8
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.212	289.8 -> 254.8	4595140	20.0000 ng/ml	0.001
γ-BHC-d6(IS)	5.491	223.9 -> 187.0	5031515	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	6.559	276.8 -> 241.8	2319788	20.0000 ng/ml	0.003
Chorpyrifos-d10(IS)	6.948	199.9 -> 171.9	1194320	20.0000 ng/ml	0.001
Aldrin-13C(IS)	7.207	269.8 -> 200.0	2189608	20.0000 ng/ml	0.001
Octachlorostyrene-13C8(IS)	7.729	315.8 -> 245.8	1740272	20.0000 ng/ml	0.001
Isodrin-13C12(IS)	7.789	199.9 -> 130.1	2236610	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	7.961	190.0 -> 125.0	1352053	20.0000 ng/ml	0.000
Heptachlor epoxide-13C10(IS)	7.963	362.8 -> 270.0	751030	20.0000 ng/ml	0.000
Pyrene-d10	8.765	212.0 -> 208.0	17056625	100.0000 ng/ml	0.000
Endrin-13C12(IS)	10.131	269.8 -> 200.0	275782	20.0000 ng/ml	0.006
4,4'-DDD d4(IS)	10.532	243.0 -> 173.1	1840566	5.0000 ng/ml	0.000
4,4'-DDT-d4(IS)	11.791	243.0 -> 173.1	1088326	5.0000 ng/ml	0.001
Endrin ketone-13C12(IS)	13.080	327.9 -> 291.8	66029	20.0000 ng/ml	0.001
Methoxychlor-d6(IS)	13.394	233.0 -> 141.0	2690616	20.0000 ng/ml	0.001
Mirex-13C10(IS)	14.328	276.8 -> 241.8	1796077	5.0000 ng/ml	0.003

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	4595140	21.335 ng/ml	
		Spiked Amount =	20.0	Recovery =	*106.7 %*
γ-BHC-d6	5.491	223.9 -> 187.0	5031515	23.053 ng/ml	
		Spiked Amount =	20.0	Recovery =	*115.3 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	2319788	18.501 ng/ml	
		Spiked Amount =	20.0	Recovery =	*92.5 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	1194320	22.225 ng/ml	
		Spiked Amount =	20.0	Recovery =	*111.1 %*
Aldrin-13C	7.207	269.8 -> 200.0	2189295	23.076 ng/ml	
		Spiked Amount =	20.0	Recovery =	*115.4 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	1740272	20.353 ng/ml	
		Spiked Amount =	20.0	Recovery =	*101.8 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2236610	21.997 ng/ml	
		Spiked Amount =	20.0	Recovery =	*110.0 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1352053	22.425 ng/ml	
		Spiked Amount =	20.0	Recovery =	*112.1 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	751030	22.007 ng/ml	
		Spiked Amount =	20.0	Recovery =	*110.0 %*
Endrin-13C12	10.131	269.8 -> 200.0	275782	18.965 ng/ml	
		Spiked Amount =	20.0	Recovery =	*94.8 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	1840566	5.097 ng/ml	
		Spiked Amount =	5.0	Recovery =	*101.9 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1088326	4.893 ng/ml	
		Spiked Amount =	5.0	Recovery =	*97.9 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	66029	21.511 ng/ml	
		Spiked Amount =	20.0	Recovery =	*107.6 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	2690616	21.815 ng/ml	
		Spiked Amount =	20.0	Recovery =	*109.1 %*

MassHunter Quantitative Analysis Sample Report

System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	1796077	5.475 ng/ml
		Spiked Amount =	5.0	Recovery = *109.5 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.165	181.1 -> 145.1	6549820	18.465 ng/ml	100
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.214	283.8 -> 213.9	7175081	20.462 ng/ml	100
β-BHC	γ-BHC-d6(IS)	5.408	181.1 -> 145.1	4510800	18.987 ng/ml	100
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	5911437	19.486 ng/ml	100
δ-BHC	γ-BHC-d6(IS)	5.859	181.1 -> 145.1	4072381	18.441 ng/ml	100
Heptachlor	Heptachlor-13C10(IS)	6.569	271.7 -> 236.9	2567800	20.571 ng/ml	100
Chorpyrifos	Chorpyrifos-d10(IS)	7.019	196.9 -> 169.0	1550249	19.071 ng/ml	100
Aldrin	Aldrin-13C(IS)	7.209	254.9 -> 220.0	1122005	18.203 ng/ml	100
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.728	342.8 -> 307.8	4735910	22.145 ng/ml	100
Isodrin	Isodrin-13C12(IS)	7.796	193.0 -> 123.0	2290408	19.500 ng/ml	100
Oxychlordane	Oxychlordane-13C10(IS)	7.968	114.9 -> 51.1	3466285	19.839 ng/ml	100
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.971	352.8 -> 262.9	816074	20.519 ng/ml	100
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.510	271.8 -> 236.9	1359155	19.132 ng/ml	100
2,4'-DDE	4,4'-DDD d4(IS)	8.527	246.0 -> 176.2	12790019	19.442 ng/ml	100
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.823	271.8 -> 236.9	1672460 ***m***	19.464 ng/ml	100
Endosulfan I	Endrin-13C12(IS)	8.840	206.9 -> 172.0	540932	21.823 ng/ml	100
trans-Nanochlor	Oxychlordane-13C10(IS)	8.891	271.8 -> 236.9	1193100	19.519 ng/ml	100
4,4' -DDE	4,4'-DDD d4(IS)	9.363	246.0 -> 176.2	9913551	21.154 ng/ml	100
Dieldrin	Endrin-13C12(IS)	9.549	262.9 -> 193.0	667049	21.700 ng/ml	100
2,4'-DDD	4,4'-DDD d4(IS)	9.553	235.0 -> 165.1	10586371	20.032 ng/ml	100
Endrin	Endrin-13C12(IS)	10.146	262.8 -> 193.0	325653	19.109 ng/ml	100
Endosulfan II	Endrin-13C12(IS)	10.464	206.9 -> 172.0	297720 ***m***	22.616 ng/ml	98
cis-Nonachlor	Oxychlordane-13C10(IS)	10.598	271.8 -> 236.9	1018698	19.386 ng/ml	100
4,4'-DDD	4,4'-DDD d4(IS)	10.608	235.0 -> 165.1	8157695 ***m***	20.935 ng/ml	100
2,4'-DDT	4,4'-DDT-d4(IS)	10.682	235.0 -> 165.1	7055012	22.141 ng/ml	100
Endrin aldehyde	Endrin-13C12(IS)	10.914	249.9 -> 214.9	110388	22.675 ng/ml	100
Endosulfan sulfate	Endrin-13C12(IS)	11.693	271.9 -> 237.0	716452	20.698 ng/ml	100
4,4'-DDT	4,4'-DDT-d4(IS)	11.874	235.0 -> 165.1	5207558	21.142 ng/ml	100
Endrin ketone	Endrin ketone-13C12(IS)	13.092	147.0 -> 111.0	269377	18.176 ng/ml	100
Methoxychlor	Methoxychlor-d6(IS)	13.443	227.0 -> 141.1	2745254	19.583 ng/ml	100
Mirex	Mirex-13C10(IS)	14.337	271.8 -> 236.8	7323544	19.789 ng/ml	100

(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram

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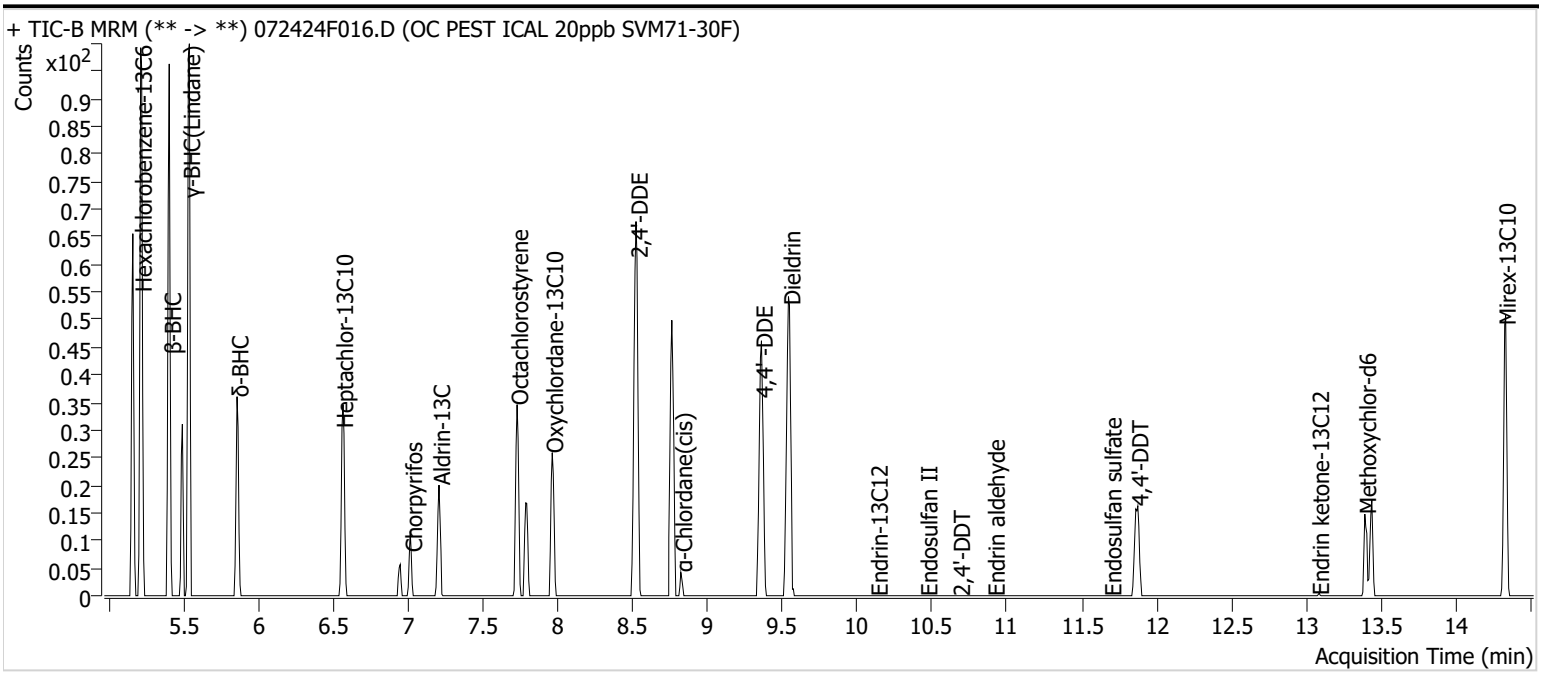
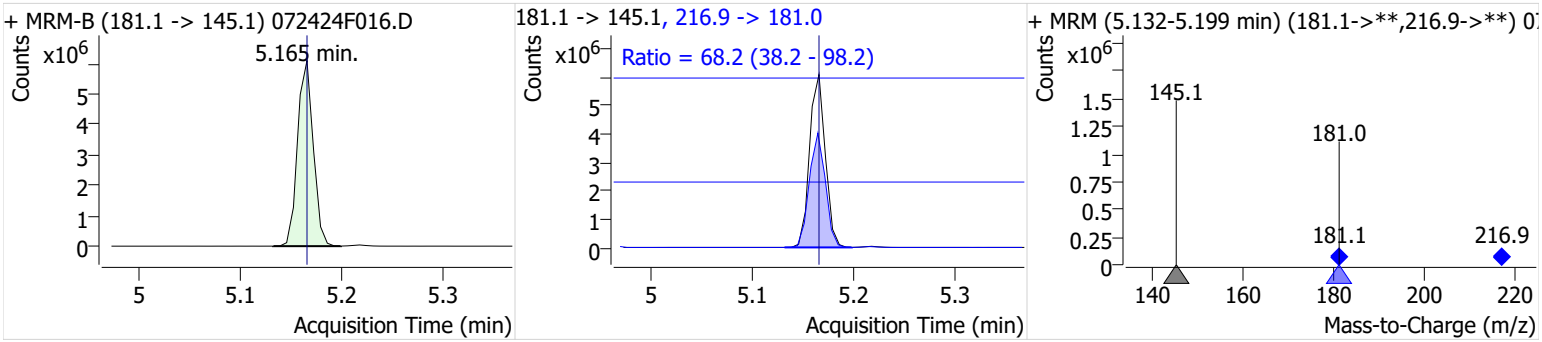
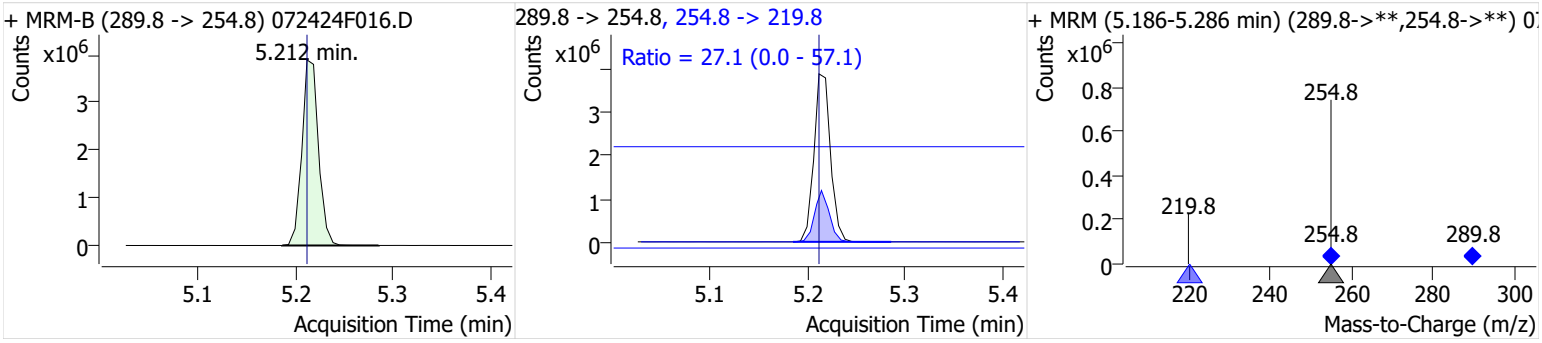


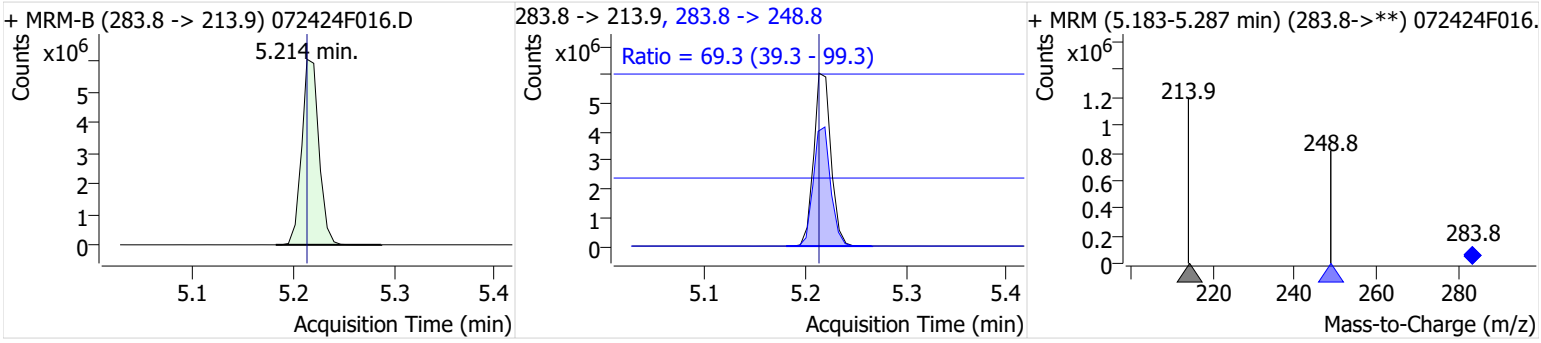
α-BHC



Hexachlorobenzene-13C6



Hexachlorobenzene



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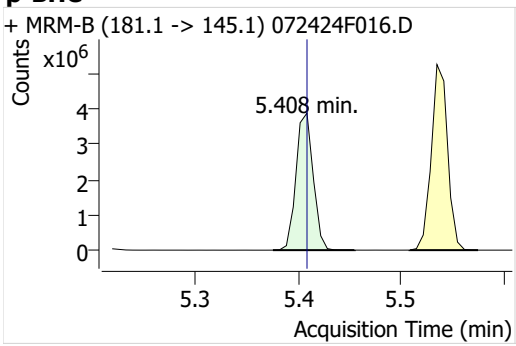
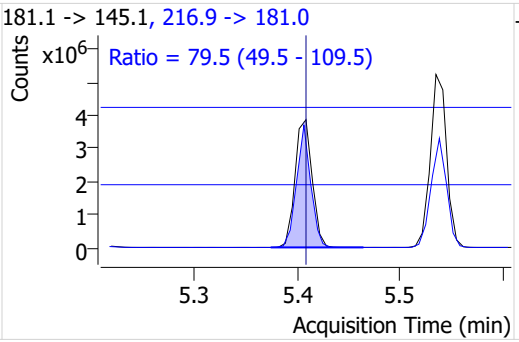
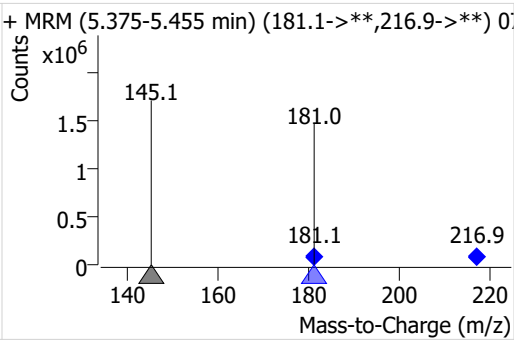
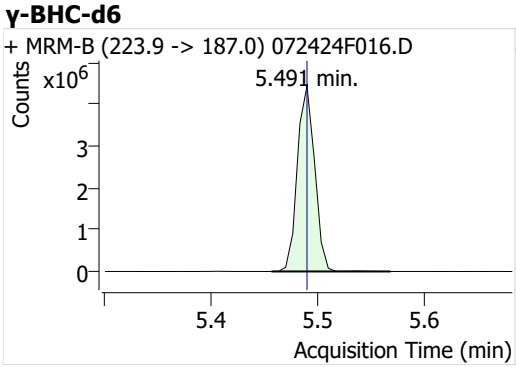
β-BHC

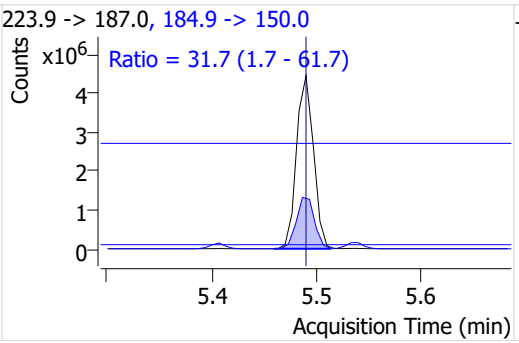


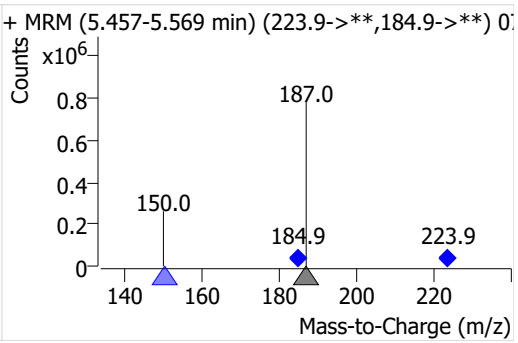




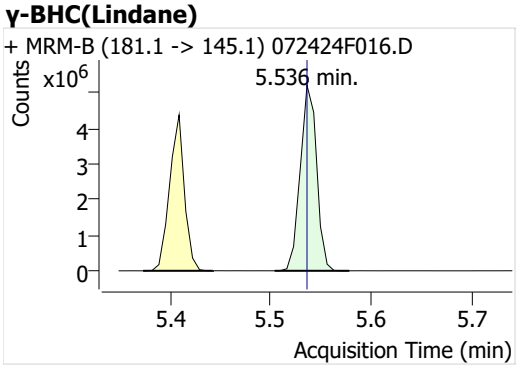
γ-BHC-d6

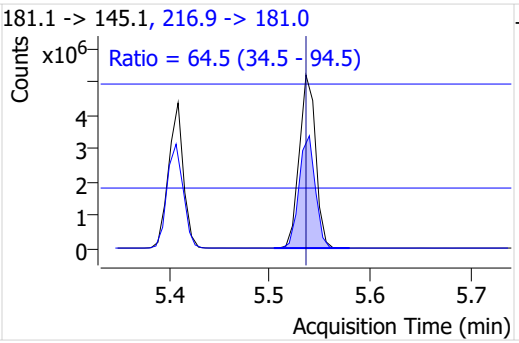


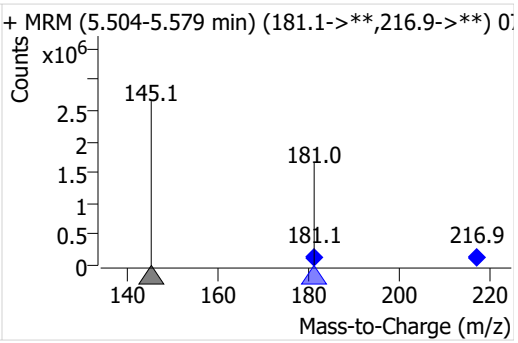




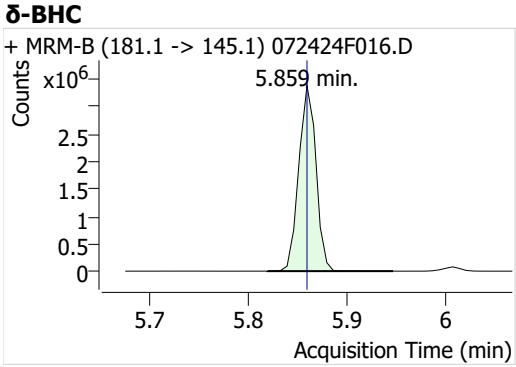
γ-BHC(Lindane)

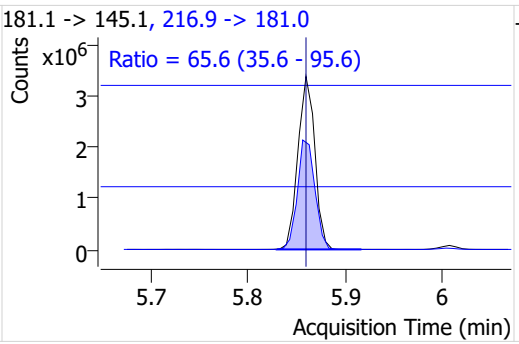


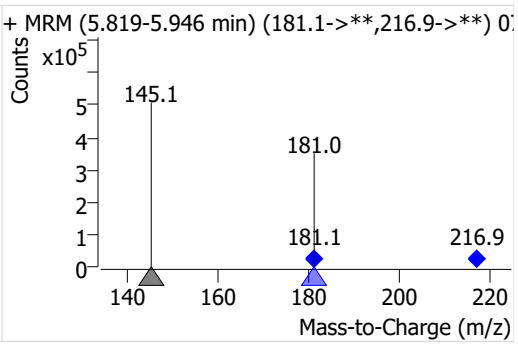




δ-BHC







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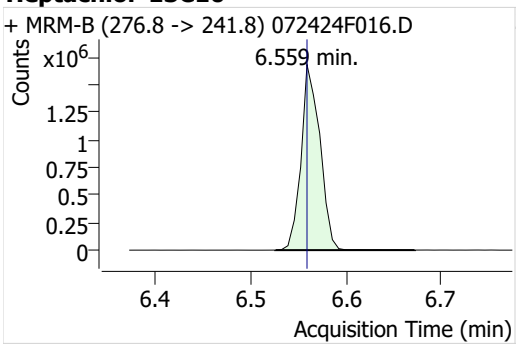
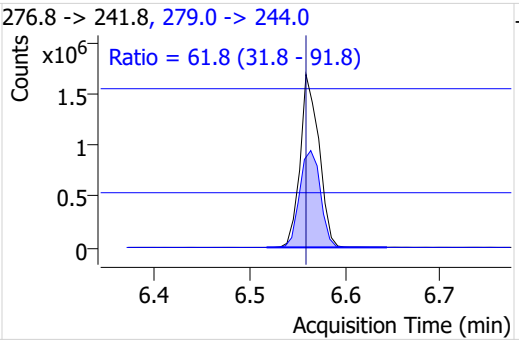
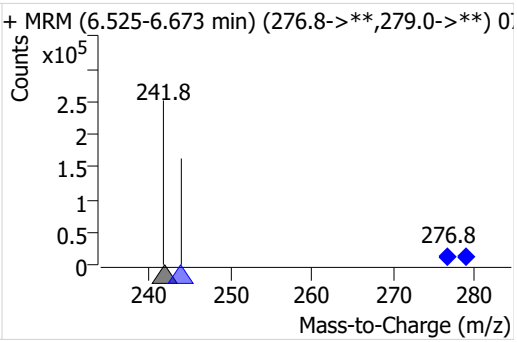
Heptachlor-13C10







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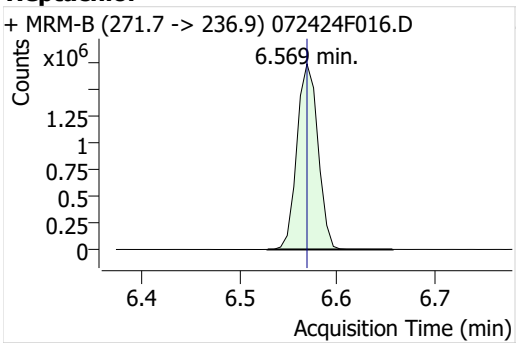
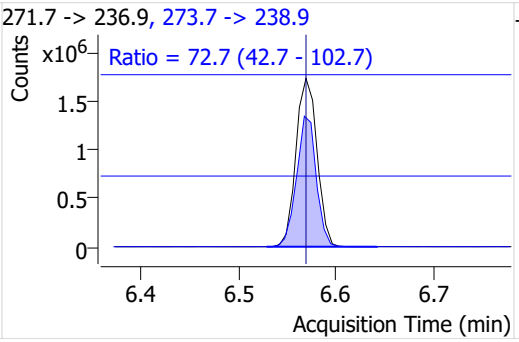
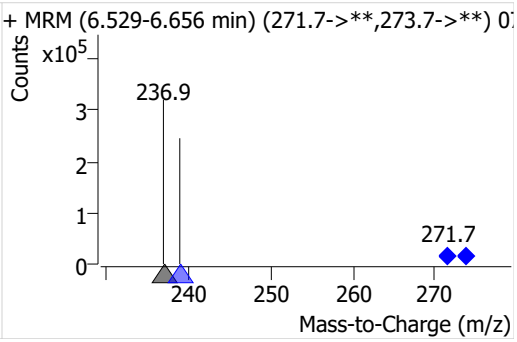
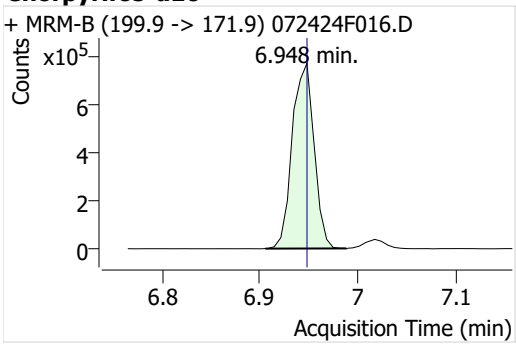
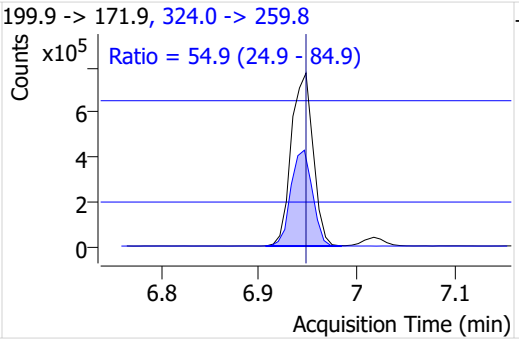


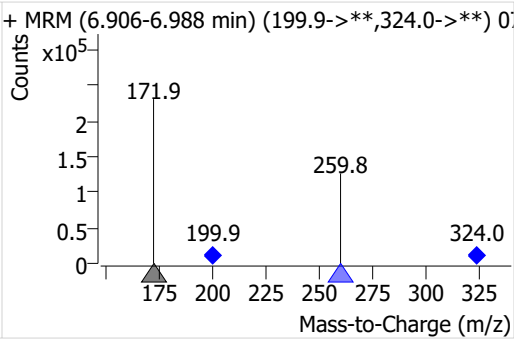




Chorpyrifos-d10







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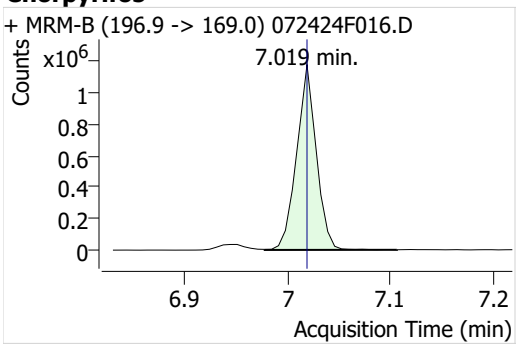
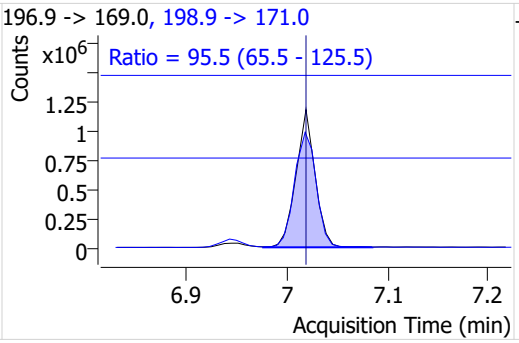
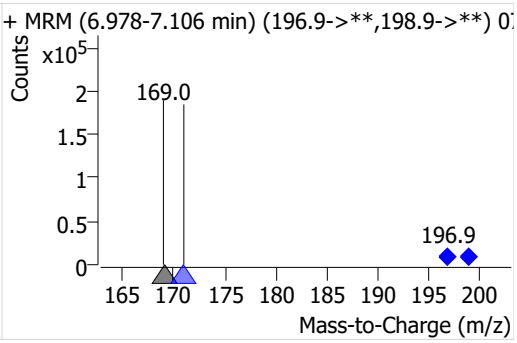
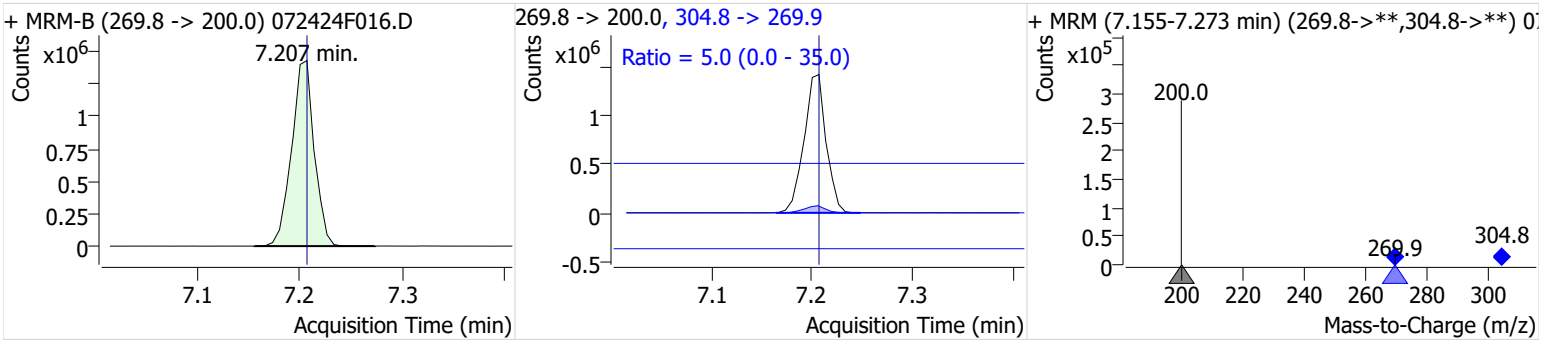




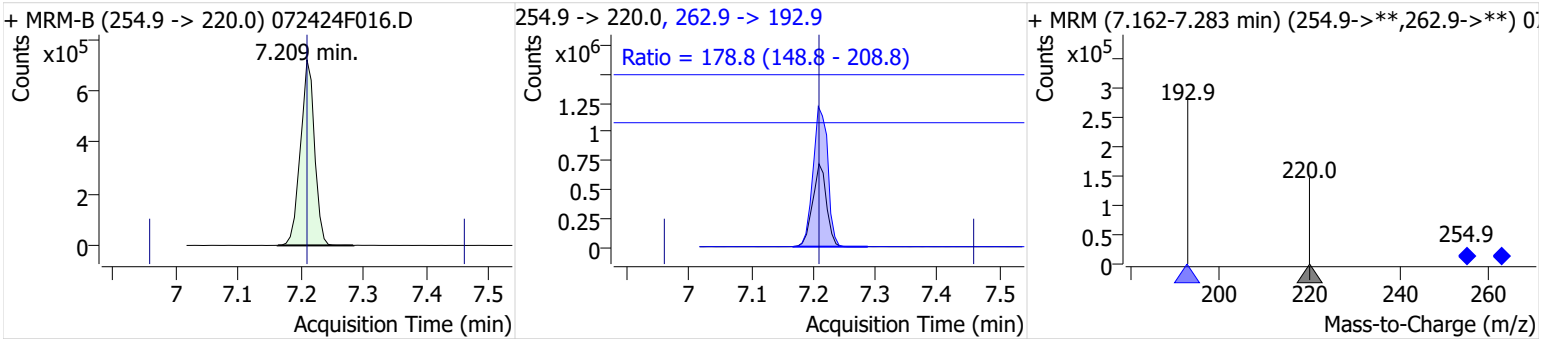


MassHunter Quantitative Analysis Sample Report

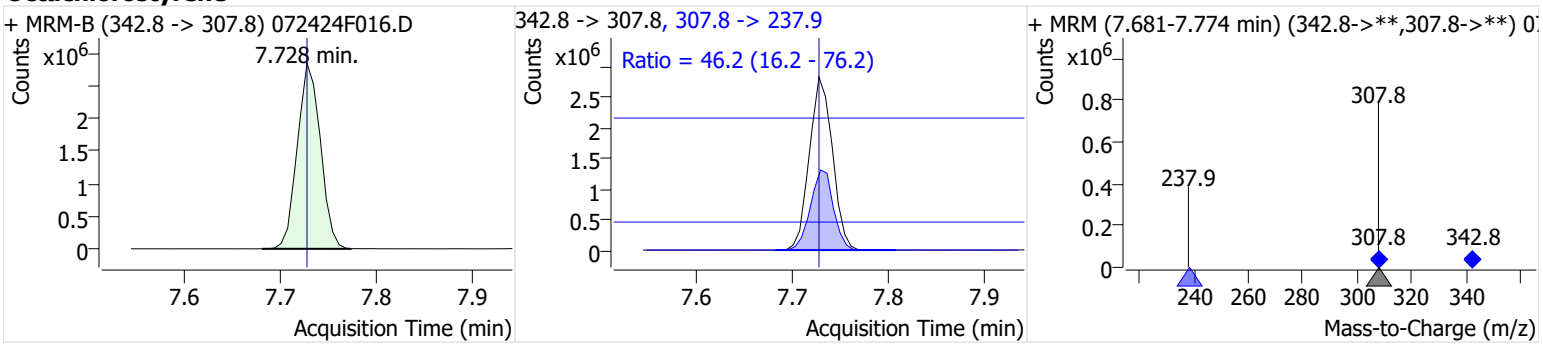
Aldrin-13C



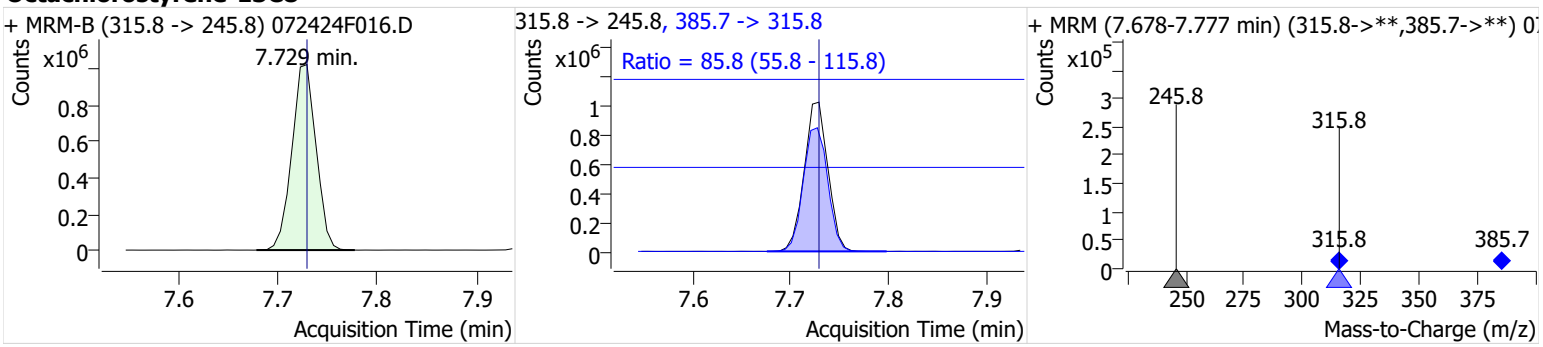
Aldrin



Octachlorostyrene



Octachlorostyrene-13C8



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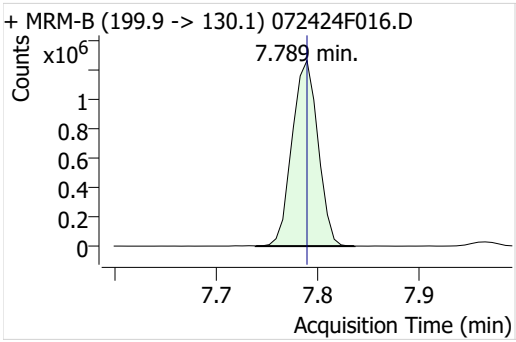
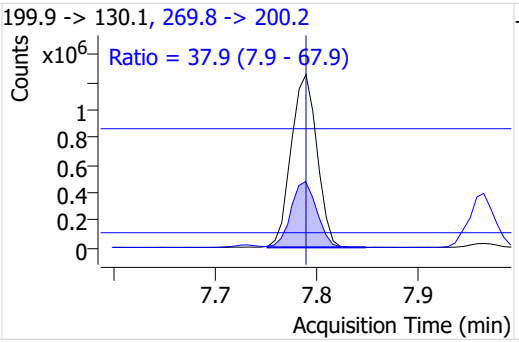
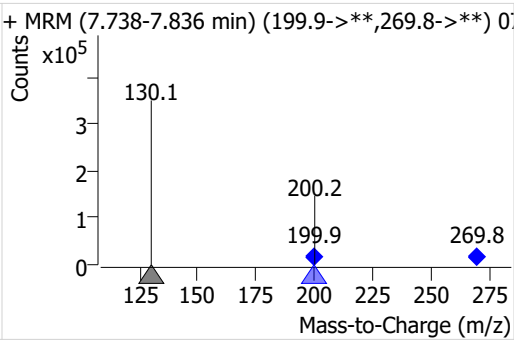
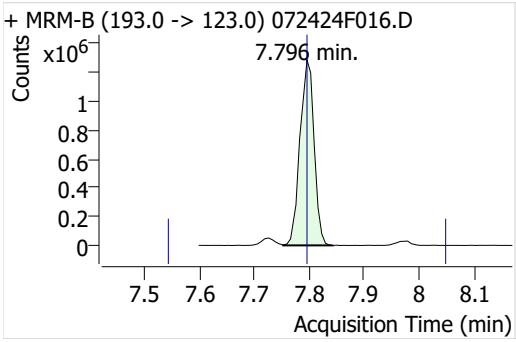
Isodrin-13C12

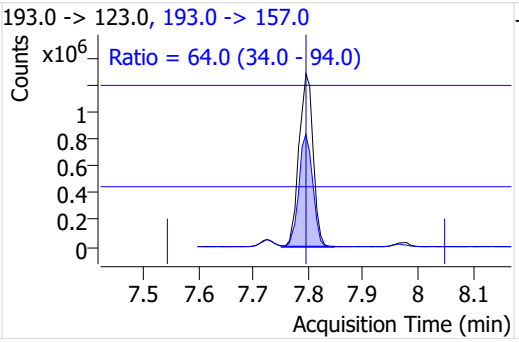


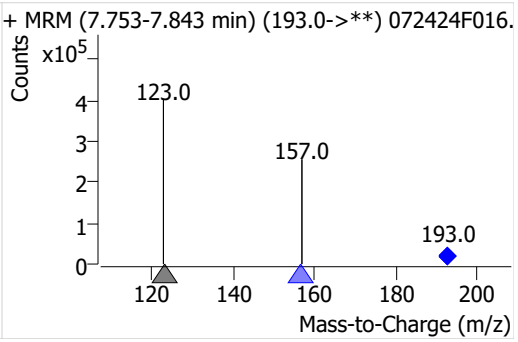




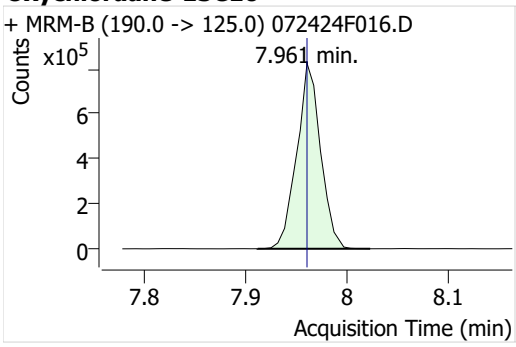
Isodrin

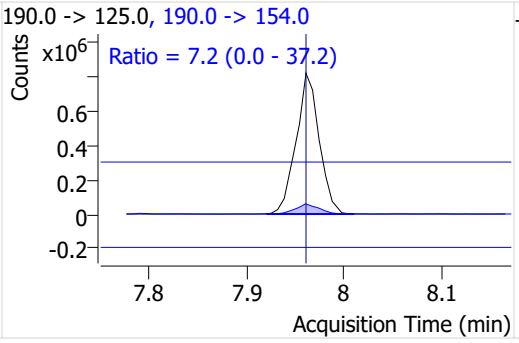


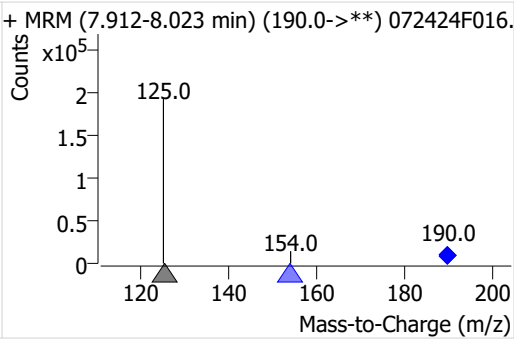




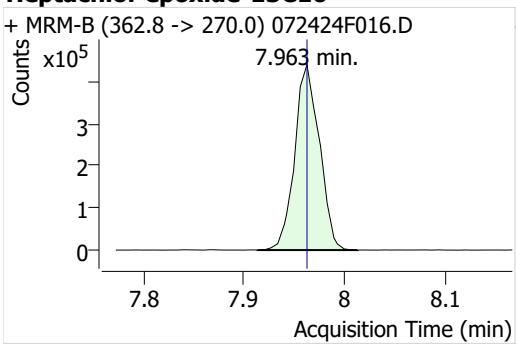
Oxychlordane-13C10

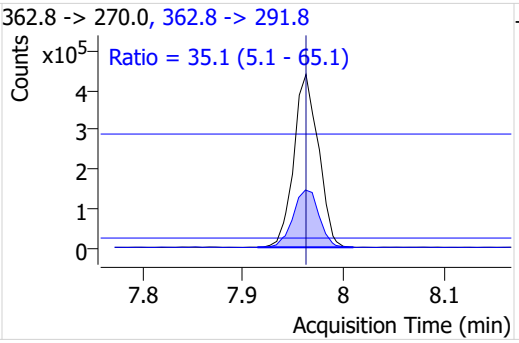


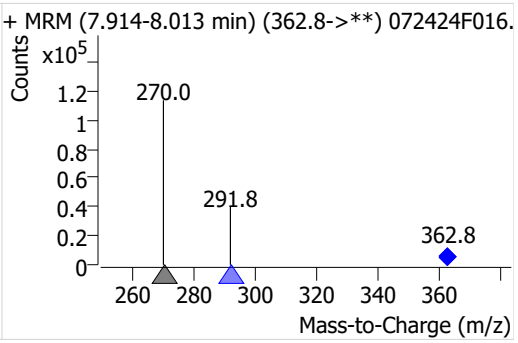




Heptachlor epoxide-13C10







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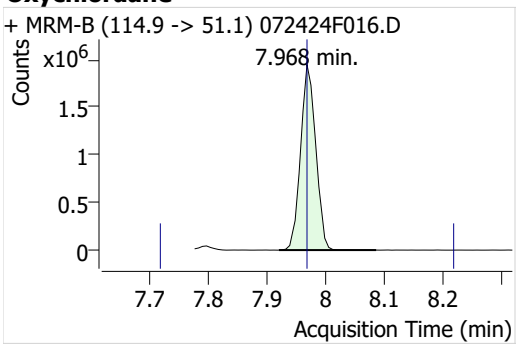
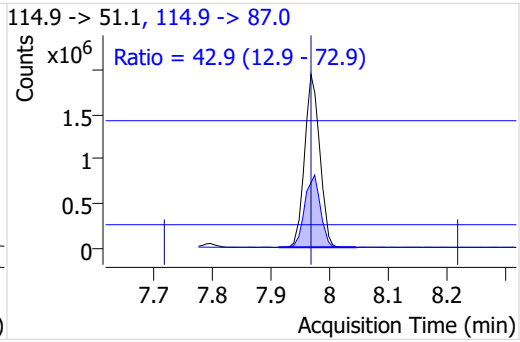
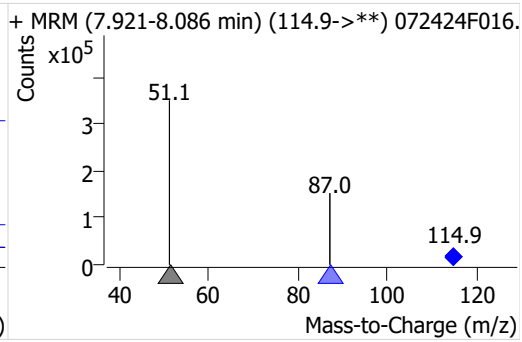
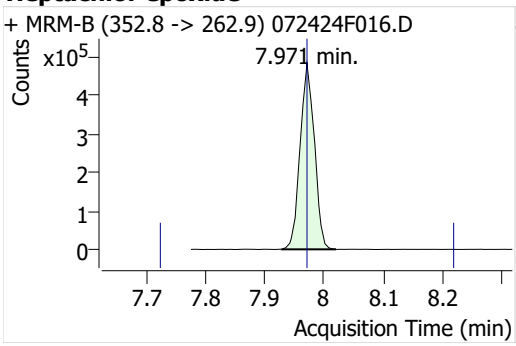
Oxychlordane

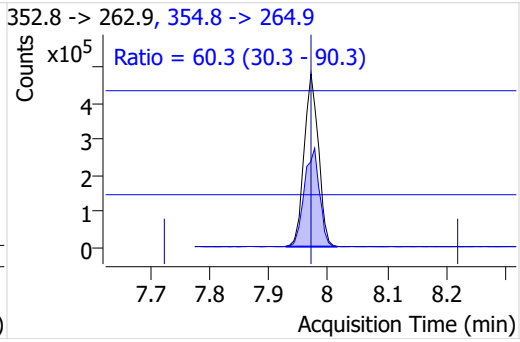


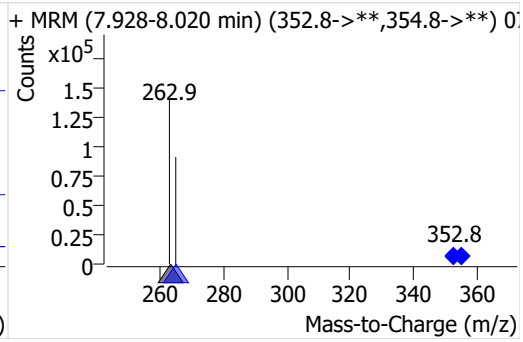




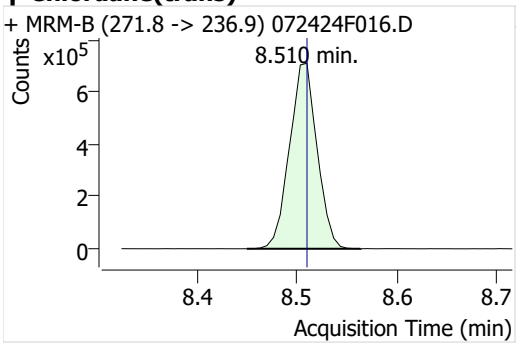
Heptachlor epoxide

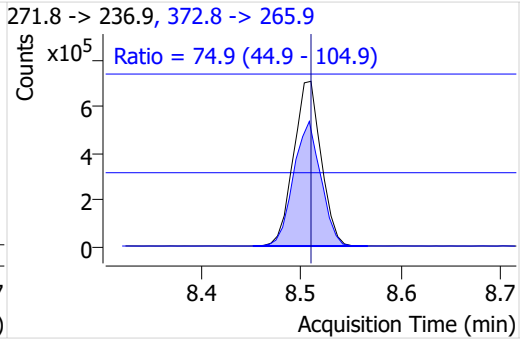


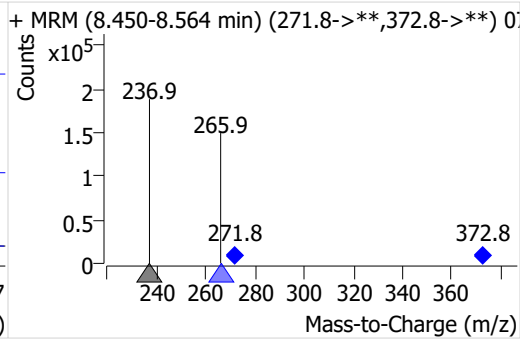




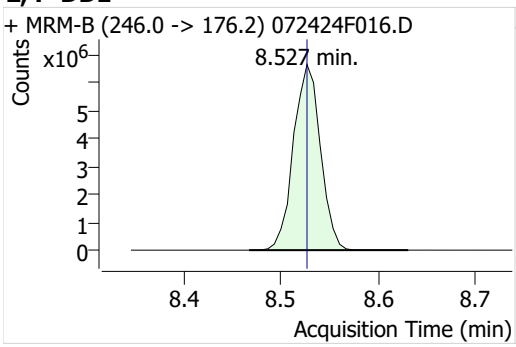
γ-Chlordane(trans)

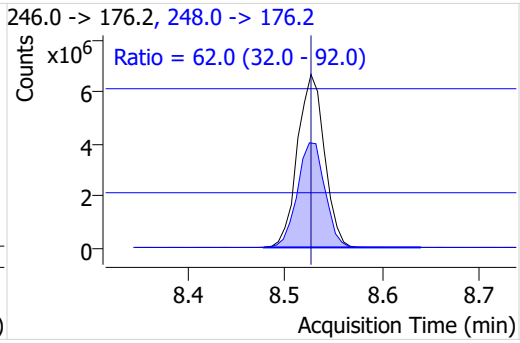


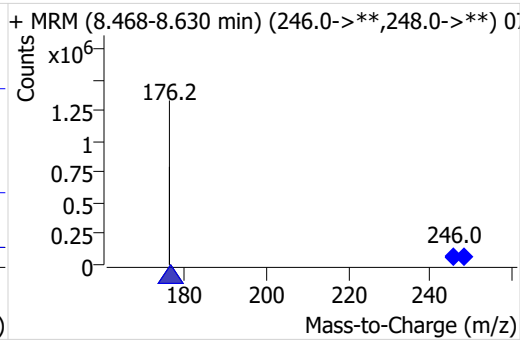




2,4'-DDE







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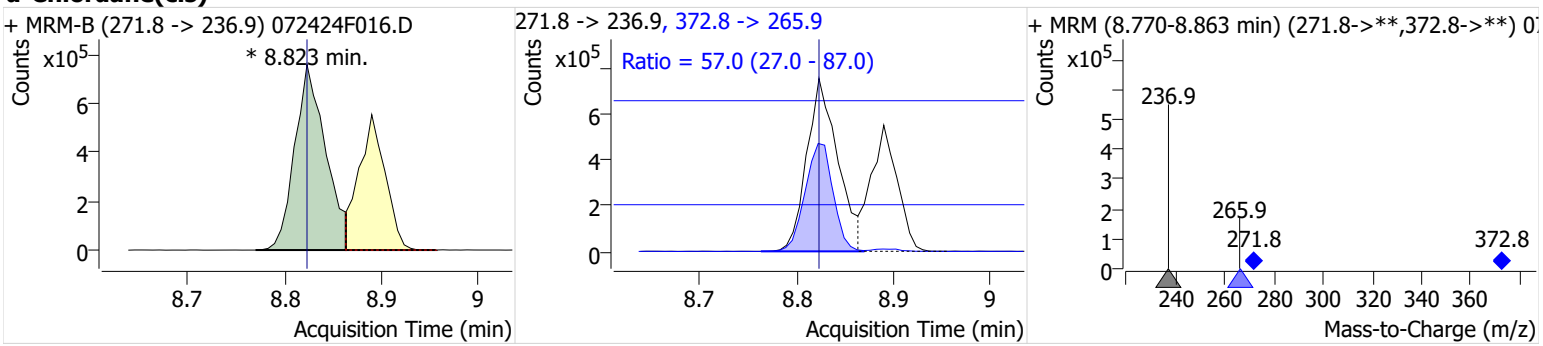
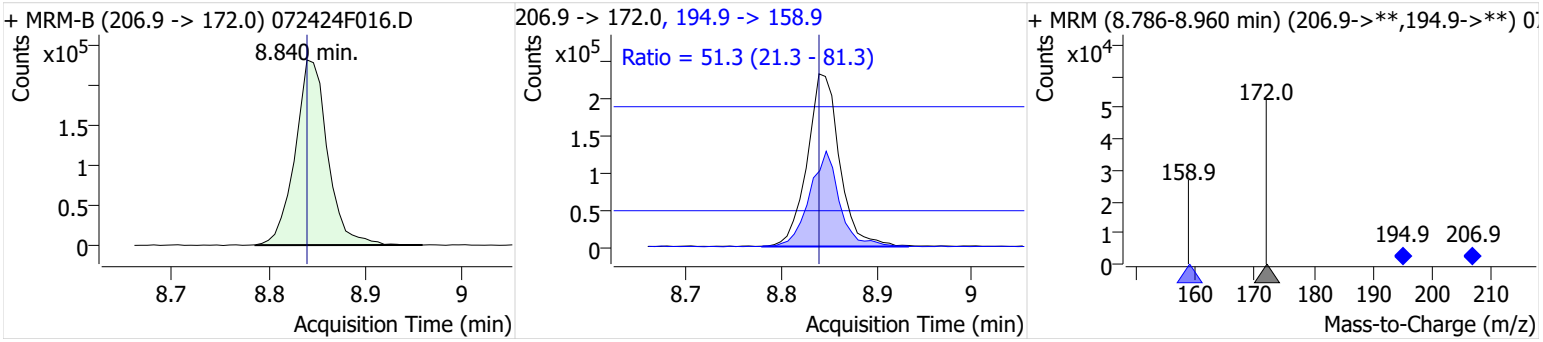
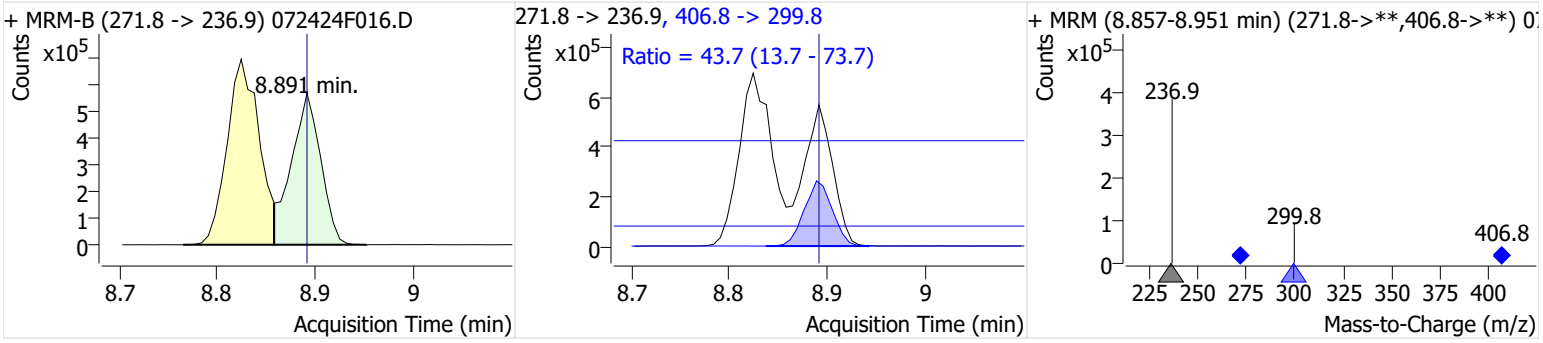
α-Chlordane(cis)



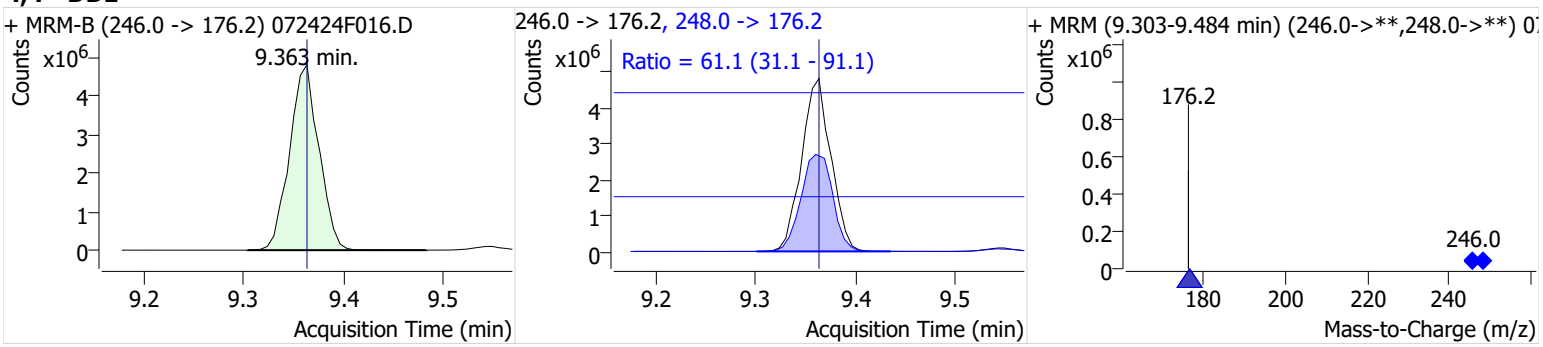
Endosulfan I



trans-Nanochlor



4,4' -DDE



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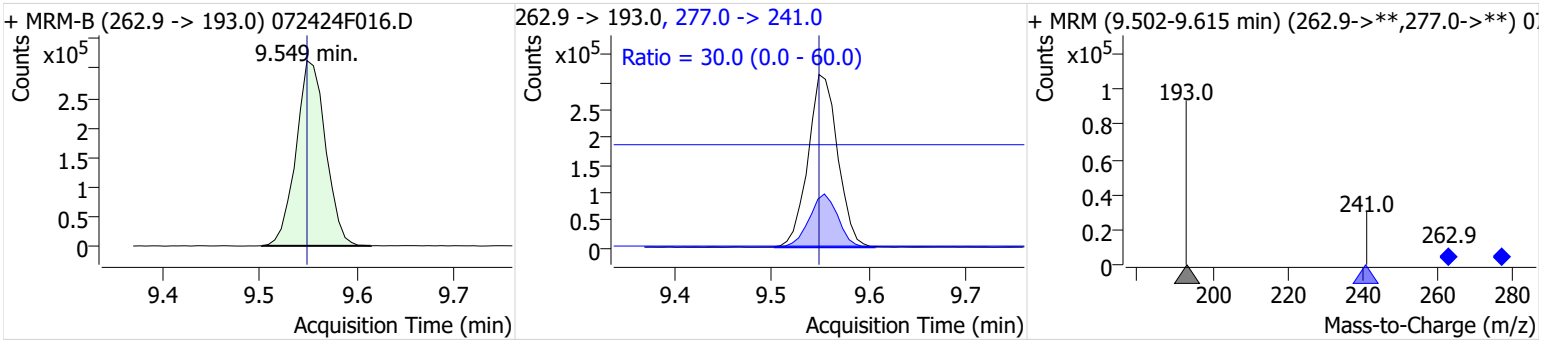
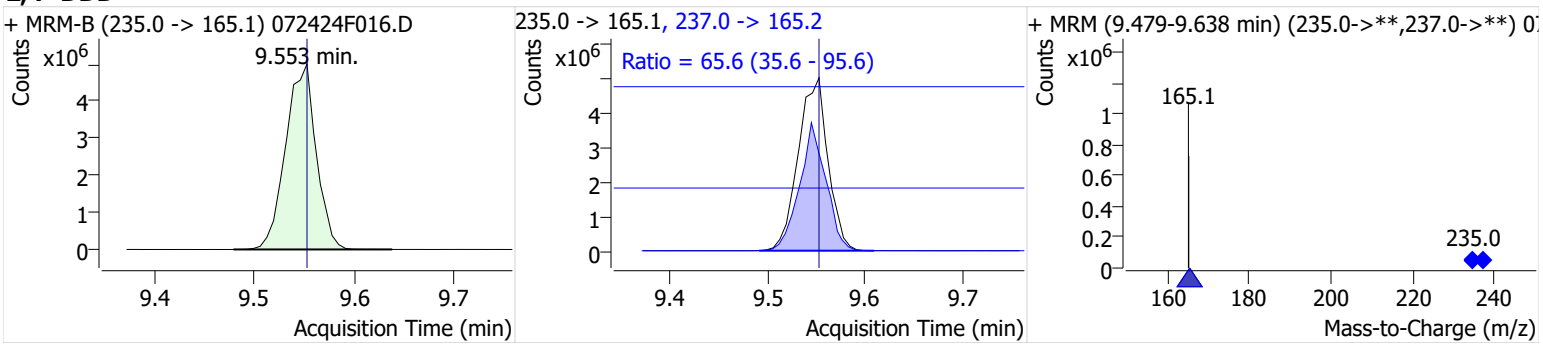
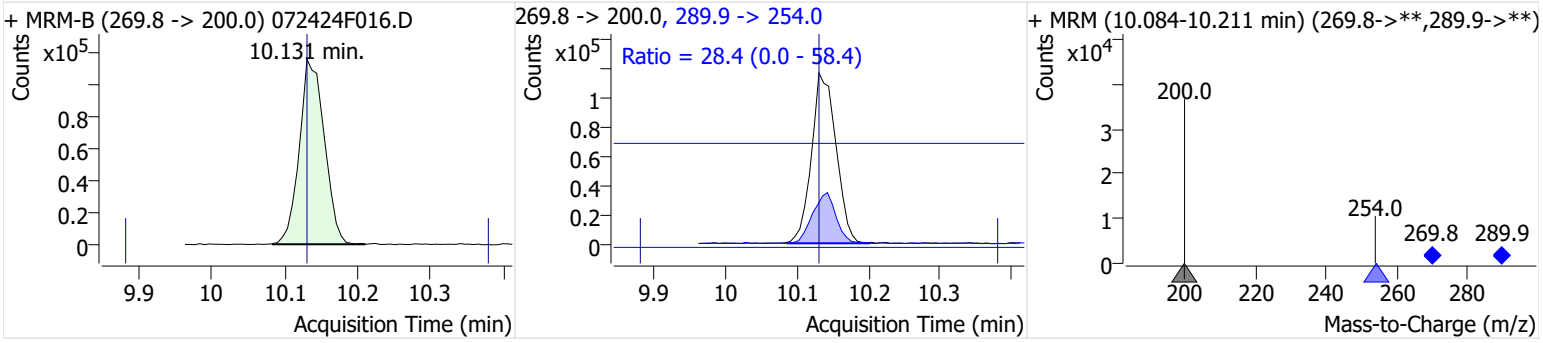
Dieldrin



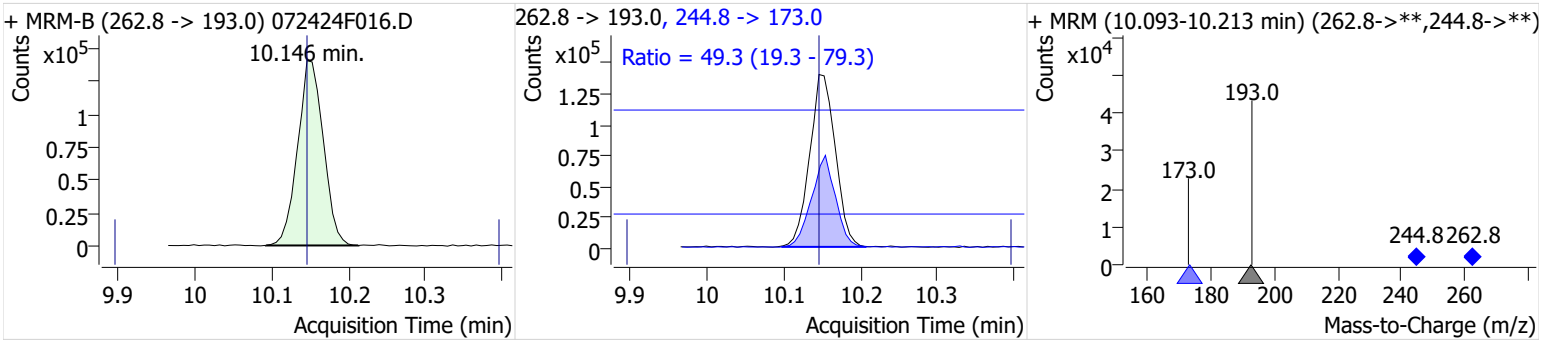
2,4'-DDD



Endrin-13C12



Endrin



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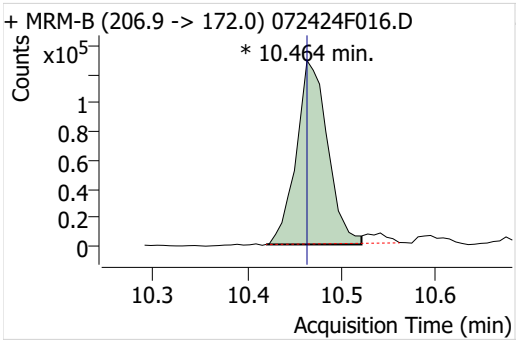
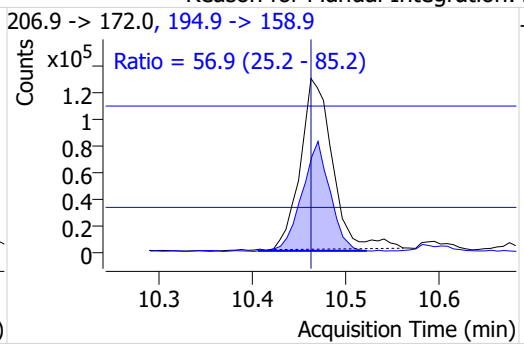
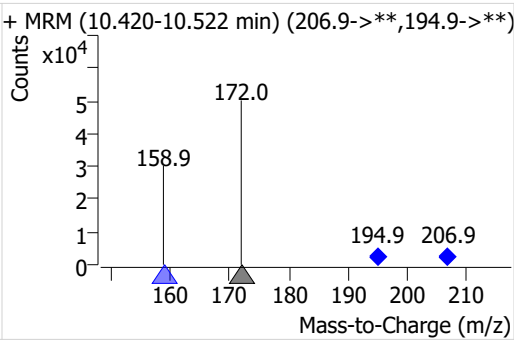
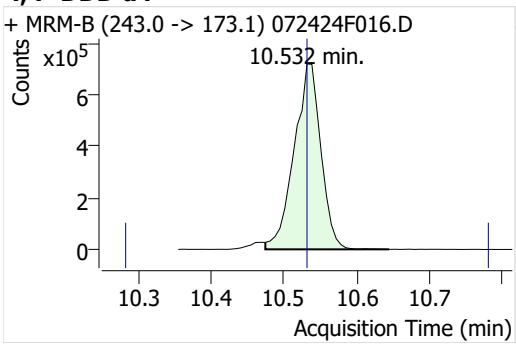
Endosulfan II Reason for Manual Integration: **BLC**

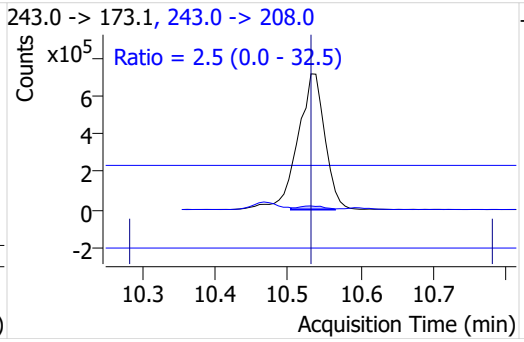


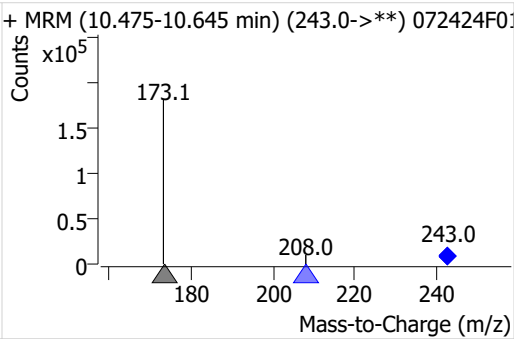




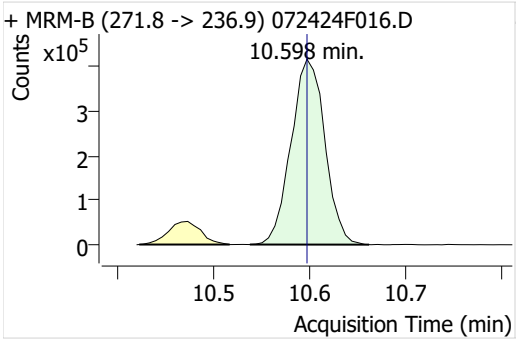
4,4'-DDD d4

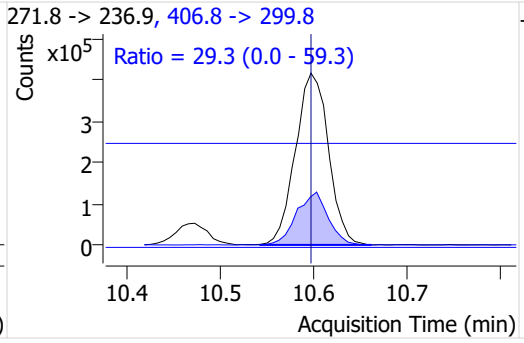


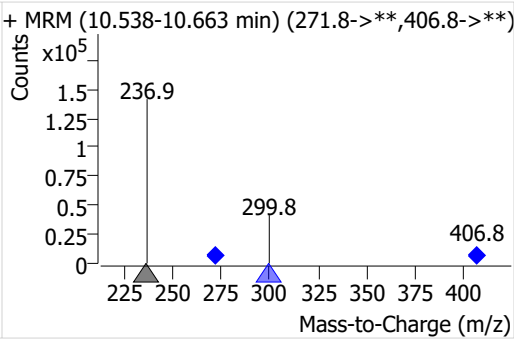




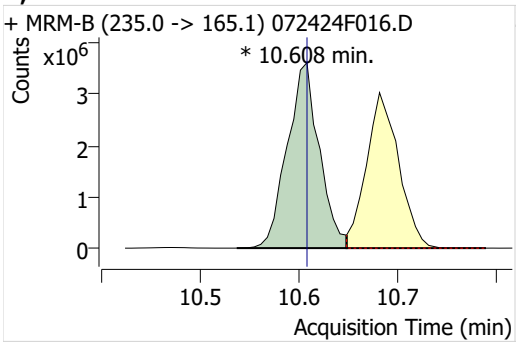
cis-Nonachlor

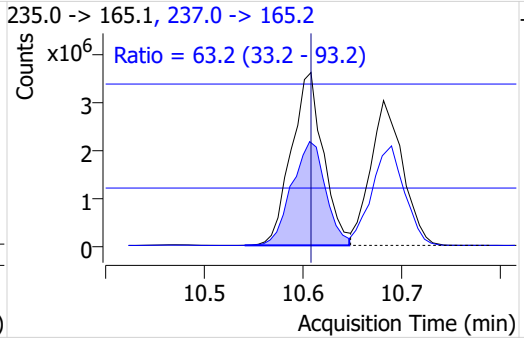


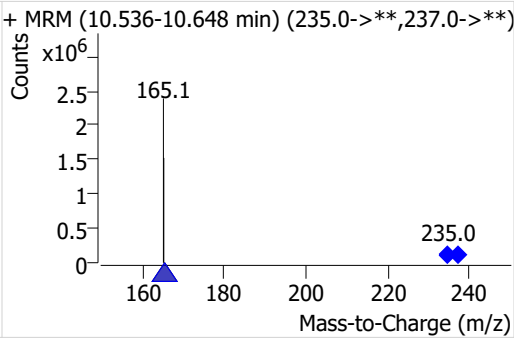




4,4'-DDD







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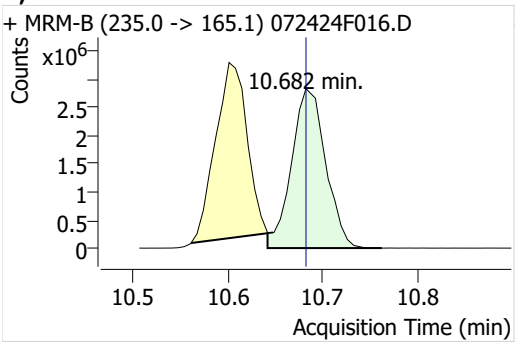
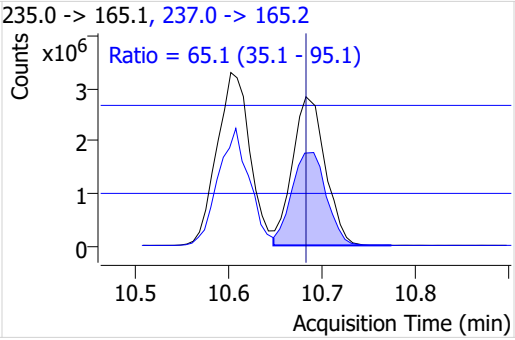
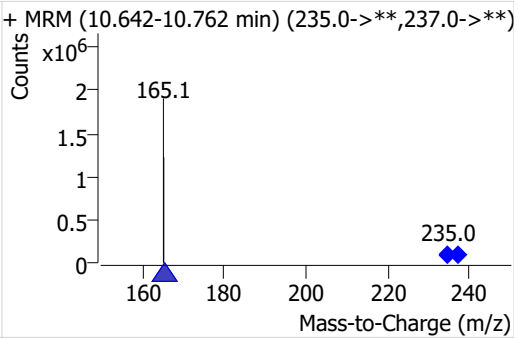
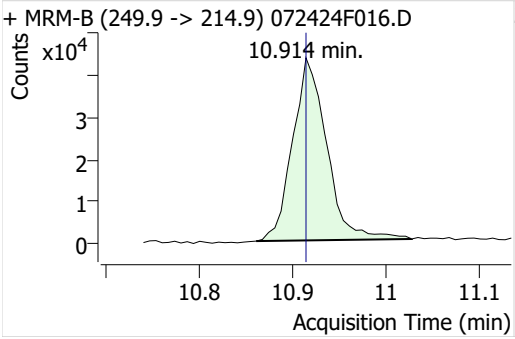
2,4'-DDT

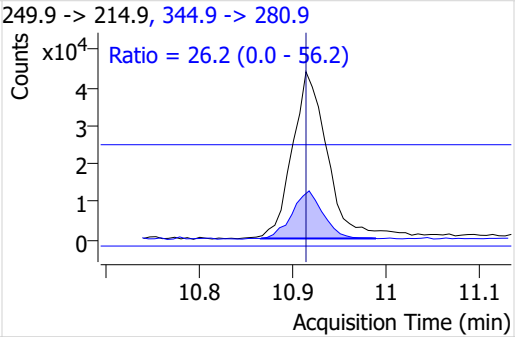


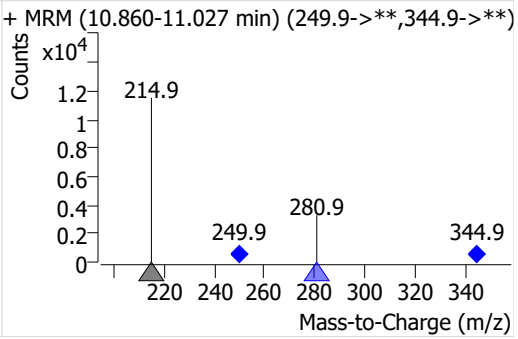




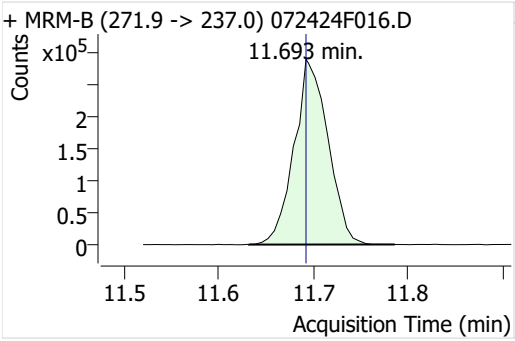
Endrin aldehyde

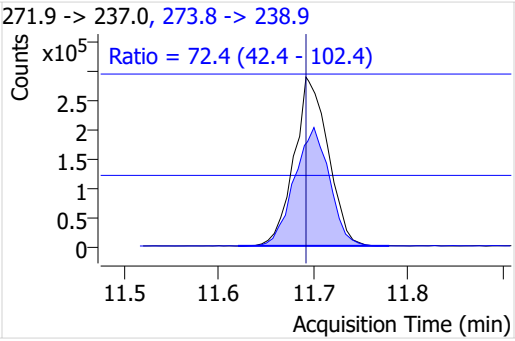


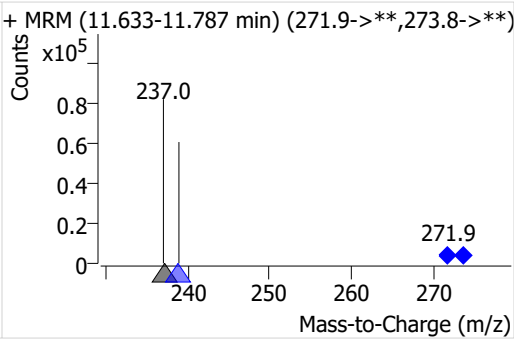




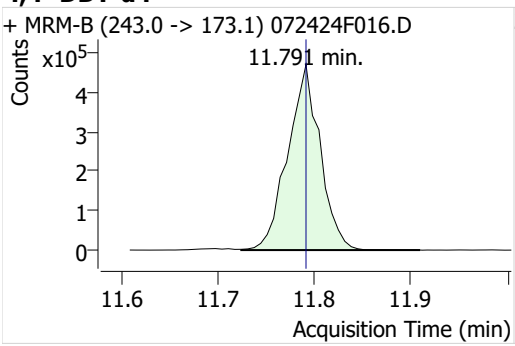
Endosulfan sulfate

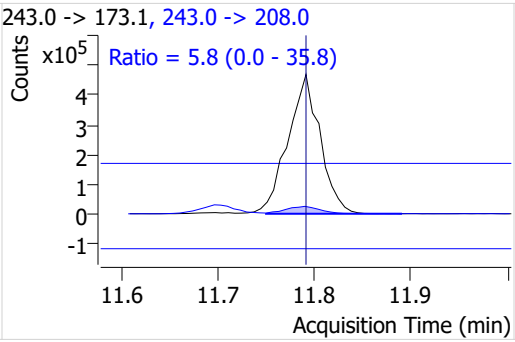


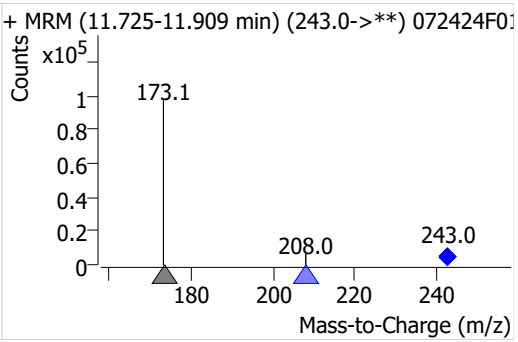




4,4'-DDT-d4







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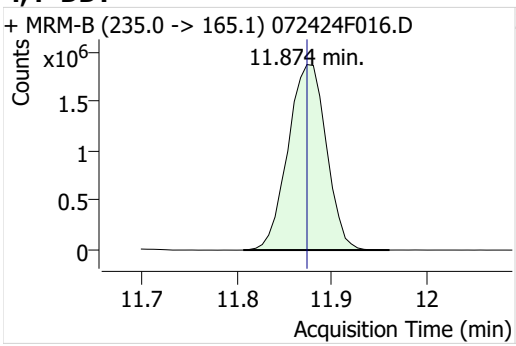
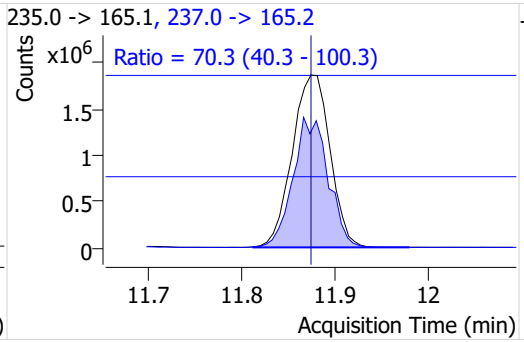
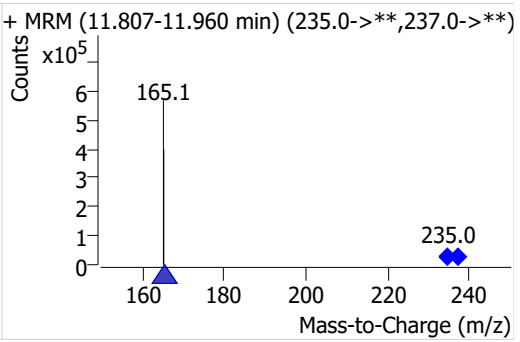
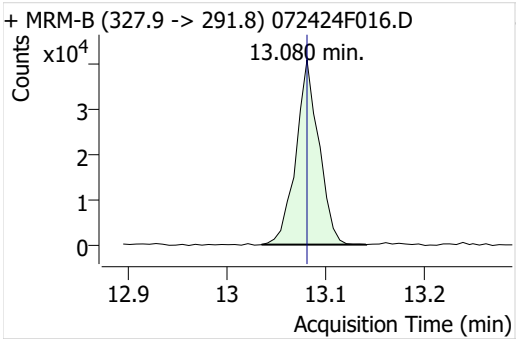
4,4'-DDT

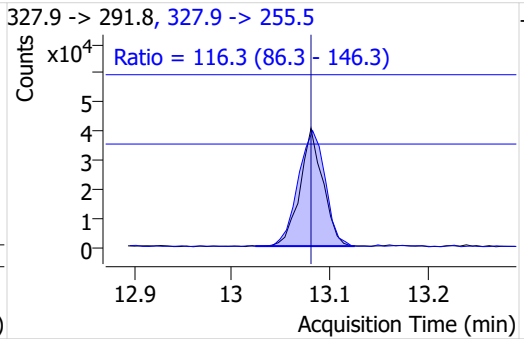


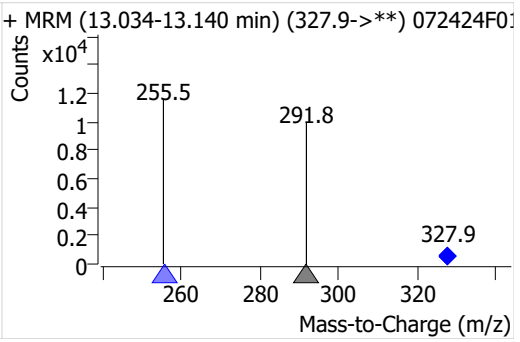




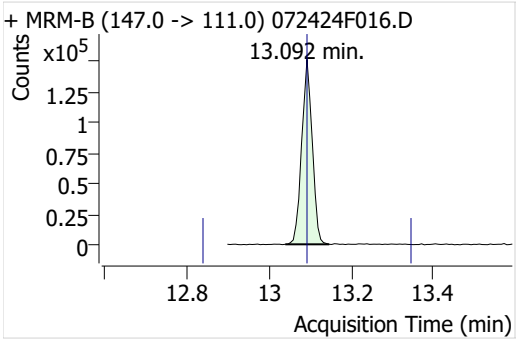
Endrin ketone-13C12

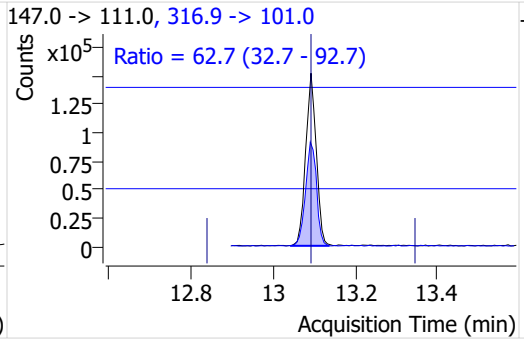


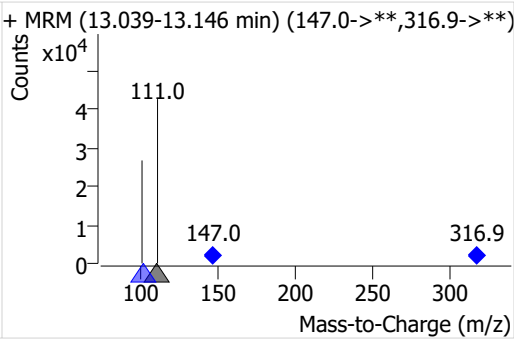




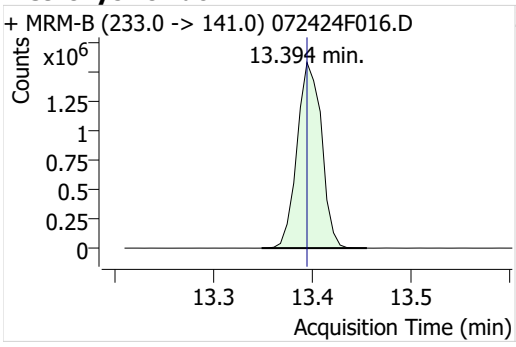
Endrin ketone

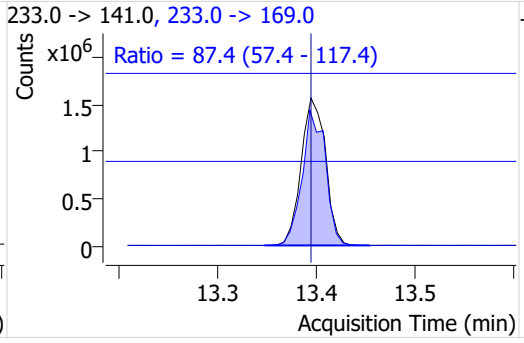


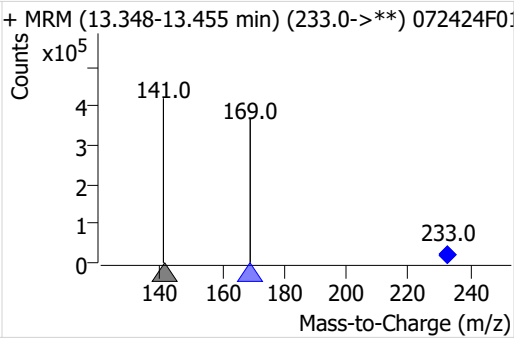




Methoxychlor-d6







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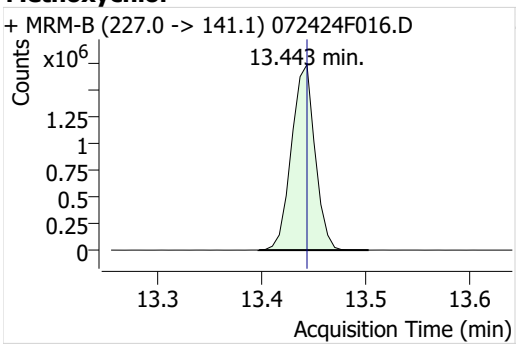
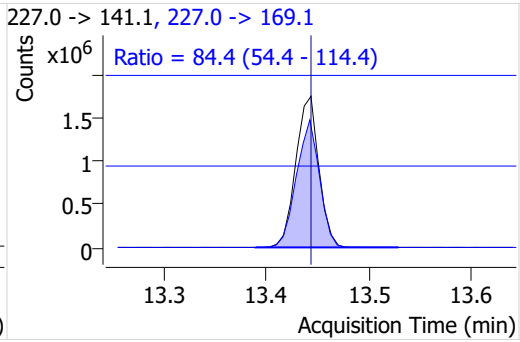
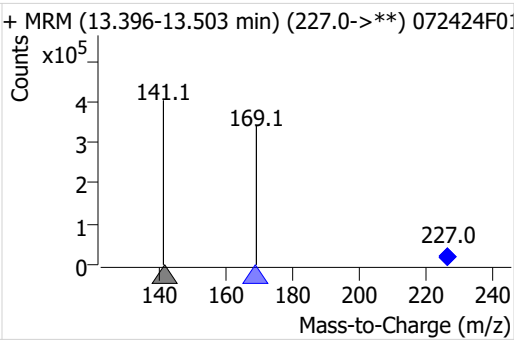
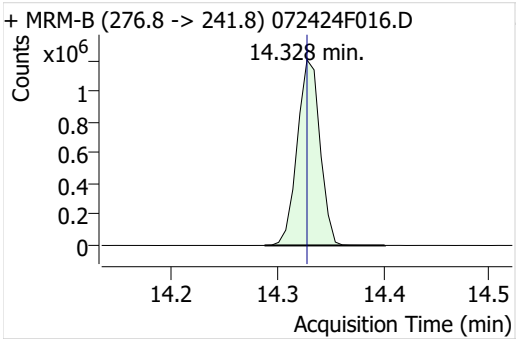
Methoxychlor

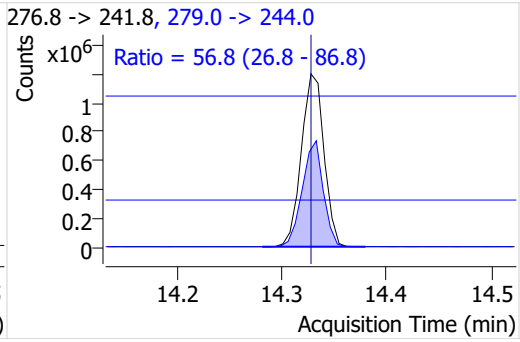


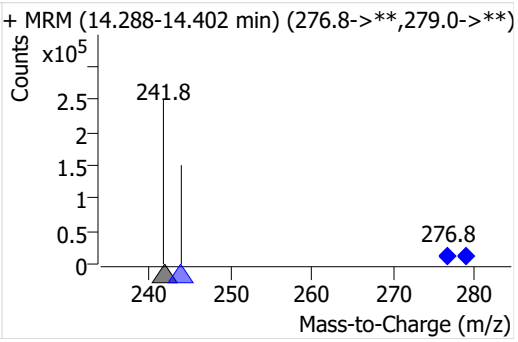




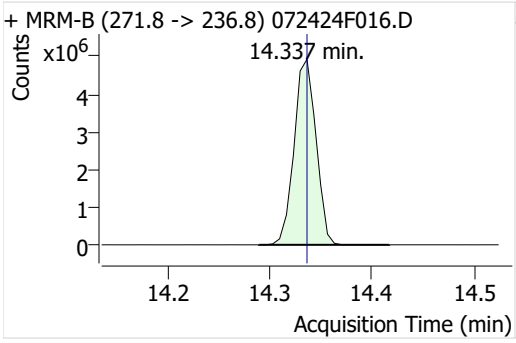
Mirex-13C10

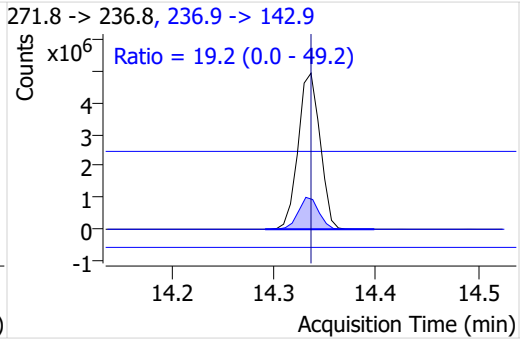


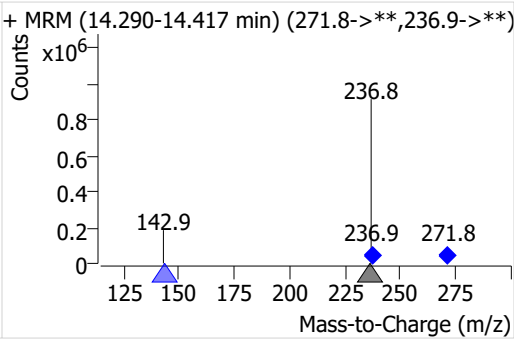




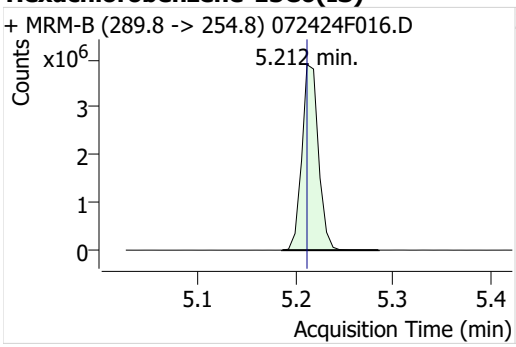
Mirex

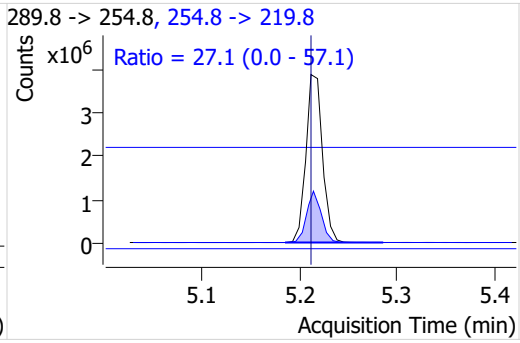


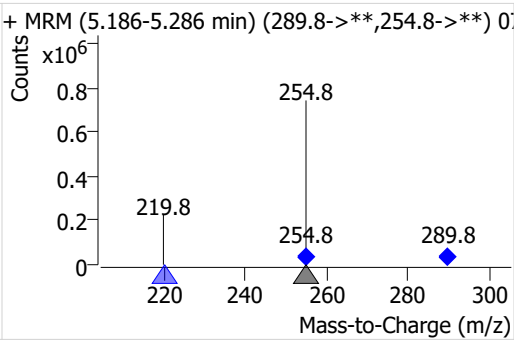




Hexachlorobenzene-13C6(IS)







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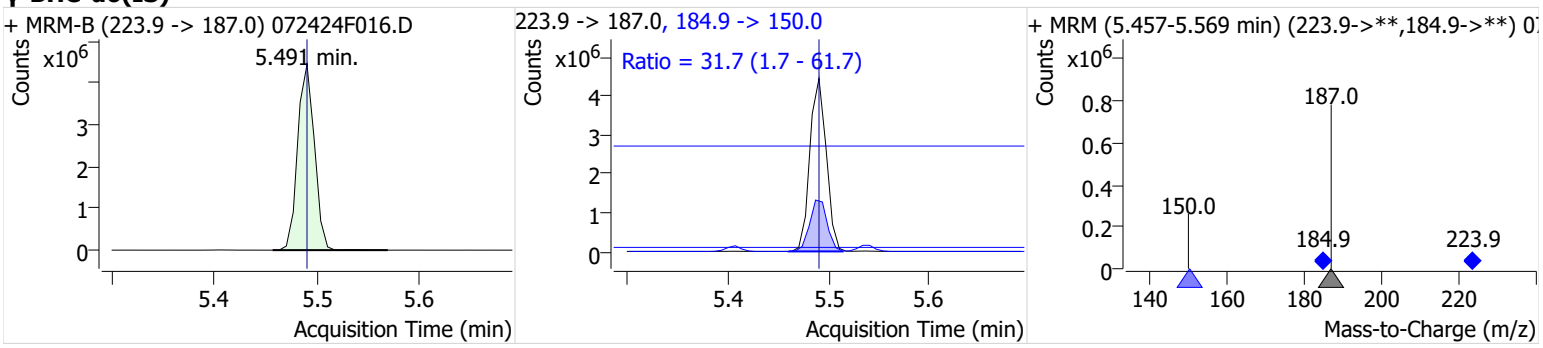
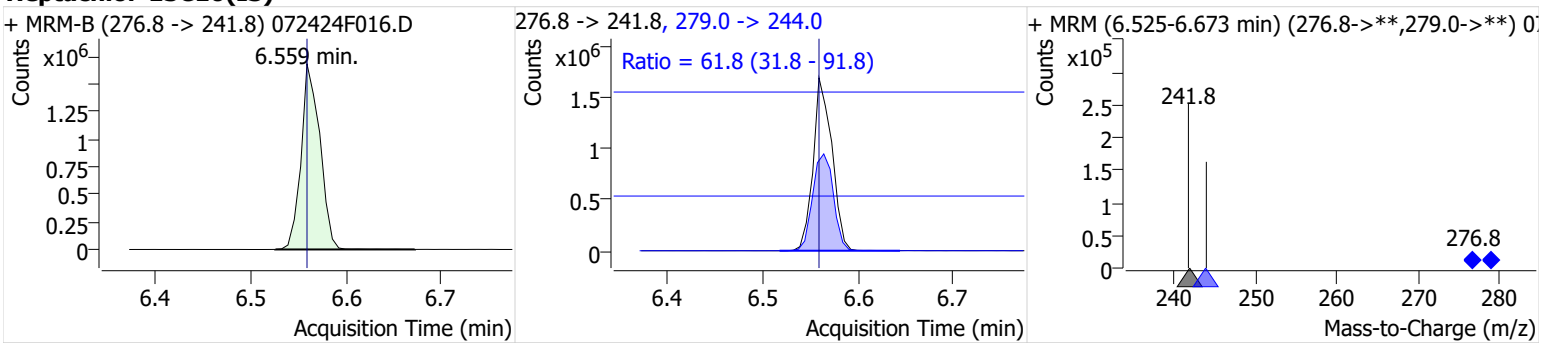
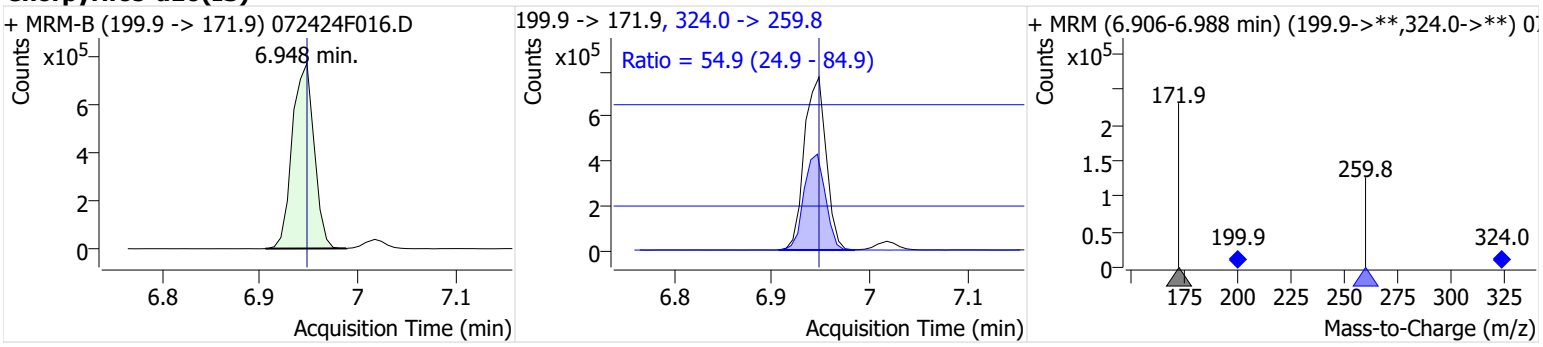
γ-BHC-d6(IS)



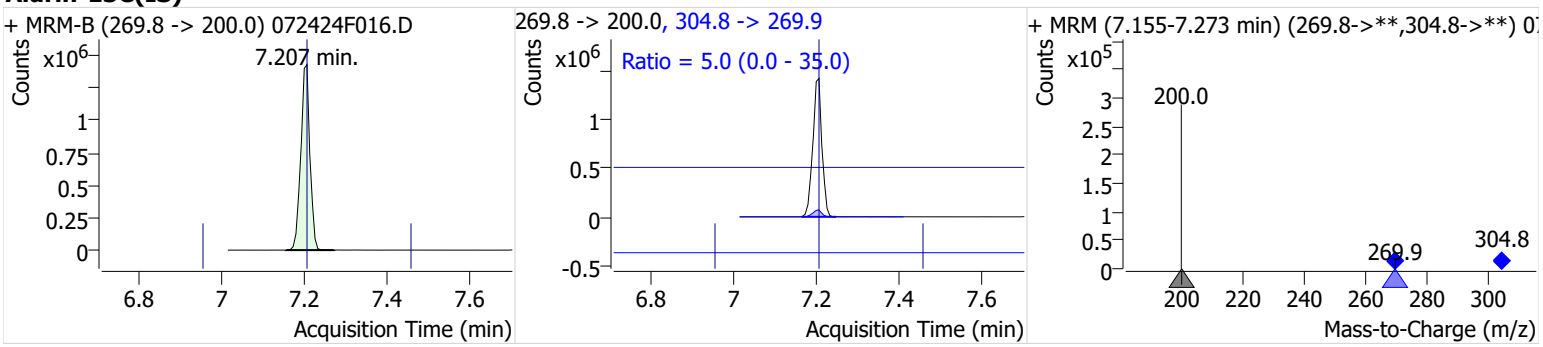
Heptachlor-13C10(IS)



Chorpyrifos-d10(IS)



Aldrin-13C(IS)



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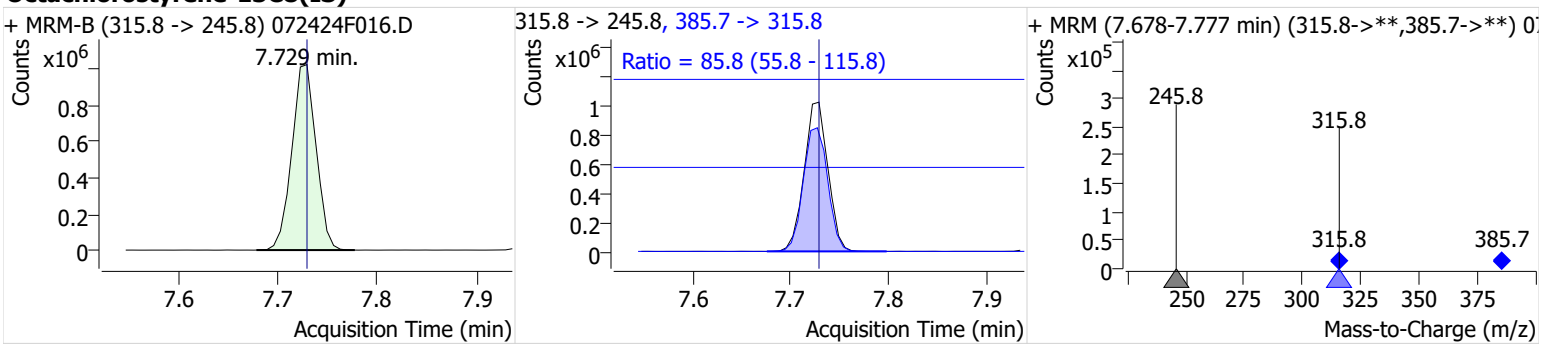
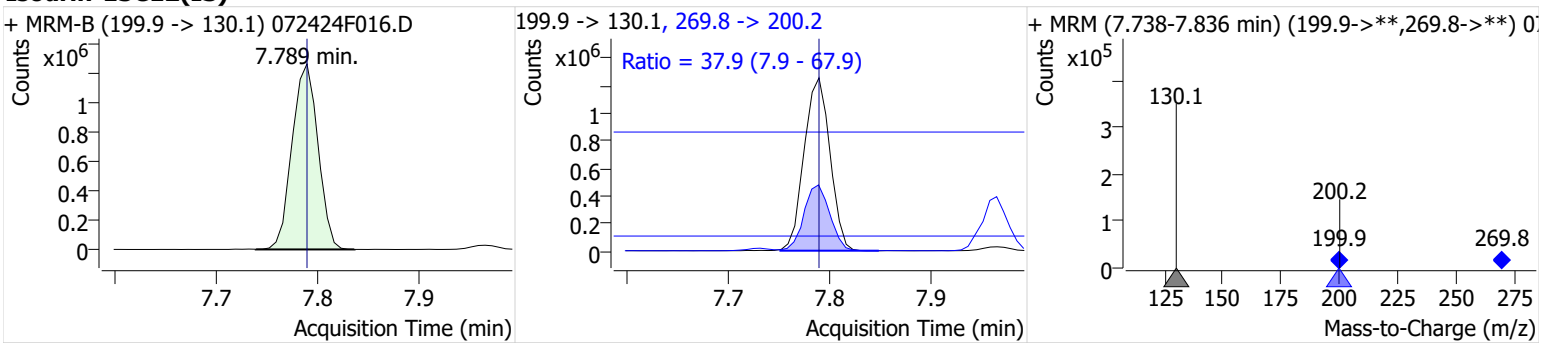
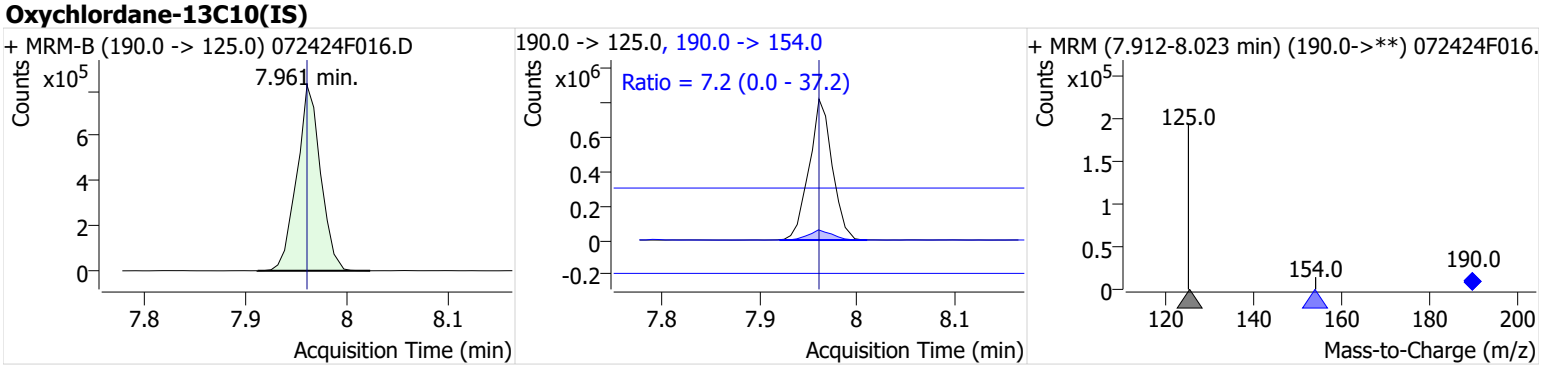
Octachlorostyrene-13C8(IS)



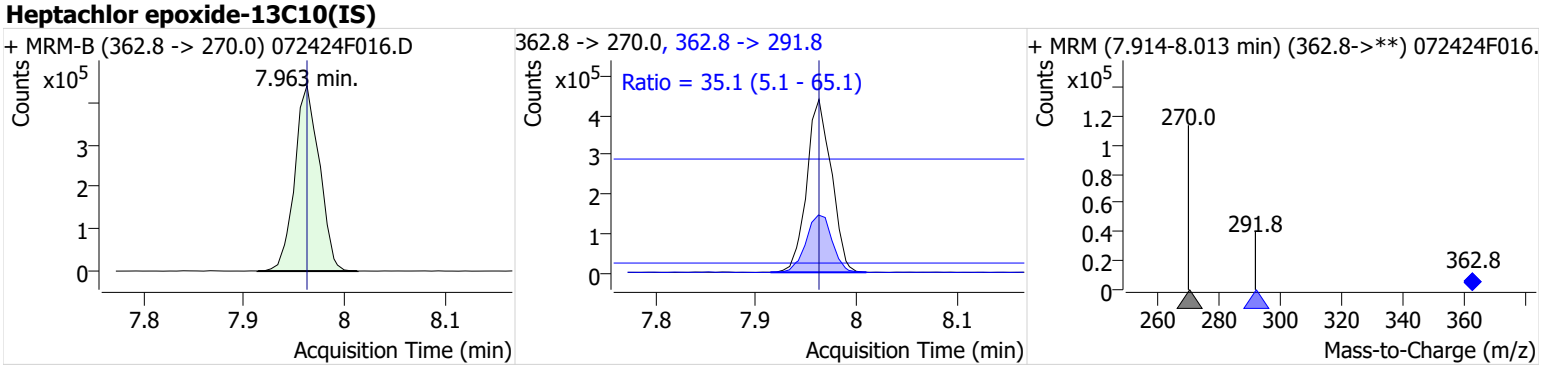
Isodrin-13C12(IS)



Oxychlordane-13C10(IS)



Heptachlor epoxide-13C10(IS)



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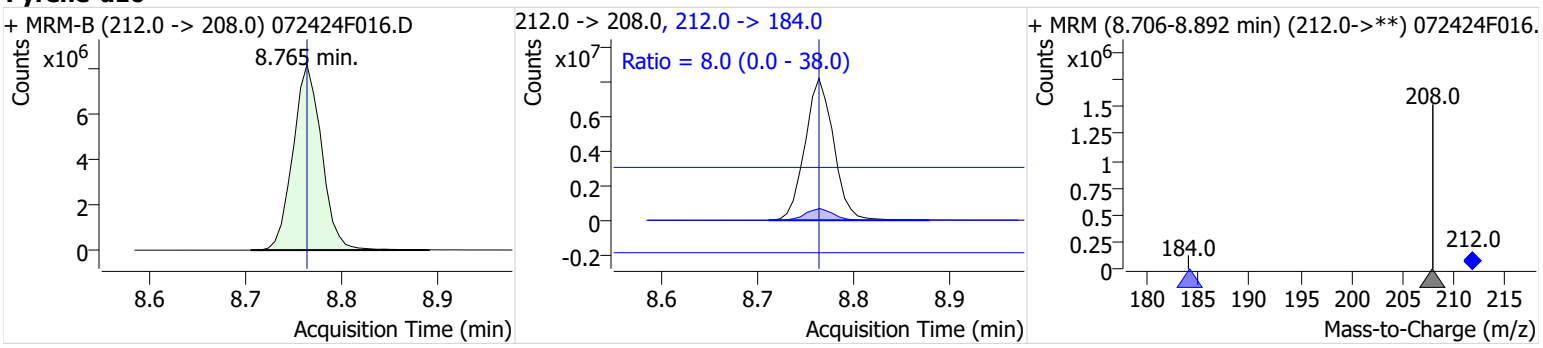
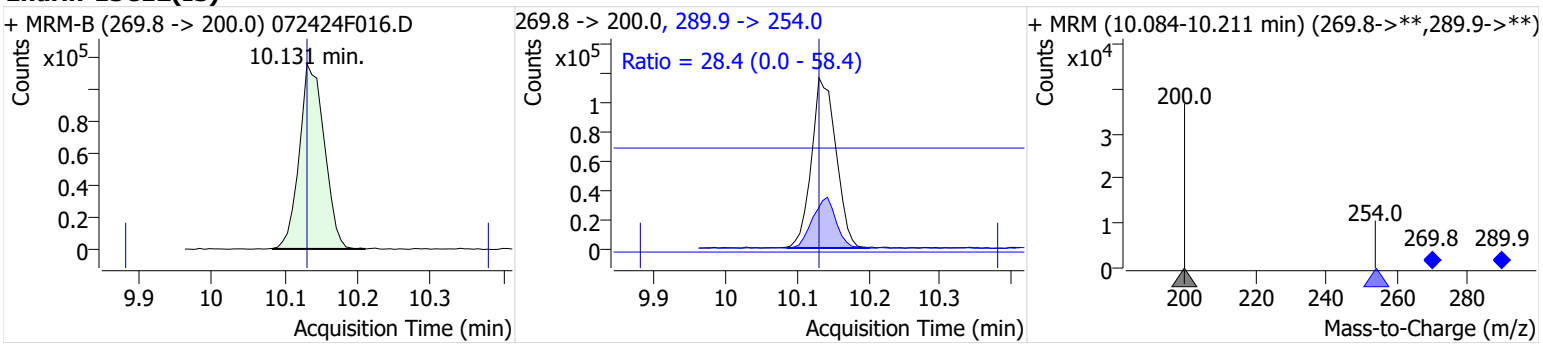
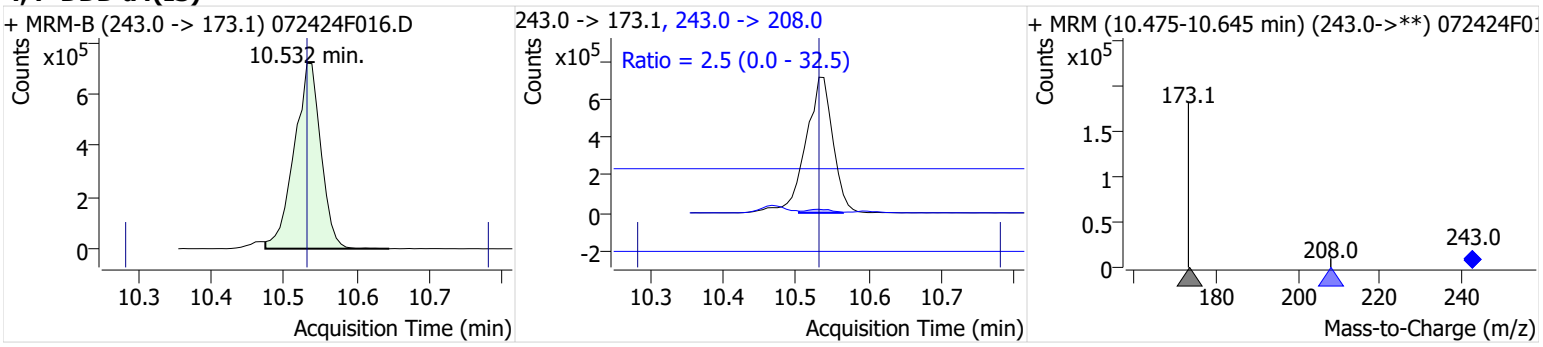
Pyrene-d10



Endrin-13C12(IS)



4,4'-DDD d4(IS)



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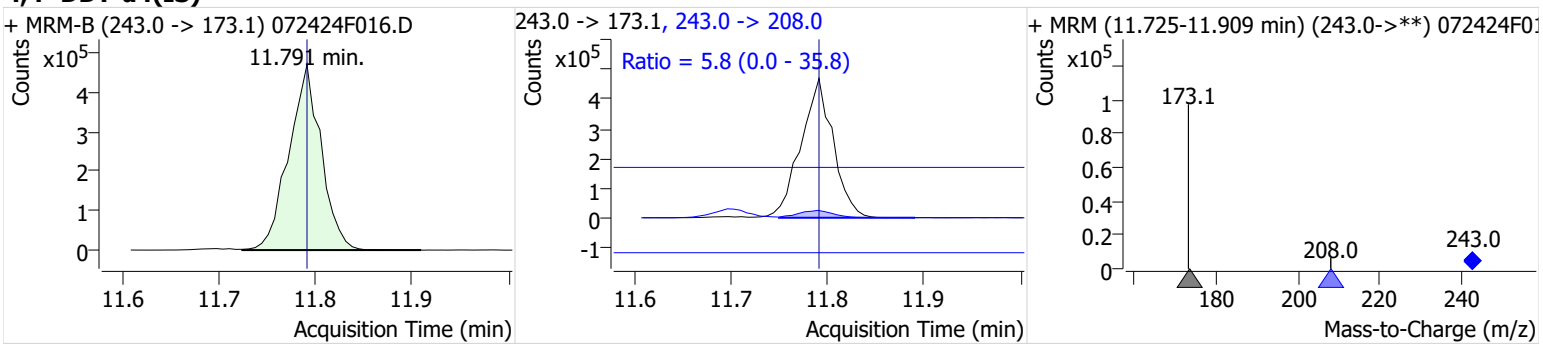
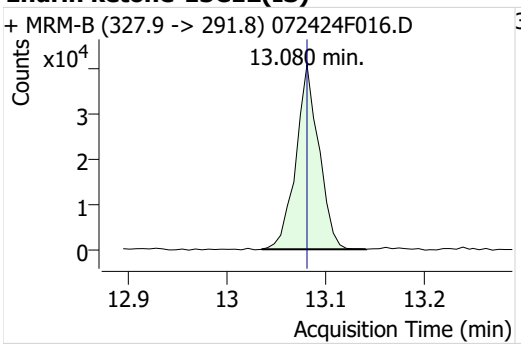
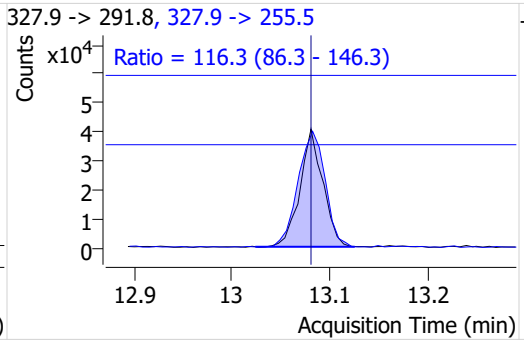
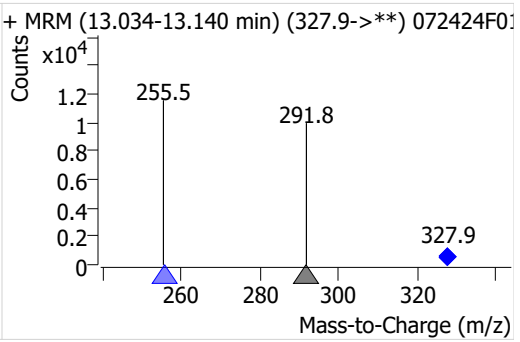


MassHunter Quantitative Analysis Sample Report

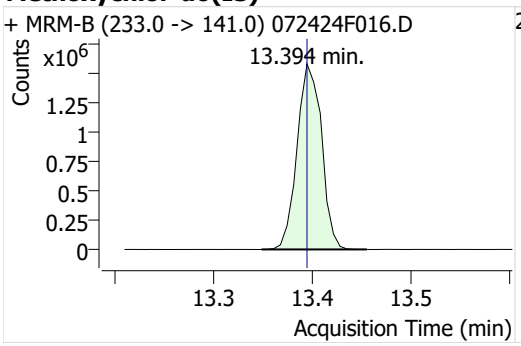
Endrin ketone-13C12(IS)

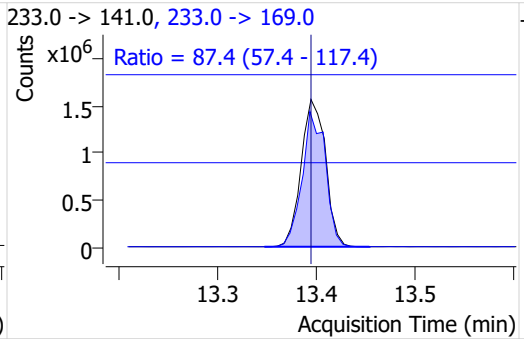


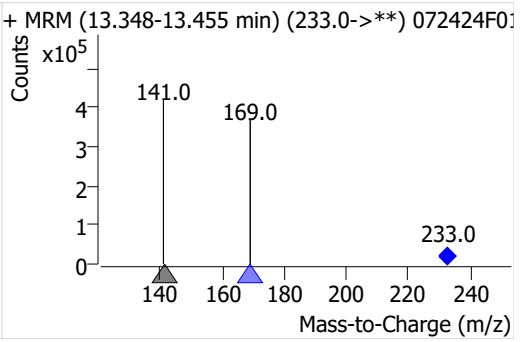




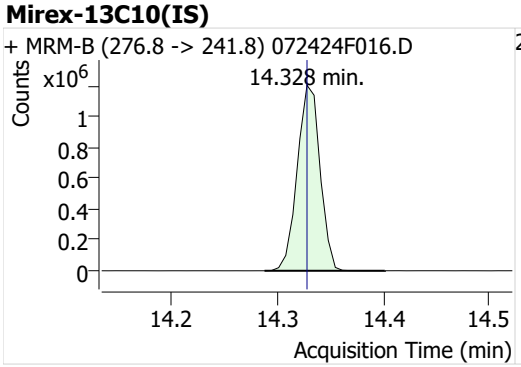
Methoxychlor-d6(IS)

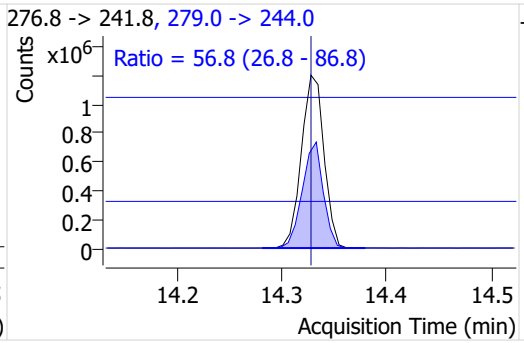


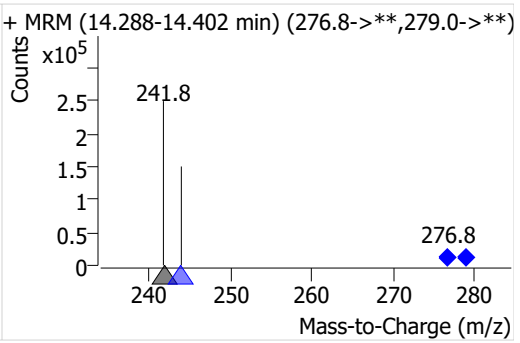




Mirex-13C10(IS)







MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Acq. Date-Time	7/24/2024 7:17:37 PM	**Acq Operator**	EBruno
Name	OC PEST ICAL 40ppb SVM71-30G	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	7/25/2024 7:23:51 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method		**Vial**	9
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.213	289.8 -> 254.8	4776624	20.0000 ng/ml	0.002
γ-BHC-d6(IS)	5.490	223.9 -> 187.0	5192065	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	6.565	276.8 -> 241.8	2902623	20.0000 ng/ml	0.006
Chorpyrifos-d10(IS)	6.948	199.9 -> 171.9	1390093	20.0000 ng/ml	0.001
Aldrin-13C(IS)	7.207	269.8 -> 200.0	2076339	20.0000 ng/ml	0.001
Octachlorostyrene-13C8(IS)	7.726	315.8 -> 245.8	1795099	20.0000 ng/ml	0.002
Isodrin-13C12(IS)	7.789	199.9 -> 130.1	2389476	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	7.961	190.0 -> 125.0	1488844	20.0000 ng/ml	0.003
Heptachlor epoxide-13C10(IS)	7.963	362.8 -> 270.0	791028	20.0000 ng/ml	0.000
Pyrene-d10	8.765	212.0 -> 208.0	23901471	100.0000 ng/ml	0.001
Endrin-13C12(IS)	10.138	269.8 -> 200.0	343173	20.0000 ng/ml	0.009
4,4'-DDD d4(IS)	10.532	243.0 -> 173.1	2329031	5.0000 ng/ml	0.000
4,4'-DDT-d4(IS)	11.791	243.0 -> 173.1	1450312	5.0000 ng/ml	0.003
Endrin ketone-13C12(IS)	13.080	327.9 -> 291.8	84730	20.0000 ng/ml	0.001
Methoxychlor-d6(IS)	13.398	233.0 -> 141.0	3646199	20.0000 ng/ml	0.005
Mirex-13C10(IS)	14.328	276.8 -> 241.8	2290297	5.0000 ng/ml	0.002

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	4776624	15.827 ng/ml	
		Spiked Amount =	20.0	Recovery =	*79.1 %*
γ-BHC-d6	5.491	223.9 -> 187.0	5192065	16.976 ng/ml	
		Spiked Amount =	20.0	Recovery =	*84.9 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	2902623	16.520 ng/ml	
		Spiked Amount =	20.0	Recovery =	*82.6 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	1390093	18.460 ng/ml	
		Spiked Amount =	20.0	Recovery =	*92.3 %*
Aldrin-13C	7.207	269.8 -> 200.0	2076175	15.617 ng/ml	
		Spiked Amount =	20.0	Recovery =	*78.1 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	1795099	14.982 ng/ml	
		Spiked Amount =	20.0	Recovery =	*74.9 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2389476	16.770 ng/ml	
		Spiked Amount =	20.0	Recovery =	*83.9 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1488844	17.622 ng/ml	
		Spiked Amount =	20.0	Recovery =	*88.1 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	791028	16.541 ng/ml	
		Spiked Amount =	20.0	Recovery =	*82.7 %*
Endrin-13C12	10.131	269.8 -> 200.0	343173	16.841 ng/ml	
		Spiked Amount =	20.0	Recovery =	*84.2 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	2329031	4.602 ng/ml	
		Spiked Amount =	5.0	Recovery =	*92.0 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1450312	4.653 ng/ml	
		Spiked Amount =	5.0	Recovery =	*93.1 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	84730	19.699 ng/ml	
		Spiked Amount =	20.0	Recovery =	*98.5 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	3646199	21.096 ng/ml	
		Spiked Amount =	20.0	Recovery =	*105.5 %*

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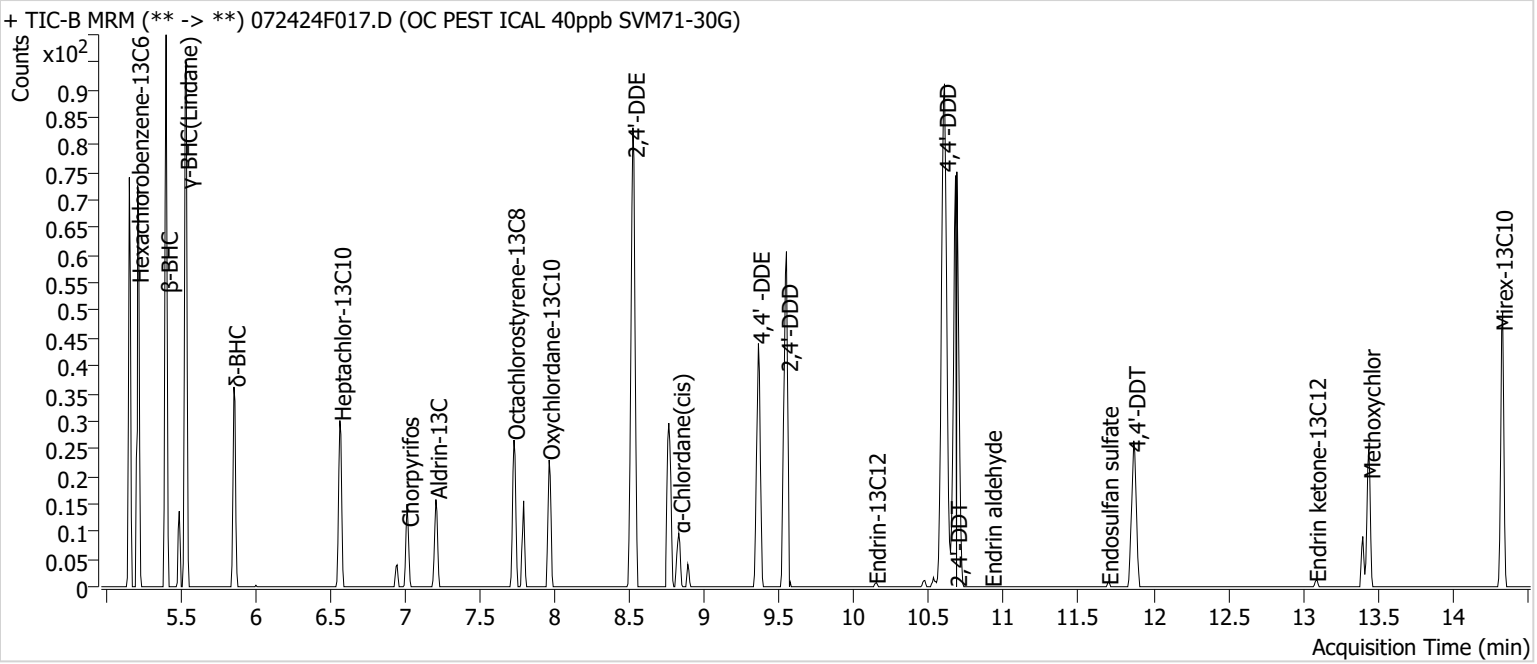
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	2290297	4.983 ng/ml
		Spiked Amount =	5.0	Recovery = *99.7 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.163	181.1 -> 145.1	15753601	43.038 ng/ml	99
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.214	283.8 -> 213.9	14026534	38.481 ng/ml	96
β-BHC	γ-BHC-d6(IS)	5.408	181.1 -> 145.1	10048548	40.988 ng/ml	99
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	12148461	38.807 ng/ml	97
δ-BHC	γ-BHC-d6(IS)	5.859	181.1 -> 145.1	9107074	39.965 ng/ml	96
Heptachlor	Heptachlor-13C10(IS)	6.569	271.7 -> 236.9	6402489	40.992 ng/ml	90
Chorpyrifos	Chorpyrifos-d10(IS)	7.019	196.9 -> 169.0	3904251	41.267 ng/ml	99
Aldrin	Aldrin-13C(IS)	7.209	254.9 -> 220.0	2245208	40.732 ng/ml	91
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.728	342.8 -> 307.8	9677693	43.871 ng/ml	99
Isodrin	Isodrin-13C12(IS)	7.796	193.0 -> 123.0	5266815	41.971 ng/ml	99
Oxychlordane	Oxychlordane-13C10(IS)	7.968	114.9 -> 51.1	8044094	41.810 ng/ml	99
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.971	352.8 -> 262.9	1786526	42.648 ng/ml	96
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.510	271.8 -> 236.9	3302006	42.209 ng/ml	90
2,4'-DDE	4,4'-DDD d4(IS)	8.528	246.0 -> 176.2	32085796	38.544 ng/ml	97
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.830	271.8 -> 236.9	4129802	43.646 ng/ml	96
Endosulfan I	Endrin-13C12(IS)	8.847	206.9 -> 172.0	1346529	43.655 ng/ml	100
trans-Nanochlor	Oxychlordane-13C10(IS)	8.891	271.8 -> 236.9	2781148	41.319 ng/ml	80
4,4' -DDE	4,4'-DDD d4(IS)	9.364	246.0 -> 176.2	21507417	36.269 ng/ml	97
Dieldrin	Endrin-13C12(IS)	9.555	262.9 -> 193.0	1647035	43.059 ng/ml	99
2,4'-DDD	4,4'-DDD d4(IS)	9.553	235.0 -> 165.1	26953351	40.305 ng/ml	96
Endrin	Endrin-13C12(IS)	10.153	262.8 -> 193.0	861617	40.631 ng/ml	98
Endosulfan II	Endrin-13C12(IS)	10.471	206.9 -> 172.0	755436	46.117 ng/ml	98
cis-Nonachlor	Oxychlordane-13C10(IS)	10.591	271.8 -> 236.9	2626342	45.387 ng/ml	95
4,4'-DDD	4,4'-DDD d4(IS)	10.608	235.0 -> 165.1	22036372	44.692 ng/ml	99
2,4'-DDT	4,4'-DDT-d4(IS)	10.682	235.0 -> 165.1	19742559	46.494 ng/ml	98
Endrin aldehyde	Endrin-13C12(IS)	10.913	249.9 -> 214.9	282543	46.640 ng/ml	98
Endosulfan sulfate	Endrin-13C12(IS)	11.693	271.9 -> 237.0	1938436	45.003 ng/ml	99
4,4'-DDT	4,4'-DDT-d4(IS)	11.874	235.0 -> 165.1	14981779	45.642 ng/ml	93
Endrin ketone	Endrin ketone-13C12(IS)	13.099	147.0 -> 111.0	708516	37.255 ng/ml	100
Methoxychlor	Methoxychlor-d6(IS)	13.443	227.0 -> 141.1	8077653	42.520 ng/ml	98
Mirex	Mirex-13C10(IS)	14.336	271.8 -> 236.8	17389280	36.849 ng/ml	99

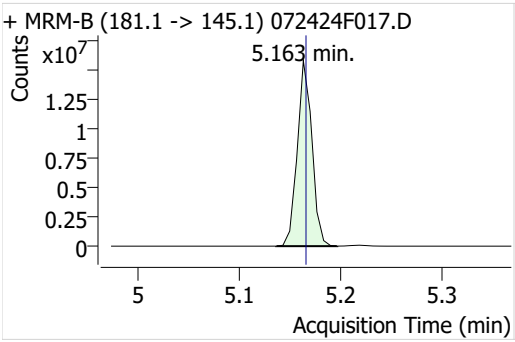
(m) = manual integration ND = Not Detected NC = Not Calculated

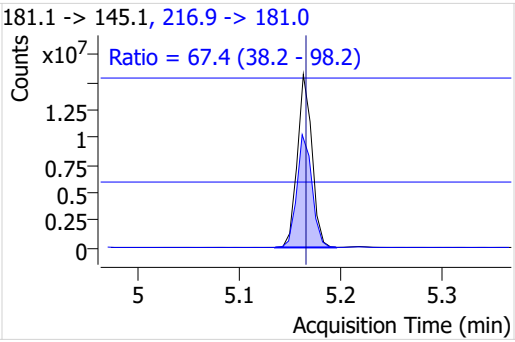
Sample Chromatogram

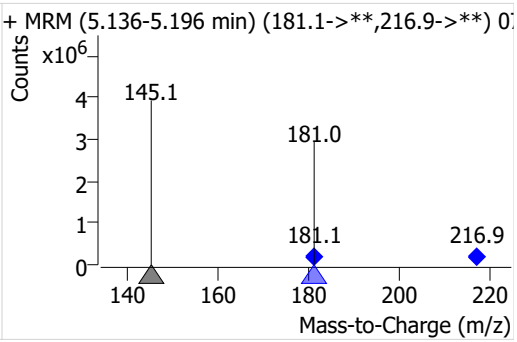
MassHunter Quantitative Analysis Sample Report



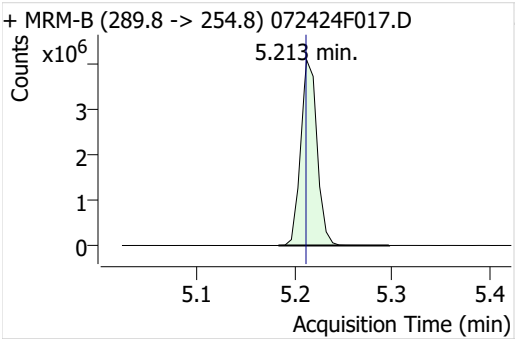
α-BHC

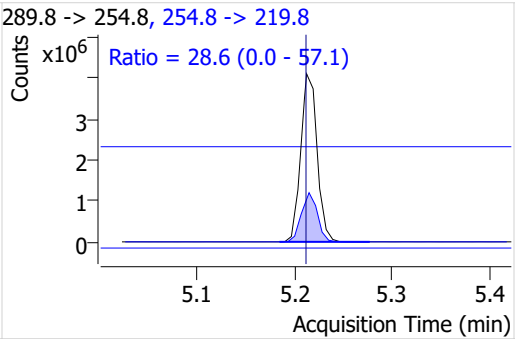


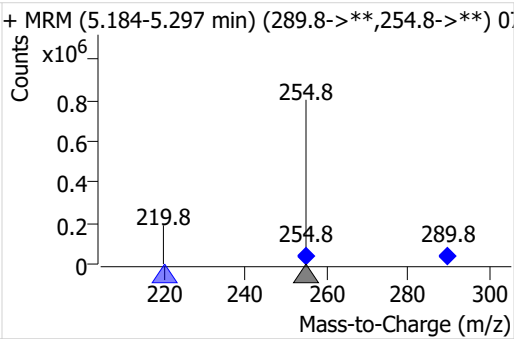




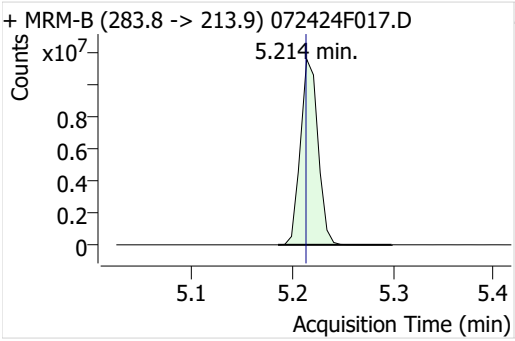
Hexachlorobenzene-13C6

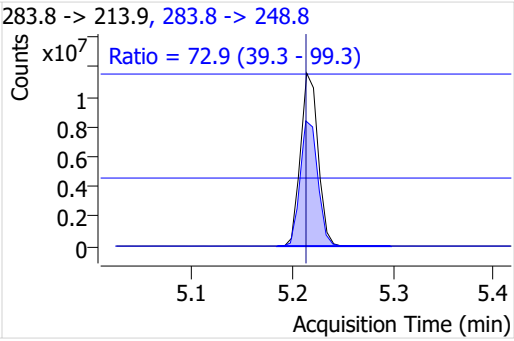


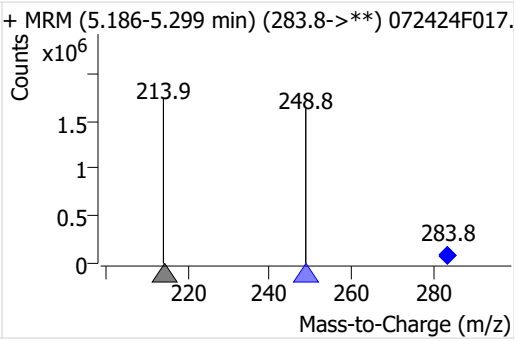




Hexachlorobenzene







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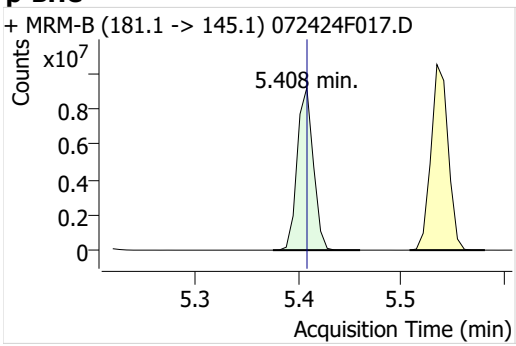
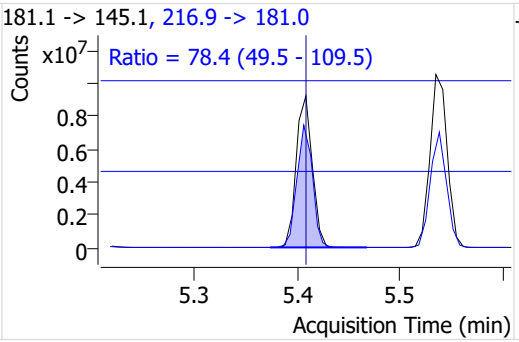
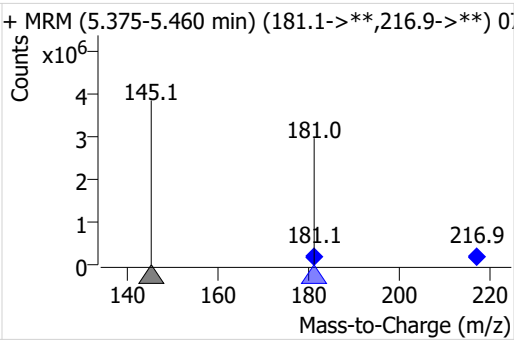
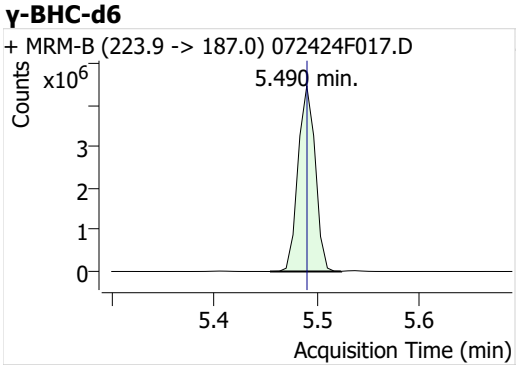
β-BHC

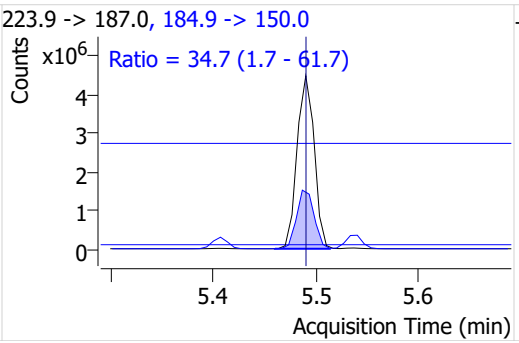


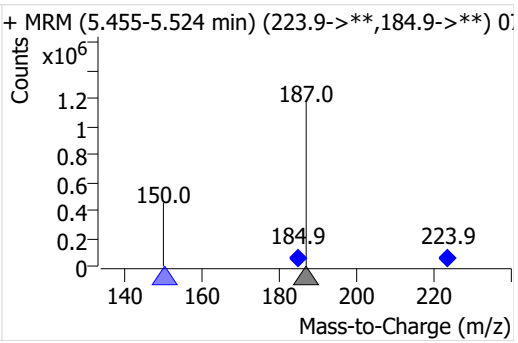




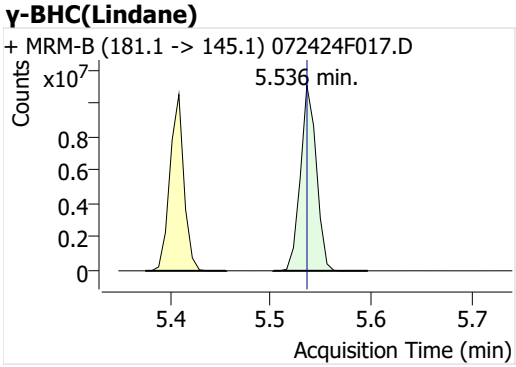
γ-BHC-d6

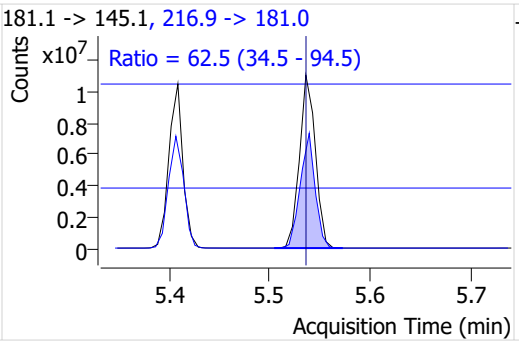


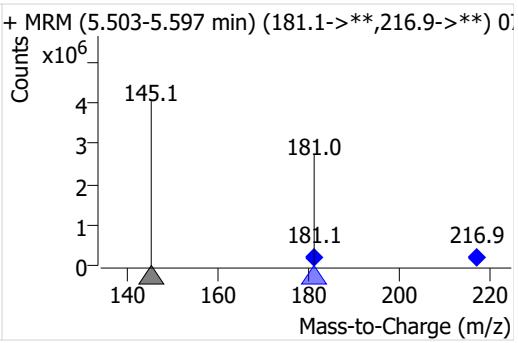




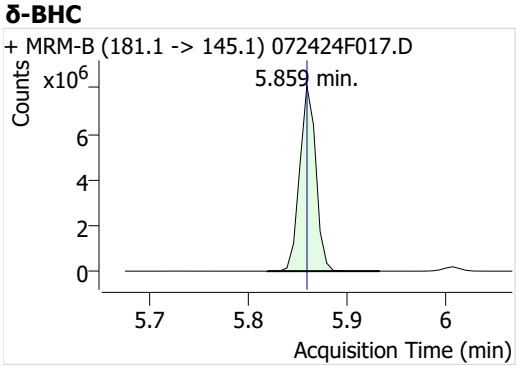
γ-BHC(Lindane)

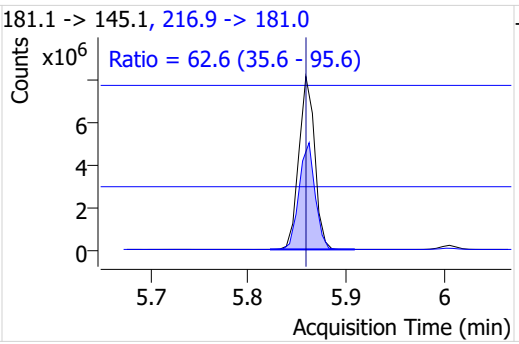


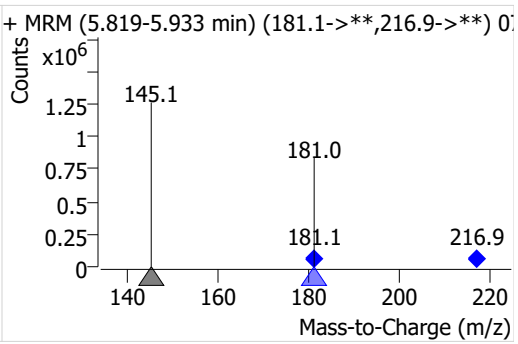




δ-BHC







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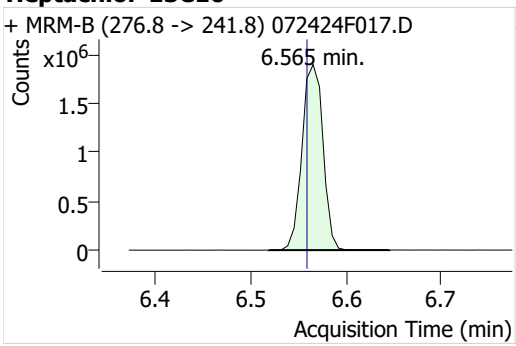
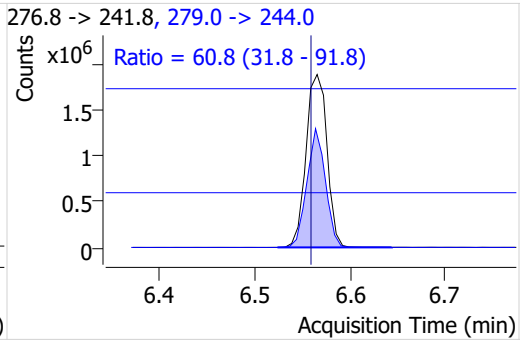
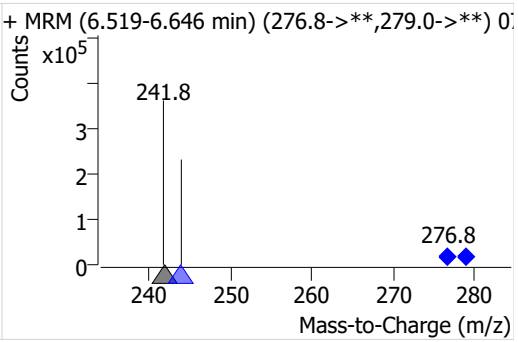
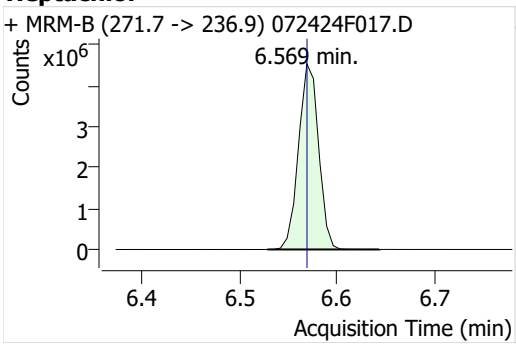
Heptachlor-13C10

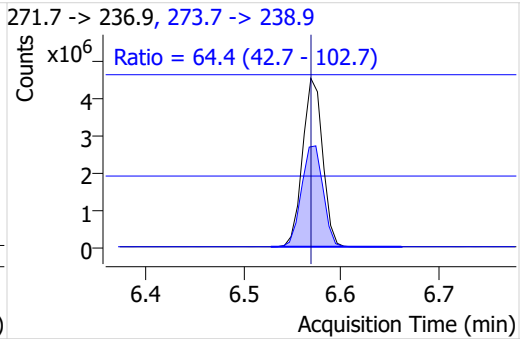


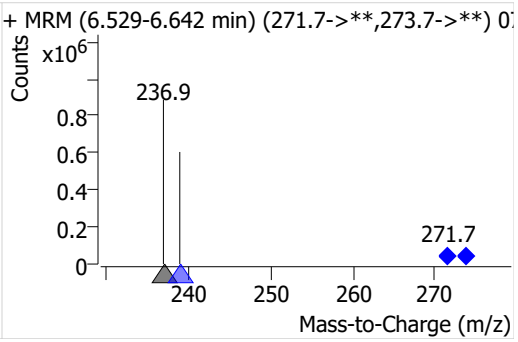




Heptachlor







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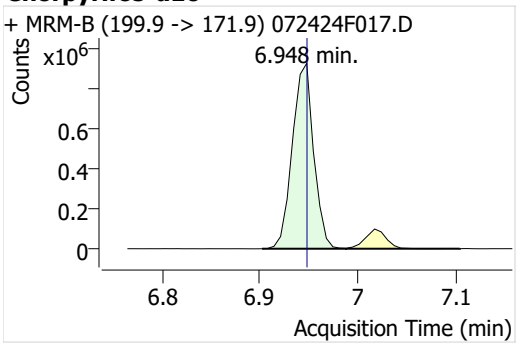
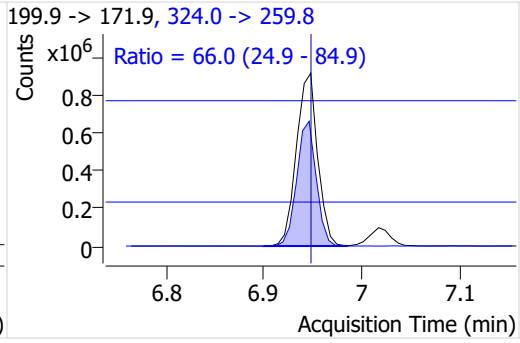
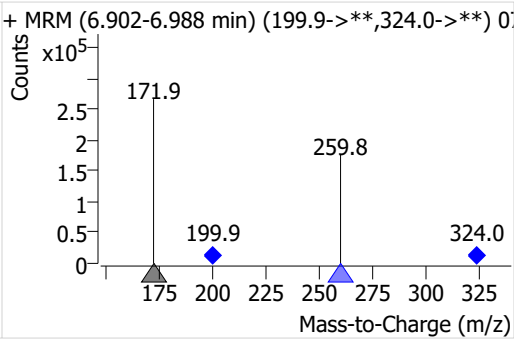
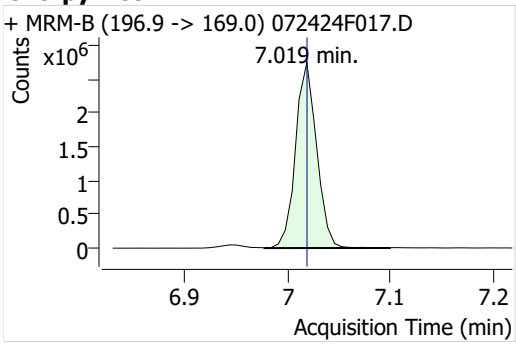
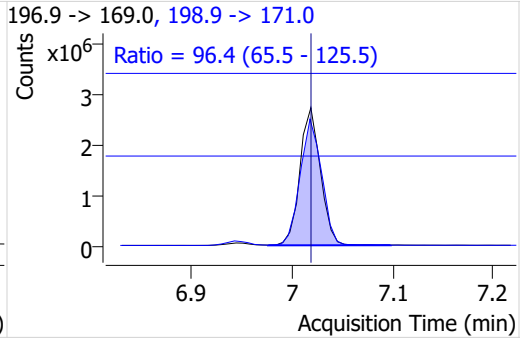


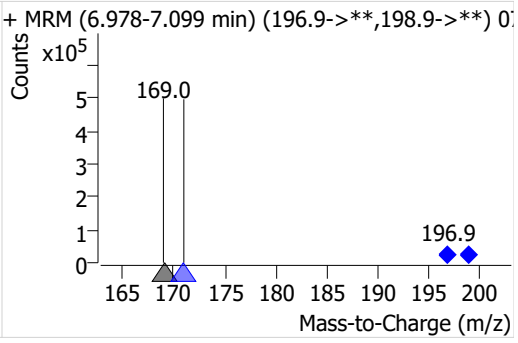




Chorpyrifos







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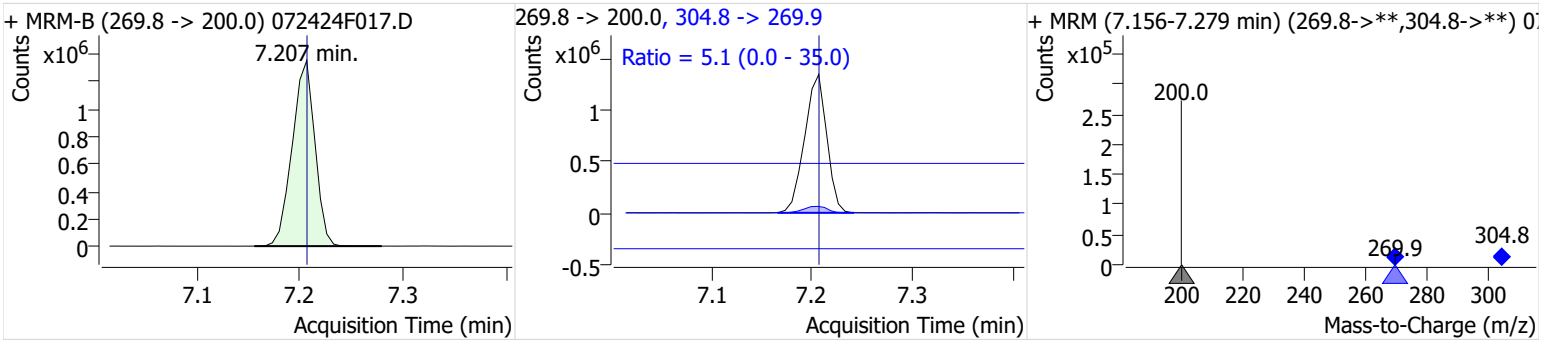
Aldrin-13C



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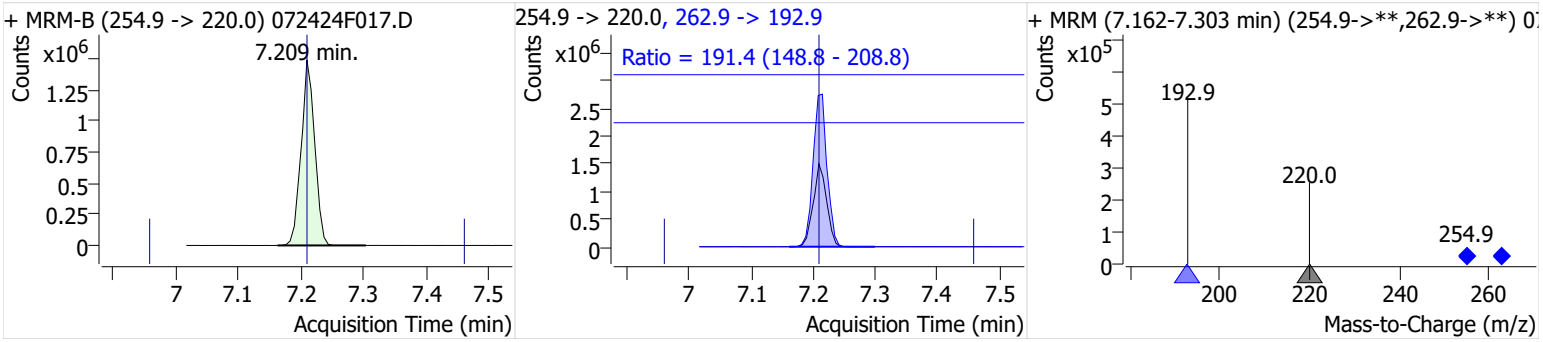
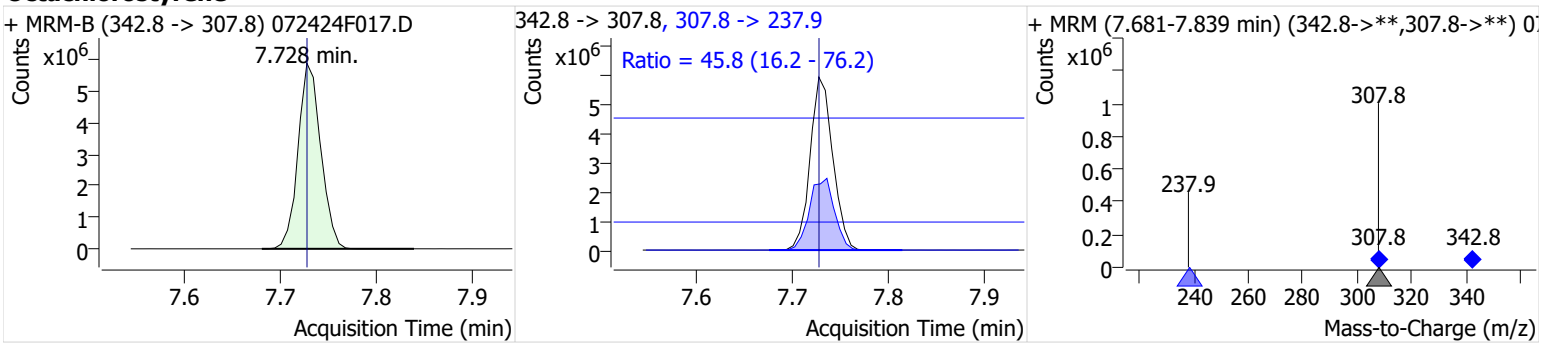


Octachlorostyrene



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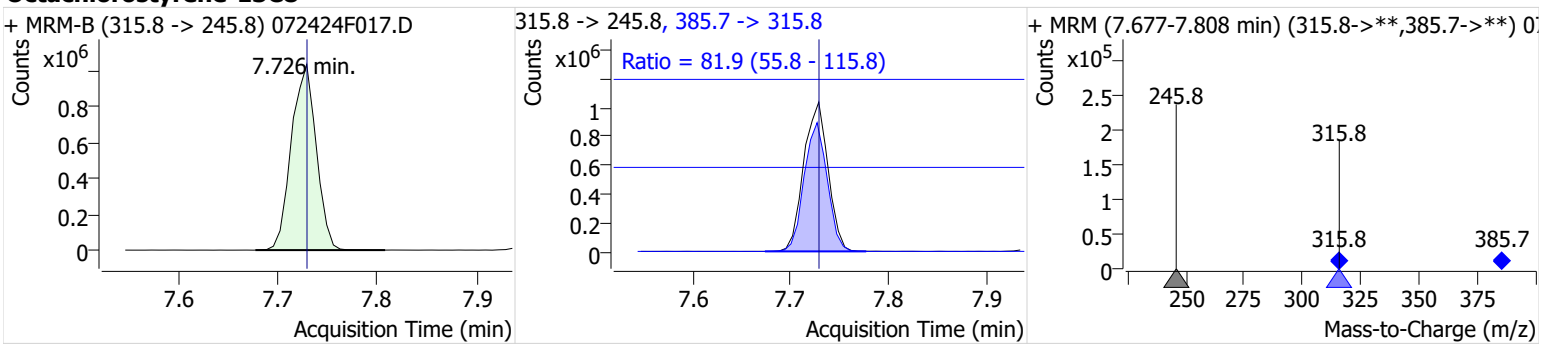

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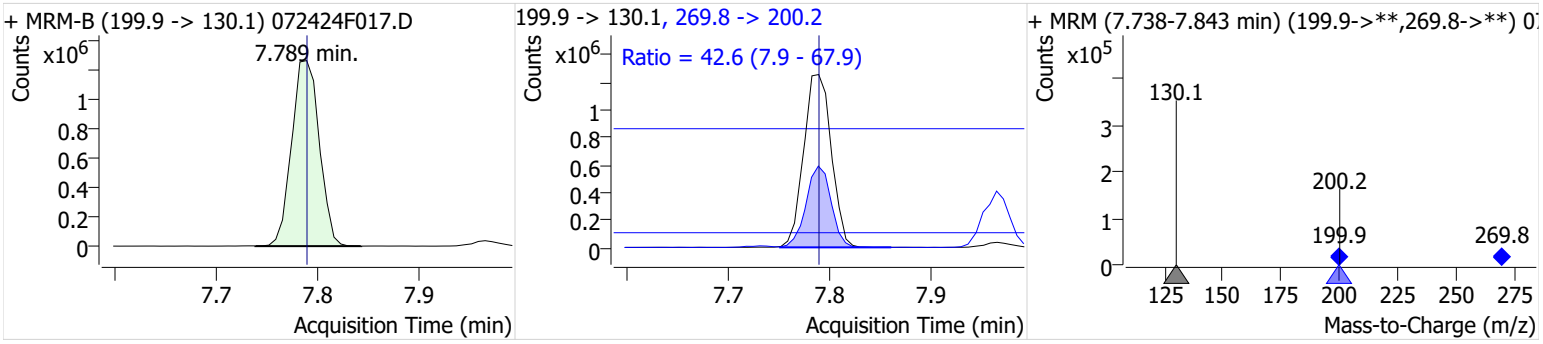
Isodrin-13C12



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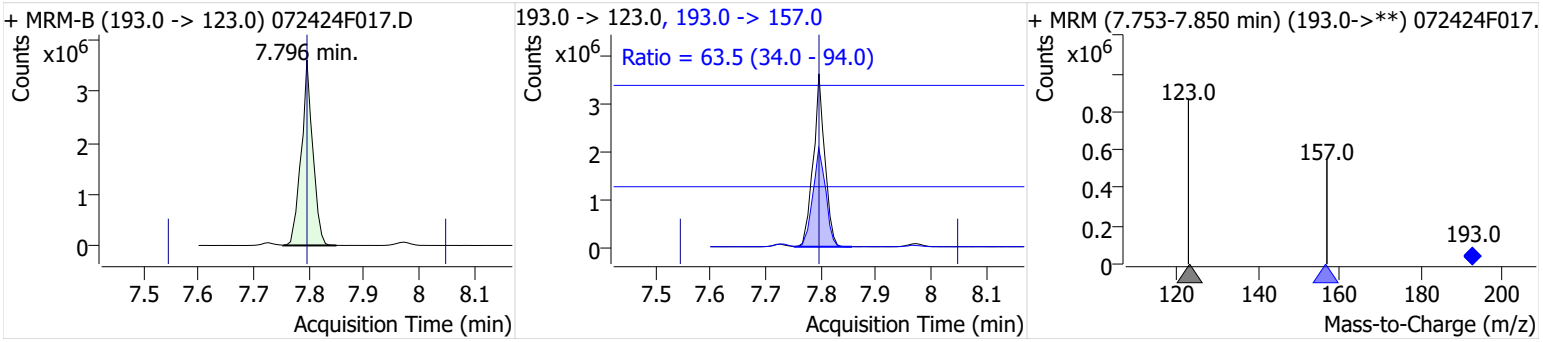
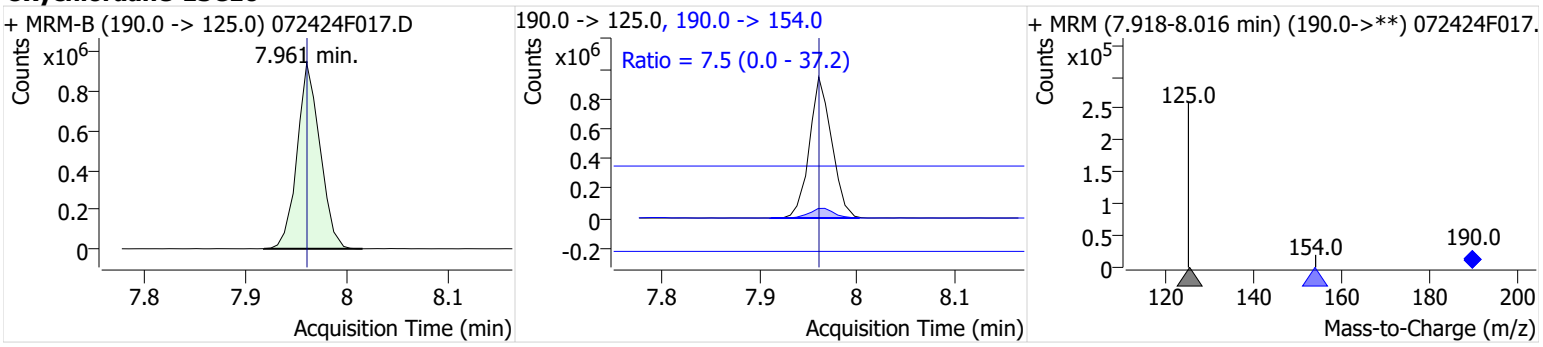
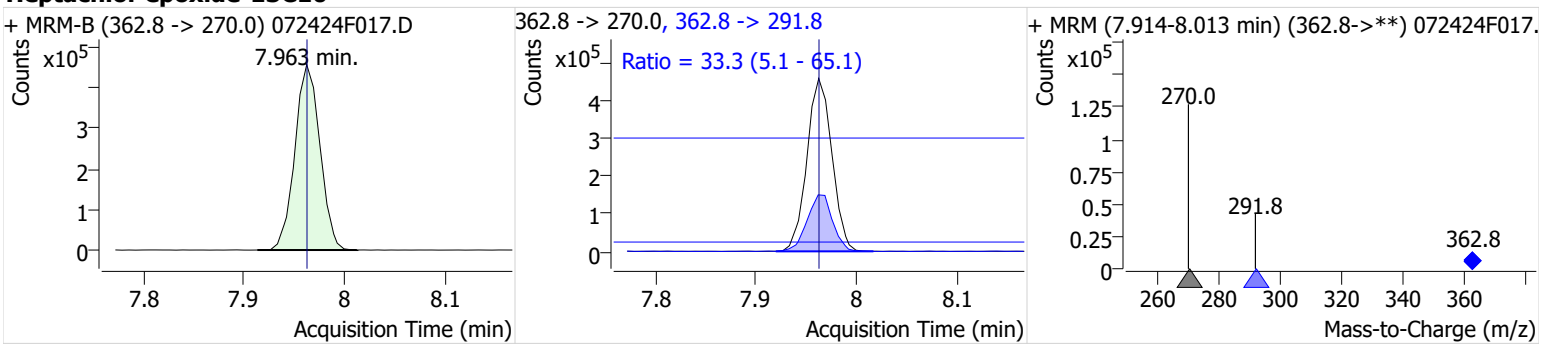


Oxychlordane-13C10



Heptachlor epoxide-13C10



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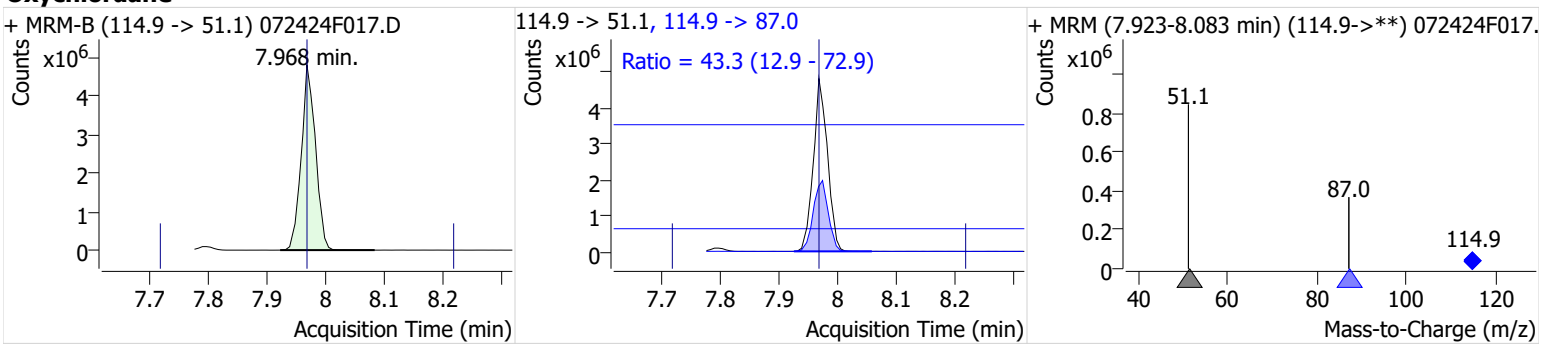
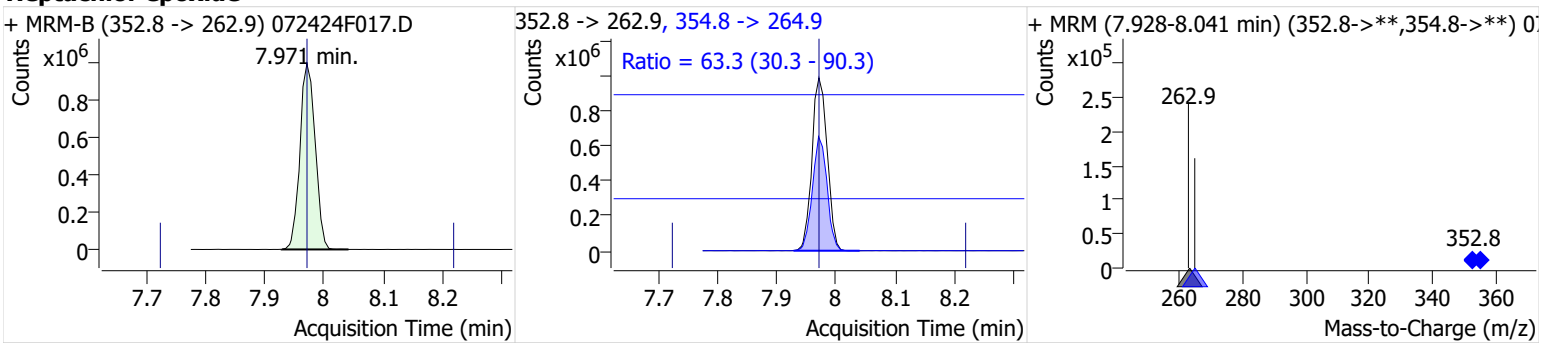
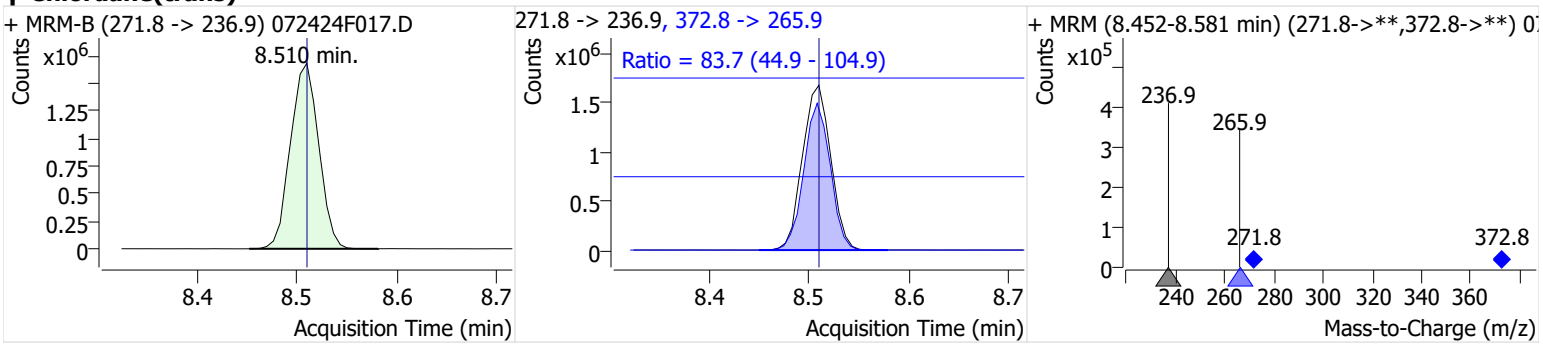
Oxychlordane



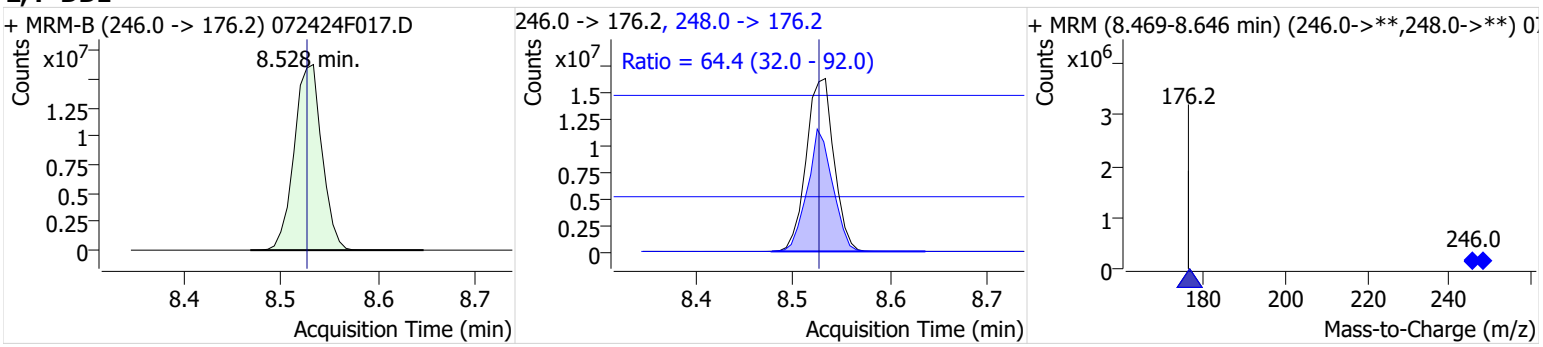
Heptachlor epoxide



γ-Chlordane(trans)



2,4'-DDE



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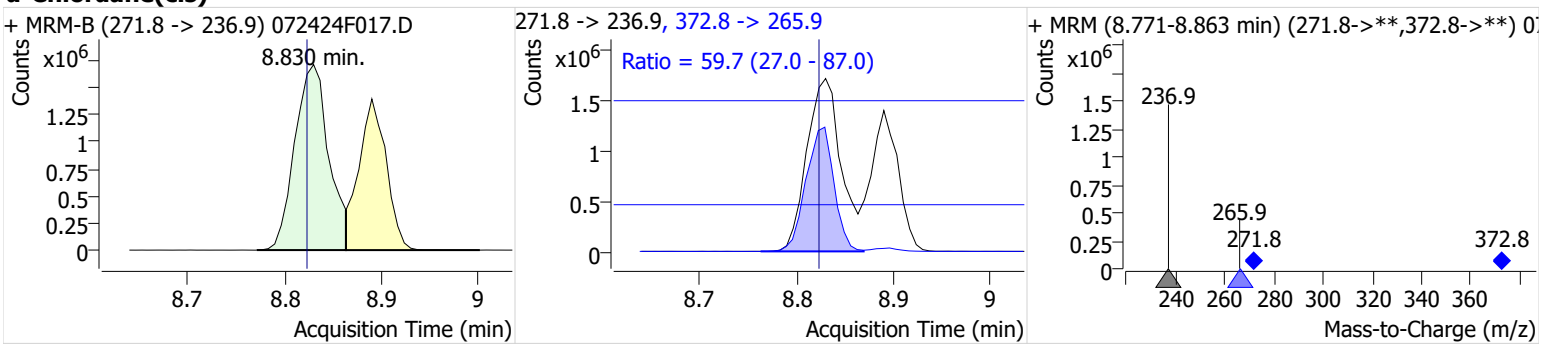
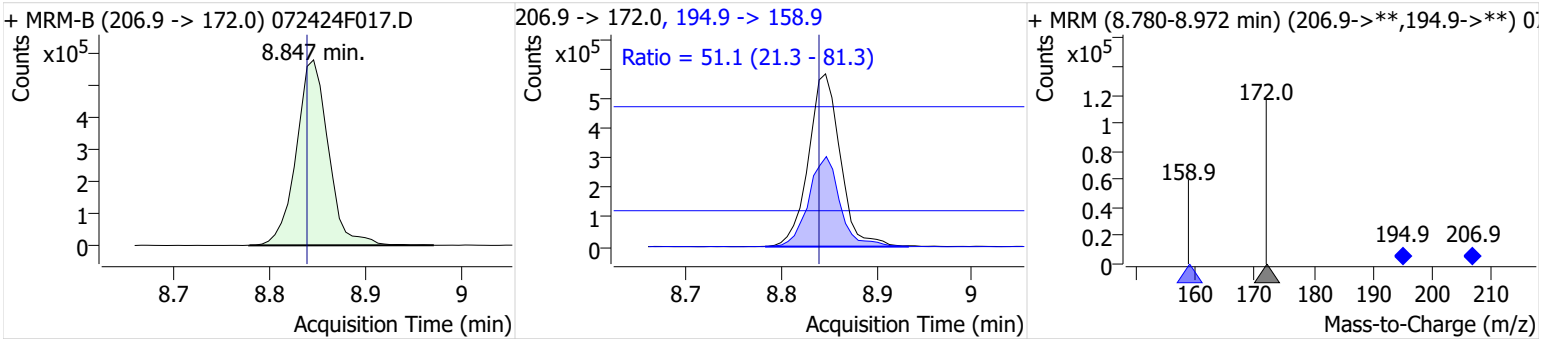
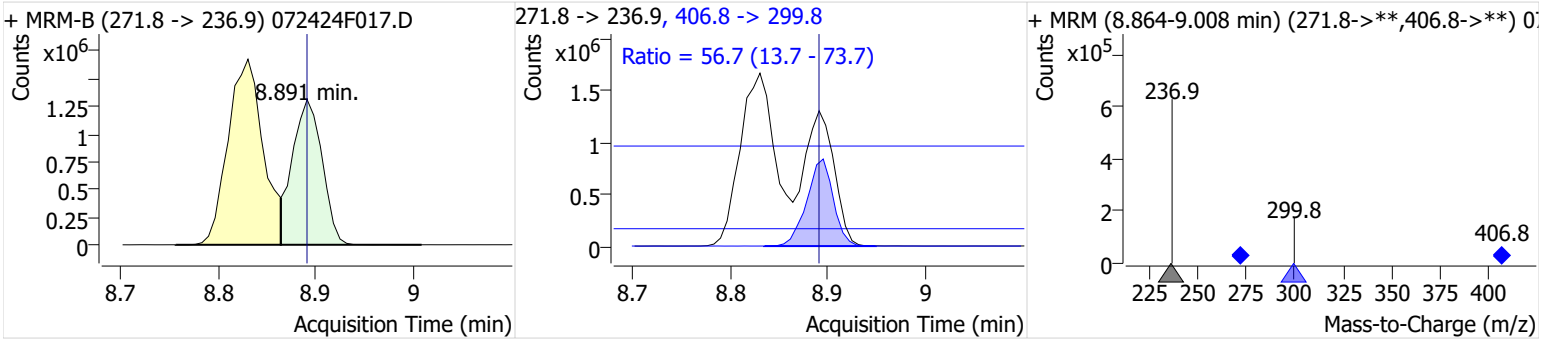
α-Chlordane(cis)



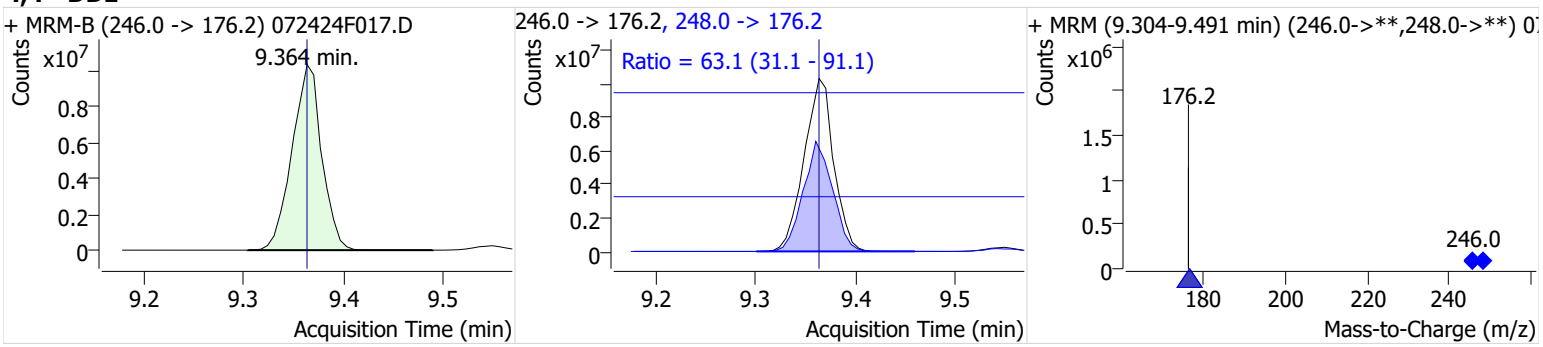
Endosulfan I



trans-Nanochlor



4,4' -DDE



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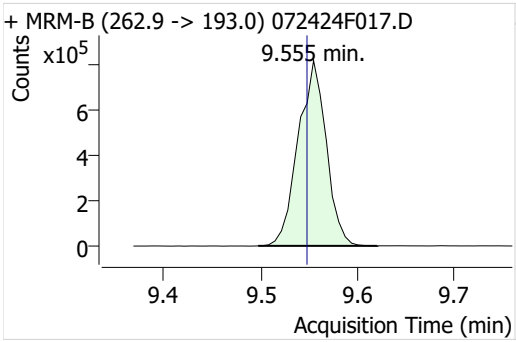
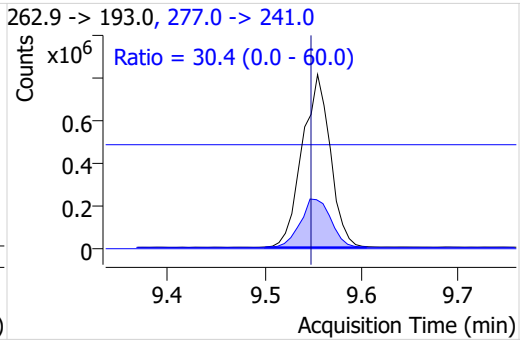
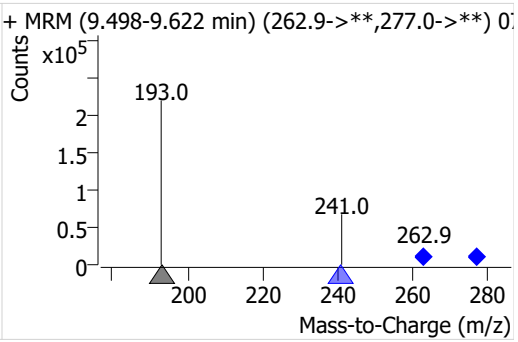
Dieldrin







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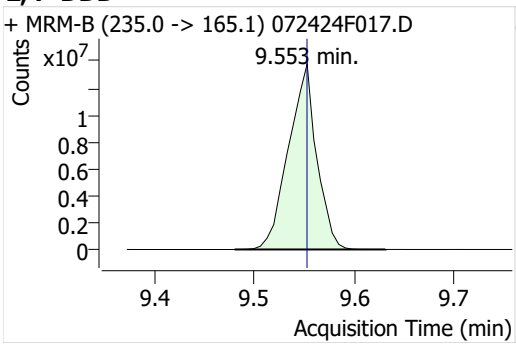
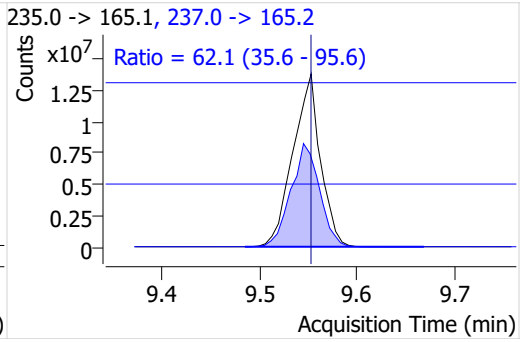
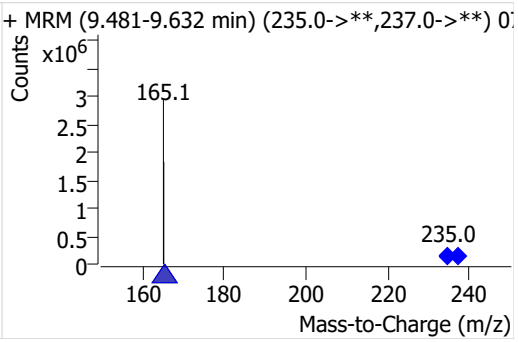
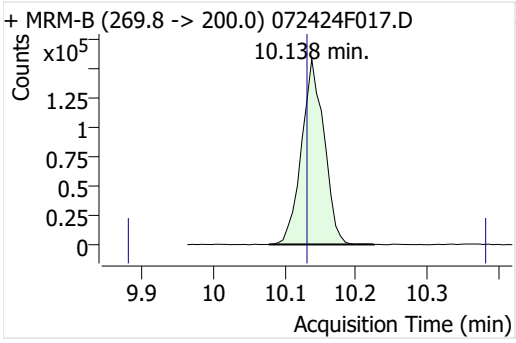
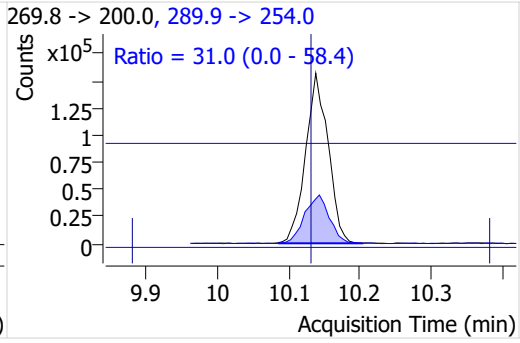


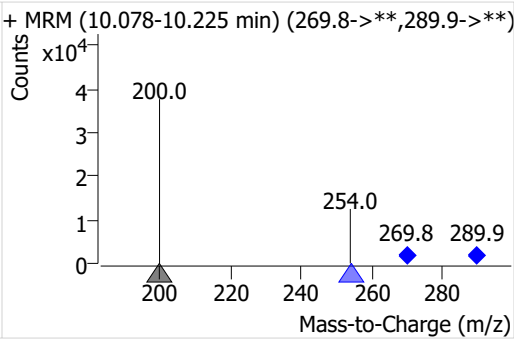




Endrin-13C12







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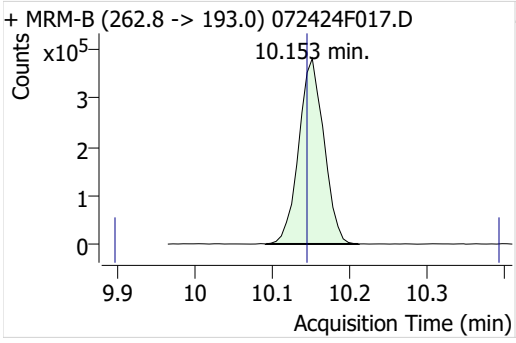

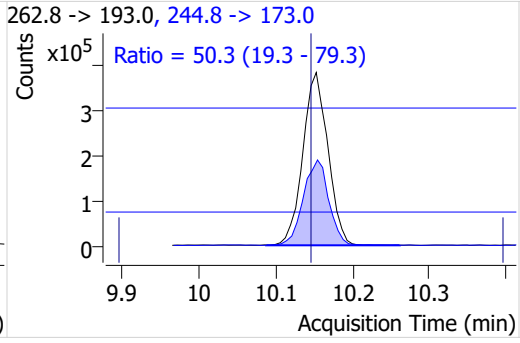

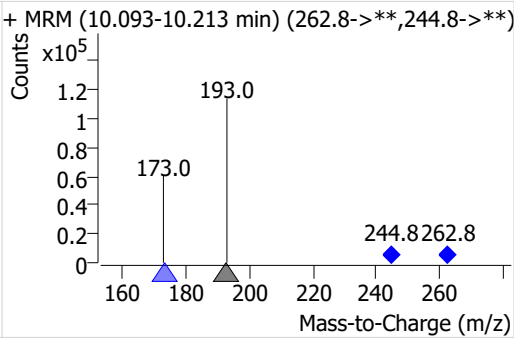

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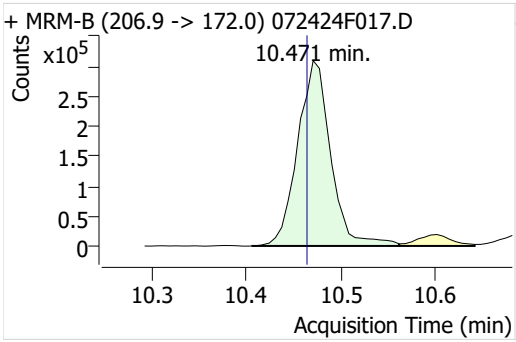
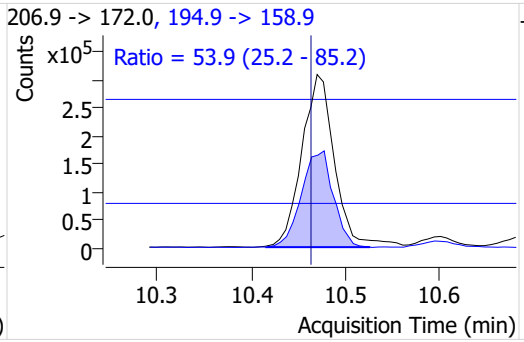
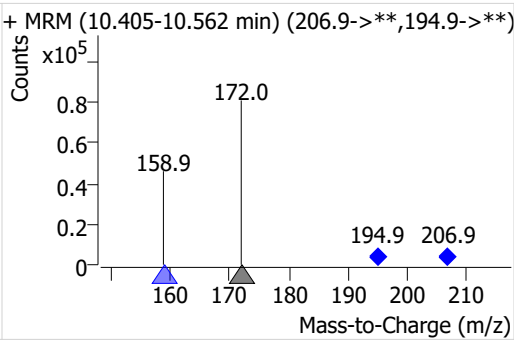
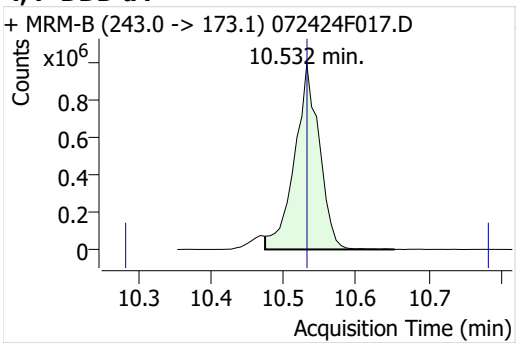
Endosulfan II

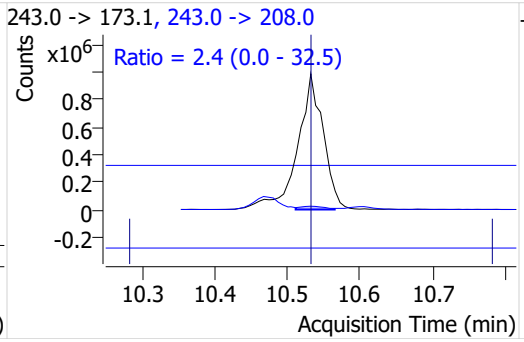


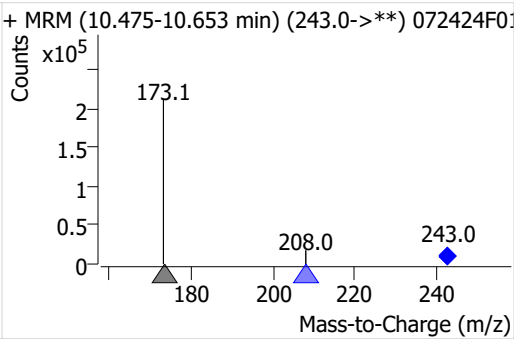




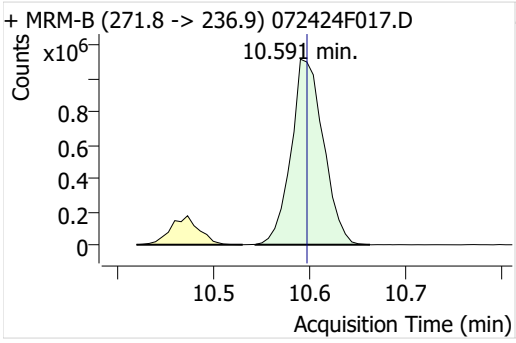
4,4'-DDD d4

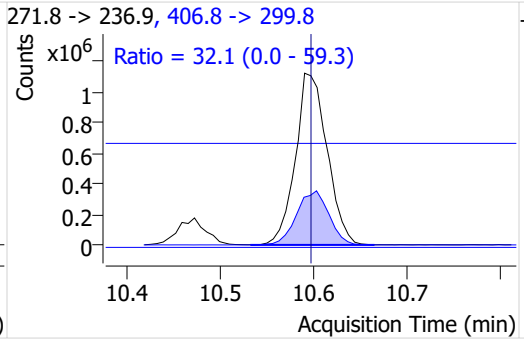


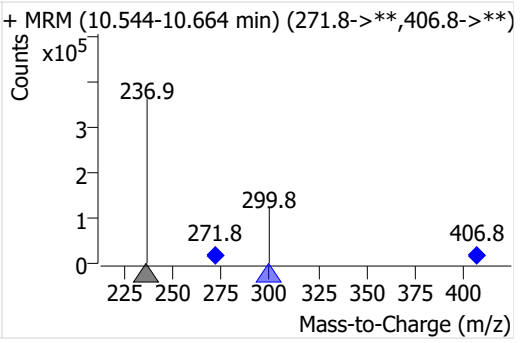




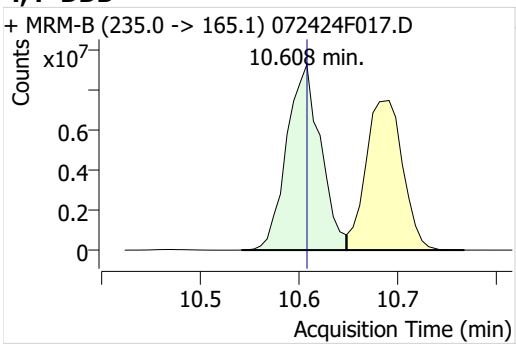
cis-Nonachlor

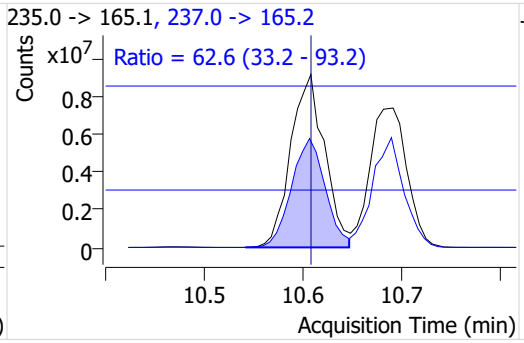


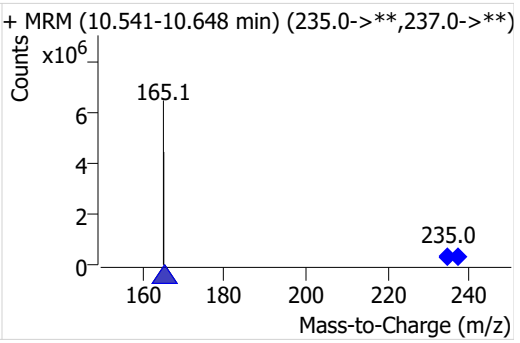




4,4'-DDD







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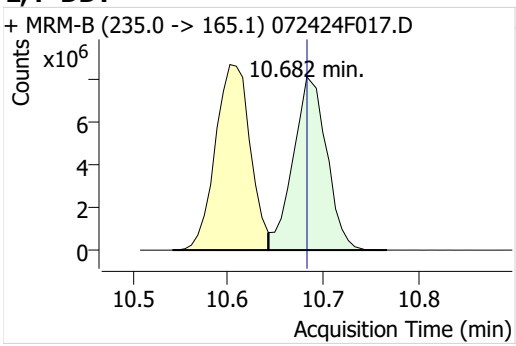
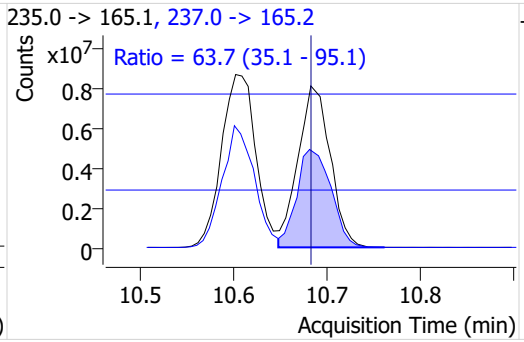
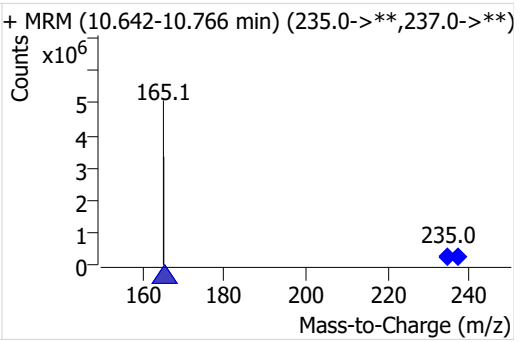
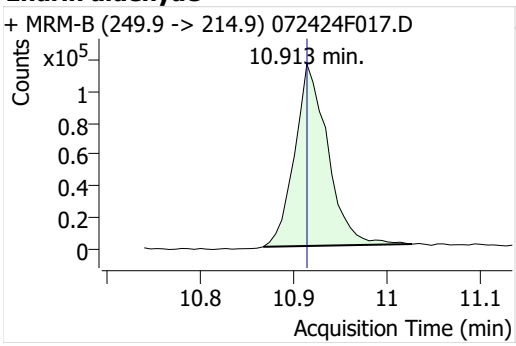
2,4'-DDT

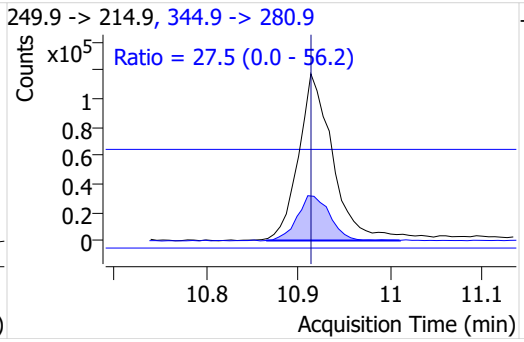


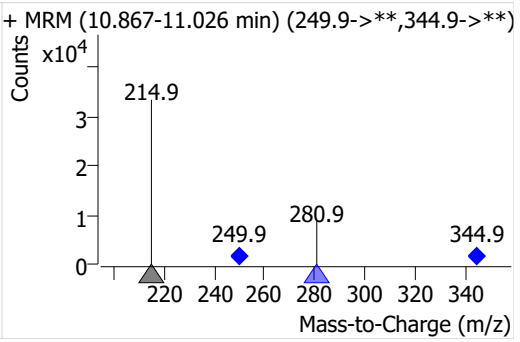




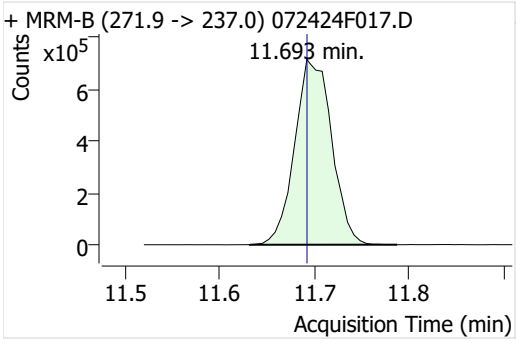
Endrin aldehyde

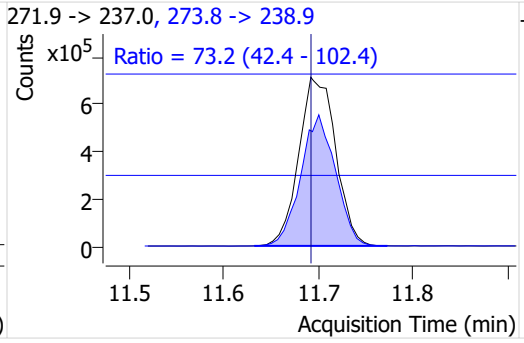


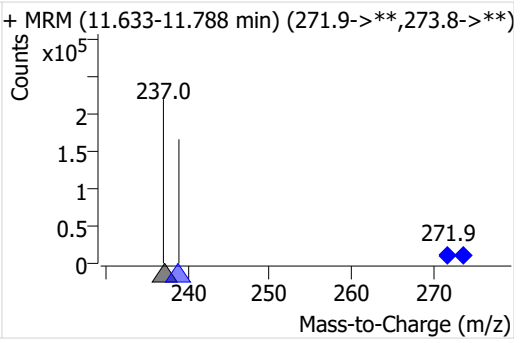




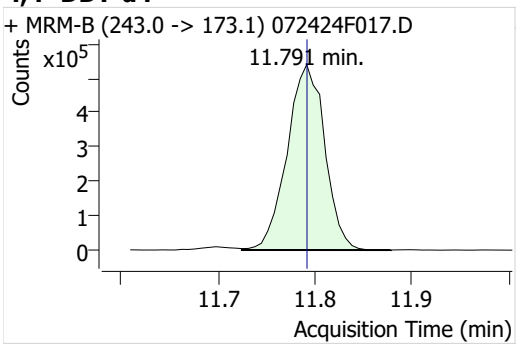
Endosulfan sulfate

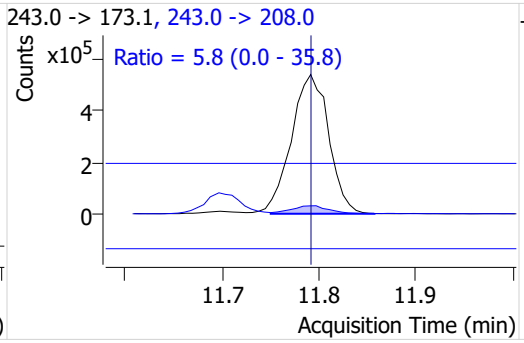


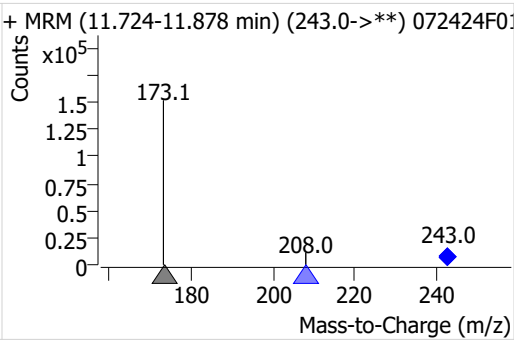




4,4'-DDT-d4







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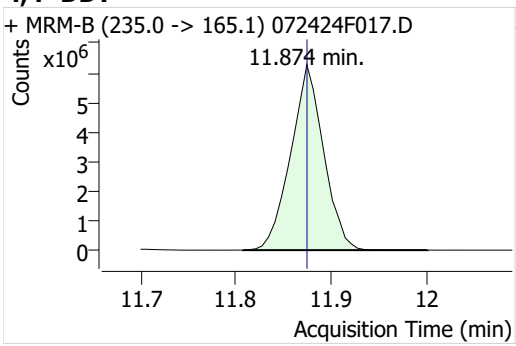
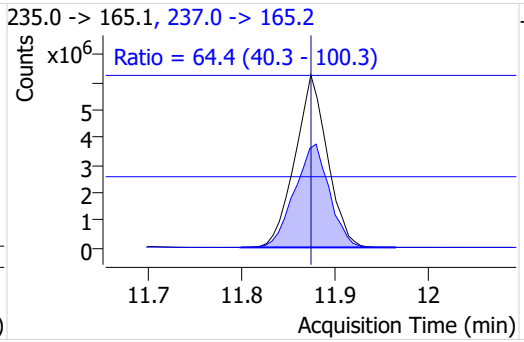
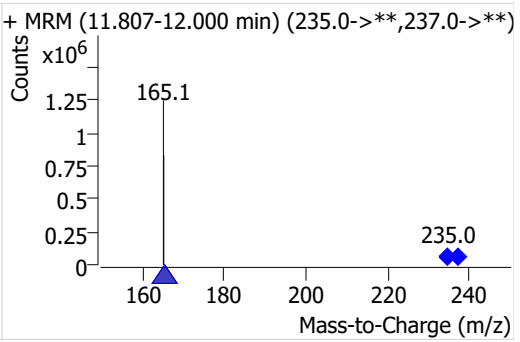
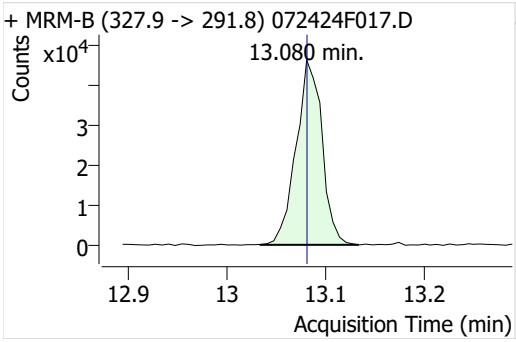
4,4'-DDT

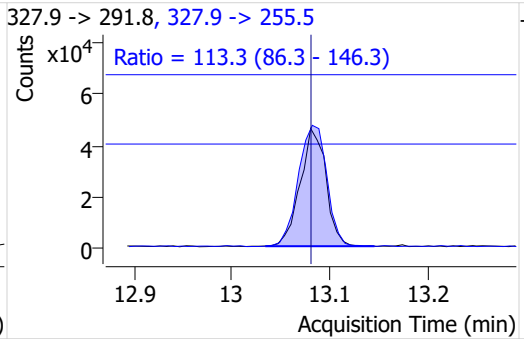


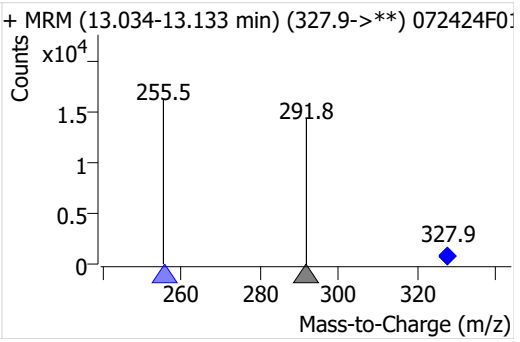




Endrin ketone-13C12







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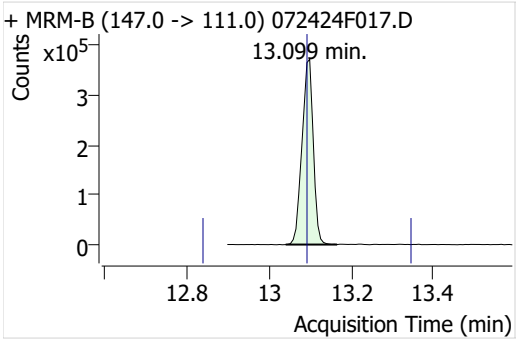
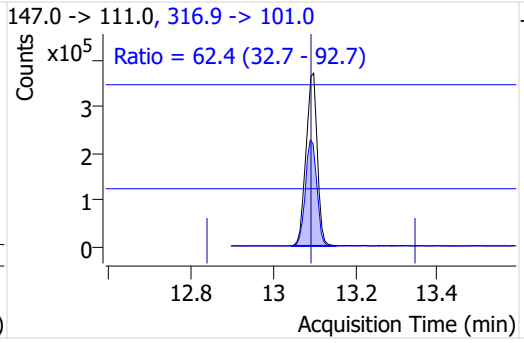
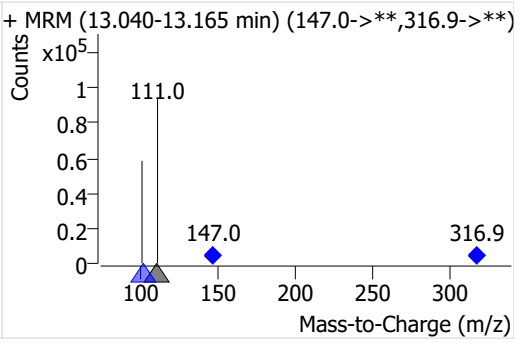
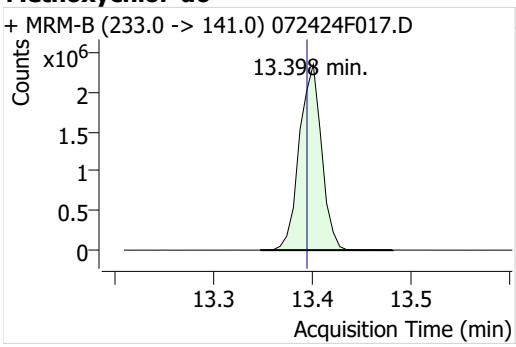
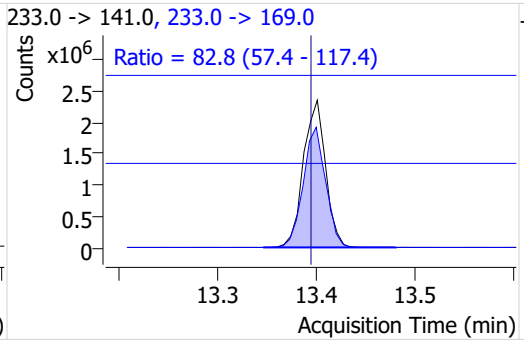


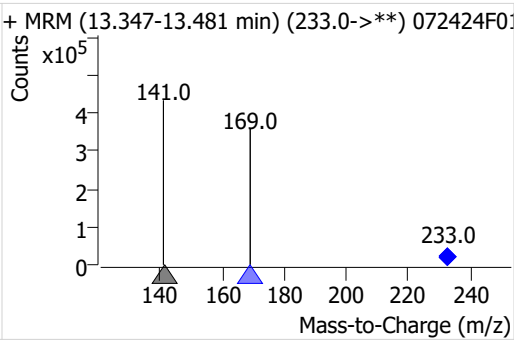




Methoxychlor-d6







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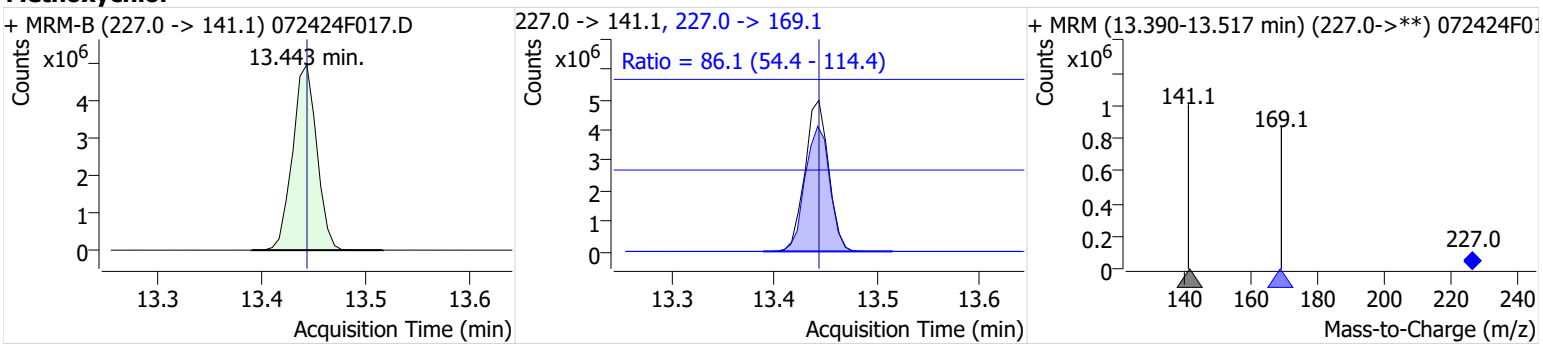
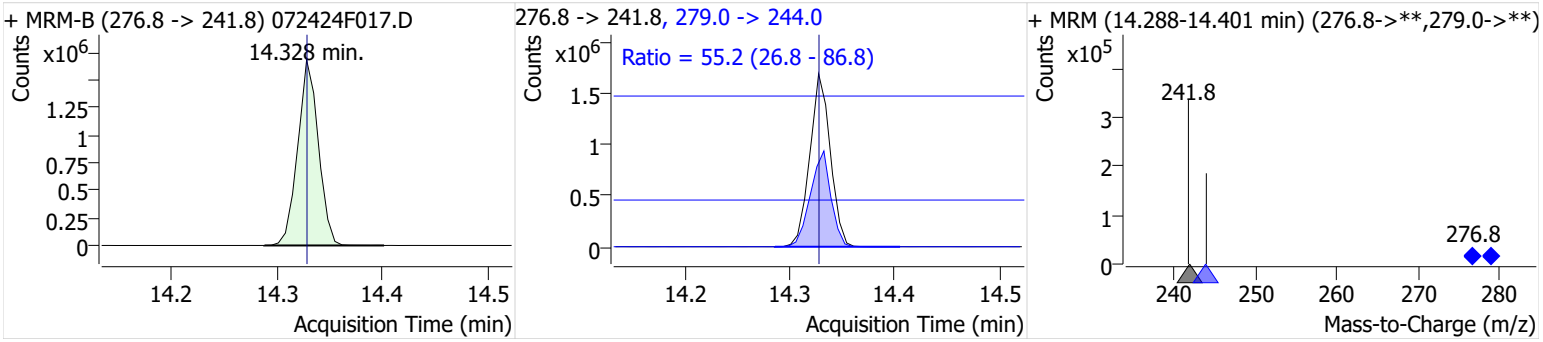
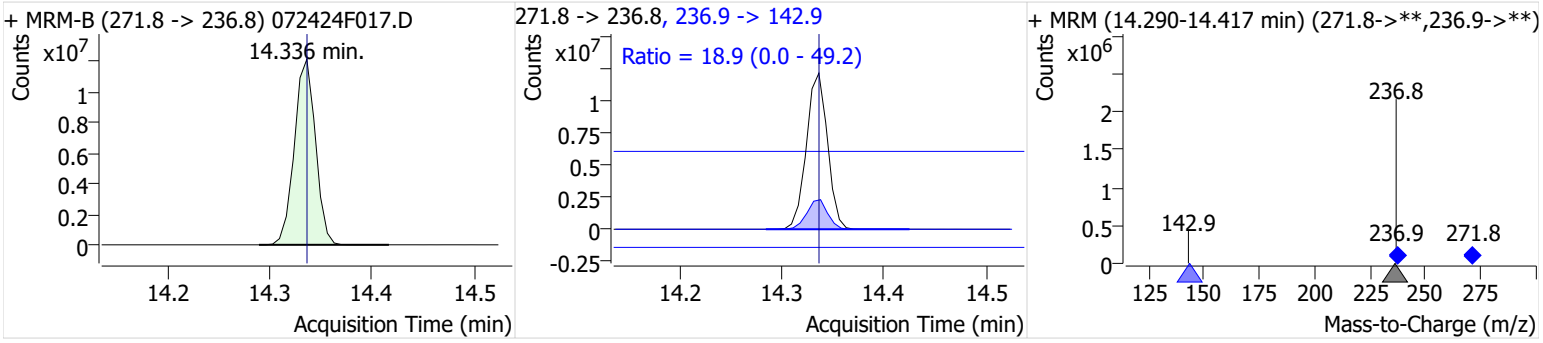
Methoxychlor



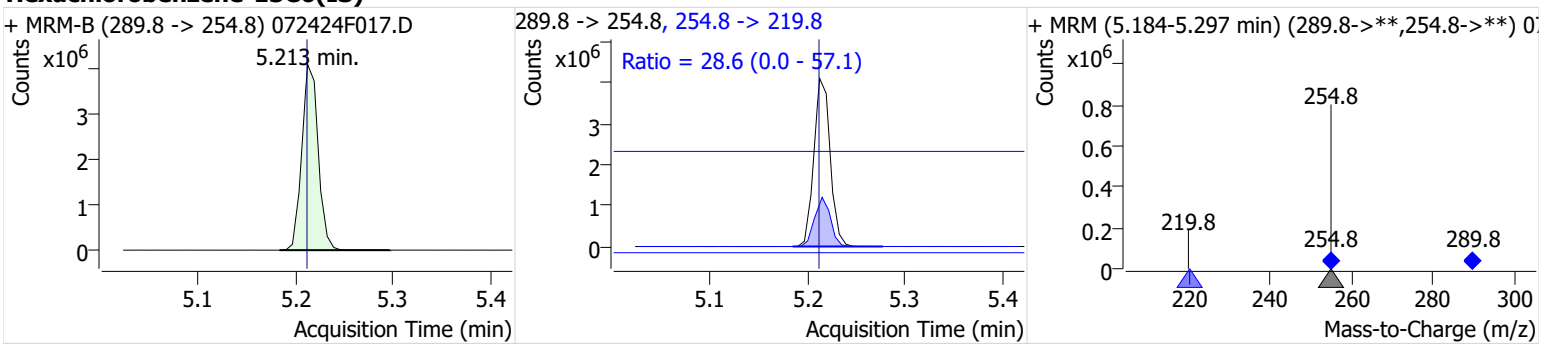
Mirex-13C10



Mirex



Hexachlorobenzene-13C6(IS)



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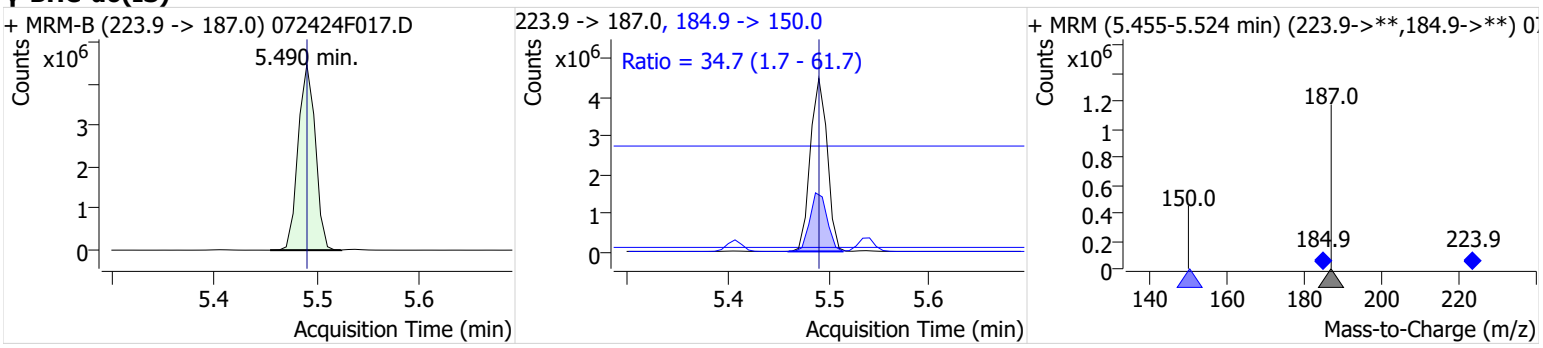
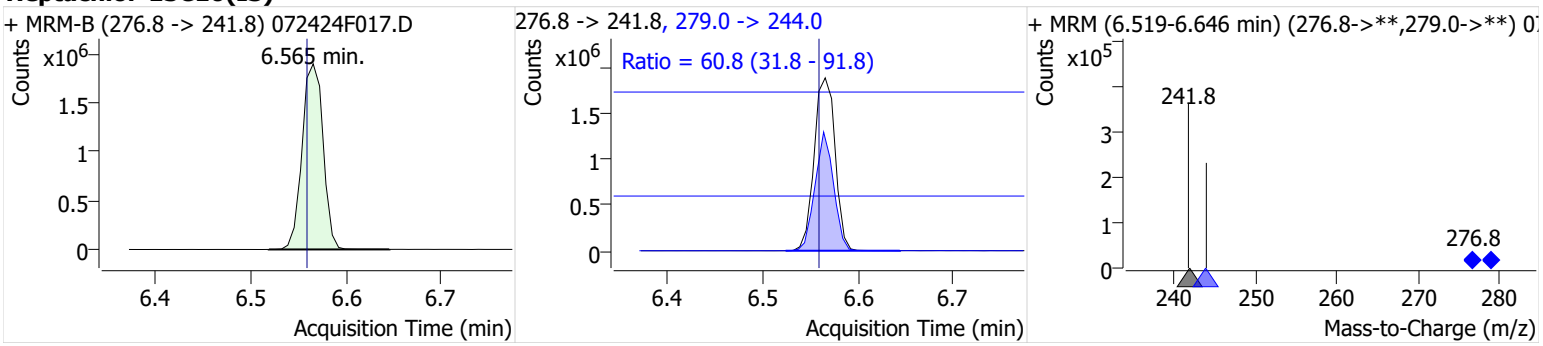
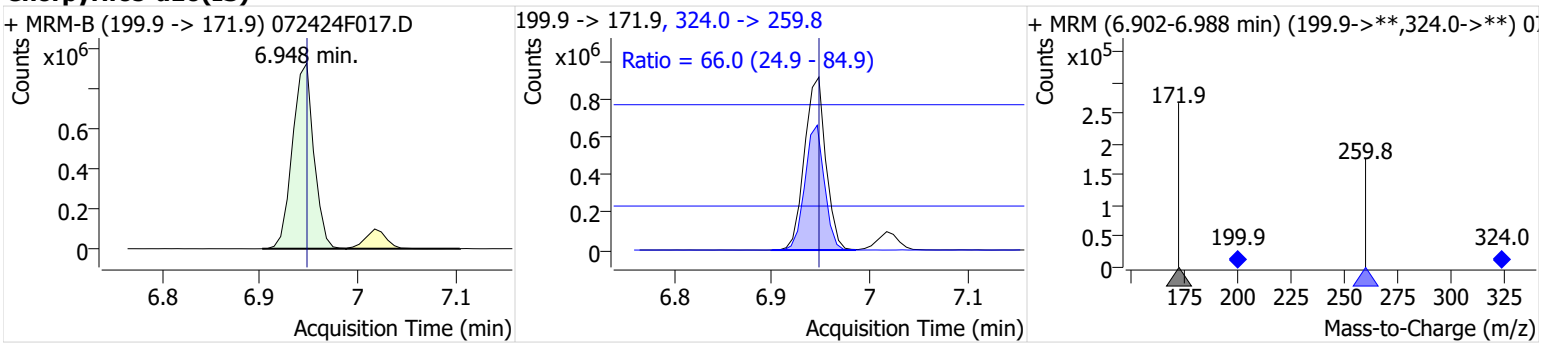
γ-BHC-d6(IS)



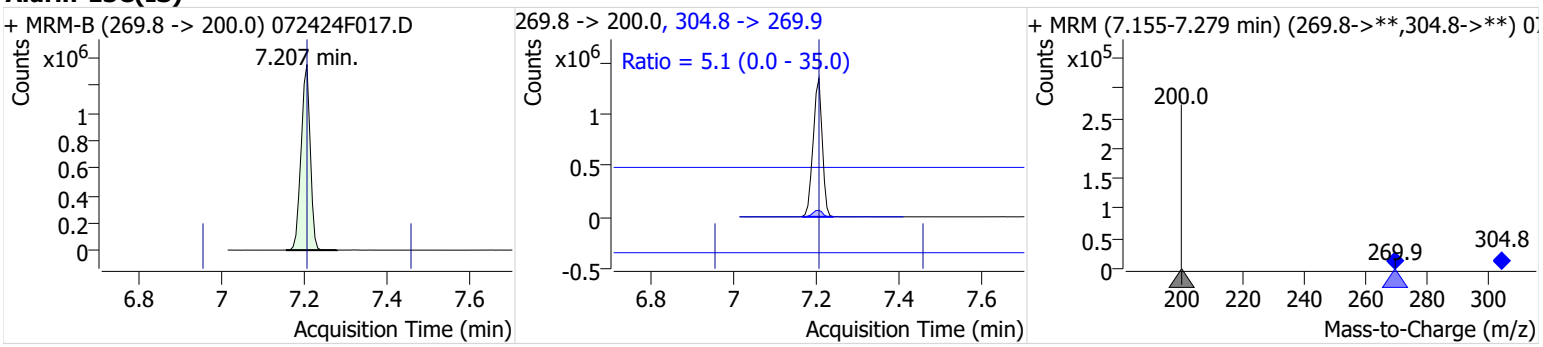
Heptachlor-13C10(IS)



Chorpyrifos-d10(IS)



Aldrin-13C(IS)



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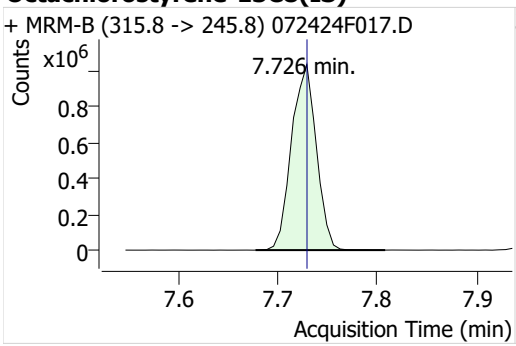
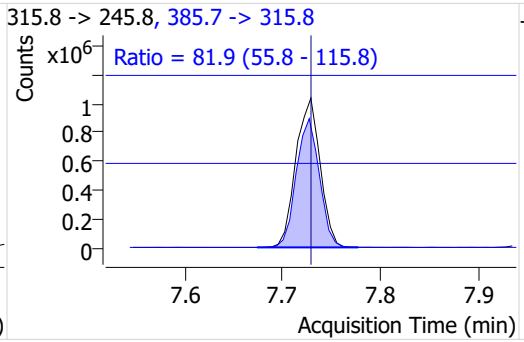
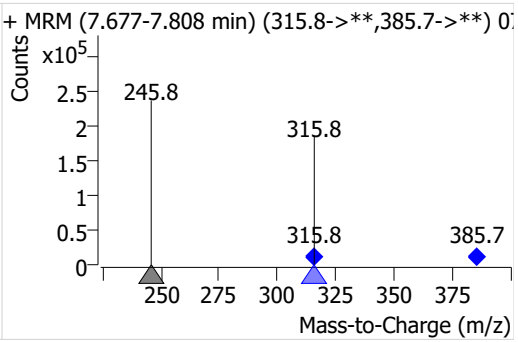
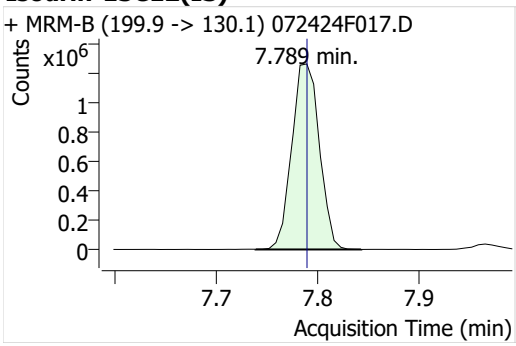
Octachlorostyrene-13C8(IS)

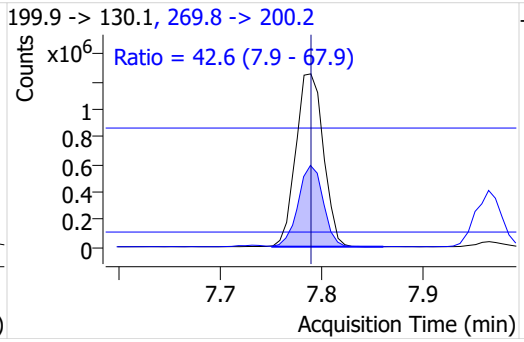


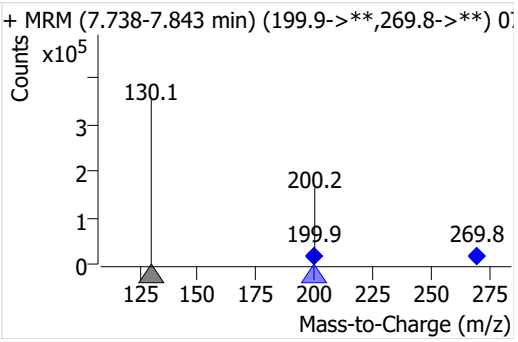




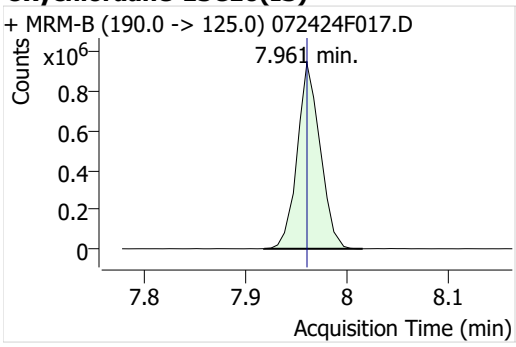
Isodrin-13C12(IS)

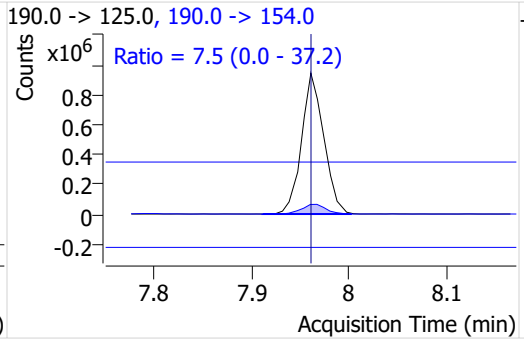


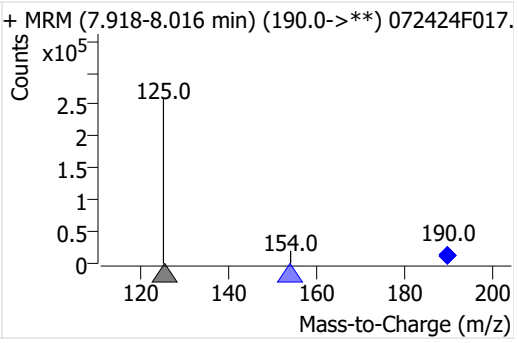




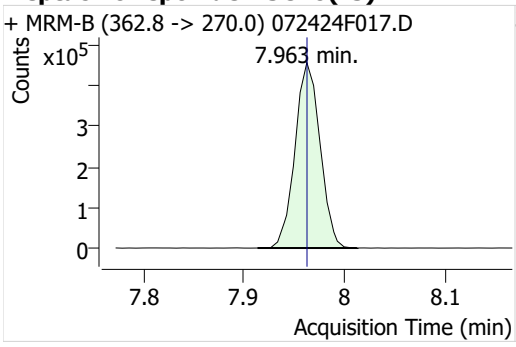
Oxychlordane-13C10(IS)

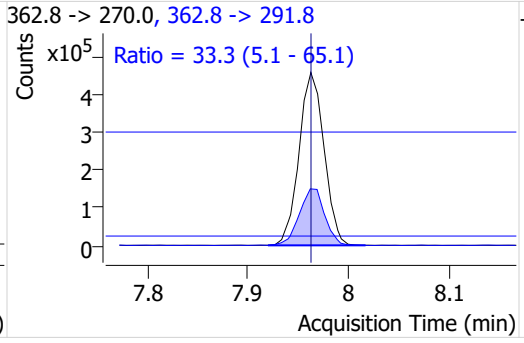


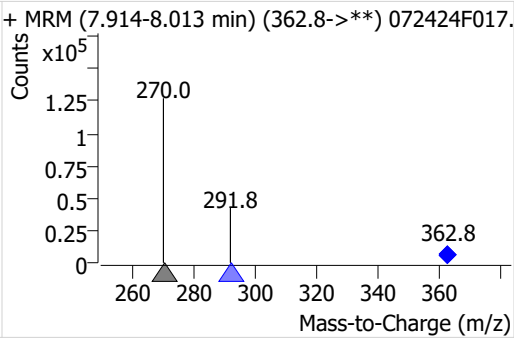




Heptachlor epoxide-13C10(IS)







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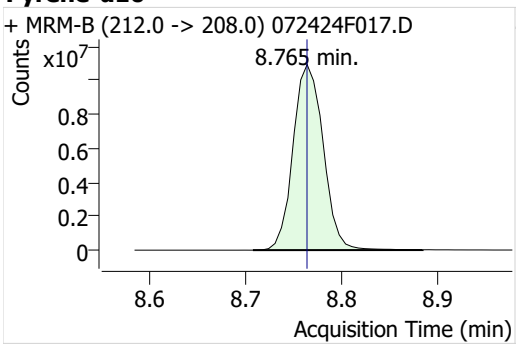
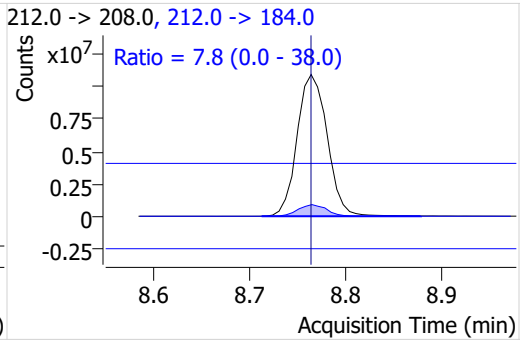
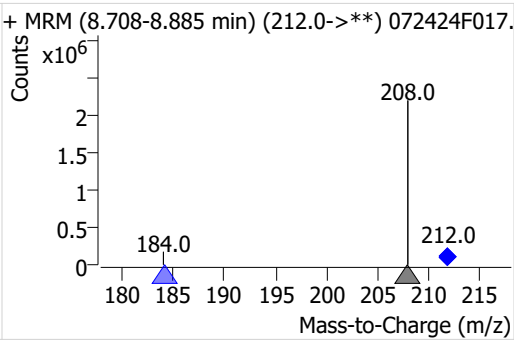
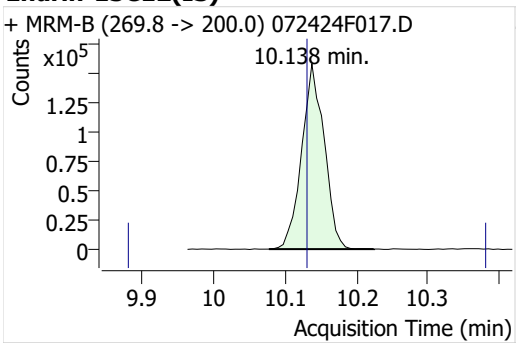
Pyrene-d10

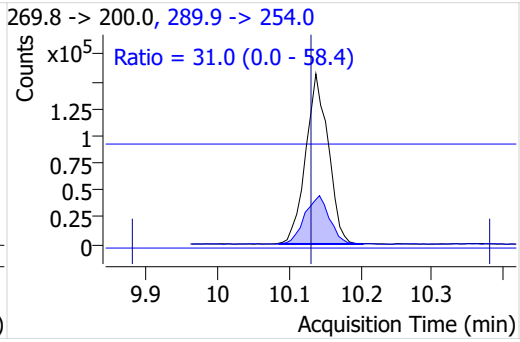


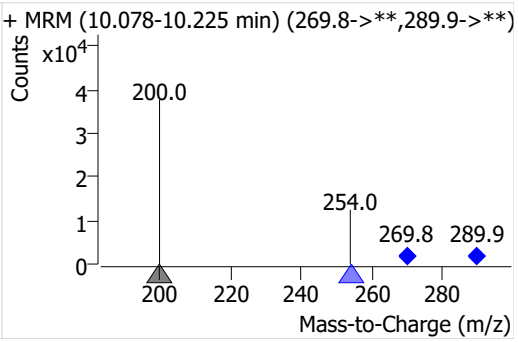




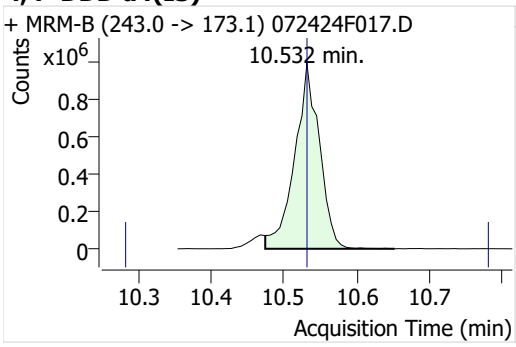
Endrin-13C12(IS)

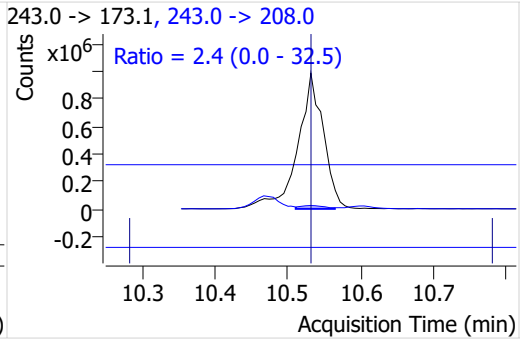


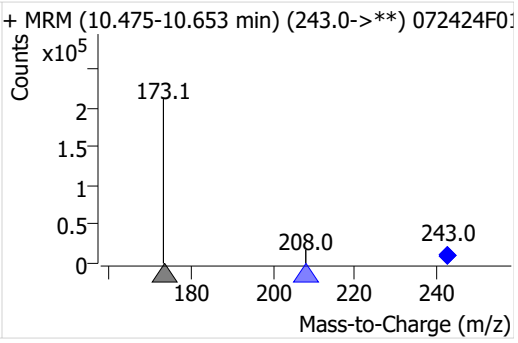




4,4'-DDD d4(IS)







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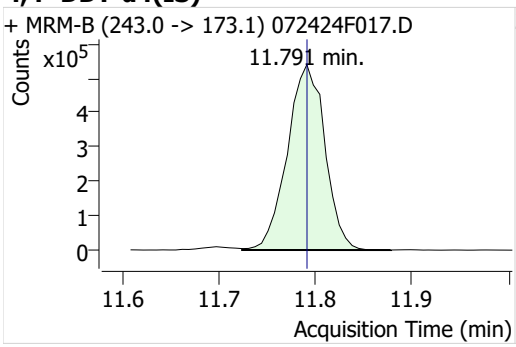

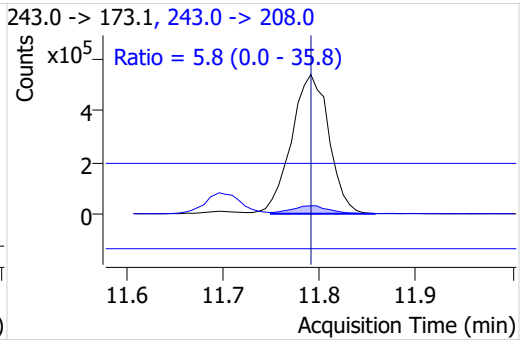

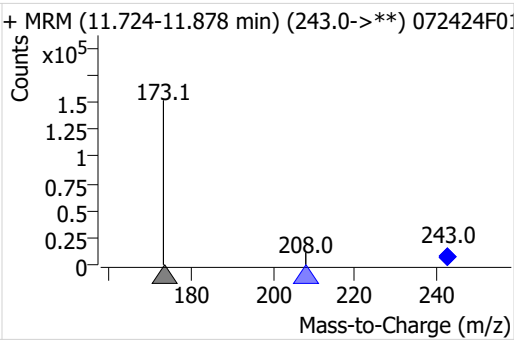

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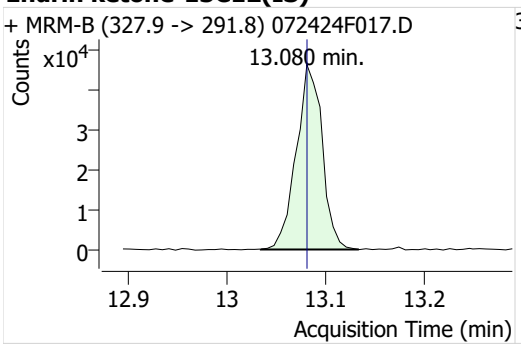
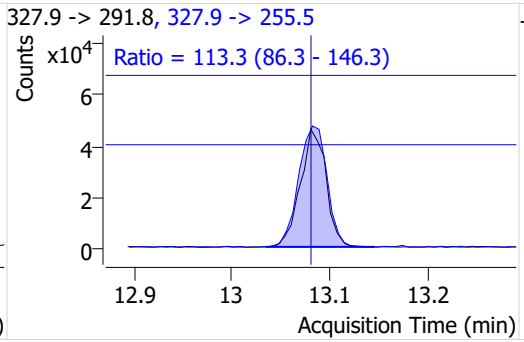
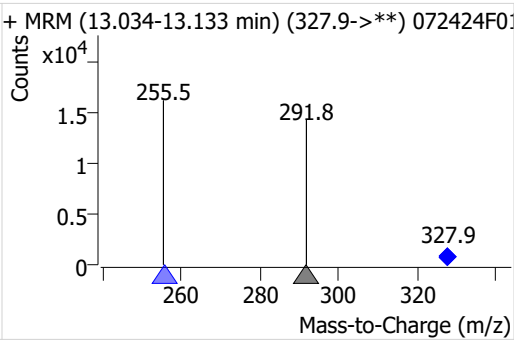
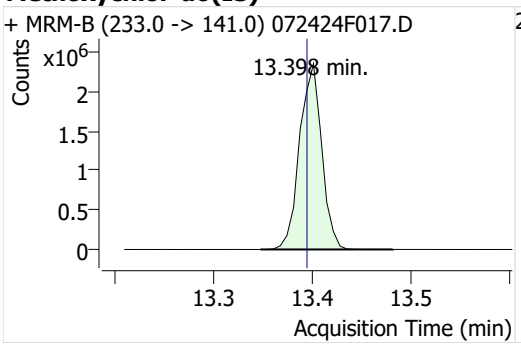
Endrin ketone-13C12(IS)

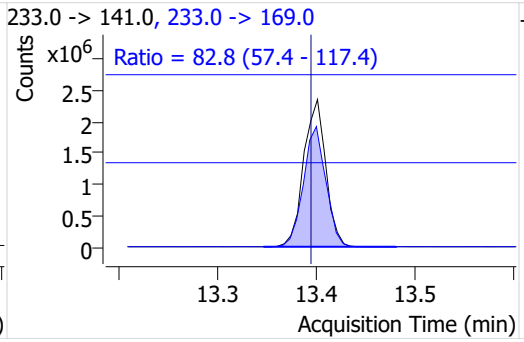


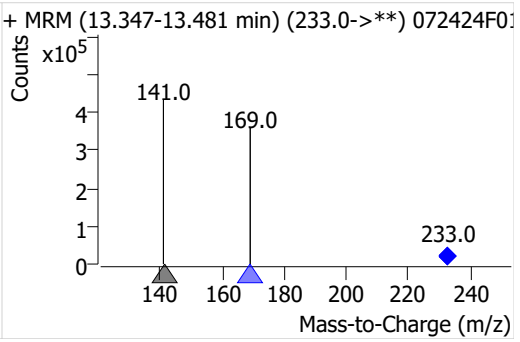




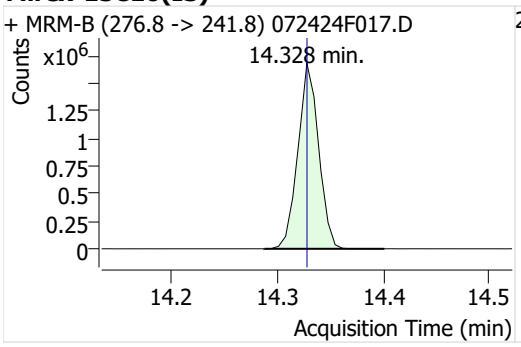
Methoxychlor-d6(IS)

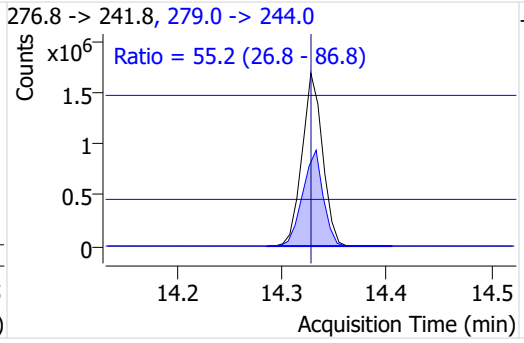


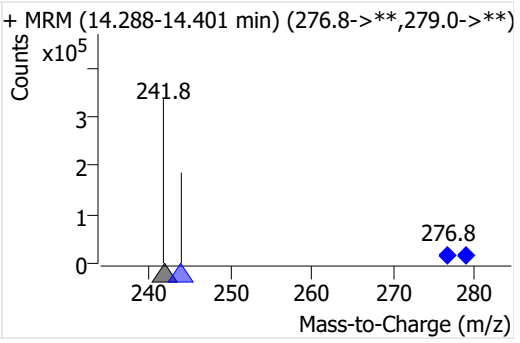




Mirex-13C10(IS)







1st 07/30/24
2nd 08/01/24

MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Acq. Date-Time	7/24/2024 7:35:53 PM	**Acq Operator**	EBruno
Name	OC PEST ICAL 60ppb SVM71-30H	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	7/25/2024 7:23:51 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method		**Vial**	10
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.212	289.8 -> 254.8	4710912	20.0000 ng/ml	0.001
γ-BHC-d6(IS)	5.491	223.9 -> 187.0	4625100	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	6.566	276.8 -> 241.8	2577470	20.0000 ng/ml	0.006
Chorpyrifos-d10(IS)	6.941	199.9 -> 171.9	907022	20.0000 ng/ml	0.008
Aldrin-13C(IS)	7.202	269.8 -> 200.0	1724816	20.0000 ng/ml	0.003
Octachlorostyrene-13C8(IS)	7.722	315.8 -> 245.8	1799911	20.0000 ng/ml	0.004
Isodrin-13C12(IS)	7.789	199.9 -> 130.1	2128197	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	7.961	190.0 -> 125.0	1369597	20.0000 ng/ml	0.003
Heptachlor epoxide-13C10(IS)	7.963	362.8 -> 270.0	645338	20.0000 ng/ml	0.003
Pyrene-d10	8.771	212.0 -> 208.0	14132294	100.0000 ng/ml	0.004
Endrin-13C12(IS)	10.144	269.8 -> 200.0	263044	20.0000 ng/ml	0.009
4,4'-DDD d4(IS)	10.532	243.0 -> 173.1	1532652	5.0000 ng/ml	0.000
4,4'-DDT-d4(IS)	11.791	243.0 -> 173.1	934197	5.0000 ng/ml	0.001
Endrin ketone-13C12(IS)	13.087	327.9 -> 291.8	54122	20.0000 ng/ml	0.004
Methoxychlor-d6(IS)	13.394	233.0 -> 141.0	1814079	20.0000 ng/ml	0.003
Mirex-13C10(IS)	14.328	276.8 -> 241.8	1639109	5.0000 ng/ml	0.001

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	4710912	26.399 ng/ml	
		Spiked Amount =	20.0	Recovery =	*132.0 %*
γ-BHC-d6	5.491	223.9 -> 187.0	4625100	25.576 ng/ml	
		Spiked Amount =	20.0	Recovery =	*127.9 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	2577470	24.810 ng/ml	
		Spiked Amount =	20.0	Recovery =	*124.0 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	907022	20.371 ng/ml	
		Spiked Amount =	20.0	Recovery =	*101.9 %*
Aldrin-13C	7.207	269.8 -> 200.0	1723047	21.920 ng/ml	
		Spiked Amount =	20.0	Recovery =	*109.6 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	1799911	25.406 ng/ml	
		Spiked Amount =	20.0	Recovery =	*127.0 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2128197	25.262 ng/ml	
		Spiked Amount =	20.0	Recovery =	*126.3 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1369597	27.417 ng/ml	
		Spiked Amount =	20.0	Recovery =	*137.1 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	645338	22.823 ng/ml	
		Spiked Amount =	20.0	Recovery =	*114.1 %*
Endrin-13C12	10.131	269.8 -> 200.0	263044	21.832 ng/ml	
		Spiked Amount =	20.0	Recovery =	*109.2 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	1532652	5.122 ng/ml	
		Spiked Amount =	5.0	Recovery =	*102.4 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	934197	5.070 ng/ml	
		Spiked Amount =	5.0	Recovery =	*101.4 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	54122	21.281 ng/ml	
		Spiked Amount =	20.0	Recovery =	*106.4 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	1814079	17.751 ng/ml	
		Spiked Amount =	20.0	Recovery =	*88.8 %*

MassHunter Quantitative Analysis Sample Report

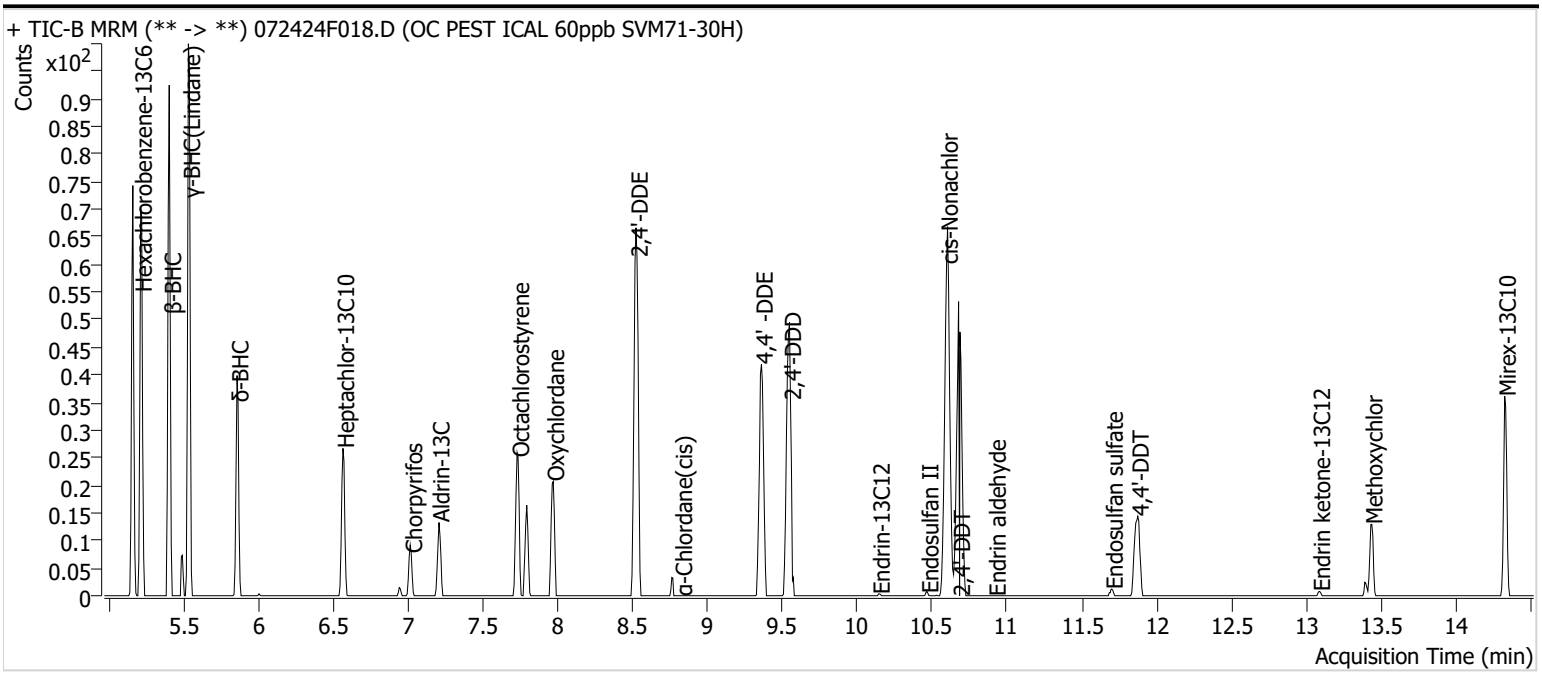
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	1639109	6.031 ng/ml
		Spiked Amount = 5.0		Recovery = *120.6 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.165	181.1 -> 145.1	21587964	66.207 ng/ml	95
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.214	283.8 -> 213.9	19748920	54.936 ng/ml	99
β-BHC	γ-BHC-d6(IS)	5.408	181.1 -> 145.1	14283234	65.404 ng/ml	89
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	18026515	64.643 ng/ml	93
δ-BHC	γ-BHC-d6(IS)	5.859	181.1 -> 145.1	14106394	69.493 ng/ml	92
Heptachlor	Heptachlor-13C10(IS)	6.569	271.7 -> 236.9	8646927	62.347 ng/ml	91
Chorpyrifos	Chorpyrifos-d10(IS)	7.019	196.9 -> 169.0	3616803	58.588 ng/ml	97
Aldrin	Aldrin-13C(IS)	7.209	254.9 -> 220.0	2767811	60.519 ng/ml	84
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.735	342.8 -> 307.8	13022144	58.875 ng/ml	95
Isodrin	Isodrin-13C12(IS)	7.796	193.0 -> 123.0	7238212	64.762 ng/ml	98
Oxychlordane	Oxychlordane-13C10(IS)	7.968	114.9 -> 51.1	9971735	56.342 ng/ml	97
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.971	352.8 -> 262.9	2337487	68.398 ng/ml	99
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.504	271.8 -> 236.9	3958846	55.012 ng/ml	93
2,4'-DDE	4,4'-DDD d4(IS)	8.527	246.0 -> 176.2	39744129	72.552 ng/ml	97
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.823	271.8 -> 236.9	4826510	55.451 ng/ml	97
Endosulfan I	Endrin-13C12(IS)	8.847	206.9 -> 172.0	1651860	69.868 ng/ml	100
trans-Nanochlor	Oxychlordane-13C10(IS)	8.884	271.8 -> 236.9	3402958	54.959 ng/ml	91
4,4' -DDE	4,4'-DDD d4(IS)	9.363	246.0 -> 176.2	27471430	70.397 ng/ml	94
Dieldrin	Endrin-13C12(IS)	9.555	262.9 -> 193.0	2160699	73.695 ng/ml	96
2,4'-DDD	4,4'-DDD d4(IS)	9.553	235.0 -> 165.1	29590413	67.241 ng/ml	98
Endrin	Endrin-13C12(IS)	10.159	262.8 -> 193.0	996690	61.318 ng/ml	100
Endosulfan II	Endrin-13C12(IS)	10.471	206.9 -> 172.0	787049	62.683 ng/ml	98
cis-Nonachlor	Oxychlordane-13C10(IS)	10.598	271.8 -> 236.9	2733046	51.344 ng/ml	95
4,4'-DDD	4,4'-DDD d4(IS)	10.608	235.0 -> 165.1	20162153	62.138 ng/ml	96
2,4'-DDT	4,4'-DDT-d4(IS)	10.682	235.0 -> 165.1	17713282	64.761 ng/ml	100
Endrin aldehyde	Endrin-13C12(IS)	10.920	249.9 -> 214.9	274139	59.037 ng/ml	98
Endosulfan sulfate	Endrin-13C12(IS)	11.702	271.9 -> 237.0	1994376	60.407 ng/ml	95
4,4'-DDT	4,4'-DDT-d4(IS)	11.874	235.0 -> 165.1	12654089	59.849 ng/ml	95
Endrin ketone	Endrin ketone-13C12(IS)	13.092	147.0 -> 111.0	748952	61.652 ng/ml	97
Methoxychlor	Methoxychlor-d6(IS)	13.437	227.0 -> 141.1	6184696	65.435 ng/ml	98
Mirex	Mirex-13C10(IS)	14.330	271.8 -> 236.8	18405405	54.496 ng/ml	98

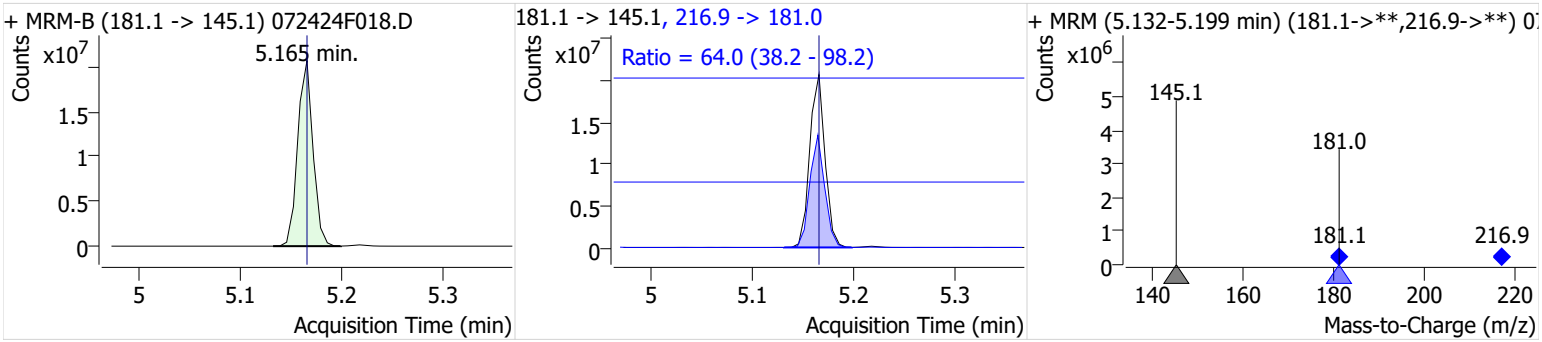
(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram

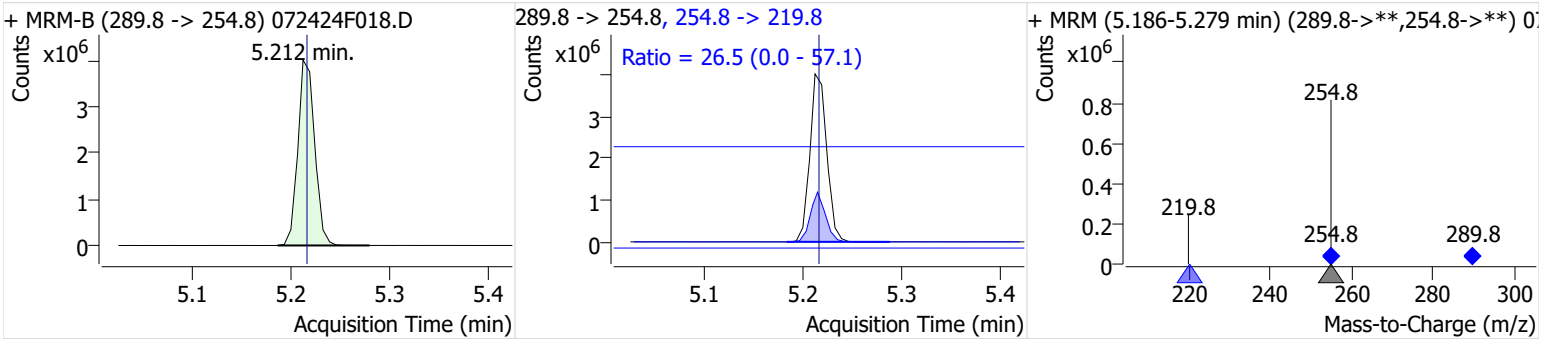
MassHunter Quantitative Analysis Sample Report



α-BHC



Hexachlorobenzene-13C6



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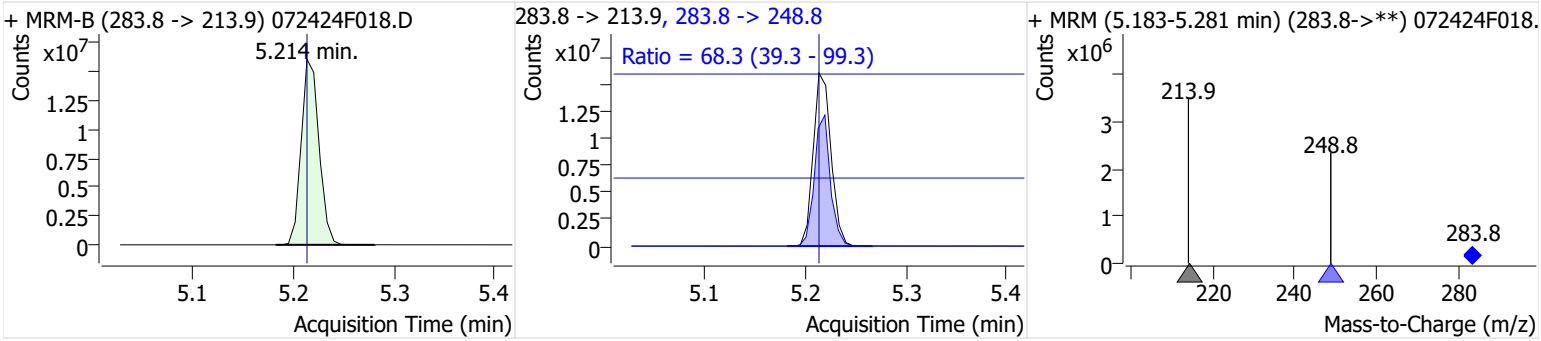

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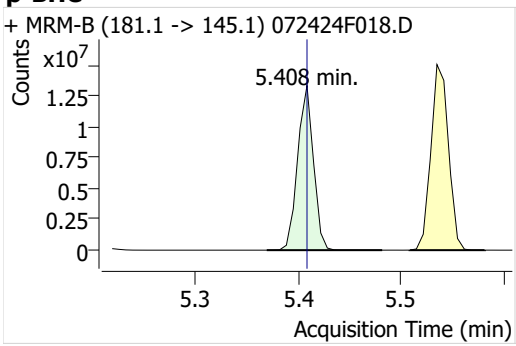
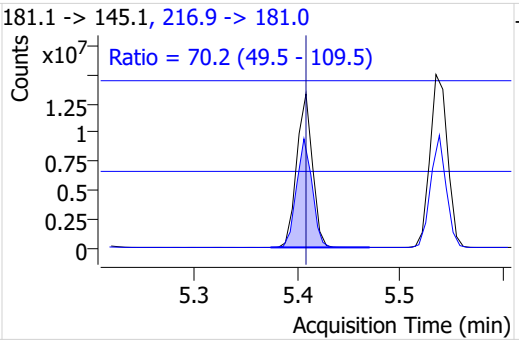
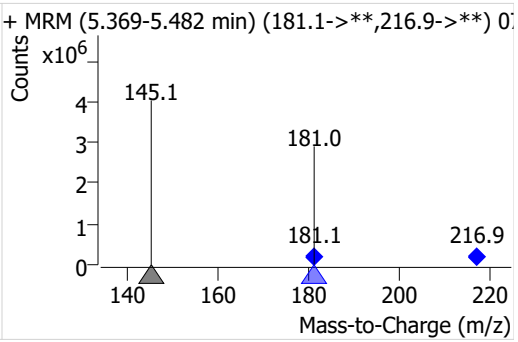
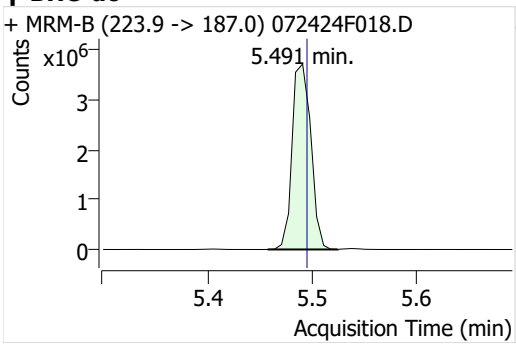
β-BHC

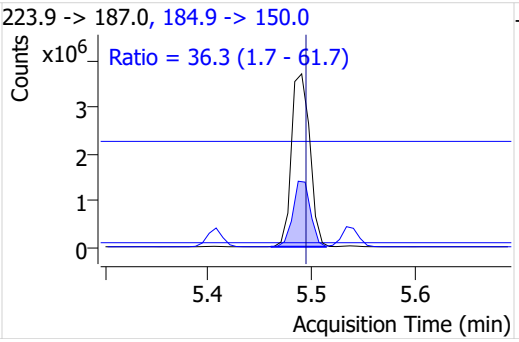


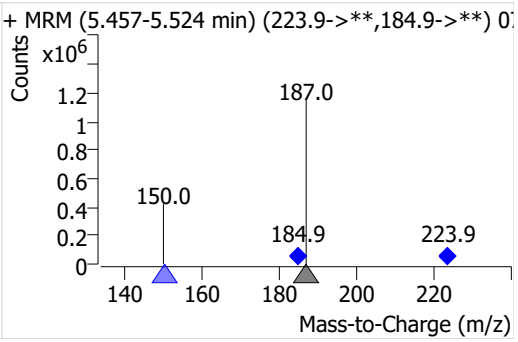




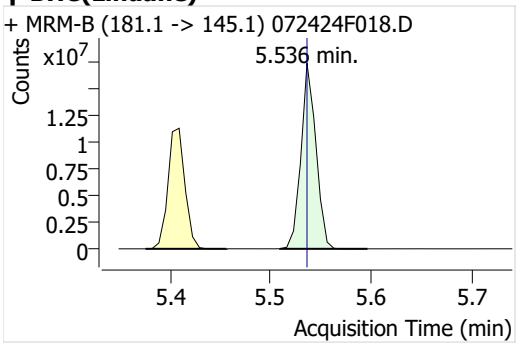
γ-BHC-d6

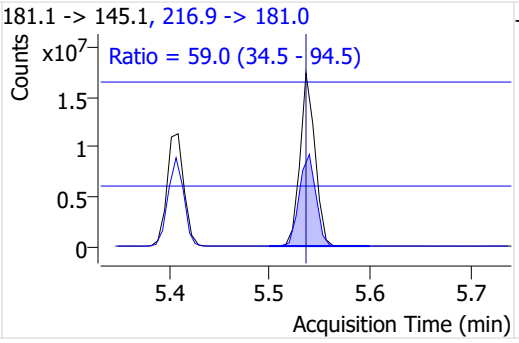


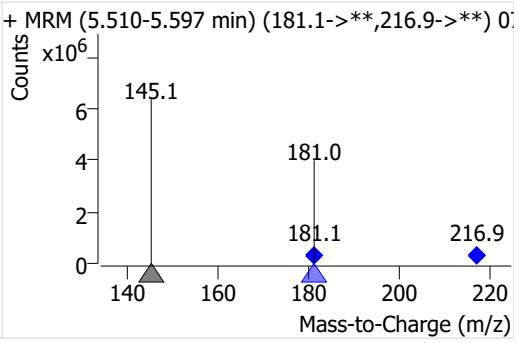




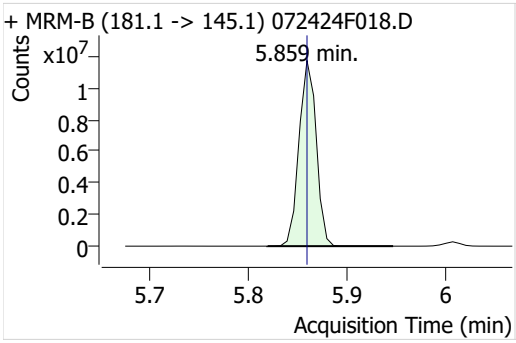
γ-BHC(Lindane)

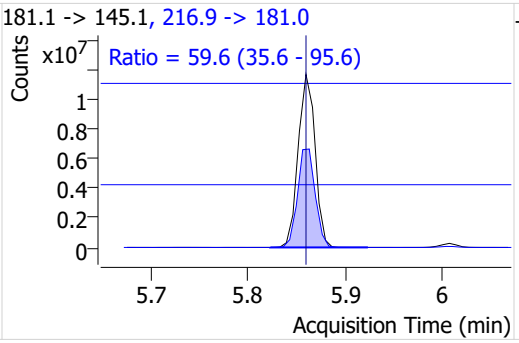


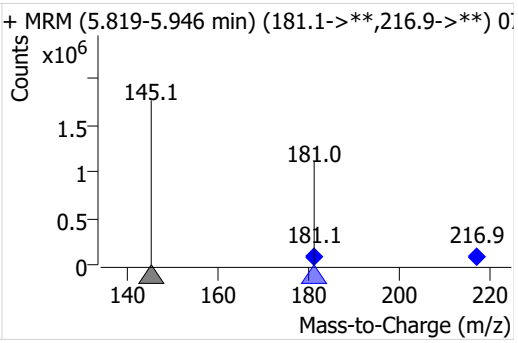




δ-BHC







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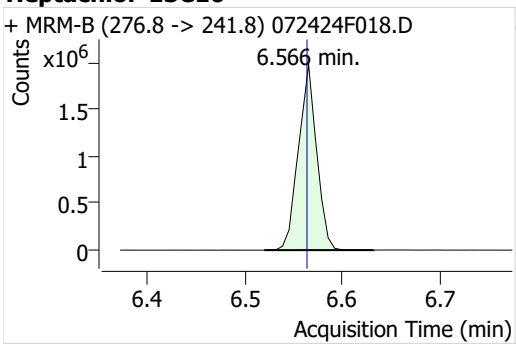
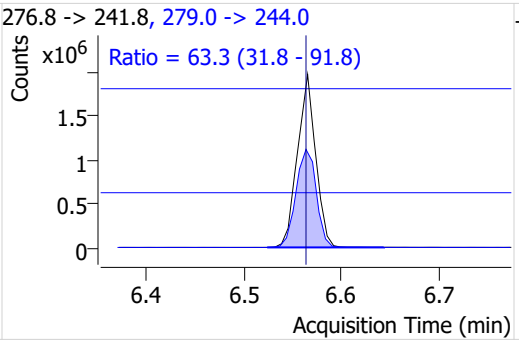
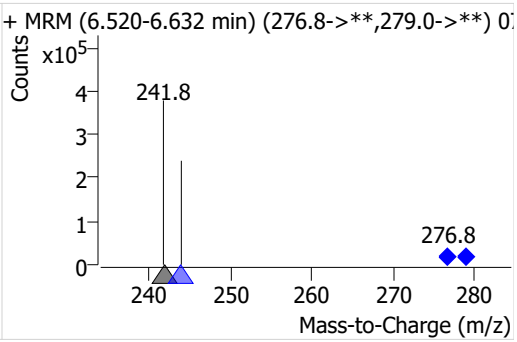
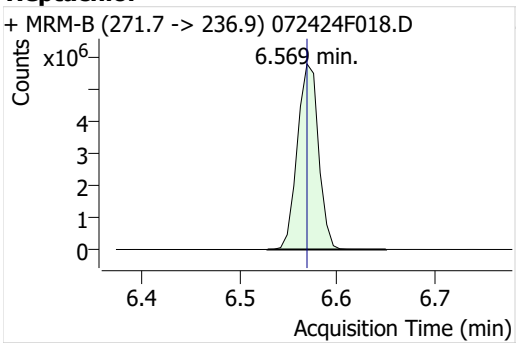
Heptachlor-13C10

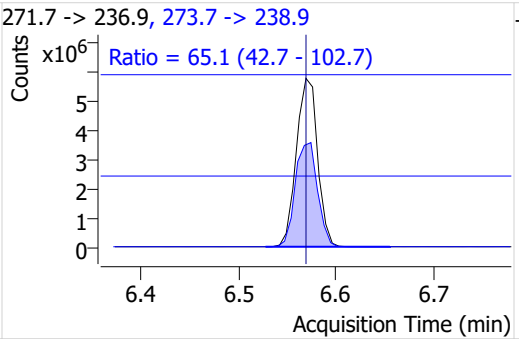


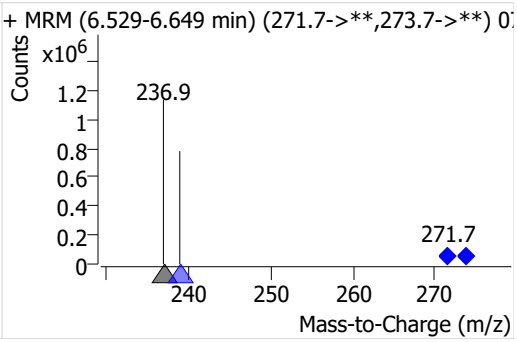




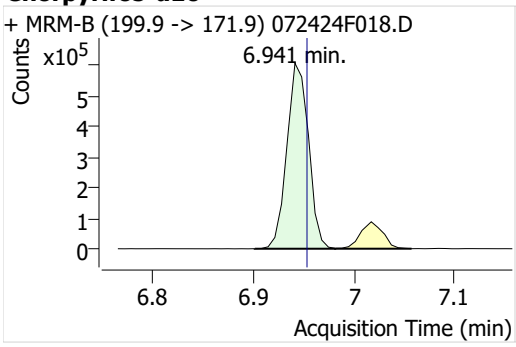
Heptachlor

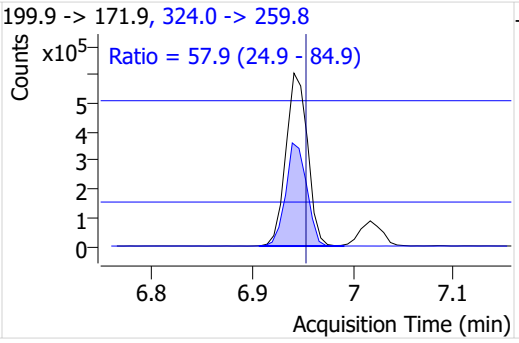


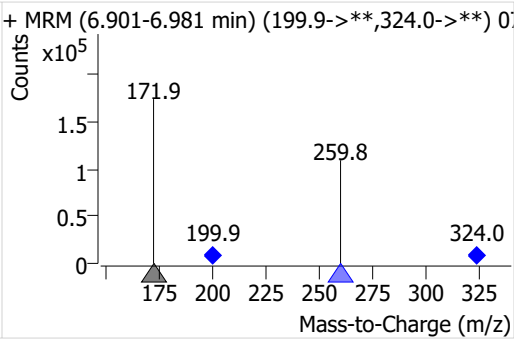




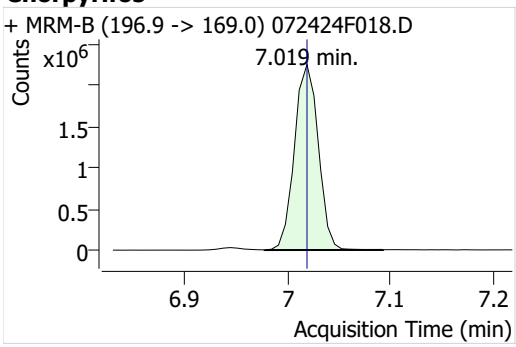
Chorpyrifos-d10

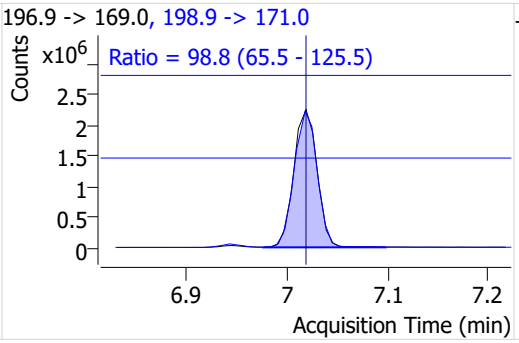


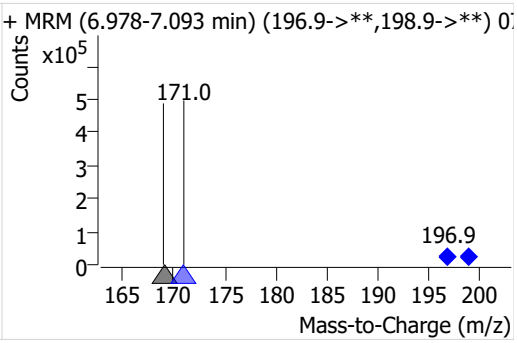




Chorpyrifos

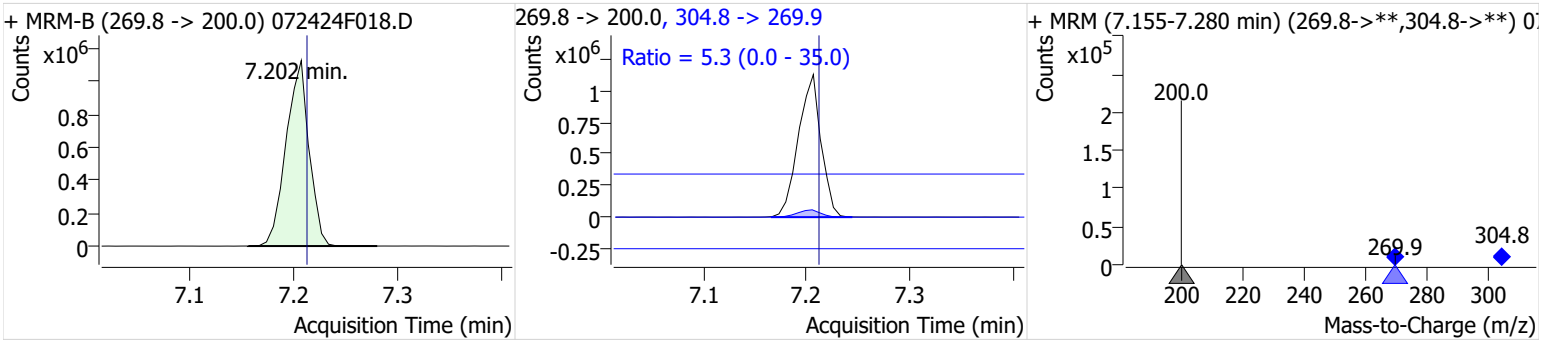




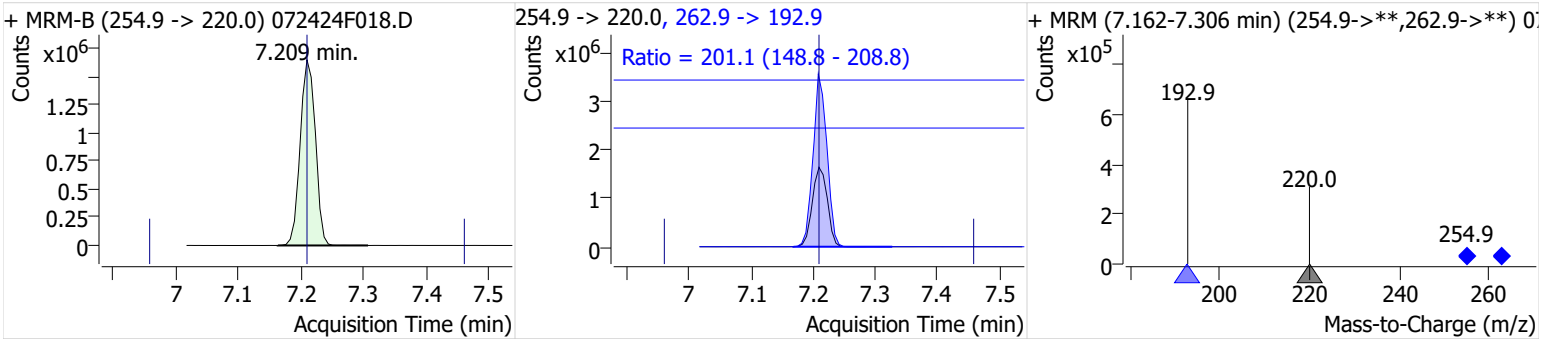


MassHunter Quantitative Analysis Sample Report

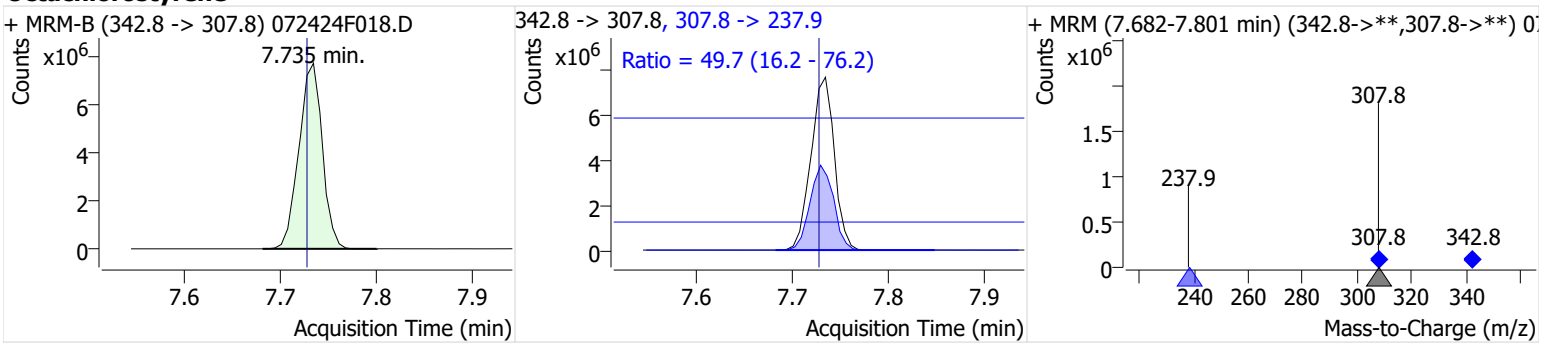
Aldrin-13C



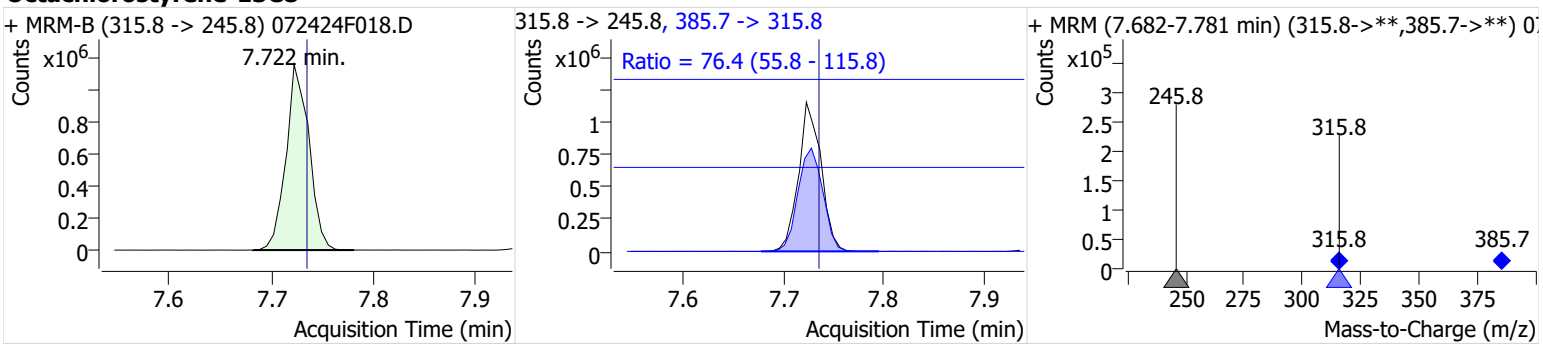
Aldrin



Octachlorostyrene



Octachlorostyrene-13C8



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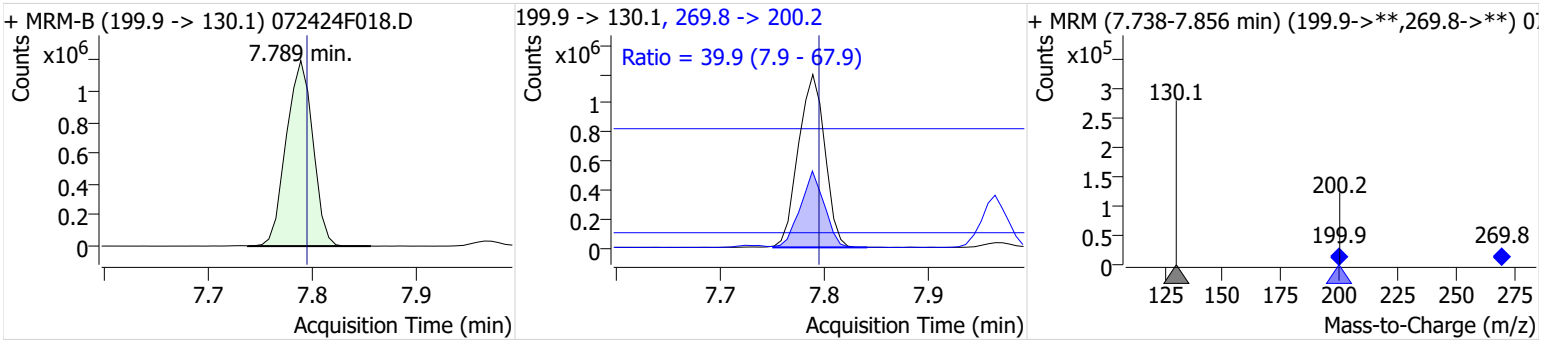
Isodrin-13C12



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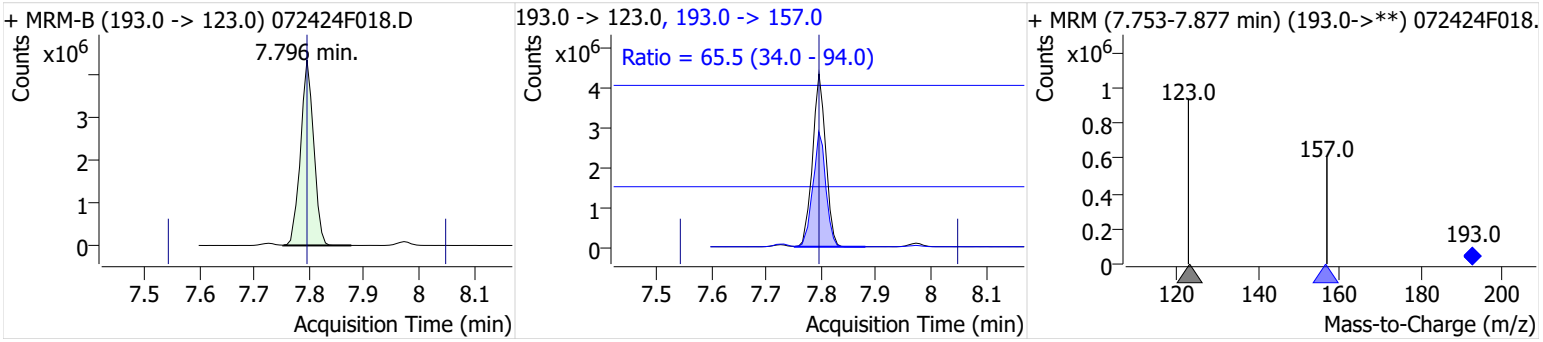
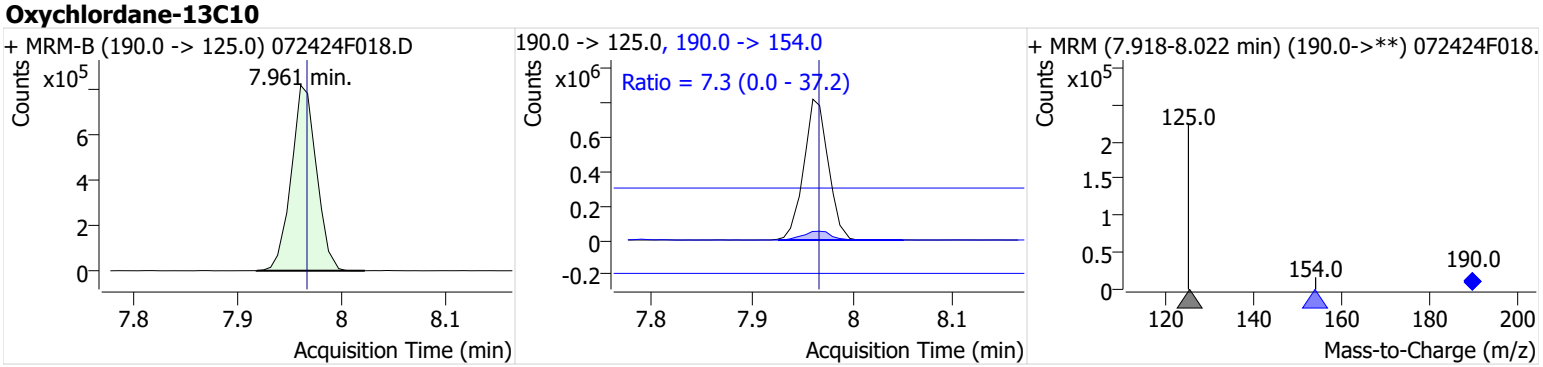
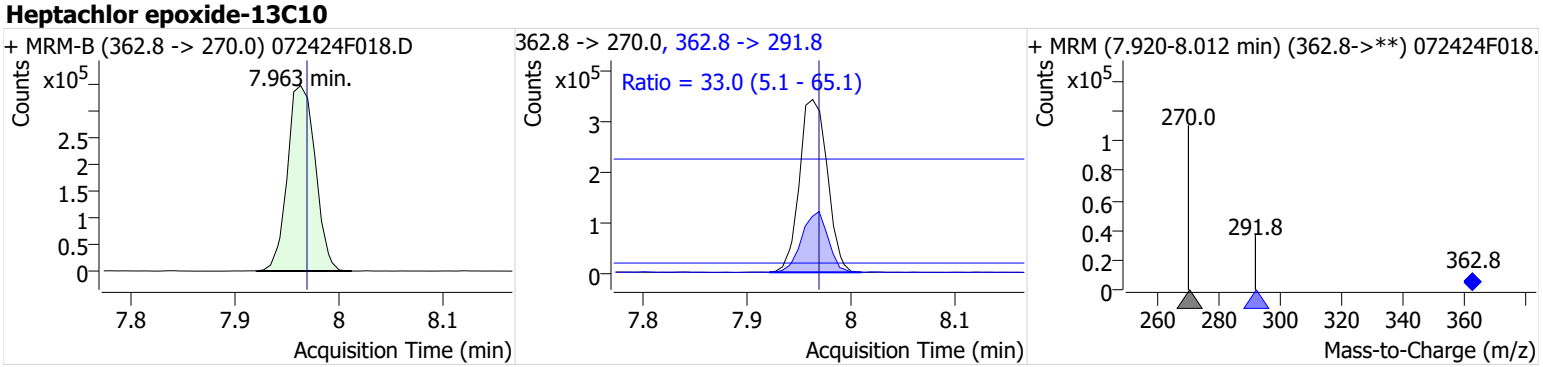


Oxychlordane-13C10

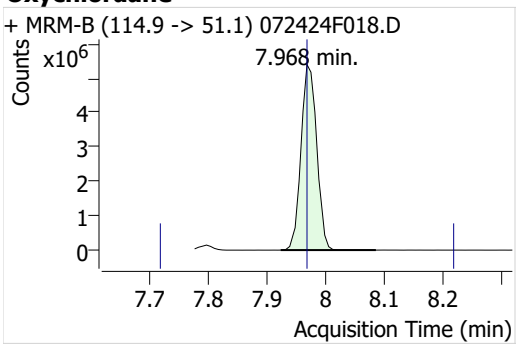


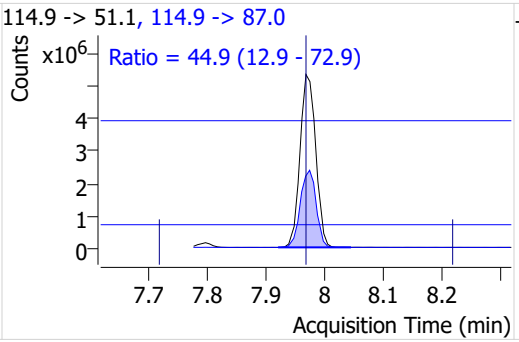
Heptachlor epoxide-13C10

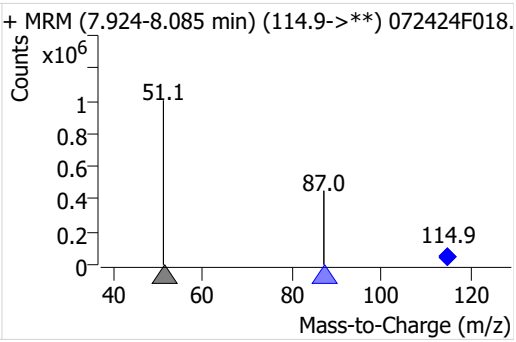


MassHunter Quantitative Analysis Sample Report

Oxychlordane







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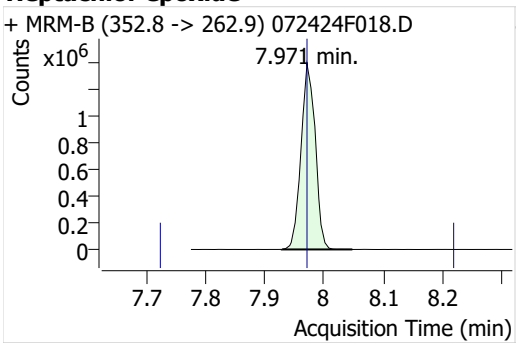
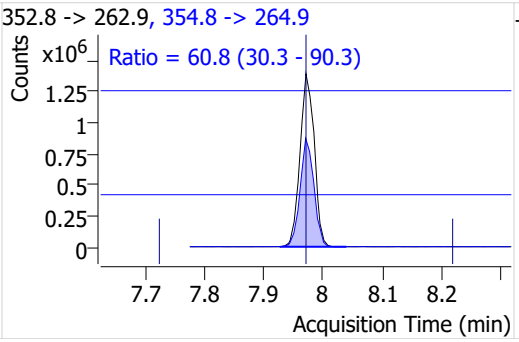
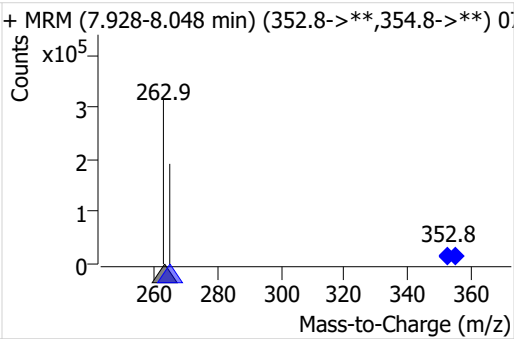
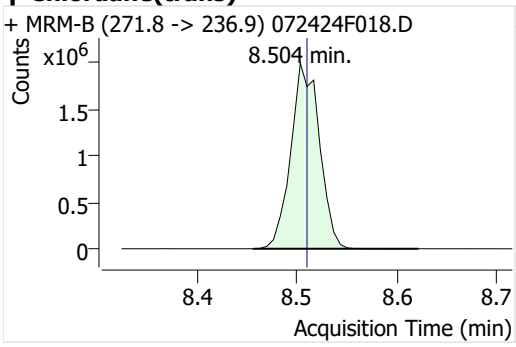
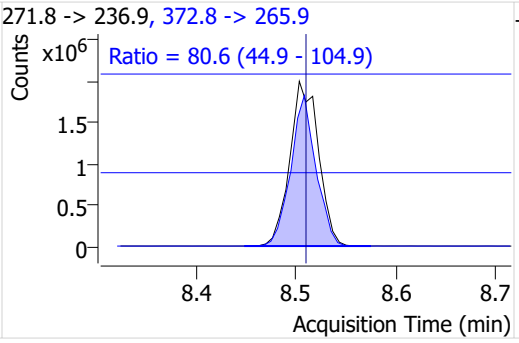


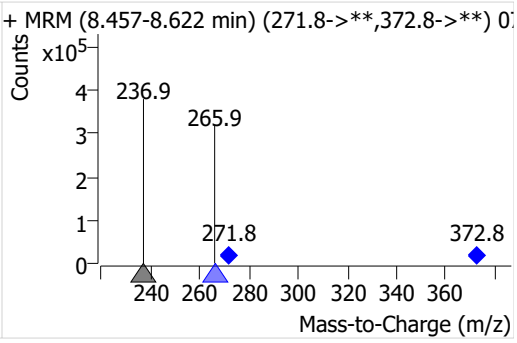




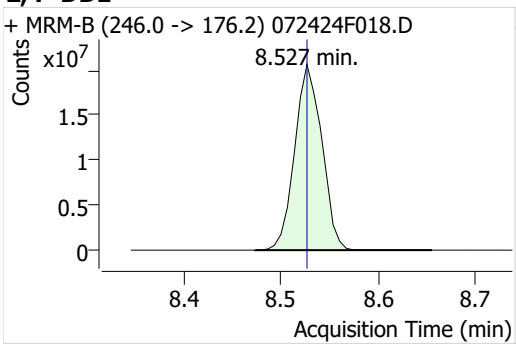
γ-Chlordane(trans)

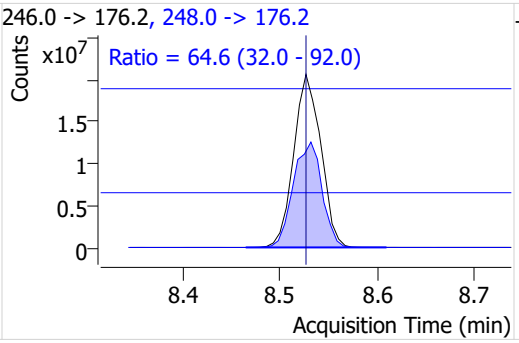


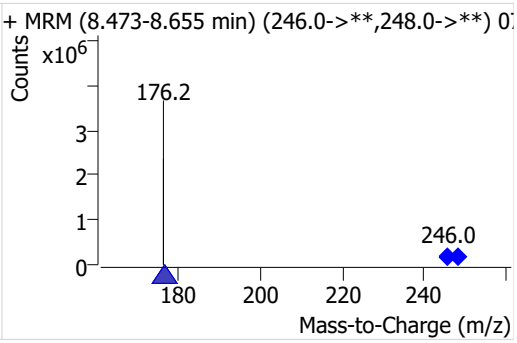




2,4'-DDE







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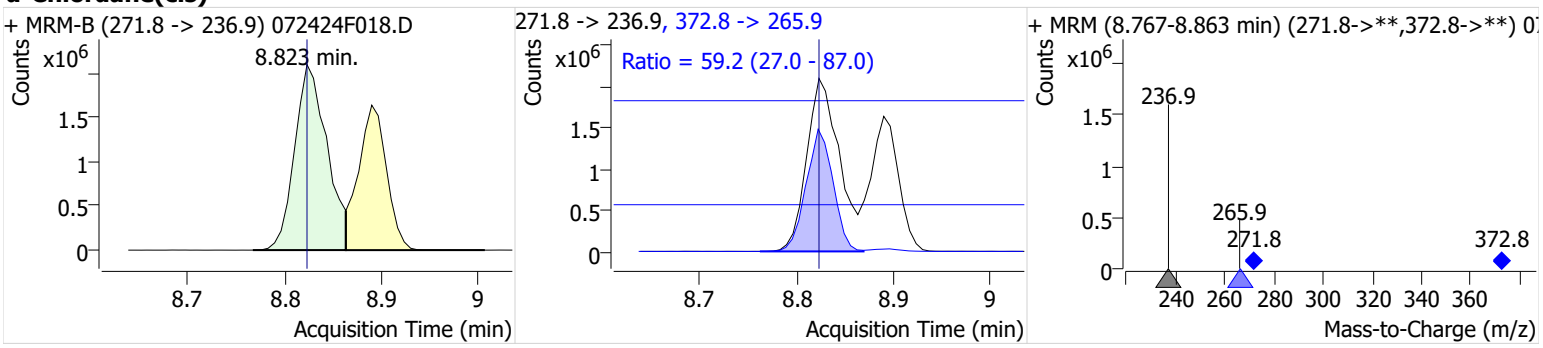
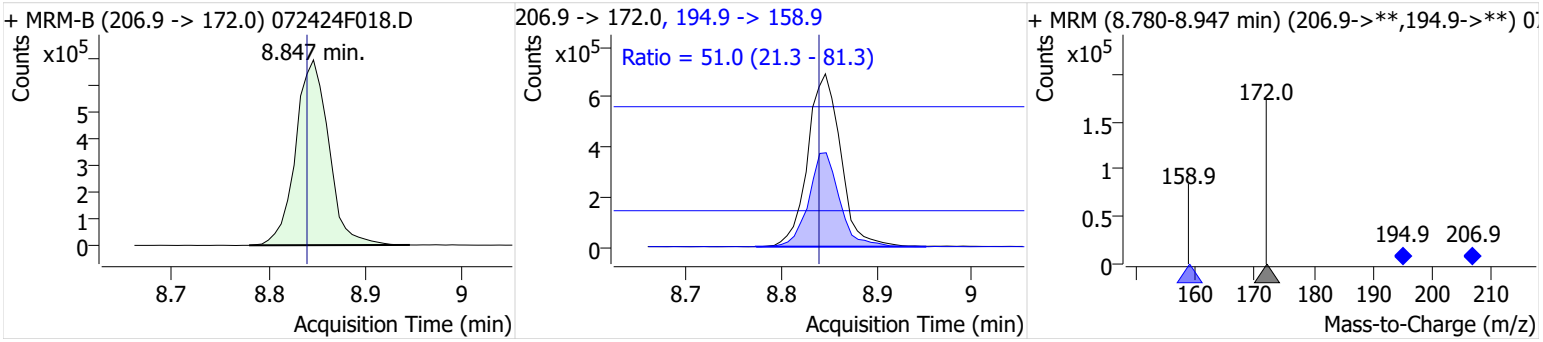
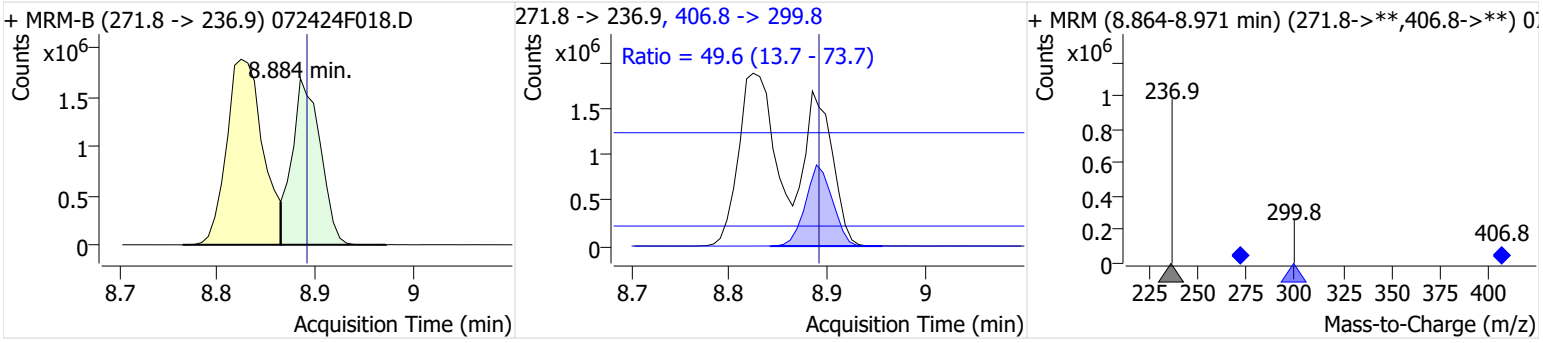
α-Chlordane(cis)



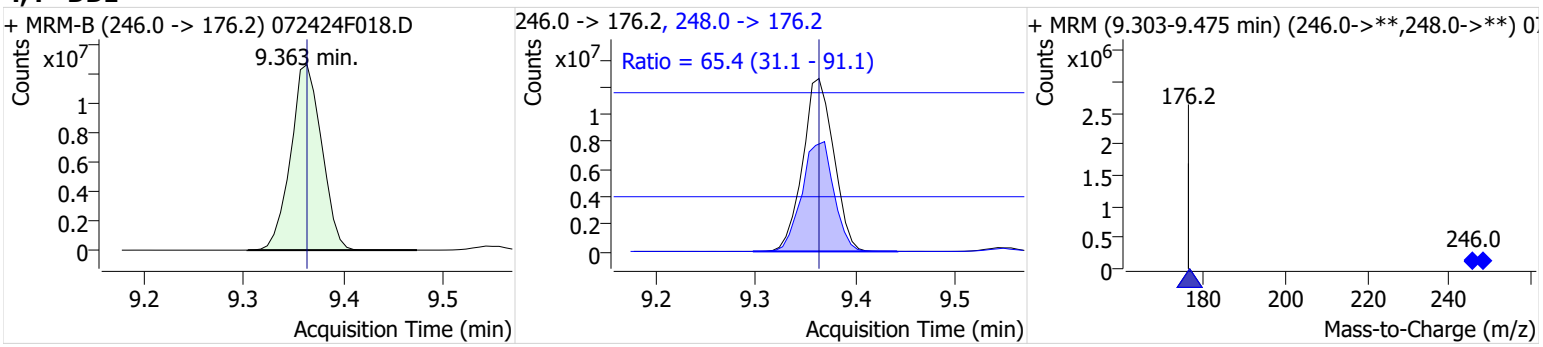
Endosulfan I



trans-Nanochlor



4,4' -DDE



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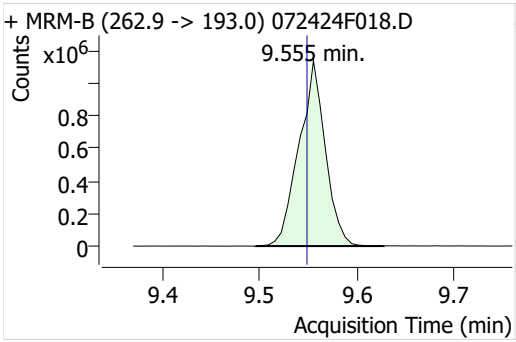
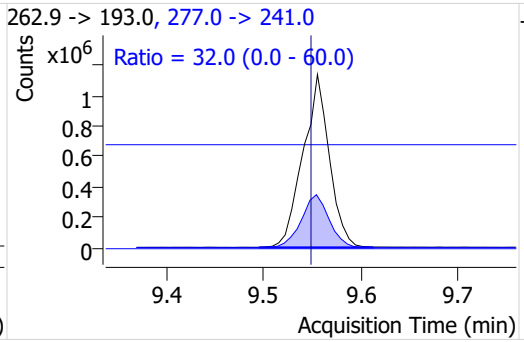
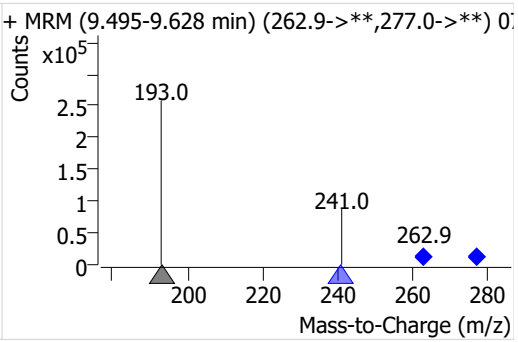
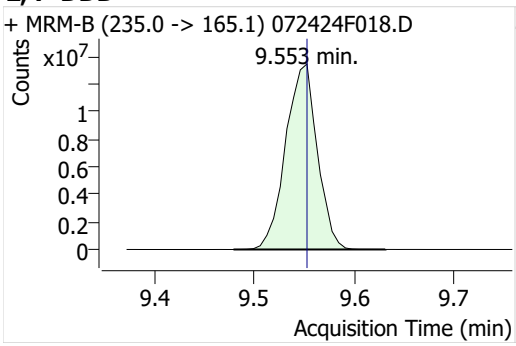
Dieldrin

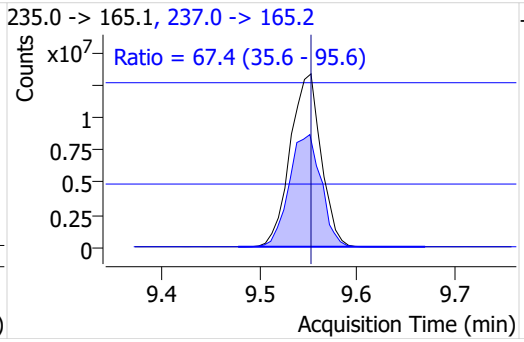


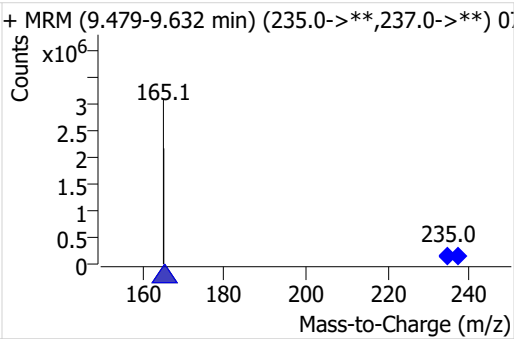




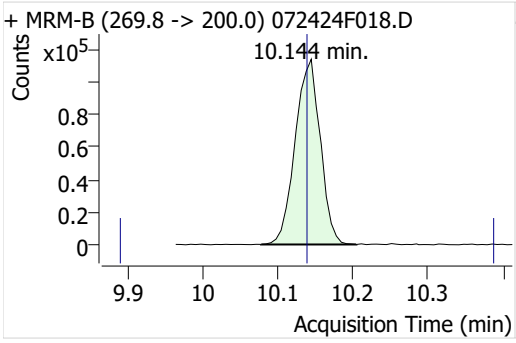
2,4'-DDD

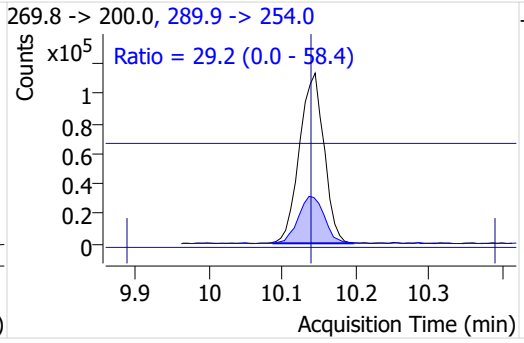


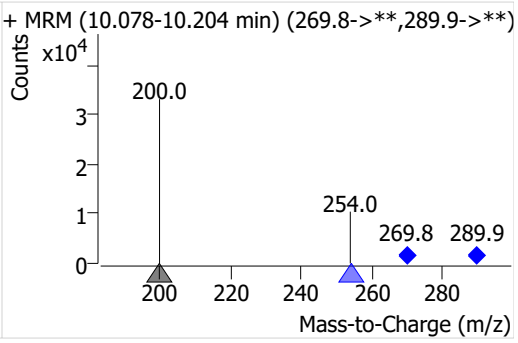




Endrin-13C12







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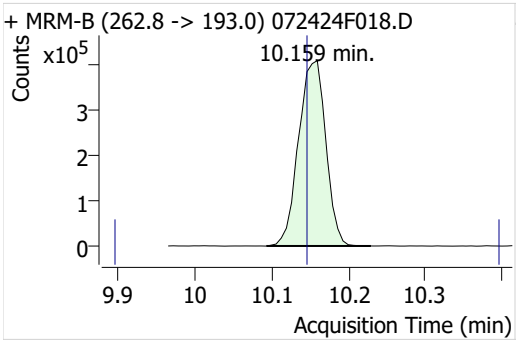

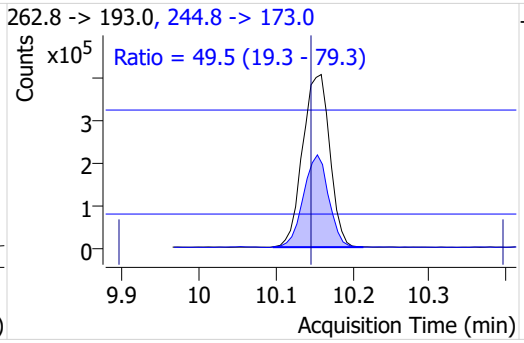

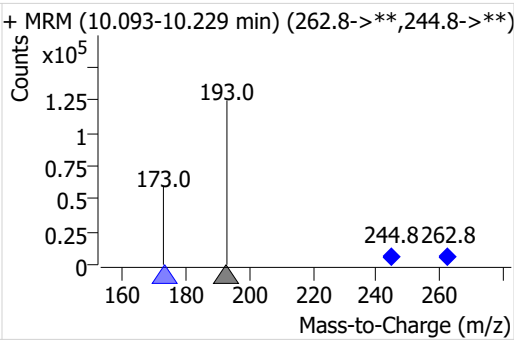

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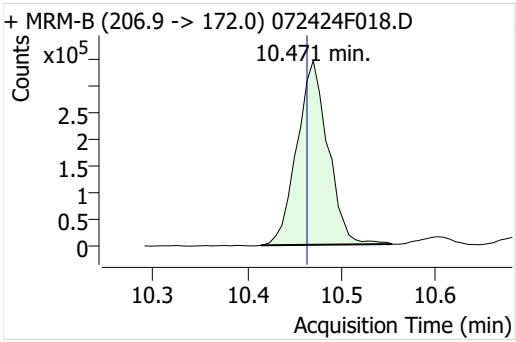
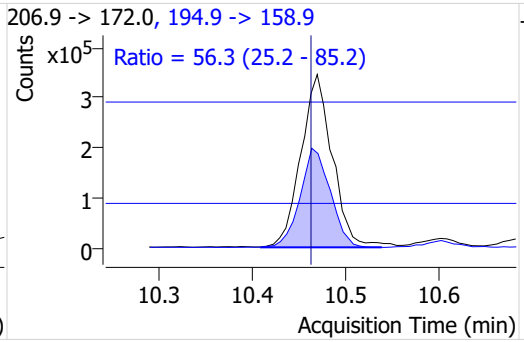
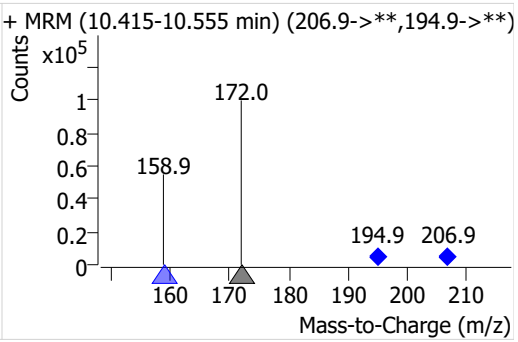
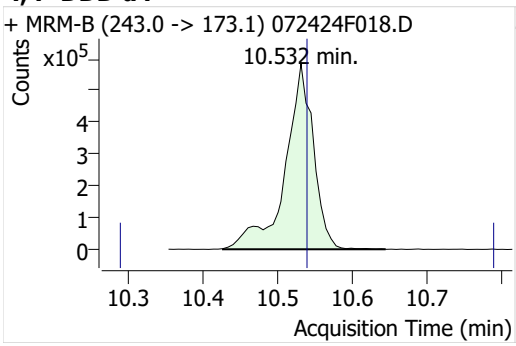
Endosulfan II

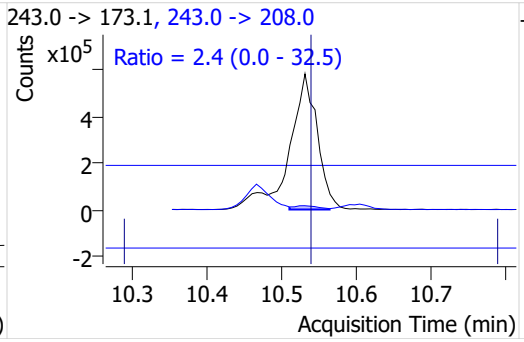


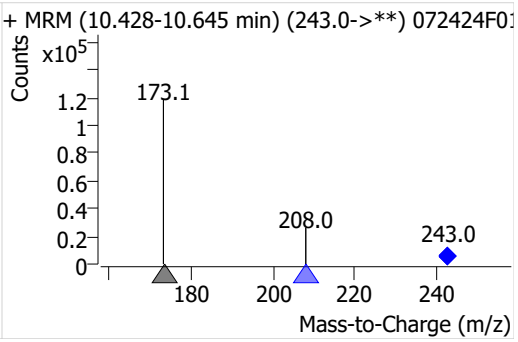




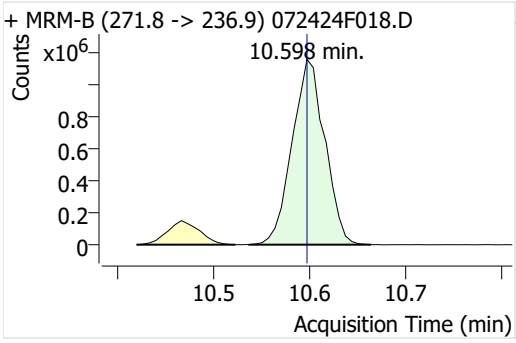
4,4'-DDD d4

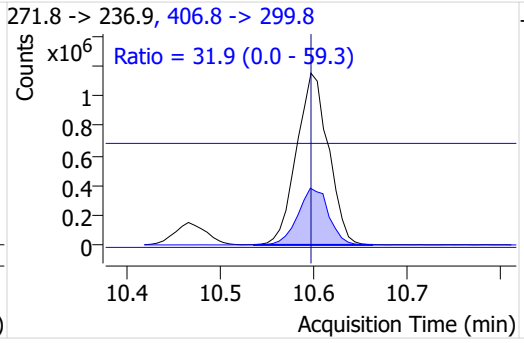


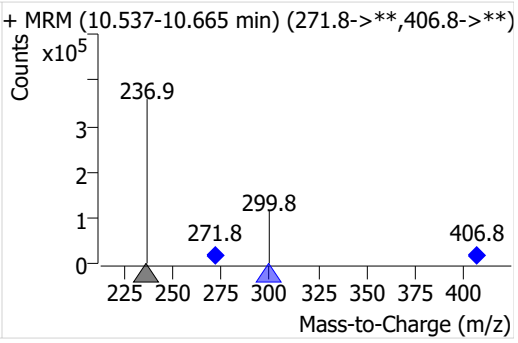




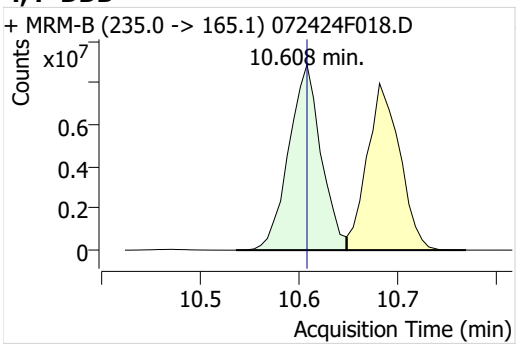
cis-Nonachlor

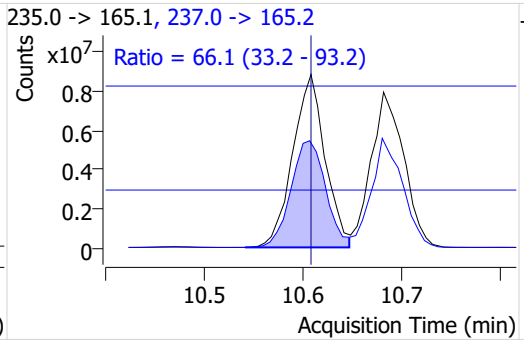


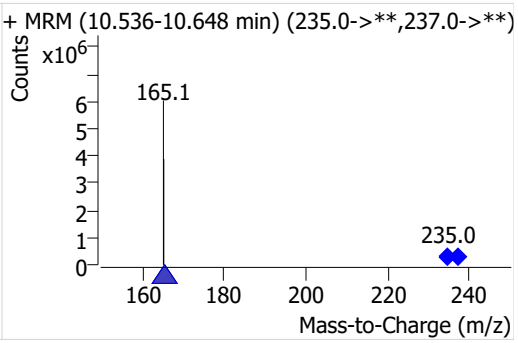




4,4'-DDD







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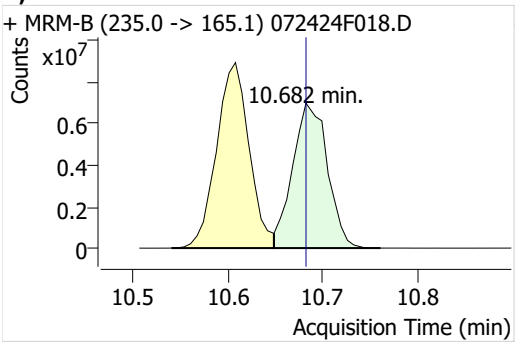
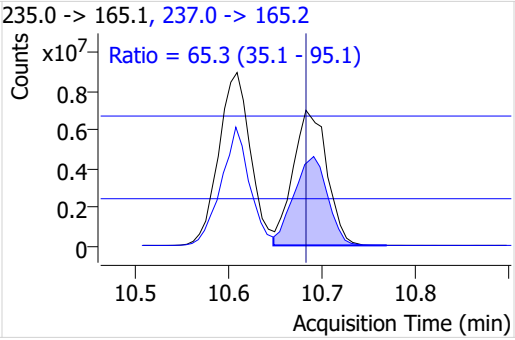
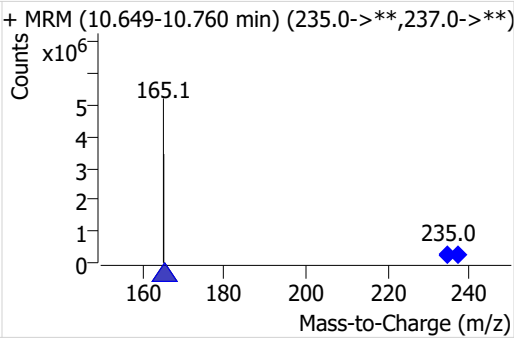
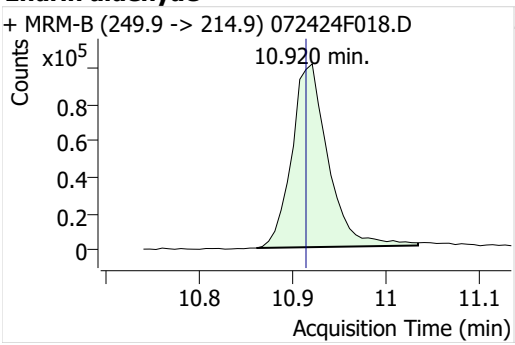
2,4'-DDT

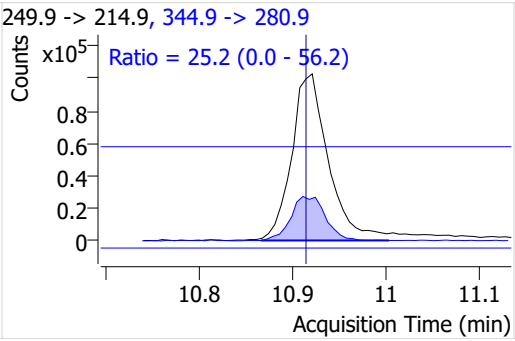


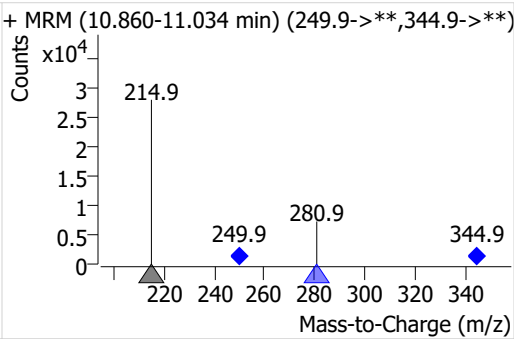




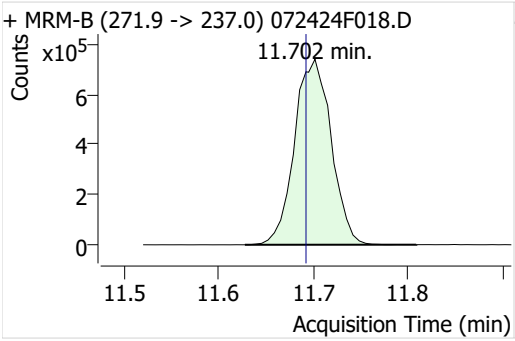
Endrin aldehyde

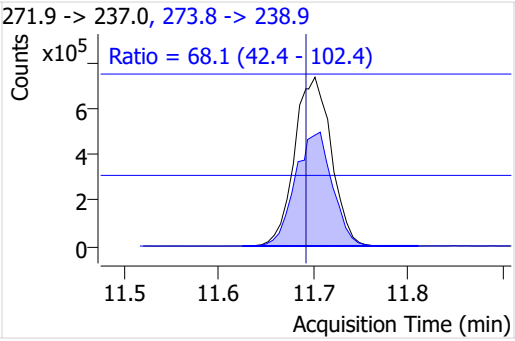


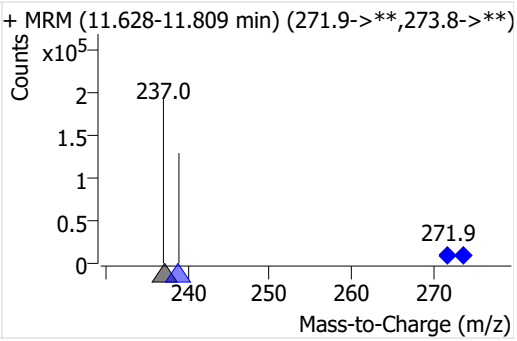




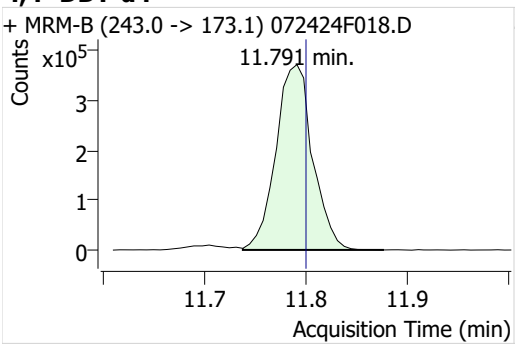
Endosulfan sulfate

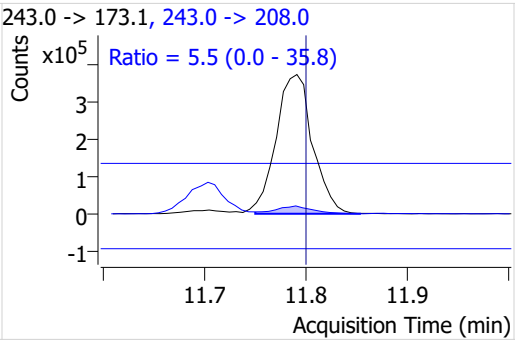


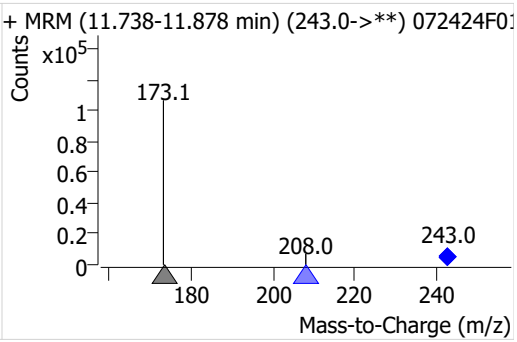




4,4'-DDT-d4







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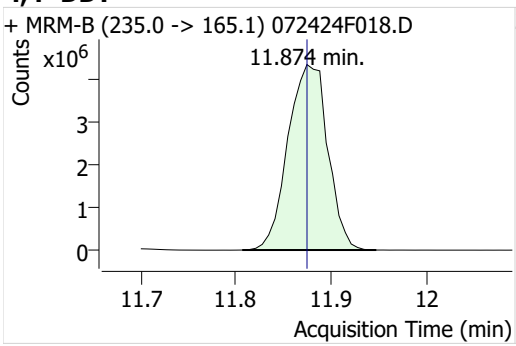
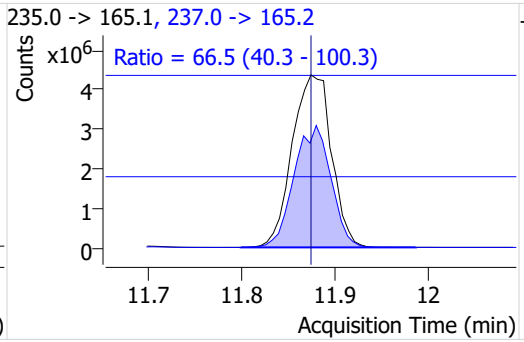
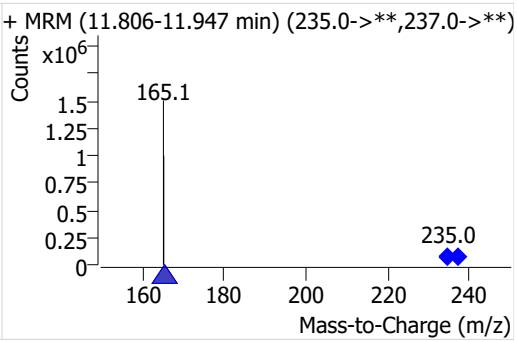
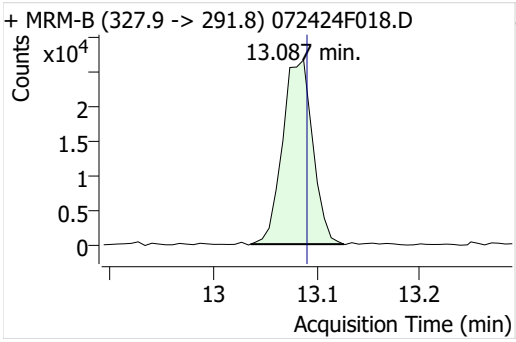
4,4'-DDT

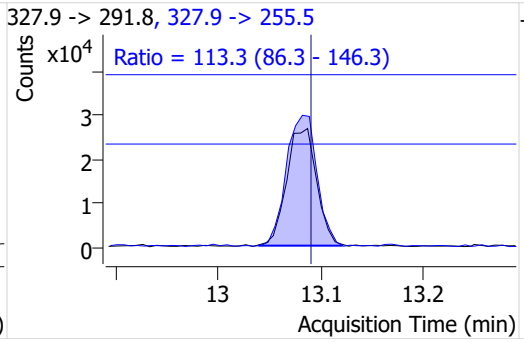


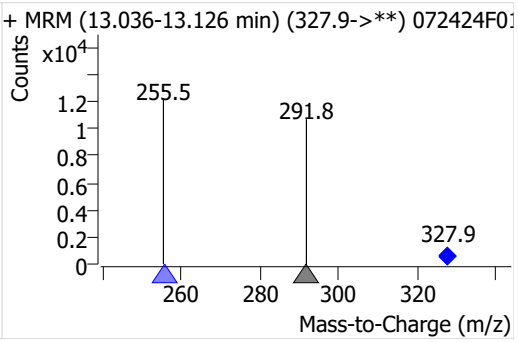




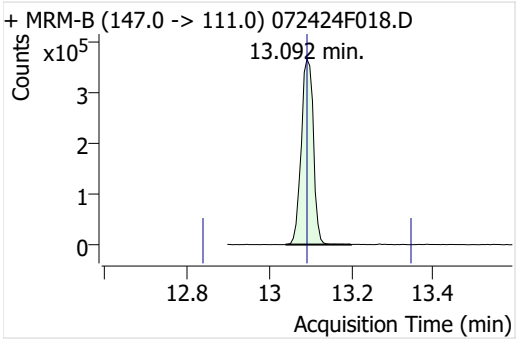
Endrin ketone-13C12

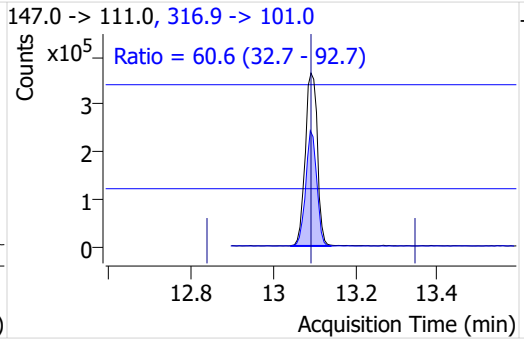


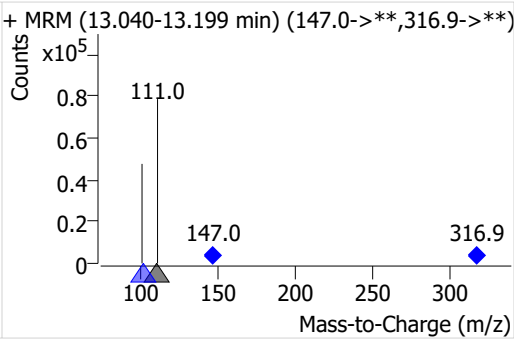




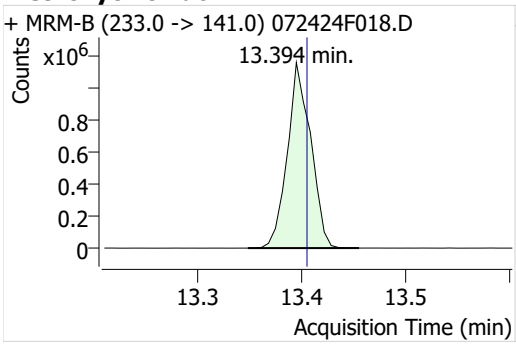
Endrin ketone

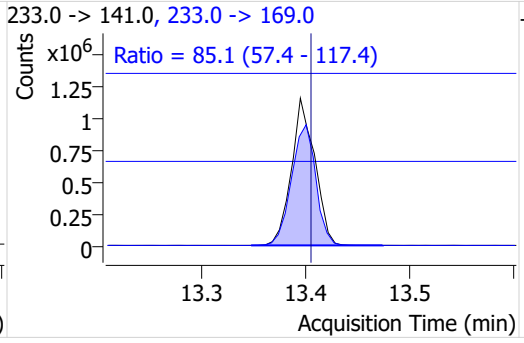


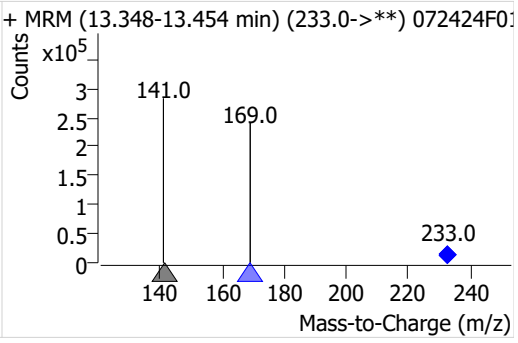




Methoxychlor-d6







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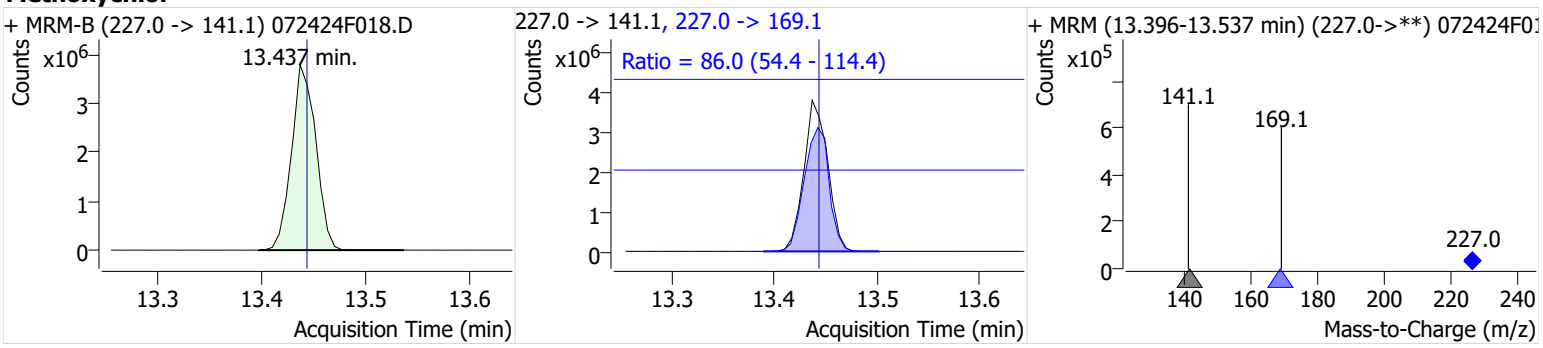
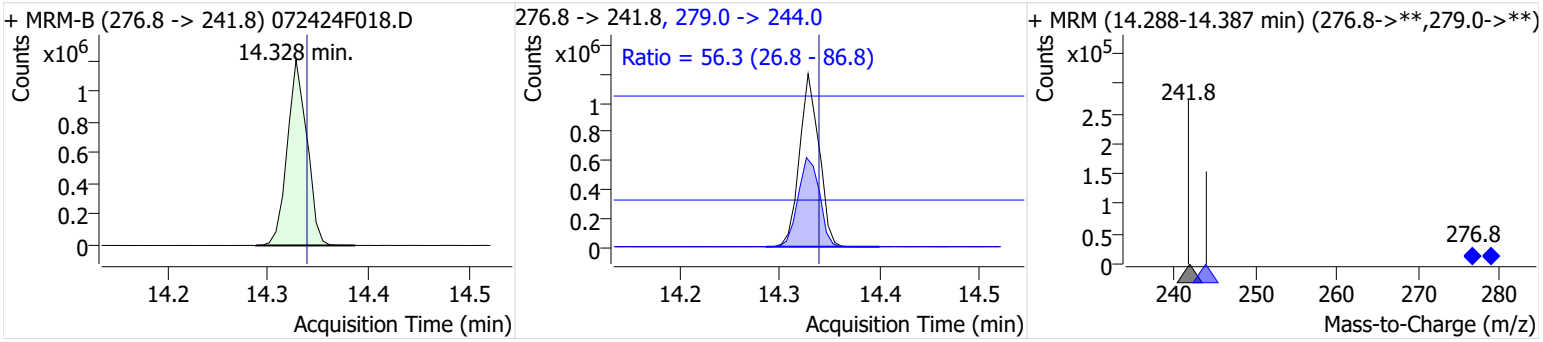
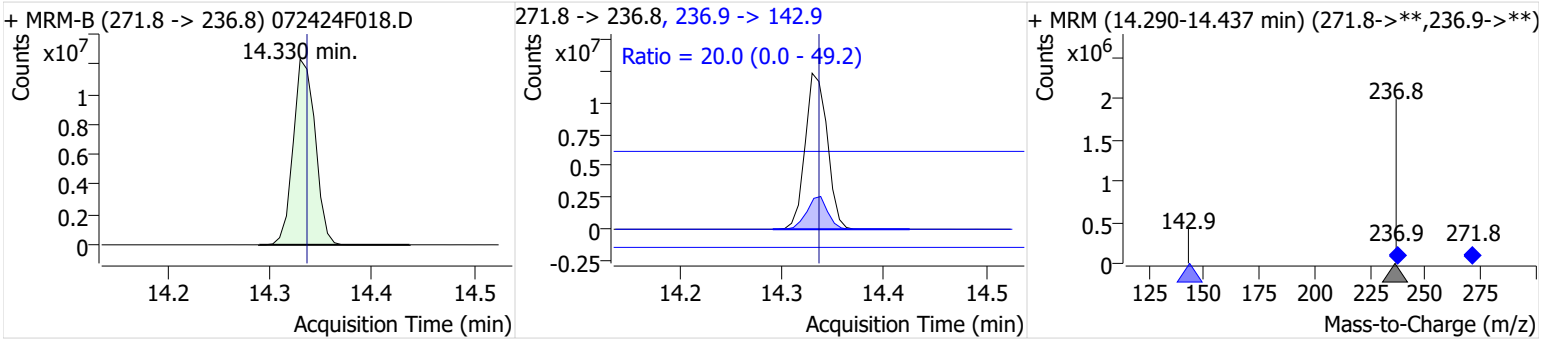
Methoxychlor



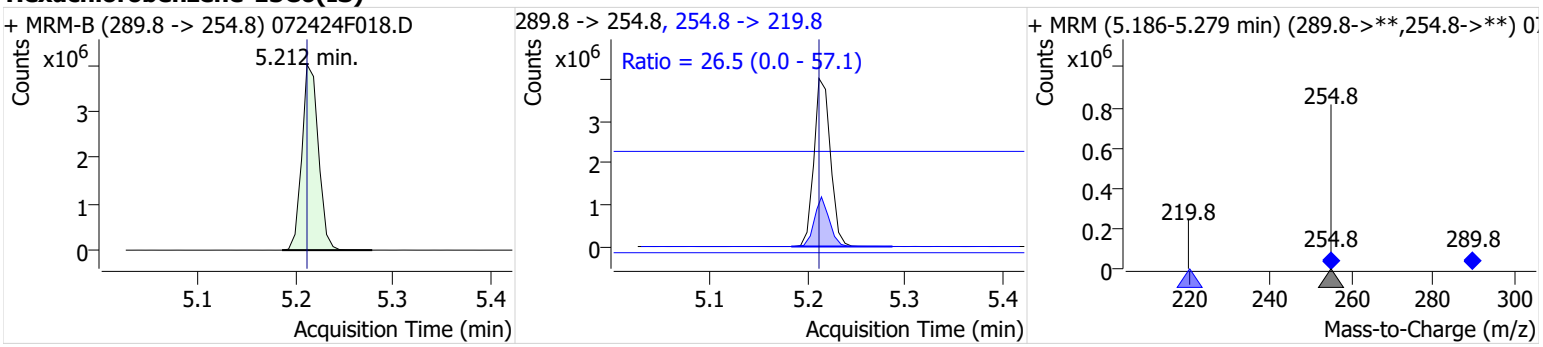
Mirex-13C10



Mirex



Hexachlorobenzene-13C6(IS)



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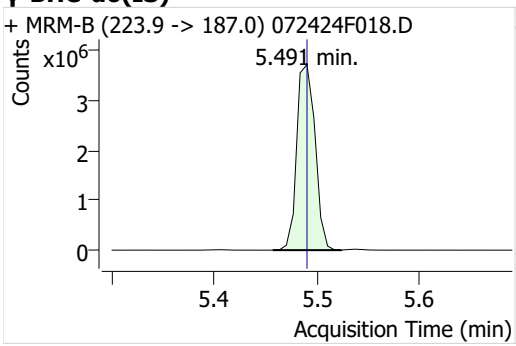
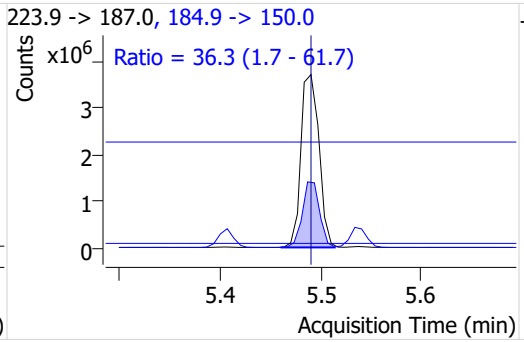
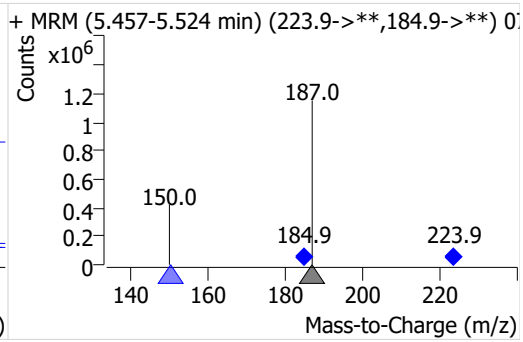
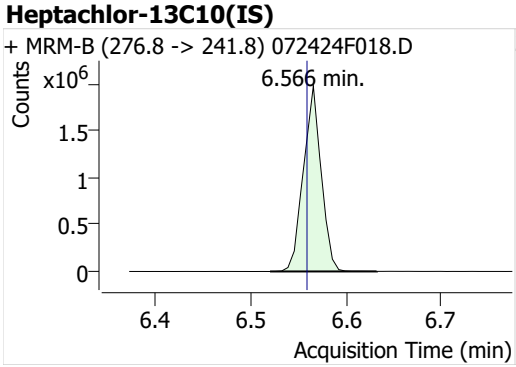
γ-BHC-d6(IS)

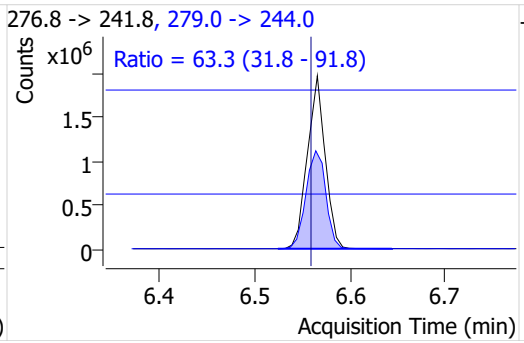


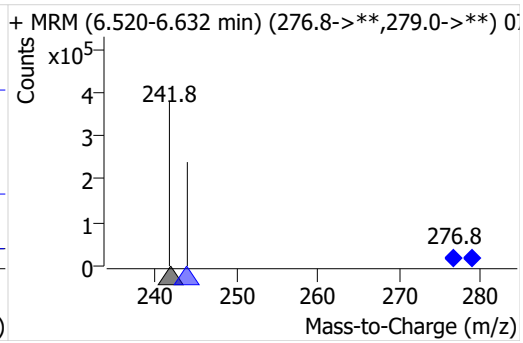




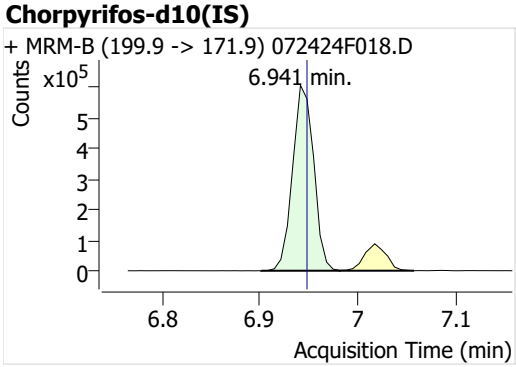
Heptachlor-13C10(IS)

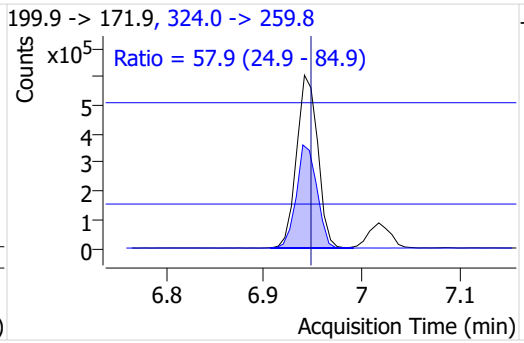


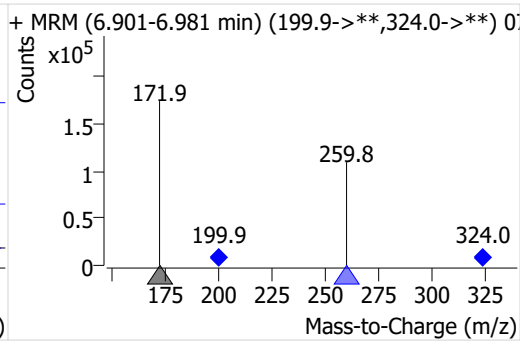




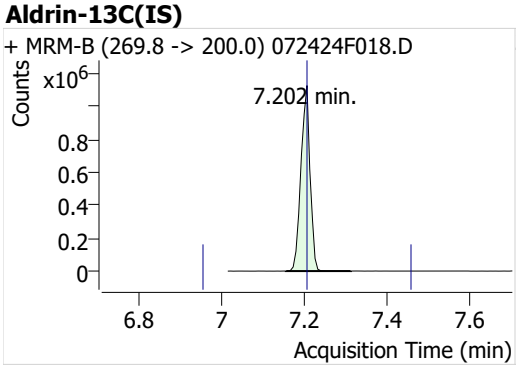
Chorpyrifos-d10(IS)

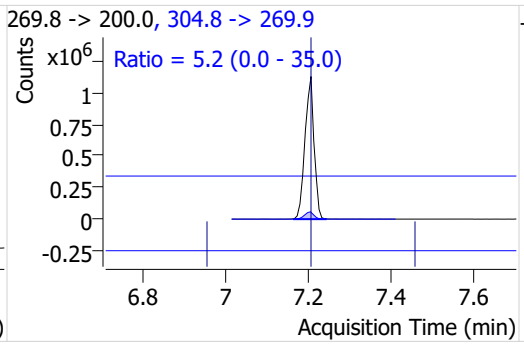


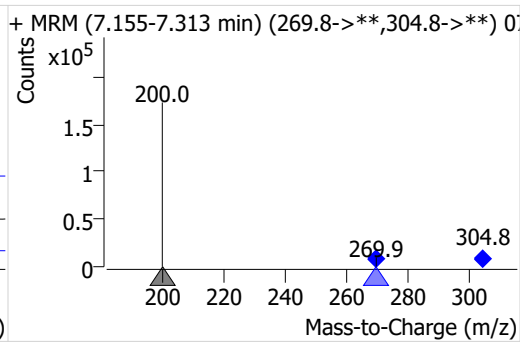




Aldrin-13C(IS)







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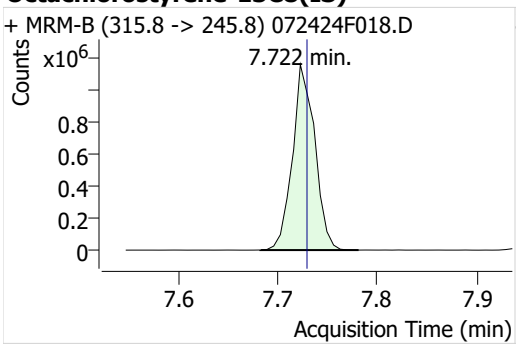
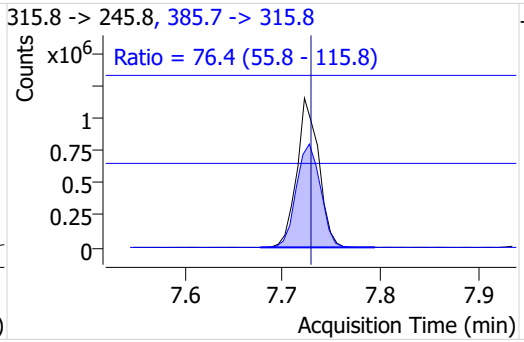
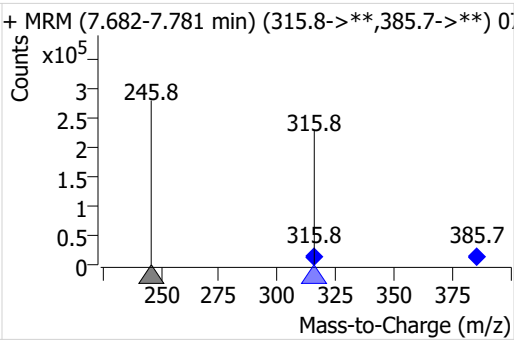
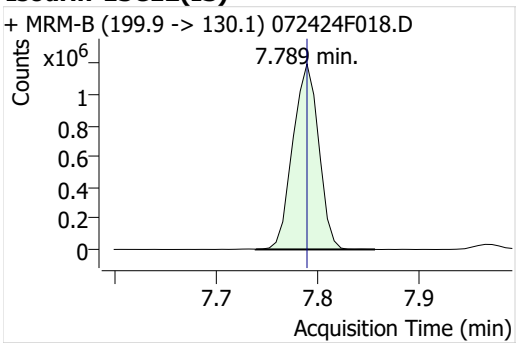
Octachlorostyrene-13C8(IS)

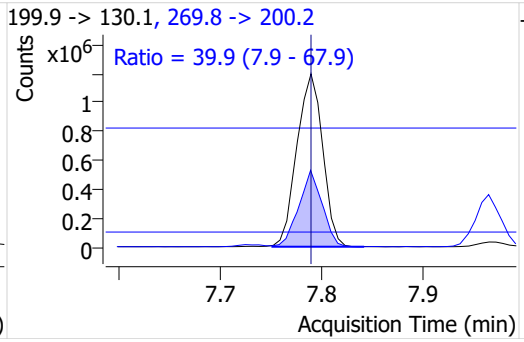


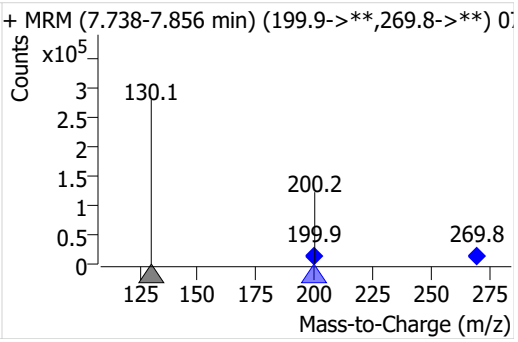




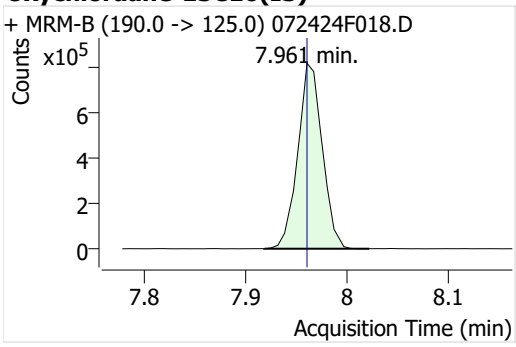
Isodrin-13C12(IS)

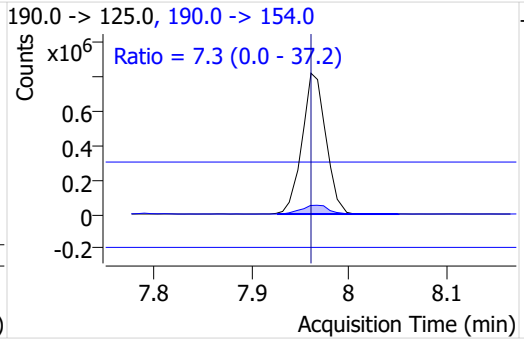


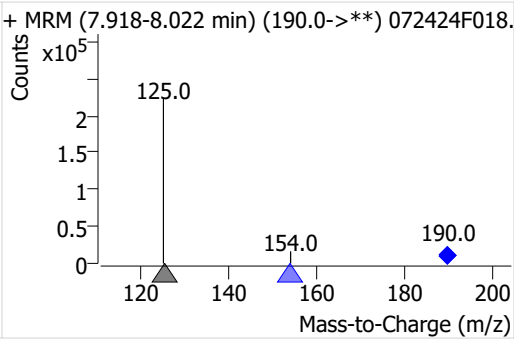




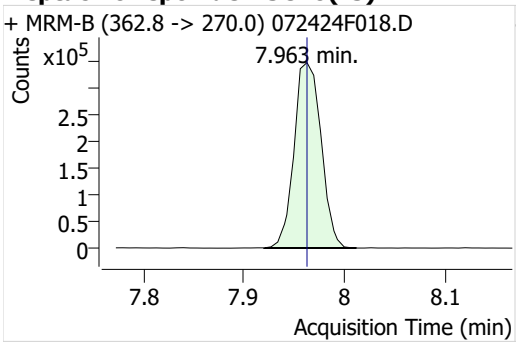
Oxychlordane-13C10(IS)

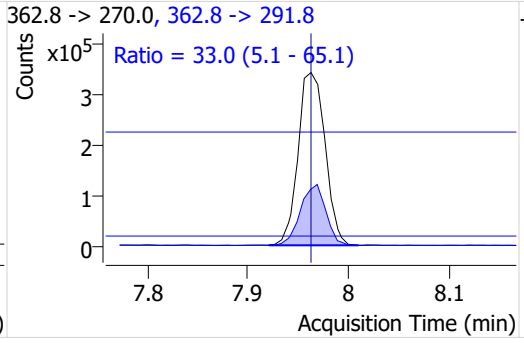


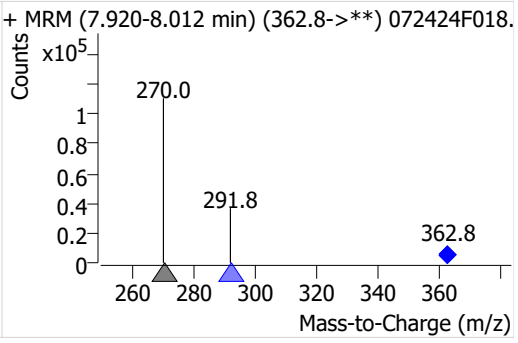




Heptachlor epoxide-13C10(IS)







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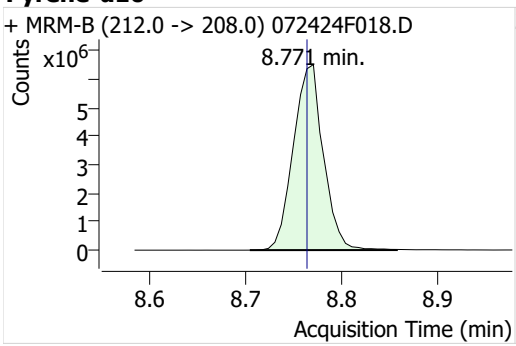
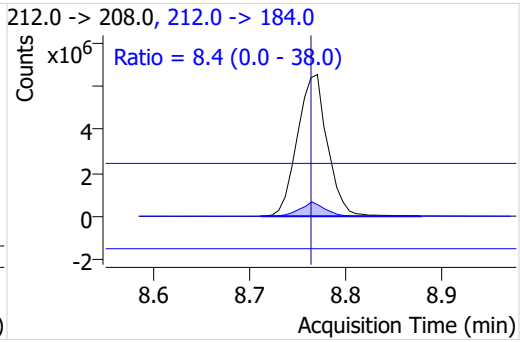
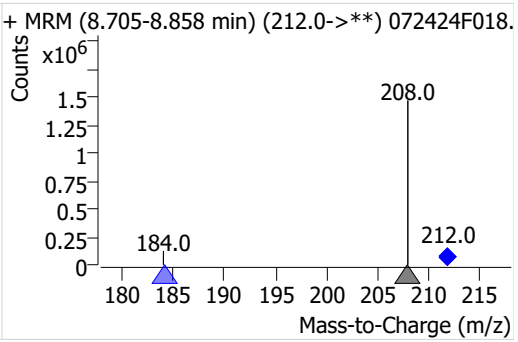
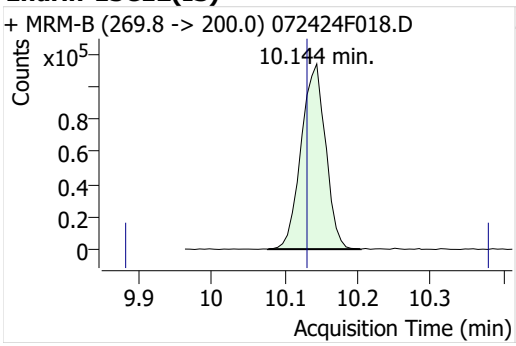
Pyrene-d10

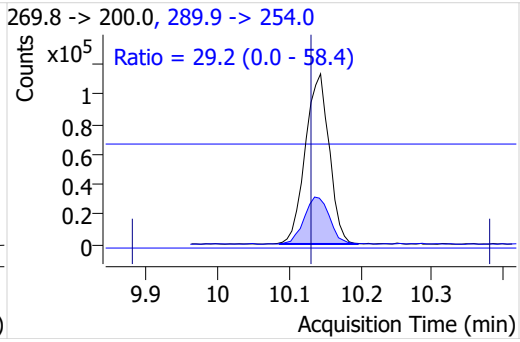


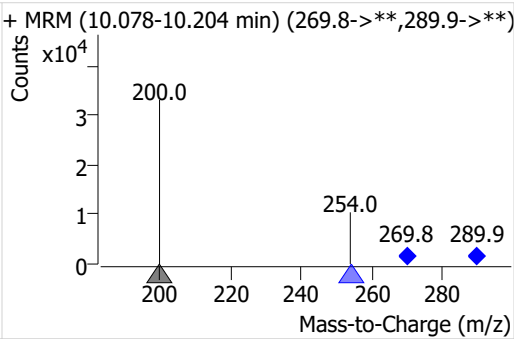




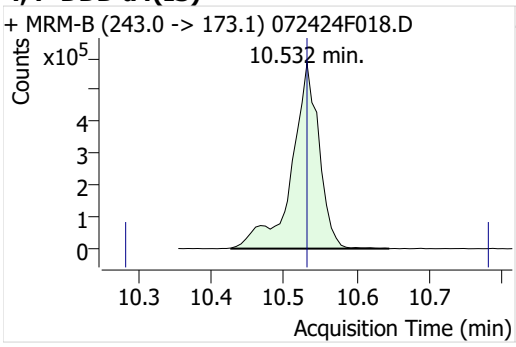
Endrin-13C12(IS)

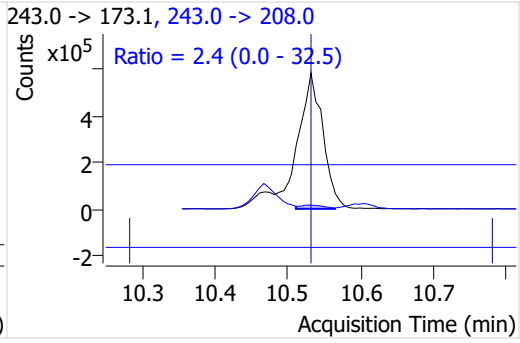


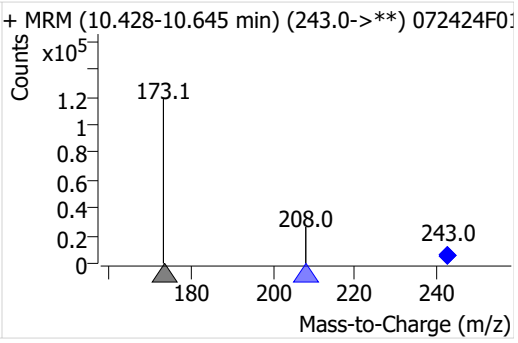




4,4'-DDD d4(IS)







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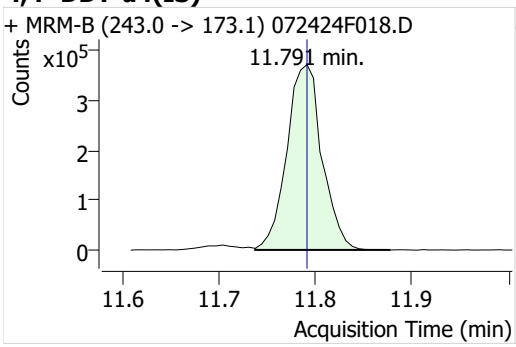

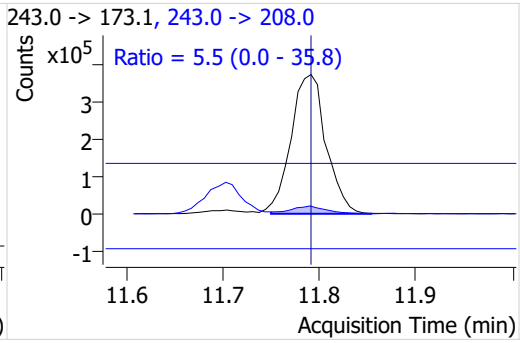

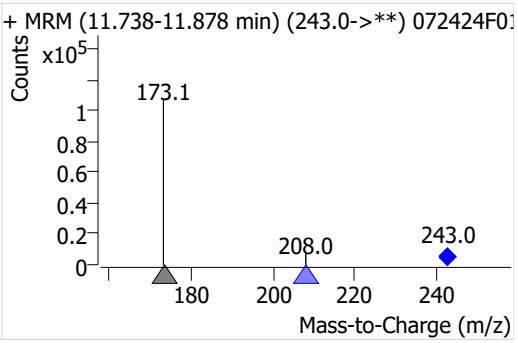

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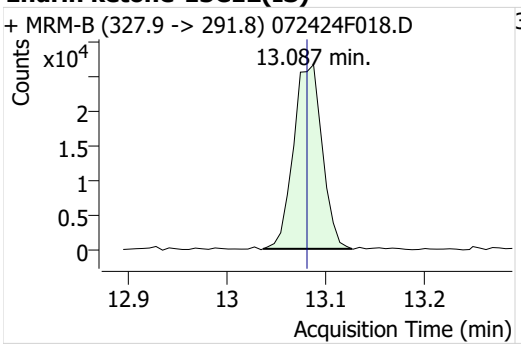
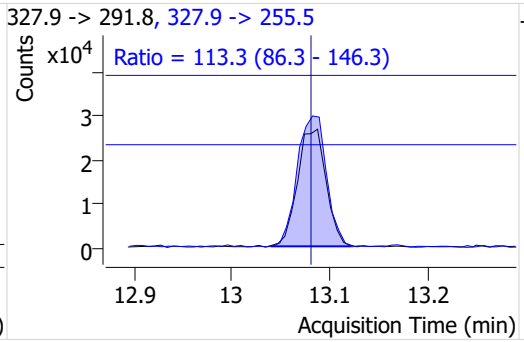
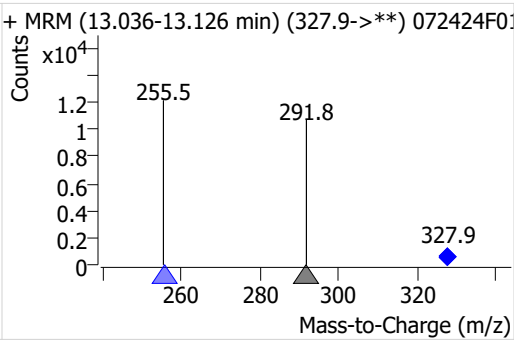
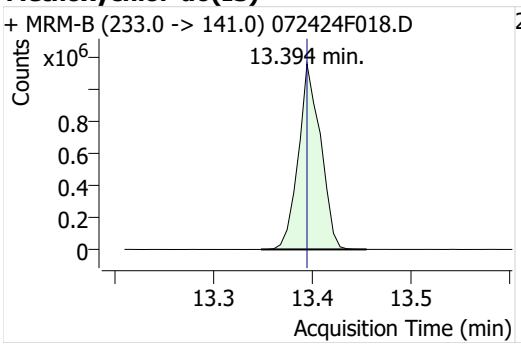
Endrin ketone-13C12(IS)

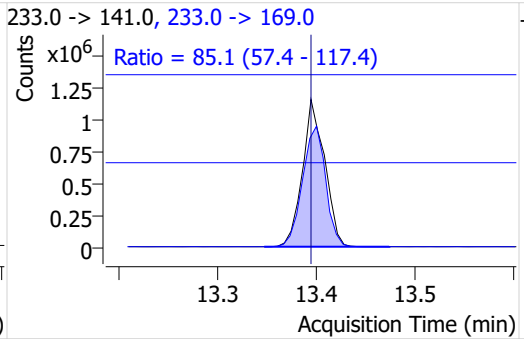


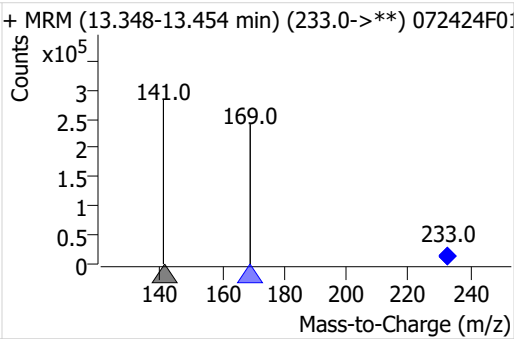




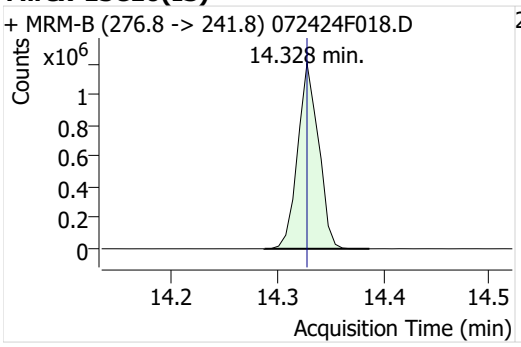
Methoxychlor-d6(IS)

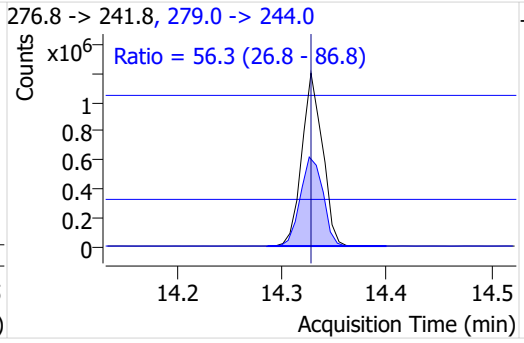


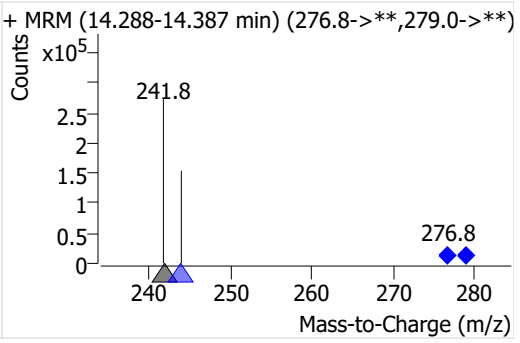




Mirex-13C10(IS)







MassHunter Quantitative Analysis Sample Report

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Acq. Date-Time	7/24/2024 7:54:15 PM	**Acq Operator**	EBruno
Name	OC PEST ICAL 80ppb SVM71-30I	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	7/25/2024 7:23:51 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method		**Vial**	11
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.213	289.8 -> 254.8	6518878	20.0000 ng/ml	0.002
γ-BHC-d6(IS)	5.491	223.9 -> 187.0	5985788	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	6.565	276.8 -> 241.8	4045130	20.0000 ng/ml	0.006
Chorpyrifos-d10(IS)	6.948	199.9 -> 171.9	1653060	20.0000 ng/ml	0.001
Aldrin-13C(IS)	7.200	269.8 -> 200.0	2694167	20.0000 ng/ml	0.004
Octachlorostyrene-13C8(IS)	7.729	315.8 -> 245.8	2439040	20.0000 ng/ml	0.001
Isodrin-13C12(IS)	7.789	199.9 -> 130.1	2978197	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	7.967	190.0 -> 125.0	1806551	20.0000 ng/ml	0.003
Heptachlor epoxide-13C10(IS)	7.963	362.8 -> 270.0	886505	20.0000 ng/ml	0.000
Pyrene-d10	8.765	212.0 -> 208.0	30242375	100.0000 ng/ml	0.001
Endrin-13C12(IS)	10.145	269.8 -> 200.0	439930	20.0000 ng/ml	0.009
4,4'-DDD d4(IS)	10.532	243.0 -> 173.1	3148921 ***m***	5.0000 ng/ml	0.033
4,4'-DDT-d4(IS)	11.791	243.0 -> 173.1	1875510	5.0000 ng/ml	0.001
Endrin ketone-13C12(IS)	13.080	327.9 -> 291.8	81878	20.0000 ng/ml	0.004
Methoxychlor-d6(IS)	13.394	233.0 -> 141.0	3314602	20.0000 ng/ml	0.003
Mirex-13C10(IS)	14.328	276.8 -> 241.8	2569862	5.0000 ng/ml	0.001

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	6518878	17.071 ng/ml	
		Spiked Amount =	20.0	Recovery =	*85.4 %*
γ-BHC-d6	5.491	223.9 -> 187.0	5985788	15.468 ng/ml	
		Spiked Amount =	20.0	Recovery =	*77.3 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	4045130	18.195 ng/ml	
		Spiked Amount =	20.0	Recovery =	*91.0 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	1653060	17.349 ng/ml	
		Spiked Amount =	20.0	Recovery =	*86.7 %*
Aldrin-13C	7.207	269.8 -> 200.0	2694289	16.017 ng/ml	
		Spiked Amount =	20.0	Recovery =	*80.1 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	2439040	16.088 ng/ml	
		Spiked Amount =	20.0	Recovery =	*80.4 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2978197	16.520 ng/ml	
		Spiked Amount =	20.0	Recovery =	*82.6 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1806551	16.899 ng/ml	
		Spiked Amount =	20.0	Recovery =	*84.5 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	886505	14.651 ng/ml	
		Spiked Amount =	20.0	Recovery =	*73.3 %*
Endrin-13C12	10.131	269.8 -> 200.0	439930	17.063 ng/ml	
		Spiked Amount =	20.0	Recovery =	*85.3 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	3148921 ***m***	4.918 ng/ml	
		Spiked Amount =	5.0	Recovery =	*98.4 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1875510	4.756 ng/ml	
		Spiked Amount =	5.0	Recovery =	*95.1 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	81878	15.045 ng/ml	
		Spiked Amount =	20.0	Recovery =	*75.2 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	3314602	15.157 ng/ml	
		Spiked Amount =	20.0	Recovery =	*75.8 %*

MassHunter Quantitative Analysis Sample Report

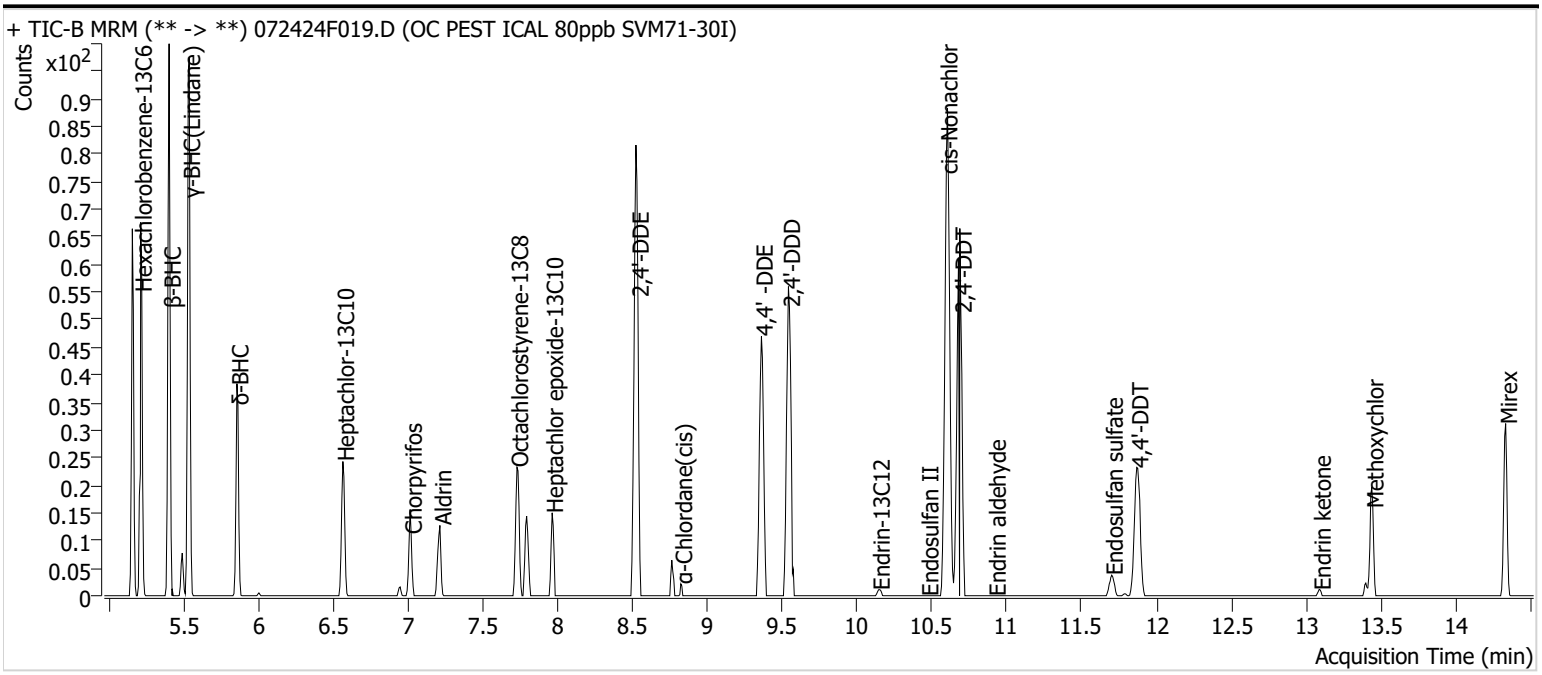
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	2569862	4.418 ng/ml
		Spiked Amount =	5.0	Recovery = *88.4 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.163	181.1 -> 145.1	38744363	91.812 ng/ml	90
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.214	283.8 -> 213.9	35519760	71.403 ng/ml	97
β-BHC	γ-BHC-d6(IS)	5.408	181.1 -> 145.1	28311904	100.171 ng/ml	90
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	34715047	96.190 ng/ml	87
δ-BHC	γ-BHC-d6(IS)	5.859	181.1 -> 145.1	27152103	103.354 ng/ml	89
Heptachlor	Heptachlor-13C10(IS)	6.569	271.7 -> 236.9	16730988	76.866 ng/ml	91
Chorpyrifos	Chorpyrifos-d10(IS)	7.019	196.9 -> 169.0	10145586	90.176 ng/ml	96
Aldrin	Aldrin-13C(IS)	7.215	254.9 -> 220.0	5729740	79.469 ng/ml	93
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.735	342.8 -> 307.8	24820445	82.811 ng/ml	99
Isodrin	Isodrin-13C12(IS)	7.796	193.0 -> 123.0	12959554	82.859 ng/ml	99
Oxychlordane	Oxychlordane-13C10(IS)	7.968	114.9 -> 51.1	19625877	84.069 ng/ml	99
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.971	352.8 -> 262.9	4045920	86.182 ng/ml	93
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.510	271.8 -> 236.9	8064240	84.956 ng/ml	85
2,4'-DDE	4,4'-DDD d4(IS)	8.533	246.0 -> 176.2	90133798	80.084 ng/ml	99
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.823	271.8 -> 236.9	9967920	86.820 ng/ml	98
Endosulfan I	Endrin-13C12(IS)	8.847	206.9 -> 172.0	3501285	88.548 ng/ml	95
trans-Nanochlor	Oxychlordane-13C10(IS)	8.891	271.8 -> 236.9	6566130	80.396 ng/ml	90
4,4' -DDE	4,4'-DDD d4(IS)	9.364	246.0 -> 176.2	62621544	78.105 ng/ml	99
Dieldrin	Endrin-13C12(IS)	9.555	262.9 -> 193.0	4161190	84.861 ng/ml	97
2,4'-DDD	4,4'-DDD d4(IS)	9.546	235.0 -> 165.1	68738219	76.026 ng/ml	100
Endrin	Endrin-13C12(IS)	10.153	262.8 -> 193.0	2232455	82.121 ng/ml	98
Endosulfan II	Endrin-13C12(IS)	10.471	206.9 -> 172.0	1979843	94.281 ng/ml	99
cis-Nonachlor	Oxychlordane-13C10(IS)	10.598	271.8 -> 236.9	5897752	83.998 ng/ml	91
4,4'-DDD	4,4'-DDD d4(IS)	10.608	235.0 -> 165.1	56695753	85.046 ng/ml	96
2,4'-DDT	4,4'-DDT-d4(IS)	10.692	235.0 -> 165.1	46846054	85.312 ng/ml	96
Endrin aldehyde	Endrin-13C12(IS)	10.920	249.9 -> 214.9	745981	96.057 ng/ml	95
Endosulfan sulfate	Endrin-13C12(IS)	11.702	271.9 -> 237.0	5600921	101.434 ng/ml	92
4,4'-DDT	4,4'-DDT-d4(IS)	11.874	235.0 -> 165.1	36866175	86.850 ng/ml	96
Endrin ketone	Endrin ketone-13C12(IS)	13.092	147.0 -> 111.0	1742310	94.804 ng/ml	94
Methoxychlor	Methoxychlor-d6(IS)	13.443	227.0 -> 141.1	17574654	101.765 ng/ml	97
Mirex	Mirex-13C10(IS)	14.336	271.8 -> 236.8	33952928	64.121 ng/ml	96

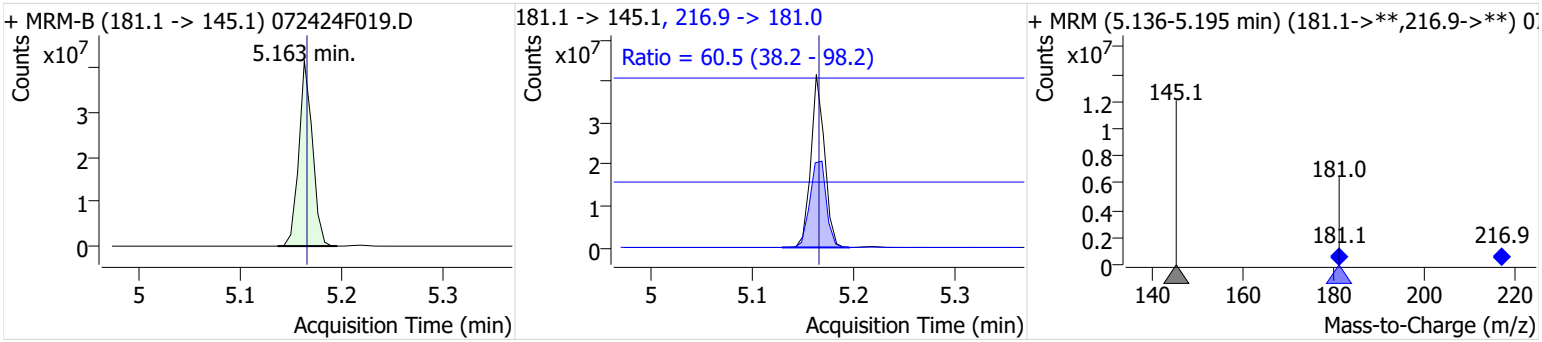
(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram

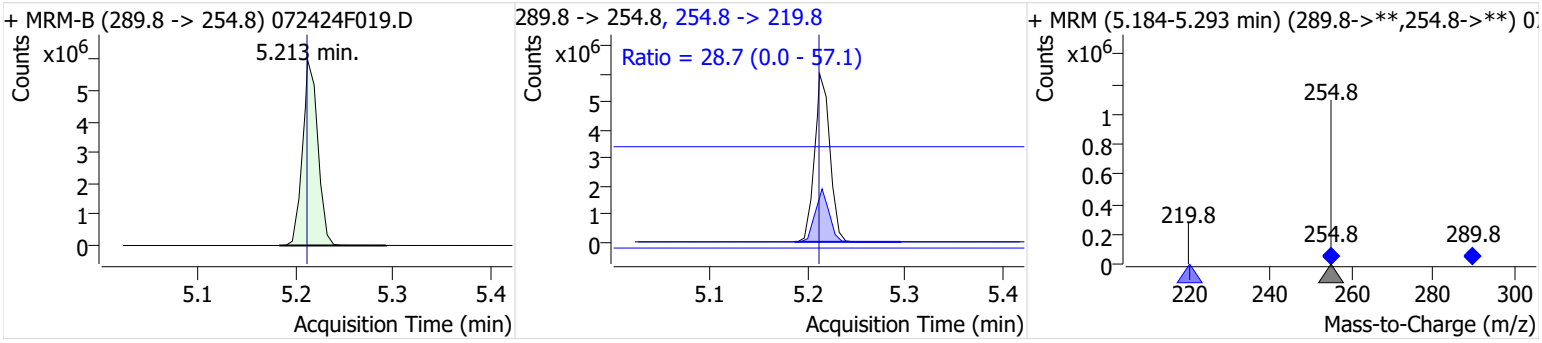
MassHunter Quantitative Analysis Sample Report



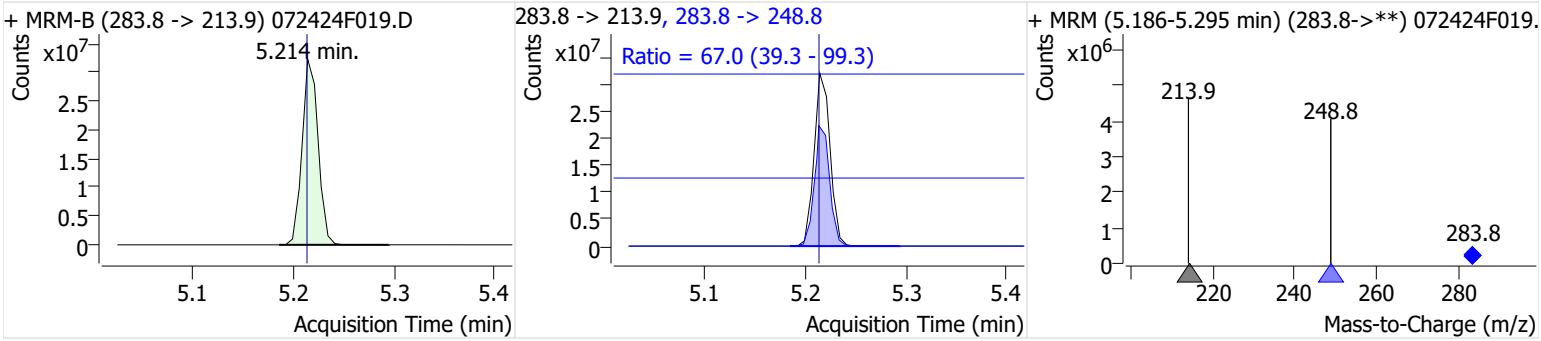
α-BHC



Hexachlorobenzene-13C6



Hexachlorobenzene



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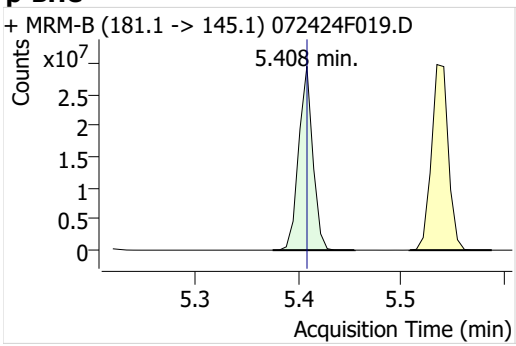
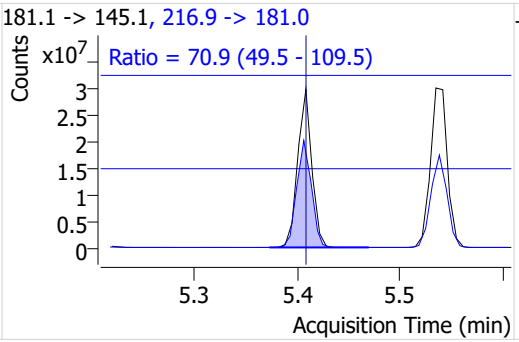
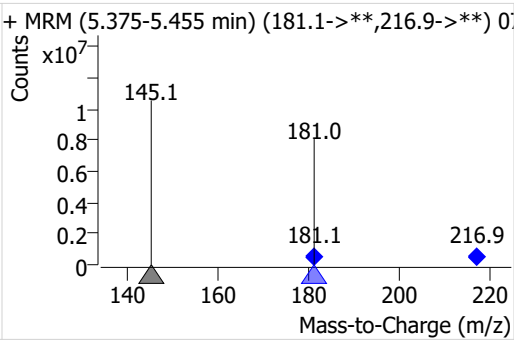
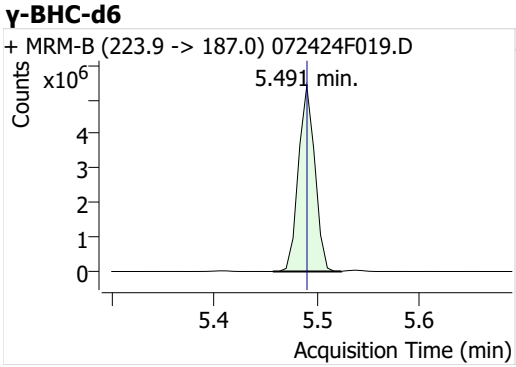
β-BHC

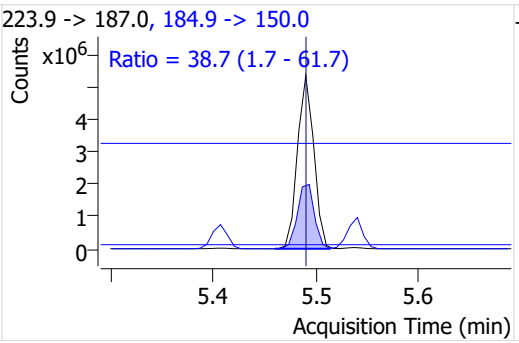


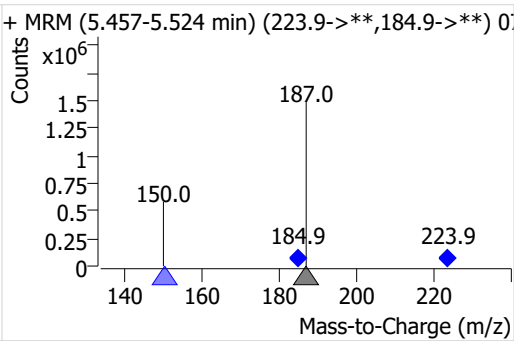




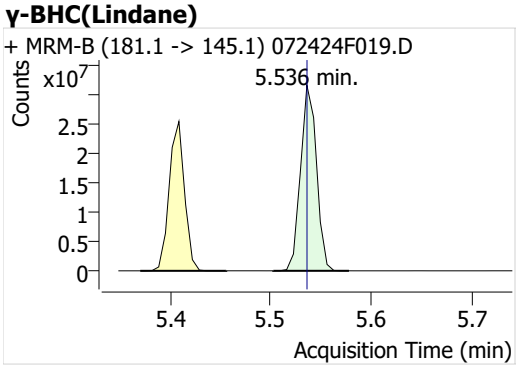
γ-BHC-d6

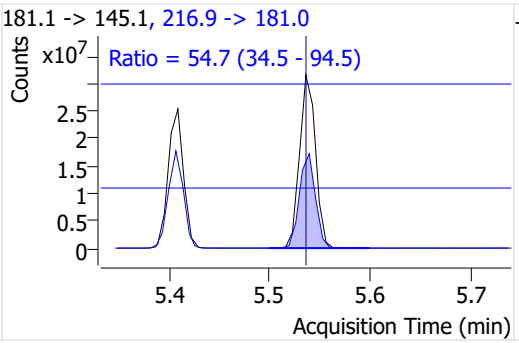


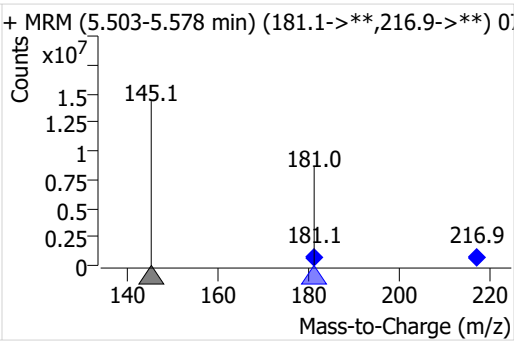




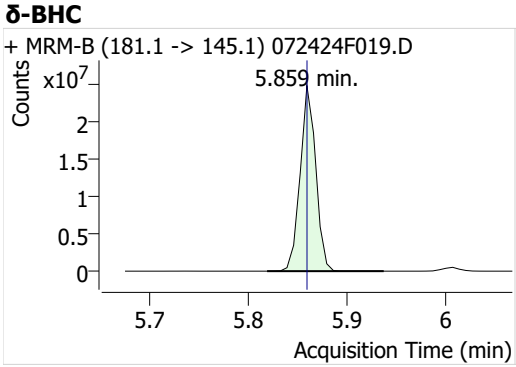
γ-BHC(Lindane)

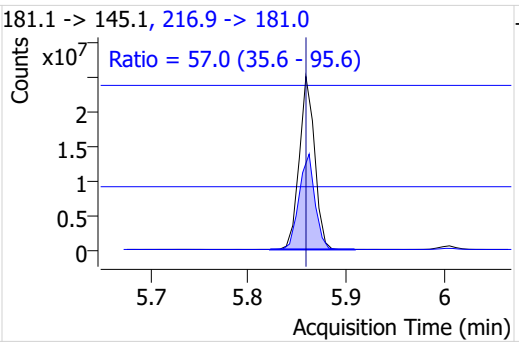


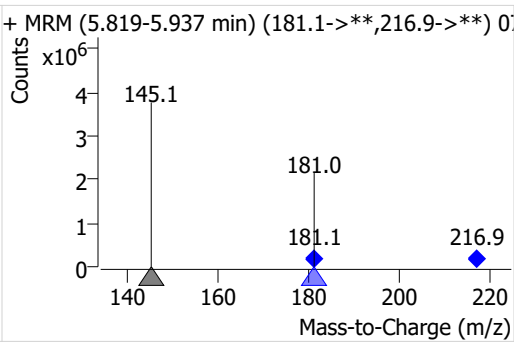




δ-BHC







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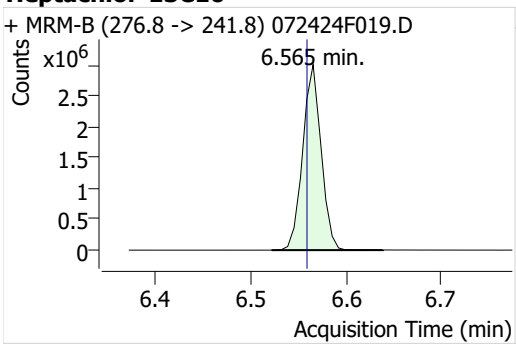
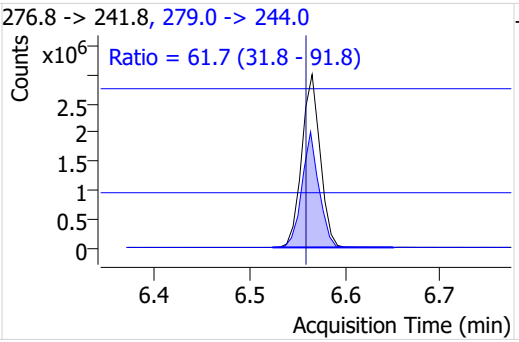
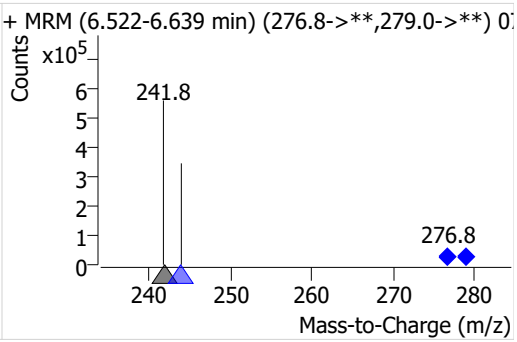
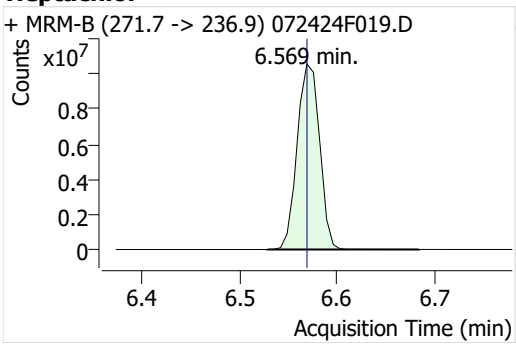
Heptachlor-13C10

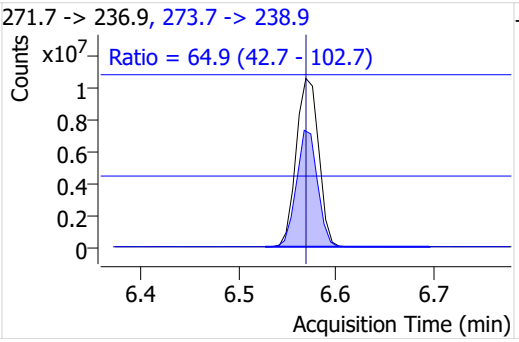


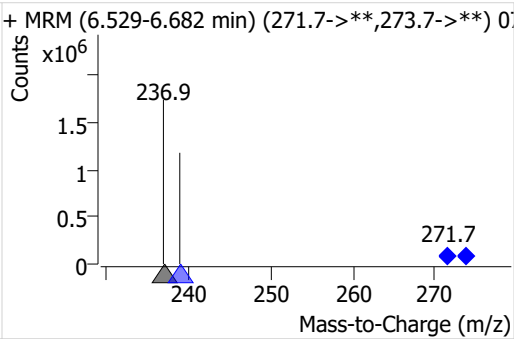




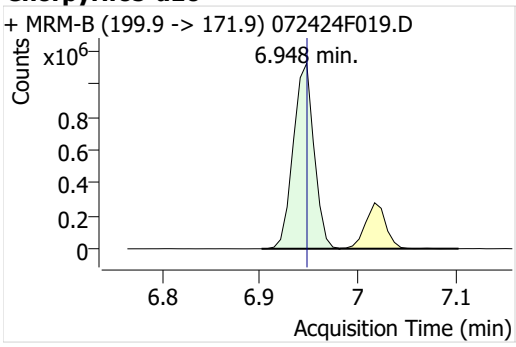
Heptachlor

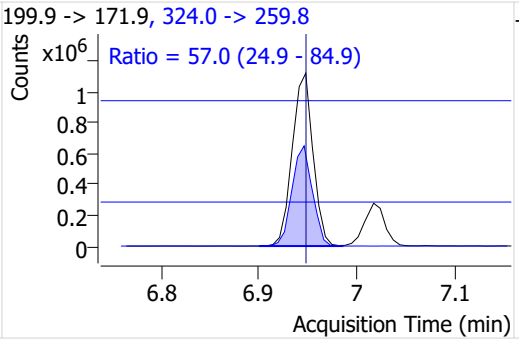


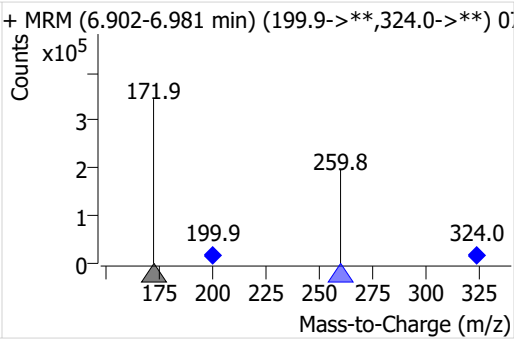




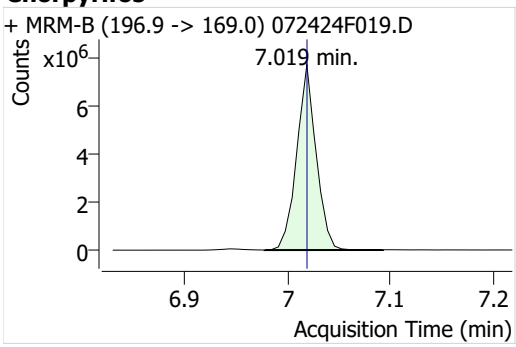
Chorpyrifos-d10

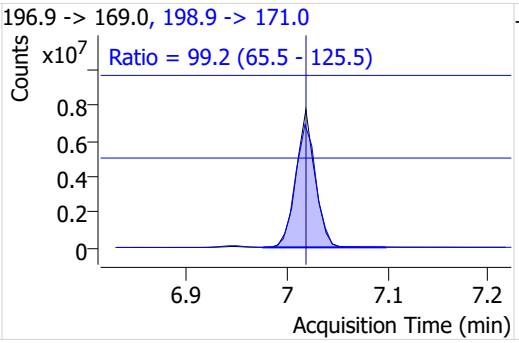


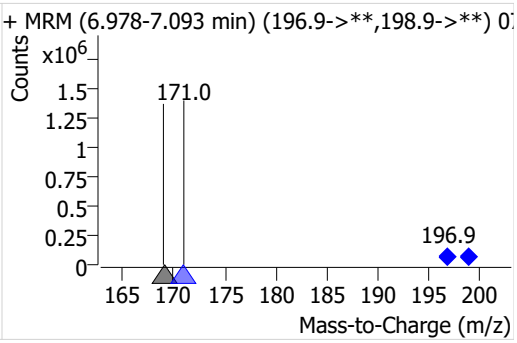




Chorpyrifos







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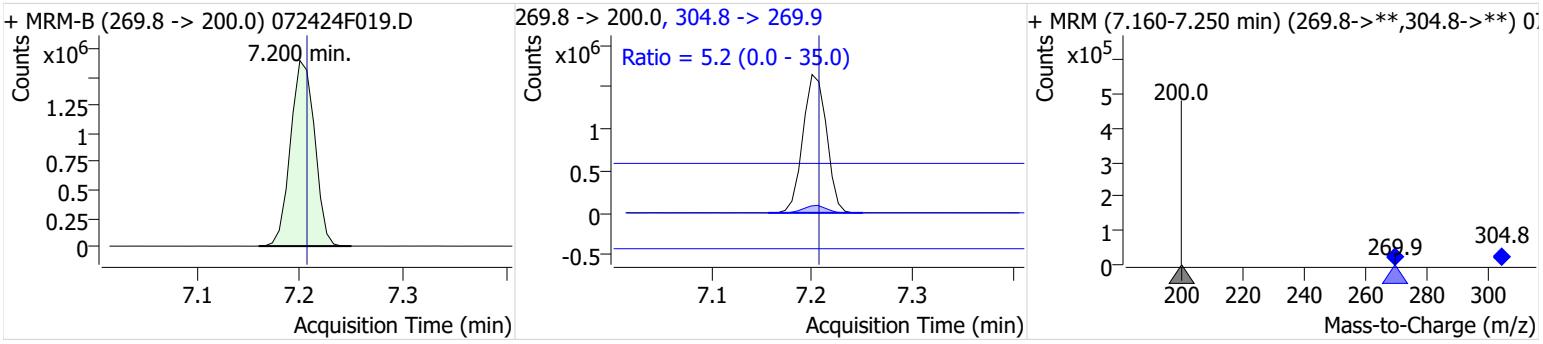
Aldrin-13C



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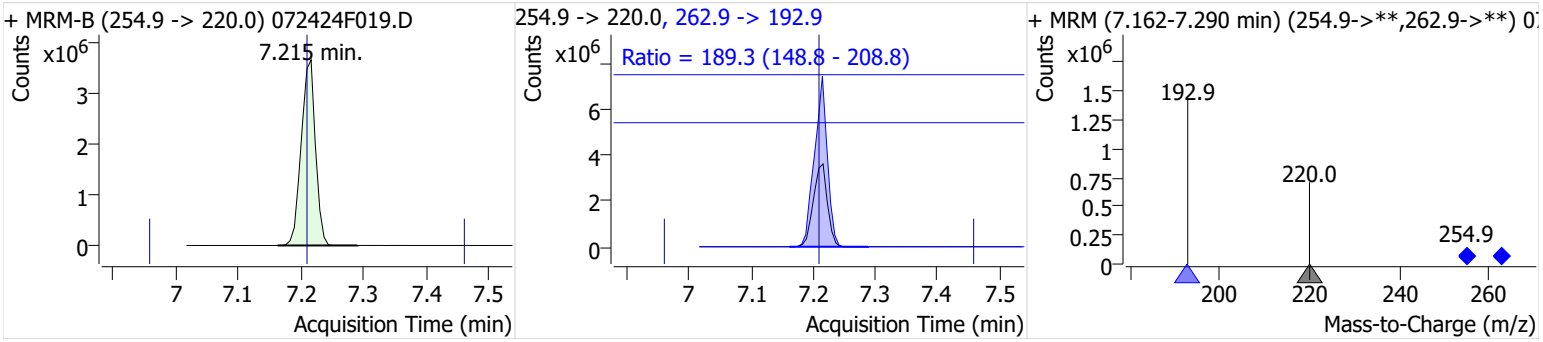
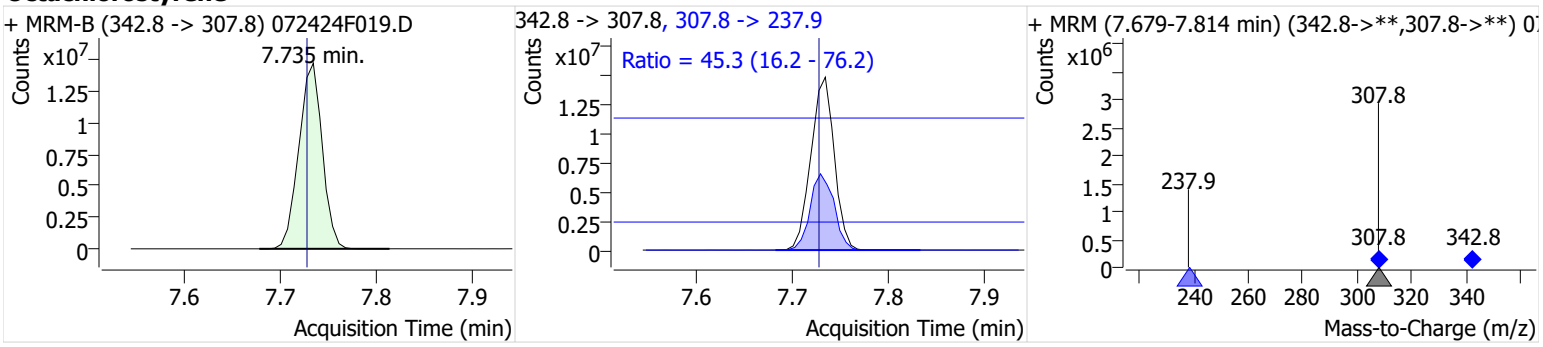
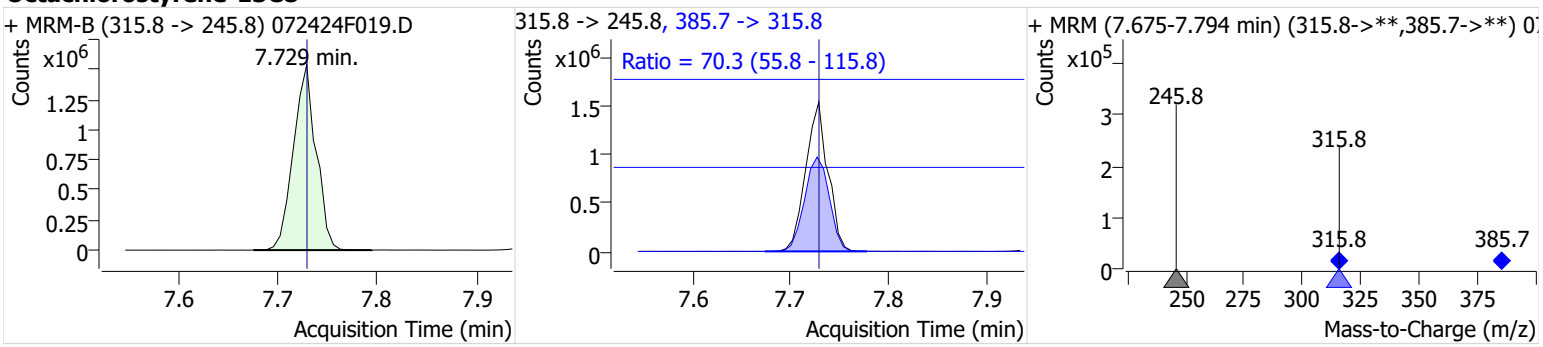


Octachlorostyrene



Octachlorostyrene-13C8



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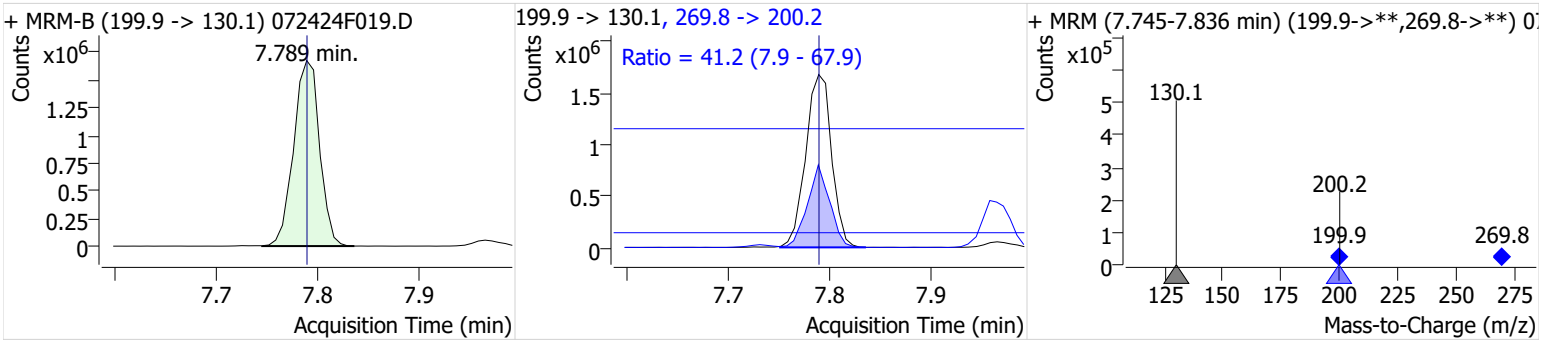
Isodrin-13C12



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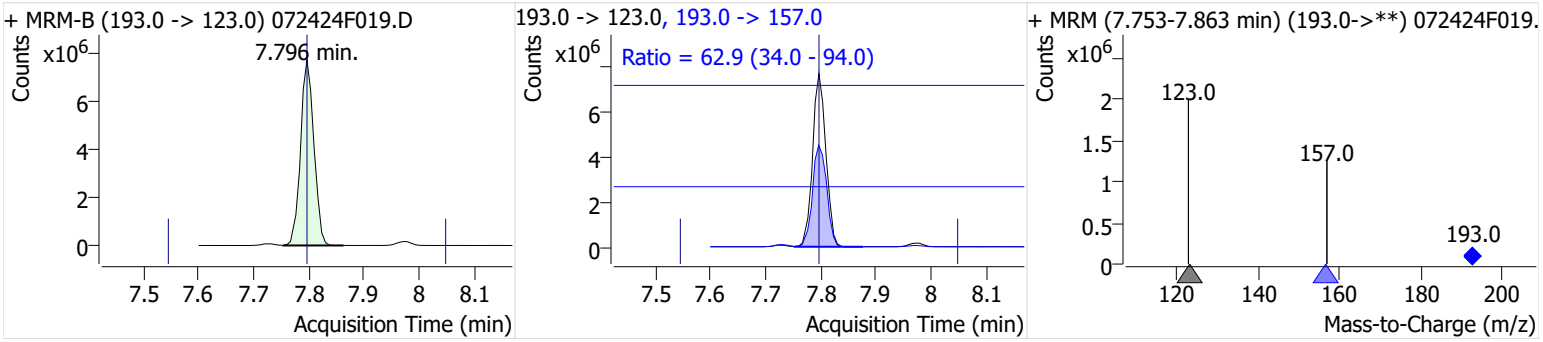
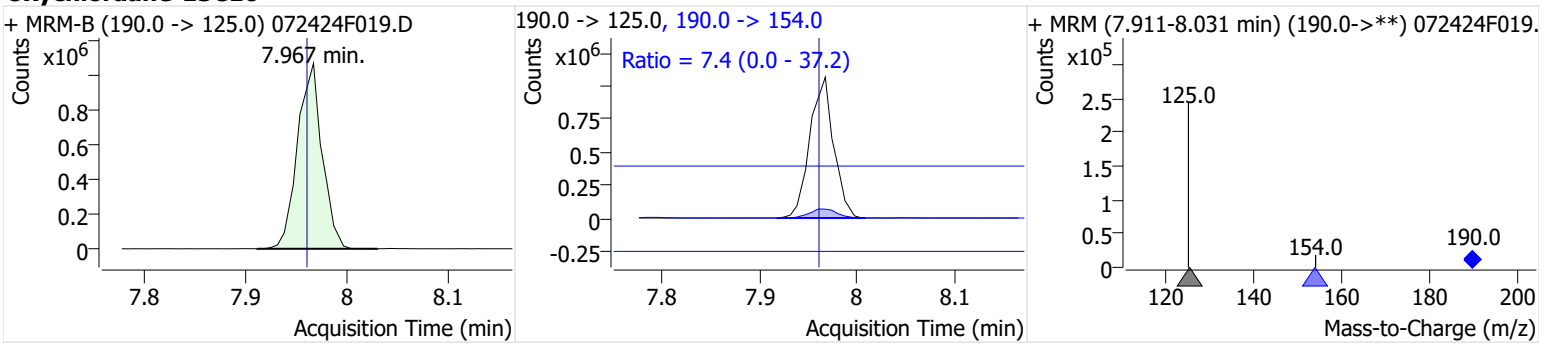
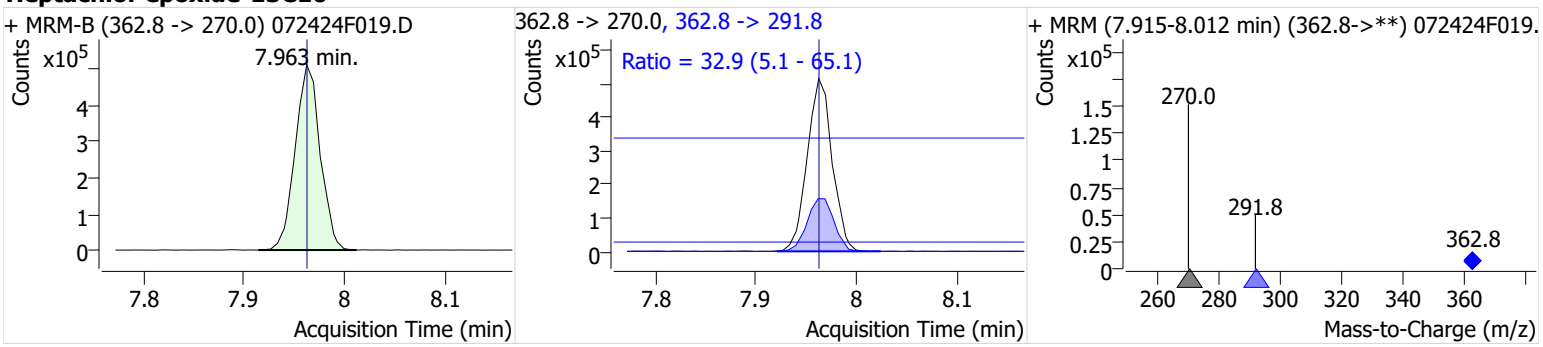


Oxychlordane-13C10



Heptachlor epoxide-13C10



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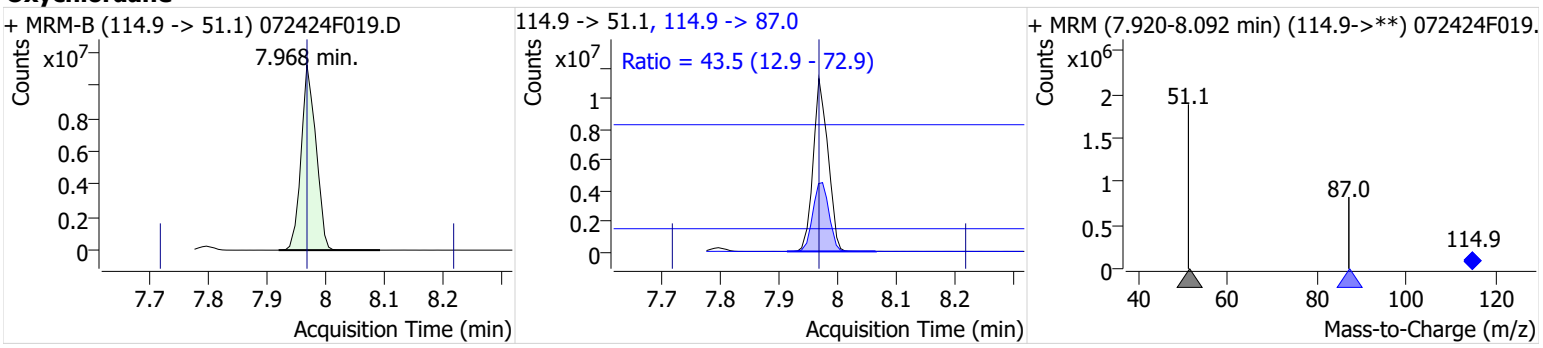
Oxychlordane



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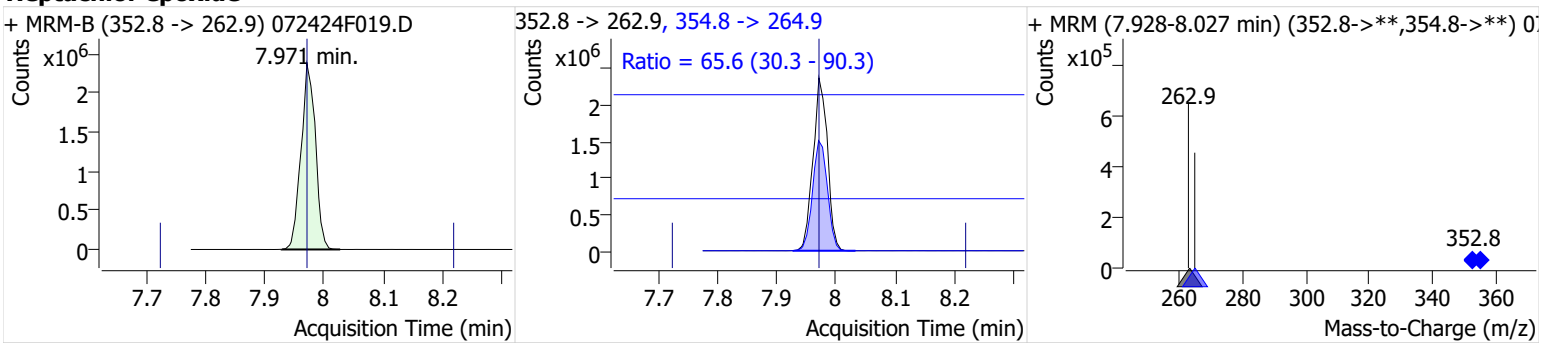
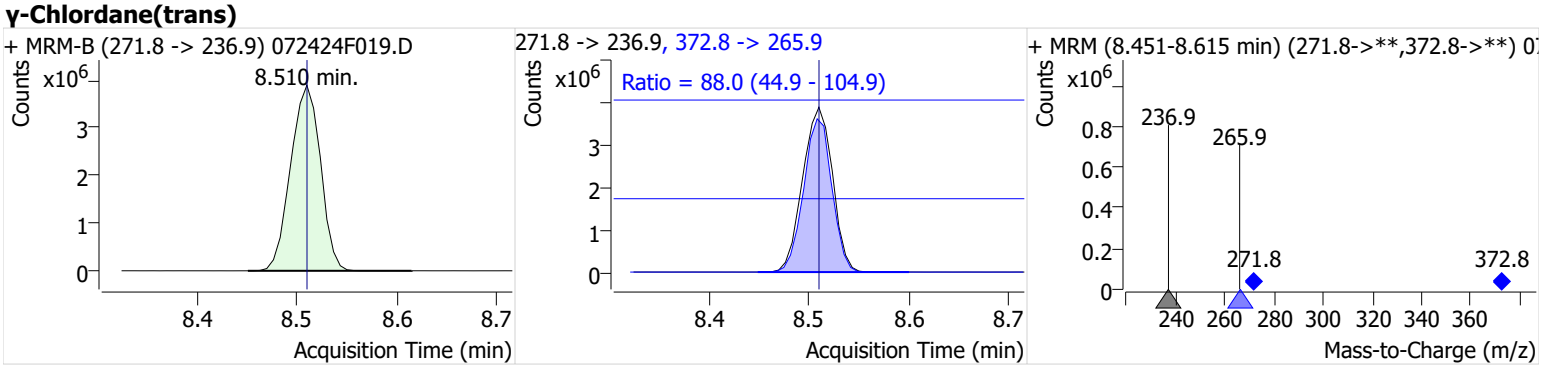
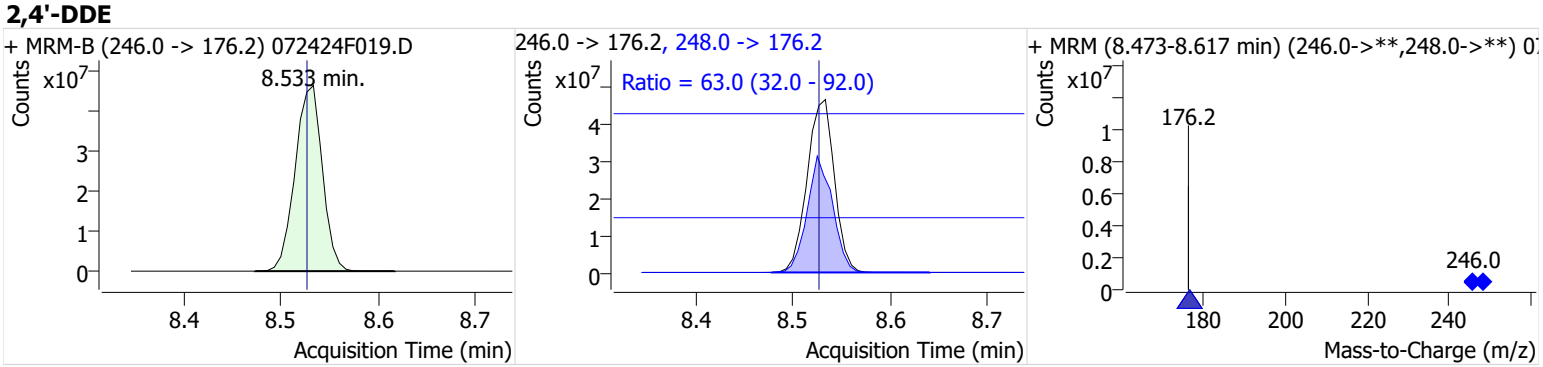


γ-Chlordane(trans)



2,4'-DDE



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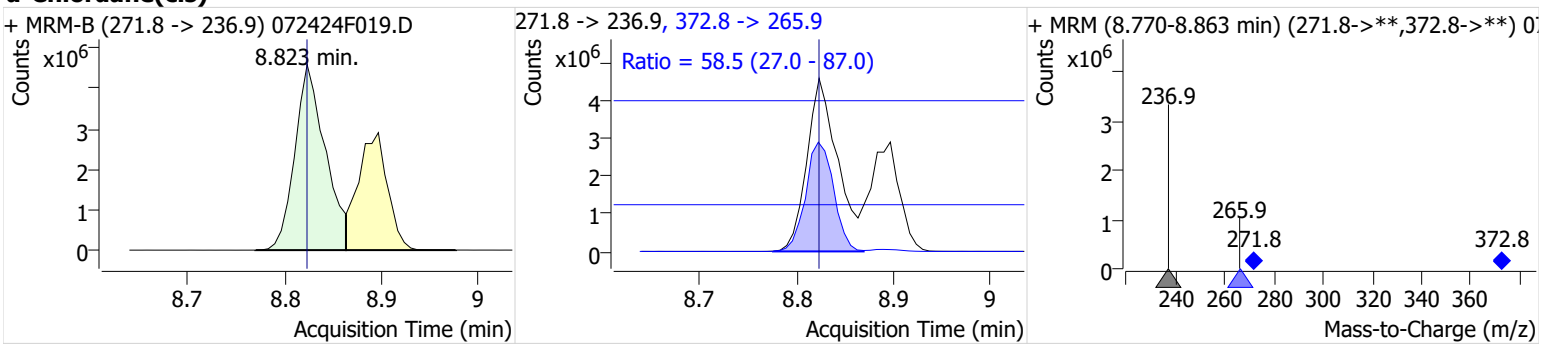
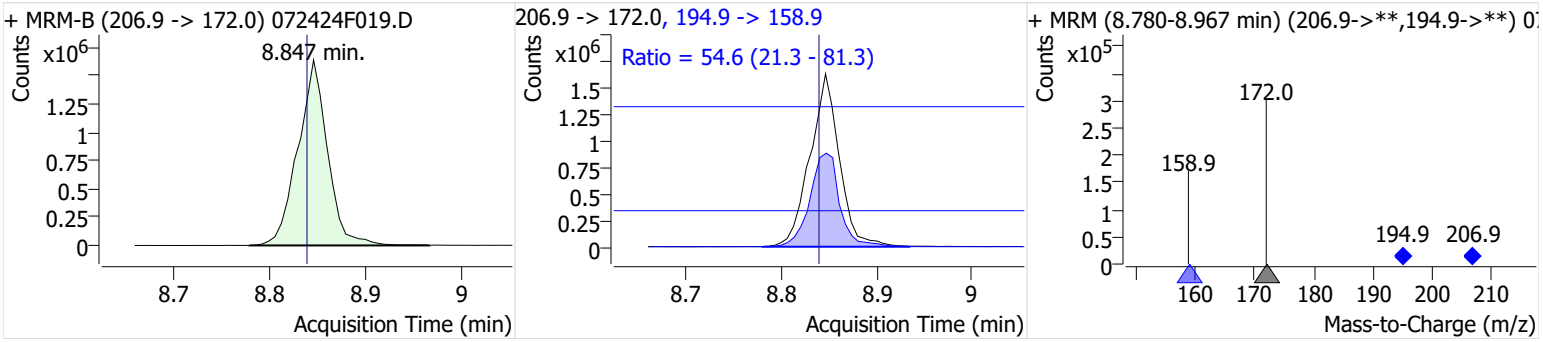
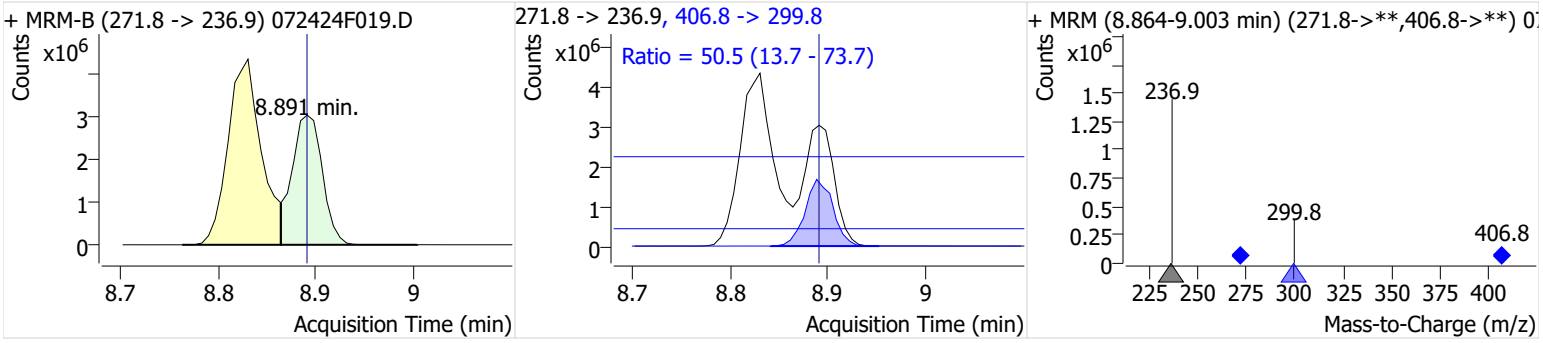
α-Chlordane(cis)



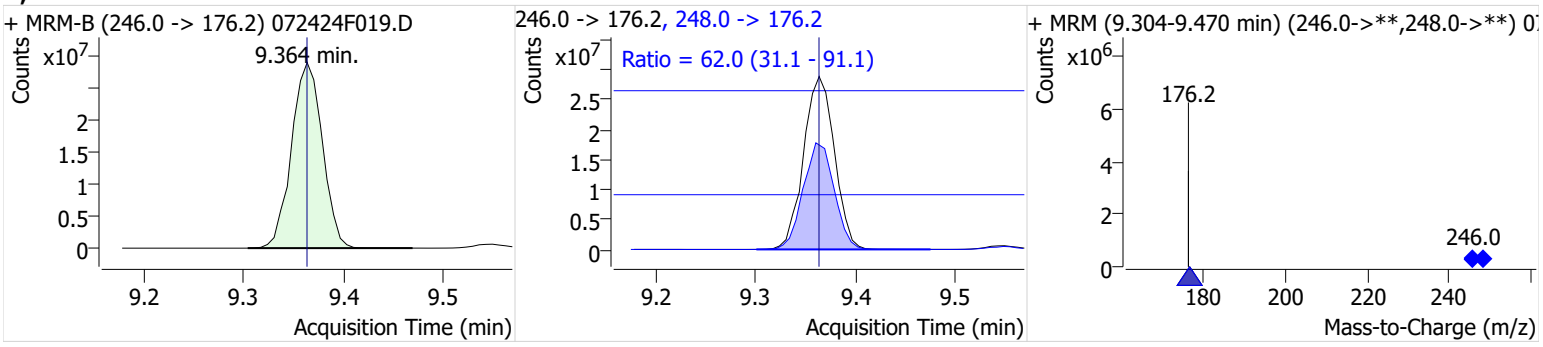
Endosulfan I



trans-Nanochlor



4,4' -DDE



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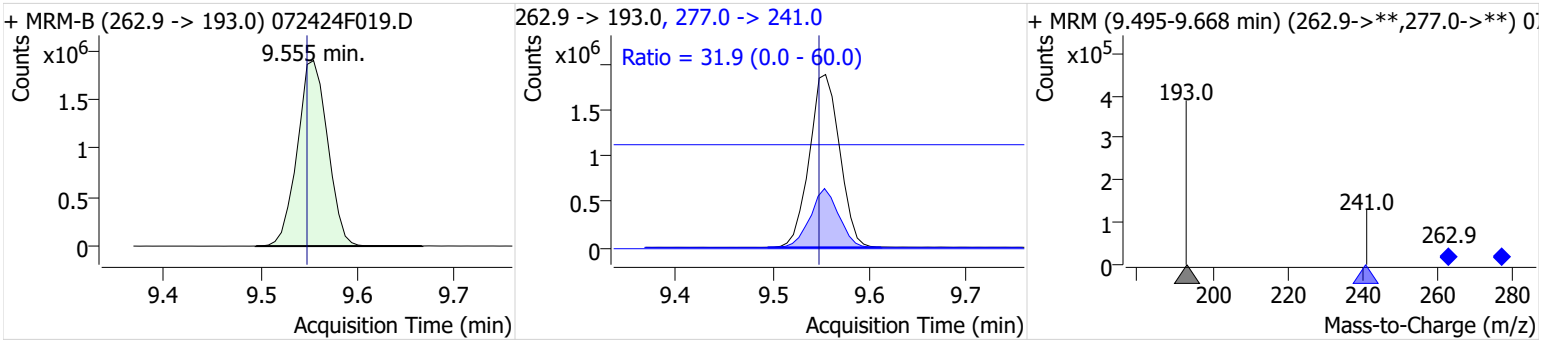
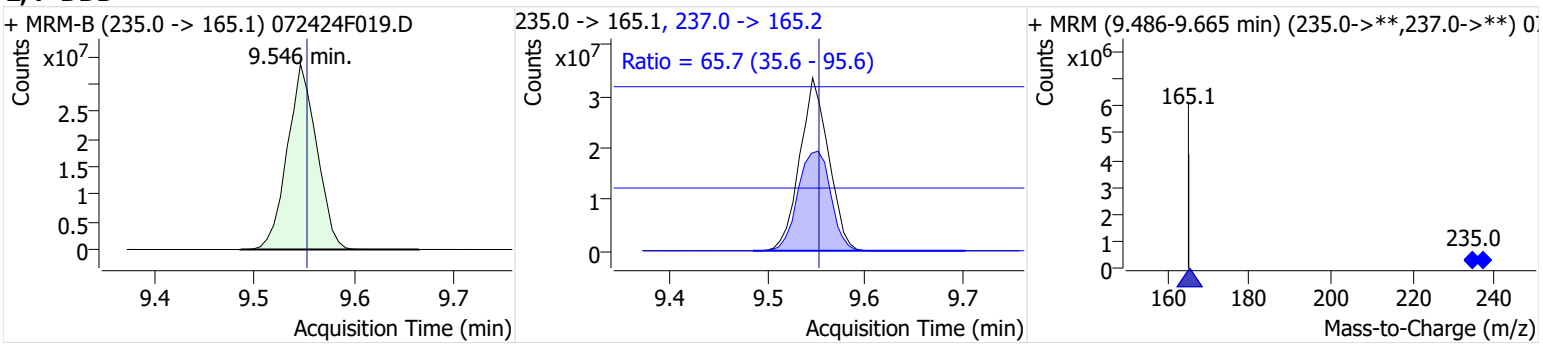
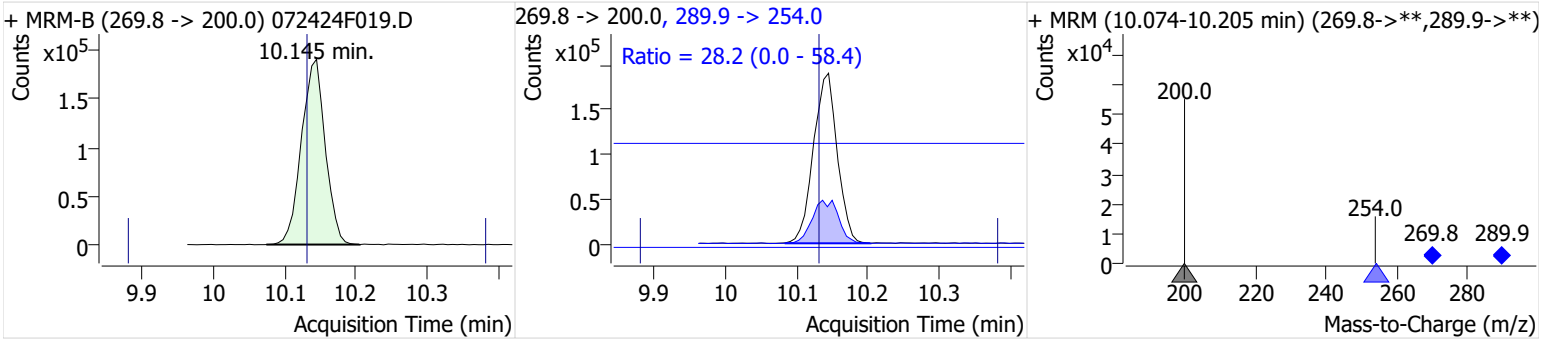
Dieldrin



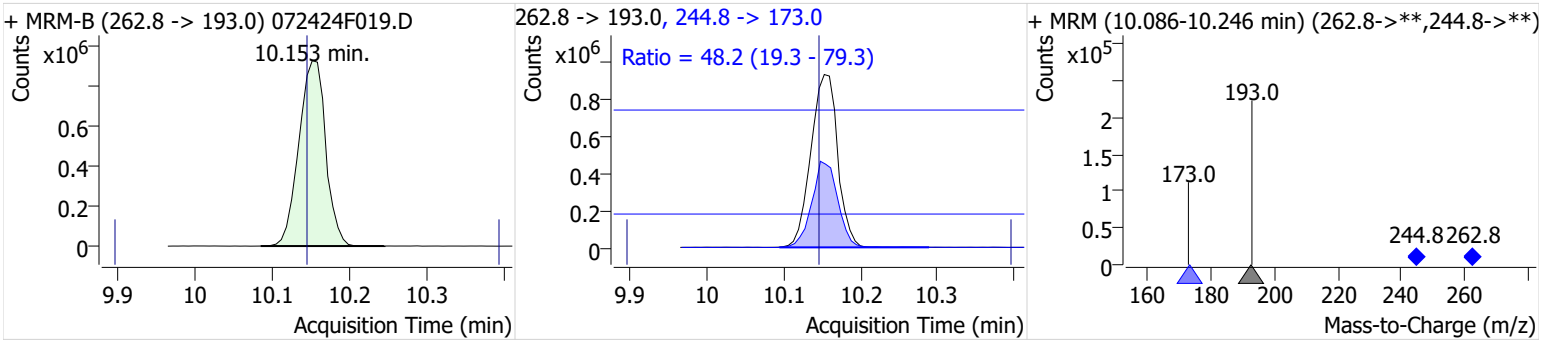
2,4'-DDD



Endrin-13C12



Endrin



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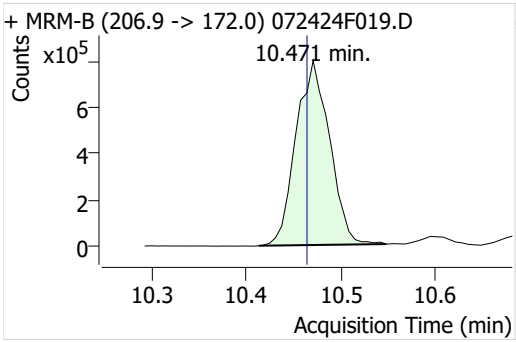
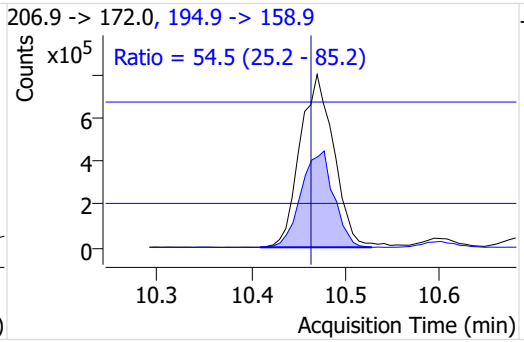
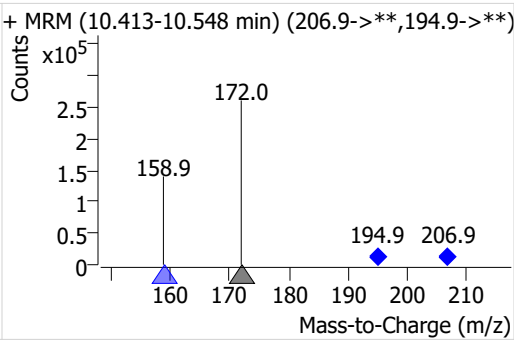
Endosulfan II

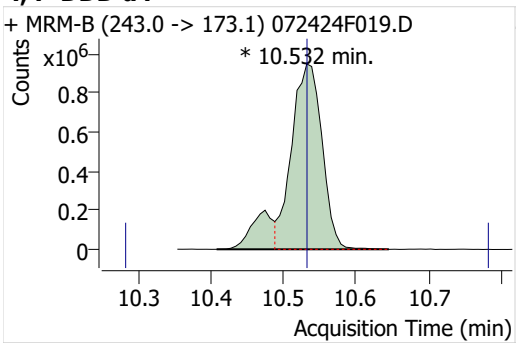


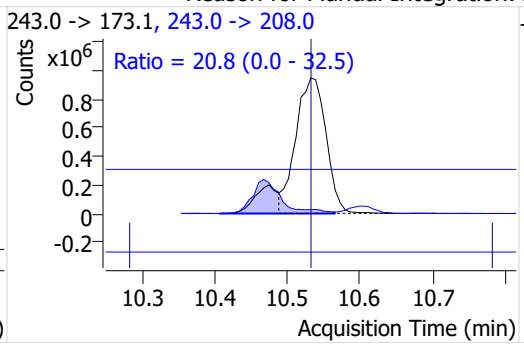


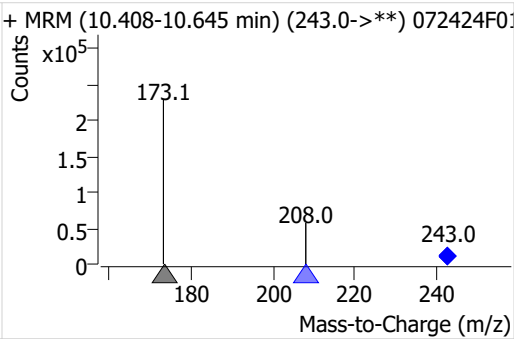


4,4'-DDD d4

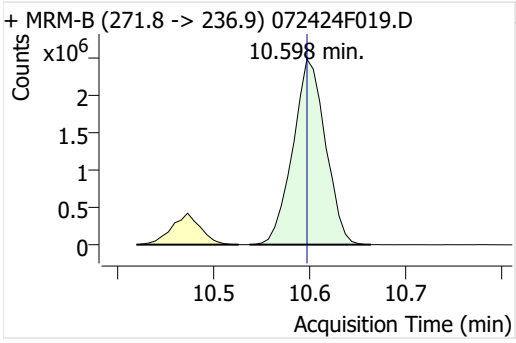
Reason for Manual Integration: **BLC**

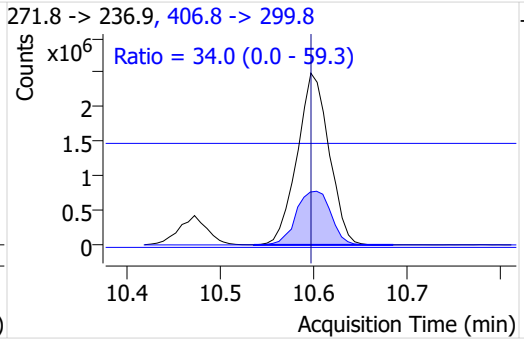


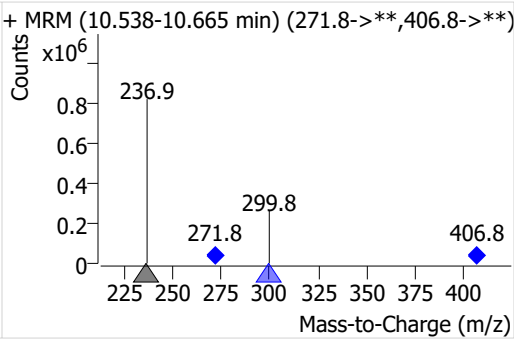




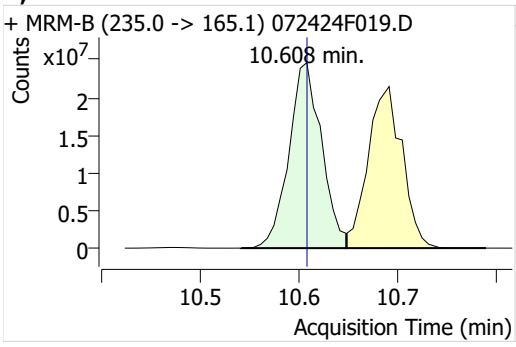
cis-Nonachlor

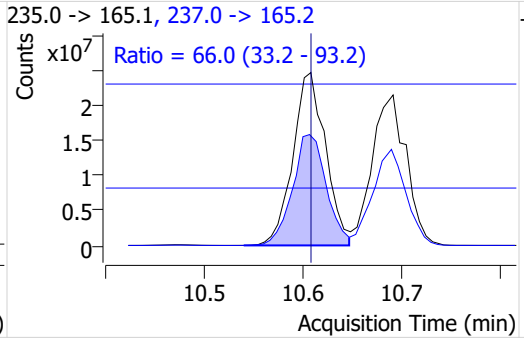


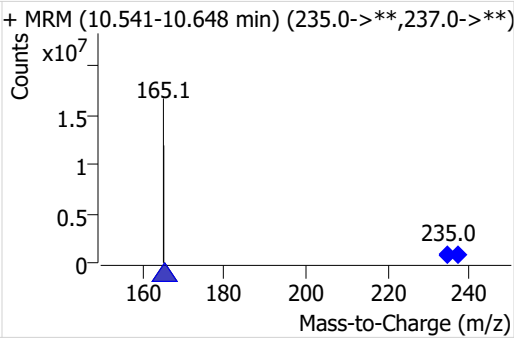




4,4'-DDD







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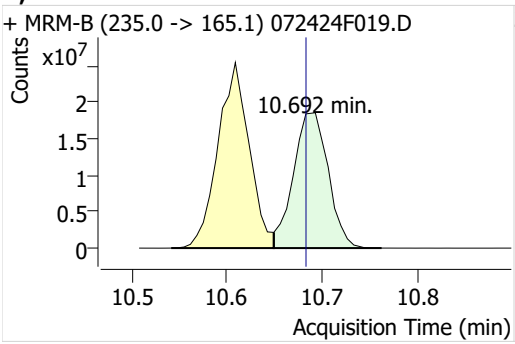
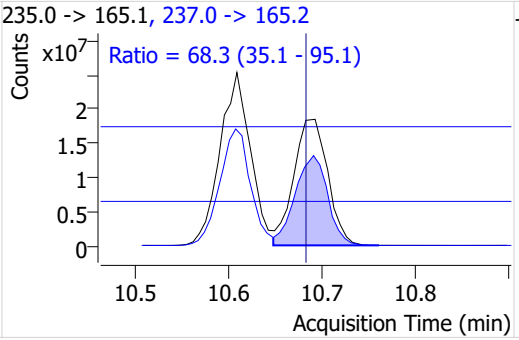
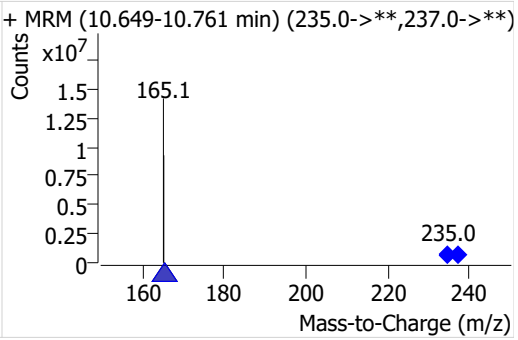
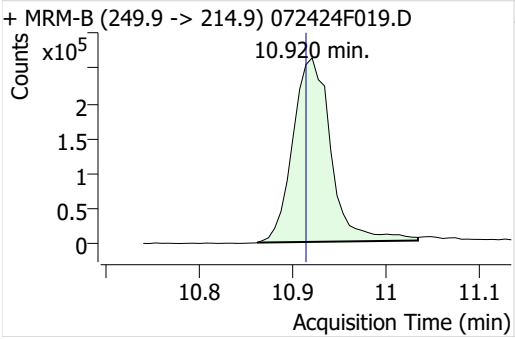
2,4'-DDT

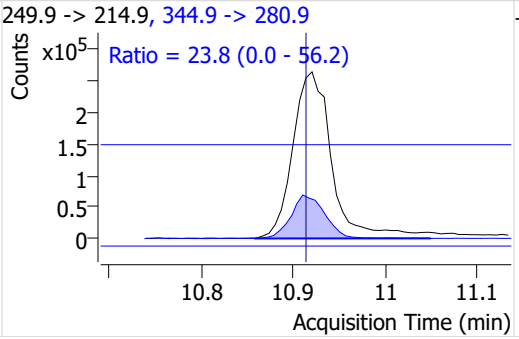


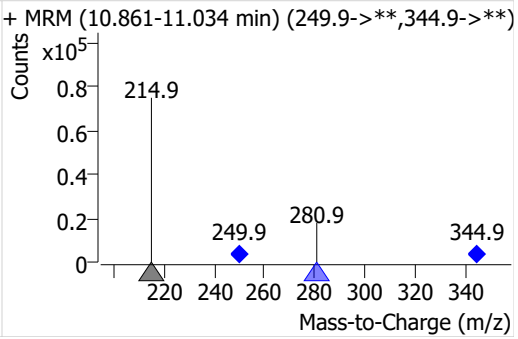




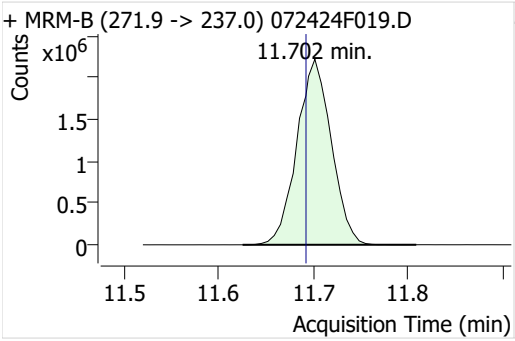
Endrin aldehyde

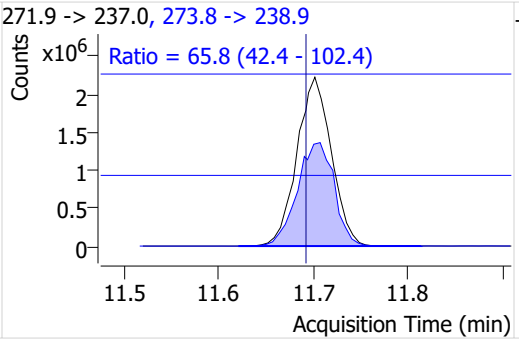


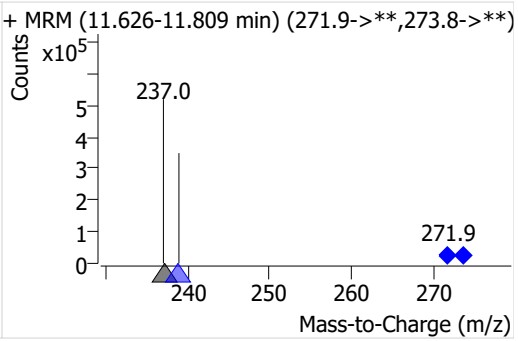




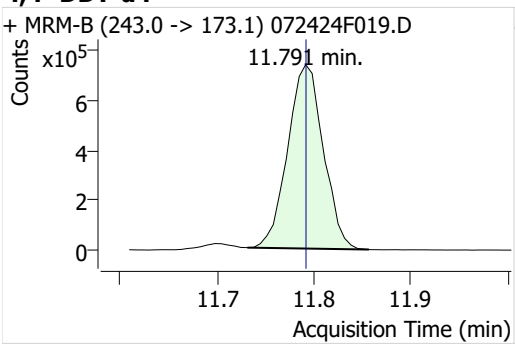
Endosulfan sulfate

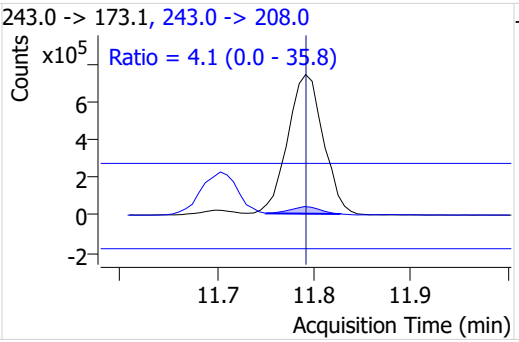


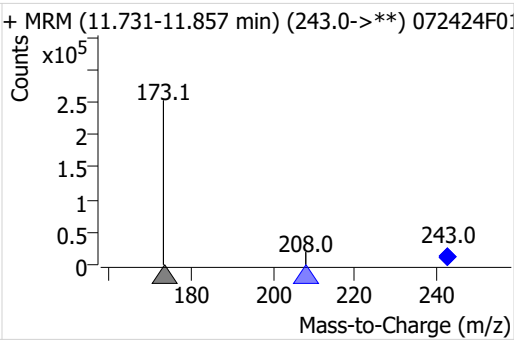




4,4'-DDT-d4







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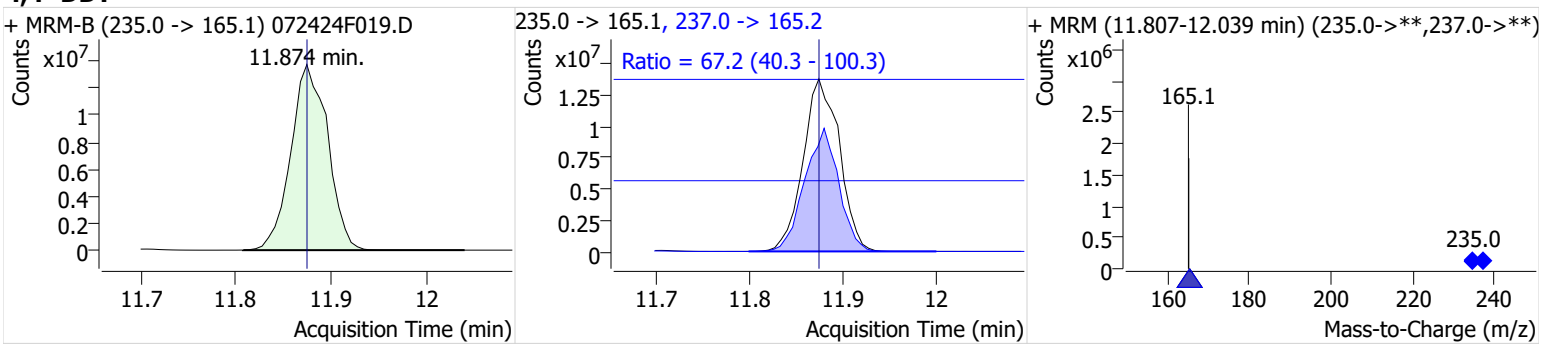
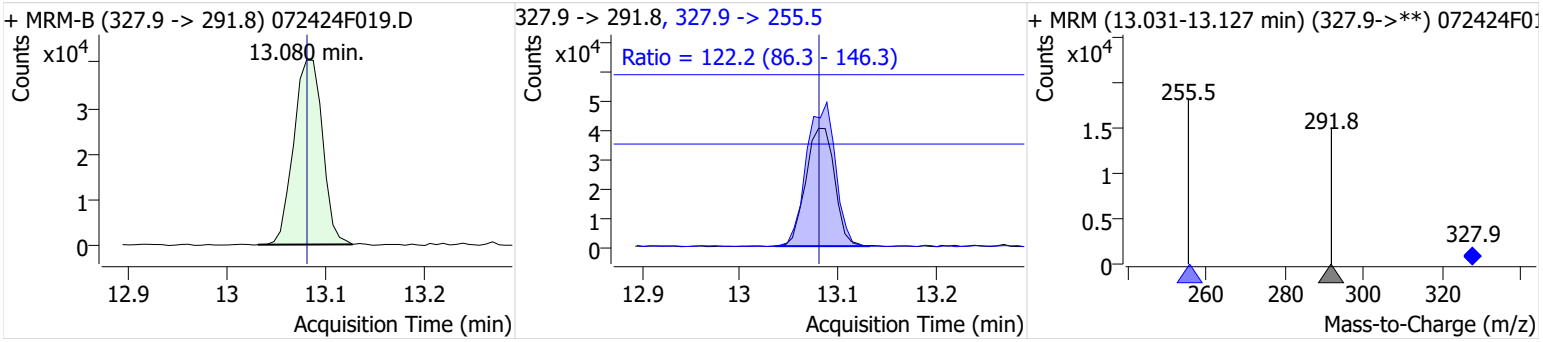
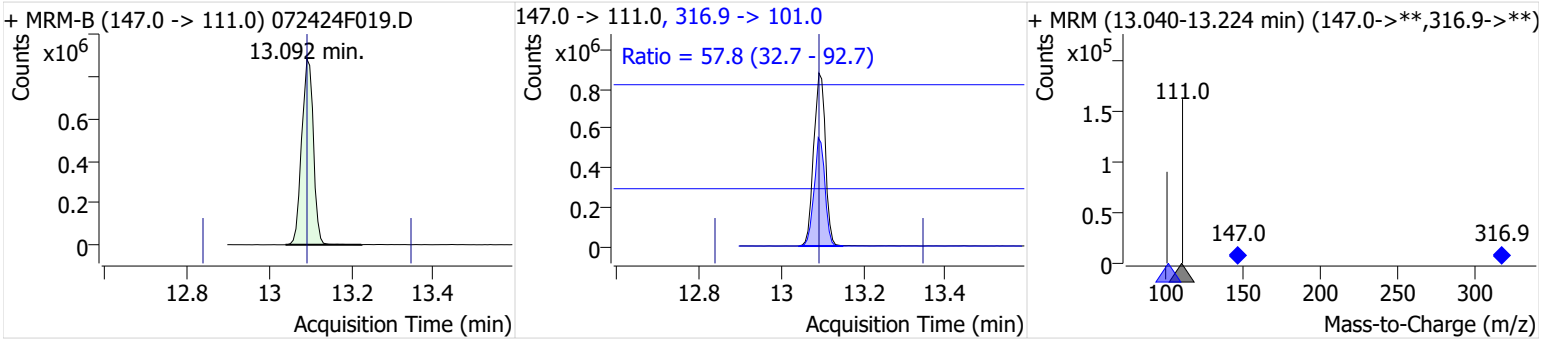
4,4'-DDT



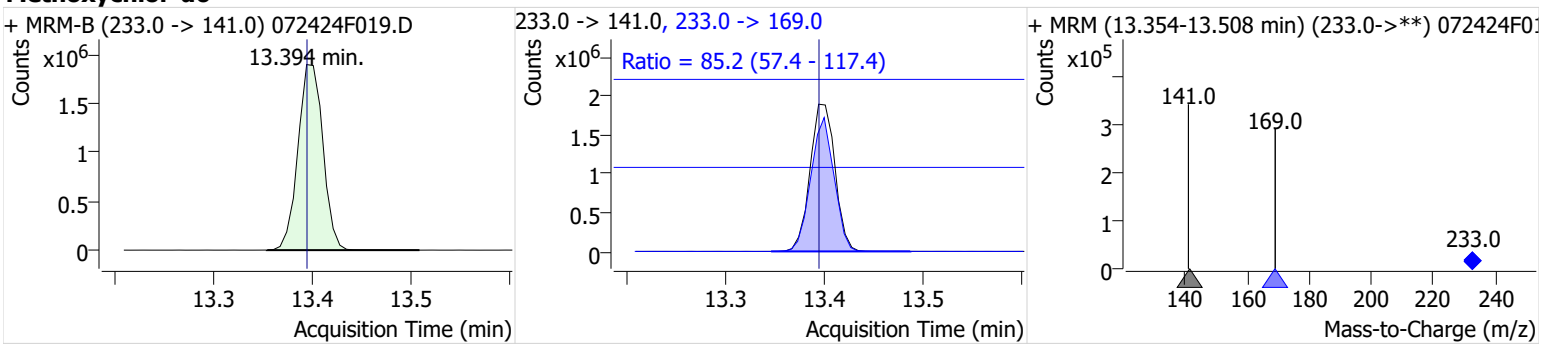
Endrin ketone-13C12



Endrin ketone



Methoxychlor-d6



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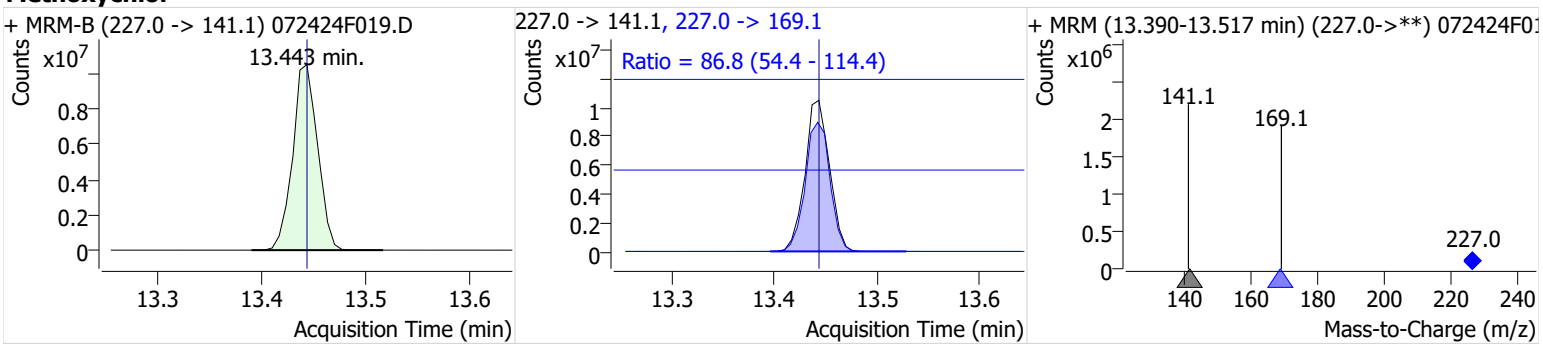
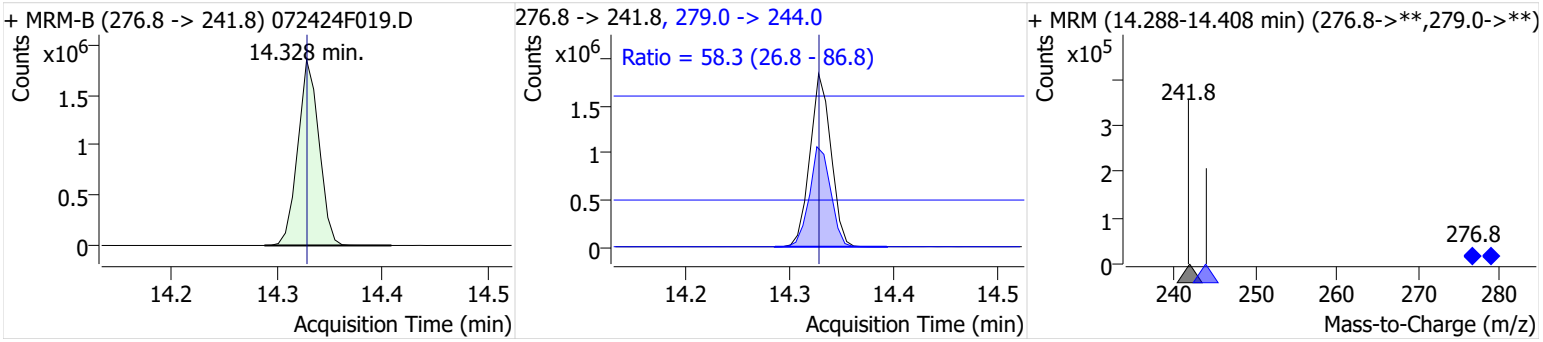
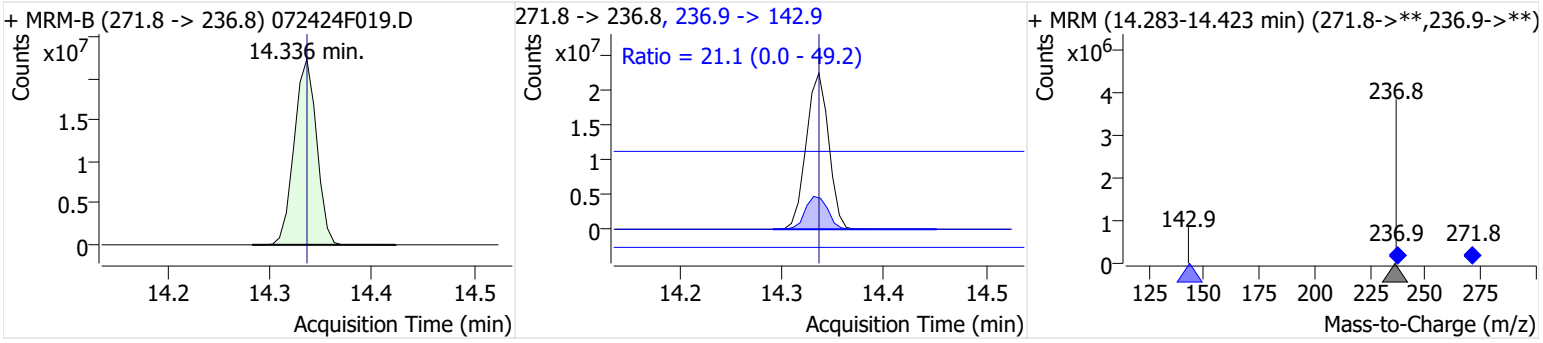
Methoxychlor



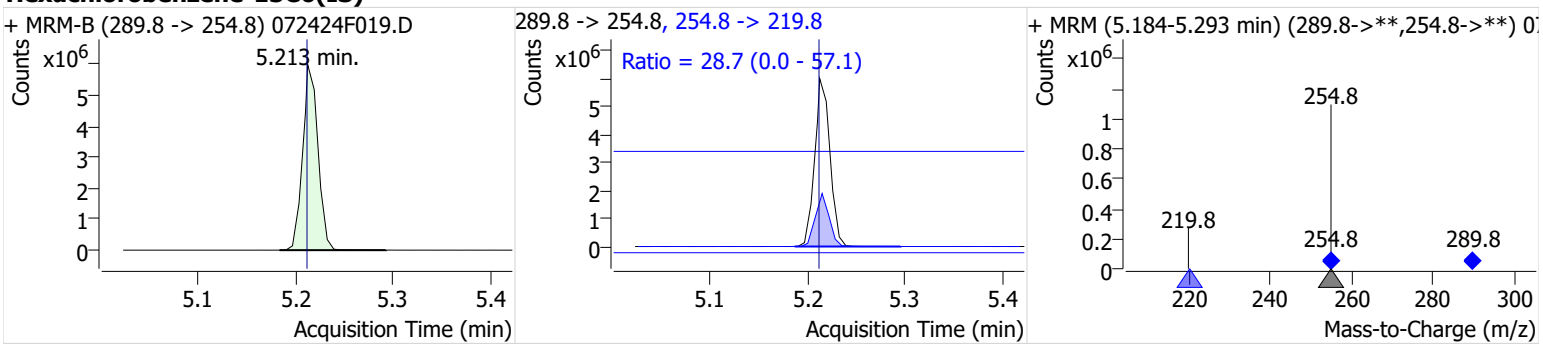
Mirex-13C10



Mirex

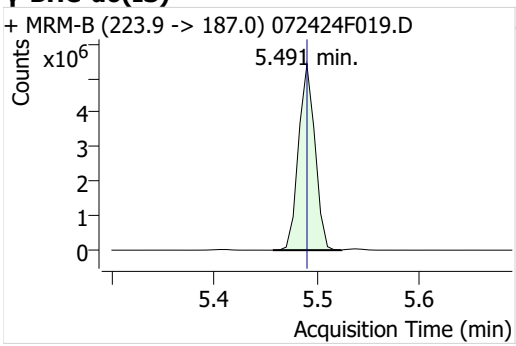


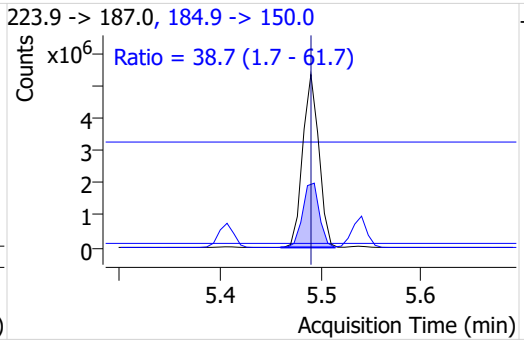
Hexachlorobenzene-13C6(IS)

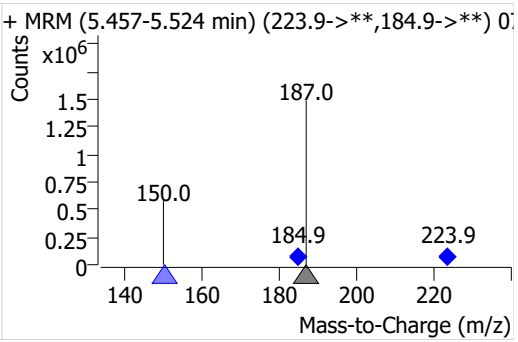


MassHunter Quantitative Analysis Sample Report

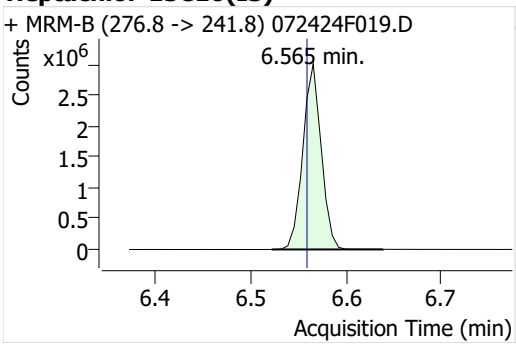
γ-BHC-d6(IS)

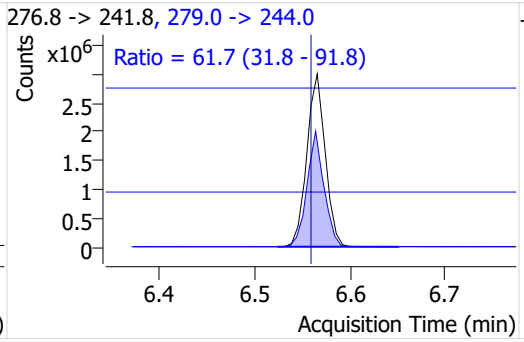


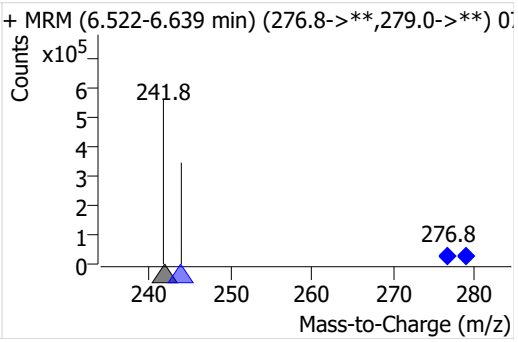




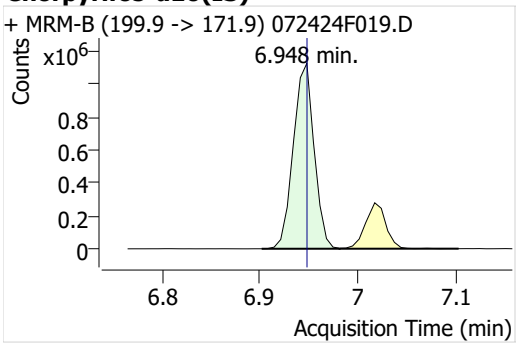
Heptachlor-13C10(IS)

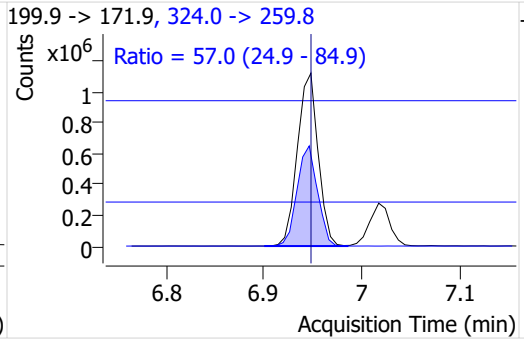


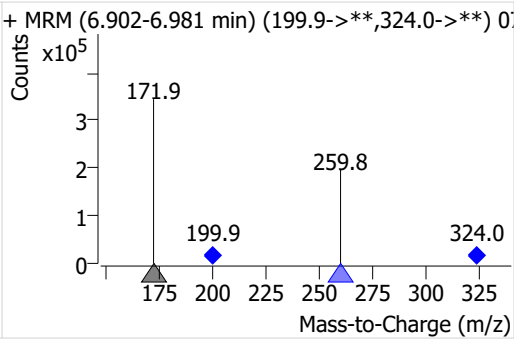




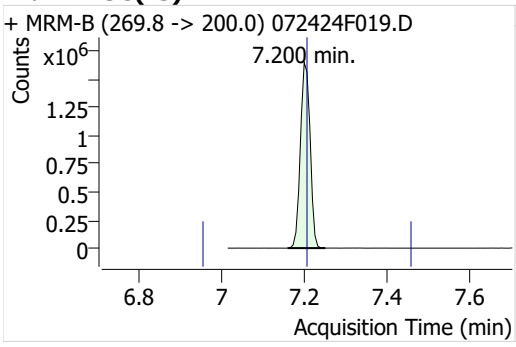
Chorpyrifos-d10(IS)

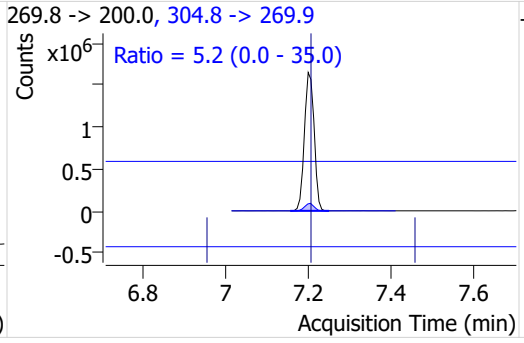


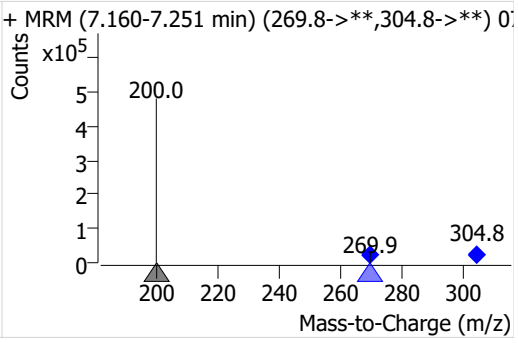




Aldrin-13C(IS)

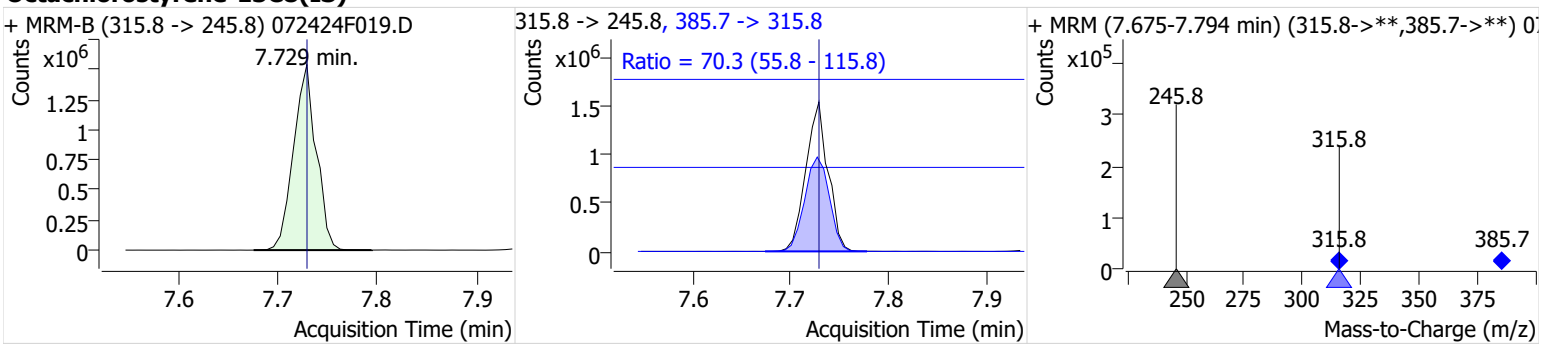




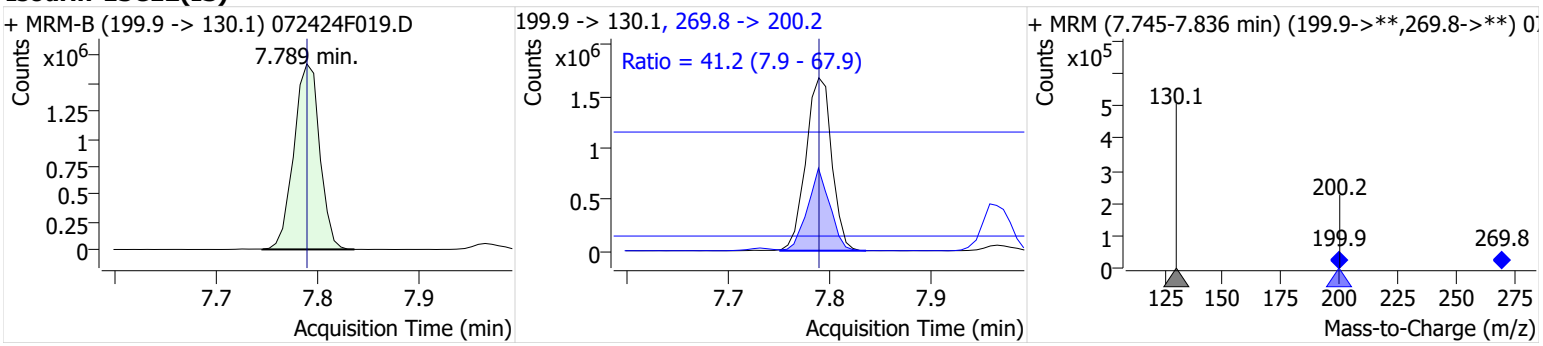


MassHunter Quantitative Analysis Sample Report

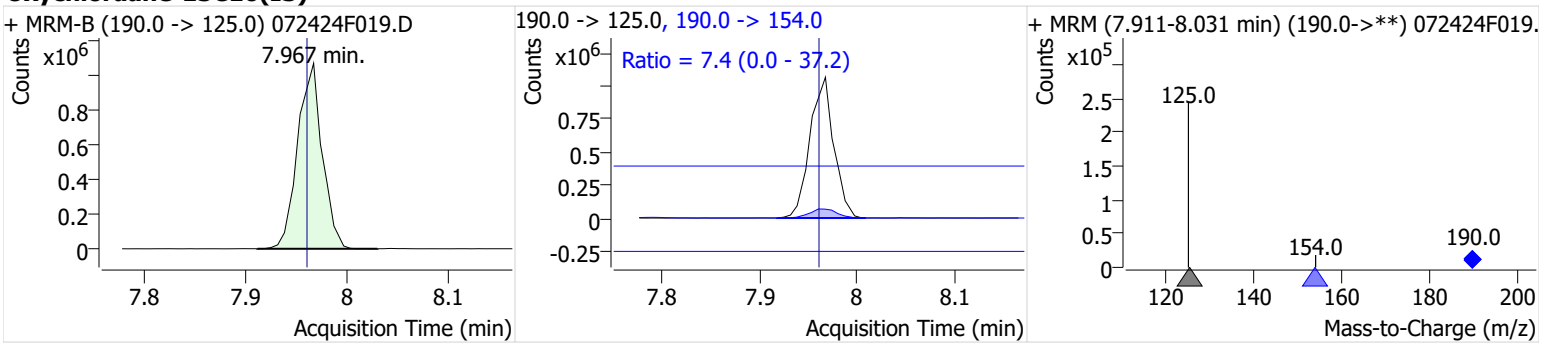
Octachlorostyrene-13C8(IS)



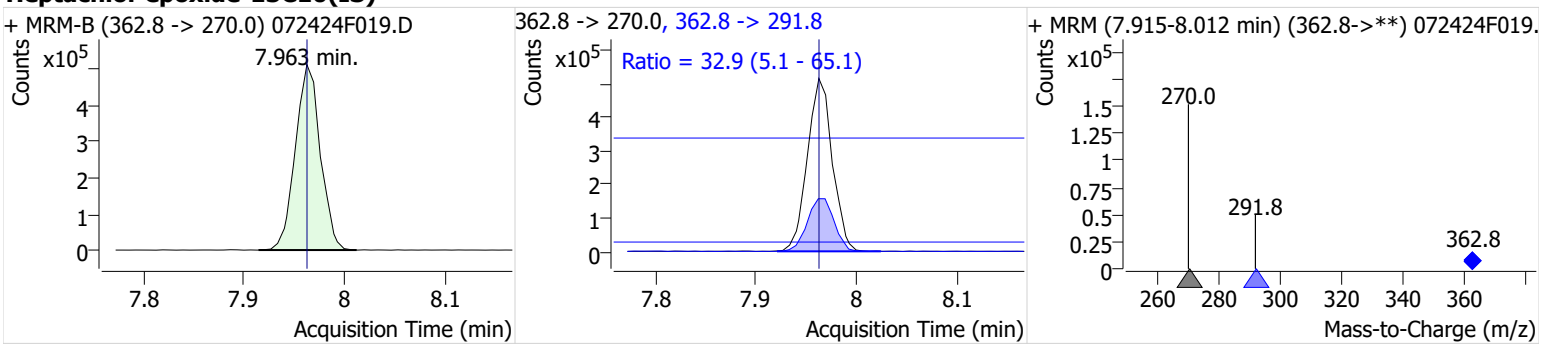
Isodrin-13C12(IS)



Oxychlordane-13C10(IS)



Heptachlor epoxide-13C10(IS)



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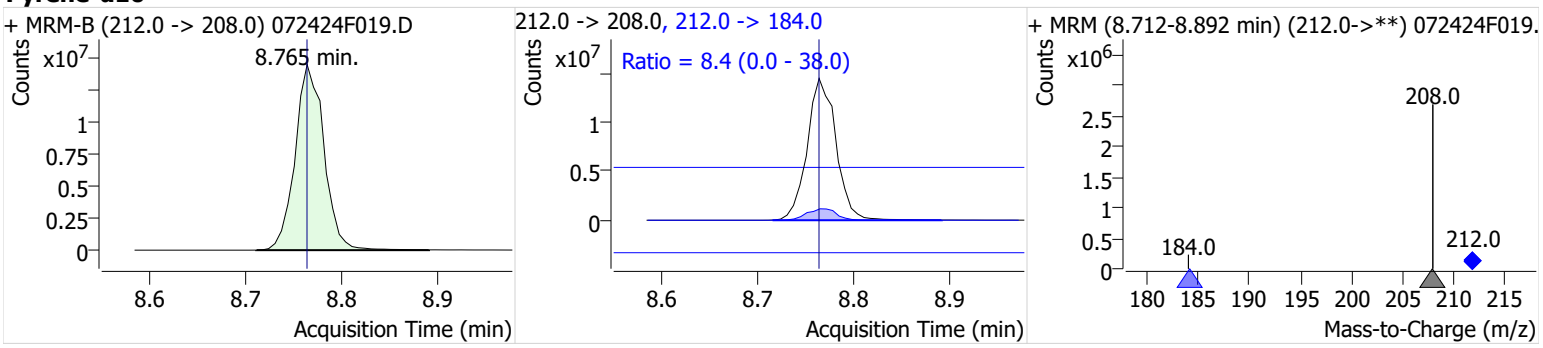
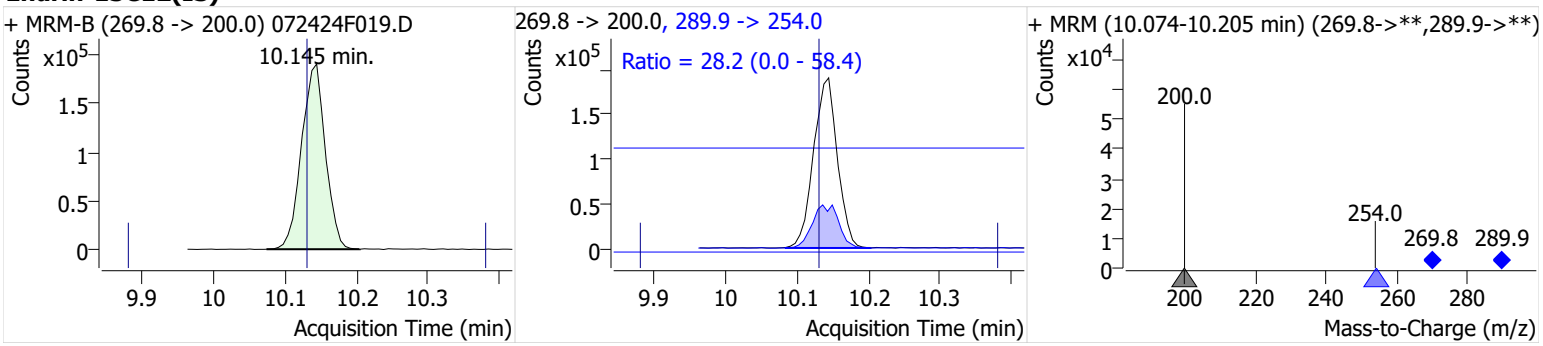
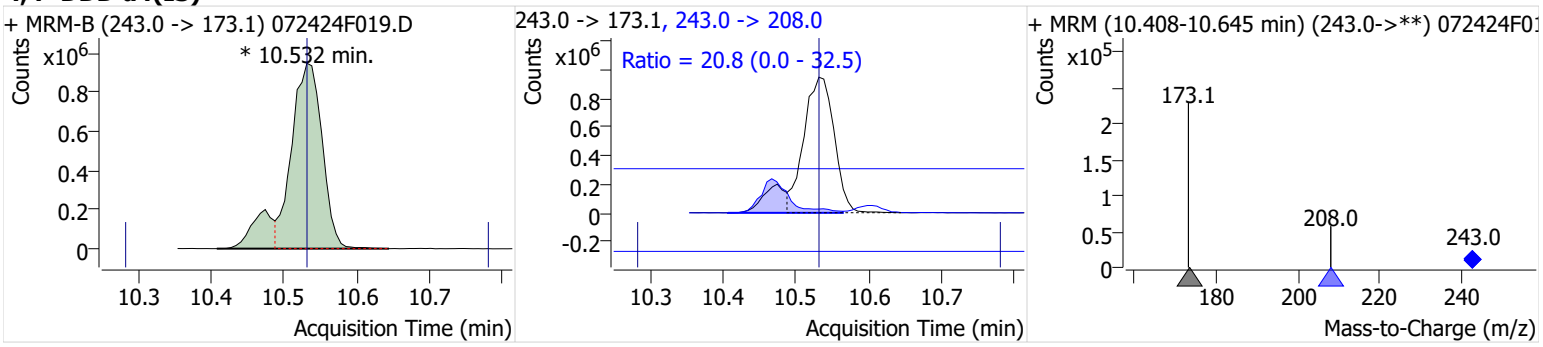
Pyrene-d10



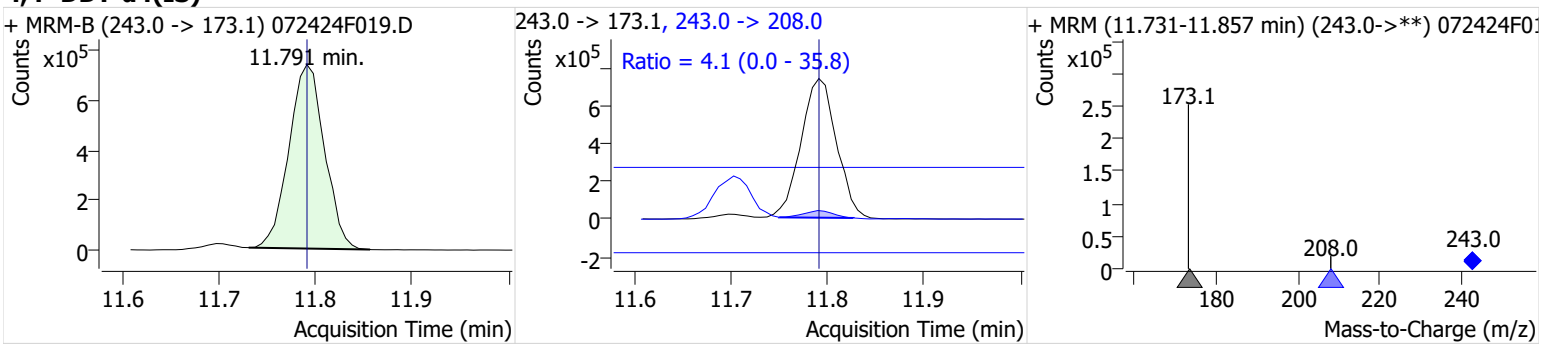
Endrin-13C12(IS)



4,4'-DDD d4(IS)



4,4'-DDT-d4(IS)



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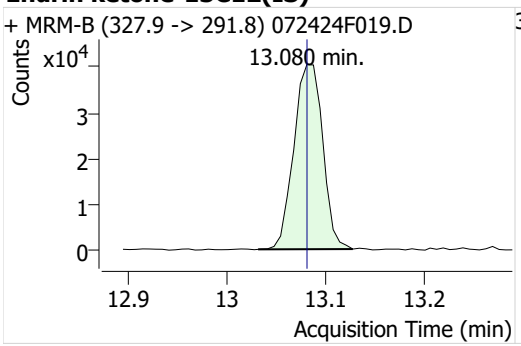
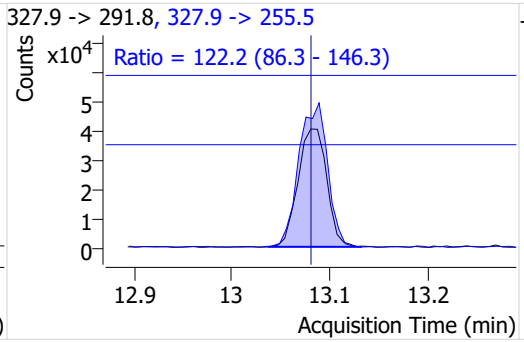
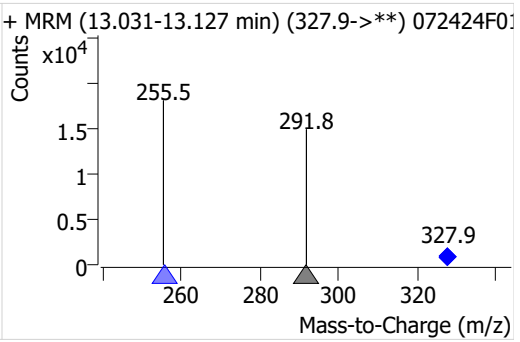
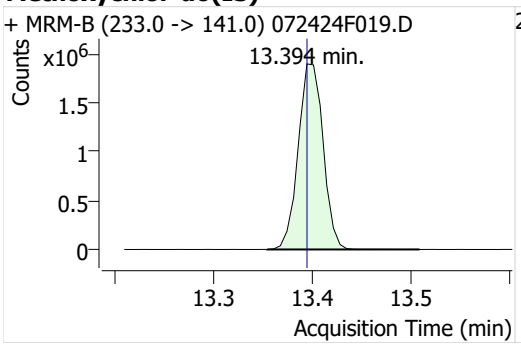
Endrin ketone-13C12(IS)

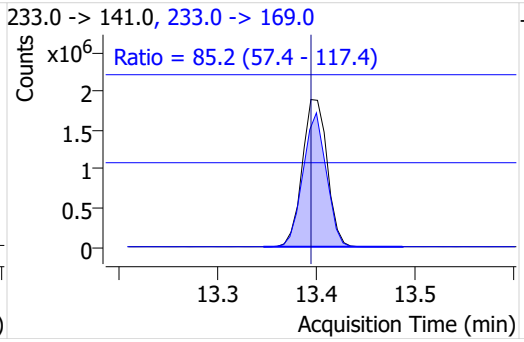


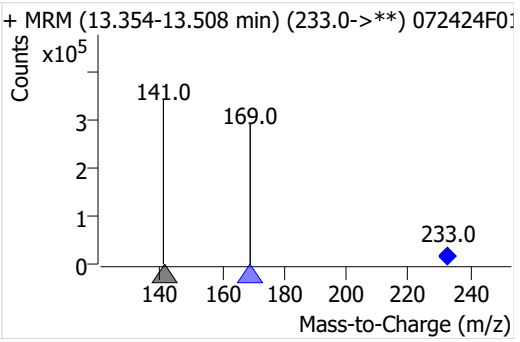




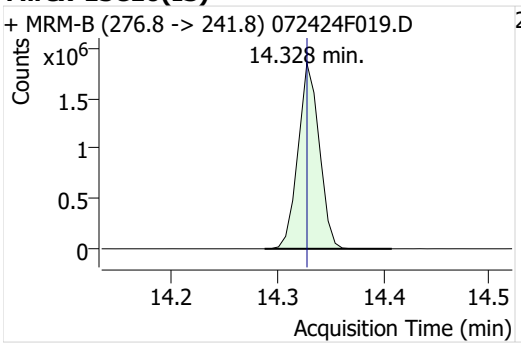
Methoxychlor-d6(IS)

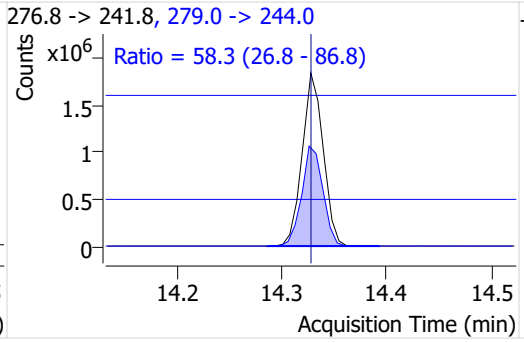


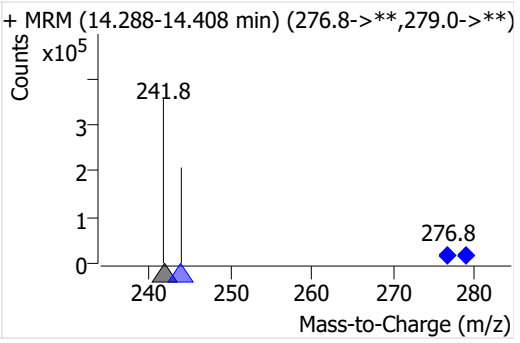




Mirex-13C10(IS)







MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS42\Data\072424\QuantResults\072424 OC PEST ICAL.batch.bin		
Acq. Date-Time	7/24/2024 8:12:33 PM	**Acq Operator**	EBruno
Name	OC PEST ICAL 100ppb SVM71-30J	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	7/25/2024 7:23:51 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method		**Vial**	12
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.212	289.8 -> 254.8	5098998	20.0000 ng/ml	0.001
γ-BHC-d6(IS)	5.491	223.9 -> 187.0	4897498	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	6.566	276.8 -> 241.8	3208948	20.0000 ng/ml	0.006
Chorpyrifos-d10(IS)	6.941	199.9 -> 171.9	1373889	20.0000 ng/ml	0.004
Aldrin-13C(IS)	7.207	269.8 -> 200.0	2099238	20.0000 ng/ml	0.004
Octachlorostyrene-13C8(IS)	7.729	315.8 -> 245.8	1768810	20.0000 ng/ml	0.001
Isodrin-13C12(IS)	7.789	199.9 -> 130.1	2231416	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	7.961	190.0 -> 125.0	1511898	20.0000 ng/ml	0.003
Heptachlor epoxide-13C10(IS)	7.963	362.8 -> 270.0	710348	20.0000 ng/ml	0.003
Pyrene-d10	8.765	212.0 -> 208.0	22220472	100.0000 ng/ml	0.000
Endrin-13C12(IS)	10.138	269.8 -> 200.0	408602	20.0000 ng/ml	0.006
4,4'-DDD d4(IS)	10.532	243.0 -> 173.1	2762753 ***m***	5.0000 ng/ml	0.029
4,4'-DDT-d4(IS)	11.785	243.0 -> 173.1	1532419	5.0000 ng/ml	0.004
Endrin ketone-13C12(IS)	13.080	327.9 -> 291.8	78989	20.0000 ng/ml	0.001
Methoxychlor-d6(IS)	13.398	233.0 -> 141.0	3781503	20.0000 ng/ml	0.008
Mirex-13C10(IS)	14.328	276.8 -> 241.8	2465250	5.0000 ng/ml	0.001

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	5098998	18.173 ng/ml
		Spiked Amount =	20.0	Recovery = *90.9 %*
γ-BHC-d6	5.491	223.9 -> 187.0	4897498	17.225 ng/ml
		Spiked Amount =	20.0	Recovery = *86.1 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	3208948	19.645 ng/ml
		Spiked Amount =	20.0	Recovery = *98.2 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	1373889	19.625 ng/ml
		Spiked Amount =	20.0	Recovery = *98.1 %*
Aldrin-13C	7.207	269.8 -> 200.0	2099260	16.985 ng/ml
		Spiked Amount =	20.0	Recovery = *84.9 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	1768810	15.879 ng/ml
		Spiked Amount =	20.0	Recovery = *79.4 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2231416	16.846 ng/ml
		Spiked Amount =	20.0	Recovery = *84.2 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1511898	19.249 ng/ml
		Spiked Amount =	20.0	Recovery = *96.2 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	710348	15.977 ng/ml
		Spiked Amount =	20.0	Recovery = *79.9 %*
Endrin-13C12	10.131	269.8 -> 200.0	408602	21.569 ng/ml
		Spiked Amount =	20.0	Recovery = *107.8 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	2762753 ***m***	5.873 ng/ml
		Spiked Amount =	5.0	Recovery = *117.5 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1532419	5.289 ng/ml
		Spiked Amount =	5.0	Recovery = *105.8 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	78989	19.753 ng/ml
		Spiked Amount =	20.0	Recovery = *98.8 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	3781503	23.534 ng/ml
		Spiked Amount =	20.0	Recovery = *117.7 %*

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System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	2465250	5.769 ng/ml
		Spiked Amount =	5.0	Recovery = *115.4 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.165	181.1 -> 145.1	40948410	118.598 ng/ml	91
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.214	283.8 -> 213.9	31404455	80.710 ng/ml	98
β-BHC	γ-BHC-d6(IS)	5.408	181.1 -> 145.1	27792908	120.187 ng/ml	87
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	36429805	123.372 ng/ml	90
δ-BHC	γ-BHC-d6(IS)	5.859	181.1 -> 145.1	23919782	111.283 ng/ml	88
Heptachlor	Heptachlor-13C10(IS)	6.569	271.7 -> 236.9	15398936	89.181 ng/ml	88
Chorpyrifos	Chorpyrifos-d10(IS)	7.019	196.9 -> 169.0	10231791	109.422 ng/ml	97
Aldrin	Aldrin-13C(IS)	7.209	254.9 -> 220.0	5705632	100.093 ng/ml	88
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.732	342.8 -> 307.8	22782614	104.814 ng/ml	100
Isodrin	Isodrin-13C12(IS)	7.796	193.0 -> 123.0	12952616	110.530 ng/ml	99
Oxychlordane	Oxychlordane-13C10(IS)	7.968	114.9 -> 51.1	21160212	108.306 ng/ml	98
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.971	352.8 -> 262.9	4415695	117.384 ng/ml	97
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.510	271.8 -> 236.9	8097414	101.930 ng/ml	89
2,4'-DDE	4,4'-DDD d4(IS)	8.527	246.0 -> 176.2	90959981	92.115 ng/ml	94
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.823	271.8 -> 236.9	9997654	104.050 ng/ml	98
Endosulfan I	Endrin-13C12(IS)	8.847	206.9 -> 172.0	3806913	103.659 ng/ml	99
trans-Nanochlor	Oxychlordane-13C10(IS)	8.891	271.8 -> 236.9	7990574	116.904 ng/ml	91
4,4' -DDE	4,4'-DDD d4(IS)	9.357	246.0 -> 176.2	63723718	90.590 ng/ml	98
Dieldrin	Endrin-13C12(IS)	9.555	262.9 -> 193.0	4666722	102.468 ng/ml	94
2,4'-DDD	4,4'-DDD d4(IS)	9.546	235.0 -> 165.1	79358455	100.041 ng/ml	93
Endrin	Endrin-13C12(IS)	10.153	262.8 -> 193.0	2490043	98.620 ng/ml	95
Endosulfan II	Endrin-13C12(IS)	10.471	206.9 -> 172.0	1969730	100.991 ng/ml	98
cis-Nonachlor	Oxychlordane-13C10(IS)	10.604	271.8 -> 236.9	6430613	109.436 ng/ml	83
4,4'-DDD	4,4'-DDD d4(IS)	10.608	235.0 -> 165.1	61895110	105.822 ng/ml	94
2,4'-DDT	4,4'-DDT-d4(IS)	10.692	235.0 -> 165.1	49979070	111.395 ng/ml	98
Endrin aldehyde	Endrin-13C12(IS)	10.920	249.9 -> 214.9	808757	112.125 ng/ml	99
Endosulfan sulfate	Endrin-13C12(IS)	11.709	271.9 -> 237.0	5392406	105.145 ng/ml	98
4,4'-DDT	4,4'-DDT-d4(IS)	11.874	235.0 -> 165.1	39466414	113.792 ng/ml	96
Endrin ketone	Endrin ketone-13C12(IS)	13.092	147.0 -> 111.0	1991887	112.348 ng/ml	91
Methoxychlor	Methoxychlor-d6(IS)	13.443	227.0 -> 141.1	22394981	113.666 ng/ml	99
Mirex	Mirex-13C10(IS)	14.337	271.8 -> 236.8	41438078	81.577 ng/ml	100

(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram

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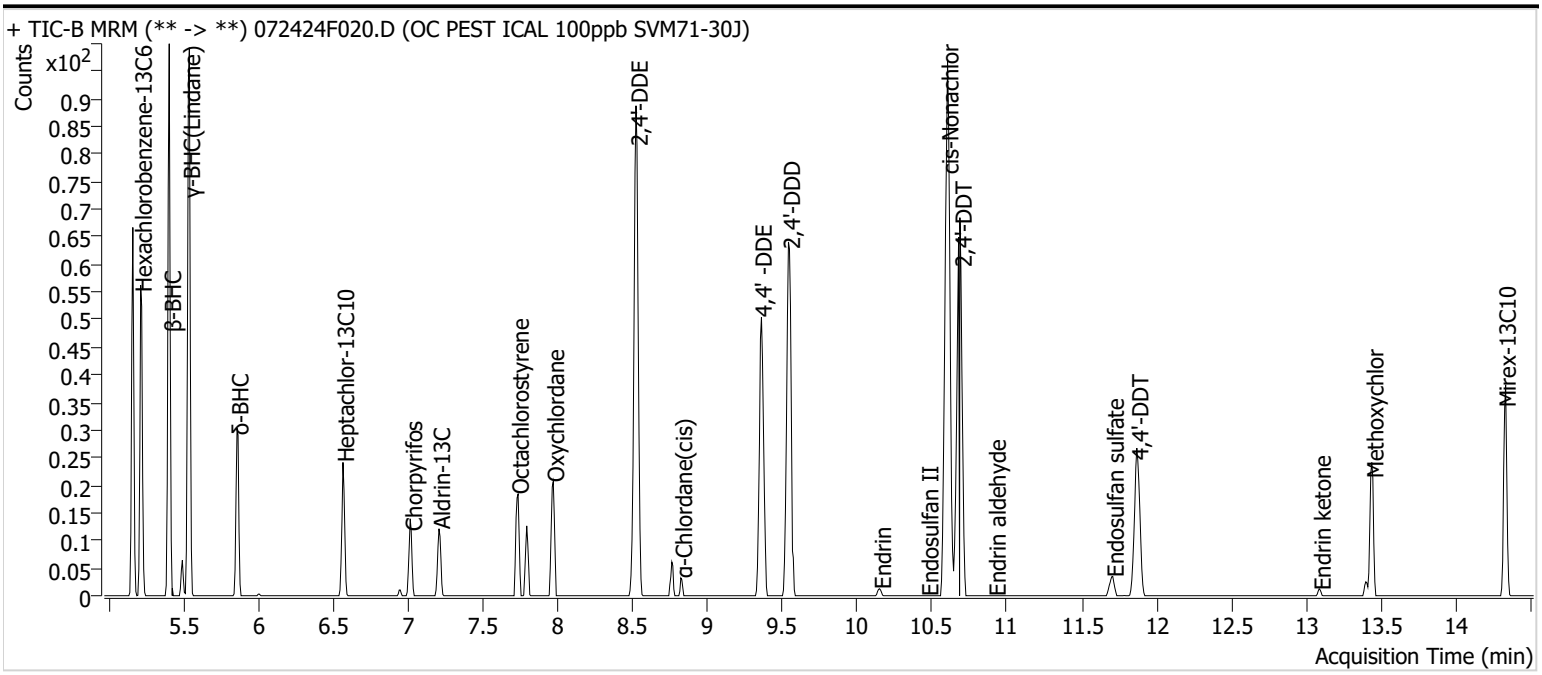
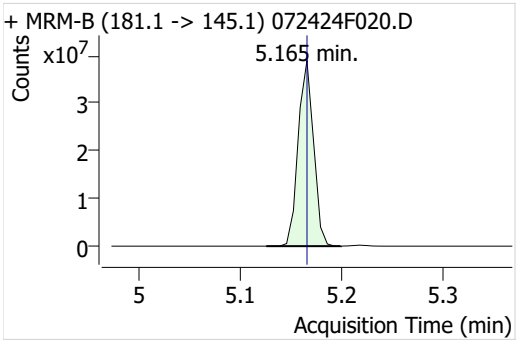
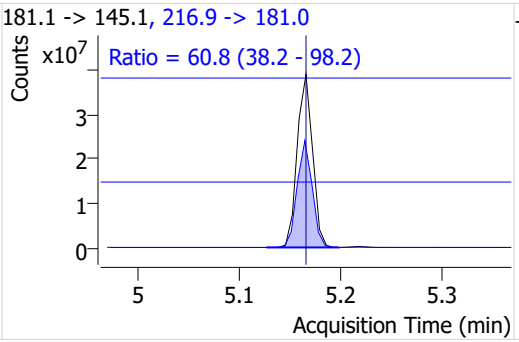
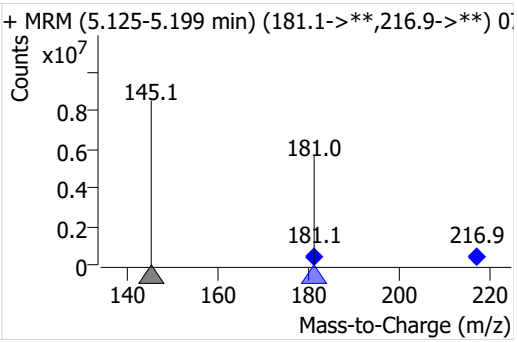


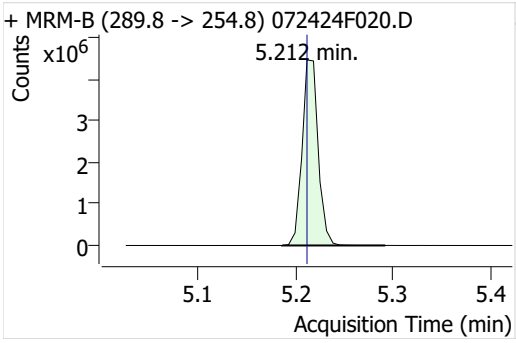
α-BHC

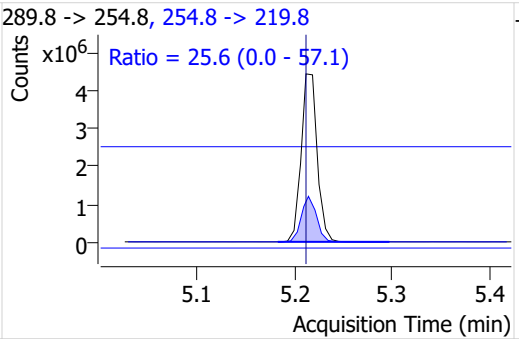


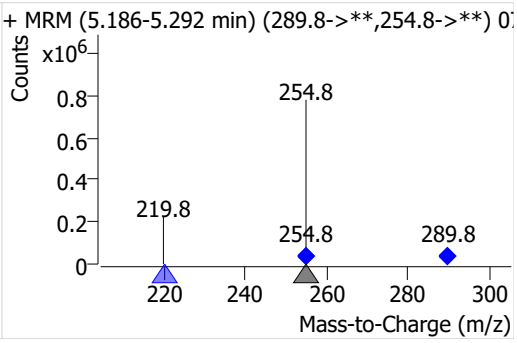




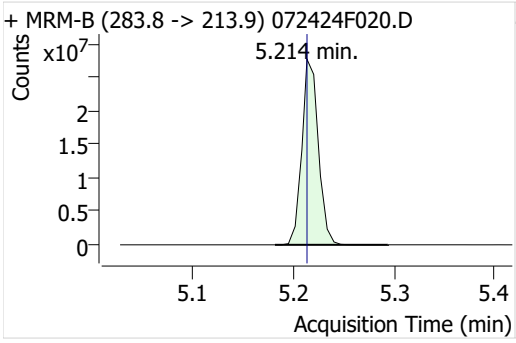
Hexachlorobenzene-13C6

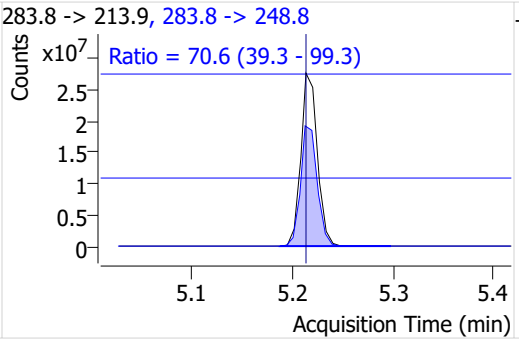


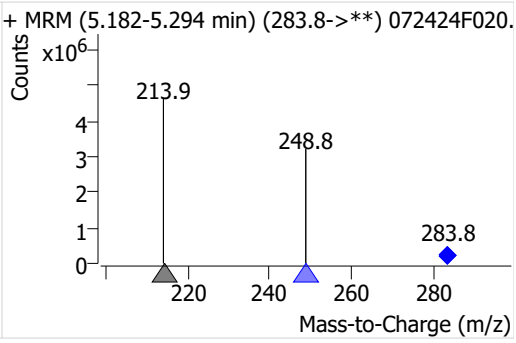




Hexachlorobenzene

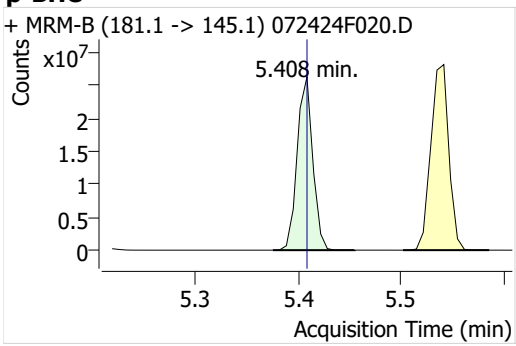


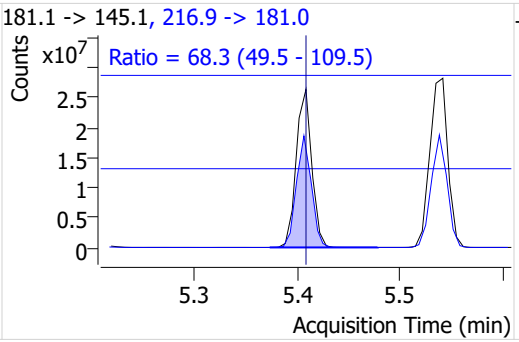


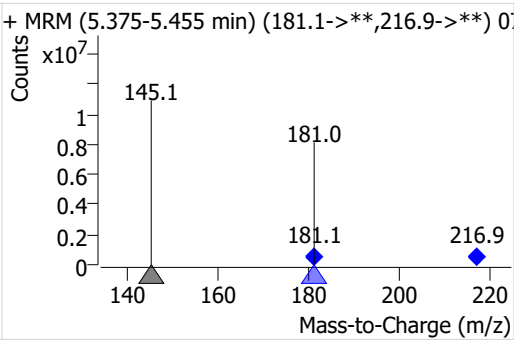


MassHunter Quantitative Analysis Sample Report

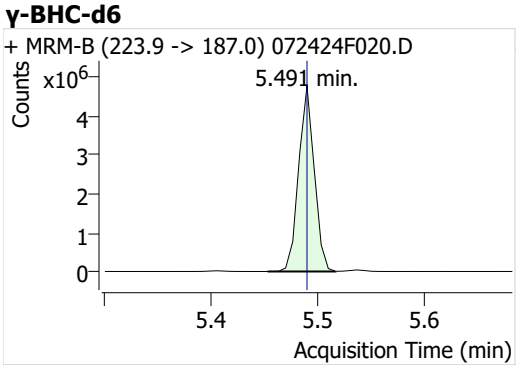
β-BHC

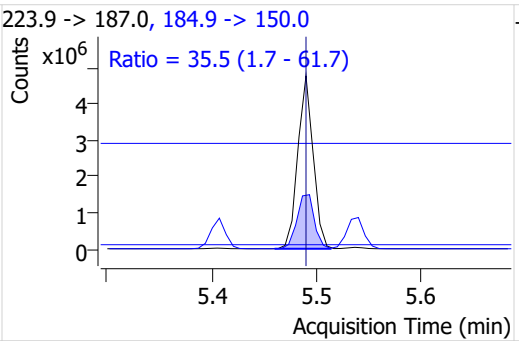


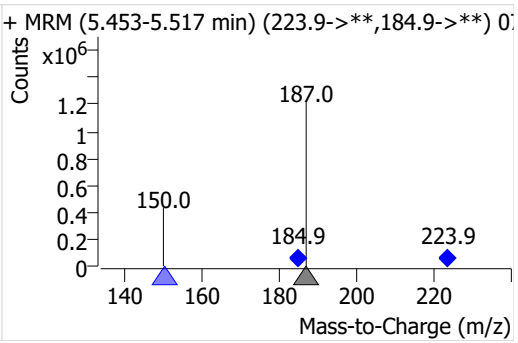




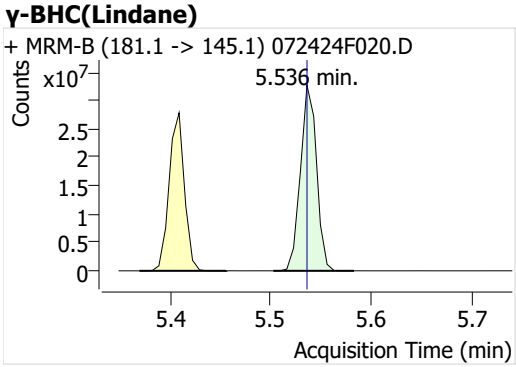
γ-BHC-d6

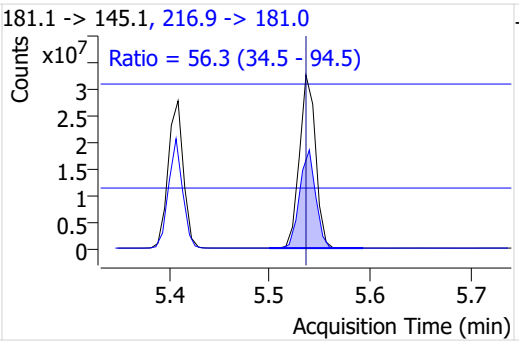


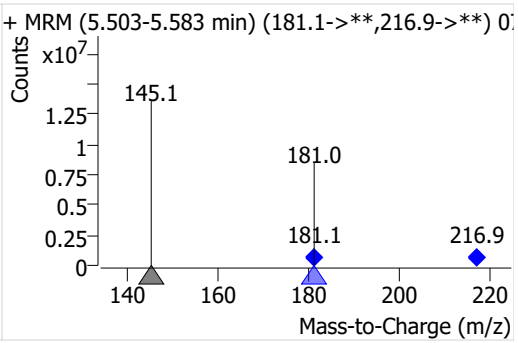




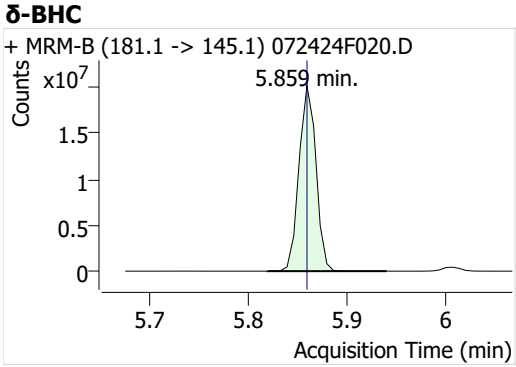
γ-BHC(Lindane)

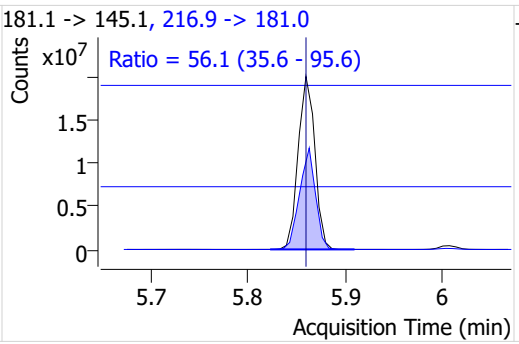


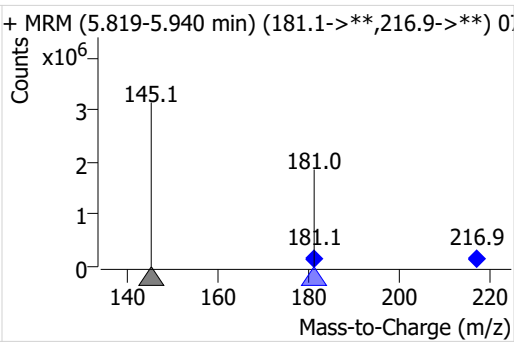




δ-BHC

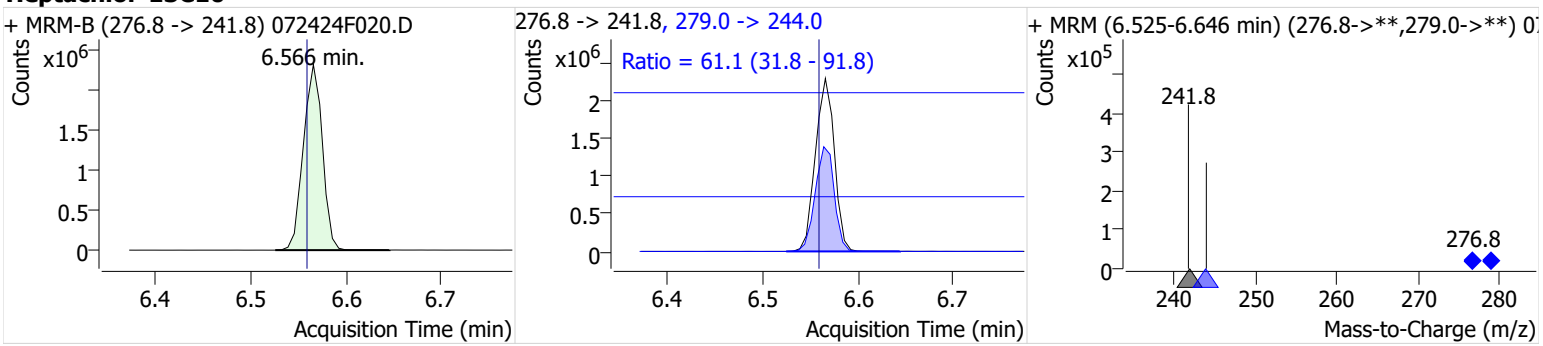




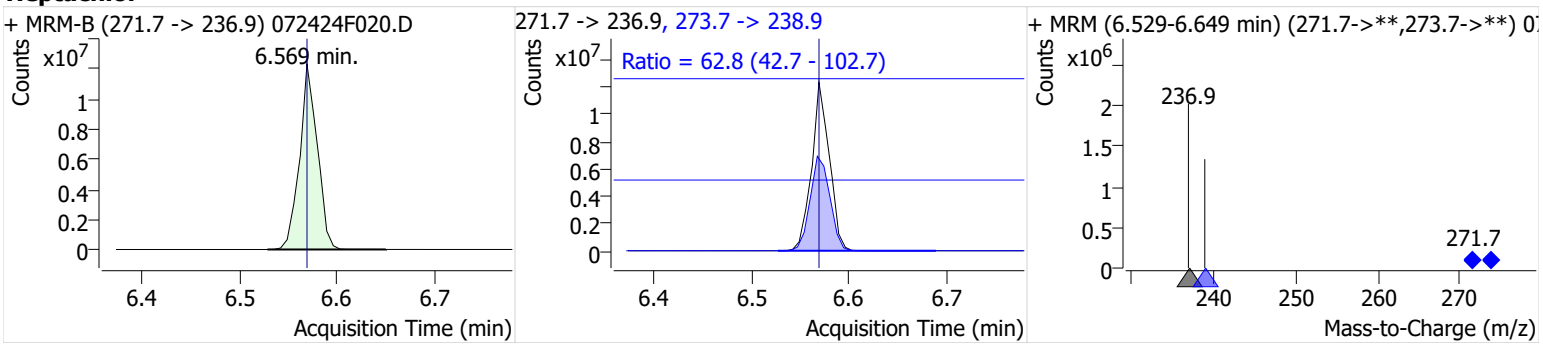


MassHunter Quantitative Analysis Sample Report

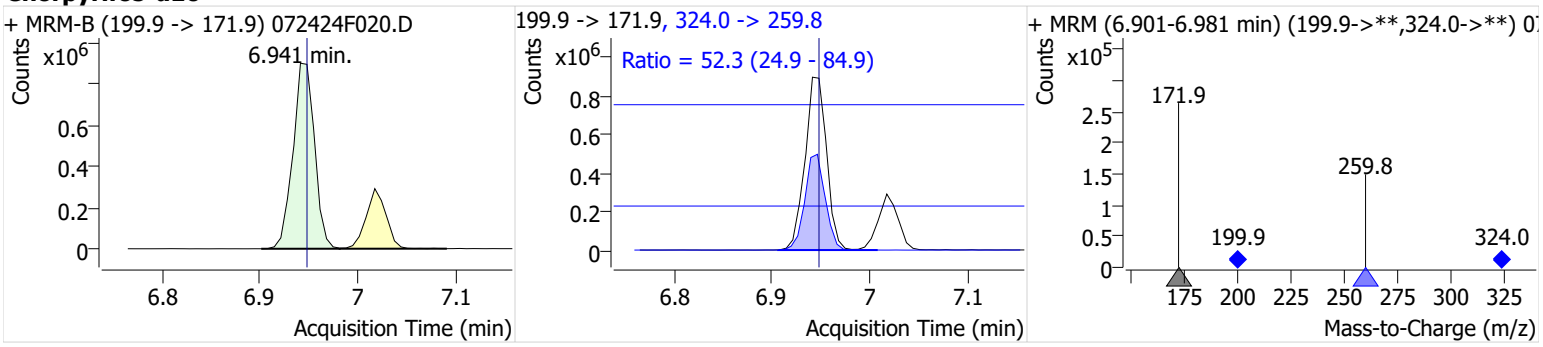
Heptachlor-13C10



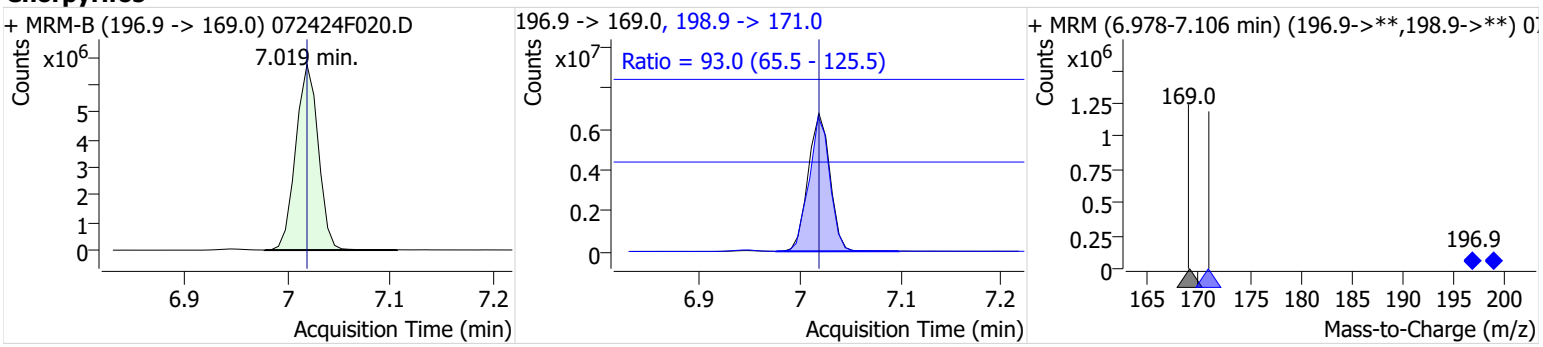
Heptachlor



Chorpyrifos-d10

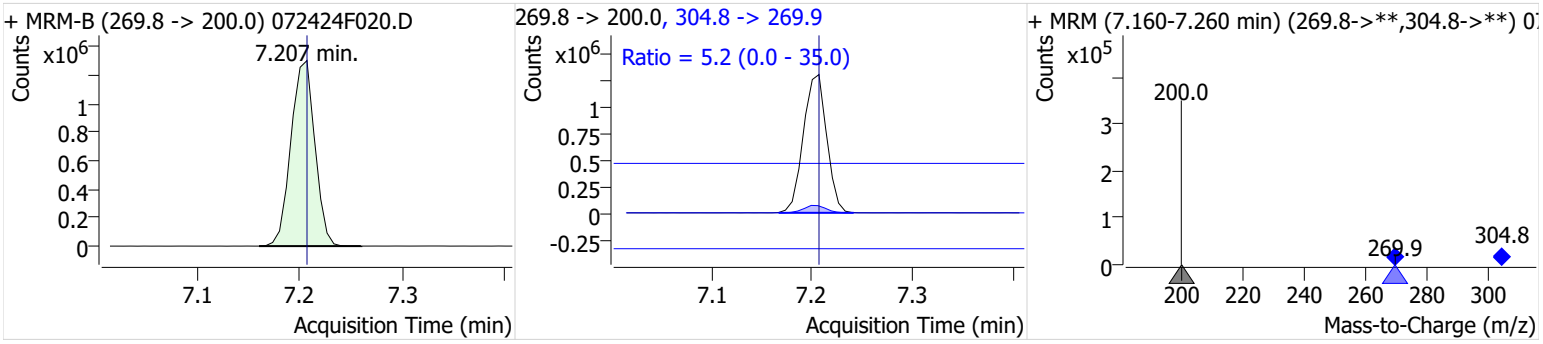


Chorpyrifos

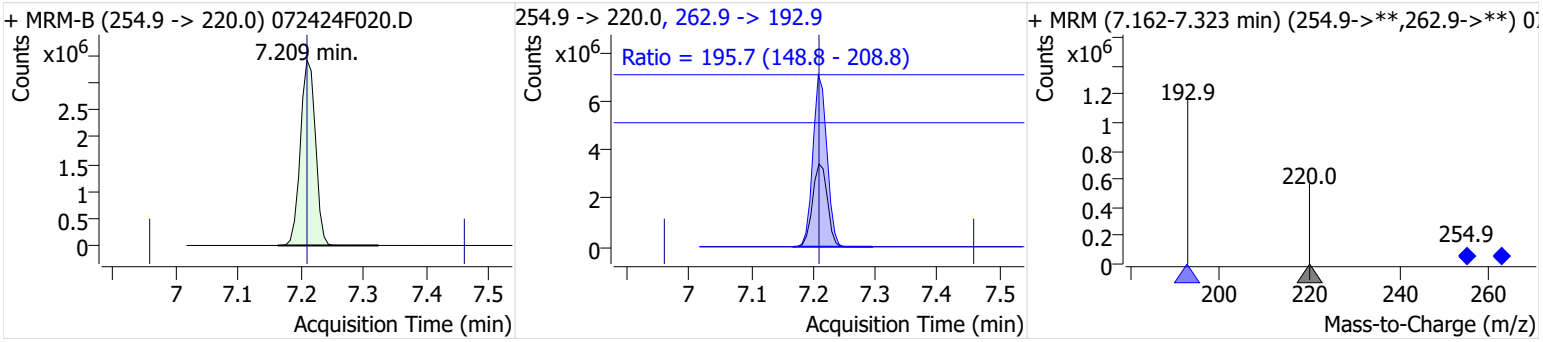


MassHunter Quantitative Analysis Sample Report

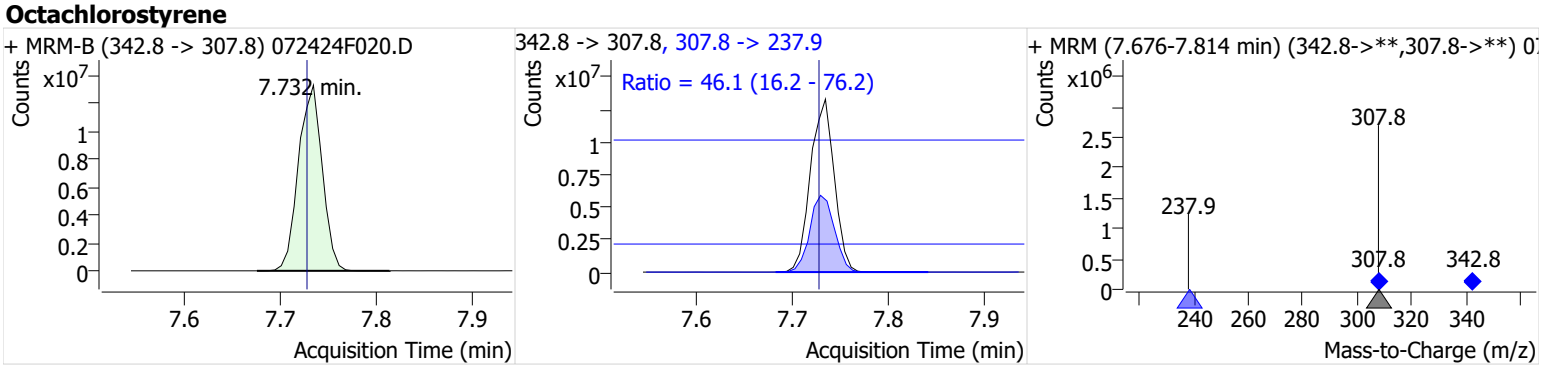
Aldrin-13C



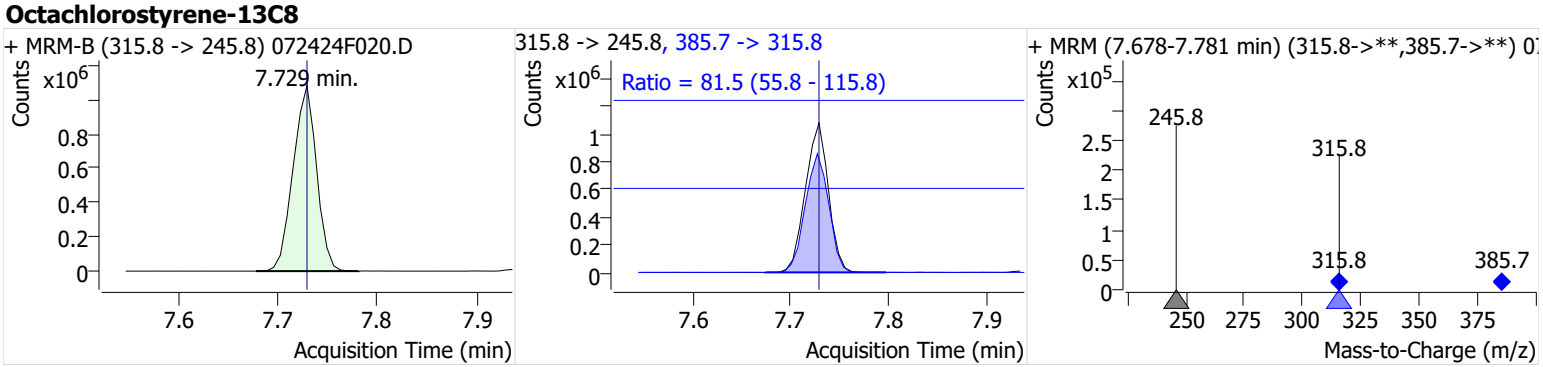
Aldrin



Octachlorostyrene



Octachlorostyrene-13C8



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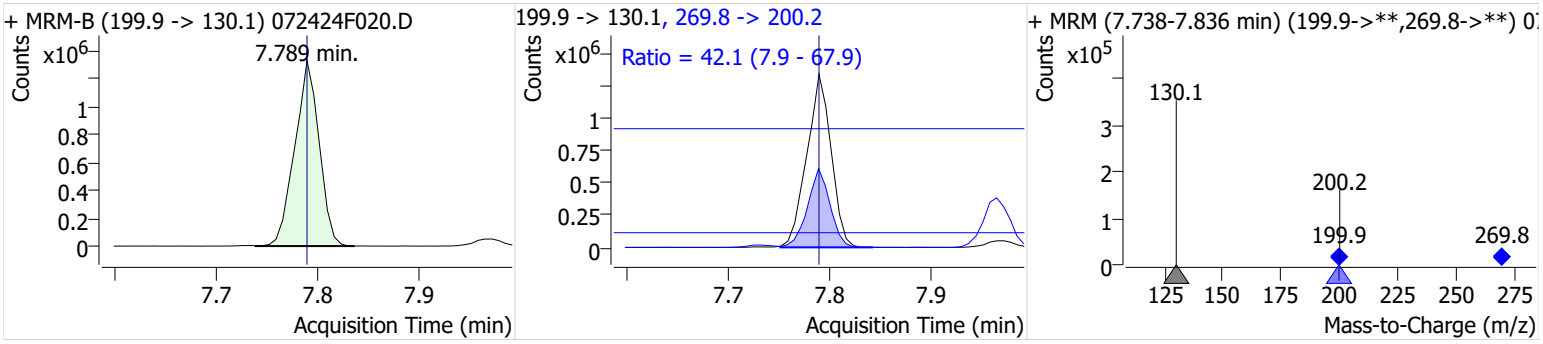
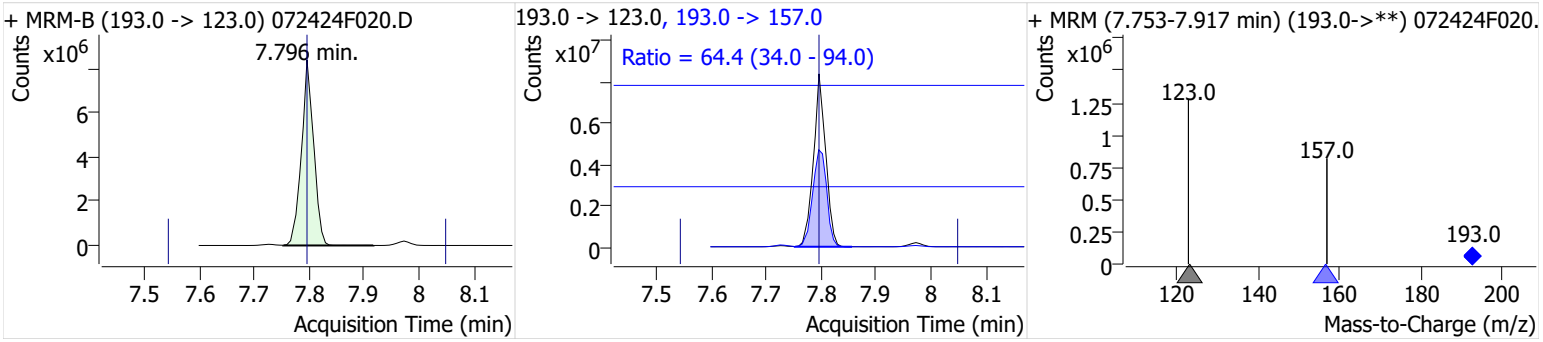
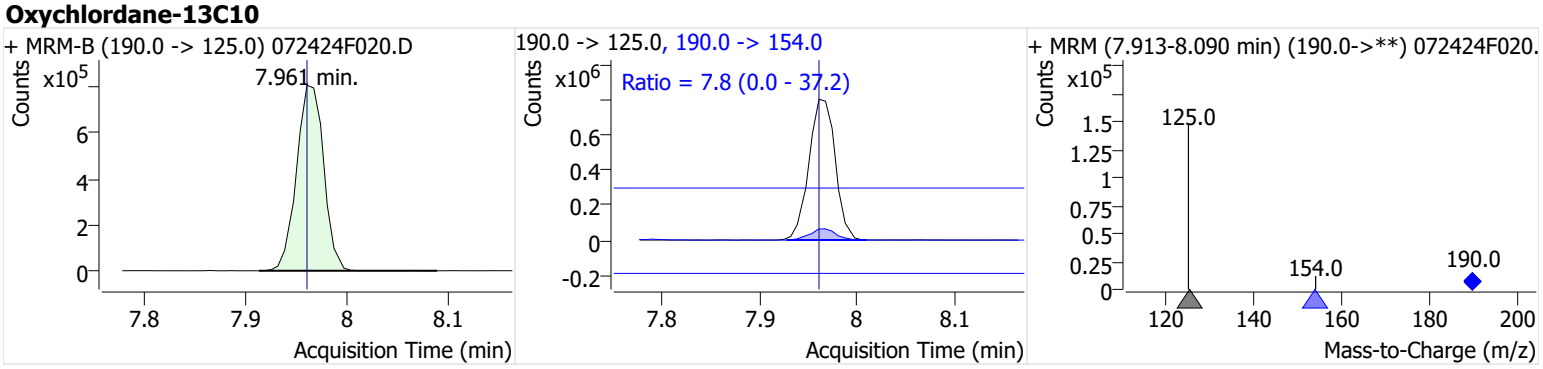
Isodrin-13C12



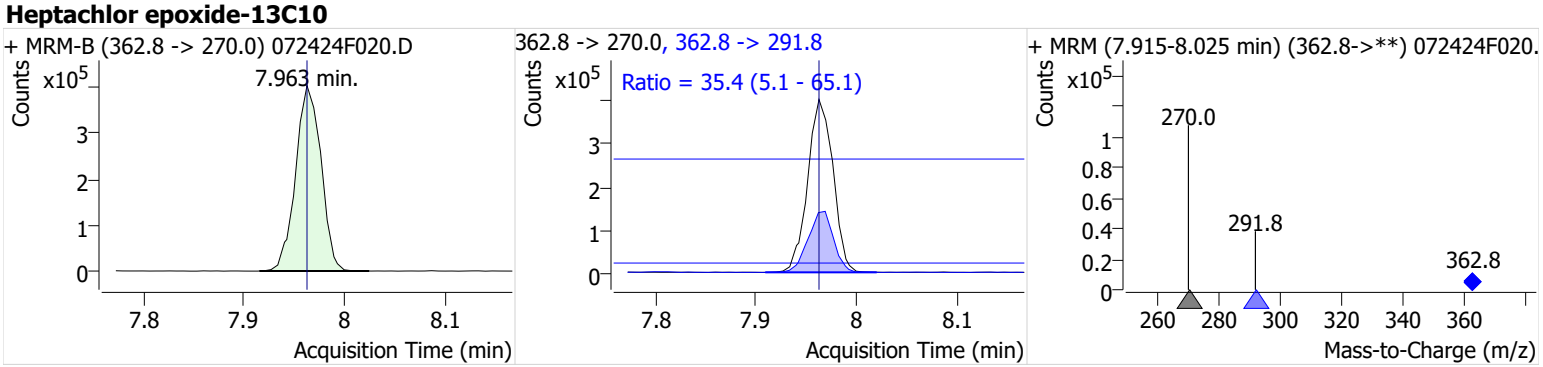
Isodrin



Oxychlordane-13C10

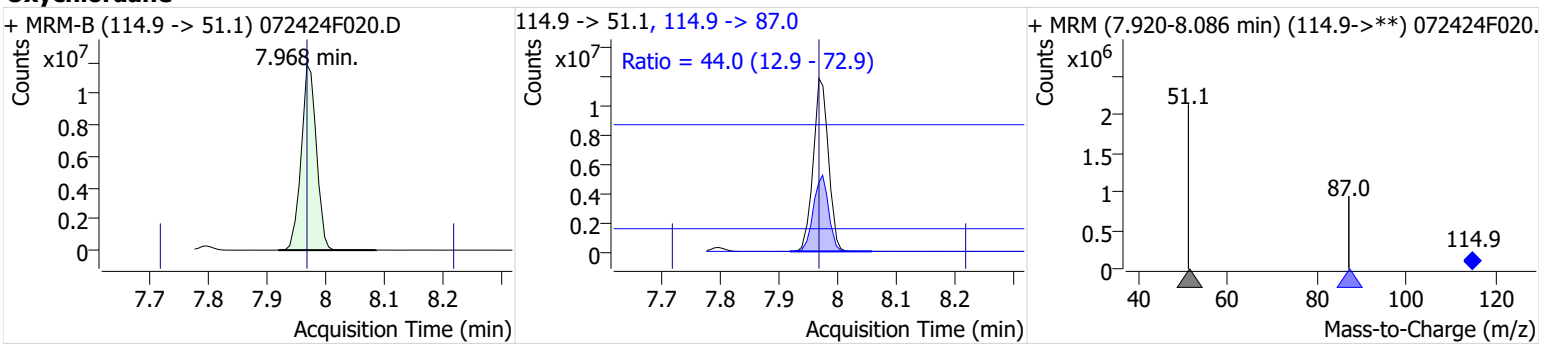


Heptachlor epoxide-13C10



MassHunter Quantitative Analysis Sample Report

Oxychlordane



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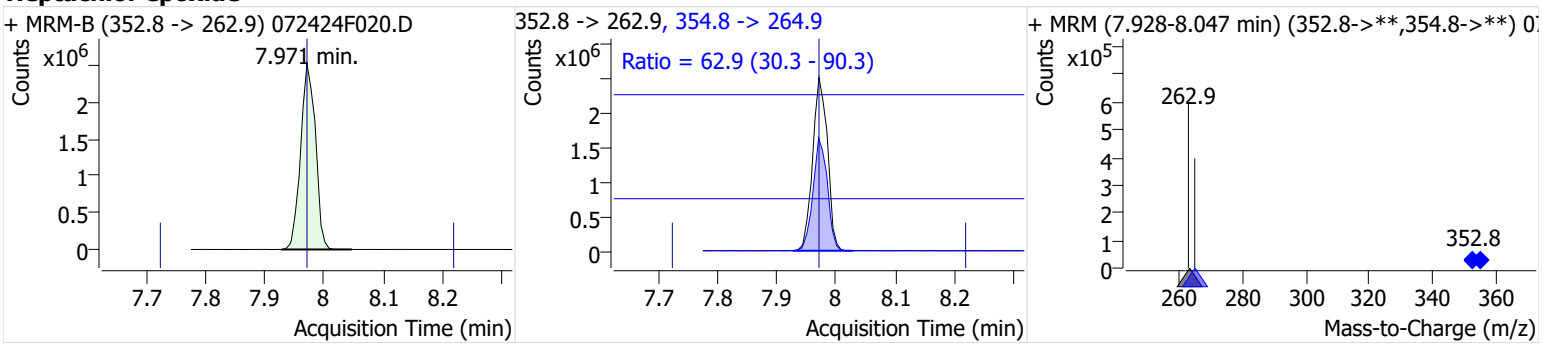
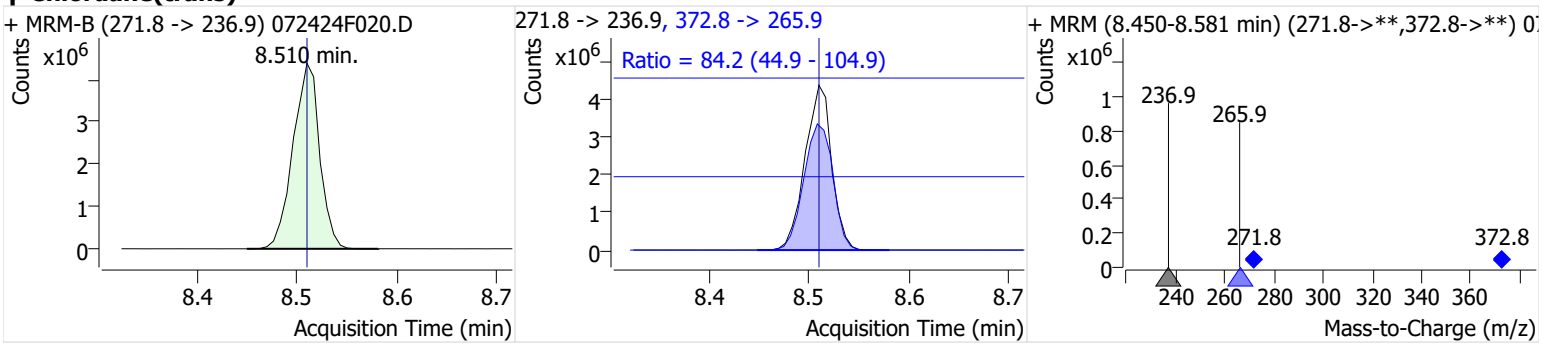
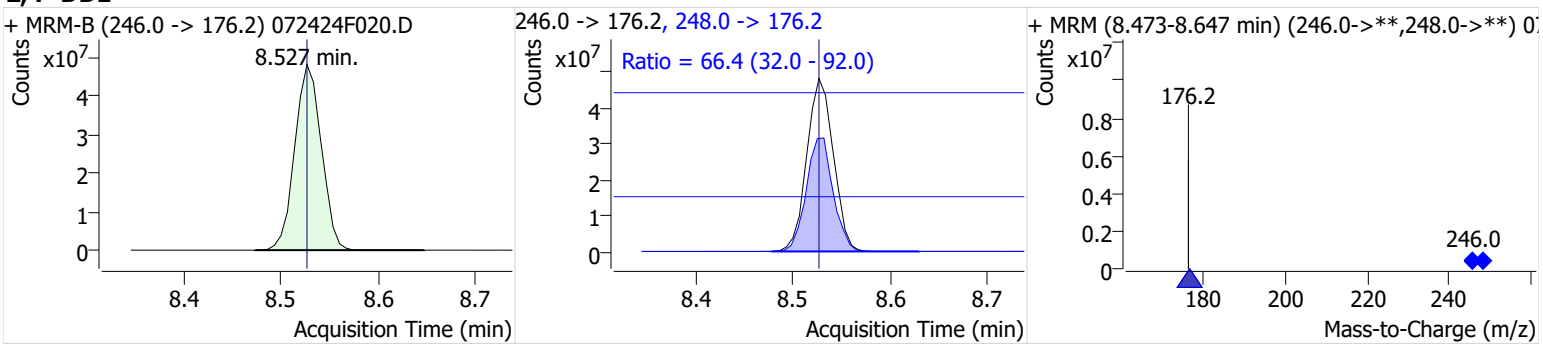


γ-Chlordane(trans)

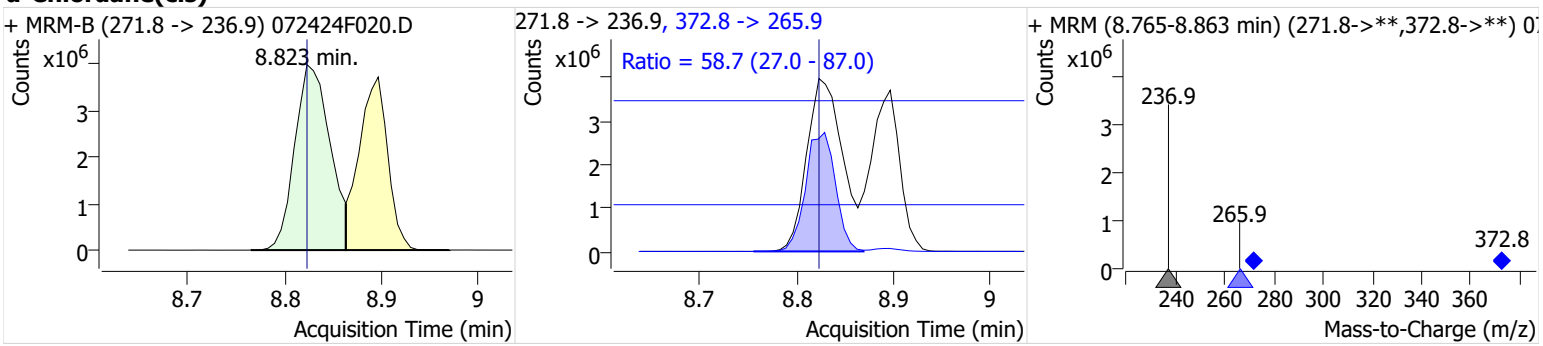


2,4'-DDE

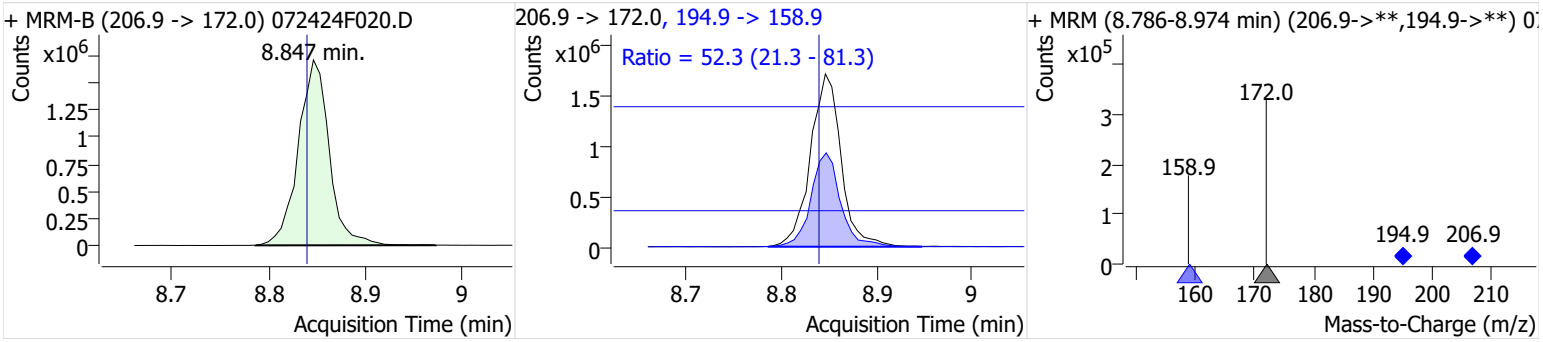


MassHunter Quantitative Analysis Sample Report

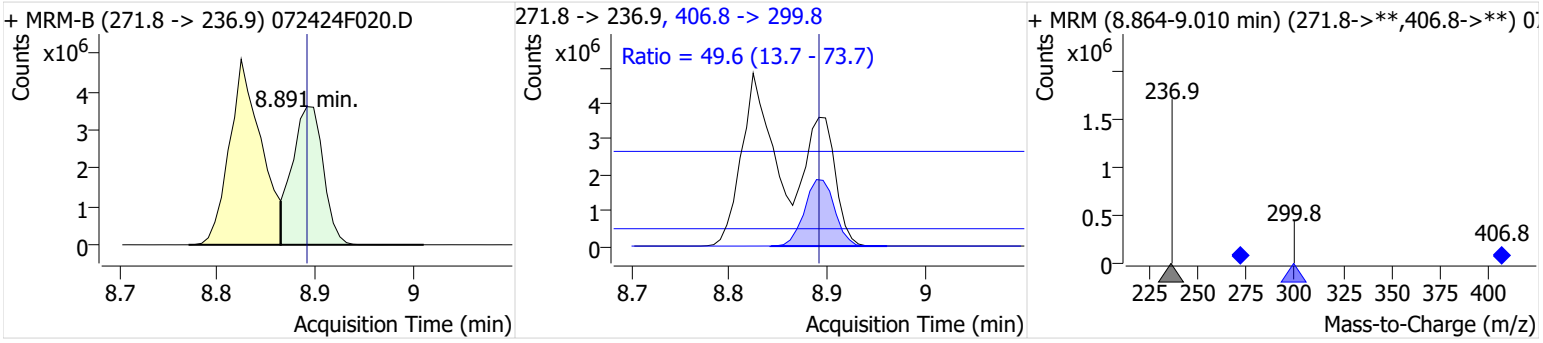
α-Chlordane(cis)



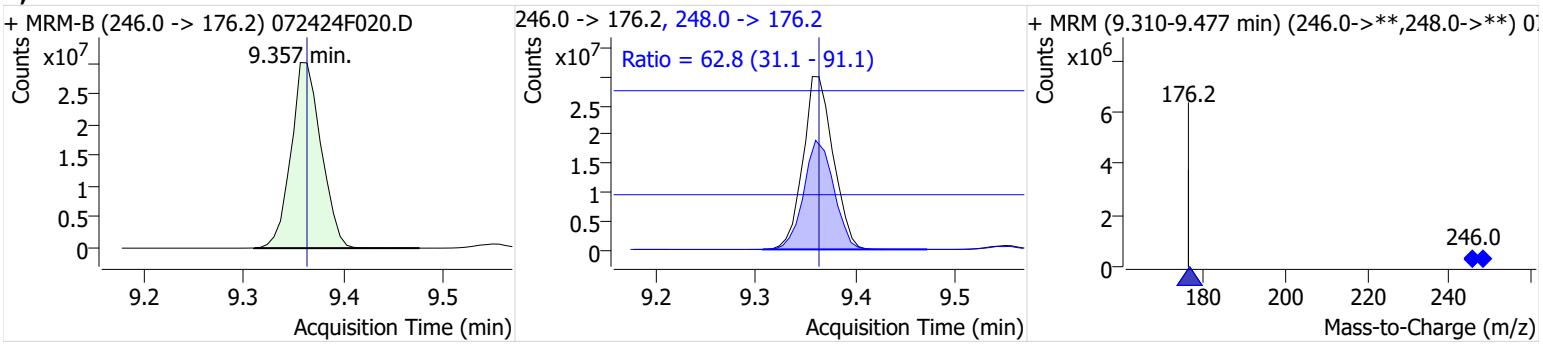
Endosulfan I



trans-Nanochlor



4,4' -DDE



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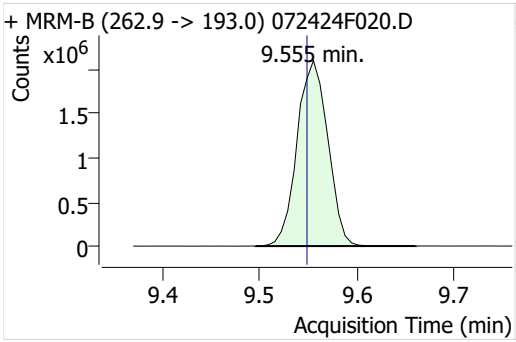
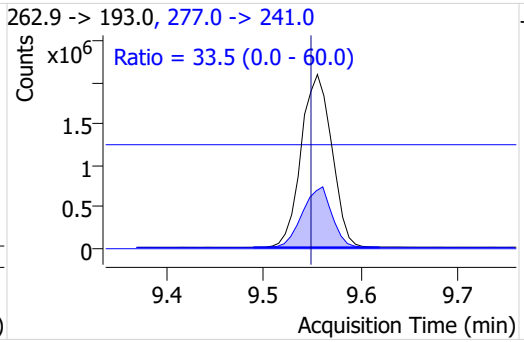
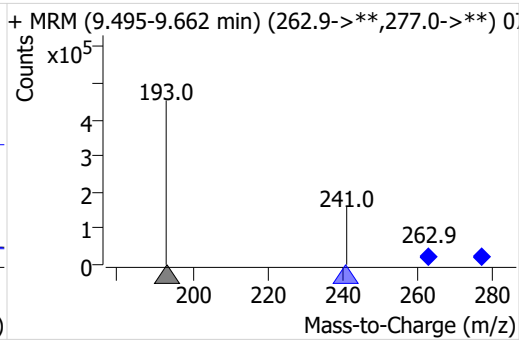
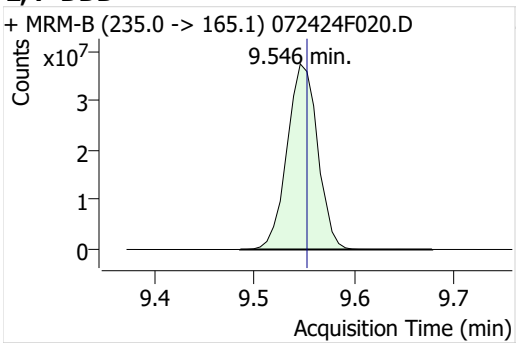
Dieldrin

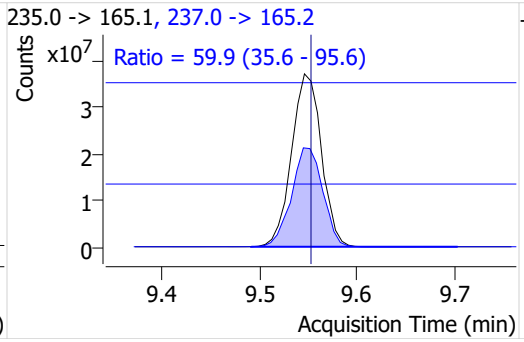


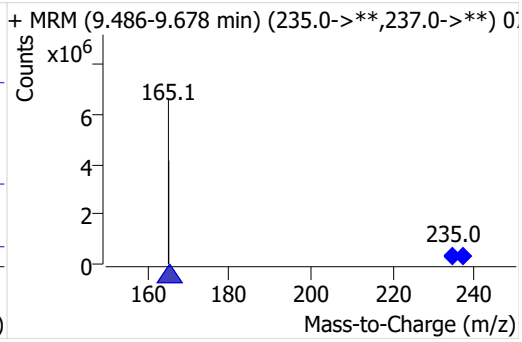




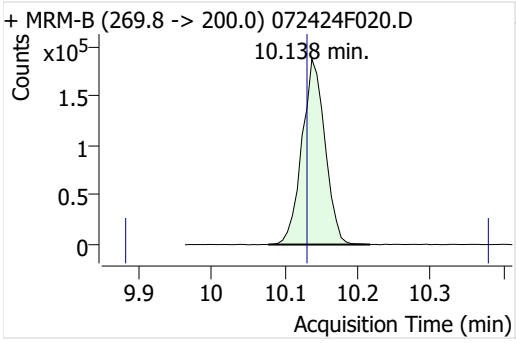
2,4'-DDD

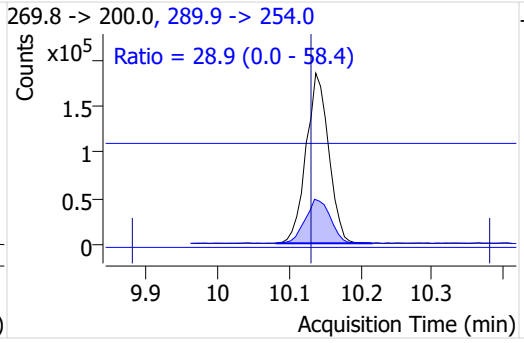


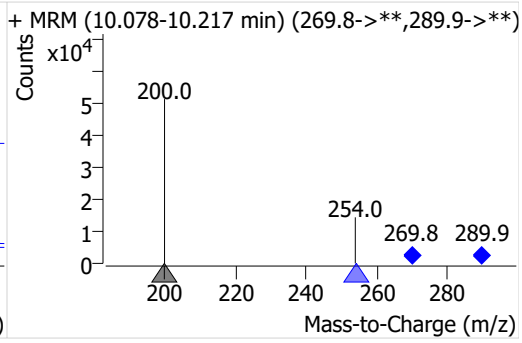




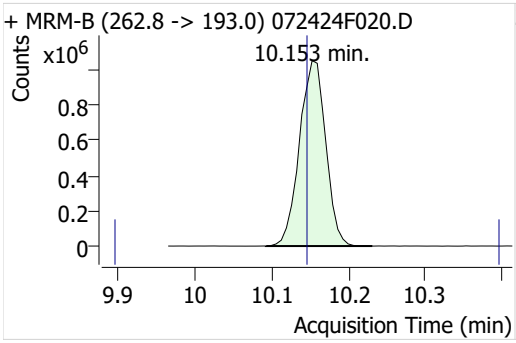
Endrin-13C12

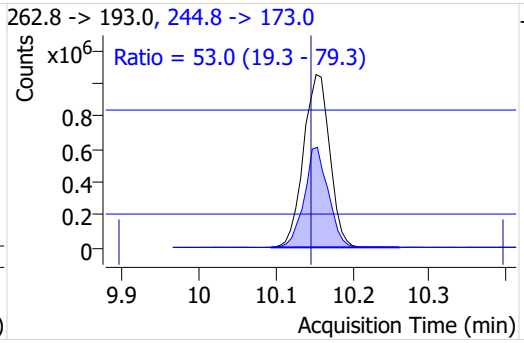


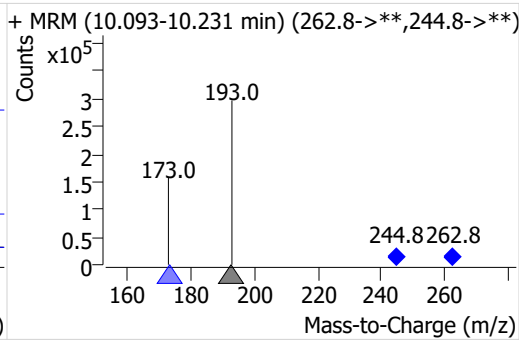




Endrin

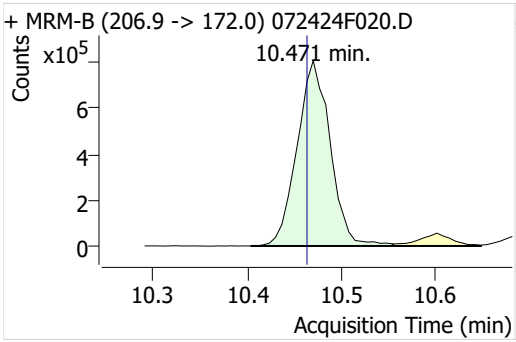


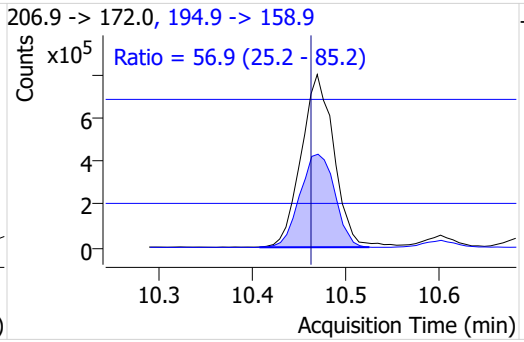


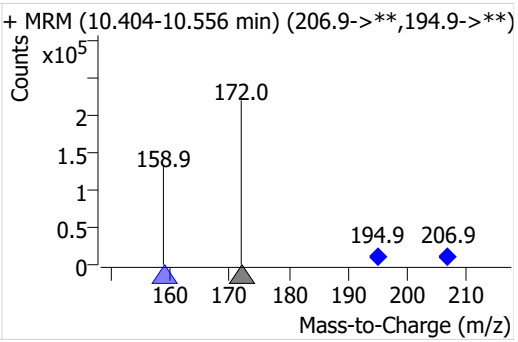


MassHunter Quantitative Analysis Sample Report

Endosulfan II

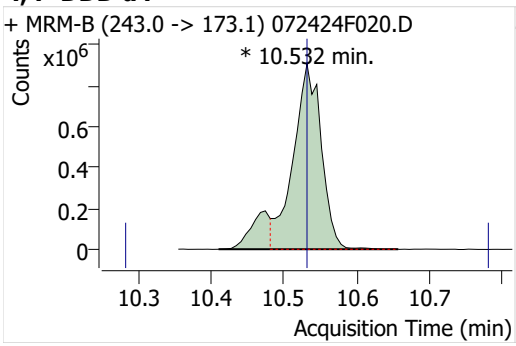


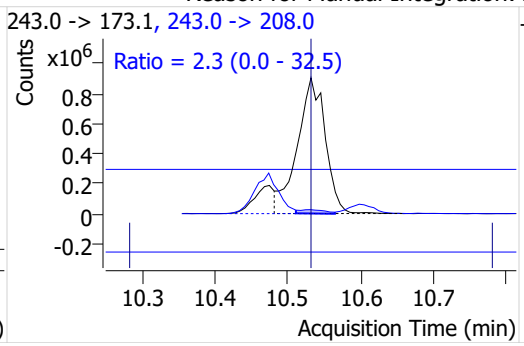


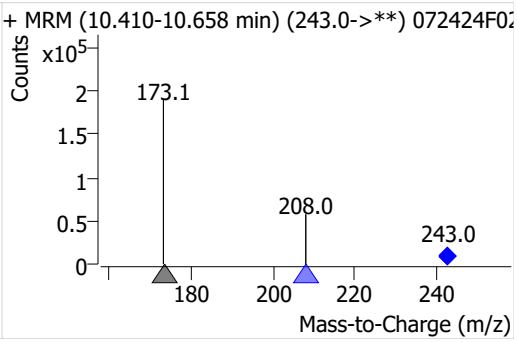


4,4'-DDD d4

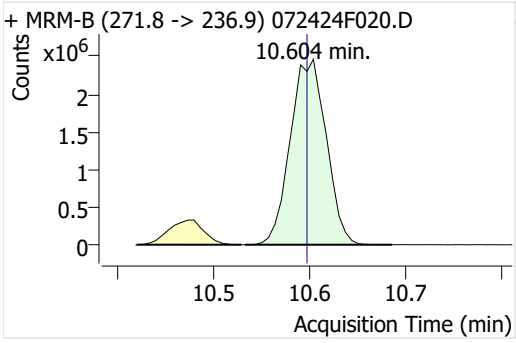
Reason for Manual Integration: **BLC**

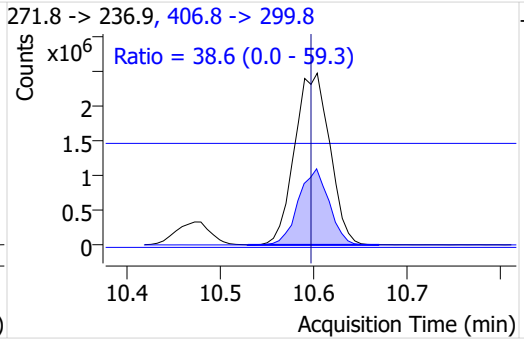


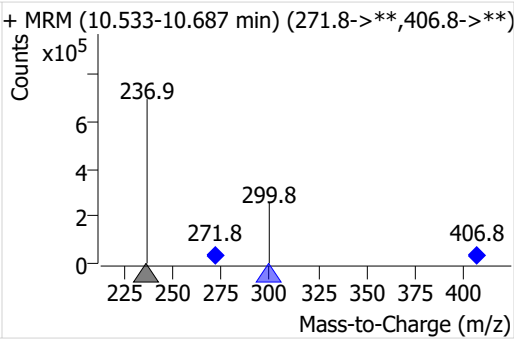




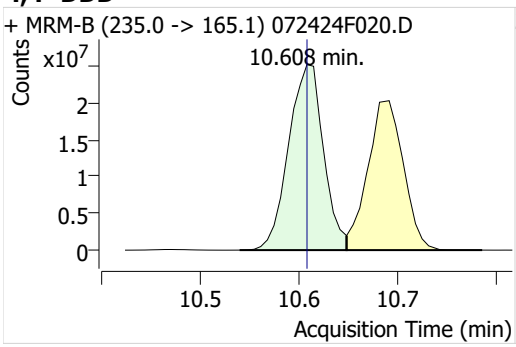
cis-Nonachlor

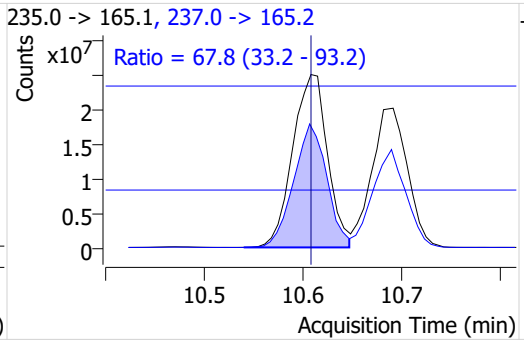


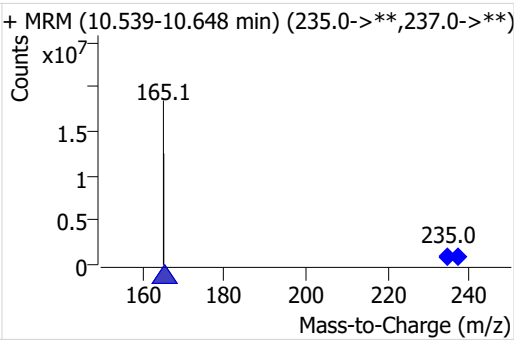




4,4'-DDD







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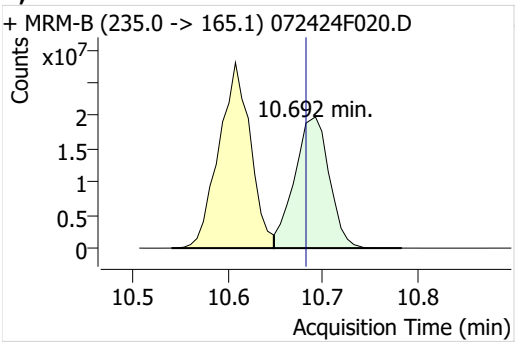
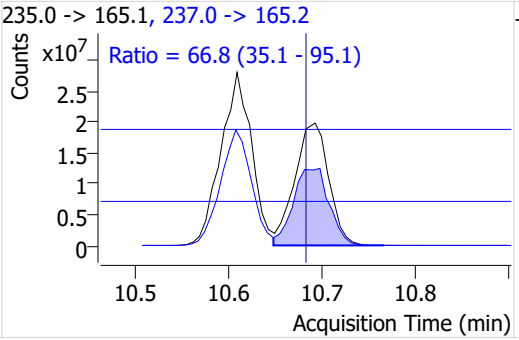
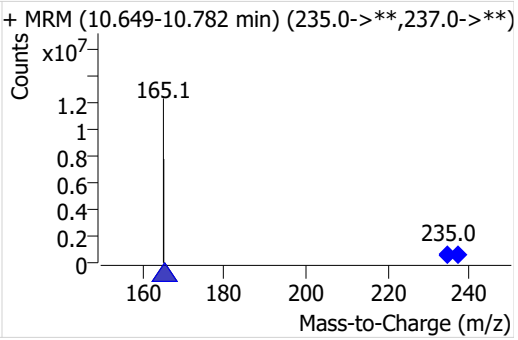
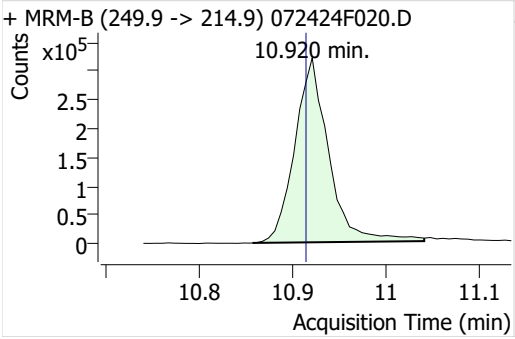
2,4'-DDT

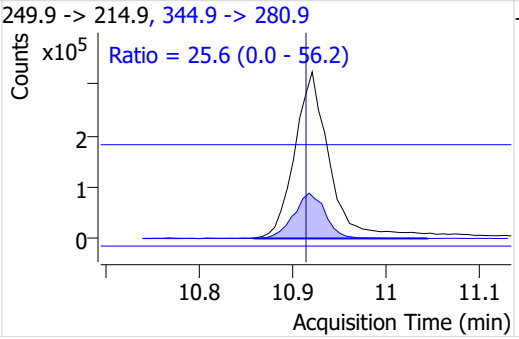


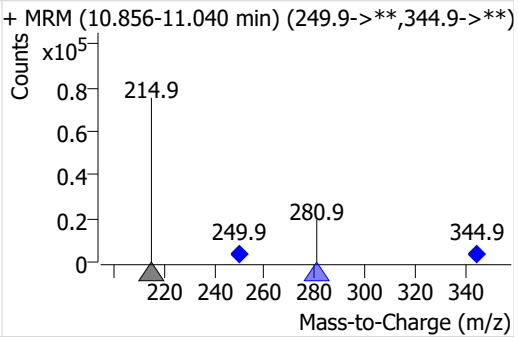




Endrin aldehyde







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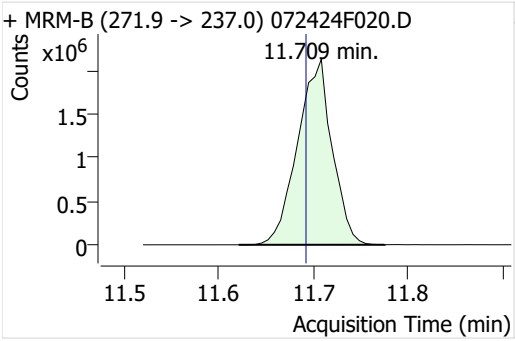
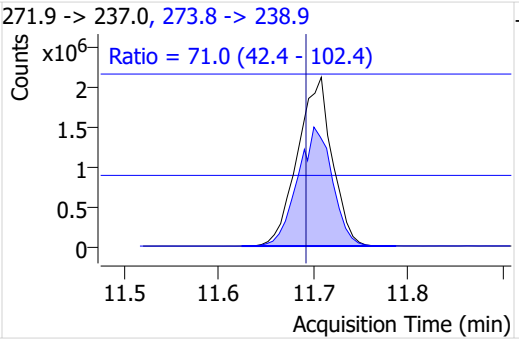
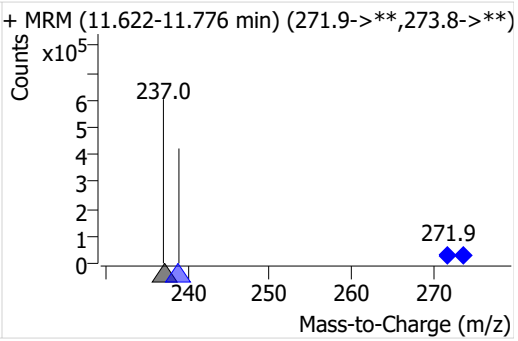
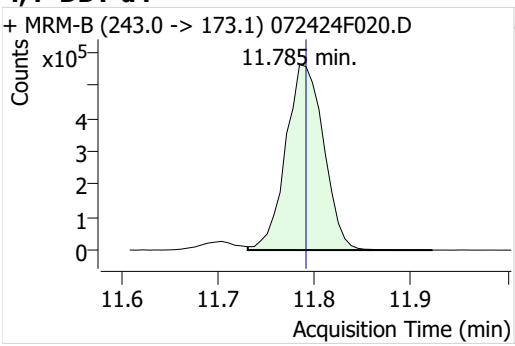
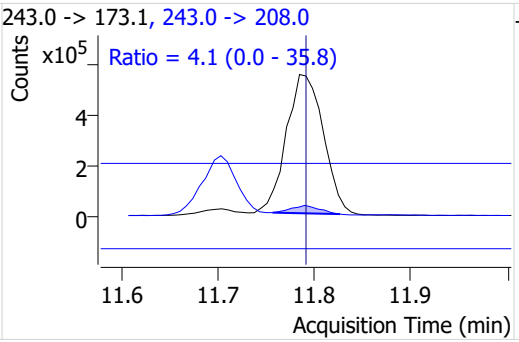


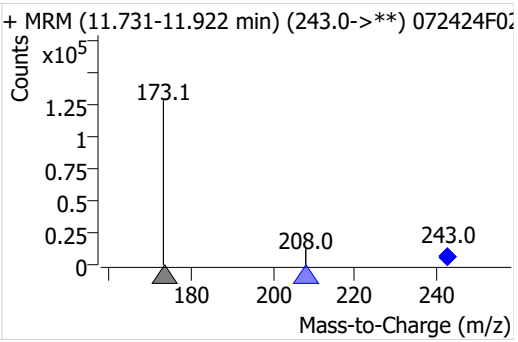




4,4'-DDT-d4







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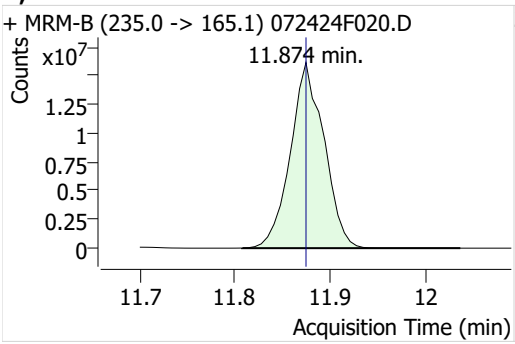
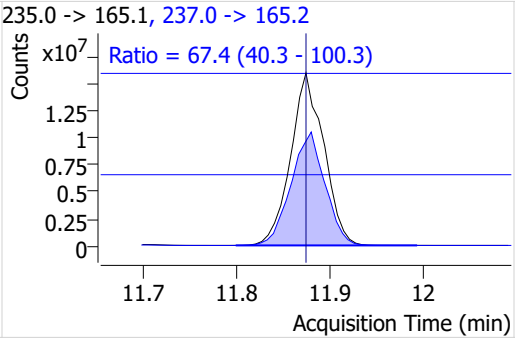
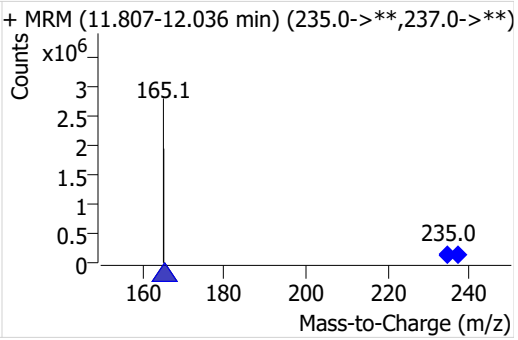
4,4'-DDT







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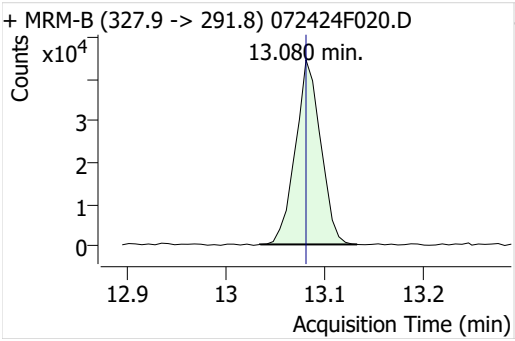

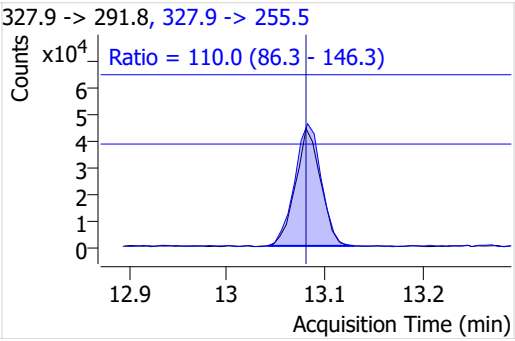

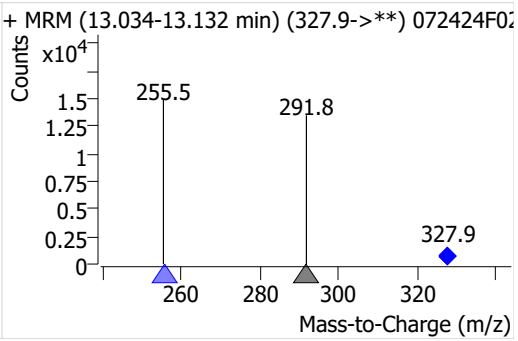

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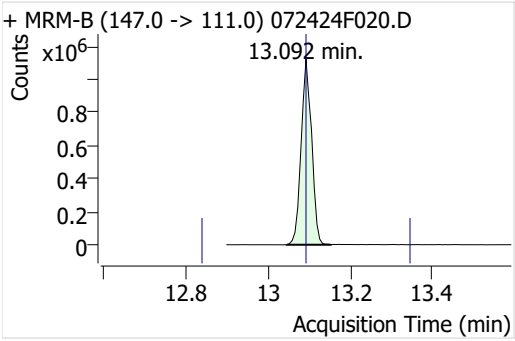
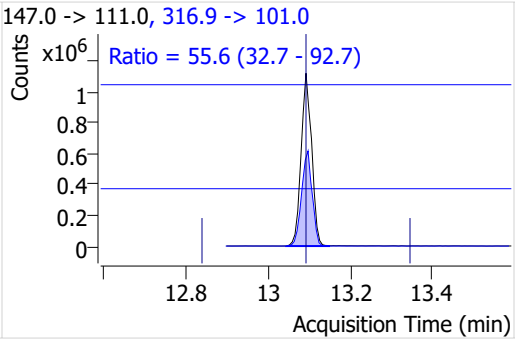
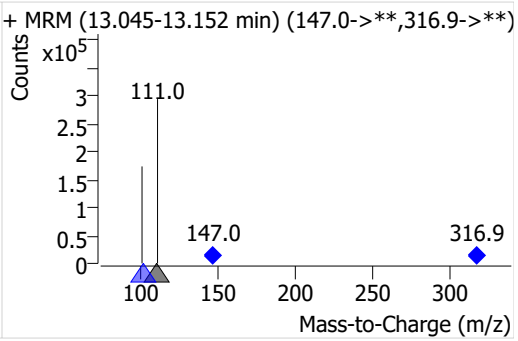
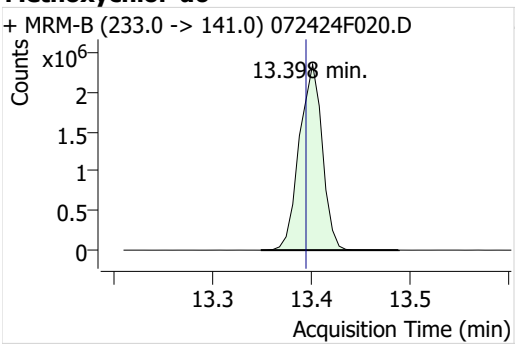
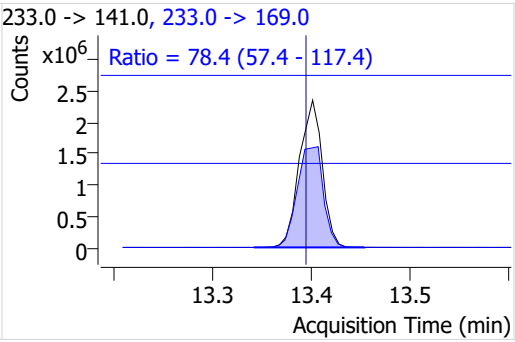


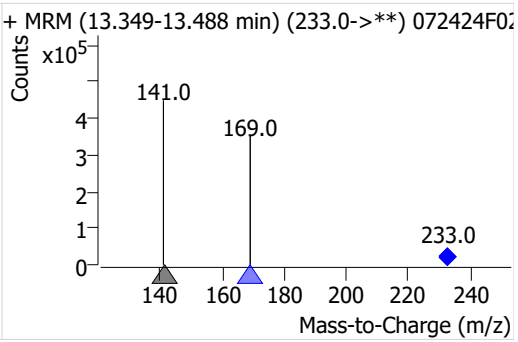




Methoxychlor-d6







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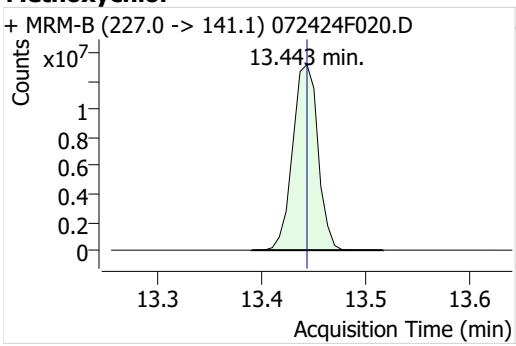
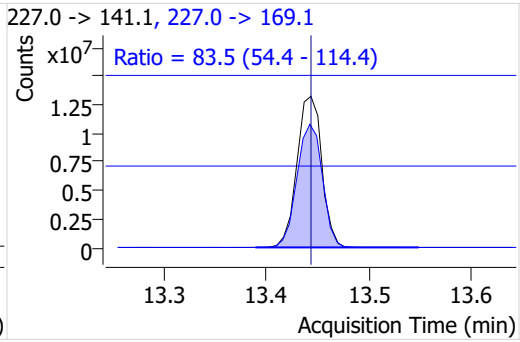
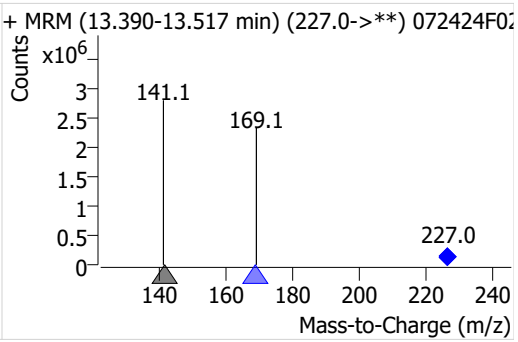
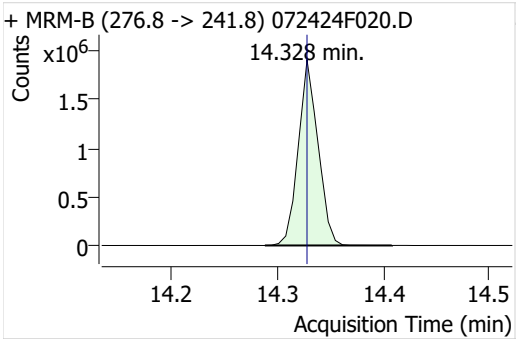
Methoxychlor

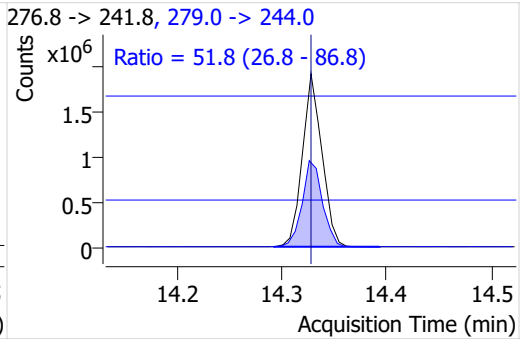


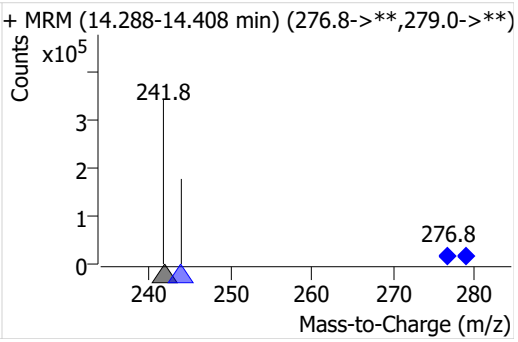




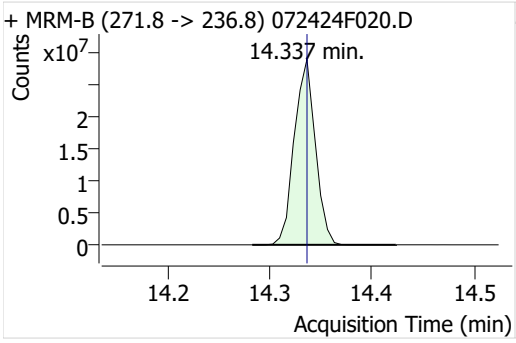
Mirex-13C10

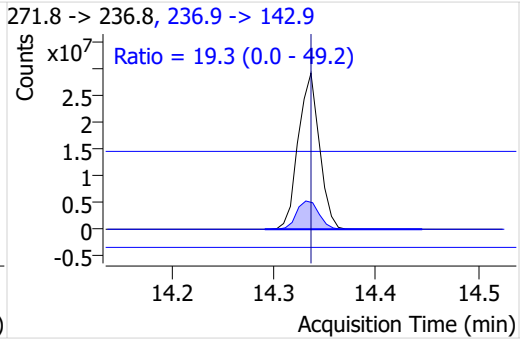


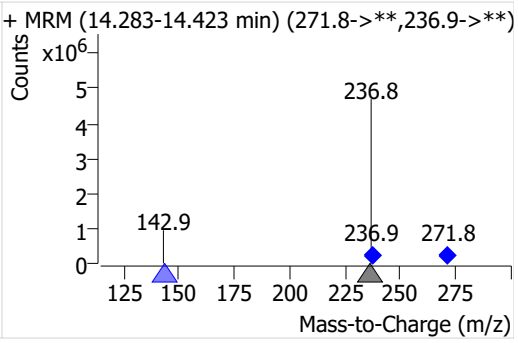




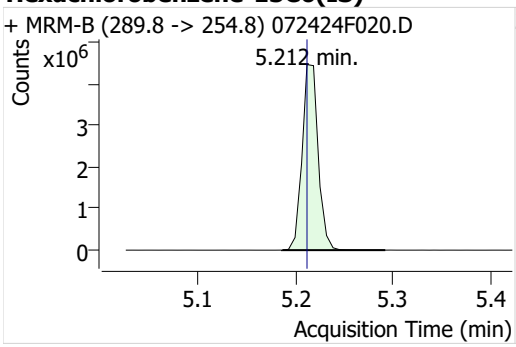
Mirex

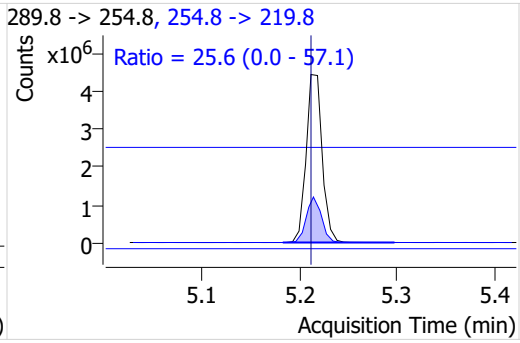


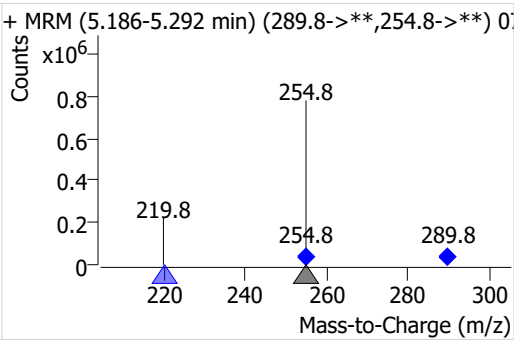




Hexachlorobenzene-13C6(IS)







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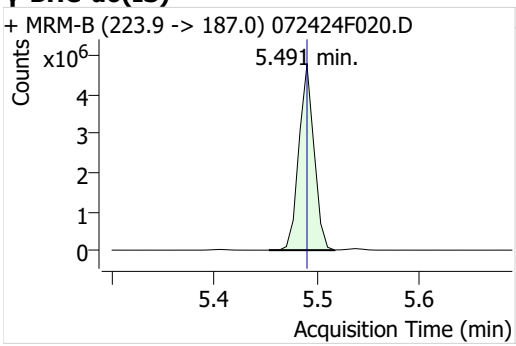
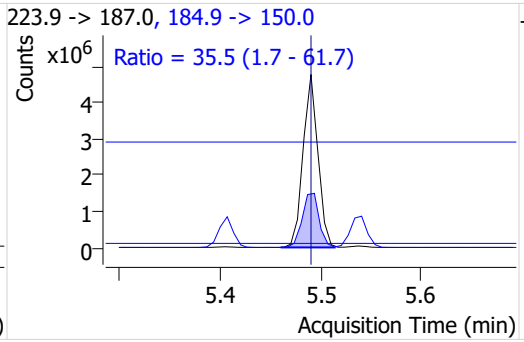
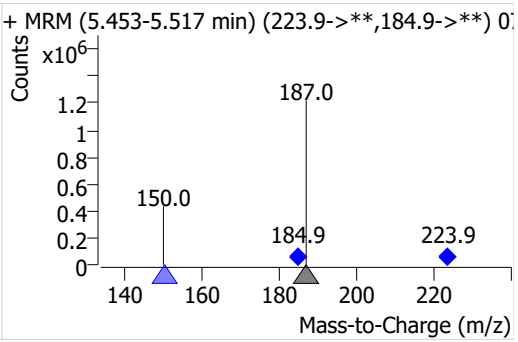
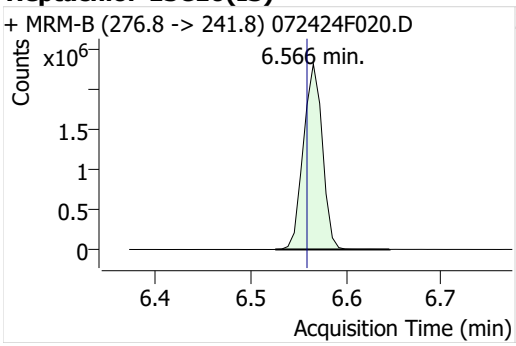
γ-BHC-d6(IS)

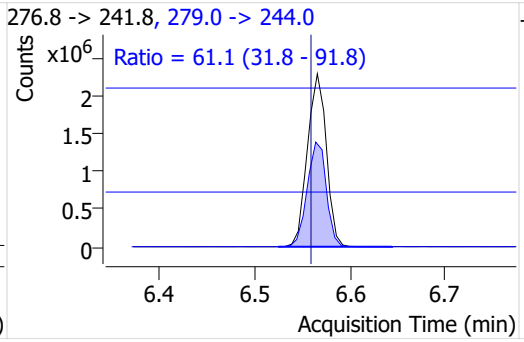


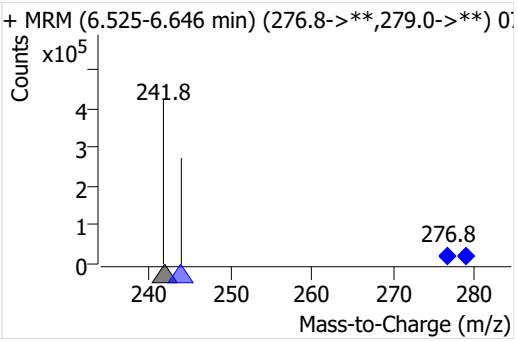




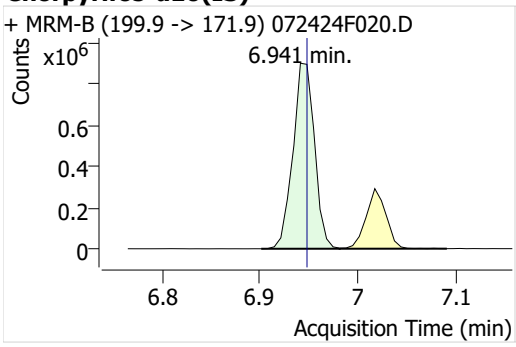
Heptachlor-13C10(IS)

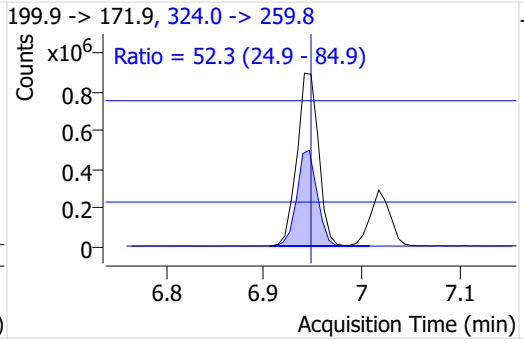


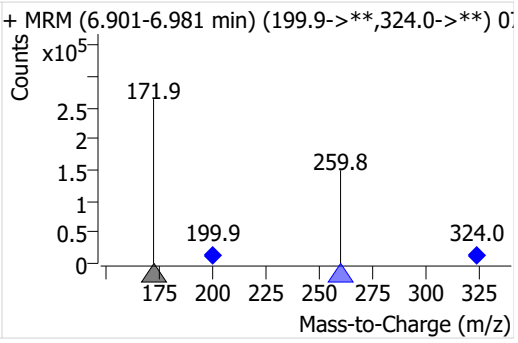




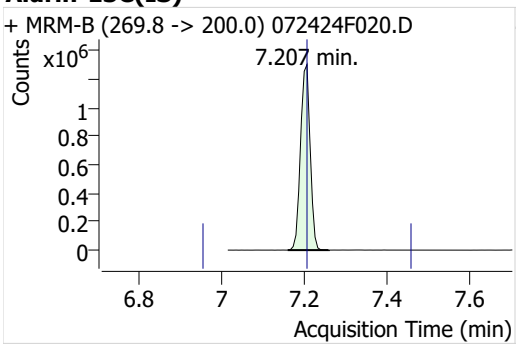
Chorpyrifos-d10(IS)

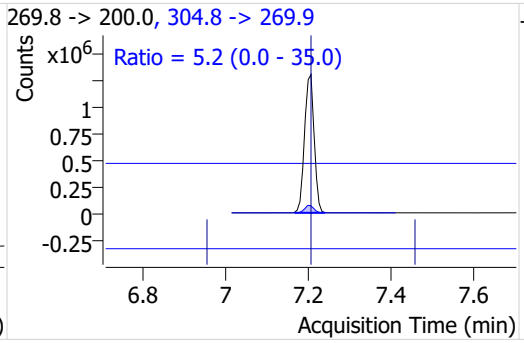


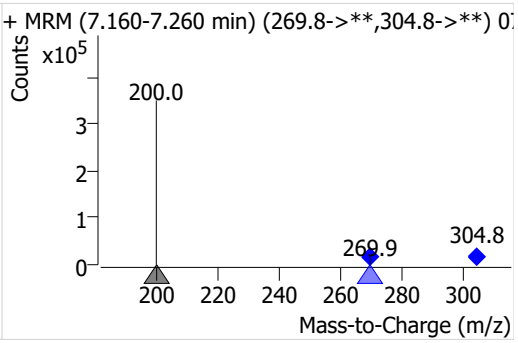




Aldrin-13C(IS)







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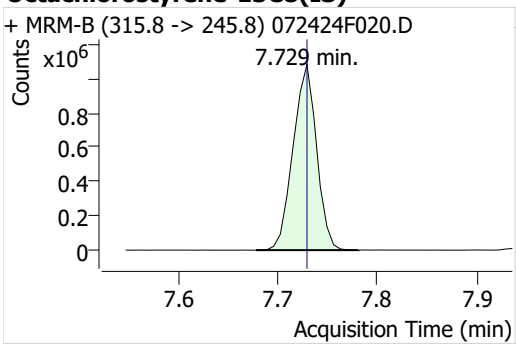
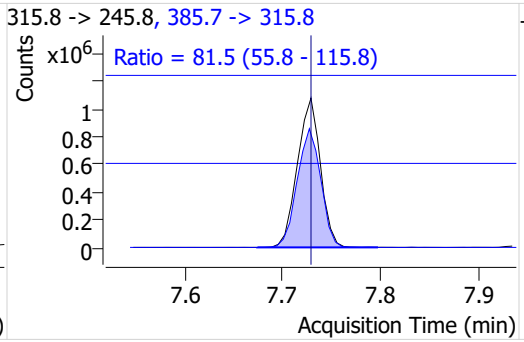
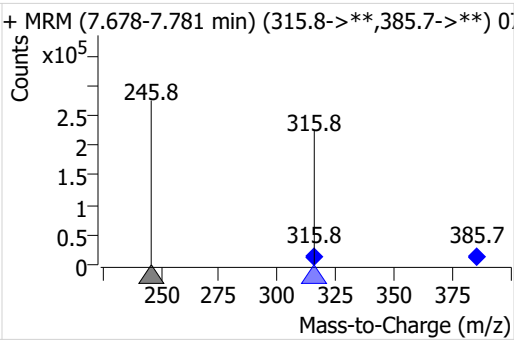
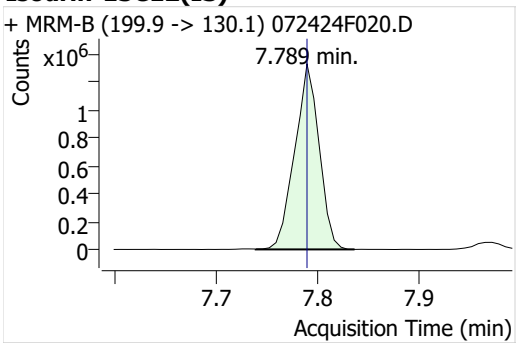
Octachlorostyrene-13C8(IS)

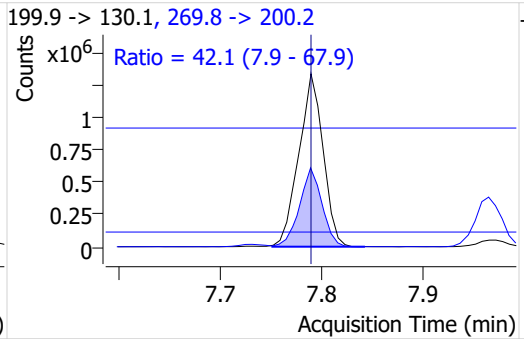


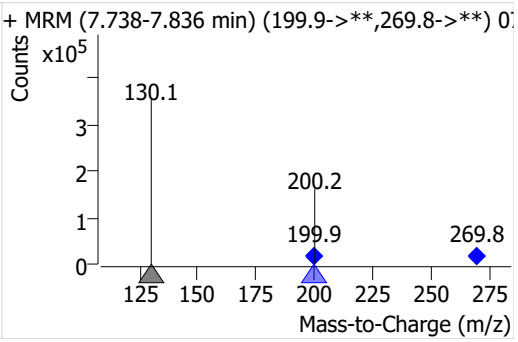




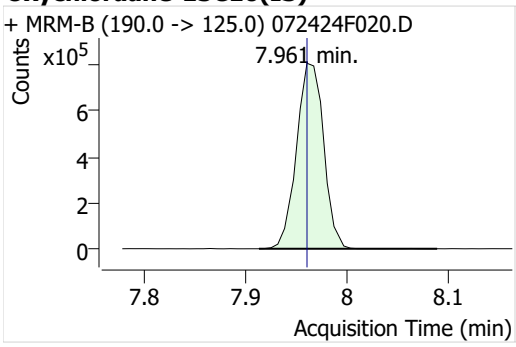
Isodrin-13C12(IS)

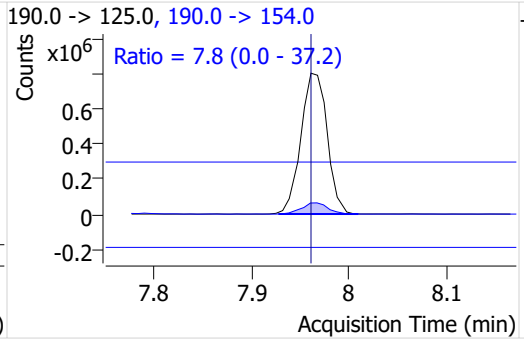


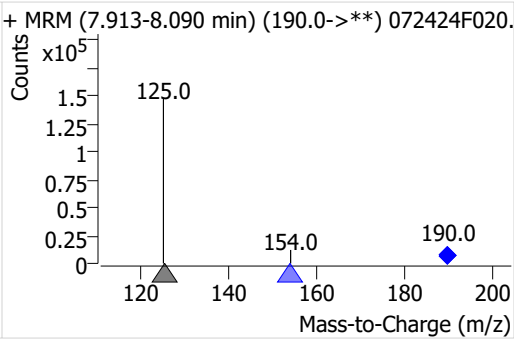




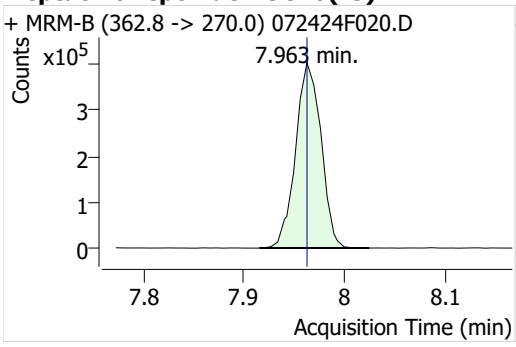
Oxychlordane-13C10(IS)

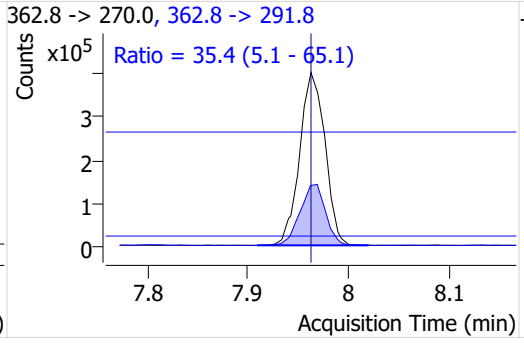


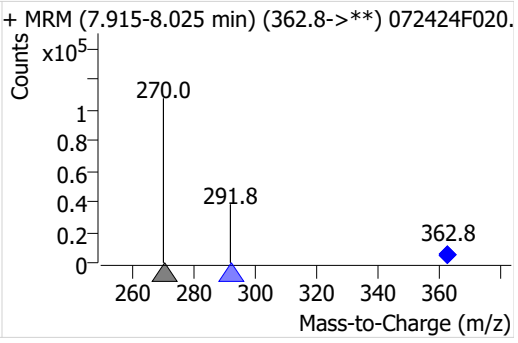




Heptachlor epoxide-13C10(IS)







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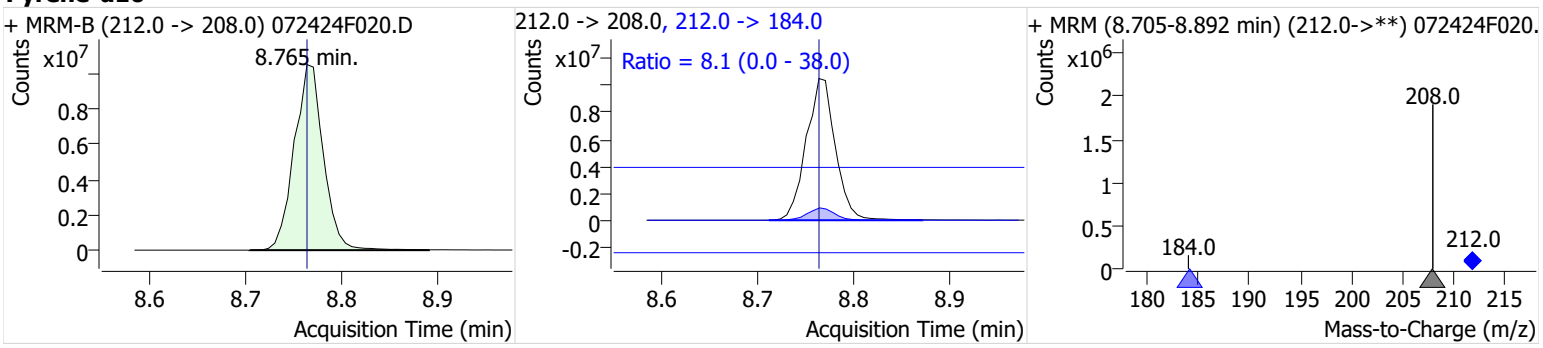
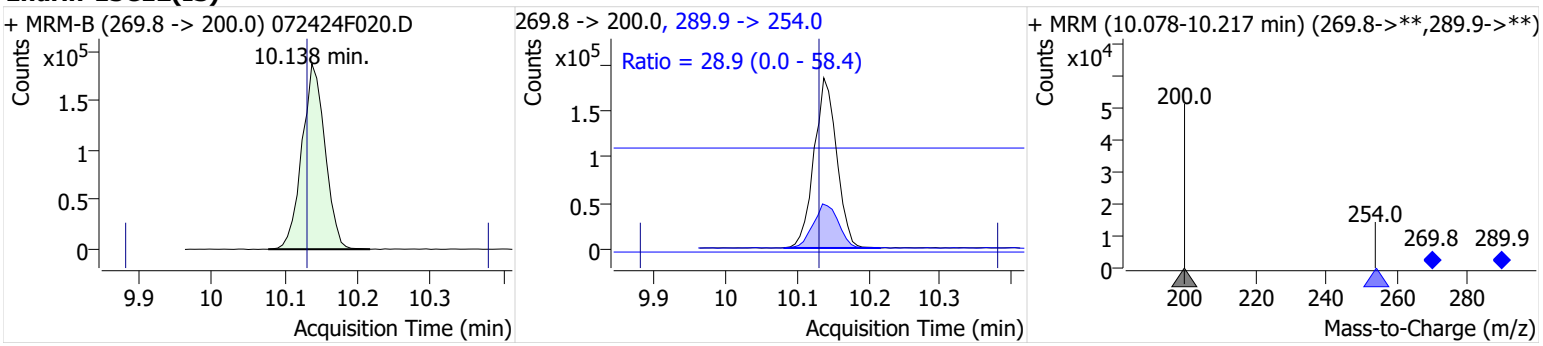
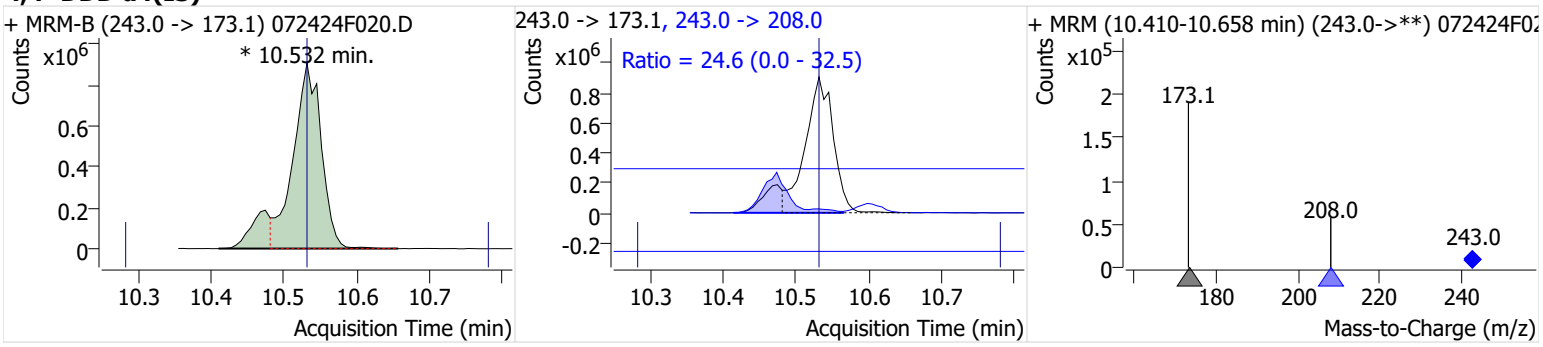
Pyrene-d10



Endrin-13C12(IS)



4,4'-DDD d4(IS)



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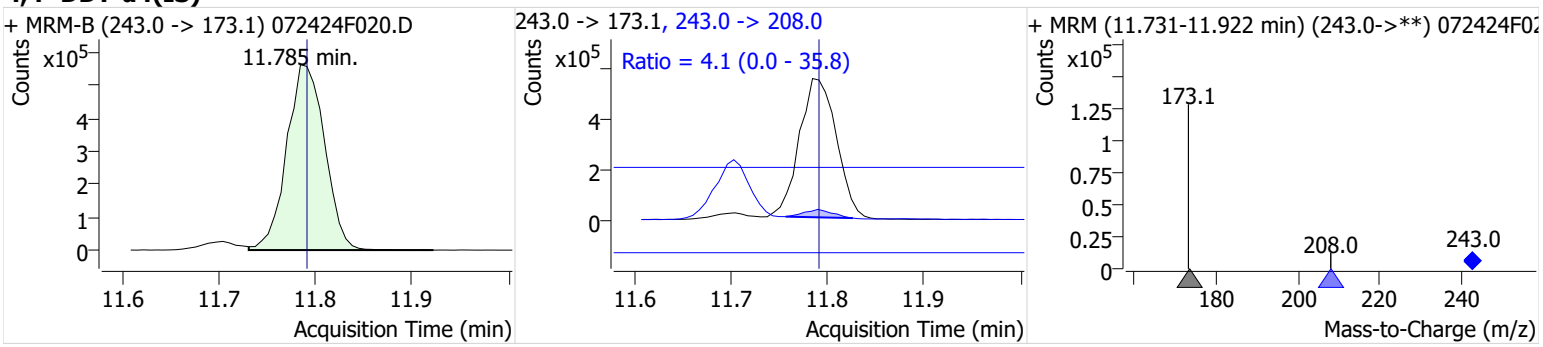
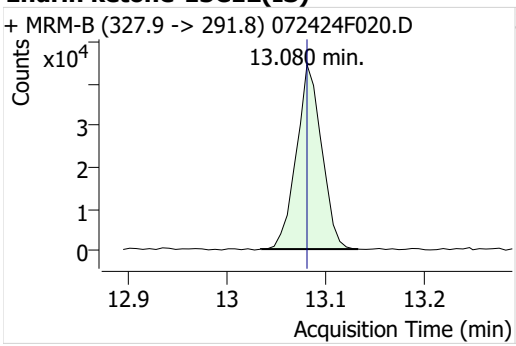
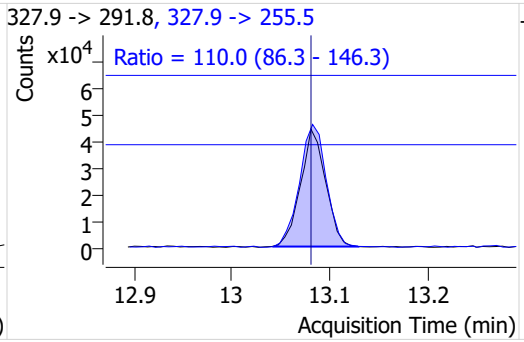
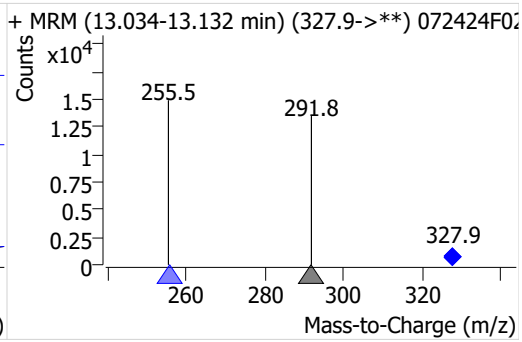


MassHunter Quantitative Analysis Sample Report

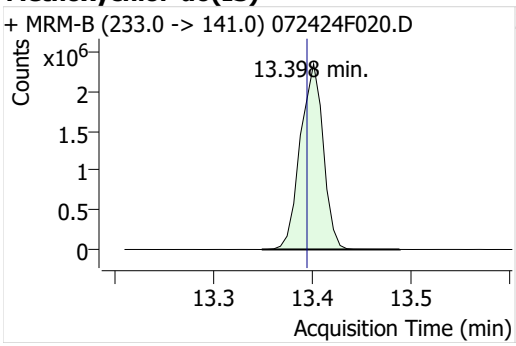
Endrin ketone-13C12(IS)

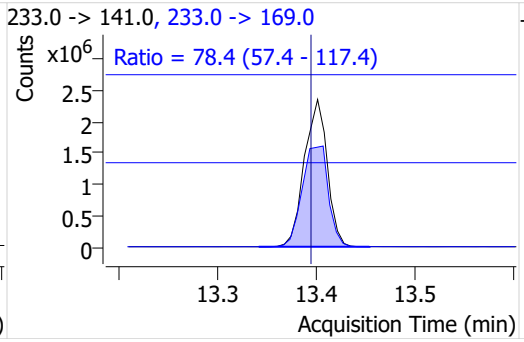


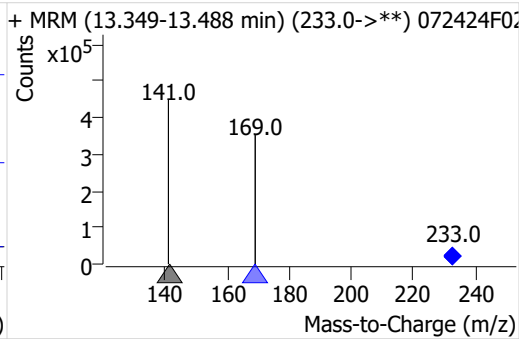




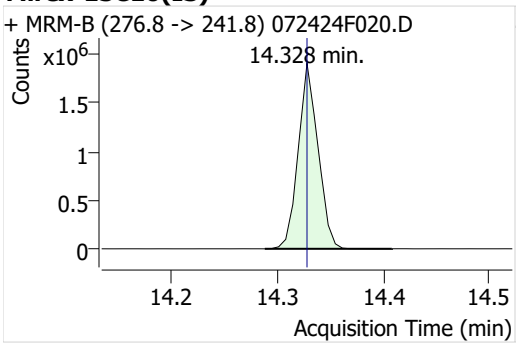
Methoxychlor-d6(IS)

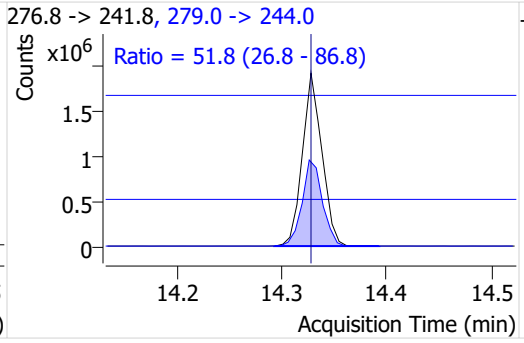


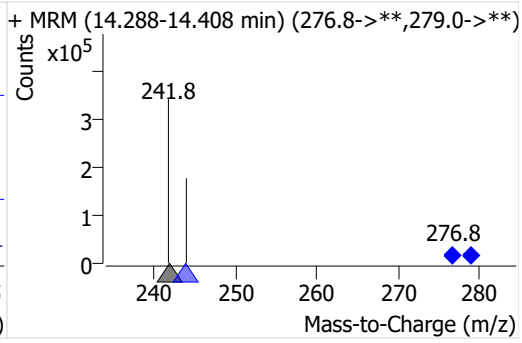




Mirex-13C10(IS)







MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS42\Data\072424\QuantResults\072424 OC PEST.batch.bin		
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Name	OC PEST ICV 20ppb SVM71-30K	**Instrument Name**	MS42
Info.		**Instrument Type**	QQQ
Quant Time	7/30/2024 9:59:53 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method	072424 OC PEST ICAL.batch.bin	**Vial**	13
Last Update	7/25/2024 7:23:43 AM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.213	289.8 -> 254.8	4538682	20.0000 ng/ml	0.002
γ-BHC-d6(IS)	5.491	223.9 -> 187.0	5181654	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	6.565	276.8 -> 241.8	3344477	20.0000 ng/ml	0.006
Chorpyrifos-d10(IS)	6.948	199.9 -> 171.9	1312494	20.0000 ng/ml	0.001
Aldrin-13C(IS)	7.200	269.8 -> 200.0	2121548	20.0000 ng/ml	0.007
Octachlorostyrene-13C8(IS)	7.729	315.8 -> 245.8	1981523	20.0000 ng/ml	0.001
Isodrin-13C12(IS)	7.789	199.9 -> 130.1	2571200	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	7.961	190.0 -> 125.0	1624690	20.0000 ng/ml	0.003
Heptachlor epoxide-13C10(IS)	7.963	362.8 -> 270.0	892082	20.0000 ng/ml	0.000
Pyrene-d10	8.765	212.0 -> 208.0	20746283	100.0000 ng/ml	0.001
Endrin-13C12(IS)	10.145	269.8 -> 200.0	349232	20.0000 ng/ml	0.013
4,4'-DDD d4(IS)	10.532	243.0 -> 173.1	1928410	5.0000 ng/ml	0.003
4,4'-DDT-d4(IS)	11.785	243.0 -> 173.1	1240998	5.0000 ng/ml	0.011
Endrin ketone-13C12(IS)	13.080	327.9 -> 291.8	59042	20.0000 ng/ml	0.001
Methoxychlor-d6(IS)	13.401	233.0 -> 141.0	2471990	20.0000 ng/ml	0.006
Mirex-13C10(IS)	14.328	276.8 -> 241.8	1628811	5.0000 ng/ml	0.001

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.212	289.8 -> 254.8	4538682	17.325 ng/ml	
		Spiked Amount =	20.0	Recovery =	*86.6 %*
γ-BHC-d6	5.491	223.9 -> 187.0	5181654	19.519 ng/ml	
		Spiked Amount =	20.0	Recovery =	*97.6 %*
Heptachlor-13C10	6.559	276.8 -> 241.8	3344477	21.930 ng/ml	
		Spiked Amount =	20.0	Recovery =	*109.6 %*
Chorpyrifos-d10	6.948	199.9 -> 171.9	1312494	20.080 ng/ml	
		Spiked Amount =	20.0	Recovery =	*100.4 %*
Aldrin-13C	7.207	269.8 -> 200.0	2120749	18.378 ng/ml	
		Spiked Amount =	20.0	Recovery =	*91.9 %*
Octachlorostyrene-13C8	7.729	315.8 -> 245.8	1981523	19.053 ng/ml	
		Spiked Amount =	20.0	Recovery =	*95.3 %*
Isodrin-13C12	7.789	199.9 -> 130.1	2571200	20.790 ng/ml	
		Spiked Amount =	20.0	Recovery =	*104.0 %*
Oxychlordane-13C10	7.961	190.0 -> 125.0	1624690	22.155 ng/ml	
		Spiked Amount =	20.0	Recovery =	*110.8 %*
Heptachlor epoxide-13C10	7.963	362.8 -> 270.0	892082	21.491 ng/ml	
		Spiked Amount =	20.0	Recovery =	*107.5 %*
Endrin-13C12	10.131	269.8 -> 200.0	349232	19.745 ng/ml	
		Spiked Amount =	20.0	Recovery =	*98.7 %*
4,4'-DDD d4	10.532	243.0 -> 173.1	1928410	4.390 ng/ml	
		Spiked Amount =	5.0	Recovery =	*87.8 %*
4,4'-DDT-d4	11.791	243.0 -> 173.1	1240998	4.587 ng/ml	
		Spiked Amount =	5.0	Recovery =	*91.7 %*
Endrin ketone-13C12	13.080	327.9 -> 291.8	59042	15.814 ng/ml	
		Spiked Amount =	20.0	Recovery =	*79.1 %*
Methoxychlor-d6	13.394	233.0 -> 141.0	2471990	16.478 ng/ml	
		Spiked Amount =	20.0	Recovery =	*82.4 %*

MassHunter Quantitative Analysis Sample Report

System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.328	276.8 -> 241.8	1628811	4.082 ng/ml
		Spiked Amount = 5.0		Recovery = *81.6 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
α-BHC	γ-BHC-d6(IS)	5.163	181.1 -> 145.1	7860312	21.517 ng/ml	92
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.214	283.8 -> 213.9	7014077	20.252 ng/ml	100
β-BHC	γ-BHC-d6(IS)	5.408	181.1 -> 145.1	5196016	21.237 ng/ml	84
γ-BHC(Lindane)	γ-BHC-d6(IS)	5.536	181.1 -> 145.1	6769677	21.669 ng/ml	83
δ-BHC	γ-BHC-d6(IS)	5.859	181.1 -> 145.1	4943400	21.737 ng/ml	92
Heptachlor	Heptachlor-13C10(IS)	6.569	271.7 -> 236.9	3588429	19.940 ng/ml	99
Chorpyrifos	Chorpyrifos-d10(IS)	7.011	196.9 -> 169.0	1542907	17.272 ng/ml	89
Aldrin	Aldrin-13C(IS)	7.209	254.9 -> 220.0	1195475	20.273 ng/ml	93
Octachlorostyrene	Octachlorostyrene-13C8(IS)	7.728	342.8 -> 307.8	4715376	19.365 ng/ml	93
Isodrin	Isodrin-13C12(IS)	7.796	193.0 -> 123.0	3002379	22.235 ng/ml	98
Oxychlordane	Oxychlordane-13C10(IS)	7.968	114.9 -> 51.1	4239517	20.193 ng/ml	97
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	7.971	352.8 -> 262.9	904735	19.151 ng/ml	99
γ-Chlordane(trans)	Oxychlordane-13C10(IS)	8.510	271.8 -> 236.9	1383226	16.203 ng/ml	99
2,4'-DDE	4,4'-DDD d4(IS)	8.527	246.0 -> 176.2	16039435	23.271 ng/ml	98
α-Chlordane(cis)	Oxychlordane-13C10(IS)	8.823	271.8 -> 236.9	1759364	17.039 ng/ml	98
Endosulfan I	Endrin-13C12(IS)	8.847	206.9 -> 172.0	589165	18.770 ng/ml	100
trans-Nanochlor	Oxychlordane-13C10(IS)	8.891	271.8 -> 236.9	1235174	16.816 ng/ml	90
4,4' -DDE	4,4'-DDD d4(IS)	9.357	246.0 -> 176.2	9991452	20.349 ng/ml	92
Dieldrin	Endrin-13C12(IS)	9.555	262.9 -> 193.0	632204	16.241 ng/ml	94
2,4'-DDD	4,4'-DDD d4(IS)	9.546	235.0 -> 165.1	10991997	19.852 ng/ml	99
Endrin	Endrin-13C12(IS)	10.153	262.8 -> 193.0	382538	17.726 ng/ml	99
Endosulfan II	Endrin-13C12(IS)	10.471	206.9 -> 172.0	323153	19.385 ng/ml	100
cis-Nonachlor	Oxychlordane-13C10(IS)	10.604	271.8 -> 236.9	1053936	16.691 ng/ml	95
4,4'-DDD	4,4'-DDD d4(IS)	10.601	235.0 -> 165.1	7362705	18.034 ng/ml	100
2,4'-DDT	4,4'-DDT-d4(IS)	10.682	235.0 -> 165.1	7173750	19.744 ng/ml	100
Endrin aldehyde	Endrin-13C12(IS)	10.920	249.9 -> 214.9	103206	16.741 ng/ml	99
Endosulfan sulfate	Endrin-13C12(IS)	11.702	271.9 -> 237.0	754705	17.218 ng/ml	96
4,4'-DDT	4,4'-DDT-d4(IS)	11.874	235.0 -> 165.1	5461473	19.445 ng/ml	94
Endrin ketone	Endrin ketone-13C12(IS)	13.099	147.0 -> 111.0	258638	19.516 ng/ml	88
Methoxychlor	Methoxychlor-d6(IS)	13.443	227.0 -> 141.1	2964654	23.018 ng/ml	98
Mirex	Mirex-13C10(IS)	14.336	271.8 -> 236.8	6488565	19.333 ng/ml	96

(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram

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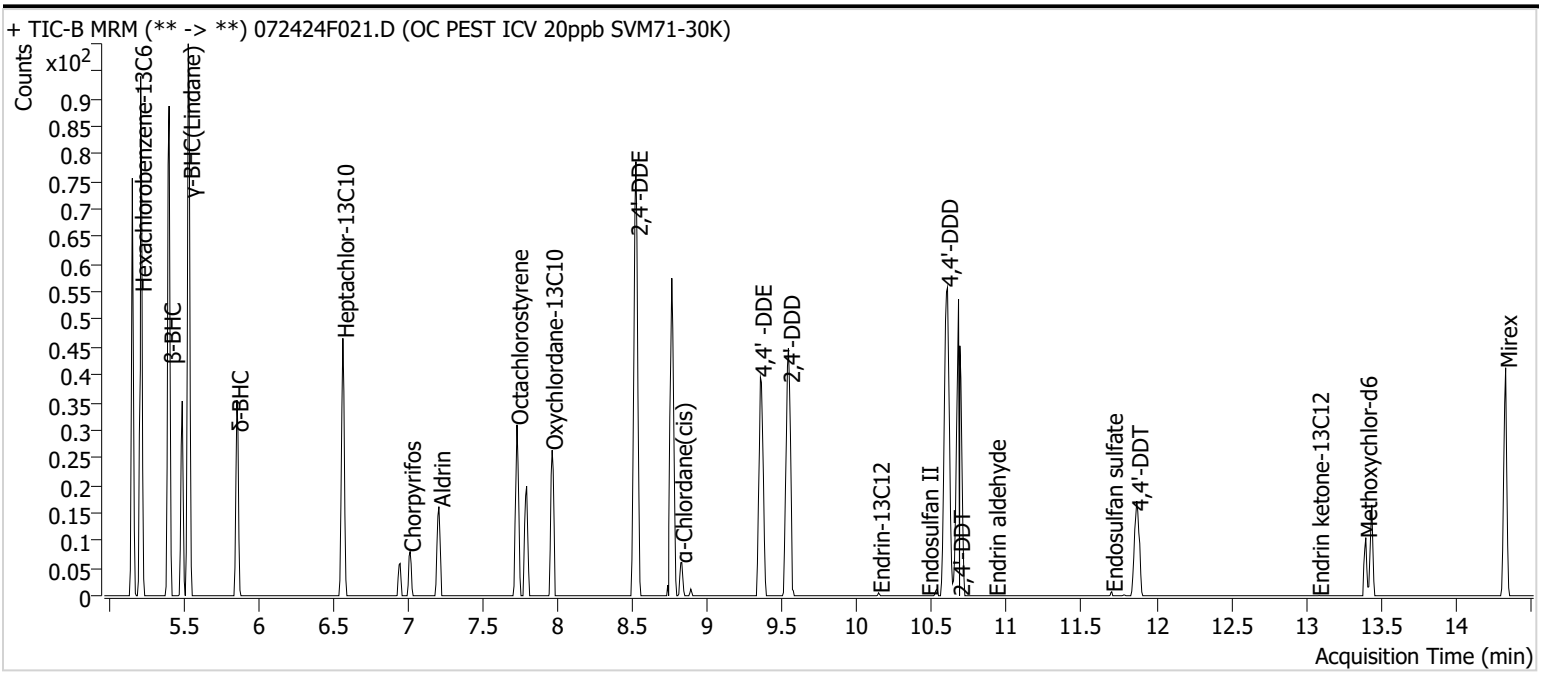
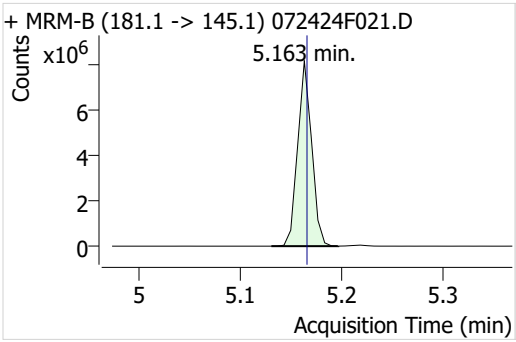
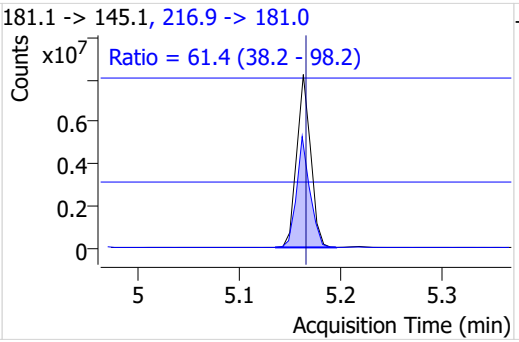
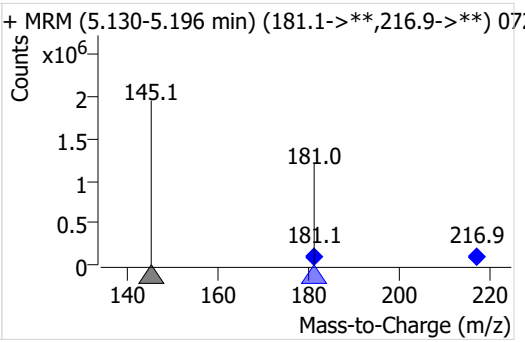


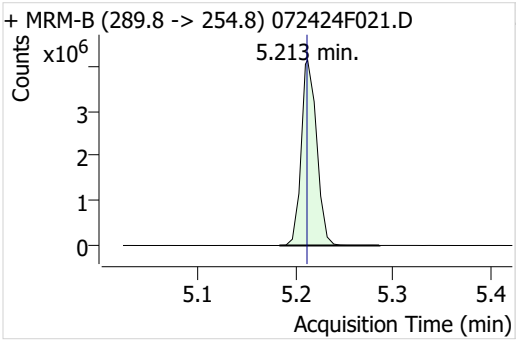
α-BHC

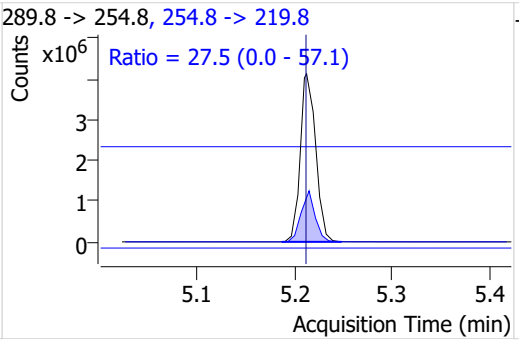


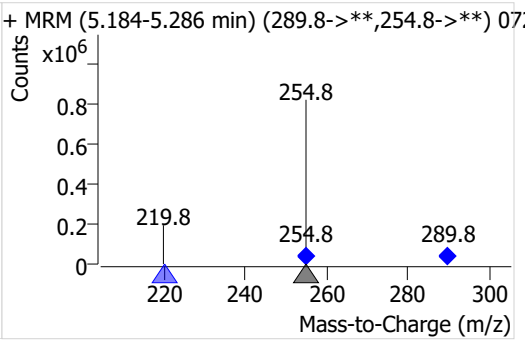




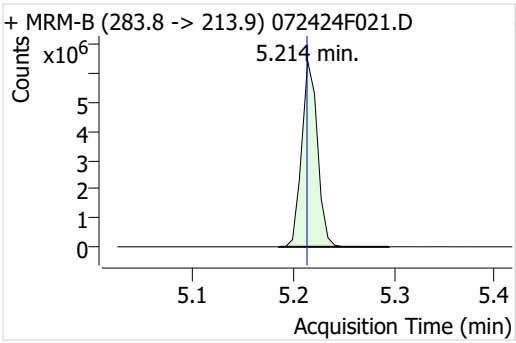
Hexachlorobenzene-13C6

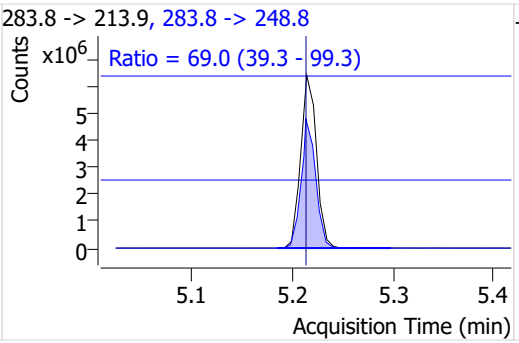


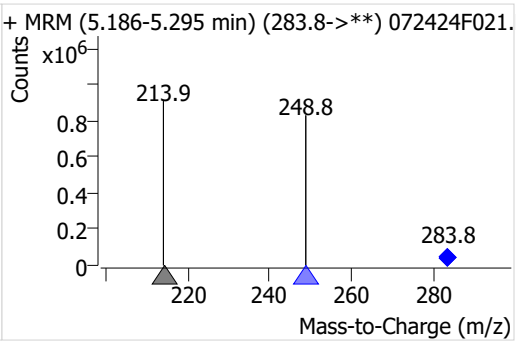




Hexachlorobenzene

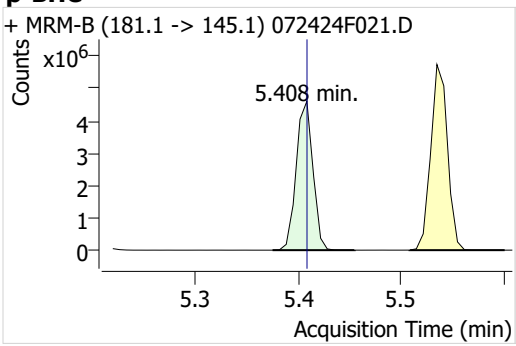


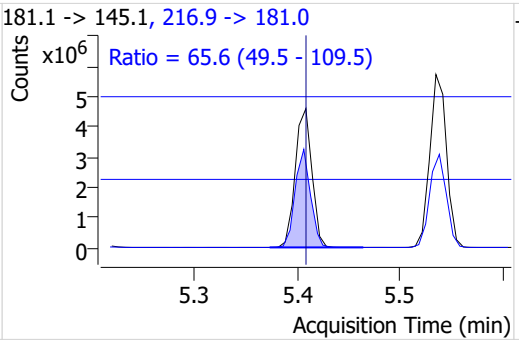


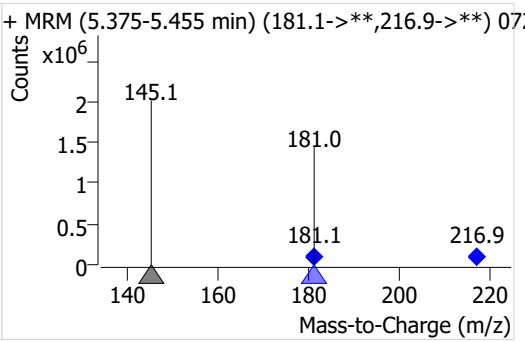


MassHunter Quantitative Analysis Sample Report

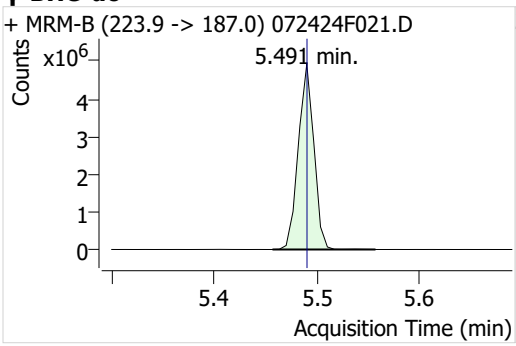
β-BHC

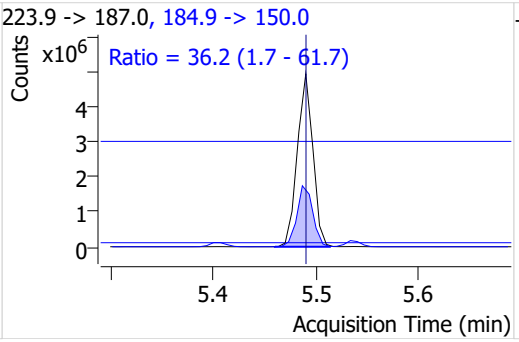


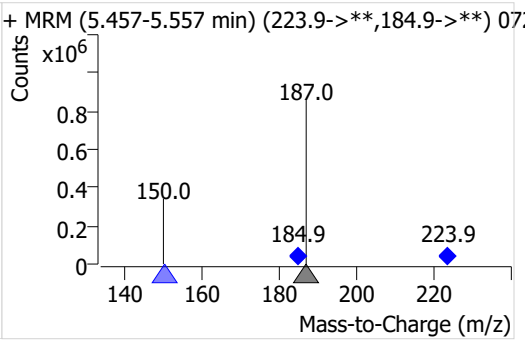




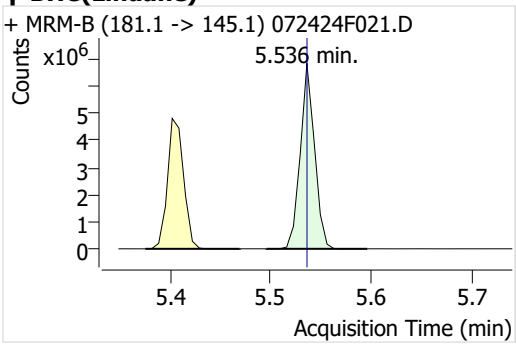
γ-BHC-d6

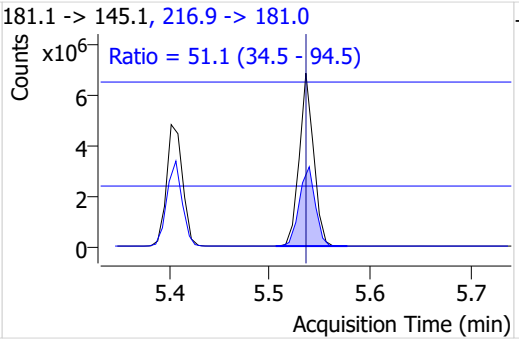


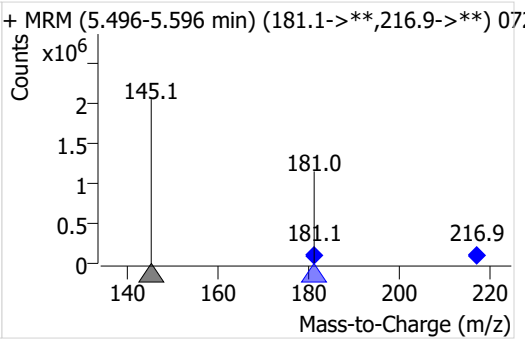




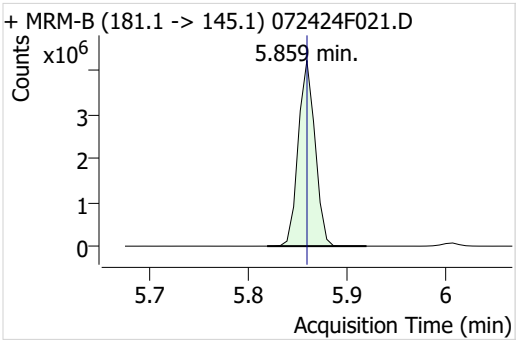
γ-BHC(Lindane)

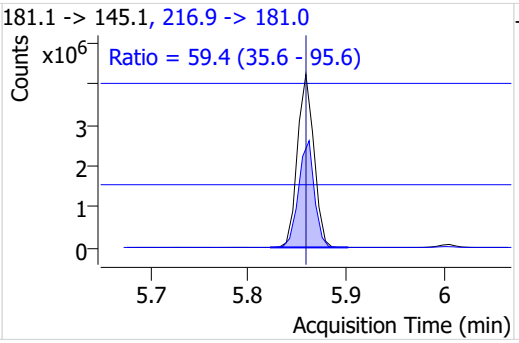


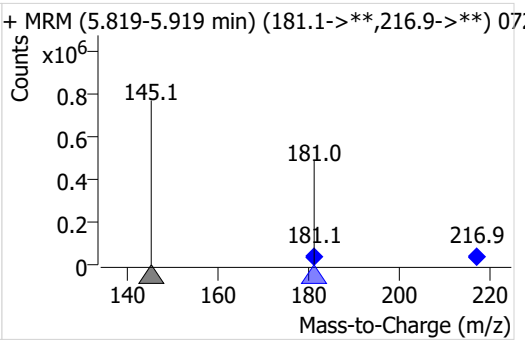




δ-BHC

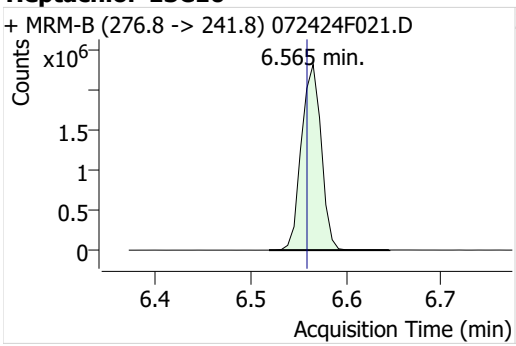


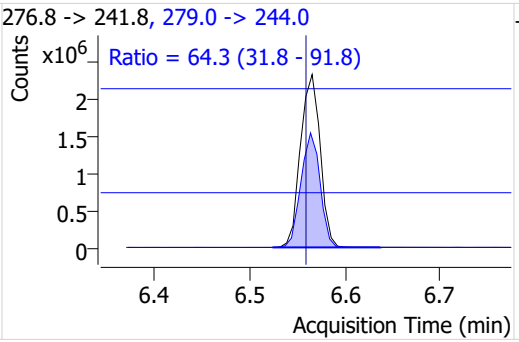


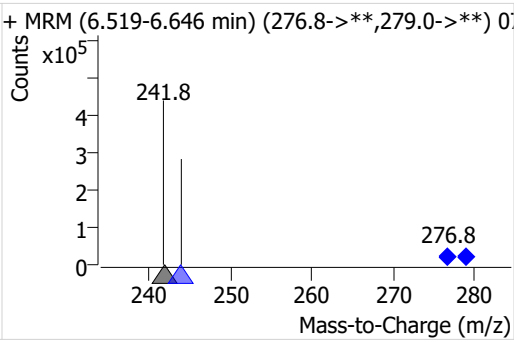


MassHunter Quantitative Analysis Sample Report

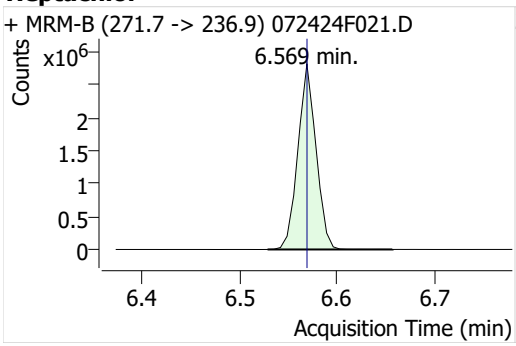
Heptachlor-13C10

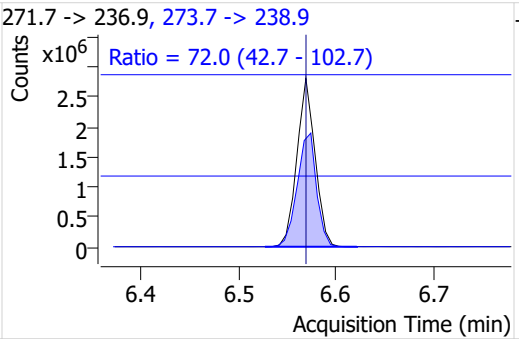


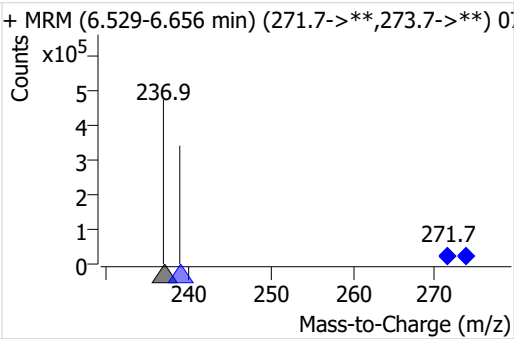




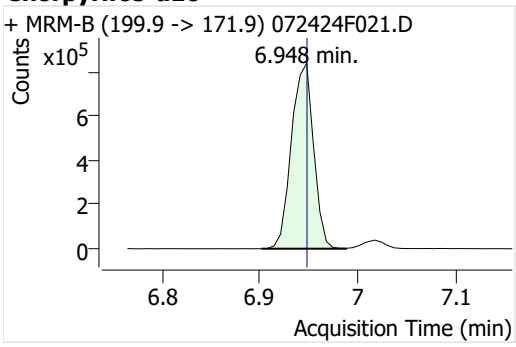
Heptachlor

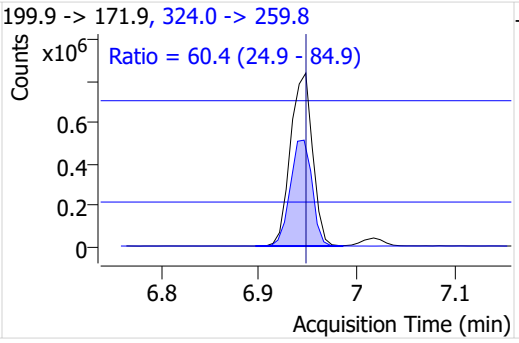


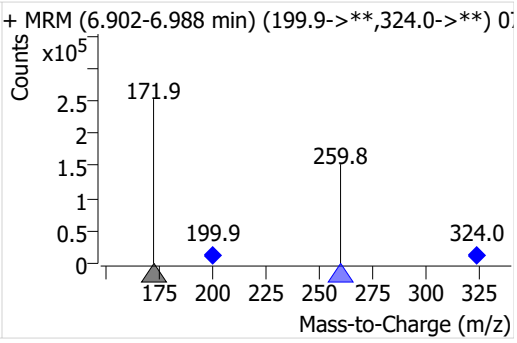




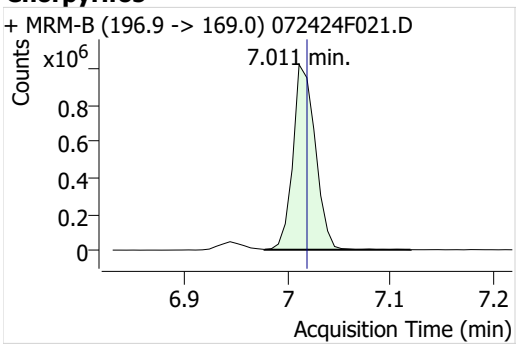
Chorpyrifos-d10

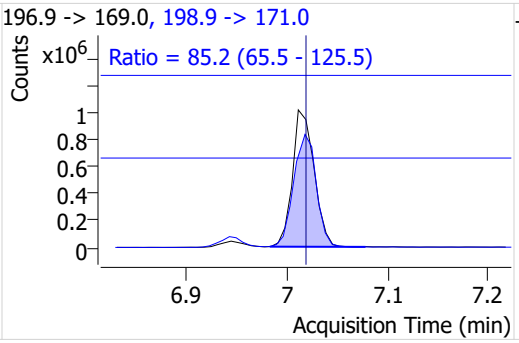


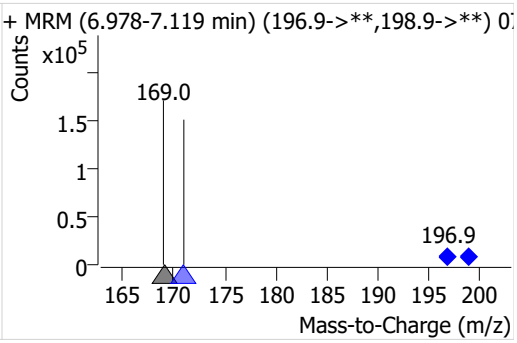




Chorpyrifos

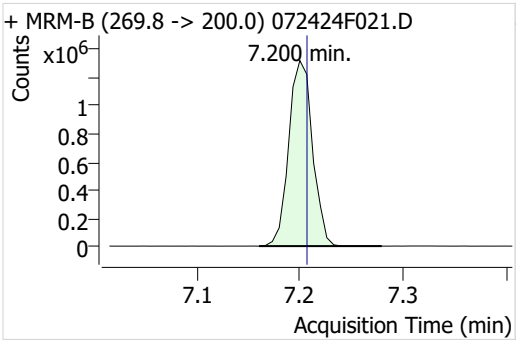


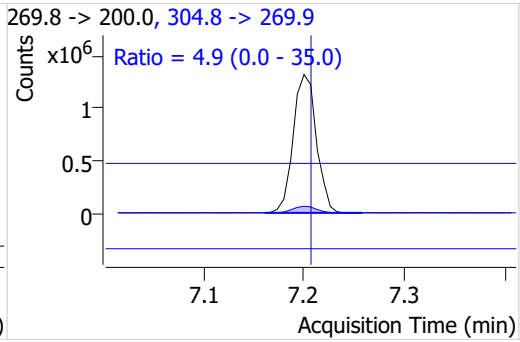


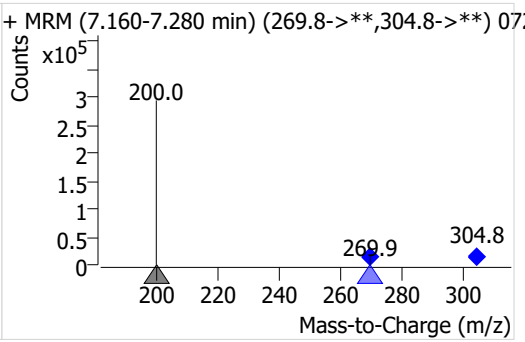


MassHunter Quantitative Analysis Sample Report

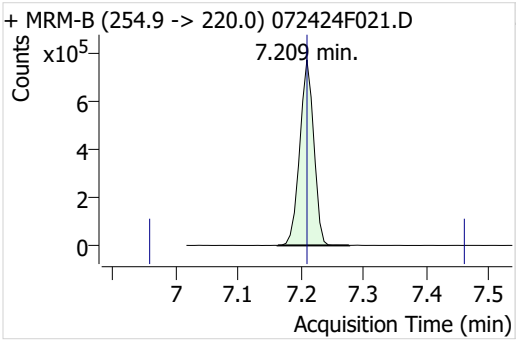
Aldrin-13C

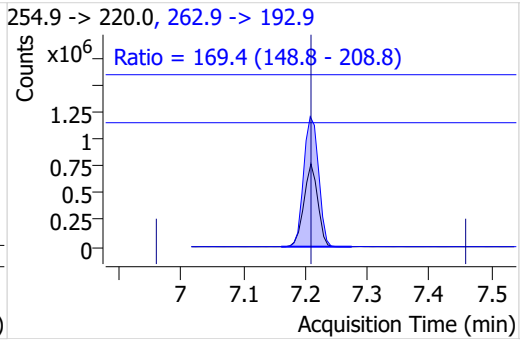


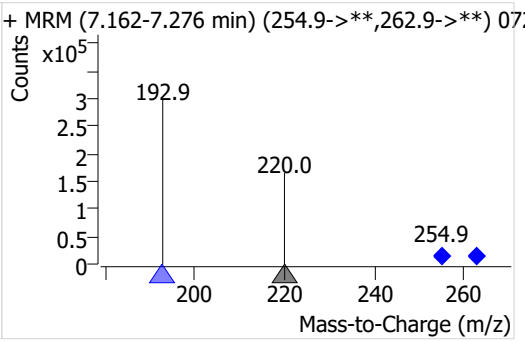




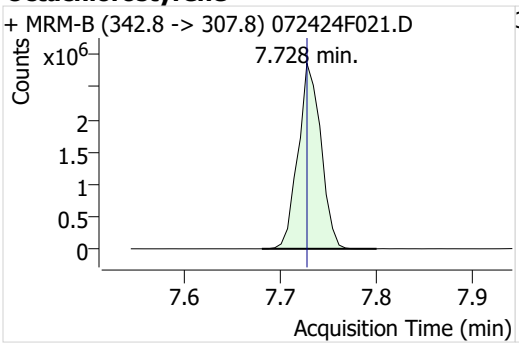
Aldrin

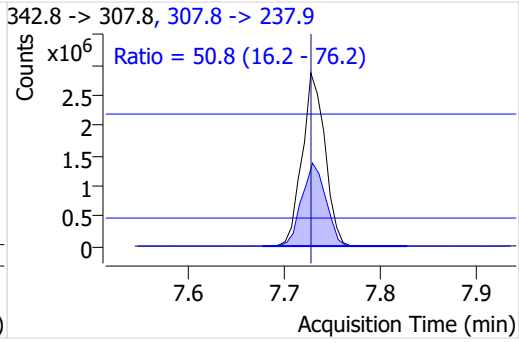


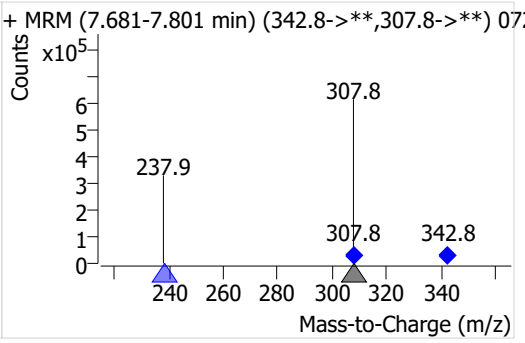




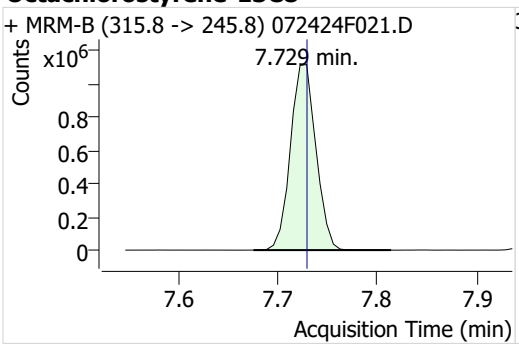
Octachlorostyrene

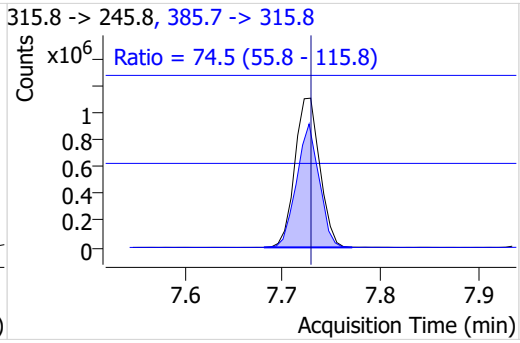


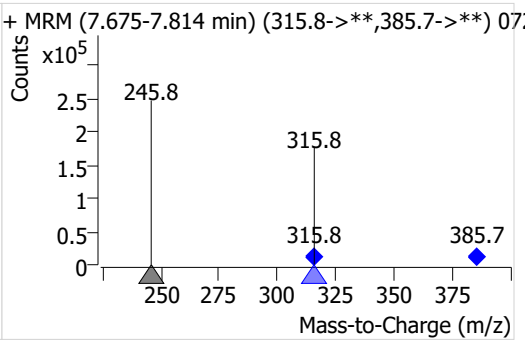




Octachlorostyrene-13C8







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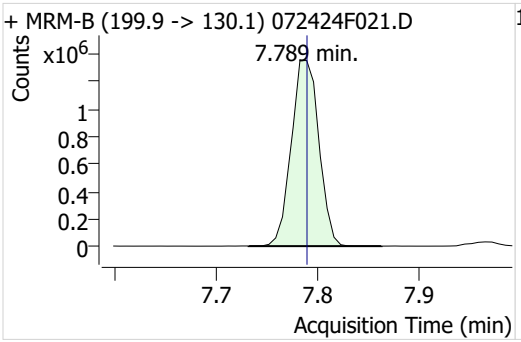
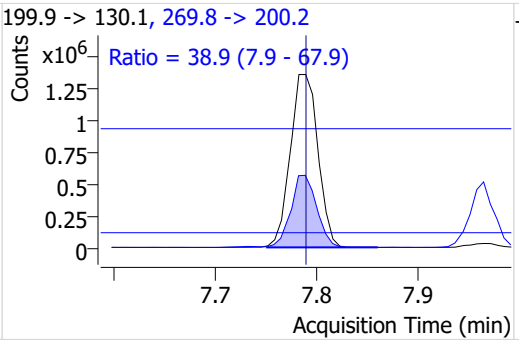
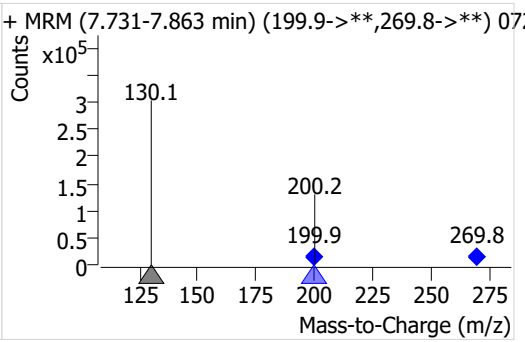
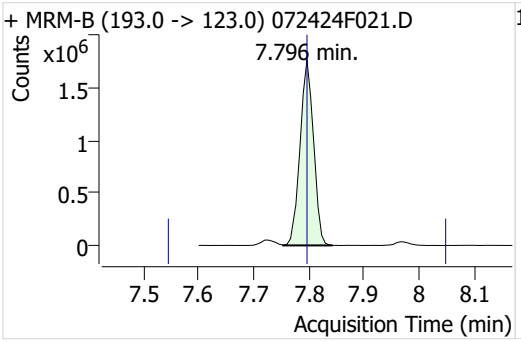
Isodrin-13C12

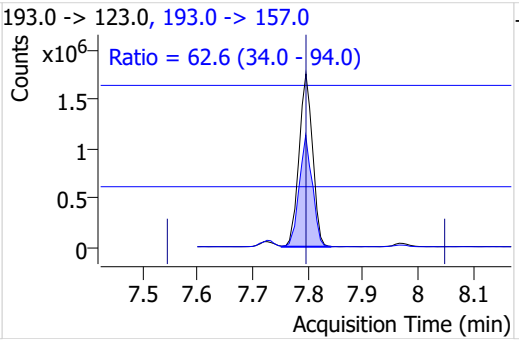


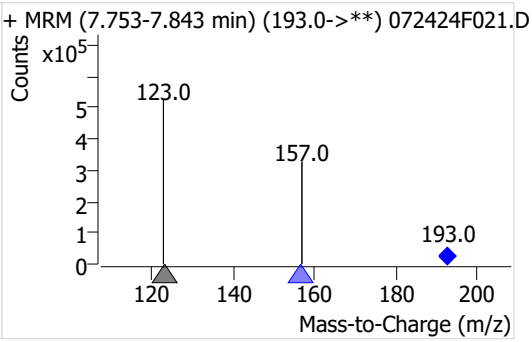




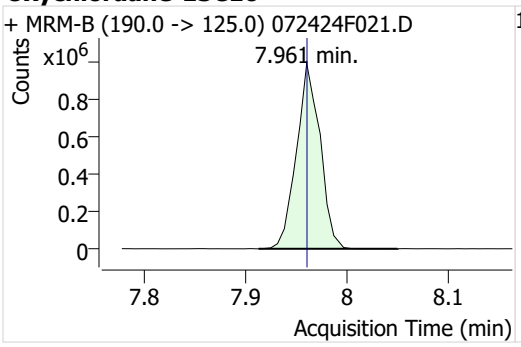
Isodrin

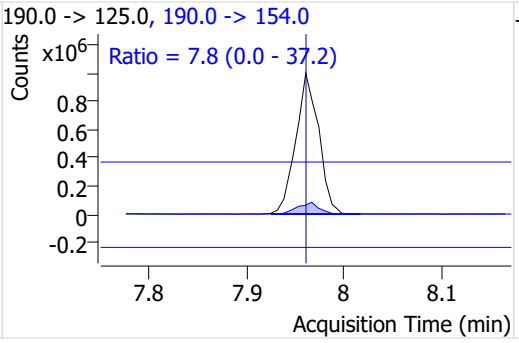


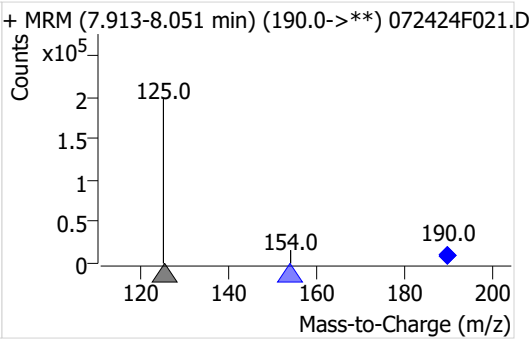




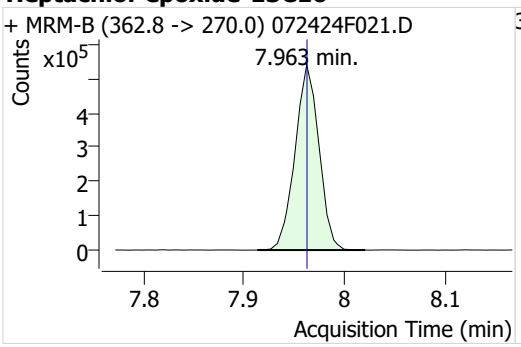
Oxychlordane-13C10

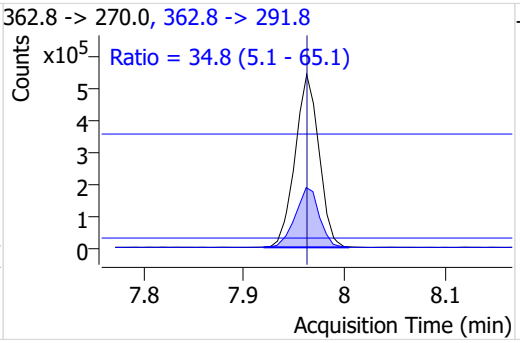


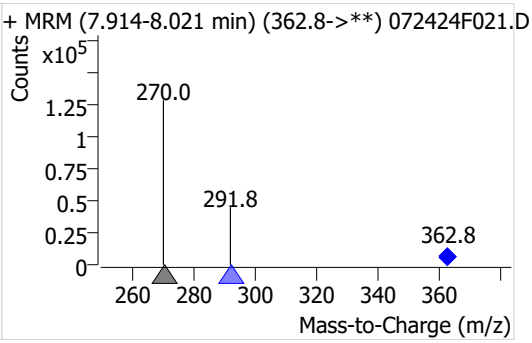




Heptachlor epoxide-13C10

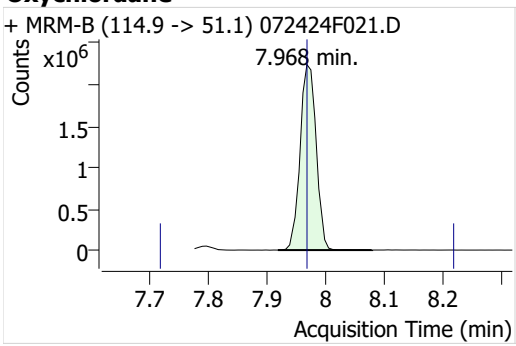


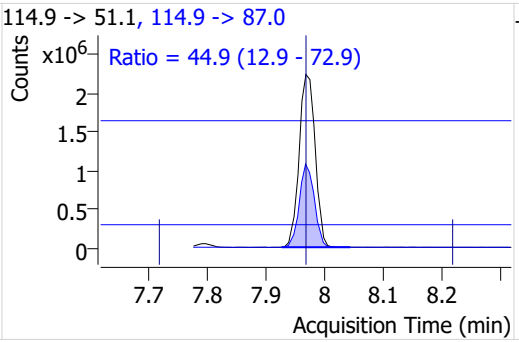


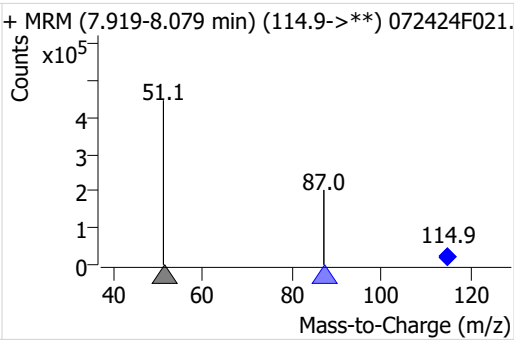


MassHunter Quantitative Analysis Sample Report

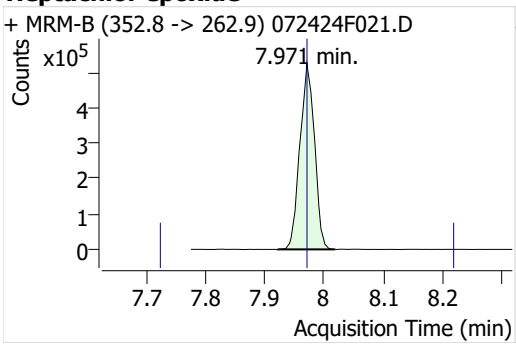
Oxychlordane

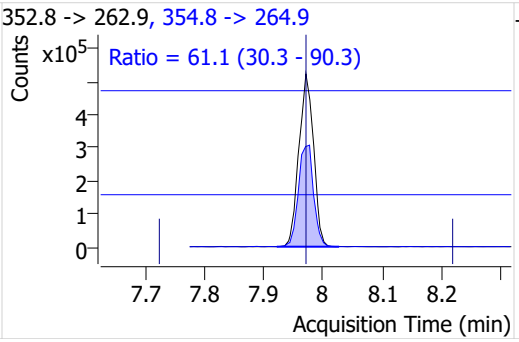


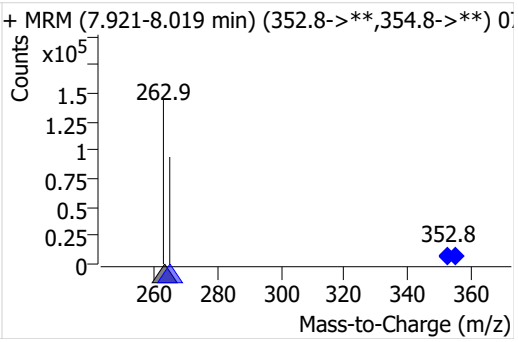




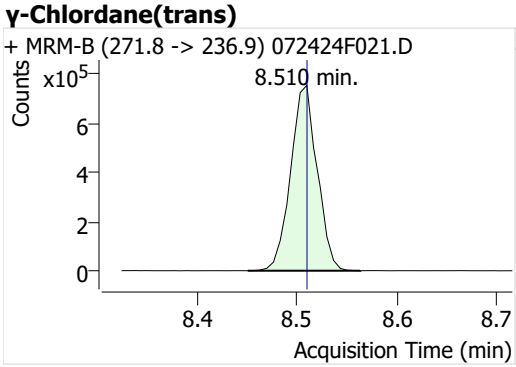
Heptachlor epoxide

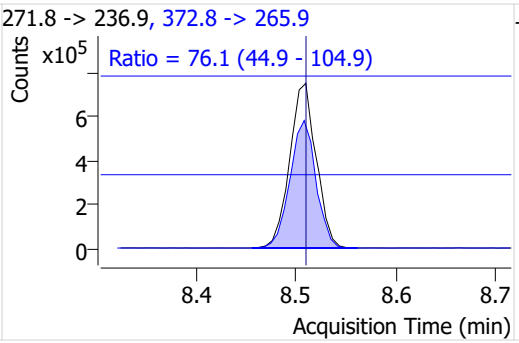


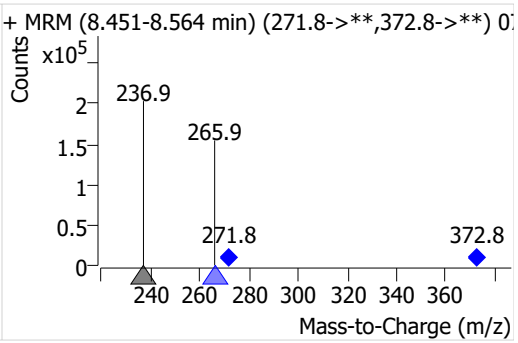




γ-Chlordane(trans)







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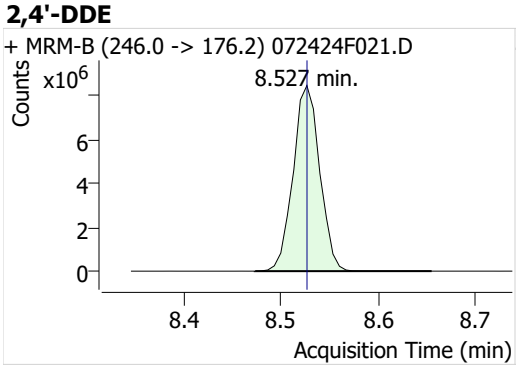

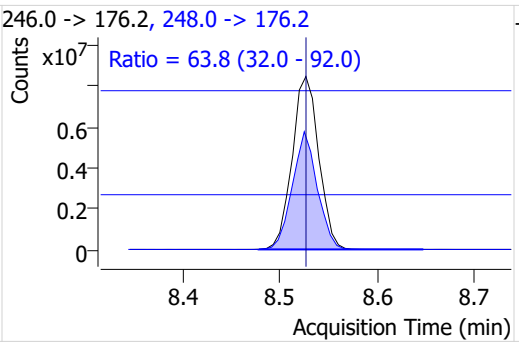

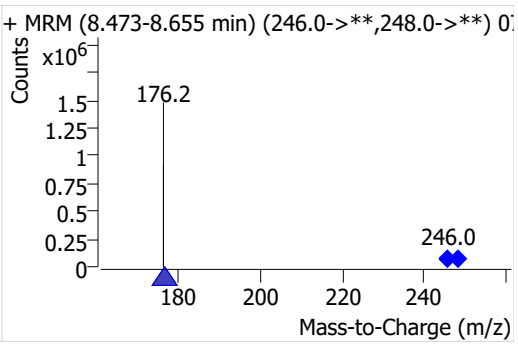

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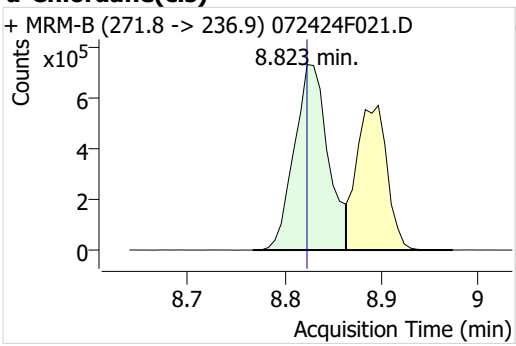
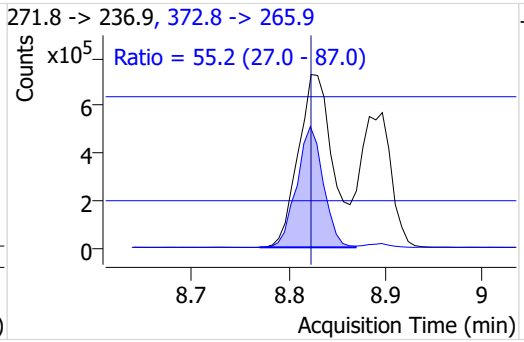
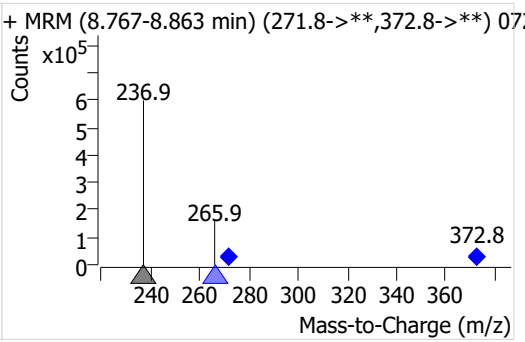
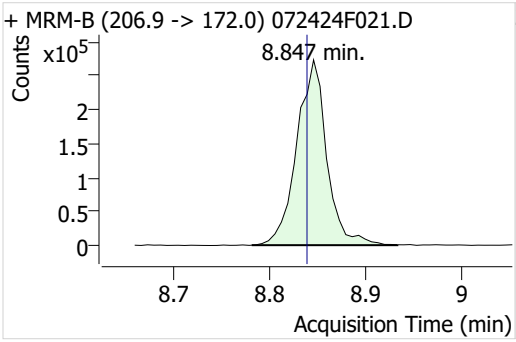
α-Chlordane(cis)

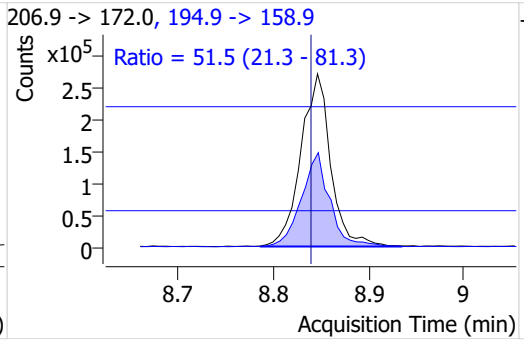


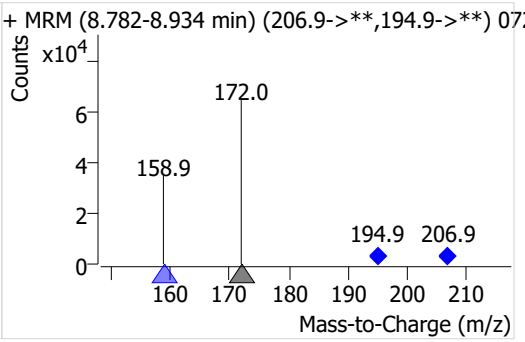




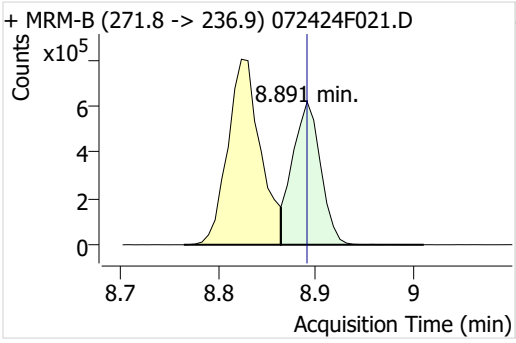
Endosulfan I

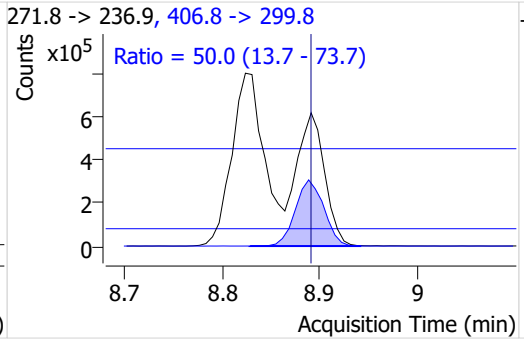


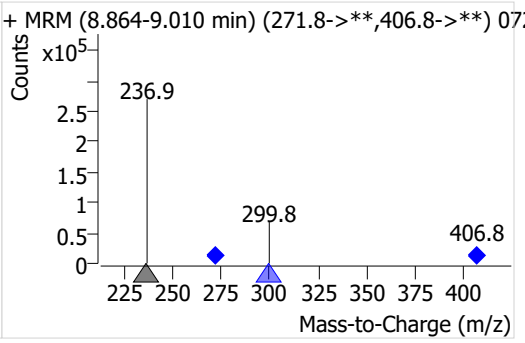




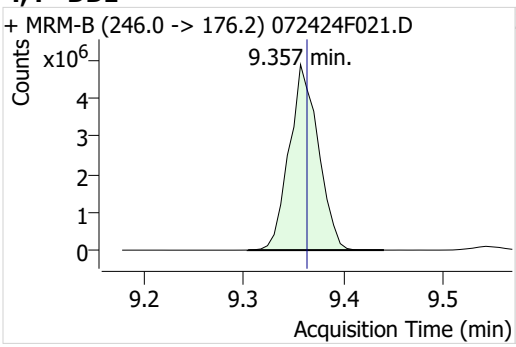
trans-Nanochlor

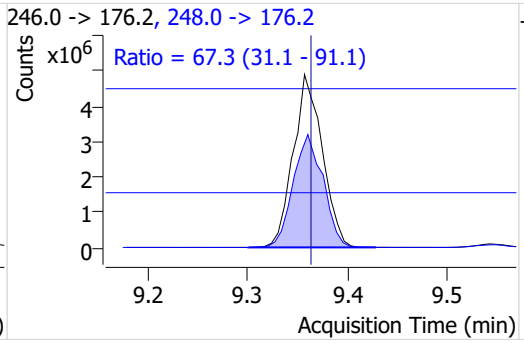


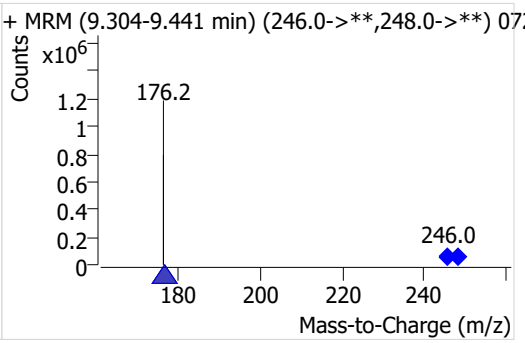




4,4' -DDE







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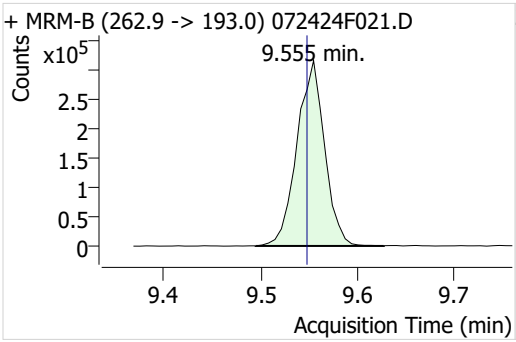
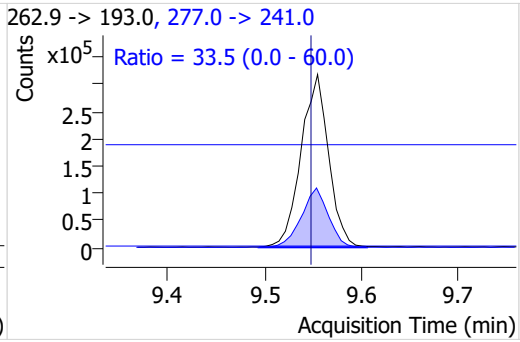
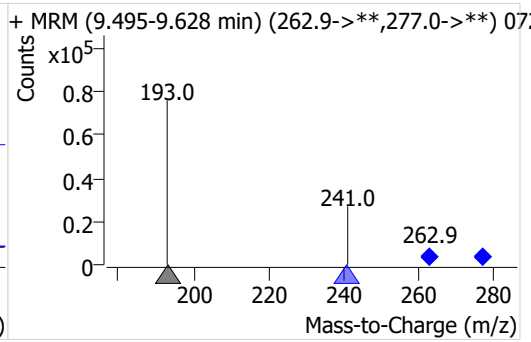
Dieldrin







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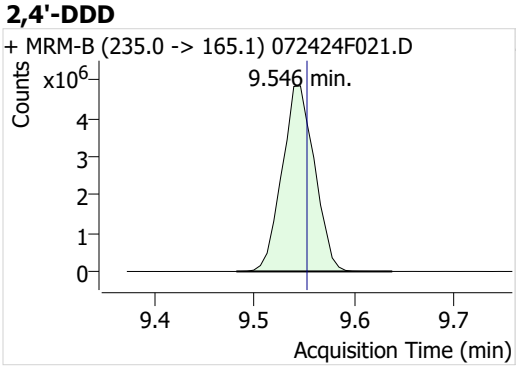
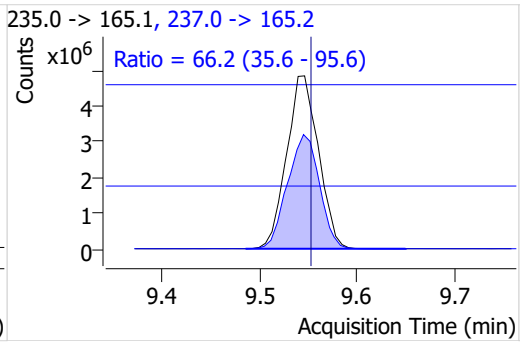
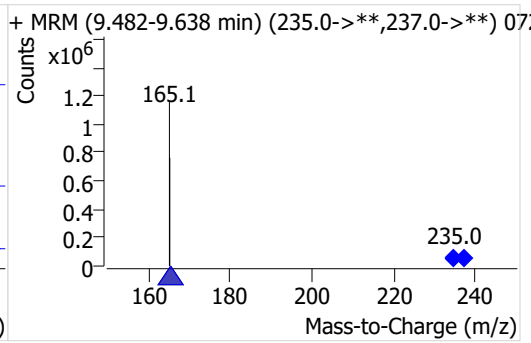
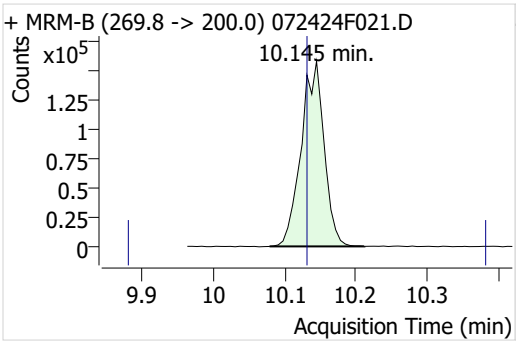
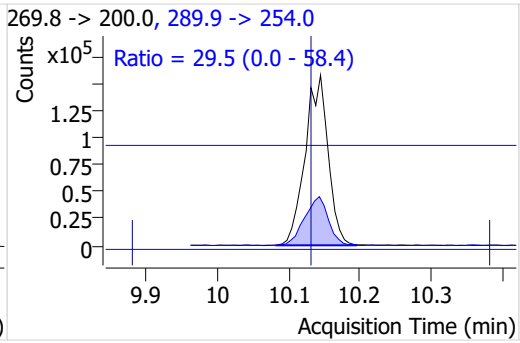


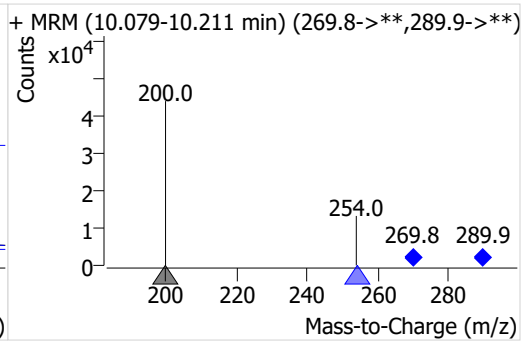




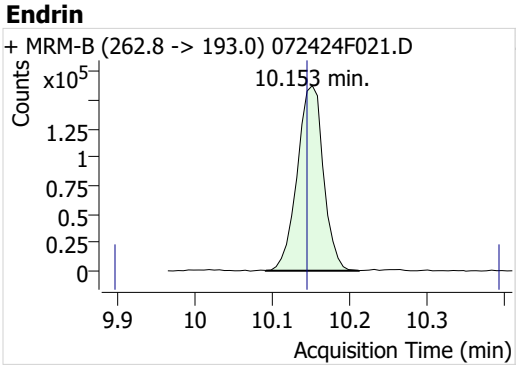
Endrin-13C12

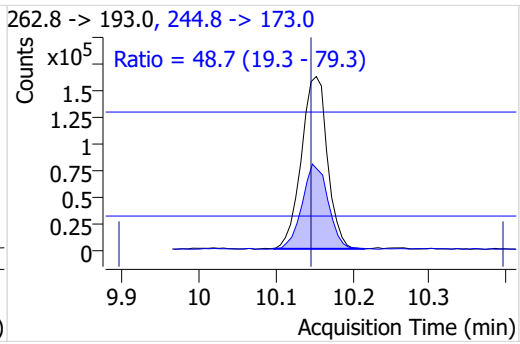


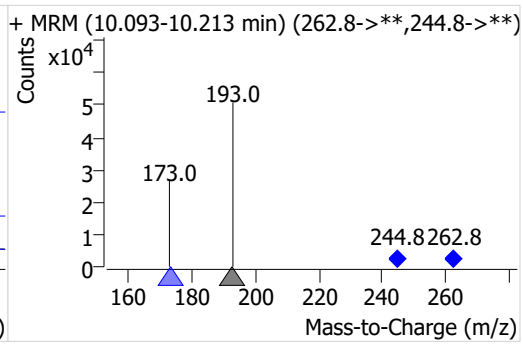




Endrin







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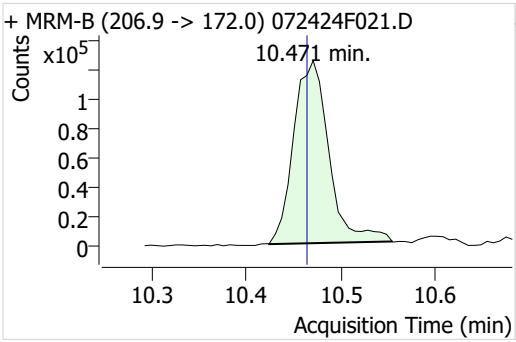
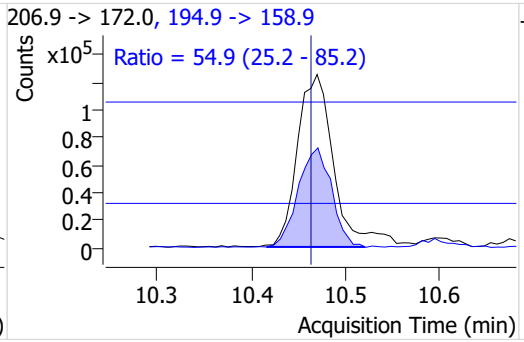
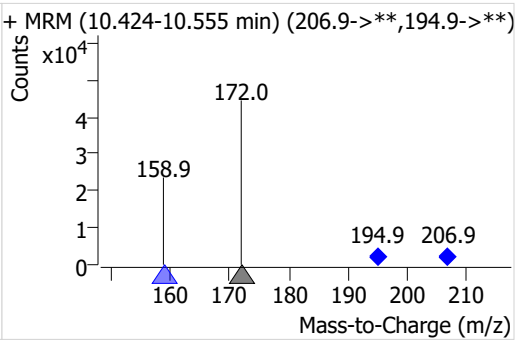
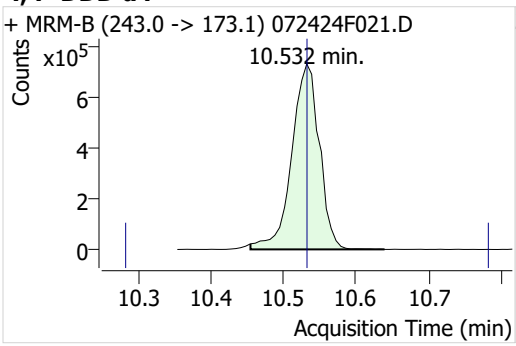
Endosulfan II

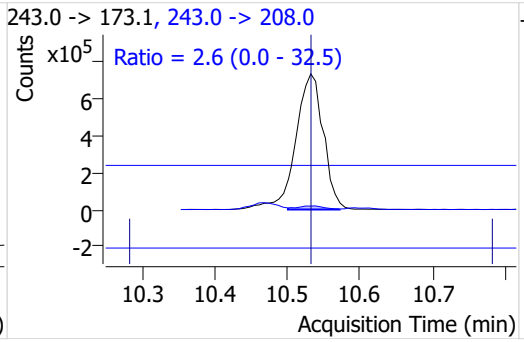


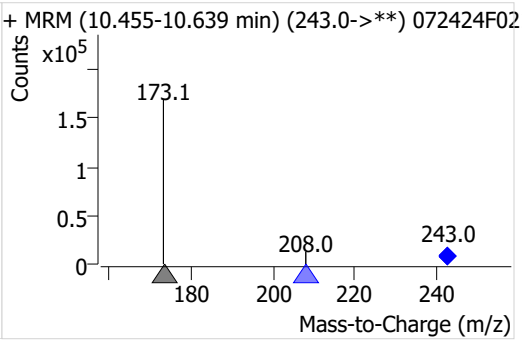




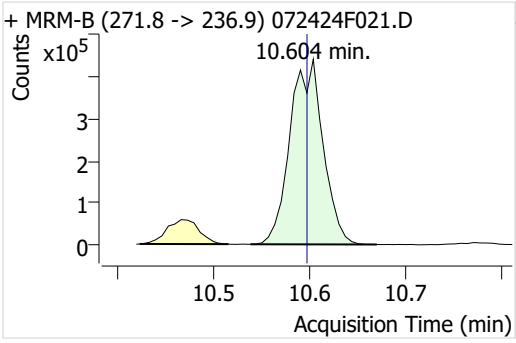
4,4'-DDD d4

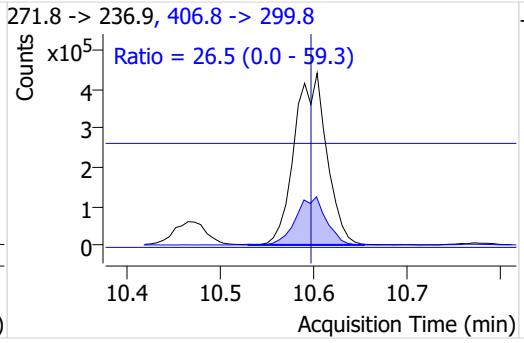


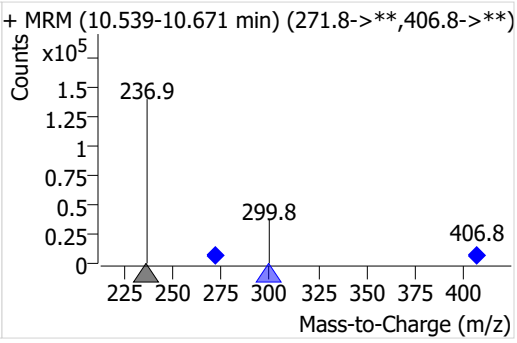




cis-Nonachlor







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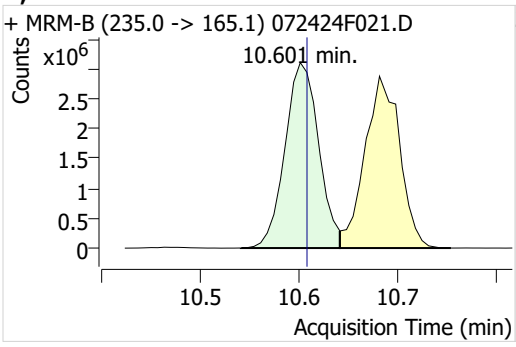

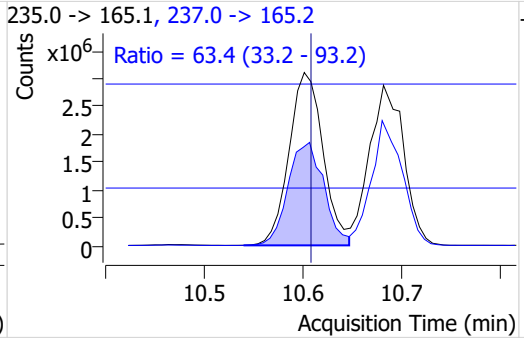

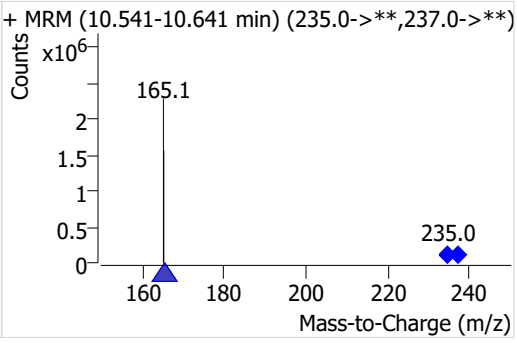

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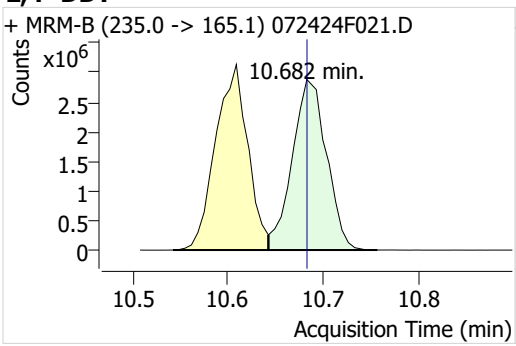
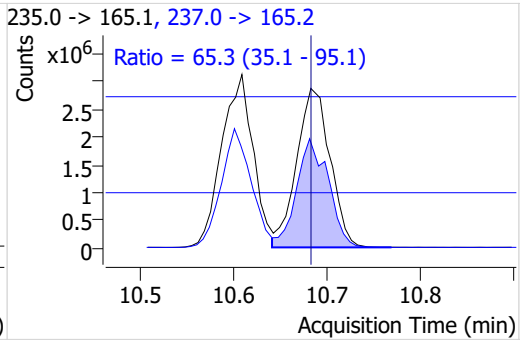
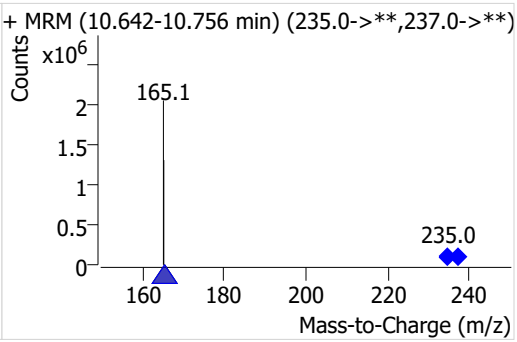
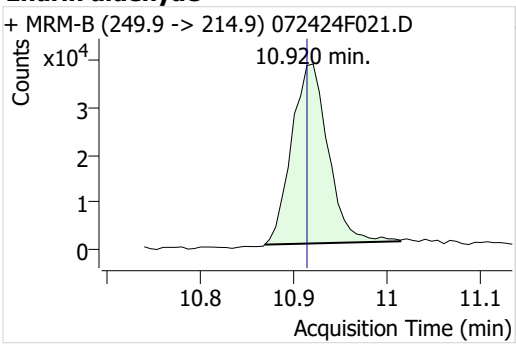
2,4'-DDT

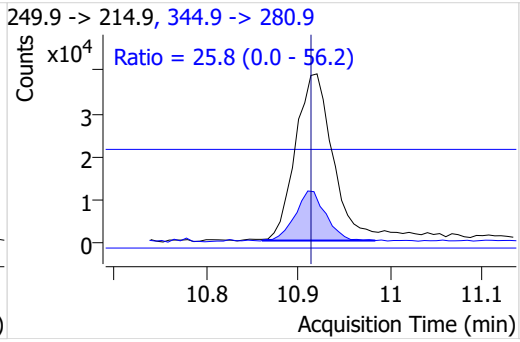


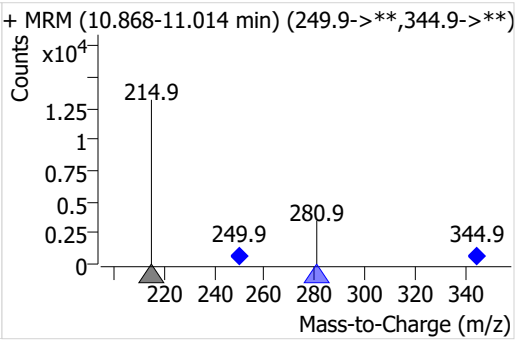




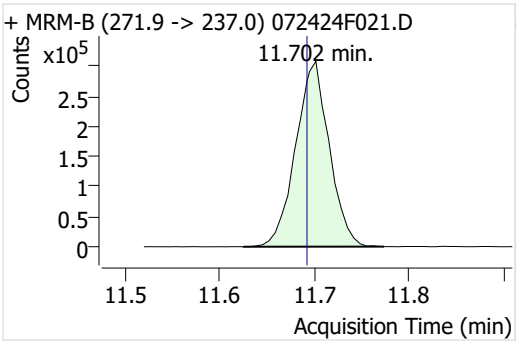
Endrin aldehyde

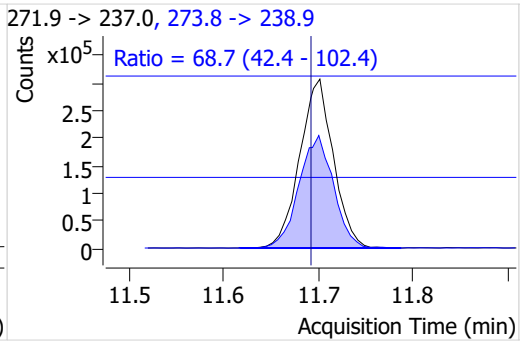


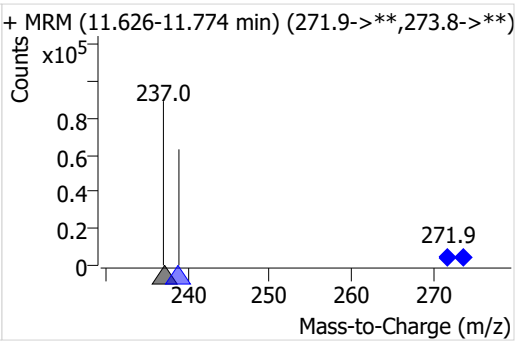




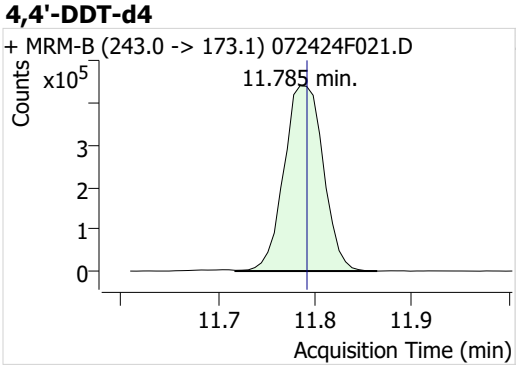
Endosulfan sulfate

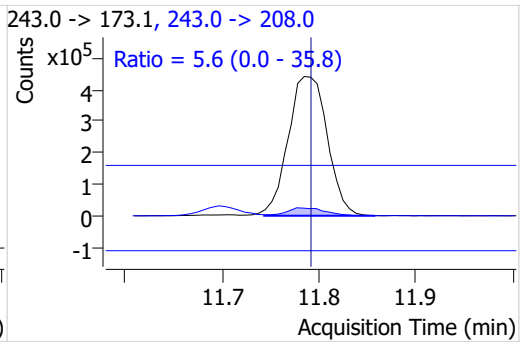


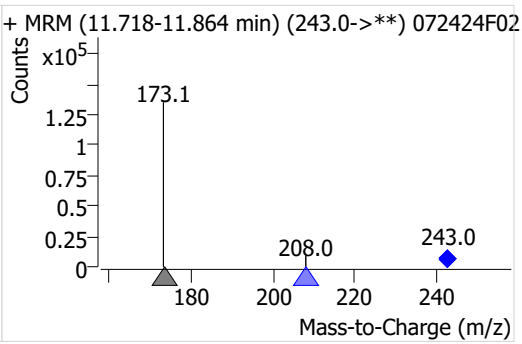




4,4'-DDT-d4







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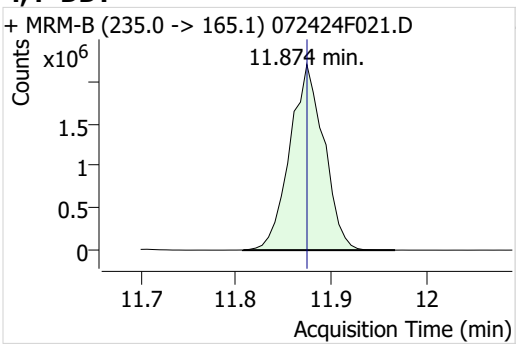
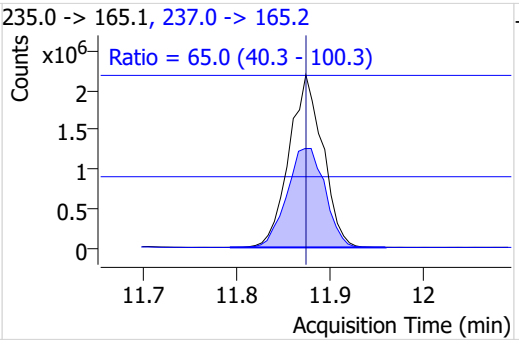
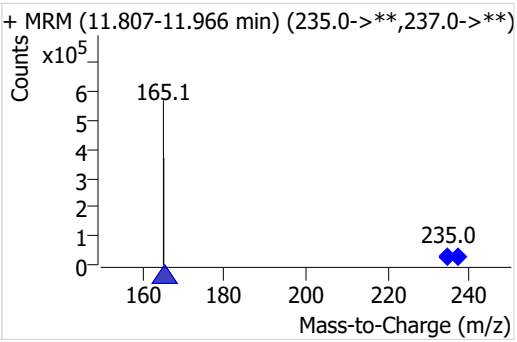
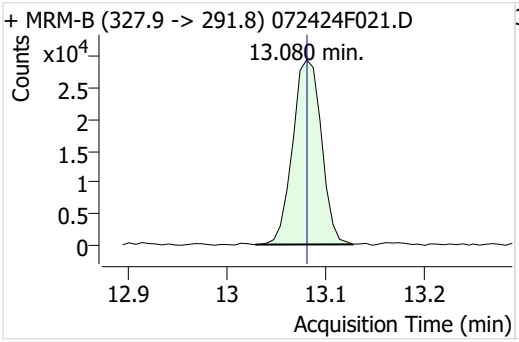
4,4'-DDT

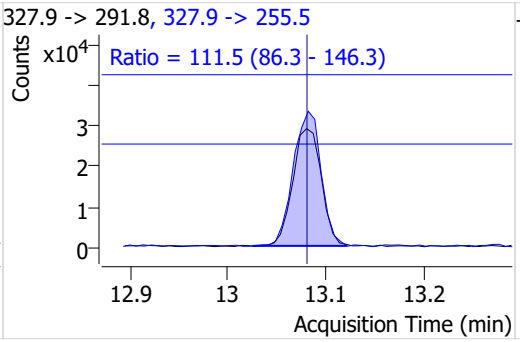


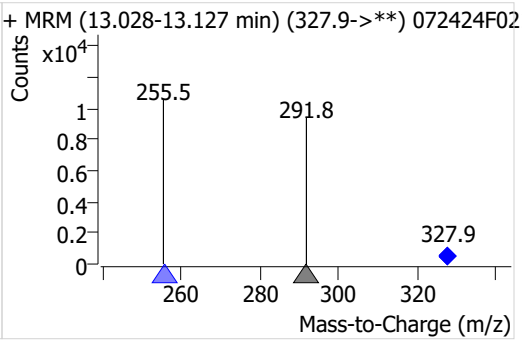




Endrin ketone-13C12







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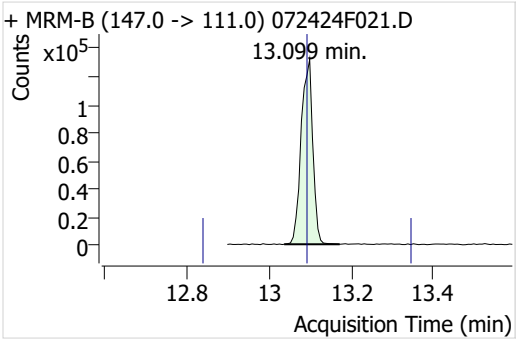
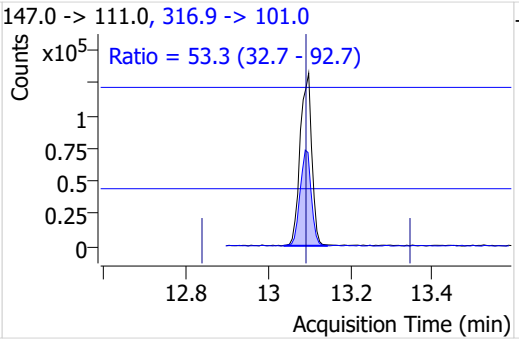
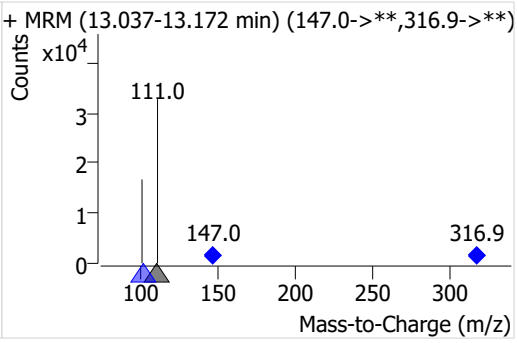
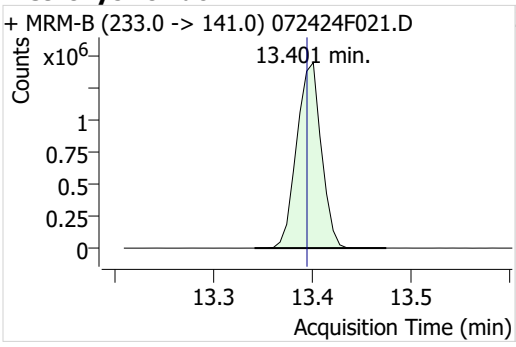
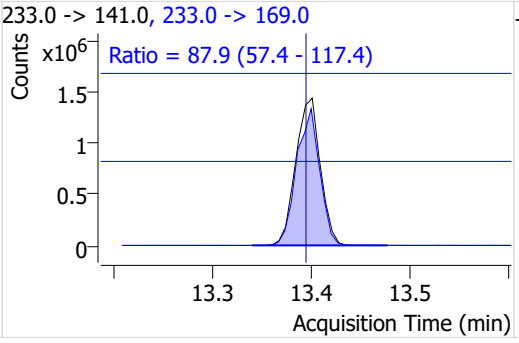


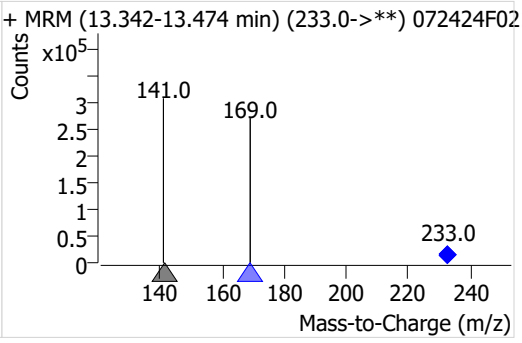




Methoxychlor-d6







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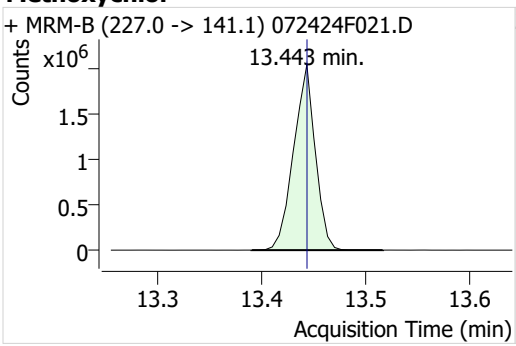
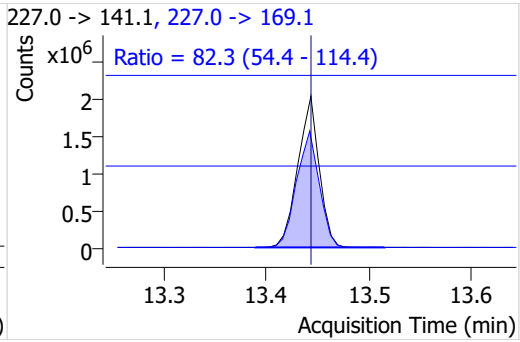
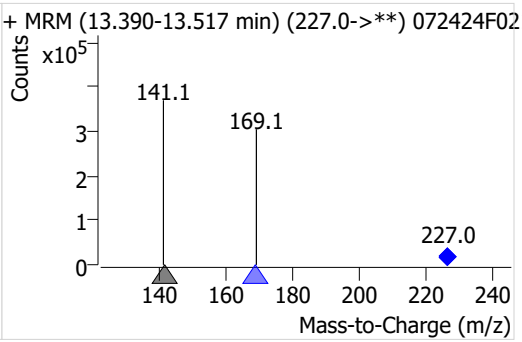
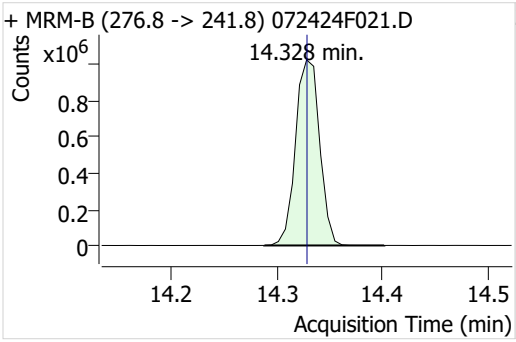
Methoxychlor

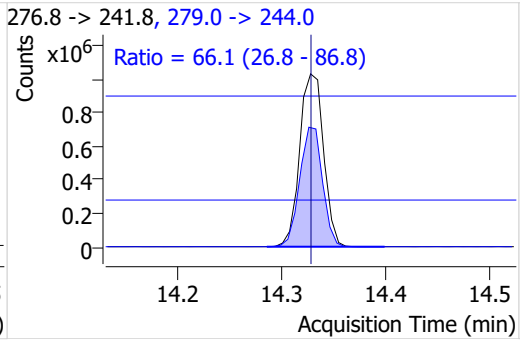


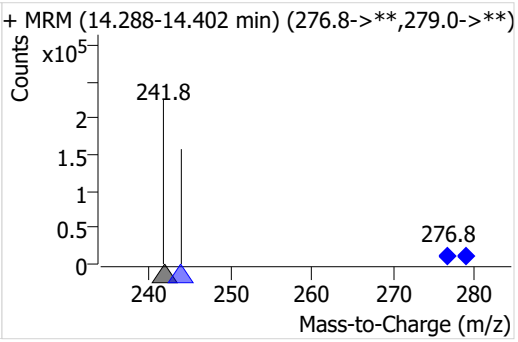




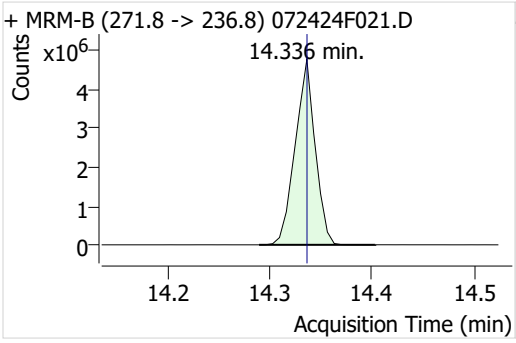
Mirex-13C10

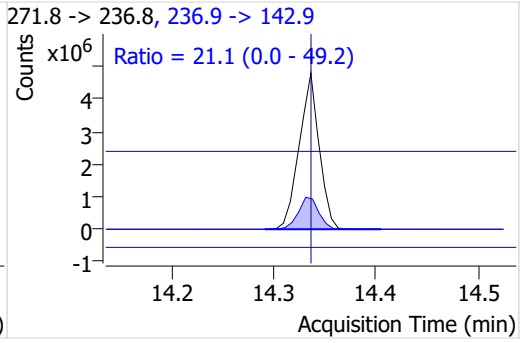


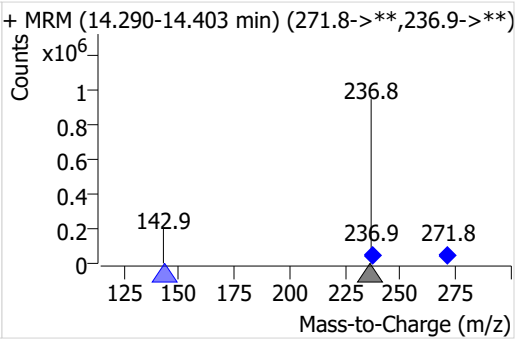




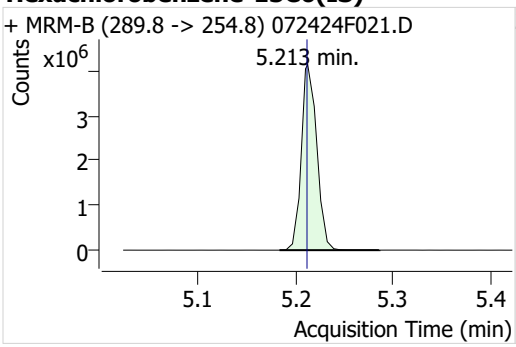
Mirex

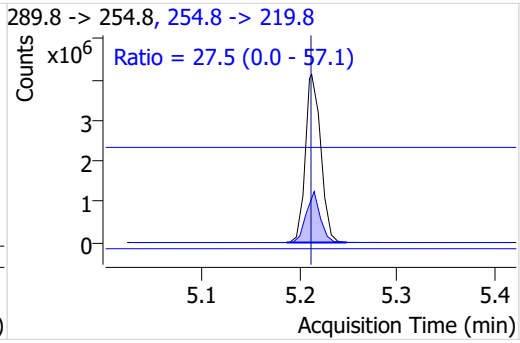


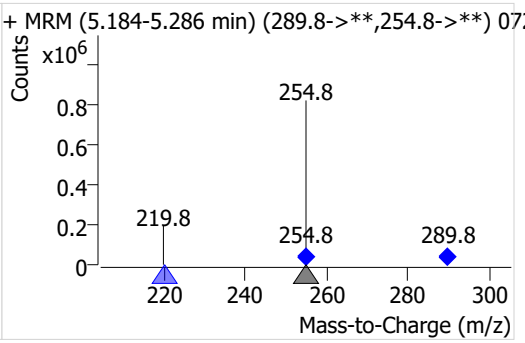




Hexachlorobenzene-13C6(IS)







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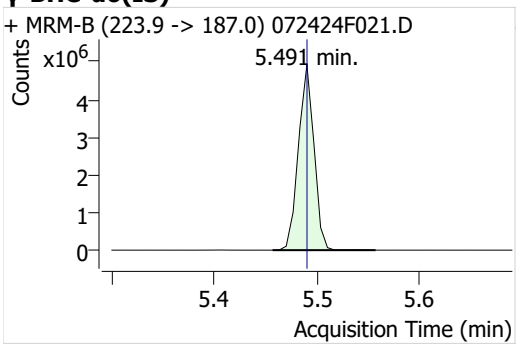
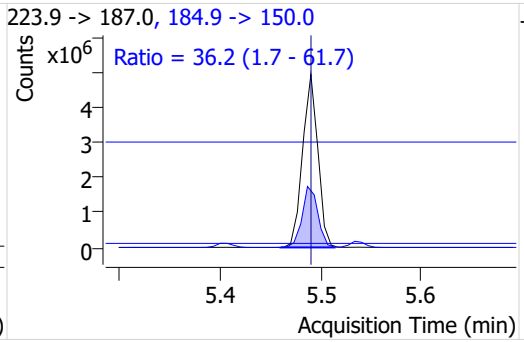
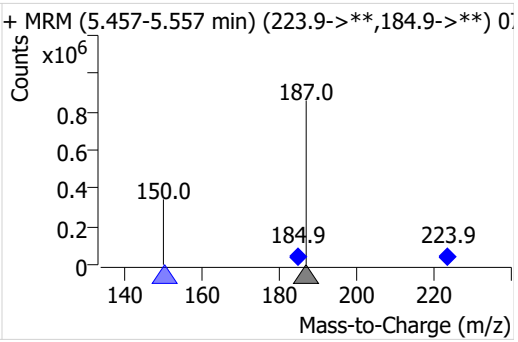
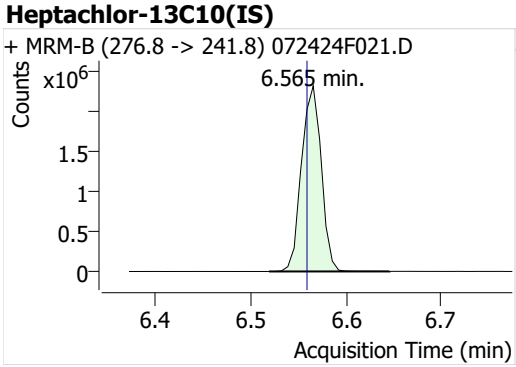
γ-BHC-d6(IS)

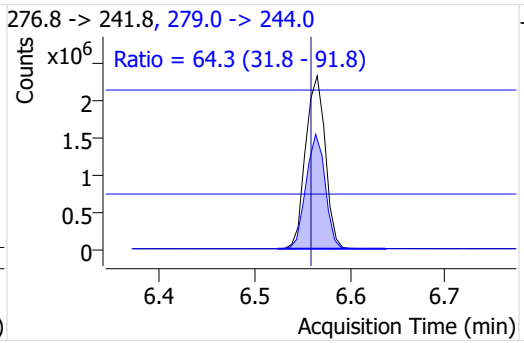


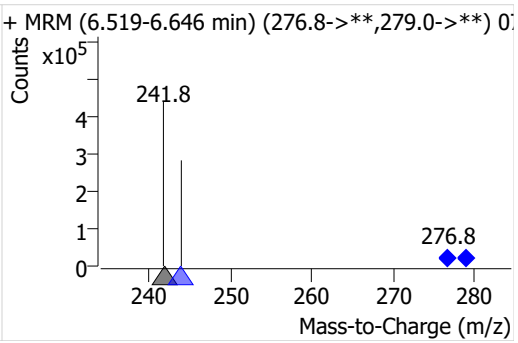




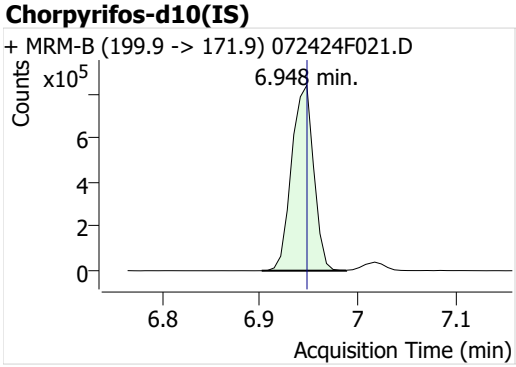
Heptachlor-13C10(IS)

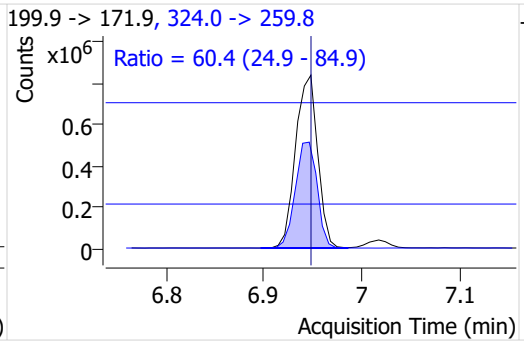


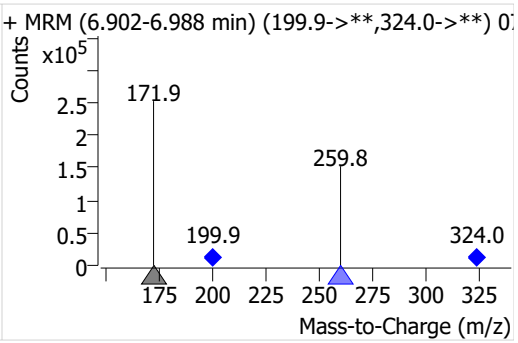




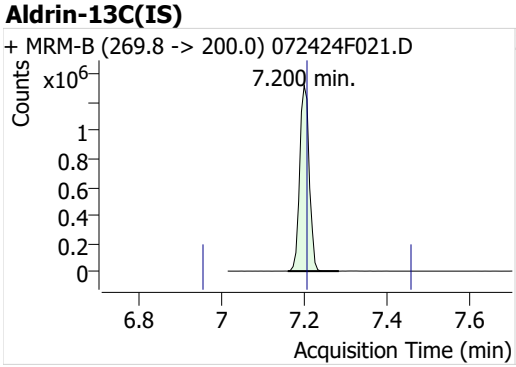
Chorpyrifos-d10(IS)

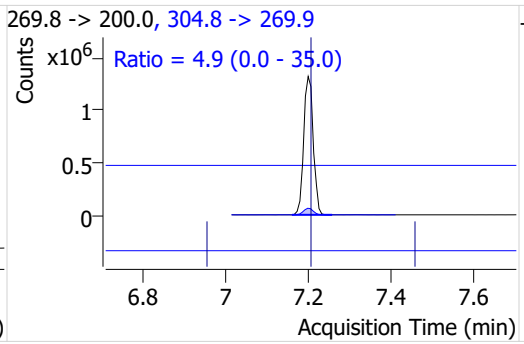


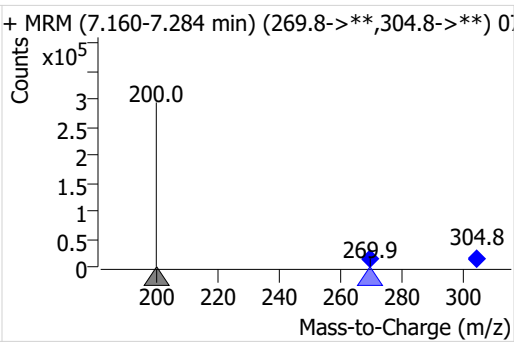




Aldrin-13C(IS)







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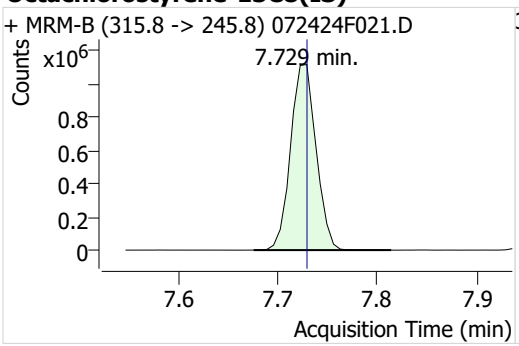
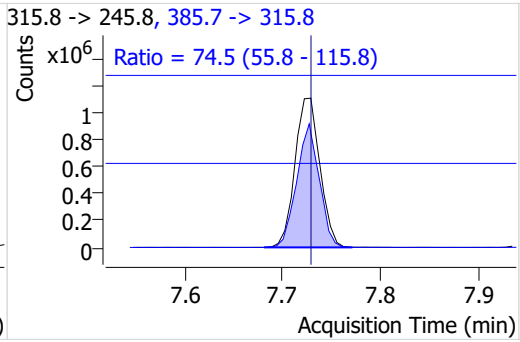
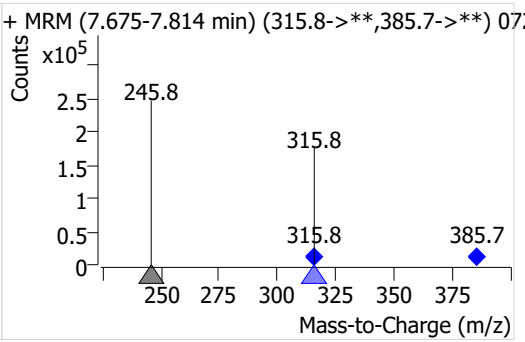
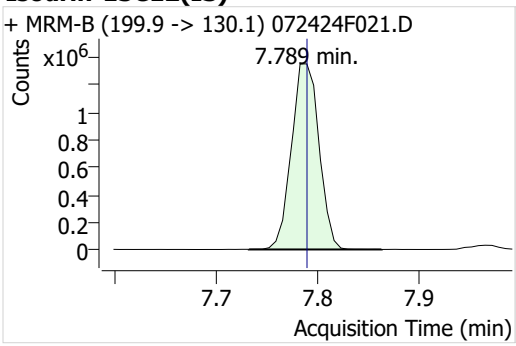
Octachlorostyrene-13C8(IS)

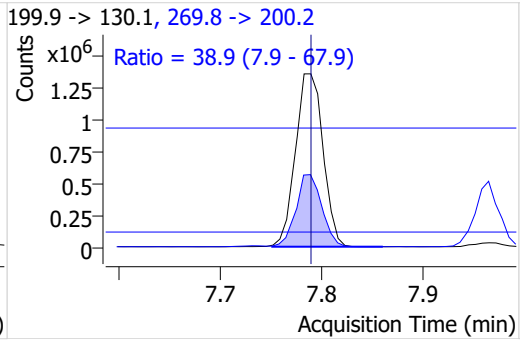


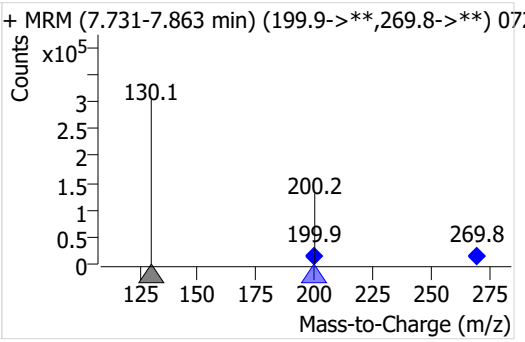




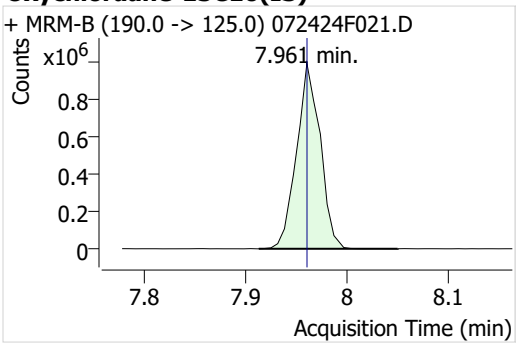
Isodrin-13C12(IS)

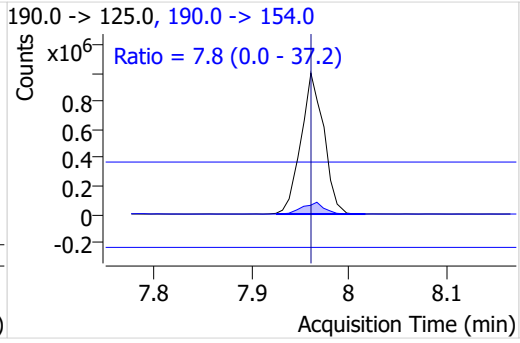


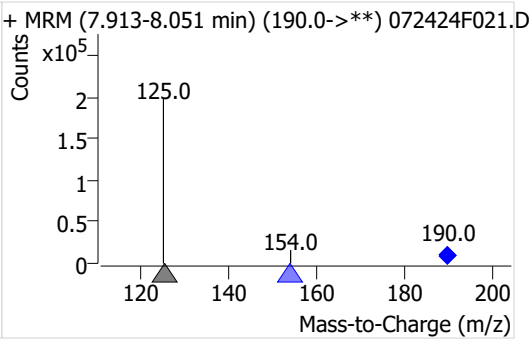




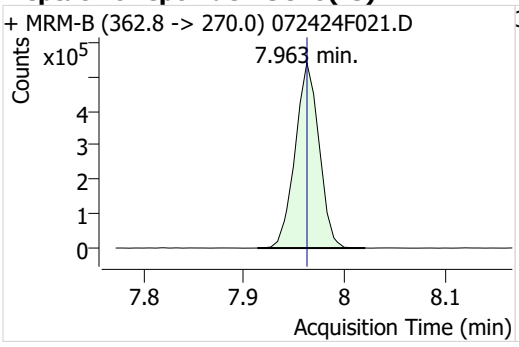
Oxychlordane-13C10(IS)

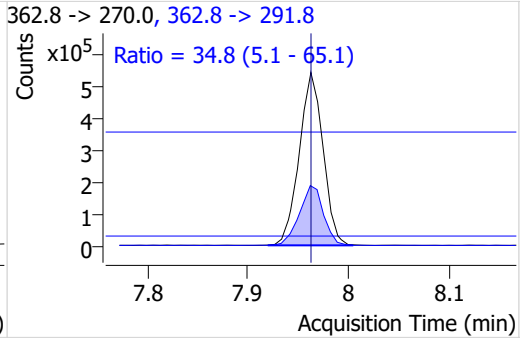


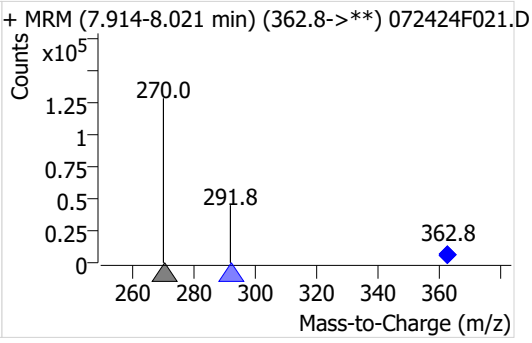




Heptachlor epoxide-13C10(IS)







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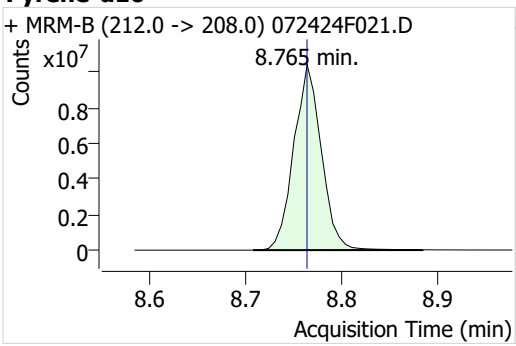
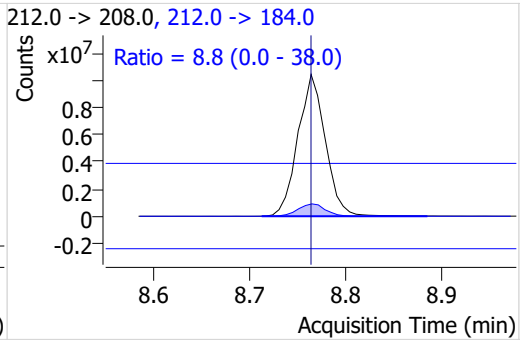
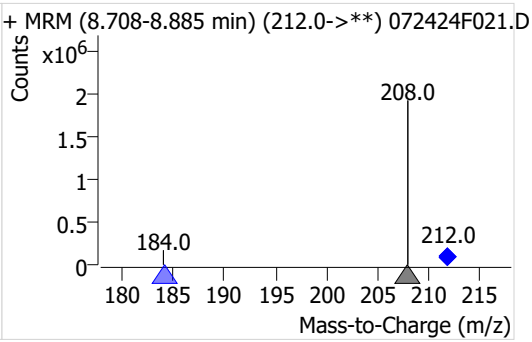
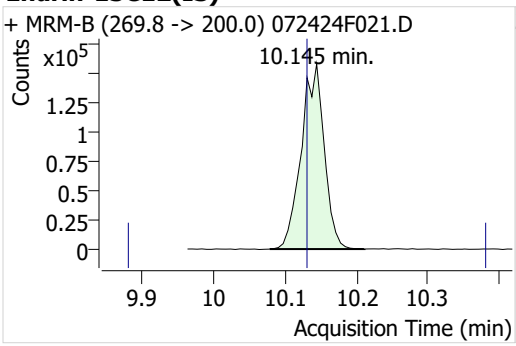
Pyrene-d10

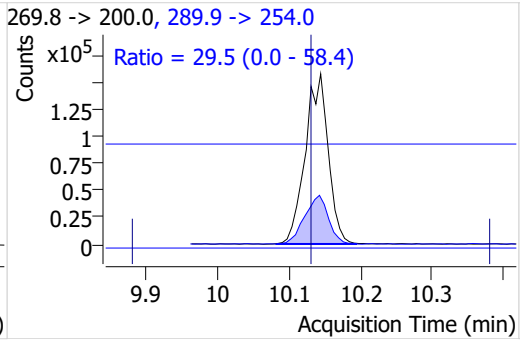


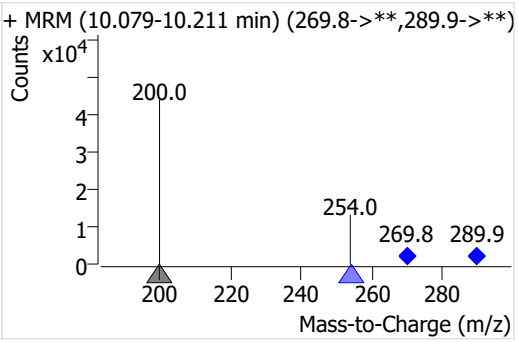




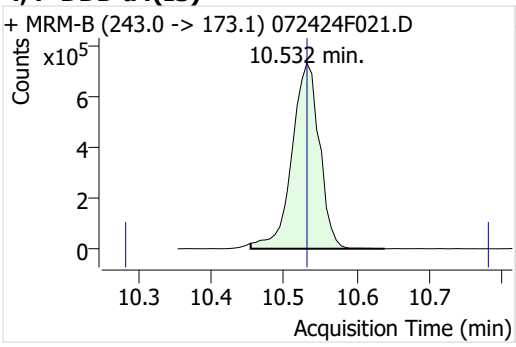
Endrin-13C12(IS)

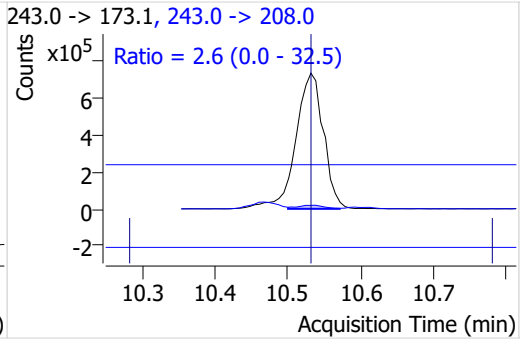


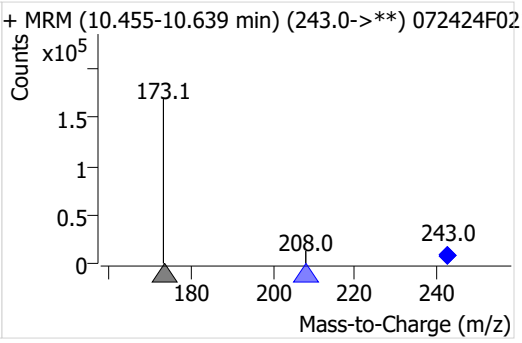




4,4'-DDD d4(IS)







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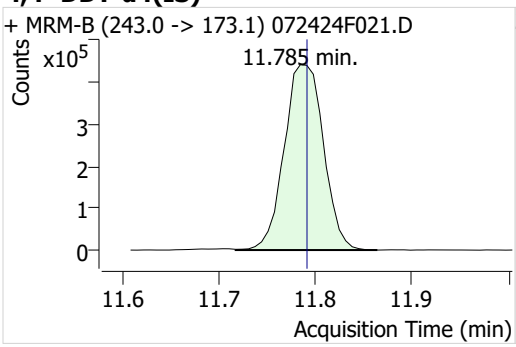
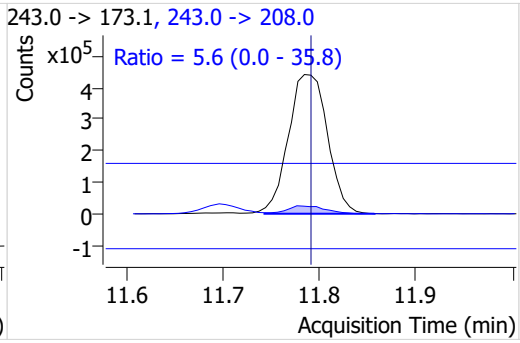
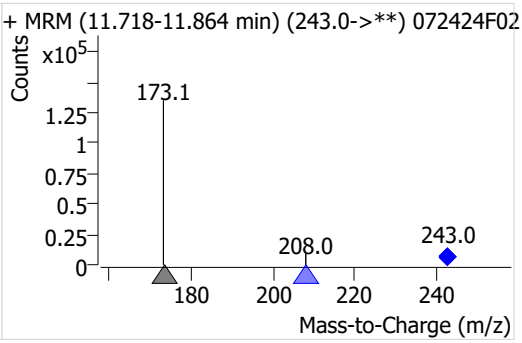
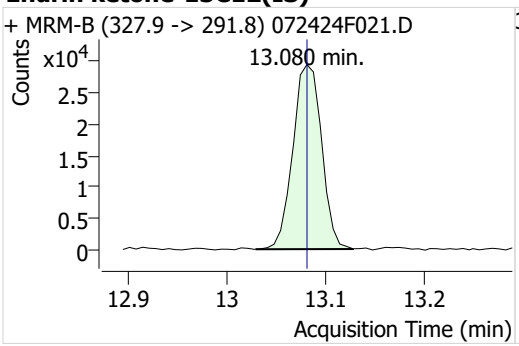


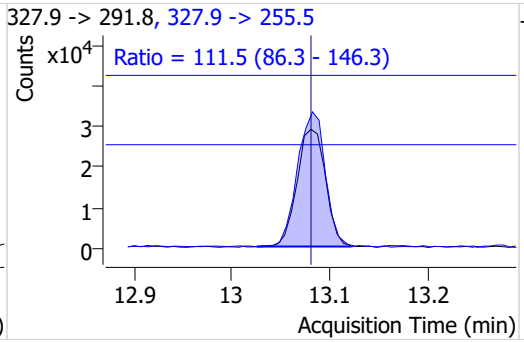


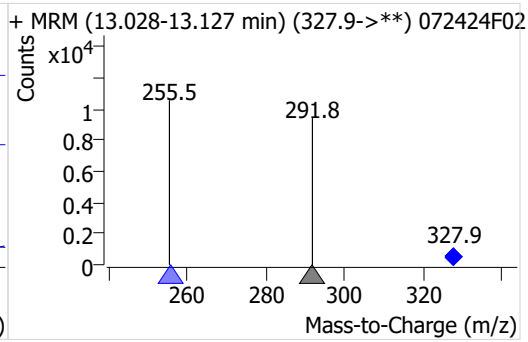


MassHunter Quantitative Analysis Sample Report

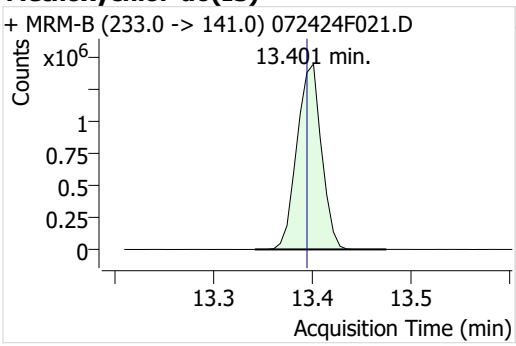
Endrin ketone-13C12(IS)

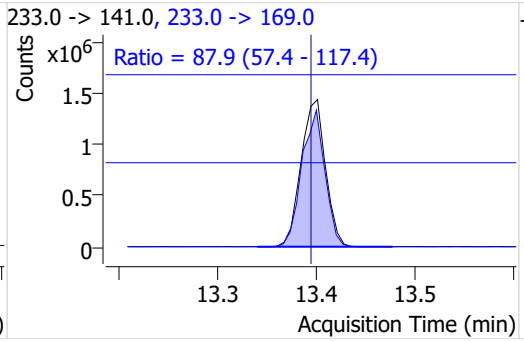


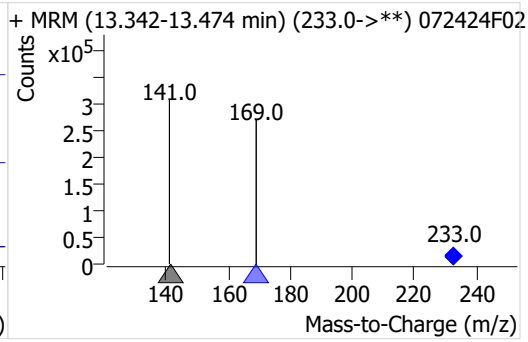




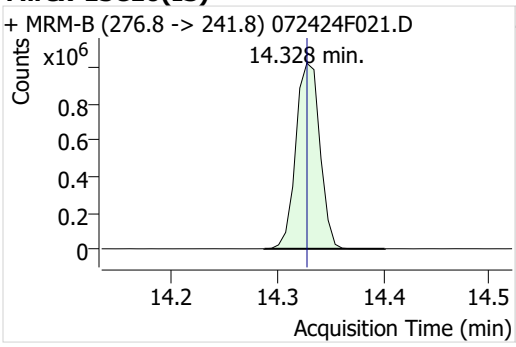
Methoxychlor-d6(IS)

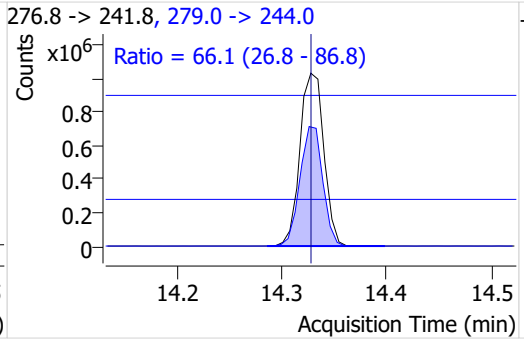


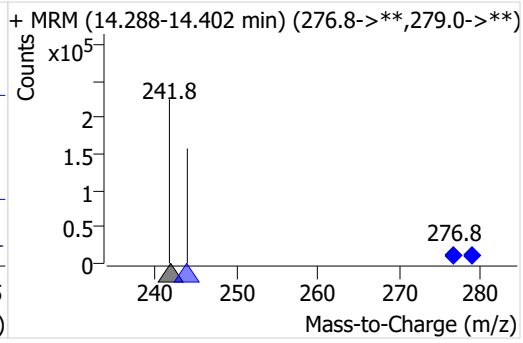




Mirex-13C10(IS)







MassHunter Quantitative Analysis Injection Log Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin				
Analysis Time	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser	**Report Generator Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Analyze Quant Version**	12.1	**Report Quant Version**	12.1

Sequence Table

Data File	Name	Type	Vial	Vol.	Level	Acq. Method File	Acq. Date-Time
082024F003.D	D/E Bkdwn std 20ppm SVM71-99L	Sample	1	1		OC Pest_dMRM	8/20/2024 11:16:03 AM
082024F004.D	IB	Sample	2	1		OC Pest_dMRM	8/20/2024 11:35:51 AM
082024F005.D	OC PEST ICAL 0.5ppb SVM71-99A	Cal	3	1	0.5	OC Pest_dMRM	8/20/2024 11:55:35 AM
082024F006.D	OC PEST ICAL 1ppb SVM71-99B	Cal	4	1	1	OC Pest_dMRM	8/20/2024 12:15:19 PM
082024F007.D	OC PEST ICAL 2ppb SVM71-99C	Cal	5	1	2	OC Pest_dMRM	8/20/2024 12:35:01 PM
082024F008.D	OC PEST ICAL 5ppb SVM71-99D	Cal	6	1	5	OC Pest_dMRM	8/20/2024 12:54:44 PM
082024F009.D	OC PEST ICAL 10ppb SVM71-99E	Cal	7	1	10	OC Pest_dMRM	8/20/2024 1:14:31 PM
082024F010.D	OC PEST ICAL 20ppb SVM71-99F	Cal	8	1	20	OC Pest_dMRM	8/20/2024 1:34:15 PM
082024F011.D	OC PEST ICAL 40ppb SVM71-99G	Cal	9	1	40	OC Pest_dMRM	8/20/2024 1:54:04 PM
082024F012.D	OC PEST ICAL 60ppb SVM71-99H	Cal	10	1	60	OC Pest_dMRM	8/20/2024 2:13:45 PM
082024F013.D	OC PEST ICAL 80ppb SVM71-99I	Cal	11	1	80	OC Pest_dMRM	8/20/2024 2:33:28 PM
082024F014.D	OC PEST ICAL 100ppb SVM71-99J	Cal	12	1	100	OC Pest_dMRM	8/20/2024 2:53:16 PM
082024F015.D	OC PEST ICV 20ppb SVM71-99K	QC	13	1	20	OC Pest_dMRM	8/20/2024 3:13:02 PM

OC Pest ICAL
KC2400398
8-20-24 eb
8/21/24

Full List

1st 08/20/24
2nd 08/21/24

Triple Quadrupole GC/MS System Verification - Tune

Instrument Name	MS47 / US2116V309	**MS Model**	7010B
Tune Date & Time	8/19/2024 2:49:55 PM	**Source**	EI High Efficiency
Tune File	D:\MassHunter\GCMS\1\7010\atunes.eihs.tune.xml Modified		

Instrument Actuals

Ionization mode	EI+
Source Temp.	300 °C
MS1 Quad Temp.	150 °C
MS2 Quad Temp.	150 °C
Filament Current	100.1 µA

Vacuum

Rough Vac	1.48E+2 mTorr
High Vac	7.95E-5 Torr
Turbo 1 Speed	100.0 %
Turbo 1 Power	20.3 W

GC Gas Flow

Quench Flow	2.250 mL/min	Column 1	1.200 mL/min
Collision Cell	1.500 mL/min	Column 2	0.000 mL/min

MS1 Checktune Results

	Value	Limit	Result
Low mass assignment (target 69.00, actual 69.00)	0.00	<= 0.20	OK
Mid mass assignment (target 264.00, actual 264.00)	0.00	<= 0.20	OK
High mass assignment (target 502.00, actual 502.00)	0.00	<= 0.20	OK
Low mass isotope position (target 70.00, actual 70.00)	0.00	<= 0.20	OK
Mid mass isotope position (target 265.00, actual 265.00)	0.00	<= 0.20	OK
High mass isotope position (target 503.00, actual 503.00)	0.00	<= 0.20	OK
Low mass isotope ratio	1.20%	>= 0.5% and <= 1.6%	OK
Mid mass isotope ratio	5.76%	>= 4.2% and <= 6.9%	OK
High mass isotope ratio	9.76%	>= 7.9% and <= 12.3%	OK
Ratio of mid mass to low mass	27.44%	>= 5.0%	OK
Ratio of high mass to low mass	3.81%	>= 0.8%	OK
Low mass precursor ratio	0.24%	<= 3.00%	OK
Mid mass precursor ratio	0.10%	<= 6.00%	OK
High mass precursor ratio	0.05%	<= 12.00%	OK

MS2 Checktune Results

Low mass assignment (target 69.00, actual 69.00)	0.00	<= 0.20	OK
Mid mass assignment (target 264.00, actual 264.00)	0.00	<= 0.20	OK
High mass assignment (target 502.00, actual 502.00)	0.00	<= 0.20	OK
Low mass isotope position (target 70.00, actual 70.00)	0.00	<= 0.20	OK
Mid mass isotope position (target 265.00, actual 265.08)	0.08	<= 0.20	OK
High mass isotope position (target 503.00, actual 503.02)	0.02	<= 0.20	OK
Low mass isotope ratio	1.24%	>= 0.5% and <= 1.6%	OK
Mid mass isotope ratio	5.45%	>= 4.2% and <= 6.9%	OK
High mass isotope ratio	9.45%	>= 7.9% and <= 12.3%	OK
Low mass precursor ratio	0.00%	<= 3.00%	OK
Mid mass precursor ratio	0.00%	<= 6.00%	OK
High mass precursor ratio	0.15%	<= 12.00%	OK

Detector

EMV	1133	<= 2900	OK
Maximum gain factor	8516	>= 100	OK

1st 08/20/24
2nd 08/21/24

Triple Quadrupole GC/MS System Verification - Tune

Instrument Name	MS47 / US2116V309	**MS Model**	7010B
Tune Date & Time	8/19/2024 2:49:55 PM	**Source**	EI High Efficiency
Tune File	D:\MassHunter\GCMS\1\7010\atunes.eihs.tune.xml Modified		

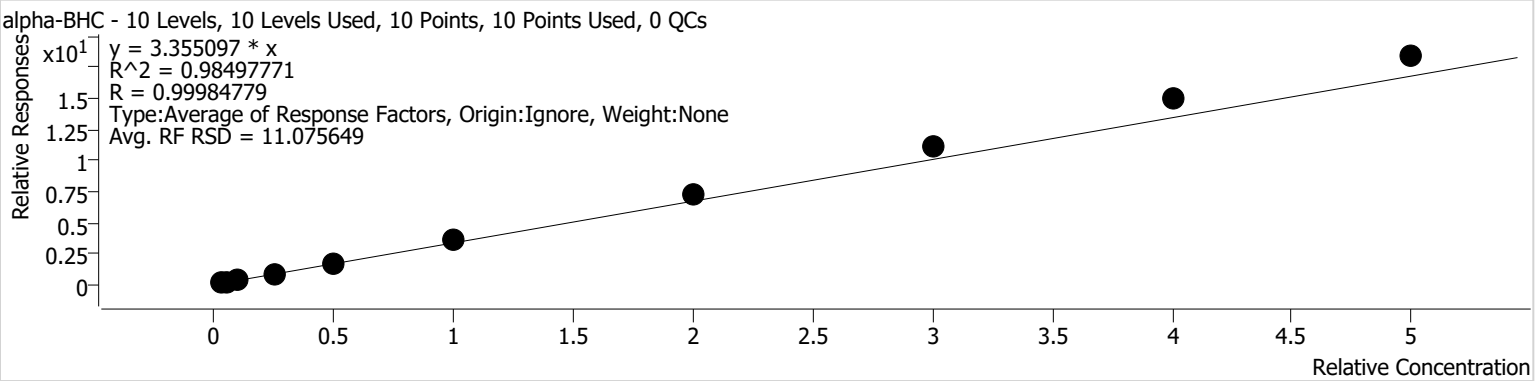
Air and Water Check	Abundance	Relative Abundance	Limit	Result
PFTBA (69.00)	6472963			
Water	41239	0.64%	<= 20.00%	OK
Oxygen	83548	1.29%	<= 2.50%	OK
Nitrogen	311382	4.81%	<= 10.00%	OK

* Nitrogen values are calculated from oxygen abundance

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

alpha-BHC **Relative Standard Error** 11.1



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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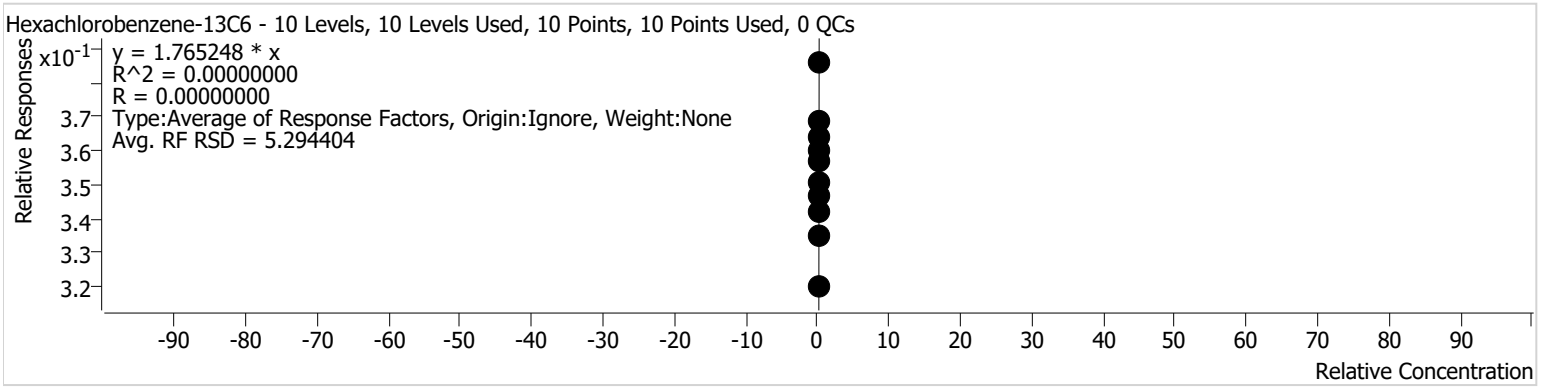
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	1445398.722
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	3258728.730
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	6877563.523
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	15062397.190
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	28586340.692
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	45588362.207
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	62677248.374
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	77007080.561

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Hexachlorobenzene-13C6 **Relative Standard Error** 5.3



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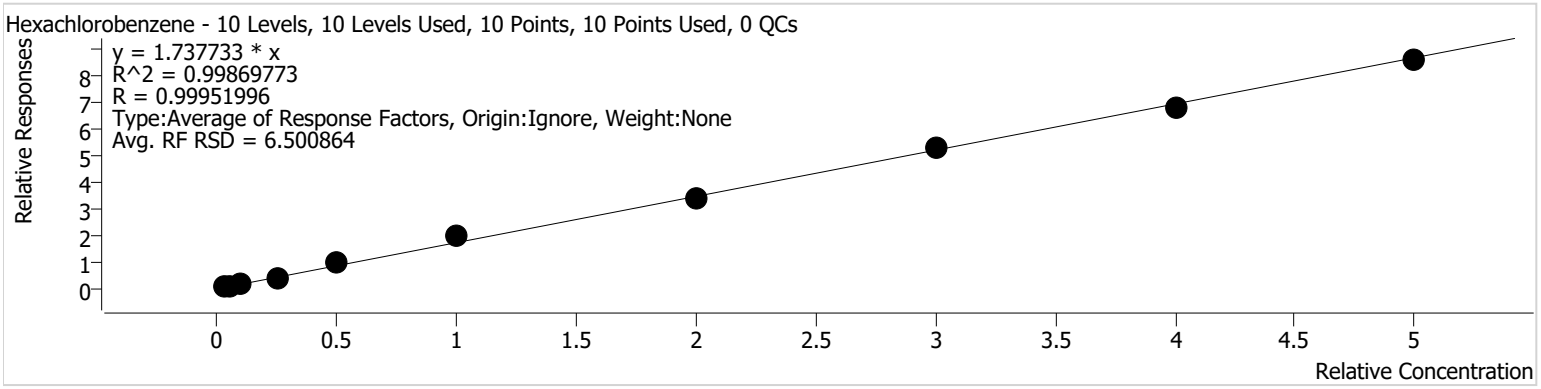
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	20.0000	4536221.381
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	20.0000	4796454.647
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	20.0000	4883067.915

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Hexachlorobenzene **Relative Standard Error** 6.5



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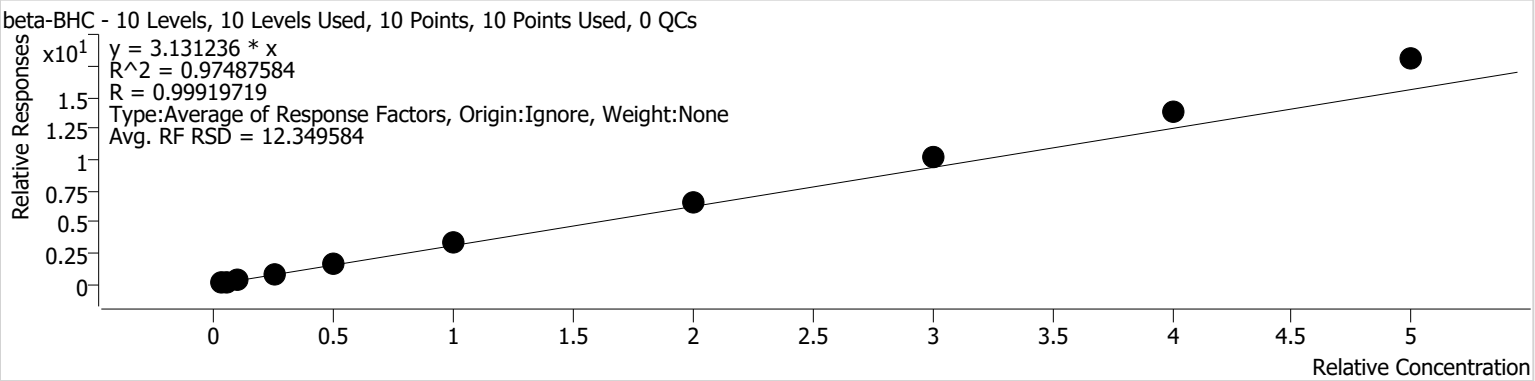
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	1788290.378
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	3806932.299
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	8422105.513
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	15070889.477
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	24021805.439
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	32498119.561
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	41821428.723

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

beta-BHC **Relative Standard Error** 12.3



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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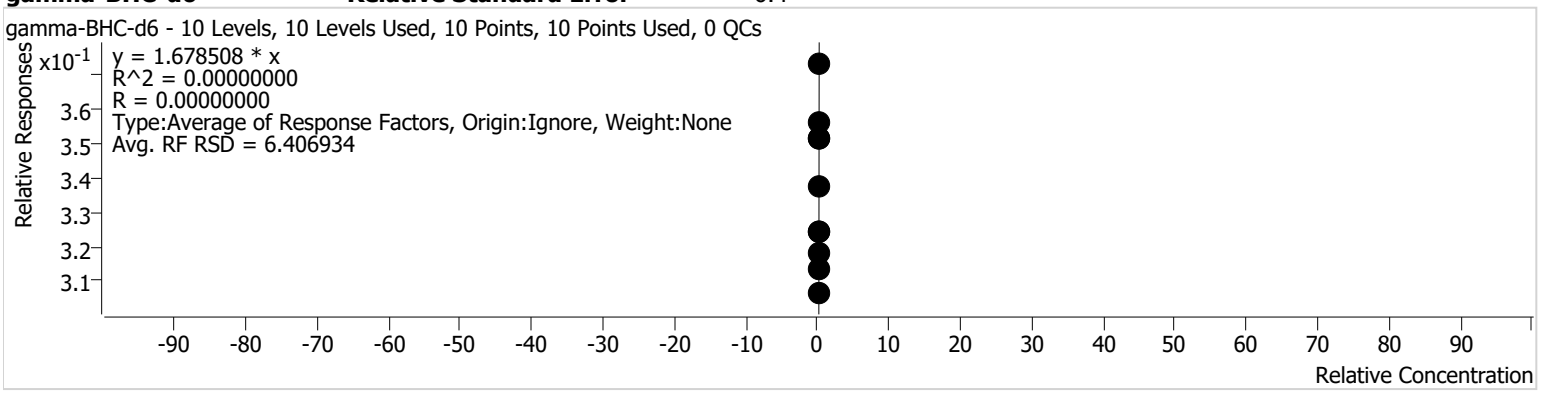
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	1378509.020
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	3085073.142
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	6438110.273
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	13880547.178
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	26463286.098
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	41751987.552
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	58448933.186
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	76827710.043

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

gamma-BHC-d6 **Relative Standard Error** 6.4

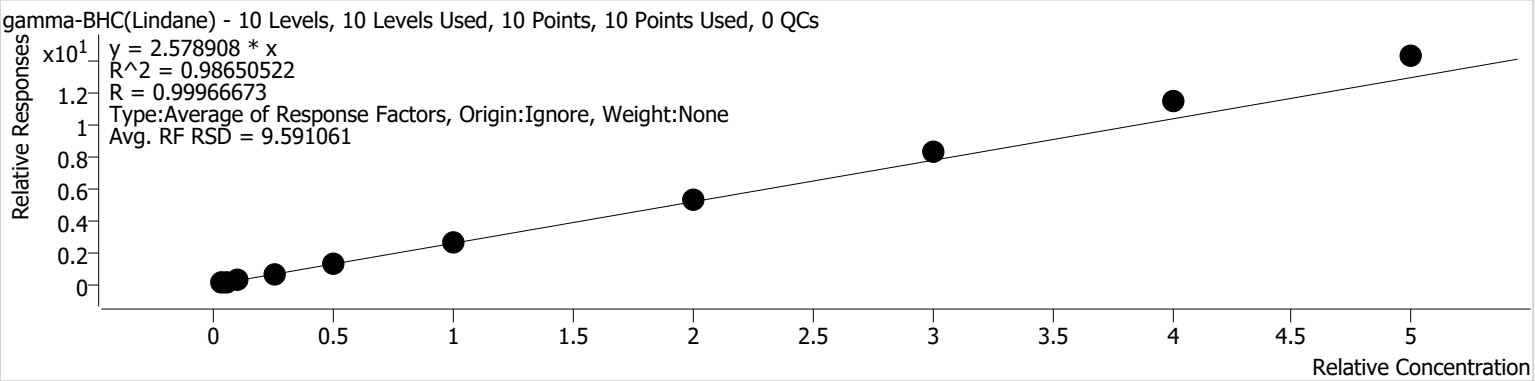


Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
8/20/2024 11:55 AM	J:\MS47\data\082024\082024F005.D	Calibration	0.5	True	20.0000	4564146.026
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	20.0000	4281448.926
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	20.0000	4710666.462
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	20.0000	4210772.929
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	20.0000	4050092.764
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	4174344.973
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	20.0000	3982668.273
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	20.0000	4091487.978
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	20.0000	4185224.895
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	20.0000	4207344.486

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

gamma-BHC(Lindane) **Relative Standard Error** 9.6



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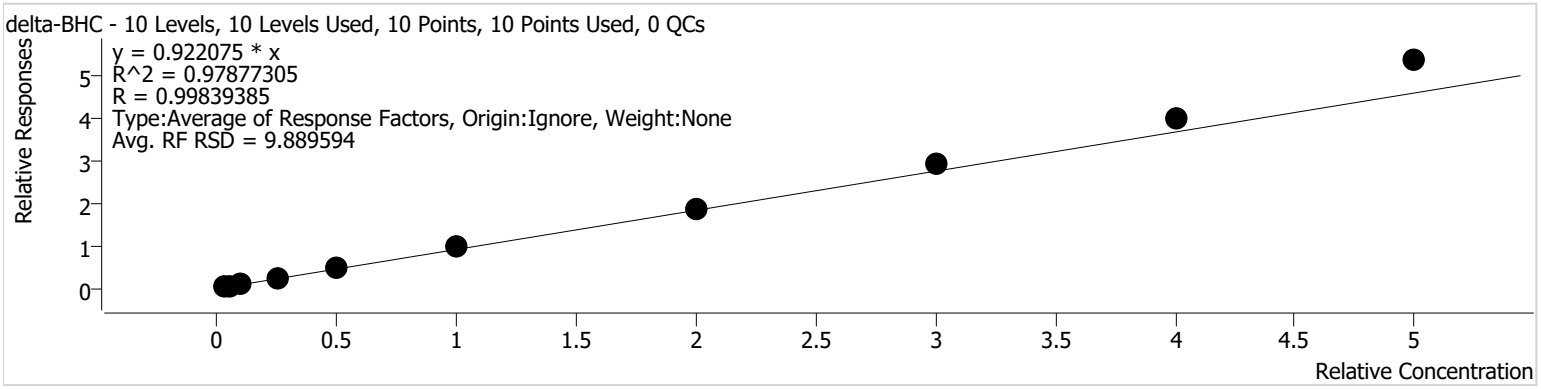
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	488725.369
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	1109987.334
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	2671966.237
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	5514508.650
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	10994452.756
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	21289580.952
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	33753177.455
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	48011095.545
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	59616893.353

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

delta-BHC **Relative Standard Error** 9.9



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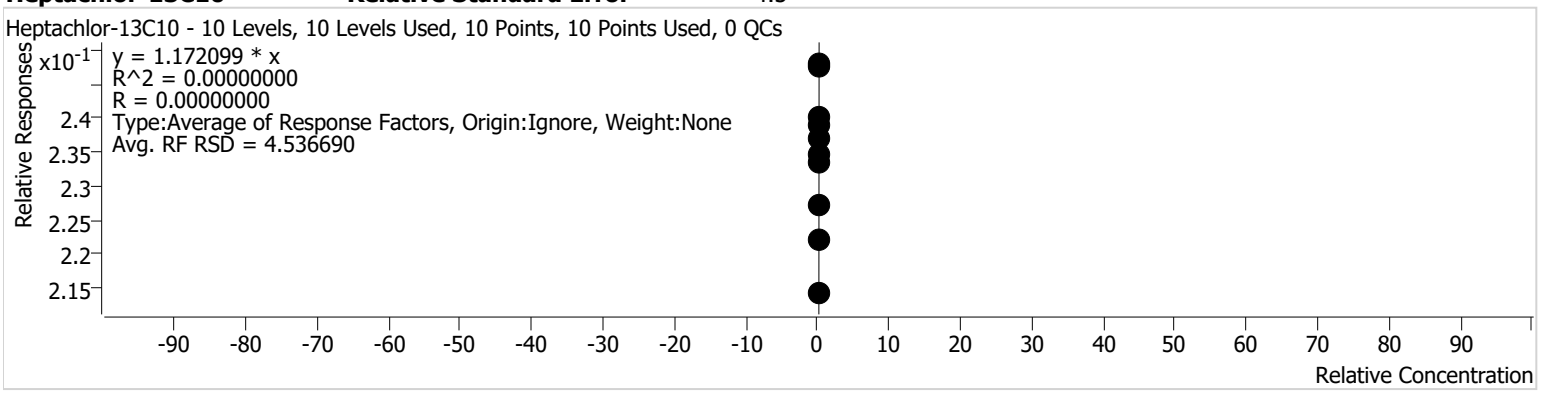
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	413818.982
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	902246.995
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	1886068.345
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	4026671.338
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	7471672.599
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	12014531.053
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	16715013.016
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	22562602.322

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Heptachlor-13C10 **Relative Standard Error** 4.5



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8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	20.0000	2722513.446
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	20.0000	3361308.045
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	20.0000	2864015.216
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	20.0000	2856266.136
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	2860527.040
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	20.0000	2784469.495
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	20.0000	3027747.699
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	20.0000	3075845.714
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	20.0000	3132289.995

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
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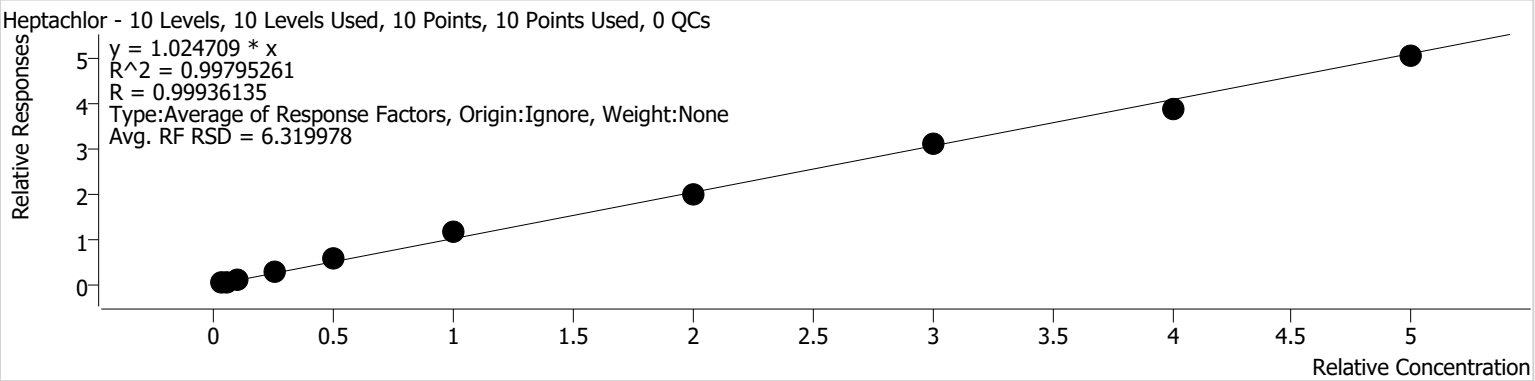
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Heptachlor **Relative Standard Error** 6.3



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	329854.656
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	745684.635
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	1585649.733
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8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	5614678.623
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8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	12026022.404
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	15797665.372

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
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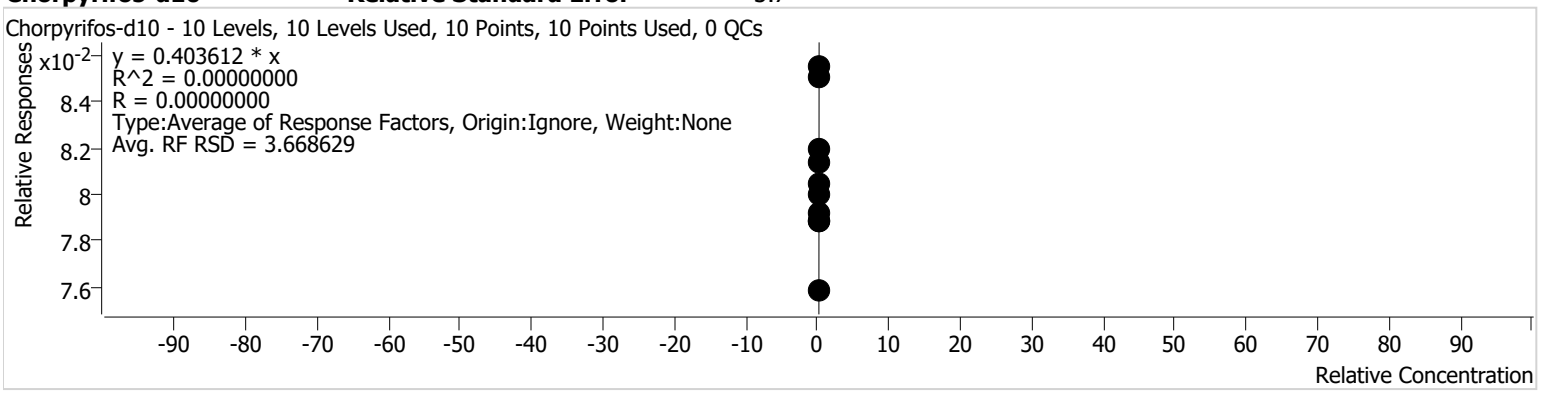
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Chorpyrifos-d10 **Relative Standard Error** 3.7



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8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	20.0000	1025053.048
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	20.0000	922681.312
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8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	20.0000	983955.180
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8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	20.0000	979085.199
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	20.0000	1061952.938

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
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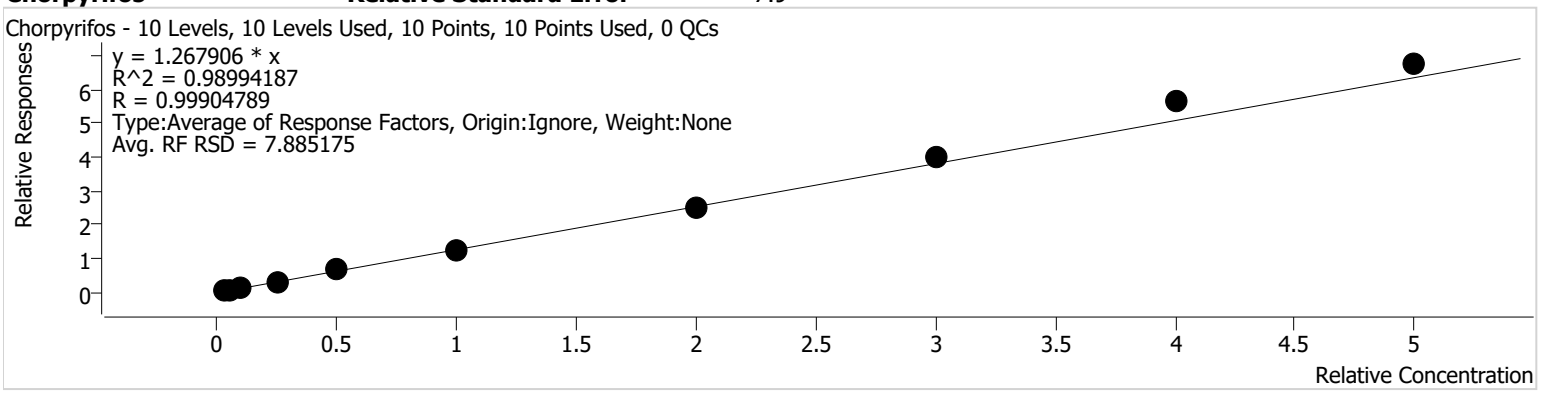
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Chorpyrifos **Relative Standard Error** 7.9



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8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	303607.646
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	606115.715
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	1327438.505
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	2489960.277
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	4087400.979
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	5566916.312
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	7125750.447

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
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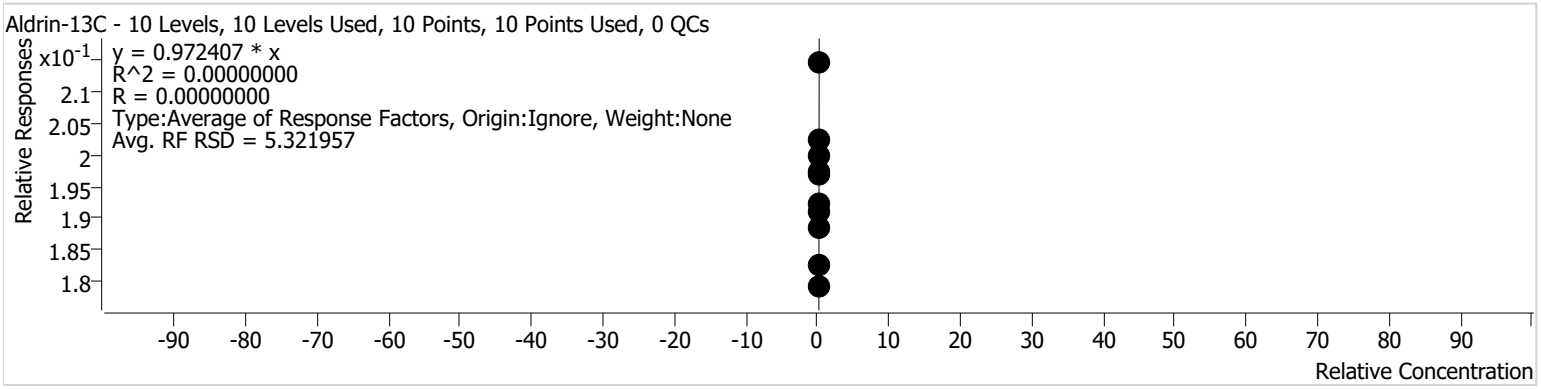
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Aldrin-13C **Relative Standard Error** 5.3



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8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	20.0000	2701020.694
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	20.0000	2360071.132
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	20.0000	2304765.356
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	2541745.374
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	20.0000	2322974.886
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	20.0000	2373165.254
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	20.0000	2511408.448
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	20.0000	2575878.874

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
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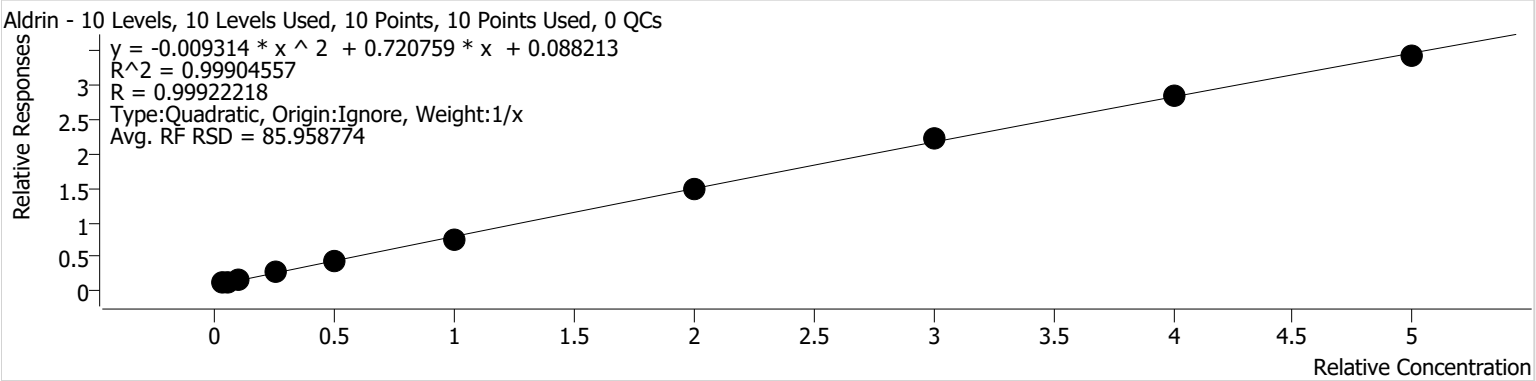
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Aldrin **Relative Standard Error** 15.9



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8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	284265.011
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	421780.221
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	634581.688
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	1023188.944
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	1955339.355
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	3465065.321
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	5301147.053
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	7170616.863
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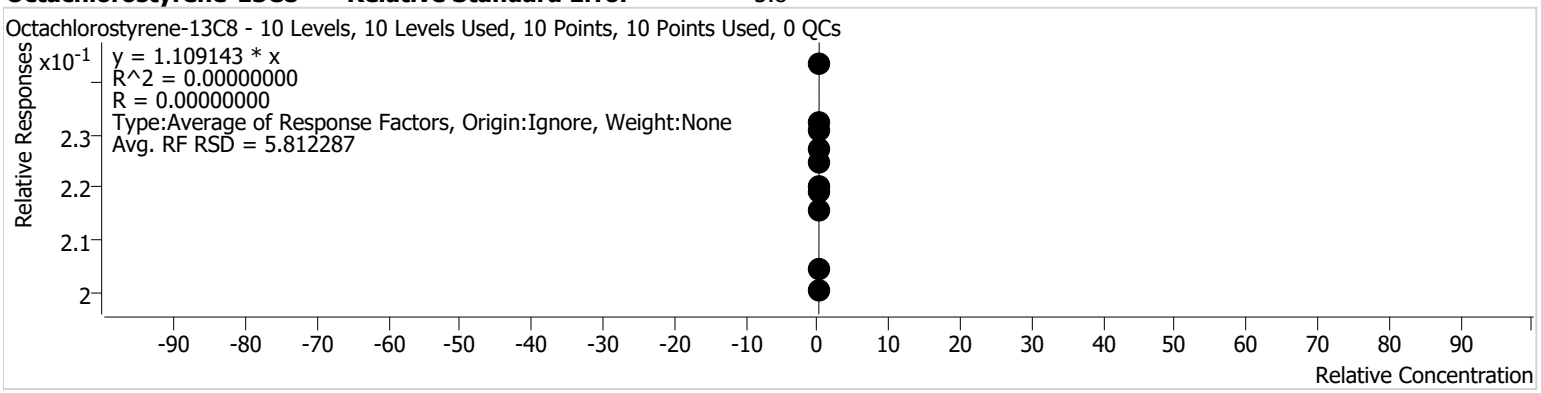
MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Octachlorostyrene-13C8 **Relative Standard Error** 5.8



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	20.0000	2793711.104
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	20.0000	3030315.952
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	20.0000	2784902.696
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	20.0000	2617725.507
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	2890339.313
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	20.0000	2598565.956
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	20.0000	2764234.514
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	20.0000	2863501.834
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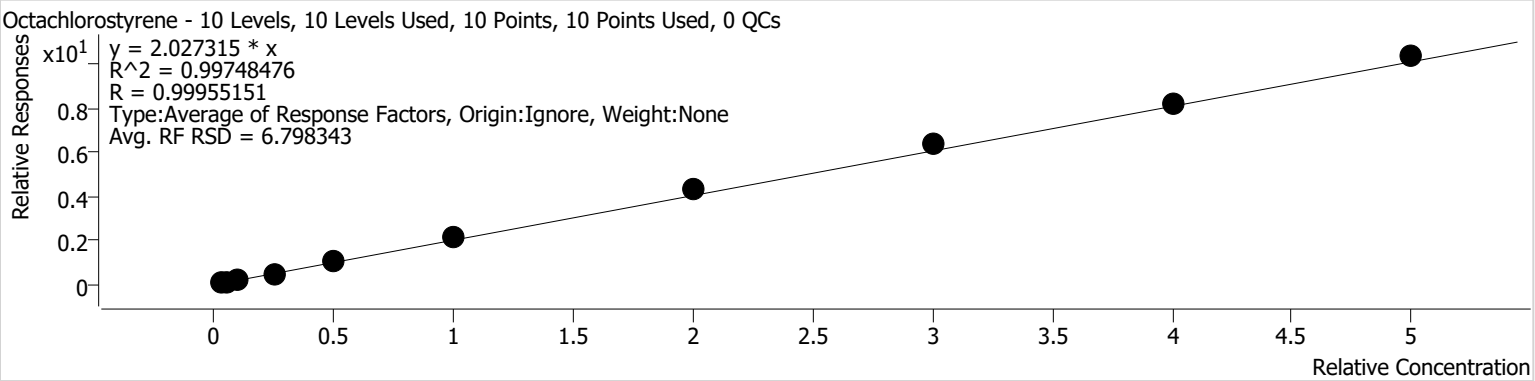
MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Octachlorostyrene **Relative Standard Error** 6.8



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	590782.850
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	1400404.211
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	2764058.894
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	6137228.406
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	11403977.888
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	17880434.329
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	23468595.052
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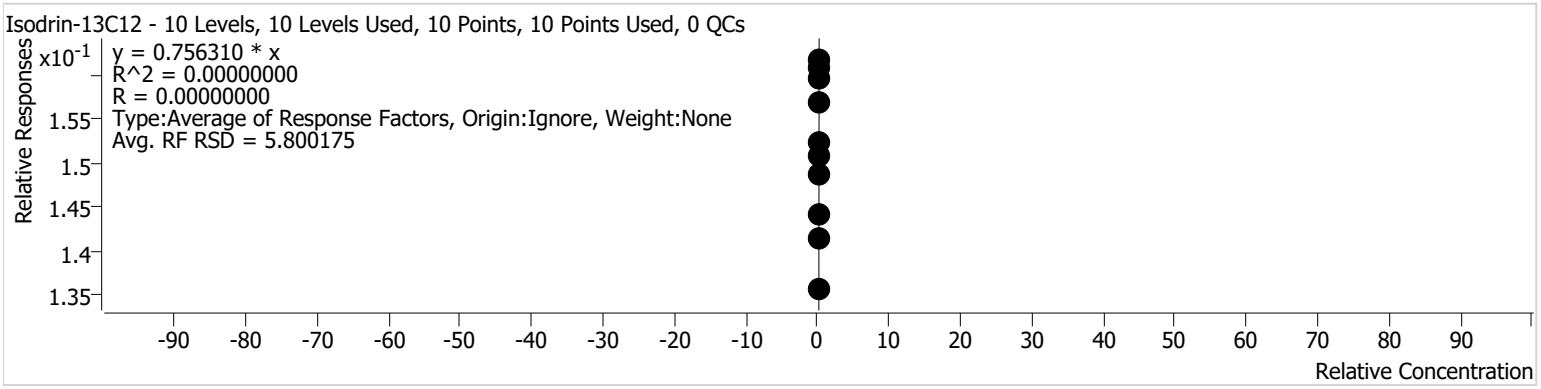
MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Isodrin-13C12 **Relative Standard Error** 5.8



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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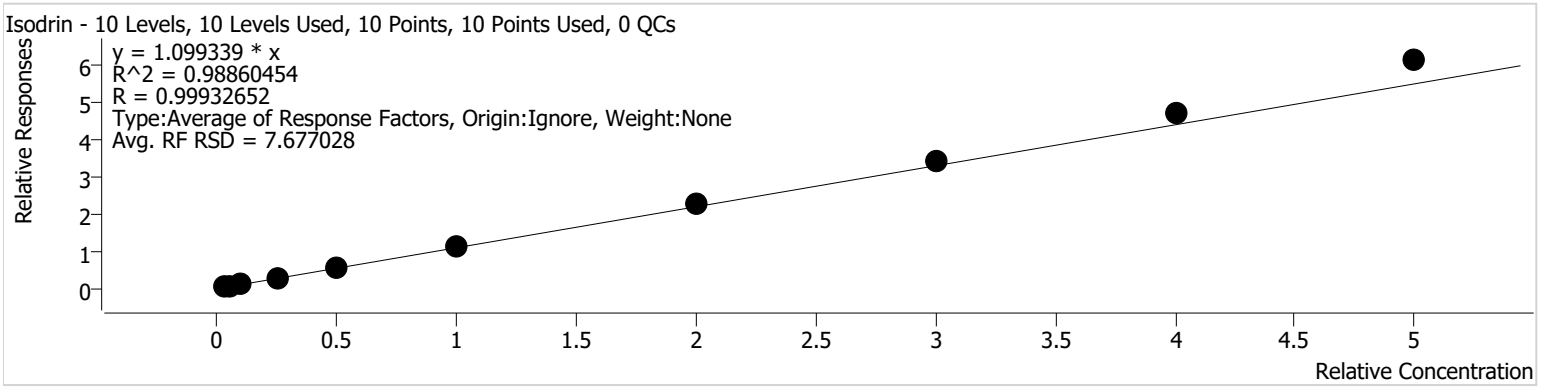
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	20.0000	1856937.279
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	20.0000	2009721.330
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	20.0000	1878740.905
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	20.0000	1840210.401
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	1960999.936
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	20.0000	1837080.844
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	20.0000	1874902.386
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	20.0000	1871484.542
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	20.0000	1935034.581

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Isodrin **Relative Standard Error** 7.7



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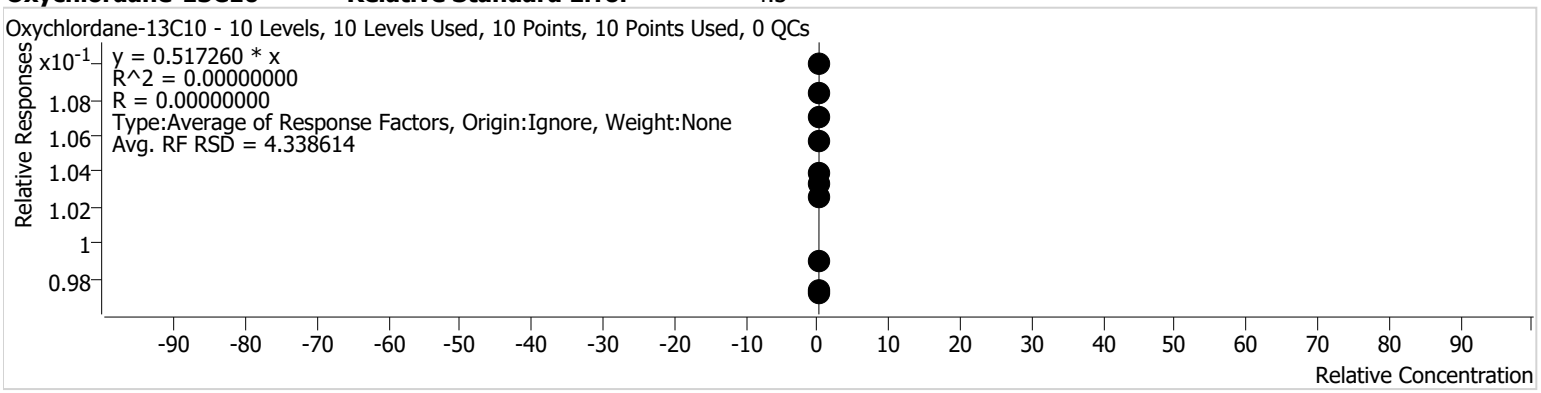
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	87966.837
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	211569.674
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	497570.753
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	1044198.561
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	2217943.890
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	4183653.538
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	6385718.264
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	8816960.336
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	11820831.203

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Oxychlordane-13C10 **Relative Standard Error** 4.3



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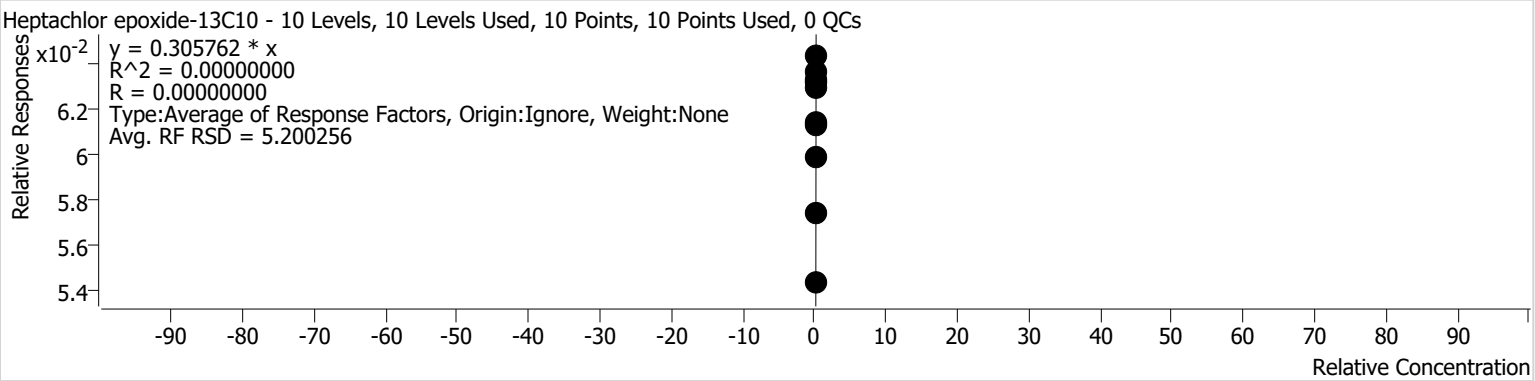
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	20.0000	1244436.620
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	20.0000	1440139.495
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	20.0000	1316381.303
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	20.0000	1234379.431
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	1319266.954
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	20.0000	1263058.664
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	20.0000	1301370.486
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	20.0000	1290616.893
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	20.0000	1327540.016

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Heptachlor epoxide-13C10 **Relative Standard Error** 5.2



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	20.0000	803380.902
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	20.0000	686926.345
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	20.0000	740721.194
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	812789.470
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	20.0000	777423.392
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	20.0000	797975.181
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	20.0000	790284.123
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	20.0000	821901.876

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
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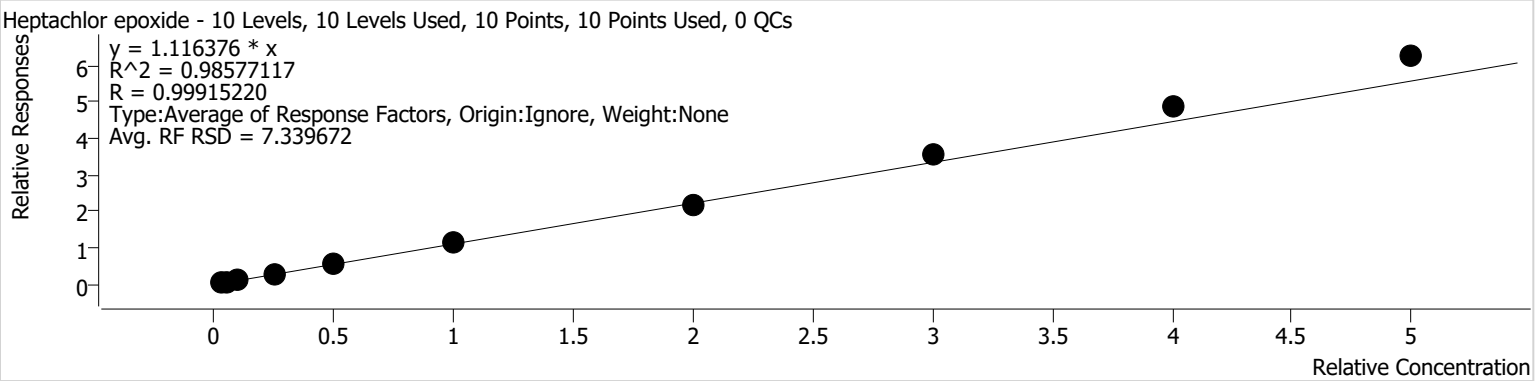
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Heptachlor epoxide **Relative Standard Error** 7.3



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8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	83241.232
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	187065.883
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	405002.402
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	933328.215
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	1707672.051
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	2834221.437
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	3861991.925
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	5126624.014

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
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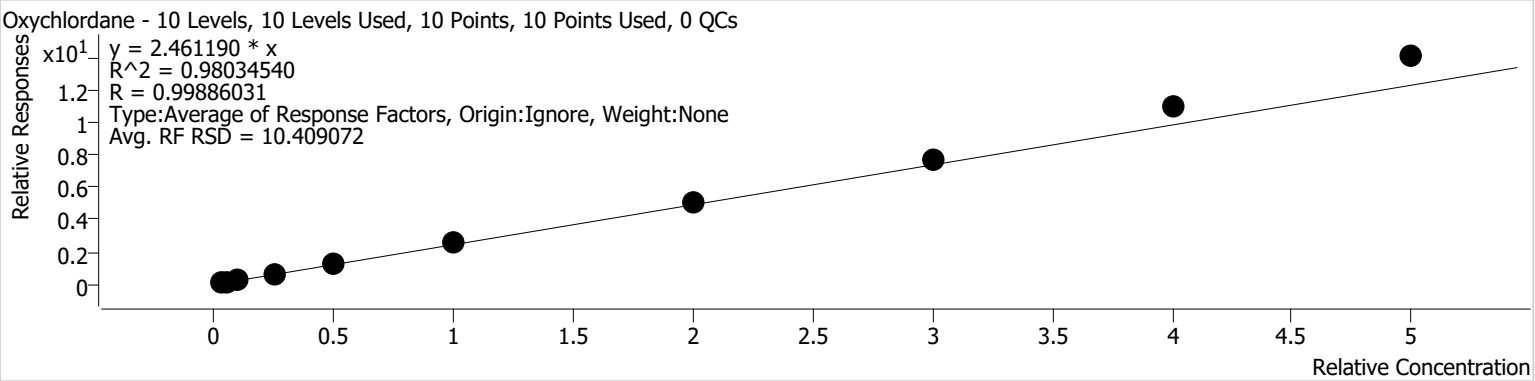
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Oxychlordane **Relative Standard Error** 10.4



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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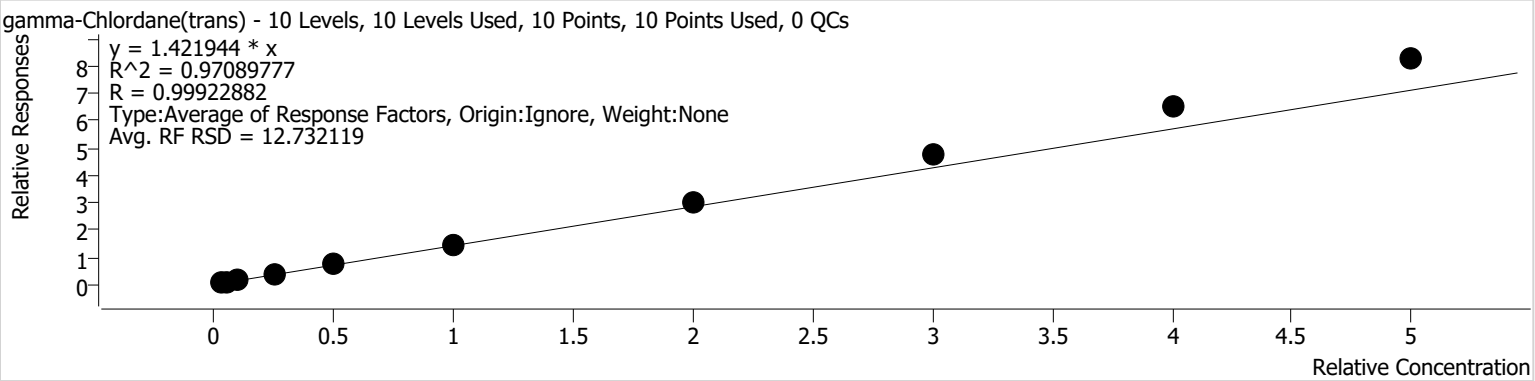
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	336264.722
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	763335.517
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	1591366.815
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	3352241.306
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	6345773.118
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	10021523.605
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	14227330.037
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	18641715.832

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

gamma-Chlordane(trans) **Relative Standard Error** 12.7



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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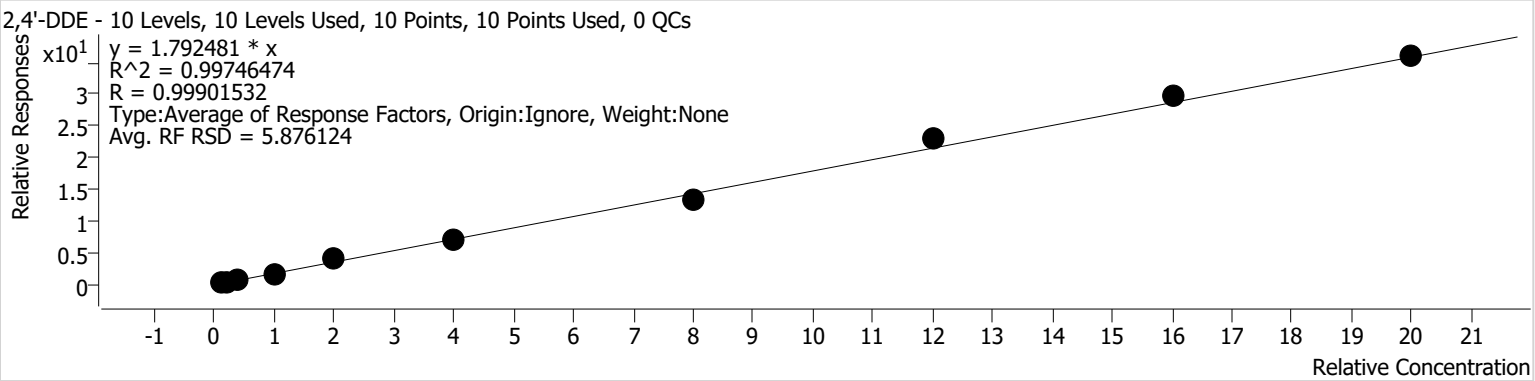
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	81280.896
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	183413.587
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	426775.918
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	911059.684
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	1870291.939
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	3752345.685
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	6187593.146
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	8390007.752
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	11044755.830

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

2,4'-DDE **Relative Standard Error** 5.9



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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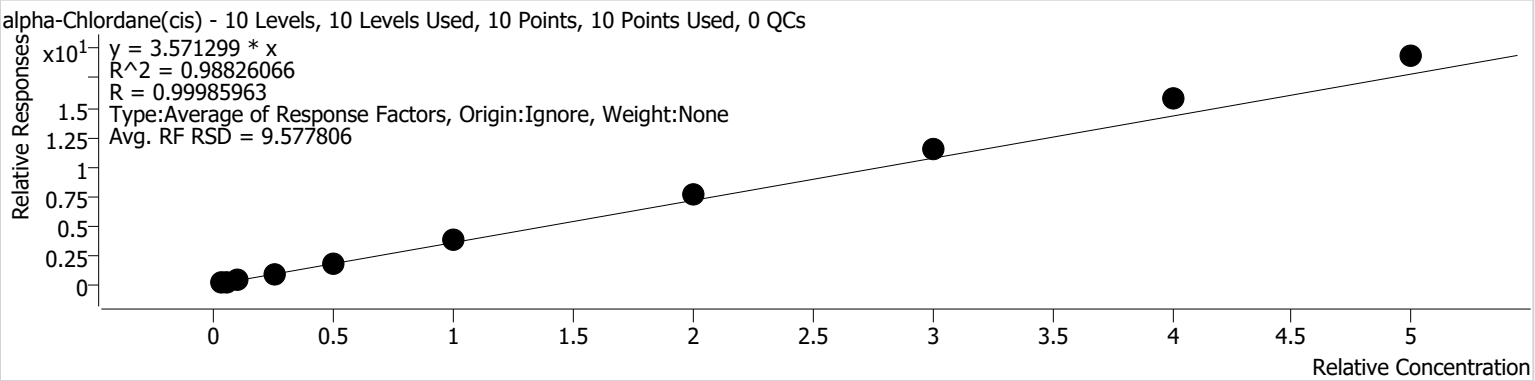
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	538989.291
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	1202572.895
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	2749842.394
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	6044926.976
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	12323948.418
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	23385567.829
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	39907590.234
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	54584512.658
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	72582338.420

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

alpha-Chlordane(cis) **Relative Standard Error** 9.6



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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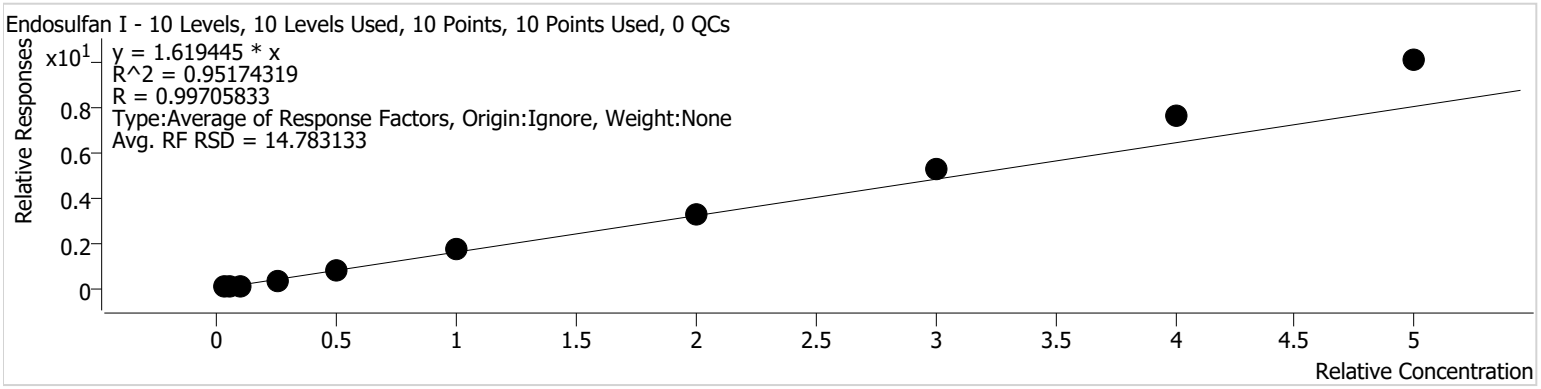
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	200539.480
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	464409.458
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	1064340.247
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	2306447.190
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	4993046.507
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	9565617.197
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	15075906.975
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	20386343.804
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	25616710.952

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Endosulfan I **Relative Standard Error** 14.8



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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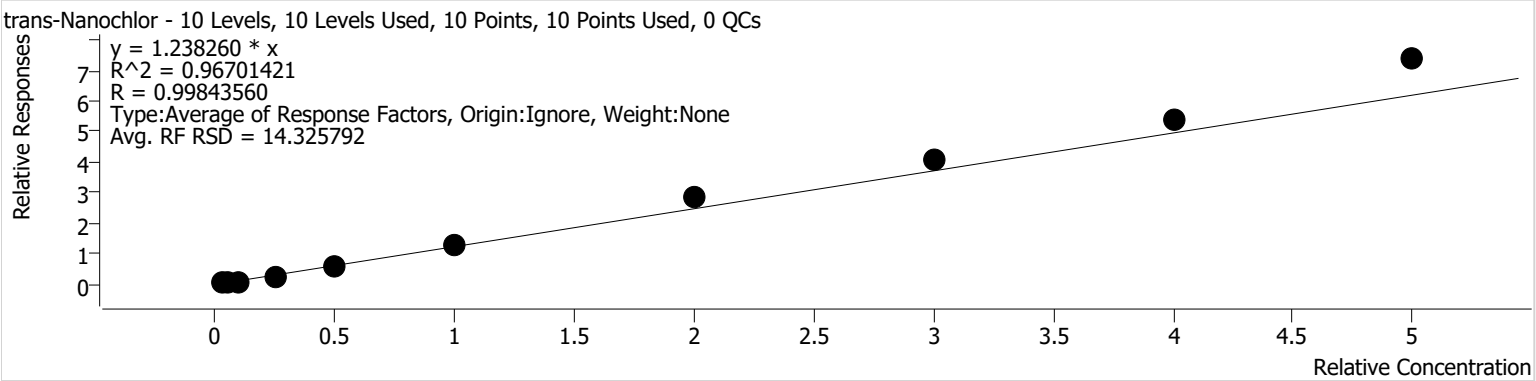
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	68115.772
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	153278.535
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	310264.740
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	744211.885
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	1408969.895
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	2171629.718
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	3218905.270
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	4219100.212

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

trans-Nanochlor **Relative Standard Error** 14.3



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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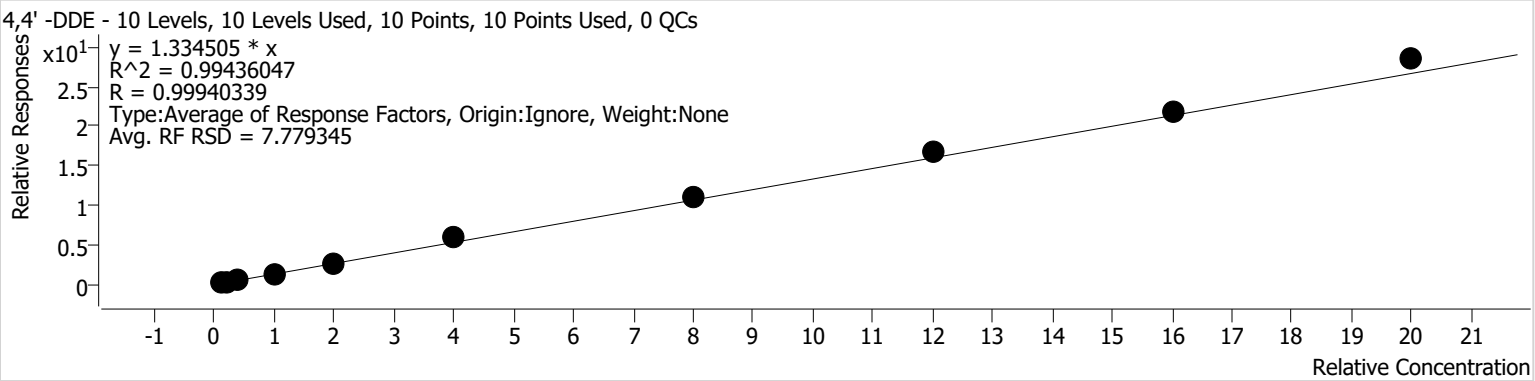
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	67686.514
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	156379.783
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	358633.864
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	773114.486
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	1703109.262
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	3576108.543
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	5360223.423
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	7000806.837
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	9871874.549

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

4,4' -DDE **Relative Standard Error** 7.8



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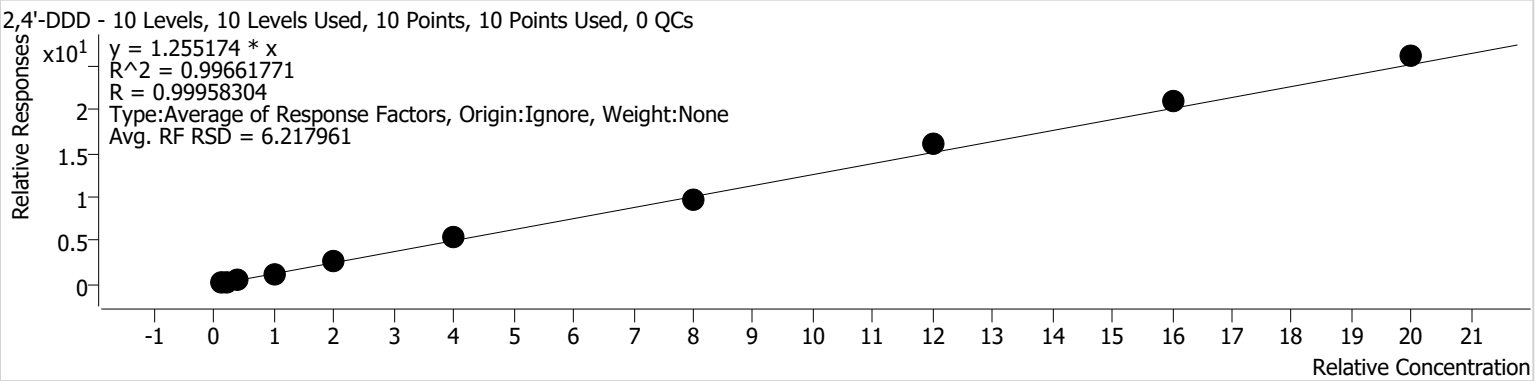
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	393905.378
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	890426.045
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	2065567.165
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	4110126.994
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	10067659.861
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	19124636.416
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	28841472.351
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	40088882.763
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	58207389.174

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

2,4'-DDD **Relative Standard Error** 6.2



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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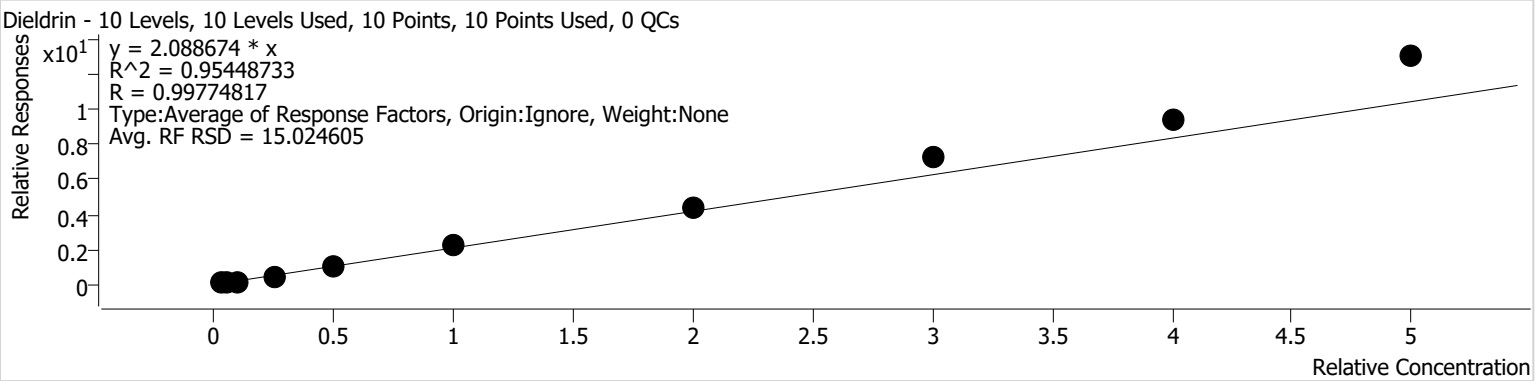
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	370231.038
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	846851.875
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	1951282.150
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	3929348.451
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	9256831.367
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	16917939.484
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	27901203.526
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	38566500.006
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	52524848.101

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Dieldrin **Relative Standard Error** 15.0



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	85856.204
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	197252.291
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	413338.298
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	930275.025
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	1845567.261
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	2978467.345
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	3994859.775
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	5417290.030

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
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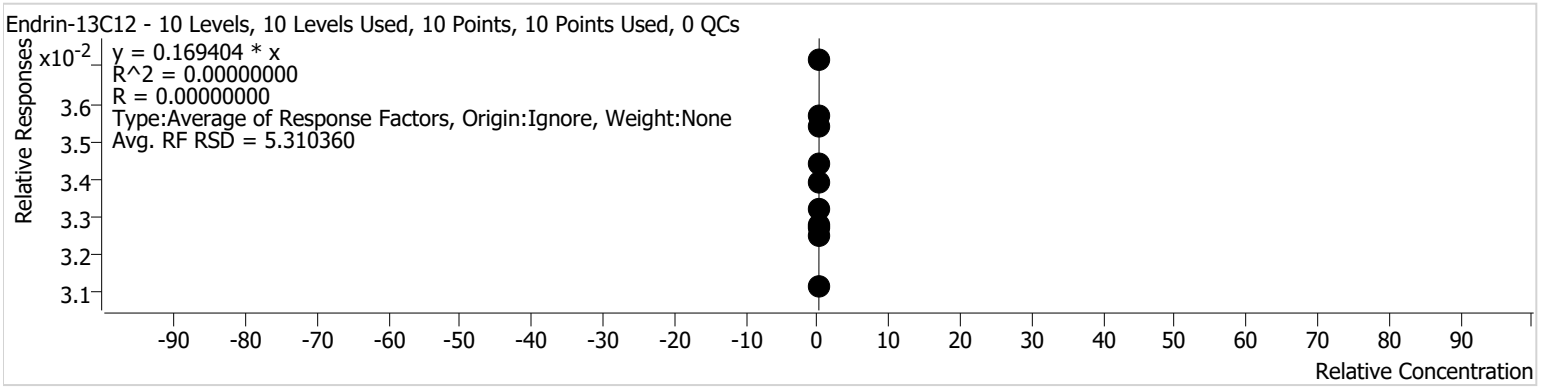
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Endrin-13C12 **Relative Standard Error** 5.3



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	20.0000	396277.823
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	427288.823
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	20.0000	424281.164
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	20.0000	412847.495
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	20.0000	421198.911
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	20.0000	417076.809

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
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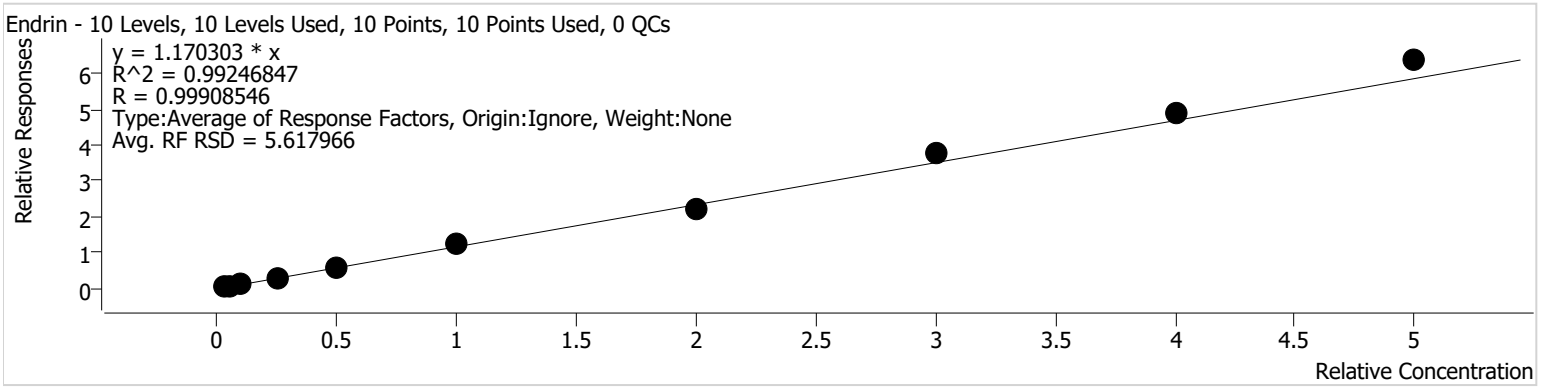
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Endrin **Relative Standard Error** 5.6



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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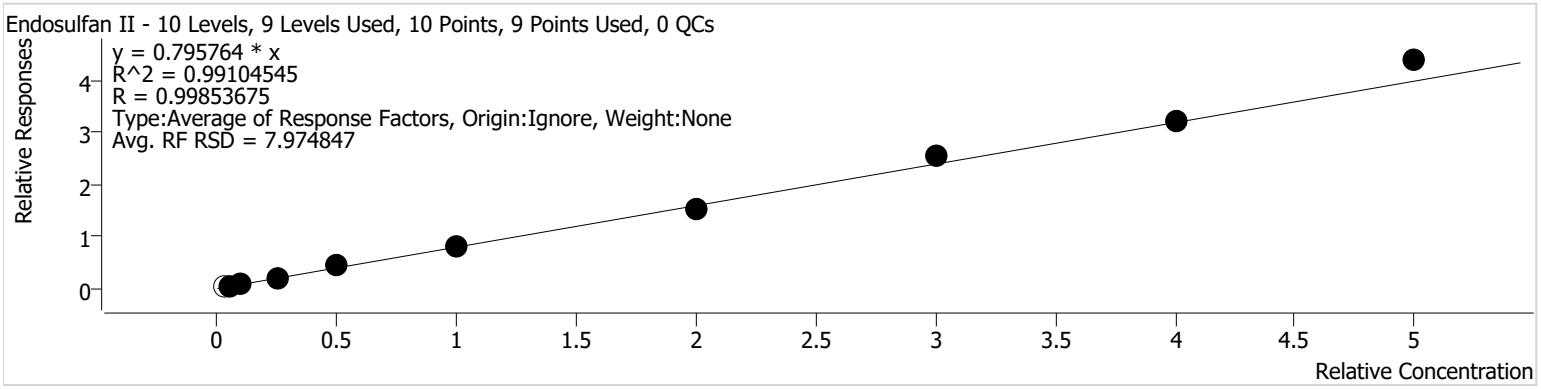
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	52178.874
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	118709.907
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	228971.509
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	520201.218
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	939292.133
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	1545304.001
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	2059941.769
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	2644099.729

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Endosulfan II **Relative Standard Error** 8.0



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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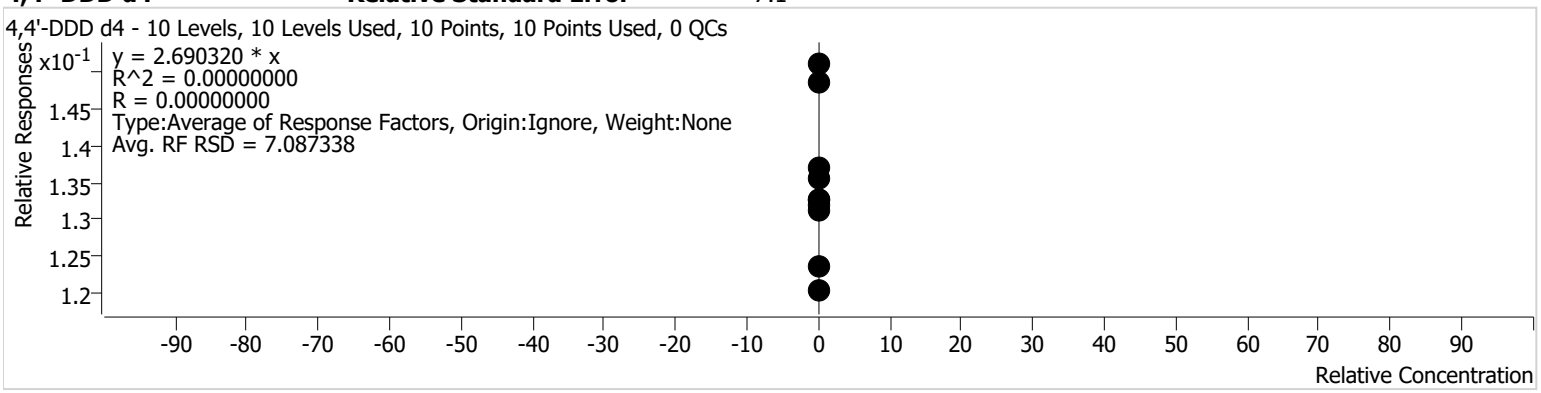
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	15155.543
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	35302.129
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	77304.555
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	173715.210
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	348553.963
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	658048.406
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	1047581.234
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	1359999.039
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	1820135.946

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

4,4'-DDD d4 **Relative Standard Error** 7.1



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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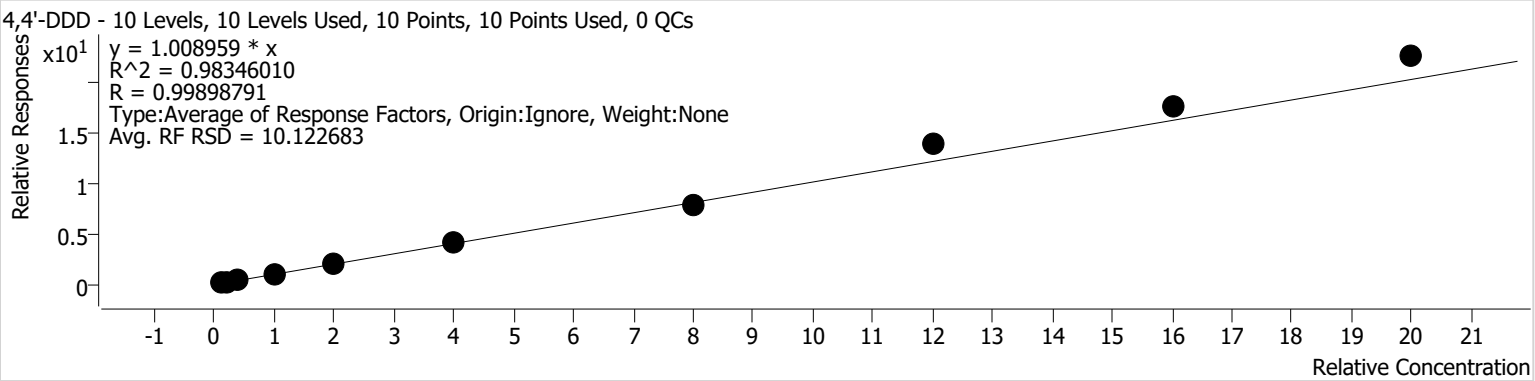
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	5.0000	1779697.193
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	1623095.374
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	5.0000	1514761.968
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	5.0000	1706251.710
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	5.0000	1721847.138
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	5.0000	1728395.639
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	5.0000	1845497.535
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	5.0000	2024148.552

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

4,4'-DDD **Relative Standard Error** 10.1



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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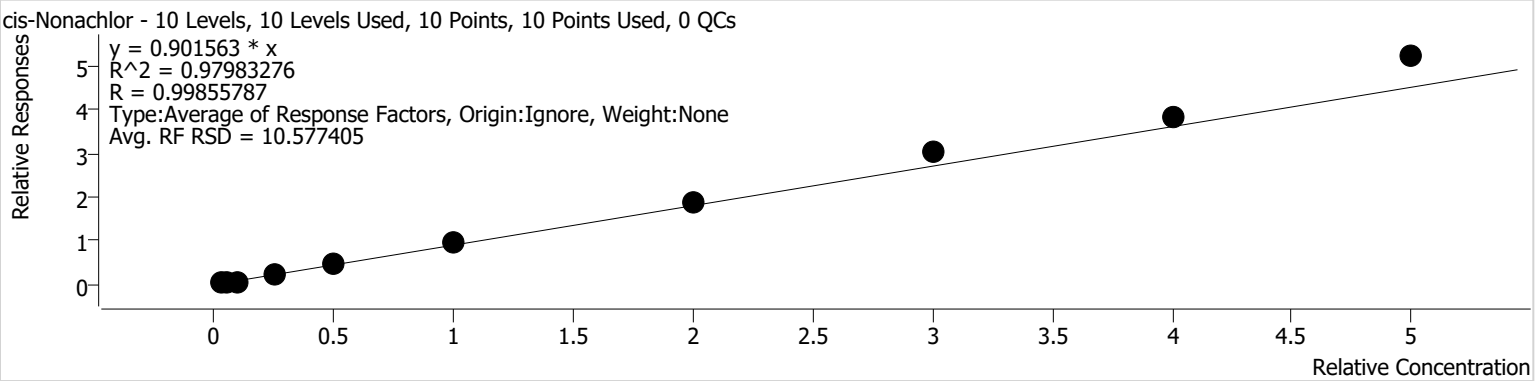
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	280419.278
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	636588.003
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	1521989.747
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	3185670.498
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	7300718.260
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	13530173.757
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	23828040.028
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	32525641.143
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	45297281.747

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

cis-Nonachlor **Relative Standard Error** 10.6



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
8/20/2024 11:55 AM	J:\MS47\data\082024\082024F005.D	Calibration	0.5	True	0.5000	26398.196
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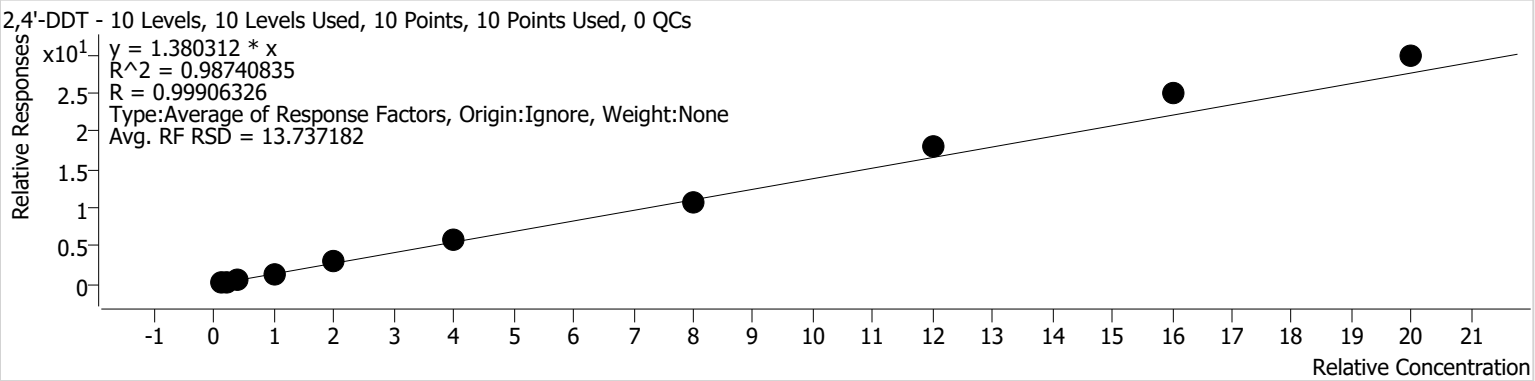
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	114467.624
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	277096.131
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	579418.812
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	1251062.527
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	2363852.667
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	3929176.503
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	4909311.663
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	6898812.790

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

2,4'-DDT **Relative Standard Error** 13.7



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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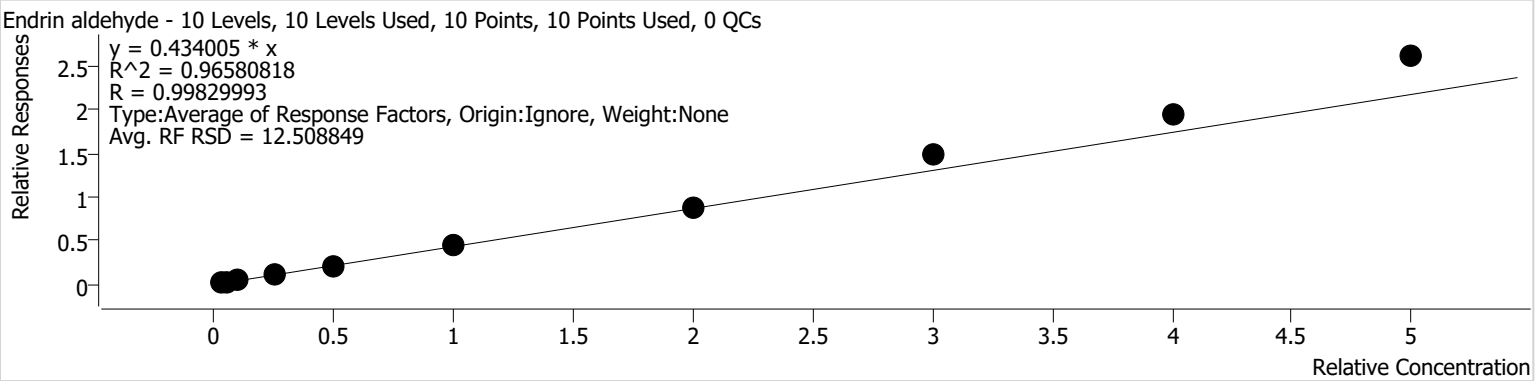
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	212519.918
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	499705.046
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	1145693.972
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	2448840.234
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	5178611.857
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	9377907.770
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	15854860.401
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	21477698.598
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	28549487.253

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Endrin aldehyde **Relative Standard Error** 12.5



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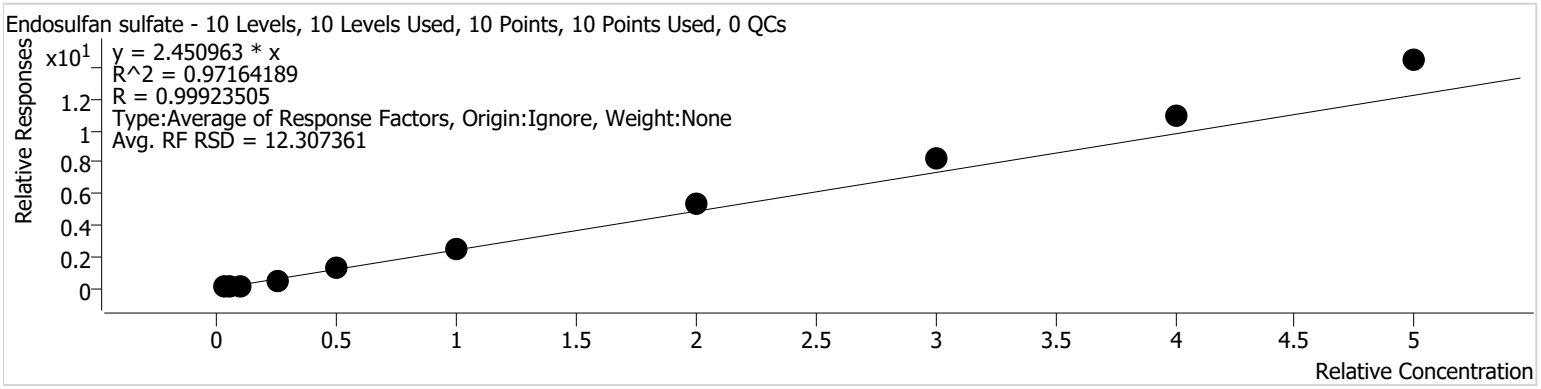
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	19069.024
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	44359.971
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	82868.716
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	189975.976
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	367229.730
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	616324.777
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	824281.086
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	1082921.325

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Endosulfan sulfate **Relative Standard Error** 12.3



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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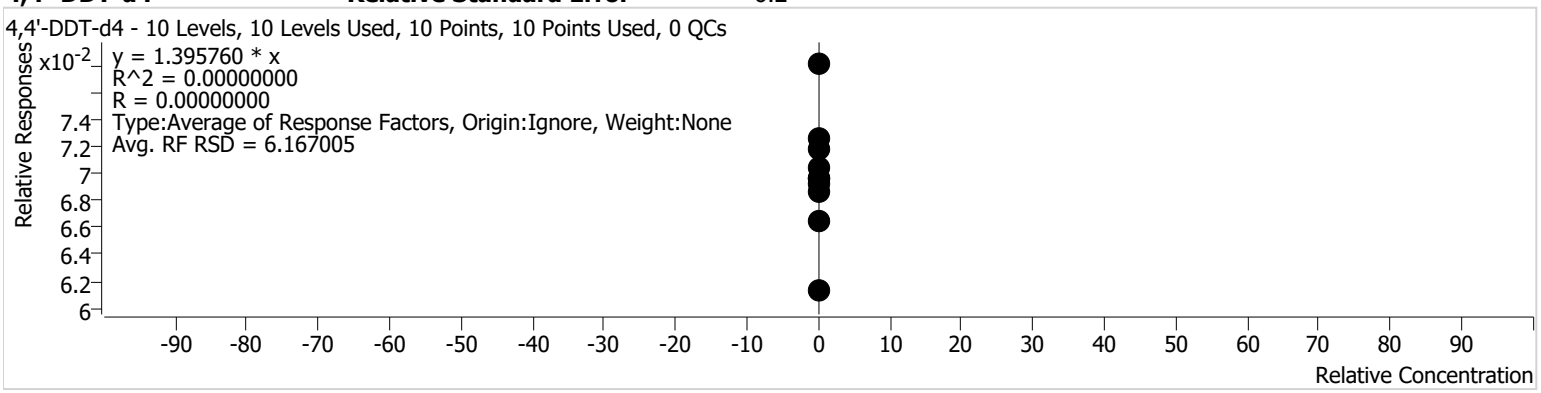
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	104712.101
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	233549.100
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	493692.920
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	1061470.255
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	2246905.556
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	3399420.051
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	4597731.209
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	6013134.606

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

4,4'-DDT-d4 **Relative Standard Error** 6.2



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8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	5.0000	906104.197
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	870021.584
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	5.0000	790999.929
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	5.0000	896263.392
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	5.0000	863556.267
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	5.0000	887887.279
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	5.0000	865046.844
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	5.0000	961891.313

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
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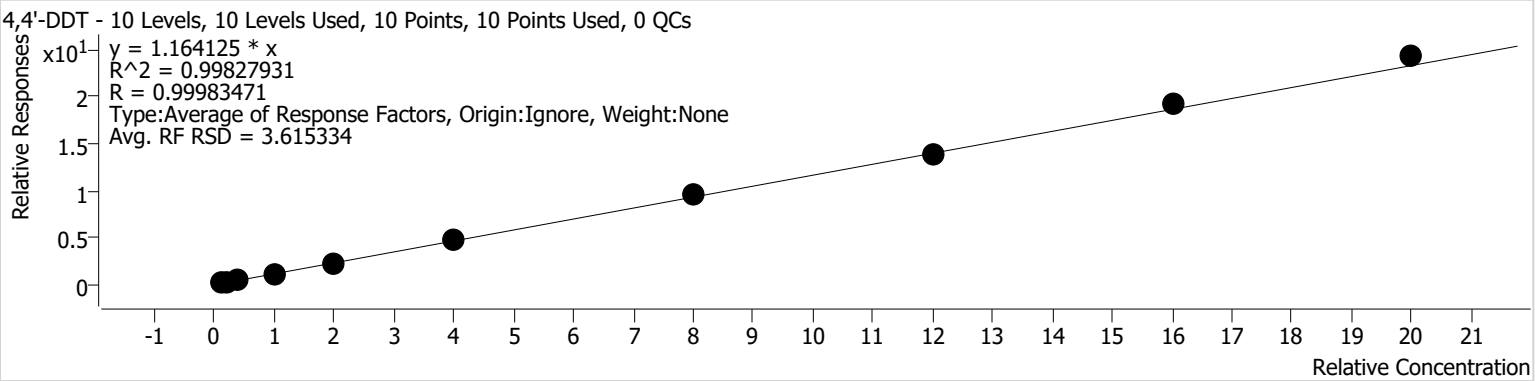
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

4,4'-DDT **Relative Standard Error** 3.6



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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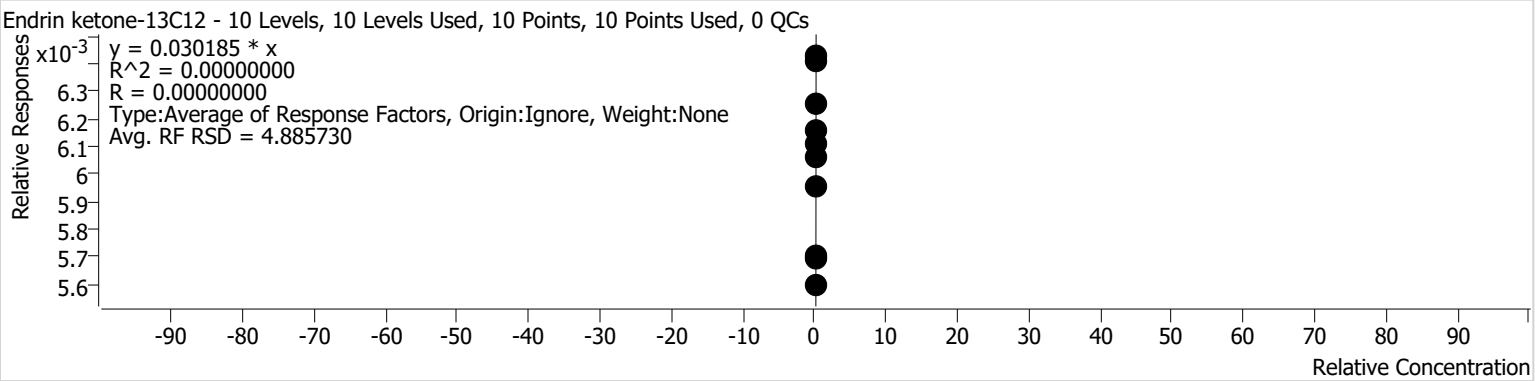
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	168907.983
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	420087.725
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	1002330.109
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	1837160.738
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	4300611.796
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	8206007.539
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	12382057.861
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	16599612.142
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	23264348.951

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Endrin ketone-13C12 **Relative Standard Error** 4.9



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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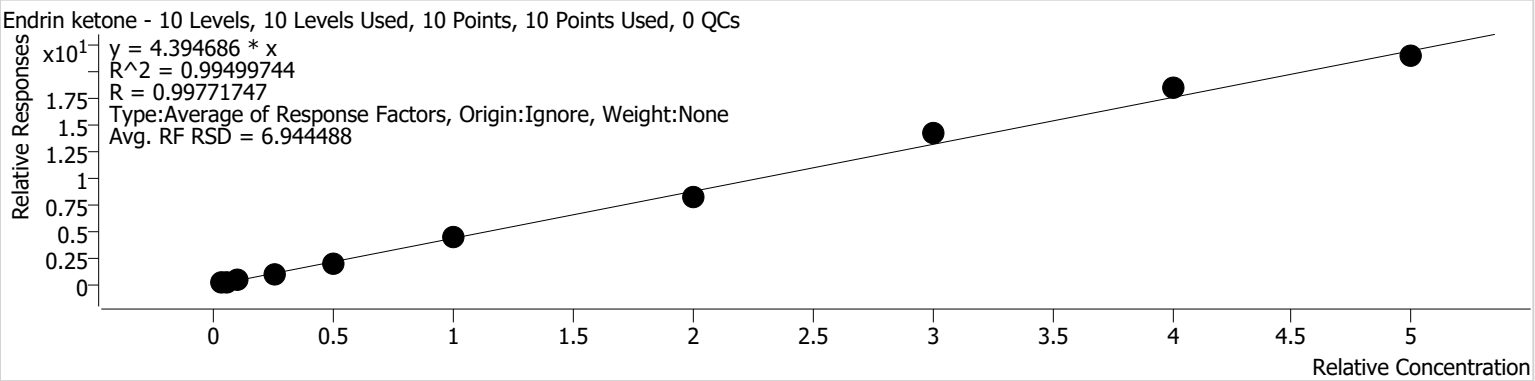
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	20.0000	84281.024
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	20.0000	72525.272
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	20.0000	73907.458
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	73402.187
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	20.0000	72718.467
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	20.0000	75006.201
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	20.0000	76414.498
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	20.0000	83908.983

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Endrin ketone **Relative Standard Error** 6.9



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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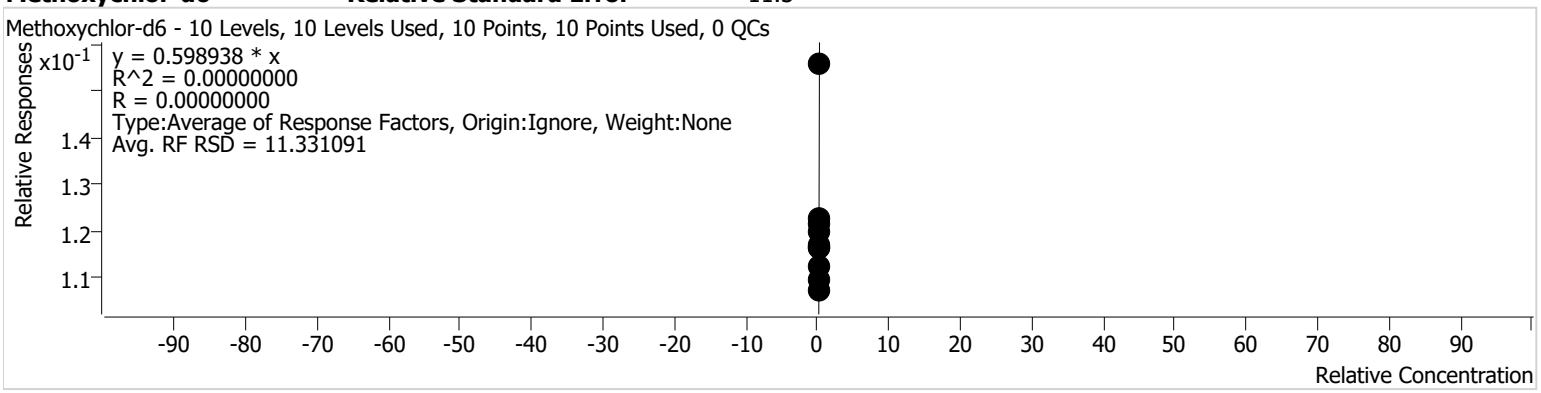
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	34552.889
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	74311.410
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	149266.174
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	332478.484
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	608618.174
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	1075174.586
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	1423134.210
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	1793662.525

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Methoxychlor-d6 **Relative Standard Error** 11.3



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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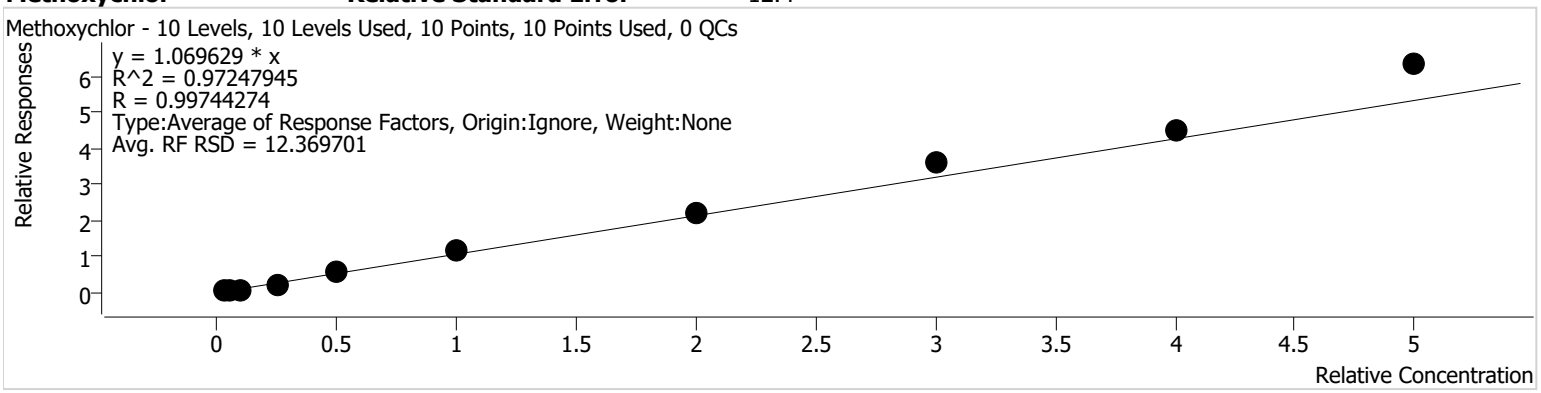
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	20.0000	1786285.549
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	20.0000	1719141.699
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	20.0000	1471143.115
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	20.0000	1402610.282
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	1500217.445
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	20.0000	1419308.169
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	20.0000	1475922.826
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	20.0000	1485015.613
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	20.0000	1433263.455

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Methoxychlor **Relative Standard Error** 12.4



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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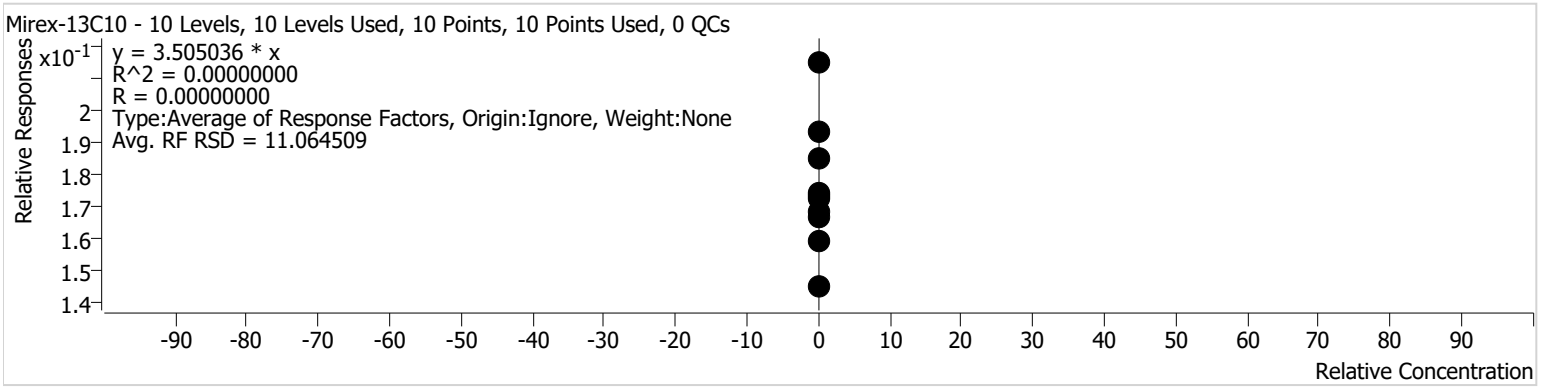
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	77438.283
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	161918.506
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	355469.399
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	770033.746
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	1751725.789
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	40.0000	3096386.958
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	60.0000	5399313.368
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	80.0000	6698269.919
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	9076376.202

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Mirex-13C10 **Relative Standard Error** 11.1



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
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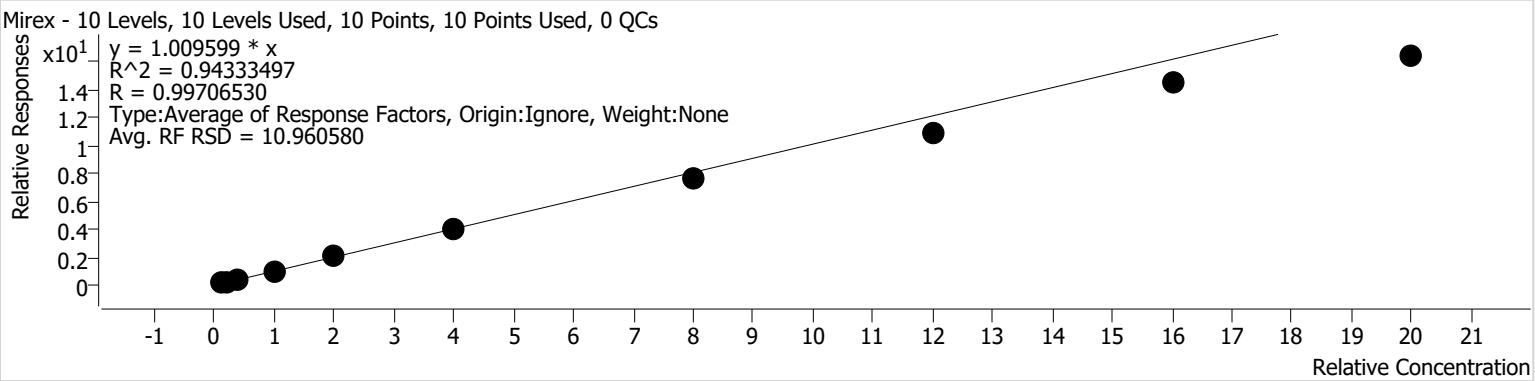
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	5.0000	1912589.766
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	5.0000	2137485.055
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	2080205.362
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	5.0000	2002545.019
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	5.0000	2217895.537
8/20/2024 1:54 PM	J:\MS47\data\082024\082024F011.D	Calibration	40	True	5.0000	2186354.027
8/20/2024 2:13 PM	J:\MS47\data\082024\082024F012.D	Calibration	60	True	5.0000	2331805.302
8/20/2024 2:33 PM	J:\MS47\data\082024\082024F013.D	Calibration	80	True	5.0000	2398320.100
8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	5.0000	2891544.536

MassHunter Quantitative Analysis Calibration Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Analysis Time Stamp	8/20/2024 3:33:05 PM	**Analyst Name**	CORP\alkls.nouser
Report Generation Time	8/20/2024 3:43:59 PM	**Reporter Name**	CORP\alkls.nouser
Calibration Last Update	8/20/2024 3:23:05 PM	**Batch State**	Processed
Analyze Quant Version	12.1	**Report Quant Version**	12.1

Mirex **Relative Standard Error** 11.0



Acq. Date-Time	Calibration STD Path	Type	Level	Enable	Conc.	Response
8/20/2024 11:55 AM	J:\MS47\data\082024\082024F005.D	Calibration	0.5	True	0.5000	231345.996
8/20/2024 12:15 PM	J:\MS47\data\082024\082024F006.D	Calibration	1	True	1.0000	433939.116
8/20/2024 12:35 PM	J:\MS47\data\082024\082024F007.D	Calibration	2	True	2.0000	952227.979
8/20/2024 12:54 PM	J:\MS47\data\082024\082024F008.D	Calibration	5	True	5.0000	2204549.486
8/20/2024 1:14 PM	J:\MS47\data\082024\082024F009.D	Calibration	10	True	10.0000	4253313.191
8/20/2024 1:34 PM	J:\MS47\data\082024\082024F010.D	Calibration	20	True	20.0000	9048962.812
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8/20/2024 2:53 PM	J:\MS47\data\082024\082024F014.D	Calibration	100	True	100.0000	47192242.350

MassHunter Quantitative Analysis Sample Report

Data File	J:\MS47\data\082024\082024F003.D		
Batch File	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Acq. Date-Time	8/20/2024 11:16:03 AM	**Acq Operator**	
Name	D/E Bkdwn std 20ppm SVM71-99L	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	8/20/2024 3:33:05 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	080624 OC PEST ICAL.batch.bin	**Vial**	1
Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)		289.8 -> 254.8		ND ng/ml	
gamma-BHC-d6(IS)		223.9 -> 187.0		ND ng/ml	
Heptachlor-13C10(IS)		276.8 -> 241.8		ND ng/ml	
Chorpyrifos-d10(IS)		199.9 -> 171.9		ND ng/ml	
Aldrin-13C(IS)		269.8 -> 200.0		ND ng/ml	
Octachlorostyrene-13C8(IS)		315.8 -> 245.8		ND ng/ml	
Isodrin-13C12(IS)		199.9 -> 130.1		ND ng/ml	
Oxychlordane-13C10(IS)		190.0 -> 125.0		ND ng/ml	
Heptachlor epoxide-13C10(IS)		362.8 -> 270.0		ND ng/ml	
Pyrene-d10	9.713	212.0 -> 208.0	13049583	100.0000 ng/ml	0.009
Endrin-13C12(IS)		269.8 -> 200.0		ND ng/ml	
4,4'-DDD d4(IS)		243.0 -> 173.1		ND ng/ml	
4,4'-DDT-d4(IS)		243.0 -> 173.1		ND ng/ml	
Endrin ketone-13C12(IS)		327.9 -> 291.8		ND ng/ml	
Methoxychlor-d6(IS)		233.0 -> 141.0		ND ng/ml	
Mirex-13C10(IS)		276.8 -> 241.8		ND ng/ml	

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6		289.8 -> 254.8		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
gamma-BHC-d6		223.9 -> 187.0		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Heptachlor-13C10		276.8 -> 241.8		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Chorpyrifos-d10		199.9 -> 171.9		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Aldrin-13C		269.8 -> 200.0		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Octachlorostyrene-13C8		315.8 -> 245.8		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Oxychlordane-13C10		190.0 -> 125.0		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Heptachlor epoxide-13C10		362.8 -> 270.0		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Endrin-13C12		269.8 -> 200.0		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
4,4'-DDD d4		243.0 -> 173.1		0.000 ng/ml	
		Spiked Amount =	5.0	Recovery =	*NC %*
4,4'-DDT-d4		243.0 -> 173.1		0.000 ng/ml	
		Spiked Amount =	5.0	Recovery =	*NC %*
Methoxychlor-d6		233.0 -> 141.0		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Mirex-13C10		276.8 -> 241.8		0.000 ng/ml	
		Spiked Amount =	5.0	Recovery =	*NC %*

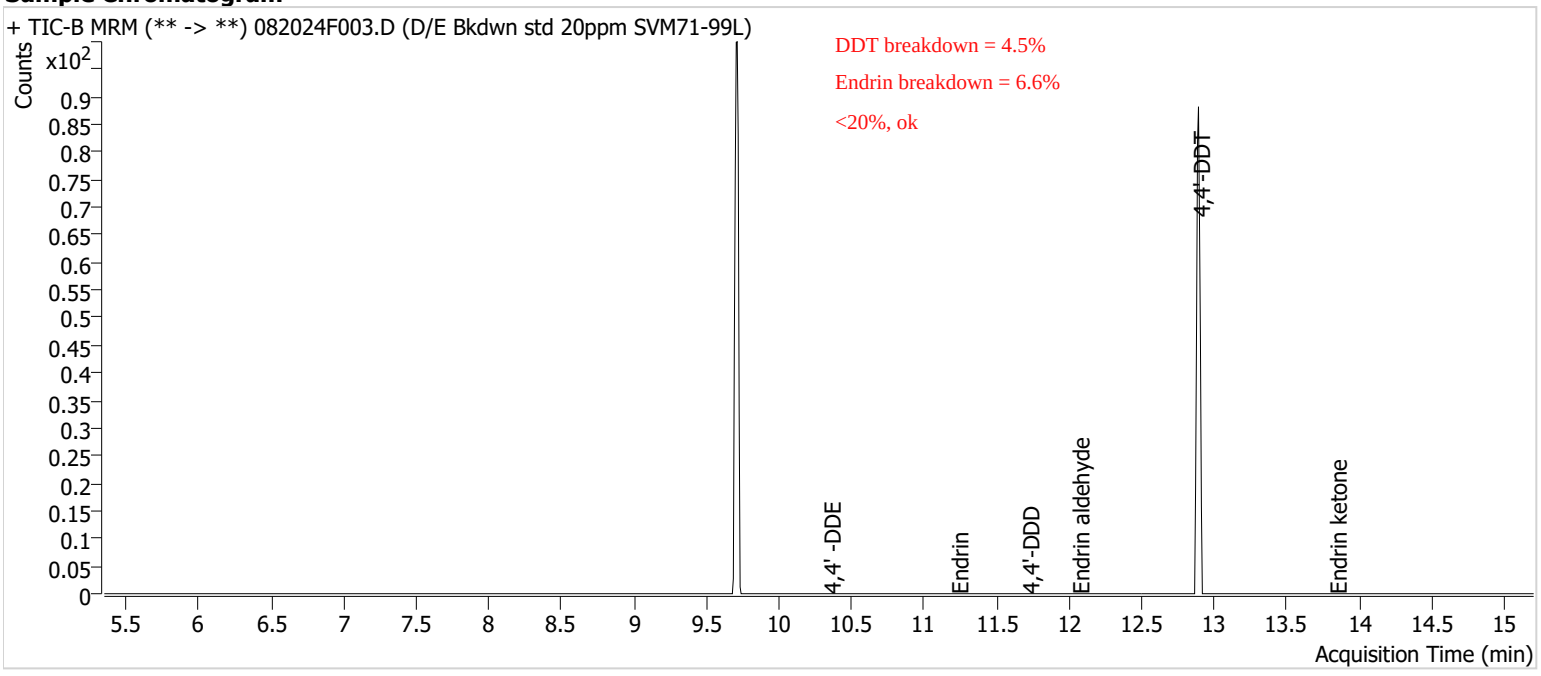
Target Compounds	**ISTD**	**RT**	**Transition**	**Resp.**	**Conc. Units**	**Qvalue**
alpha-BHC	gamma-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	

MassHunter Quantitative Analysis Sample Report

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)		283.8 -> 213.9		ND ng/ml	
beta-BHC	gamma-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
gamma-BHC(Lindane)	gamma-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
delta-BHC	gamma-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Heptachlor	Heptachlor-13C10(IS)		271.7 -> 236.9		ND ng/ml	
Chorpyrifos	Chorpyrifos-d10(IS)		196.9 -> 169.0		ND ng/ml	
Aldrin	Aldrin-13C(IS)		254.9 -> 220.0		ND ng/ml	
Octachlorostyrene	Octachlorostyrene-13C8(IS)		342.8 -> 307.8		ND ng/ml	
Isodrin	Isodrin-13C12(IS)		193.0 -> 123.0		ND ng/ml	
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)		352.8 -> 262.9		ND ng/ml	
Oxychlordane	Oxychlordane-13C10(IS)		114.9 -> 51.1		ND ng/ml	
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
2,4'-DDE	4,4'-DDD d4(IS)		246.0 -> 176.2		ND ng/ml	
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
Endosulfan I	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
trans-Nanochlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
4,4' -DDE	4,4'-DDD d4(IS)	10.349	246.0 -> 176.2	63890	NC ng/ml	98
2,4'-DDD	4,4'-DDD d4(IS)		235.0 -> 165.1		ND ng/ml	
Dieldrin	Endrin-13C12(IS)		262.9 -> 193.0		ND ng/ml	
Endrin	Endrin-13C12(IS)	11.230	262.8 -> 193.0	449533	NC ng/ml	91
Endosulfan II	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
4,4'-DDD	4,4'-DDD d4(IS)	11.719	235.0 -> 165.1	159590	NC ng/ml	98
cis-Nonachlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
2,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin aldehyde	Endrin-13C12(IS)	12.064	249.9 -> 214.9	13724	NC ng/ml	96
Endosulfan sulfate	Endrin-13C12(IS)		271.9 -> 237.0		ND ng/ml	
4,4'-DDT	4,4'-DDT-d4(IS)	12.896	235.0 -> 165.1	4716969	NC ng/ml	94
Endrin ketone	Endrin ketone-13C12(IS)	13.837	147.0 -> 111.0	17907	NC ng/ml	99
Methoxychlor	Methoxychlor-d6(IS)		227.0 -> 141.1		ND ng/ml	
Mirex	Mirex-13C10(IS)		271.8 -> 236.8		ND ng/ml	

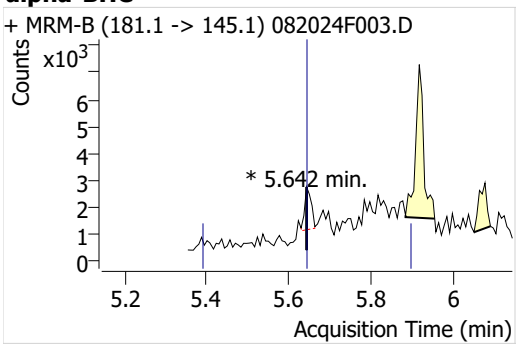
(m) = manual integration ND = Not Detected NC = Not Calculated

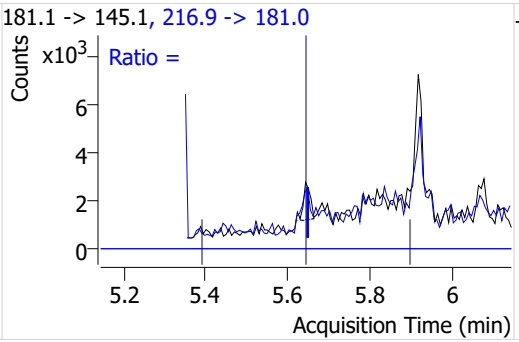
Sample Chromatogram

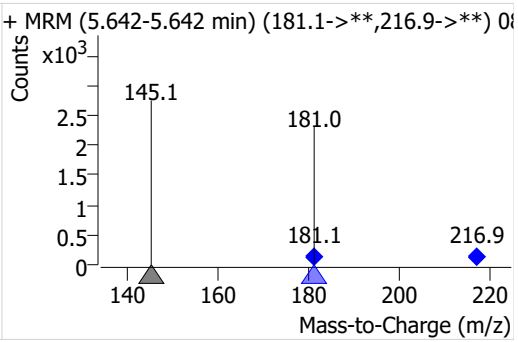


MassHunter Quantitative Analysis Sample Report

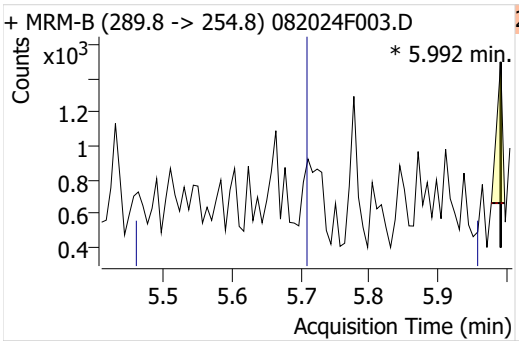
alpha-BHC

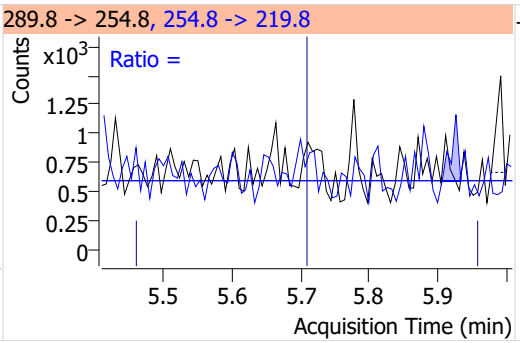


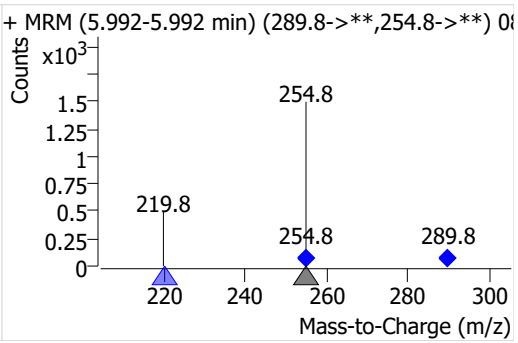




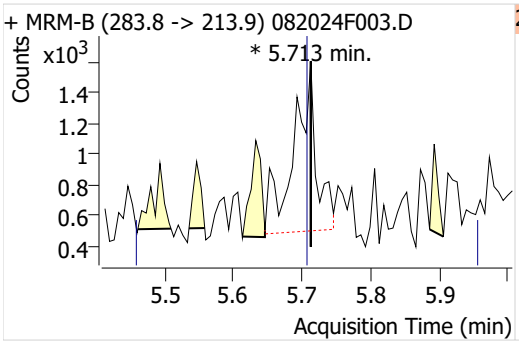
Hexachlorobenzene-13C6

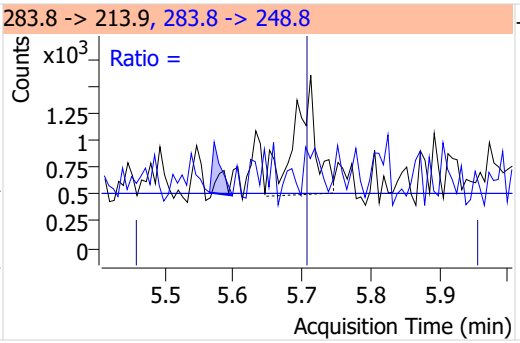


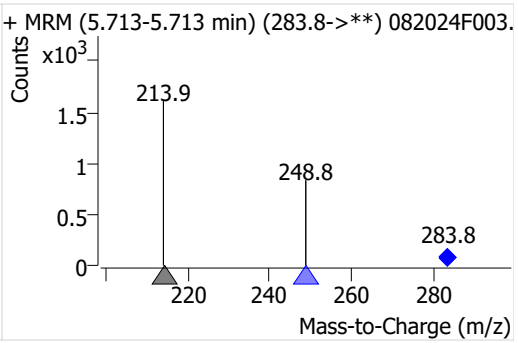




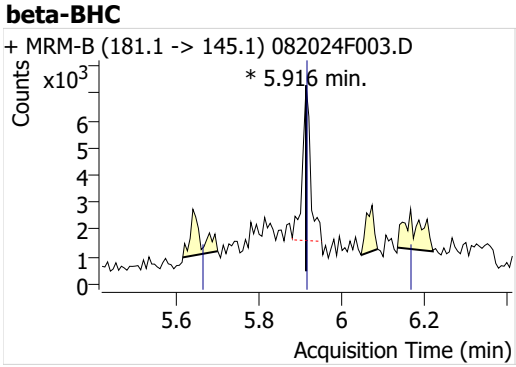
Hexachlorobenzene

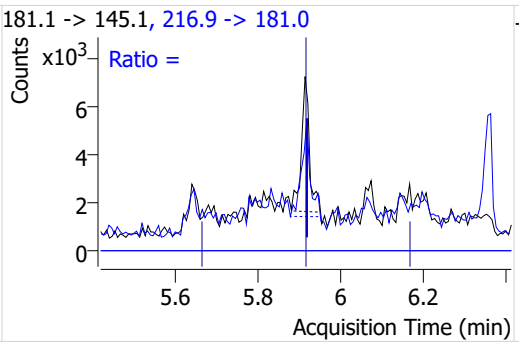


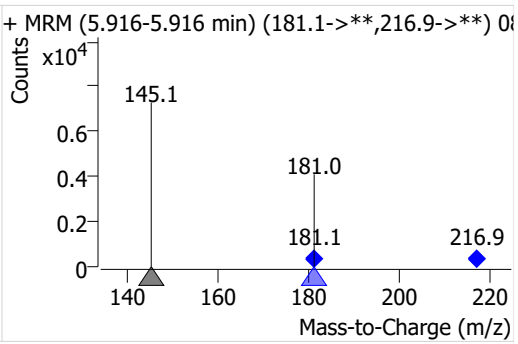




beta-BHC

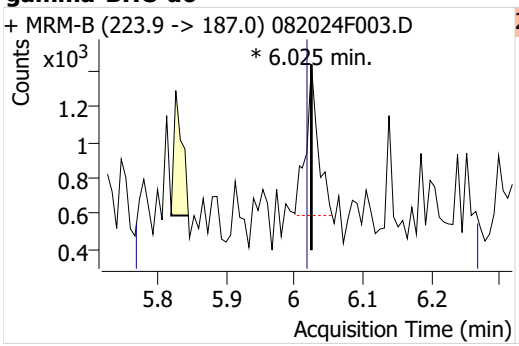


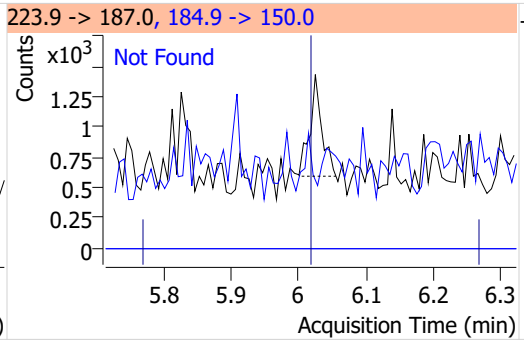


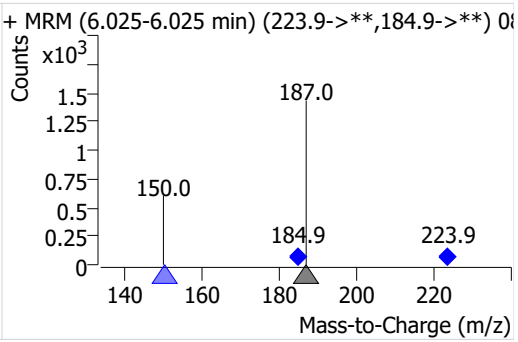


MassHunter Quantitative Analysis Sample Report

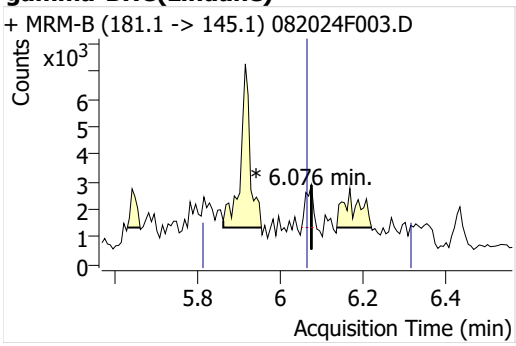
gamma-BHC-d6

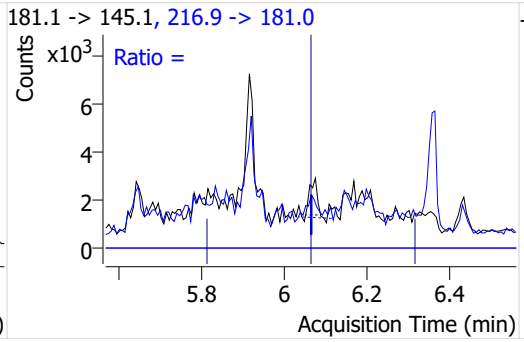


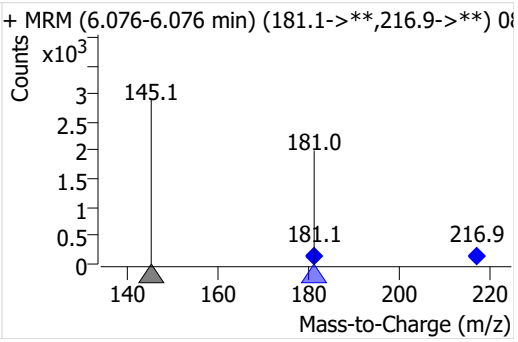




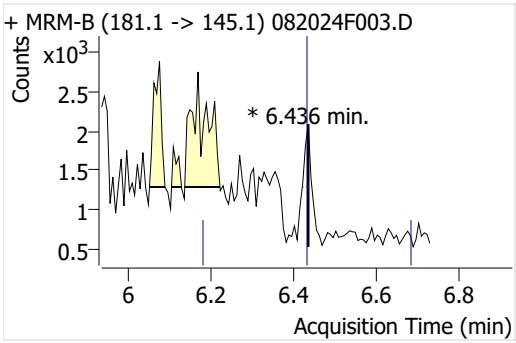
gamma-BHC(Lindane)

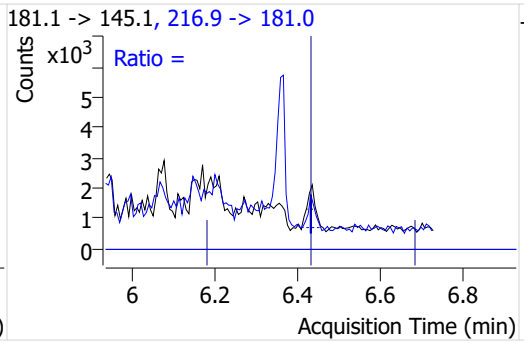


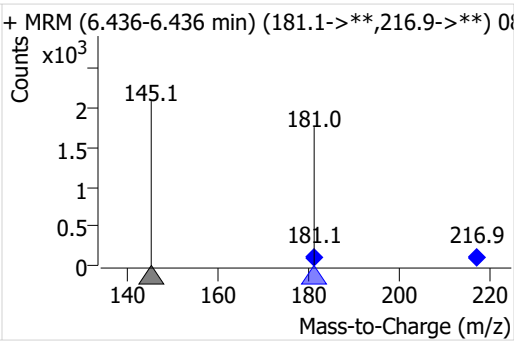




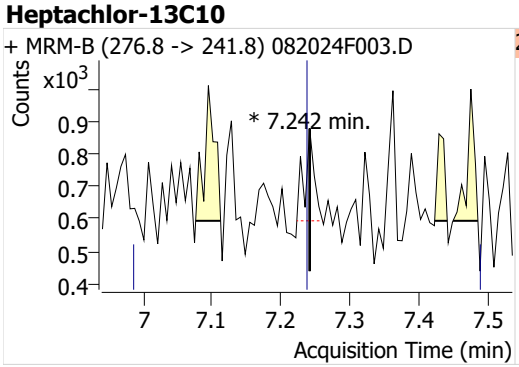
delta-BHC

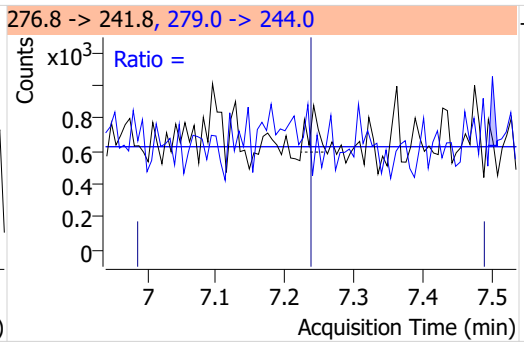


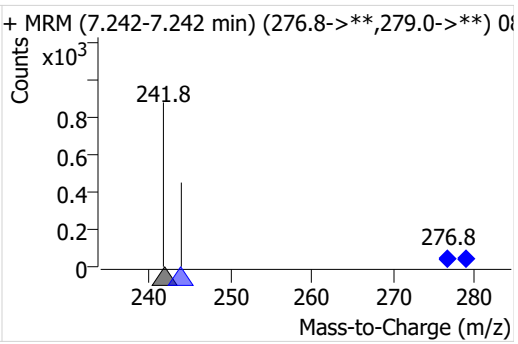




Heptachlor-13C10

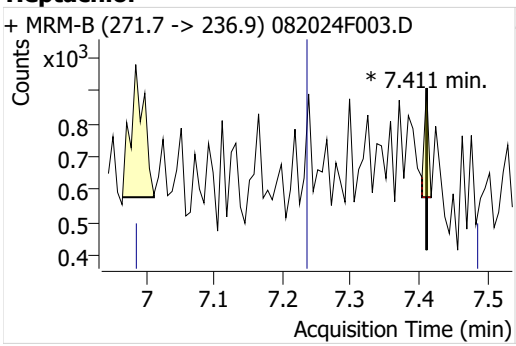


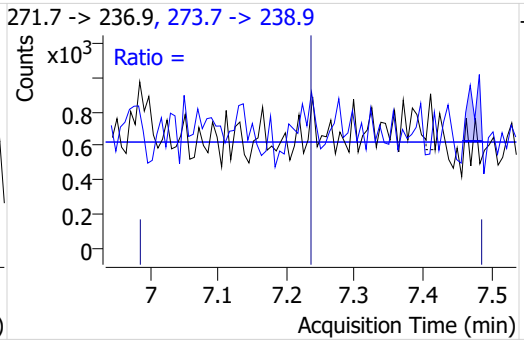


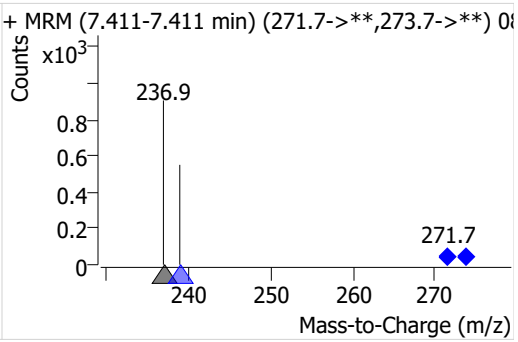


MassHunter Quantitative Analysis Sample Report

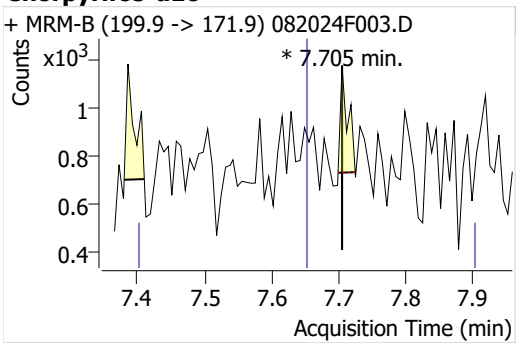
Heptachlor

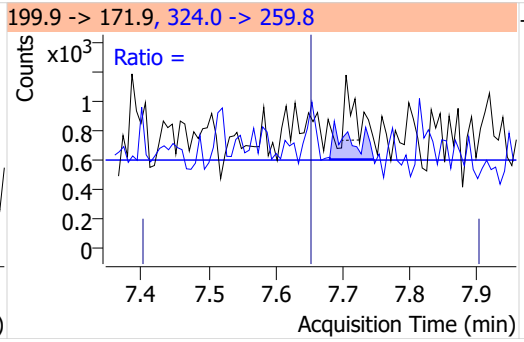


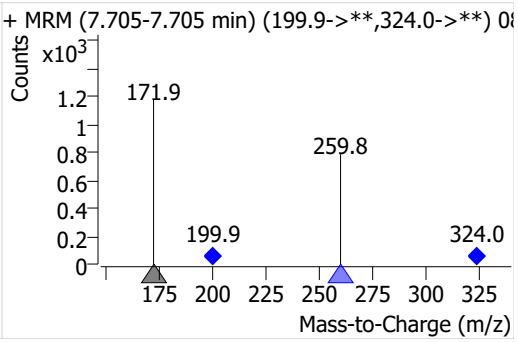




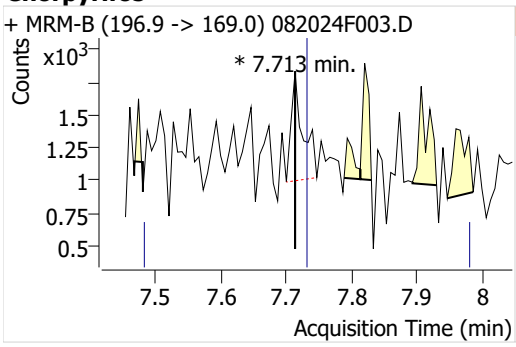
Chorpyrifos-d10

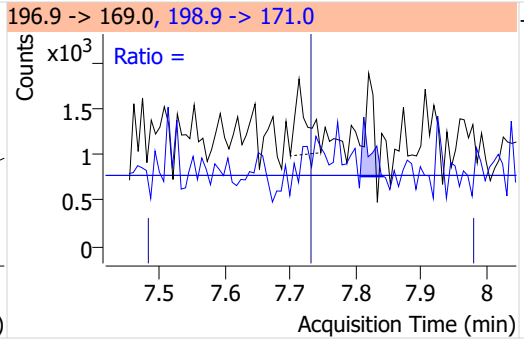


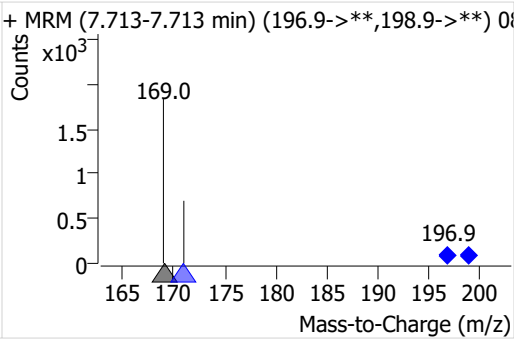




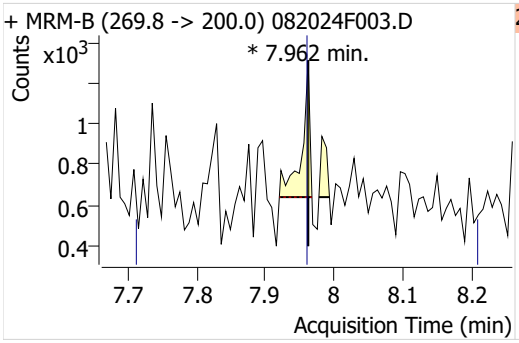
Chorpyrifos

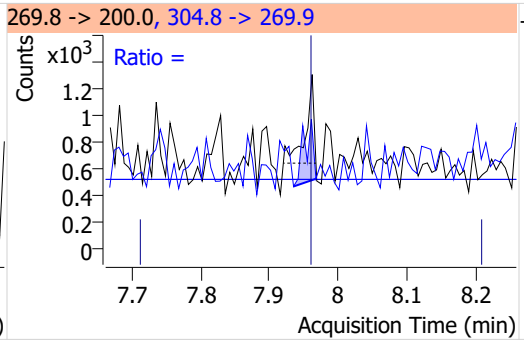


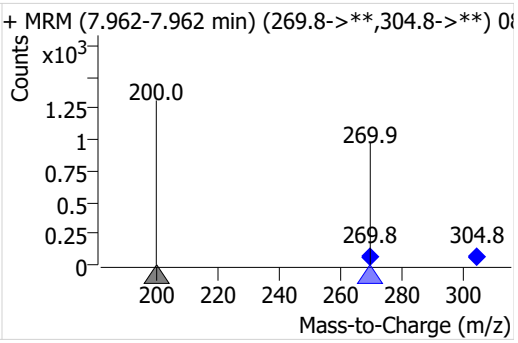




Aldrin-13C







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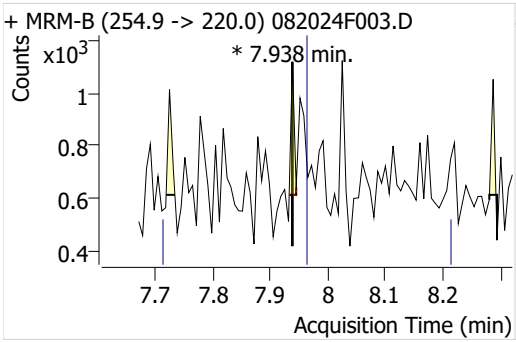
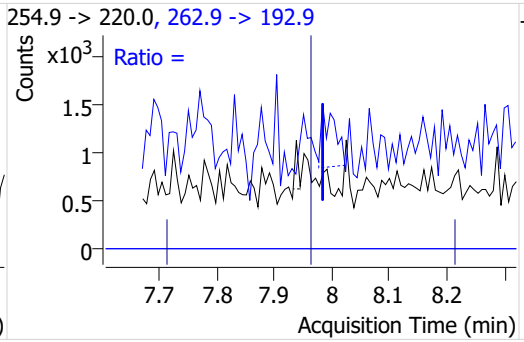
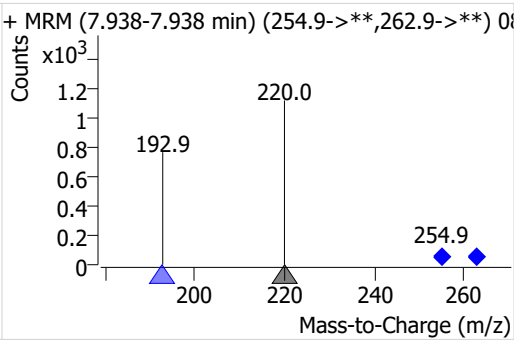
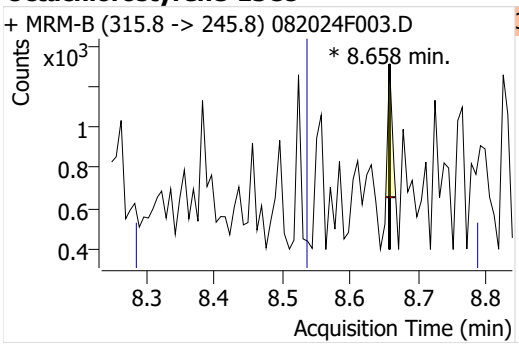
Aldrin

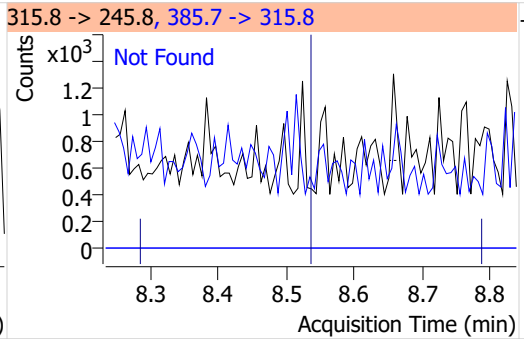


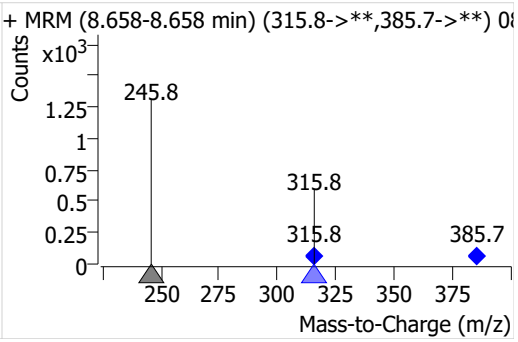




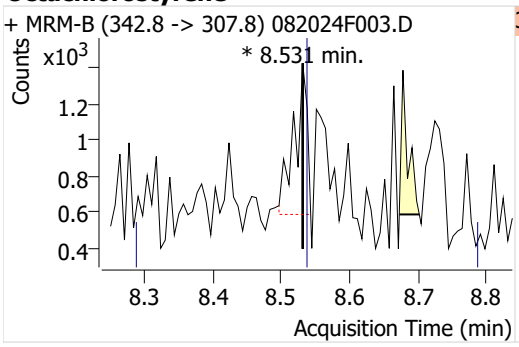
Octachlorostyrene-13C8

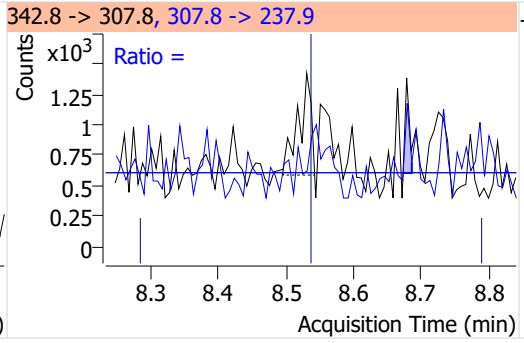


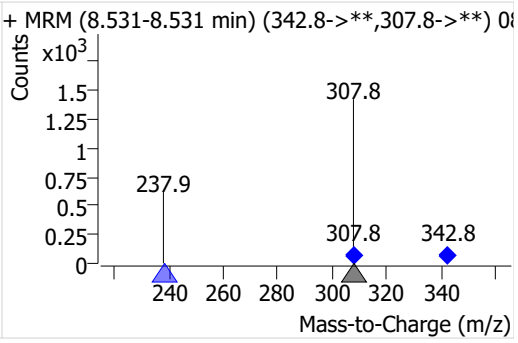




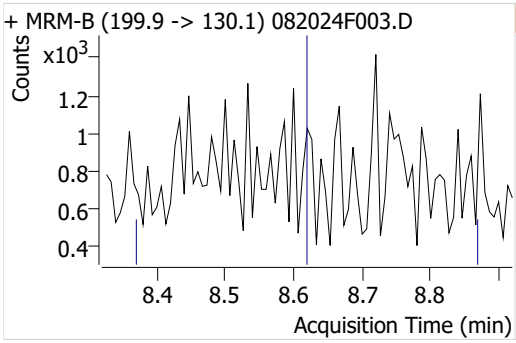
Octachlorostyrene

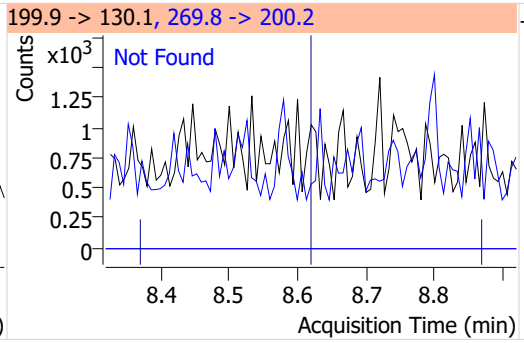


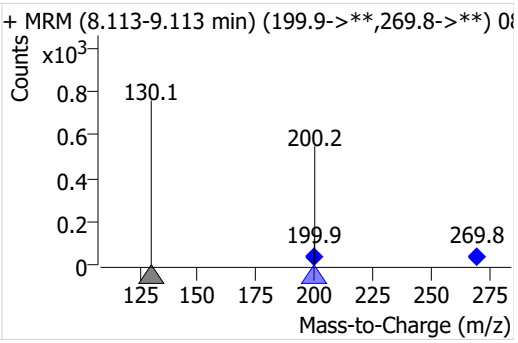




Isodrin-13C12







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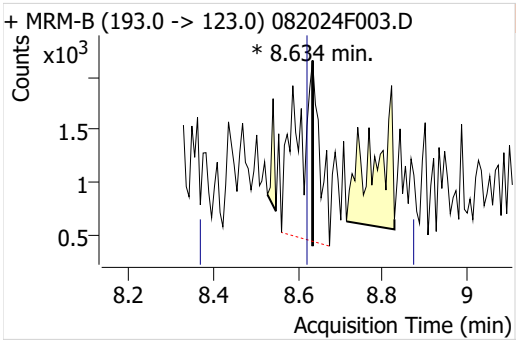
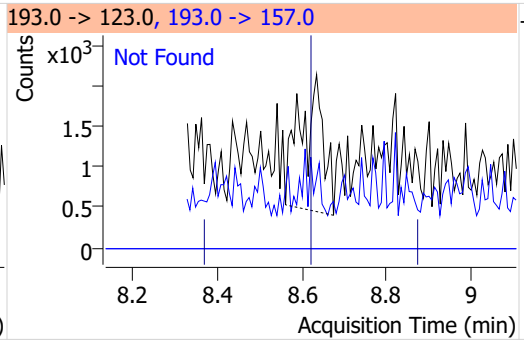
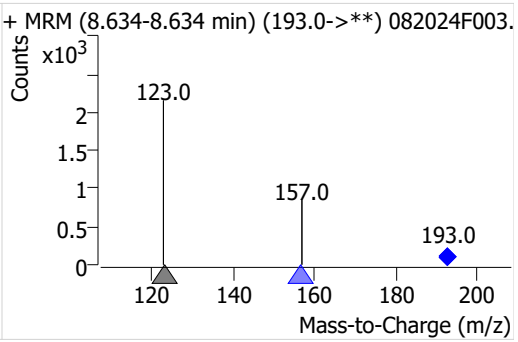
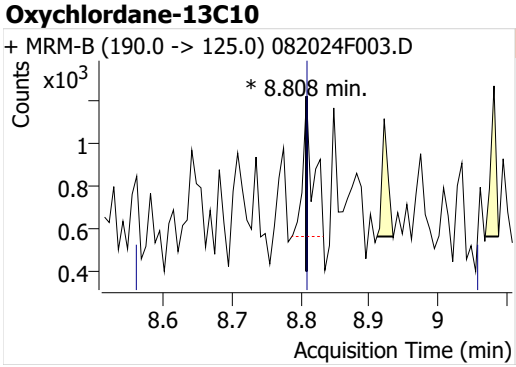
Isodrin

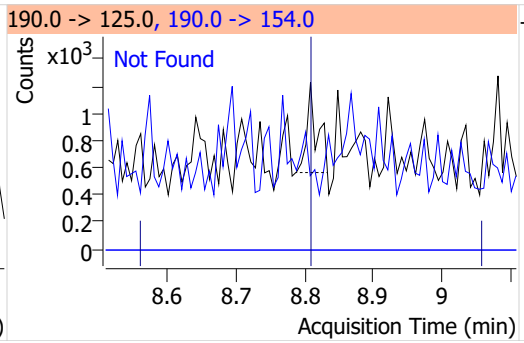


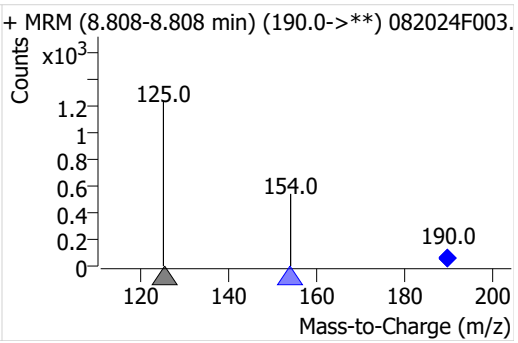




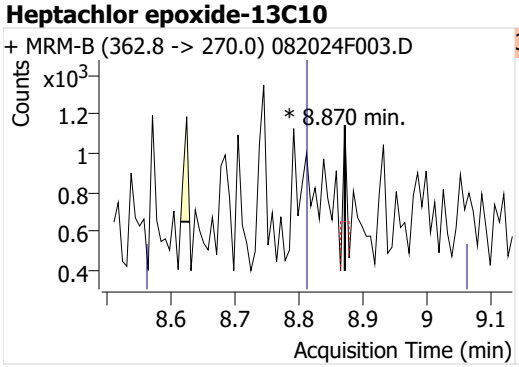
Oxychlordane-13C10

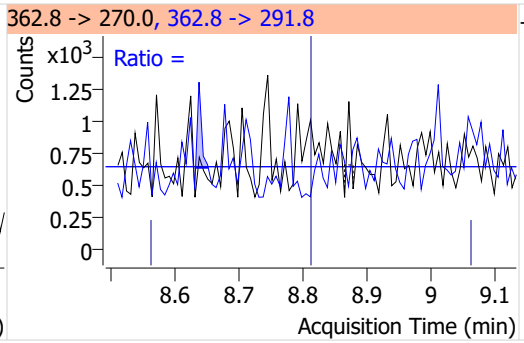


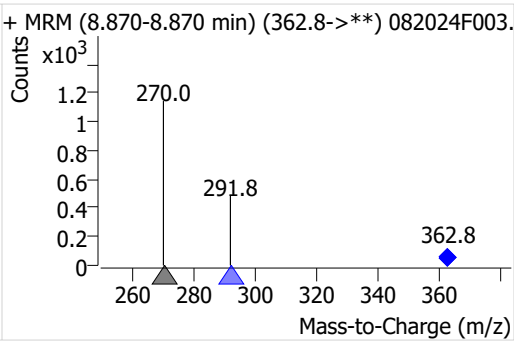




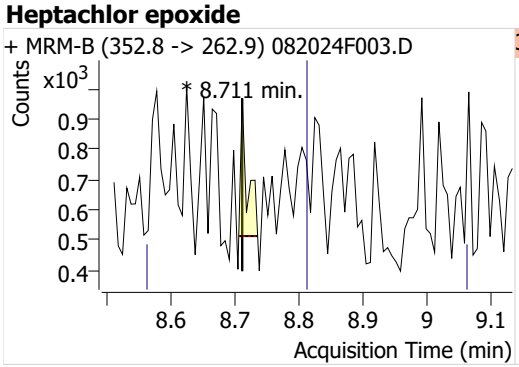
Heptachlor epoxide-13C10

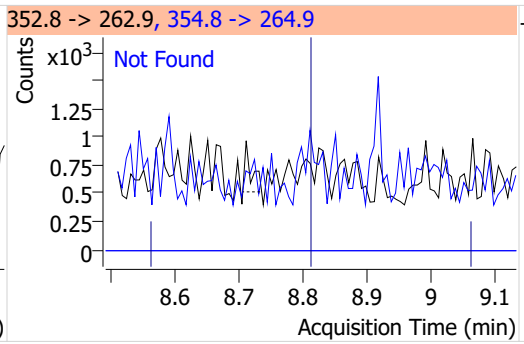


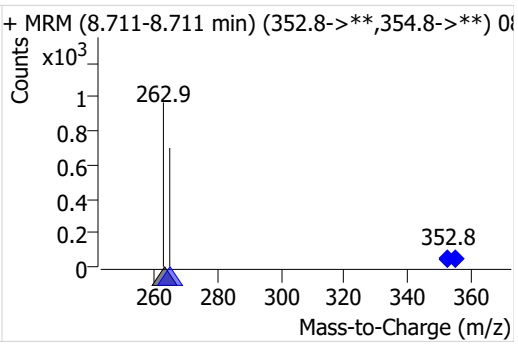




Heptachlor epoxide







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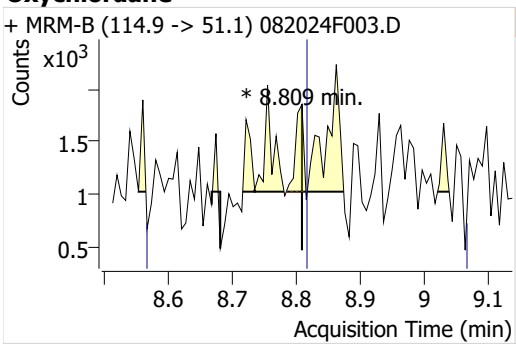
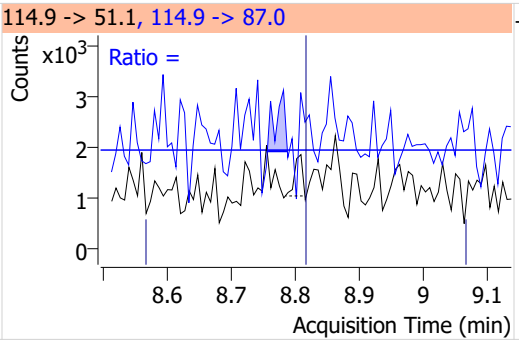
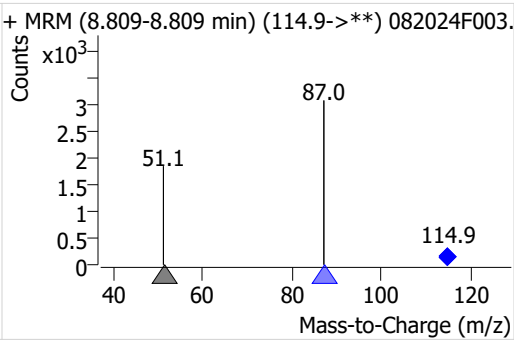
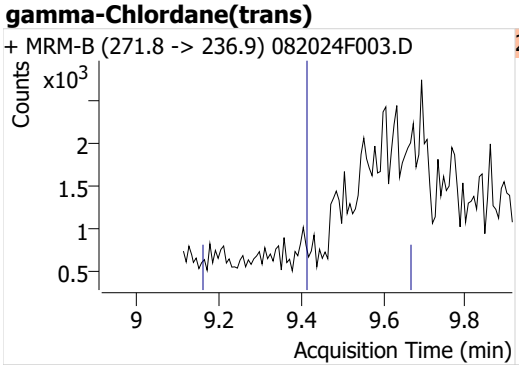
Oxychlordane

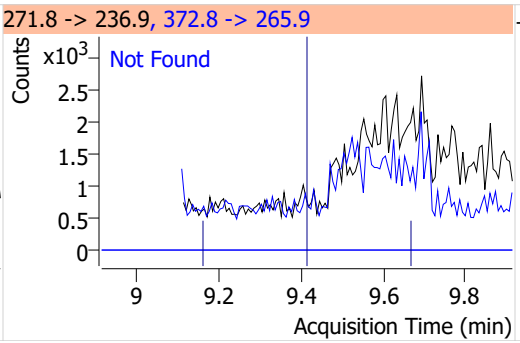


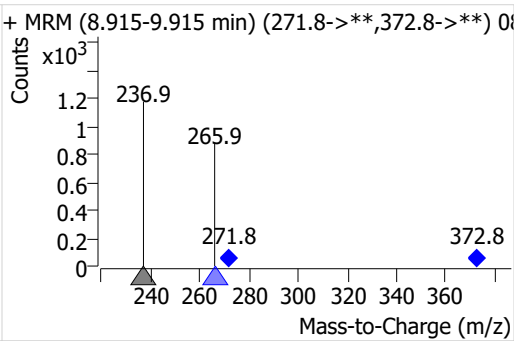




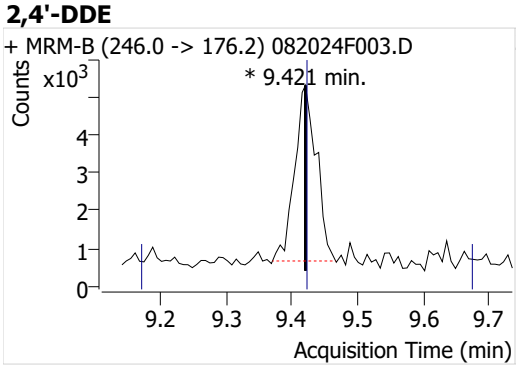
gamma-Chlordane(trans)

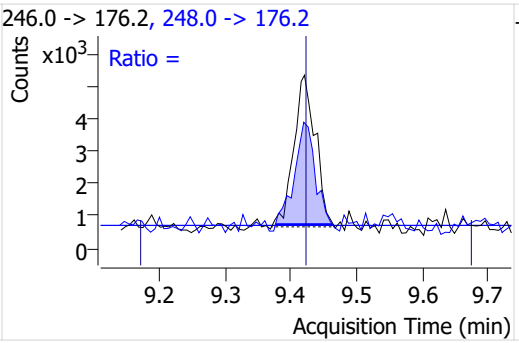


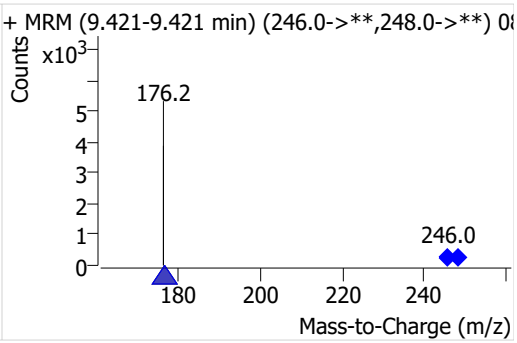




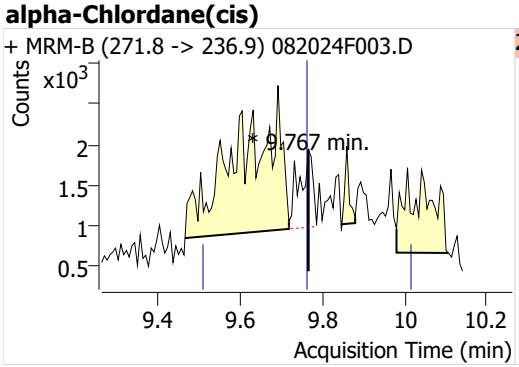
2,4'-DDE

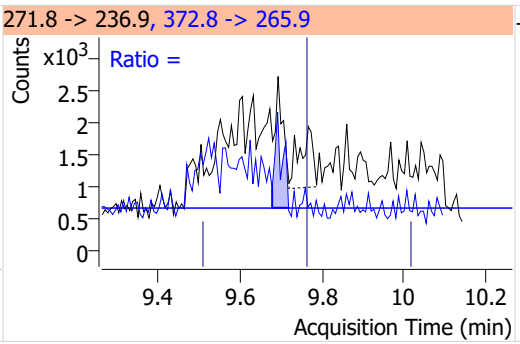


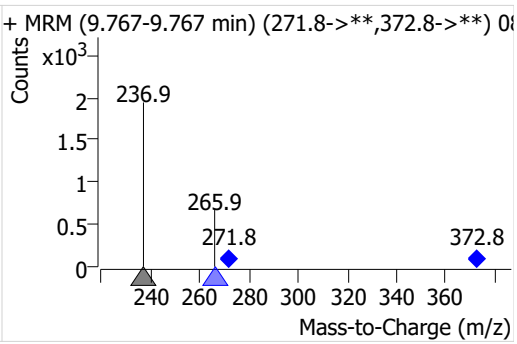




alpha-Chlordane(cis)







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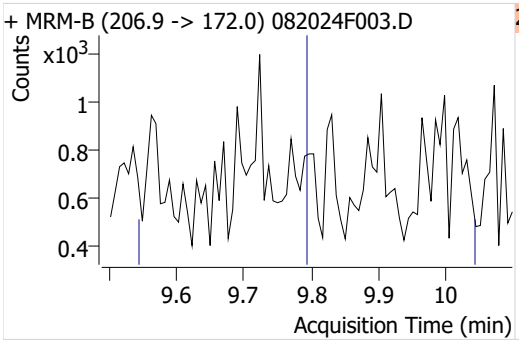
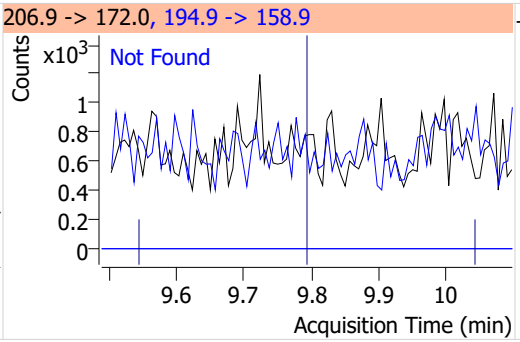
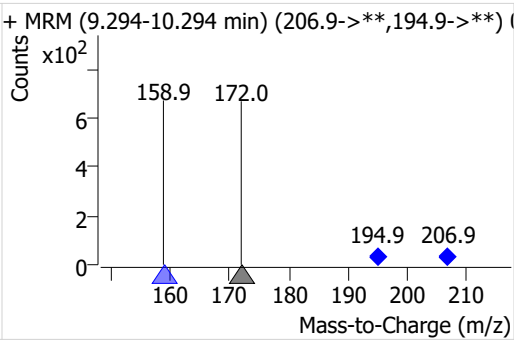
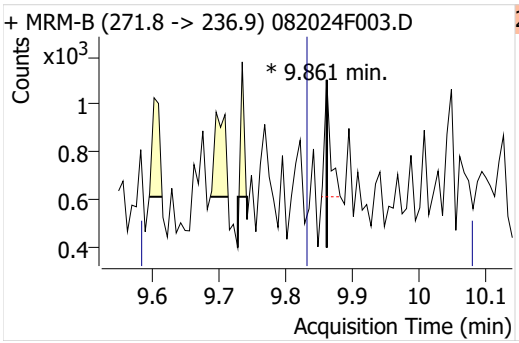
Endosulfan I

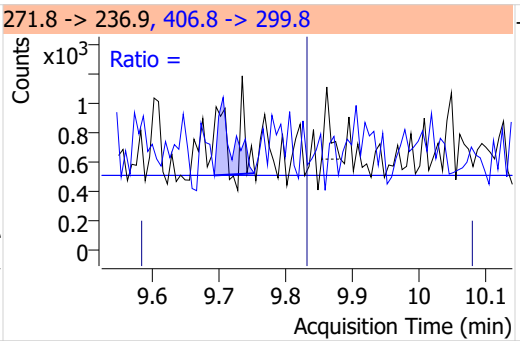


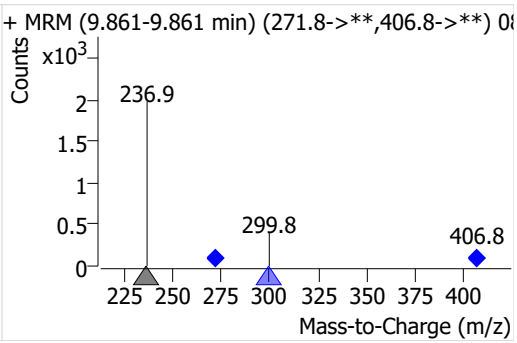




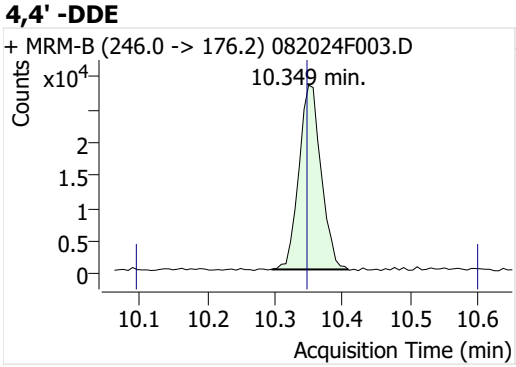
trans-Nanochlor

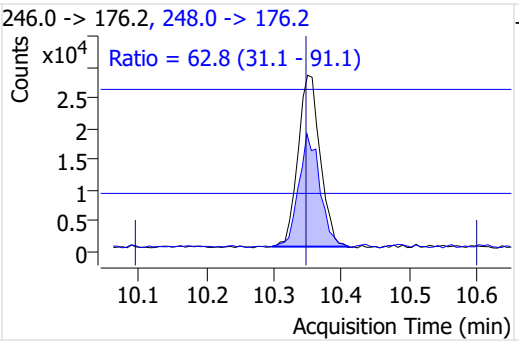


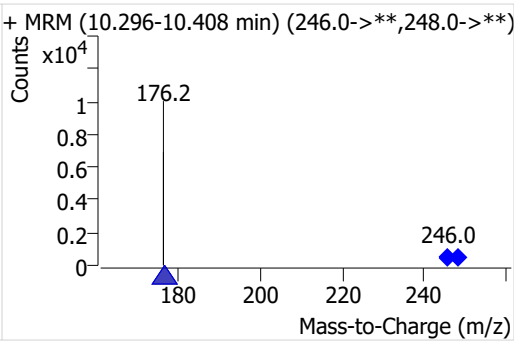




4,4' -DDE







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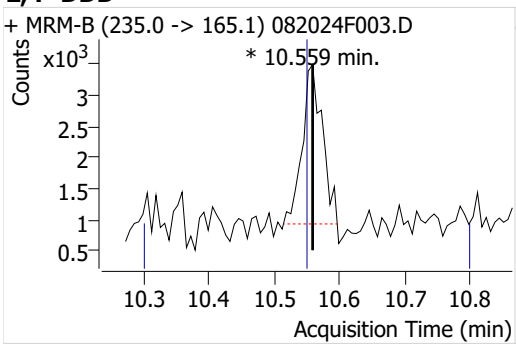

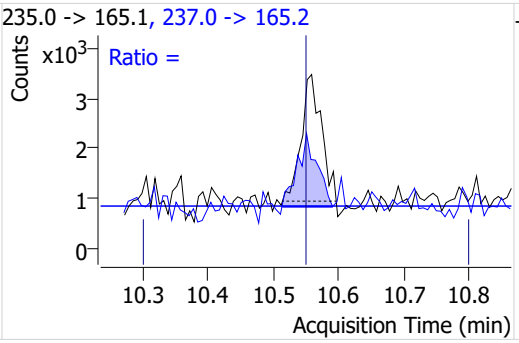

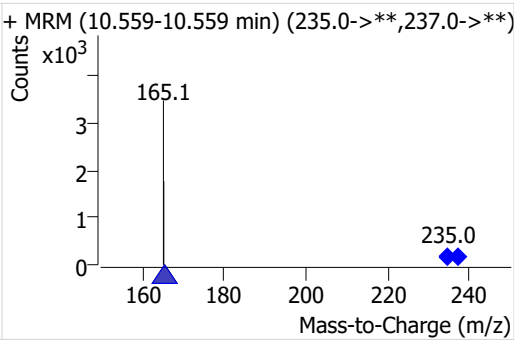

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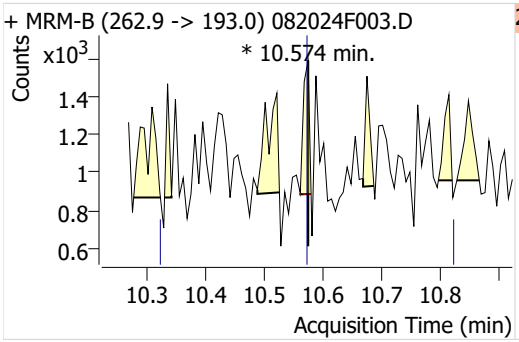
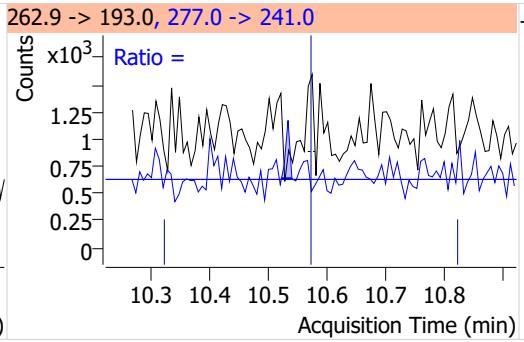
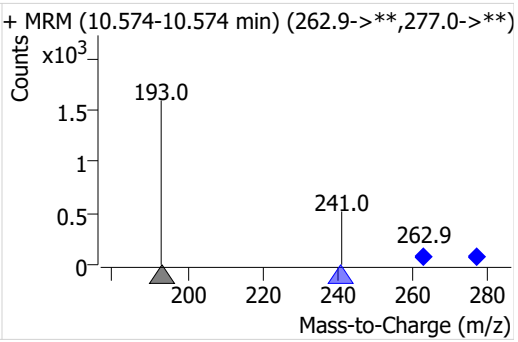
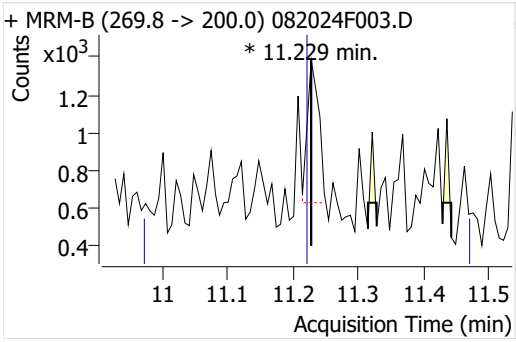
Dieldrin

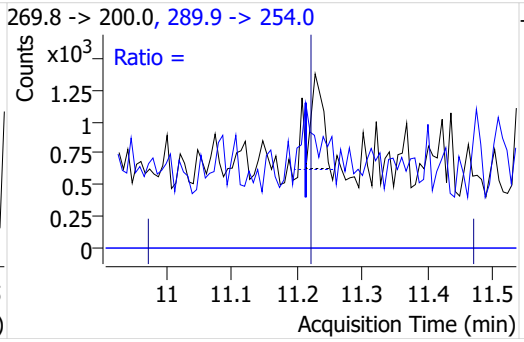


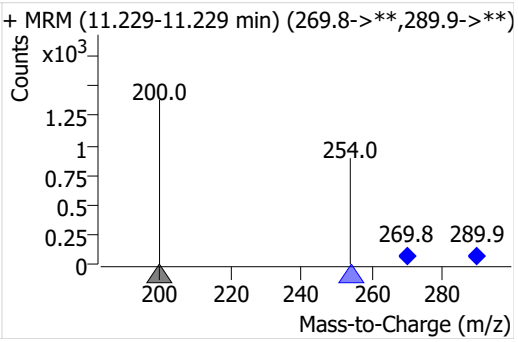




Endrin-13C12







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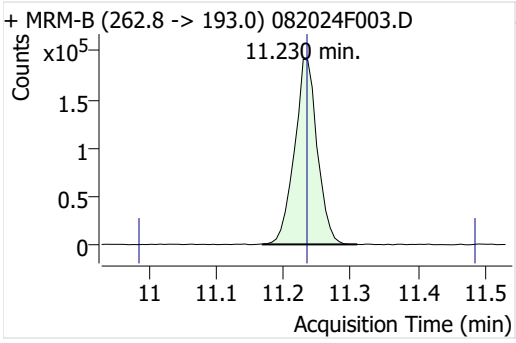
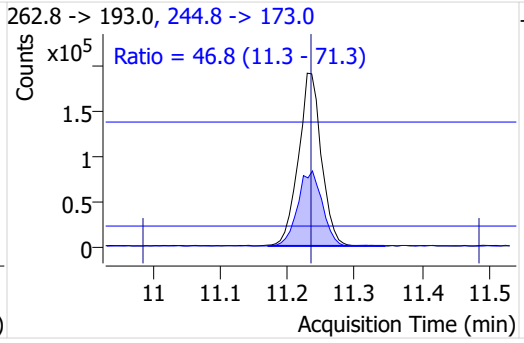
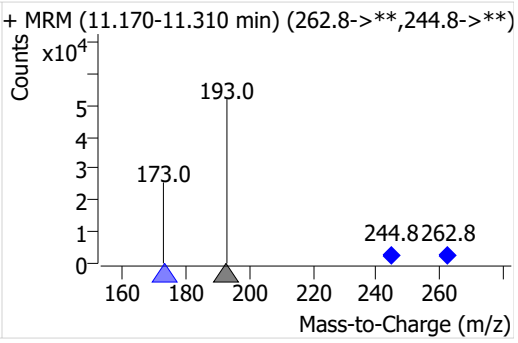
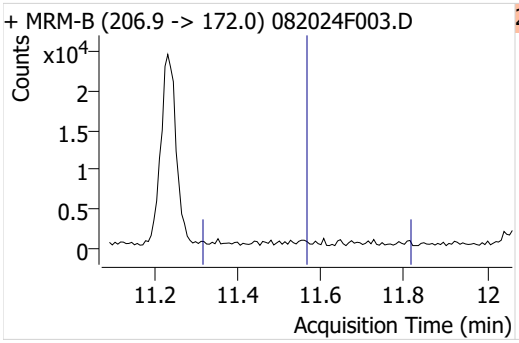
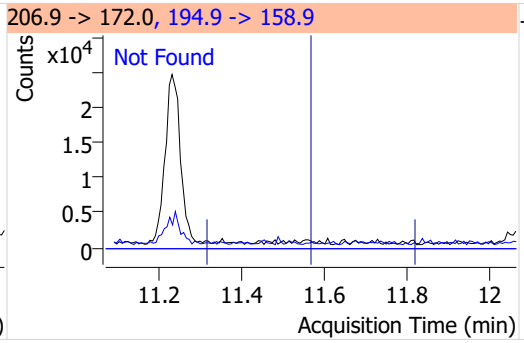


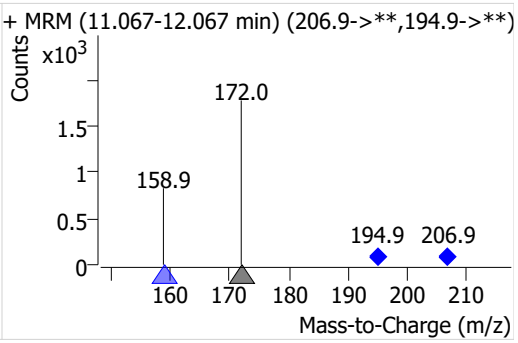




Endosulfan II

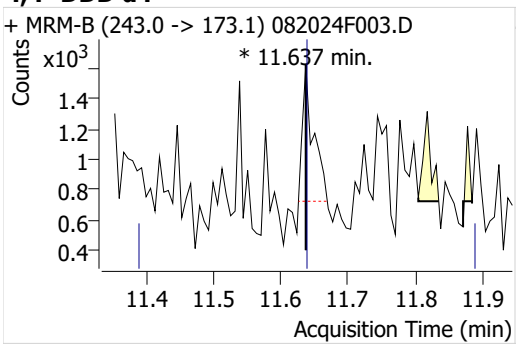


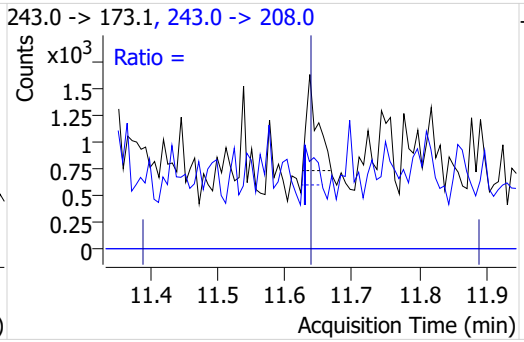


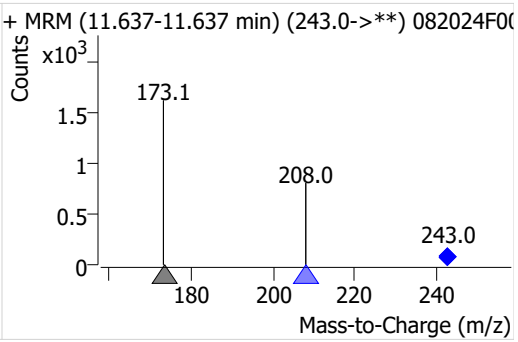


MassHunter Quantitative Analysis Sample Report

4,4'-DDD d4







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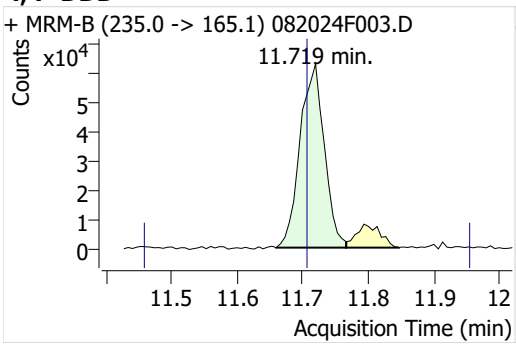
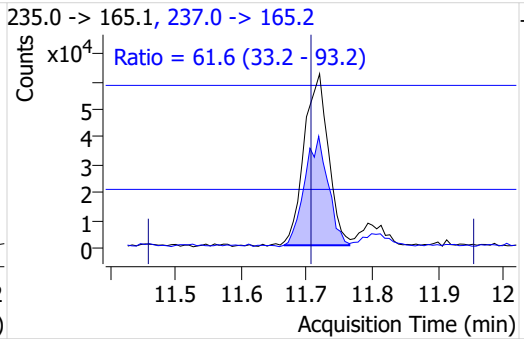
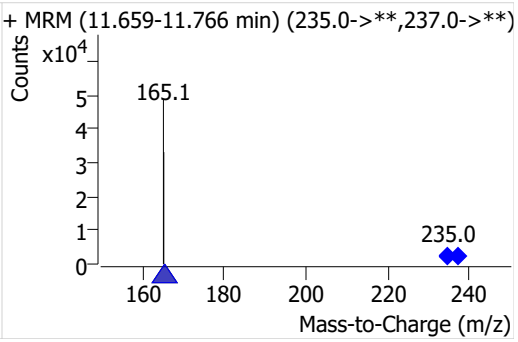
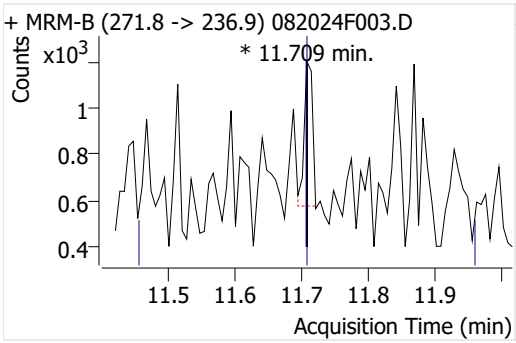
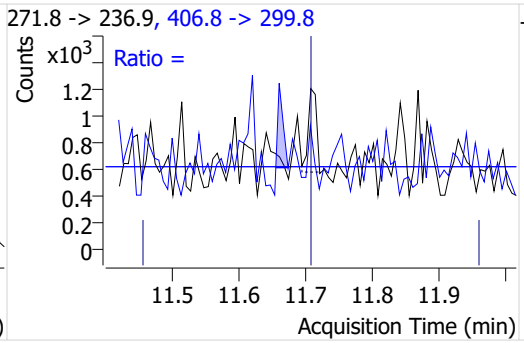


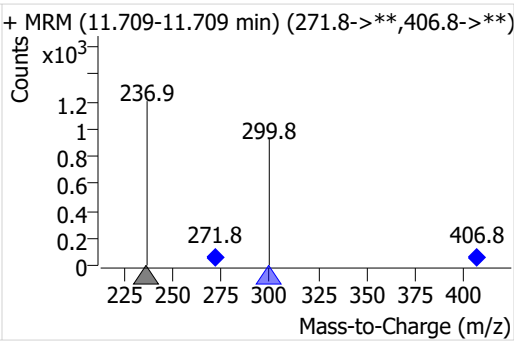




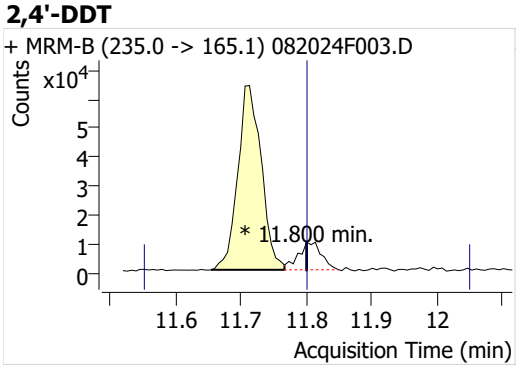
cis-Nonachlor

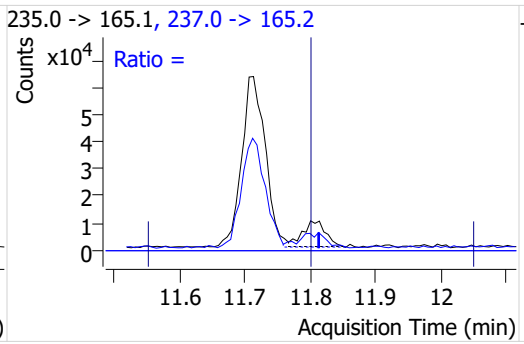


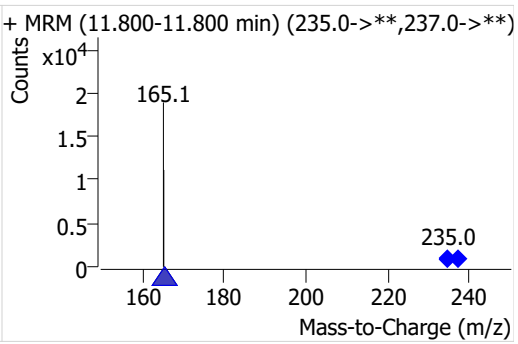




2,4'-DDT







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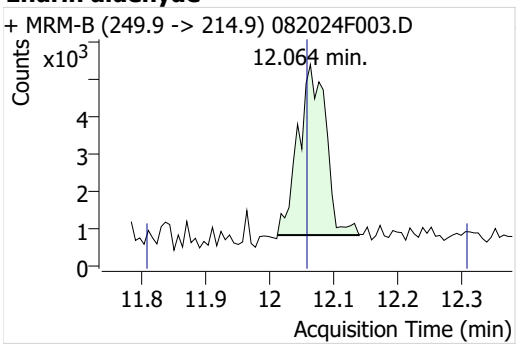
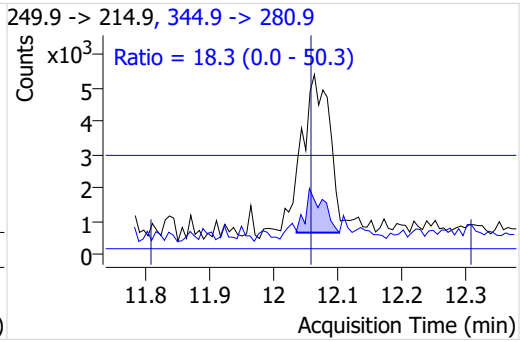
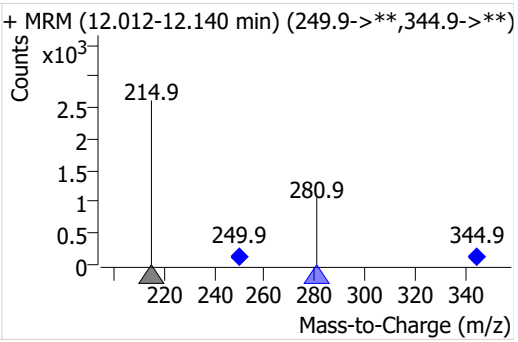
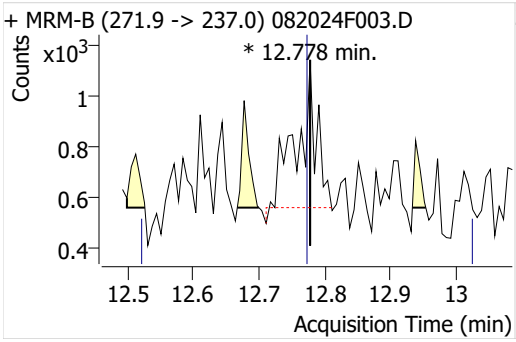
Endrin aldehyde

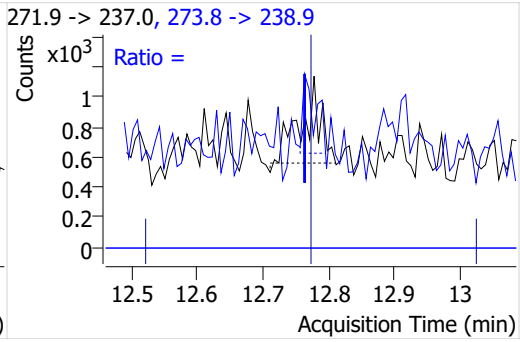


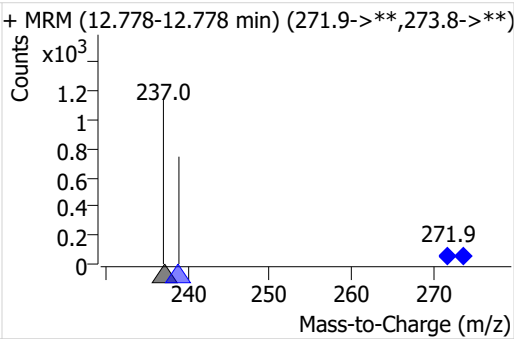




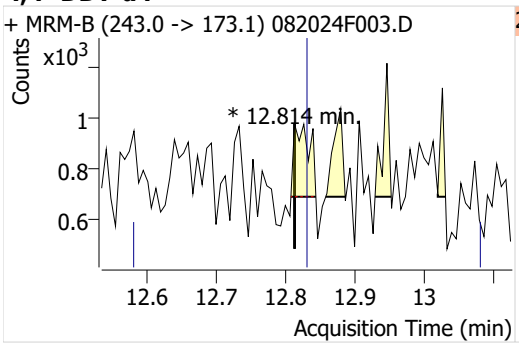
Endosulfan sulfate

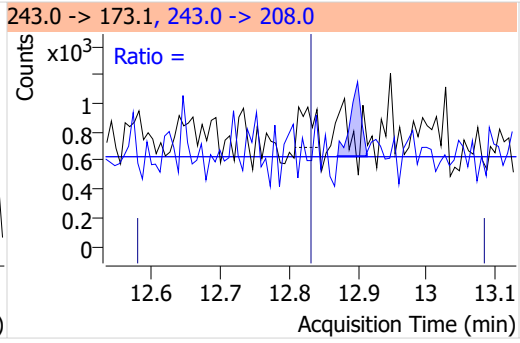


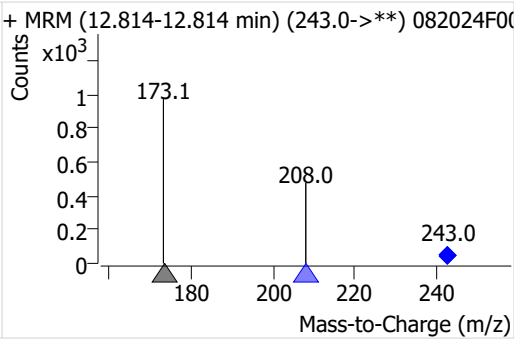




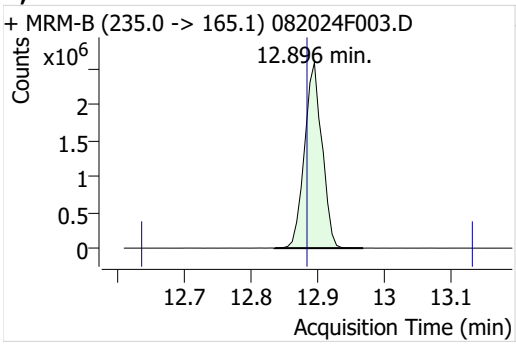
4,4'-DDT-d4

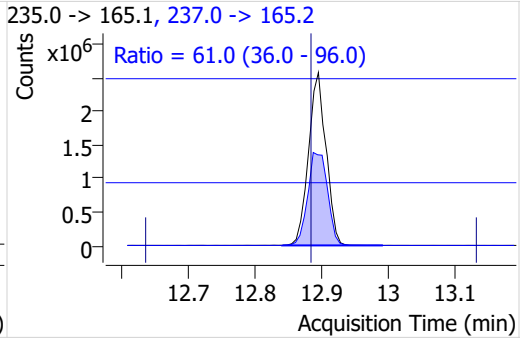


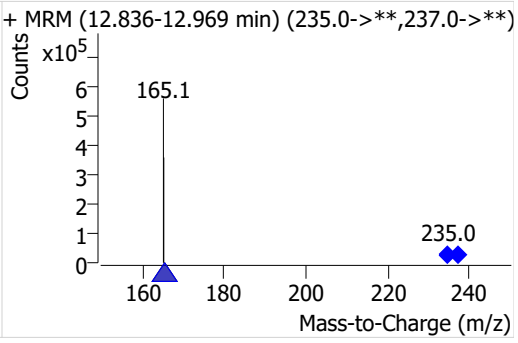




4,4'-DDT







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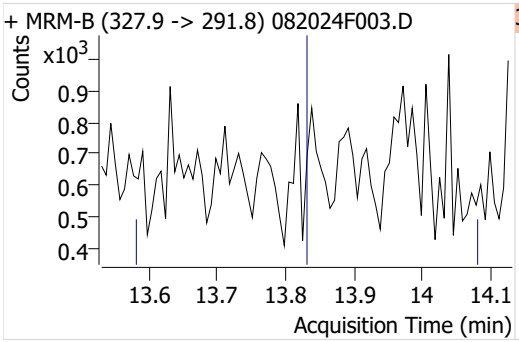
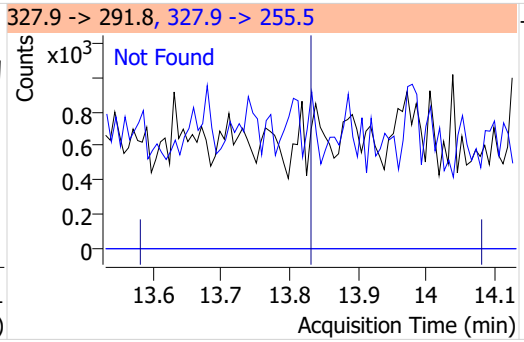
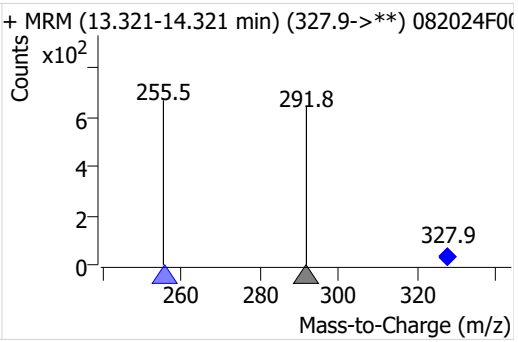
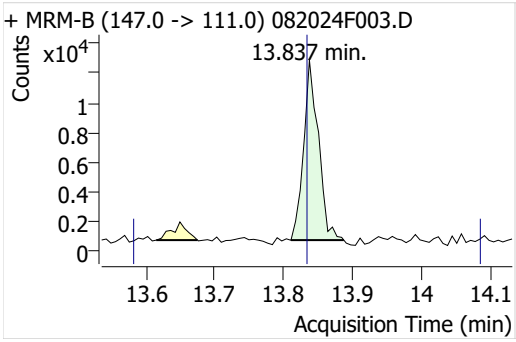
Endrin ketone-13C12

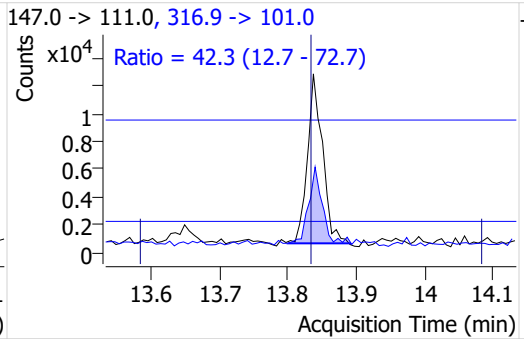


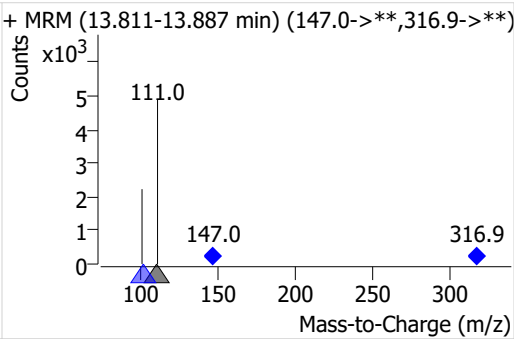




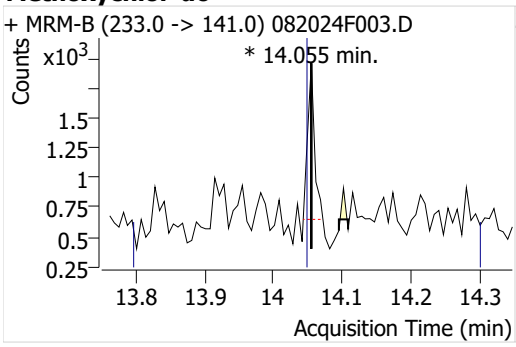
Endrin ketone

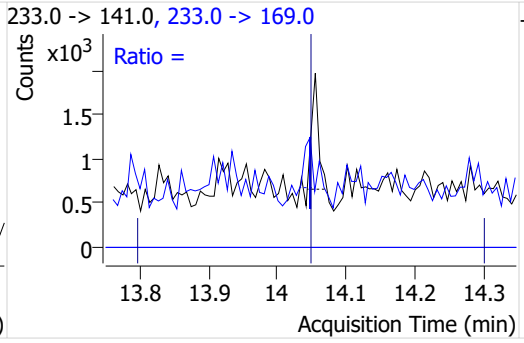


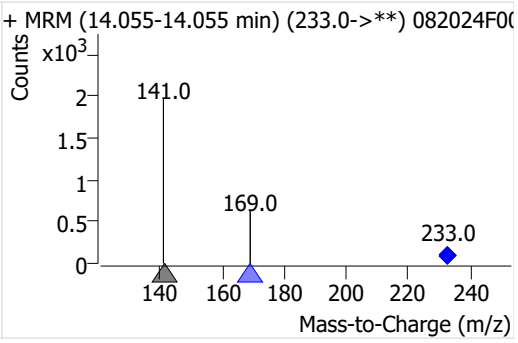




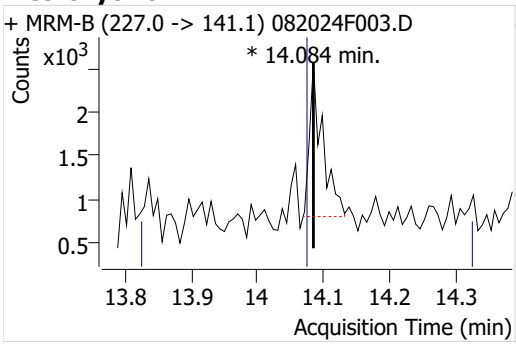
Methoxychlor-d6

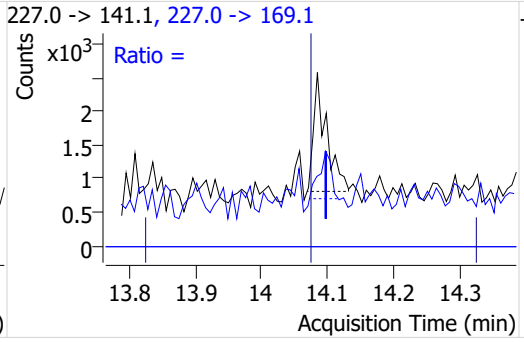


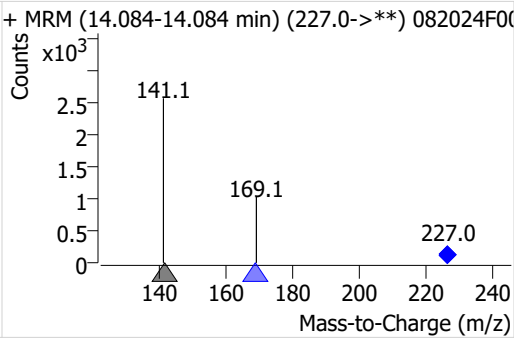




Methoxychlor







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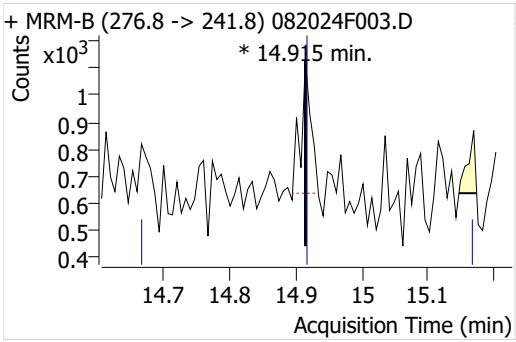
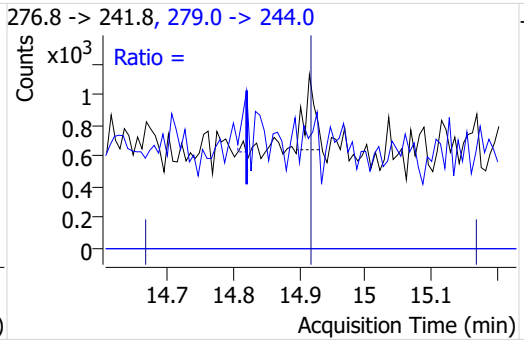
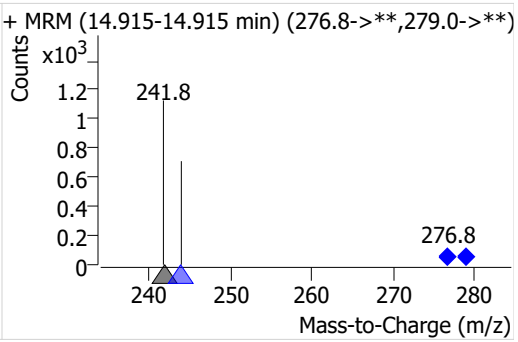
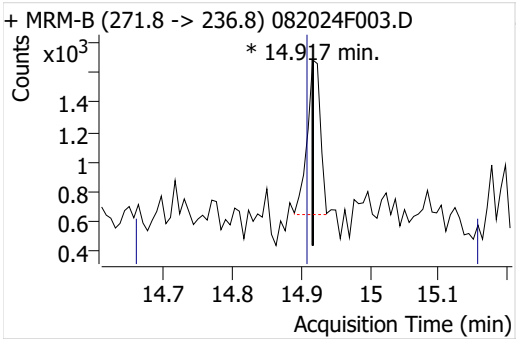
Mirex-13C10

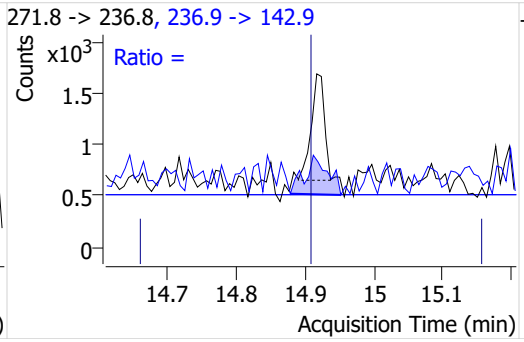


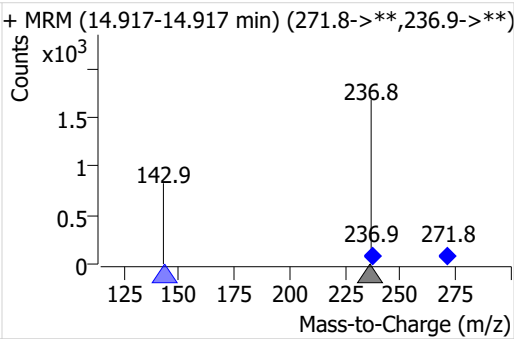




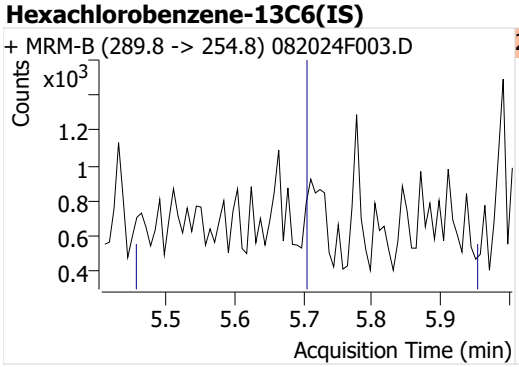
Mirex

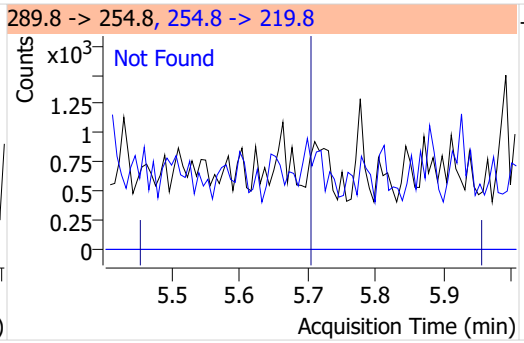


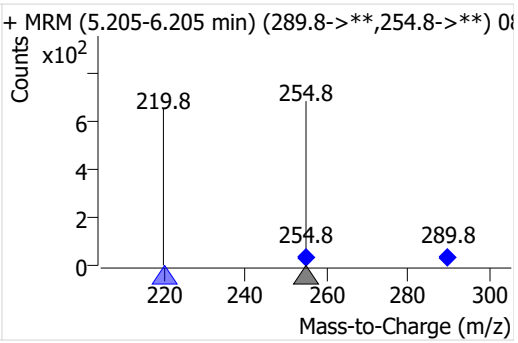




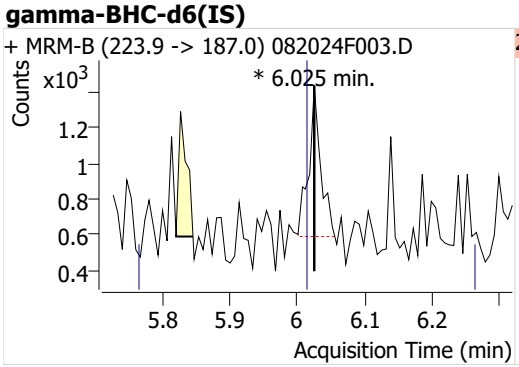
Hexachlorobenzene-13C6(IS)

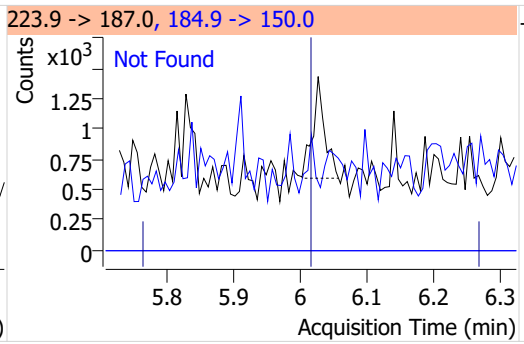


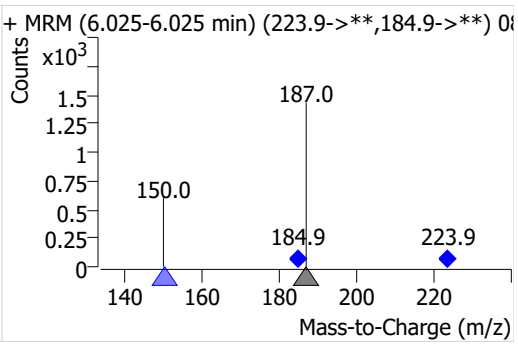




gamma-BHC-d6(IS)

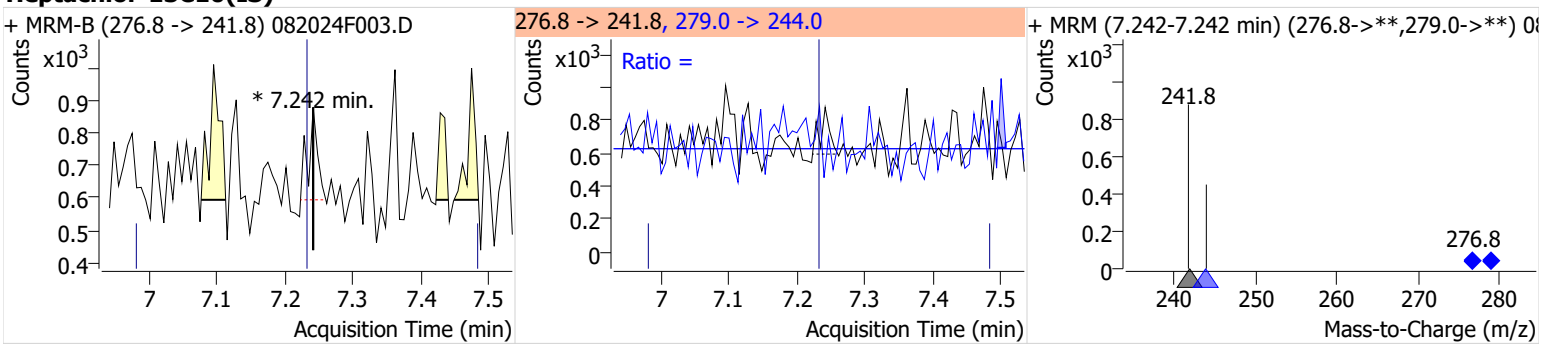




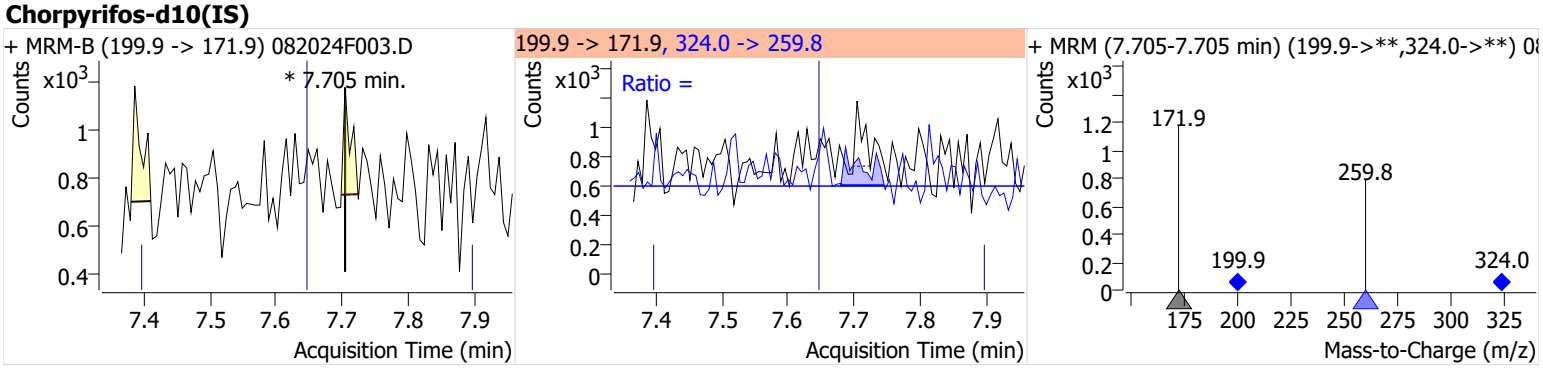


MassHunter Quantitative Analysis Sample Report

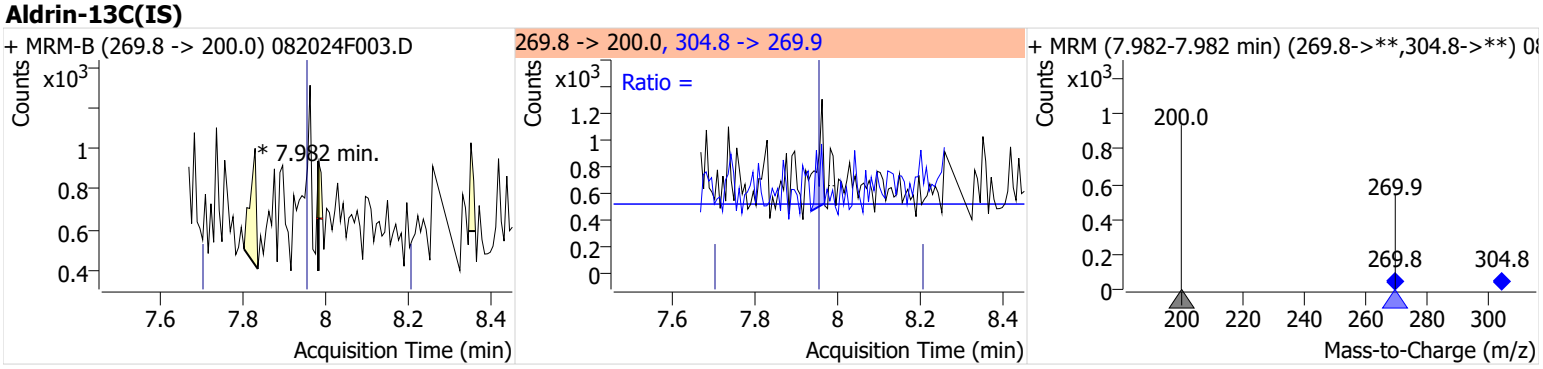
Heptachlor-13C10(IS)



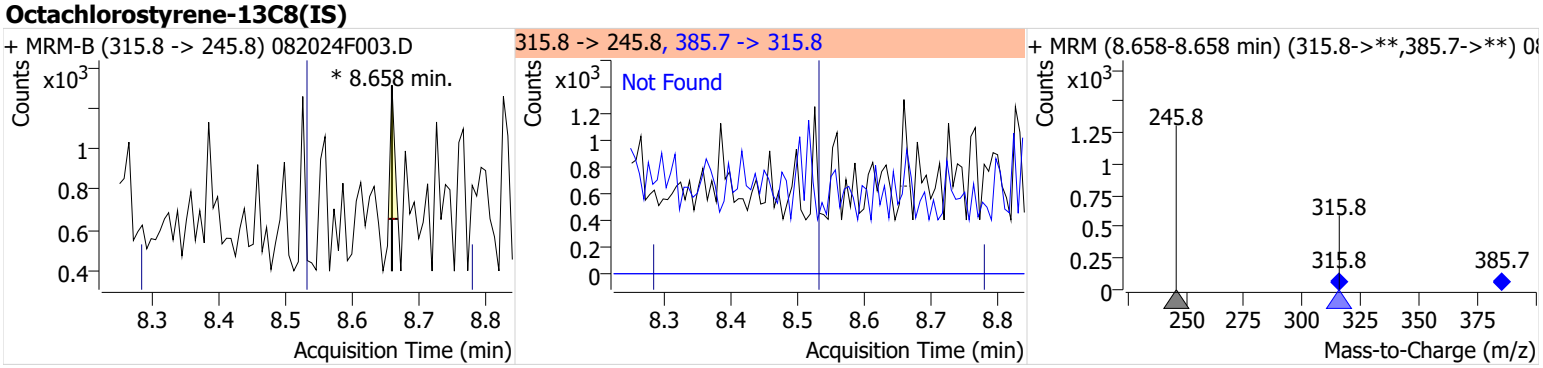
Chorpyrifos-d10(IS)



Aldrin-13C(IS)



Octachlorostyrene-13C8(IS)



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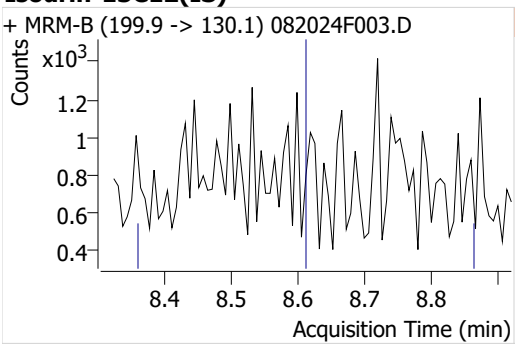
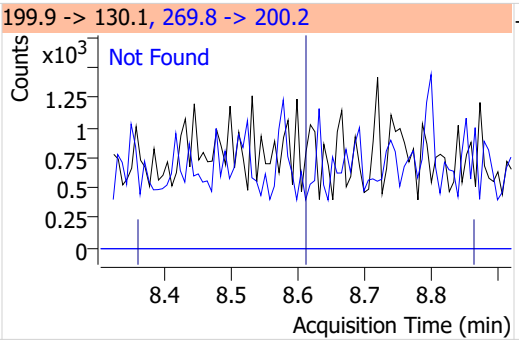
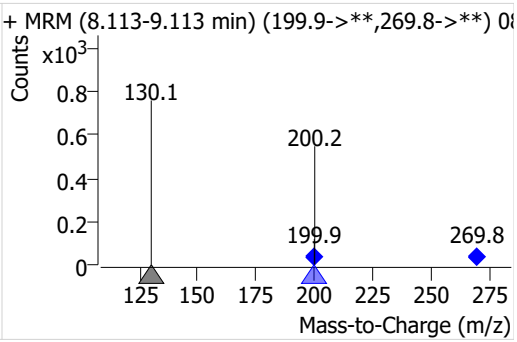
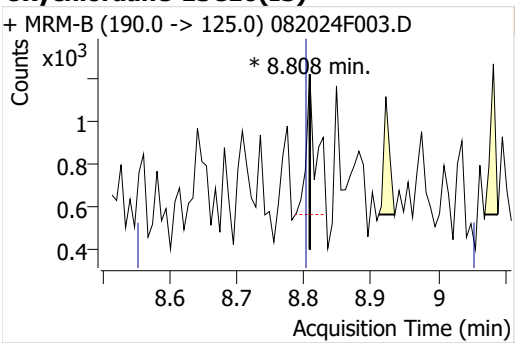
Isodrin-13C12(IS)

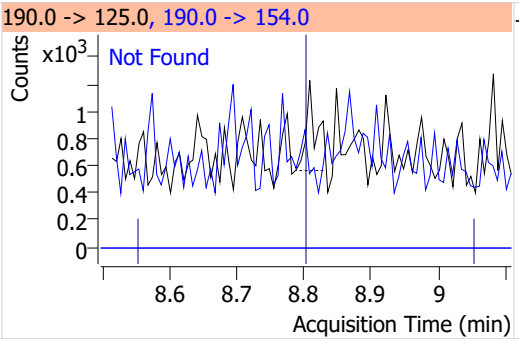


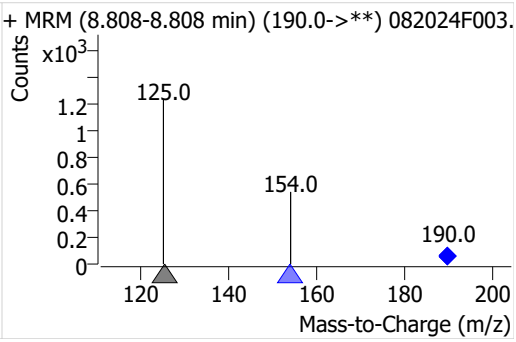




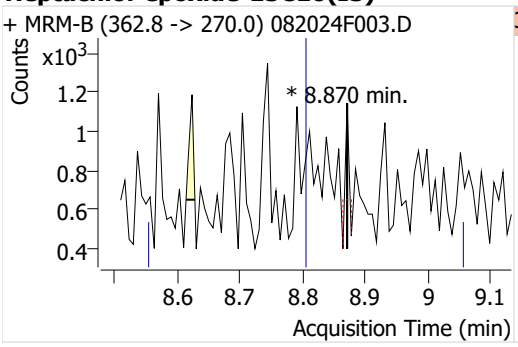
Oxychlordane-13C10(IS)

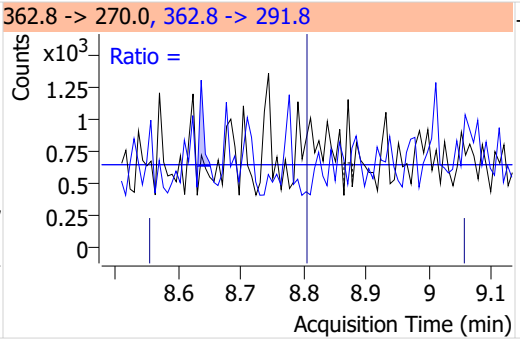


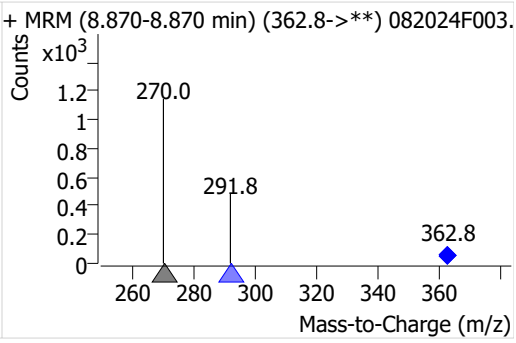




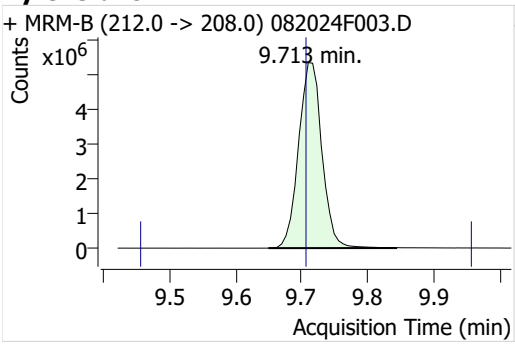
Heptachlor epoxide-13C10(IS)

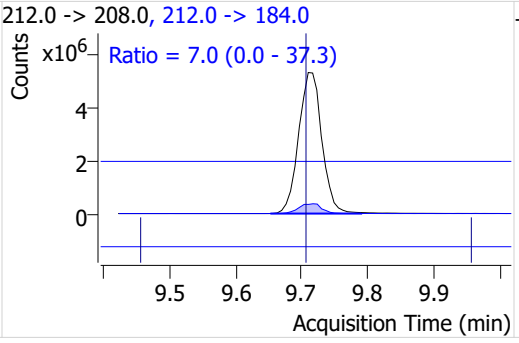


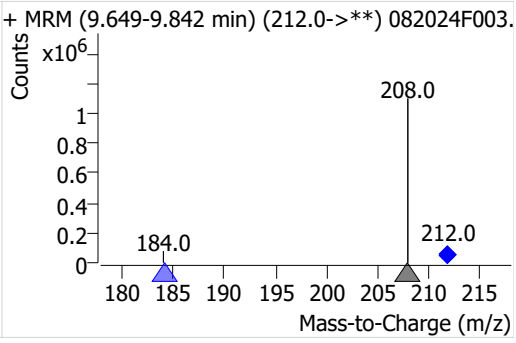




Pyrene-d10

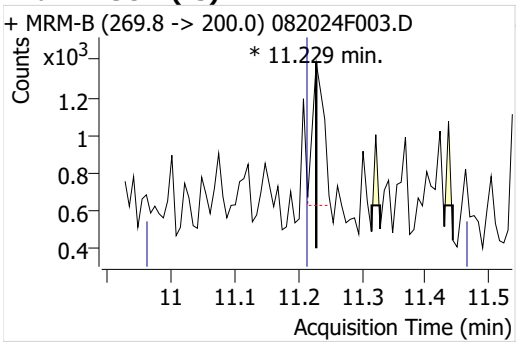


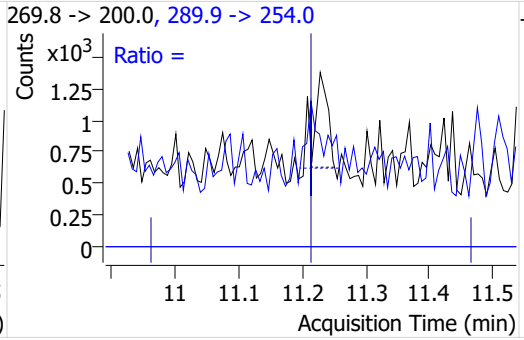


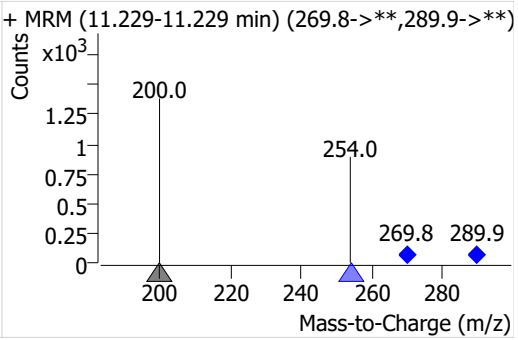


MassHunter Quantitative Analysis Sample Report

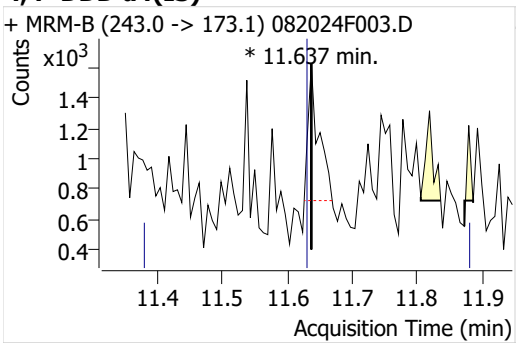
Endrin-13C12(IS)

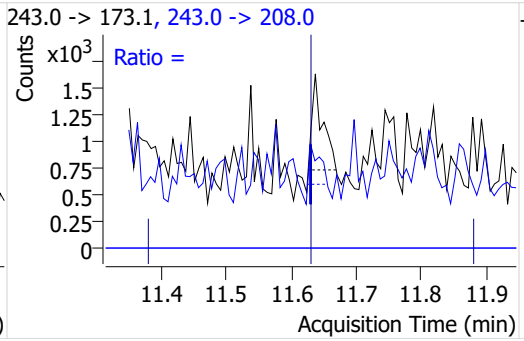


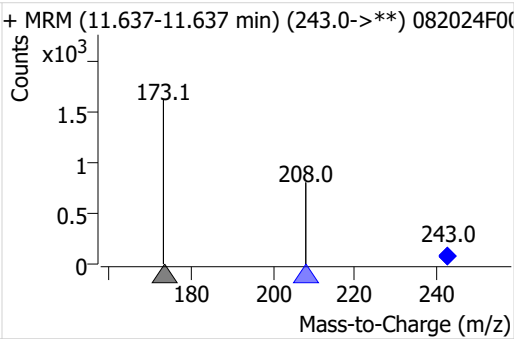




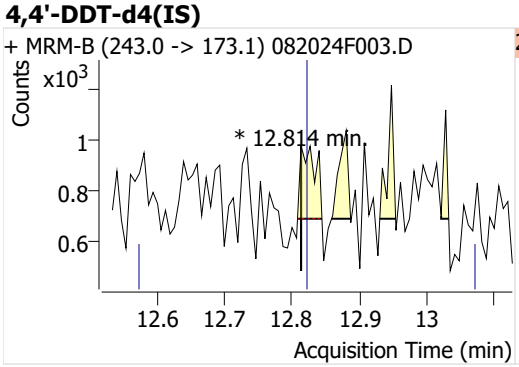
4,4'-DDD d4(IS)

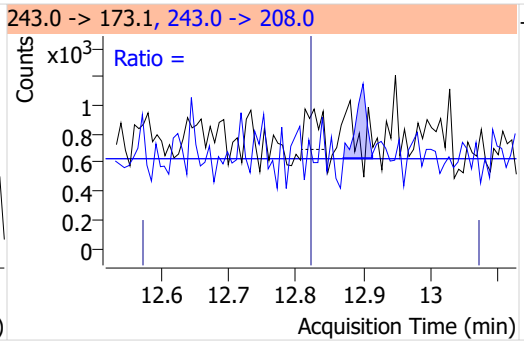


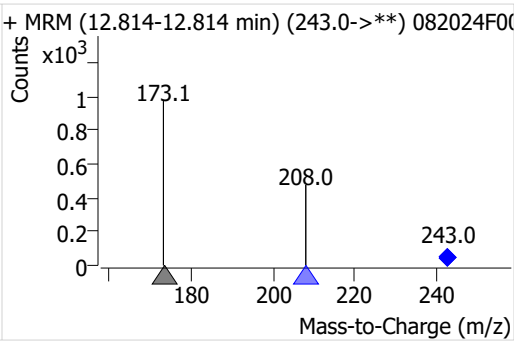




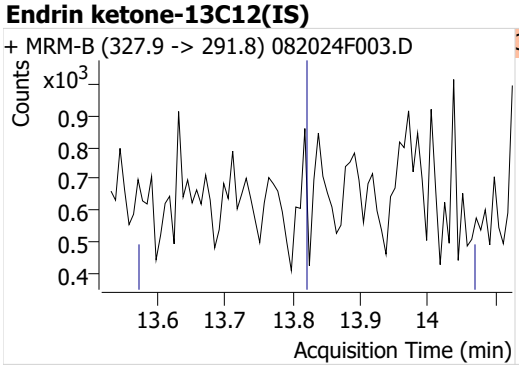
4,4'-DDT-d4(IS)

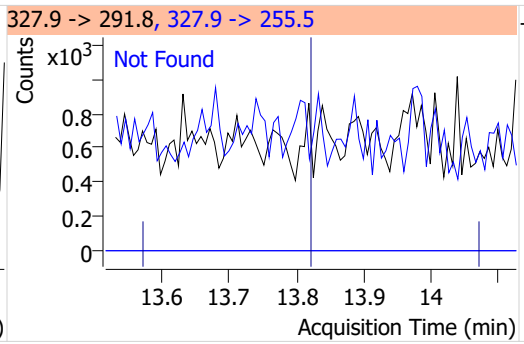


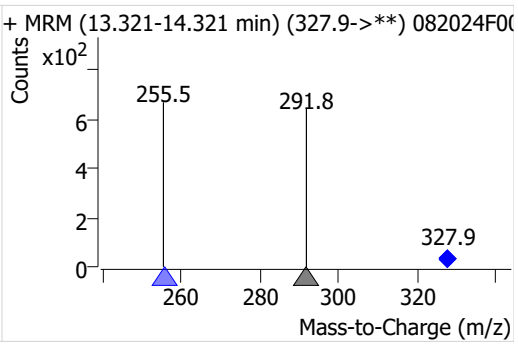




Endrin ketone-13C12(IS)

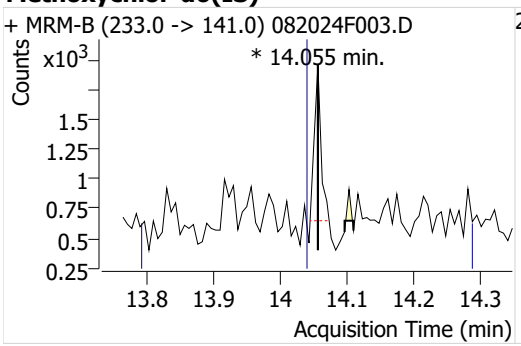


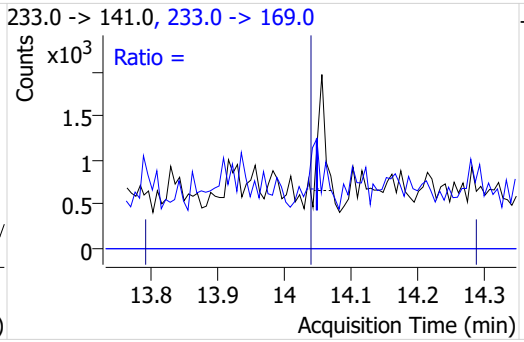


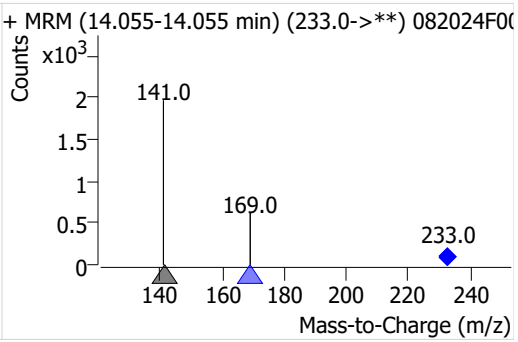


MassHunter Quantitative Analysis Sample Report

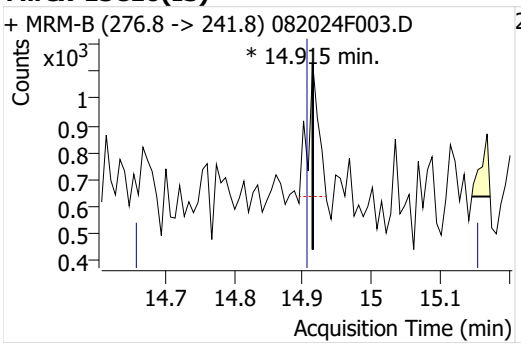
Methoxychlor-d6(IS)

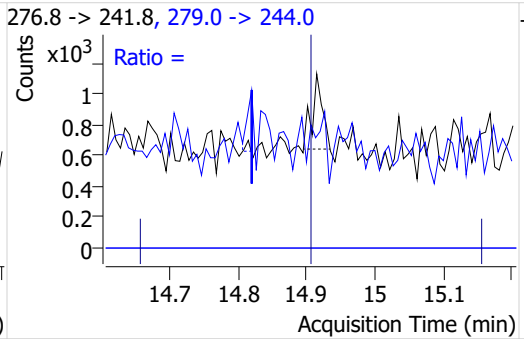


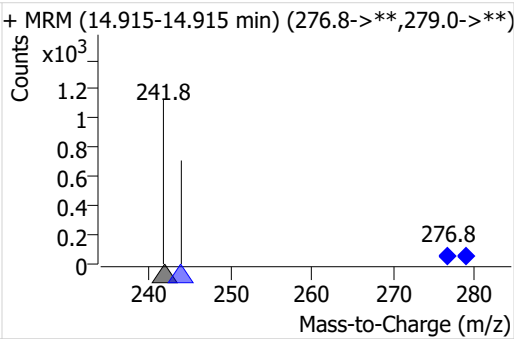




Mirex-13C10(IS)







MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Acq. Date-Time	8/20/2024 11:35:51 AM	**Acq Operator**	
Name	IB	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	8/20/2024 3:33:05 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	080624 OC PEST ICAL.batch.bin	**Vial**	2
Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)		289.8 -> 254.8		ND ng/ml	
gamma-BHC-d6(IS)		223.9 -> 187.0		ND ng/ml	
Heptachlor-13C10(IS)		276.8 -> 241.8		ND ng/ml	
Chorpyrifos-d10(IS)		199.9 -> 171.9		ND ng/ml	
Aldrin-13C(IS)		269.8 -> 200.0		ND ng/ml	
Octachlorostyrene-13C8(IS)		315.8 -> 245.8		ND ng/ml	
Isodrin-13C12(IS)		199.9 -> 130.1		ND ng/ml	
Oxychlordane-13C10(IS)		190.0 -> 125.0		ND ng/ml	
Heptachlor epoxide-13C10(IS)		362.8 -> 270.0		ND ng/ml	
Pyrene-d10	9.709	212.0 -> 208.0	30932318	100.0000 ng/ml	0.004
Endrin-13C12(IS)		269.8 -> 200.0		ND ng/ml	
4,4'-DDD d4(IS)		243.0 -> 173.1		ND ng/ml	
4,4'-DDT-d4(IS)		243.0 -> 173.1		ND ng/ml	
Endrin ketone-13C12(IS)		327.9 -> 291.8		ND ng/ml	
Methoxychlor-d6(IS)		233.0 -> 141.0		ND ng/ml	
Mirex-13C10(IS)		276.8 -> 241.8		ND ng/ml	

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6		289.8 -> 254.8		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
gamma-BHC-d6		223.9 -> 187.0		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Heptachlor-13C10		276.8 -> 241.8		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Aldrin-13C		269.8 -> 200.0		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Octachlorostyrene-13C8		315.8 -> 245.8		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Isodrin-13C12		199.9 -> 130.1		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Oxychlordane-13C10		190.0 -> 125.0		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Heptachlor epoxide-13C10		362.8 -> 270.0		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Endrin-13C12		269.8 -> 200.0		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
4,4'-DDD d4		243.0 -> 173.1		0.000 ng/ml	
		Spiked Amount =	5.0	Recovery =	*NC %*
4,4'-DDT-d4		243.0 -> 173.1		0.000 ng/ml	
		Spiked Amount =	5.0	Recovery =	*NC %*
Endrin ketone-13C12		327.9 -> 291.8		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Methoxychlor-d6		233.0 -> 141.0		0.000 ng/ml	
		Spiked Amount =	20.0	Recovery =	*NC %*
Mirex-13C10		276.8 -> 241.8		0.000 ng/ml	
		Spiked Amount =	5.0	Recovery =	*NC %*

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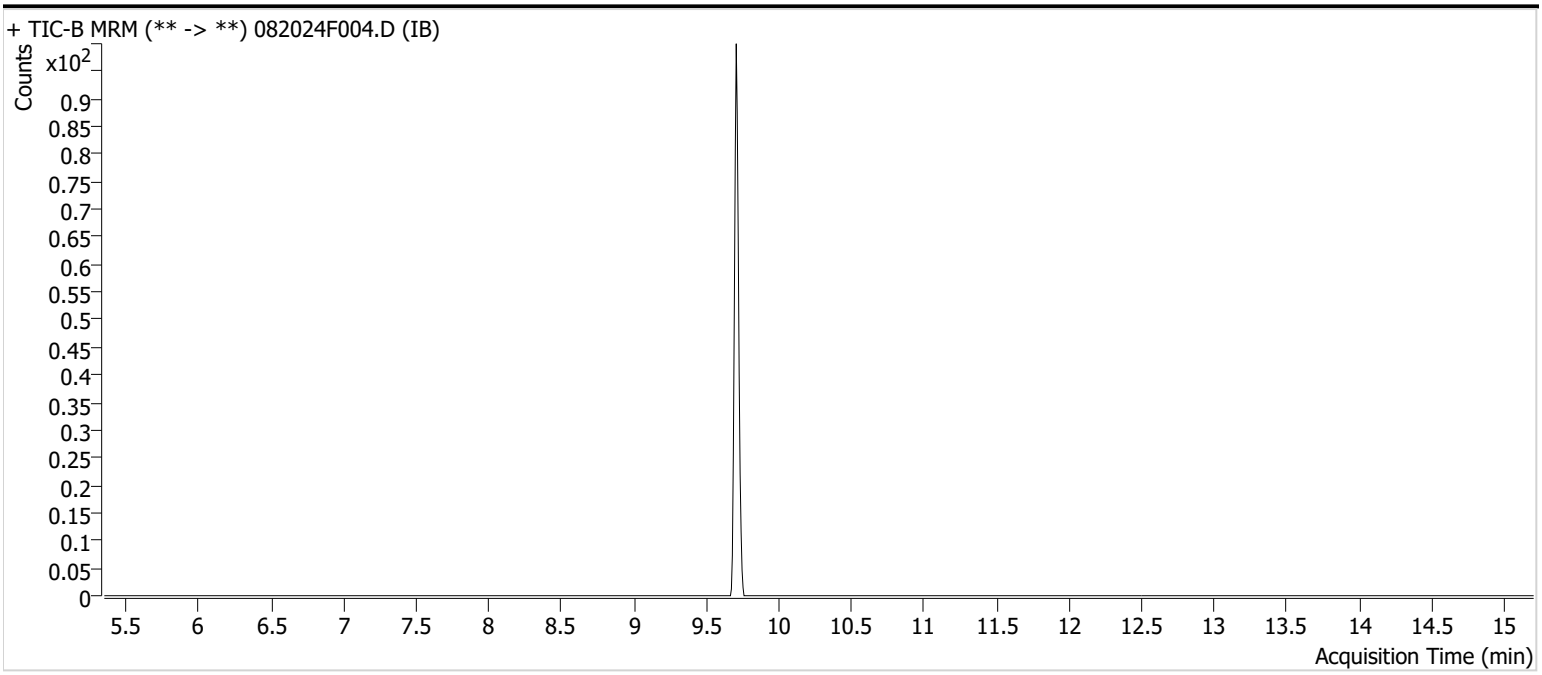
Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)		283.8 -> 213.9		ND ng/ml	
beta-BHC	gamma-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
gamma-BHC(Lindane)	gamma-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
delta-BHC	gamma-BHC-d6(IS)		181.1 -> 145.1		ND ng/ml	
Heptachlor	Heptachlor-13C10(IS)		271.7 -> 236.9		ND ng/ml	
Chorpyrifos	Chorpyrifos-d10(IS)		196.9 -> 169.0		ND ng/ml	
Aldrin	Aldrin-13C(IS)		254.9 -> 220.0		ND ng/ml	
Octachlorostyrene	Octachlorostyrene-13C8(IS)		342.8 -> 307.8		ND ng/ml	
Isodrin	Isodrin-13C12(IS)		193.0 -> 123.0		ND ng/ml	
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)		352.8 -> 262.9		ND ng/ml	
Oxychlordane	Oxychlordane-13C10(IS)		114.9 -> 51.1		ND ng/ml	
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
2,4'-DDE	4,4'-DDD d4(IS)		246.0 -> 176.2		ND ng/ml	
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
Endosulfan I	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
trans-Nanochlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
4,4' -DDE	4,4'-DDD d4(IS)		246.0 -> 176.2		ND ng/ml	
2,4'-DDD	4,4'-DDD d4(IS)		235.0 -> 165.1		ND ng/ml	
Dieldrin	Endrin-13C12(IS)		262.9 -> 193.0		ND ng/ml	
Endrin	Endrin-13C12(IS)		262.8 -> 193.0		ND ng/ml	
Endosulfan II	Endrin-13C12(IS)		206.9 -> 172.0		ND ng/ml	
4,4'-DDD	4,4'-DDD d4(IS)		235.0 -> 165.1		ND ng/ml	
cis-Nonachlor	Oxychlordane-13C10(IS)		271.8 -> 236.9		ND ng/ml	
2,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin aldehyde	Endrin-13C12(IS)		249.9 -> 214.9		ND ng/ml	
Endosulfan sulfate	Endrin-13C12(IS)		271.9 -> 237.0		ND ng/ml	
4,4'-DDT	4,4'-DDT-d4(IS)		235.0 -> 165.1		ND ng/ml	
Endrin ketone	Endrin ketone-13C12(IS)		147.0 -> 111.0		ND ng/ml	
Methoxychlor	Methoxychlor-d6(IS)		227.0 -> 141.1		ND ng/ml	
Mirex	Mirex-13C10(IS)		271.8 -> 236.8		ND ng/ml	

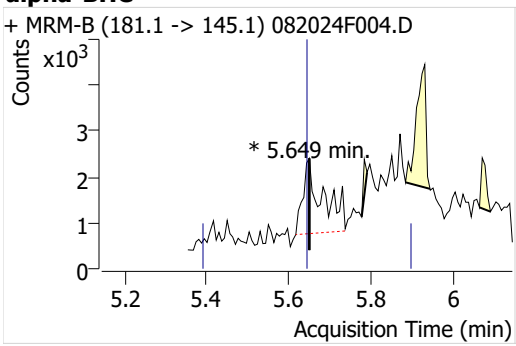
(m) = manual integration ND = Not Detected NC = Not Calculated

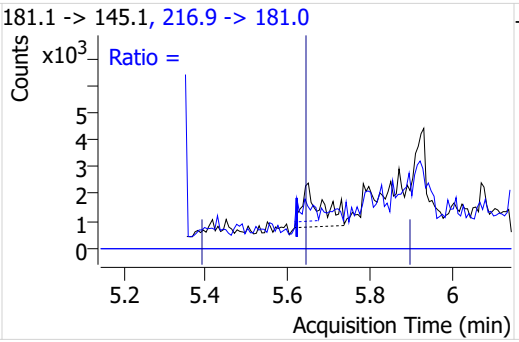
Sample Chromatogram

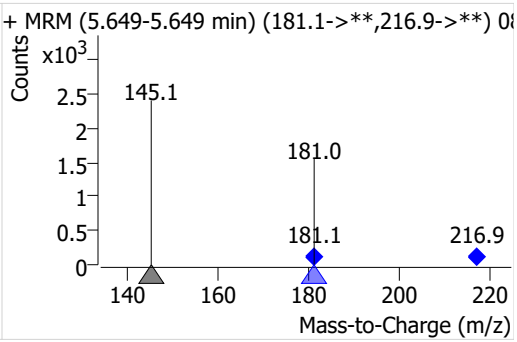
MassHunter Quantitative Analysis Sample Report



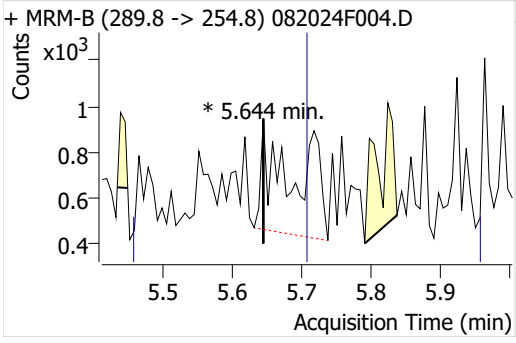
alpha-BHC

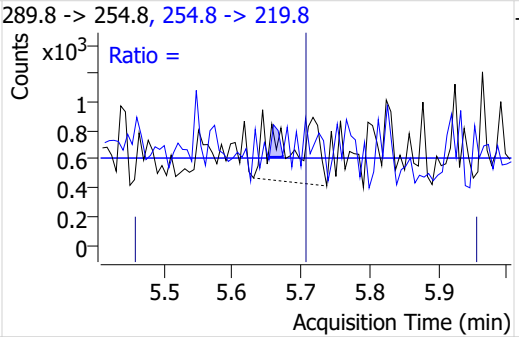


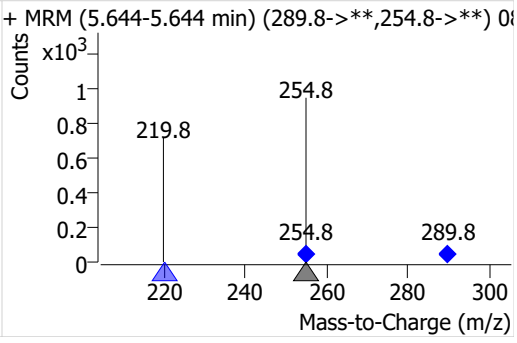




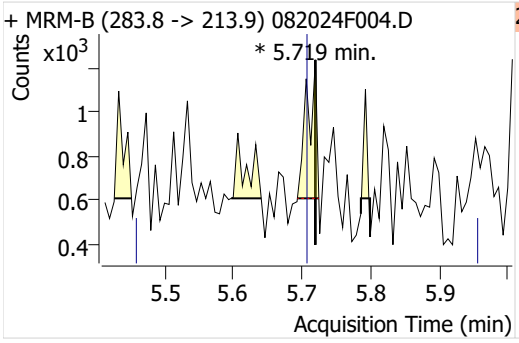
Hexachlorobenzene-13C6

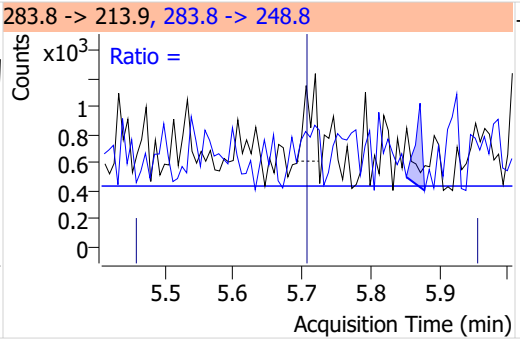


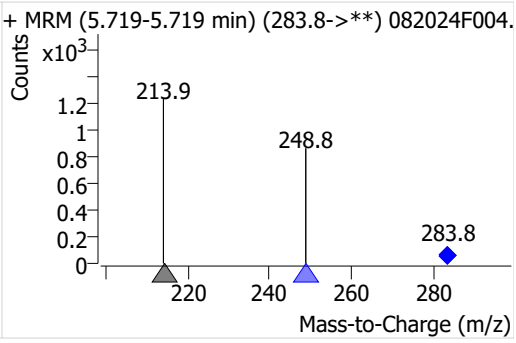




Hexachlorobenzene







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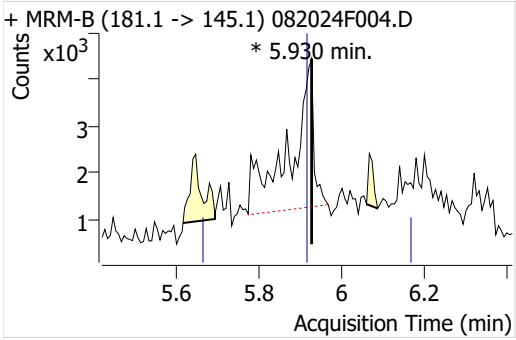
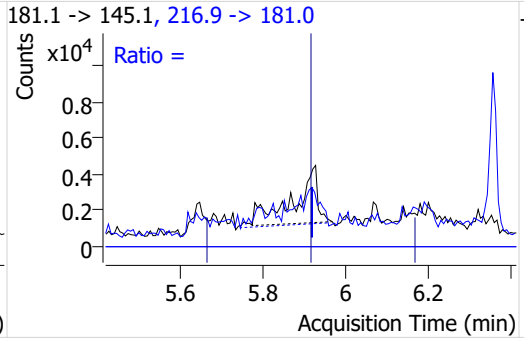
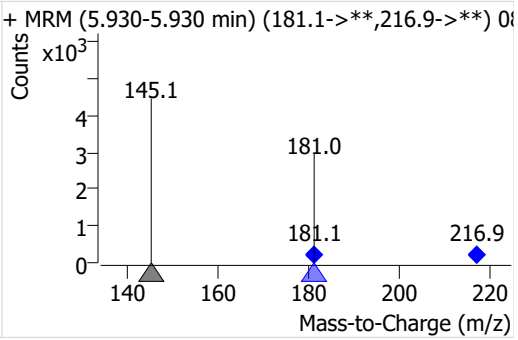
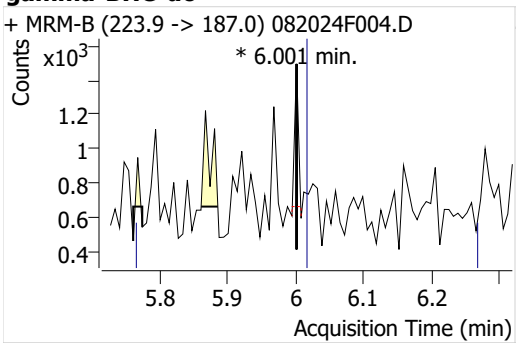
beta-BHC

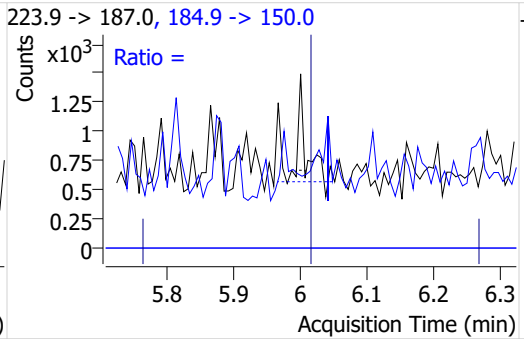


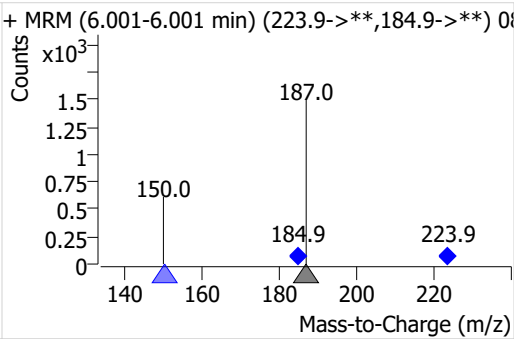




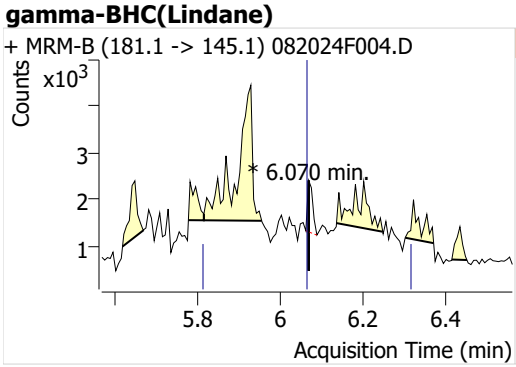
gamma-BHC-d6

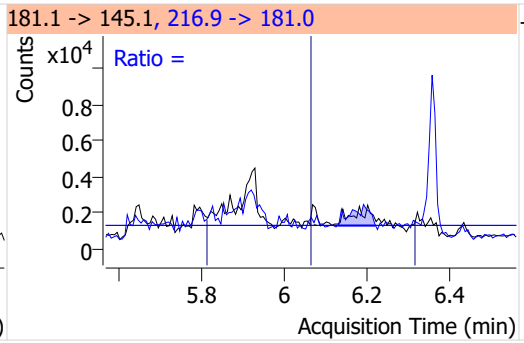


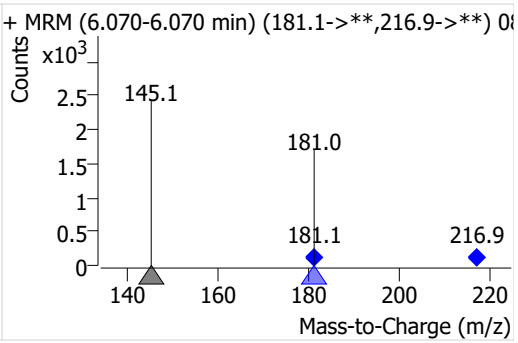




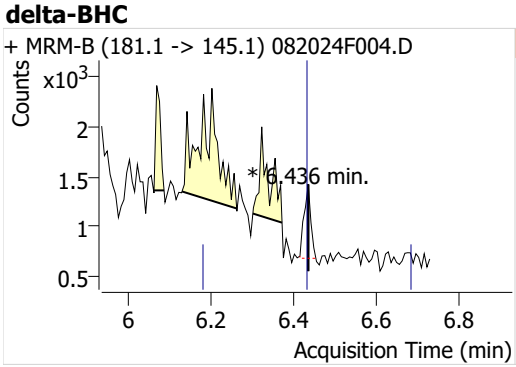
gamma-BHC(Lindane)

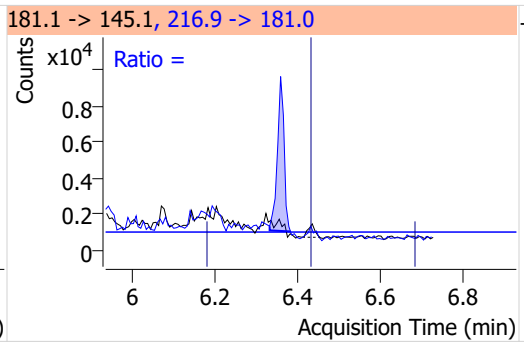


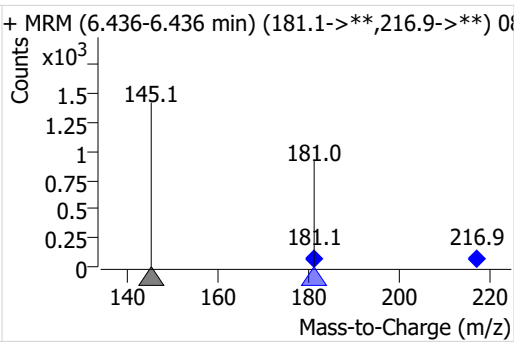




delta-BHC

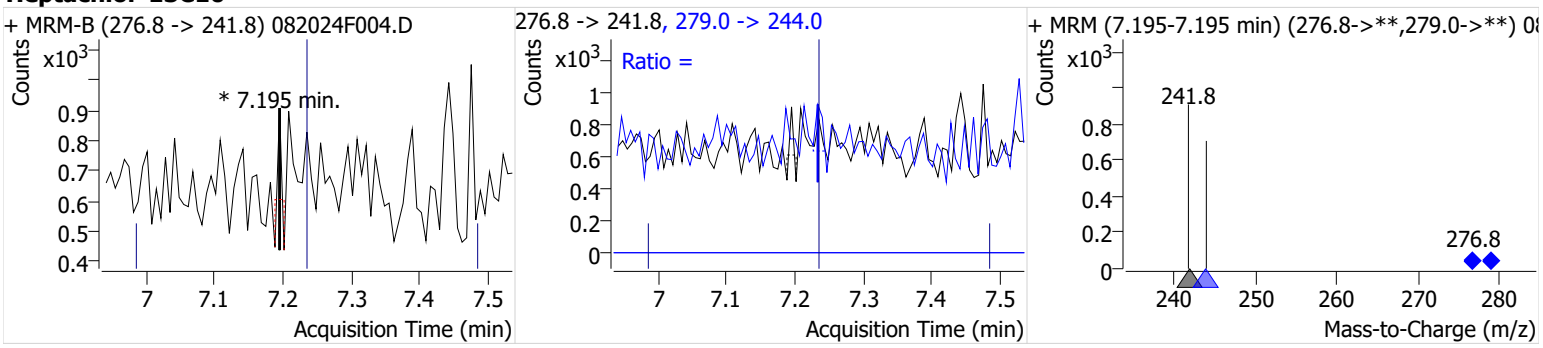




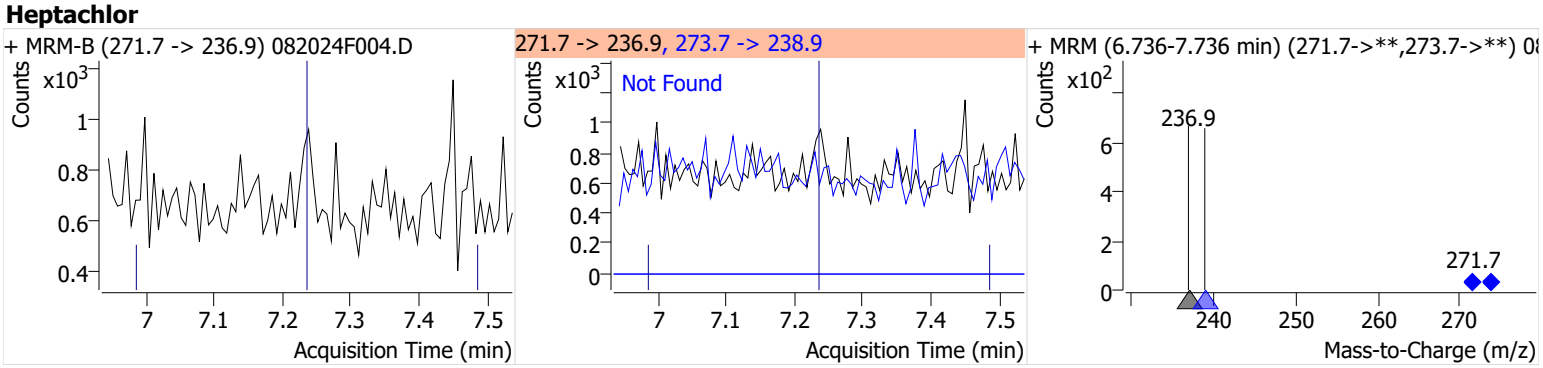


MassHunter Quantitative Analysis Sample Report

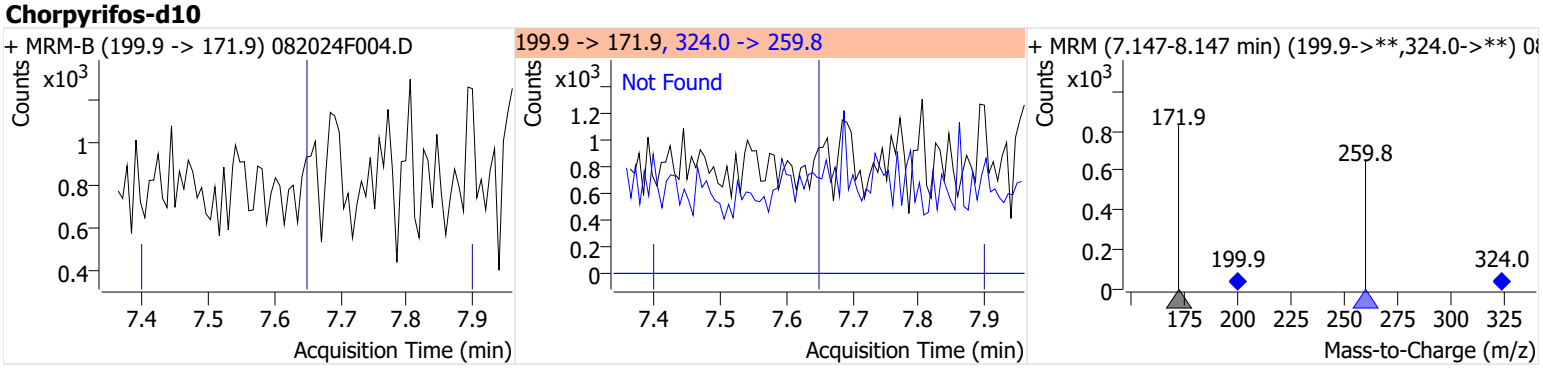
Heptachlor-13C10



Heptachlor



Chorpyrifos-d10



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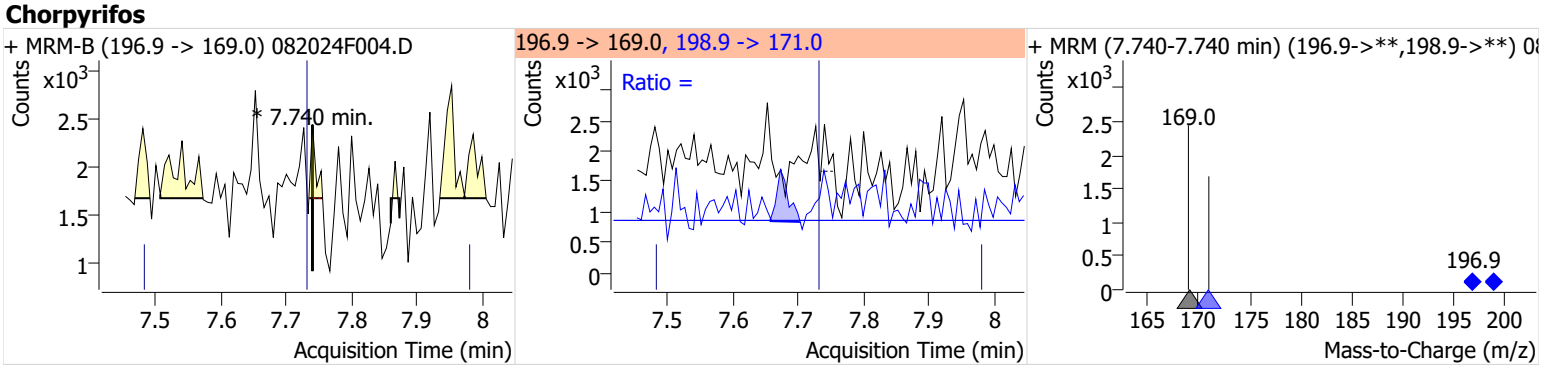

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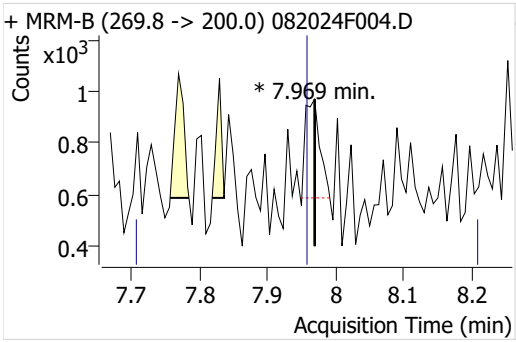
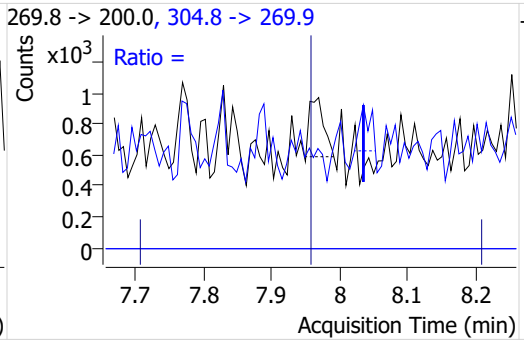
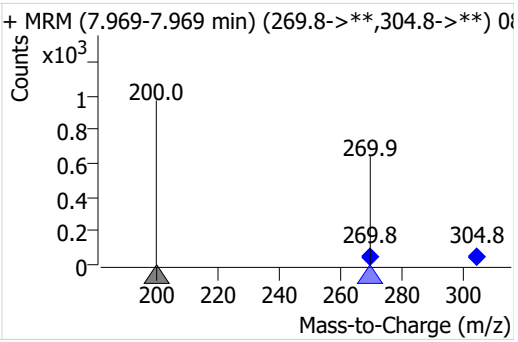
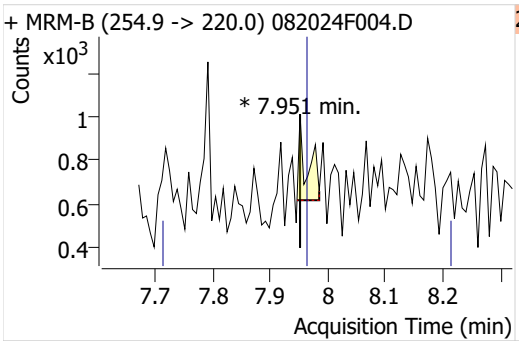
Aldrin-13C

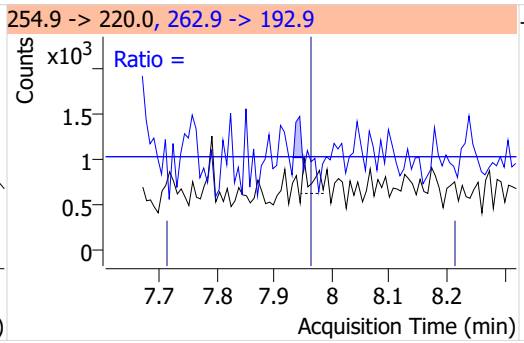


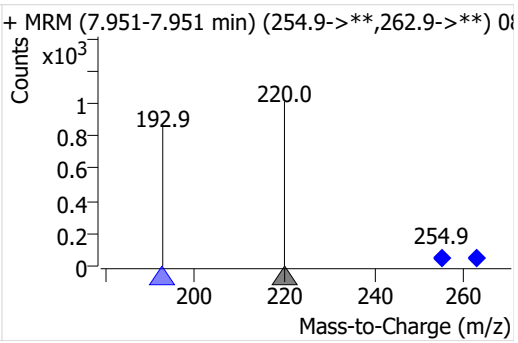




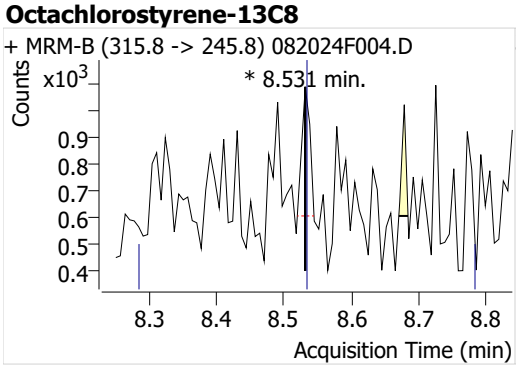
Aldrin

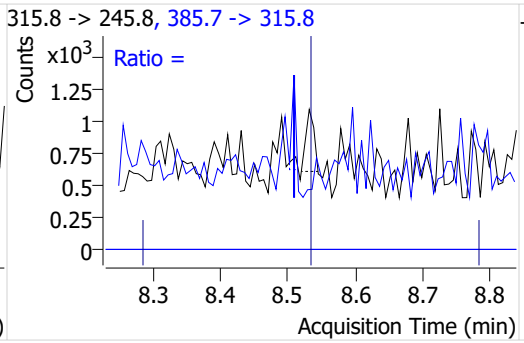


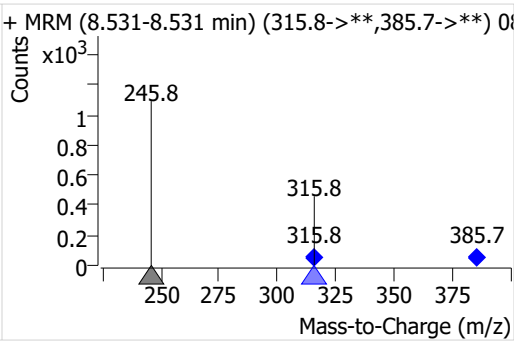




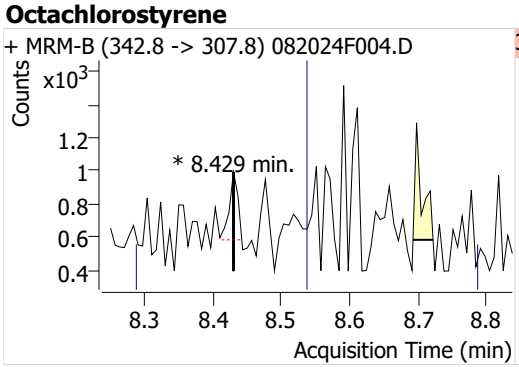
Octachlorostyrene-13C8

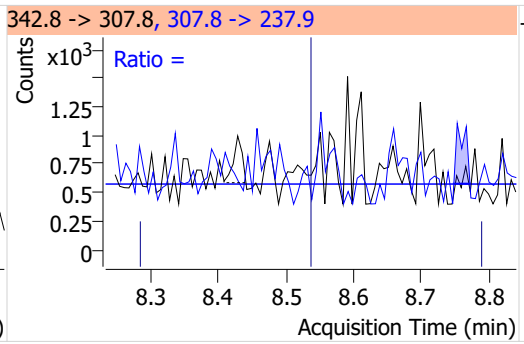


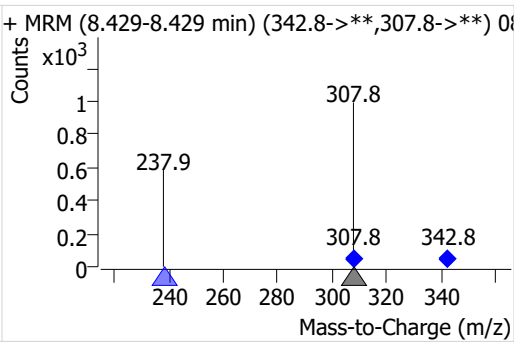




Octachlorostyrene







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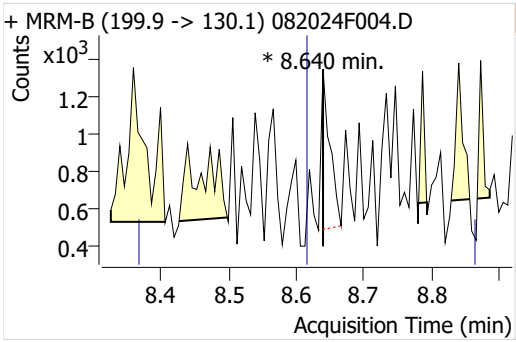
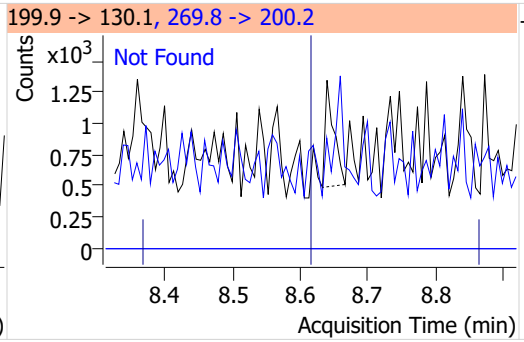
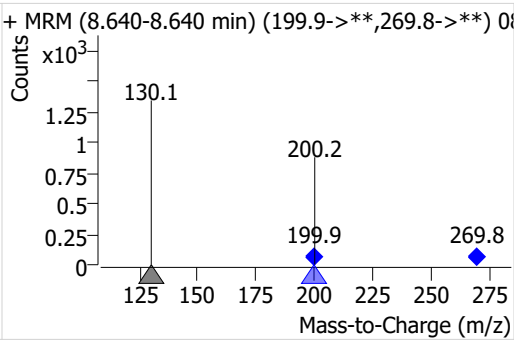
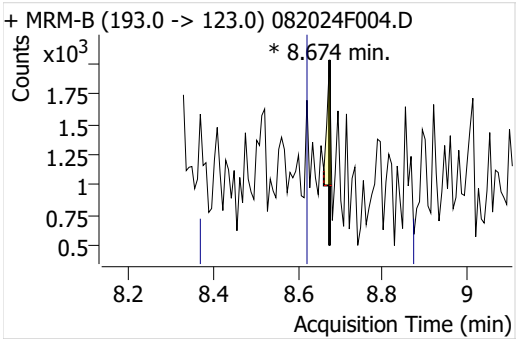
Isodrin-13C12

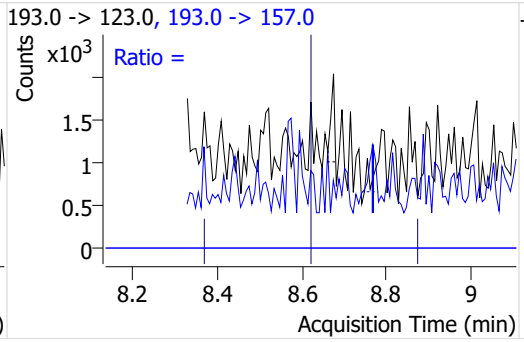


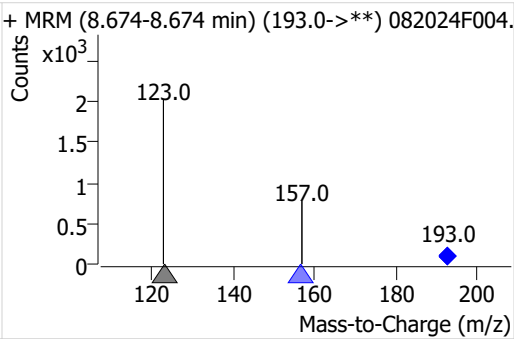




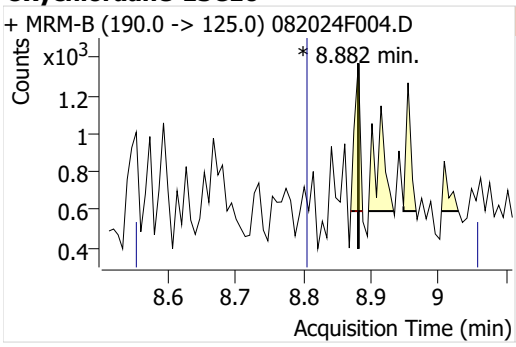
Isodrin

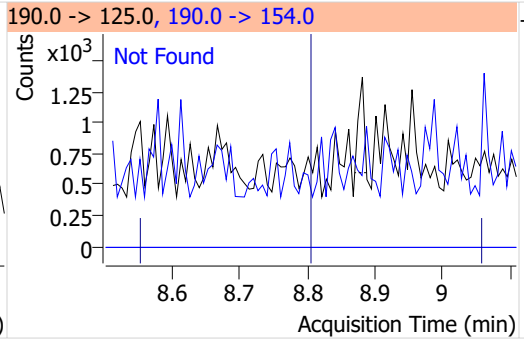


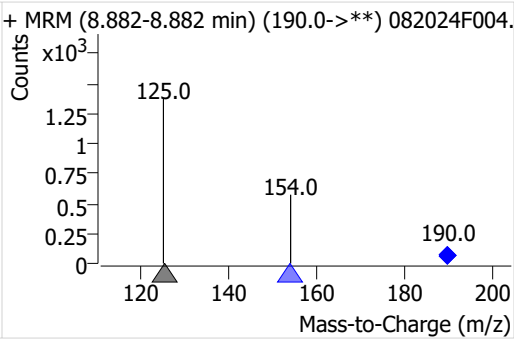




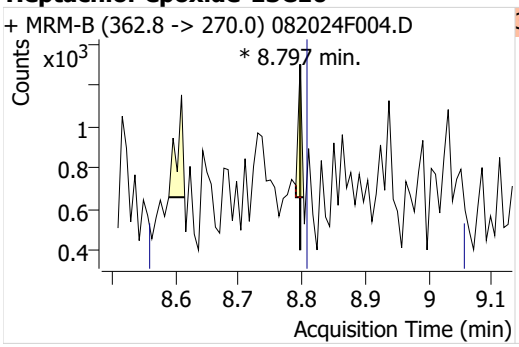
Oxychlordane-13C10

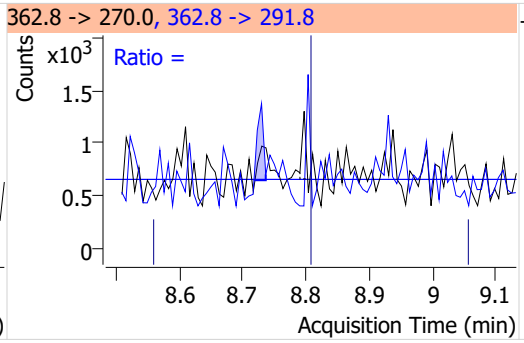


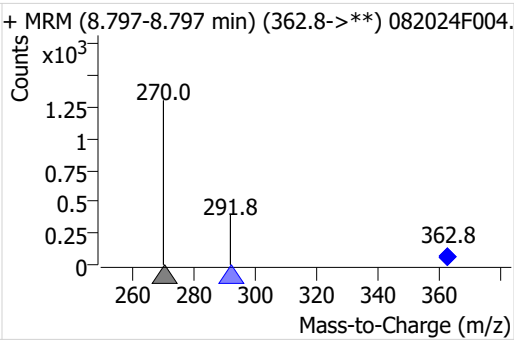




Heptachlor epoxide-13C10







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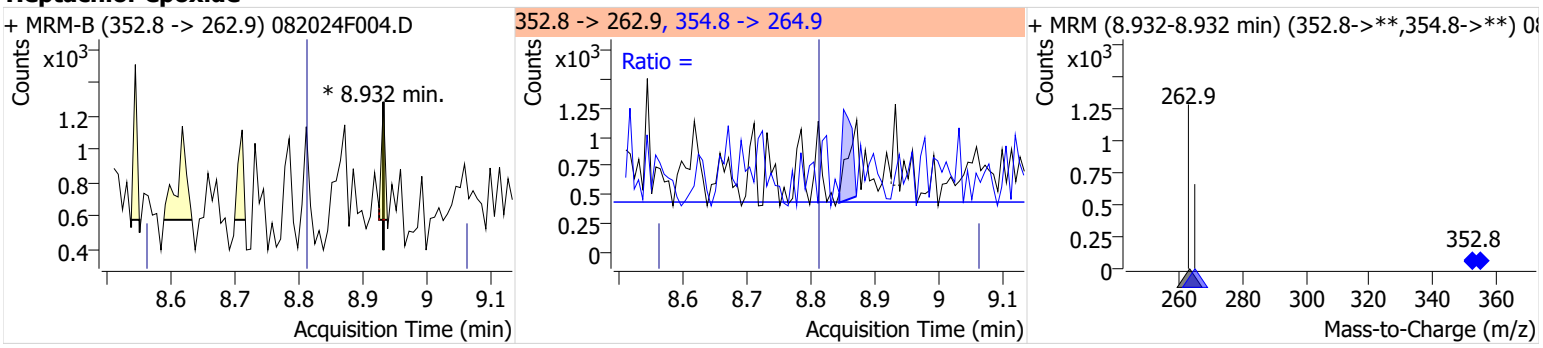
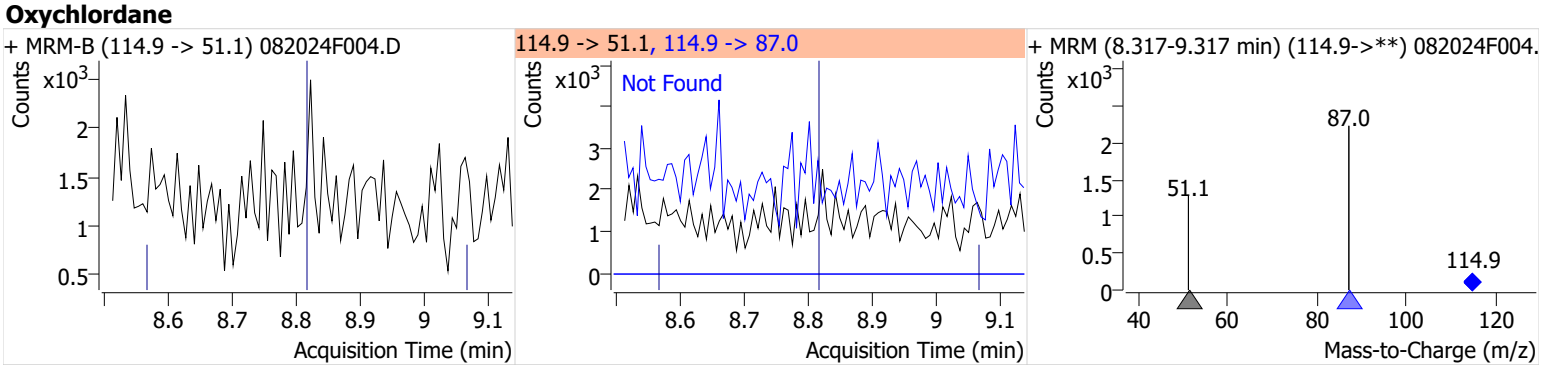
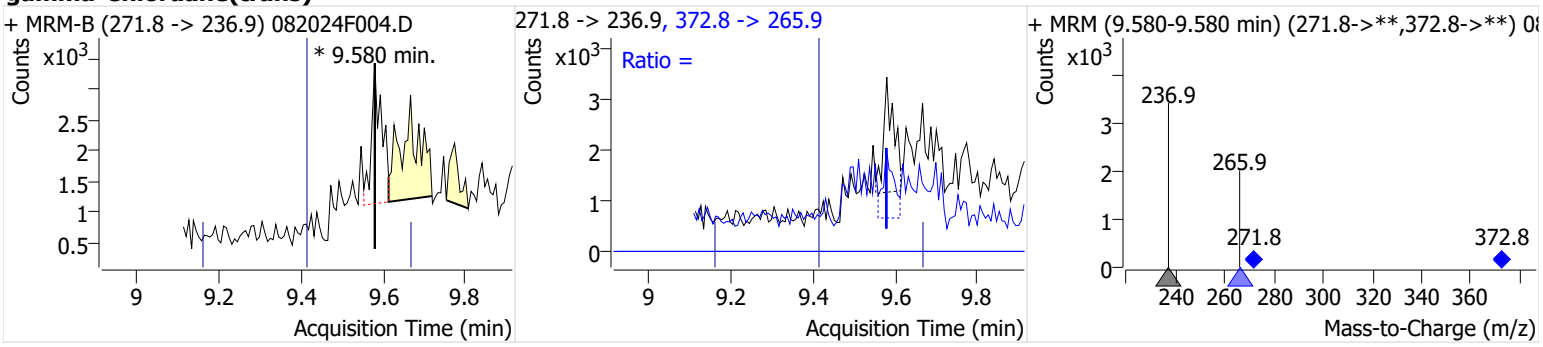
Heptachlor epoxide



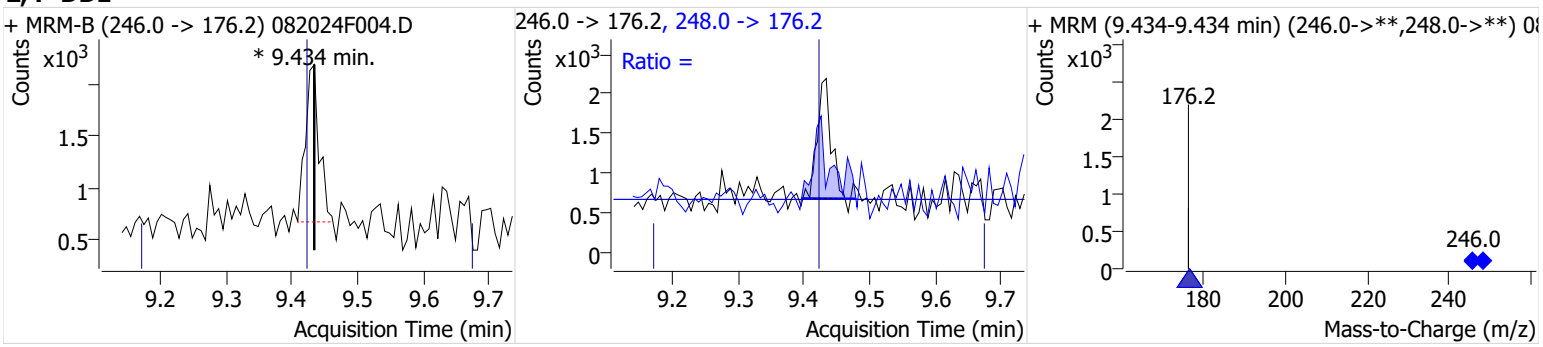
Oxychlordane



gamma-Chlordane(trans)



2,4'-DDE



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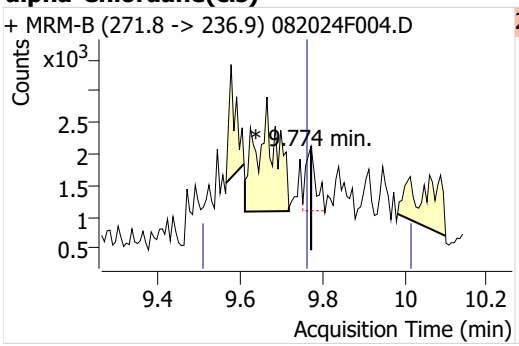
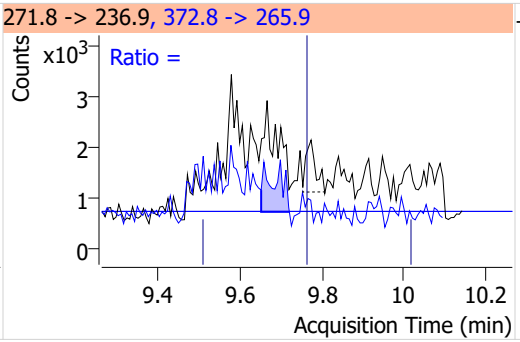
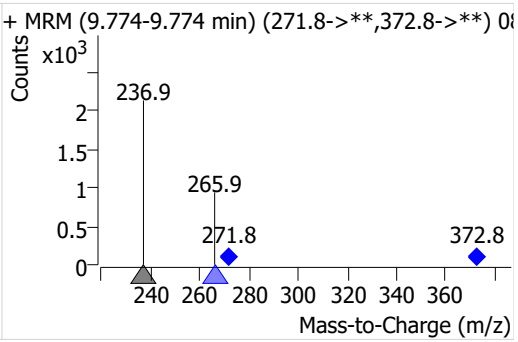
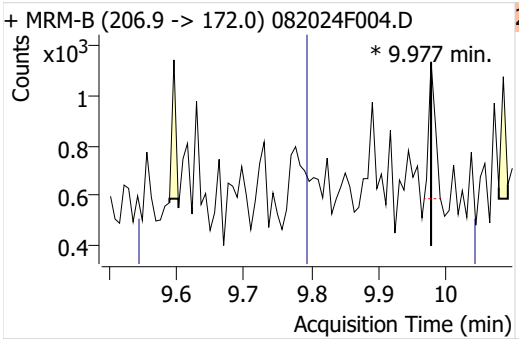
alpha-Chlordane(cis)

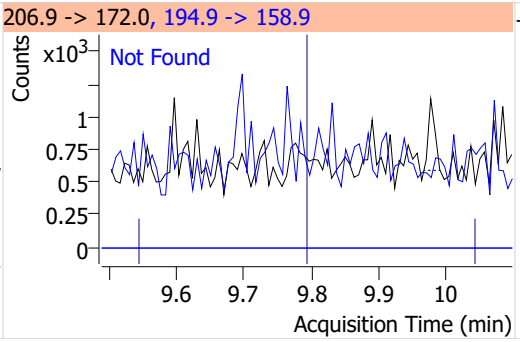


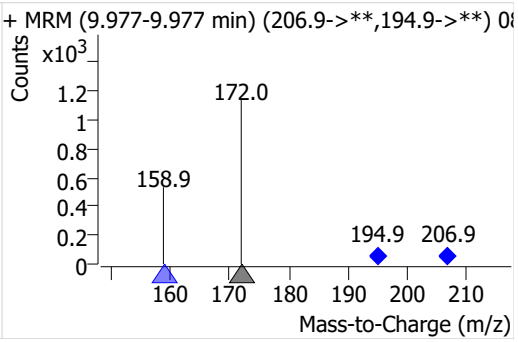




Endosulfan I







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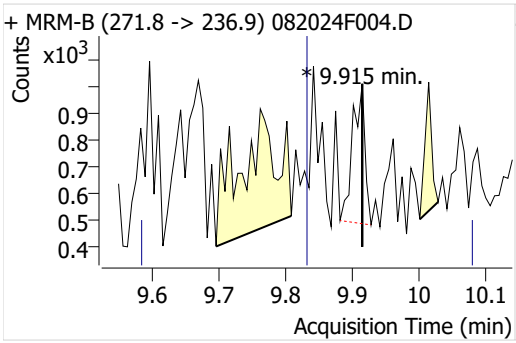
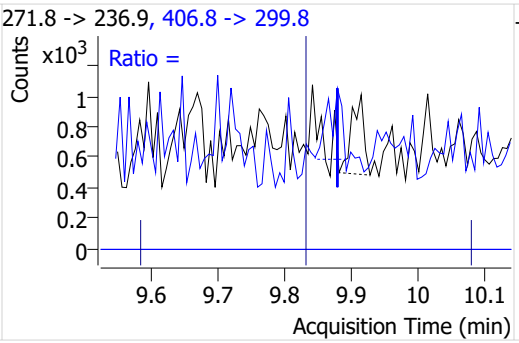
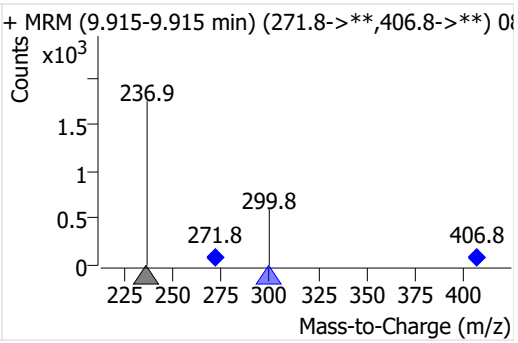
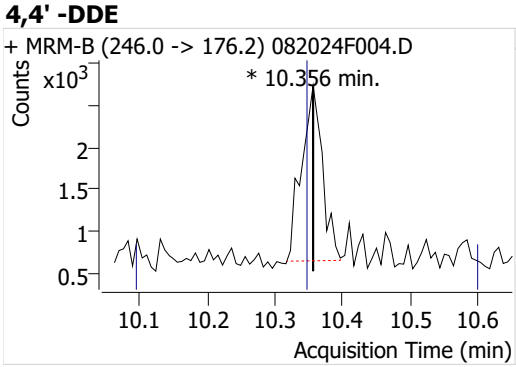
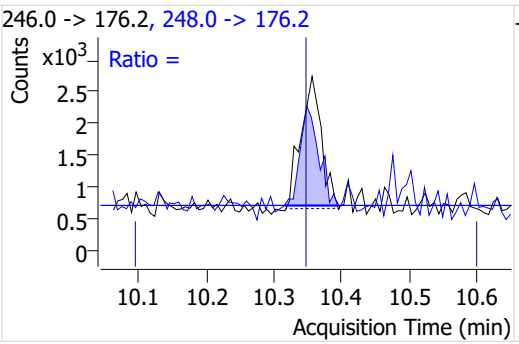


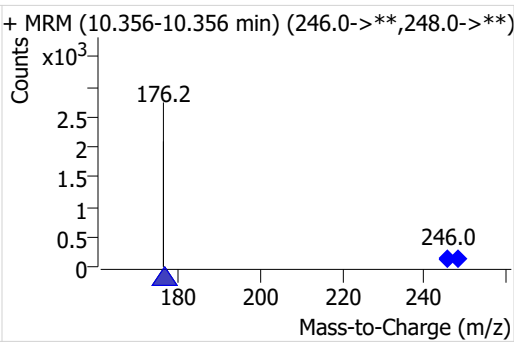




4,4' -DDE







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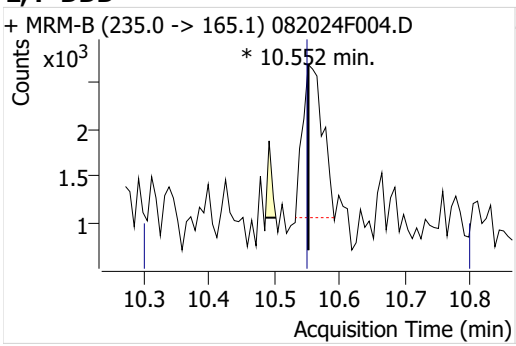
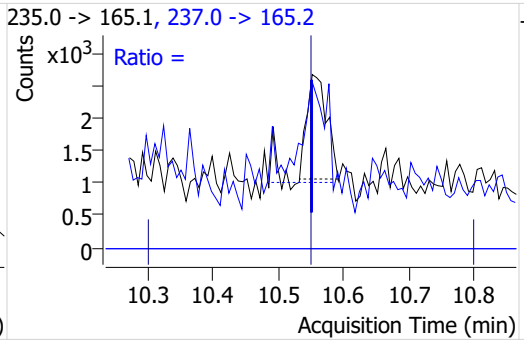
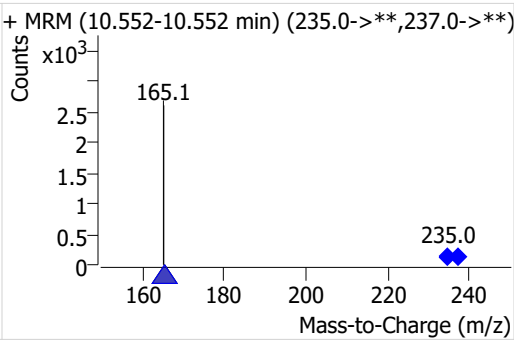
2,4'-DDD







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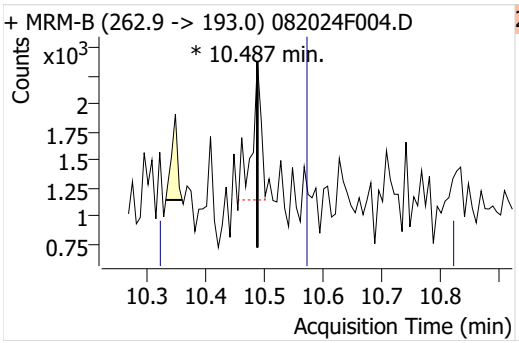

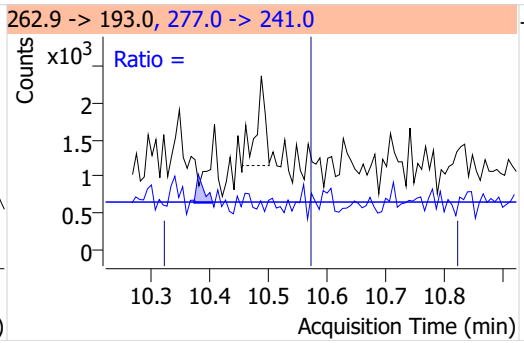

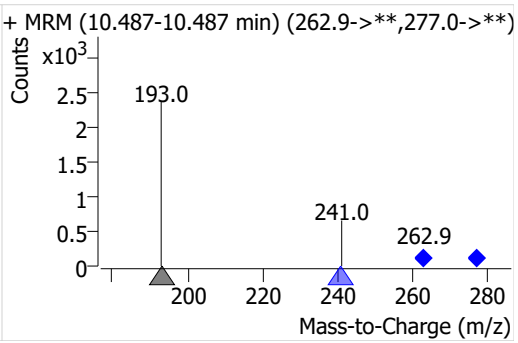

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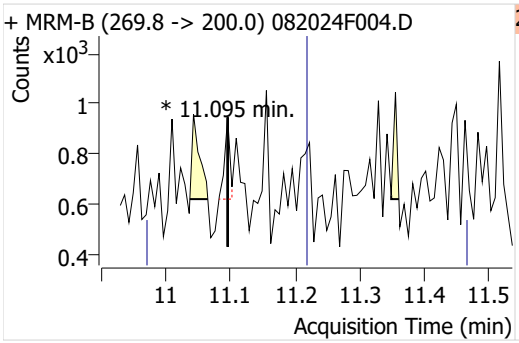

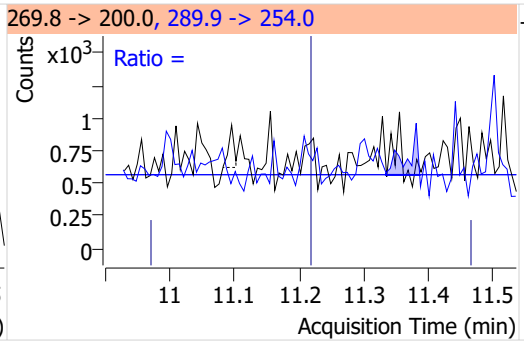

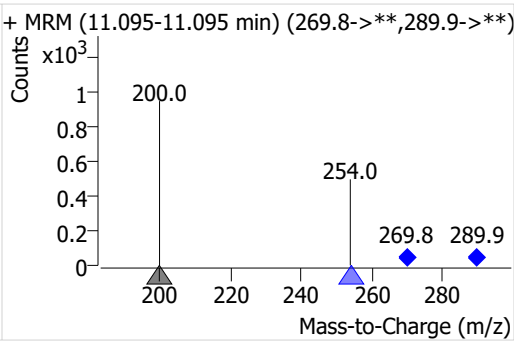

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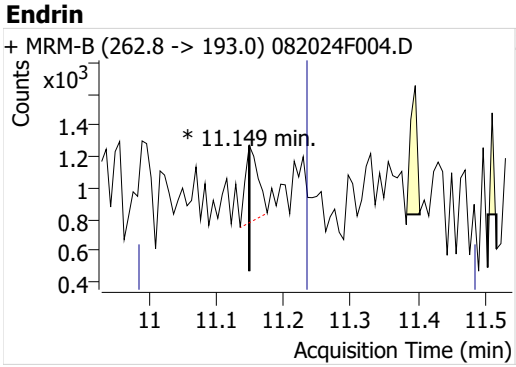

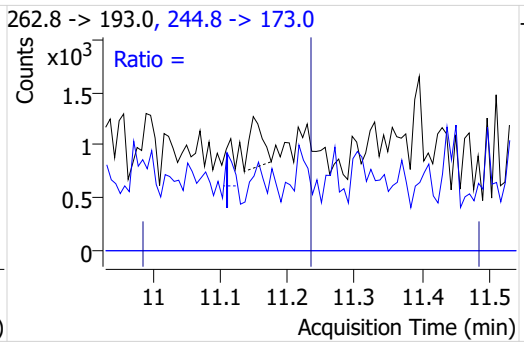

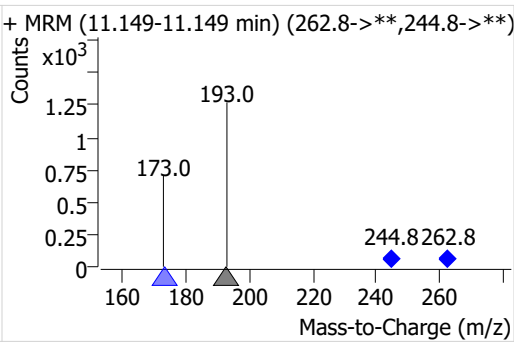

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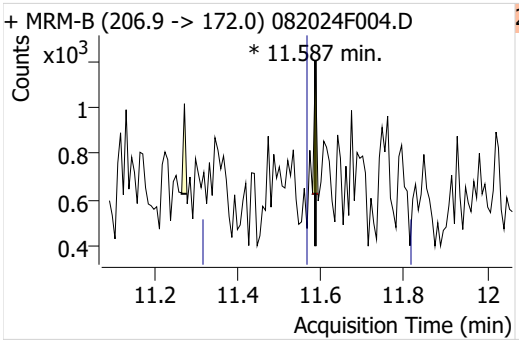
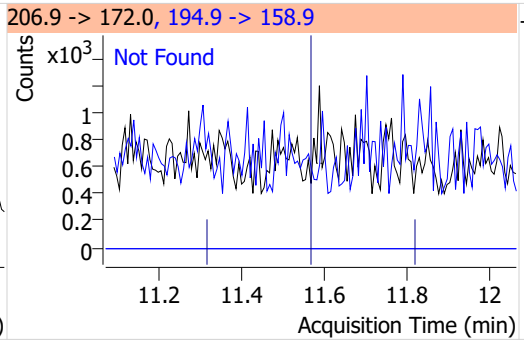
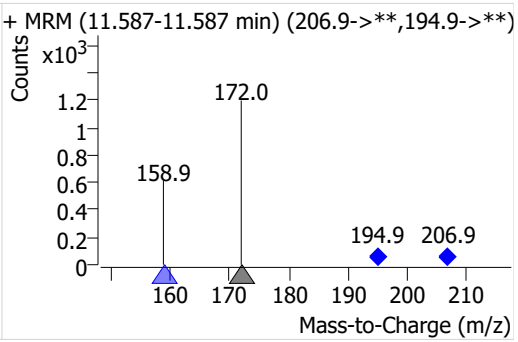
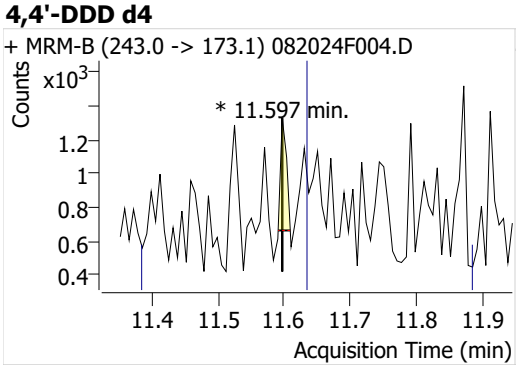
Endosulfan II

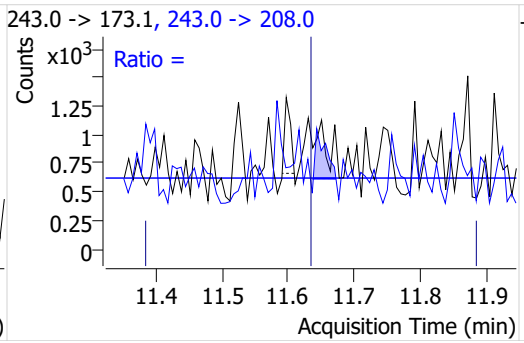


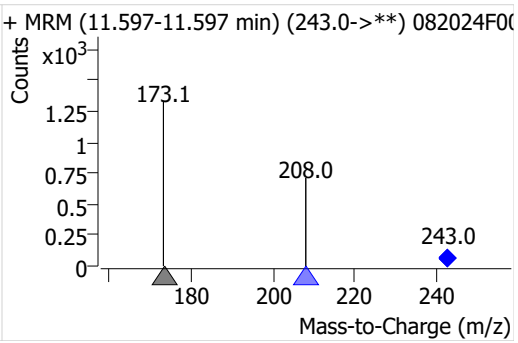




4,4'-DDD d4







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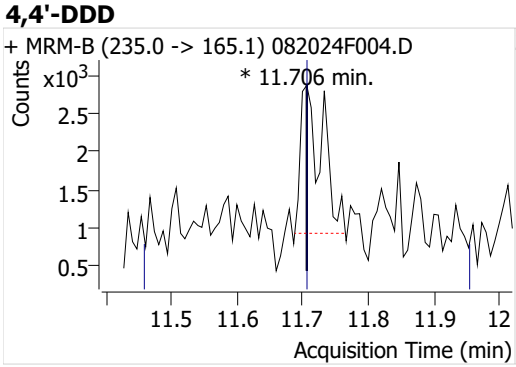

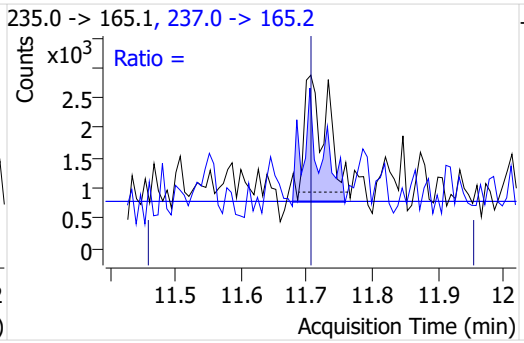

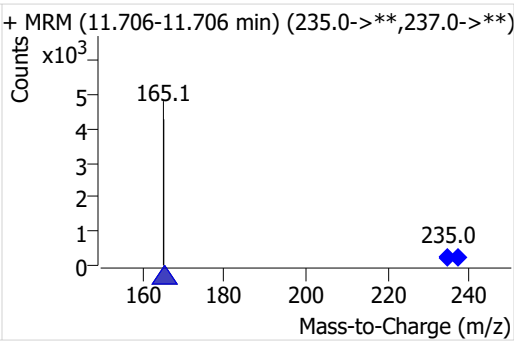

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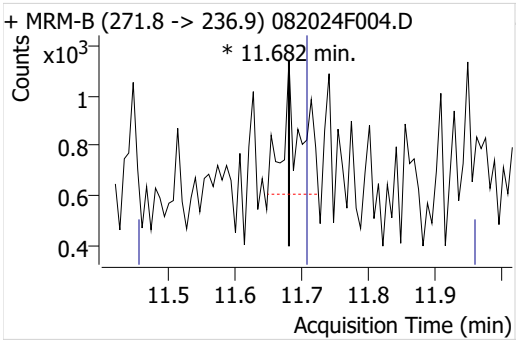

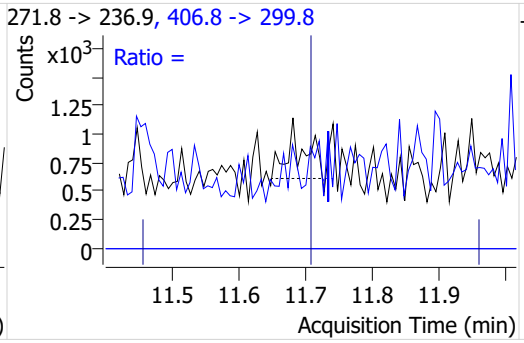

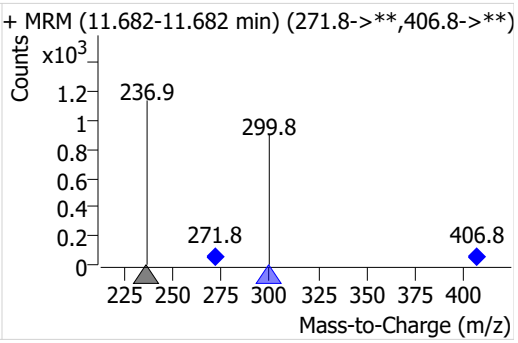

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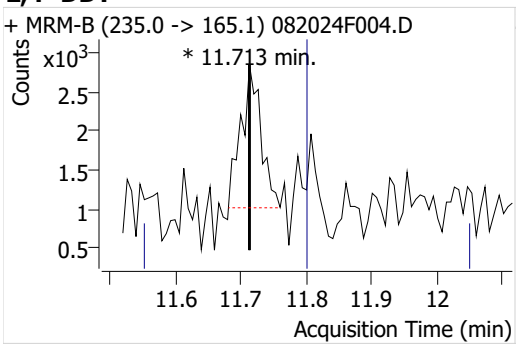
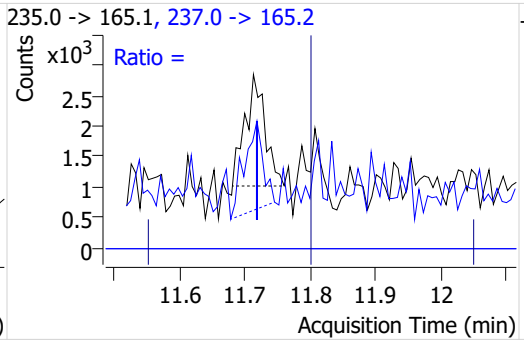
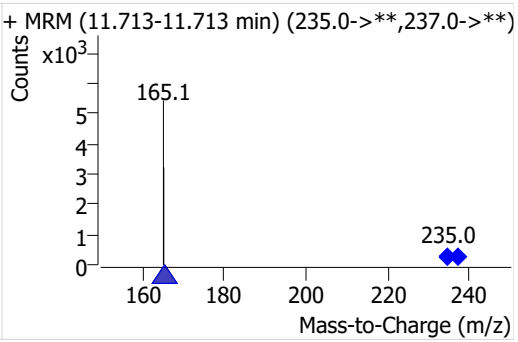
2,4'-DDT







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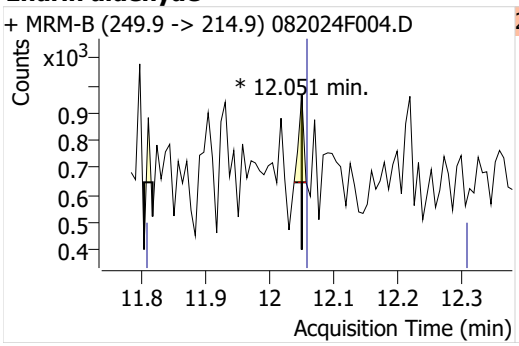
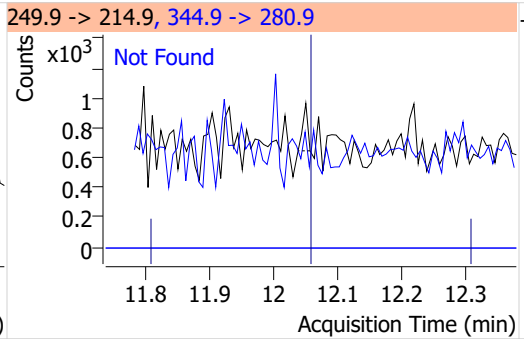
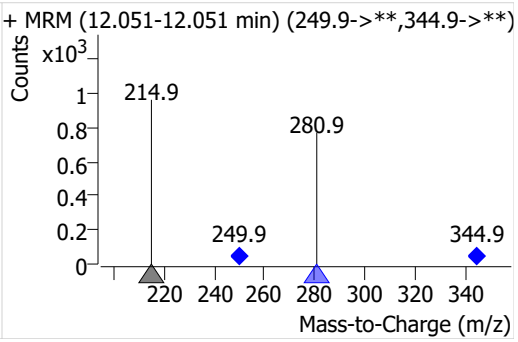
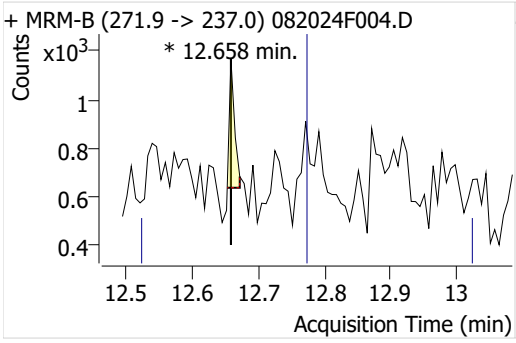
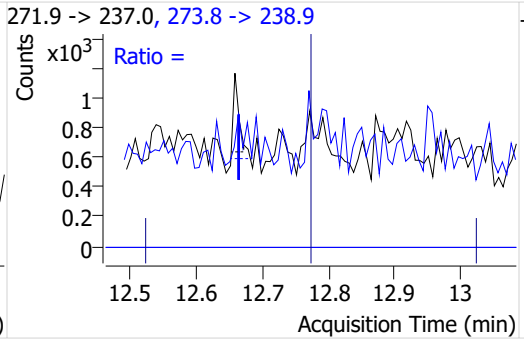


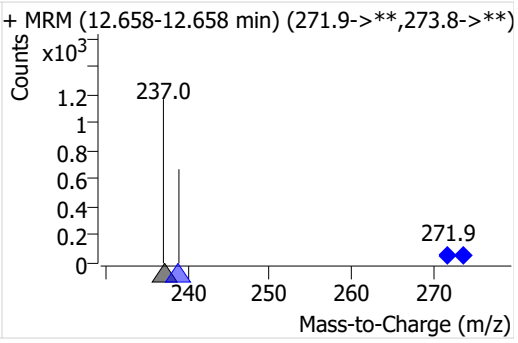




Endosulfan sulfate







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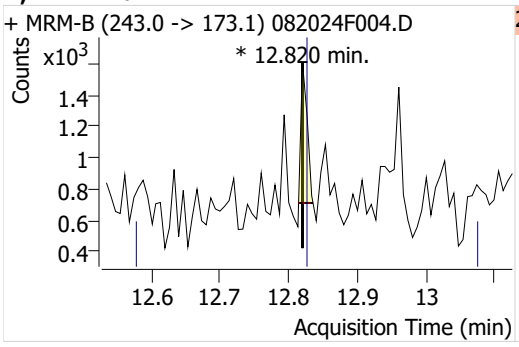

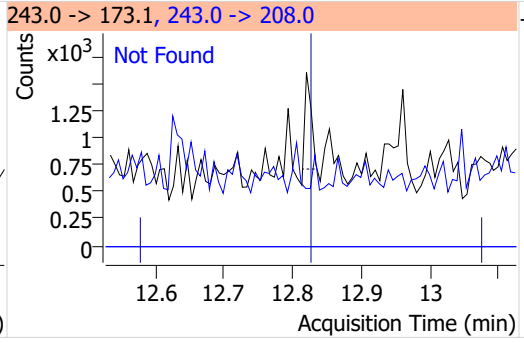

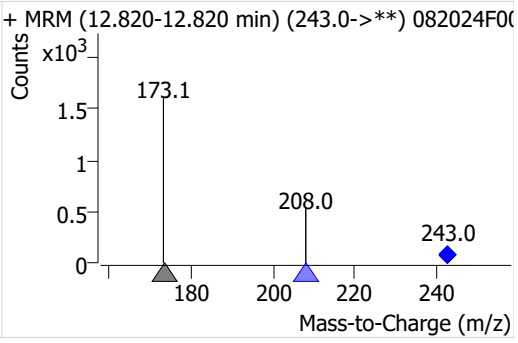

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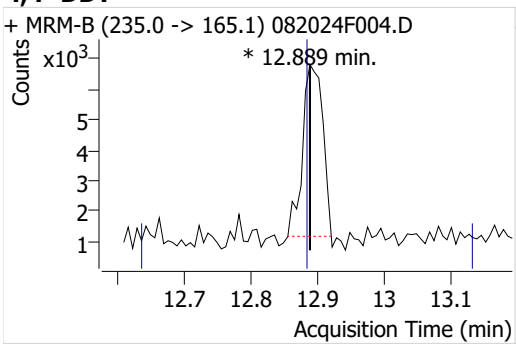
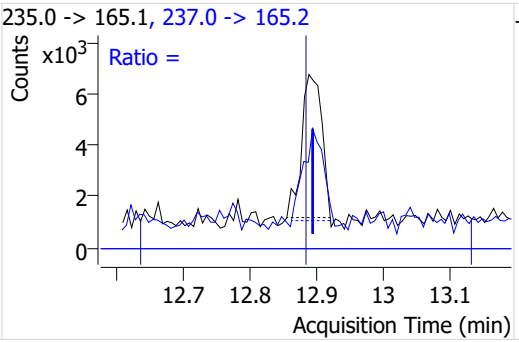
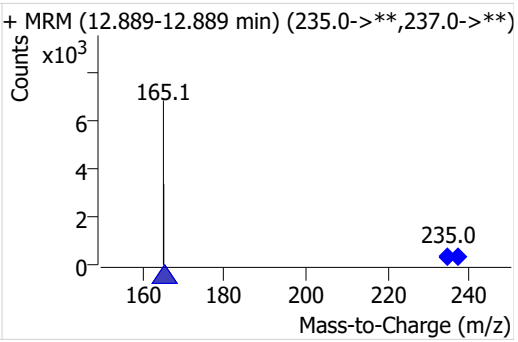
4,4'-DDT







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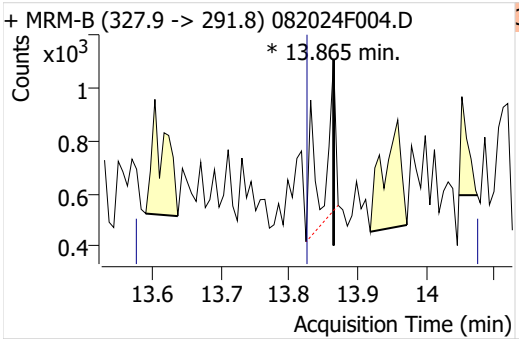

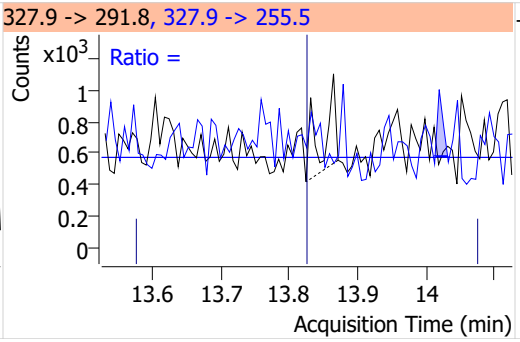

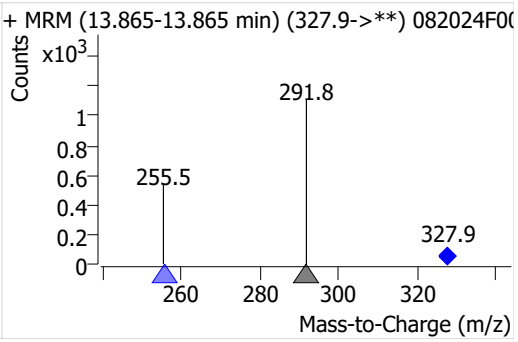

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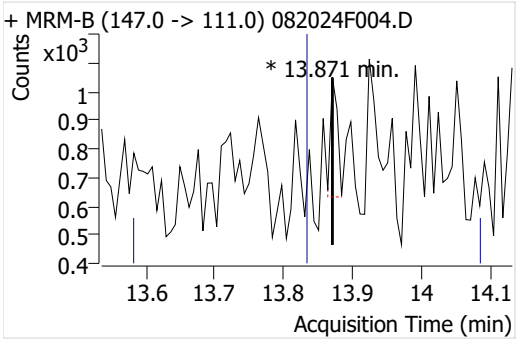
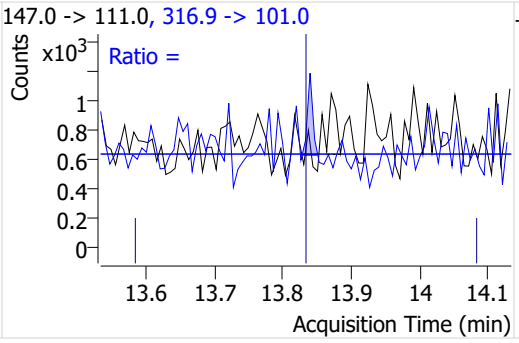
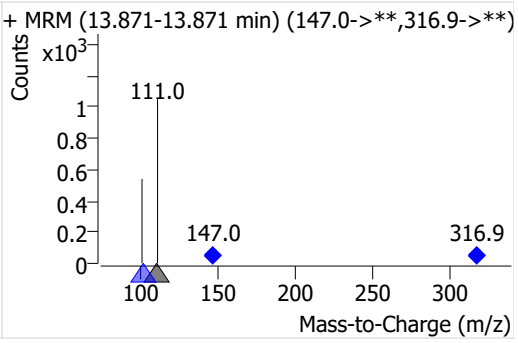
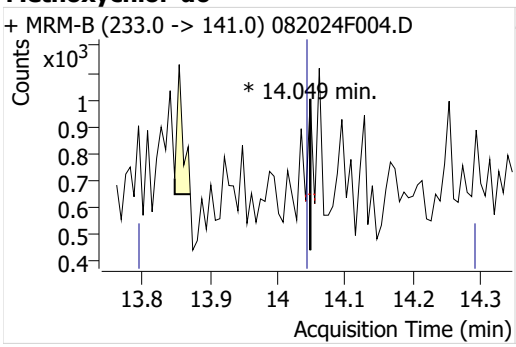
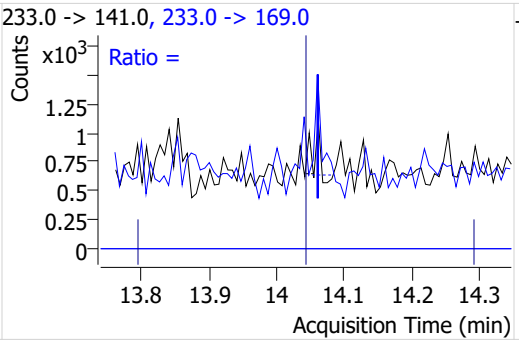


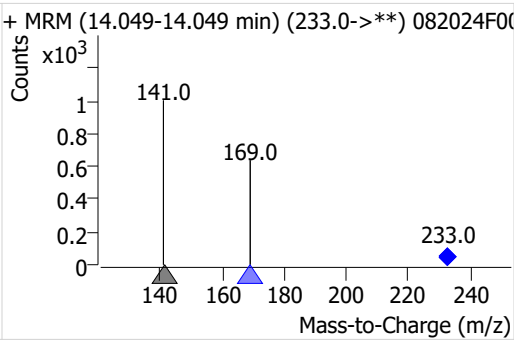




Methoxychlor-d6







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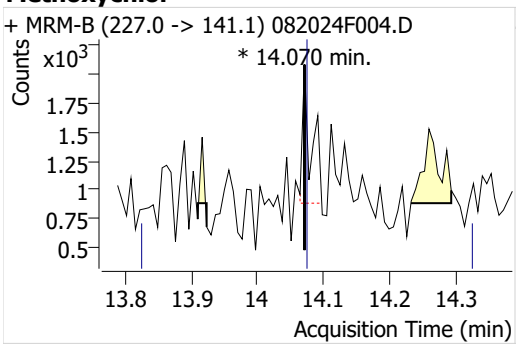
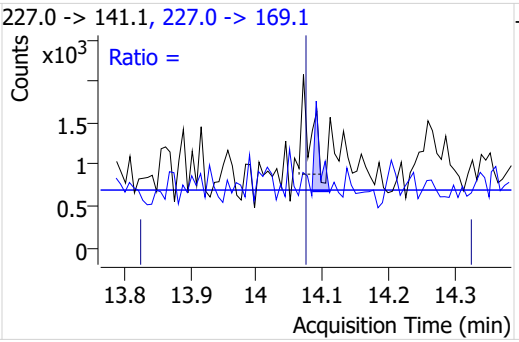
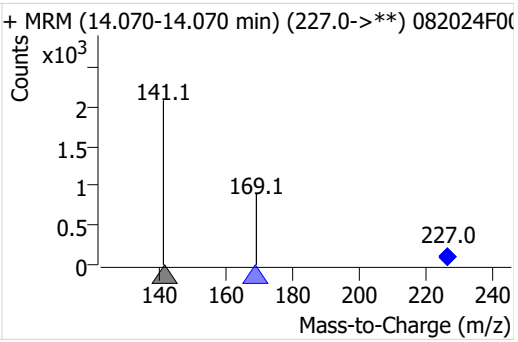
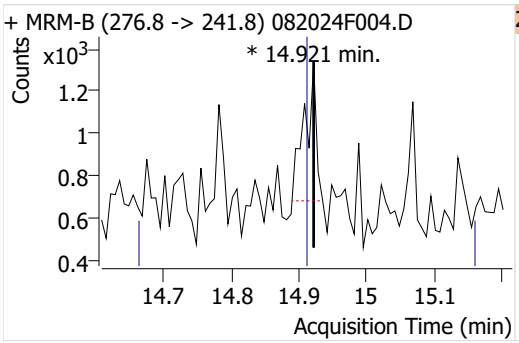
Methoxychlor

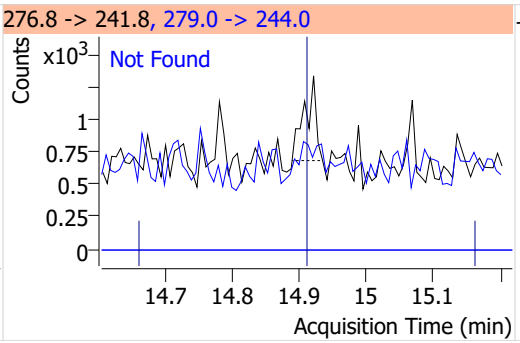


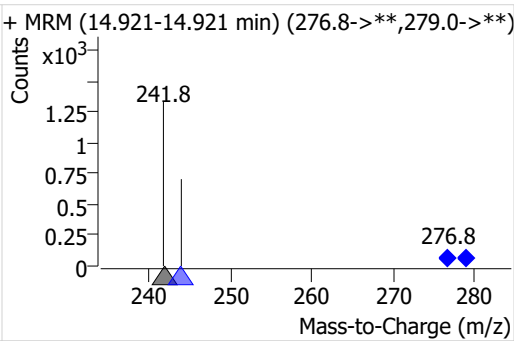




Mirex-13C10







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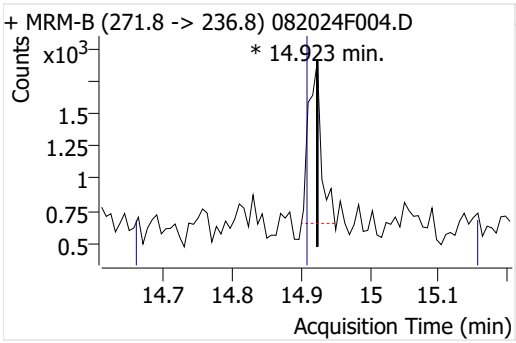
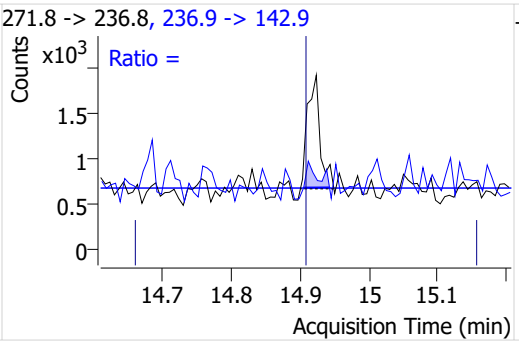
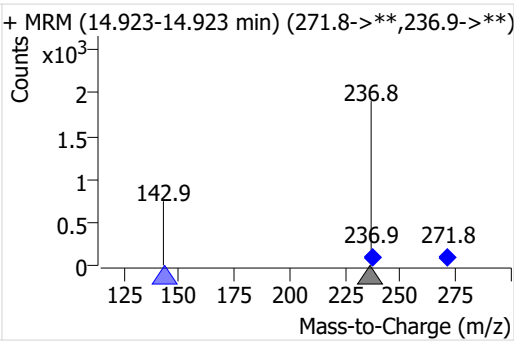
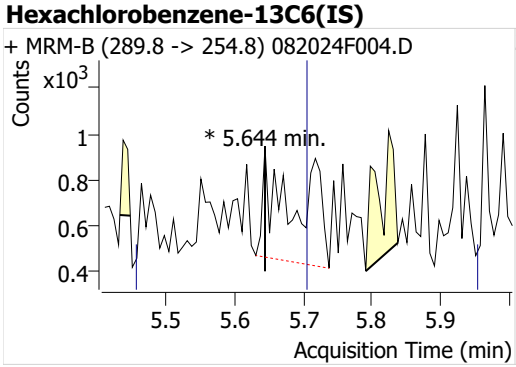
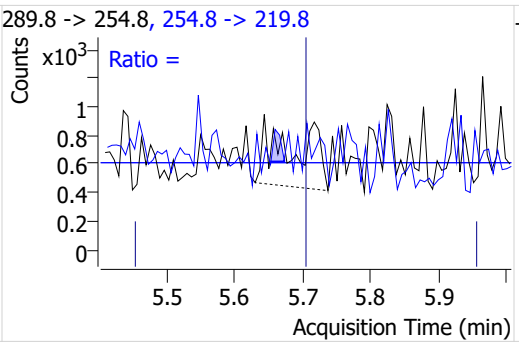


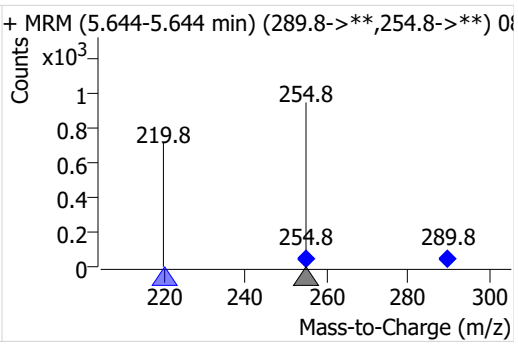




Hexachlorobenzene-13C6(IS)







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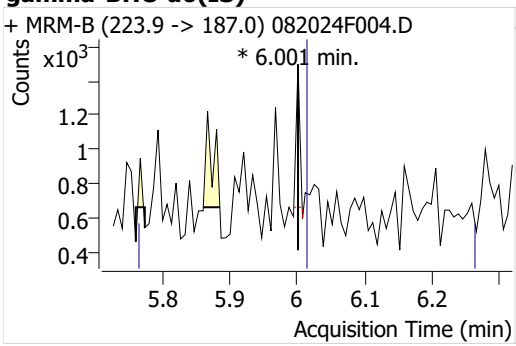
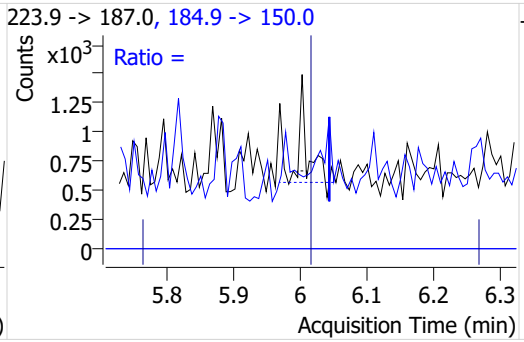
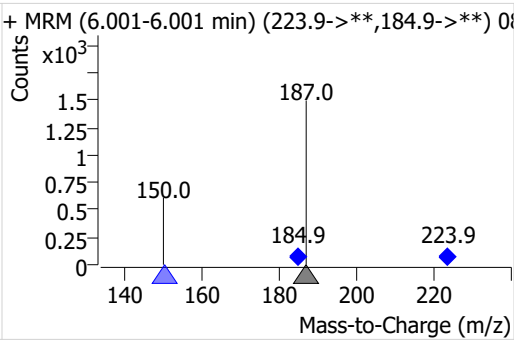
gamma-BHC-d6(IS)







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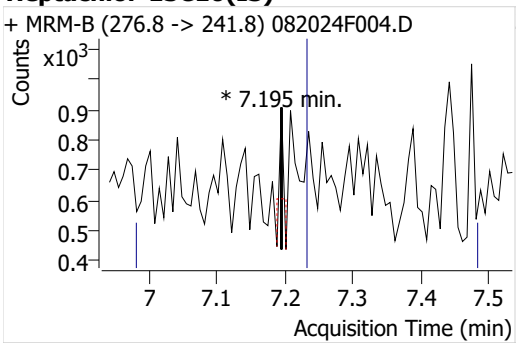

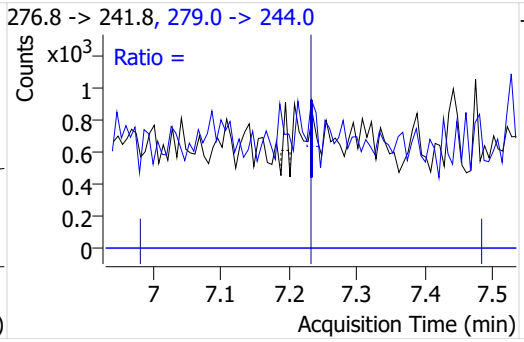

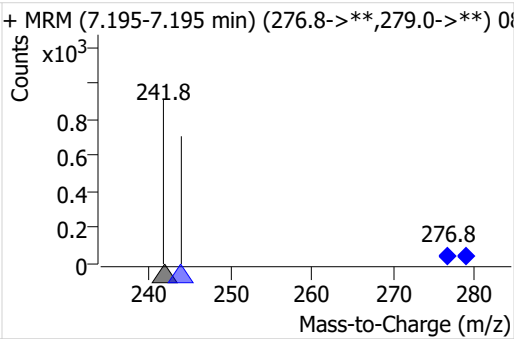

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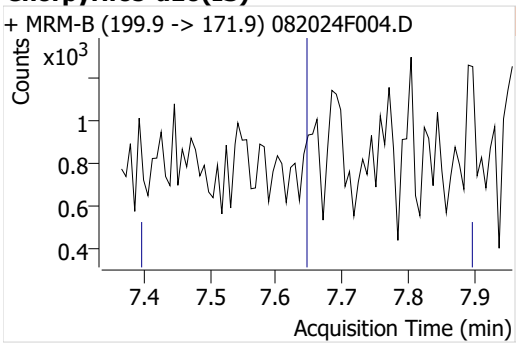

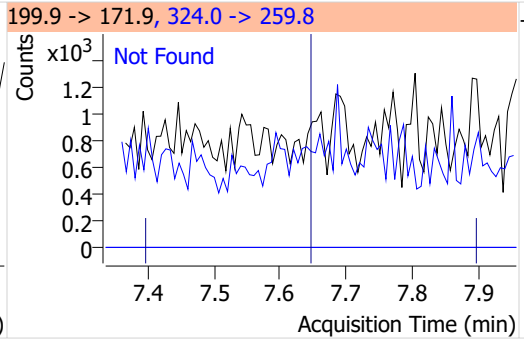

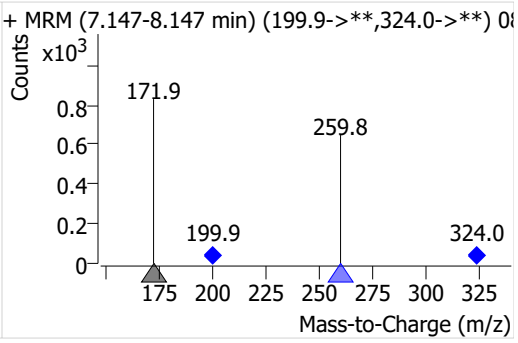

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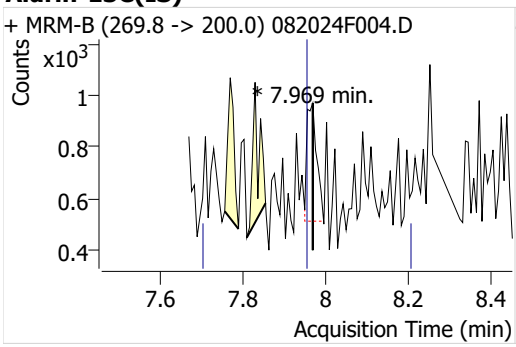

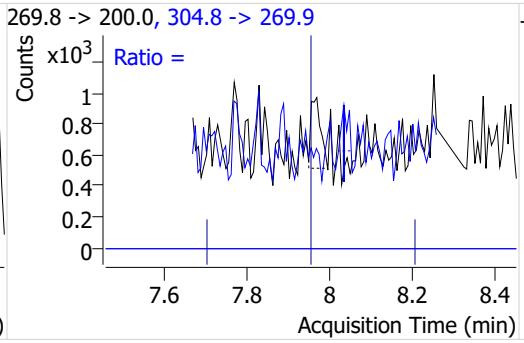

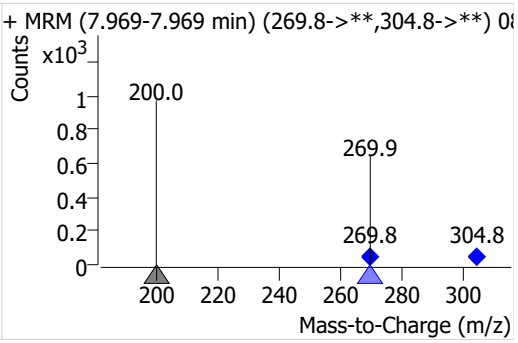

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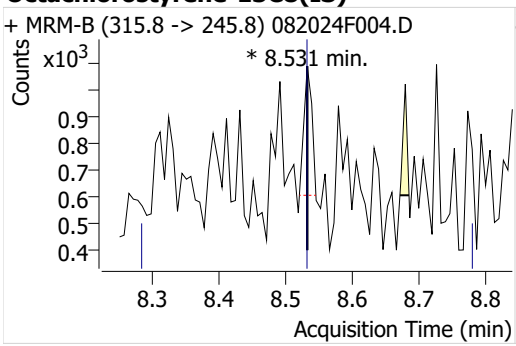
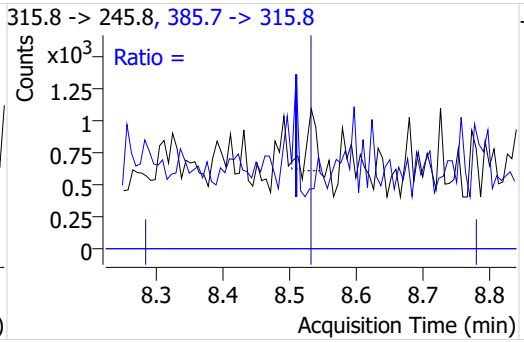
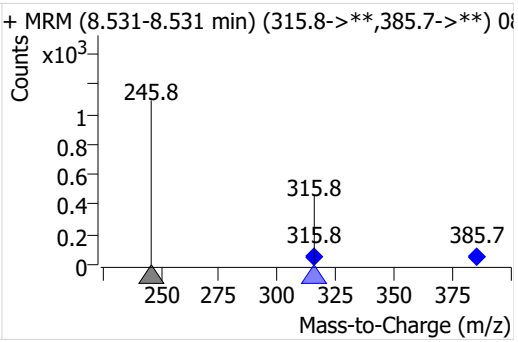
Octachlorostyrene-13C8(IS)







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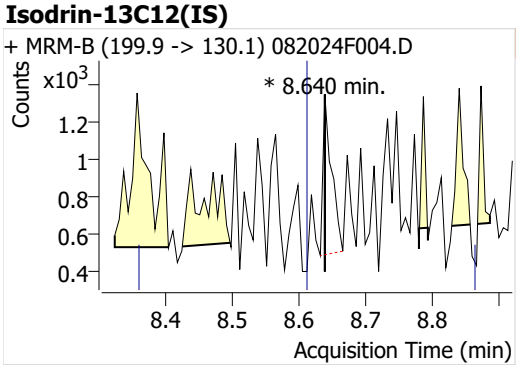

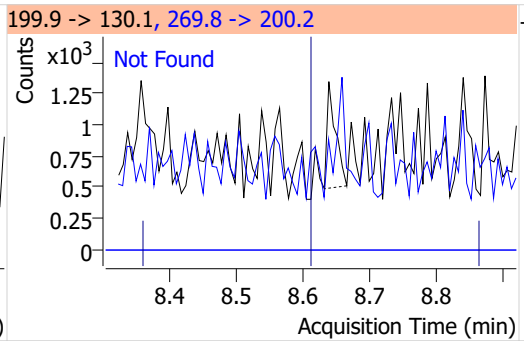

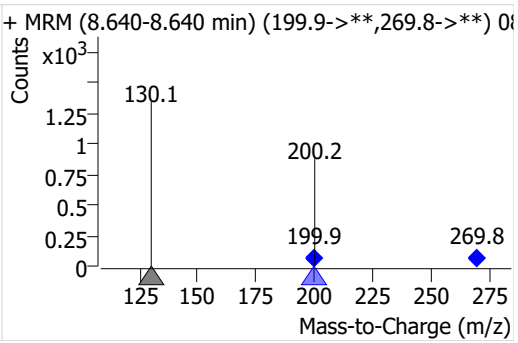

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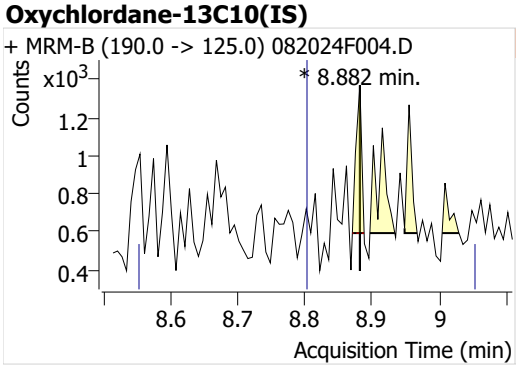

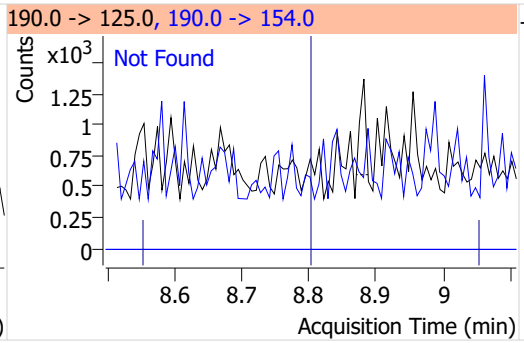

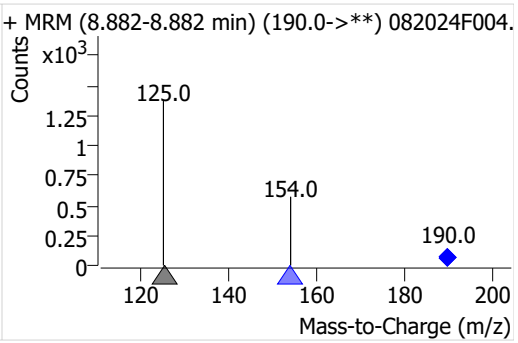

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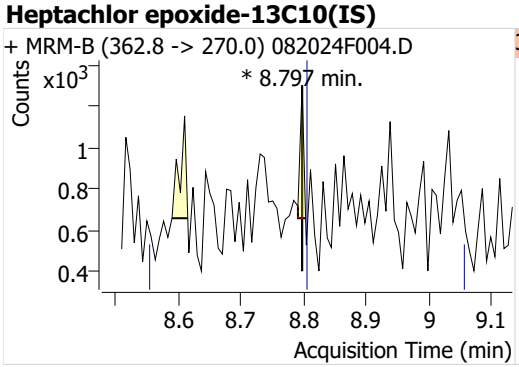

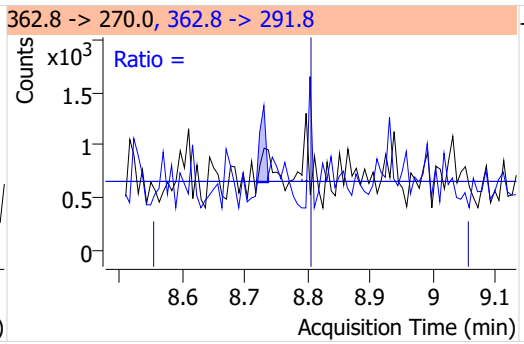

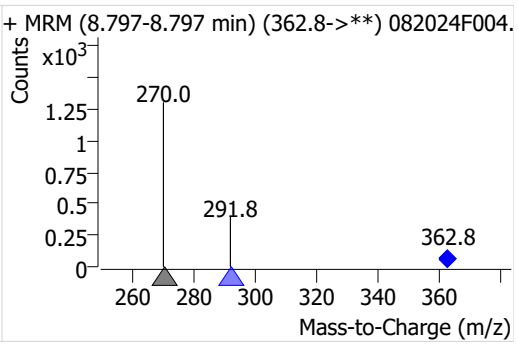

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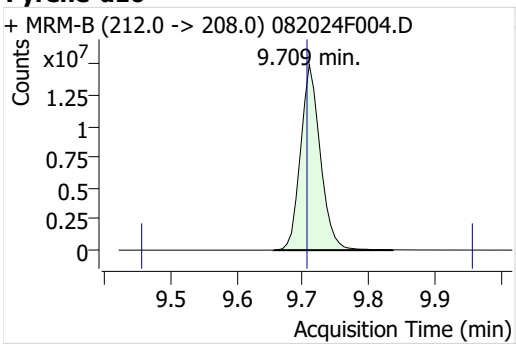
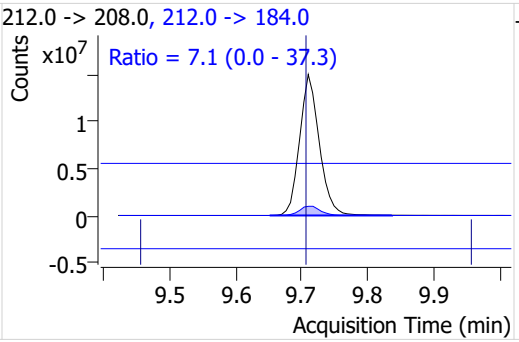
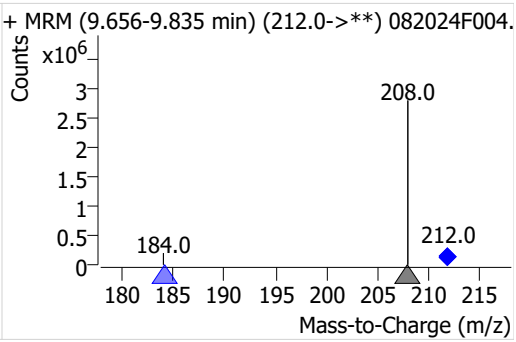
Pyrene-d10







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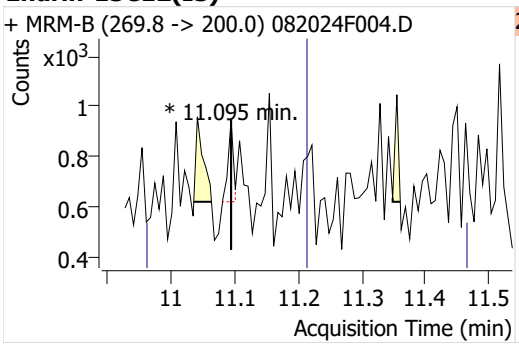

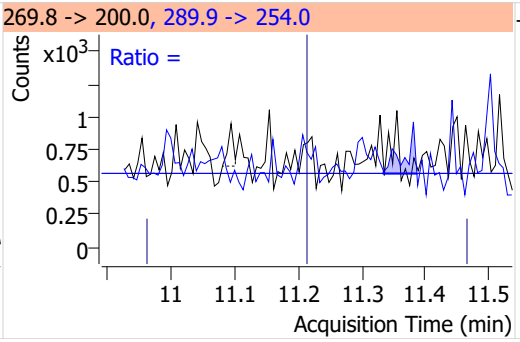

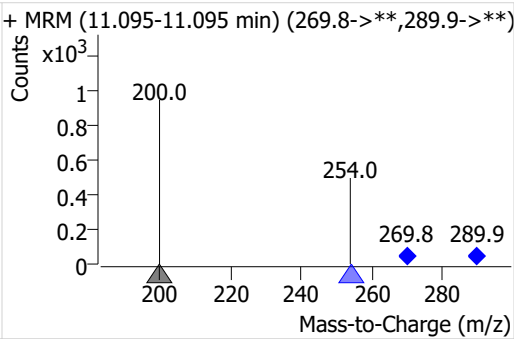

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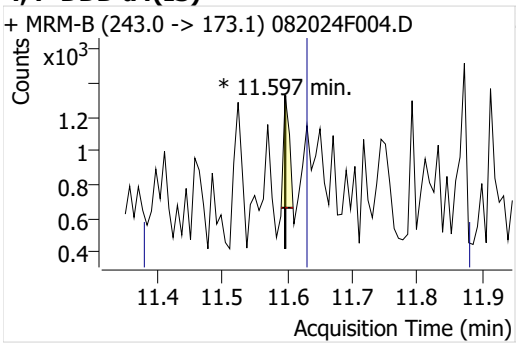

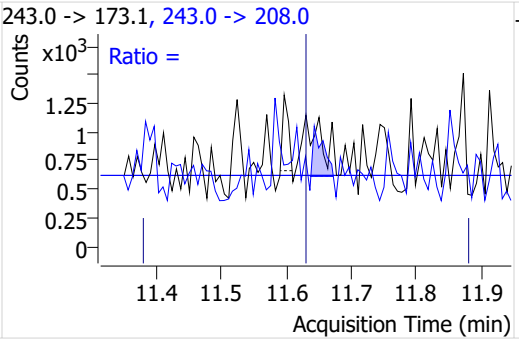

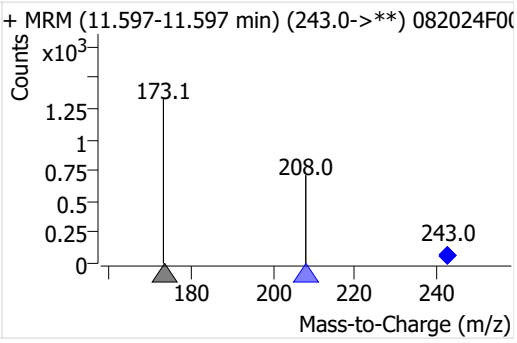

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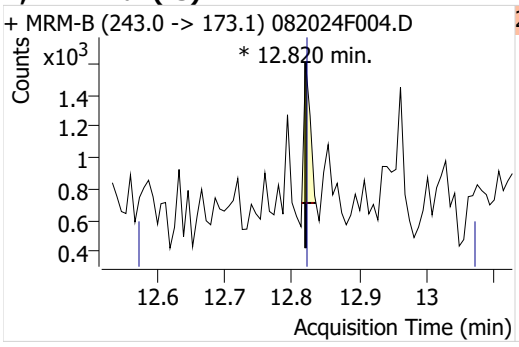

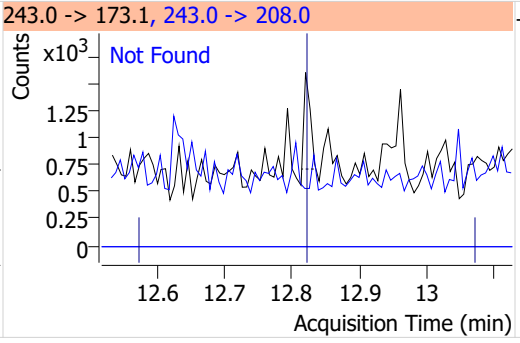

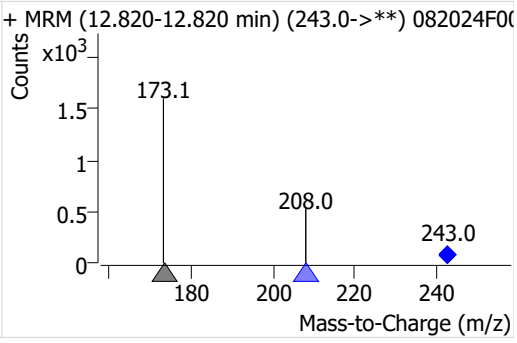

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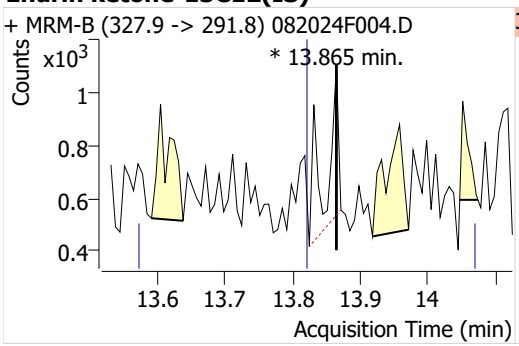
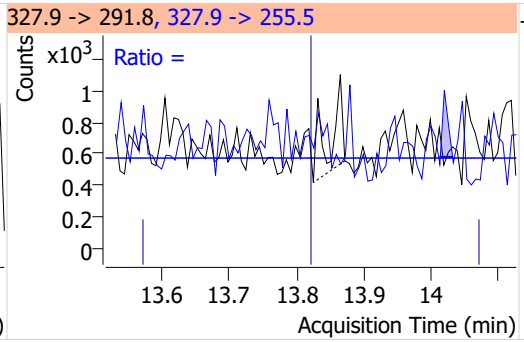
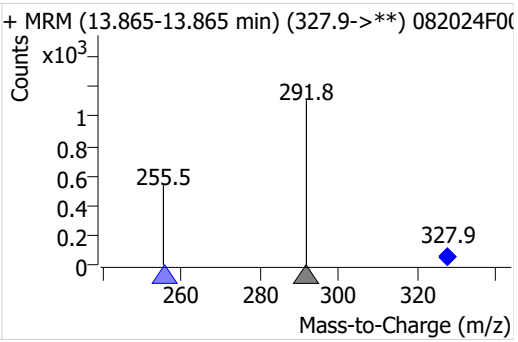
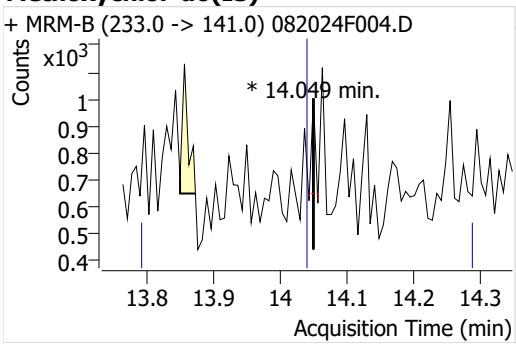
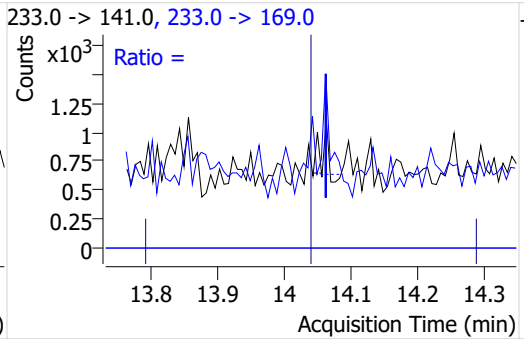


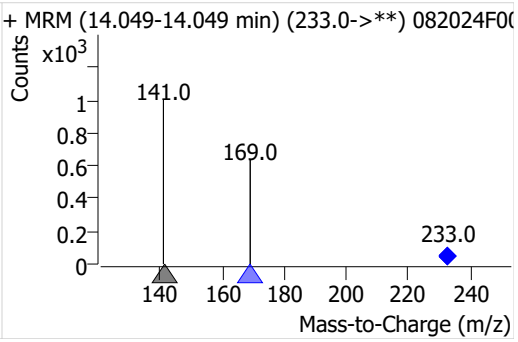




Methoxychlor-d6(IS)







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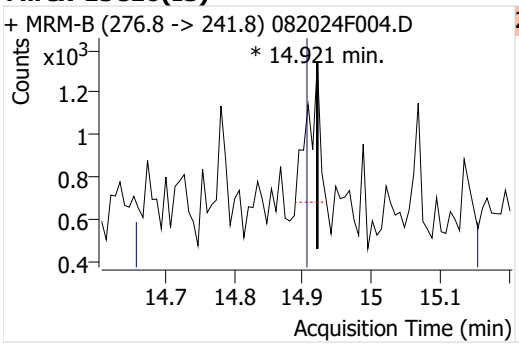

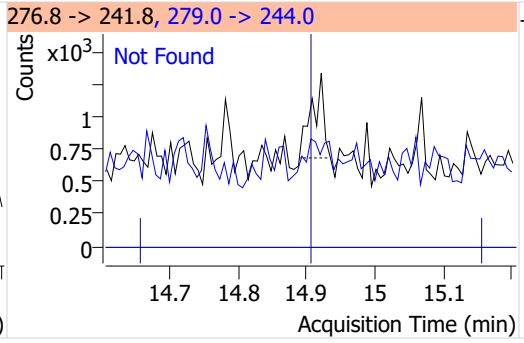

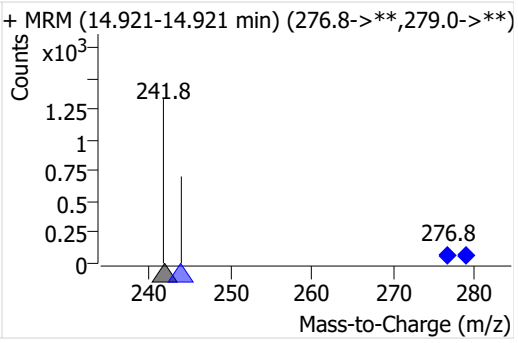

MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Acq. Date-Time	8/20/2024 11:55:35 AM	**Acq Operator**	
Name	OC PEST ICAL 0.5ppb SVM71-99A	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	8/20/2024 3:33:05 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	080624 OC PEST ICAL.batch.bin	**Vial**	3
Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.704	289.8 -> 254.8	4495395	20.0000 ng/ml	0.000
gamma-BHC-d6(IS)	6.018	223.9 -> 187.0	4564146	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	7.235	276.8 -> 241.8	3006887	20.0000 ng/ml	0.002
Chorpyrifos-d10(IS)	7.656	199.9 -> 171.9	1050385	20.0000 ng/ml	0.004
Aldrin-13C(IS)	7.949	269.8 -> 200.0	2447389	20.0000 ng/ml	0.003
Octachlorostyrene-13C8(IS)	8.538	315.8 -> 245.8	2819872	20.0000 ng/ml	0.006
Isodrin-13C12(IS)	8.619	199.9 -> 130.1	2061261	20.0000 ng/ml	0.003
Oxychlordane-13C10(IS)	8.808	190.0 -> 125.0	1355611	20.0000 ng/ml	0.005
Heptachlor epoxide-13C10(IS)	8.811	362.8 -> 270.0	786735	20.0000 ng/ml	0.005
Pyrene-d10	9.709	212.0 -> 208.0	12819141	100.0000 ng/ml	0.004
Endrin-13C12(IS)	11.222	269.8 -> 200.0	453869	20.0000 ng/ml	0.007
4,4'-DDD d4(IS)	11.630	243.0 -> 173.1	1587460	5.0000 ng/ml	0.003
4,4'-DDT-d4(IS)	12.834	243.0 -> 173.1	1000790	5.0000 ng/ml	0.011
Endrin ketone-13C12(IS)	13.832	327.9 -> 291.8	82348	20.0000 ng/ml	0.011
Methoxychlor-d6(IS)	14.055	233.0 -> 141.0	1436400	20.0000 ng/ml	0.013
Mirex-13C10(IS)	14.915	276.8 -> 241.8	2043491	5.0000 ng/ml	0.008

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**
Hexachlorobenzene-13C6	5.705	289.8 -> 254.8	4495395	19.866 ng/ml
		Spiked Amount = 20.0		Recovery = *99.3 %*
gamma-BHC-d6	6.014	223.9 -> 187.0	4564146	21.212 ng/ml
		Spiked Amount = 20.0		Recovery = *106.1 %*
Heptachlor-13C10	7.232	276.8 -> 241.8	3006887	20.012 ng/ml
		Spiked Amount = 20.0		Recovery = *100.1 %*
Chorpyrifos-d10	7.647	199.9 -> 171.9	1050385	20.301 ng/ml
		Spiked Amount = 20.0		Recovery = *101.5 %*
Aldrin-13C	7.955	269.8 -> 200.0	2450170	19.656 ng/ml
		Spiked Amount = 20.0		Recovery = *98.3 %*
Octachlorostyrene-13C8	8.531	315.8 -> 245.8	2819872	19.833 ng/ml
		Spiked Amount = 20.0		Recovery = *99.2 %*
Isodrin-13C12	8.613	199.9 -> 130.1	2061261	21.261 ng/ml
		Spiked Amount = 20.0		Recovery = *106.3 %*
Oxychlordane-13C10	8.803	190.0 -> 125.0	1355611	20.444 ng/ml
		Spiked Amount = 20.0		Recovery = *102.2 %*
Heptachlor epoxide-13C10	8.805	362.8 -> 270.0	786735	20.072 ng/ml
		Spiked Amount = 20.0		Recovery = *100.4 %*
Endrin-13C12	11.214	269.8 -> 200.0	453869	20.900 ng/ml
		Spiked Amount = 20.0		Recovery = *104.5 %*
4,4'-DDD d4	11.630	243.0 -> 173.1	1587460	4.603 ng/ml
		Spiked Amount = 5.0		Recovery = *92.1 %*
4,4'-DDT-d4	12.822	243.0 -> 173.1	1000790	5.593 ng/ml
		Spiked Amount = 5.0		Recovery = *111.9 %*
Endrin ketone-13C12	13.821	327.9 -> 291.8	82348	21.281 ng/ml
		Spiked Amount = 20.0		Recovery = *106.4 %*
Methoxychlor-d6	14.039	233.0 -> 141.0	1436400	18.708 ng/ml
		Spiked Amount = 20.0		Recovery = *93.5 %*

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System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.906	276.8 -> 241.8	2043491	4.548 ng/ml
		Spiked Amount = 5.0		Recovery = *91.0 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)	5.649	181.1 -> 145.1	303439	0.396 ng/ml	90
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.713	283.8 -> 213.9	176366	0.452 ng/ml	100
beta-BHC	gamma-BHC-d6(IS)	5.916	181.1 -> 145.1	279132	0.391 ng/ml	94
gamma-BHC(Lindane)	gamma-BHC-d6(IS)	6.070	181.1 -> 145.1	243052	0.413 ng/ml	99
delta-BHC	gamma-BHC-d6(IS)	6.436	181.1 -> 145.1	85432	0.406 ng/ml	82
Heptachlor	Heptachlor-13C10(IS)	7.238	271.7 -> 236.9	69416	0.451 ng/ml	1
Chorpyrifos	Chorpyrifos-d10(IS)	7.733	196.9 -> 169.0	27931	0.419 ng/ml	73
Aldrin	Aldrin-13C(IS)	7.958	254.9 -> 220.0	274381	0.663 ng/ml	7
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.544	342.8 -> 307.8	125307	0.438 ng/ml	98
Isodrin	Isodrin-13C12(IS)	8.620	193.0 -> 123.0	51244	0.452 ng/ml	93
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	8.818	352.8 -> 262.9	19689	0.448 ng/ml	88
Oxychlordane	Oxychlordane-13C10(IS)	8.809	114.9 -> 51.1	65798	0.394 ng/ml	94
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.413	271.8 -> 236.9	36922	0.383 ng/ml	99
2,4'-DDE	4,4'-DDD d4(IS)	9.434	246.0 -> 176.2	269905	0.474 ng/ml	91
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.767	271.8 -> 236.9	103465	0.427 ng/ml	97
Endosulfan I	Endrin-13C12(IS)	9.790	206.9 -> 172.0	14764	0.402 ng/ml	100
trans-Nanochlor	Oxychlordane-13C10(IS)	9.834	271.8 -> 236.9	31979	0.381 ng/ml	89
4,4' -DDE	4,4'-DDD d4(IS)	10.356	246.0 -> 176.2	177306	0.418 ng/ml	99
2,4'-DDD	4,4'-DDD d4(IS)	10.552	235.0 -> 165.1	176082	0.442 ng/ml	93
Dieldrin	Endrin-13C12(IS)	10.574	262.9 -> 193.0	18661	0.394 ng/ml	90
Endrin	Endrin-13C12(IS)	11.230	262.8 -> 193.0	13345	0.502 ng/ml	91
Endosulfan II	Endrin-13C12(IS)	11.580	206.9 -> 172.0	7597 ***m***	0.421 ng/ml	82
4,4'-DDD	4,4'-DDD d4(IS)	11.719	235.0 -> 165.1	136599	0.426 ng/ml	99
cis-Nonachlor	Oxychlordane-13C10(IS)	11.716	271.8 -> 236.9	26398	0.432 ng/ml	97
2,4'-DDT	4,4'-DDT-d4(IS)	11.800	235.0 -> 165.1	89821	0.325 ng/ml	99
Endrin aldehyde	Endrin-13C12(IS)	12.077	249.9 -> 214.9	4168	0.423 ng/ml	96
Endosulfan sulfate	Endrin-13C12(IS)	12.771	271.9 -> 237.0	24464	0.440 ng/ml	93
4,4'-DDT	4,4'-DDT-d4(IS)	12.896	235.0 -> 165.1	114952	0.493 ng/ml	91
Endrin ketone	Endrin ketone-13C12(IS)	13.844	147.0 -> 111.0	10067	0.556 ng/ml	88
Methoxychlor	Methoxychlor-d6(IS)	14.084	227.0 -> 141.1	34144	0.444 ng/ml	97
Mirex	Mirex-13C10(IS)	14.916	271.8 -> 236.8	231346	0.561 ng/ml	91

(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram

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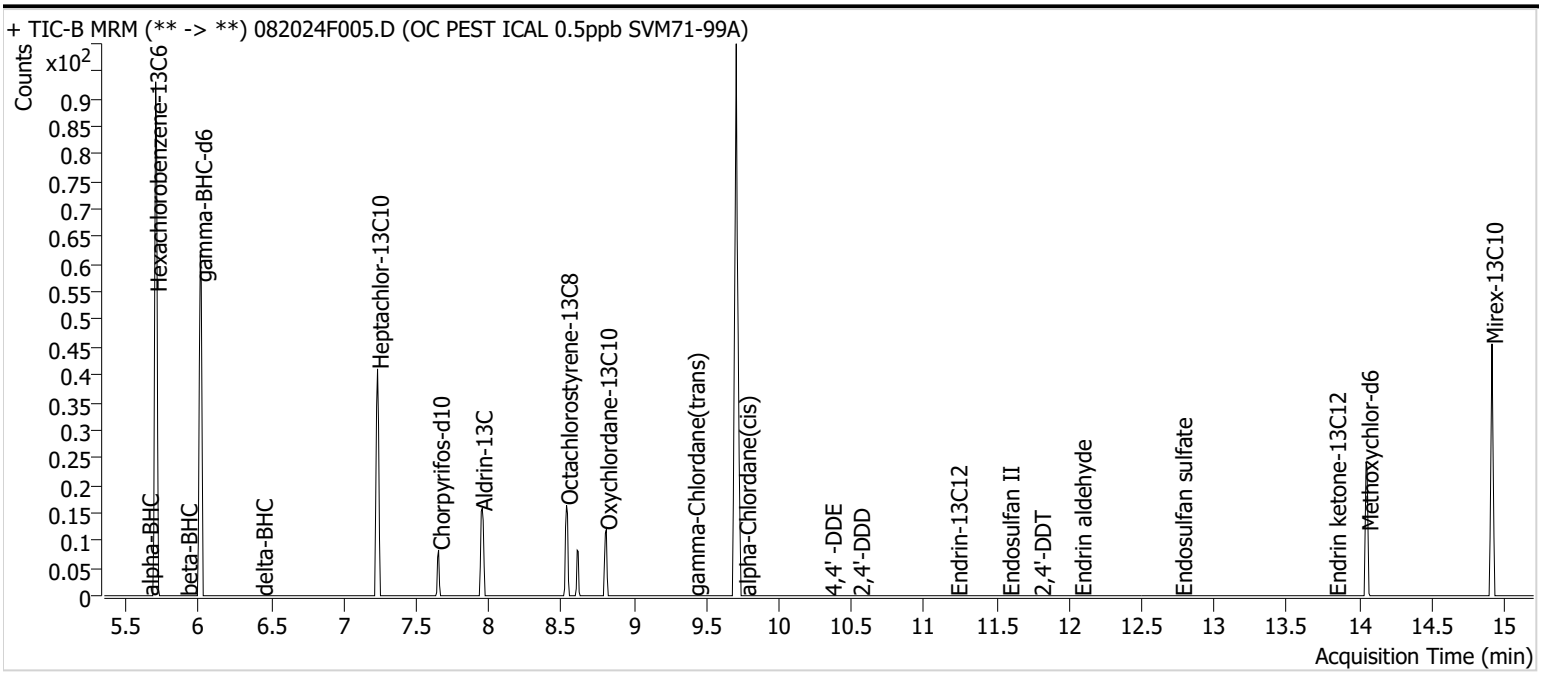
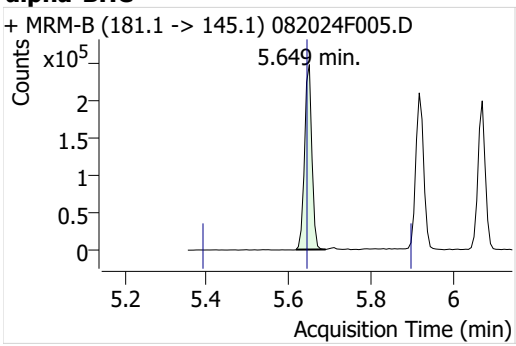
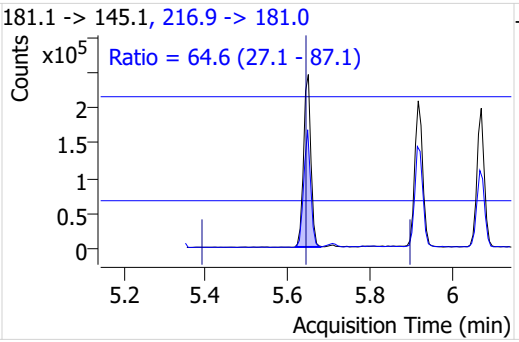
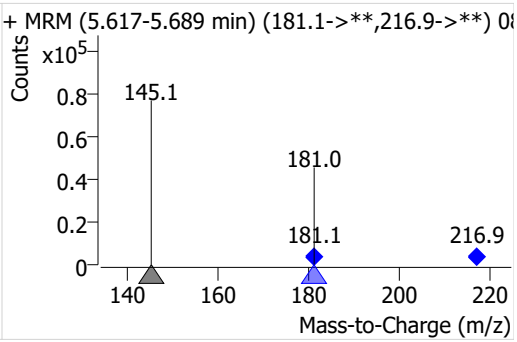


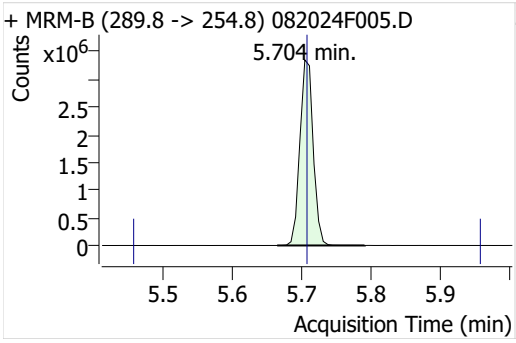
alpha-BHC

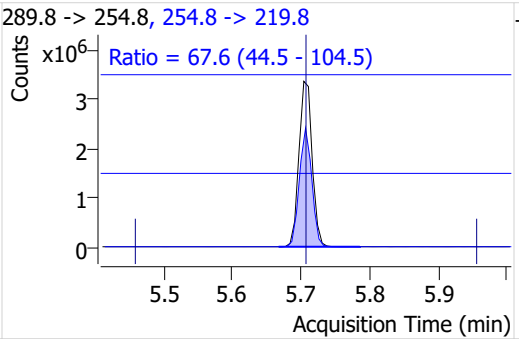


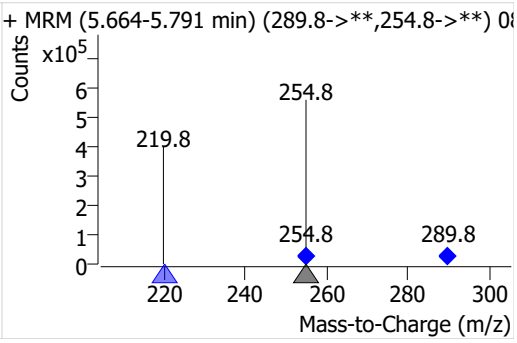




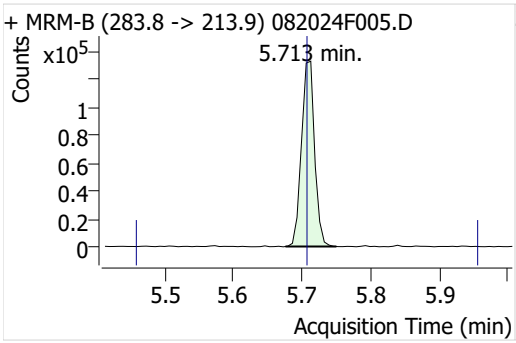
Hexachlorobenzene-13C6

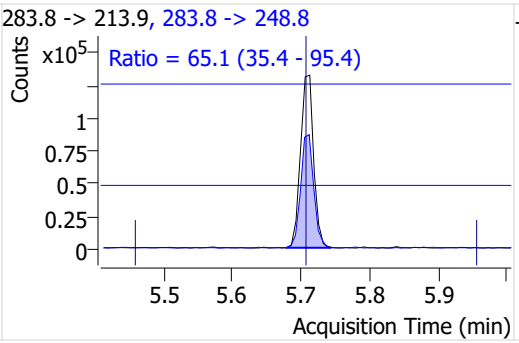


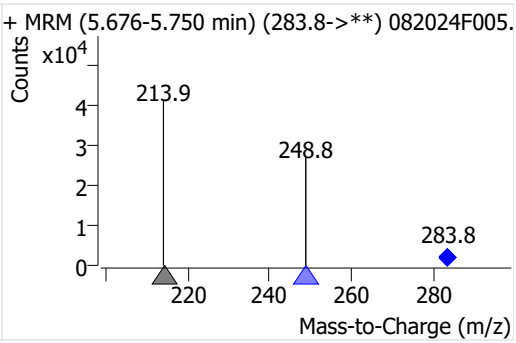




Hexachlorobenzene







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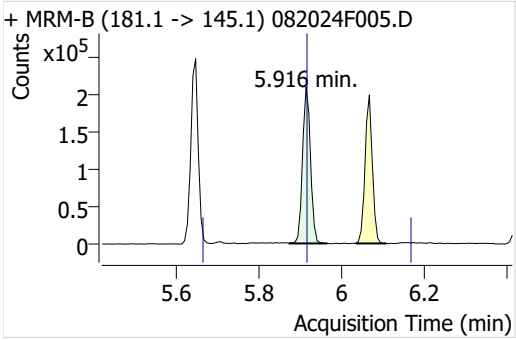
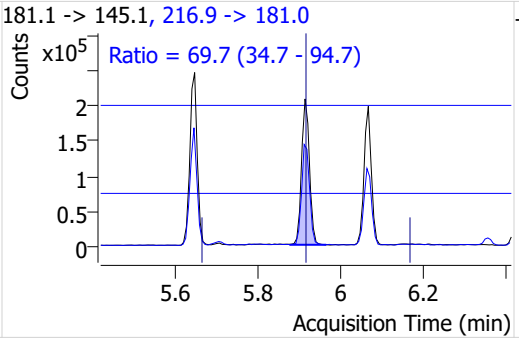
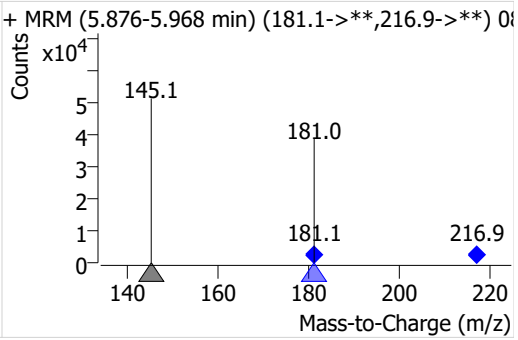
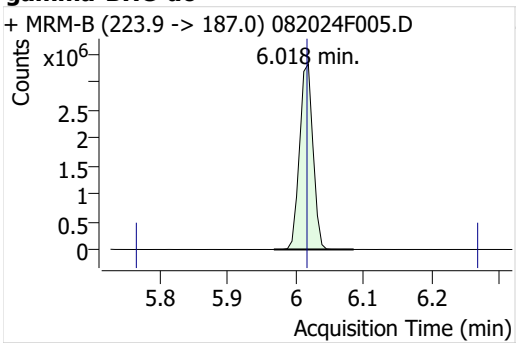
beta-BHC

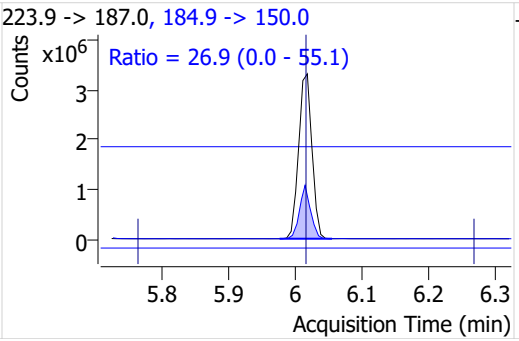


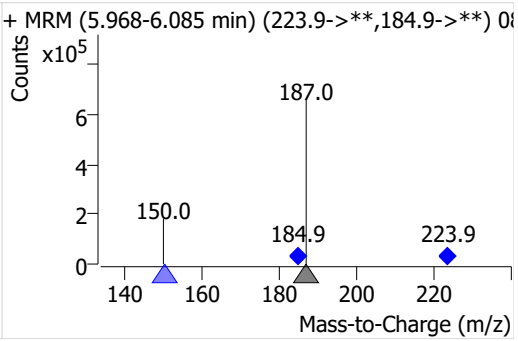




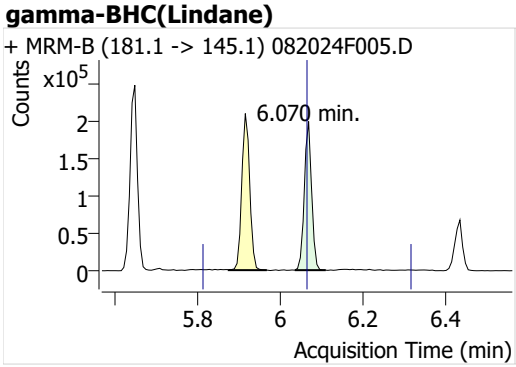
gamma-BHC-d6

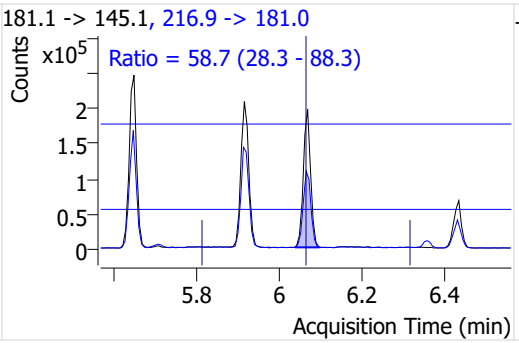


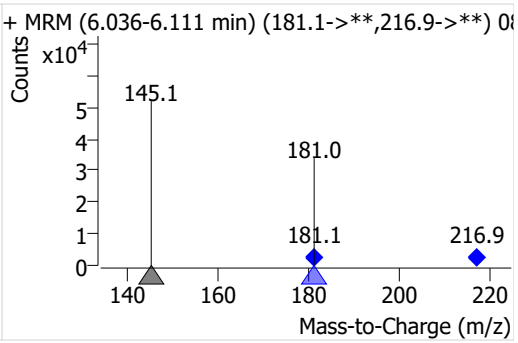




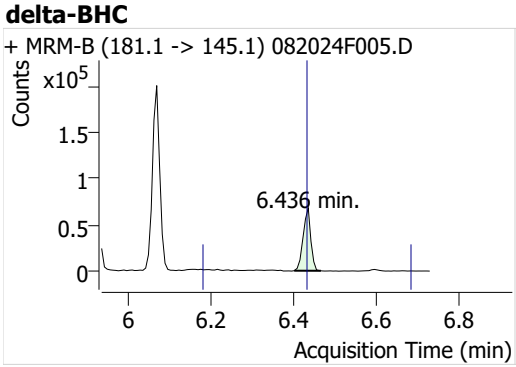
gamma-BHC(Lindane)

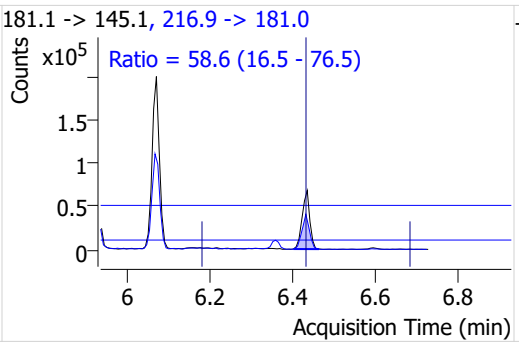


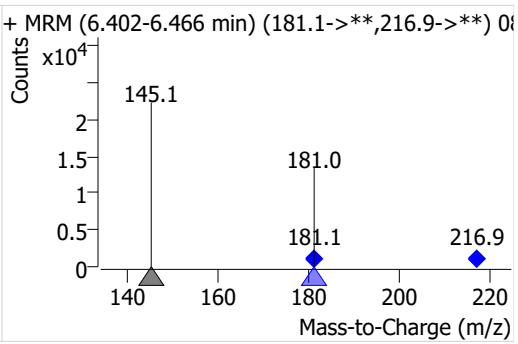




delta-BHC







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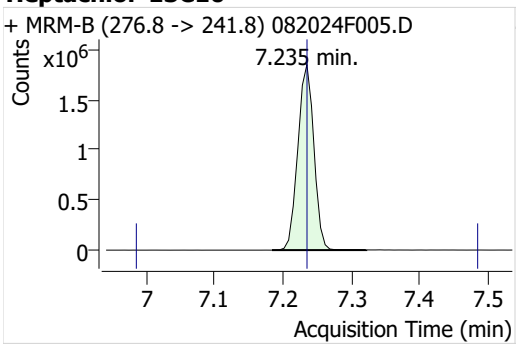
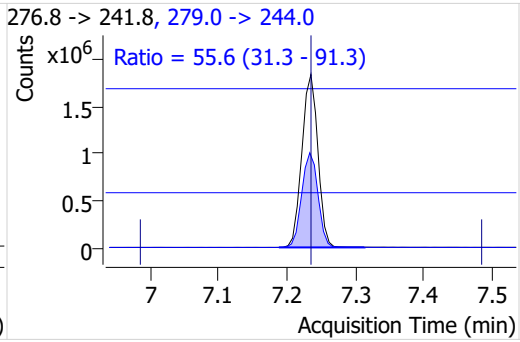
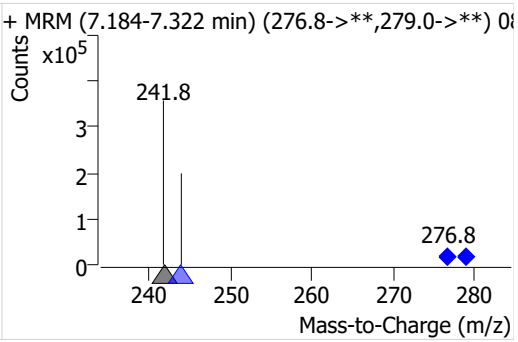
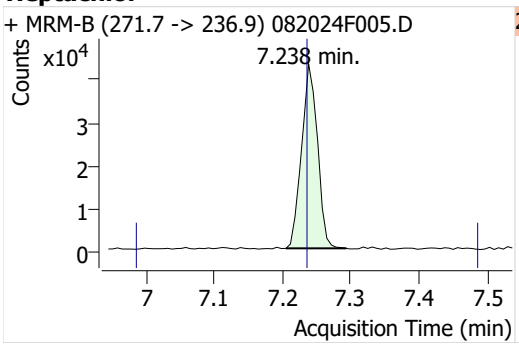
Heptachlor-13C10

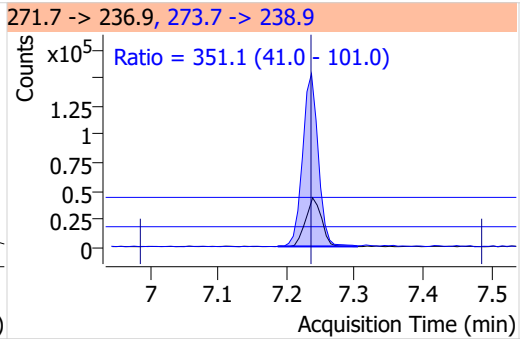


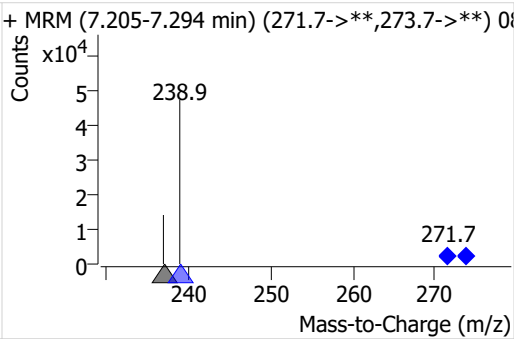




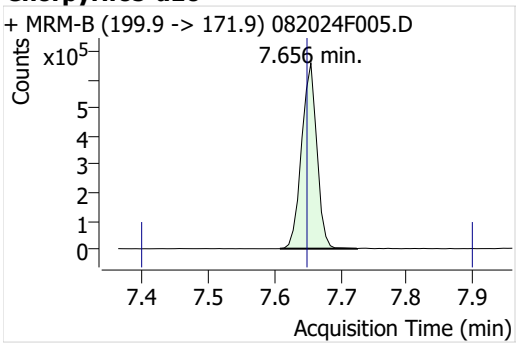
Heptachlor

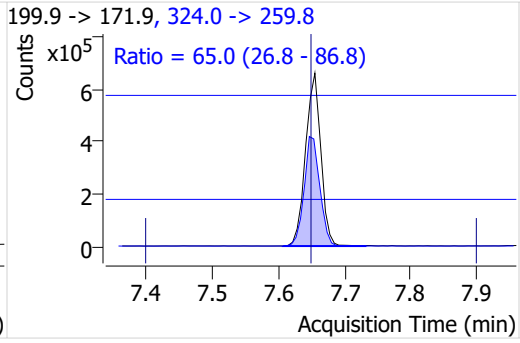


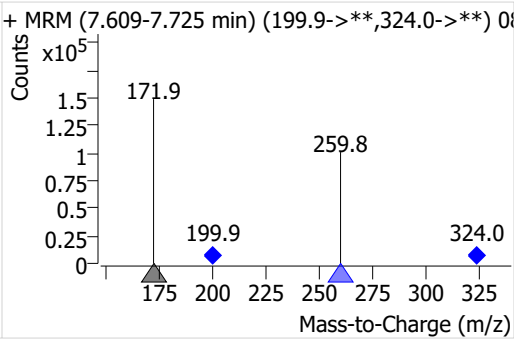




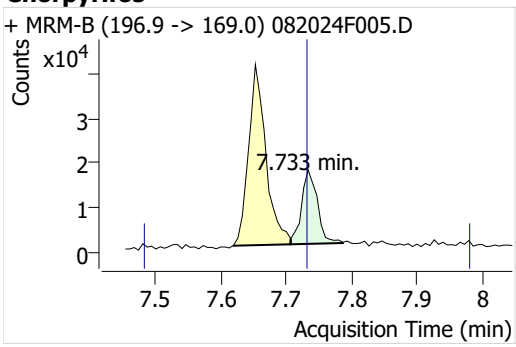
Chorpyrifos-d10

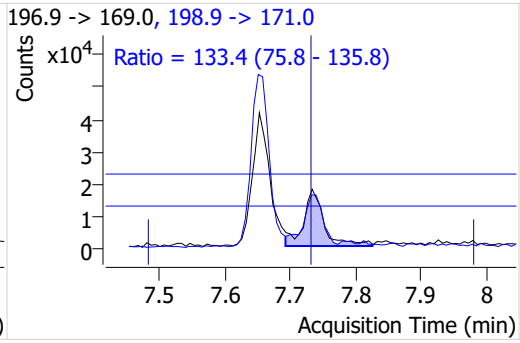


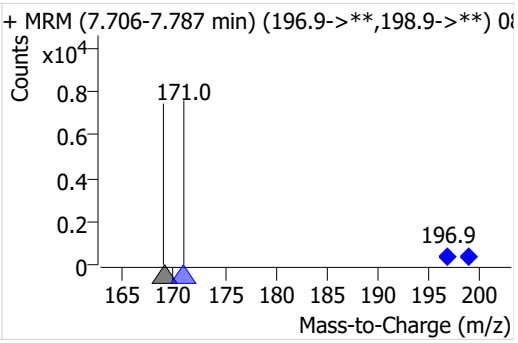




Chorpyrifos







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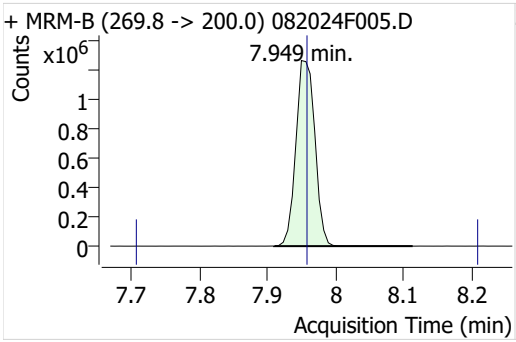
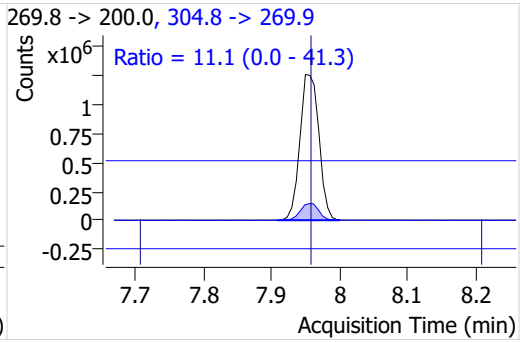
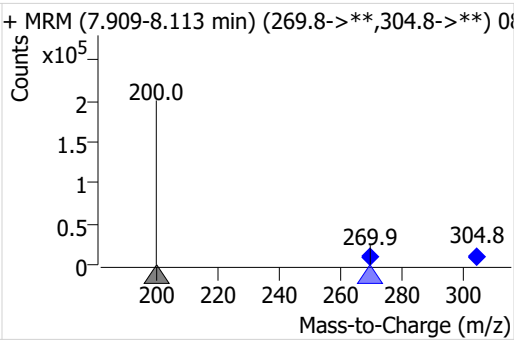
Aldrin-13C







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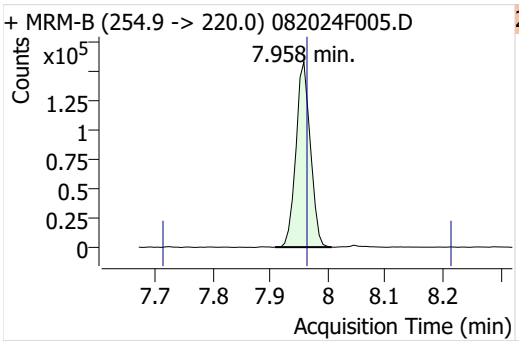
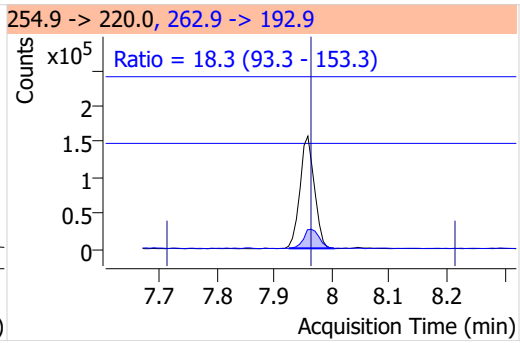
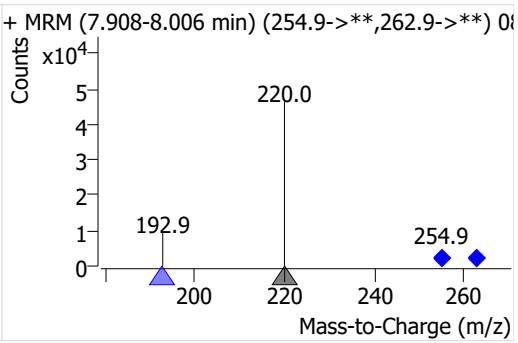
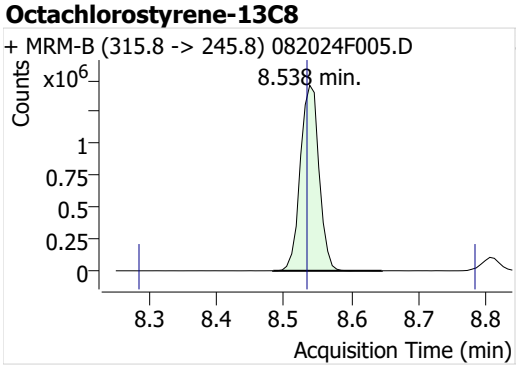
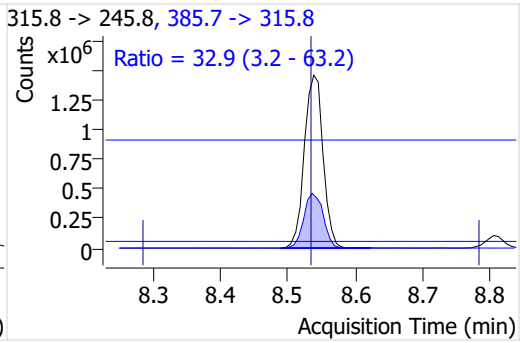


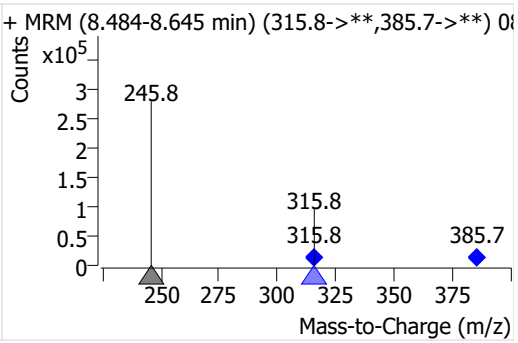




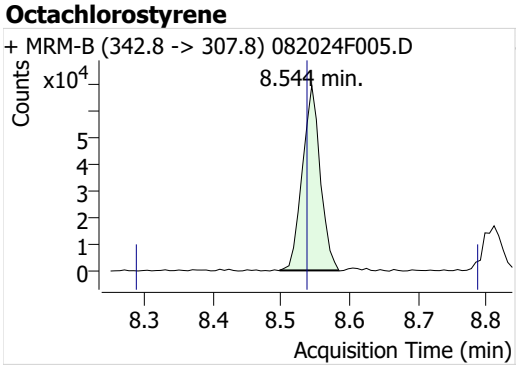
Octachlorostyrene-13C8

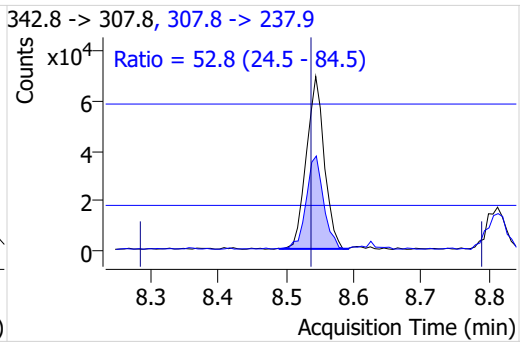


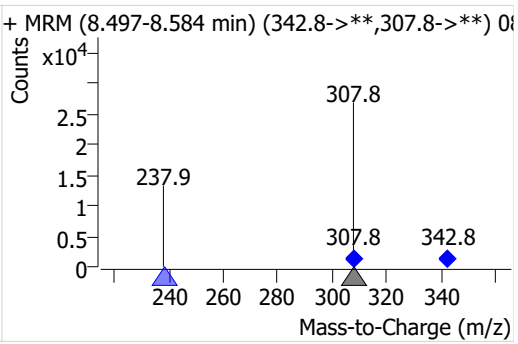




Octachlorostyrene







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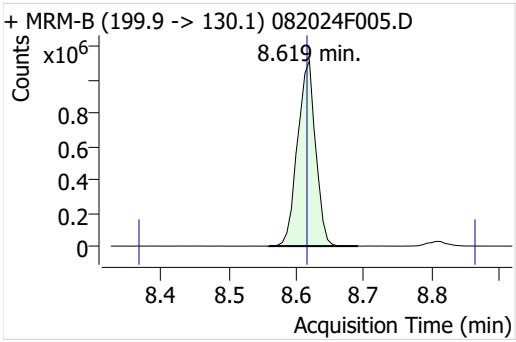
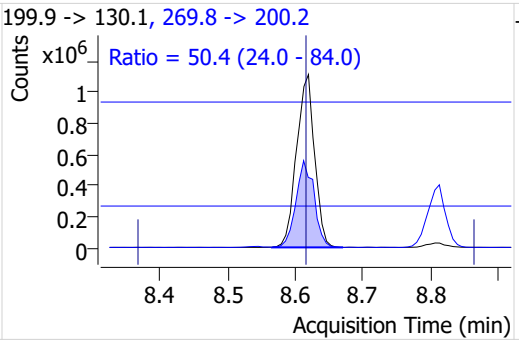
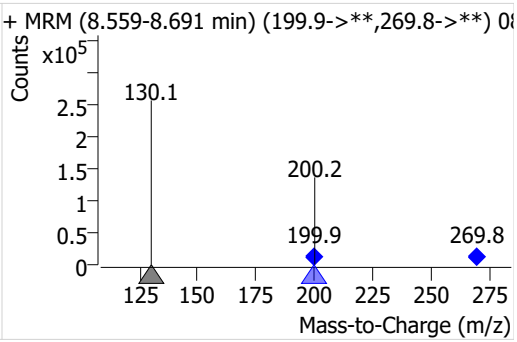
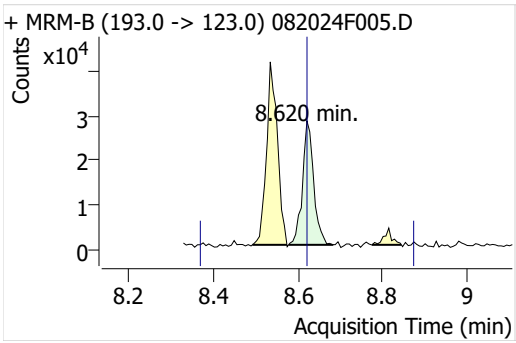
Isodrin-13C12

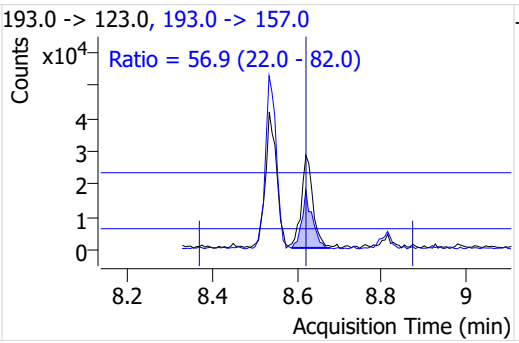


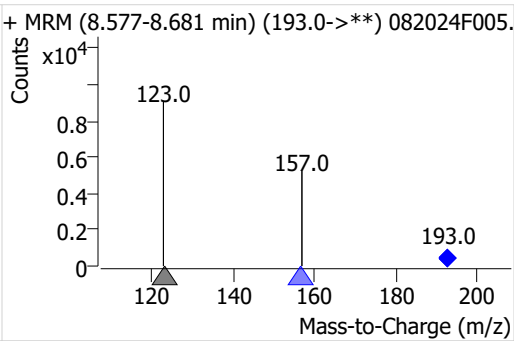




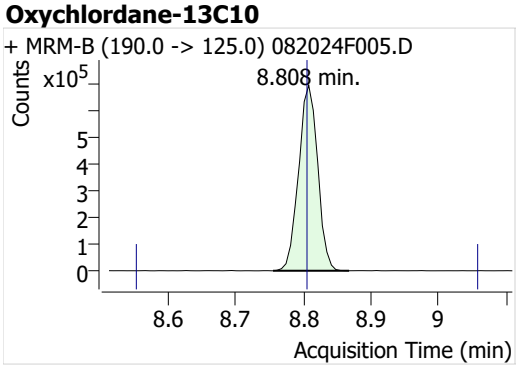
Isodrin

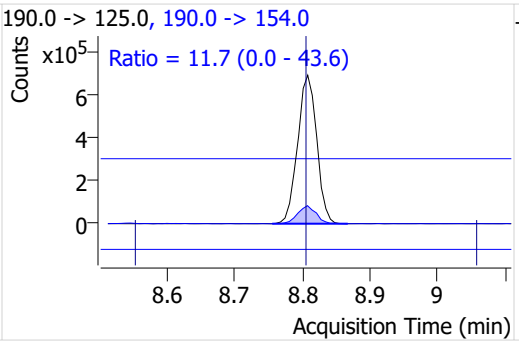


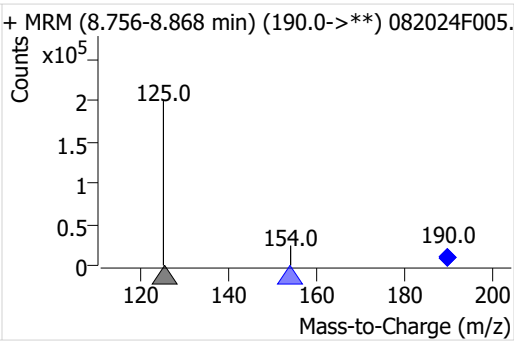




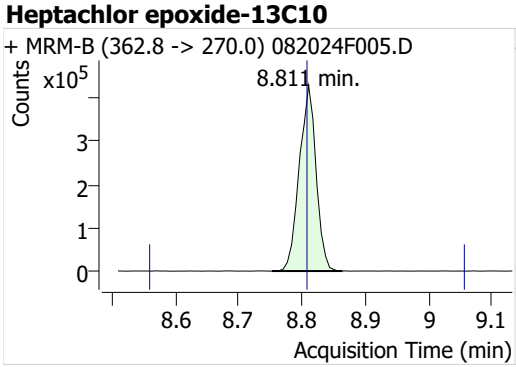
Oxychlordane-13C10

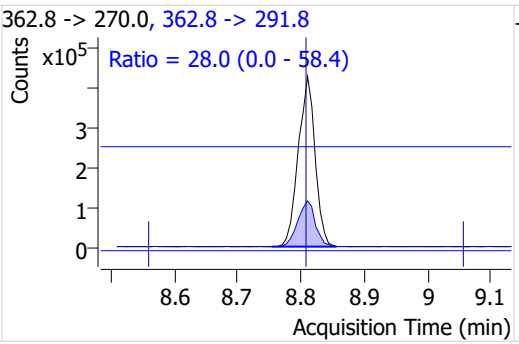


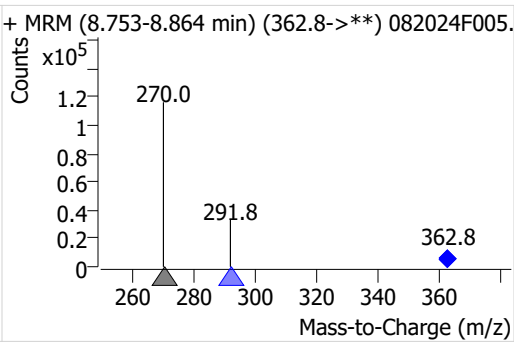




Heptachlor epoxide-13C10







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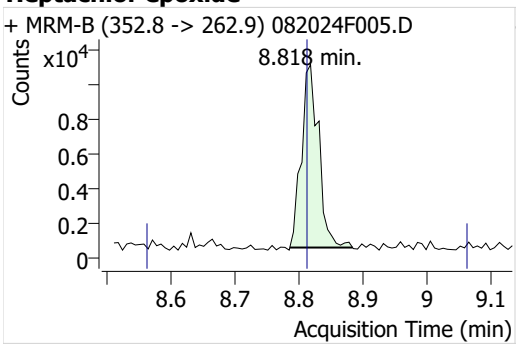
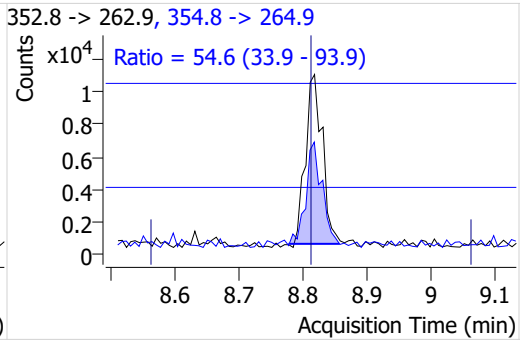
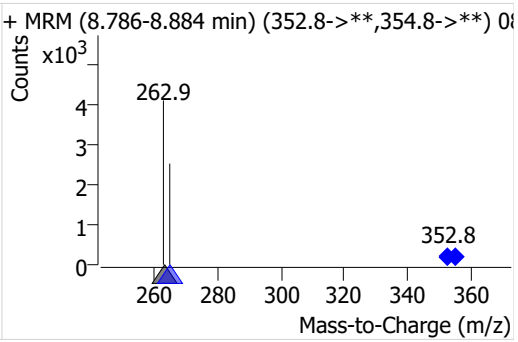
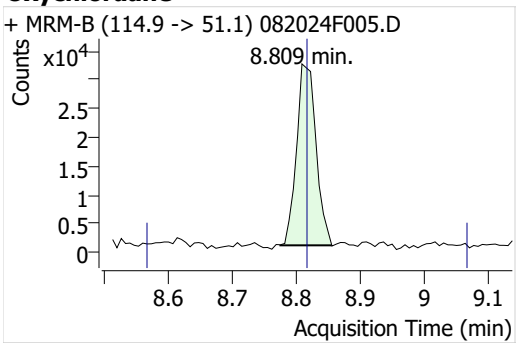
Heptachlor epoxide

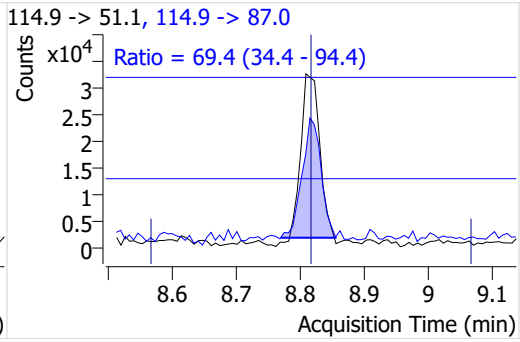


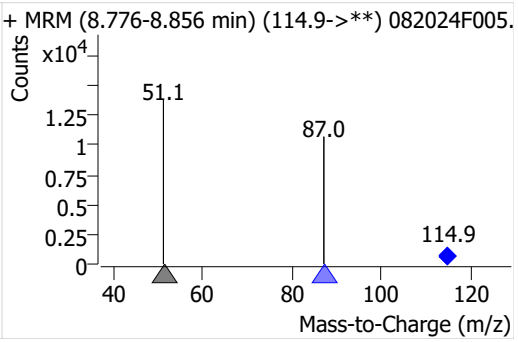




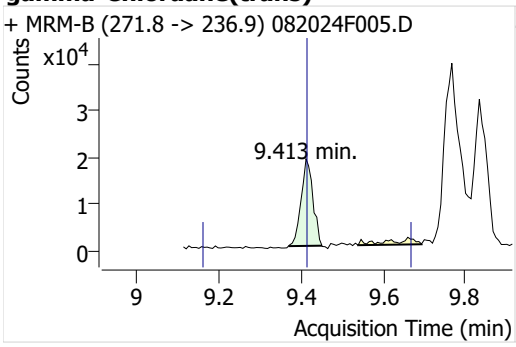
Oxychlordane

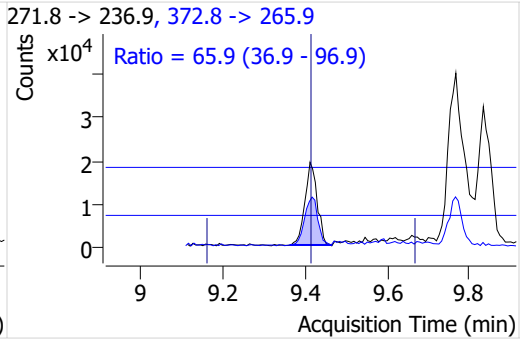


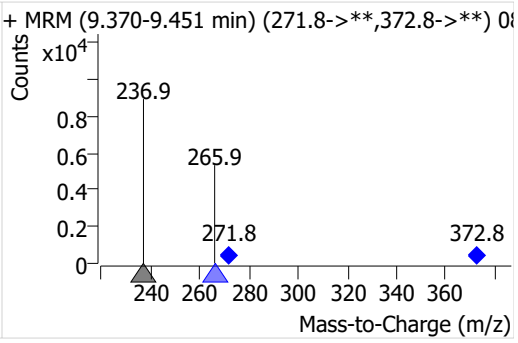




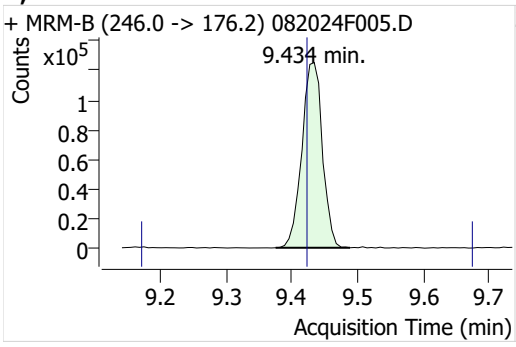
gamma-Chlordane(trans)

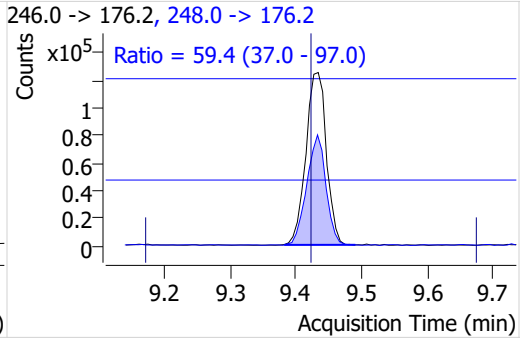


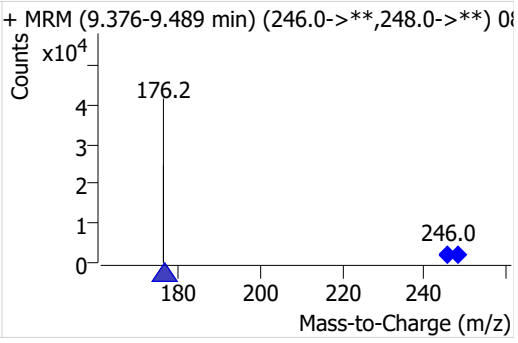




2,4'-DDE







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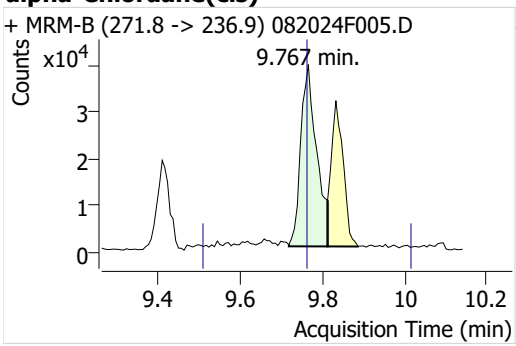
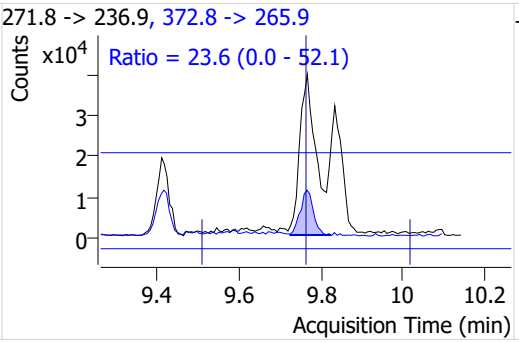
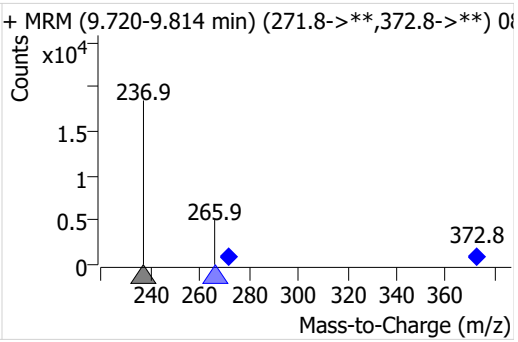
alpha-Chlordane(cis)







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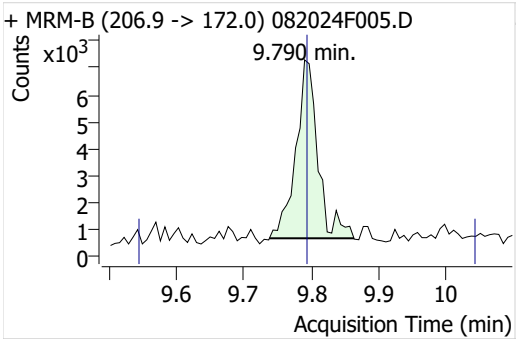
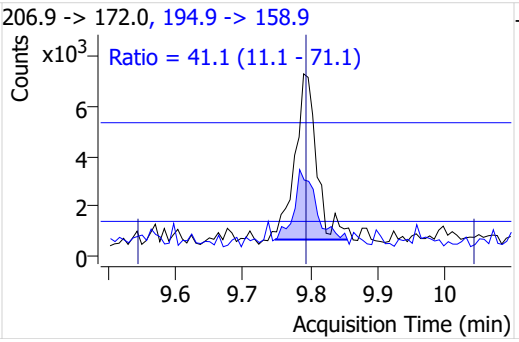
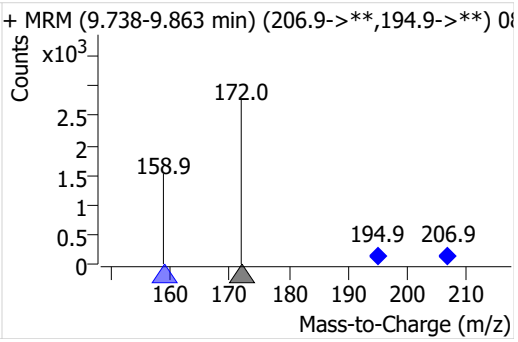
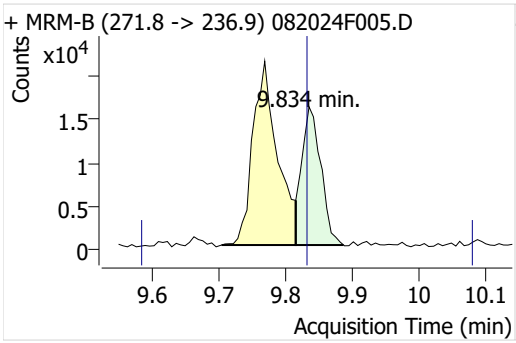
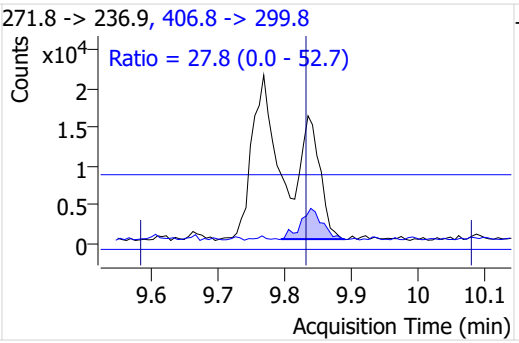


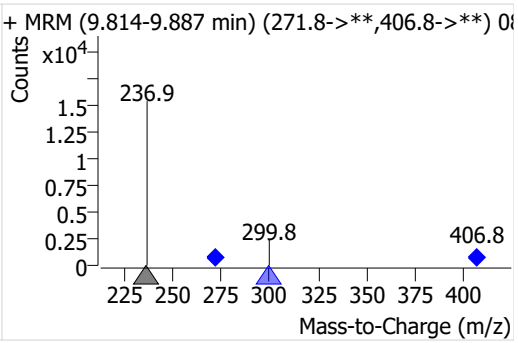




trans-Nanochlor







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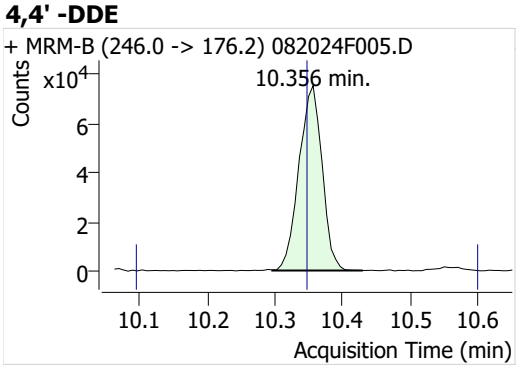

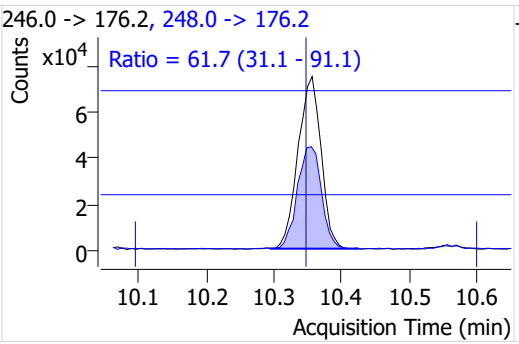

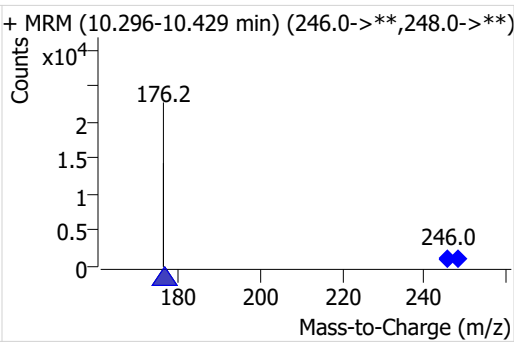

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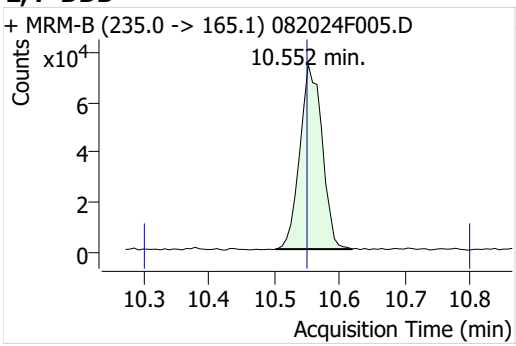
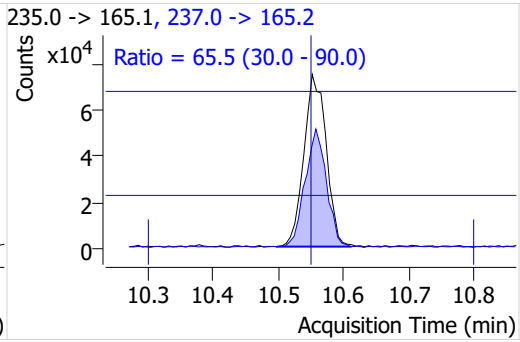
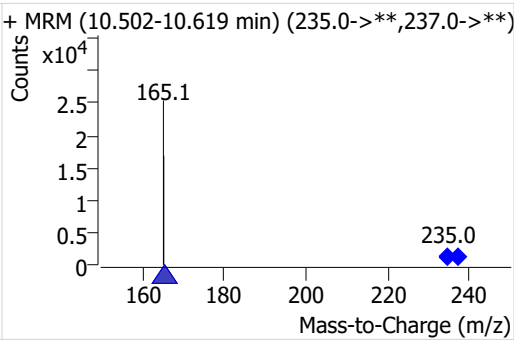
2,4'-DDD







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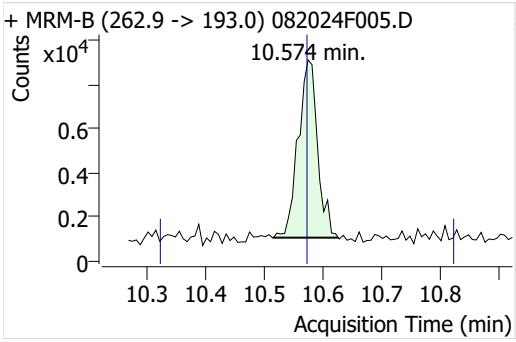
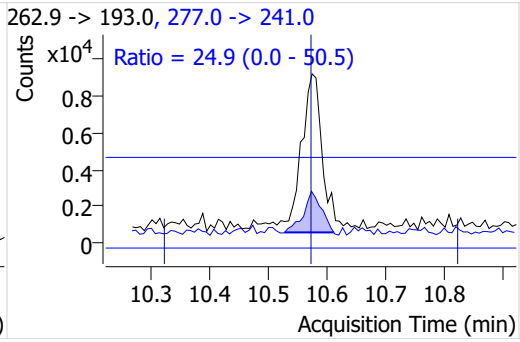
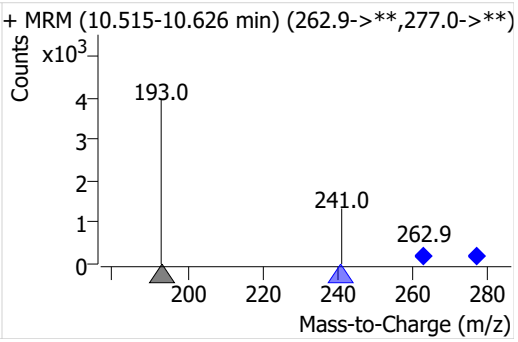
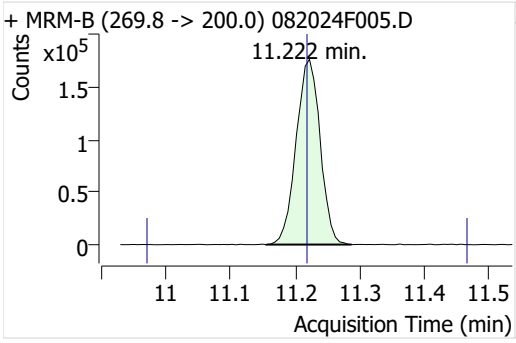
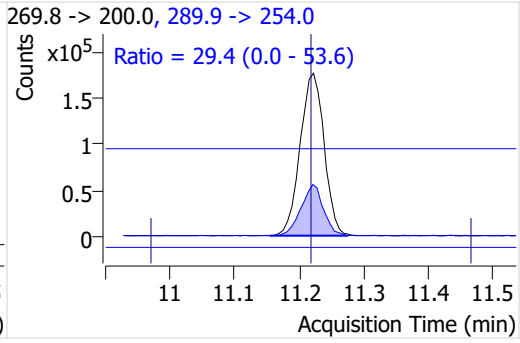


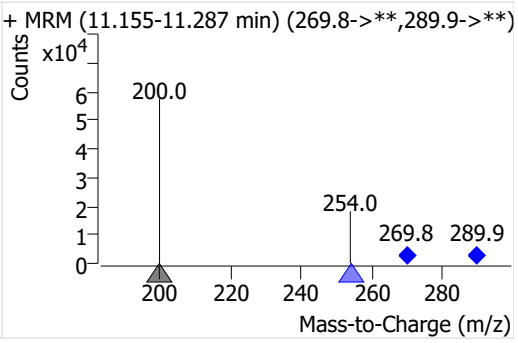




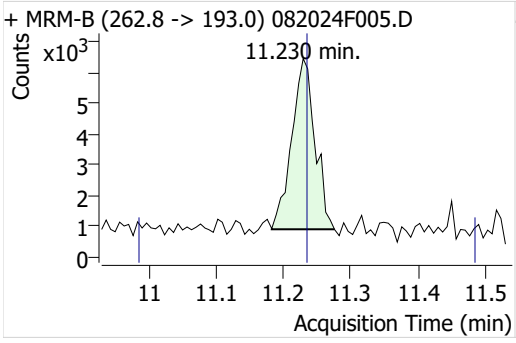
Endrin-13C12

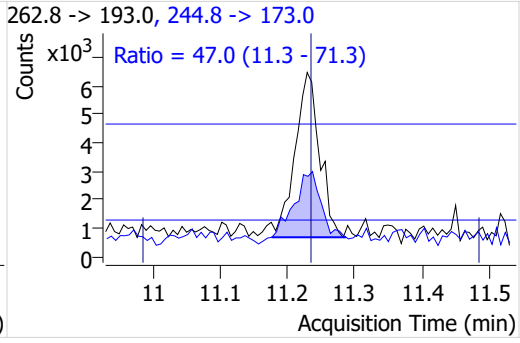


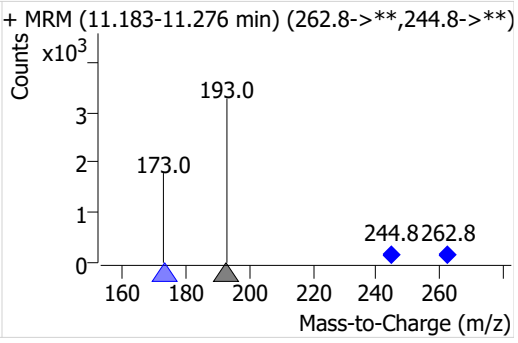




Endrin







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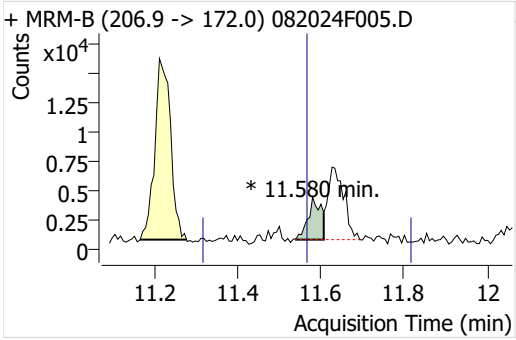
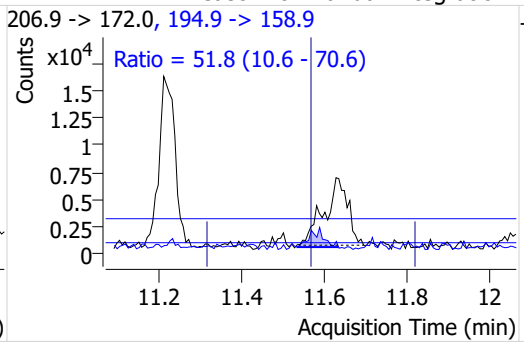
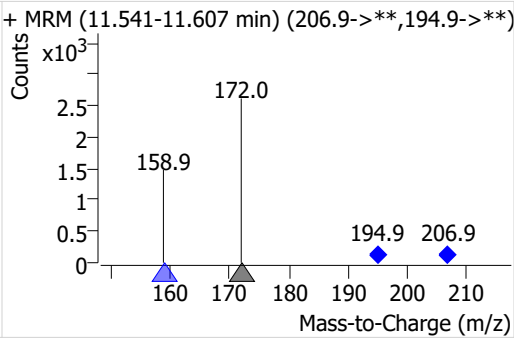
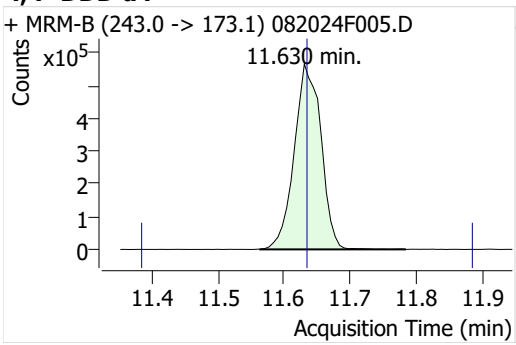
Endosulfan II Reason for Manual Integration: **BLC**

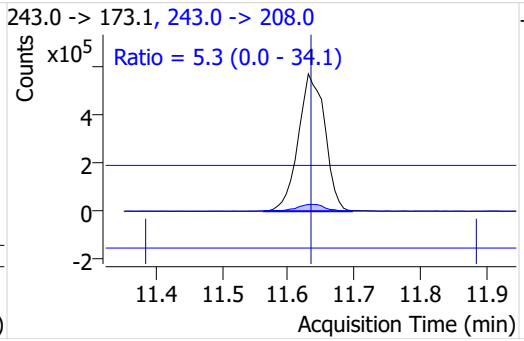


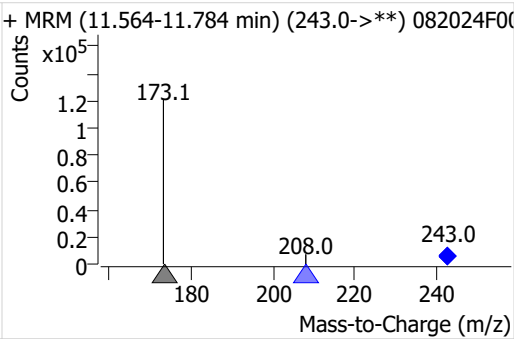




4,4'-DDD d4







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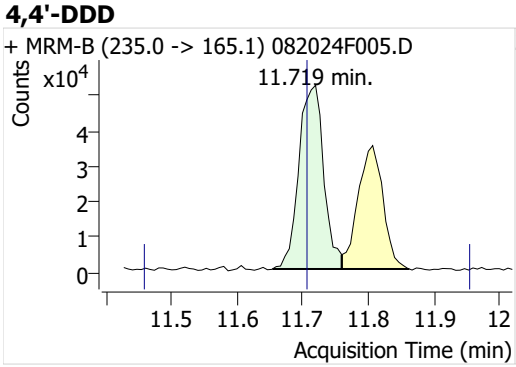

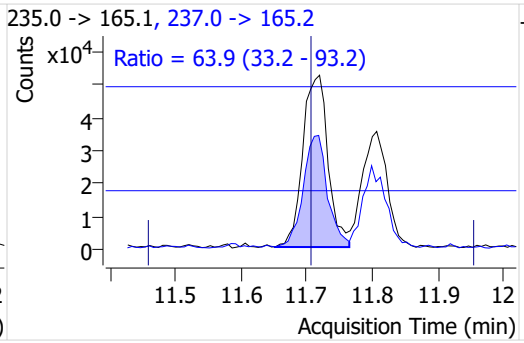

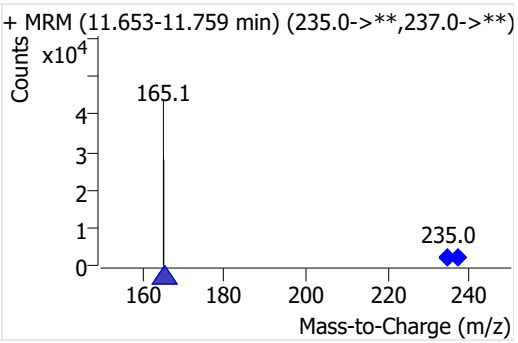

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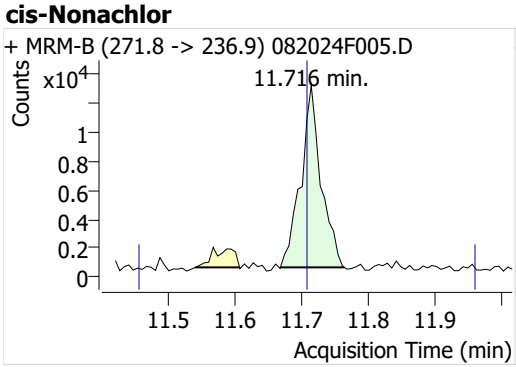

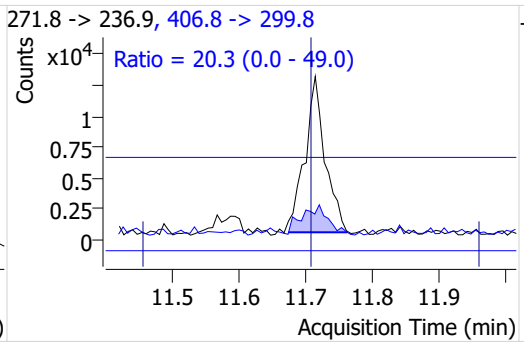

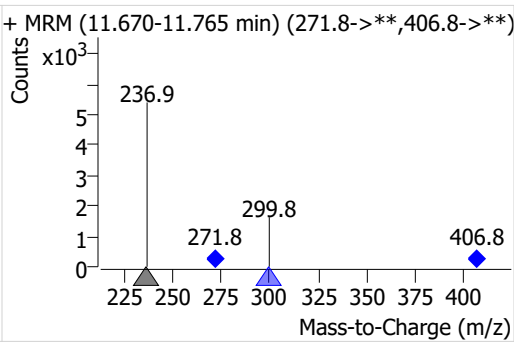

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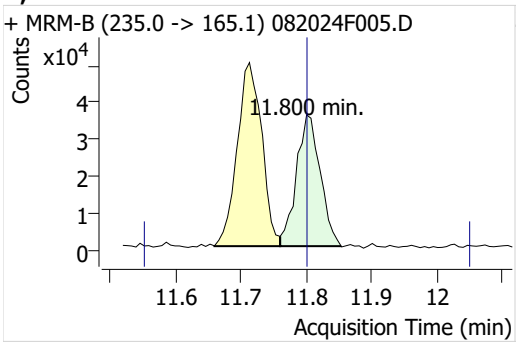
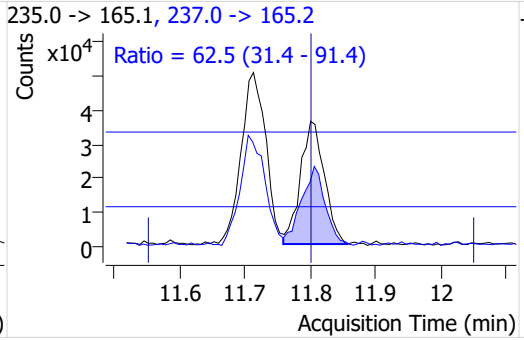
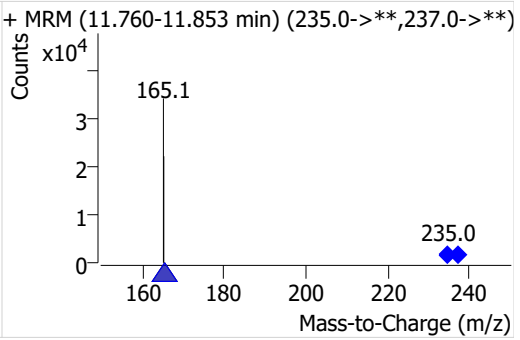
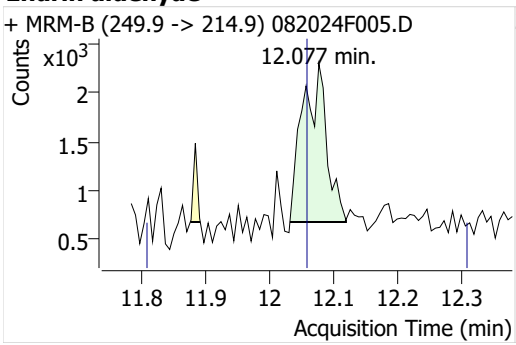
2,4'-DDT

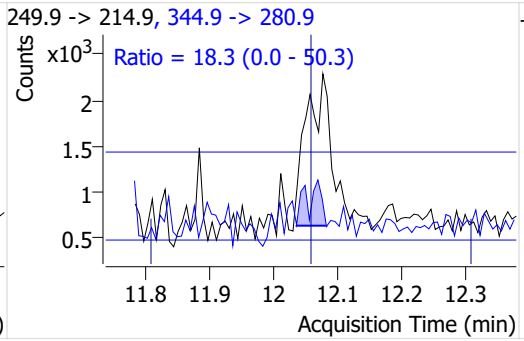


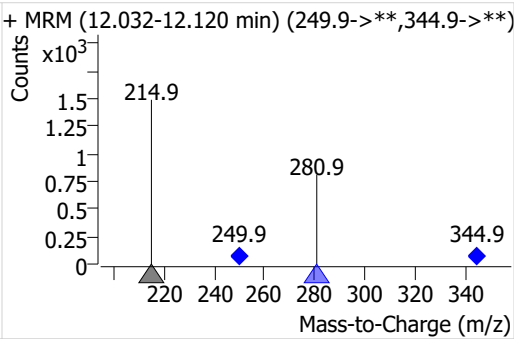




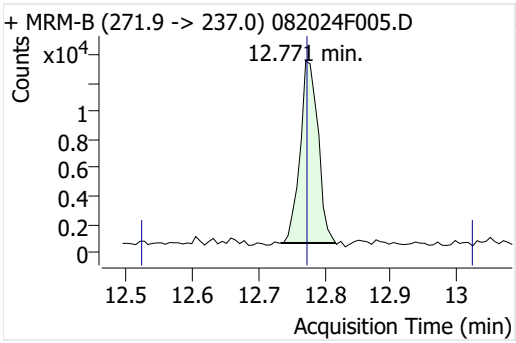
Endrin aldehyde

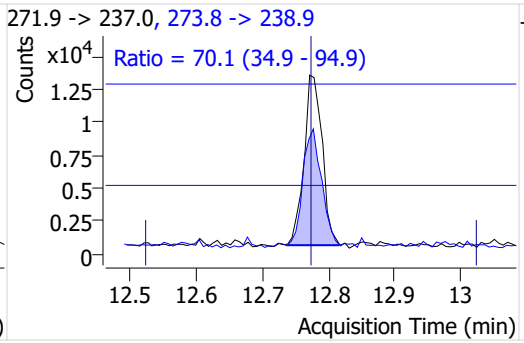


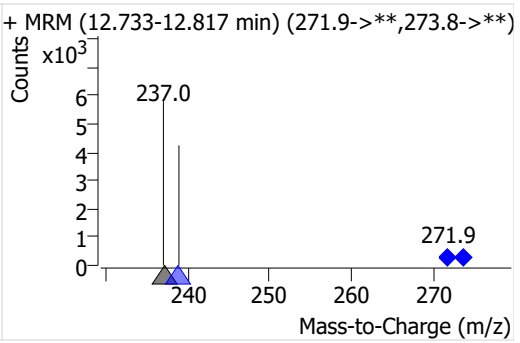




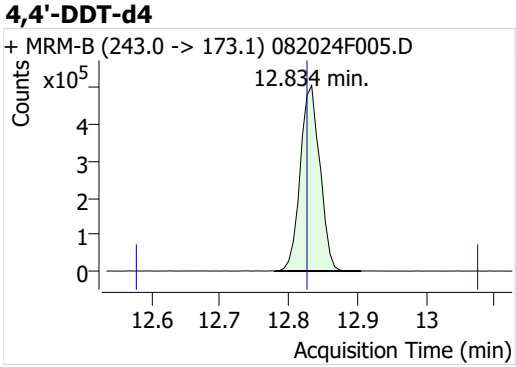
Endosulfan sulfate

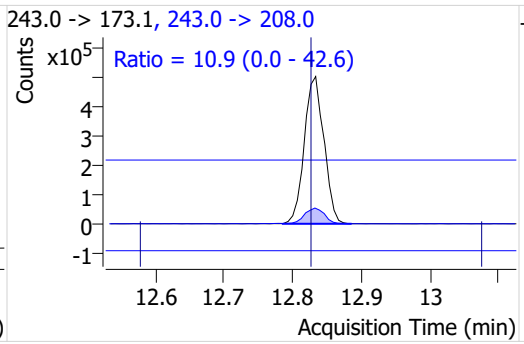


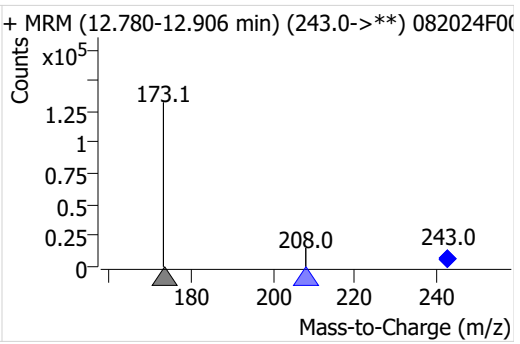




4,4'-DDT-d4







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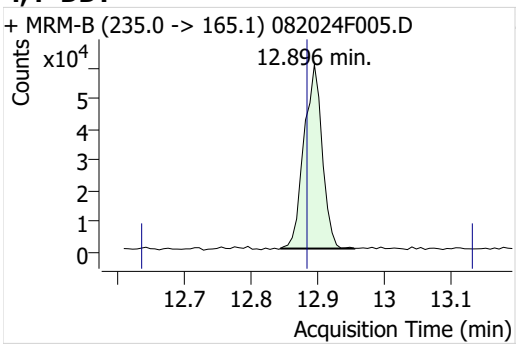
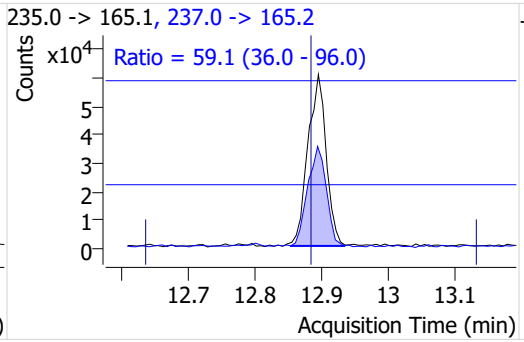
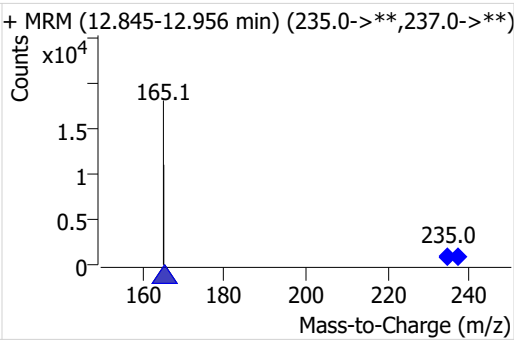
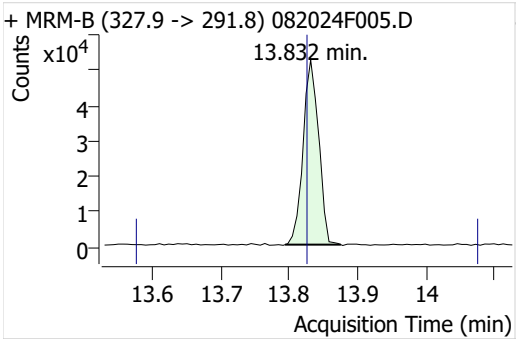
4,4'-DDT

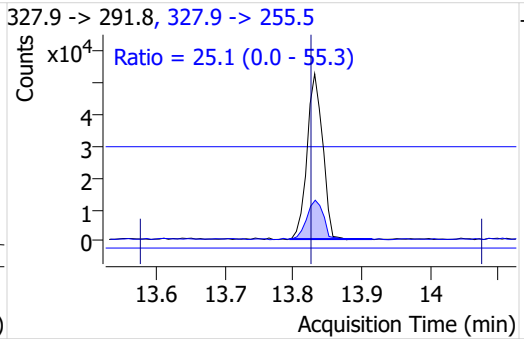


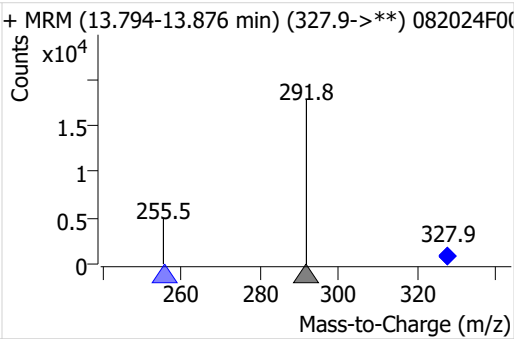




Endrin ketone-13C12







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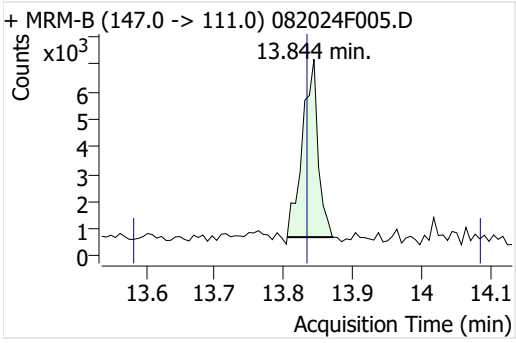
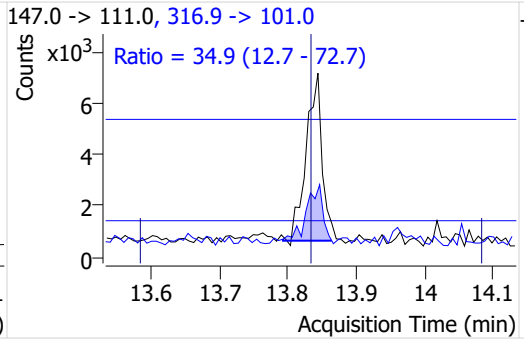
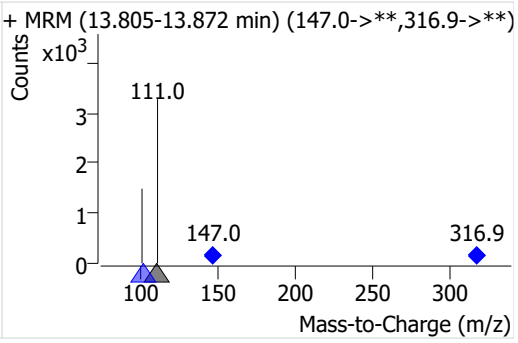
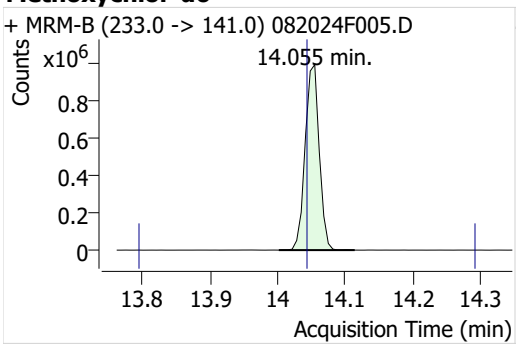
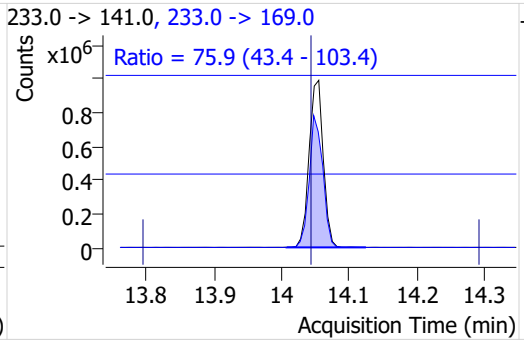


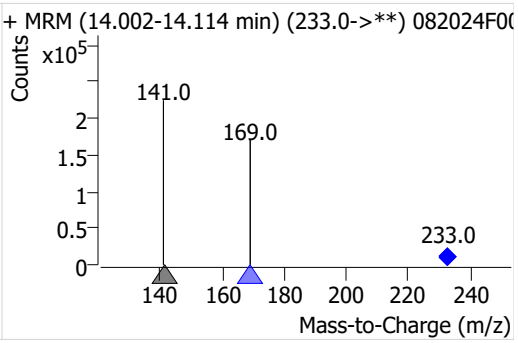




Methoxychlor-d6







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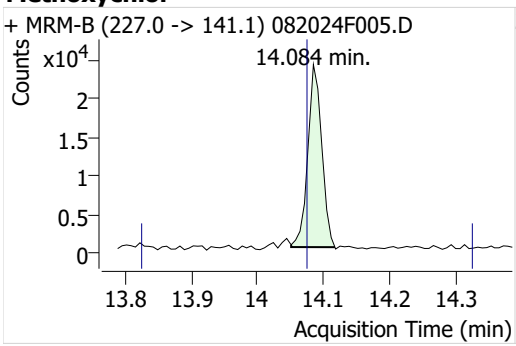
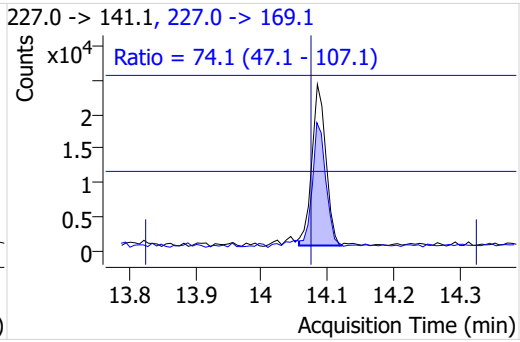
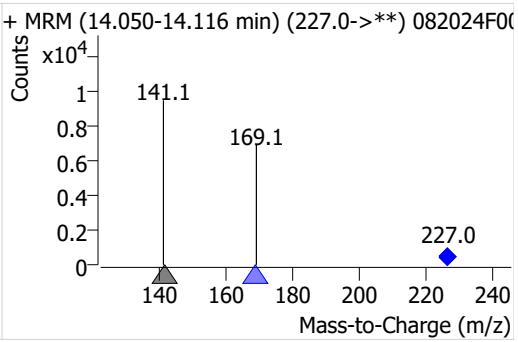
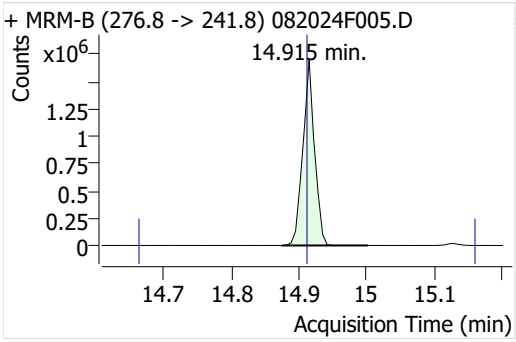
Methoxychlor

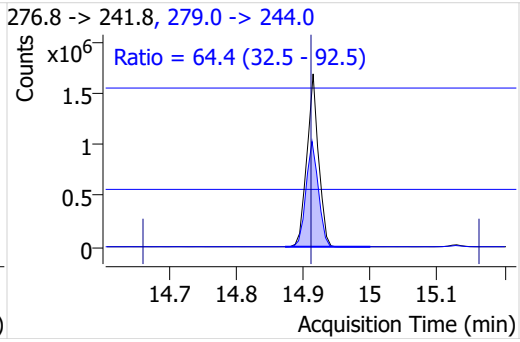


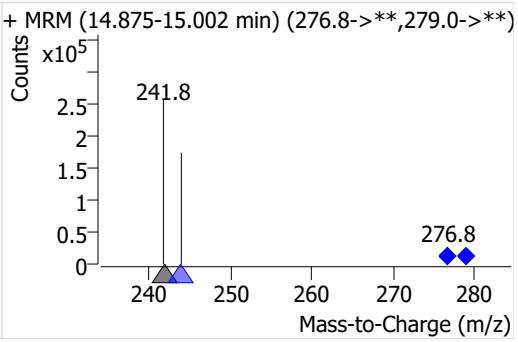




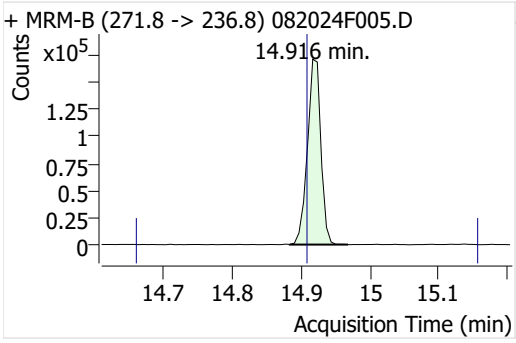
Mirex-13C10

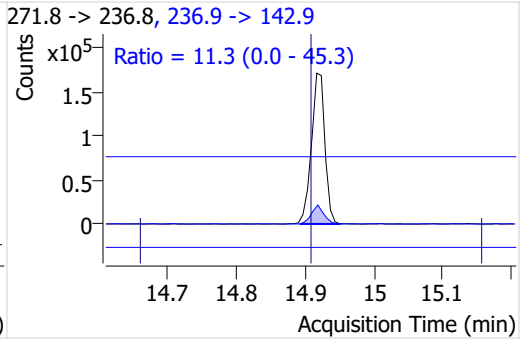


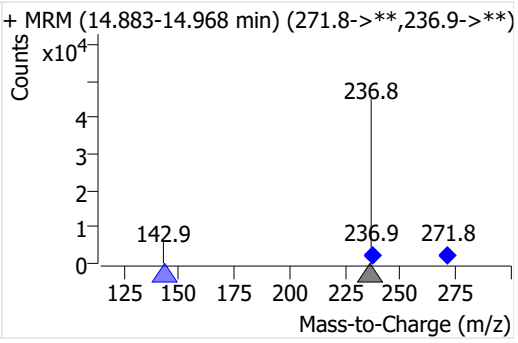




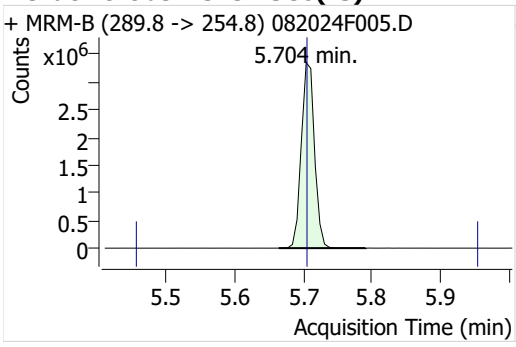
Mirex

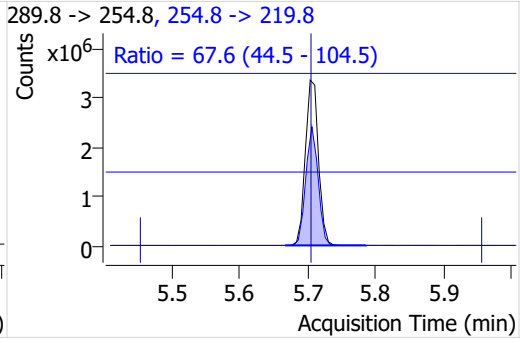


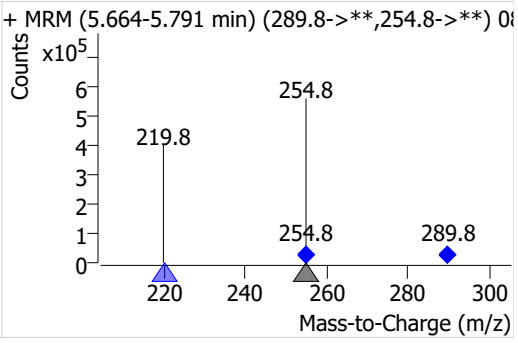




Hexachlorobenzene-13C6(IS)







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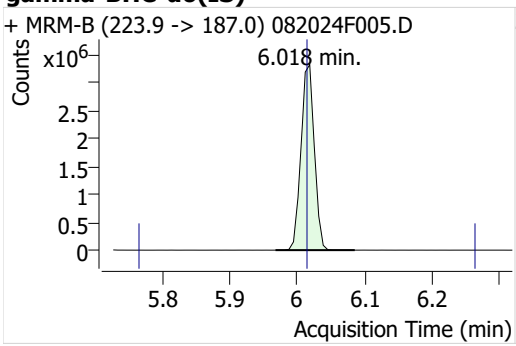
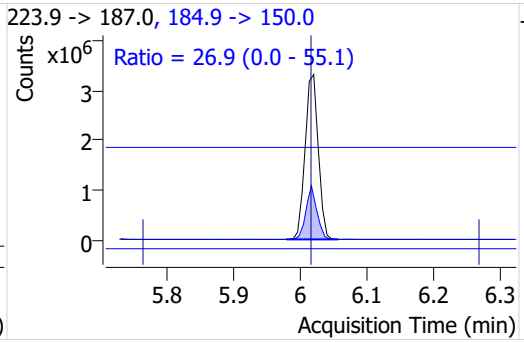
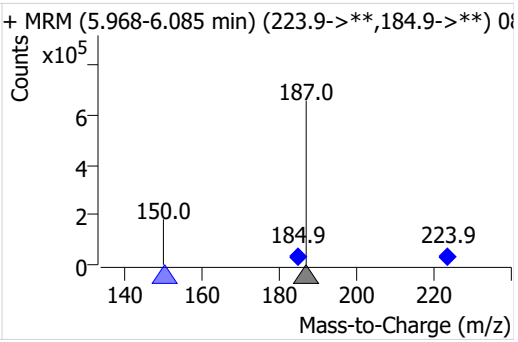
gamma-BHC-d6(IS)







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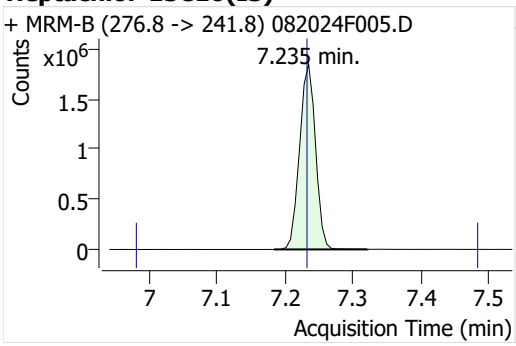
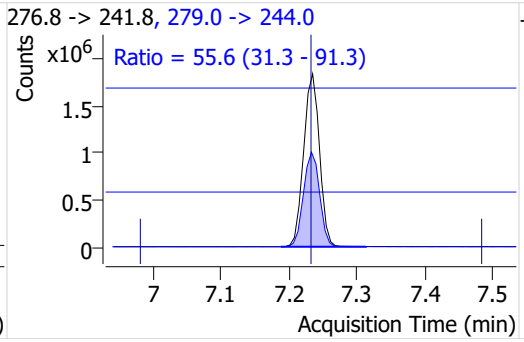
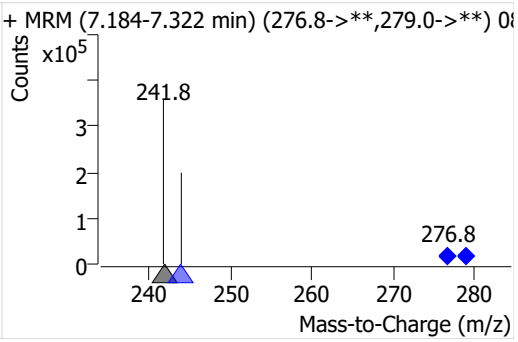
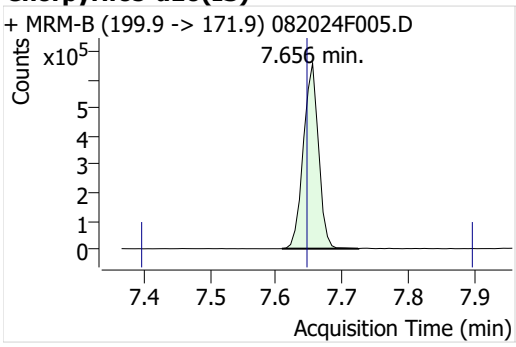
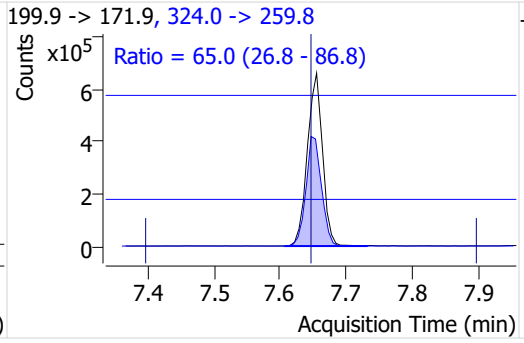


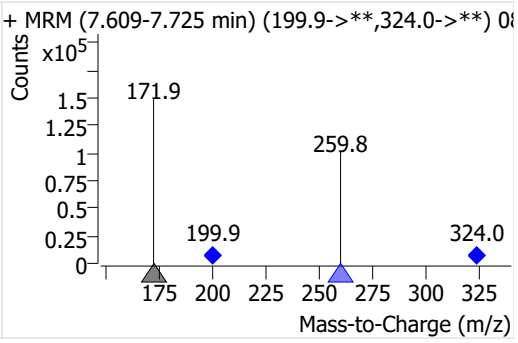




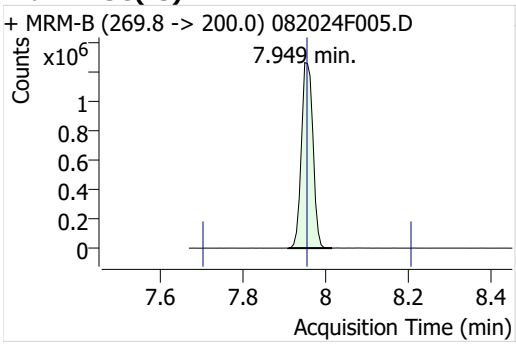
Chorpyrifos-d10(IS)

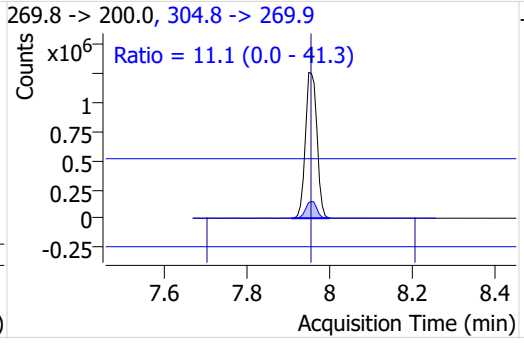


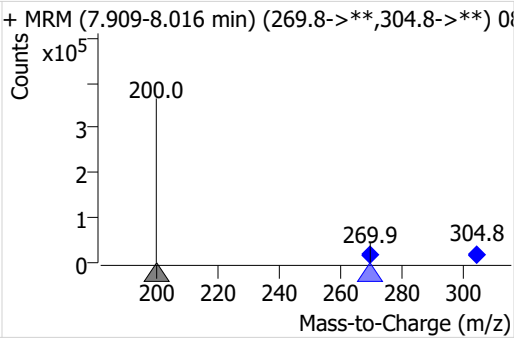




Aldrin-13C(IS)







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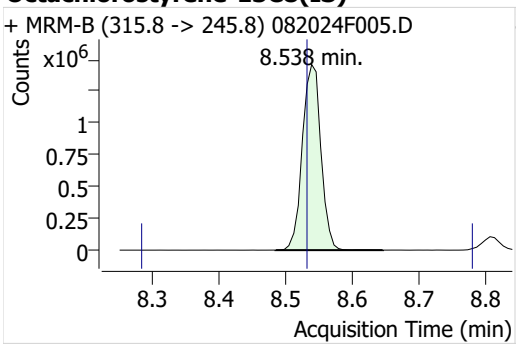
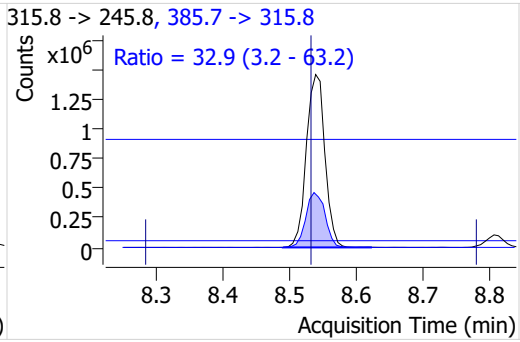
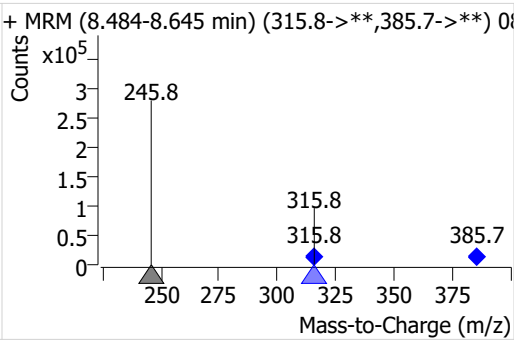
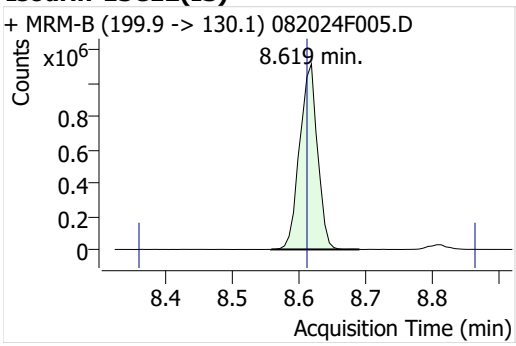
Octachlorostyrene-13C8(IS)

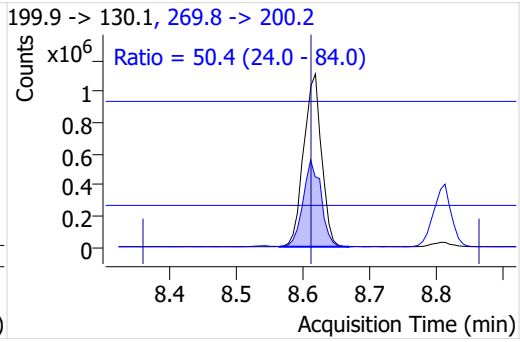


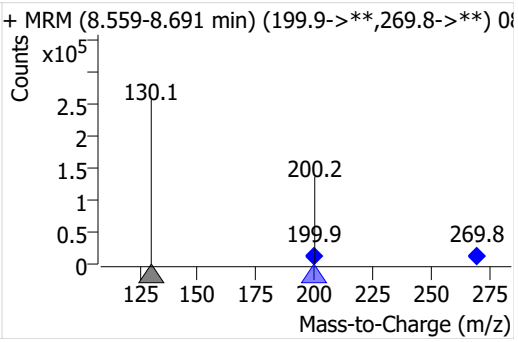




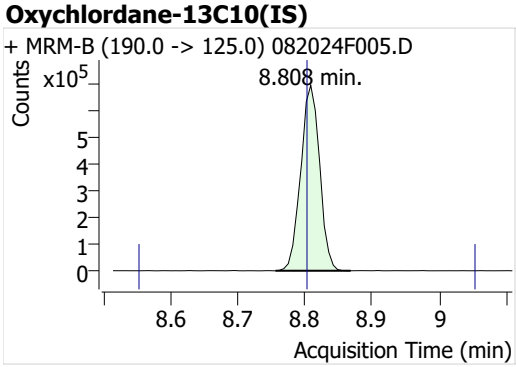
Isodrin-13C12(IS)

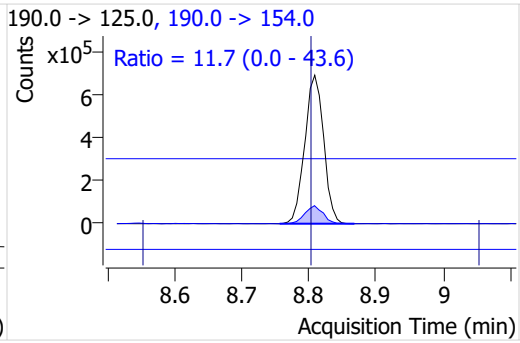


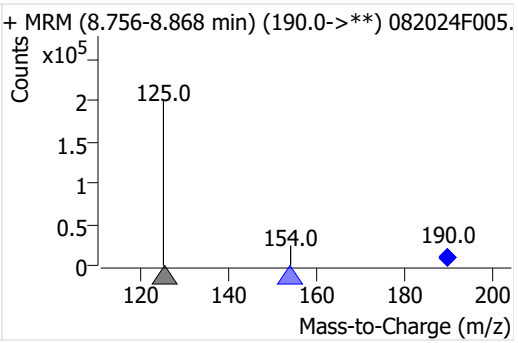




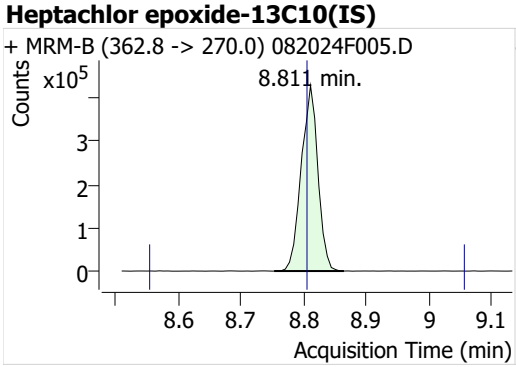
Oxychlordane-13C10(IS)

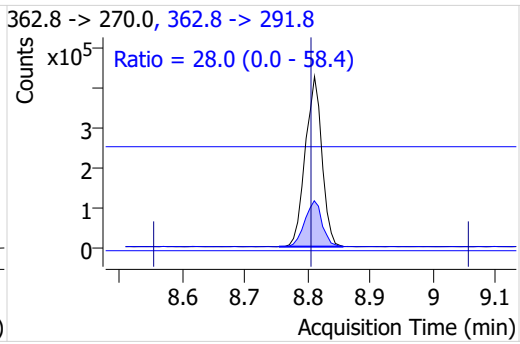


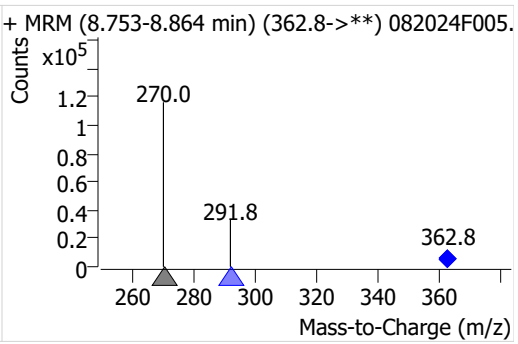




Heptachlor epoxide-13C10(IS)







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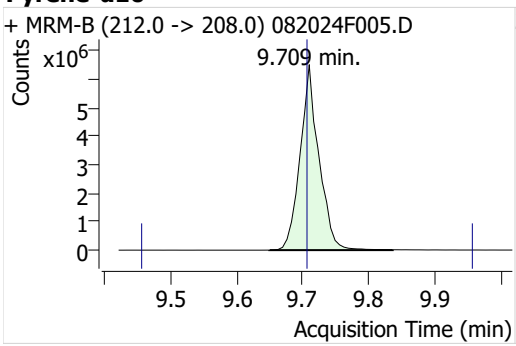
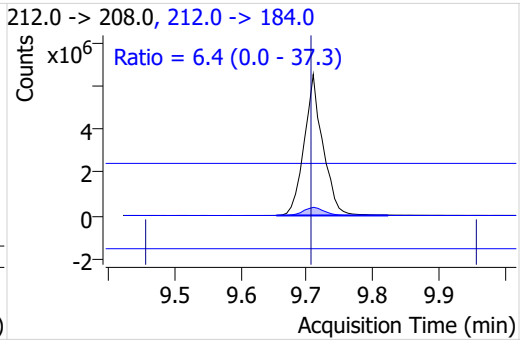
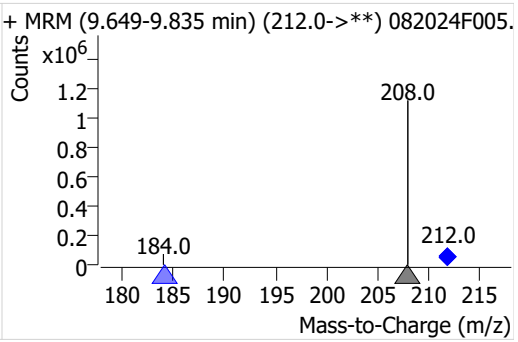
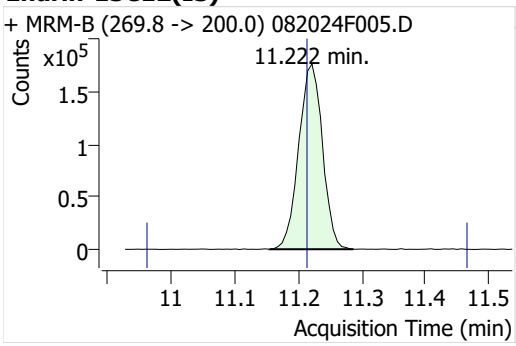
Pyrene-d10

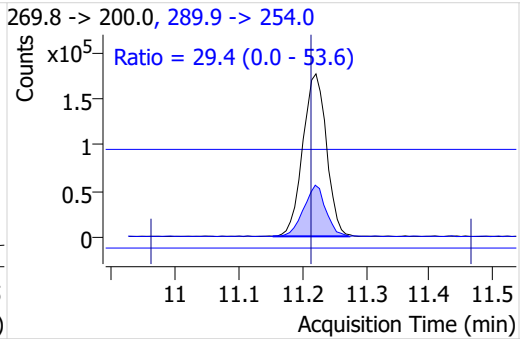


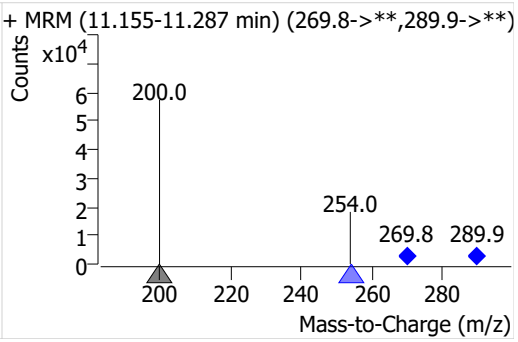




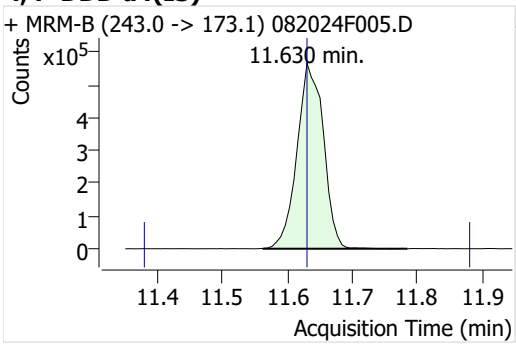
Endrin-13C12(IS)

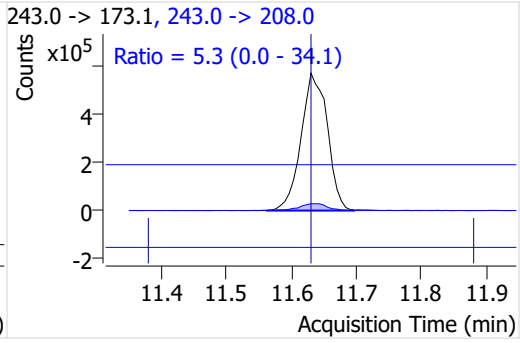


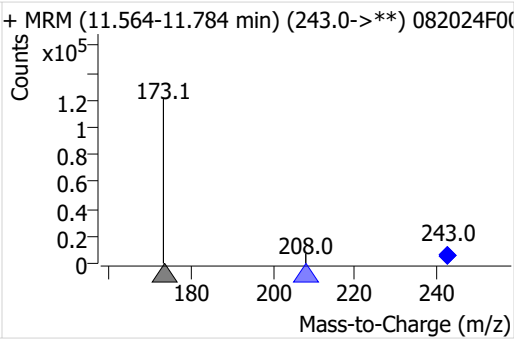




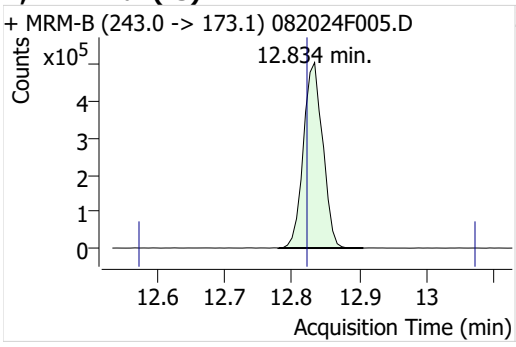
4,4'-DDD d4(IS)

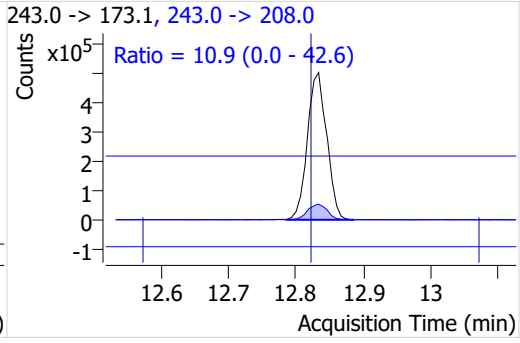


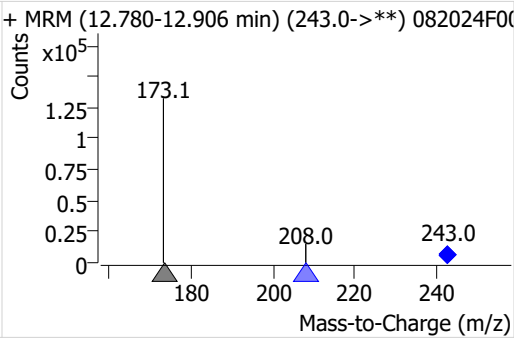




4,4'-DDT-d4(IS)







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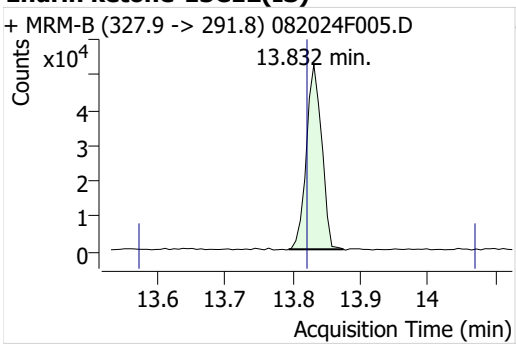
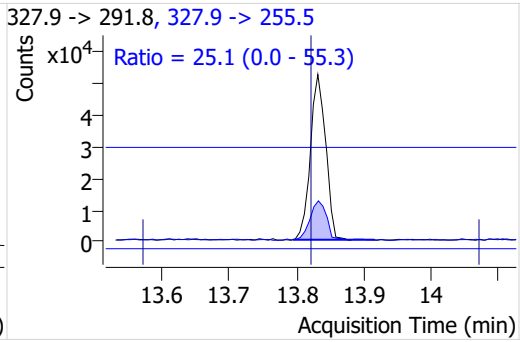
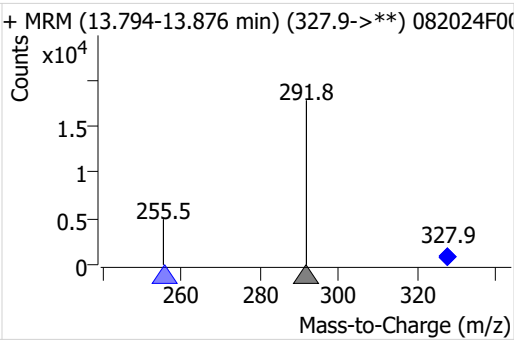
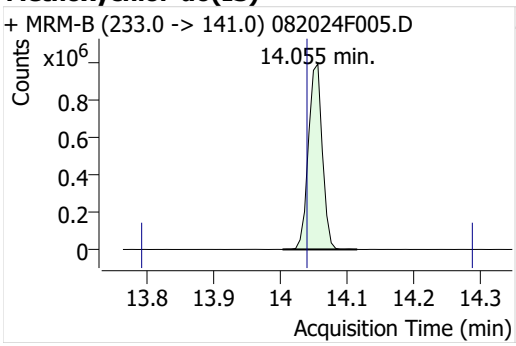
Endrin ketone-13C12(IS)

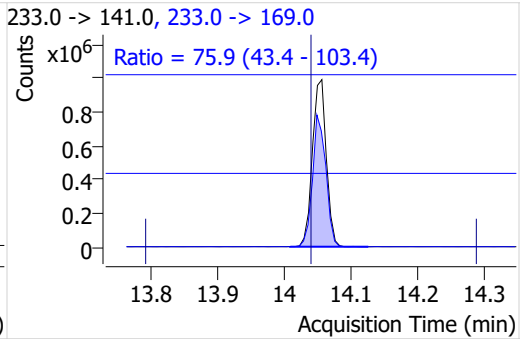


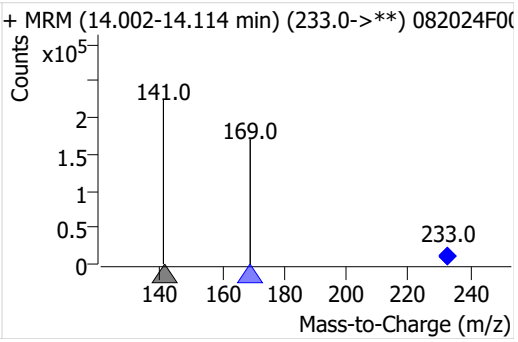




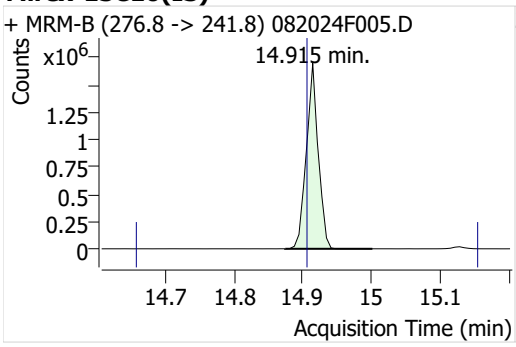
Methoxychlor-d6(IS)

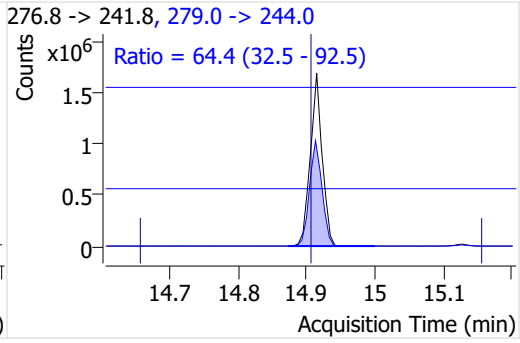


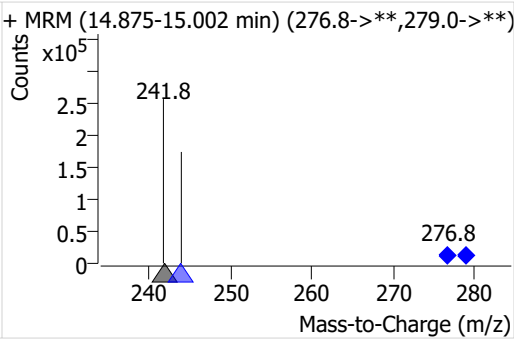




Mirex-13C10(IS)







1st 08/20/24
2nd 08/21/24

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Info.		**Instrument Type**	QQQ
Quant Time	8/20/2024 3:33:05 PM	**Acq. Method File**	OC Pest_dMRM
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Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.704	289.8 -> 254.8	4233959	20.0000 ng/ml	0.000
gamma-BHC-d6(IS)	6.012	223.9 -> 187.0	4281449	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	7.235	276.8 -> 241.8	2722513	20.0000 ng/ml	0.002
Chorpyrifos-d10(IS)	7.656	199.9 -> 171.9	977345	20.0000 ng/ml	0.004
Aldrin-13C(IS)	7.956	269.8 -> 200.0	2468033	20.0000 ng/ml	0.001
Octachlorostyrene-13C8(IS)	8.538	315.8 -> 245.8	2793711	20.0000 ng/ml	0.009
Isodrin-13C12(IS)	8.619	199.9 -> 130.1	1856937	20.0000 ng/ml	0.006
Oxychlordane-13C10(IS)	8.808	190.0 -> 125.0	1244437	20.0000 ng/ml	0.005
Heptachlor epoxide-13C10(IS)	8.811	362.8 -> 270.0	722337	20.0000 ng/ml	0.005
Pyrene-d10	9.712	212.0 -> 208.0	11483637	100.0000 ng/ml	0.005
Endrin-13C12(IS)	11.222	269.8 -> 200.0	426471	20.0000 ng/ml	0.007
4,4'-DDD d4(IS)	11.644	243.0 -> 173.1	1516800	5.0000 ng/ml	0.006
4,4'-DDT-d4(IS)	12.834	243.0 -> 173.1	795194	5.0000 ng/ml	0.007
Endrin ketone-13C12(IS)	13.832	327.9 -> 291.8	70183	20.0000 ng/ml	0.011
Methoxychlor-d6(IS)	14.049	233.0 -> 141.0	1786286	20.0000 ng/ml	0.013
Mirex-13C10(IS)	14.915	276.8 -> 241.8	1912590	5.0000 ng/ml	0.008

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.705	289.8 -> 254.8	4233959	20.886 ng/ml	
		Spiked Amount =	20.0	Recovery =	*104.4 %*
gamma-BHC-d6	6.014	223.9 -> 187.0	4281449	22.212 ng/ml	
		Spiked Amount =	20.0	Recovery =	*111.1 %*
Heptachlor-13C10	7.232	276.8 -> 241.8	2722513	20.227 ng/ml	
		Spiked Amount =	20.0	Recovery =	*101.1 %*
Chorpyrifos-d10	7.647	199.9 -> 171.9	977345	21.086 ng/ml	
		Spiked Amount =	20.0	Recovery =	*105.4 %*
Aldrin-13C	7.955	269.8 -> 200.0	2467870	22.100 ng/ml	
		Spiked Amount =	20.0	Recovery =	*110.5 %*
Octachlorostyrene-13C8	8.531	315.8 -> 245.8	2793711	21.934 ng/ml	
		Spiked Amount =	20.0	Recovery =	*109.7 %*
Isodrin-13C12	8.613	199.9 -> 130.1	1856937	21.381 ng/ml	
		Spiked Amount =	20.0	Recovery =	*106.9 %*
Oxychlordane-13C10	8.803	190.0 -> 125.0	1244437	20.950 ng/ml	
		Spiked Amount =	20.0	Recovery =	*104.7 %*
Heptachlor epoxide-13C10	8.805	362.8 -> 270.0	722337	20.572 ng/ml	
		Spiked Amount =	20.0	Recovery =	*102.9 %*
Endrin-13C12	11.214	269.8 -> 200.0	426471	21.922 ng/ml	
		Spiked Amount =	20.0	Recovery =	*109.6 %*
4,4'-DDD d4	11.630	243.0 -> 173.1	1516800	4.910 ng/ml	
		Spiked Amount =	5.0	Recovery =	*98.2 %*
4,4'-DDT-d4	12.822	243.0 -> 173.1	795194	4.961 ng/ml	
		Spiked Amount =	5.0	Recovery =	*99.2 %*
Endrin ketone-13C12	13.821	327.9 -> 291.8	70183	20.247 ng/ml	
		Spiked Amount =	20.0	Recovery =	*101.2 %*
Methoxychlor-d6	14.039	233.0 -> 141.0	1786286	25.971 ng/ml	
		Spiked Amount =	20.0	Recovery =	*129.9 %*

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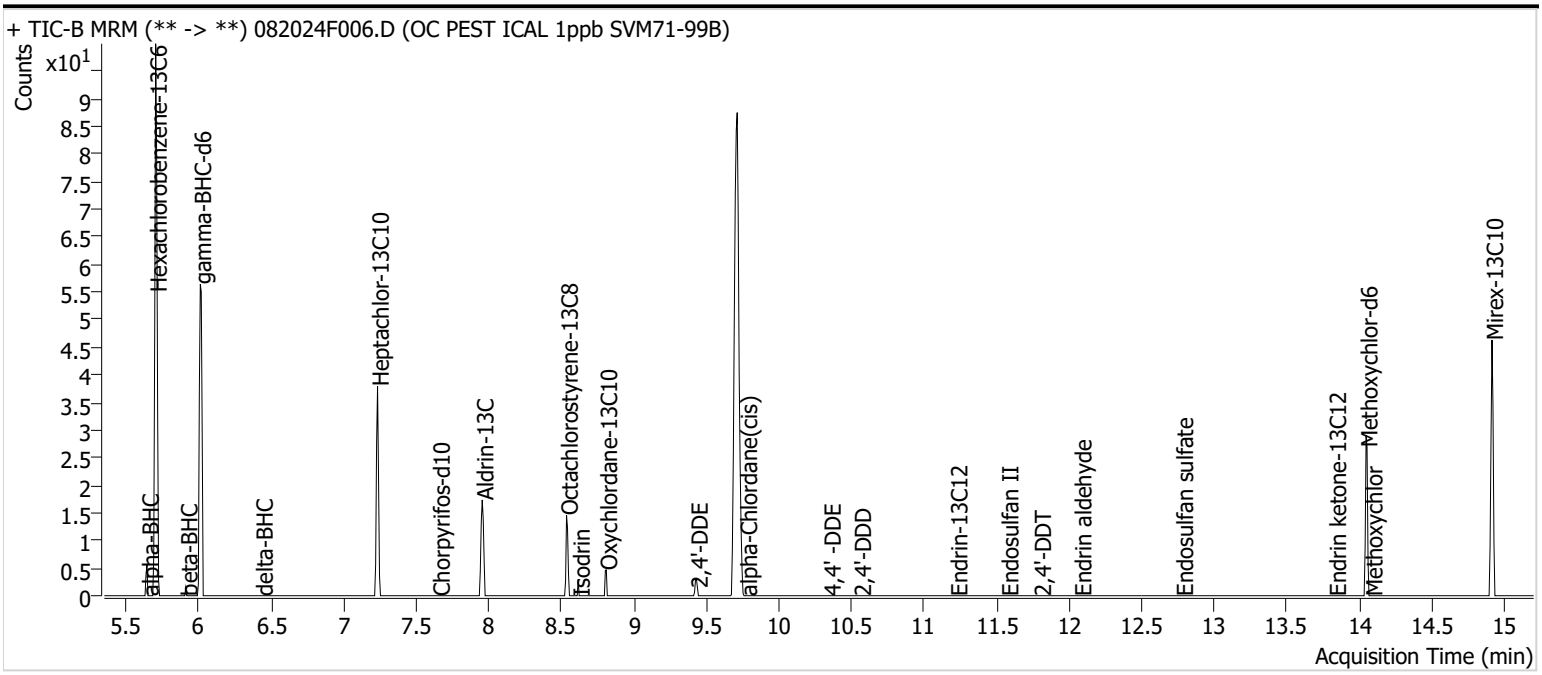
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.906	276.8 -> 241.8	1912590	4.752 ng/ml
		Spiked Amount =	5.0	Recovery = *95.0 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)	5.649	181.1 -> 145.1	645561	0.899 ng/ml	93
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.713	283.8 -> 213.9	358398	0.974 ng/ml	94
beta-BHC	gamma-BHC-d6(IS)	5.916	181.1 -> 145.1	564575	0.842 ng/ml	97
gamma-BHC(Lindane)	gamma-BHC-d6(IS)	6.070	181.1 -> 145.1	488725	0.885 ng/ml	99
delta-BHC	gamma-BHC-d6(IS)	6.436	181.1 -> 145.1	182527	0.925 ng/ml	92
Heptachlor	Heptachlor-13C10(IS)	7.238	271.7 -> 236.9	137966	0.989 ng/ml	1
Chorpyrifos	Chorpyrifos-d10(IS)	7.733	196.9 -> 169.0	62259	1.005 ng/ml	85
Aldrin	Aldrin-13C(IS)	7.958	254.9 -> 220.0	284265	0.749 ng/ml	23
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.544	342.8 -> 307.8	255574	0.902 ng/ml	100
Isodrin	Isodrin-13C12(IS)	8.620	193.0 -> 123.0	87967	0.862 ng/ml	85
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	8.818	352.8 -> 262.9	37706	0.935 ng/ml	93
Oxychlordane	Oxychlordane-13C10(IS)	8.816	114.9 -> 51.1	140199	0.915 ng/ml	98
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.413	271.8 -> 236.9	81281	0.919 ng/ml	88
2,4'-DDE	4,4'-DDD d4(IS)	9.434	246.0 -> 176.2	538989	0.991 ng/ml	93
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.773	271.8 -> 236.9	200539	0.902 ng/ml	99
Endosulfan I	Endrin-13C12(IS)	9.790	206.9 -> 172.0	29590	0.857 ng/ml	99
trans-Nanochlor	Oxychlordane-13C10(IS)	9.841	271.8 -> 236.9	67687	0.879 ng/ml	85
4,4' -DDE	4,4'-DDD d4(IS)	10.349	246.0 -> 176.2	393905	0.973 ng/ml	92
2,4'-DDD	4,4'-DDD d4(IS)	10.559	235.0 -> 165.1	370231	0.972 ng/ml	97
Dieldrin	Endrin-13C12(IS)	10.574	262.9 -> 193.0	38369	0.861 ng/ml	87
Endrin	Endrin-13C12(IS)	11.223	262.8 -> 193.0	23732	0.951 ng/ml	88
Endosulfan II	Endrin-13C12(IS)	11.574	206.9 -> 172.0	15156	0.893 ng/ml	84
4,4'-DDD	4,4'-DDD d4(IS)	11.713	235.0 -> 165.1	280419	0.916 ng/ml	94
cis-Nonachlor	Oxychlordane-13C10(IS)	11.709	271.8 -> 236.9	48550	0.865 ng/ml	100
2,4'-DDT	4,4'-DDT-d4(IS)	11.800	235.0 -> 165.1	212520	0.968 ng/ml	98
Endrin aldehyde	Endrin-13C12(IS)	12.077	249.9 -> 214.9	7662	0.828 ng/ml	79
Endosulfan sulfate	Endrin-13C12(IS)	12.778	271.9 -> 237.0	42866	0.820 ng/ml	88
4,4'-DDT	4,4'-DDT-d4(IS)	12.896	235.0 -> 165.1	168908	0.912 ng/ml	97
Endrin ketone	Endrin ketone-13C12(IS)	13.844	147.0 -> 111.0	15425	1.000 ng/ml	88
Methoxychlor	Methoxychlor-d6(IS)	14.084	227.0 -> 141.1	77438	0.811 ng/ml	96
Mirex	Mirex-13C10(IS)	14.916	271.8 -> 236.8	433939	1.124 ng/ml	95

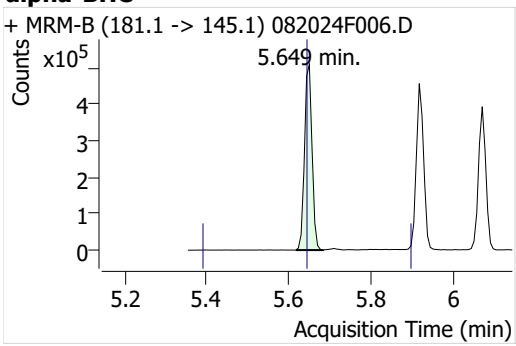
(m) = manual integration ND = Not Detected NC = Not Calculated

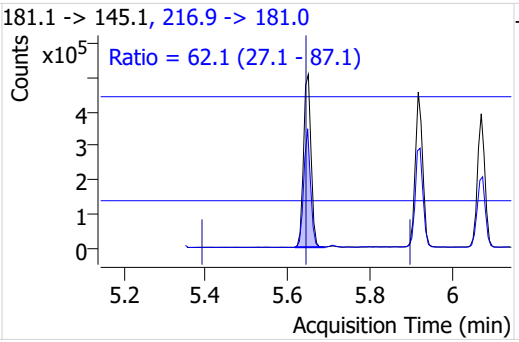
Sample Chromatogram

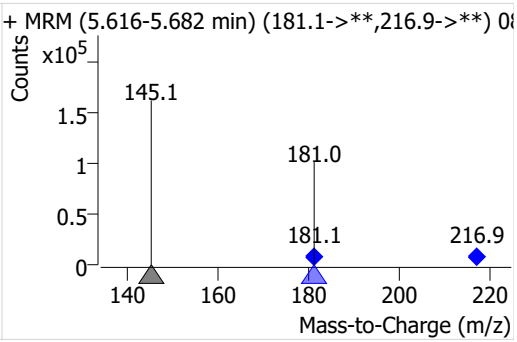
MassHunter Quantitative Analysis Sample Report



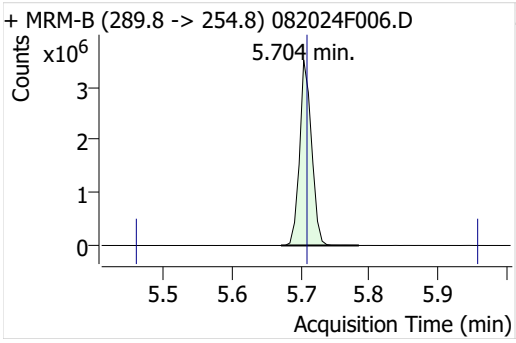
alpha-BHC

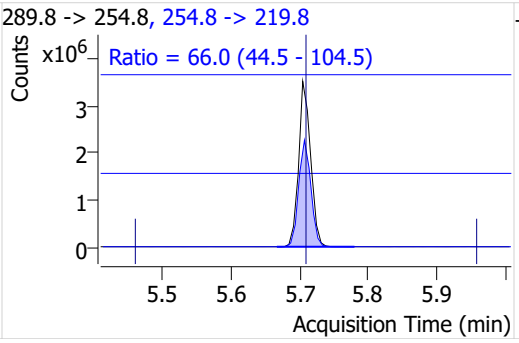


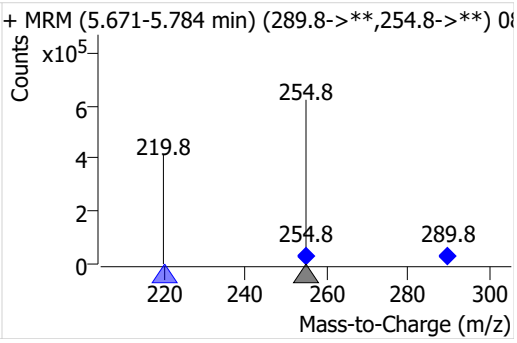




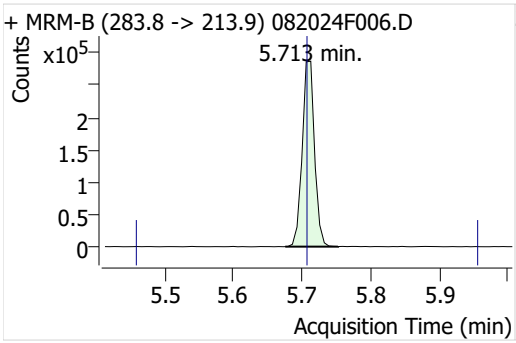
Hexachlorobenzene-13C6

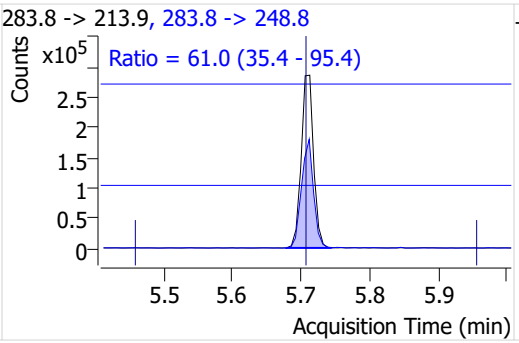


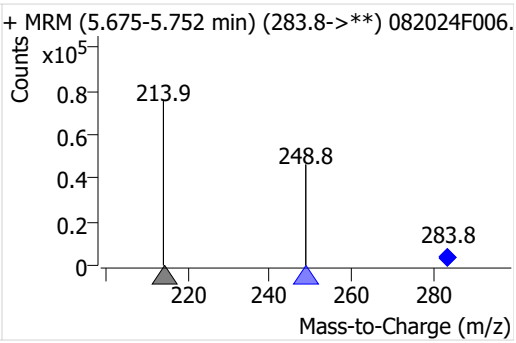




Hexachlorobenzene

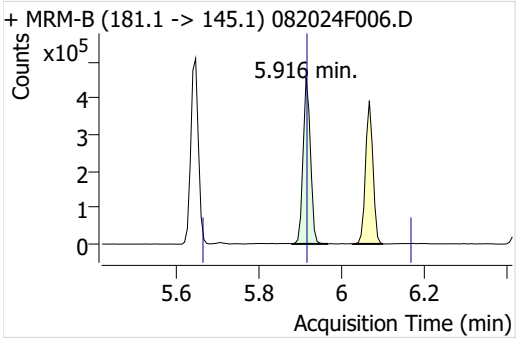


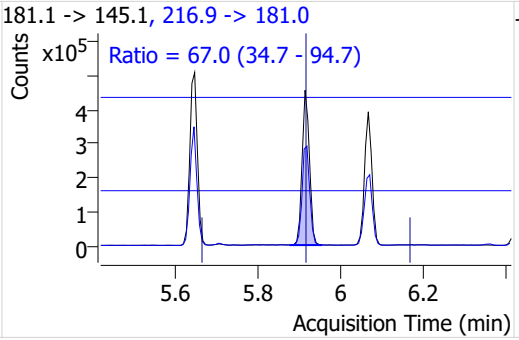


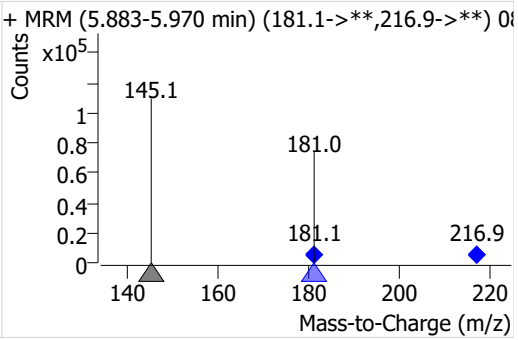


MassHunter Quantitative Analysis Sample Report

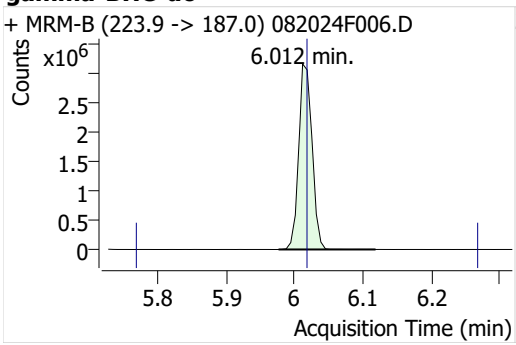
beta-BHC

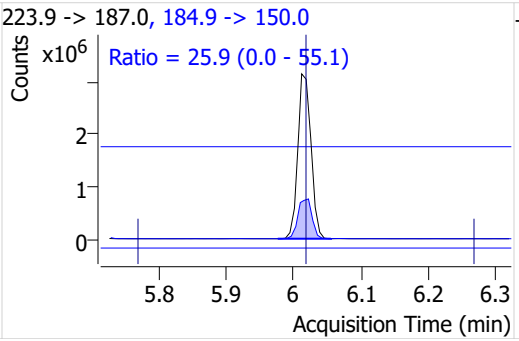


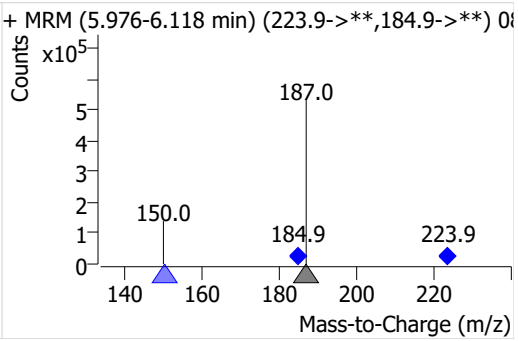




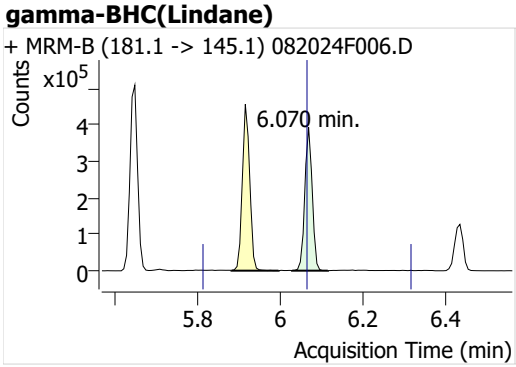
gamma-BHC-d6

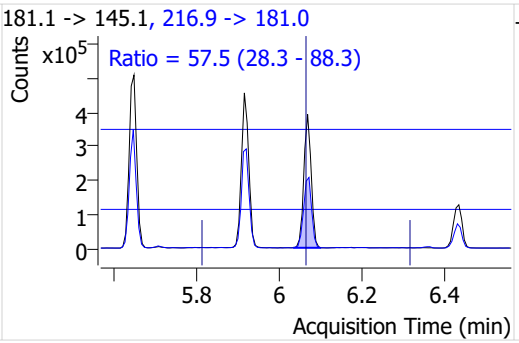


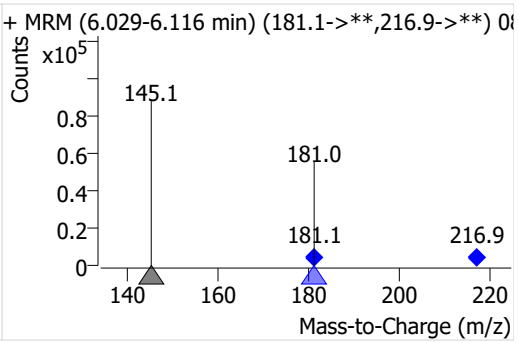




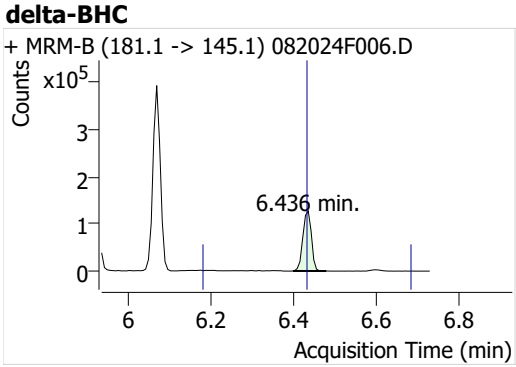
gamma-BHC(Lindane)

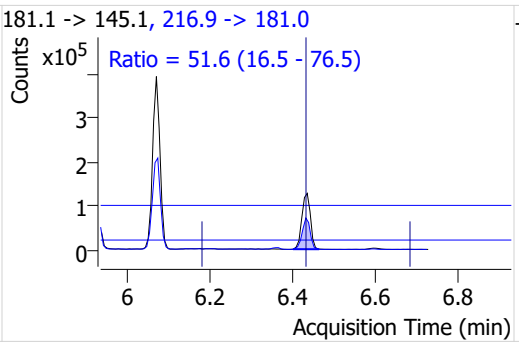


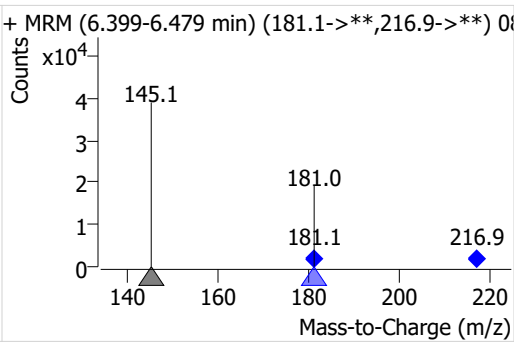




delta-BHC

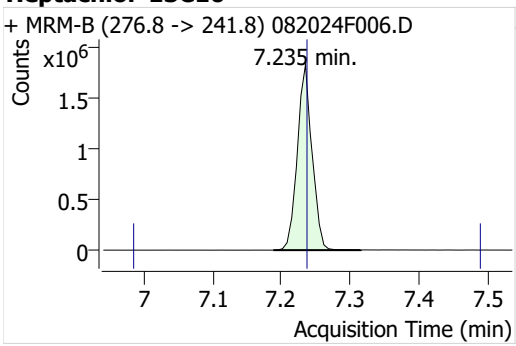


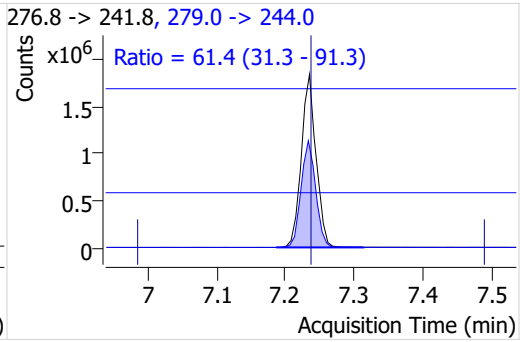


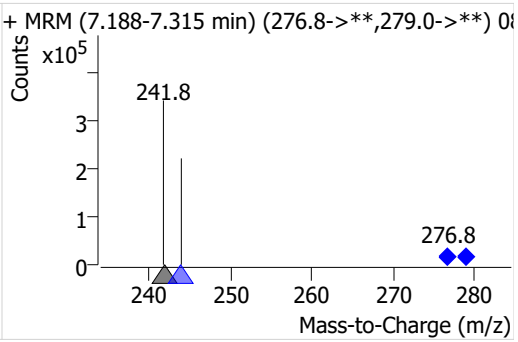


MassHunter Quantitative Analysis Sample Report

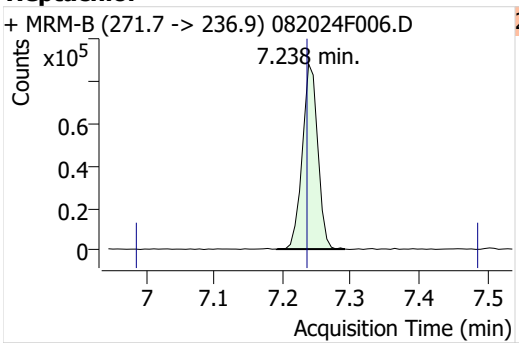
Heptachlor-13C10

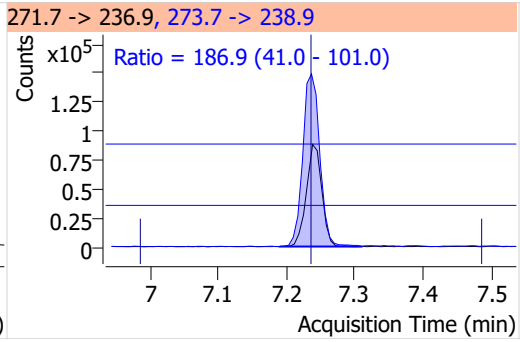


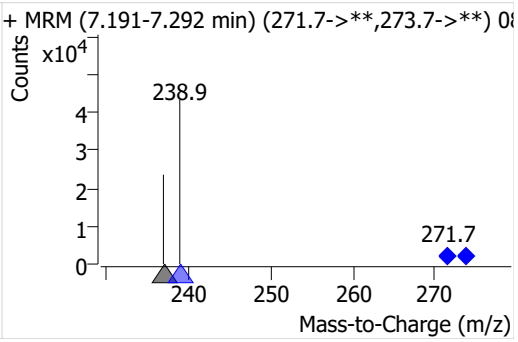




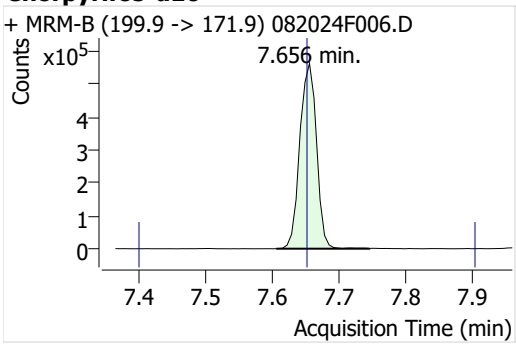
Heptachlor

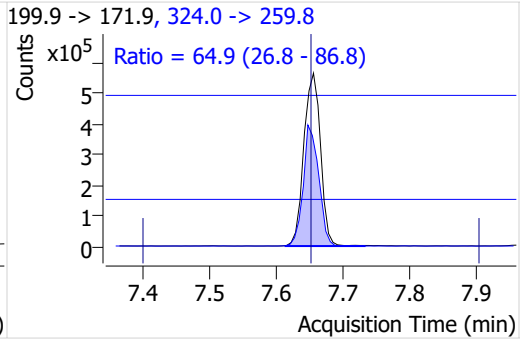


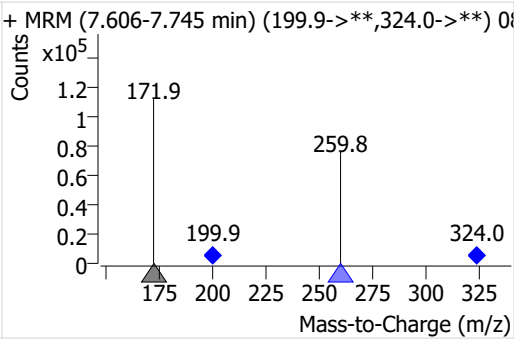




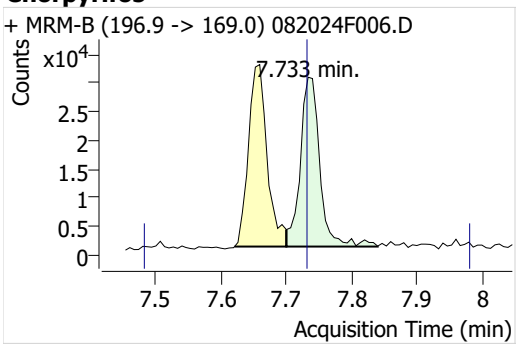
Chorpyrifos-d10

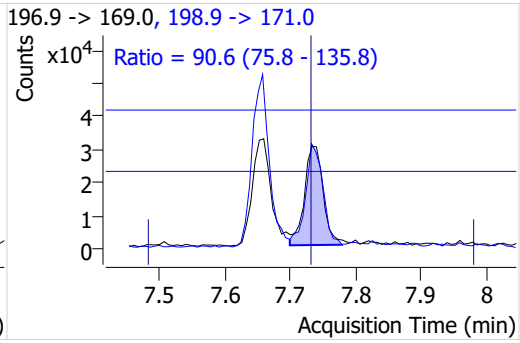


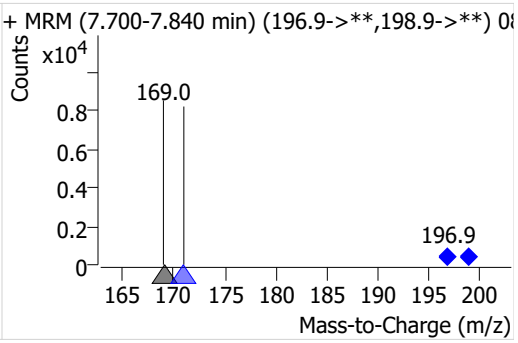




Chorpyrifos

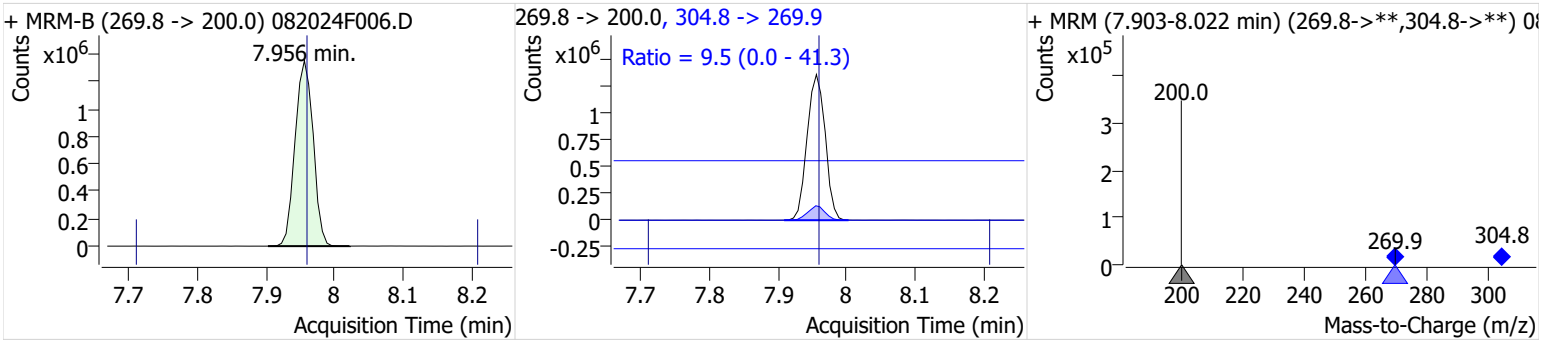




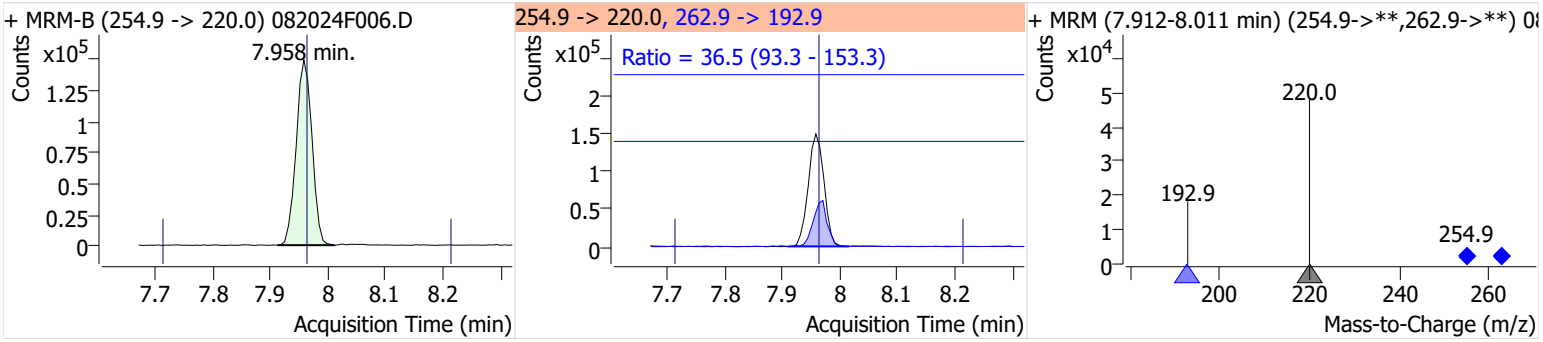


MassHunter Quantitative Analysis Sample Report

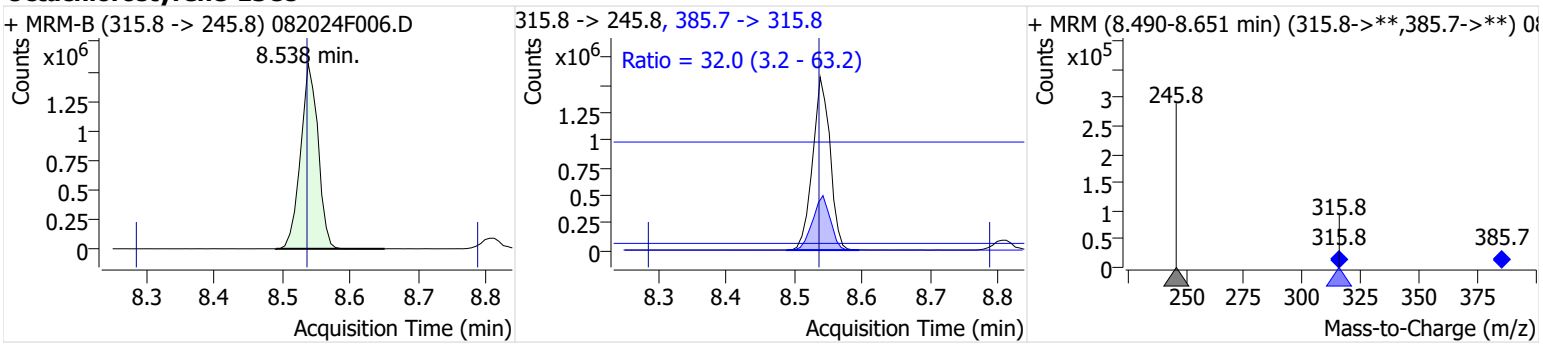
Aldrin-13C



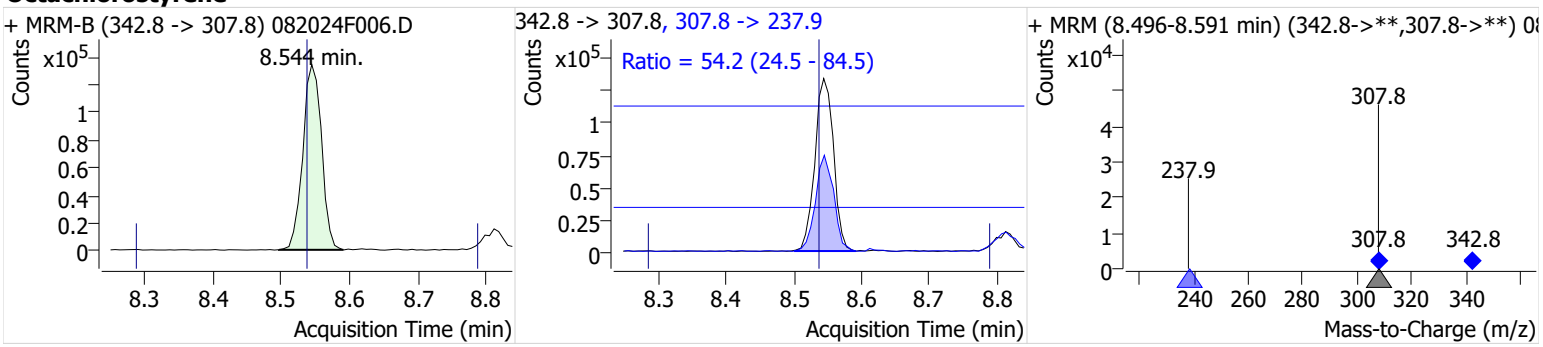
Aldrin



Octachlorostyrene-13C8

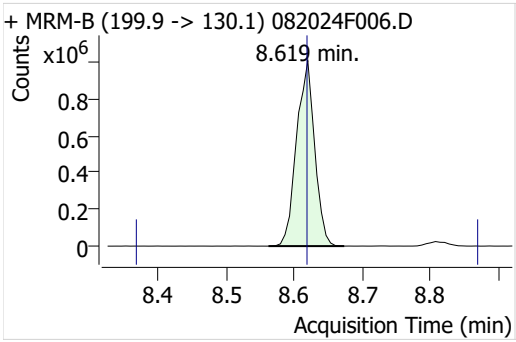


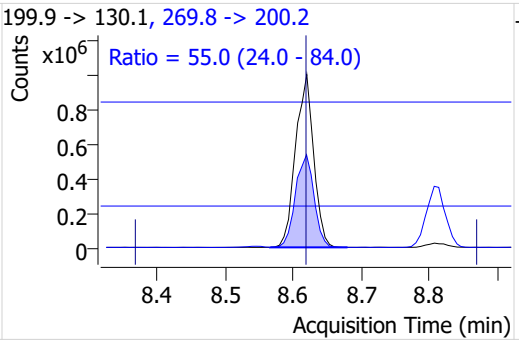
Octachlorostyrene

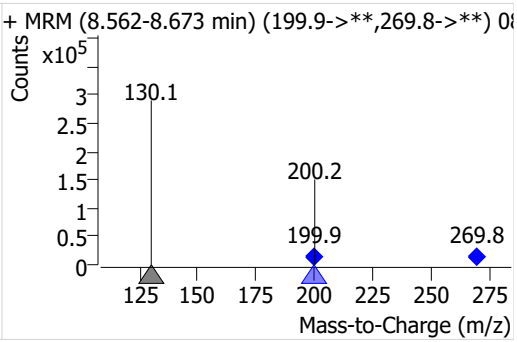


MassHunter Quantitative Analysis Sample Report

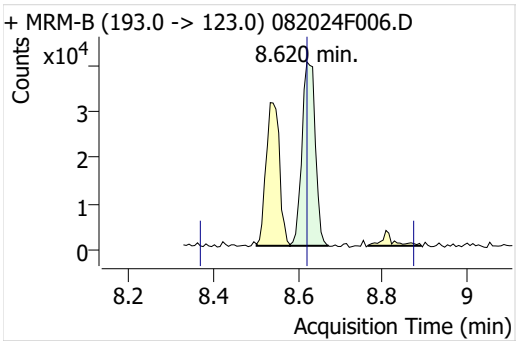
Isodrin-13C12

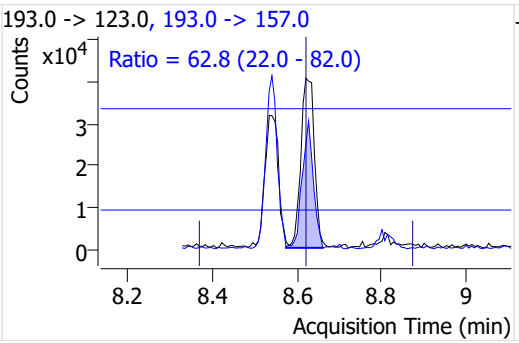


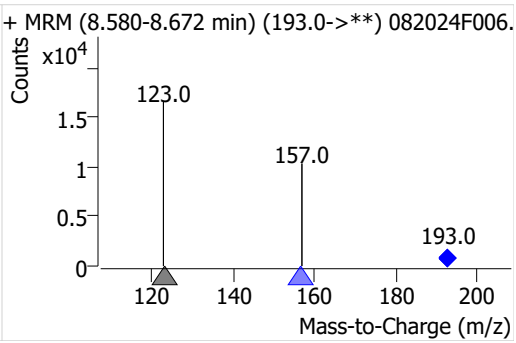




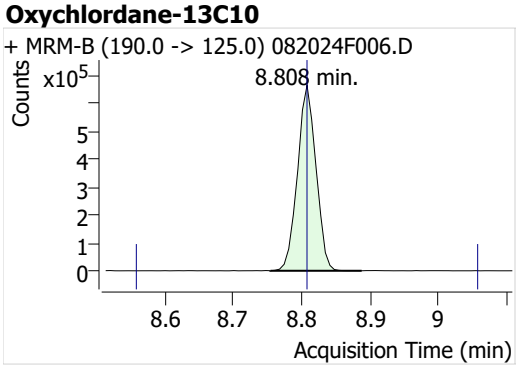
Isodrin

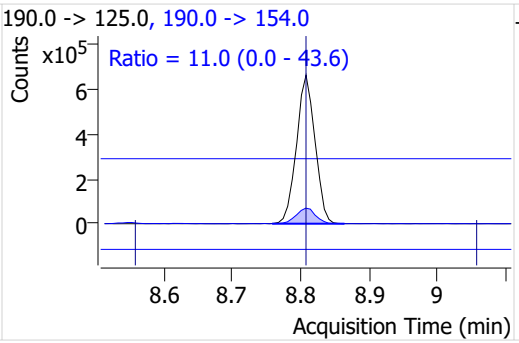


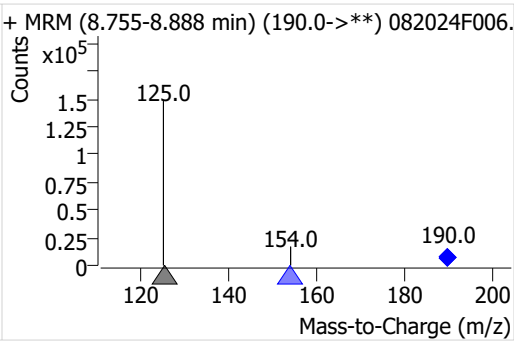




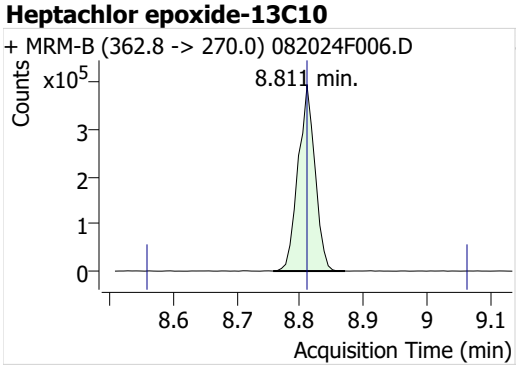
Oxychlordane-13C10

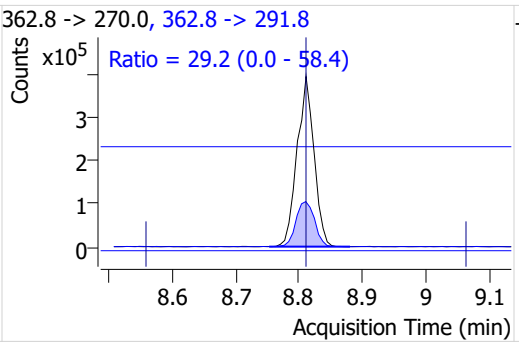


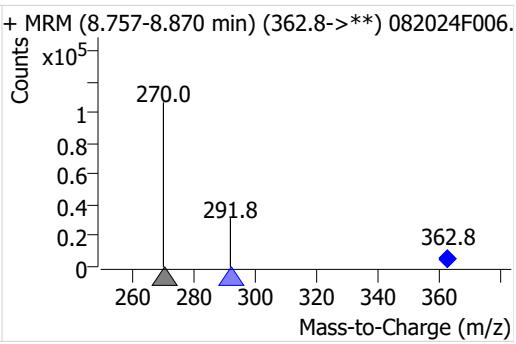




Heptachlor epoxide-13C10

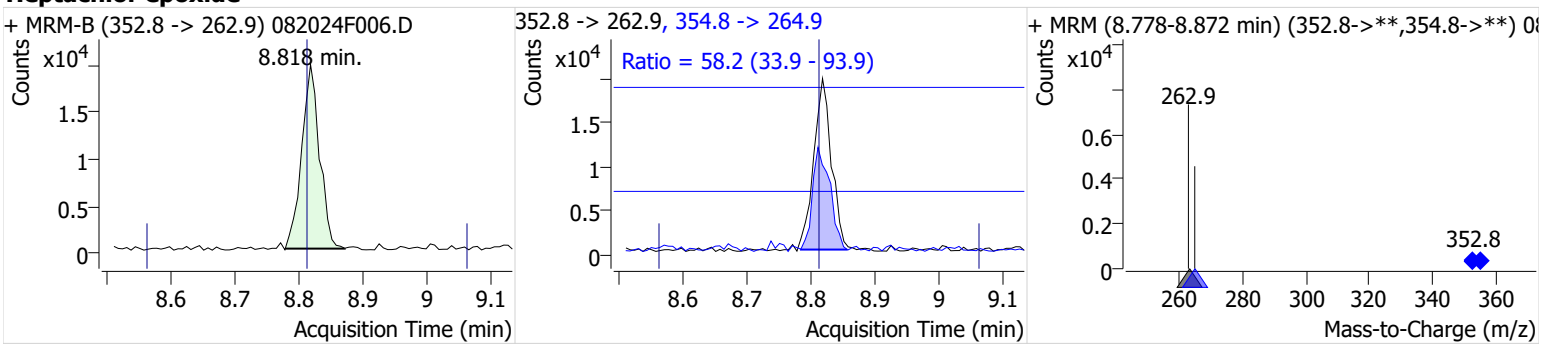






MassHunter Quantitative Analysis Sample Report

Heptachlor epoxide



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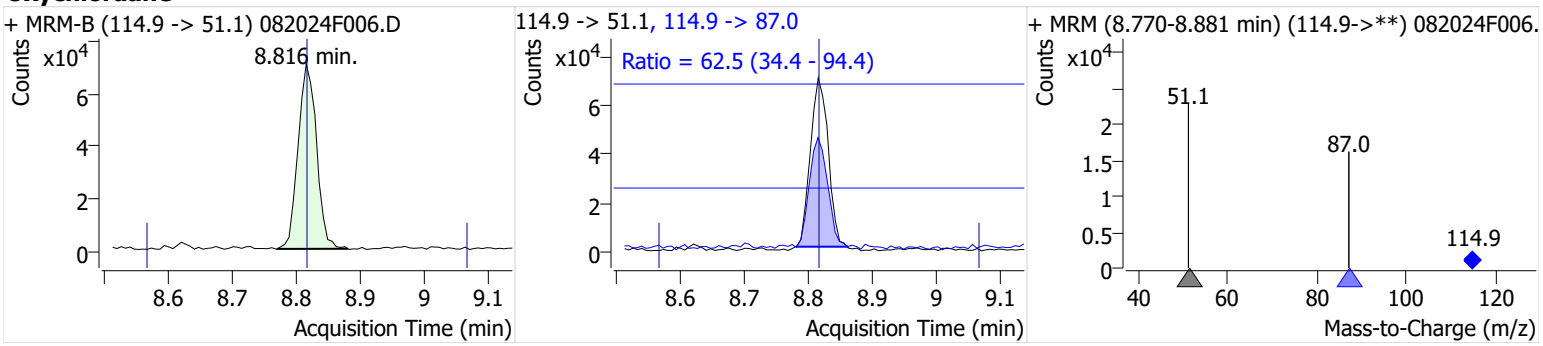
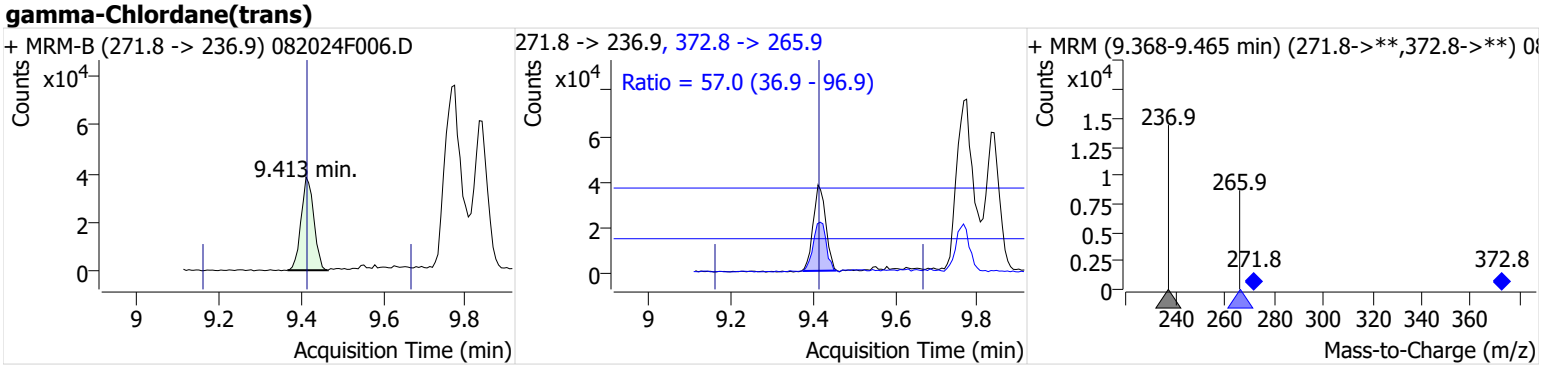
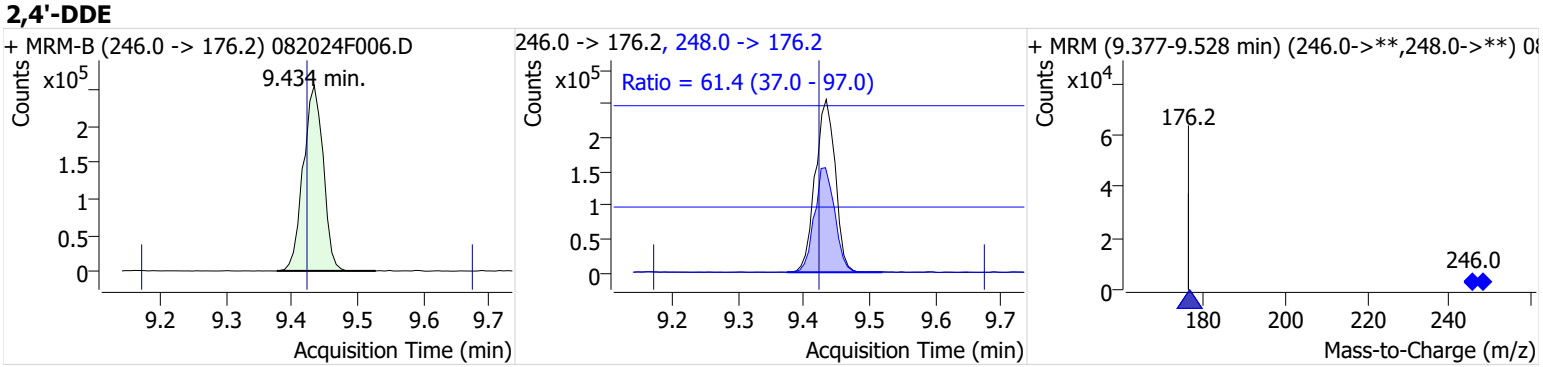


gamma-Chlordane(trans)



2,4'-DDE



MassHunter Quantitative Analysis Sample Report

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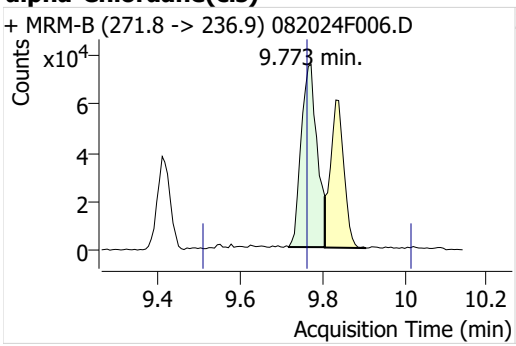
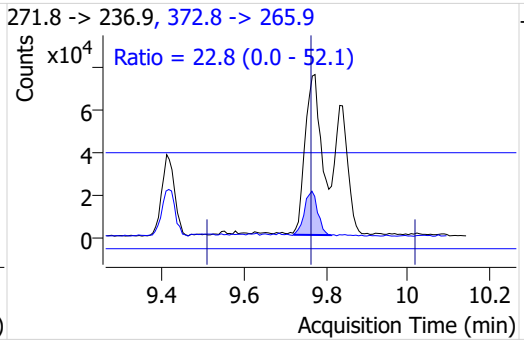
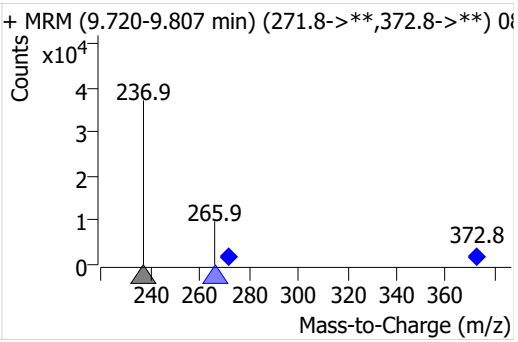
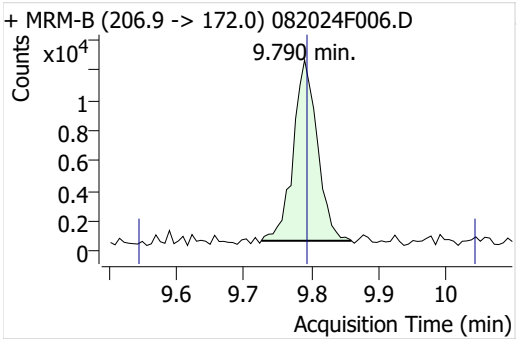
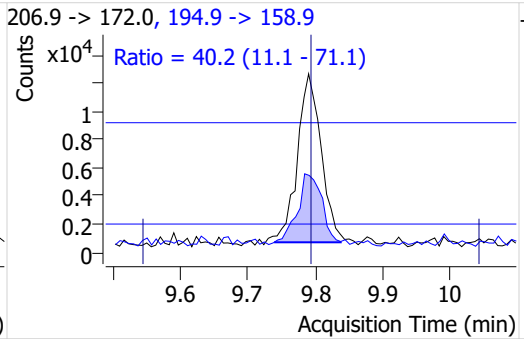


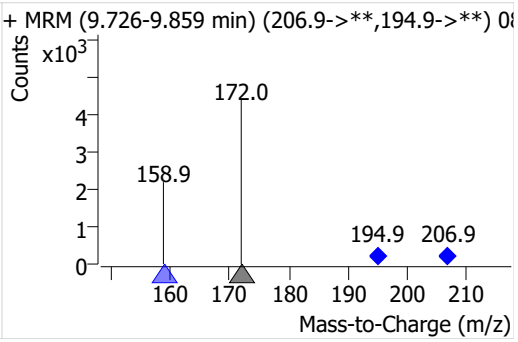




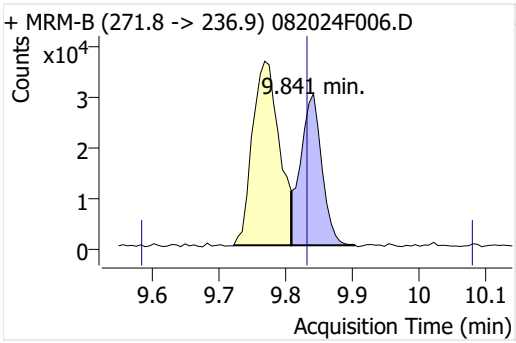
Endosulfan I

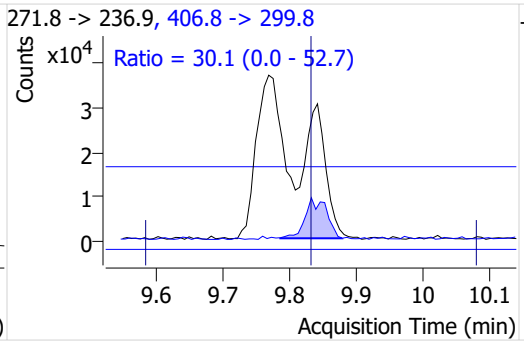


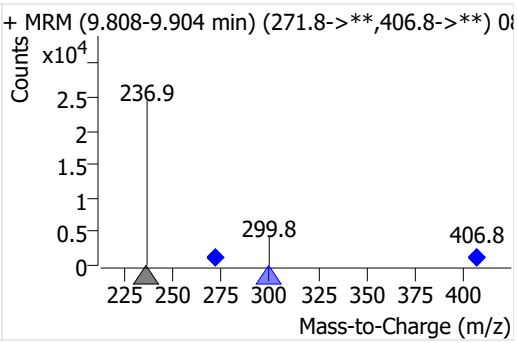




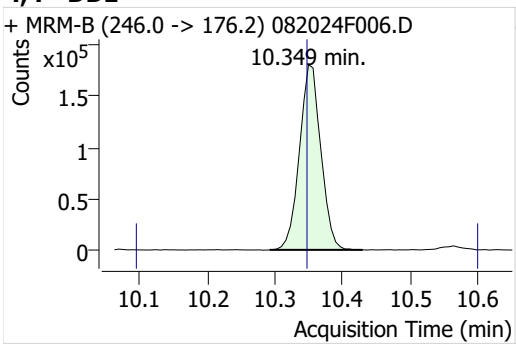
trans-Nanochlor

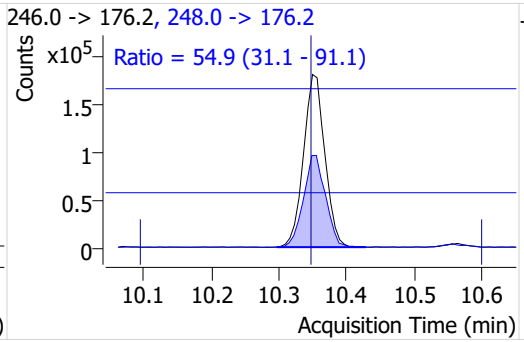


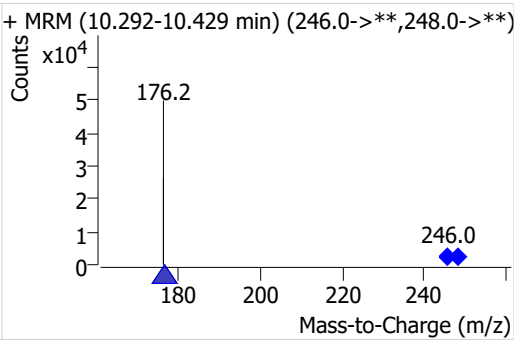




4,4' -DDE

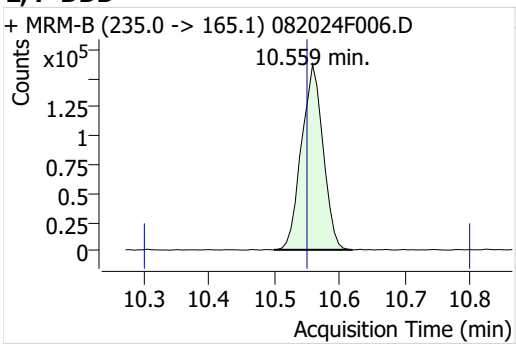


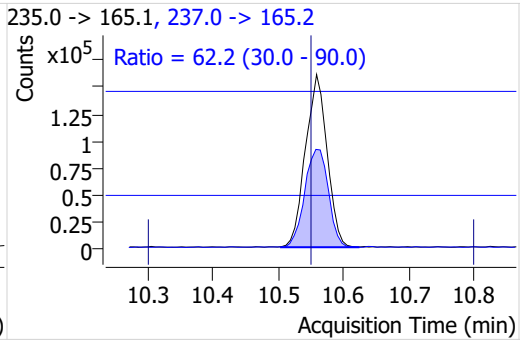


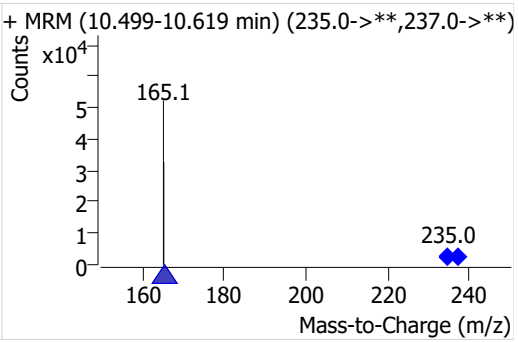


MassHunter Quantitative Analysis Sample Report

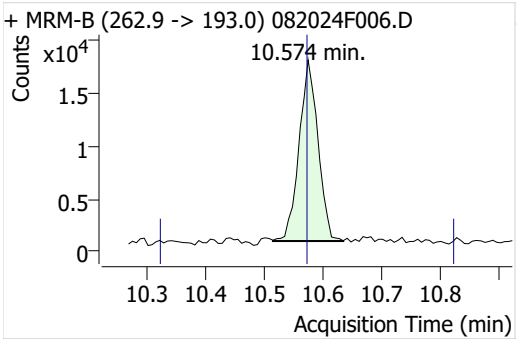
2,4'-DDD

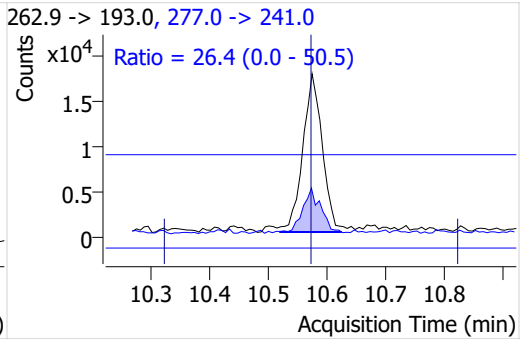


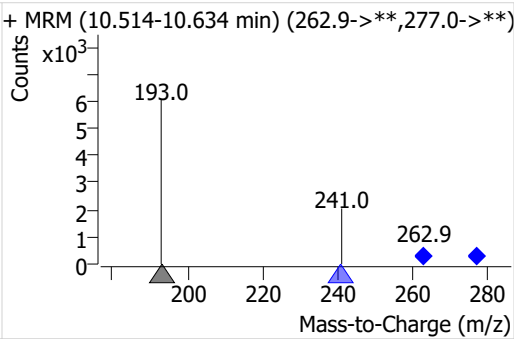




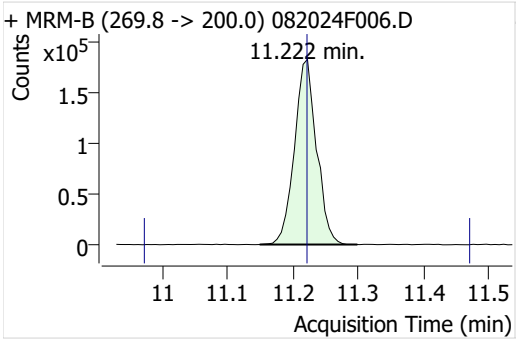
Dieldrin

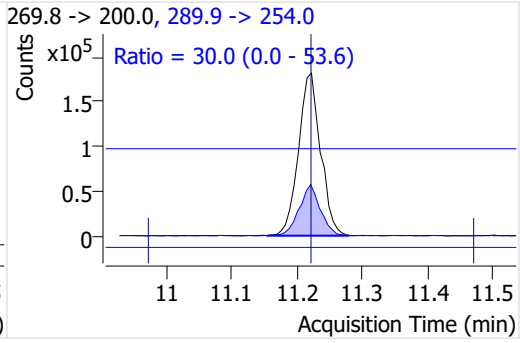


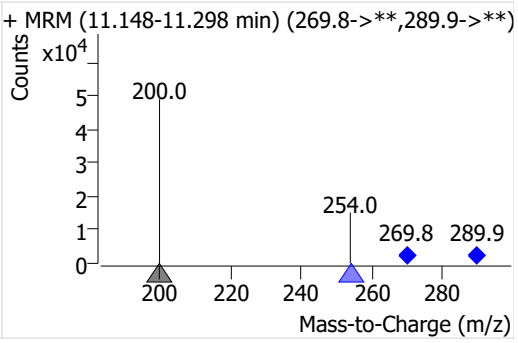




Endrin-13C12







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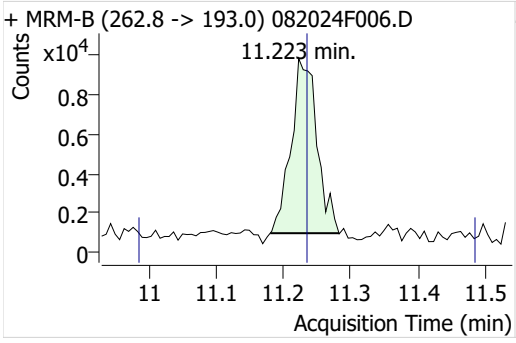

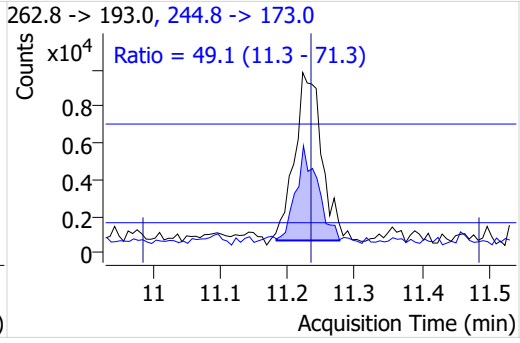

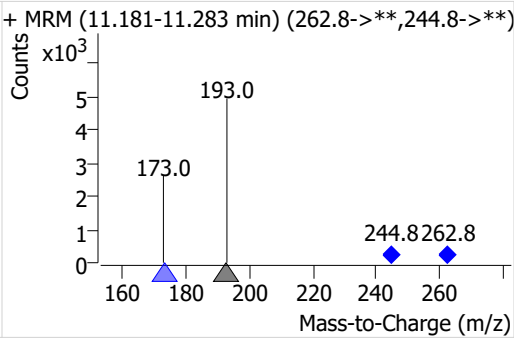

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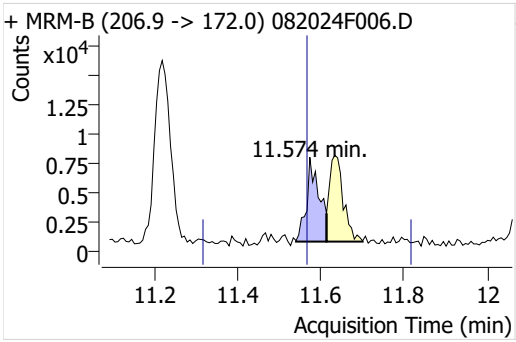
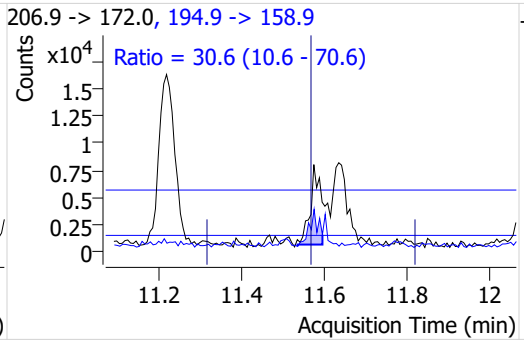
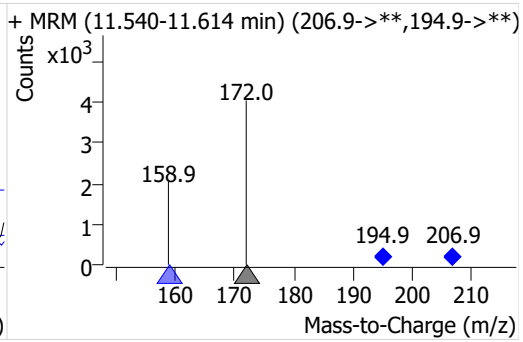
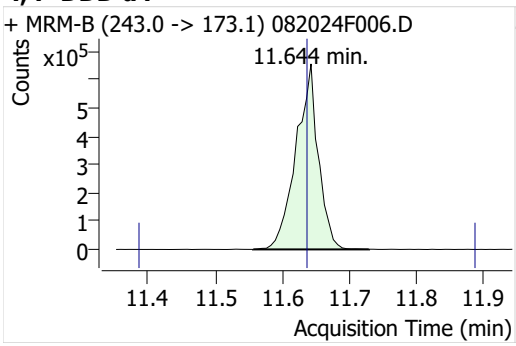
Endosulfan II

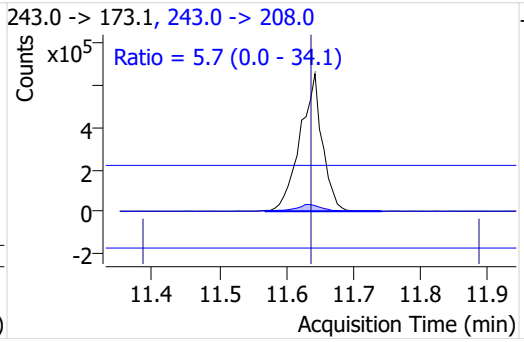


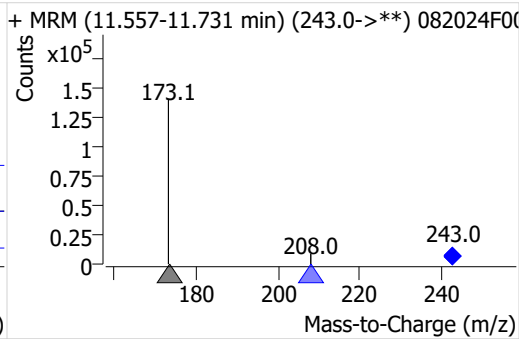




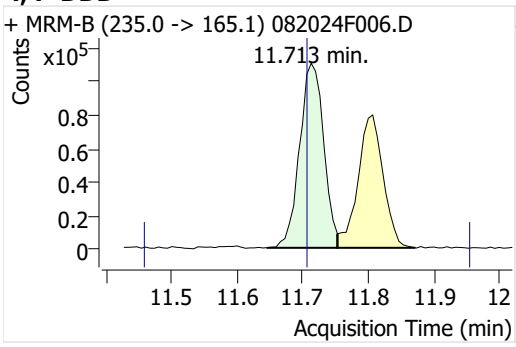
4,4'-DDD d4

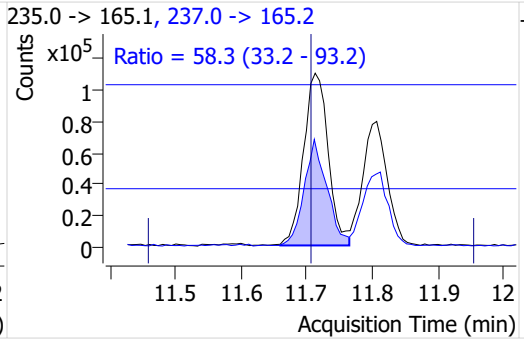


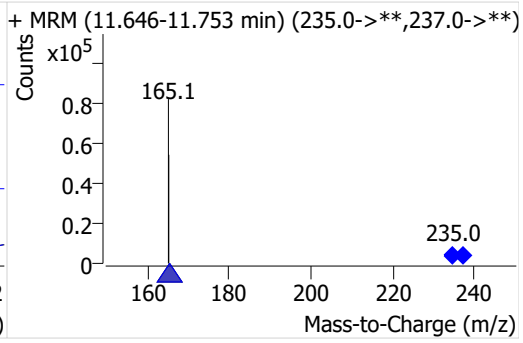




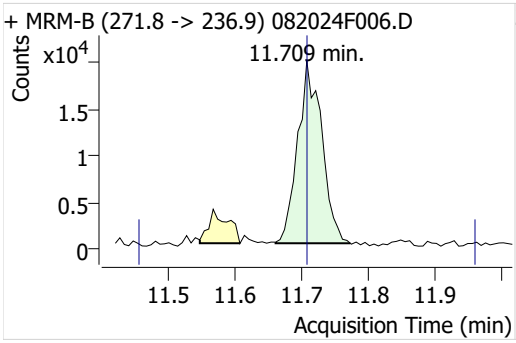
4,4'-DDD

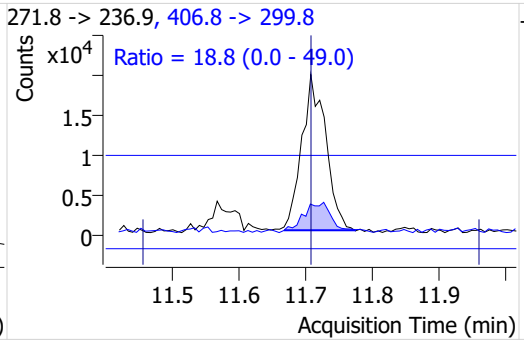


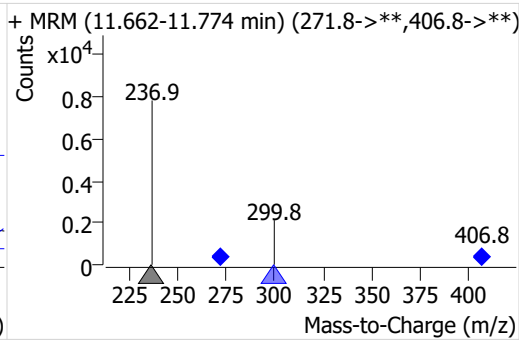




cis-Nonachlor

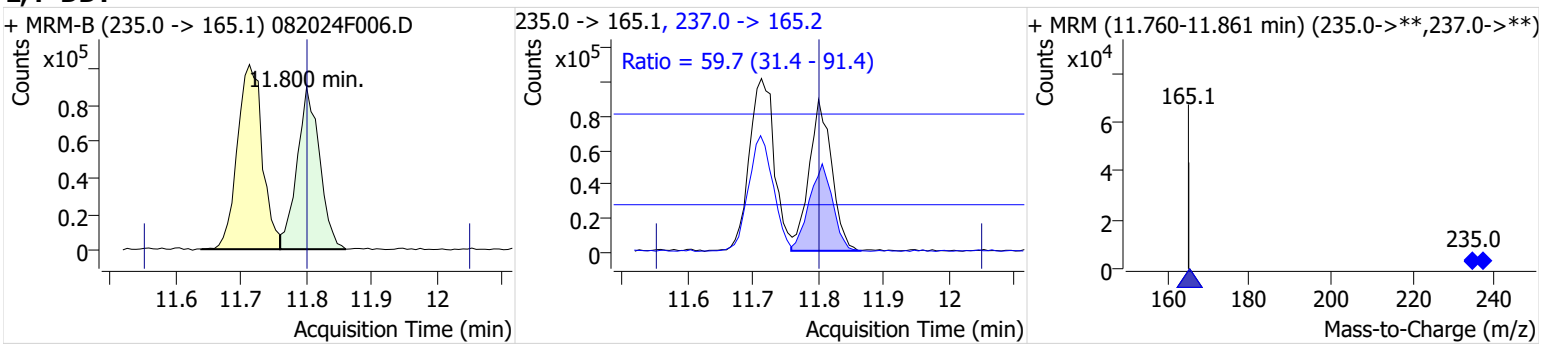




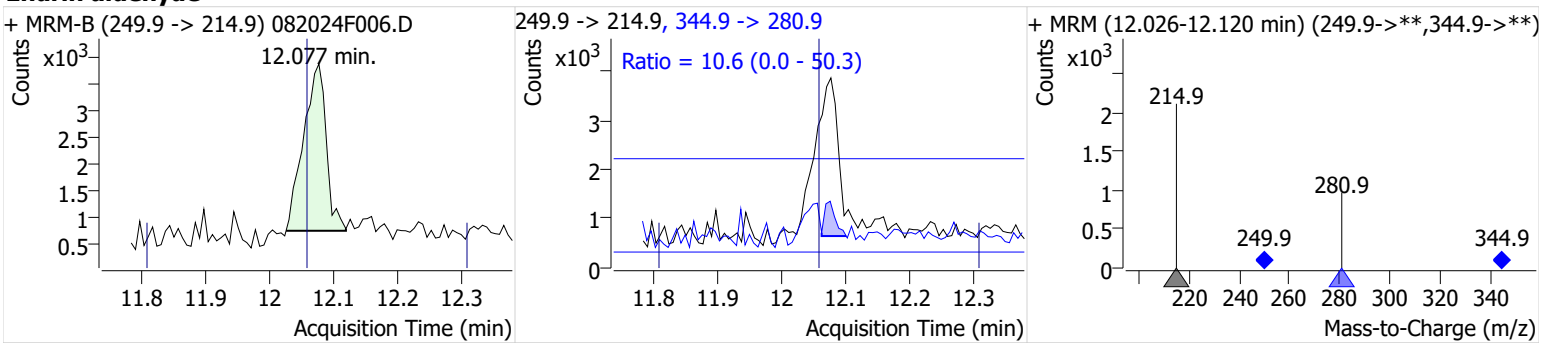


MassHunter Quantitative Analysis Sample Report

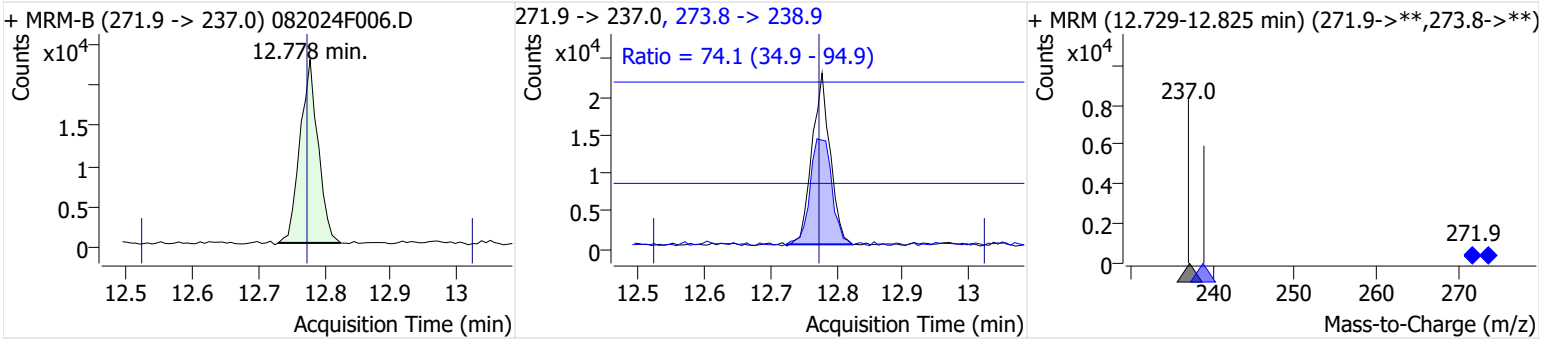
2,4'-DDT



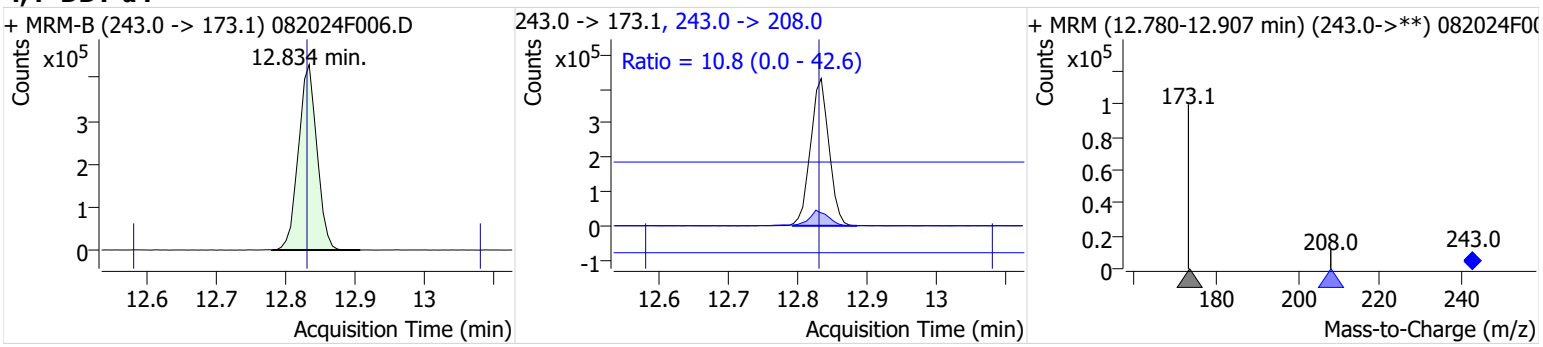
Endrin aldehyde



Endosulfan sulfate

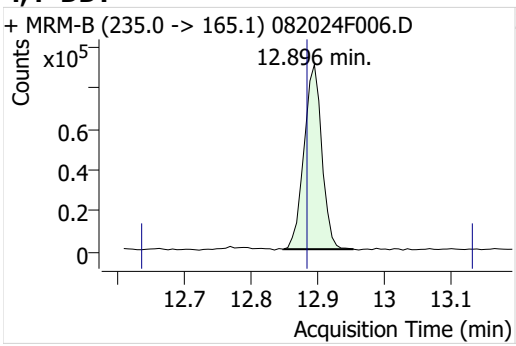


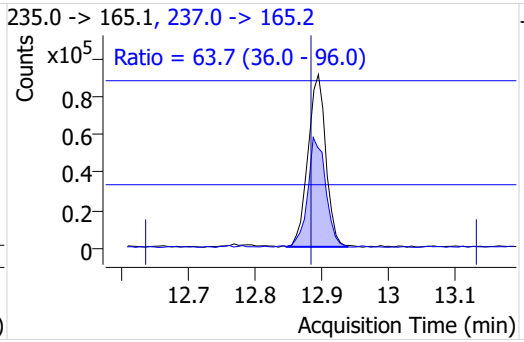
4,4'-DDT-d4

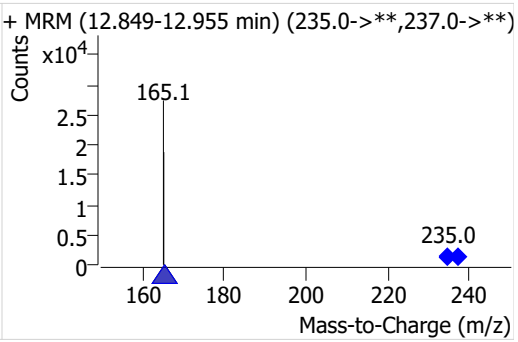


MassHunter Quantitative Analysis Sample Report

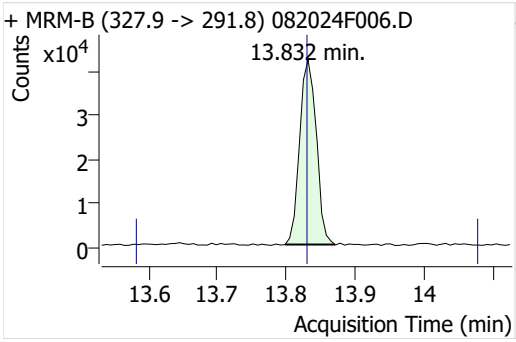
4,4'-DDT

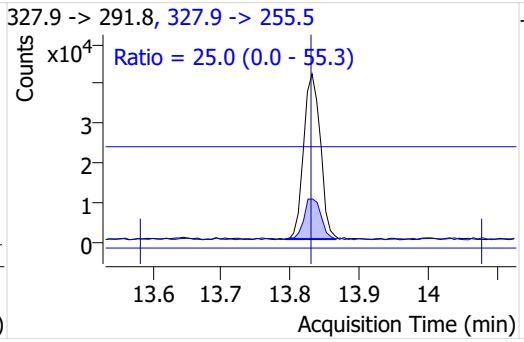


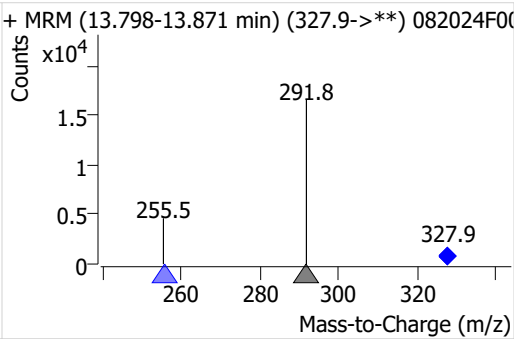




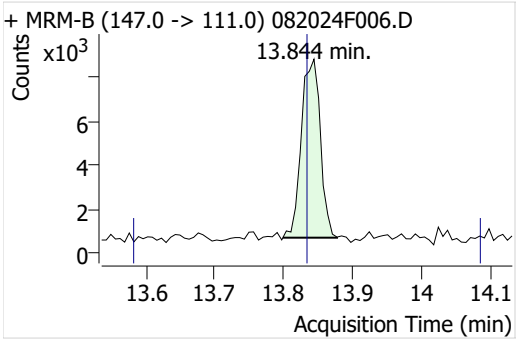
Endrin ketone-13C12

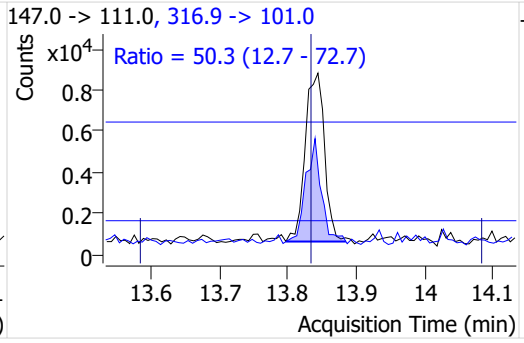


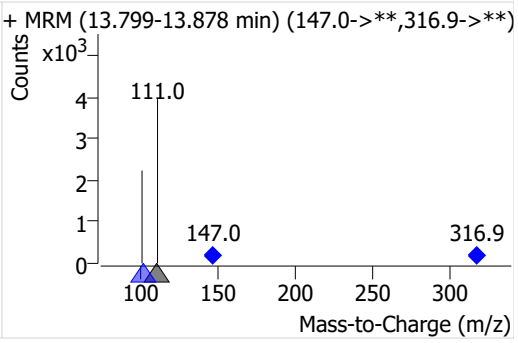




Endrin ketone







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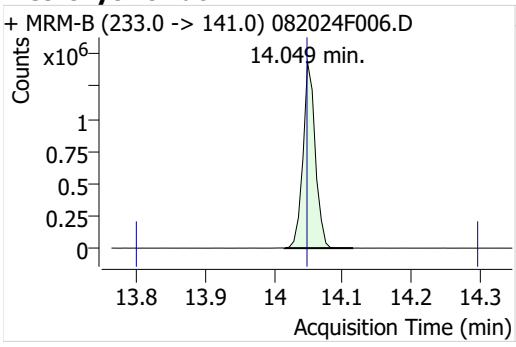

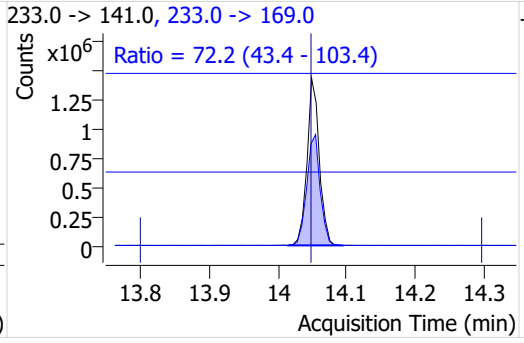

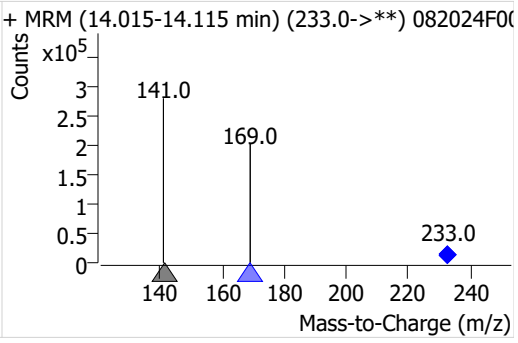

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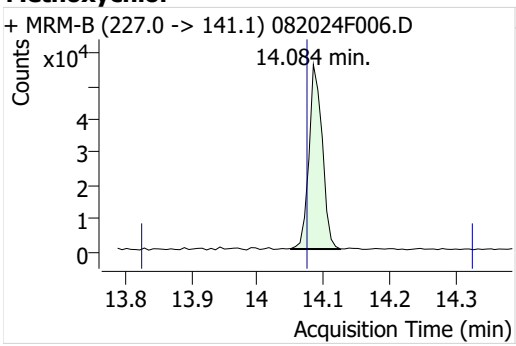
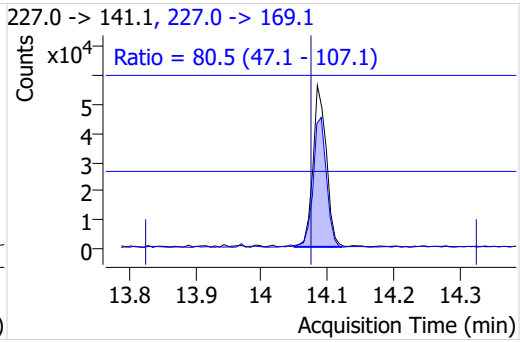
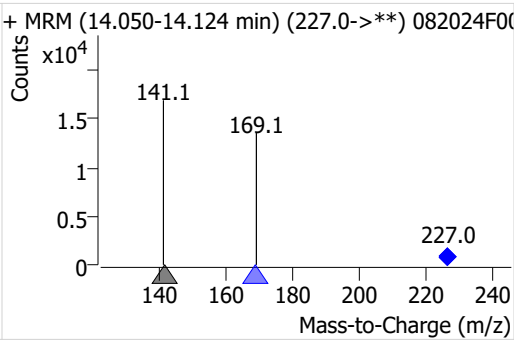
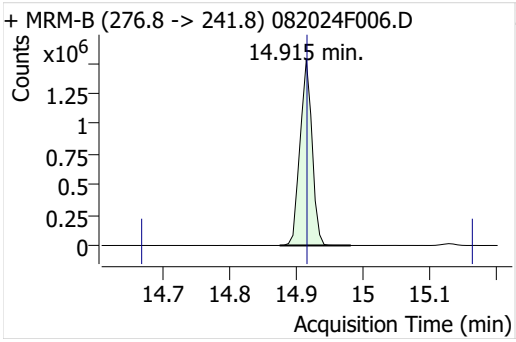
Methoxychlor

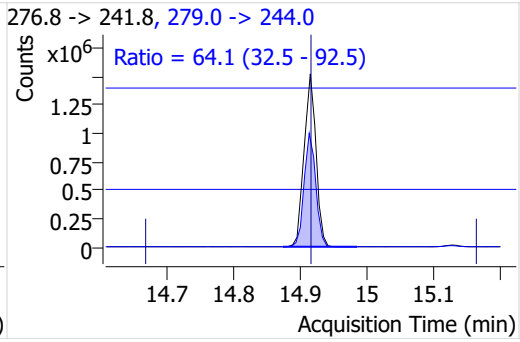


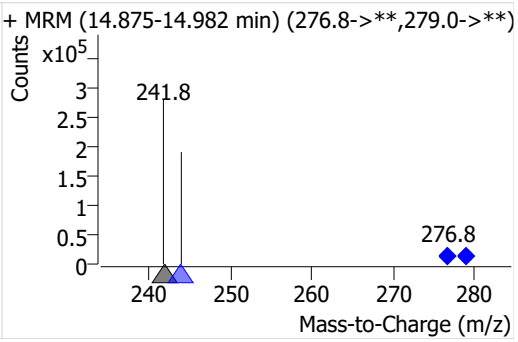




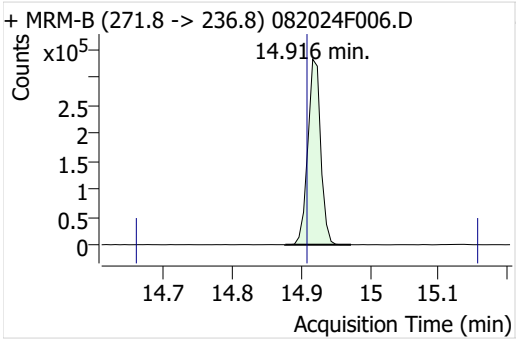
Mirex-13C10

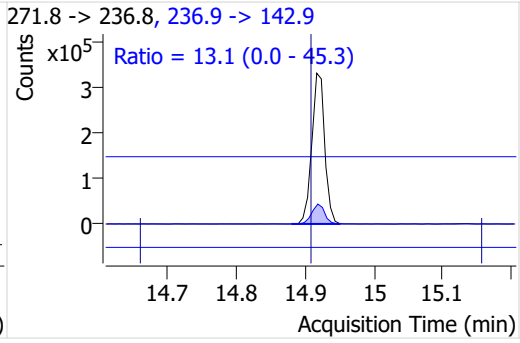


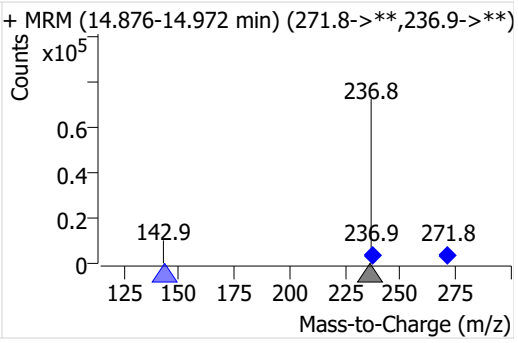




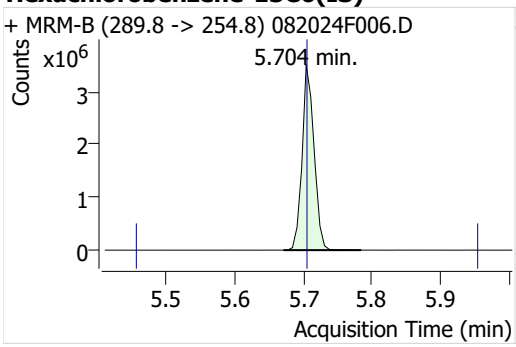
Mirex

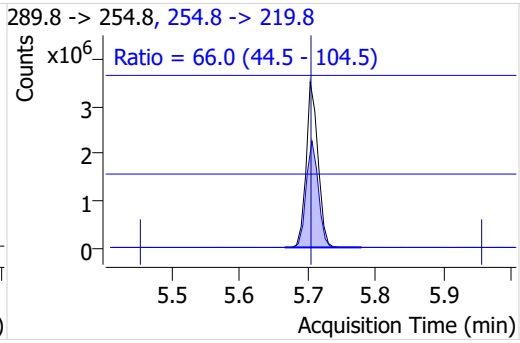


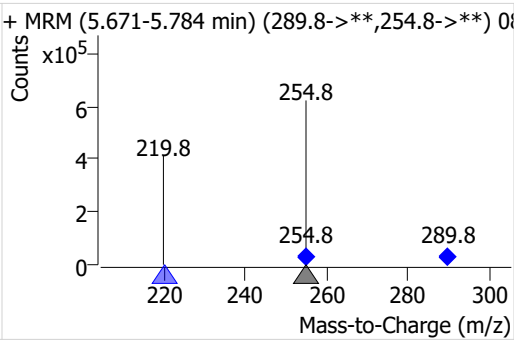




Hexachlorobenzene-13C6(IS)







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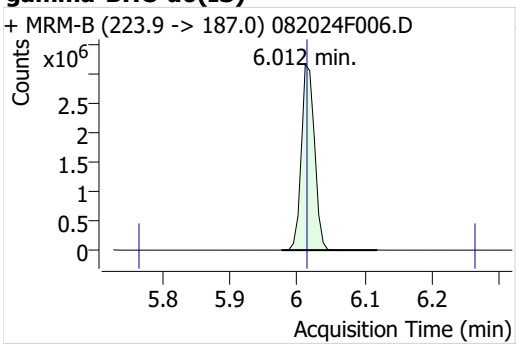
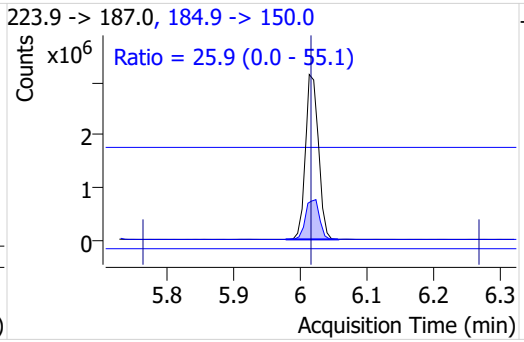
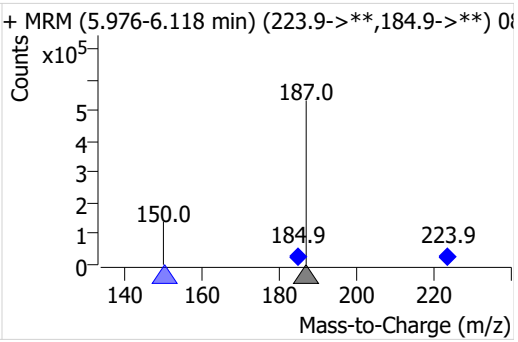
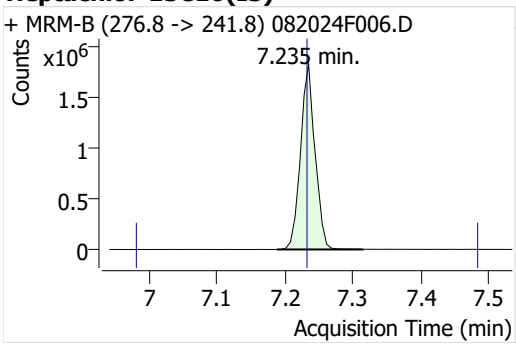
gamma-BHC-d6(IS)

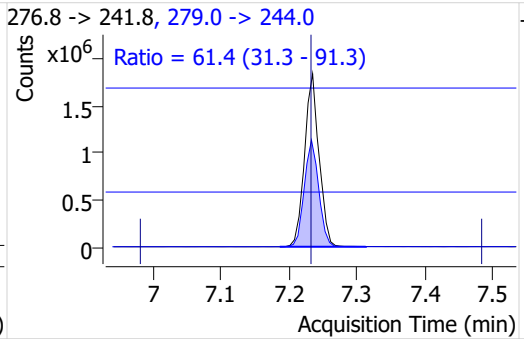


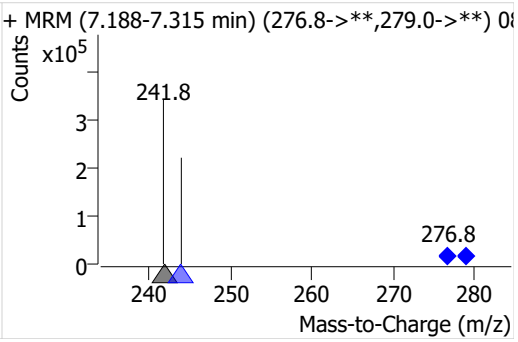




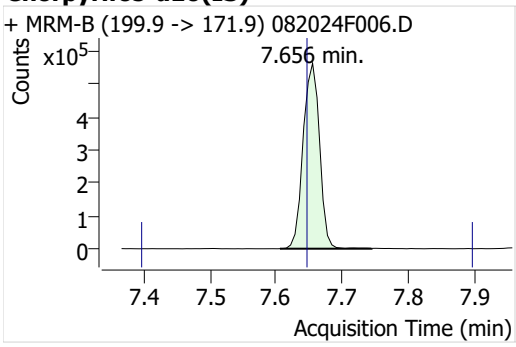
Heptachlor-13C10(IS)

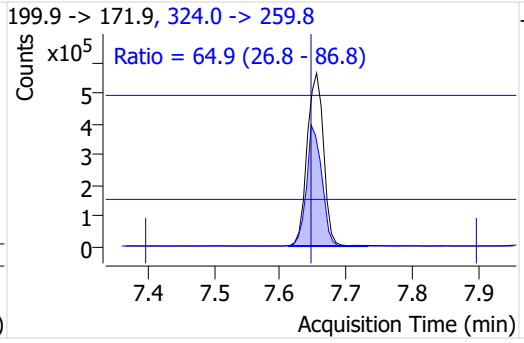


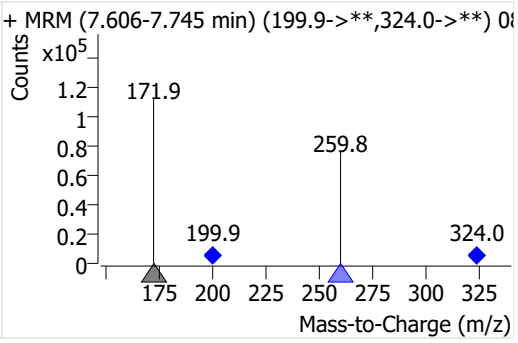




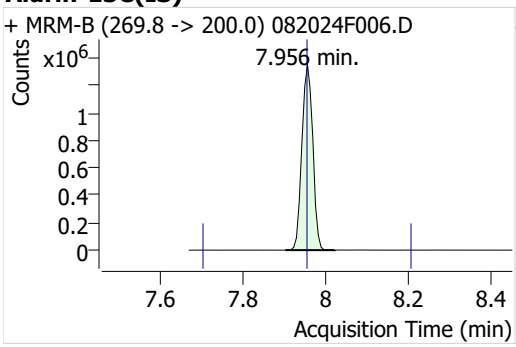
Chorpyrifos-d10(IS)

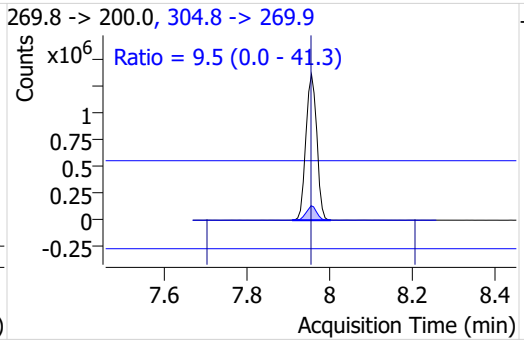


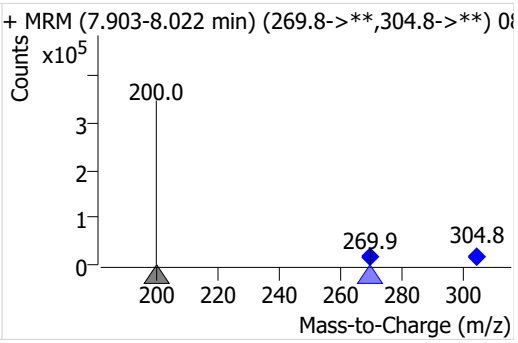




Aldrin-13C(IS)







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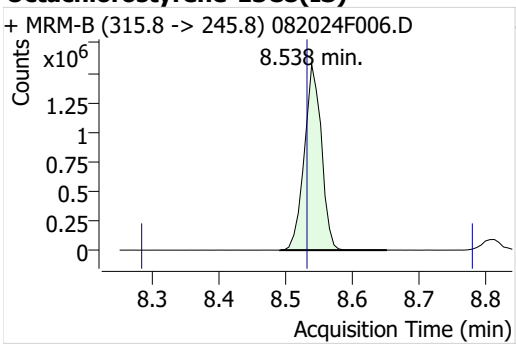
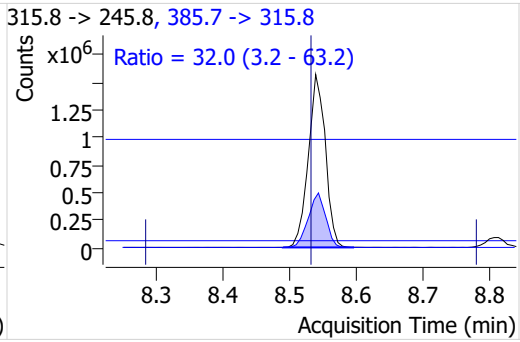
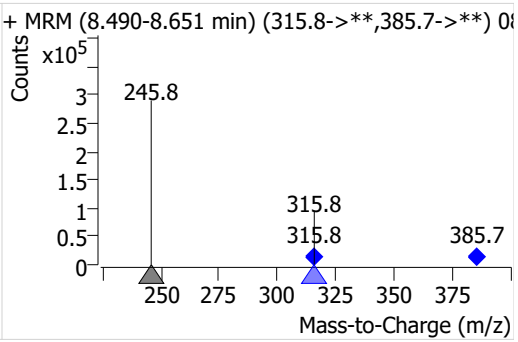
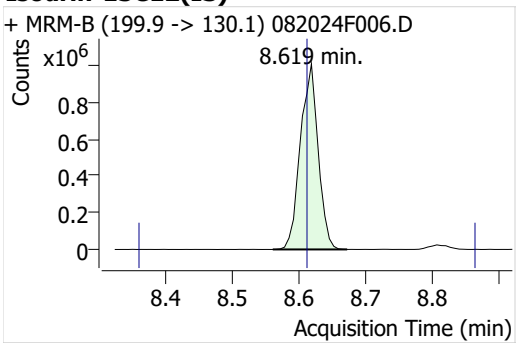
Octachlorostyrene-13C8(IS)

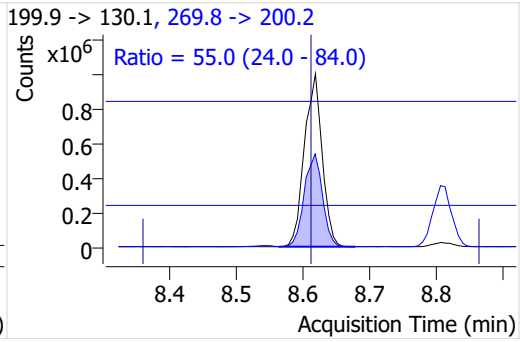


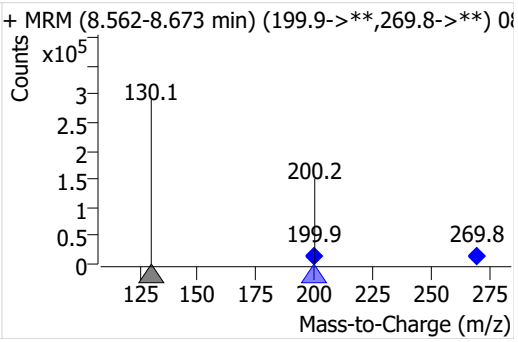




Isodrin-13C12(IS)







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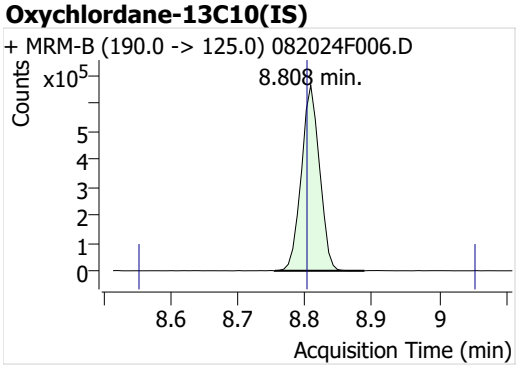
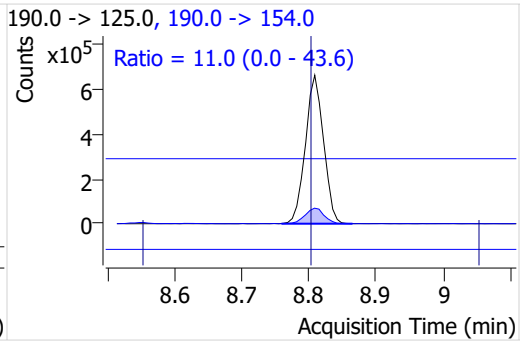
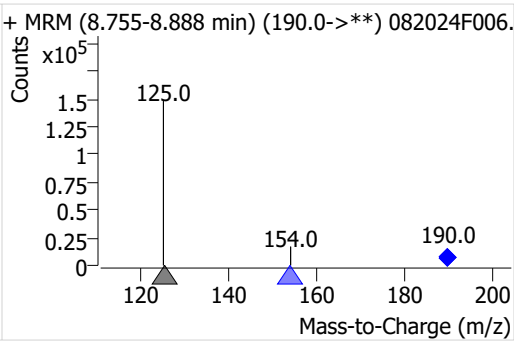
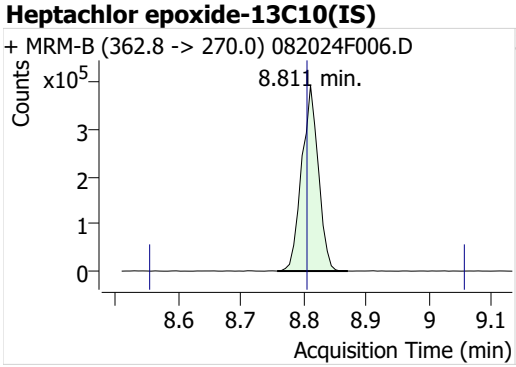
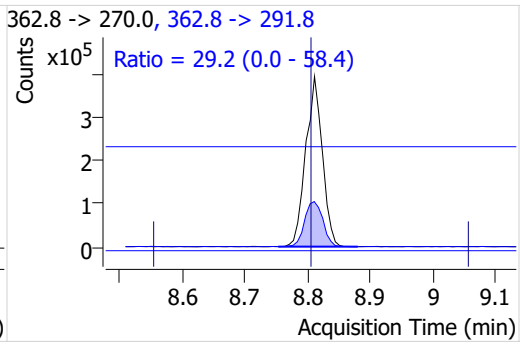


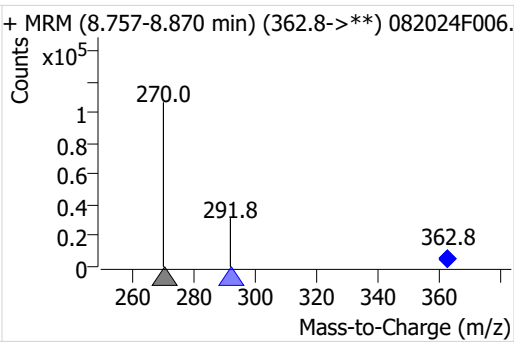




Heptachlor epoxide-13C10(IS)







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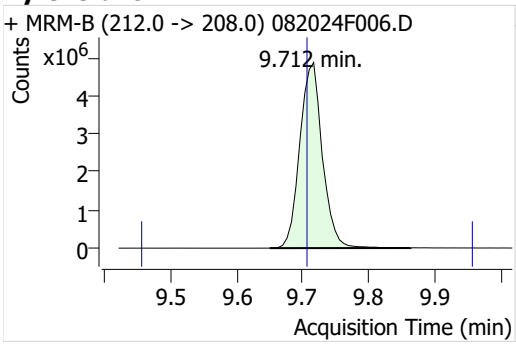
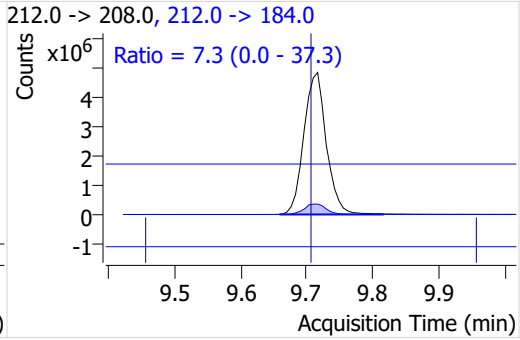
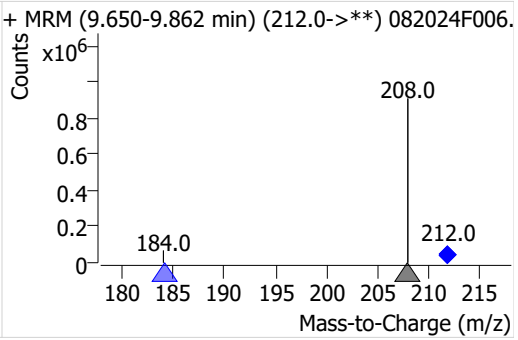
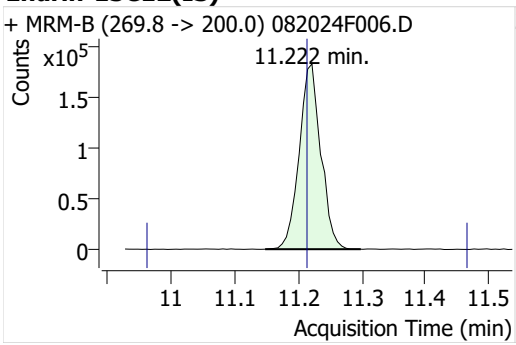
Pyrene-d10

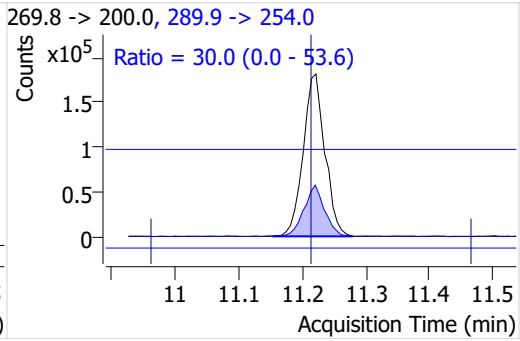


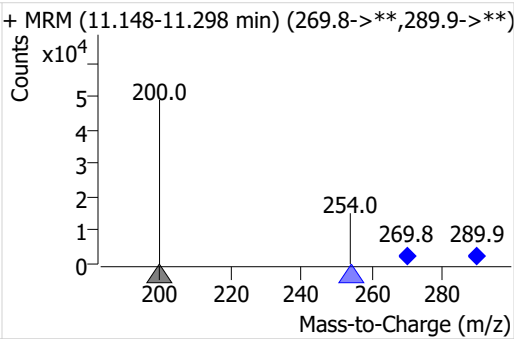




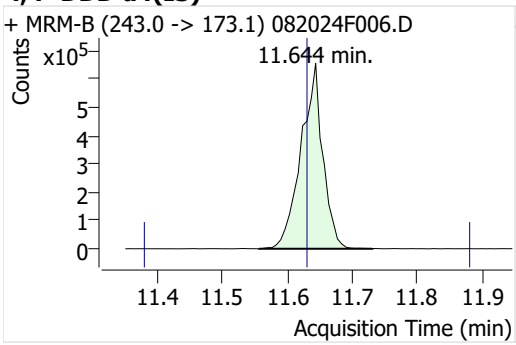
Endrin-13C12(IS)

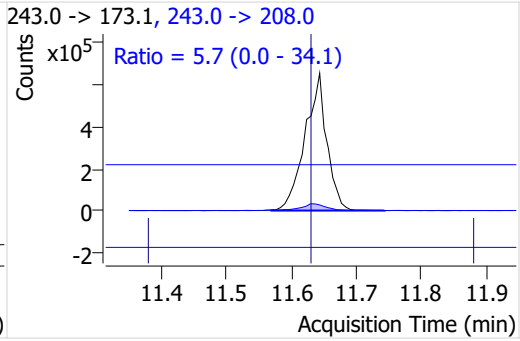


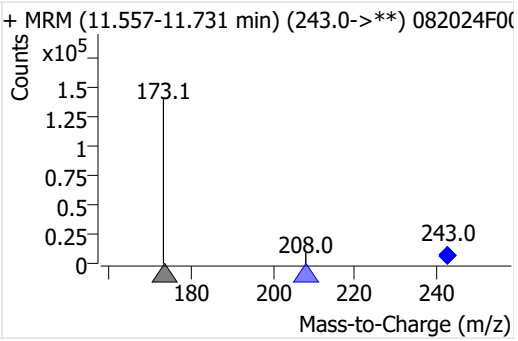




4,4'-DDD d4(IS)







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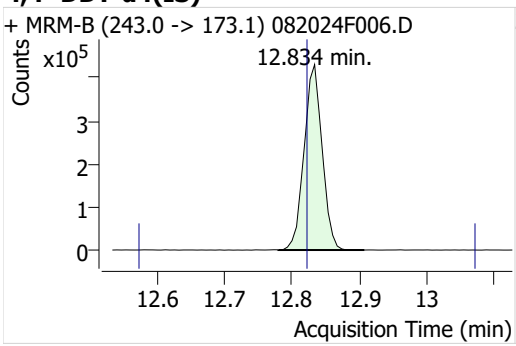

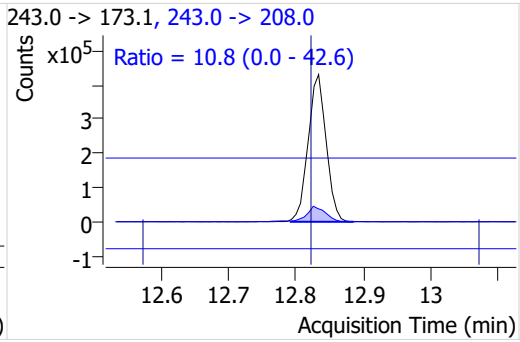

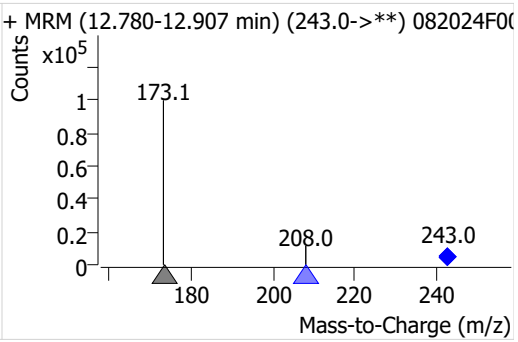

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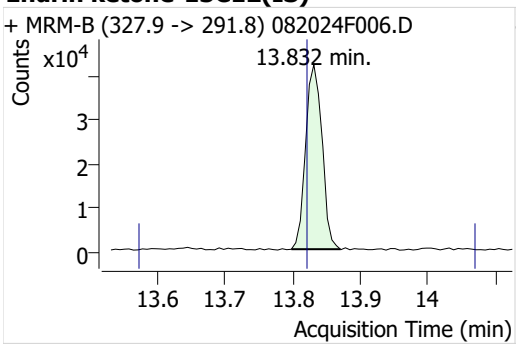
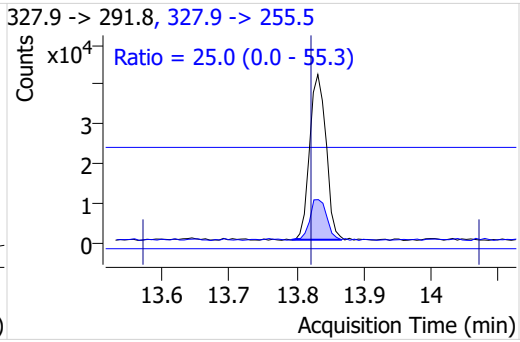
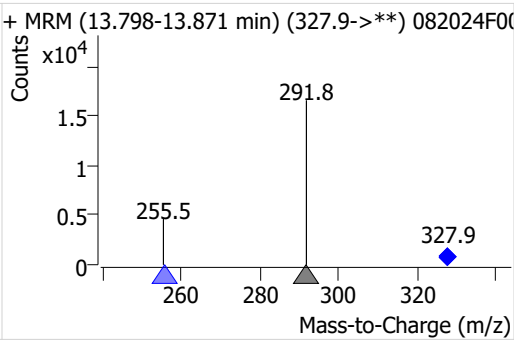
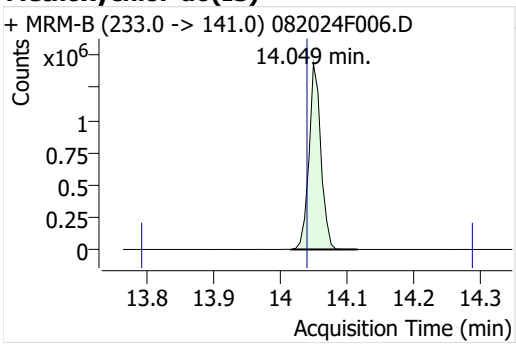
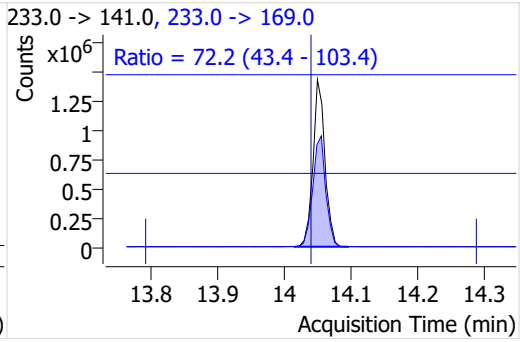


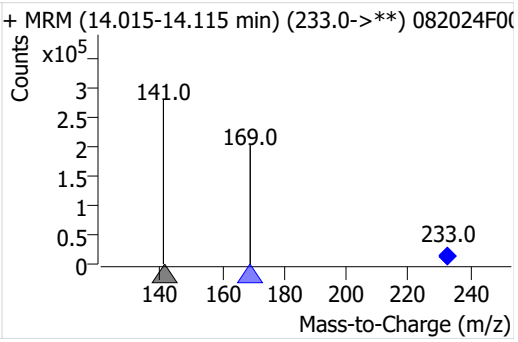




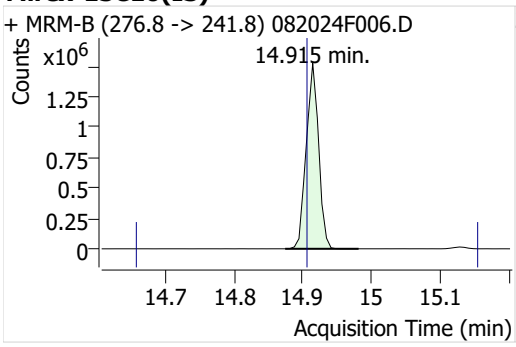
Methoxychlor-d6(IS)

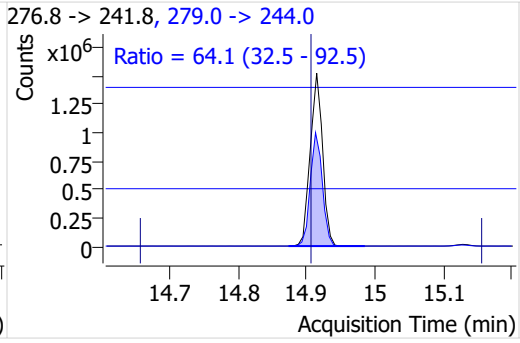


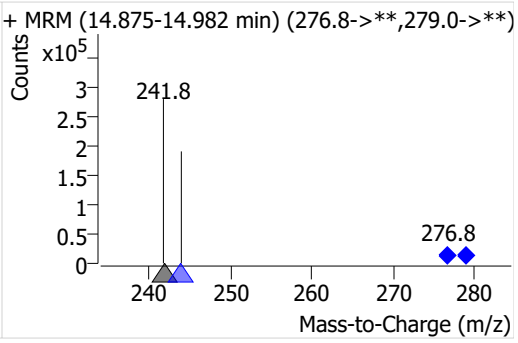




Mirex-13C10(IS)







1st 08/20/24
2nd 08/21/24

MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Acq. Date-Time	8/20/2024 12:35:01 PM	**Acq Operator**	
Name	OC PEST ICAL 2ppb SVM71-99C	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	8/20/2024 3:33:05 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	080624 OC PEST ICAL.batch.bin	**Vial**	5
Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.704	289.8 -> 254.8	4733264	20.0000 ng/ml	0.000
gamma-BHC-d6(IS)	6.018	223.9 -> 187.0	4710666	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	7.235	276.8 -> 241.8	3361308	20.0000 ng/ml	0.002
Chorpyrifos-d10(IS)	7.649	199.9 -> 171.9	1167103	20.0000 ng/ml	0.001
Aldrin-13C(IS)	7.956	269.8 -> 200.0	2703317	20.0000 ng/ml	0.001
Octachlorostyrene-13C8(IS)	8.539	315.8 -> 245.8	3030316	20.0000 ng/ml	0.007
Isodrin-13C12(IS)	8.613	199.9 -> 130.1	2009721	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	8.808	190.0 -> 125.0	1440139	20.0000 ng/ml	0.005
Heptachlor epoxide-13C10(IS)	8.811	362.8 -> 270.0	803381	20.0000 ng/ml	0.005
Pyrene-d10	9.709	212.0 -> 208.0	14800131	100.0000 ng/ml	0.007
Endrin-13C12(IS)	11.215	269.8 -> 200.0	481242	20.0000 ng/ml	0.004
4,4'-DDD d4(IS)	11.630	243.0 -> 173.1	1779697	5.0000 ng/ml	0.006
4,4'-DDT-d4(IS)	12.834	243.0 -> 173.1	906104	5.0000 ng/ml	0.011
Endrin ketone-13C12(IS)	13.832	327.9 -> 291.8	84281	20.0000 ng/ml	0.011
Methoxychlor-d6(IS)	14.049	233.0 -> 141.0	1719142	20.0000 ng/ml	0.009
Mirex-13C10(IS)	14.915	276.8 -> 241.8	2137485	5.0000 ng/ml	0.008

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.705	289.8 -> 254.8	4733264	18.117 ng/ml	
		Spiked Amount =	20.0	Recovery =	*90.6 %*
gamma-BHC-d6	6.014	223.9 -> 187.0	4710666	18.962 ng/ml	
		Spiked Amount =	20.0	Recovery =	*94.8 %*
Heptachlor-13C10	7.232	276.8 -> 241.8	3361308	19.377 ng/ml	
		Spiked Amount =	20.0	Recovery =	*96.9 %*
Chorpyrifos-d10	7.647	199.9 -> 171.9	1167103	19.538 ng/ml	
		Spiked Amount =	20.0	Recovery =	*97.7 %*
Aldrin-13C	7.955	269.8 -> 200.0	2701021	18.768 ng/ml	
		Spiked Amount =	20.0	Recovery =	*93.8 %*
Octachlorostyrene-13C8	8.531	315.8 -> 245.8	3030316	18.460 ng/ml	
		Spiked Amount =	20.0	Recovery =	*92.3 %*
Isodrin-13C12	8.613	199.9 -> 130.1	2009721	17.954 ng/ml	
		Spiked Amount =	20.0	Recovery =	*89.8 %*
Oxychlordane-13C10	8.803	190.0 -> 125.0	1440139	18.812 ng/ml	
		Spiked Amount =	20.0	Recovery =	*94.1 %*
Heptachlor epoxide-13C10	8.805	362.8 -> 270.0	803381	17.753 ng/ml	
		Spiked Amount =	20.0	Recovery =	*88.8 %*
Endrin-13C12	11.214	269.8 -> 200.0	481242	19.194 ng/ml	
		Spiked Amount =	20.0	Recovery =	*96.0 %*
4,4'-DDD d4	11.630	243.0 -> 173.1	1779697	4.470 ng/ml	
		Spiked Amount =	5.0	Recovery =	*89.4 %*
4,4'-DDT-d4	12.822	243.0 -> 173.1	906104	4.386 ng/ml	
		Spiked Amount =	5.0	Recovery =	*87.7 %*
Endrin ketone-13C12	13.821	327.9 -> 291.8	84281	18.865 ng/ml	
		Spiked Amount =	20.0	Recovery =	*94.3 %*
Methoxychlor-d6	14.039	233.0 -> 141.0	1719142	19.394 ng/ml	
		Spiked Amount =	20.0	Recovery =	*97.0 %*

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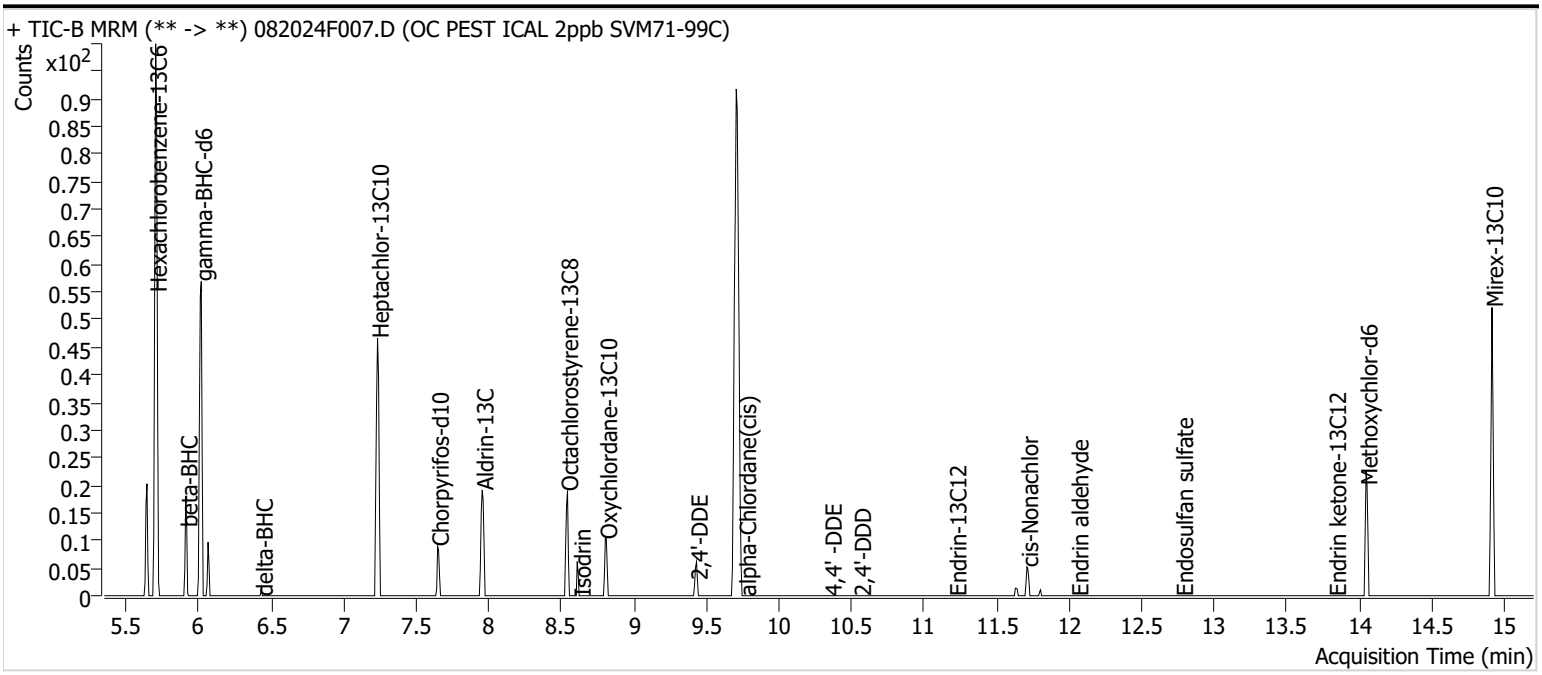
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.906	276.8 -> 241.8	2137485	4.120 ng/ml
		Spiked Amount =	5.0	Recovery = *82.4 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)	5.649	181.1 -> 145.1	1445399	1.829 ng/ml	94
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.706	283.8 -> 213.9	811117	1.972 ng/ml	99
beta-BHC	gamma-BHC-d6(IS)	5.916	181.1 -> 145.1	1378509	1.869 ng/ml	99
gamma-BHC(Lindane)	gamma-BHC-d6(IS)	6.070	181.1 -> 145.1	1109987	1.827 ng/ml	99
delta-BHC	gamma-BHC-d6(IS)	6.436	181.1 -> 145.1	413819	1.905 ng/ml	86
Heptachlor	Heptachlor-13C10(IS)	7.238	271.7 -> 236.9	329855	1.915 ng/ml	30
Chorpyrifos	Chorpyrifos-d10(IS)	7.740	196.9 -> 169.0	140280	1.896 ng/ml	86
Aldrin	Aldrin-13C(IS)	7.958	254.9 -> 220.0	421780	1.884 ng/ml	38
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.544	342.8 -> 307.8	590783	1.923 ng/ml	97
Isodrin	Isodrin-13C12(IS)	8.627	193.0 -> 123.0	211570	1.915 ng/ml	95
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	8.818	352.8 -> 262.9	83241	1.856 ng/ml	100
Oxychlordane	Oxychlordane-13C10(IS)	8.816	114.9 -> 51.1	336265	1.897 ng/ml	96
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.419	271.8 -> 236.9	183414	1.791 ng/ml	95
2,4'-DDE	4,4'-DDD d4(IS)	9.434	246.0 -> 176.2	1202573	1.885 ng/ml	98
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.767	271.8 -> 236.9	464409	1.806 ng/ml	97
Endosulfan I	Endrin-13C12(IS)	9.797	206.9 -> 172.0	68116	1.748 ng/ml	97
trans-Nanochlor	Oxychlordane-13C10(IS)	9.841	271.8 -> 236.9	156380	1.754 ng/ml	94
4,4' -DDE	4,4'-DDD d4(IS)	10.356	246.0 -> 176.2	890426	1.875 ng/ml	97
2,4'-DDD	4,4'-DDD d4(IS)	10.559	235.0 -> 165.1	846852	1.896 ng/ml	93
Dieldrin	Endrin-13C12(IS)	10.574	262.9 -> 193.0	85856	1.708 ng/ml	85
Endrin	Endrin-13C12(IS)	11.230	262.8 -> 193.0	52179	1.853 ng/ml	92
Endosulfan II	Endrin-13C12(IS)	11.580	206.9 -> 172.0	35302 ***m***	1.844 ng/ml	90
4,4'-DDD	4,4'-DDD d4(IS)	11.713	235.0 -> 165.1	636588	1.773 ng/ml	100
cis-Nonachlor	Oxychlordane-13C10(IS)	11.709	271.8 -> 236.9	114468	1.763 ng/ml	95
2,4'-DDT	4,4'-DDT-d4(IS)	11.800	235.0 -> 165.1	499705	1.998 ng/ml	99
Endrin aldehyde	Endrin-13C12(IS)	12.057	249.9 -> 214.9	19069	1.826 ng/ml	100
Endosulfan sulfate	Endrin-13C12(IS)	12.778	271.9 -> 237.0	104712	1.776 ng/ml	92
4,4'-DDT	4,4'-DDT-d4(IS)	12.896	235.0 -> 165.1	420088	1.991 ng/ml	91
Endrin ketone	Endrin ketone-13C12(IS)	13.837	147.0 -> 111.0	34553	1.866 ng/ml	93
Methoxychlor	Methoxychlor-d6(IS)	14.090	227.0 -> 141.1	161919	1.761 ng/ml	96
Mirex	Mirex-13C10(IS)	14.916	271.8 -> 236.8	952228	2.206 ng/ml	96

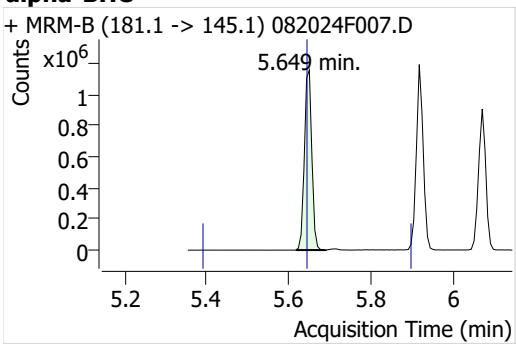
(m) = manual integration ND = Not Detected NC = Not Calculated

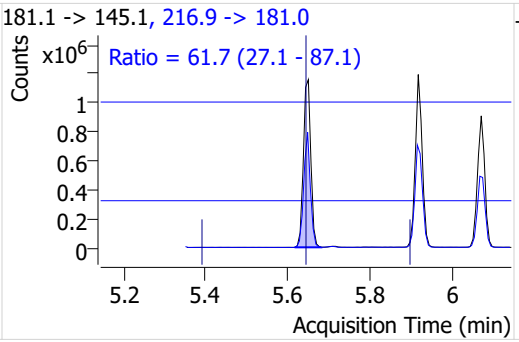
Sample Chromatogram

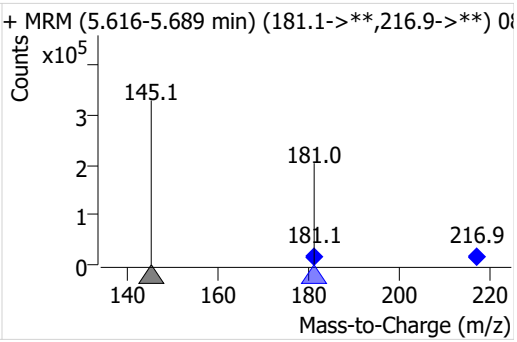
MassHunter Quantitative Analysis Sample Report



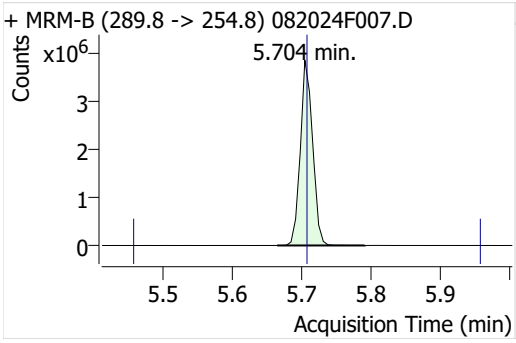
alpha-BHC

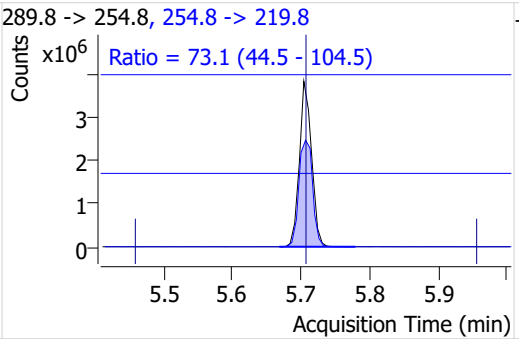


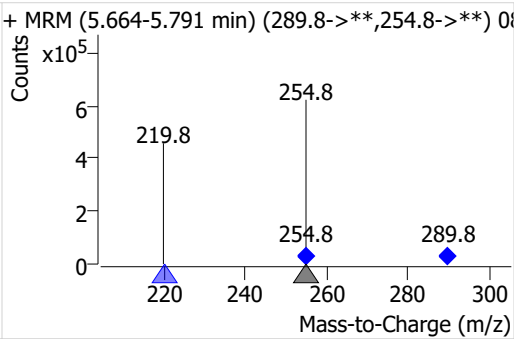




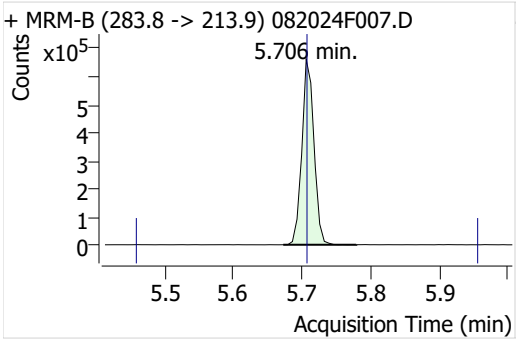
Hexachlorobenzene-13C6

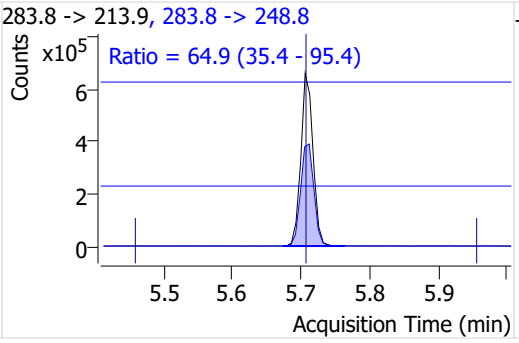


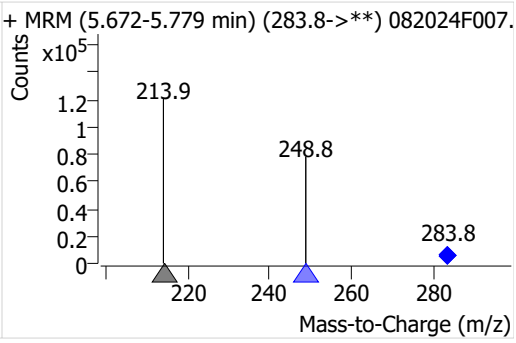




Hexachlorobenzene







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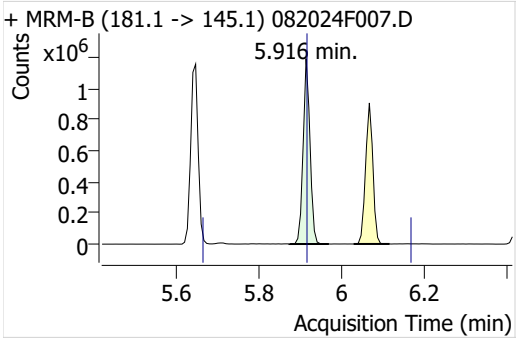
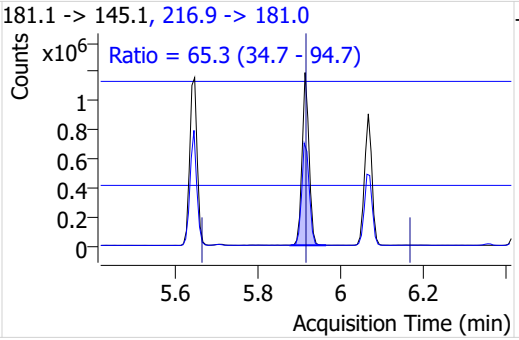
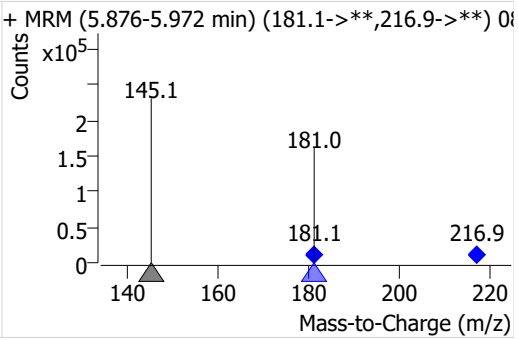
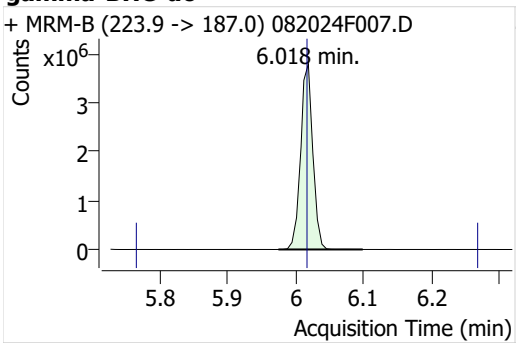
beta-BHC

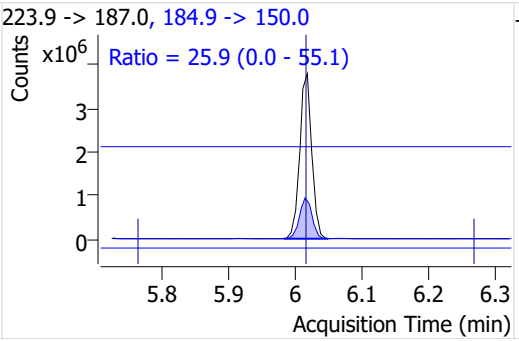


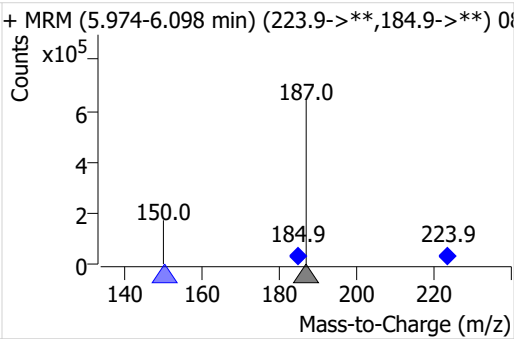




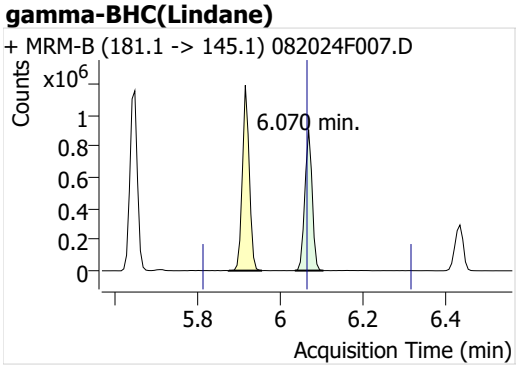
gamma-BHC-d6

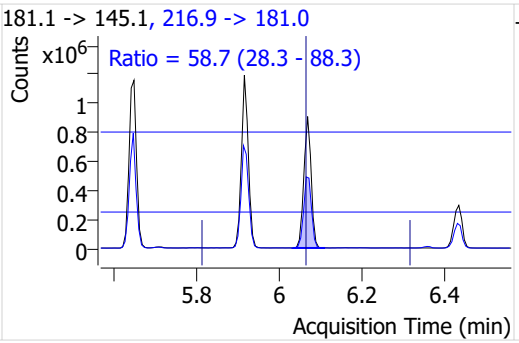


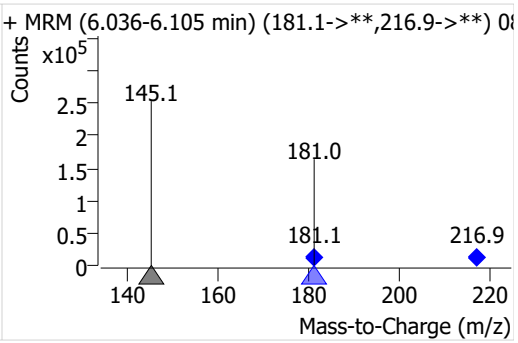




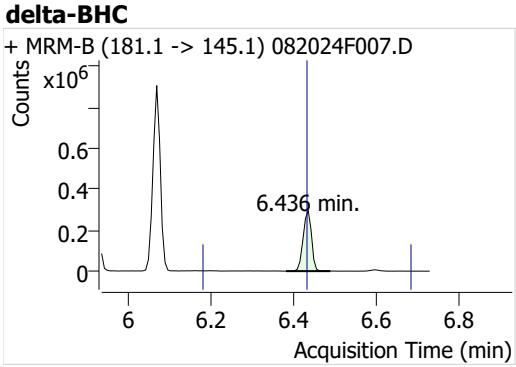
gamma-BHC(Lindane)

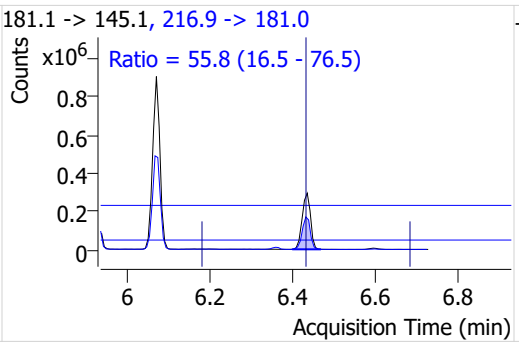


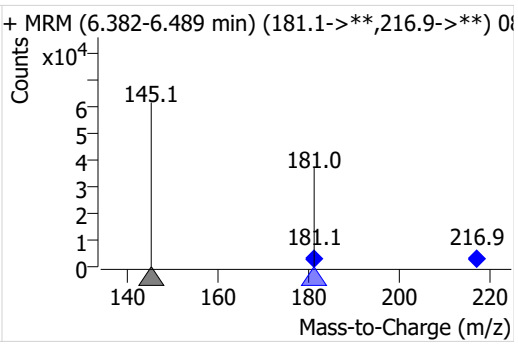




delta-BHC







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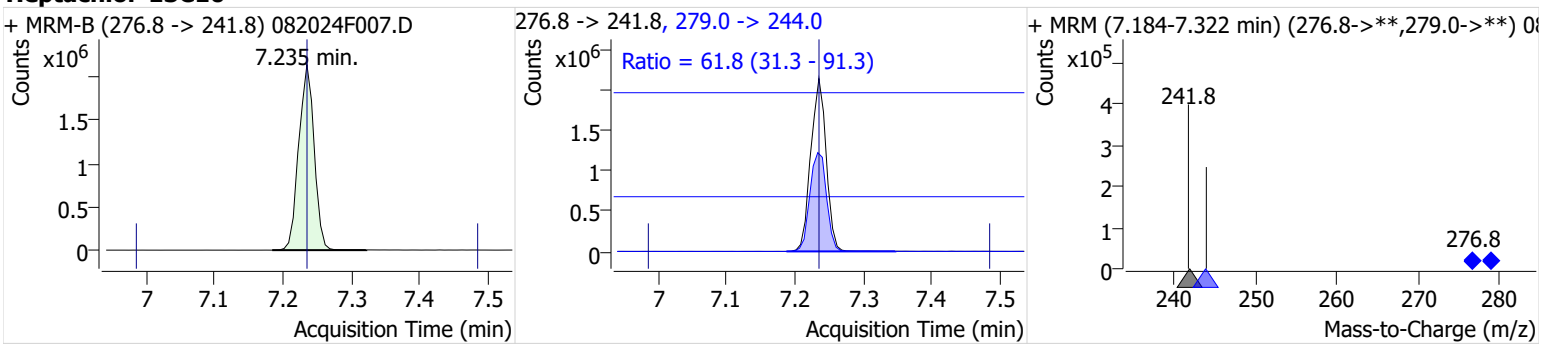
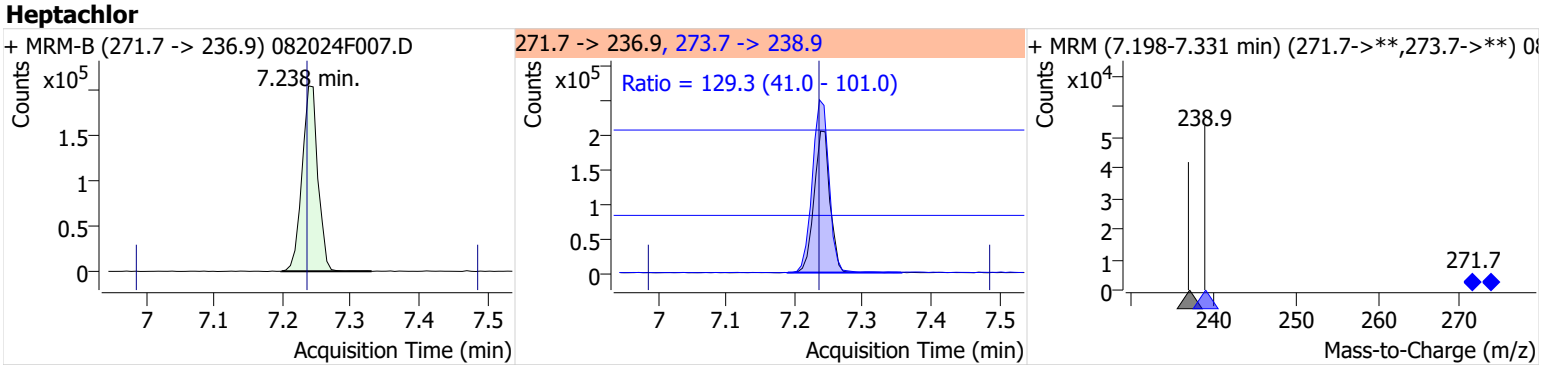
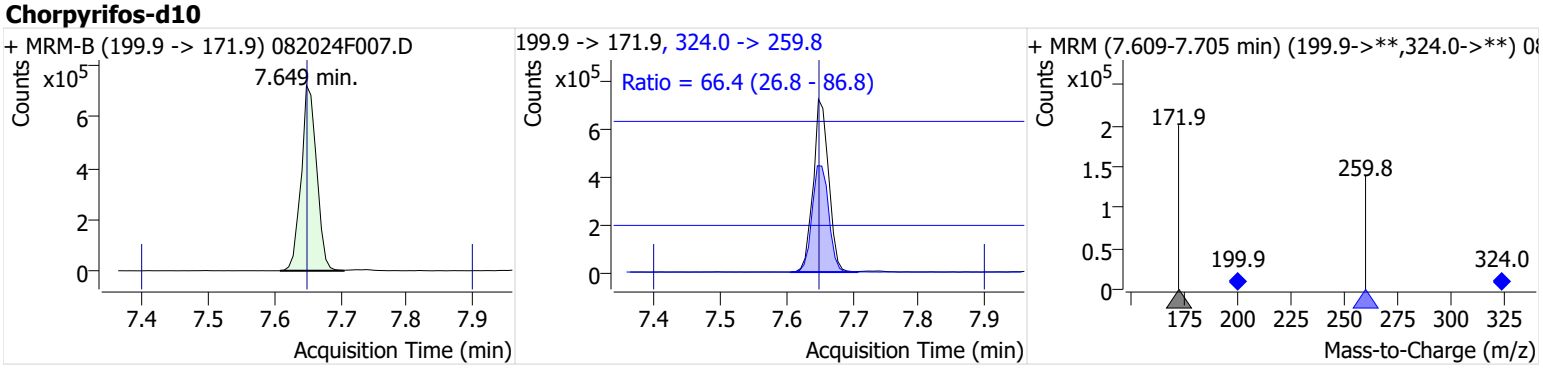
Heptachlor-13C10



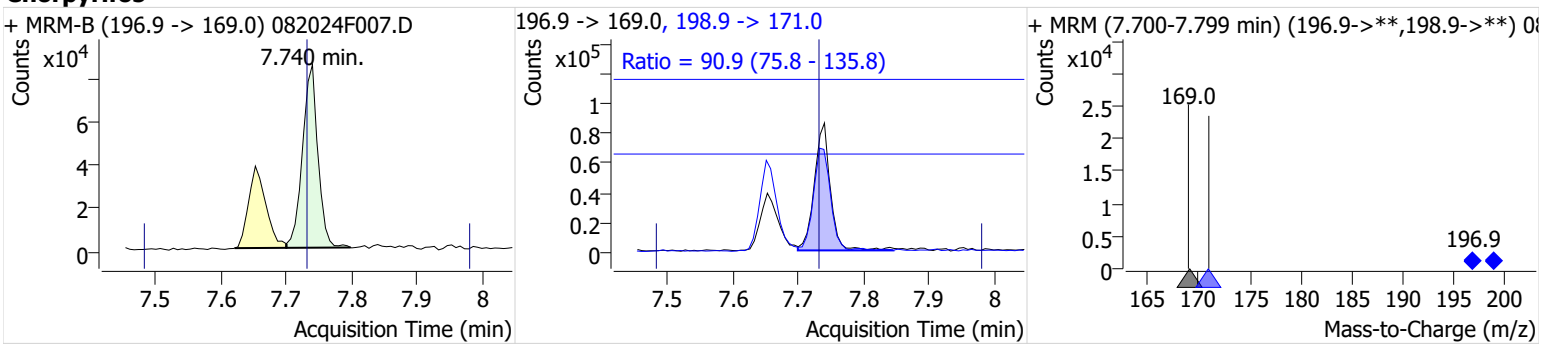
Heptachlor



Chorpyrifos-d10



Chorpyrifos



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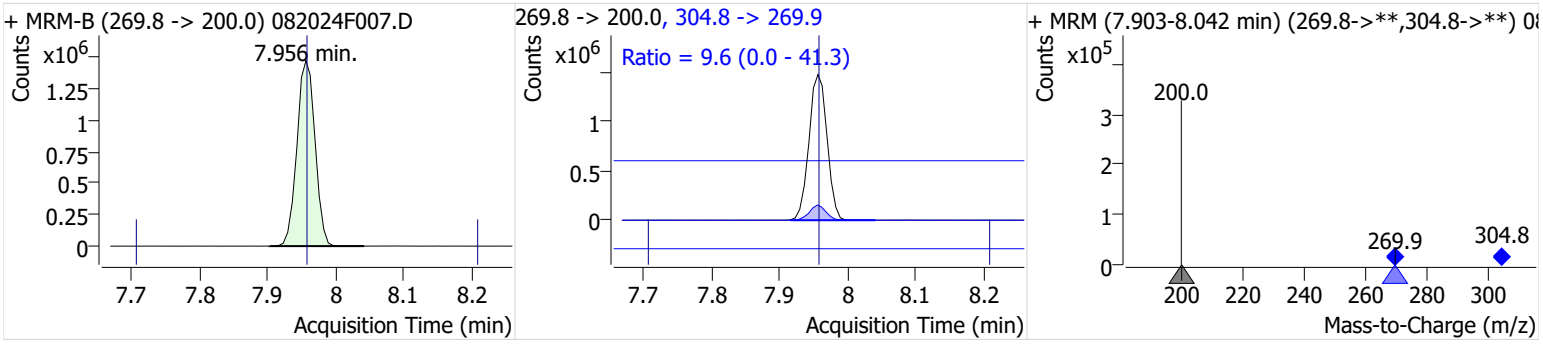
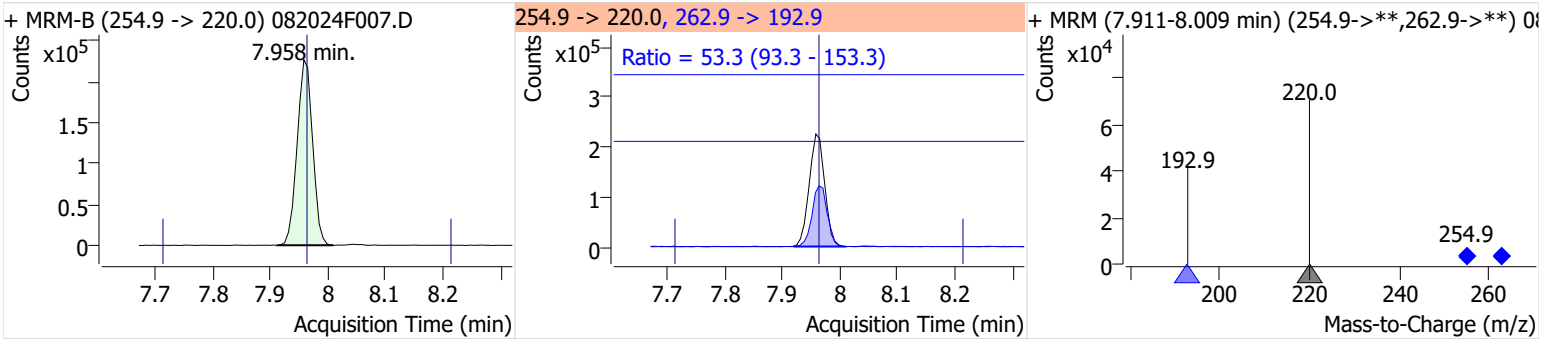
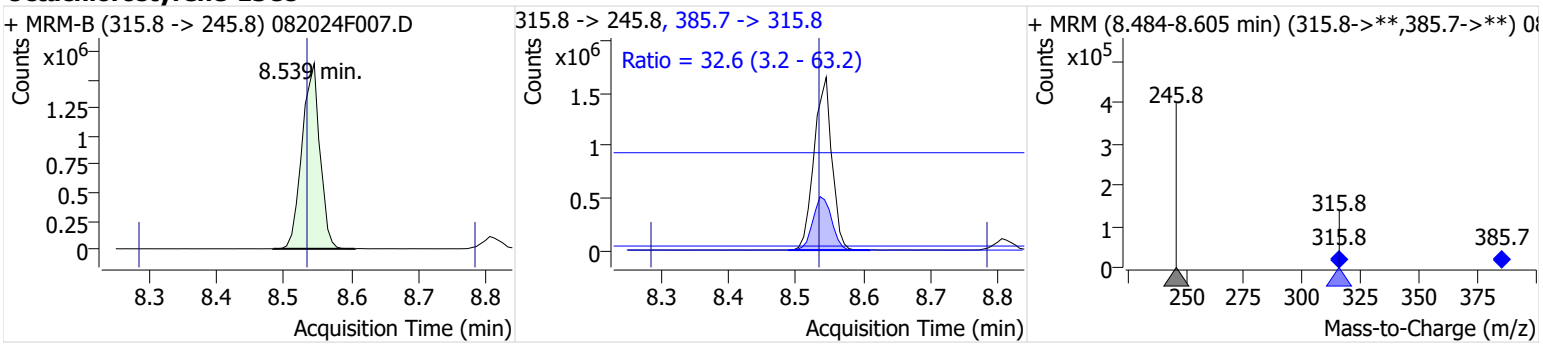
Aldrin-13C



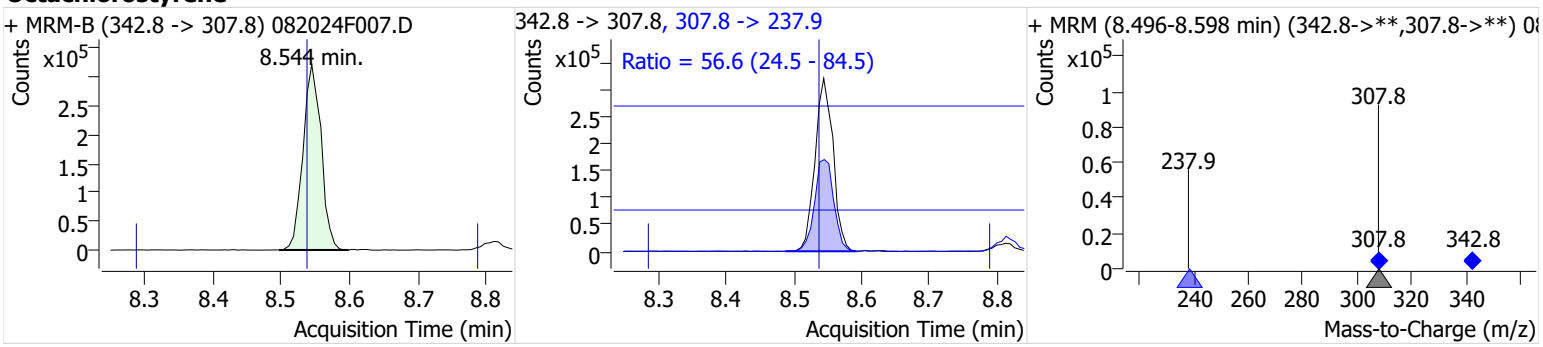
Aldrin



Octachlorostyrene-13C8

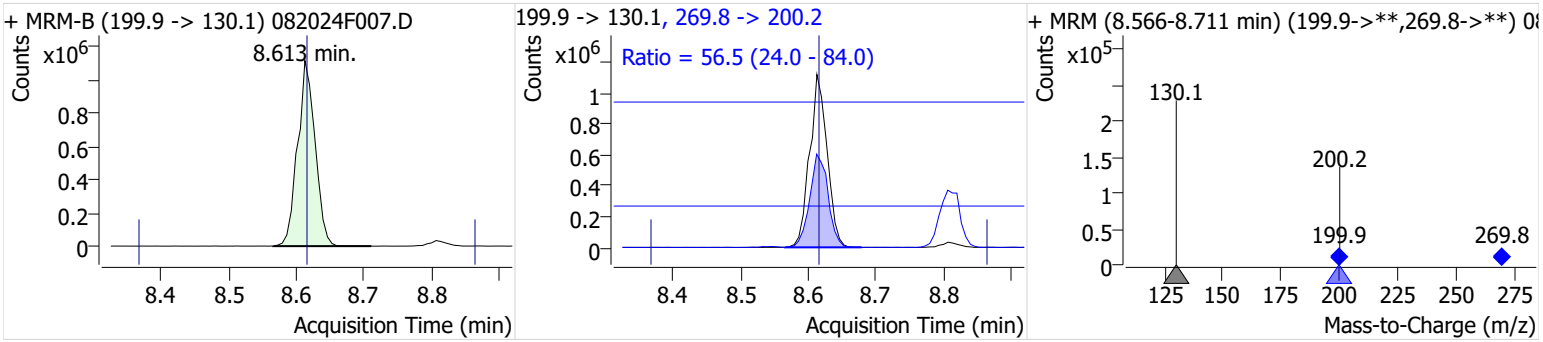


Octachlorostyrene



MassHunter Quantitative Analysis Sample Report

Isodrin-13C12



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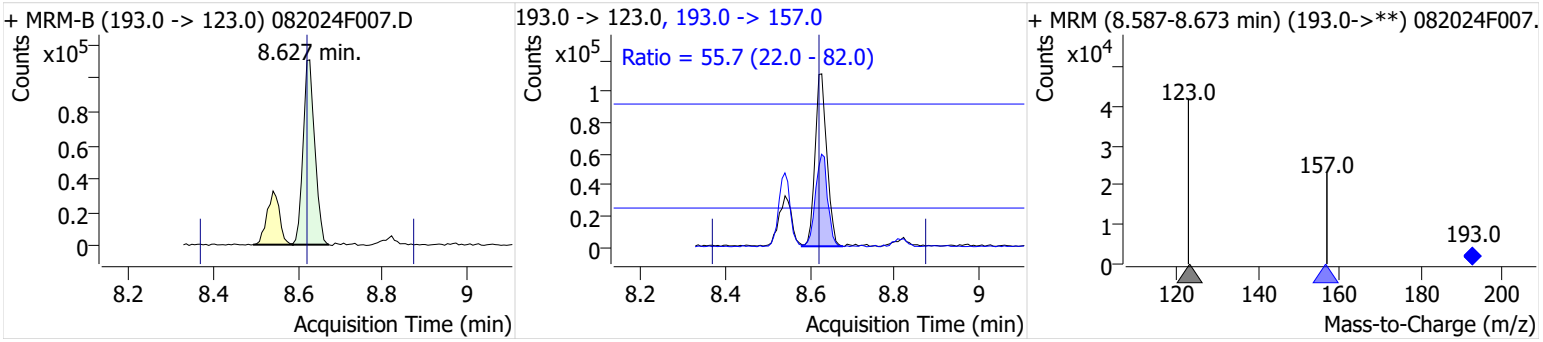
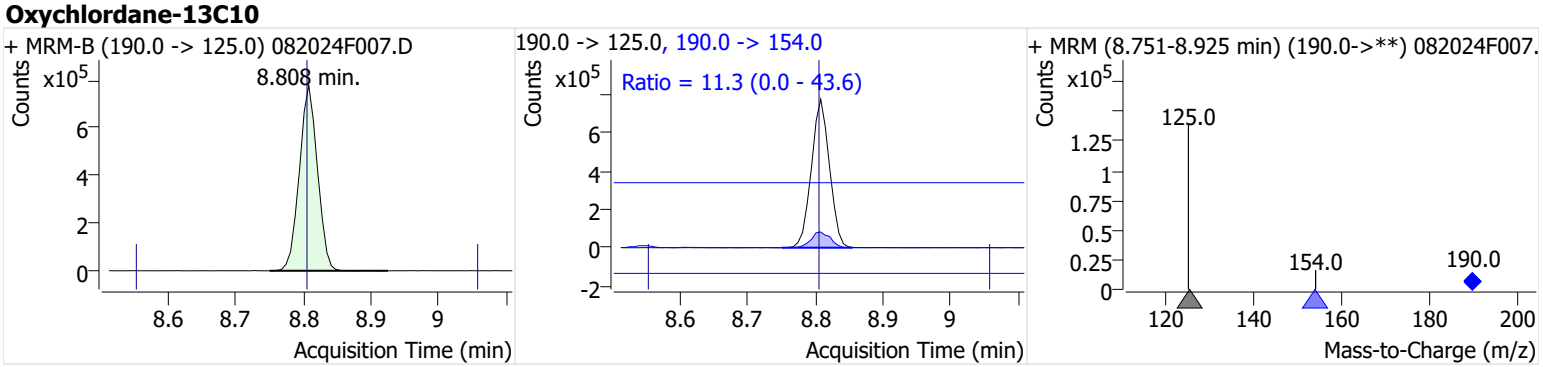
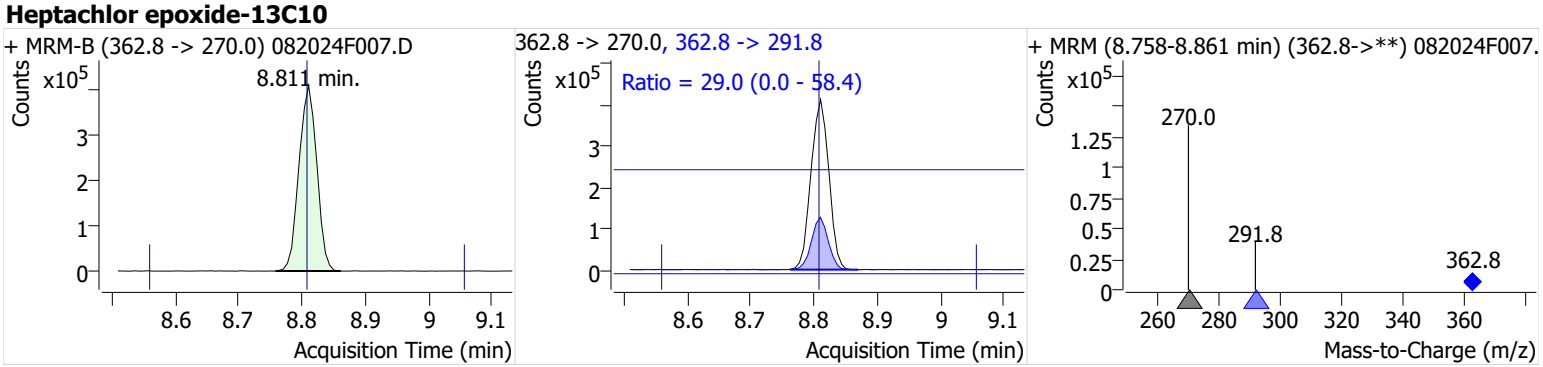


Oxychlordane-13C10

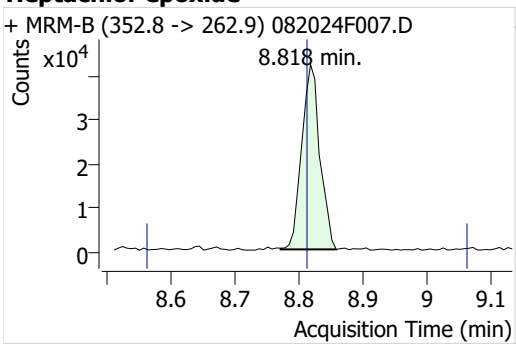


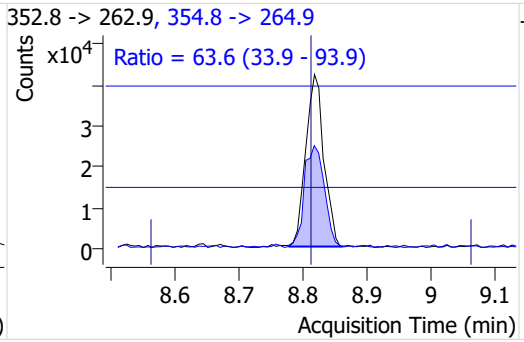
Heptachlor epoxide-13C10

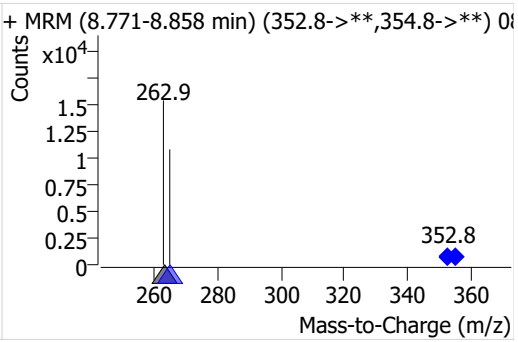


MassHunter Quantitative Analysis Sample Report

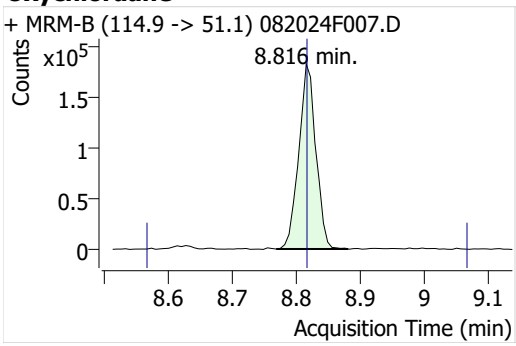
Heptachlor epoxide

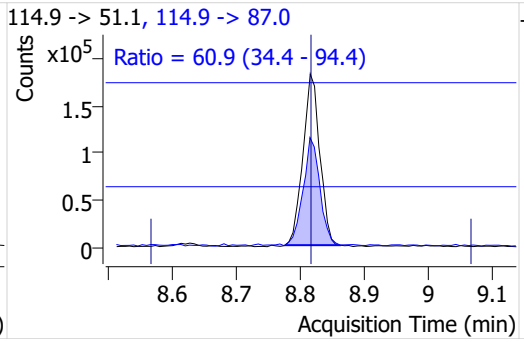


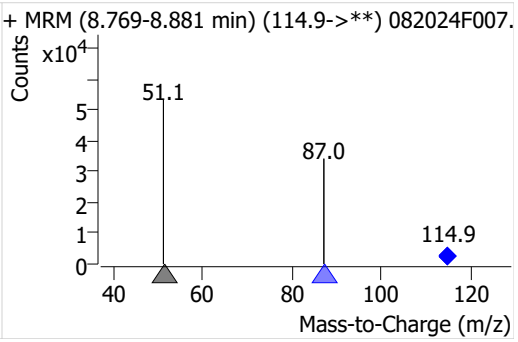




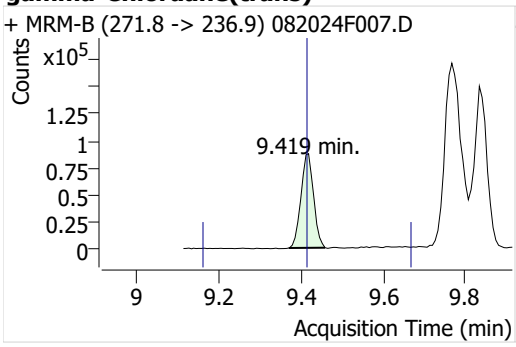
Oxychlordane

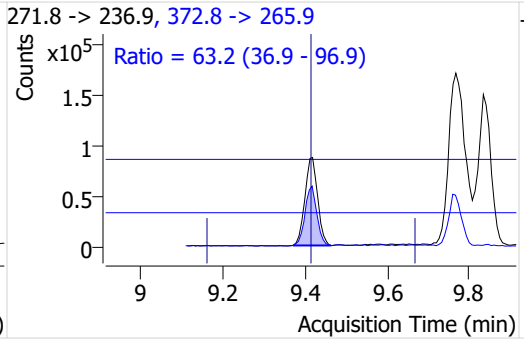


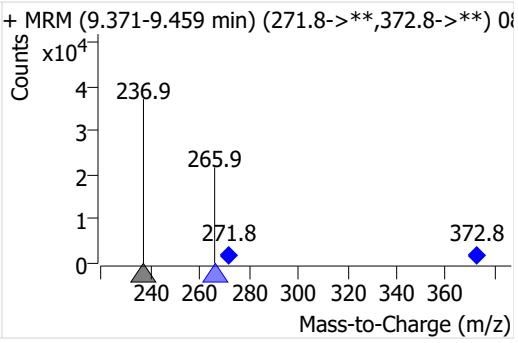




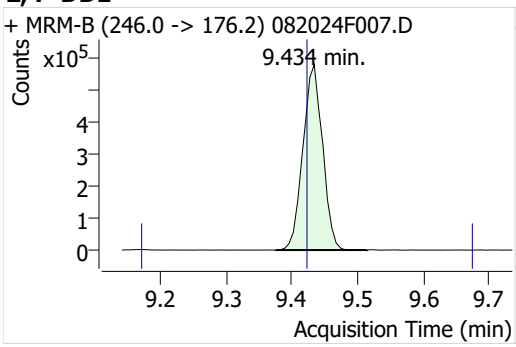
gamma-Chlordane(trans)

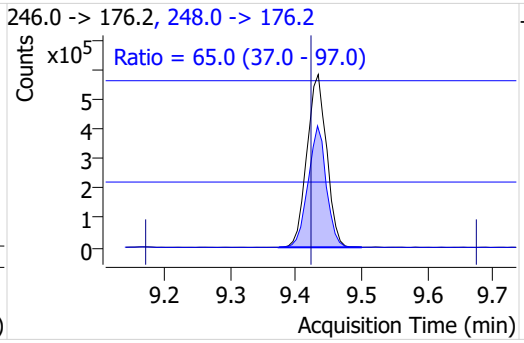


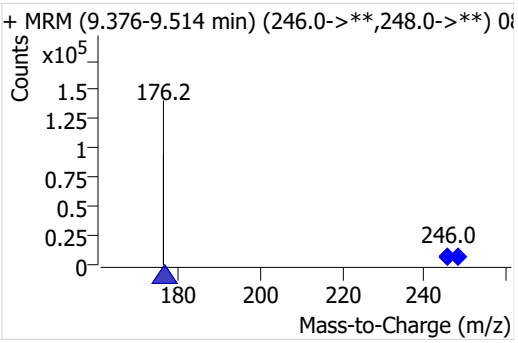




2,4'-DDE







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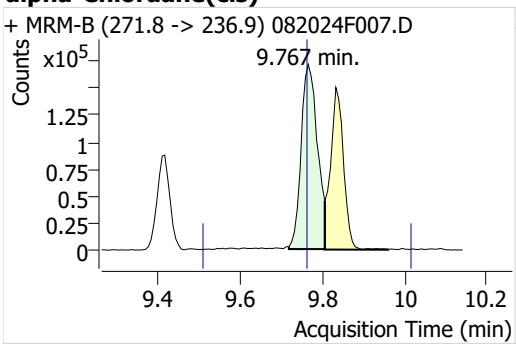
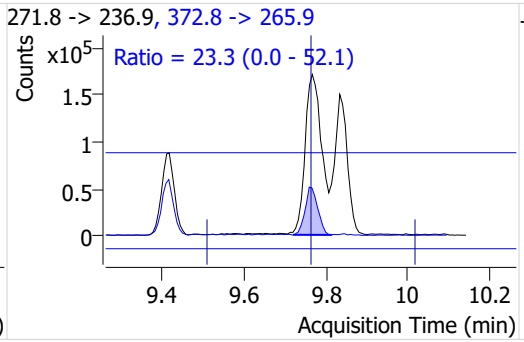
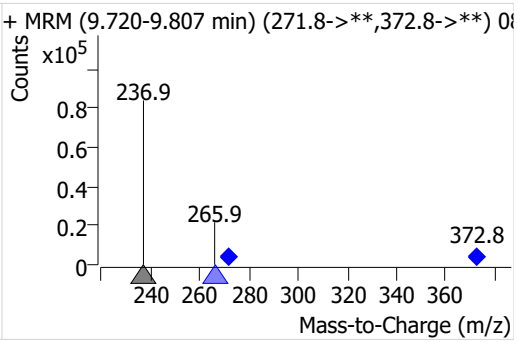
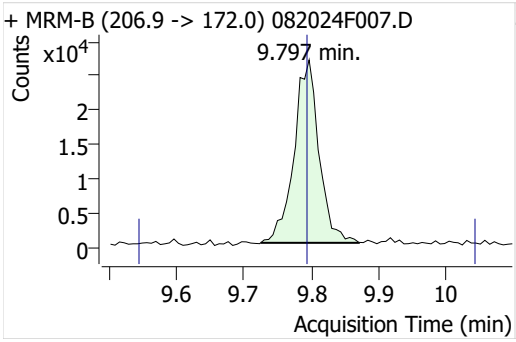
alpha-Chlordane(cis)

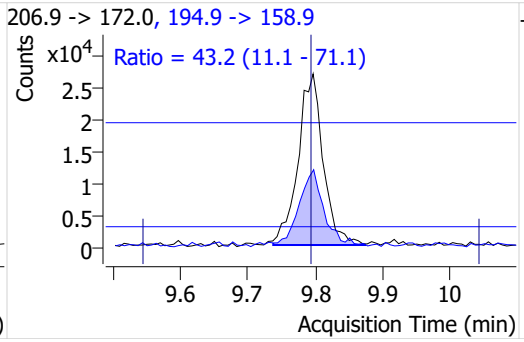


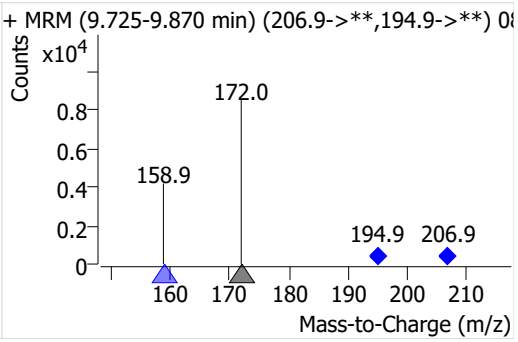




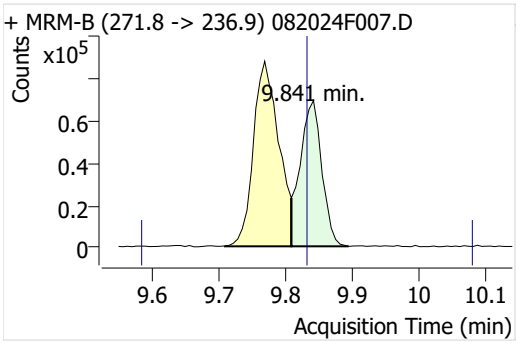
Endosulfan I

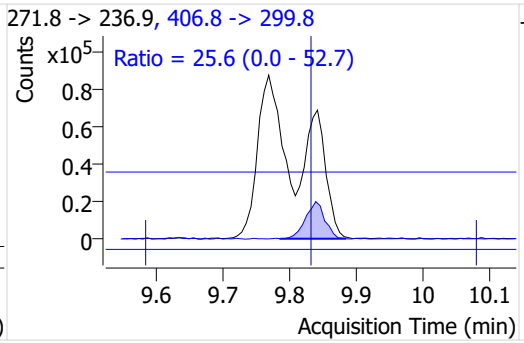


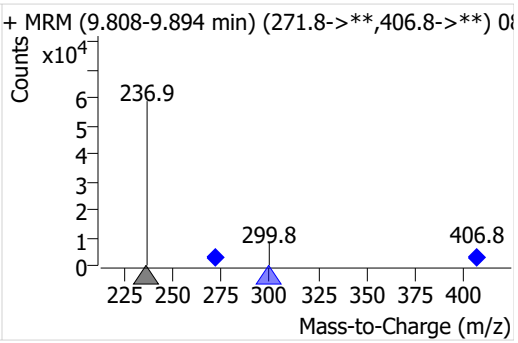




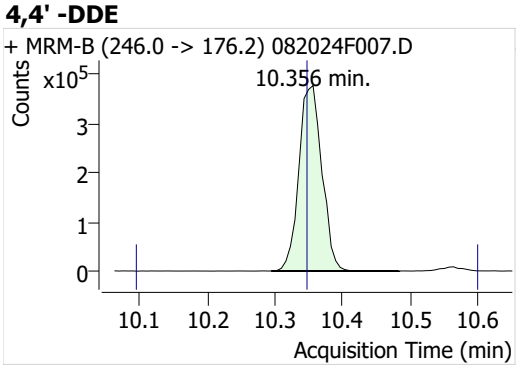
trans-Nanochlor

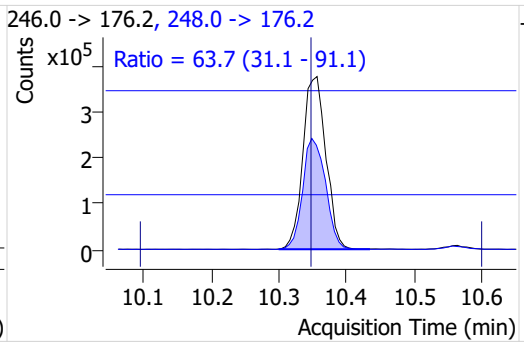


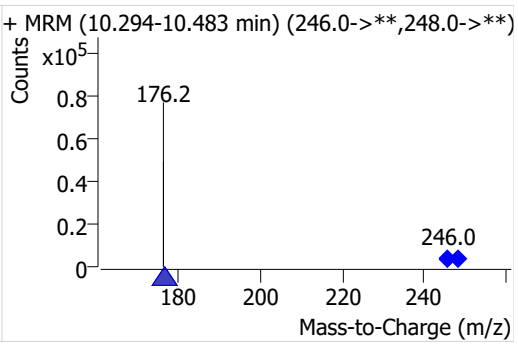




4,4' -DDE

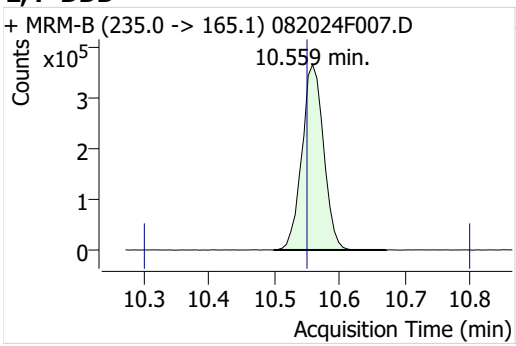


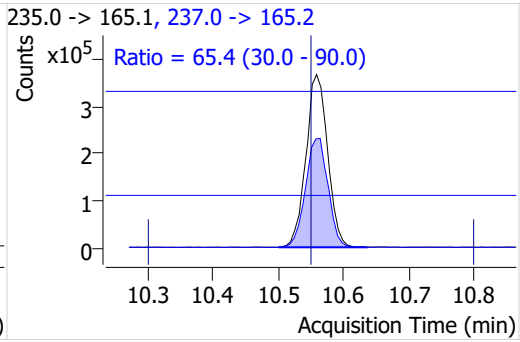


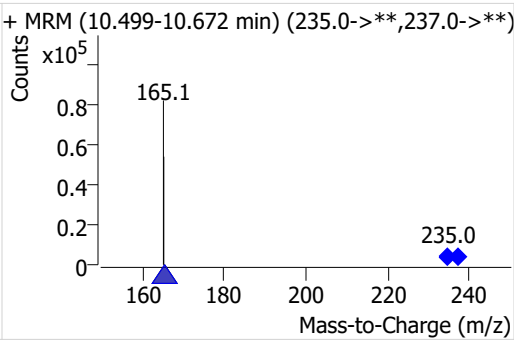


MassHunter Quantitative Analysis Sample Report

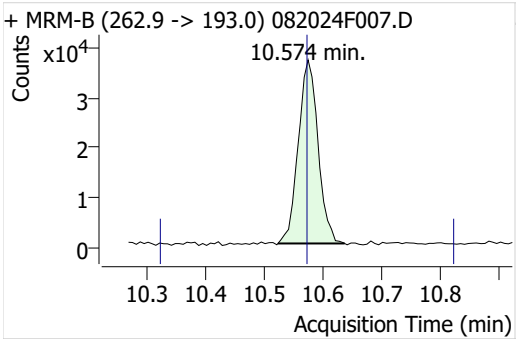
2,4'-DDD

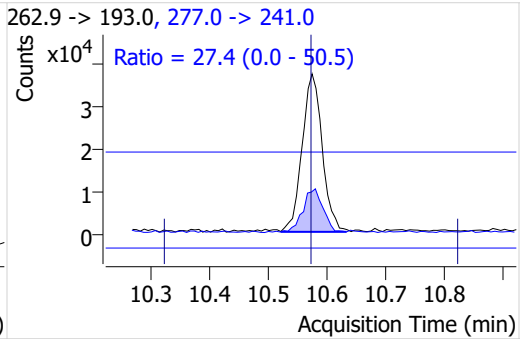


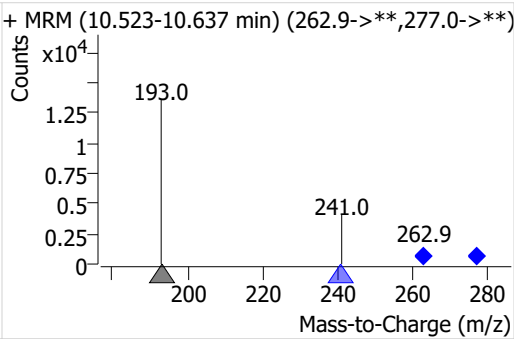




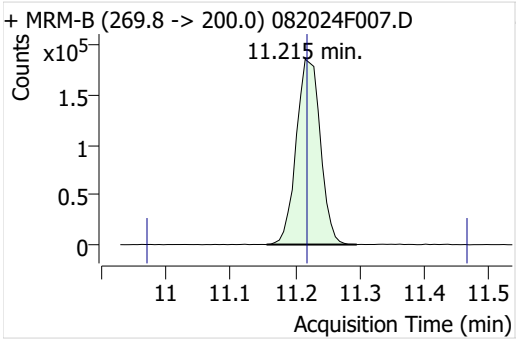
Dieldrin

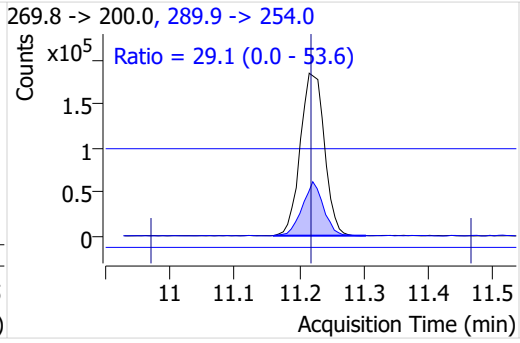


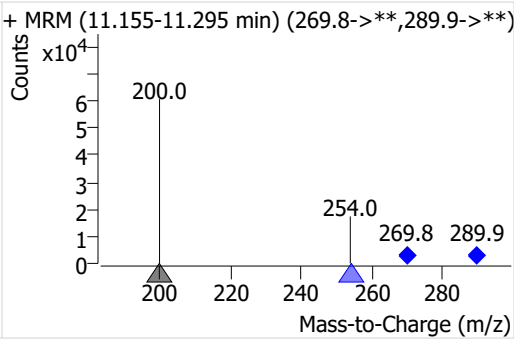




Endrin-13C12







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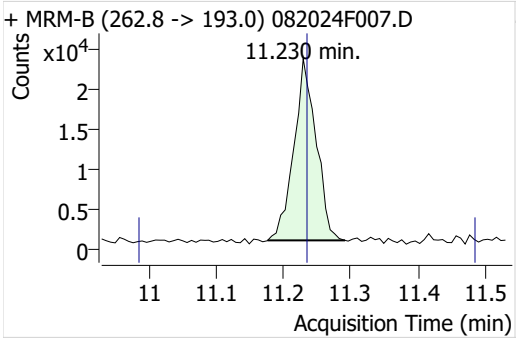

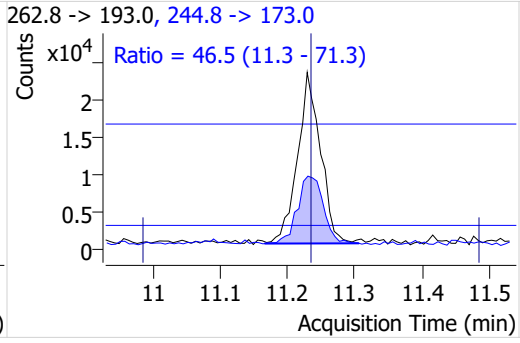

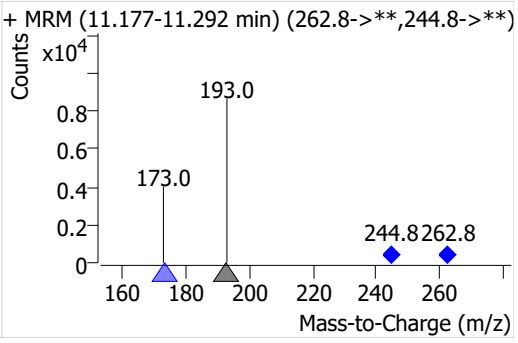

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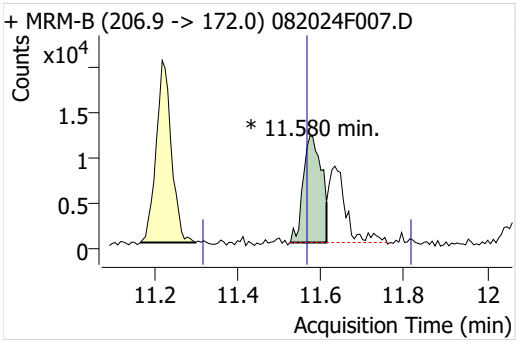
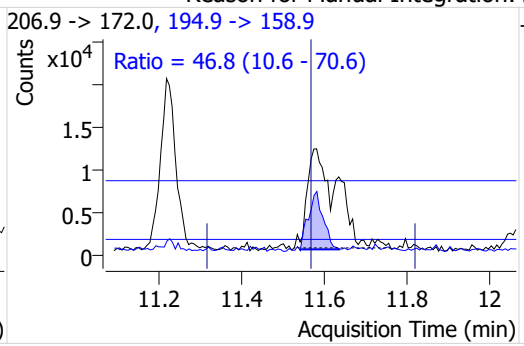
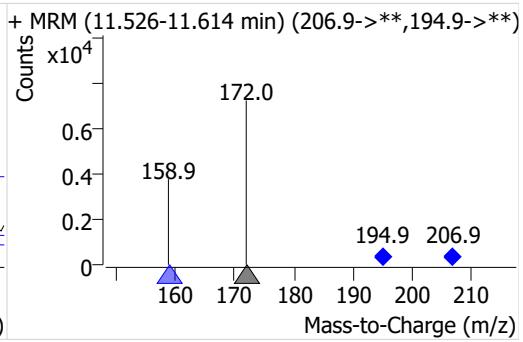
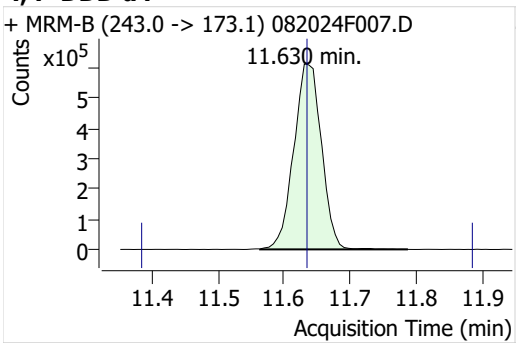
Endosulfan II Reason for Manual Integration: **BLC**

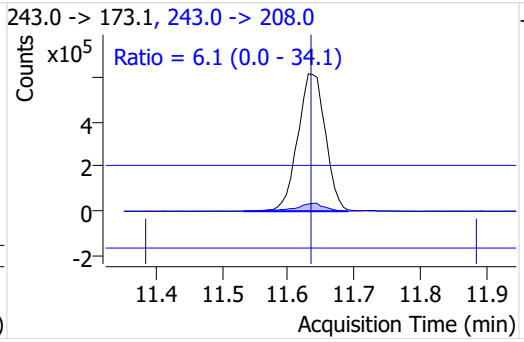


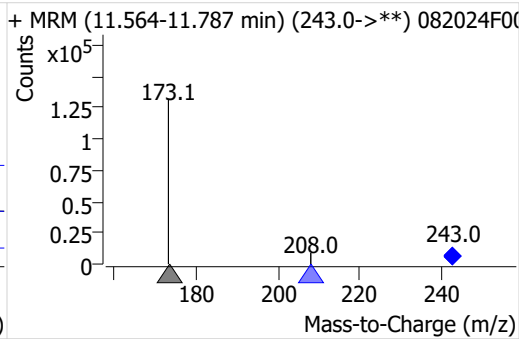




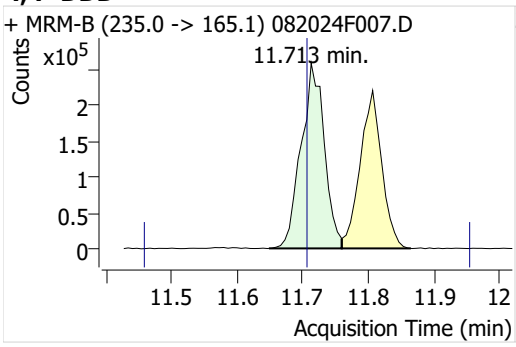
4,4'-DDD d4

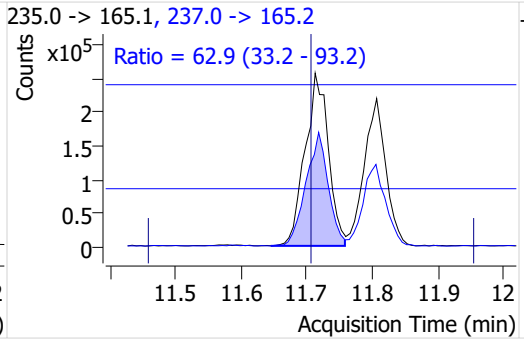


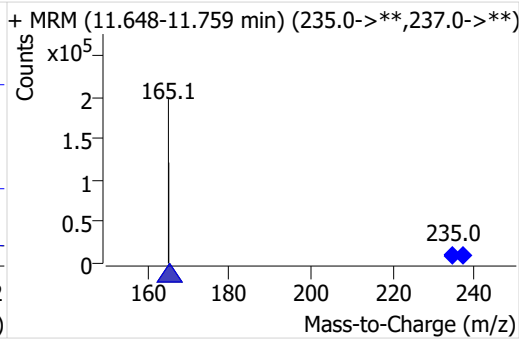




4,4'-DDD







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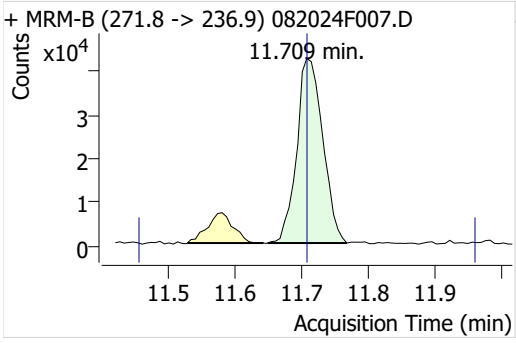

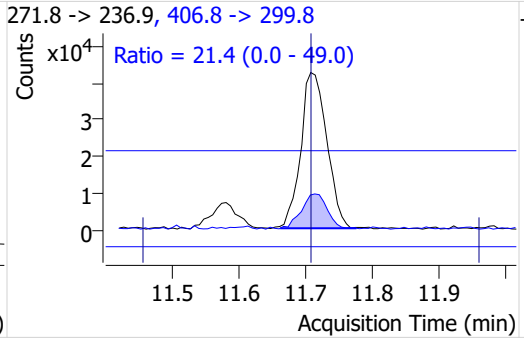

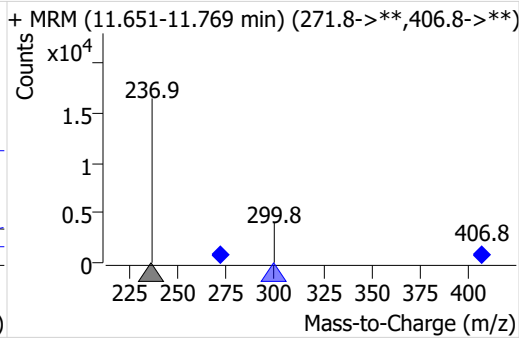

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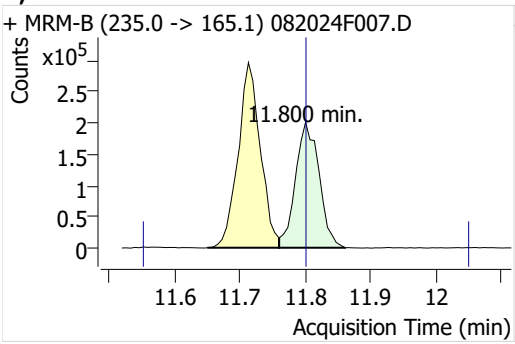
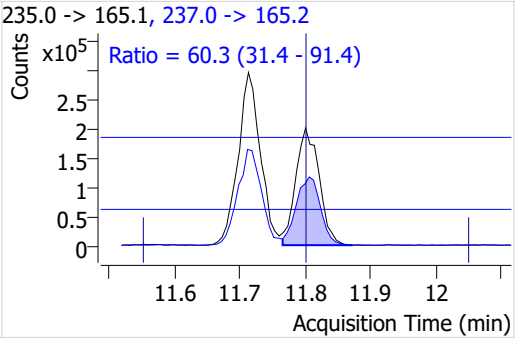
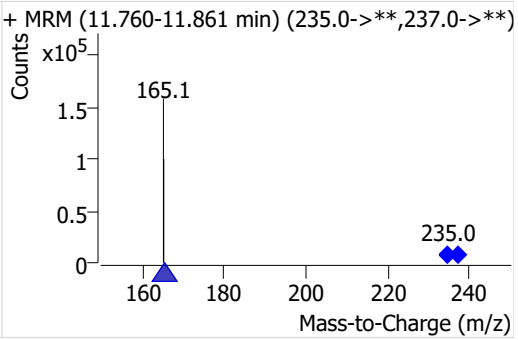
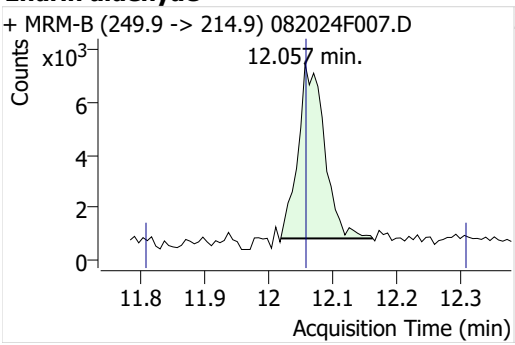
2,4'-DDT

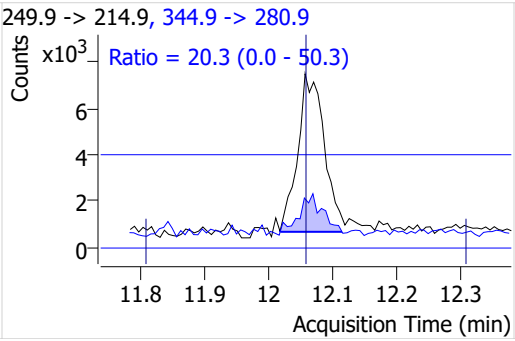


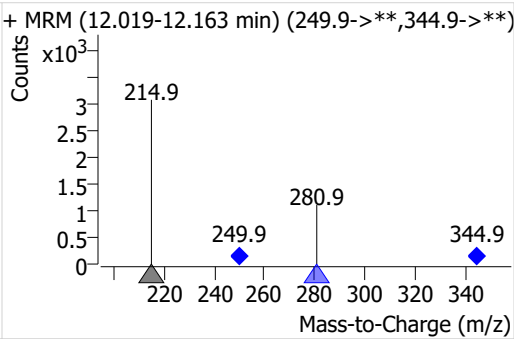




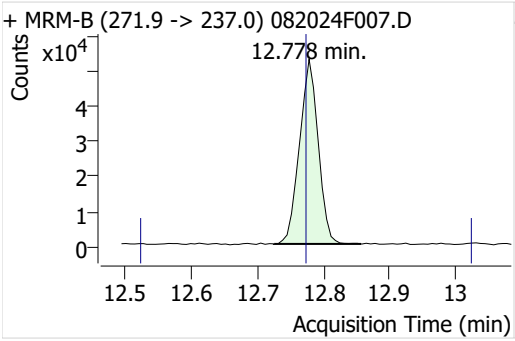
Endrin aldehyde

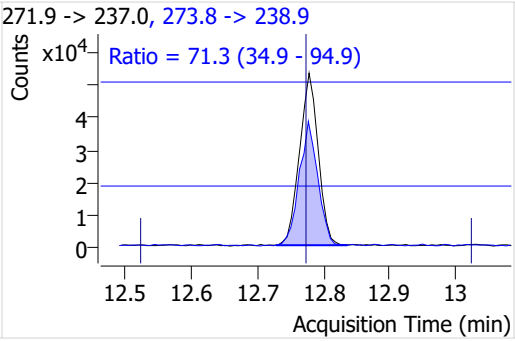


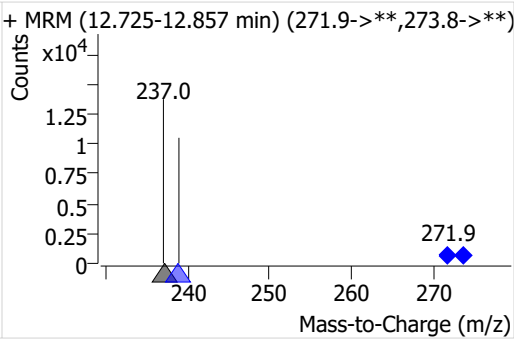




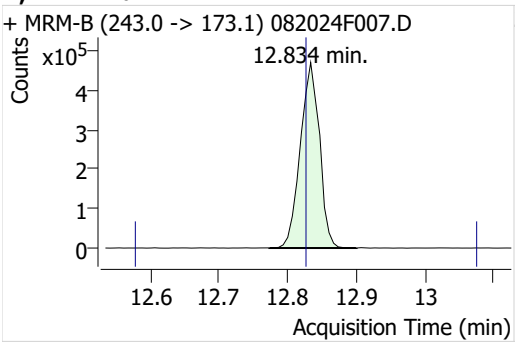
Endosulfan sulfate

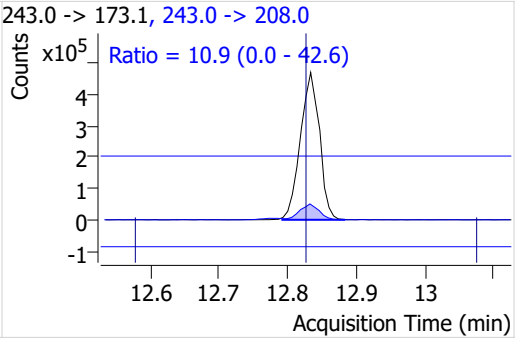


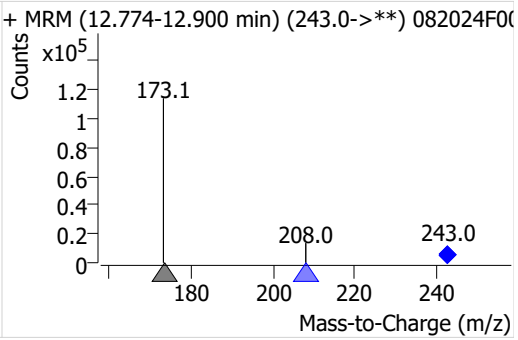




4,4'-DDT-d4







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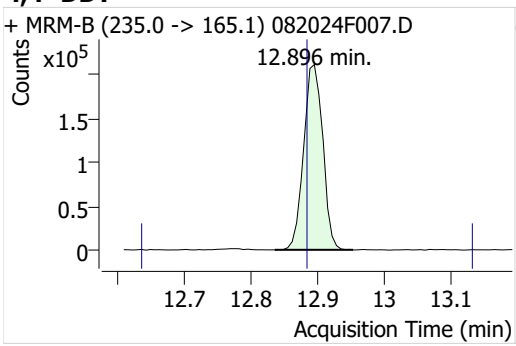
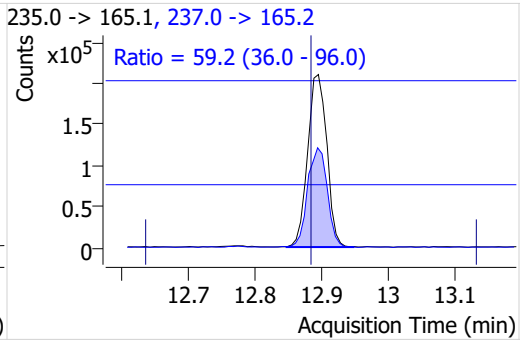
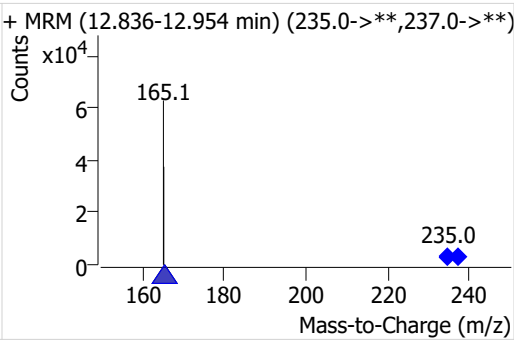
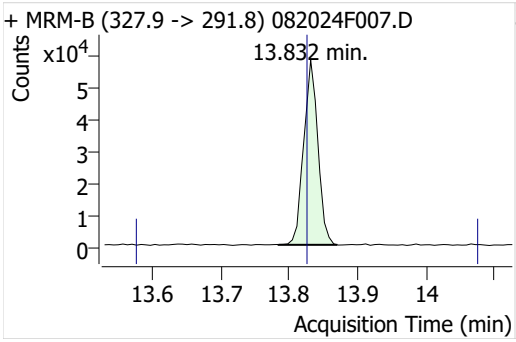
4,4'-DDT

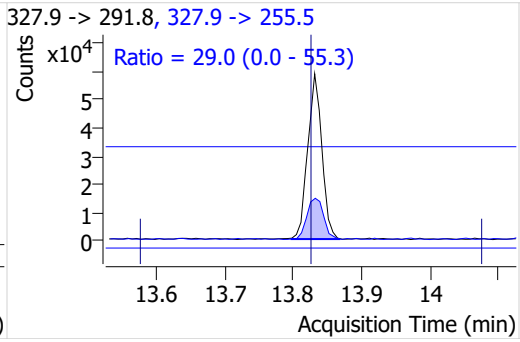


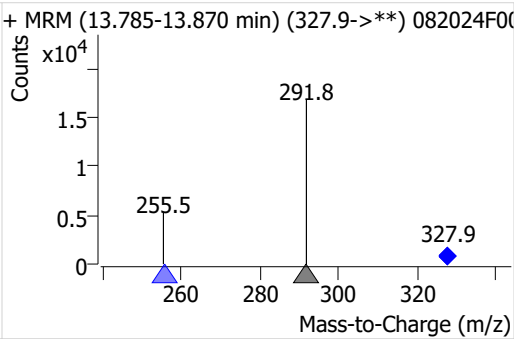




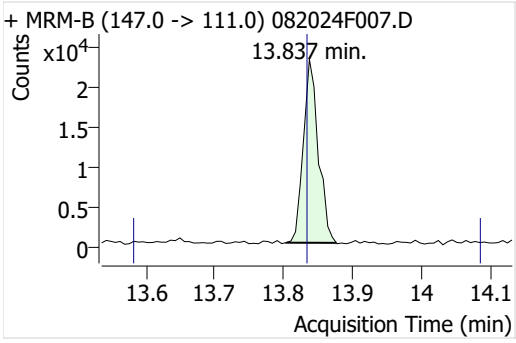
Endrin ketone-13C12

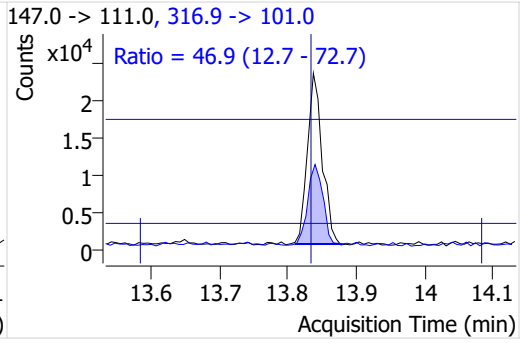


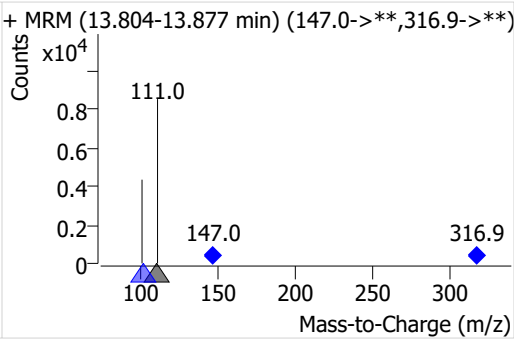




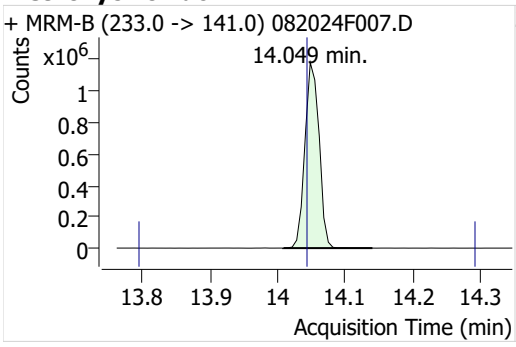
Endrin ketone

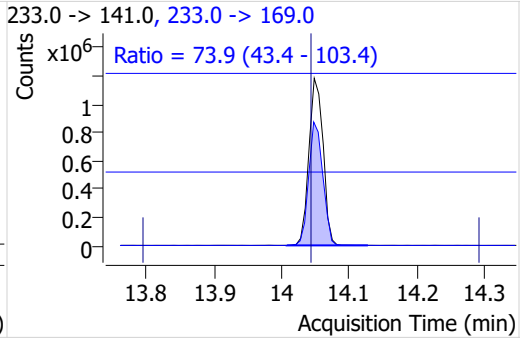


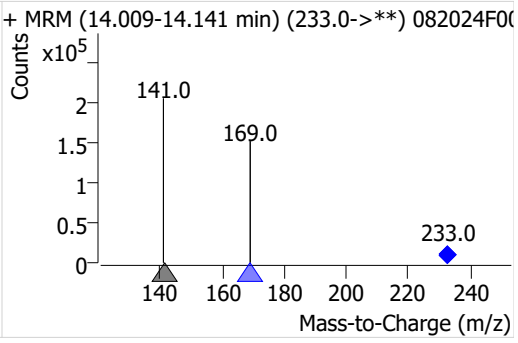




Methoxychlor-d6







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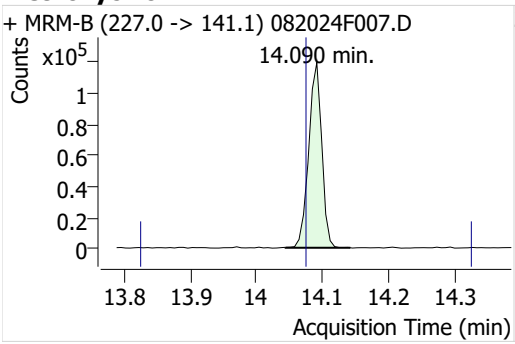
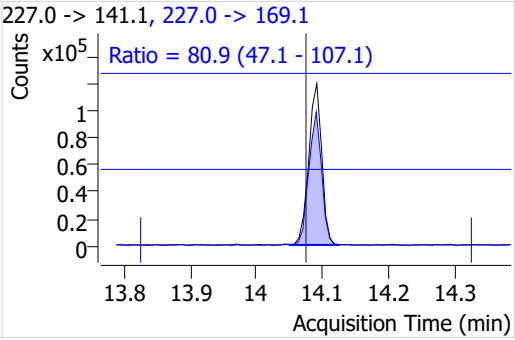
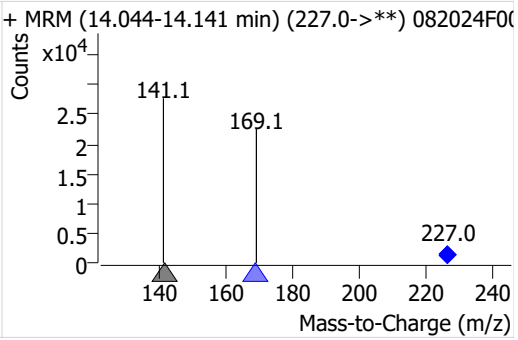
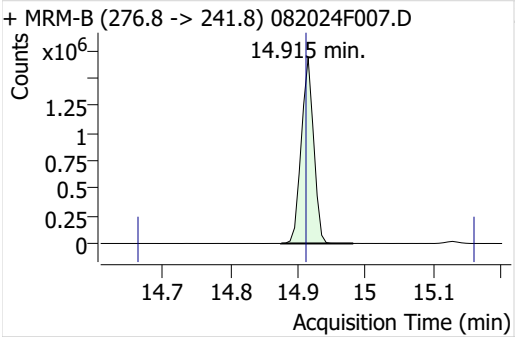
Methoxychlor

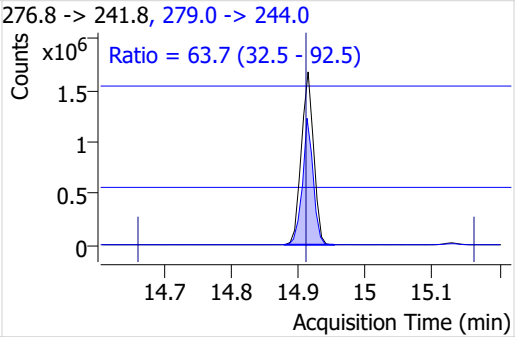


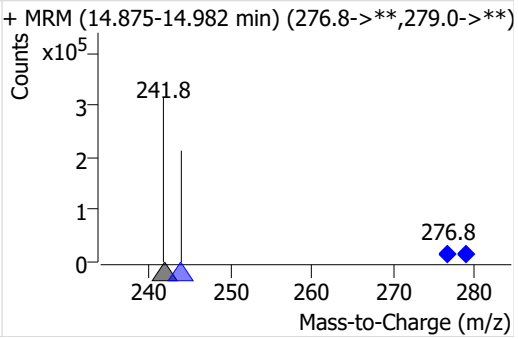




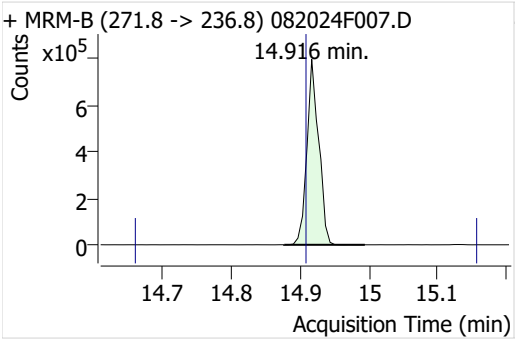
Mirex-13C10

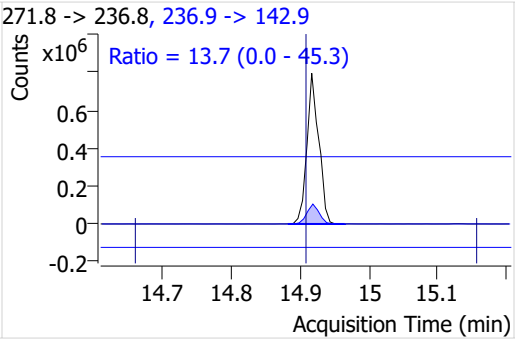


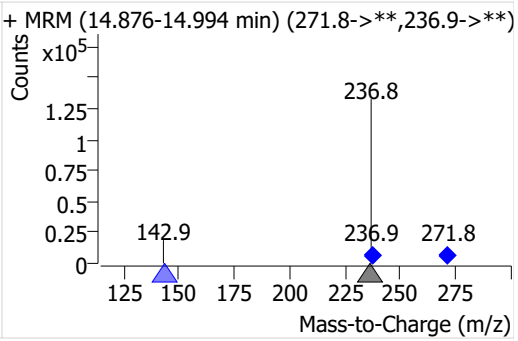




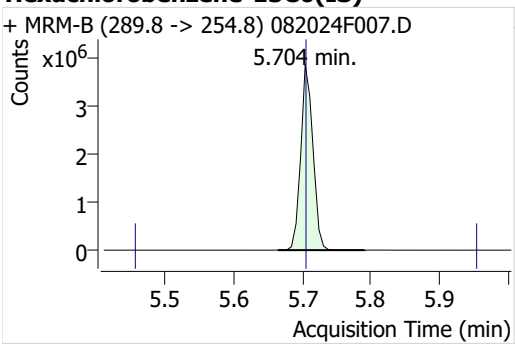
Mirex

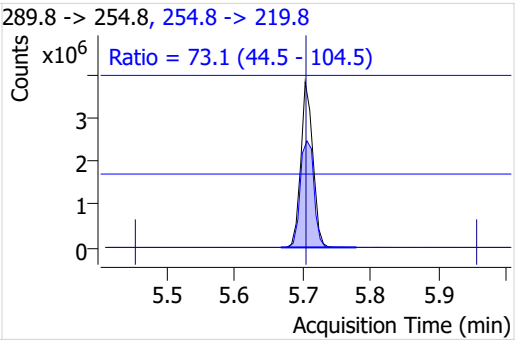


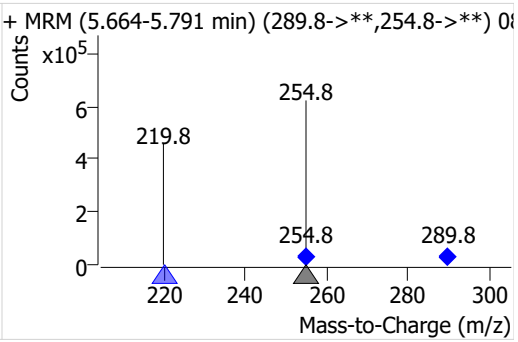




Hexachlorobenzene-13C6(IS)







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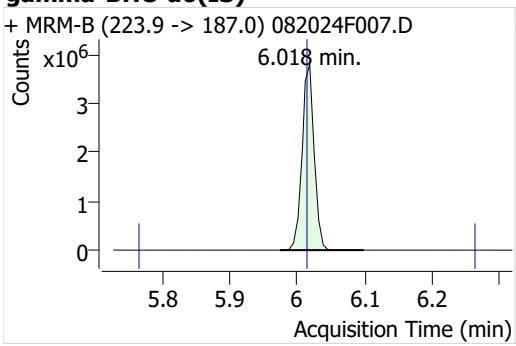
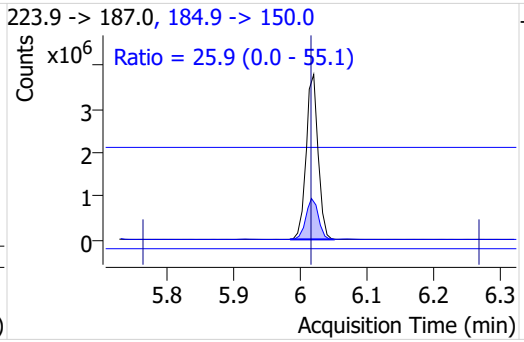
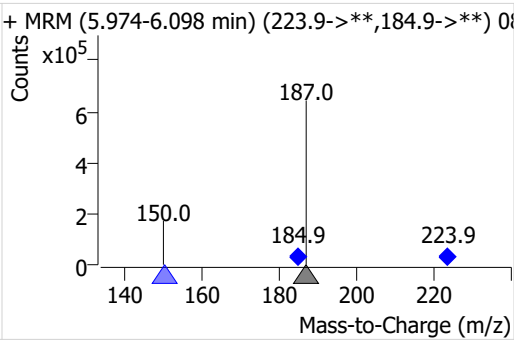
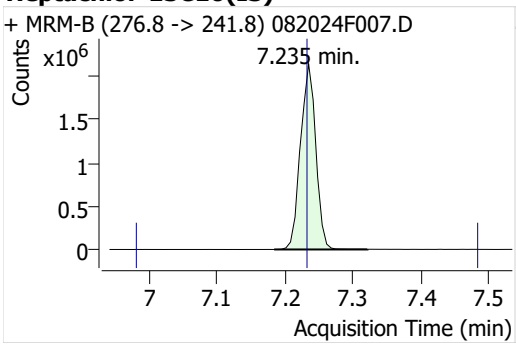
gamma-BHC-d6(IS)

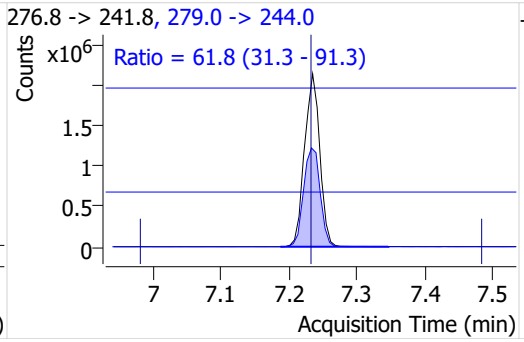


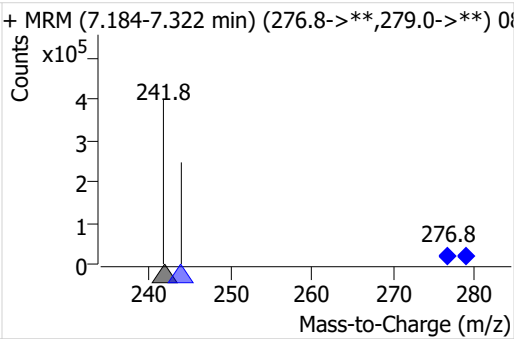




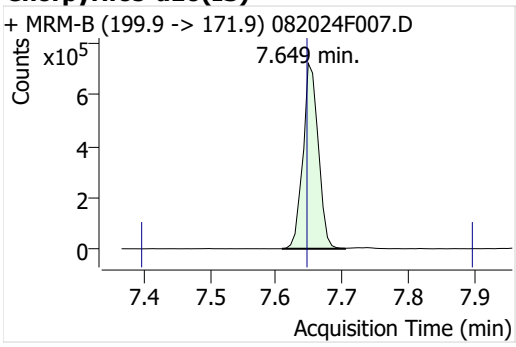
Heptachlor-13C10(IS)

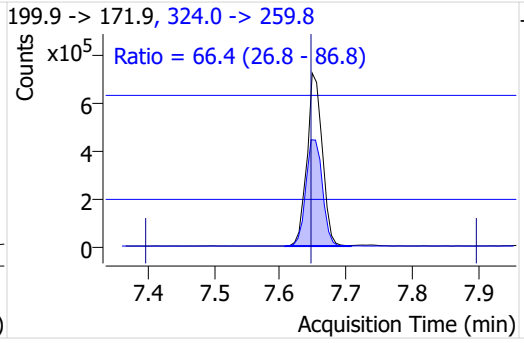


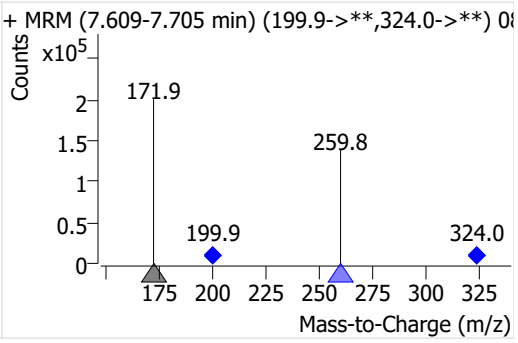




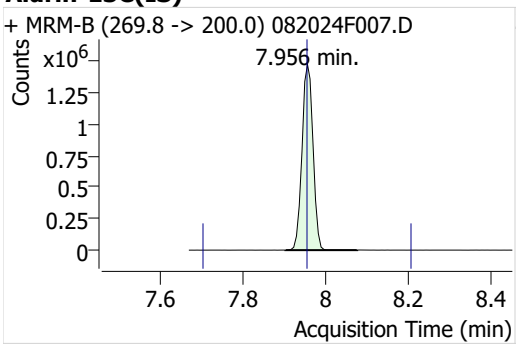
Chorpyrifos-d10(IS)

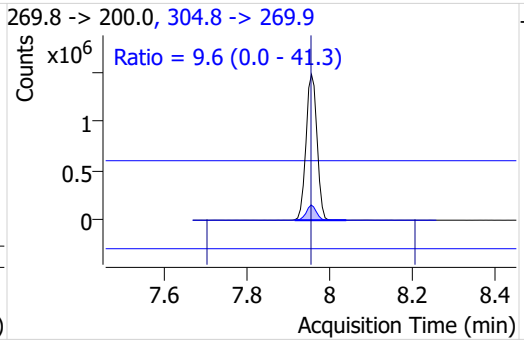


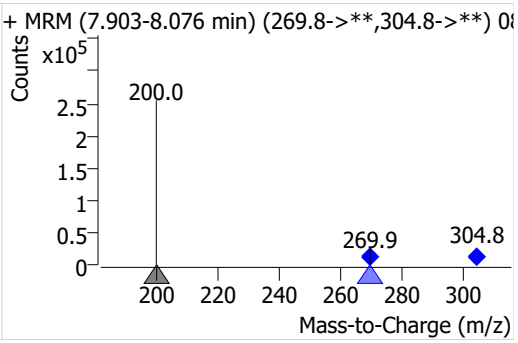




Aldrin-13C(IS)







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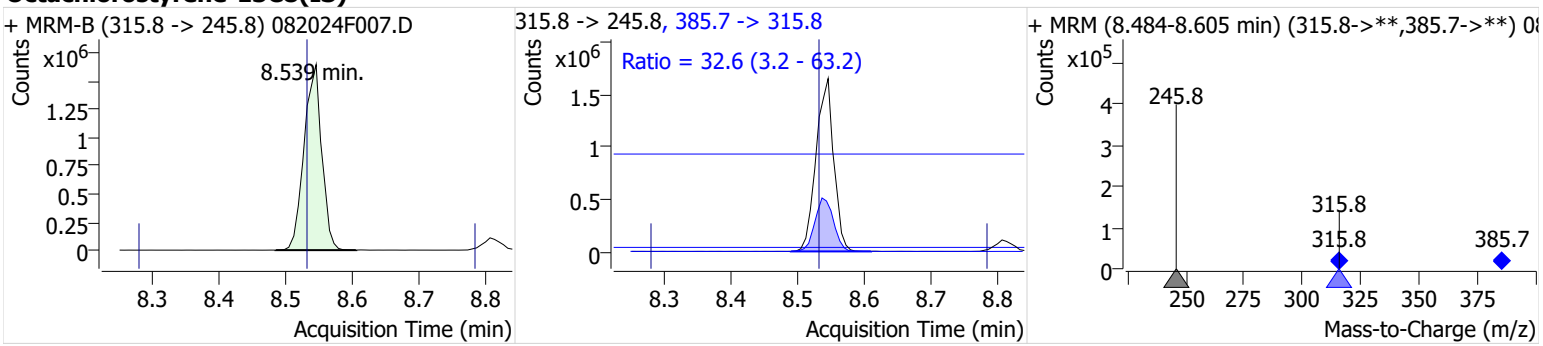
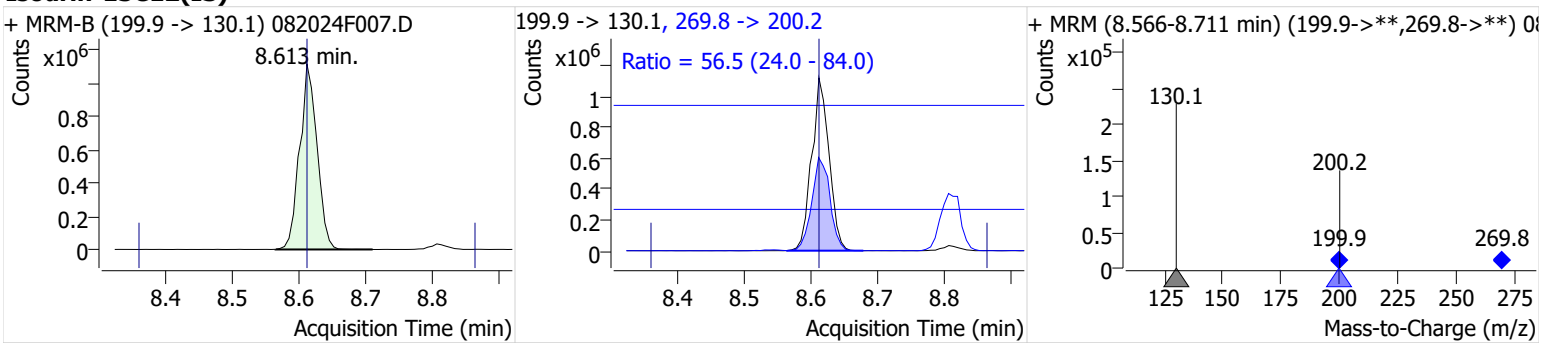
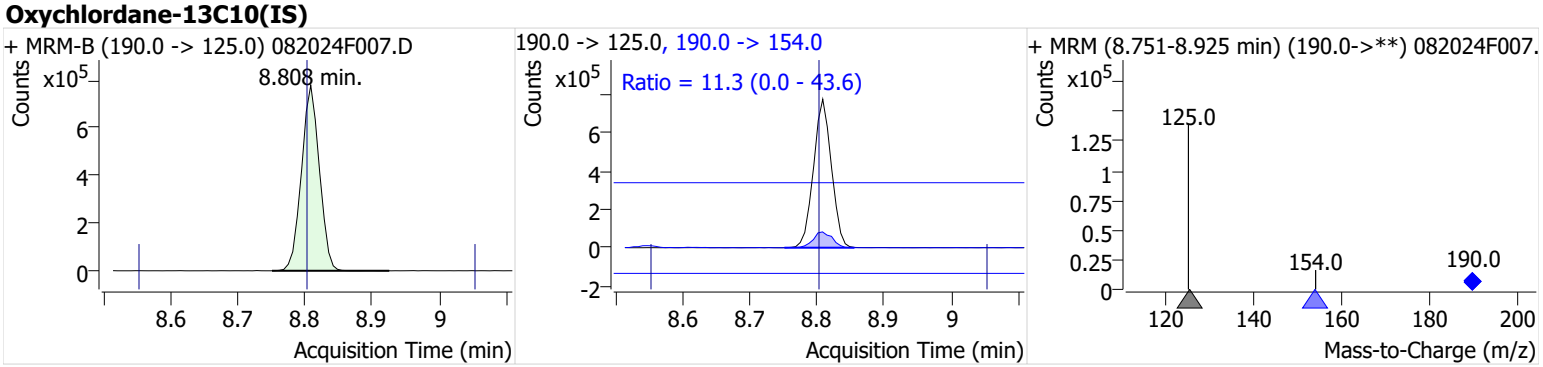
Octachlorostyrene-13C8(IS)



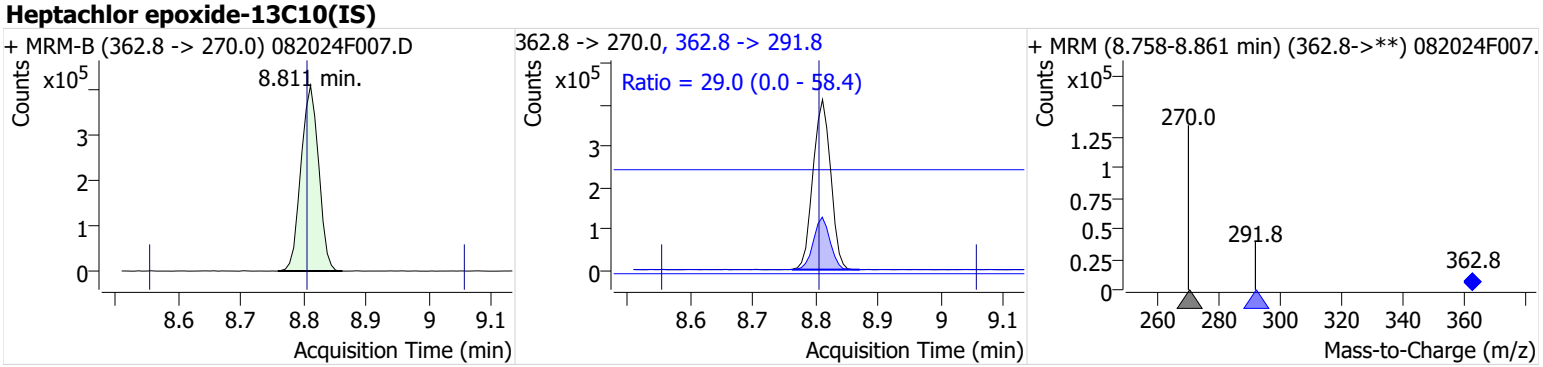
Isodrin-13C12(IS)



Oxychlordane-13C10(IS)



Heptachlor epoxide-13C10(IS)



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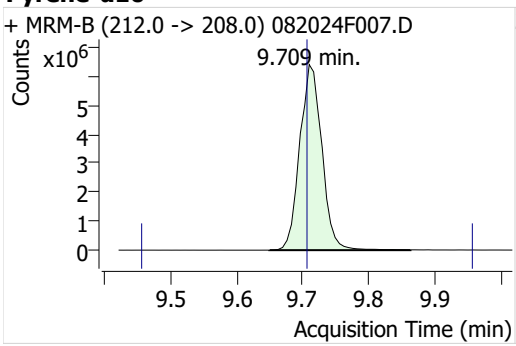
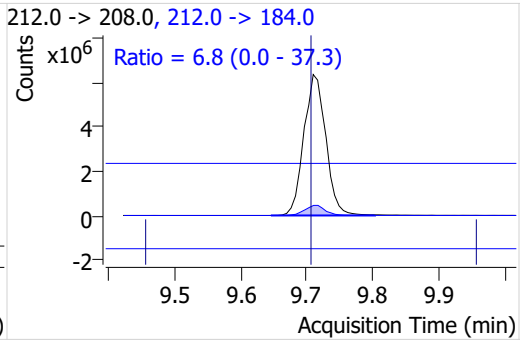
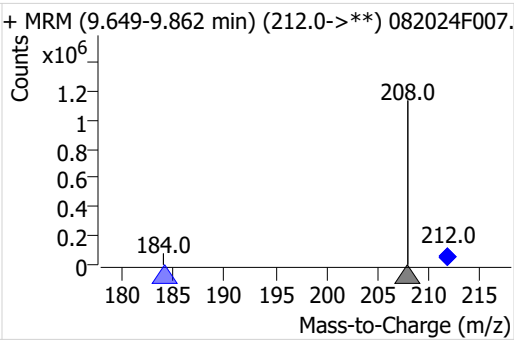
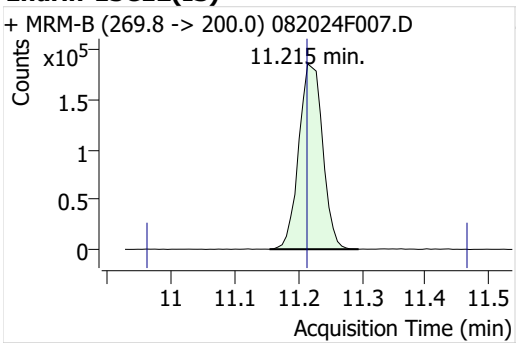
Pyrene-d10

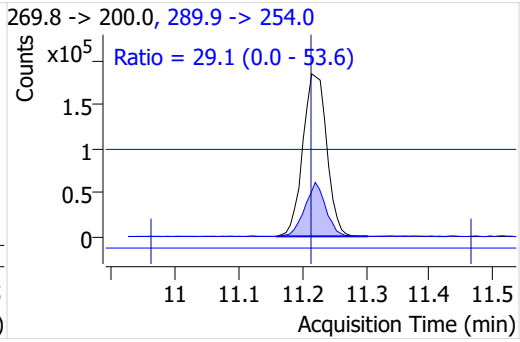


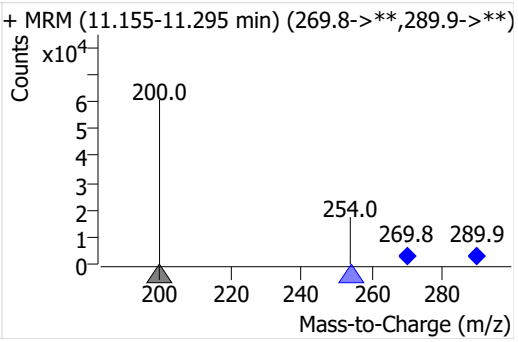




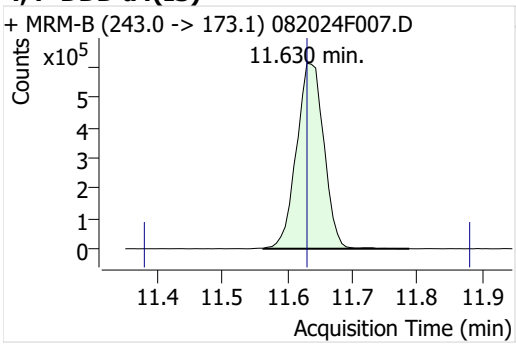
Endrin-13C12(IS)

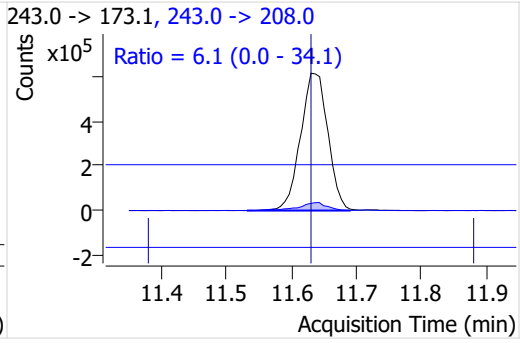


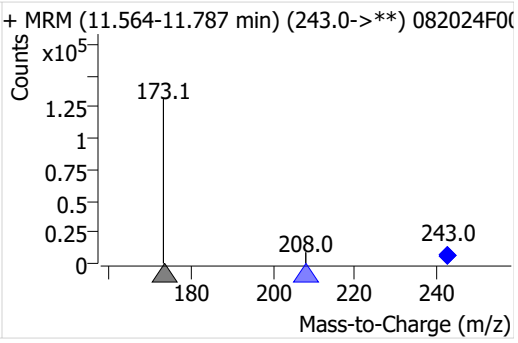




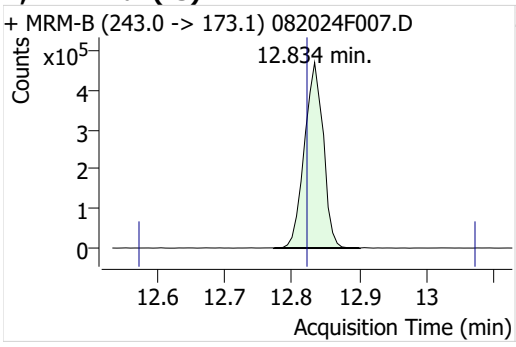
4,4'-DDD d4(IS)

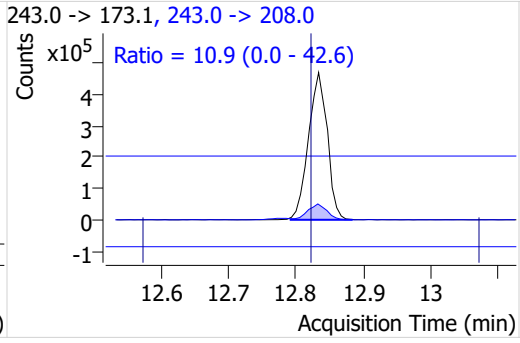


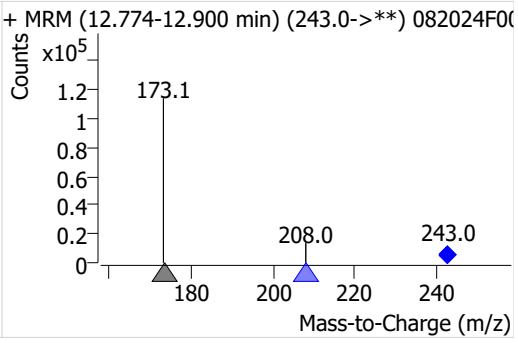




4,4'-DDT-d4(IS)

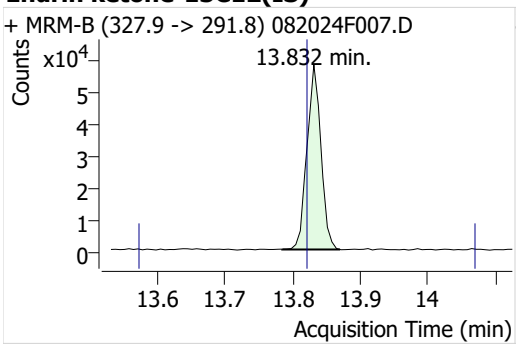


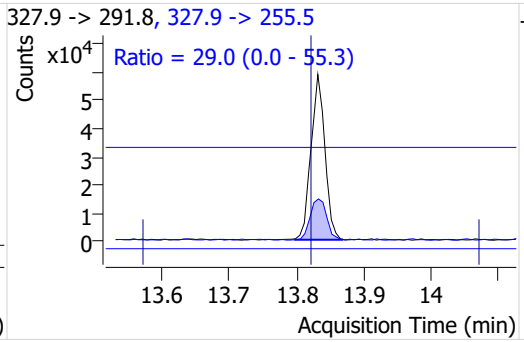


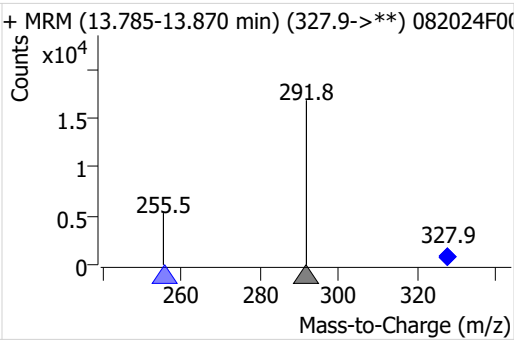


MassHunter Quantitative Analysis Sample Report

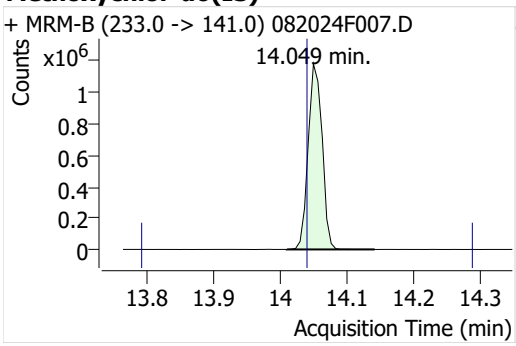
Endrin ketone-13C12(IS)

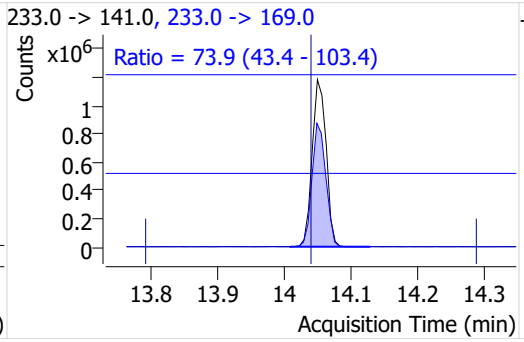


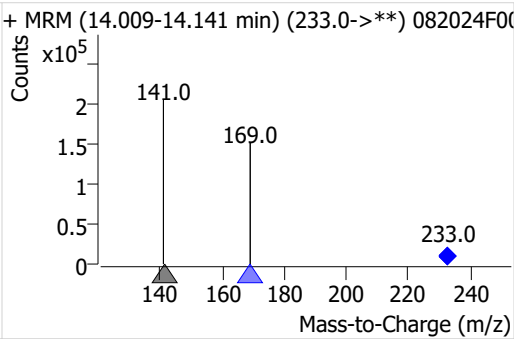




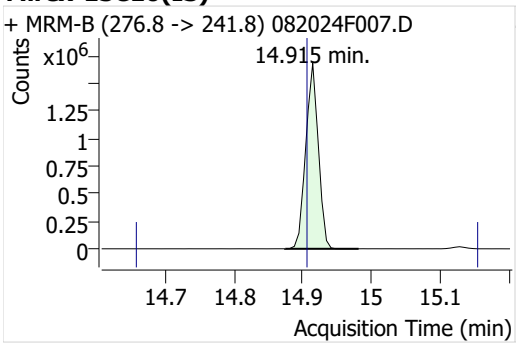
Methoxychlor-d6(IS)

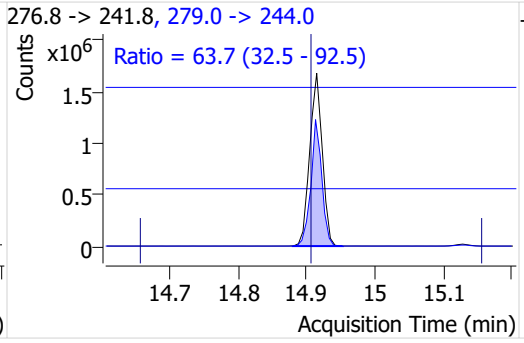


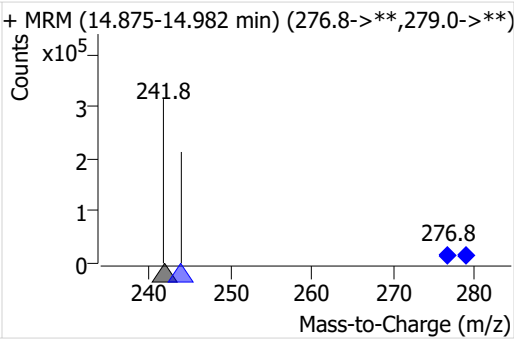




Mirex-13C10(IS)







MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Acq. Date-Time	8/20/2024 12:54:44 PM	**Acq Operator**	
Name	OC PEST ICAL 5ppb SVM71-99D	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	8/20/2024 3:33:05 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	080624 OC PEST ICAL.batch.bin	**Vial**	6
Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.704	289.8 -> 254.8	4276509	20.0000 ng/ml	0.000
gamma-BHC-d6(IS)	6.012	223.9 -> 187.0	4210773	20.0000 ng/ml	0.001
Heptachlor-13C10(IS)	7.235	276.8 -> 241.8	2864015	20.0000 ng/ml	0.002
Chorpyrifos-d10(IS)	7.656	199.9 -> 171.9	1025053	20.0000 ng/ml	0.004
Aldrin-13C(IS)	7.962	269.8 -> 200.0	2359796	20.0000 ng/ml	0.004
Octachlorostyrene-13C8(IS)	8.538	315.8 -> 245.8	2784903	20.0000 ng/ml	0.009
Isodrin-13C12(IS)	8.619	199.9 -> 130.1	1878741	20.0000 ng/ml	0.006
Oxychlordane-13C10(IS)	8.808	190.0 -> 125.0	1316381	20.0000 ng/ml	0.005
Heptachlor epoxide-13C10(IS)	8.817	362.8 -> 270.0	686926	20.0000 ng/ml	0.009
Pyrene-d10	9.712	212.0 -> 208.0	11974206	100.0000 ng/ml	0.005
Endrin-13C12(IS)	11.215	269.8 -> 200.0	427229	20.0000 ng/ml	0.007
4,4'-DDD d4(IS)	11.637	243.0 -> 173.1	1623095	5.0000 ng/ml	0.006
4,4'-DDT-d4(IS)	12.834	243.0 -> 173.1	870022	5.0000 ng/ml	0.011
Endrin ketone-13C12(IS)	13.832	327.9 -> 291.8	72525	20.0000 ng/ml	0.014
Methoxychlor-d6(IS)	14.055	233.0 -> 141.0	1471143	20.0000 ng/ml	0.016
Mirex-13C10(IS)	14.915	276.8 -> 241.8	2080205	5.0000 ng/ml	0.008

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**
Hexachlorobenzene-13C6	5.705	289.8 -> 254.8	4276509	20.232 ng/ml
		Spiked Amount =	20.0	Recovery = *101.2 %*
gamma-BHC-d6	6.014	223.9 -> 187.0	4210773	20.950 ng/ml
		Spiked Amount =	20.0	Recovery = *104.8 %*
Heptachlor-13C10	7.232	276.8 -> 241.8	2864015	20.406 ng/ml
		Spiked Amount =	20.0	Recovery = *102.0 %*
Chorpyrifos-d10	7.647	199.9 -> 171.9	1025053	21.210 ng/ml
		Spiked Amount =	20.0	Recovery = *106.0 %*
Aldrin-13C	7.955	269.8 -> 200.0	2360071	20.269 ng/ml
		Spiked Amount =	20.0	Recovery = *101.3 %*
Octachlorostyrene-13C8	8.531	315.8 -> 245.8	2784903	20.969 ng/ml
		Spiked Amount =	20.0	Recovery = *104.8 %*
Isodrin-13C12	8.613	199.9 -> 130.1	1878741	20.745 ng/ml
		Spiked Amount =	20.0	Recovery = *103.7 %*
Oxychlordane-13C10	8.803	190.0 -> 125.0	1316381	21.253 ng/ml
		Spiked Amount =	20.0	Recovery = *106.3 %*
Heptachlor epoxide-13C10	8.805	362.8 -> 270.0	686926	18.762 ng/ml
		Spiked Amount =	20.0	Recovery = *93.8 %*
Endrin-13C12	11.214	269.8 -> 200.0	427229	21.062 ng/ml
		Spiked Amount =	20.0	Recovery = *105.3 %*
4,4'-DDD d4	11.630	243.0 -> 173.1	1623095	5.038 ng/ml
		Spiked Amount =	5.0	Recovery = *100.8 %*
4,4'-DDT-d4	12.822	243.0 -> 173.1	870022	5.206 ng/ml
		Spiked Amount =	5.0	Recovery = *104.1 %*
Endrin ketone-13C12	13.821	327.9 -> 291.8	72525	20.065 ng/ml
		Spiked Amount =	20.0	Recovery = *100.3 %*
Methoxychlor-d6	14.039	233.0 -> 141.0	1471143	20.513 ng/ml
		Spiked Amount =	20.0	Recovery = *102.6 %*

MassHunter Quantitative Analysis Sample Report

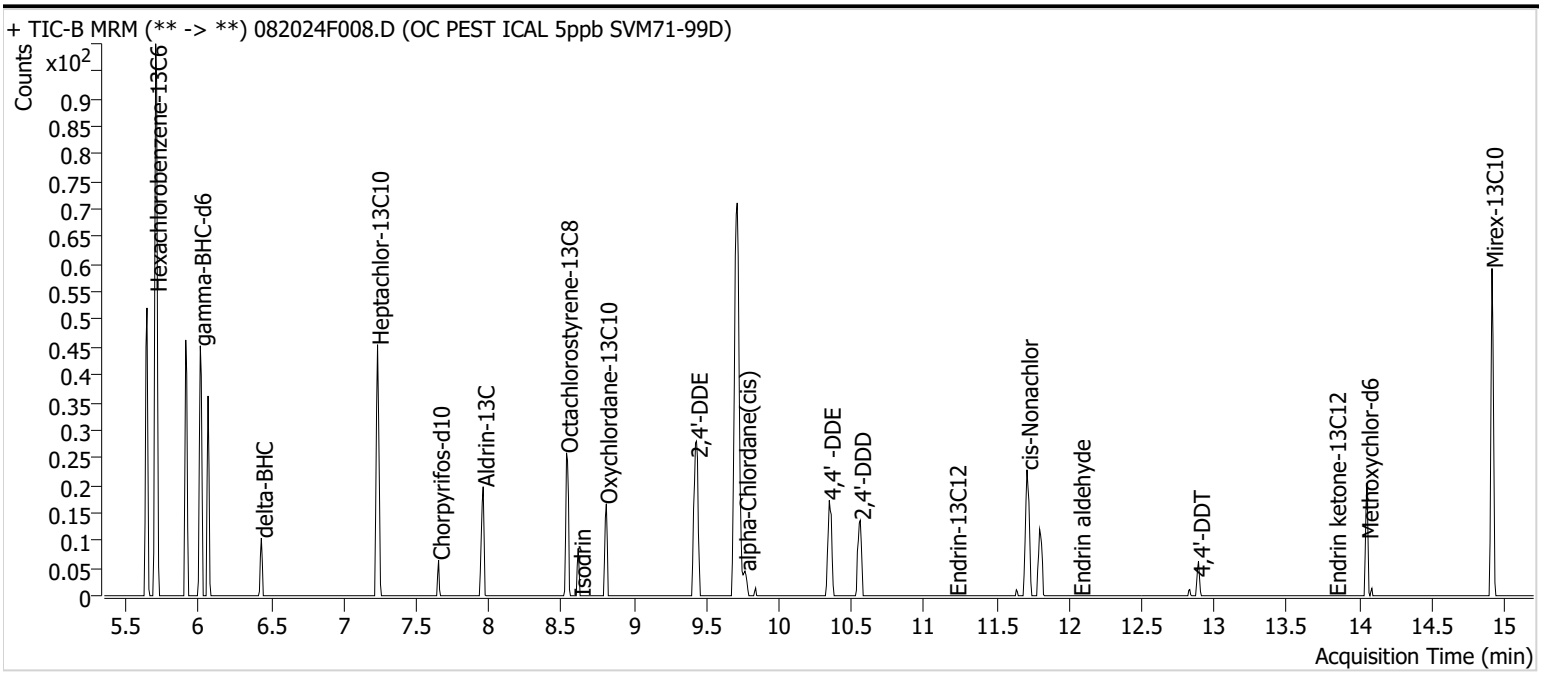
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.906	276.8 -> 241.8	2080205	4.956 ng/ml
		Spiked Amount = 5.0		Recovery = *99.1 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)	5.649	181.1 -> 145.1	3258729	4.613 ng/ml	95
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.713	283.8 -> 213.9	1788290	4.813 ng/ml	95
beta-BHC	gamma-BHC-d6(IS)	5.916	181.1 -> 145.1	3085073	4.680 ng/ml	99
gamma-BHC(Lindane)	gamma-BHC-d6(IS)	6.070	181.1 -> 145.1	2671966	4.921 ng/ml	100
delta-BHC	gamma-BHC-d6(IS)	6.436	181.1 -> 145.1	902247	4.648 ng/ml	74
Heptachlor	Heptachlor-13C10(IS)	7.238	271.7 -> 236.9	745685	5.082 ng/ml	74
Chorpyrifos	Chorpyrifos-d10(IS)	7.740	196.9 -> 169.0	303608	4.672 ng/ml	82
Aldrin	Aldrin-13C(IS)	7.964	254.9 -> 220.0	634582	5.031 ng/ml	64
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.544	342.8 -> 307.8	1400404	4.961 ng/ml	99
Isodrin	Isodrin-13C12(IS)	8.627	193.0 -> 123.0	497571	4.818 ng/ml	95
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	8.818	352.8 -> 262.9	187066	4.879 ng/ml	97
Oxychlordane	Oxychlordane-13C10(IS)	8.816	114.9 -> 51.1	763336	4.712 ng/ml	95
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.413	271.8 -> 236.9	426776	4.560 ng/ml	96
2,4'-DDE	4,4'-DDD d4(IS)	9.434	246.0 -> 176.2	2749842	4.726 ng/ml	96
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.767	271.8 -> 236.9	1064340	4.528 ng/ml	98
Endosulfan I	Endrin-13C12(IS)	9.790	206.9 -> 172.0	153279	4.431 ng/ml	99
trans-Nanochlor	Oxychlordane-13C10(IS)	9.841	271.8 -> 236.9	358634	4.400 ng/ml	94
4,4' -DDE	4,4'-DDD d4(IS)	10.349	246.0 -> 176.2	2065567	4.768 ng/ml	98
2,4'-DDD	4,4'-DDD d4(IS)	10.559	235.0 -> 165.1	1951282	4.789 ng/ml	95
Dieldrin	Endrin-13C12(IS)	10.574	262.9 -> 193.0	197252	4.421 ng/ml	90
Endrin	Endrin-13C12(IS)	11.230	262.8 -> 193.0	118710	4.749 ng/ml	97
Endosulfan II	Endrin-13C12(IS)	11.587	206.9 -> 172.0	77305 ***m***	4.548 ng/ml	97
4,4'-DDD	4,4'-DDD d4(IS)	11.713	235.0 -> 165.1	1521990	4.647 ng/ml	98
cis-Nonachlor	Oxychlordane-13C10(IS)	11.709	271.8 -> 236.9	277096	4.670 ng/ml	100
2,4'-DDT	4,4'-DDT-d4(IS)	11.800	235.0 -> 165.1	1145694	4.770 ng/ml	99
Endrin aldehyde	Endrin-13C12(IS)	12.071	249.9 -> 214.9	44360	4.785 ng/ml	99
Endosulfan sulfate	Endrin-13C12(IS)	12.778	271.9 -> 237.0	233549	4.461 ng/ml	92
4,4'-DDT	4,4'-DDT-d4(IS)	12.896	235.0 -> 165.1	1002330	4.948 ng/ml	96
Endrin ketone	Endrin ketone-13C12(IS)	13.837	147.0 -> 111.0	74311	4.663 ng/ml	95
Methoxychlor	Methoxychlor-d6(IS)	14.084	227.0 -> 141.1	355469	4.518 ng/ml	96
Mirex	Mirex-13C10(IS)	14.916	271.8 -> 236.8	2204549	5.248 ng/ml	96

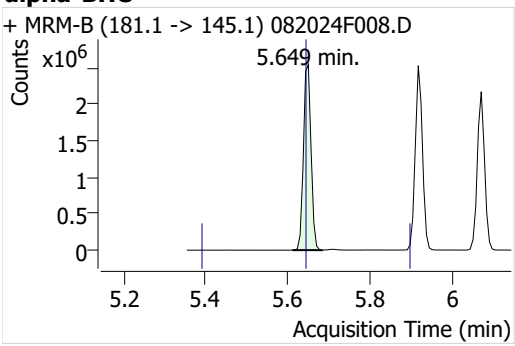
(m) = manual integration ND = Not Detected NC = Not Calculated

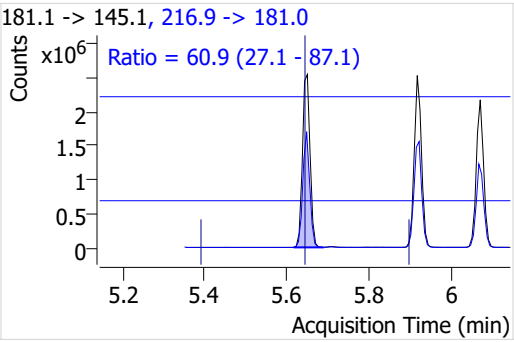
Sample Chromatogram

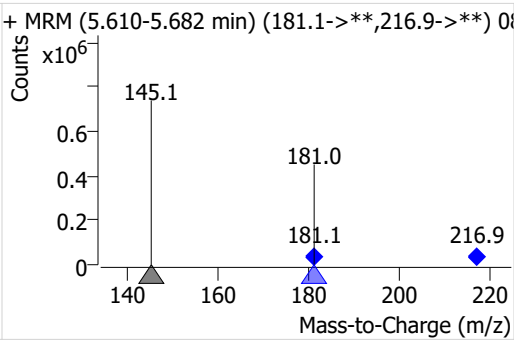
MassHunter Quantitative Analysis Sample Report



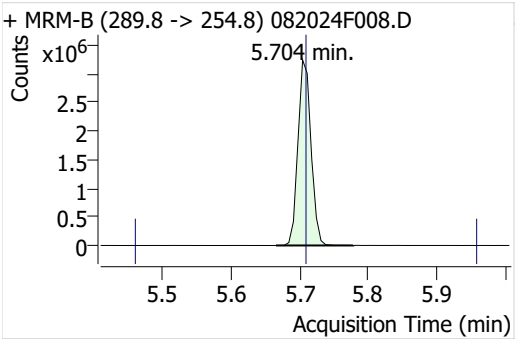
alpha-BHC

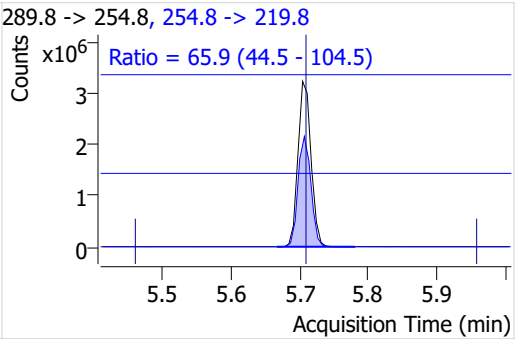


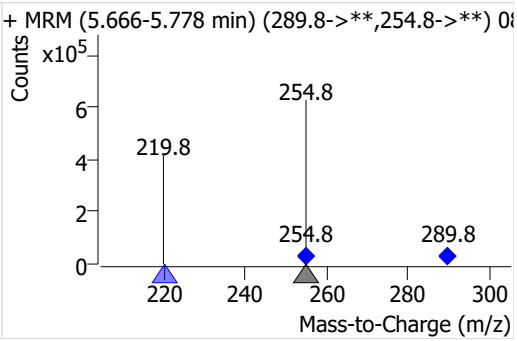




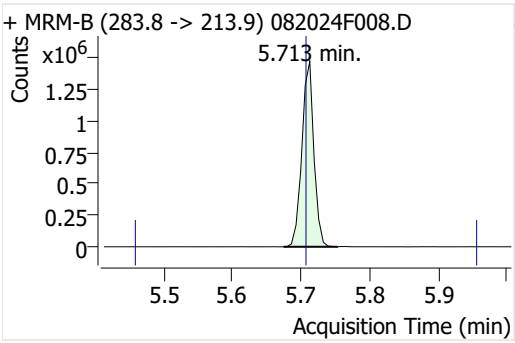
Hexachlorobenzene-13C6

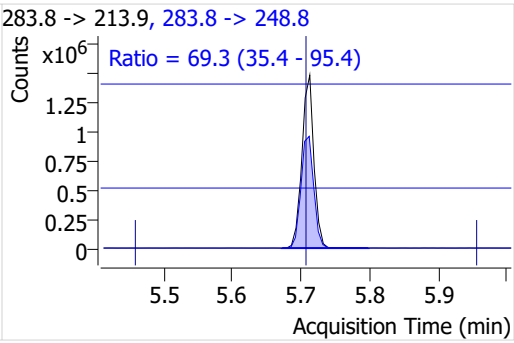


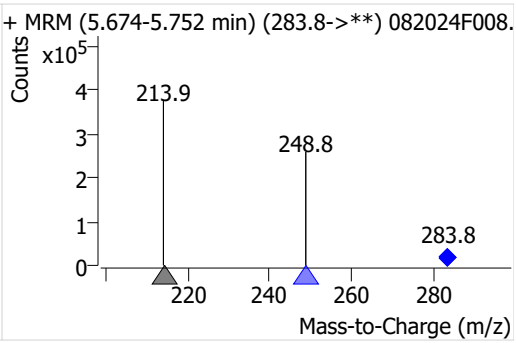




Hexachlorobenzene







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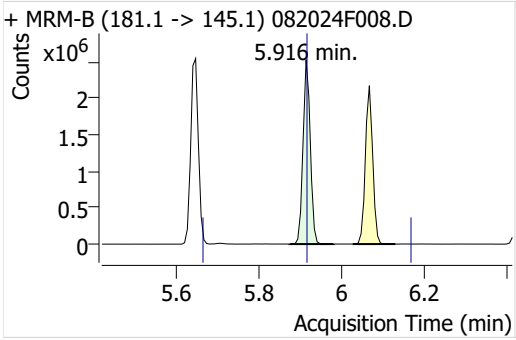
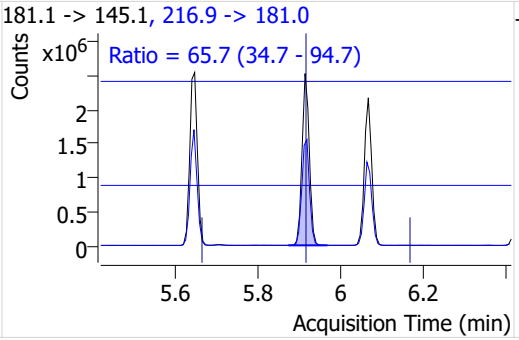
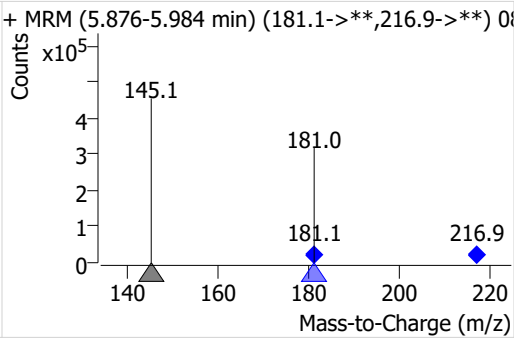
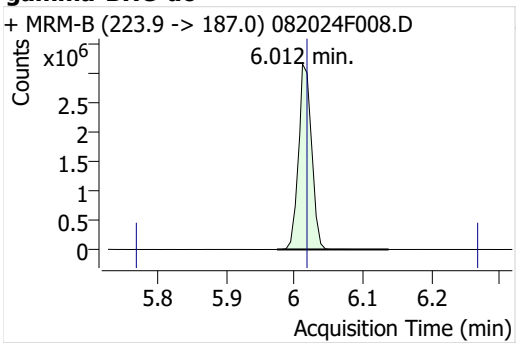
beta-BHC

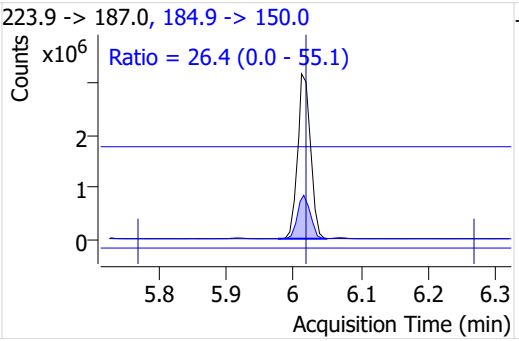


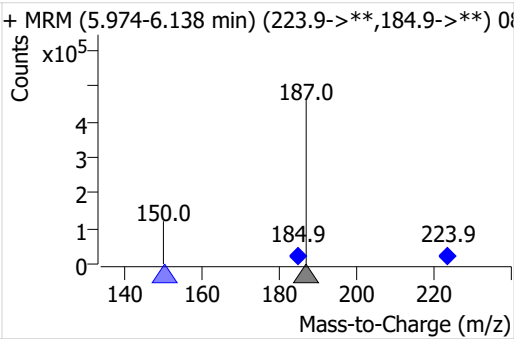




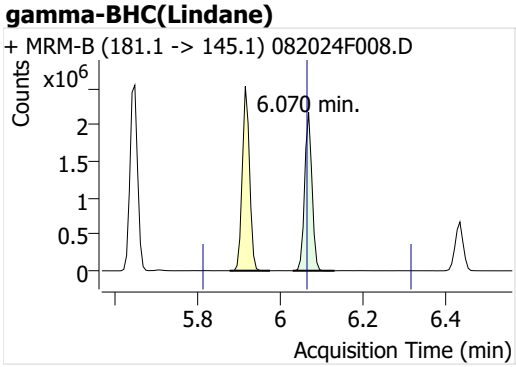
gamma-BHC-d6

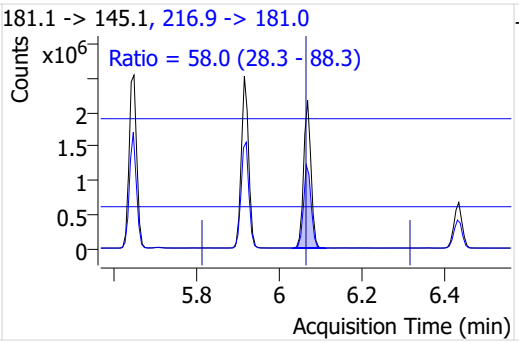


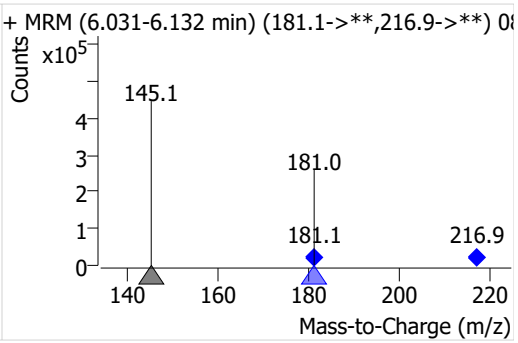




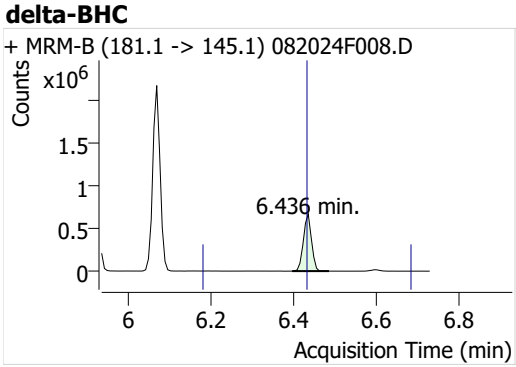
gamma-BHC(Lindane)

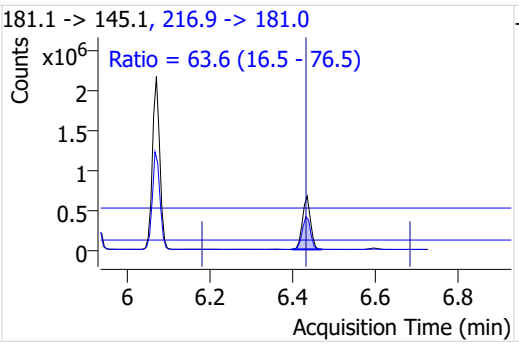


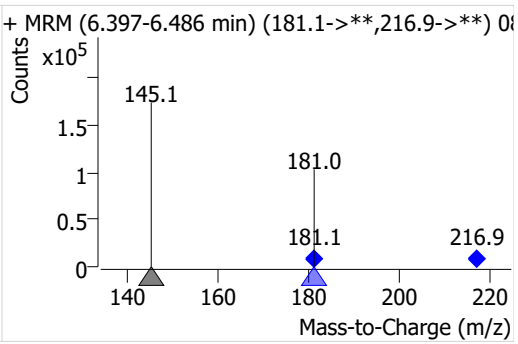




delta-BHC

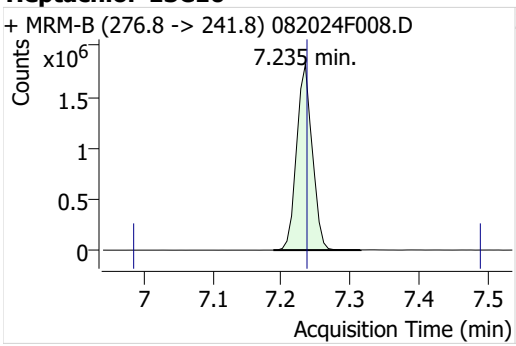


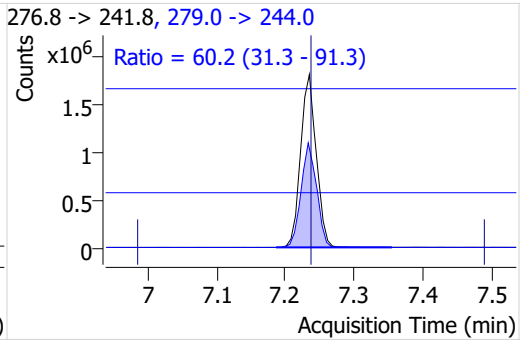


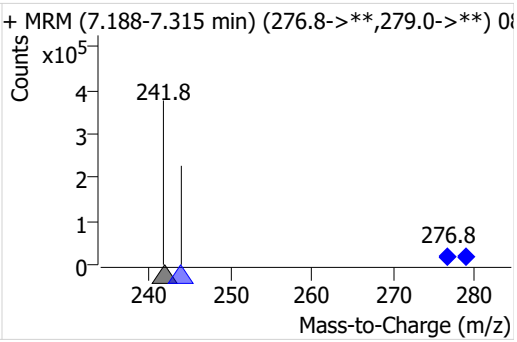


MassHunter Quantitative Analysis Sample Report

Heptachlor-13C10







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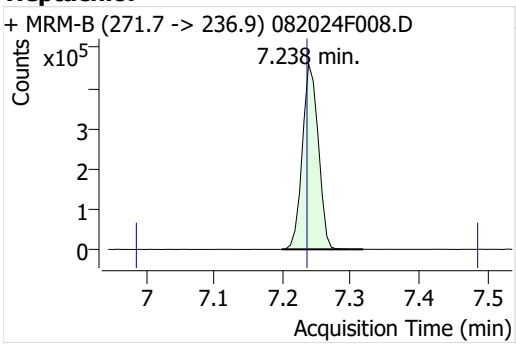
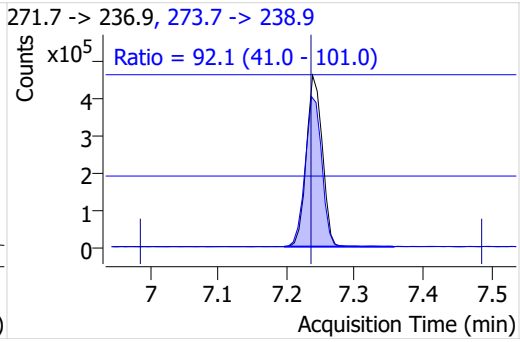
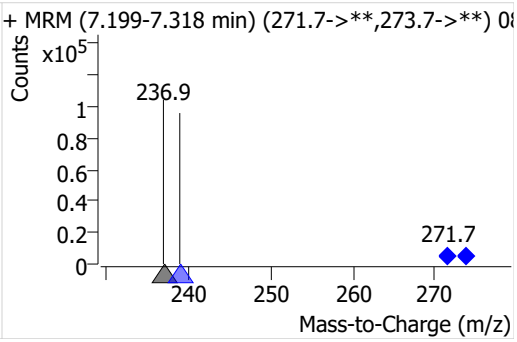
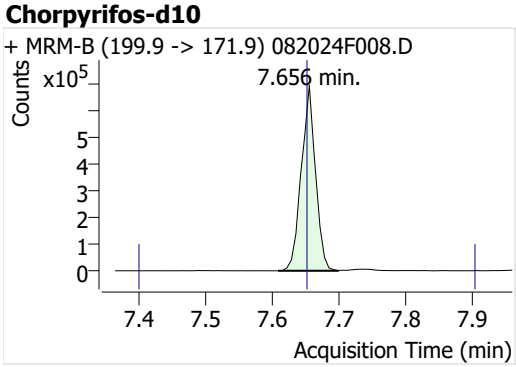
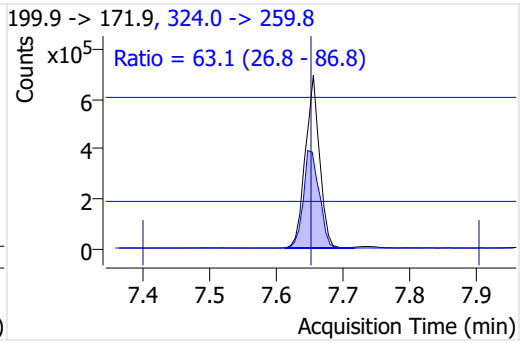


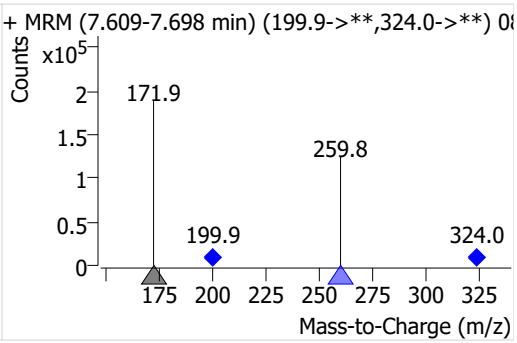




Chorpyrifos-d10







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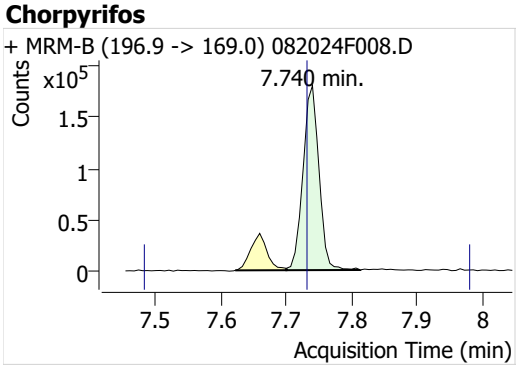

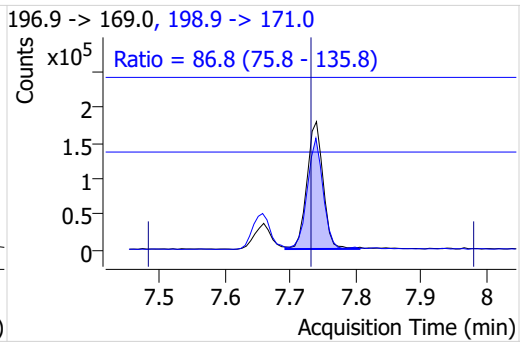

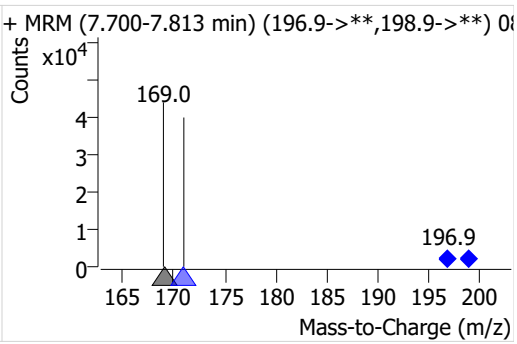

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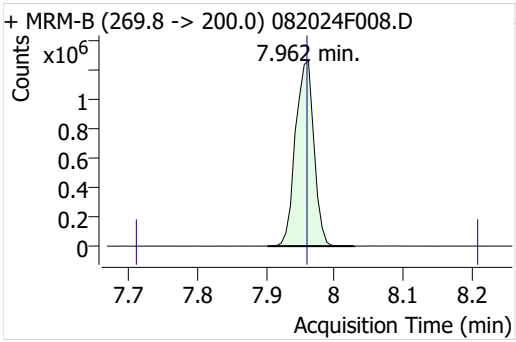
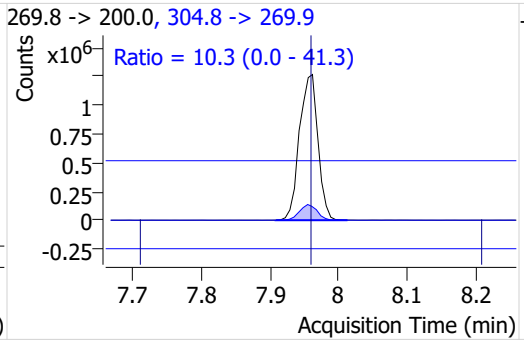
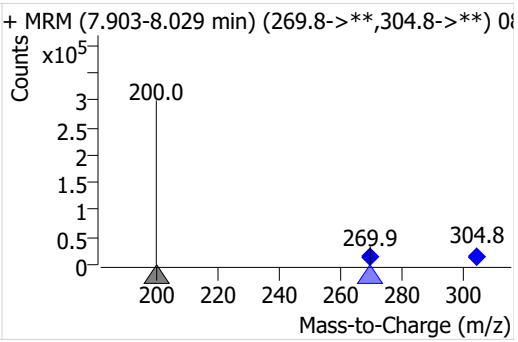
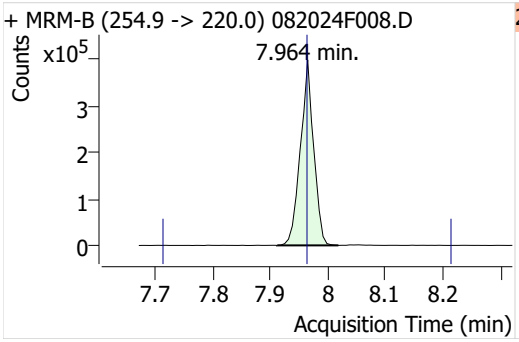
Aldrin-13C

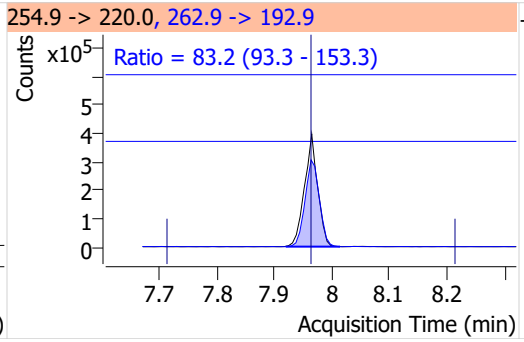


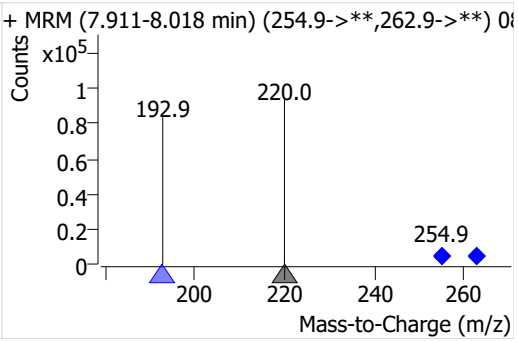




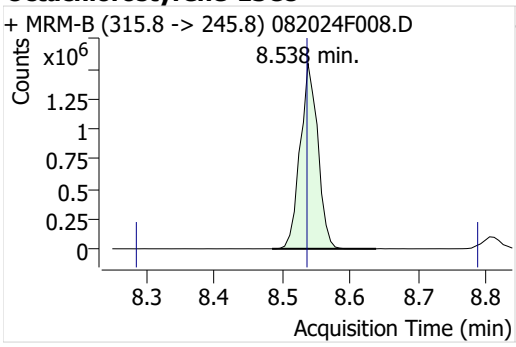
Aldrin

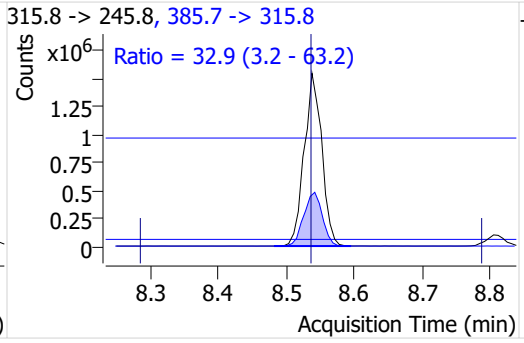


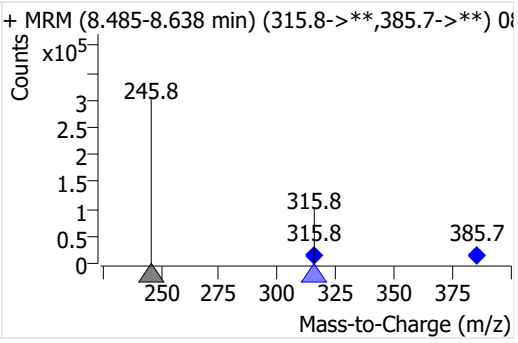




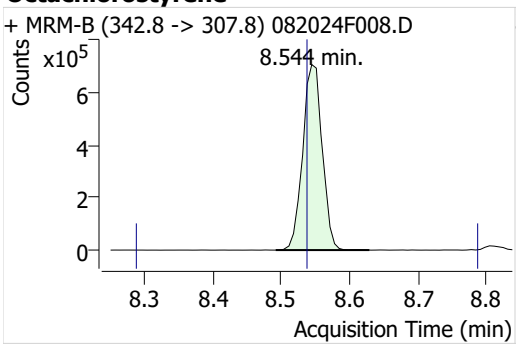
Octachlorostyrene-13C8

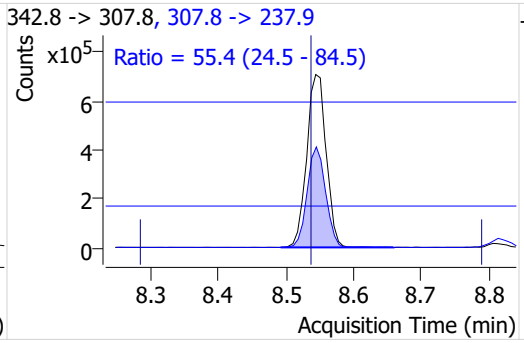


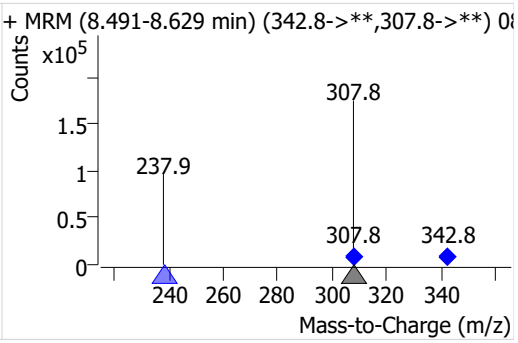




Octachlorostyrene







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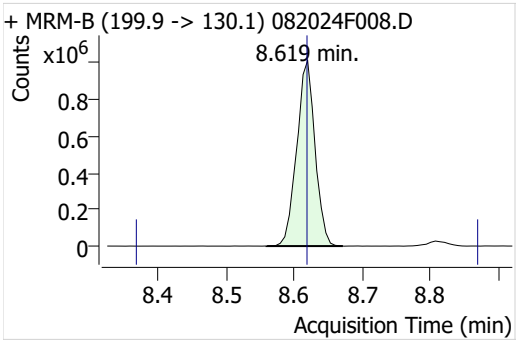
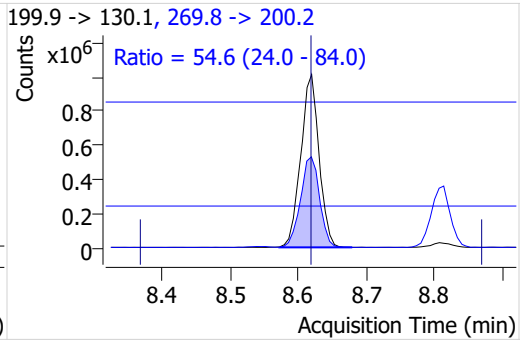
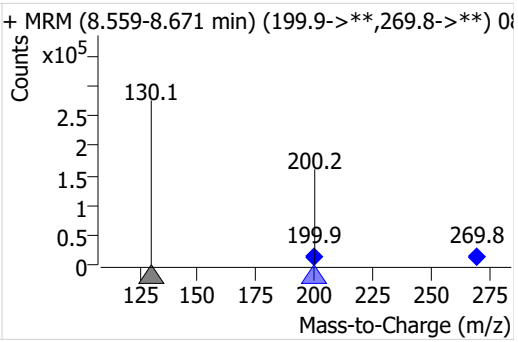
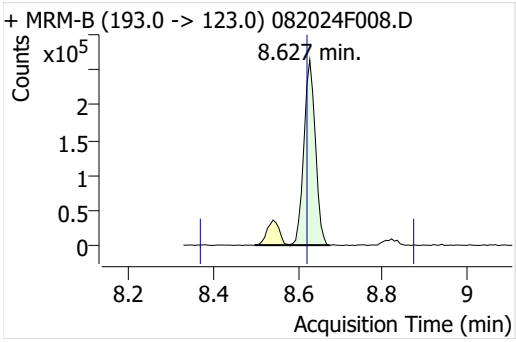
Isodrin-13C12

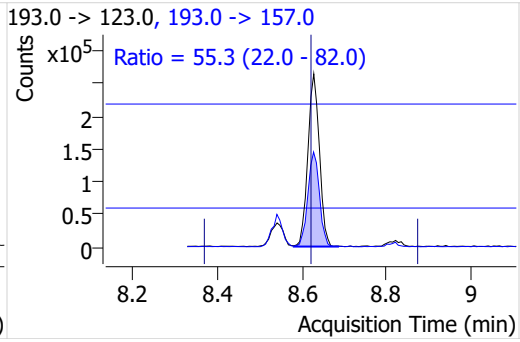


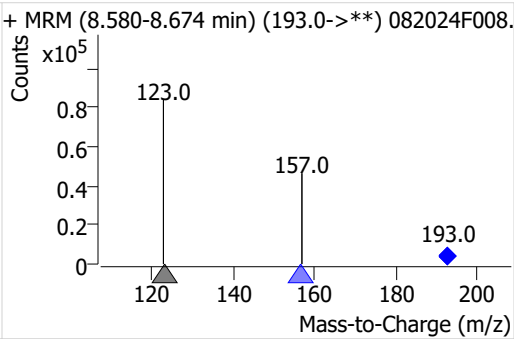




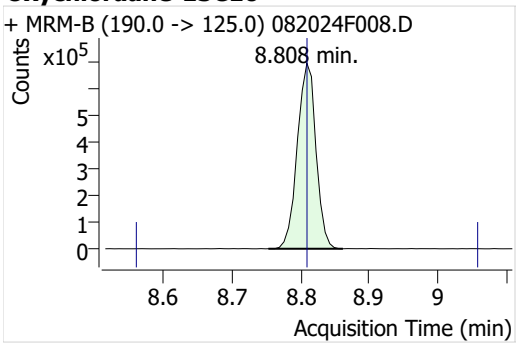
Isodrin

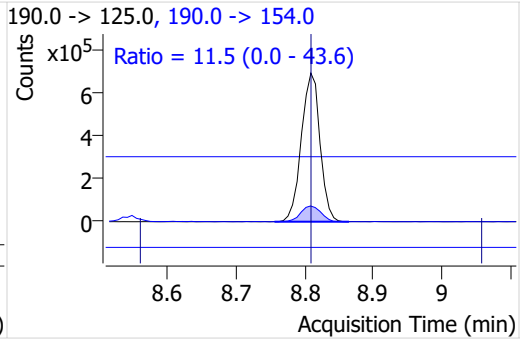


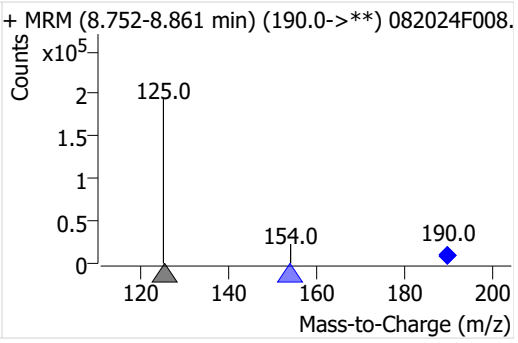




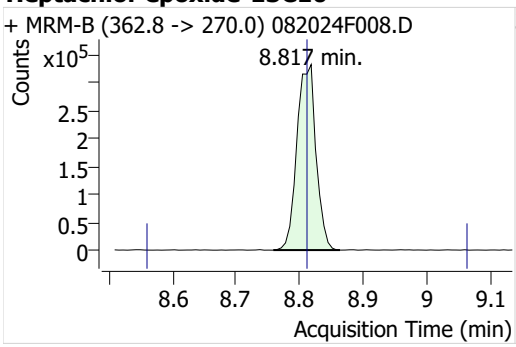
Oxychlordane-13C10

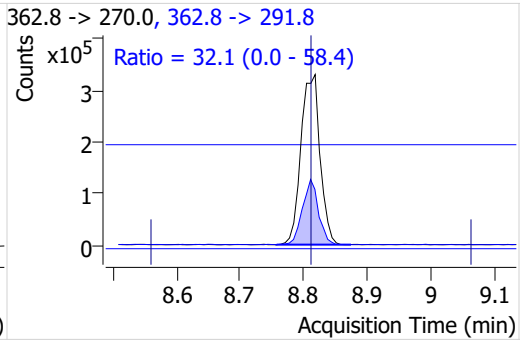


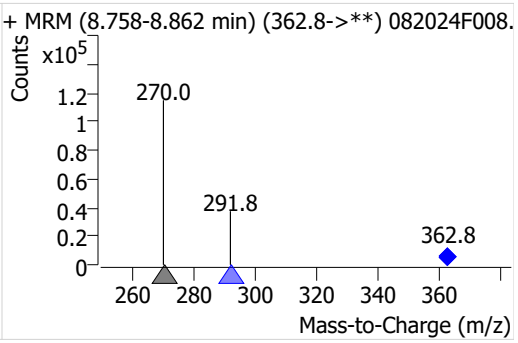




Heptachlor epoxide-13C10







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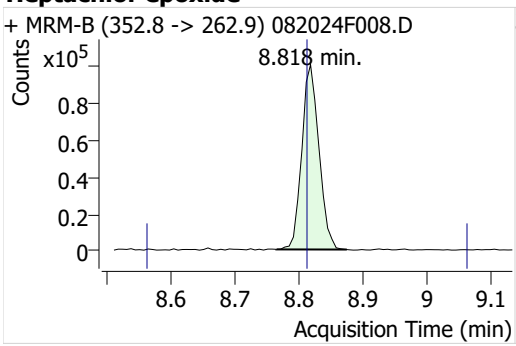
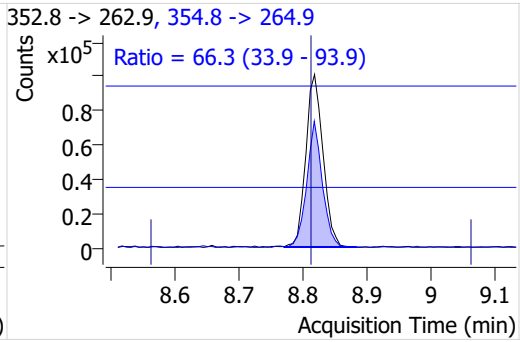
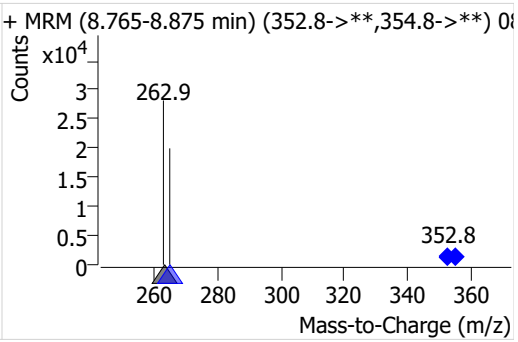
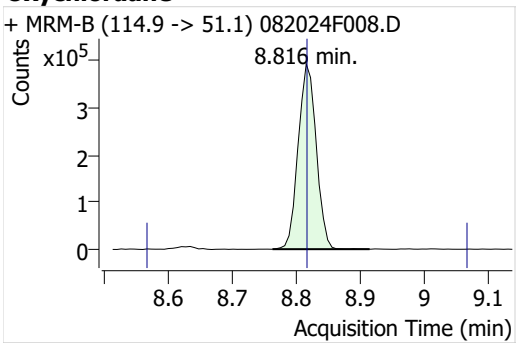
Heptachlor epoxide

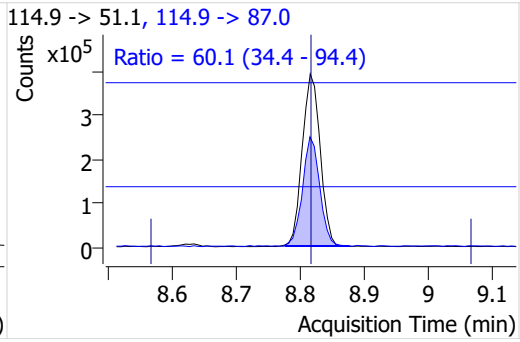


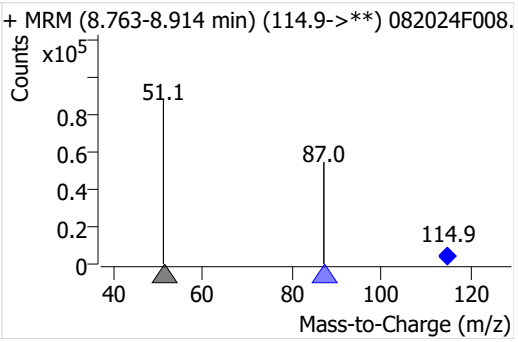




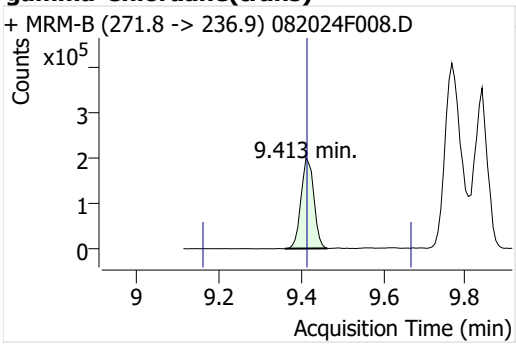
Oxychlordane

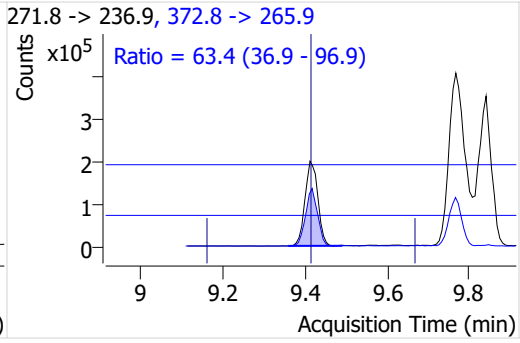


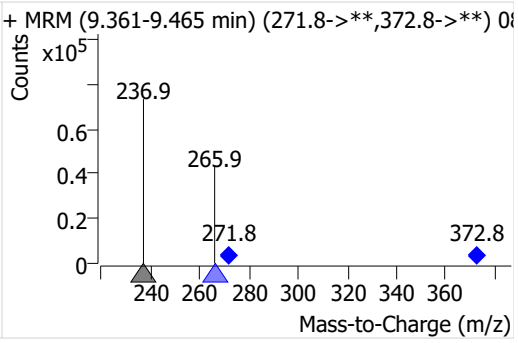




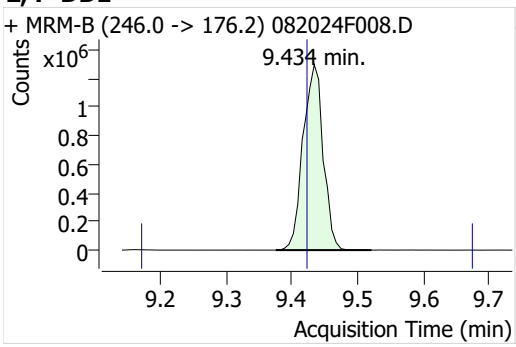
gamma-Chlordane(trans)

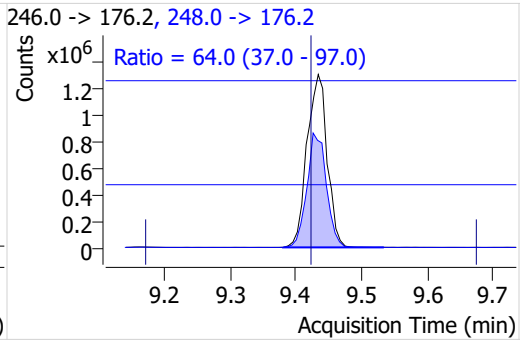


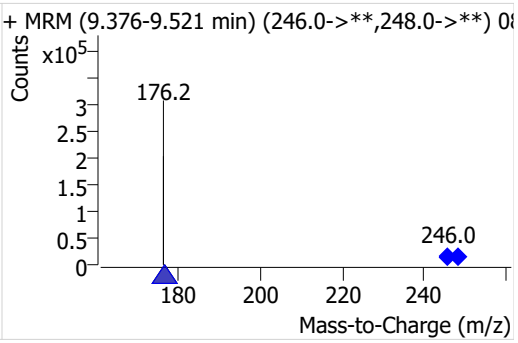




2,4'-DDE







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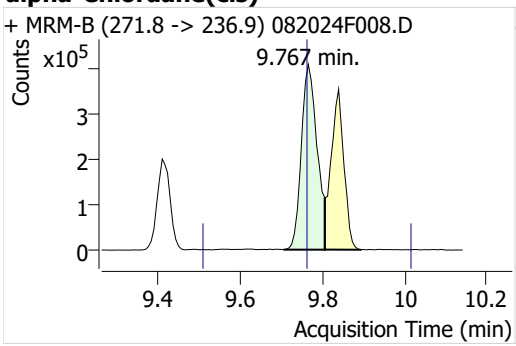
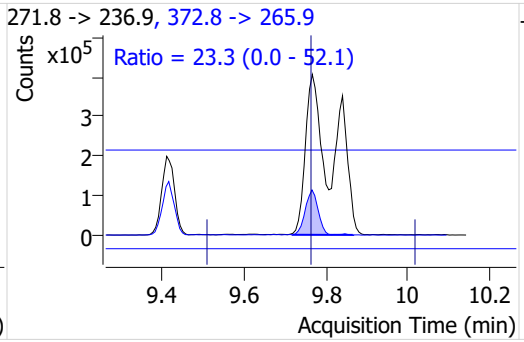
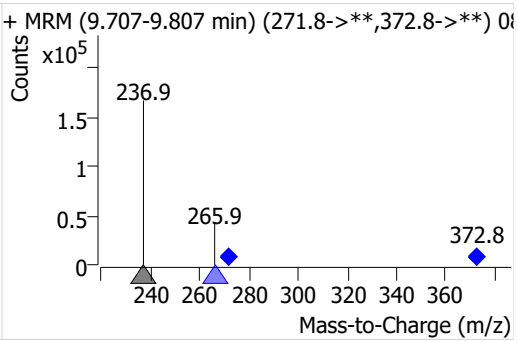
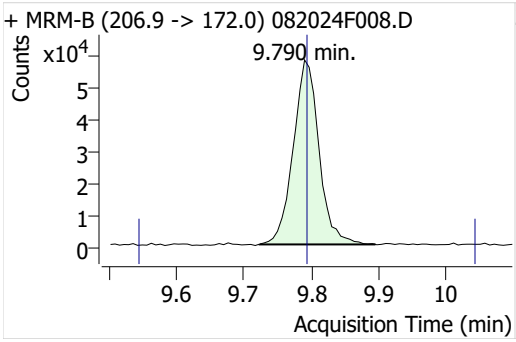
alpha-Chlordane(cis)

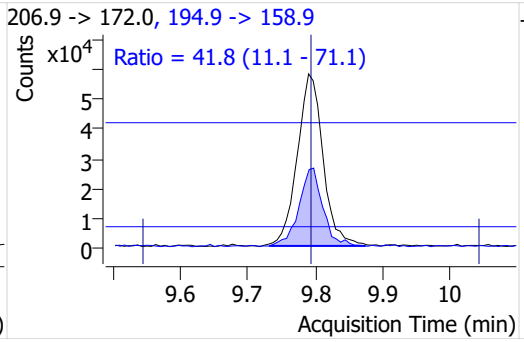


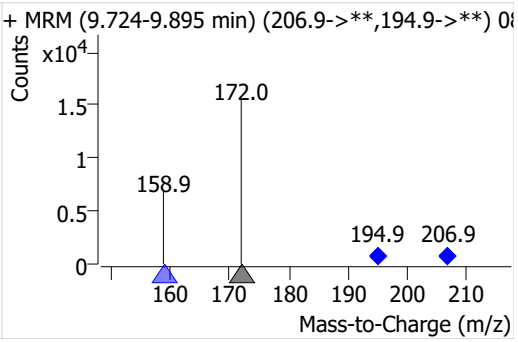




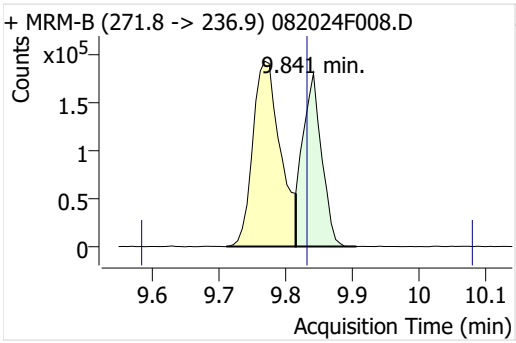
Endosulfan I

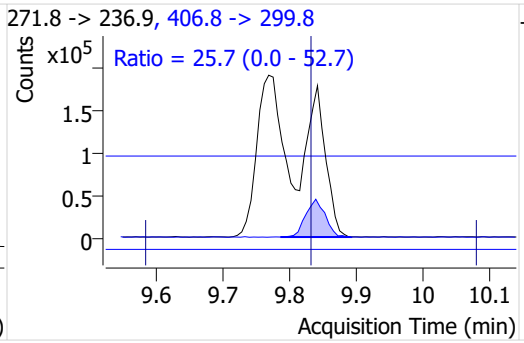


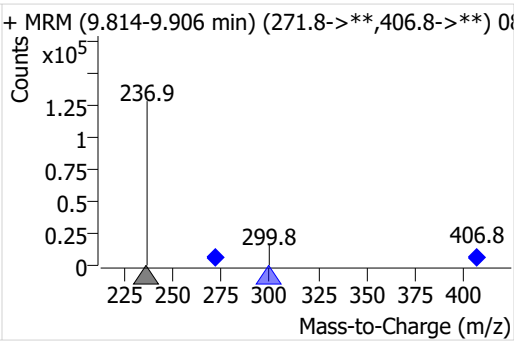




trans-Nanochlor







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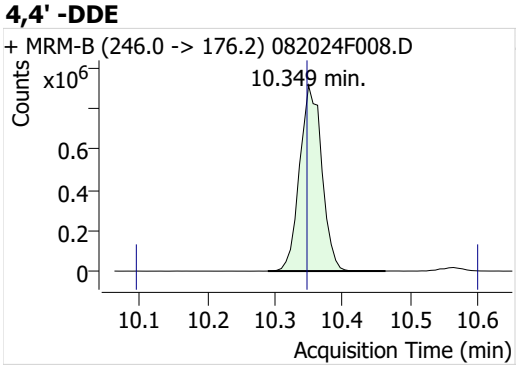
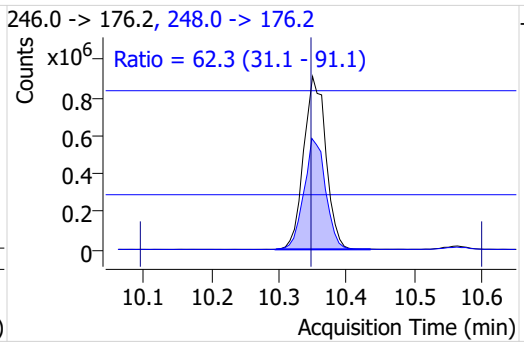
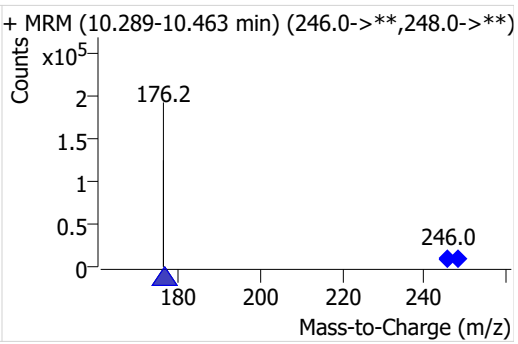
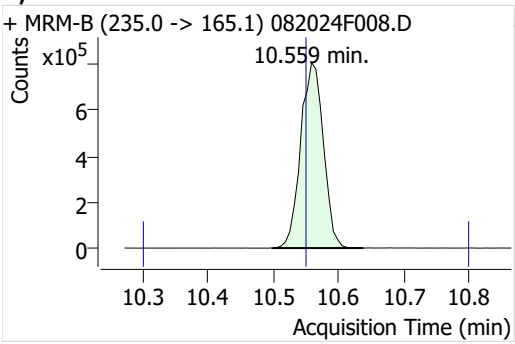


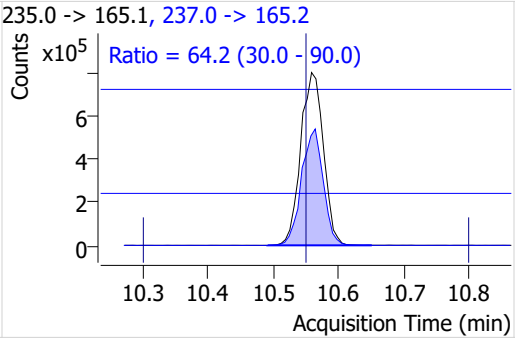


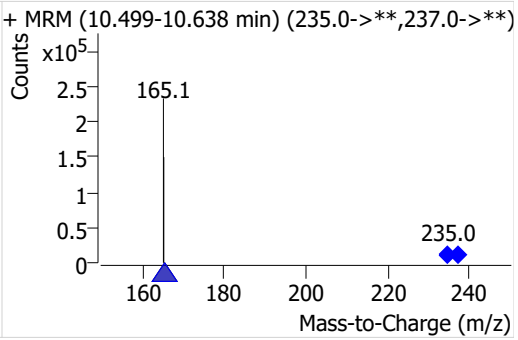


MassHunter Quantitative Analysis Sample Report

2,4'-DDD







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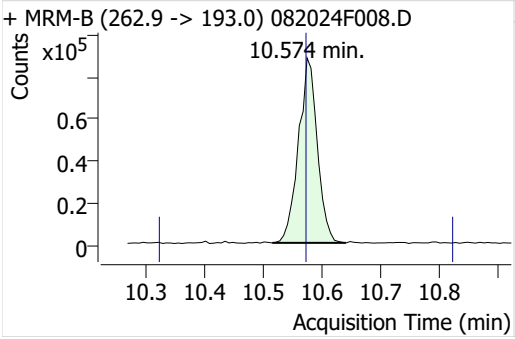

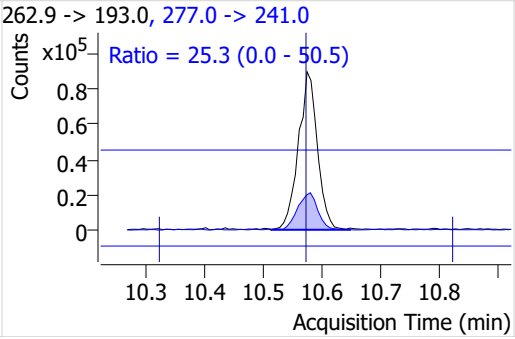

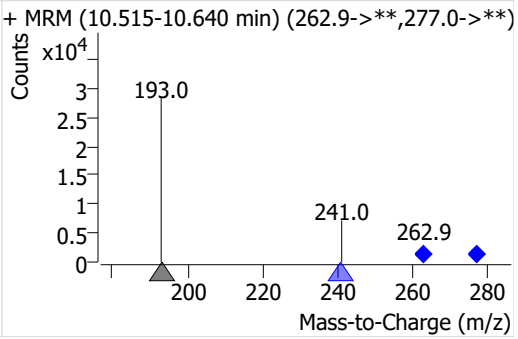

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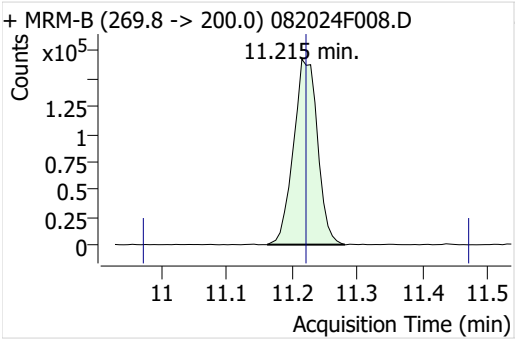

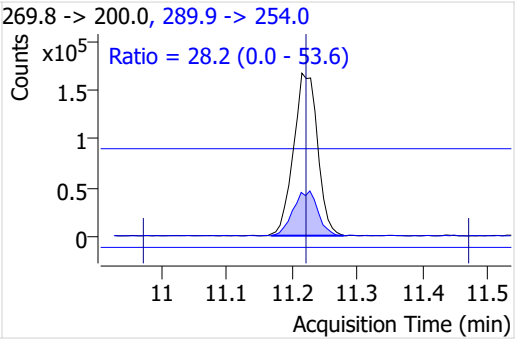

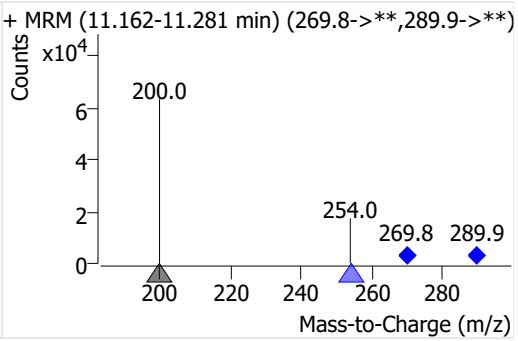

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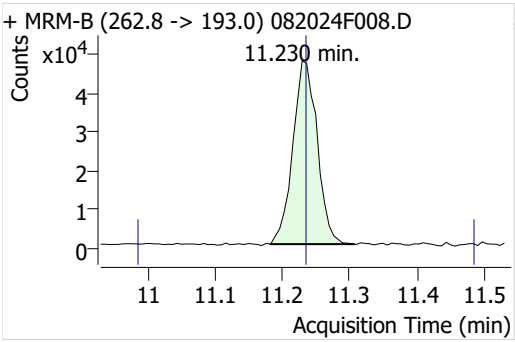

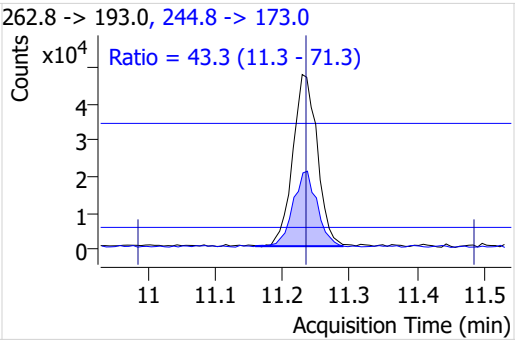

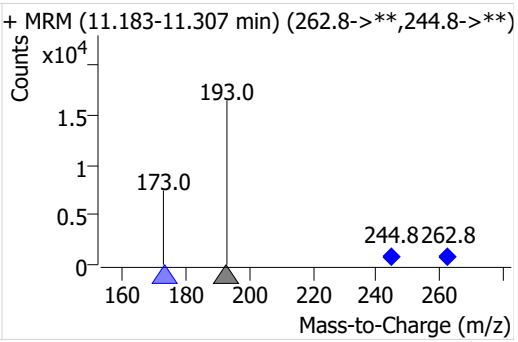

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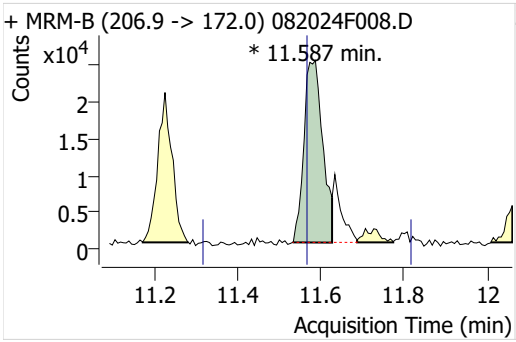
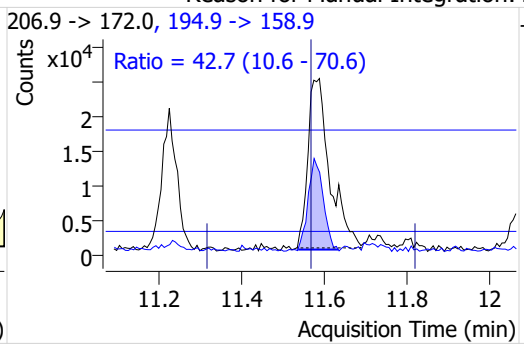
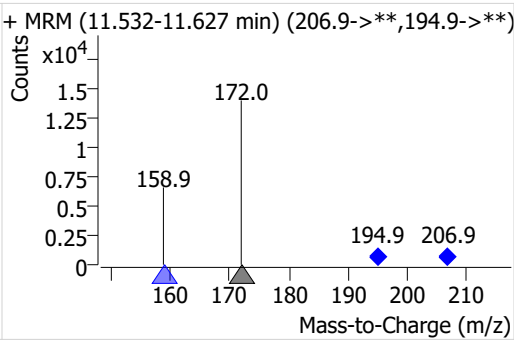
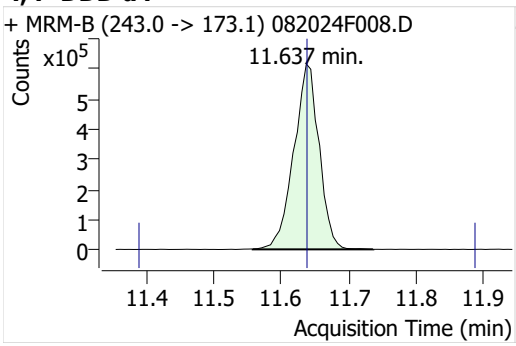
Endosulfan II Reason for Manual Integration: **BLC**

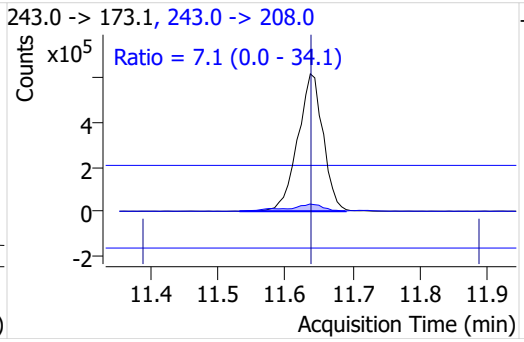


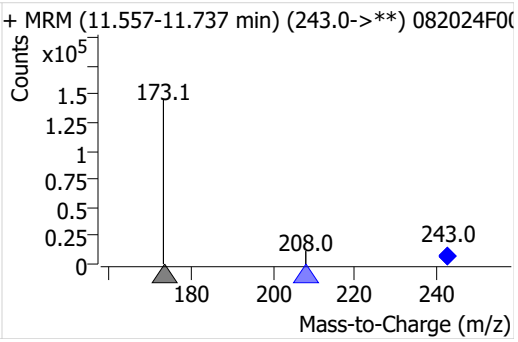




4,4'-DDD d4







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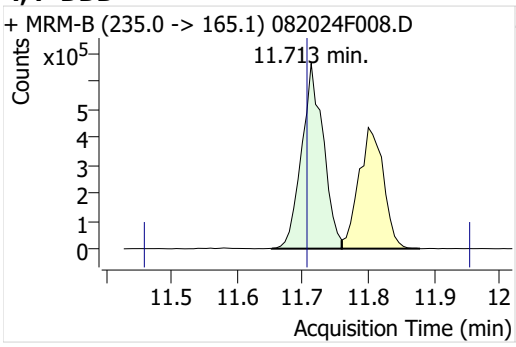

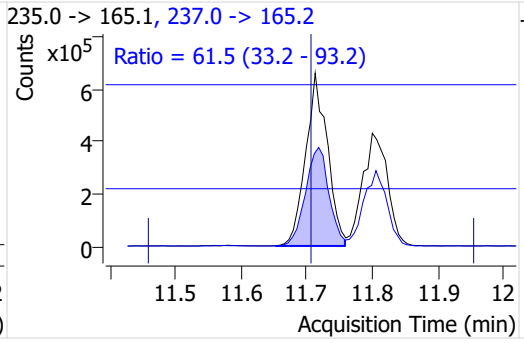

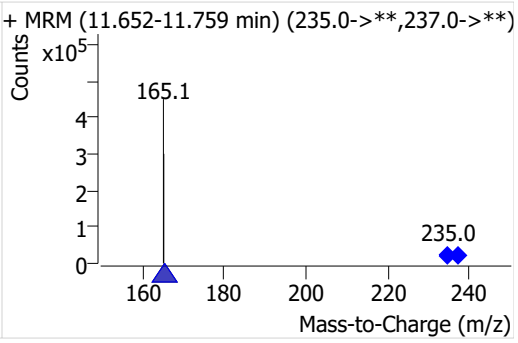

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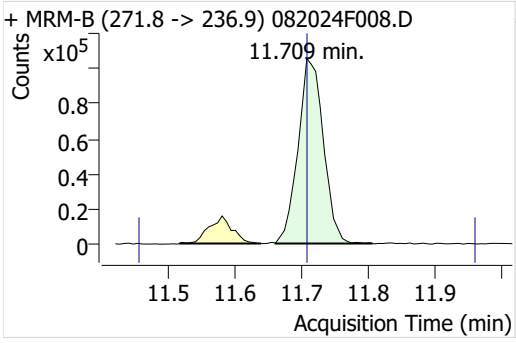

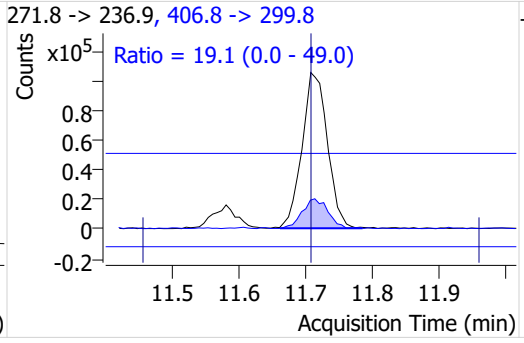

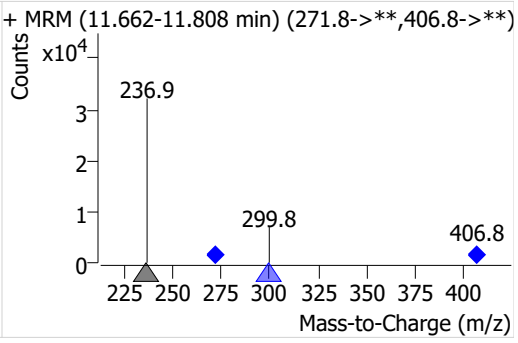

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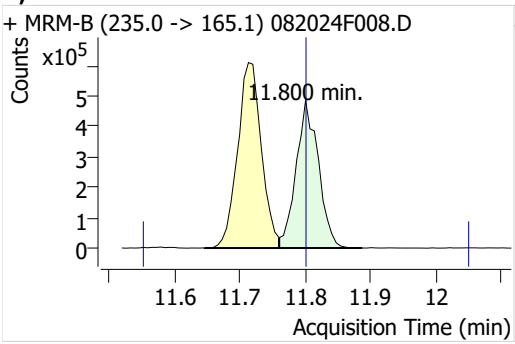
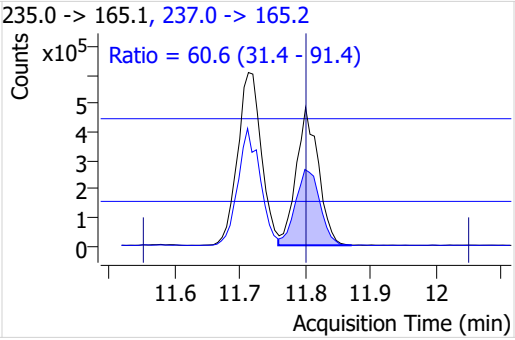
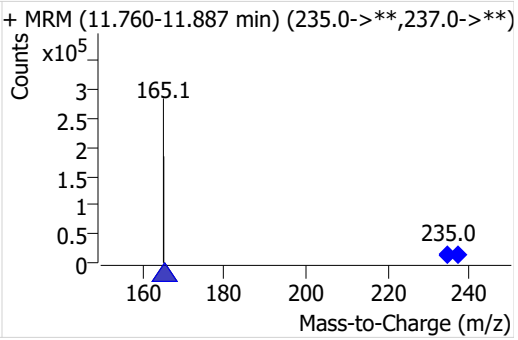
2,4'-DDT







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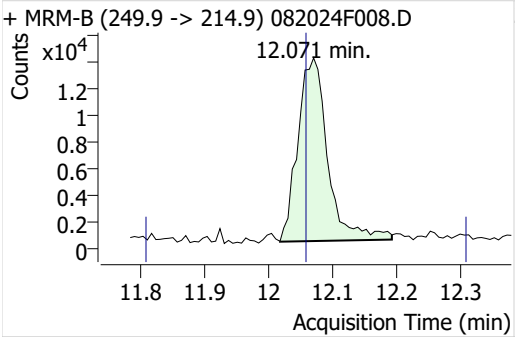
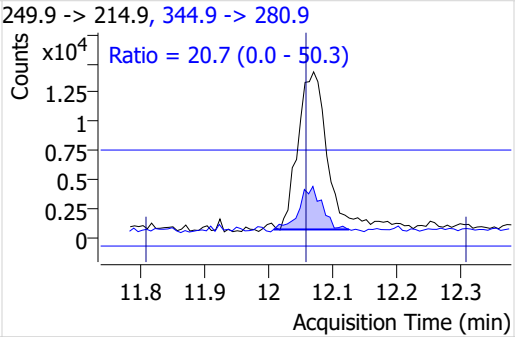
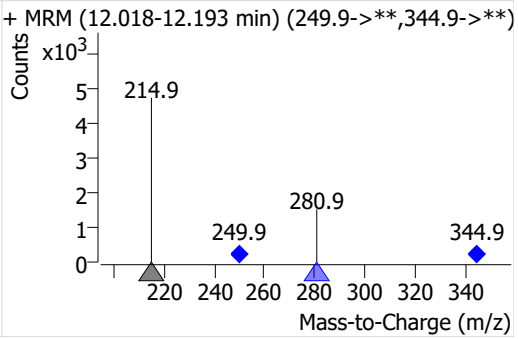
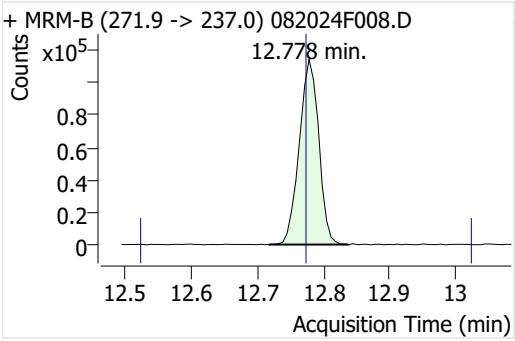
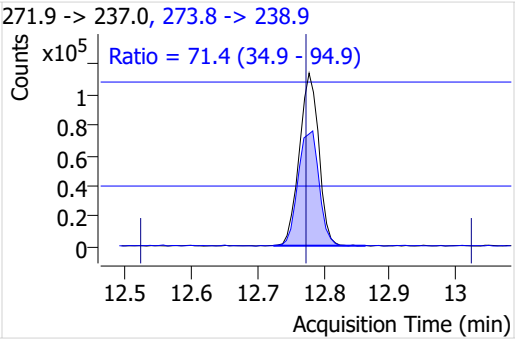


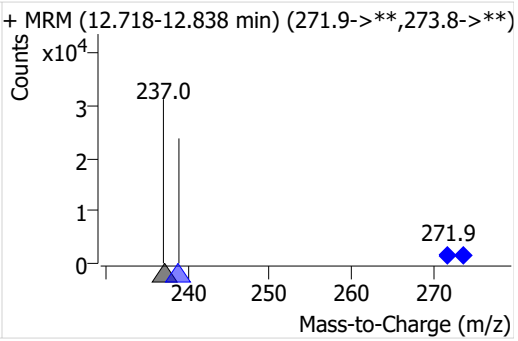




Endosulfan sulfate







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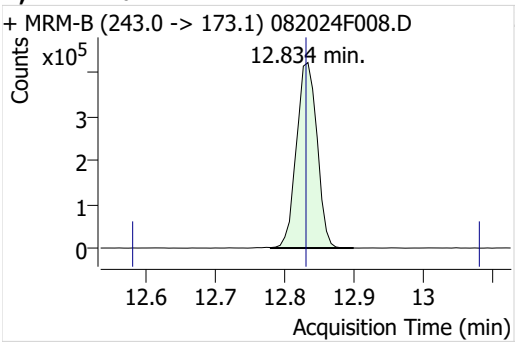

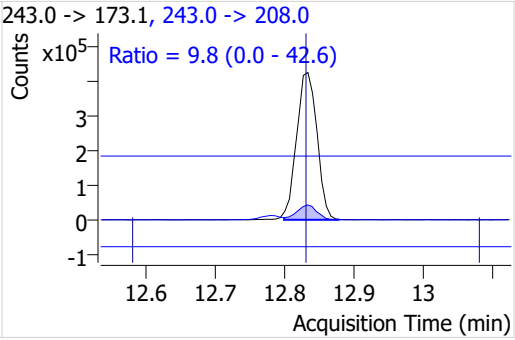

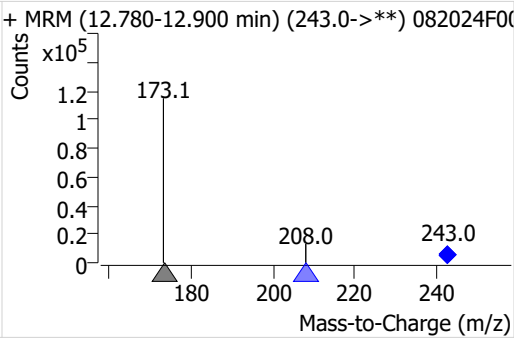

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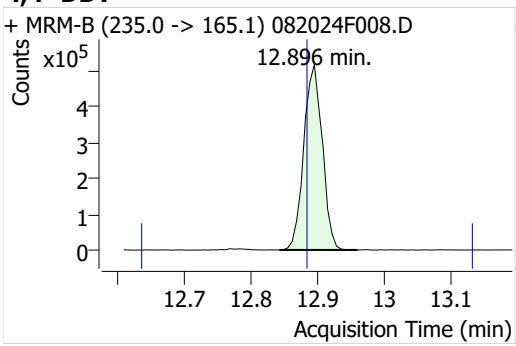
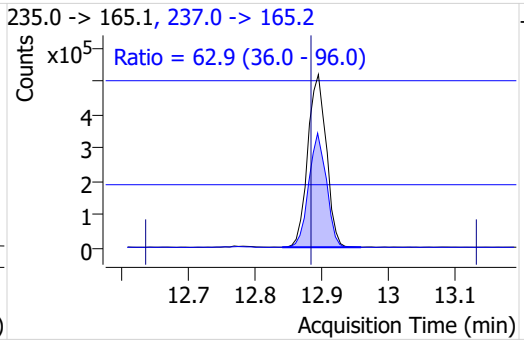
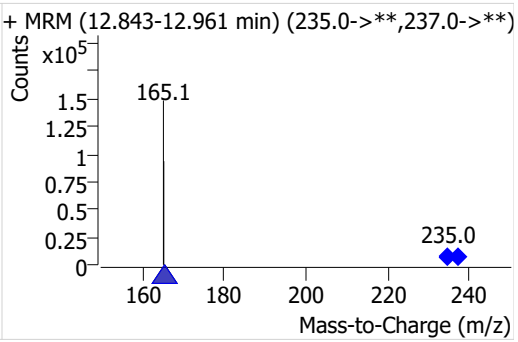
4,4'-DDT







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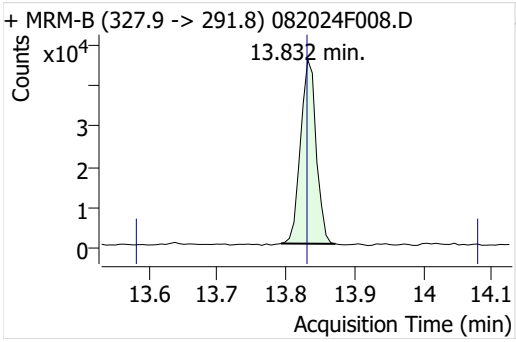

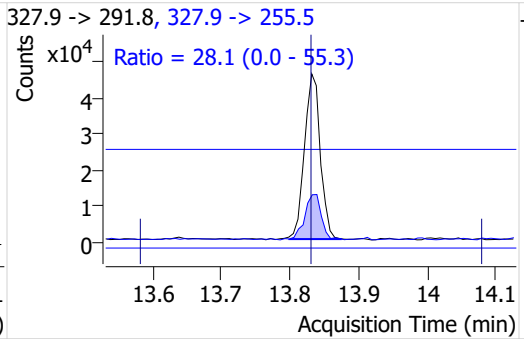

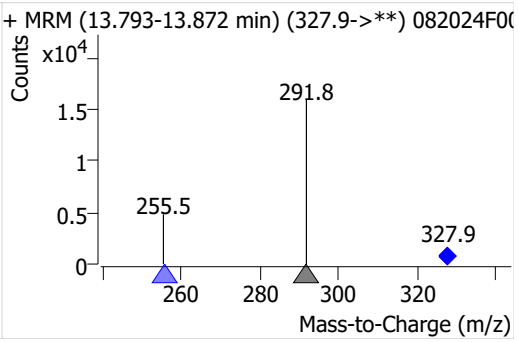

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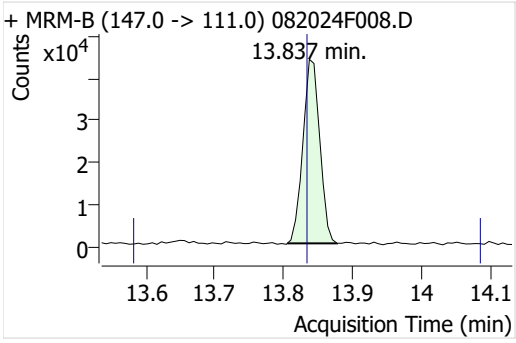

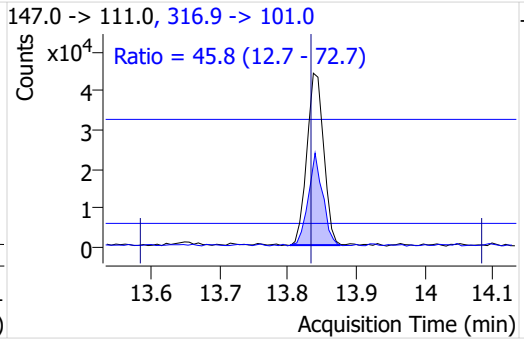

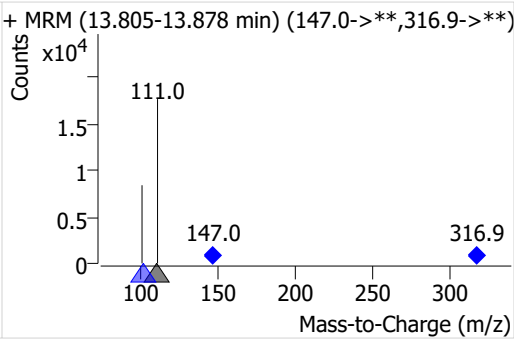

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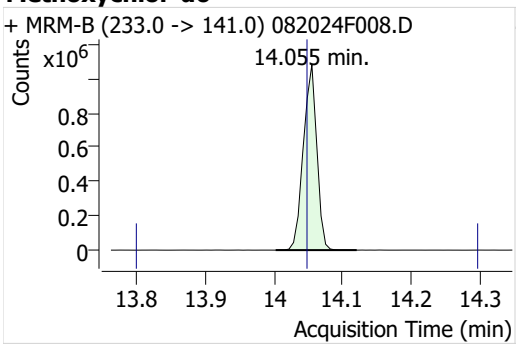

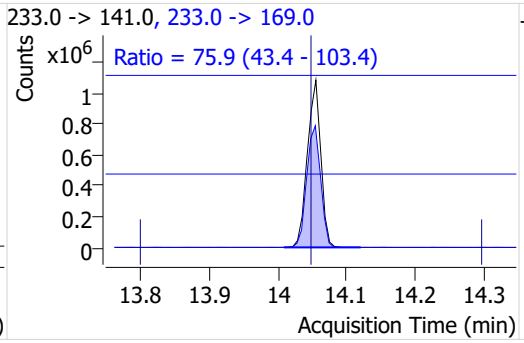

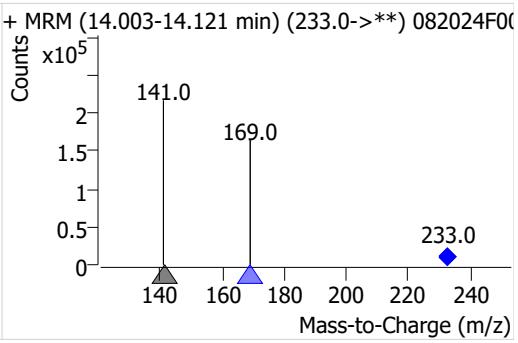

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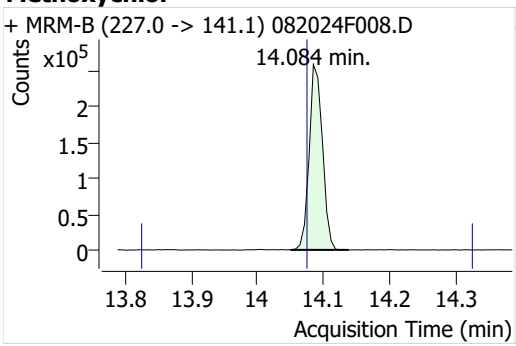
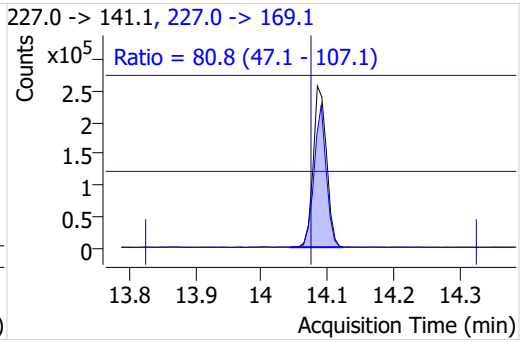
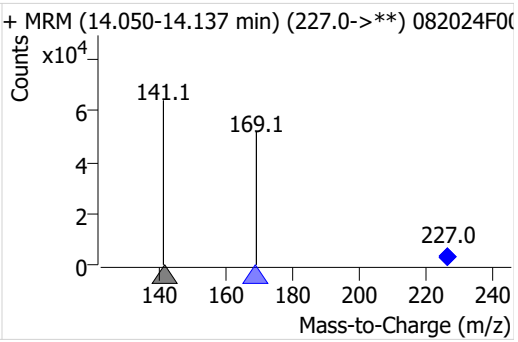
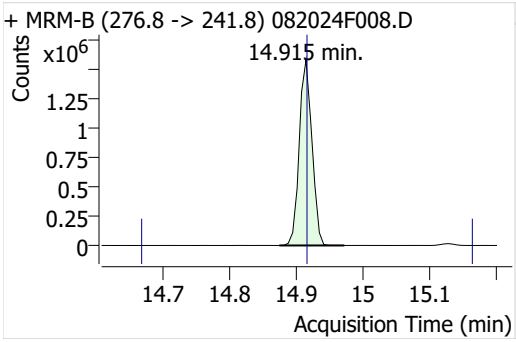
Methoxychlor

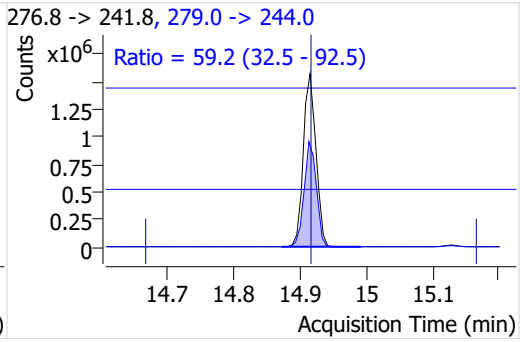


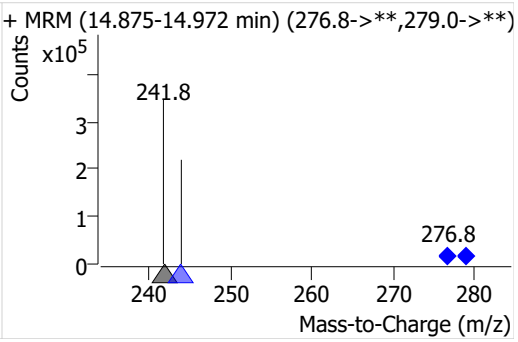




Mirex-13C10







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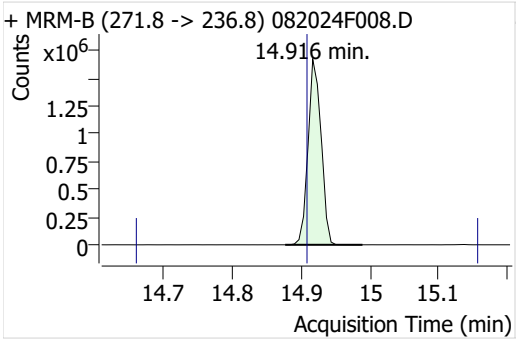

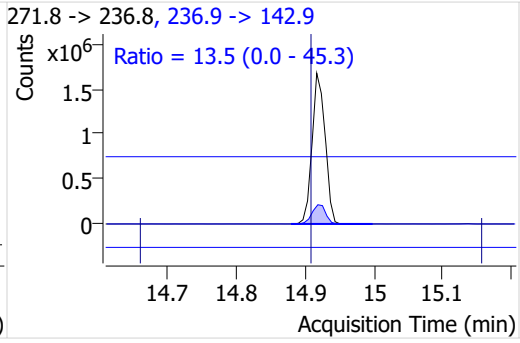

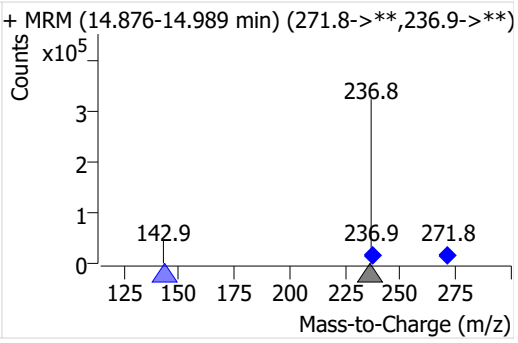

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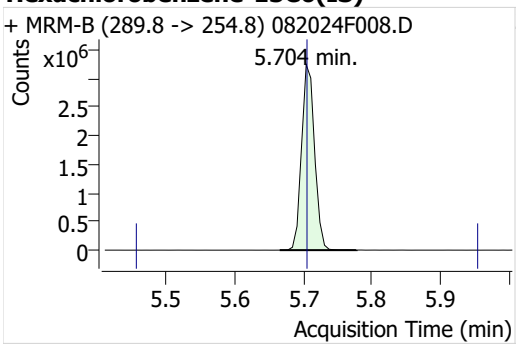

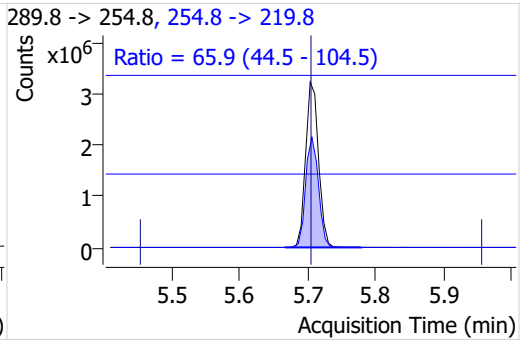

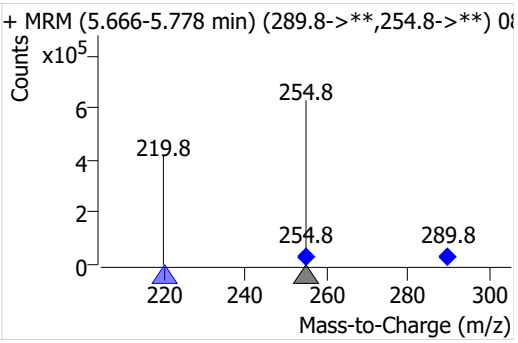

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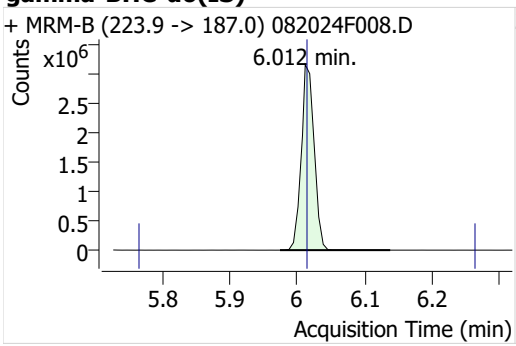

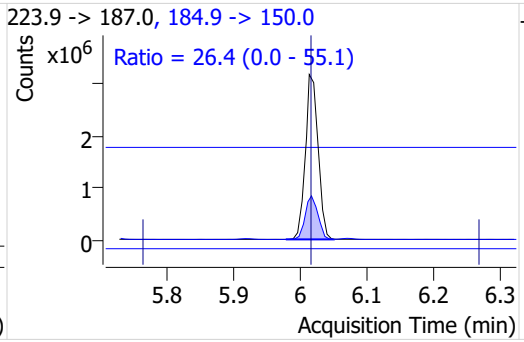

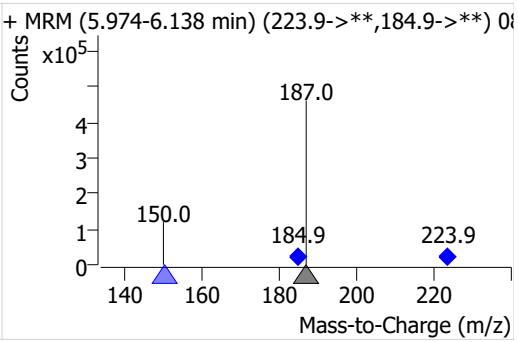

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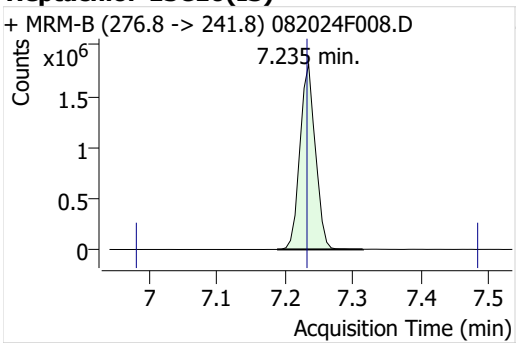
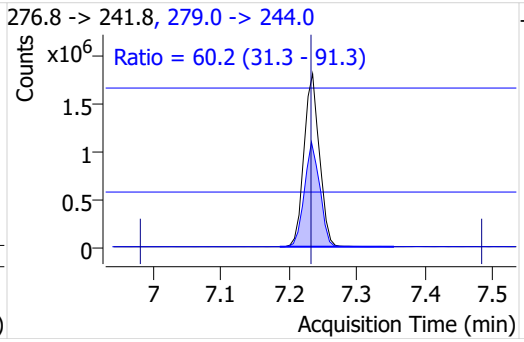
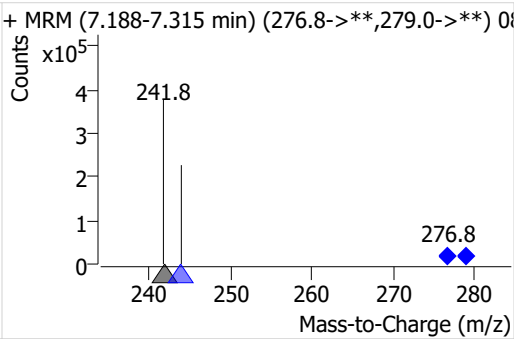
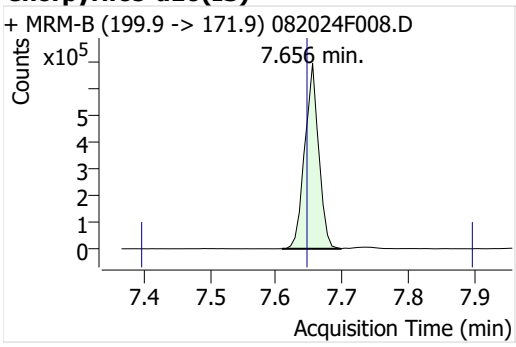
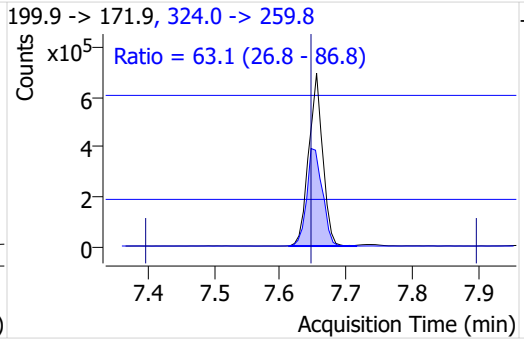


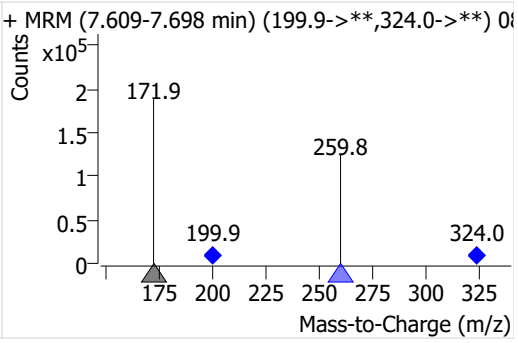




Chorpyrifos-d10(IS)







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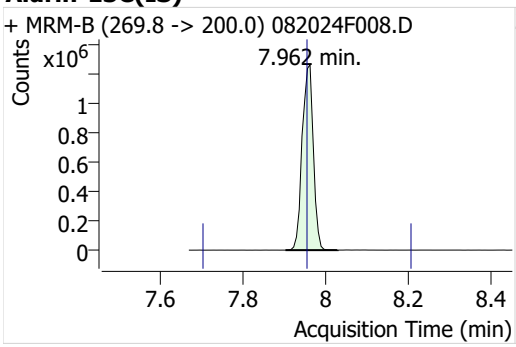

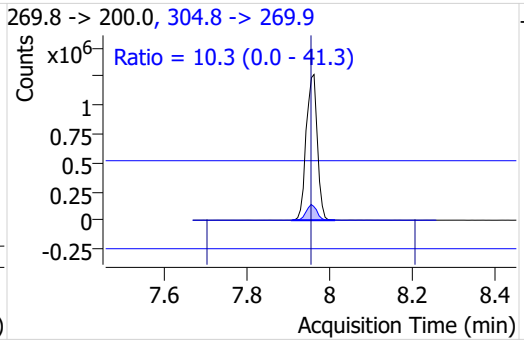

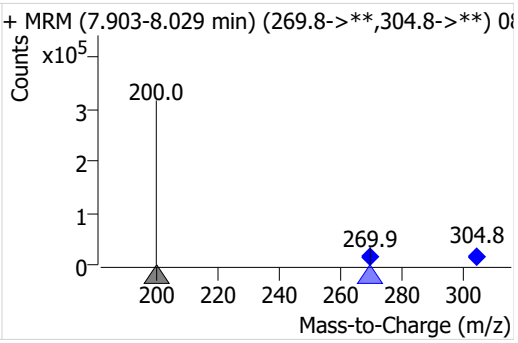

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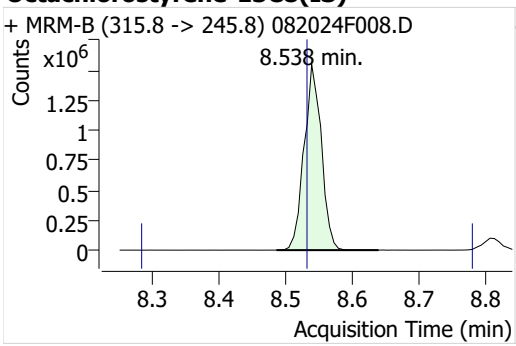

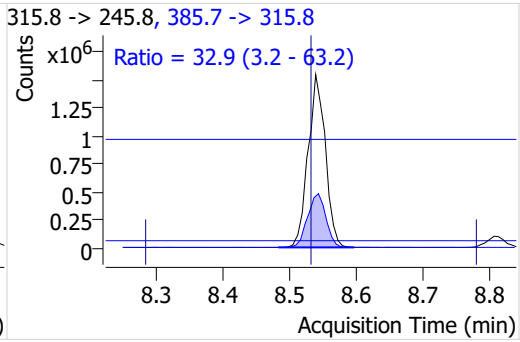

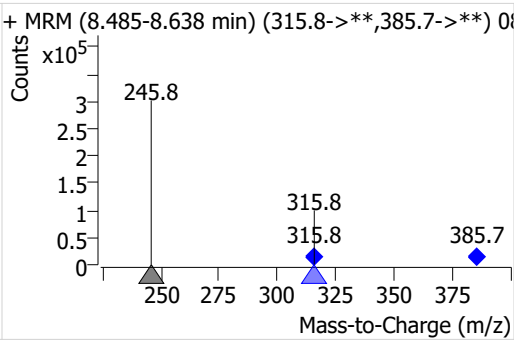

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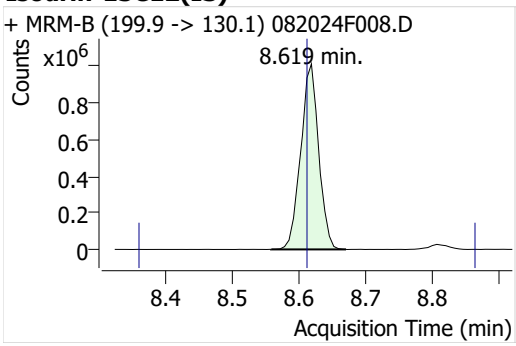

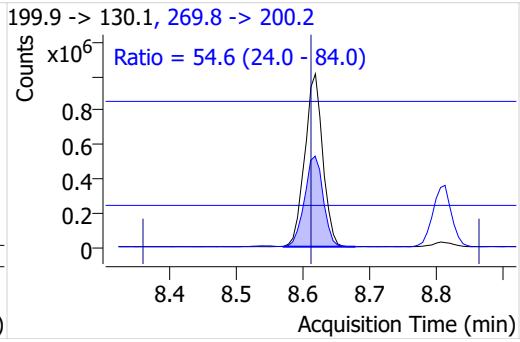

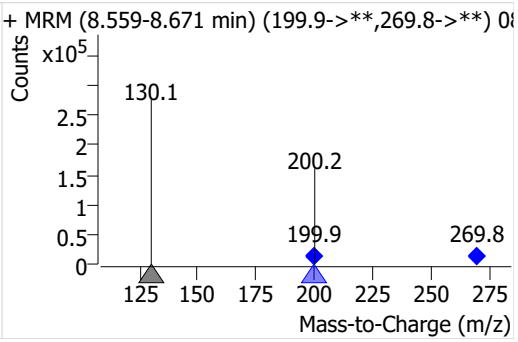

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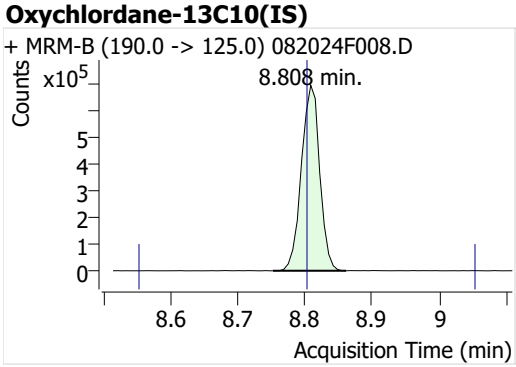

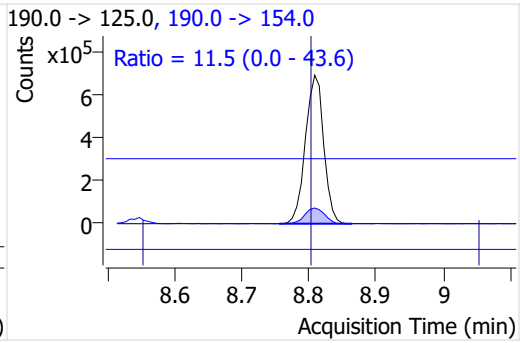

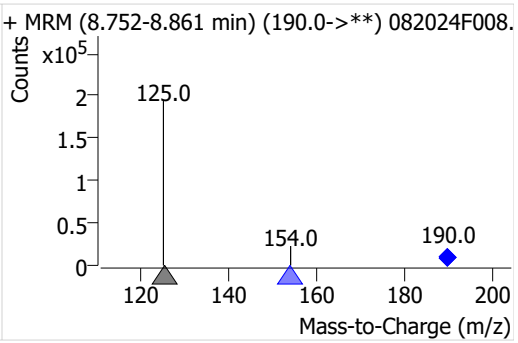

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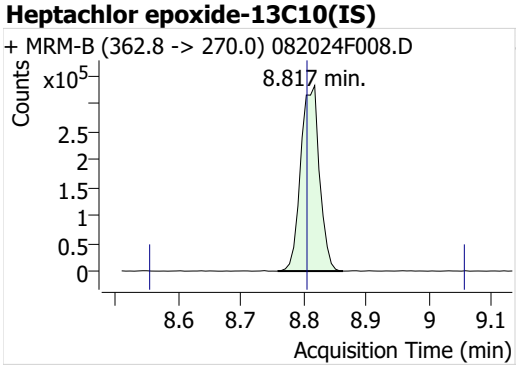

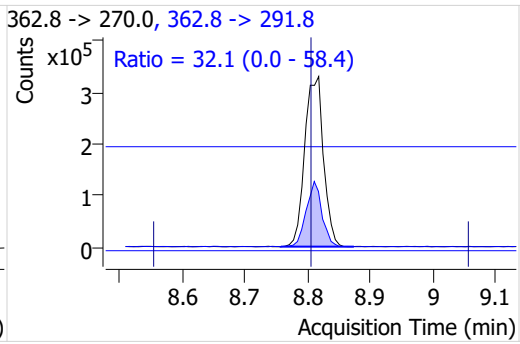

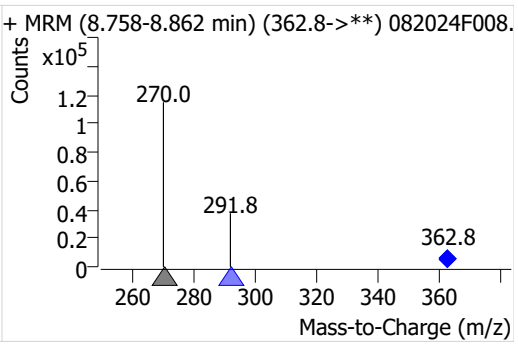

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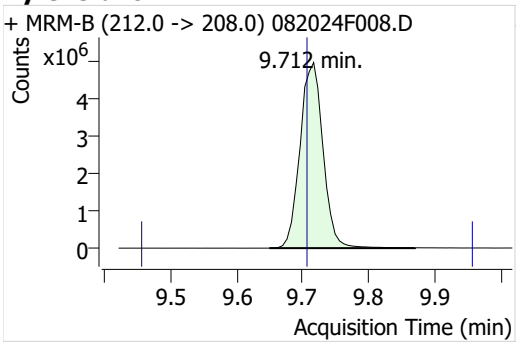
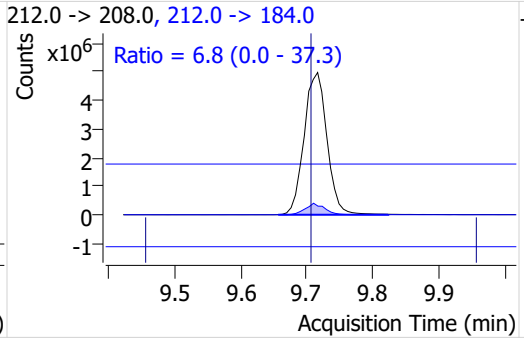
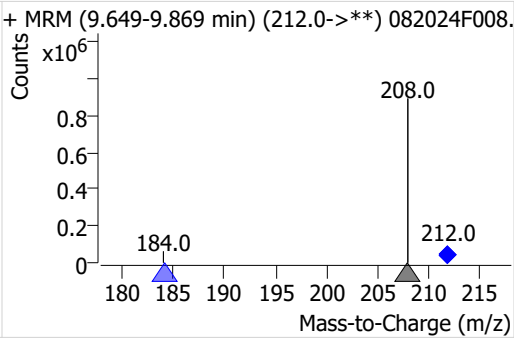
Pyrene-d10







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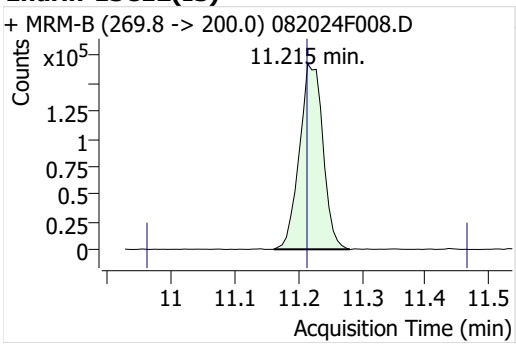

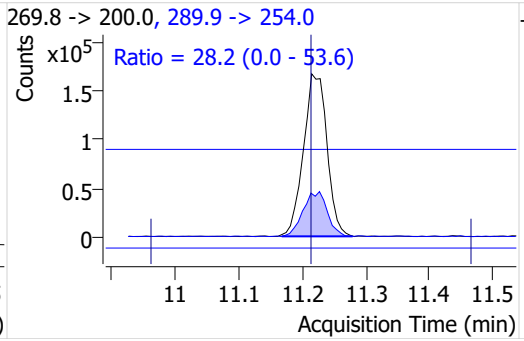

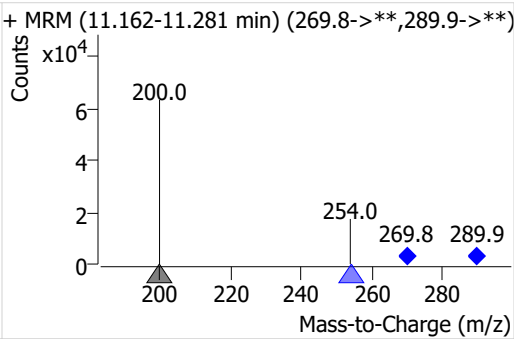

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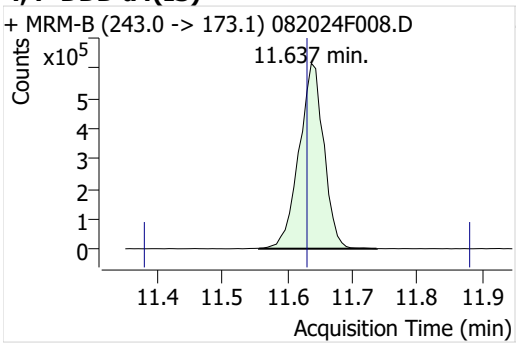

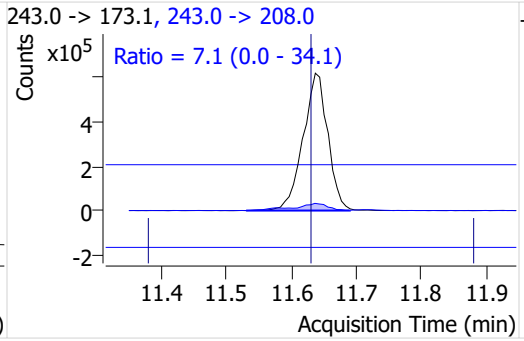

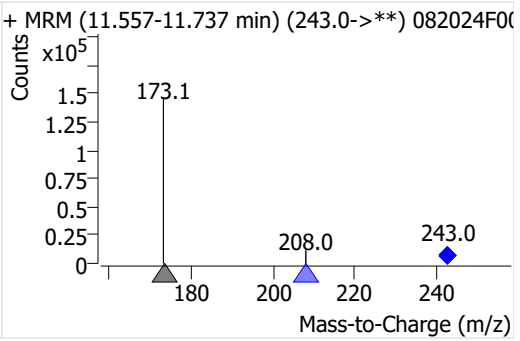

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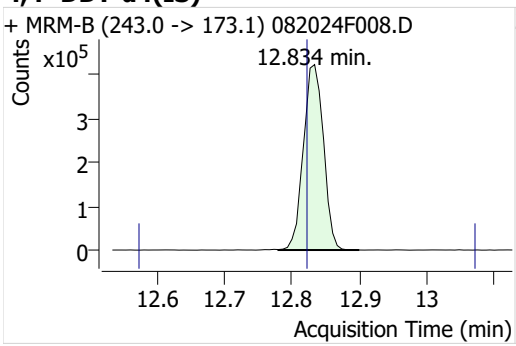

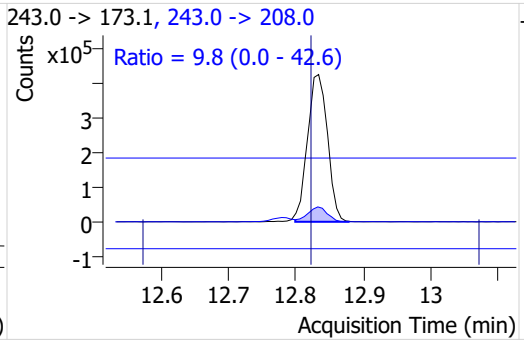

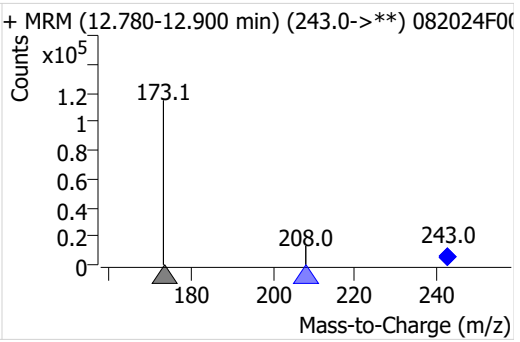

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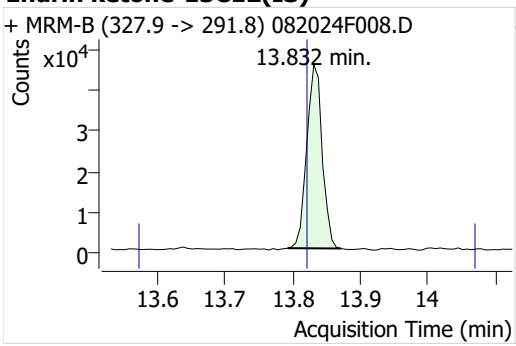
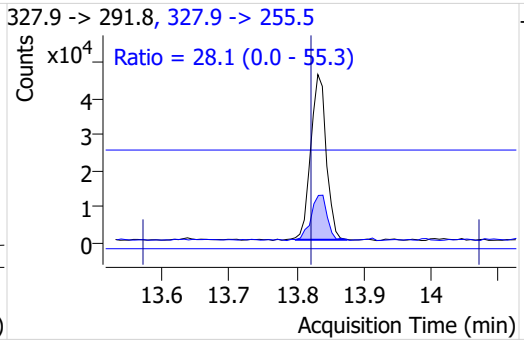
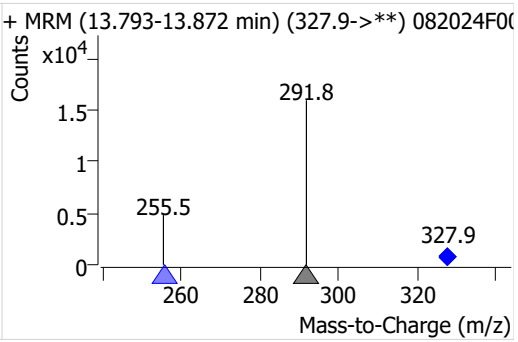
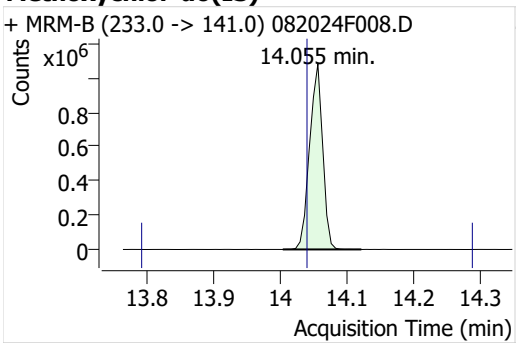
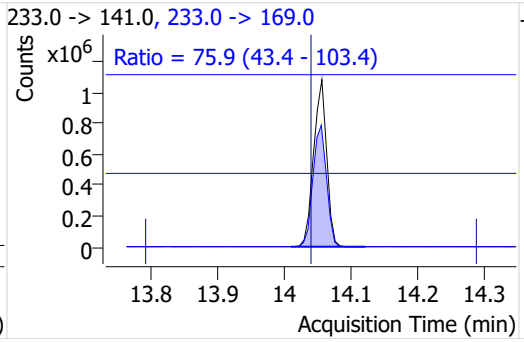


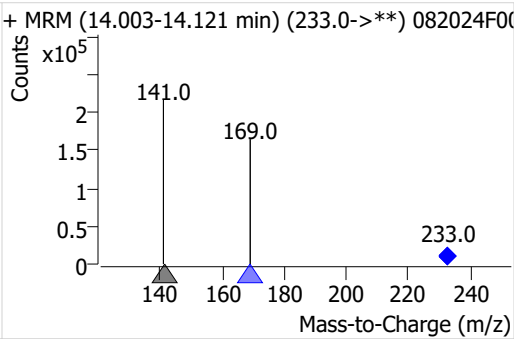




Methoxychlor-d6(IS)







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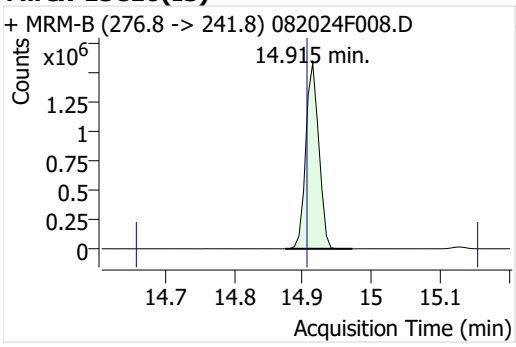

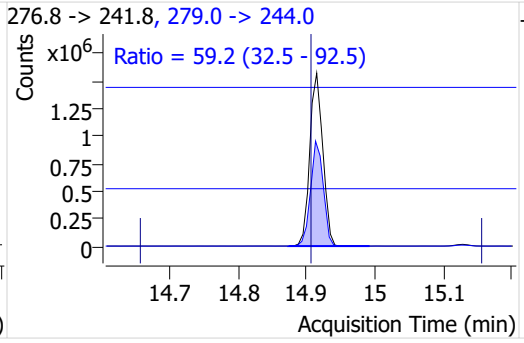

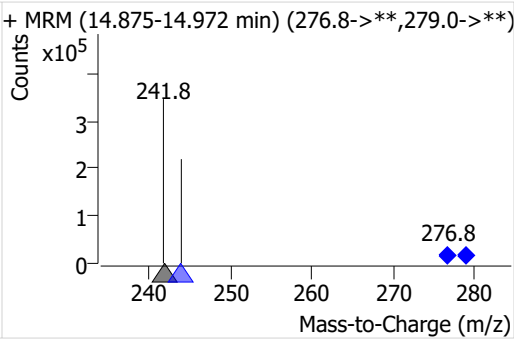

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Acq. Date-Time	8/20/2024 1:14:31 PM	**Acq Operator**	
Name	OC PEST ICAL 10ppb SVM71-99E	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	8/20/2024 3:33:05 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	080624 OC PEST ICAL.batch.bin	**Vial**	7
Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.711	289.8 -> 254.8	3999327	20.0000 ng/ml	0.003
gamma-BHC-d6(IS)	6.018	223.9 -> 187.0	4050093	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	7.235	276.8 -> 241.8	2856266	20.0000 ng/ml	0.002
Chorpyrifos-d10(IS)	7.656	199.9 -> 171.9	922681	20.0000 ng/ml	0.004
Aldrin-13C(IS)	7.956	269.8 -> 200.0	2304925	20.0000 ng/ml	0.001
Octachlorostyrene-13C8(IS)	8.538	315.8 -> 245.8	2617726	20.0000 ng/ml	0.006
Isodrin-13C12(IS)	8.613	199.9 -> 130.1	1840210	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	8.808	190.0 -> 125.0	1234379	20.0000 ng/ml	0.005
Heptachlor epoxide-13C10(IS)	8.811	362.8 -> 270.0	740721	20.0000 ng/ml	0.005
Pyrene-d10	9.709	212.0 -> 208.0	11525264	100.0000 ng/ml	0.004
Endrin-13C12(IS)	11.215	269.8 -> 200.0	396278	20.0000 ng/ml	0.004
4,4'-DDD d4(IS)	11.644	243.0 -> 173.1	1514762	5.0000 ng/ml	0.010
4,4'-DDT-d4(IS)	12.834	243.0 -> 173.1	791000	5.0000 ng/ml	0.011
Endrin ketone-13C12(IS)	13.832	327.9 -> 291.8	73907	20.0000 ng/ml	0.011
Methoxychlor-d6(IS)	14.049	233.0 -> 141.0	1402610	20.0000 ng/ml	0.009
Mirex-13C10(IS)	14.915	276.8 -> 241.8	2002545	5.0000 ng/ml	0.008

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**
Hexachlorobenzene-13C6	5.705	289.8 -> 254.8	3999327	19.658 ng/ml
		Spiked Amount = 20.0		Recovery = *98.3 %*
gamma-BHC-d6	6.014	223.9 -> 187.0	4050093	20.936 ng/ml
		Spiked Amount = 20.0		Recovery = *104.7 %*
Heptachlor-13C10	7.232	276.8 -> 241.8	2856266	21.144 ng/ml
		Spiked Amount = 20.0		Recovery = *105.7 %*
Chorpyrifos-d10	7.647	199.9 -> 171.9	922681	19.835 ng/ml
		Spiked Amount = 20.0		Recovery = *99.2 %*
Aldrin-13C	7.955	269.8 -> 200.0	2304765	20.565 ng/ml
		Spiked Amount = 20.0		Recovery = *102.8 %*
Octachlorostyrene-13C8	8.531	315.8 -> 245.8	2617726	20.478 ng/ml
		Spiked Amount = 20.0		Recovery = *102.4 %*
Isodrin-13C12	8.613	199.9 -> 130.1	1840210	21.111 ng/ml
		Spiked Amount = 20.0		Recovery = *105.6 %*
Oxychlordane-13C10	8.803	190.0 -> 125.0	1234379	20.706 ng/ml
		Spiked Amount = 20.0		Recovery = *103.5 %*
Heptachlor epoxide-13C10	8.805	362.8 -> 270.0	740721	21.019 ng/ml
		Spiked Amount = 20.0		Recovery = *105.1 %*
Endrin-13C12	11.214	269.8 -> 200.0	396278	20.297 ng/ml
		Spiked Amount = 20.0		Recovery = *101.5 %*
4,4'-DDD d4	11.630	243.0 -> 173.1	1514762	4.885 ng/ml
		Spiked Amount = 5.0		Recovery = *97.7 %*
4,4'-DDT-d4	12.822	243.0 -> 173.1	791000	4.917 ng/ml
		Spiked Amount = 5.0		Recovery = *98.3 %*
Endrin ketone-13C12	13.821	327.9 -> 291.8	73907	21.244 ng/ml
		Spiked Amount = 20.0		Recovery = *106.2 %*
Methoxychlor-d6	14.039	233.0 -> 141.0	1402610	20.319 ng/ml
		Spiked Amount = 20.0		Recovery = *101.6 %*

MassHunter Quantitative Analysis Sample Report

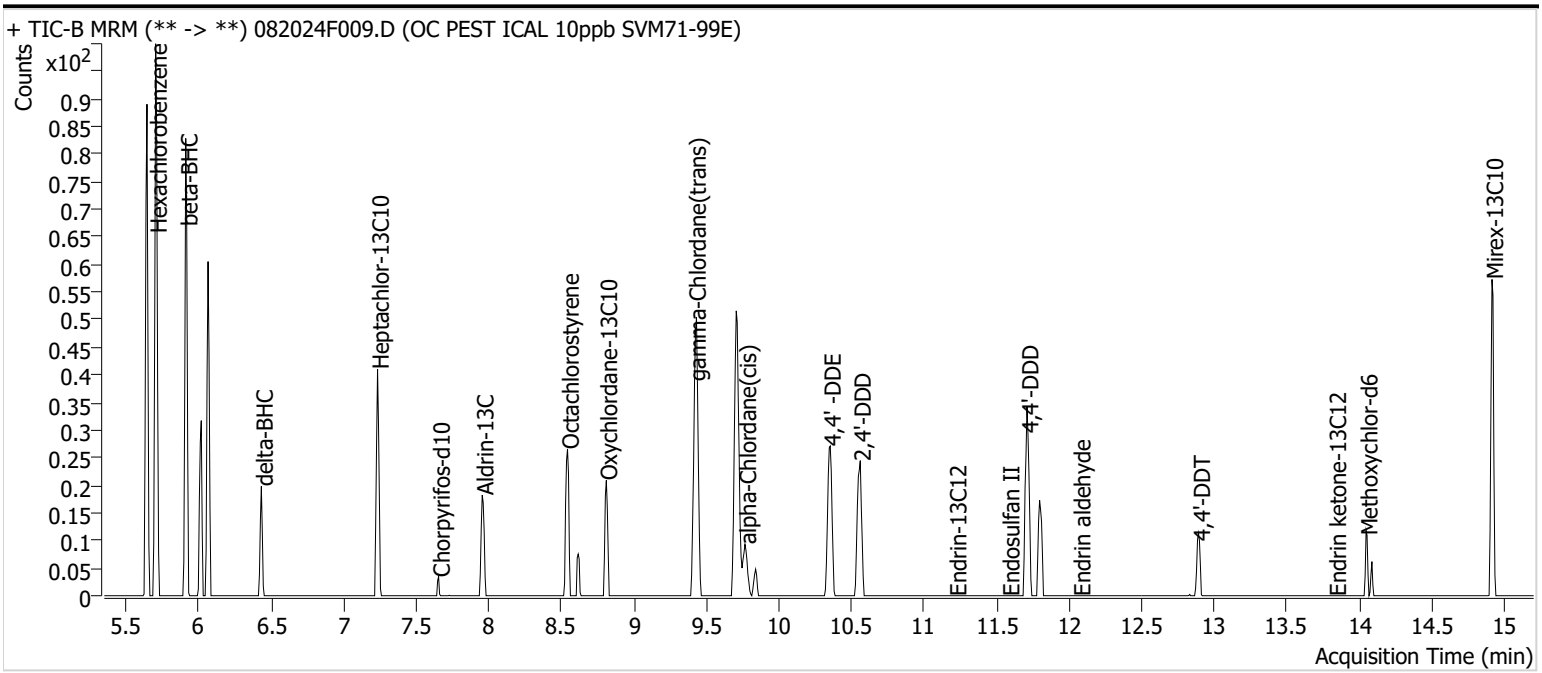
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.906	276.8 -> 241.8	2002545	4.957 ng/ml
		Spiked Amount = 5.0		Recovery = *99.1 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)	5.649	181.1 -> 145.1	6877564	10.123 ng/ml	95
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.706	283.8 -> 213.9	3806932	10.956 ng/ml	100
beta-BHC	gamma-BHC-d6(IS)	5.916	181.1 -> 145.1	6438110	10.153 ng/ml	98
gamma-BHC(Lindane)	gamma-BHC-d6(IS)	6.070	181.1 -> 145.1	5514509	10.559 ng/ml	99
delta-BHC	gamma-BHC-d6(IS)	6.436	181.1 -> 145.1	1886068	10.101 ng/ml	80
Heptachlor	Heptachlor-13C10(IS)	7.238	271.7 -> 236.9	1585650	10.835 ng/ml	99
Chorpyrifos	Chorpyrifos-d10(IS)	7.733	196.9 -> 169.0	606116	10.362 ng/ml	87
Aldrin	Aldrin-13C(IS)	7.958	254.9 -> 220.0	1023189	9.934 ng/ml	83
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.545	342.8 -> 307.8	2764059	10.417 ng/ml	99
Isodrin	Isodrin-13C12(IS)	8.627	193.0 -> 123.0	1044199	10.323 ng/ml	97
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	8.825	352.8 -> 262.9	405002	9.795 ng/ml	98
Oxychlordane	Oxychlordane-13C10(IS)	8.816	114.9 -> 51.1	1591367	10.476 ng/ml	98
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.419	271.8 -> 236.9	911060	10.381 ng/ml	91
2,4'-DDE	4,4'-DDD d4(IS)	9.434	246.0 -> 176.2	6044927	11.132 ng/ml	94
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.767	271.8 -> 236.9	2306447	10.464 ng/ml	99
Endosulfan I	Endrin-13C12(IS)	9.790	206.9 -> 172.0	310265	9.669 ng/ml	99
trans-Nanochlor	Oxychlordane-13C10(IS)	9.841	271.8 -> 236.9	773114	10.116 ng/ml	95
4,4' -DDE	4,4'-DDD d4(IS)	10.349	246.0 -> 176.2	4110127	10.166 ng/ml	95
2,4'-DDD	4,4'-DDD d4(IS)	10.558	235.0 -> 165.1	3929348	10.333 ng/ml	95
Dieldrin	Endrin-13C12(IS)	10.574	262.9 -> 193.0	413338	9.988 ng/ml	88
Endrin	Endrin-13C12(IS)	11.236	262.8 -> 193.0	228972	9.874 ng/ml	99
Endosulfan II	Endrin-13C12(IS)	11.580	206.9 -> 172.0	173715	11.018 ng/ml	98
4,4'-DDD	4,4'-DDD d4(IS)	11.713	235.0 -> 165.1	3185670	10.422 ng/ml	97
cis-Nonachlor	Oxychlordane-13C10(IS)	11.723	271.8 -> 236.9	579419	10.413 ng/ml	97
2,4'-DDT	4,4'-DDT-d4(IS)	11.800	235.0 -> 165.1	2448840	11.214 ng/ml	99
Endrin aldehyde	Endrin-13C12(IS)	12.071	249.9 -> 214.9	82869	9.637 ng/ml	89
Endosulfan sulfate	Endrin-13C12(IS)	12.785	271.9 -> 237.0	493693	10.166 ng/ml	99
4,4'-DDT	4,4'-DDT-d4(IS)	12.896	235.0 -> 165.1	1837161	9.976 ng/ml	98
Endrin ketone	Endrin ketone-13C12(IS)	13.837	147.0 -> 111.0	149266	9.191 ng/ml	94
Methoxychlor	Methoxychlor-d6(IS)	14.090	227.0 -> 141.1	770034	10.265 ng/ml	96
Mirex	Mirex-13C10(IS)	14.923	271.8 -> 236.8	4253313	10.519 ng/ml	97

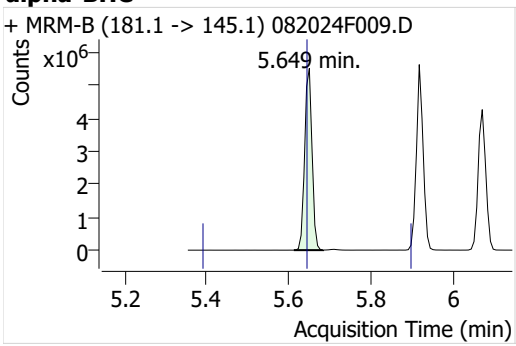
(m) = manual integration ND = Not Detected NC = Not Calculated

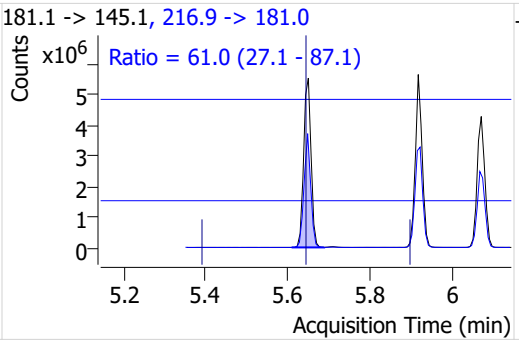
Sample Chromatogram

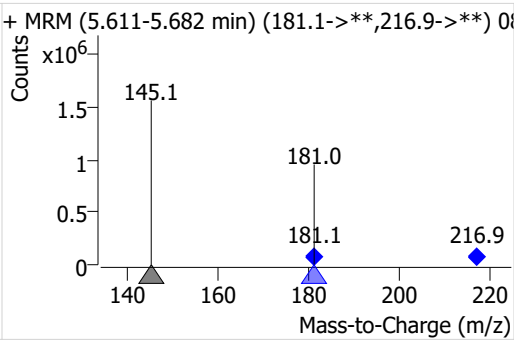
MassHunter Quantitative Analysis Sample Report



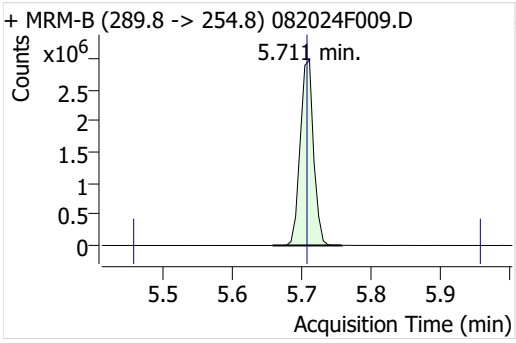
alpha-BHC

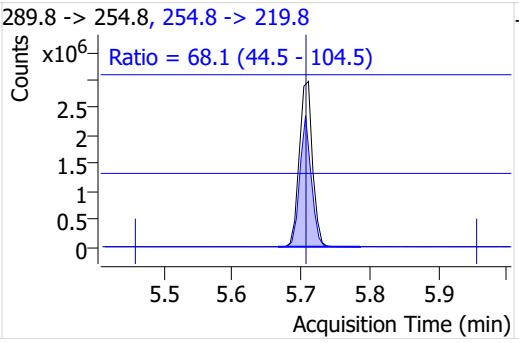


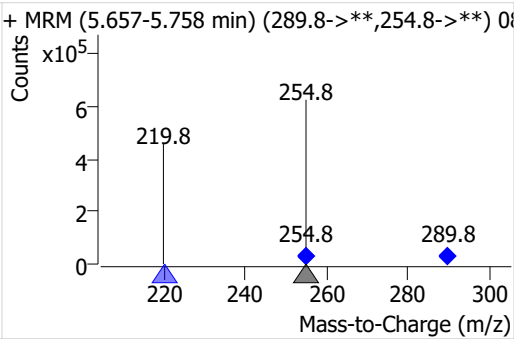




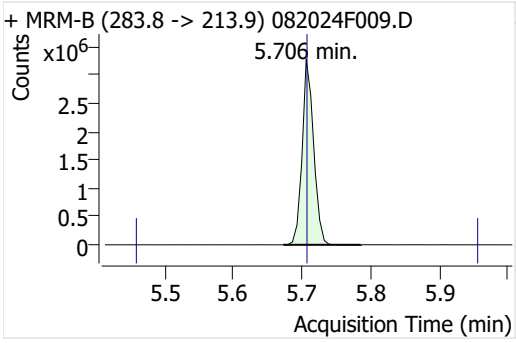
Hexachlorobenzene-13C6

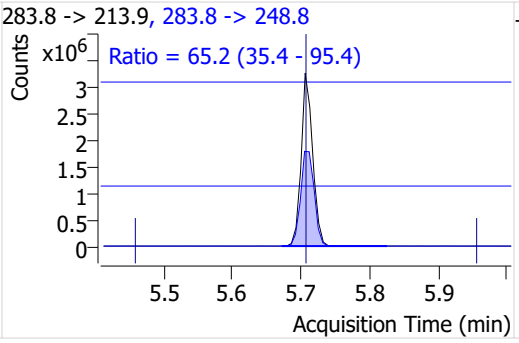


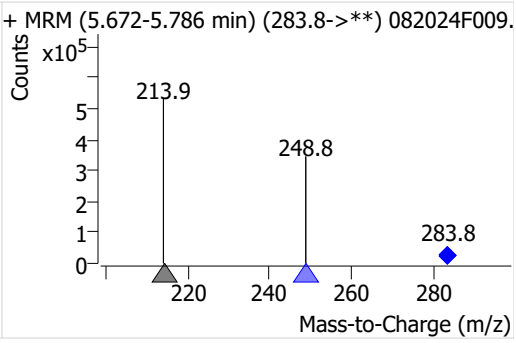




Hexachlorobenzene

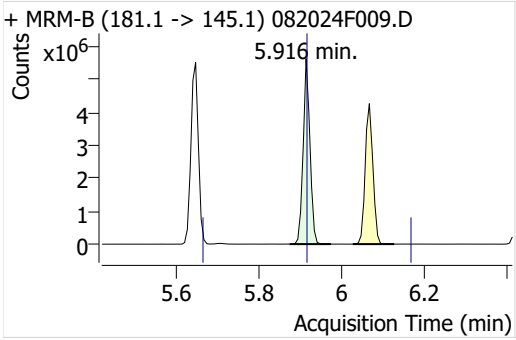


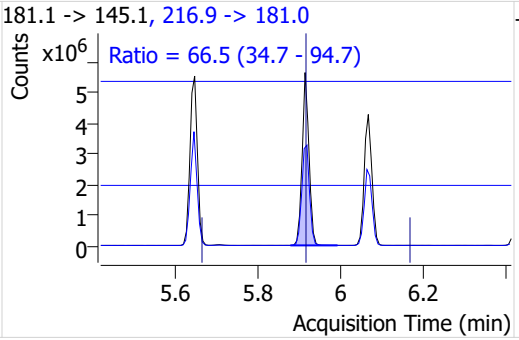


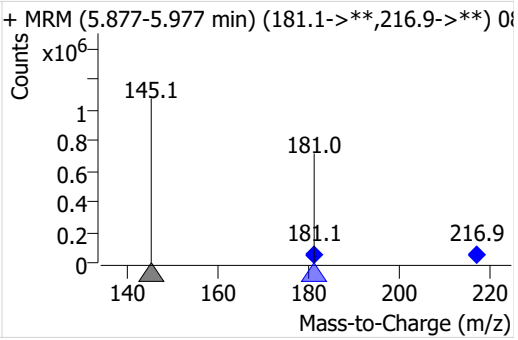


MassHunter Quantitative Analysis Sample Report

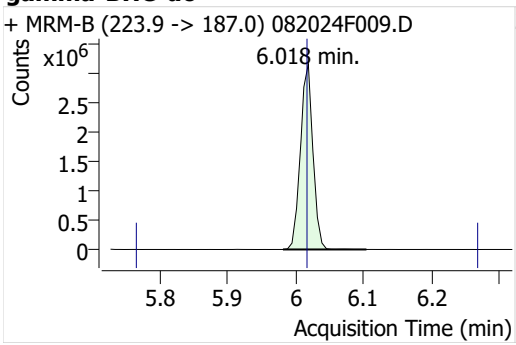
beta-BHC

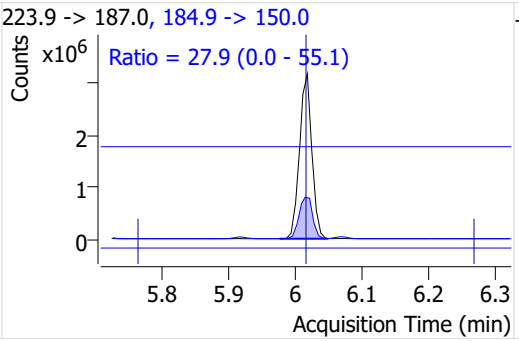


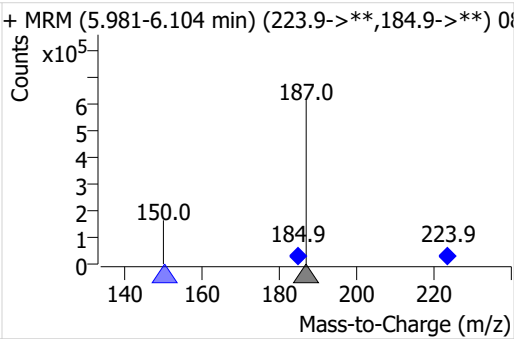




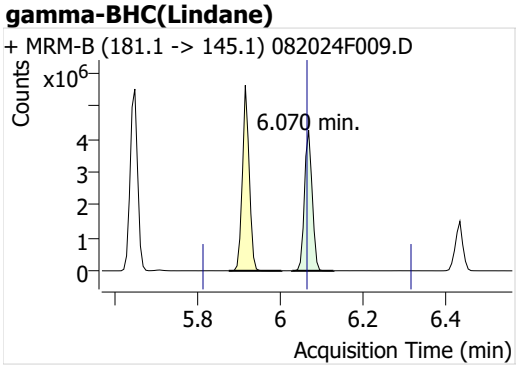
gamma-BHC-d6

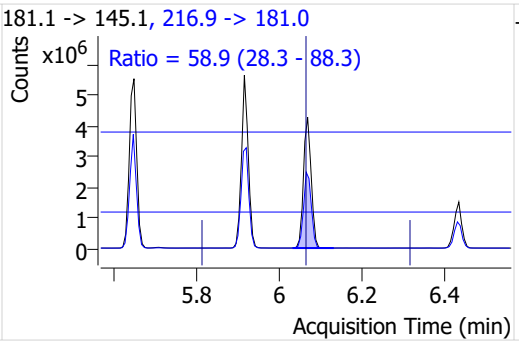


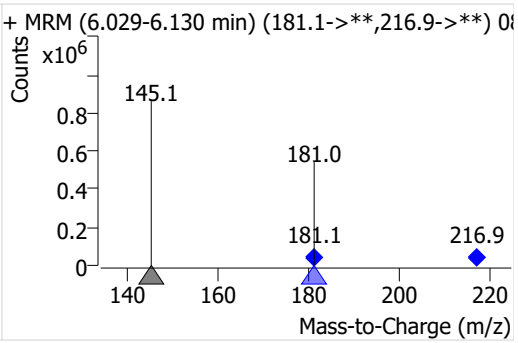




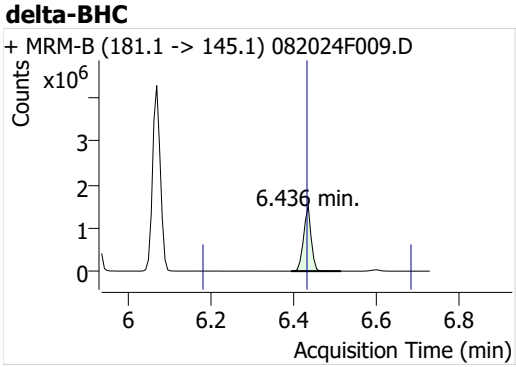
gamma-BHC(Lindane)

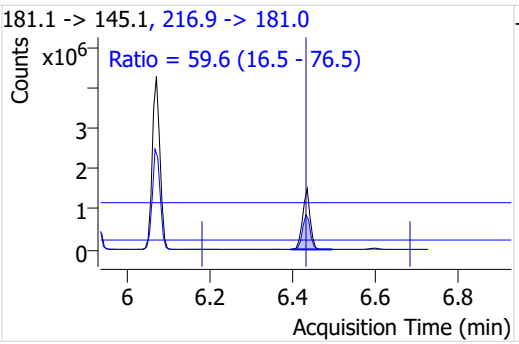


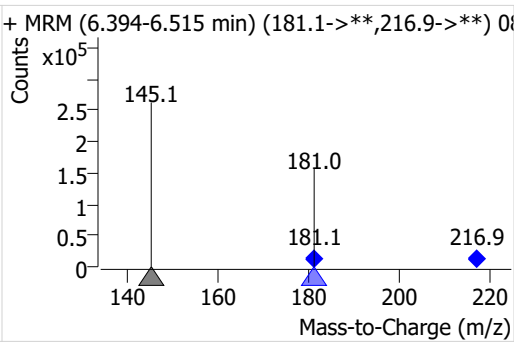




delta-BHC

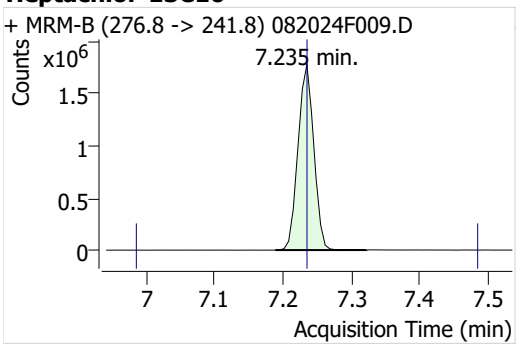


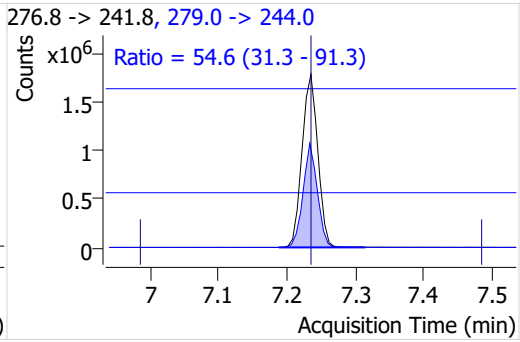


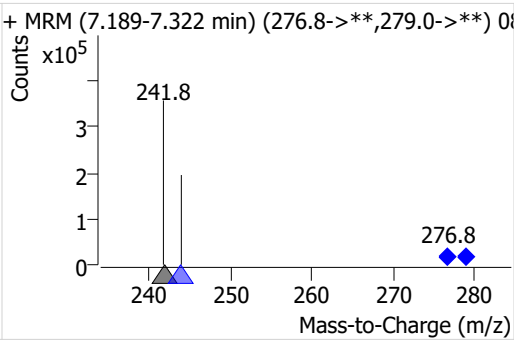


MassHunter Quantitative Analysis Sample Report

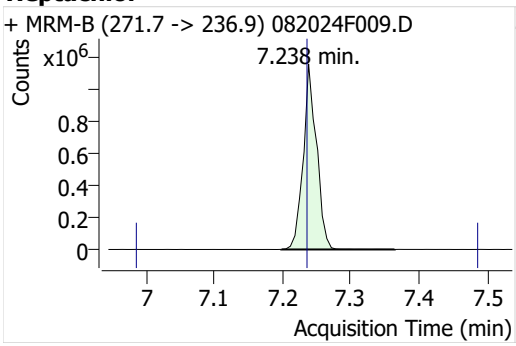
Heptachlor-13C10

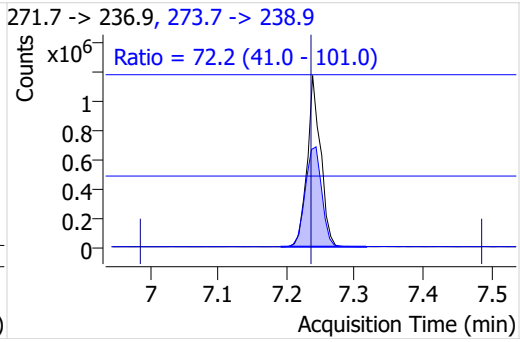


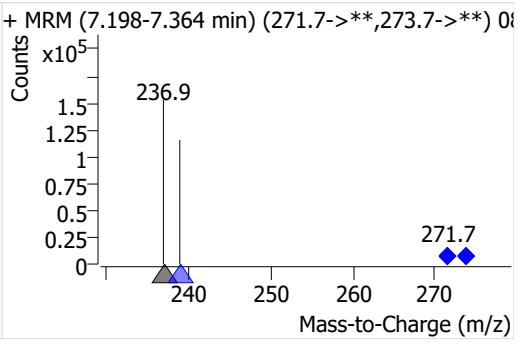




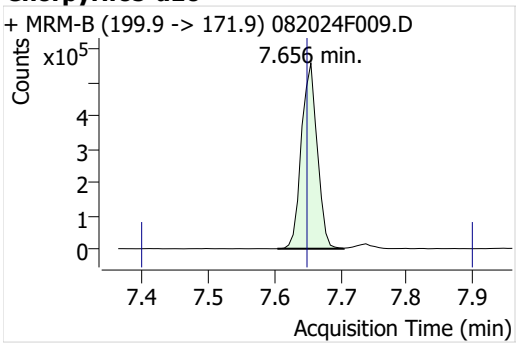
Heptachlor

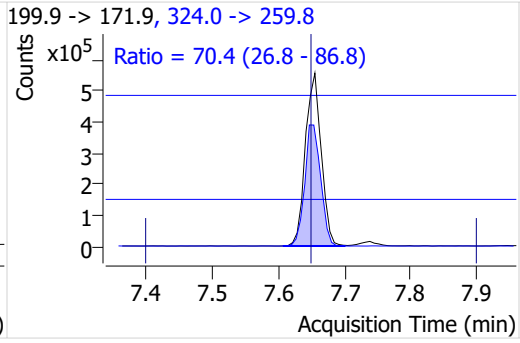


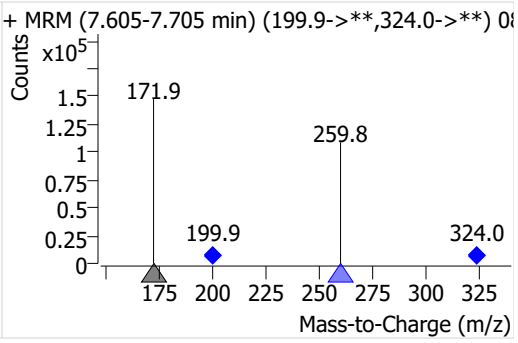




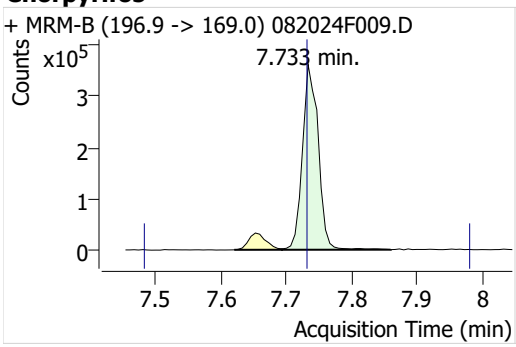
Chorpyrifos-d10

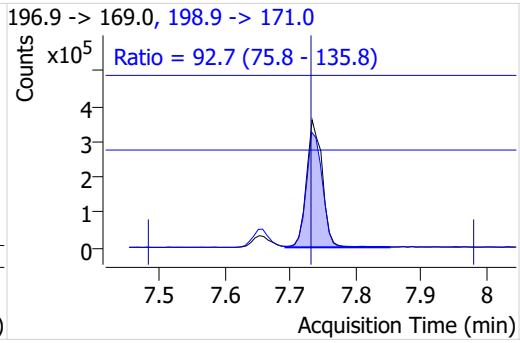


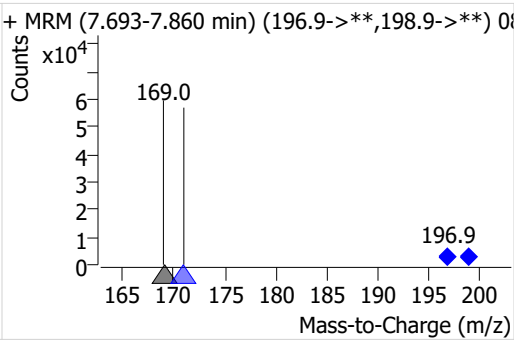




Chorpyrifos

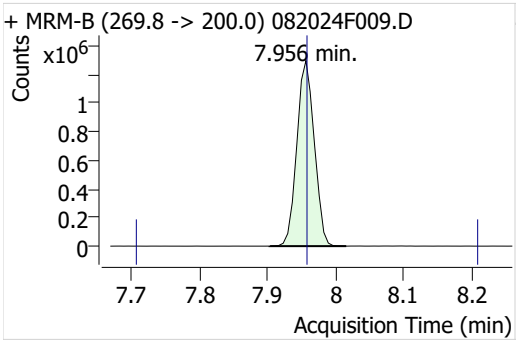


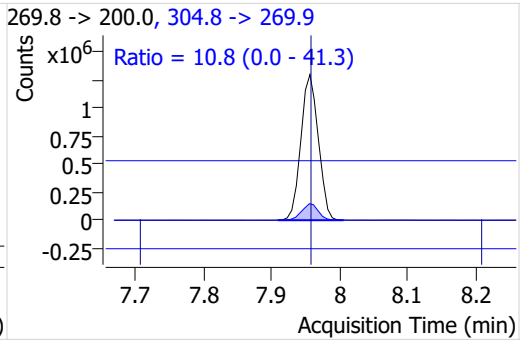


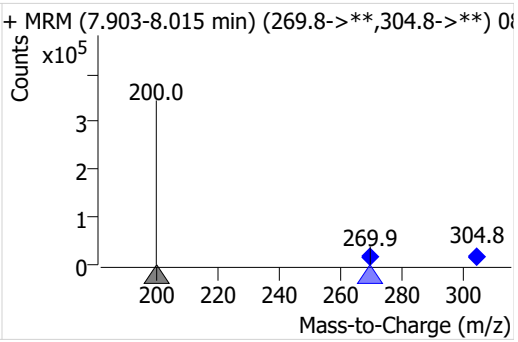


MassHunter Quantitative Analysis Sample Report

Aldrin-13C







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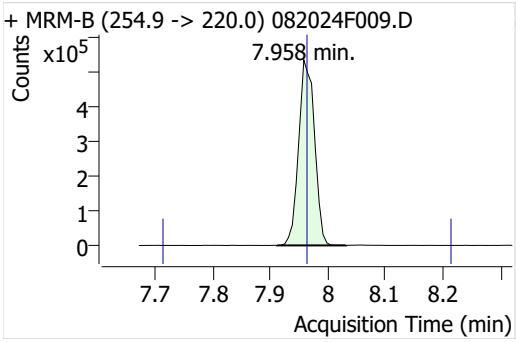
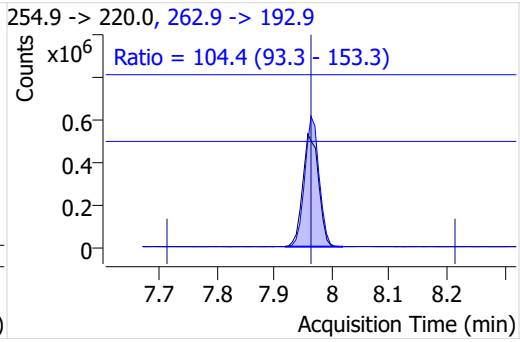
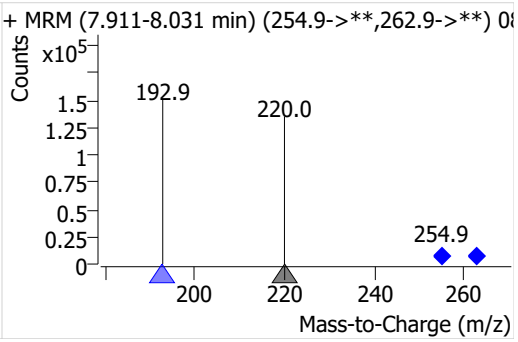
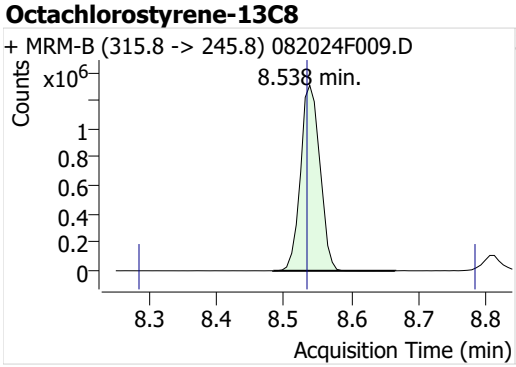
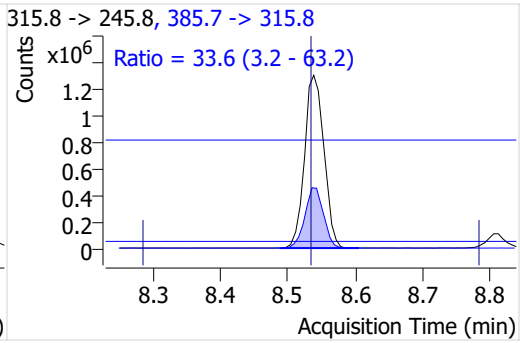


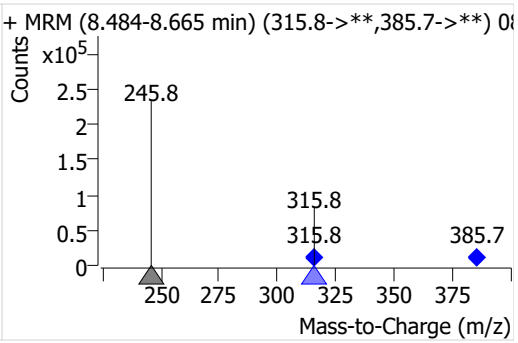




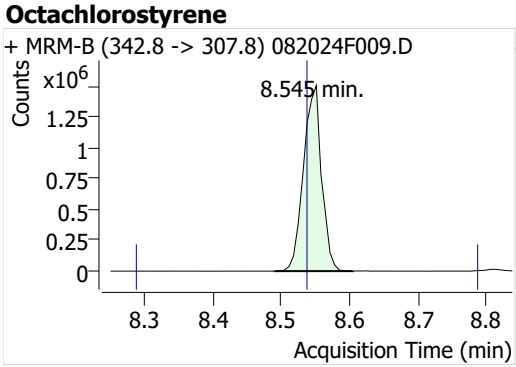
Octachlorostyrene-13C8

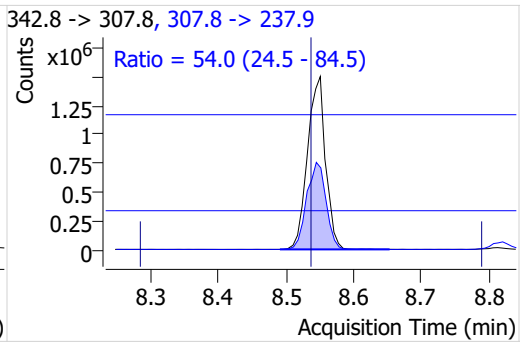


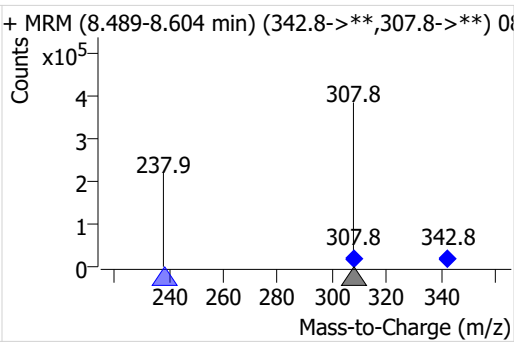




Octachlorostyrene







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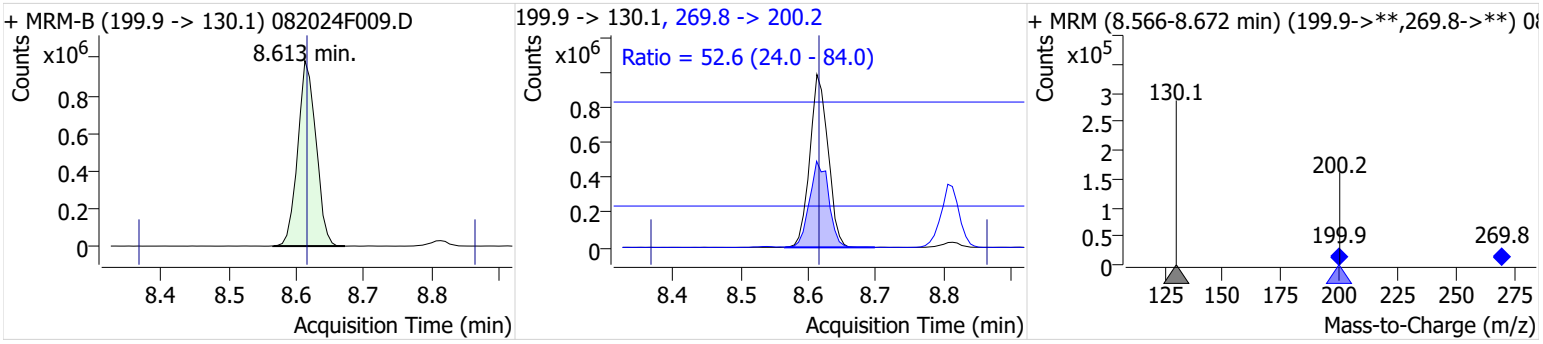
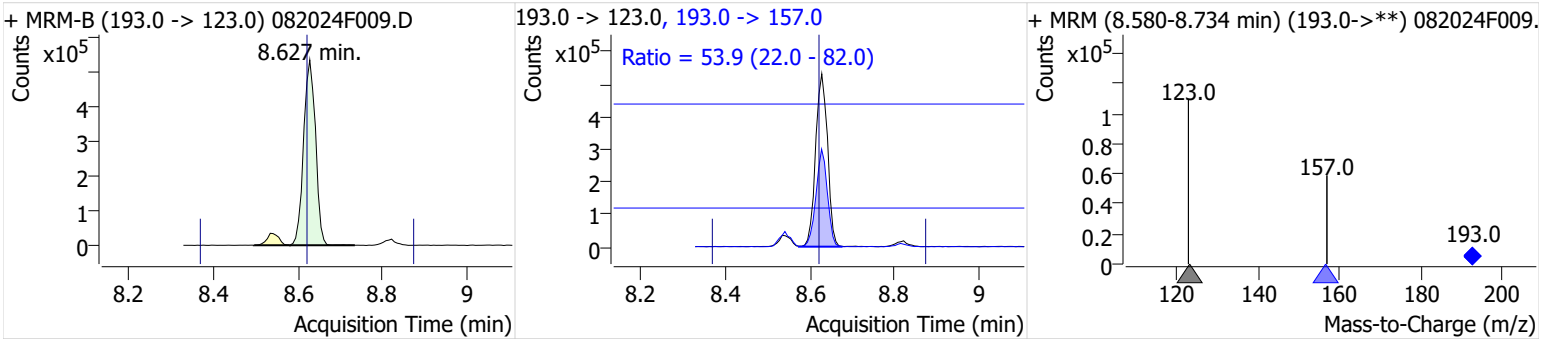
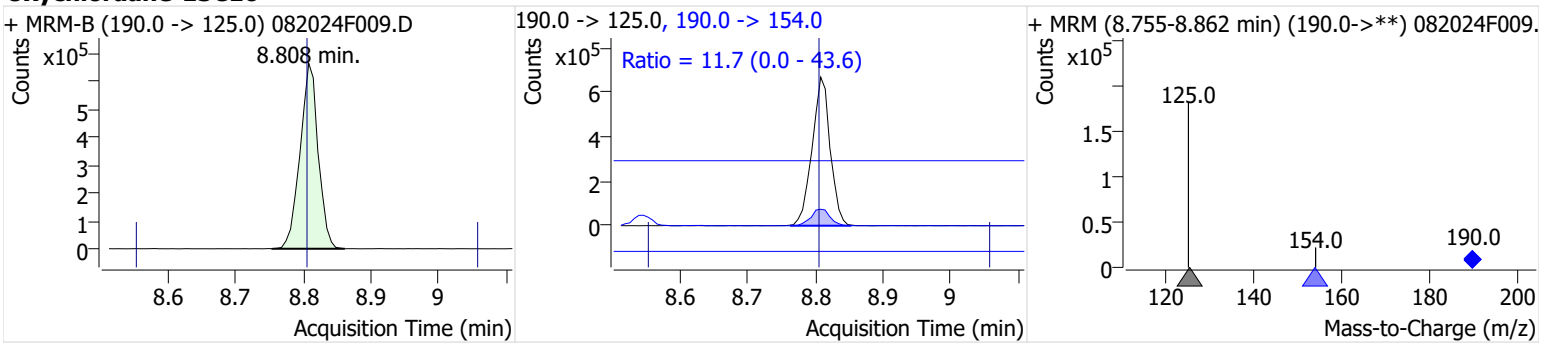
Isodrin-13C12



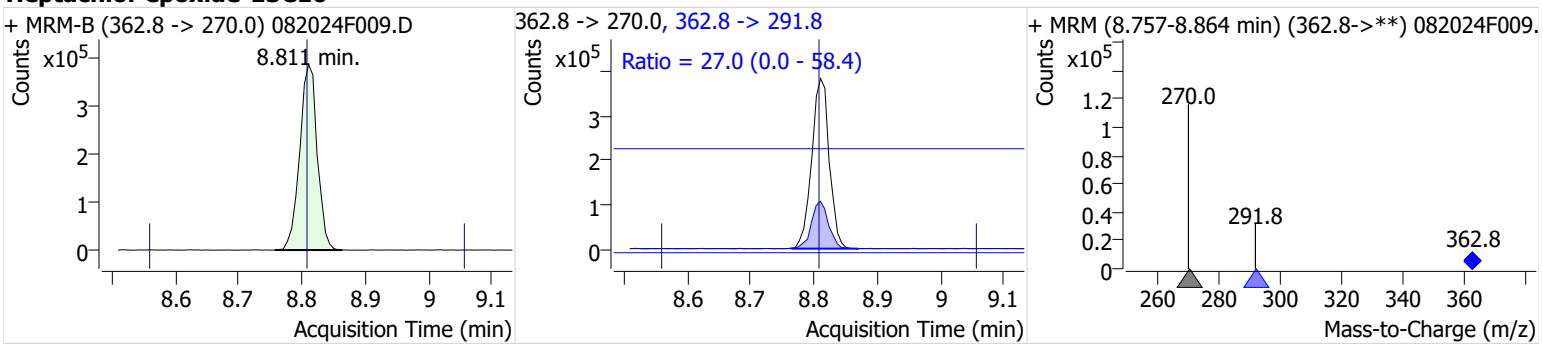
Isodrin



Oxychlordane-13C10



Heptachlor epoxide-13C10



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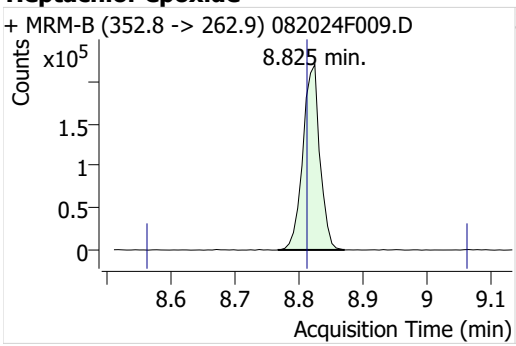
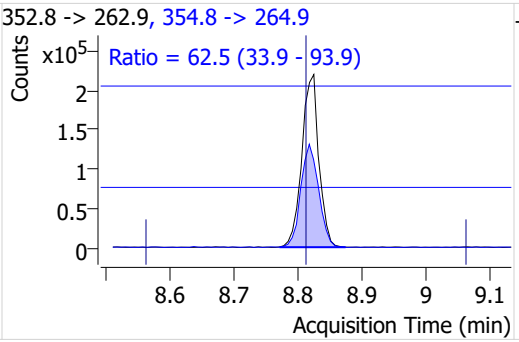
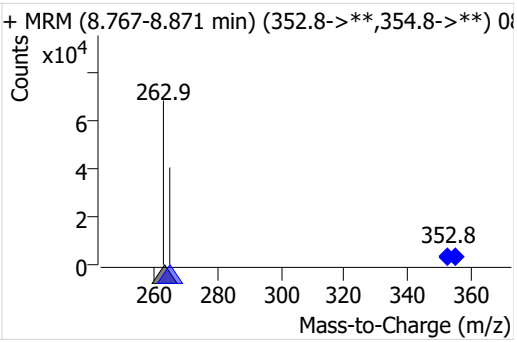
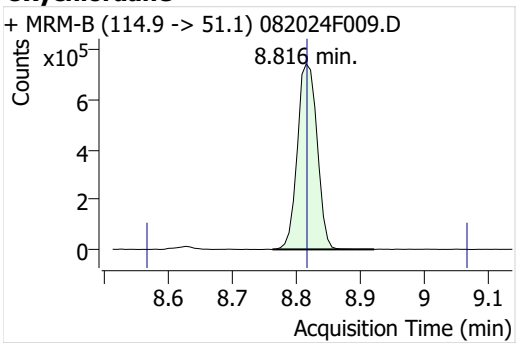
Heptachlor epoxide

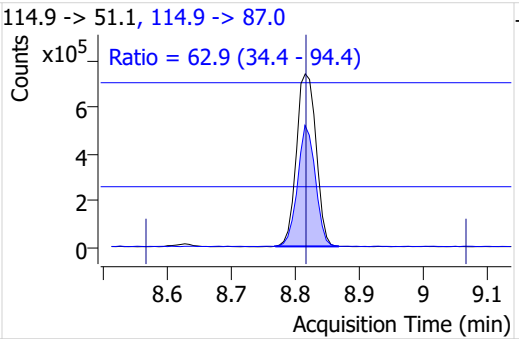


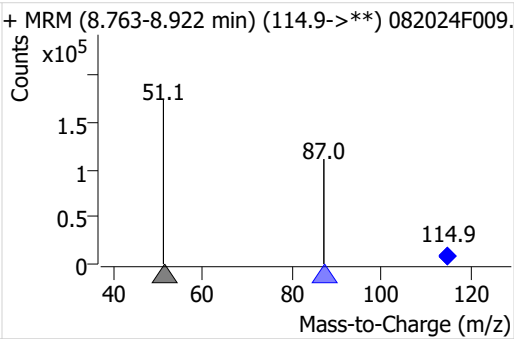




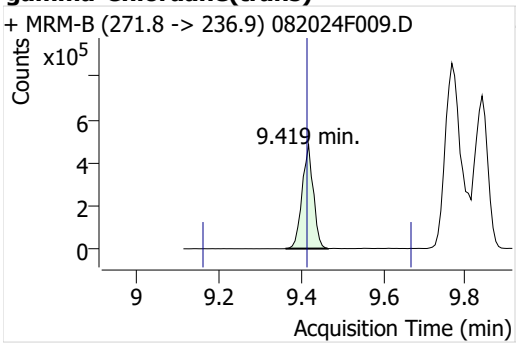
Oxychlordane

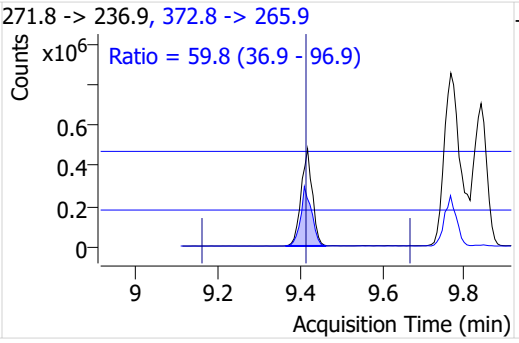


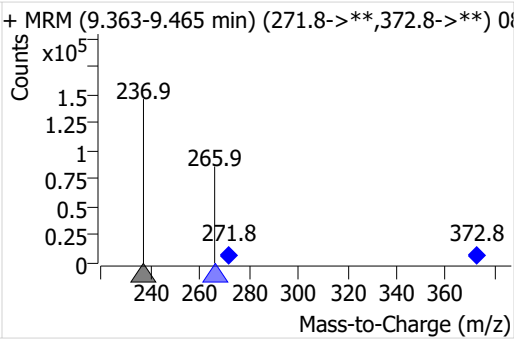




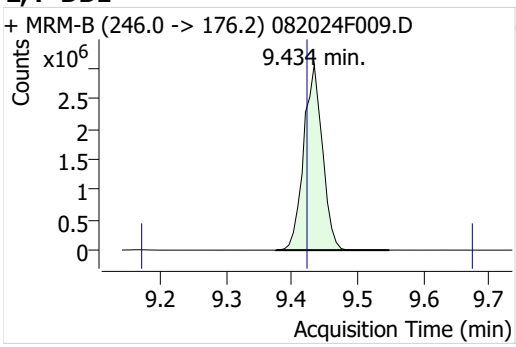
gamma-Chlordane(trans)

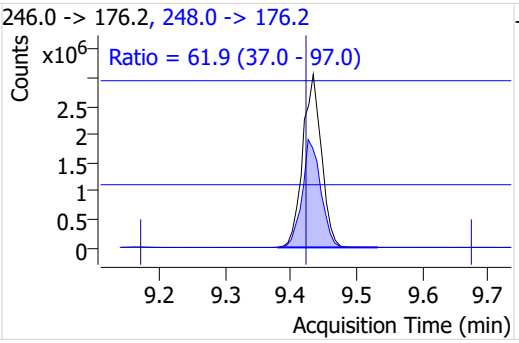


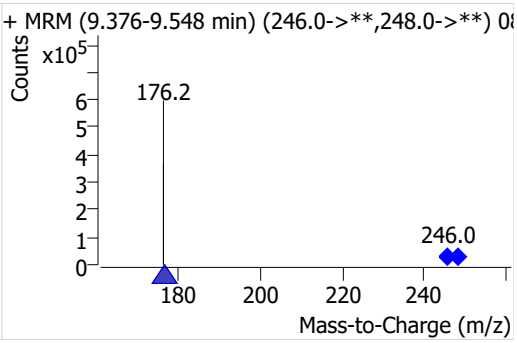




2,4'-DDE







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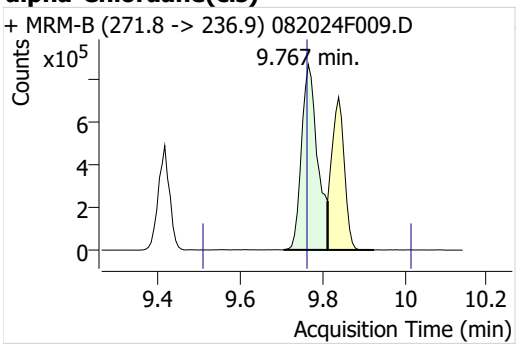
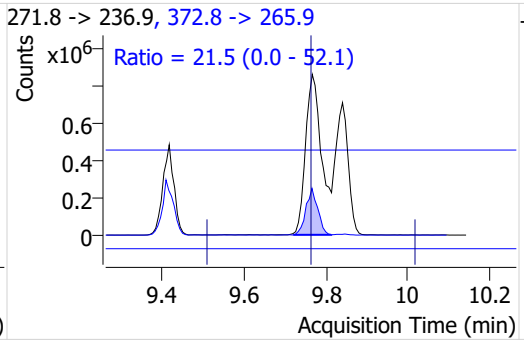
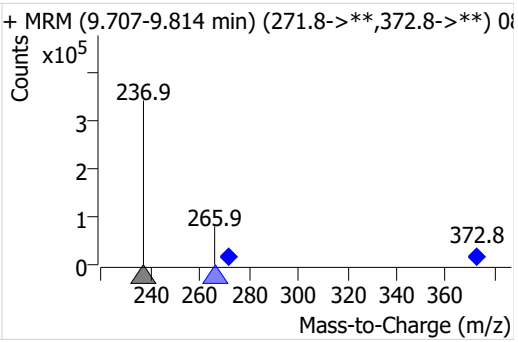
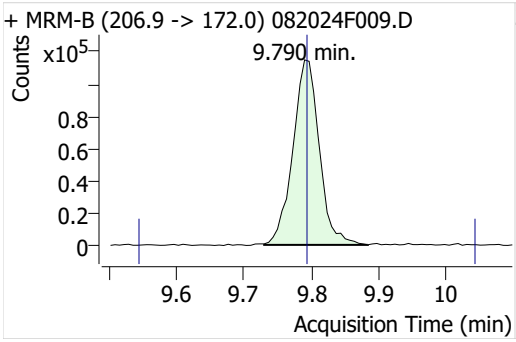
alpha-Chlordane(cis)

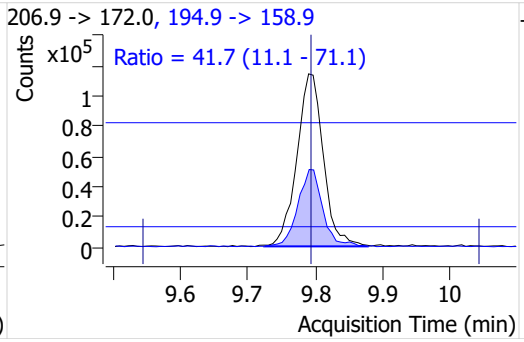


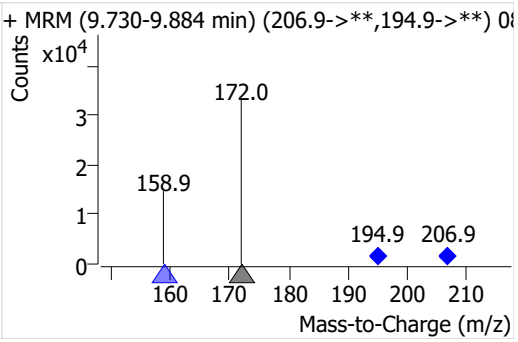




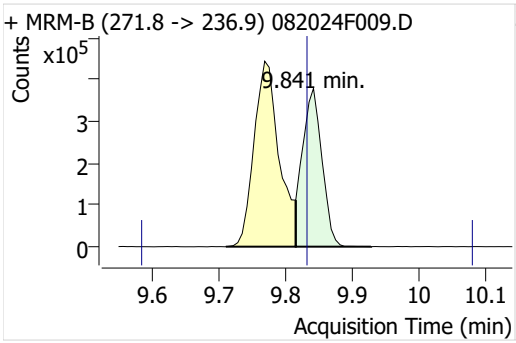
Endosulfan I

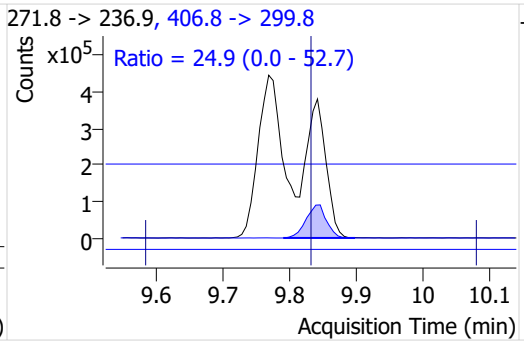


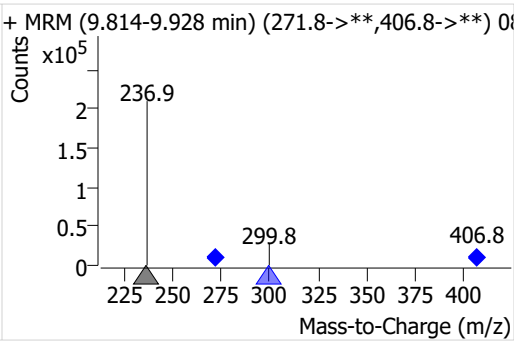




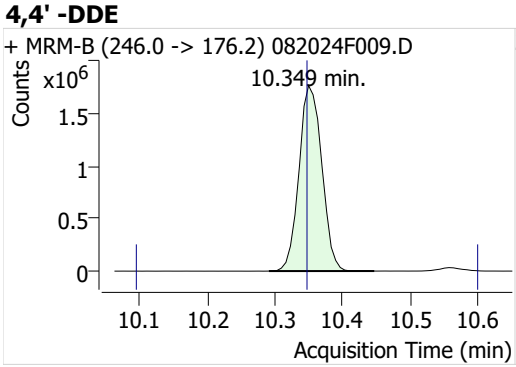
trans-Nanochlor

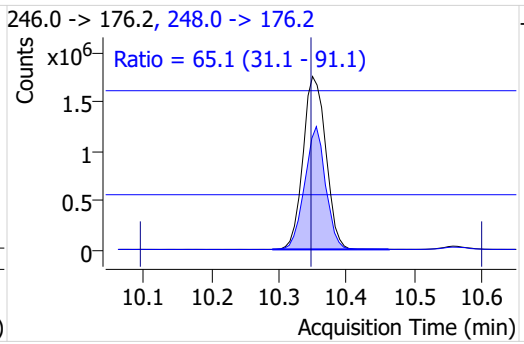


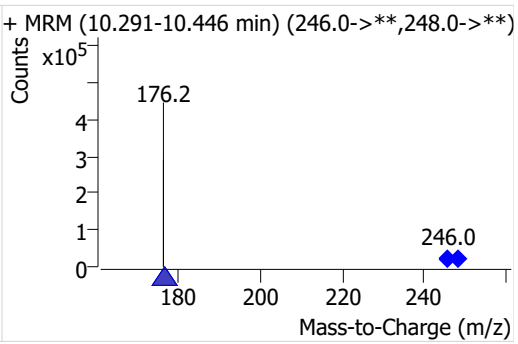




4,4' -DDE







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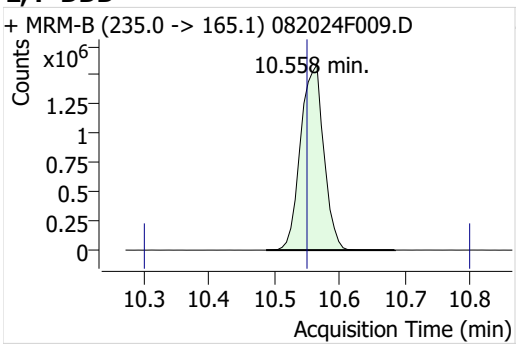
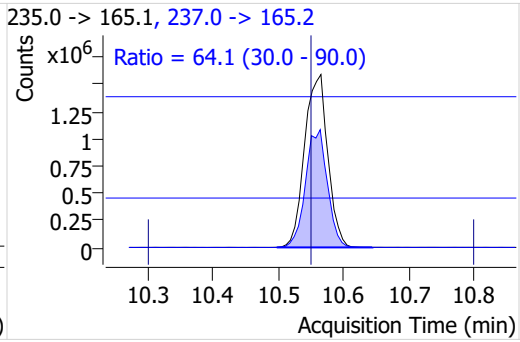
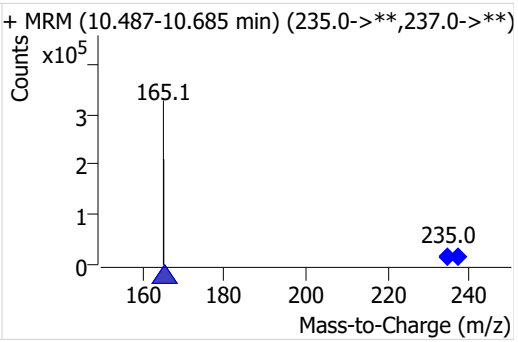
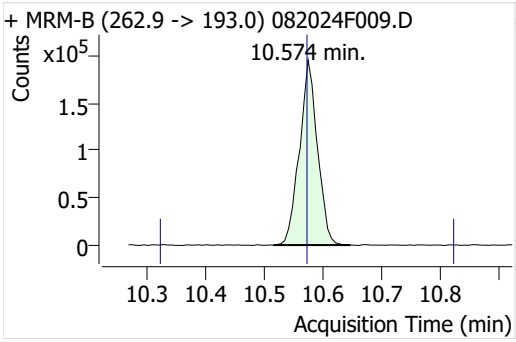
2,4'-DDD

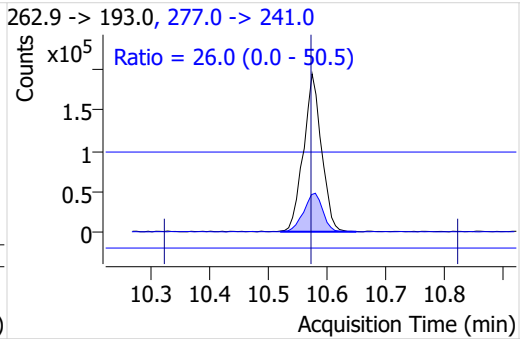


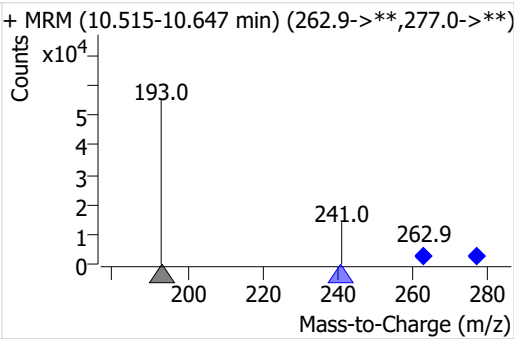




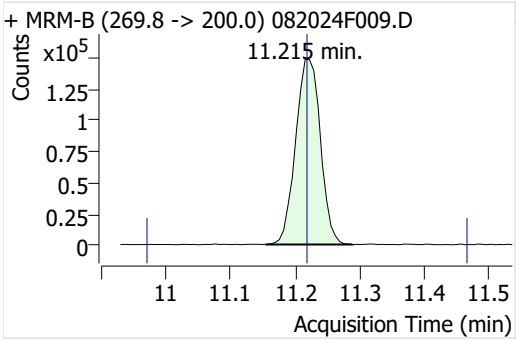
Dieldrin

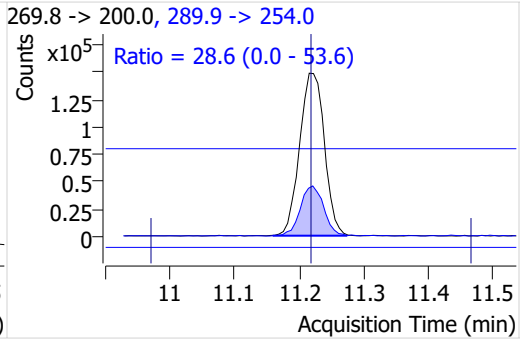


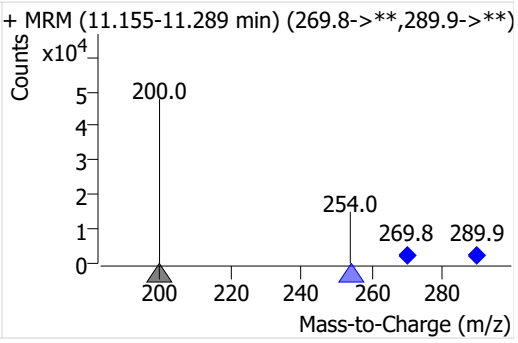




Endrin-13C12







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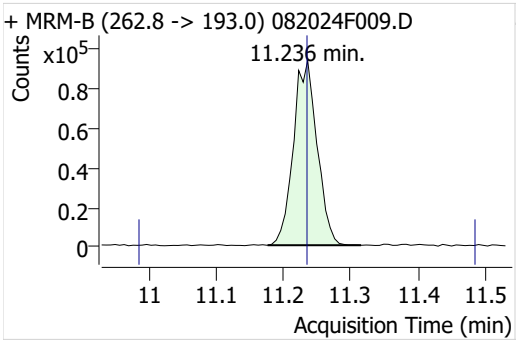

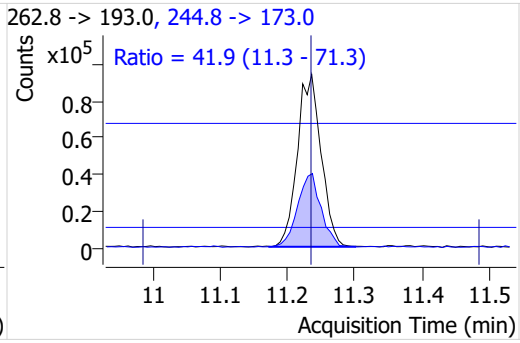

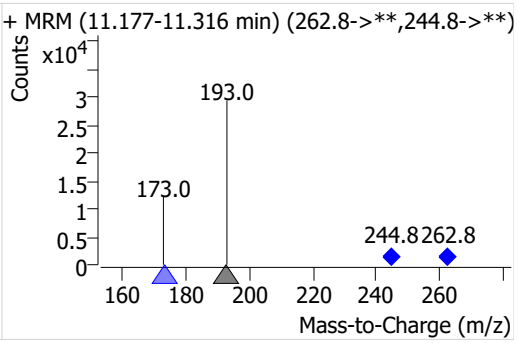

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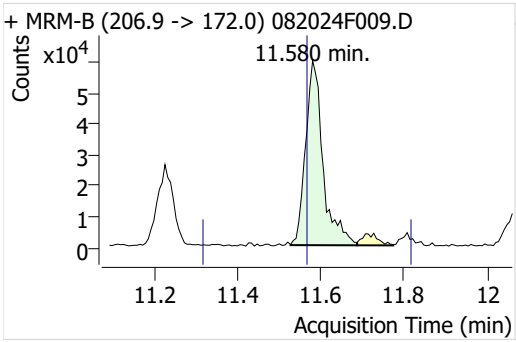
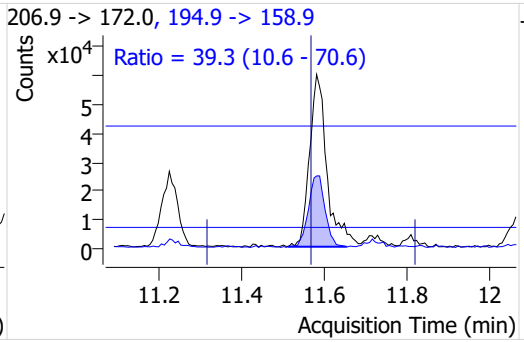
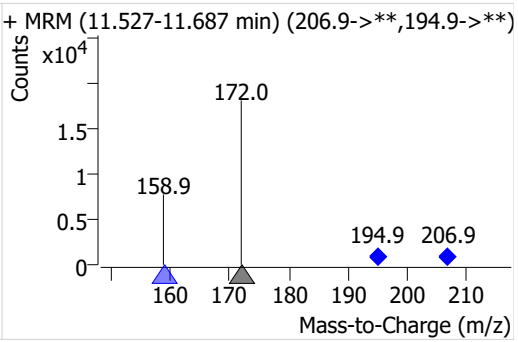
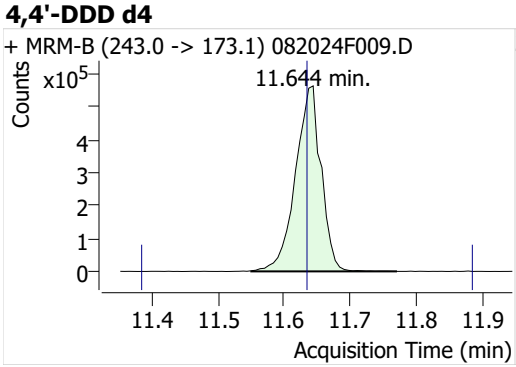
Endosulfan II

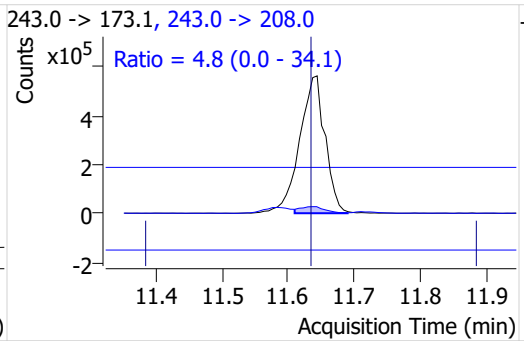


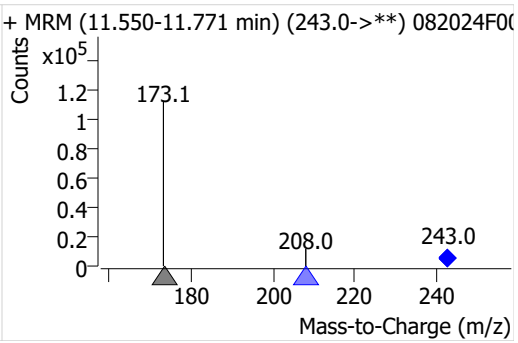




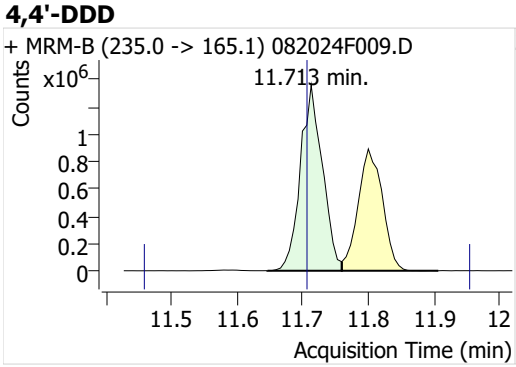
4,4'-DDD d4

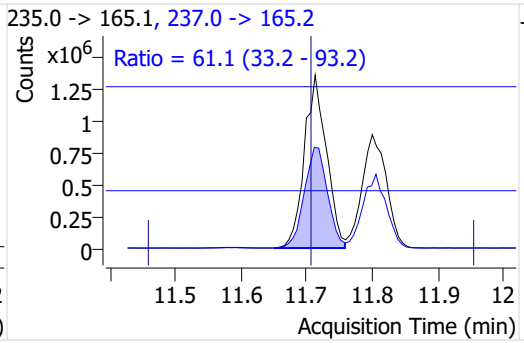


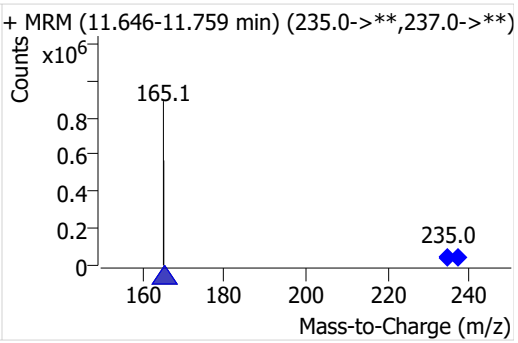




4,4'-DDD







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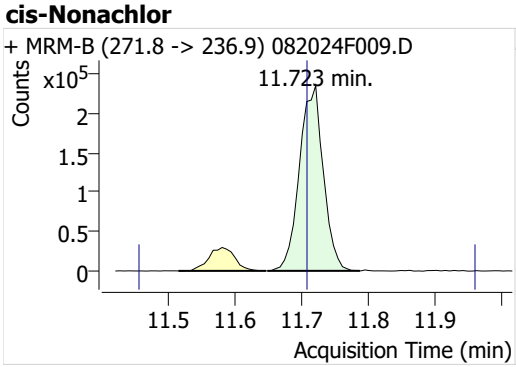

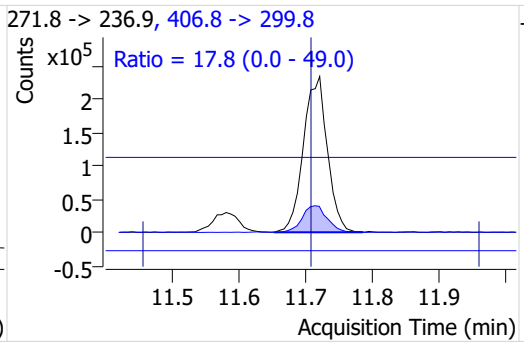

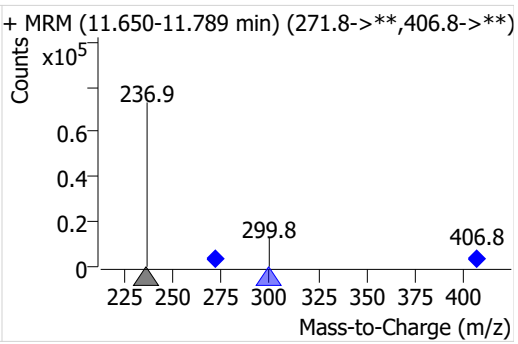

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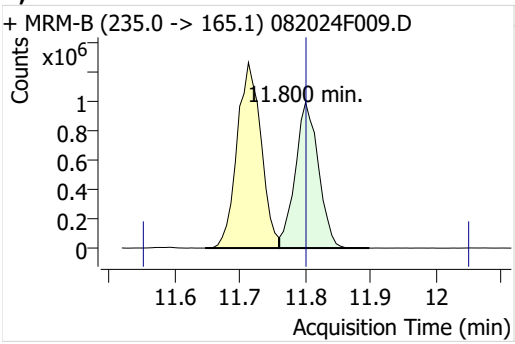
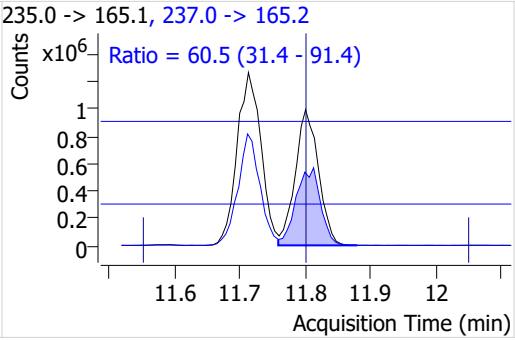
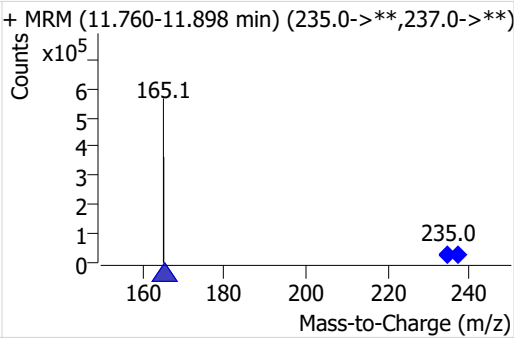
2,4'-DDT







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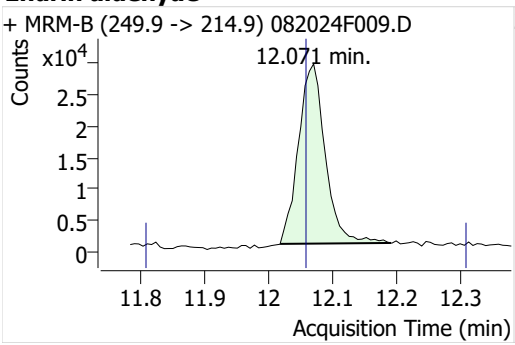

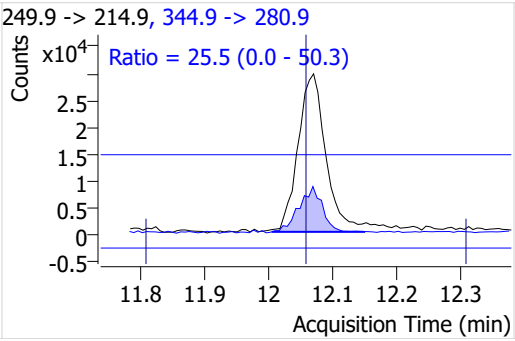

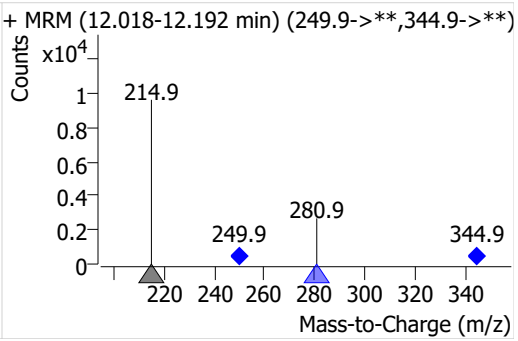

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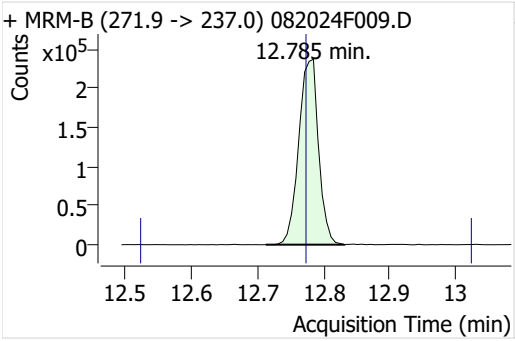

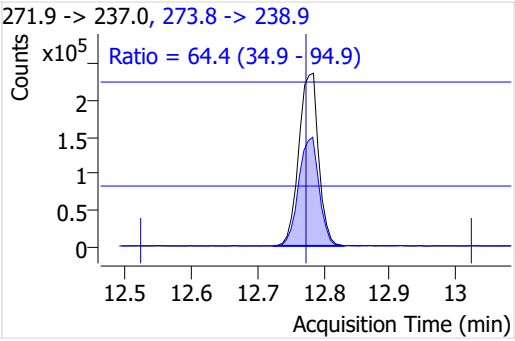

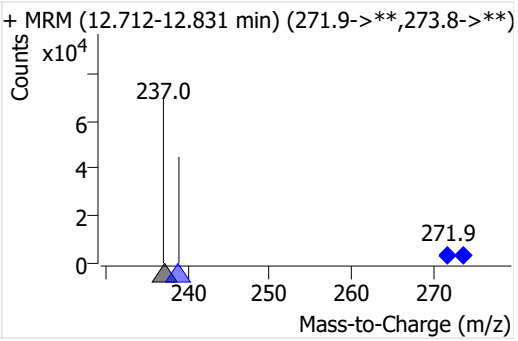

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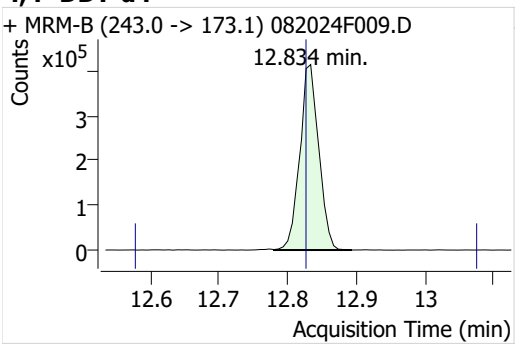

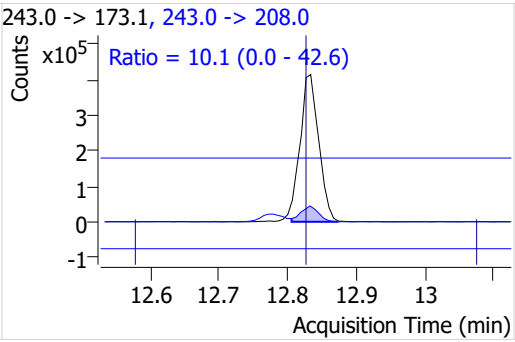

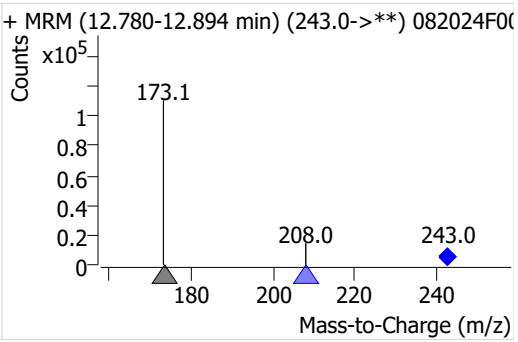

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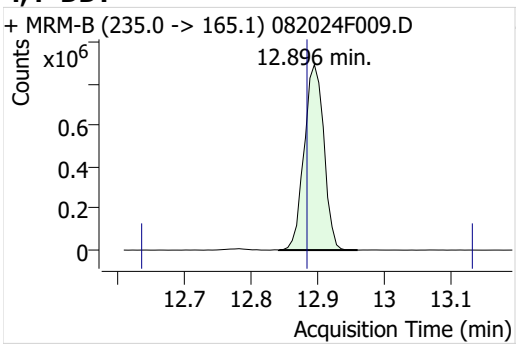
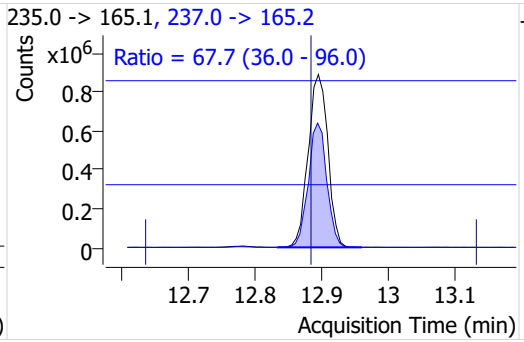
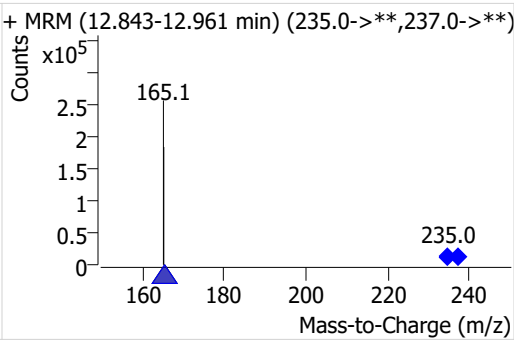
4,4'-DDT







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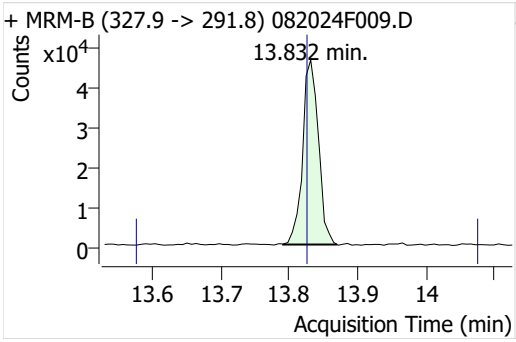

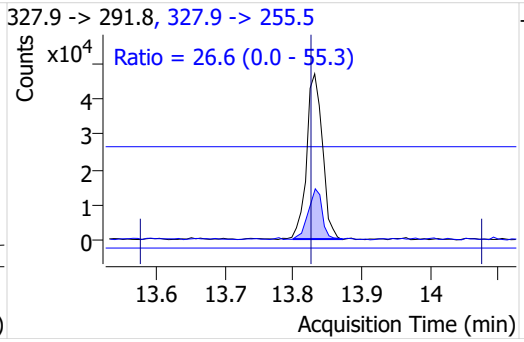

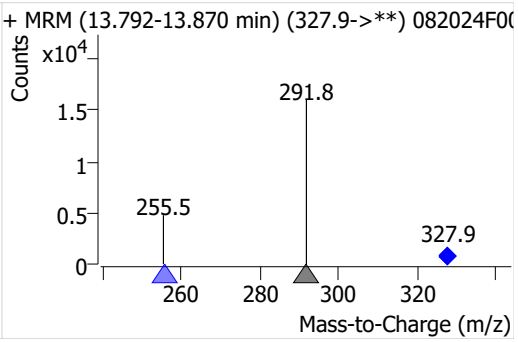

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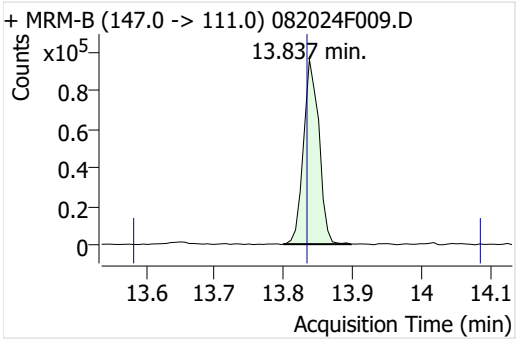
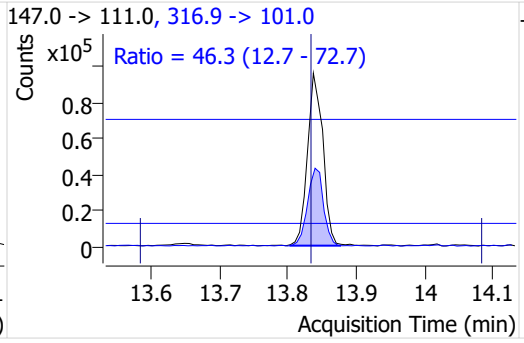
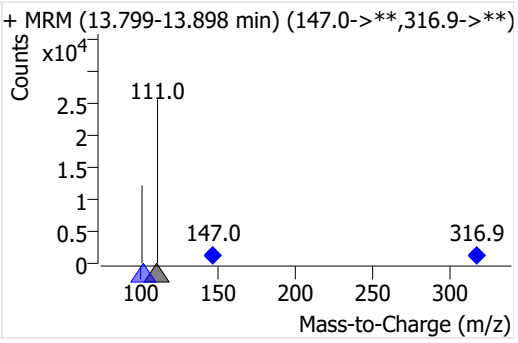
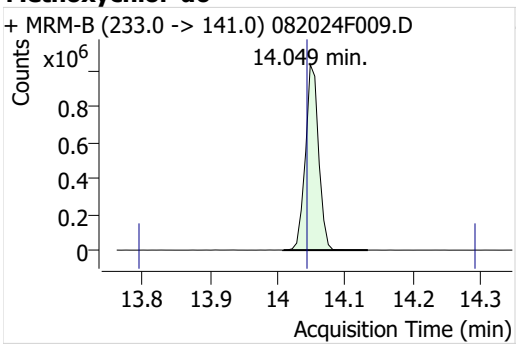
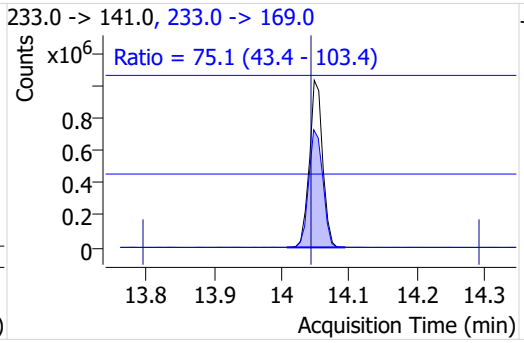


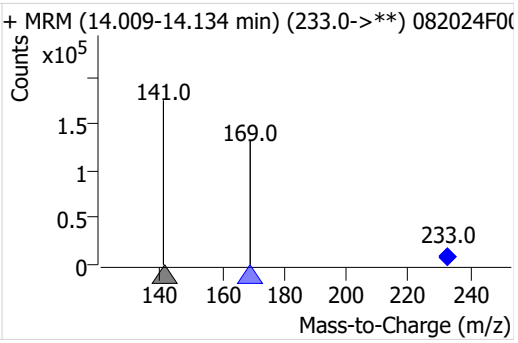




Methoxychlor-d6







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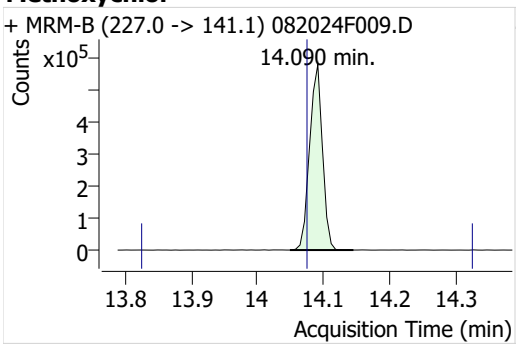
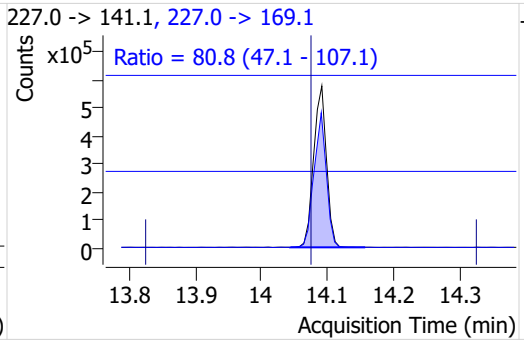
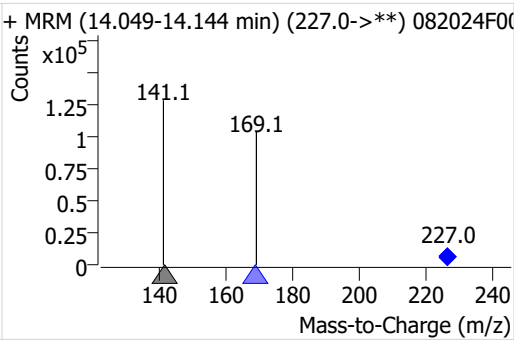
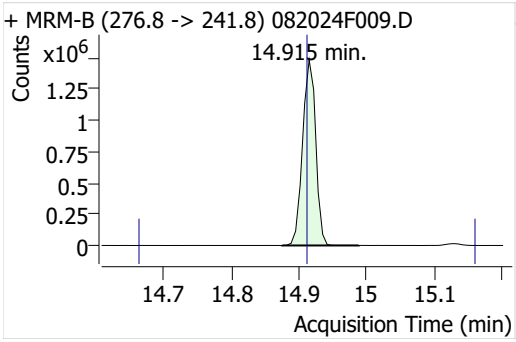
Methoxychlor

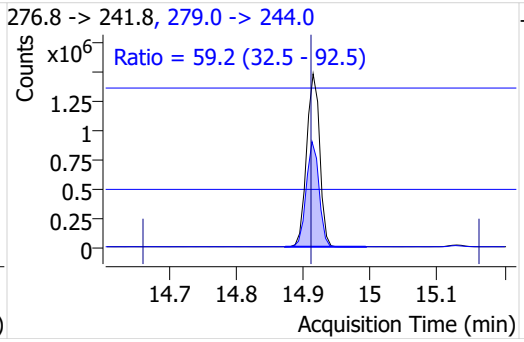


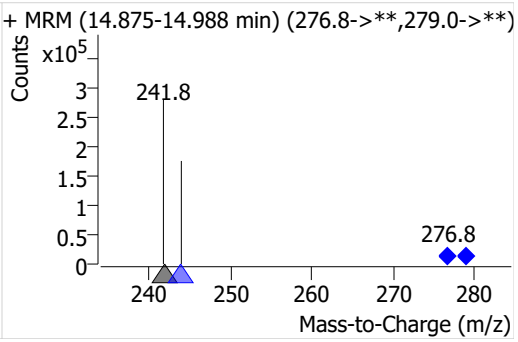




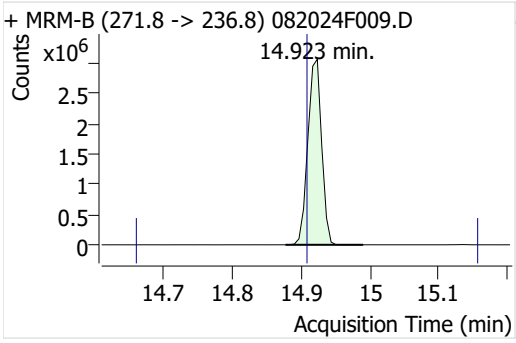
Mirex-13C10

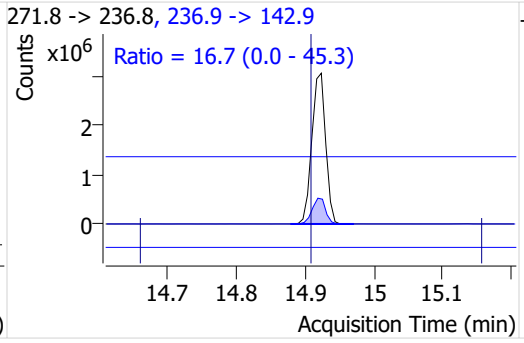


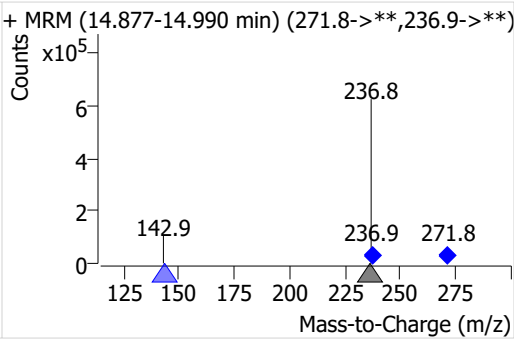




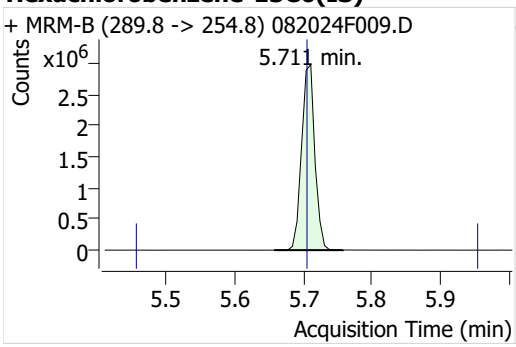
Mirex

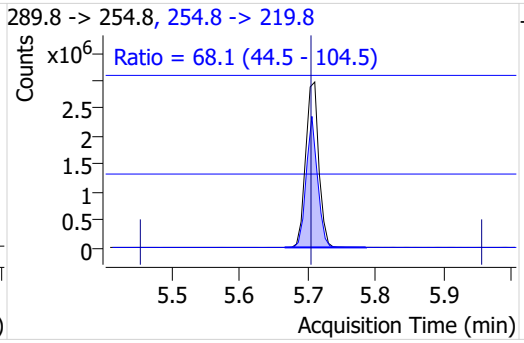


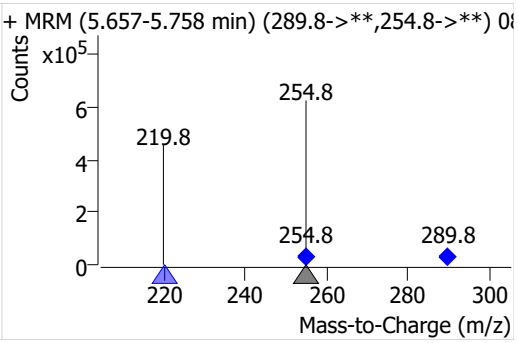




Hexachlorobenzene-13C6(IS)







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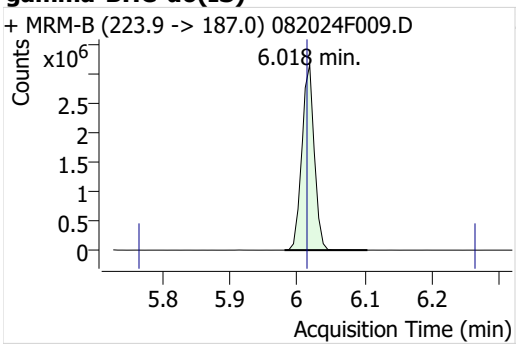
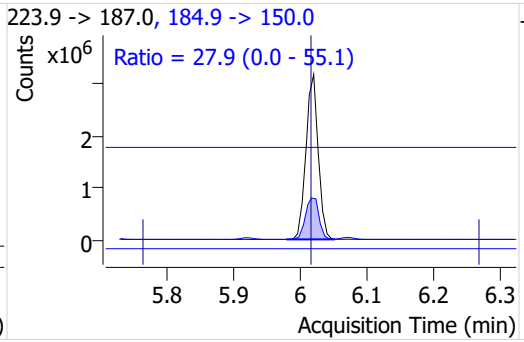
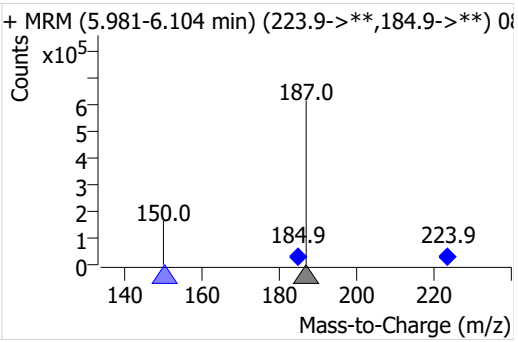
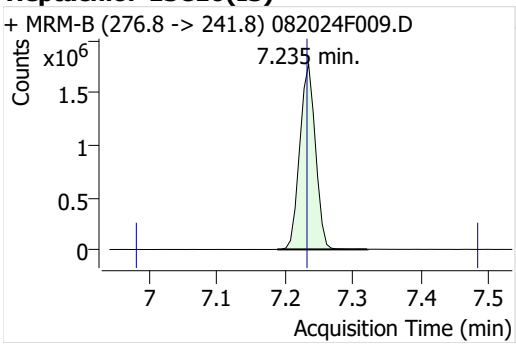
gamma-BHC-d6(IS)

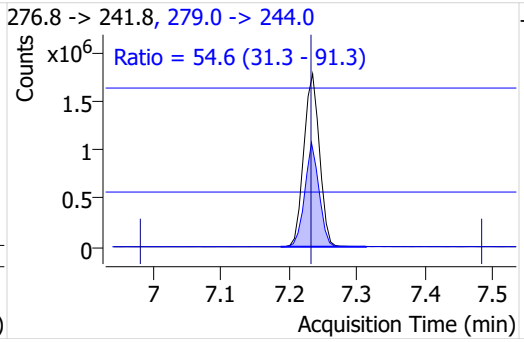


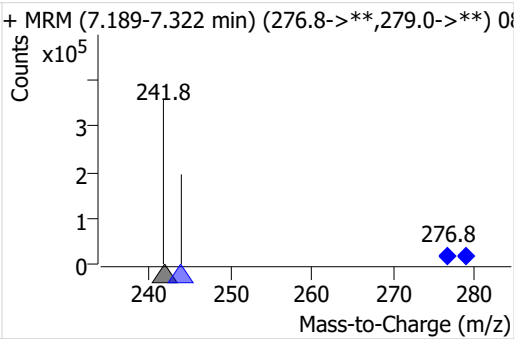




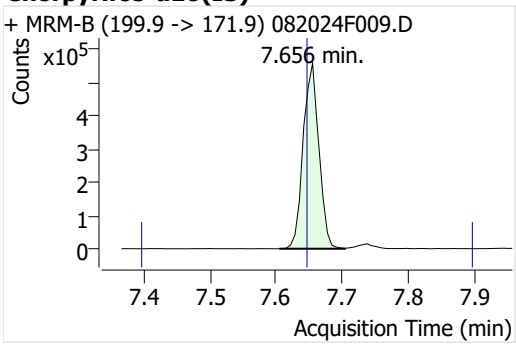
Heptachlor-13C10(IS)

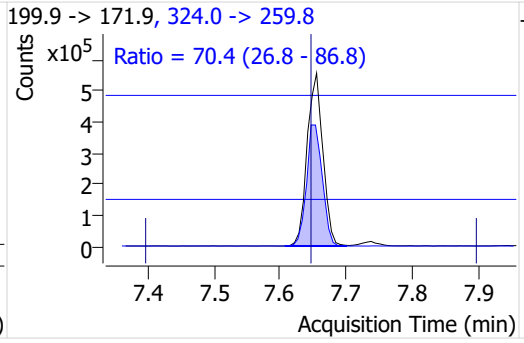


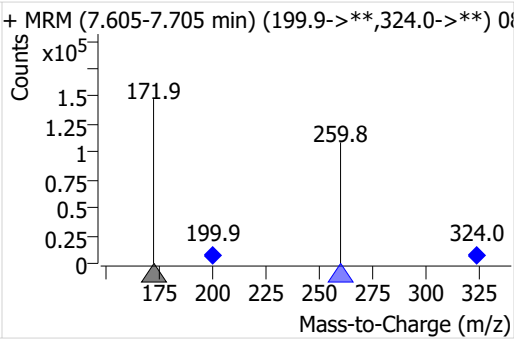




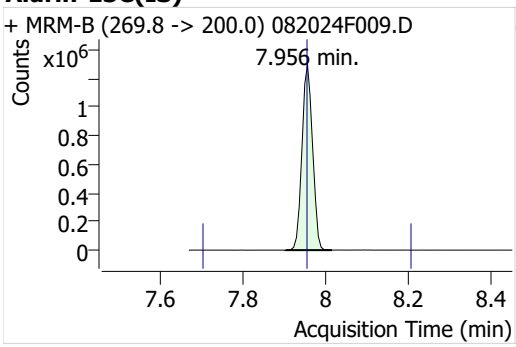
Chorpyrifos-d10(IS)

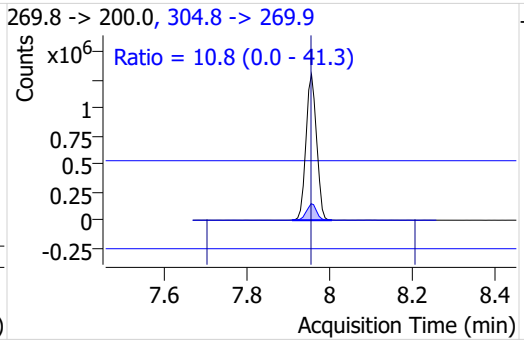


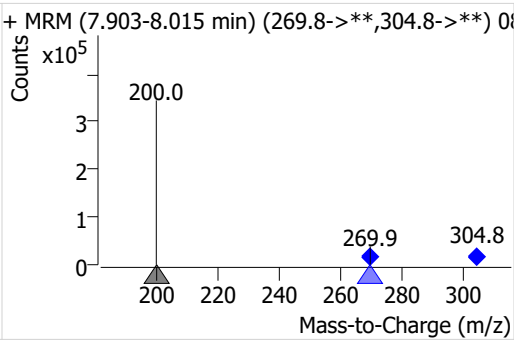




Aldrin-13C(IS)

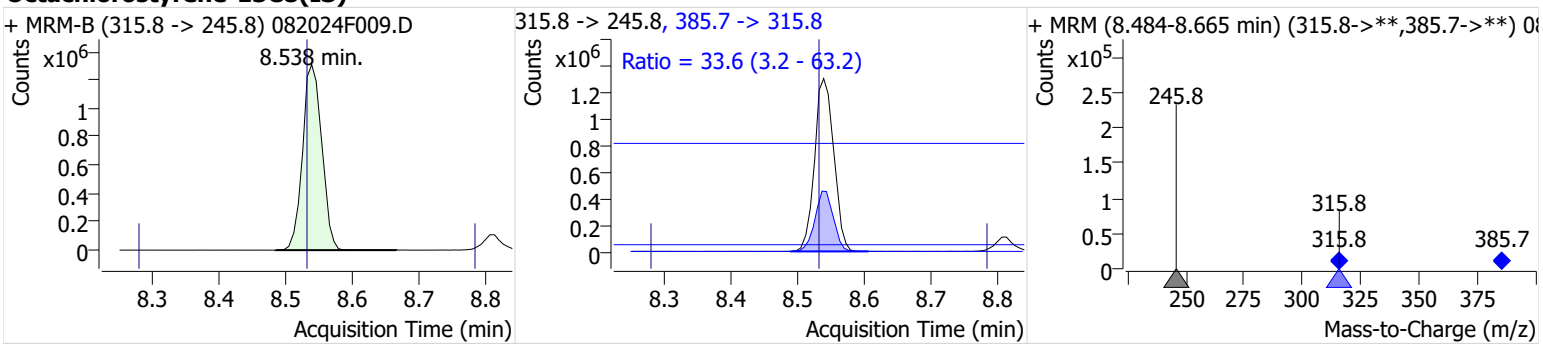




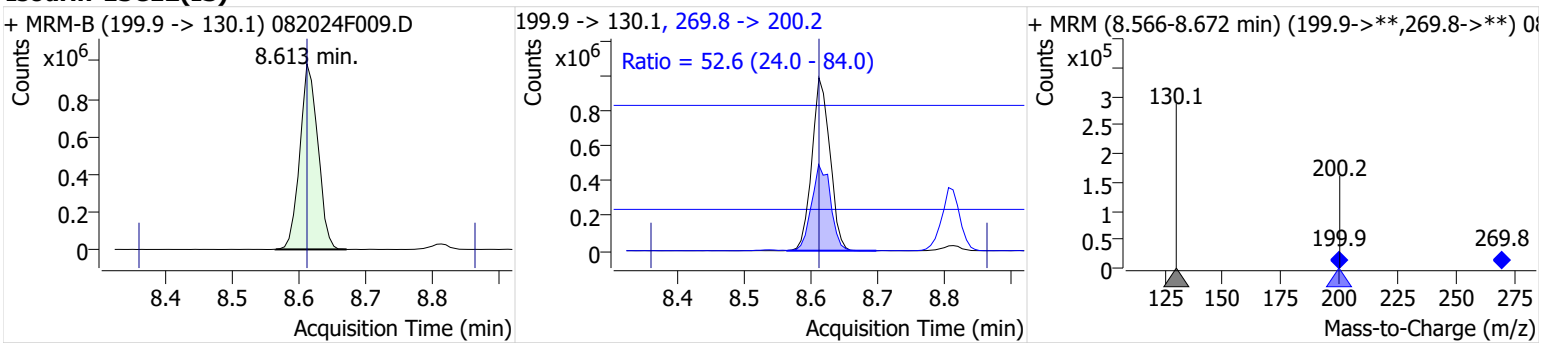


MassHunter Quantitative Analysis Sample Report

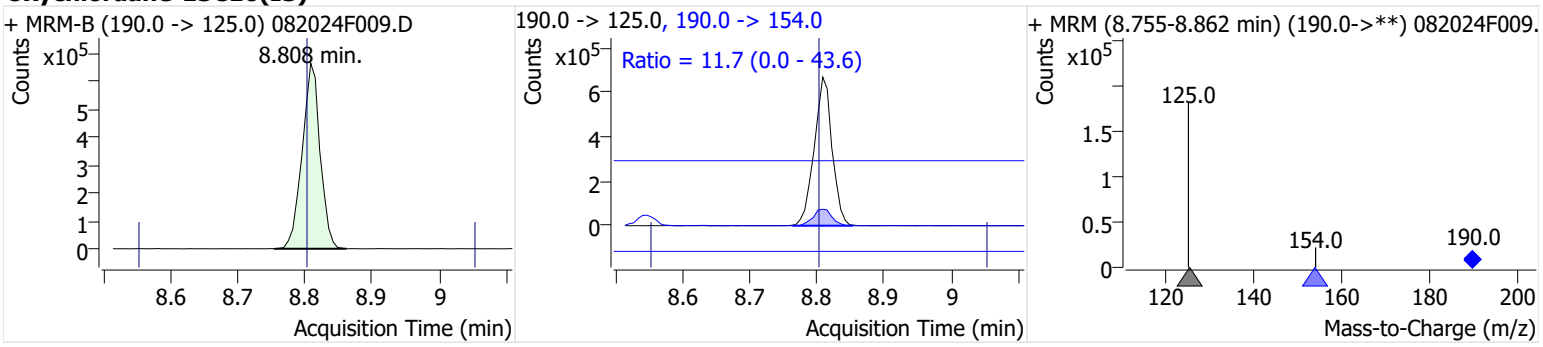
Octachlorostyrene-13C8(IS)



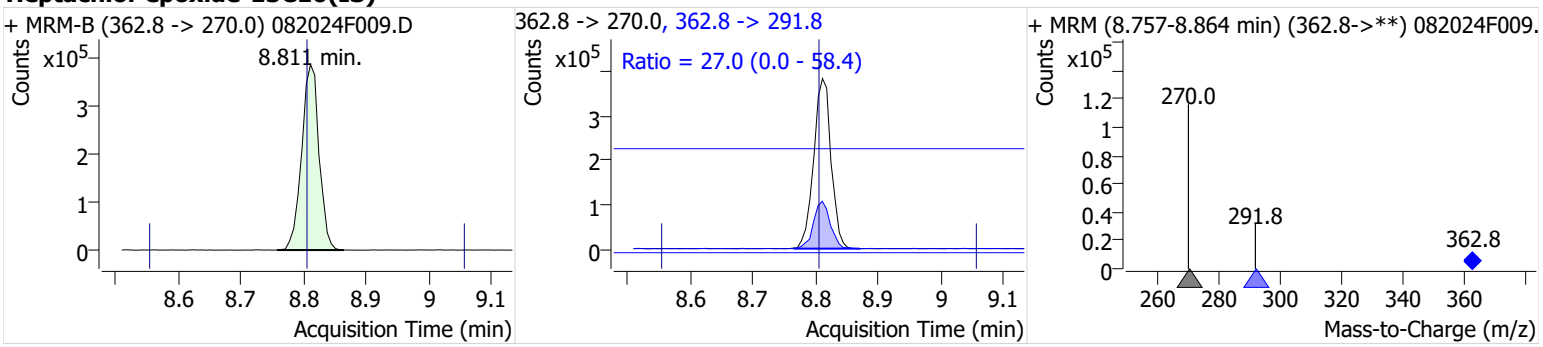
Isodrin-13C12(IS)



Oxychlordane-13C10(IS)



Heptachlor epoxide-13C10(IS)



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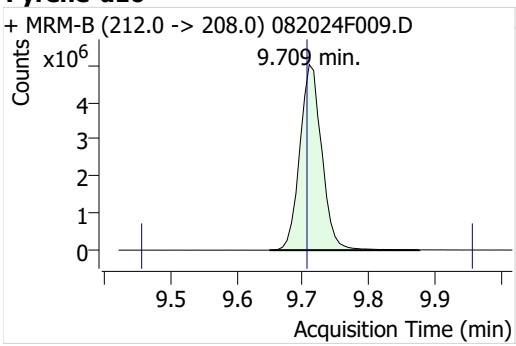
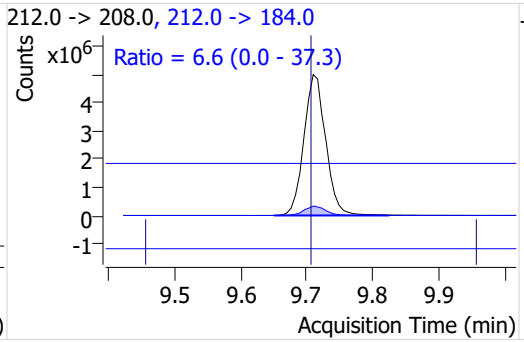
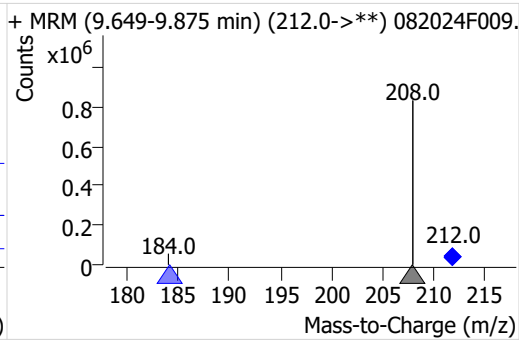
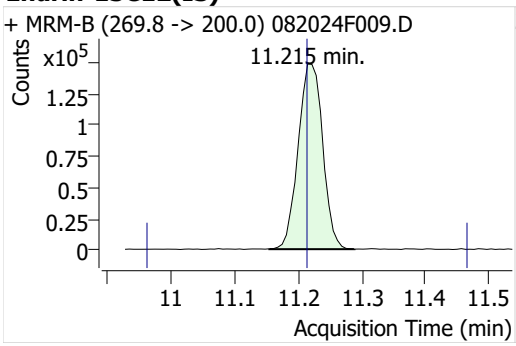
Pyrene-d10

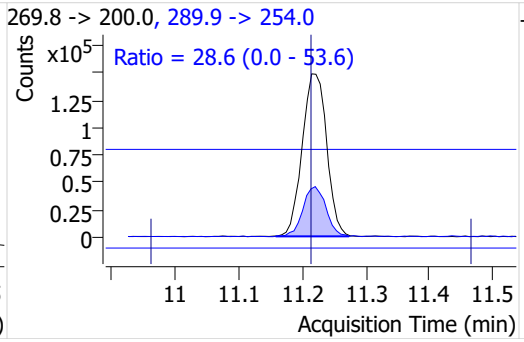


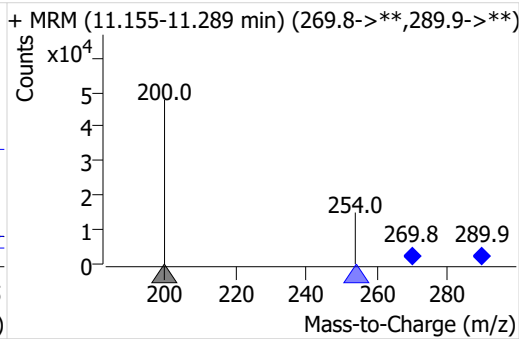




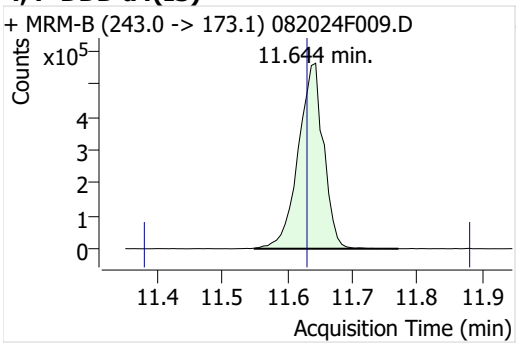
Endrin-13C12(IS)

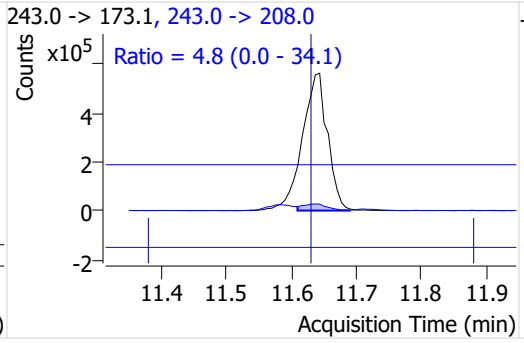


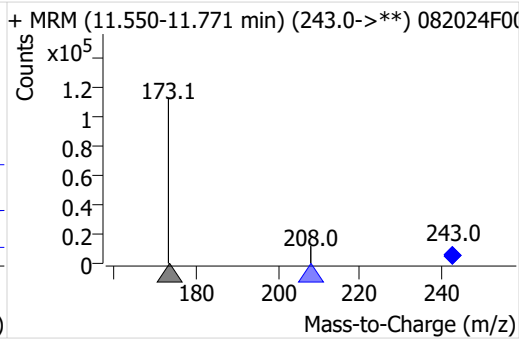




4,4'-DDD d4(IS)







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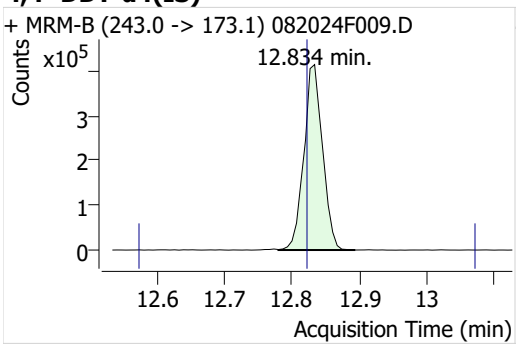

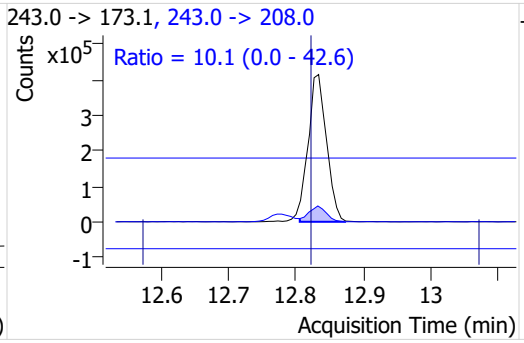

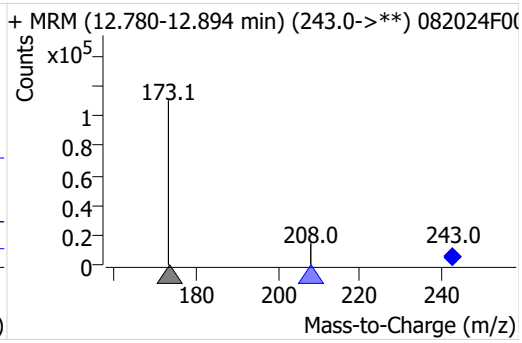

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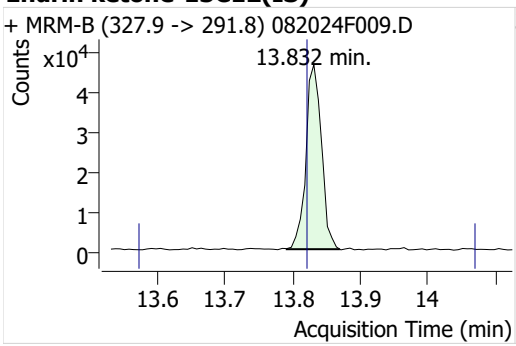
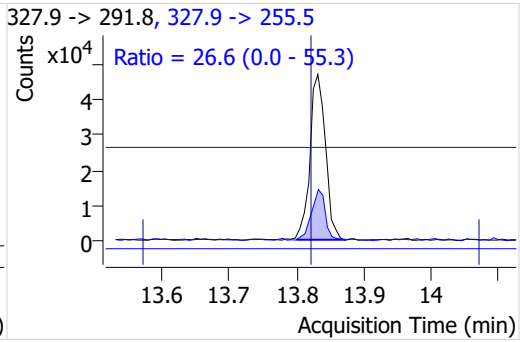
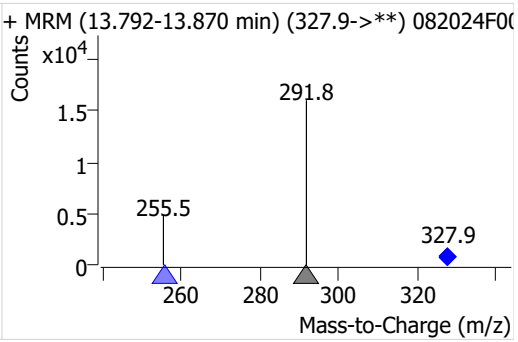
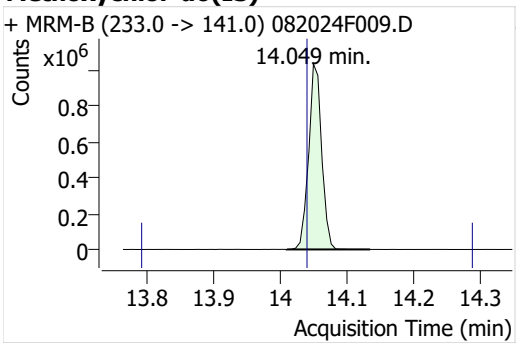
Endrin ketone-13C12(IS)

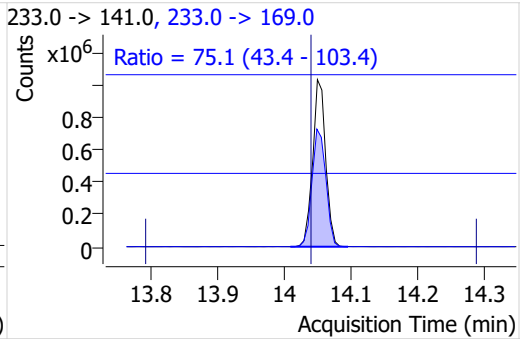


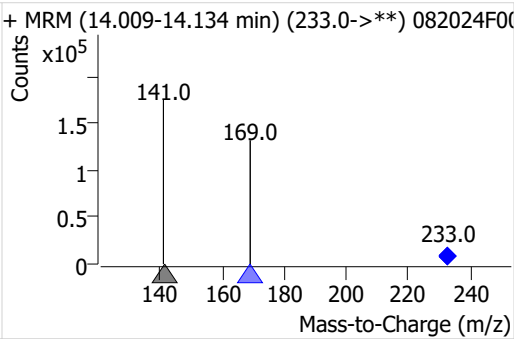




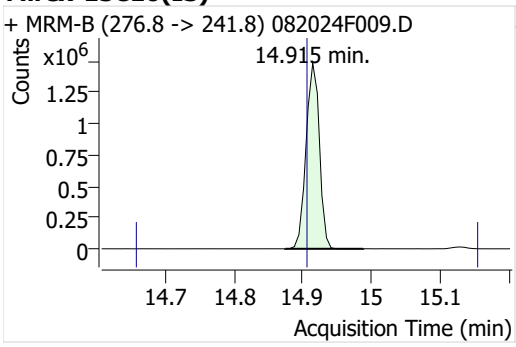
Methoxychlor-d6(IS)

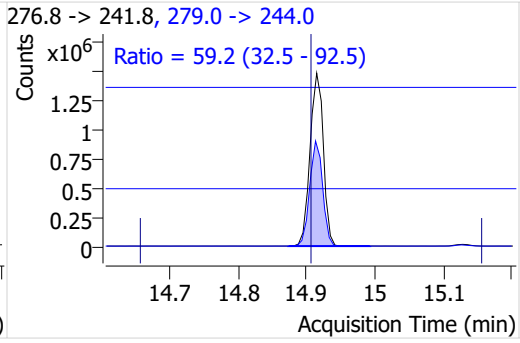


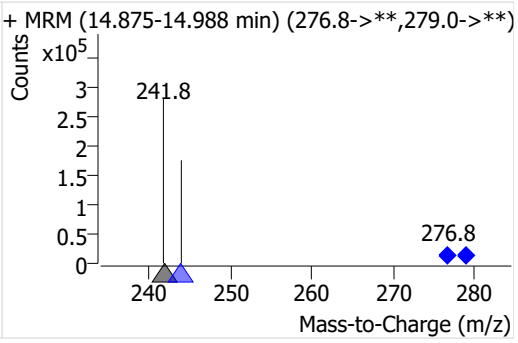




Mirex-13C10(IS)







1st 08/20/24
2nd 08/21/24

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Data File	J:\MS47\data\082024\082024F010.D		
Batch File	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
Acq. Date-Time	8/20/2024 1:34:15 PM	**Acq Operator**	
Name	OC PEST ICAL 20ppb SVM71-99F	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	8/20/2024 3:33:05 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	080624 OC PEST ICAL.batch.bin	**Vial**	8
Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.704	289.8 -> 254.8	4307912	20.0000 ng/ml	0.000
gamma-BHC-d6(IS)	6.018	223.9 -> 187.0	4174345	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	7.235	276.8 -> 241.8	2860527	20.0000 ng/ml	0.002
Chorpyrifos-d10(IS)	7.656	199.9 -> 171.9	1046540	20.0000 ng/ml	0.004
Aldrin-13C(IS)	7.956	269.8 -> 200.0	2542263	20.0000 ng/ml	0.001
Octachlorostyrene-13C8(IS)	8.545	315.8 -> 245.8	2890339	20.0000 ng/ml	0.012
Isodrin-13C12(IS)	8.613	199.9 -> 130.1	1961000	20.0000 ng/ml	0.003
Oxychlordane-13C10(IS)	8.808	190.0 -> 125.0	1319267	20.0000 ng/ml	0.005
Heptachlor epoxide-13C10(IS)	8.811	362.8 -> 270.0	812789	20.0000 ng/ml	0.005
Pyrene-d10	9.709	212.0 -> 208.0	12865804	100.0000 ng/ml	0.007
Endrin-13C12(IS)	11.222	269.8 -> 200.0	427289	20.0000 ng/ml	0.011
4,4'-DDD d4(IS)	11.637	243.0 -> 173.1	1706252	5.0000 ng/ml	0.003
4,4'-DDT-d4(IS)	12.834	243.0 -> 173.1	896263	5.0000 ng/ml	0.011
Endrin ketone-13C12(IS)	13.832	327.9 -> 291.8	73402	20.0000 ng/ml	0.011
Methoxychlor-d6(IS)	14.049	233.0 -> 141.0	1500217	20.0000 ng/ml	0.009
Mirex-13C10(IS)	14.915	276.8 -> 241.8	2217896	5.0000 ng/ml	0.008

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.705	289.8 -> 254.8	4307912	18.968 ng/ml	
		Spiked Amount =	20.0	Recovery =	*94.8 %*
gamma-BHC-d6	6.014	223.9 -> 187.0	4174345	19.330 ng/ml	
		Spiked Amount =	20.0	Recovery =	*96.6 %*
Heptachlor-13C10	7.232	276.8 -> 241.8	2860527	18.969 ng/ml	
		Spiked Amount =	20.0	Recovery =	*94.8 %*
Chorpyrifos-d10	7.647	199.9 -> 171.9	1046540	20.154 ng/ml	
		Spiked Amount =	20.0	Recovery =	*100.8 %*
Aldrin-13C	7.955	269.8 -> 200.0	2541745	20.316 ng/ml	
		Spiked Amount =	20.0	Recovery =	*101.6 %*
Octachlorostyrene-13C8	8.531	315.8 -> 245.8	2890339	20.255 ng/ml	
		Spiked Amount =	20.0	Recovery =	*101.3 %*
Isodrin-13C12	8.613	199.9 -> 130.1	1961000	20.153 ng/ml	
		Spiked Amount =	20.0	Recovery =	*100.8 %*
Oxychlordane-13C10	8.803	190.0 -> 125.0	1319267	19.824 ng/ml	
		Spiked Amount =	20.0	Recovery =	*99.1 %*
Heptachlor epoxide-13C10	8.805	362.8 -> 270.0	812789	20.661 ng/ml	
		Spiked Amount =	20.0	Recovery =	*103.3 %*
Endrin-13C12	11.214	269.8 -> 200.0	427289	19.605 ng/ml	
		Spiked Amount =	20.0	Recovery =	*98.0 %*
4,4'-DDD d4	11.630	243.0 -> 173.1	1706252	4.929 ng/ml	
		Spiked Amount =	5.0	Recovery =	*98.6 %*
4,4'-DDT-d4	12.822	243.0 -> 173.1	896263	4.991 ng/ml	
		Spiked Amount =	5.0	Recovery =	*99.8 %*
Endrin ketone-13C12	13.821	327.9 -> 291.8	73402	18.901 ng/ml	
		Spiked Amount =	20.0	Recovery =	*94.5 %*
Methoxychlor-d6	14.039	233.0 -> 141.0	1500217	19.469 ng/ml	
		Spiked Amount =	20.0	Recovery =	*97.3 %*

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System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.906	276.8 -> 241.8	2217896	4.918 ng/ml
		Spiked Amount =	5.0	Recovery = *98.4 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)	5.649	181.1 -> 145.1	15062397	21.510 ng/ml	99
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.713	283.8 -> 213.9	8422106	22.501 ng/ml	97
beta-BHC	gamma-BHC-d6(IS)	5.916	181.1 -> 145.1	13880547	21.239 ng/ml	95
gamma-BHC(Lindane)	gamma-BHC-d6(IS)	6.070	181.1 -> 145.1	10994453	20.426 ng/ml	97
delta-BHC	gamma-BHC-d6(IS)	6.436	181.1 -> 145.1	4026671	20.923 ng/ml	88
Heptachlor	Heptachlor-13C10(IS)	7.238	271.7 -> 236.9	3281518	22.390 ng/ml	95
Chorpyrifos	Chorpyrifos-d10(IS)	7.740	196.9 -> 169.0	1327439	20.008 ng/ml	96
Aldrin	Aldrin-13C(IS)	7.964	254.9 -> 220.0	1955339	19.131 ng/ml	96
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.544	342.8 -> 307.8	6137228	20.948 ng/ml	99
Isodrin	Isodrin-13C12(IS)	8.627	193.0 -> 123.0	2217944	20.576 ng/ml	94
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	8.818	352.8 -> 262.9	933328	20.572 ng/ml	93
Oxychlordane	Oxychlordane-13C10(IS)	8.816	114.9 -> 51.1	3352241	20.648 ng/ml	98
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.419	271.8 -> 236.9	1870292	19.940 ng/ml	98
2,4'-DDE	4,4'-DDD d4(IS)	9.434	246.0 -> 176.2	12323948	20.148 ng/ml	98
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.767	271.8 -> 236.9	4993047	21.195 ng/ml	93
Endosulfan I	Endrin-13C12(IS)	9.797	206.9 -> 172.0	744212	21.510 ng/ml	97
trans-Nanochlor	Oxychlordane-13C10(IS)	9.841	271.8 -> 236.9	1703109	20.851 ng/ml	96
4,4' -DDE	4,4'-DDD d4(IS)	10.349	246.0 -> 176.2	10067660	22.107 ng/ml	100
2,4'-DDD	4,4'-DDD d4(IS)	10.559	235.0 -> 165.1	9256831	21.612 ng/ml	98
Dieldrin	Endrin-13C12(IS)	10.574	262.9 -> 193.0	930275	20.847 ng/ml	90
Endrin	Endrin-13C12(IS)	11.230	262.8 -> 193.0	520201	20.806 ng/ml	98
Endosulfan II	Endrin-13C12(IS)	11.580	206.9 -> 172.0	348554	20.502 ng/ml	95
4,4'-DDD	4,4'-DDD d4(IS)	11.713	235.0 -> 165.1	7300718	21.204 ng/ml	98
cis-Nonachlor	Oxychlordane-13C10(IS)	11.716	271.8 -> 236.9	1251063	21.037 ng/ml	98
2,4'-DDT	4,4'-DDT-d4(IS)	11.807	235.0 -> 165.1	5178612	20.930 ng/ml	98
Endrin aldehyde	Endrin-13C12(IS)	12.064	249.9 -> 214.9	189976	20.489 ng/ml	96
Endosulfan sulfate	Endrin-13C12(IS)	12.778	271.9 -> 237.0	1061470	20.271 ng/ml	99
4,4'-DDT	4,4'-DDT-d4(IS)	12.889	235.0 -> 165.1	4300612	20.609 ng/ml	98
Endrin ketone	Endrin ketone-13C12(IS)	13.844	147.0 -> 111.0	332478	20.614 ng/ml	94
Methoxychlor	Methoxychlor-d6(IS)	14.090	227.0 -> 141.1	1751726	21.833 ng/ml	97
Mirex	Mirex-13C10(IS)	14.916	271.8 -> 236.8	9048963	20.206 ng/ml	98

(m) = manual integration ND = Not Detected NC = Not Calculated

Sample Chromatogram

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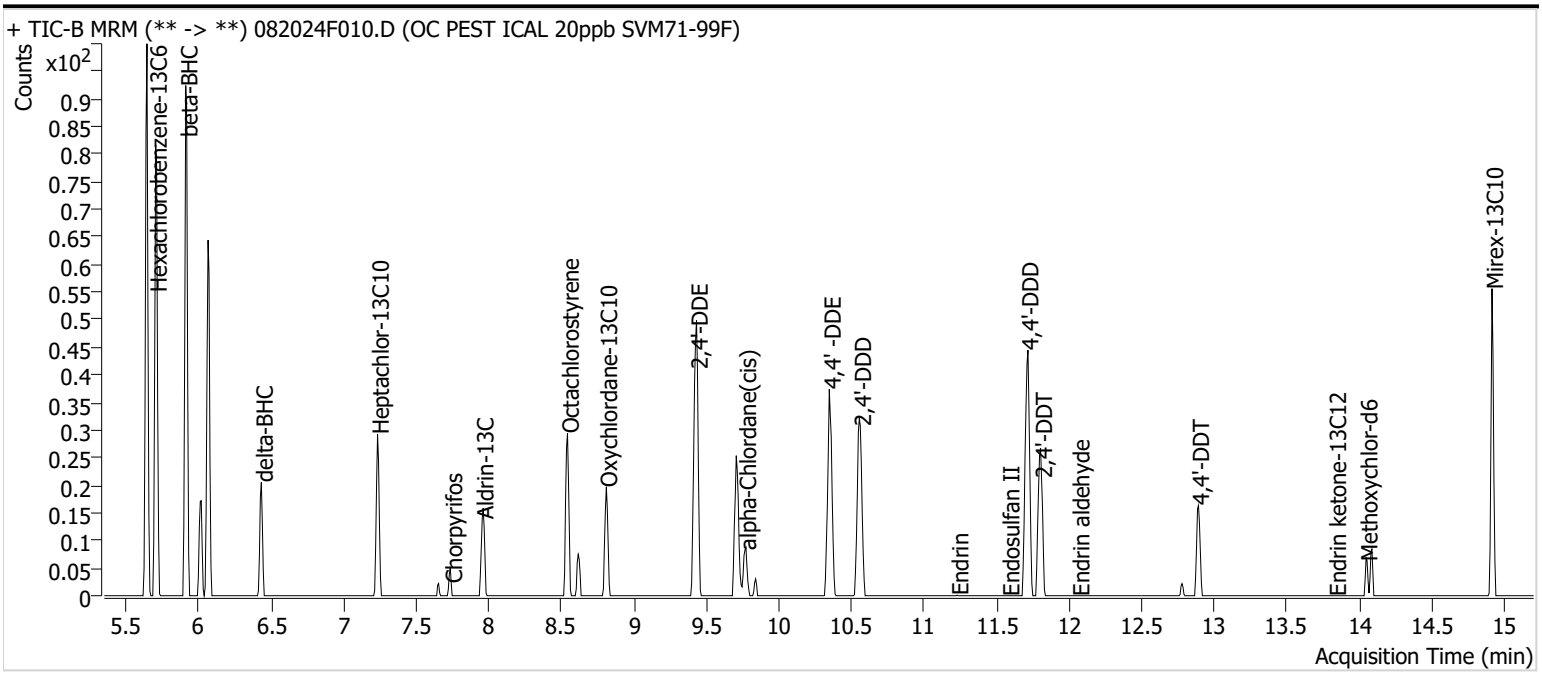
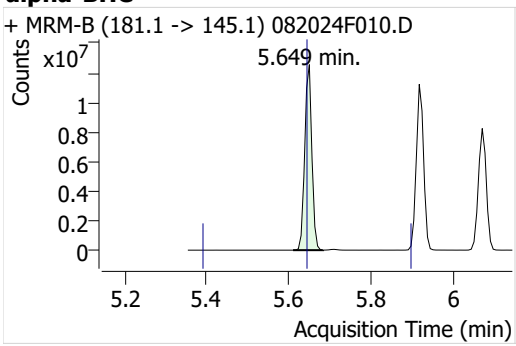
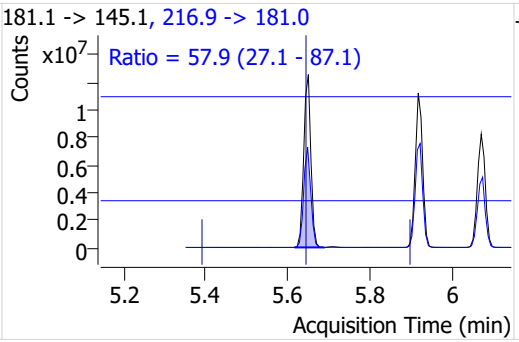
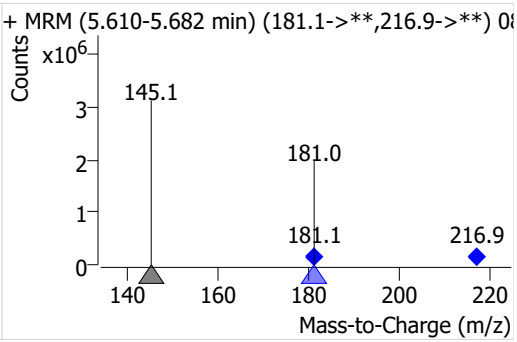


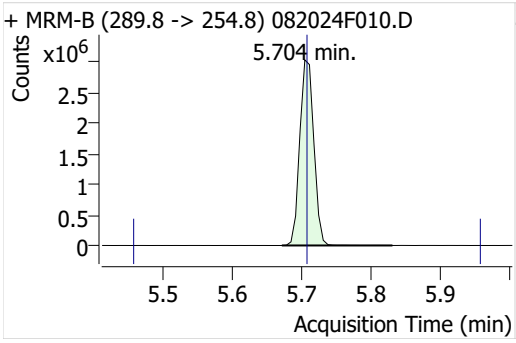
alpha-BHC

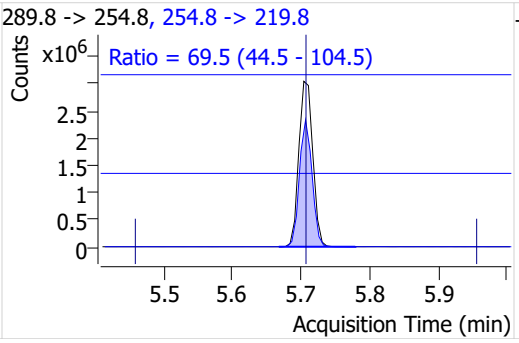


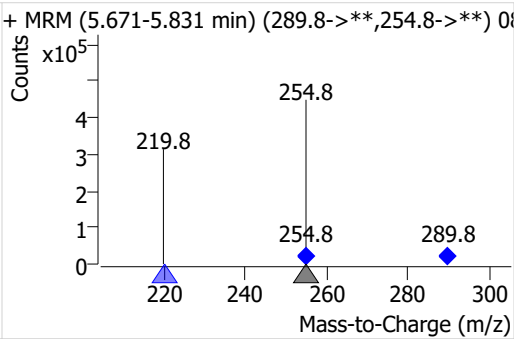




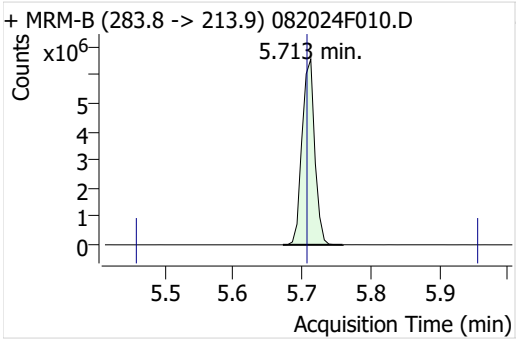
Hexachlorobenzene-13C6

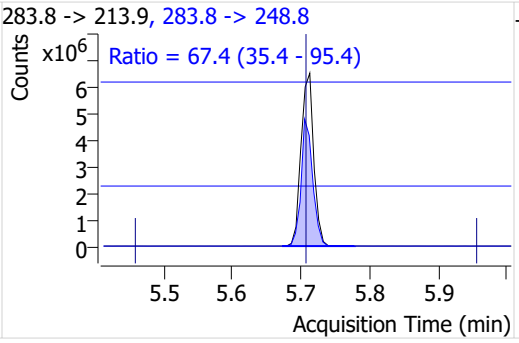


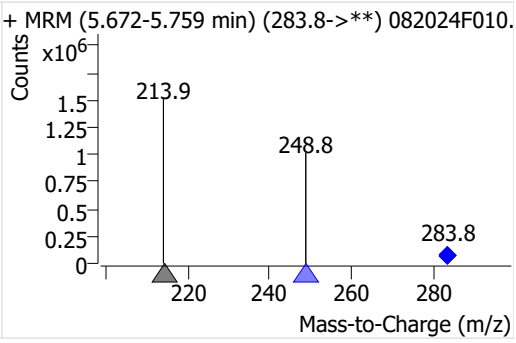




Hexachlorobenzene

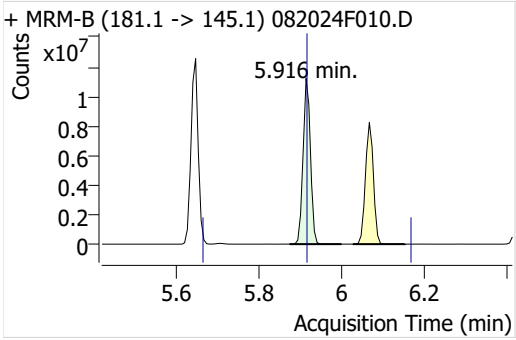


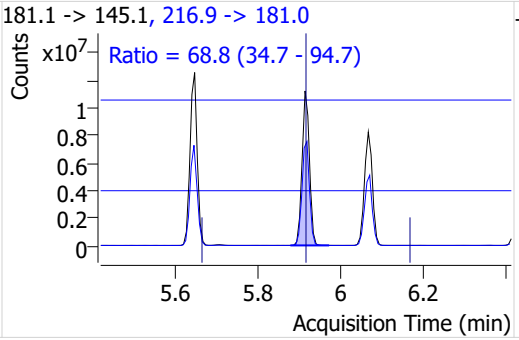


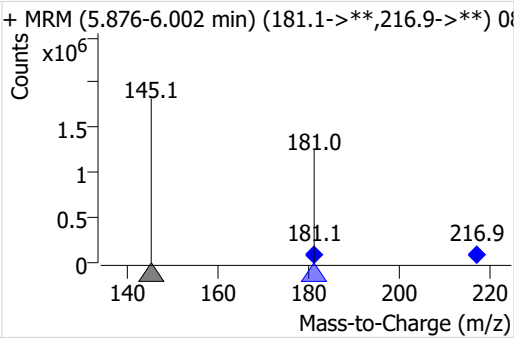


MassHunter Quantitative Analysis Sample Report

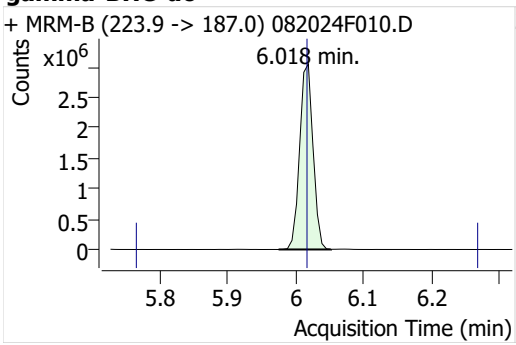
beta-BHC

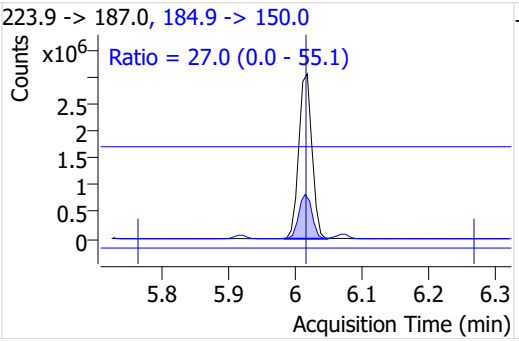


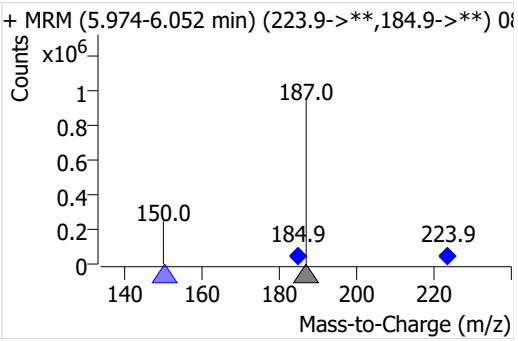




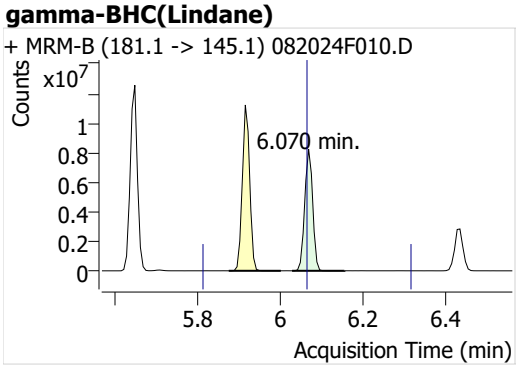
gamma-BHC-d6

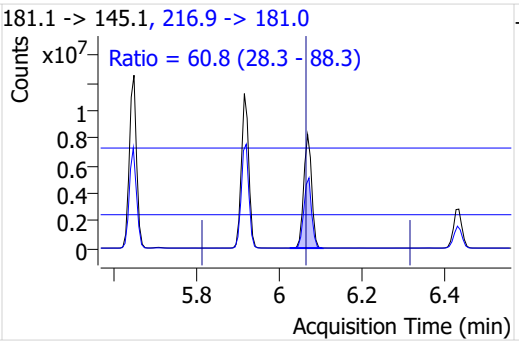


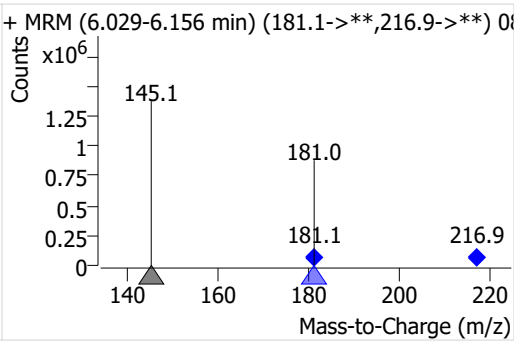




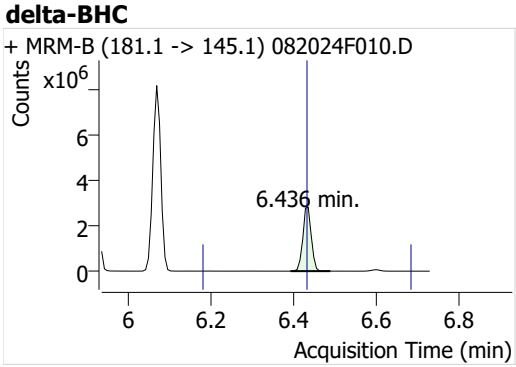
gamma-BHC(Lindane)

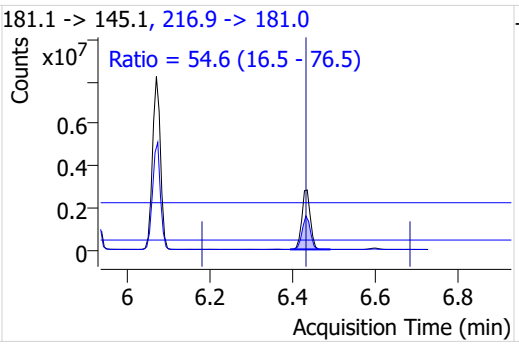


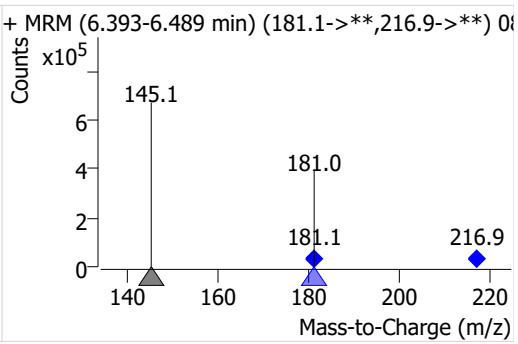




delta-BHC

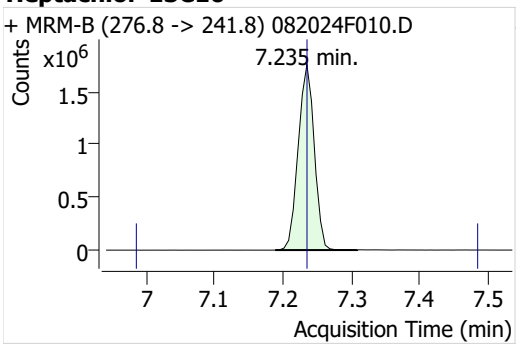


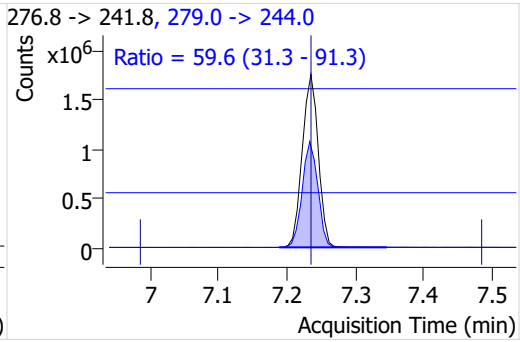


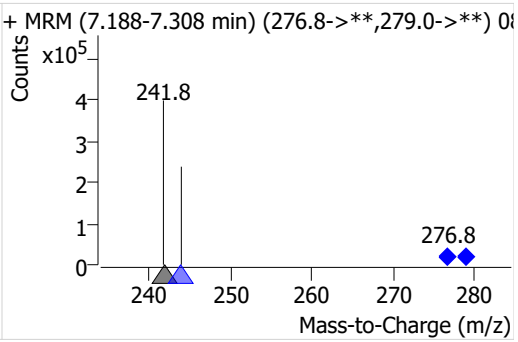


MassHunter Quantitative Analysis Sample Report

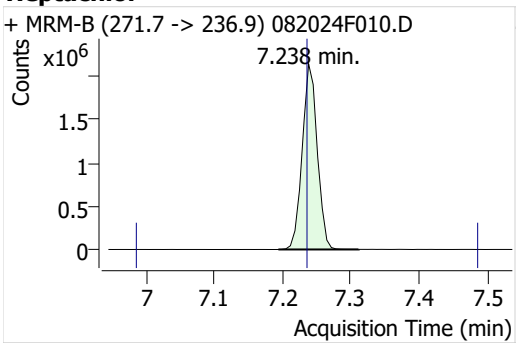
Heptachlor-13C10

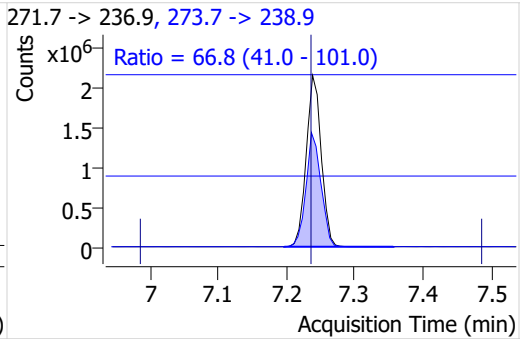


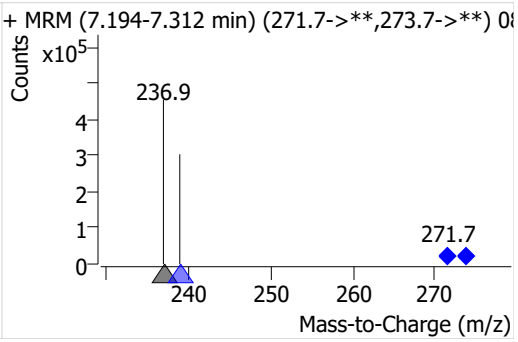




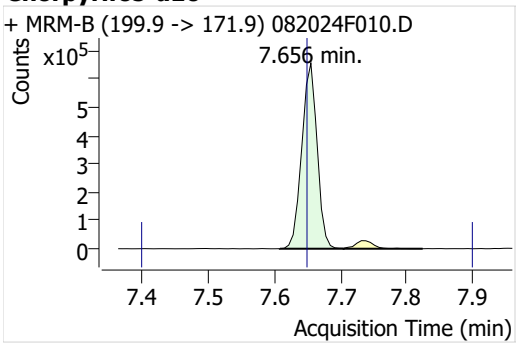
Heptachlor

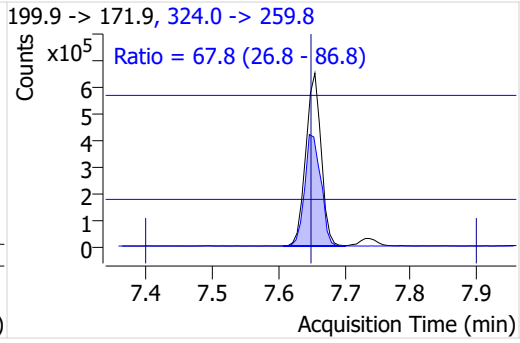


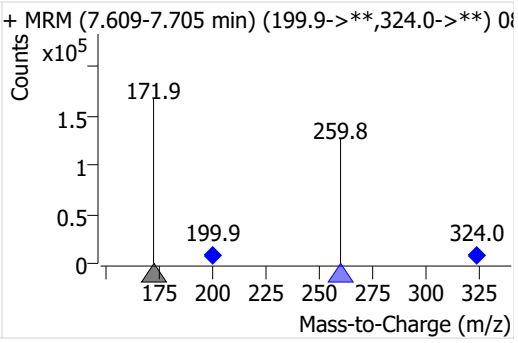




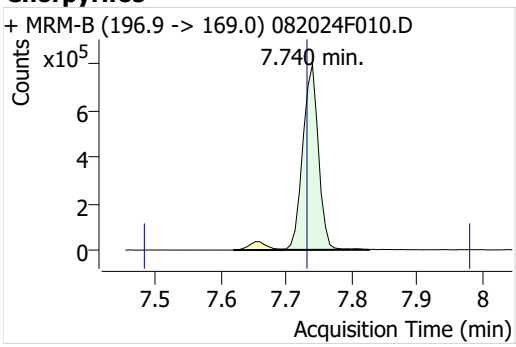
Chorpyrifos-d10

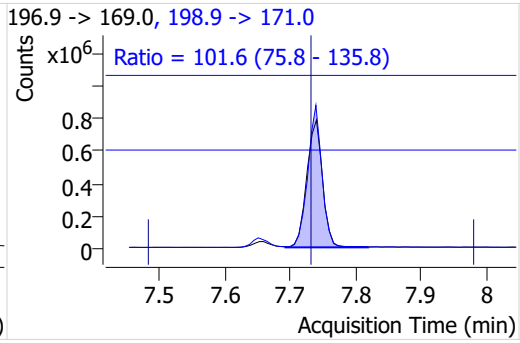


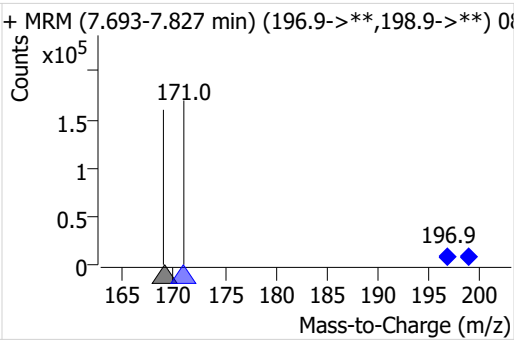




Chorpyrifos

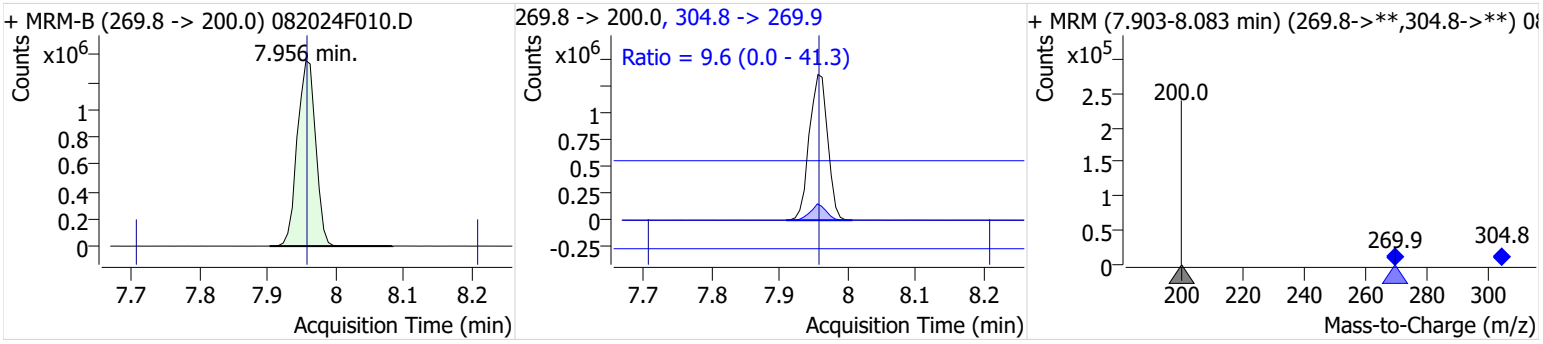




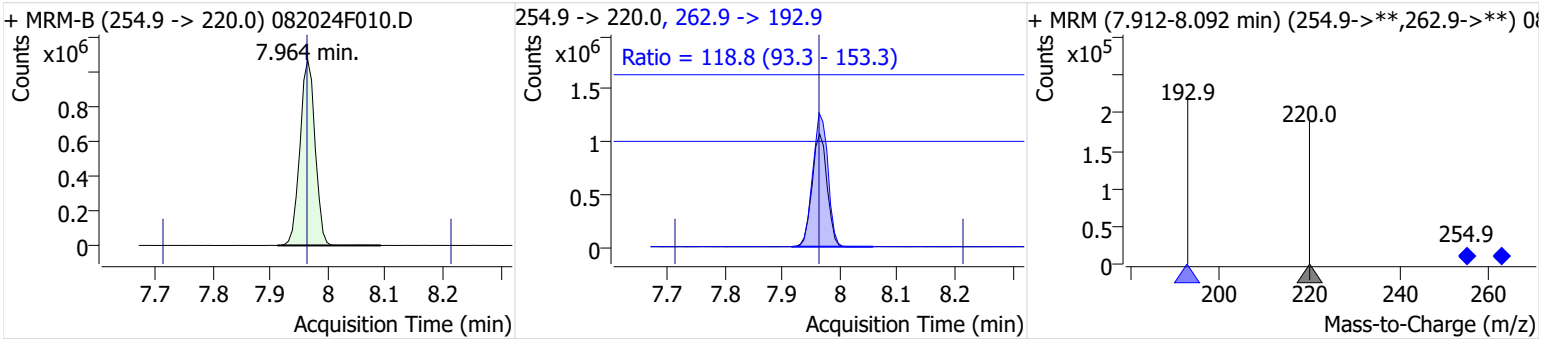


MassHunter Quantitative Analysis Sample Report

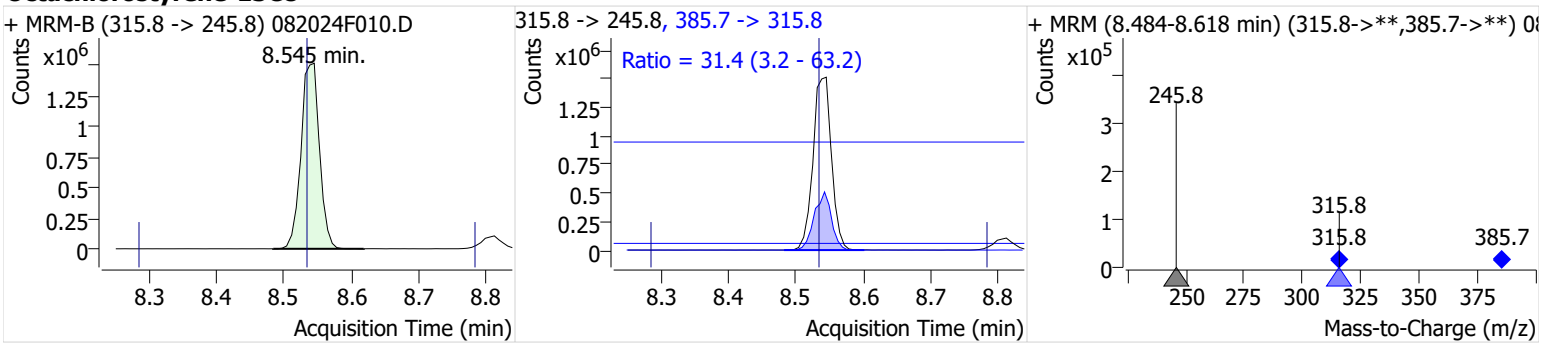
Aldrin-13C



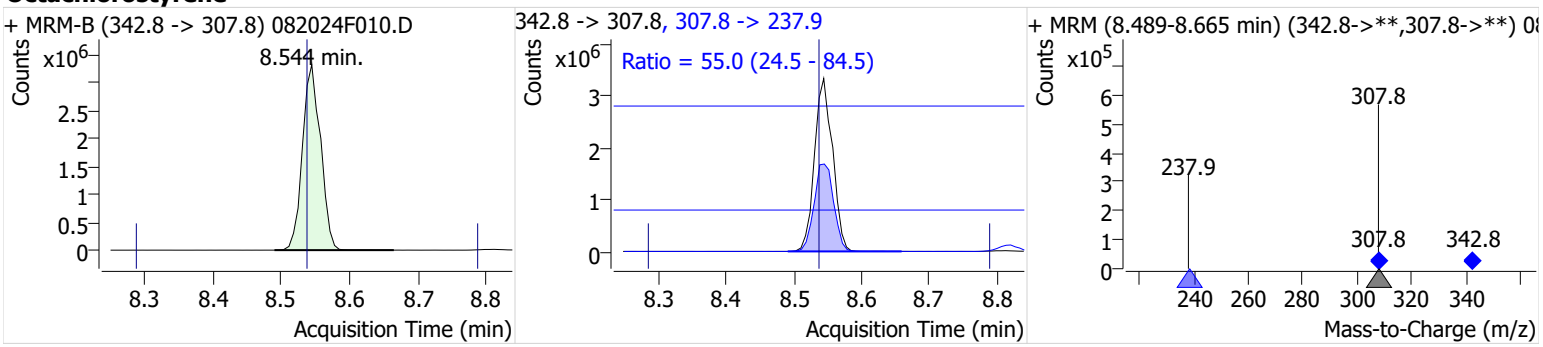
Aldrin



Octachlorostyrene-13C8

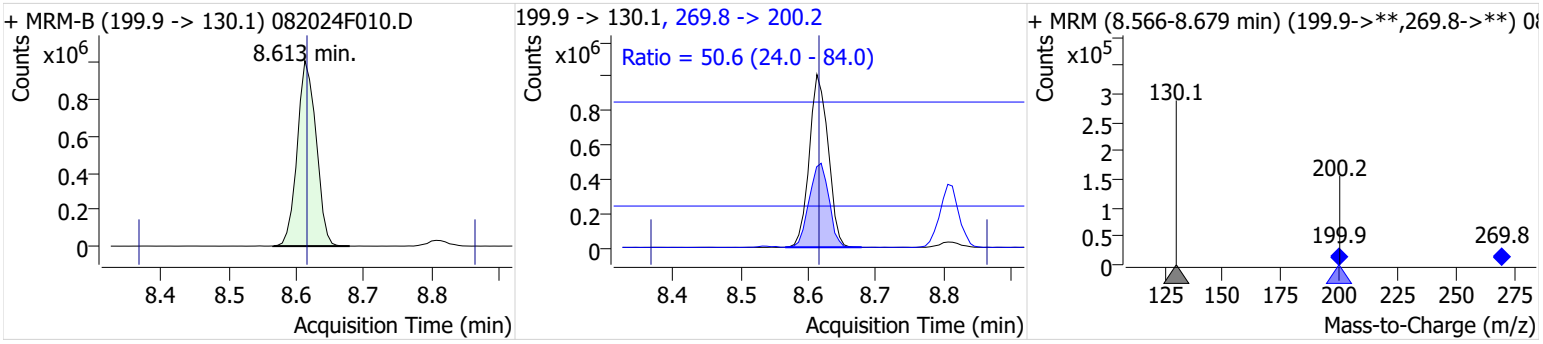


Octachlorostyrene

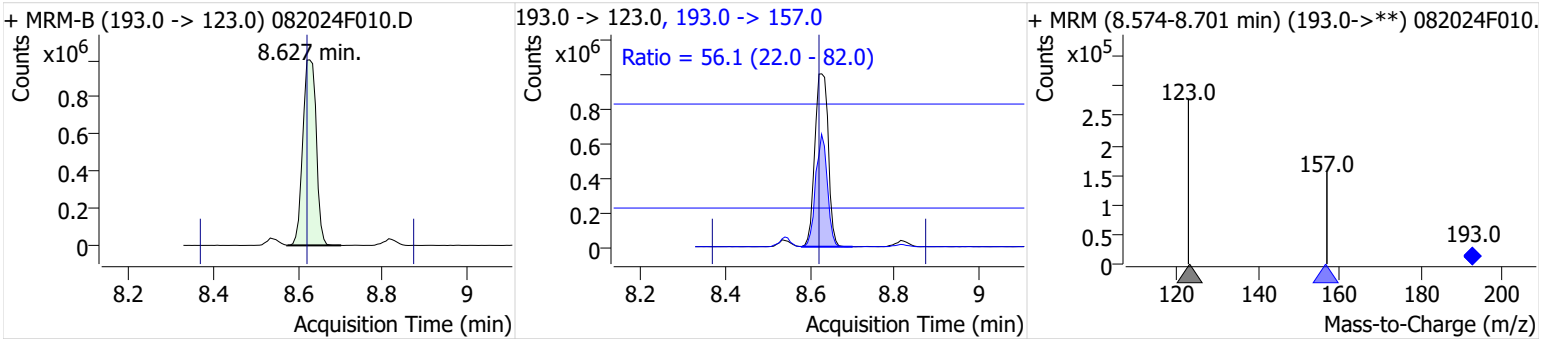


MassHunter Quantitative Analysis Sample Report

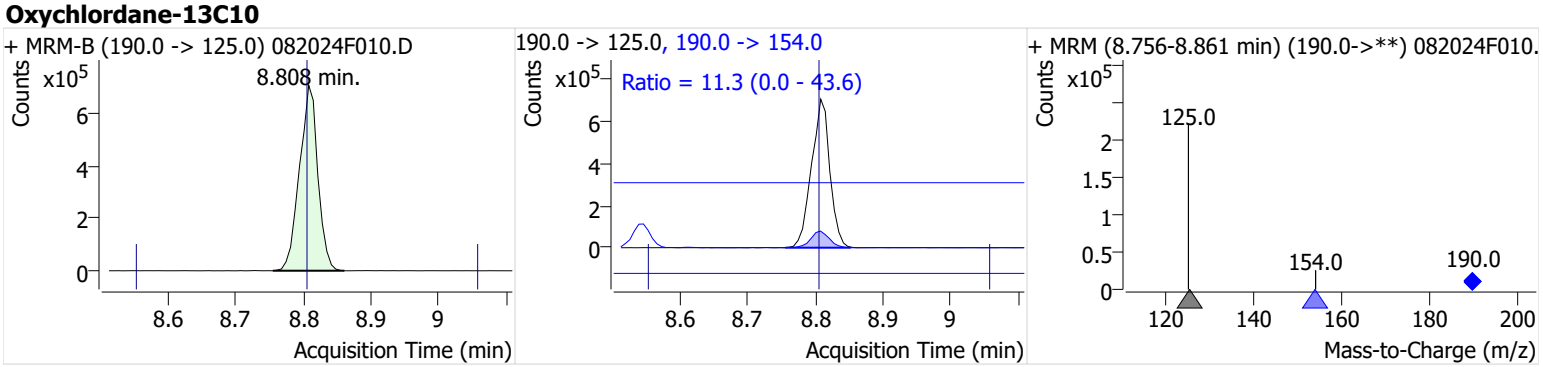
Isodrin-13C12



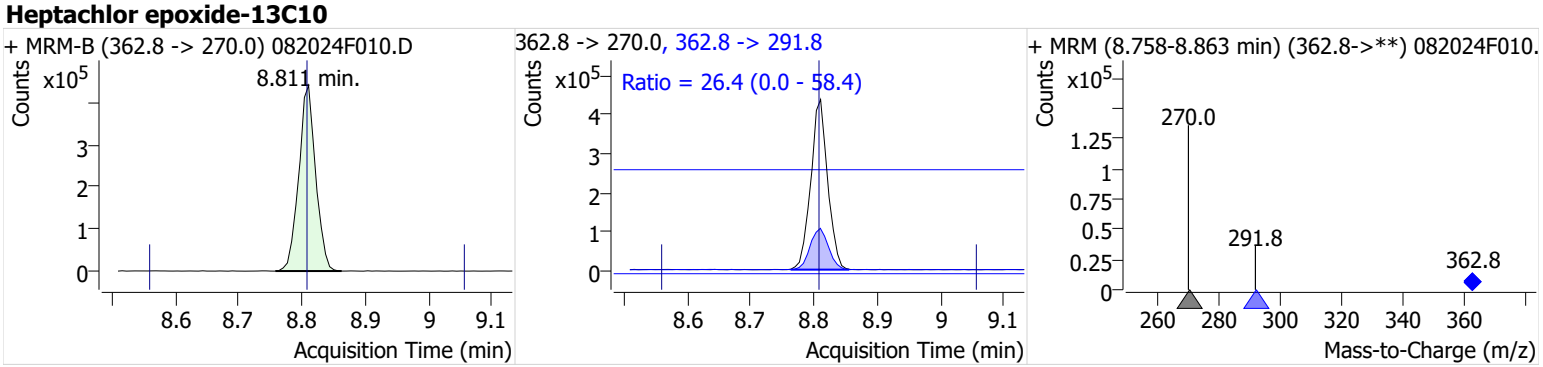
Isodrin



Oxychlordane-13C10

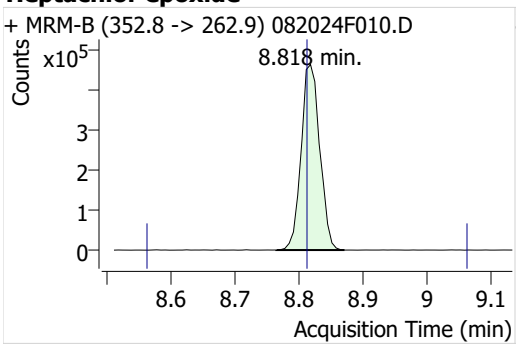


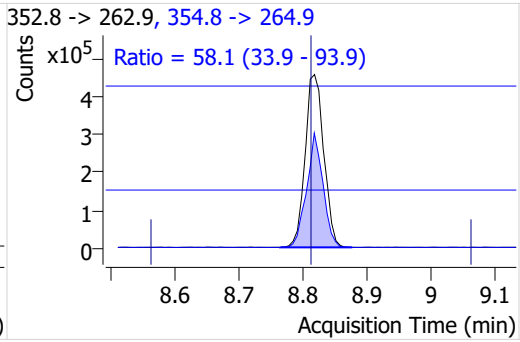
Heptachlor epoxide-13C10

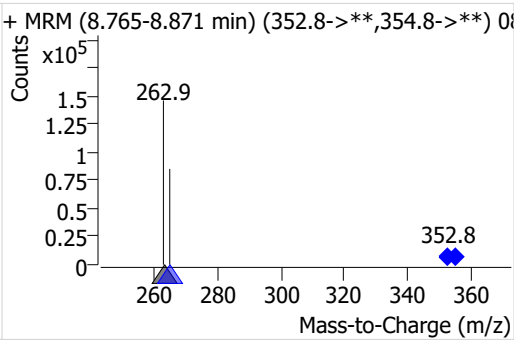


MassHunter Quantitative Analysis Sample Report

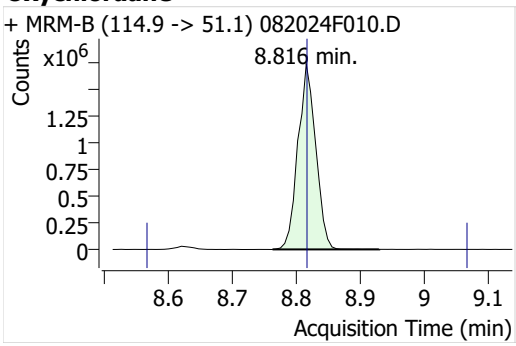
Heptachlor epoxide

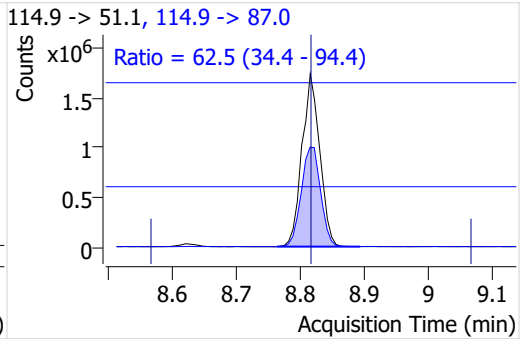


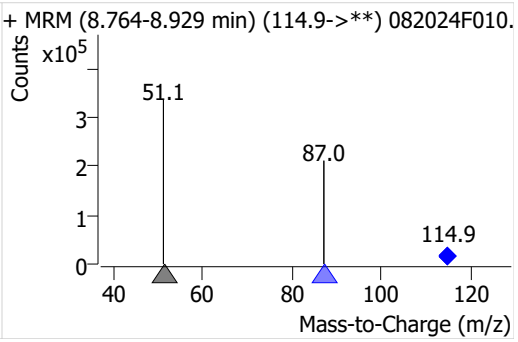




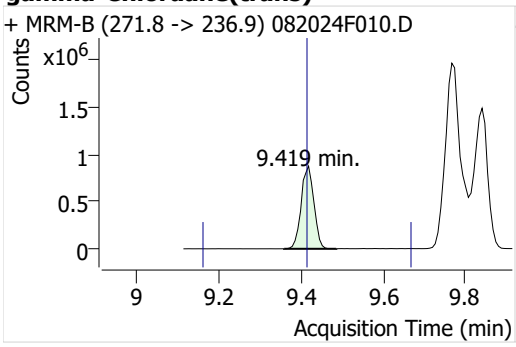
Oxychlordane

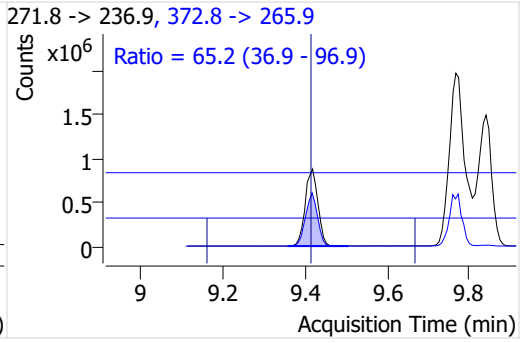


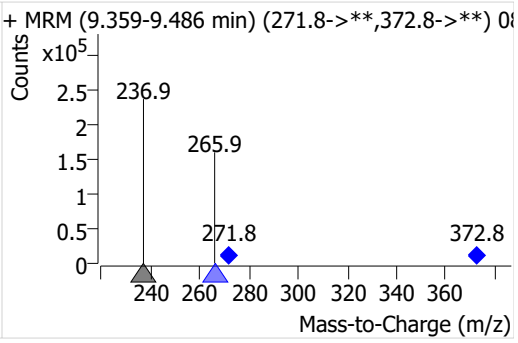




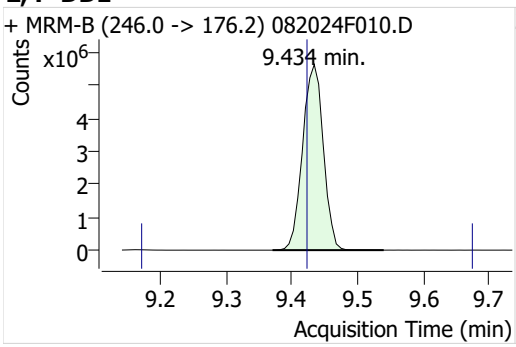
gamma-Chlordane(trans)

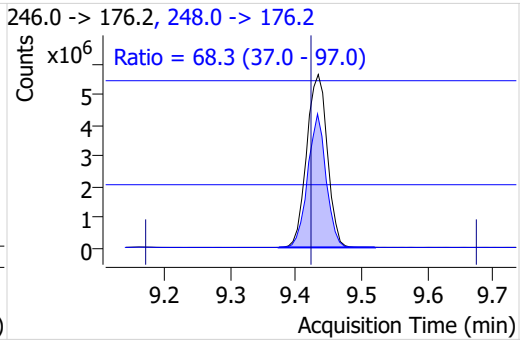


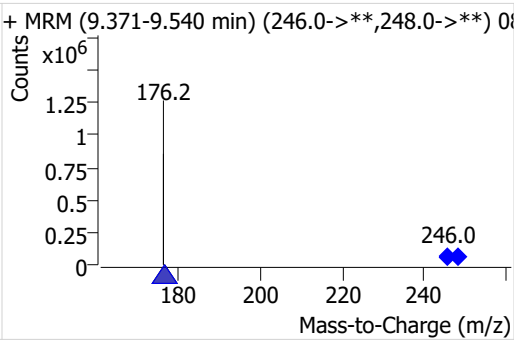




2,4'-DDE







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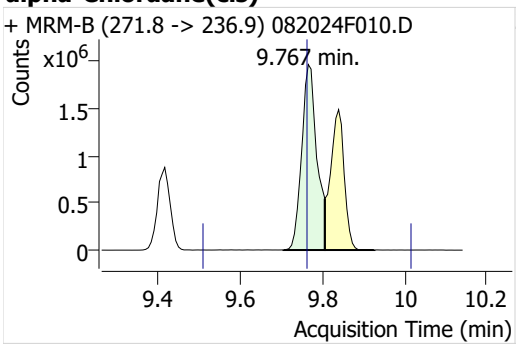
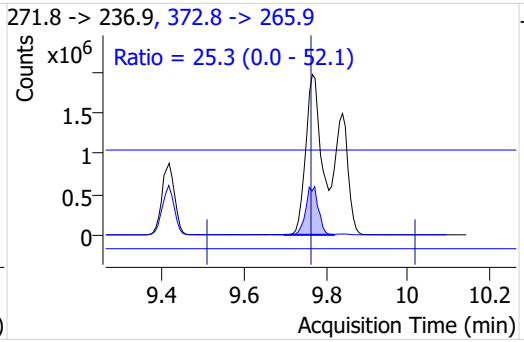
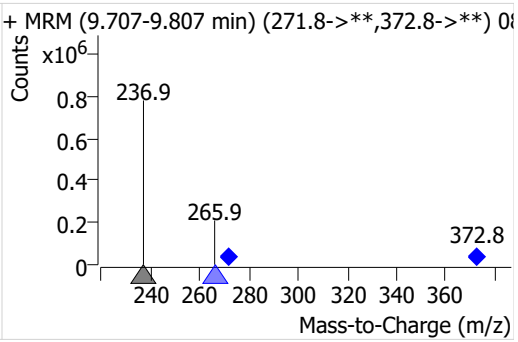
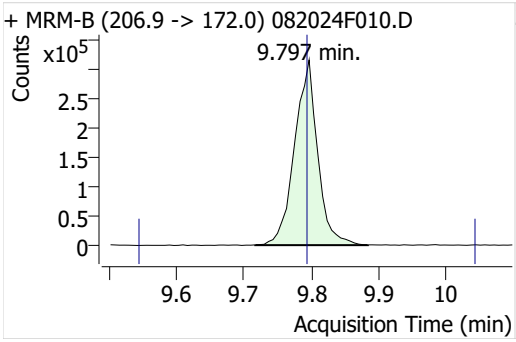
alpha-Chlordane(cis)

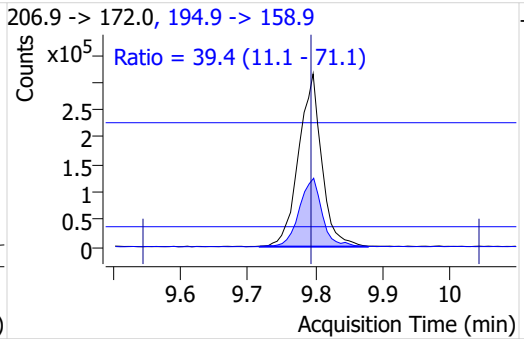


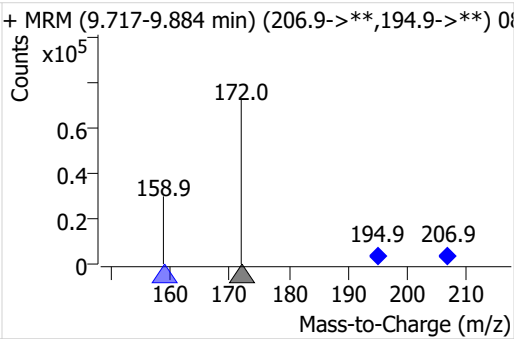




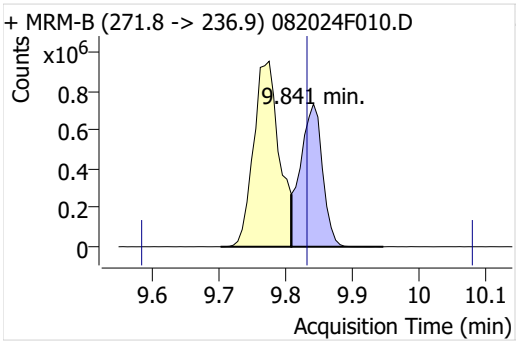
Endosulfan I

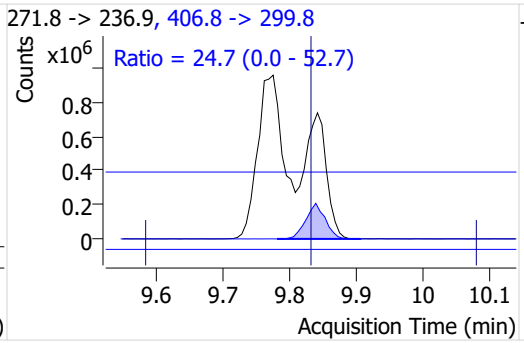


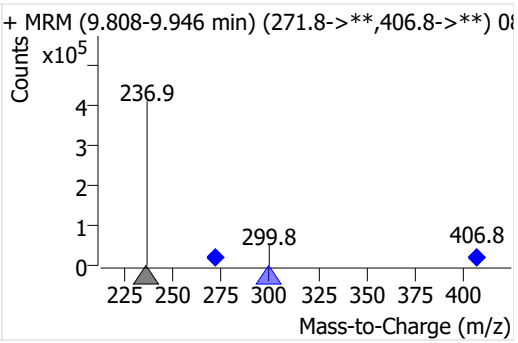




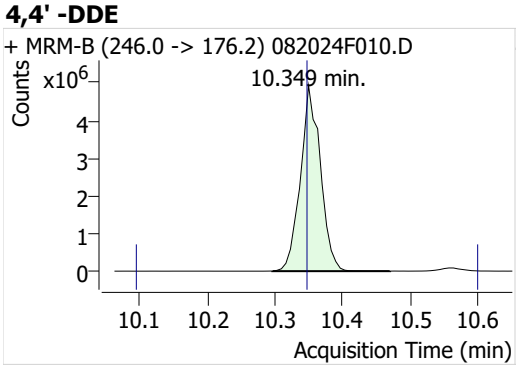
trans-Nanochlor

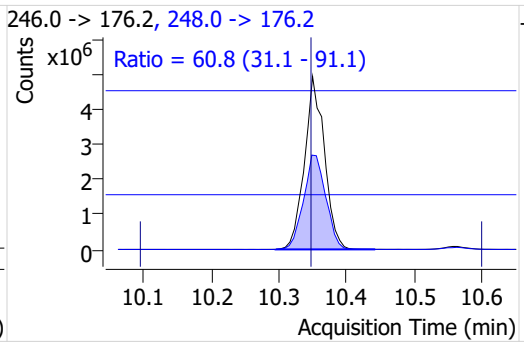


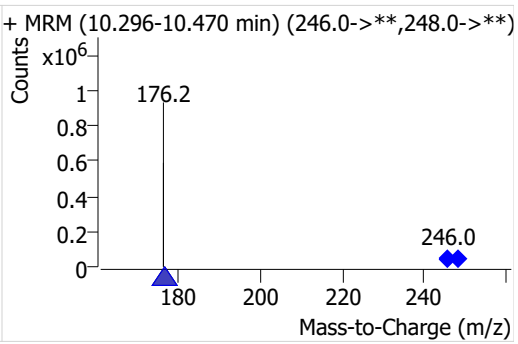




4,4' -DDE

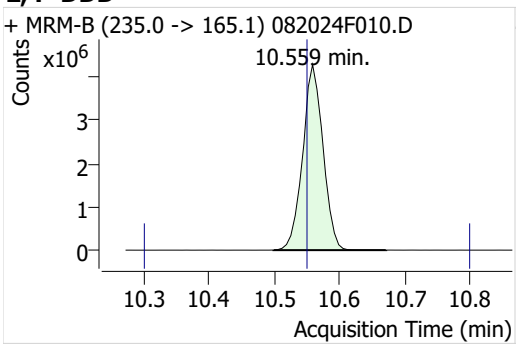


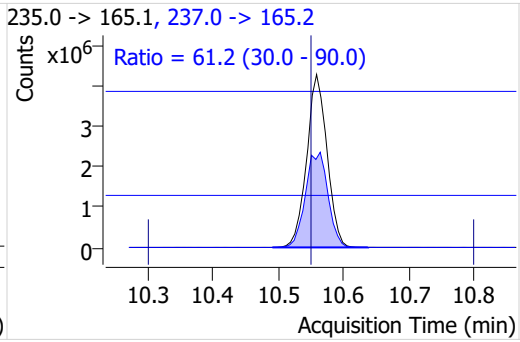


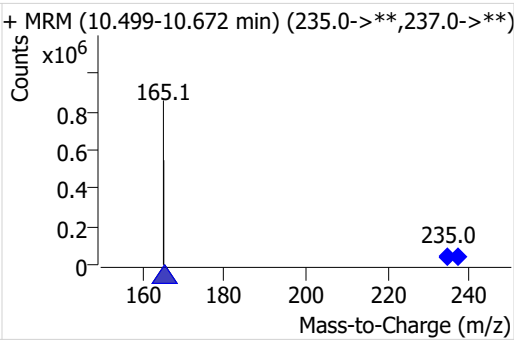


MassHunter Quantitative Analysis Sample Report

2,4'-DDD







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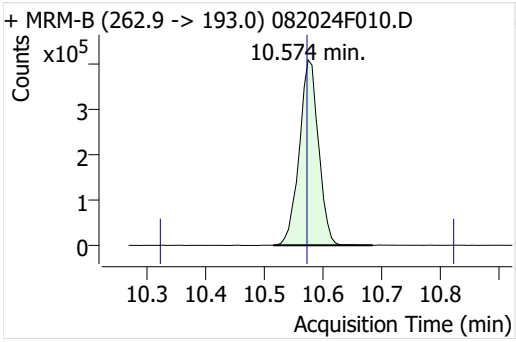
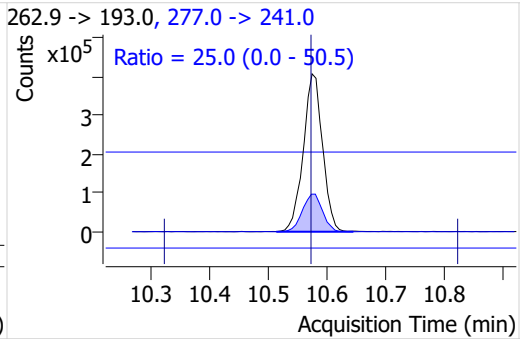
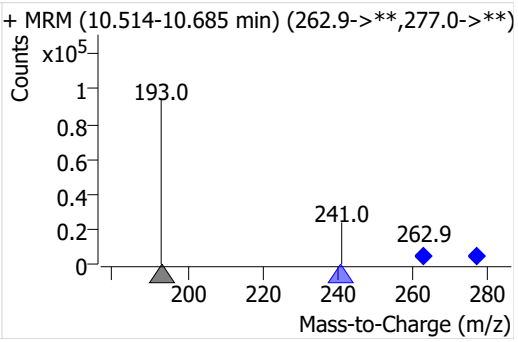
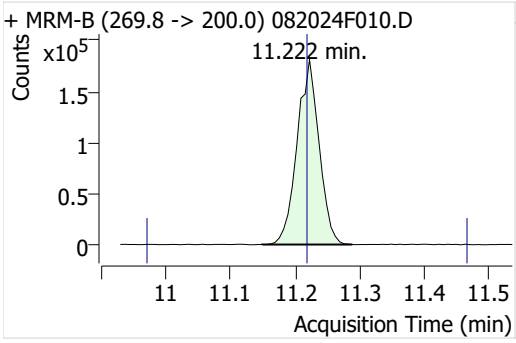
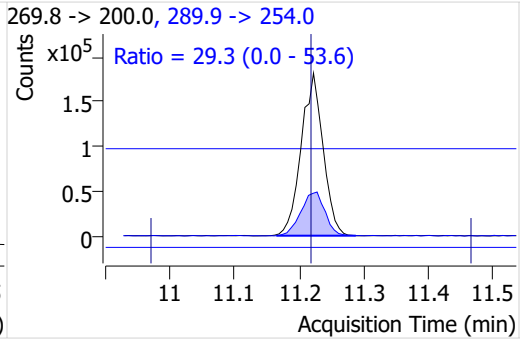


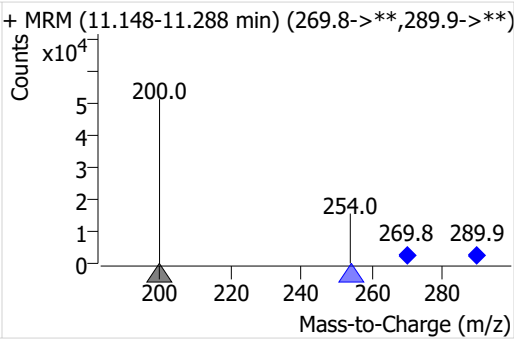




Endrin-13C12







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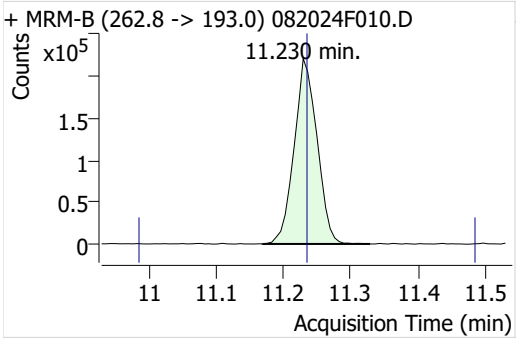
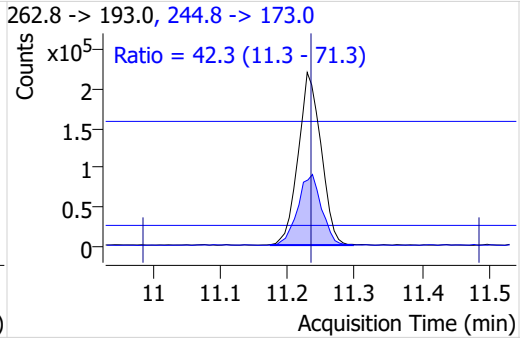
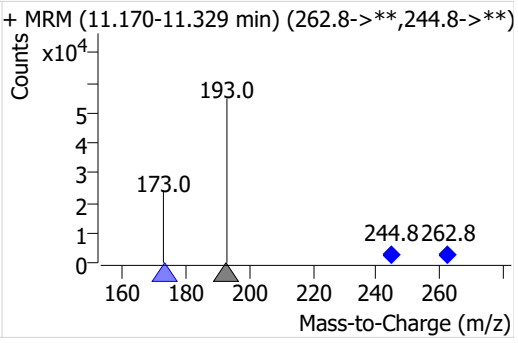
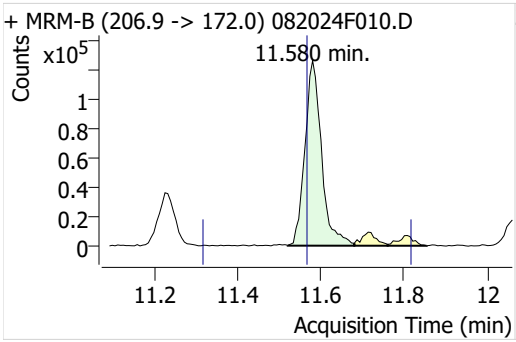


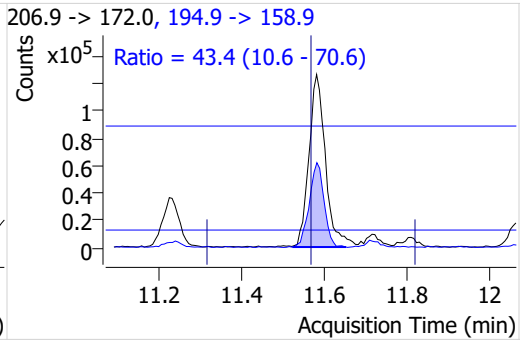


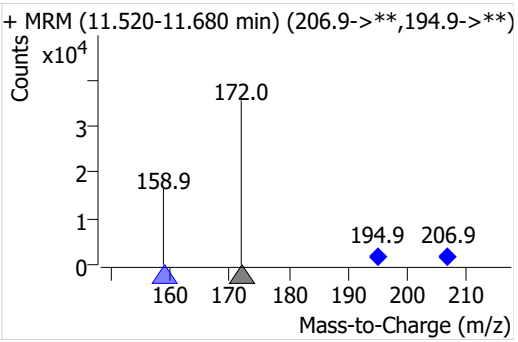


MassHunter Quantitative Analysis Sample Report

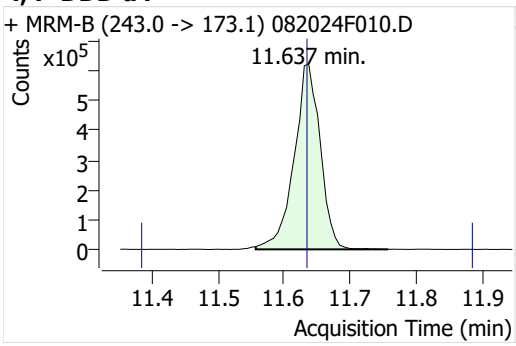
Endosulfan II

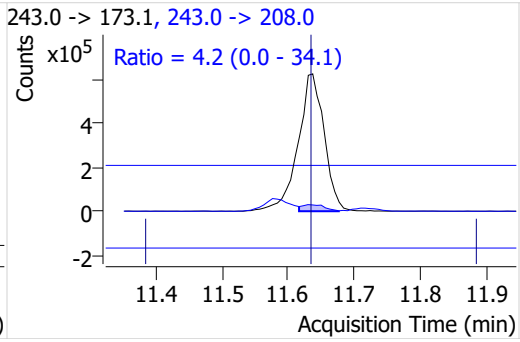


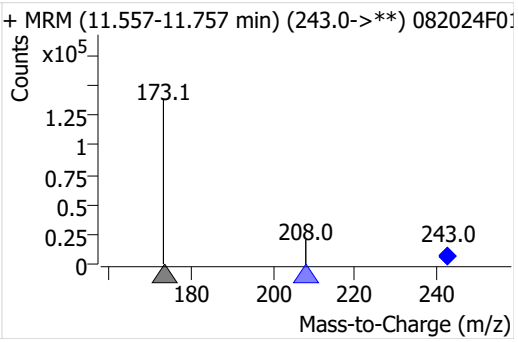




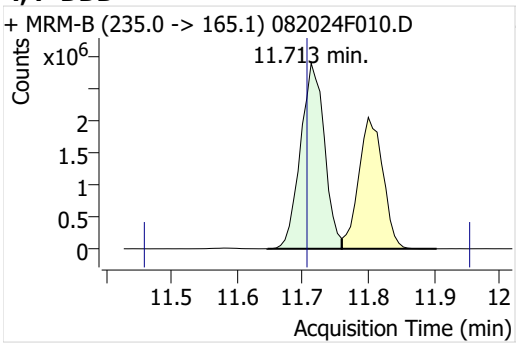
4,4'-DDD d4

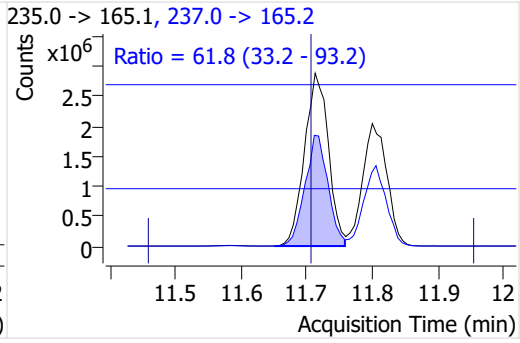


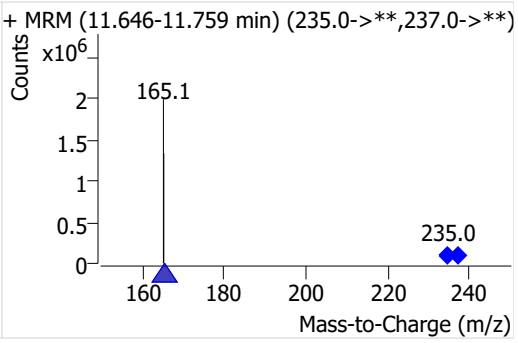




4,4'-DDD







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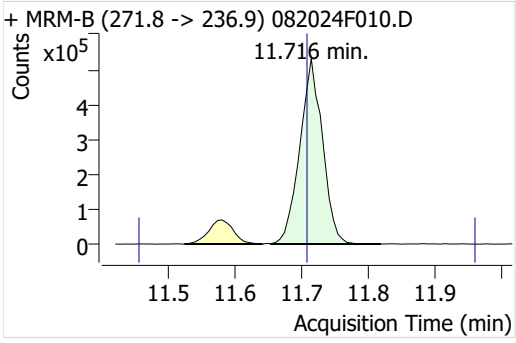
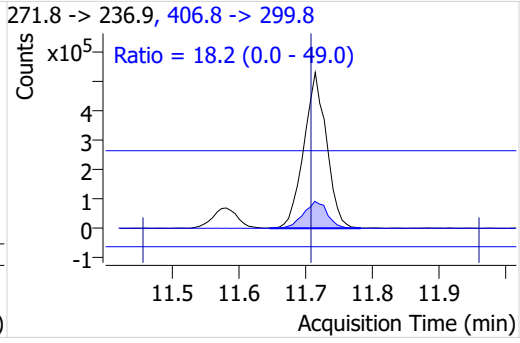
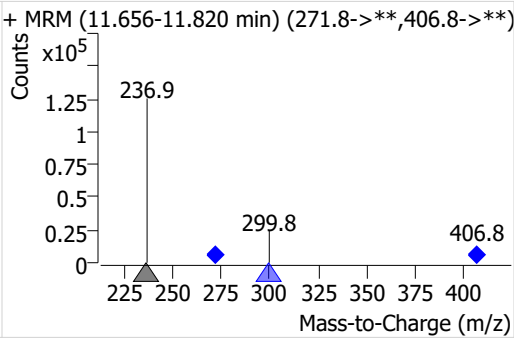
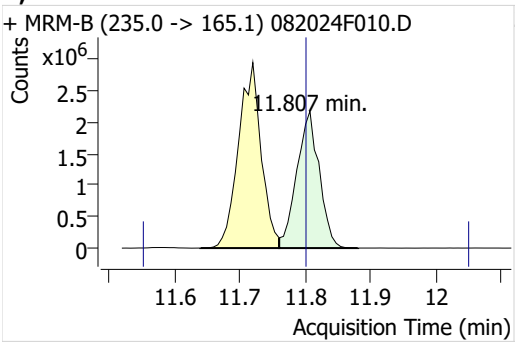


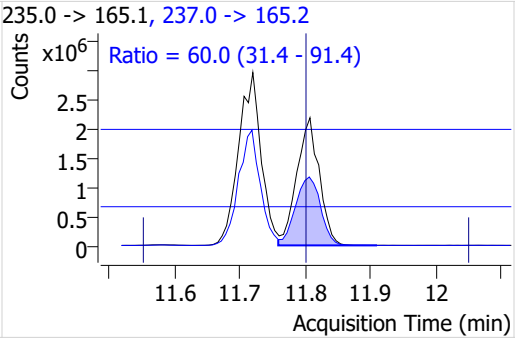


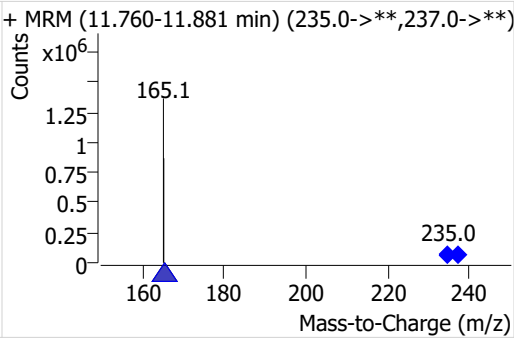


MassHunter Quantitative Analysis Sample Report

2,4'-DDT







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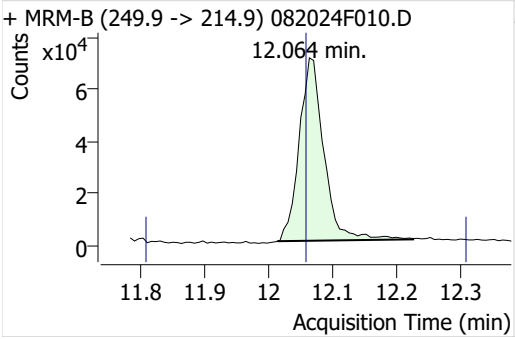
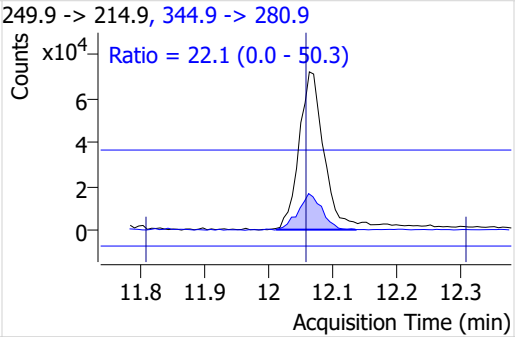
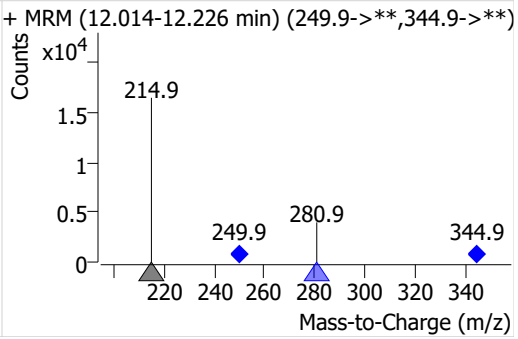
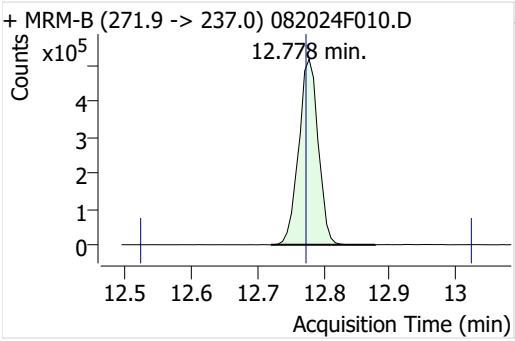
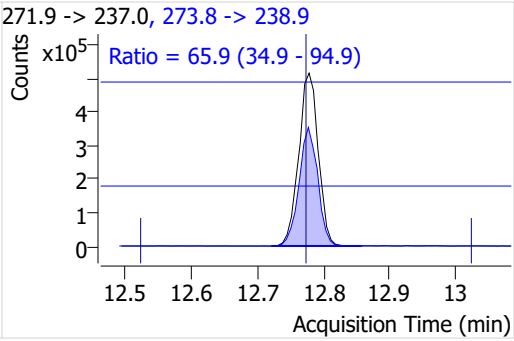


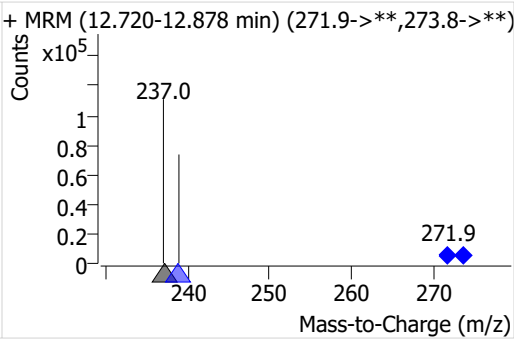




Endosulfan sulfate







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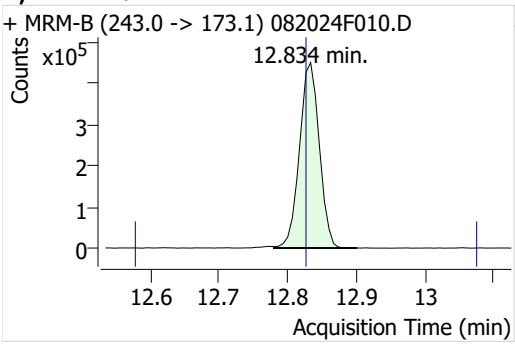

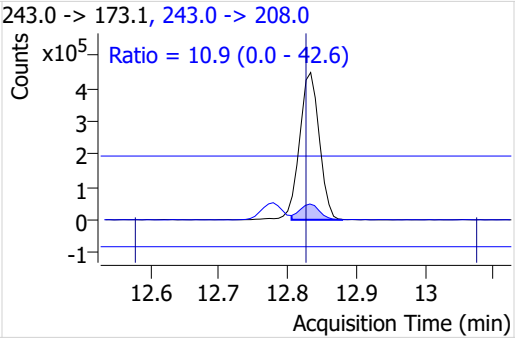

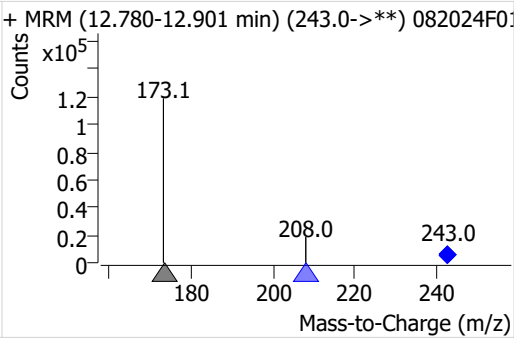

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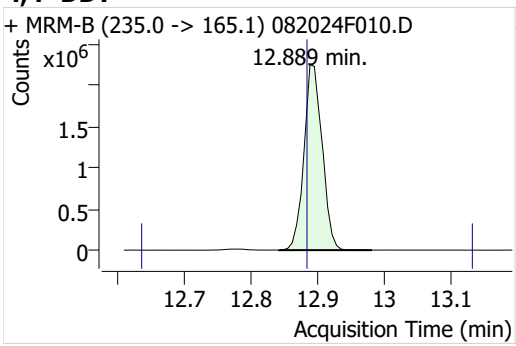
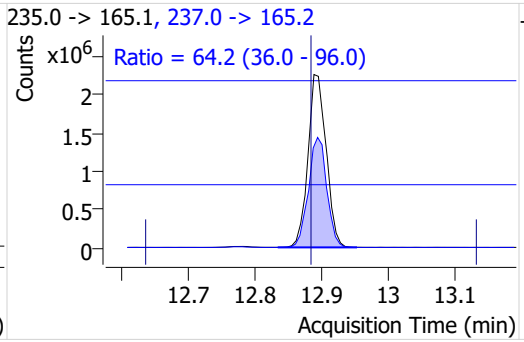
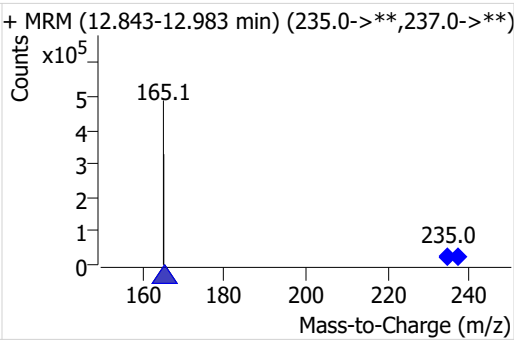
4,4'-DDT







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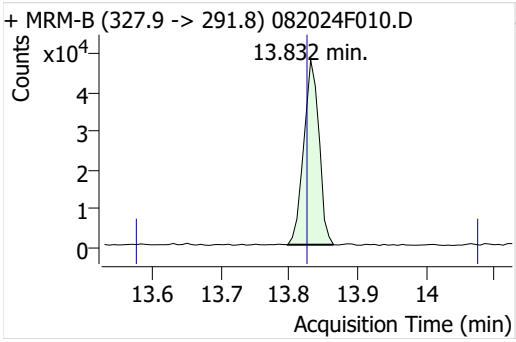
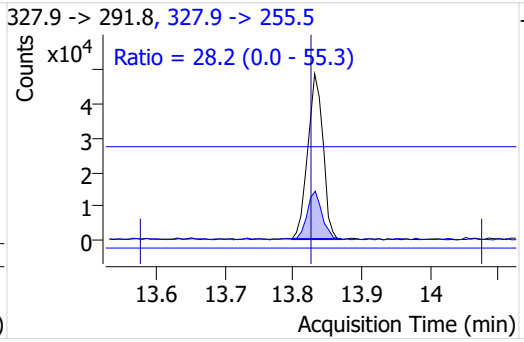
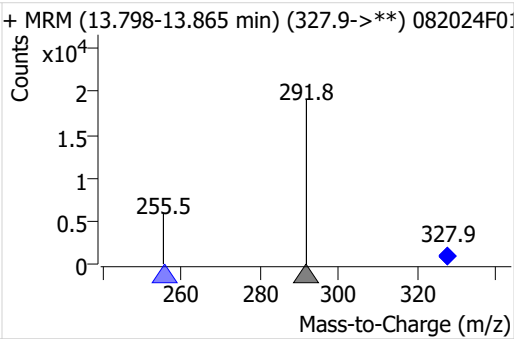
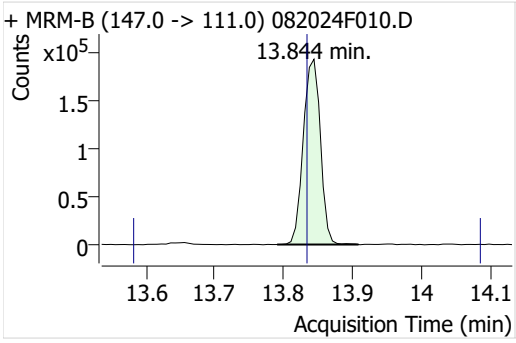
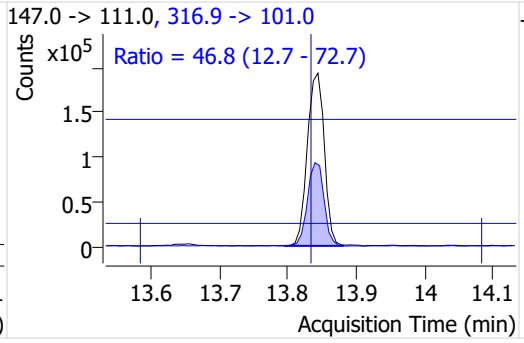


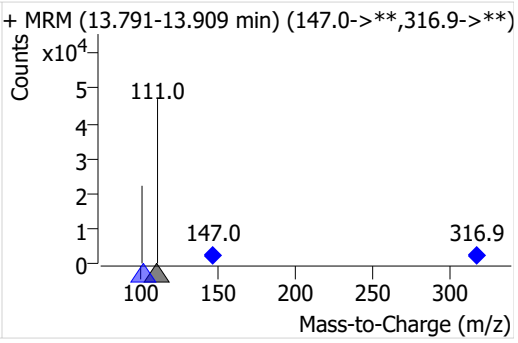




Endrin ketone







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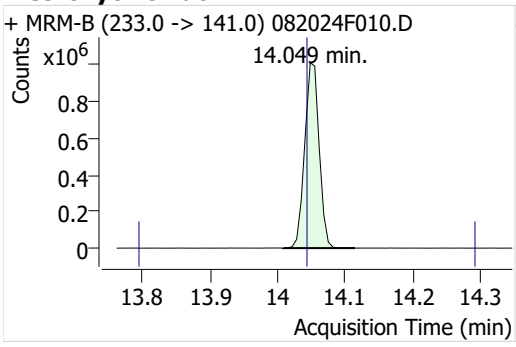
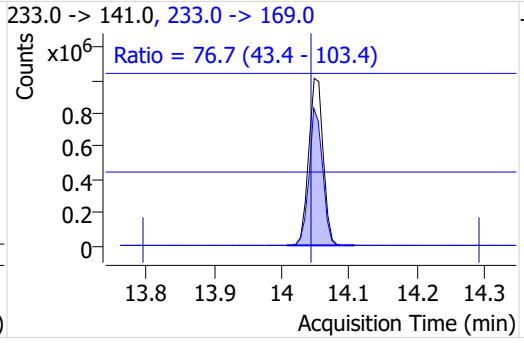
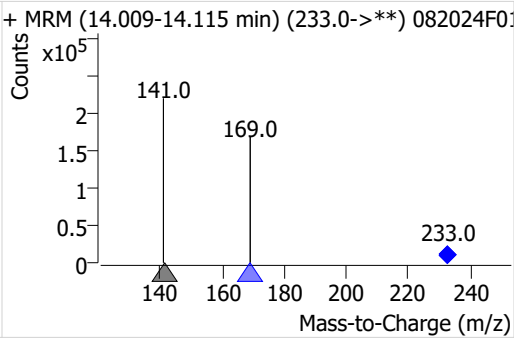
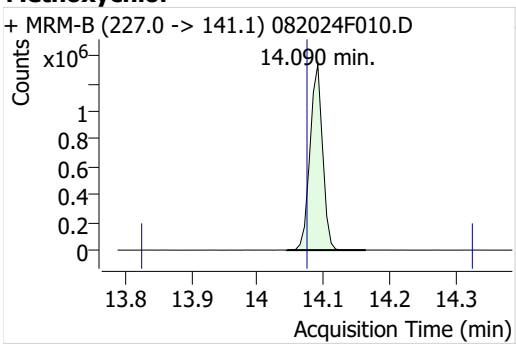


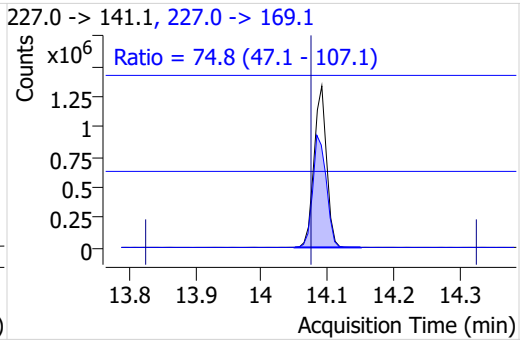


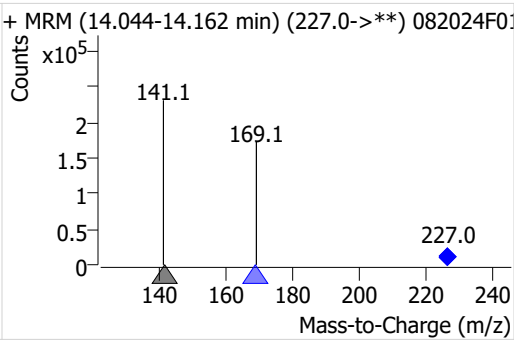


MassHunter Quantitative Analysis Sample Report

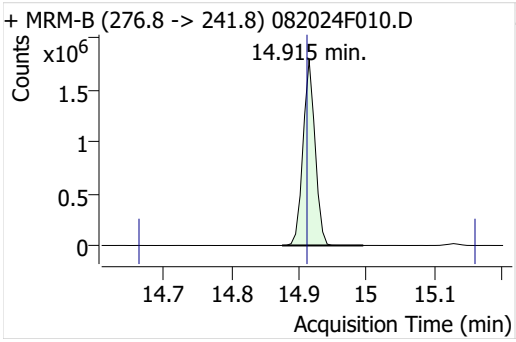
Methoxychlor

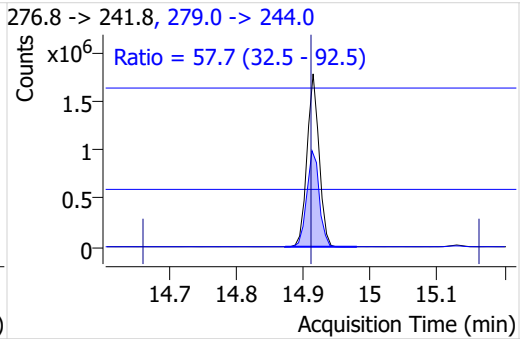


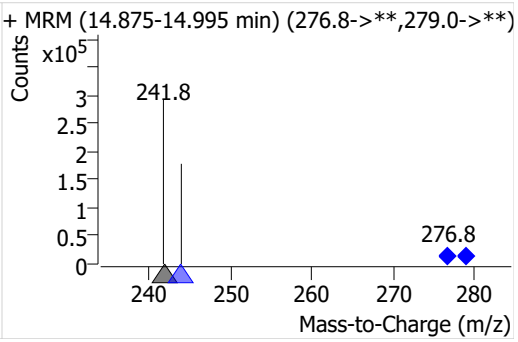




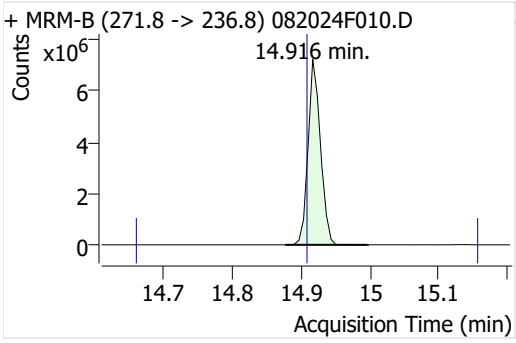
Mirex-13C10

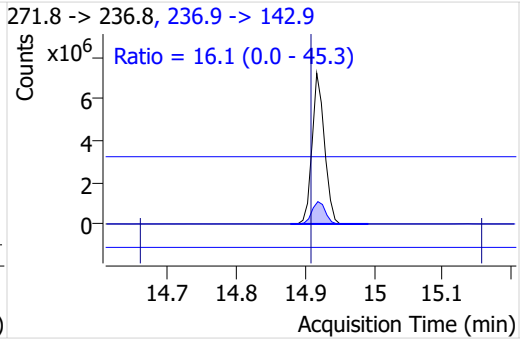


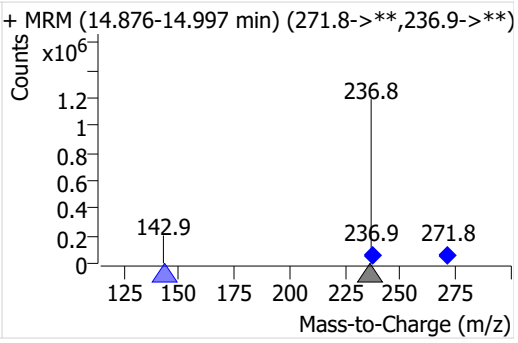




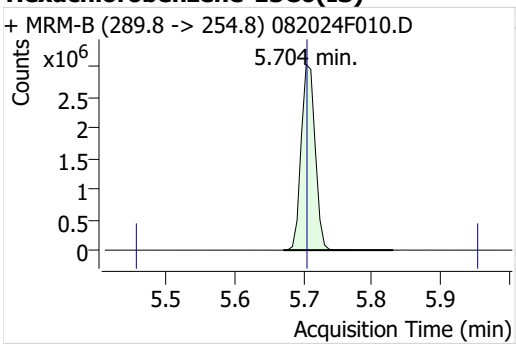
Mirex

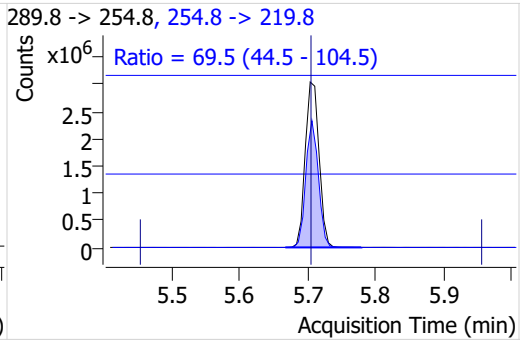


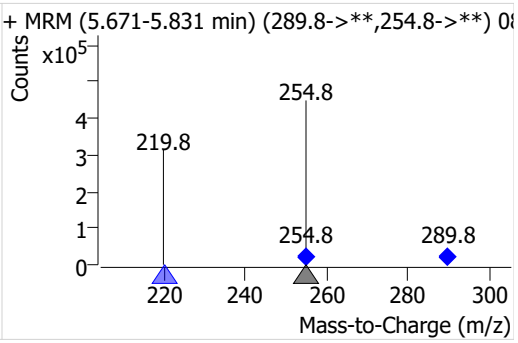




Hexachlorobenzene-13C6(IS)







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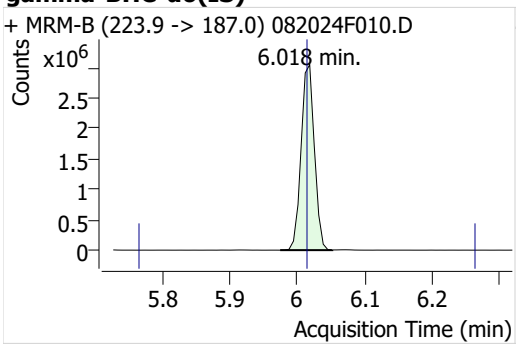
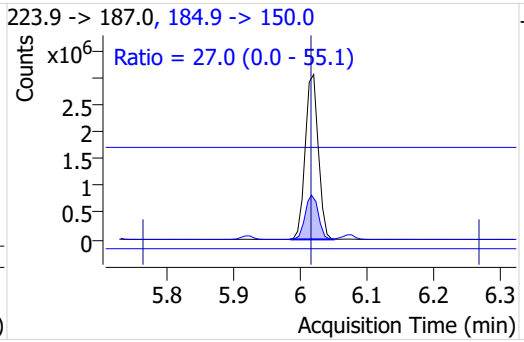
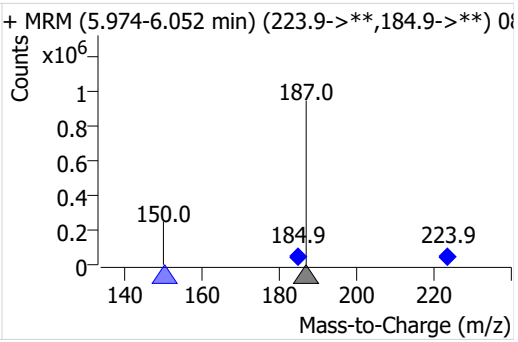
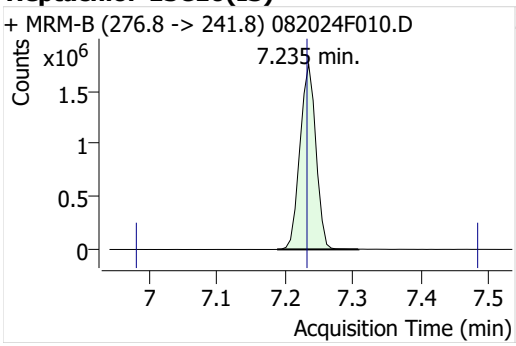
gamma-BHC-d6(IS)

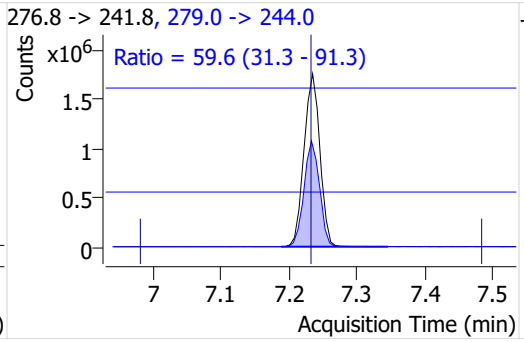


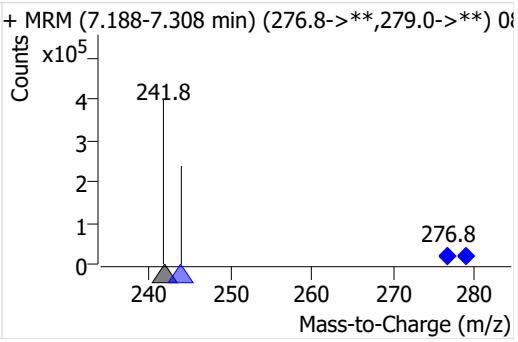




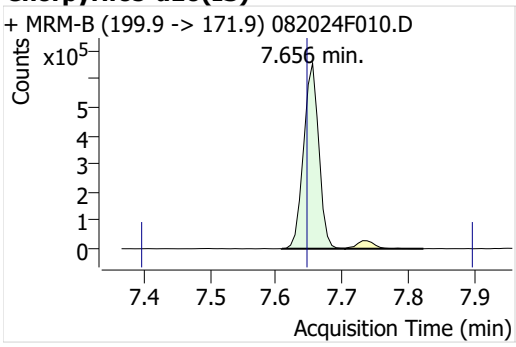
Heptachlor-13C10(IS)

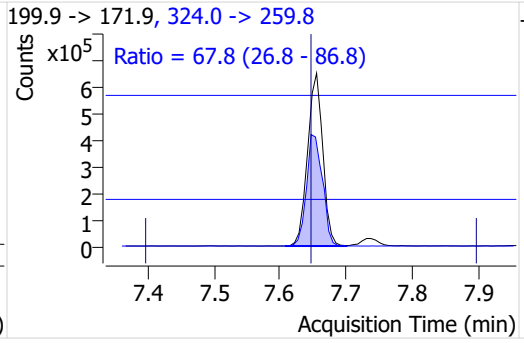


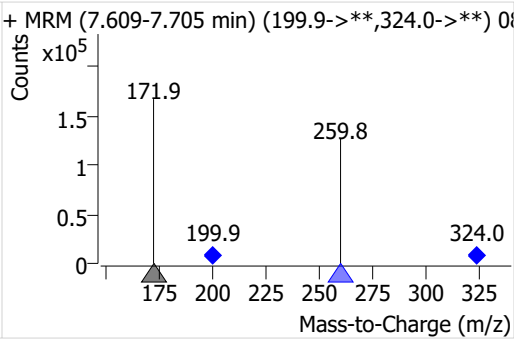




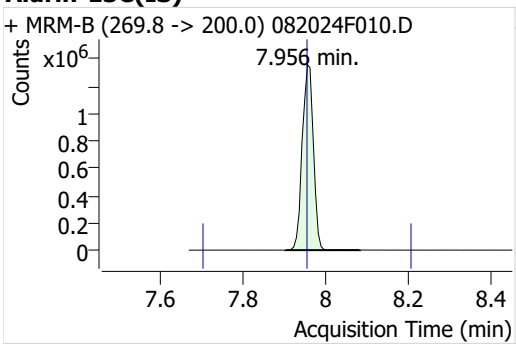
Chorpyrifos-d10(IS)

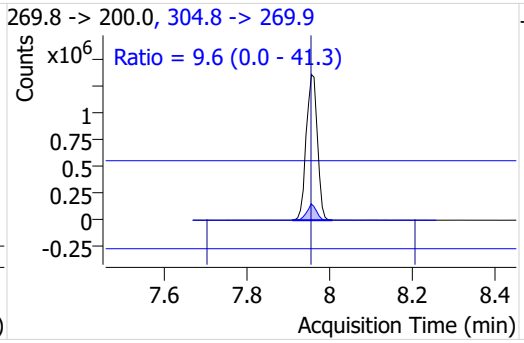


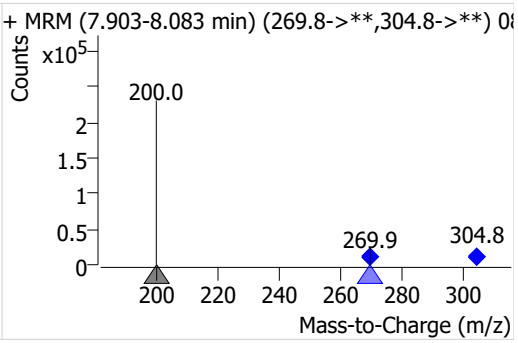




Aldrin-13C(IS)







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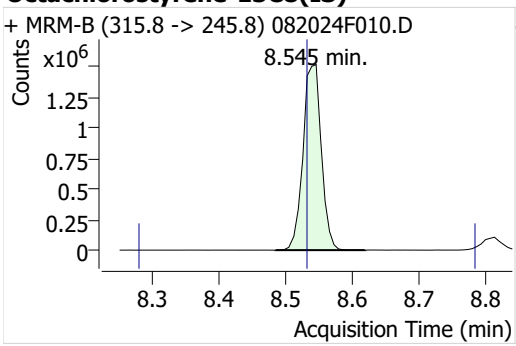
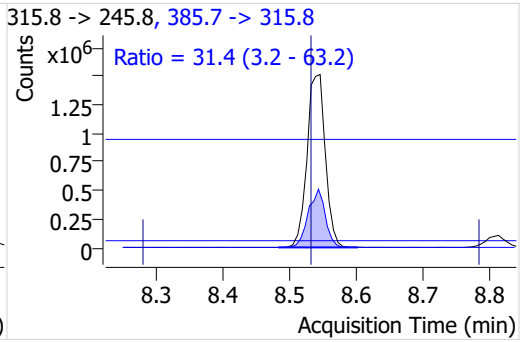
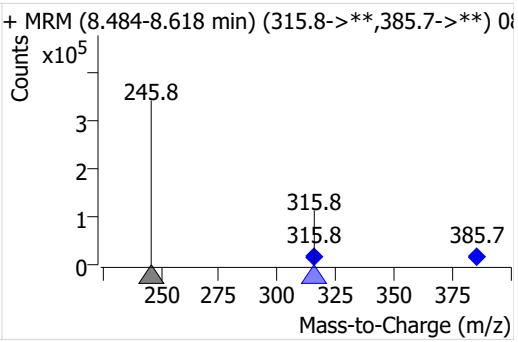
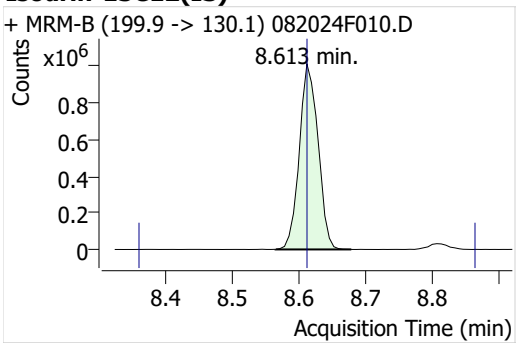
Octachlorostyrene-13C8(IS)

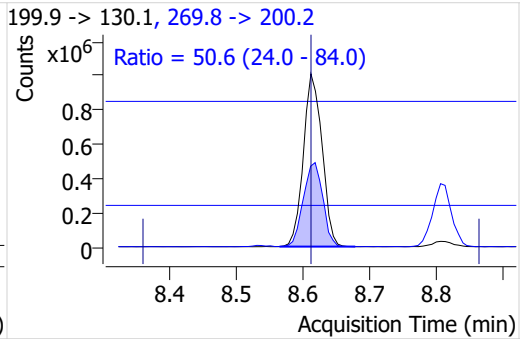


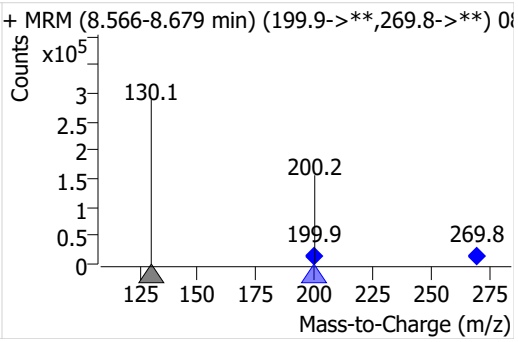




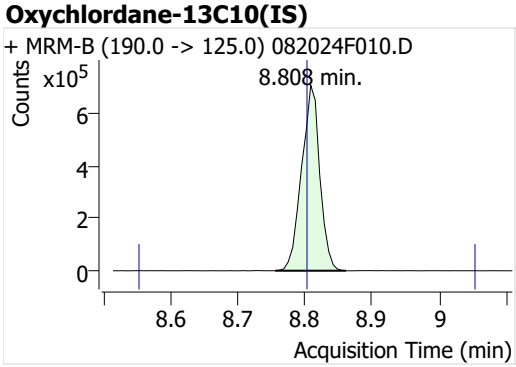
Isodrin-13C12(IS)

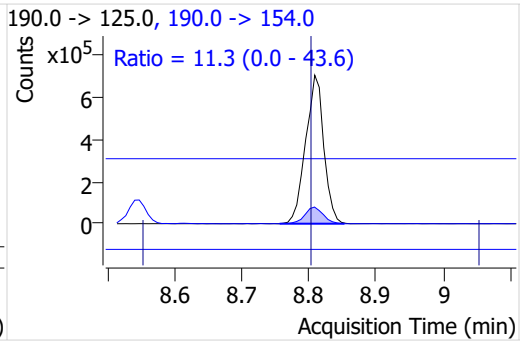


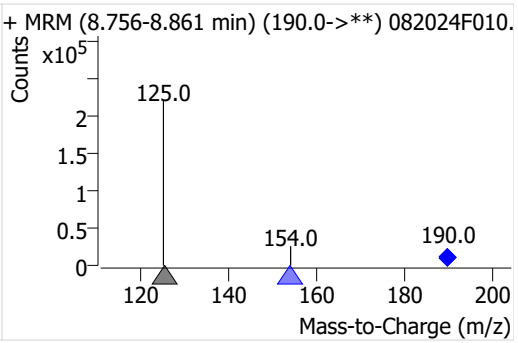




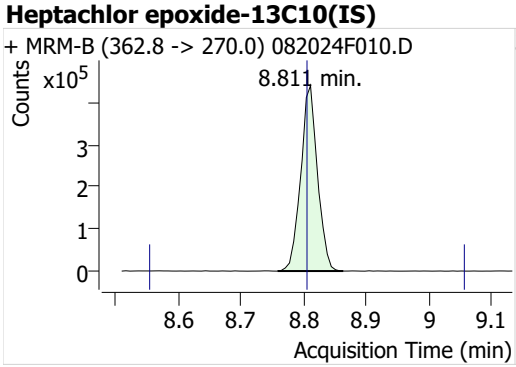
Oxychlordane-13C10(IS)

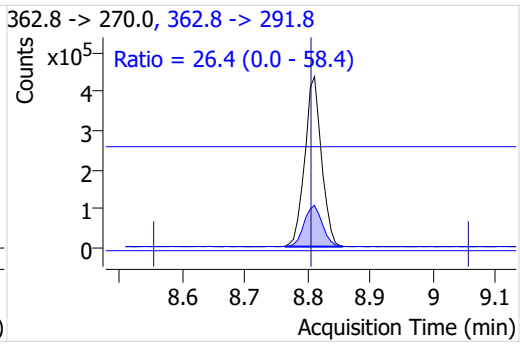


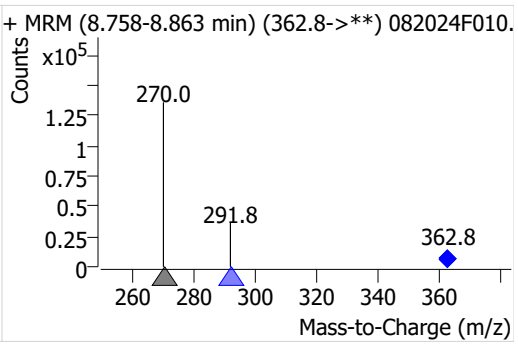




Heptachlor epoxide-13C10(IS)







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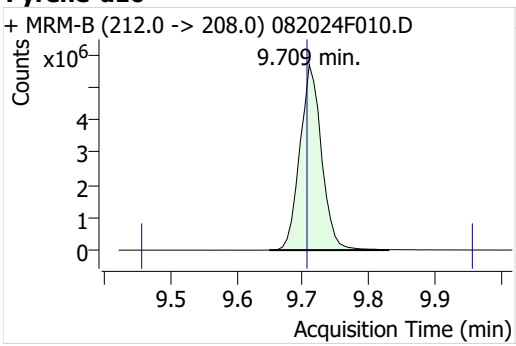
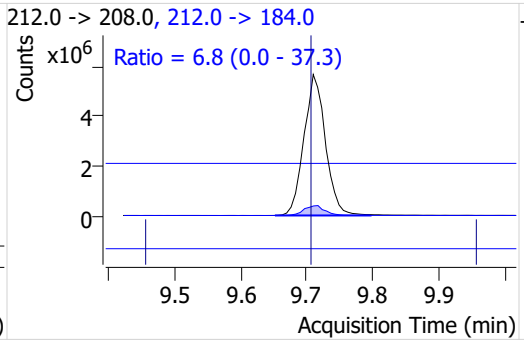
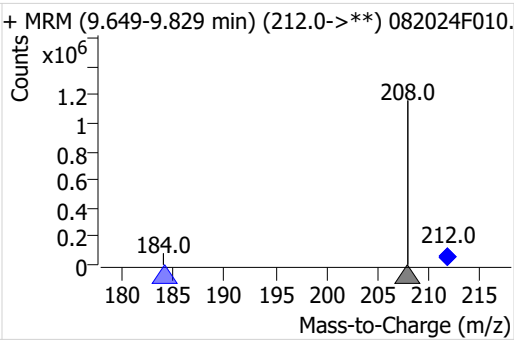
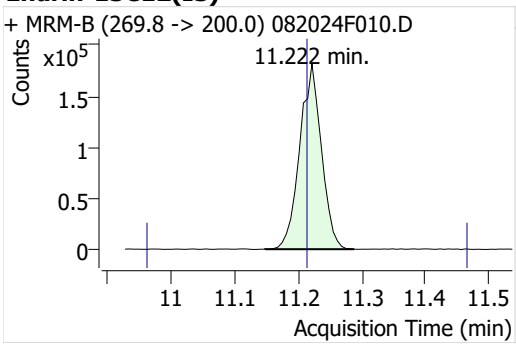
Pyrene-d10

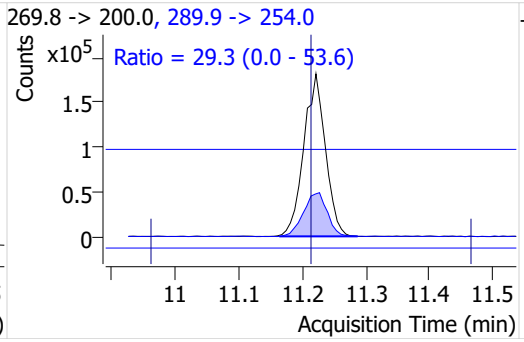


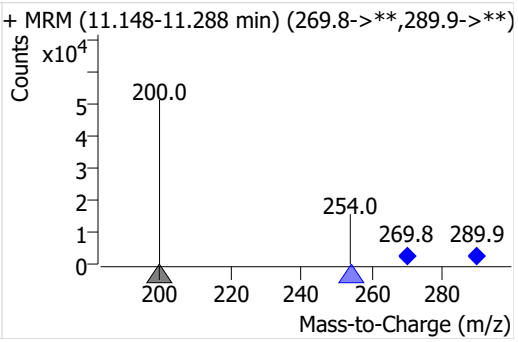




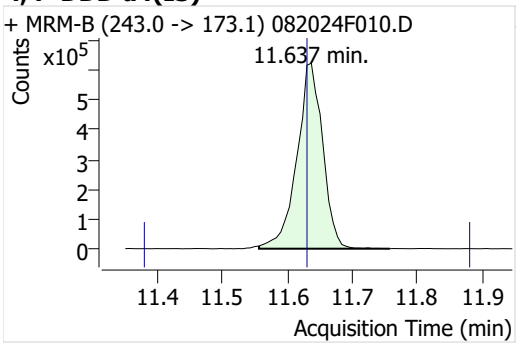
Endrin-13C12(IS)

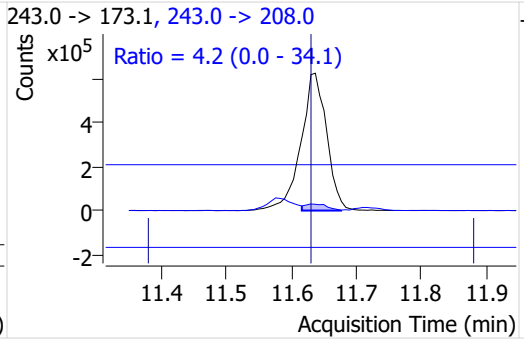


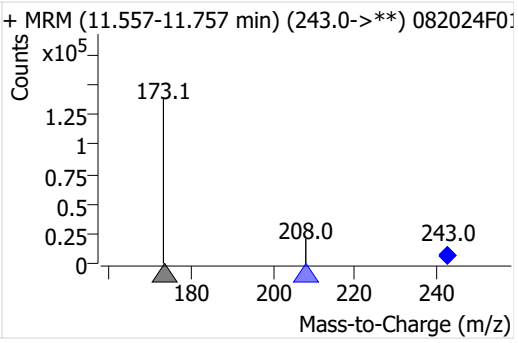




4,4'-DDD d4(IS)







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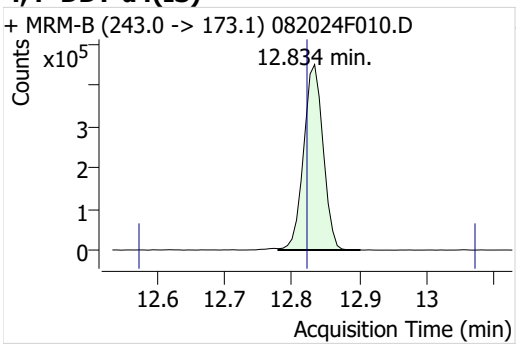

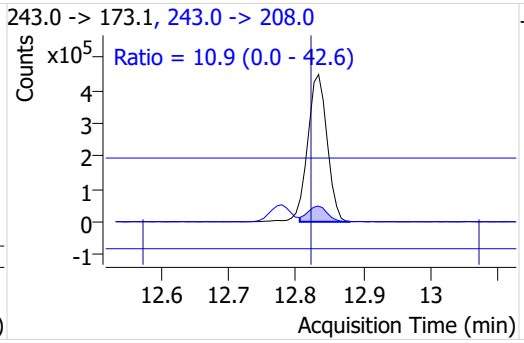

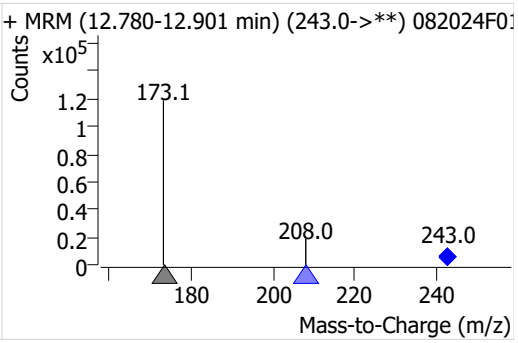

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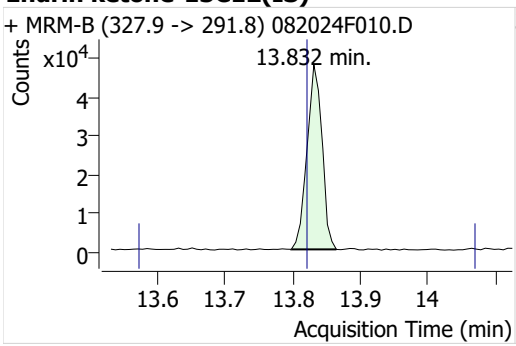
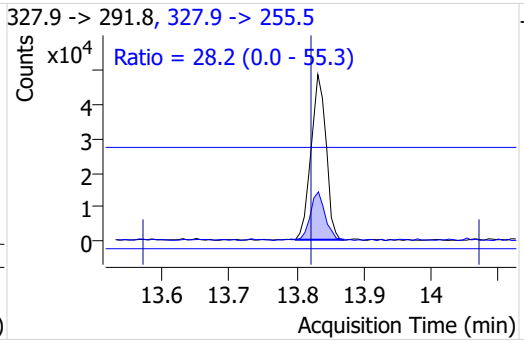
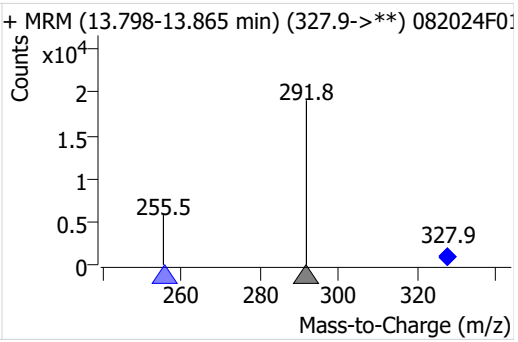
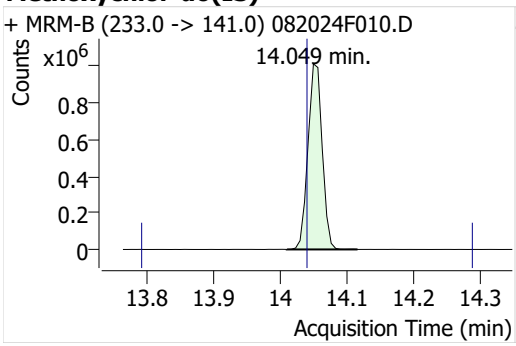
Endrin ketone-13C12(IS)

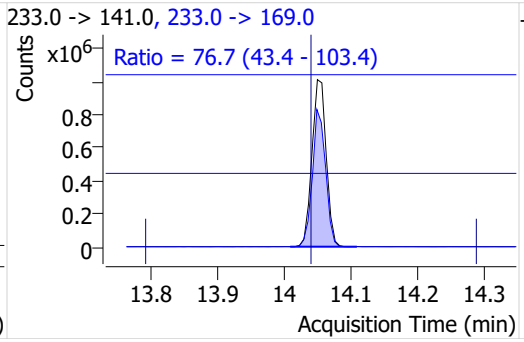


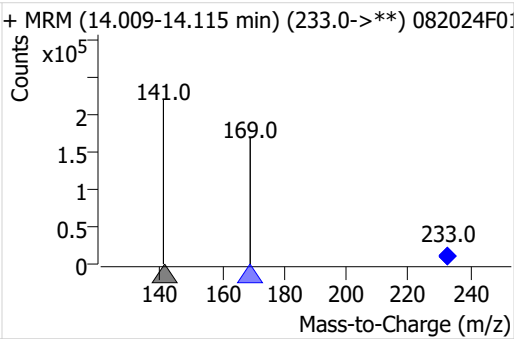




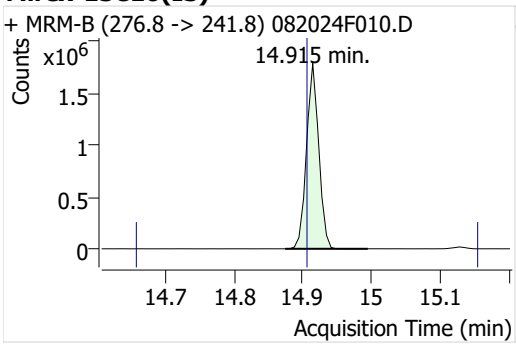
Methoxychlor-d6(IS)

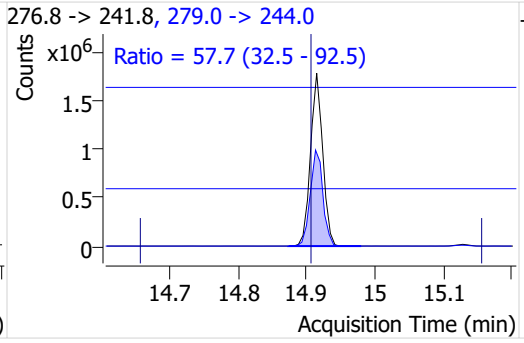


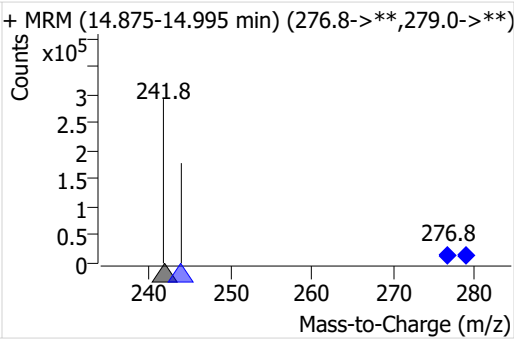




Mirex-13C10(IS)







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Info.		**Instrument Type**	QQQ
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Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.704	289.8 -> 254.8	4437911	20.0000 ng/ml	0.000
gamma-BHC-d6(IS)	6.018	223.9 -> 187.0	3982668	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	7.235	276.8 -> 241.8	2784469	20.0000 ng/ml	0.002
Chorpyrifos-d10(IS)	7.656	199.9 -> 171.9	983955	20.0000 ng/ml	0.008
Aldrin-13C(IS)	7.949	269.8 -> 200.0	2323262	20.0000 ng/ml	0.003
Octachlorostyrene-13C8(IS)	8.538	315.8 -> 245.8	2598566	20.0000 ng/ml	0.006
Isodrin-13C12(IS)	8.613	199.9 -> 130.1	1837081	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	8.808	190.0 -> 125.0	1263059	20.0000 ng/ml	0.005
Heptachlor epoxide-13C10(IS)	8.811	362.8 -> 270.0	777423	20.0000 ng/ml	0.005
Pyrene-d10	9.709	212.0 -> 208.0	12980659	100.0000 ng/ml	0.000
Endrin-13C12(IS)	11.222	269.8 -> 200.0	424281	20.0000 ng/ml	0.007
4,4'-DDD d4(IS)	11.630	243.0 -> 173.1	1721847	5.0000 ng/ml	0.024
4,4'-DDT-d4(IS)	12.834	243.0 -> 173.1	863556	5.0000 ng/ml	0.007
Endrin ketone-13C12(IS)	13.832	327.9 -> 291.8	72718	20.0000 ng/ml	0.007
Methoxychlor-d6(IS)	14.055	233.0 -> 141.0	1419308	20.0000 ng/ml	0.013
Mirex-13C10(IS)	14.915	276.8 -> 241.8	2186354	5.0000 ng/ml	0.008

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.705	289.8 -> 254.8	4437911	19.368 ng/ml	
		Spiked Amount =	20.0	Recovery =	*96.8 %*
gamma-BHC-d6	6.014	223.9 -> 187.0	3982668	18.279 ng/ml	
		Spiked Amount =	20.0	Recovery =	*91.4 %*
Heptachlor-13C10	7.232	276.8 -> 241.8	2784469	18.301 ng/ml	
		Spiked Amount =	20.0	Recovery =	*91.5 %*
Chorpyrifos-d10	7.647	199.9 -> 171.9	983955	18.781 ng/ml	
		Spiked Amount =	20.0	Recovery =	*93.9 %*
Aldrin-13C	7.955	269.8 -> 200.0	2322975	18.403 ng/ml	
		Spiked Amount =	20.0	Recovery =	*92.0 %*
Octachlorostyrene-13C8	8.531	315.8 -> 245.8	2598566	18.049 ng/ml	
		Spiked Amount =	20.0	Recovery =	*90.2 %*
Isodrin-13C12	8.613	199.9 -> 130.1	1837081	18.712 ng/ml	
		Spiked Amount =	20.0	Recovery =	*93.6 %*
Oxychlordane-13C10	8.803	190.0 -> 125.0	1263059	18.811 ng/ml	
		Spiked Amount =	20.0	Recovery =	*94.1 %*
Heptachlor epoxide-13C10	8.805	362.8 -> 270.0	777423	19.587 ng/ml	
		Spiked Amount =	20.0	Recovery =	*97.9 %*
Endrin-13C12	11.214	269.8 -> 200.0	424281	19.295 ng/ml	
		Spiked Amount =	20.0	Recovery =	*96.5 %*
4,4'-DDD d4	11.630	243.0 -> 173.1	1721847	4.931 ng/ml	
		Spiked Amount =	5.0	Recovery =	*98.6 %*
4,4'-DDT-d4	12.822	243.0 -> 173.1	863556	4.766 ng/ml	
		Spiked Amount =	5.0	Recovery =	*95.3 %*
Endrin ketone-13C12	13.821	327.9 -> 291.8	72718	18.559 ng/ml	
		Spiked Amount =	20.0	Recovery =	*92.8 %*
Methoxychlor-d6	14.039	233.0 -> 141.0	1419308	18.256 ng/ml	
		Spiked Amount =	20.0	Recovery =	*91.3 %*

MassHunter Quantitative Analysis Sample Report

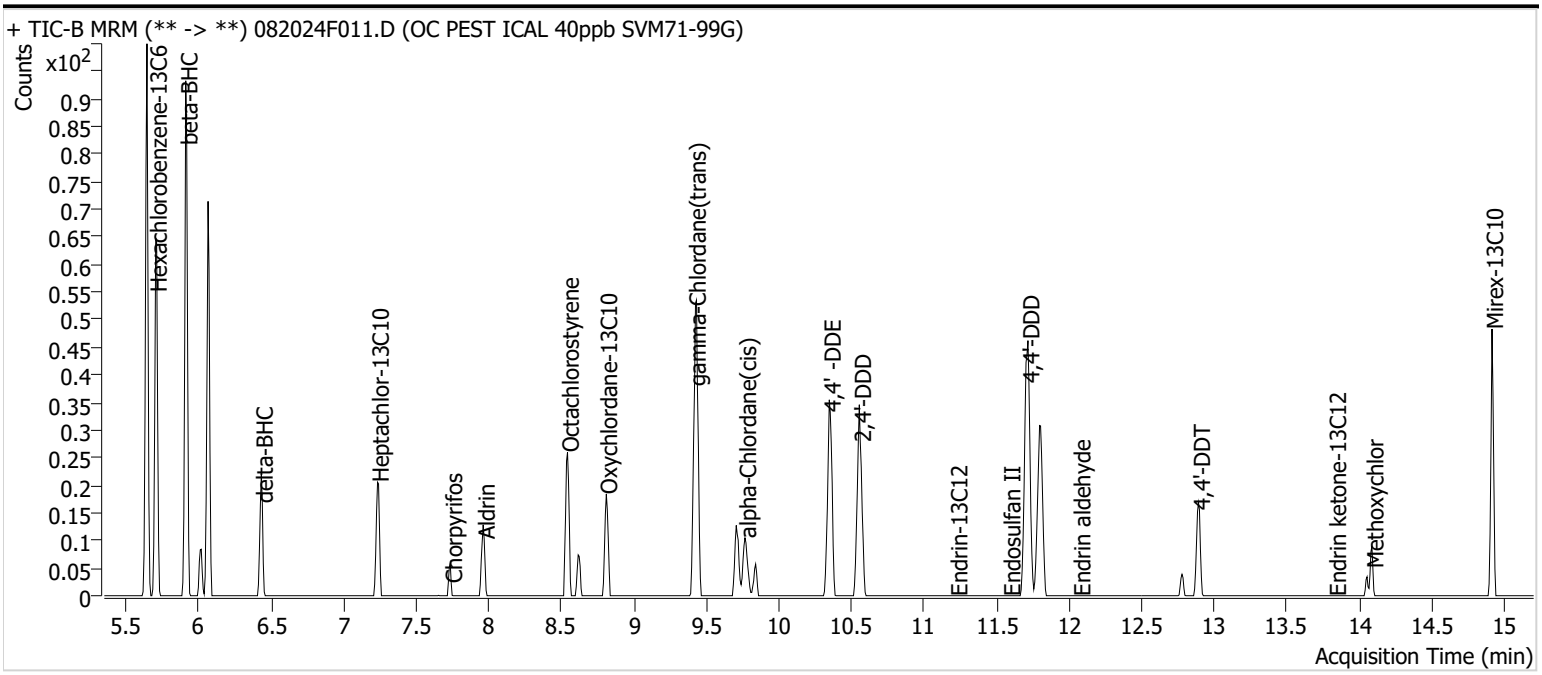
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.906	276.8 -> 241.8	2186354	4.805 ng/ml
		Spiked Amount =	5.0	Recovery = *96.1 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)	5.649	181.1 -> 145.1	28586341	42.787 ng/ml	98
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.713	283.8 -> 213.9	15070889	39.085 ng/ml	98
beta-BHC	gamma-BHC-d6(IS)	5.916	181.1 -> 145.1	26463286	42.441 ng/ml	99
gamma-BHC(Lindane)	gamma-BHC-d6(IS)	6.070	181.1 -> 145.1	21289581	41.456 ng/ml	99
delta-BHC	gamma-BHC-d6(IS)	6.436	181.1 -> 145.1	7471673	40.692 ng/ml	79
Heptachlor	Heptachlor-13C10(IS)	7.245	271.7 -> 236.9	5614679	39.356 ng/ml	97
Chorpyrifos	Chorpyrifos-d10(IS)	7.740	196.9 -> 169.0	2489960	39.917 ng/ml	98
Aldrin	Aldrin-13C(IS)	7.964	254.9 -> 220.0	3465065	39.970 ng/ml	96
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.544	342.8 -> 307.8	11403978	43.294 ng/ml	100
Isodrin	Isodrin-13C12(IS)	8.627	193.0 -> 123.0	4183654	41.431 ng/ml	99
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	8.818	352.8 -> 262.9	1707672	39.352 ng/ml	93
Oxychlordane	Oxychlordane-13C10(IS)	8.816	114.9 -> 51.1	6345773	40.827 ng/ml	97
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.419	271.8 -> 236.9	3752346	41.786 ng/ml	94
2,4'-DDE	4,4'-DDD d4(IS)	9.434	246.0 -> 176.2	23385568	37.885 ng/ml	99
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.767	271.8 -> 236.9	9565617	42.412 ng/ml	95
Endosulfan I	Endrin-13C12(IS)	9.797	206.9 -> 172.0	1408970	41.012 ng/ml	100
trans-Nanochlor	Oxychlordane-13C10(IS)	9.841	271.8 -> 236.9	3576109	45.730 ng/ml	99
4,4' -DDE	4,4'-DDD d4(IS)	10.349	246.0 -> 176.2	19124636	41.615 ng/ml	99
2,4'-DDD	4,4'-DDD d4(IS)	10.559	235.0 -> 165.1	16917939	39.140 ng/ml	92
Dieldrin	Endrin-13C12(IS)	10.581	262.9 -> 193.0	1845567	41.652 ng/ml	92
Endrin	Endrin-13C12(IS)	11.236	262.8 -> 193.0	939292	37.834 ng/ml	97
Endosulfan II	Endrin-13C12(IS)	11.587	206.9 -> 172.0	658048	38.981 ng/ml	91
4,4'-DDD	4,4'-DDD d4(IS)	11.719	235.0 -> 165.1	13530174	38.941 ng/ml	97
cis-Nonachlor	Oxychlordane-13C10(IS)	11.723	271.8 -> 236.9	2363853	41.517 ng/ml	98
2,4'-DDT	4,4'-DDT-d4(IS)	11.800	235.0 -> 165.1	9377908	39.338 ng/ml	96
Endrin aldehyde	Endrin-13C12(IS)	12.071	249.9 -> 214.9	367230	39.886 ng/ml	97
Endosulfan sulfate	Endrin-13C12(IS)	12.778	271.9 -> 237.0	2246906	43.214 ng/ml	97
4,4'-DDT	4,4'-DDT-d4(IS)	12.896	235.0 -> 165.1	8206008	40.814 ng/ml	96
Endrin ketone	Endrin ketone-13C12(IS)	13.844	147.0 -> 111.0	608618	38.089 ng/ml	91
Methoxychlor	Methoxychlor-d6(IS)	14.090	227.0 -> 141.1	3096387	40.792 ng/ml	97
Mirex	Mirex-13C10(IS)	14.916	271.8 -> 236.8	16622334	37.652 ng/ml	97

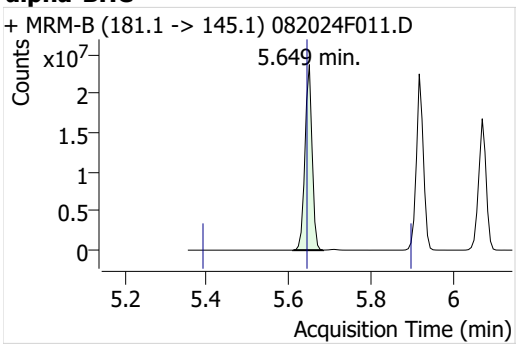
(m) = manual integration ND = Not Detected NC = Not Calculated

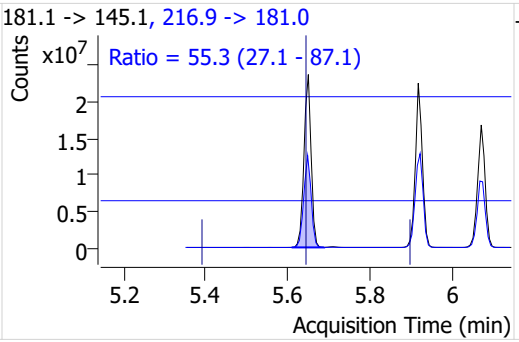
Sample Chromatogram

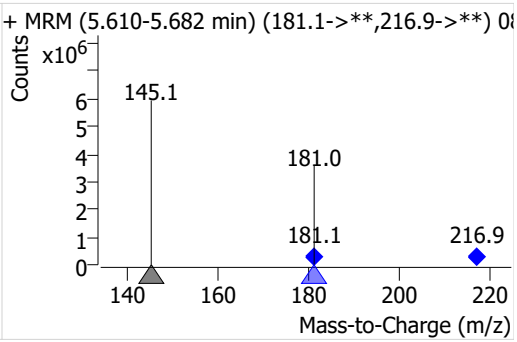
MassHunter Quantitative Analysis Sample Report



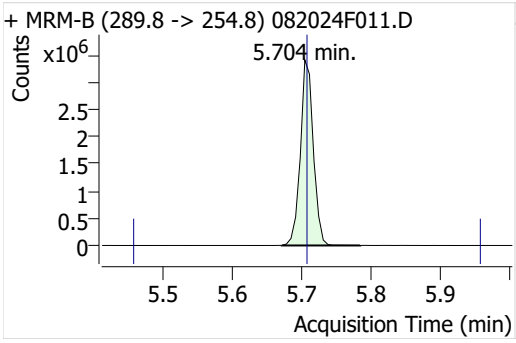
alpha-BHC

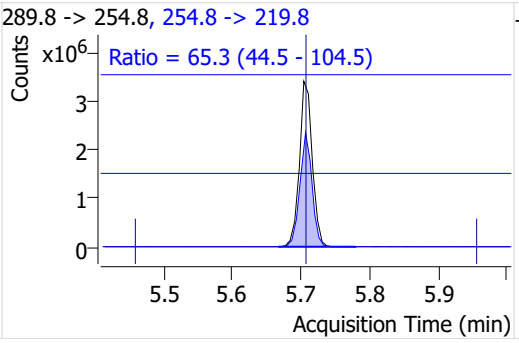


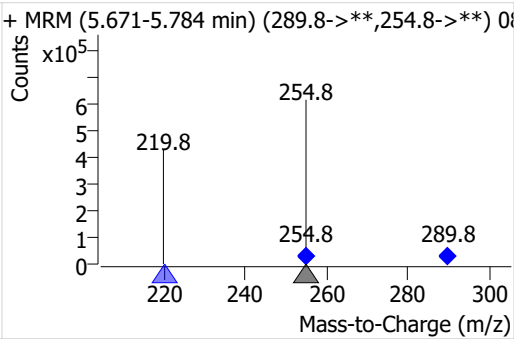




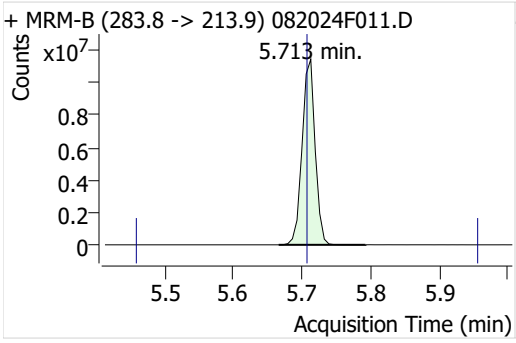
Hexachlorobenzene-13C6

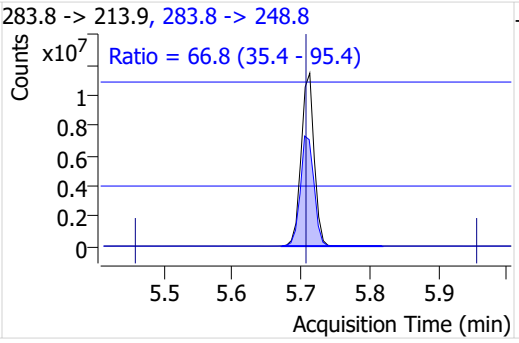


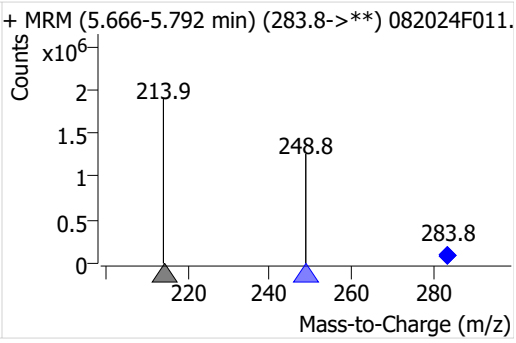




Hexachlorobenzene

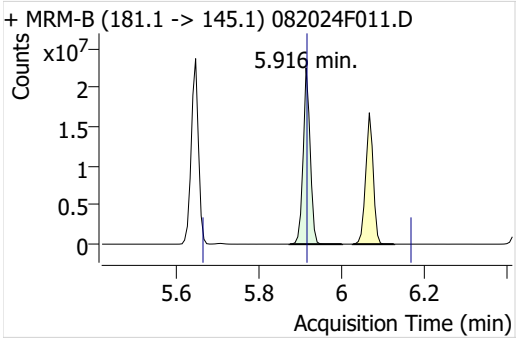


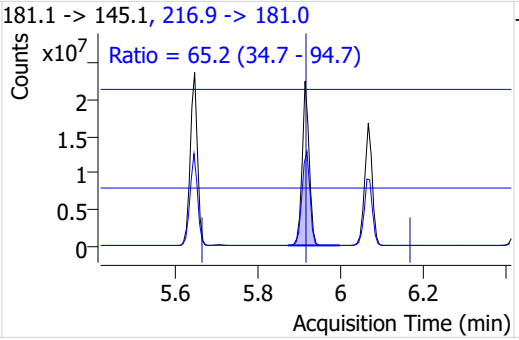


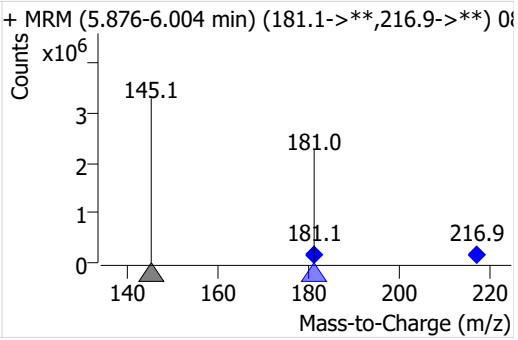


MassHunter Quantitative Analysis Sample Report

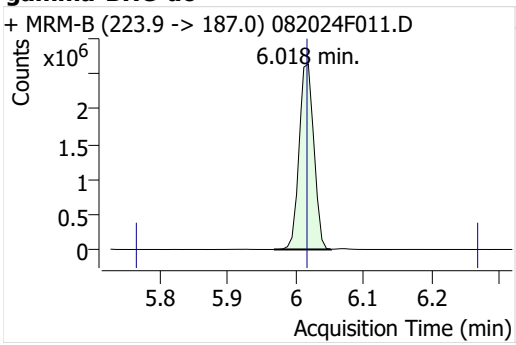
beta-BHC

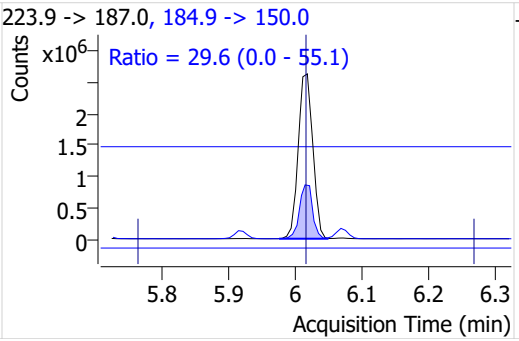


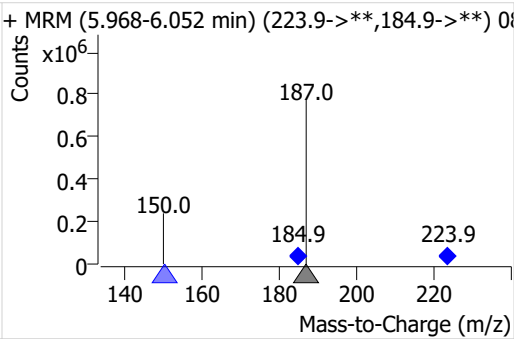




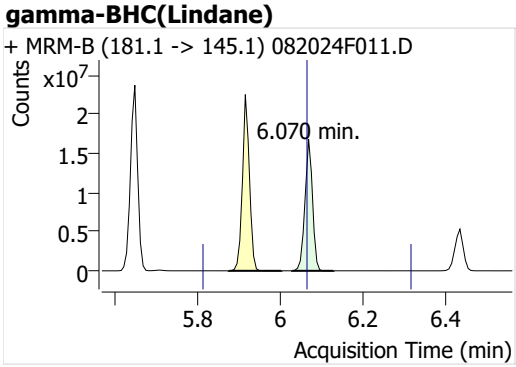
gamma-BHC-d6

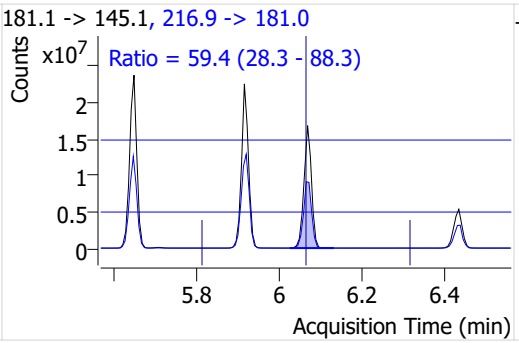


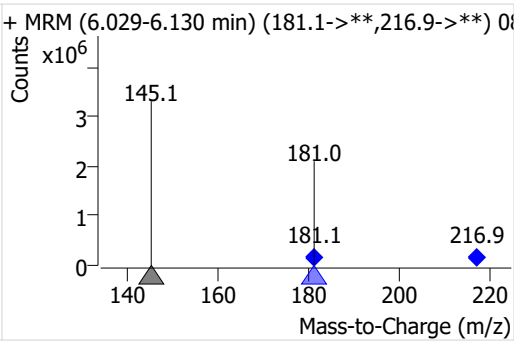




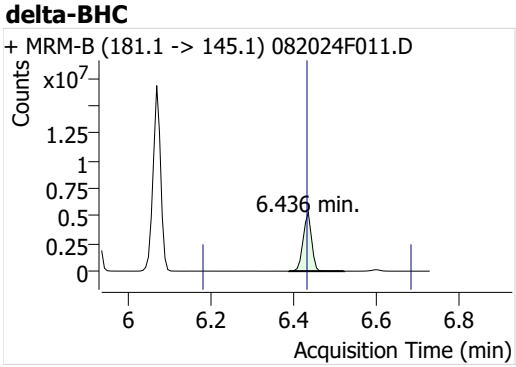
gamma-BHC(Lindane)

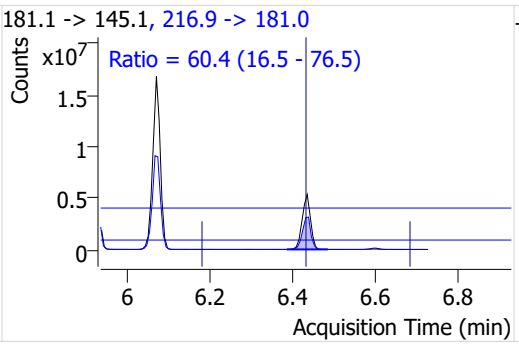


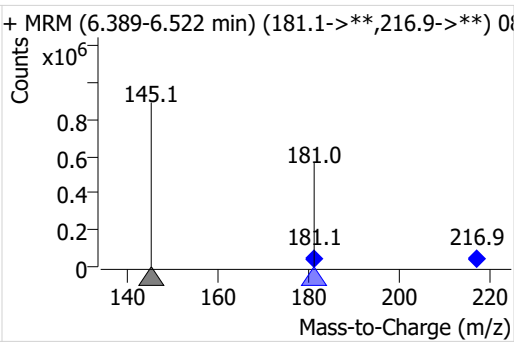




delta-BHC

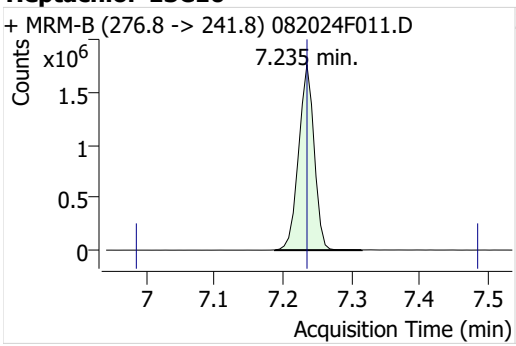


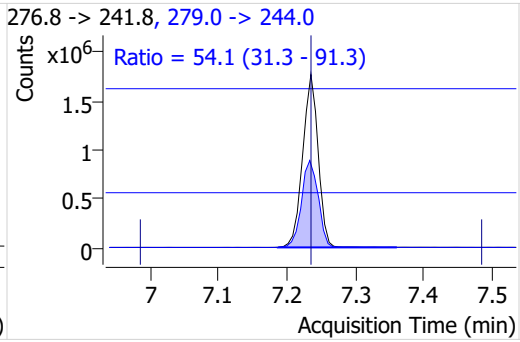


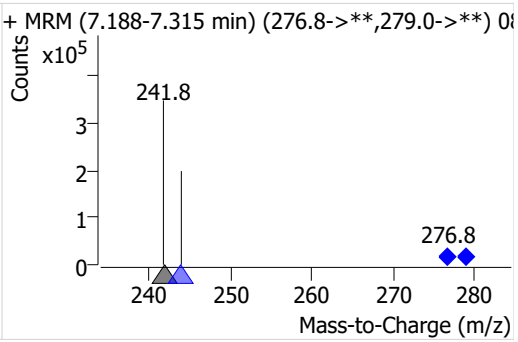


MassHunter Quantitative Analysis Sample Report

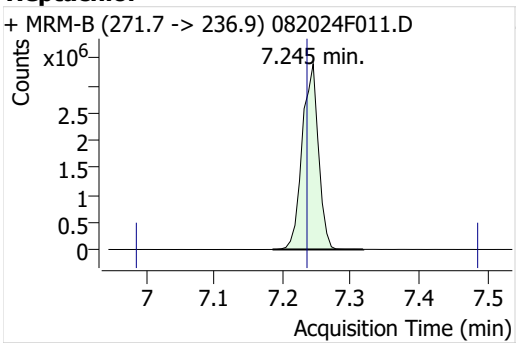
Heptachlor-13C10

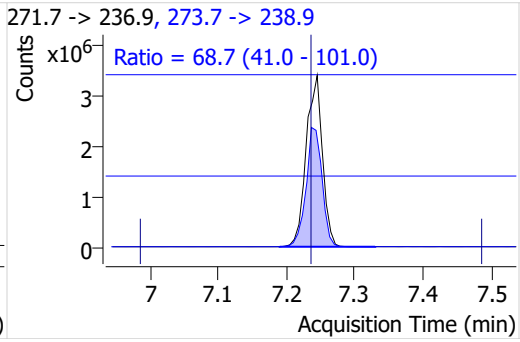


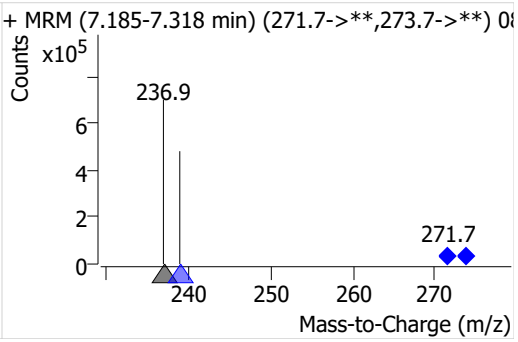




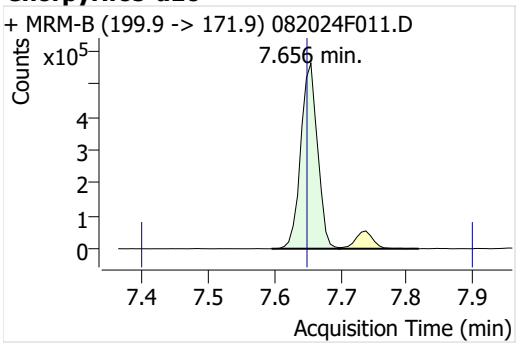
Heptachlor

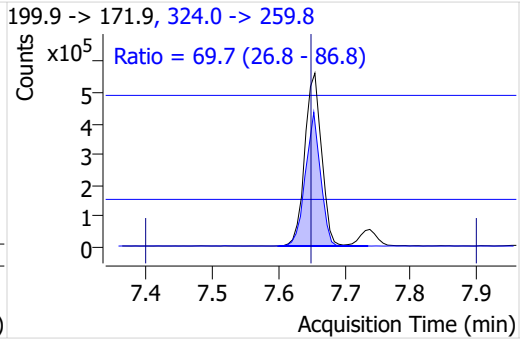


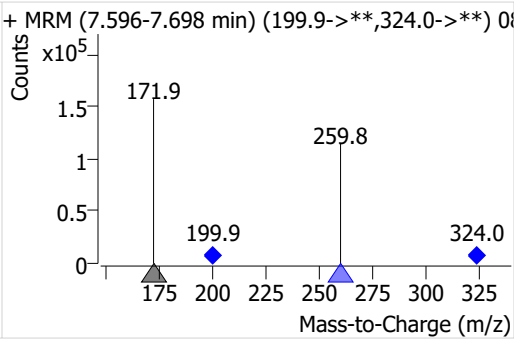




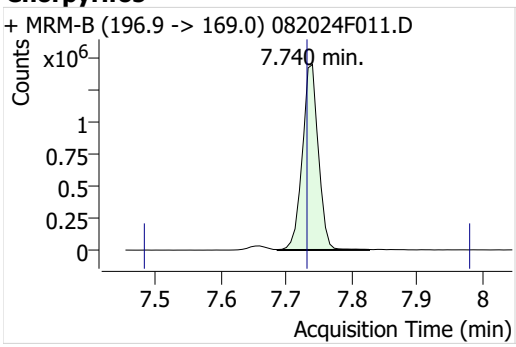
Chorpyrifos-d10

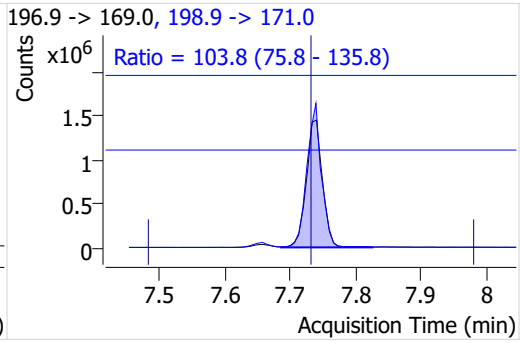


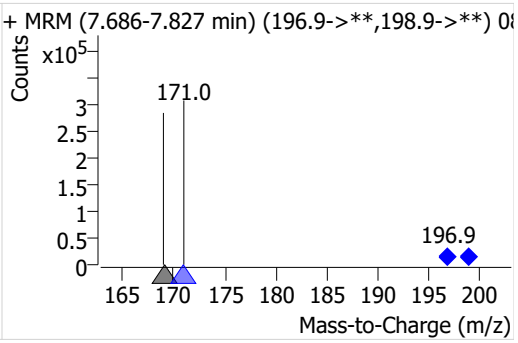




Chorpyrifos

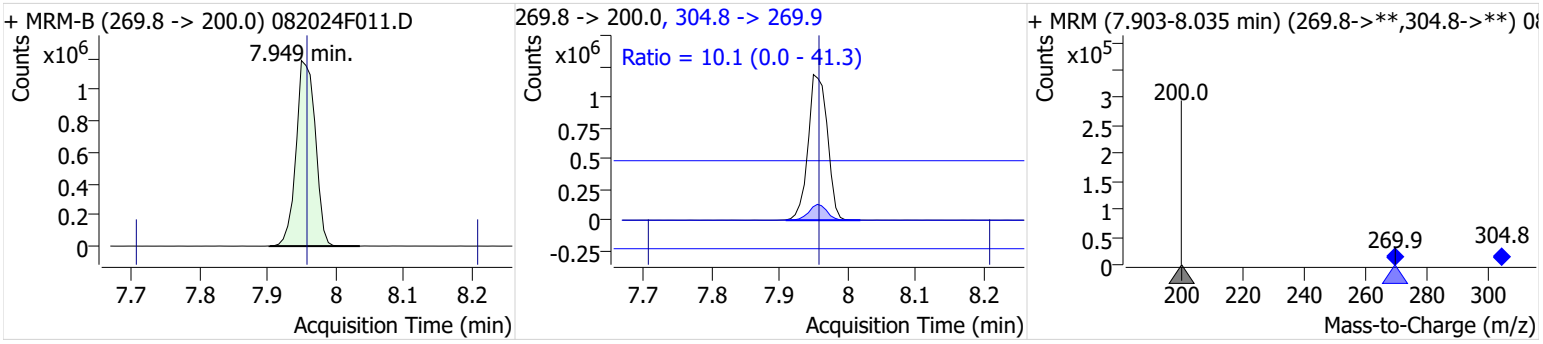




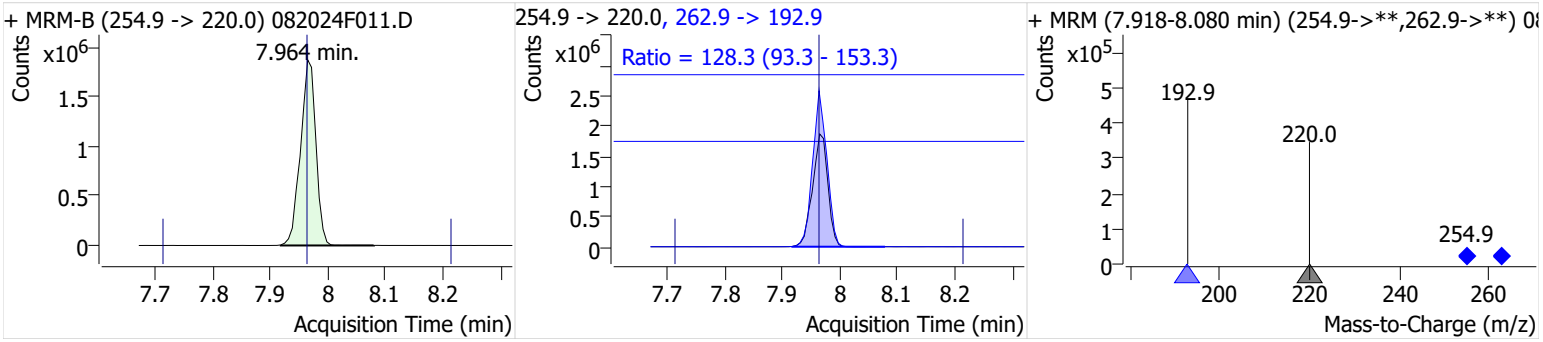


MassHunter Quantitative Analysis Sample Report

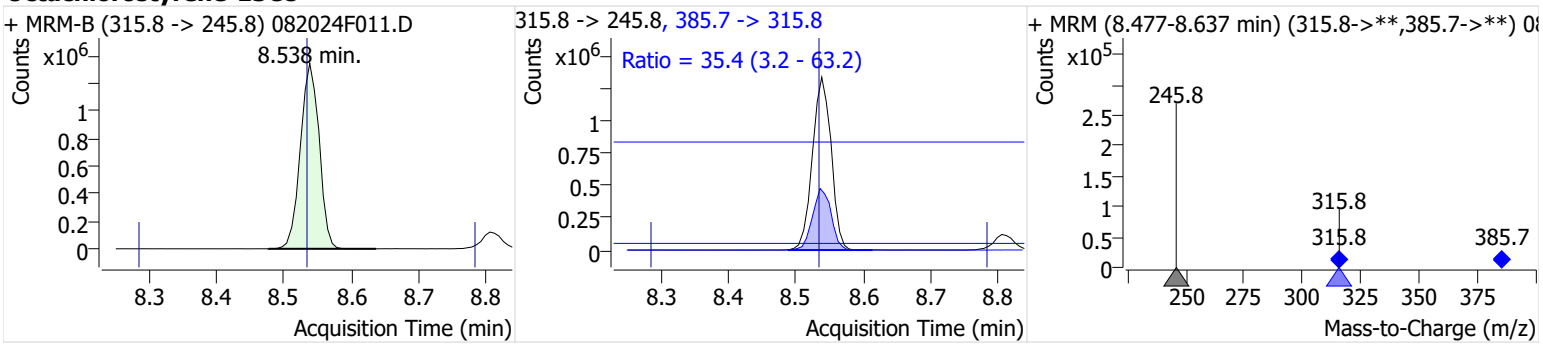
Aldrin-13C



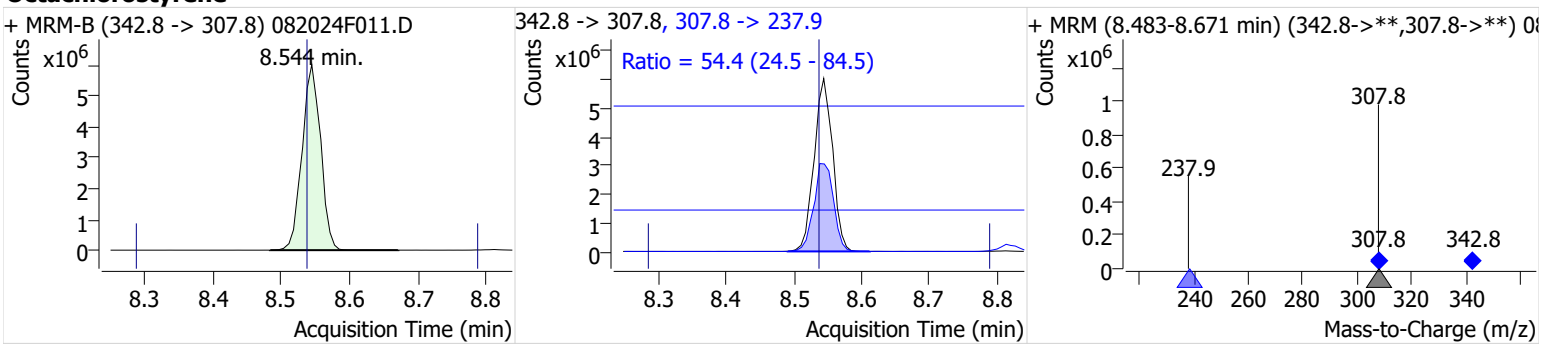
Aldrin



Octachlorostyrene-13C8

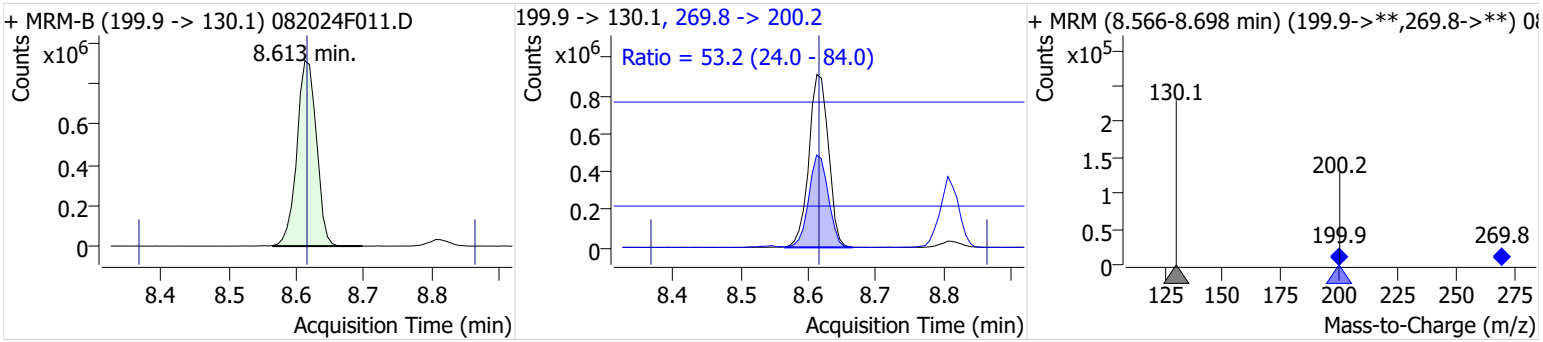


Octachlorostyrene

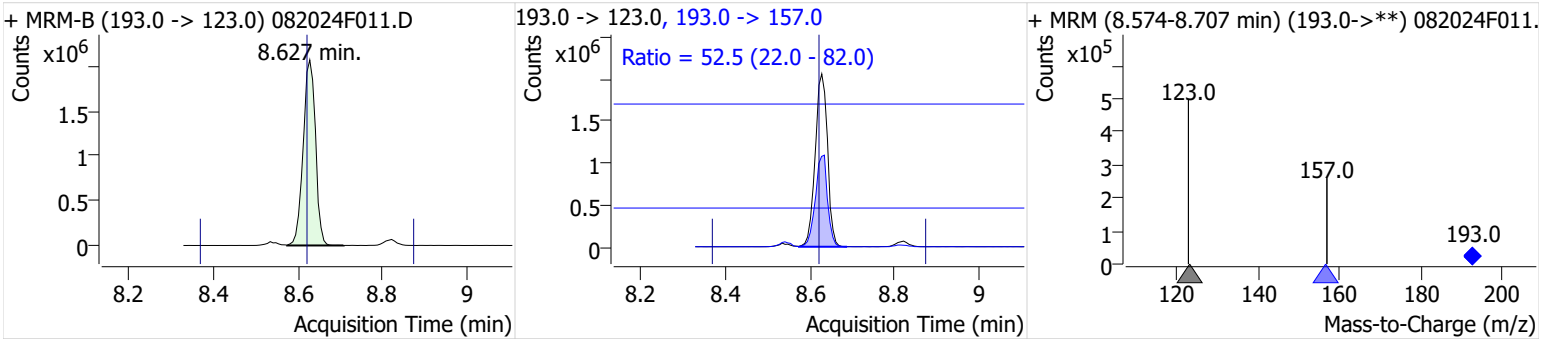


MassHunter Quantitative Analysis Sample Report

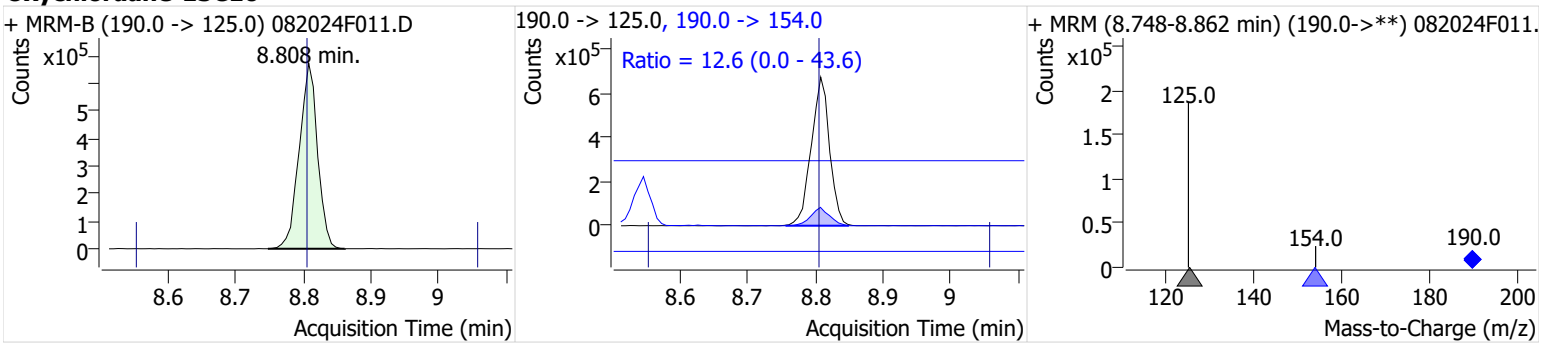
Isodrin-13C12



Isodrin



Oxychlordane-13C10



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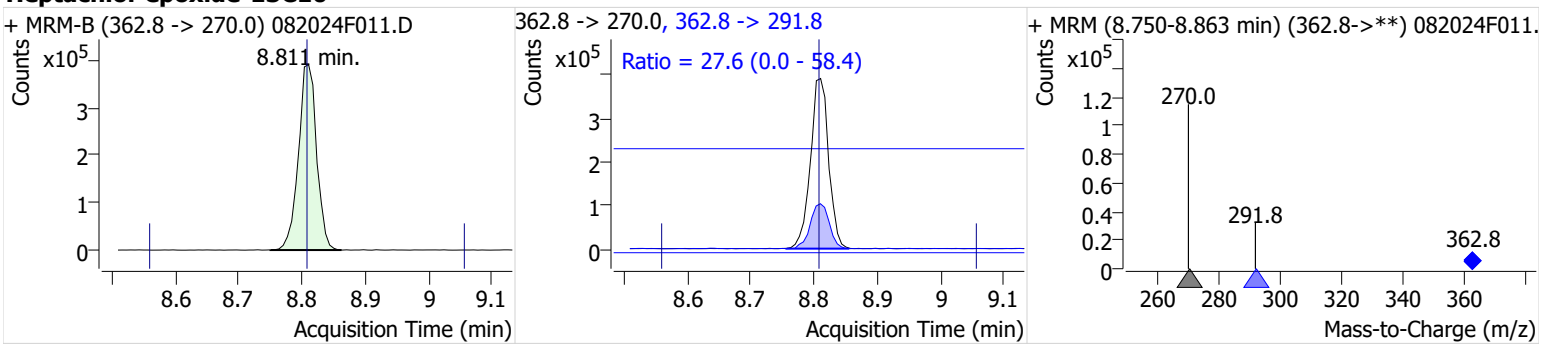

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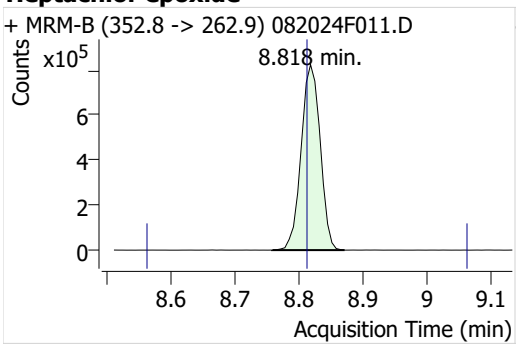
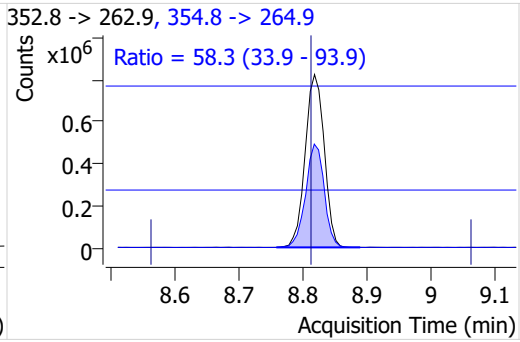
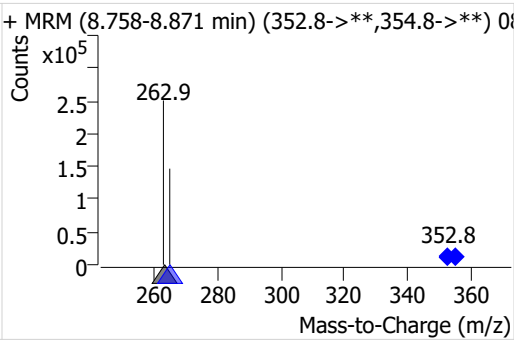
Heptachlor epoxide







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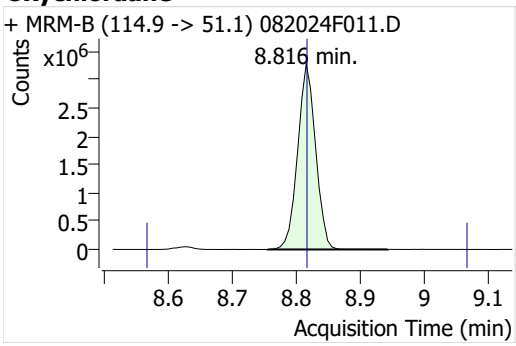
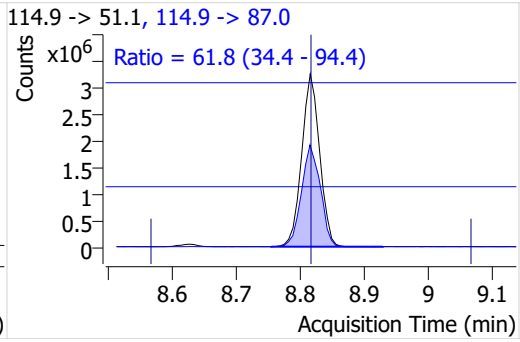
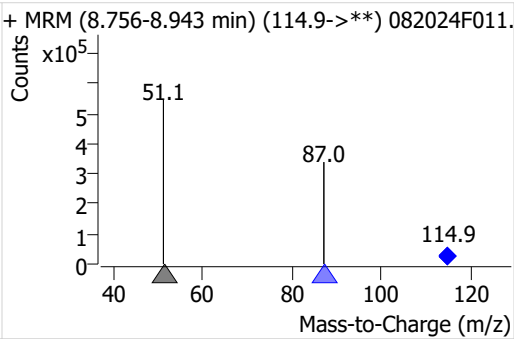
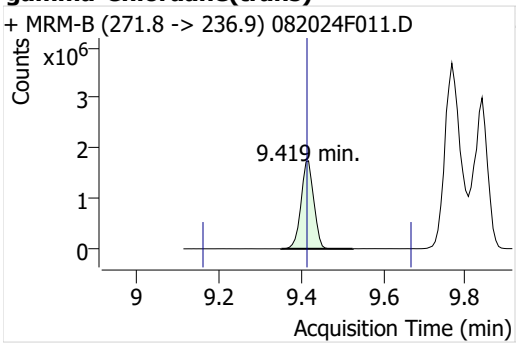
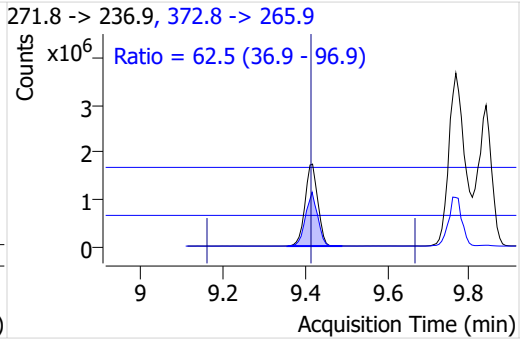


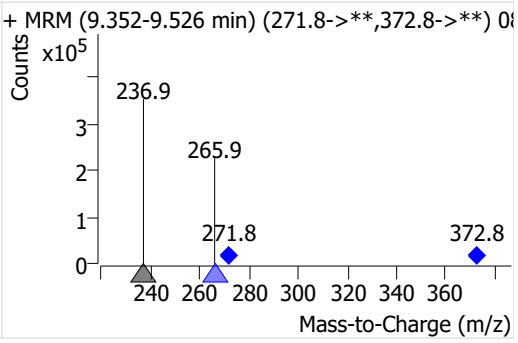




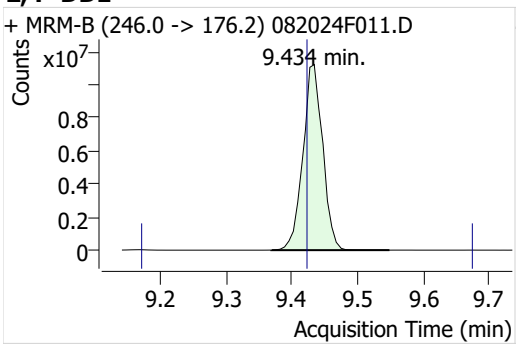
gamma-Chlordane(trans)

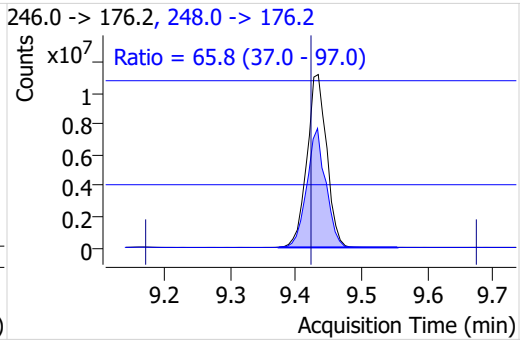


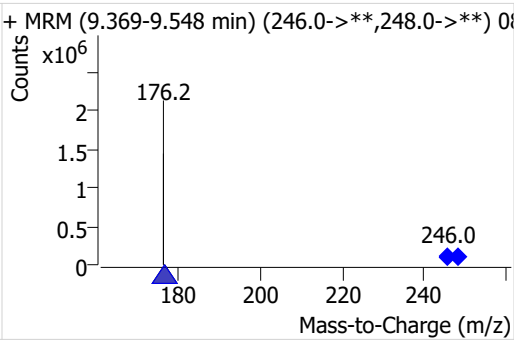




2,4'-DDE







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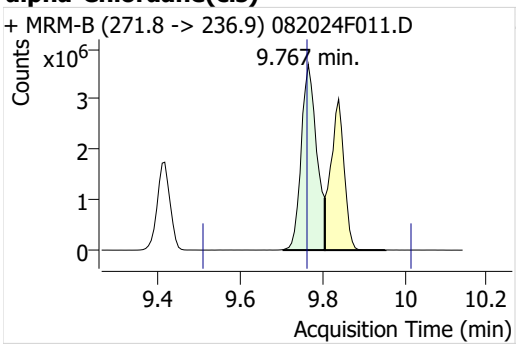
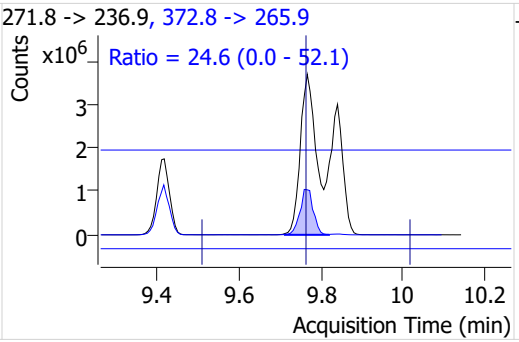
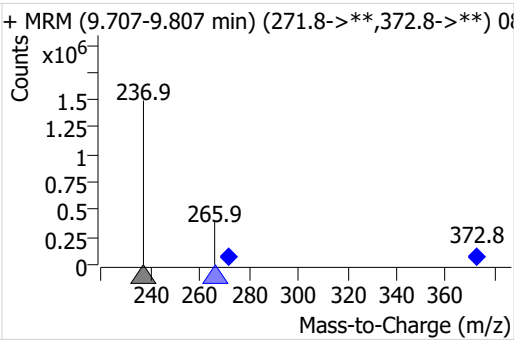
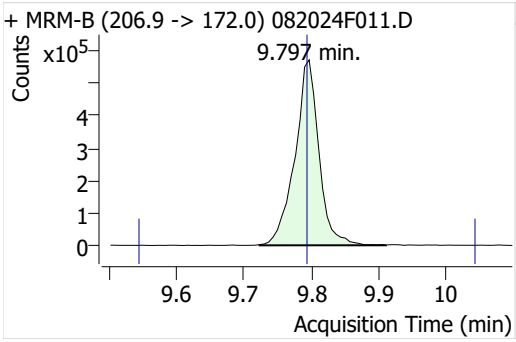
alpha-Chlordane(cis)

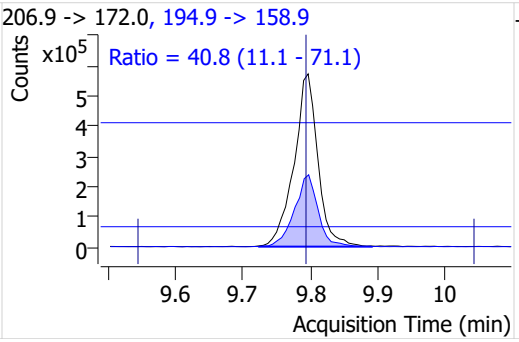


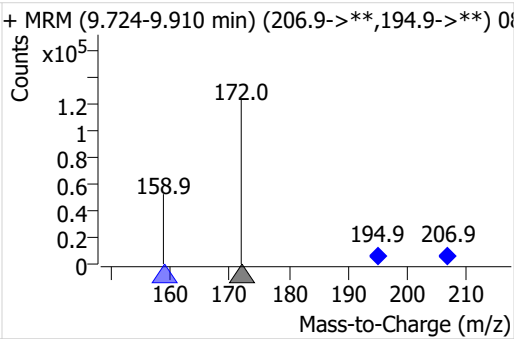




Endosulfan I







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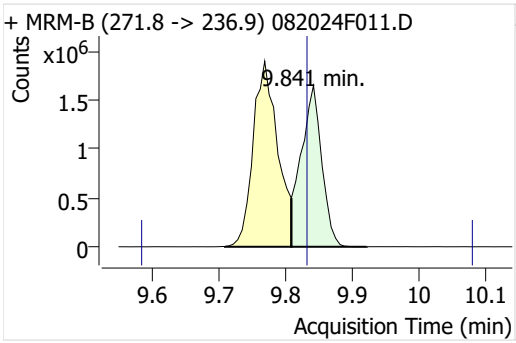
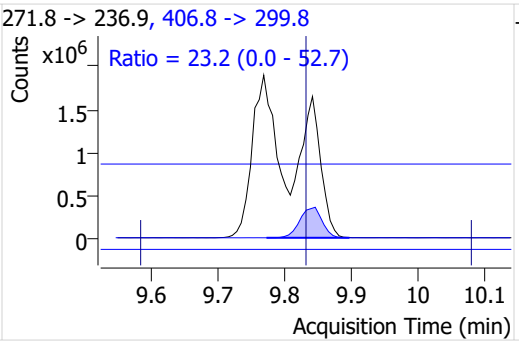
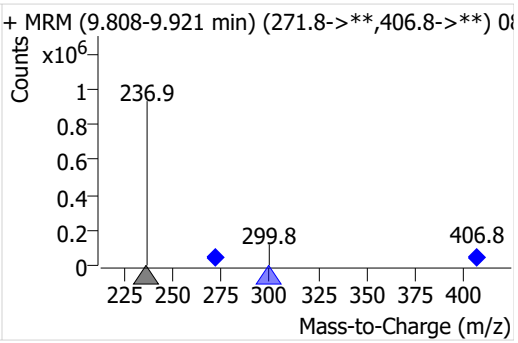
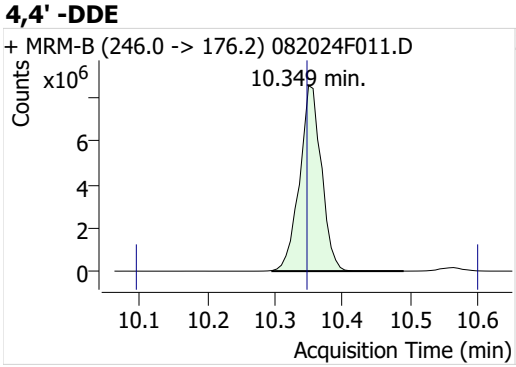
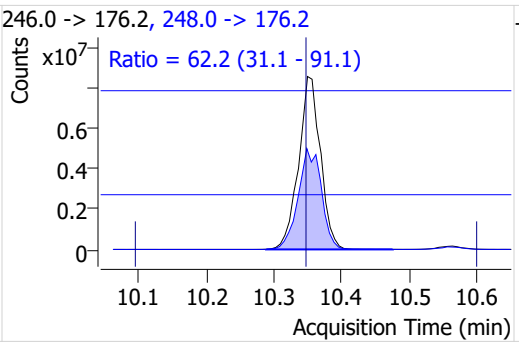


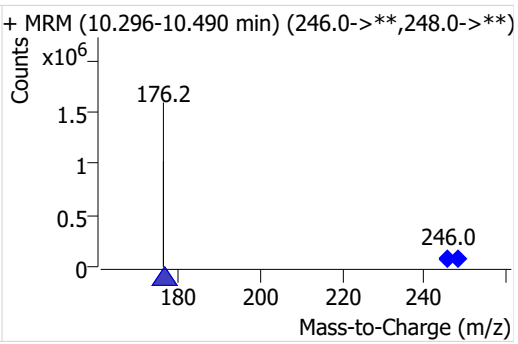




4,4' -DDE







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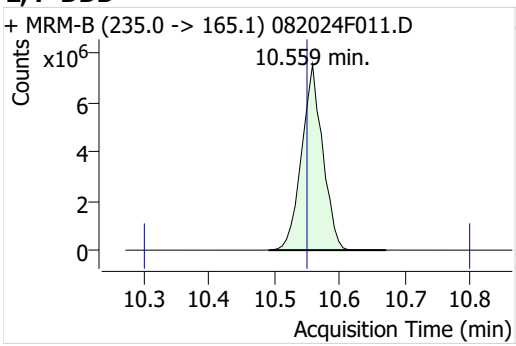
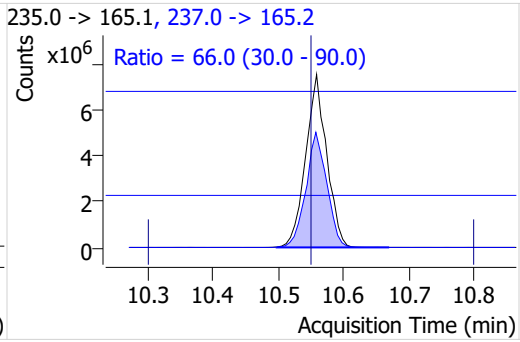
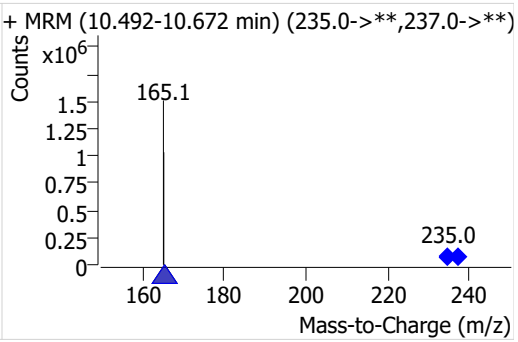
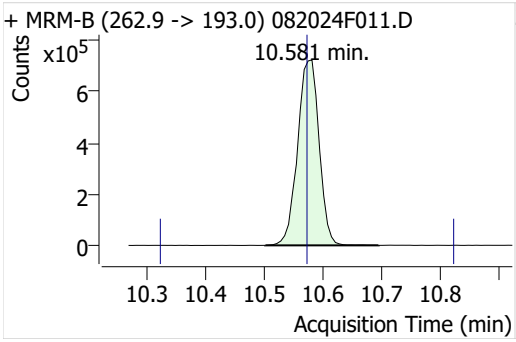
2,4'-DDD

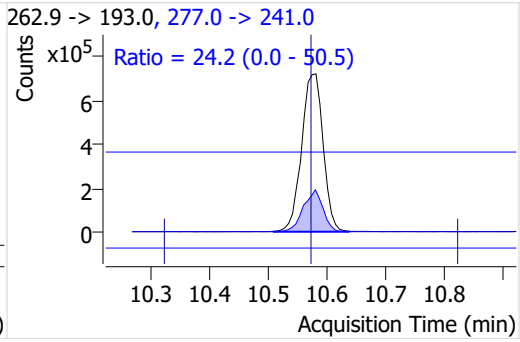


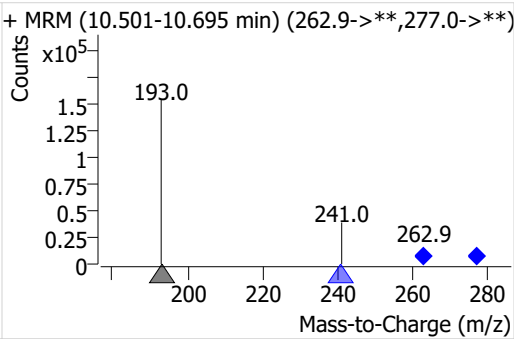




Dieldrin







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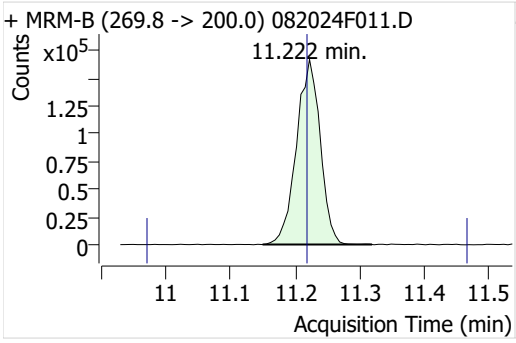

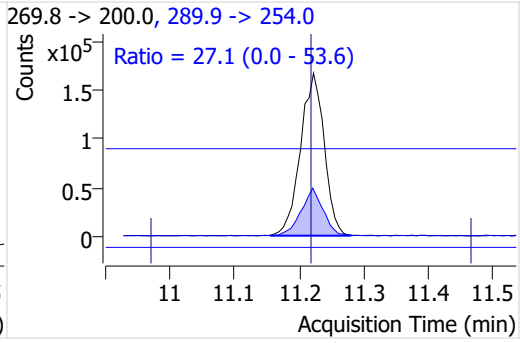

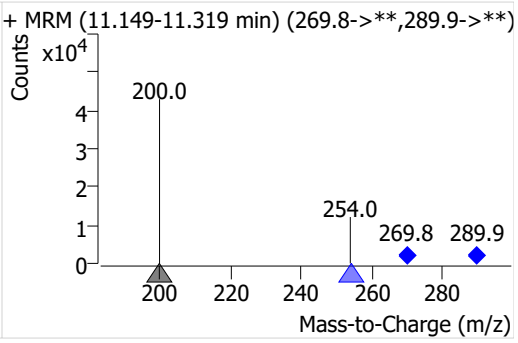

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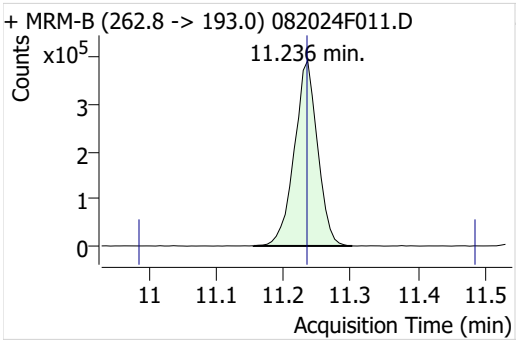

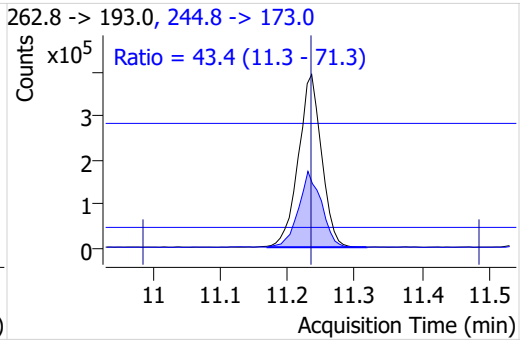

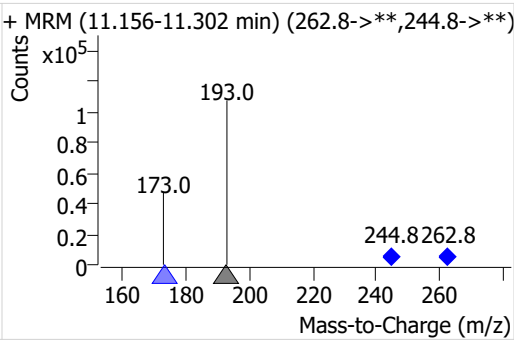

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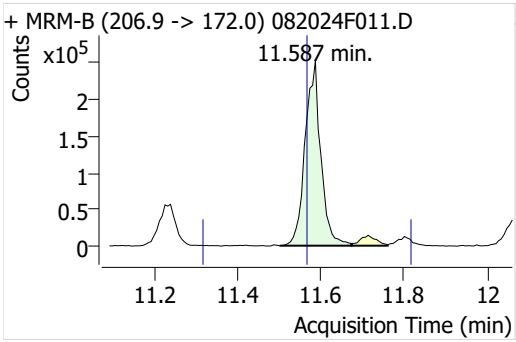
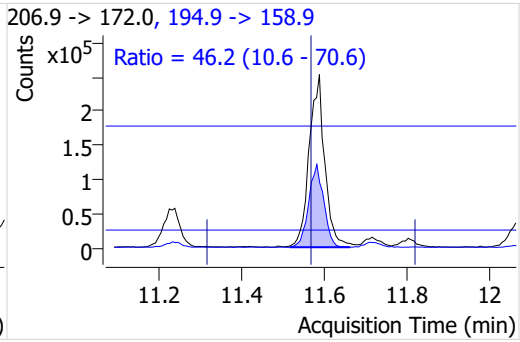
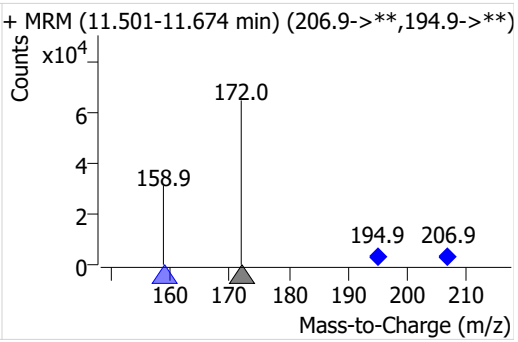
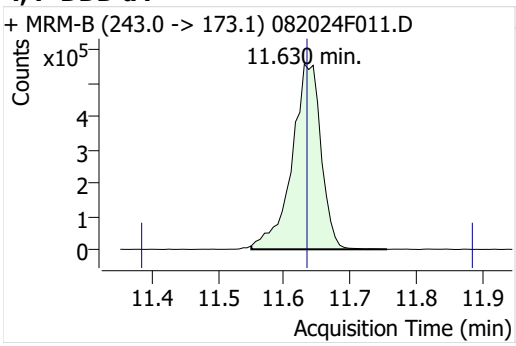
Endosulfan II

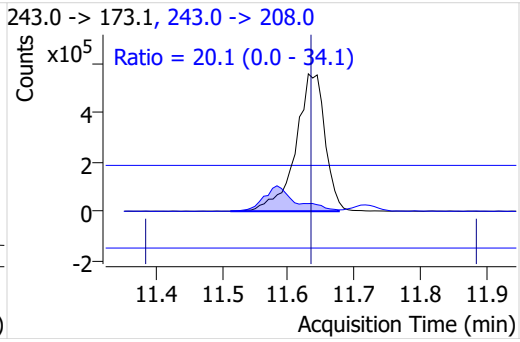


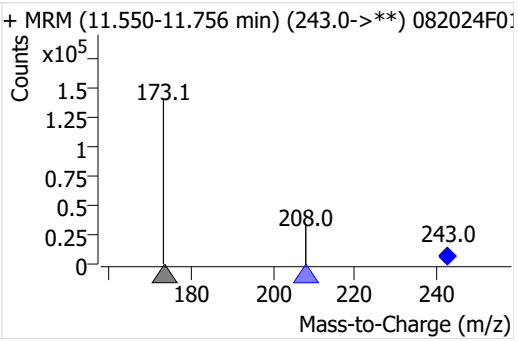




4,4'-DDD d4







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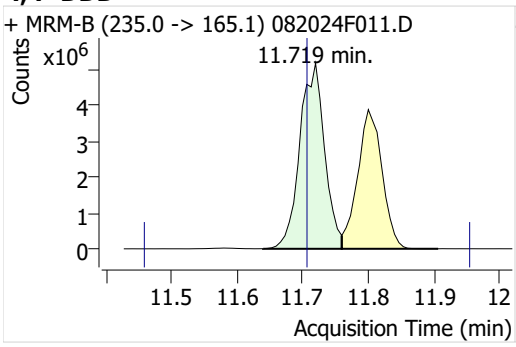
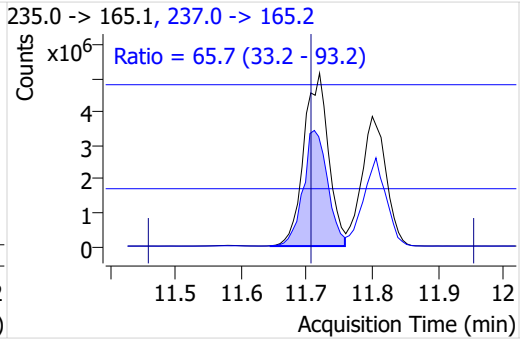
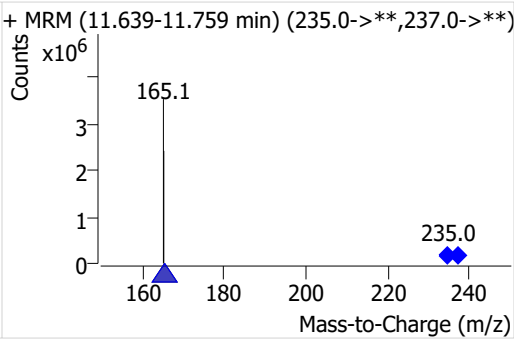
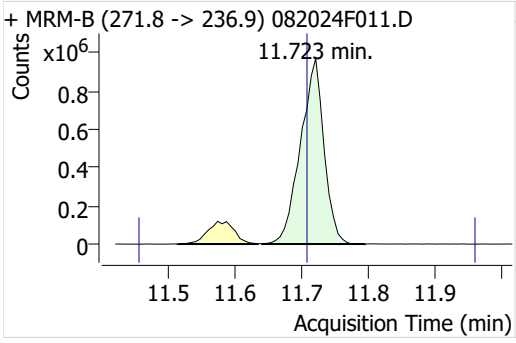
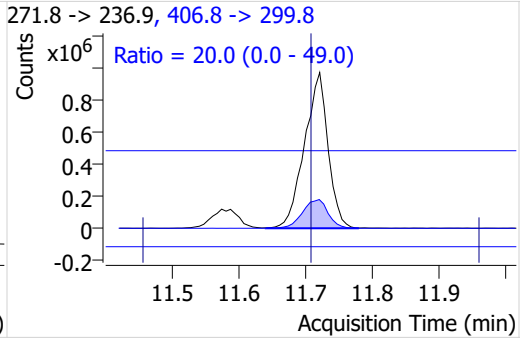


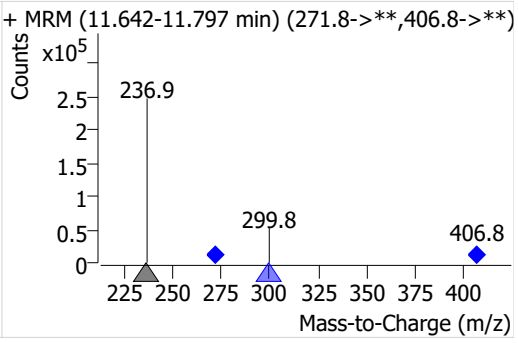




cis-Nonachlor







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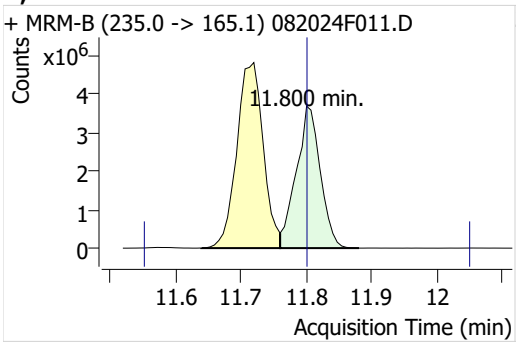
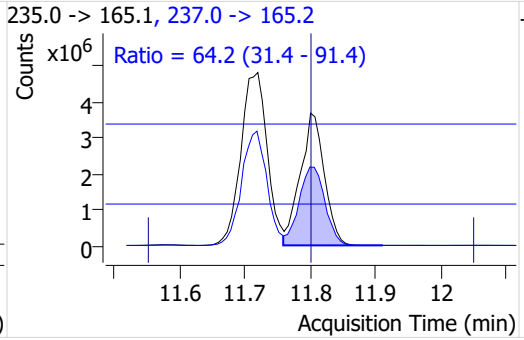
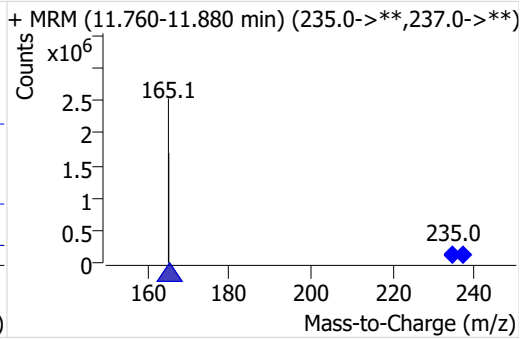
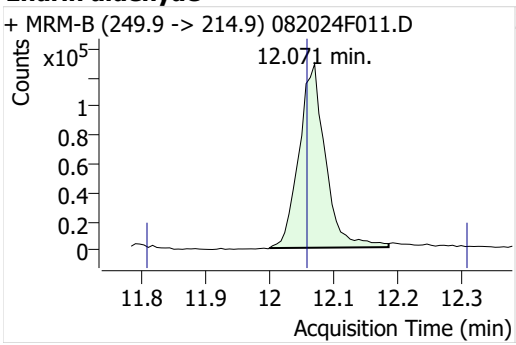
2,4'-DDT

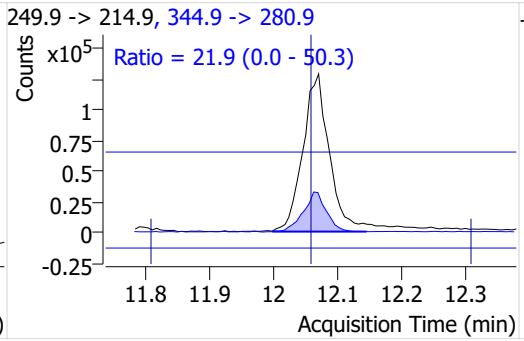


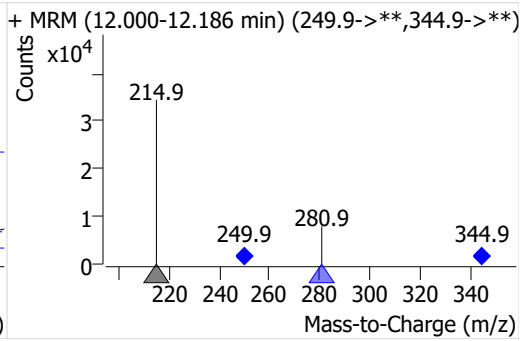




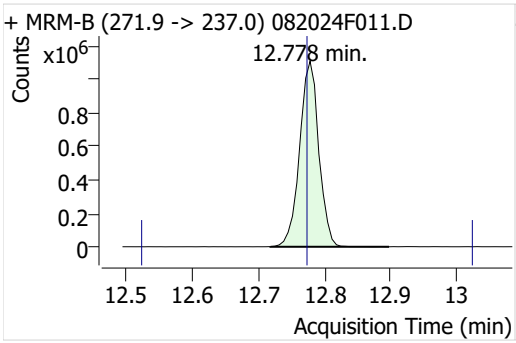
Endrin aldehyde

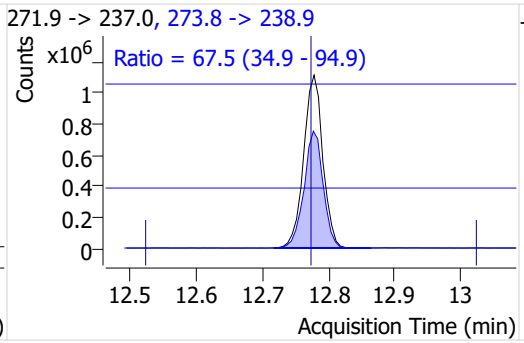


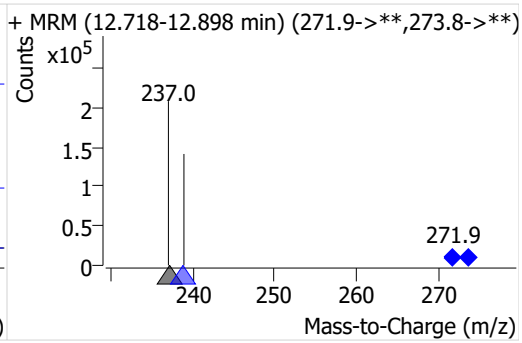




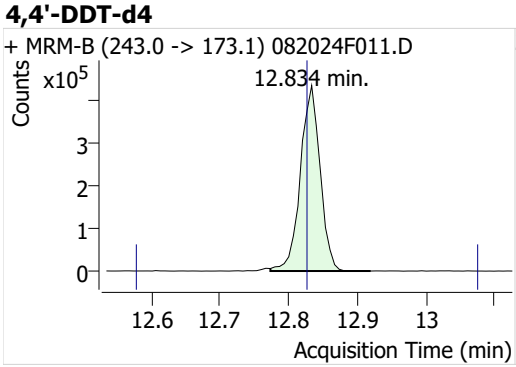
Endosulfan sulfate

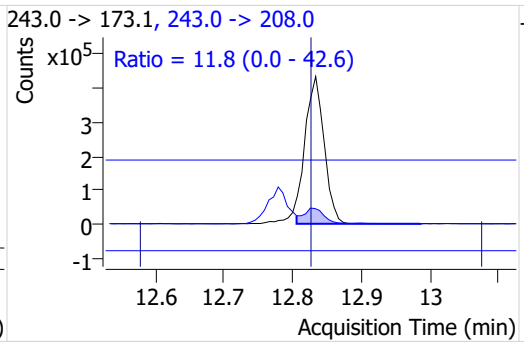


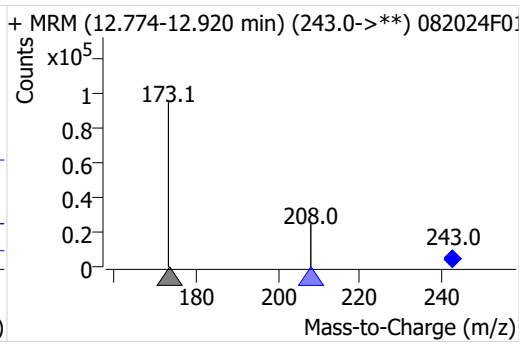




4,4'-DDT-d4







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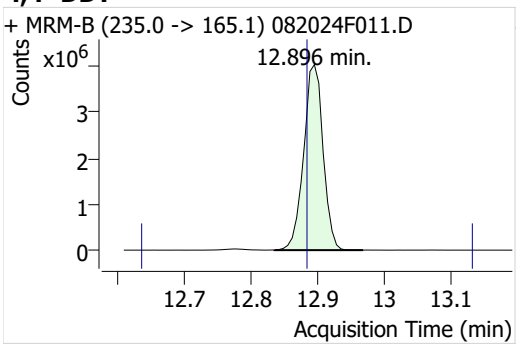
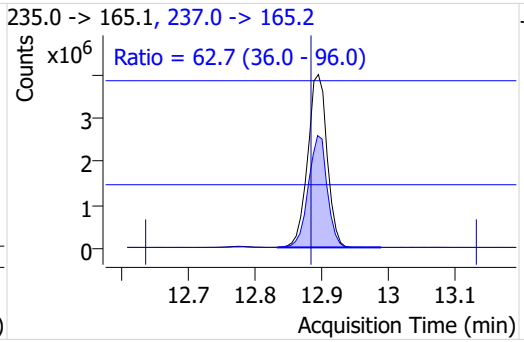
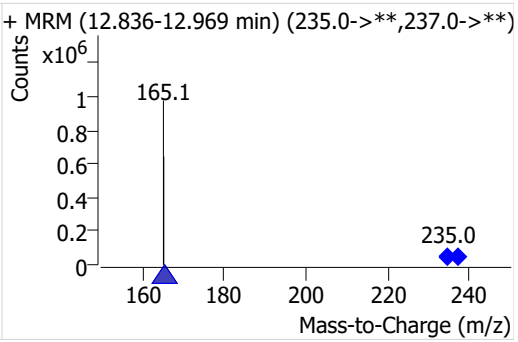
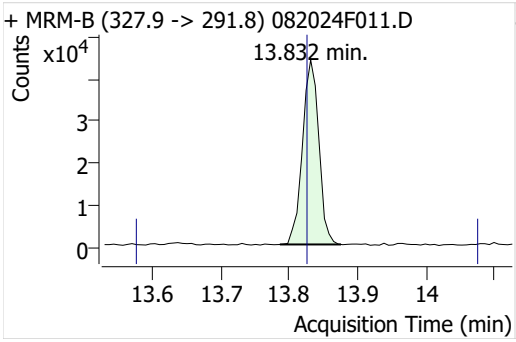
4,4'-DDT

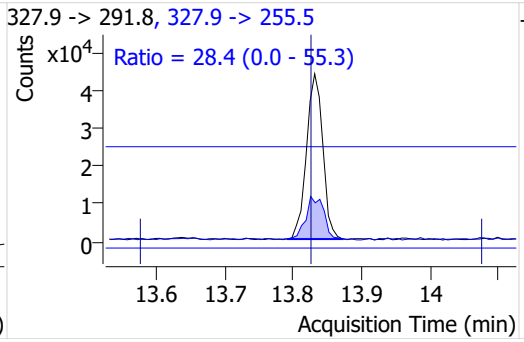


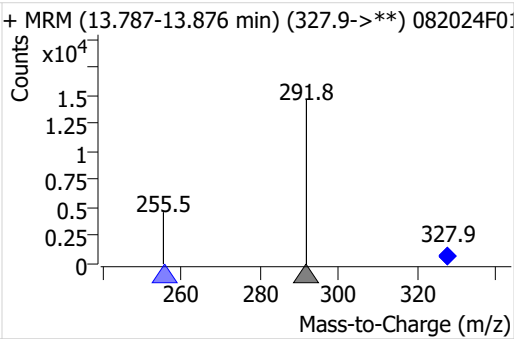




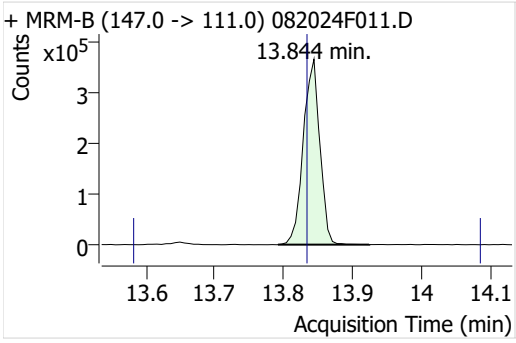
Endrin ketone-13C12

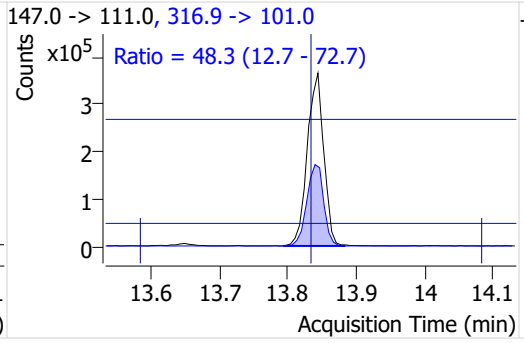


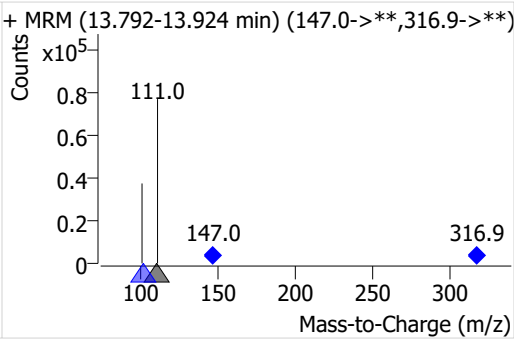




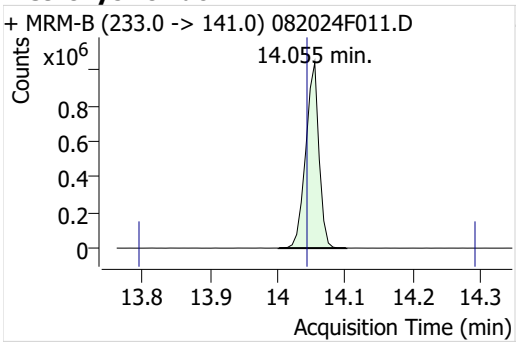
Endrin ketone

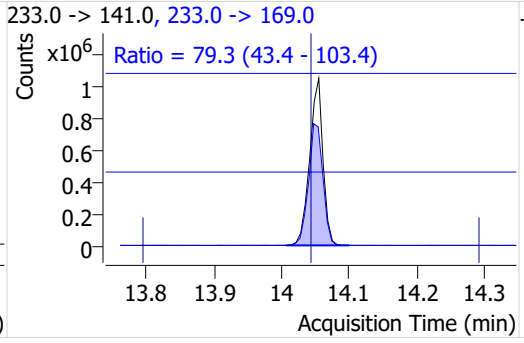


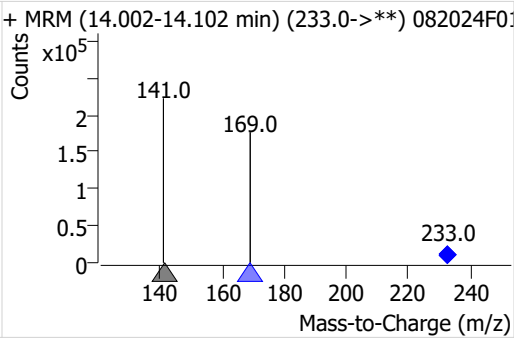




Methoxychlor-d6







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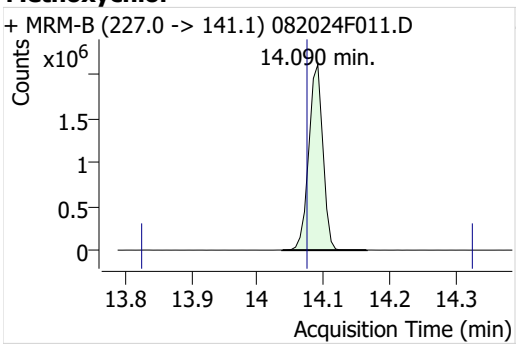
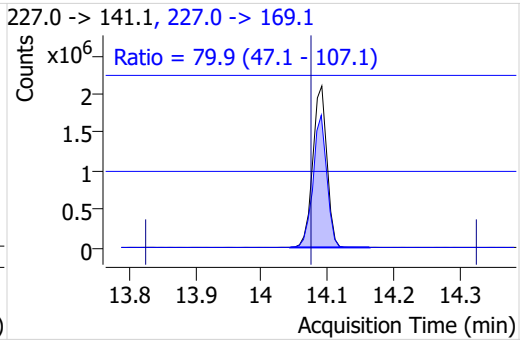
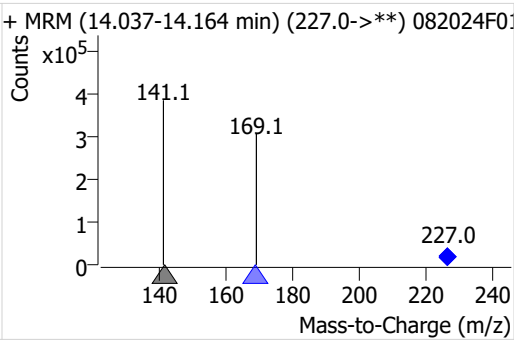
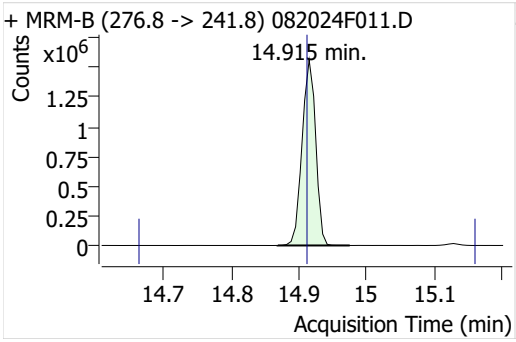
Methoxychlor

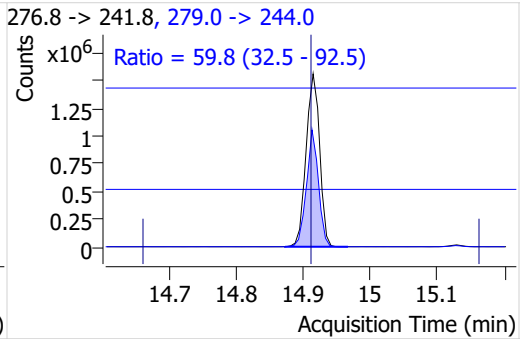


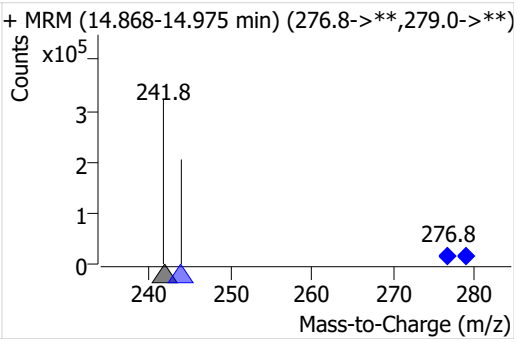




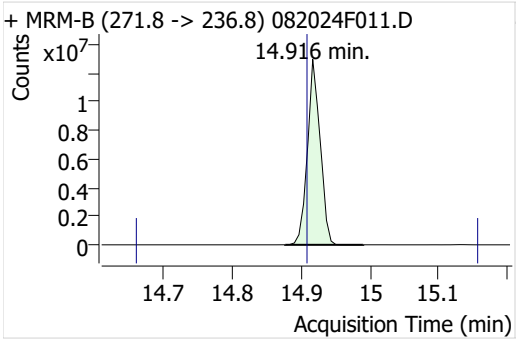
Mirex-13C10

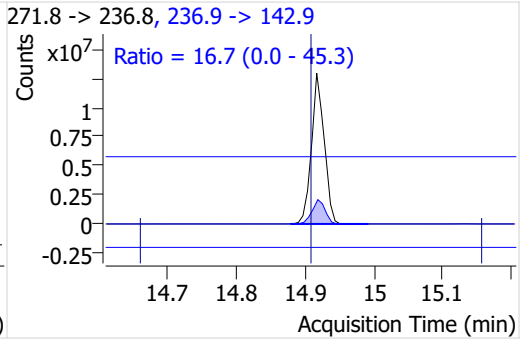


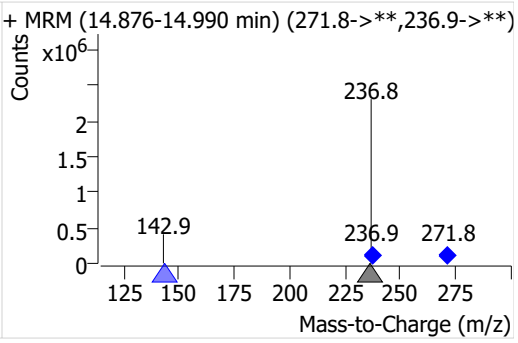




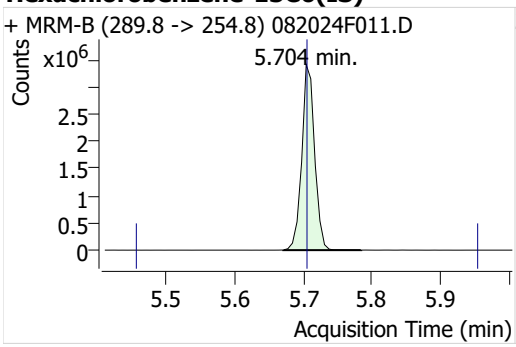
Mirex

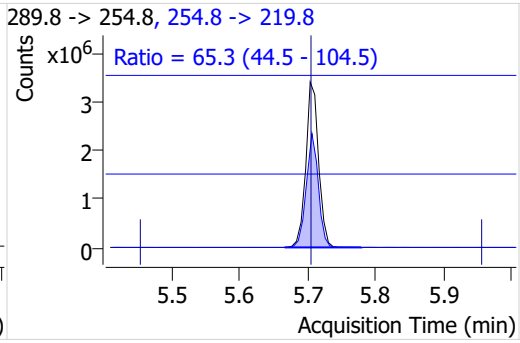


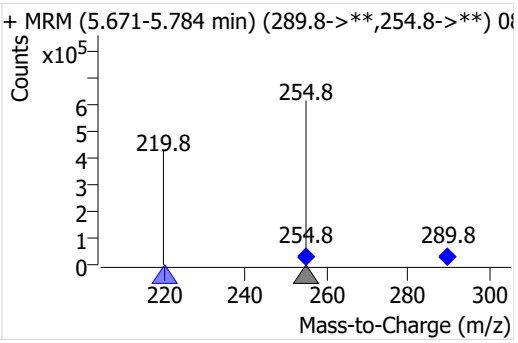




Hexachlorobenzene-13C6(IS)







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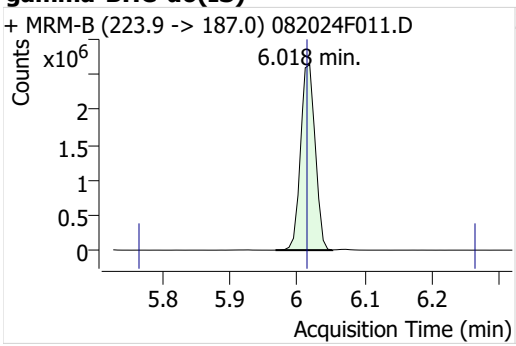
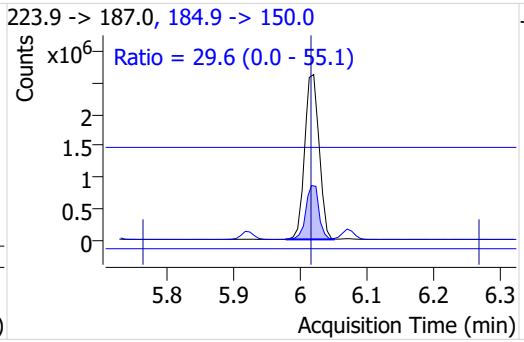
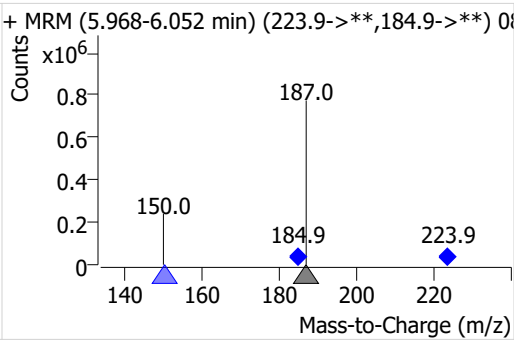
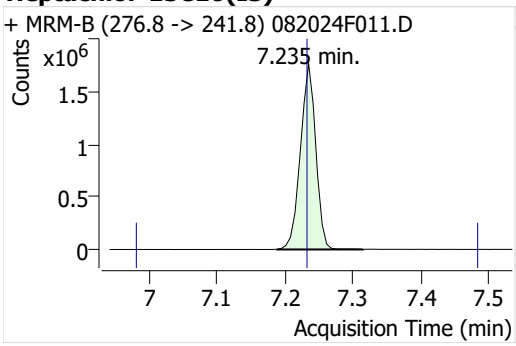
gamma-BHC-d6(IS)

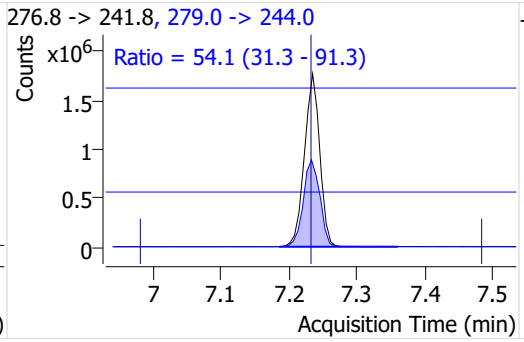


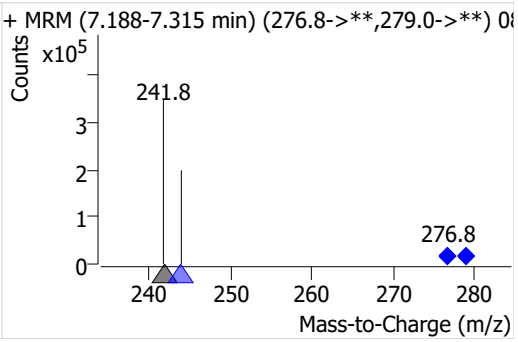




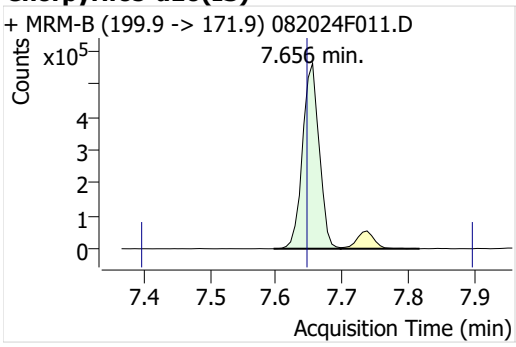
Heptachlor-13C10(IS)

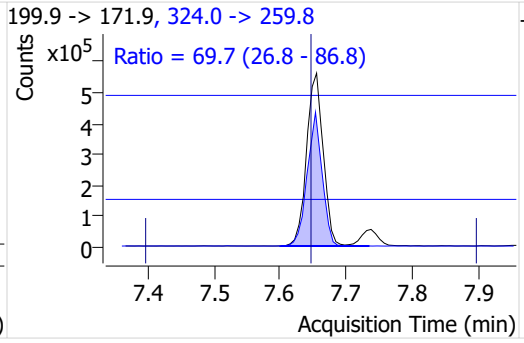


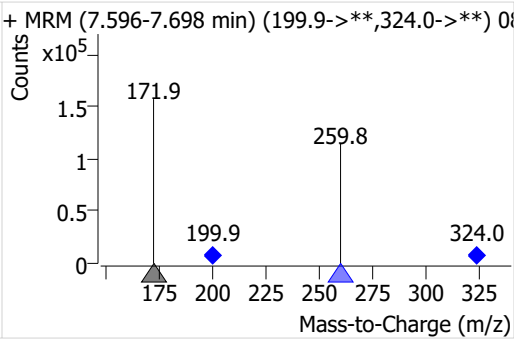




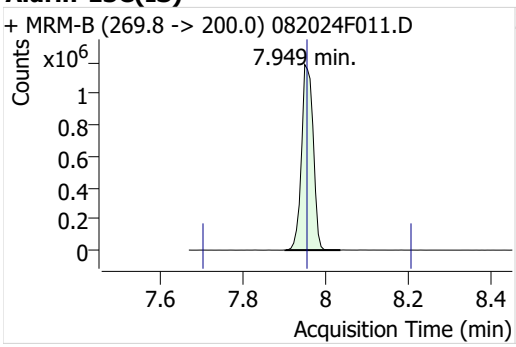
Chorpyrifos-d10(IS)

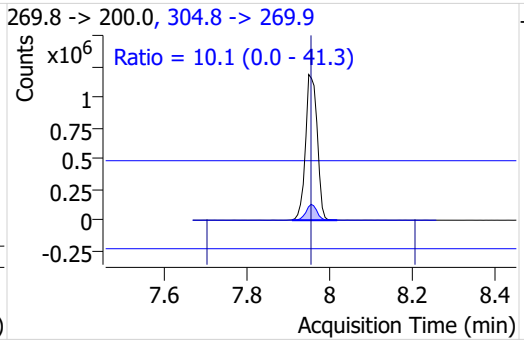


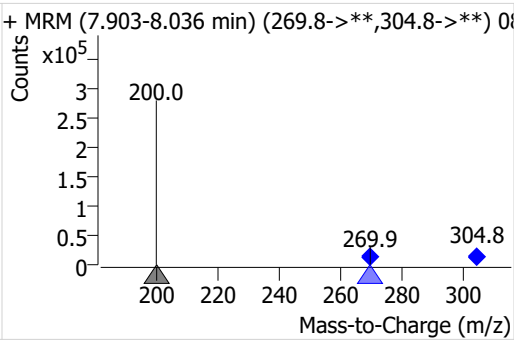




Aldrin-13C(IS)







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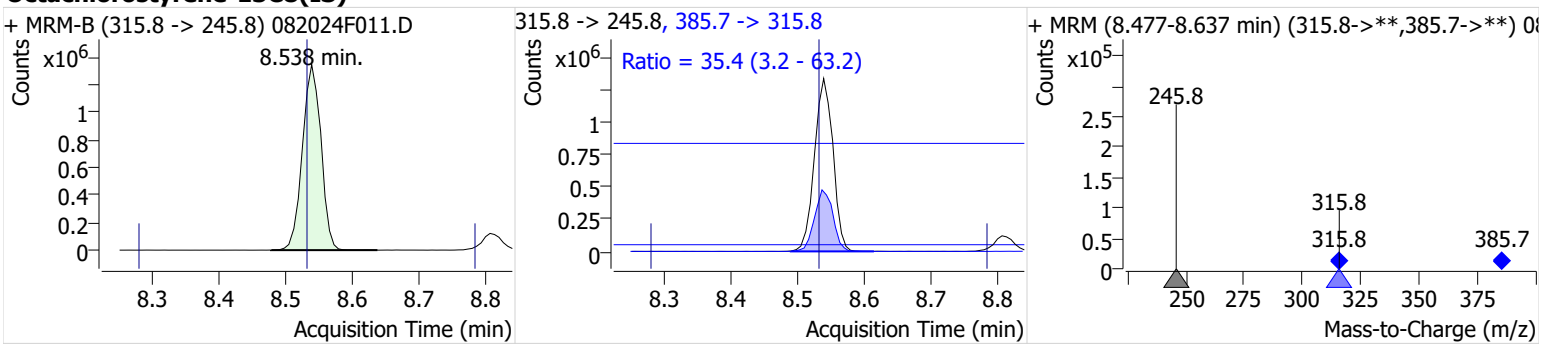
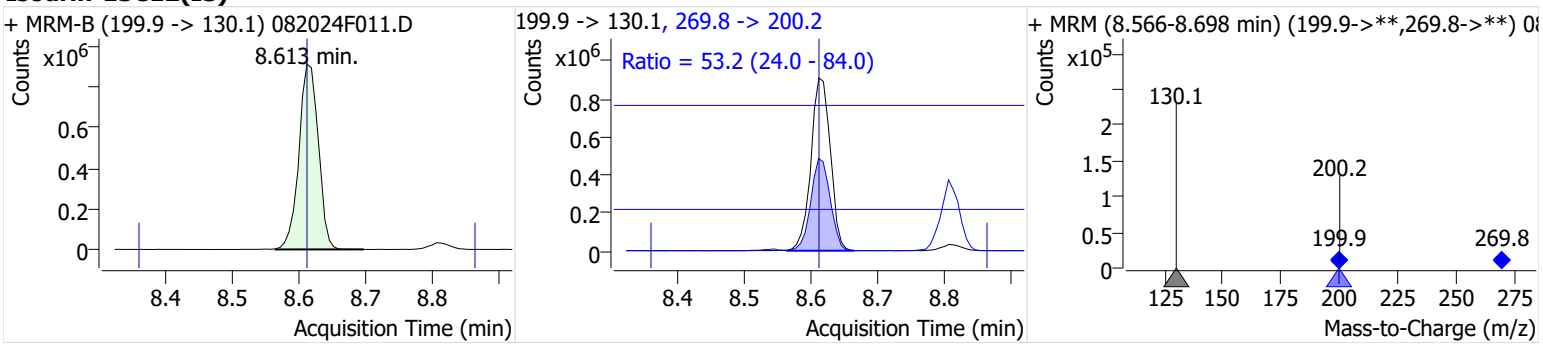
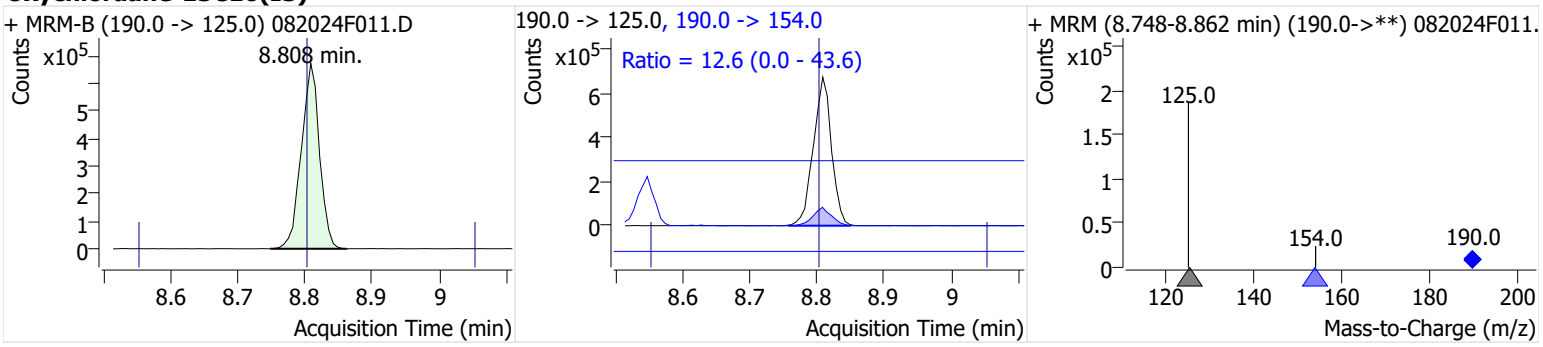
Octachlorostyrene-13C8(IS)



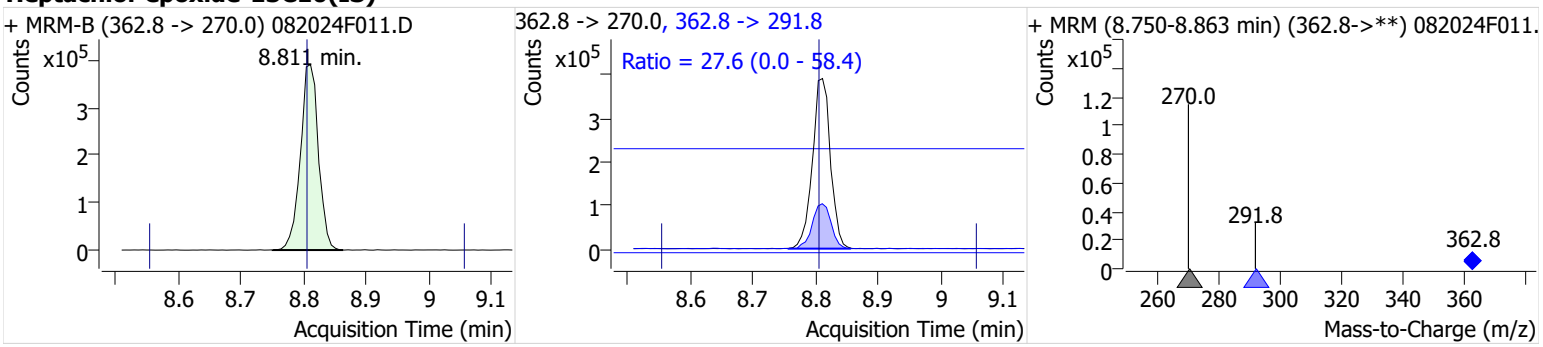
Isodrin-13C12(IS)



Oxychlordane-13C10(IS)



Heptachlor epoxide-13C10(IS)



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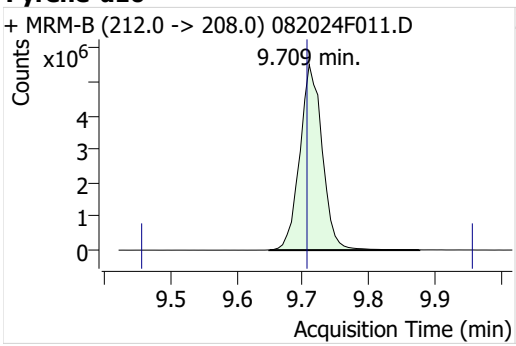
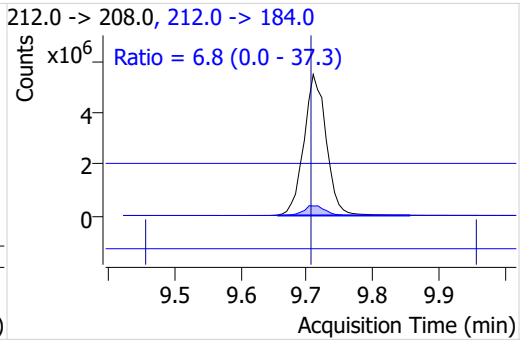
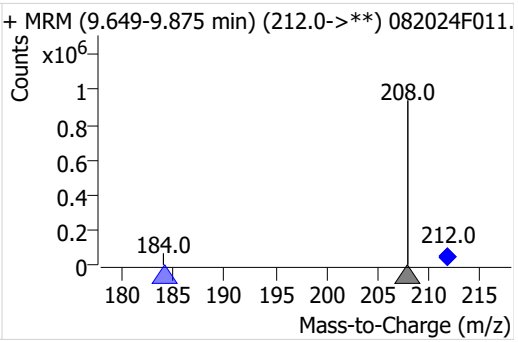
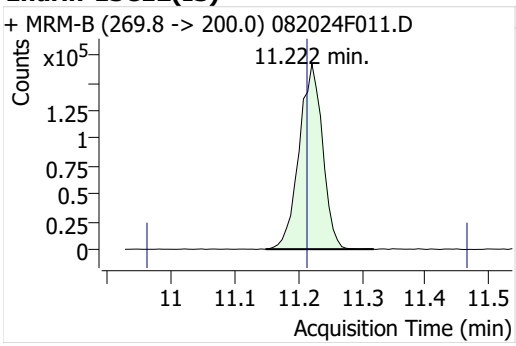
Pyrene-d10

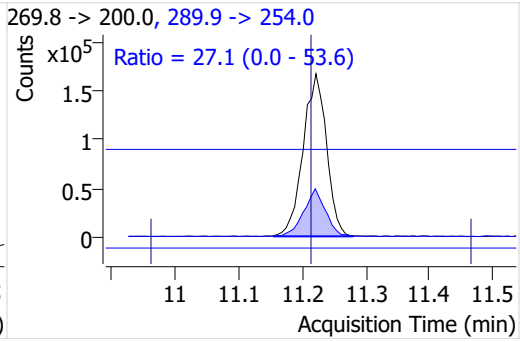


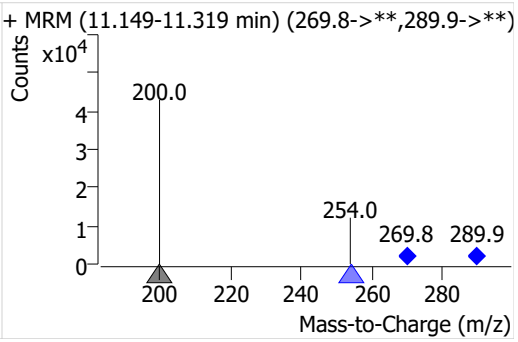




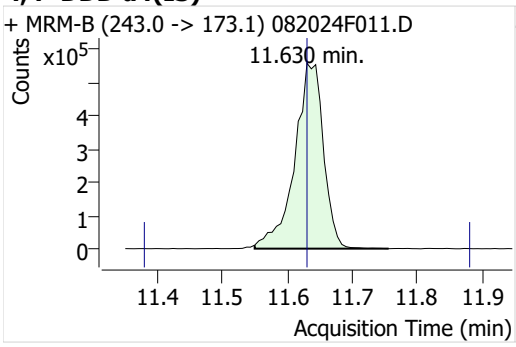
Endrin-13C12(IS)

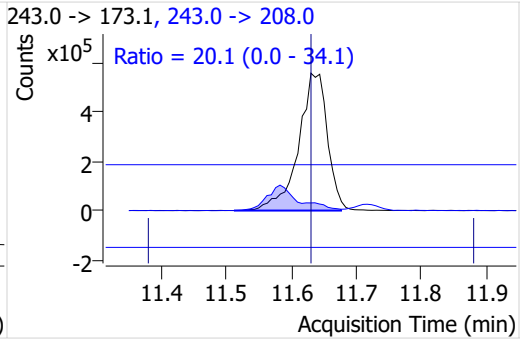


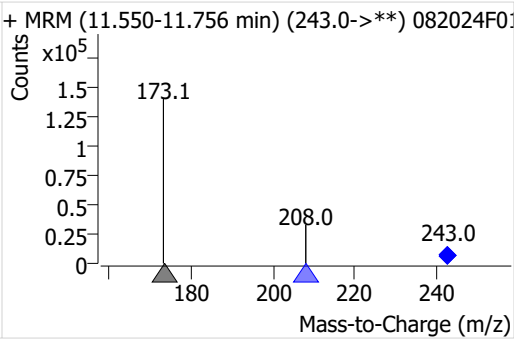




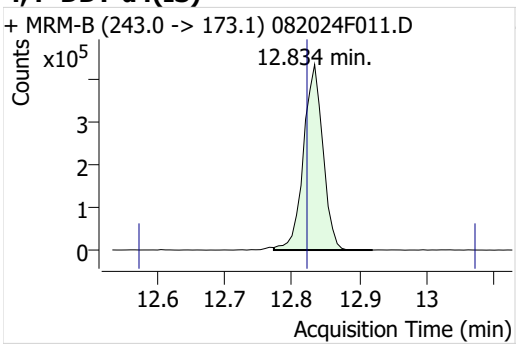
4,4'-DDD d4(IS)

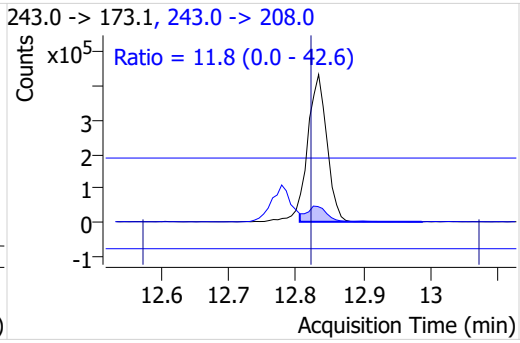


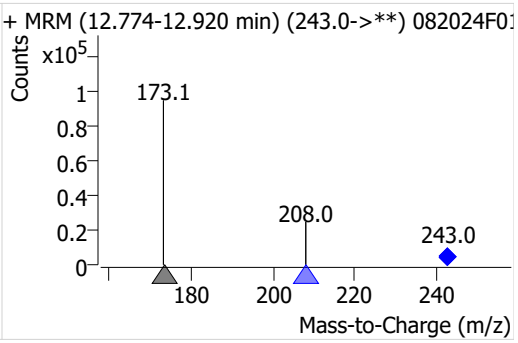




4,4'-DDT-d4(IS)

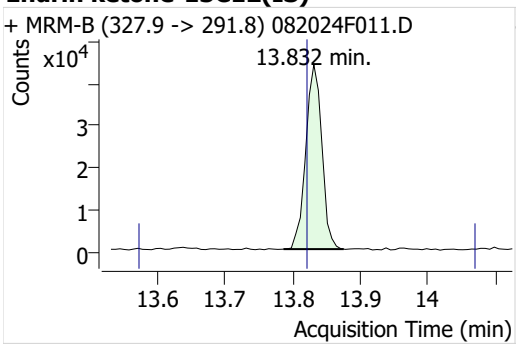


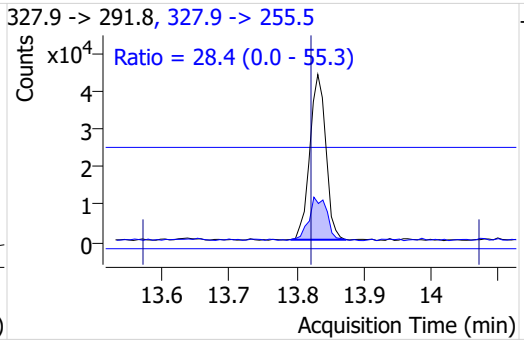


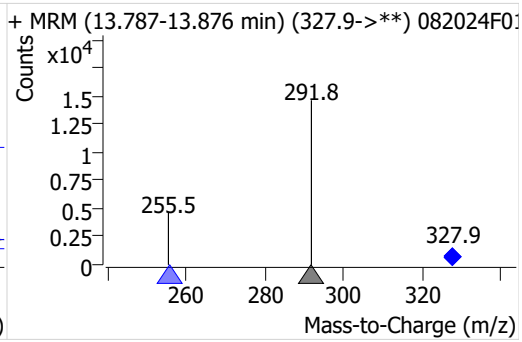


MassHunter Quantitative Analysis Sample Report

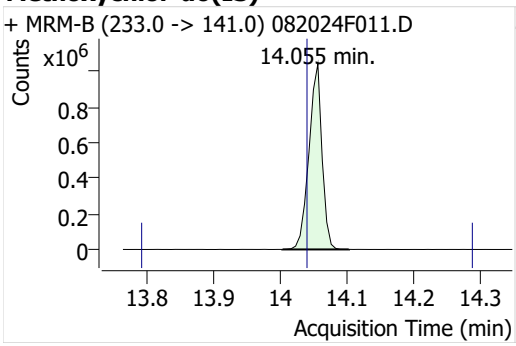
Endrin ketone-13C12(IS)

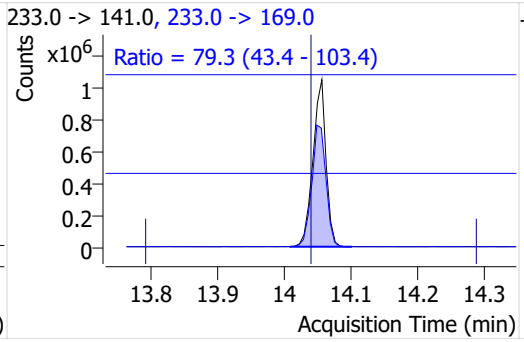


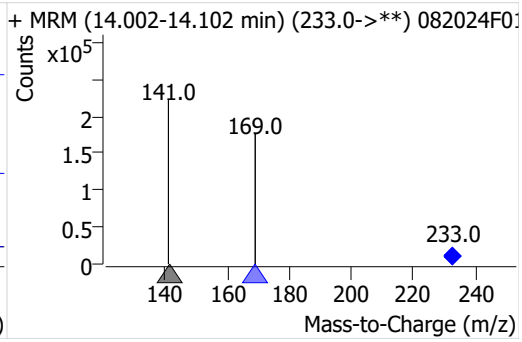




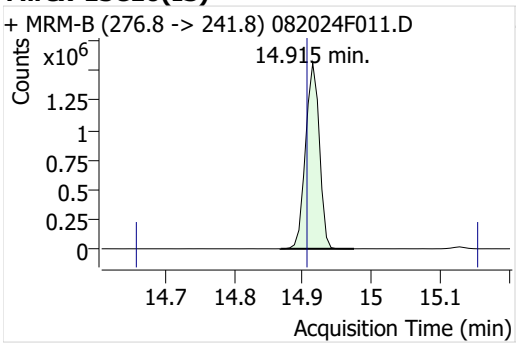
Methoxychlor-d6(IS)

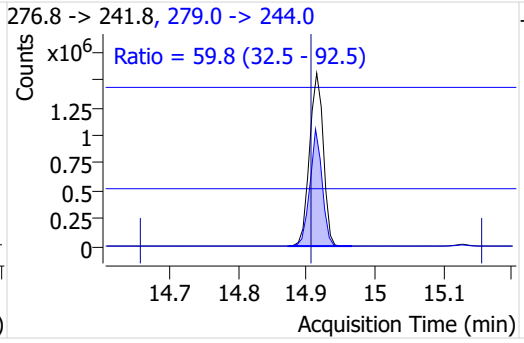


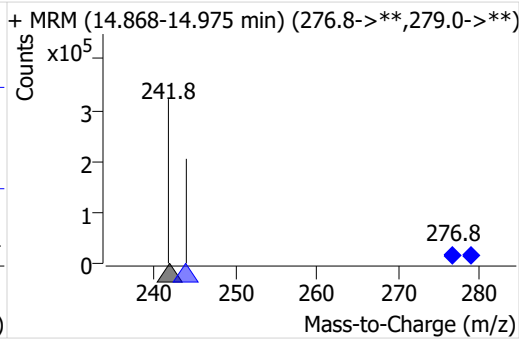




Mirex-13C10(IS)







1st 08/20/24
2nd 08/21/24

MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
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Name	OC PEST ICAL 60ppb SVM71-99H	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	8/20/2024 3:33:05 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	080624 OC PEST ICAL.batch.bin	**Vial**	10
Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.704	289.8 -> 254.8	4536221	20.0000 ng/ml	0.000
gamma-BHC-d6(IS)	6.018	223.9 -> 187.0	4091488	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	7.235	276.8 -> 241.8	3027748	20.0000 ng/ml	0.002
Chorpyrifos-d10(IS)	7.656	199.9 -> 171.9	1013956	20.0000 ng/ml	0.008
Aldrin-13C(IS)	7.956	269.8 -> 200.0	2372824	20.0000 ng/ml	0.001
Octachlorostyrene-13C8(IS)	8.545	315.8 -> 245.8	2764235	20.0000 ng/ml	0.012
Isodrin-13C12(IS)	8.619	199.9 -> 130.1	1874902	20.0000 ng/ml	0.003
Oxychlordane-13C10(IS)	8.808	190.0 -> 125.0	1301370	20.0000 ng/ml	0.005
Heptachlor epoxide-13C10(IS)	8.811	362.8 -> 270.0	797975	20.0000 ng/ml	0.005
Pyrene-d10	9.716	212.0 -> 208.0	12602551	100.0000 ng/ml	0.010
Endrin-13C12(IS)	11.222	269.8 -> 200.0	412847	20.0000 ng/ml	0.004
4,4'-DDD d4(IS)	11.637	243.0 -> 173.1	1728396	5.0000 ng/ml	0.020
4,4'-DDT-d4(IS)	12.827	243.0 -> 173.1	887887	5.0000 ng/ml	0.004
Endrin ketone-13C12(IS)	13.832	327.9 -> 291.8	75006	20.0000 ng/ml	0.007
Methoxychlor-d6(IS)	14.049	233.0 -> 141.0	1475923	20.0000 ng/ml	0.009
Mirex-13C10(IS)	14.915	276.8 -> 241.8	2331805	5.0000 ng/ml	0.008

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.705	289.8 -> 254.8	4536221	20.391 ng/ml	
		Spiked Amount =	20.0	Recovery =	*102.0 %*
gamma-BHC-d6	6.014	223.9 -> 187.0	4091488	19.342 ng/ml	
		Spiked Amount =	20.0	Recovery =	*96.7 %*
Heptachlor-13C10	7.232	276.8 -> 241.8	3027748	20.497 ng/ml	
		Spiked Amount =	20.0	Recovery =	*102.5 %*
Chorpyrifos-d10	7.647	199.9 -> 171.9	1013956	19.934 ng/ml	
		Spiked Amount =	20.0	Recovery =	*99.7 %*
Aldrin-13C	7.955	269.8 -> 200.0	2373165	19.365 ng/ml	
		Spiked Amount =	20.0	Recovery =	*96.8 %*
Octachlorostyrene-13C8	8.531	315.8 -> 245.8	2764235	19.776 ng/ml	
		Spiked Amount =	20.0	Recovery =	*98.9 %*
Isodrin-13C12	8.613	199.9 -> 130.1	1874902	19.671 ng/ml	
		Spiked Amount =	20.0	Recovery =	*98.4 %*
Oxychlordane-13C10	8.803	190.0 -> 125.0	1301370	19.963 ng/ml	
		Spiked Amount =	20.0	Recovery =	*99.8 %*
Heptachlor epoxide-13C10	8.805	362.8 -> 270.0	797975	20.708 ng/ml	
		Spiked Amount =	20.0	Recovery =	*103.5 %*
Endrin-13C12	11.214	269.8 -> 200.0	412847	19.338 ng/ml	
		Spiked Amount =	20.0	Recovery =	*96.7 %*
4,4'-DDD d4	11.630	243.0 -> 173.1	1728396	5.098 ng/ml	
		Spiked Amount =	5.0	Recovery =	*102.0 %*
4,4'-DDT-d4	12.822	243.0 -> 173.1	887887	5.048 ng/ml	
		Spiked Amount =	5.0	Recovery =	*101.0 %*
Endrin ketone-13C12	13.821	327.9 -> 291.8	75006	19.717 ng/ml	
		Spiked Amount =	20.0	Recovery =	*98.6 %*
Methoxychlor-d6	14.039	233.0 -> 141.0	1475923	19.553 ng/ml	
		Spiked Amount =	20.0	Recovery =	*97.8 %*

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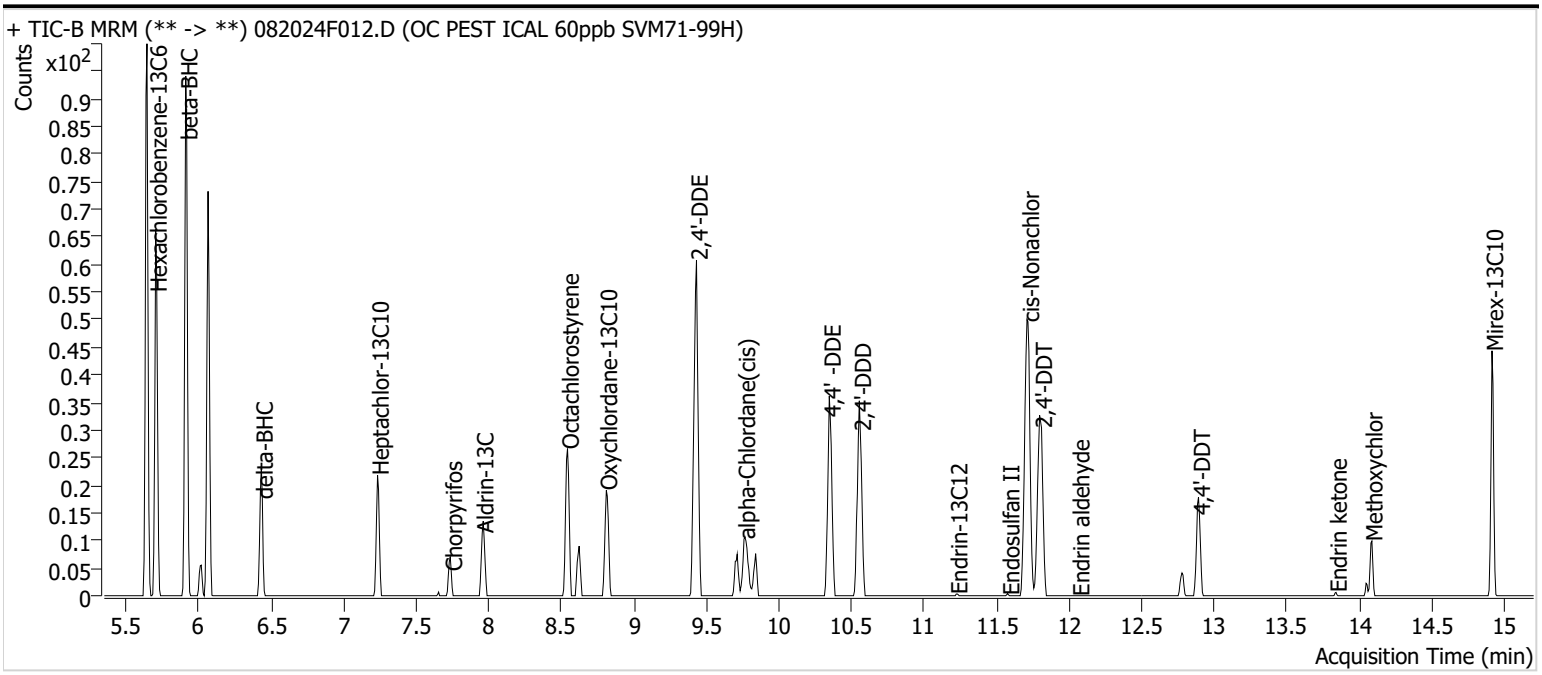
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.906	276.8 -> 241.8	2331805	5.279 ng/ml
		Spiked Amount =	5.0	Recovery = *105.6 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)	5.649	181.1 -> 145.1	45588362	66.420 ng/ml	98
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.706	283.8 -> 213.9	24021805	60.948 ng/ml	95
beta-BHC	gamma-BHC-d6(IS)	5.916	181.1 -> 145.1	41751988	65.179 ng/ml	99
gamma-BHC(Lindane)	gamma-BHC-d6(IS)	6.070	181.1 -> 145.1	33753177	63.978 ng/ml	100
delta-BHC	gamma-BHC-d6(IS)	6.436	181.1 -> 145.1	12014531	63.693 ng/ml	80
Heptachlor	Heptachlor-13C10(IS)	7.238	271.7 -> 236.9	9405932	60.633 ng/ml	96
Chorpyrifos	Chorpyrifos-d10(IS)	7.740	196.9 -> 169.0	4087401	63.587 ng/ml	85
Aldrin	Aldrin-13C(IS)	7.965	254.9 -> 220.0	5301147	62.032 ng/ml	90
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.544	342.8 -> 307.8	17880434	63.813 ng/ml	99
Isodrin	Isodrin-13C12(IS)	8.626	193.0 -> 123.0	6385718	61.963 ng/ml	90
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	8.818	352.8 -> 262.9	2834221	63.630 ng/ml	98
Oxychlordane	Oxychlordane-13C10(IS)	8.816	114.9 -> 51.1	10021524	62.577 ng/ml	97
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.413	271.8 -> 236.9	6187593	66.876 ng/ml	92
2,4'-DDE	4,4'-DDD d4(IS)	9.434	246.0 -> 176.2	39907590	64.406 ng/ml	96
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.760	271.8 -> 236.9	15075907	64.876 ng/ml	94
Endosulfan I	Endrin-13C12(IS)	9.797	206.9 -> 172.0	2171630	64.962 ng/ml	100
trans-Nanochlor	Oxychlordane-13C10(IS)	9.841	271.8 -> 236.9	5360223	66.527 ng/ml	94
4,4' -DDE	4,4'-DDD d4(IS)	10.349	246.0 -> 176.2	28841472	62.521 ng/ml	94
2,4'-DDD	4,4'-DDD d4(IS)	10.559	235.0 -> 165.1	27901204	64.305 ng/ml	97
Dieldrin	Endrin-13C12(IS)	10.574	262.9 -> 193.0	2978467	69.082 ng/ml	91
Endrin	Endrin-13C12(IS)	11.236	262.8 -> 193.0	1545304	63.967 ng/ml	95
Endosulfan II	Endrin-13C12(IS)	11.580	206.9 -> 172.0	1047581	63.774 ng/ml	95
4,4'-DDD	4,4'-DDD d4(IS)	11.719	235.0 -> 165.1	23828040	68.319 ng/ml	94
cis-Nonachlor	Oxychlordane-13C10(IS)	11.716	271.8 -> 236.9	3929177	66.978 ng/ml	99
2,4'-DDT	4,4'-DDT-d4(IS)	11.807	235.0 -> 165.1	15854860	64.684 ng/ml	98
Endrin aldehyde	Endrin-13C12(IS)	12.064	249.9 -> 214.9	616325	68.795 ng/ml	99
Endosulfan sulfate	Endrin-13C12(IS)	12.778	271.9 -> 237.0	3399420	67.191 ng/ml	95
4,4'-DDT	4,4'-DDT-d4(IS)	12.896	235.0 -> 165.1	12382058	59.897 ng/ml	97
Endrin ketone	Endrin ketone-13C12(IS)	13.837	147.0 -> 111.0	1075175	65.235 ng/ml	97
Methoxychlor	Methoxychlor-d6(IS)	14.084	227.0 -> 141.1	5399313	68.402 ng/ml	91
Mirex	Mirex-13C10(IS)	14.916	271.8 -> 236.8	25166370	53.450 ng/ml	96

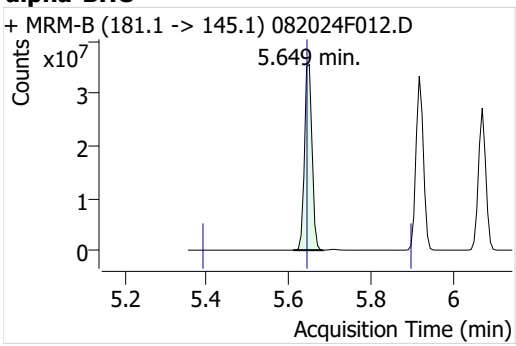
(m) = manual integration ND = Not Detected NC = Not Calculated

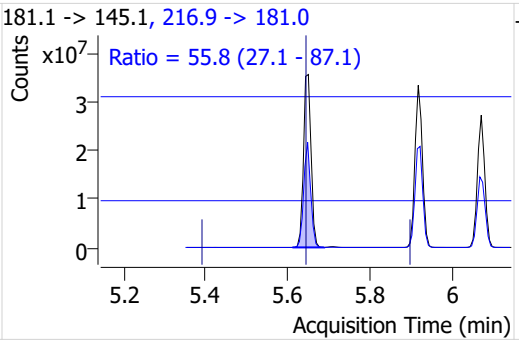
Sample Chromatogram

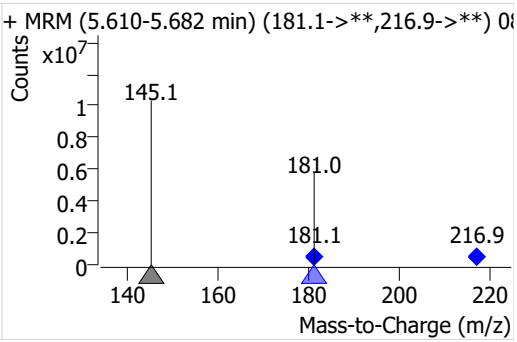
MassHunter Quantitative Analysis Sample Report



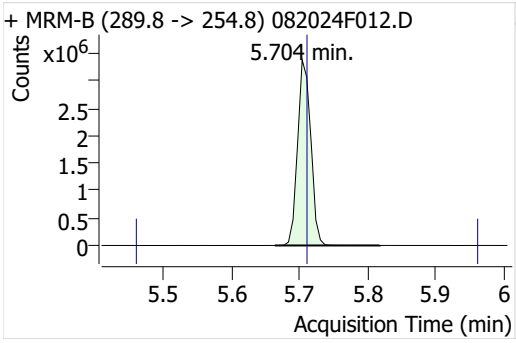
alpha-BHC

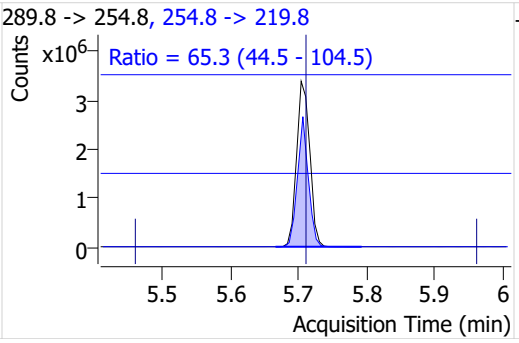


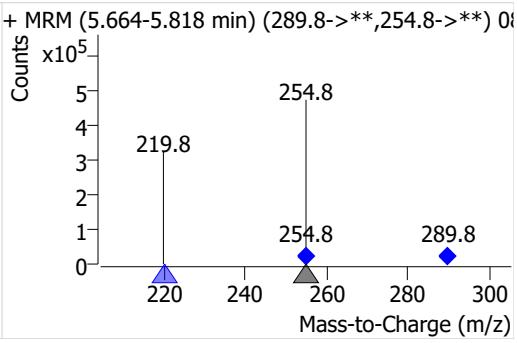




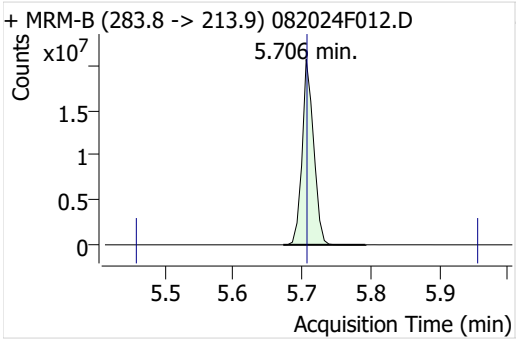
Hexachlorobenzene-13C6

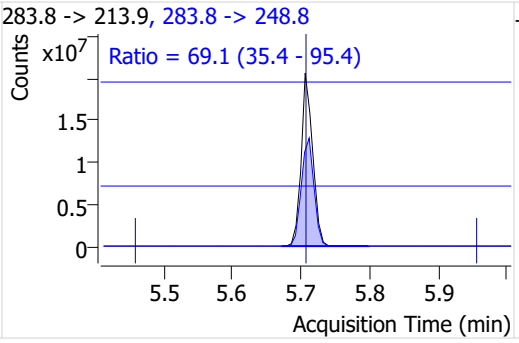


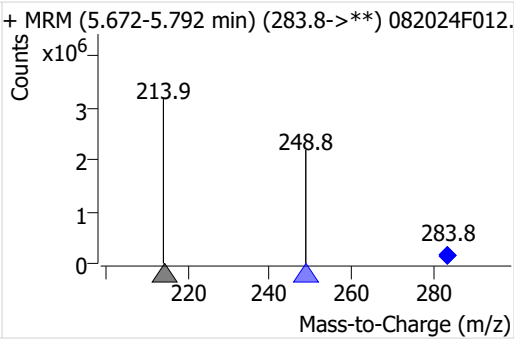




Hexachlorobenzene







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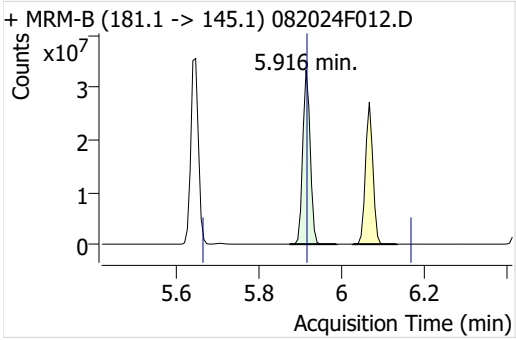
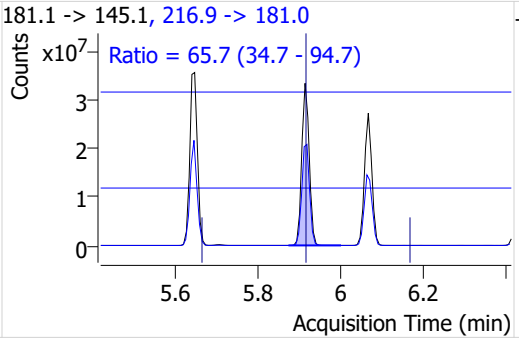
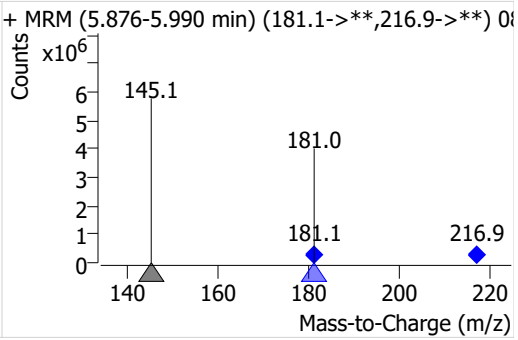
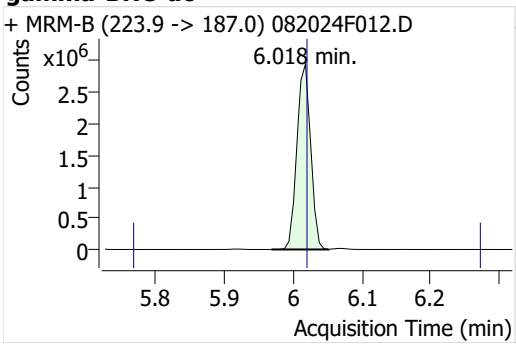
beta-BHC

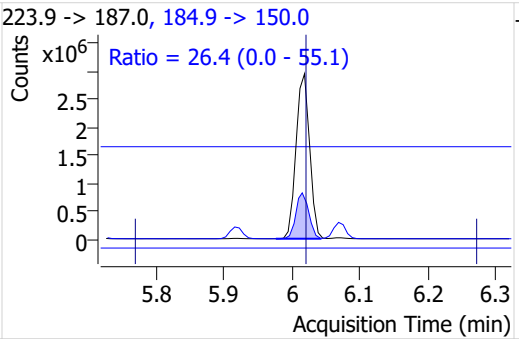


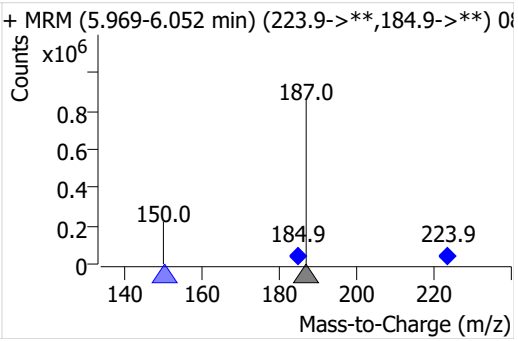




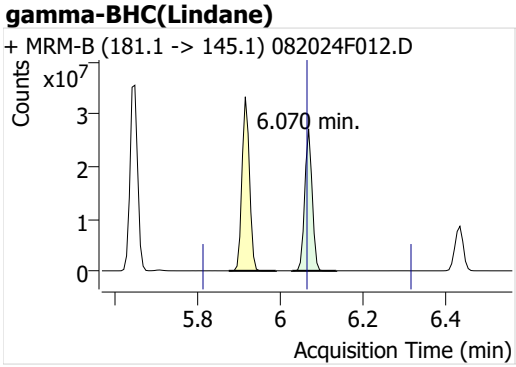
gamma-BHC-d6

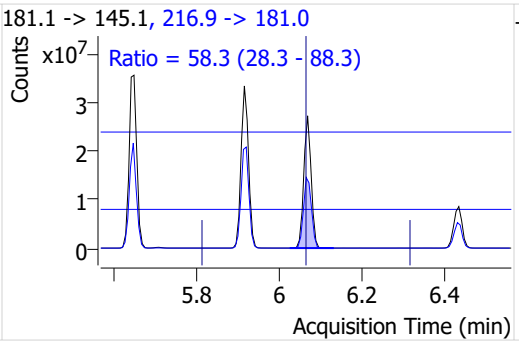


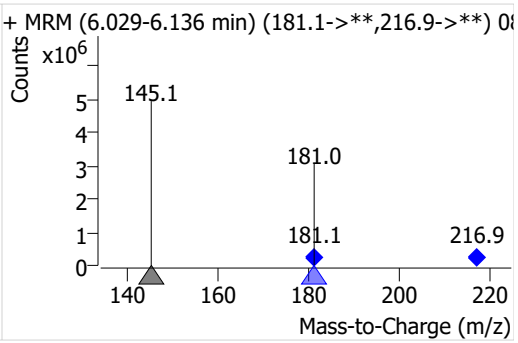




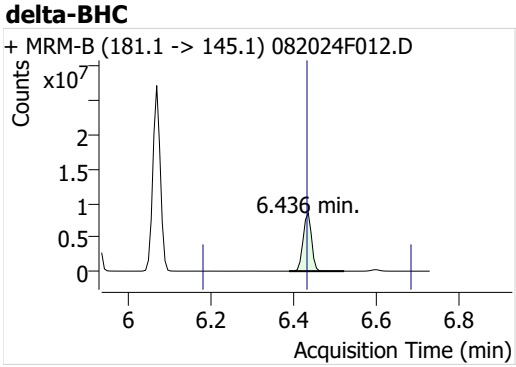
gamma-BHC(Lindane)

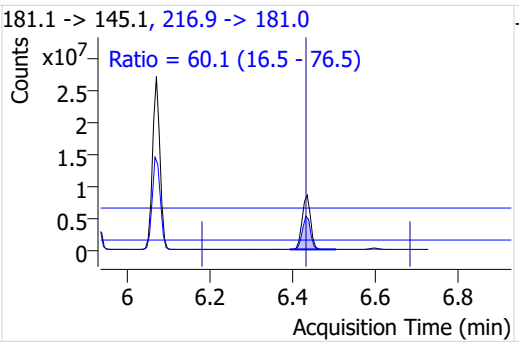


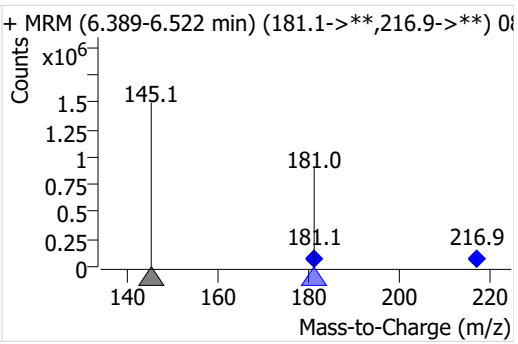




delta-BHC

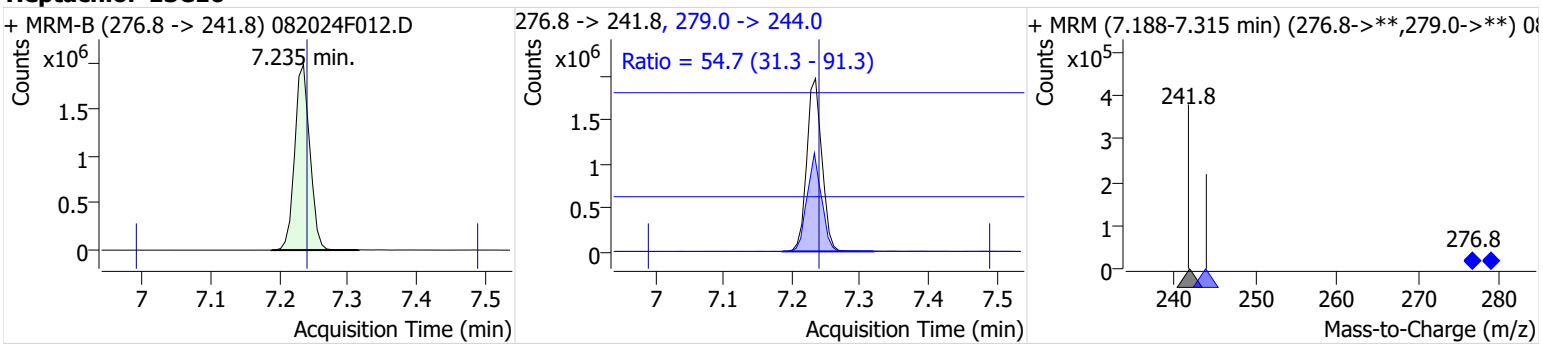






MassHunter Quantitative Analysis Sample Report

Heptachlor-13C10



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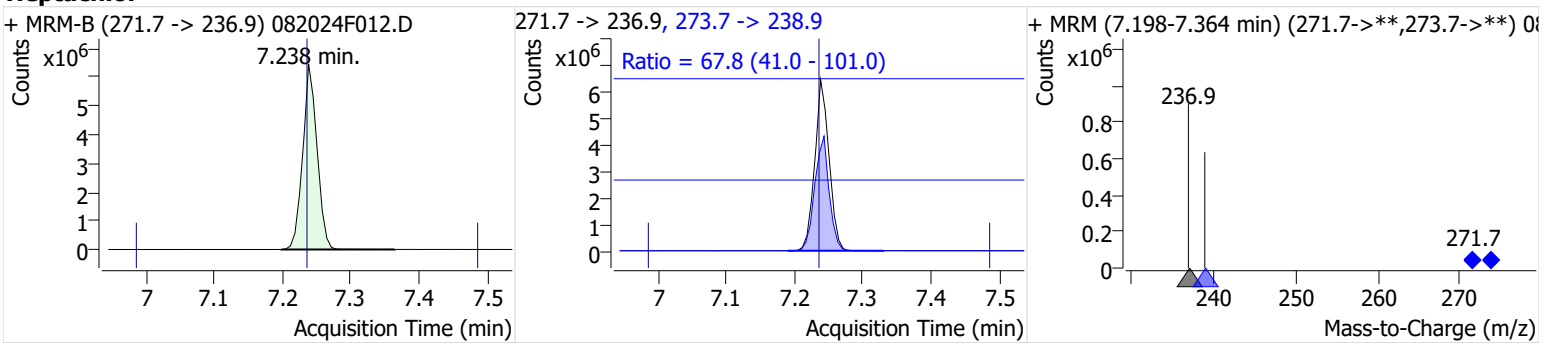

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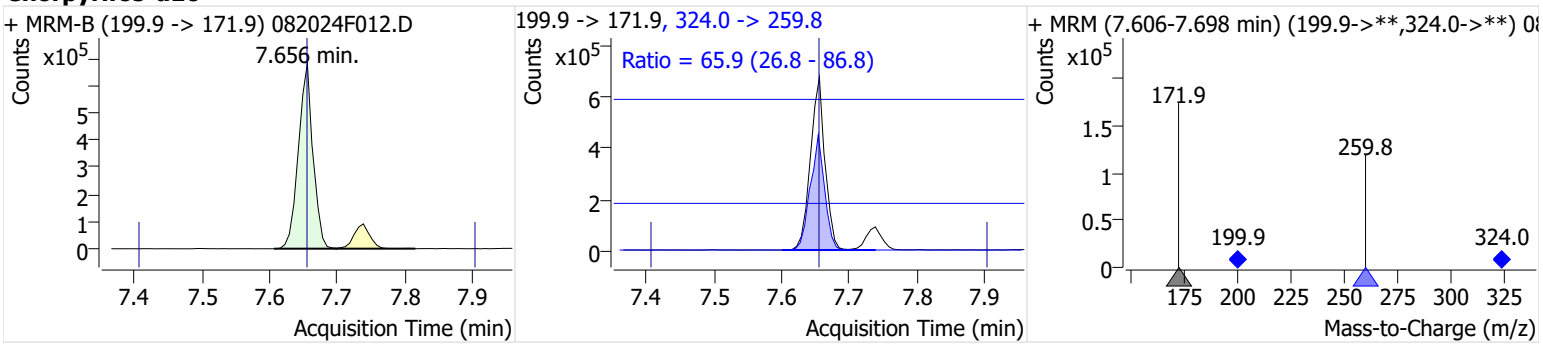

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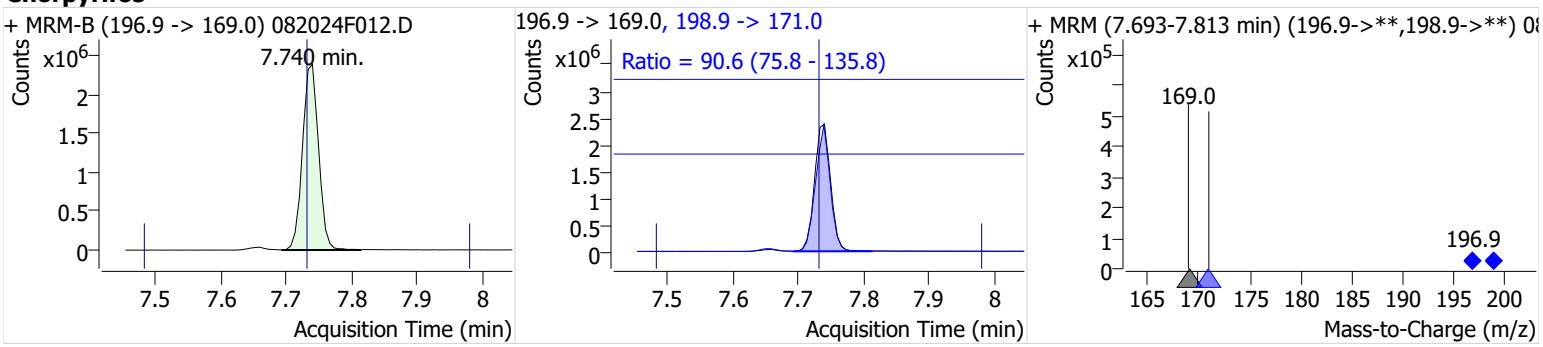
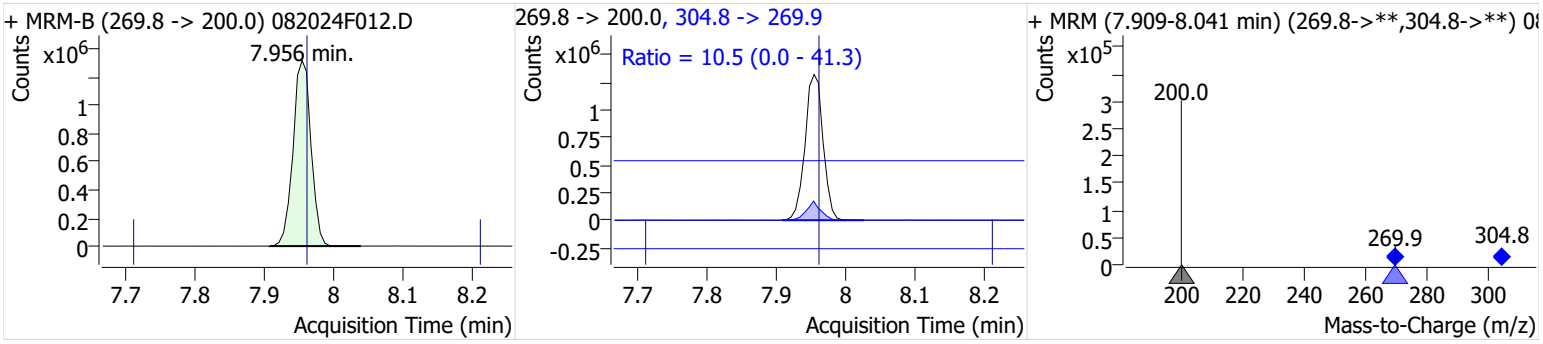


MassHunter Quantitative Analysis Sample Report

Aldrin-13C



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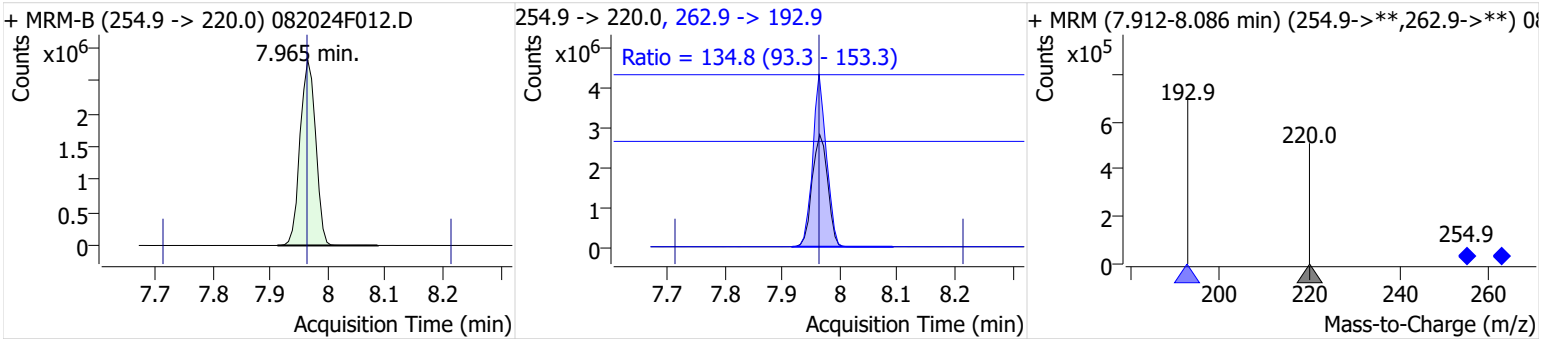
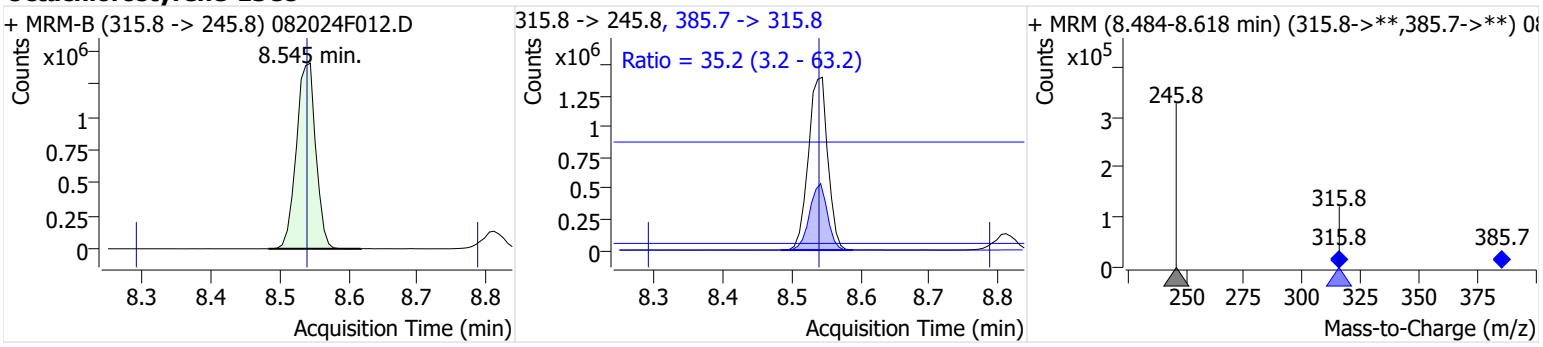


Octachlorostyrene-13C8



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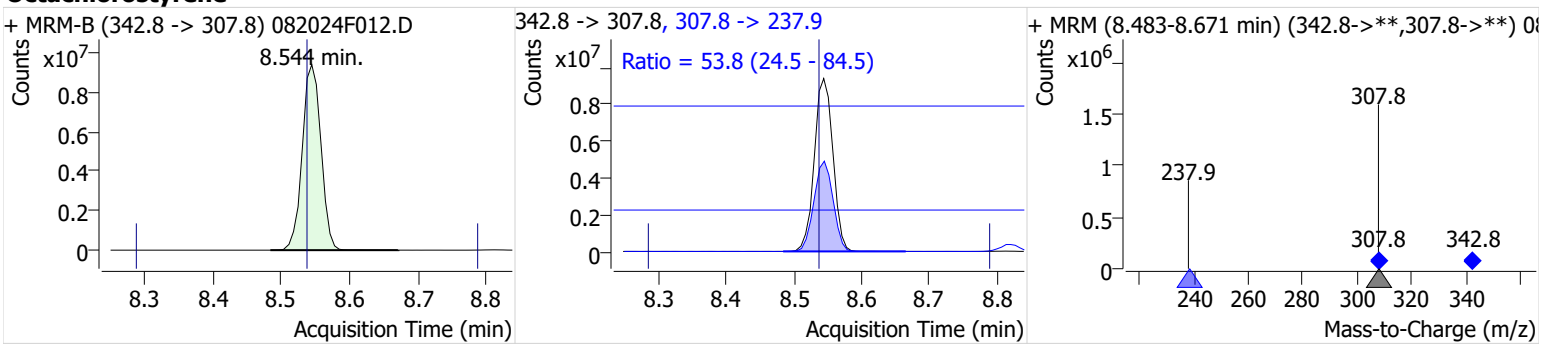

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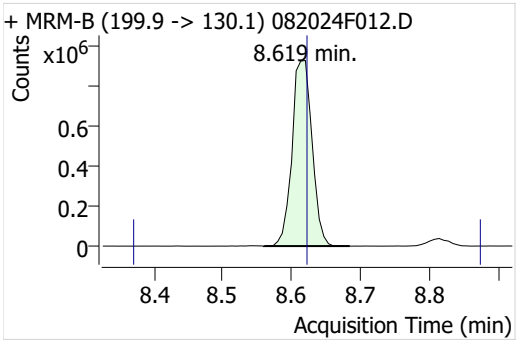
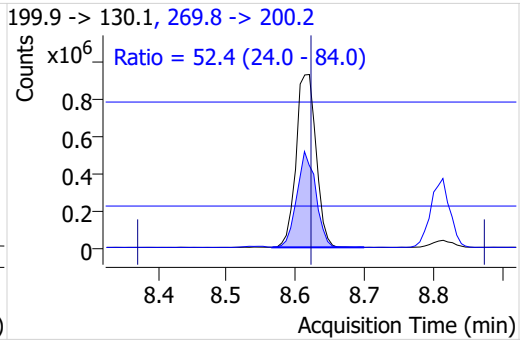
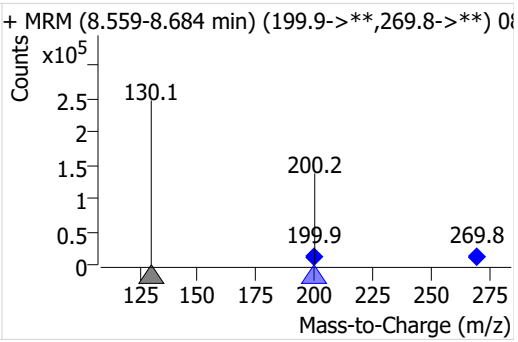
Isodrin-13C12







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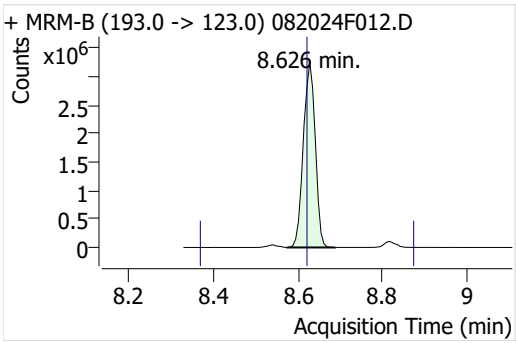
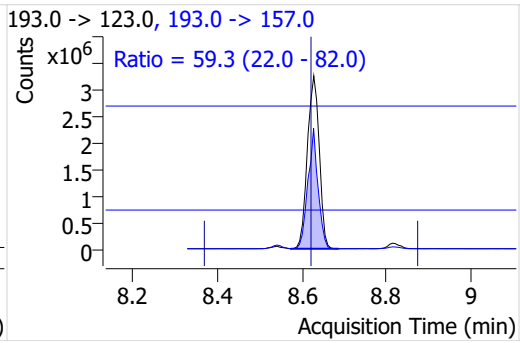
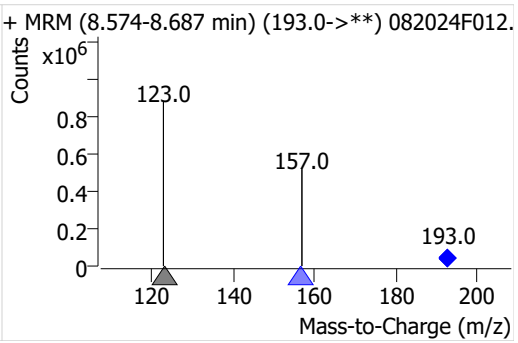
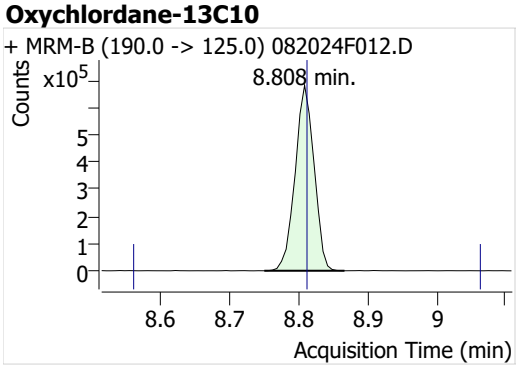
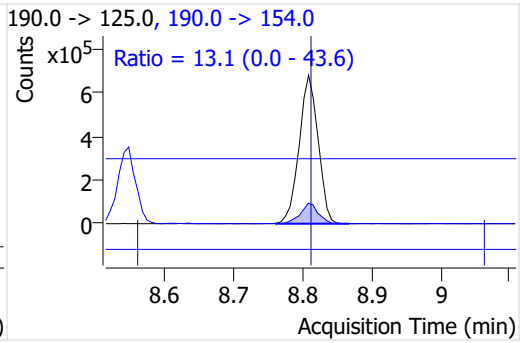


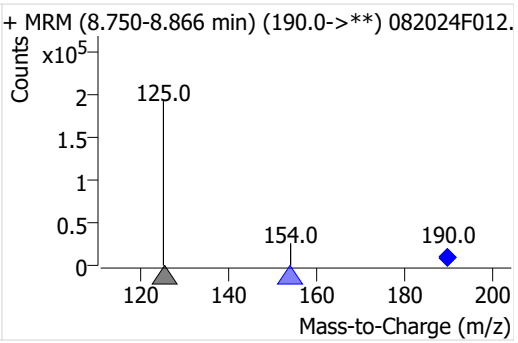




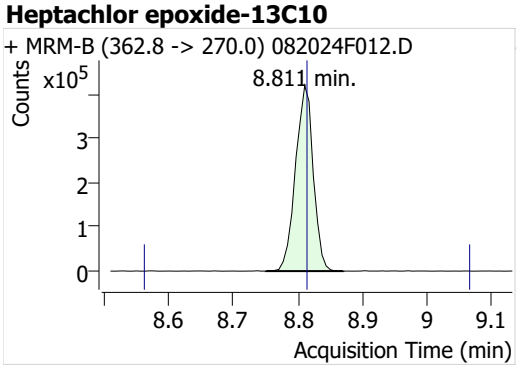
Oxychlordane-13C10

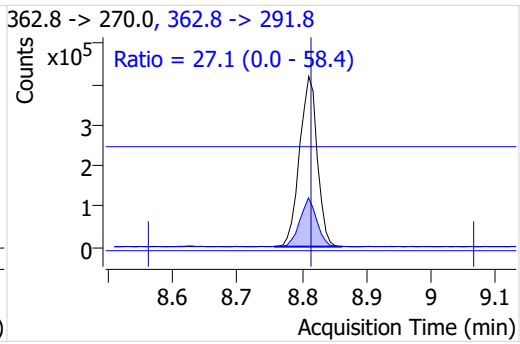


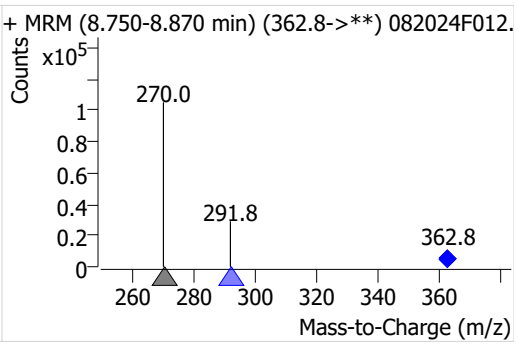




Heptachlor epoxide-13C10







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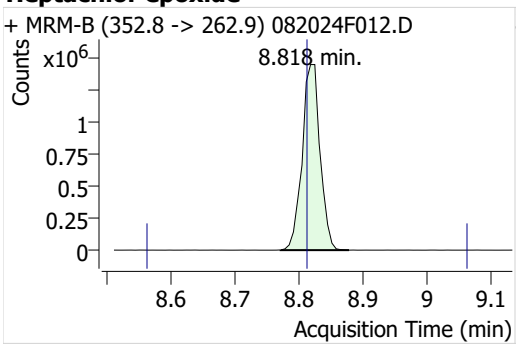
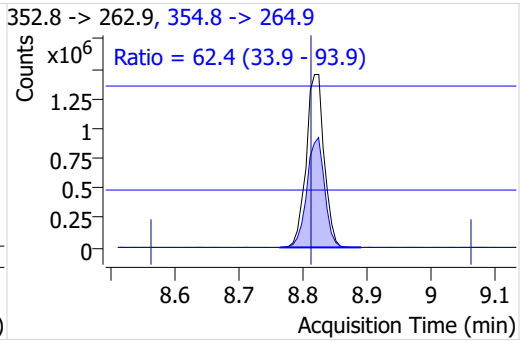
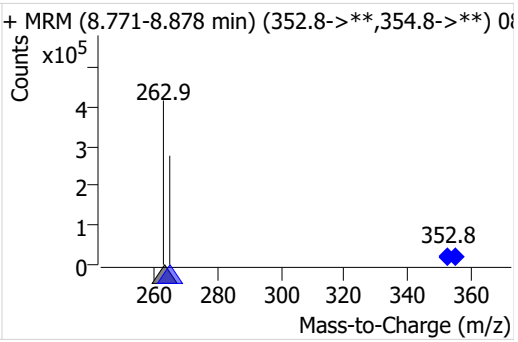
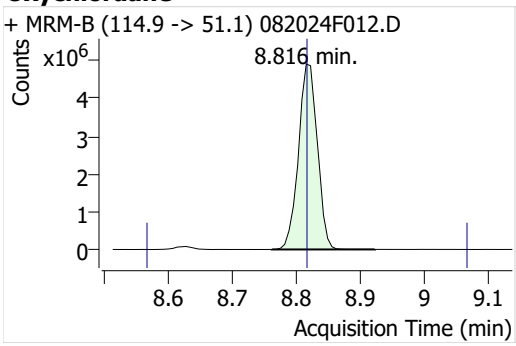
Heptachlor epoxide

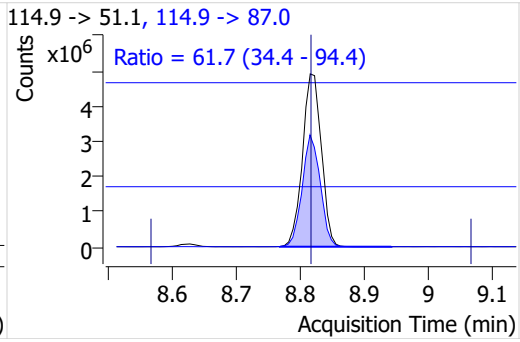


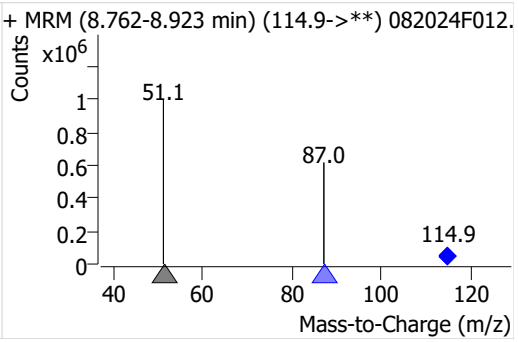




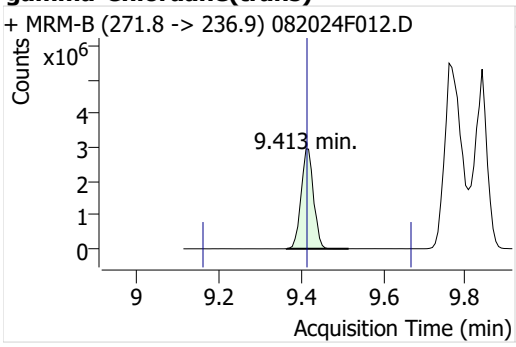
Oxychlordane

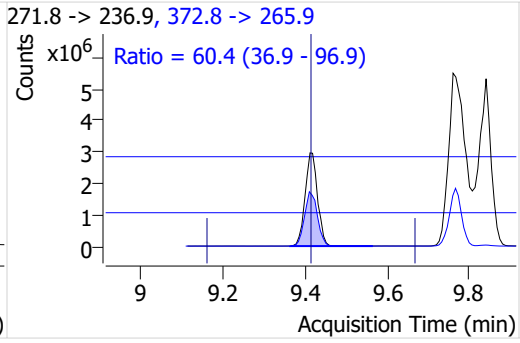


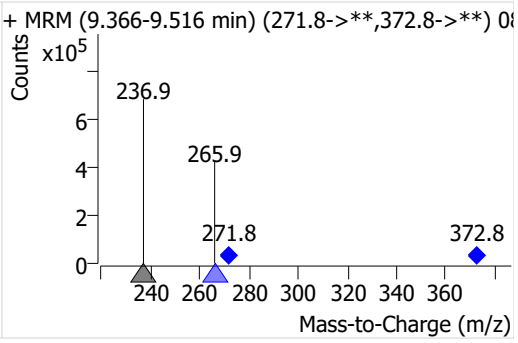




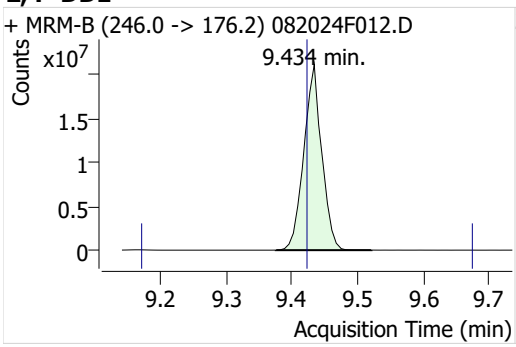
gamma-Chlordane(trans)

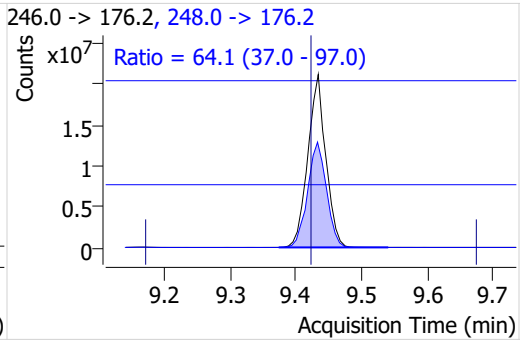


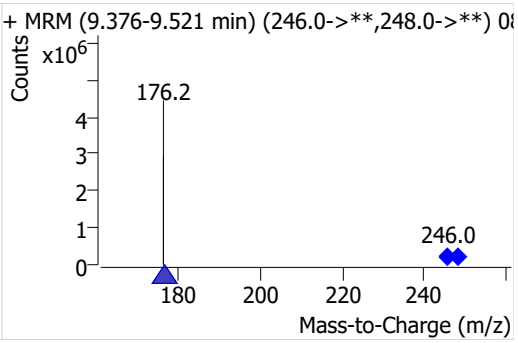




2,4'-DDE







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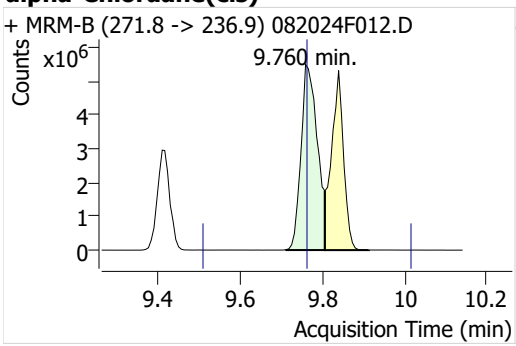
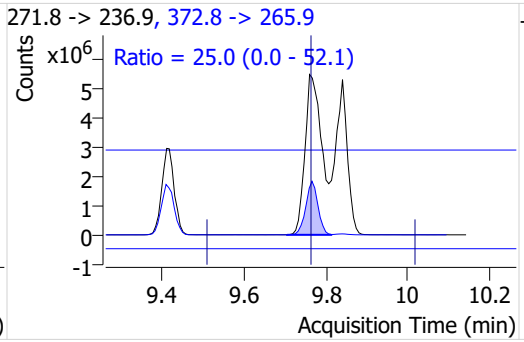
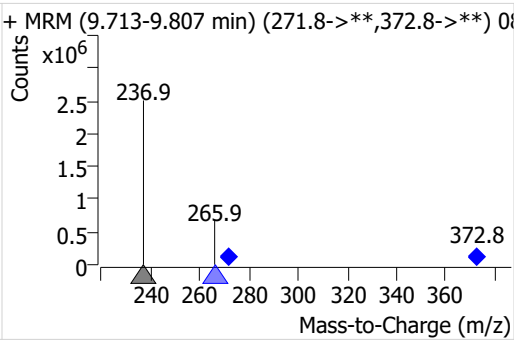
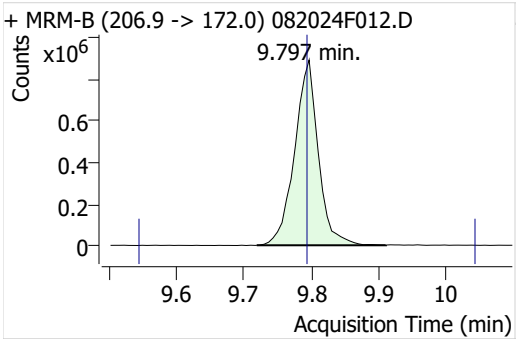
alpha-Chlordane(cis)

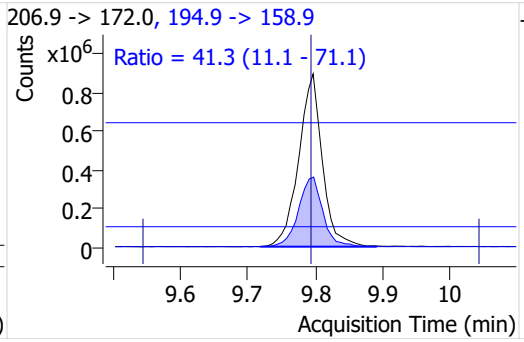


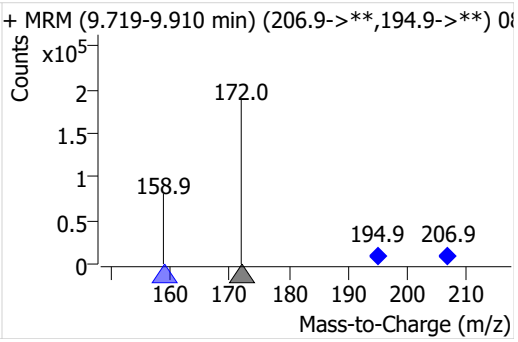




Endosulfan I







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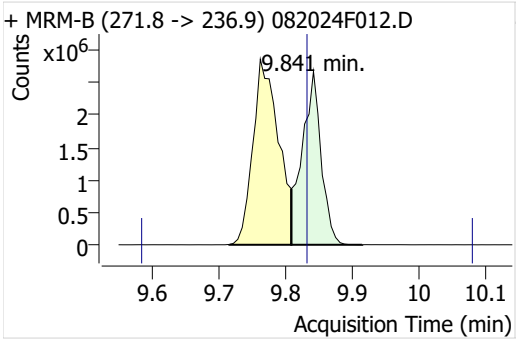
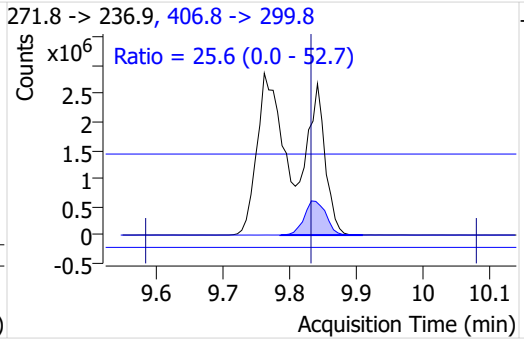
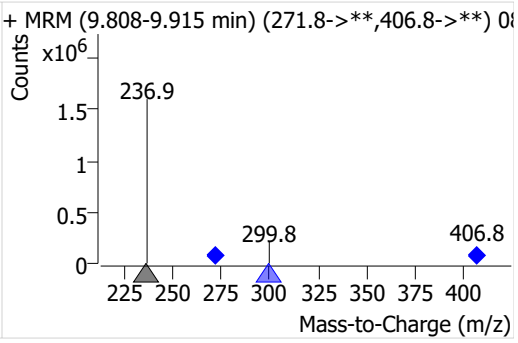
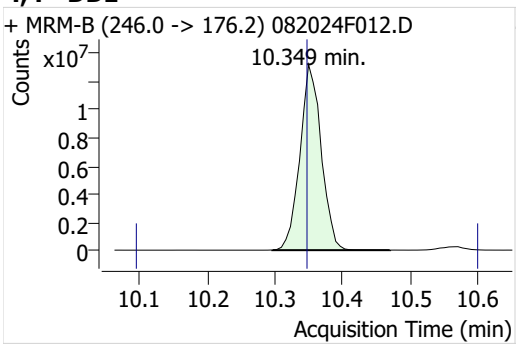
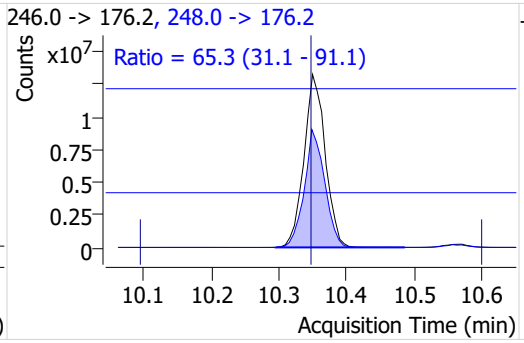


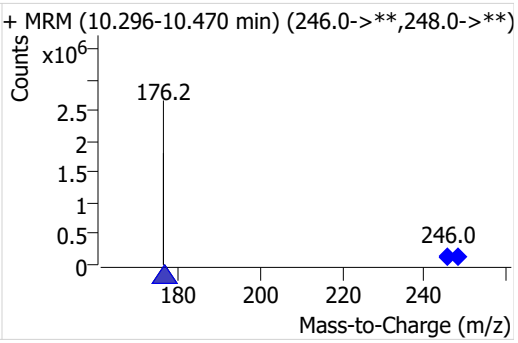




4,4' -DDE







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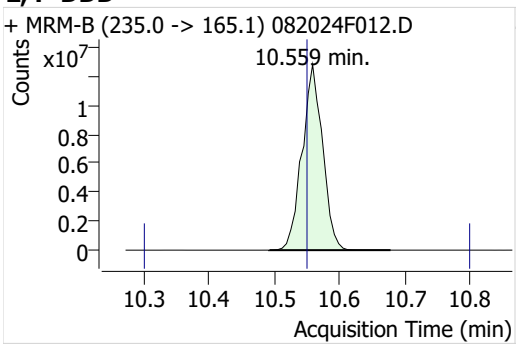
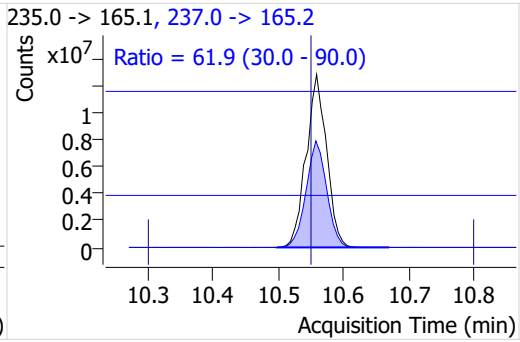
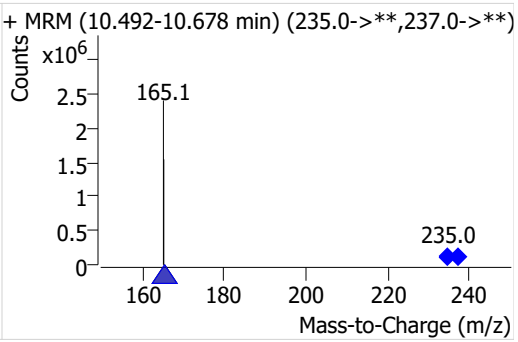
2,4'-DDD







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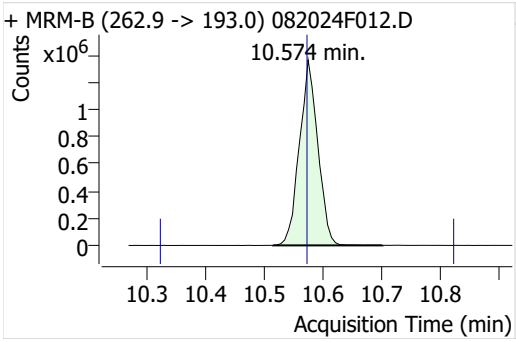
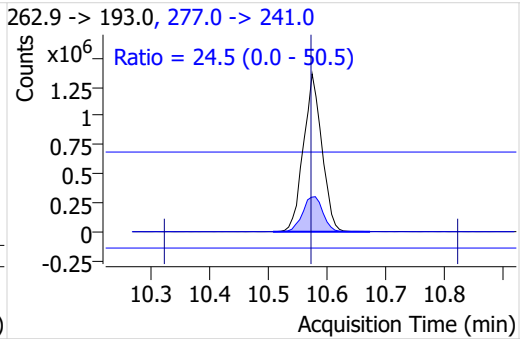
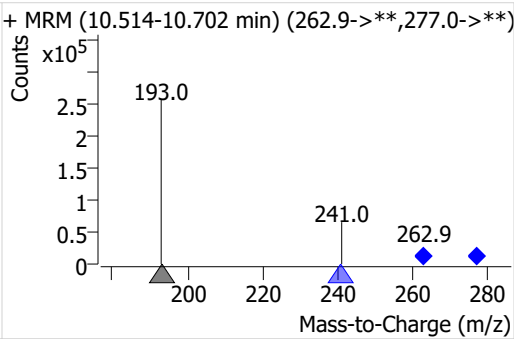
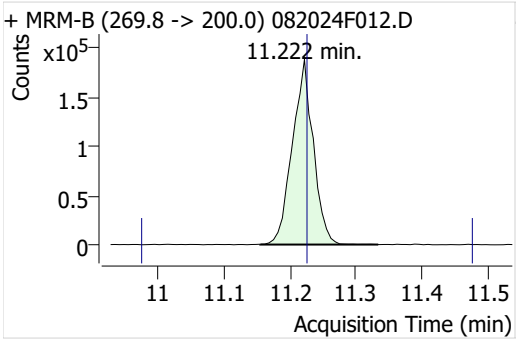
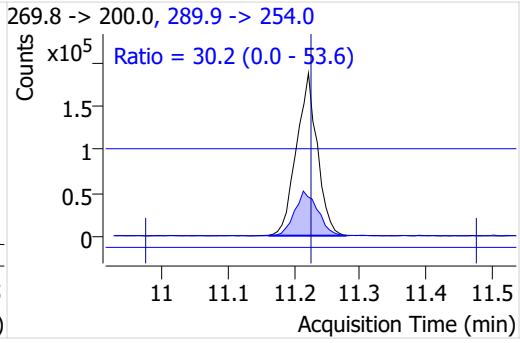


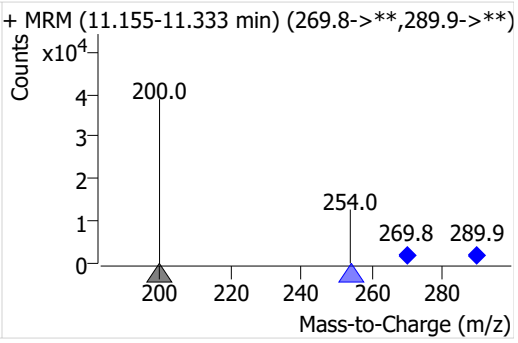




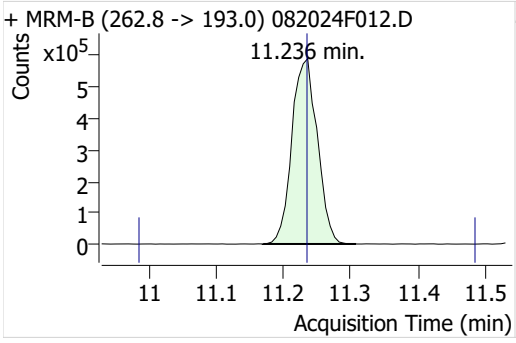
Endrin-13C12

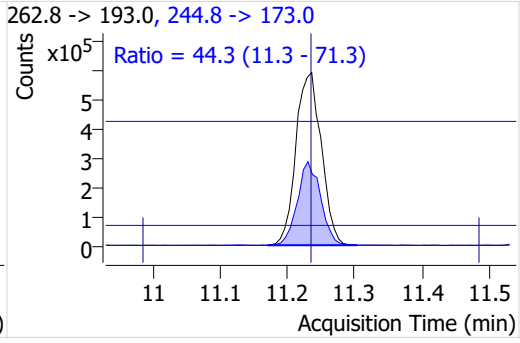


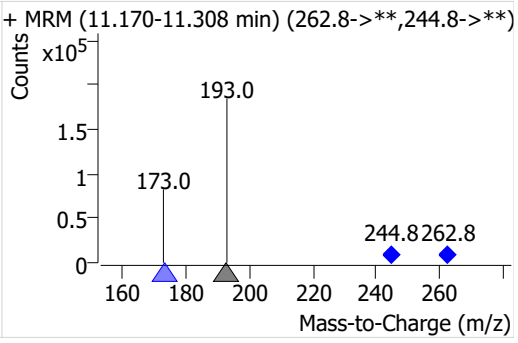




Endrin







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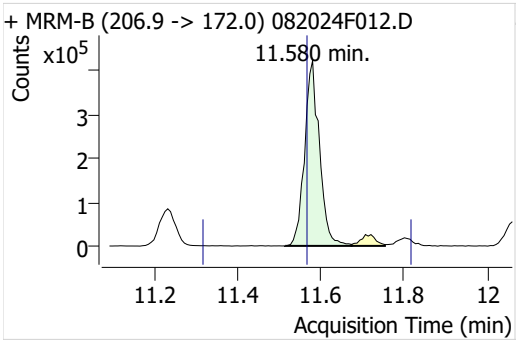
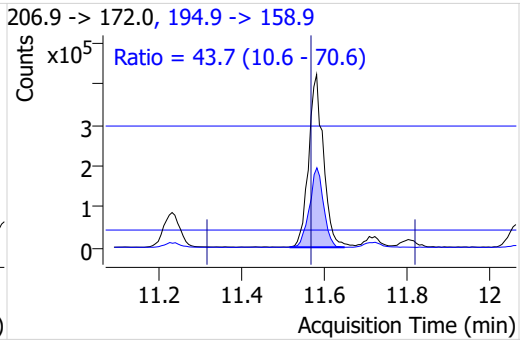
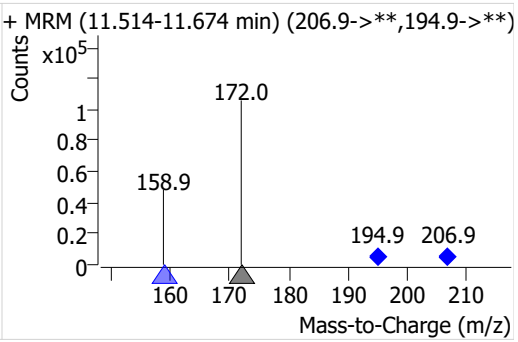
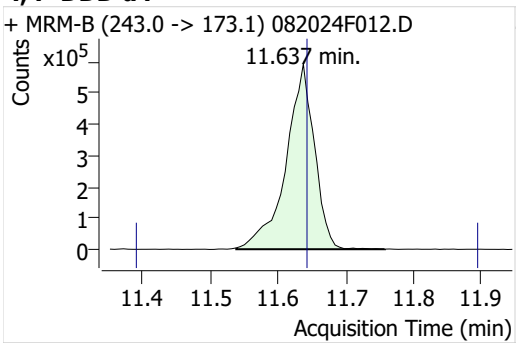
Endosulfan II

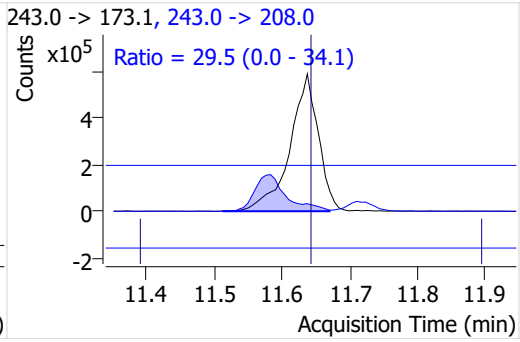


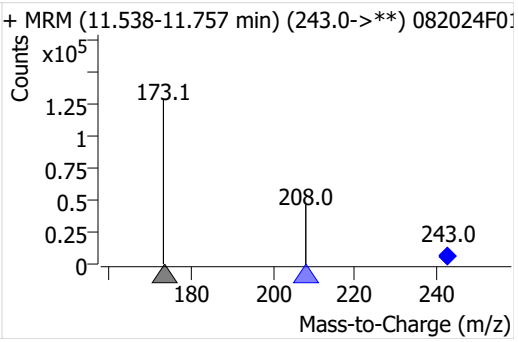




4,4'-DDD d4







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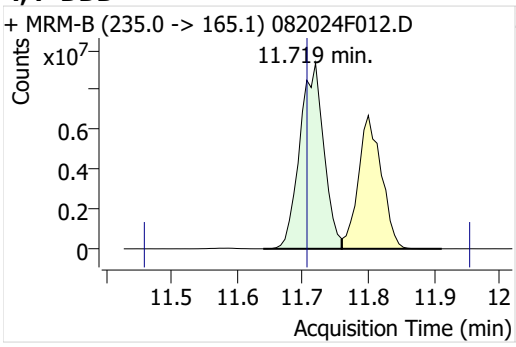

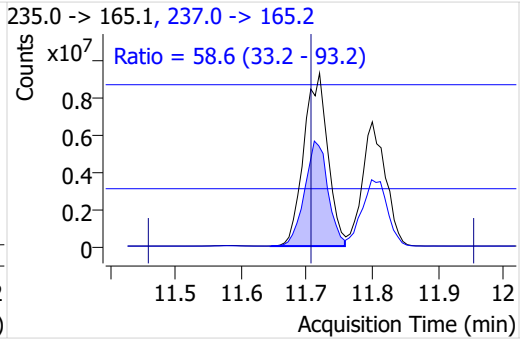

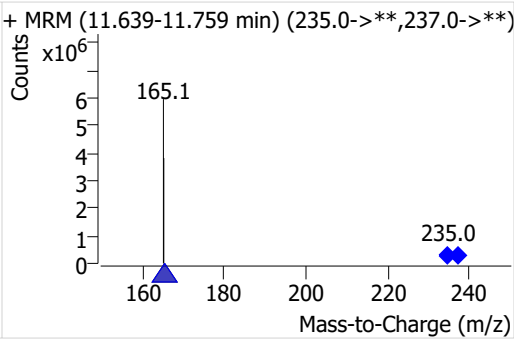

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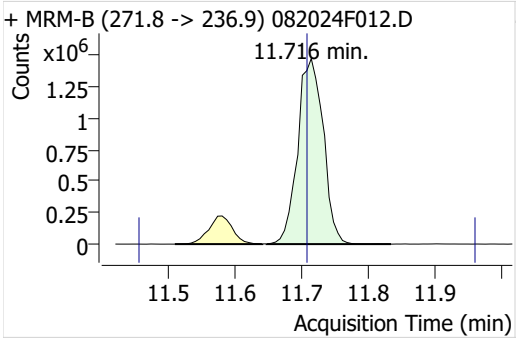

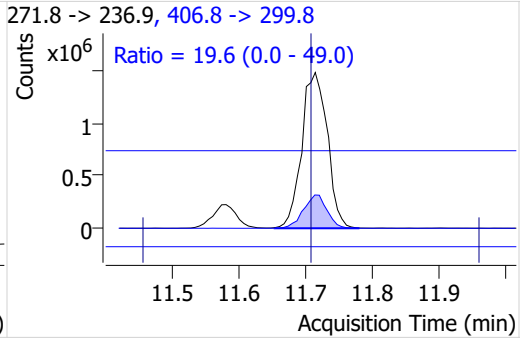

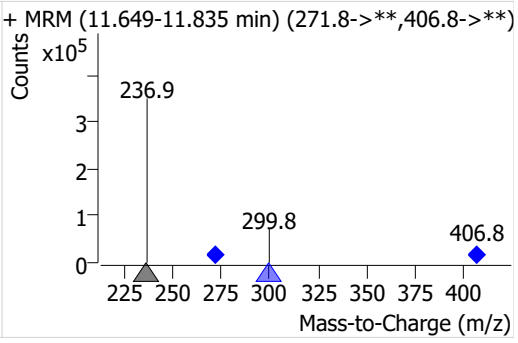

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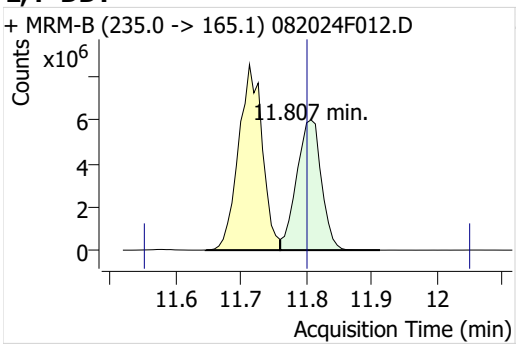
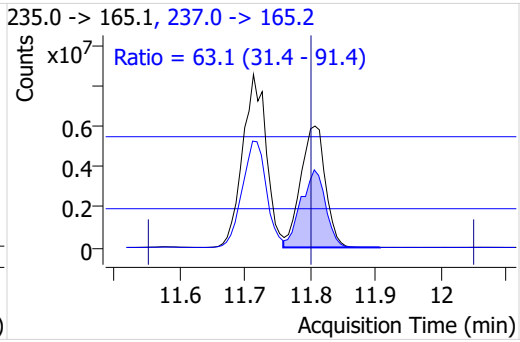
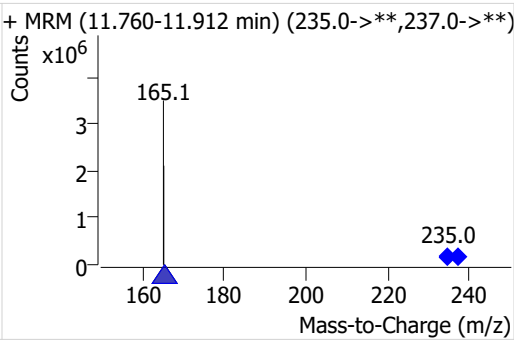
2,4'-DDT







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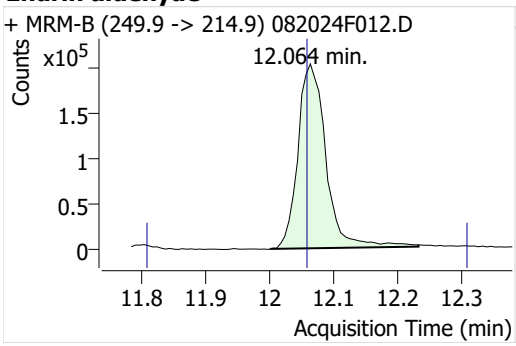
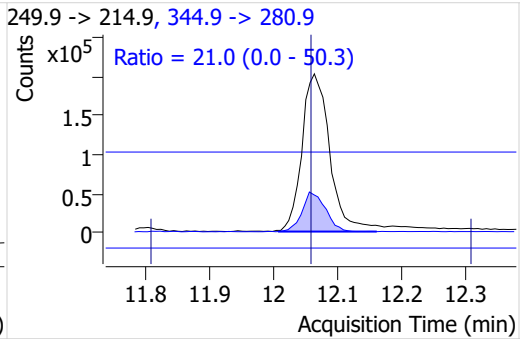
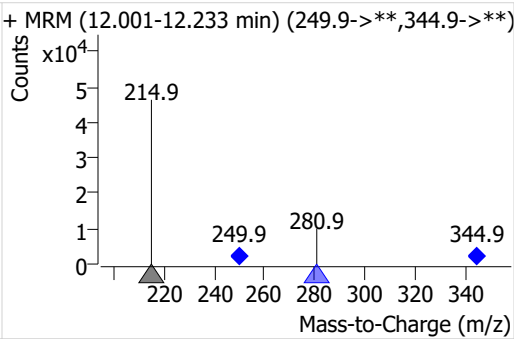
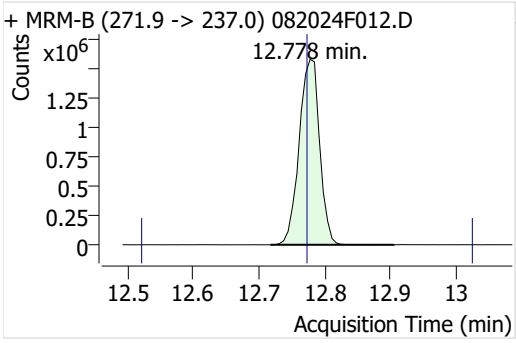
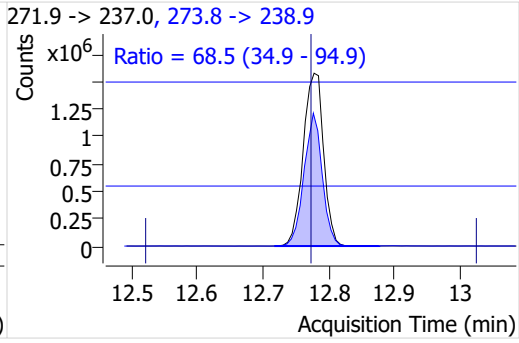


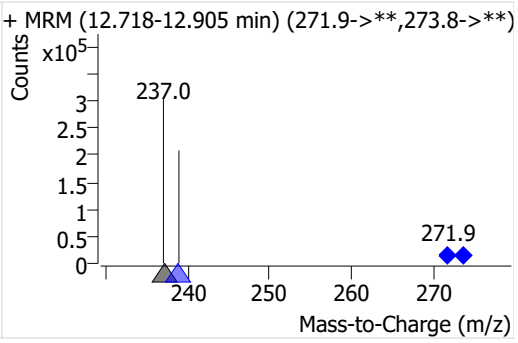




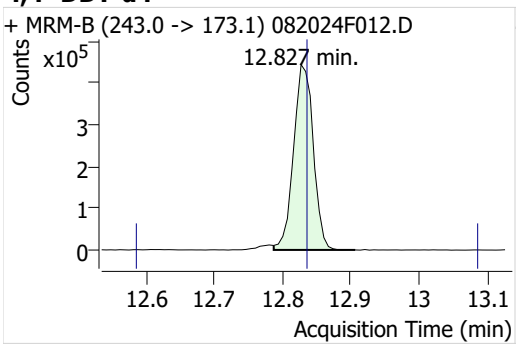
Endosulfan sulfate

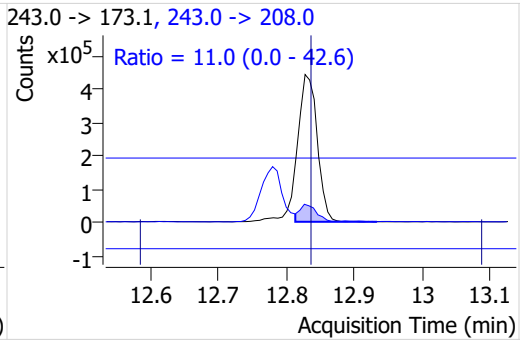


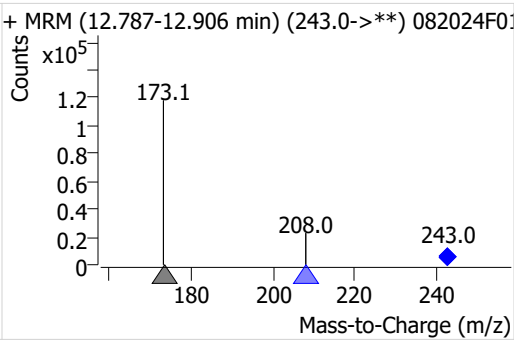




4,4'-DDT-d4







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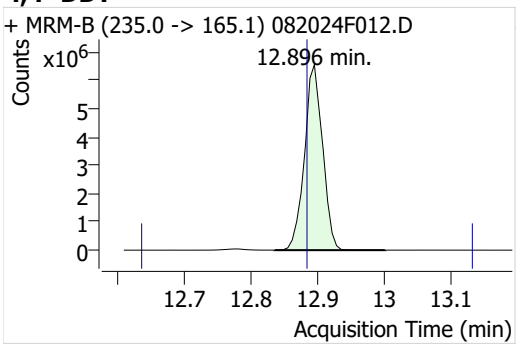
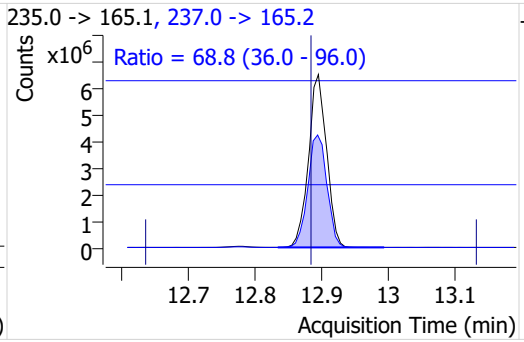
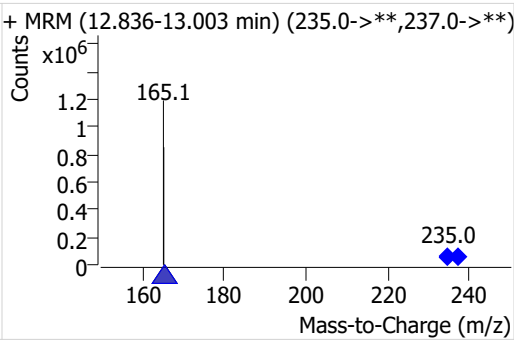
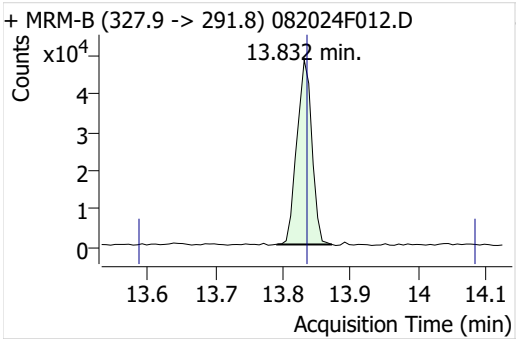
4,4'-DDT

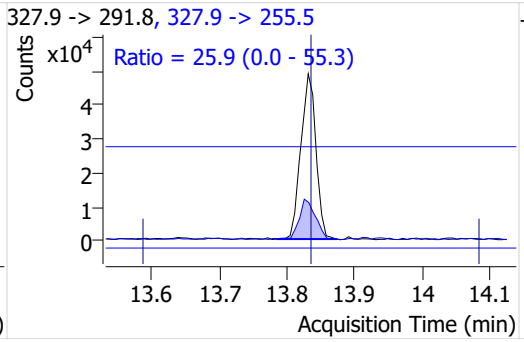


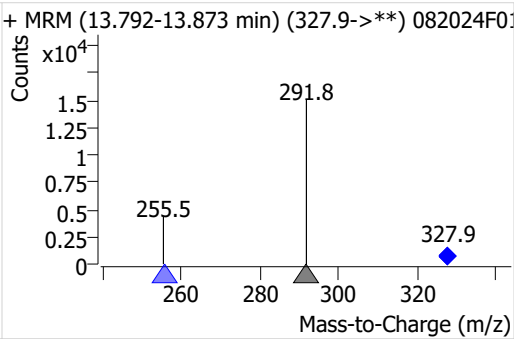




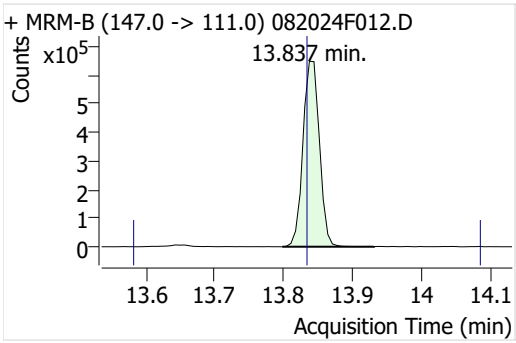
Endrin ketone-13C12

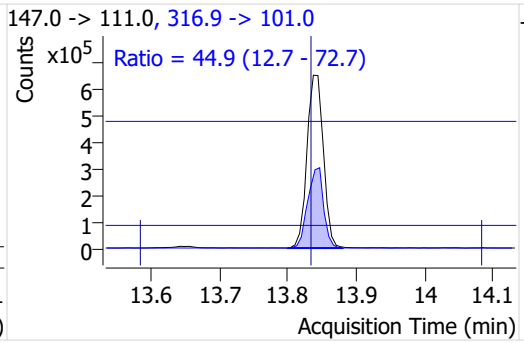


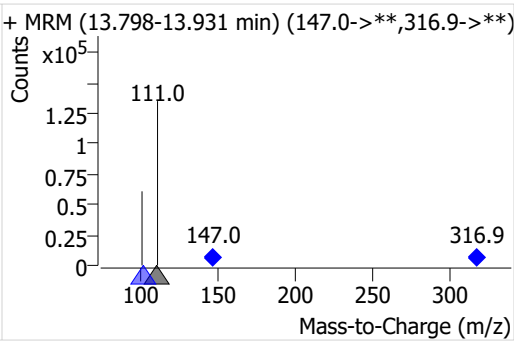




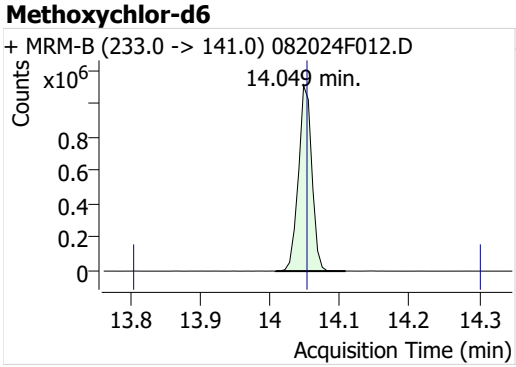
Endrin ketone

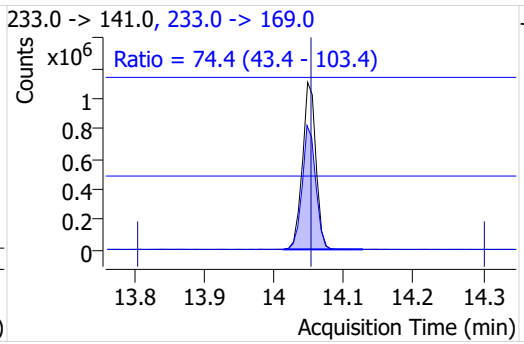


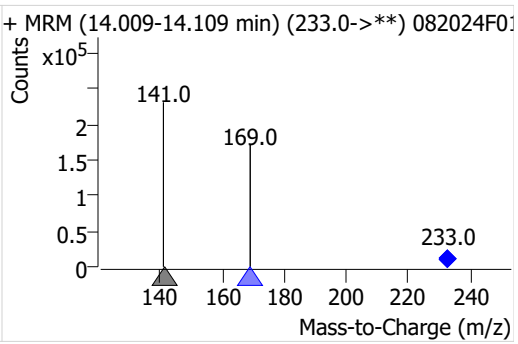




Methoxychlor-d6







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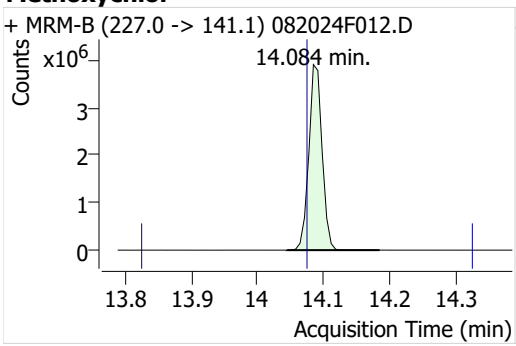
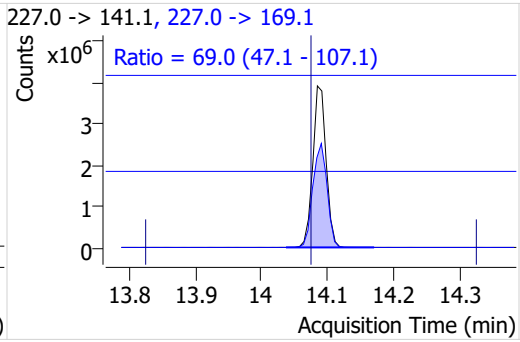
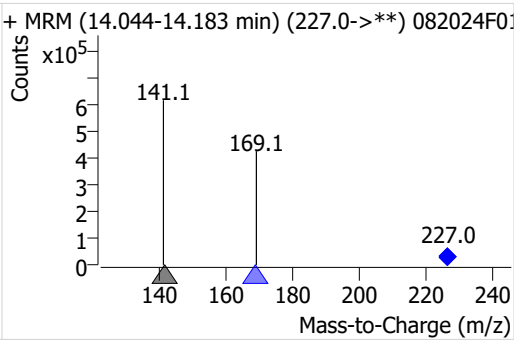
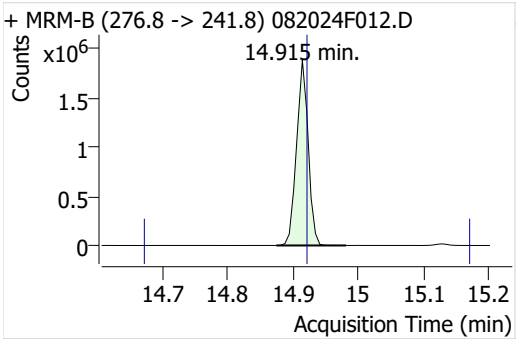
Methoxychlor

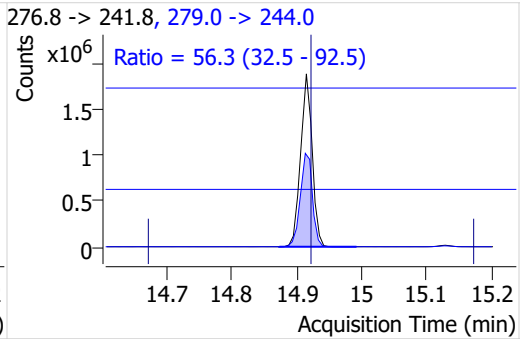


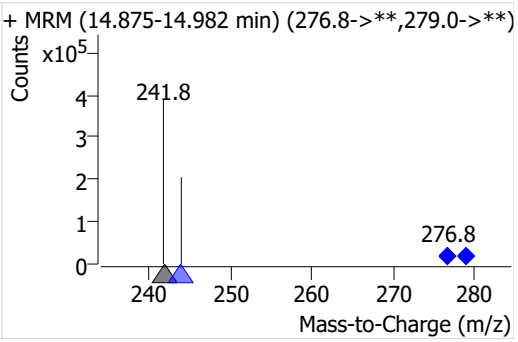




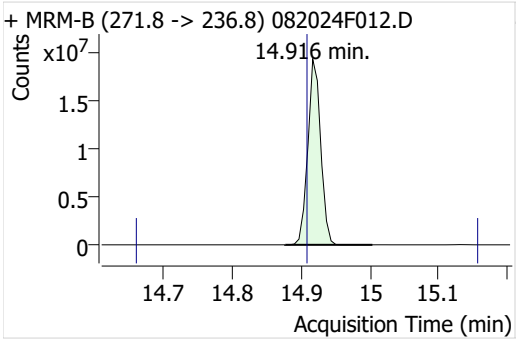
Mirex-13C10

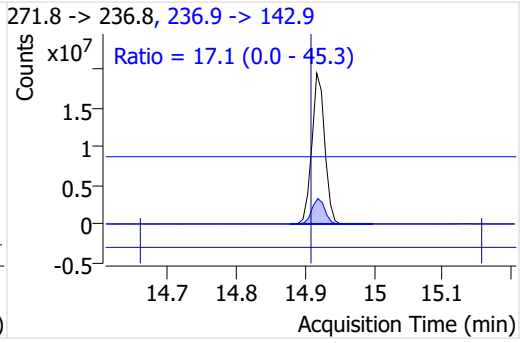


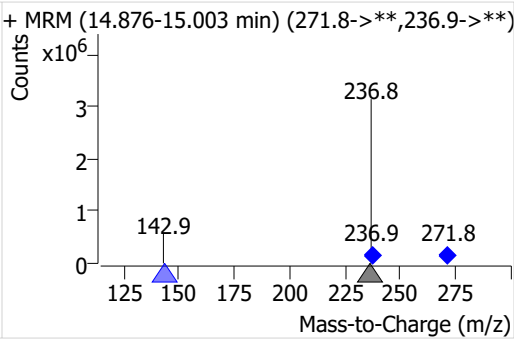




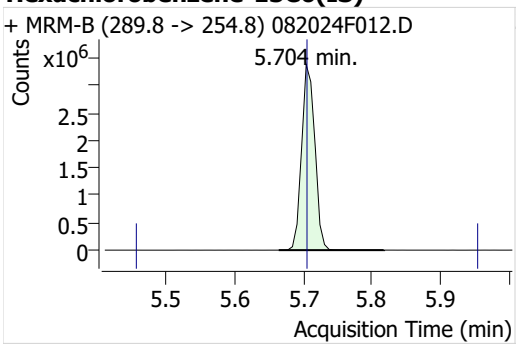
Mirex

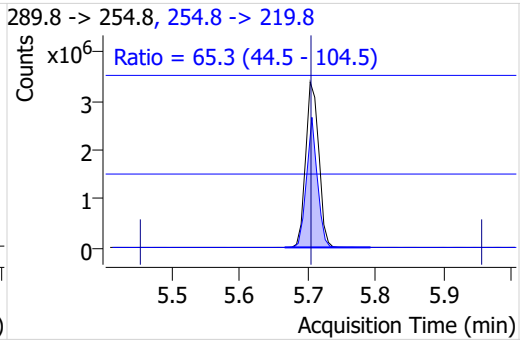


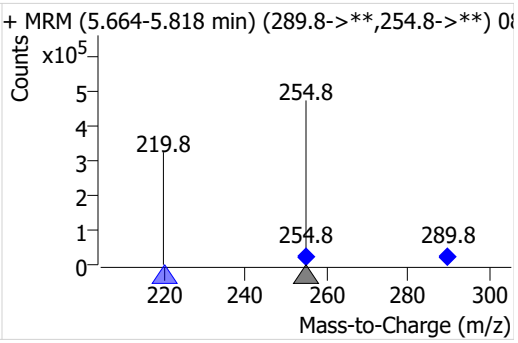




Hexachlorobenzene-13C6(IS)







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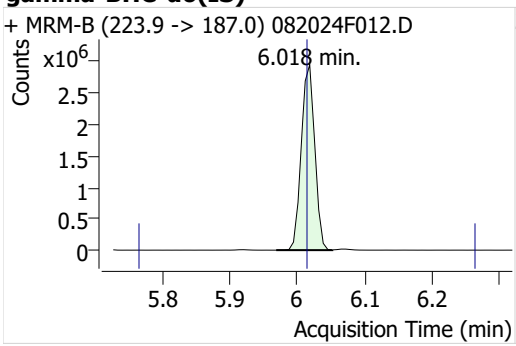
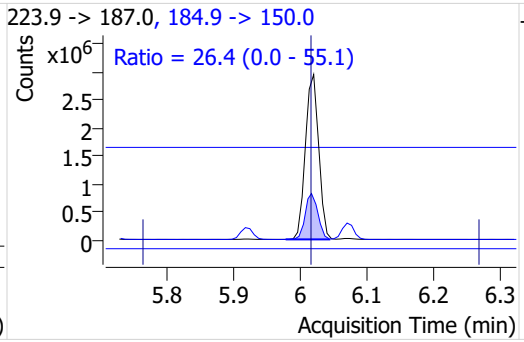
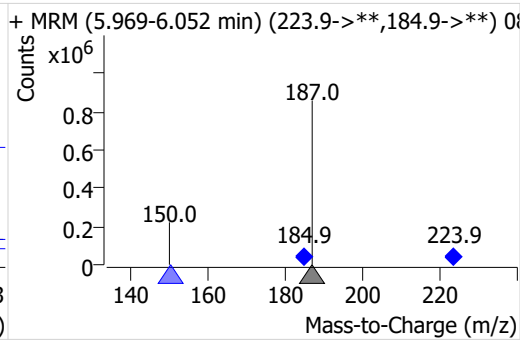
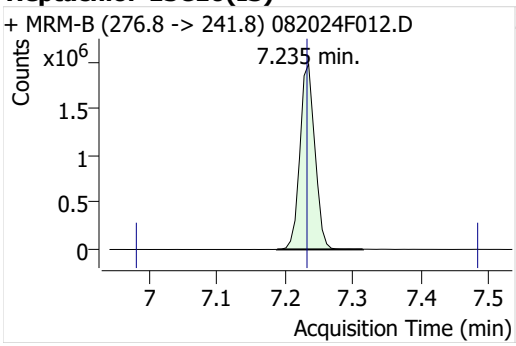
gamma-BHC-d6(IS)

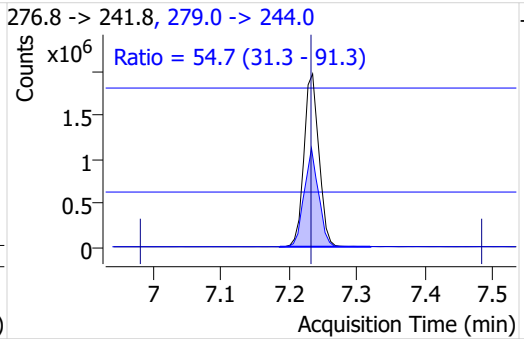


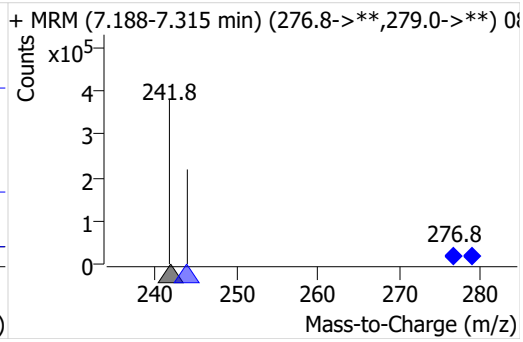




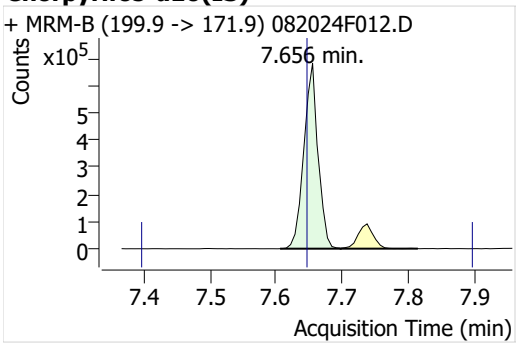
Heptachlor-13C10(IS)

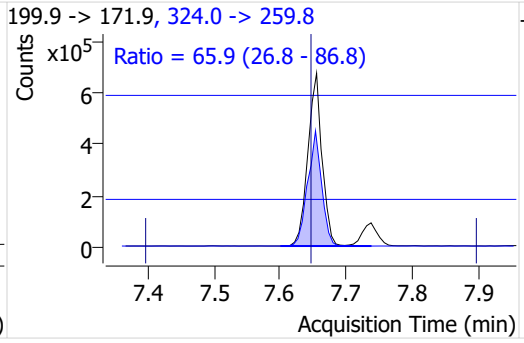


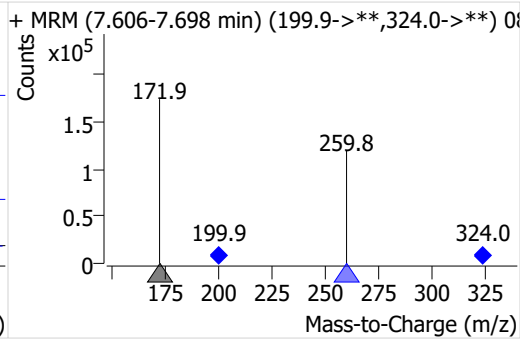




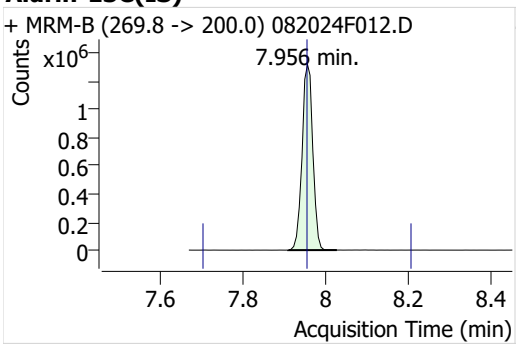
Chorpyrifos-d10(IS)

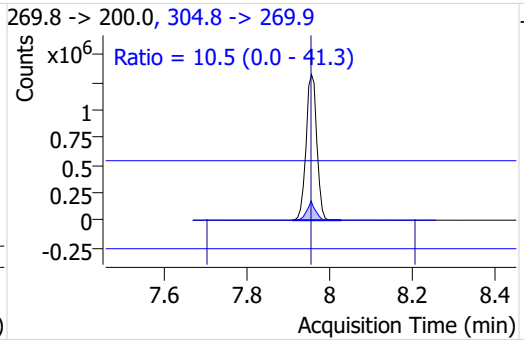


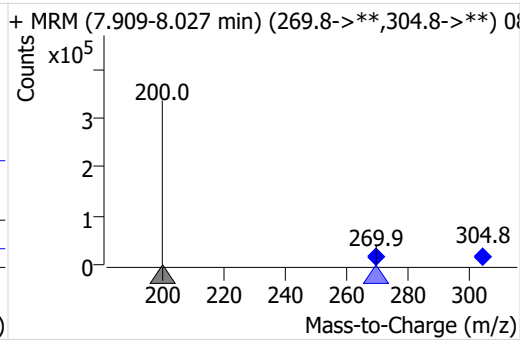




Aldrin-13C(IS)







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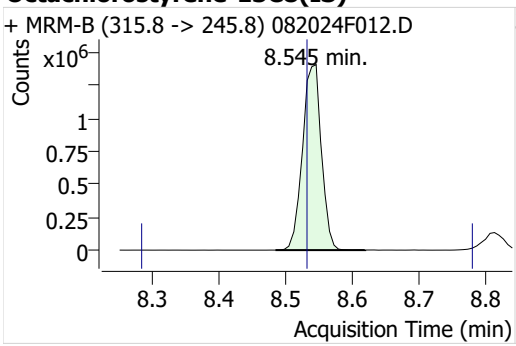
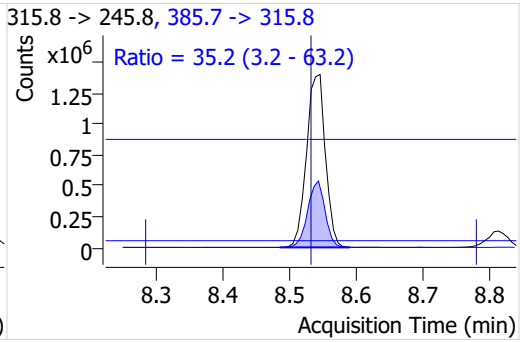
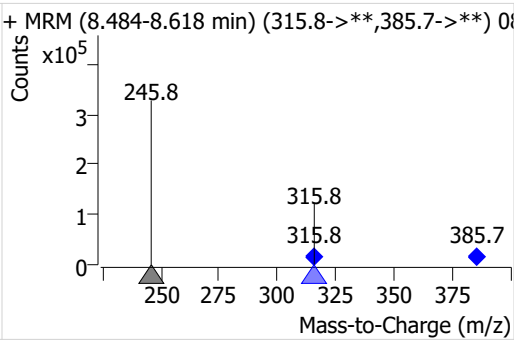
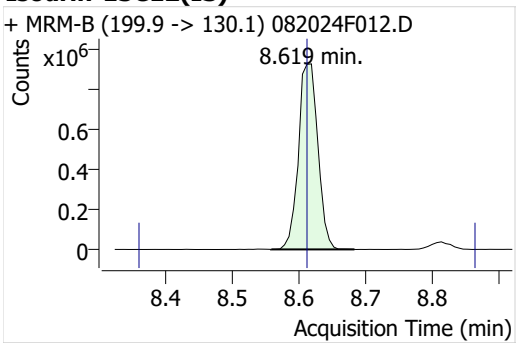
Octachlorostyrene-13C8(IS)

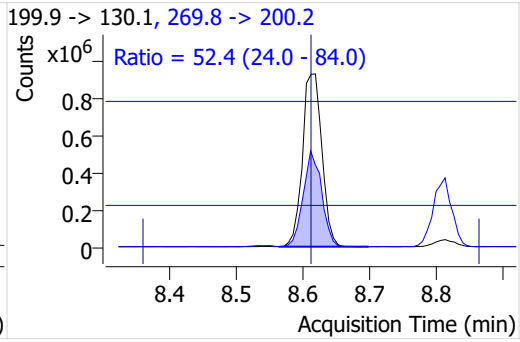


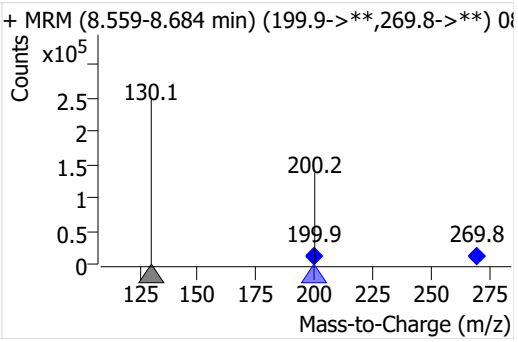




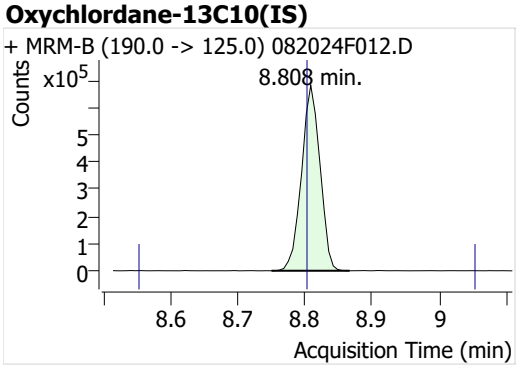
Isodrin-13C12(IS)

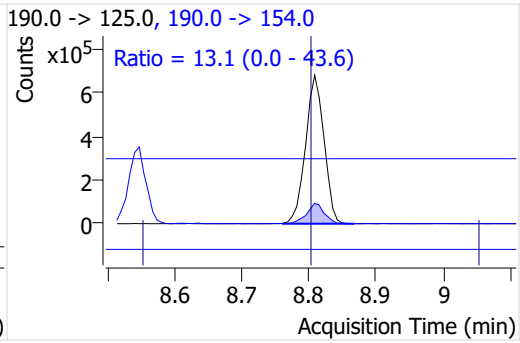


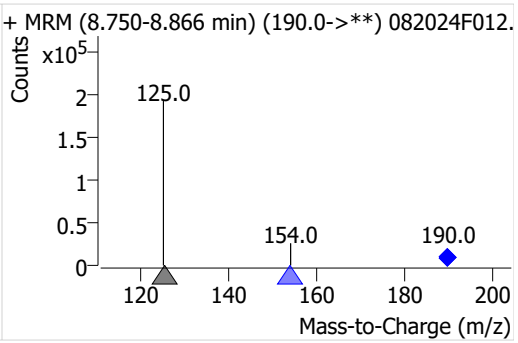




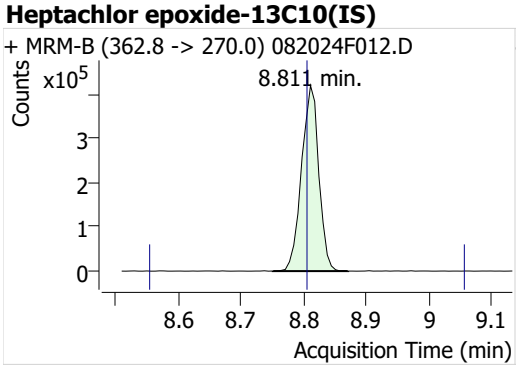
Oxychlordane-13C10(IS)

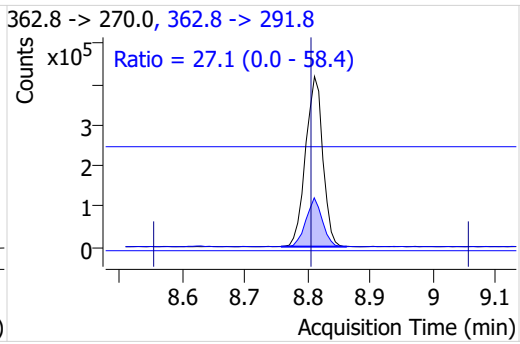


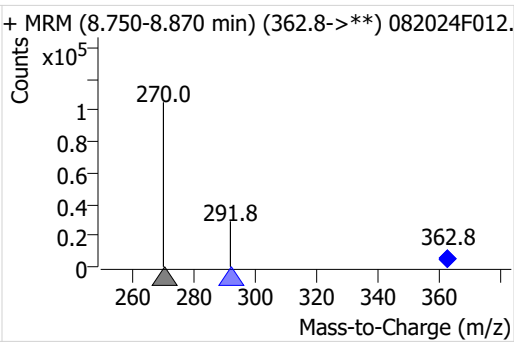




Heptachlor epoxide-13C10(IS)







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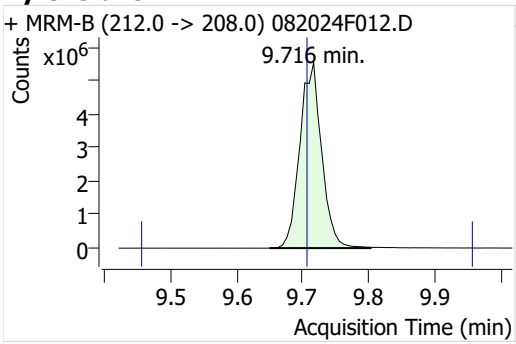
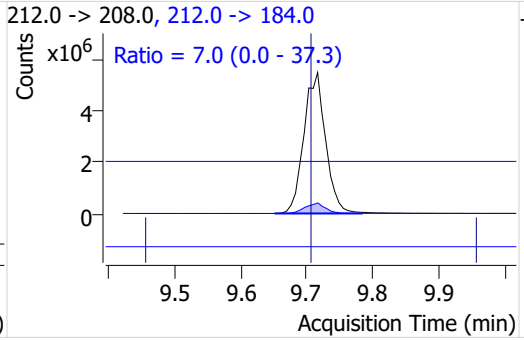
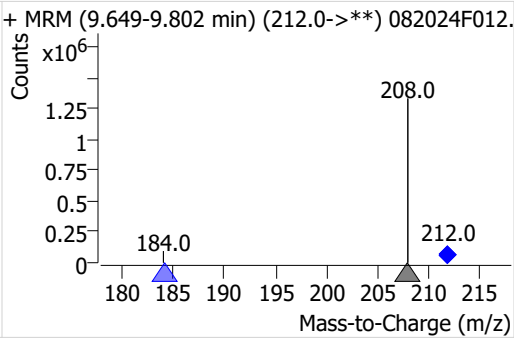
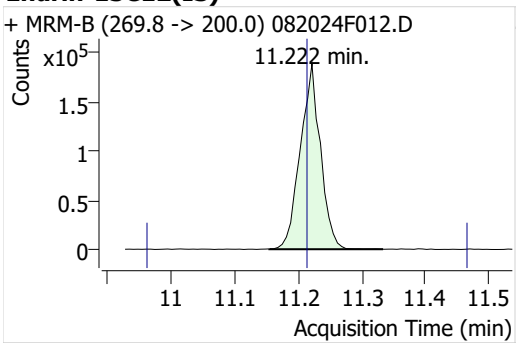
Pyrene-d10

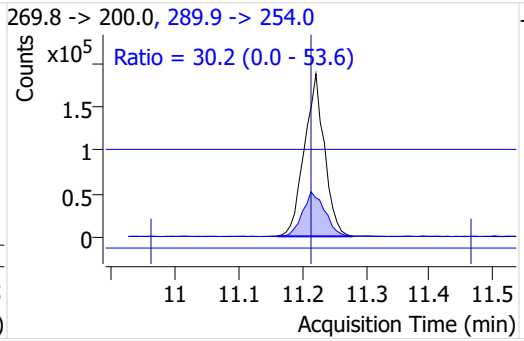


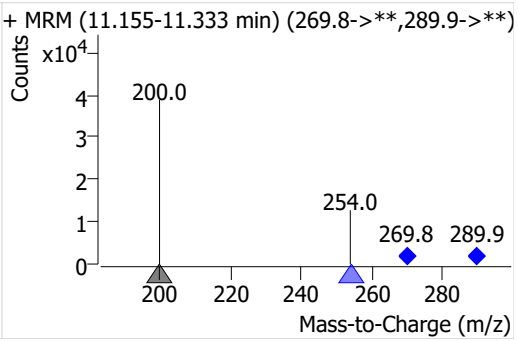




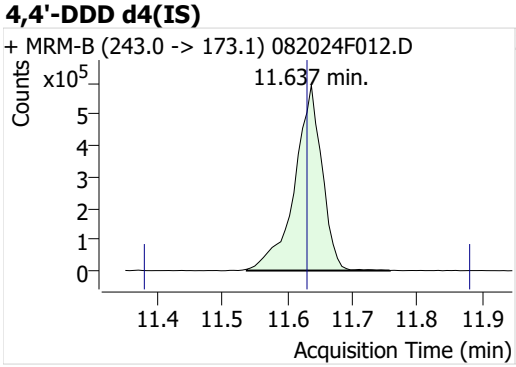
Endrin-13C12(IS)

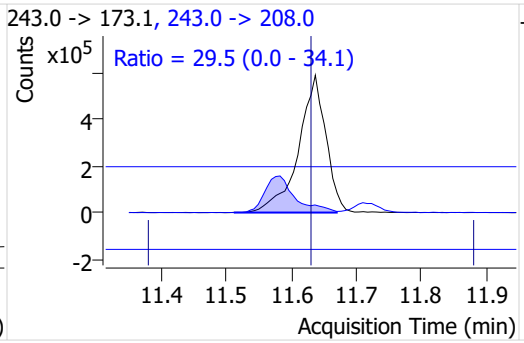


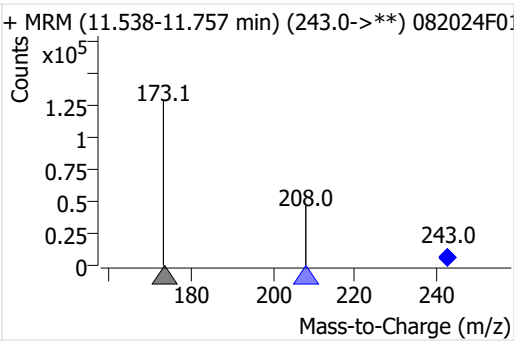




4,4'-DDD d4(IS)







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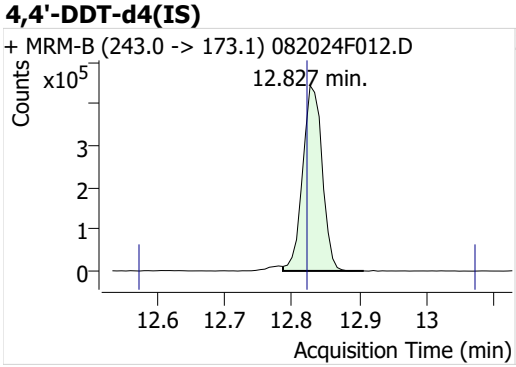

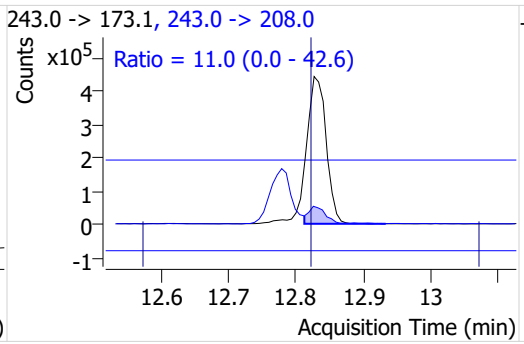

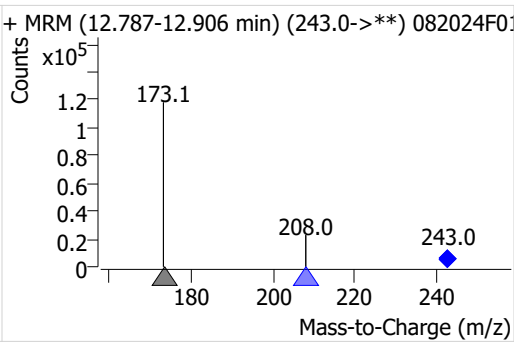

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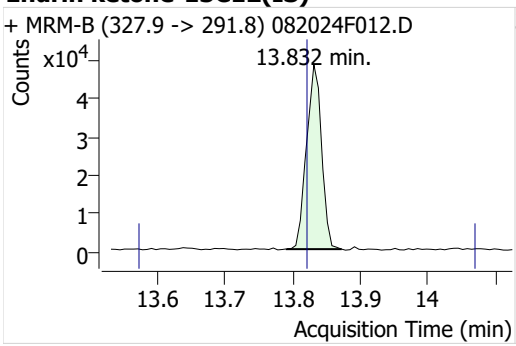
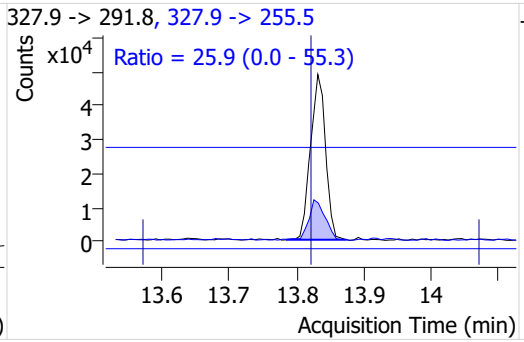
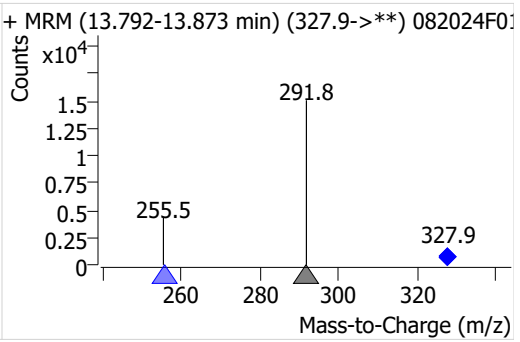
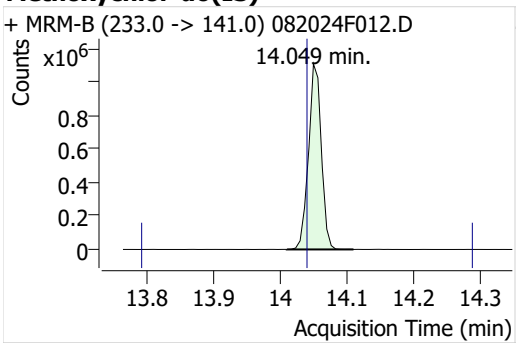
Endrin ketone-13C12(IS)

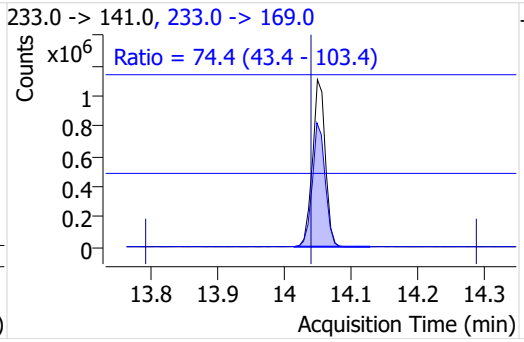


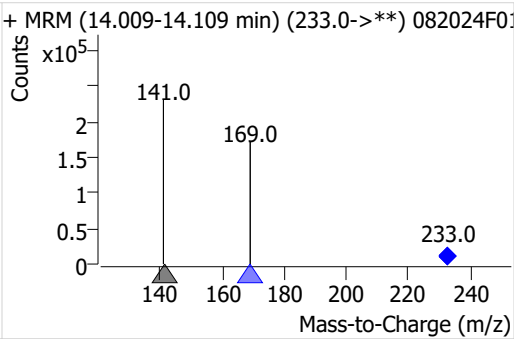




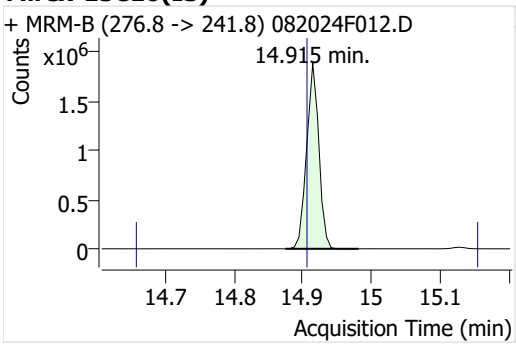
Methoxychlor-d6(IS)

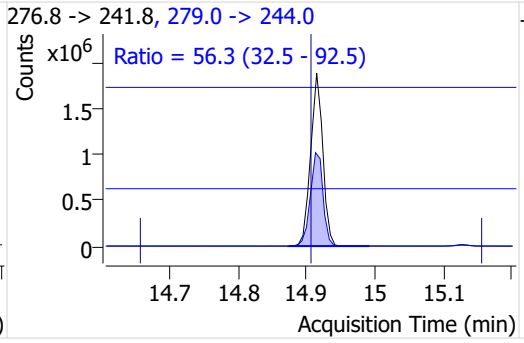


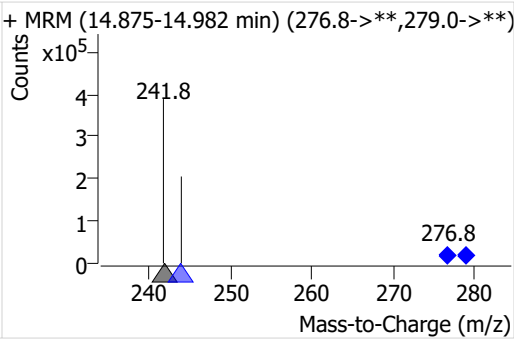




Mirex-13C10(IS)







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Name	OC PEST ICAL 80ppb SVM71-99I	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	8/20/2024 3:33:05 PM	**Acq. Method File**	OC Pest_dMRM
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Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.711	289.8 -> 254.8	4796455	20.0000 ng/ml	0.003
gamma-BHC-d6(IS)	6.018	223.9 -> 187.0	4185225	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	7.235	276.8 -> 241.8	3075846	20.0000 ng/ml	0.002
Chorpyrifos-d10(IS)	7.656	199.9 -> 171.9	979085	20.0000 ng/ml	0.008
Aldrin-13C(IS)	7.957	269.8 -> 200.0	2512661	20.0000 ng/ml	0.001
Octachlorostyrene-13C8(IS)	8.545	315.8 -> 245.8	2863502	20.0000 ng/ml	0.012
Isodrin-13C12(IS)	8.613	199.9 -> 130.1	1871485	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	8.808	190.0 -> 125.0	1290617	20.0000 ng/ml	0.005
Heptachlor epoxide-13C10(IS)	8.811	362.8 -> 270.0	790284	20.0000 ng/ml	0.005
Pyrene-d10	9.716	212.0 -> 208.0	12414760	100.0000 ng/ml	0.007
Endrin-13C12(IS)	11.215	269.8 -> 200.0	421199	20.0000 ng/ml	0.004
4,4'-DDD d4(IS)	11.630	243.0 -> 173.1	1845498	5.0000 ng/ml	0.020
4,4'-DDT-d4(IS)	12.834	243.0 -> 173.1	865047	5.0000 ng/ml	0.011
Endrin ketone-13C12(IS)	13.832	327.9 -> 291.8	76414	20.0000 ng/ml	0.011
Methoxychlor-d6(IS)	14.049	233.0 -> 141.0	1485016	20.0000 ng/ml	0.013
Mirex-13C10(IS)	14.915	276.8 -> 241.8	2398320	5.0000 ng/ml	0.008

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**
Hexachlorobenzene-13C6	5.705	289.8 -> 254.8	4796455	21.886 ng/ml
		Spiked Amount = 20.0		Recovery = *109.4 %*
gamma-BHC-d6	6.014	223.9 -> 187.0	4185225	20.084 ng/ml
		Spiked Amount = 20.0		Recovery = *100.4 %*
Heptachlor-13C10	7.232	276.8 -> 241.8	3075846	21.138 ng/ml
		Spiked Amount = 20.0		Recovery = *105.7 %*
Chorpyrifos-d10	7.647	199.9 -> 171.9	979085	19.540 ng/ml
		Spiked Amount = 20.0		Recovery = *97.7 %*
Aldrin-13C	7.955	269.8 -> 200.0	2511408	20.803 ng/ml
		Spiked Amount = 20.0		Recovery = *104.0 %*
Octachlorostyrene-13C8	8.531	315.8 -> 245.8	2863502	20.796 ng/ml
		Spiked Amount = 20.0		Recovery = *104.0 %*
Isodrin-13C12	8.613	199.9 -> 130.1	1871485	19.932 ng/ml
		Spiked Amount = 20.0		Recovery = *99.7 %*
Oxychlordane-13C10	8.803	190.0 -> 125.0	1290617	20.098 ng/ml
		Spiked Amount = 20.0		Recovery = *100.5 %*
Heptachlor epoxide-13C10	8.805	362.8 -> 270.0	790284	20.819 ng/ml
		Spiked Amount = 20.0		Recovery = *104.1 %*
Endrin-13C12	11.214	269.8 -> 200.0	421199	20.027 ng/ml
		Spiked Amount = 20.0		Recovery = *100.1 %*
4,4'-DDD d4	11.630	243.0 -> 173.1	1845498	5.525 ng/ml
		Spiked Amount = 5.0		Recovery = *110.5 %*
4,4'-DDT-d4	12.822	243.0 -> 173.1	865047	4.992 ng/ml
		Spiked Amount = 5.0		Recovery = *99.8 %*
Endrin ketone-13C12	13.821	327.9 -> 291.8	76414	20.391 ng/ml
		Spiked Amount = 20.0		Recovery = *102.0 %*
Methoxychlor-d6	14.039	233.0 -> 141.0	1485016	19.972 ng/ml
		Spiked Amount = 20.0		Recovery = *99.9 %*

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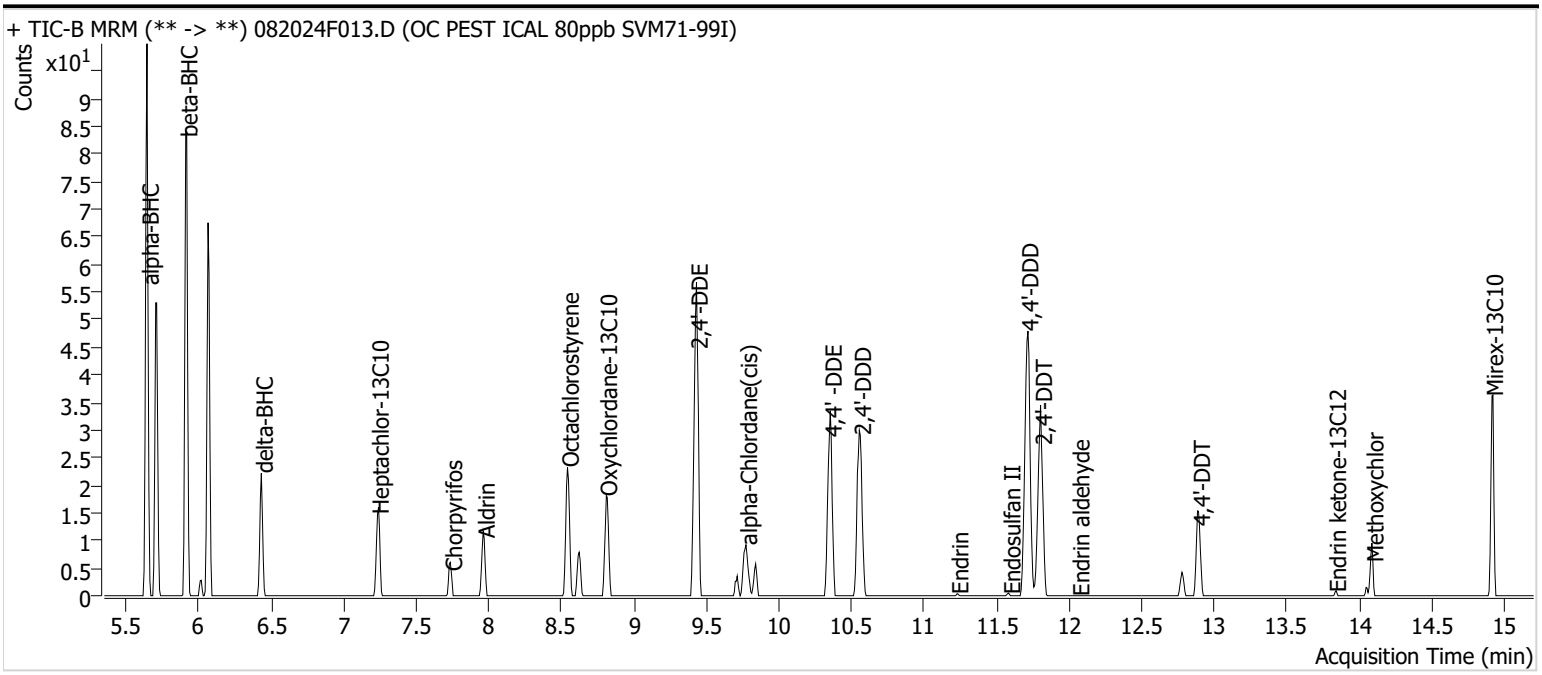
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.906	276.8 -> 241.8	2398320	5.512 ng/ml
		Spiked Amount =	5.0	Recovery = *110.2 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)	5.649	181.1 -> 145.1	62677248	89.272 ng/ml	99
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.706	283.8 -> 213.9	32498120	77.980 ng/ml	98
beta-BHC	gamma-BHC-d6(IS)	5.916	181.1 -> 145.1	58448933	89.201 ng/ml	99
gamma-BHC(Lindane)	gamma-BHC-d6(IS)	6.070	181.1 -> 145.1	48011096	88.965 ng/ml	100
delta-BHC	gamma-BHC-d6(IS)	6.436	181.1 -> 145.1	16715013	86.627 ng/ml	86
Heptachlor	Heptachlor-13C10(IS)	7.245	271.7 -> 236.9	12026022	76.311 ng/ml	91
Chorpyrifos	Chorpyrifos-d10(IS)	7.740	196.9 -> 169.0	5566916	89.689 ng/ml	88
Aldrin	Aldrin-13C(IS)	7.964	254.9 -> 220.0	7170617	80.978 ng/ml	93
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.544	342.8 -> 307.8	23468595	80.853 ng/ml	97
Isodrin	Isodrin-13C12(IS)	8.627	193.0 -> 123.0	8816960	85.710 ng/ml	95
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	8.818	352.8 -> 262.9	3861992	87.548 ng/ml	96
Oxychlordane	Oxychlordane-13C10(IS)	8.816	114.9 -> 51.1	14227330	89.580 ng/ml	97
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.413	271.8 -> 236.9	8390008	91.435 ng/ml	92
2,4'-DDE	4,4'-DDD d4(IS)	9.434	246.0 -> 176.2	54584513	82.503 ng/ml	98
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.774	271.8 -> 236.9	20386344	88.460 ng/ml	97
Endosulfan I	Endrin-13C12(IS)	9.790	206.9 -> 172.0	3218905	94.381 ng/ml	99
trans-Nanochlor	Oxychlordane-13C10(IS)	9.841	271.8 -> 236.9	7000807	87.613 ng/ml	90
4,4' -DDE	4,4'-DDD d4(IS)	10.356	246.0 -> 176.2	40088883	81.388 ng/ml	96
2,4'-DDD	4,4'-DDD d4(IS)	10.559	235.0 -> 165.1	38566500	83.246 ng/ml	99
Dieldrin	Endrin-13C12(IS)	10.581	262.9 -> 193.0	3994860	90.818 ng/ml	91
Endrin	Endrin-13C12(IS)	11.230	262.8 -> 193.0	2059942	83.579 ng/ml	96
Endosulfan II	Endrin-13C12(IS)	11.587	206.9 -> 172.0	1359999	81.152 ng/ml	90
4,4'-DDD	4,4'-DDD d4(IS)	11.713	235.0 -> 165.1	32525641	87.339 ng/ml	98
cis-Nonachlor	Oxychlordane-13C10(IS)	11.716	271.8 -> 236.9	4909312	84.383 ng/ml	96
2,4'-DDT	4,4'-DDT-d4(IS)	11.807	235.0 -> 165.1	21477699	89.938 ng/ml	99
Endrin aldehyde	Endrin-13C12(IS)	12.064	249.9 -> 214.9	824281	90.183 ng/ml	98
Endosulfan sulfate	Endrin-13C12(IS)	12.778	271.9 -> 237.0	4597731	89.074 ng/ml	94
4,4'-DDT	4,4'-DDT-d4(IS)	12.896	235.0 -> 165.1	16599612	82.419 ng/ml	98
Endrin ketone	Endrin ketone-13C12(IS)	13.844	147.0 -> 111.0	1423134	84.756 ng/ml	95
Methoxychlor	Methoxychlor-d6(IS)	14.090	227.0 -> 141.1	6698270	84.339 ng/ml	99
Mirex	Mirex-13C10(IS)	14.923	271.8 -> 236.8	34850709	71.966 ng/ml	98

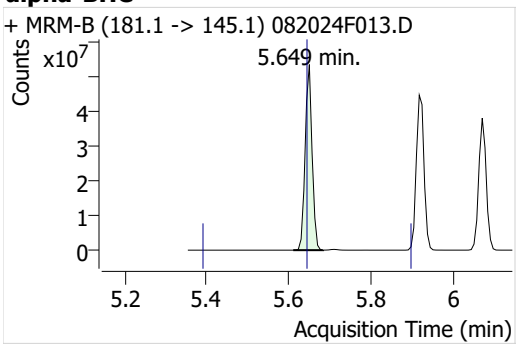
(m) = manual integration ND = Not Detected NC = Not Calculated

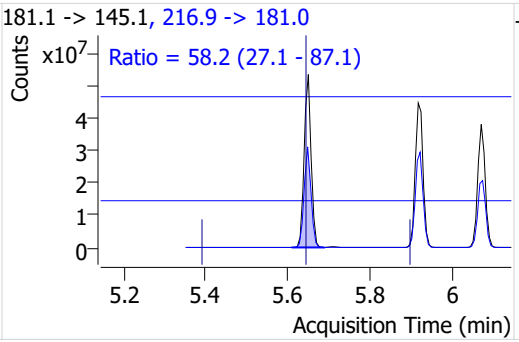
Sample Chromatogram

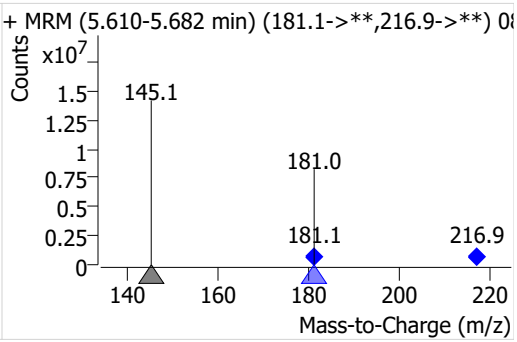
MassHunter Quantitative Analysis Sample Report



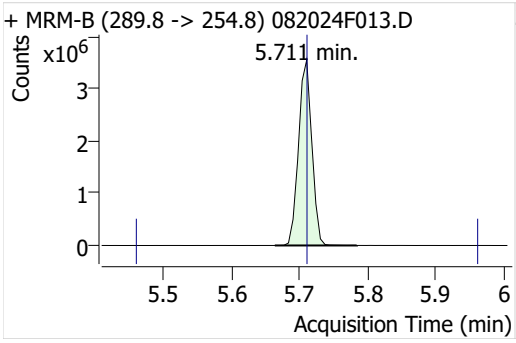
alpha-BHC

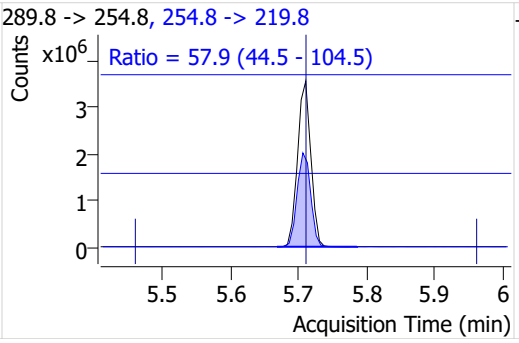


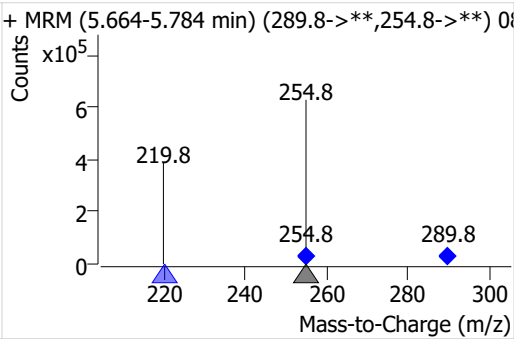




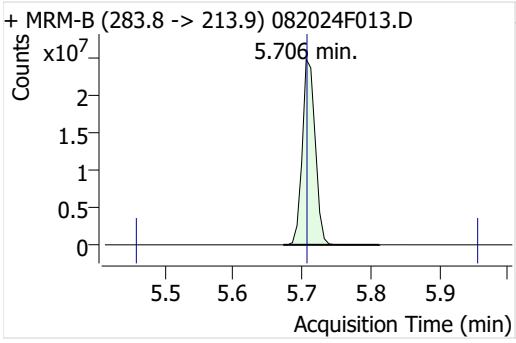
Hexachlorobenzene-13C6

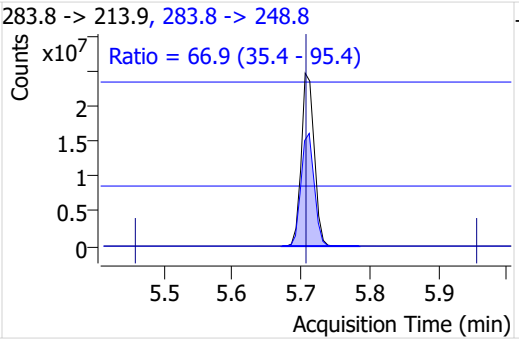


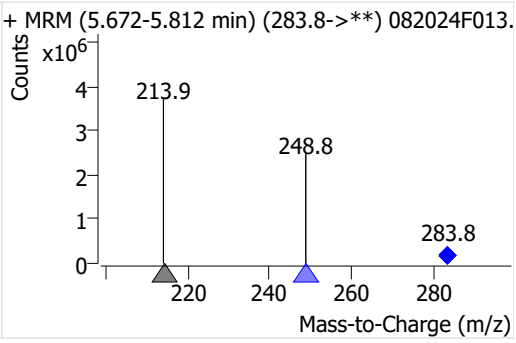




Hexachlorobenzene

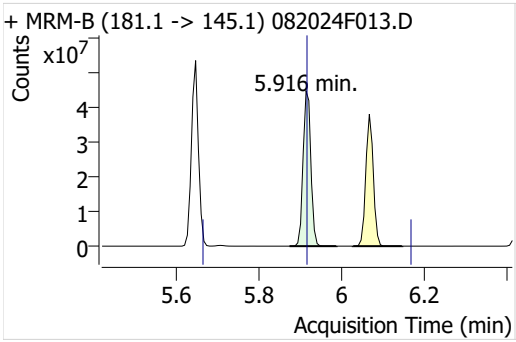


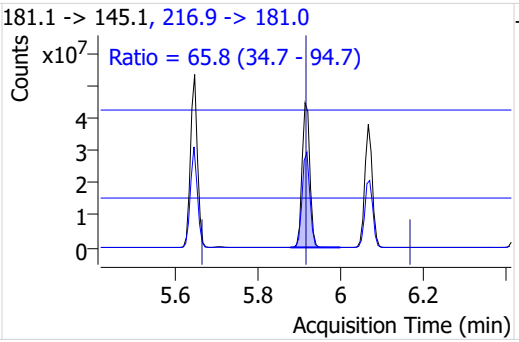


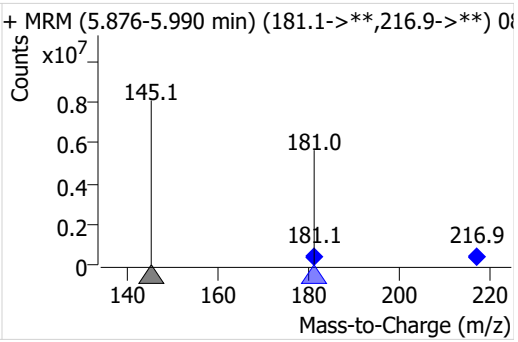


MassHunter Quantitative Analysis Sample Report

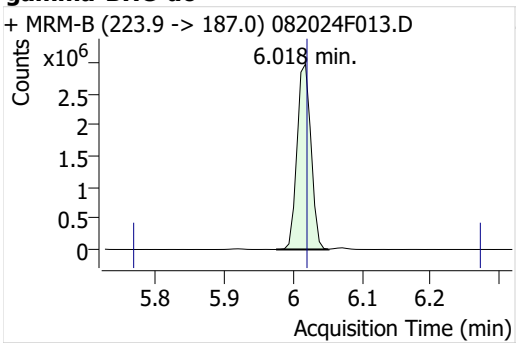
beta-BHC

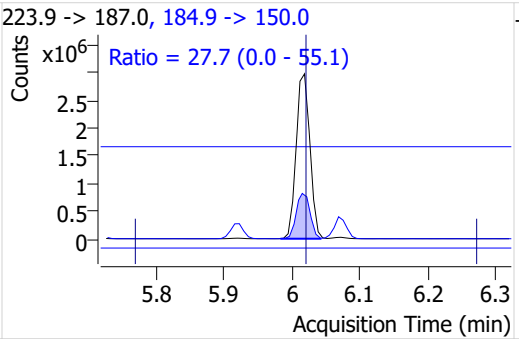


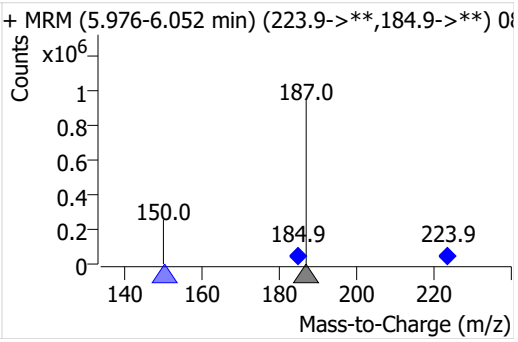




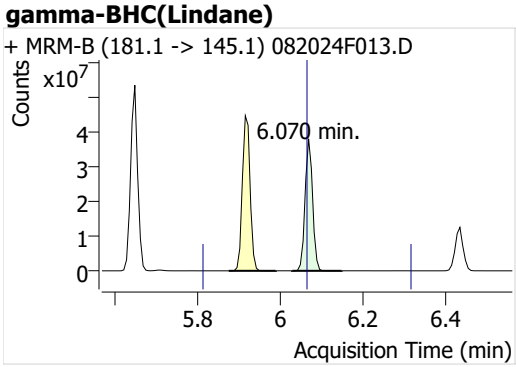
gamma-BHC-d6

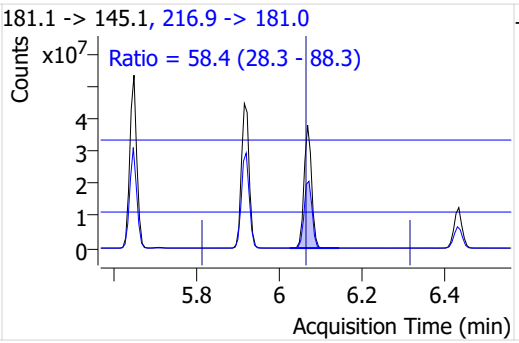


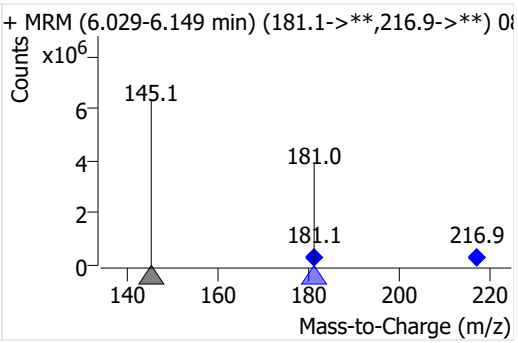




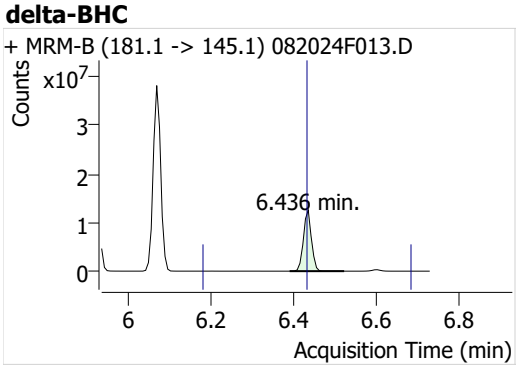
gamma-BHC(Lindane)

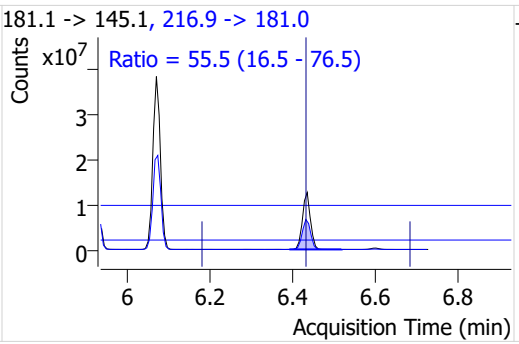


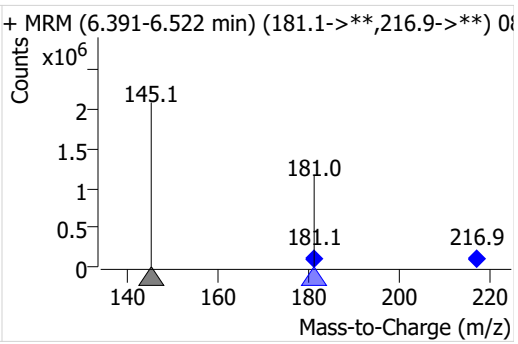




delta-BHC

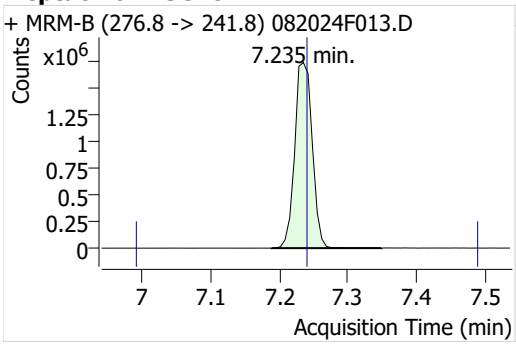


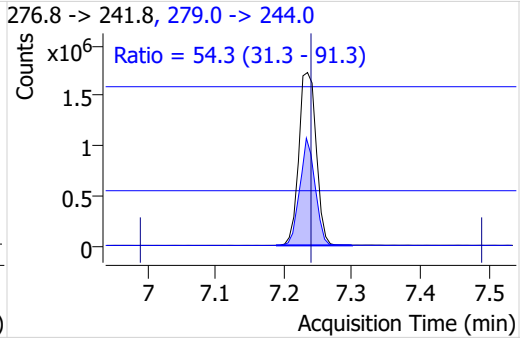


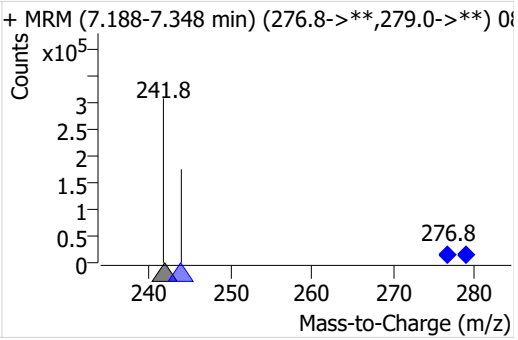


MassHunter Quantitative Analysis Sample Report

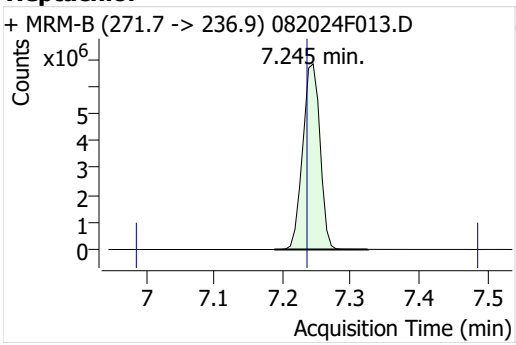
Heptachlor-13C10

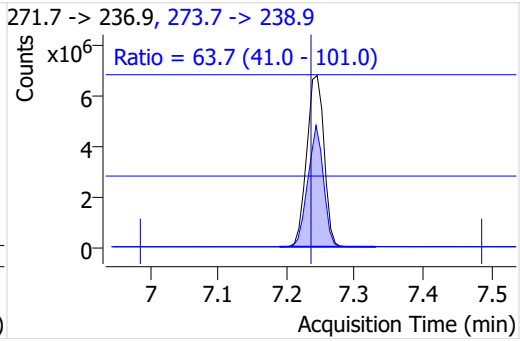


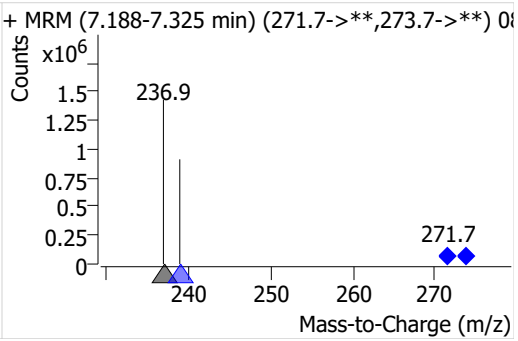




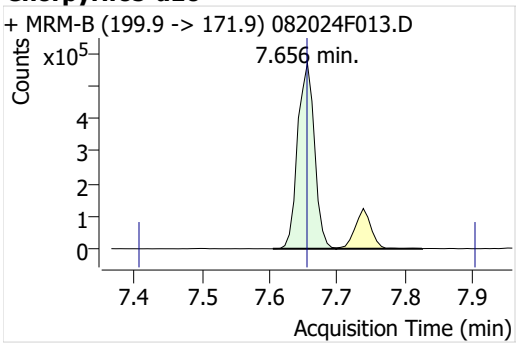
Heptachlor

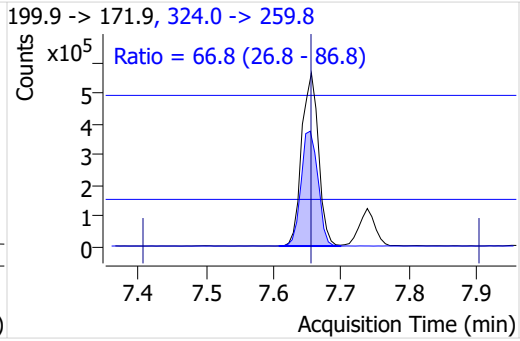


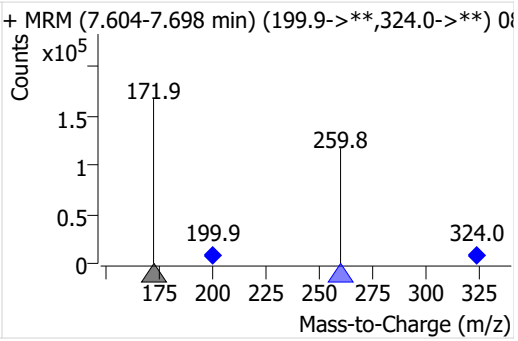




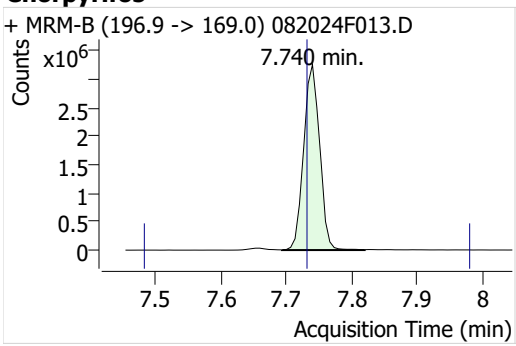
Chorpyrifos-d10

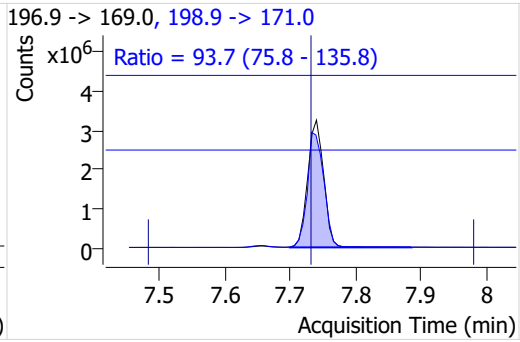


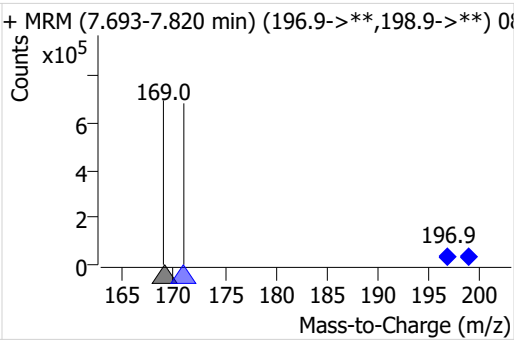




Chorpyrifos

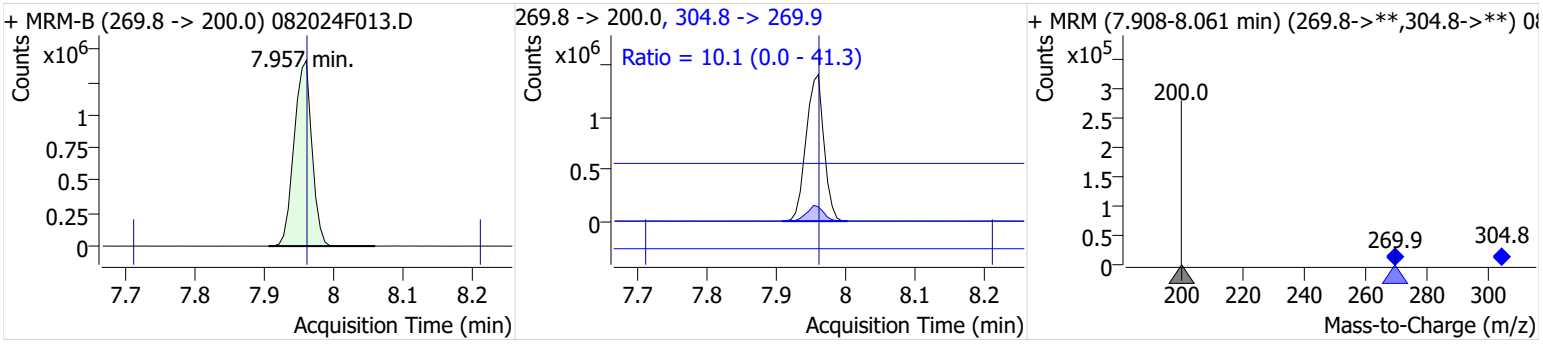




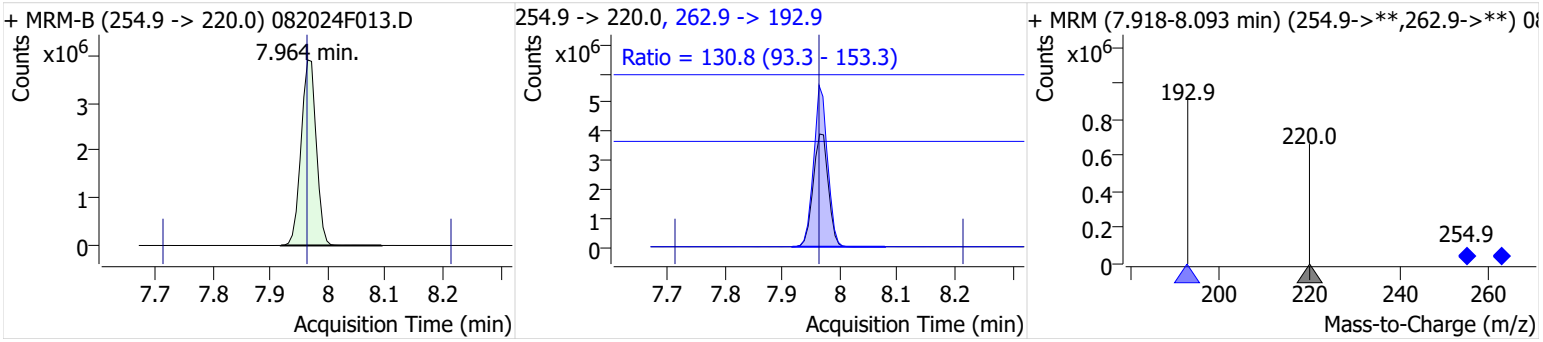


MassHunter Quantitative Analysis Sample Report

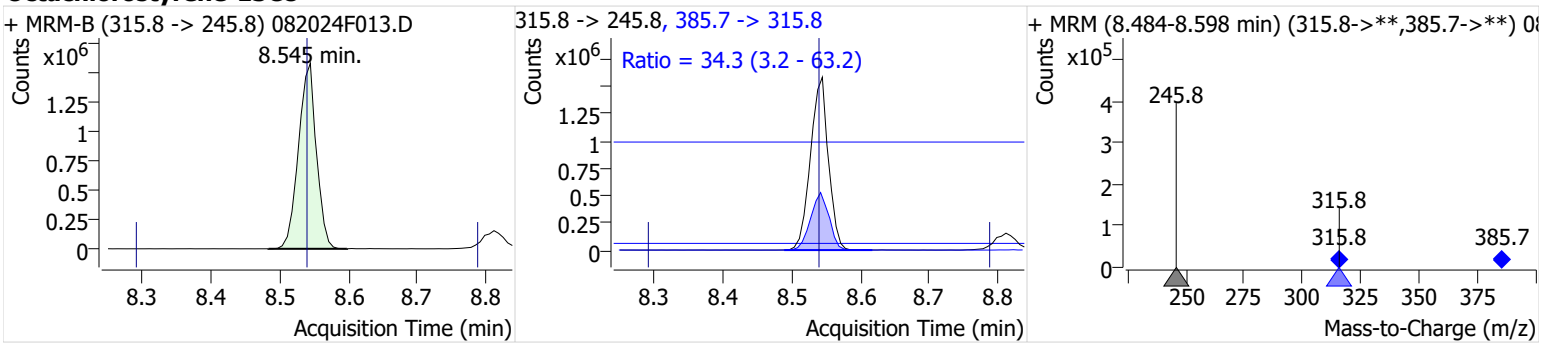
Aldrin-13C



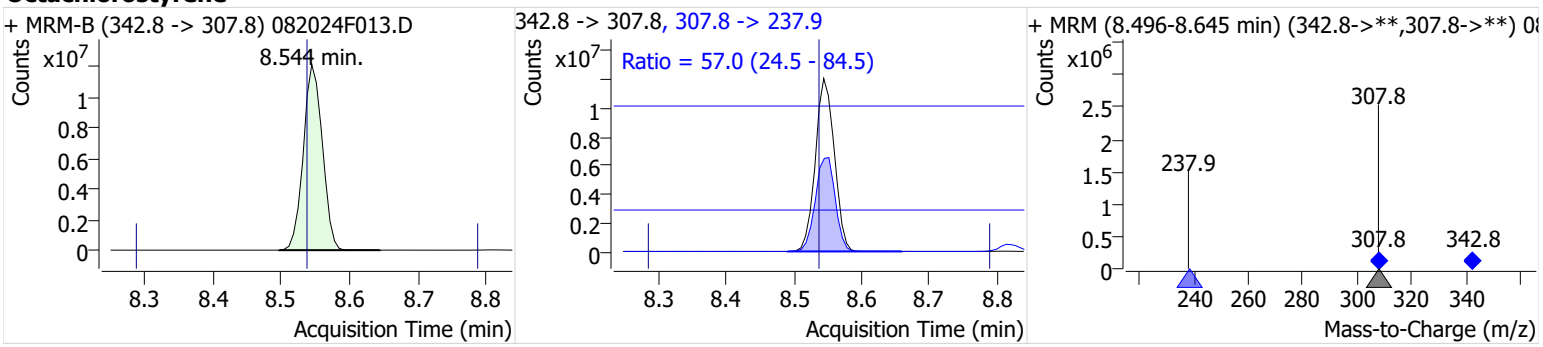
Aldrin



Octachlorostyrene-13C8

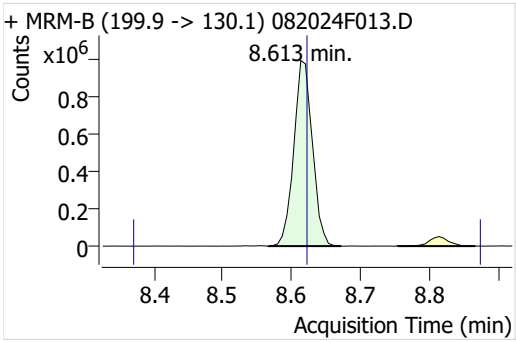


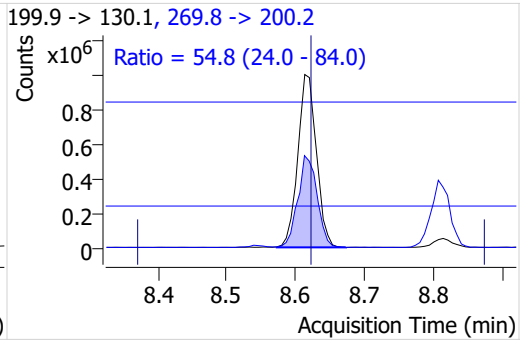
Octachlorostyrene

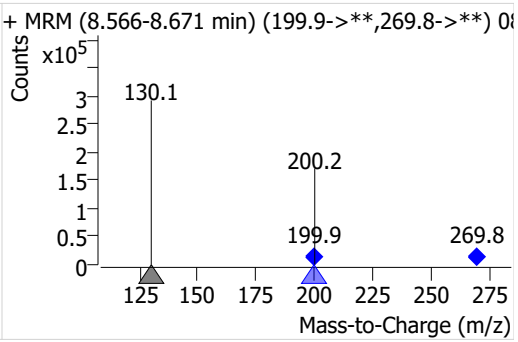


MassHunter Quantitative Analysis Sample Report

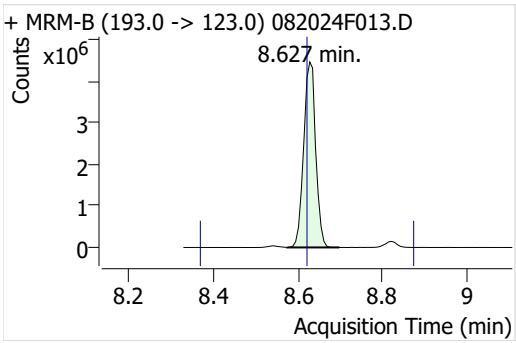
Isodrin-13C12

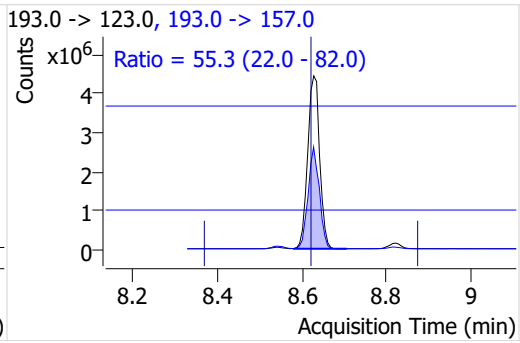


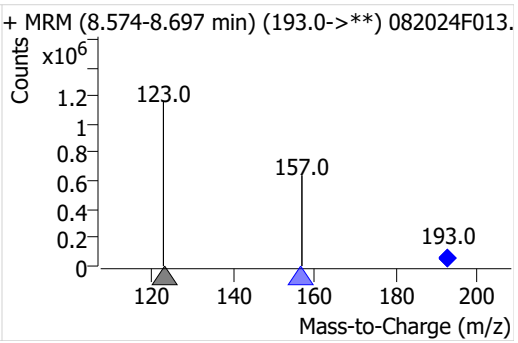




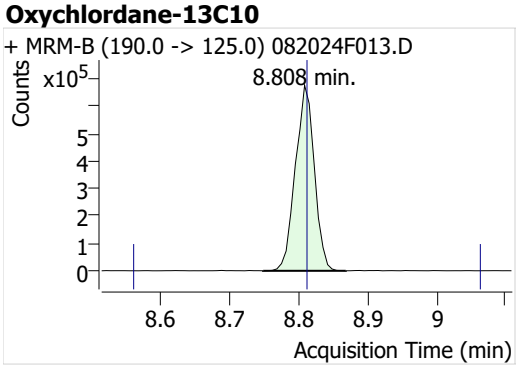
Isodrin

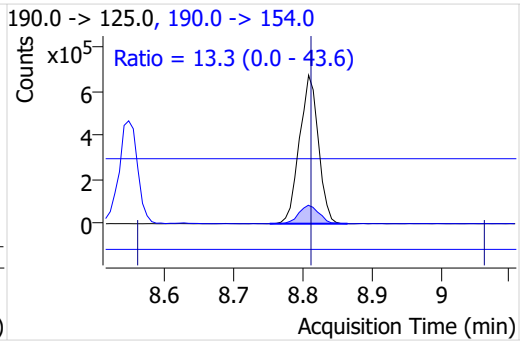


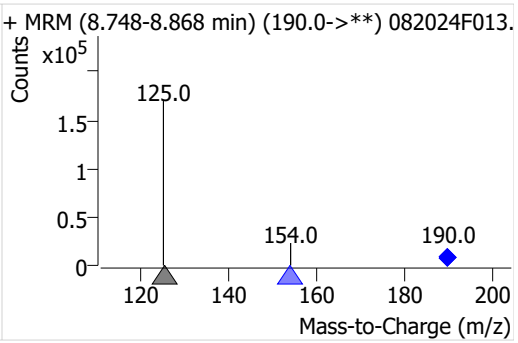




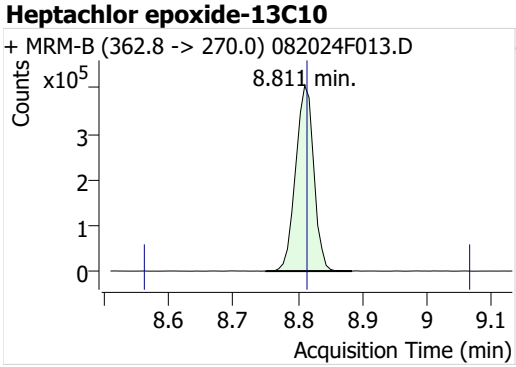
Oxychlordane-13C10

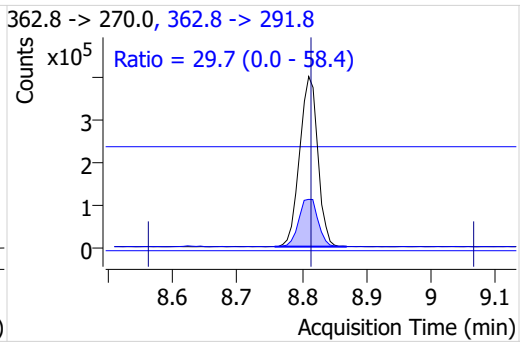


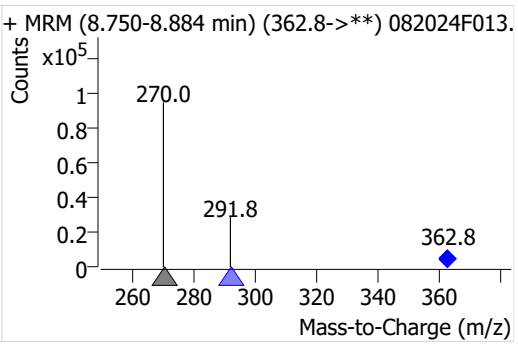




Heptachlor epoxide-13C10







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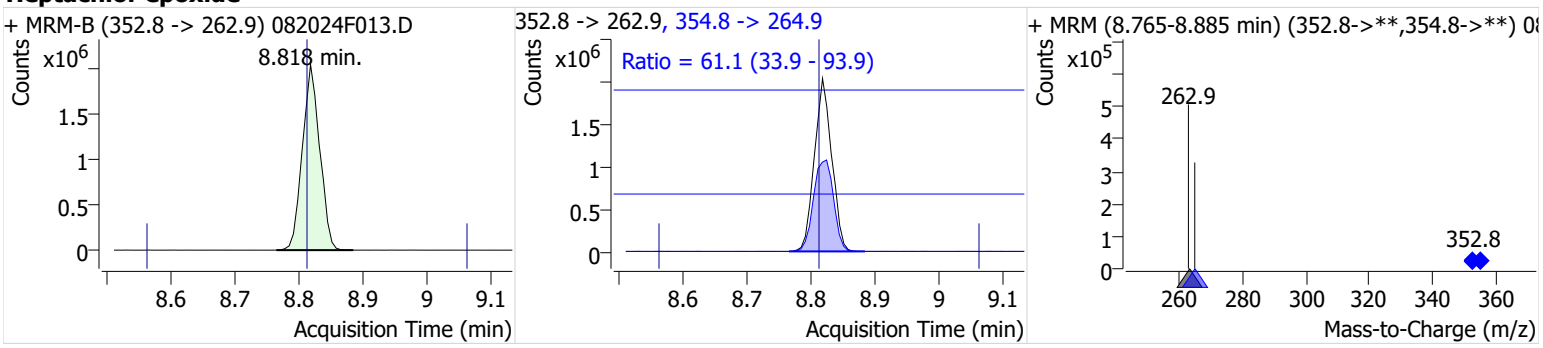
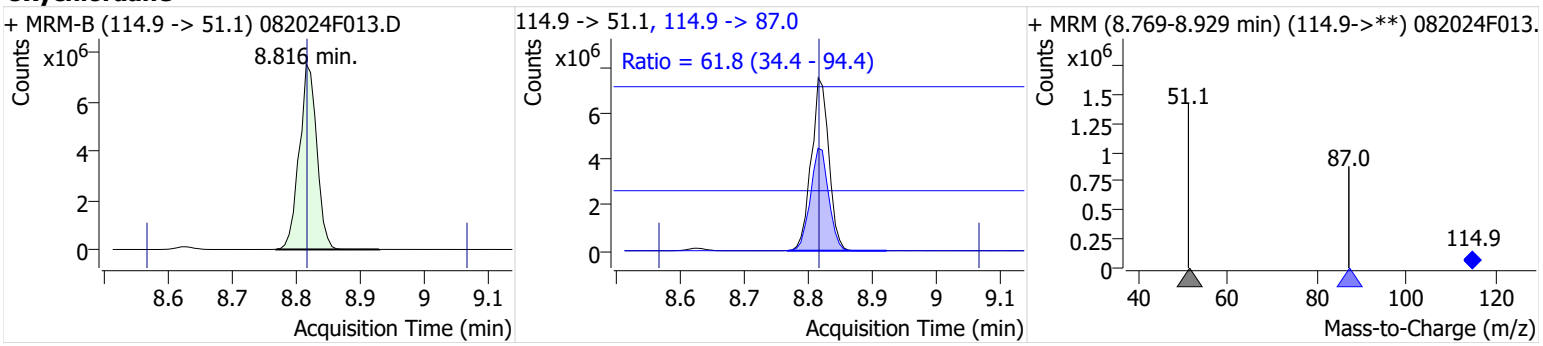
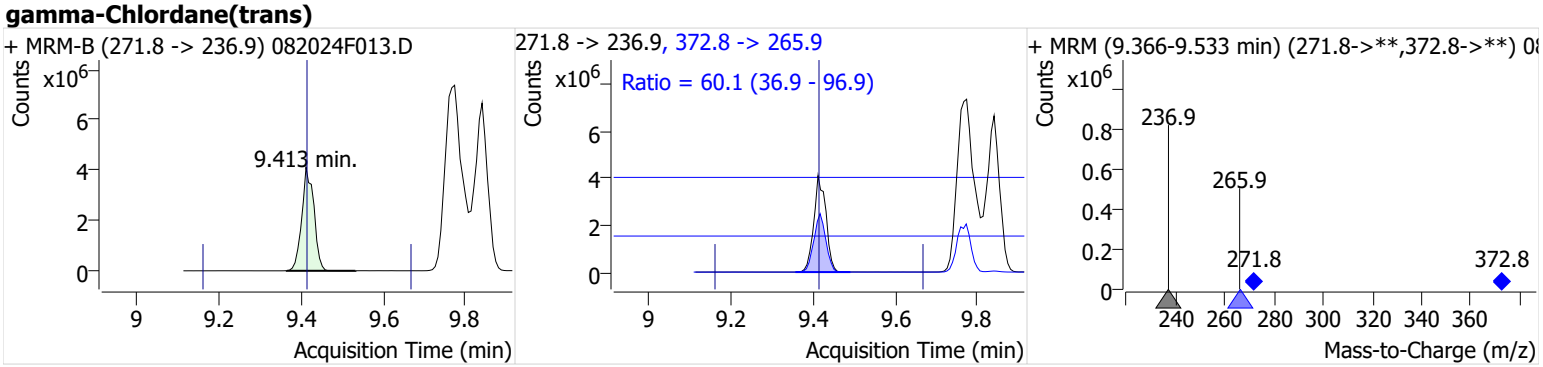
Heptachlor epoxide



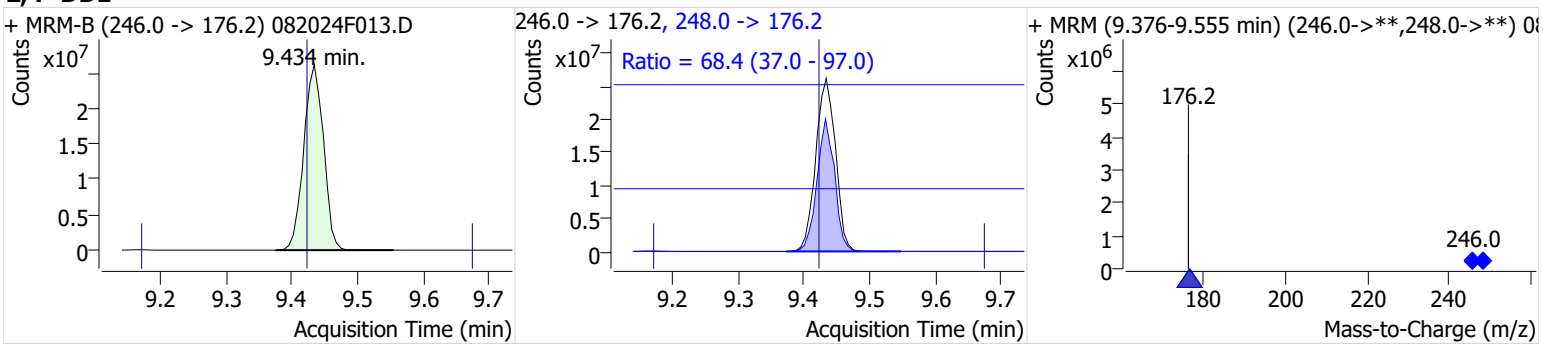
Oxychlordane



gamma-Chlordane(trans)



2,4'-DDE



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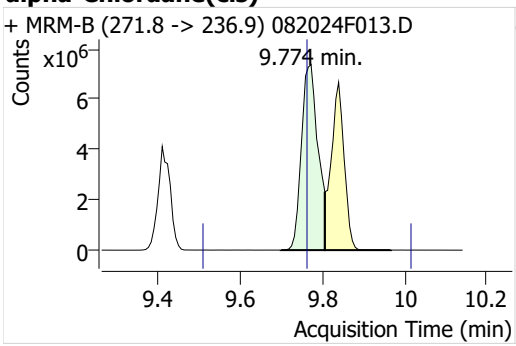
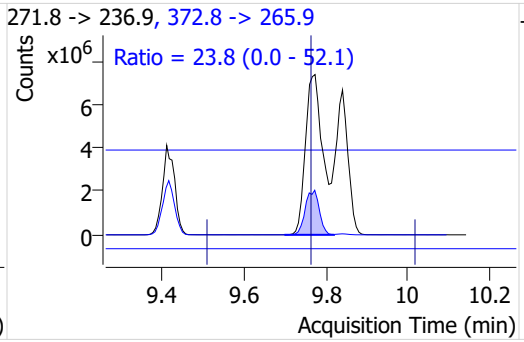
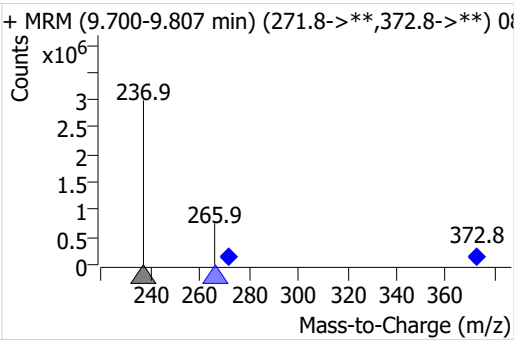
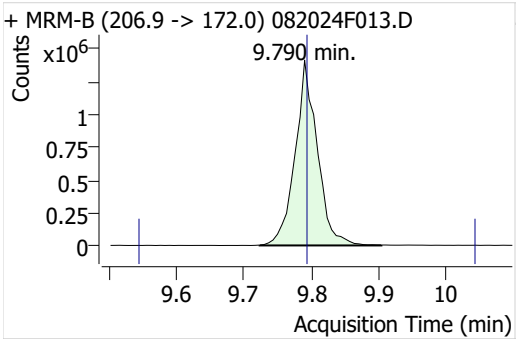
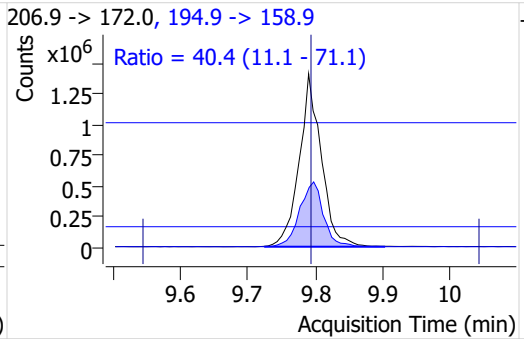


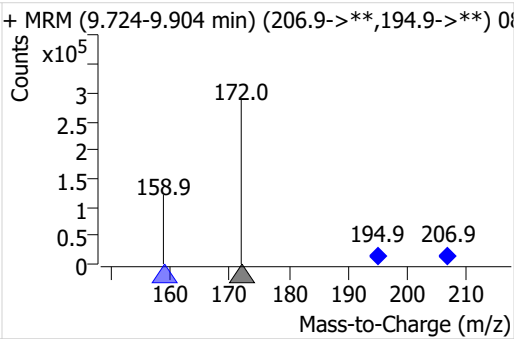




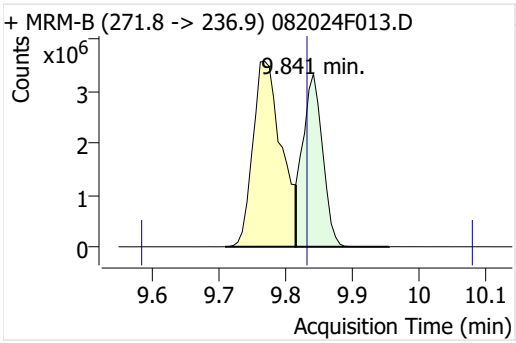
Endosulfan I

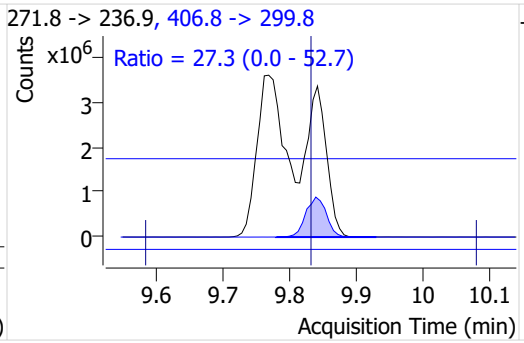


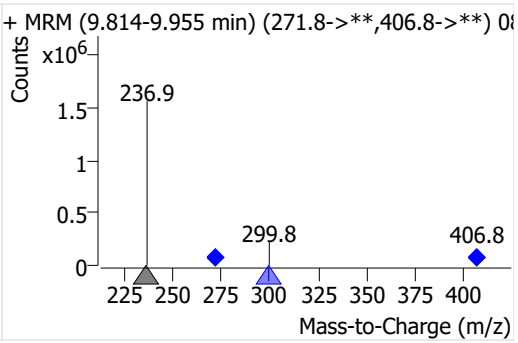




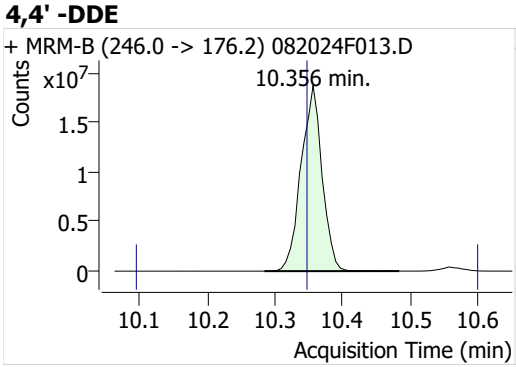
trans-Nanochlor

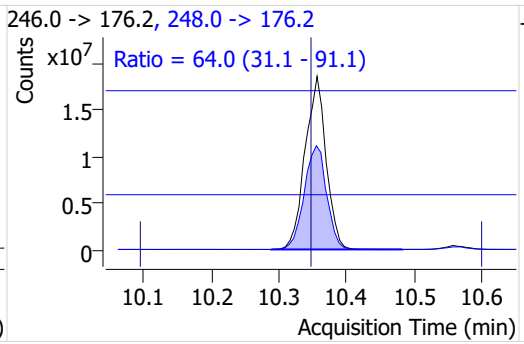


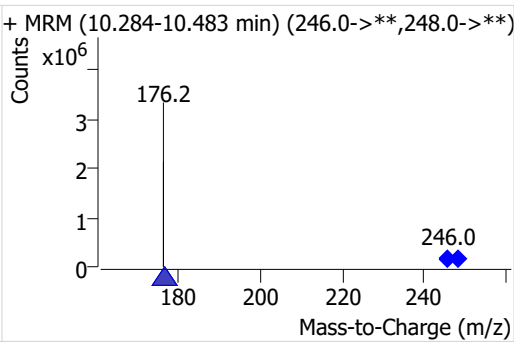




4,4' -DDE







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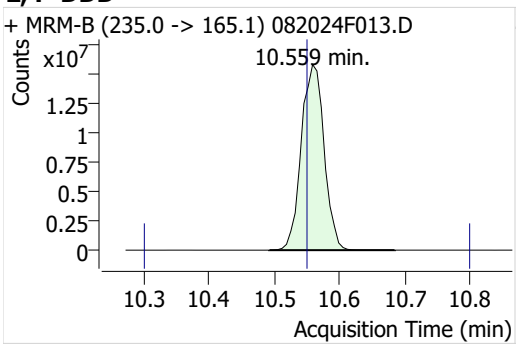
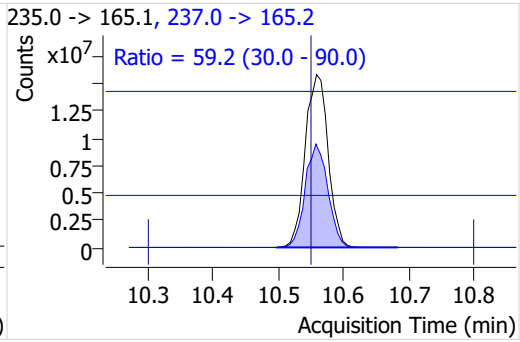
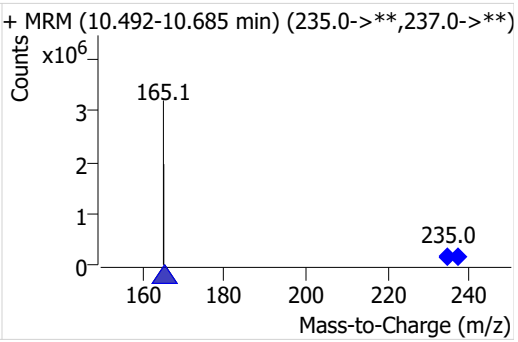
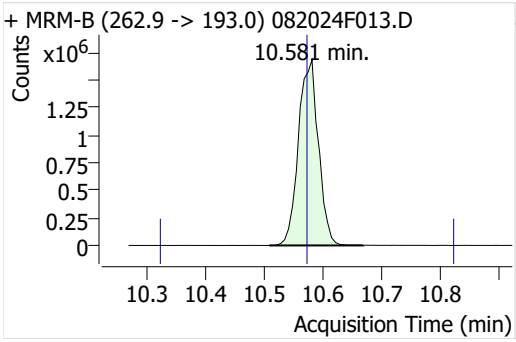
2,4'-DDD

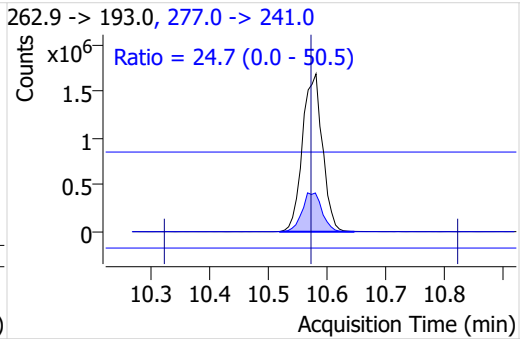


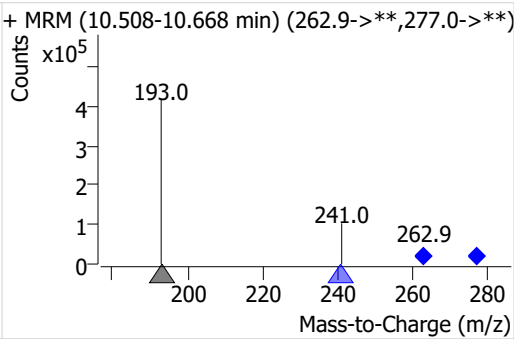




Dieldrin







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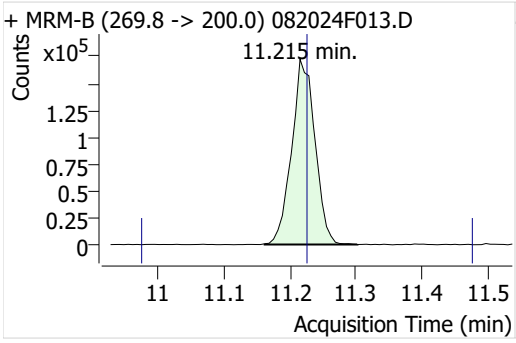

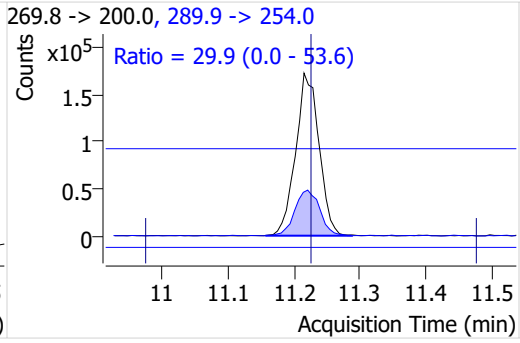

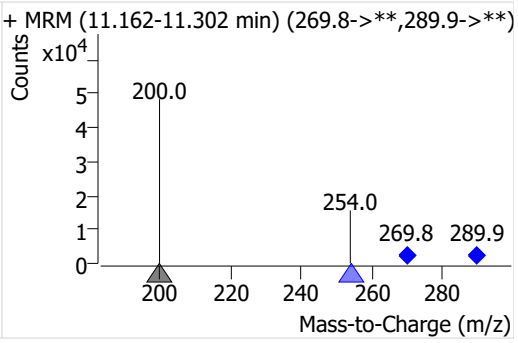

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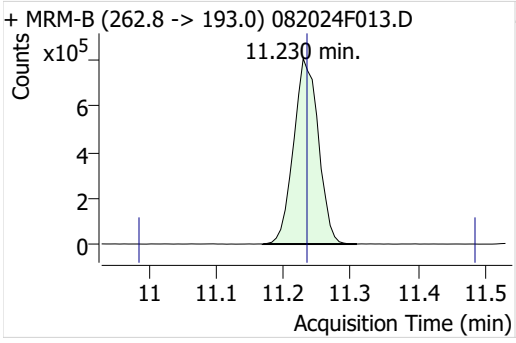

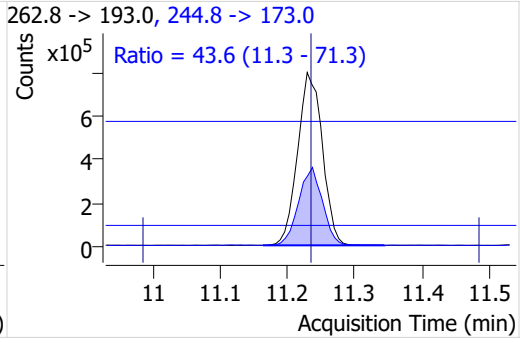

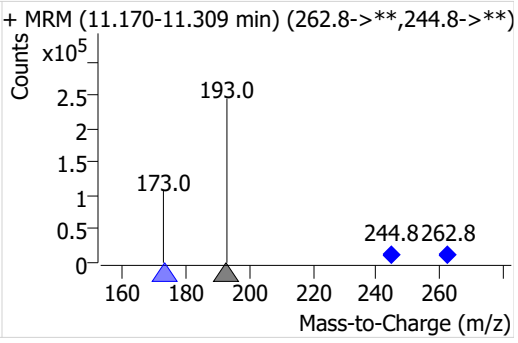

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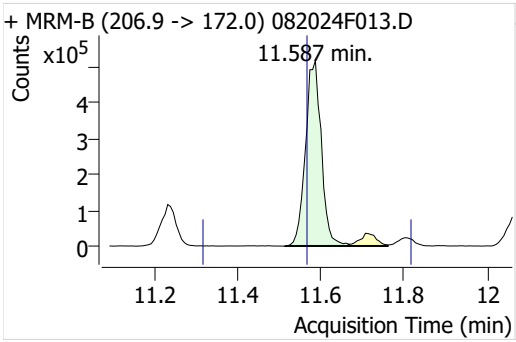
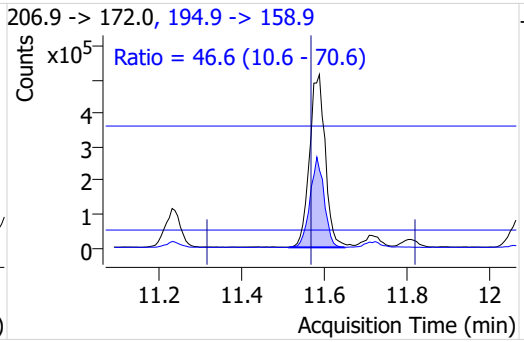
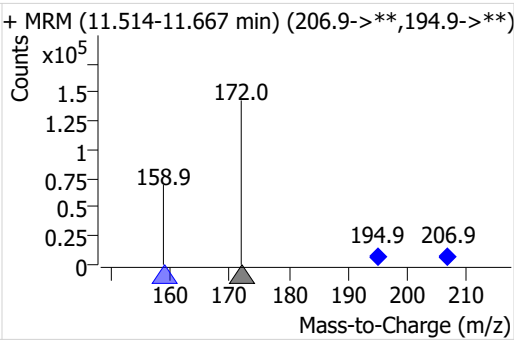
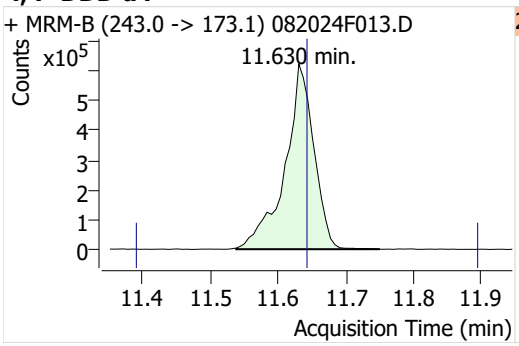
Endosulfan II

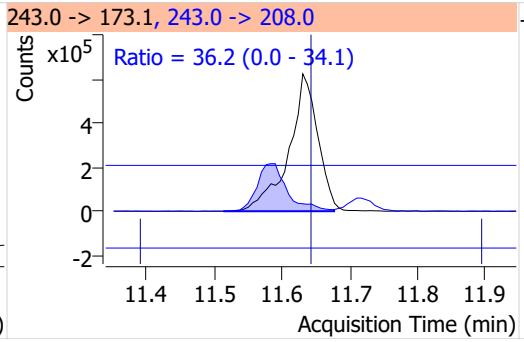


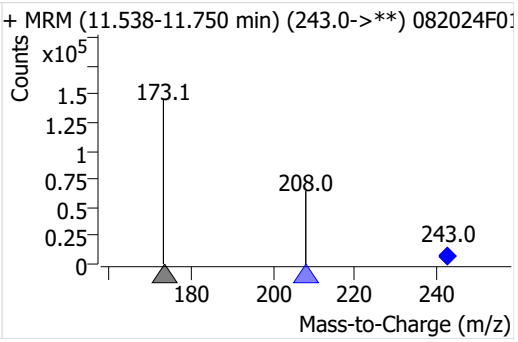




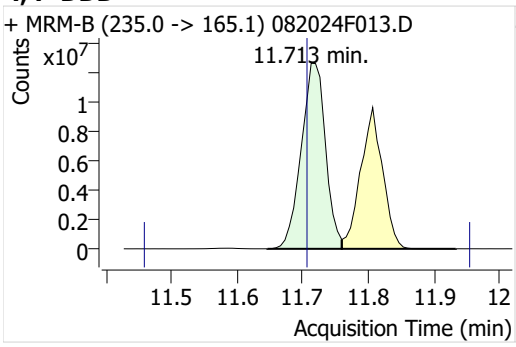
4,4'-DDD d4

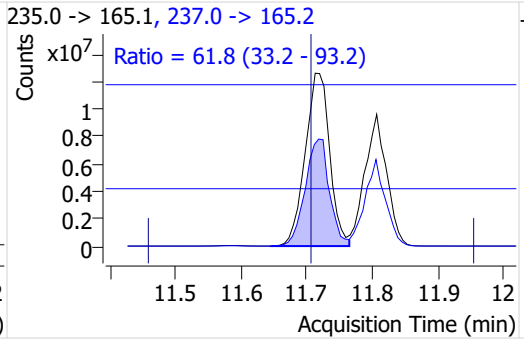


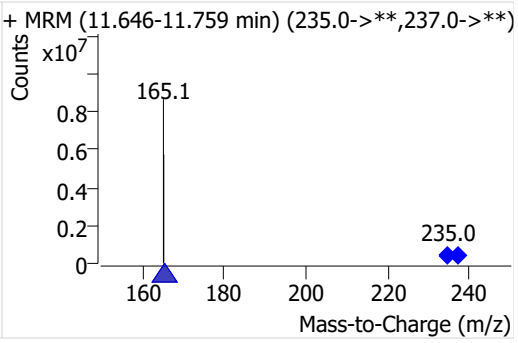




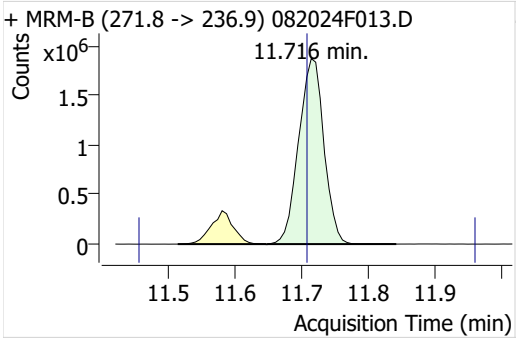
4,4'-DDD

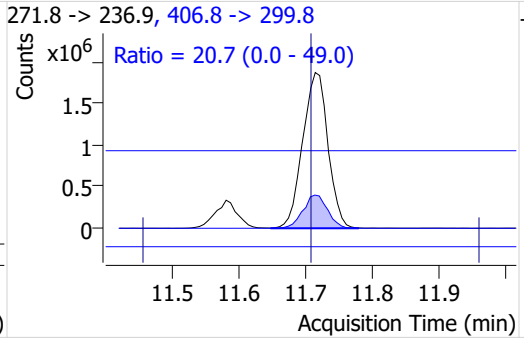


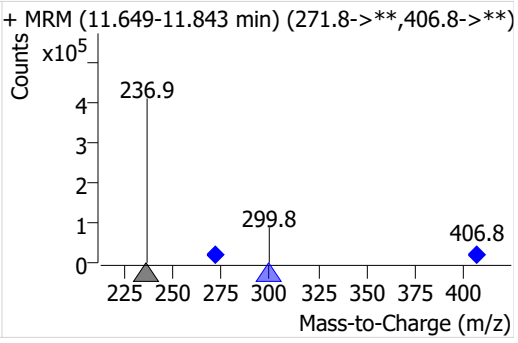




cis-Nonachlor







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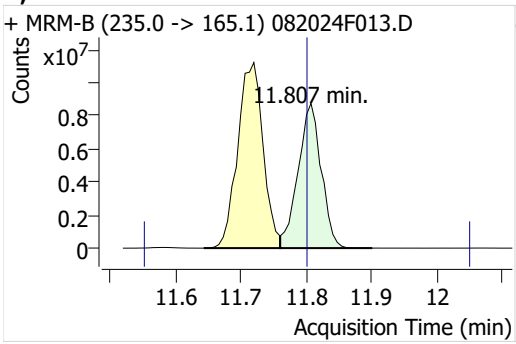
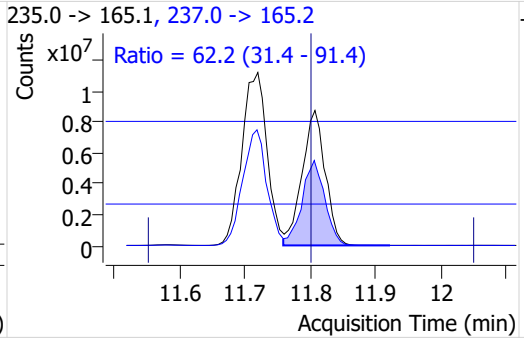
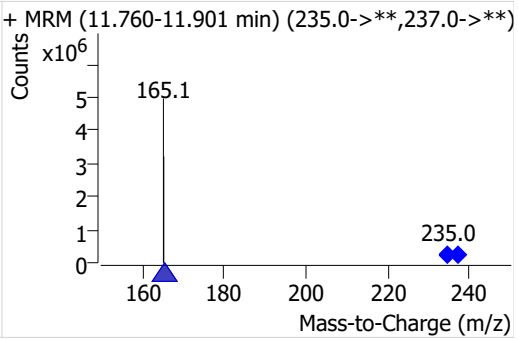
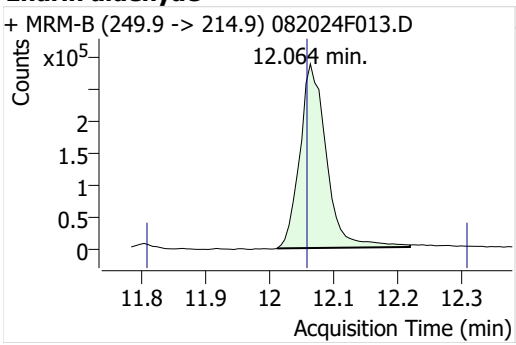
2,4'-DDT

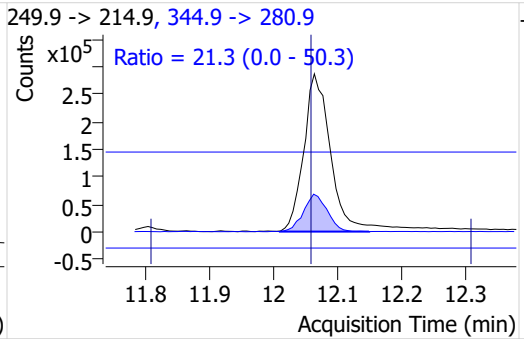


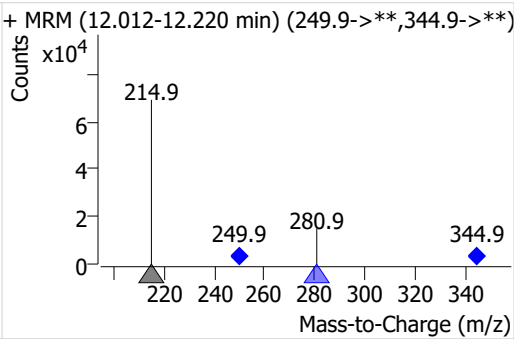




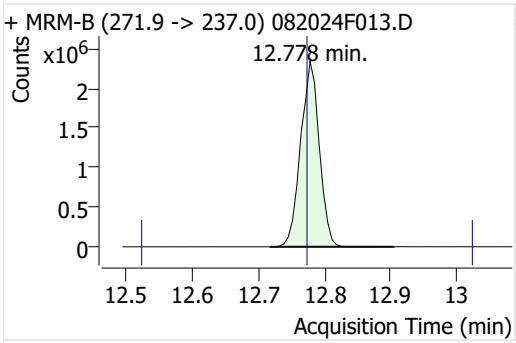
Endrin aldehyde

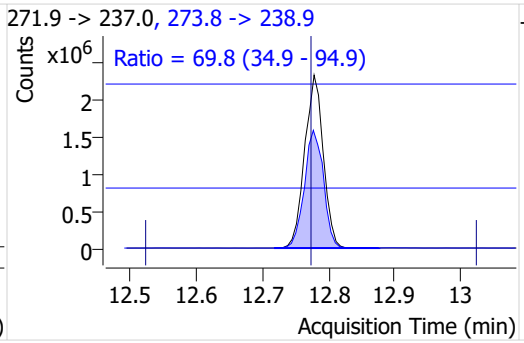


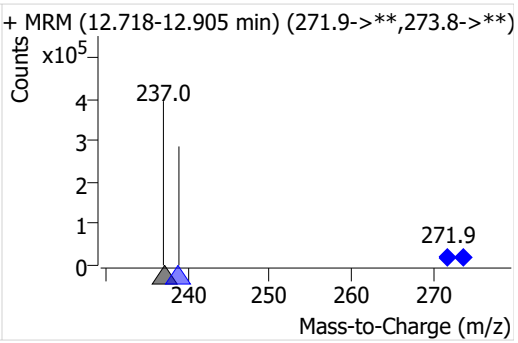




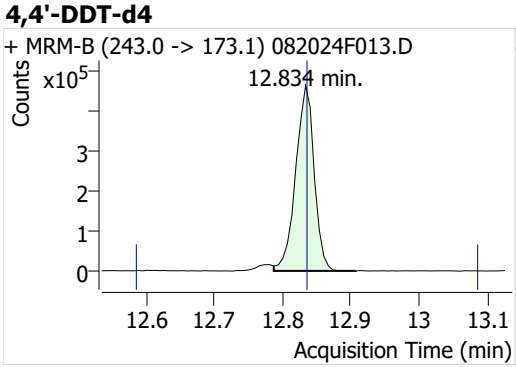
Endosulfan sulfate

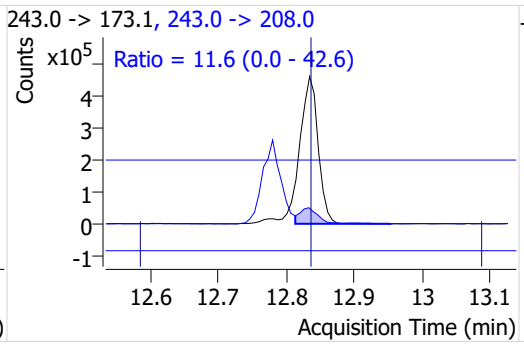


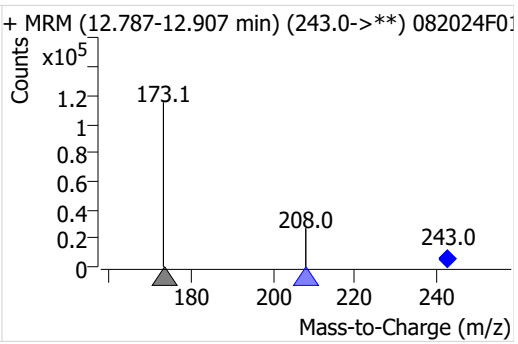




4,4'-DDT-d4

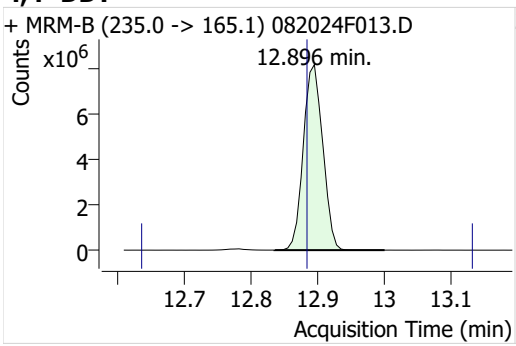


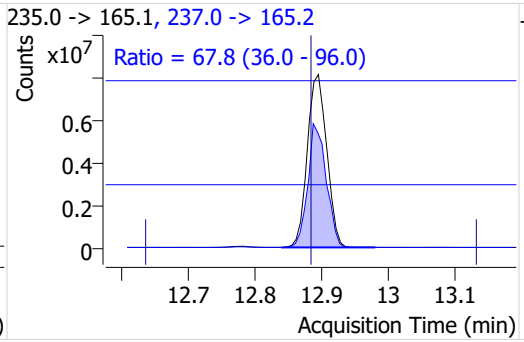


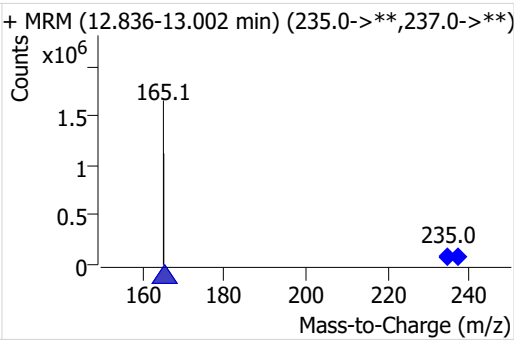


MassHunter Quantitative Analysis Sample Report

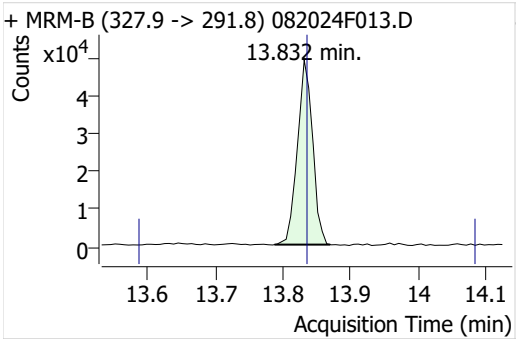
4,4'-DDT

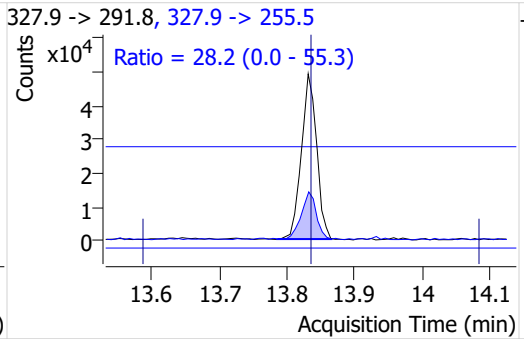


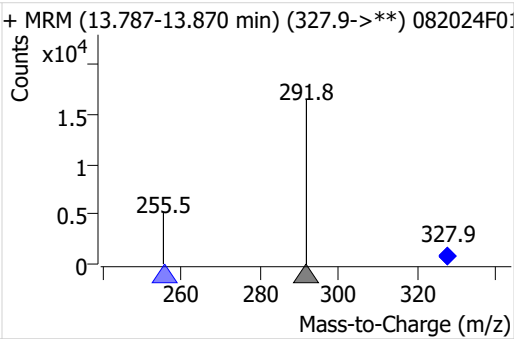




Endrin ketone-13C12







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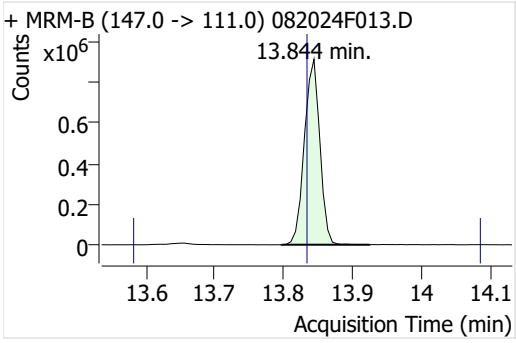
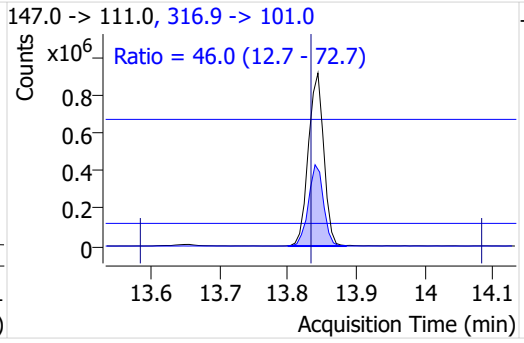
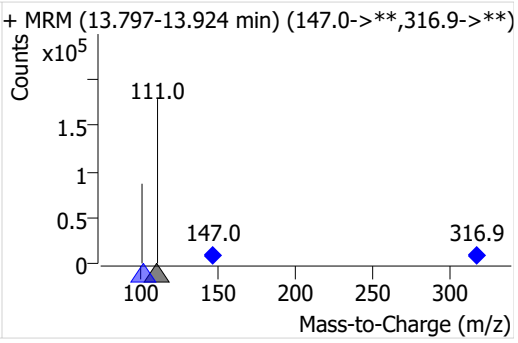
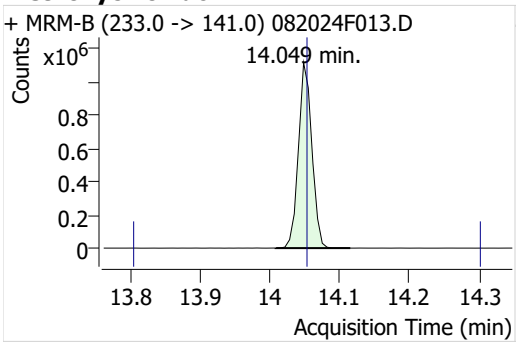
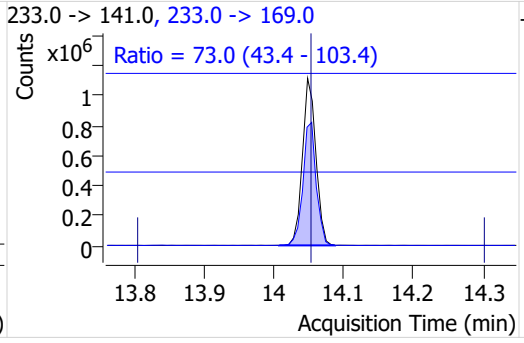


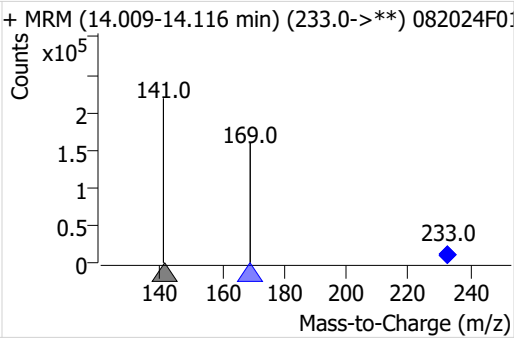




Methoxychlor-d6







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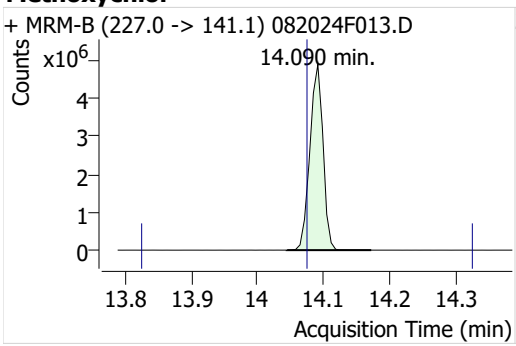
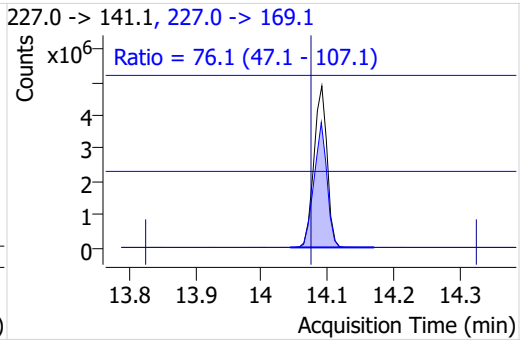
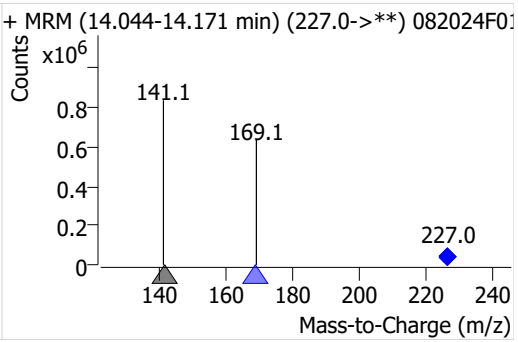
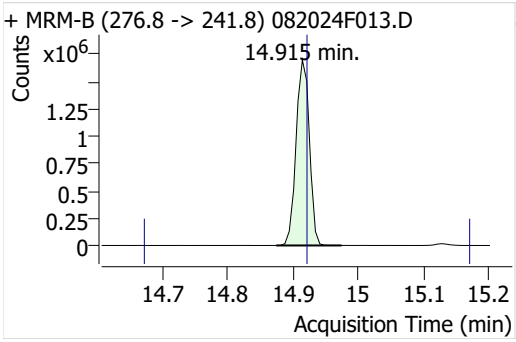
Methoxychlor

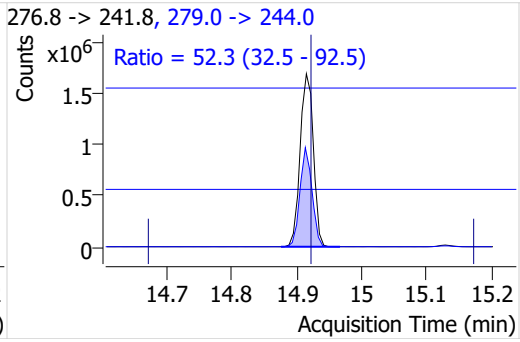


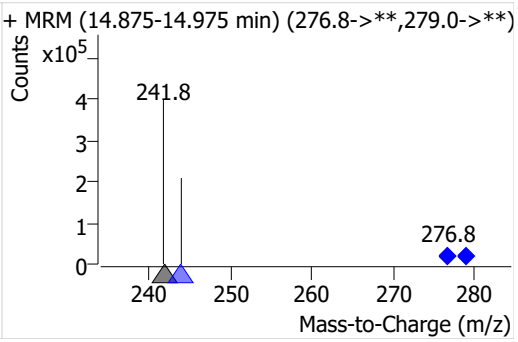




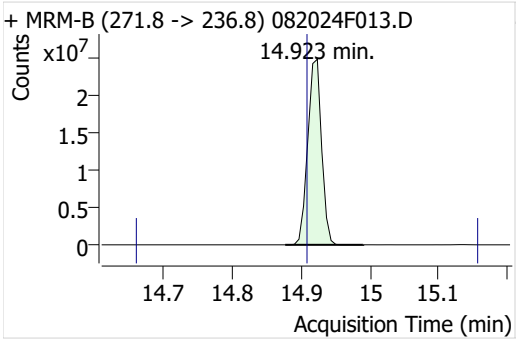
Mirex-13C10

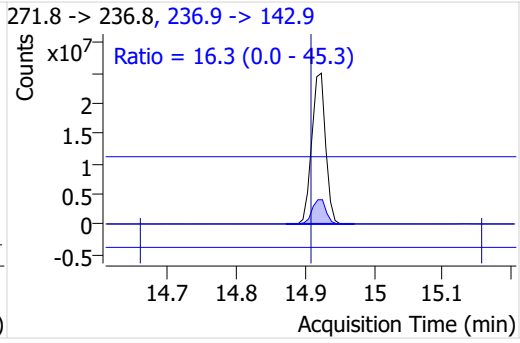


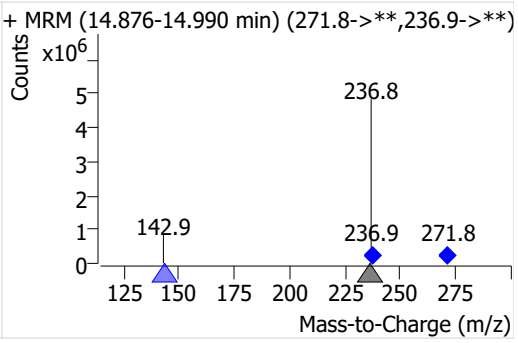




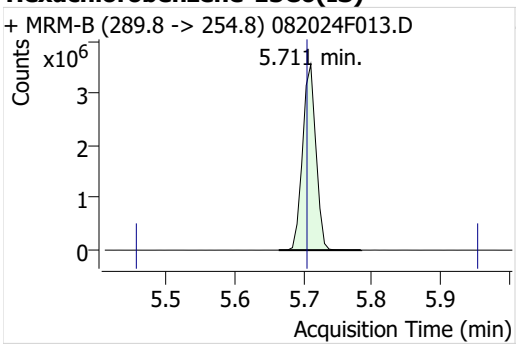
Mirex

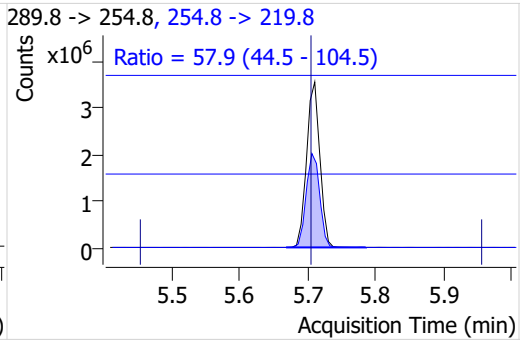


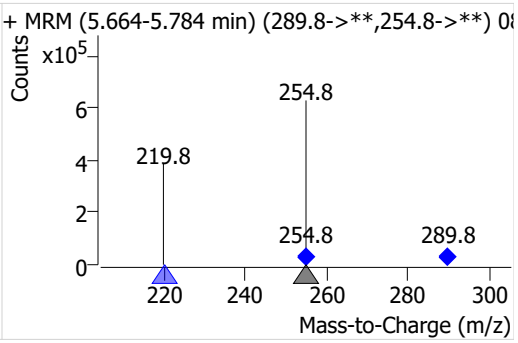




Hexachlorobenzene-13C6(IS)







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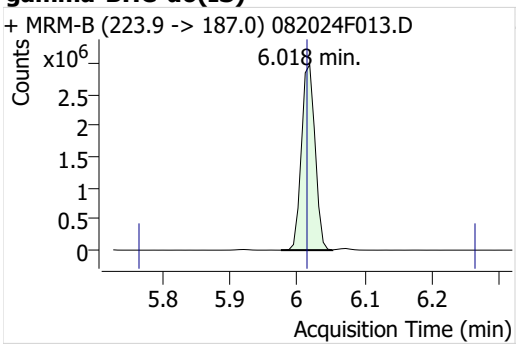
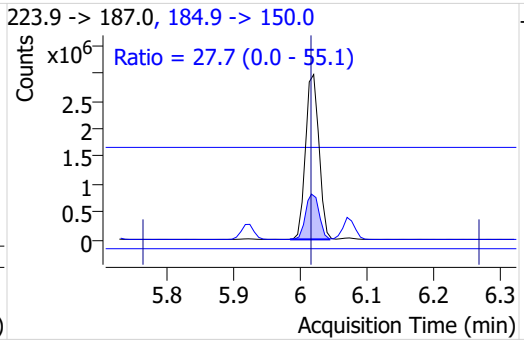
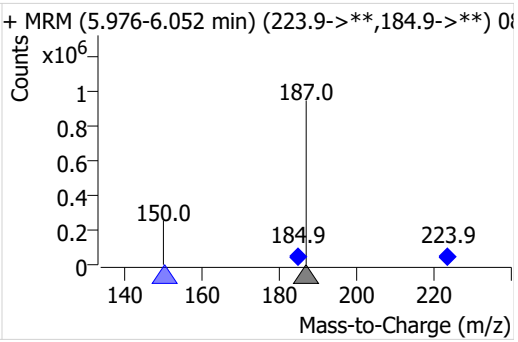
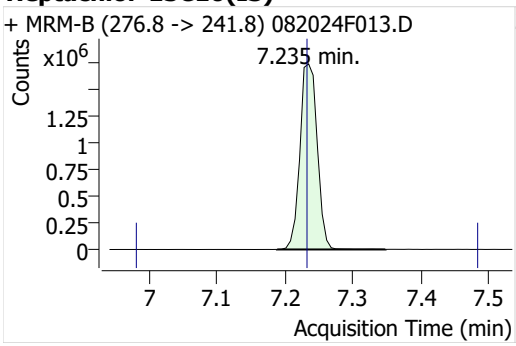
gamma-BHC-d6(IS)

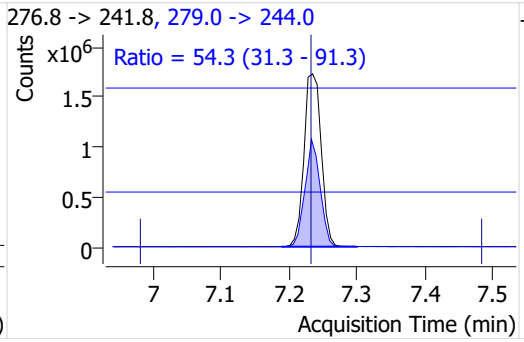


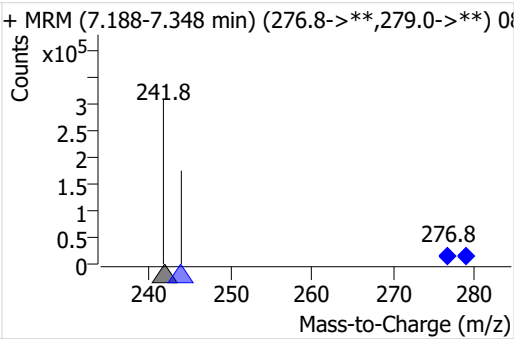




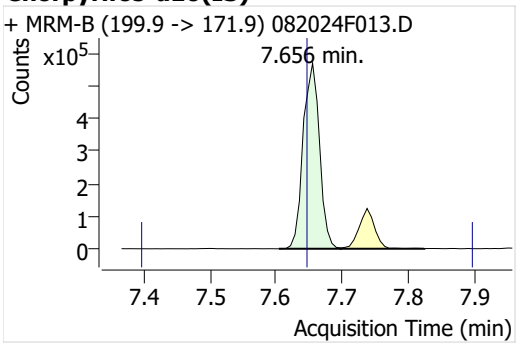
Heptachlor-13C10(IS)

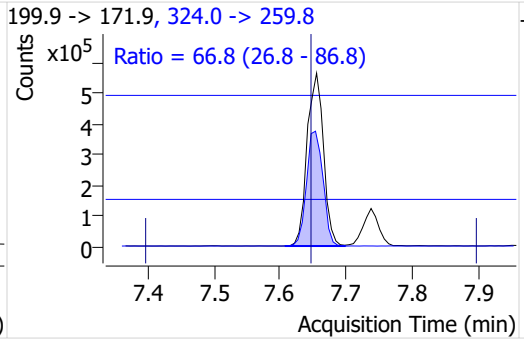


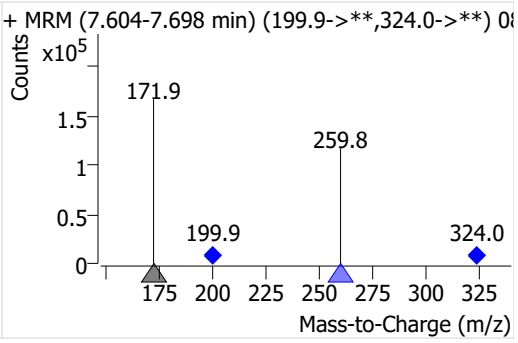




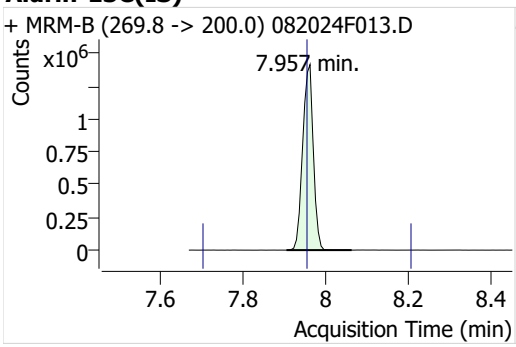
Chorpyrifos-d10(IS)

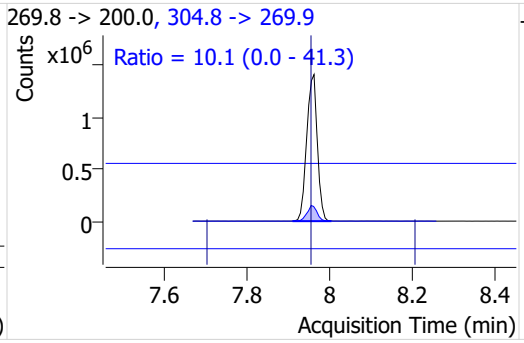


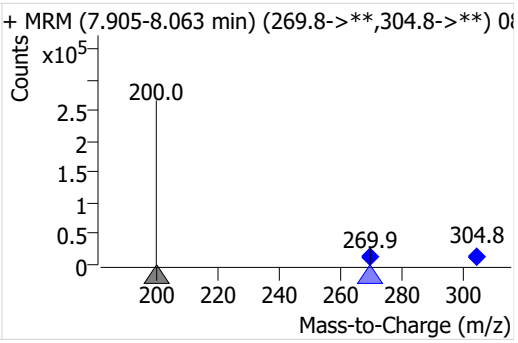




Aldrin-13C(IS)







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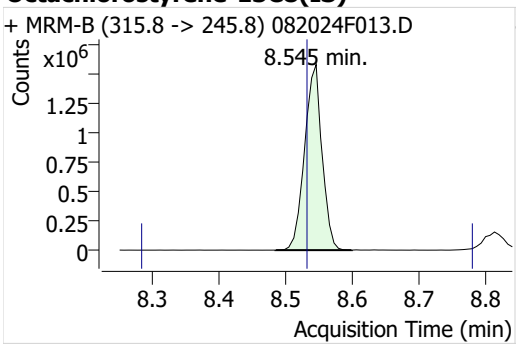
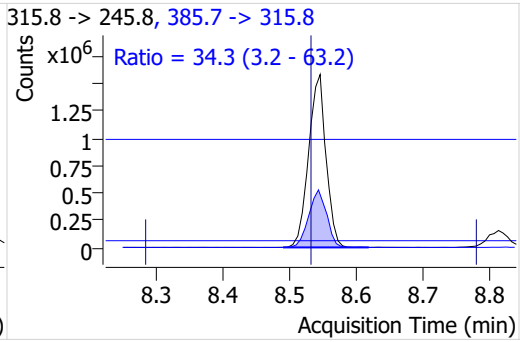
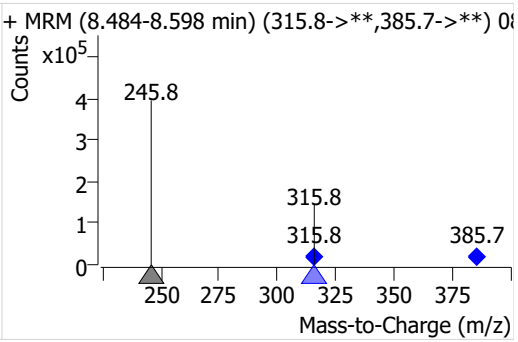
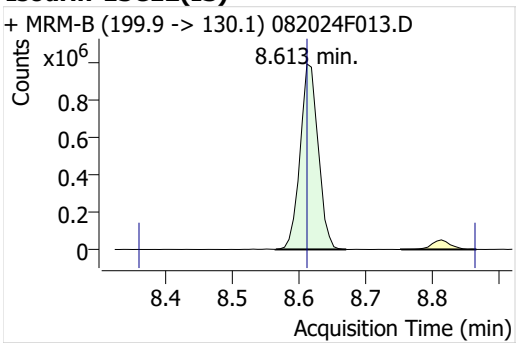
Octachlorostyrene-13C8(IS)

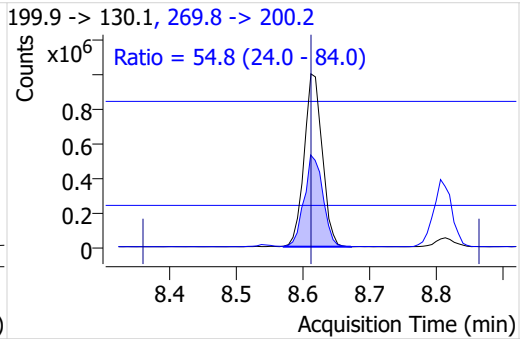


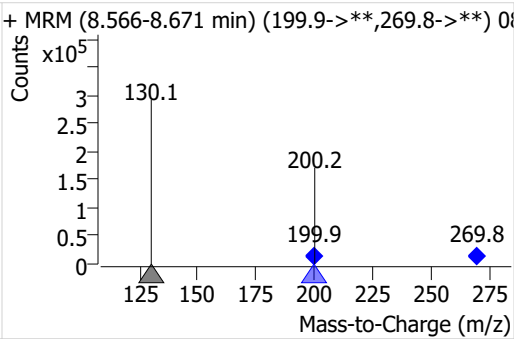




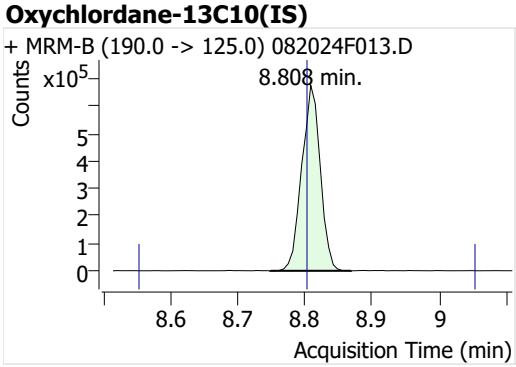
Isodrin-13C12(IS)

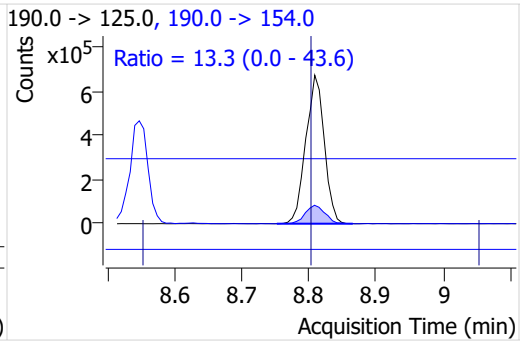


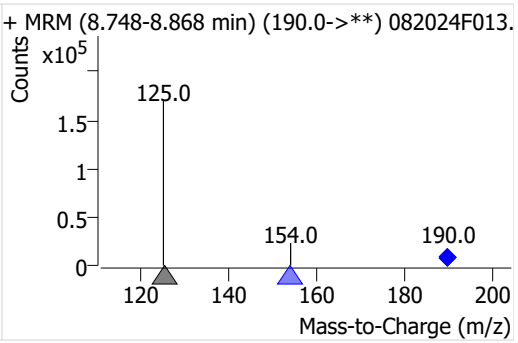




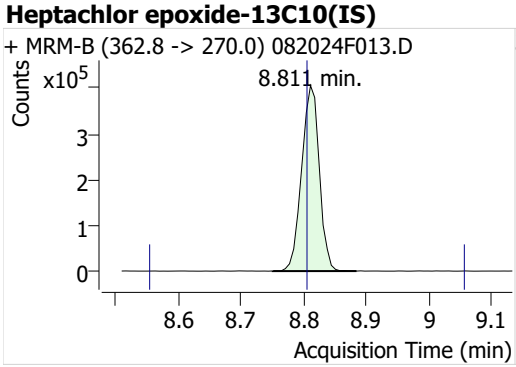
Oxychlordane-13C10(IS)

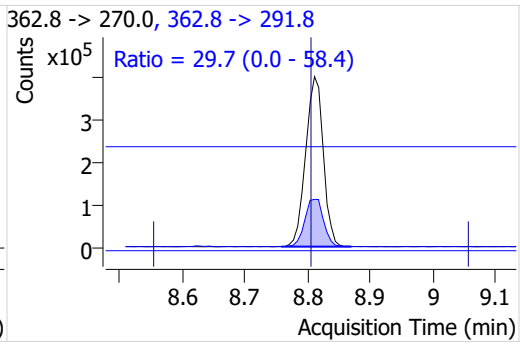


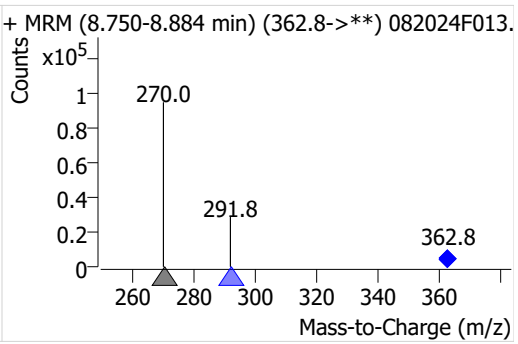




Heptachlor epoxide-13C10(IS)







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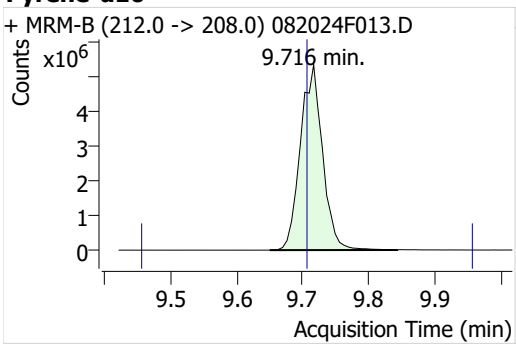
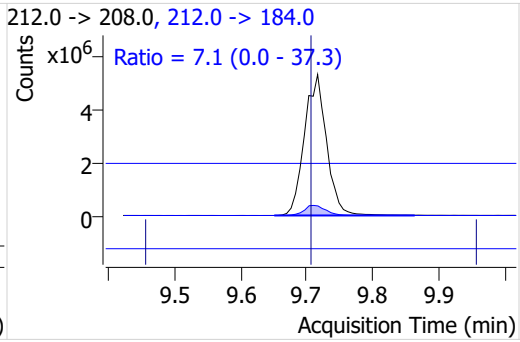
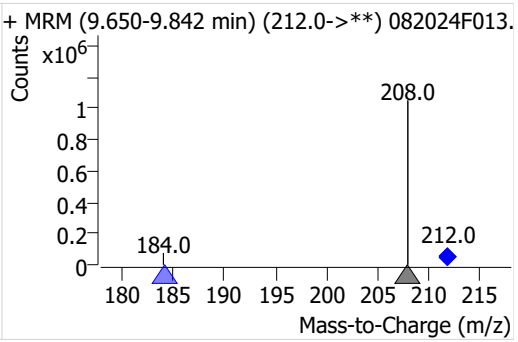
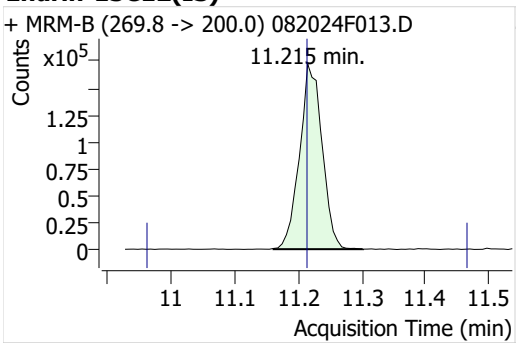
Pyrene-d10

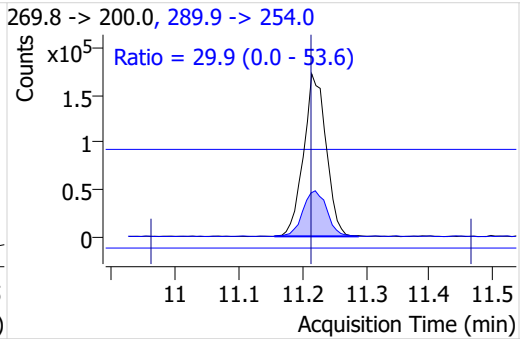


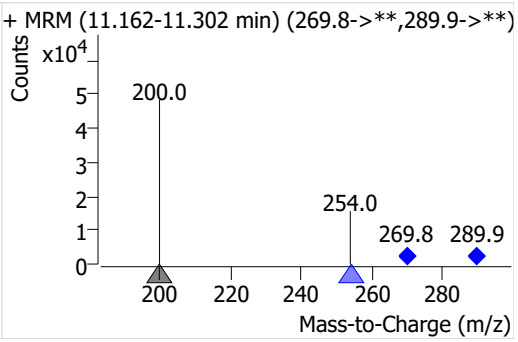




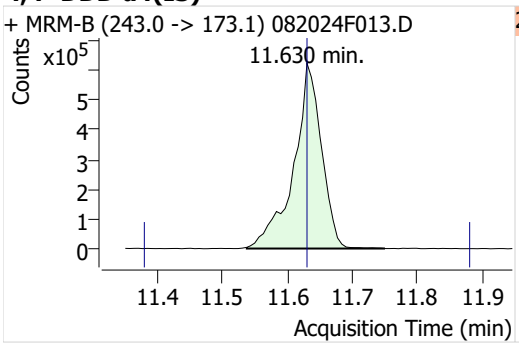
Endrin-13C12(IS)

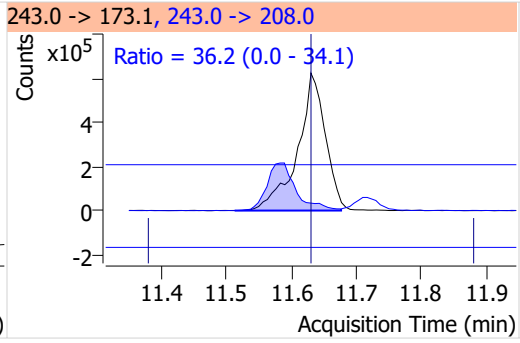


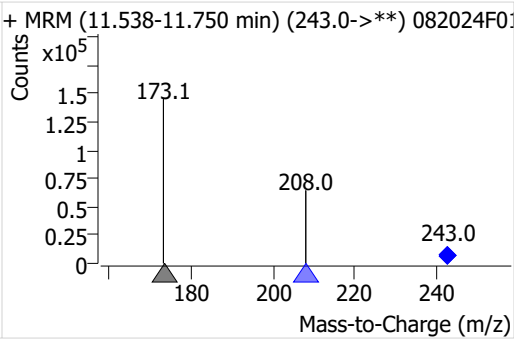




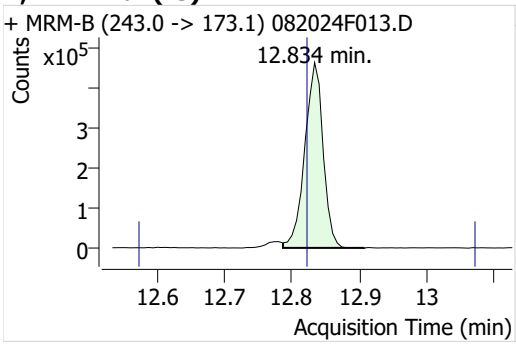
4,4'-DDD d4(IS)

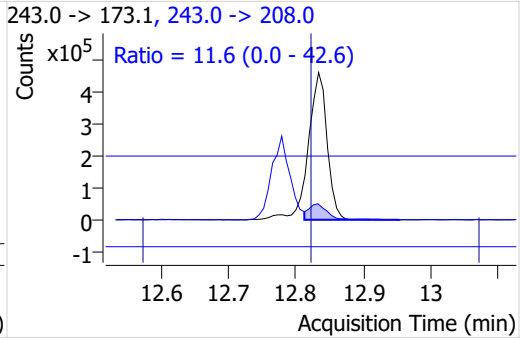


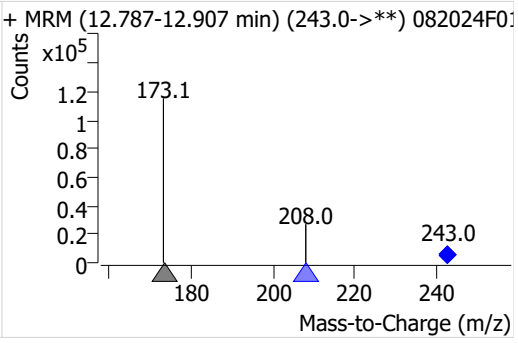




4,4'-DDT-d4(IS)

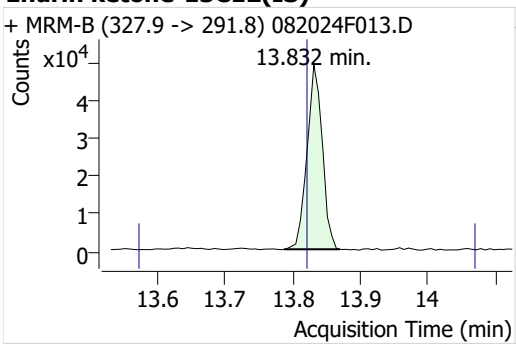


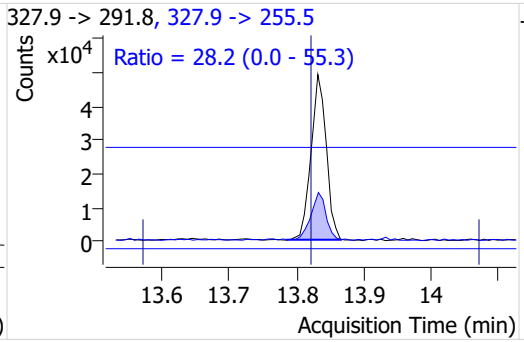


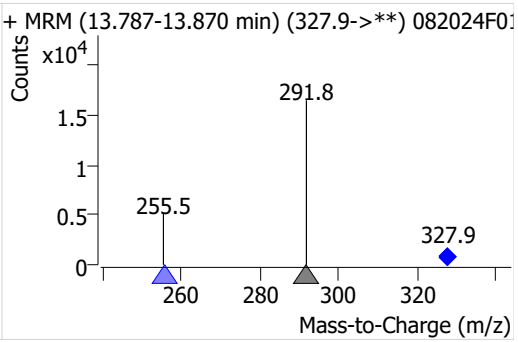


MassHunter Quantitative Analysis Sample Report

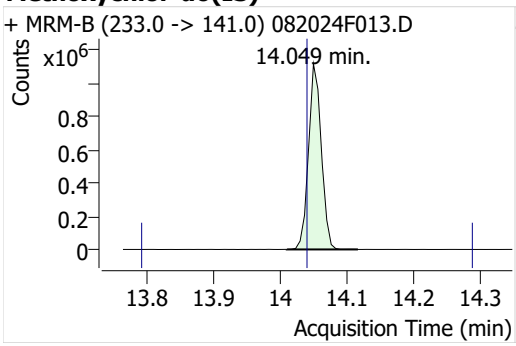
Endrin ketone-13C12(IS)

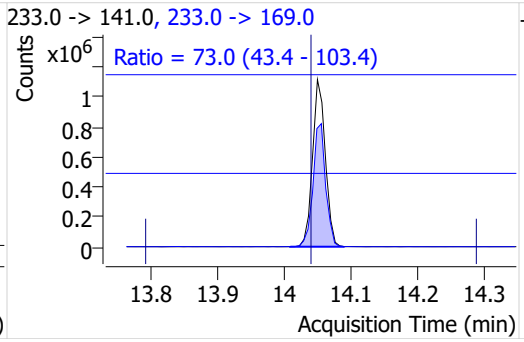


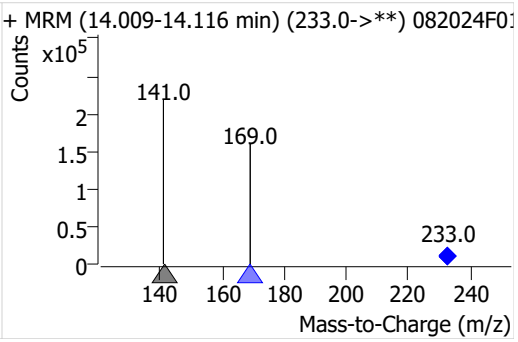




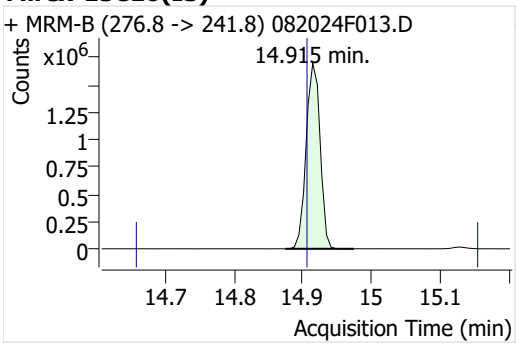
Methoxychlor-d6(IS)

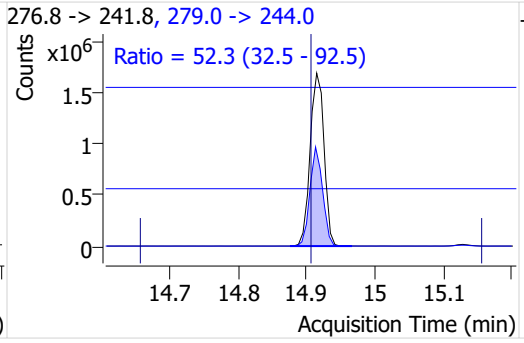


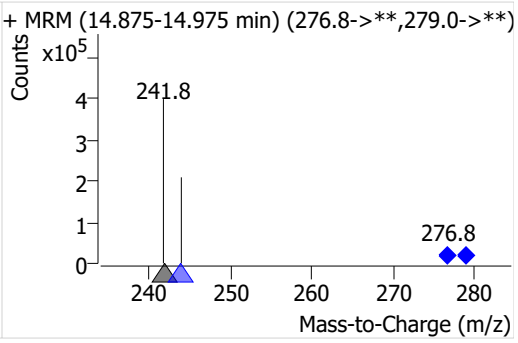




Mirex-13C10(IS)







1st 08/20/24
2nd 08/21/24

MassHunter Quantitative Analysis Sample Report

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Batch File	J:\MS47\data\082024\QuantResults\082024 OC PEST ICAL.batch.bin		
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Name	OC PEST ICAL 100ppb SVM71-99J	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	8/20/2024 3:33:05 PM	**Acq. Method File**	OC Pest_dMRM
Quant Method	080624 OC PEST ICAL.batch.bin	**Vial**	12
Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.711	289.8 -> 254.8	4883068	20.0000 ng/ml	0.003
gamma-BHC-d6(IS)	6.018	223.9 -> 187.0	4207344	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	7.235	276.8 -> 241.8	3132290	20.0000 ng/ml	0.002
Chorpyrifos-d10(IS)	7.649	199.9 -> 171.9	1061953	20.0000 ng/ml	0.004
Aldrin-13C(IS)	7.956	269.8 -> 200.0	2576044	20.0000 ng/ml	0.001
Octachlorostyrene-13C8(IS)	8.538	315.8 -> 245.8	2893110	20.0000 ng/ml	0.009
Isodrin-13C12(IS)	8.617	199.9 -> 130.1	1935035	20.0000 ng/ml	0.005
Oxychlordane-13C10(IS)	8.808	190.0 -> 125.0	1327540	20.0000 ng/ml	0.005
Heptachlor epoxide-13C10(IS)	8.811	362.8 -> 270.0	821902	20.0000 ng/ml	0.009
Pyrene-d10	9.709	212.0 -> 208.0	13409654	100.0000 ng/ml	0.004
Endrin-13C12(IS)	11.222	269.8 -> 200.0	417077	20.0000 ng/ml	0.011
4,4'-DDD d4(IS)	11.637	243.0 -> 173.1	2024149	5.0000 ng/ml	0.020
4,4'-DDT-d4(IS)	12.834	243.0 -> 173.1	961891	5.0000 ng/ml	0.011
Endrin ketone-13C12(IS)	13.832	327.9 -> 291.8	83909	20.0000 ng/ml	0.011
Methoxychlor-d6(IS)	14.055	233.0 -> 141.0	1433263	20.0000 ng/ml	0.016
Mirex-13C10(IS)	14.915	276.8 -> 241.8	2891545	5.0000 ng/ml	0.008

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**	
Hexachlorobenzene-13C6	5.705	289.8 -> 254.8	4883068	20.629 ng/ml	
		Spiked Amount =	20.0	Recovery =	*103.1 %*
gamma-BHC-d6	6.014	223.9 -> 187.0	4207344	18.692 ng/ml	
		Spiked Amount =	20.0	Recovery =	*93.5 %*
Heptachlor-13C10	7.232	276.8 -> 241.8	3132290	19.929 ng/ml	
		Spiked Amount =	20.0	Recovery =	*99.6 %*
Chorpyrifos-d10	7.647	199.9 -> 171.9	1061953	19.621 ng/ml	
		Spiked Amount =	20.0	Recovery =	*98.1 %*
Aldrin-13C	7.955	269.8 -> 200.0	2575879	19.754 ng/ml	
		Spiked Amount =	20.0	Recovery =	*98.8 %*
Octachlorostyrene-13C8	8.531	315.8 -> 245.8	2893110	19.452 ng/ml	
		Spiked Amount =	20.0	Recovery =	*97.3 %*
Isodrin-13C12	8.613	199.9 -> 130.1	1935035	19.080 ng/ml	
		Spiked Amount =	20.0	Recovery =	*95.4 %*
Oxychlordane-13C10	8.803	190.0 -> 125.0	1327540	19.139 ng/ml	
		Spiked Amount =	20.0	Recovery =	*95.7 %*
Heptachlor epoxide-13C10	8.805	362.8 -> 270.0	821902	20.046 ng/ml	
		Spiked Amount =	20.0	Recovery =	*100.2 %*
Endrin-13C12	11.214	269.8 -> 200.0	417077	18.360 ng/ml	
		Spiked Amount =	20.0	Recovery =	*91.8 %*
4,4'-DDD d4	11.630	243.0 -> 173.1	2024149	5.611 ng/ml	
		Spiked Amount =	5.0	Recovery =	*112.2 %*
4,4'-DDT-d4	12.822	243.0 -> 173.1	961891	5.139 ng/ml	
		Spiked Amount =	5.0	Recovery =	*102.8 %*
Endrin ketone-13C12	13.821	327.9 -> 291.8	83909	20.730 ng/ml	
		Spiked Amount =	20.0	Recovery =	*103.6 %*
Methoxychlor-d6	14.039	233.0 -> 141.0	1433263	17.845 ng/ml	
		Spiked Amount =	20.0	Recovery =	*89.2 %*

MassHunter Quantitative Analysis Sample Report

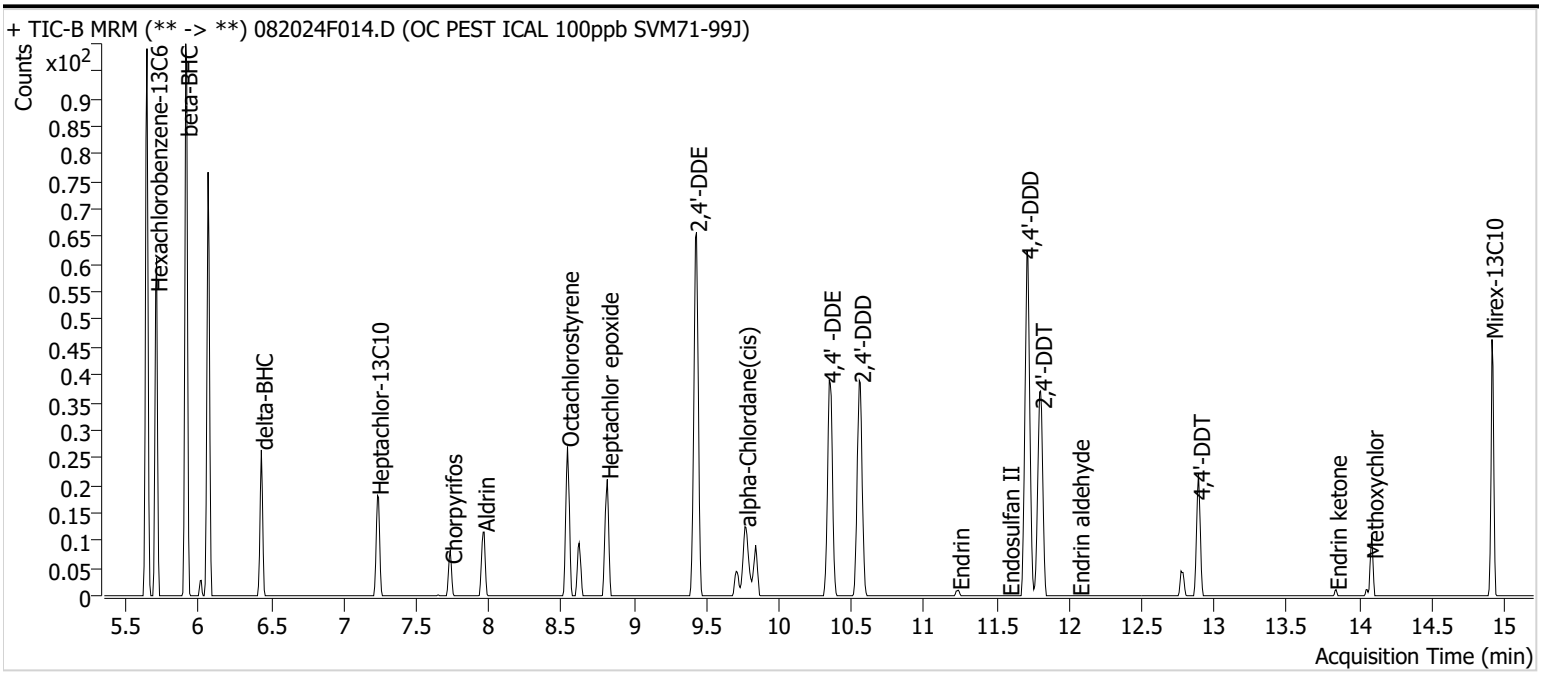
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.906	276.8 -> 241.8	2891545	6.152 ng/ml
		Spiked Amount = 5.0		Recovery = *123.0 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)	5.649	181.1 -> 145.1	77007081	109.106 ng/ml	97
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.713	283.8 -> 213.9	41821429	98.572 ng/ml	98
beta-BHC	gamma-BHC-d6(IS)	5.916	181.1 -> 145.1	76827710	116.634 ng/ml	100
gamma-BHC(Lindane)	gamma-BHC-d6(IS)	6.070	181.1 -> 145.1	59616893	109.889 ng/ml	96
delta-BHC	gamma-BHC-d6(IS)	6.436	181.1 -> 145.1	22562602	116.317 ng/ml	87
Heptachlor	Heptachlor-13C10(IS)	7.238	271.7 -> 236.9	15797665	98.437 ng/ml	94
Chorpyrifos	Chorpyrifos-d10(IS)	7.740	196.9 -> 169.0	7125750	105.844 ng/ml	95
Aldrin	Aldrin-13C(IS)	7.965	254.9 -> 220.0	8759257	98.126 ng/ml	91
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.544	342.8 -> 307.8	29950498	102.129 ng/ml	97
Isodrin	Isodrin-13C12(IS)	8.627	193.0 -> 123.0	11820831	111.137 ng/ml	96
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	8.818	352.8 -> 262.9	5126624	111.746 ng/ml	95
Oxychlordane	Oxychlordane-13C10(IS)	8.823	114.9 -> 51.1	18641716	114.110 ng/ml	94
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.419	271.8 -> 236.9	11044756	117.019 ng/ml	92
2,4'-DDE	4,4'-DDD d4(IS)	9.428	246.0 -> 176.2	72582338	100.024 ng/ml	99
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.767	271.8 -> 236.9	25616711	108.064 ng/ml	92
Endosulfan I	Endrin-13C12(IS)	9.790	206.9 -> 172.0	4219100	124.930 ng/ml	100
trans-Nanochlor	Oxychlordane-13C10(IS)	9.841	271.8 -> 236.9	9871875	120.107 ng/ml	93
4,4' -DDE	4,4'-DDD d4(IS)	10.349	246.0 -> 176.2	58207389	107.742 ng/ml	94
2,4'-DDD	4,4'-DDD d4(IS)	10.559	235.0 -> 165.1	52524848	103.369 ng/ml	96
Dieldrin	Endrin-13C12(IS)	10.581	262.9 -> 193.0	5417290	124.373 ng/ml	91
Endrin	Endrin-13C12(IS)	11.236	262.8 -> 193.0	2644100	108.341 ng/ml	97
Endosulfan II	Endrin-13C12(IS)	11.580	206.9 -> 172.0	1820136	109.682 ng/ml	91
4,4'-DDD	4,4'-DDD d4(IS)	11.713	235.0 -> 165.1	45297282	110.899 ng/ml	97
cis-Nonachlor	Oxychlordane-13C10(IS)	11.716	271.8 -> 236.9	6898813	115.282 ng/ml	96
2,4'-DDT	4,4'-DDT-d4(IS)	11.807	235.0 -> 165.1	28549487	107.514 ng/ml	94
Endrin aldehyde	Endrin-13C12(IS)	12.064	249.9 -> 214.9	1082921	119.651 ng/ml	99
Endosulfan sulfate	Endrin-13C12(IS)	12.771	271.9 -> 237.0	6013135	117.646 ng/ml	96
4,4'-DDT	4,4'-DDT-d4(IS)	12.896	235.0 -> 165.1	23264349	103.881 ng/ml	91
Endrin ketone	Endrin ketone-13C12(IS)	13.838	147.0 -> 111.0	1793663	97.282 ng/ml	93
Methoxychlor	Methoxychlor-d6(IS)	14.091	227.0 -> 141.1	9076376	118.409 ng/ml	94
Mirex	Mirex-13C10(IS)	14.917	271.8 -> 236.8	47192242	80.828 ng/ml	100

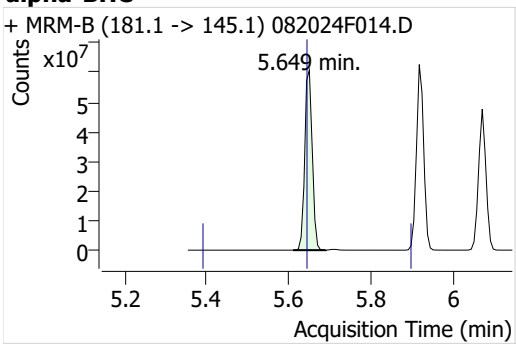
(m) = manual integration ND = Not Detected NC = Not Calculated

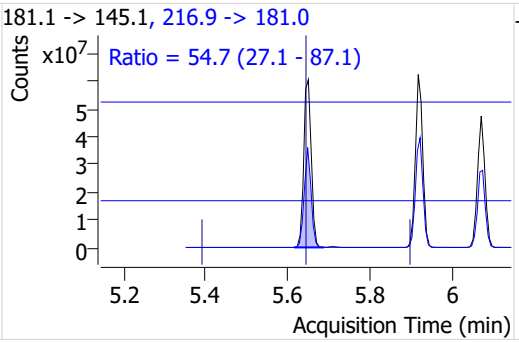
Sample Chromatogram

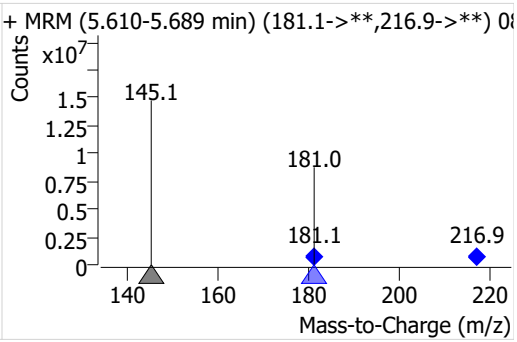
MassHunter Quantitative Analysis Sample Report



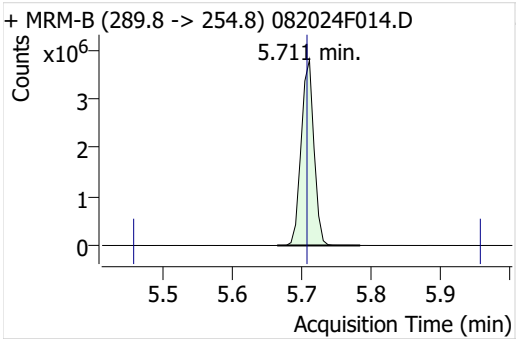
alpha-BHC

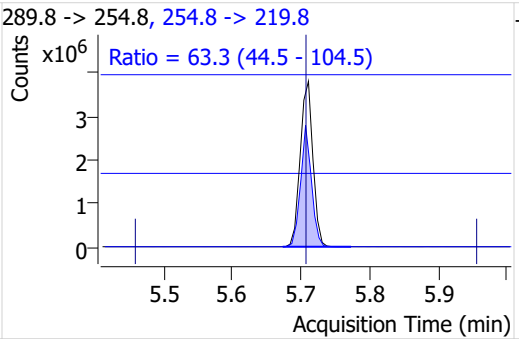


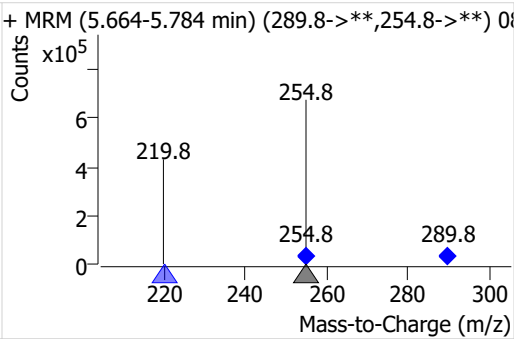




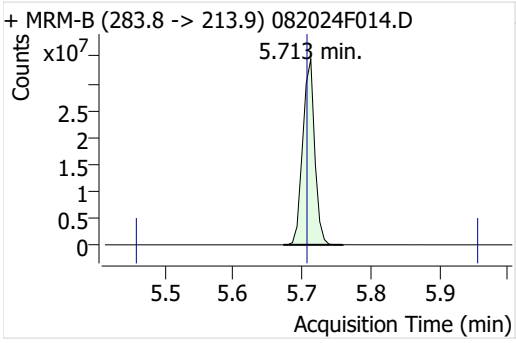
Hexachlorobenzene-13C6

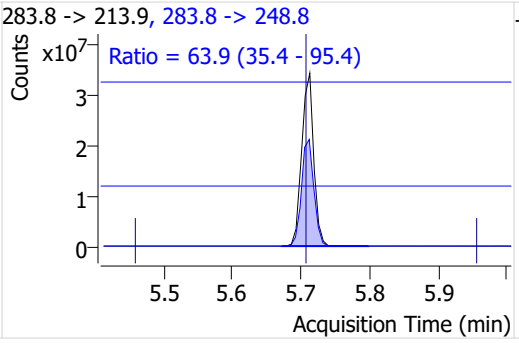


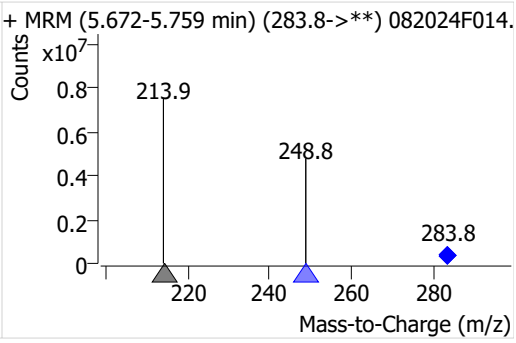




Hexachlorobenzene







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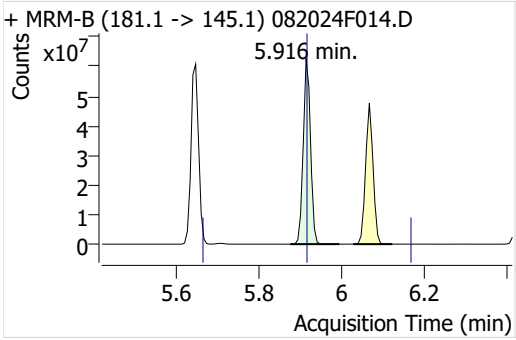
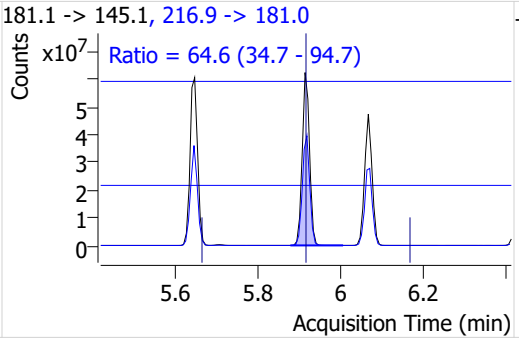
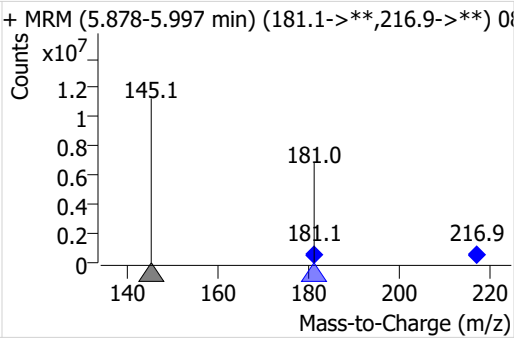
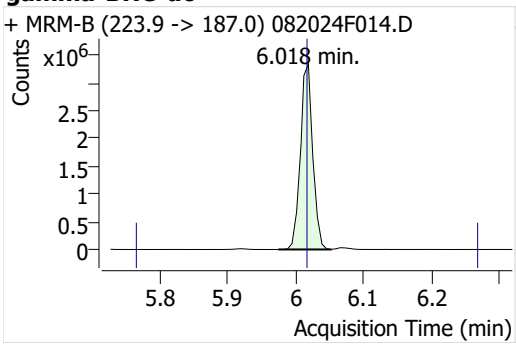
beta-BHC

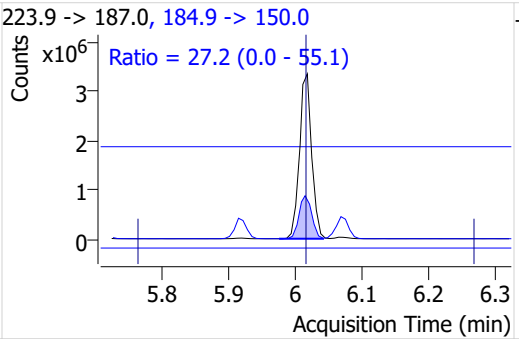


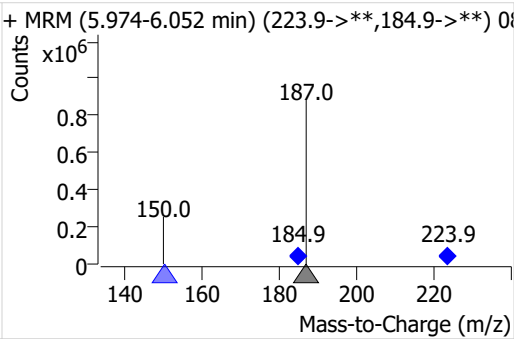




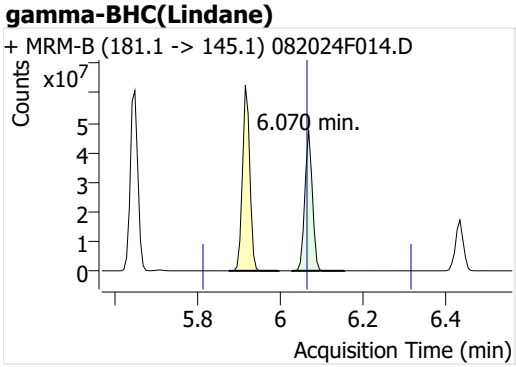
gamma-BHC-d6

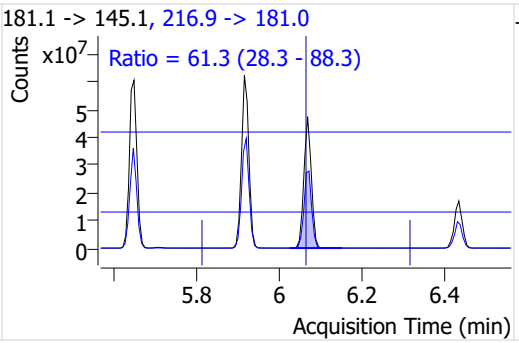


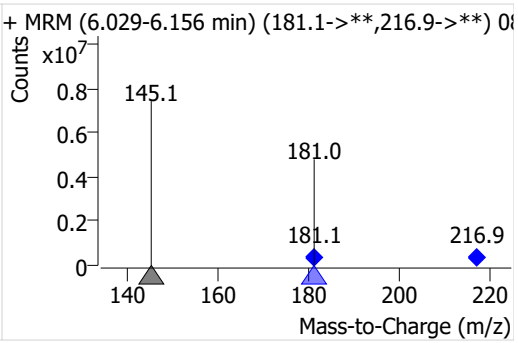




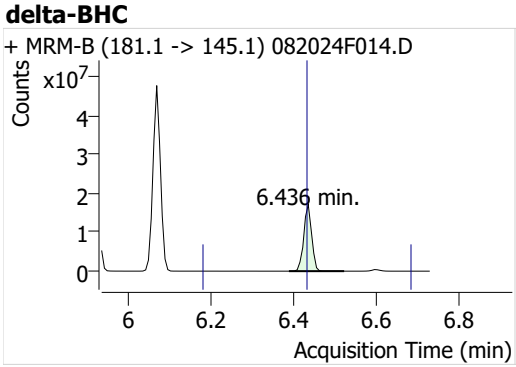
gamma-BHC(Lindane)

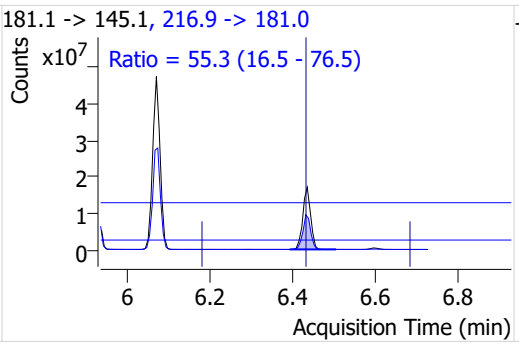


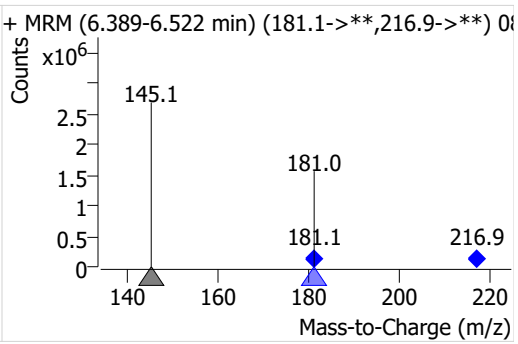




delta-BHC

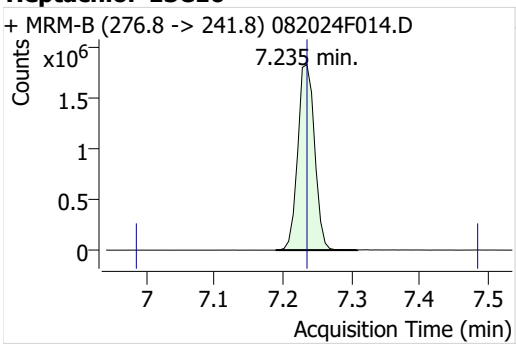


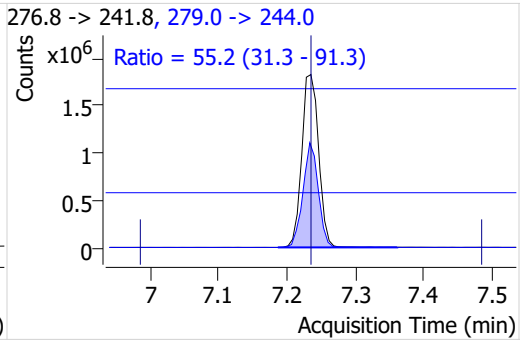


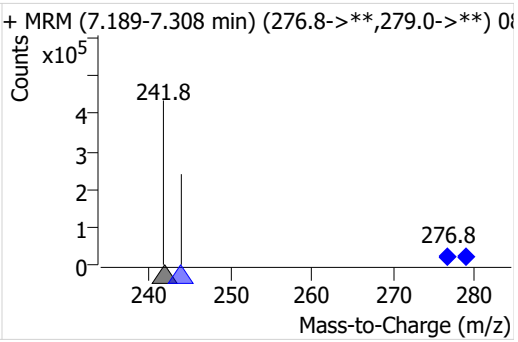


MassHunter Quantitative Analysis Sample Report

Heptachlor-13C10







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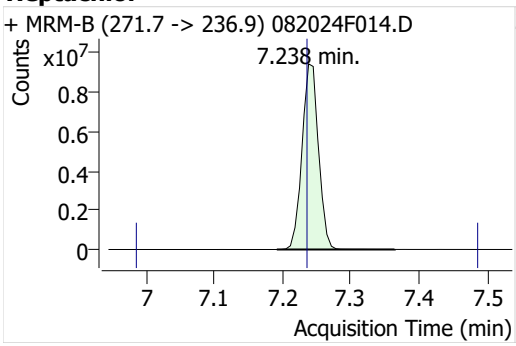
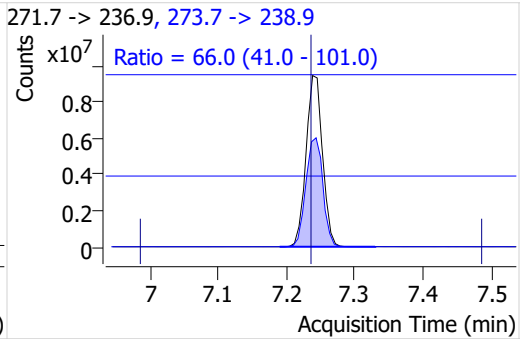
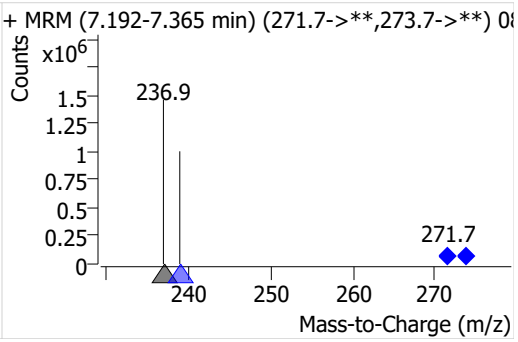
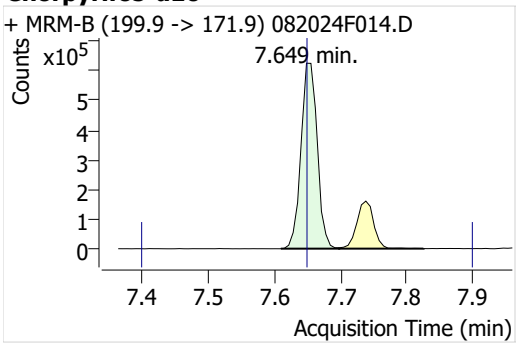
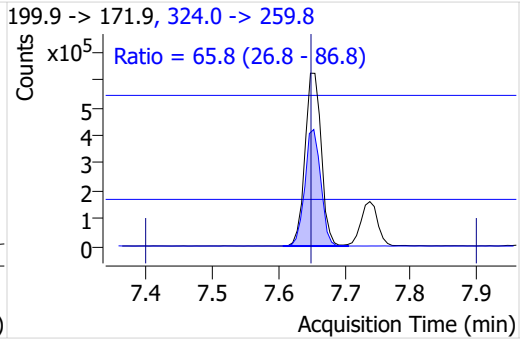


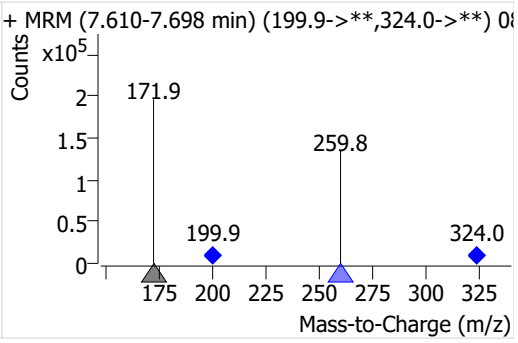




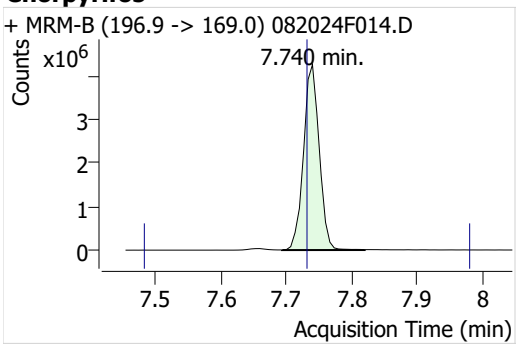
Chorpyrifos-d10

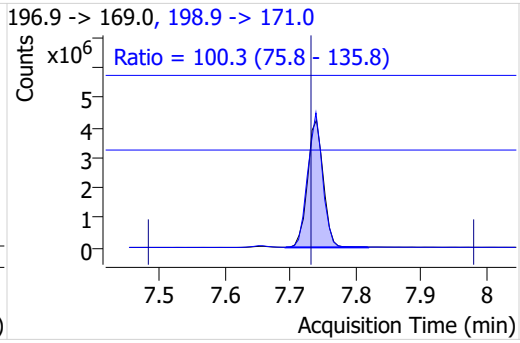


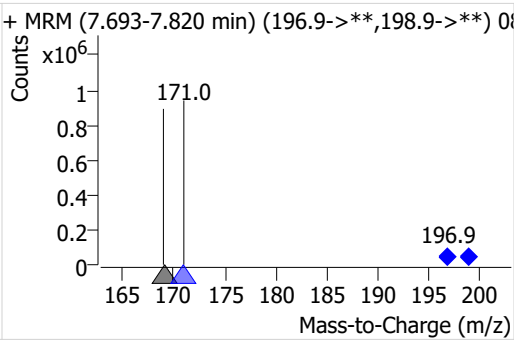




Chorpyrifos

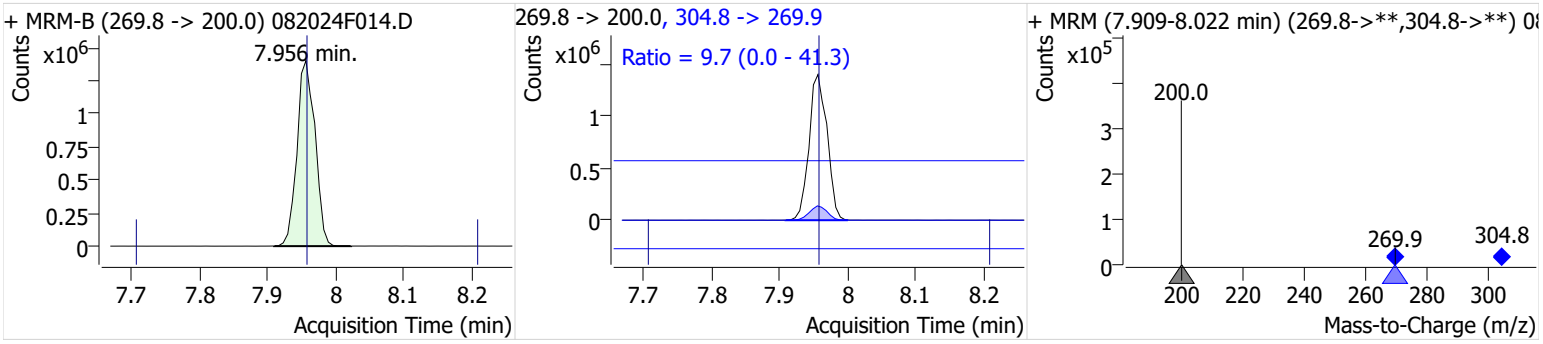






MassHunter Quantitative Analysis Sample Report

Aldrin-13C



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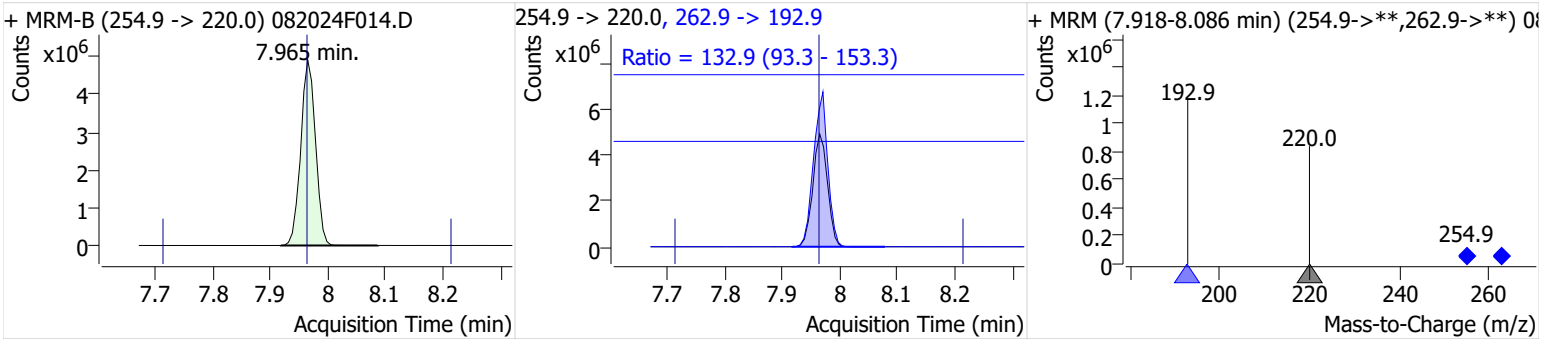
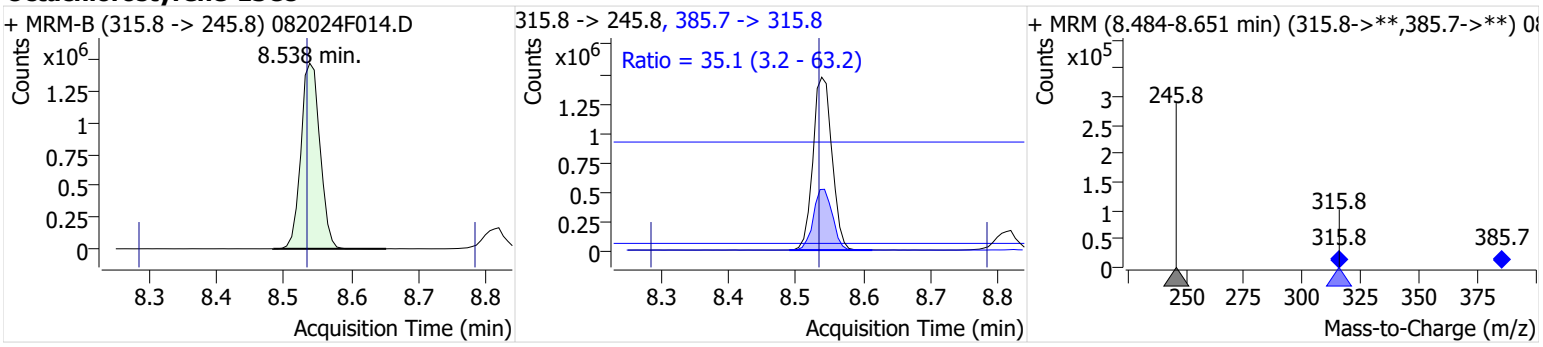


Octachlorostyrene-13C8



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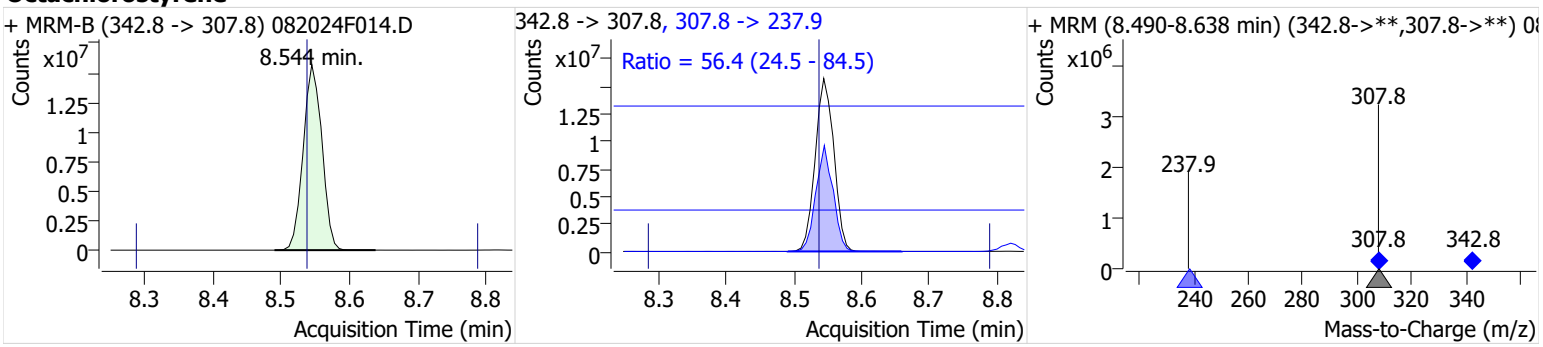

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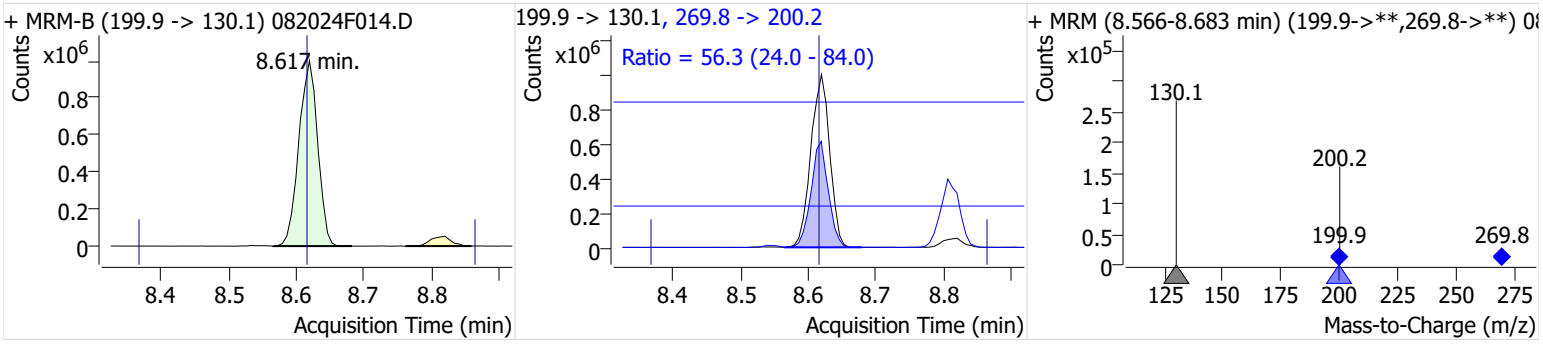
Isodrin-13C12



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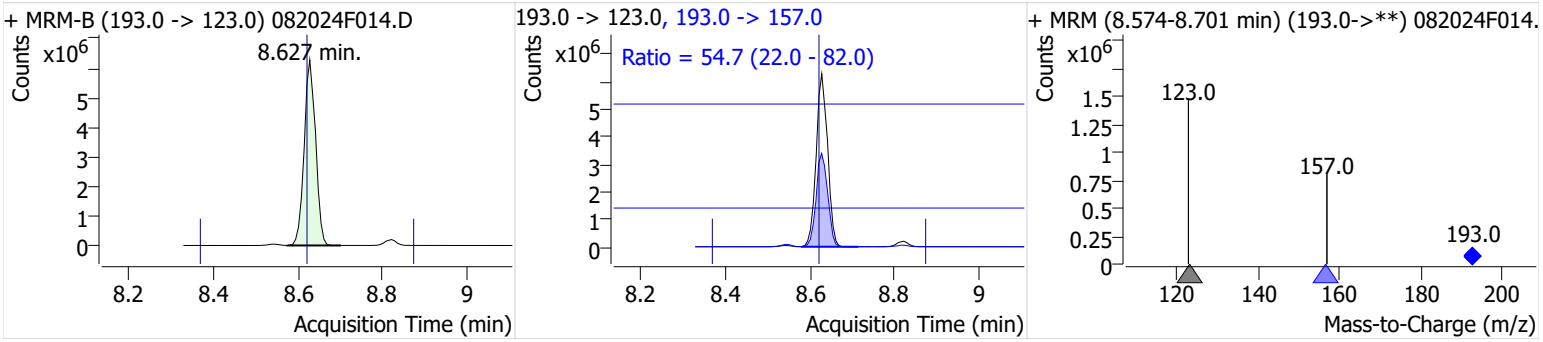
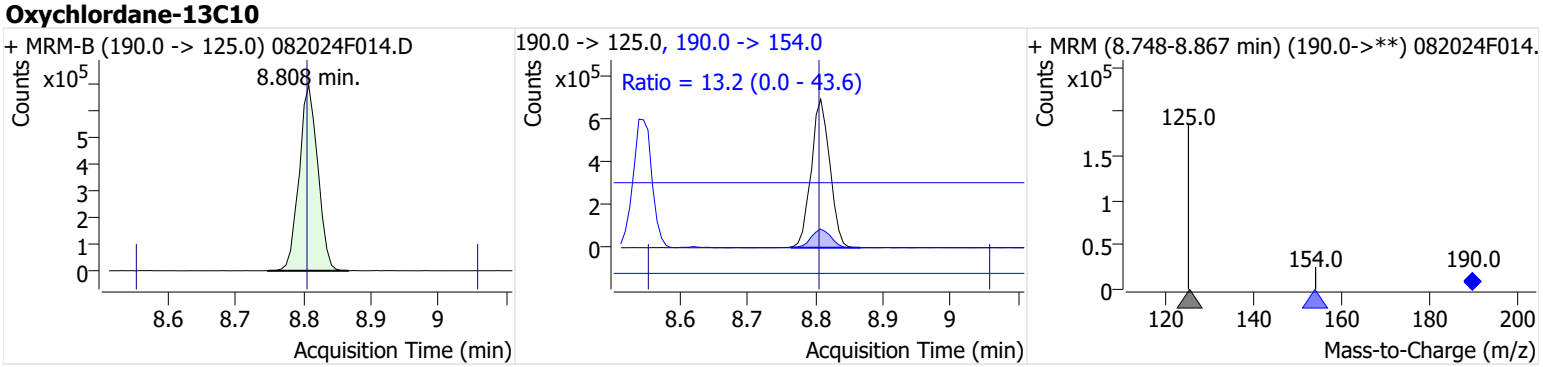
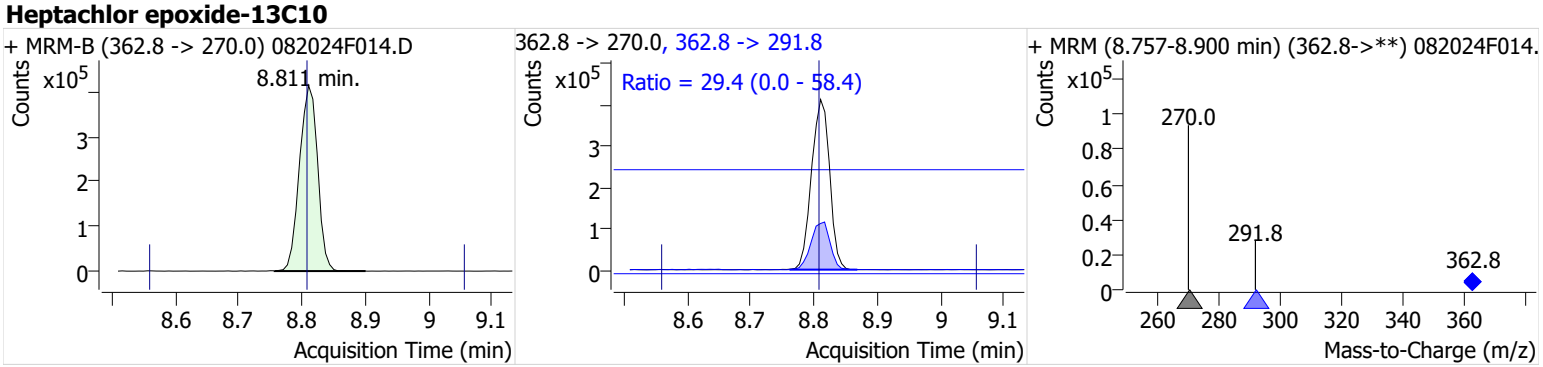


Oxychlordane-13C10

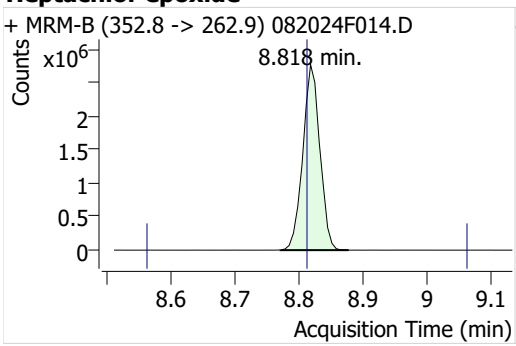


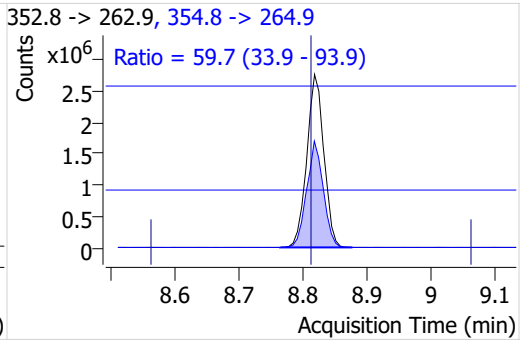
Heptachlor epoxide-13C10

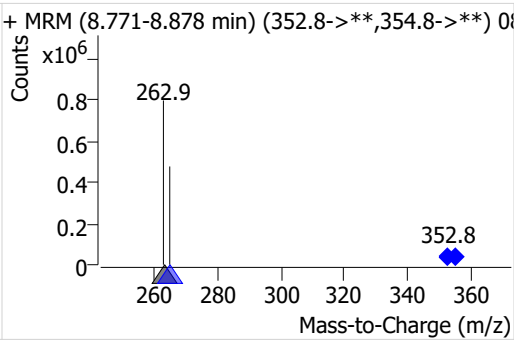


MassHunter Quantitative Analysis Sample Report

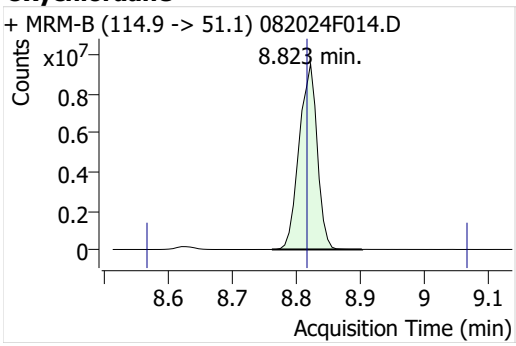
Heptachlor epoxide

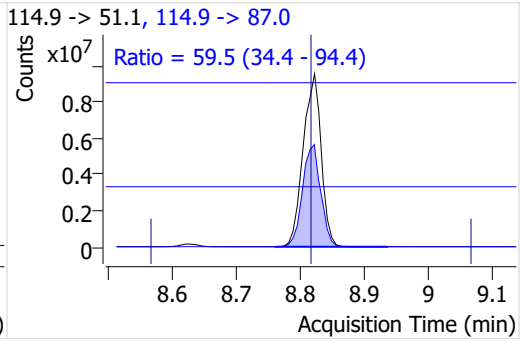


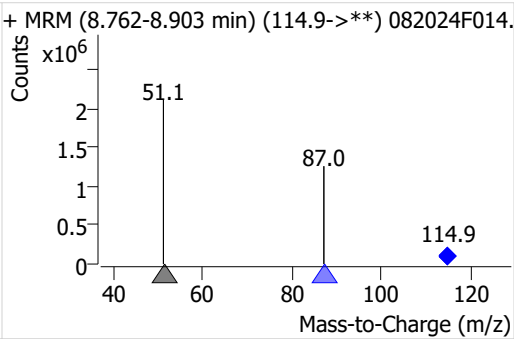




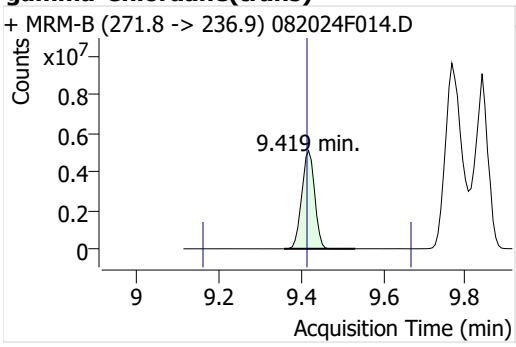
Oxychlordane

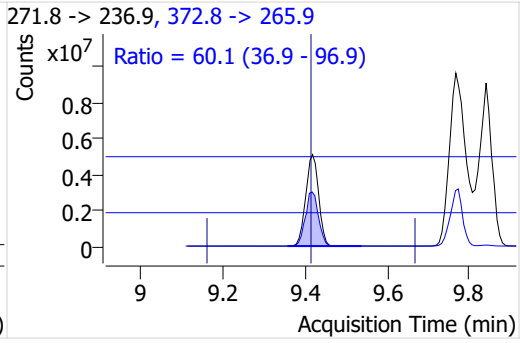


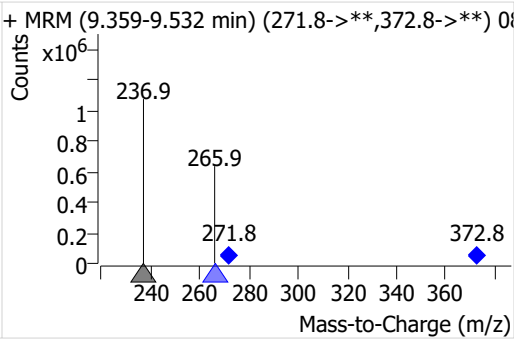




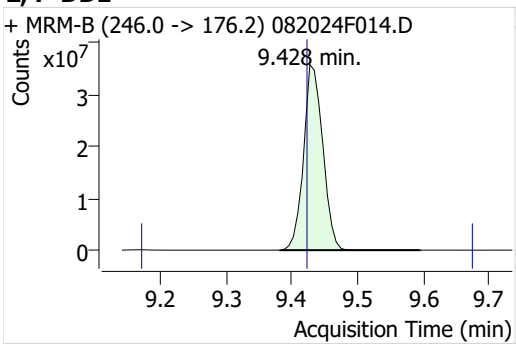
gamma-Chlordane(trans)

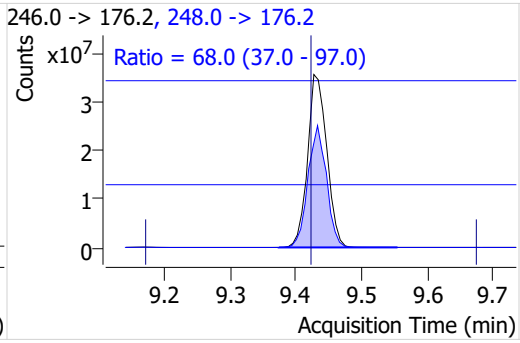


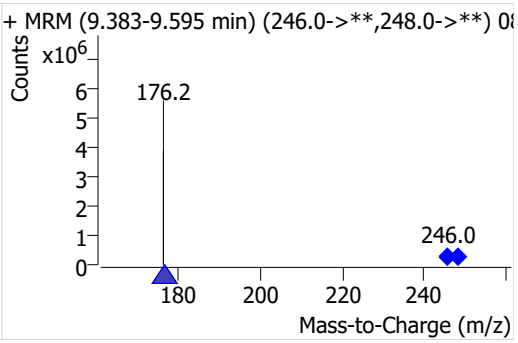




2,4'-DDE







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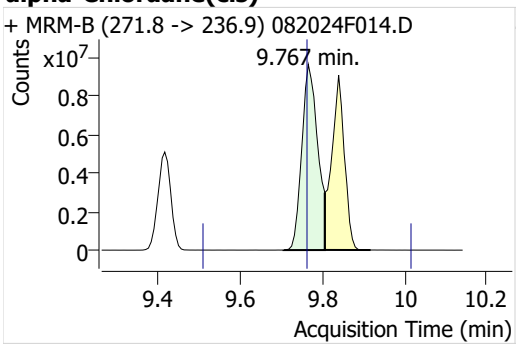
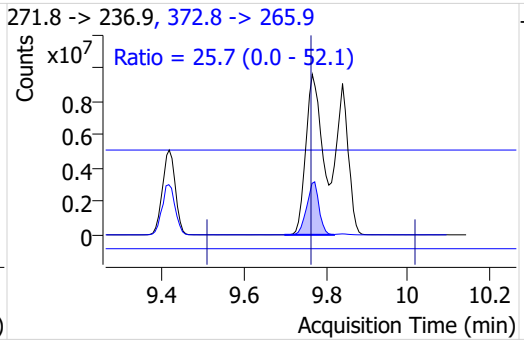
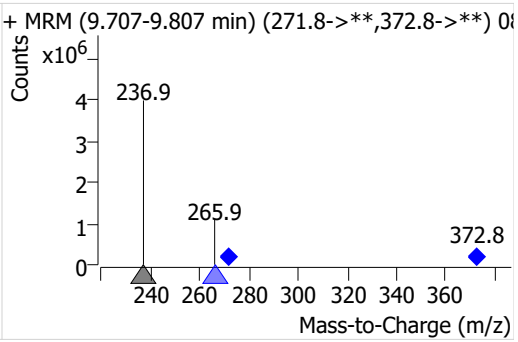
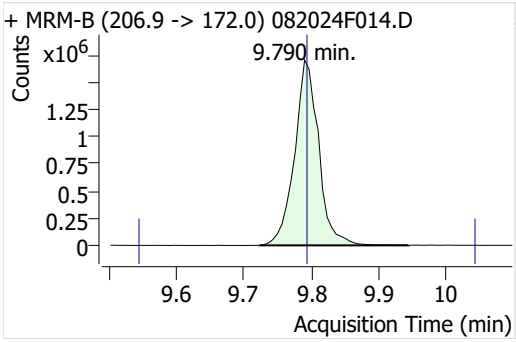
alpha-Chlordane(cis)

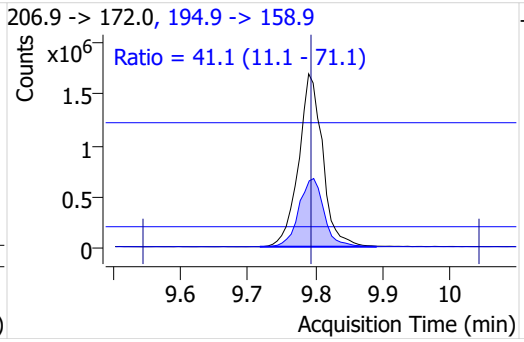


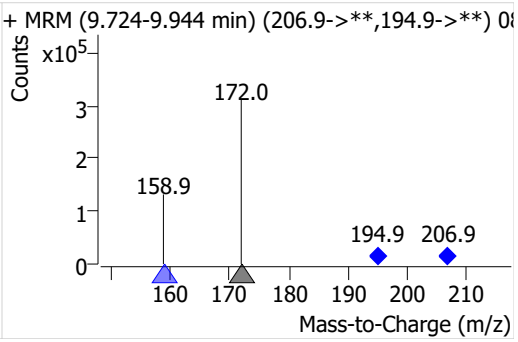




Endosulfan I







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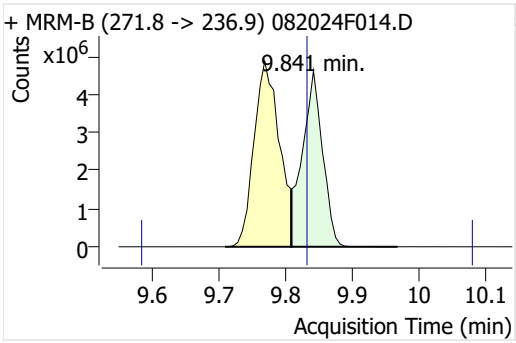
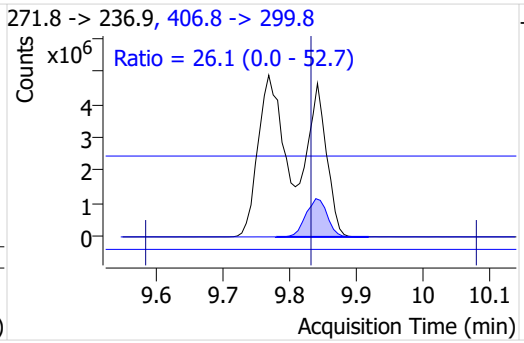
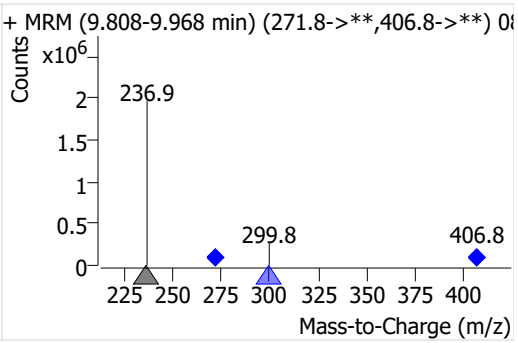
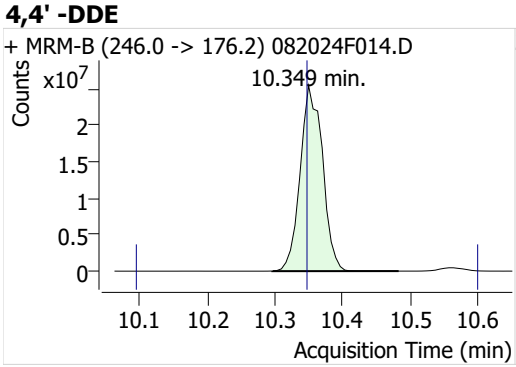
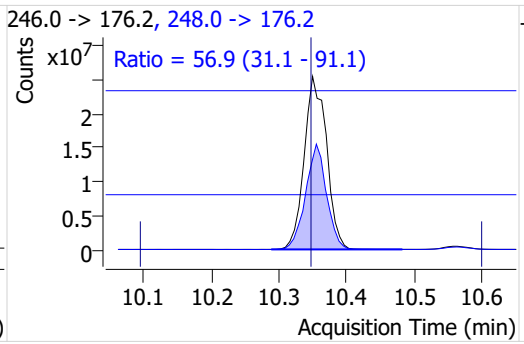


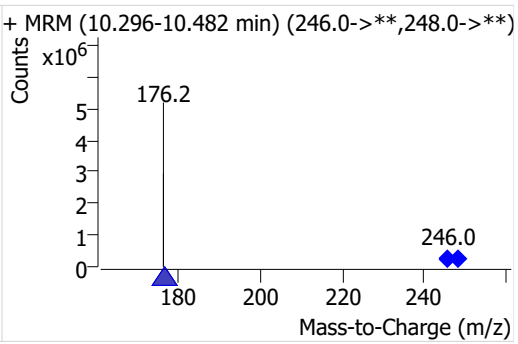




4,4' -DDE







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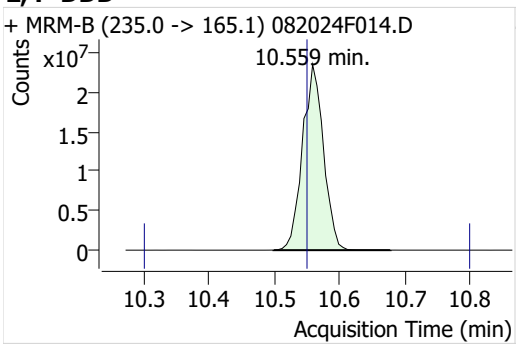
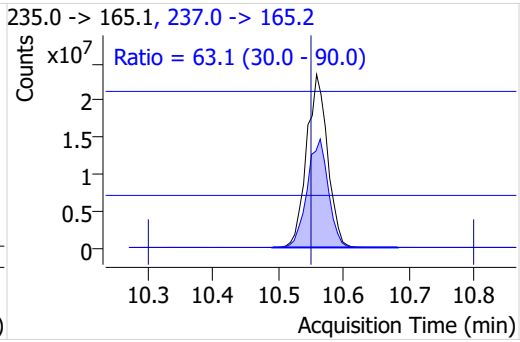
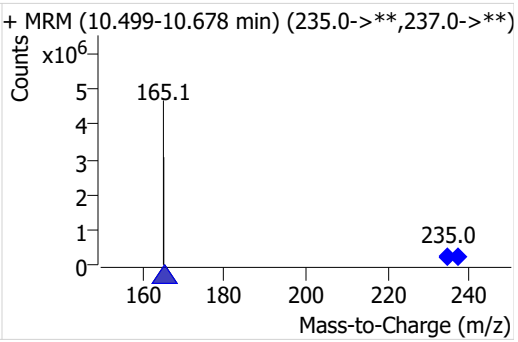
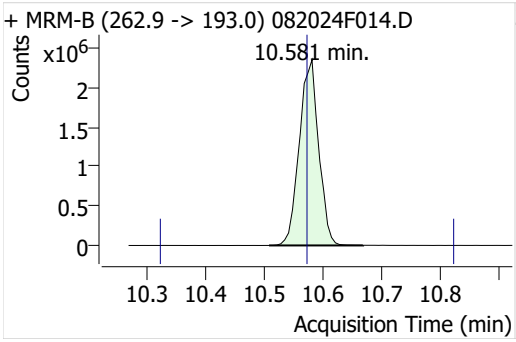
2,4'-DDD

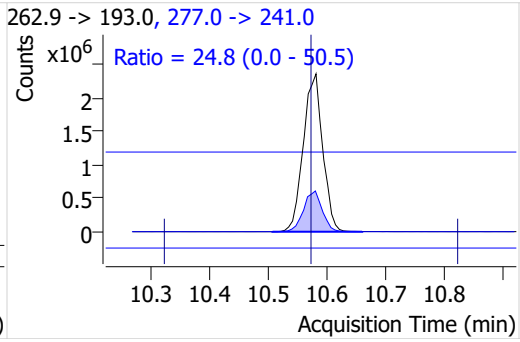


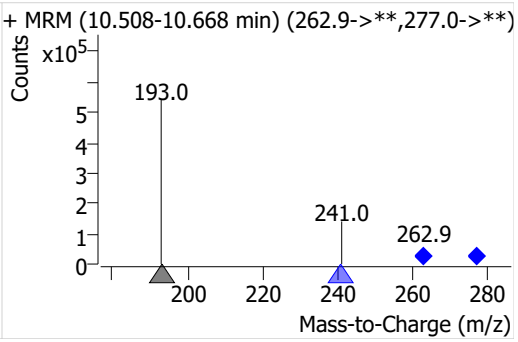




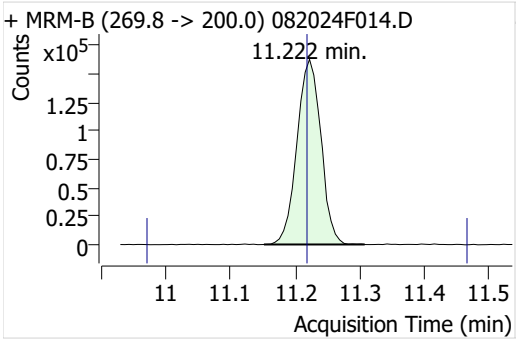
Dieldrin

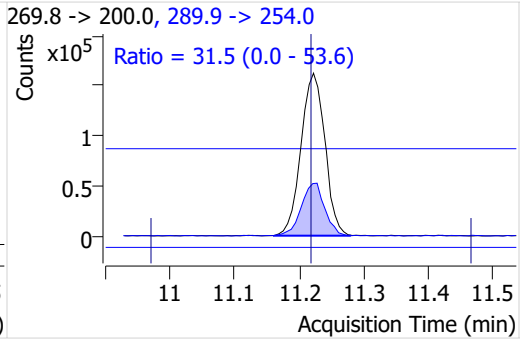


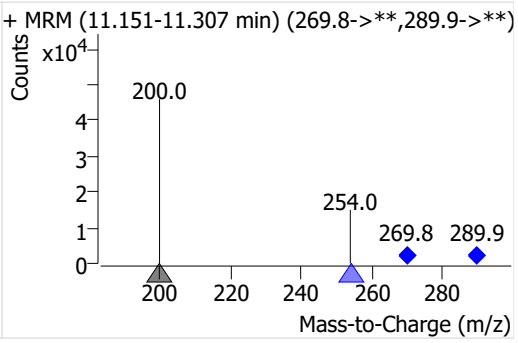




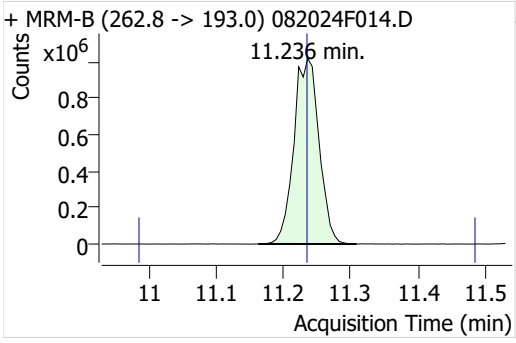
Endrin-13C12

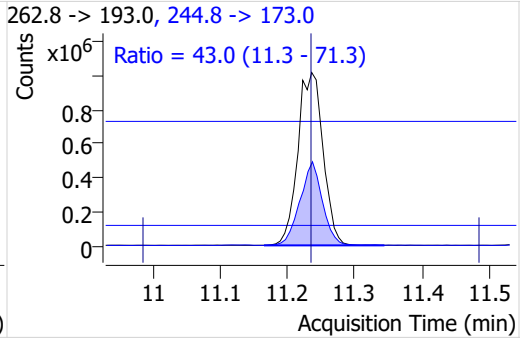


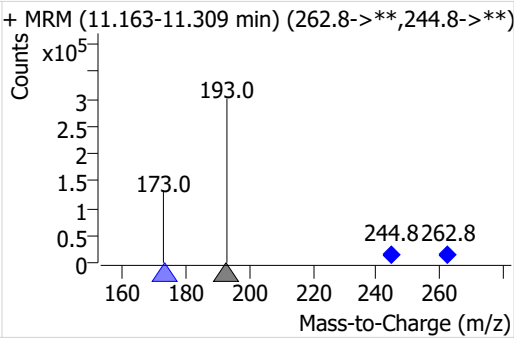




Endrin







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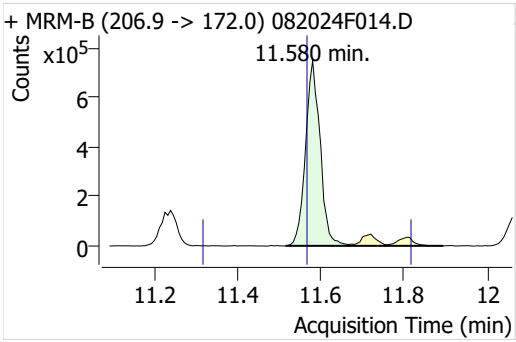
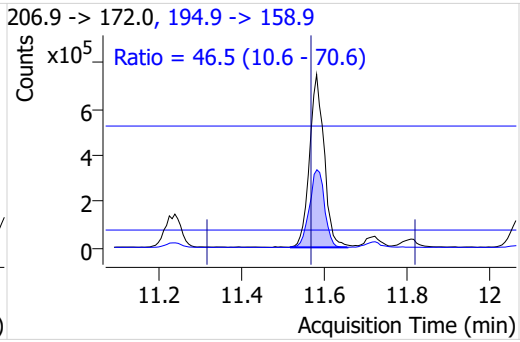
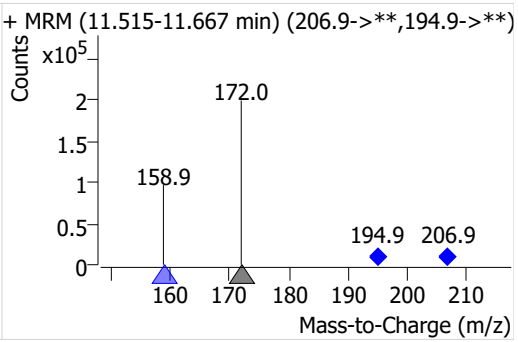
Endosulfan II







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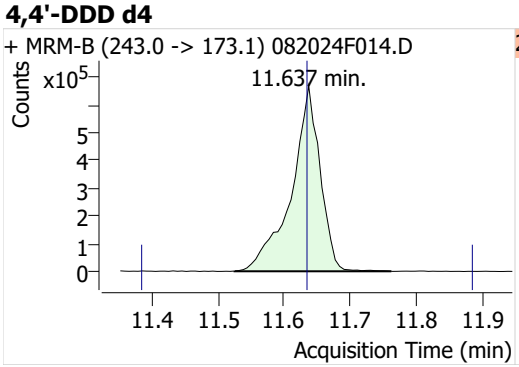

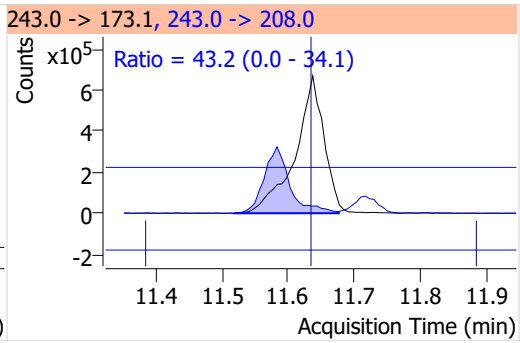

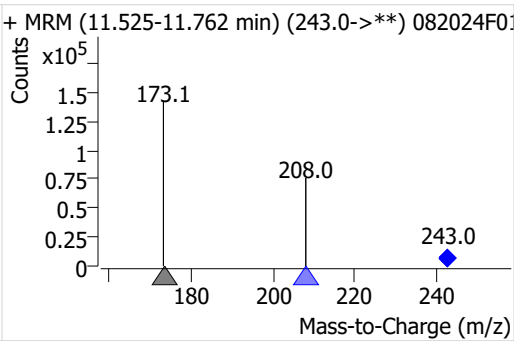

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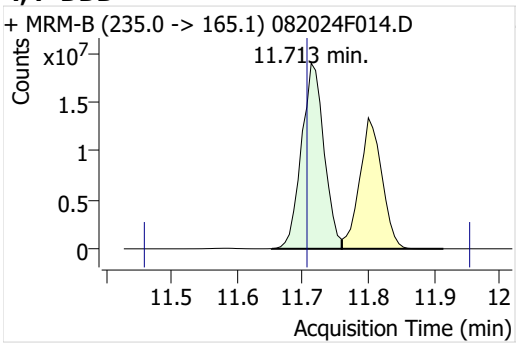

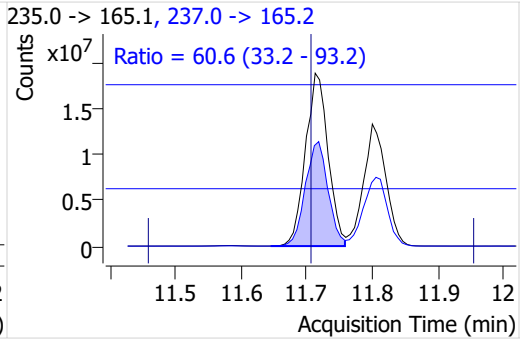

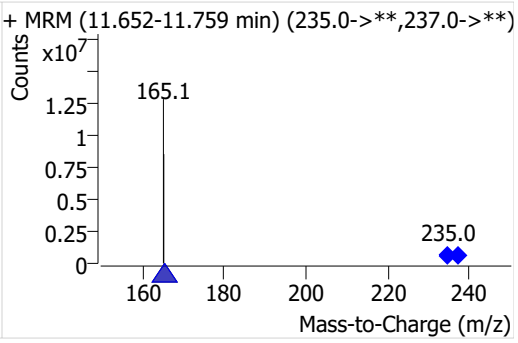

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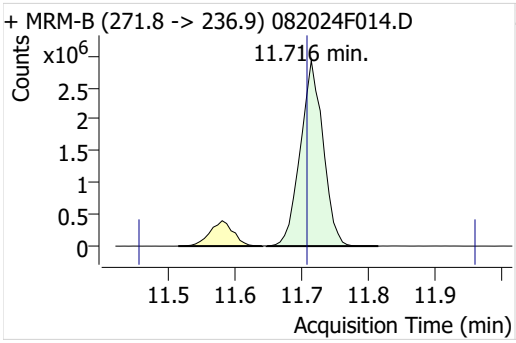

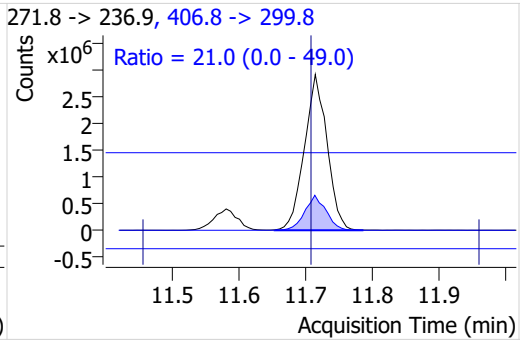

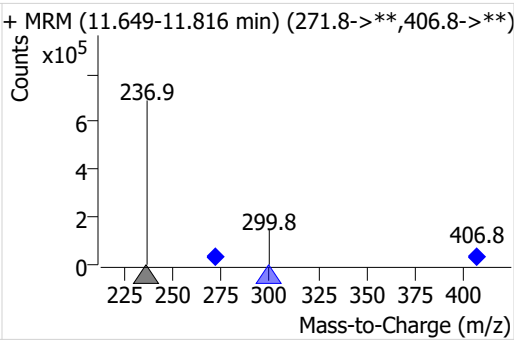

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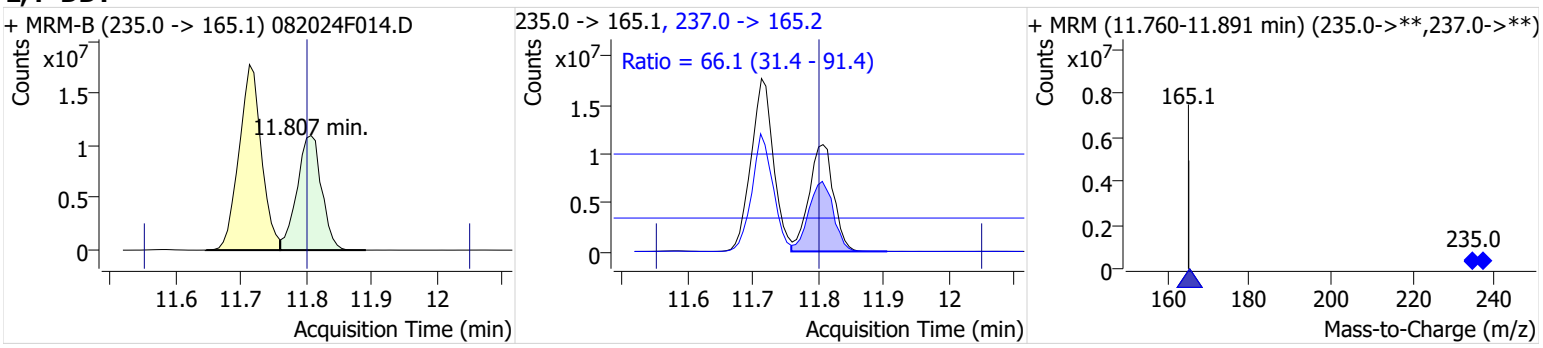
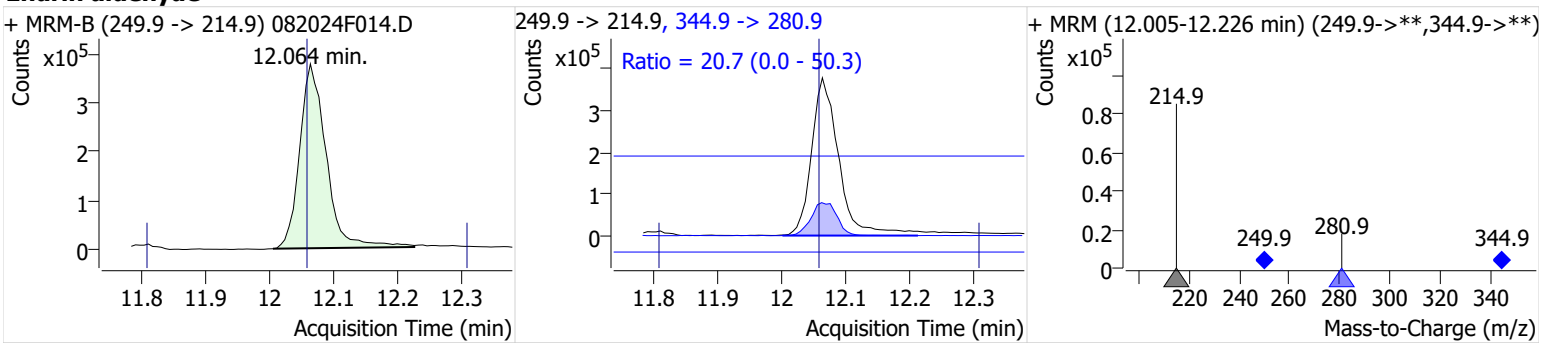
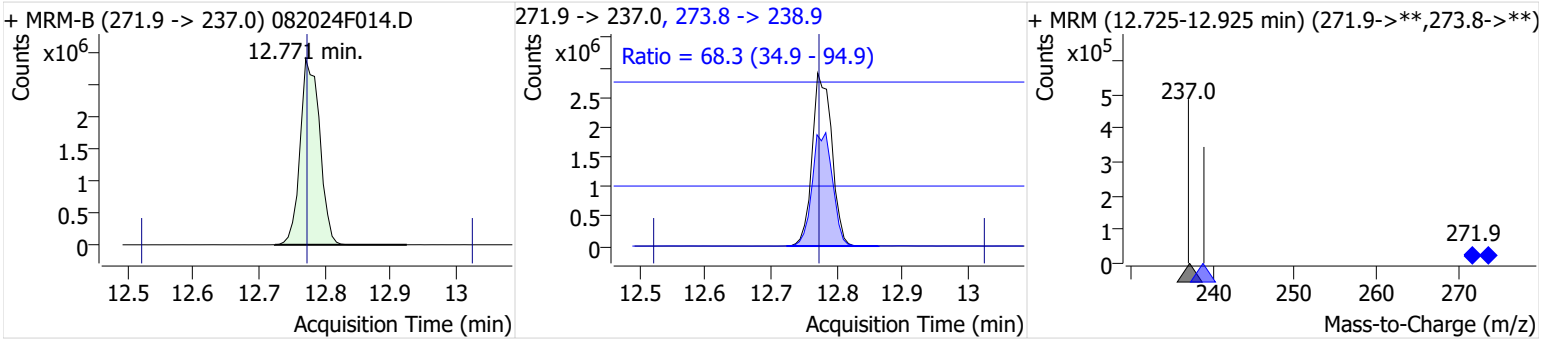
2,4'-DDT



Endrin aldehyde



Endosulfan sulfate



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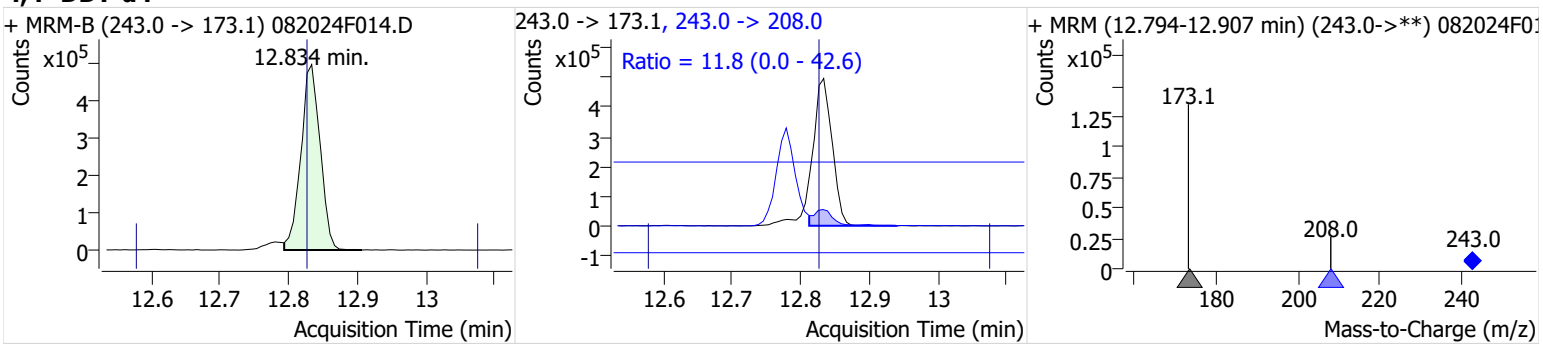

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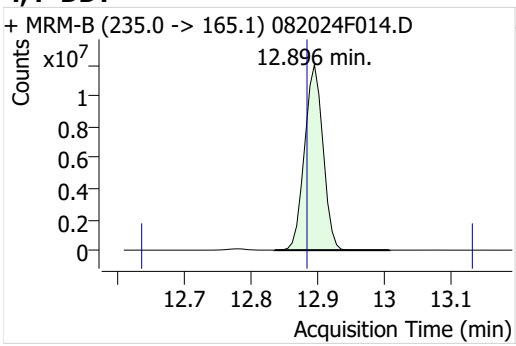
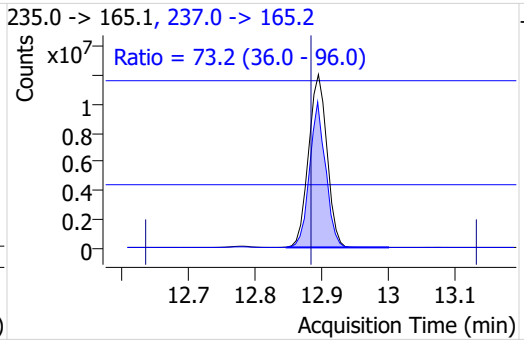
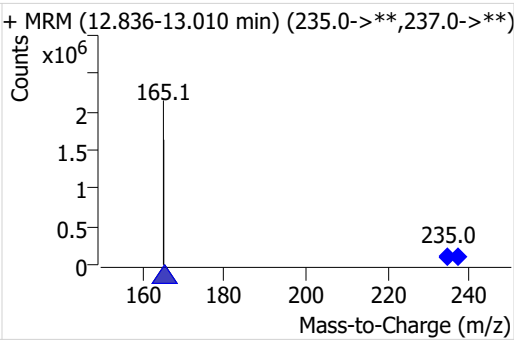
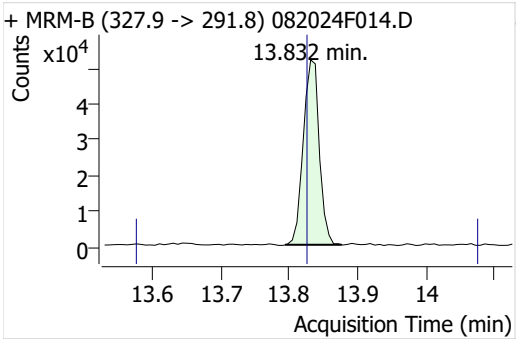
4,4'-DDT

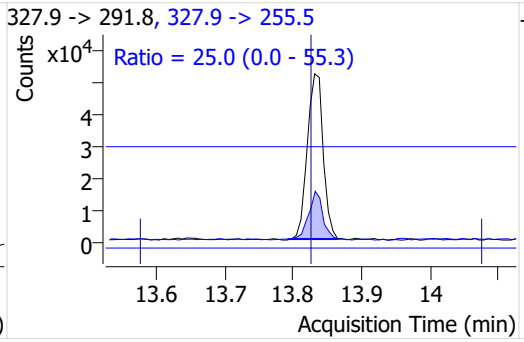


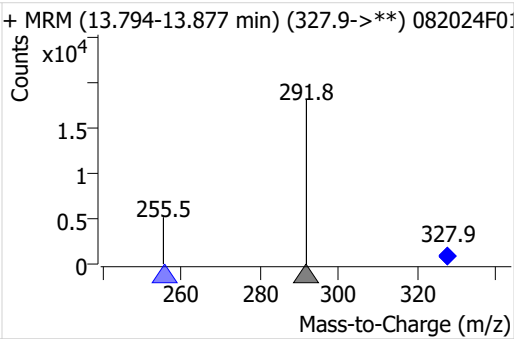




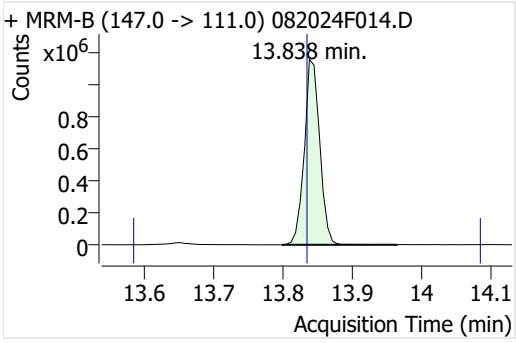
Endrin ketone-13C12

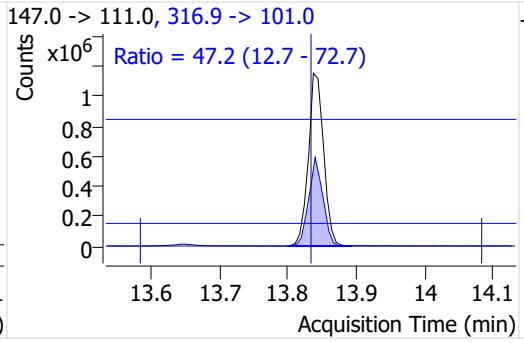


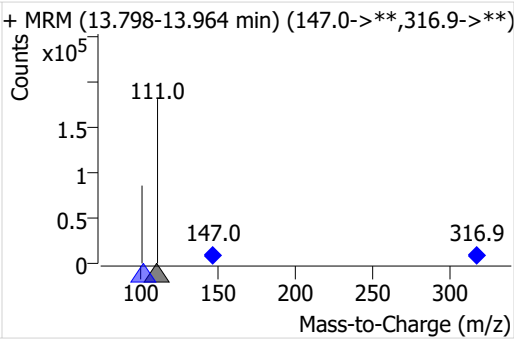




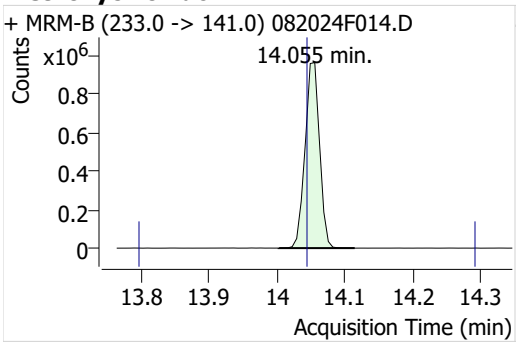
Endrin ketone

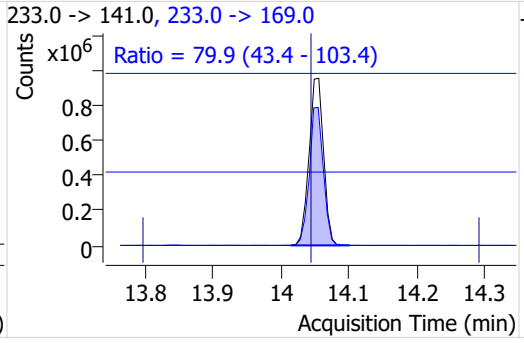


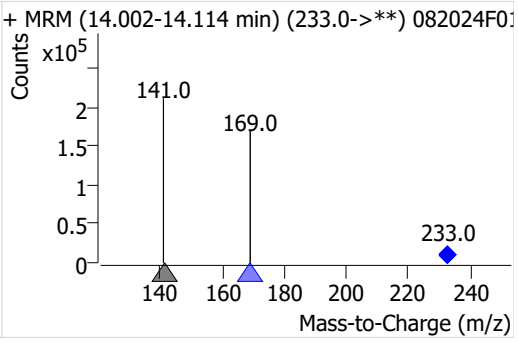




Methoxychlor-d6







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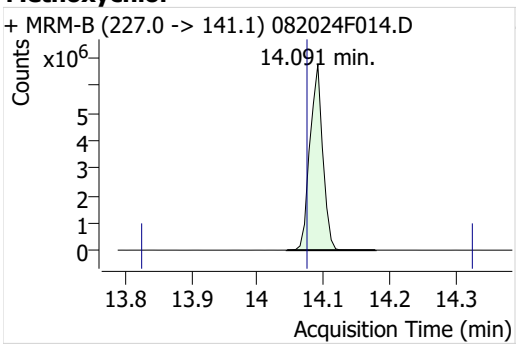
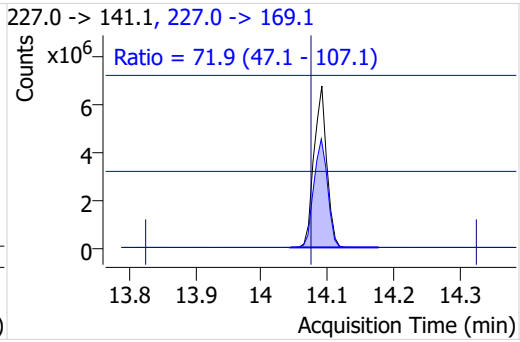
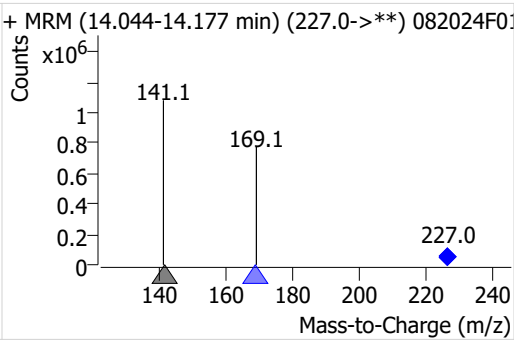
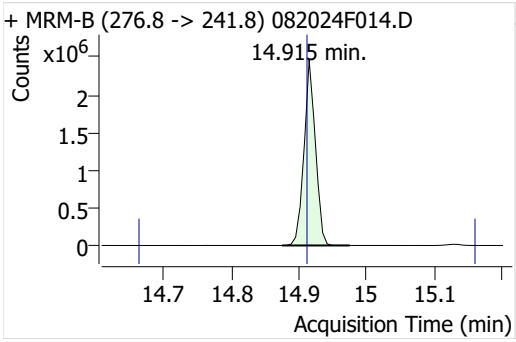
Methoxychlor

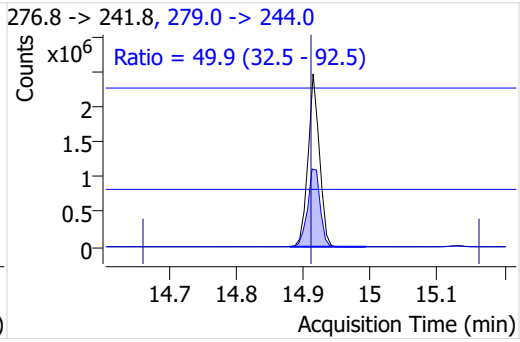


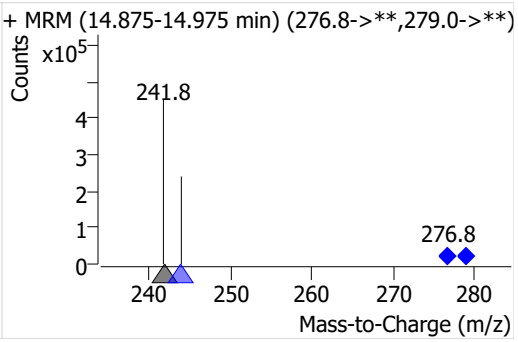




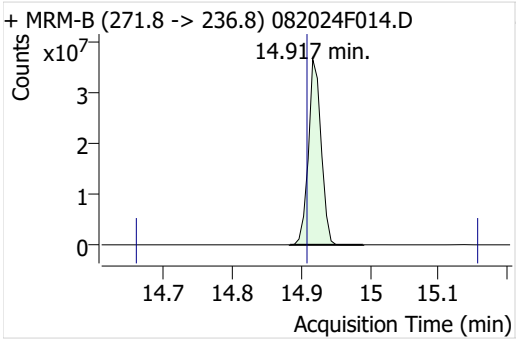
Mirex-13C10

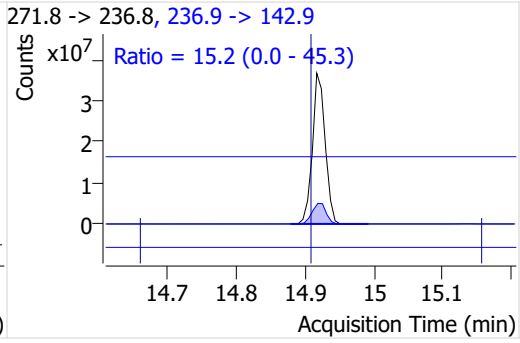


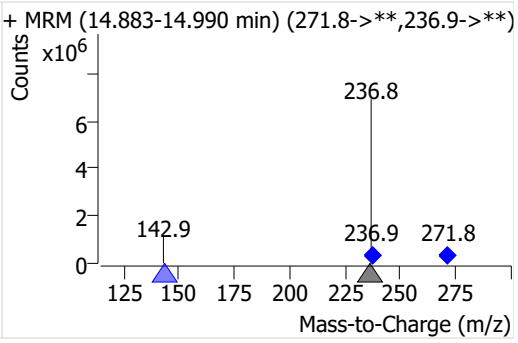




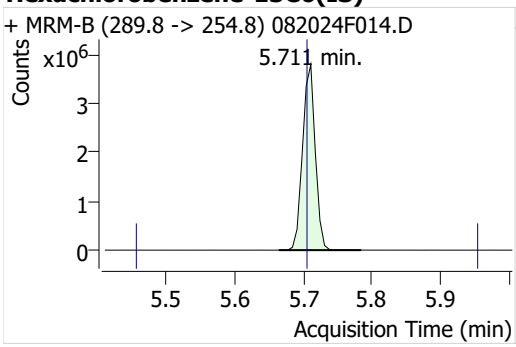
Mirex

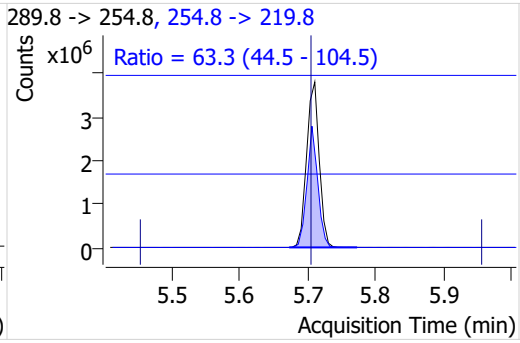


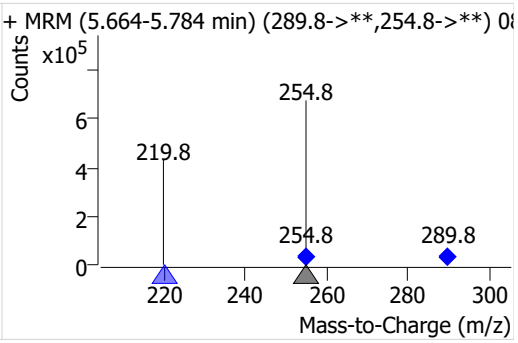




Hexachlorobenzene-13C6(IS)







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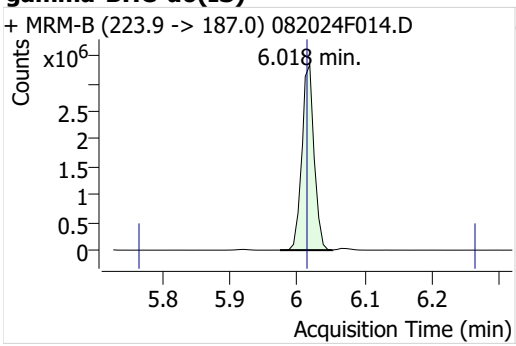
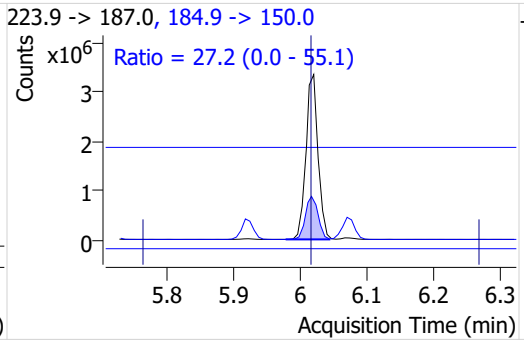
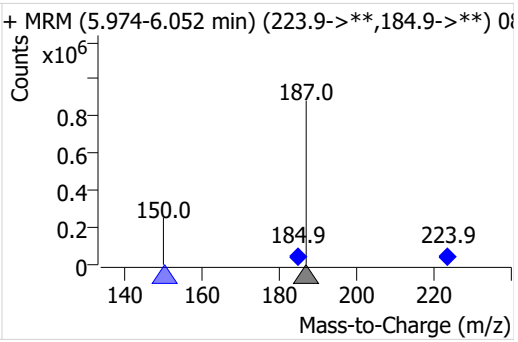
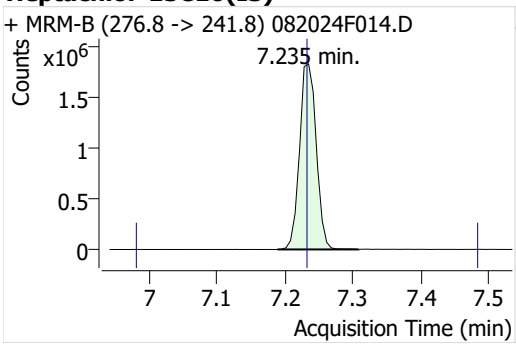
gamma-BHC-d6(IS)

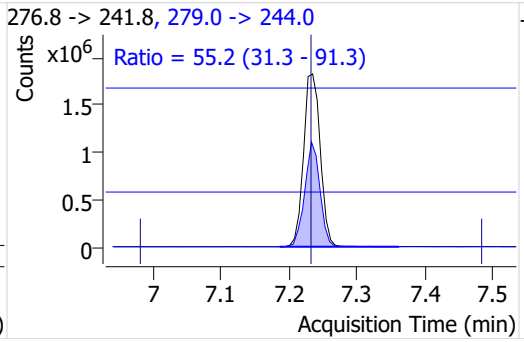


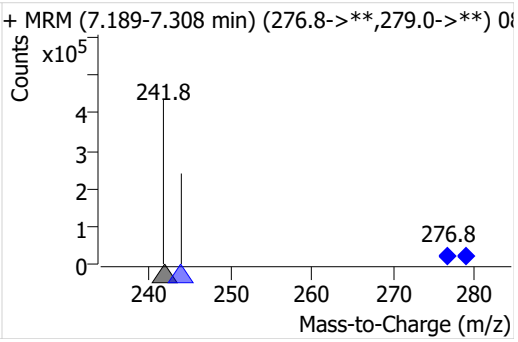




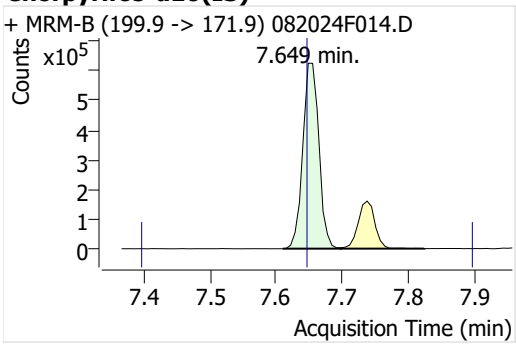
Heptachlor-13C10(IS)

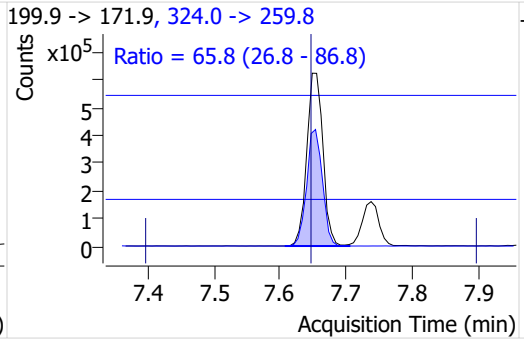


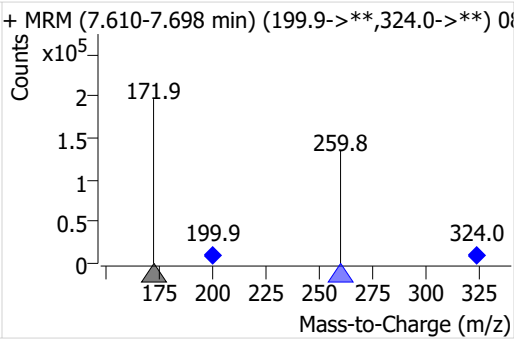




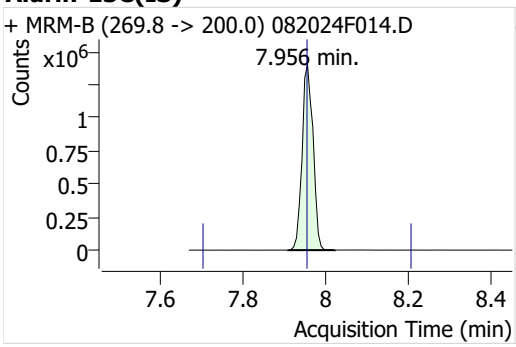
Chorpyrifos-d10(IS)

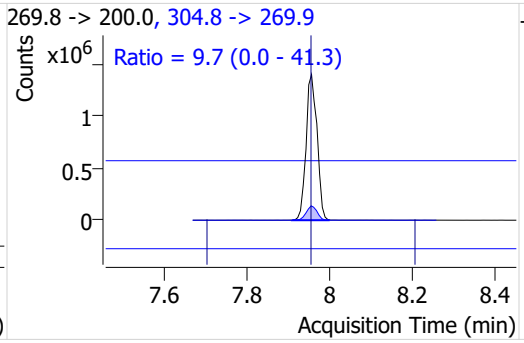


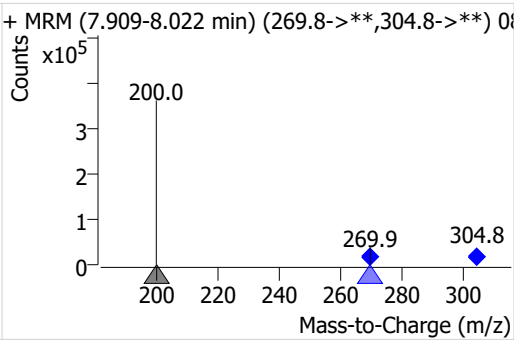




Aldrin-13C(IS)







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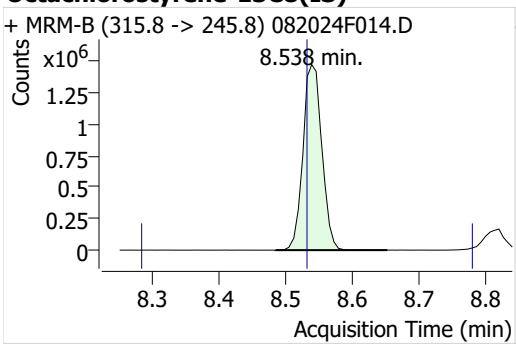
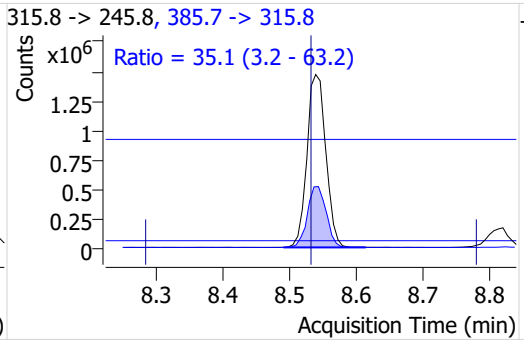
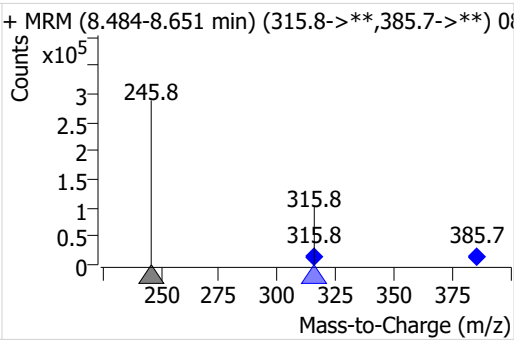
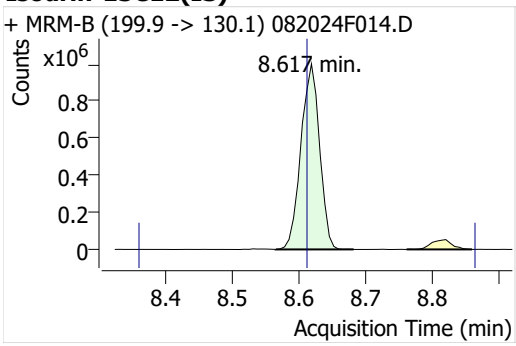
Octachlorostyrene-13C8(IS)

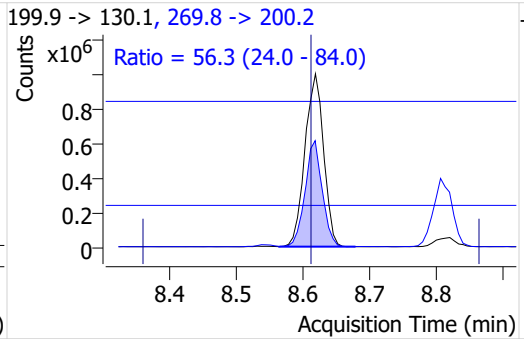


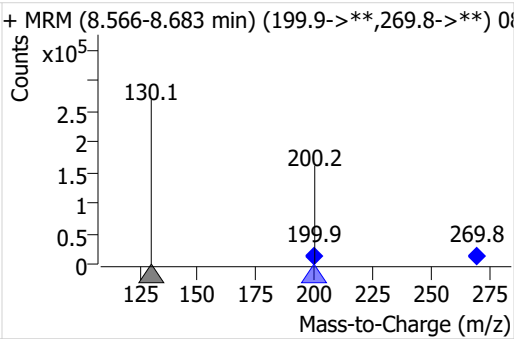




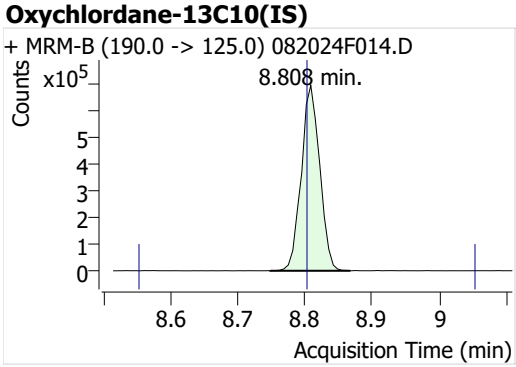
Isodrin-13C12(IS)

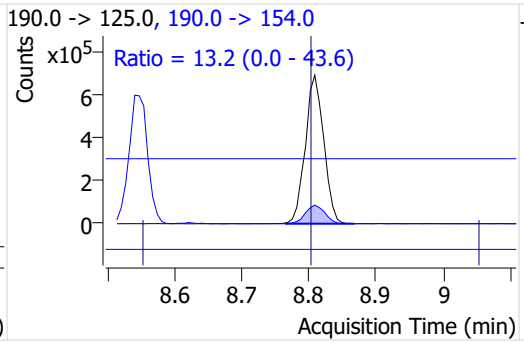


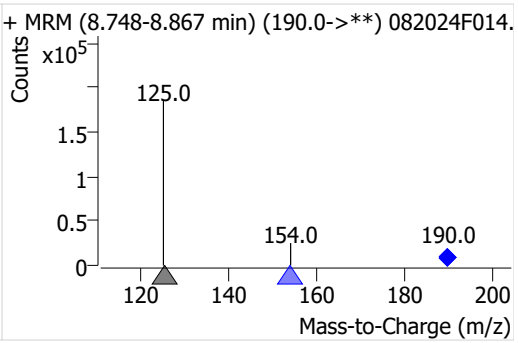




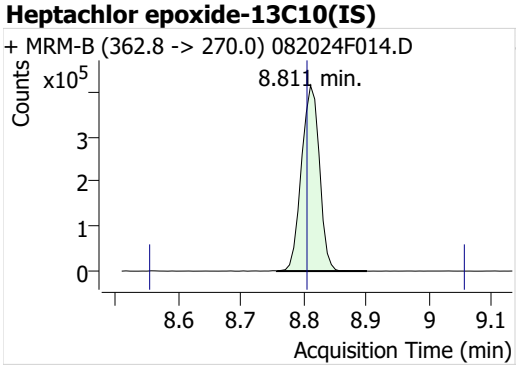
Oxychlordane-13C10(IS)

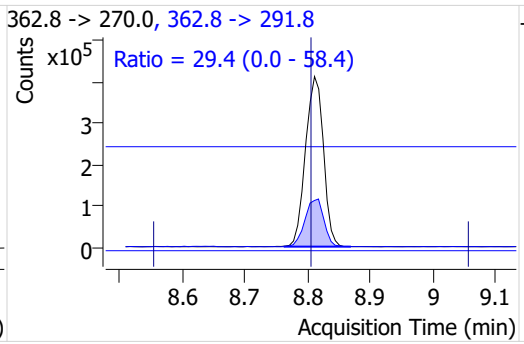


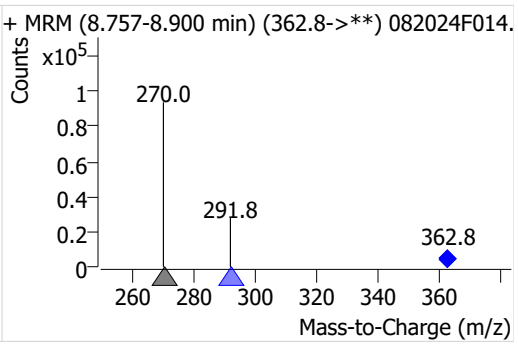




Heptachlor epoxide-13C10(IS)







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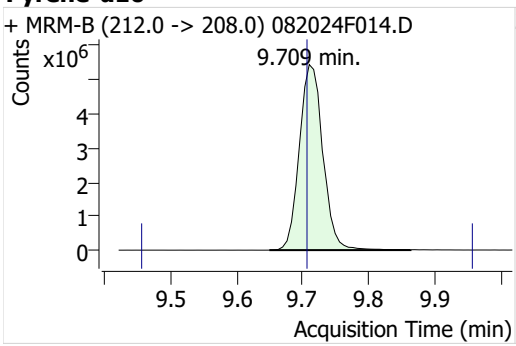
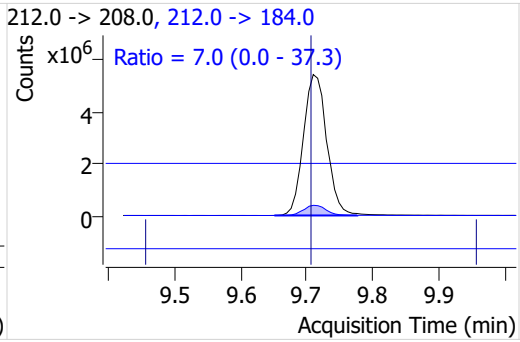
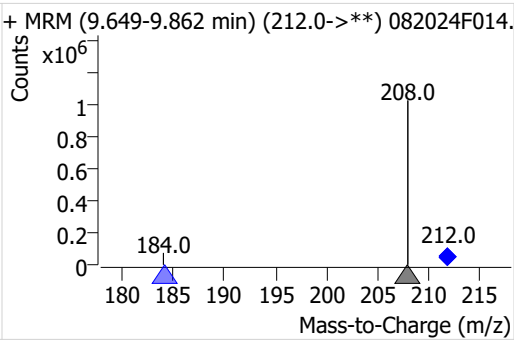
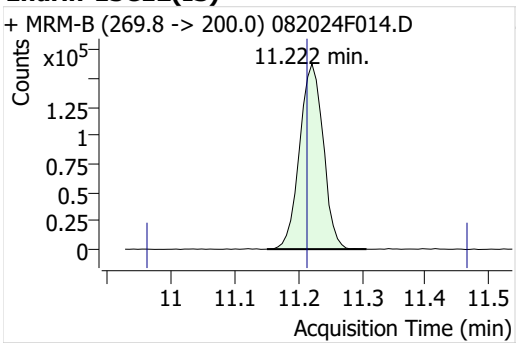
Pyrene-d10

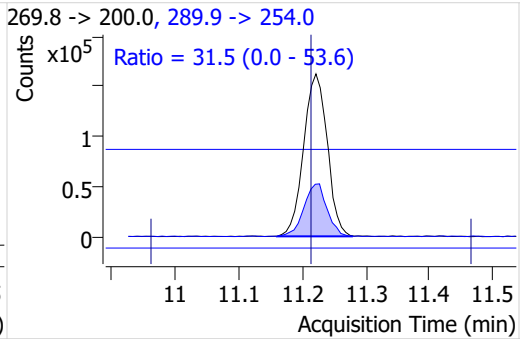


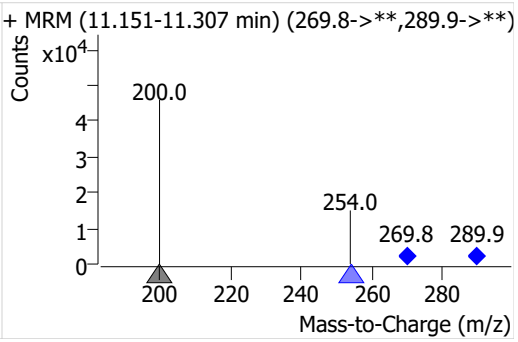




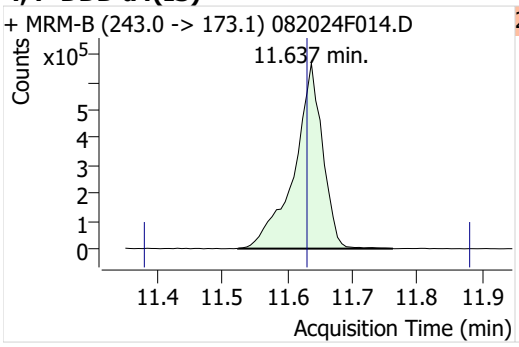
Endrin-13C12(IS)

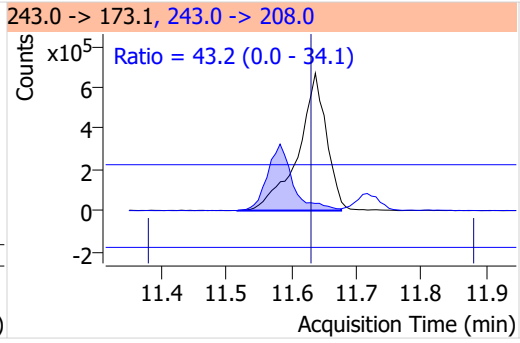


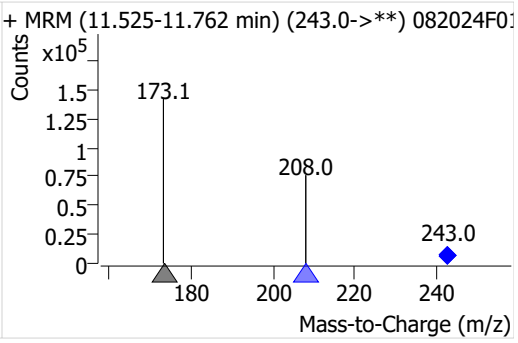




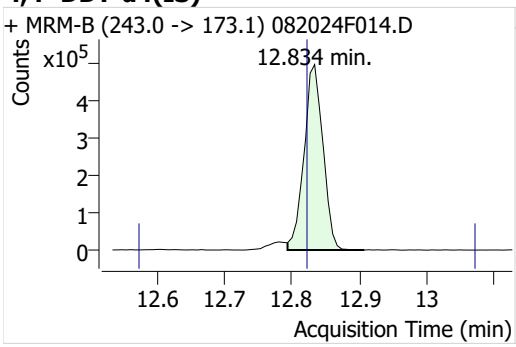
4,4'-DDD d4(IS)

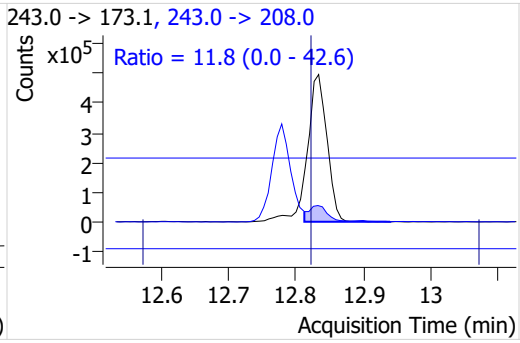


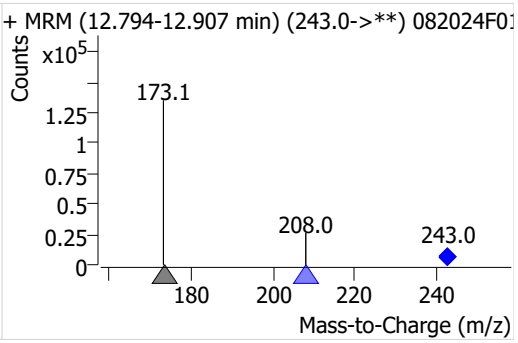




4,4'-DDT-d4(IS)







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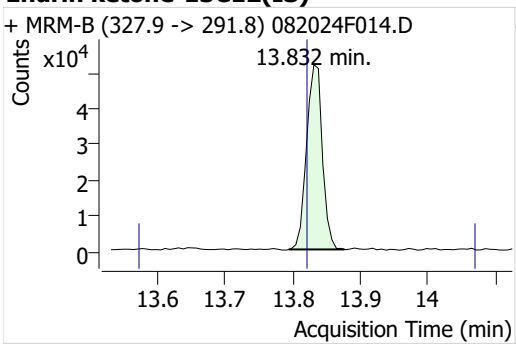
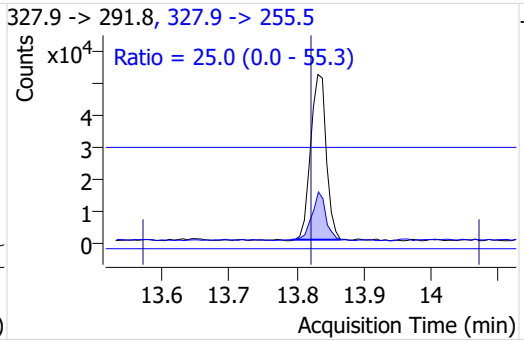
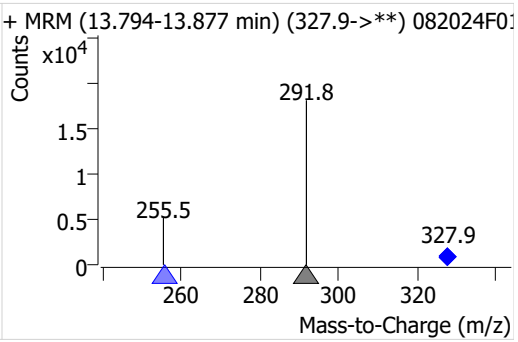
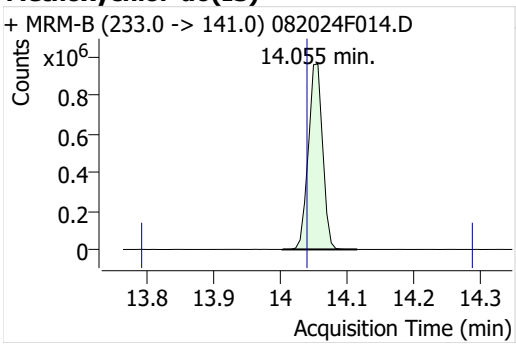
Endrin ketone-13C12(IS)

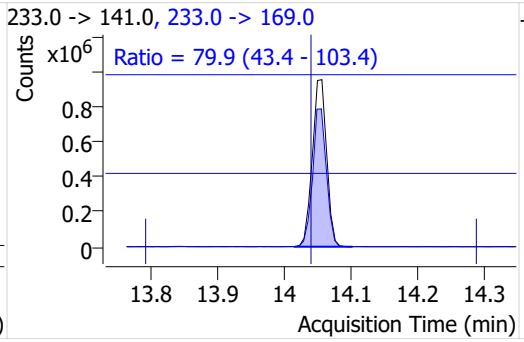


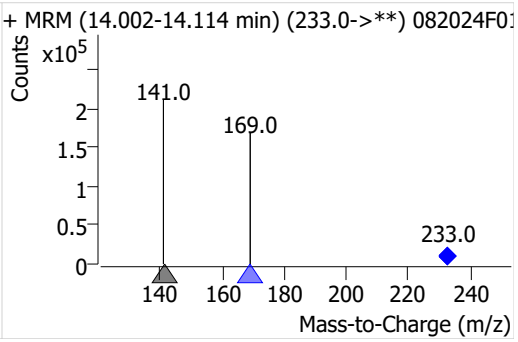




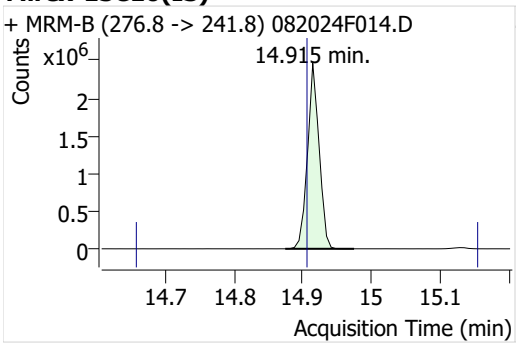
Methoxychlor-d6(IS)

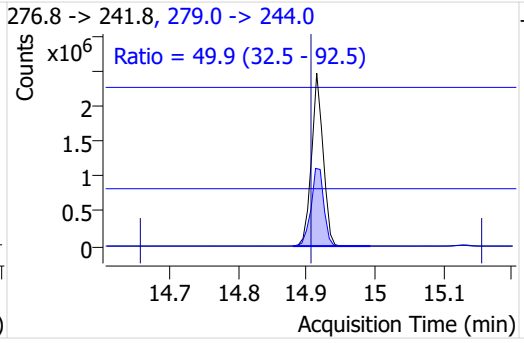


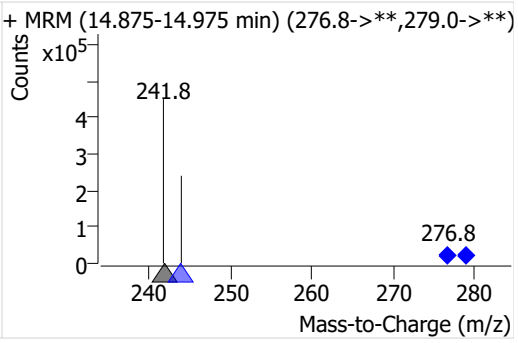




Mirex-13C10(IS)







MassHunter Quantitative Analysis Sample Report

Data File	J:\MS47\data\082024\082024F015.D		
Batch File	J:\MS47\data\082024\QuantResults\082024 OC PEST.batch.bin		
Acq. Date-Time	8/20/2024 3:13:02 PM	**Acq Operator**	
Name	OC PEST ICV 20ppb SVM71-99K	**Instrument Name**	MS47
Info.		**Instrument Type**	QQQ
Quant Time	9/18/2024 9:11:00 AM	**Acq. Method File**	OC Pest_dMRM
Quant Method	082024 OC PEST ICAL.batch.bin	**Vial**	13
Last Update	8/20/2024 3:23:05 PM	**Injection Volume (µL)**	1
Tune File Name	atunes.eihs.tune.xml		

Internal Standards	**RT**	**Transition**	**Response**	**Conc. Units**	**Dev(Min)**
Hexachlorobenzene-13C6(IS)	5.704	289.8 -> 254.8	3945413	20.0000 ng/ml	0.001
gamma-BHC-d6(IS)	6.012	223.9 -> 187.0	3936968	20.0000 ng/ml	0.002
Heptachlor-13C10(IS)	7.235	276.8 -> 241.8	2469281	20.0000 ng/ml	0.001
Chorpyrifos-d10(IS)	7.649	199.9 -> 171.9	883267	20.0000 ng/ml	0.003
Aldrin-13C(IS)	7.956	269.8 -> 200.0	2253664	20.0000 ng/ml	0.000
Octachlorostyrene-13C8(IS)	8.538	315.8 -> 245.8	2624536	20.0000 ng/ml	0.001
Isodrin-13C12(IS)	8.613	199.9 -> 130.1	1809236	20.0000 ng/ml	0.000
Oxychlordane-13C10(IS)	8.802	190.0 -> 125.0	1131613	20.0000 ng/ml	0.006
Heptachlor epoxide-13C10(IS)	8.811	362.8 -> 270.0	675393	20.0000 ng/ml	0.000
Pyrene-d10	9.716	212.0 -> 208.0	9947083	100.0000 ng/ml	0.003
Endrin-13C12(IS)	11.222	269.8 -> 200.0	341009	20.0000 ng/ml	0.003
4,4'-DDD d4(IS)	11.644	243.0 -> 173.1	1540170	5.0000 ng/ml	0.030
4,4'-DDT-d4(IS)	12.834	243.0 -> 173.1	645466	5.0000 ng/ml	0.001
Endrin ketone-13C12(IS)	13.832	327.9 -> 291.8	63583	20.0000 ng/ml	0.000
Methoxychlor-d6(IS)	14.055	233.0 -> 141.0	1160642	20.0000 ng/ml	0.004
Mirex-13C10(IS)	14.915	276.8 -> 241.8	1786984	5.0000 ng/ml	0.001

System Monitoring Compounds	**RT**	**Transition**	**Response**	**Conc. Units**
Hexachlorobenzene-13C6	5.704	289.8 -> 254.8	3945413	22.469 ng/ml
		Spiked Amount =	20.0	Recovery = *112.3 %*
gamma-BHC-d6	6.012	223.9 -> 187.0	3936968	23.580 ng/ml
		Spiked Amount =	20.0	Recovery = *117.9 %*
Heptachlor-13C10	7.235	276.8 -> 241.8	2469281	21.179 ng/ml
		Spiked Amount =	20.0	Recovery = *105.9 %*
Chorpyrifos-d10	7.649	199.9 -> 171.9	883267	22.000 ng/ml
		Spiked Amount =	20.0	Recovery = *110.0 %*
Aldrin-13C	7.956	269.8 -> 200.0	2253445	23.297 ng/ml
		Spiked Amount =	20.0	Recovery = *116.5 %*
Octachlorostyrene-13C8	8.538	315.8 -> 245.8	2624536	23.789 ng/ml
		Spiked Amount =	20.0	Recovery = *118.9 %*
Isodrin-13C12	8.613	199.9 -> 130.1	1809236	24.049 ng/ml
		Spiked Amount =	20.0	Recovery = *120.2 %*
Oxychlordane-13C10	8.802	190.0 -> 125.0	1131613	21.993 ng/ml
		Spiked Amount =	20.0	Recovery = *110.0 %*
Heptachlor epoxide-13C10	8.811	362.8 -> 270.0	675393	22.206 ng/ml
		Spiked Amount =	20.0	Recovery = *111.0 %*
Endrin-13C12	11.222	269.8 -> 200.0	341009	20.237 ng/ml
		Spiked Amount =	20.0	Recovery = *101.2 %*
4,4'-DDD d4	11.644	243.0 -> 173.1	1540170	5.755 ng/ml
		Spiked Amount =	5.0	Recovery = *115.1 %*
4,4'-DDT-d4	12.834	243.0 -> 173.1	645466	4.649 ng/ml
		Spiked Amount =	5.0	Recovery = *93.0 %*
Endrin ketone-13C12	13.832	327.9 -> 291.8	63583	21.176 ng/ml
		Spiked Amount =	20.0	Recovery = *105.9 %*
Methoxychlor-d6	14.055	233.0 -> 141.0	1160642	19.481 ng/ml
		Spiked Amount =	20.0	Recovery = *97.4 %*

MassHunter Quantitative Analysis Sample Report

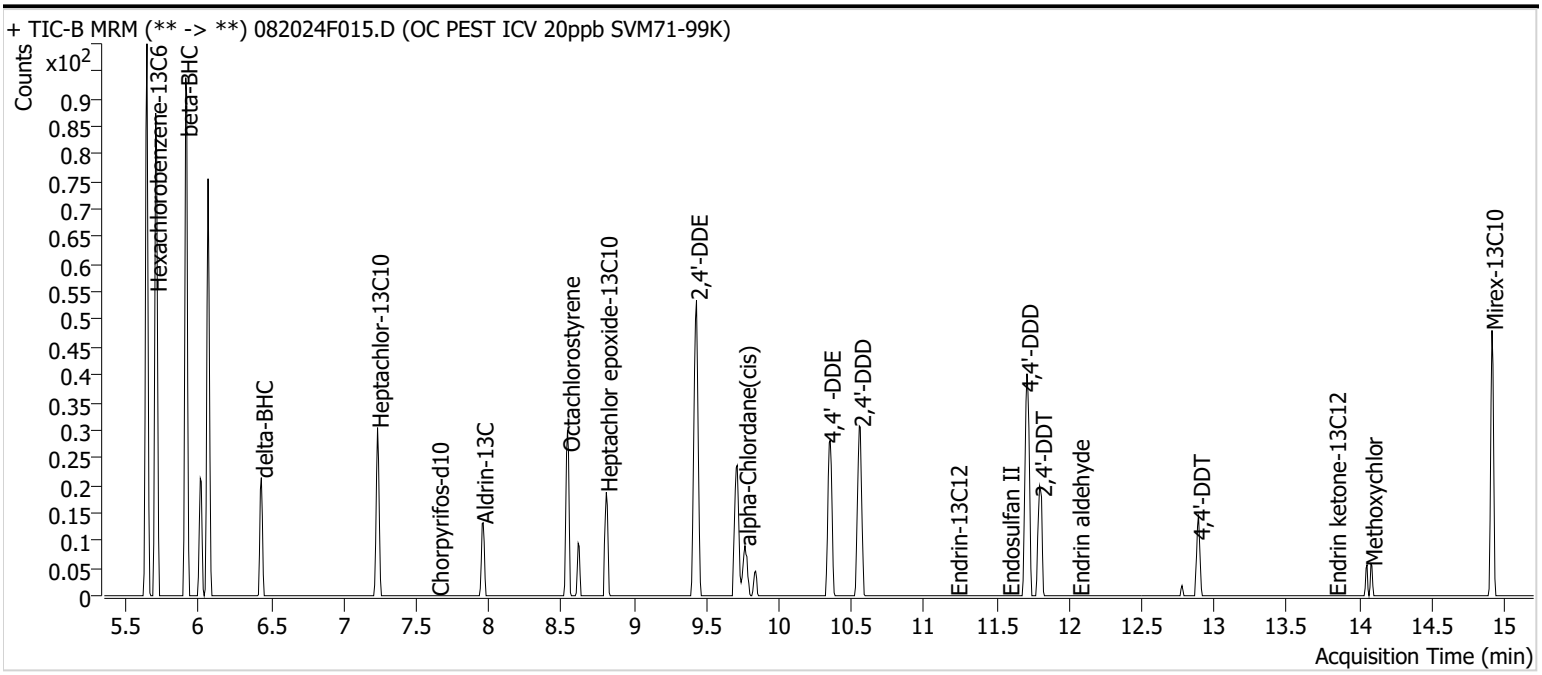
System Monitoring Compounds	RT	Transition	Response	Conc. Units
Mirex-13C10	14.915	276.8 -> 241.8	1786984	5.125 ng/ml
		Spiked Amount =	5.0	Recovery = *102.5 %*

Target Compounds	ISTD	RT	Transition	Resp.	Conc. Units	Qvalue
alpha-BHC	gamma-BHC-d6(IS)	5.649	181.1 -> 145.1	12276037	18.588 ng/ml	100
Hexachlorobenzene	Hexachlorobenzene-13C6(IS)	5.706	283.8 -> 213.9	7100665	20.713 ng/ml	100
beta-BHC	gamma-BHC-d6(IS)	5.916	181.1 -> 145.1	11736924	19.042 ng/ml	100
gamma-BHC(Lindane)	gamma-BHC-d6(IS)	6.070	181.1 -> 145.1	9757135	19.220 ng/ml	100
delta-BHC	gamma-BHC-d6(IS)	6.436	181.1 -> 145.1	3468966	19.112 ng/ml	100
Heptachlor	Heptachlor-13C10(IS)	7.238	271.7 -> 236.9	2480735	19.608 ng/ml	100
Chorpyrifos	Chorpyrifos-d10(IS)	7.733	196.9 -> 169.0	871811	15.569 ng/ml	100
Aldrin	Aldrin-13C(IS)	7.964	254.9 -> 220.0	1572621	17.104 ng/ml	100
Octachlorostyrene	Octachlorostyrene-13C8(IS)	8.551	342.8 -> 307.8	4975489	18.702 ng/ml	100
Isodrin	Isodrin-13C12(IS)	8.627	193.0 -> 123.0	1978801	19.898 ng/ml	100
Oxychlordane	Oxychlordane-13C10(IS)	8.816	114.9 -> 51.1	2752039	19.762 ng/ml	100
Heptachlor epoxide	Heptachlor epoxide-13C10(IS)	8.818	352.8 -> 262.9	699757	18.561 ng/ml	100
gamma-Chlordane(trans)	Oxychlordane-13C10(IS)	9.419	271.8 -> 236.9	1417243	17.615 ng/ml	100
2,4'-DDE	4,4'-DDD d4(IS)	9.433	246.0 -> 176.2	10460446	18.945 ng/ml	100
alpha-Chlordane(cis)	Oxychlordane-13C10(IS)	9.767	271.8 -> 236.9	3910769	19.354 ng/ml	100
Endosulfan I	Endrin-13C12(IS)	9.797	206.9 -> 172.0	609135	22.060 ng/ml	100
trans-Nanochlor	Oxychlordane-13C10(IS)	9.841	271.8 -> 236.9	1530709	21.848 ng/ml	100
4,4' -DDE	4,4'-DDD d4(IS)	10.349	246.0 -> 176.2	7296803	17.751 ng/ml	100
2,4'-DDD	4,4'-DDD d4(IS)	10.559	235.0 -> 165.1	7349560	19.009 ng/ml	100
Dieldrin	Endrin-13C12(IS)	10.574	262.9 -> 193.0	652180	18.313 ng/ml	100
Endrin	Endrin-13C12(IS)	11.230	262.8 -> 193.0	372889	18.687 ng/ml	100
Endosulfan II	Endrin-13C12(IS)	11.580	206.9 -> 172.0	301433	22.216 ng/ml	100
4,4'-DDD	4,4'-DDD d4(IS)	11.713	235.0 -> 165.1	5627301	18.106 ng/ml	100
cis-Nonachlor	Oxychlordane-13C10(IS)	11.723	271.8 -> 236.9	1078392	21.140 ng/ml	100
2,4'-DDT	4,4'-DDT-d4(IS)	11.807	235.0 -> 165.1	3923374	22.018 ng/ml	100
Endrin aldehyde	Endrin-13C12(IS)	12.064	249.9 -> 214.9	150779	20.376 ng/ml	100
Endosulfan sulfate	Endrin-13C12(IS)	12.778	271.9 -> 237.0	788335	18.864 ng/ml	100
4,4'-DDT	4,4'-DDT-d4(IS)	12.896	235.0 -> 165.1	3155580	20.998 ng/ml	100
Endrin ketone	Endrin ketone-13C12(IS)	13.837	147.0 -> 111.0	253181	18.121 ng/ml	100
Methoxychlor	Methoxychlor-d6(IS)	14.084	227.0 -> 141.1	1173655	18.908 ng/ml	100
Mirex	Mirex-13C10(IS)	14.916	271.8 -> 236.8	7097223	19.669 ng/ml	100

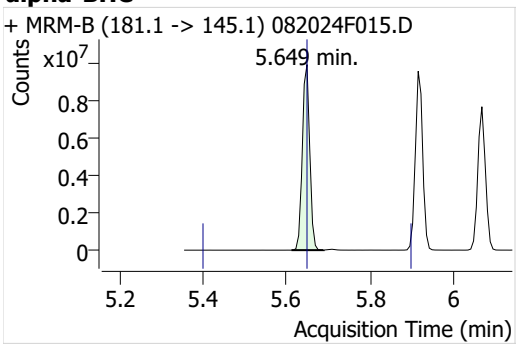
(m) = manual integration ND = Not Detected NC = Not Calculated

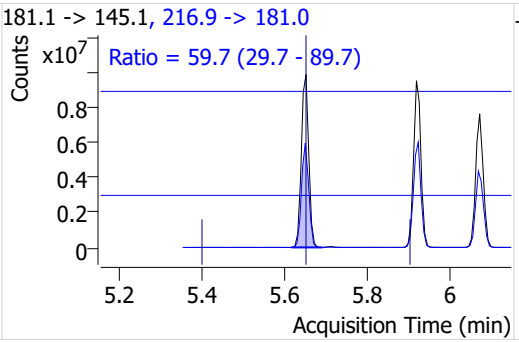
Sample Chromatogram

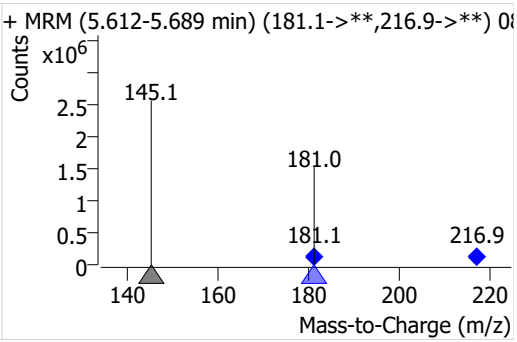
MassHunter Quantitative Analysis Sample Report



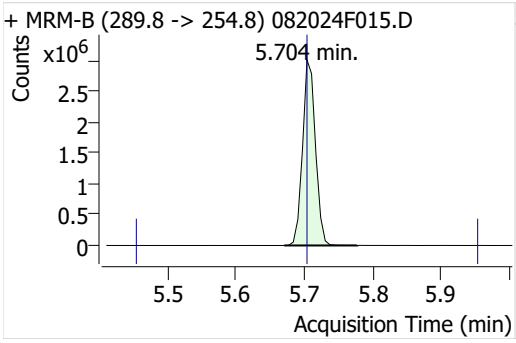
alpha-BHC

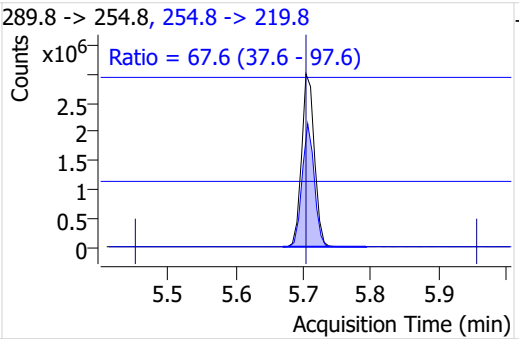


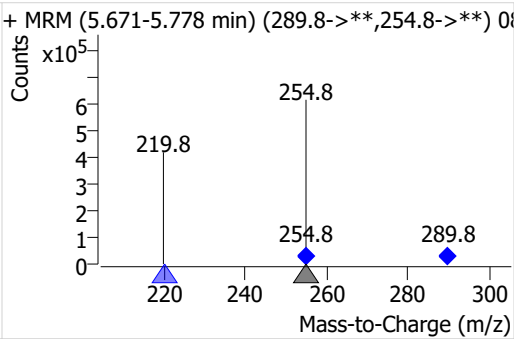




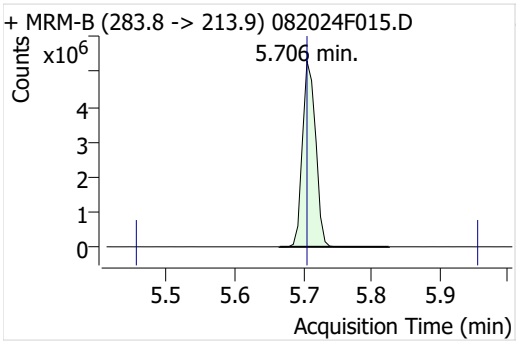
Hexachlorobenzene-13C6

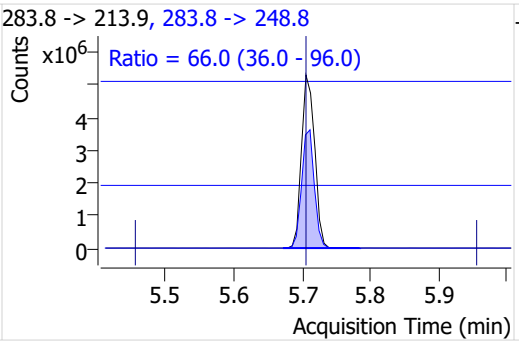


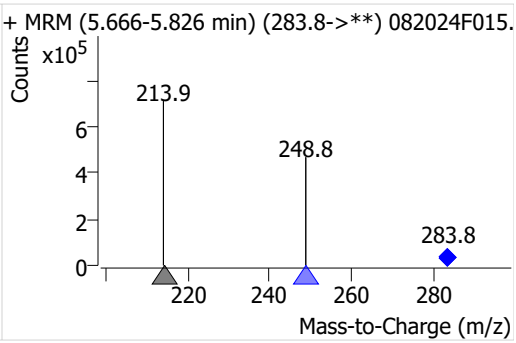




Hexachlorobenzene

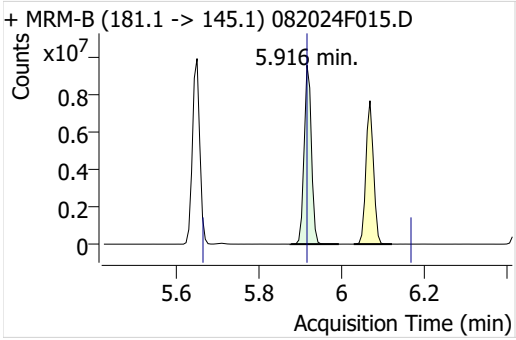


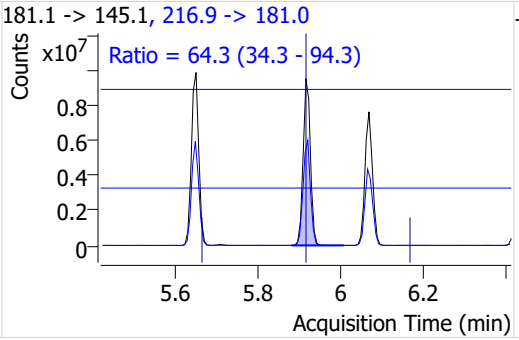


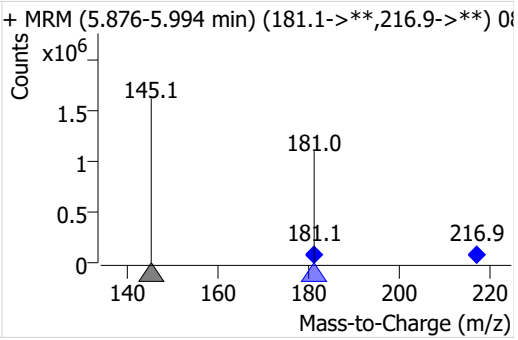


MassHunter Quantitative Analysis Sample Report

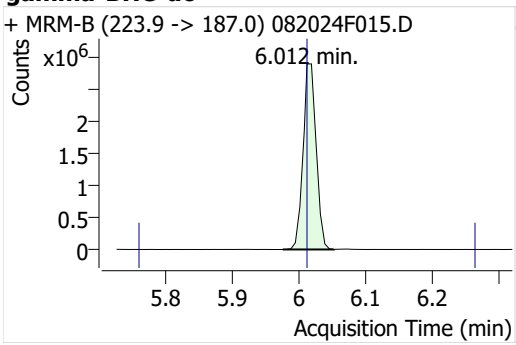
beta-BHC

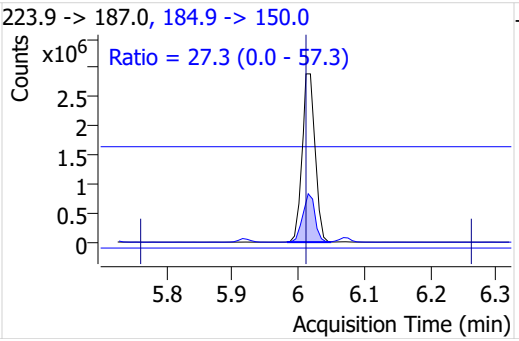


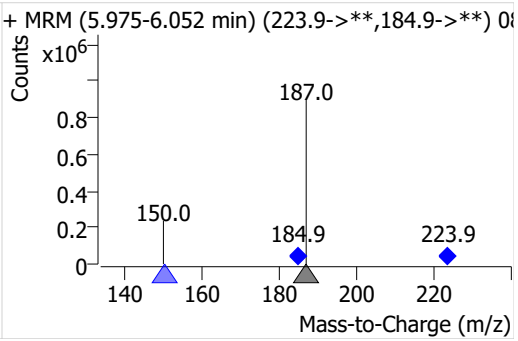




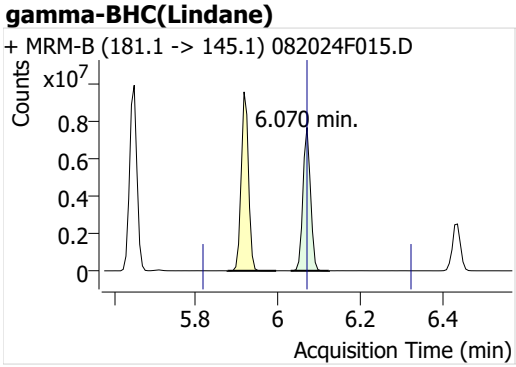
gamma-BHC-d6

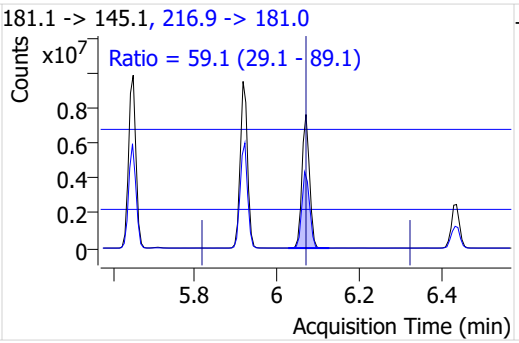


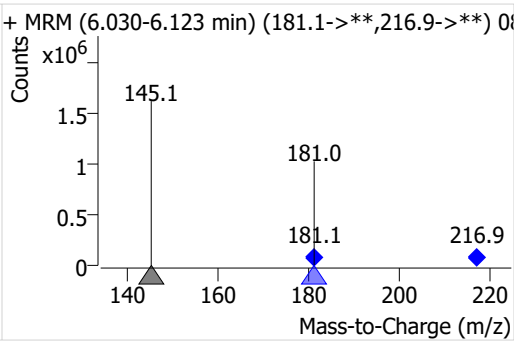




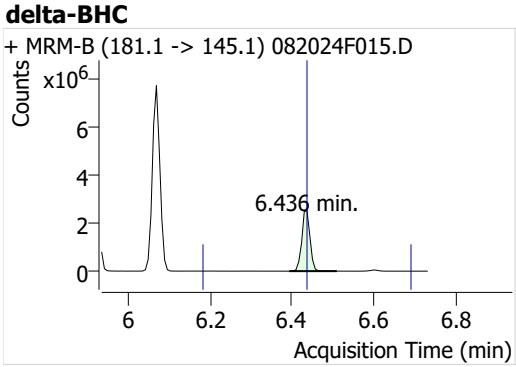
gamma-BHC(Lindane)

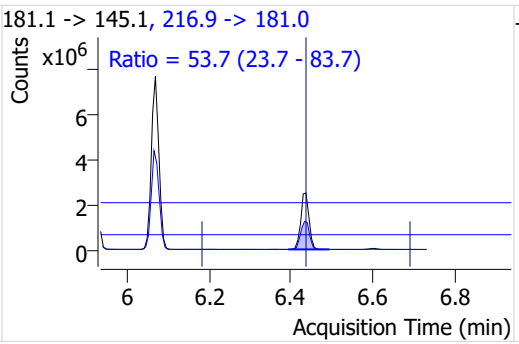


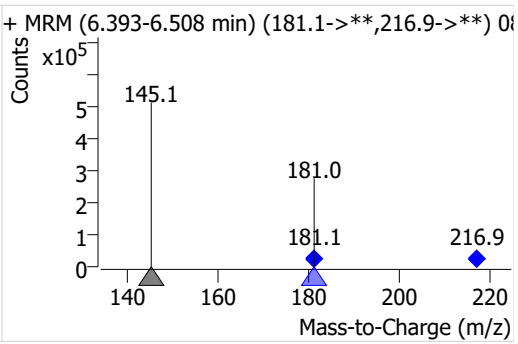




delta-BHC

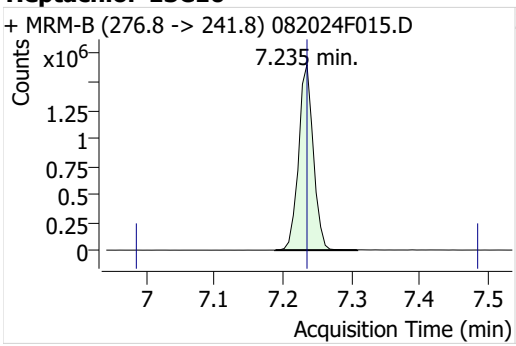


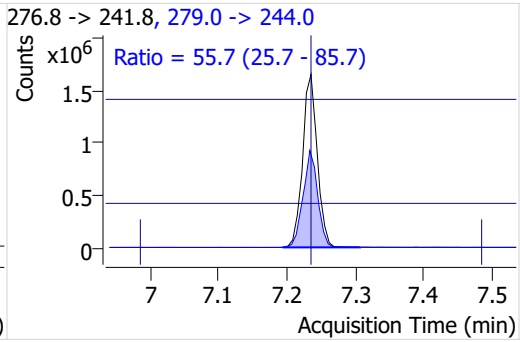


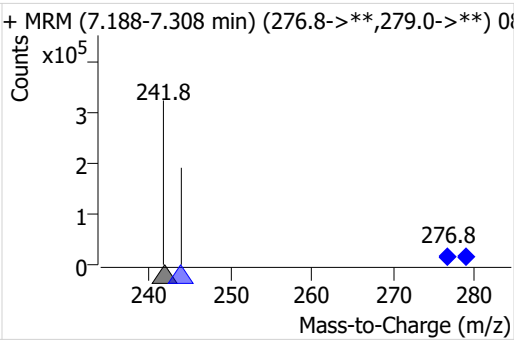


MassHunter Quantitative Analysis Sample Report

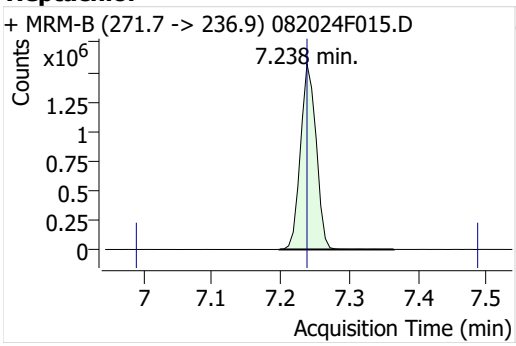
Heptachlor-13C10

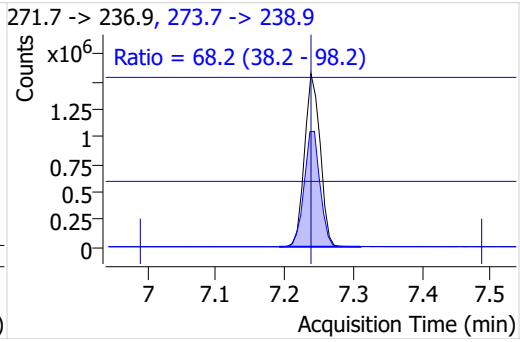


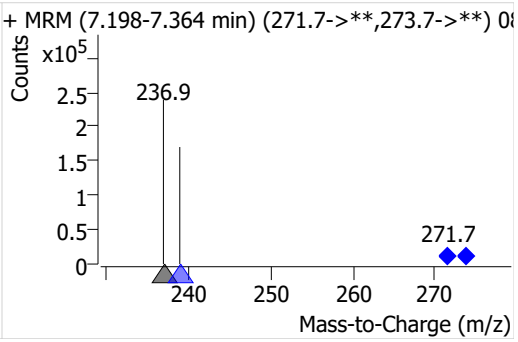




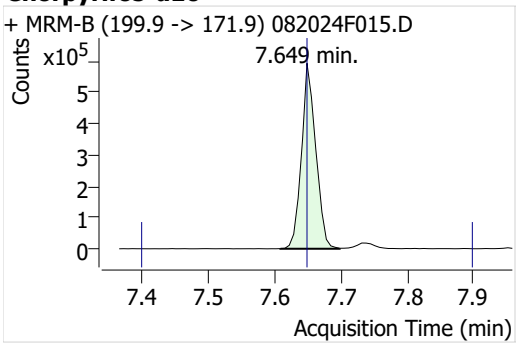
Heptachlor

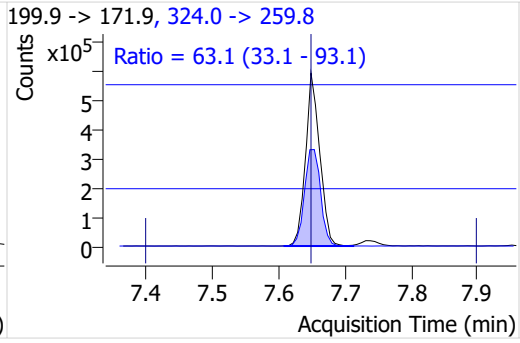


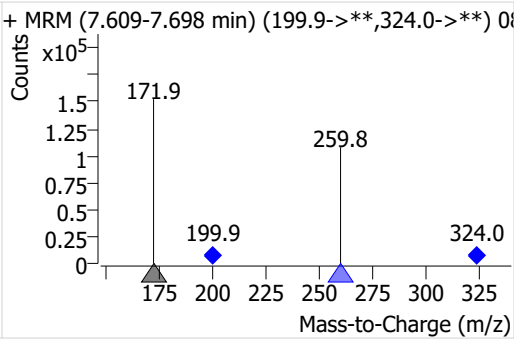




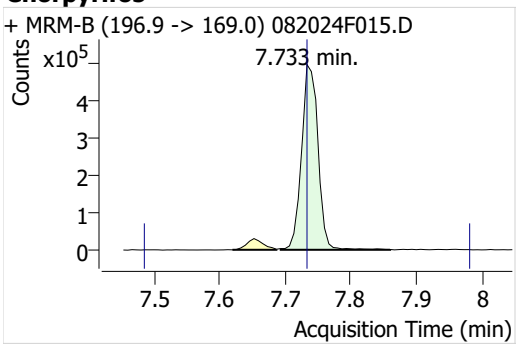
Chorpyrifos-d10

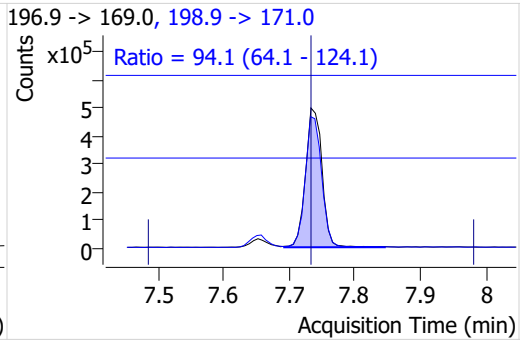


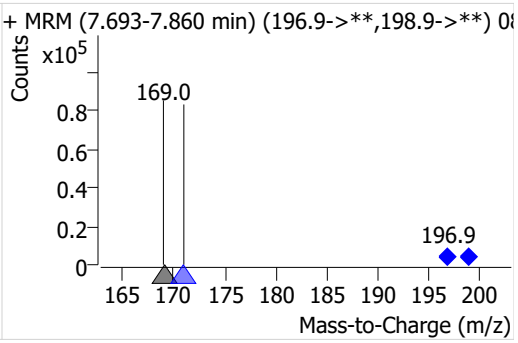




Chorpyrifos

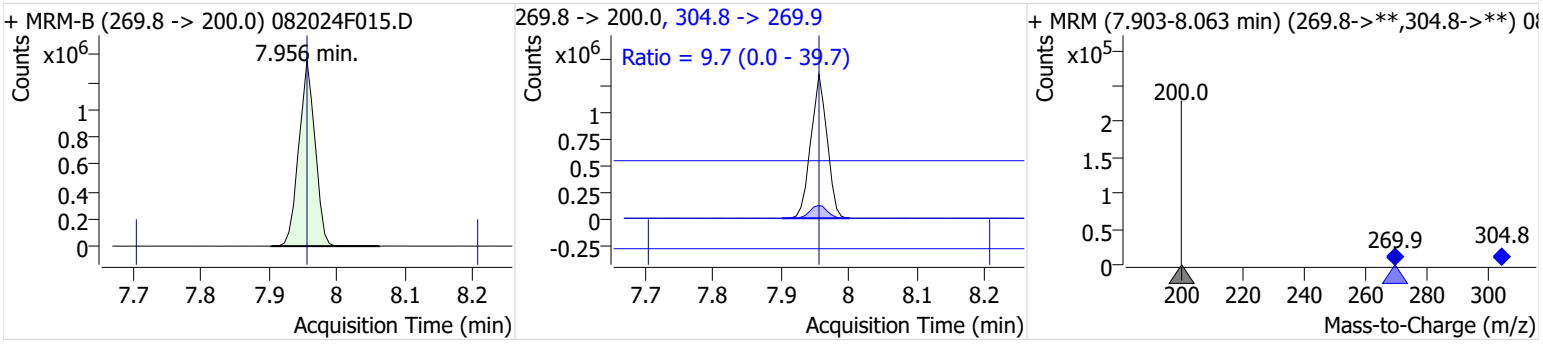




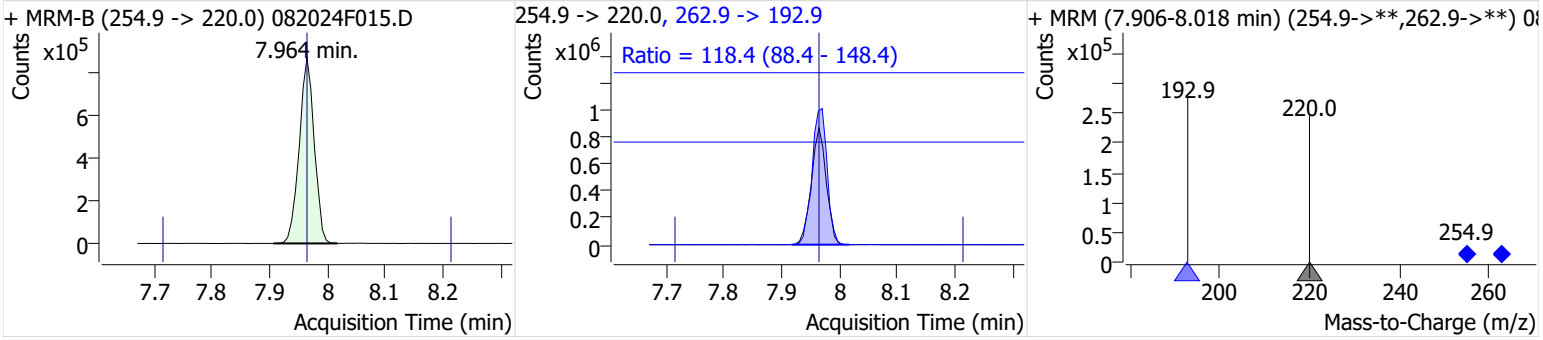


MassHunter Quantitative Analysis Sample Report

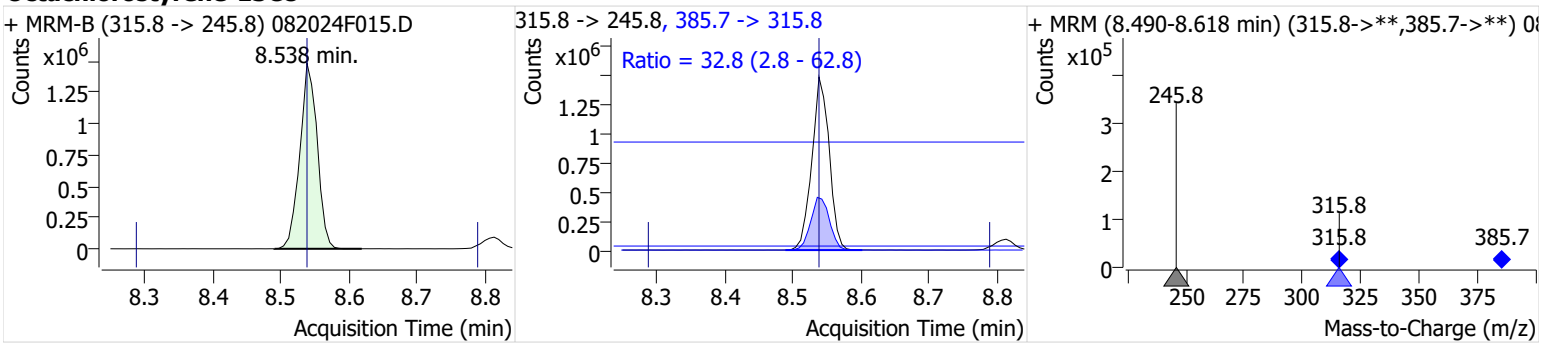
Aldrin-13C



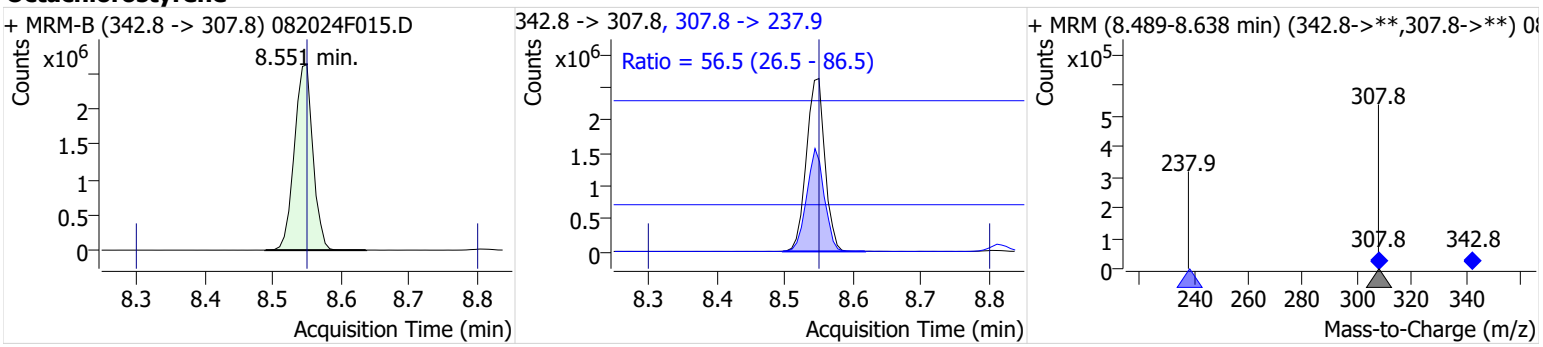
Aldrin



Octachlorostyrene-13C8

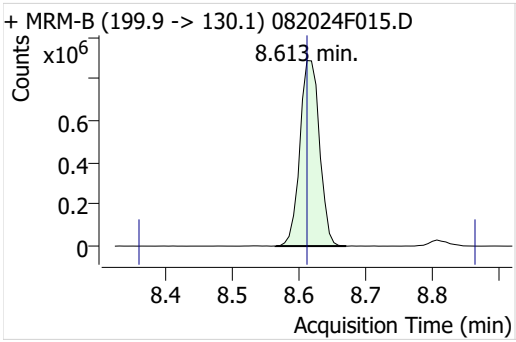


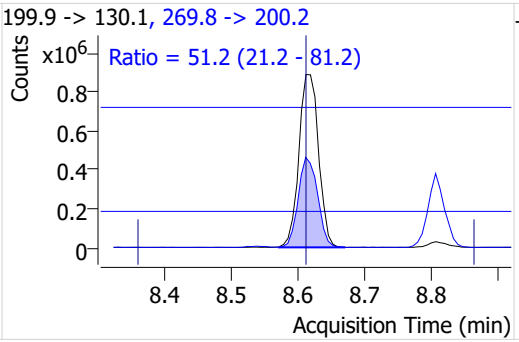
Octachlorostyrene

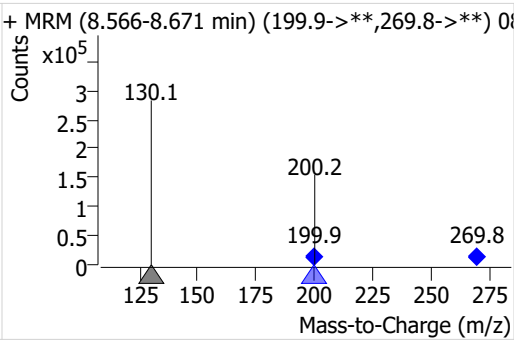


MassHunter Quantitative Analysis Sample Report

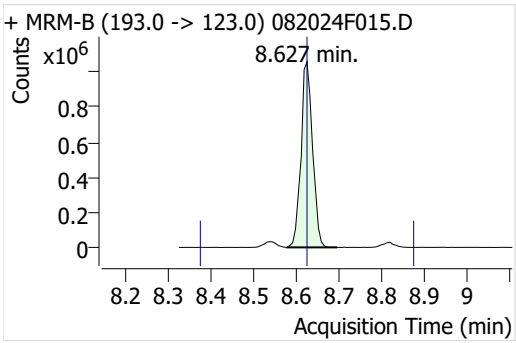
Isodrin-13C12

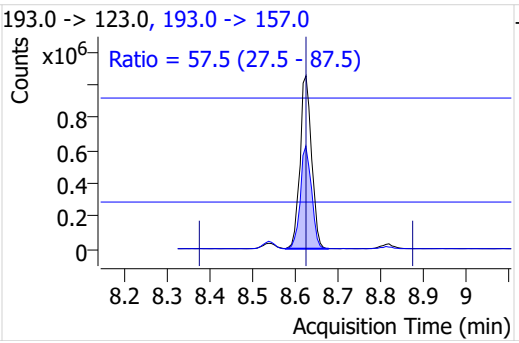


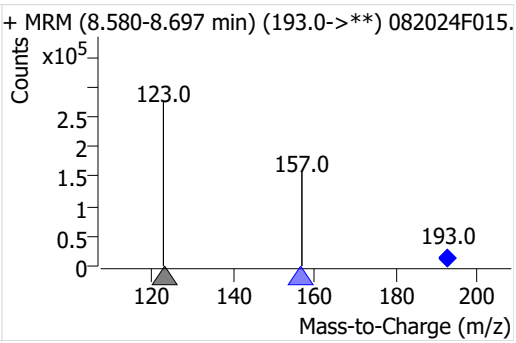




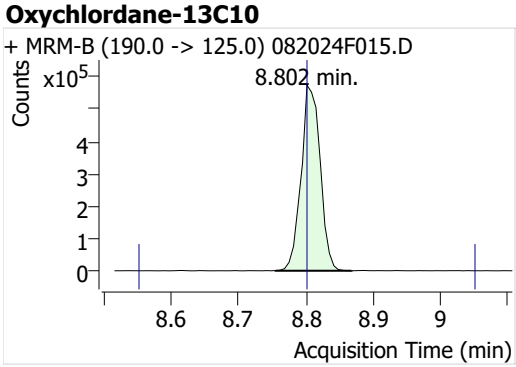
Isodrin

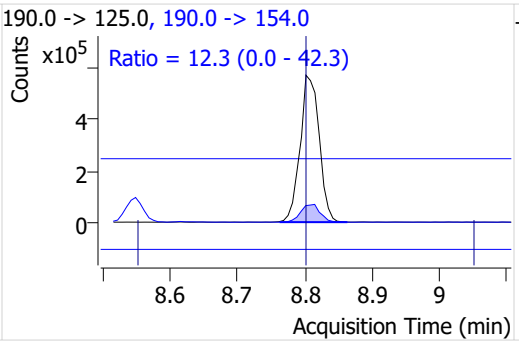


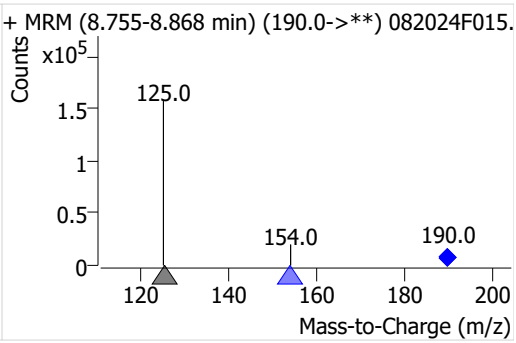




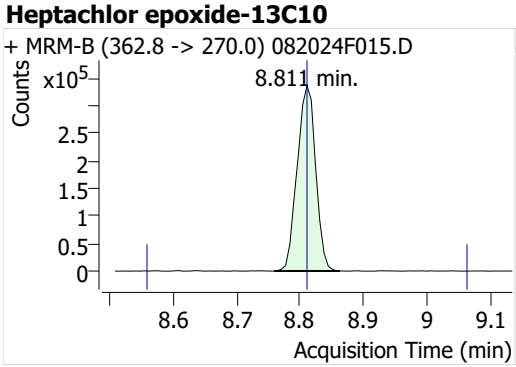
Oxychlordane-13C10

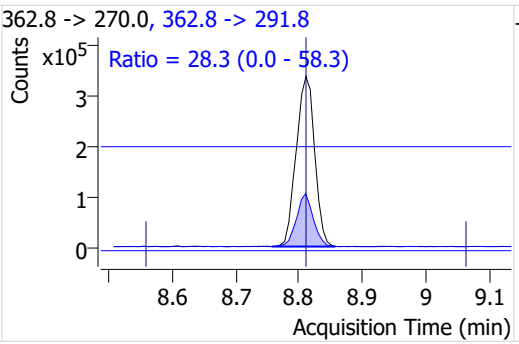


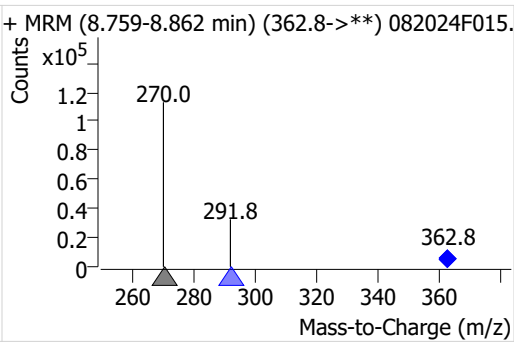




Heptachlor epoxide-13C10







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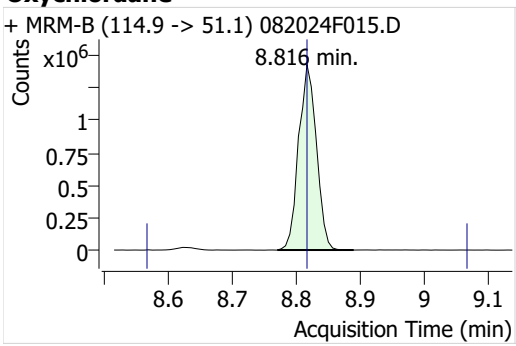
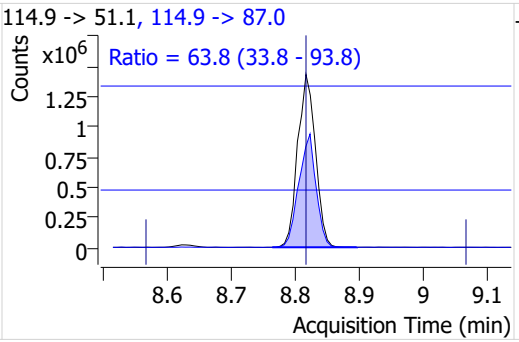
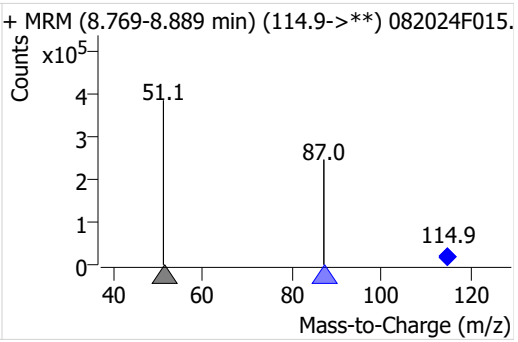
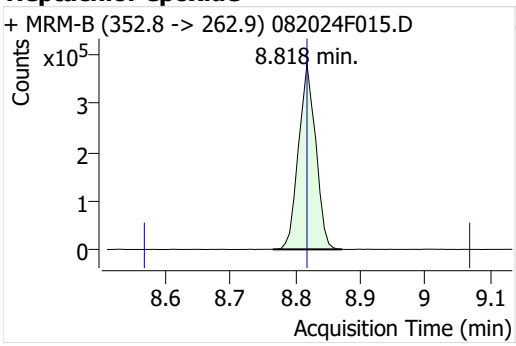
Oxychlordane

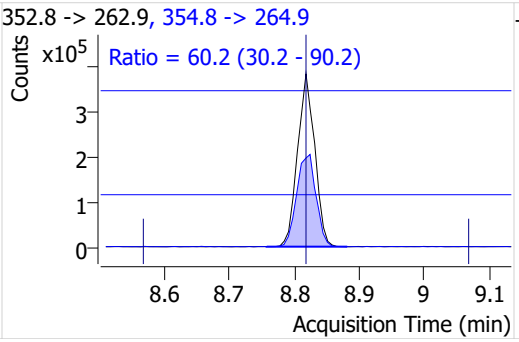


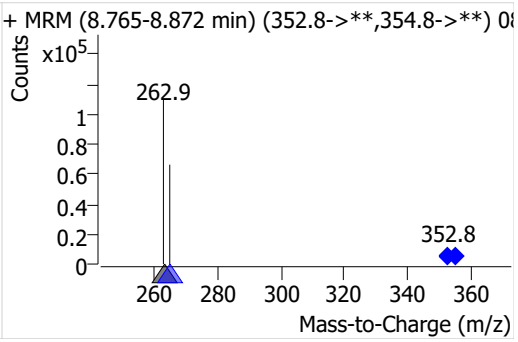




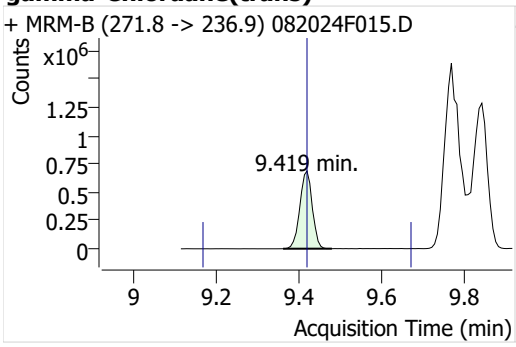
Heptachlor epoxide

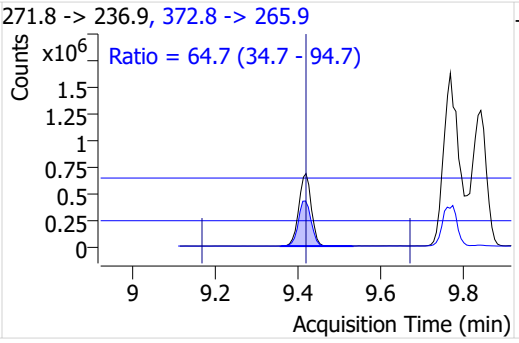


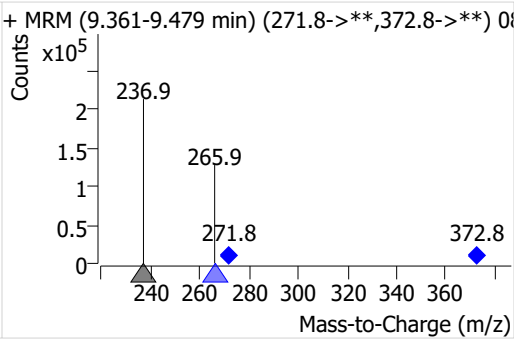




gamma-Chlordane(trans)







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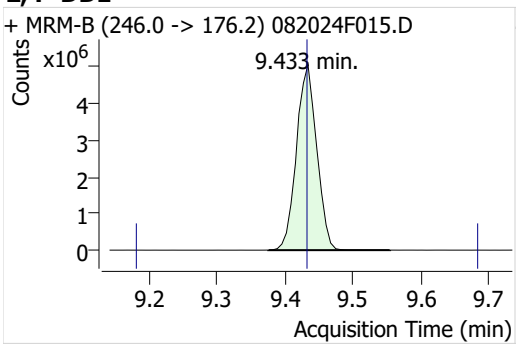

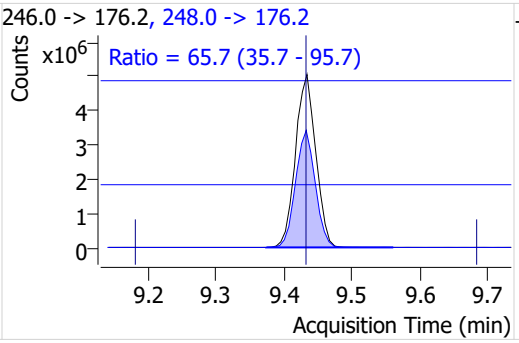

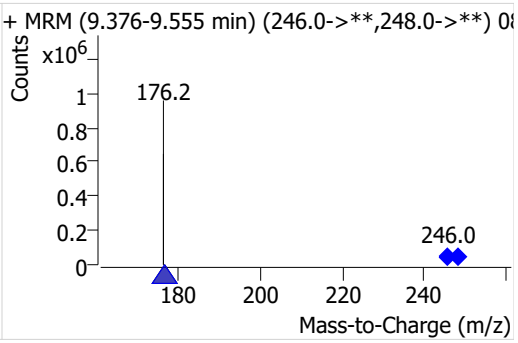

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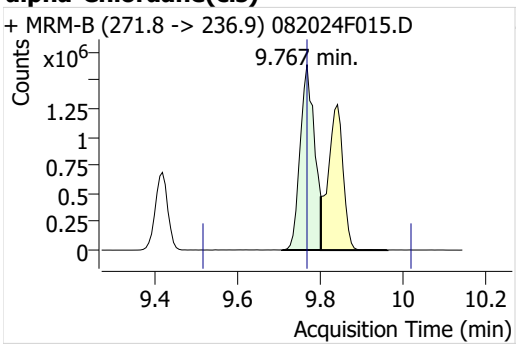
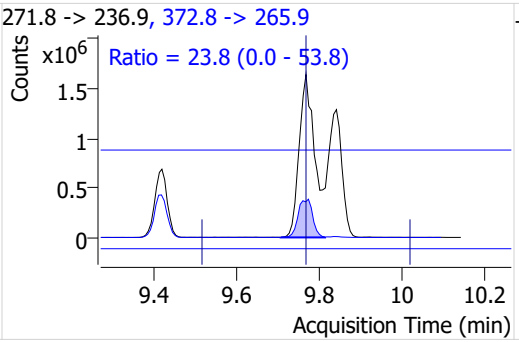
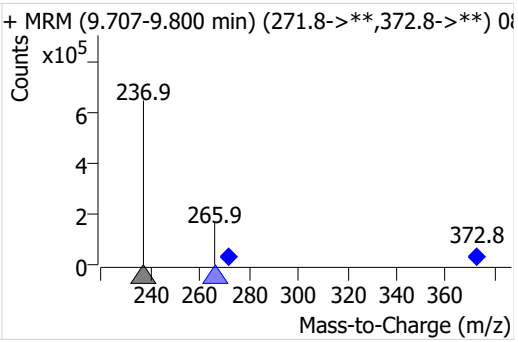
alpha-Chlordane(cis)







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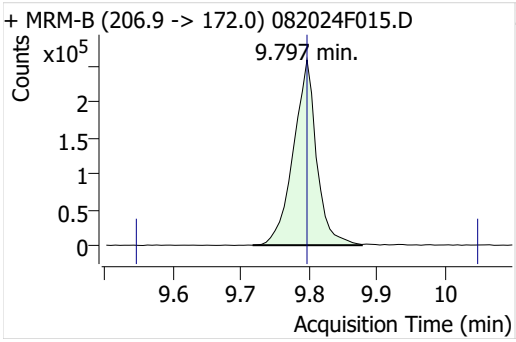

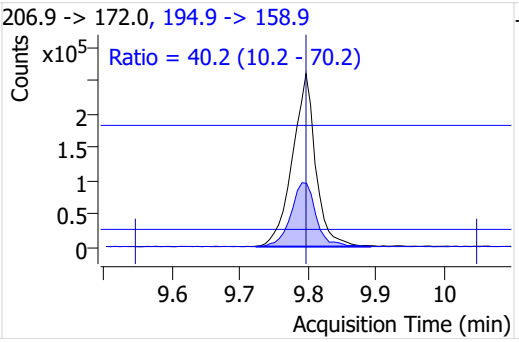

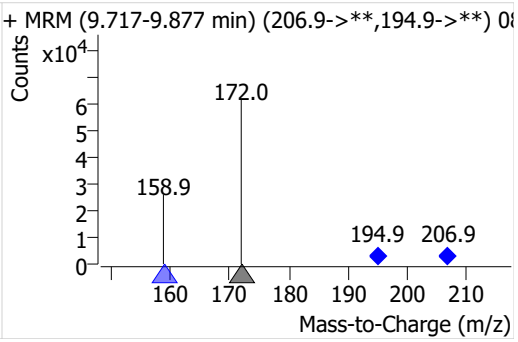

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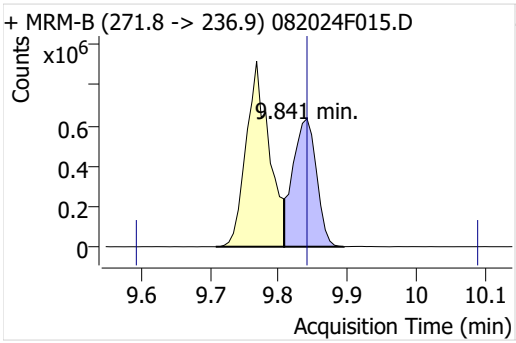

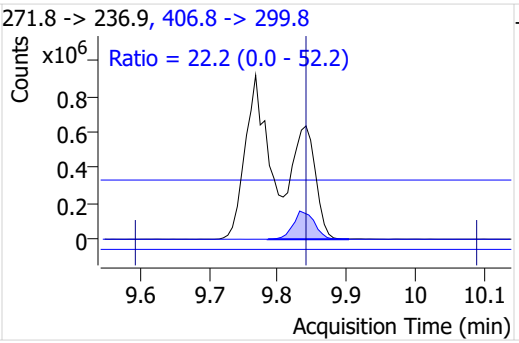

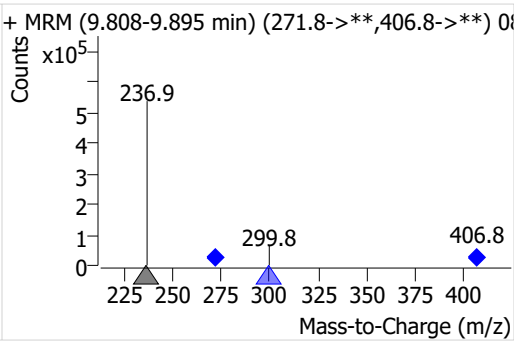

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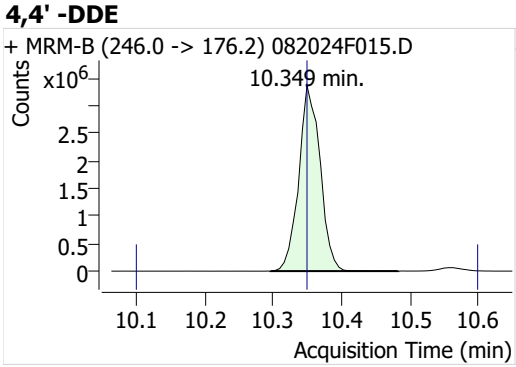

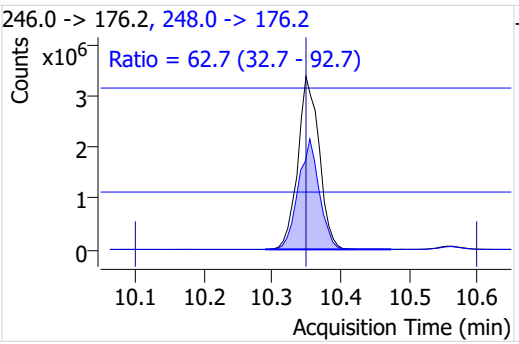

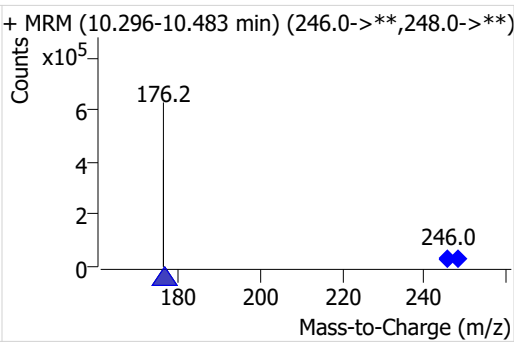

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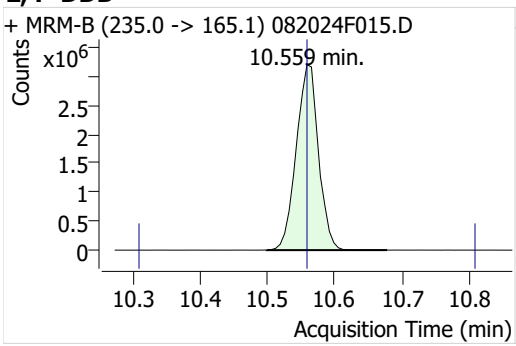
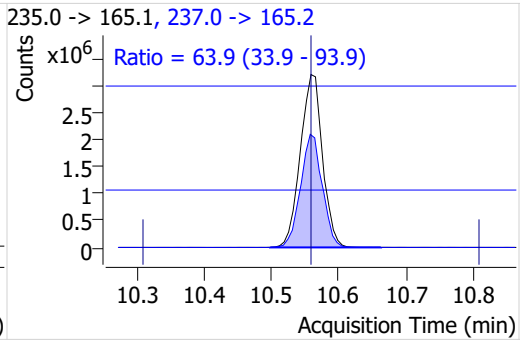
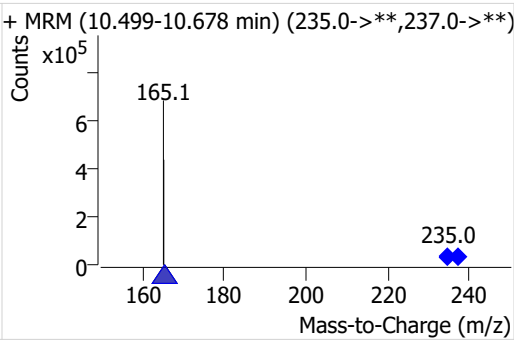
2,4'-DDD







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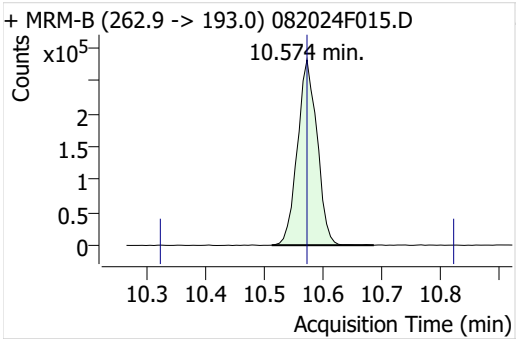

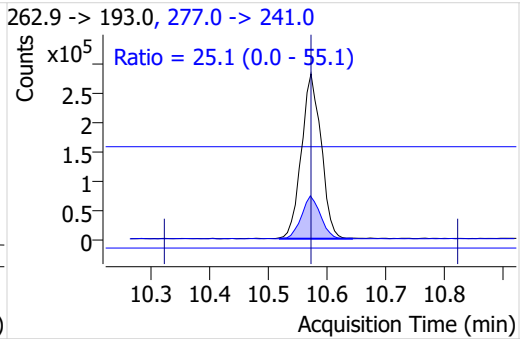

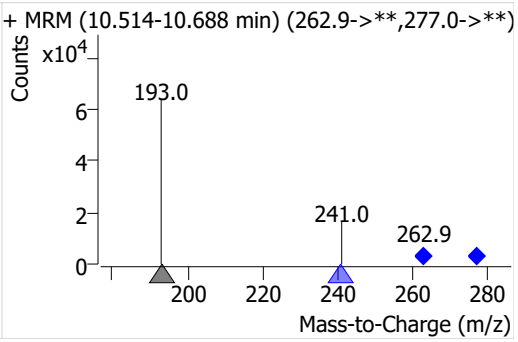

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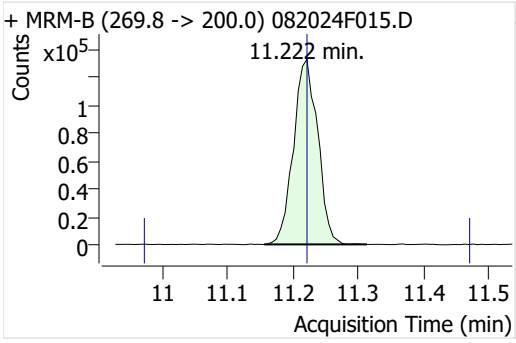

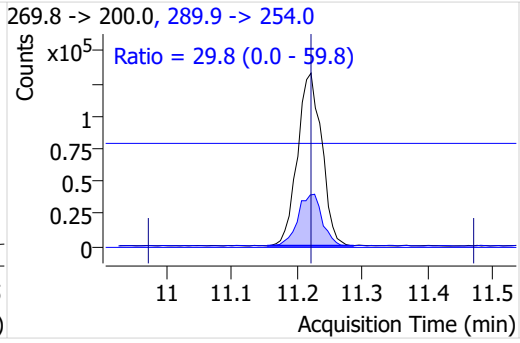

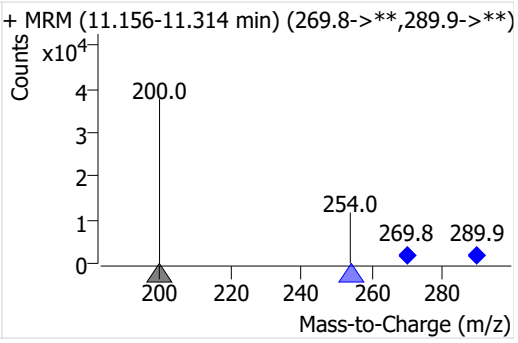

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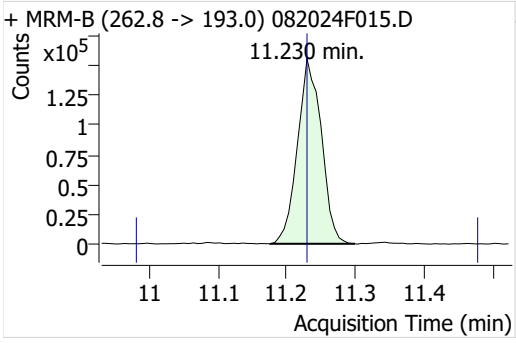

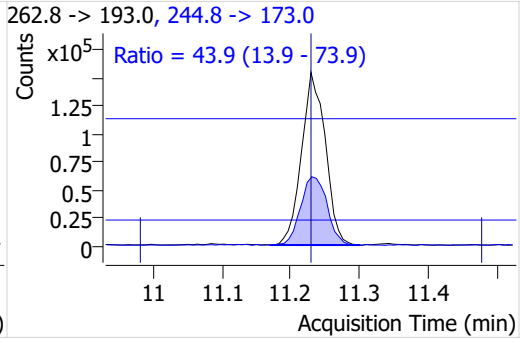

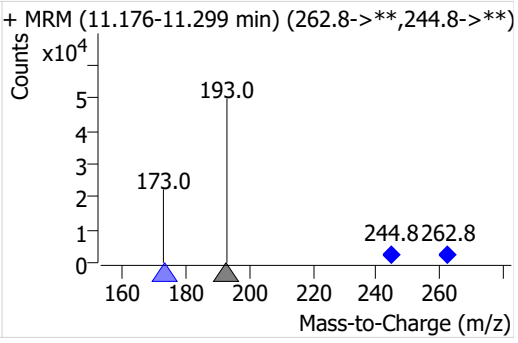

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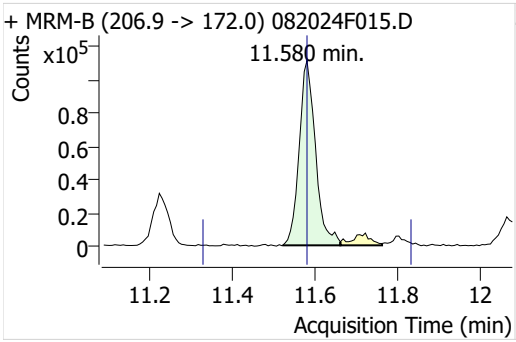
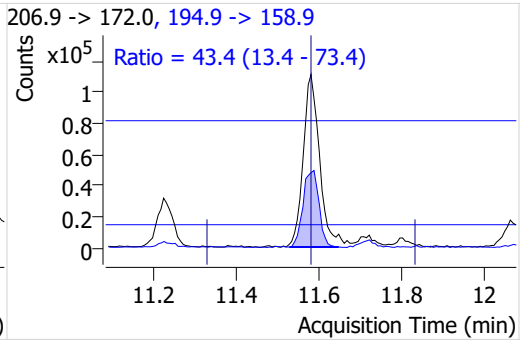
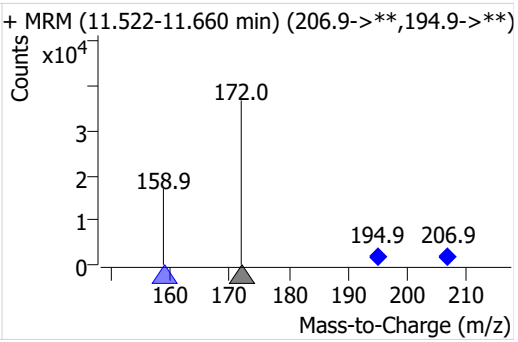
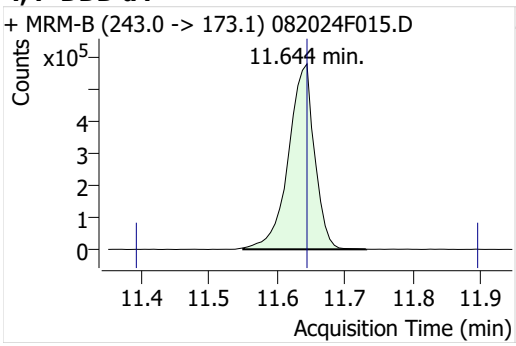
Endosulfan II

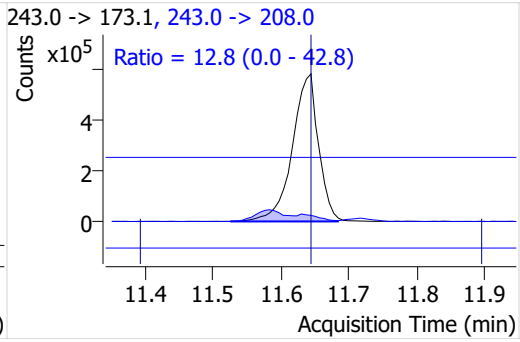


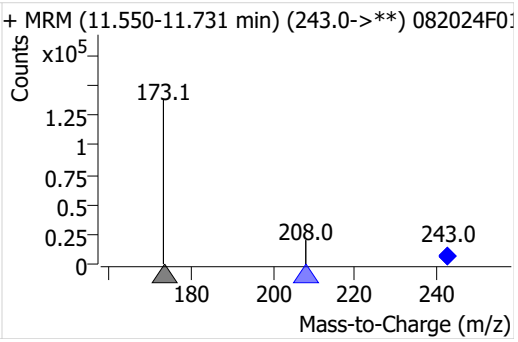




4,4'-DDD d4







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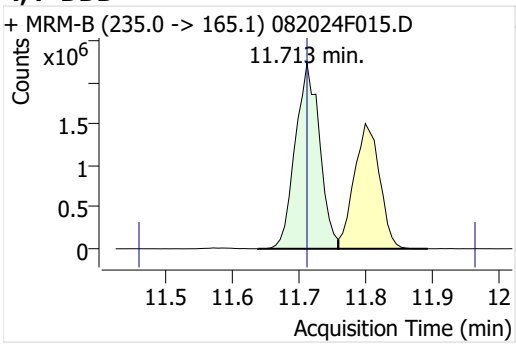

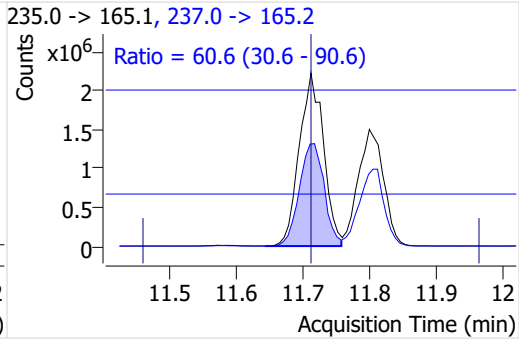

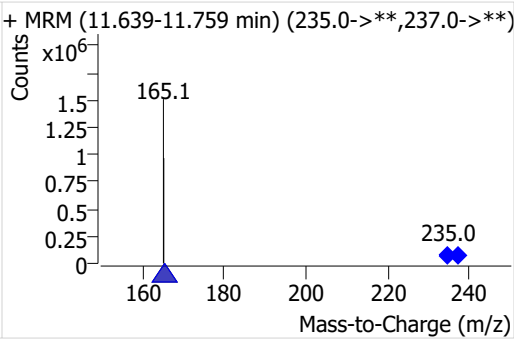

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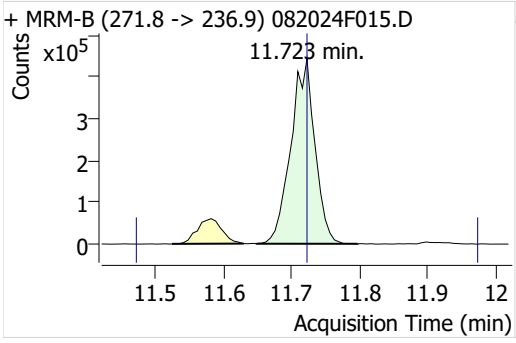

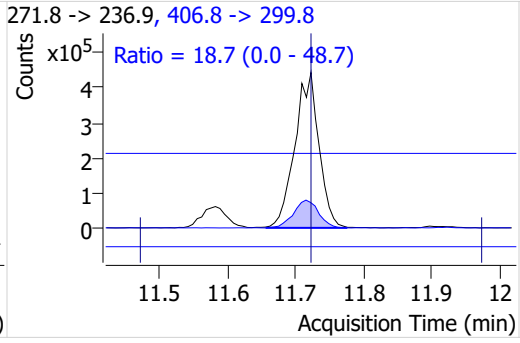

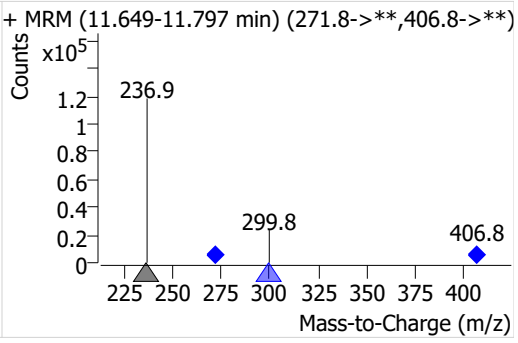

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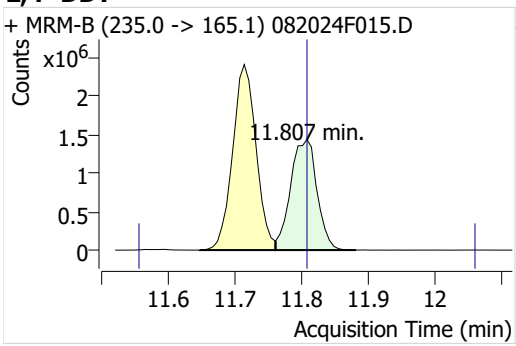
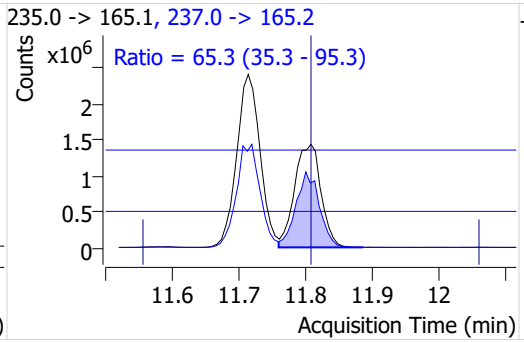
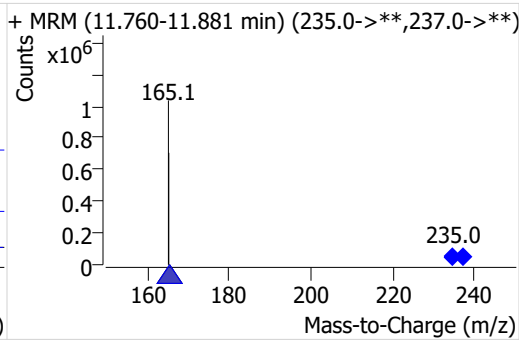
2,4'-DDT







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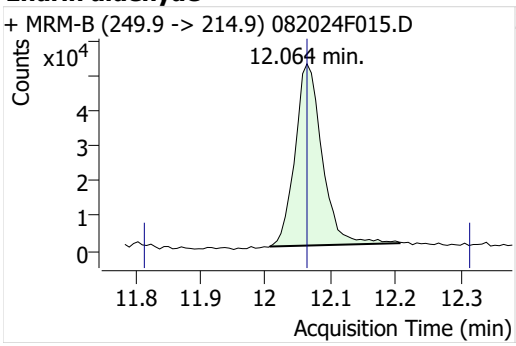
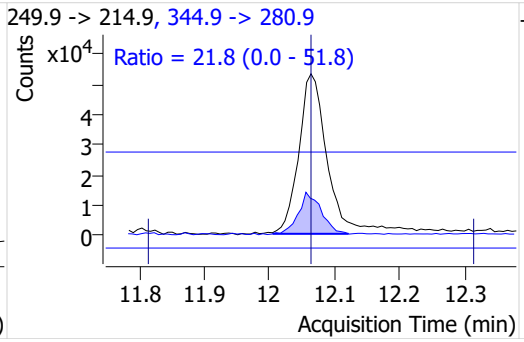
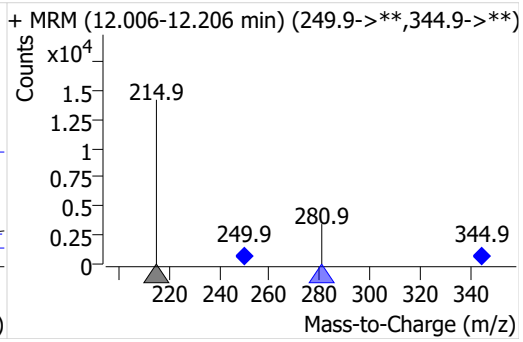
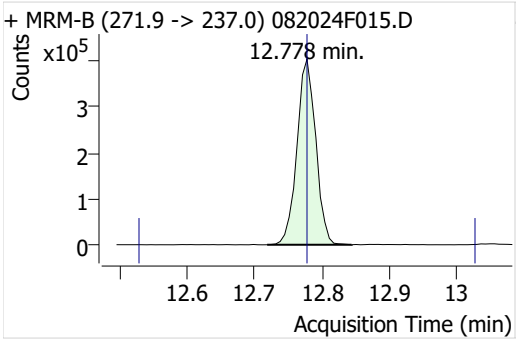
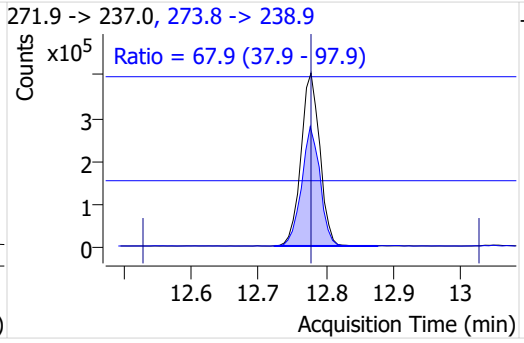


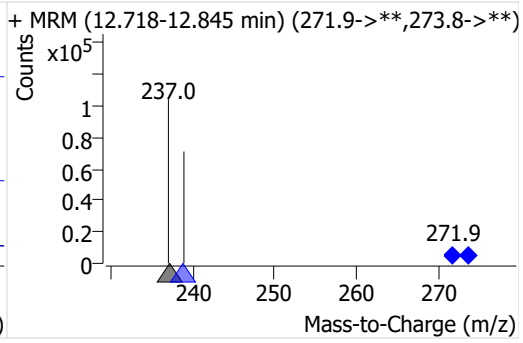




Endosulfan sulfate







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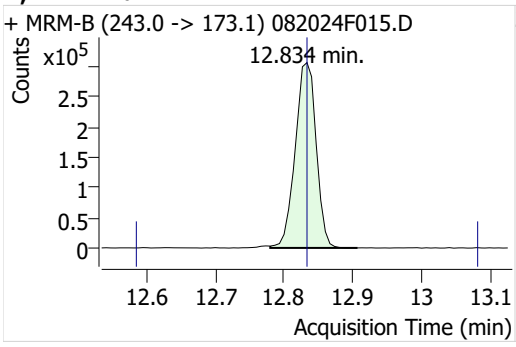

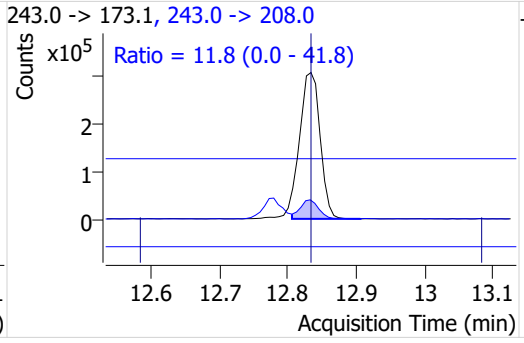

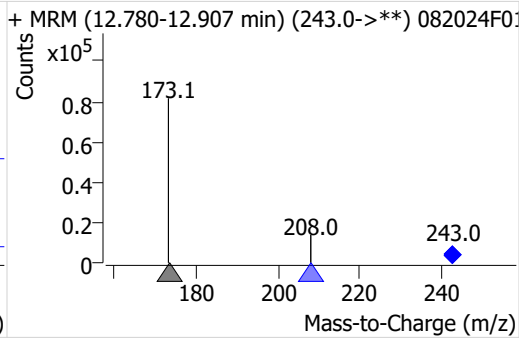

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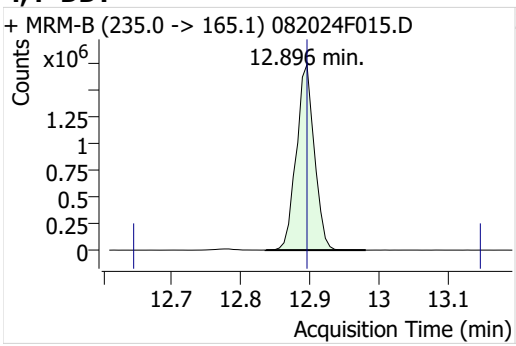
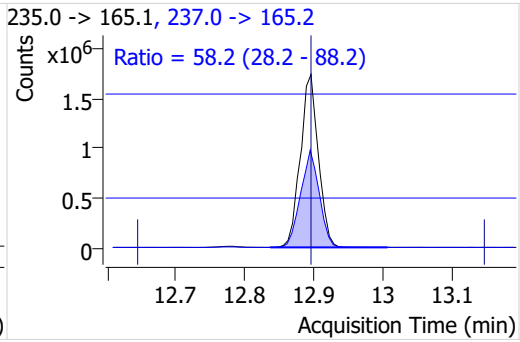
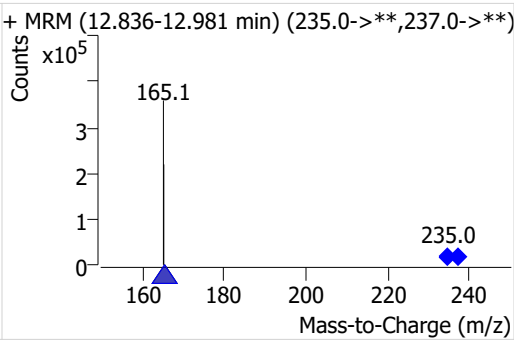
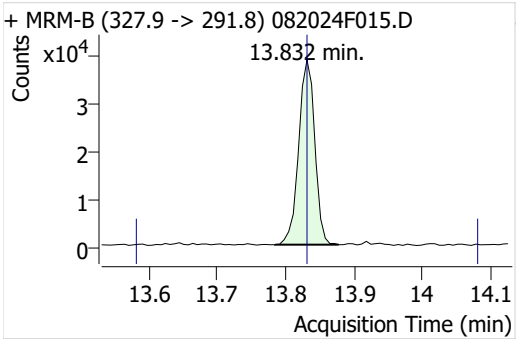
4,4'-DDT

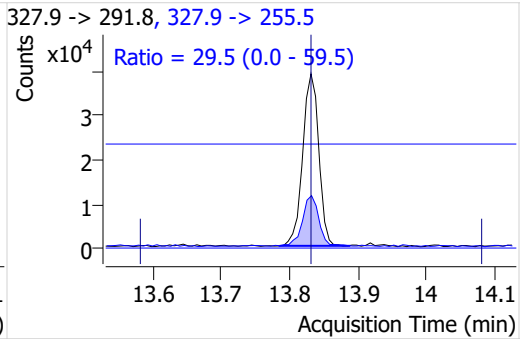


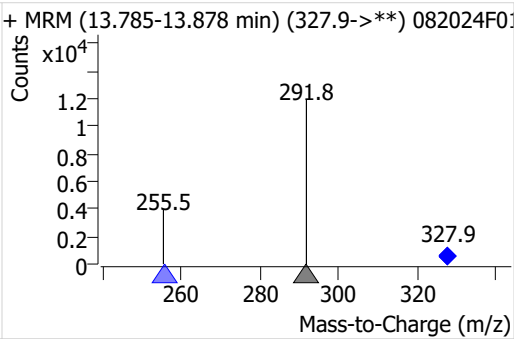




Endrin ketone-13C12







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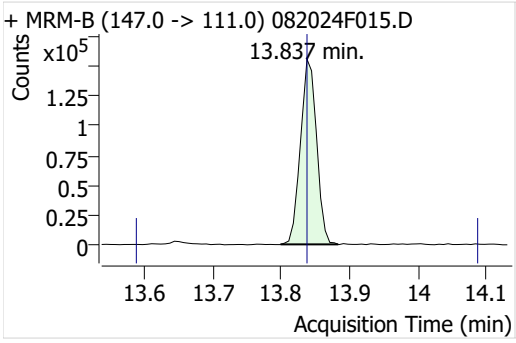
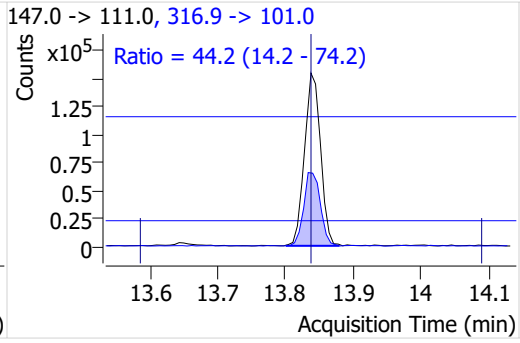
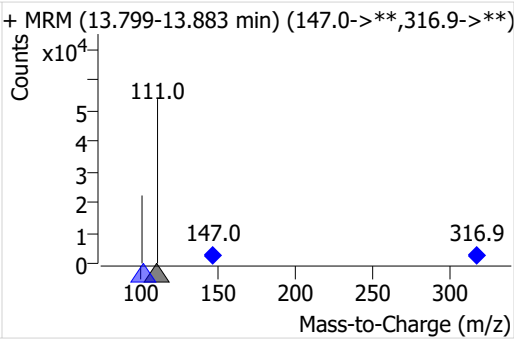
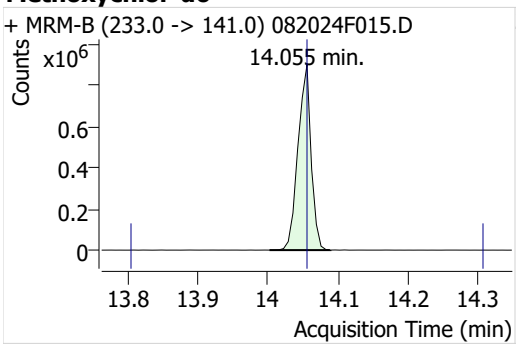
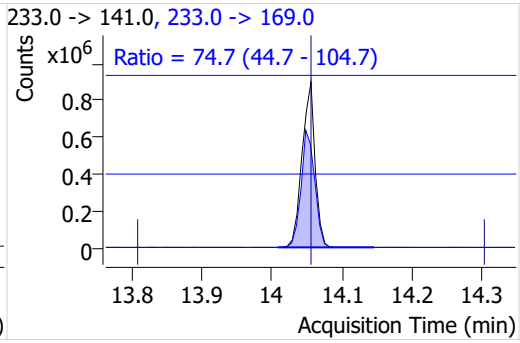


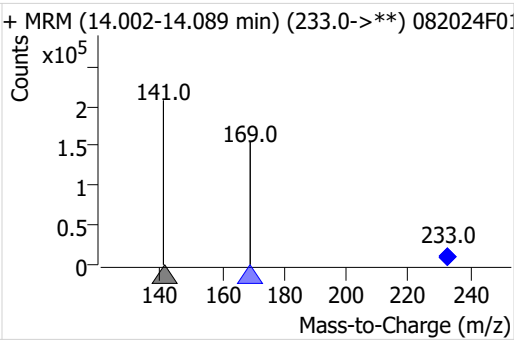




Methoxychlor-d6







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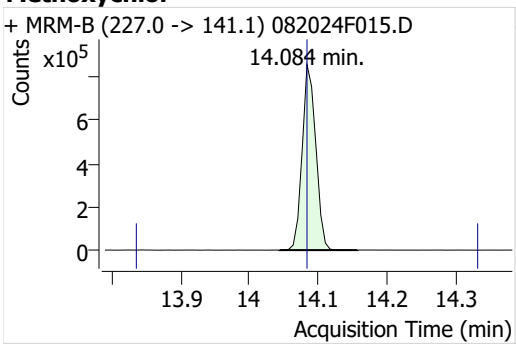
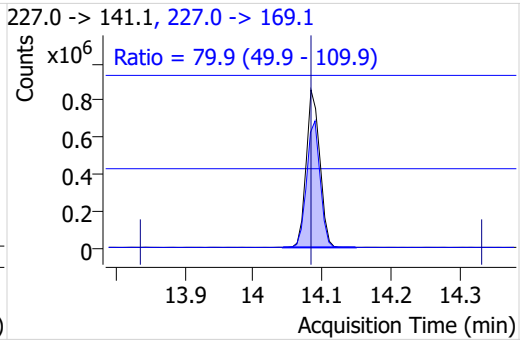
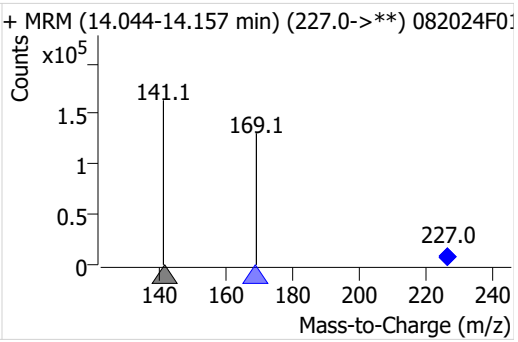
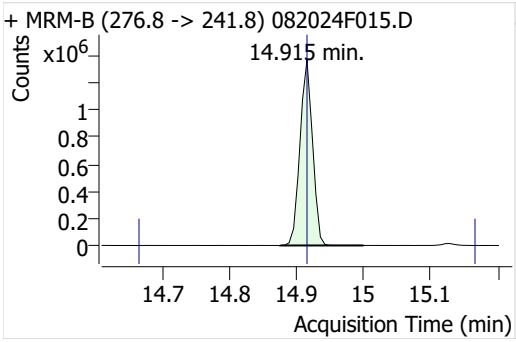
Methoxychlor

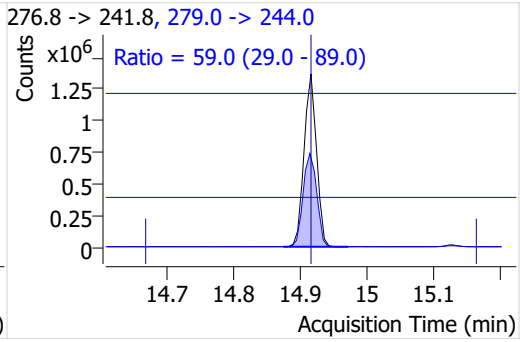


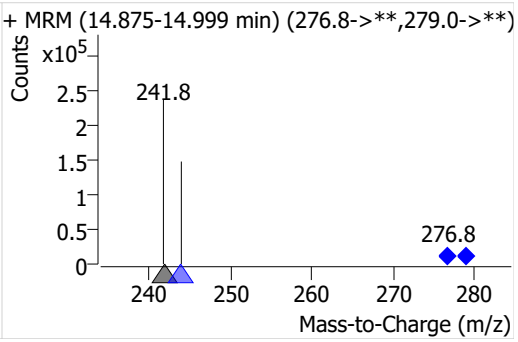




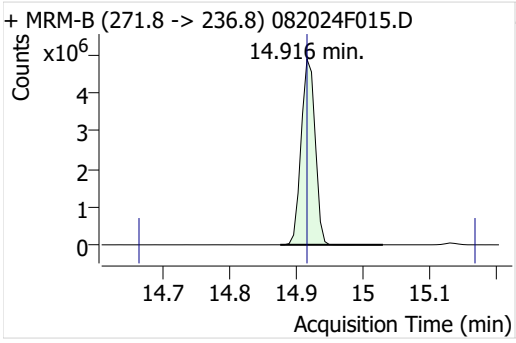
Mirex-13C10

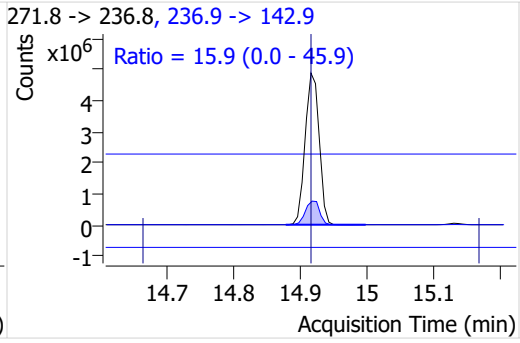


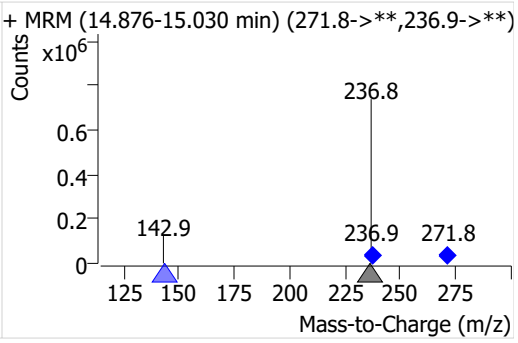




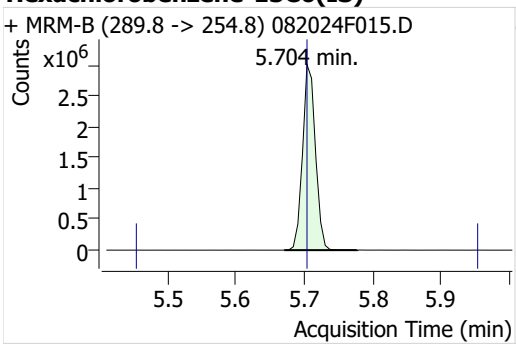
Mirex

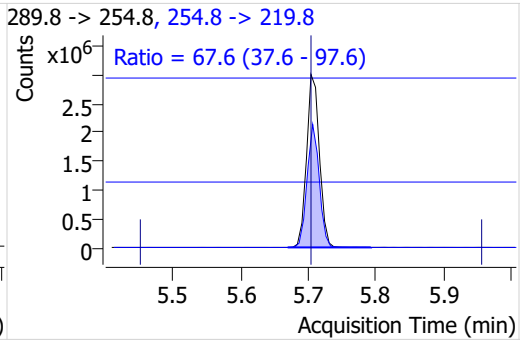


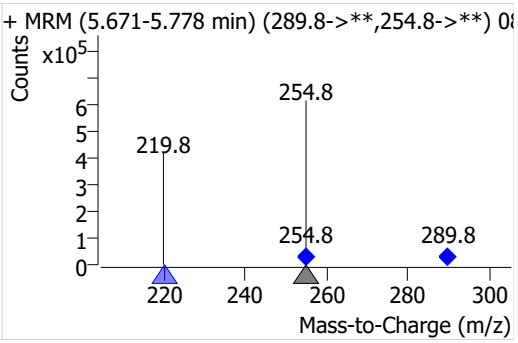




Hexachlorobenzene-13C6(IS)







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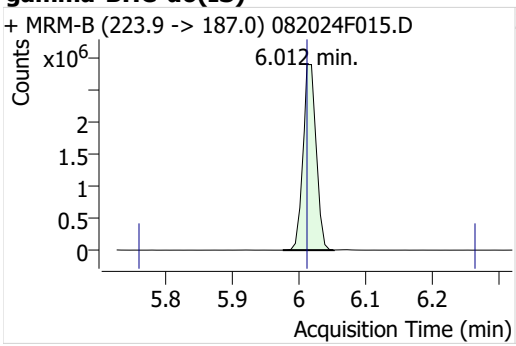
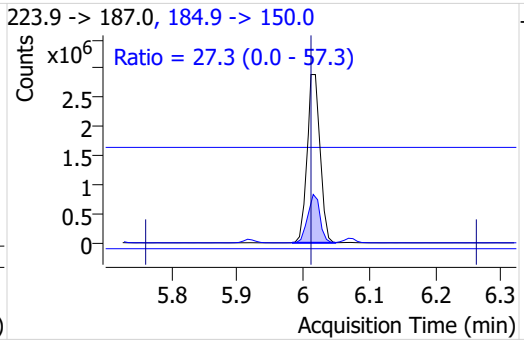
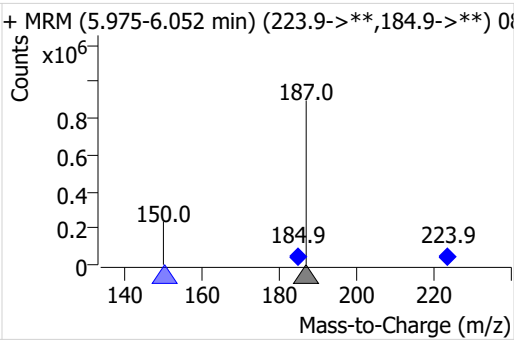
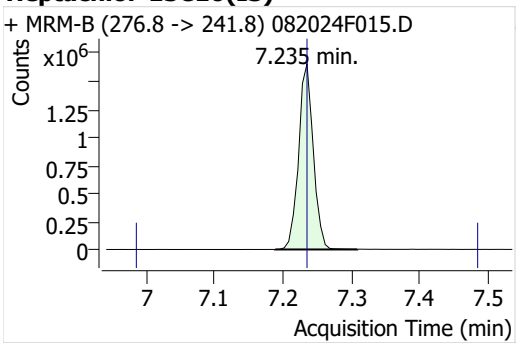
gamma-BHC-d6(IS)

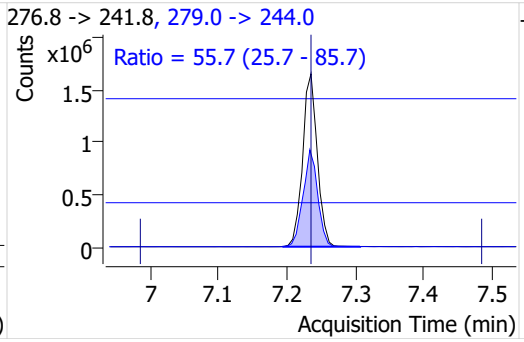


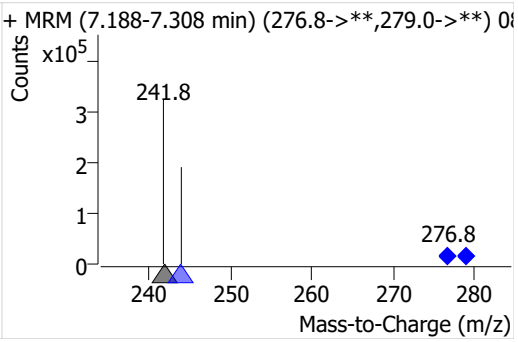




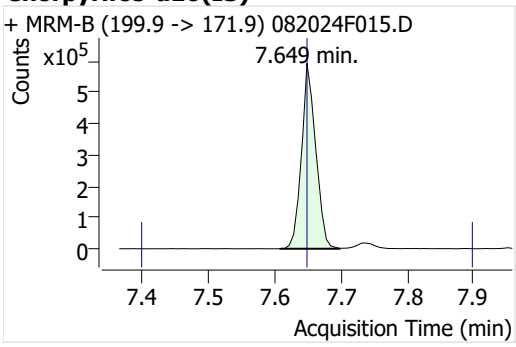
Heptachlor-13C10(IS)

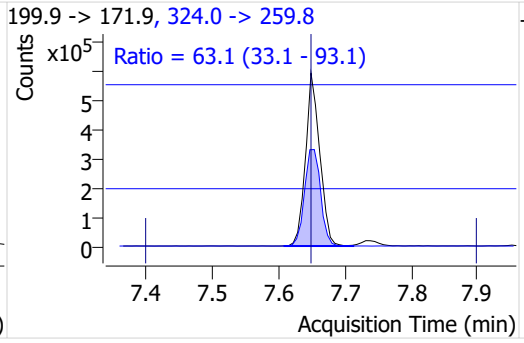


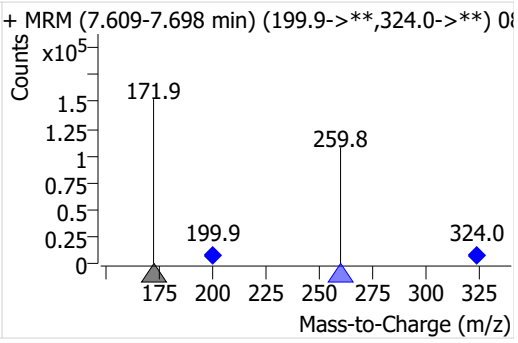




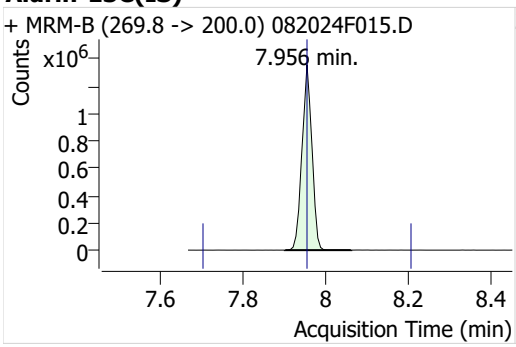
Chorpyrifos-d10(IS)

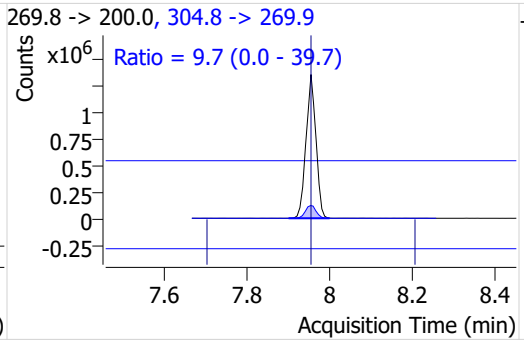


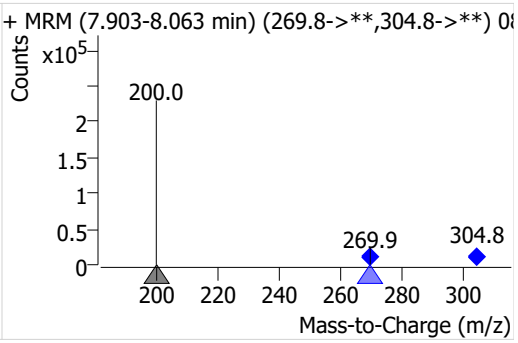




Aldrin-13C(IS)







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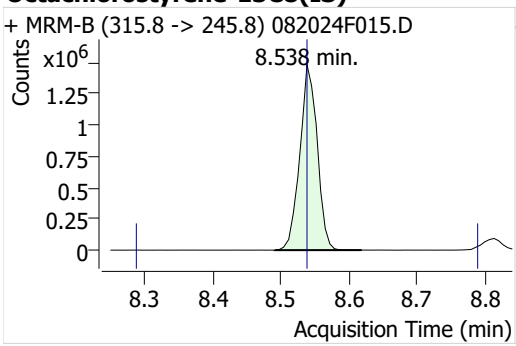
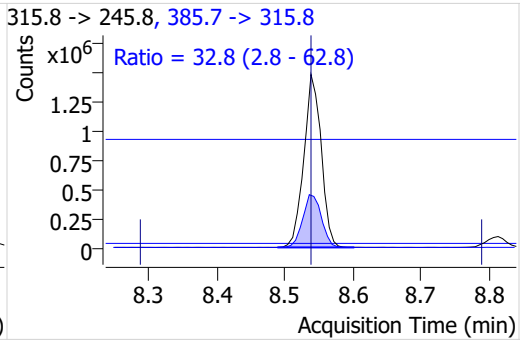
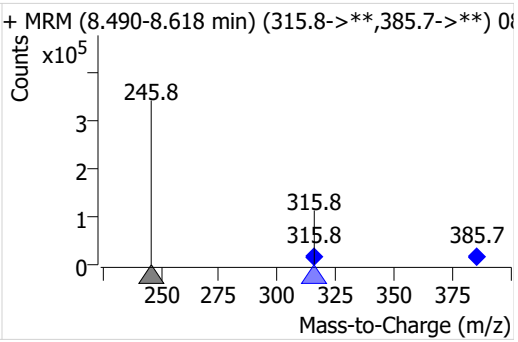
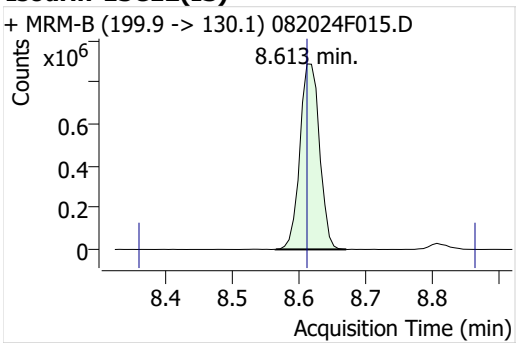
Octachlorostyrene-13C8(IS)

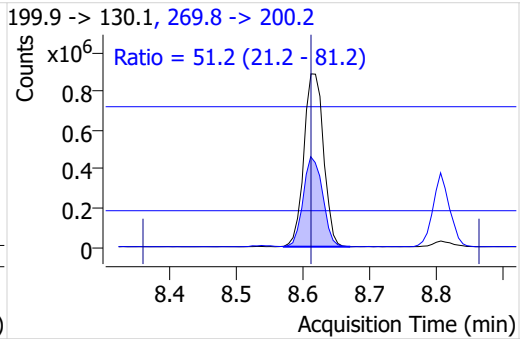


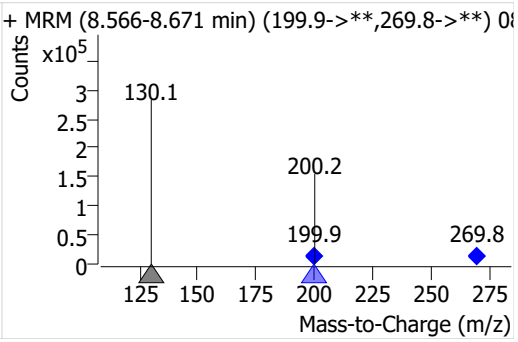




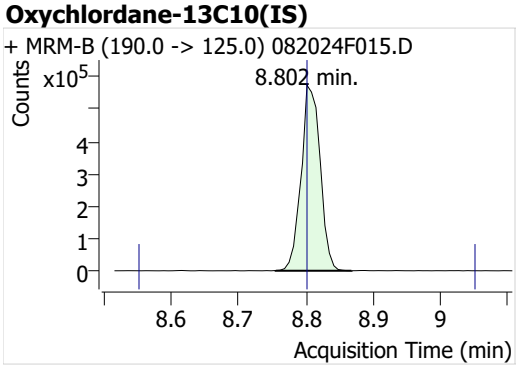
Isodrin-13C12(IS)

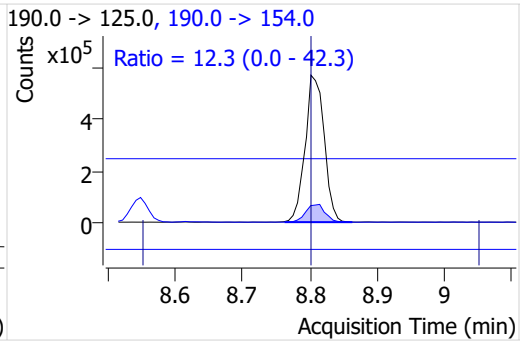


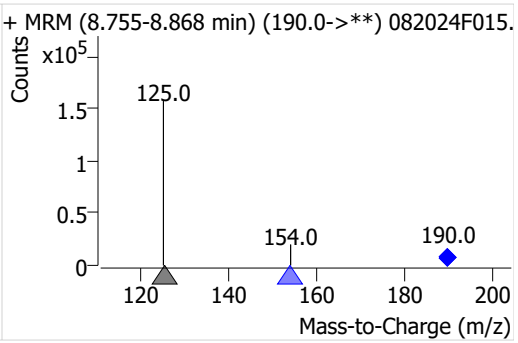




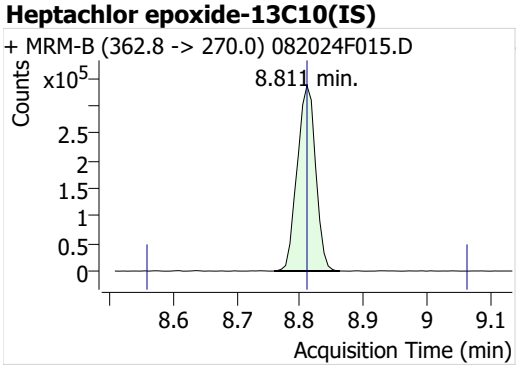
Oxychlordane-13C10(IS)

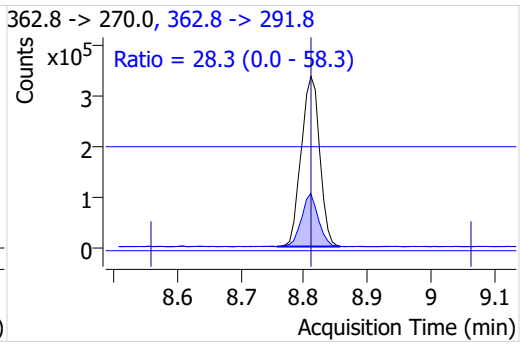


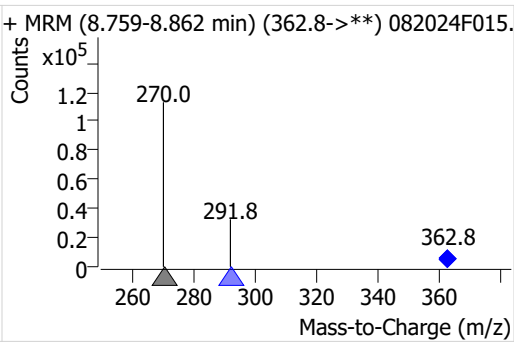




Heptachlor epoxide-13C10(IS)







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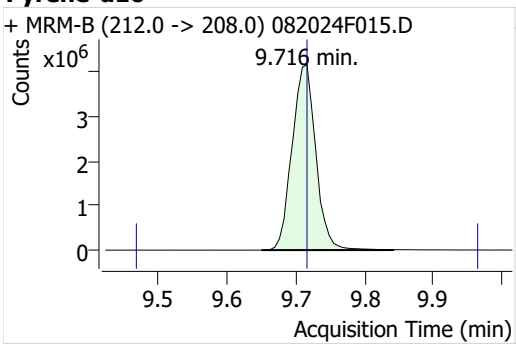
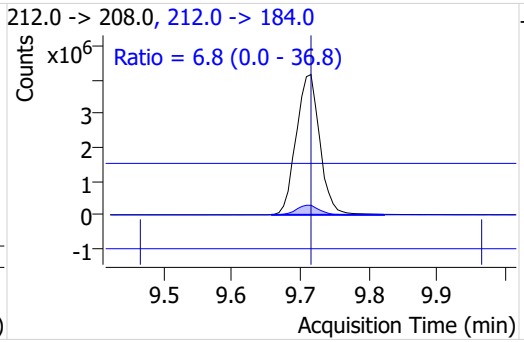
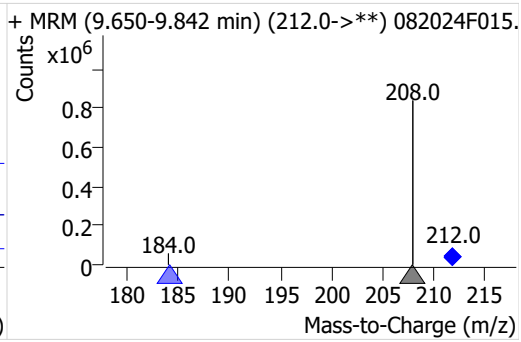
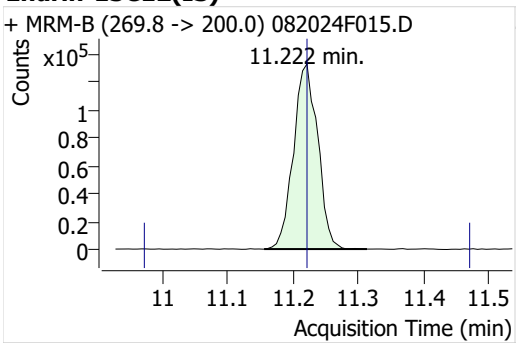
Pyrene-d10

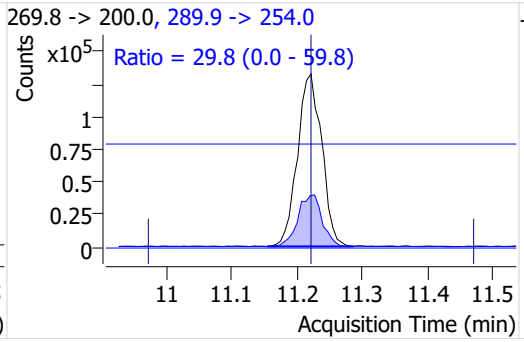


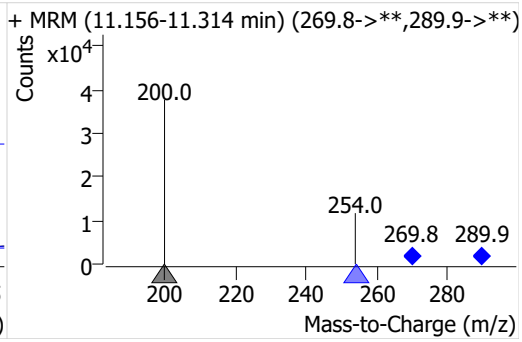




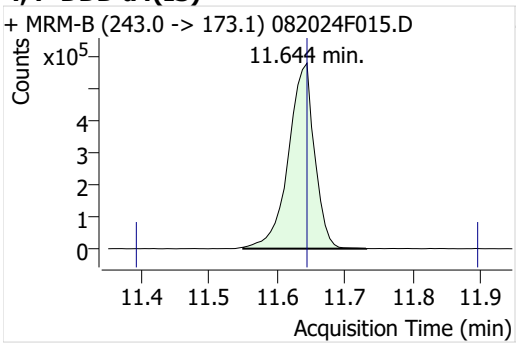
Endrin-13C12(IS)

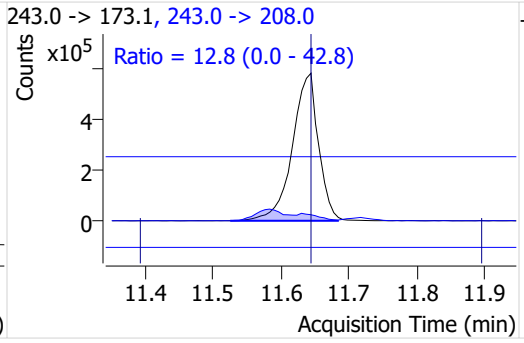


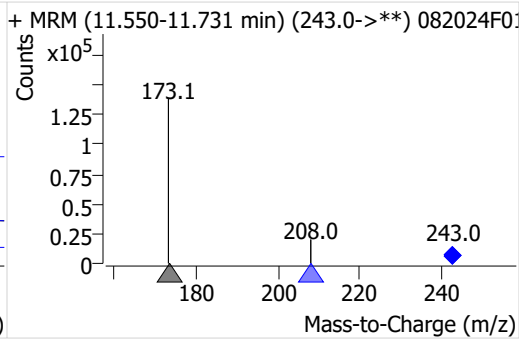




4,4'-DDD d4(IS)







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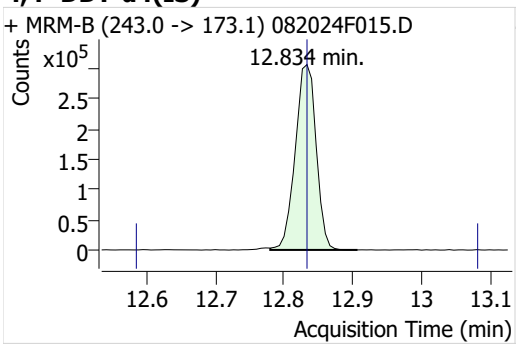
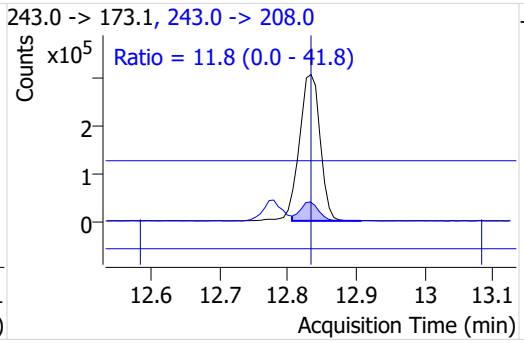
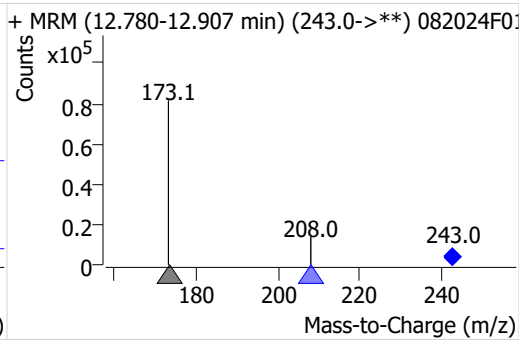
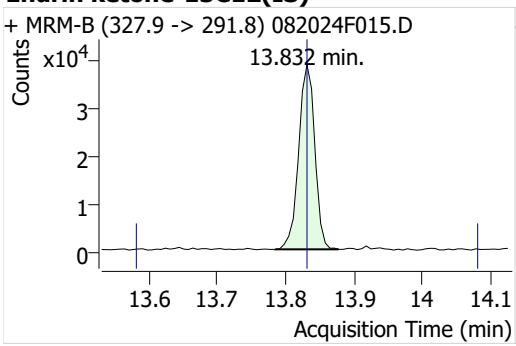


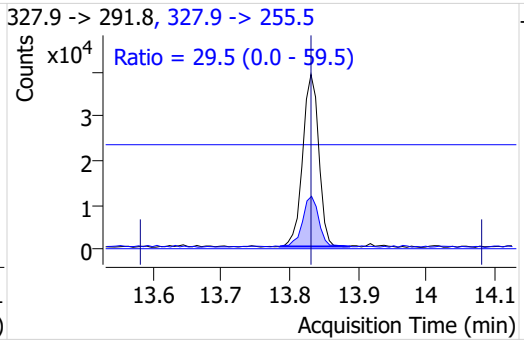


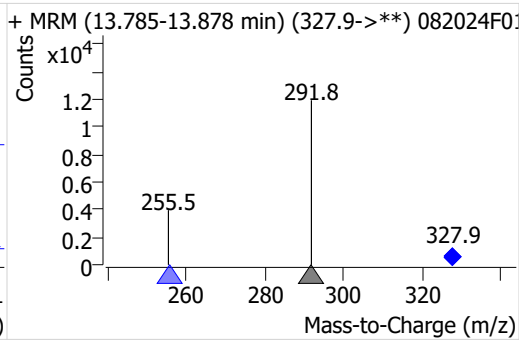


MassHunter Quantitative Analysis Sample Report

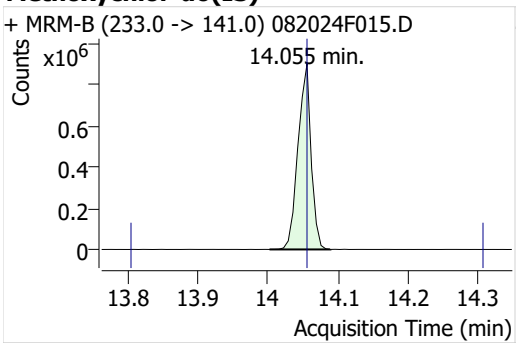
Endrin ketone-13C12(IS)

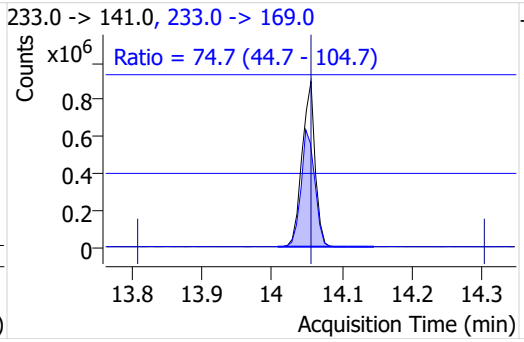


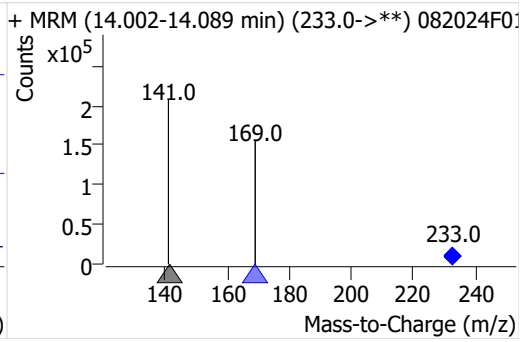




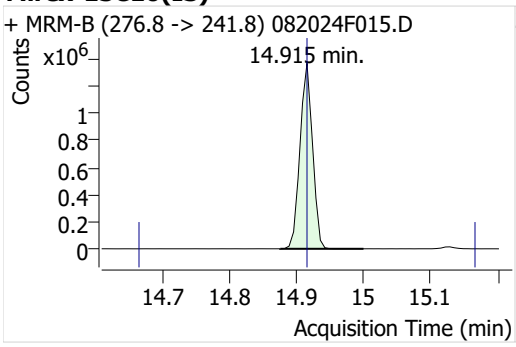
Methoxychlor-d6(IS)

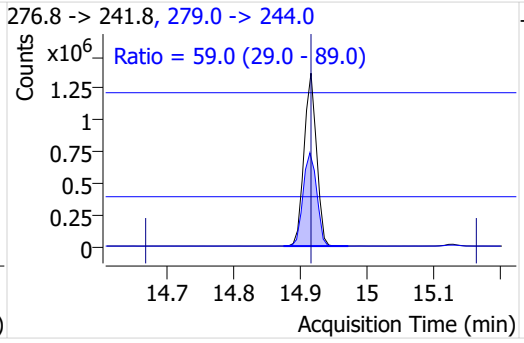


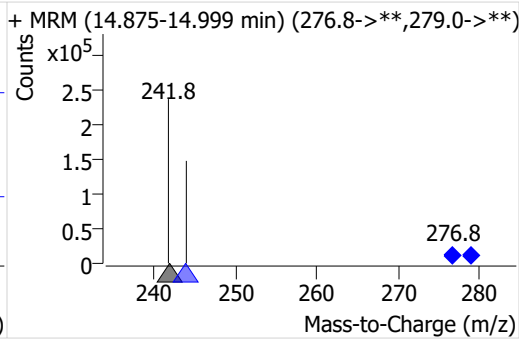




Mirex-13C10(IS)







MassHunter Quantitative Analysis Injection Log Report

Batch Data Path	J:\MS47\data\082024\QuantResults\082024 OC PEST.batch.bin				
Analysis Time	8/21/2024 7:19:42 AM	**Analyst Name**	CORP\alkls.nouser	**Report Generator Name**	CORP\alkls.nouser
Calibration Last Update	8/7/2024 7:31:22 AM	**Analyze Quant Version**	12.1	**Report Quant Version**	12.1

Sequence Table

Data File	Name	Type	Vial	Vol.	Level	Acq. Method File	Acq. Date-Time
082024F015.D	OC PEST ICV 20ppb SVM71-99K	QC	13	1	20	OC Pest_dMRM	8/20/2024 3:13:02 PM
082024F018.D	KQ2412232-04 MB	Sample	14	1		OC Pest_dMRM	8/20/2024 4:12:11 PM
082024F019.D	KQ2412232-03 LCS	QC	15	1	20	OC Pest_dMRM	8/20/2024 4:31:53 PM
082024F020.D	KQ2412232-01_K2408108-006MS	QC	16	1	20	OC Pest_dMRM	8/20/2024 4:51:36 PM
082024F021.D	KQ2412232-02_K2408108-006DMS	QC	17	1	20	OC Pest_dMRM	8/20/2024 5:11:26 PM
082024F023.D	K2408108-003	Sample	18	1		OC Pest_dMRM	8/20/2024 5:50:55 PM
082024F024.D	K2408108-006	Sample	19	1		OC Pest_dMRM	8/20/2024 6:10:44 PM
082024F025.D	K2408108-009	Sample	20	1		OC Pest_dMRM	8/20/2024 6:30:26 PM
082024F026.D	K2408109-003	Sample	21	1		OC Pest_dMRM	8/20/2024 6:50:12 PM
082024F027.D	K2408109-006	Sample	22	1		OC Pest_dMRM	8/20/2024 7:09:55 PM
082024F028.D	K2408109-009	Sample	23	1		OC Pest_dMRM	8/20/2024 7:29:38 PM
082024F029.D	K2407810-004 10X	Sample	24	1		OC Pest_dMRM	8/20/2024 7:49:24 PM

NR *

Run #:851396

CAL: KC2400398

8-21-24 eb

8/21/24

* re-solvent exchange extracts and re-analyze 8-21-24 eb

9/21/24

DILUTION LOG MS 47

Date: 8-20-24 Prepared by: EBrund Solvent Lot#: 22K0962012

LAB ID.	ALIQUOT	FINAL VOLUME	DILUTION FACTOR	COMMENTS
K2407810-4	100ul	1000ul	10x	Target

MassHunter Quantitative Analysis Injection Log Report

Batch Data Path	J:\MS42\Data\080624\QuantResults\080624 OC PEST.batch.bin				
Analysis Time	8/7/2024 7:47:19 AM	**Analyst Name**	CORP\alkls.nouser	**Report Generator Name**	CORP\alkls.nouser
Calibration Last Update	7/25/2024 7:23:43 AM	**Analyze Quant Version**	10.2	**Report Quant Version**	10.2

Sequence Table

Data File	Name	Type	Vial	Vol.	Level	Acq. Method File	Acq. Date-Time
080624F005.D	OC PEST CCV 20ppb SVM71-93A	QC	1	1	20	OC Pest_dMRM	8/6/2024 10:25:34 AM
080624F008.D	KQ2411800-04 MB	Sample	4	1		OC Pest_dMRM	8/6/2024 12:46:32 PM
080624F009.D	KQ2411726-03 LCS	QC	5	1	20	OC Pest_dMRM	8/6/2024 1:04:48 PM
080624F010.D	KQ2411800-03 LCS	QC	6	1	20	OC Pest_dMRM	8/6/2024 1:23:08 PM
080624F011.D	KQ2411726-01_K2407751-003MS	QC	7	1	20	OC Pest_dMRM	8/6/2024 1:41:25 PM
080624F012.D	KQ2411726-02_K2407751-003DMS	QC	8	1	20	OC Pest_dMRM	8/6/2024 1:59:41 PM
080624F013.D	KQ2411800-01_K2407810-001MS	QC	9	1	20	OC Pest_dMRM	8/6/2024 2:17:59 PM
080624F014.D	KQ2411800-02_K2407810-001DMS	QC	10	1	20	OC Pest_dMRM	8/6/2024 2:36:20 PM
080624F016.D	KQ2411726-04 MB	Sample	3	1		OC Pest_dMRM	8/6/2024 3:12:58 PM
080624F017.D	K2407751-003	Sample	11	1		OC Pest_dMRM	8/6/2024 3:31:17 PM
080624F018.D	K2407751-007	Sample	12	1		OC Pest_dMRM	8/6/2024 3:49:37 PM
080624F019.D	K2407751-010	Sample	13	1		OC Pest_dMRM	8/6/2024 4:07:56 PM
080624F020.D	K2407810-001	Sample	14	1		OC Pest_dMRM	8/6/2024 4:26:14 PM
080624F021.D	K2407810-002	Sample	15	1		OC Pest_dMRM	8/6/2024 4:44:33 PM
080624F022.D	K2407810-003	Sample	16	1		OC Pest_dMRM	8/6/2024 5:02:55 PM
080624F023.D	K2407810-004Need dil	Sample	17	1		OC Pest_dMRM	8/6/2024 5:21:15 PM

Run # 851162
CAL KC2400368
8.20.24 eb

8/20/24

Preparation Information Benchsheet

Prep Run#: 442452
Team: Semivoa GCMS/DCLOKE
Prep WorkFlow: OrgExtSimS(14)
Prep Method: EPA 3546
Status: Prepped
Prep Date/Time: 8/1/24 12:40

Number of Copies to make: 1

#	Lab Code	Client ID	B#	Method /Test	pH	Matrix	Amt. Ext.	Final Vol	Sample Description
1	KQ2411801-04	MB		8270D/PAH SIM		Solid	10.6140g	10.00mL	
2	KQ2411801-03	LCS		8270D/PAH SIM		Solid	10.00g	10.00mL	
3	KQ2411801-01	K2407810-001 MS	.01	8270D/PAH SIM		Solid	10.116g	10.00mL	ZBIBI k-balance-50
4	KQ2411801-02	K2407810-001 DMS	.01	8270D/PAH SIM		Solid	10.151g	10.00mL	ZBIBI k-balance-50
5	K2407810-001	SIB-SC-E24-7-8-07/12/2022	.01	8270D/PAH SIM		Sediment	10.079g	10.00mL	ZBIBI k-balance-50
6	K2407810-002	SIB-SC-E24-8-9-07/12/2022	.01	8270D/PAH SIM		Sediment	10.089g	10.00mL	ZBIBI k-balance-50
7	K2407810-003	SIB-SC-E24-9-10-07/12/2022	.01	8270D/PAH SIM		Sediment	10.464g	10.00mL	ZBIBI k-balance-50
8	K2407810-004	SIB-SC-J06-8-9-07/26/2022	.01	8270D/PAH SIM		Sediment	10.614g	10.00mL	ZBIBI k-balance-50

Spiking Solutions

Name: 8270 ALL PURPOSE SURROGATE Inventory ID 234790 Logbook Ref: SVM71-57C Expires On: 10/24/2024

K2407810-001 20.00µL K2407810-002 20.00µL K2407810-003 20.00µL K2407810-004 20.00µL KQ2411801-01 20.00µL KQ2411801-02 20.00µL
KQ2411801-03 20.00µL KQ2411801-04 20.00µL

Name: 8270 SIM-PAH Matrix Spike 25ppm Inventory ID 236350 Logbook Ref: SVM71-84M Expires On: 01/03/2025

KQ2411801-01 200.00µL KQ2411801-02 200.00µL KQ2411801-03 200.00µL

Preparation Steps

Step:	Weigh	Step:	Extraction	Step:	Final Volume
Started:	7/31/24 12:00	Started:	8/1/24 12:40	Started:	8/2/24 06:43
Finished:	7/31/24 12:19	Finished:	8/1/24 13:25	Finished:	8/2/24 09:02
By:	RAJONES	By:	RAJONES	By:	JCHRISTENSEN
Comments		Comments		Comments	

Comments: K-Tundra Top Shelf IS=SVM71-88C

Reviewed By: JC SM Date: 8/2/24 Spike Witness: RAJONES Date:

Chain of Custody

Relinquished By: JC Date: 8/2/24
Received By: eb Date: 8/2/24
Extracts Examined: Yes / No

Preparation Information Benchsheet

Prep Run#: 442452 **Prep WorkFlow:** OrgExtSimS(14) **Status:** Draft RJ 8/1/24

Team: Semivoa GCMS/DCLOKE **Prep Method:** EPA 3546 **Prep Date/Time:** ~~7/31/24 10:05 AM~~ 8/1/24 1240 PM

Number of Copies to make: 1

#	Lab Code	Client ID	B#	√	Method /Test	Matrix	Amt. Ext. g	pH n/a	Int. Vol mL	Final Vol mL	Surr Amt µL	Spike Amt µL
1	**KQ2411801-04**	MB	—	—	8270D / PAH SIM	Solid	10.614		4	10	20	—
2	**KQ2411801-03**	LCS	—	—	8270D / PAH SIM	Solid	10					200
3	**KQ2411801-01**	K2407810-001 MS	.01	✓	8270D / PAH SIM	Solid	*					
4	**KQ2411801-02**	K2407810-001 DMS	.01	✓	8270D / PAH SIM	Solid						
5	**K2407810-001**	SIB-SC-E24-7-8-07/12/2022	.01	✓	8270D / PAH SIM	Sediment						—
6	**K2407810-002**	SIB-SC-E24-8-9-07/12/2022	.01	✓	8270D / PAH SIM	Sediment						—
7	**K2407810-003**	SIB-SC-E24-9-10-07/12/2022	.01	✓	8270D / PAH SIM	Sediment						—
8	**K2407810-004**	SIB-SC-J06-8-9-07/26/2022	.01	✓	8270D / PAH SIM	Sediment						—

Comments: * See pre prep Worksheet

Surrogate ID: [AP] SUM71-57C 100/1500ppm MeOH xp: 10/24/24. 20µL. Spike ID: [PAH SIM] SUM71-84M xp: 1/3/25 20µL.

Witnessed By: ~~Paige Cook~~ 8/1/24 Rayna Jones

Analyst: Allaney Dedl Assisted By:

Pre-Prep Information Benchsheet

Prep Run #: 442452 **Container Lot No:** 100923-1SR **Prep Due Date:** Jul-15-2022

#	Lab Code	Bottle	Test Name	Weight	Sample Comments	Test Comments
1	K2407810-001	.01	PAH SIM : 8270D/	10.079g		ZBIBI k-balance-50
2	K2407810-001 MS KQ2411801-01	.01	PAH SIM : 8270D/	10.116g		ZBIBI k-balance-50
3	K2407810-001 DMS KQ2411801-02	.01	PAH SIM : 8270D/	10.151g		ZBIBI k-balance-50
4	K2407810-002	.01	PAH SIM : 8270D/	10.089g		ZBIBI k-balance-50
5	K2407810-003	.01	PAH SIM : 8270D/	10.464g		ZBIBI k-balance-50
6	K2407810-004	.01	PAH SIM : 8270D/	10.614g		ZBIBI k-balance-50

Relinquished By:	Date/Time:	Received By:	Date/Time:
ZZB	7/31/24 12:00	[signature]	1219 7/31/24

ALS Environmental

Appendix from EXT-3546
Extracting PAH SIM/SIM ALK in Soil
EPA Method 3546

Service Request # K2407810 **Work Group #** KQ2411801

4:1 Hexane:Acetone Lot # 19Ext03-11K Sulfate Lot # 202309 2552

Syringe Volume(s) and ID: 25µL # 73, 250µL-#58
RJ 8/8/24

Extraction Start (time/date/initial): ~~1233~~ 1240 8/1/24 JC

Extraction Stop (time/date/initial): 1325 8/1/24 JC

Pipette Lot # (5 mL) 72120 - 5110 Archived Extract Storage: Grim

Aliquot Amount: 4mL Verified (date/initials): 8/2/24 JC

N-Evap (time/date/initial): 0643 8/2/24 JC N-Evap Thermometer ID: X-SUM-007

Temp as measured: 20 °C Correction factor: 0 °C Adjusted temp: 20 °C
Hexane Exchange (Time/Date/Initial): 0710 8/2/24 JC Hexane Lot #: Z4C116 2011

Silica Gel Clean-up (3630) (Time/Date/Initial): 07:40 8/2/24 SM
Silica Column Lot # 19Ext01-12T 1:1 Hexane/DCM Reagent Lot # 19Ext01-27E

Turbovap (Time/Date/Initial): 08:08 8/2/24 SM Turbovap Therm. ID: V-Turbovap-05
Temp as measured: 27 °C Correction factor: 0 °C Adjusted temp: 27 °C

DCM Lot # Z4E316 2008
Pipette Lot # (1 mL) 09424645

Completed By (time/date/initial): 09:02 8/2/24 SM

Bench Sheet Review Check List	
☑	Hold times met; if no, reason:
☑	Prep date, time, method, department, product code correct
☑	Spike information and Q.C. correct (insufficient volume or mass recorded if no Q.C.)
☑	Weights/Volumes and units correct on raw and final bench sheets
☑	Sample IDs have been checked - bottle numbers appended if required
☑	Names present for: started by, completed by, relinquished by, and witnessed by
☑	Extract storage recorded
☑	Additional prep sheet completely filled out (NA or line out blanks)
☑	All clean-ups have been noted on additional prep sheet

1st 08/08/24
2nd 08/08/24

Validation Report

Data File: J:\MS14\DATA\080524\0805F009.D\
Lab ID: K2407810-001
RunType: N/A
Matrix: Sediment

Date Acquired: 8/5/24 13:20:00
Batch ID: 849989
Analysis Method: 8270D/PAH SIM

Validations

Validation Categories	Pass	Fail
Preparation Hold Time		X
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery		X
Lab Control Sample Recovery	X	
Method Blank	X	
Method Blank Surrogates	X	
Internal Standards	X	
Surrogates	X	
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Sample Exceptions

Exception Categories	Result	Corrective Action
Preparation Hold Time	Prep Date/Time: 08/01/2024 1240 Hold Date/Time: 07/26/2022 2359	Frozen Sample Used

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Continuing Calibration Recovery	Benzo(a)pyrene	22		20	OK, <40

Primary Review: _____

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Secondary Review: _____

1st 08/08/24
2nd 08/08/24

Quantitation Report

Data File:	J:\MS14\DATA\080524\0805F009.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 13:20:00	**Vial:**	7
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-001	**Raw Units:**	ng/mL

Bottle ID:	K2407810-001.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	PAH SIM	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	849989	**Prep Lot:**	442452	**Report Group:**	K2407810
Analysis	8270D	**Prep Method:**	EPA 3546		
		Prep Date:	8/1/24		

Title:	Polycyclic Aromatic Hydrocarbons by GC/MS SIM	**Calibration ID:**	KC2400163
		Report List ID:	18909

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Acenaphthene-d10	6.19	+0.01	127467	200.00	OK
Chrysene-d12	9.93	+0.01	280553	200.00	OK
Naphthalene-d8	4.56	-0.01	257911	200.00	OK
Perylene-d12	13.00	+0.08	331456	200.00	OK
Phenanthrene-d10	7.44	+0.01	258283	200.00	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec	% Rec Criteria	Rpt?
Fluoranthene-d10	8.43	+0.02	268162	189.76	95	28 - 112	Y
Fluorene-d10	6.63	+0.01	127586	173.92	87	34 - 106	Y
Terphenyl-d14	8.76	+0.01	253580	163.56	82	32 - 122	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
2-Methylnaphthalene	5.26	-0.01	39503	49.22	93		Y
Acenaphthene	6.21		98871	135.74	260		Y
Acenaphthylene	6.06	-0.01	42557	37.54	71		Y
Anthracene	7.50	+0.01	127729	101.69	190		Y
Benz(a)anthracene	9.92	+0.02	465016	254.77	480		Y
Benzo(a)pyrene	12.84	+0.07	398295	234.80	440		Y
Benzo(b)fluoranthene	11.96	+0.05	533302	250.98	480		Y
Benzo(g,h,i)perylene	15.72	+0.05	306230	131.26	250		Y
Benzo(k)fluoranthene	12.02	+0.05	186218	92.79	180		Y
Chrysene	9.97	+0.02	673111	387.36	730		Y
Dibenz(a,h)anthracene	15.37	+0.04	75264	37.77	72		Y
Fluoranthene	8.44	+0.01	892543	575.84	1100		Y
Fluorene	6.65		136481	163.00	310		Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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1st 08/08/24

2nd 08/08/24

Data File:	J:\MS14\DATA\080524\0805F009.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 13:20:00	**Vial:**	7
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-001	**Raw Units:**	ng/mL

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Indeno(1,2,3-cd)pyrene	15.34	+0.05	254394	144.31	270		Y
Naphthalene	4.58	-0.02	108067	87.40	170		Y
Phenanthrene	7.46	+0.01	1117875	829.01	1600		Y
Pyrene	8.63	+0.01	1177818	648.69	1200		Y

Prep Amount:	10.079 g	**Dilution:**	1
Prep Final Amount:	10.00 mL	**Basis Factor:**	52.40

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23

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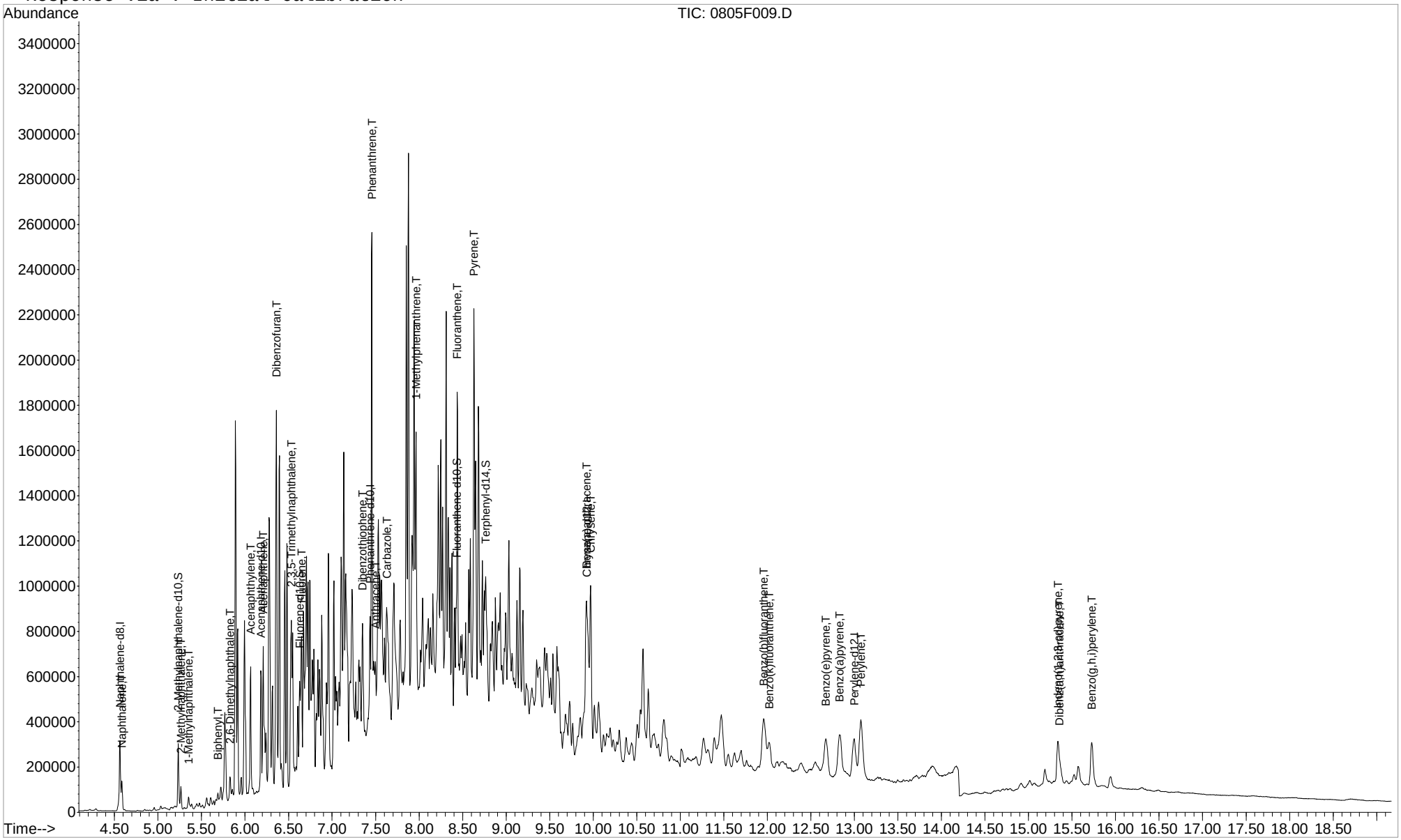
Quantitation Report (QT Reviewed)

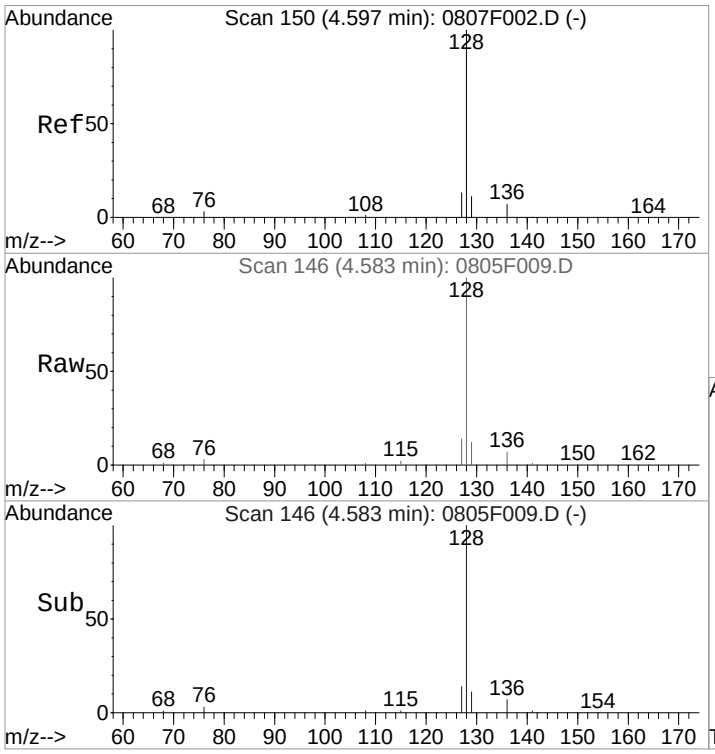
1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:07 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration



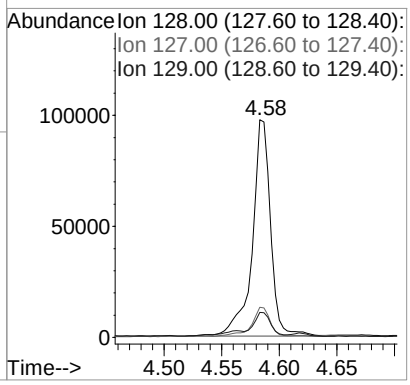
1st 08/08/24
2nd 08/08/24

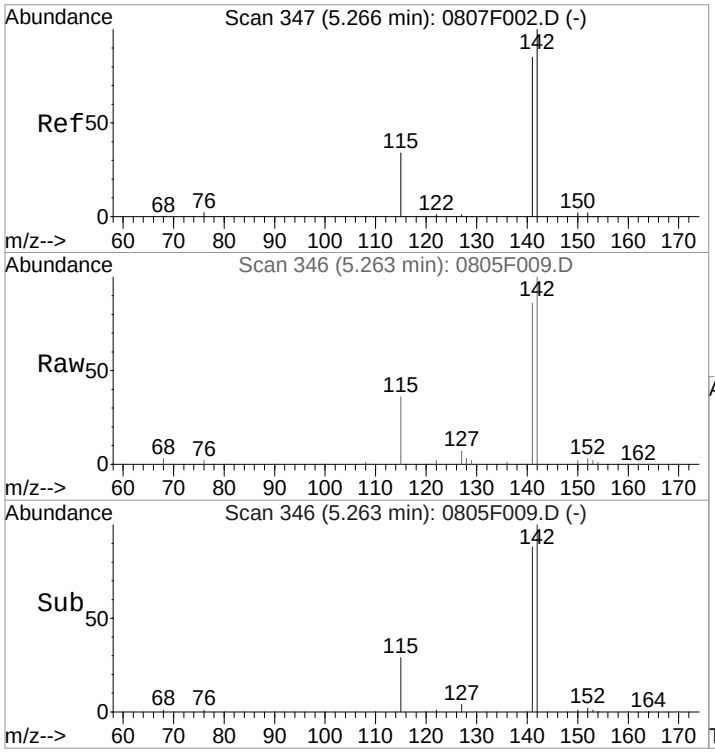


#2
Naphthalene
Concen: 87.40 ng/ml
RT: 4.58 min Scan# 146
Delta R.T. -0.06 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:128 Resp: 108067

Ion	Ratio	Lower	Upper
128	100		
127	13.6	0.0	42.8
129	11.1	0.0	41.5

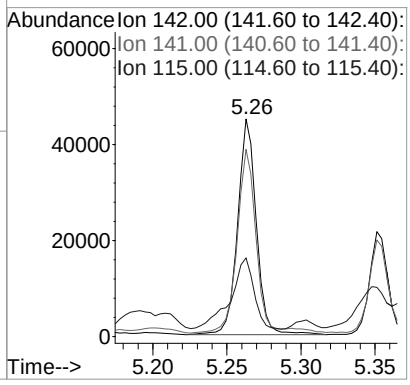




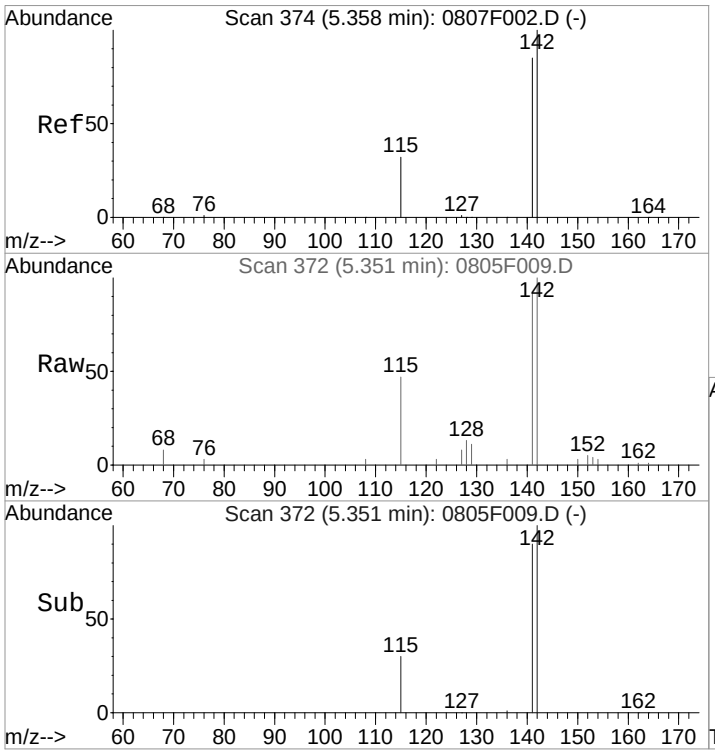
#4
2-Methylnaphthalene
Concen: 49.22 ng/ml
RT: 5.26 min Scan# 346
Delta R.T. -0.04 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:142 Resp: 39503

Ion	Ratio	Lower	Upper
142	100		
141	84.9	52.1	112.1
115	32.3	1.0	61.0



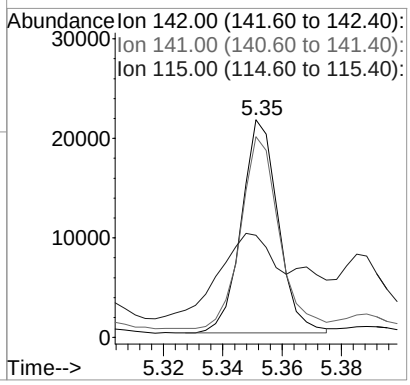
1st 08/08/24
2nd 08/08/24

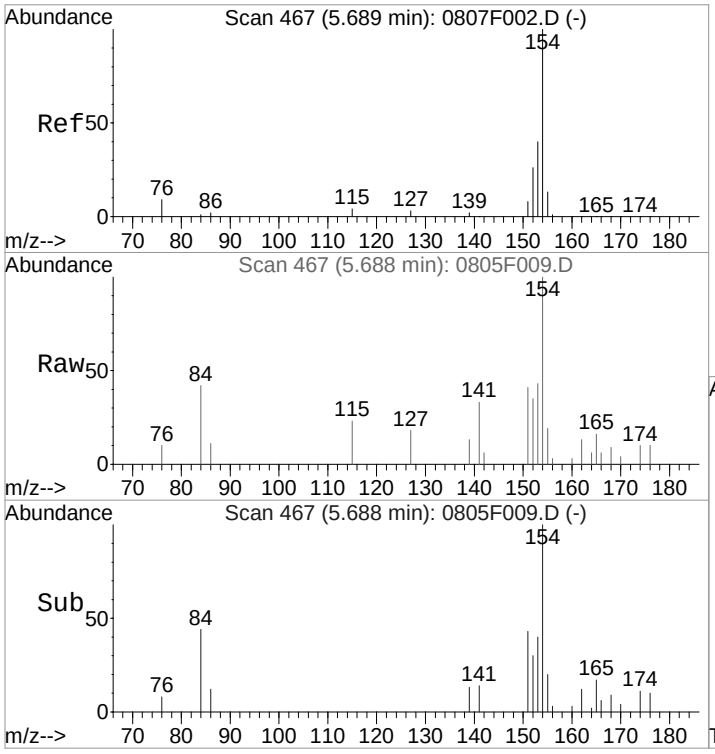


#5
1-Methylnaphthalene
Concen: 24.40 ng/ml
RT: 5.35 min Scan# 372
Delta R.T. -0.04 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:142 Resp: 18432

Ion	Ratio	Lower	Upper
142	100		
141	89.9	55.8	115.8
115	35.1	1.9	61.9

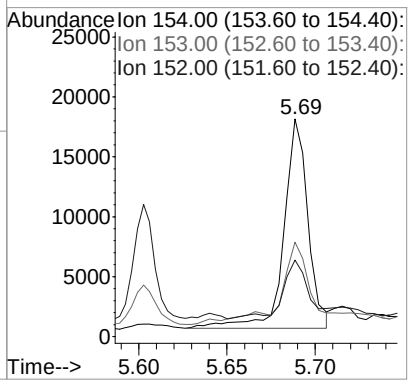




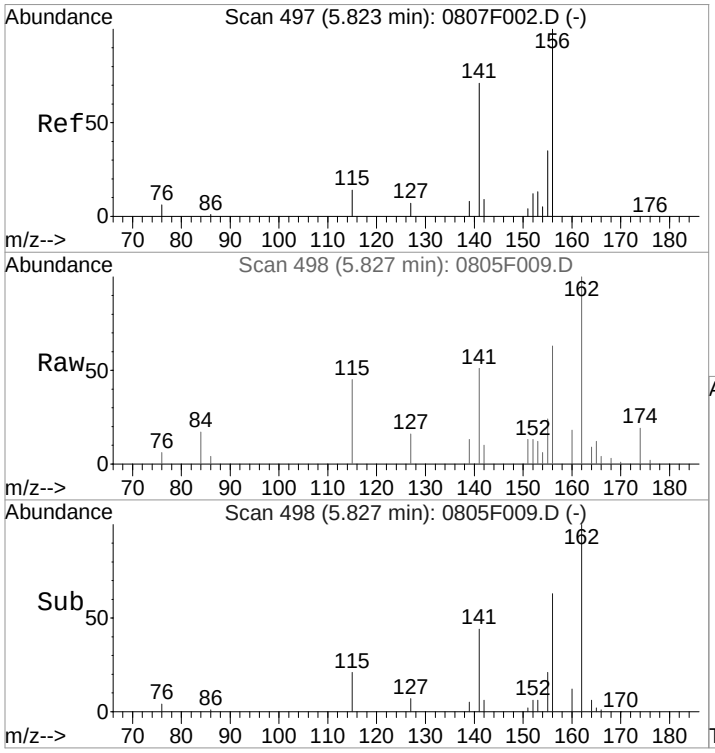
#6
Biphenyl
Concen: 16.81 ng/ml
RT: 5.69 min Scan# 467
Delta R.T. -0.03 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:154 Resp: 16410

Ion	Ratio	Lower	Upper
154	100		
153	39.2	8.6	68.6
152	27.8	0.0	55.8



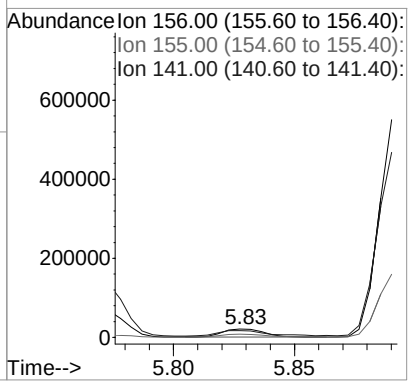
1st 08/08/24
2nd 08/08/24

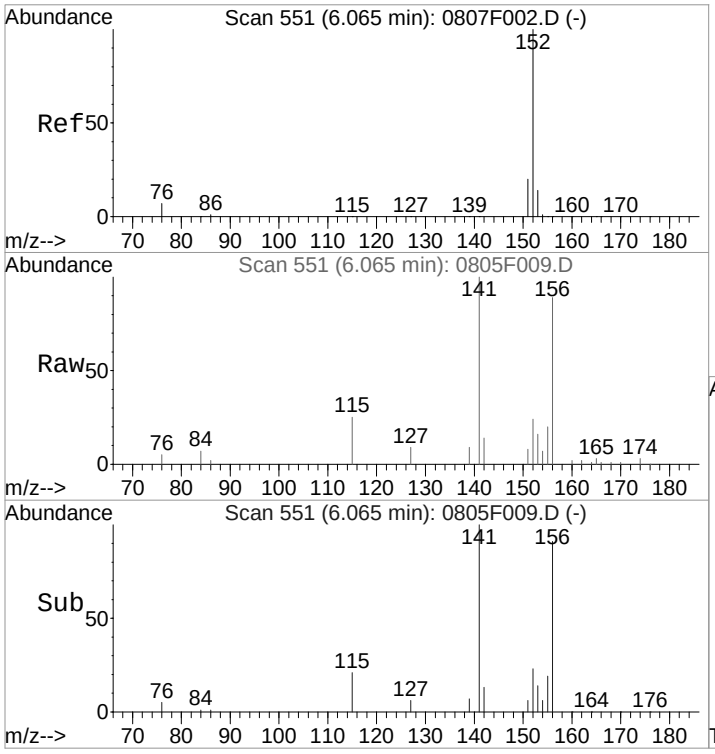


#7
2,6-Dimethylnaphthalene
Concen: 35.56 ng/ml
RT: 5.83 min Scan# 498
Delta R.T. -0.02 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:156 Resp: 24573

Ion	Ratio	Lower	Upper
156	100		
155	34.7	4.7	64.7
141	66.7	39.2	99.2

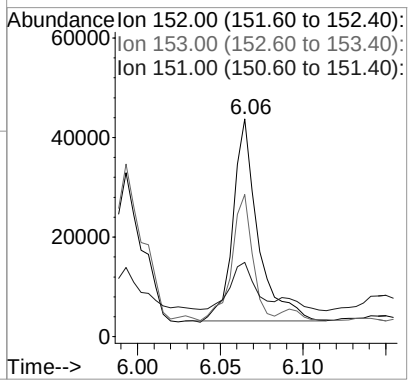




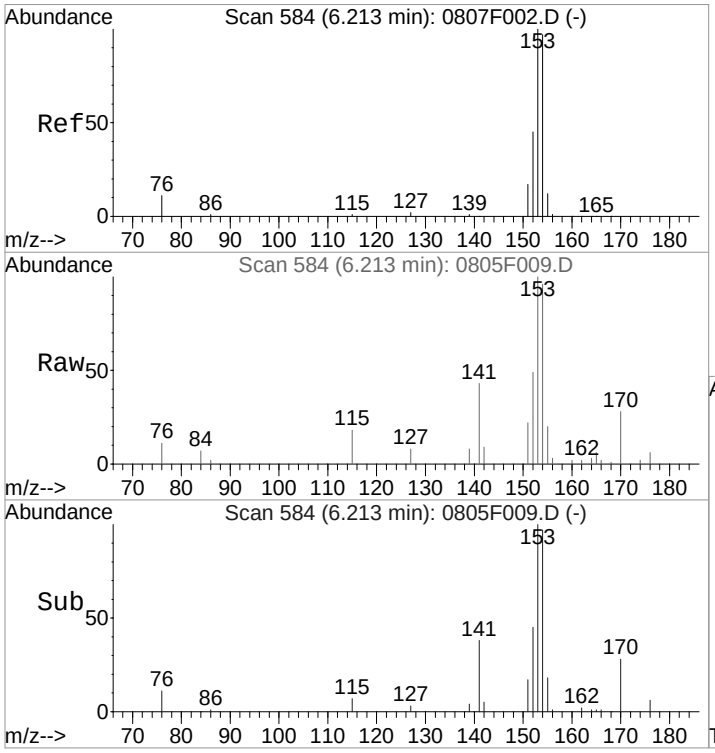
#9
Acenaphthylene
Concen: 37.54 ng/ml
RT: 6.06 min Scan# 551
Delta R.T. -0.03 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:152 Resp: 42557

Ion	Ratio	Lower	Upper
152	100		
153	62.0	0.0	44.2#
151	24.0	0.0	49.6



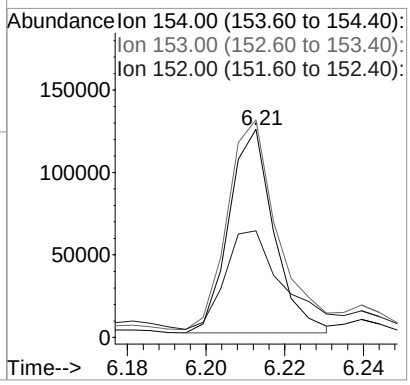
1st 08/08/24
2nd 08/08/24

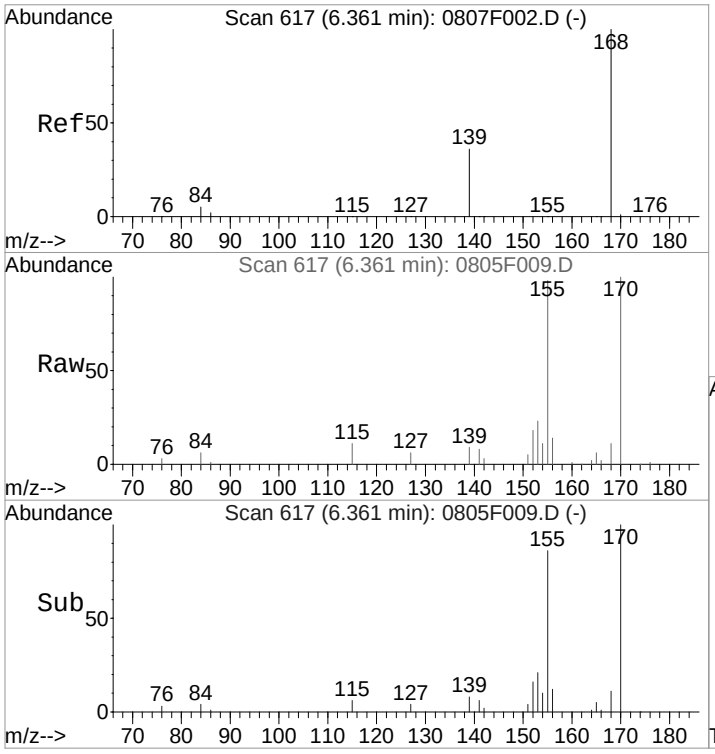


#10
Acenaphthene
Concen: 135.74 ng/ml
RT: 6.21 min Scan# 584
Delta R.T. -0.02 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:154 Resp: 98871

Ion	Ratio	Lower	Upper
154	100		
153	103.0	75.0	135.0
152	48.5	19.6	79.6

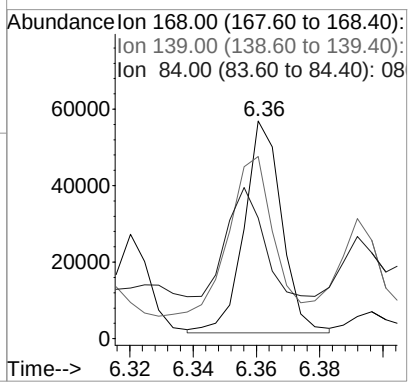




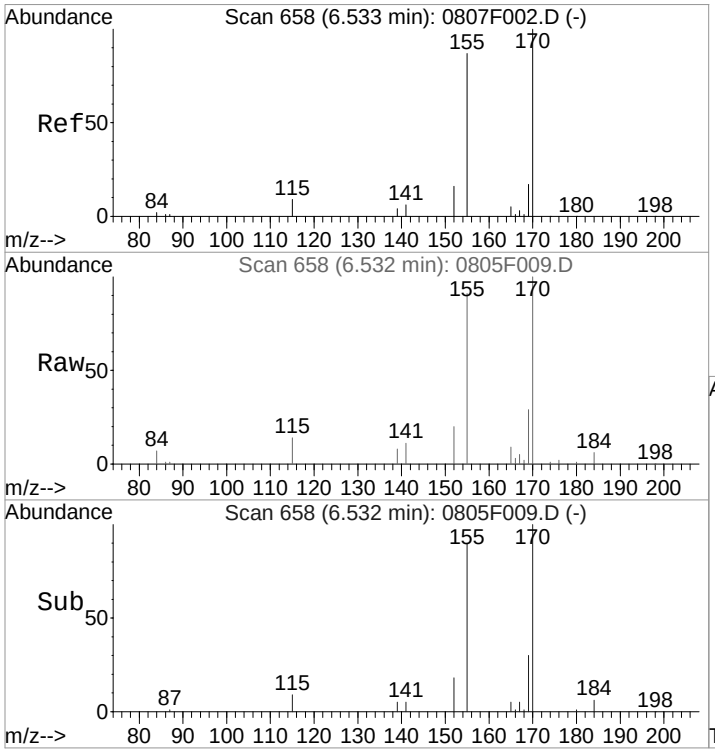
#11
Dibenzofuran
Concen: 42.53 ng/ml m
RT: 6.36 min Scan# 617
Delta R.T. -0.03 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:168 Resp: 45908

Ion	Ratio	Lower	Upper
168	100		
139	83.8	0.0	59.2#
84	55.4	0.0	34.2#



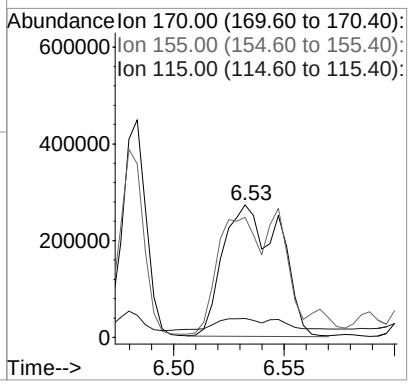
1st 08/08/24
2nd 08/08/24

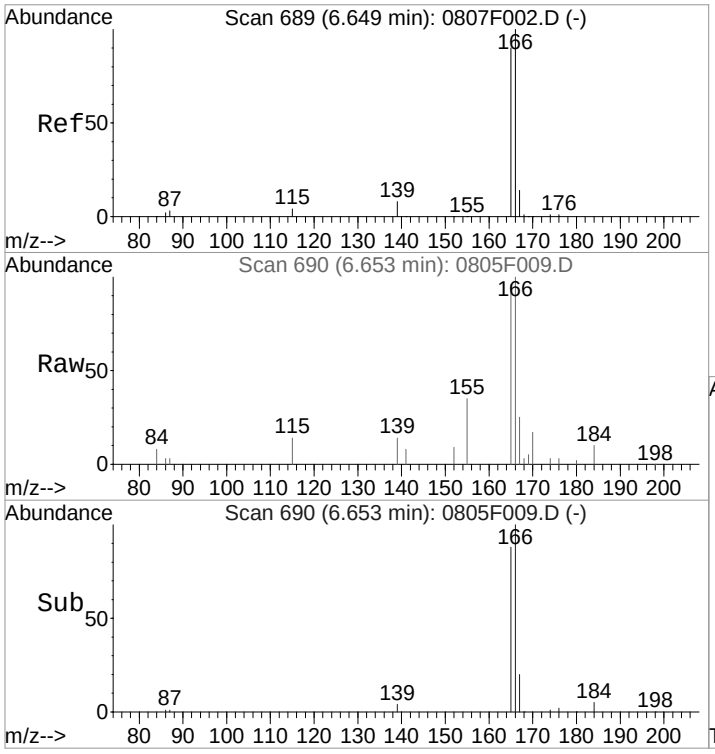


#12
2,3,5-Trimethylnaphthalene
Concen: 713.95 ng/ml m
RT: 6.53 min Scan# 658
Delta R.T. -0.03 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:170 Resp: 486999

Ion	Ratio	Lower	Upper
170	100		
155	90.6	52.5	112.5
115	14.3	0.0	38.1

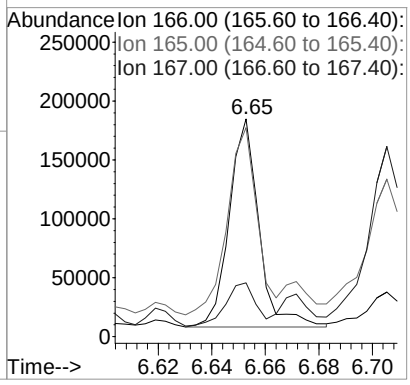




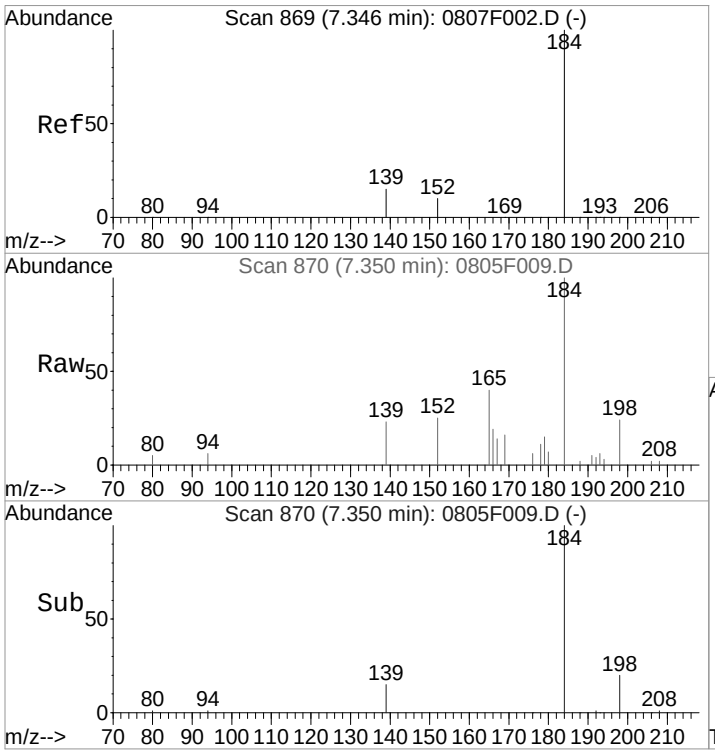
#14
Fluorene
Concen: 163.00 ng/ml
RT: 6.65 min Scan# 690
Delta R.T. -0.02 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:166 Resp: 136481

Ion	Ratio	Lower	Upper
166	100		
165	90.1	56.8	116.8
167	20.9	0.0	44.0



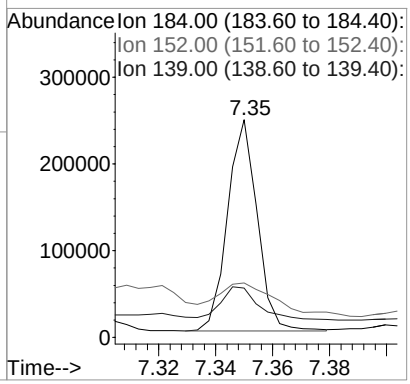
1st 08/08/24
2nd 08/08/24

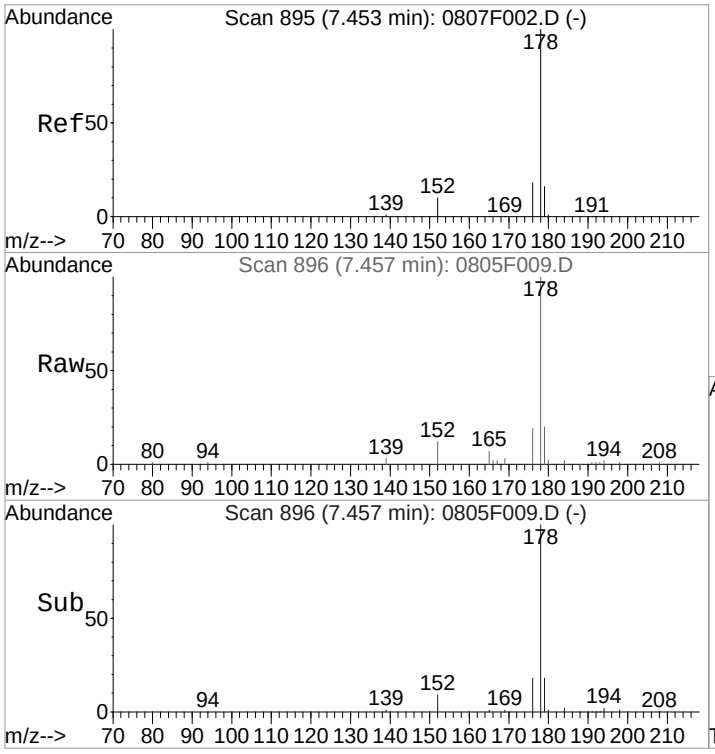


#16
Dibenzothiophene
Concen: 136.33 ng/ml
RT: 7.35 min Scan# 870
Delta R.T. -0.02 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:184 Resp: 176828

Ion	Ratio	Lower	Upper
184	100		
152	13.7	0.0	40.4
139	14.9	0.0	44.9

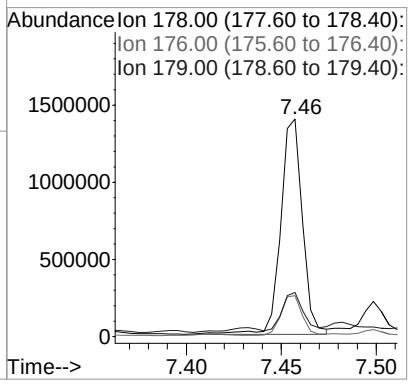




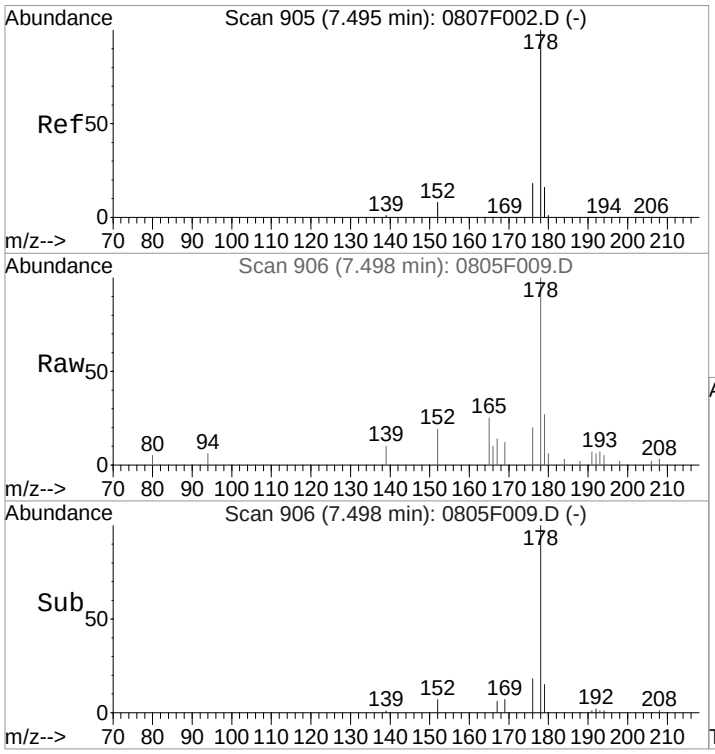
#17
Phenanthrene
Concen: 829.01 ng/ml
RT: 7.46 min Scan# 896
Delta R.T. -0.02 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:178 Resp: 1117875

Ion	Ratio	Lower	Upper
178	100		
176	18.5	0.0	47.9
179	18.2	0.0	46.5



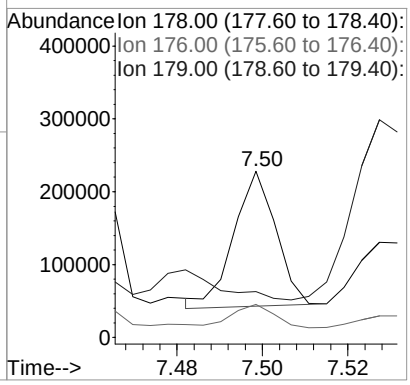
1st 08/08/24
2nd 08/08/24

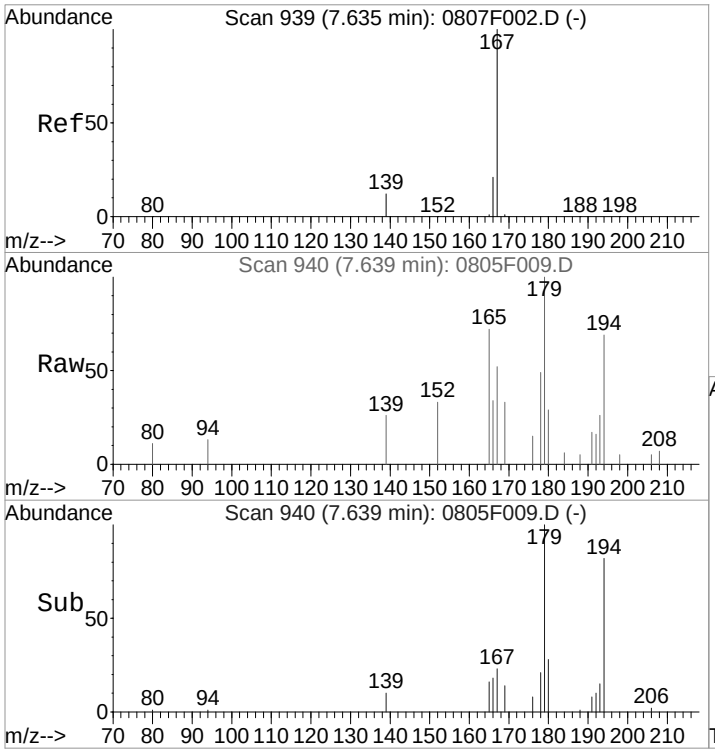


#18
Anthracene
Concen: 101.69 ng/ml
RT: 7.50 min Scan# 906
Delta R.T. -0.02 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:178 Resp: 127729

Ion	Ratio	Lower	Upper
178	100		
176	17.4	0.0	47.8
179	0.0	0.0	46.9

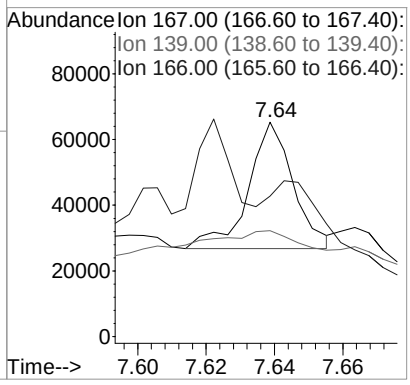




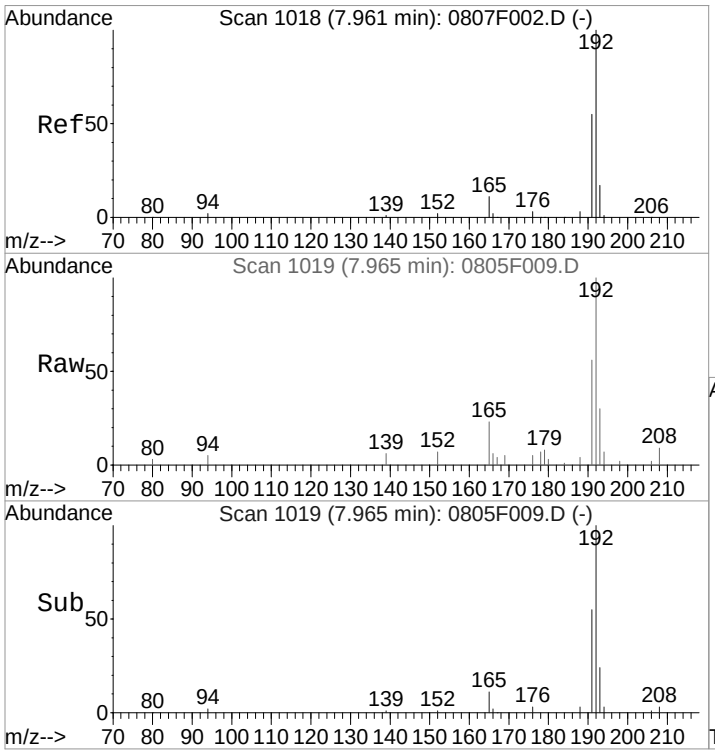
#19
Carbazole
Concen: 29.70 ng/ml
RT: 7.64 min Scan# 940
Delta R.T. -0.02 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:167 Resp: 35236

Ion	Ratio	Lower	Upper
167	100		
139	15.5	0.0	42.5
166	21.8	0.0	50.6



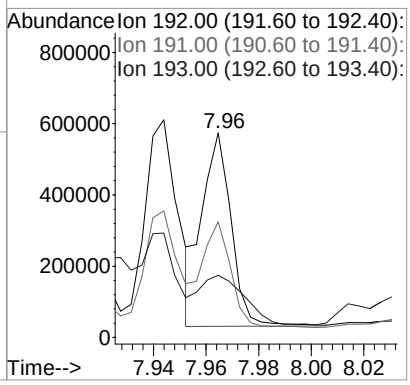
1st 08/08/24
2nd 08/08/24

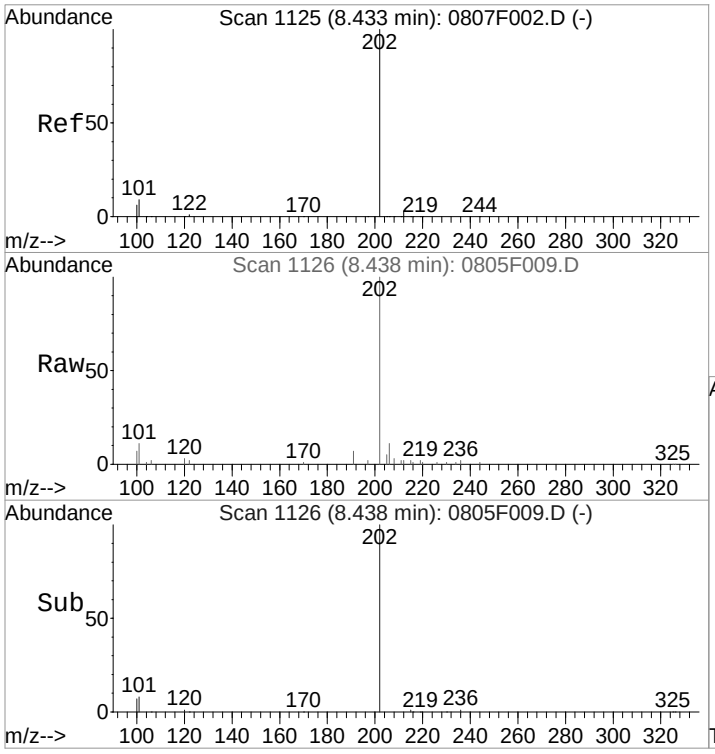


#20
1-Methylphenanthrene
Concen: 420.72 ng/ml
RT: 7.96 min Scan# 1019
Delta R.T. -0.02 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:192 Resp: 422018

Ion	Ratio	Lower	Upper
192	100		
191	54.7	22.7	82.7
193	24.7	0.0	47.5

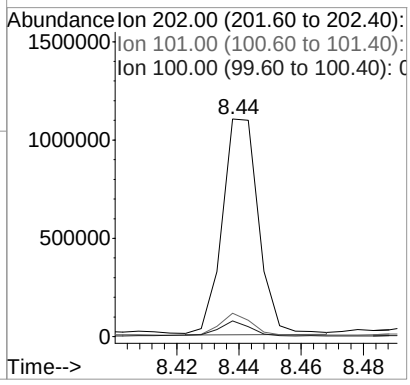




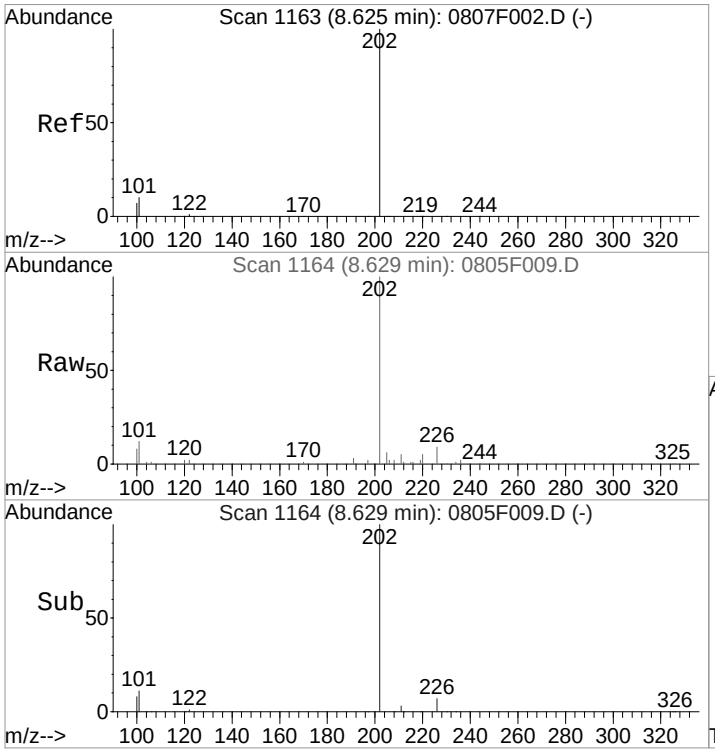
#21
Fluoranthene
Concen: 575.84 ng/ml
RT: 8.44 min Scan# 1126
Delta R.T. -0.03 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:202 Resp: 892543

Ion	Ratio	Lower	Upper
202	100		
101	10.3	0.0	36.9
100	6.9	0.0	34.3



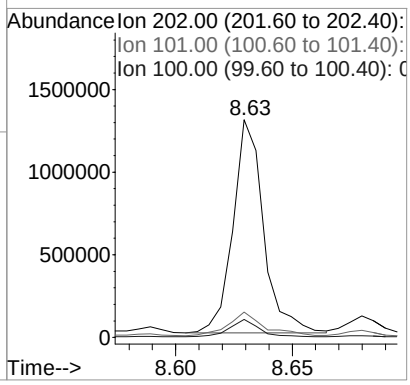
1st 08/08/24
2nd 08/08/24

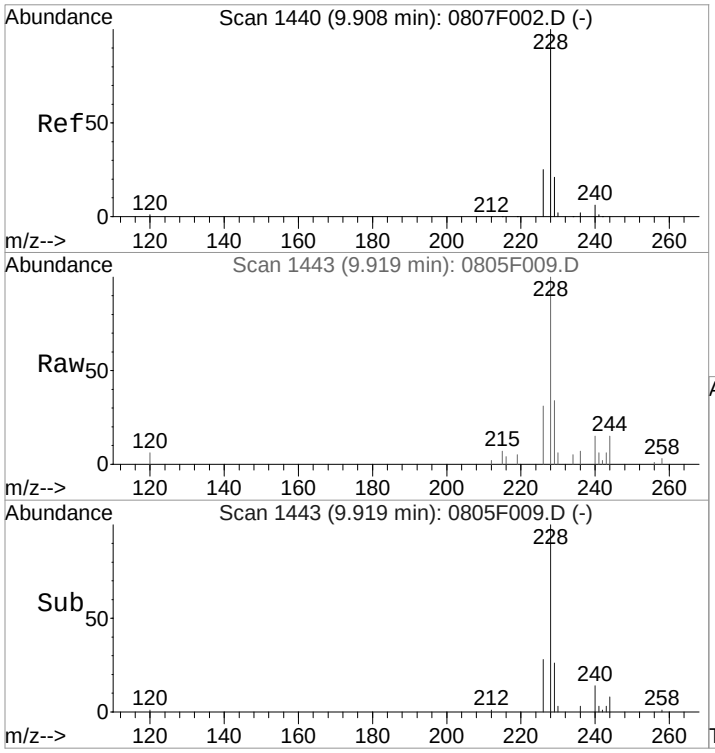


#24
Pyrene
Concen: 648.69 ng/ml
RT: 8.63 min Scan# 1164
Delta R.T. -0.02 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:202 Resp: 1177818

Ion	Ratio	Lower	Upper
202	100		
101	11.0	0.0	41.8
100	8.2	0.0	37.9

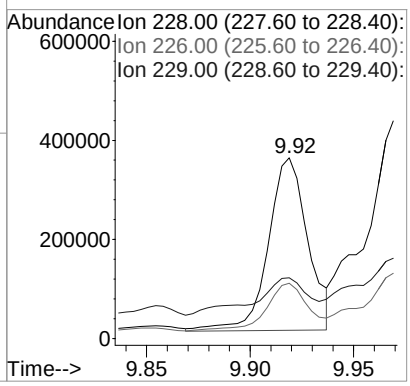


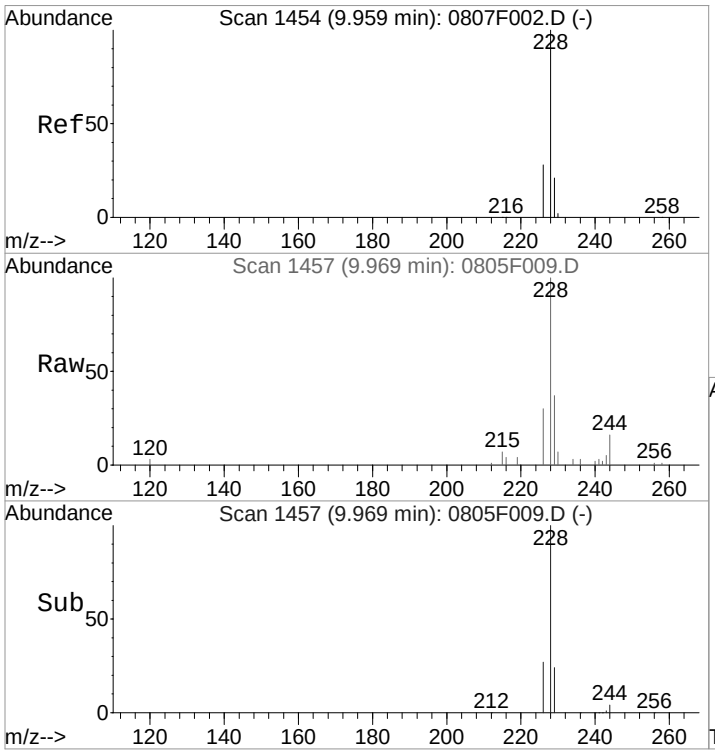


#26
Benz(a)anthracene
Concen: 254.77 ng/ml
RT: 9.92 min Scan# 1443
Delta R.T. -0.03 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:228 Resp: 465016

Ion	Ratio	Lower	Upper
228	100		
226	27.8	0.0	54.6
229	21.9	0.0	50.6

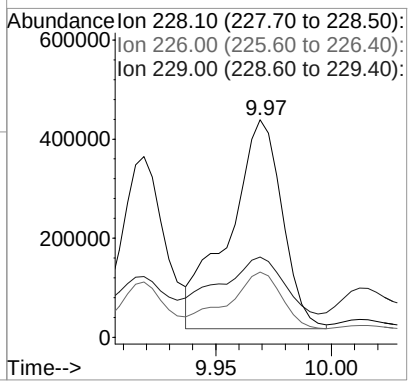


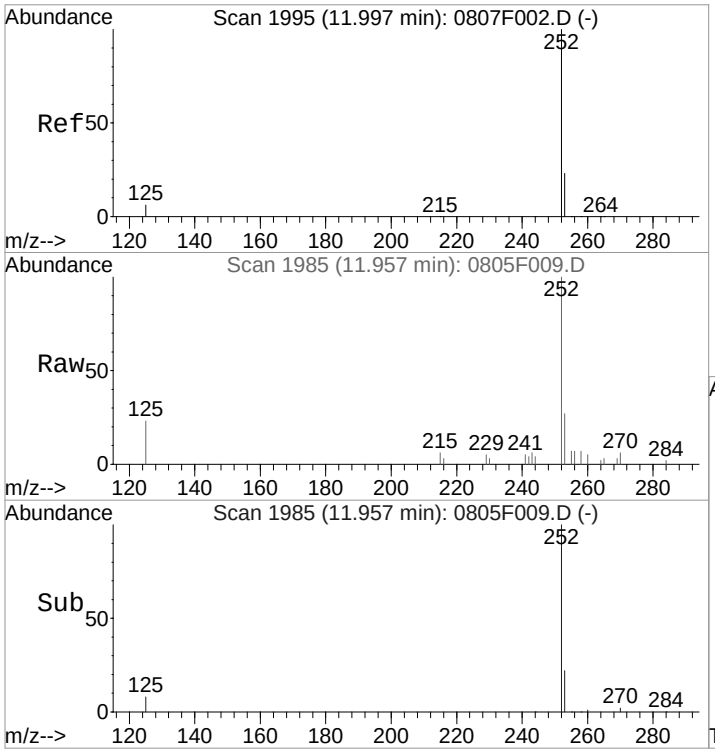


#27
Chrysene
Concen: 387.36 ng/ml
RT: 9.97 min Scan# 1457
Delta R.T. -0.03 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:228 Resp: 673111

Ion	Ratio	Lower	Upper
228	100		
226	27.6	0.0	57.3
229	27.2	0.0	50.7

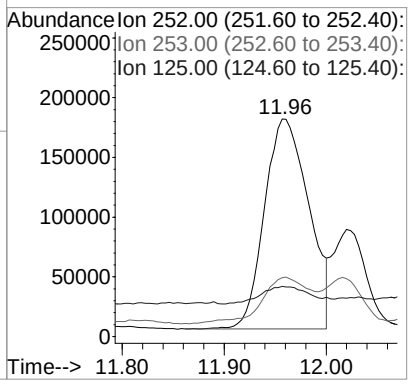


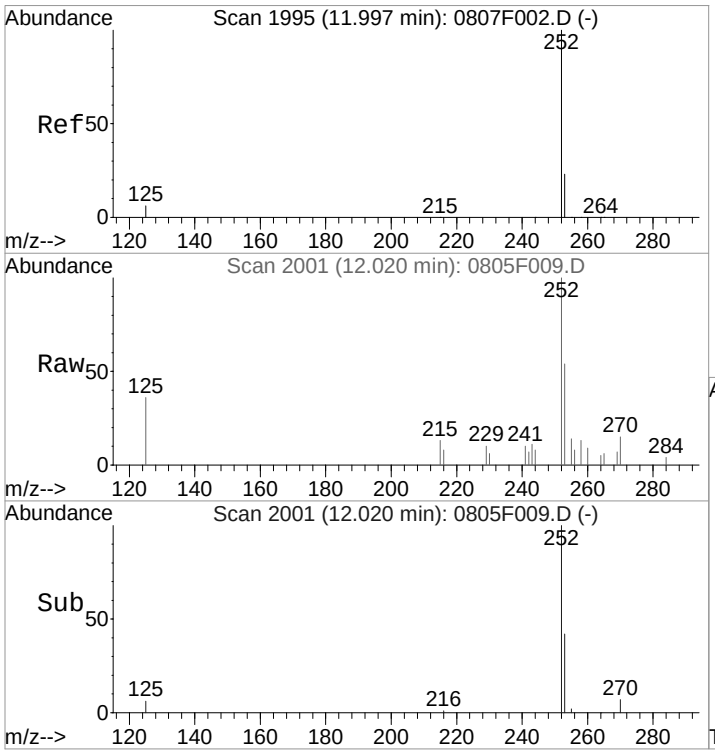


#29
Benzo(b)fluoranthene
Concen: 250.98 ng/ml
RT: 11.96 min Scan# 1985
Delta R.T. 0.03 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:252 Resp: 533302

Ion	Ratio	Lower	Upper
252	100		
253	21.9	0.0	52.5
125	8.1	0.0	36.1

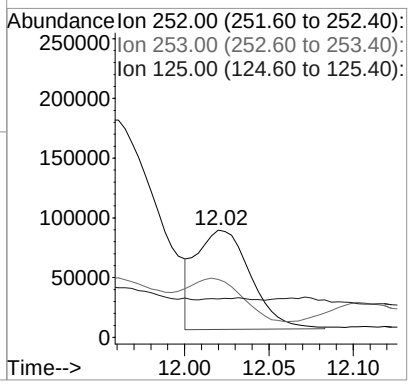


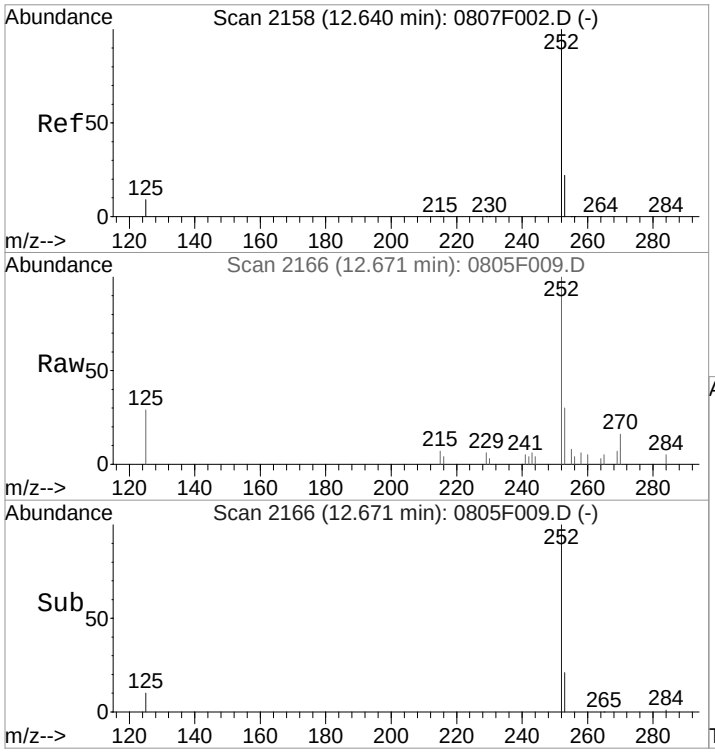


#30
Benzo(k)fluoranthene
Concen: 92.79 ng/ml m
RT: 12.02 min Scan# 2001
Delta R.T. 0.03 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:252 Resp: 186218

Ion	Ratio	Lower	Upper
252	100		
253	54.0	0.0	52.7#
125	36.0	0.0	35.9#

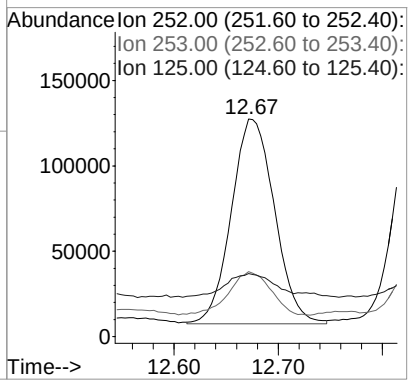


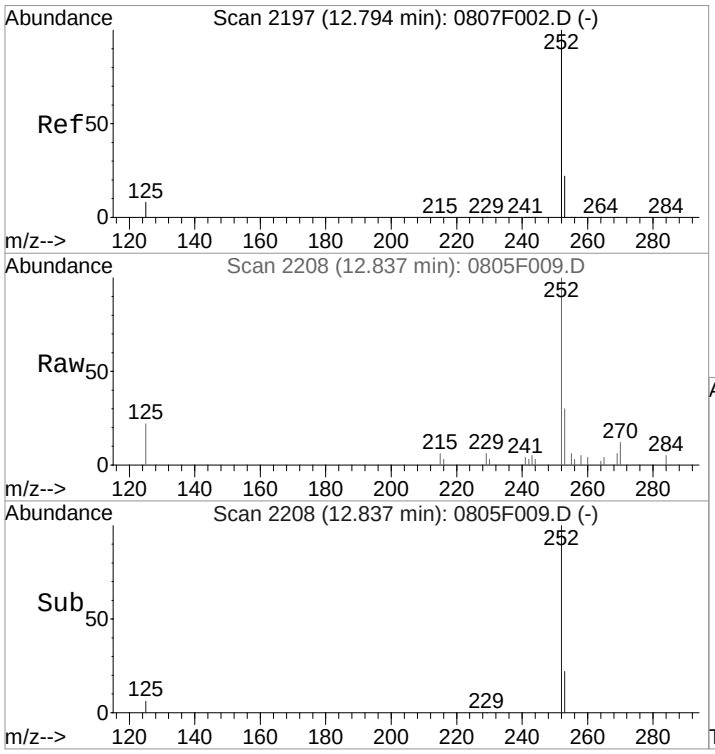


#31
Benzo(e)pyrene
Concen: 173.91 ng/ml m
RT: 12.67 min Scan# 2166
Delta R.T. 0.04 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:252 Resp: 346269

Ion	Ratio	Lower	Upper
252	100		
253	29.9	0.0	52.0
125	29.0	0.0	39.2

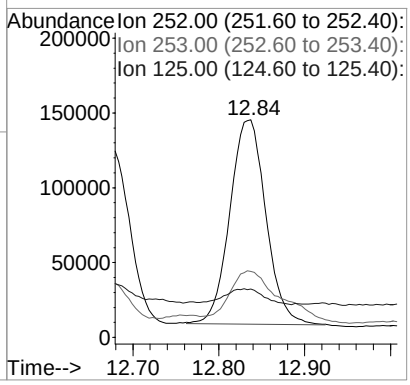


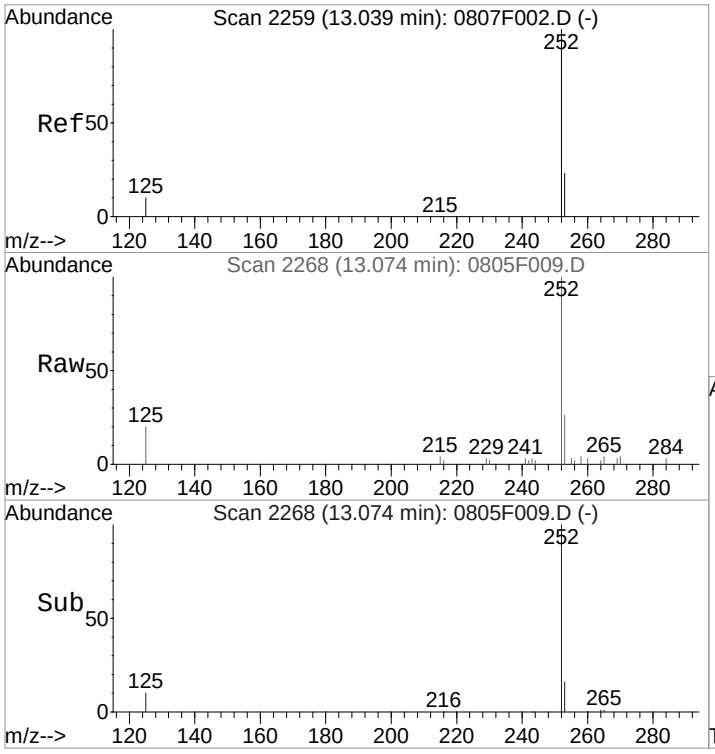


#32
Benzo(a)pyrene
Concen: 234.80 ng/ml m
RT: 12.84 min Scan# 2208
Delta R.T. 0.06 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:252 Resp: 398295

Ion	Ratio	Lower	Upper
252	100		
253	30.3	0.0	52.3
125	22.2	0.0	36.9

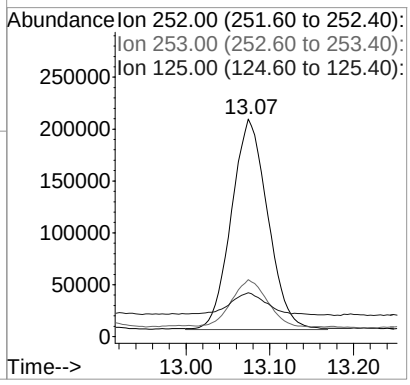


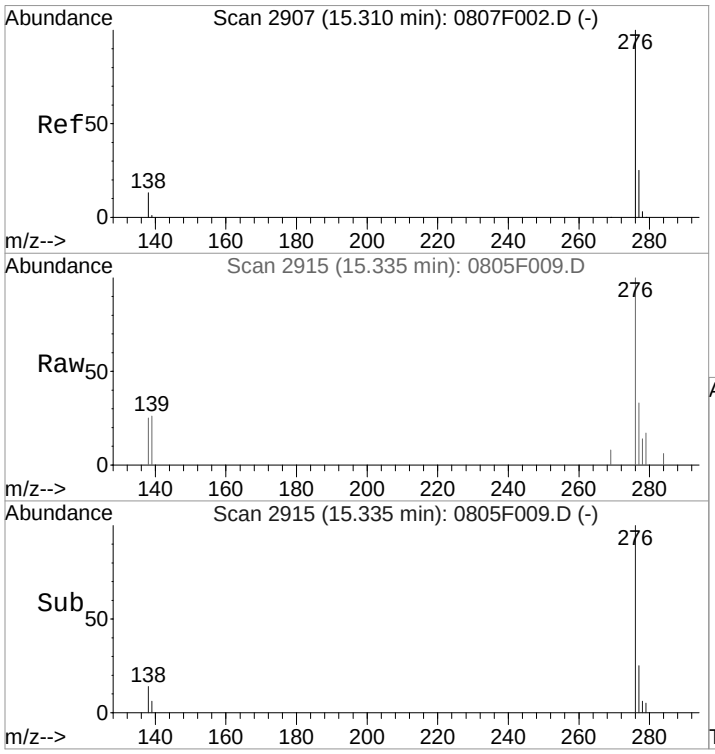


#33
Perylene
Concen: 335.94 ng/ml m
RT: 13.07 min Scan# 2268
Delta R.T. 0.05 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:252 Resp: 614850

Ion	Ratio	Lower	Upper
252	100		
253	26.3	0.0	52.2
125	20.2	0.0	39.2

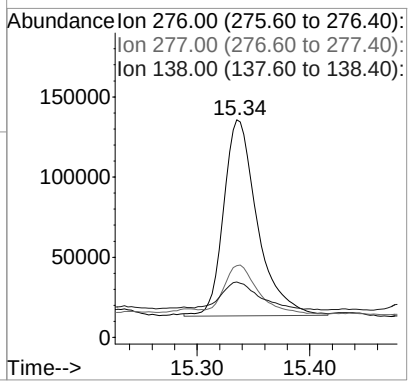


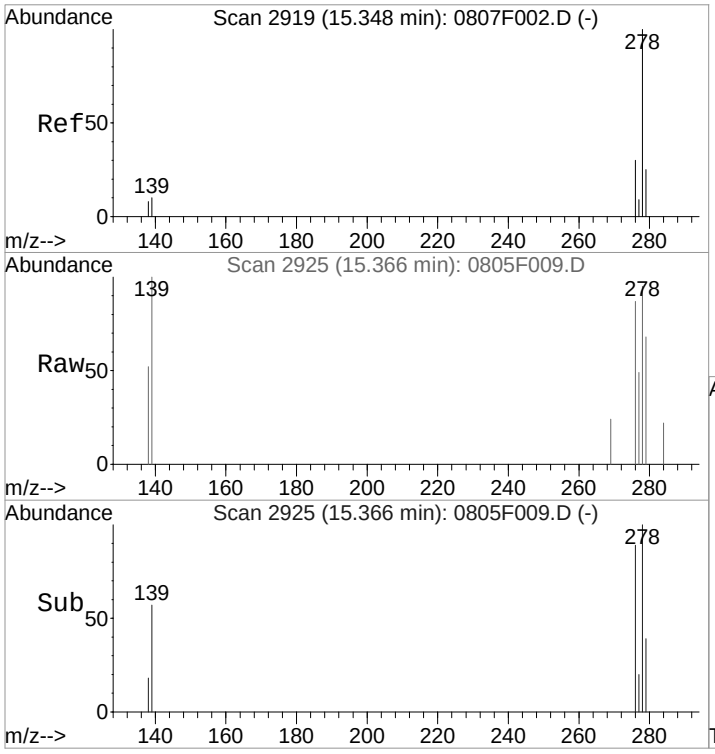


#34
Indeno(1,2,3-cd)pyrene
Concen: 144.31 ng/ml m
RT: 15.34 min Scan# 2915
Delta R.T. 0.05 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:276 Resp: 254394

Ion	Ratio	Lower	Upper
276	100		
277	33.0	0.0	55.2
138	25.4	0.0	42.2

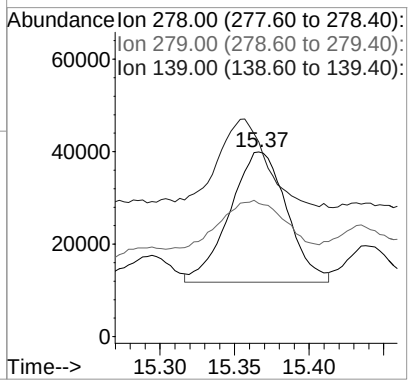




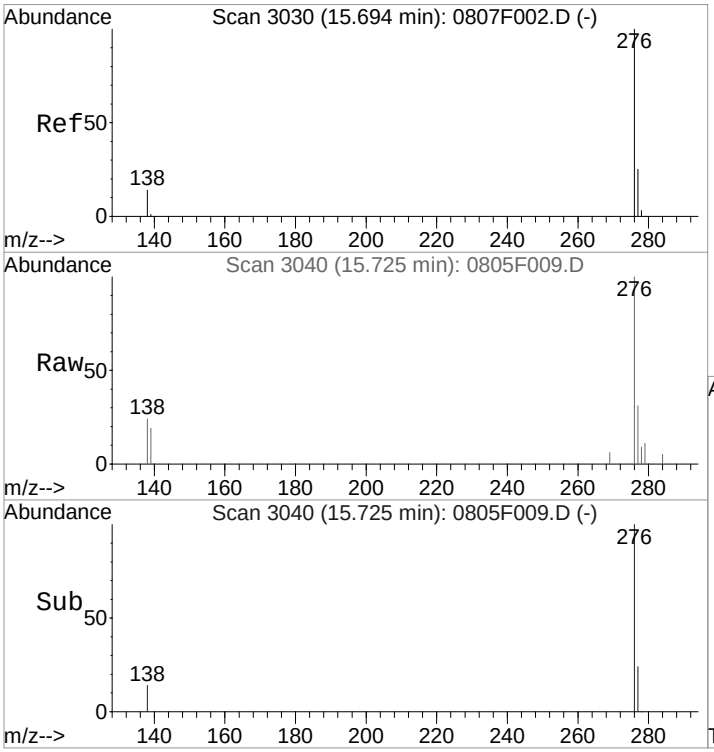
#35
Dibenz(a,h)anthracene
Concen: 37.77 ng/ml m
RT: 15.37 min Scan# 2925
Delta R.T. 0.03 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:278 Resp: 75264

Ion	Ratio	Lower	Upper
278	100		
279	72.1	0.0	55.2#
139	105.4	0.0	40.4#



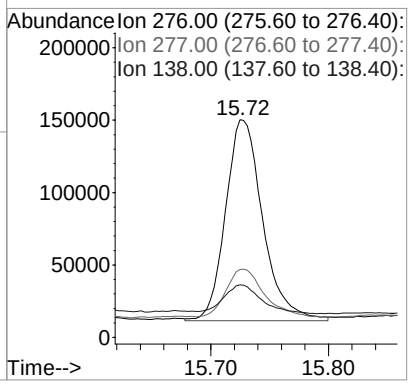
1st 08/08/24
2nd 08/08/24



#36
Benzo(g,h,i)perylene
Concen: 131.26 ng/ml m
RT: 15.72 min Scan# 3040
Delta R.T. 0.06 min
Lab File: 0805F009.D
Acq: 5 Aug 2024 1:20 pm

Tgt Ion:276 Resp: 306230

Ion	Ratio	Lower	Upper
276	100		
277	31.2	0.0	54.9
138	24.1	0.0	43.8



Quantitation Report (QT Reviewed)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 05 14:59:31 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.56	136	257911	200.00	ng/ml	-0.06
8) Acenaphthene-d10	6.19	164	127467	200.00	ng/ml	-0.02
15) Phenanthrene-d10	7.44	188	258283	200.00	ng/ml	-0.02
23) Chrysene-d12	9.93	240	280553	200.00	ng/ml	-0.03
28) Perylene-d12	13.00	264	331456m	200.00	ng/ml	0.05
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.23	152	110810	153.54	ng/ml	-0.04
Spiked Amount 200.000			Recovery = 76.77%			
13) Fluorene-d10	6.63	176	127586	173.92	ng/ml	-0.03
Spiked Amount 200.000			Recovery = 86.96%			
22) Fluoranthene-d10	8.43	212	268162m	189.76	ng/ml	-0.02
Spiked Amount 200.000			Recovery = 94.88%			
25) Terphenyl-d14	8.76	244	253580	163.56	ng/ml	-0.03
Spiked Amount 200.000			Recovery = 81.78%			
Target Compounds						Qvalue
2) Naphthalene	4.58	128	108067	87.40	ng/ml	99
4) 2-Methylnaphthalene	5.26	142	39503	49.22	ng/ml	97
5) 1-Methylnaphthalene	5.35	142	18432	24.40	ng/ml	95
6) Biphenyl	5.69	154	16410	16.81	ng/ml	98
7) 2,6-Dimethylnaphthalene	5.83	156	24573	35.56	ng/ml	98
9) Acenaphthylene	6.06	152	42557	37.54	ng/ml#	45
10) Acenaphthene	6.21	154	98871	135.74	ng/ml	98
11) Dibenzofuran	6.36	168	45908m	42.53	ng/ml	
12) 2,3,5-Trimethylnaphthalene	6.53	170	486999m	713.95	ng/ml	
14) Fluorene	6.65	166	136481	163.00	ng/ml	95
16) Dibenzothiophene	7.35	184	176828	136.33	ng/ml	96
17) Phenanthrene	7.46	178	1117875	829.01	ng/ml	97
18) Anthracene	7.50	178	127729	101.69	ng/ml	80
19) Carbazole	7.64	167	35236	29.70	ng/ml	95
20) 1-Methylphenanthrene	7.96	192	422018	420.72	ng/ml	94
21) Fluoranthene	8.44	202	892543	575.84	ng/ml	91
24) Pyrene	8.63	202	1177818	648.69	ng/ml	98
26) Benz(a)anthracene	9.92	228	465016	254.77	ng/ml	95
27) Chrysene	9.97	228	673111	387.36	ng/ml	94
29) Benzo(b)fluoranthene	11.96	252	533302	250.98	ng/ml	98
30) Benzo(k)fluoranthene	12.02	252	186218m	92.79	ng/ml	
31) Benzo(e)pyrene	12.67	252	346269m	173.91	ng/ml	
32) Benzo(a)pyrene	12.84	252	398295m	234.80	ng/ml	
33) Perylene	13.07	252	614850m	335.94	ng/ml	
34) Indeno(1,2,3-cd)pyrene	15.34	276	254394m	144.31	ng/ml	
35) Dibenz(a,h)anthracene	15.37	278	75264m	37.77	ng/ml	
36) Benzo(g,h,i)perylene	15.72	276	306230m	131.26	ng/ml	

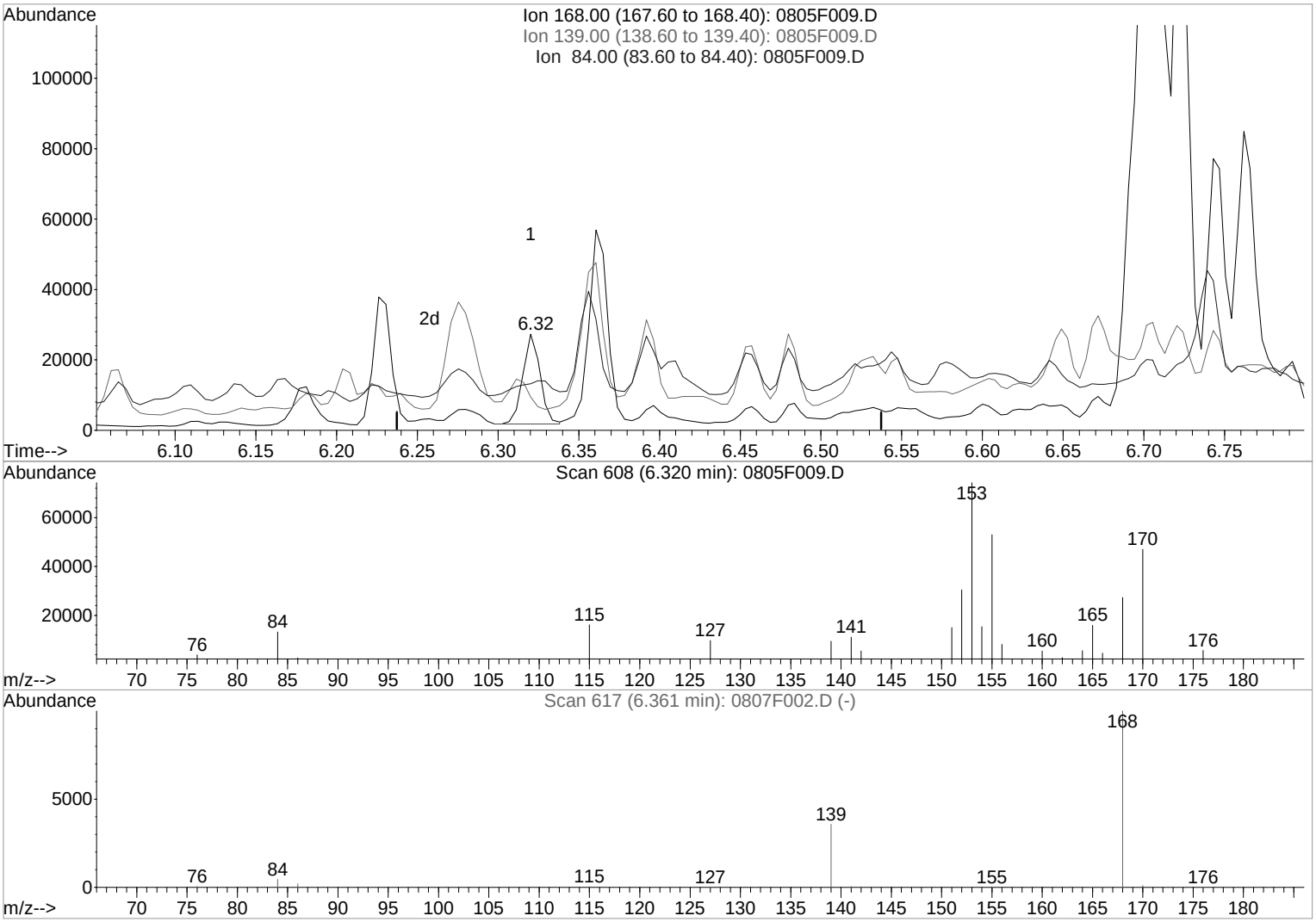
(#) = qualifier out of range (m) = manual integration

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 5 14:59 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(11) Dibenzofuran (T)

6.32min 17.71ng/ml

response 19119

Ion	Exp%	Act%
168.00	100	100
139.00	29.20	9.78
84.00	4.20	12.86
0.00	0.00	0.00

Manual Integration:

Before

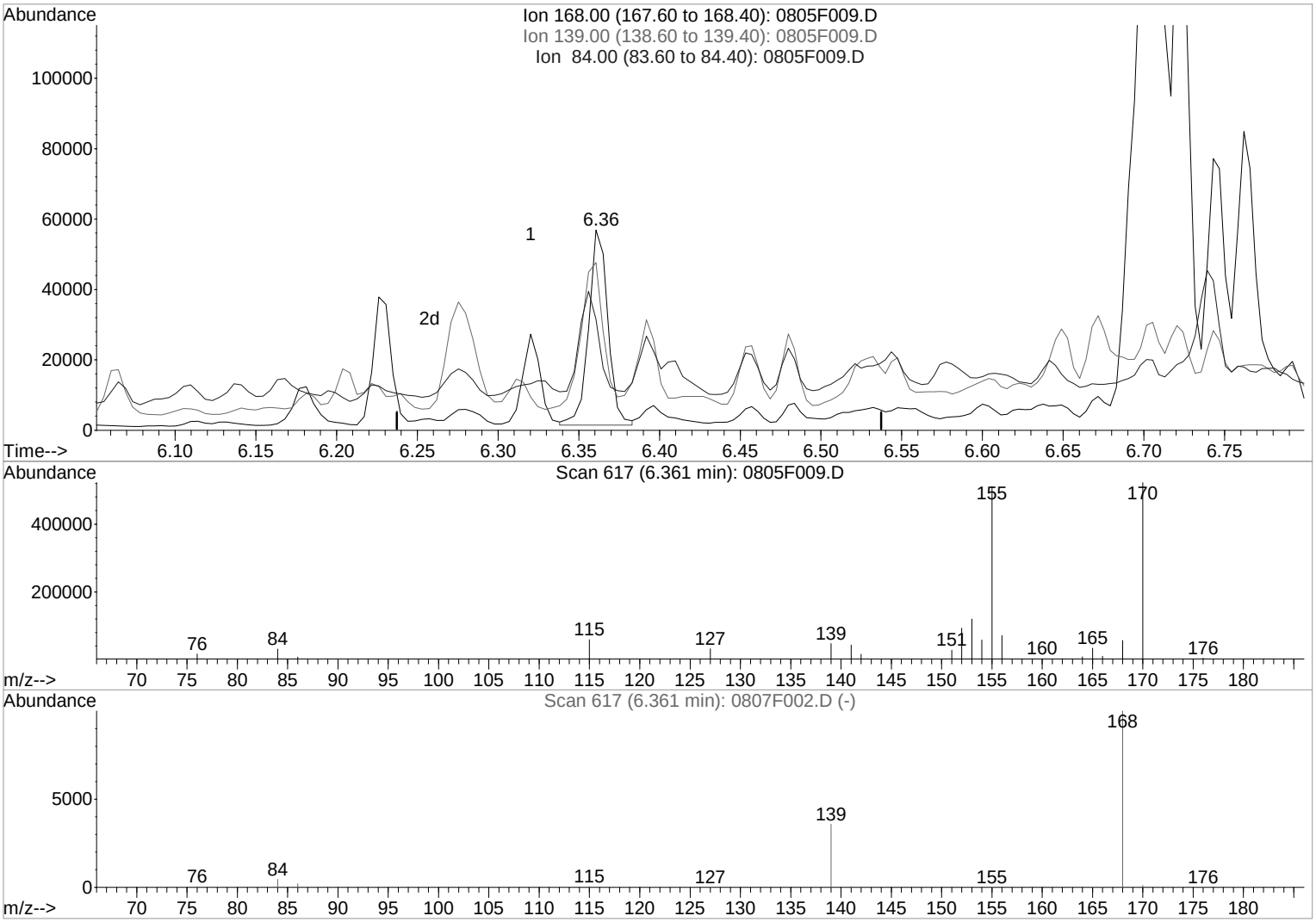
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:05 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(11) Dibenzofuran (T)

6.36min 42.53ng/ml m

response 45908

Ion	Exp%	Act%
168.00	100	100
139.00	29.20	83.78#
84.00	4.20	55.43#
0.00	0.00	0.00

Manual Integration:

After

WP

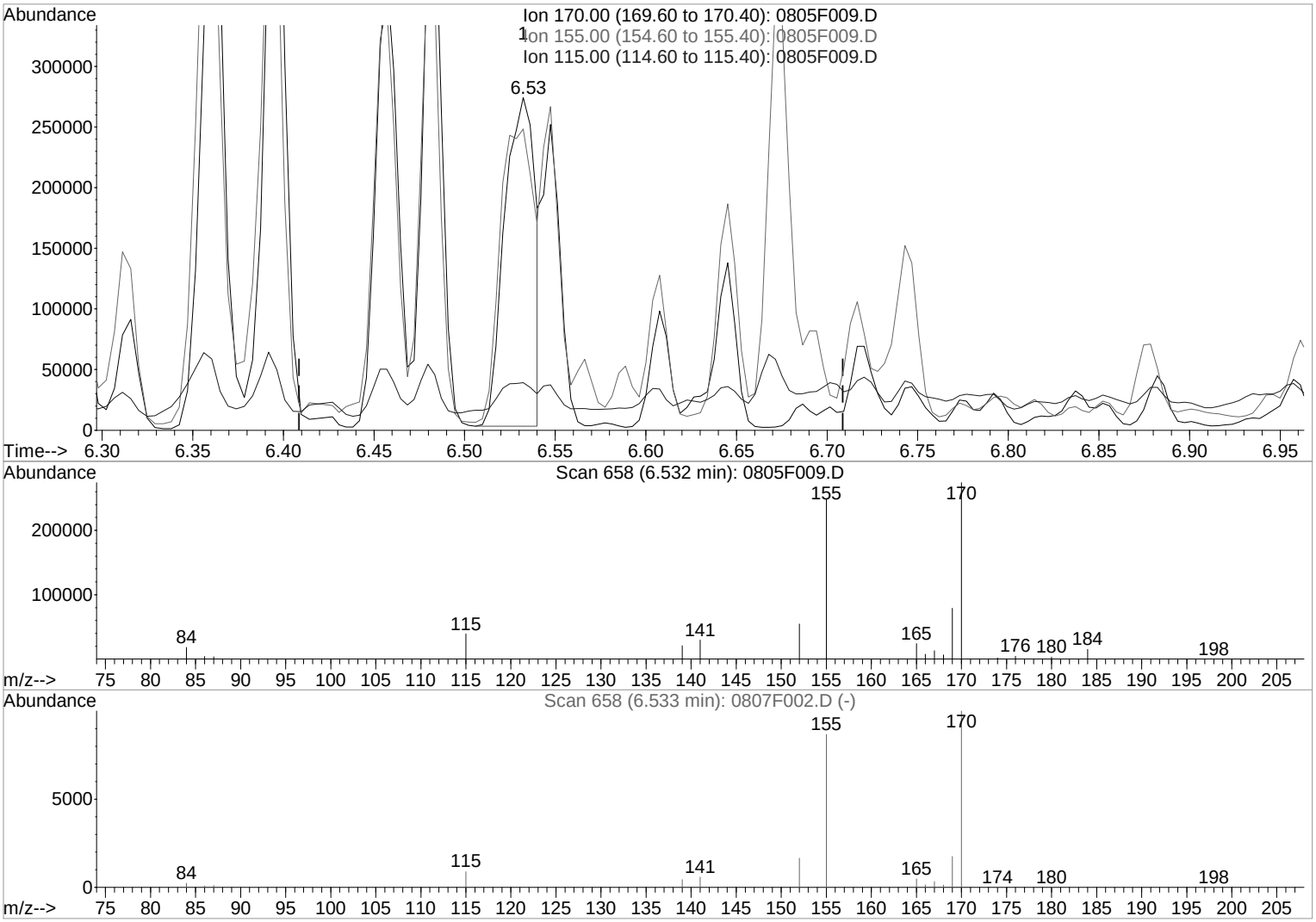
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:05 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(12) 2,3,5-Trimethylnaphthalene (T)

6.53min 465.27ng/ml

response 317371

Ion	Exp%	Act%
170.00	100	100
155.00	82.50	89.30
115.00	8.10	8.40
0.00	0.00	0.00

Manual Integration:

Before

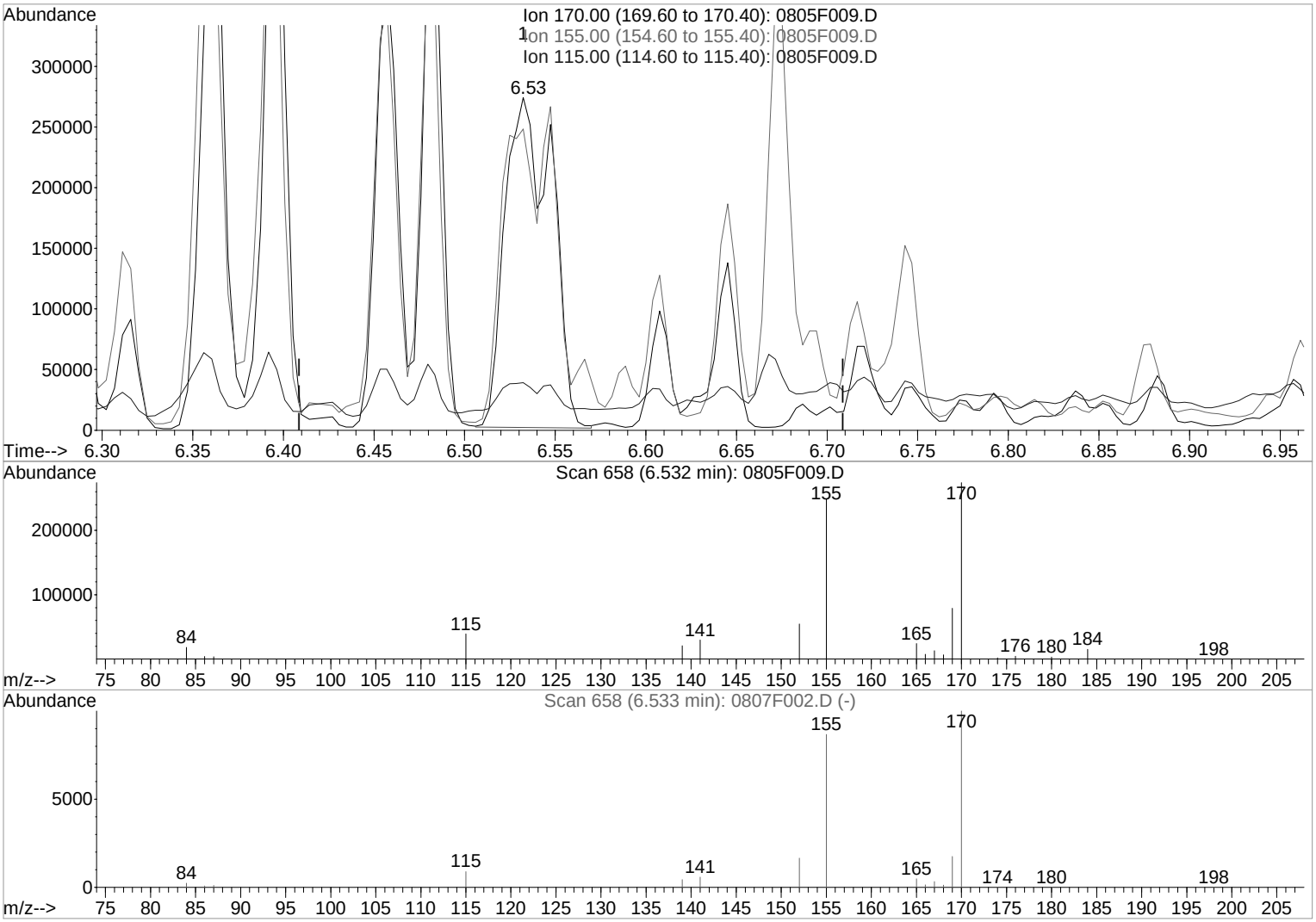
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:05 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(12) 2,3,5-Trimethylnaphthalene (T)

6.53min 713.95ng/ml m

response 486999

Ion	Exp%	Act%
170.00	100	100
155.00	82.50	90.60
115.00	8.10	14.33
0.00	0.00	0.00

Manual Integration:

After

BLC

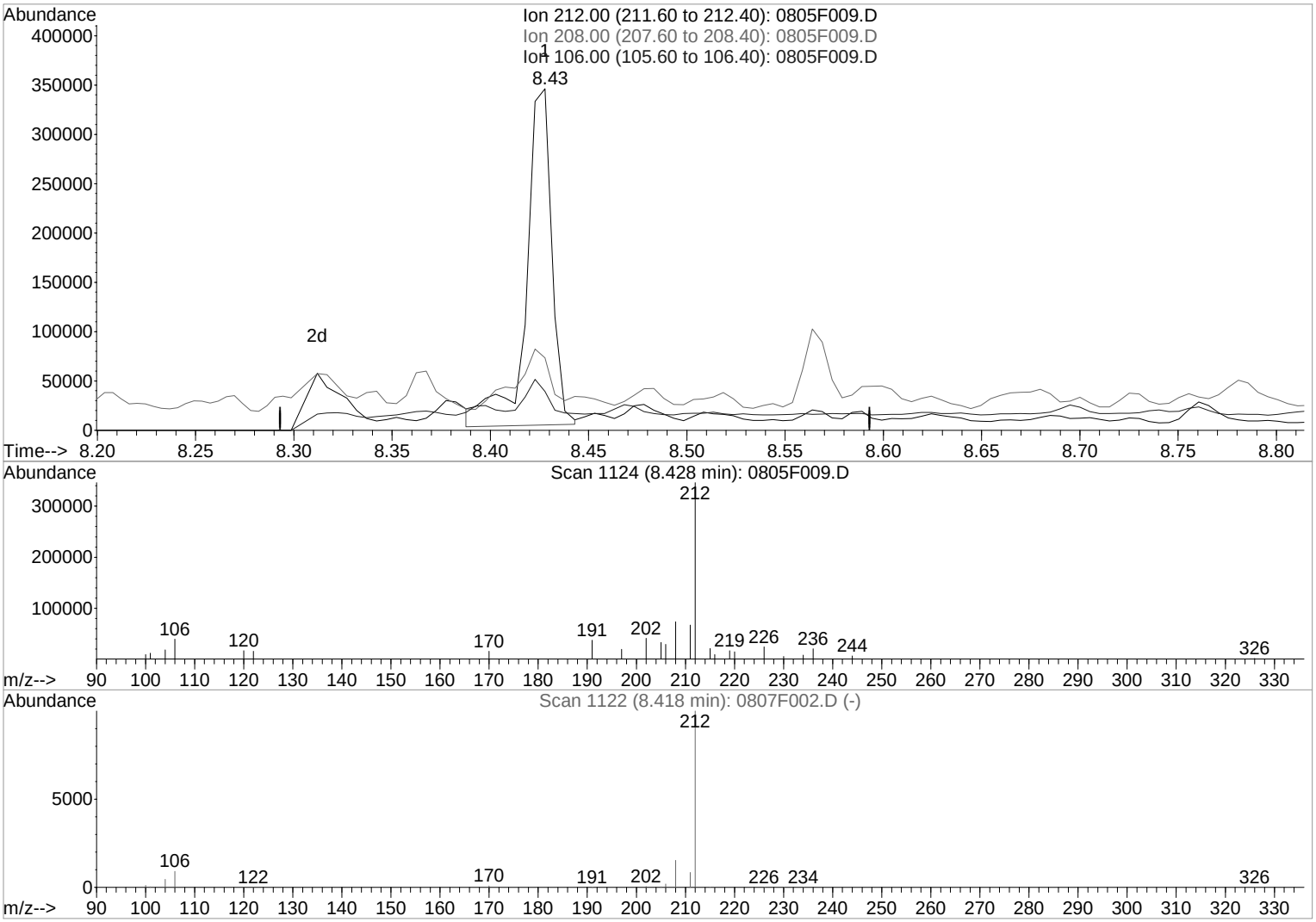
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:05 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(22) Fluoranthene-d10 (S)

8.43min 220.71ng/ml

response 311898

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	15.35
106.00	10.20	6.70
0.00	0.00	0.00

Manual Integration:

Before

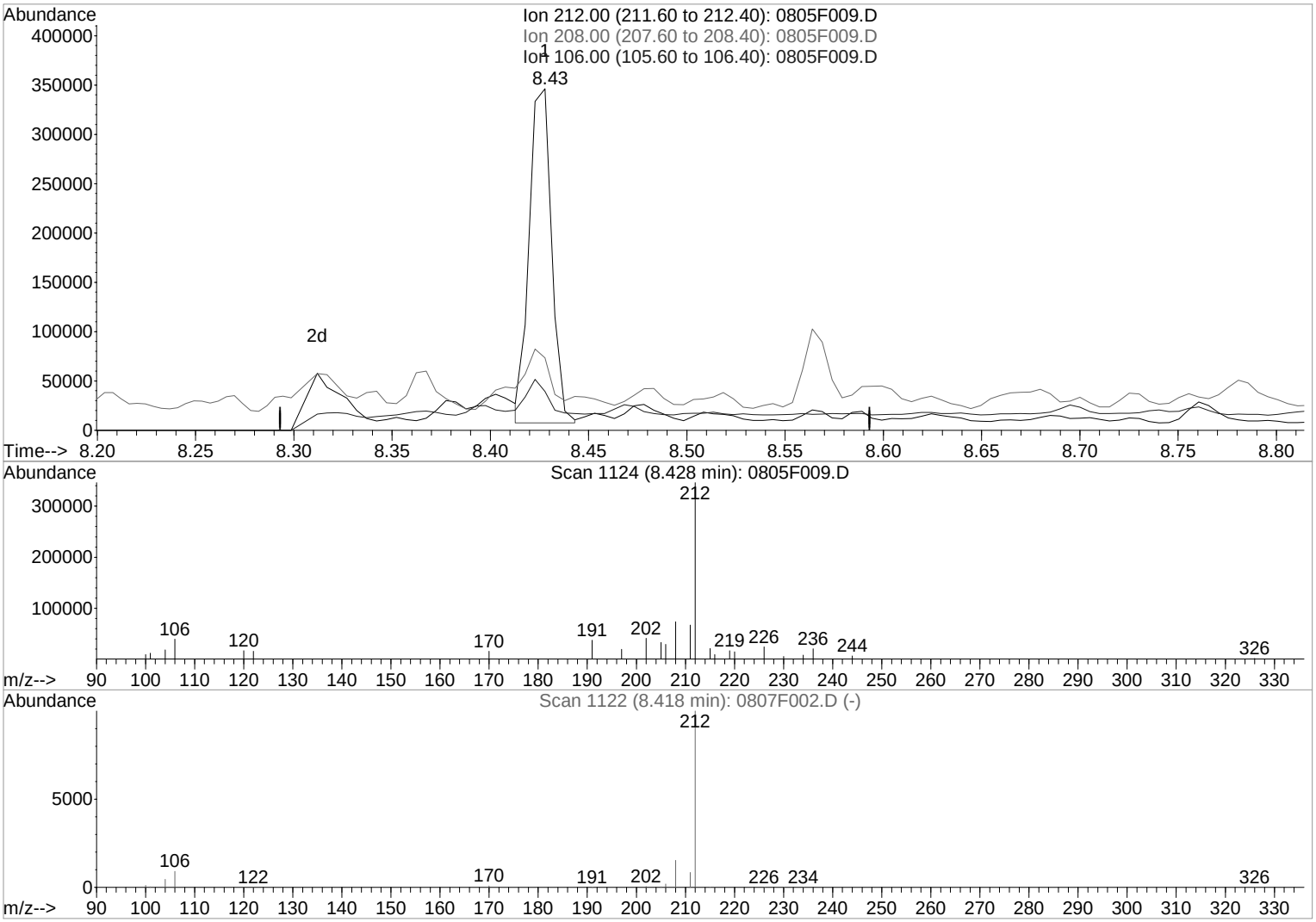
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:06 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(22) Fluoranthene-d10 (S)

8.43min 189.76ng/ml m

response 268162

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	21.13
106.00	10.20	11.37
0.00	0.00	0.00

Manual Integration:

After

BLC

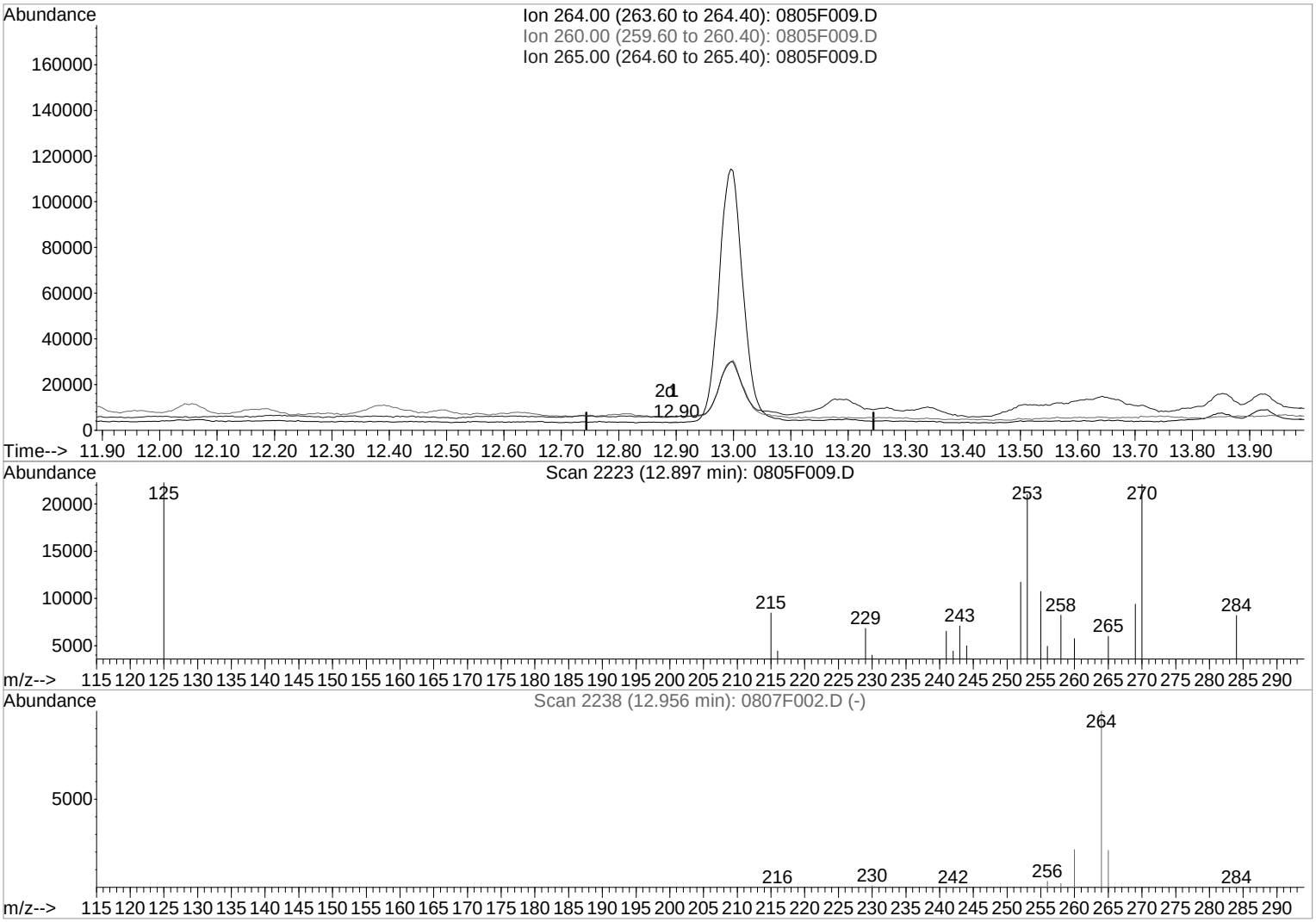
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:06 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(28) Perylene-d12 (I)

12.90min 200.00ng/ml

response 107

Ion	Exp%	Act%
264.00	100	100
260.00	22.50	32.61
265.00	21.70	40.43
0.00	0.00	0.00

Manual Integration:

Before

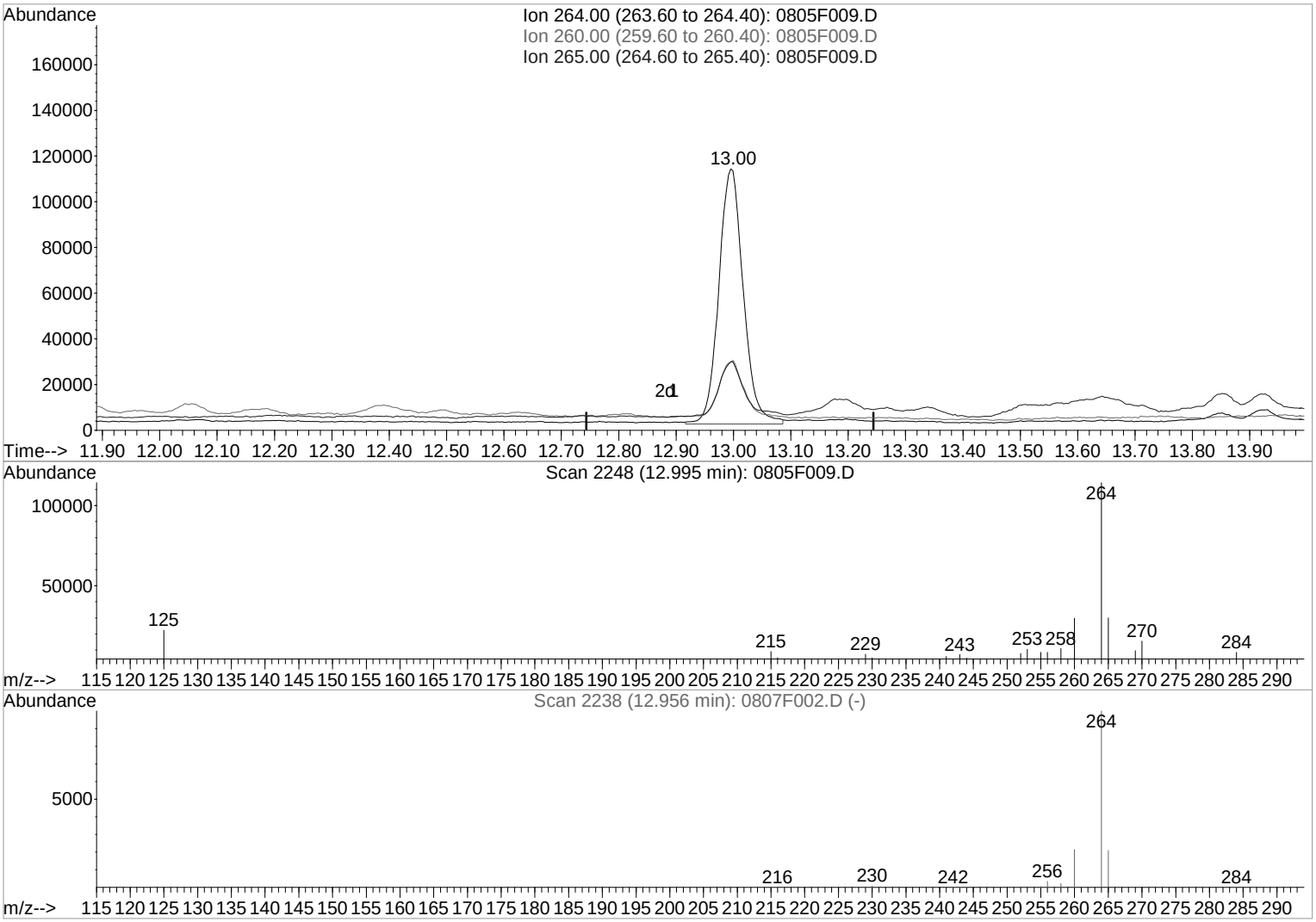
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:06 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(28) Perylene-d12 (I)

13.00min 200.00ng/ml m

response 331456

Ion	Exp%	Act%
264.00	100	100
260.00	22.50	26.05
265.00	21.70	26.24
0.00	0.00	0.00

Manual Integration:

After

WP

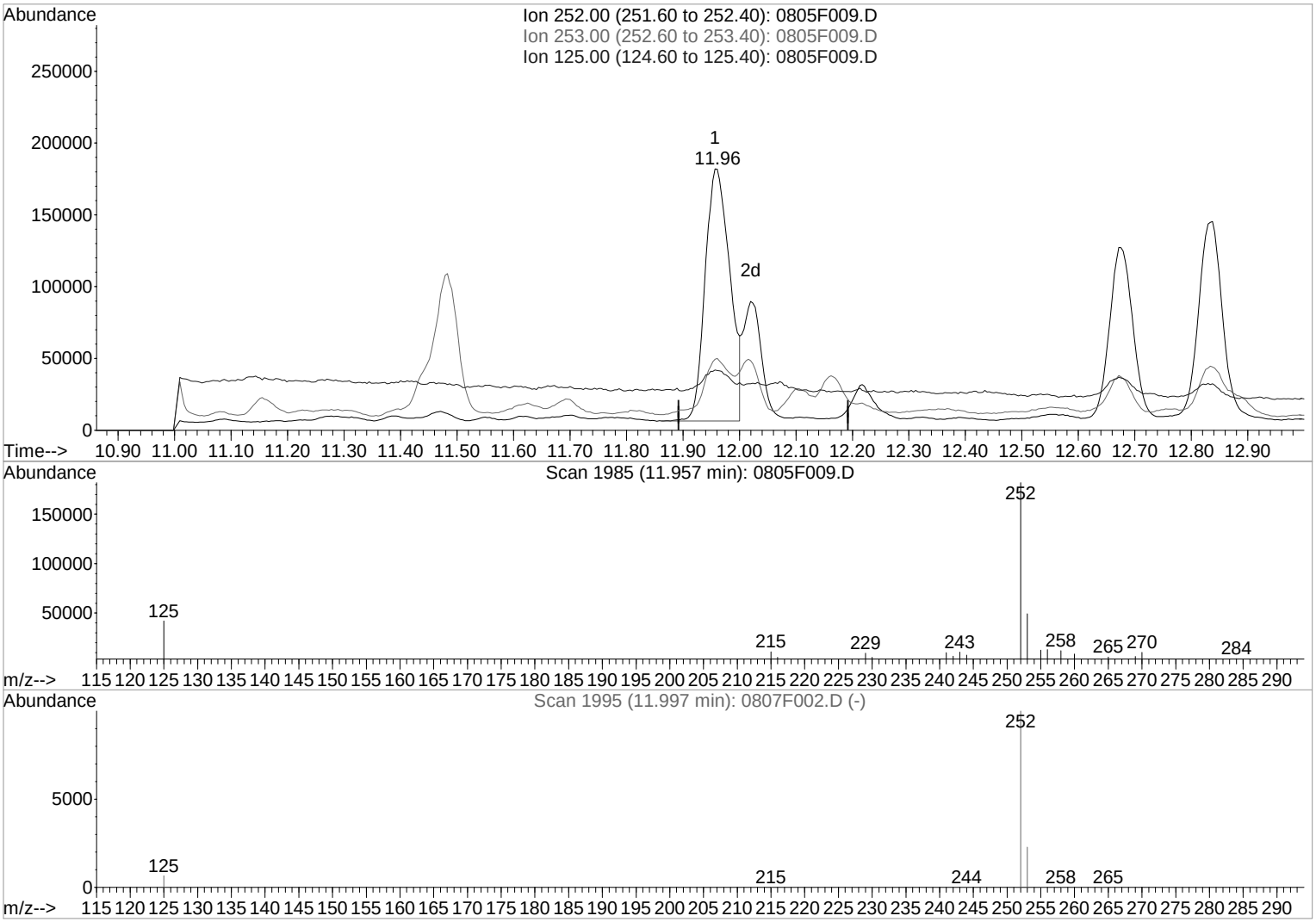
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:06 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(30) Benzo(k)fluoranthene (T)

11.96min 265.75ng/ml

response 533302

Ion	Exp%	Act%
252.00	100	100
253.00	22.70	21.89
125.00	5.90	8.10
0.00	0.00	0.00

Manual Integration:

Before

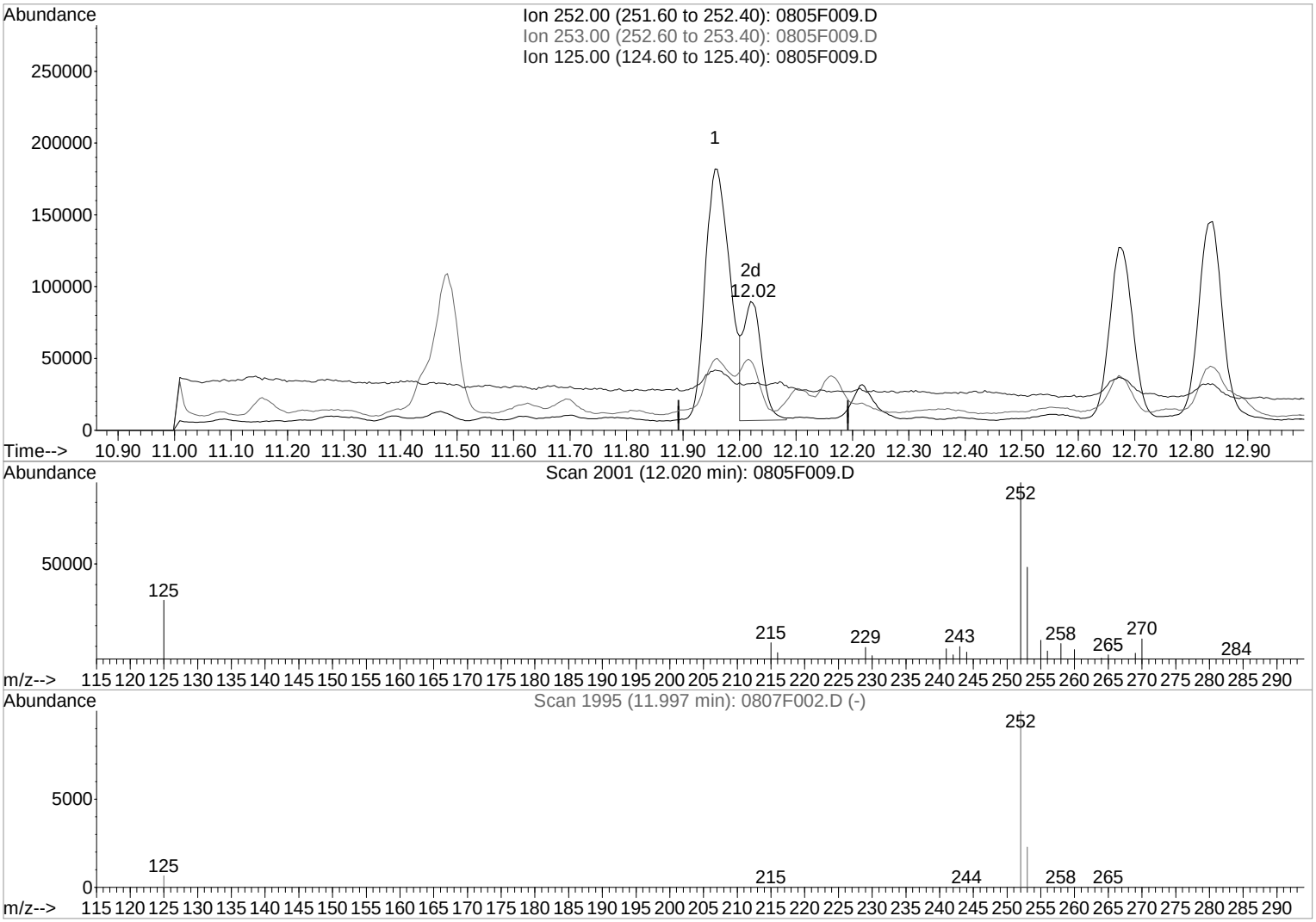
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:06 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(30) Benzo(k)fluoranthene (T)

12.02min 92.79ng/ml m

response 186218

Ion	Exp%	Act%
252.00	100	100
253.00	22.70	54.01#
125.00	5.90	36.03#
0.00	0.00	0.00

Manual Integration:

After

WP

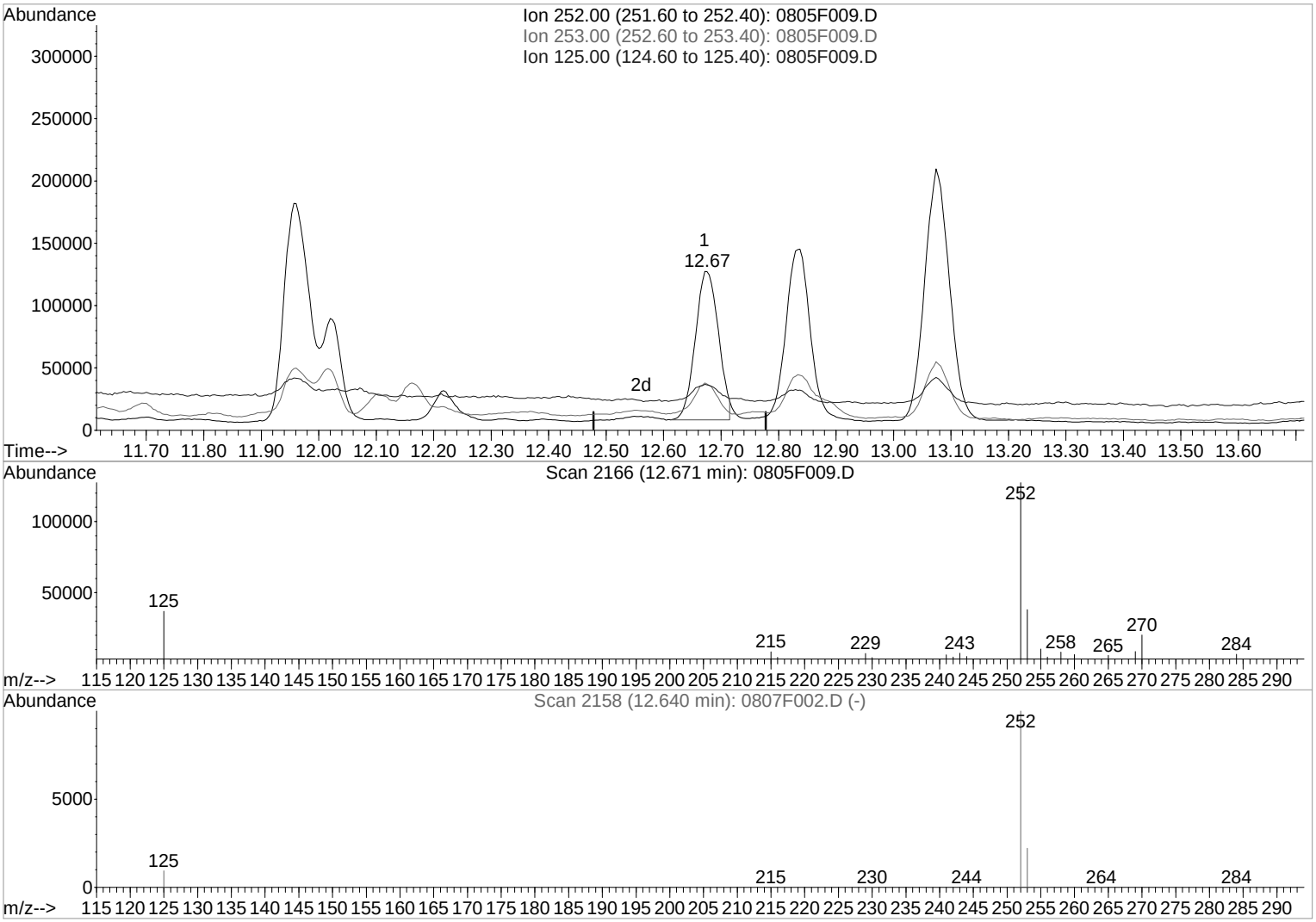
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:06 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(31) Benzo(e)pyrene (T)

12.67min 167.21ng/ml

response 332918

Ion	Exp%	Act%
252.00	100	100
253.00	22.00	20.87
125.00	9.20	11.17
0.00	0.00	0.00

Manual Integration:

Before

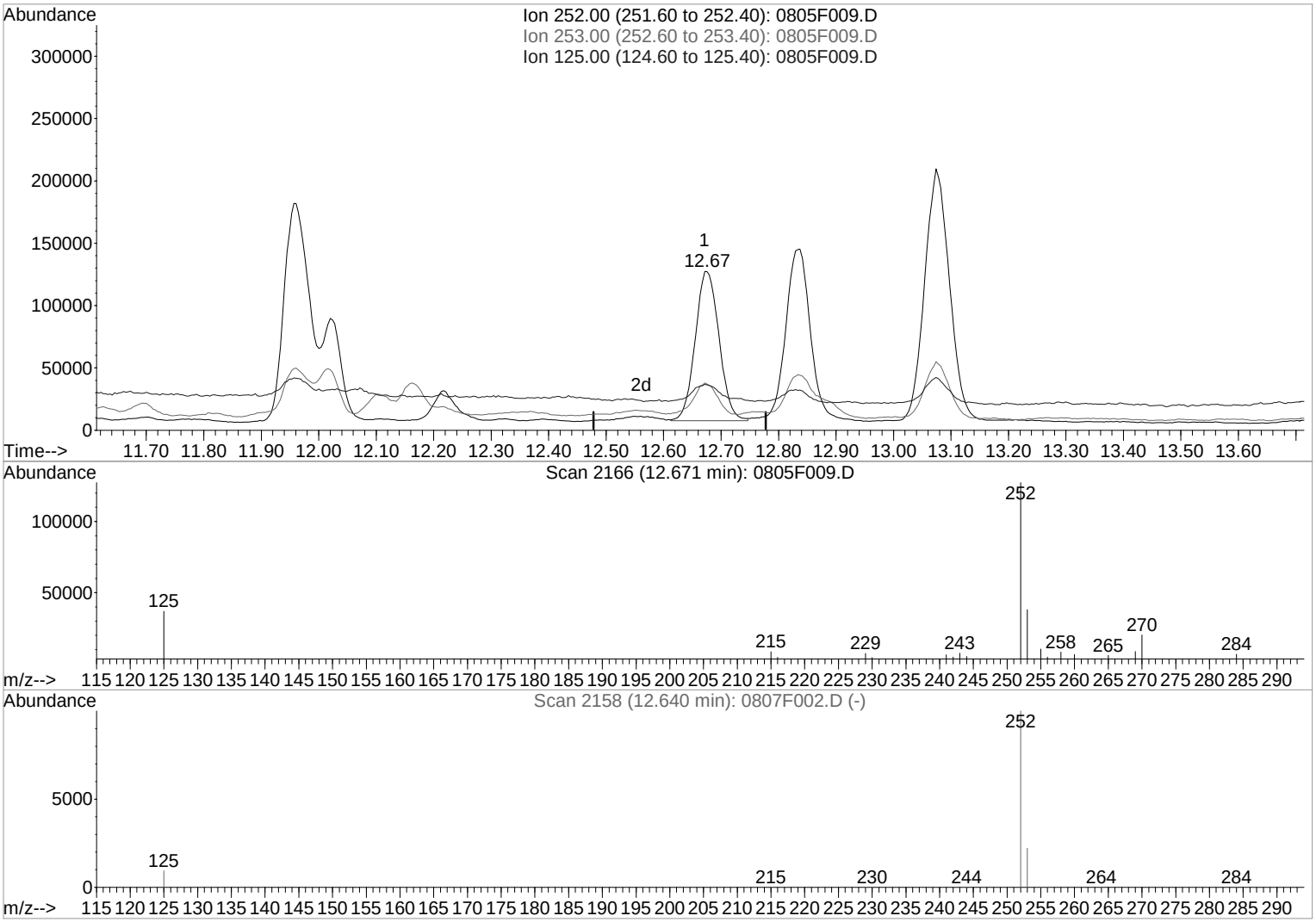
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:06 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(31) Benzo(e)pyrene (T)

12.67min 173.91ng/ml m

response 346269

Ion	Exp%	Act%
252.00	100	100
253.00	22.00	29.85
125.00	9.20	28.96
0.00	0.00	0.00

Manual Integration:

After

BLC

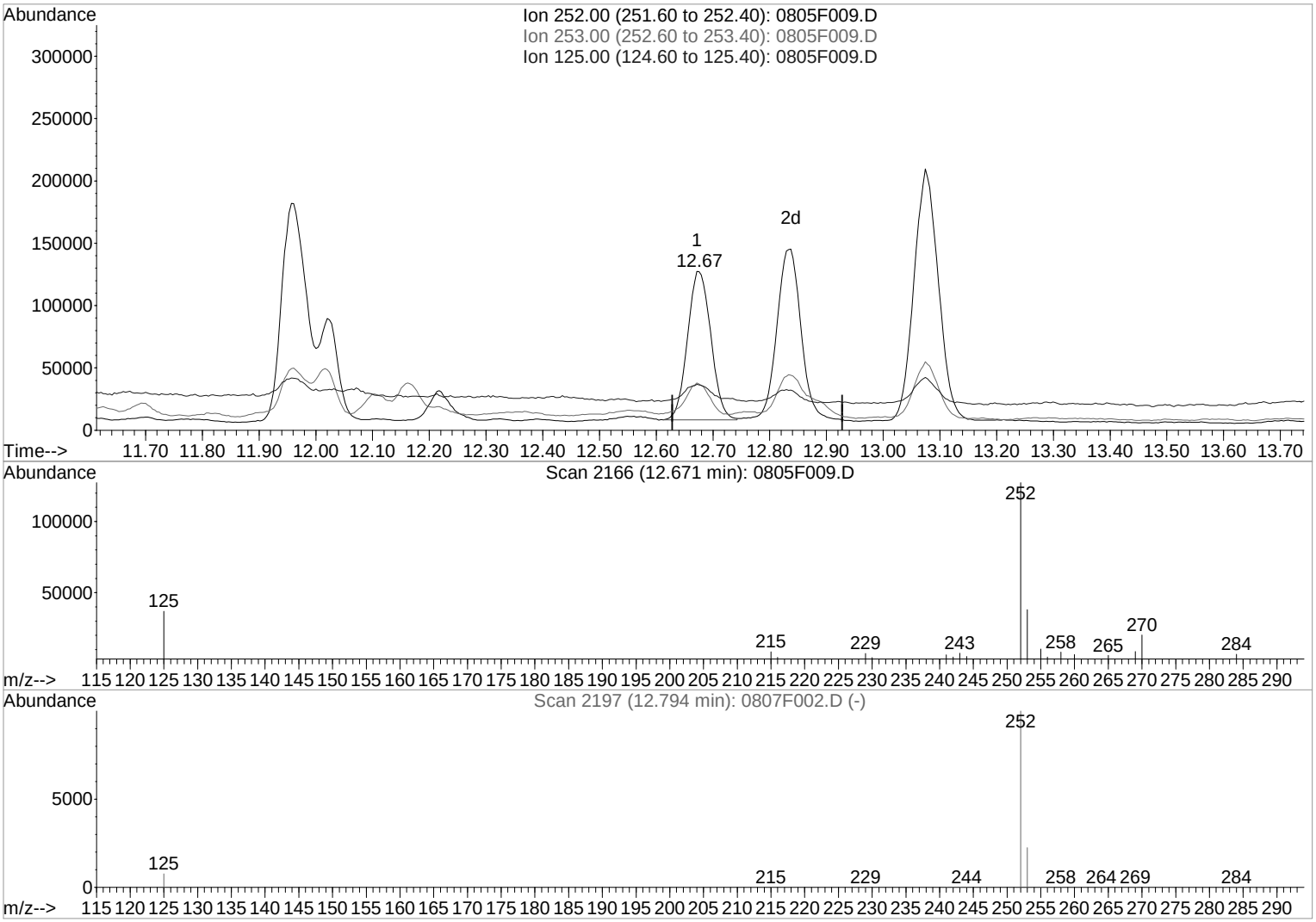
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:06 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(32) Benzo(a)pyrene (T)

12.67min 200.03ng/ml

response 339318

Ion	Exp%	Act%
252.00	100	100
253.00	22.30	20.87
125.00	6.90	11.17
0.00	0.00	0.00

Manual Integration:

Before

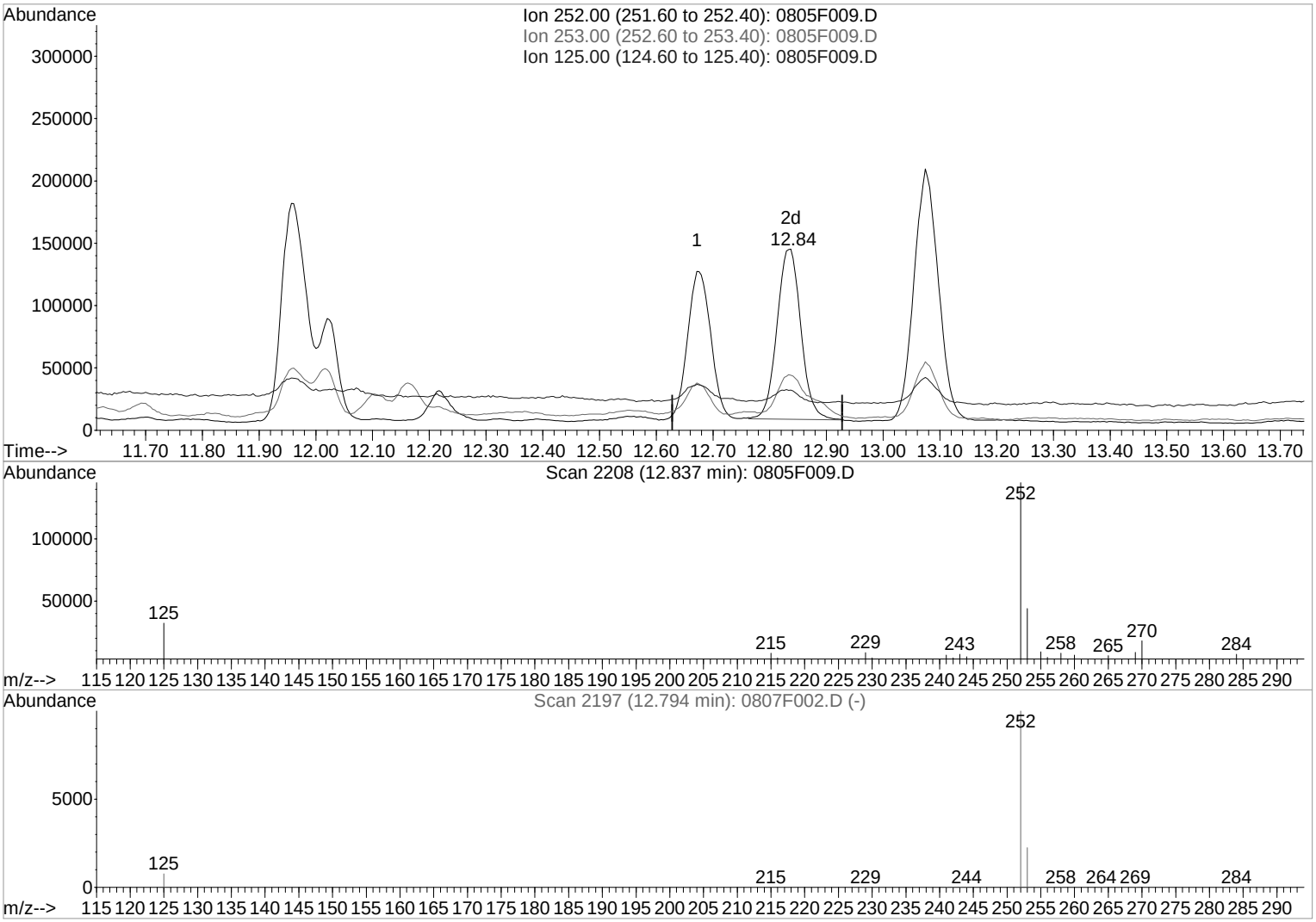
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:07 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(32) Benzo(a)pyrene (T)

12.84min 234.80ng/ml m

response 398295

Ion	Exp%	Act%
252.00	100	100
253.00	22.30	30.27
125.00	6.90	22.20
0.00	0.00	0.00

Manual Integration:

After

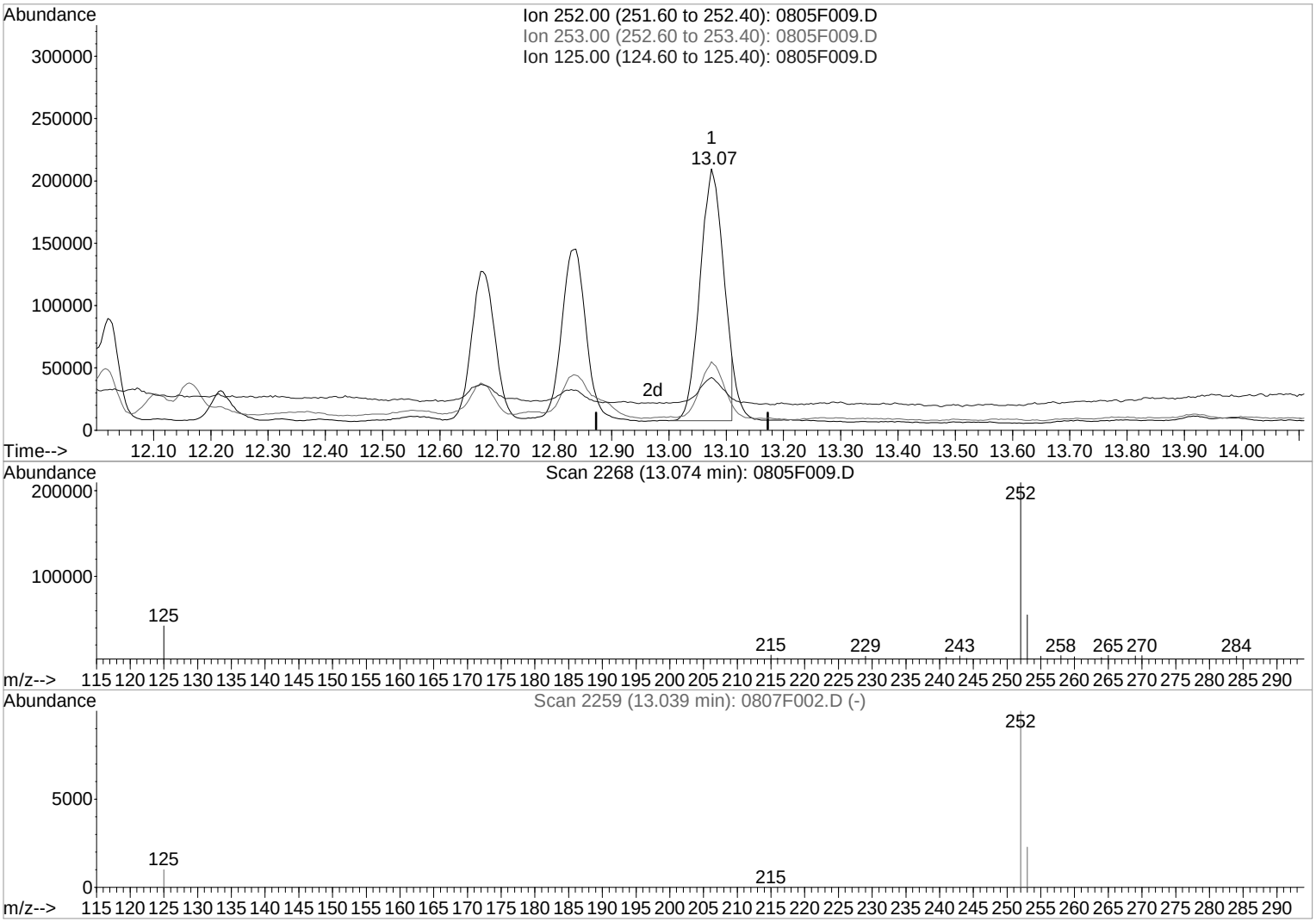
WP

08/08/24

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:07 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(33) Perylene (T)

13.07min 313.91ng/ml

response 574531

Ion	Exp%	Act%
252.00	100	100
253.00	22.20	22.03
125.00	9.20	10.13
0.00	0.00	0.00

Manual Integration:

Before

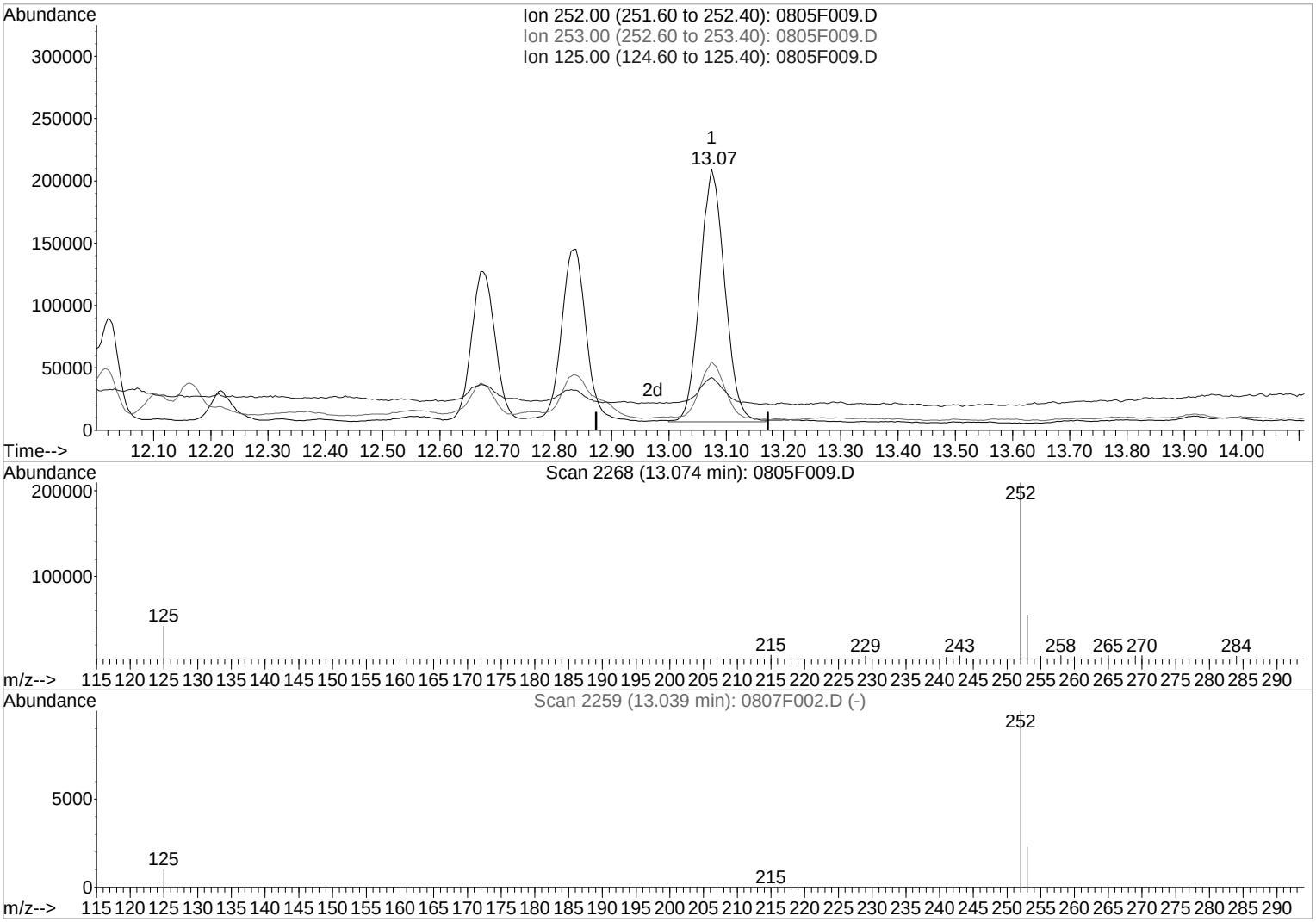
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:07 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(33) Perylene (T)

13.07min 335.94ng/ml m

response 614850

Ion	Exp%	Act%
252.00	100	100
253.00	22.20	26.26
125.00	9.20	20.16
0.00	0.00	0.00

Manual Integration:

After

BLC

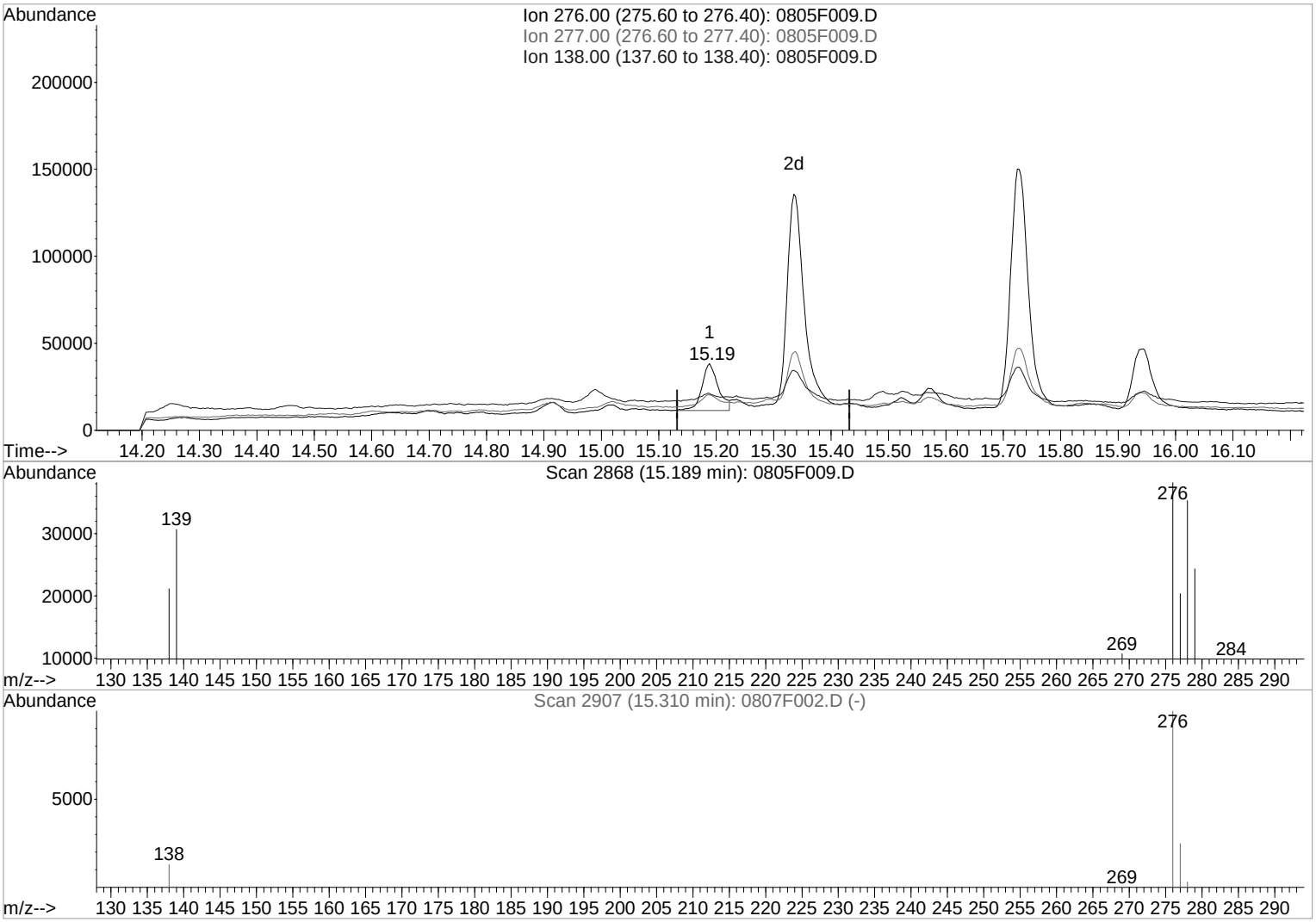
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:07 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.19min 30.45ng/ml

response 53671

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	25.68
138.00	12.20	16.70
0.00	0.00	0.00

Manual Integration:

Before

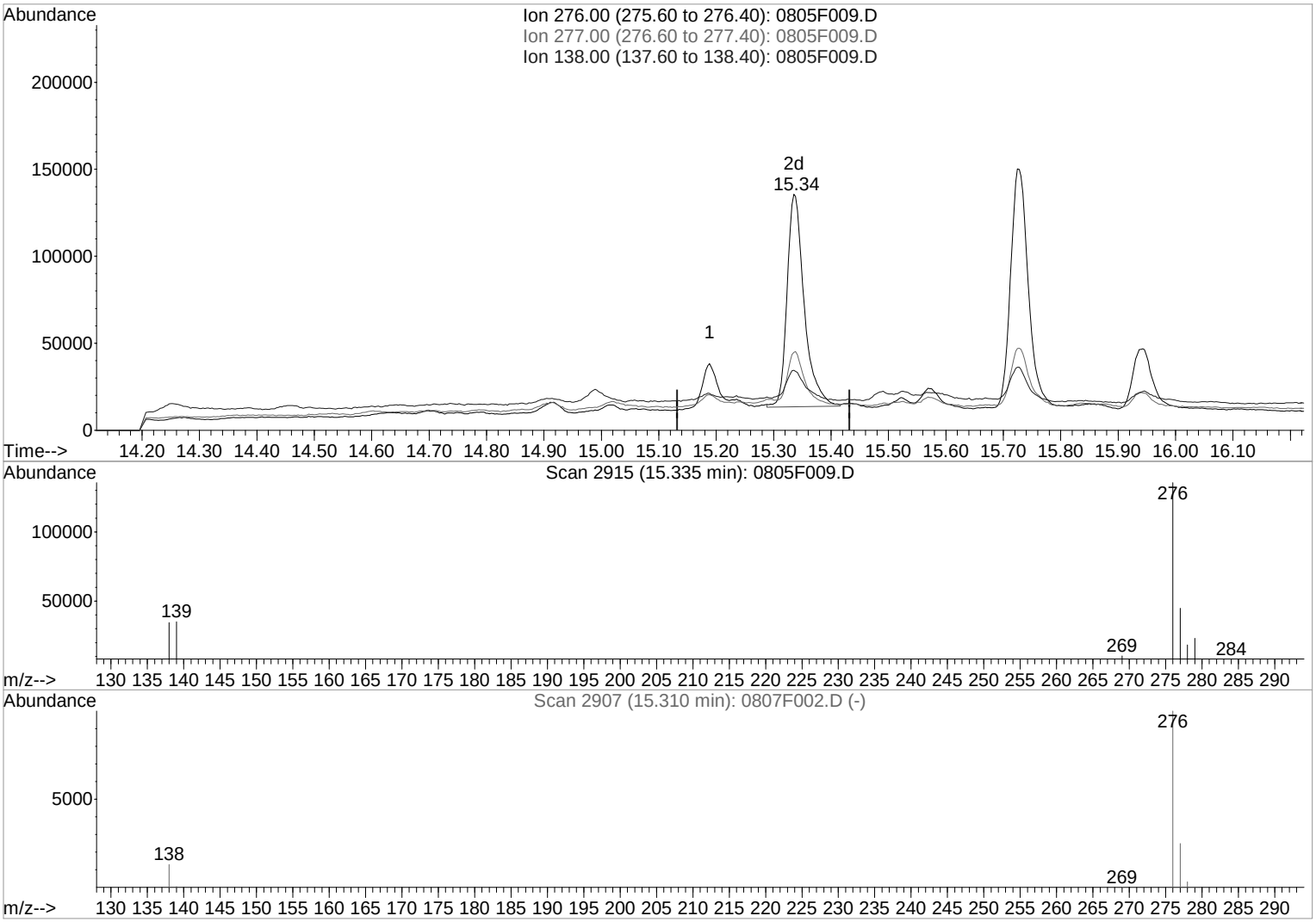
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:07 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.34min 144.31ng/ml m

response 254394

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	32.97
138.00	12.20	25.44
0.00	0.00	0.00

Manual Integration:

After

BLC

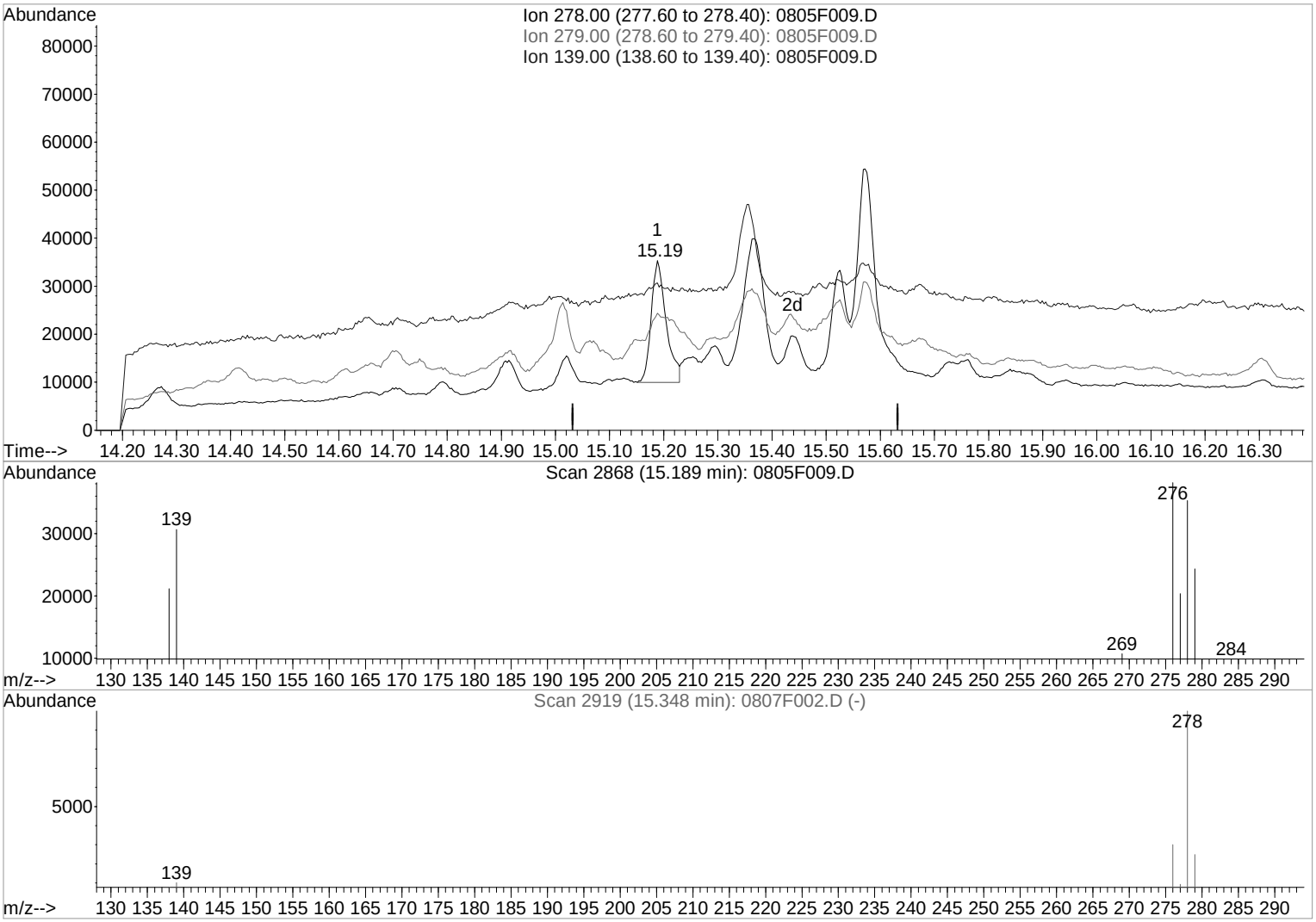
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:07 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(35) Dibenz(a,h)anthracene (T)

15.19min 24.45ng/ml

response 48717

Ion	Exp%	Act%
278.00	100	100
279.00	25.20	22.10
139.00	10.40	10.25
0.00	0.00	0.00

Manual Integration:

Before

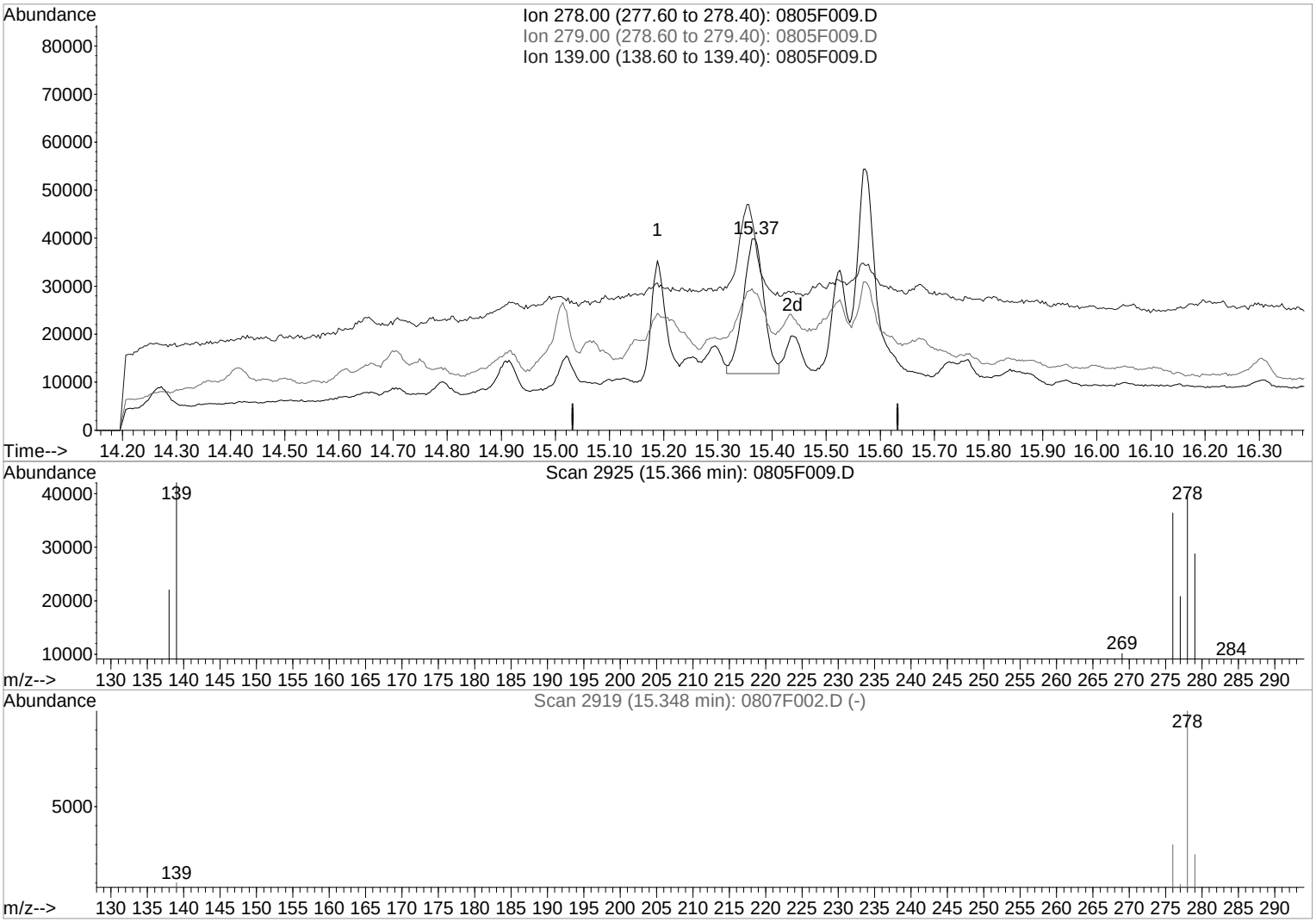
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:07 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(35) Dibenz(a,h)anthracene (T)

15.37min 37.77ng/ml m

response 75264

Ion	Exp%	Act%
278.00	100	100
279.00	25.20	72.08#
139.00	10.40	105.43#
0.00	0.00	0.00

Manual Integration:

After

WP

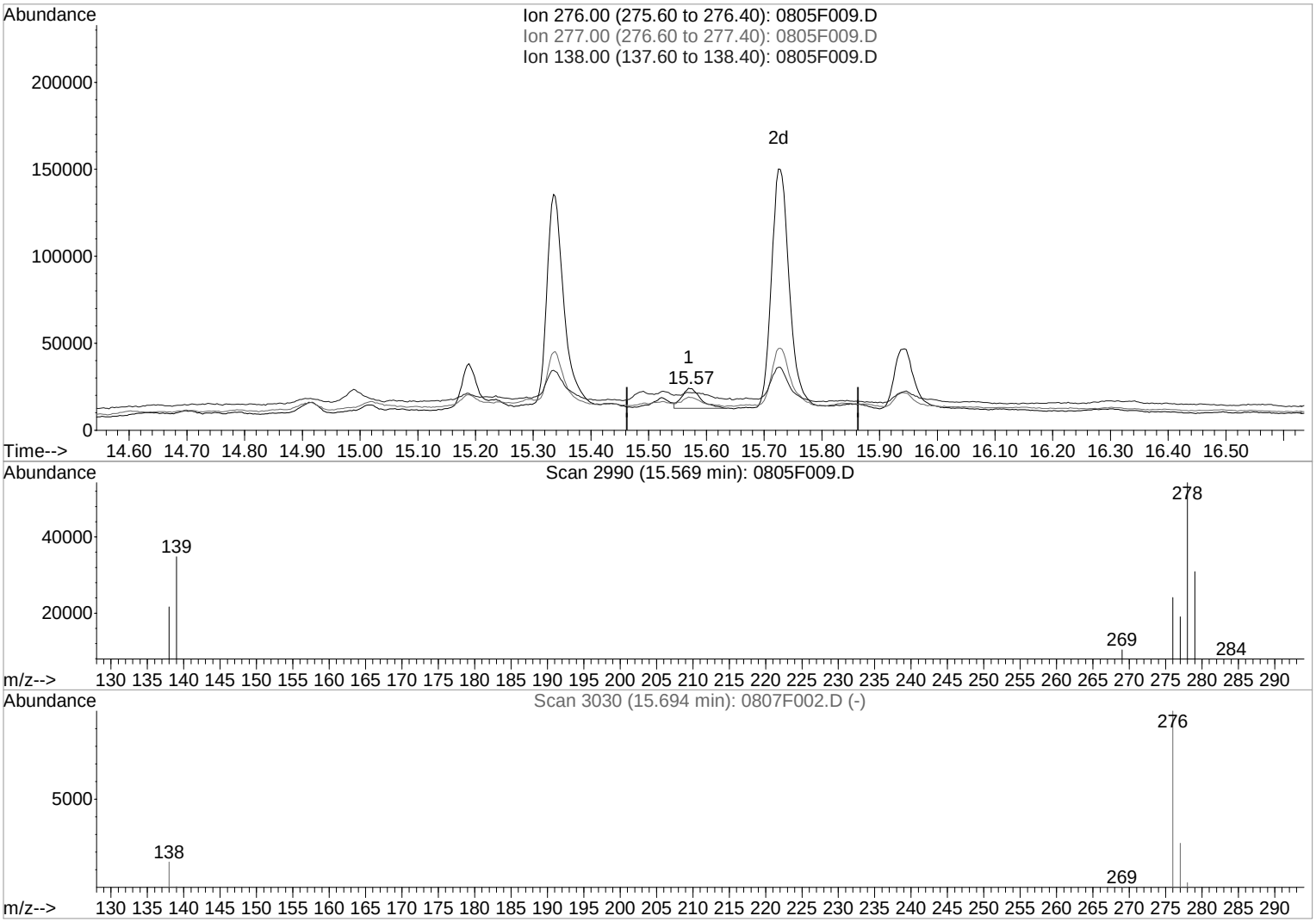
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:07 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(36) Benzo(g,h,i)perylene (T)

15.57min 11.16ng/ml

response 26047

Ion	Exp%	Act%
276.00	100	100
277.00	24.90	45.61
138.00	13.80	33.26
0.00	0.00	0.00

Manual Integration:

Before

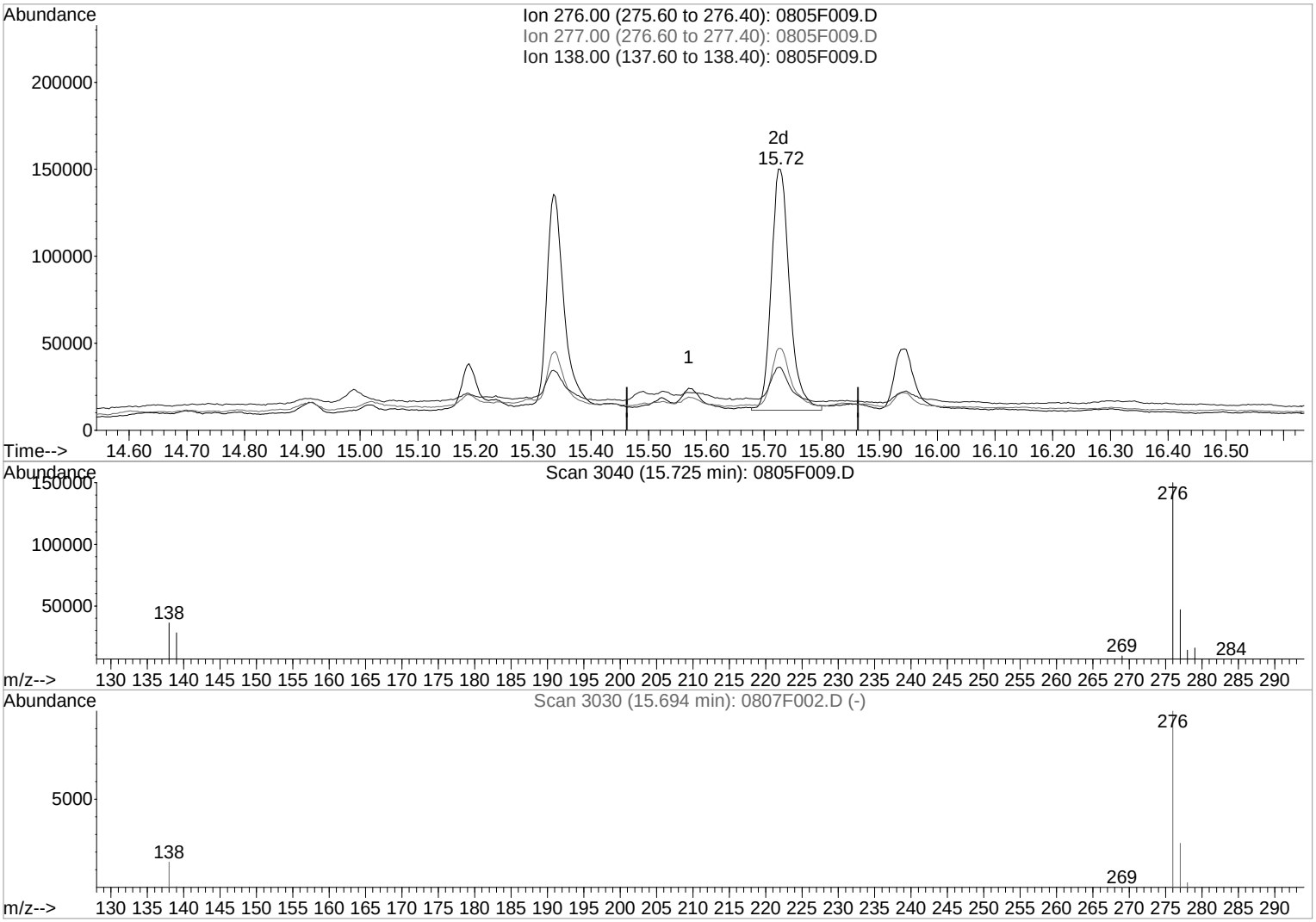
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F009.D Vial: 9
Acq On : 5 Aug 2024 1:20 pm Operator: EBruno
Sample : K2407810-001 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:07 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F009.D

(36) Benzo(g,h,i)perylene (T)

15.72min 131.26ng/ml m

response 306230

Ion	Exp%	Act%
276.00	100	100
277.00	24.90	31.23
138.00	13.80	24.10
0.00	0.00	0.00

Manual Integration:

After

WP

08/08/24

1st 08/08/24
2nd 08/08/24

Validation Report

Data File: J:\MS14\DATA\080524\0805F010.D\
Lab ID: K2407810-002
RunType: N/A
Matrix: Sediment

Date Acquired: 8/5/24 13:47:00
Batch ID: 849989
Analysis Method: 8270D/PAH SIM

Validations

Validation Categories	Pass	Fail
Preparation Hold Time		X
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery		X
Lab Control Sample Recovery	X	
Method Blank	X	
Method Blank Surrogates	X	
Internal Standards	X	
Surrogates	X	
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Sample Exceptions

Exception Categories	Result	Corrective Action
Preparation Hold Time	Prep Date/Time: 08/01/2024 1240 Hold Date/Time: 07/26/2022 2359	Frozen Sample Used

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Continuing Calibration Recovery	Benzo(a)pyrene	22		20	OK, <40

Primary Review: _____

Printed: 8/8/24 11:23
\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

Secondary Review: _____

1st 08/08/24
2nd 08/08/24

Quantitation Report

Data File:	J:\MS14\DATA\080524\0805F010.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 13:47:00	**Vial:**	8
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-002	**Raw Units:**	ng/mL

Bottle ID:	K2407810-002.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	PAH SIM	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	849989	**Prep Lot:**	442452	**Report Group:**	K2407810
Analysis	8270D	**Prep Method:**	EPA 3546		
		Prep Date:	8/1/24		

Title:	Polycyclic Aromatic Hydrocarbons by GC/MS SIM	**Calibration ID:**	KC2400163
		Report List ID:	18909

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Acenaphthene-d10	6.19	+0.01	122692	200.00	OK
Chrysene-d12	9.94	+0.02	283332	200.00	OK
Naphthalene-d8	4.56	-0.01	244624	200.00	OK
Perylene-d12	13.03	+0.11	321745	200.00	OK
Phenanthrene-d10	7.44	+0.01	259435	200.00	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec	% Rec Criteria	Rpt?
Fluoranthene-d10	8.43	+0.02	263688	185.76	93	28 - 112	Y
Fluorene-d10	6.63	+0.01	132962	188.31	94	34 - 106	Y
Terphenyl-d14	8.77	+0.02	249563	159.39	80	32 - 122	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
2-Methylnaphthalene	5.26	-0.01	83717	109.98	220		Y
Acenaphthene	6.21		198464	283.08	550		Y
Acenaphthylene	6.06	-0.01	81622	74.80	150		Y
Anthracene	7.50	+0.01	297701	235.96	460		Y
Benz(a)anthracene	9.93	+0.03	571458	310.02	610		Y
Benzo(a)pyrene	12.87	+0.10	450569	273.63	530		Y
Benzo(b)fluoranthene	11.99	+0.08	539930	261.76	510		Y
Benzo(g,h,i)perylene	15.76	+0.09	343762	151.80	300		Y
Benzo(k)fluoranthene	12.05	+0.08	148915	76.44	150		Y
Chrysene	9.98	+0.03	911527	519.41	1000		Y
Dibenz(a,h)anthracene	15.39	+0.06	92968	48.06	94		Y
Fluoranthene	8.45	+0.02	734634	471.85	920		Y
Fluorene	6.66	+0.01	383959	476.41	930		Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23
\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

1st 08/08/24

2nd 08/08/24

Data File:	J:\MS14\DATA\080524\0805F010.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 13:47:00	**Vial:**	8
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-002	**Raw Units:**	ng/mL

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Indeno(1,2,3-cd)pyrene	15.36	+0.07	252413	147.51	290		Y
Naphthalene	4.58	-0.02	75482	64.36	130		Y
Phenanthrene	7.46	+0.01	2185700	1613.70	3200		Y
Pyrene	8.64	+0.02	1419307	774.03	1500		Y

Prep Amount:	10.089 g	**Dilution:**	1
Prep Final Amount:	10.00 mL	**Basis Factor:**	50.70

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23

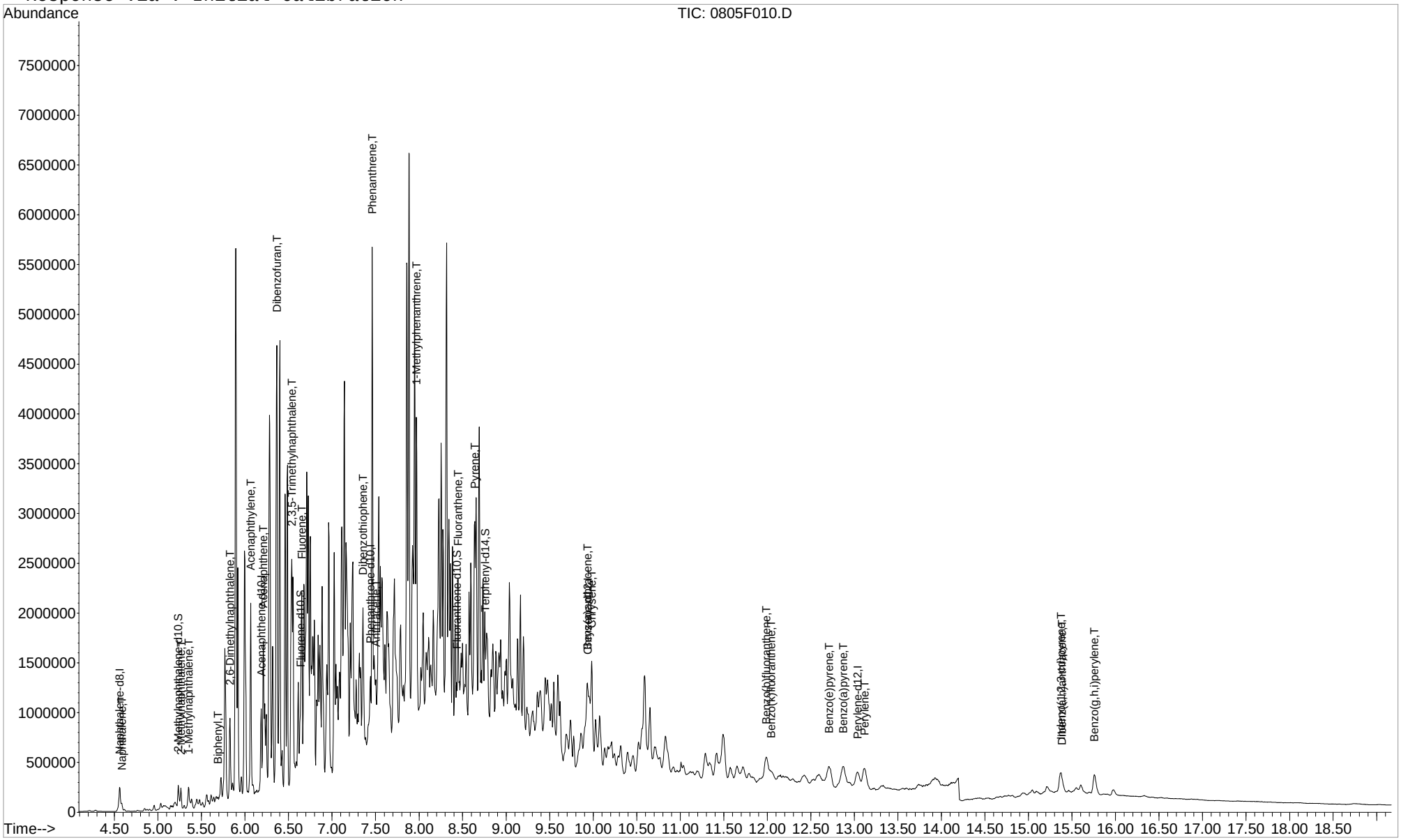
\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

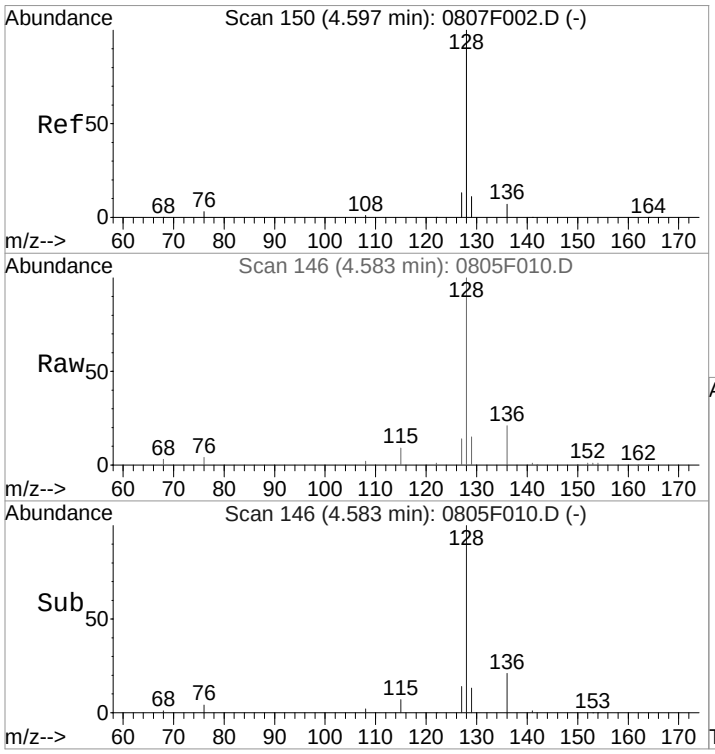
Quantitation Report (QT Reviewed)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:11 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration

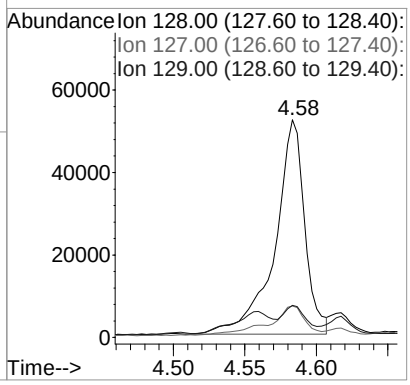


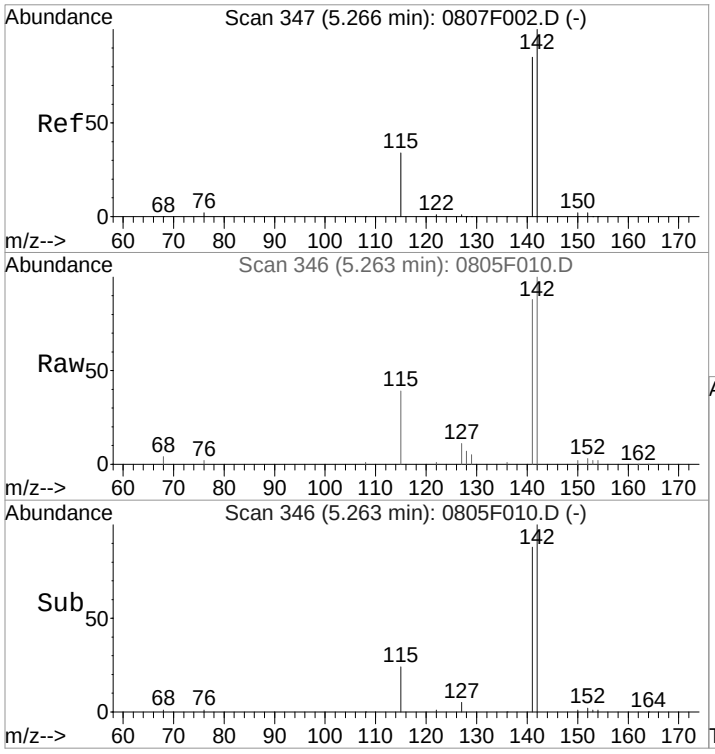


#2
Naphthalene
Concen: 64.36 ng/ml
RT: 4.58 min Scan# 146
Delta R.T. -0.06 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:128 Resp: 75482

Ion	Ratio	Lower	Upper
128	100		
127	13.6	0.0	42.8
129	12.9	0.0	41.5

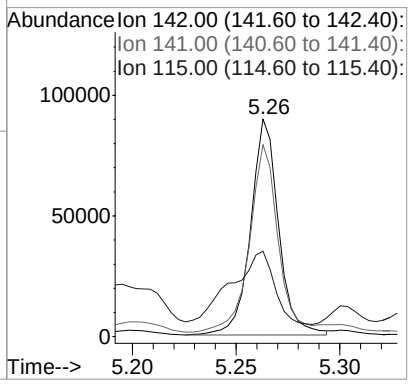




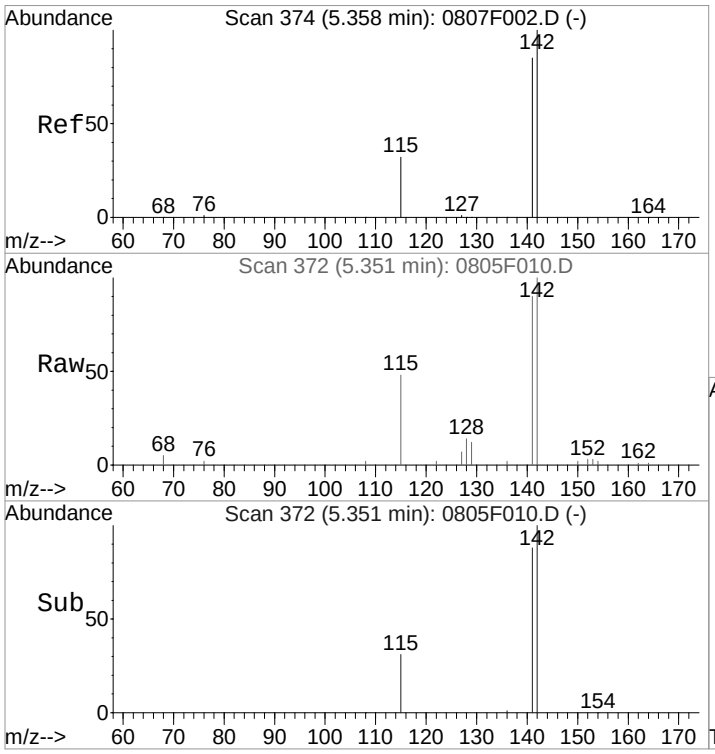
#4
2-Methylnaphthalene
Concen: 109.98 ng/ml
RT: 5.26 min Scan# 346
Delta R.T. -0.04 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:142 Resp: 83717

Ion	Ratio	Lower	Upper
142	100		
141	86.9	52.1	112.1
115	32.8	1.0	61.0



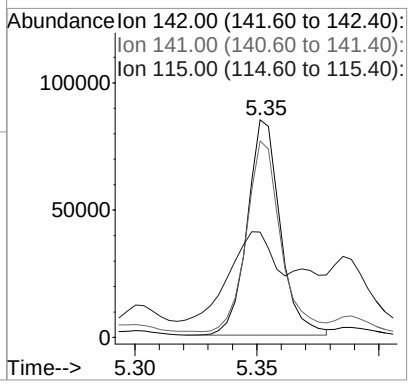
1st 08/08/24
2nd 08/08/24

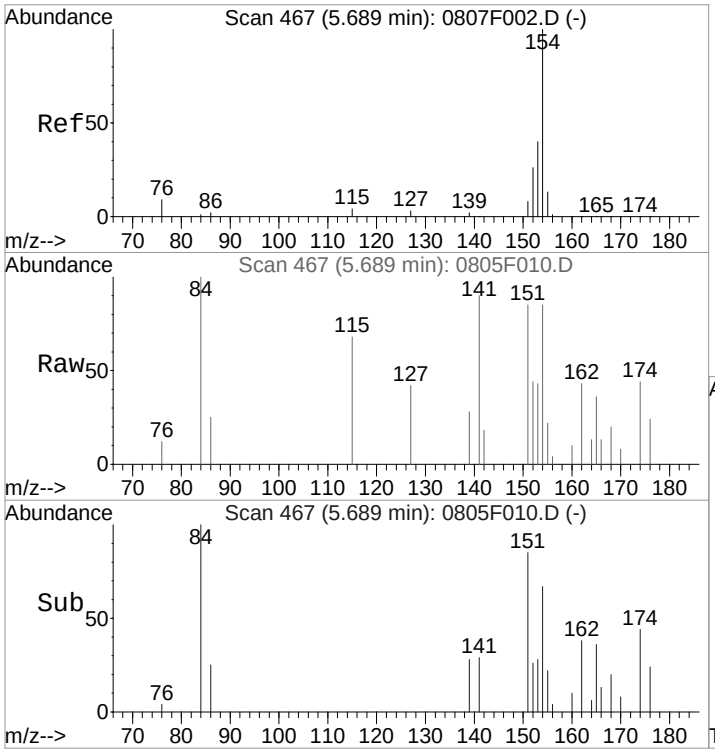


#5
1-Methylnaphthalene
Concen: 110.68 ng/ml
RT: 5.35 min Scan# 372
Delta R.T. -0.04 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:142 Resp: 79290

Ion	Ratio	Lower	Upper
142	100		
141	88.5	55.8	115.8
115	40.9	1.9	61.9

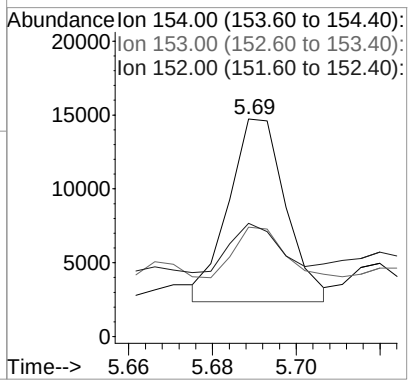




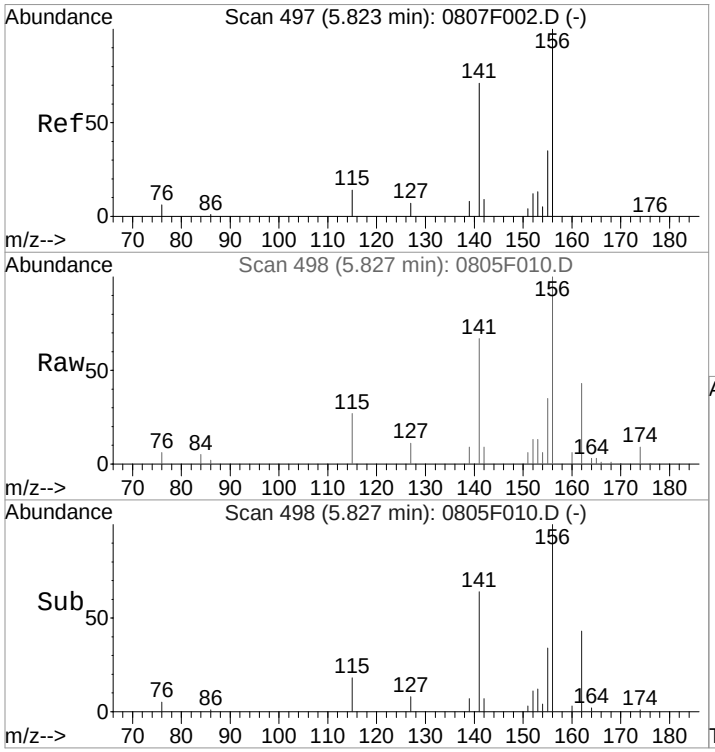
#6
Biphenyl
Concen: 12.68 ng/ml m
RT: 5.69 min Scan# 467
Delta R.T. -0.03 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:154 Resp: 11739

Ion	Ratio	Lower	Upper
154	100		
153	50.3	8.6	68.6
152	52.1	0.0	55.8



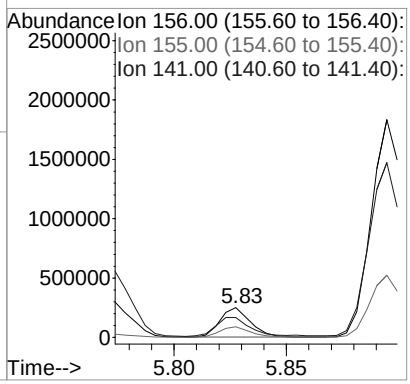
1st 08/08/24
2nd 08/08/24

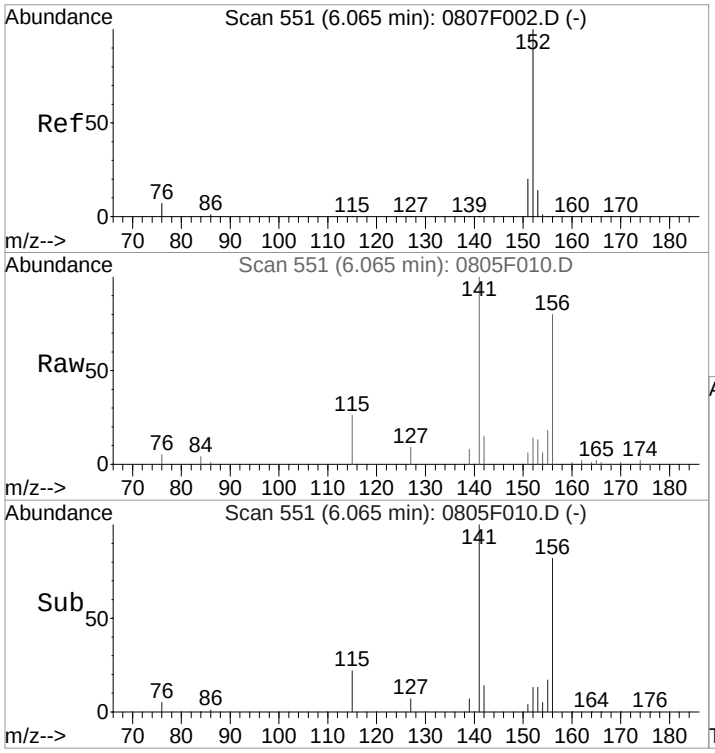


#7
2,6-Dimethylnaphthalene
Concen: 355.63 ng/ml
RT: 5.83 min Scan# 498
Delta R.T. -0.02 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:156 Resp: 233102

Ion	Ratio	Lower	Upper
156	100		
155	34.7	4.7	64.7
141	63.8	39.2	99.2

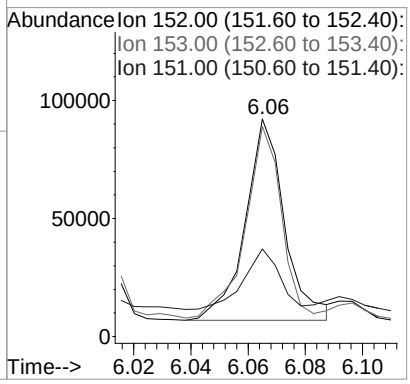




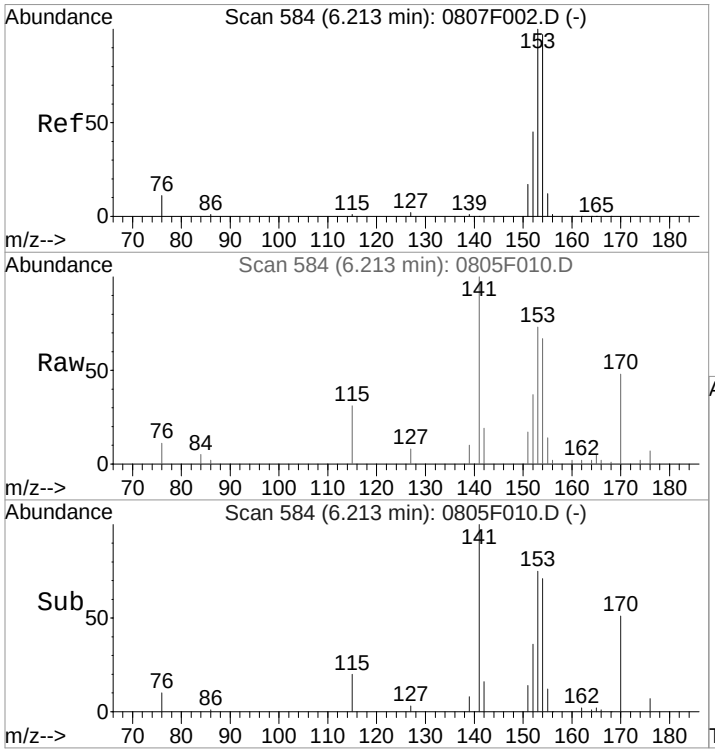
#9
Acenaphthylene
Concen: 74.80 ng/ml
RT: 6.06 min Scan# 551
Delta R.T. -0.03 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:152 Resp: 81622

Ion	Ratio	Lower	Upper
152	100		
153	95.3	0.0	44.2#
151	30.0	0.0	49.6



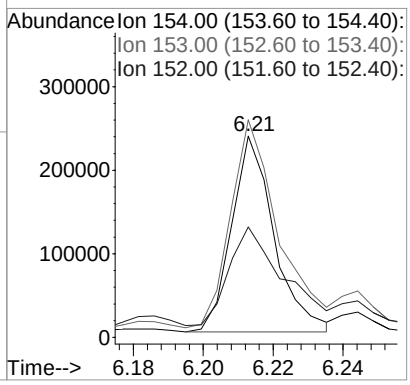
1st 08/08/24
2nd 08/08/24

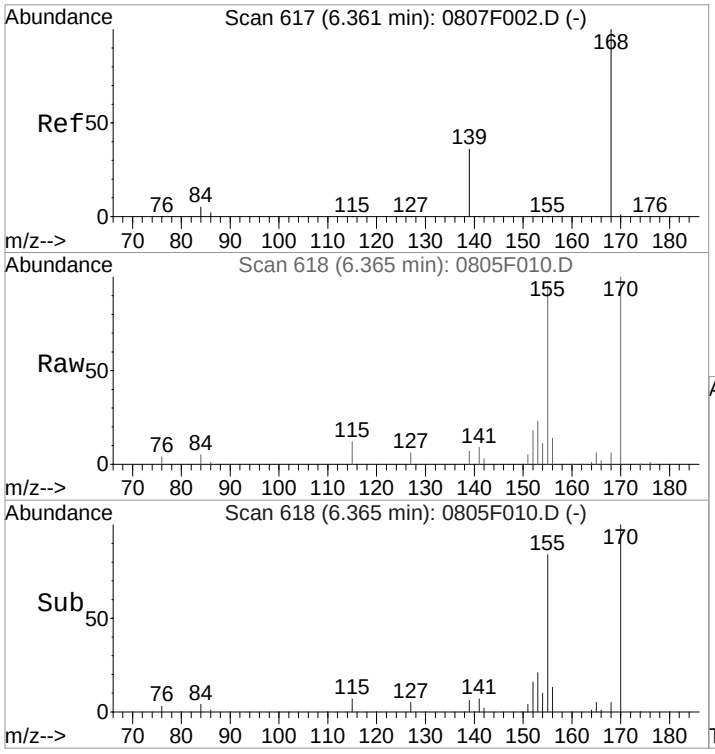


#10
Acenaphthene
Concen: 283.08 ng/ml
RT: 6.21 min Scan# 584
Delta R.T. -0.02 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:154 Resp: 198464

Ion	Ratio	Lower	Upper
154	100		
153	106.1	75.0	135.0
152	50.3	19.6	79.6

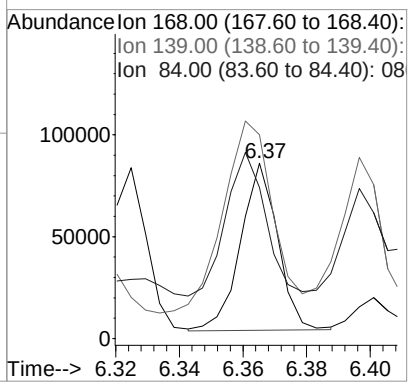


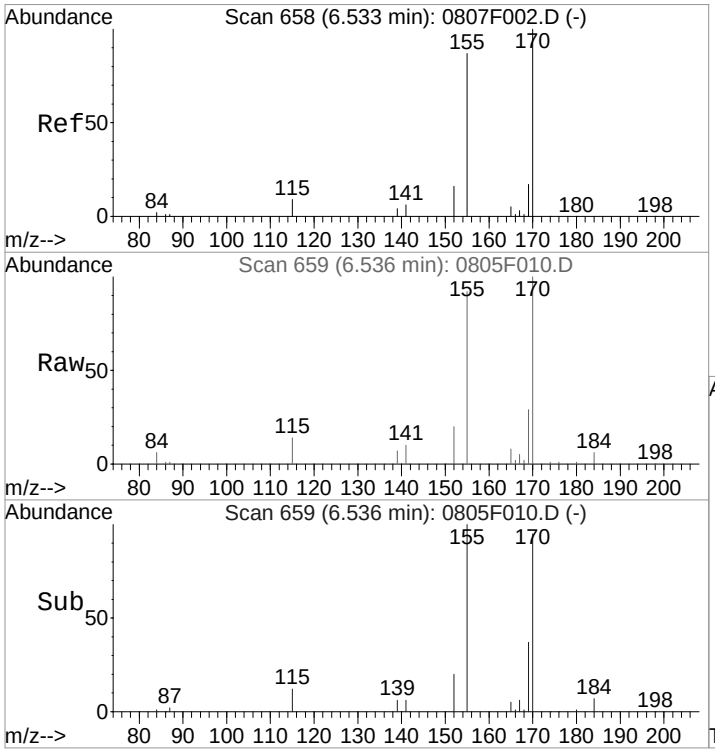


#11
Dibenzofuran
Concen: 64.13 ng/ml m
RT: 6.37 min Scan# 618
Delta R.T. -0.02 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:168 Resp: 66637

Ion	Ratio	Lower	Upper
168	100		
139	116.3	0.0	59.2#
84	86.2	0.0	34.2#

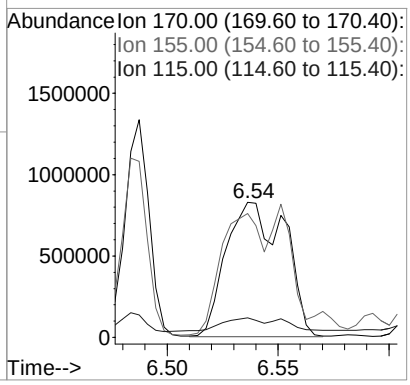


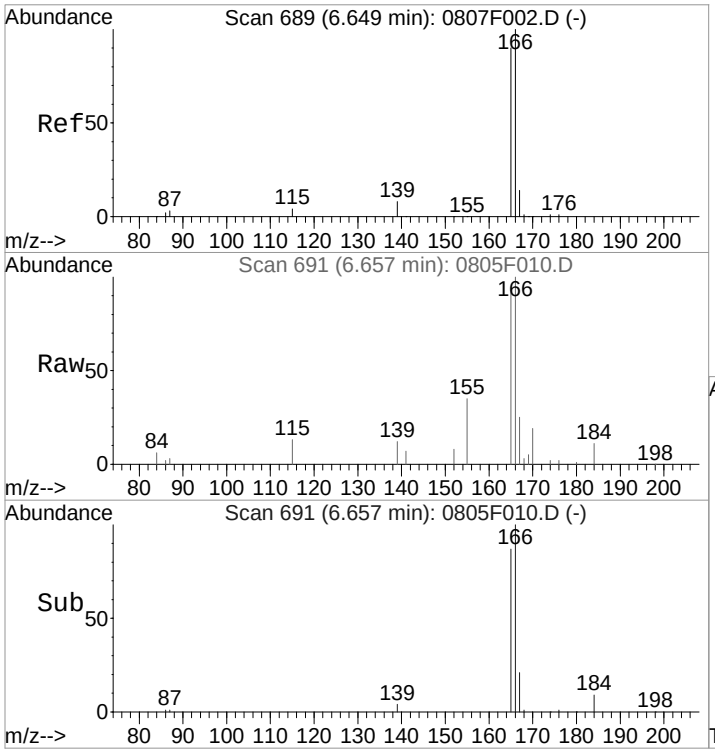


#12
2,3,5-Trimethylnaphthalene
Concen: 2317.64 ng/ml m
RT: 6.54 min Scan# 659
Delta R.T. -0.02 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:170 Resp: 1521678

Ion	Ratio	Lower	Upper
170	100		
155	91.6	52.5	112.5
115	14.4	0.0	38.1

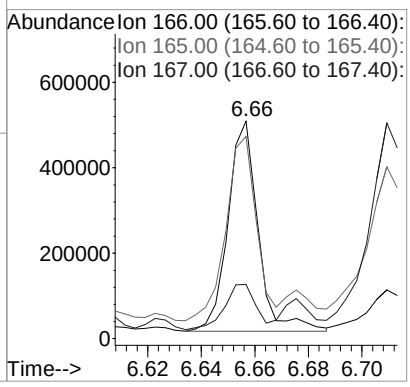




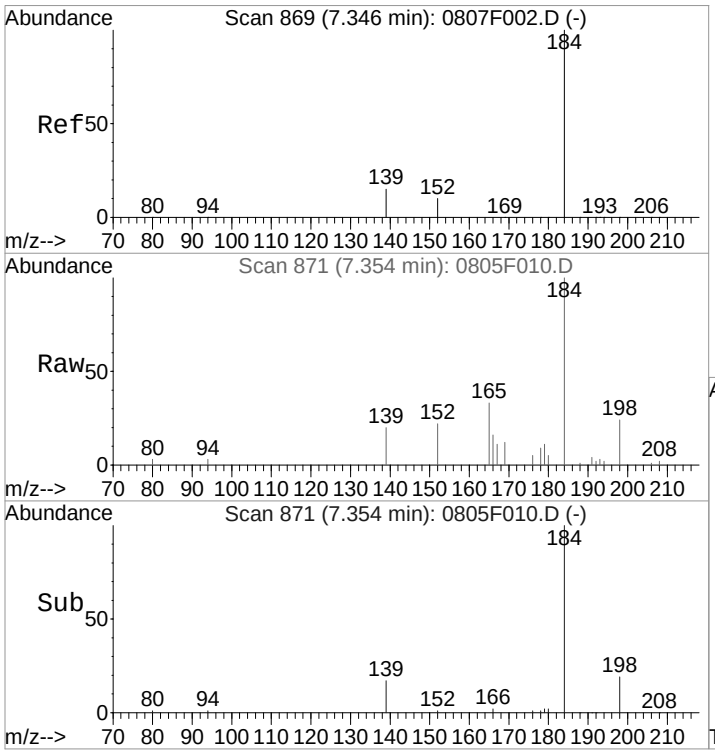
#14
Fluorene
Concen: 476.41 ng/ml
RT: 6.66 min Scan# 691
Delta R.T. -0.02 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:166 Resp: 383959

Ion	Ratio	Lower	Upper
166	100		
165	87.8	56.8	116.8
167	21.5	0.0	44.0



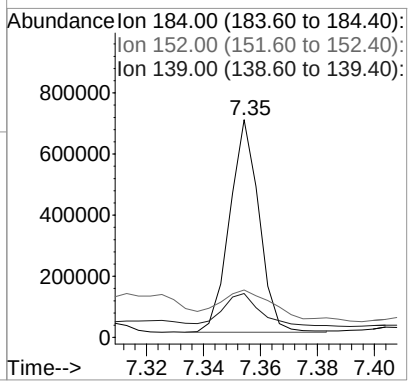
1st 08/08/24
2nd 08/08/24

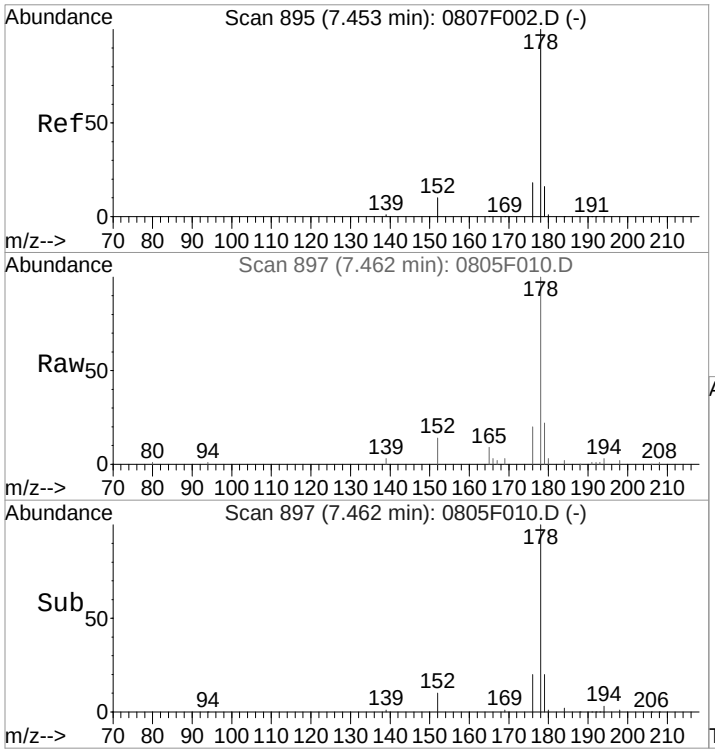


#16
Dibenzothiophene
Concen: 384.77 ng/ml
RT: 7.35 min Scan# 871
Delta R.T. -0.02 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:184 Resp: 501304

Ion	Ratio	Lower	Upper
184	100		
152	13.2	0.0	40.4
139	15.1	0.0	44.9

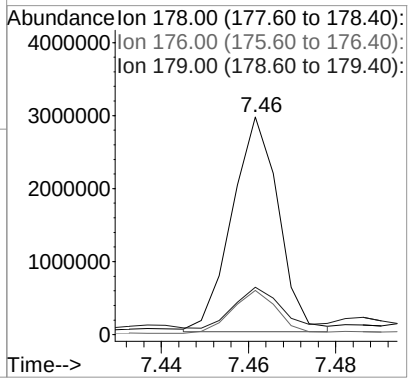




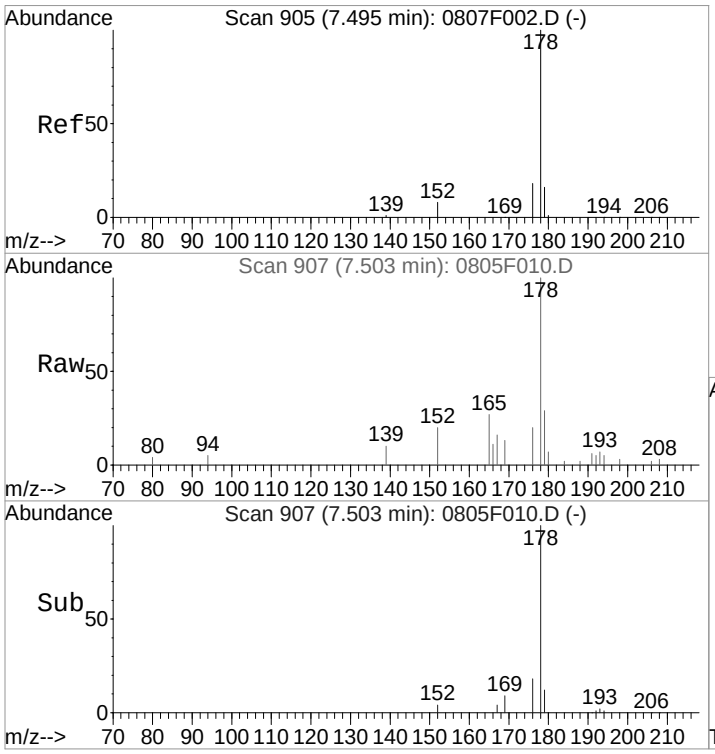
#17
Phenanthrene
Concen: 1613.70 ng/ml m
RT: 7.46 min Scan# 897
Delta R.T. -0.02 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:178 Resp: 2185700

Ion	Ratio	Lower	Upper
178	100		
176	20.4	0.0	47.9
179	21.8	0.0	46.5



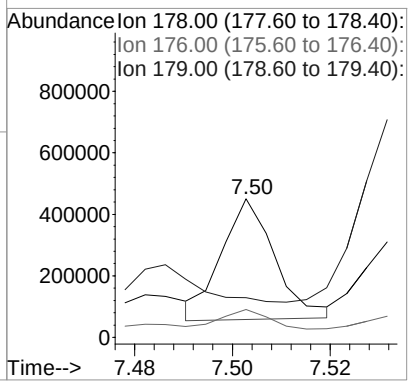
1st 08/08/24
2nd 08/08/24

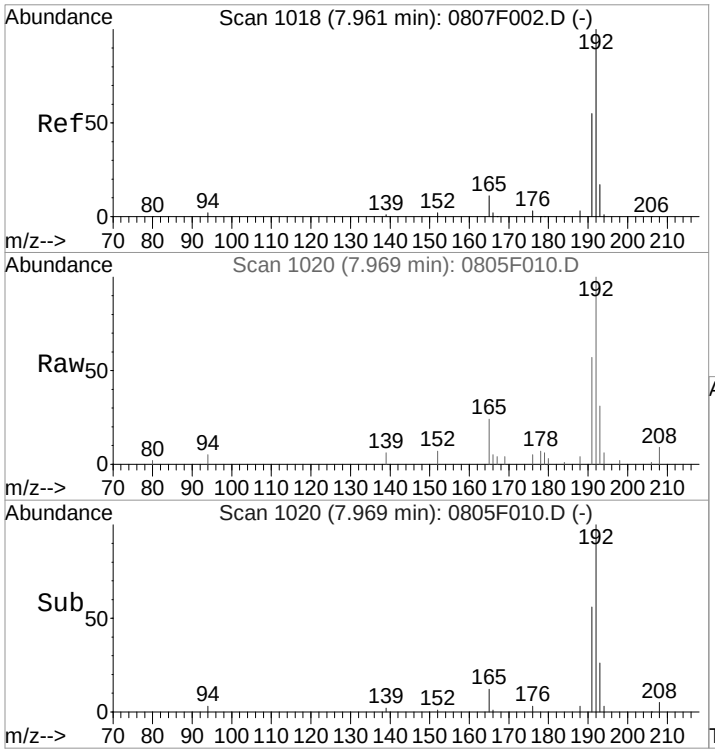


#18
Anthracene
Concen: 235.96 ng/ml
RT: 7.50 min Scan# 907
Delta R.T. -0.02 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:178 Resp: 297701

Ion	Ratio	Lower	Upper
178	100		
176	17.7	0.0	47.8
179	0.0	0.0	46.9

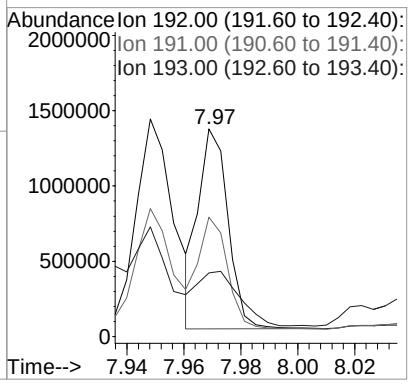




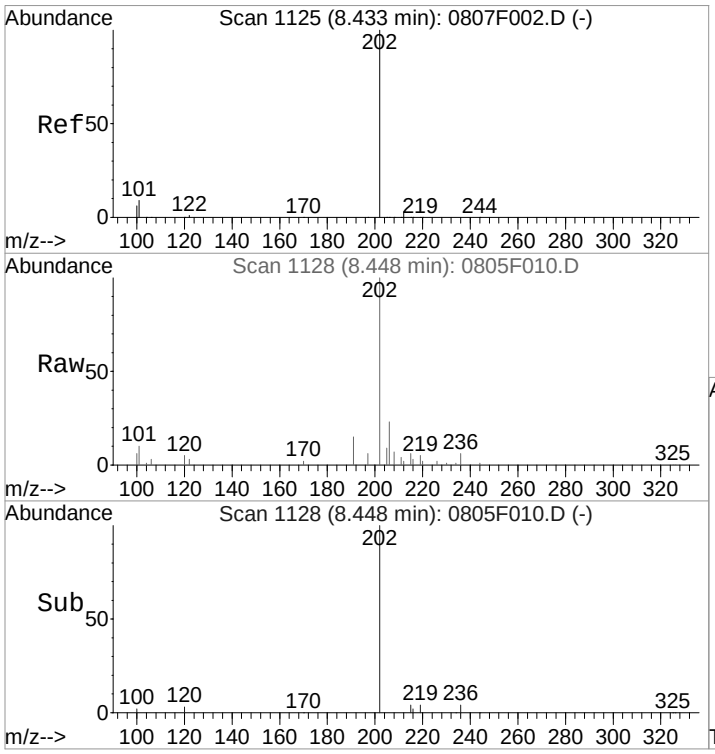
#20
1-Methylphenanthrene
Concen: 950.81 ng/ml
RT: 7.97 min Scan# 1020
Delta R.T. -0.02 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:192 Resp: 957991

Ion	Ratio	Lower	Upper
192	100		
191	56.0	22.7	82.7
193	26.1	0.0	47.5



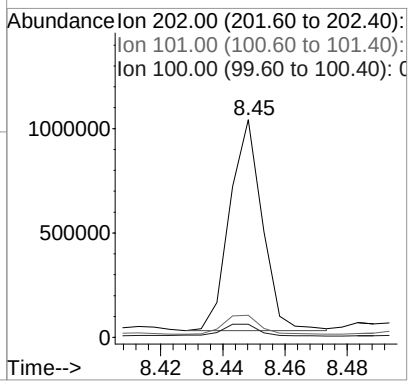
1st 08/08/24
2nd 08/08/24

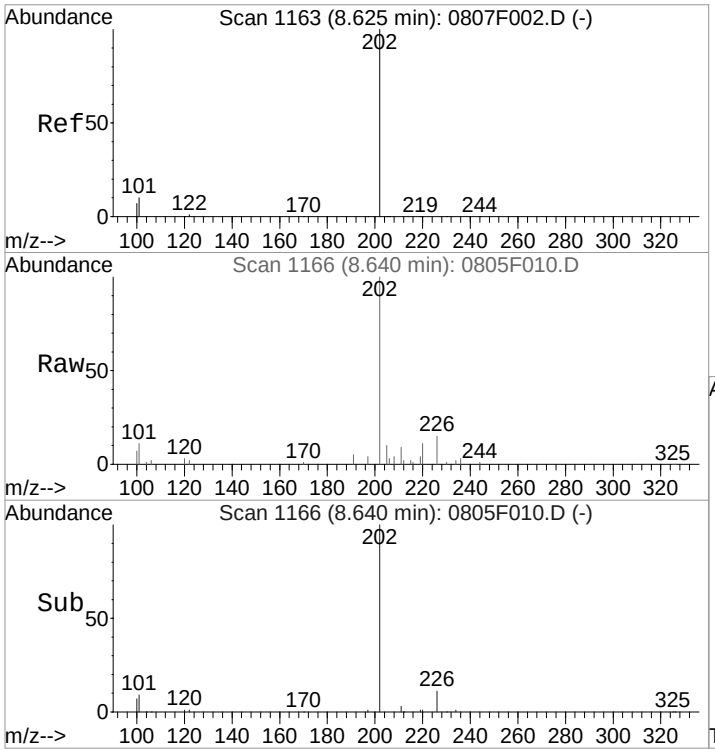


#21
Fluoranthene
Concen: 471.85 ng/ml
RT: 8.45 min Scan# 1128
Delta R.T. -0.02 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:202 Resp: 734634

Ion	Ratio	Lower	Upper
202	100		
101	9.1	0.0	36.9
100	5.5	0.0	34.3

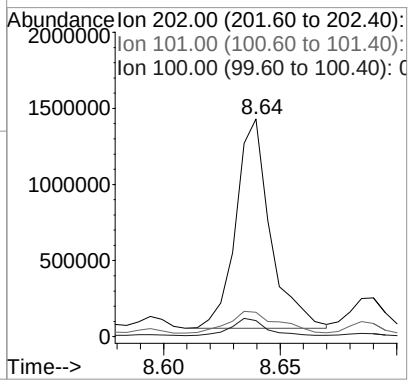


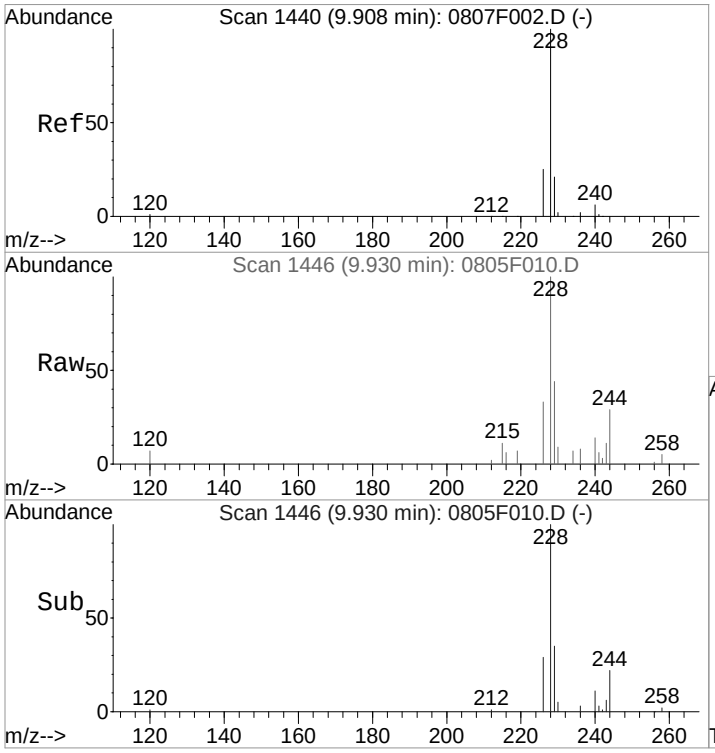


#24
Pyrene
Concen: 774.03 ng/ml
RT: 8.64 min Scan# 1166
Delta R.T. -0.01 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:202 Resp: 1419307

Ion	Ratio	Lower	Upper
202	100		
101	9.9	0.0	41.8
100	7.2	0.0	37.9

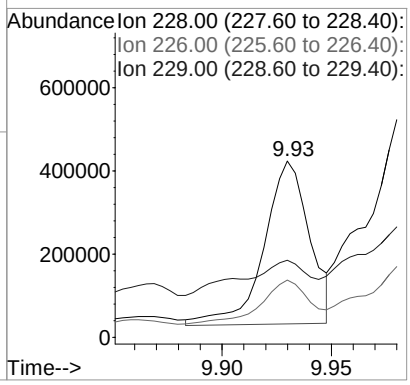


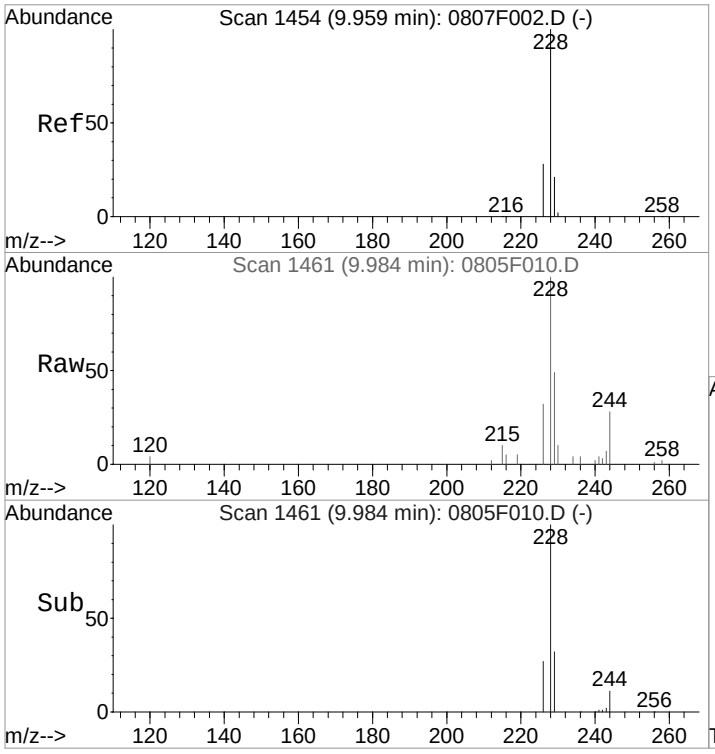


#26
Benz(a)anthracene
Concen: 310.02 ng/ml
RT: 9.93 min Scan# 1446
Delta R.T. -0.02 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:228 Resp: 571458

Ion	Ratio	Lower	Upper
228	100		
226	27.7	0.0	54.6
229	22.1	0.0	50.6

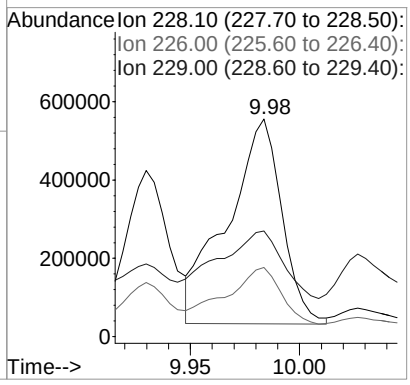


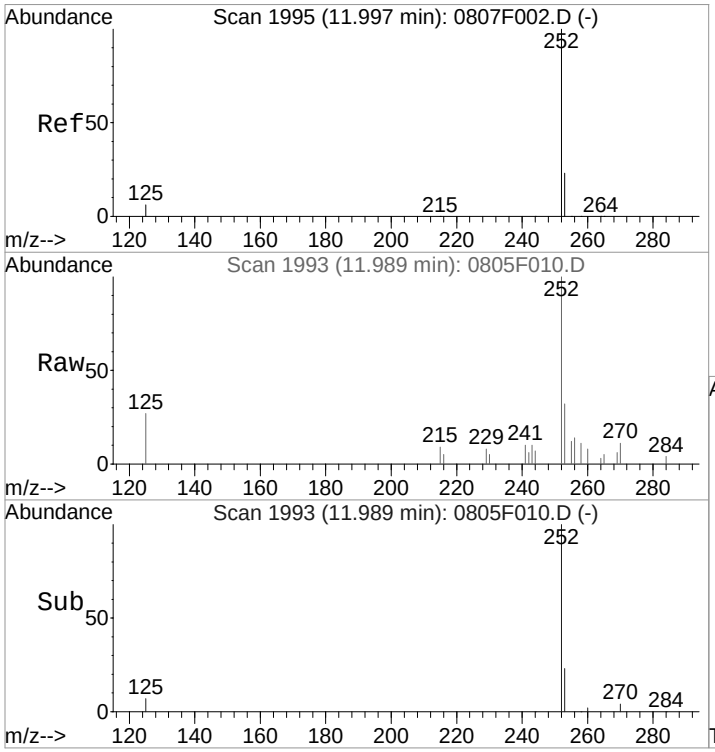


#27
Chrysene
Concen: 519.41 ng/ml
RT: 9.98 min Scan# 1461
Delta R.T. -0.02 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:228 Resp: 911527

Ion	Ratio	Lower	Upper
228	100		
226	28.3	0.0	57.3
229	32.0	0.0	50.7

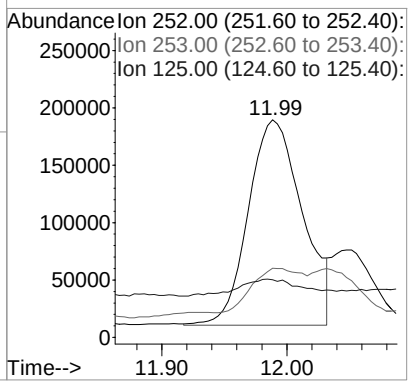


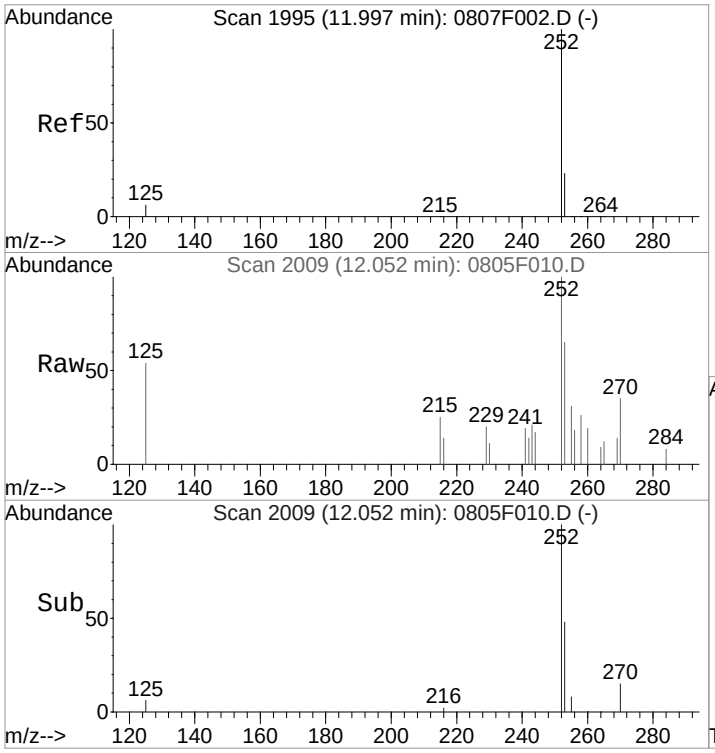


#29
Benzo(b)fluoranthene
Concen: 261.76 ng/ml m
RT: 11.99 min Scan# 1993
Delta R.T. 0.06 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:252 Resp: 539930

Ion	Ratio	Lower	Upper
252	100		
253	31.7	0.0	52.5
125	26.6	0.0	36.1

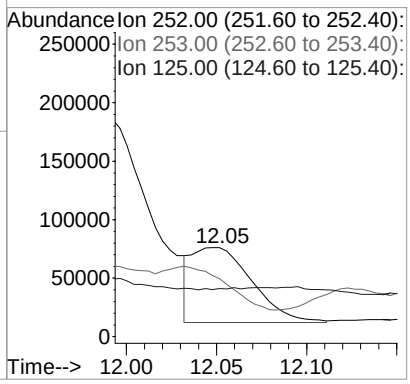


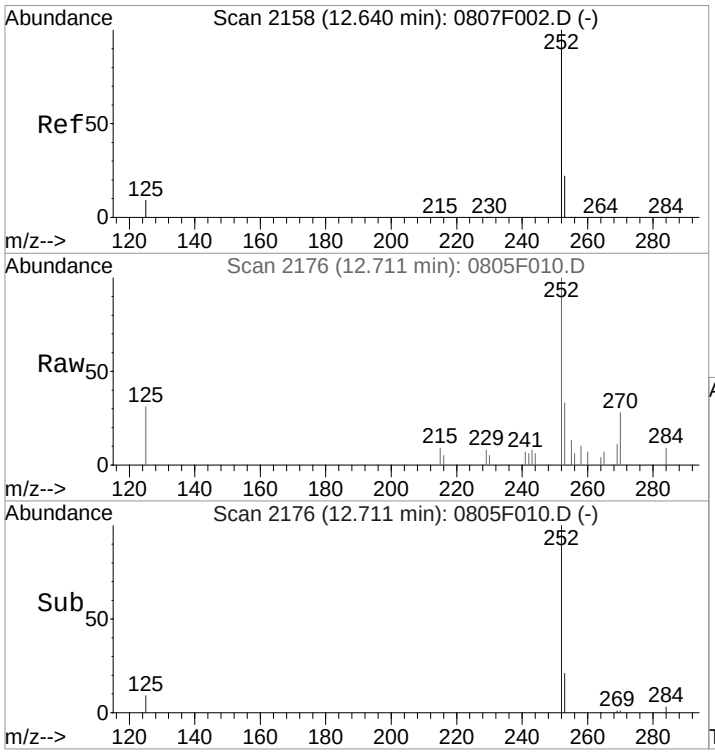


#30
Benzo(k)fluoranthene
Concen: 76.44 ng/ml m
RT: 12.05 min Scan# 2009
Delta R.T. 0.06 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:252 Resp: 148915

Ion	Ratio	Lower	Upper
252	100		
253	64.9	0.0	52.7#
125	54.0	0.0	35.9#

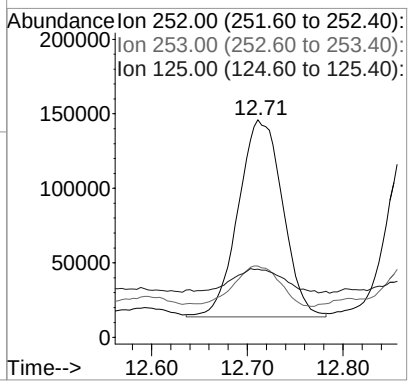


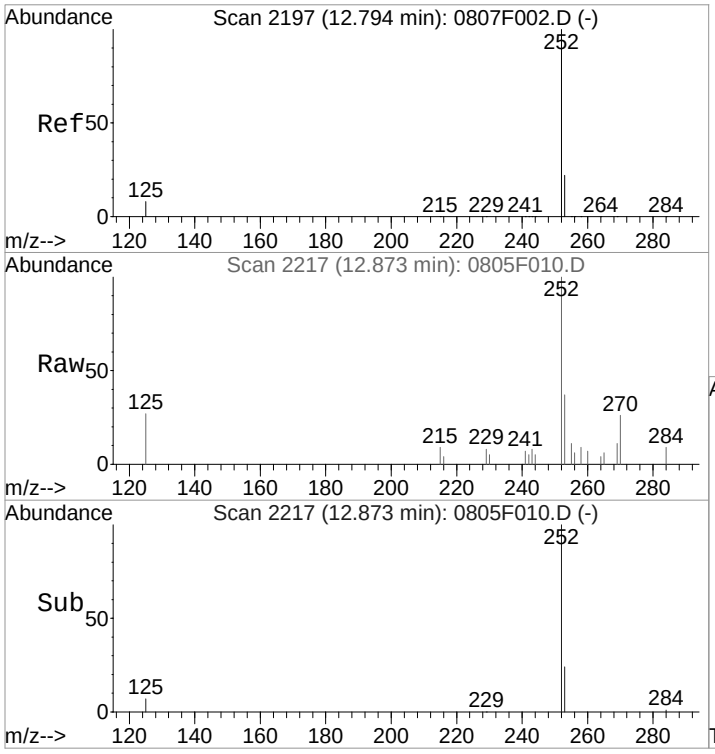


#31
Benzo(e)pyrene
Concen: 220.98 ng/ml m
RT: 12.71 min Scan# 2176
Delta R.T. 0.08 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:252 Resp: 427099

Ion	Ratio	Lower	Upper
252	100		
253	32.8	0.0	52.0
125	31.4	0.0	39.2

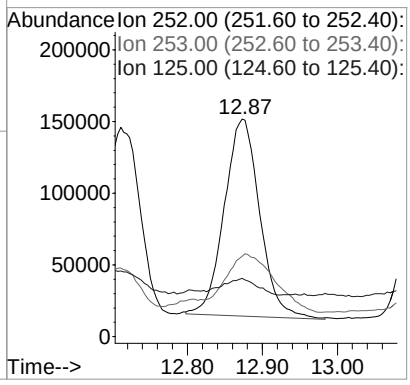


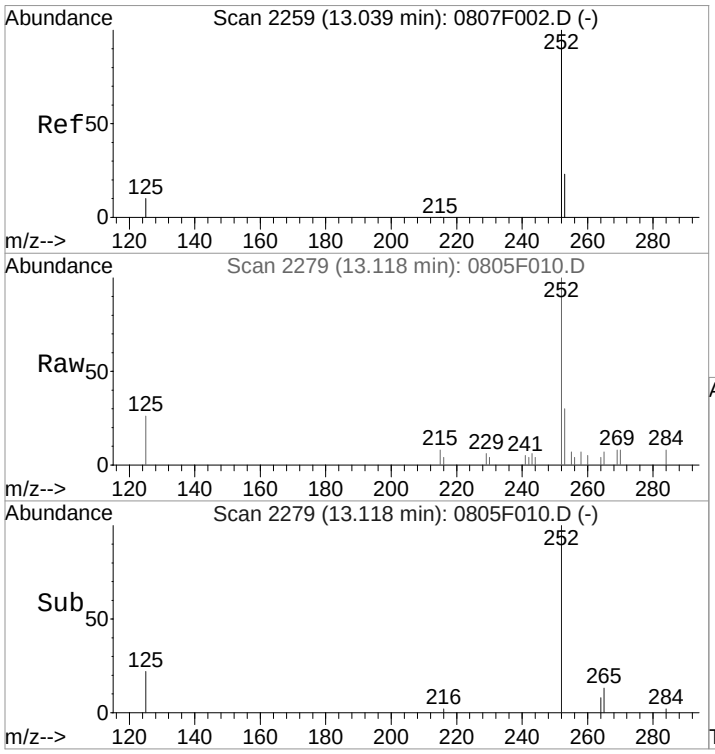


#32
Benzo(a)pyrene
Concen: 273.63 ng/ml m
RT: 12.87 min Scan# 2217
Delta R.T. 0.09 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:252 Resp: 450569

Ion	Ratio	Lower	Upper
252	100		
253	36.9	0.0	52.3
125	26.8	0.0	36.9

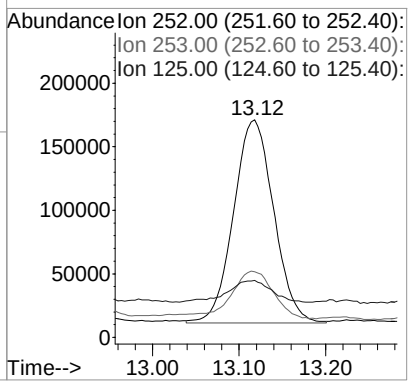


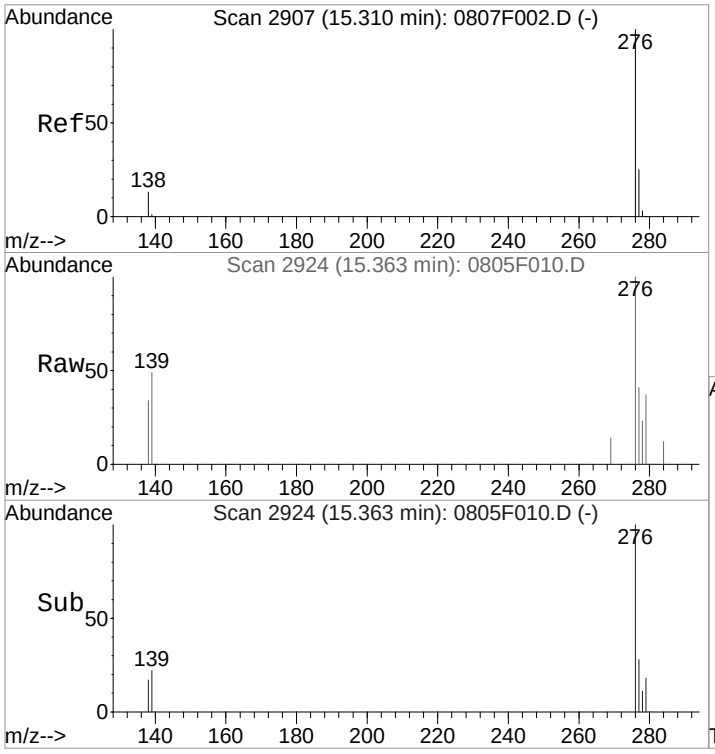


#33
Perylene
Concen: 290.62 ng/ml m
RT: 13.12 min Scan# 2279
Delta R.T. 0.09 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:252 Resp: 516317

Ion	Ratio	Lower	Upper
252	100		
253	30.1	0.0	52.2
125	26.2	0.0	39.2

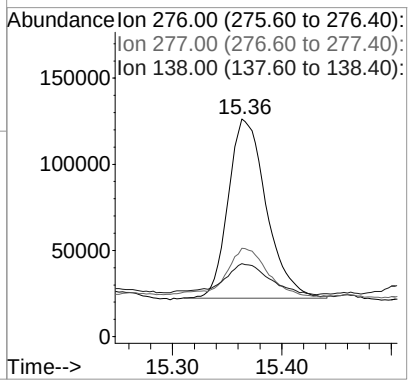


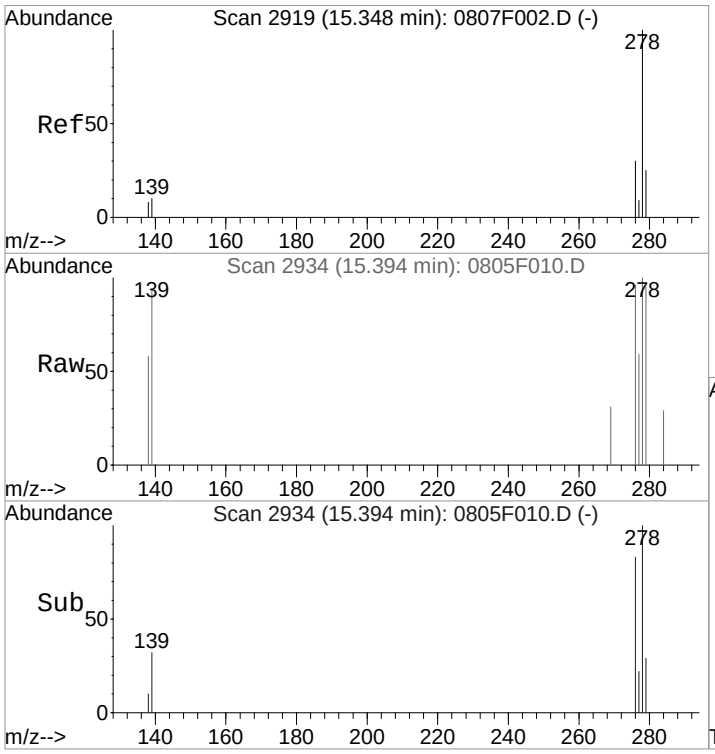


#34
Indeno(1,2,3-cd)pyrene
Concen: 147.51 ng/ml m
RT: 15.36 min Scan# 2924
Delta R.T. 0.08 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:276 Resp: 252413

Ion	Ratio	Lower	Upper
276	100		
277	40.6	0.0	55.2
138	33.5	0.0	42.2

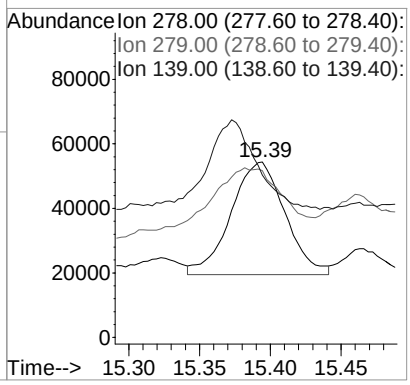


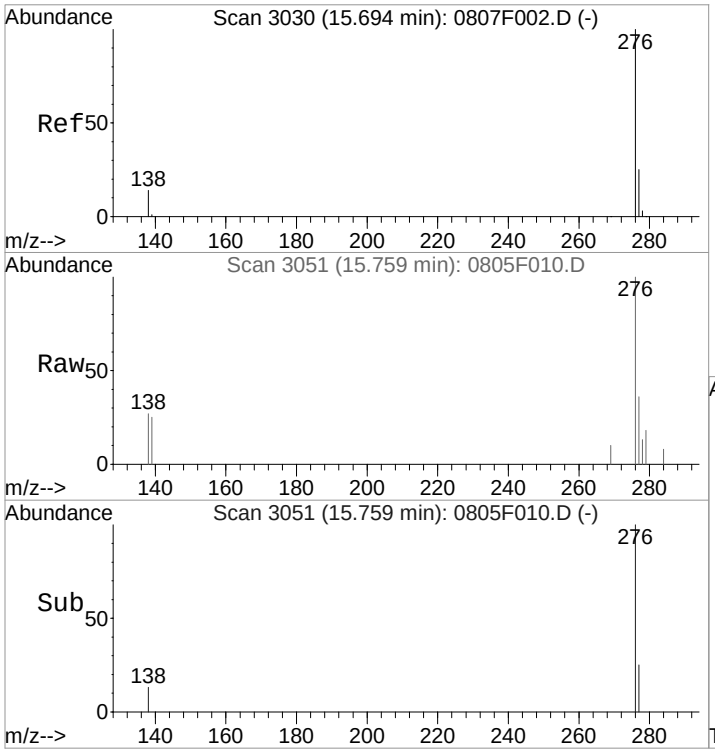


#35
Dibenz(a,h)anthracene
Concen: 48.06 ng/ml m
RT: 15.39 min Scan# 2934
Delta R.T. 0.06 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:278 Resp: 92968

Ion	Ratio	Lower	Upper
278	100		
279	95.1	0.0	55.2#
139	92.6	0.0	40.4#

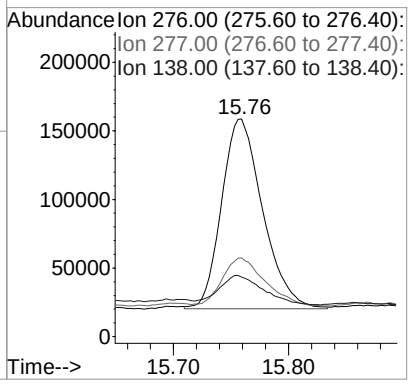




#36
Benzo(g,h,i)perylene
Concen: 151.80 ng/ml m
RT: 15.76 min Scan# 3051
Delta R.T. 0.10 min
Lab File: 0805F010.D
Acq: 5 Aug 2024 1:47 pm

Tgt Ion:276 Resp: 343762

Ion	Ratio	Lower	Upper
276	100		
277	36.1	0.0	54.9
138	27.4	0.0	43.8



Quantitation Report (QT Reviewed)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 05 14:59:31 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.56	136	244624	200.00	ng/ml	-0.06
8) Acenaphthene-d10	6.19	164	122692	200.00	ng/ml	-0.02
15) Phenanthrene-d10	7.44	188	259435	200.00	ng/ml	-0.02
23) Chrysene-d12	9.94	240	283332	200.00	ng/ml	-0.02
28) Perylene-d12	13.03	264	321745m	200.00	ng/ml	0.09
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.23	152	95659m	139.75	ng/ml	-0.04
Spiked Amount 200.000			Recovery =	69.88%		
13) Fluorene-d10	6.63	176	132962	188.31	ng/ml	-0.02
Spiked Amount 200.000			Recovery =	94.16%		
22) Fluoranthene-d10	8.43	212	263688m	185.76	ng/ml	0.00
Spiked Amount 200.000			Recovery =	92.88%		
25) Terphenyl-d14	8.77	244	249563	159.39	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	79.69%		
Target Compounds						Qvalue
2) Naphthalene	4.58	128	75482	64.36	ng/ml	97
4) 2-Methylnaphthalene	5.26	142	83717	109.98	ng/ml	95
5) 1-Methylnaphthalene	5.35	142	79290	110.68	ng/ml	93
6) Biphenyl	5.69	154	11739m	12.68	ng/ml	
7) 2,6-Dimethylnaphthalene	5.83	156	233102	355.63	ng/ml	96
9) Acenaphthylene	6.06	152	81622	74.80	ng/ml#	3
10) Acenaphthene	6.21	154	198464	283.08	ng/ml	99
11) Dibenzofuran	6.37	168	66637m	64.13	ng/ml	
12) 2,3,5-Trimethylnaphthalene	6.54	170	1521678m	2317.64	ng/ml	
14) Fluorene	6.66	166	383959	476.41	ng/ml	97
16) Dibenzothiophene	7.35	184	501304	384.77	ng/ml	97
17) Phenanthrene	7.46	178	2185700m	1613.70	ng/ml	
18) Anthracene	7.50	178	297701	235.96	ng/ml	81
20) 1-Methylphenanthrene	7.97	192	957991	950.81	ng/ml	92
21) Fluoranthene	8.45	202	734634	471.85	ng/ml	95
24) Pyrene	8.64	202	1419307	774.03	ng/ml	96
26) Benz(a)anthracene	9.93	228	571458	310.02	ng/ml	95
27) Chrysene	9.98	228	911527	519.41	ng/ml	88
29) Benzo(b)fluoranthene	11.99	252	539930m	261.76	ng/ml	
30) Benzo(k)fluoranthene	12.05	252	148915m	76.44	ng/ml	
31) Benzo(e)pyrene	12.71	252	427099m	220.98	ng/ml	
32) Benzo(a)pyrene	12.87	252	450569m	273.63	ng/ml	
33) Perylene	13.12	252	516317m	290.62	ng/ml	
34) Indeno(1,2,3-cd)pyrene	15.36	276	252413m	147.51	ng/ml	
35) Dibenz(a,h)anthracene	15.39	278	92968m	48.06	ng/ml	
36) Benzo(g,h,i)perylene	15.76	276	343762m	151.80	ng/ml	

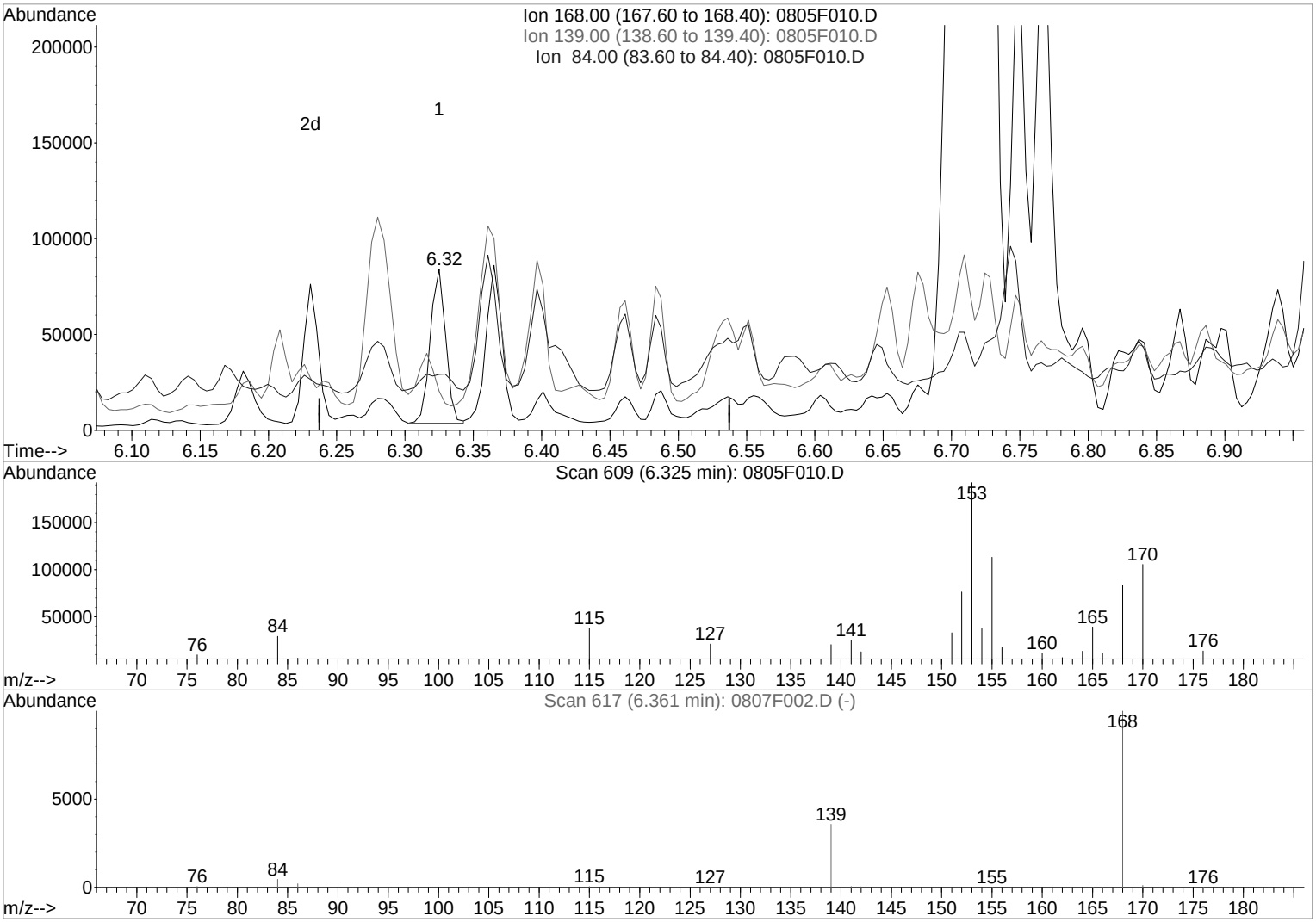
(#) = qualifier out of range (m) = manual integration

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:08 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(11) Dibenzofuran (T)

6.32min 60.55ng/ml

response 62916

Ion	Exp%	Act%
168.00	100	100
139.00	29.20	4.31
84.00	4.20	10.15
0.00	0.00	0.00

Manual Integration:

Before

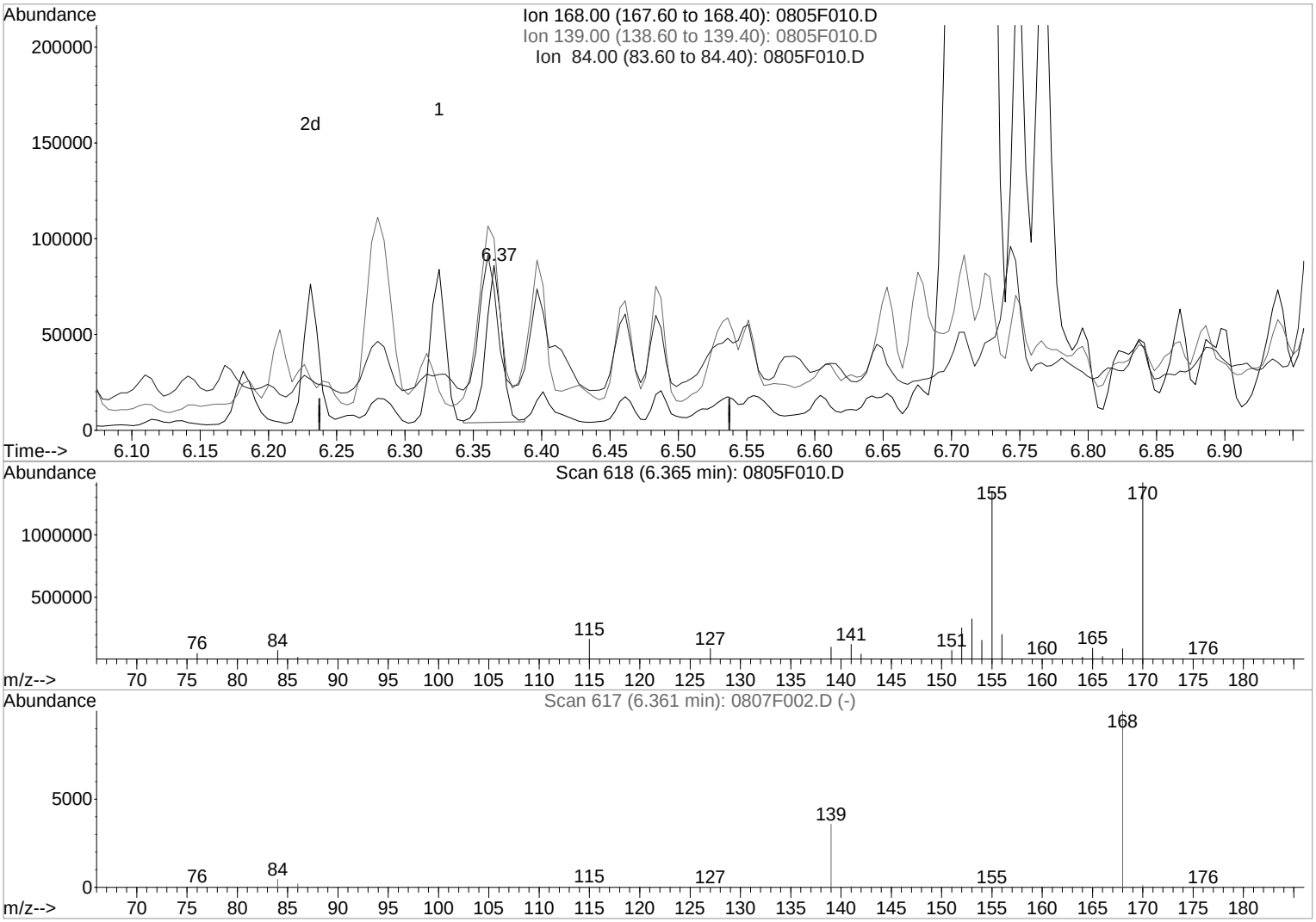
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:08 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(11) Dibenzofuran (T)

6.37min 64.13ng/ml m

response 66637

Ion	Exp%	Act%
168.00	100	100
139.00	29.20	116.32#
84.00	4.20	86.22#
0.00	0.00	0.00

Manual Integration:

After

WP

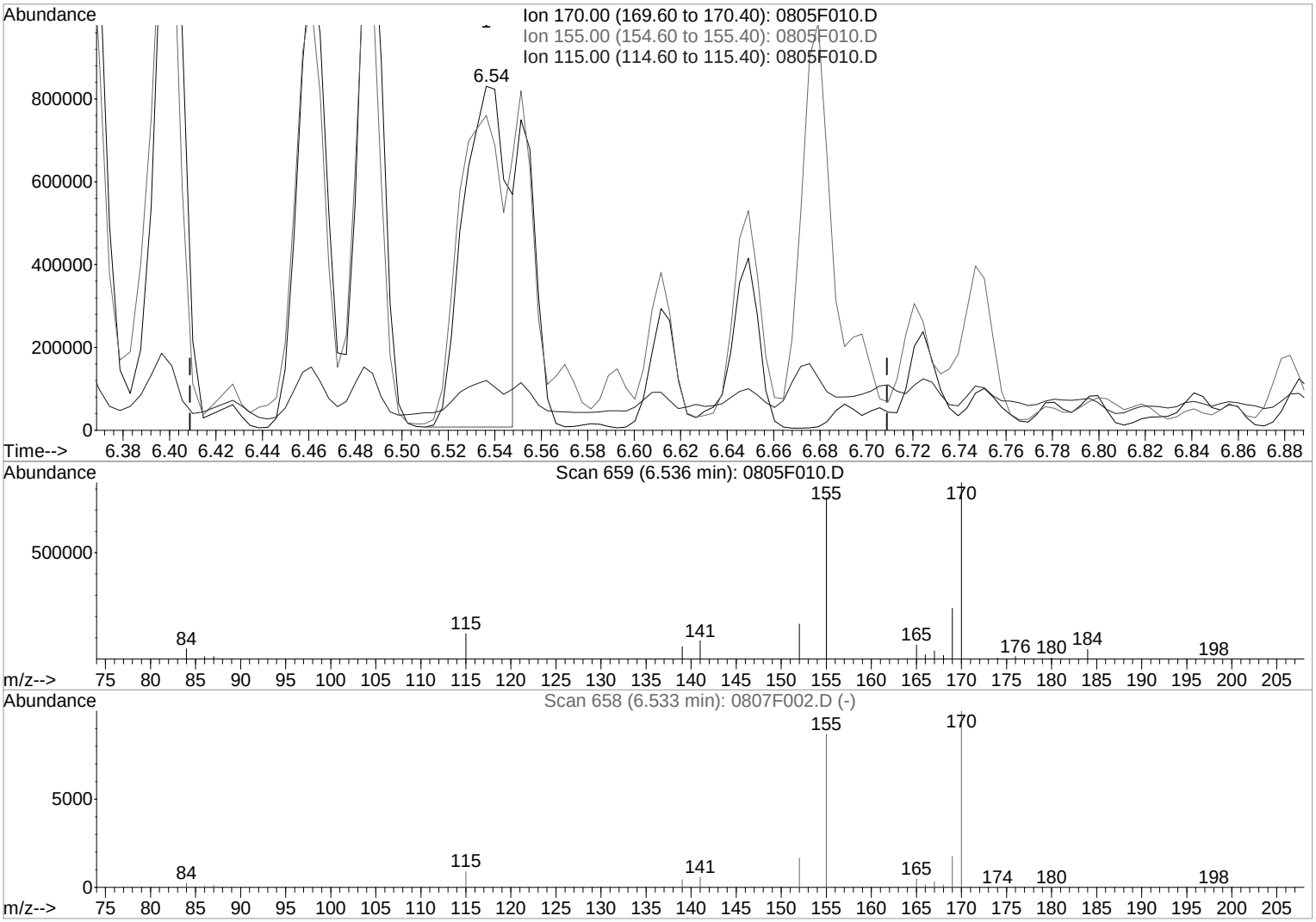
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:08 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(12) 2,3,5-Trimethylnaphthalene (T)

6.54min 1683.63ng/ml

response 1105410

Ion	Exp%	Act%
170.00	100	100
155.00	82.50	90.51
115.00	8.10	9.41
0.00	0.00	0.00

Manual Integration:

Before

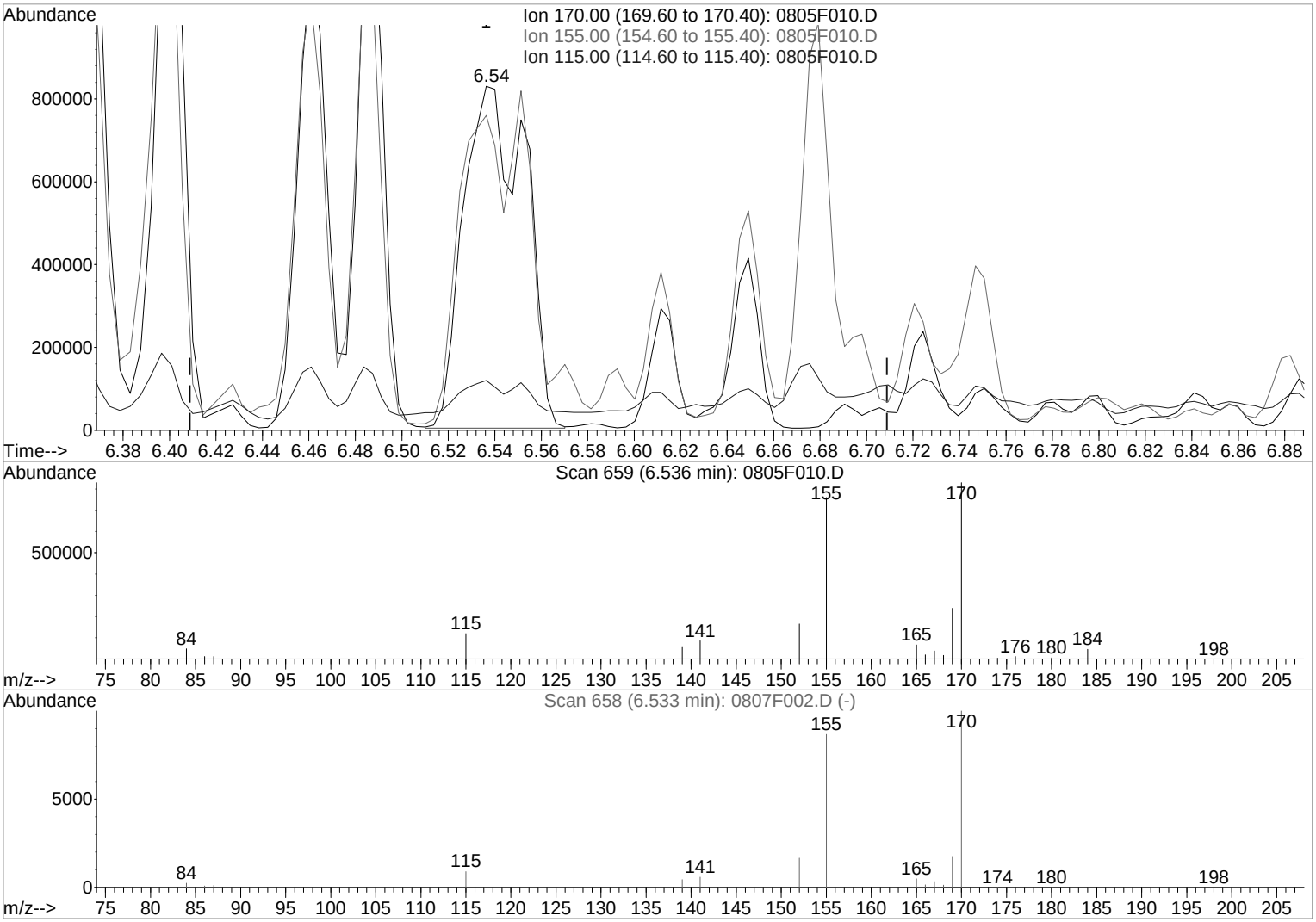
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:08 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(12) 2,3,5-Trimethylnaphthalene (T)

6.54min 2317.64ng/ml m

response 1521678

Ion	Exp%	Act%
170.00	100	100
155.00	82.50	91.57
115.00	8.10	14.43
0.00	0.00	0.00

Manual Integration:

After

BLC

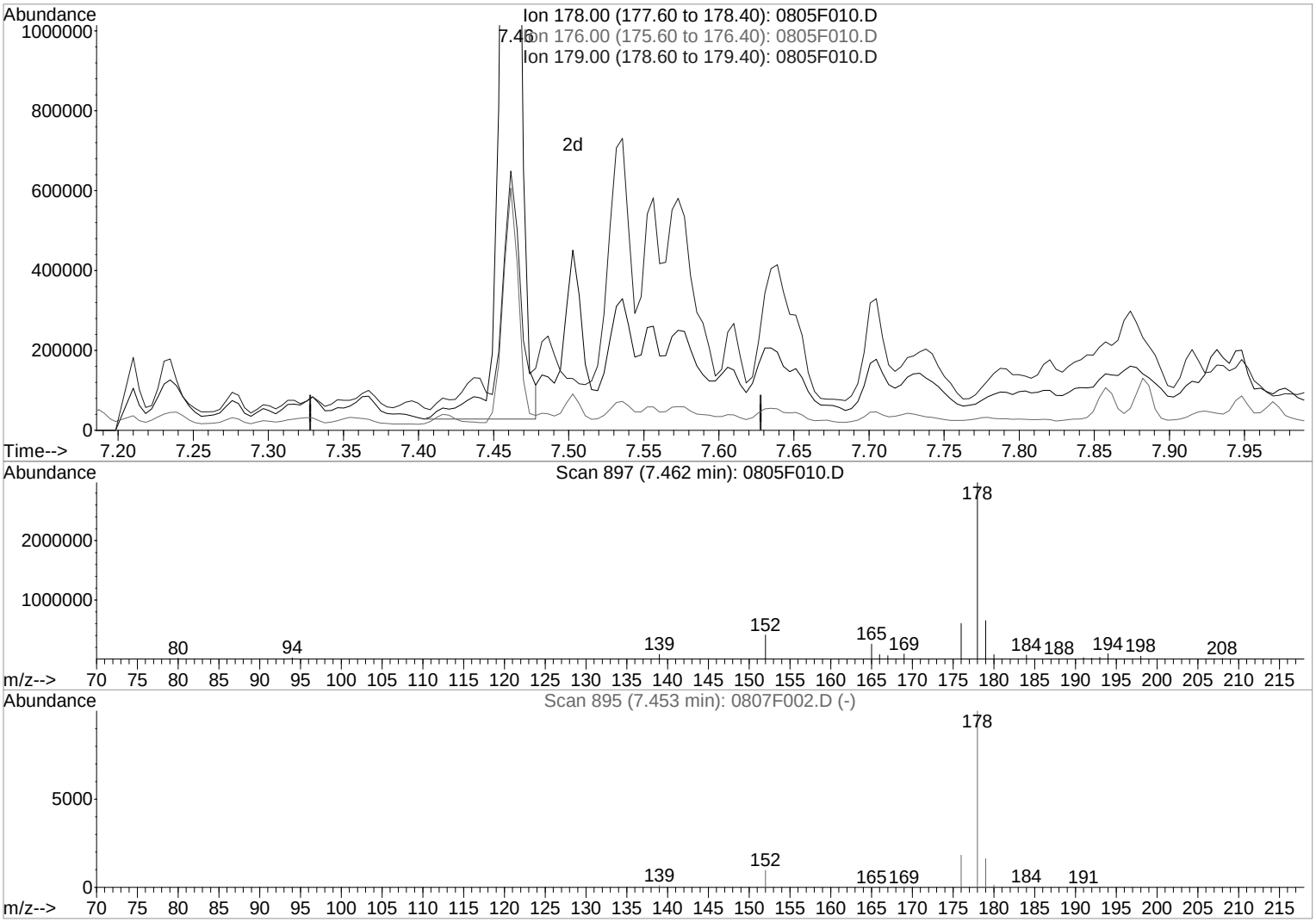
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:08 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(17) Phenanthrene (T)

7.46min 1692.24ng/ml

response 2292082

Ion	Exp%	Act%
178.00	100	100
176.00	17.90	19.98
179.00	16.50	20.11
0.00	0.00	0.00

Manual Integration:

Before

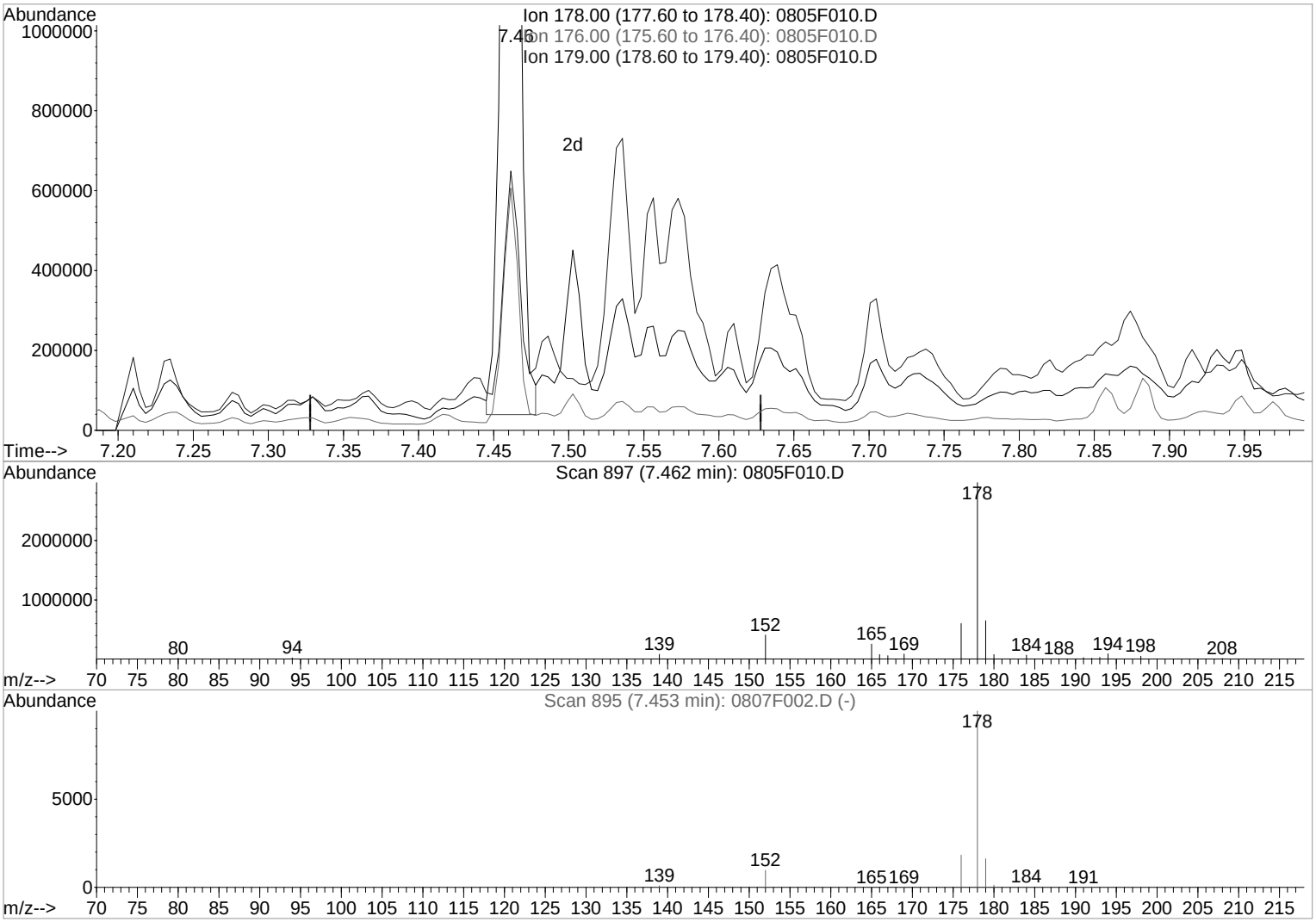
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:09 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(17) Phenanthrene (T)

7.46min 1613.70ng/ml m

response 2185700

Ion	Exp%	Act%
178.00	100	100
176.00	17.90	20.35
179.00	16.50	21.78
0.00	0.00	0.00

Manual Integration:

After

BLC

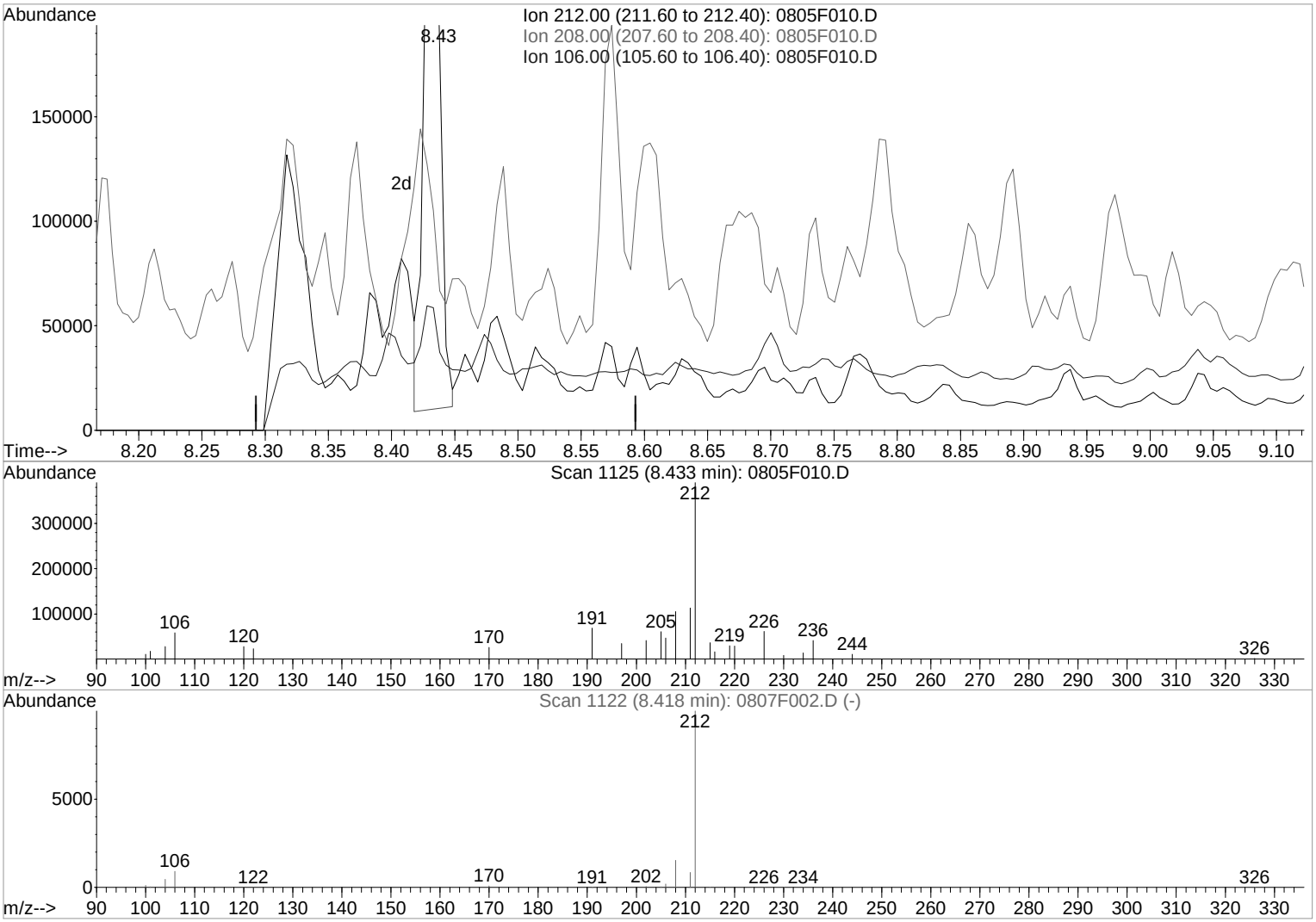
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:09 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(22) Fluoranthene-d10 (S)

8.43min 193.97ng/ml

response 275337

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	8.78
106.00	10.20	8.00
0.00	0.00	0.00

Manual Integration:

Before

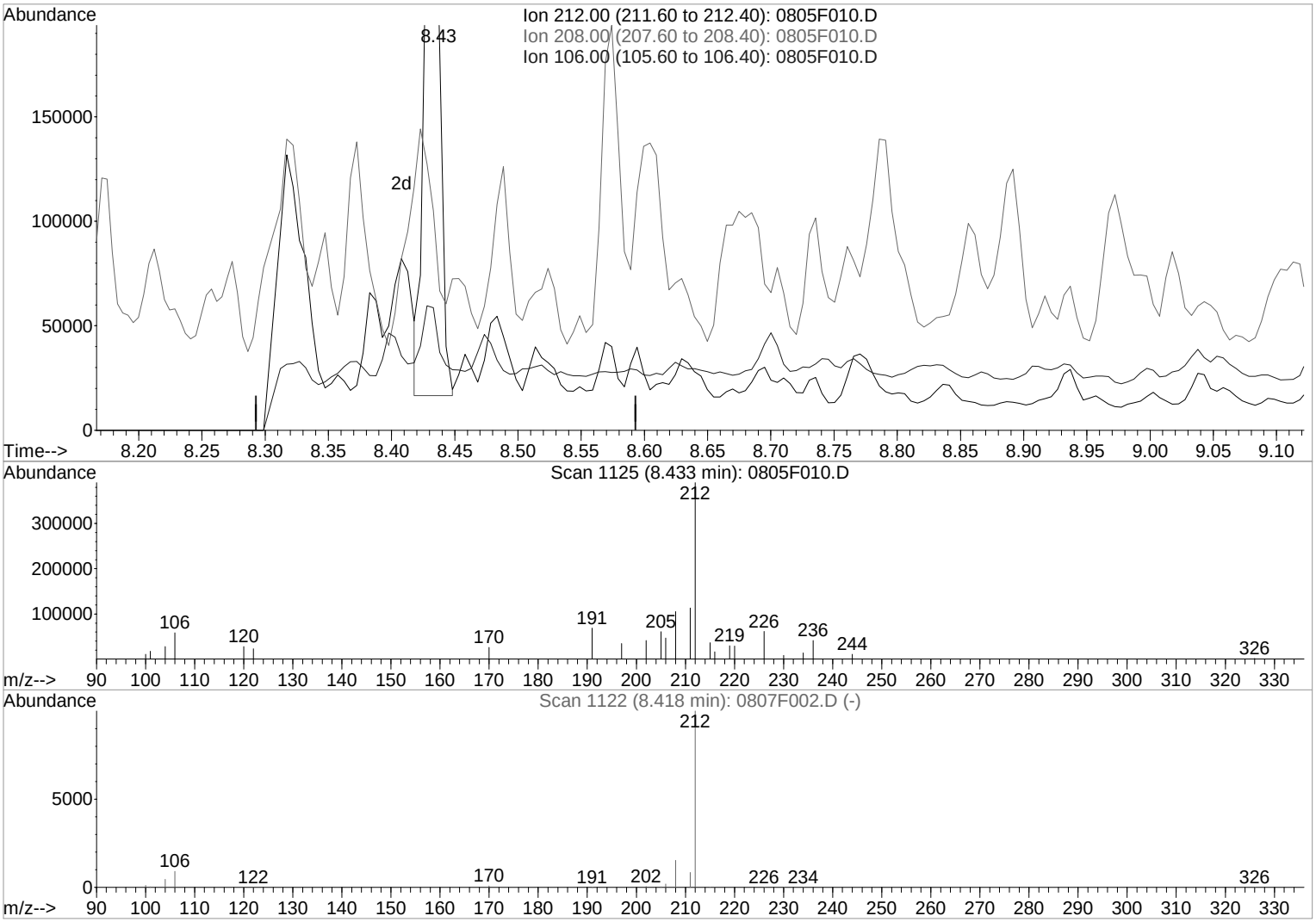
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:09 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(22) Fluoranthene-d10 (S)

8.43min 185.76ng/ml m

response 263688

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	26.91
106.00	10.20	15.02
0.00	0.00	0.00

Manual Integration:

After

BLC

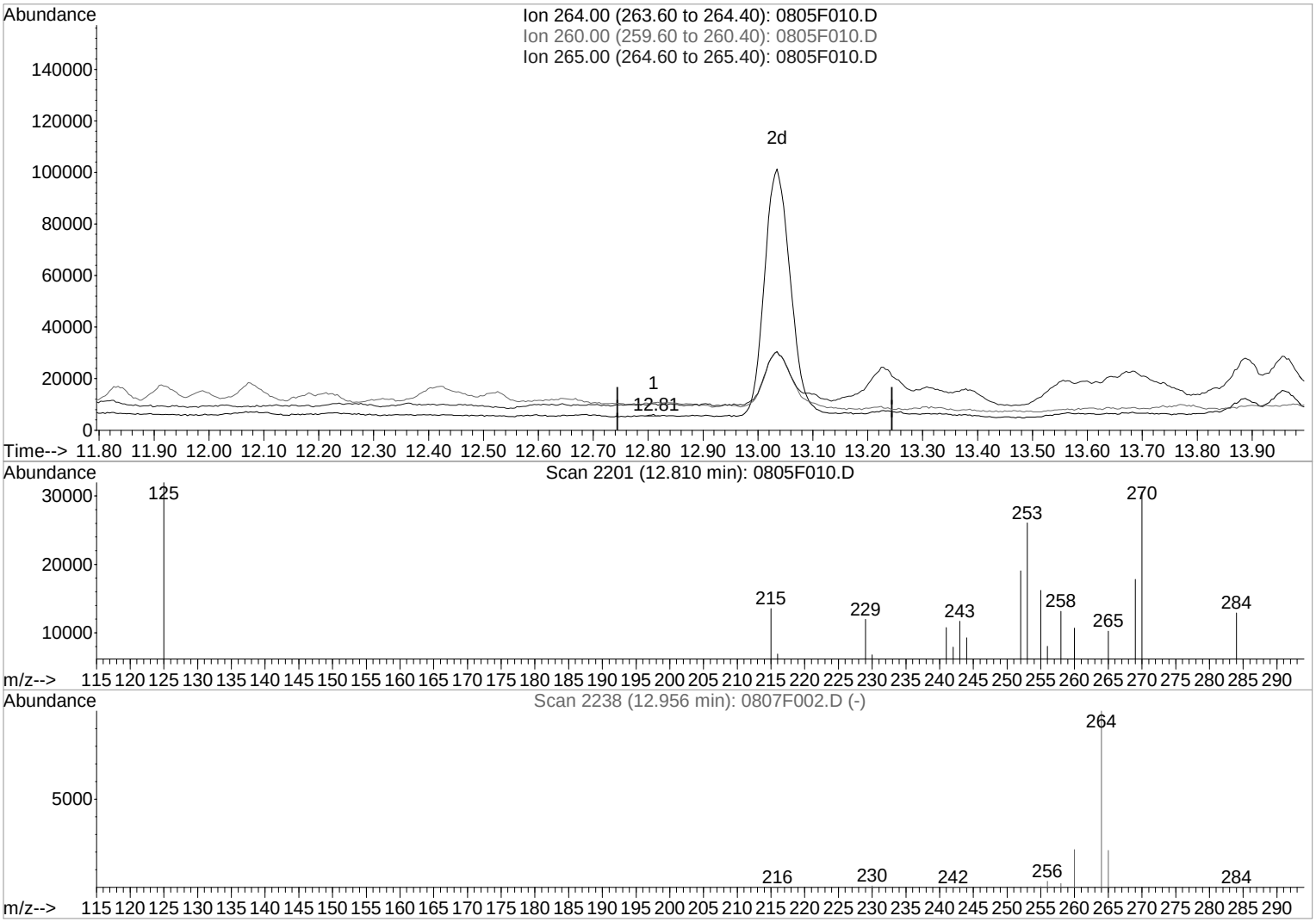
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:09 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(28) Perylene-d12 (I)

12.81min 200.00ng/ml

response 488

Ion	Exp%	Act%
264.00	100	100
260.00	22.50	23.57
265.00	21.70	50.49
0.00	0.00	0.00

Manual Integration:

Before

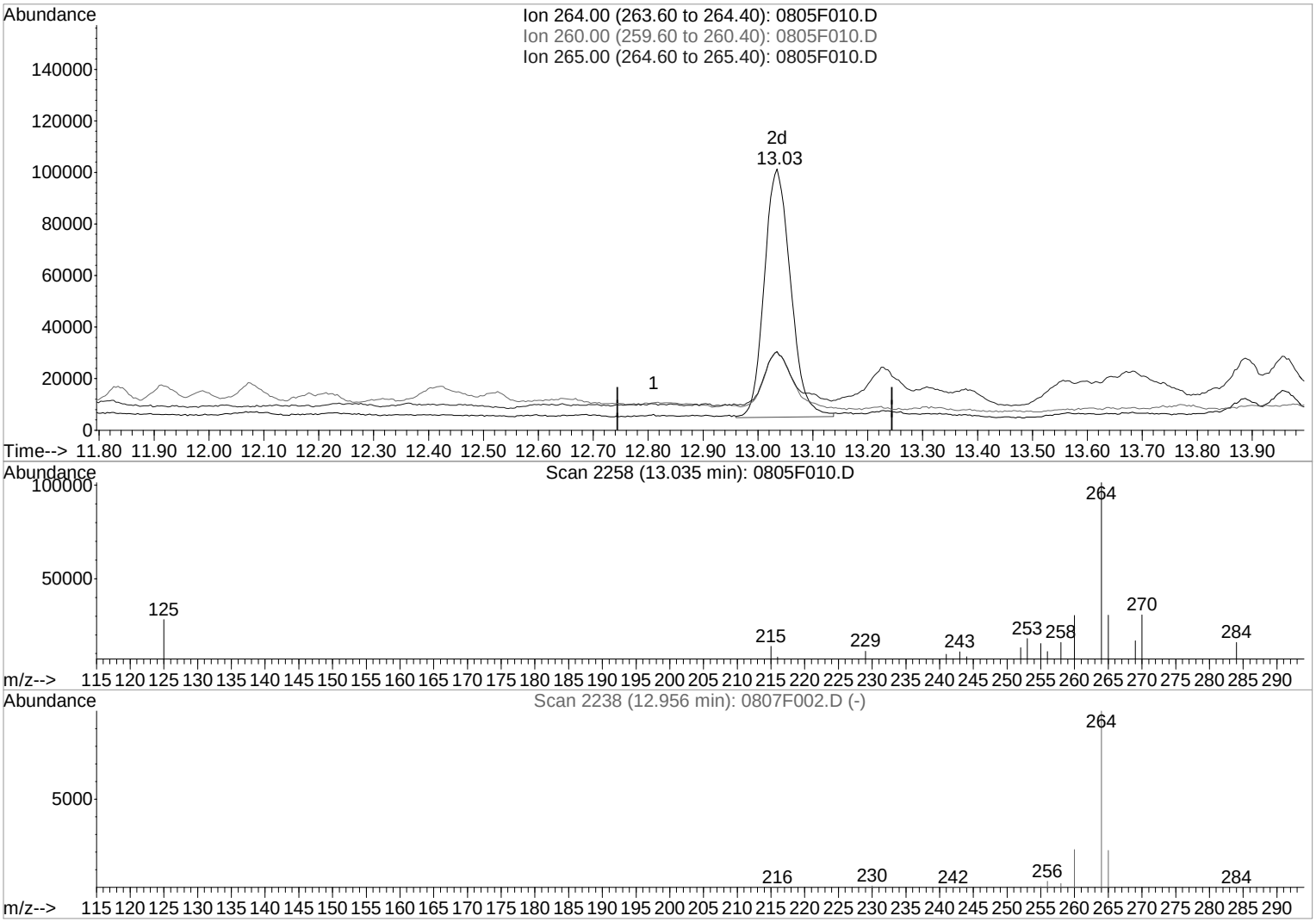
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:09 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(28) Perylene-d12 (I)

13.03min 200.00ng/ml m

response 321745

Ion	Exp%	Act%
264.00	100	100
260.00	22.50	29.94
265.00	21.70	30.11
0.00	0.00	0.00

Manual Integration:

After

WP

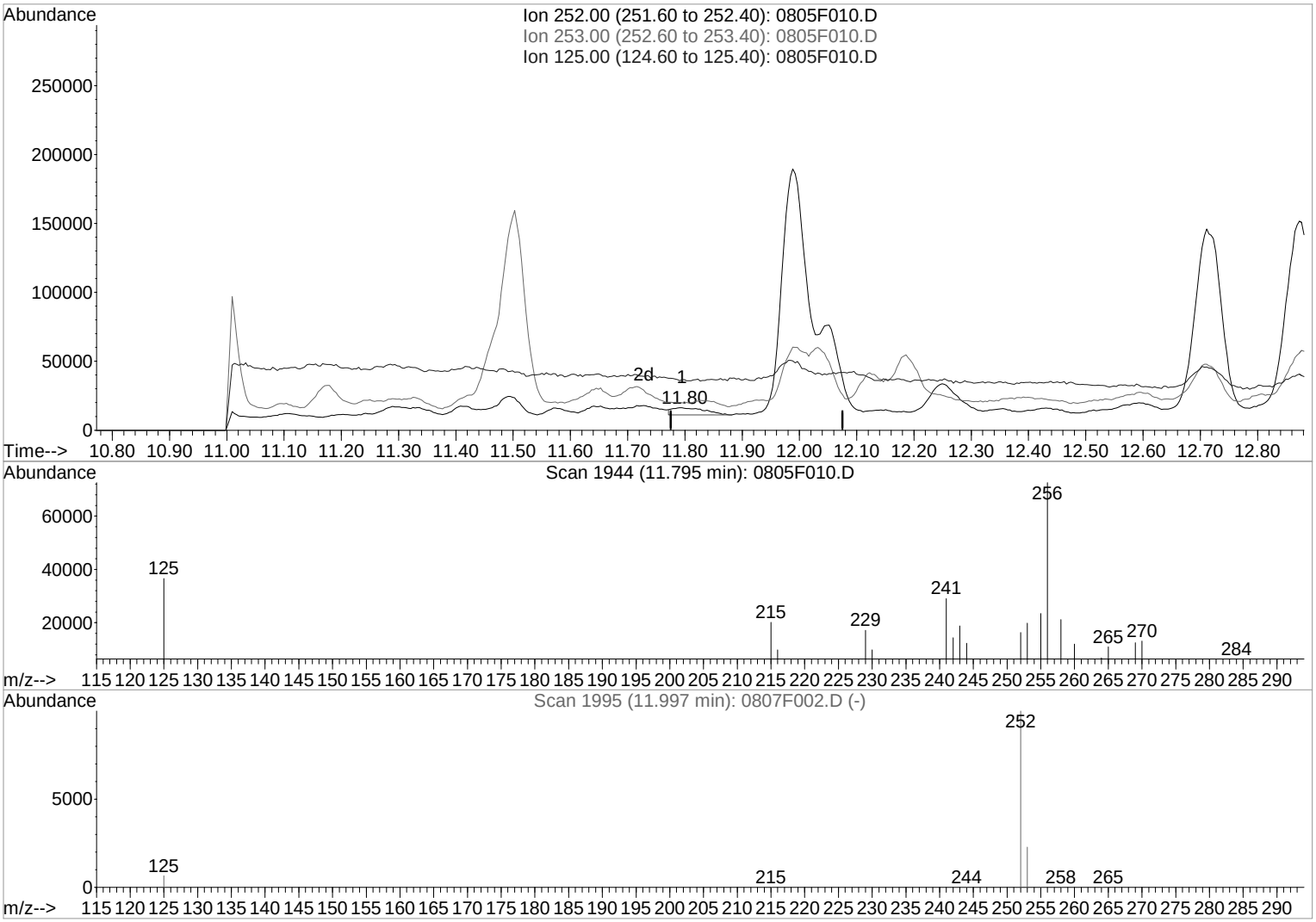
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:09 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(29) Benzo(b)fluoranthene (T)

11.80min 9.80ng/ml

response 20223

Ion	Exp%	Act%
252.00	100	100
253.00	22.50	39.85
125.00	6.10	0.00
0.00	0.00	0.00

Manual Integration:

Before

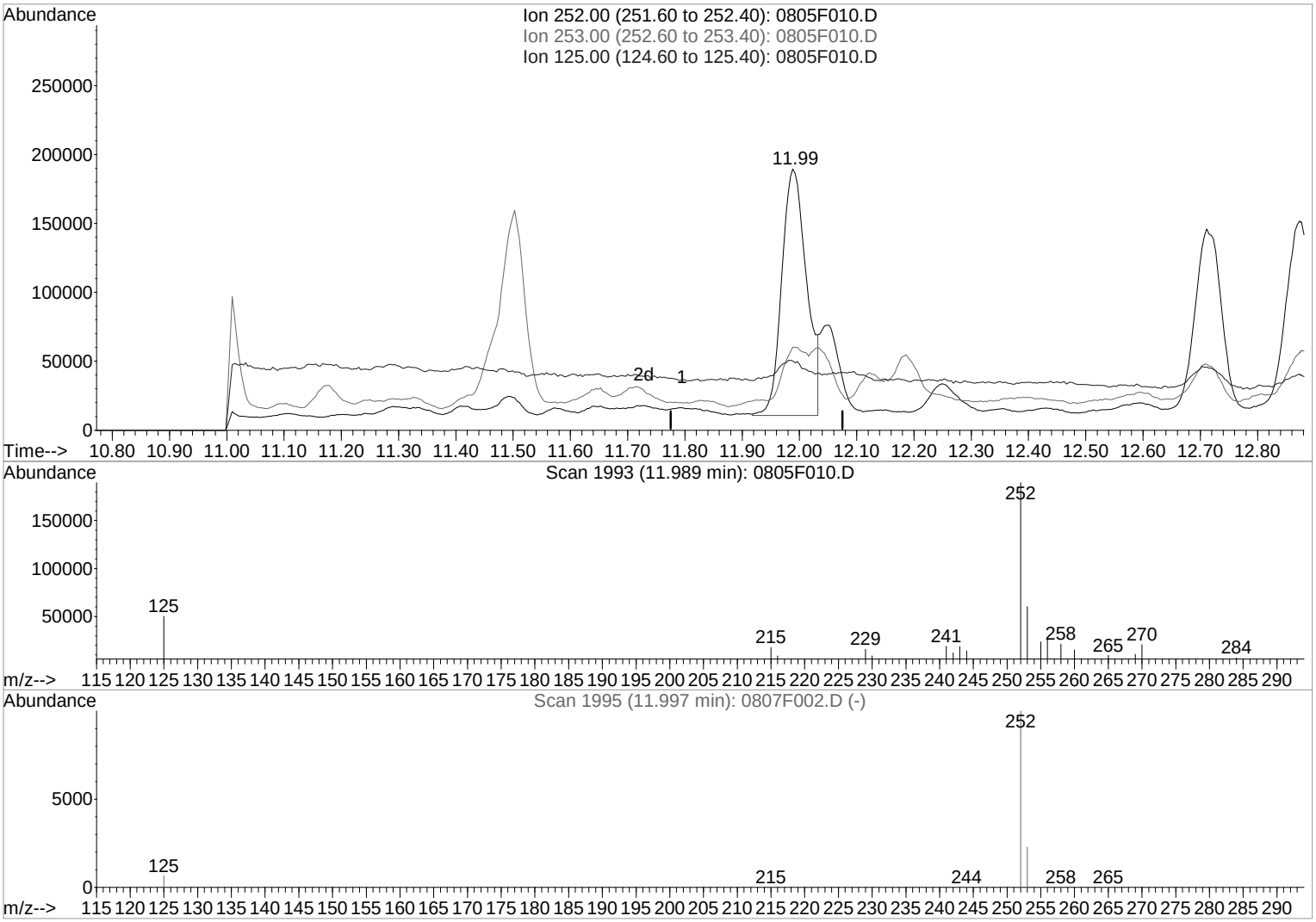
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:09 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(29) Benzo(b)fluoranthene (T)

11.99min 261.76ng/ml m

response 539930

Ion	Exp%	Act%
252.00	100	100
253.00	22.50	31.74
125.00	6.10	26.57
0.00	0.00	0.00

Manual Integration:

After

WP

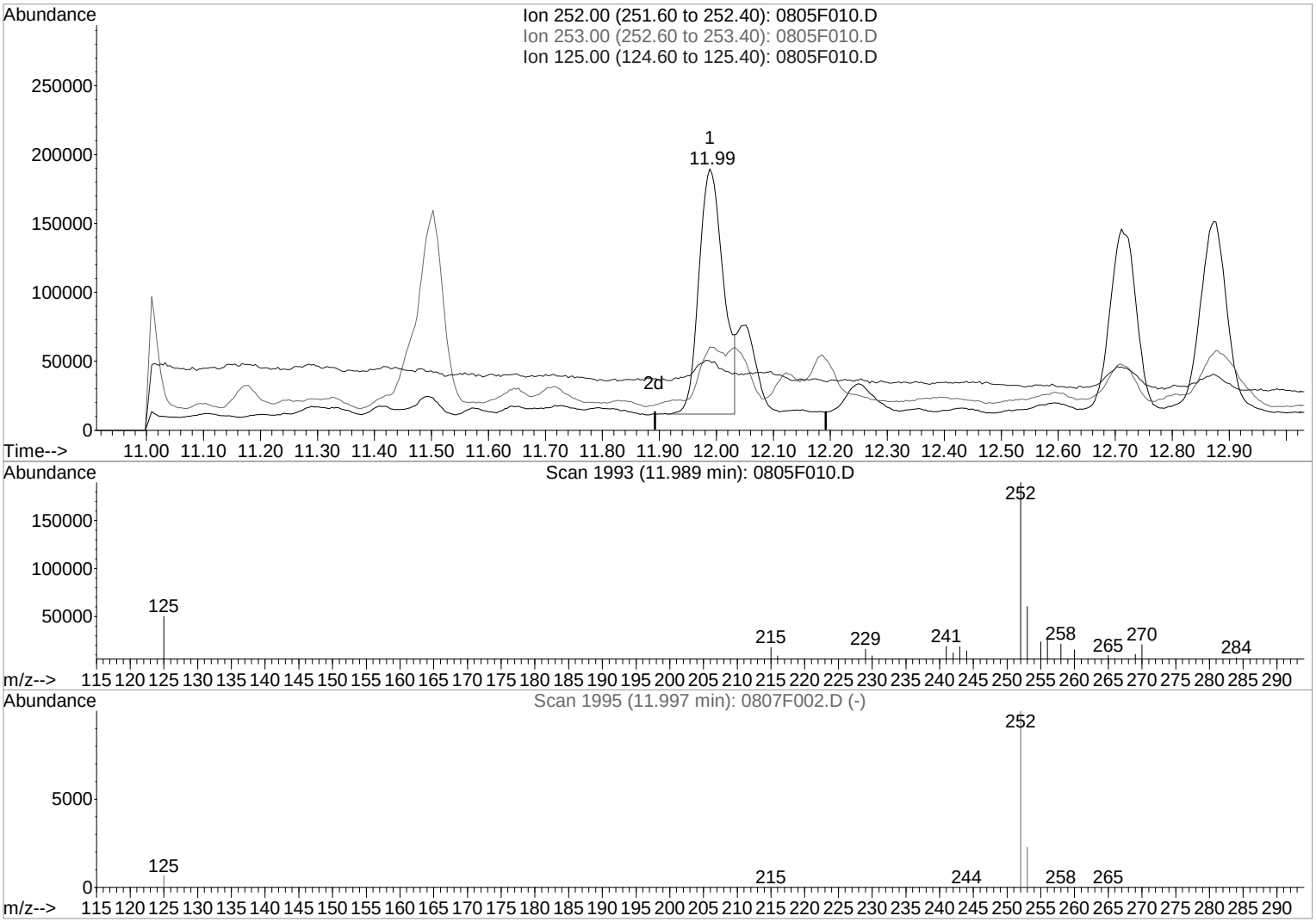
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:09 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(30) Benzo(k)fluoranthene (T)

11.99min 273.14ng/ml

response 532080

Ion	Exp%	Act%
252.00	100	100
253.00	22.70	22.12
125.00	5.90	8.04
0.00	0.00	0.00

Manual Integration:

Before

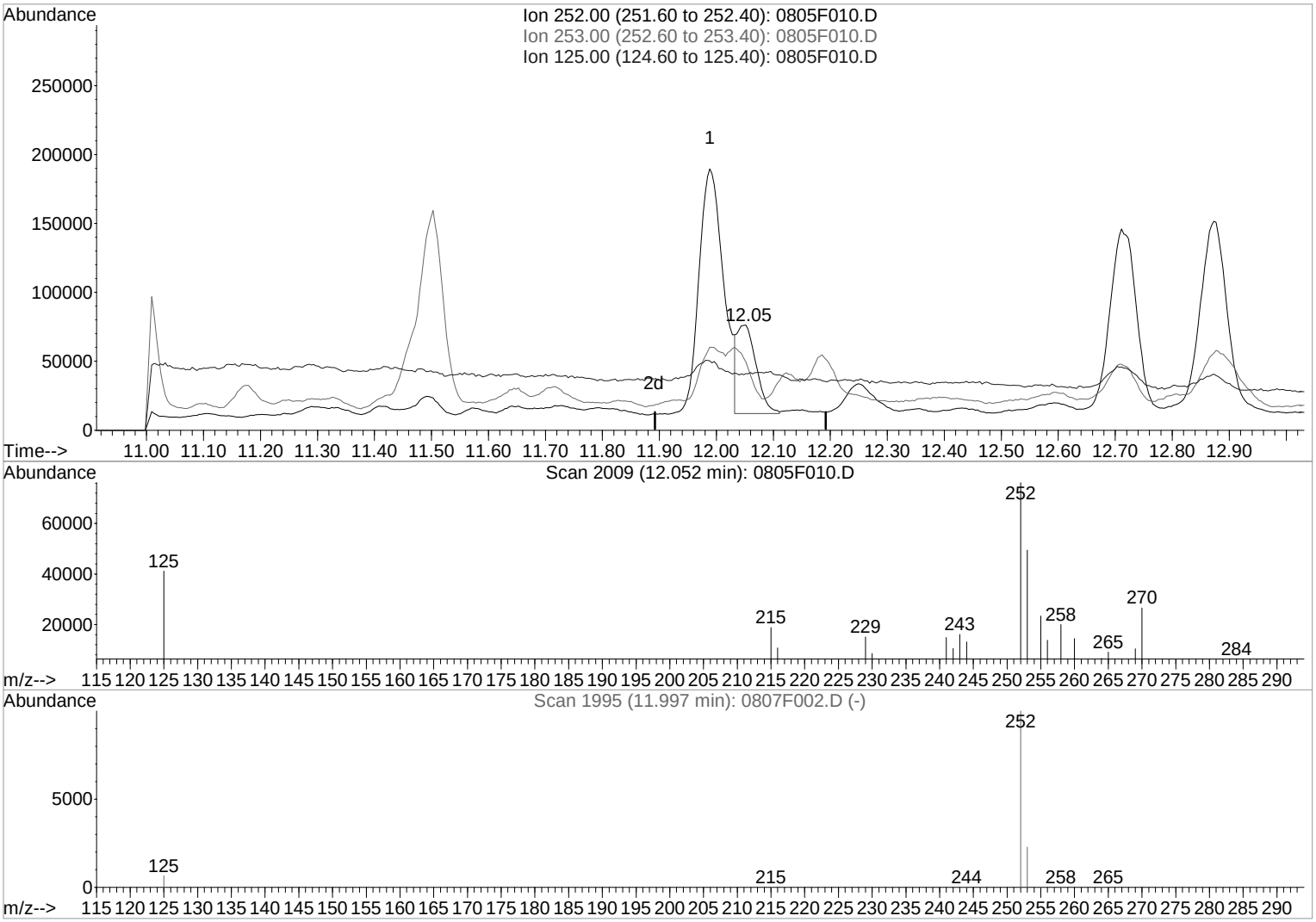
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:10 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(30) Benzo(k)fluoranthene (T)

12.05min 76.44ng/ml m

response 148915

Ion	Exp%	Act%
252.00	100	100
253.00	22.70	64.91#
125.00	5.90	53.97#
0.00	0.00	0.00

Manual Integration:

After

WP

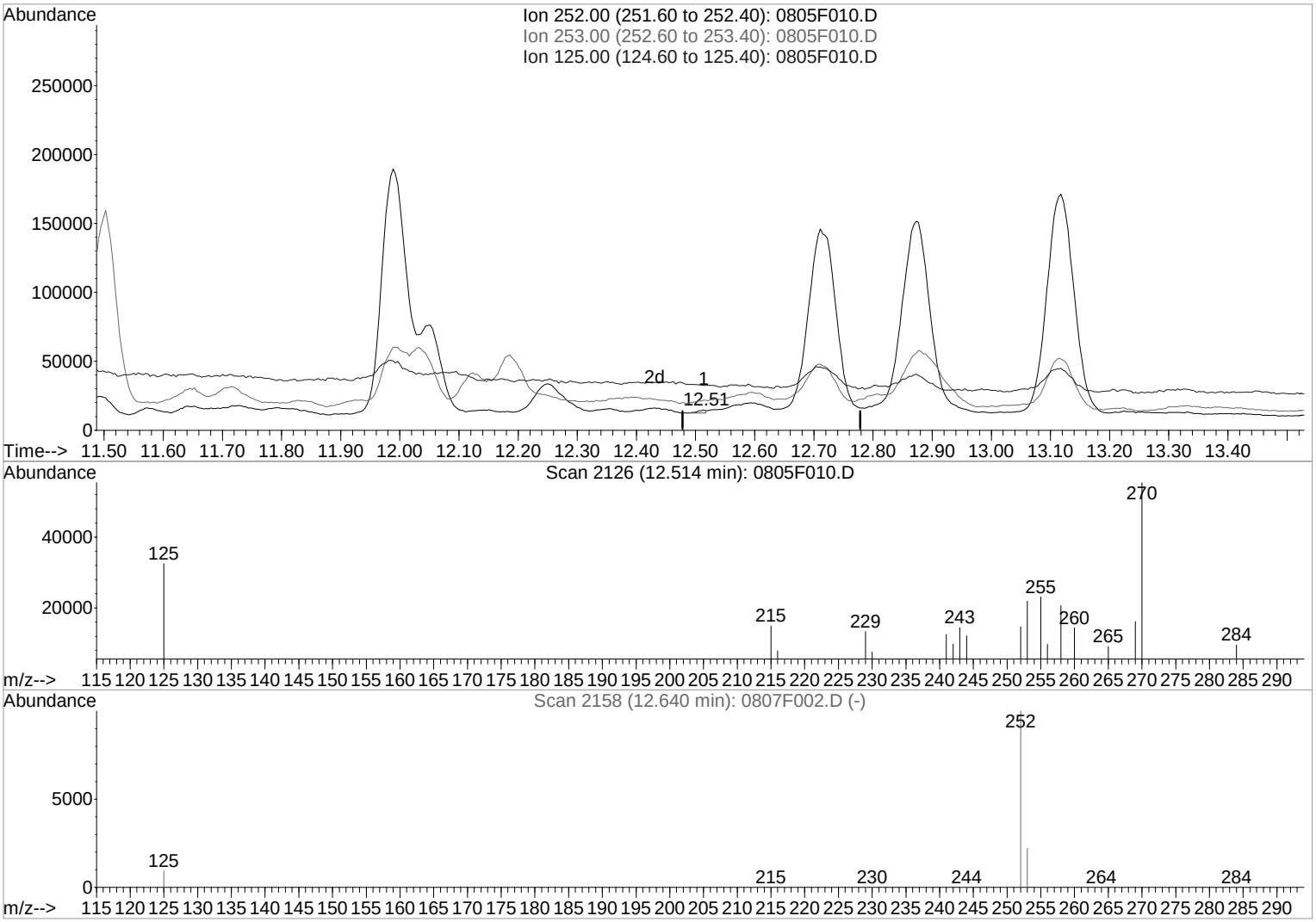
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:10 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(31) Benzo(e)pyrene (T)

12.51min 1.02ng/ml

response 1976

Ion	Exp%	Act%
252.00	100	100
253.00	22.00	109.41#
125.00	9.20	0.74
0.00	0.00	0.00

Manual Integration:

Before

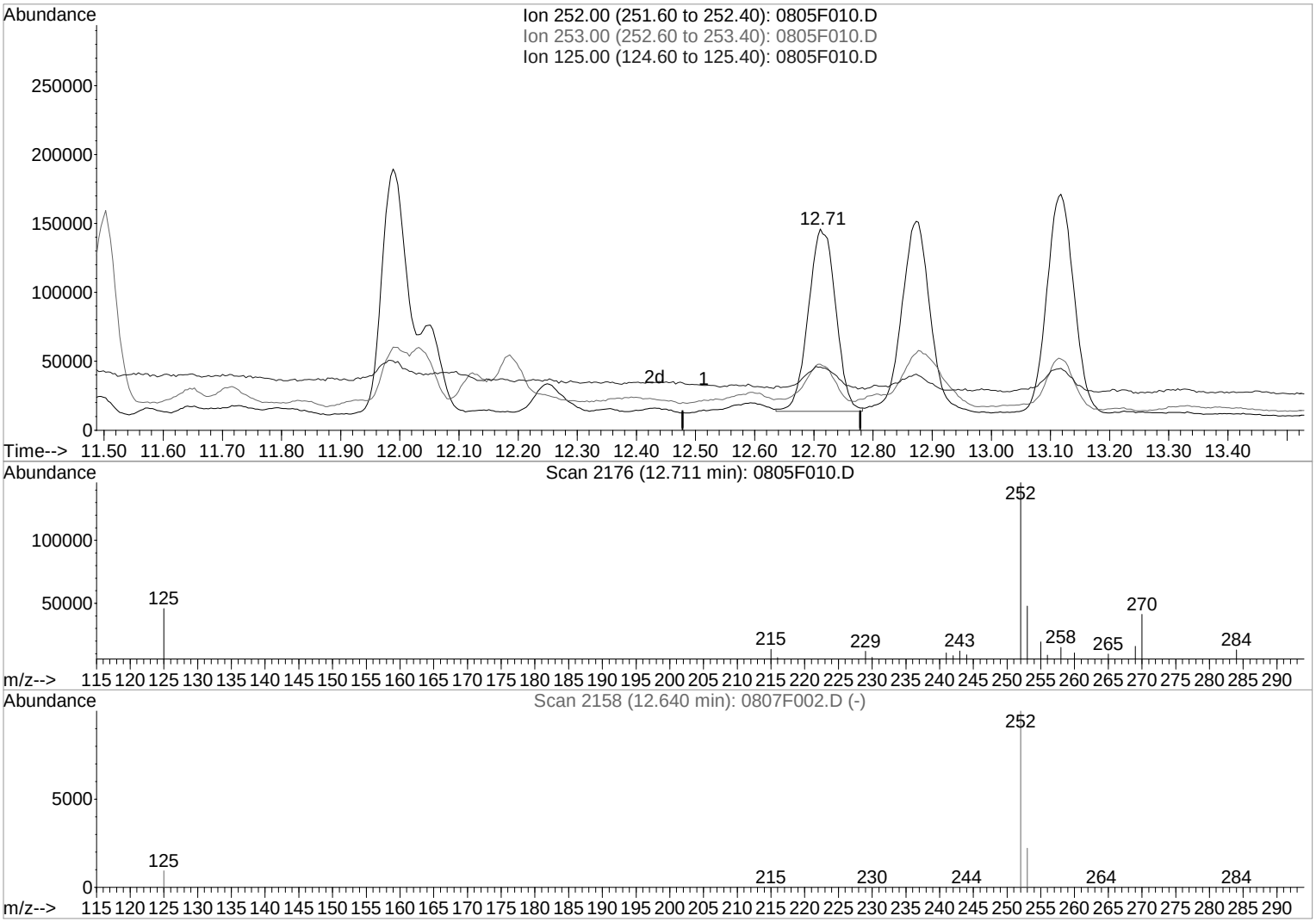
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:10 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(31) Benzo(e)pyrene (T)

12.71min 220.98ng/ml m

response 427099

Ion	Exp%	Act%
252.00	100	100
253.00	22.00	32.81
125.00	9.20	31.39
0.00	0.00	0.00

Manual Integration:

After

WP

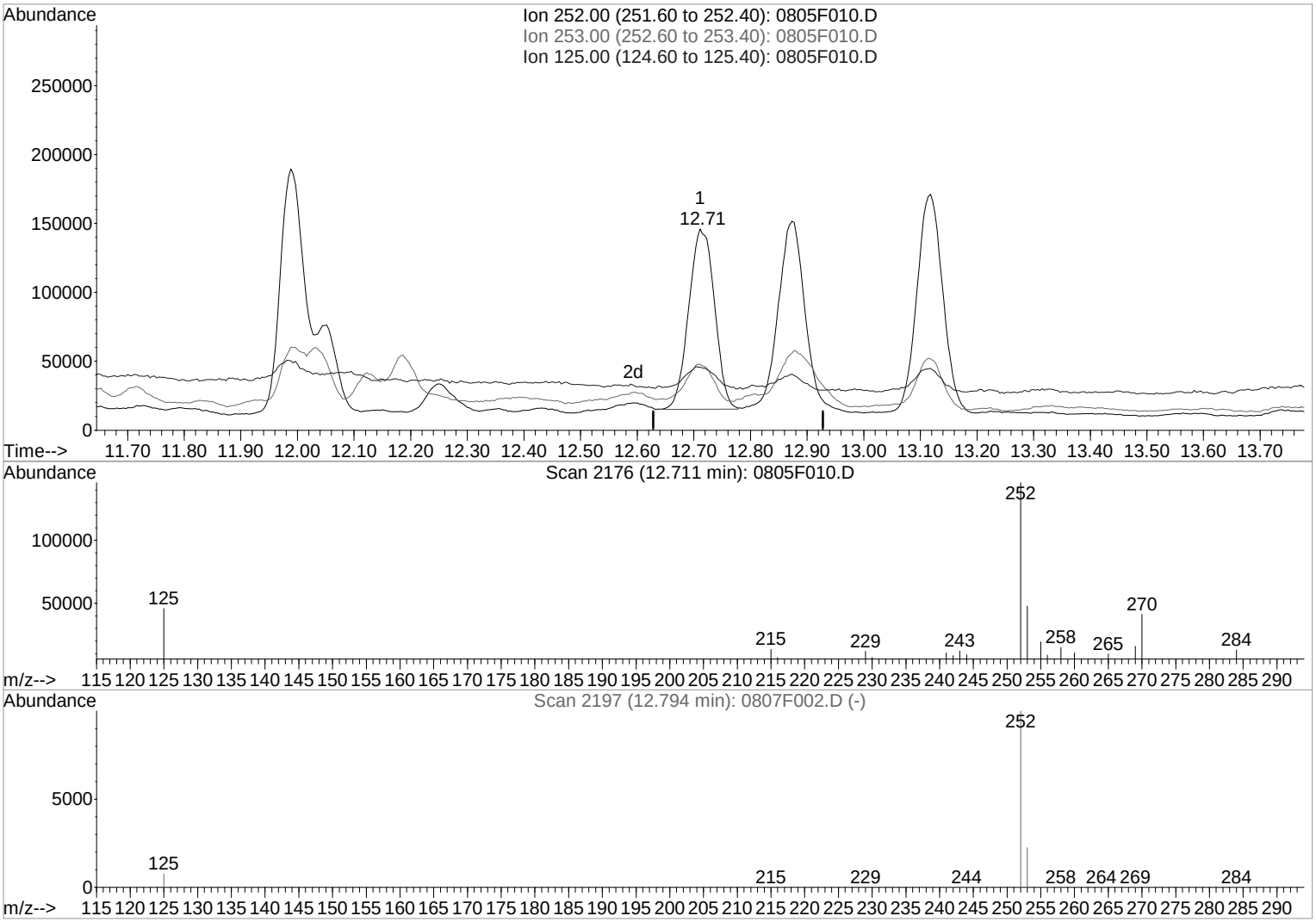
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:10 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(32) Benzo(a)pyrene (T)

12.71min 250.95ng/ml

response 413220

Ion	Exp%	Act%
252.00	100	100
253.00	22.30	19.50
125.00	6.90	11.86
0.00	0.00	0.00

Manual Integration:

Before

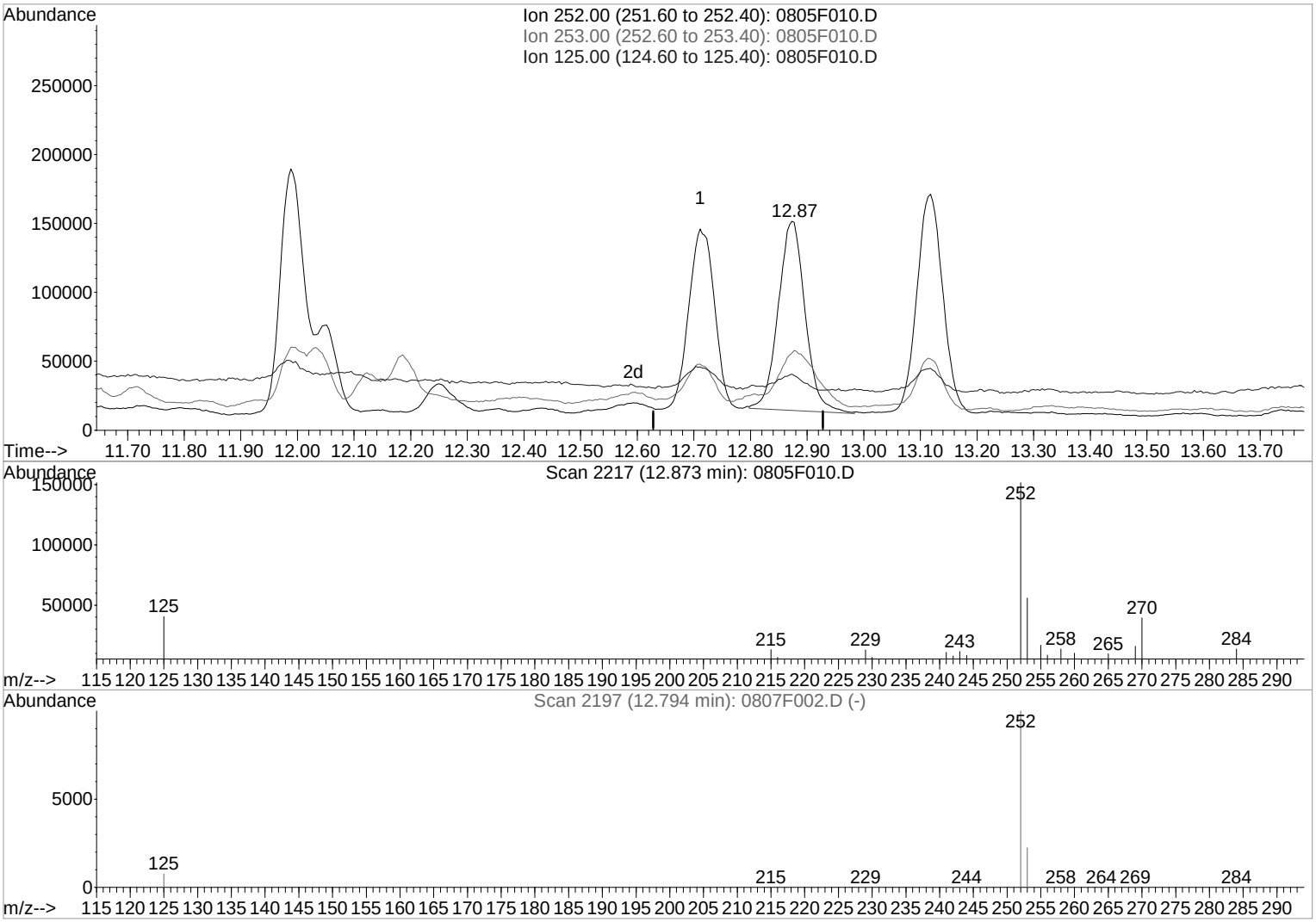
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:10 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(32) Benzo(a)pyrene (T)

12.87min 273.63ng/ml m

response 450569

Ion	Exp%	Act%
252.00	100	100
253.00	22.30	36.89
125.00	6.90	26.80
0.00	0.00	0.00

Manual Integration:

After

WP

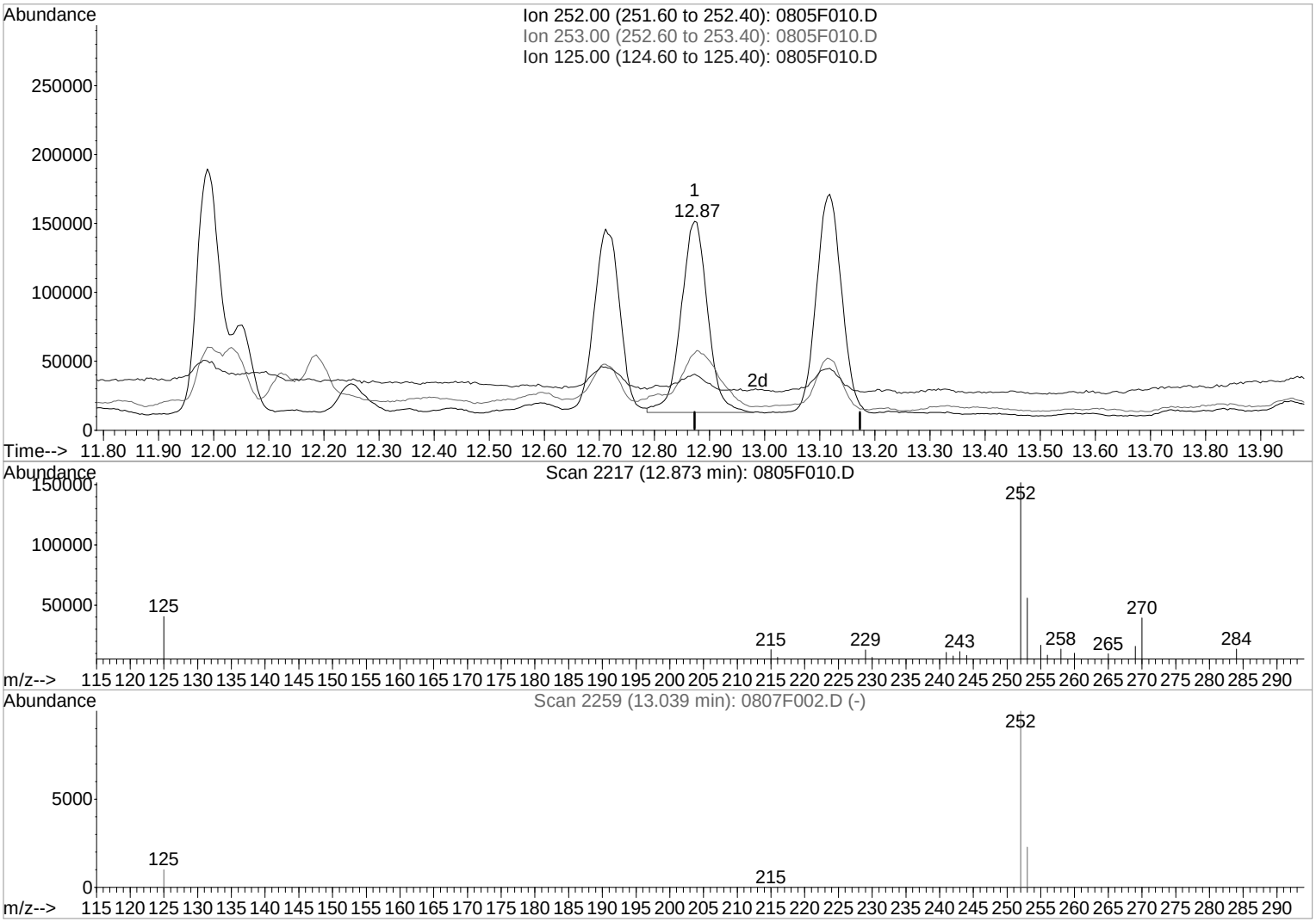
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:10 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(33) Perylene (T)

12.87min 261.69ng/ml

response 464921

Ion	Exp%	Act%
252.00	100	100
253.00	22.20	28.04
125.00	9.20	8.25
0.00	0.00	0.00

Manual Integration:

Before

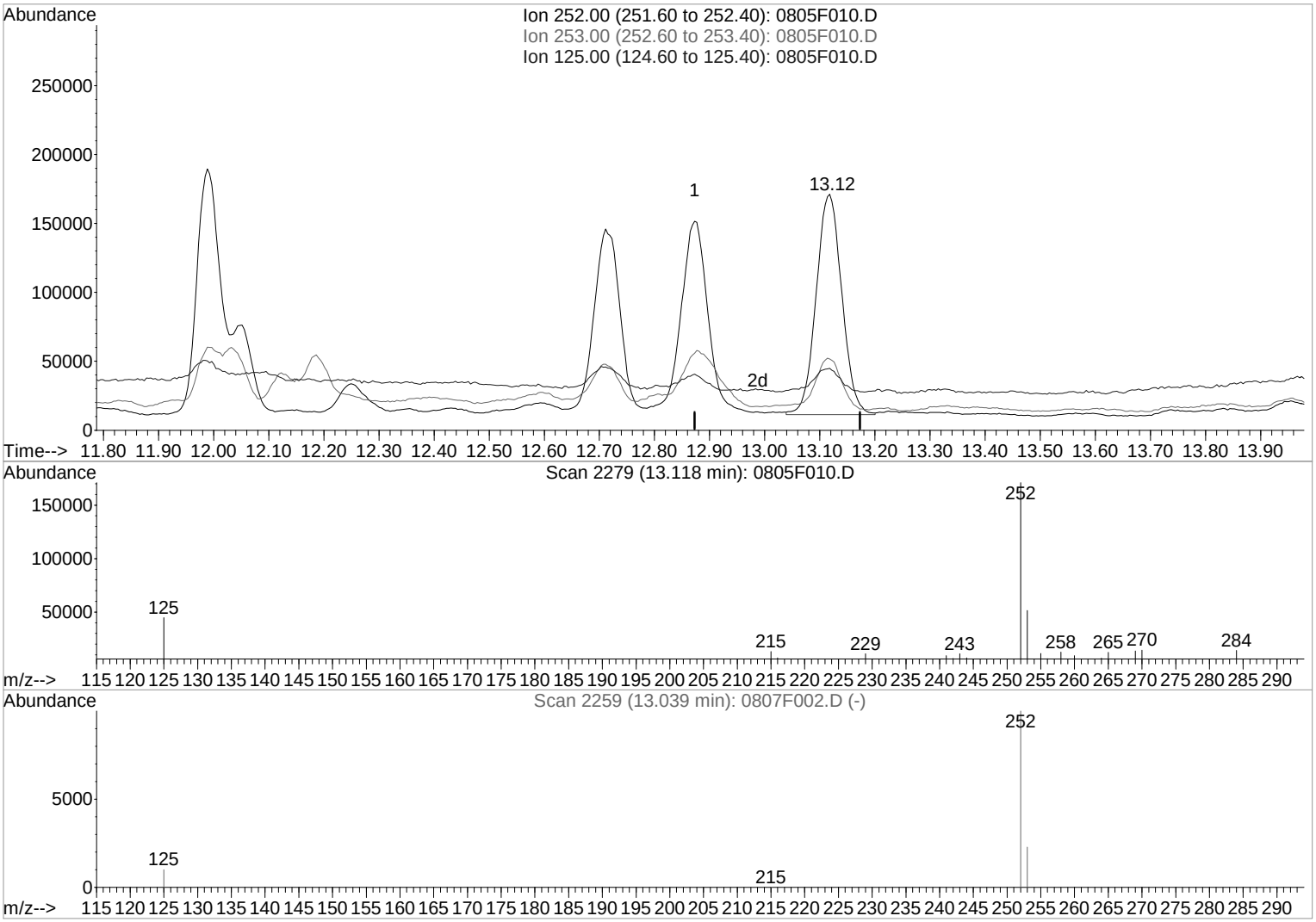
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:10 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(33) Perylene (T)

13.12min 290.62ng/ml m

response 516317

Ion	Exp%	Act%
252.00	100	100
253.00	22.20	30.15
125.00	9.20	26.23
0.00	0.00	0.00

Manual Integration:

After

WP

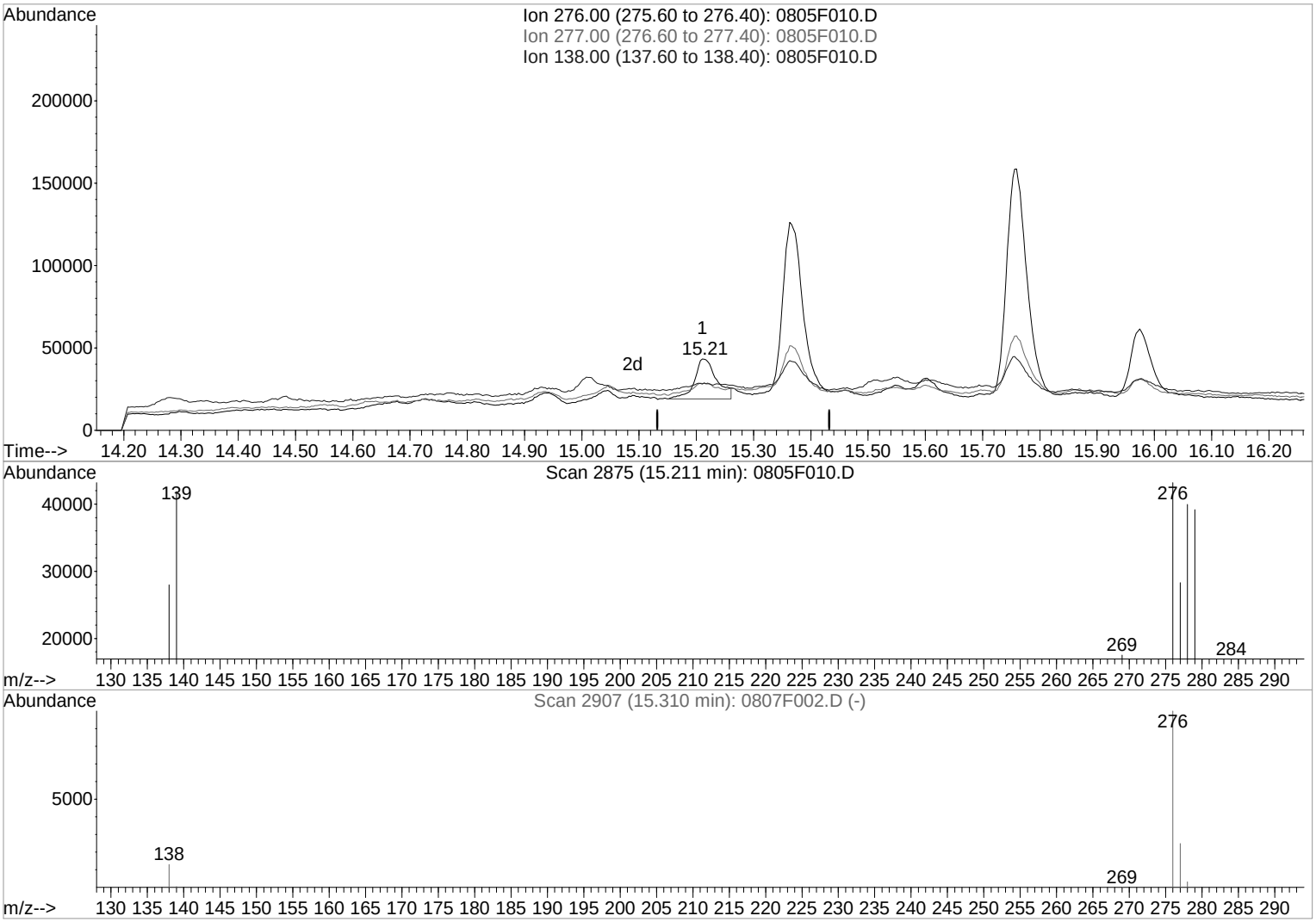
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:10 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.21min 38.19ng/ml

response 65352

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	29.66
138.00	12.20	14.58
0.00	0.00	0.00

Manual Integration:

Before

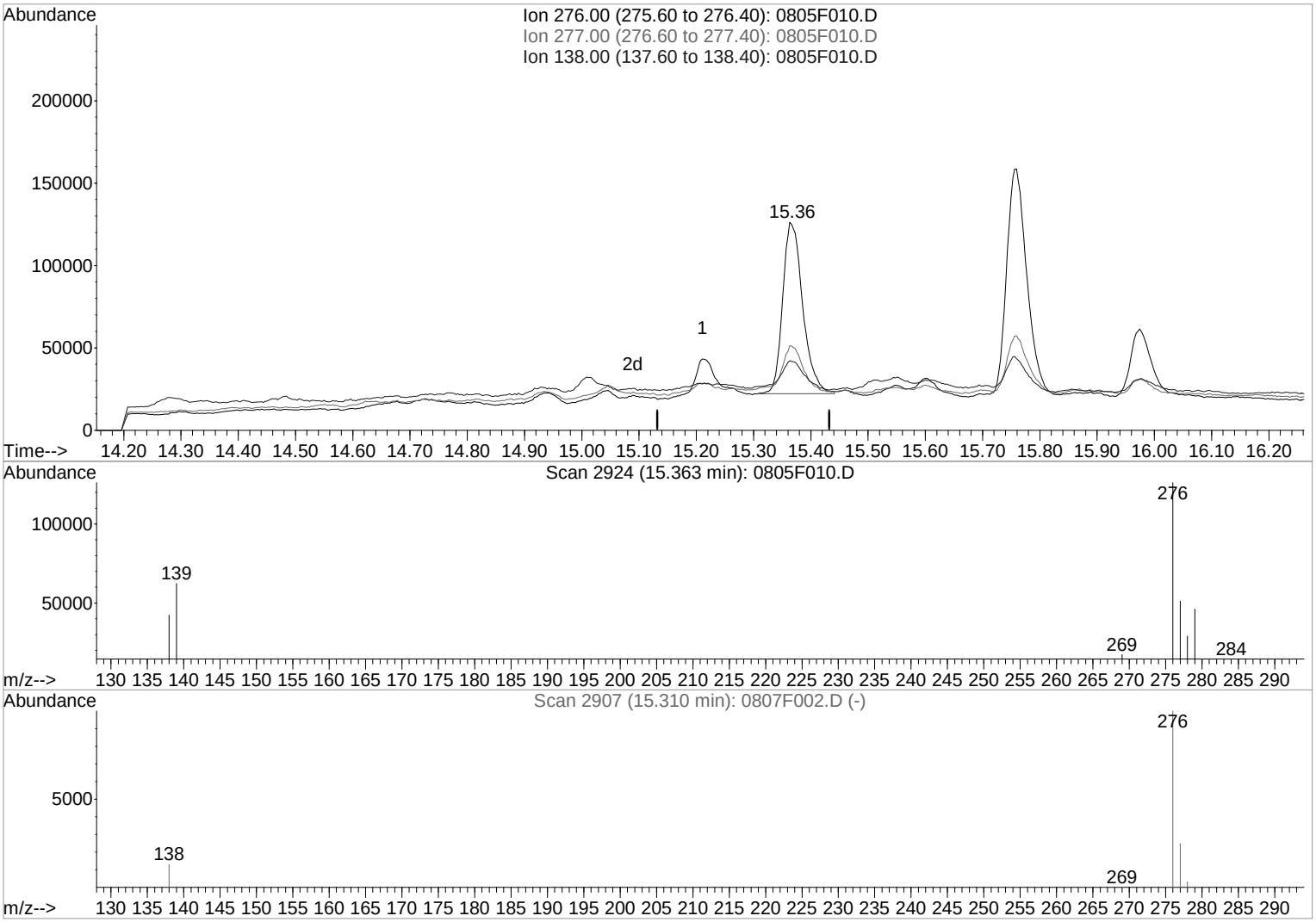
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:10 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.36min 147.51ng/ml m

response 252413

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	40.56
138.00	12.20	33.52
0.00	0.00	0.00

Manual Integration:

After

WP

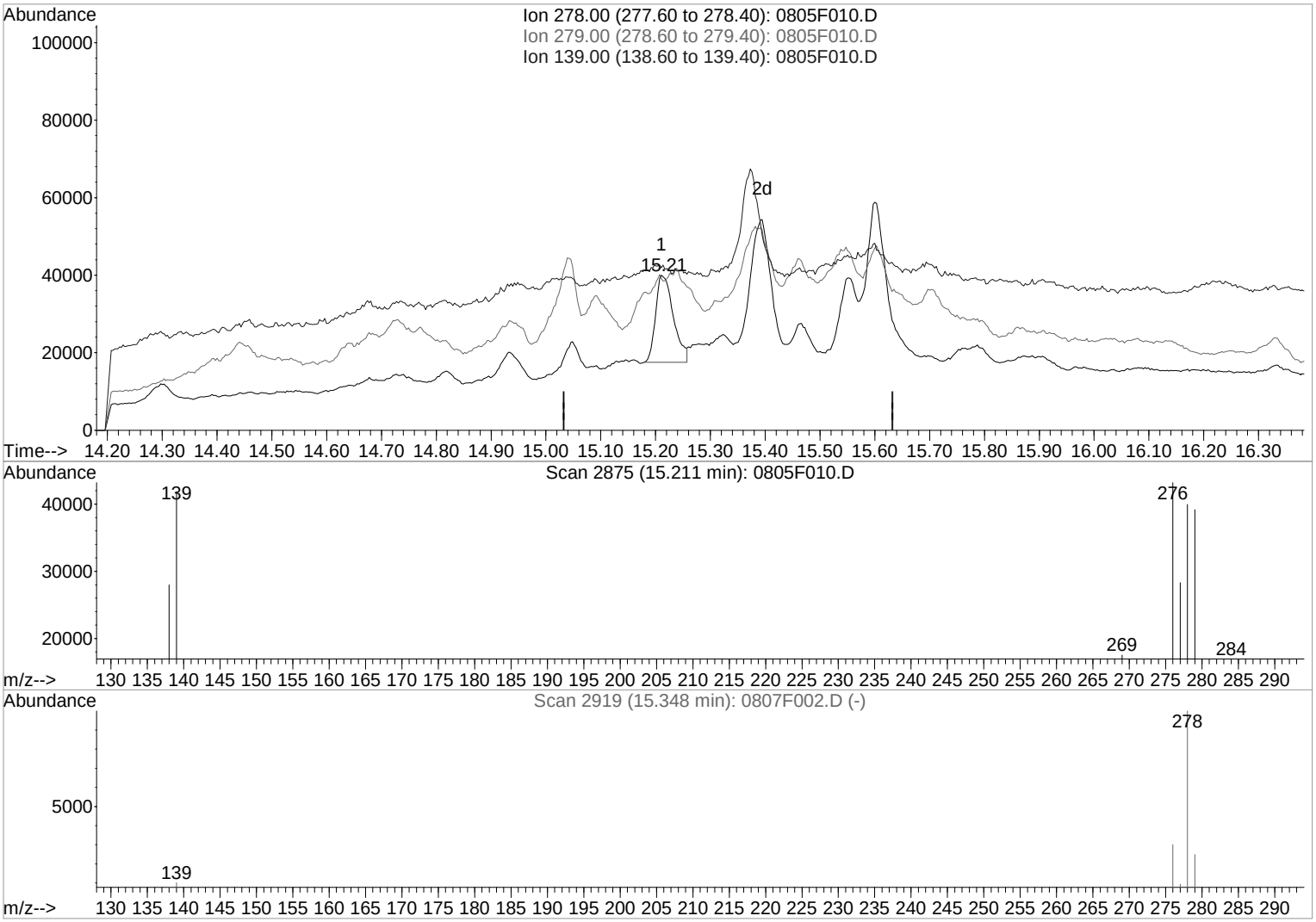
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:10 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(35) Dibenz(a,h)anthracene (T)

15.21min 26.33ng/ml

response 50924

Ion	Exp%	Act%
278.00	100	100
279.00	25.20	16.11
139.00	10.40	7.02
0.00	0.00	0.00

Manual Integration:

Before

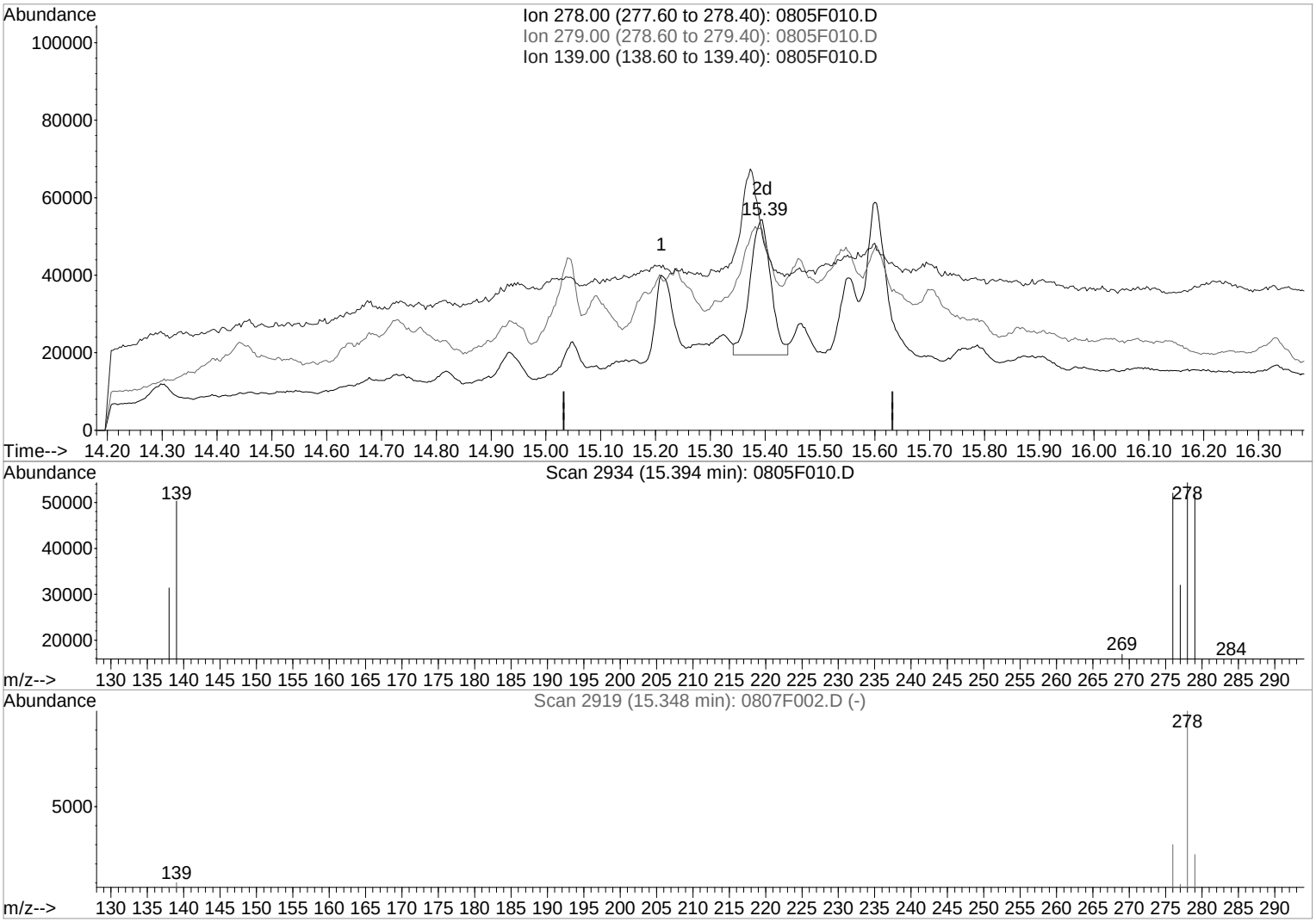
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:10 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(35) Dibenz(a,h)anthracene (T)

15.39min 48.06ng/ml m

response 92968

Ion	Exp%	Act%
278.00	100	100
279.00	25.20	95.14#
139.00	10.40	92.58#
0.00	0.00	0.00

Manual Integration:

After

WP

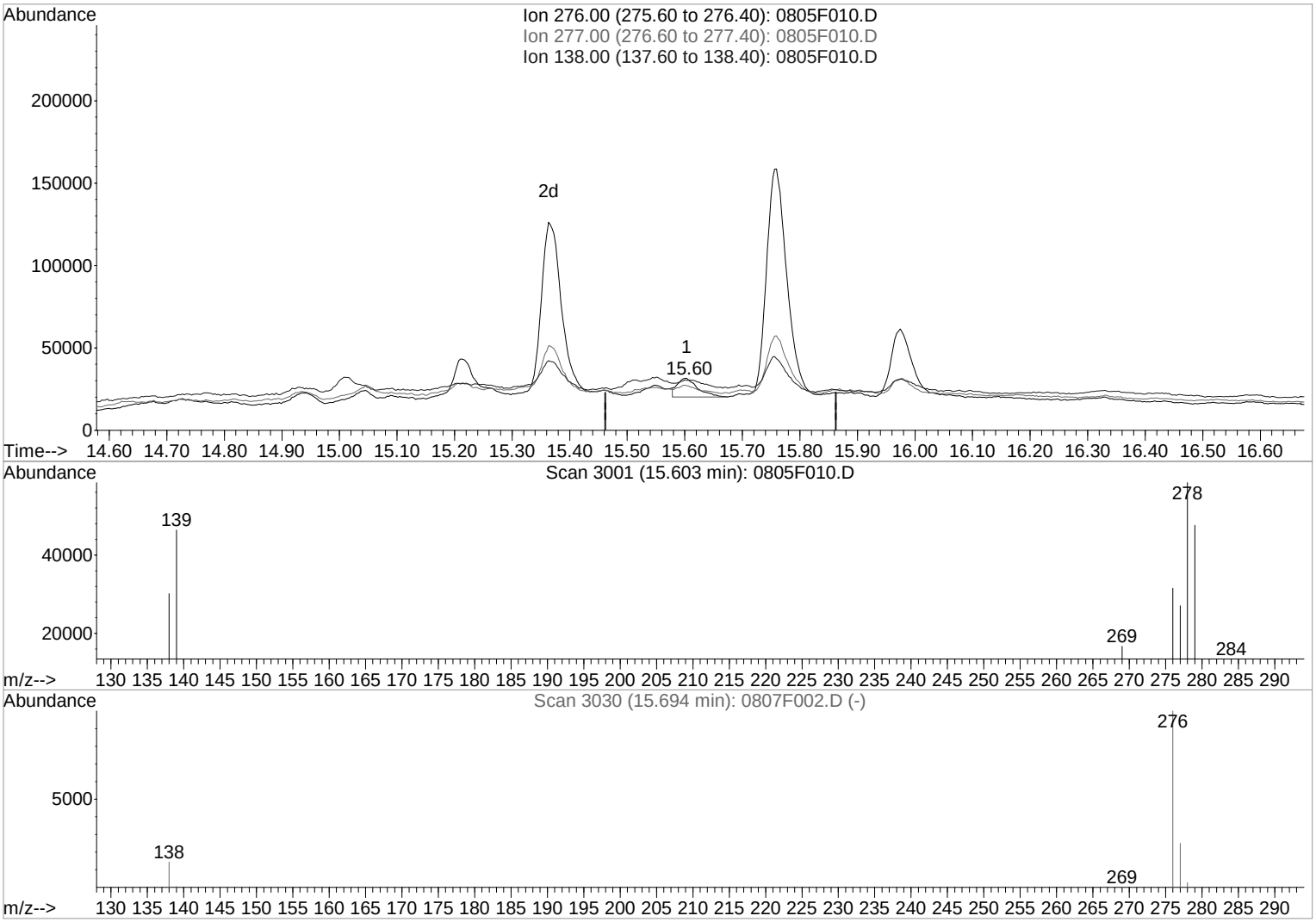
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:10 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(36) Benzo(g,h,i)perylene (T)

15.60min 12.32ng/ml

response 27889

Ion	Exp%	Act%
276.00	100	100
277.00	24.90	39.27
138.00	13.80	40.53
0.00	0.00	0.00

Manual Integration:

Before

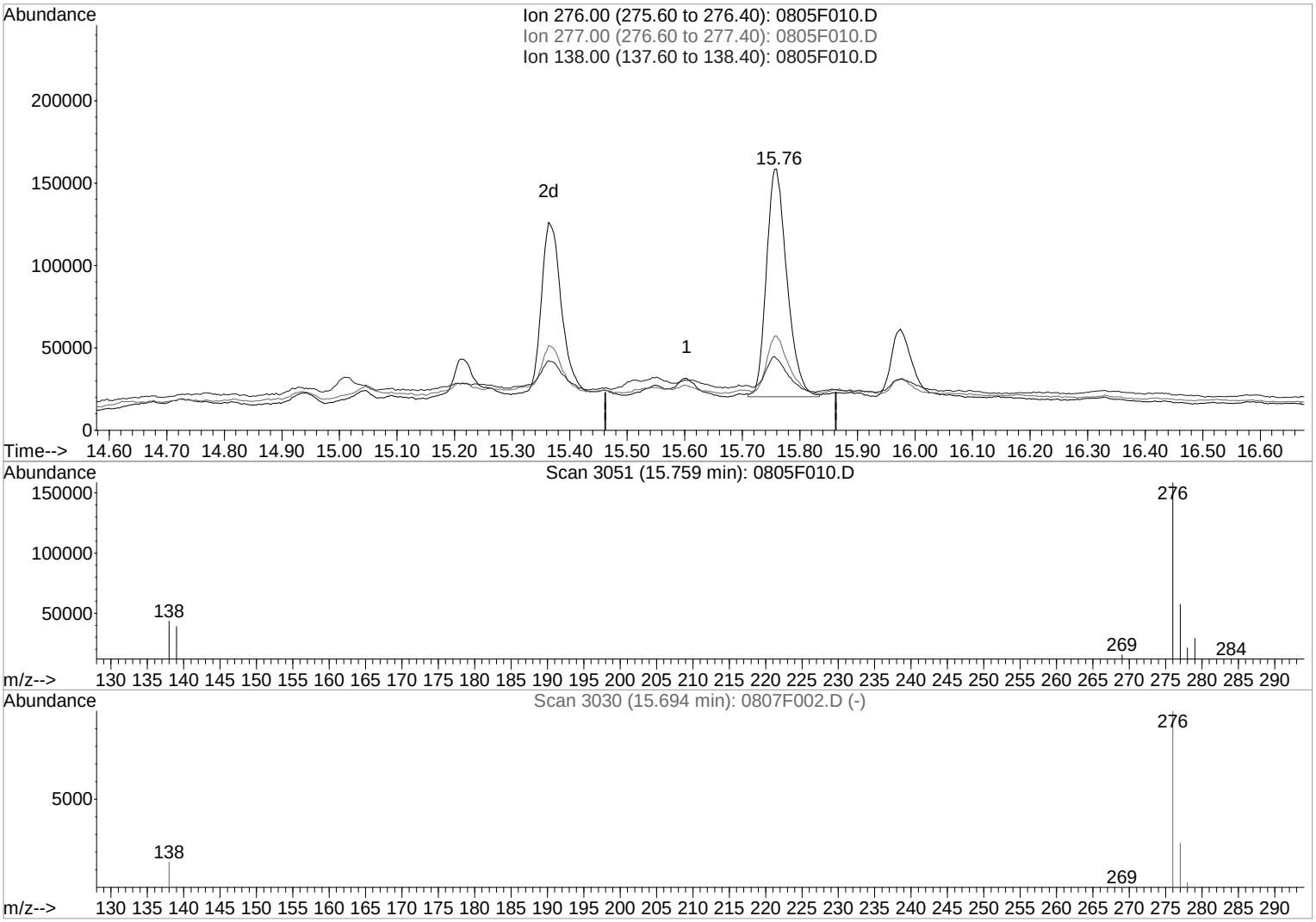
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:11 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(36) Benzo(g,h,i)perylene (T)

15.76min 151.80ng/ml m

response 343762

Ion	Exp%	Act%
276.00	100	100
277.00	24.90	36.14
138.00	13.80	27.40
0.00	0.00	0.00

Manual Integration:

After

WP

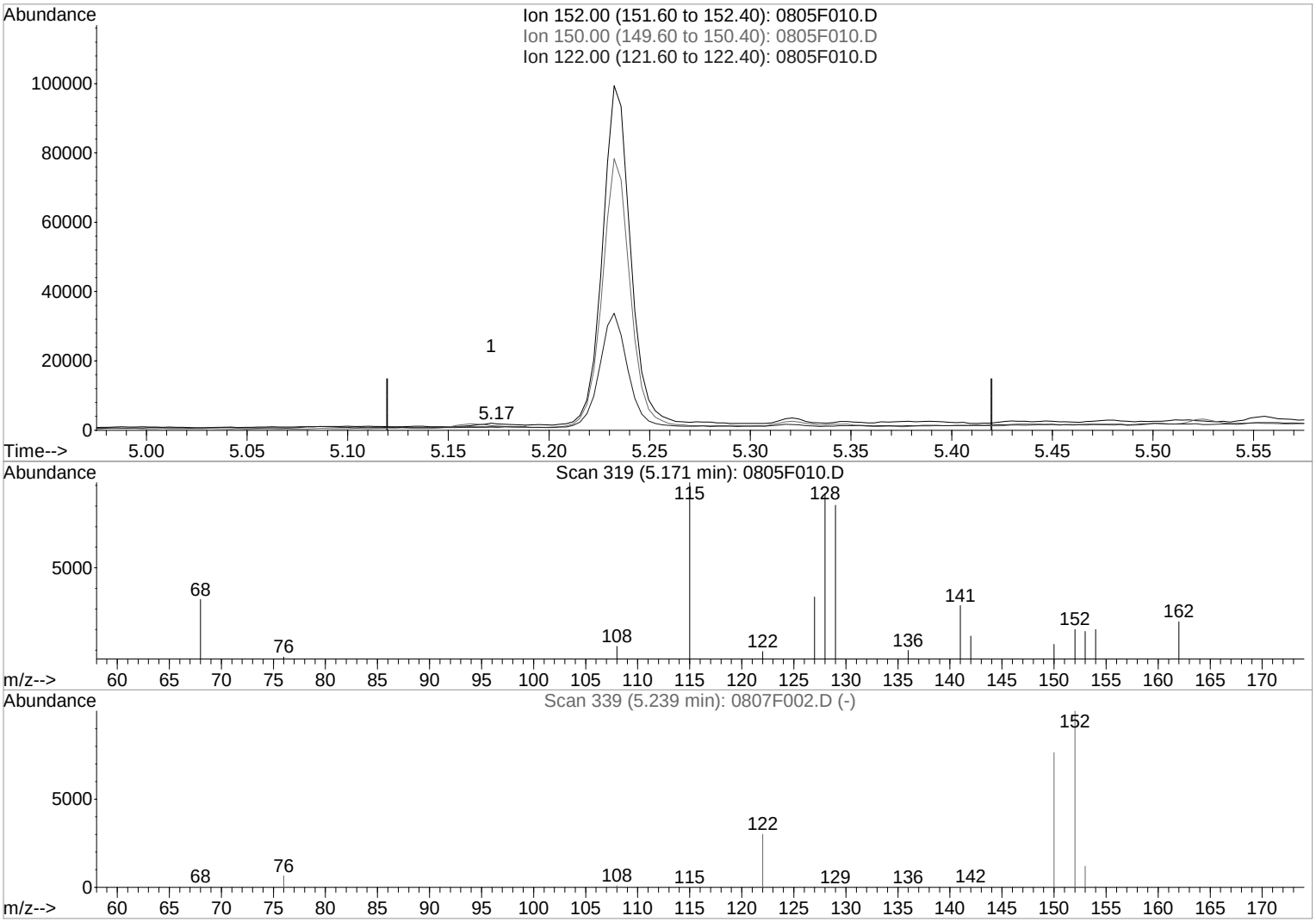
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 5 14:59 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(3) 2-Methylnaphthalene-d10 (S)

5.17min 1.92ng/ml

response 1314

Ion	Exp%	Act%
152.00	100	100
150.00	77.40	50.14
122.00	32.80	17.07
0.00	0.00	0.00

Manual Integration:

Before

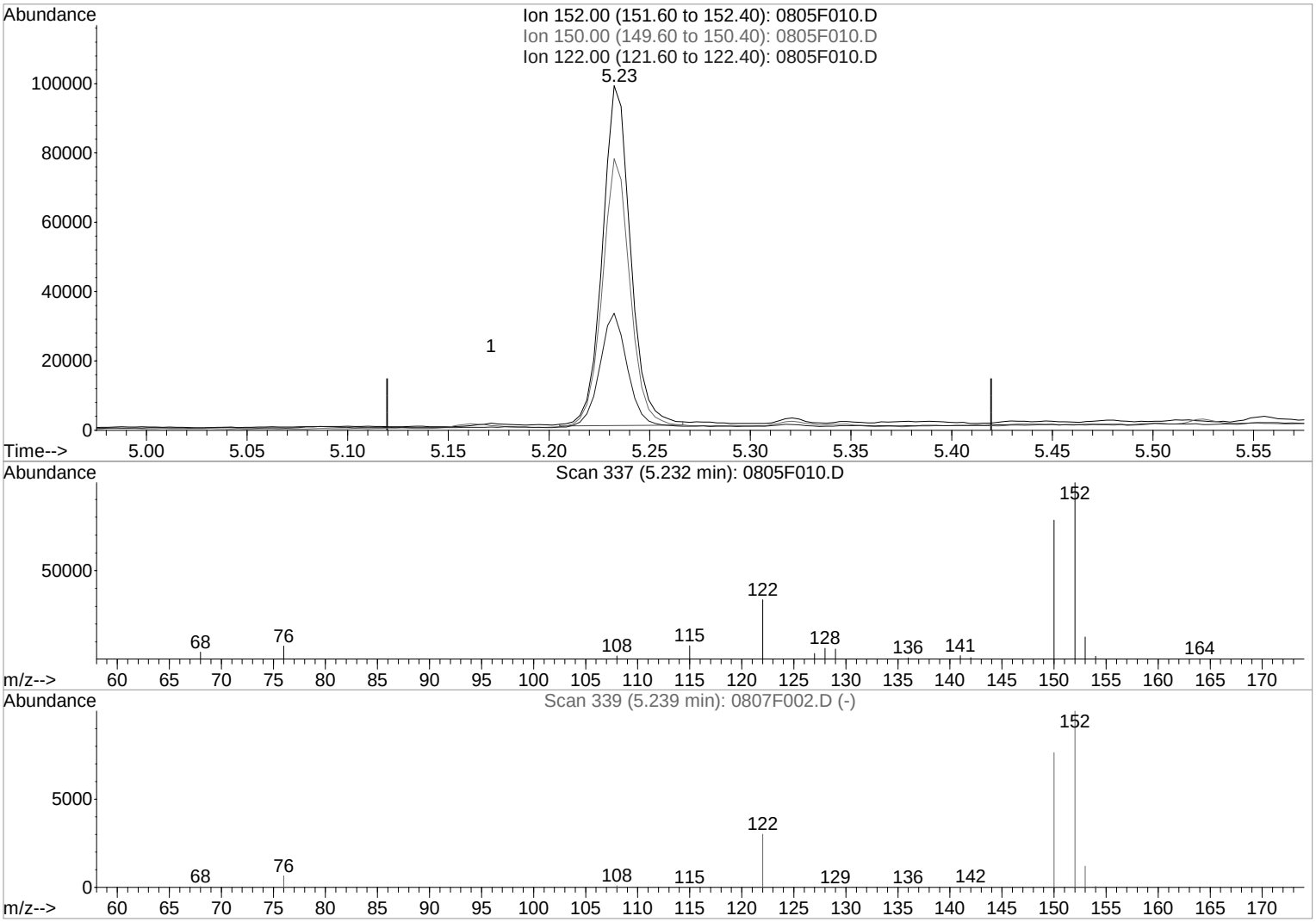
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:07 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(3) 2-Methylnaphthalene-d10 (S)

5.23min 139.75ng/ml m

response 95659

Ion	Exp%	Act%
152.00	100	100
150.00	77.40	78.75
122.00	32.80	33.92
0.00	0.00	0.00

Manual Integration:

After

WP

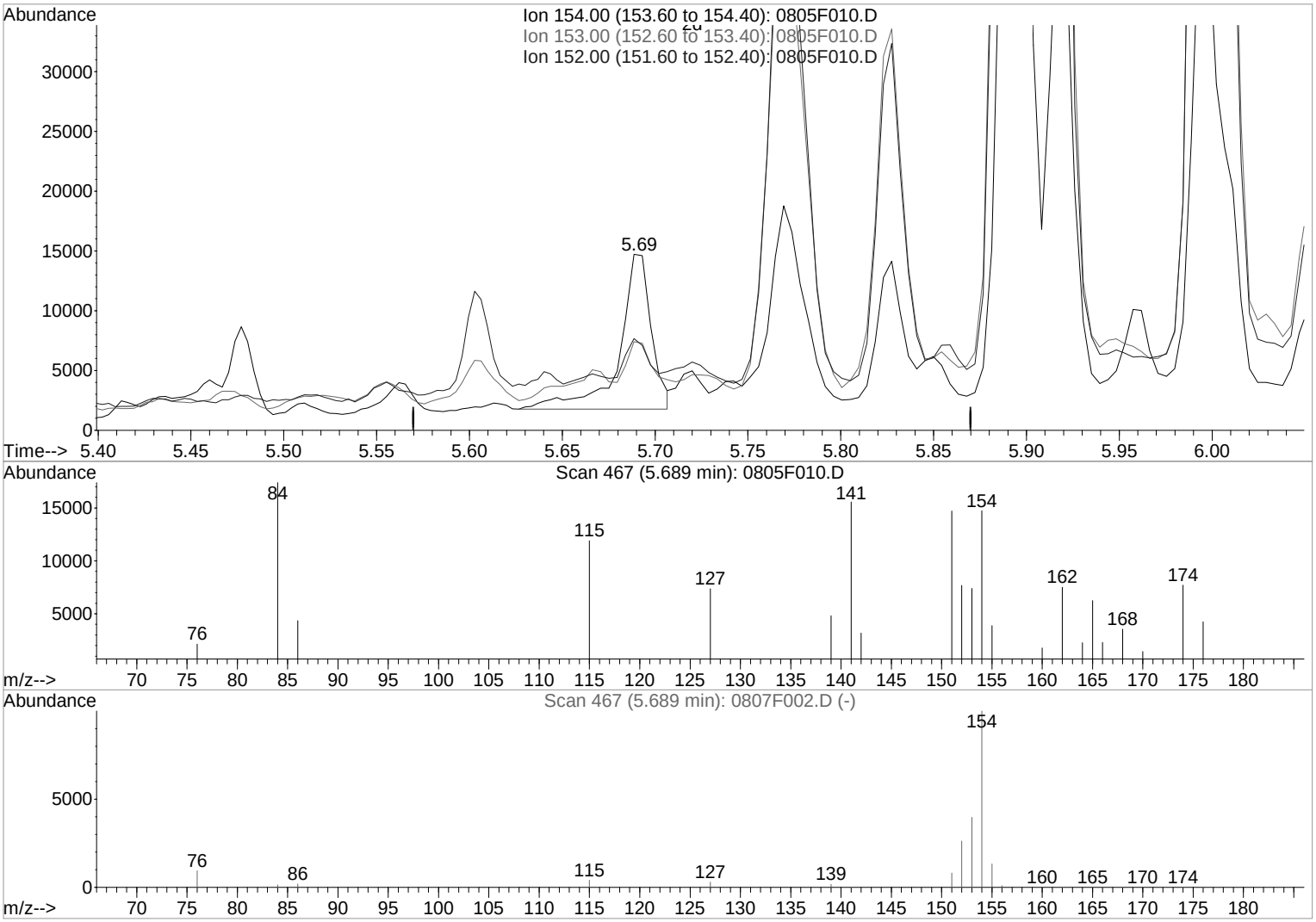
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:07 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(6) Biphenyl (T)

5.69min 16.68ng/ml

response 15446

Ion	Exp%	Act%
154.00	100	100
153.00	38.60	37.99
152.00	25.80	29.35
0.00	0.00	0.00

Manual Integration:

Before

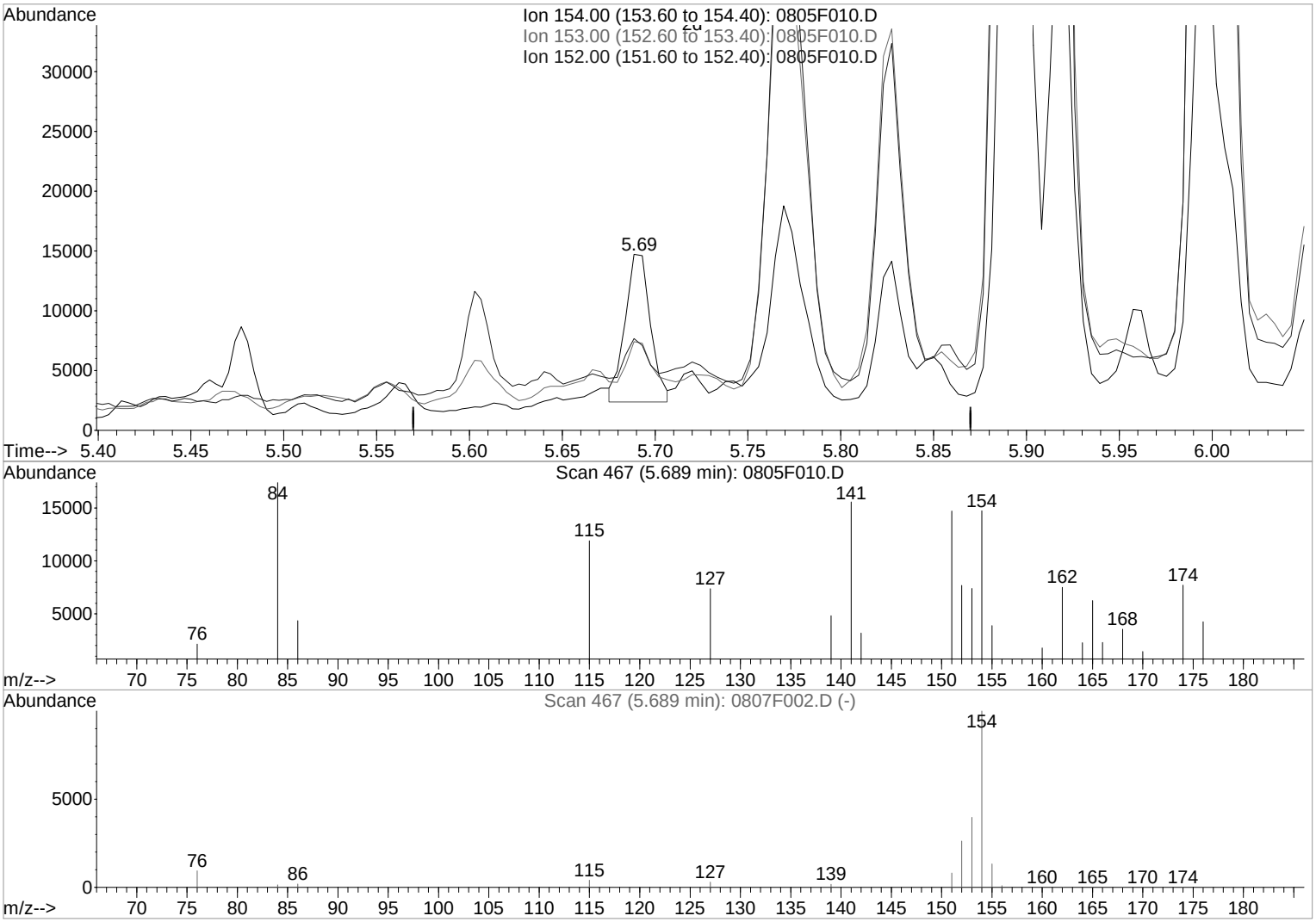
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F010.D Vial: 10
Acq On : 5 Aug 2024 1:47 pm Operator: EBruno
Sample : K2407810-002 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:08 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F010.D

(6) Biphenyl (T)

5.69min 12.68ng/ml m

response 11739

Ion	Exp%	Act%
154.00	100	100
153.00	38.60	50.30
152.00	25.80	52.13
0.00	0.00	0.00

Manual Integration:

After

BLC

08/08/24

1st 08/08/24
2nd 08/08/24

Validation Report

Data File: J:\MS14\DATA\080524\0805F011.D\
Lab ID: K2407810-003
RunType: N/A
Matrix: Sediment

Date Acquired: 8/5/24 14:14:00
Batch ID: 849989
Analysis Method: 8270D/PAH SIM

Validations

Validation Categories	Pass	Fail
Preparation Hold Time		X
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery		X
Lab Control Sample Recovery	X	
Method Blank	X	
Method Blank Surrogates	X	
Internal Standards	X	
Surrogates	X	
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Sample Exceptions

Exception Categories	Result	Corrective Action
Preparation Hold Time	Prep Date/Time: 08/01/2024 1240 Hold Date/Time: 07/26/2022 2359	Frozen Sample Used

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Continuing Calibration Recovery	Benzo(a)pyrene	22		20	OK, <40

Primary Review: _____

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Secondary Review: _____

1st 08/08/24
2nd 08/08/24

Quantitation Report

Data File:	J:\MS14\DATA\080524\0805F011.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 14:14:00	**Vial:**	9
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-003	**Raw Units:**	ng/mL

Bottle ID:	K2407810-003.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	PAH SIM	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	849989	**Prep Lot:**	442452	**Report Group:**	K2407810
Analysis	8270D	**Prep Method:**	EPA 3546		
		Prep Date:	8/1/24		

Title:	Polycyclic Aromatic Hydrocarbons by GC/MS SIM	**Calibration ID:**	KC2400163
		Report List ID:	18909

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Acenaphthene-d10	6.19	+0.01	131921	200.00	OK
Chrysene-d12	9.94	+0.02	288087	200.00	OK
Naphthalene-d8	4.57		260636	200.00	OK
Perylene-d12	13.01	+0.09	331075	200.00	OK
Phenanthrene-d10	7.44	+0.01	265895	200.00	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec	% Rec Criteria	Rpt?
Fluoranthene-d10	8.43	+0.02	288003	197.96	99	28 - 112	Y
Fluorene-d10	6.63	+0.01	140673	185.29	93	34 - 106	Y
Terphenyl-d14	8.77	+0.02	273401	171.73	86	32 - 122	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
2-Methylnaphthalene	5.27		129449	159.62	300		Y
Acenaphthene	6.21		103166	136.86	260		Y
Acenaphthylene	6.06	-0.01	55081	46.94	89		Y
Anthracene	7.50	+0.01	165227	127.78	240		Y
Benz(a)anthracene	9.93	+0.03	301266	160.74	300		Y
Benzo(a)pyrene	12.85	+0.08	309651	182.75	350		Y
Benzo(b)fluoranthene	11.97	+0.06	381870	179.92	340		Y
Benzo(g,h,i)perylene	15.74	+0.07	290726	124.76	240		Y
Benzo(k)fluoranthene	12.03	+0.06	121292	60.51	110		Y
Chrysene	9.98	+0.03	481005	269.57	510		Y
Dibenz(a,h)anthracene	15.37	+0.04	62860	31.58	60		Y
Fluoranthene	8.44	+0.01	506059	317.14	600		Y
Fluorene	6.65		202856	234.09	440		Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

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1st 08/08/24

2nd 08/08/24

Data File:	J:\MS14\DATA\080524\0805F011.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 14:14:00	**Vial:**	9
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-003	**Raw Units:**	ng/mL

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Indeno(1,2,3-cd)pyrene	15.34	+0.05	225020	127.79	240		Y
Naphthalene	4.59	-0.01	158100	126.52	240		Y
Phenanthrene	7.46	+0.01	1187176	855.19	1600		Y
Pyrene	8.63	+0.01	837233	449.06	850		Y

Prep Amount:	10.464 g	**Dilution:**	1
Prep Final Amount:	10.00 mL	**Basis Factor:**	50.50

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23

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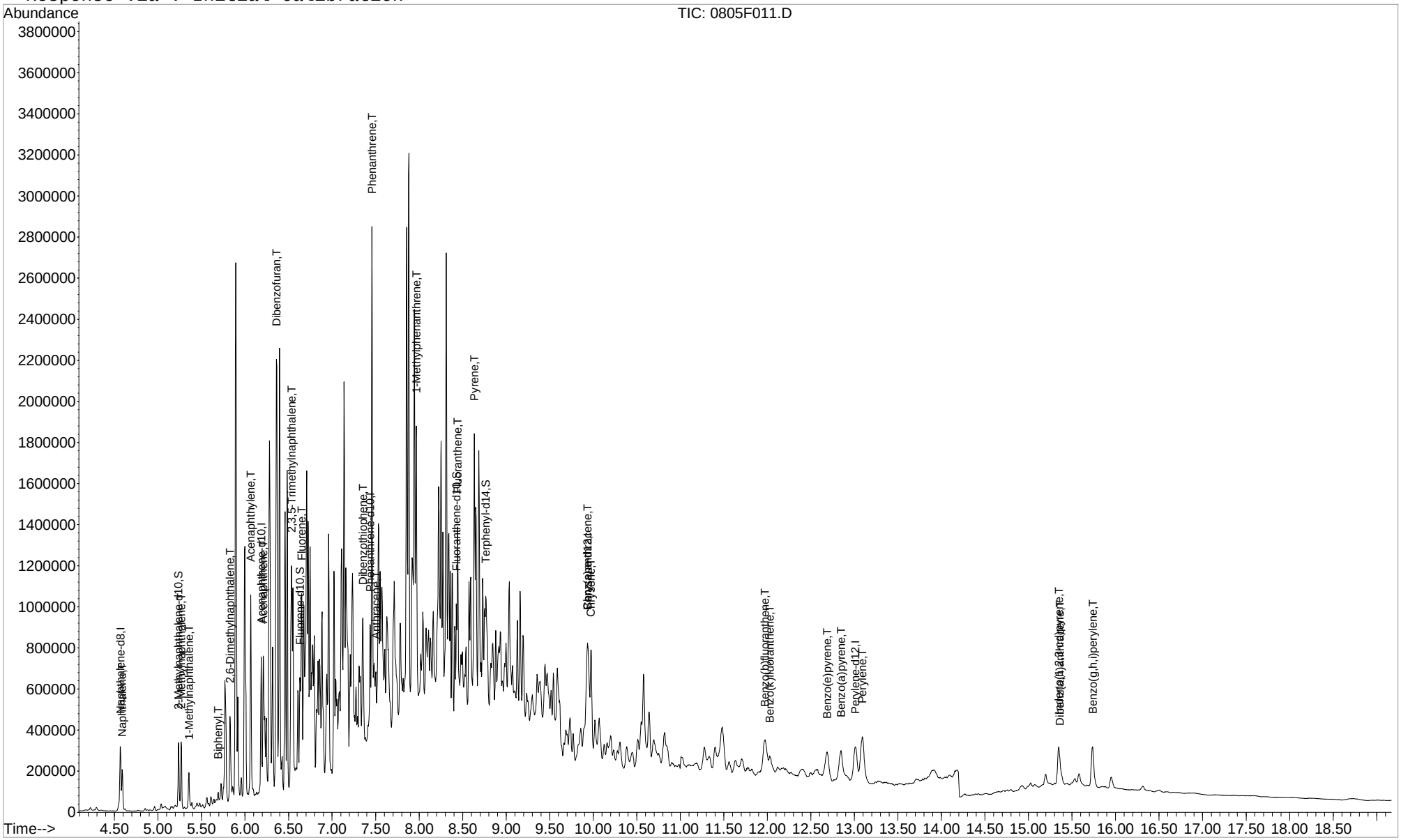
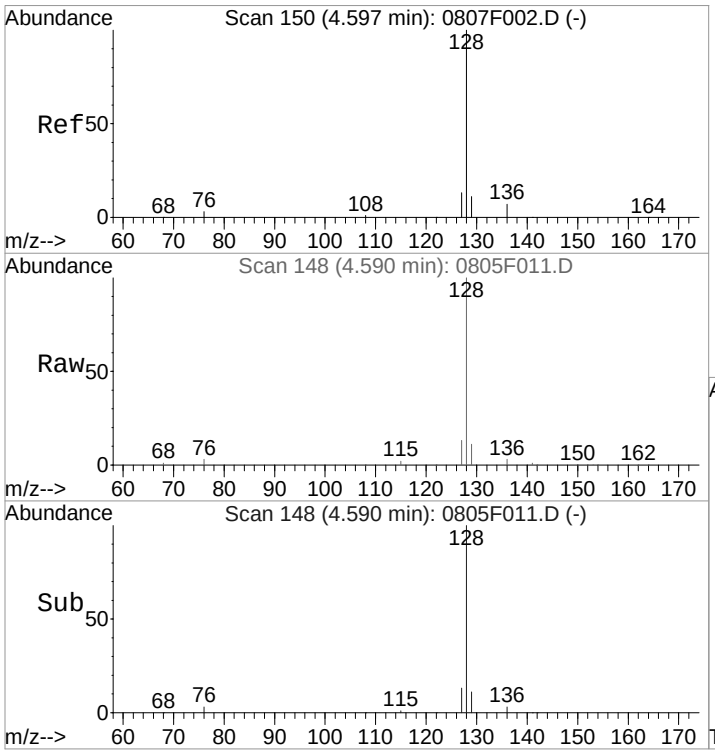
1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:13 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration



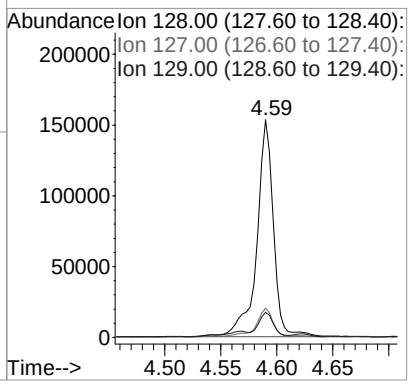
1st 08/08/24
2nd 08/08/24

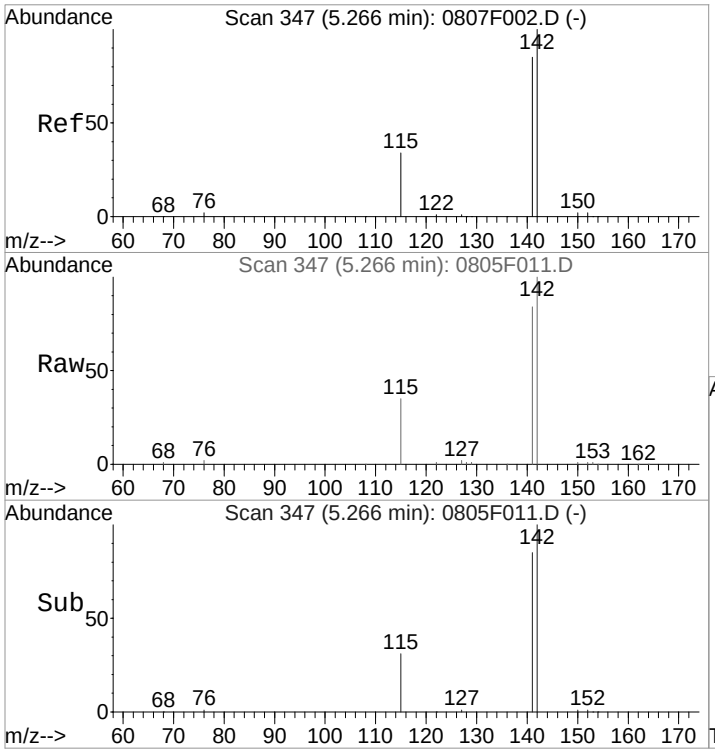


#2
Naphthalene
Concen: 126.52 ng/ml
RT: 4.59 min Scan# 148
Delta R.T. -0.05 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:128 Resp: 158100

Ion	Ratio	Lower	Upper
128	100		
127	13.2	0.0	42.8
129	11.2	0.0	41.5

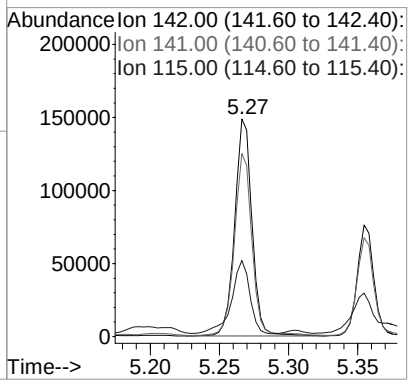




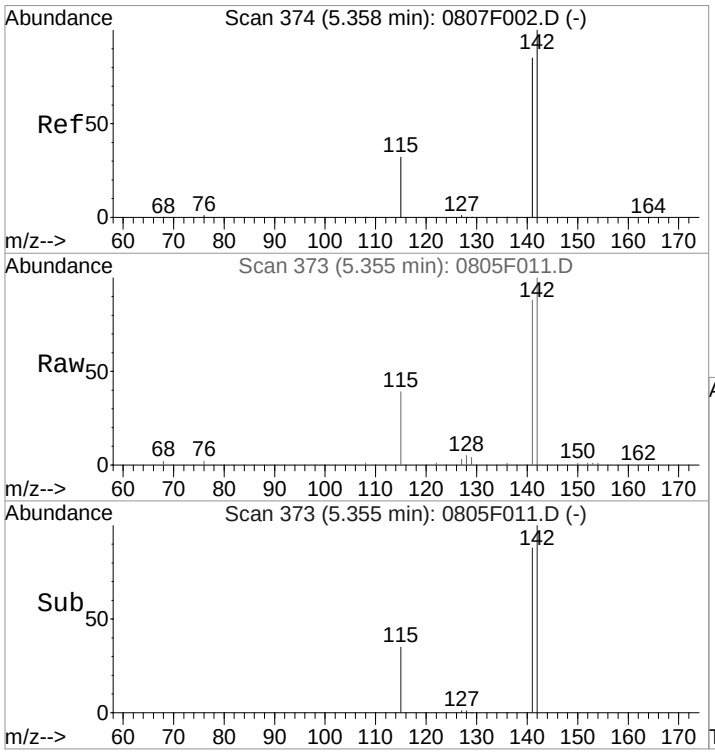
#4
2-Methylnaphthalene
Concen: 159.62 ng/ml
RT: 5.27 min Scan# 347
Delta R.T. -0.03 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:142 Resp: 129449

Ion	Ratio	Lower	Upper
142	100		
141	83.8	52.1	112.1
115	33.4	1.0	61.0



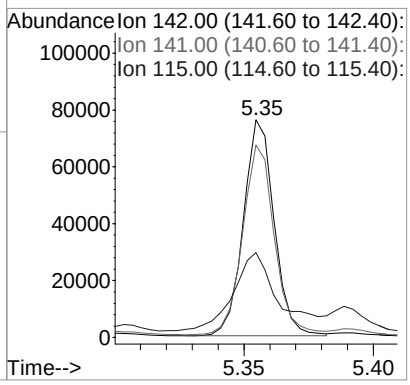
1st 08/08/24
2nd 08/08/24

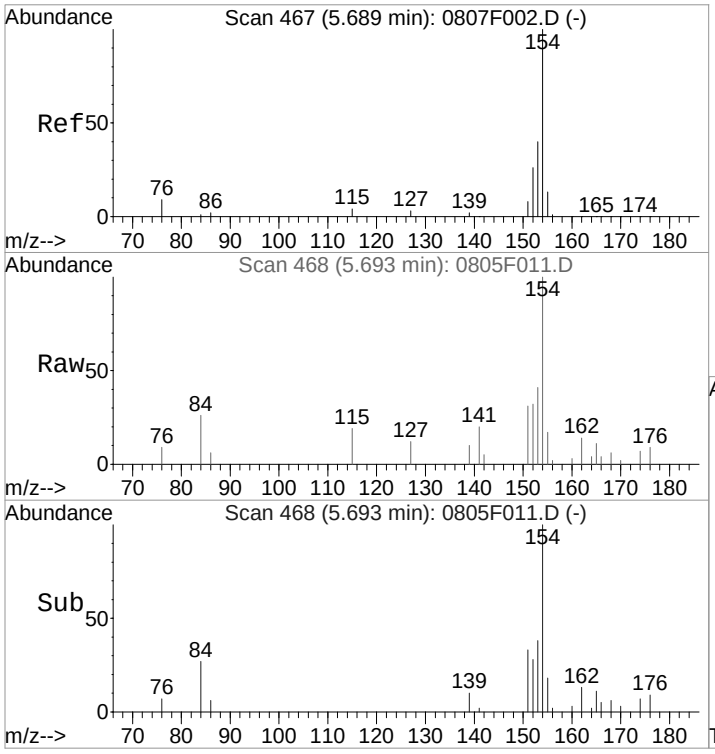


#5
1-Methylnaphthalene
Concen: 82.28 ng/ml
RT: 5.35 min Scan# 373
Delta R.T. -0.03 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:142 Resp: 62806

Ion	Ratio	Lower	Upper
142	100		
141	87.8	55.8	115.8
115	35.6	1.9	61.9

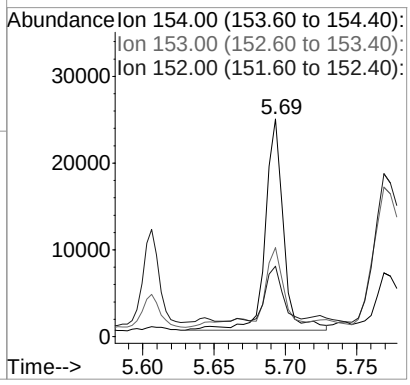




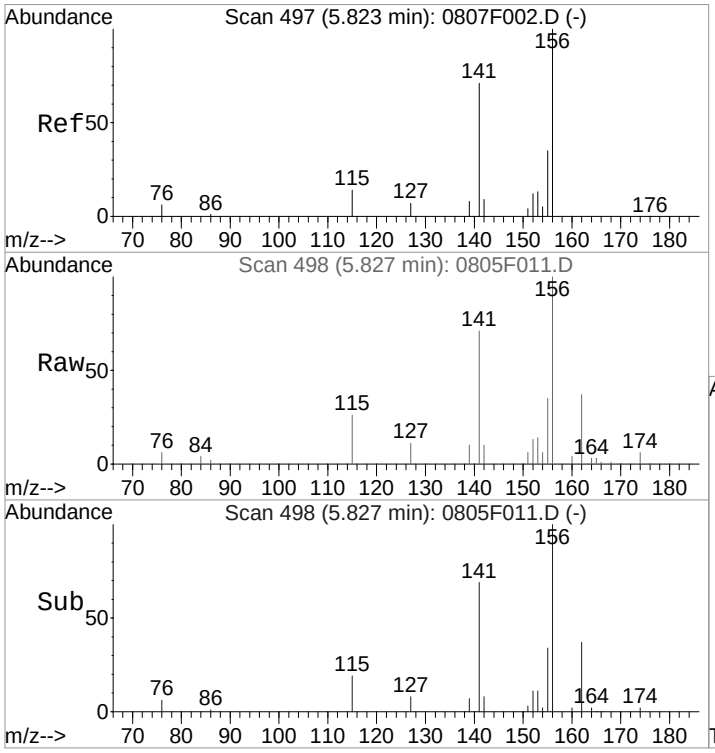
#6
Biphenyl
Concen: 21.96 ng/ml
RT: 5.69 min Scan# 468
Delta R.T. -0.03 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:154 Resp: 21666

Ion	Ratio	Lower	Upper
154	100		
153	37.7	8.6	68.6
152	26.5	0.0	55.8



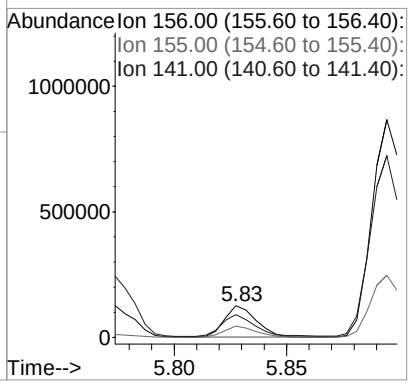
1st 08/08/24
2nd 08/08/24

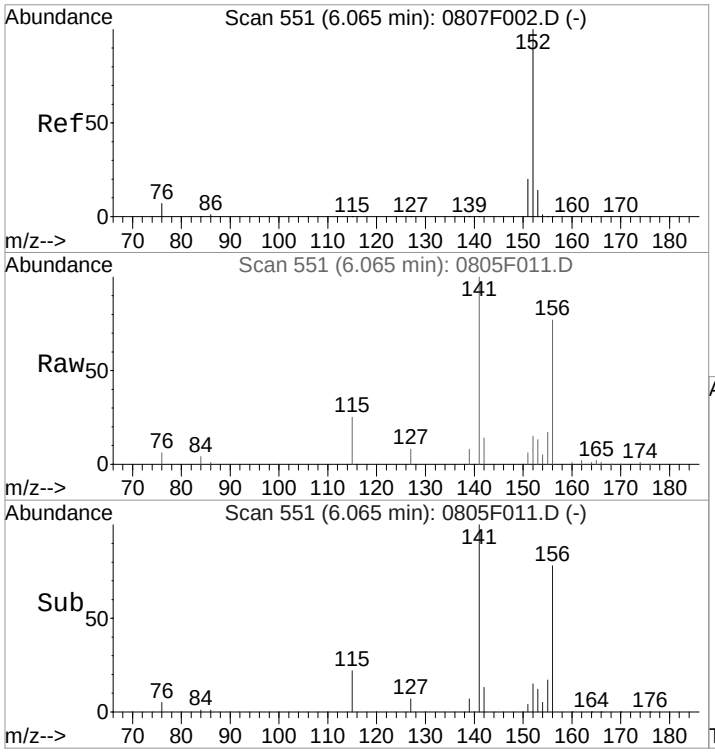


#7
2,6-Dimethylnaphthalene
Concen: 175.96 ng/ml
RT: 5.83 min Scan# 498
Delta R.T. -0.02 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:156 Resp: 122880

Ion	Ratio	Lower	Upper
156	100		
155	34.8	4.7	64.7
141	68.8	39.2	99.2

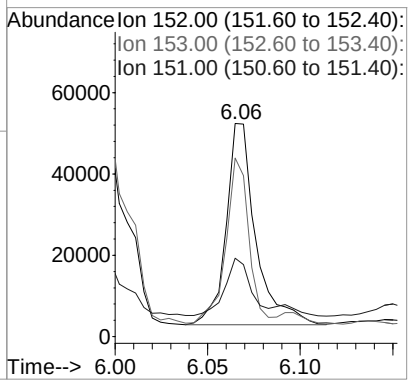




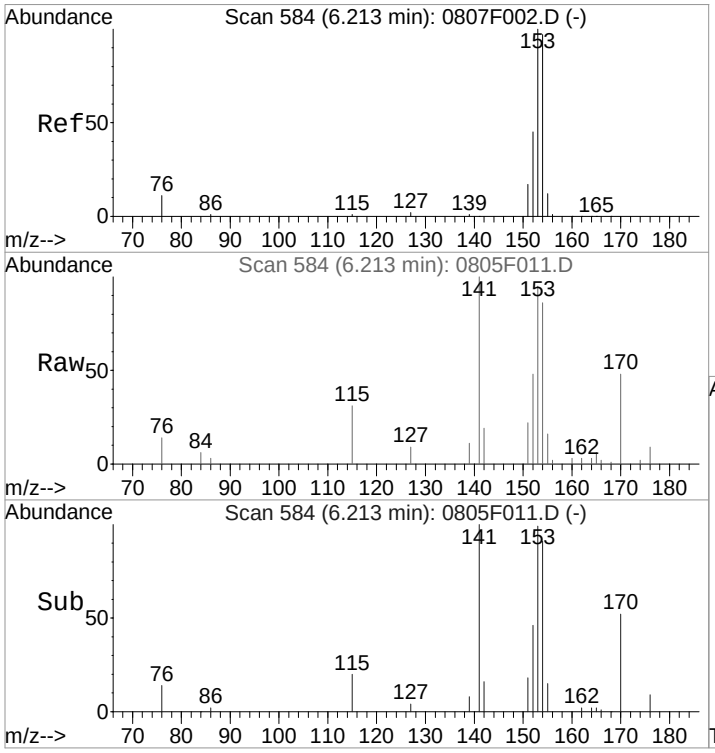
#9
Acenaphthylene
Concen: 46.94 ng/ml
RT: 6.06 min Scan# 551
Delta R.T. -0.03 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:152 Resp: 55081

Ion	Ratio	Lower	Upper
152	100		
153	82.0	0.0	44.2#
151	28.8	0.0	49.6



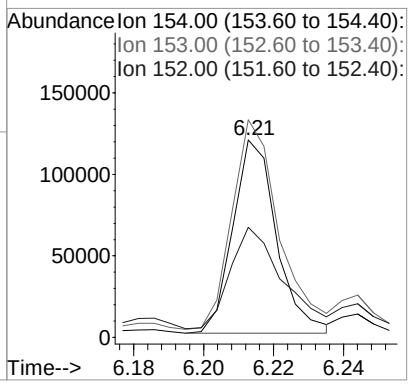
1st 08/08/24
2nd 08/08/24

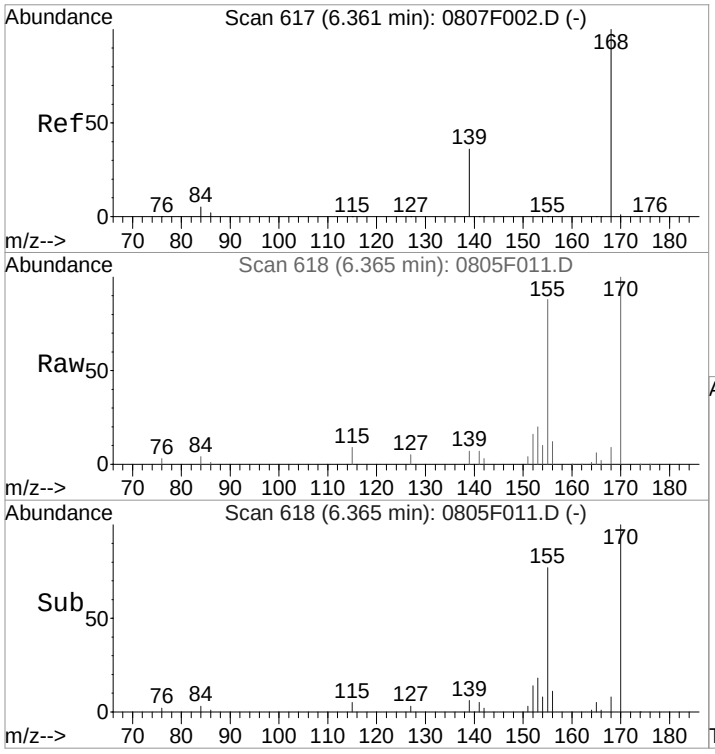


#10
Acenaphthene
Concen: 136.86 ng/ml
RT: 6.21 min Scan# 584
Delta R.T. -0.02 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:154 Resp: 103166

Ion	Ratio	Lower	Upper
154	100		
153	108.3	75.0	135.0
152	52.4	19.6	79.6

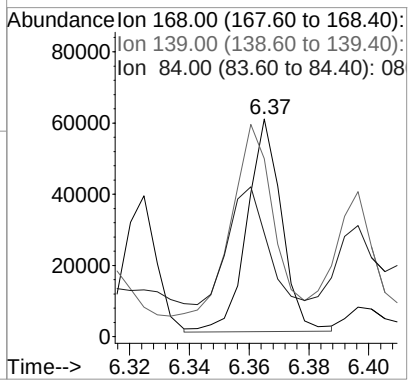




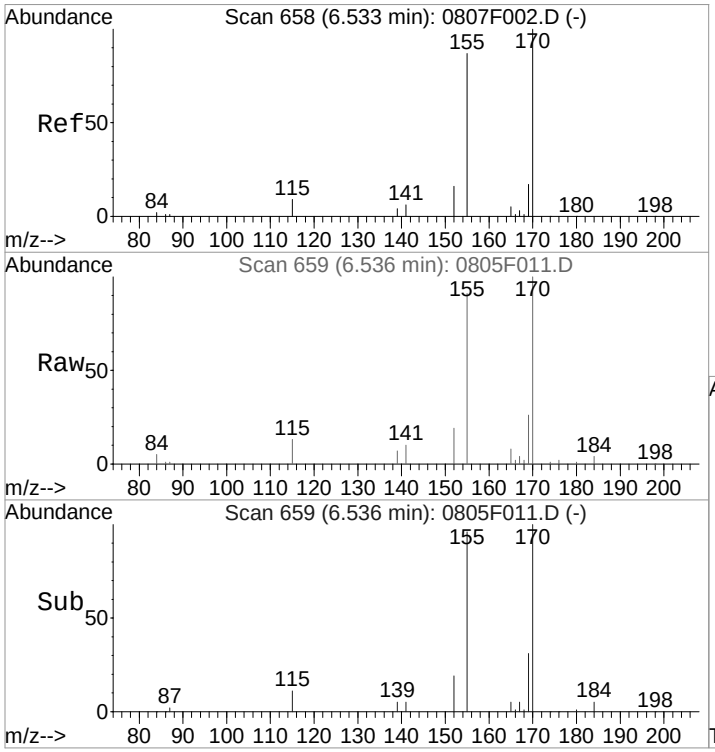
#11
Dibenzofuran
Concen: 42.86 ng/ml m
RT: 6.37 min Scan# 618
Delta R.T. -0.02 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:168 Resp: 47882

Ion	Ratio	Lower	Upper
168	100		
139	81.8	0.0	59.2#
84	47.6	0.0	34.2#



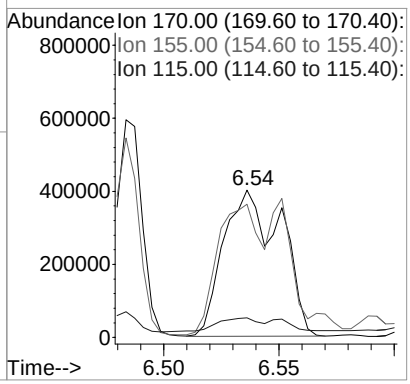
1st 08/08/24
2nd 08/08/24

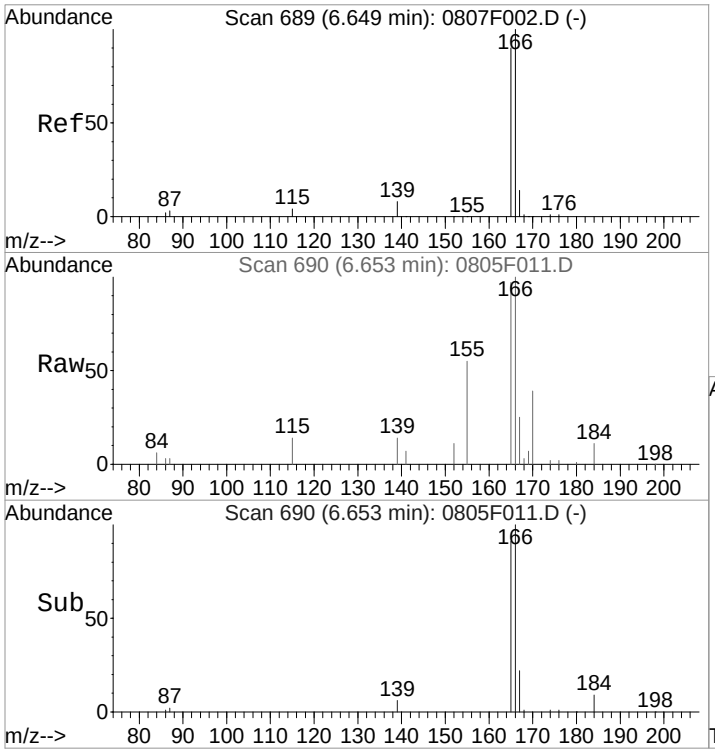


#12
2,3,5-Trimethylnaphthalene
Concen: 982.81 ng/ml m
RT: 6.54 min Scan# 659
Delta R.T. -0.02 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:170 Resp: 693815

Ion	Ratio	Lower	Upper
170	100		
155	90.6	52.5	112.5
115	13.2	0.0	38.1

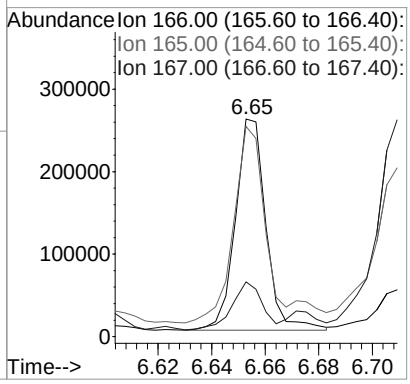


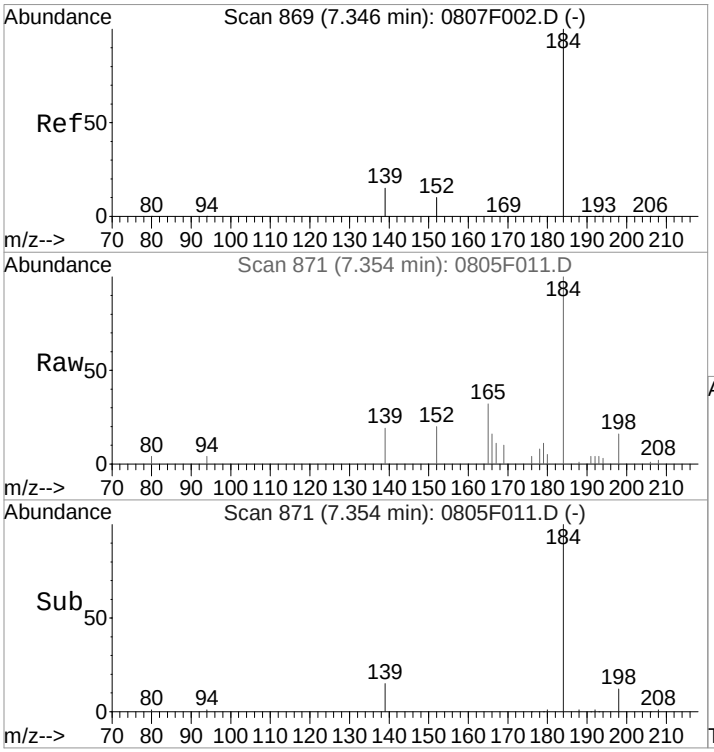


#14
Fluorene
Concen: 234.09 ng/ml
RT: 6.65 min Scan# 690
Delta R.T. -0.02 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:166 Resp: 202856

Ion	Ratio	Lower	Upper
166	100		
165	93.1	56.8	116.8
167	22.7	0.0	44.0

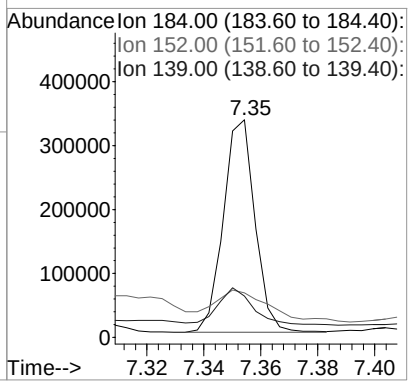


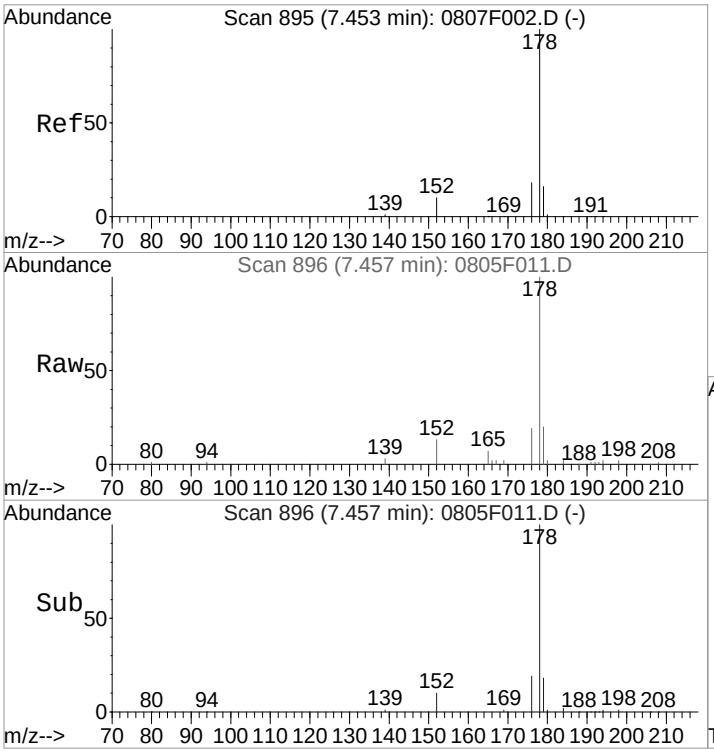


#16
Dibenzothiophene
Concen: 192.59 ng/ml
RT: 7.35 min Scan# 871
Delta R.T. -0.02 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:184 Resp: 257174

Ion	Ratio	Lower	Upper
184	100		
152	12.1	0.0	40.4
139	13.4	0.0	44.9

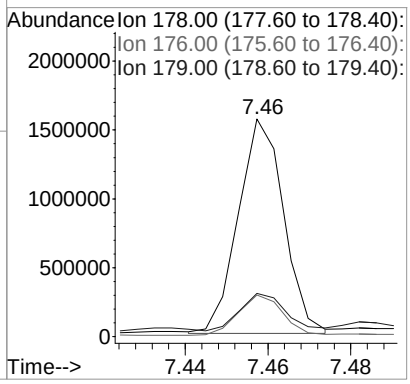




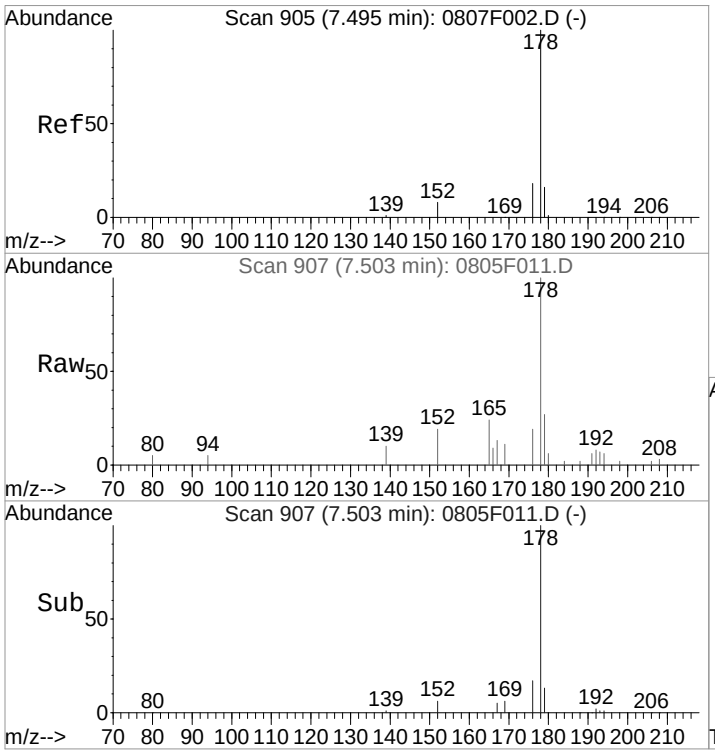
#17
Phenanthrene
Concen: 855.19 ng/ml m
RT: 7.46 min Scan# 896
Delta R.T. -0.02 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:178 Resp: 1187176

Ion	Ratio	Lower	Upper
178	100		
176	19.1	0.0	47.9
179	19.9	0.0	46.5



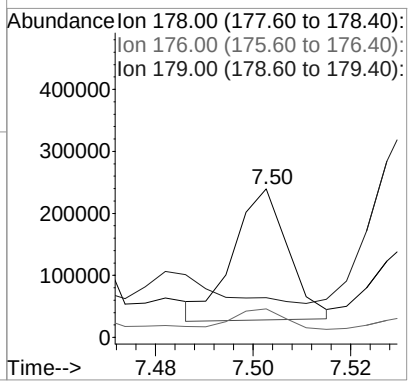
1st 08/08/24
2nd 08/08/24

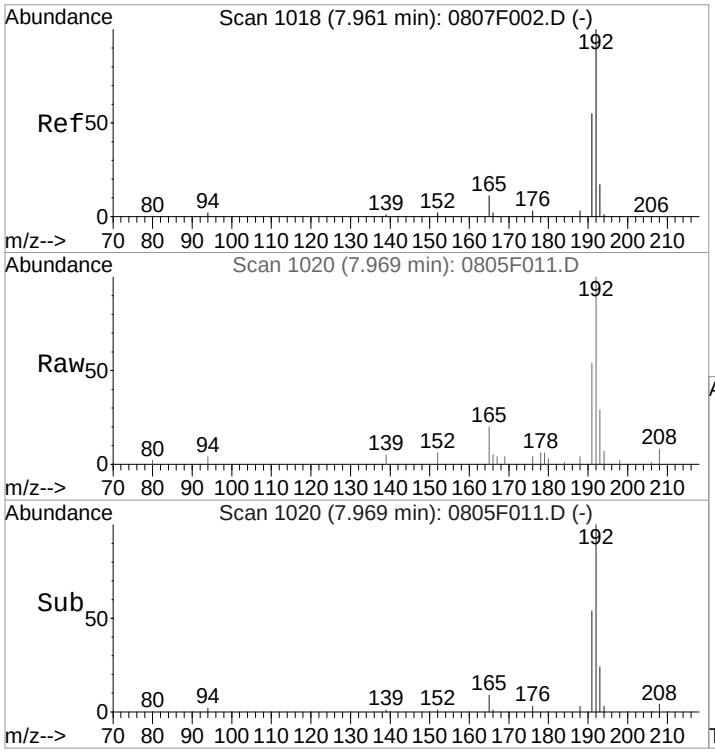


#18
Anthracene
Concen: 127.78 ng/ml
RT: 7.50 min Scan# 907
Delta R.T. -0.02 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:178 Resp: 165227

Ion	Ratio	Lower	Upper
178	100		
176	17.0	0.0	47.8
179	1.5	0.0	46.9

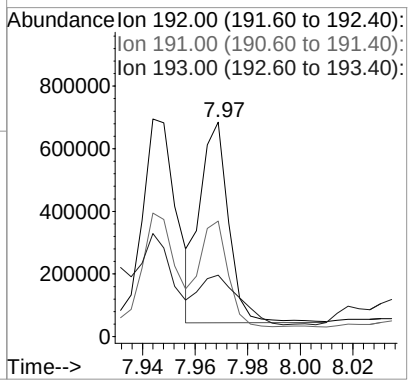


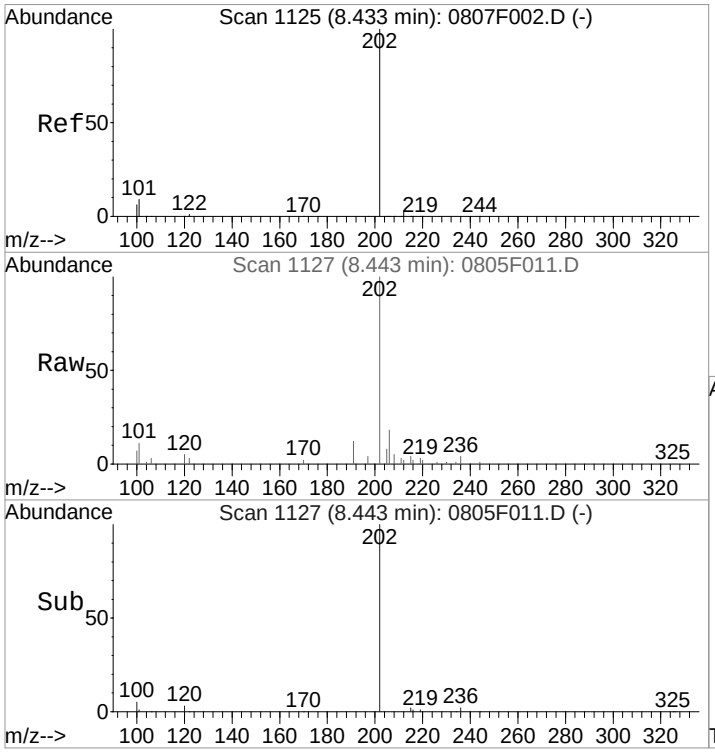


#20
1-Methylphenanthrene
Concen: 471.92 ng/ml
RT: 7.97 min Scan# 1020
Delta R.T. -0.02 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:192 Resp: 487330

Ion	Ratio	Lower	Upper
192	100		
191	53.1	22.7	82.7
193	23.7	0.0	47.5

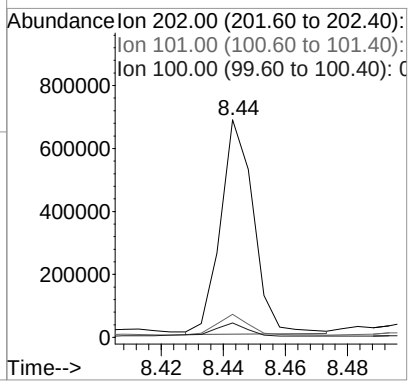


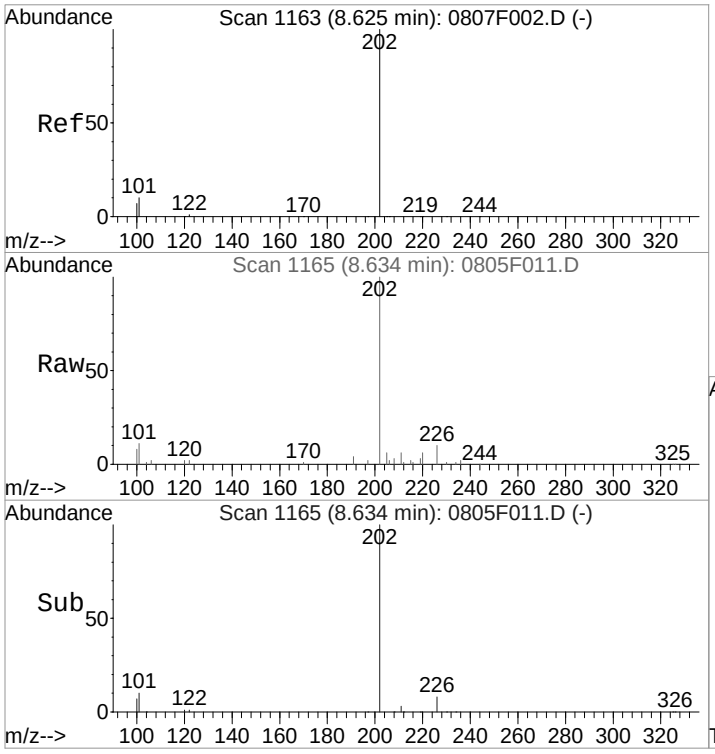


#21
Fluoranthene
Concen: 317.14 ng/ml
RT: 8.44 min Scan# 1127
Delta R.T. -0.02 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:202 Resp: 506059

Ion	Ratio	Lower	Upper
202	100		
101	9.8	0.0	36.9
100	6.3	0.0	34.3

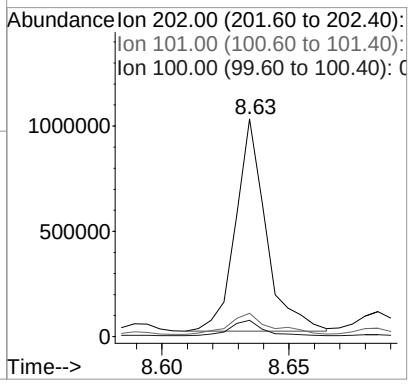


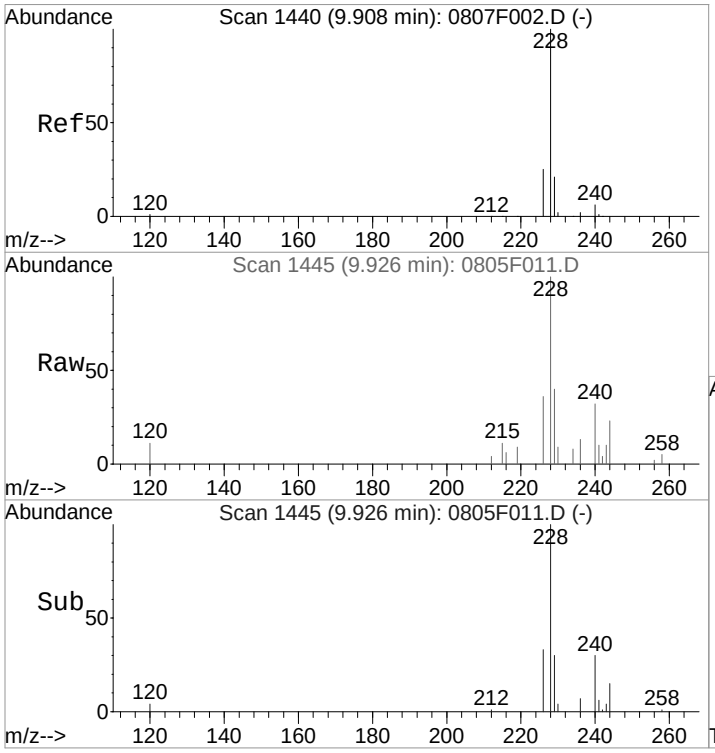


#24
Pyrene
Concen: 449.06 ng/ml
RT: 8.63 min Scan# 1165
Delta R.T. -0.02 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:202 Resp: 837233

Ion	Ratio	Lower	Upper
202	100		
101	9.9	0.0	41.8
100	7.3	0.0	37.9

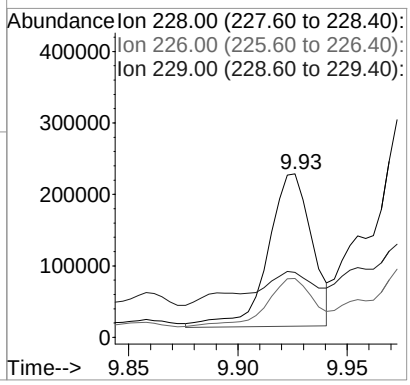


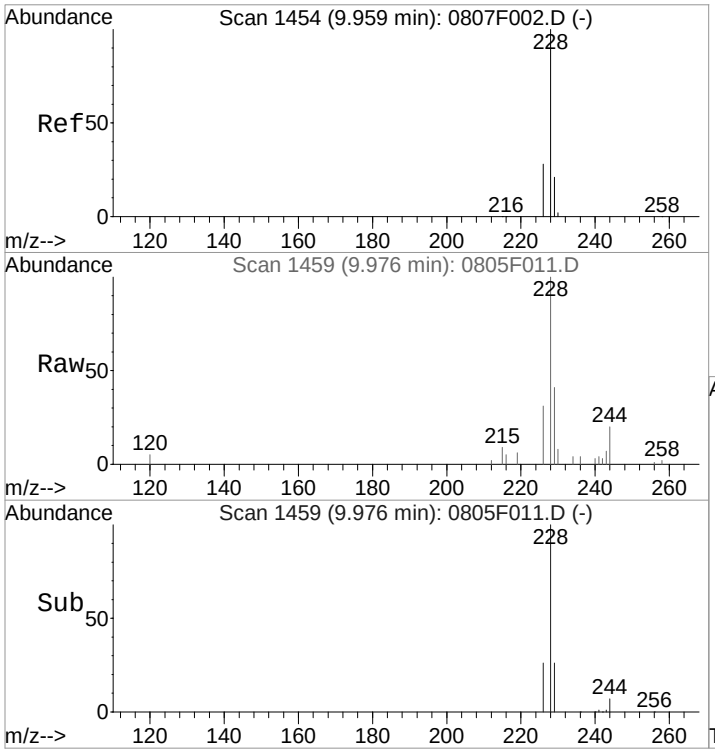


#26
Benz(a)anthracene
Concen: 160.74 ng/ml
RT: 9.93 min Scan# 1445
Delta R.T. -0.03 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:228 Resp: 301266

Ion	Ratio	Lower	Upper
228	100		
226	31.9	0.0	54.6
229	22.2	0.0	50.6

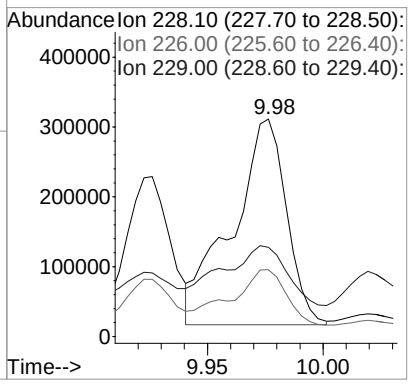




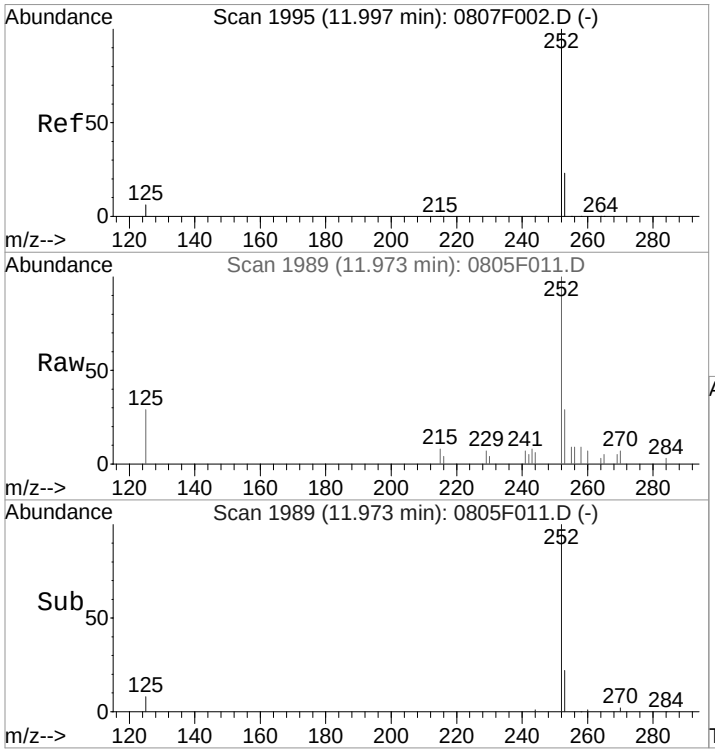
#27
Chrysene
Concen: 269.57 ng/ml
RT: 9.98 min Scan# 1459
Delta R.T. -0.03 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:228 Resp: 481005

Ion	Ratio	Lower	Upper
228	100		
226	27.3	0.0	57.3
229	28.8	0.0	50.7



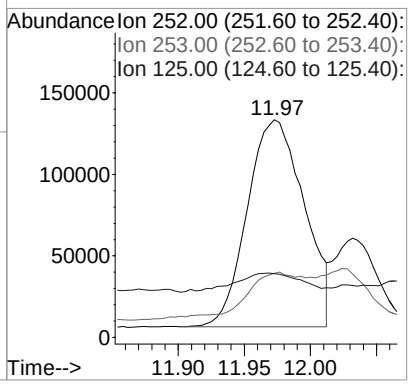
1st 08/08/24
2nd 08/08/24

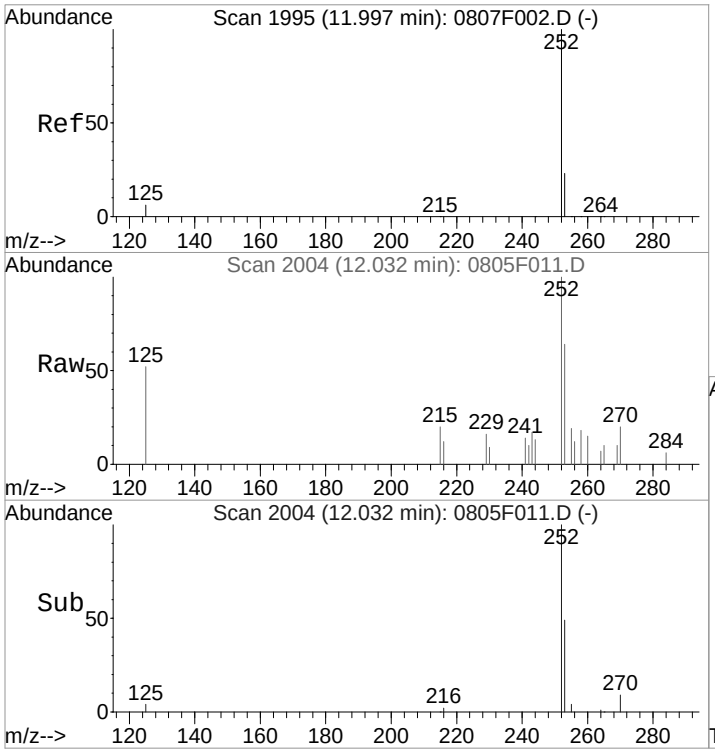


#29
Benzo(b)fluoranthene
Concen: 179.92 ng/ml
RT: 11.97 min Scan# 1989
Delta R.T. 0.05 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:252 Resp: 381870

Ion	Ratio	Lower	Upper
252	100		
253	21.0	0.0	52.5
125	8.5	0.0	36.1

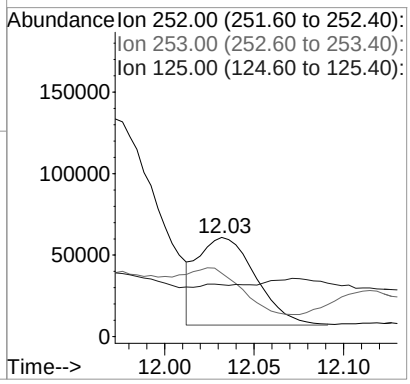




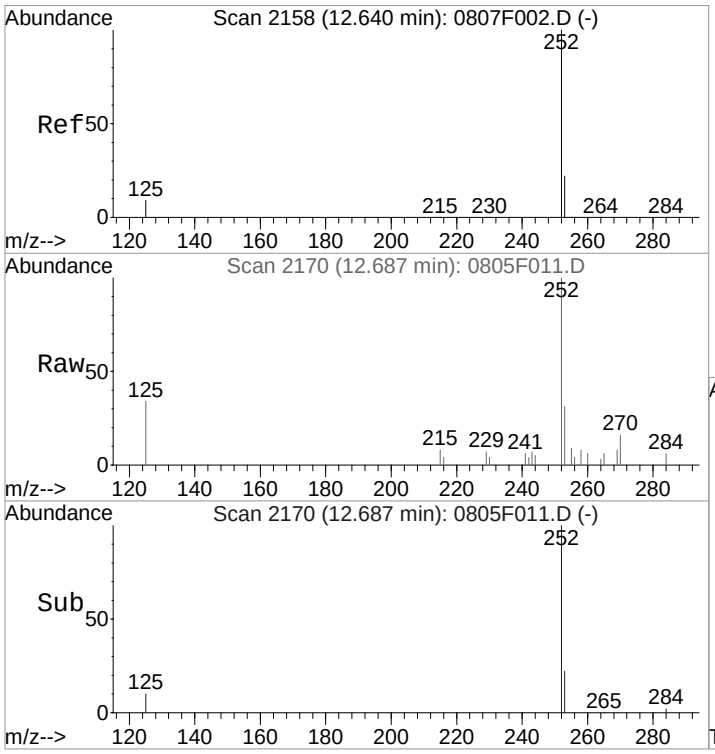
#30
Benzo(k)fluoranthene
Concen: 60.51 ng/ml m
RT: 12.03 min Scan# 2004
Delta R.T. 0.04 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:252 Resp: 121292

Ion	Ratio	Lower	Upper
252	100		
253	64.1	0.0	52.7#
125	52.3	0.0	35.9#



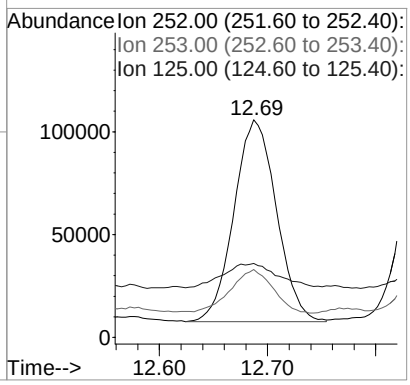
1st 08/08/24
2nd 08/08/24

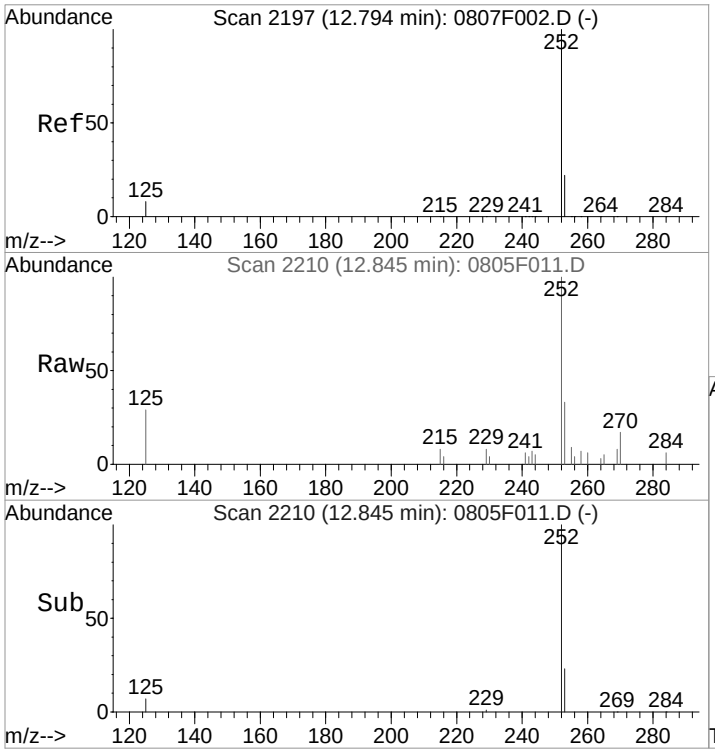


#31
Benzo(e)pyrene
Concen: 134.74 ng/ml
RT: 12.69 min Scan# 2170
Delta R.T. 0.06 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:252 Resp: 267958

Ion	Ratio	Lower	Upper
252	100		
253	20.8	0.0	52.0
125	12.0	0.0	39.2

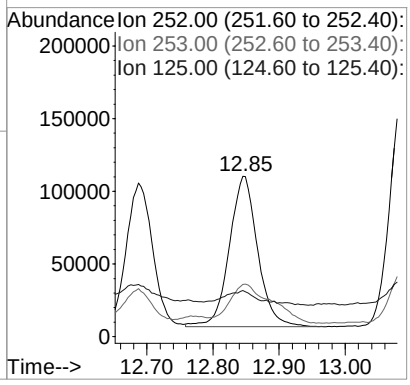


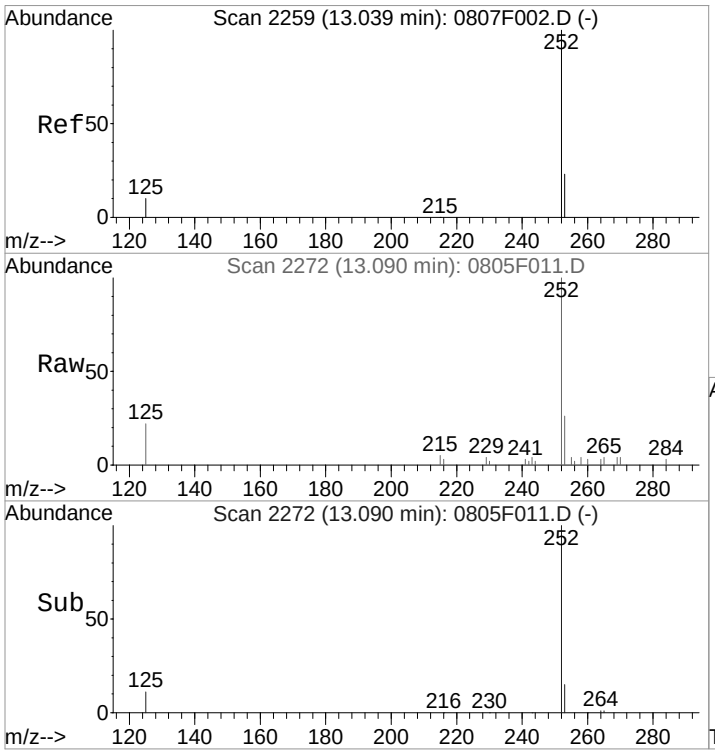


#32
Benzo(a)pyrene
Concen: 182.75 ng/ml
RT: 12.85 min Scan# 2210
Delta R.T. 0.07 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:252 Resp: 309651

Ion	Ratio	Lower	Upper
252	100		
253	25.5	0.0	52.3
125	8.9	0.0	36.9

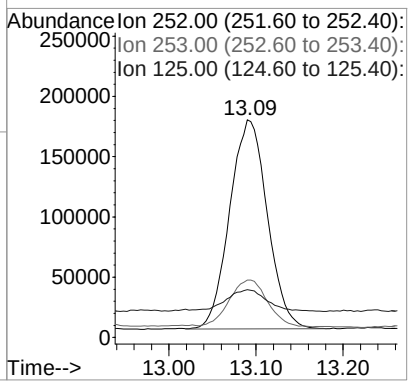


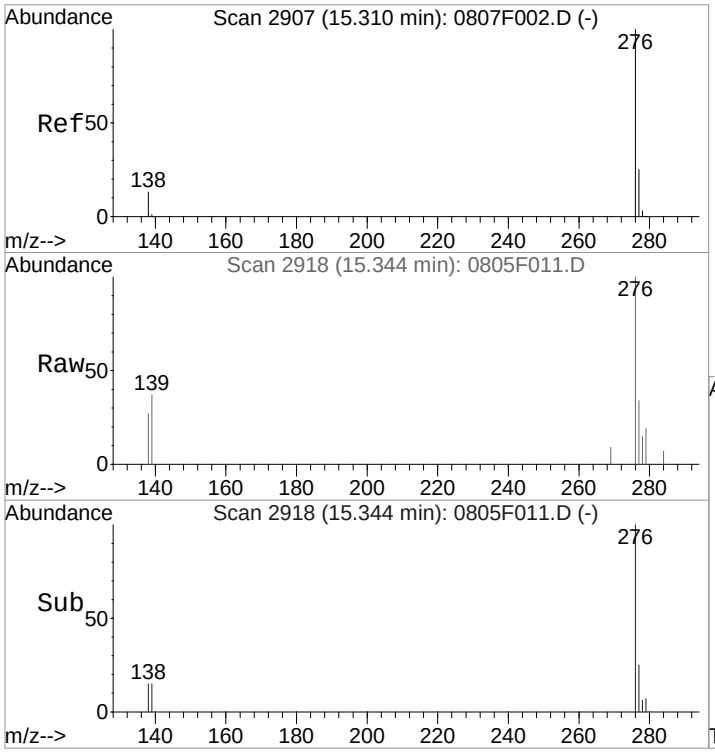


#33
Perylene
Concen: 285.75 ng/ml
RT: 13.09 min Scan# 2272
Delta R.T. 0.07 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:252 Resp: 522388

Ion	Ratio	Lower	Upper
252	100		
253	22.2	0.0	52.2
125	10.5	0.0	39.2

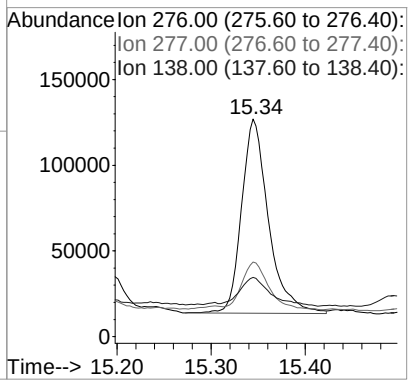


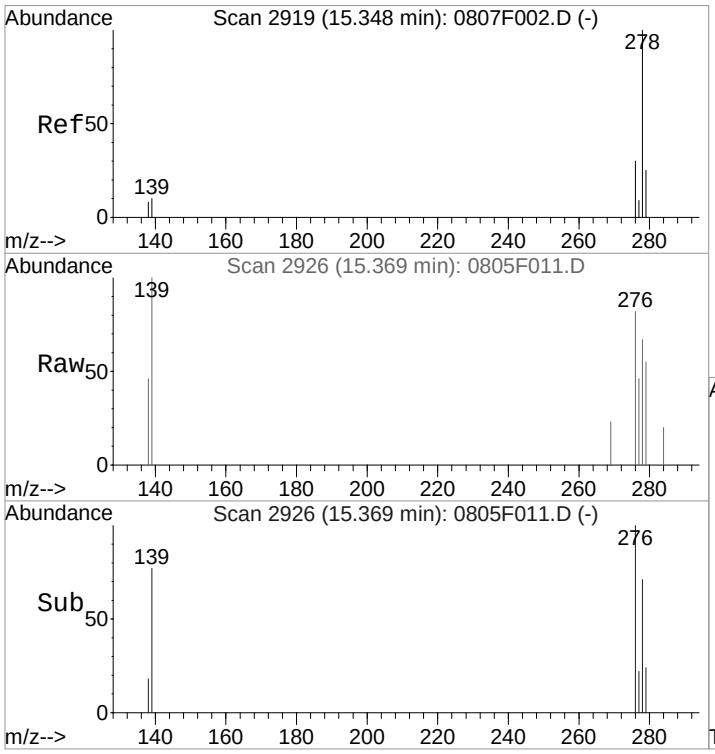


#34
Indeno(1,2,3-cd)pyrene
Concen: 127.79 ng/ml
RT: 15.34 min Scan# 2918
Delta R.T. 0.06 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:276 Resp: 225020

Ion	Ratio	Lower	Upper
276	100		
277	24.5	0.0	55.2
138	14.5	0.0	42.2

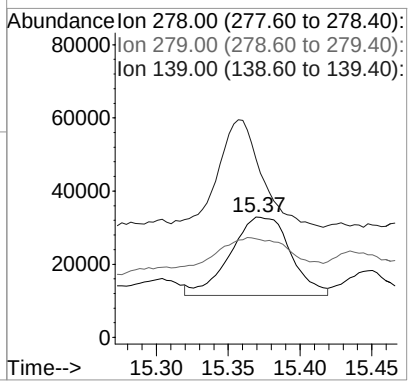


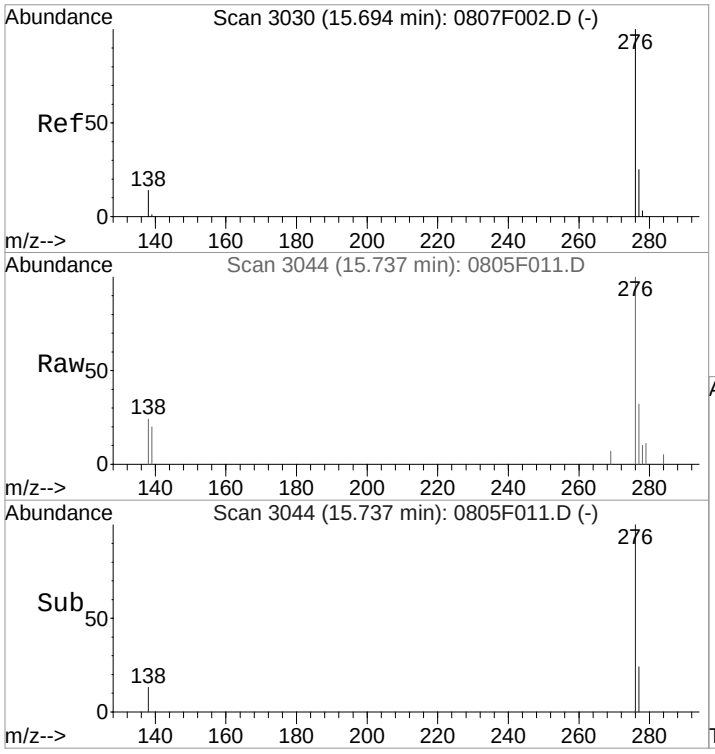


#35
Dibenz(a,h)anthracene
Concen: 31.58 ng/ml m
RT: 15.37 min Scan# 2926
Delta R.T. 0.04 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:278 Resp: 62860

Ion	Ratio	Lower	Upper
278	100		
279	81.9	0.0	55.2#
139	148.6	0.0	40.4#

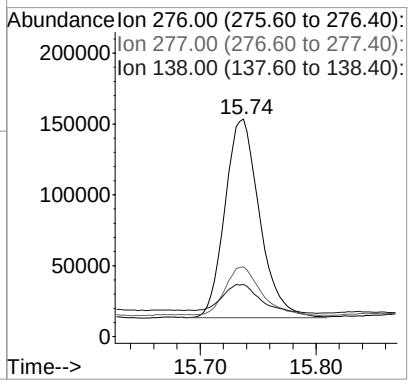




#36
Benzo(g,h,i)perylene
Concen: 124.76 ng/ml
RT: 15.74 min Scan# 3044
Delta R.T. 0.07 min
Lab File: 0805F011.D
Acq: 5 Aug 2024 2:14 pm

Tgt Ion:276 Resp: 290726

Ion	Ratio	Lower	Upper
276	100		
277	24.4	0.0	54.9
138	14.3	0.0	43.8



Quantitation Report (QT Reviewed)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 05 14:59:32 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.57	136	260636	200.00	ng/ml	-0.05
8) Acenaphthene-d10	6.19	164	131921	200.00	ng/ml	-0.02
15) Phenanthrene-d10	7.44	188	265895	200.00	ng/ml	-0.02
23) Chrysene-d12	9.94	240	288087	200.00	ng/ml	-0.02
28) Perylene-d12	13.01	264	331075	200.00	ng/ml	0.07
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.24	152	118215	162.09	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	81.05%		
13) Fluorene-d10	6.63	176	140673m	185.29	ng/ml	-0.02
Spiked Amount 200.000			Recovery =	92.64%		
22) Fluoranthene-d10	8.43	212	288003m	197.96	ng/ml	-0.02
Spiked Amount 200.000			Recovery =	98.98%		
25) Terphenyl-d14	8.77	244	273401	171.73	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	85.86%		
Target Compounds						Qvalue
2) Naphthalene	4.59	128	158100	126.52	ng/ml	99
4) 2-Methylnaphthalene	5.27	142	129449	159.62	ng/ml	97
5) 1-Methylnaphthalene	5.35	142	62806	82.28	ng/ml	97
6) Biphenyl	5.69	154	21666	21.96	ng/ml	99
7) 2,6-Dimethylnaphthalene	5.83	156	122880	175.96	ng/ml	100
9) Acenaphthylene	6.06	152	55081	46.94	ng/ml#	19
10) Acenaphthene	6.21	154	103166	136.86	ng/ml	96
11) Dibenzofuran	6.37	168	47882m	42.86	ng/ml	
12) 2,3,5-Trimethylnaphthalene	6.54	170	693815m	982.81	ng/ml	
14) Fluorene	6.65	166	202856	234.09	ng/ml	91
16) Dibenzothiophene	7.35	184	257174	192.59	ng/ml	96
17) Phenanthrene	7.46	178	1187176m	855.19	ng/ml	
18) Anthracene	7.50	178	165227	127.78	ng/ml	82
20) 1-Methylphenanthrene	7.97	192	487330	471.92	ng/ml	96
21) Fluoranthene	8.44	202	506059	317.14	ng/ml	93
24) Pyrene	8.63	202	837233	449.06	ng/ml	96
26) Benz(a)anthracene	9.93	228	301266	160.74	ng/ml	90
27) Chrysene	9.98	228	481005	269.57	ng/ml	92
29) Benzo(b)fluoranthene	11.97	252	381870	179.92	ng/ml	96
30) Benzo(k)fluoranthene	12.03	252	121292m	60.51	ng/ml	
31) Benzo(e)pyrene	12.69	252	267958	134.74	ng/ml	96
32) Benzo(a)pyrene	12.85	252	309651	182.75	ng/ml	94
33) Perylene	13.09	252	522388	285.75	ng/ml	99
34) Indeno(1,2,3-cd)pyrene	15.34	276	225020	127.79	ng/ml	97
35) Dibenz(a,h)anthracene	15.37	278	62860m	31.58	ng/ml	
36) Benzo(g,h,i)perylene	15.74	276	290726	124.76	ng/ml	99

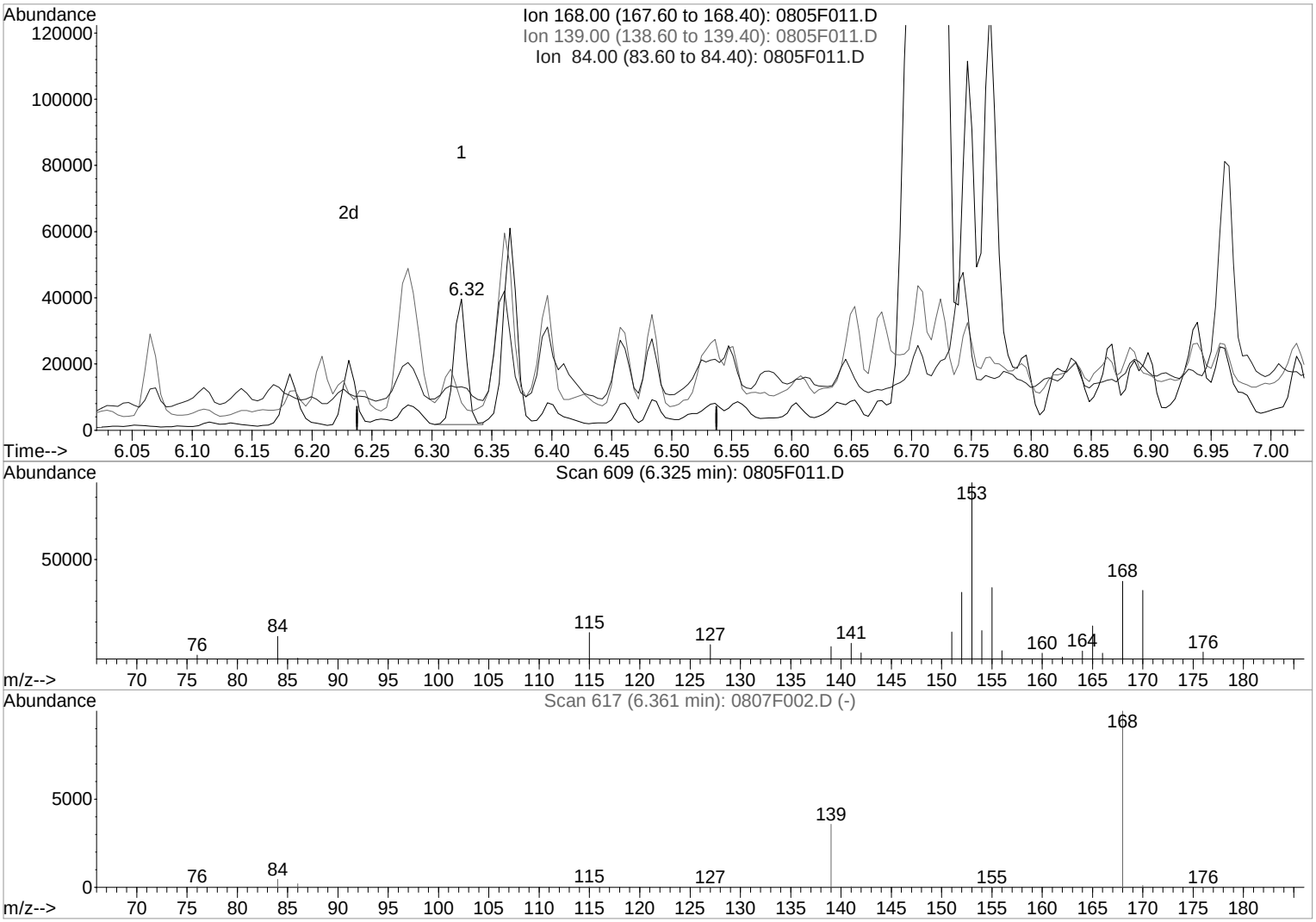
(#) = qualifier out of range (m) = manual integration

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 5 14:59 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(11) Dibenzofuran (T)

6.32min 25.14ng/ml

response 28093

Ion	Exp%	Act%
168.00	100	100
139.00	29.20	2.07
84.00	4.20	10.91
0.00	0.00	0.00

Manual Integration:

Before

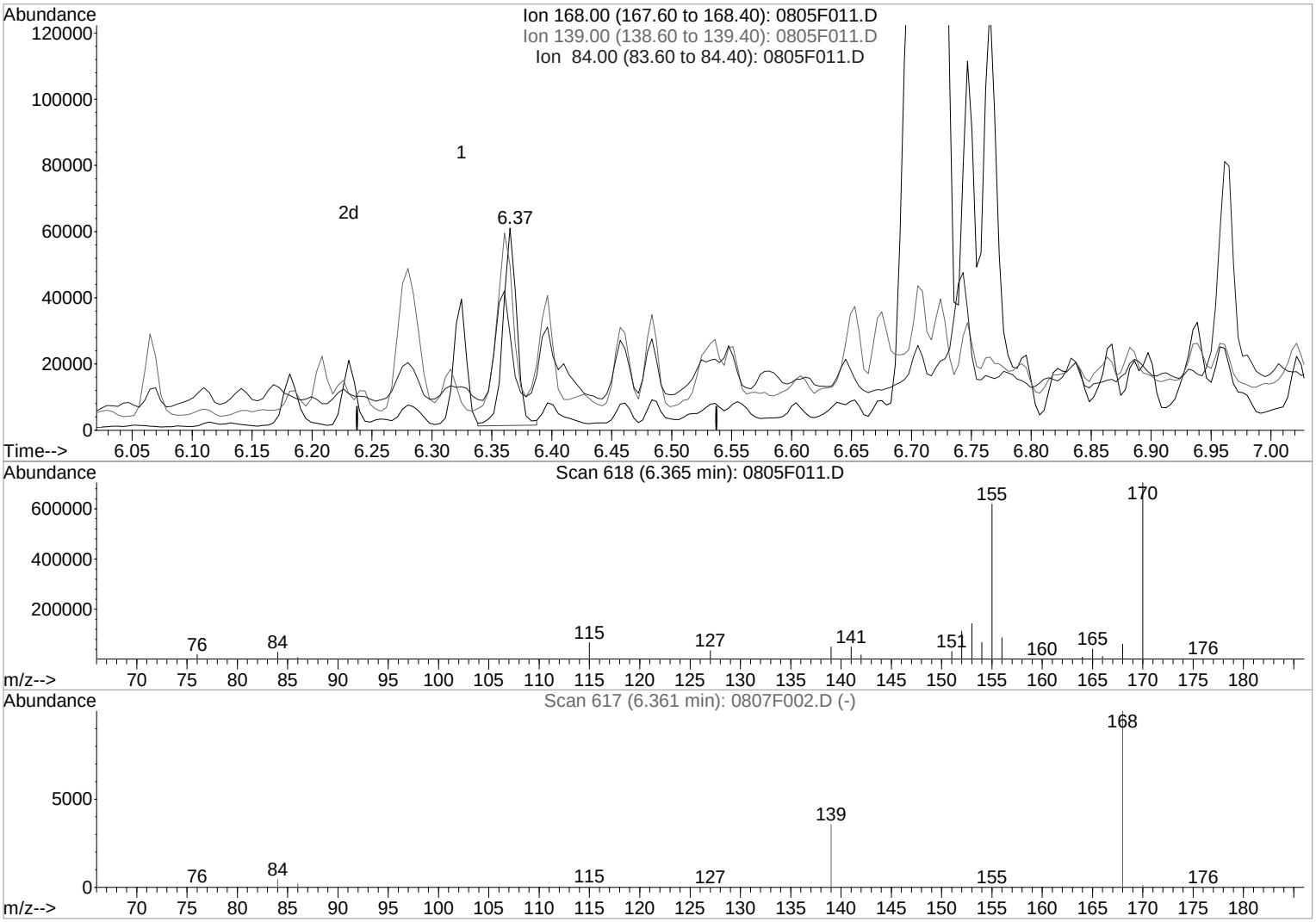
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:11 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(11) Dibenzofuran (T)

6.37min 42.86ng/ml m

response 47882

Ion	Exp%	Act%
168.00	100	100
139.00	29.20	81.76#
84.00	4.20	47.55#
0.00	0.00	0.00

Manual Integration:

After

WP

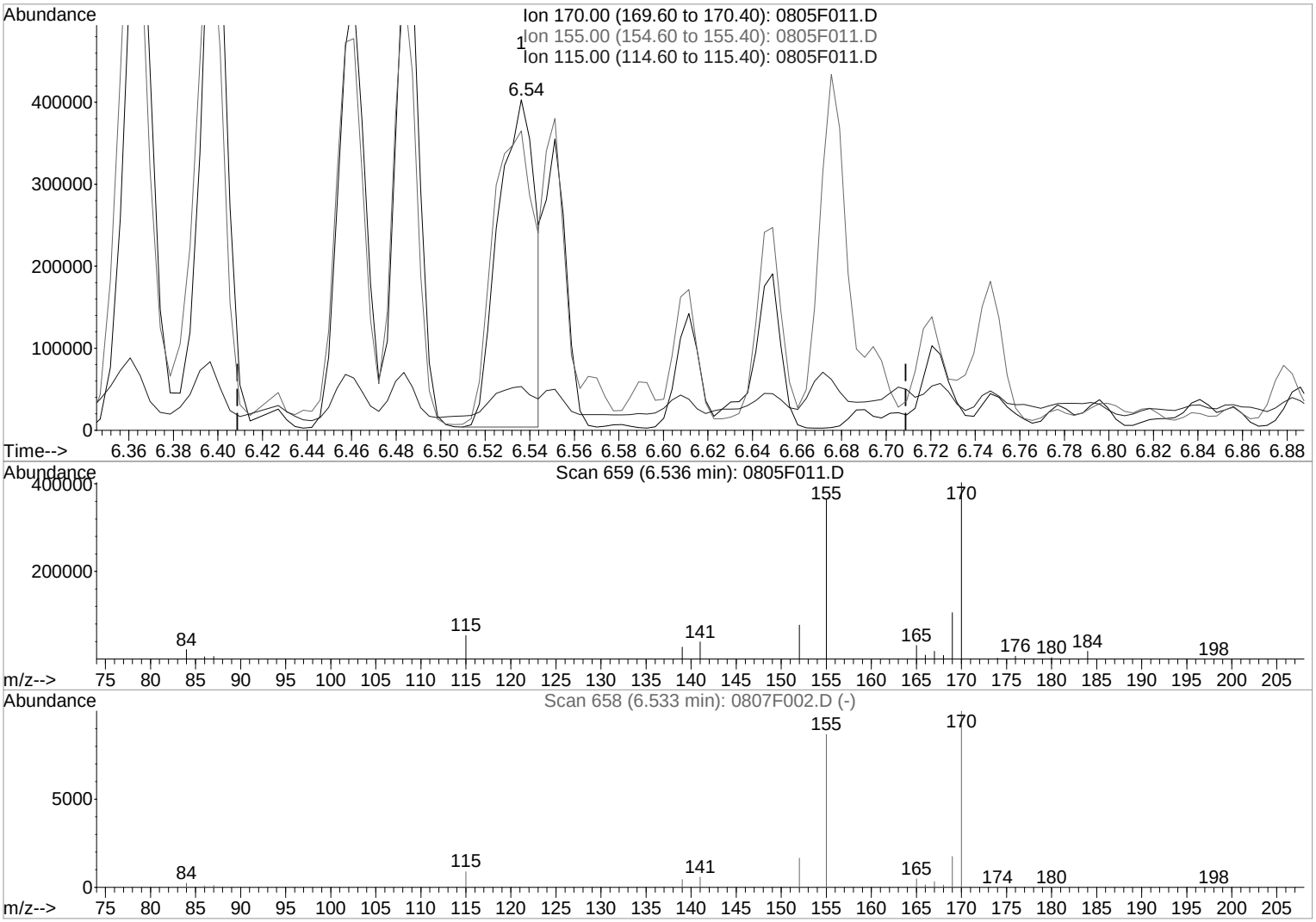
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:11 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(12) 2,3,5-Trimethylnaphthalene (T)

6.54min 655.84ng/ml

response 462993

Ion	Exp%	Act%
170.00	100	100
155.00	82.50	89.62
115.00	8.10	9.01
0.00	0.00	0.00

Manual Integration:

Before

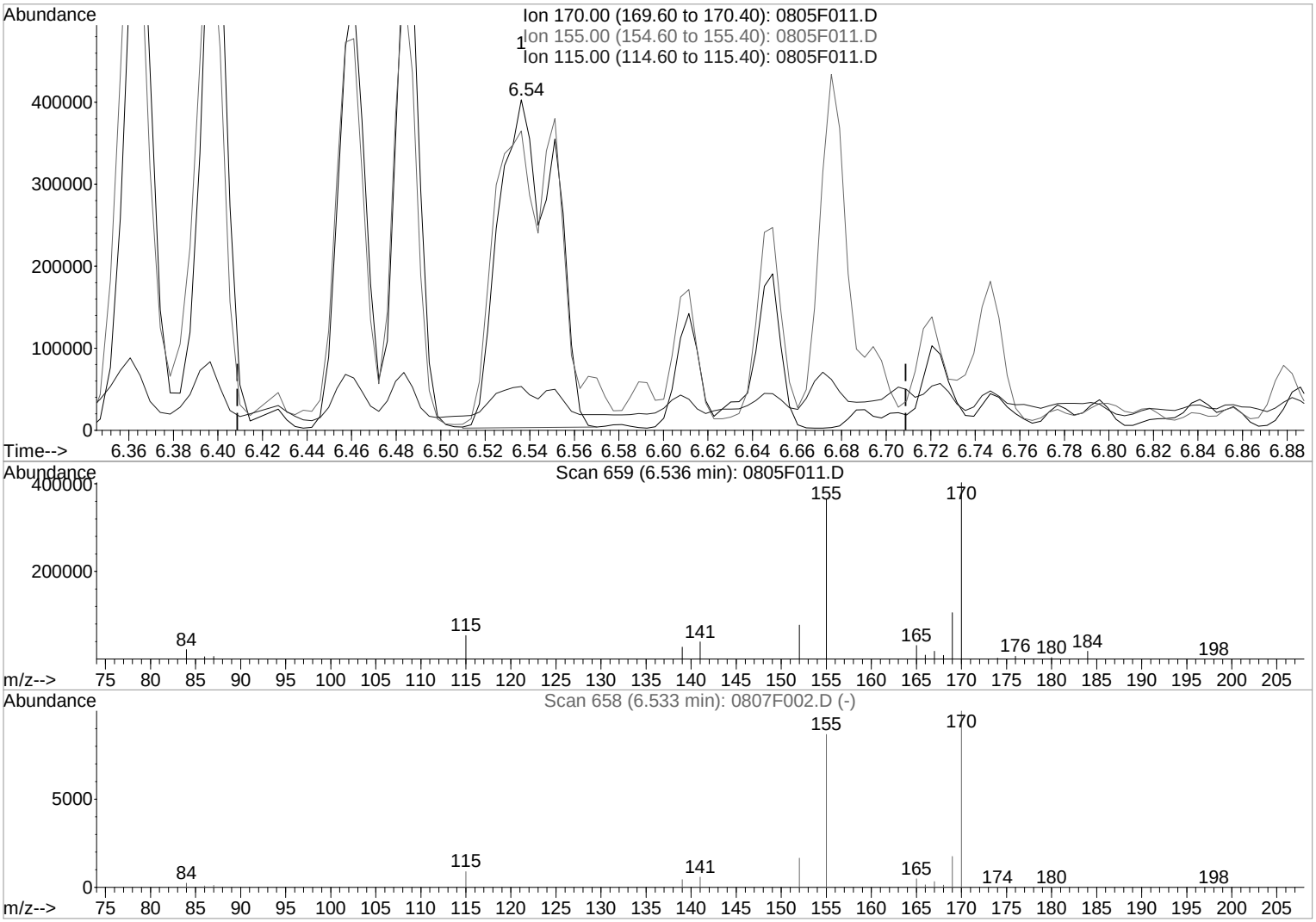
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:11 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(12) 2,3,5-Trimethylnaphthalene (T)

6.54min 982.81ng/ml m

response 693815

Ion	Exp%	Act%
170.00	100	100
155.00	82.50	90.57
115.00	8.10	13.23
0.00	0.00	0.00

Manual Integration:

After

BLC

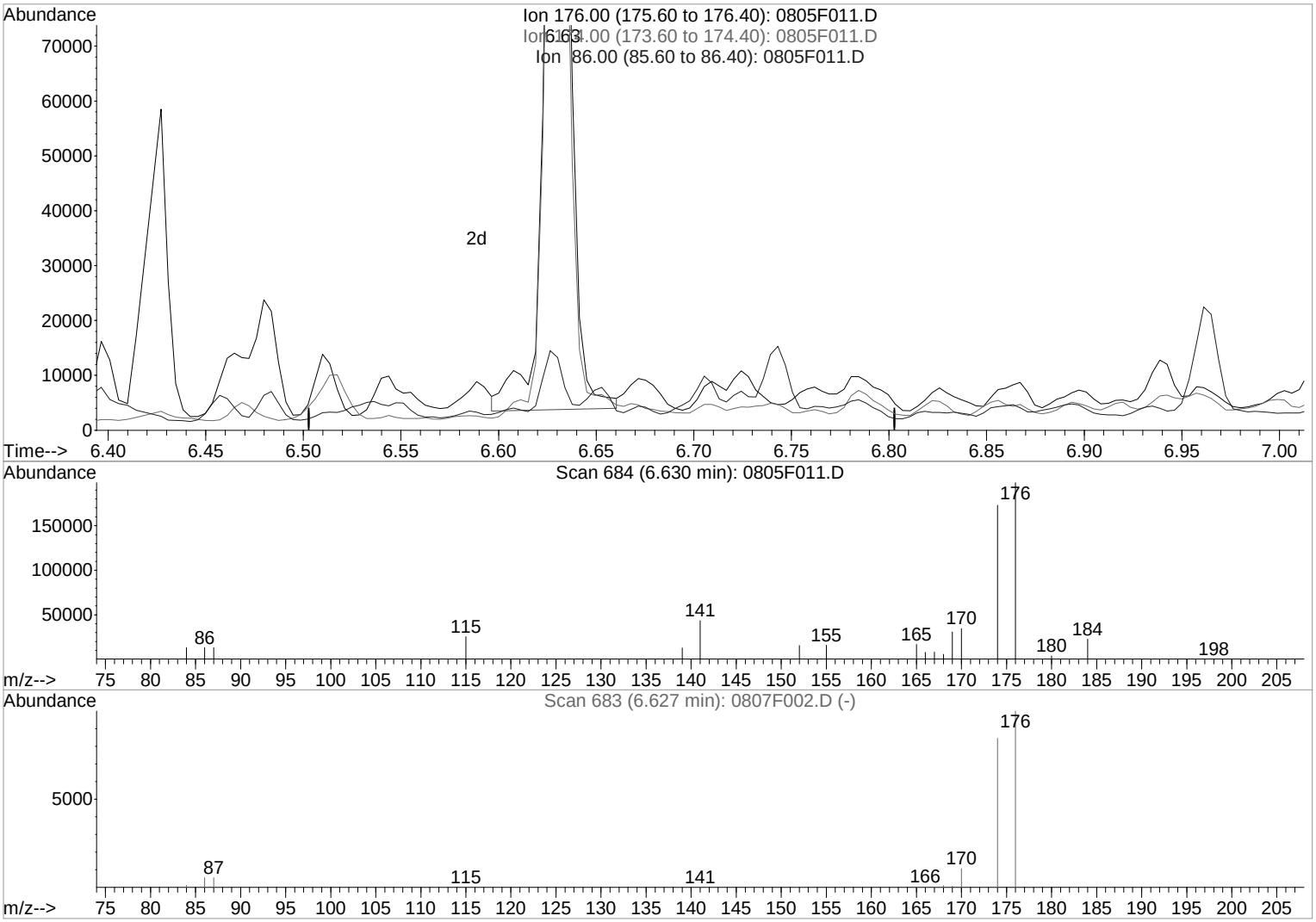
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:11 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(13) Fluorene-d10 (S)

6.63min 197.42ng/ml

response 149879

Ion	Exp%	Act%
176.00	100	100
174.00	85.70	88.63
86.00	5.70	5.36
0.00	0.00	0.00

Manual Integration:

Before

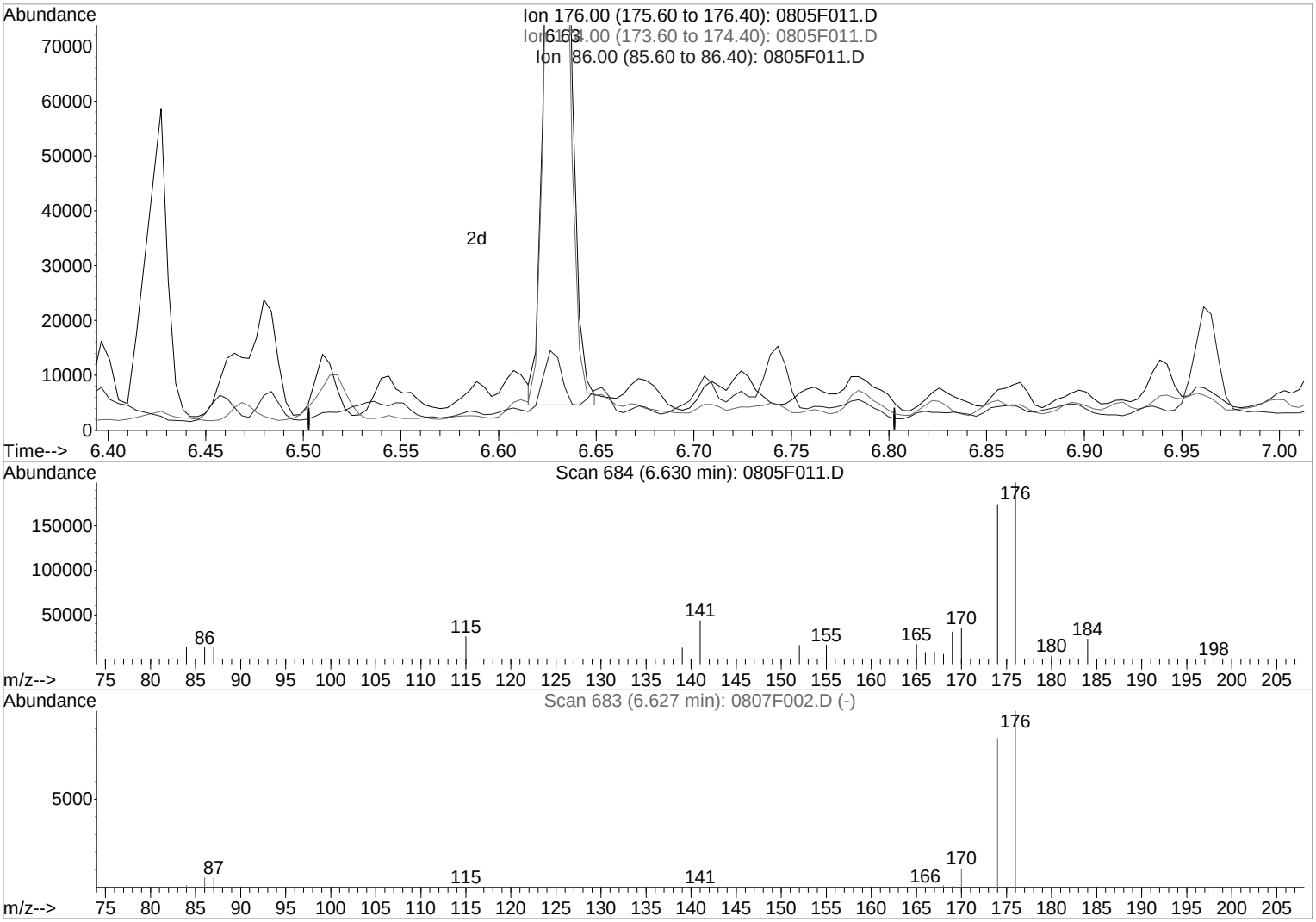
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:12 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(13) Fluorene-d10 (S)

6.63min 185.29ng/ml m

response 140673

Ion	Exp%	Act%
176.00	100	100
174.00	85.70	87.13
86.00	5.70	6.66
0.00	0.00	0.00

Manual Integration:

After

BLC

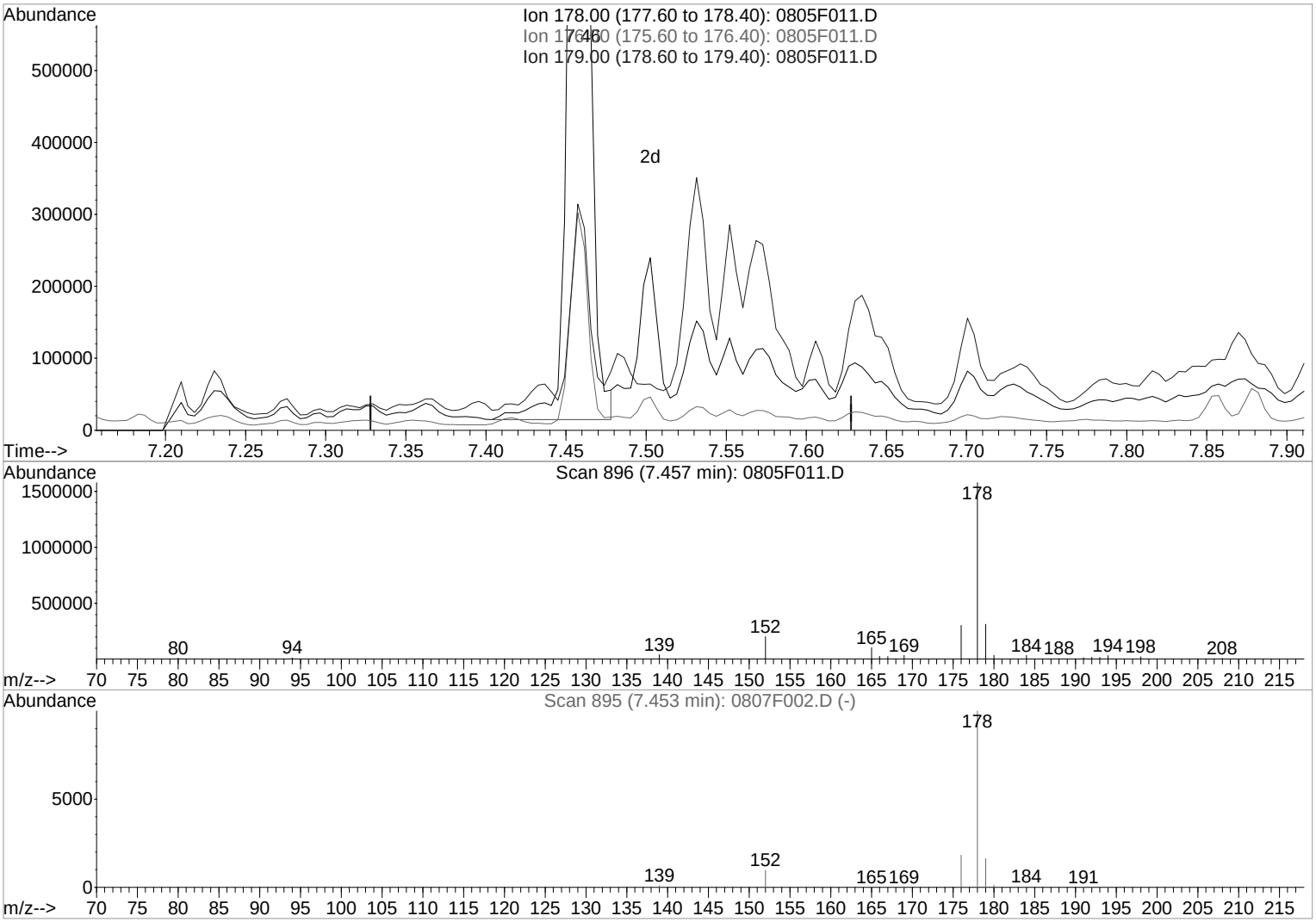
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:12 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(17) Phenanthrene (T)

7.46min 897.38ng/ml

response 1245737

Ion	Exp%	Act%
178.00	100	100
176.00	17.90	18.76
179.00	16.50	18.29
0.00	0.00	0.00

Manual Integration:

Before

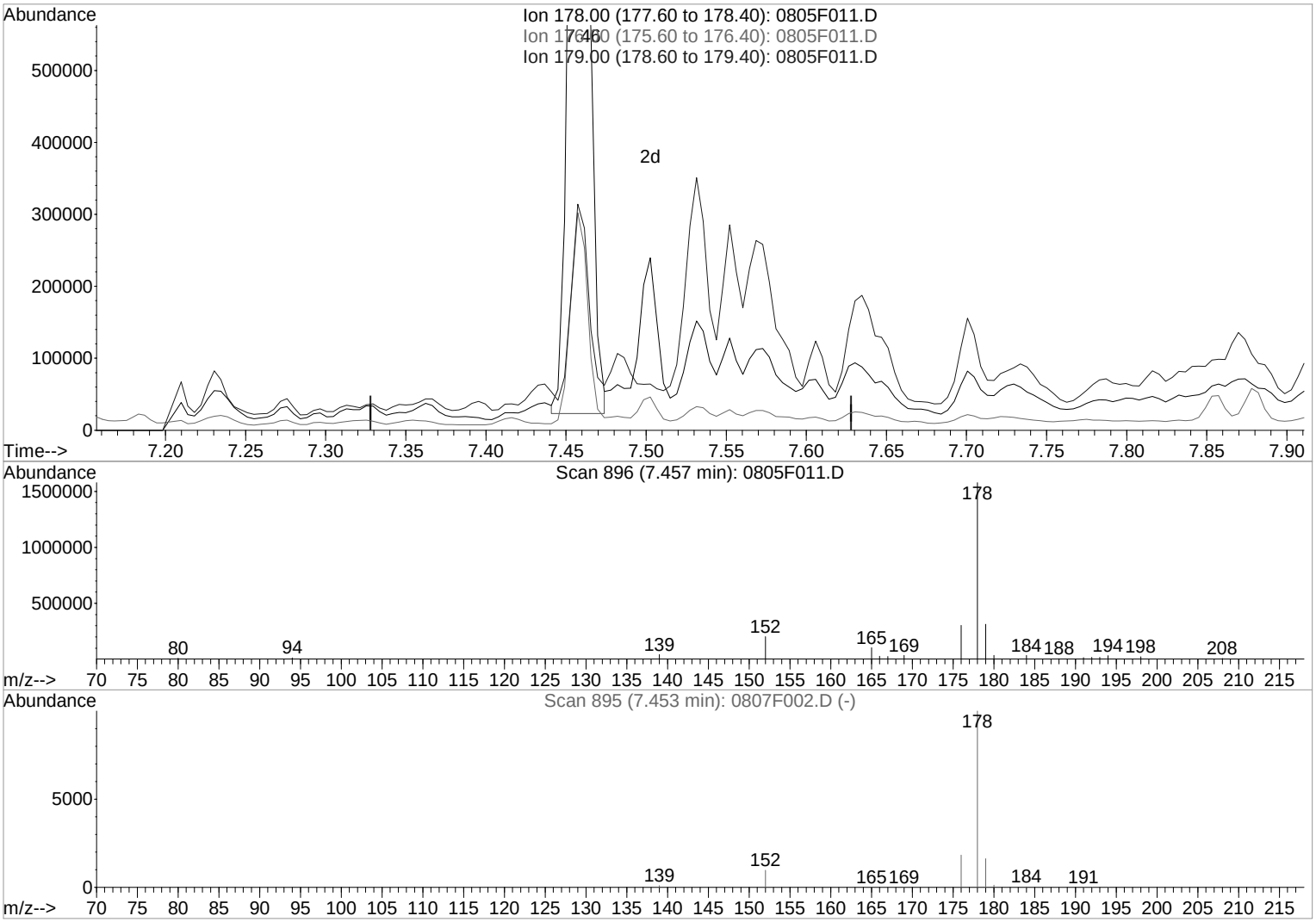
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:12 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(17) Phenanthrene (T)

7.46min 855.19ng/ml m

response 1187176

Ion	Exp%	Act%
178.00	100	100
176.00	17.90	19.14
179.00	16.50	19.89
0.00	0.00	0.00

Manual Integration:

After

BLC

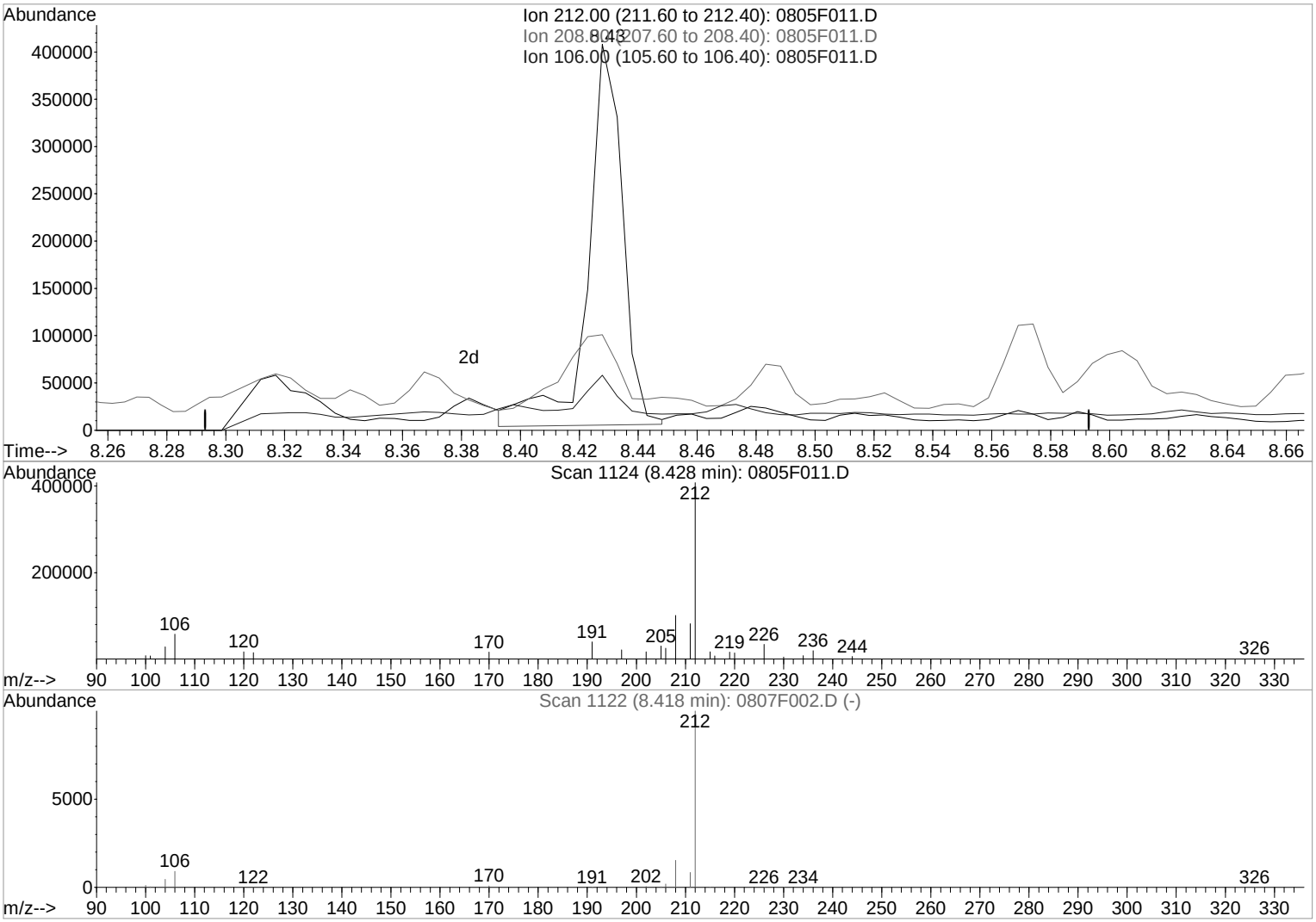
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:12 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(22) Fluoranthene-d10 (S)

8.43min 227.82ng/ml

response 331437

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	20.11
106.00	10.20	10.32
0.00	0.00	0.00

Manual Integration:

Before

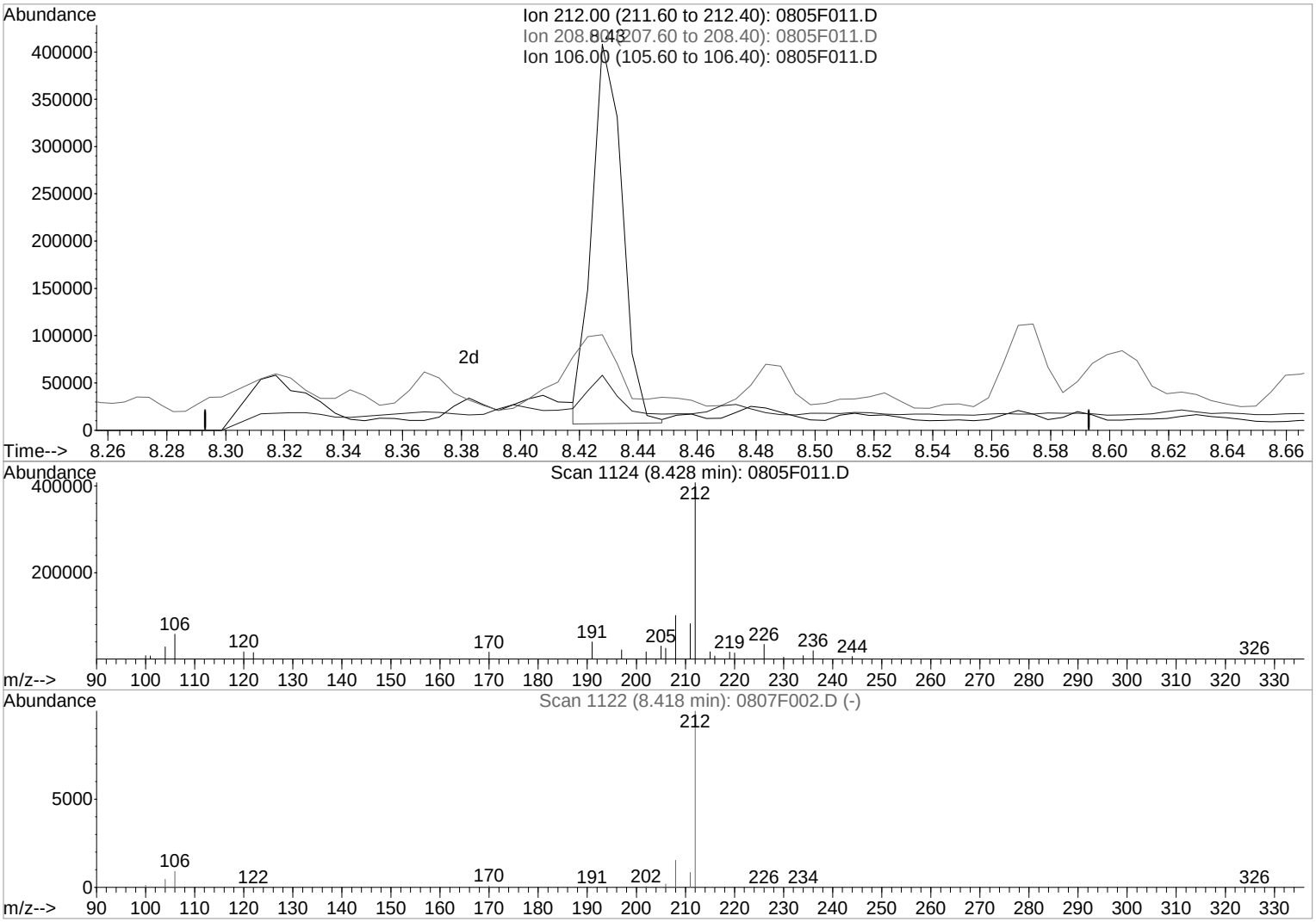
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:12 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(22) Fluoranthene-d10 (S)

8.43min 197.96ng/ml m

response 288003

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	24.75
106.00	10.20	14.24
0.00	0.00	0.00

Manual Integration:

After

BLC

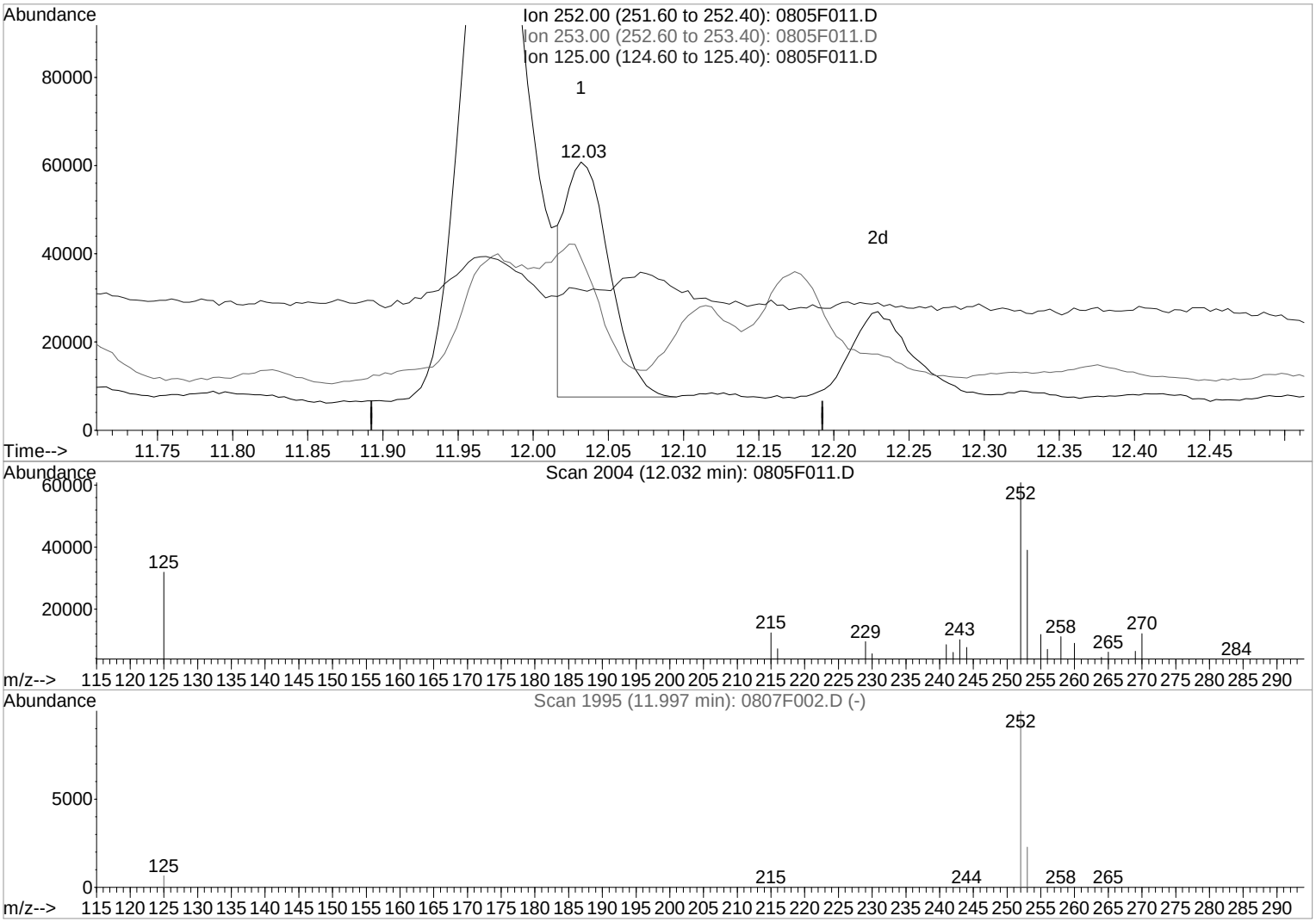
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:12 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(30) Benzo(k)fluoranthene (T)

12.03min 54.94ng/ml

response 110118

Ion	Exp%	Act%
252.00	100	100
253.00	22.70	32.18
125.00	5.90	2.85
0.00	0.00	0.00

Manual Integration:

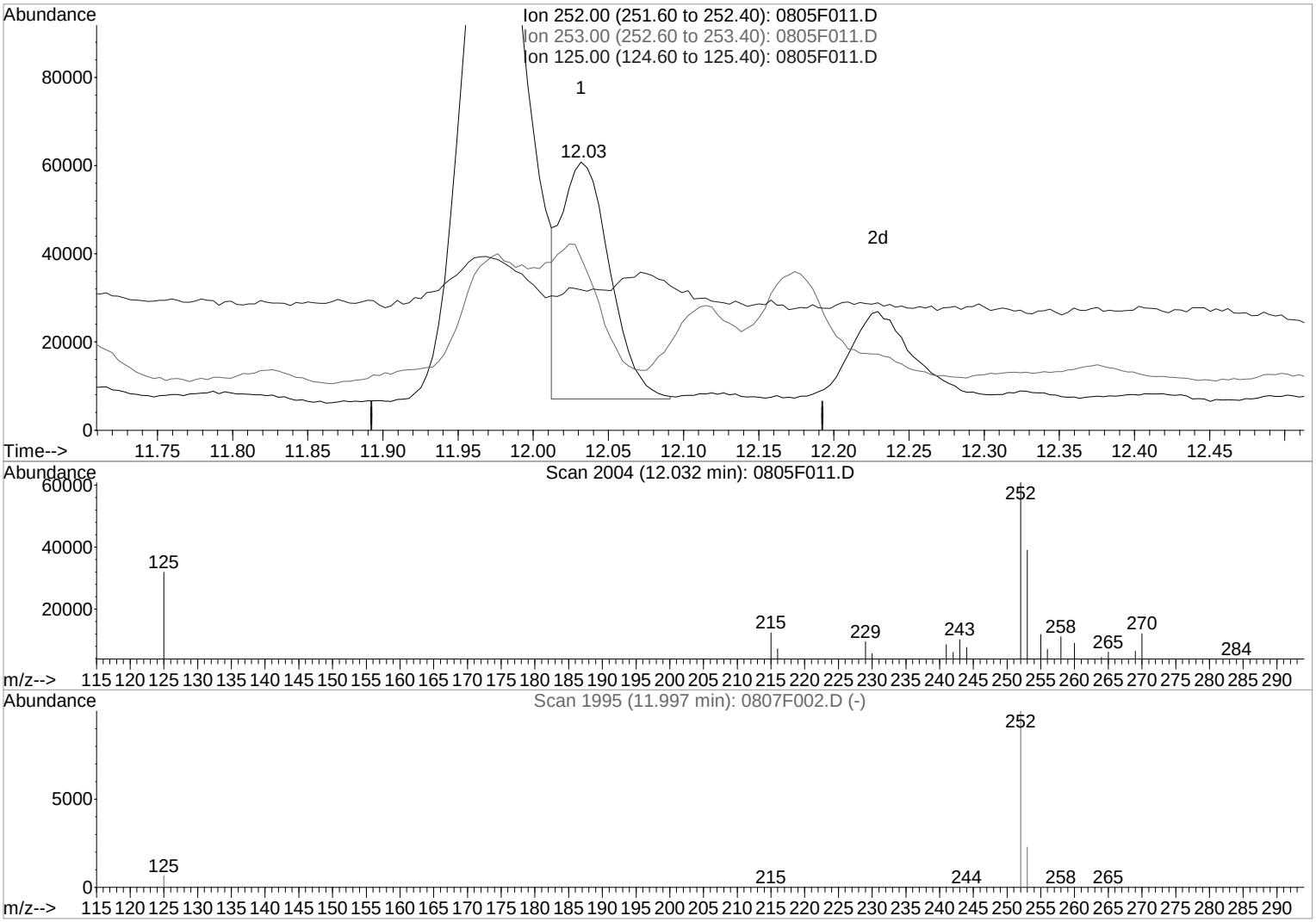
Before

08/08/24

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:13 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(30) Benzo(k)fluoranthene (T)

12.03min 60.51ng/ml m

response 121292

Ion	Exp%	Act%
252.00	100	100
253.00	22.70	64.10#
125.00	5.90	52.34#
0.00	0.00	0.00

Manual Integration:

After

BLC

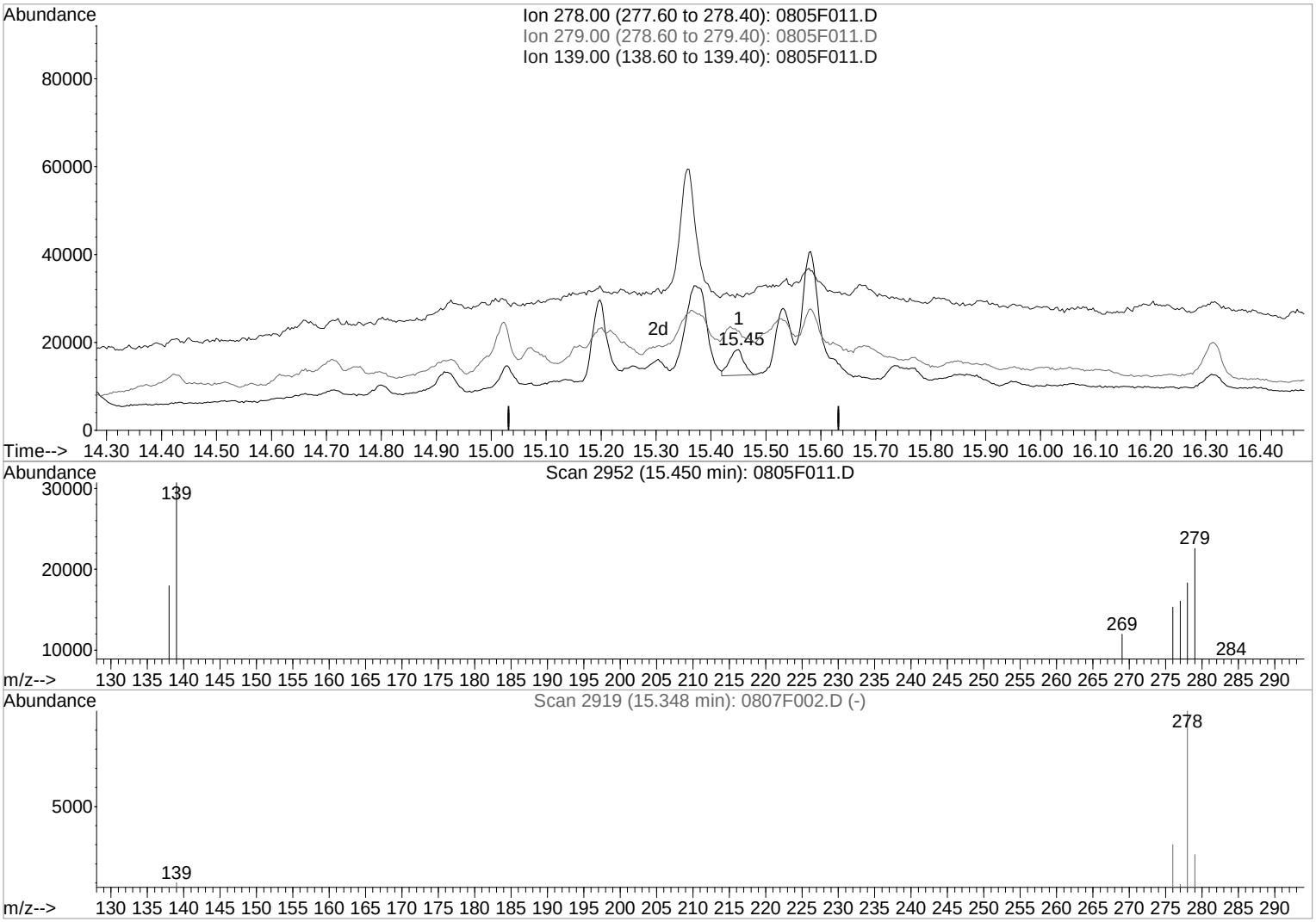
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:13 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(35) Dibenz(a,h)anthracene (T)

15.45min 5.36ng/ml

response 10679

Ion	Exp%	Act%
278.00	100	100
279.00	25.20	46.04
139.00	10.40	3.80
0.00	0.00	0.00

Manual Integration:

Before

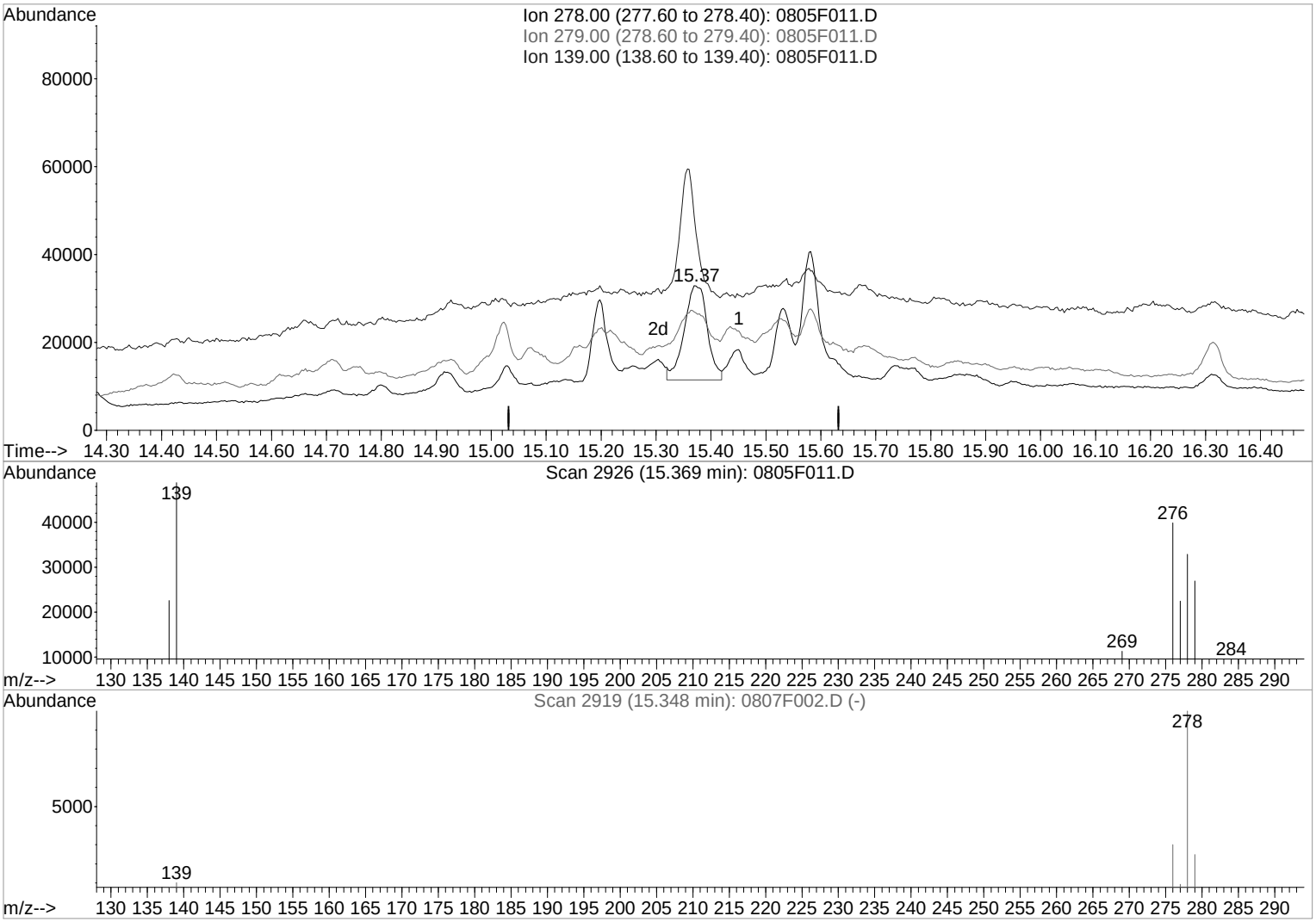
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F011.D Vial: 11
Acq On : 5 Aug 2024 2:14 pm Operator: EBruno
Sample : K2407810-003 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:13 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F011.D

(35) Dibenz(a,h)anthracene (T)

15.37min 31.58ng/ml m

response 62860

Ion	Exp%	Act%
278.00	100	100
279.00	25.20	81.90#
139.00	10.40	148.61#
0.00	0.00	0.00

Manual Integration:

After

WP

08/08/24

1st 08/08/24
2nd 08/08/24

Validation Report

Data File: J:\MS14\DATA\080524\0805F012.D\
Lab ID: K2407810-004
RunType: N/A
Matrix: Sediment

Date Acquired: 8/5/24 14:40:00
Batch ID: 849989
Analysis Method: 8270D/PAH SIM

Validations

Validation Categories	Pass	Fail
Preparation Hold Time		X
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery		X
Lab Control Sample Recovery	X	
Method Blank	X	
Method Blank Surrogates	X	
Internal Standards	X	
Surrogates		X
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level		X

Sample Exceptions

Exception Categories	Result	Corrective Action
Preparation Hold Time	Prep Date/Time: 08/01/2024 1240 Hold Date/Time: 08/09/2022 2359	Frozen Sample Used

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Continuing Calibration Recovery	Benzo(a)pyrene	22		20	OK, <40
Surrogates	Fluoranthene-d10	115	28	112	See Dilution
Above Highest ICAL Level	Benz(a)anthracene	2633.92		2000	
	Benzo(a)pyrene	2455.82		2000	
	Benzo(b)fluoranthene	2909.83		2000	
	Chrysene	2977.54		2000	
	Fluoranthene	4974.70		2000	
	Phenanthrene	4713.41		2000	
	Pyrene	4906.10		2000	

Primary Review: _____

Secondary Review: _____

Printed: 8/8/24 11:23
\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

1st 08/08/24
2nd 08/08/24

Quantitation Report

Data File:	J:\MS14\DATA\080524\0805F012.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 14:40:00	**Vial:**	10
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-004	**Raw Units:**	ng/mL

Bottle ID:	K2407810-004.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	PAH SIM	**Collect Date:**	7/26/22	**Receive Date:**	7/27/22

Analysis Lot:	849989	**Prep Lot:**	442452	**Report Group:**	K2407810
Analysis	8270D	**Prep Method:**	EPA 3546		
		Prep Date:	8/1/24		

Title:	Polycyclic Aromatic Hydrocarbons by GC/MS SIM	**Calibration ID:**	KC2400163
		Report List ID:	18909

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Acenaphthene-d10	6.19	+0.01	125663	200.00	OK
Chrysene-d12	9.96	+0.04	280445	200.00	OK
Naphthalene-d8	4.57		226502	200.00	OK
Perylene-d12	13.06	+0.14	329316	200.00	OK
Phenanthrene-d10	7.45	+0.02	258885	200.00	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec		% Rec Criteria	Rpt?
Fluoranthene-d10	8.44	+0.03	324508	229.09	115	*	28 - 112	N
Fluorene-d10	6.63	+0.01	139475	192.86	96		34 - 106	Y
Terphenyl-d14	8.78	+0.03	259352	167.35	84		32 - 122	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
2-Methylnaphthalene	5.27		155808	221.07	350		Y
Acenaphthene	6.22	+0.01	297809	414.74	650		Y
Acenaphthylene	6.08	+0.01	168417	150.68	240		Y
Anthracene	7.51	+0.02	1078247	856.44	1300		Y
Benz(a)anthracene	9.94	+0.04	4805624	2633.92	4100	E	N
Benzo(a)pyrene	12.90	+0.13	4139001	2455.82	3800	E	N
Benzo(b)fluoranthene	12.02	+0.11	6143210	2909.83	4600	E	N
Benzo(g,h,i)perylene	15.77	+0.10	3085269	1331.08	2100		Y
Benzo(k)fluoranthene	12.08	+0.11	1953147	979.58	1500		Y
Chrysene	10.00	+0.05	5172090	2977.54	4700	E	N
Dibenz(a,h)anthracene	15.41	+0.08	885579	447.28	700		Y
Fluoranthene	8.46	+0.03	7728722	4974.70	7800	E	N
Fluorene	6.66	+0.01	661472	801.34	1300		Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23
\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

1st 08/08/24

2nd 08/08/24

Data File:	J:\MS14\DATA\080524\0805F012.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 14:40:00	**Vial:**	10
Run Type:	N/A	**Dilution:**	1
Lab ID:	K2407810-004	**Raw Units:**	ng/mL

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Indeno(1,2,3-cd)pyrene	15.38	+0.09	2813701	1606.48	2500		Y
Naphthalene	4.59	-0.01	127095	117.04	180		Y
Phenanthrene	7.47	+0.02	6370618	4713.41	7400	E	N
Pyrene	8.65	+0.03	8904452	4906.10	7700	E	N

Prep Amount:	10.614 g	**Dilution:**	1
Prep Final Amount:	10.00 mL	**Basis Factor:**	60.20

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23

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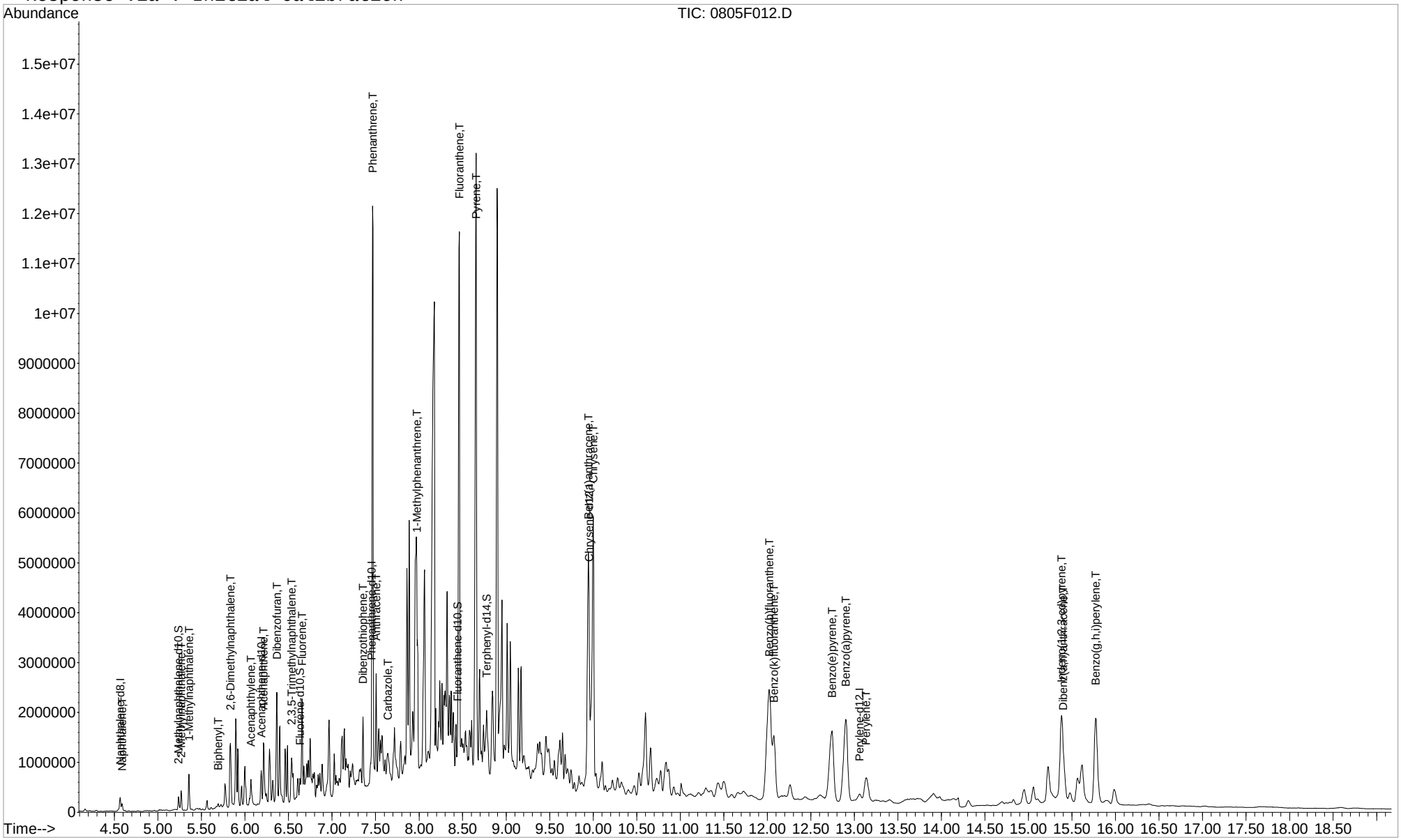
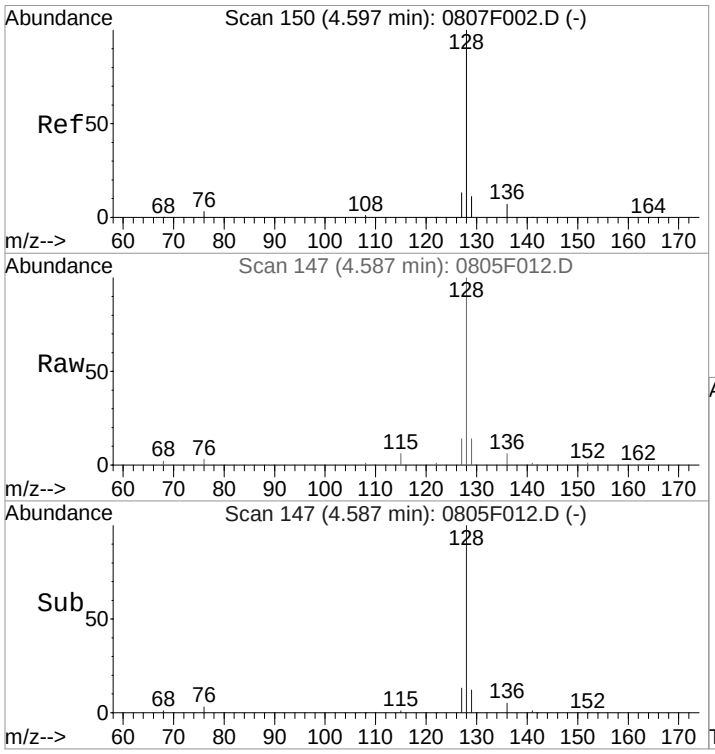
1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:19 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration



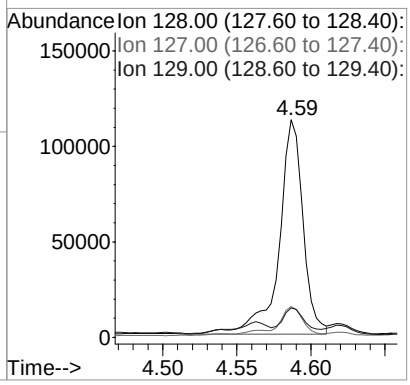
1st 08/08/24
2nd 08/08/24

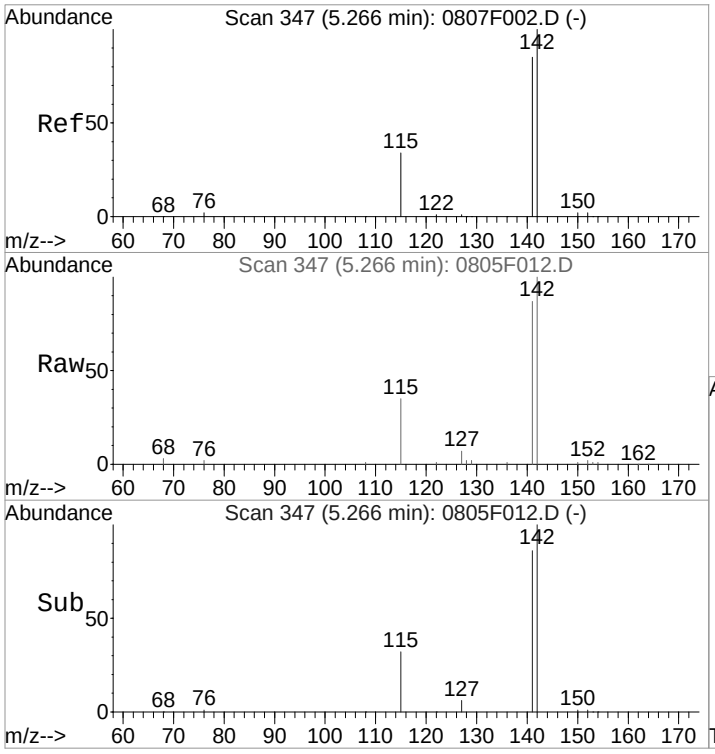


#2
Naphthalene
Concen: 117.04 ng/ml
RT: 4.59 min Scan# 147
Delta R.T. -0.05 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:128 Resp: 127095

Ion	Ratio	Lower	Upper
128	100		
127	13.3	0.0	42.8
129	12.0	0.0	41.5

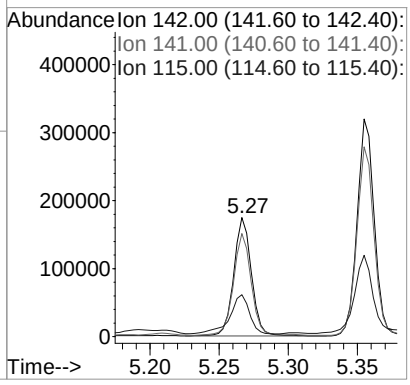


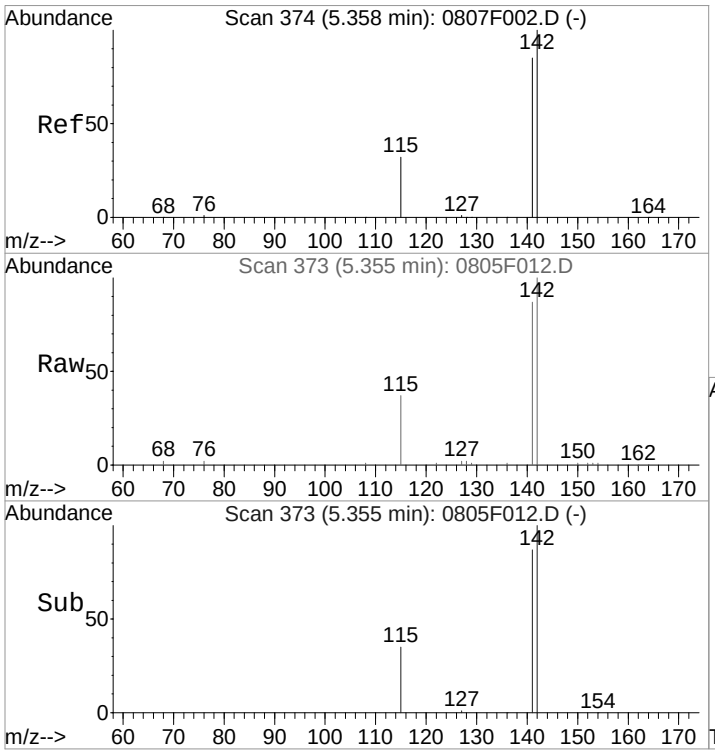


#4
2-Methylnaphthalene
Concen: 221.07 ng/ml
RT: 5.27 min Scan# 347
Delta R.T. -0.03 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:142 Resp: 155808

Ion	Ratio	Lower	Upper
142	100		
141	85.9	52.1	112.1
115	32.9	1.0	61.0

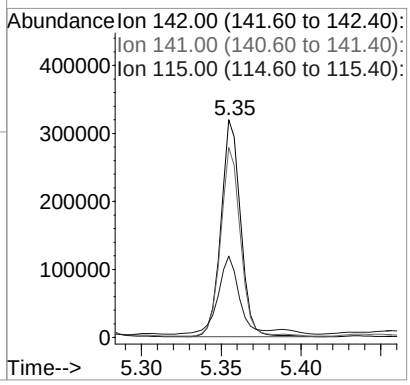


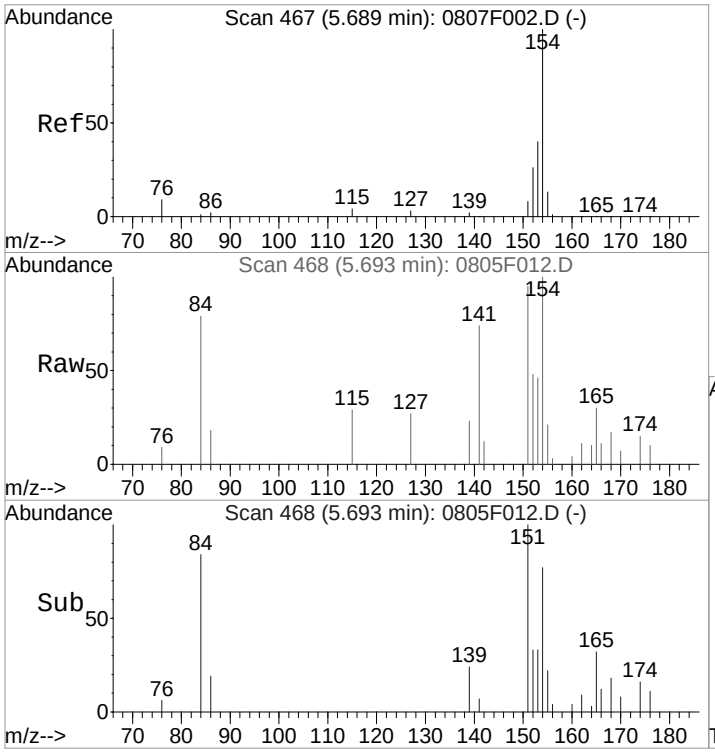


#5
1-Methylnaphthalene
Concen: 416.26 ng/ml
RT: 5.35 min Scan# 373
Delta R.T. -0.03 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:142 Resp: 276112

Ion	Ratio	Lower	Upper
142	100		
141	86.9	55.8	115.8
115	35.9	1.9	61.9

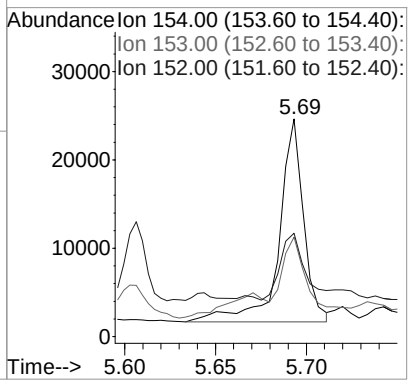




#6
Biphenyl
Concen: 25.54 ng/ml
RT: 5.69 min Scan# 468
Delta R.T. -0.03 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:154 Resp: 21890

Ion	Ratio	Lower	Upper
154	100		
153	39.5	8.6	68.6
152	33.2	0.0	55.8



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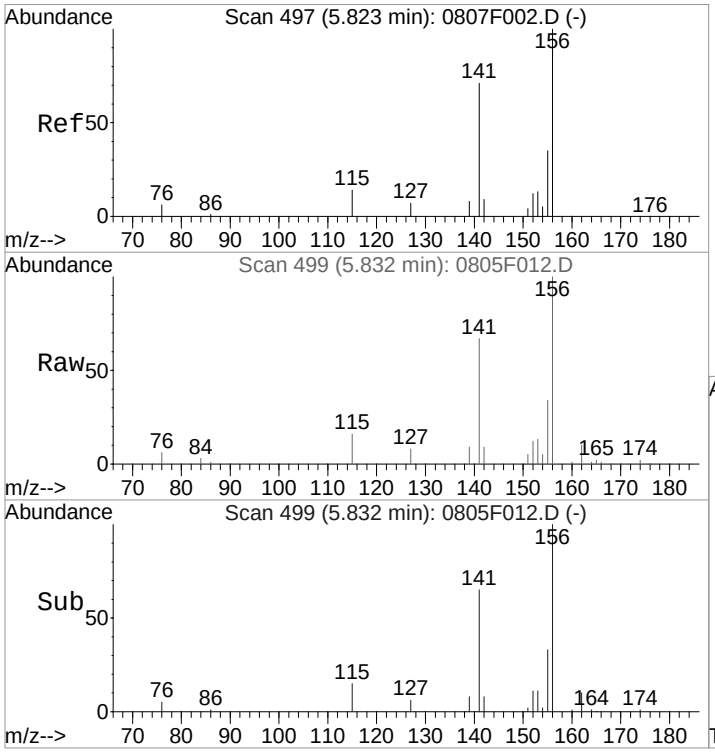
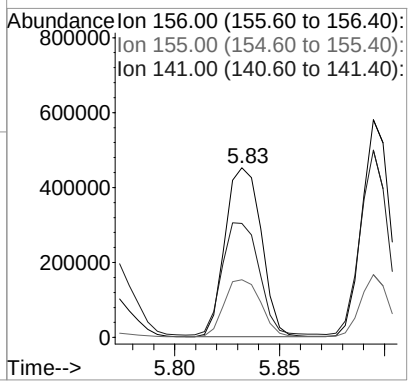
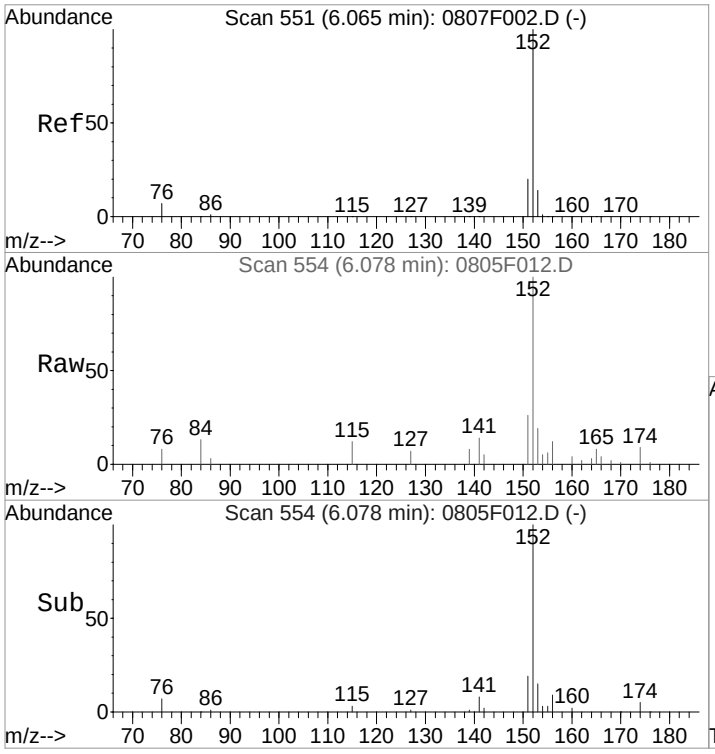


#7
2,6-Dimethylnaphthalene
Concen: 893.13 ng/ml
RT: 5.83 min Scan# 499
Delta R.T. -0.02 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:156 Resp: 542041

Ion	Ratio	Lower	Upper
156	100		
155	33.7	4.7	64.7
141	66.0	39.2	99.2

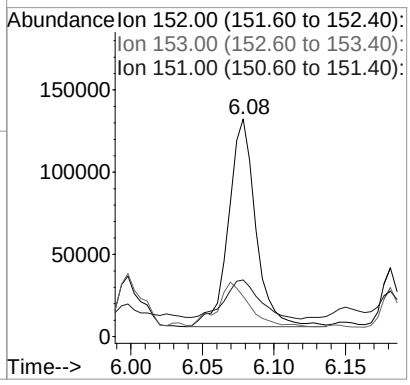




#9
Acenaphthylene
Concen: 150.68 ng/ml
RT: 6.08 min Scan# 554
Delta R.T. -0.01 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:152 Resp: 168417

Ion	Ratio	Lower	Upper
152	100		
153	14.4	0.0	44.2
151	18.1	0.0	49.6



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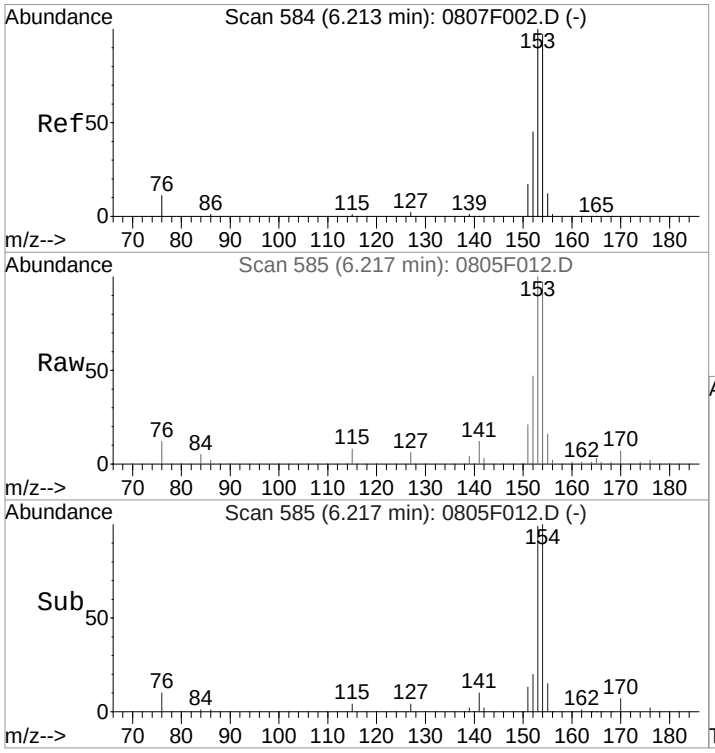
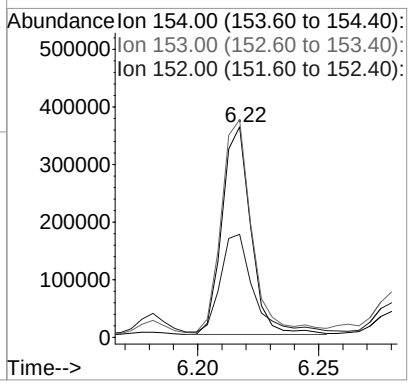
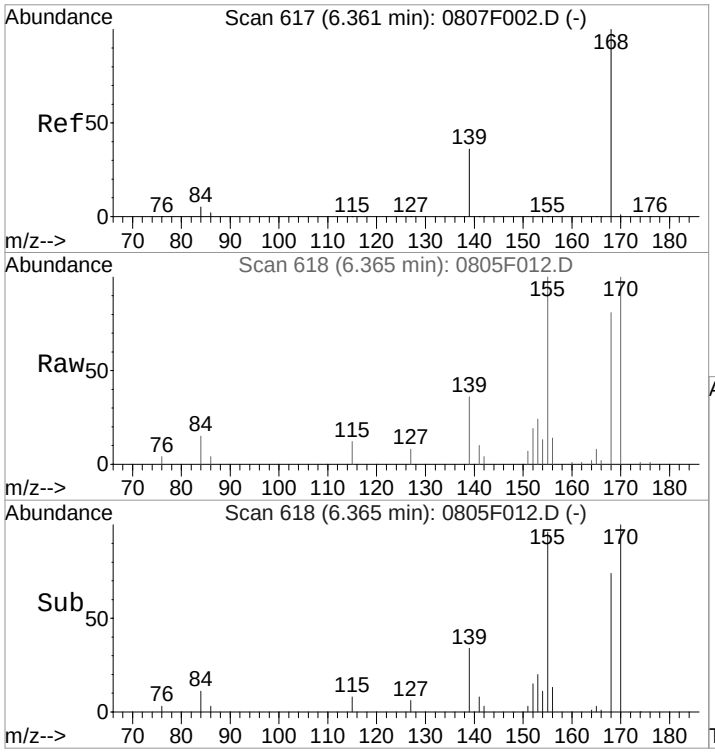


#10
Acenaphthene
Concen: 414.74 ng/ml
RT: 6.22 min Scan# 585
Delta R.T. -0.02 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:154 Resp: 297809

Ion	Ratio	Lower	Upper
154	100		
153	102.3	75.0	135.0
152	46.9	19.6	79.6

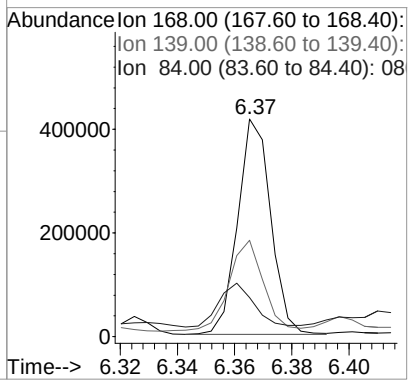




#11
Dibenzofuran
Concen: 314.07 ng/ml
RT: 6.37 min Scan# 618
Delta R.T. -0.02 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:168 Resp: 334248

Ion	Ratio	Lower	Upper
168	100		
139	41.8	0.0	59.2
84	13.7	0.0	34.2



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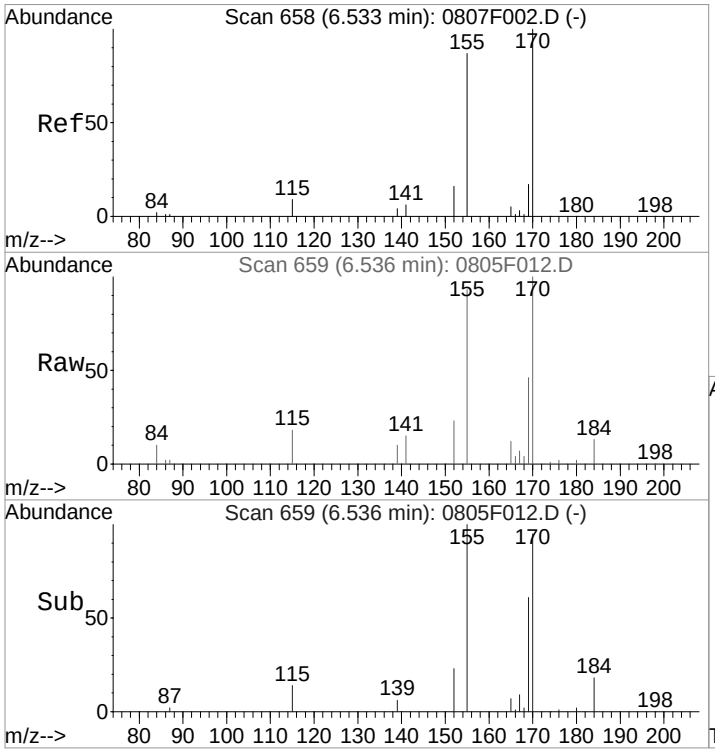
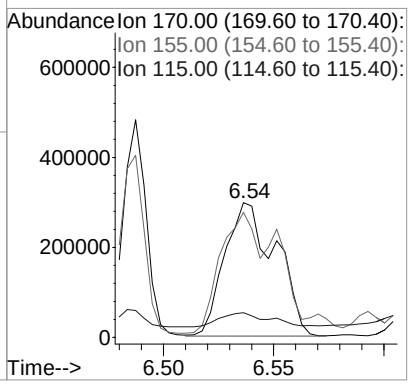
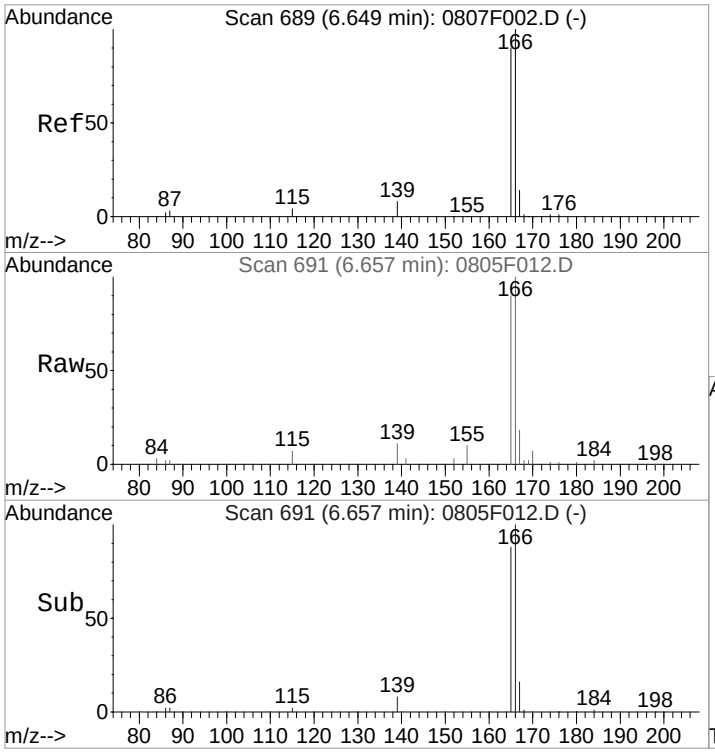


#12
2,3,5-Trimethylnaphthalene
Concen: 710.83 ng/ml
RT: 6.54 min Scan# 659
Delta R.T. -0.02 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:170 Resp: 478004

Ion	Ratio	Lower	Upper
170	100		
155	90.8	52.5	112.5
115	10.5	0.0	38.1

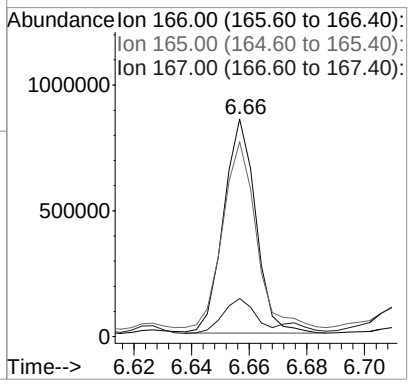


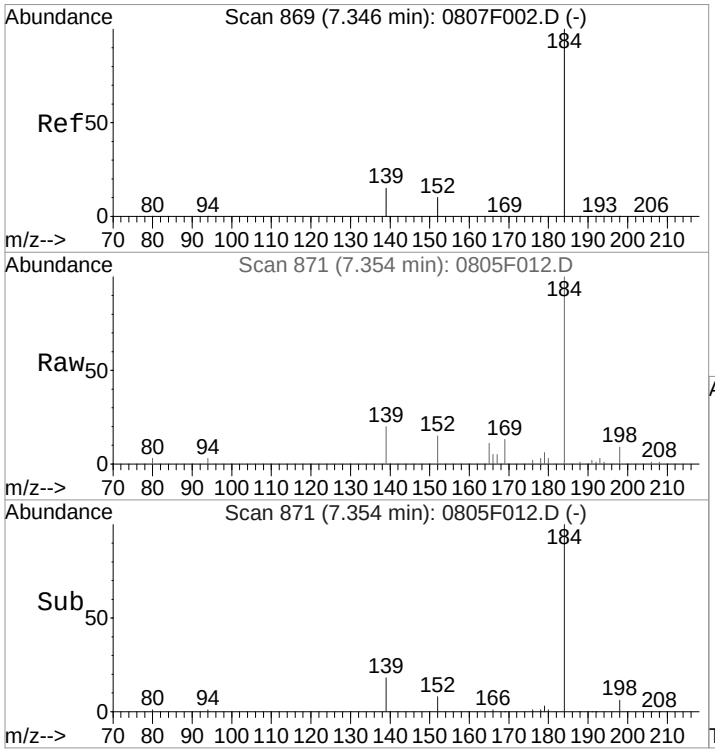


#14
Fluorene
Concen: 801.34 ng/ml
RT: 6.66 min Scan# 691
Delta R.T. -0.02 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:166 Resp: 661472

Ion	Ratio	Lower	Upper
166	100		
165	86.9	56.8	116.8
167	16.2	0.0	44.0

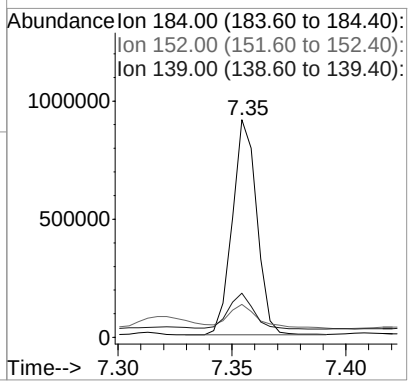


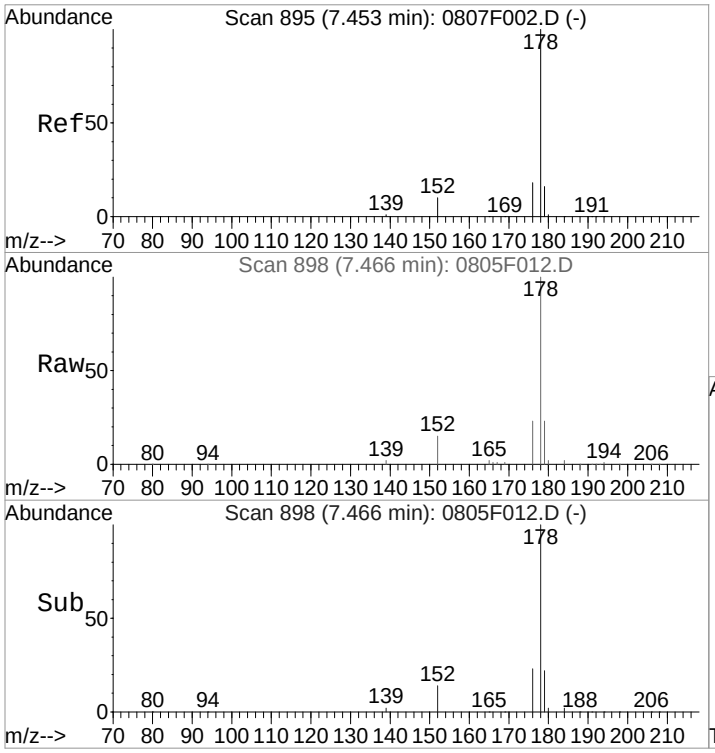


#16
Dibenzothiophene
Concen: 524.31 ng/ml
RT: 7.35 min Scan# 871
Delta R.T. -0.02 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:184 Resp: 681659

Ion	Ratio	Lower	Upper
184	100		
152	11.0	0.0	40.4
139	16.7	0.0	44.9

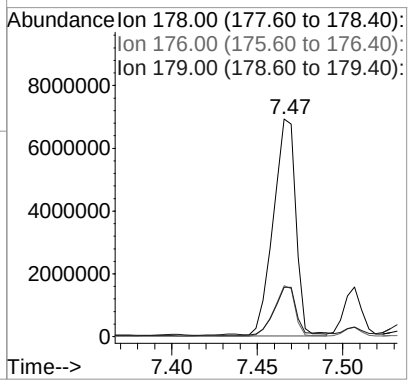




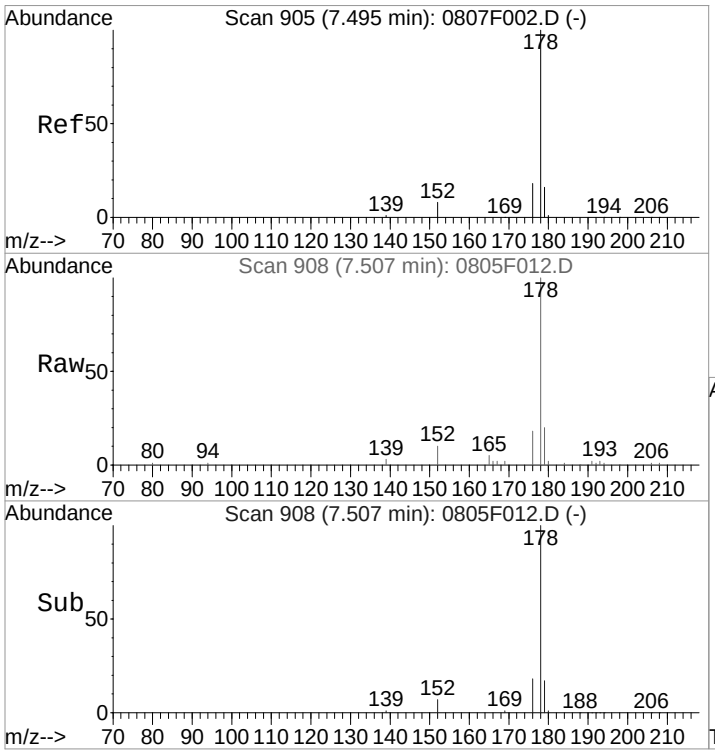
#17
Phenanthrene
Concen: 4713.41 ng/ml
RT: 7.47 min Scan# 898
Delta R.T. -0.01 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:178 Resp: 6370618

Ion	Ratio	Lower	Upper
178	100		
176	23.4	0.0	47.9
179	21.9	0.0	46.5



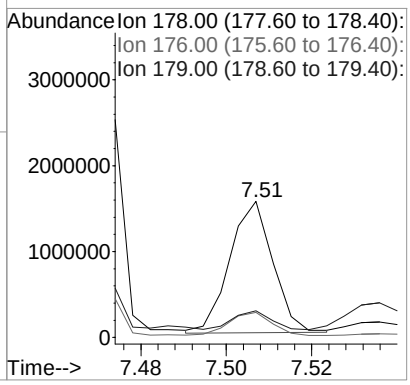
1st 08/08/24
2nd 08/08/24

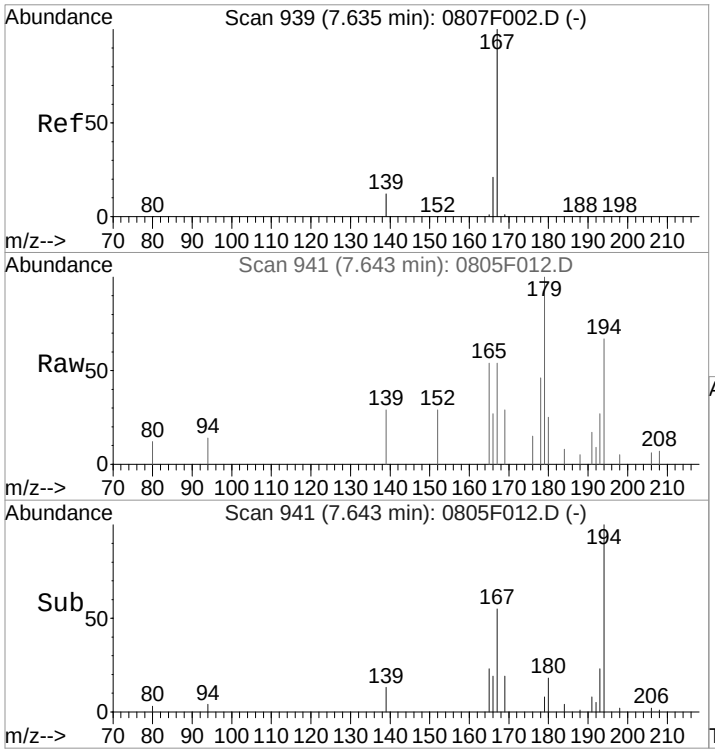


#18
Anthracene
Concen: 856.44 ng/ml
RT: 7.51 min Scan# 908
Delta R.T. -0.01 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:178 Resp: 1078247

Ion	Ratio	Lower	Upper
178	100		
176	18.0	0.0	47.8
179	12.8	0.0	46.9

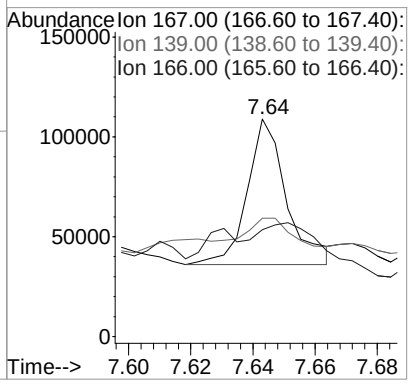




#19
Carbazole
Concen: 53.93 ng/ml
RT: 7.64 min Scan# 941
Delta R.T. -0.02 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:167 Resp: 64130

Ion	Ratio	Lower	Upper
167	100		
139	19.5	0.0	42.5
166	20.0	0.0	50.6



1st 08/08/24
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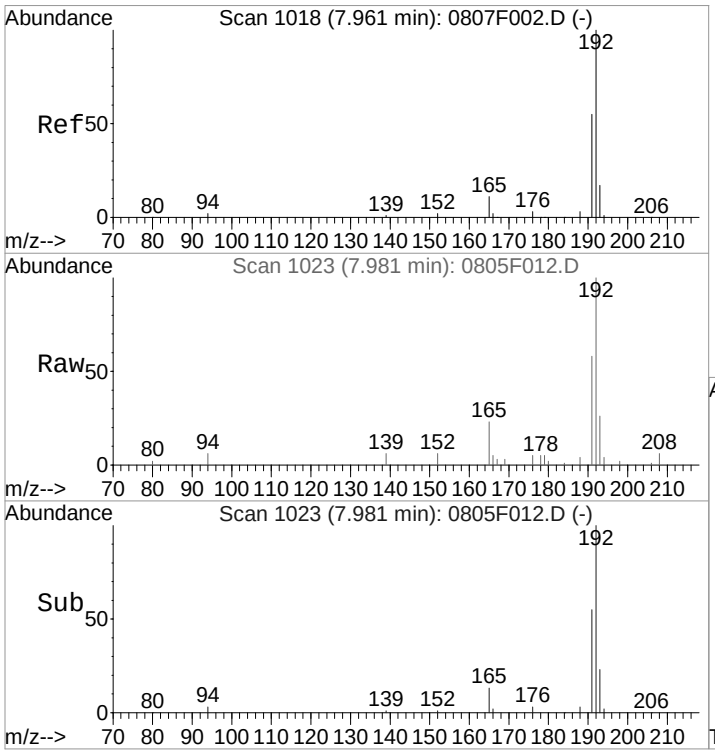
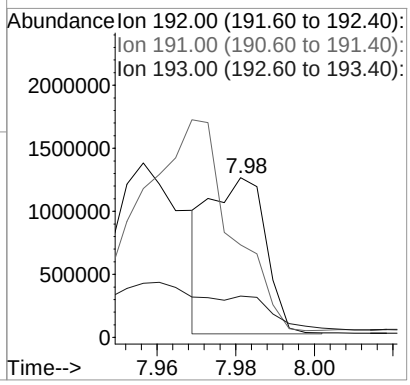
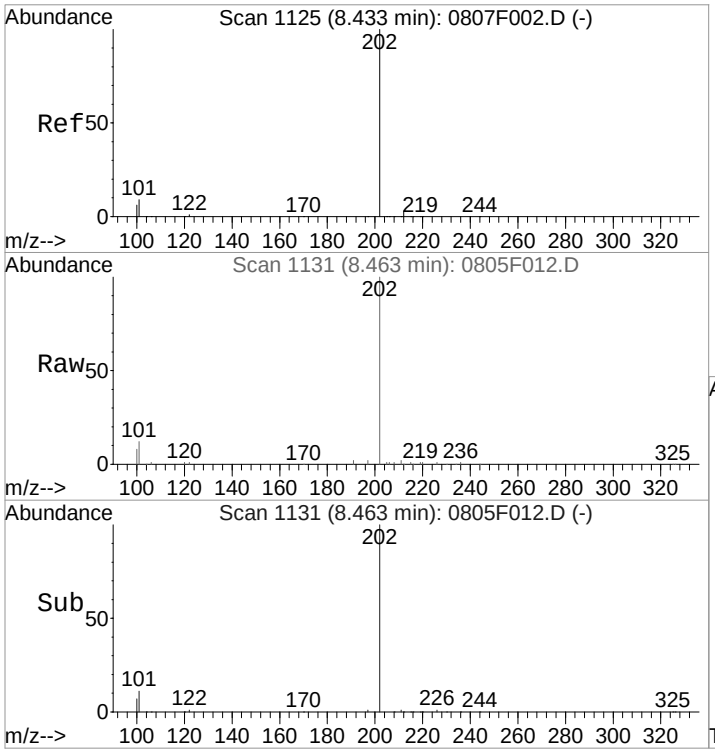


#20
1-Methylphenanthrene
Concen: 1231.46 ng/ml m
RT: 7.98 min Scan# 1023
Delta R.T. -0.00 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:192 Resp: 1238136

Ion	Ratio	Lower	Upper
192	100		
191	57.8	22.7	82.7
193	25.9	0.0	47.5

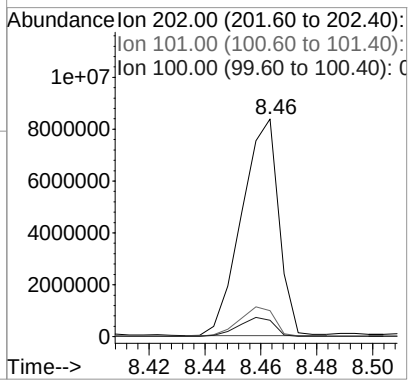


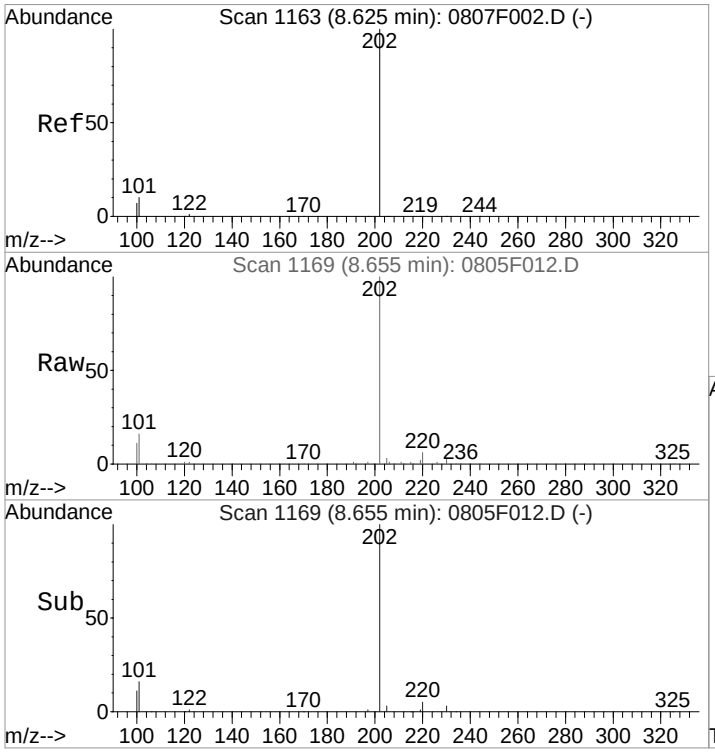


#21
Fluoranthene
Concen: 4974.70 ng/ml
RT: 8.46 min Scan# 1131
Delta R.T. 0.00 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:202 Resp: 7728722

Ion	Ratio	Lower	Upper
202	100		
101	11.9	0.0	36.9
100	7.5	0.0	34.3

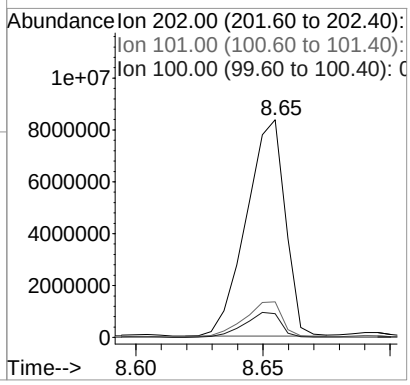


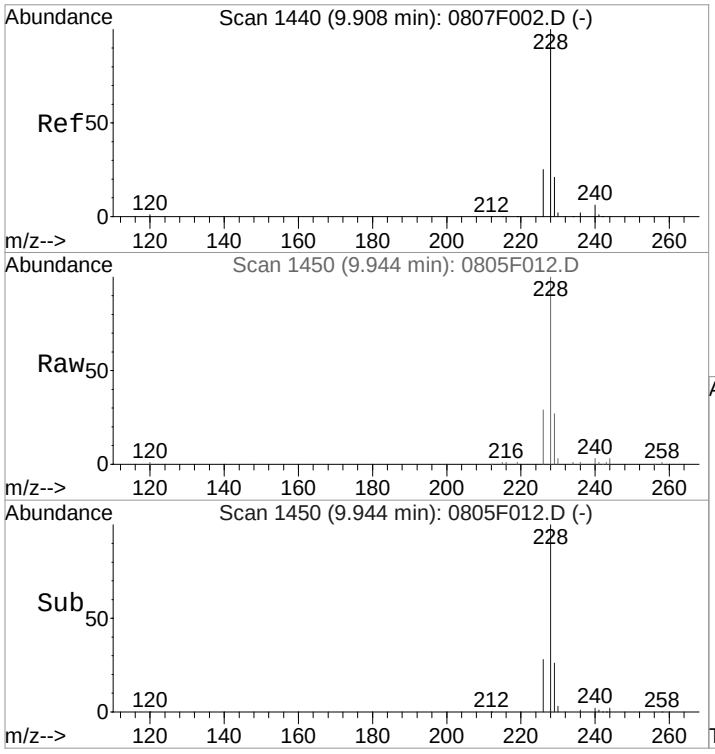


#24
Pyrene
Concen: 4906.10 ng/ml
RT: 8.65 min Scan# 1169
Delta R.T. 0.01 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:202 Resp: 8904452

Ion	Ratio	Lower	Upper
202	100		
101	16.2	0.0	41.8
100	10.9	0.0	37.9

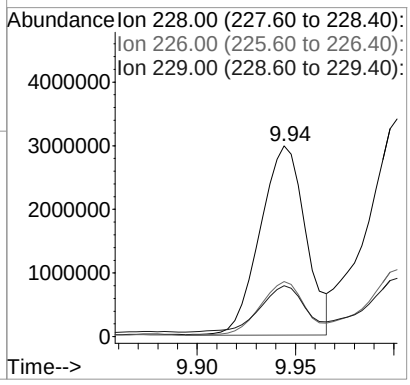


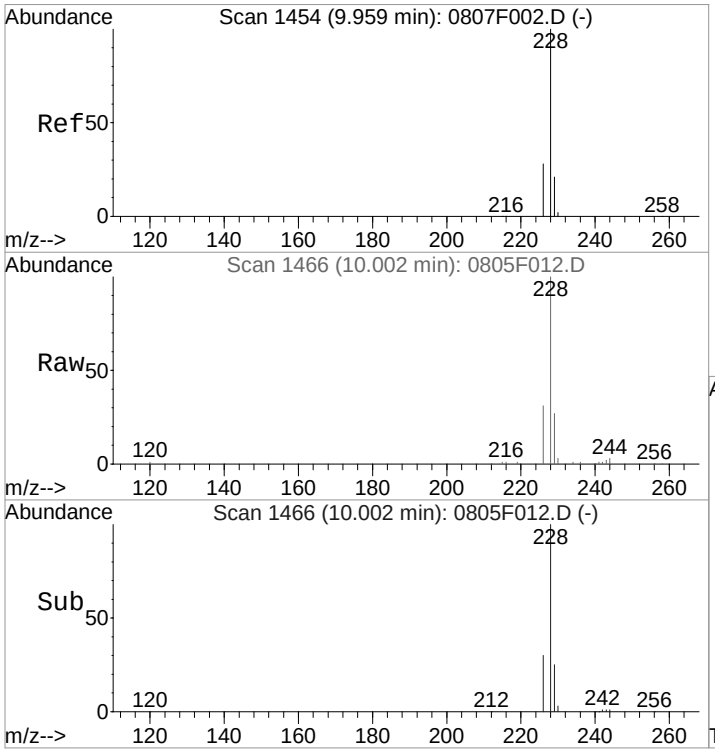


#26
Benz(a)anthracene
Concen: 2633.92 ng/ml
RT: 9.94 min Scan# 1450
Delta R.T. -0.01 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:228 Resp: 4805624

Ion	Ratio	Lower	Upper
228	100		
226	28.4	0.0	54.6
229	24.7	0.0	50.6

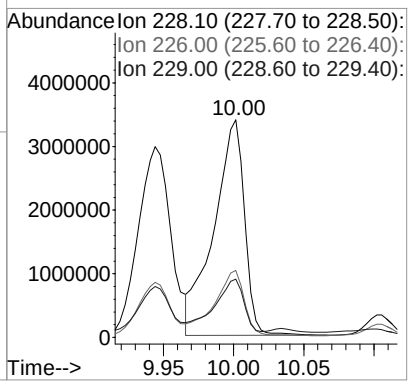


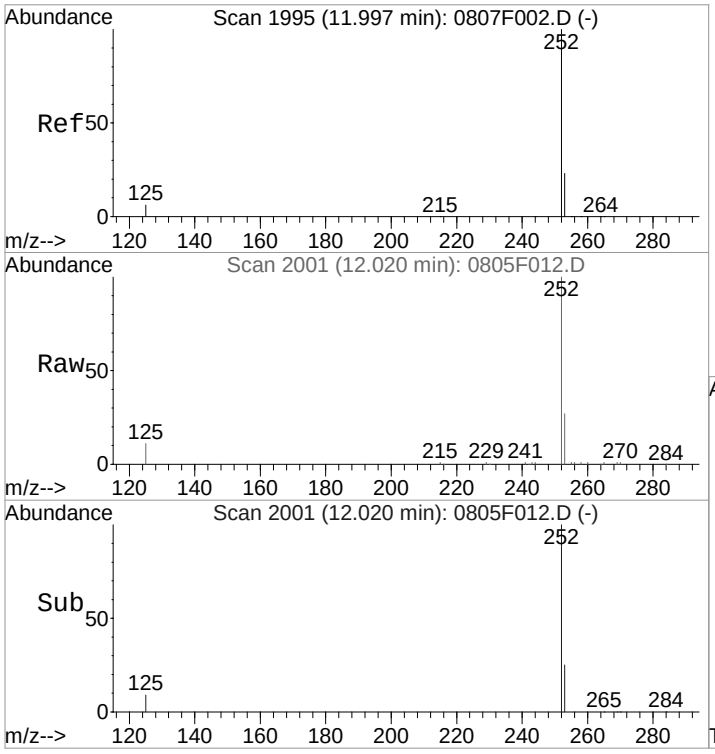


#27
Chrysene
Concen: 2977.54 ng/ml
RT: 10.00 min Scan# 1466
Delta R.T. 0.00 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:228 Resp: 5172090

Ion	Ratio	Lower	Upper
228	100		
226	30.3	0.0	57.3
229	24.6	0.0	50.7

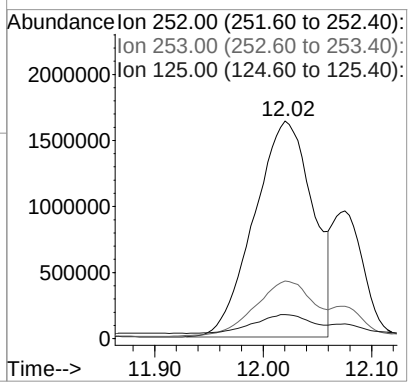


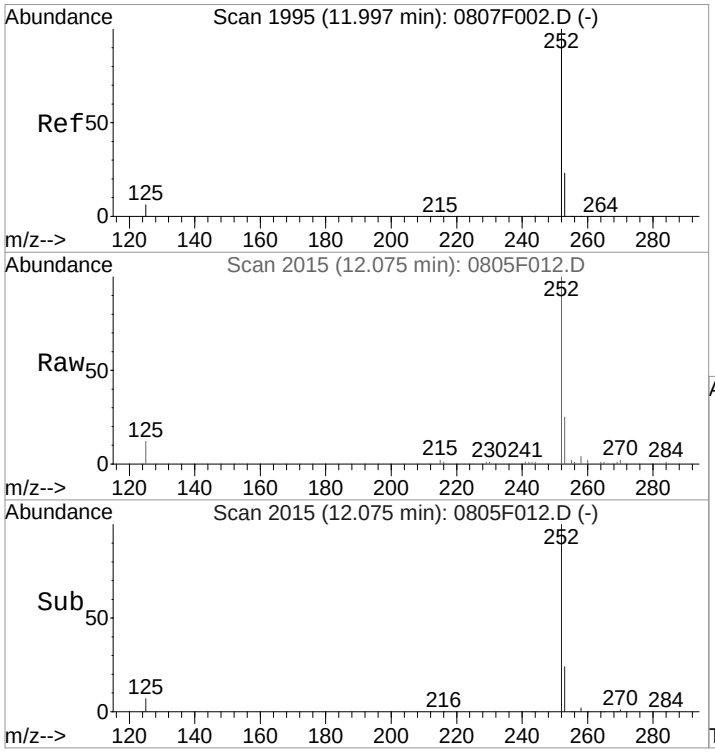


#29
Benzo(b)fluoranthene
Concen: 2909.83 ng/ml m
RT: 12.02 min Scan# 2001
Delta R.T. 0.09 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:252 Resp: 6143210

Ion	Ratio	Lower	Upper
252	100		
253	26.5	0.0	52.5
125	11.1	0.0	36.1

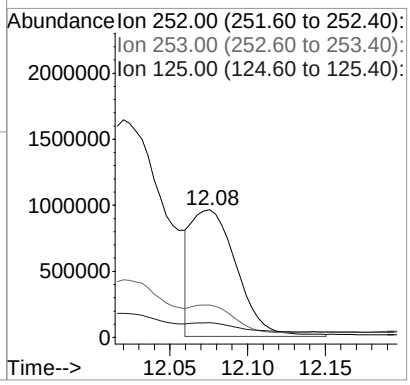


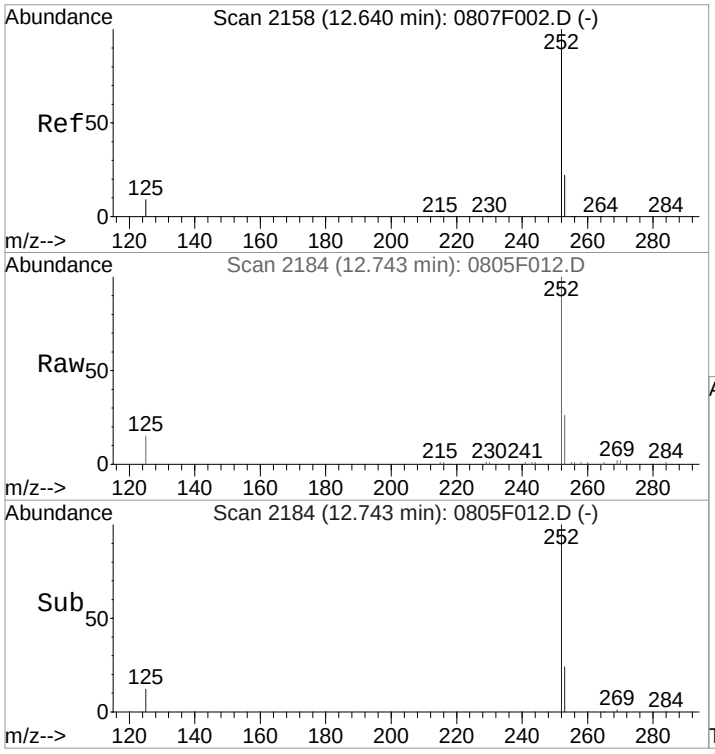


#30
Benzo(k)fluoranthene
Concen: 979.58 ng/ml m
RT: 12.08 min Scan# 2015
Delta R.T. 0.08 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:252 Resp: 1953147

Ion	Ratio	Lower	Upper
252	100		
253	25.4	0.0	52.7
125	11.6	0.0	35.9

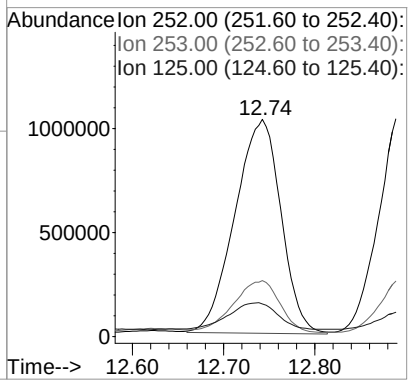


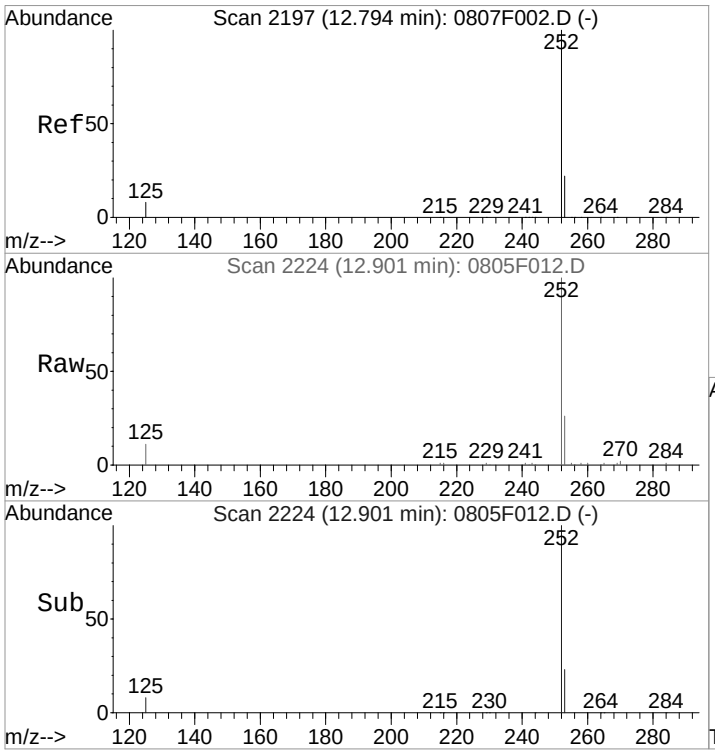


#31
Benzo(e)pyrene
Concen: 1823.87 ng/ml m
RT: 12.74 min Scan# 2184
Delta R.T. 0.11 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:252 Resp: 3607988

Ion	Ratio	Lower	Upper
252	100		
253	25.8	0.0	52.0
125	15.1	0.0	39.2

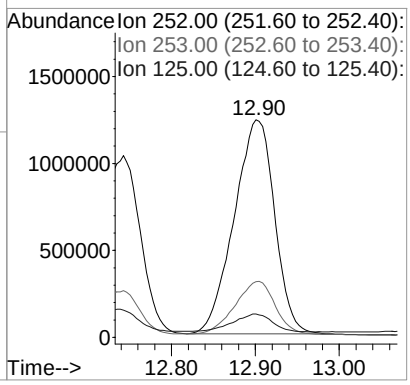


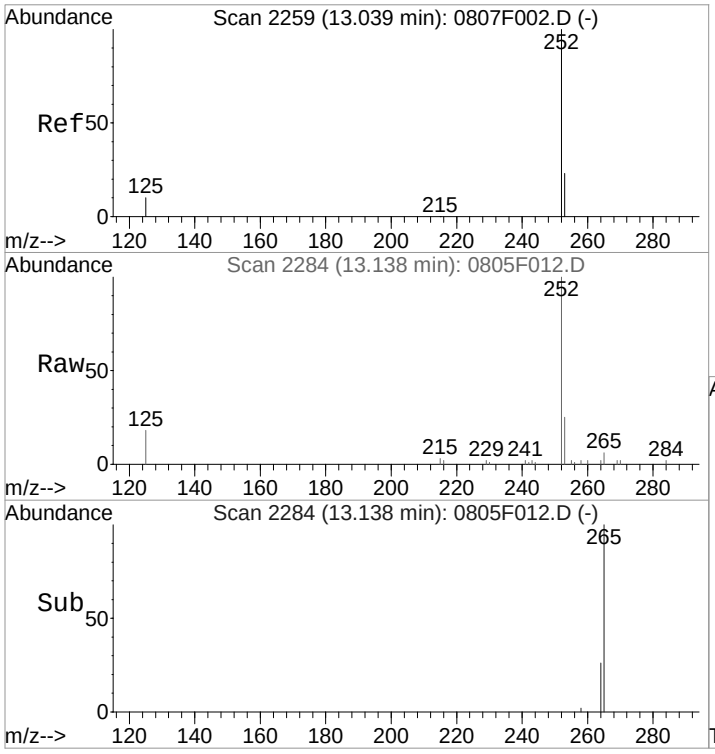


#32
Benzo(a)pyrene
Concen: 2455.82 ng/ml m
RT: 12.90 min Scan# 2224
Delta R.T. 0.12 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:252 Resp: 4139001

Ion	Ratio	Lower	Upper
252	100		
253	25.6	0.0	52.3
125	10.8	0.0	36.9

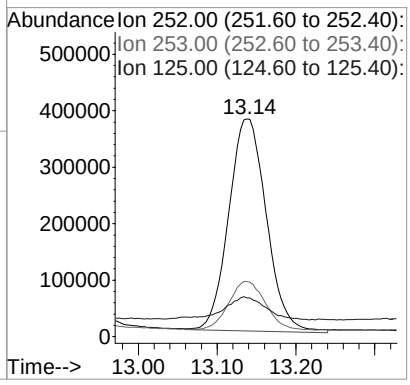


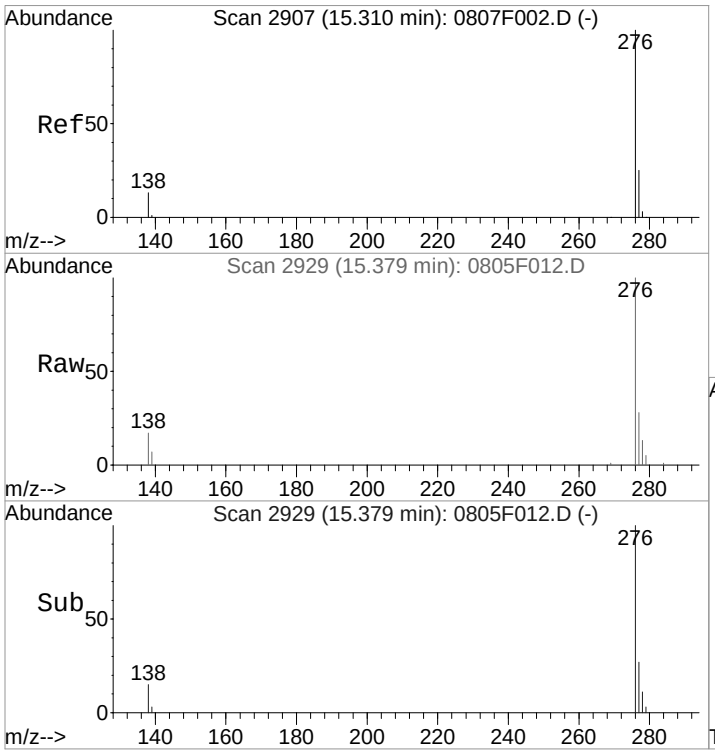


#33
Perylene
Concen: 687.02 ng/ml m
RT: 13.14 min Scan# 2284
Delta R.T. 0.11 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:252 Resp: 1249305

Ion	Ratio	Lower	Upper
252	100		
253	25.3	0.0	52.2
125	17.8	0.0	39.2

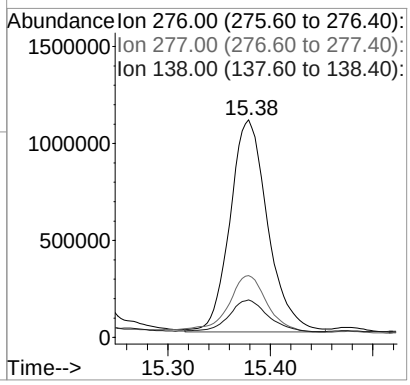


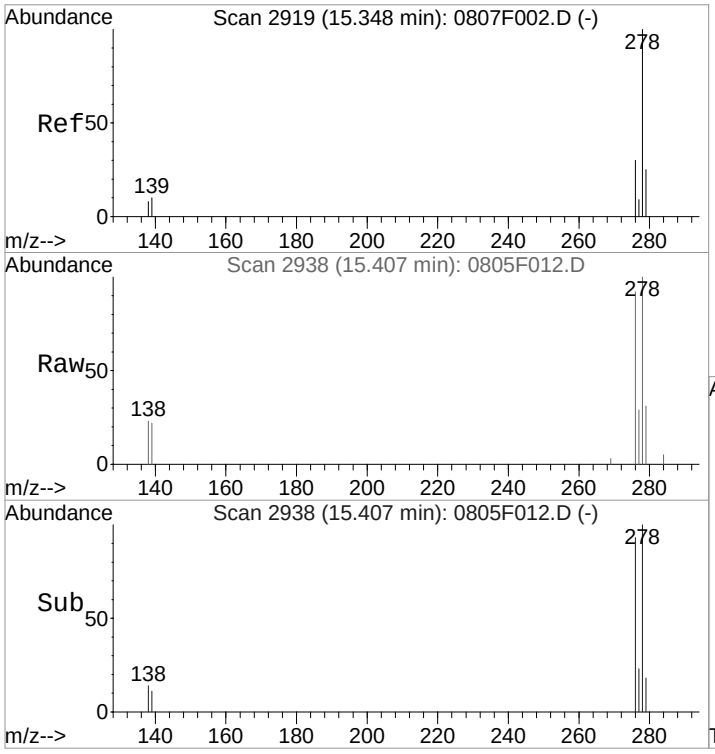


#34
Indeno(1,2,3-cd)pyrene
Concen: 1606.48 ng/ml m
RT: 15.38 min Scan# 2929
Delta R.T. 0.10 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:276 Resp: 2813701

Ion	Ratio	Lower	Upper
276	100		
277	28.5	0.0	55.2
138	17.3	0.0	42.2

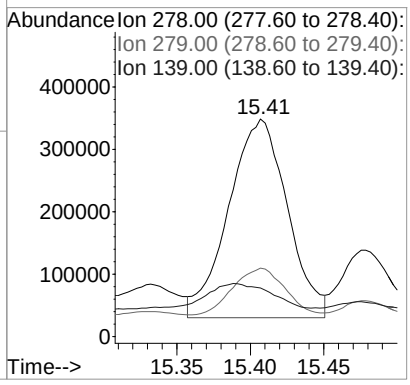


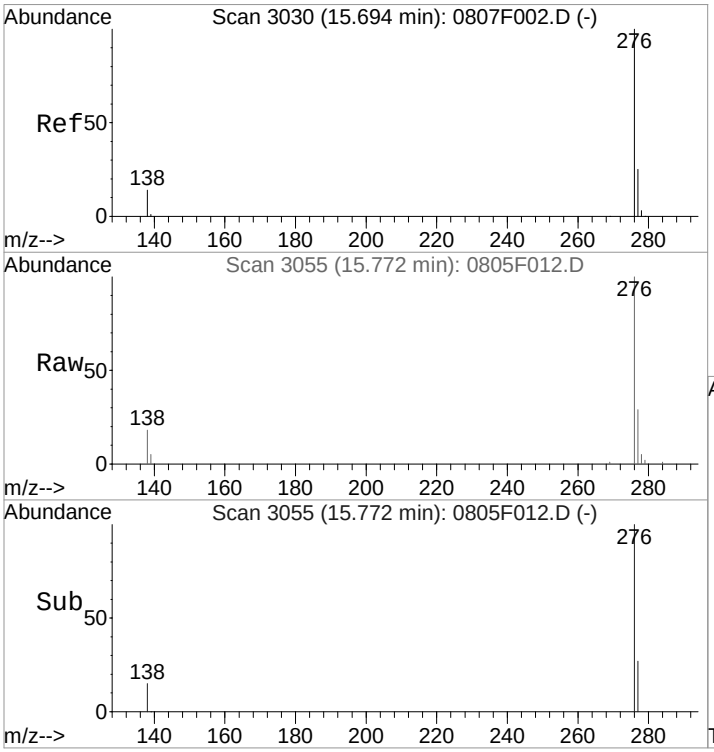


#35
Dibenz(a,h)anthracene
Concen: 447.28 ng/ml m
RT: 15.41 min Scan# 2938
Delta R.T. 0.07 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:278 Resp: 885579

Ion	Ratio	Lower	Upper
278	100		
279	31.4	0.0	55.2
139	22.4	0.0	40.4

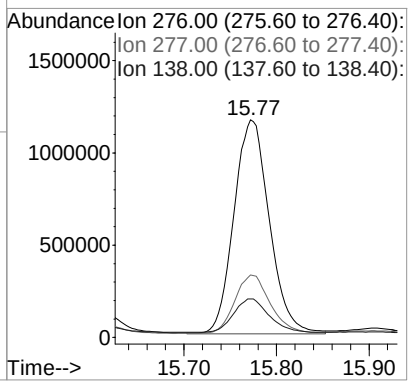




#36
Benzo(g,h,i)perylene
Concen: 1331.08 ng/ml m
RT: 15.77 min Scan# 3055
Delta R.T. 0.11 min
Lab File: 0805F012.D
Acq: 5 Aug 2024 2:40 pm

Tgt Ion:276 Resp: 3085269

Ion	Ratio	Lower	Upper
276	100		
277	28.7	0.0	54.9
138	17.7	0.0	43.8



Quantitation Report (QT Reviewed)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 08 10:16:40 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.57	136	226502	200.00	ng/ml	-0.05
8) Acenaphthene-d10	6.19	164	125663	200.00	ng/ml	-0.02
15) Phenanthrene-d10	7.45	188	258885	200.00	ng/ml	-0.01
23) Chrysene-d12	9.96	240	280445	200.00	ng/ml	0.00
28) Perylene-d12	13.06	264	329316m	200.00	ng/ml	0.11
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.24	152	102364	161.51	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	80.75%		
13) Fluorene-d10	6.63	176	139475	192.86	ng/ml	-0.02
Spiked Amount 200.000			Recovery =	96.43%		
22) Fluoranthene-d10	8.44	212	324508m	229.09	ng/ml	0.00
Spiked Amount 200.000			Recovery =	114.55%		
25) Terphenyl-d14	8.78	244	259352	167.35	ng/ml	-0.02
Spiked Amount 200.000			Recovery =	83.67%		
Target Compounds						Qvalue
2) Naphthalene	4.59	128	127095	117.04	ng/ml	99
4) 2-Methylnaphthalene	5.27	142	155808	221.07	ng/ml	96
5) 1-Methylnaphthalene	5.35	142	276112	416.26	ng/ml	97
6) Biphenyl	5.69	154	21890	25.54	ng/ml	93
7) 2,6-Dimethylnaphthalene	5.83	156	542041	893.13	ng/ml	97
9) Acenaphthylene	6.08	152	168417	150.68	ng/ml	98
10) Acenaphthene	6.22	154	297809	414.74	ng/ml	97
11) Dibenzofuran	6.37	168	334248	314.07	ng/ml	76
12) 2,3,5-Trimethylnaphthalene	6.54	170	478004	710.83	ng/ml	91
14) Fluorene	6.66	166	661472	801.34	ng/ml	99
16) Dibenzothiophene	7.35	184	681659	524.31	ng/ml	97
17) Phenanthrene	7.47	178	6370618	4713.41	ng/ml	87
18) Anthracene	7.51	178	1078247	856.44	ng/ml	95
19) Carbazole	7.64	167	64130	53.93	ng/ml	92
20) 1-Methylphenanthrene	7.98	192	1238136m	1231.46	ng/ml	
21) Fluoranthene	8.46	202	7728722	4974.70	ng/ml	87
24) Pyrene	8.65	202	8904452	4906.10	ng/ml	90
26) Benz(a)anthracene	9.94	228	4805624	2633.92	ng/ml	92
27) Chrysene	10.00	228	5172090	2977.54	ng/ml	93
29) Benzo(b)fluoranthene	12.02	252	6143210m	2909.83	ng/ml	
30) Benzo(k)fluoranthene	12.08	252	1953147m	979.58	ng/ml	
31) Benzo(e)pyrene	12.74	252	3607988m	1823.87	ng/ml	
32) Benzo(a)pyrene	12.90	252	4139001m	2455.82	ng/ml	
33) Perylene	13.14	252	1249305m	687.02	ng/ml	
34) Indeno(1,2,3-cd)pyrene	15.38	276	2813701m	1606.48	ng/ml	
35) Dibenz(a,h)anthracene	15.41	278	885579m	447.28	ng/ml	
36) Benzo(g,h,i)perylene	15.77	276	3085269m	1331.08	ng/ml	

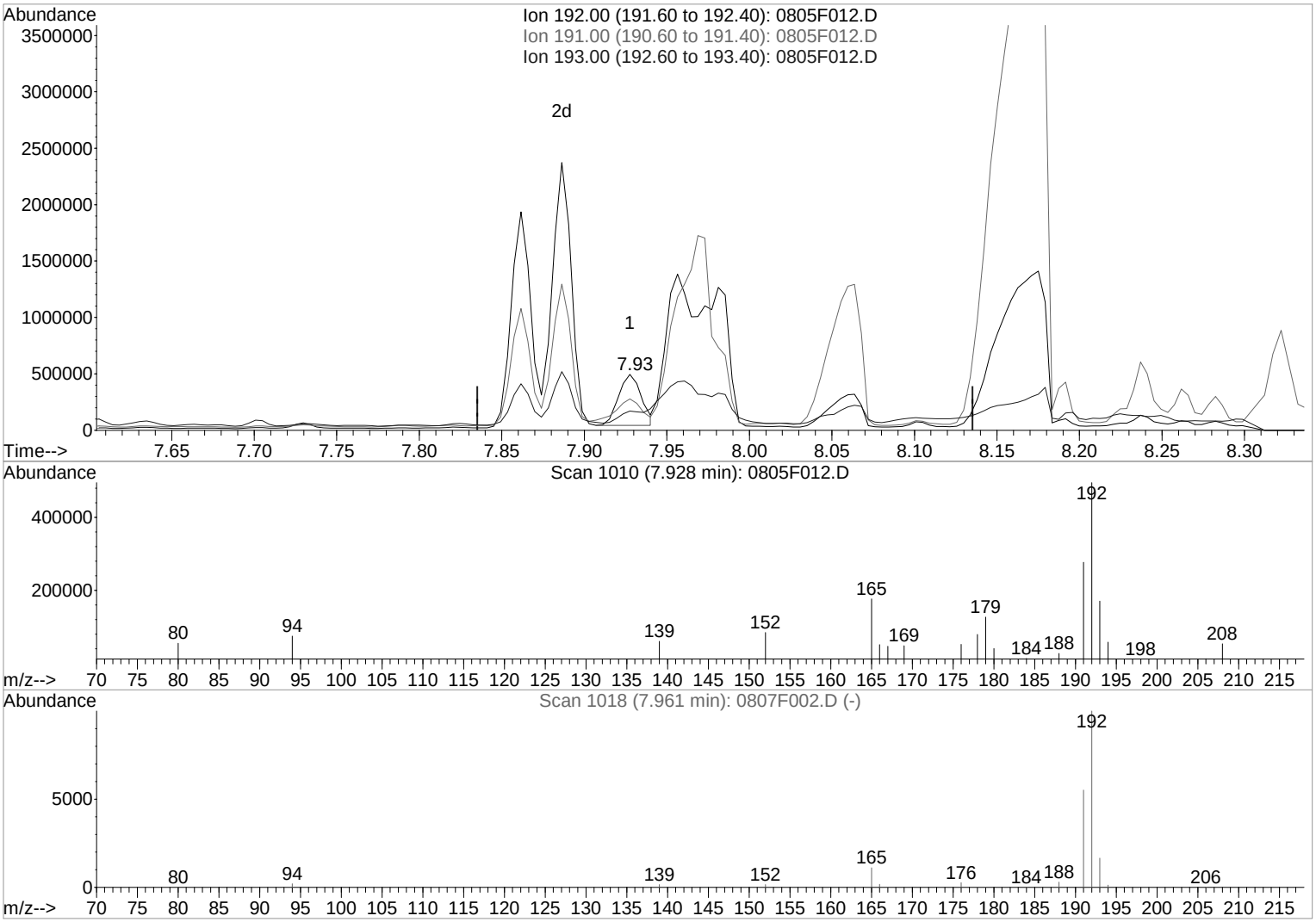
(#) = qualifier out of range (m) = manual integration

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 5 15:03 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(20) 1-Methylphenanthrene (T)

7.93min 431.59ng/ml

response 433925

Ion	Exp%	Act%
192.00	100	100
191.00	52.70	41.50
193.00	17.50	22.48
0.00	0.00	0.00

Manual Integration:

Before

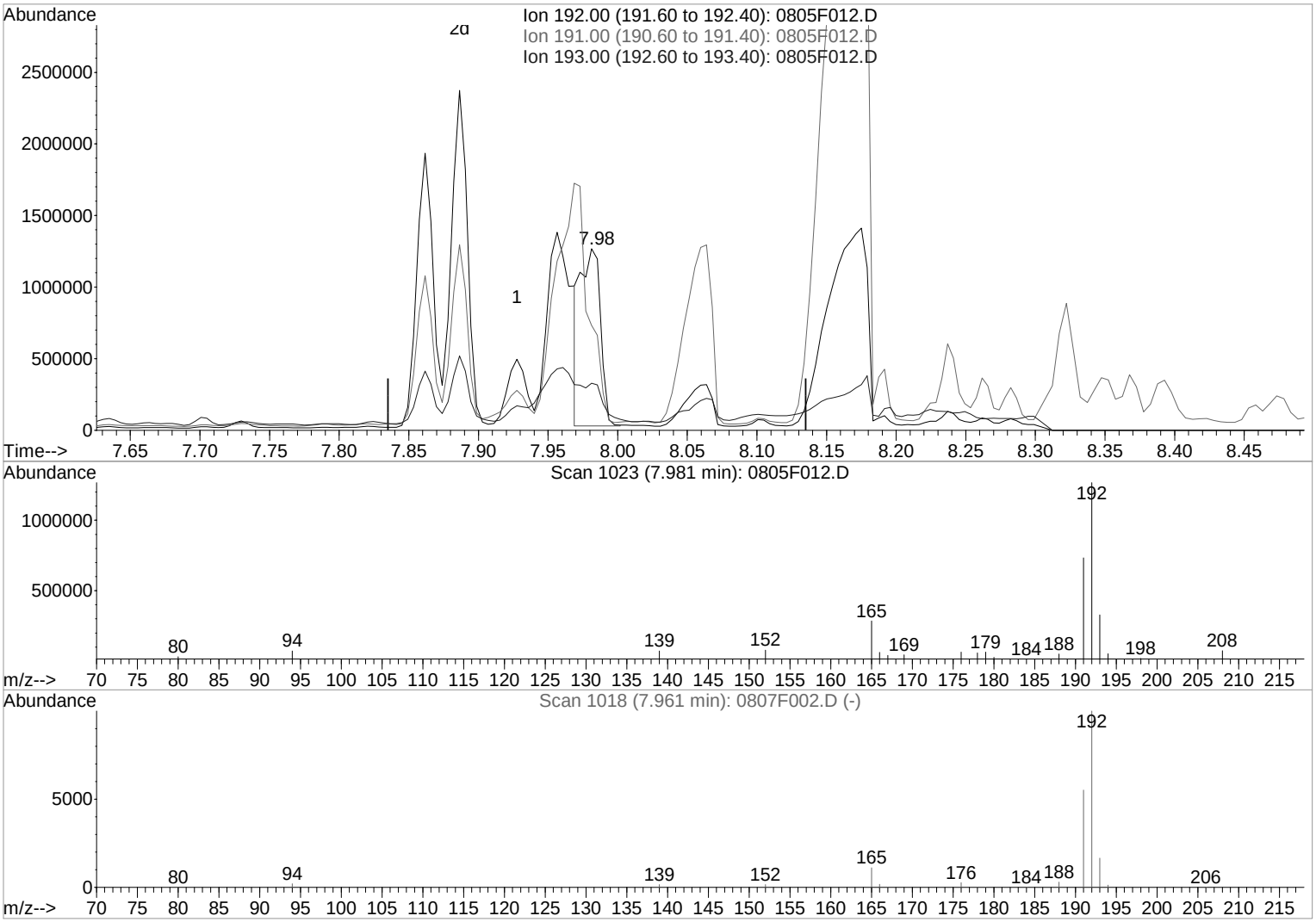
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:17 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(20) 1-Methylphenanthrene (T)

7.98min 1231.46ng/ml m

response 1238136

Ion	Exp%	Act%
192.00	100	100
191.00	52.70	57.83
193.00	17.50	25.87
0.00	0.00	0.00

Manual Integration:

After

WP

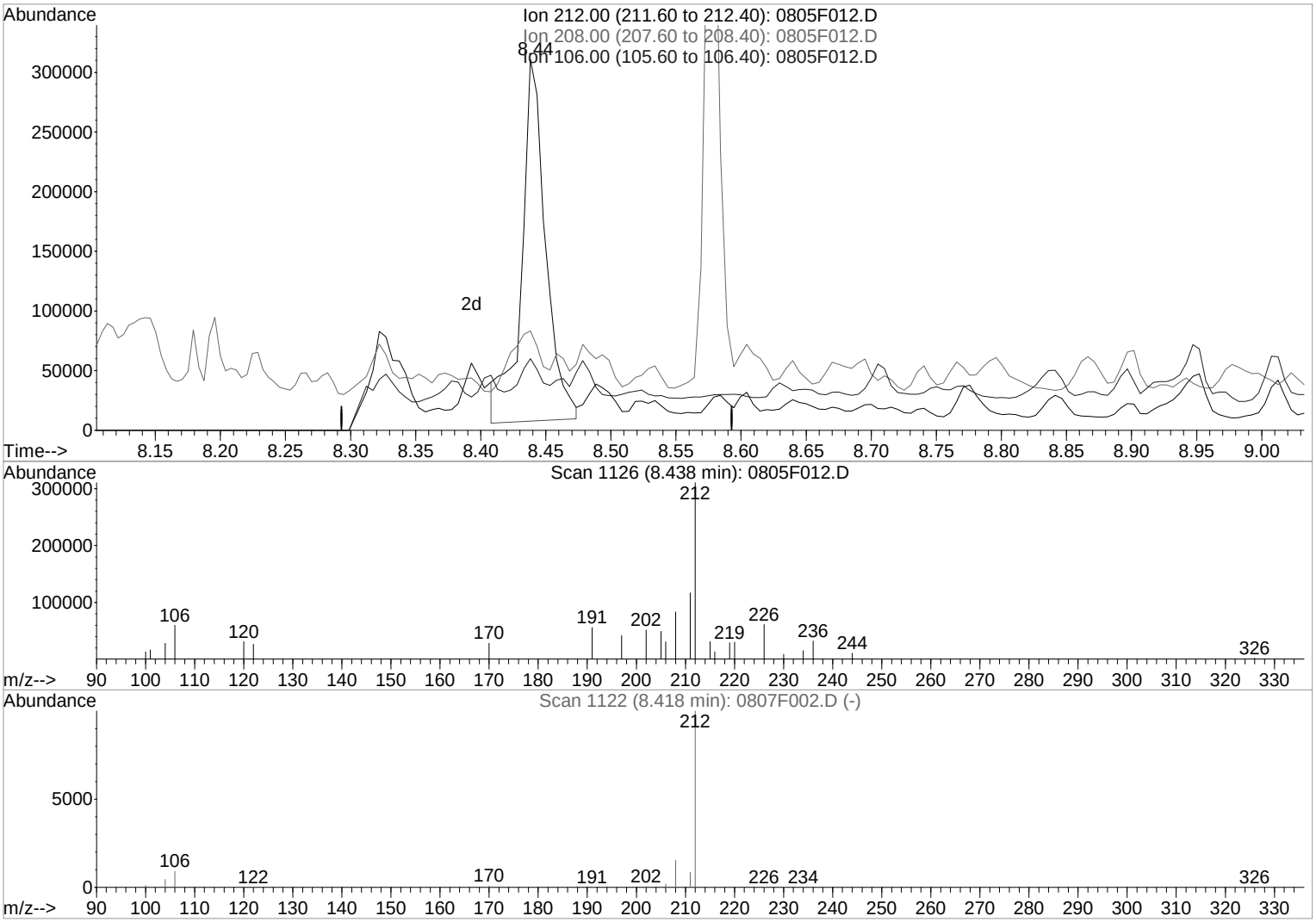
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:14 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(22) Fluoranthene-d10 (S)

8.44min 276.26ng/ml

response 391314

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	17.53
106.00	10.20	4.79
0.00	0.00	0.00

Manual Integration:

Before

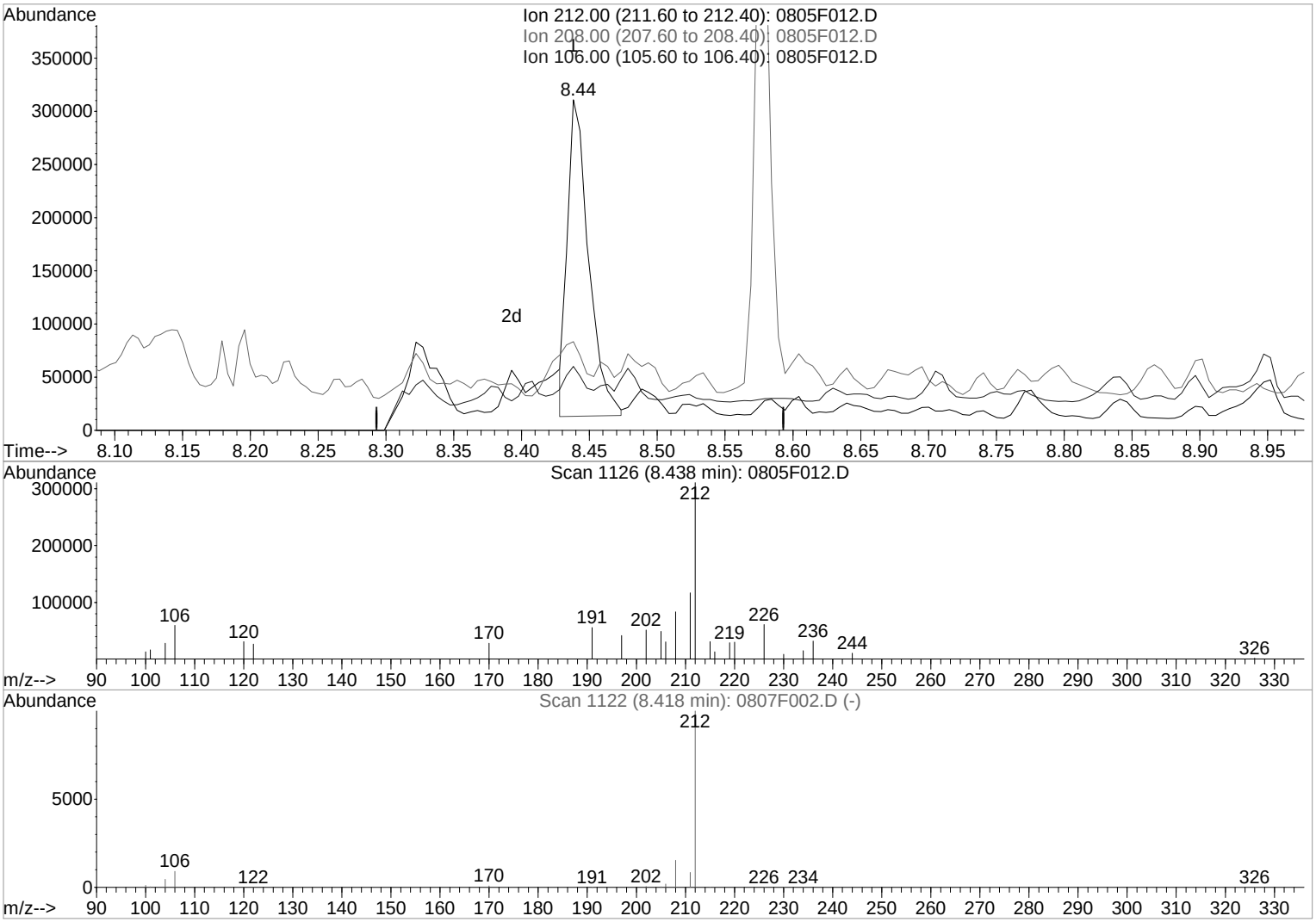
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:17 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(22) Fluoranthene-d10 (S)

8.44min 229.09ng/ml m

response 324508

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	26.83
106.00	10.20	19.29
0.00	0.00	0.00

Manual Integration:

After

BLC

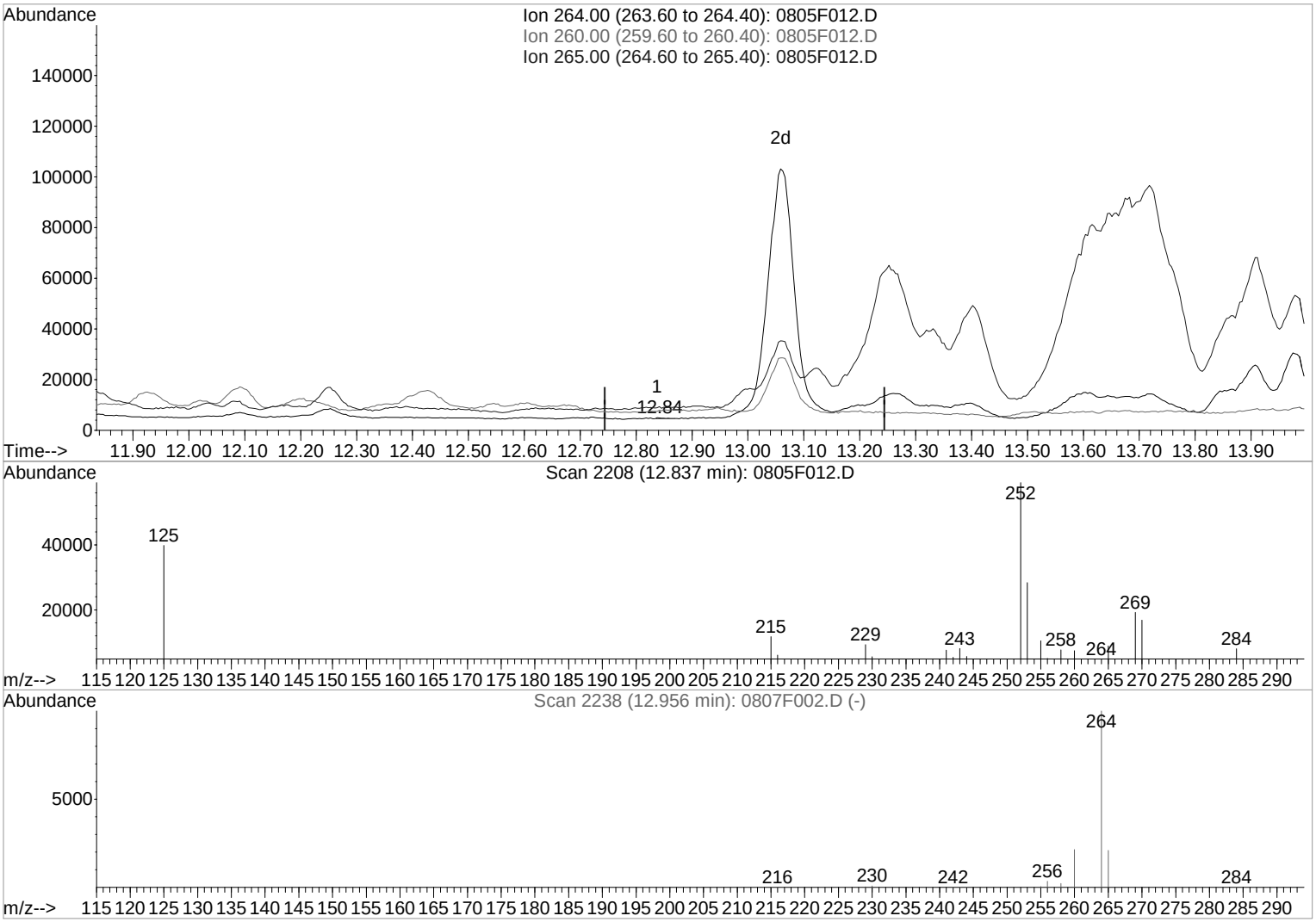
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:17 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(28) Perylene-d12 (I)

12.84min 200.00ng/ml

response 377

Ion	Exp%	Act%
264.00	100	100
260.00	22.50	2.84
265.00	21.70	34.28
0.00	0.00	0.00

Manual Integration:

Before

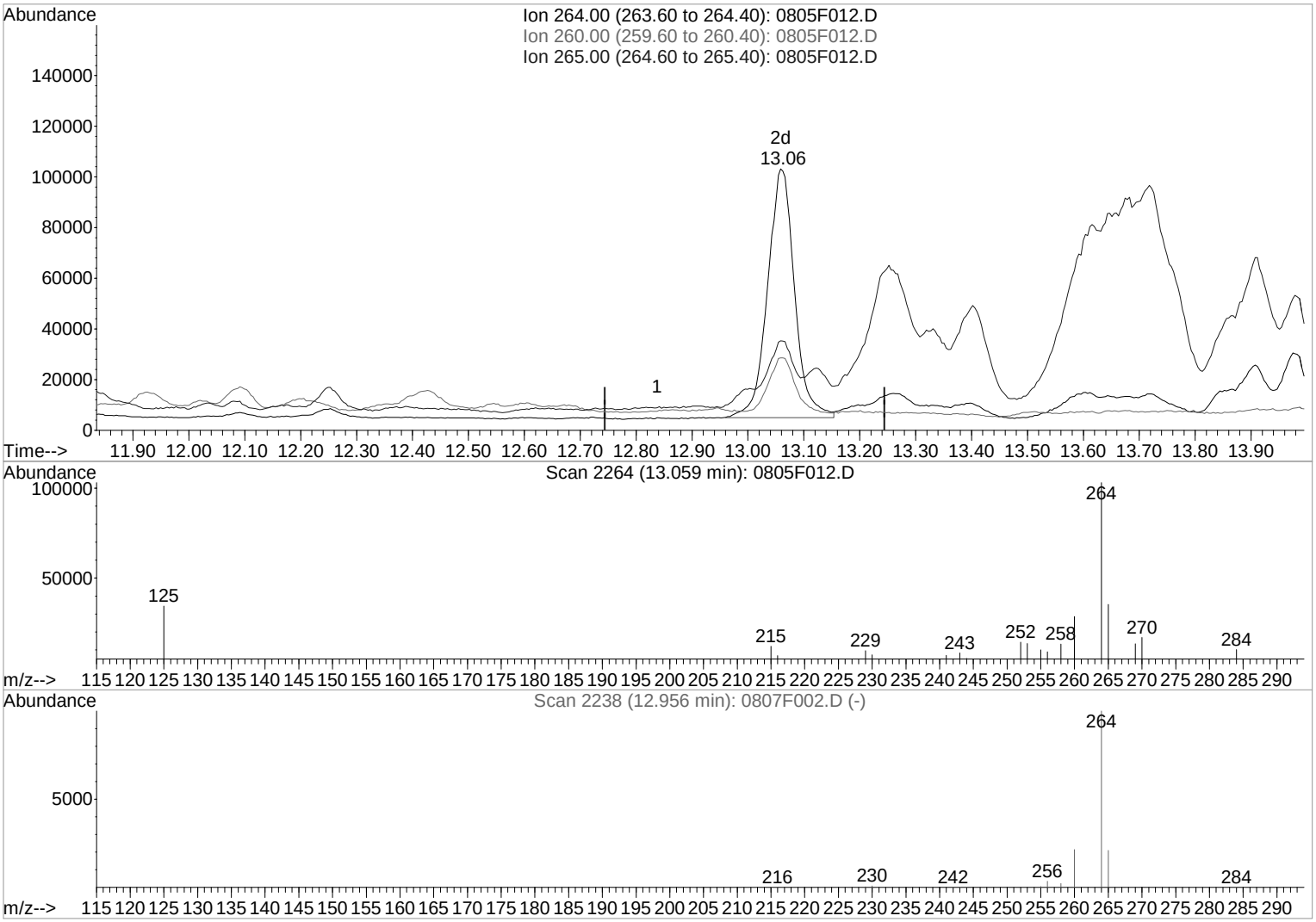
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:17 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(28) Perylene-d12 (I)

13.06min 200.00ng/ml m

response 329316

Ion	Exp%	Act%
264.00	100	100
260.00	22.50	27.64
265.00	21.70	34.23
0.00	0.00	0.00

Manual Integration:

After

WP

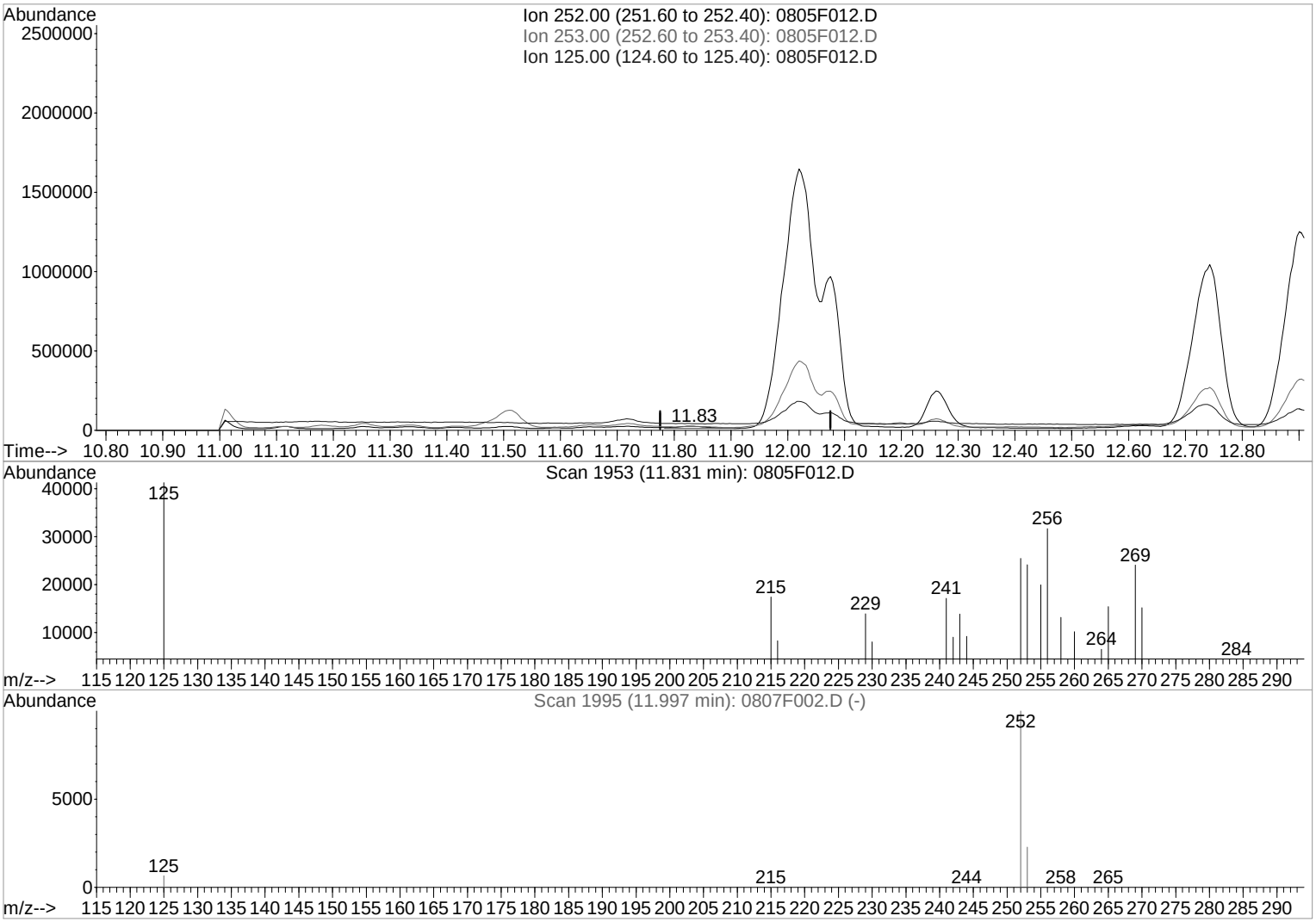
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:17 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(29) Benzo(b)fluoranthene (T)

11.83min 23.43ng/ml

response 49460

Ion	Exp%	Act%
252.00	100	100
253.00	22.50	46.77
125.00	6.10	3.00
0.00	0.00	0.00

Manual Integration:

Before

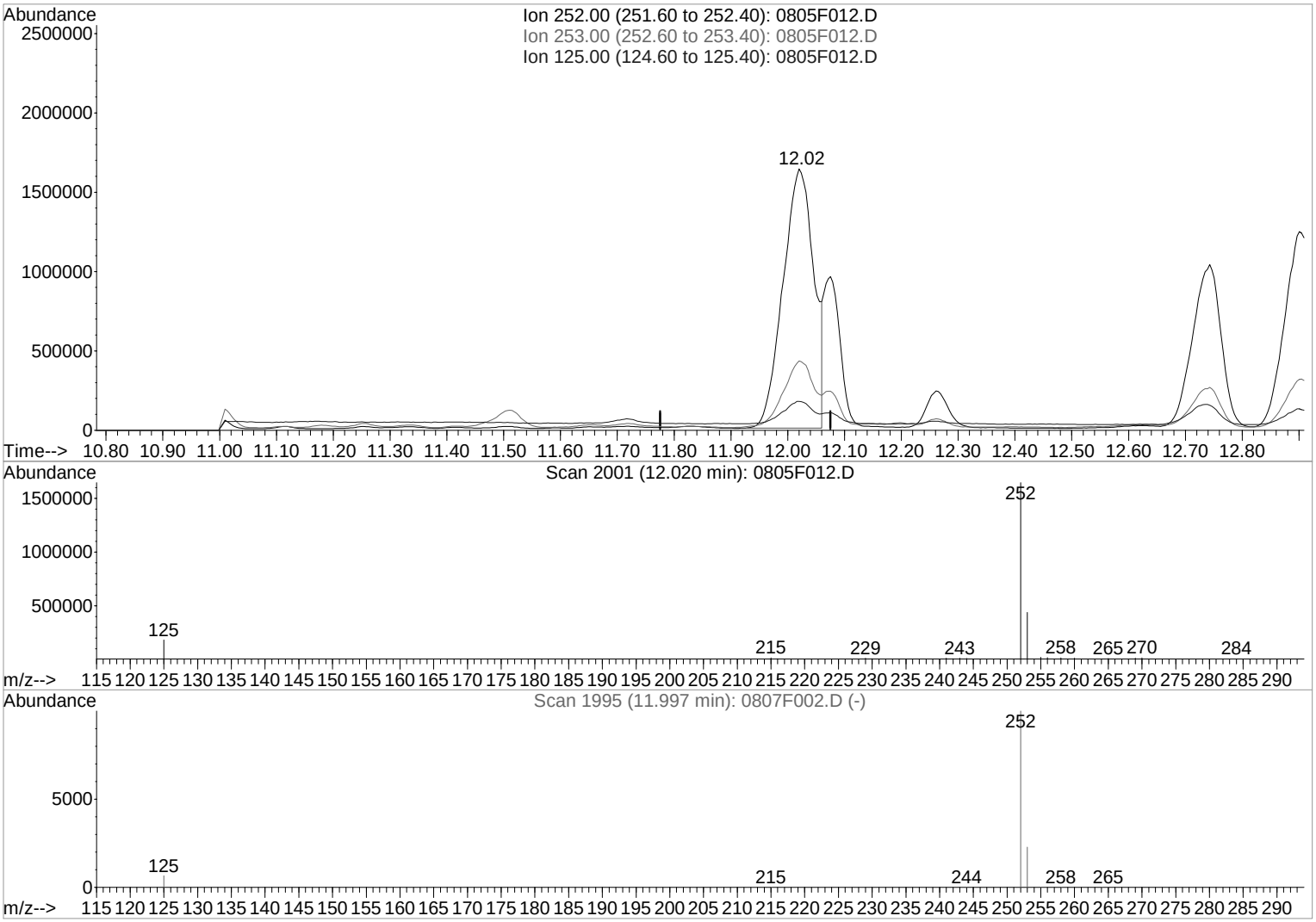
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:17 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(29) Benzo(b)fluoranthene (T)

12.02min 2909.83ng/ml m

response 6143210

Ion	Exp%	Act%
252.00	100	100
253.00	22.50	26.51
125.00	6.10	11.07
0.00	0.00	0.00

Manual Integration:

After

WP

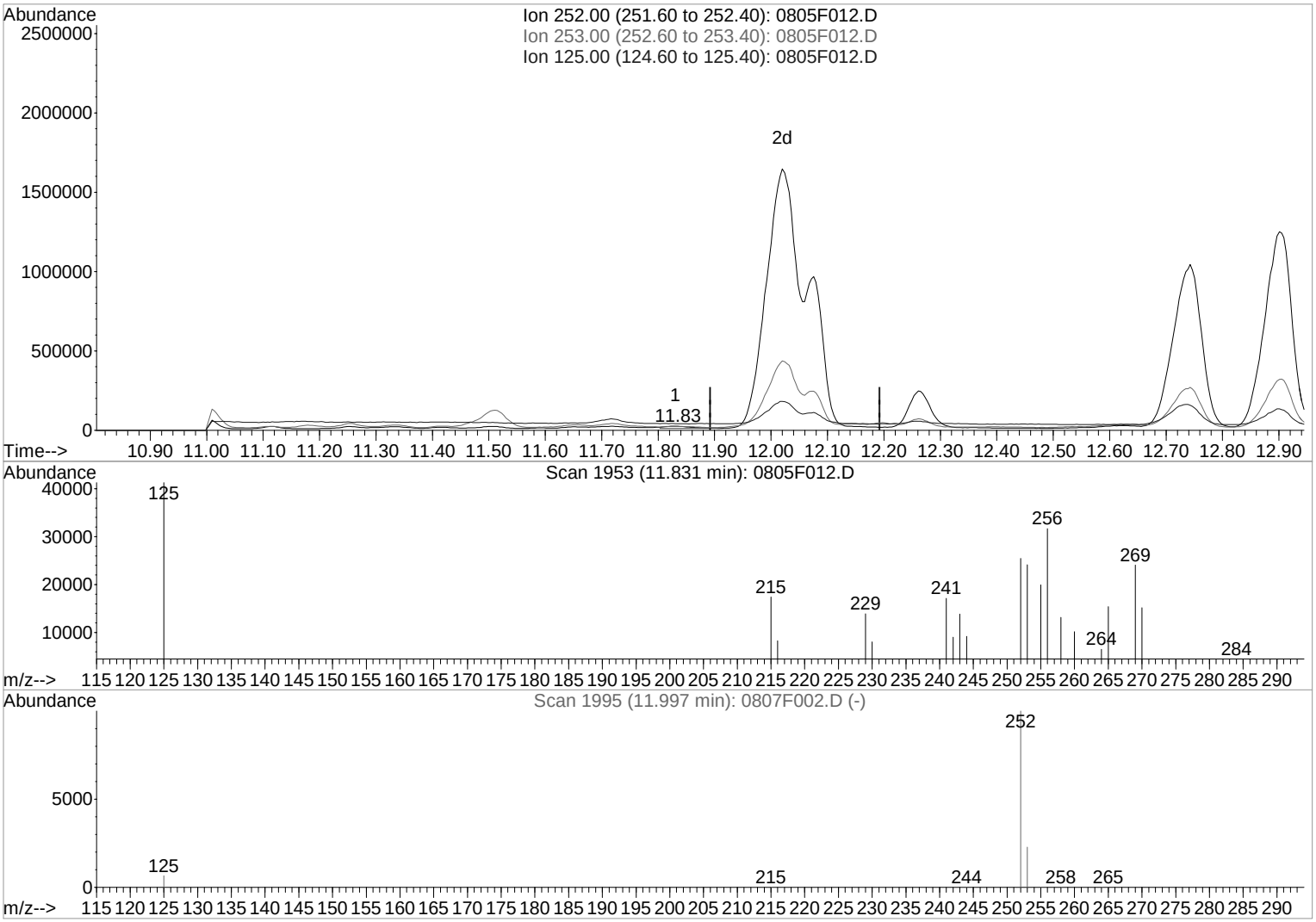
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:17 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(30) Benzo(k)fluoranthene (T)

11.83min 21.25ng/ml

response 42373

Ion	Exp%	Act%
252.00	100	100
253.00	22.70	46.77
125.00	5.90	3.00
0.00	0.00	0.00

Manual Integration:

Before

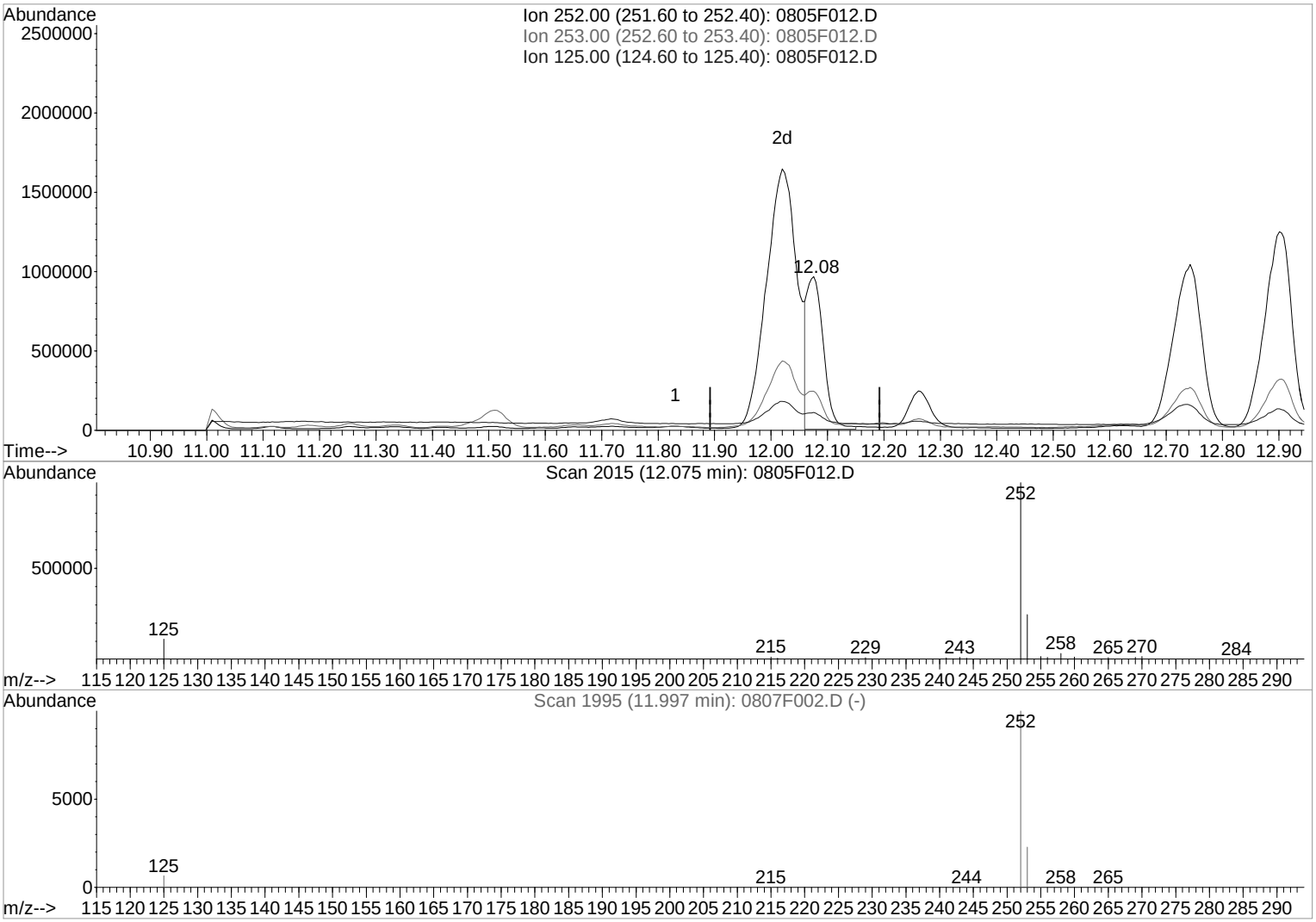
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:18 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(30) Benzo(k)fluoranthene (T)

12.08min 979.58ng/ml m

response 1953147

Ion	Exp%	Act%
252.00	100	100
253.00	22.70	25.40
125.00	5.90	11.57
0.00	0.00	0.00

Manual Integration:

After

WP

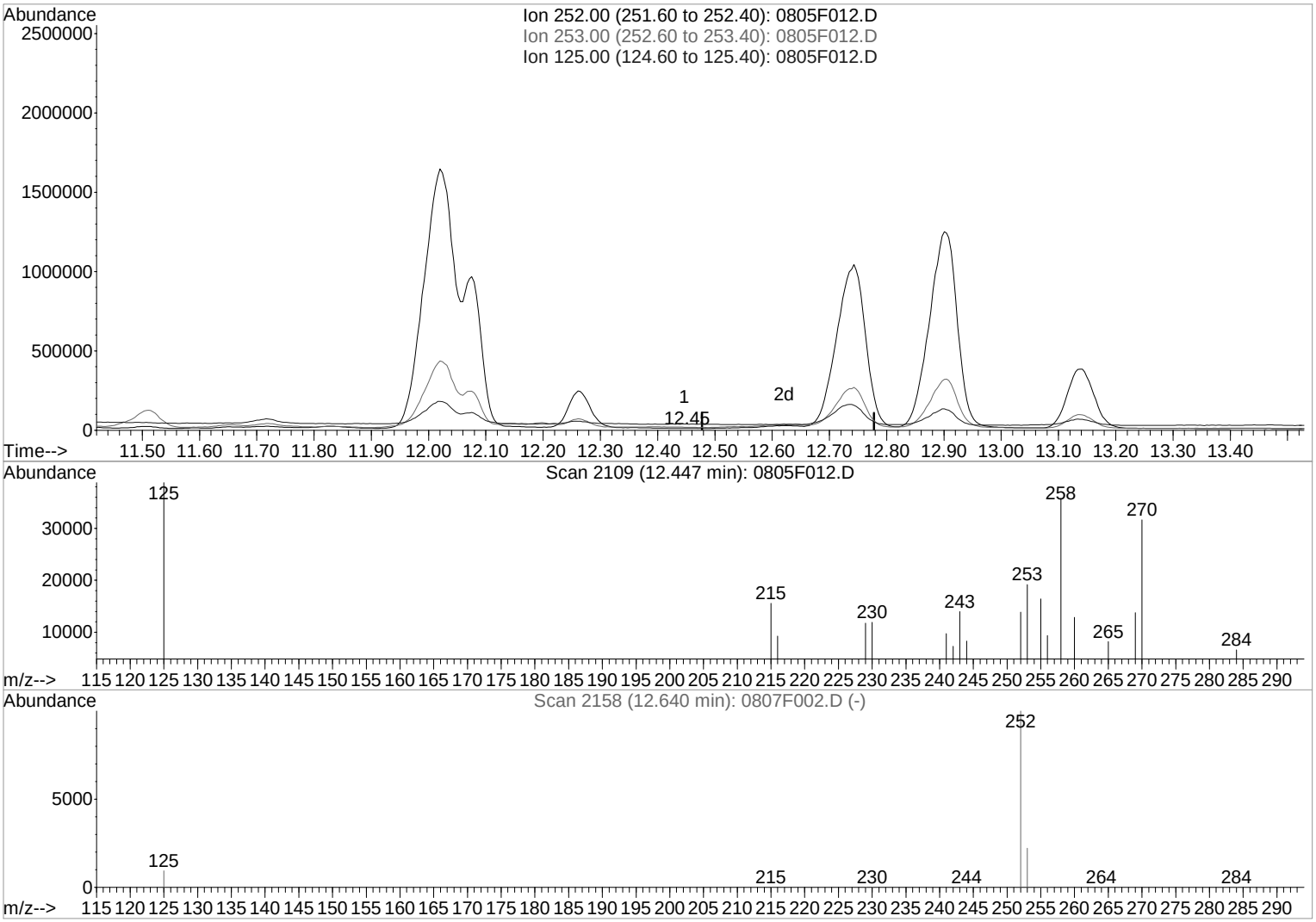
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:18 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(31) Benzo(e)pyrene (T)

12.45min 2.62ng/ml

response 5179

Ion	Exp%	Act%
252.00	100	100
253.00	22.00	62.49#
125.00	9.20	89.74#
0.00	0.00	0.00

Manual Integration:

Before

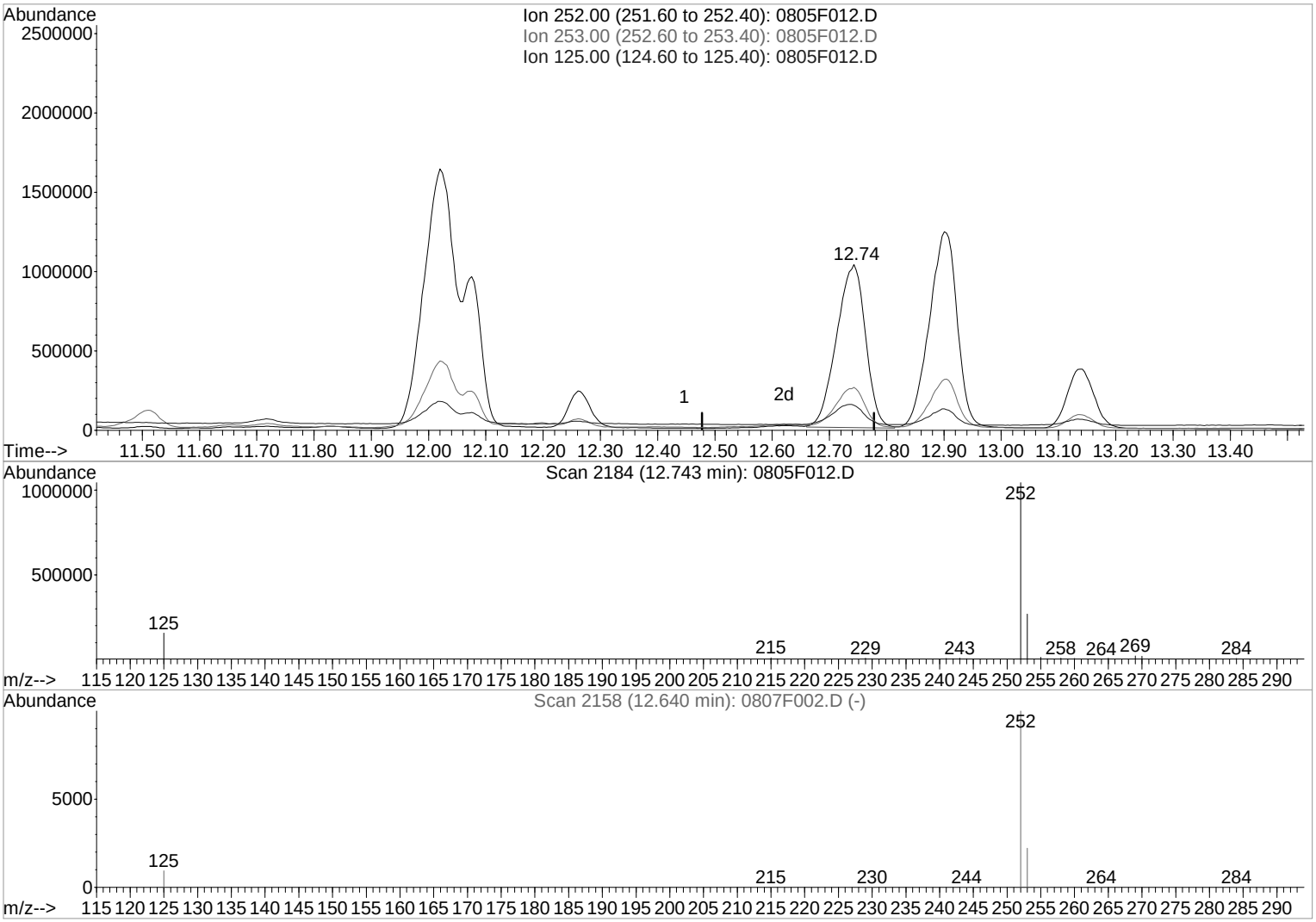
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:18 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(31) Benzo(e)pyrene (T)

12.74min 1823.87ng/ml m

response 3607988

Ion	Exp%	Act%
252.00	100	100
253.00	22.00	25.81
125.00	9.20	15.06
0.00	0.00	0.00

Manual Integration:

After

WP

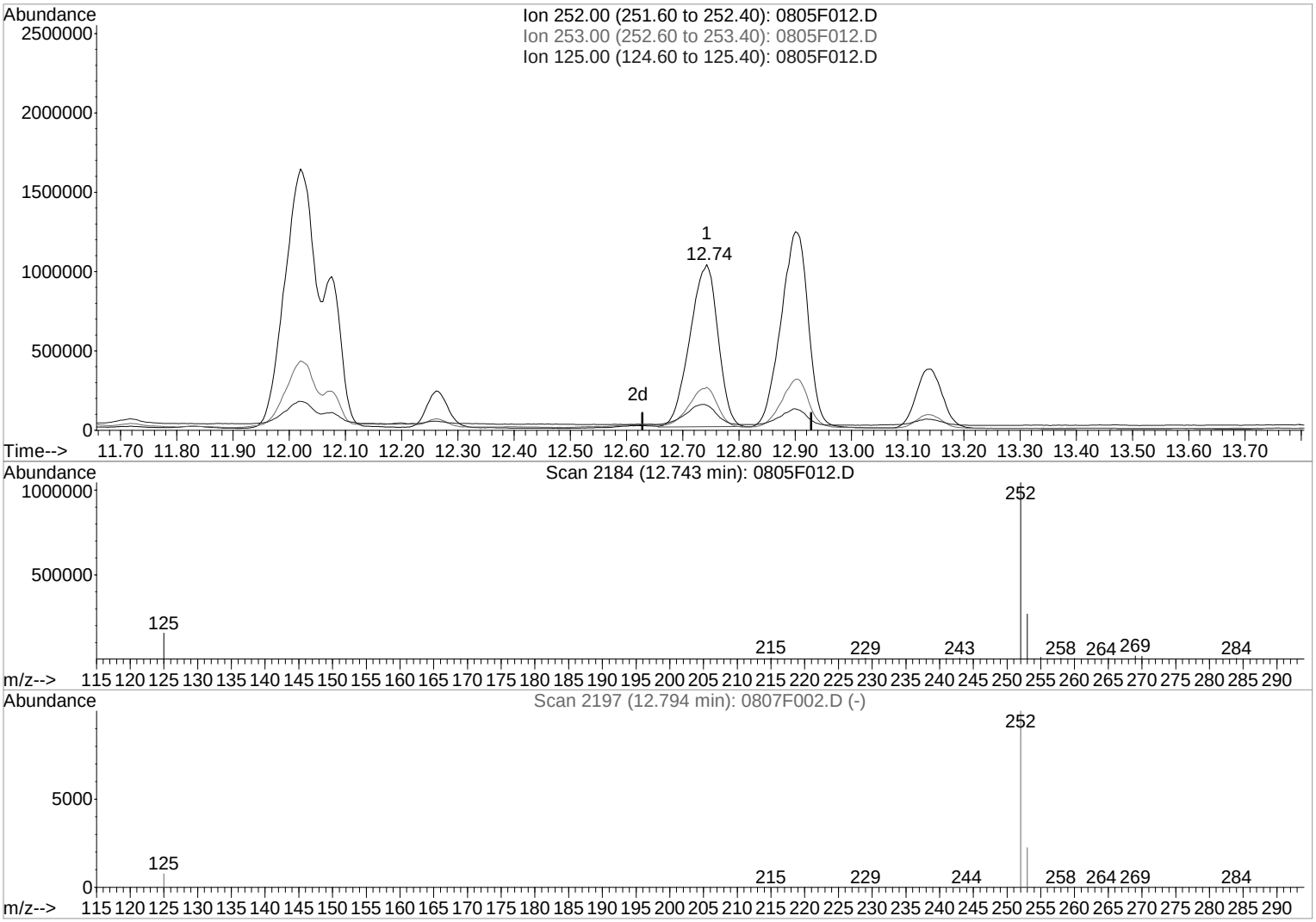
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:18 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(32) Benzo(a)pyrene (T)

12.74min 2108.94ng/ml

response 3554370

Ion	Exp%	Act%
252.00	100	100
253.00	22.30	24.44
125.00	6.90	11.94
0.00	0.00	0.00

Manual Integration:

Before

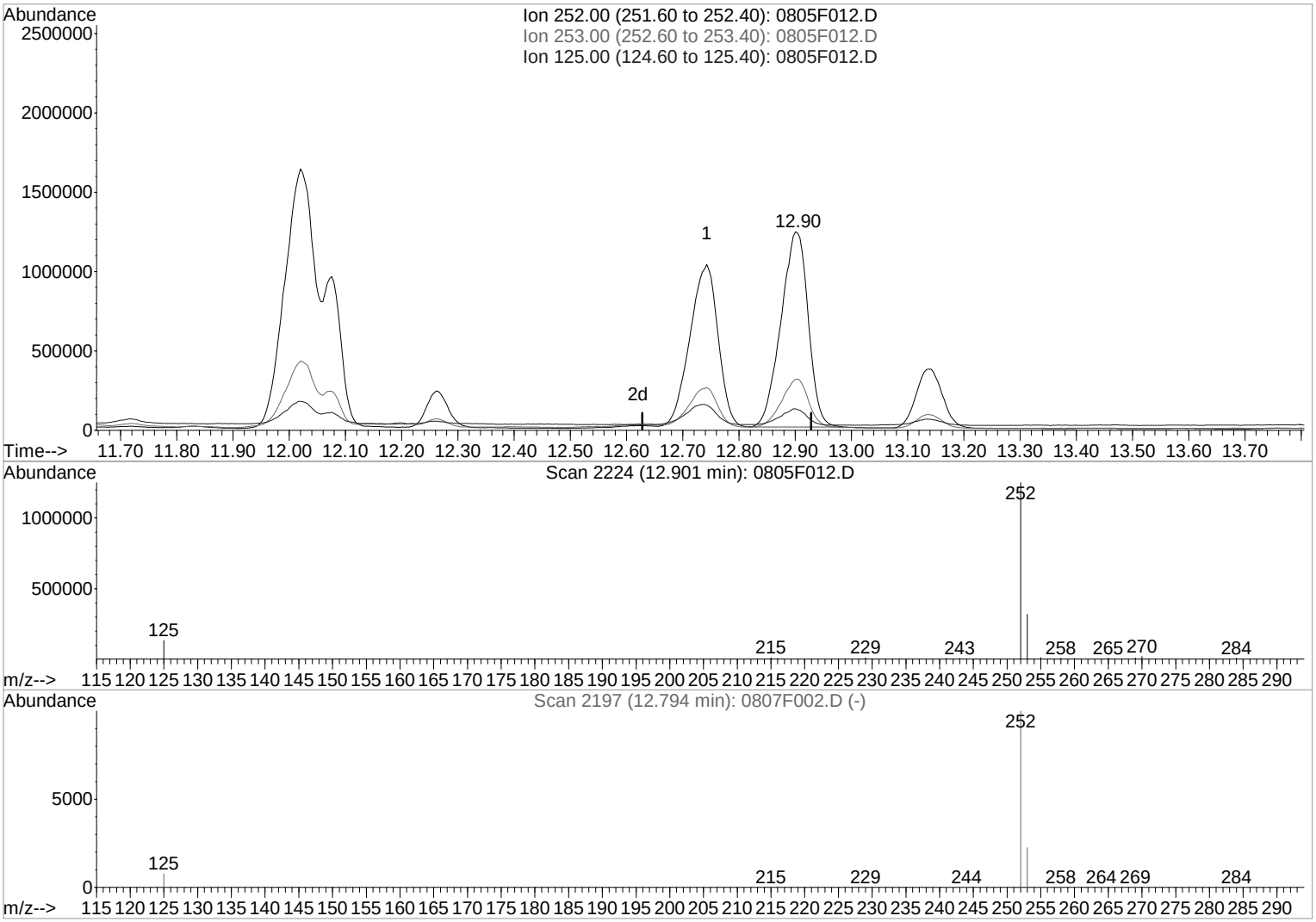
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:18 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(32) Benzo(a)pyrene (T)

12.90min 2455.82ng/ml m

response 4139001

Ion	Exp%	Act%
252.00	100	100
253.00	22.30	25.57
125.00	6.90	10.81
0.00	0.00	0.00

Manual Integration:

After

WP

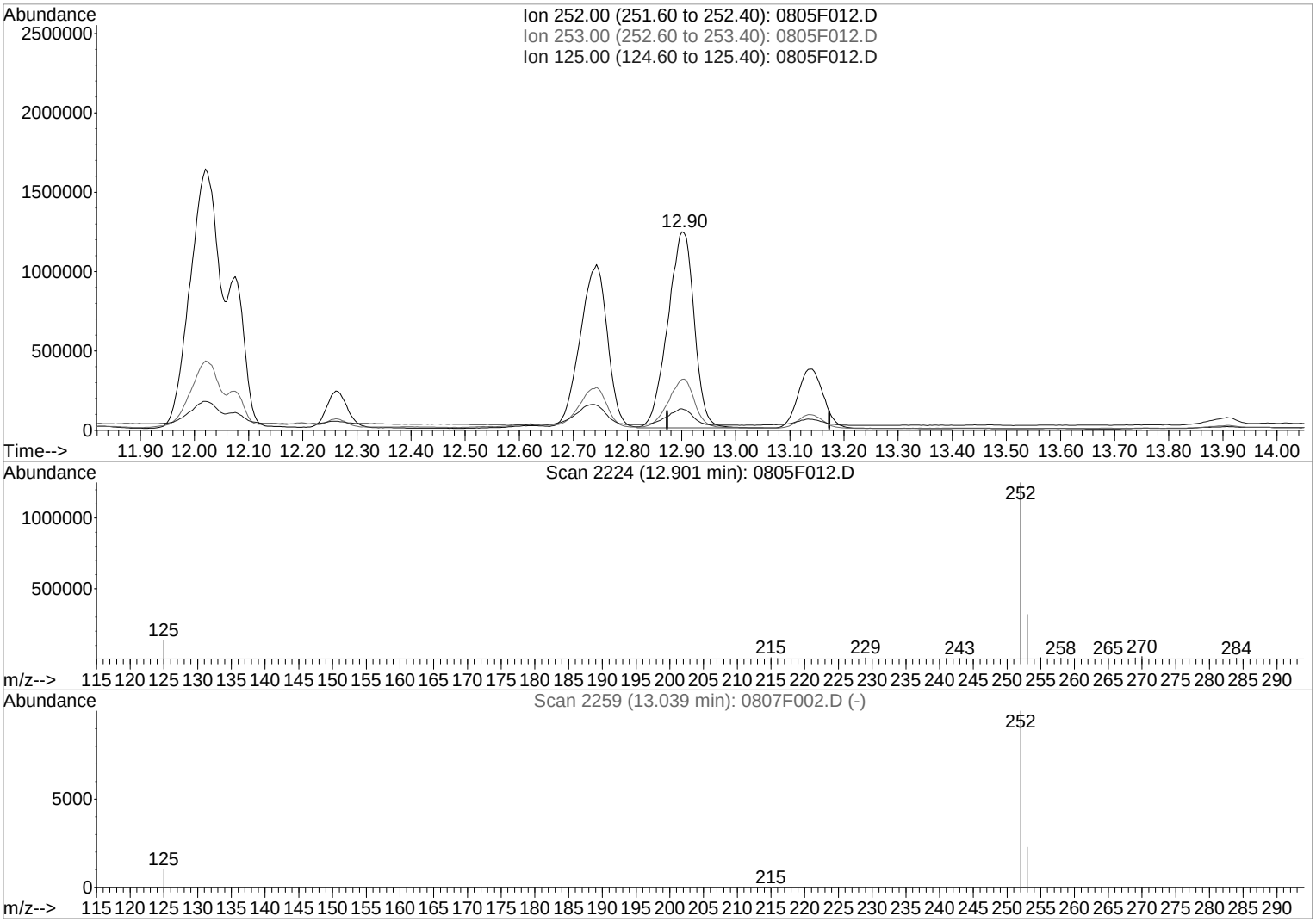
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:18 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(33) Perylene (T)

12.90min 2312.49ng/ml

response 4205132

Ion	Exp%	Act%
252.00	100	100
253.00	22.20	24.79
125.00	9.20	8.23
0.00	0.00	0.00

Manual Integration:

Before

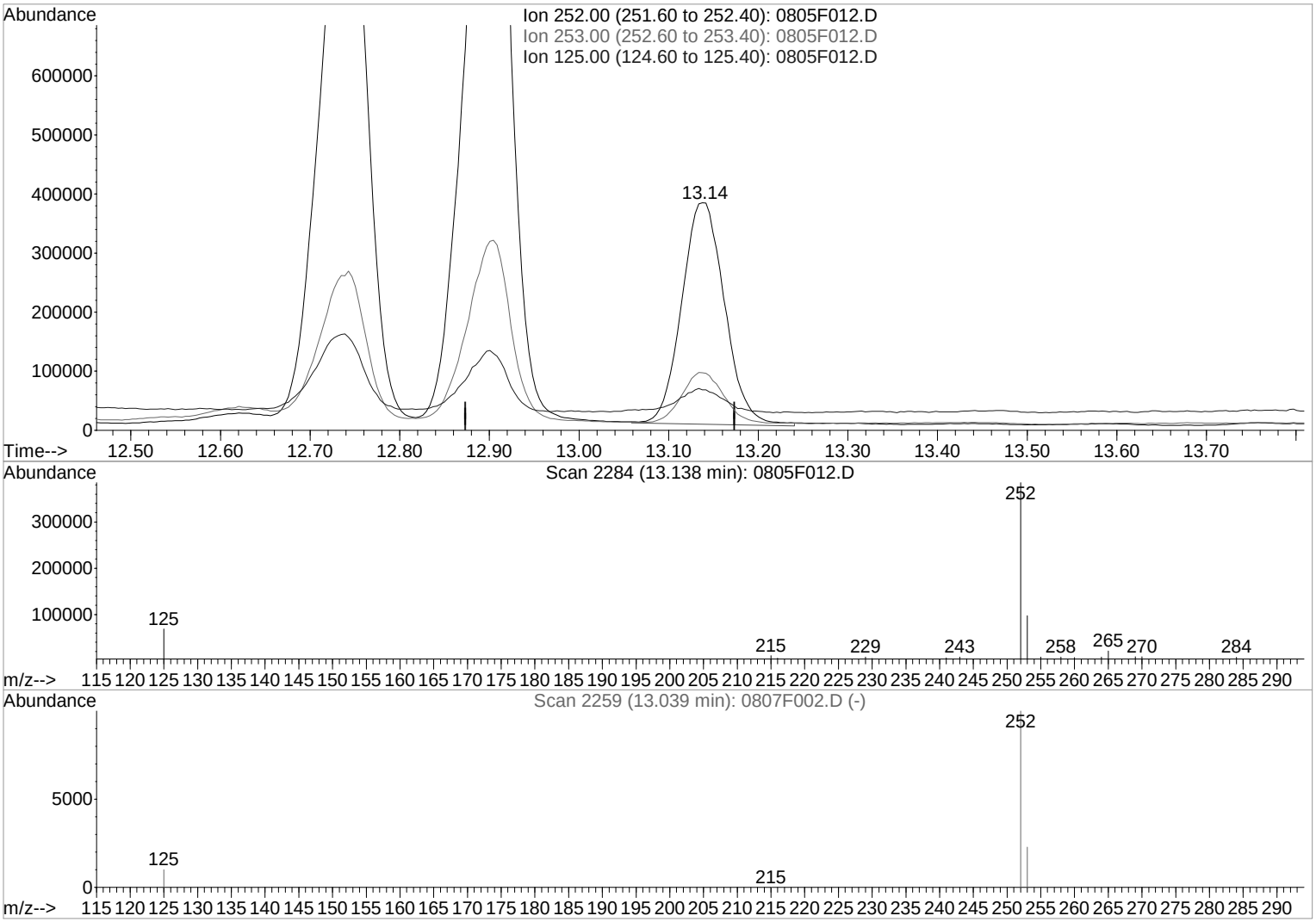
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:18 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(33) Perylene (T)

13.14min 687.02ng/ml m

response 1249305

Ion	Exp%	Act%
252.00	100	100
253.00	22.20	25.29
125.00	9.20	17.81
0.00	0.00	0.00

Manual Integration:

After

WP

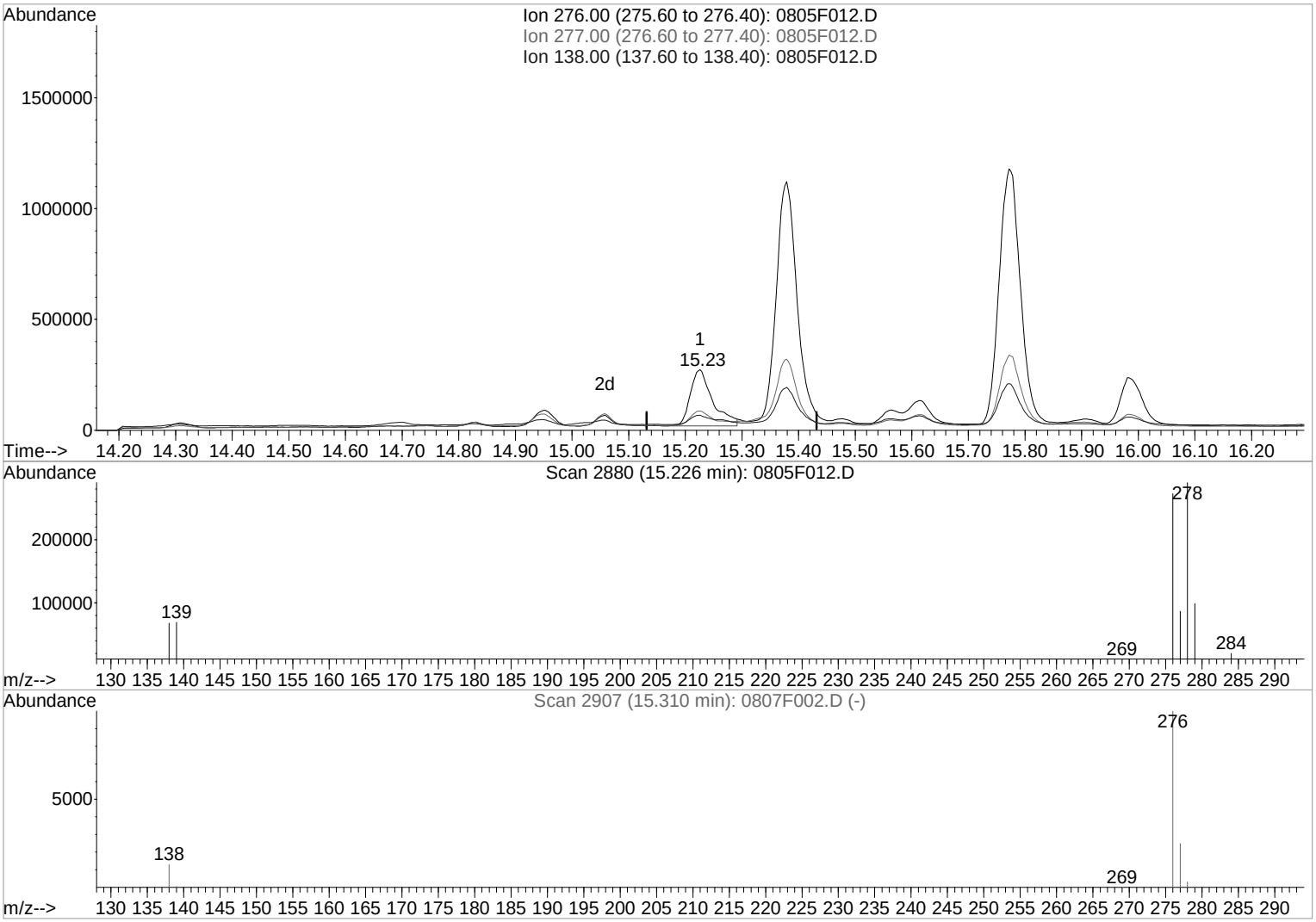
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:18 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.23min 398.94ng/ml

response 698726

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	25.63
138.00	12.20	16.71
0.00	0.00	0.00

Manual Integration:

Before

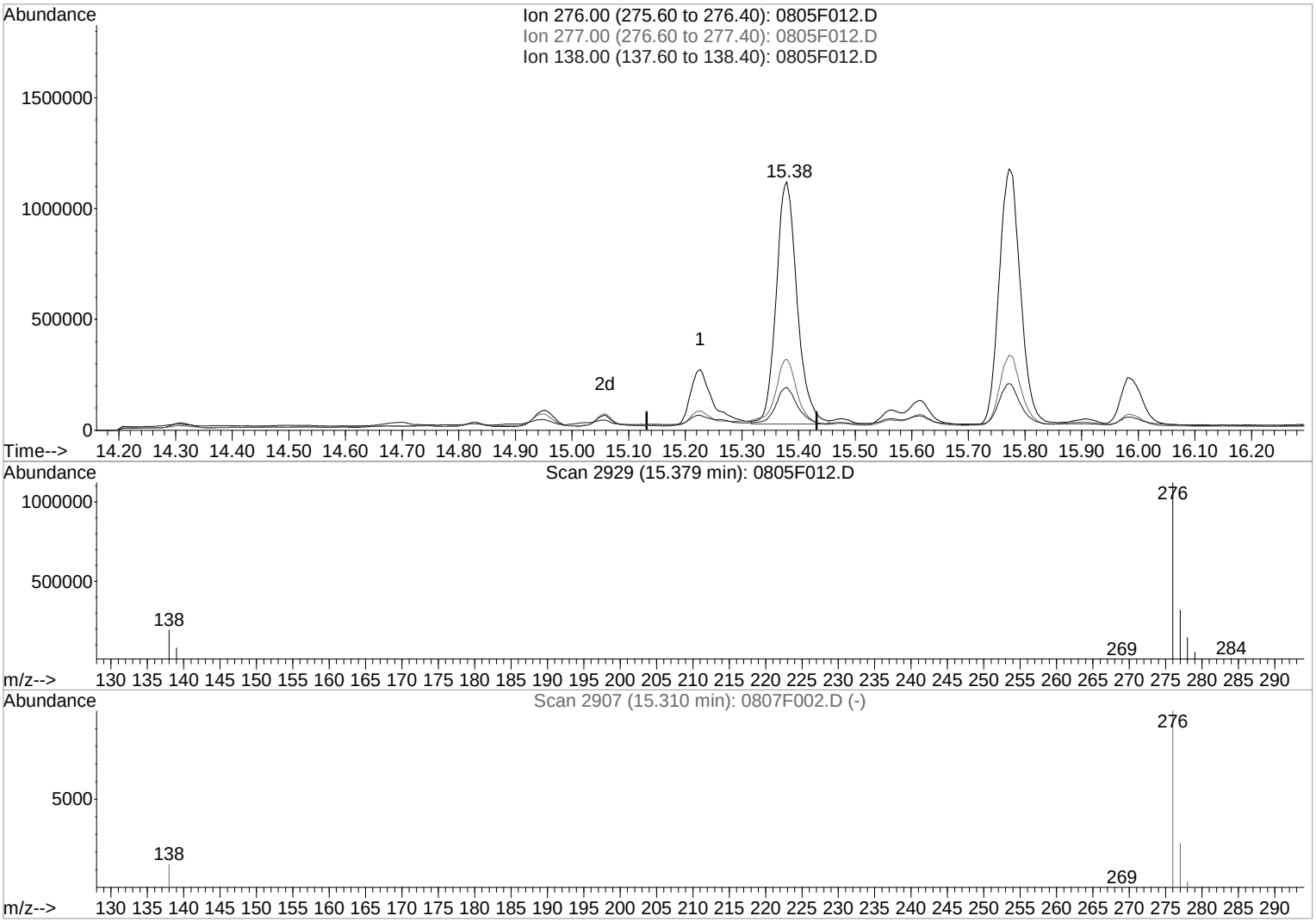
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:18 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.38min 1606.48ng/ml m

response 2813701

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	28.49
138.00	12.20	17.26
0.00	0.00	0.00

Manual Integration:

After

WP

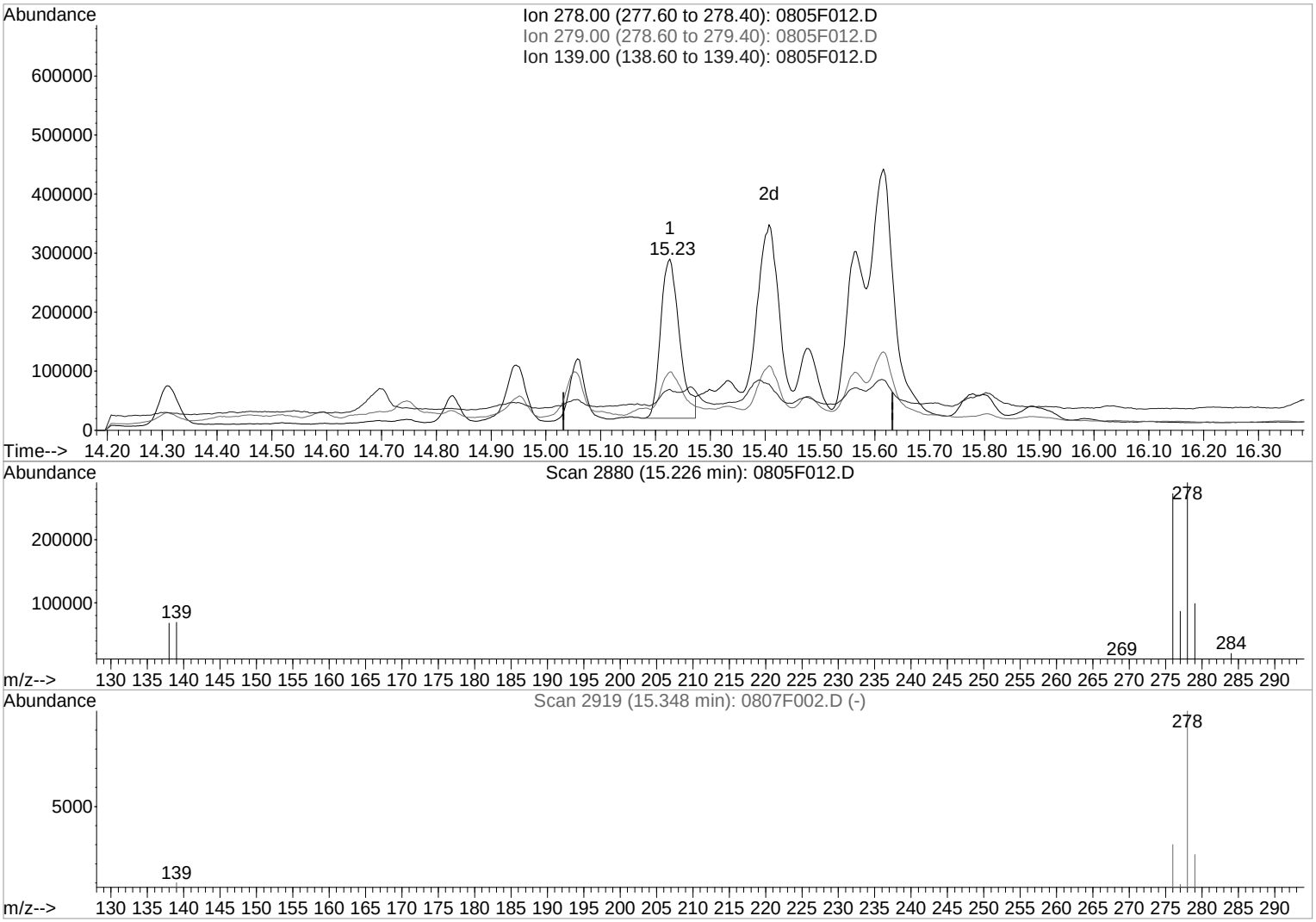
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:18 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(35) Dibenz(a,h)anthracene (T)

15.23min 328.39ng/ml

response 650185

Ion	Exp%	Act%
278.00	100	100
279.00	25.20	22.83
139.00	10.40	9.46
0.00	0.00	0.00

Manual Integration:

Before

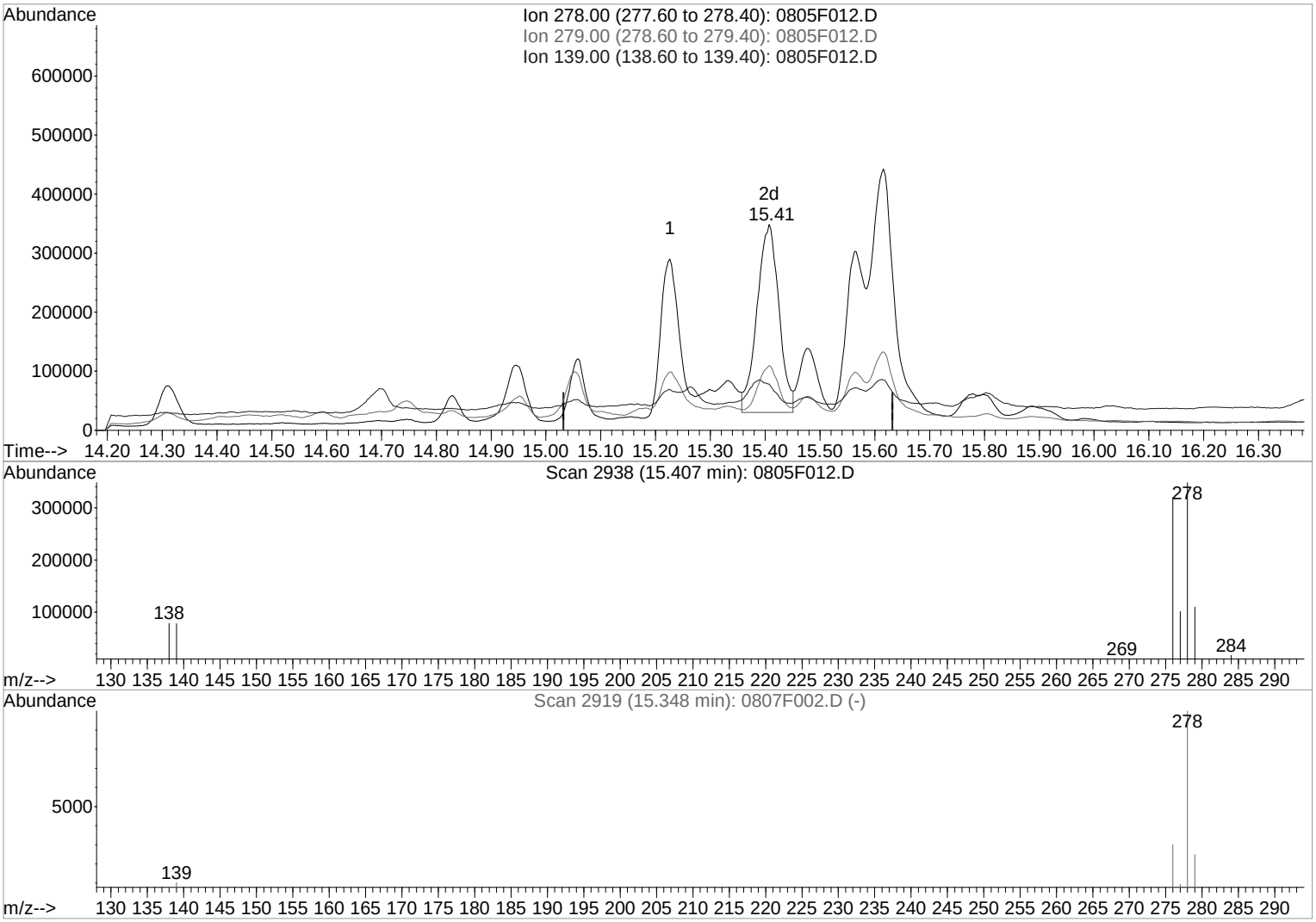
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:18 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(35) Dibenz(a,h)anthracene (T)

15.41min 447.28ng/ml m

response 885579

Ion	Exp%	Act%
278.00	100	100
279.00	25.20	31.45
139.00	10.40	22.44
0.00	0.00	0.00

Manual Integration:

After

WP

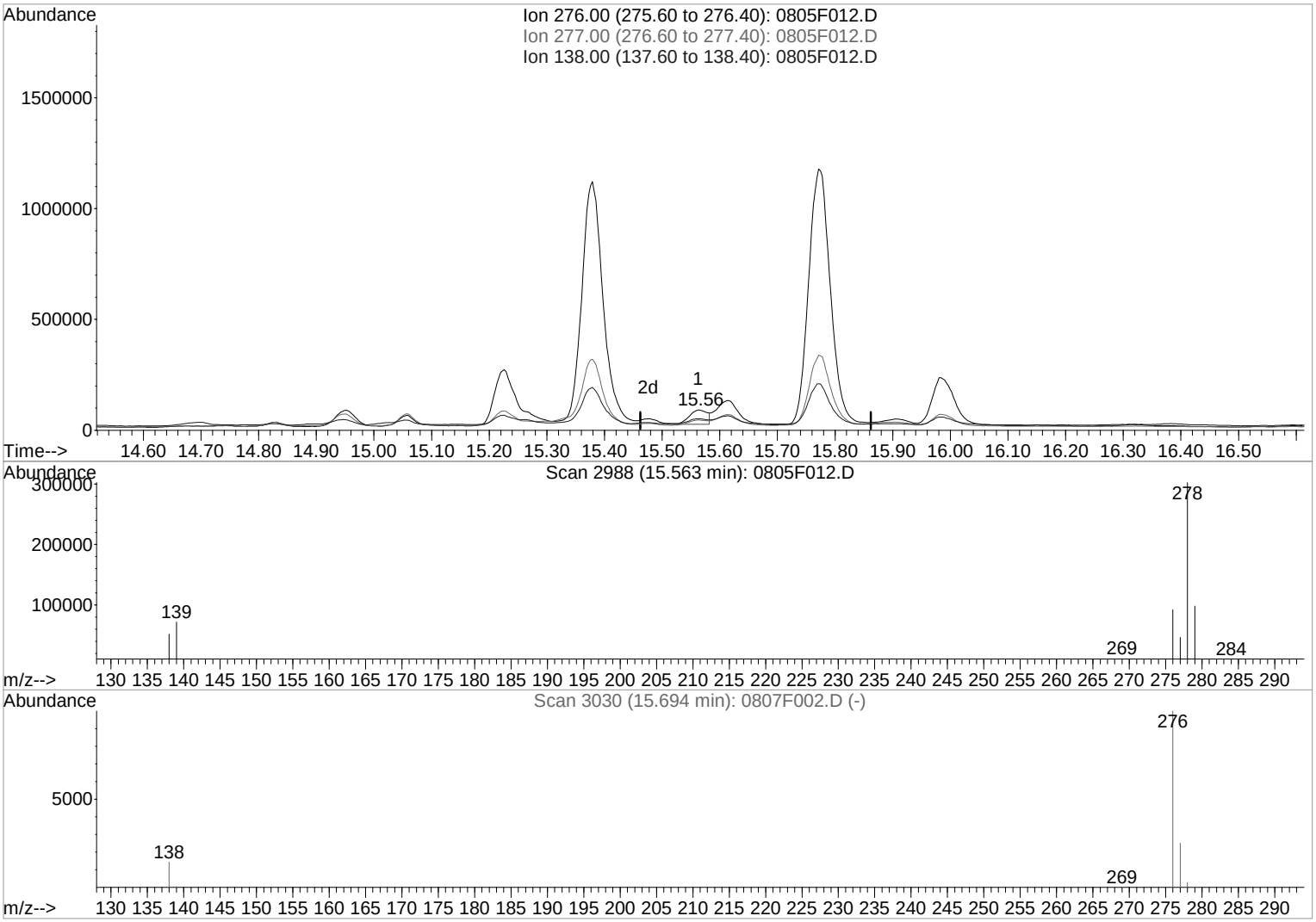
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:18 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(36) Benzo(g,h,i)perylene (T)

15.56min 60.58ng/ml

response 140415

Ion	Exp%	Act%
276.00	100	100
277.00	24.90	35.93
138.00	13.80	32.13
0.00	0.00	0.00

Manual Integration:

Before

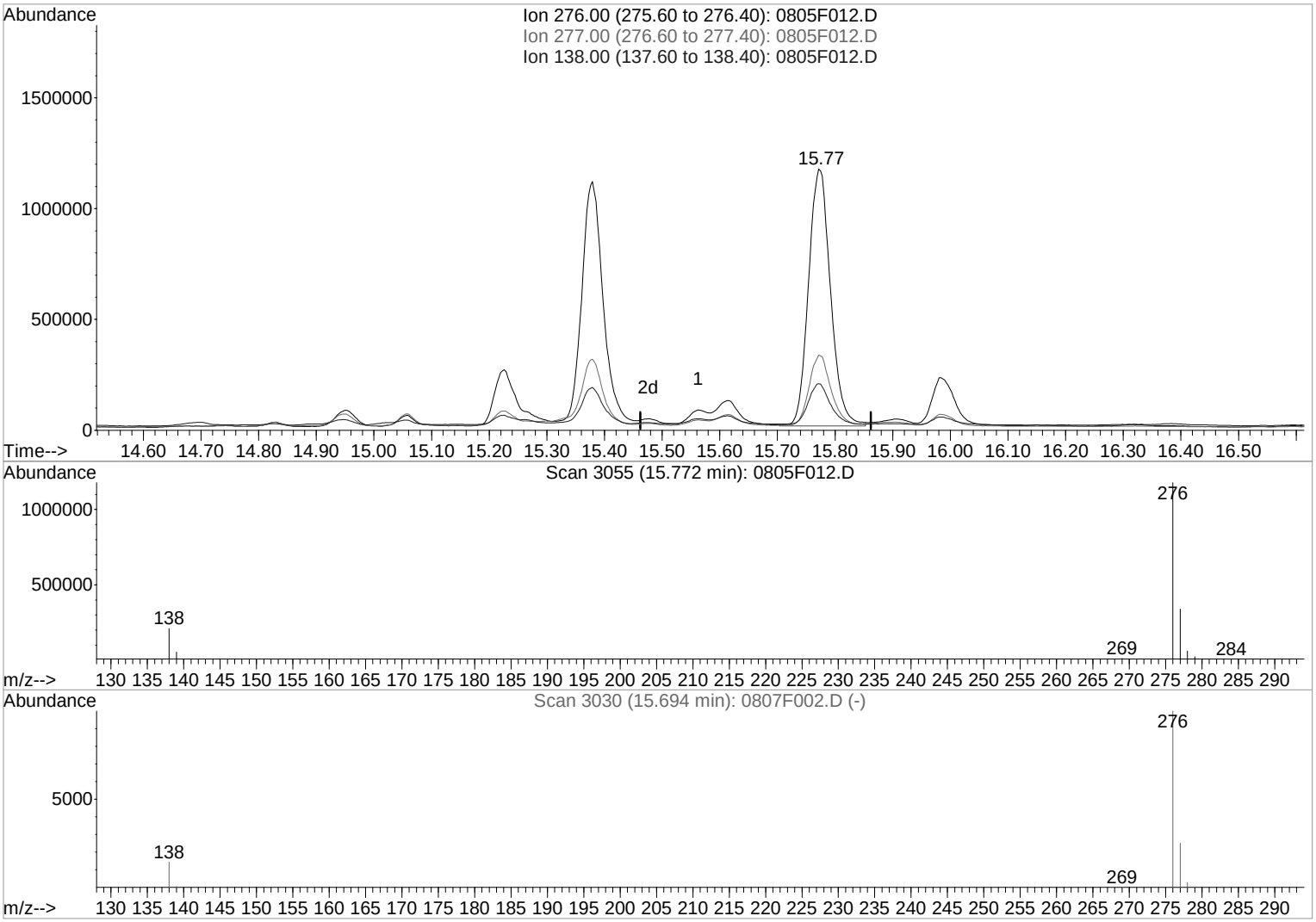
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F012.D Vial: 12
Acq On : 5 Aug 2024 2:40 pm Operator: EBruno
Sample : K2407810-004 Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:19 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F012.D

(36) Benzo(g,h,i)perylene (T)

15.77min 1331.08ng/ml m

response 3085269

Ion	Exp%	Act%
276.00	100	100
277.00	24.90	28.69
138.00	13.80	17.72
0.00	0.00	0.00

Manual Integration:

After

WP

08/08/24

1st 08/08/24
2nd 08/08/24

Validation Report

Data File: J:\MS14\DATA\080524\0805F013.D\
Lab ID: K2407810-004.R01
RunType: N/A
Matrix: Sediment

Date Acquired: 8/5/24 15:15:00
Batch ID: 849989
Analysis Method: 8270D/PAH SIM

Validations

Validation Categories	Pass	Fail
Preparation Hold Time		X
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery		X
Lab Control Sample Recovery	X	
Method Blank	X	
Method Blank Surrogates	X	
Internal Standards	X	
Surrogates	X	
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Sample Exceptions

Exception Categories	Result	Corrective Action
Preparation Hold Time	Prep Date/Time: 08/01/2024 1240 Hold Date/Time: 08/09/2022 2359	Frozen Sample Used

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Continuing Calibration Recovery	Benzo(a)pyrene	22		20	OK, <40

Primary Review: _____

Printed: 8/8/24 11:23
\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

Secondary Review: _____

1st 08/08/24
2nd 08/08/24

Quantitation Report

Data File:	J:\MS14\DATA\080524\0805F013.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 15:15:00	**Vial:**	11
Run Type:	N/A	**Dilution:**	10
Lab ID:	K2407810-004.R01	**Raw Units:**	ng/mL

Bottle ID:	K2407810-004.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	PAH SIM	**Collect Date:**	7/26/22	**Receive Date:**	7/27/22

Analysis Lot:	849989	**Prep Lot:**	442452	**Report Group:**	K2407810
Analysis	8270D	**Prep Method:**	EPA 3546		
		Prep Date:	8/1/24		

Title:	Polycyclic Aromatic Hydrocarbons by GC/MS SIM	**Calibration ID:**	KC2400163
		Report List ID:	18909

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Acenaphthene-d10	6.19	+0.01	133697	200.00	OK
Chrysene-d12	9.93	+0.01	256797	200.00	OK
Naphthalene-d8	4.58	+0.01	238346	200.00	OK
Perylene-d12	12.98	+0.06	309910	200.00	OK
Phenanthrene-d10	7.44	+0.01	256455	200.00	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec	% Rec Criteria	Rpt?
Fluoranthene-d10	8.43	+0.02	25814	18.40	92	28 - 112	Y
Fluorene-d10	6.63	+0.01	14384	18.69	93	34 - 106	N
Terphenyl-d14	8.76	+0.01	24502	17.27	86	32 - 122	N

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
2-Methylnaphthalene	5.27		16220	21.87	340		N
Acenaphthene	6.22	+0.01	31477	41.20	640		N
Acenaphthylene	6.08	+0.01	16007	13.46	210		N
Anthracene	7.50	+0.01	115932	92.96	1500		N
Benz(a)anthracene	9.92	+0.02	506427	303.13	4700		Y
Benzo(a)pyrene	12.81	+0.04	433998	273.63	4300		Y
Benzo(b)fluoranthene	11.94	+0.03	625139	314.65	4900		Y
Benzo(g,h,i)perylene	15.71	+0.04	319328	146.40	2300		N
Benzo(k)fluoranthene	12.01	+0.04	222911	118.80	1900		N
Chrysene	9.97	+0.02	571137	359.08	5600		Y
Dibenz(a,h)anthracene	15.36	+0.03	89905	48.25	760		N
Fluoranthene	8.44	+0.01	925142	601.12	9400		Y
Fluorene	6.66	+0.01	70877	80.70	1300		N

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23
\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

1st 08/08/24

2nd 08/08/24

Data File:	J:\MS14\DATA\080524\0805F013.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 15:15:00	**Vial:**	11
Run Type:	N/A	**Dilution:**	10
Lab ID:	K2407810-004.R01	**Raw Units:**	ng/mL

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Indeno(1,2,3-cd)pyrene	15.32	+0.03	294452	178.64	2800		N
Naphthalene	4.60		12990	11.37	180		N
Phenanthrene	7.46	+0.01	766916	572.79	9000		Y
Pyrene	8.63	+0.01	1079615	649.61	10000		Y

Prep Amount:	10.614 g	**Dilution:**	10
Prep Final Amount:	10.00 mL	**Basis Factor:**	60.20

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23

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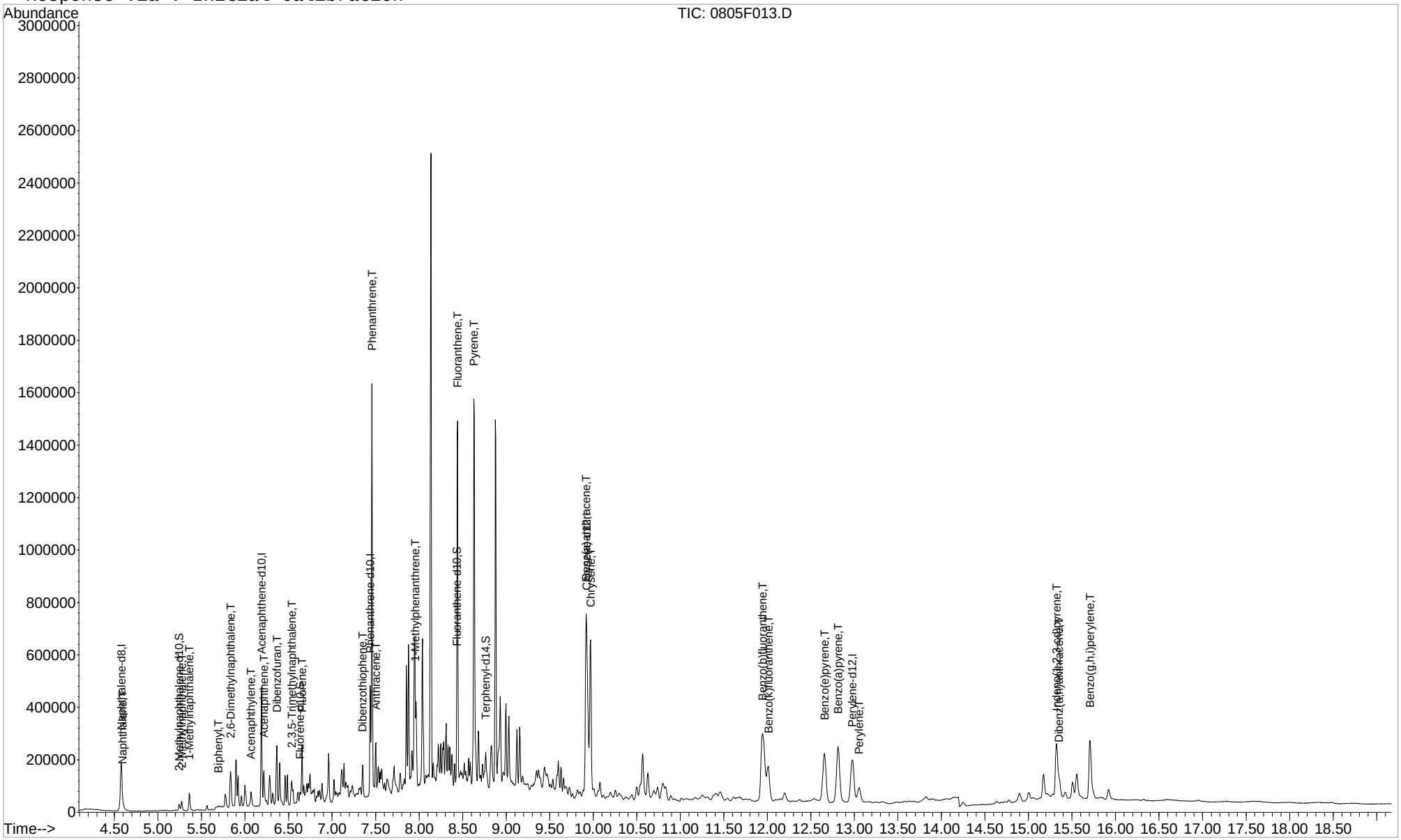
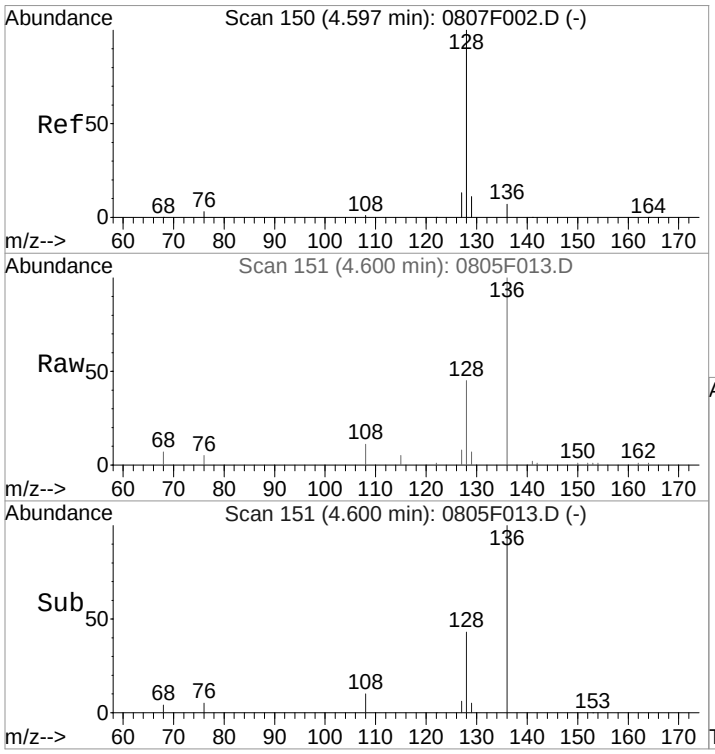
1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F013.D Vial: 13
Acq On : 5 Aug 2024 3:15 pm Operator: EBruno
Sample : K2407810-004 10X Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:15 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration



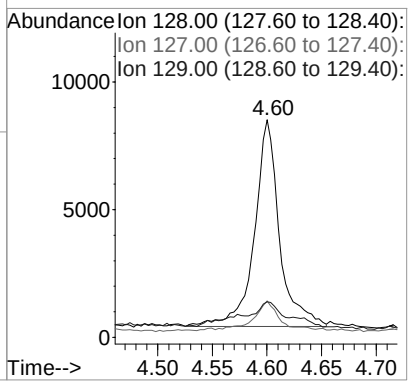
1st 08/08/24
2nd 08/08/24

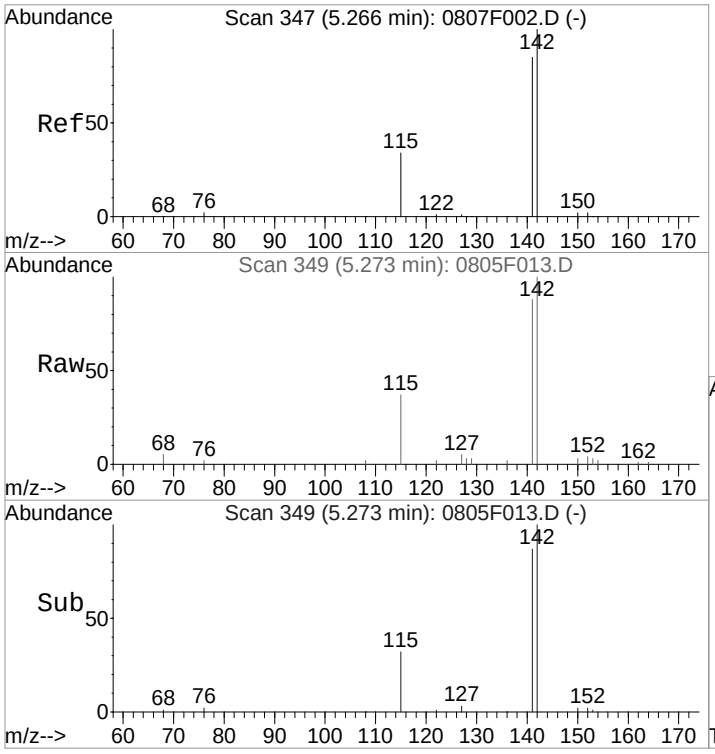


#2
Naphthalene
Concen: 11.37 ng/ml
RT: 4.60 min Scan# 151
Delta R.T. -0.04 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:128 Resp: 12990

Ion	Ratio	Lower	Upper
128	100		
127	14.2	0.0	42.8
129	12.1	0.0	41.5

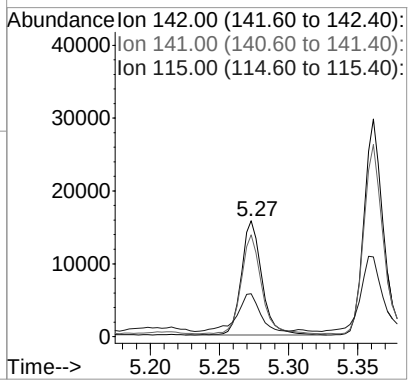




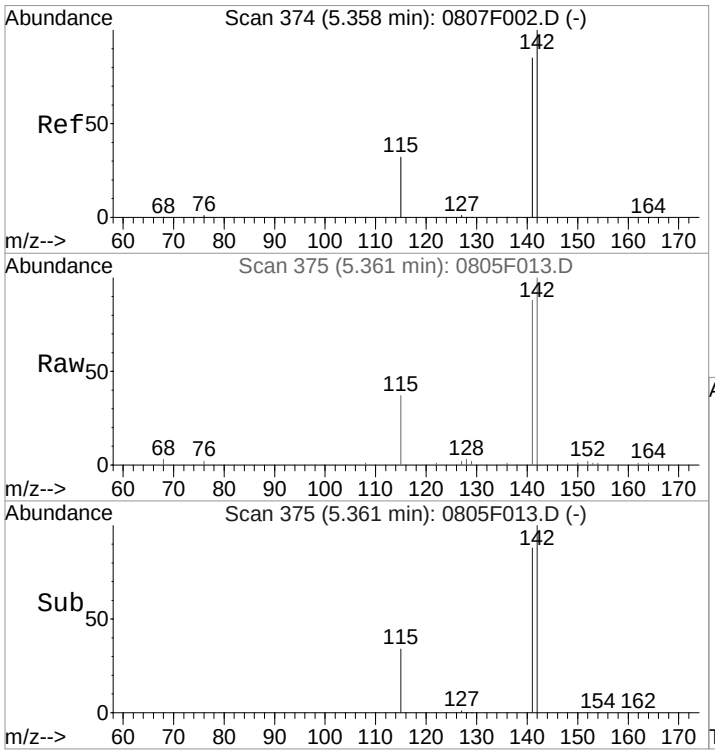
#4
2-Methylnaphthalene
Concen: 21.87 ng/ml
RT: 5.27 min Scan# 349
Delta R.T. -0.03 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:142 Resp: 16220

Ion	Ratio	Lower	Upper
142	100		
141	86.1	52.1	112.1
115	32.3	1.0	61.0



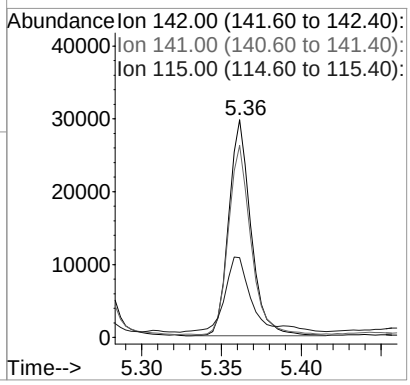
1st 08/08/24
2nd 08/08/24

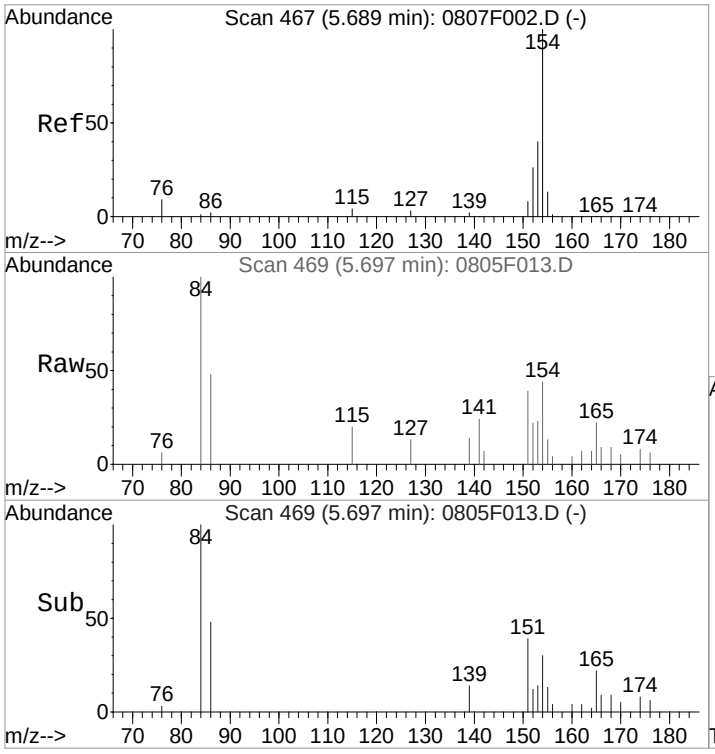


#5
1-Methylnaphthalene
Concen: 41.05 ng/ml
RT: 5.36 min Scan# 375
Delta R.T. -0.03 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:142 Resp: 28651

Ion	Ratio	Lower	Upper
142	100		
141	87.4	55.8	115.8
115	34.3	1.9	61.9

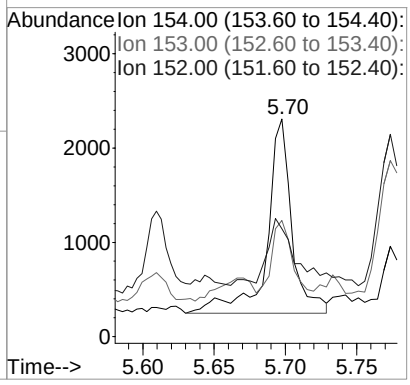




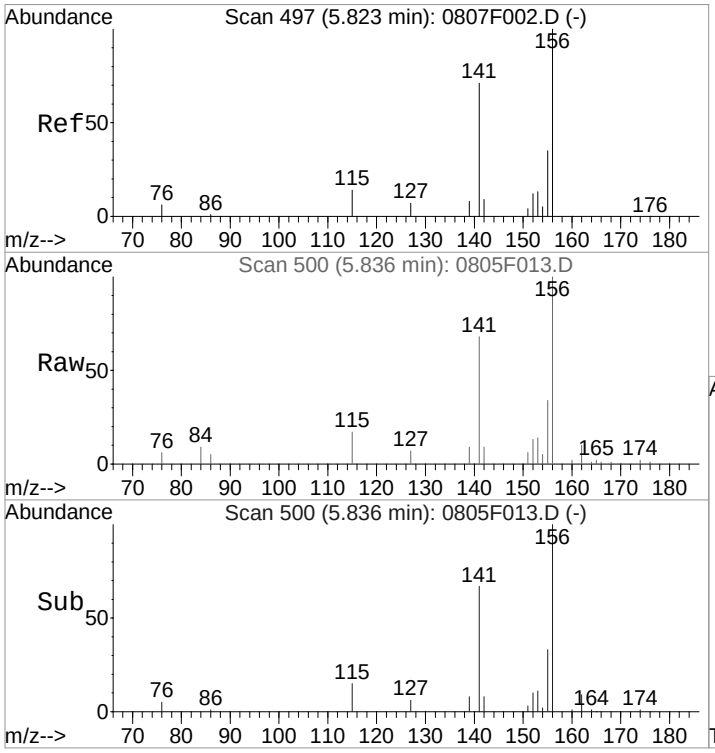
#6
Biphenyl
Concen: 2.75 ng/ml
RT: 5.70 min Scan# 469
Delta R.T. -0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:154 Resp: 2479

Ion	Ratio	Lower	Upper
154	100		
153	40.6	8.6	68.6
152	28.1	0.0	55.8



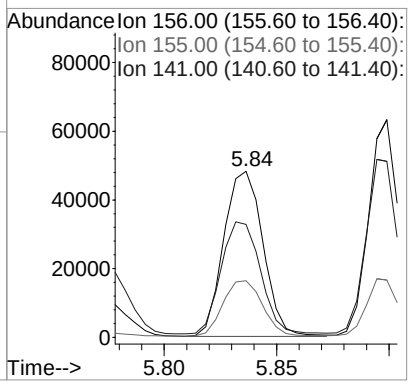
1st 08/08/24
2nd 08/08/24

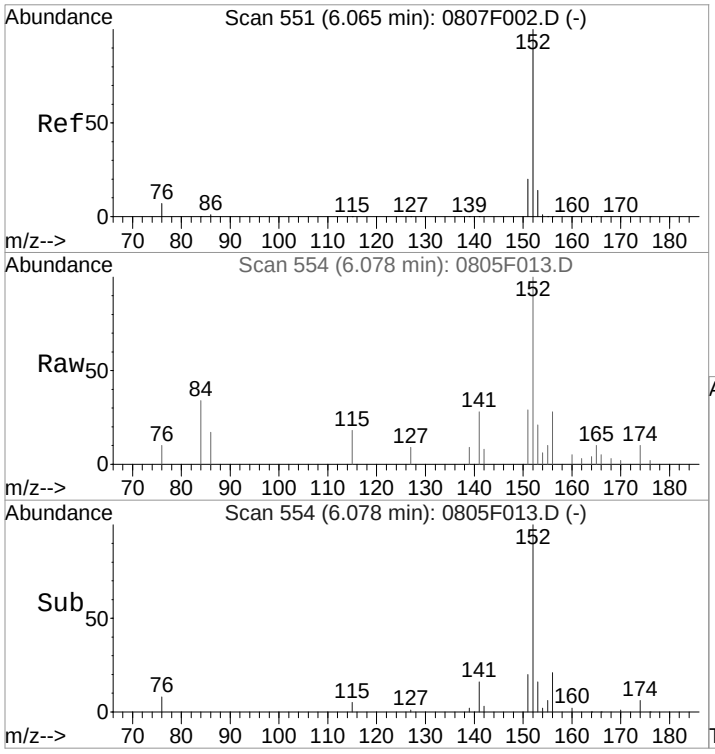


#7
2,6-Dimethylnaphthalene
Concen: 91.25 ng/ml
RT: 5.84 min Scan# 500
Delta R.T. -0.01 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:156 Resp: 58277

Ion	Ratio	Lower	Upper
156	100		
155	33.6	4.7	64.7
141	66.3	39.2	99.2

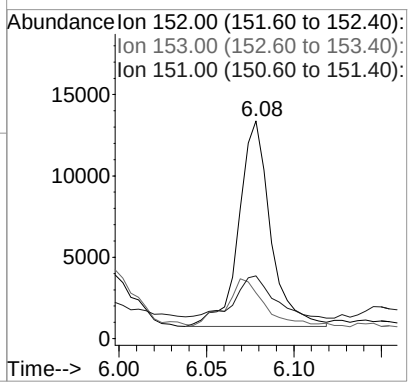


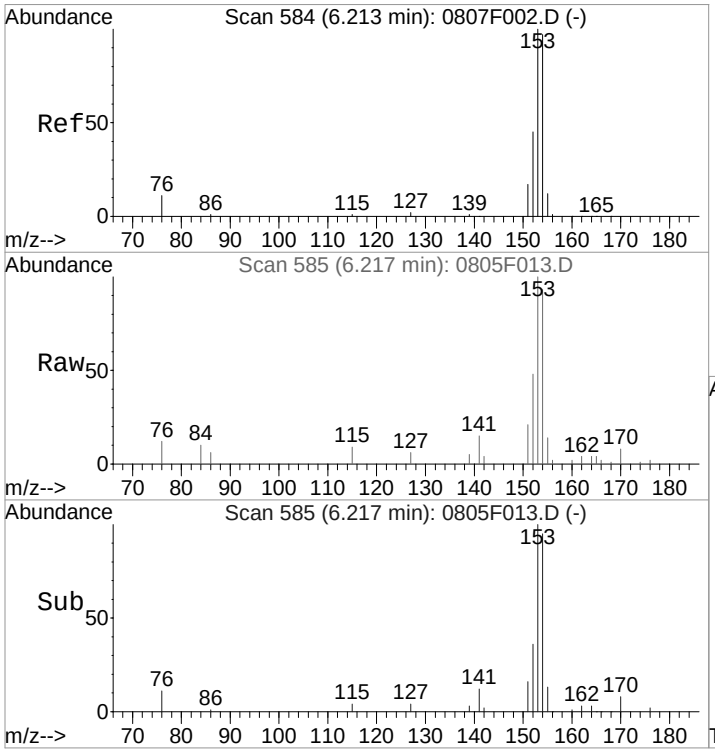


#9
Acenaphthylene
Concen: 13.46 ng/ml
RT: 6.08 min Scan# 554
Delta R.T. -0.01 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:152 Resp: 16007

Ion	Ratio	Lower	Upper
152	100		
153	15.4	0.0	44.2
151	20.5	0.0	49.6

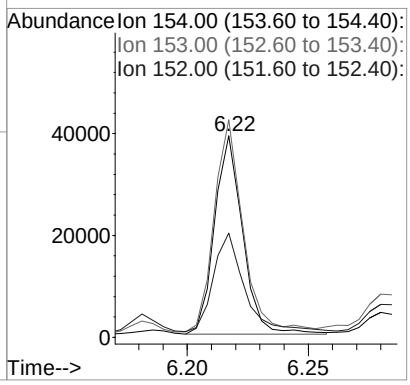


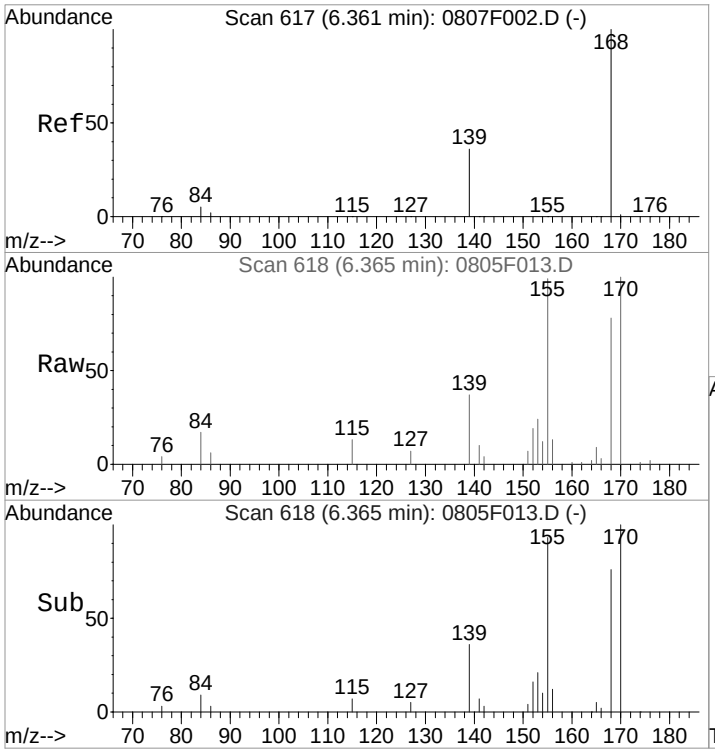


#10
Acenaphthene
Concen: 41.20 ng/ml
RT: 6.22 min Scan# 585
Delta R.T. -0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:154 Resp: 31477

Ion	Ratio	Lower	Upper
154	100		
153	106.8	75.0	135.0
152	49.7	19.6	79.6

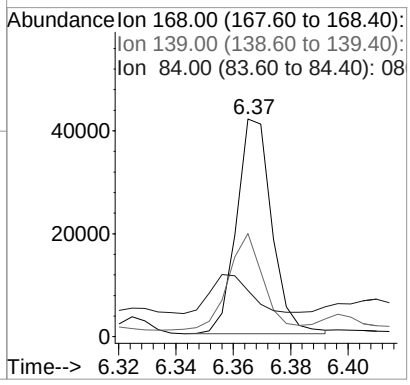


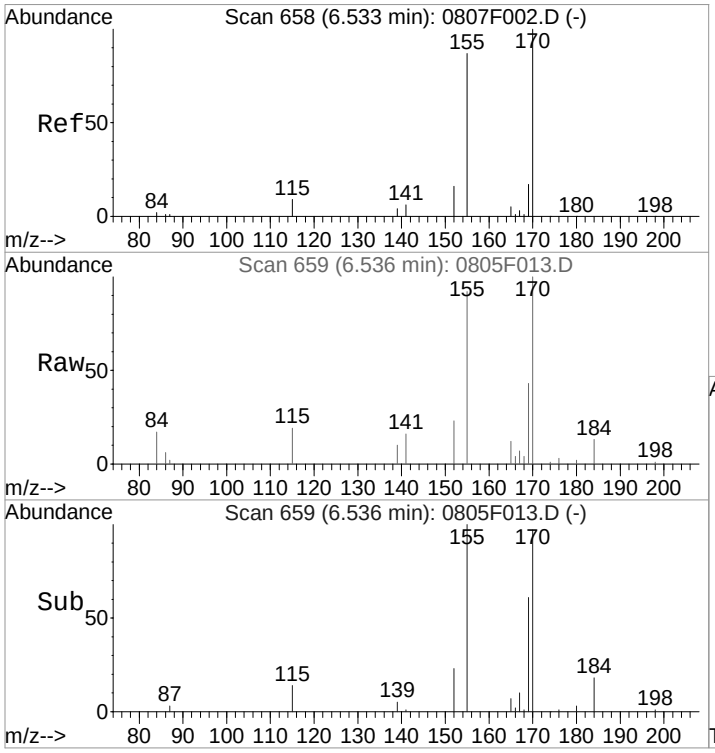


#11
Dibenzofuran
Concen: 31.67 ng/ml m
RT: 6.37 min Scan# 618
Delta R.T. -0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:168 Resp: 35856

Ion	Ratio	Lower	Upper
168	100		
139	47.4	0.0	59.2
84	21.2	0.0	34.2

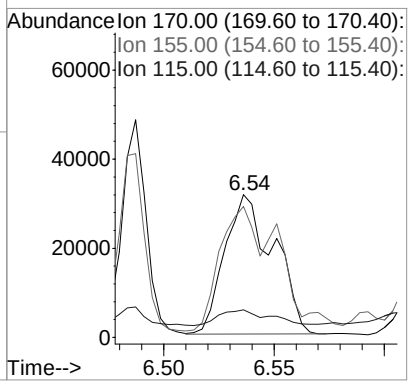


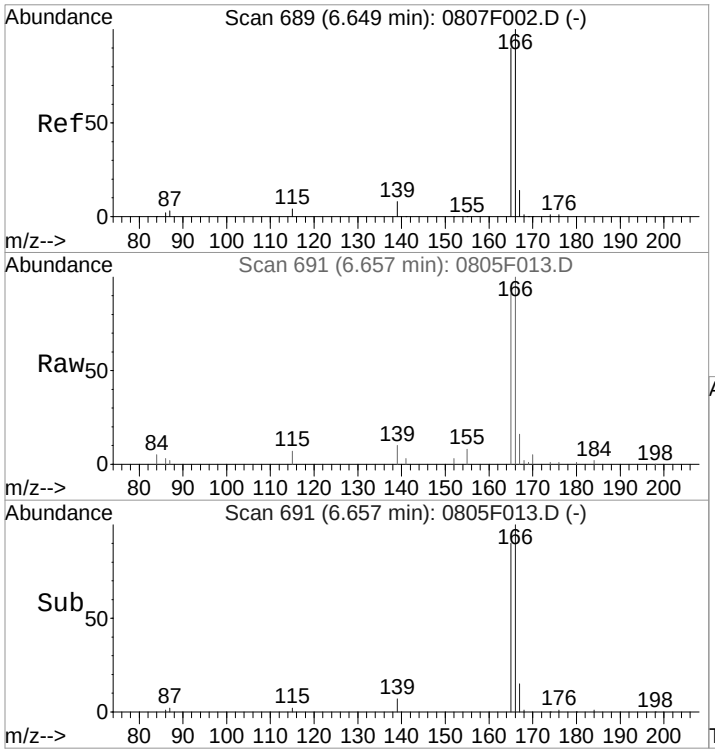


#12
2,3,5-Trimethylnaphthalene
Concen: 67.74 ng/ml
RT: 6.54 min Scan# 659
Delta R.T. -0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:170 Resp: 48464

Ion	Ratio	Lower	Upper
170	100		
155	89.8	52.5	112.5
115	11.2	0.0	38.1

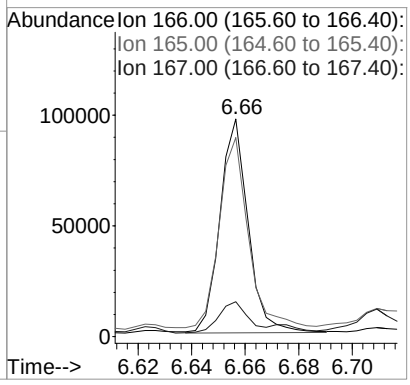


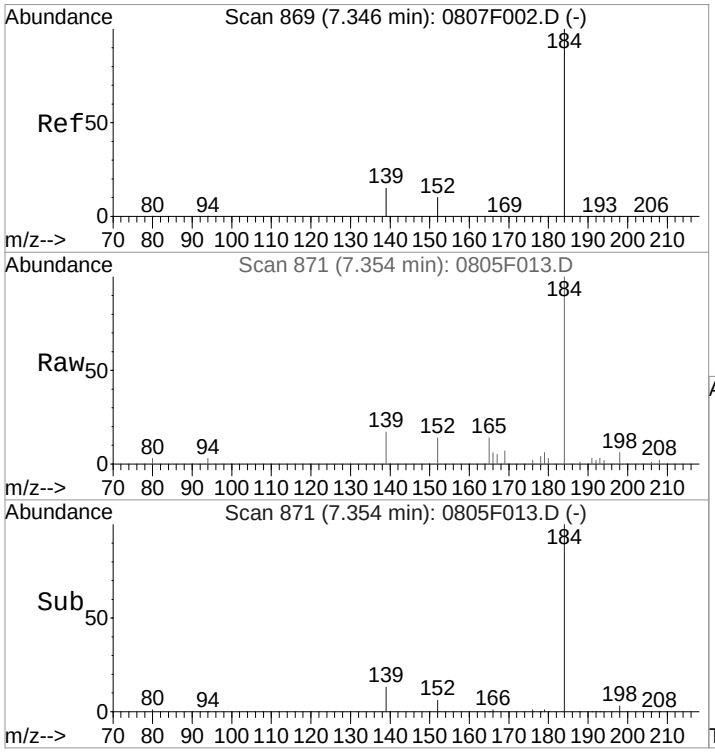


#14
Fluorene
Concen: 80.70 ng/ml
RT: 6.66 min Scan# 691
Delta R.T. -0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:166 Resp: 70877

Ion	Ratio	Lower	Upper
166	100		
165	89.3	56.8	116.8
167	14.7	0.0	44.0

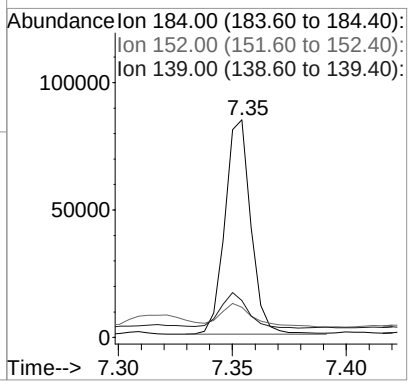


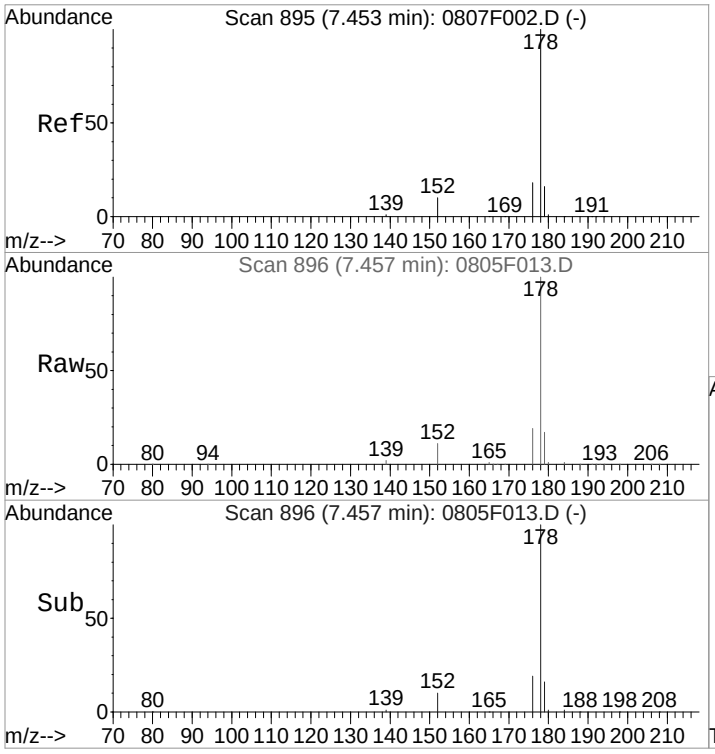


#16
Dibenzothiophene
Concen: 52.03 ng/ml
RT: 7.35 min Scan# 871
Delta R.T. -0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:184 Resp: 67016

Ion	Ratio	Lower	Upper
184	100		
152	9.3	0.0	40.4
139	12.5	0.0	44.9

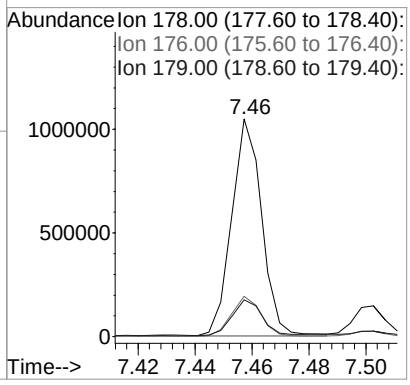


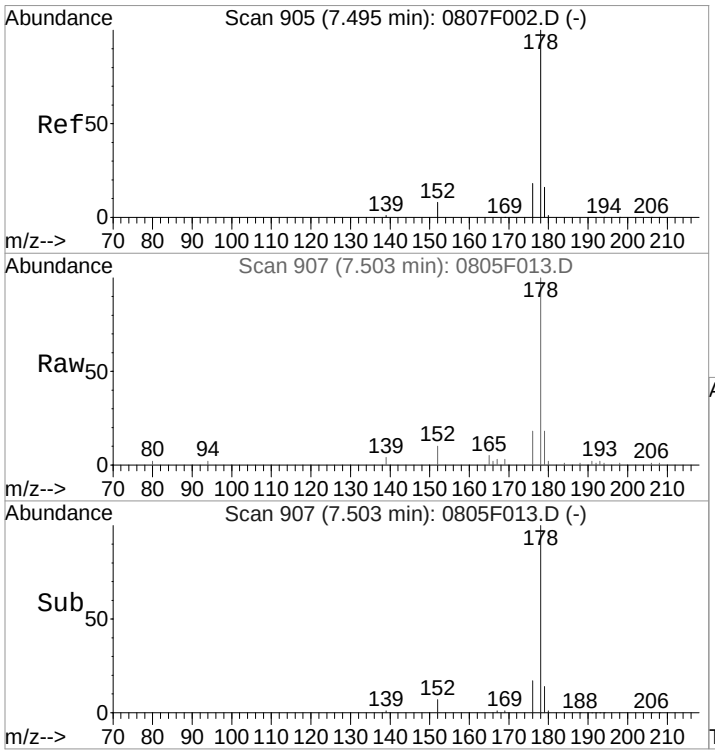


#17
Phenanthrene
Concen: 572.79 ng/ml
RT: 7.46 min Scan# 896
Delta R.T. -0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:178 Resp: 766916

Ion	Ratio	Lower	Upper
178	100		
176	18.5	0.0	47.9
179	16.5	0.0	46.5

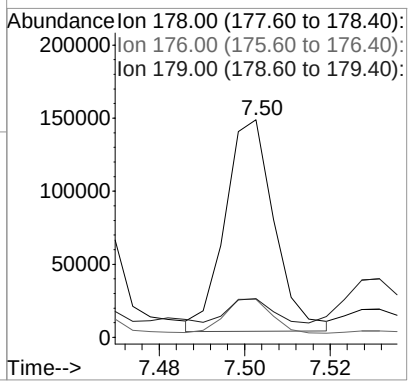


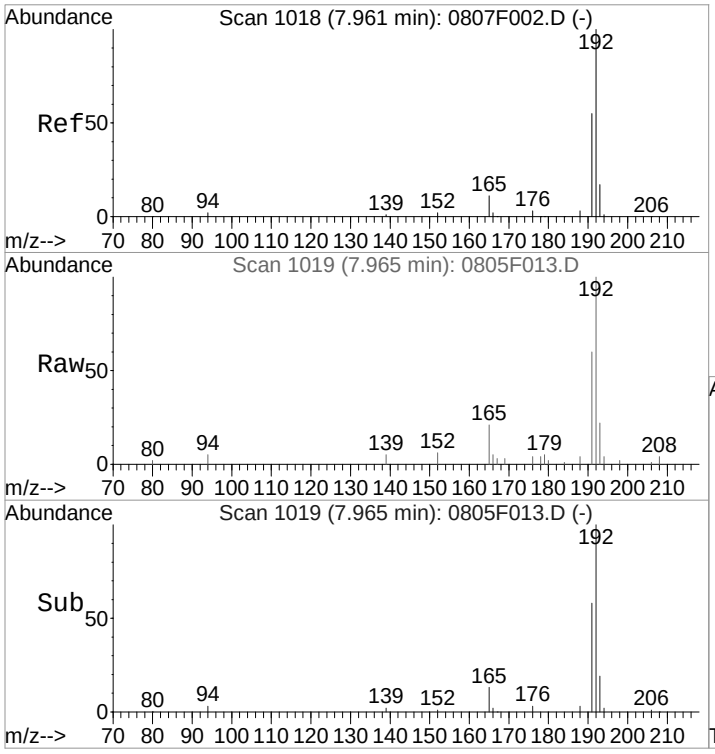


#18
Anthracene
Concen: 92.96 ng/ml
RT: 7.50 min Scan# 907
Delta R.T. -0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:178 Resp: 115932

Ion	Ratio	Lower	Upper
178	100		
176	16.9	0.0	47.8
179	10.3	0.0	46.9

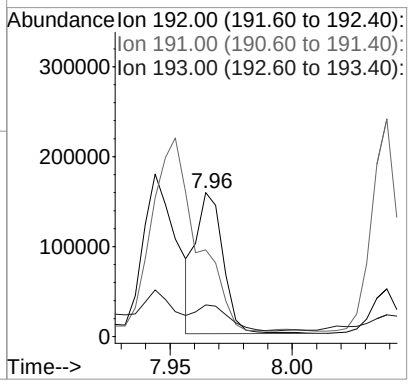


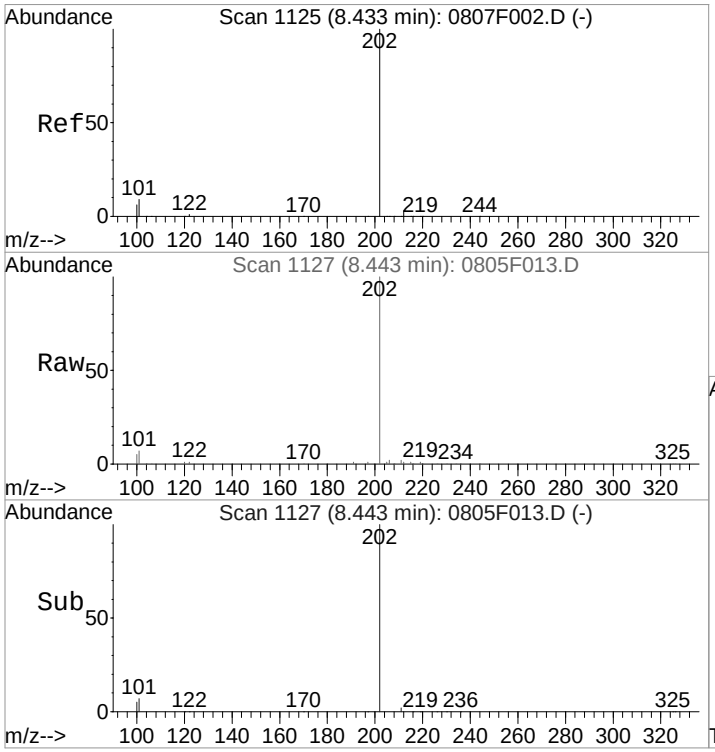


#20
1-Methylphenanthrene
Concen: 121.45 ng/ml
RT: 7.96 min Scan# 1019
Delta R.T. -0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:192 Resp: 120959

Ion	Ratio	Lower	Upper
192	100		
191	57.8	22.7	82.7
193	16.7	0.0	47.5

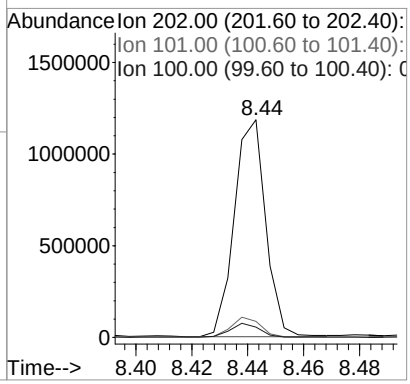


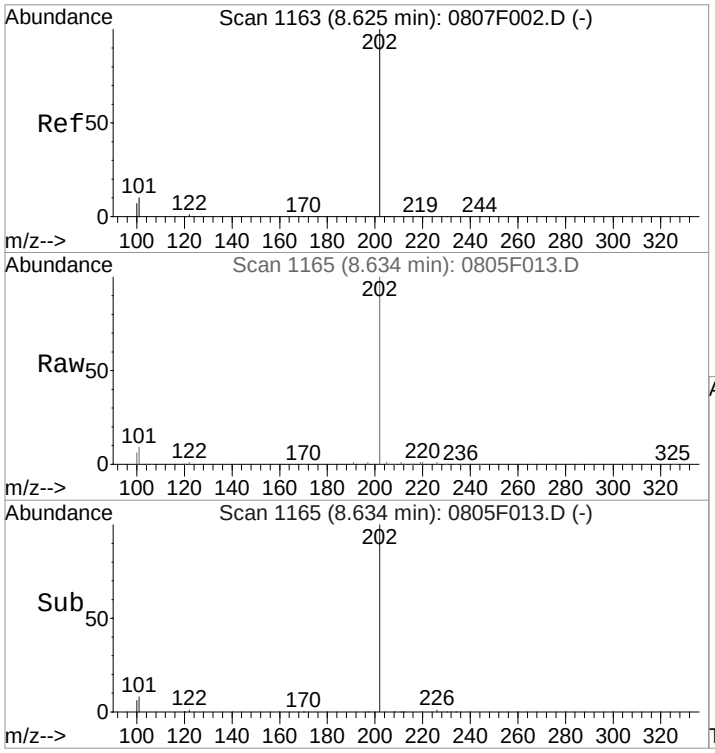


#21
Fluoranthene
Concen: 601.12 ng/ml
RT: 8.44 min Scan# 1127
Delta R.T. -0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:202 Resp: 925142

Ion	Ratio	Lower	Upper
202	100		
101	7.2	0.0	36.9
100	4.7	0.0	34.3

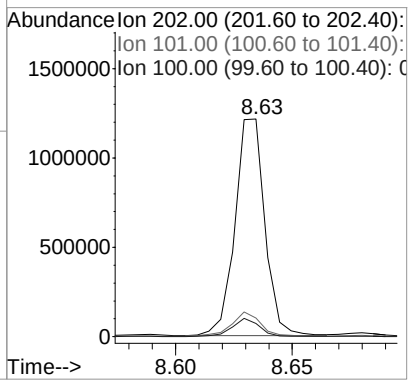


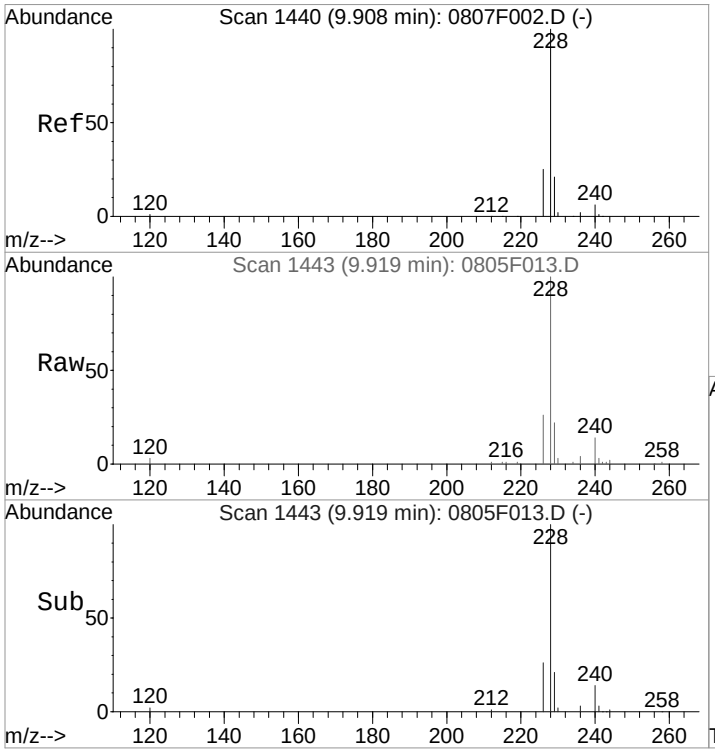


#24
Pyrene
Concen: 649.61 ng/ml
RT: 8.63 min Scan# 1165
Delta R.T. -0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:202 Resp: 1079615

Ion	Ratio	Lower	Upper
202	100		
101	8.5	0.0	41.8
100	6.0	0.0	37.9

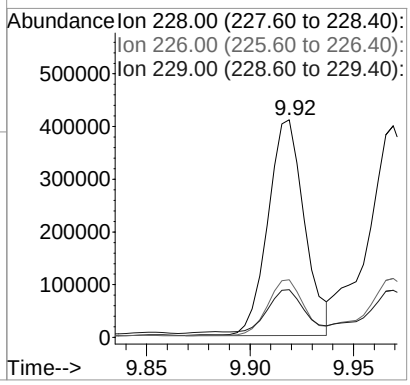


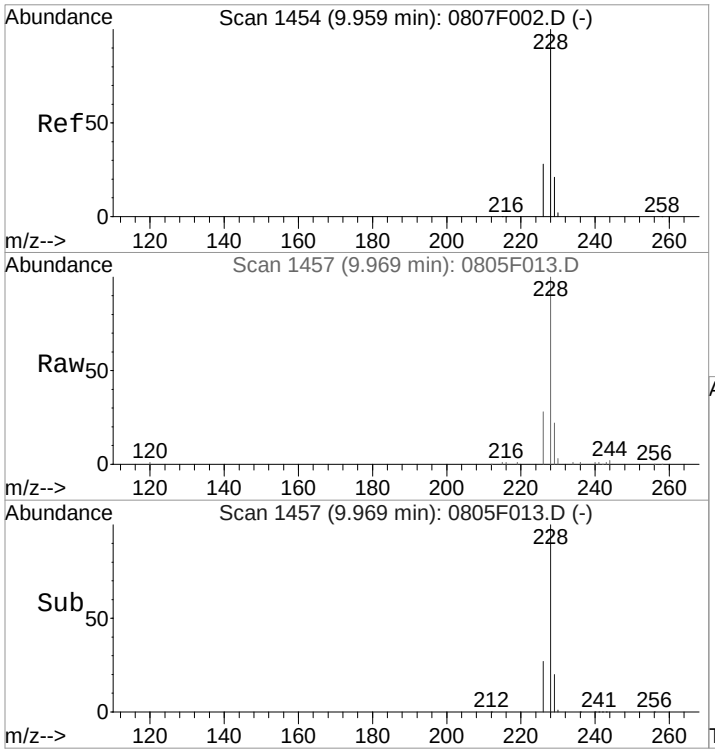


#26
Benz(a)anthracene
Concen: 303.13 ng/ml
RT: 9.92 min Scan# 1443
Delta R.T. -0.03 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:228 Resp: 506427

Ion	Ratio	Lower	Upper
228	100		
226	26.0	0.0	54.6
229	20.2	0.0	50.6

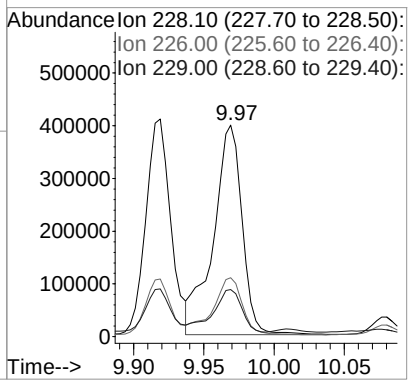


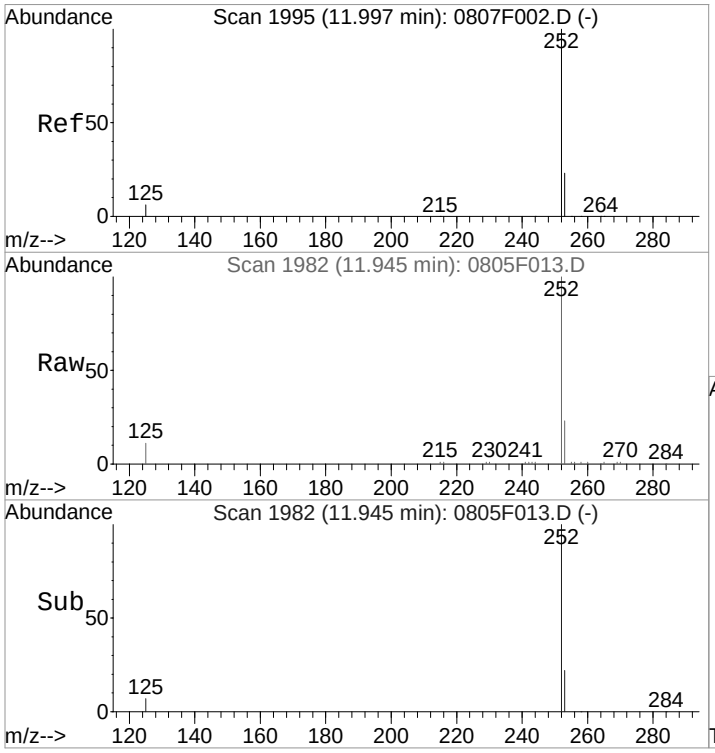


#27
Chrysene
Concen: 359.08 ng/ml
RT: 9.97 min Scan# 1457
Delta R.T. -0.03 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:228 Resp: 571137

Ion	Ratio	Lower	Upper
228	100		
226	27.4	0.0	57.3
229	20.4	0.0	50.7

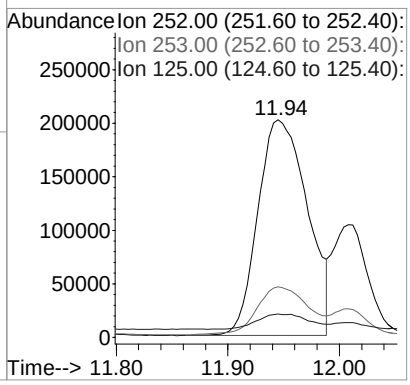


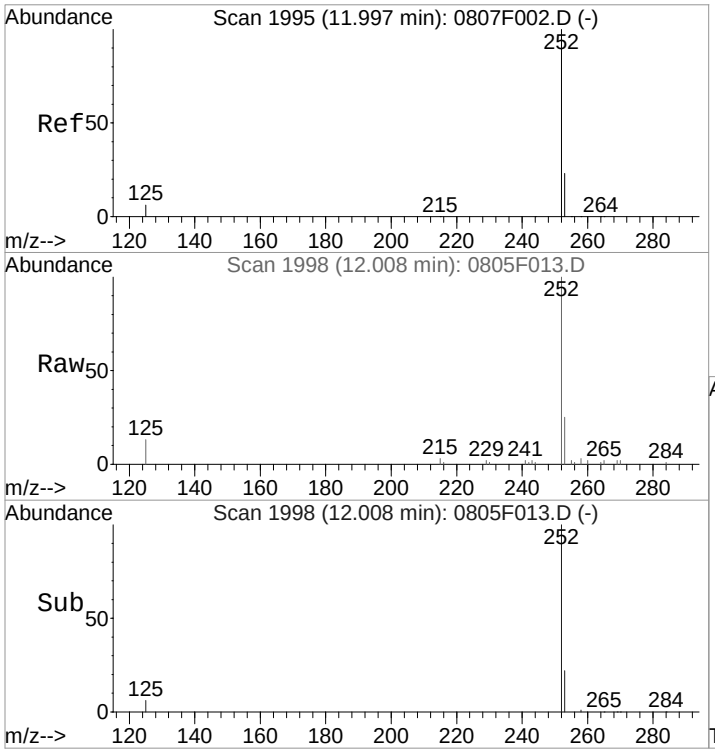


#29
Benzo(b)fluoranthene
Concen: 314.65 ng/ml
RT: 11.94 min Scan# 1982
Delta R.T. 0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:252 Resp: 625139

Ion	Ratio	Lower	Upper
252	100		
253	22.3	0.0	52.5
125	6.9	0.0	36.1

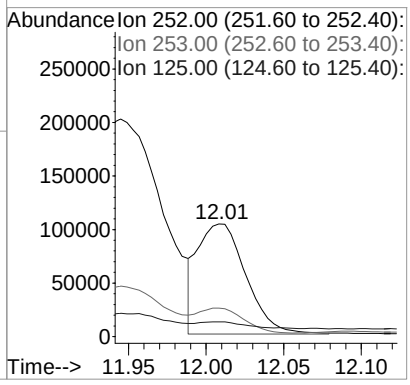




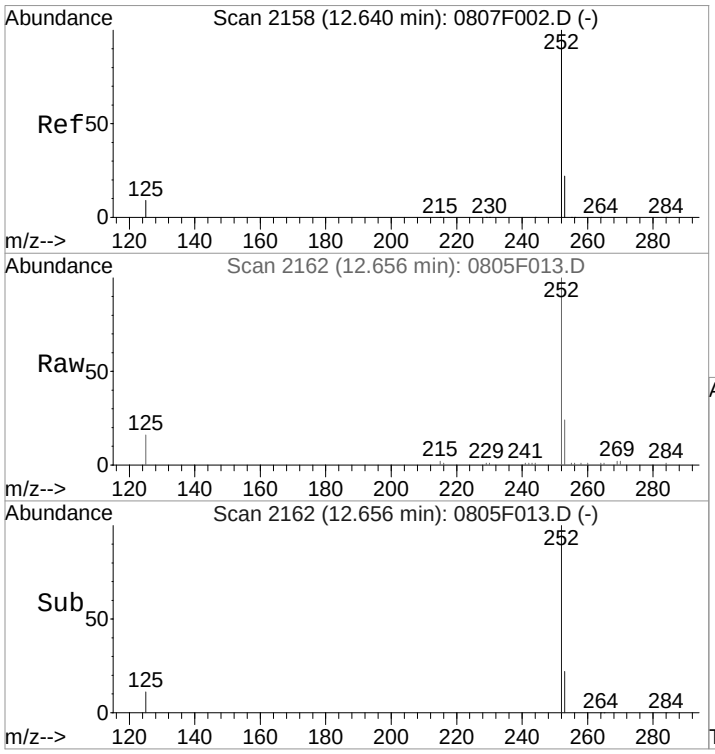
#30
Benzo(k)fluoranthene
Concen: 118.80 ng/ml m
RT: 12.01 min Scan# 1998
Delta R.T. 0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:252 Resp: 222911

Ion	Ratio	Lower	Upper
252	100		
253	25.5	0.0	52.7
125	13.2	0.0	35.9



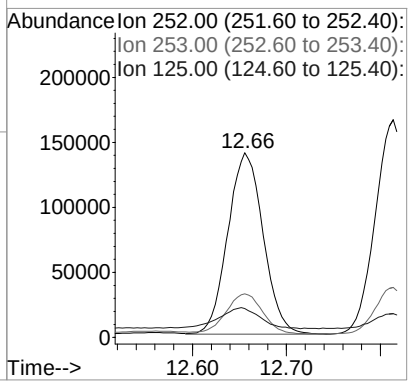
1st 08/08/24
2nd 08/08/24

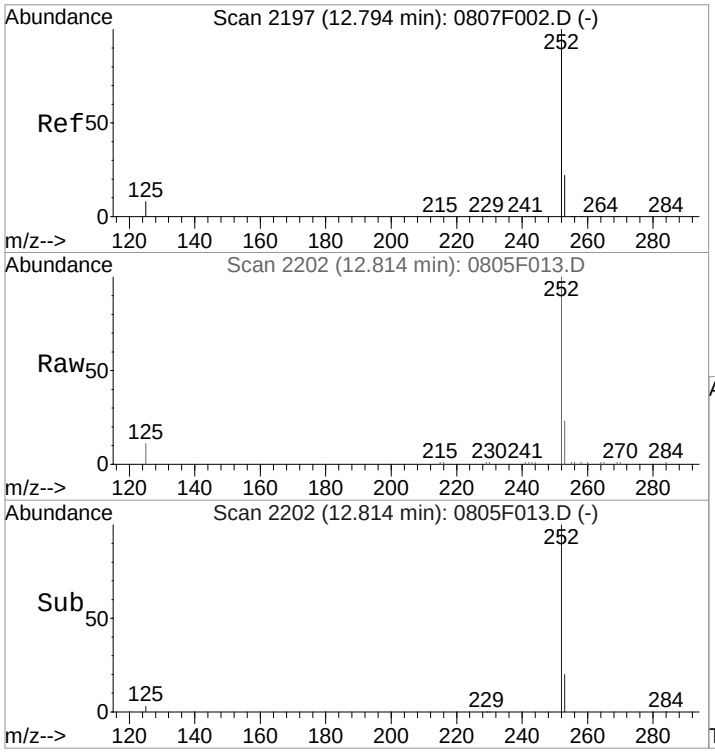


#31
Benzo(e)pyrene
Concen: 196.04 ng/ml
RT: 12.66 min Scan# 2162
Delta R.T. 0.03 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:252 Resp: 364954

Ion	Ratio	Lower	Upper
252	100		
253	22.0	0.0	52.0
125	11.0	0.0	39.2

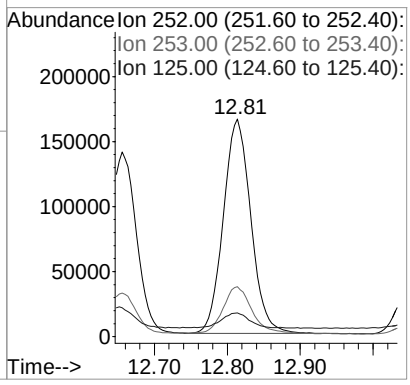


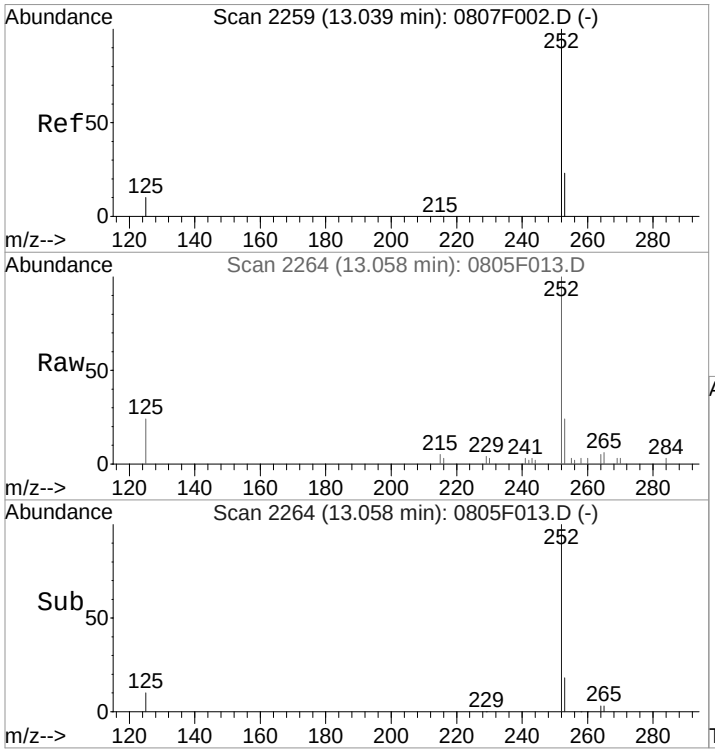


#32
Benzo(a)pyrene
Concen: 273.63 ng/ml
RT: 12.81 min Scan# 2202
Delta R.T. 0.04 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:252 Resp: 433998

Ion	Ratio	Lower	Upper
252	100		
253	21.9	0.0	52.3
125	7.0	0.0	36.9

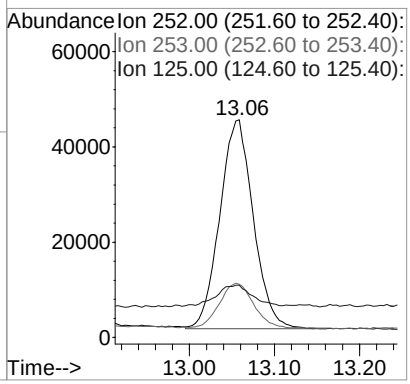


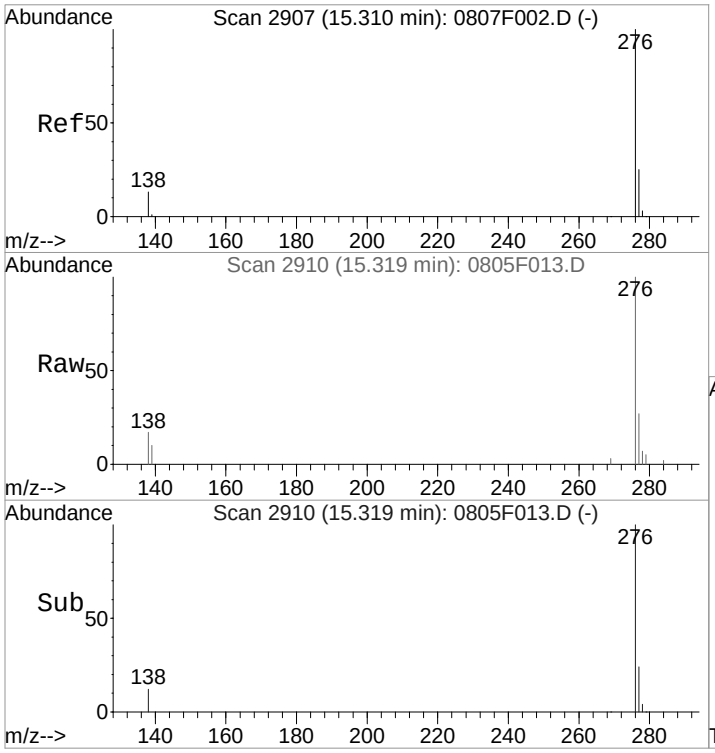


#33
Perylene
Concen: 70.38 ng/ml
RT: 13.06 min Scan# 2264
Delta R.T. 0.04 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:252 Resp: 120447

Ion	Ratio	Lower	Upper
252	100		
253	20.9	0.0	52.2
125	10.0	0.0	39.2

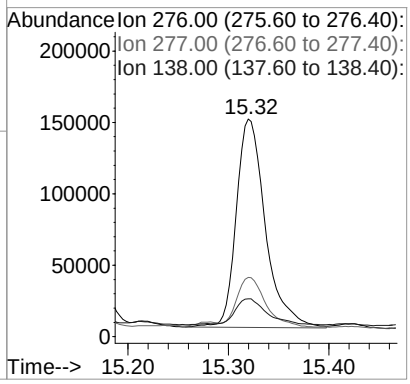


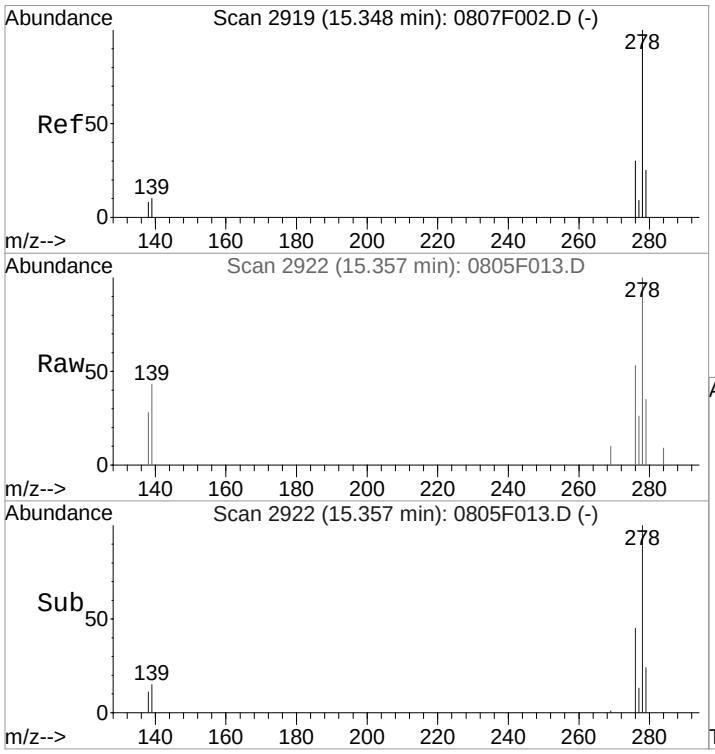


#34
Indeno(1,2,3-cd)pyrene
Concen: 178.64 ng/ml
RT: 15.32 min Scan# 2910
Delta R.T. 0.04 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:276 Resp: 294452

Ion	Ratio	Lower	Upper
276	100		
277	24.0	0.0	55.2
138	12.5	0.0	42.2

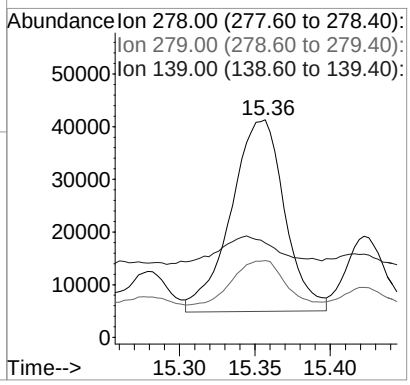


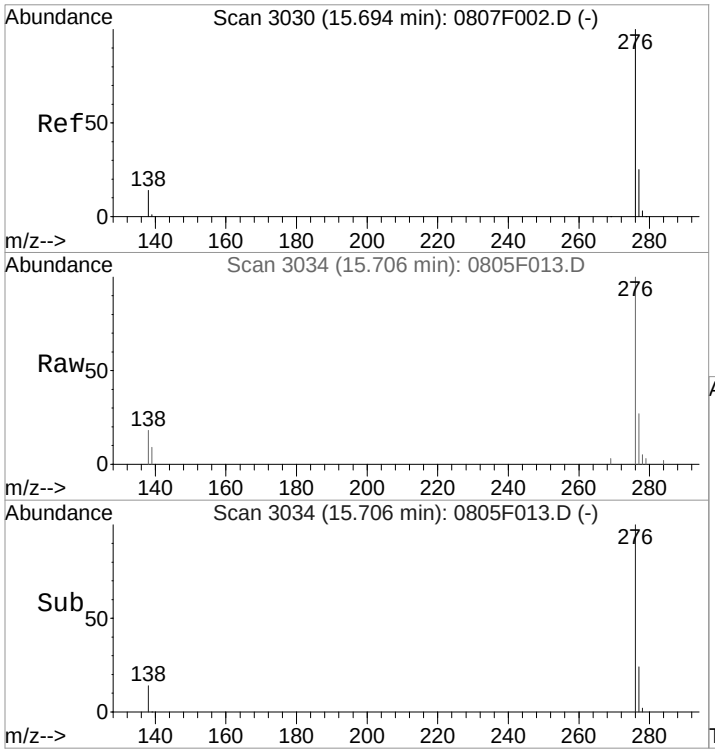


#35
Dibenz(a,h)anthracene
Concen: 48.25 ng/ml
RT: 15.36 min Scan# 2922
Delta R.T. 0.02 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:278 Resp: 89905

Ion	Ratio	Lower	Upper
278	100		
279	24.8	0.0	55.2
139	10.5	0.0	40.4

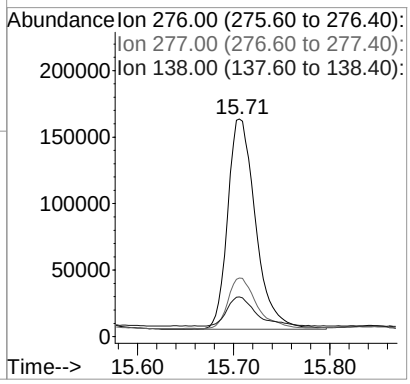




#36
Benzo(g,h,i)perylene
Concen: 146.40 ng/ml
RT: 15.71 min Scan# 3034
Delta R.T. 0.04 min
Lab File: 0805F013.D
Acq: 5 Aug 2024 3:15 pm

Tgt Ion:276 Resp: 319328

Ion	Ratio	Lower	Upper
276	100		
277	23.9	0.0	54.9
138	13.9	0.0	43.8



Quantitation Report (QT Reviewed)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F013.D Vial: 13
Acq On : 5 Aug 2024 3:15 pm Operator: EBruno
Sample : K2407810-004 10X Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 05 16:02:06 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.58	136	238346	200.00	ng/ml	-0.04
8) Acenaphthene-d10	6.19	164	133697	200.00	ng/ml	-0.02
15) Phenanthrene-d10	7.44	188	256455	200.00	ng/ml	-0.02
23) Chrysene-d12	9.93	240	256797	200.00	ng/ml	-0.03
28) Perylene-d12	12.98	264	309910	200.00	ng/ml	0.03
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.24	152	10568	15.85	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	7.92%		
13) Fluorene-d10	6.63	176	14384	18.69	ng/ml	-0.02
Spiked Amount 200.000			Recovery =	9.35%		
22) Fluoranthene-d10	8.43	212	25814m	18.40	ng/ml	-0.02
Spiked Amount 200.000			Recovery =	9.20%		
25) Terphenyl-d14	8.76	244	24502	17.27	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	8.63%		
Target Compounds						Qvalue
2) Naphthalene	4.60	128	12990	11.37	ng/ml	97
4) 2-Methylnaphthalene	5.27	142	16220	21.87	ng/ml	96
5) 1-Methylnaphthalene	5.36	142	28651	41.05	ng/ml	98
6) Biphenyl	5.70	154	2479	2.75	ng/ml	96
7) 2,6-Dimethylnaphthalene	5.84	156	58277	91.25	ng/ml	97
9) Acenaphthylene	6.08	152	16007	13.46	ng/ml	98
10) Acenaphthene	6.22	154	31477	41.20	ng/ml	99
11) Dibenzofuran	6.37	168	35856m	31.67	ng/ml	
12) 2,3,5-Trimethylnaphthalene	6.54	170	48464	67.74	ng/ml	92
14) Fluorene	6.66	166	70877	80.70	ng/ml	97
16) Dibenzothiophene	7.35	184	67016	52.03	ng/ml	95
17) Phenanthrene	7.46	178	766916	572.79	ng/ml	99
18) Anthracene	7.50	178	115932	92.96	ng/ml	92
20) 1-Methylphenanthrene	7.96	192	120959	121.45	ng/ml	94
21) Fluoranthene	8.44	202	925142	601.12	ng/ml	99
24) Pyrene	8.63	202	1079615	649.61	ng/ml	93
26) Benz(a)anthracene	9.92	228	506427	303.13	ng/ml	98
27) Chrysene	9.97	228	571137	359.08	ng/ml	100
29) Benzo(b)fluoranthene	11.94	252	625139	314.65	ng/ml	99
30) Benzo(k)fluoranthene	12.01	252	222911m	118.80	ng/ml	
31) Benzo(e)pyrene	12.66	252	364954	196.04	ng/ml	99
32) Benzo(a)pyrene	12.81	252	433998	273.63	ng/ml	99
33) Perylene	13.06	252	120447	70.38	ng/ml	97
34) Indeno(1,2,3-cd)pyrene	15.32	276	294452	178.64	ng/ml	98
35) Dibenz(a,h)anthracene	15.36	278	89905	48.25	ng/ml	99
36) Benzo(g,h,i)perylene	15.71	276	319328	146.40	ng/ml	99

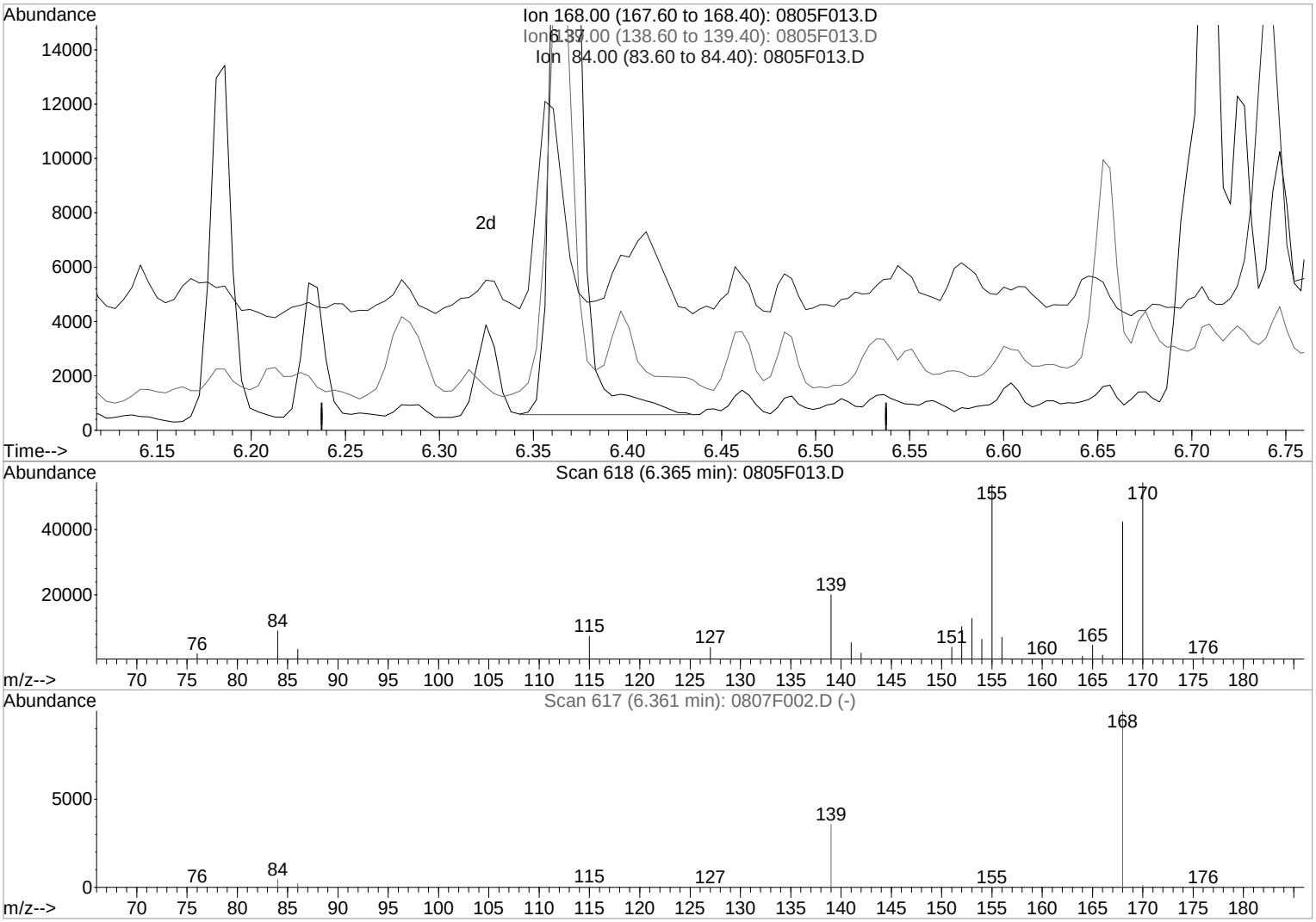
(#) = qualifier out of range (m) = manual integration

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F013.D Vial: 13
Acq On : 5 Aug 2024 3:15 pm Operator: EBruno
Sample : K2407810-004 10X Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 5 16:02 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F013.D

(11) Dibenzofuran (T)

6.37min 34.92ng/ml

response 39541

Ion	Exp%	Act%
168.00	100	100
139.00	29.20	44.57
84.00	4.20	11.25
0.00	0.00	0.00

Manual Integration:

Before

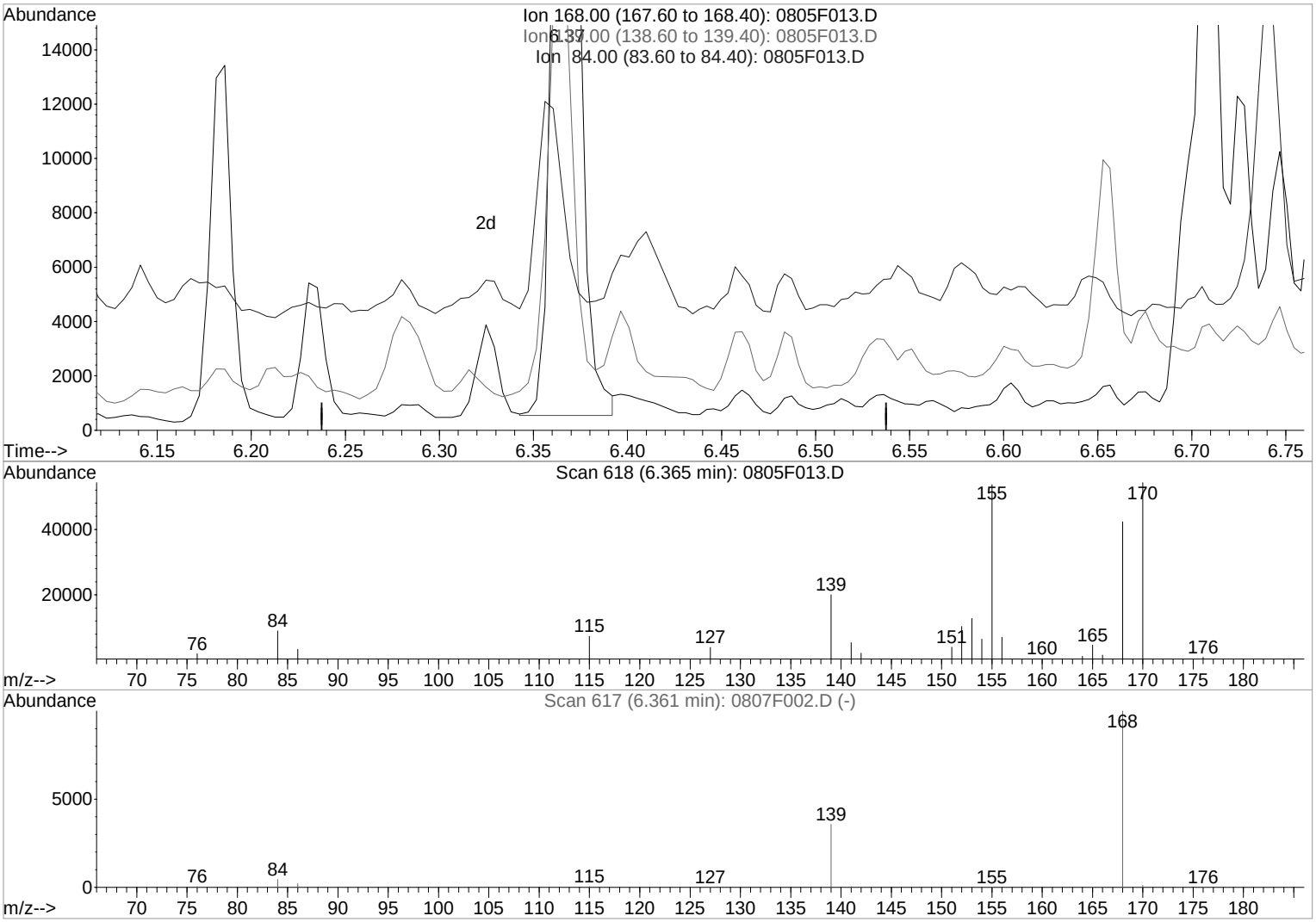
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F013.D Vial: 13
Acq On : 5 Aug 2024 3:15 pm Operator: EBruno
Sample : K2407810-004 10X Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:15 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F013.D

(11) Dibenzofuran (T)

6.37min 31.67ng/ml m

response 35856

Ion	Exp%	Act%
168.00	100	100
139.00	29.20	47.36
84.00	4.20	21.23
0.00	0.00	0.00

Manual Integration:

After

BLC

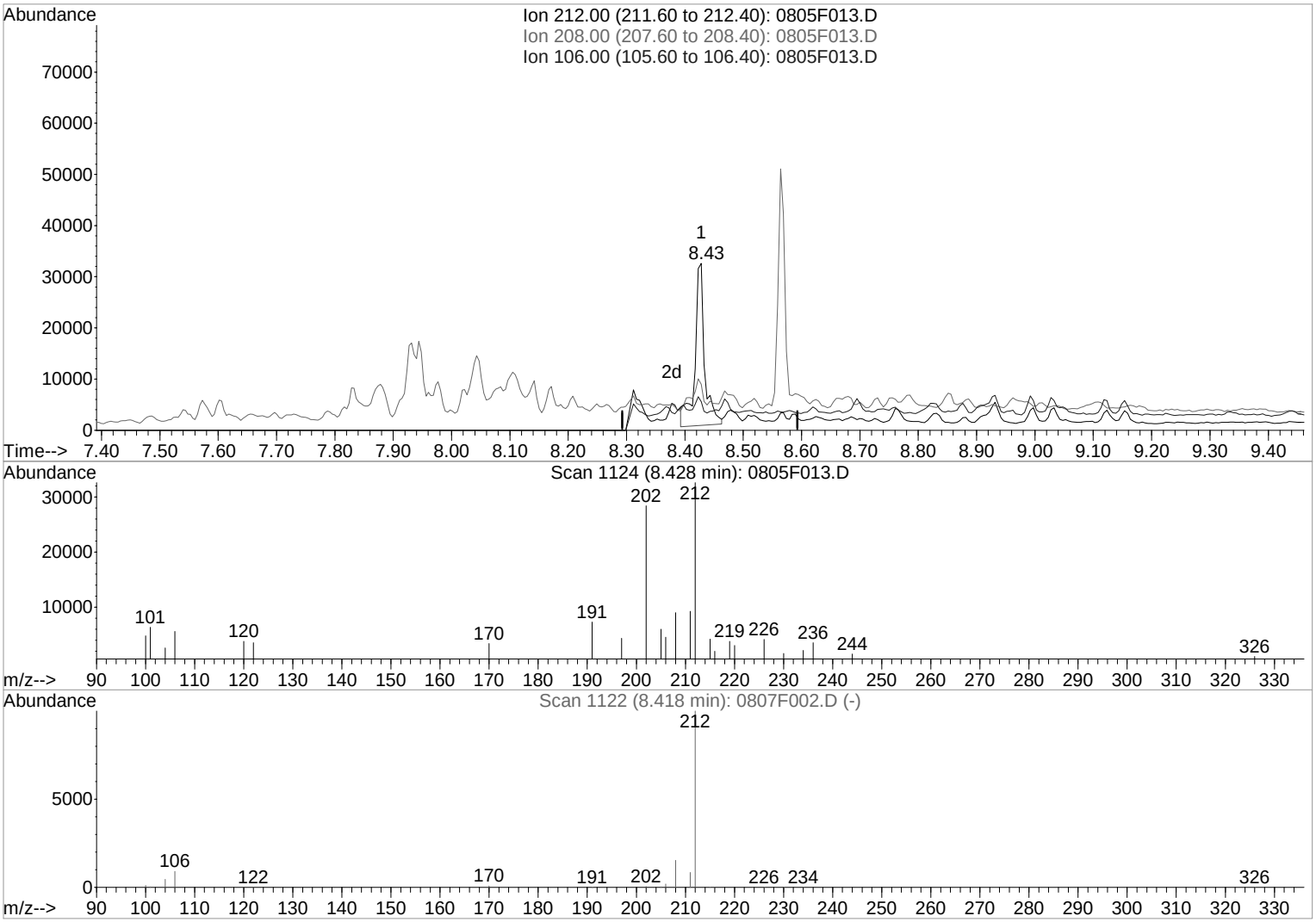
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F013.D Vial: 13
Acq On : 5 Aug 2024 3:15 pm Operator: EBruno
Sample : K2407810-004 10X Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:15 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F013.D

(22) Fluoranthene-d10 (S)

8.43min 26.13ng/ml

response 36659

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	17.04
106.00	10.20	3.36
0.00	0.00	0.00

Manual Integration:

Before

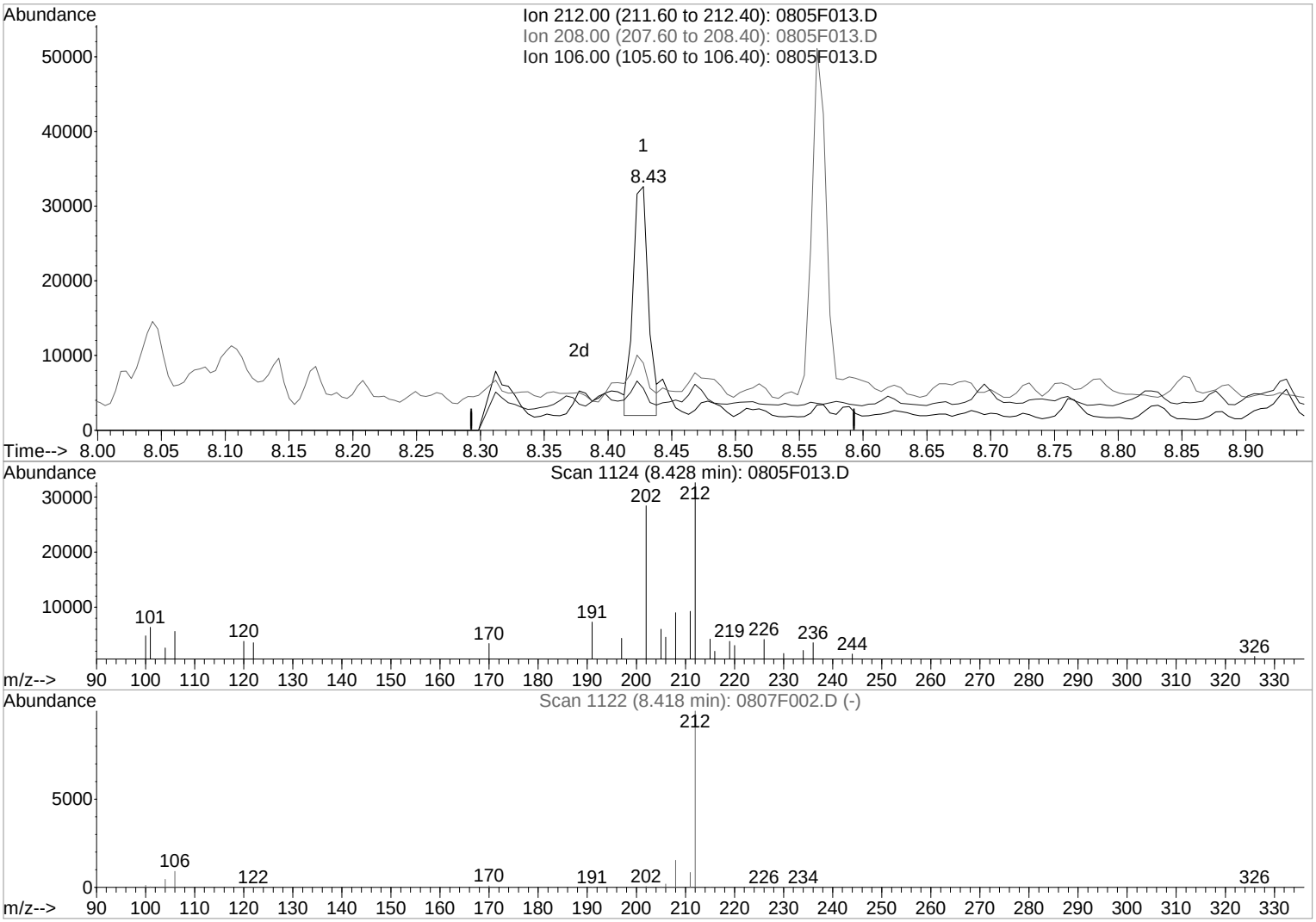
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F013.D Vial: 13
Acq On : 5 Aug 2024 3:15 pm Operator: EBruno
Sample : K2407810-004 10X Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:15 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F013.D

(22) Fluoranthene-d10 (S)

8.43min 18.40ng/ml m

response 25814

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	27.53
106.00	10.20	17.11
0.00	0.00	0.00

Manual Integration:

After

BLC

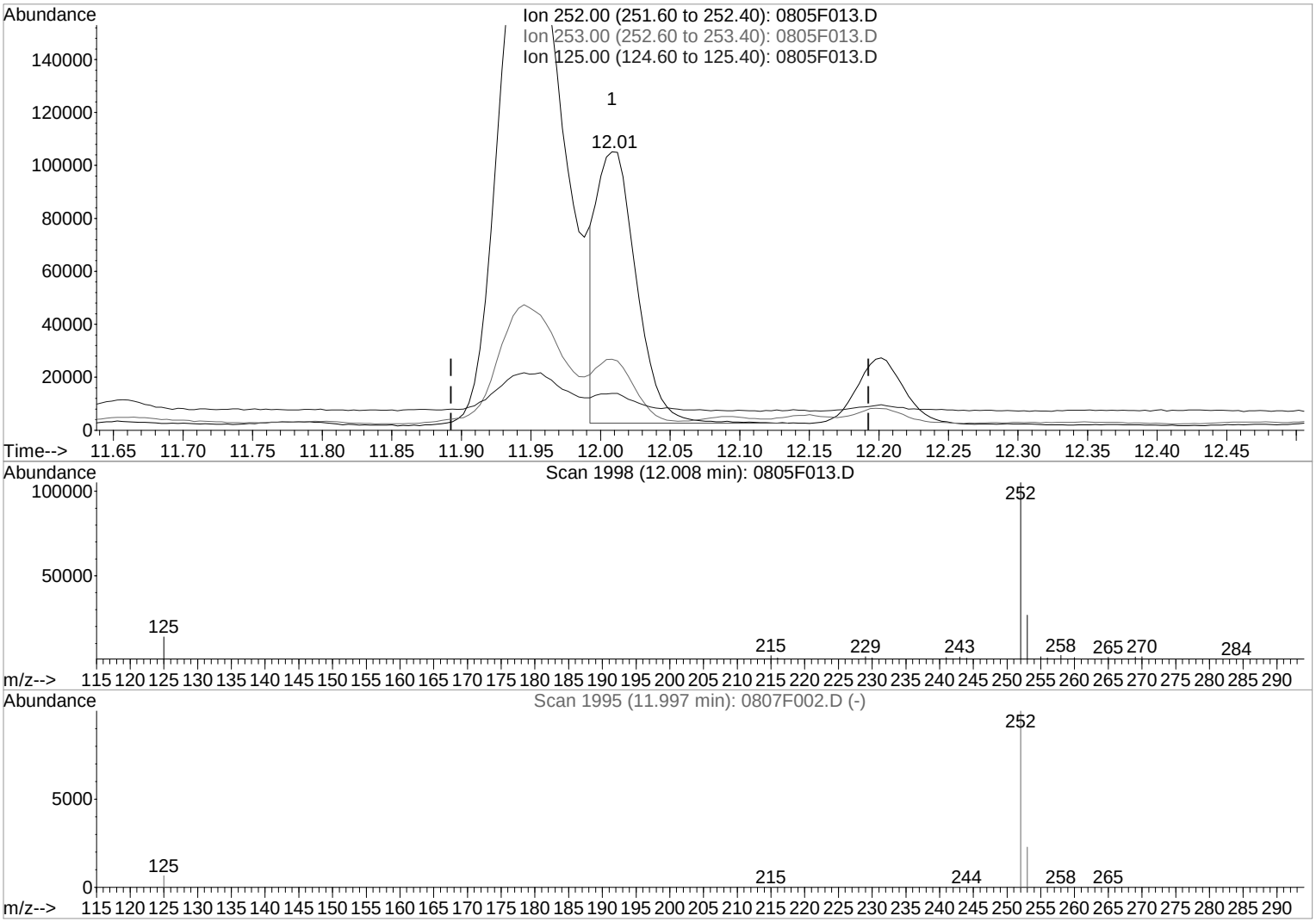
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F013.D Vial: 13
Acq On : 5 Aug 2024 3:15 pm Operator: EBruno
Sample : K2407810-004 10X Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:15 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F013.D

(30) Benzo(k)fluoranthene (T)

12.01min 109.28ng/ml

response 205050

Ion	Exp%	Act%
252.00	100	100
253.00	22.70	21.16
125.00	5.90	6.27
0.00	0.00	0.00

Manual Integration:

Before

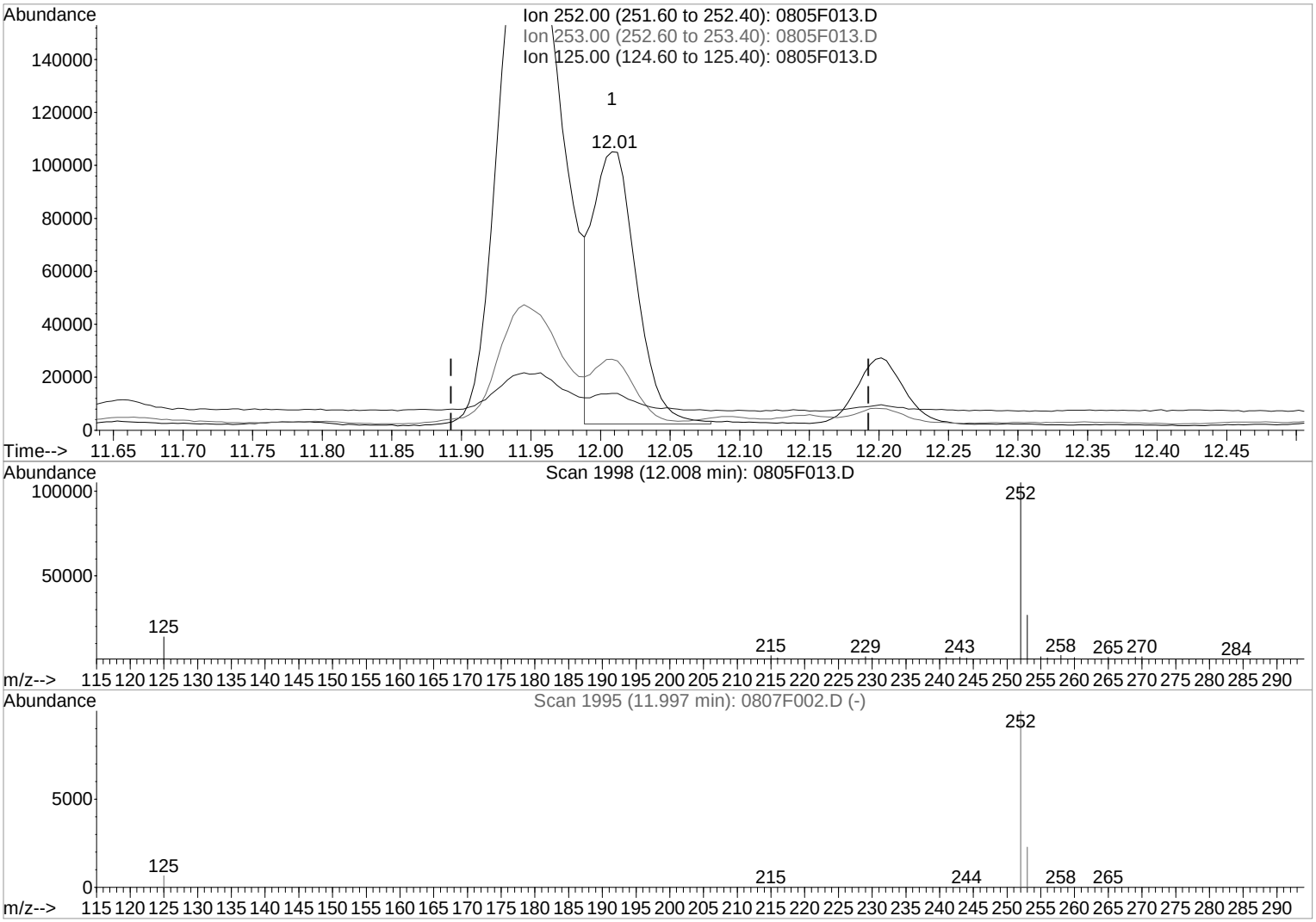
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F013.D Vial: 13
Acq On : 5 Aug 2024 3:15 pm Operator: EBruno
Sample : K2407810-004 10X Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:15 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F013.D

(30) Benzo(k)fluoranthene (T)

12.01min 118.80ng/ml m

response 222911

Ion	Exp%	Act%
252.00	100	100
253.00	22.70	25.47
125.00	5.90	13.19
0.00	0.00	0.00

Manual Integration:

After

BLC

08/08/24

1st 08/08/24
2nd 08/08/24

Validation Report

Data File: J:\MS14\DATA\080524\0805F005.D\
Lab ID: KQ2411801-04
RunType: MB
Matrix: Sediment

Date Acquired: 8/5/24 11:33:00
Batch ID: 849989
Analysis Method: 8270D/PAH SIM

Validations

Validation Categories	Pass	Fail
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery		X
Internal Standards	X	
Surrogates	X	
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Continuing Calibration Recovery	Benzo(a)pyrene	22		20	OK, <40

Primary Review: _____

Secondary Review: _____

1st 08/08/24
2nd 08/08/24

Quantitation Report

Data File:	J:\MS14\DATA\080524\0805F005.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 11:33:00	**Vial:**	3
Run Type:	MB	**Dilution:**	1
Lab ID:	KQ2411801-04	**Raw Units:**	ng/mL

Bottle ID:		**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	PAH SIM	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	849989	**Prep Lot:**	442452	**Report Group:**	KQ2411801
Analysis	8270D	**Prep Method:**	EPA 3546		
		Prep Date:	8/1/24		

Title:	Polycyclic Aromatic Hydrocarbons by GC/MS SIM	**Calibration ID:**	KC2400163
		Report List ID:	18909

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Acenaphthene-d10	6.18		146981	200.00	OK
Chrysene-d12	9.91	-0.01	311041	200.00	OK
Naphthalene-d8	4.56	-0.01	272353	200.00	OK
Perylene-d12	12.92		339212	200.00	OK
Phenanthrene-d10	7.43		284281	200.00	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec	% Rec Criteria	Rpt?
Fluoranthene-d10	8.41		304655	195.87	98	28 - 112	Y
Fluorene-d10	6.62		152513	180.30	90	34 - 106	Y
Terphenyl-d14	8.75		293601	170.81	85	32 - 122	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
2-Methylnaphthalene	0.00		0	0.00	0	U	Y
Acenaphthene	0.00		0	0.00	0	U	Y
Acenaphthylene	0.00		0	0.00	0	U	Y
Anthracene	0.00		0	0.00	0	U	Y
Benz(a)anthracene	9.91	+0.01	755	0.37	0.35	J	Y
Benzo(a)pyrene	0.00		0	0.00	0	U	Y
Benzo(b)fluoranthene	0.00		0	0.00	0	U	Y
Benzo(g,h,i)perylene	0.00		0	0.00	0	U	Y
Benzo(k)fluoranthene	0.00		0	0.00	0	U	Y
Chrysene	0.00		0	0.00	0	U	Y
Dibenz(a,h)anthracene	0.00		0	0.00	0	U	Y
Fluoranthene	0.00		0	0.00	0	U	Y
Fluorene	0.00		0	0.00	0	U	Y

1st 08/08/24

2nd 08/08/24

Data File:	J:\MS14\DATA\080524\0805F005.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 11:33:00	**Vial:**	3
Run Type:	MB	**Dilution:**	1
Lab ID:	KQ2411801-04	**Raw Units:**	ng/mL

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Indeno(1,2,3-cd)pyrene	0.00		0	0.00	0	U	Y
Naphthalene	4.58	-0.02	677	0.52	0.49	J	Y
Phenanthrene	0.00		0	0.00	0	U	Y
Pyrene	8.62		769	0.38	0.36	J	Y

Prep Amount:	10.6140 g	**Dilution:**	1
Prep Final Amount:	10.00 mL	**Basis Factor:**	100.00

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23

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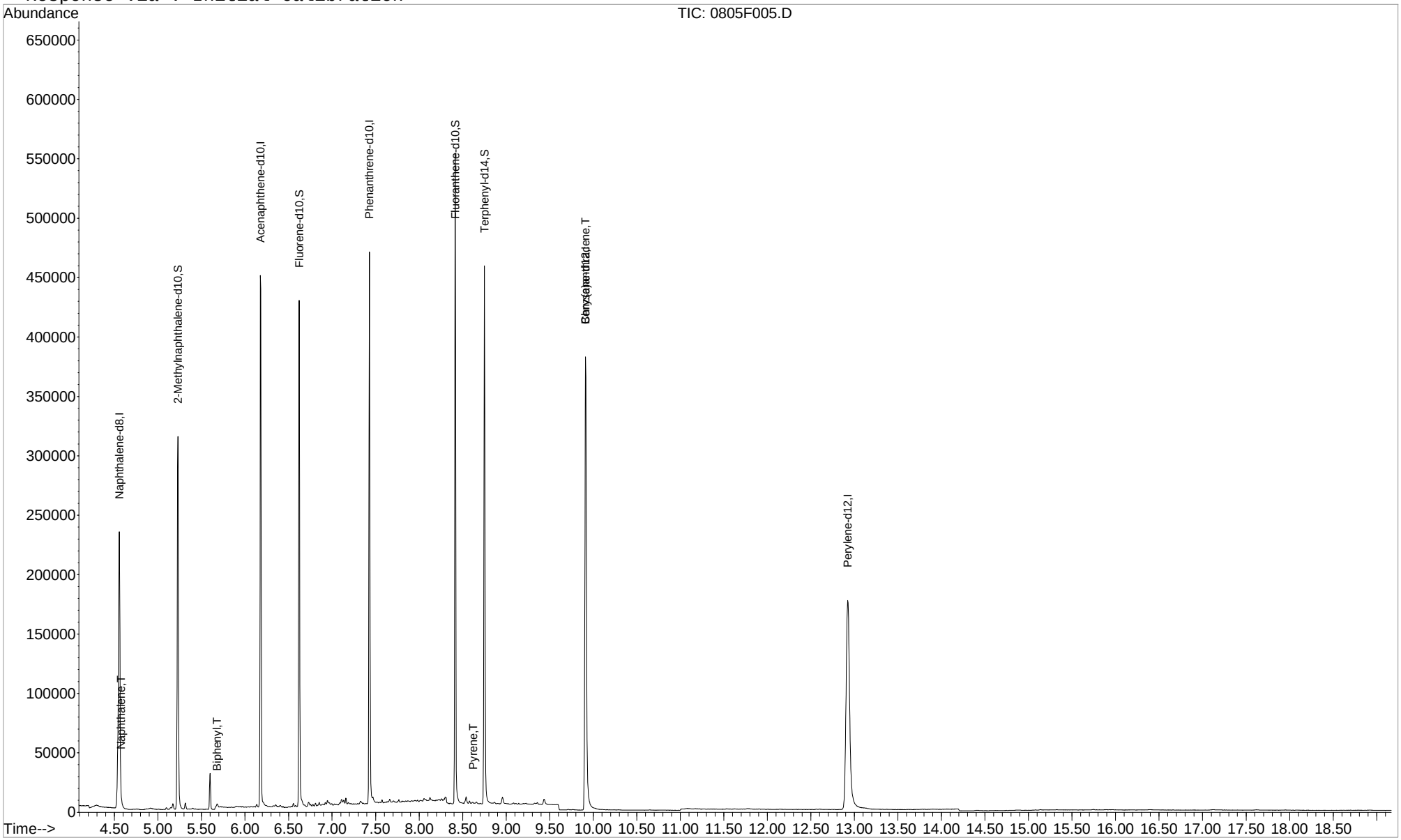
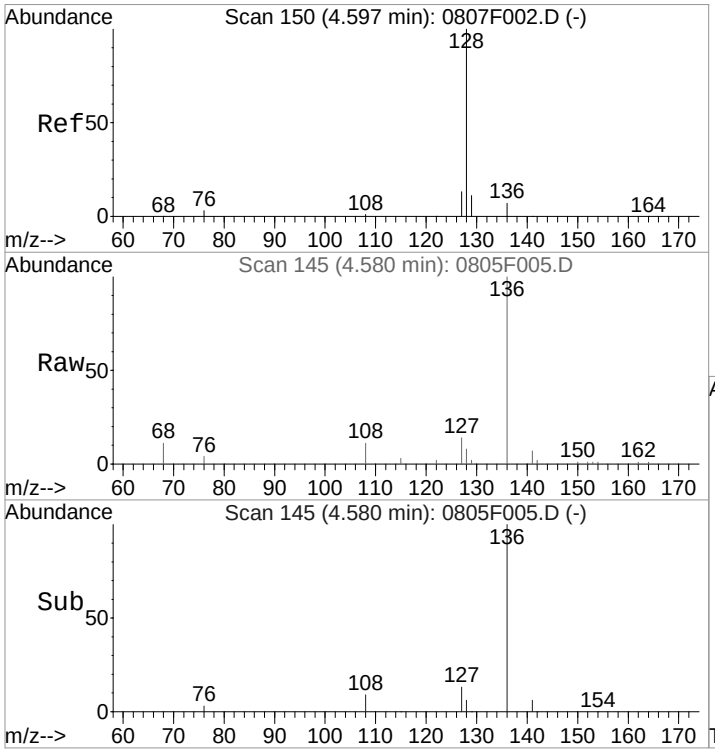
1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F005.D Vial: 5
Acq On : 5 Aug 2024 11:33 am Operator: EBruno
Sample : KQ2411801-04 MB Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:00 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration



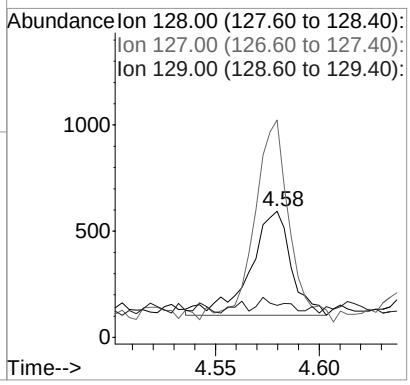
1st 08/08/24
2nd 08/08/24

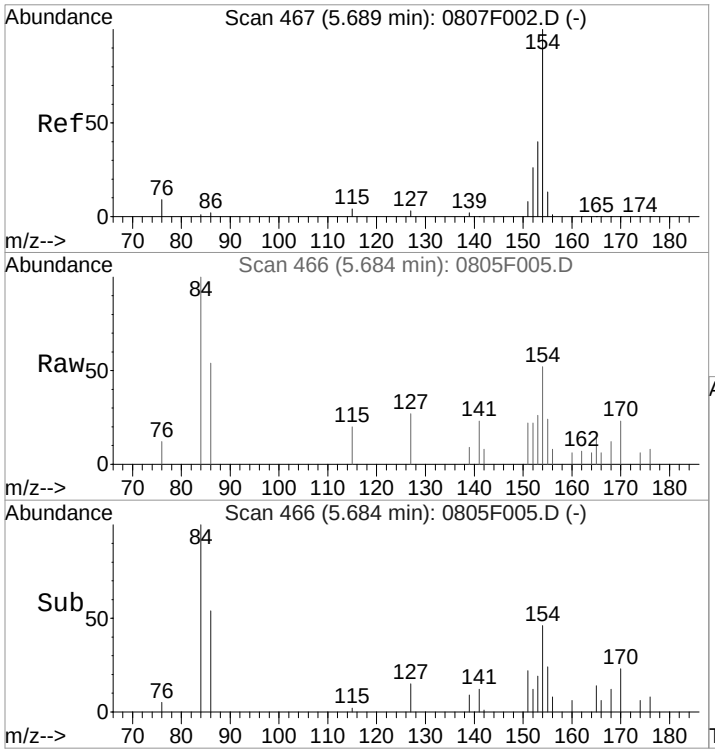


#2
Naphthalene
Concen: 0.52 ng/ml
RT: 4.58 min Scan# 145
Delta R.T. -0.06 min
Lab File: 0805F005.D
Acq: 5 Aug 2024 11:33 am

Tgt Ion:128 Resp: 677

Ion	Ratio	Lower	Upper
128	100		
127	182.9	0.0	42.8#
129	4.9	0.0	41.5

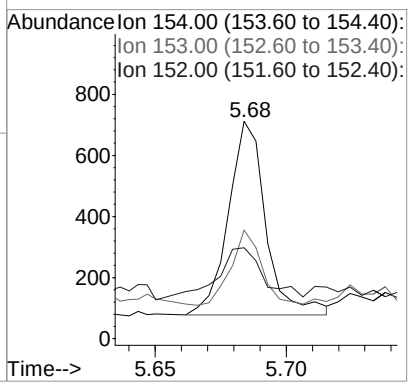


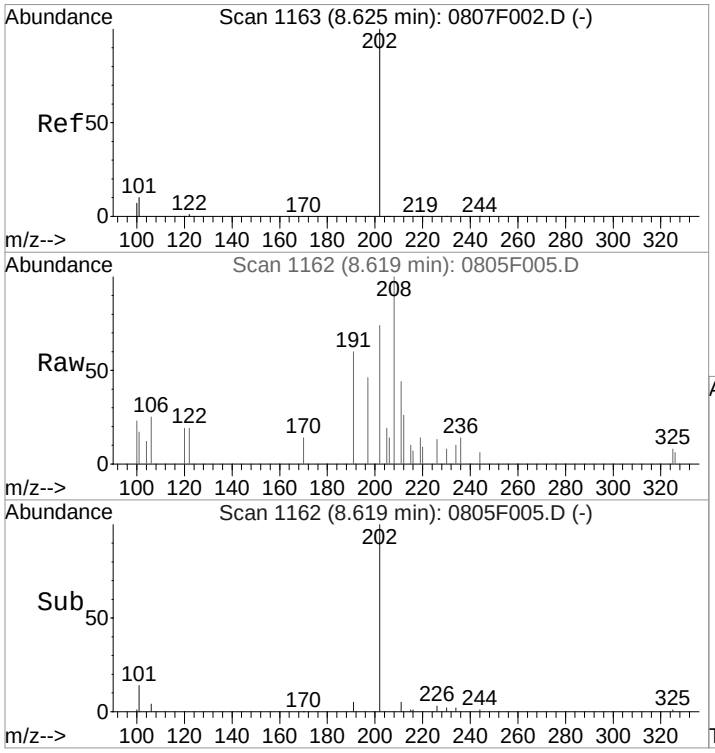


#6
Biphenyl
Concen: 0.61 ng/ml
RT: 5.68 min Scan# 466
Delta R.T. -0.04 min
Lab File: 0805F005.D
Acq: 5 Aug 2024 11:33 am

Tgt Ion:154 Resp: 631

Ion	Ratio	Lower	Upper
154	100		
153	38.2	8.6	68.6
152	22.7	0.0	55.8

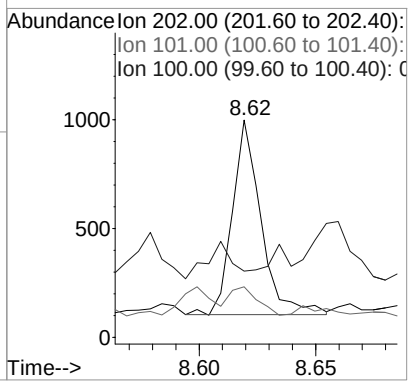


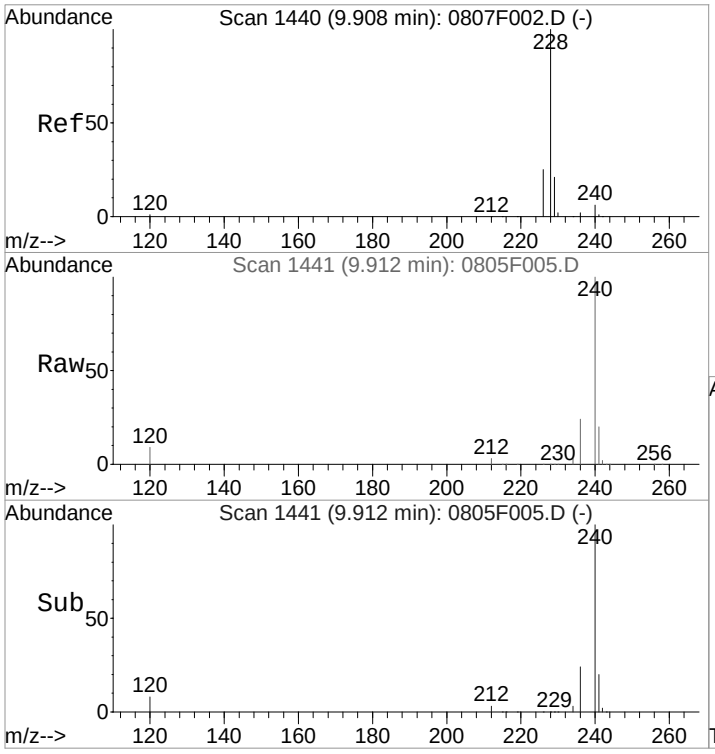


#24
Pyrene
Concen: 0.38 ng/ml
RT: 8.62 min Scan# 1162
Delta R.T. -0.03 min
Lab File: 0805F005.D
Acq: 5 Aug 2024 11:33 am

Tgt Ion:202 Resp: 769

Ion	Ratio	Lower	Upper
202	100		
101	11.1	0.0	41.8
100	3.9	0.0	37.9

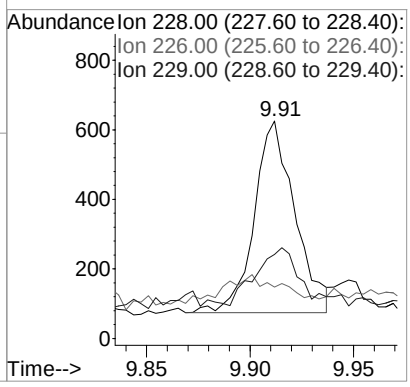




#26
Benz(a)anthracene
Concen: 0.37 ng/ml
RT: 9.91 min Scan# 1441
Delta R.T. -0.04 min
Lab File: 0805F005.D
Acq: 5 Aug 2024 11:33 am

Tgt Ion:228 Resp: 755

Ion	Ratio	Lower	Upper
228	100		
226	8.5	0.0	54.6
229	22.1	0.0	50.6



Quantitation Report (QT Reviewed)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F005.D Vial: 5
Acq On : 5 Aug 2024 11:33 am Operator: EBruno
Sample : KQ2411801-04 MB Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 05 14:59:29 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.56	136	272353	200.00	ng/ml	-0.06
8) Acenaphthene-d10	6.18	164	146981	200.00	ng/ml	-0.03
15) Phenanthrene-d10	7.43	188	284281	200.00	ng/ml	-0.03
23) Chrysene-d12	9.91	240	311041	200.00	ng/ml	-0.05
28) Perylene-d12	12.92	264	339212	200.00	ng/ml	-0.02
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.23	152	130141	170.77	ng/ml	-0.04
Spiked Amount 200.000			Recovery =	85.39%		
13) Fluorene-d10	6.62	176	152513	180.30	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	90.15%		
22) Fluoranthene-d10	8.41	212	304655	195.87	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	97.94%		
25) Terphenyl-d14	8.75	244	293601	170.81	ng/ml	-0.04
Spiked Amount 200.000			Recovery =	85.41%		
Target Compounds						Qvalue
2) Naphthalene	4.58	128	677	0.52	ng/ml#	1
6) Biphenyl	5.68	154	631	0.61	ng/ml	97
24) Pyrene	8.62	202	769	0.38	ng/ml	94
26) Benz(a)anthracene	9.91	228	755	0.37	ng/ml	81

(#) = qualifier out of range (m) = manual integration

1st 08/08/24
2nd 08/08/24

Validation Report

Data File: J:\MS14\DATA\080524\0805F006.D\
Lab ID: KQ2411801-03
RunType: LCS
Matrix: Sediment

Date Acquired: 8/5/24 11:59:00
Batch ID: 849989
Analysis Method: 8270D/PAH SIM

Validations

Validation Categories	Pass	Fail
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery		X
Internal Standards	X	
Surrogates	X	
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Continuing Calibration Recovery	Benzo(a)pyrene	22		20	OK, <40

Primary Review: _____

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Secondary Review: _____

1st 08/08/24
2nd 08/08/24

Quantitation Report

Data File:	J:\MS14\DATA\080524\0805F006.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 11:59:00	**Vial:**	4
Run Type:	LCS	**Dilution:**	1
Lab ID:	KQ2411801-03	**Raw Units:**	ng/mL

Bottle ID:		**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	PAH SIM	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	849989	**Prep Lot:**	442452	**Report Group:**	KQ2411801
Analysis	8270D	**Prep Method:**	EPA 3546		
		Prep Date:	8/1/24		

Title:	Polycyclic Aromatic Hydrocarbons by GC/MS SIM	**Calibration ID:**	KC2400163
		Report List ID:	18909

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Acenaphthene-d10	6.18		135558	200.00	OK
Chrysene-d12	9.91	-0.01	276115	200.00	OK
Naphthalene-d8	4.56	-0.01	269812	200.00	OK
Perylene-d12	12.92		313707	200.00	OK
Phenanthrene-d10	7.43		262466	200.00	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec	% Rec Criteria	Rpt?
Fluoranthene-d10	8.41		275345	191.73	96	28 - 112	Y
Fluorene-d10	6.62		132760	170.18	85	34 - 106	Y
Terphenyl-d14	8.75		266403	174.59	87	32 - 122	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
2-Methylnaphthalene	5.26	-0.01	307498	366.26	366		Y
Acenaphthene	6.21		280697	362.38	362		Y
Acenaphthylene	6.06	-0.01	470763	390.45	390		Y
Anthracene	7.49		518295	406.06	406		Y
Benz(a)anthracene	9.90		793458	441.71	442		Y
Benzo(a)pyrene	12.76	-0.01	807005	502.65	503		Y
Benzo(b)fluoranthene	11.90	-0.01	914509	454.72	455		Y
Benzo(g,h,i)perylene	15.67		848554	384.31	384		Y
Benzo(k)fluoranthene	11.97		861857	453.76	454		Y
Chrysene	9.95		748201	437.49	437		Y
Dibenz(a,h)anthracene	15.32	-0.01	873097	462.91	463		Y
Fluoranthene	8.43		667700	423.91	424		Y
Fluorene	6.65		354686	398.32	398		Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23
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1st 08/08/24

2nd 08/08/24

Data File:	J:\MS14\DATA\080524\0805F006.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 11:59:00	**Vial:**	4
Run Type:	LCS	**Dilution:**	1
Lab ID:	KQ2411801-03	**Raw Units:**	ng/mL

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Indeno(1,2,3-cd)pyrene	15.28	-0.01	790448	473.76	474		Y
Naphthalene	4.58	-0.02	462625	357.64	358		Y
Phenanthrene	7.45		515570	376.25	376		Y
Pyrene	8.62		724684	405.54	406		Y

Prep Amount:	10.00 g	**Dilution:**	1
Prep Final Amount:	10.00 mL	**Basis Factor:**	100.00

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23

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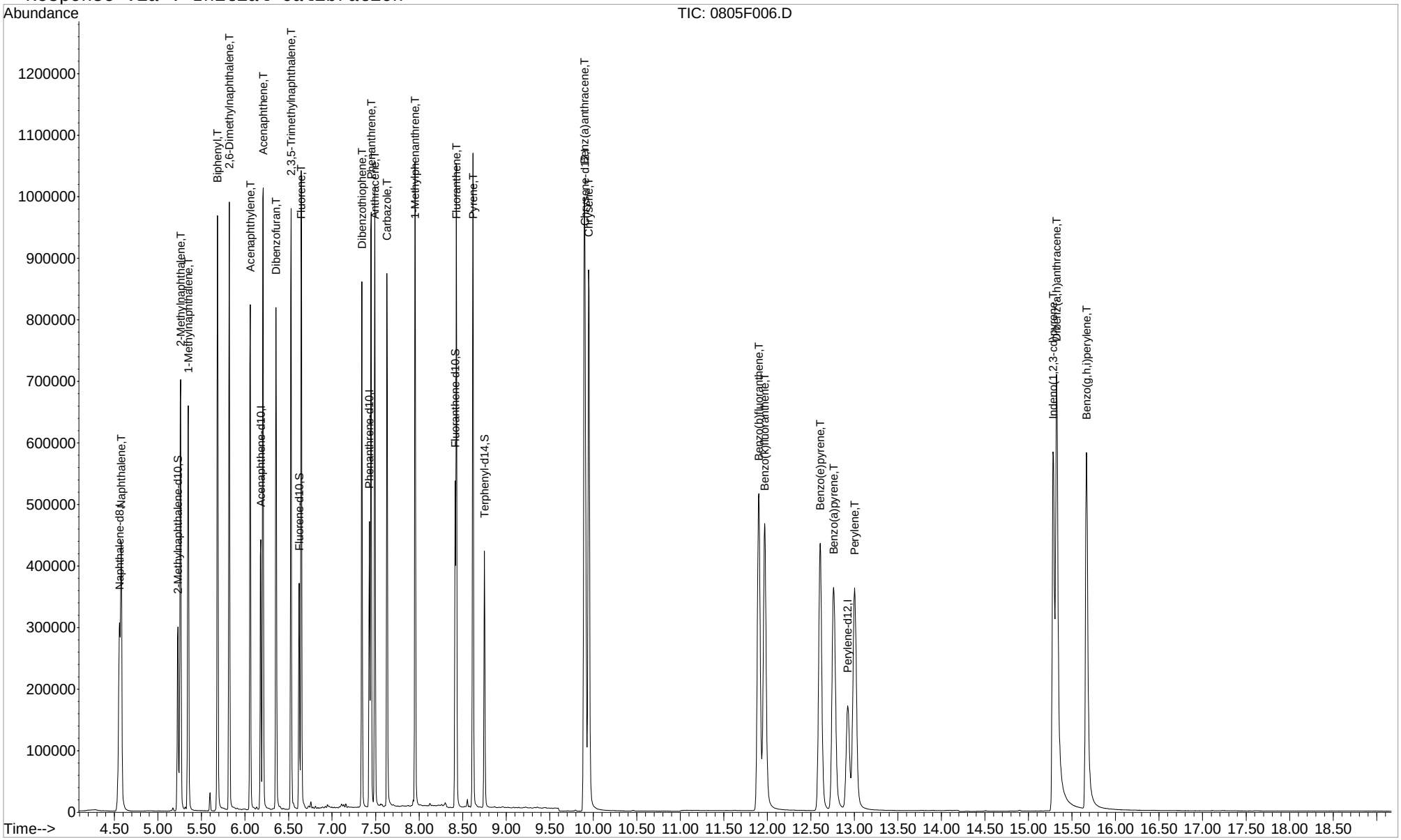
1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F006.D Vial: 6
Acq On : 5 Aug 2024 11:59 am Operator: EBruno
Sample : KQ2411801-03 LCS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:01 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F006.D Vial: 6
Acq On : 5 Aug 2024 11:59 am Operator: EBruno
Sample : KQ2411801-03 LCS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 05 14:59:29 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.56	136	269812	200.00	ng/ml	-0.06
8) Acenaphthene-d10	6.18	164	135558	200.00	ng/ml	-0.03
15) Phenanthrene-d10	7.43	188	262466	200.00	ng/ml	-0.03
23) Chrysene-d12	9.91	240	276115	200.00	ng/ml	-0.05
28) Perylene-d12	12.92	264	313707	200.00	ng/ml	-0.02
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.23	152	122311	162.00	ng/ml	-0.04
Spiked Amount 200.000			Recovery =	81.00%		
13) Fluorene-d10	6.62	176	132760	170.18	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	85.09%		
22) Fluoranthene-d10	8.41	212	275345	191.73	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	95.86%		
25) Terphenyl-d14	8.75	244	266403	174.59	ng/ml	-0.04
Spiked Amount 200.000			Recovery =	87.30%		
Target Compounds						Qvalue
2) Naphthalene	4.58	128	462625	357.64	ng/ml	99
4) 2-Methylnaphthalene	5.26	142	307498	366.26	ng/ml	99
5) 1-Methylnaphthalene	5.35	142	281650	356.45	ng/ml	98
6) Biphenyl	5.68	154	407670	399.23	ng/ml	99
7) 2,6-Dimethylnaphthalene	5.82	156	290363	401.64	ng/ml	98
9) Acenaphthylene	6.06	152	470763	390.45	ng/ml	99
10) Acenaphthene	6.21	154	280697	362.38	ng/ml	96
11) Dibenzofuran	6.36	168	463582	403.80	ng/ml	88
12) 2,3,5-Trimethylnaphthalene	6.53	170	290526	400.50	ng/ml	99
14) Fluorene	6.65	166	354686	398.32	ng/ml	98
16) Dibenzothiophene	7.34	184	491692	373.03	ng/ml	99
17) Phenanthrene	7.45	178	515570	376.25	ng/ml	99
18) Anthracene	7.49	178	518295	406.06	ng/ml	99
19) Carbazole	7.63	167	500156	414.90	ng/ml	99
20) 1-Methylphenanthrene	7.96	192	423001	414.98	ng/ml	98
21) Fluoranthene	8.43	202	667700	423.91	ng/ml	96
24) Pyrene	8.62	202	724684	405.54	ng/ml	94
26) Benz(a)anthracene	9.90	228	793458	441.71	ng/ml	99
27) Chrysene	9.95	228	748201	437.49	ng/ml	100
29) Benzo(b)fluoranthene	11.90	252	914509	454.72	ng/ml	100
30) Benzo(k)fluoranthene	11.97	252	861857	453.76	ng/ml	99
31) Benzo(e)pyrene	12.61	252	850486	451.32	ng/ml	99
32) Benzo(a)pyrene	12.76	252	807005	502.65	ng/ml	100
33) Perylene	13.00	252	769228	444.06	ng/ml	100
34) Indeno(1,2,3-cd)pyrene	15.28	276	790448m	473.76	ng/ml	
35) Dibenz(a,h)anthracene	15.32	278	873097	462.91	ng/ml	100
36) Benzo(g,h,i)perylene	15.67	276	848554	384.31	ng/ml	100

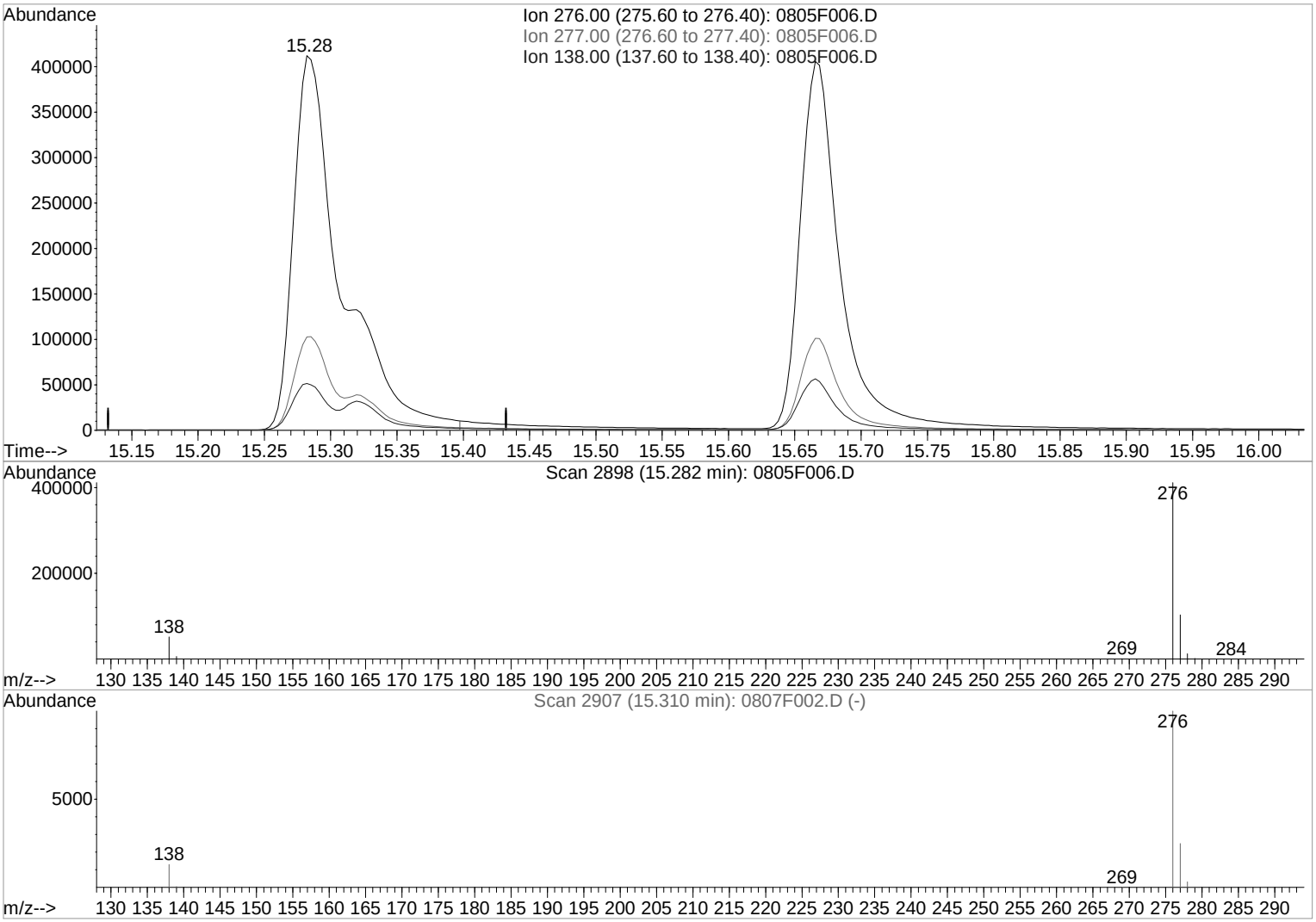
(#) = qualifier out of range (m) = manual integration

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F006.D Vial: 6
Acq On : 5 Aug 2024 11:59 am Operator: EBruno
Sample : KQ2411801-03 LCS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 5 14:59 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F006.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.28min 620.85ng/ml

response 1035859

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	24.87
138.00	12.20	12.33
0.00	0.00	0.00

Manual Integration:

Before

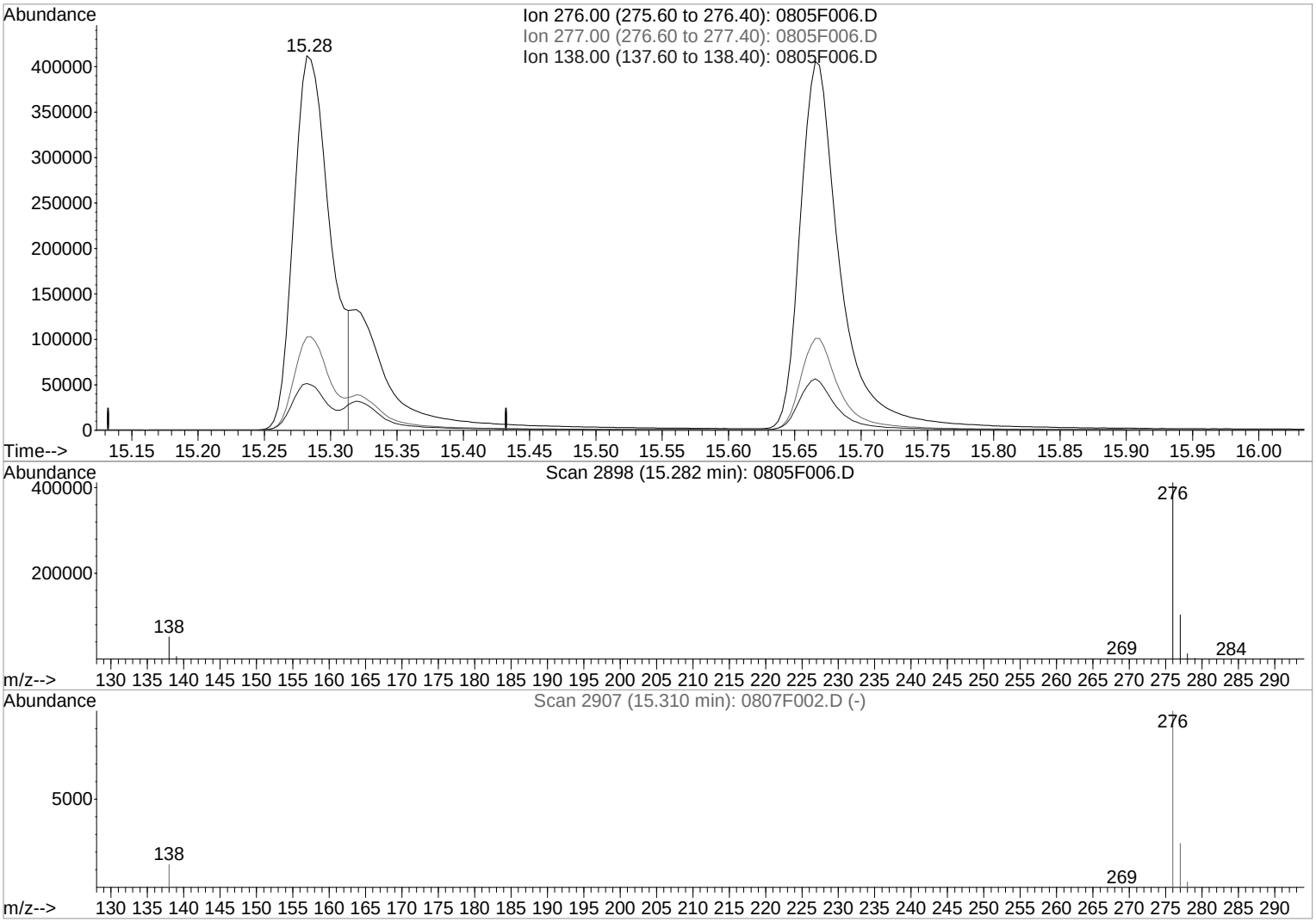
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F006.D Vial: 6
Acq On : 5 Aug 2024 11:59 am Operator: EBruno
Sample : KQ2411801-03 LCS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:01 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F006.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.28min 473.76ng/ml m

response 790448

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	24.90
138.00	12.20	12.44
0.00	0.00	0.00

Manual Integration:

After

BLC

08/08/24

1st 08/08/24
2nd 08/08/24

Validation Report

Data File: J:\MS14\DATA\080524\0805F007.D\
Lab ID: KQ2411801-01
RunType: MS
Matrix: Sediment

Date Acquired: 8/5/24 12:26:00
Batch ID: 849989
Analysis Method: 8270D/PAH SIM

Validations

Validation Categories	Pass	Fail
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery		X
Internal Standards	X	
Surrogates	X	
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Continuing Calibration Recovery	Benzo(a)pyrene	22		20	OK, <40

Primary Review: _____

Printed: 8/8/24 11:23
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Secondary Review: _____

1st 08/08/24
2nd 08/08/24

Quantitation Report

Data File:	J:\MS14\DATA\080524\0805F007.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 12:26:00	**Vial:**	5
Run Type:	MS	**Dilution:**	1
Lab ID:	KQ2411801-01	**Raw Units:**	ng/mL

Bottle ID:	K2407810-001.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	PAH SIM	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	849989	**Prep Lot:**	442452	**Report Group:**	KQ2411801
Analysis	8270D	**Prep Method:**	EPA 3546		
		Prep Date:	8/1/24		

Title:	Polycyclic Aromatic Hydrocarbons by GC/MS SIM	**Calibration ID:**	KC2400163
		Report List ID:	18909

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Acenaphthene-d10	6.18		124301	200.00	OK
Chrysene-d12	9.93	+0.01	279653	200.00	OK
Naphthalene-d8	4.56	-0.01	261258	200.00	OK
Perylene-d12	12.98	+0.06	335137	200.00	OK
Phenanthrene-d10	7.43		239923	200.00	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec	% Rec Criteria	Rpt?
Fluoranthene-d10	8.42	+0.01	260638	198.55	99	28 - 112	Y
Fluorene-d10	6.62		117271	163.93	82	34 - 106	Y
Terphenyl-d14	8.76	+0.01	245452	158.83	79	32 - 122	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
2-Methylnaphthalene	5.26	-0.01	453676	558.07	1050		Y
Acenaphthene	6.21		316994	446.30	842		Y
Acenaphthylene	6.06	-0.01	430116	389.04	734		Y
Anthracene	7.49		581457	498.35	940		Y
Benz(a)anthracene	9.91	+0.01	1055905	580.37	1090		Y
Benzo(a)pyrene	12.82	+0.05	1120023	653.01	1230		Y
Benzo(b)fluoranthene	11.95	+0.04	1262304	587.52	1110		Y
Benzo(g,h,i)perylene	15.72	+0.05	1099568	466.15	879		Y
Benzo(k)fluoranthene	12.01	+0.04	963153	474.67	895		Y
Chrysene	9.97	+0.02	1180145	681.33	1290		Y
Dibenz(a,h)anthracene	15.37	+0.04	911758	452.50	854		Y
Fluoranthene	8.44	+0.01	1214969	843.84	1590		Y
Fluorene	6.65		426179	521.95	985		Y

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Printed: 8/8/24 11:23
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1st 08/08/24

2nd 08/08/24

Data File:	J:\MS14\DATA\080524\0805F007.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 12:26:00	**Vial:**	5
Run Type:	MS	**Dilution:**	1
Lab ID:	KQ2411801-01	**Raw Units:**	ng/mL

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Indeno(1,2,3-cd)pyrene	15.33	+0.04	980212	549.93	1040		Y
Naphthalene	4.58	-0.02	497992	397.58	750		Y
Phenanthrene	7.45		1268421	1012.63	1910		Y
Pyrene	8.63	+0.01	1521930	840.92	1590		Y

Prep Amount:	10.116 g	**Dilution:**	1
Prep Final Amount:	10.00 mL	**Basis Factor:**	52.40

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

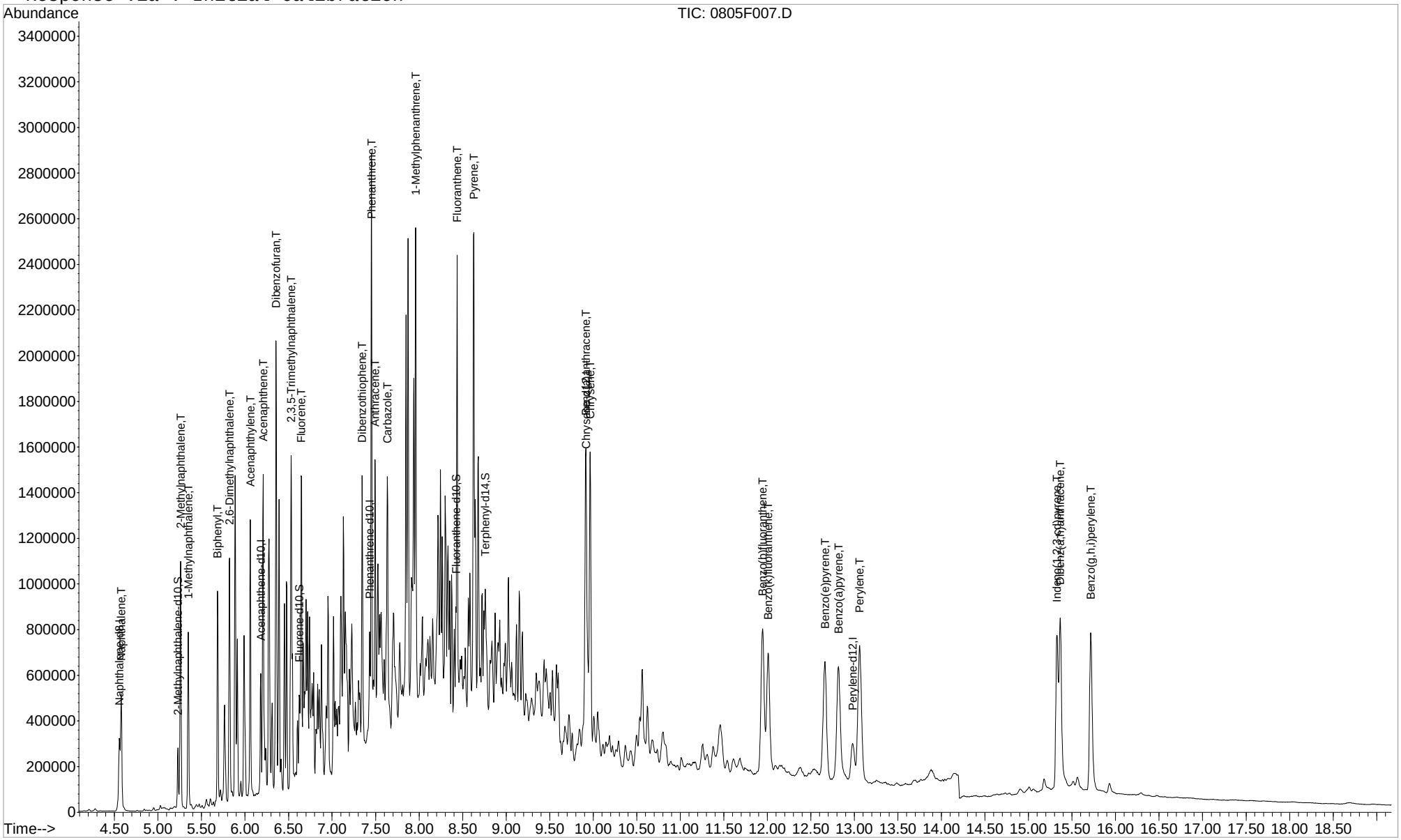
Printed: 8/8/24 11:23

\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:03 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration



1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 05 14:59:30 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.56	136	261258	200.00	ng/ml	-0.06
8) Acenaphthene-d10	6.18	164	124301	200.00	ng/ml	-0.03
15) Phenanthrene-d10	7.43	188	239923	200.00	ng/ml	-0.02
23) Chrysene-d12	9.93	240	279653	200.00	ng/ml	-0.04
28) Perylene-d12	12.98	264	335137m	200.00	ng/ml	0.04
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.23	152	104298	142.67	ng/ml	-0.04
Spiked Amount 200.000			Recovery =	71.33%		
13) Fluorene-d10	6.62	176	117271	163.93	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	81.97%		
22) Fluoranthene-d10	8.42	212	260638m	198.55	ng/ml	-0.02
Spiked Amount 200.000			Recovery =	99.28%		
25) Terphenyl-d14	8.76	244	245452	158.83	ng/ml	-0.04
Spiked Amount 200.000			Recovery =	79.42%		
Target Compounds						Qvalue
2) Naphthalene	4.58	128	497992	397.58	ng/ml	99
4) 2-Methylnaphthalene	5.26	142	453676	558.07	ng/ml	99
5) 1-Methylnaphthalene	5.35	142	304282	397.70	ng/ml	99
6) Biphenyl	5.68	154	370835	375.05	ng/ml	99
7) 2,6-Dimethylnaphthalene	5.82	156	370028	528.59	ng/ml	94
9) Acenaphthylene	6.06	152	430116	389.04	ng/ml	96
10) Acenaphthene	6.21	154	316994	446.30	ng/ml	98
11) Dibenzofuran	6.36	168	388662	369.20	ng/ml	99
12) 2,3,5-Trimethylnaphthalene	6.53	170	649920	977.07	ng/ml	98
14) Fluorene	6.65	166	426179	521.95	ng/ml	97
16) Dibenzothiophene	7.35	184	581372	482.51	ng/ml	100
17) Phenanthrene	7.45	178	1268421	1012.63	ng/ml	97
18) Anthracene	7.49	178	581457	498.35	ng/ml	95
19) Carbazole	7.63	167	464776	421.77	ng/ml	96
20) 1-Methylphenanthrene	7.96	192	749866	804.77	ng/ml	96
21) Fluoranthene	8.44	202	1214969	843.84	ng/ml	96
24) Pyrene	8.63	202	1521930	840.92	ng/ml	94
26) Benz(a)anthracene	9.91	228	1055905	580.37	ng/ml	97
27) Chrysene	9.97	228	1180145m	681.33	ng/ml	
29) Benzo(b)fluoranthene	11.95	252	1262304	587.52	ng/ml	99
30) Benzo(k)fluoranthene	12.01	252	963153m	474.67	ng/ml	
31) Benzo(e)pyrene	12.66	252	1080979m	536.95	ng/ml	
32) Benzo(a)pyrene	12.82	252	1120023m	653.01	ng/ml	
33) Perylene	13.06	252	1351548m	730.34	ng/ml	
34) Indeno(1,2,3-cd)pyrene	15.33	276	980212m	549.93	ng/ml	
35) Dibenz(a,h)anthracene	15.37	278	911758m	452.50	ng/ml	
36) Benzo(g,h,i)perylene	15.72	276	1099568m	466.15	ng/ml	

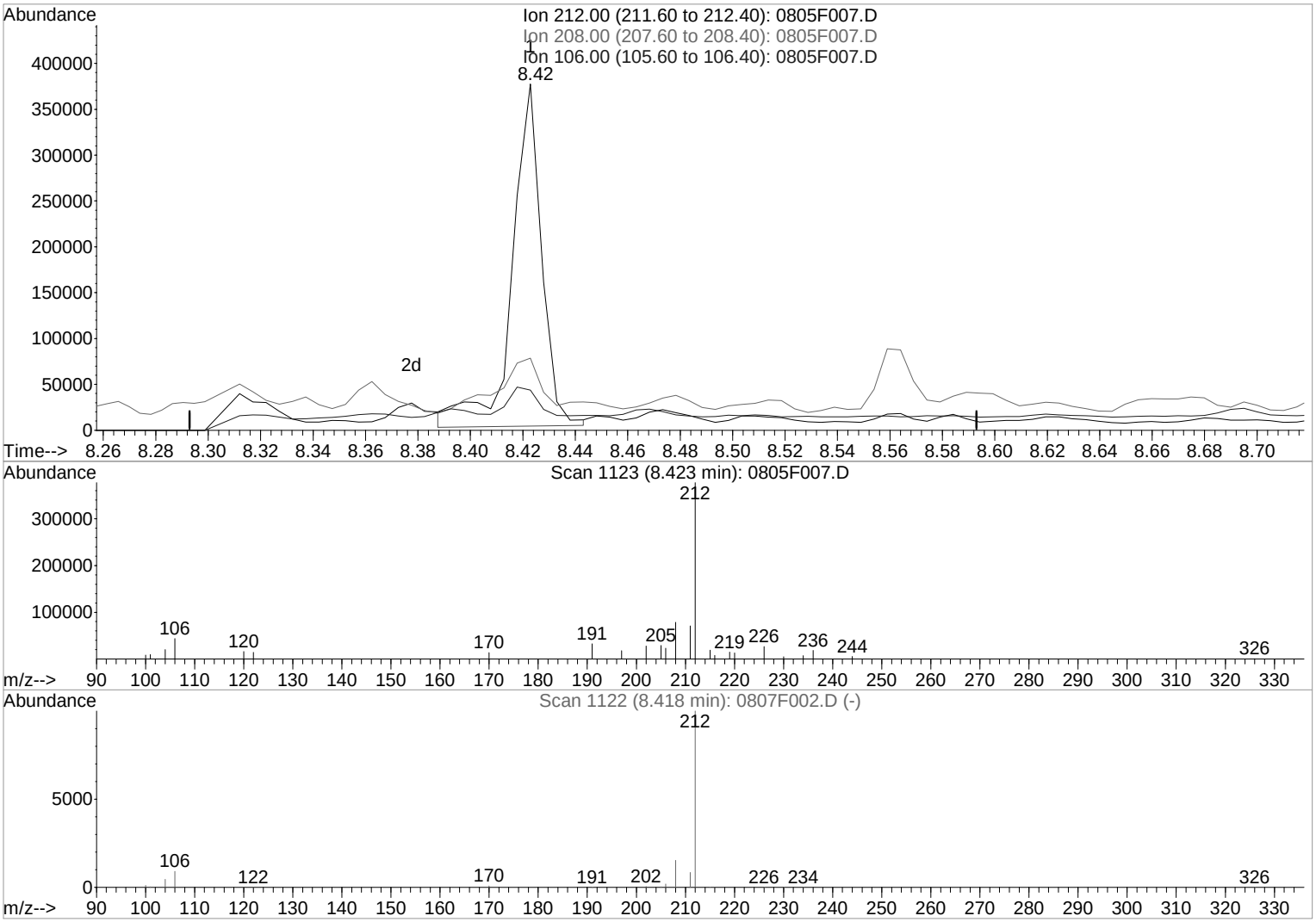
(#) = qualifier out of range (m) = manual integration

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 5 14:59 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(22) Fluoranthene-d10 (S)

8.42min 222.82ng/ml

response 292498

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	16.35
106.00	10.20	7.61
0.00	0.00	0.00

Manual Integration:

Before

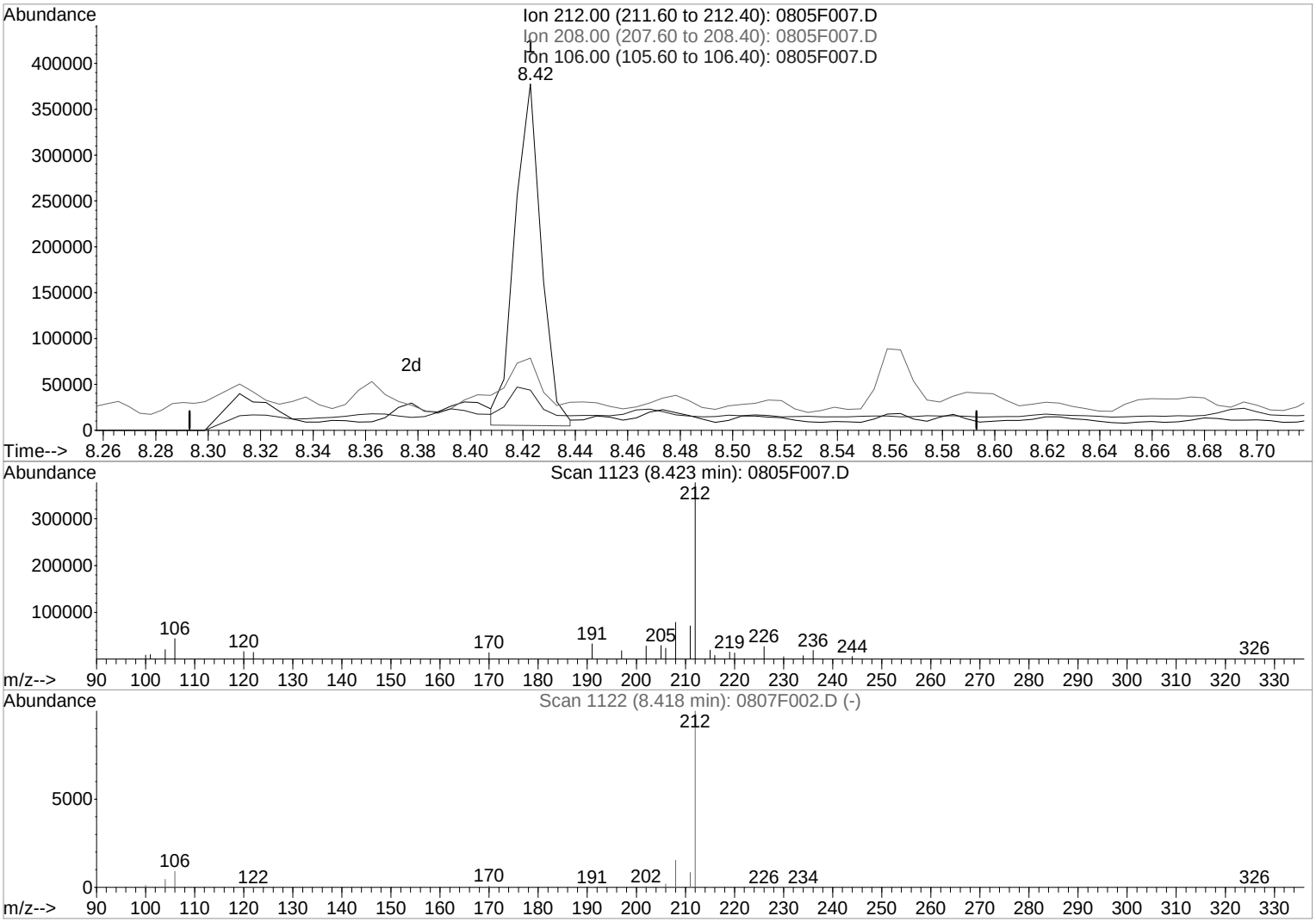
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:01 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(22) Fluoranthene-d10 (S)

8.42min 198.55ng/ml m

response 260638

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	20.78
106.00	10.20	11.61
0.00	0.00	0.00

Manual Integration:

After

BLC

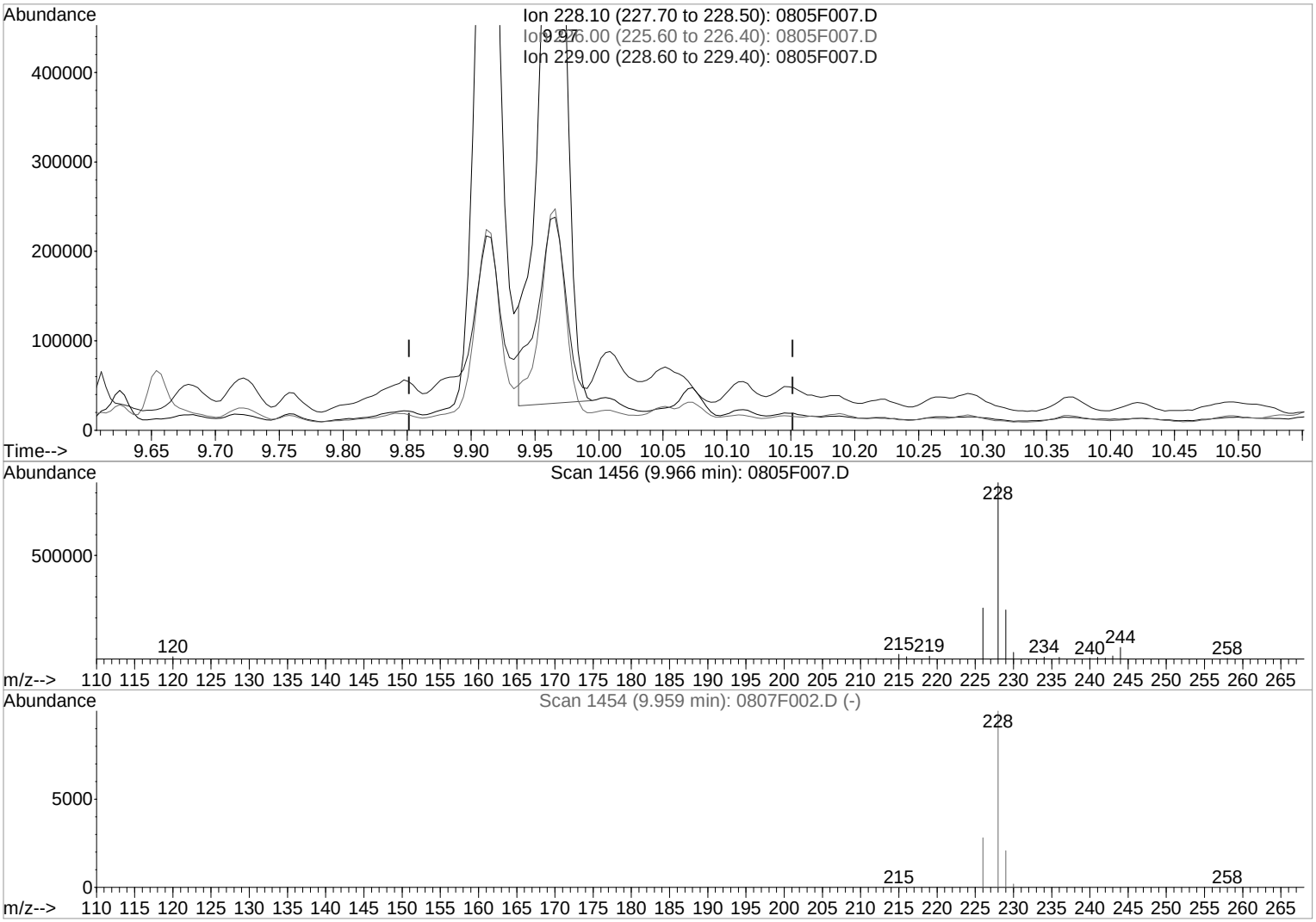
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:01 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(27) Chrysene (T)

9.97min 641.00ng/ml

response 1110290

Ion	Exp%	Act%
228.10	100	100
226.00	27.30	27.91
229.00	20.70	22.43
0.00	0.00	0.00

Manual Integration:

Before

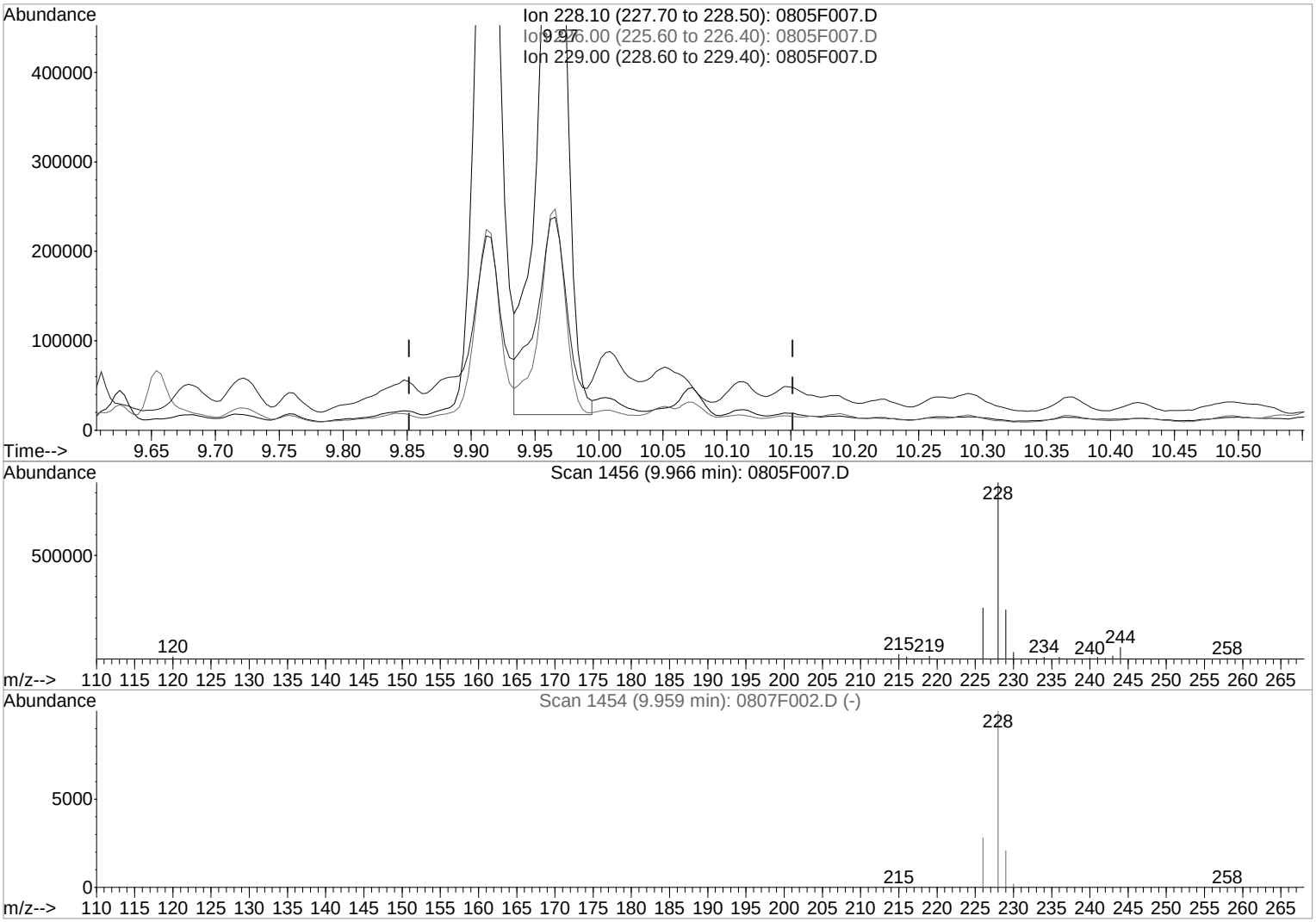
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:02 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(27) Chrysene (T)

9.97min 681.33ng/ml m

response 1180145

Ion	Exp%	Act%
228.10	100	100
226.00	27.30	29.13
229.00	20.70	28.03
0.00	0.00	0.00

Manual Integration:

After

BLC

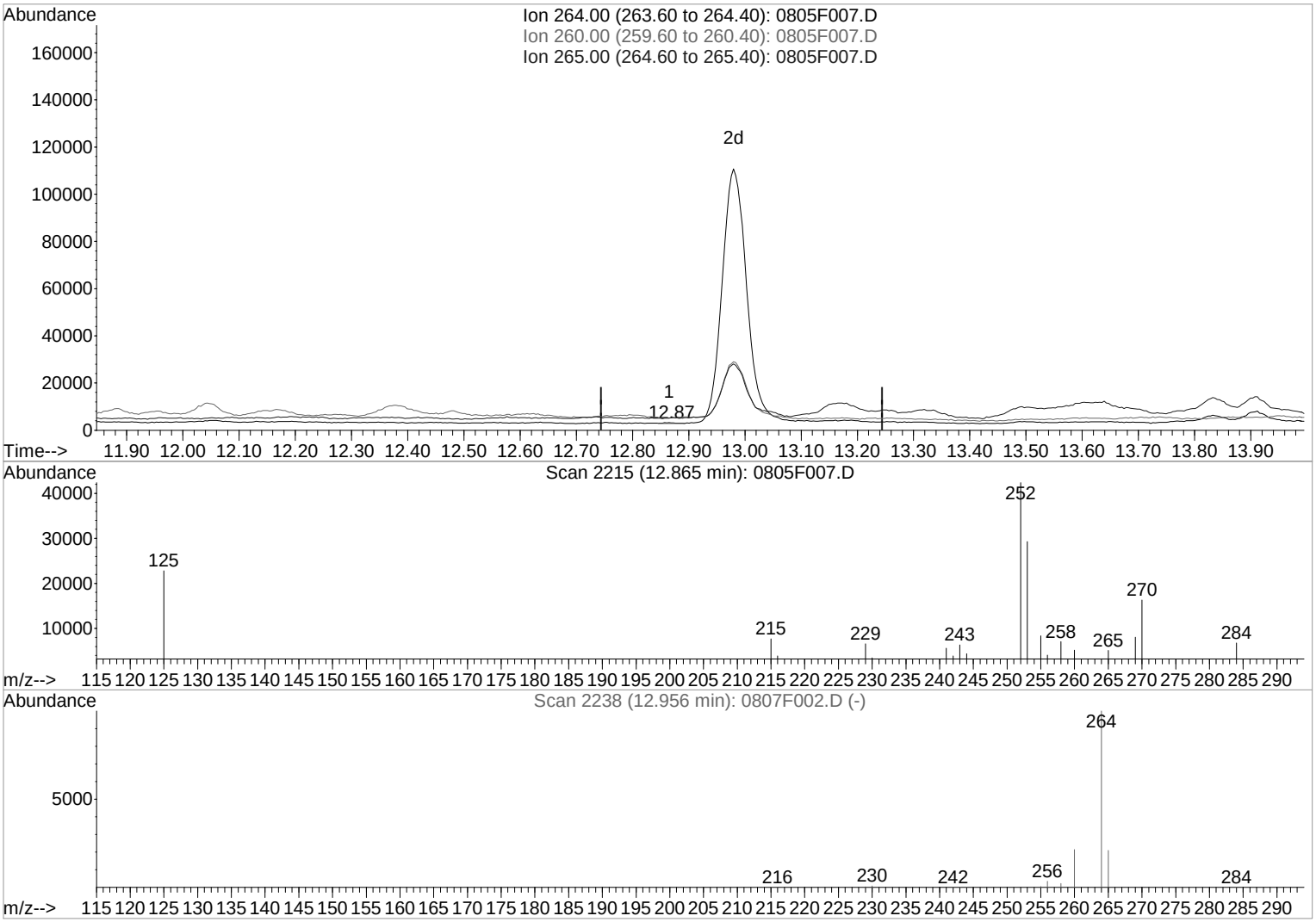
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:02 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(28) Perylene-d12 (I)

12.87min 200.00ng/ml

response 595

Ion	Exp%	Act%
264.00	100	100
260.00	22.50	0.00
265.00	21.70	6.80
0.00	0.00	0.00

Manual Integration:

Before

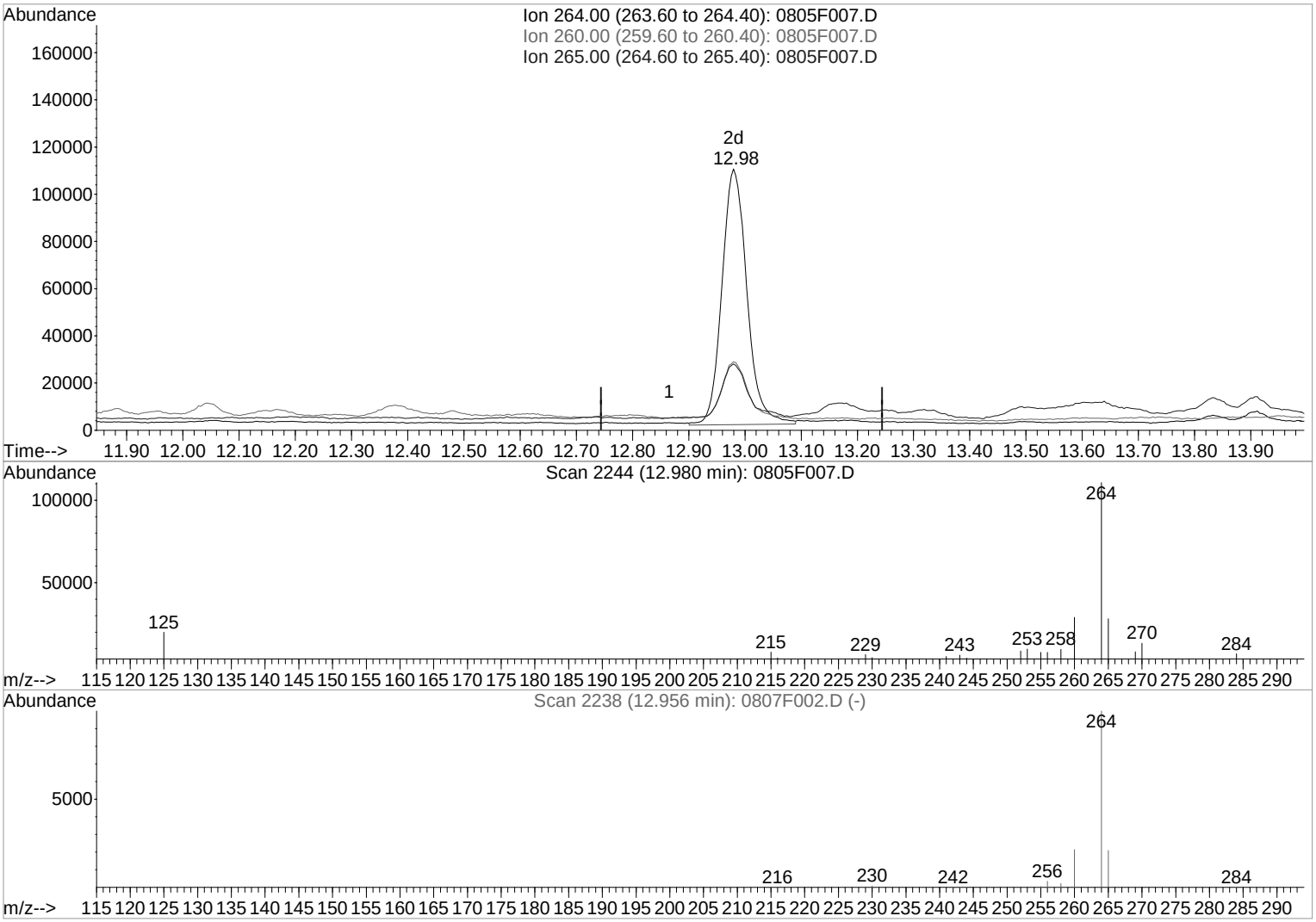
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:02 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(28) Perylene-d12 (I)

12.98min 200.00ng/ml m

response 335137

Ion	Exp%	Act%
264.00	100	100
260.00	22.50	26.18
265.00	21.70	25.35
0.00	0.00	0.00

Manual Integration:

After

WP

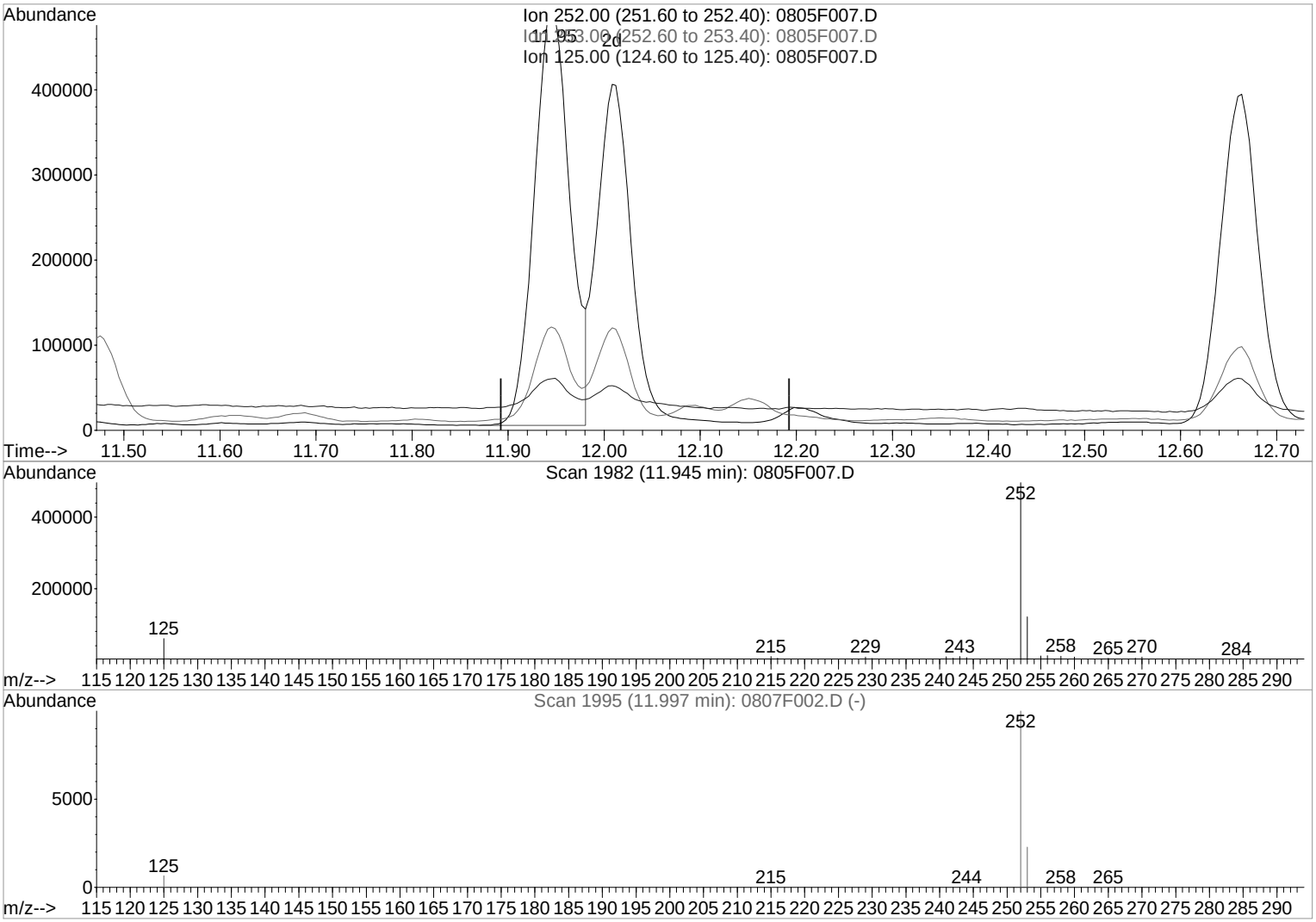
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:02 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(30) Benzo(k)fluoranthene (T)

11.95min 622.10ng/ml

response 1262304

Ion	Exp%	Act%
252.00	100	100
253.00	22.70	22.44
125.00	5.90	7.11
0.00	0.00	0.00

Manual Integration:

Before

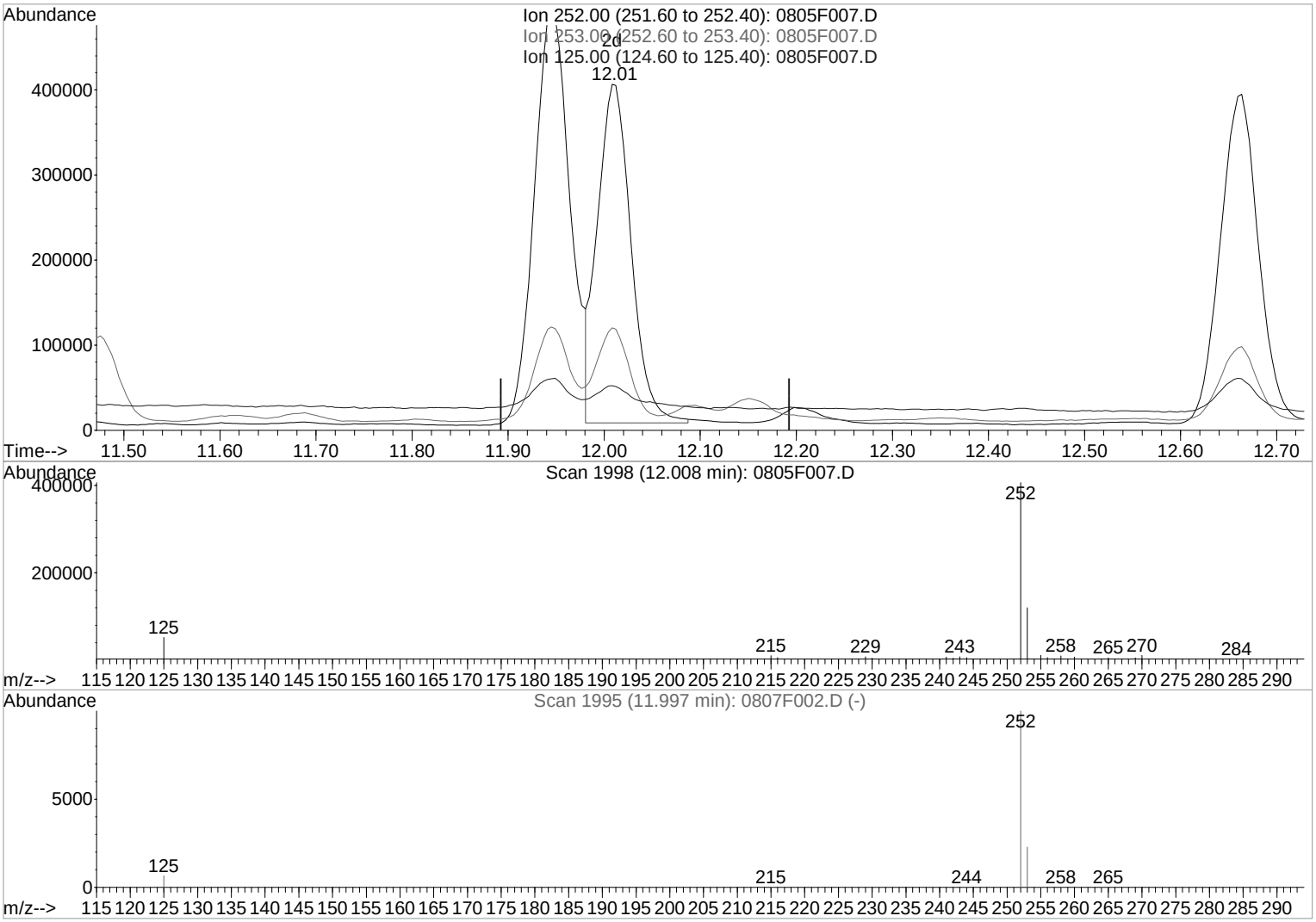
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:02 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(30) Benzo(k)fluoranthene (T)

12.01min 474.67ng/ml m

response 963153

Ion	Exp%	Act%
252.00	100	100
253.00	22.70	29.59
125.00	5.90	12.85
0.00	0.00	0.00

Manual Integration:

After

WP

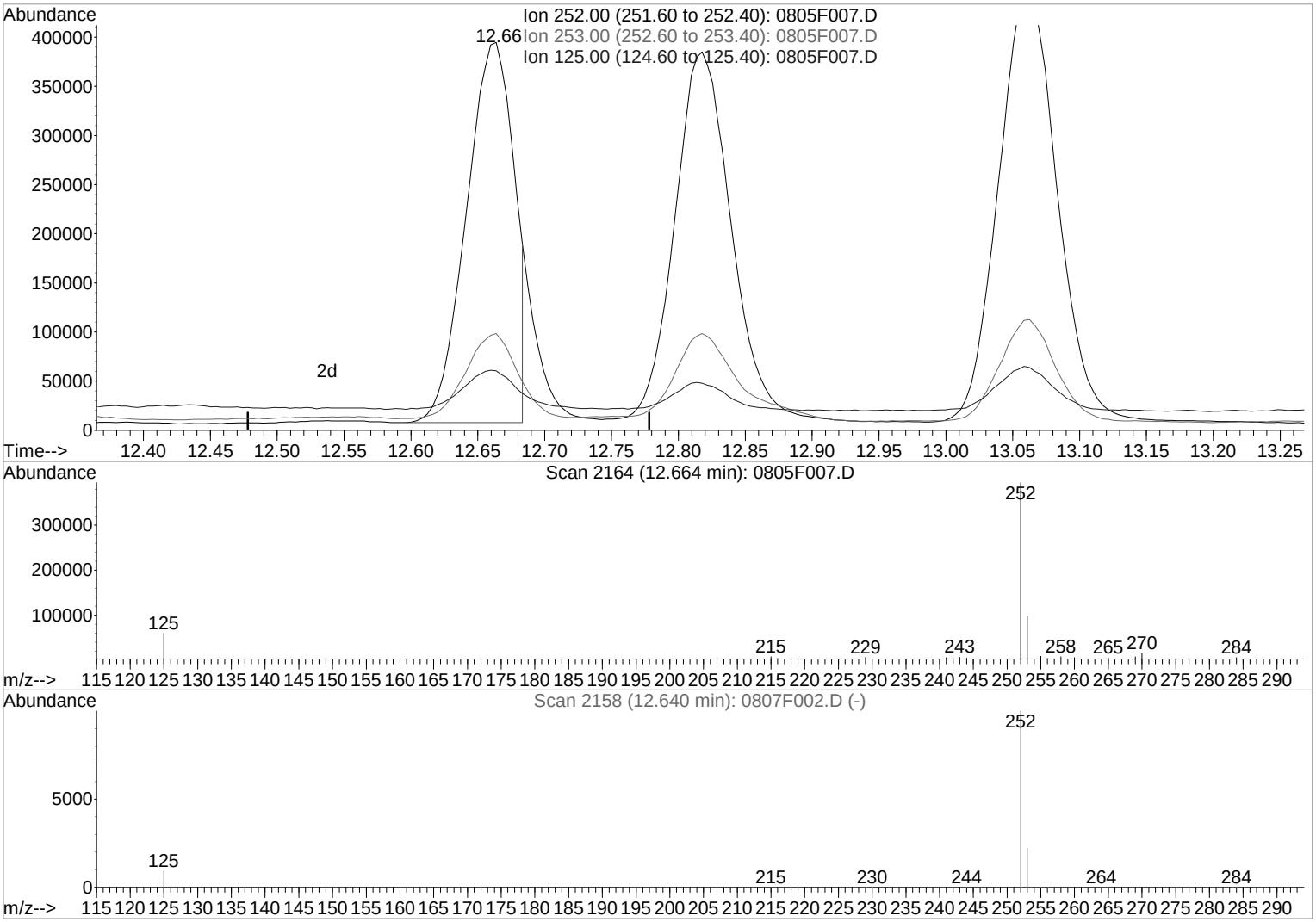
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:02 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(31) Benzo(e)pyrene (T)

12.66min 475.75ng/ml

response 957776

Ion	Exp%	Act%
252.00	100	100
253.00	22.00	22.33
125.00	9.20	10.16
0.00	0.00	0.00

Manual Integration:

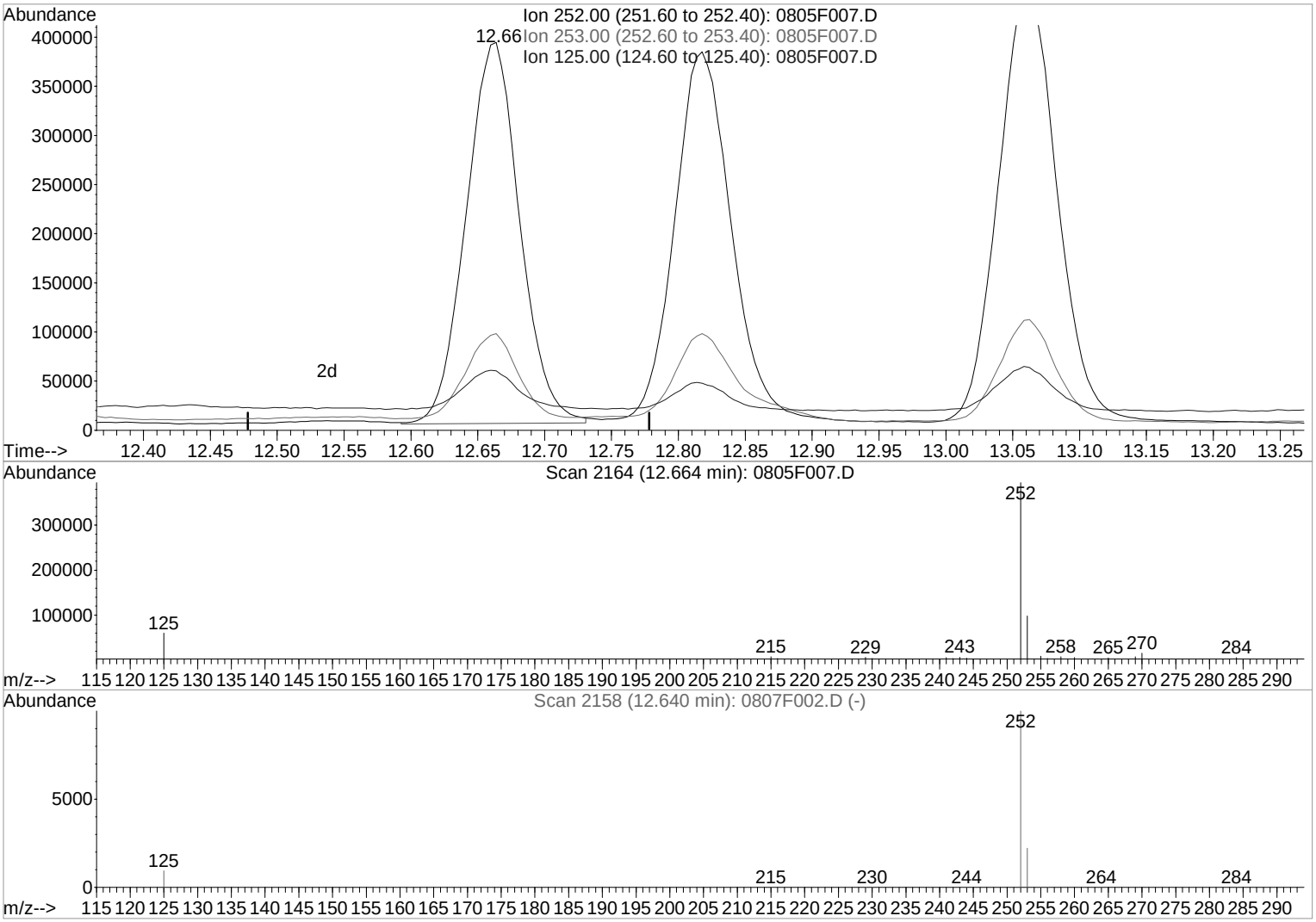
Before

08/08/24

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:02 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(31) Benzo(e)pyrene (T)

12.66min 536.95ng/ml m

response 1080979

Ion	Exp%	Act%
252.00	100	100
253.00	22.00	24.89
125.00	9.20	15.31
0.00	0.00	0.00

Manual Integration:

After

BLC

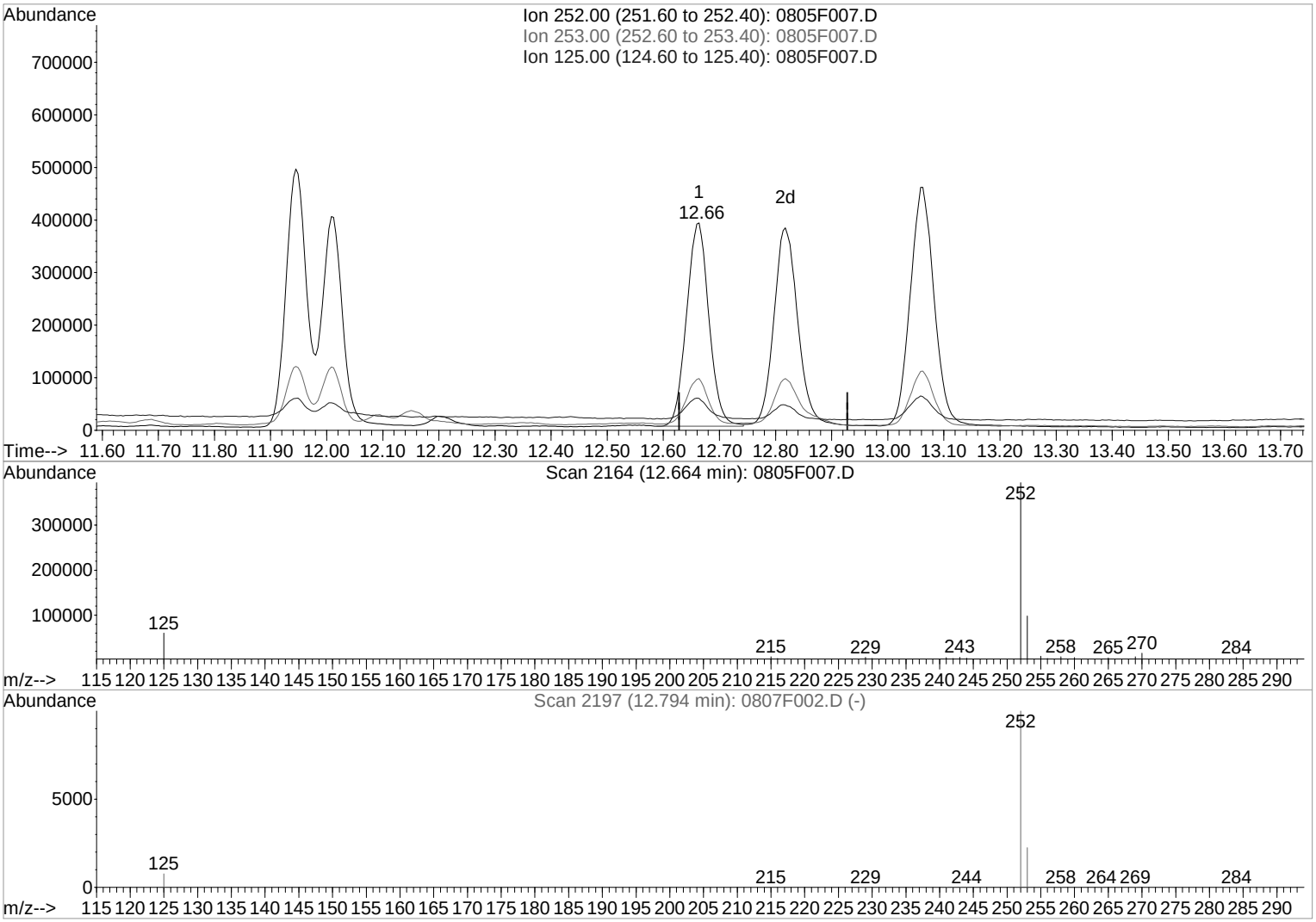
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:02 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(32) Benzo(a)pyrene (T)

12.66min 628.00ng/ml

response 1077120

Ion	Exp%	Act%
252.00	100	100
253.00	22.30	22.34
125.00	6.90	10.00
0.00	0.00	0.00

Manual Integration:

Before

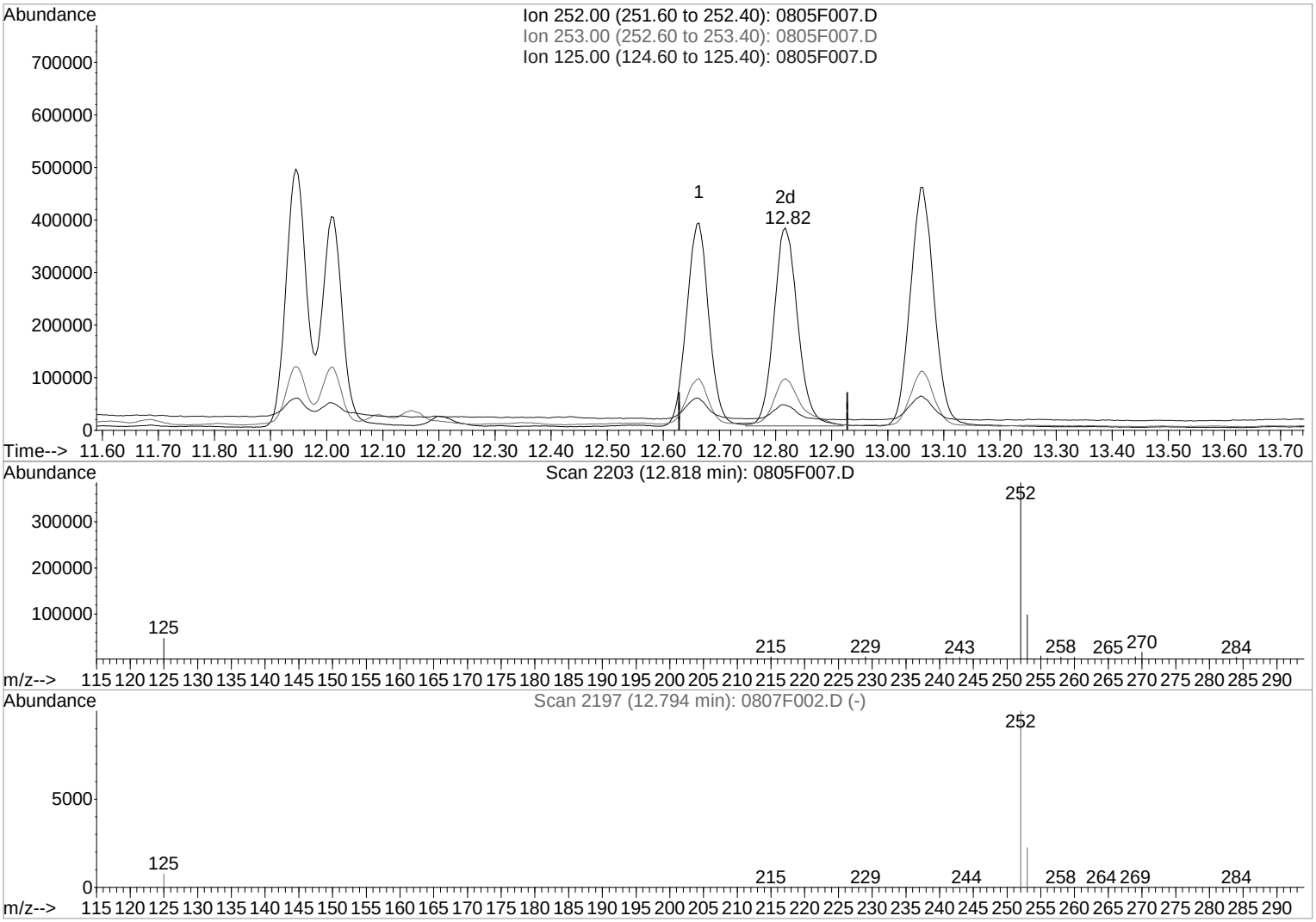
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:02 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(32) Benzo(a)pyrene (T)

12.82min 653.01ng/ml m

response 1120023

Ion	Exp%	Act%
252.00	100	100
253.00	22.30	25.53
125.00	6.90	12.40
0.00	0.00	0.00

Manual Integration:

After

WP

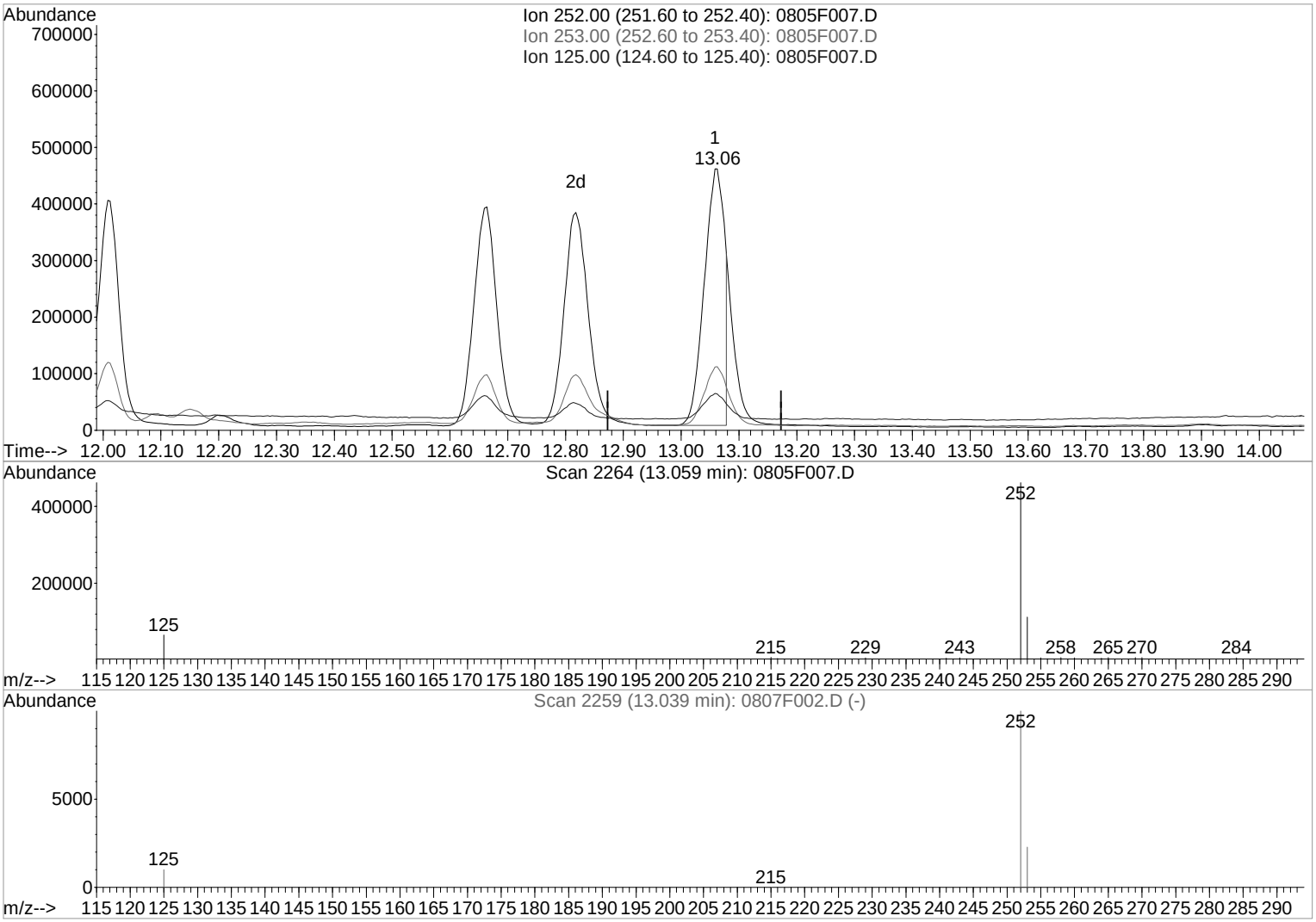
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:02 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(33) Perylene (T)

13.06min 594.18ng/ml

response 1099579

Ion	Exp%	Act%
252.00	100	100
253.00	22.20	22.58
125.00	9.20	9.90
0.00	0.00	0.00

Manual Integration:

Before

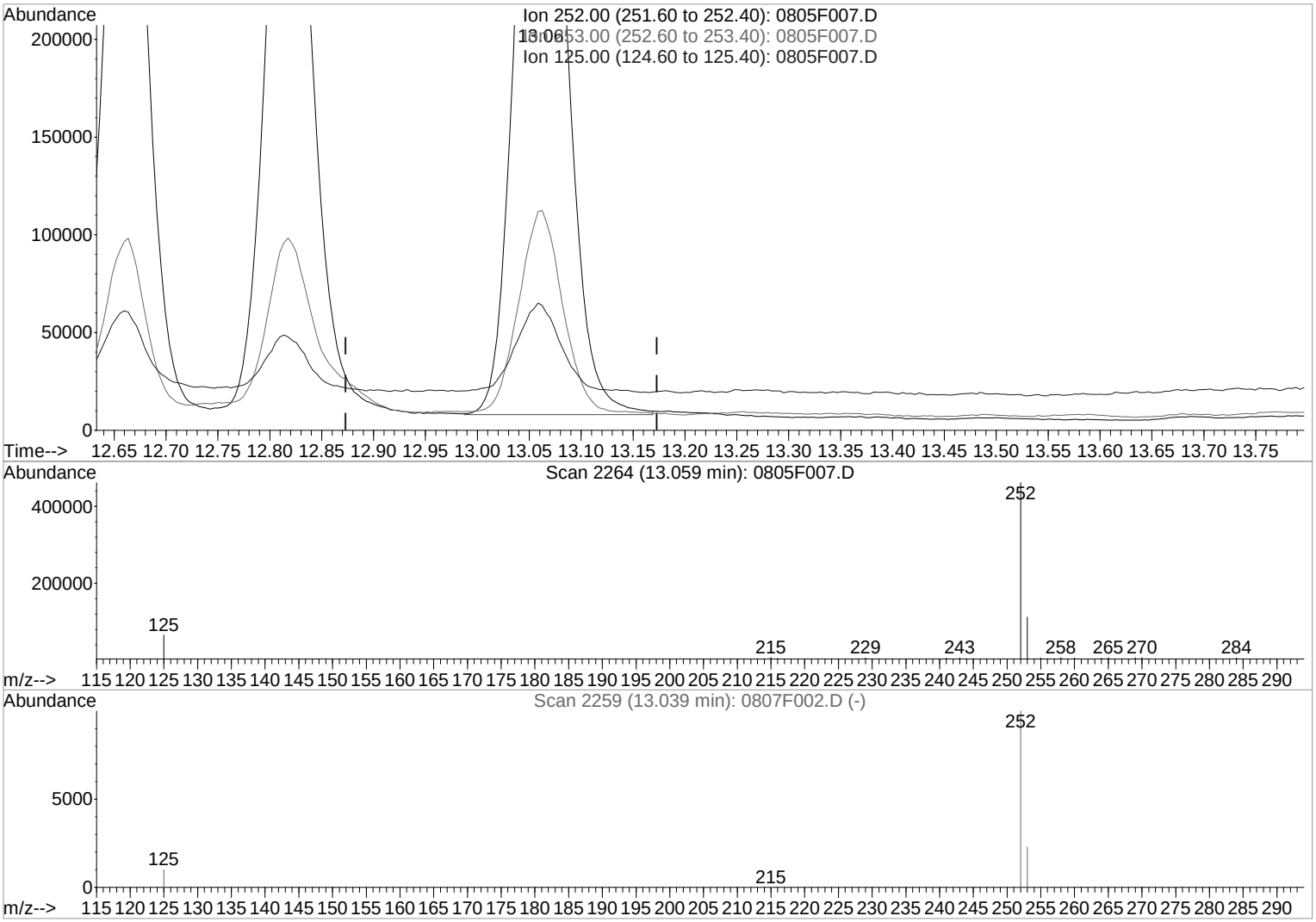
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:03 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(33) Perylene (T)

13.06min 730.34ng/ml m

response 1351548

Ion	Exp%	Act%
252.00	100	100
253.00	22.20	24.21
125.00	9.20	14.08
0.00	0.00	0.00

Manual Integration:

After

BLC

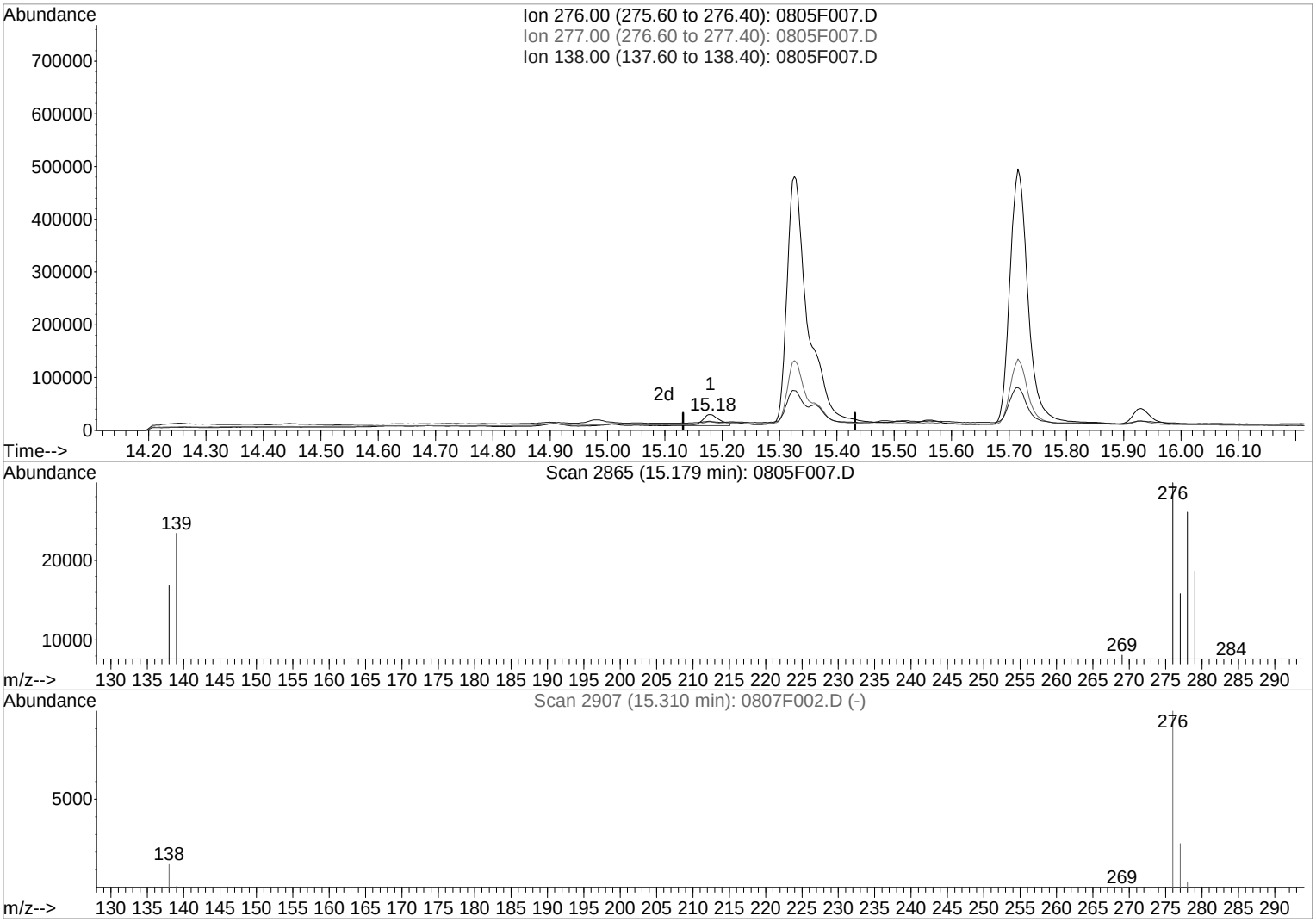
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:03 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.18min 25.19ng/ml

response 44900

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	27.33
138.00	12.20	16.33
0.00	0.00	0.00

Manual Integration:

Before

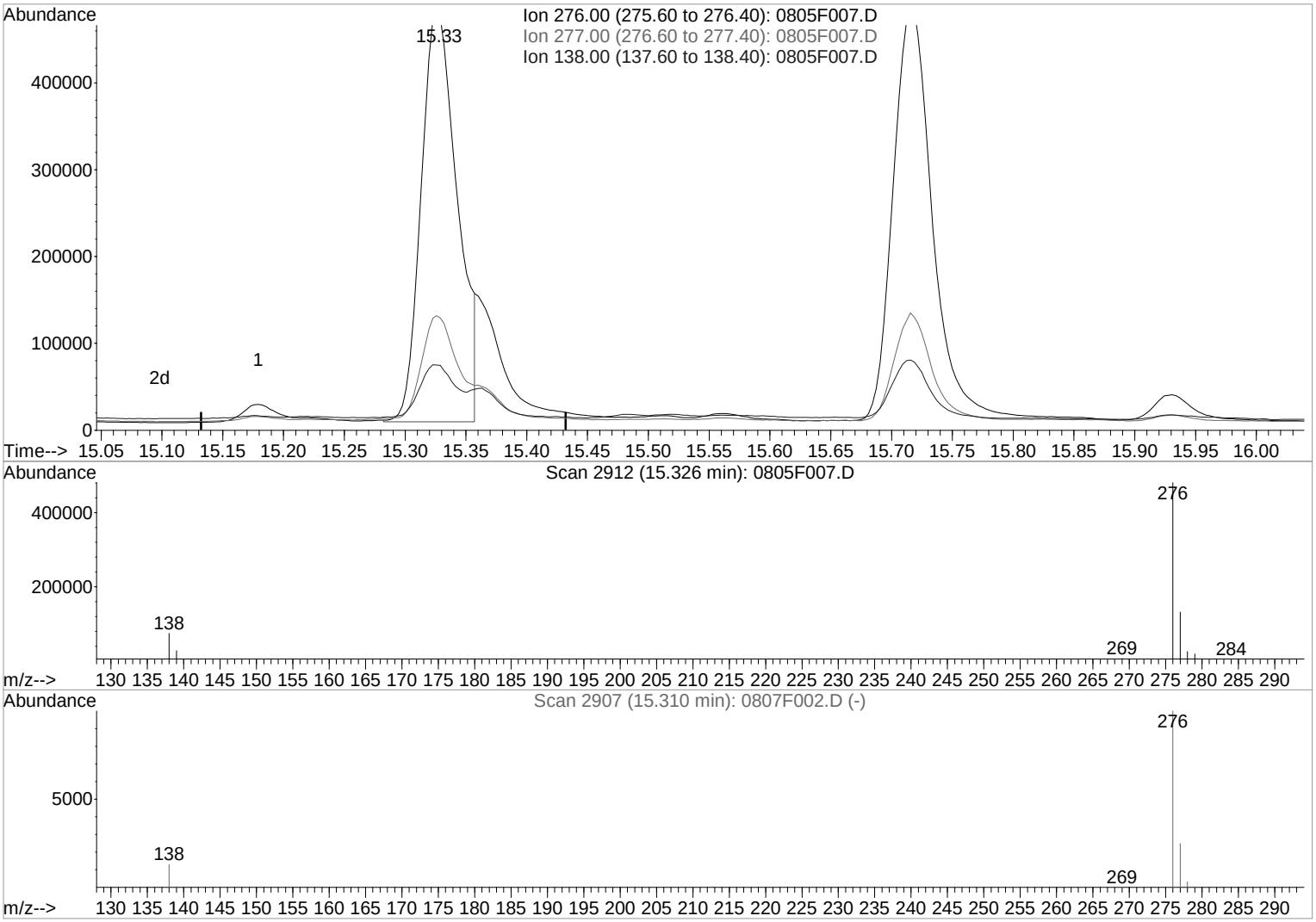
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:03 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.33min 549.93ng/ml m

response 980212

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	27.42
138.00	12.20	15.63
0.00	0.00	0.00

Manual Integration:

After

WP

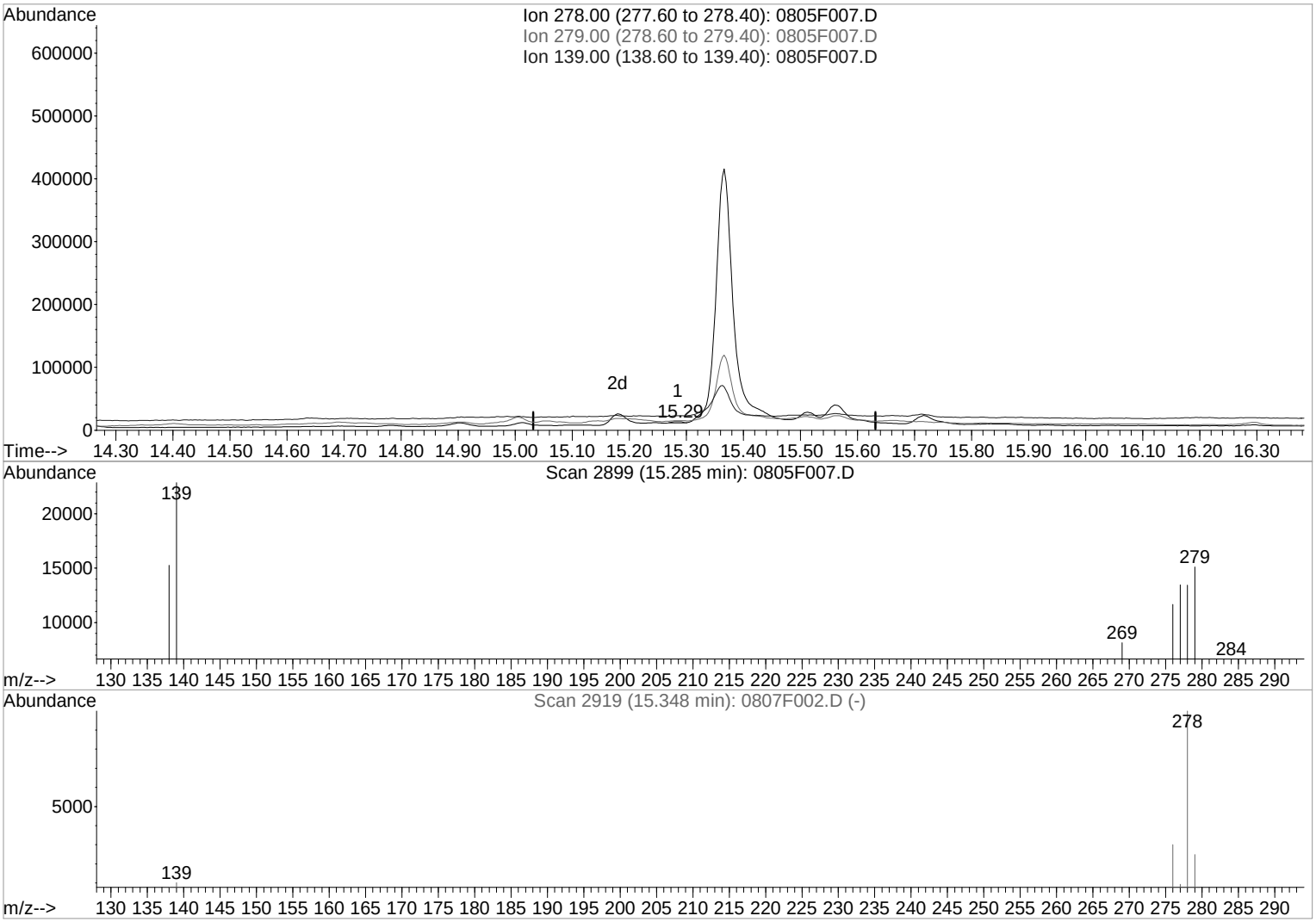
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:03 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(35) Dibenz(a,h)anthracene (T)

15.29min 1.55ng/ml

response 3121

Ion	Exp%	Act%
278.00	100	100
279.00	25.20	41.10
139.00	10.40	26.69
0.00	0.00	0.00

Manual Integration:

Before

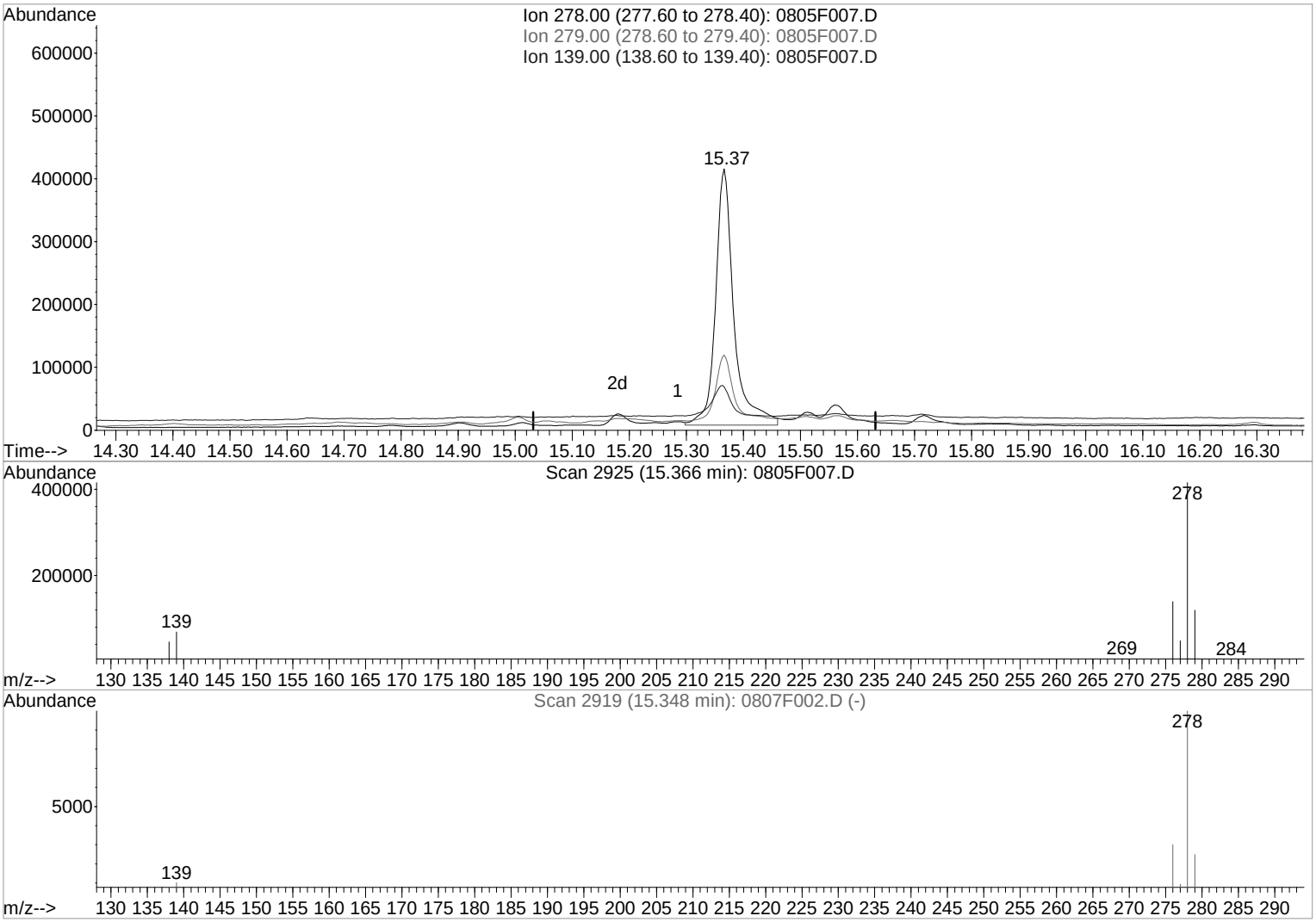
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:03 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(35) Dibenz(a,h)anthracene (T)

15.37min 452.50ng/ml m

response 911758

Ion	Exp%	Act%
278.00	100	100
279.00	25.20	28.74
139.00	10.40	16.59
0.00	0.00	0.00

Manual Integration:

After

WP

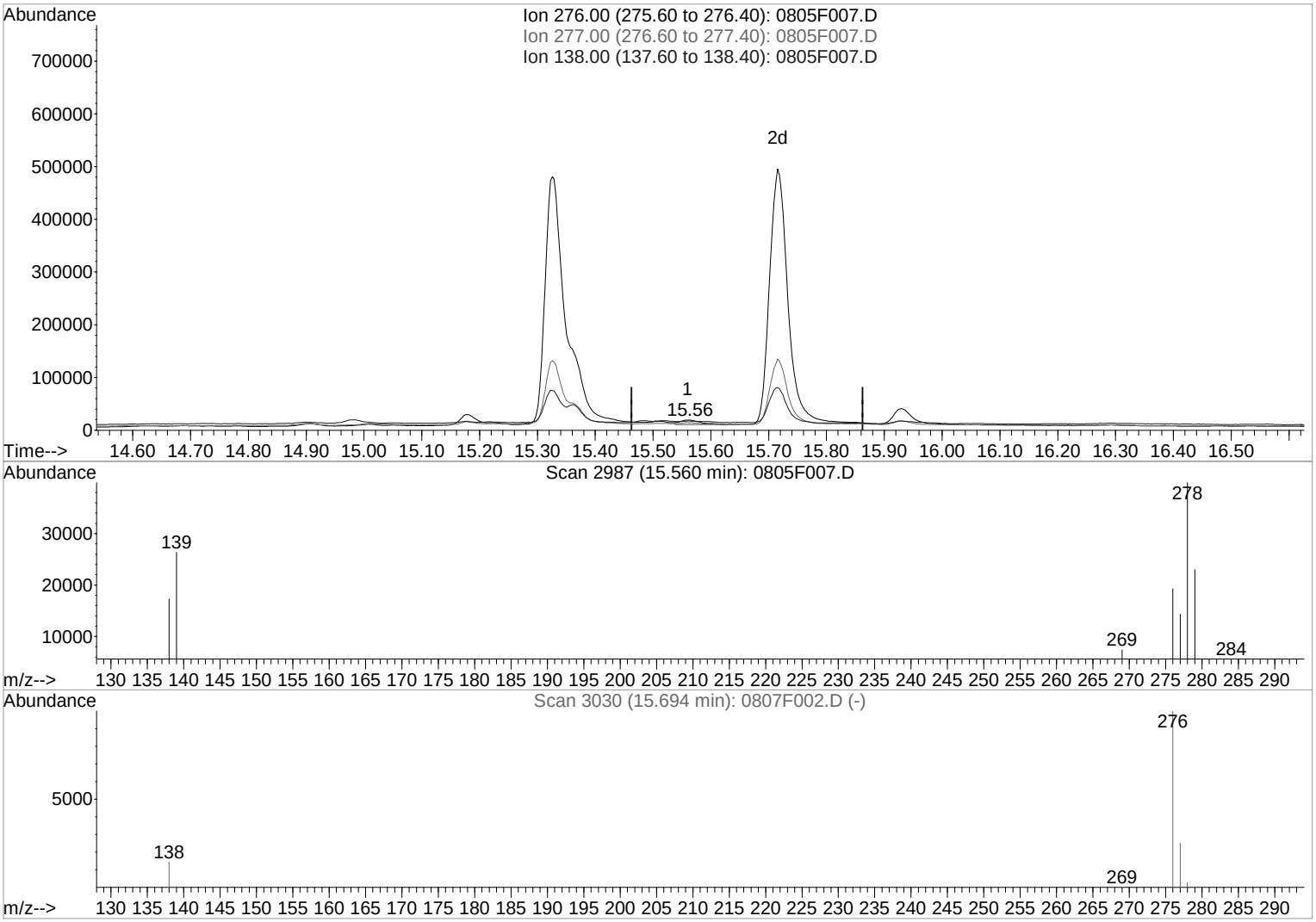
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:03 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(36) Benzo(g,h,i)perylene (T)

15.56min 8.80ng/ml

response 20763

Ion	Exp%	Act%
276.00	100	100
277.00	24.90	43.88
138.00	13.80	31.70
0.00	0.00	0.00

Manual Integration:

Before

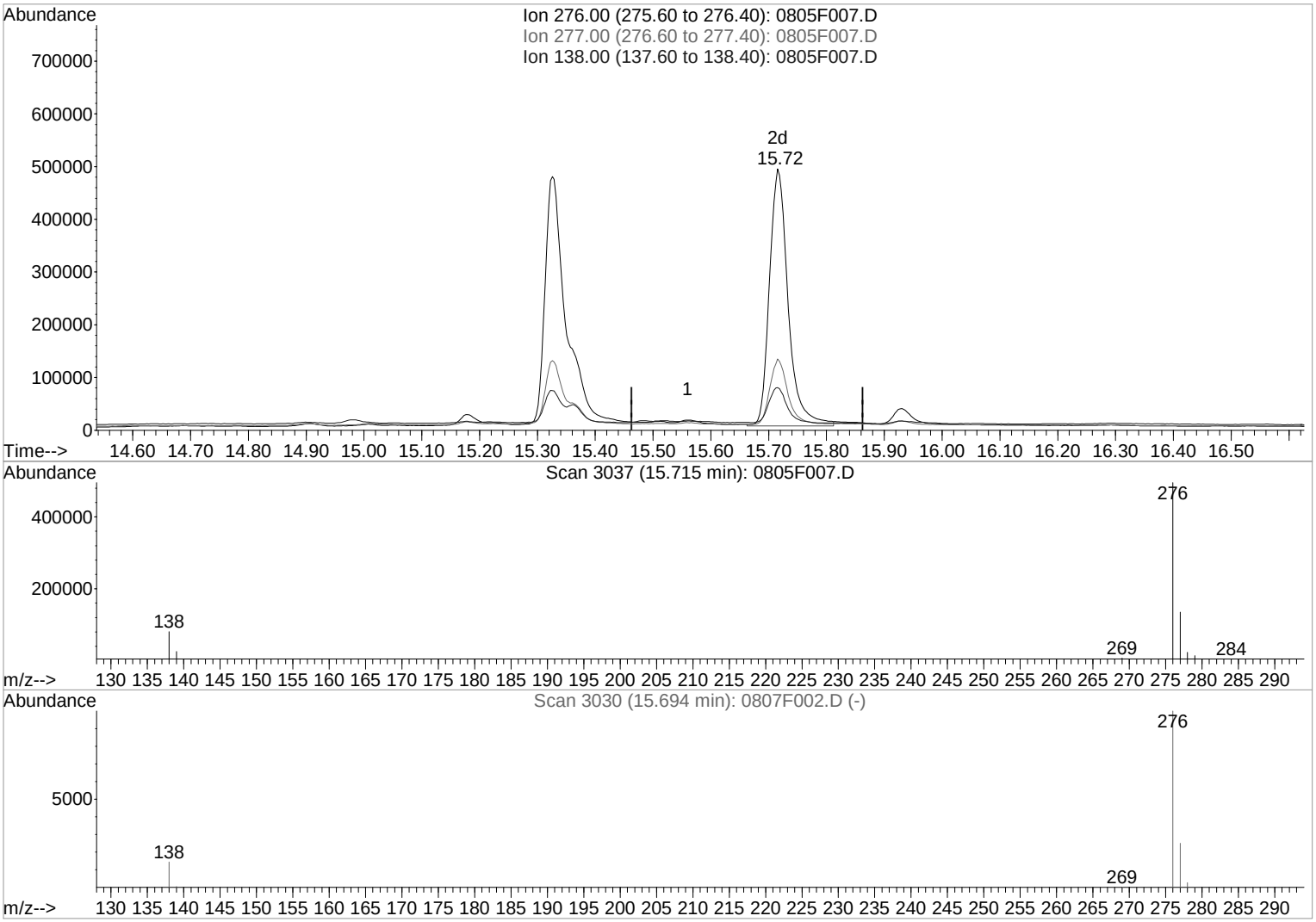
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F007.D Vial: 7
Acq On : 5 Aug 2024 12:26 pm Operator: EBruno
Sample : KQ2411801-01_K2407810-001MS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:03 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F007.D

(36) Benzo(g,h,i)perylene (T)

15.72min 466.15ng/ml m

response 1099568

Ion	Exp%	Act%
276.00	100	100
277.00	24.90	27.22
138.00	13.80	16.31
0.00	0.00	0.00

Manual Integration:

After

WP

08/08/24

1st 08/08/24
2nd 08/08/24

Validation Report

Data File: J:\MS14\DATA\080524\0805F008.D\
Lab ID: KQ2411801-02
RunType: DMS
Matrix: Sediment

Date Acquired: 8/5/24 12:53:00
Batch ID: 849989
Analysis Method: 8270D/PAH SIM

Validations

Validation Categories	Pass	Fail
Analytical Hold Time	X	
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Continuing Calibration Recovery		X
Internal Standards	X	
Surrogates	X	
Std MRL Unsupported by ICAL	X	
Above Highest ICAL Level	X	

Analyte Exceptions

Exception Categories	Analyte Name	Result	Low Limit	High Limit	Corrective Action
Continuing Calibration Recovery	Benzo(a)pyrene	22		20	OK, <40

Primary Review: _____

Printed: 8/8/24 11:23
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Secondary Review: _____

1st 08/08/24
2nd 08/08/24

Quantitation Report

Data File:	J:\MS14\DATA\080524\0805F008.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 12:53:00	**Vial:**	6
Run Type:	DMS	**Dilution:**	1
Lab ID:	KQ2411801-02	**Raw Units:**	ng/mL

Bottle ID:	K2407810-001.01	**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	PAH SIM	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	849989	**Prep Lot:**	442452	**Report Group:**	KQ2411801
Analysis	8270D	**Prep Method:**	EPA 3546		
		Prep Date:	8/1/24		

Title:	Polycyclic Aromatic Hydrocarbons by GC/MS SIM	**Calibration ID:**	KC2400163
		Report List ID:	18909

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Acenaphthene-d10	6.18		126438	200.00	OK
Chrysene-d12	9.93	+0.01	284343	200.00	OK
Naphthalene-d8	4.56	-0.01	258937	200.00	OK
Perylene-d12	13.00	+0.08	328125	200.00	OK
Phenanthrene-d10	7.43		256932	200.00	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	% Rec	% Rec Criteria	Rpt?
Fluoranthene-d10	8.42	+0.01	240649	171.18	86	28 - 112	Y
Fluorene-d10	6.63	+0.01	119376	164.06	82	34 - 106	Y
Terphenyl-d14	8.76	+0.01	232000	147.65	74	32 - 122	Y

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
2-Methylnaphthalene	5.26	-0.01	311188	386.23	726		Y
Acenaphthene	6.21		332731	460.54	866		Y
Acenaphthylene	6.06	-0.01	442225	393.24	739		Y
Anthracene	7.50	+0.01	652630	522.32	982		Y
Benz(a)anthracene	9.92	+0.02	1141513	617.08	1160		Y
Benzo(a)pyrene	12.83	+0.06	1170605	697.08	1310		Y
Benzo(b)fluoranthene	11.95	+0.04	1312159	623.78	1170		Y
Benzo(g,h,i)perylene	15.72	+0.05	1093535	473.50	890		Y
Benzo(k)fluoranthene	12.02	+0.05	952090	479.24	901		Y
Chrysene	9.97	+0.02	1285706	730.03	1370		Y
Dibenz(a,h)anthracene	15.37	+0.04	922829	467.78	879		Y
Fluoranthene	8.44	+0.01	1305254	846.53	1590		Y
Fluorene	6.65		452586	544.92	1020		Y

1st 08/08/24

2nd 08/08/24

Data File:	J:\MS14\DATA\080524\0805F008.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 12:53:00	**Vial:**	6
Run Type:	DMS	**Dilution:**	1
Lab ID:	KQ2411801-02	**Raw Units:**	ng/mL

Target Compounds

Final Conc.Units: ug/Kg

Parameter Name	RT	RT Dev	Response	Solution Conc	Final Conc	Q	Rpt?
Indeno(1,2,3-cd)pyrene	15.34	+0.05	1017614	583.12	1100		Y
Naphthalene	4.58	-0.02	479309	386.10	726		Y
Phenanthrene	7.45		1469689	1095.64	2060		Y
Pyrene	8.63	+0.01	1679763	912.81	1720		Y

Prep Amount:	10.151 g	**Dilution:**	1
Prep Final Amount:	10.00 mL	**Basis Factor:**	52.40

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23

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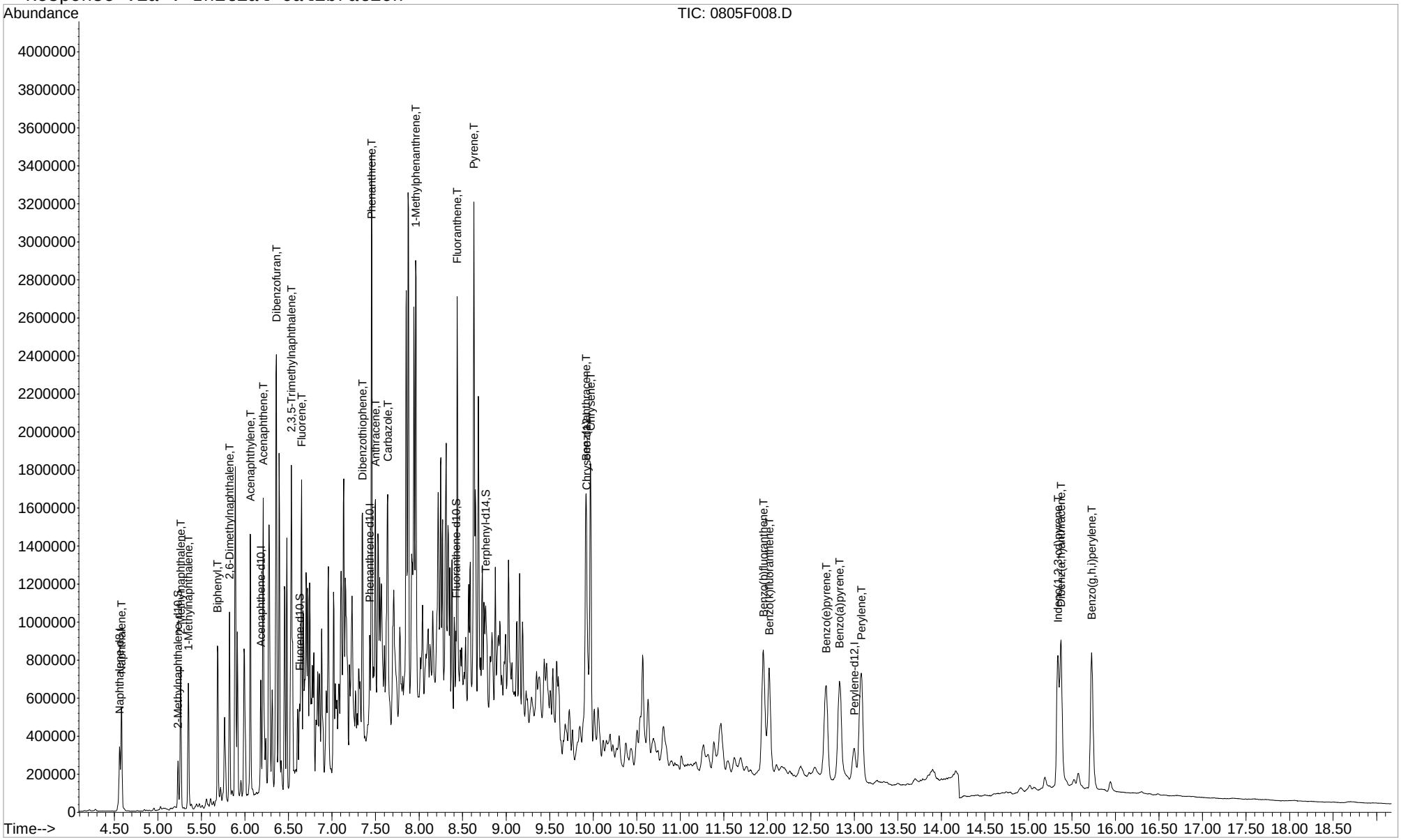
Quantitation Report (QT Reviewed)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F008.D Vial: 8
Acq On : 5 Aug 2024 12:53 pm Operator: EBruno
Sample : KQ2411801-02_K2407810-001DMS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:05 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration



1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F008.D Vial: 8
Acq On : 5 Aug 2024 12:53 pm Operator: EBruno
Sample : KQ2411801-02_K2407810-001DMS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 05 14:59:30 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.56	136	258937	200.00	ng/ml	-0.06
8) Acenaphthene-d10	6.18	164	126438	200.00	ng/ml	-0.03
15) Phenanthrene-d10	7.43	188	256932	200.00	ng/ml	-0.02
23) Chrysene-d12	9.93	240	284343	200.00	ng/ml	-0.03
28) Perylene-d12	13.00	264	328125	200.00	ng/ml	0.05
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.23	152	99182	136.89	ng/ml	-0.04
Spiked Amount 200.000			Recovery =	68.44%		
13) Fluorene-d10	6.63	176	119376	164.06	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	82.03%		
22) Fluoranthene-d10	8.42	212	240649m	171.18	ng/ml	-0.02
Spiked Amount 200.000			Recovery =	85.59%		
25) Terphenyl-d14	8.76	244	232000	147.65	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	73.83%		
Target Compounds						Qvalue
2) Naphthalene	4.58	128	479309	386.10	ng/ml	99
4) 2-Methylnaphthalene	5.26	142	311188	386.23	ng/ml	98
5) 1-Methylnaphthalene	5.35	142	271898	358.56	ng/ml	99
6) Biphenyl	5.68	154	353512	360.73	ng/ml	98
7) 2,6-Dimethylnaphthalene	5.82	156	289513	417.28	ng/ml	93
9) Acenaphthylene	6.06	152	442225	393.24	ng/ml	96
10) Acenaphthene	6.21	154	332731	460.54	ng/ml	98
11) Dibenzofuran	6.36	168	378977	353.91	ng/ml	89
12) 2,3,5-Trimethylnaphthalene	6.53	170	798219	1179.73	ng/ml	94
14) Fluorene	6.65	166	452586	544.92	ng/ml	96
16) Dibenzothiophene	7.35	184	636885	493.59	ng/ml	97
17) Phenanthrene	7.45	178	1469689m	1095.64	ng/ml	
18) Anthracene	7.50	178	652630m	522.32	ng/ml	
19) Carbazole	7.64	167	495086	419.54	ng/ml	97
20) 1-Methylphenanthrene	7.96	192	830003	831.80	ng/ml	96
21) Fluoranthene	8.44	202	1305254	846.53	ng/ml	92
24) Pyrene	8.63	202	1679763	912.81	ng/ml	98
26) Benz(a)anthracene	9.92	228	1141513	617.08	ng/ml	97
27) Chrysene	9.97	228	1285706m	730.03	ng/ml	
29) Benzo(b)fluoranthene	11.95	252	1312159	623.78	ng/ml	98
30) Benzo(k)fluoranthene	12.02	252	952090	479.24	ng/ml	97
31) Benzo(e)pyrene	12.68	252	1095960	556.03	ng/ml	99
32) Benzo(a)pyrene	12.83	252	1170605	697.08	ng/ml	97
33) Perylene	13.08	252	1336186	737.46	ng/ml	98
34) Indeno(1,2,3-cd)pyrene	15.34	276	1017614m	583.12	ng/ml	
35) Dibenz(a,h)anthracene	15.37	278	922829	467.78	ng/ml	98
36) Benzo(g,h,i)perylene	15.72	276	1093535	473.50	ng/ml	99

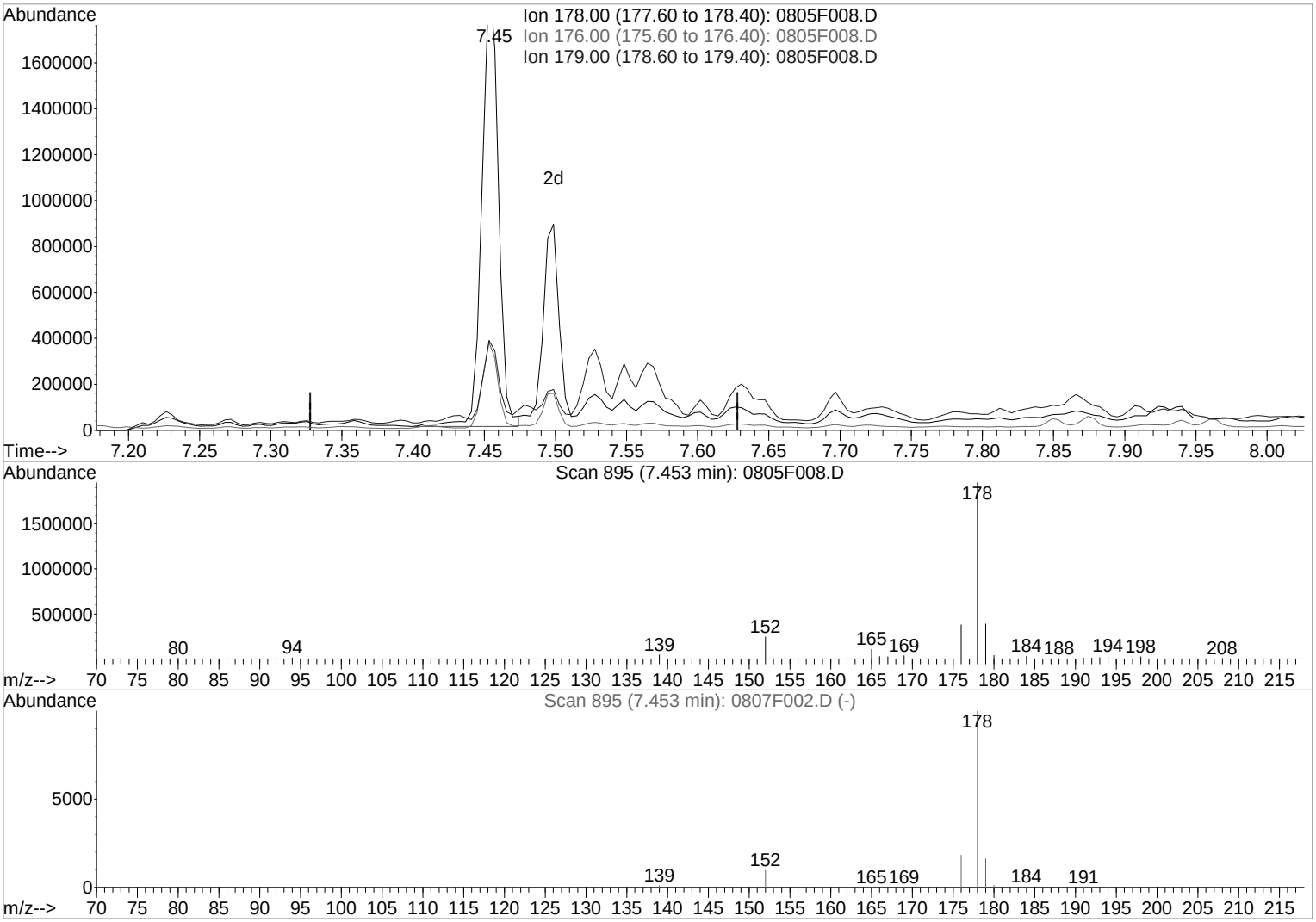
(#) = qualifier out of range (m) = manual integration

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F008.D Vial: 8
Acq On : 5 Aug 2024 12:53 pm Operator: EBruno
Sample : KQ2411801-02_K2407810-001DMS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 5 14:59 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F008.D

(17) Phenanthrene (T)

7.45min 1151.33ng/ml

response 1544393

Ion	Exp%	Act%
178.00	100	100
176.00	17.90	19.18
179.00	16.50	18.51
0.00	0.00	0.00

Manual Integration:

Before

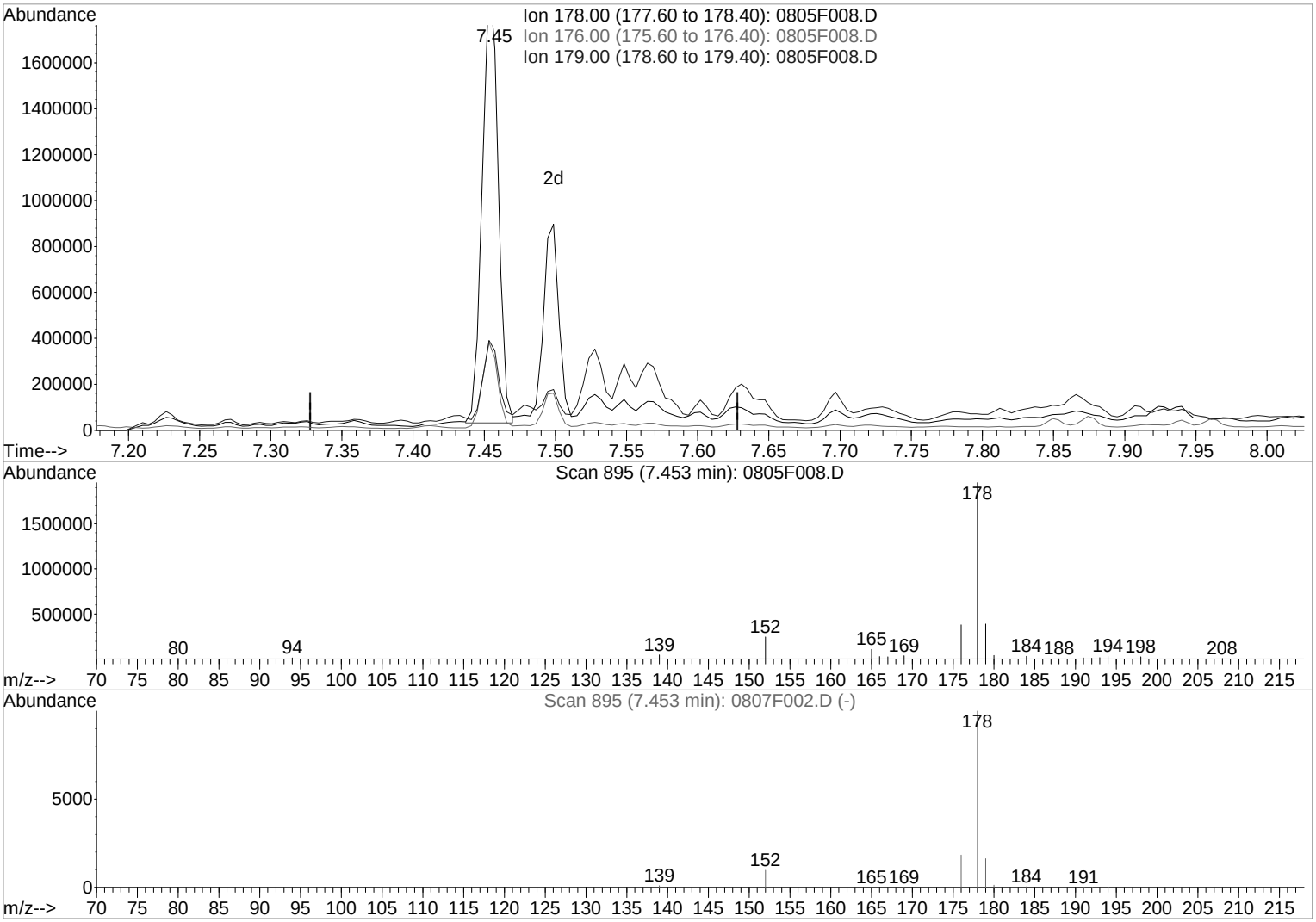
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F008.D Vial: 8
Acq On : 5 Aug 2024 12:53 pm Operator: EBruno
Sample : KQ2411801-02_K2407810-001DMS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:04 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F008.D

(17) Phenanthrene (T)

7.45min 1095.64ng/ml m

response 1469689

Ion	Exp%	Act%
178.00	100	100
176.00	17.90	19.53
179.00	16.50	19.96
0.00	0.00	0.00

Manual Integration:

After

BLC

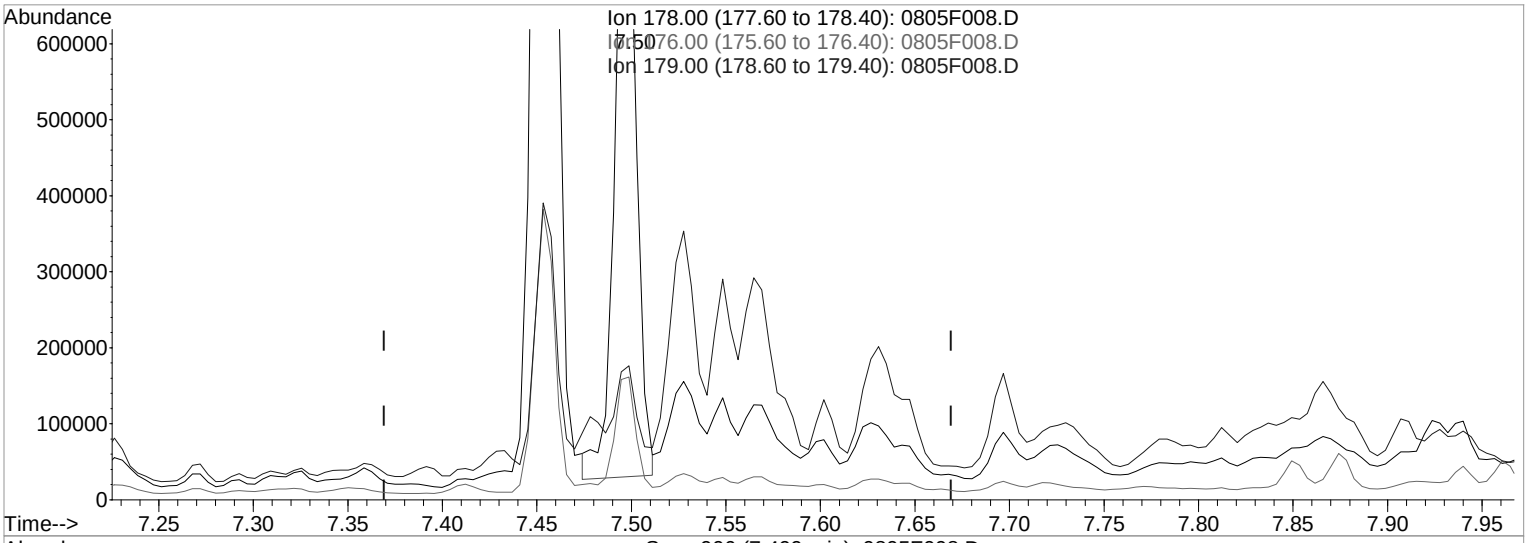
08/08/24

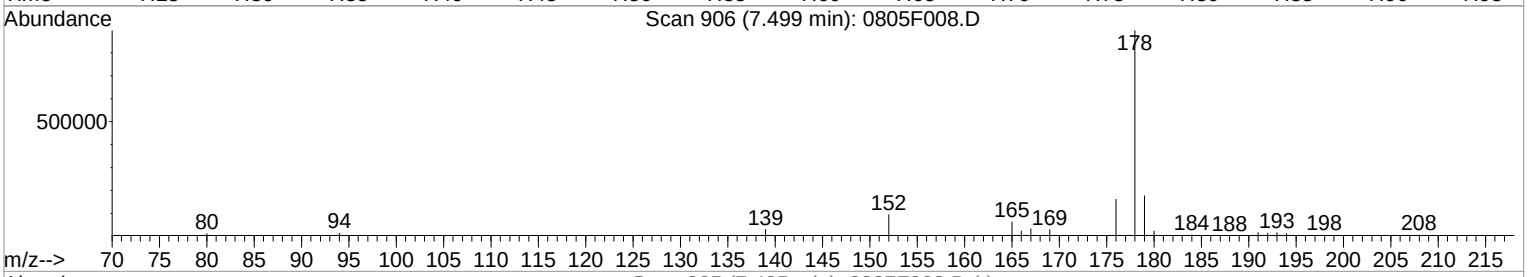
Quantitation Report (Qedit)

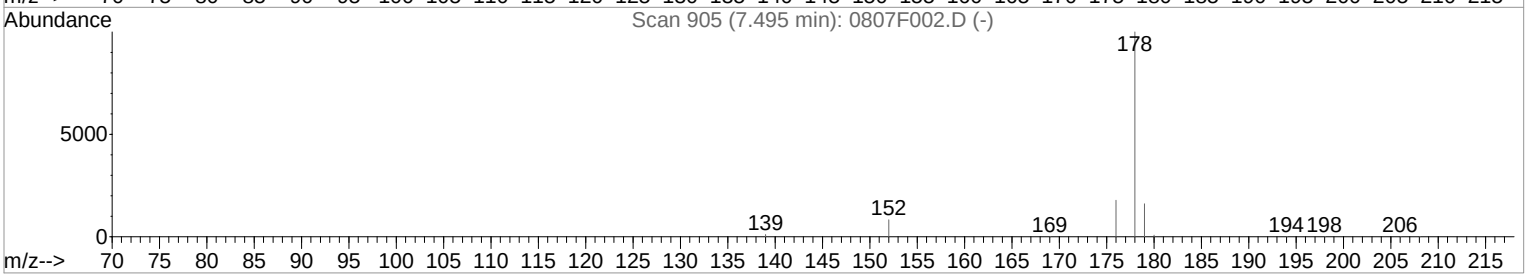
1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F008.D Vial: 8
Acq On : 5 Aug 2024 12:53 pm Operator: EBruno
Sample : KQ2411801-02_K2407810-001DMS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:04 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration







TIC: 0805F008.D

(18) Anthracene (T)

7.50min 540.92ng/ml

response 675871

Ion	Exp%	Act%
178.00	100	100
176.00	17.80	17.30
179.00	16.90	12.89
0.00	0.00	0.00

Manual Integration:

Before

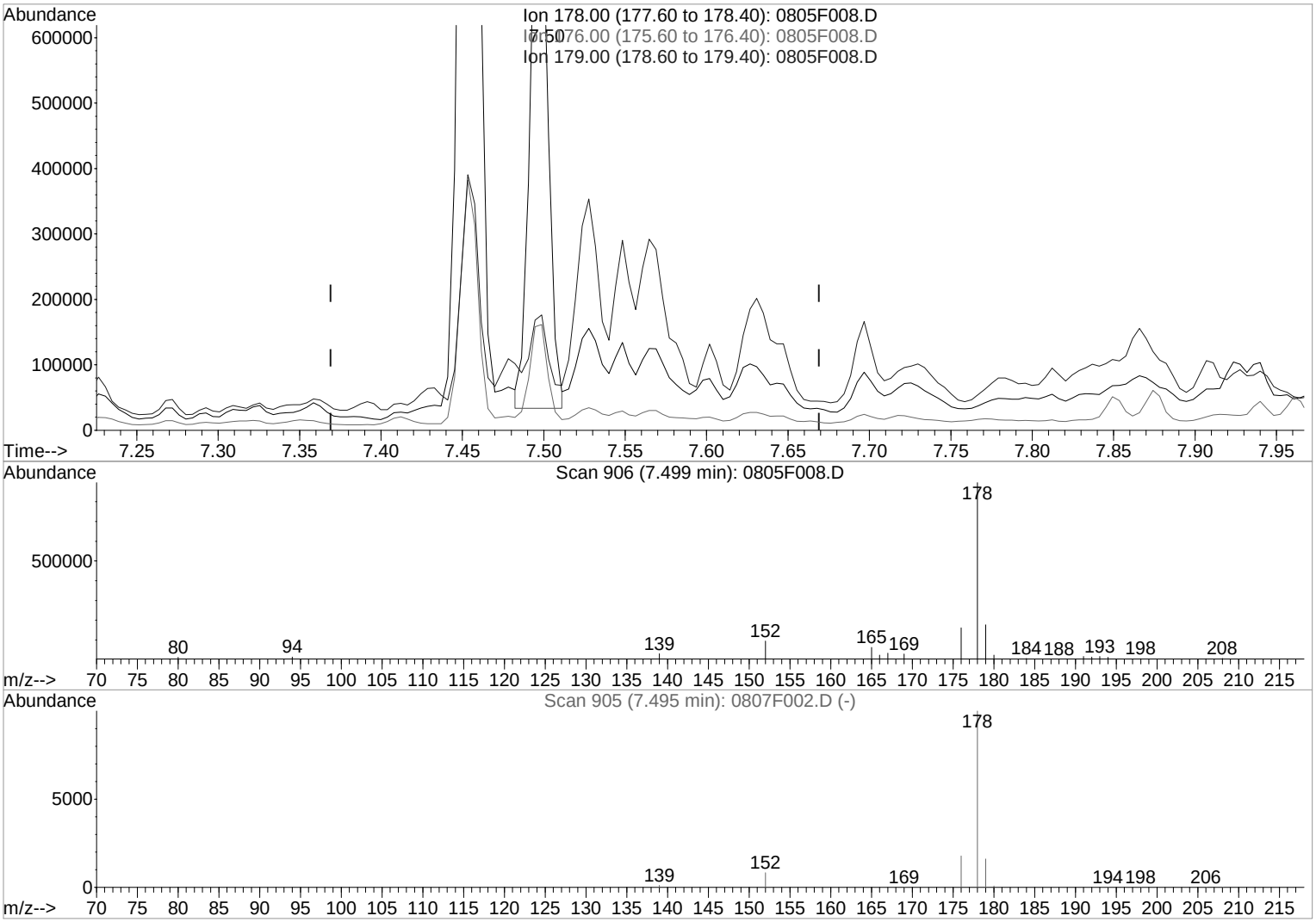
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F008.D Vial: 8
Acq On : 5 Aug 2024 12:53 pm Operator: EBruno
Sample : KQ2411801-02_K2407810-001DMS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:04 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F008.D

(18) Anthracene (T)

7.50min 522.32ng/ml m

response 652630

Ion	Exp%	Act%
178.00	100	100
176.00	17.80	17.99
179.00	16.90	19.66
0.00	0.00	0.00

Manual Integration:

After

BLC

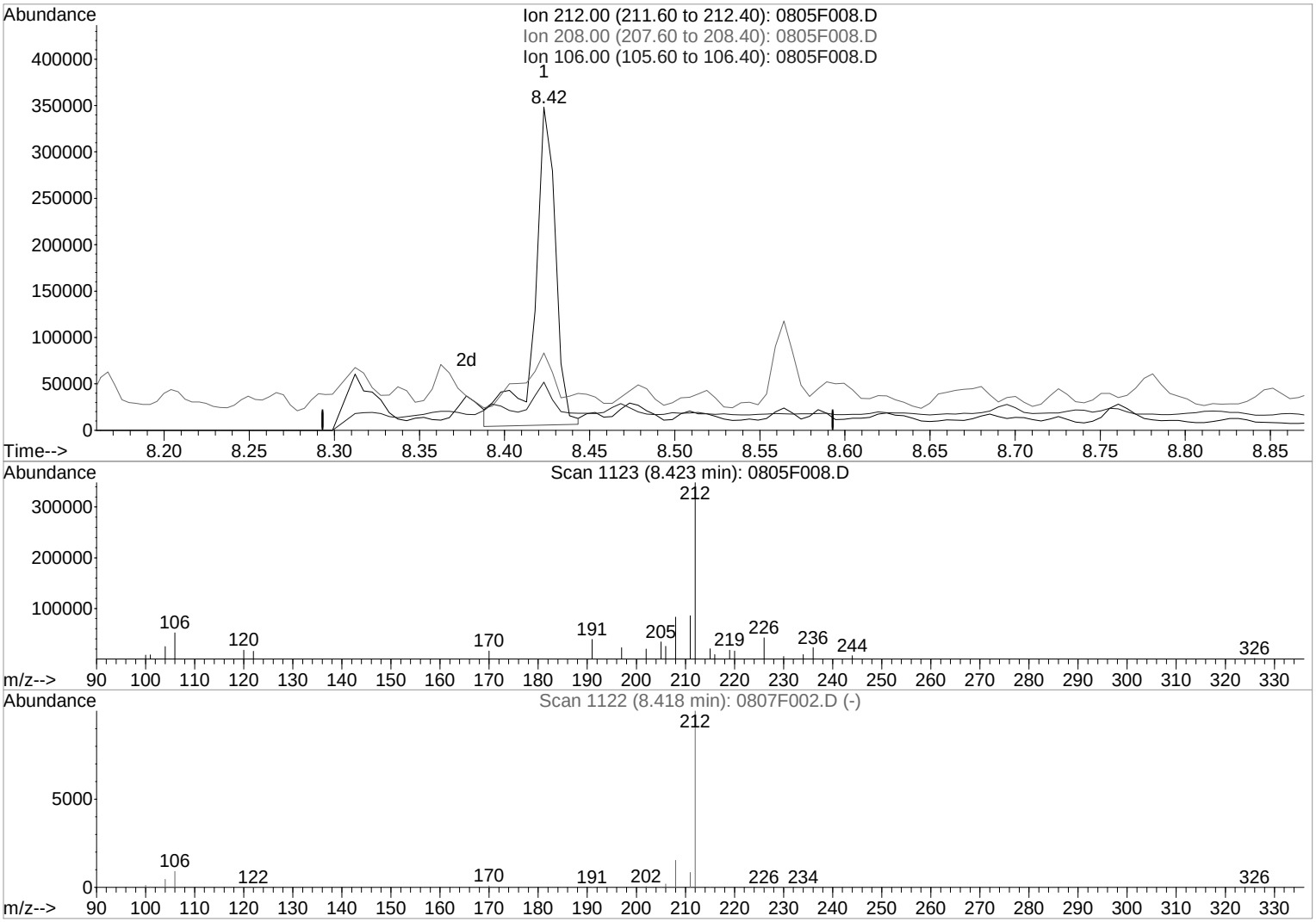
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F008.D Vial: 8
Acq On : 5 Aug 2024 12:53 pm Operator: EBruno
Sample : KQ2411801-02_K2407810-001DMS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:04 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F008.D

(22) Fluoranthene-d10 (S)

8.42min 210.39ng/ml

response 295759

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	17.59
106.00	10.20	10.00
0.00	0.00	0.00

Manual Integration:

Before

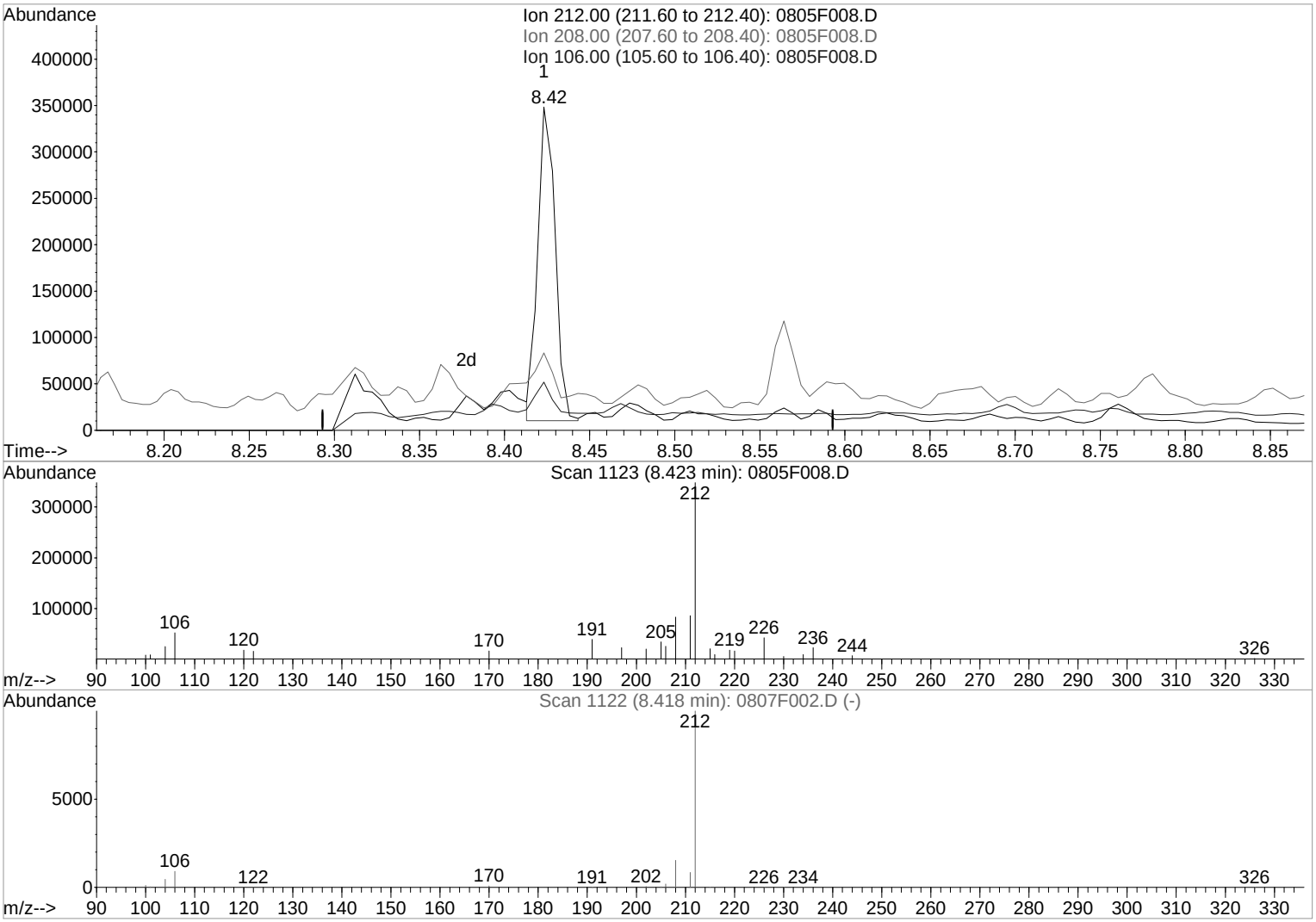
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F008.D Vial: 8
Acq On : 5 Aug 2024 12:53 pm Operator: EBruno
Sample : KQ2411801-02_K2407810-001DMS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:04 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F008.D

(22) Fluoranthene-d10 (S)

8.42min 171.18ng/ml m

response 240649

Ion	Exp%	Act%
212.00	100	100
208.00	16.10	23.88
106.00	10.20	14.87
0.00	0.00	0.00

Manual Integration:

After

BLC

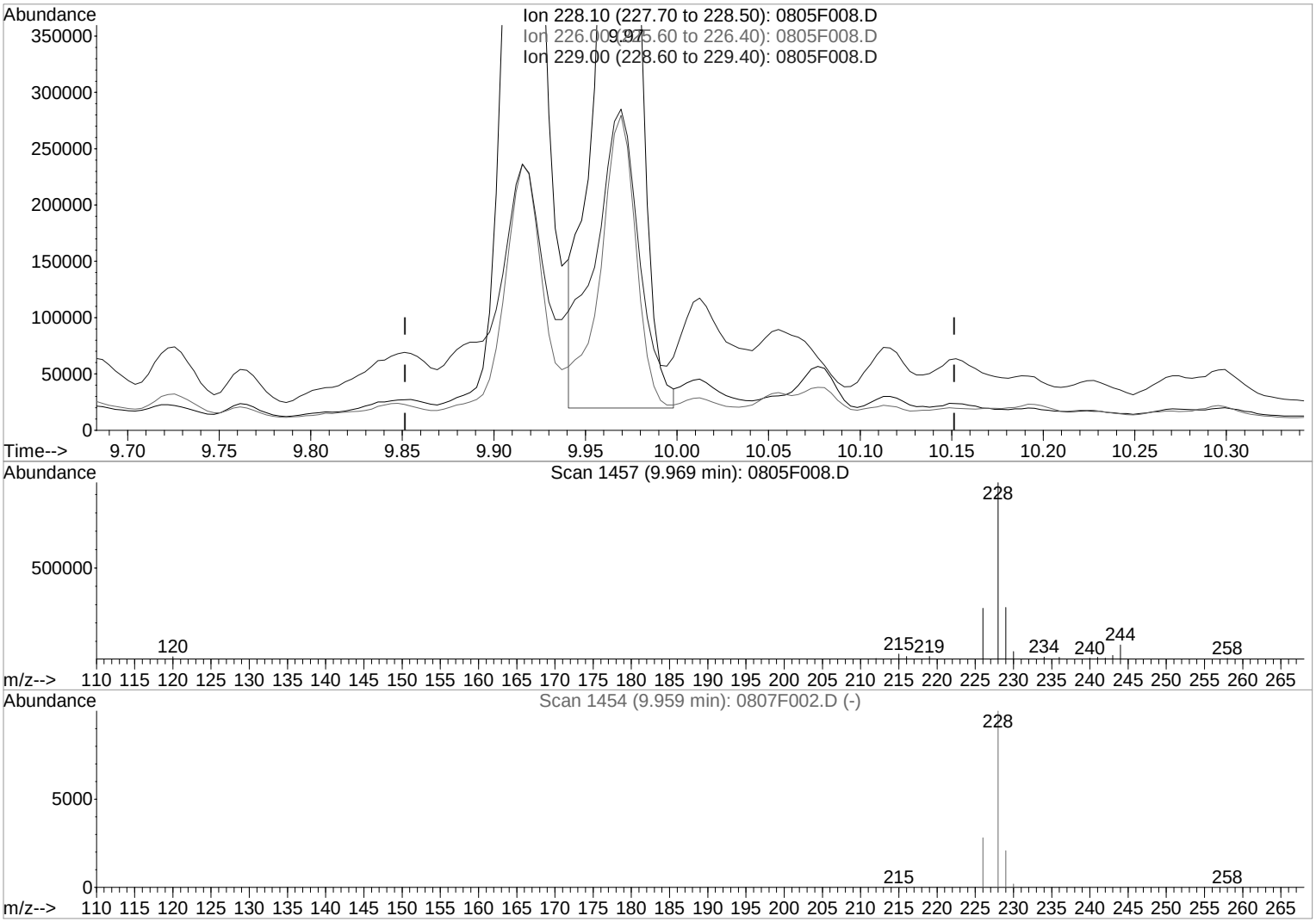
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F008.D Vial: 8
Acq On : 5 Aug 2024 12:53 pm Operator: EBruno
Sample : KQ2411801-02_K2407810-001DMS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:04 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F008.D

(27) Chrysene (T)

9.97min 725.02ng/ml

response 1276893

Ion	Exp%	Act%
228.10	100	100
226.00	27.30	27.67
229.00	20.70	23.70
0.00	0.00	0.00

Manual Integration:

Before

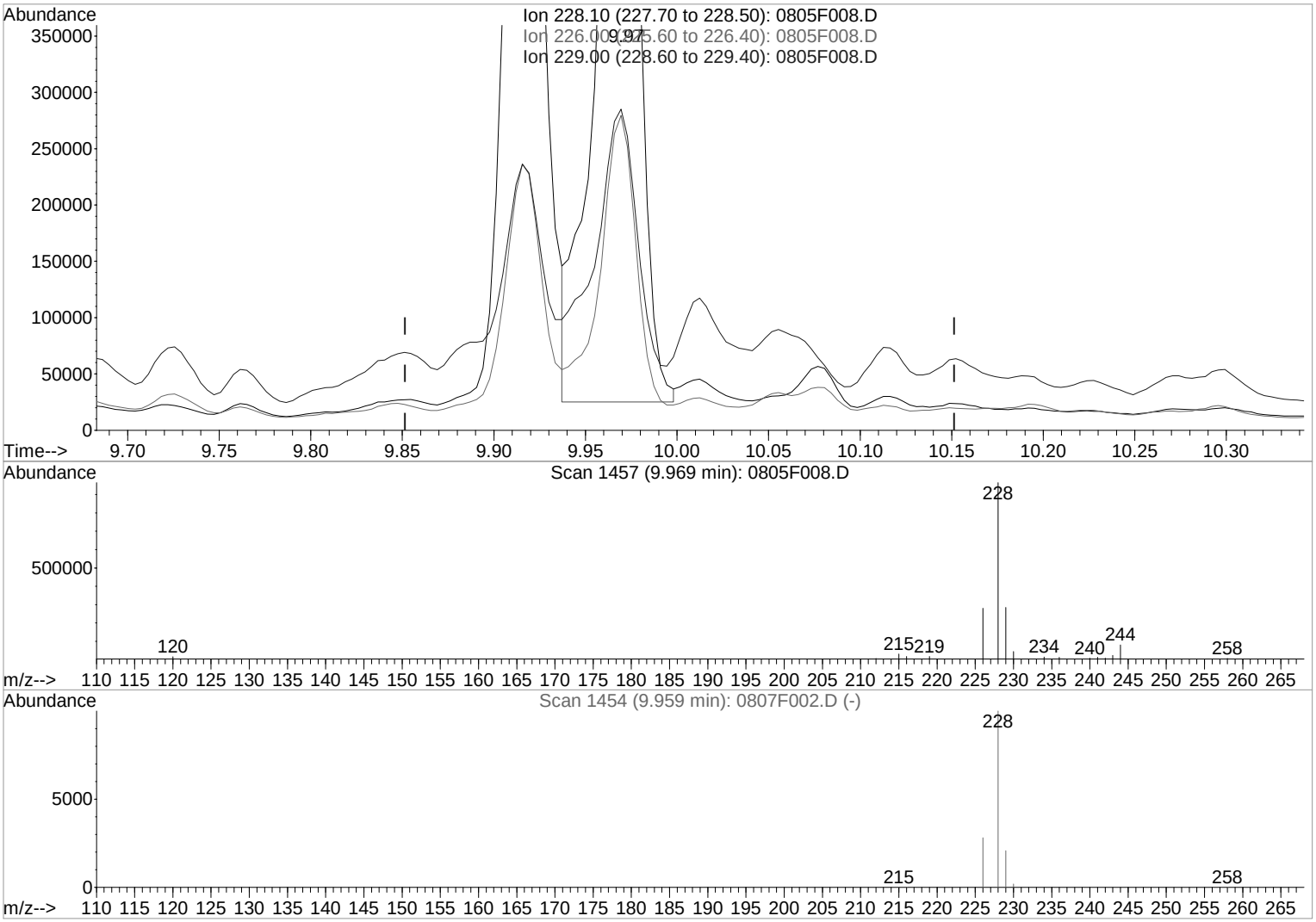
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F008.D Vial: 8
Acq On : 5 Aug 2024 12:53 pm Operator: EBruno
Sample : KQ2411801-02_K2407810-001DMS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:04 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F008.D

(27) Chrysene (T)

9.97min 730.03ng/ml m

response 1285706

Ion	Exp%	Act%
228.10	100	100
226.00	27.30	28.95
229.00	20.70	29.54
0.00	0.00	0.00

Manual Integration:

After

BLC

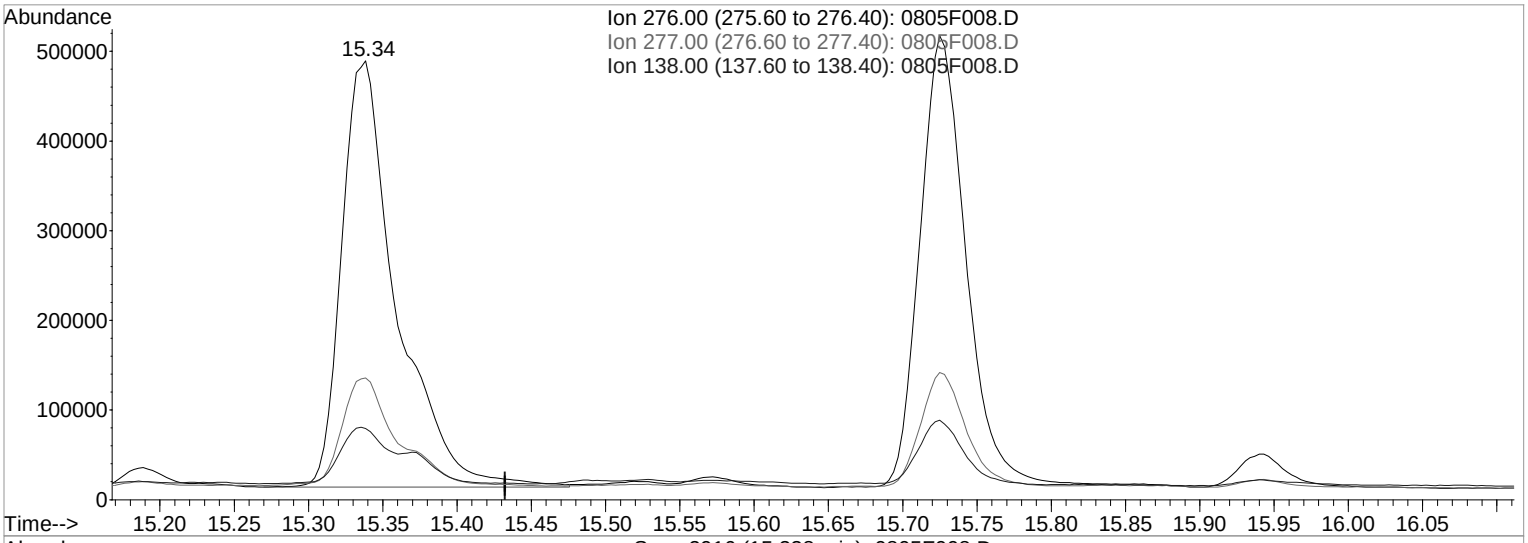
08/08/24

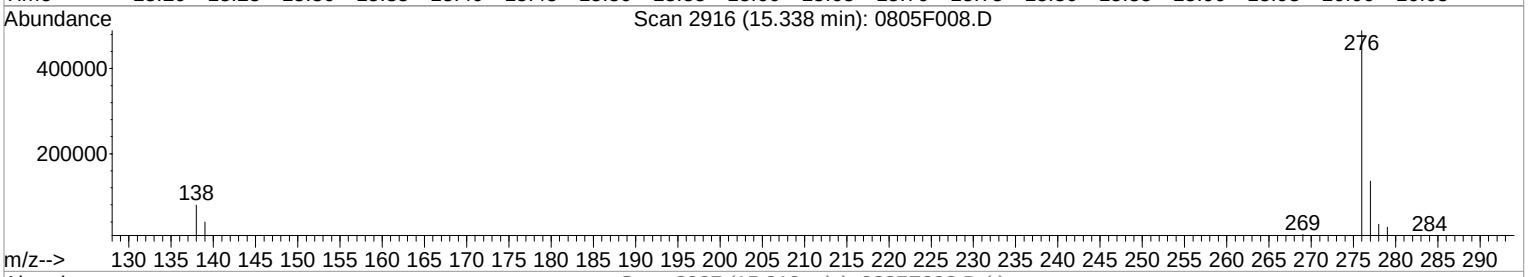
Quantitation Report (Qedit)

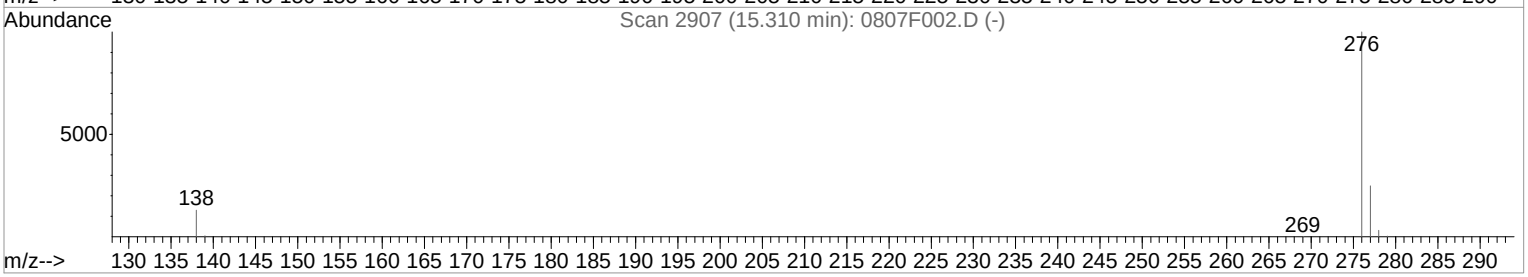
1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F008.D Vial: 8
Acq On : 5 Aug 2024 12:53 pm Operator: EBruno
Sample : KQ2411801-02_K2407810-001DMS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:04 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration







TIC: 0805F008.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.34min 697.79ng/ml

response 1217733

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	25.34
138.00	12.20	12.94
0.00	0.00	0.00

Manual Integration:

Before

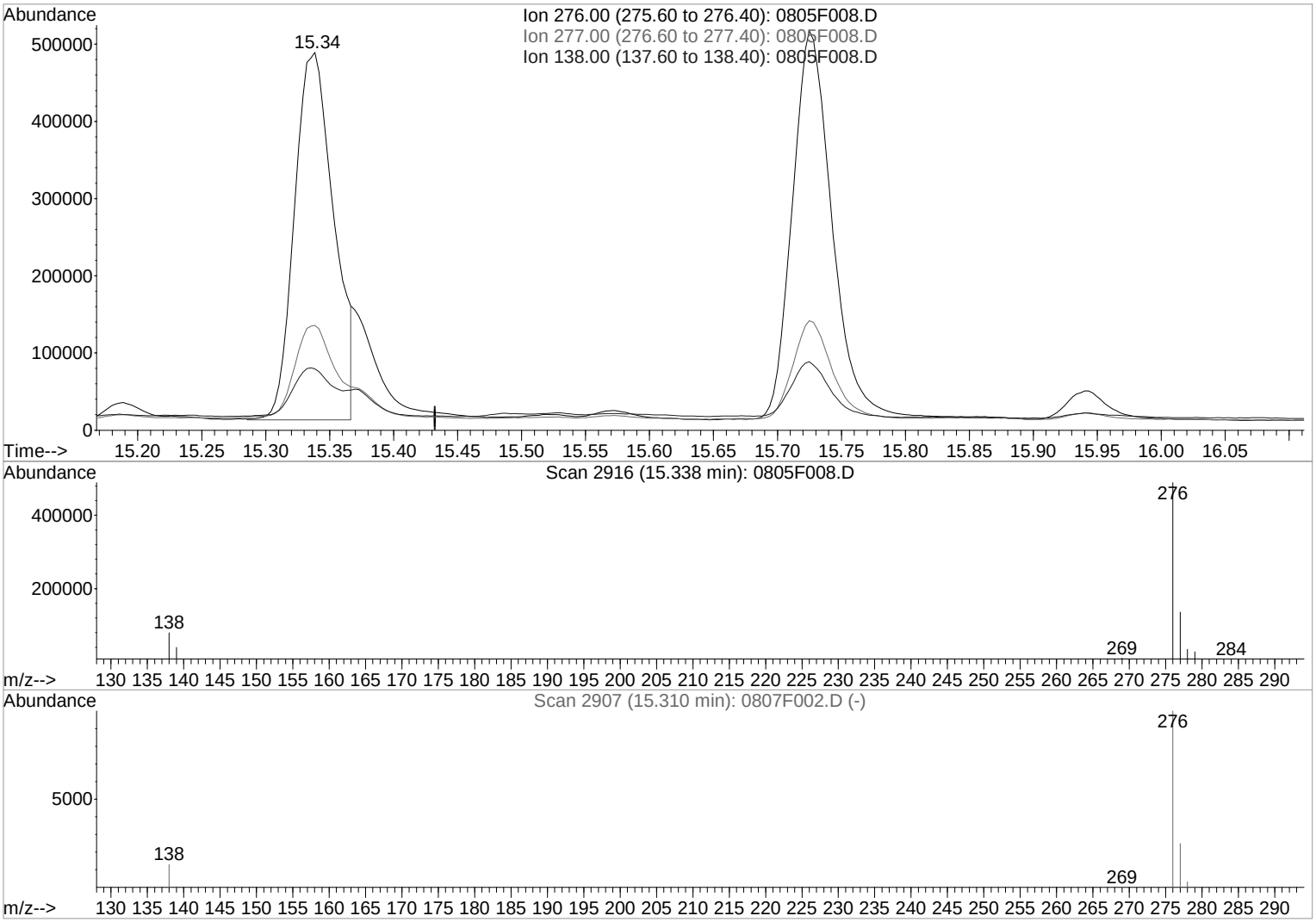
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F008.D Vial: 8
Acq On : 5 Aug 2024 12:53 pm Operator: EBruno
Sample : KQ2411801-02_K2407810-001DMS Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 10:05 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F008.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.34min 583.12ng/ml m

response 1017614

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	27.75
138.00	12.20	16.22
0.00	0.00	0.00

Manual Integration:

After

BLC

08/08/24

1st 08/08/24
2nd 08/08/24

Validation Report

Data File: J:\MS14\DATA\080524\0805F002.D\
Lab ID: KQ2412273-02
RunType: CCV
Matrix: Sediment

Date Acquired: 8/5/24 10:05:00
Batch ID: 849989
Analysis Method: 8270D/PAH SIM

Validations

Validation Categories	Pass	Fail
ICAL Analyte Recovery	X	
Second Source ICAL Verification	X	
Internal Standards	X	

Primary Review: _____

Printed: 8/8/24 11:23
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Secondary Review: _____

1st 08/08/24
2nd 08/08/24

Quantitation Report

Data File:	J:\MS14\DATA\080524\0805F002.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 10:05:00	**Vial:**	2
Run Type:	CCV	**Dilution:**	1
Lab ID:	KQ2412273-02	**Raw Units:**	ng/mL

Bottle ID:		**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	PAH SIM	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	849989	**Prep Lot:**		**Report Group:**	KQ2412273
Analysis	8270D	**Prep Method:**			
		Prep Date:			

Title:	Polycyclic Aromatic Hydrocarbons by GC/MS SIM	**Calibration ID:**	KC2400163
		Report List ID:	18909

Internal Standard Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Area Criteria
Acenaphthene-d10	6.18		136308	200.00	OK
Chrysene-d12	9.92		322421	200.00	OK
Naphthalene-d8	4.57		279198	200.00	OK
Perylene-d12	12.92		381000	200.00	OK
Phenanthrene-d10	7.43		249760	200.00	OK

Surrogate Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
Fluoranthene-d10	8.41		633554	463.61	Y
Fluorene-d10	6.62		329929	420.59	Y
Terphenyl-d14	8.75		688224	386.26	Y

Target Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
2-Methylnaphthalene	5.27		343311	395.17	Y
Acenaphthene	6.21		318666	409.13	Y
Acenaphthylene	6.07		518208	427.43	Y
Anthracene	7.49		531847	437.87	Y
Benz(a)anthracene	9.90		923174	440.11	Y
Benzo(a)pyrene	12.77		954153	489.34	Y
Benzo(b)fluoranthene	11.91		1082278	443.10	Y
Benzo(g,h,i)perylene	15.67		1043594	389.16	Y
Benzo(k)fluoranthene	11.97		1009432	437.59	Y
Chrysene	9.95		872989	437.14	Y
Dibenz(a,h)anthracene	15.33		1036380	452.43	Y
Fluoranthene	8.43		651861	434.91	Y
Fluorene	6.65		369852	413.07	Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23
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1st 08/08/24

2nd 08/08/24

Data File:	J:\MS14\DATA\080524\0805F002.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 10:05:00	**Vial:**	2
Run Type:	CCV	**Dilution:**	1
Lab ID:	KQ2412273-02	**Raw Units:**	ng/mL

Target Compounds

Parameter Name	RT	RT Dev	Response	Solution Conc	Rpt?
Indeno(1,2,3-cd)pyrene	15.29		902027	445.15	Y
Naphthalene	4.60		549817	410.75	Y
Phenanthrene	7.45		529669	406.20	Y
Pyrene	8.62		723773	346.86	Y

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23

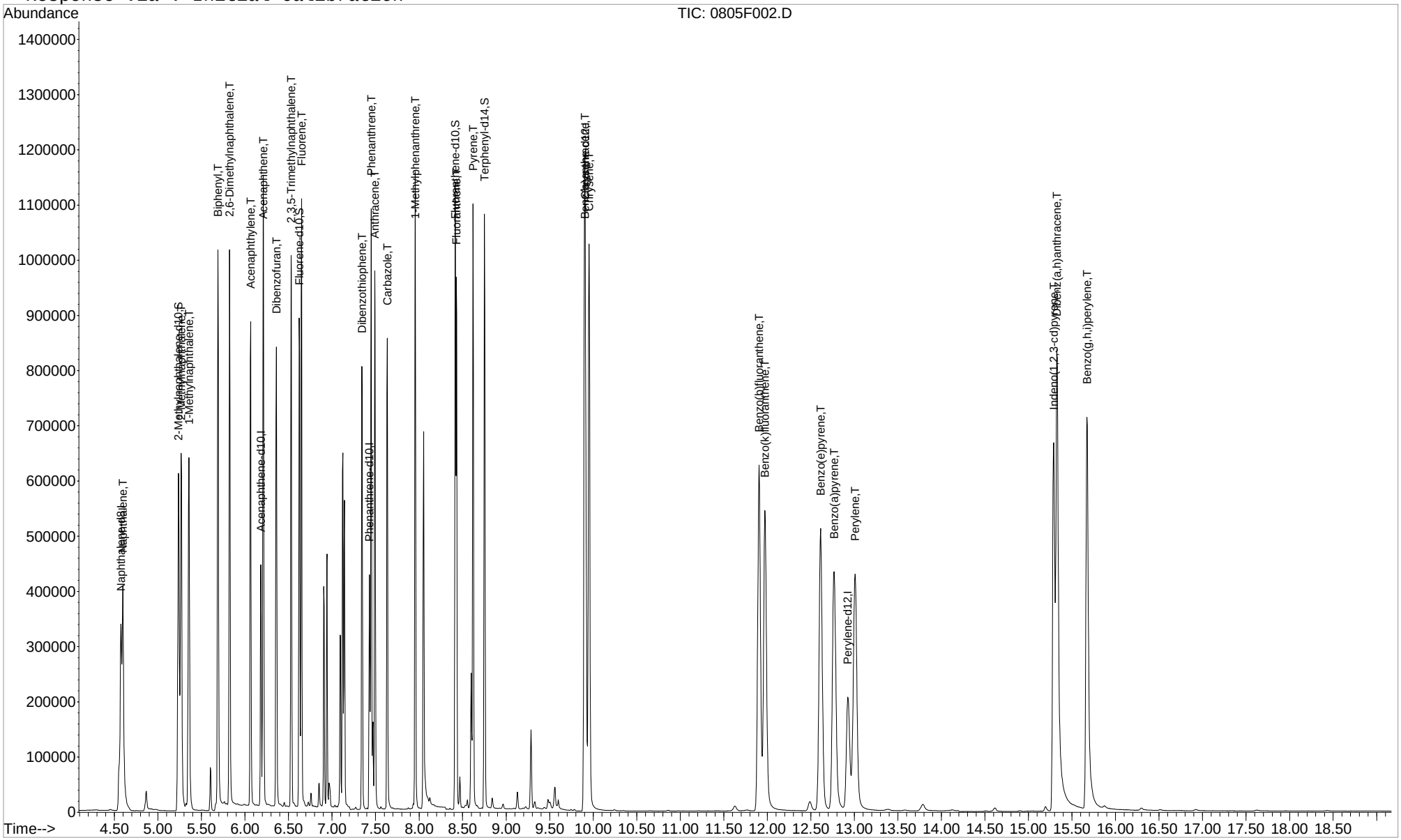
\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

Quantitation Report (QT Reviewed)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F002.D Vial: 2
Acq On : 5 Aug 2024 10:05 am Operator: EBruno
Sample : PAH CCV 0.4PPM SVM71-90A Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 9:58 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F002.D Vial: 2
Acq On : 5 Aug 2024 10:05 am Operator: EBruno
Sample : PAH CCV 0.4PPM SVM71-90A Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 05 10:31:20 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.57	136	279198	200.00	ng/ml	-0.05
8) Acenaphthene-d10	6.18	164	136308	200.00	ng/ml	-0.03
15) Phenanthrene-d10	7.43	188	249760	200.00	ng/ml	-0.03
23) Chrysene-d12	9.92	240	322421	200.00	ng/ml	-0.05
28) Perylene-d12	12.92	264	381000	200.00	ng/ml	-0.02
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.24	152	318172	407.26	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	203.63%		
13) Fluorene-d10	6.62	176	329929	420.59	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	210.29%		
22) Fluoranthene-d10	8.41	212	633554	463.61	ng/ml	-0.03
Spiked Amount 200.000			Recovery =	231.81%		
25) Terphenyl-d14	8.75	244	688224	386.26	ng/ml	-0.04
Spiked Amount 200.000			Recovery =	193.13%		
Target Compounds						Qvalue
2) Naphthalene	4.60	128	549817	410.75	ng/ml	99
4) 2-Methylnaphthalene	5.27	142	343311	395.17	ng/ml	97
5) 1-Methylnaphthalene	5.35	142	325133	397.65	ng/ml	98
6) Biphenyl	5.69	154	452944	428.66	ng/ml	99
7) 2,6-Dimethylnaphthalene	5.82	156	321263	429.44	ng/ml	96
9) Acenaphthylene	6.07	152	518208	427.43	ng/ml	99
10) Acenaphthene	6.21	154	318666	409.13	ng/ml	98
11) Dibenzofuran	6.36	168	506883	439.08	ng/ml	99
12) 2,3,5-Trimethylnaphthalene	6.53	170	314831	431.61	ng/ml	96
14) Fluorene	6.65	166	369852	413.07	ng/ml	99
16) Dibenzothiophene	7.34	184	512344	408.48	ng/ml	98
17) Phenanthrene	7.45	178	529669	406.20	ng/ml	99
18) Anthracene	7.49	178	531847	437.87	ng/ml	99
19) Carbazole	7.63	167	496961	433.22	ng/ml	98
20) 1-Methylphenanthrene	7.96	192	429569	442.86	ng/ml	98
21) Fluoranthene	8.43	202	651861	434.91	ng/ml	99
24) Pyrene	8.62	202	723773	346.86	ng/ml	96
26) Benz(a)anthracene	9.90	228	923174	440.11	ng/ml	99
27) Chrysene	9.95	228	872989	437.14	ng/ml	99
29) Benzo(b)fluoranthene	11.91	252	1082278	443.10	ng/ml	100
30) Benzo(k)fluoranthene	11.97	252	1009432	437.59	ng/ml	100
31) Benzo(e)pyrene	12.61	252	1005130	439.18	ng/ml	98
32) Benzo(a)pyrene	12.77	252	954153	489.34	ng/ml	99
33) Perylene	13.01	252	921710	438.11	ng/ml	100
34) Indeno(1,2,3-cd)pyrene	15.29	276	902027m	445.15	ng/ml	
35) Dibenz(a,h)anthracene	15.33	278	1036380	452.43	ng/ml	100
36) Benzo(g,h,i)perylene	15.67	276	1043594	389.16	ng/ml	100

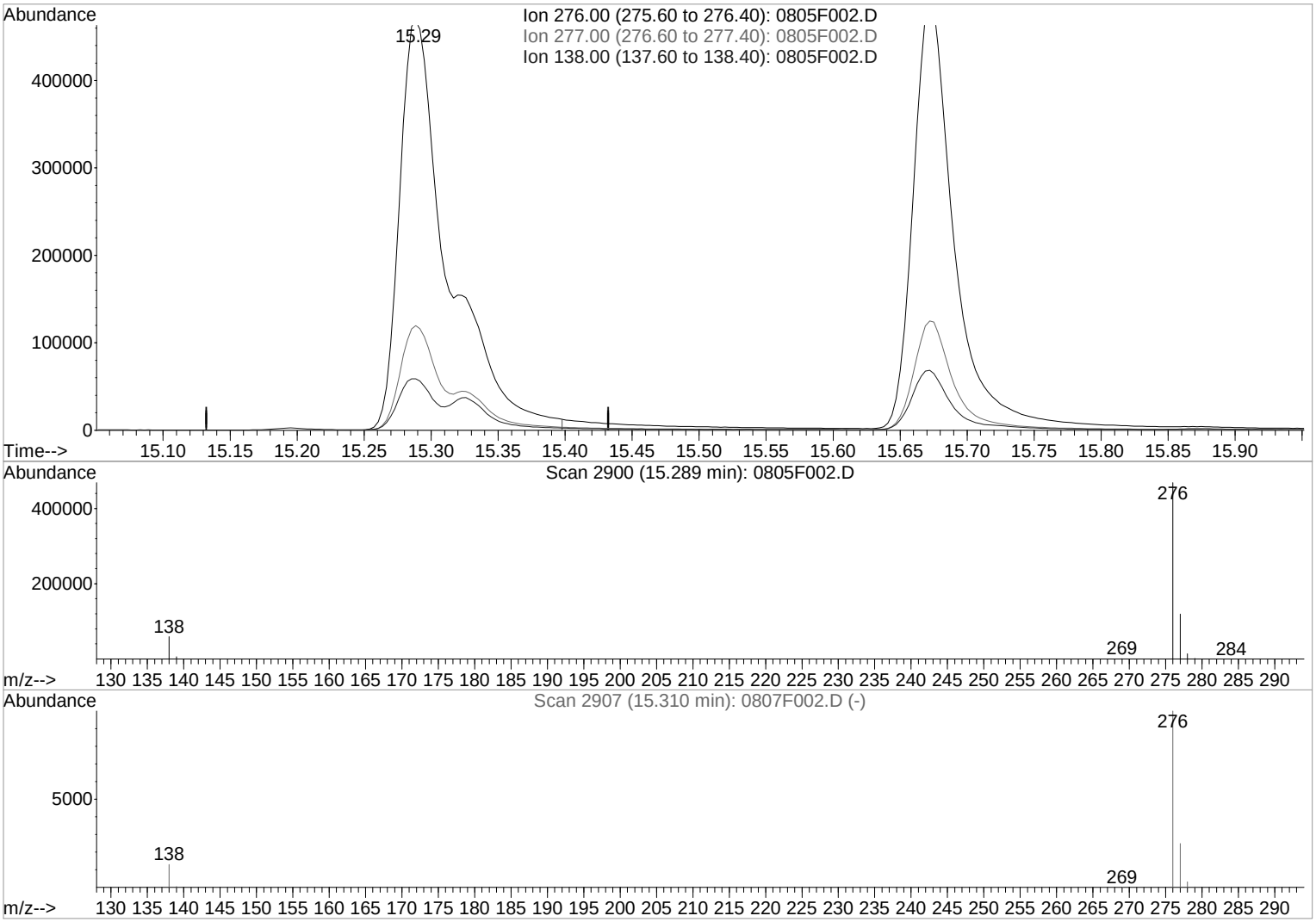
(#) = qualifier out of range (m) = manual integration

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F002.D Vial: 2
Acq On : 5 Aug 2024 10:05 am Operator: EBruno
Sample : PAH CCV 0.4PPM SVM71-90A Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 5 10:31 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F002.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.29min 587.29ng/ml

response 1190061

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	25.48
138.00	12.20	12.45
0.00	0.00	0.00

Manual Integration:

Before

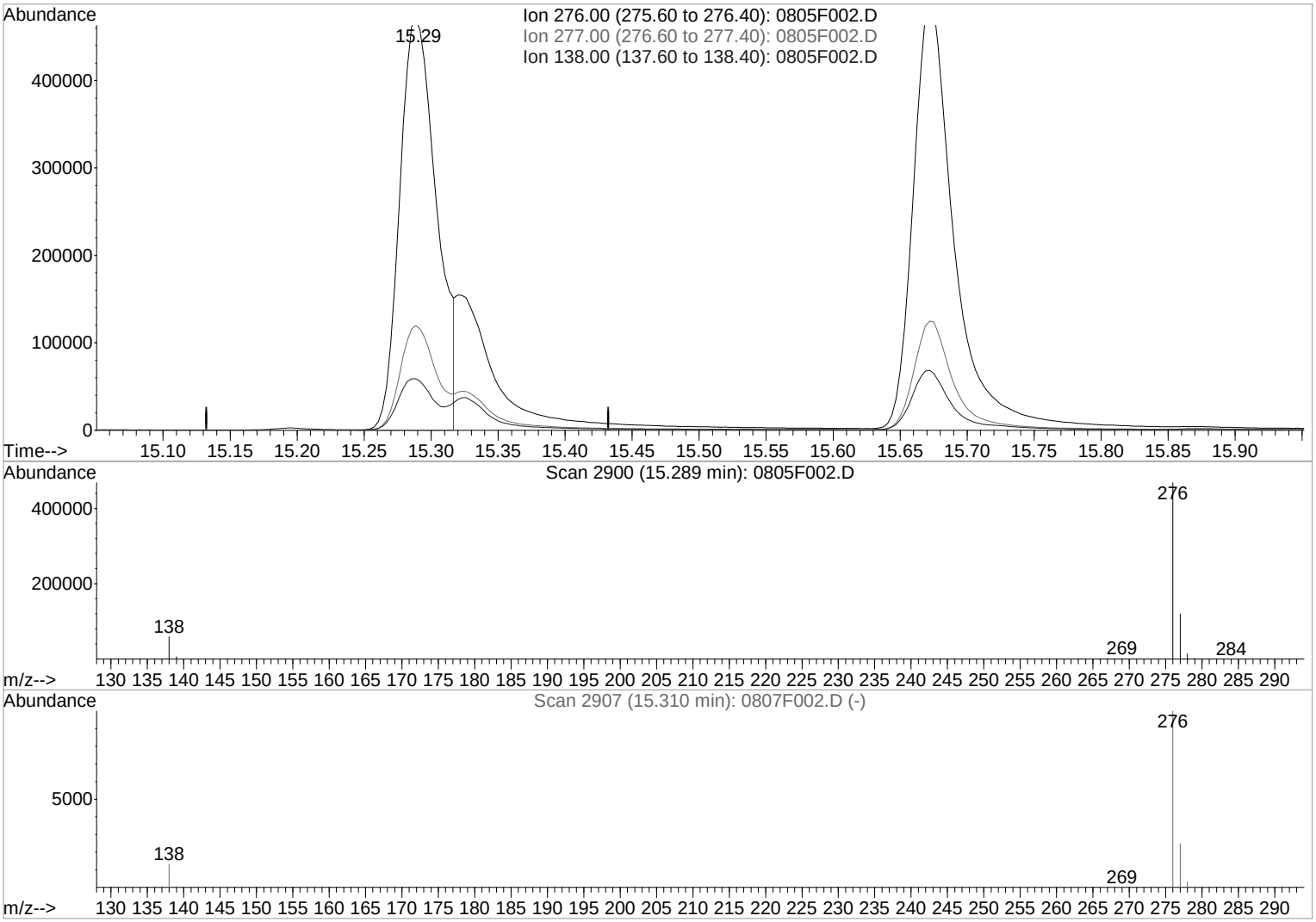
08/08/24

Quantitation Report (Qedit)

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F002.D Vial: 2
Acq On : 5 Aug 2024 10:05 am Operator: EBruno
Sample : PAH CCV 0.4PPM SVM71-90A Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 8 9:58 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration



TIC: 0805F002.D

(34) Indeno(1,2,3-cd)pyrene (T)

15.29min 445.15ng/ml m

response 902027

Ion	Exp%	Act%
276.00	100	100
277.00	25.20	25.49
138.00	12.20	12.56
0.00	0.00	0.00

Manual Integration:

After

BLC

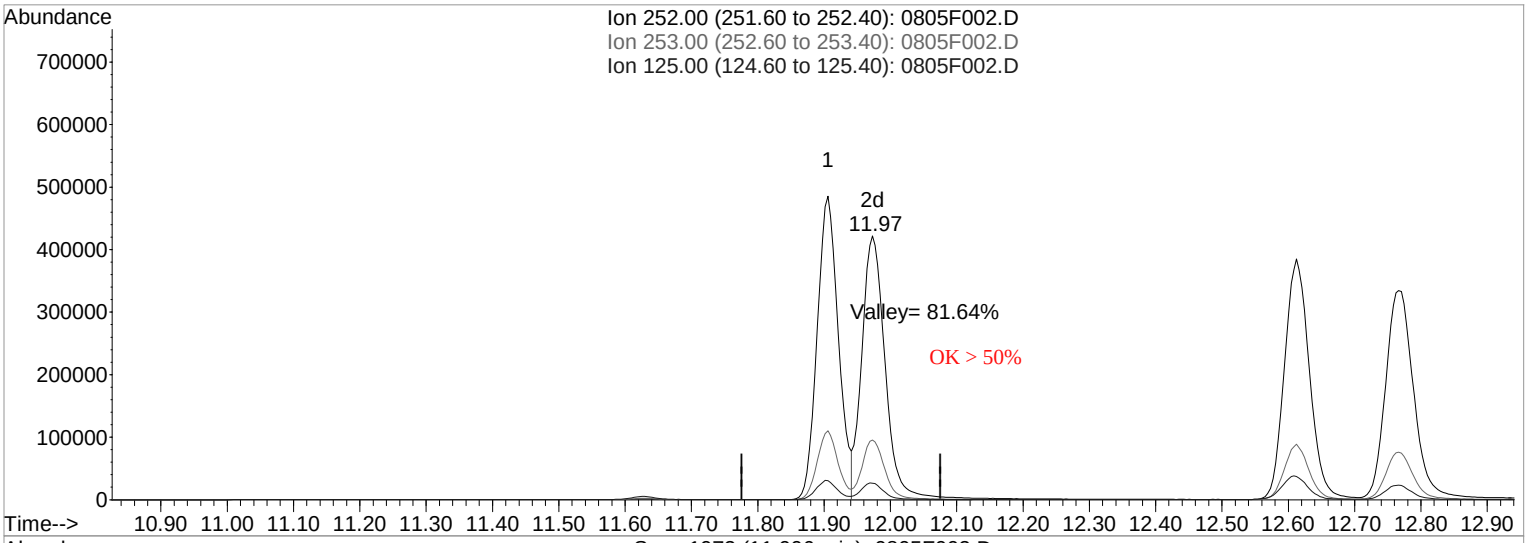
08/08/24

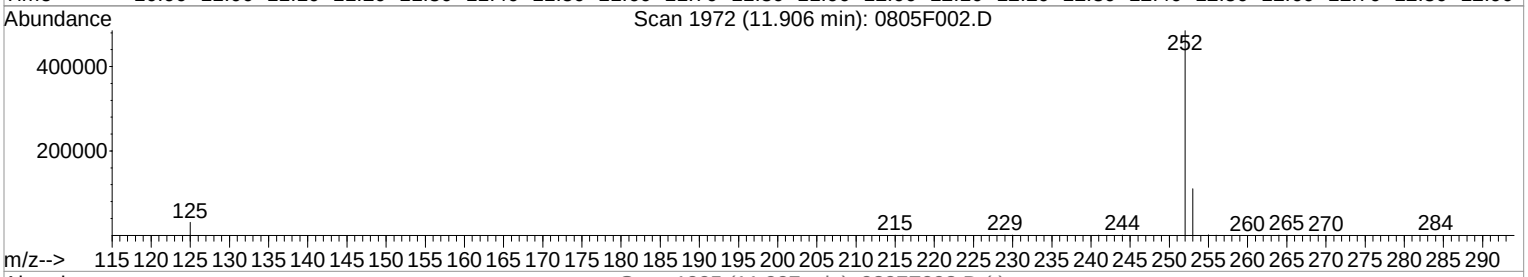
Quantitation Report (Qedit)

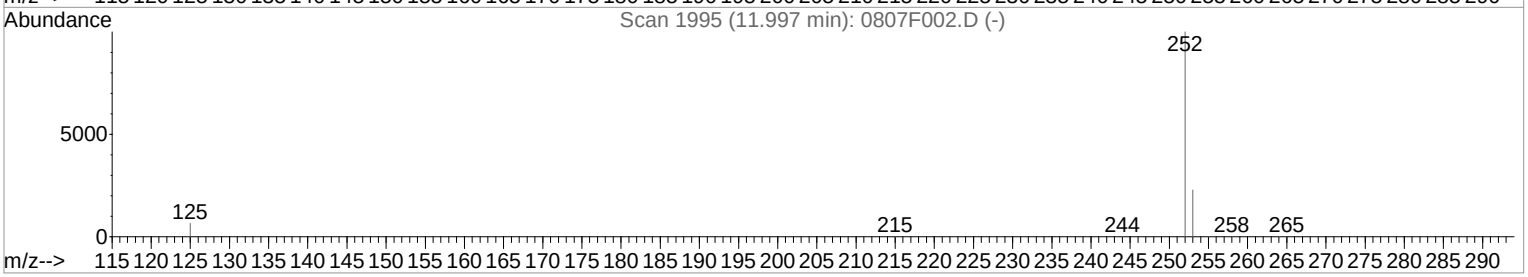
1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F002.D Vial: 2
Acq On : 5 Aug 2024 10:05 am Operator: EBruno
Sample : PAH CCV 0.4PPM SVM71-90A Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Aug 5 10:31 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Thu Aug 01 08:56:26 2024
Response via : Multiple Level Calibration







TIC: 0805F002.D

(29) Benzo(b)fluoranthene (T)

11.91min 443.10ng/ml

response 1082278

Ion	Exp%	Act%
252.00	100	100
253.00	22.50	22.68
125.00	6.10	6.24
0.00	0.00	0.00

1st 08/08/24
2nd 08/08/24

Validation Report

Data File: J:\MS14\DATA\080524\0805F001.D\
Lab ID: KQ2412273-01
RunType: TUNE
Matrix: Sediment

Date Acquired: 8/5/24 09:39:00
Batch ID: 849989
Analysis Method: 8270D/PAH SIM

Validations

Validation Categories	Pass	Fail
Tune Ion Ratio	X	

Primary Review: _____

Printed: 8/8/24 11:23
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Secondary Review: _____

1st 08/08/24
2nd 08/08/24

Quantitation Report

Data File:	J:\MS14\DATA\080524\0805F001.D\	**Instrument:**	K-MS-14
Acqu Date:	8/5/24 09:39:00	**Vial:**	1
Run Type:	TUNE	**Dilution:**	1
Lab ID:	KQ2412273-01	**Raw Units:**	

Bottle ID:		**Tier:**	IV	**Matrix:**	Sediment
Prod Code:	PAH SIM	**Collect Date:**	7/12/22	**Receive Date:**	7/13/22

Analysis Lot:	849989	**Prep Lot:**		**Report Group:**	KQ2412273
Analysis	8270D	**Prep Method:**			
		Prep Date:			

Title:	Polycyclic Aromatic Hydrocarbons by GC/MS SIM	**Calibration ID:**	KC2400163
		Report List ID:	18909

Tune Results

Target Mass	Relative to Mass	Lower Limit%	Upper Limit%	Relative Abundance %	Raw Abundance	Result Pass/Fail
51	198	10	80	24.6	499012	Pass
68	69	0	2	0.5	2781	Pass
69	198	0	100	27.1	548941	Pass
70	69	0	2	0.5	2680	Pass
127	198	10	80	41.4	839868	Pass
197	198	0	2	0.8	16617	Pass
198	442	30	100	40.1	2027349	Pass
199	198	5	9	7.4	150749	Pass
275	198	10	60	40.3	817621	Pass
365	442	1	50	2.7	136789	Pass
441	443	0.01	100	73.6	874240	Pass
442	442	30	100	100.0	5061632	Pass
443	442	15	24	23.5	1187584	Pass

U: Undetected at or above MDL
J: Analyte detected above MDL, but below MRL
B: Hit above MRL also found in Method Blank
E: Analyte concentration above high point of ICAL
N: Presumptive evidence of compound

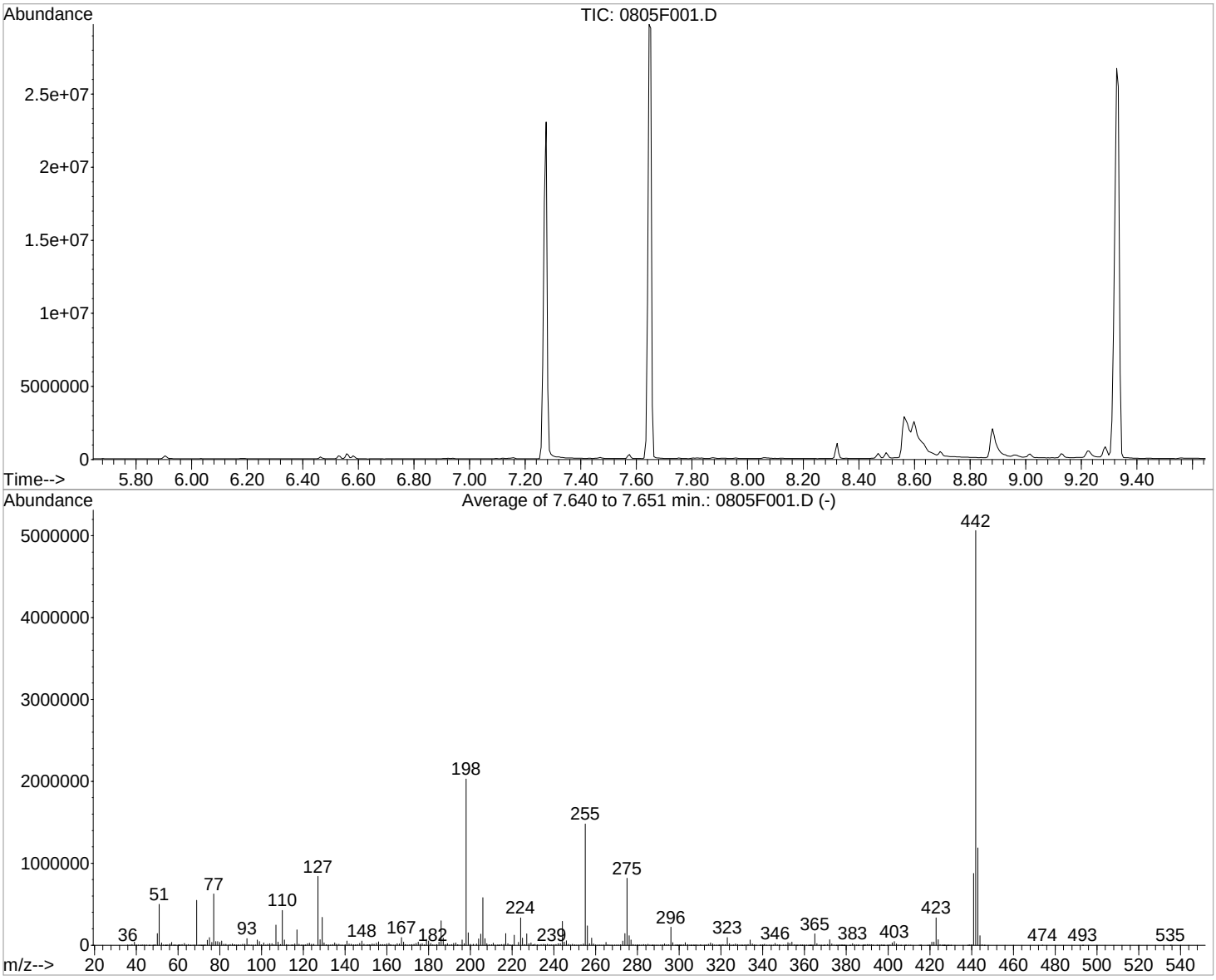
D: Result from dilution
m: Manual integration performed
d: Compound manually deleted
NR: Analyte not reported from this analysis

*: Result fails acceptance criteria
#: Acceptance criteria not applicable
?: Insufficient information to determine acceptance
e: Result >= MRL, but MRL less than low point of ICAL
c: check for co-elution

Printed: 8/8/24 11:23
\\alprews001\starlims$\LIMSReps\QuantValidation.rpt

1st 08/08/24
2nd 08/08/24

Data File : J:\MS14\DATA\080524\0805F001.D Vial: 1
Acq On : 5 Aug 2024 9:39 am Operator: EBruno
Sample : DFTPP @ 10ug/mL SVM71-21G Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS



AutoFind: Scans 604, 605, 606; Background Corrected with Scan 599

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
51	198	10	80	24.6	499012	PASS
68	69	0.00	2	0.5	2781	PASS
69	198	0.00	100	27.1	548941	PASS
70	69	0.00	2	0.5	2680	PASS
127	198	10	80	41.4	839868	PASS
197	198	0.00	2	0.8	16617	PASS
198	442	30	100	40.1	2027349	PASS
199	198	5	9	7.4	150749	PASS
275	198	10	60	40.3	817621	PASS
365	442	1	50	2.7	136789	PASS
441	443	0.01	100	73.6	874240	PASS
442	442	30	100	100.0	5061632	PASS
443	442	15	24	23.5	1187584	PASS

1st 08/08/24
2nd 08/08/24

Average of 7.640 to 7.651 min.: 0805F001.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
36.00	333	48.00	109	57.95	1444	67.20	802
37.00	2101	49.10	4315	58.20	299	68.05	2781
38.05	7051	50.05	140896	59.00	302	69.00	548941
39.10	36813	51.05	499012	60.00	9	70.05	2680
40.00	1281	52.10	26957	60.30	139	71.05	408
41.00	304	53.05	1152	61.00	6386	71.30	177
42.05	189	53.90	80	62.00	7848	72.00	84
43.05	366	54.20	69	63.10	20943	73.00	4656
43.85	324	55.05	3313	63.95	2322	74.05	61458
44.90	861	56.05	15035	65.00	9455	75.00	93497
46.10	53	57.00	34478	65.95	252	76.15	34048

Average of 7.640 to 7.651 min.: 0805F001.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
77.05	626868	87.10	4716	97.15	1843	107.95	36132
78.10	42920	87.95	2172	98.00	64994	109.10	8540
79.00	44938	88.80	392	98.95	45724	110.00	424512
80.00	34088	89.05	1059	99.95	4642	111.00	63904
80.95	48902	90.15	489	101.00	27248	112.00	7874
82.00	11346	91.00	10804	102.05	1828	112.95	3017
82.95	11131	91.95	12243	102.95	10052	114.15	794
83.95	988	93.00	80056	104.00	18174	114.85	598
85.00	7650	94.05	5648	105.00	17079	115.10	626
86.00	14497	95.05	1134	106.00	6168	116.00	14125
86.90	1517	96.00	3320	106.95	244238	116.95	188565

Average of 7.640 to 7.651 min.: 0805F001.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
118.00	12973	129.00	338688	140.05	3860	149.05	10355
119.00	1063	130.00	27968	140.95	49230	150.05	3092
119.95	3104	130.95	5773	141.95	13737	150.90	1173
120.90	1309	132.00	2319	142.90	10077	151.00	5180
121.10	258	132.95	888	143.90	518	151.60	900
122.00	16488	134.00	9783	144.10	1905	151.75	3264
123.00	24513	135.00	27341	144.80	553	152.20	457
123.95	10833	135.95	12040	145.05	1984	153.00	15171
125.00	10779	137.05	13224	146.00	7849	153.95	10328
127.00	839868	137.95	3149	147.00	22831	155.00	25979
128.05	67115	138.90	1995	148.00	51685	156.00	41064

Average of 7.640 to 7.651 min.: 0805F001.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
157.00	8491	167.00	91380	177.90	3116	188.00	7534
158.00	8524	168.00	37234	178.10	3431	189.00	17416
159.00	7148	168.95	7468	179.00	71160	189.95	3255
160.00	14694	170.05	3498	180.00	49944	190.95	8273
161.00	22763	170.95	4022	181.00	22999	192.00	22828
161.80	1260	171.95	8703	182.00	3676	193.00	26170
161.95	5180	172.95	11566	182.95	2744	193.90	594
163.00	1917	174.00	20643	184.00	6825	194.05	4546
163.95	2771	175.00	38872	185.00	36866	195.10	2947
164.95	19684	175.95	10854	186.00	297813	196.00	64192
166.00	15623	176.95	17841	187.00	86720	197.10	16617

Average of 7.640 to 7.651 min.: 0805F001.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
197.90	2027349	210.20	4793	219.10	835	230.00	3650
198.95	150749	210.90	23274	220.20	1412	231.00	12035
199.95	12297	211.80	772	221.00	123511	231.90	1606
201.40	10333	213.00	1688	223.00	34290	232.10	692
202.90	14029	213.50	200	224.00	332394	232.90	2163
203.95	75922	213.90	856	225.00	85776	233.90	8624
205.00	135536	214.95	6816	226.00	9119	235.00	10868
206.00	580478	216.00	11490	226.95	138101	235.95	7395
207.00	79284	216.95	141872	228.00	19493	236.95	10449
207.95	19281	217.95	19553	229.00	28540	237.90	1051
209.05	5269	218.90	974	229.80	220	238.20	917

Average of 7.640 to 7.651 min.: 0805F001.D

1st 08/08/24
2nd 08/08/24

DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
238.95	5613	249.90	1152	260.00	2919	270.90	3122
239.95	4751	250.10	785	260.95	2806	272.00	4292
241.00	7772	250.95	2773	262.00	585	273.00	51309
242.00	18426	251.95	3017	262.95	1115	274.00	140637
243.05	18676	253.00	5581	263.90	1156	275.00	817621
244.00	292578	254.10	14030	264.95	35245	276.00	116082
245.00	38941	255.00	1480554	265.85	4624	276.95	63258
245.95	52288	256.00	234426	266.90	742	277.95	8916
247.00	10174	257.00	17765	267.70	475	279.00	1934
248.00	3255	258.00	87181	269.05	483	279.80	153
248.95	11090	258.95	14344	270.00	1776	280.00	106

Average of 7.640 to 7.651 min.: 0805F001.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
280.95	949	290.95	1721	299.70	173	307.10	68
281.90	1965	291.90	3808	300.10	132	307.95	3634
282.95	7441	293.00	15381	300.80	450	309.00	2707
283.90	4931	293.95	3924	300.95	2601	310.00	3604
285.00	11958	295.05	4853	301.95	4307	310.80	779
286.00	1863	296.00	219482	302.95	30151	311.95	1321
286.80	74	296.95	29604	304.05	8261	312.80	266
287.00	209	298.05	2255	305.05	1310	313.00	2103
287.95	686	298.80	83	305.70	52	314.00	12904
288.90	2284	298.90	278	305.95	288	315.00	26884
289.90	2579	299.05	437	306.80	786	316.00	16149

Average of 7.640 to 7.651 min.: 0805F001.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
316.95	3114	325.80	935	334.95	15509	343.85	189
317.95	266	326.10	653	335.80	168	345.00	548
318.90	248	326.90	15384	336.05	1755	345.90	20763
319.10	460	327.95	9133	336.95	319	346.95	3734
319.90	636	328.95	1766	338.85	935	347.80	260
320.10	575	329.85	359	339.10	544	348.00	246
321.00	8270	330.15	203	339.80	199	349.90	831
322.00	4907	331.10	457	339.95	1426	351.00	1818
323.00	93656	331.90	6312	340.90	10932	352.00	32173
324.00	16968	333.00	9110	342.05	2839	353.00	22875
324.95	1386	334.00	63381	343.00	494	353.95	35964

Average of 7.640 to 7.651 min.: 0805F001.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
355.00	6506	362.60	98	372.00	66914	379.10	86
355.90	747	362.80	134	373.00	15476	381.70	236
356.20	122	363.10	80	374.05	2012	383.00	17803
356.90	455	364.05	1753	375.05	124	384.00	5238
357.85	348	364.95	136789	375.85	173	384.95	1658
358.20	335	365.95	19662	376.70	78	385.70	141
358.80	178	366.90	1637	377.05	1581	385.90	322
358.95	2317	367.90	57	377.60	146	387.90	64
360.00	687	369.05	203	377.95	414	388.10	98
361.00	497	369.90	3413	378.20	82	388.85	332
361.90	214	371.00	9956	378.90	86	389.20	286

Average of 7.640 to 7.651 min.: 0805F001.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
390.00	9633	397.70	72	410.00	1573	424.95	6190
390.80	666	398.00	69	410.85	263	425.95	543
391.00	6954	399.70	52	415.00	2271	426.30	90
391.90	572	401.00	4190	415.30	119	426.80	190
392.05	4123	401.95	29056	415.80	366	427.00	70
392.95	997	403.00	45118	418.85	173	428.30	94
394.75	294	403.95	15372	420.10	634	429.00	139
395.00	548	405.00	2080	421.00	39109	430.00	69
395.80	423	406.10	223	422.00	38061	438.15	184
396.80	440	408.05	215	423.00	334733	438.90	525
397.00	617	408.90	266	424.00	65528	439.20	330

Average of 7.640 to 7.651 min.: 0805F001.D
DFTPP @ 10ug/mL SVM71-21G

Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
440.10	4272						
441.00	874240						
442.00	5061632						
443.00	1187584						
444.00	114096						
445.00	6200						
446.05	244						
473.90	284						
493.10	116						
535.20	95						

1st 08/08/24
2nd 08/08/24

Injection Log

Directory: J:\MS14\DATA\040124

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	2	*0809f001.d	1.	IBNR		1 Apr 2024 12:36
2	1	0809f002.d	1.	DFTPP @ 10ug/mL SVM71-21G		1 Apr 2024 13:02
3	2	0809f003.d	1.	IB		1 Apr 2024 13:27
4	3	0809f004.d	1.	PAH ICAL .002PPM SVM71-42A		1 Apr 2024 13:54
5	4	0809f005.d	1.	PAH ICAL .004PPM SVM71-42B		1 Apr 2024 14:20
6	5	0809f006.d	1.	PAH ICAL .008PPM SVM71-42C		1 Apr 2024 14:46
7	6	0809f007.d	1.	PAH ICAL .02PPM SVM71-42D		1 Apr 2024 15:12
8	7	0809f008.d	1.	PAH ICAL .1PPM SVM71-42E		1 Apr 2024 15:38
9	8	0809f009.d	1.	PAH ICAL .2PPM SVM71-42F		1 Apr 2024 16:05
10	9	0809f010.d	1.	PAH ICAL .4PPM SVM71-42G		1 Apr 2024 16:30
11	10	0809f011.d	1.	PAH ICAL 1PPM SVM71-42H		1 Apr 2024 16:57
12	11	0809f012.d	1.	PAH ICAL 1.6PPM SVM71-42I		1 Apr 2024 17:24
13	12	0809f013.d	1.	PAH ICAL 2PPM SVM71-42J		1 Apr 2024 17:49
14	13	0809f014.d	1.	PAH ICV .4PPM SVM71-42J		1 Apr 2024 18:15

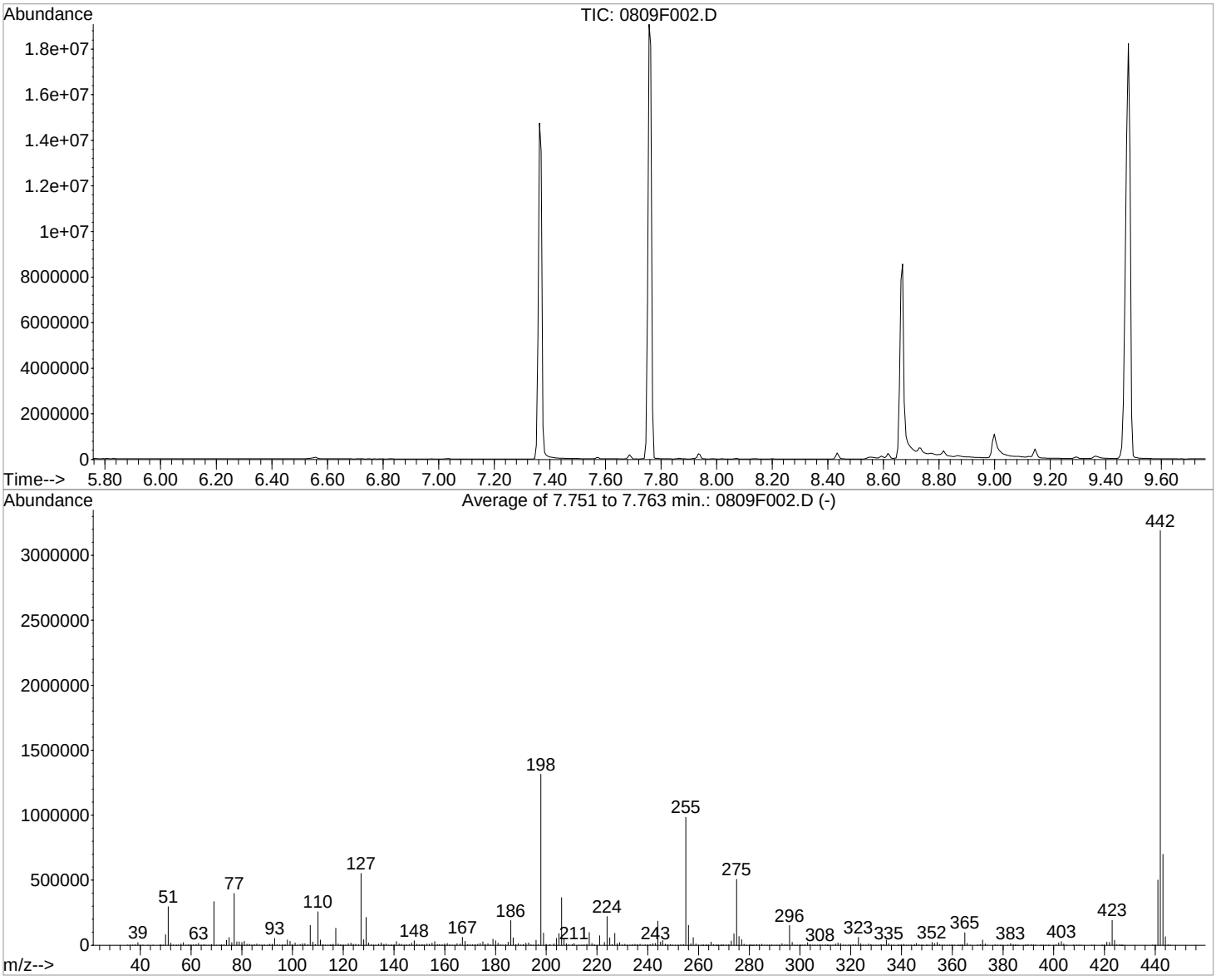
Sim PAH ICAL
KC2400163
4-2-24 eb

AD
4/4/24

* Wrong dat used on data files. 4-2-24eb

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F002.D Vial: 1
Acq On : 1 Apr 2024 1:02 pm Operator: EBruno
Sample : DFTPP @ 10ug/mL SVM71-21G Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: rteint.p
Method : J:\MS14\METHODS\SIM\A_DFTPP.M (RTE Integrator)
Title : dftpp tune mix



AutoFind: Scans 623, 624, 625; Background Corrected with Scan 618

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
51	198	10	80	22.5	295530	PASS
68	69	0.00	2	1.8	5936	PASS
69	198	0.00	100	25.5	334629	PASS
70	69	0.00	2	0.5	1820	PASS
127	198	10	80	42.1	552768	PASS
197	198	0.00	2	0.2	2245	PASS
198	442	30	100	41.2	1314496	PASS
199	198	5	9	7.1	93856	PASS
275	198	10	60	38.6	506816	PASS
365	442	1	50	3.0	94469	PASS
441	443	0.01	100	71.7	500602	PASS
442	442	30	100	100.0	3189653	PASS
443	442	15	24	21.9	698410	PASS

1st 04/02/24
2nd 04/04/24

Average of 7.751 to 7.763 min.: 0809F002.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
35.10	392	49.00	626	59.15	162	70.00	1820
36.05	741	50.00	81703	60.00	173	71.15	319
36.95	1023	51.00	295530	61.00	3909	71.80	58
38.00	3867	52.05	15234	62.00	4683	72.05	227
39.05	20223	53.05	698	63.00	12774	73.00	2869
39.95	642	54.00	51	64.00	1918	74.00	37392
41.00	552	54.95	1407	65.05	6098	75.00	58594
43.05	159	56.00	8447	66.00	313	76.05	20355
45.05	569	56.95	19198	67.00	351	77.00	398293
47.80	132	58.00	1035	68.05	5936	78.10	26301
48.00	29	58.90	151	69.00	334629	79.00	26538

Average of 7.751 to 7.763 min.: 0809F002.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
80.00	20836	90.10	67	100.00	2730	111.00	40501
81.00	29938	91.00	6710	101.00	17620	112.00	4762
82.00	7497	92.00	8016	101.95	1205	113.00	1448
82.95	6430	92.95	51569	102.95	5491	114.05	342
83.90	131	94.00	3441	103.95	11400	114.80	346
84.95	5225	94.90	911	104.90	11184	115.00	67
85.90	8628	96.05	2492	106.05	3754	116.00	8201
87.00	4009	96.90	460	107.00	153573	117.00	130584
87.95	1338	97.20	490	108.00	22853	118.00	9225
88.80	138	98.00	40736	108.95	4459	118.80	285
88.95	560	99.00	30418	110.00	256938	119.05	606

Average of 7.751 to 7.763 min.: 0809F002.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
120.00	2026	130.95	3478	140.95	28504	150.05	1417
120.95	596	131.95	1944	142.00	9382	150.90	765
122.00	10434	132.80	558	142.90	6484	151.10	2825
123.00	15586	133.95	6315	143.95	2023	151.80	2613
123.95	7095	135.00	17789	144.80	371	152.95	8988
124.95	6494	136.00	7025	144.95	1276	153.95	7384
126.05	2452	137.00	9511	146.00	5089	154.95	16037
127.00	552768	137.90	1900	146.95	15482	156.00	26844
128.00	42757	138.85	528	148.00	33834	157.05	4627
128.95	213610	139.10	462	149.00	6744	157.95	5463
129.95	17839	140.00	2847	149.90	467	158.95	4173

Average of 7.751 to 7.763 min.: 0809F002.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
159.95	9560	170.90	2626	181.95	2589	193.00	16923
161.00	13563	172.00	5547	182.85	1204	193.95	3557
161.95	4191	173.00	6967	184.00	3815	194.95	1877
162.95	988	173.95	13518	185.00	23611	195.95	38026
163.95	1306	175.00	25179	186.00	189349	196.80	2245
164.85	11259	176.00	7002	187.00	55789	197.90	1314496
165.95	9064	176.95	11207	188.00	5605	198.90	93856
166.95	61219	177.95	3837	188.95	12015	200.00	7294
168.00	28818	178.95	46664	189.90	2091	201.45	6057
169.00	5127	180.00	33066	190.95	5169	202.95	9562
169.95	2293	181.00	14886	191.95	15222	204.00	53072

Average of 7.751 to 7.763 min.: 0809F002.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
205.00	89570	216.90	97874	228.90	19265	239.95	2918
206.00	365461	217.95	12696	229.95	2931	240.95	5106
206.95	46825	218.90	204	231.00	8129	242.00	12177
207.95	12168	219.05	857	231.90	1455	243.00	12477
209.00	3650	221.00	72037	233.00	1732	244.00	185184
210.20	6259	222.95	22478	233.90	5698	245.00	24266
210.95	14297	224.00	220634	234.95	6780	245.90	36106
212.95	1111	225.00	55424	235.90	4550	246.95	7221
213.95	449	226.00	5269	237.00	7255	247.80	299
214.95	3940	226.95	91376	237.95	1164	247.95	1399
216.00	8122	227.95	12411	239.00	3630	248.90	6220

Average of 7.751 to 7.763 min.: 0809F002.D

1st 04/02/24
2nd 04/04/24

DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
249.90	1356	260.95	1912	268.70	56	277.95	6489
250.90	1603	261.70	60	269.00	134	278.95	1440
251.95	1659	261.95	207	269.70	199	279.90	92
252.95	3940	262.85	493	269.85	975	280.20	110
254.00	5795	263.10	67	270.95	2313	280.85	375
254.95	983530	263.90	2043	271.95	2844	281.30	71
256.00	152360	264.95	23590	272.95	32663	282.00	1121
256.95	11418	265.90	4636	273.95	87421	282.95	4569
257.90	59072	266.85	357	275.00	506816	283.95	3575
258.95	8998	267.10	70	276.00	67706	285.00	7835
259.95	1655	267.85	906	276.95	41121	286.05	1519

Average of 7.751 to 7.763 min.: 0809F002.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
287.10	188	296.95	21202	306.95	381	317.00	2161
287.90	641	297.90	1472	307.90	2441	317.90	177
288.80	196	298.95	520	308.90	1592	319.00	297
288.95	1551	299.80	85	310.00	2355	319.80	649
290.00	1531	300.00	94	310.80	66	320.90	5731
290.90	926	301.00	1930	310.95	496	322.00	2757
291.90	2014	301.95	2866	311.95	674	323.00	60488
292.90	10540	302.95	18968	312.95	1411	324.00	11025
294.00	2428	303.95	5379	313.95	8416	324.95	1000
294.95	2885	304.95	757	314.90	17496	325.90	1274
295.90	149850	305.90	209	315.95	11292	326.95	10268

Average of 7.751 to 7.763 min.: 0809F002.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
327.90	5678	338.90	826	347.80	325	357.90	425
328.90	981	339.70	60	348.30	56	359.00	1565
329.95	314	339.90	845	349.70	63	359.80	156
330.90	240	340.95	7252	349.95	436	360.00	234
331.90	4606	342.00	2084	350.90	1294	361.00	391
333.00	6061	342.90	446	352.00	20856	362.20	55
334.00	40272	343.80	128	353.00	14247	362.90	114
335.00	10703	344.90	74	354.00	21833	363.80	67
336.00	1257	345.10	129	355.00	4244	363.90	567
336.95	186	345.90	14030	356.00	369	364.90	94469
338.70	137	346.95	2526	356.90	253	365.90	13433

Average of 7.751 to 7.763 min.: 0809F002.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
367.00	1106	382.95	11485	394.90	415	409.95	879
369.95	2349	384.00	3176	395.90	350	410.85	164
371.00	6132	384.80	52	396.90	625	414.90	1301
372.00	39912	384.95	1034	397.90	51	415.85	243
373.00	9870	385.80	80	400.90	2696	418.95	107
373.90	1380	388.70	55	401.90	17524	419.85	276
376.80	505	388.95	228	403.00	26995	420.95	24207
377.00	460	389.90	5495	403.95	9901	422.00	22464
377.90	206	391.00	3943	404.95	1333	423.00	191002
378.90	67	391.95	2551	407.85	204	424.00	37547
381.90	240	392.85	490	409.05	208	424.95	3647

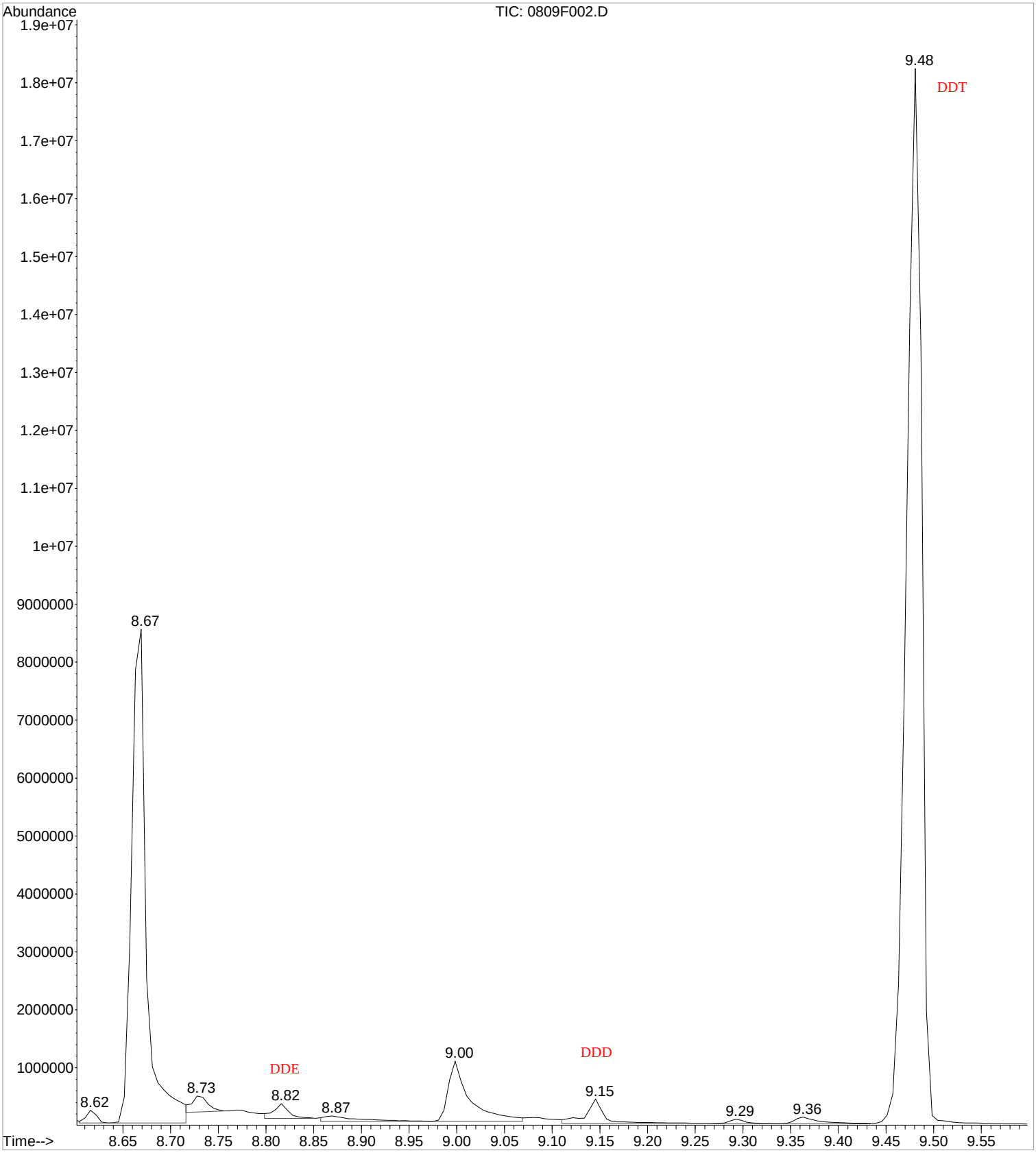
Average of 7.751 to 7.763 min.: 0809F002.D
DFTPP @ 10ug/mL SVM71-21G
Modified:subtracted

m/z	abund.	m/z	abund.	m/z	abund.	m/z	abund.
425.85	151	446.00	150				
426.15	214						
426.60	74						
427.00	54						
438.90	289						
440.00	688						
441.00	500602						
442.00	3189653						
443.00	698410						
444.00	64180						
445.00	3473						

1st 04/02/24

2nd 04/04/24

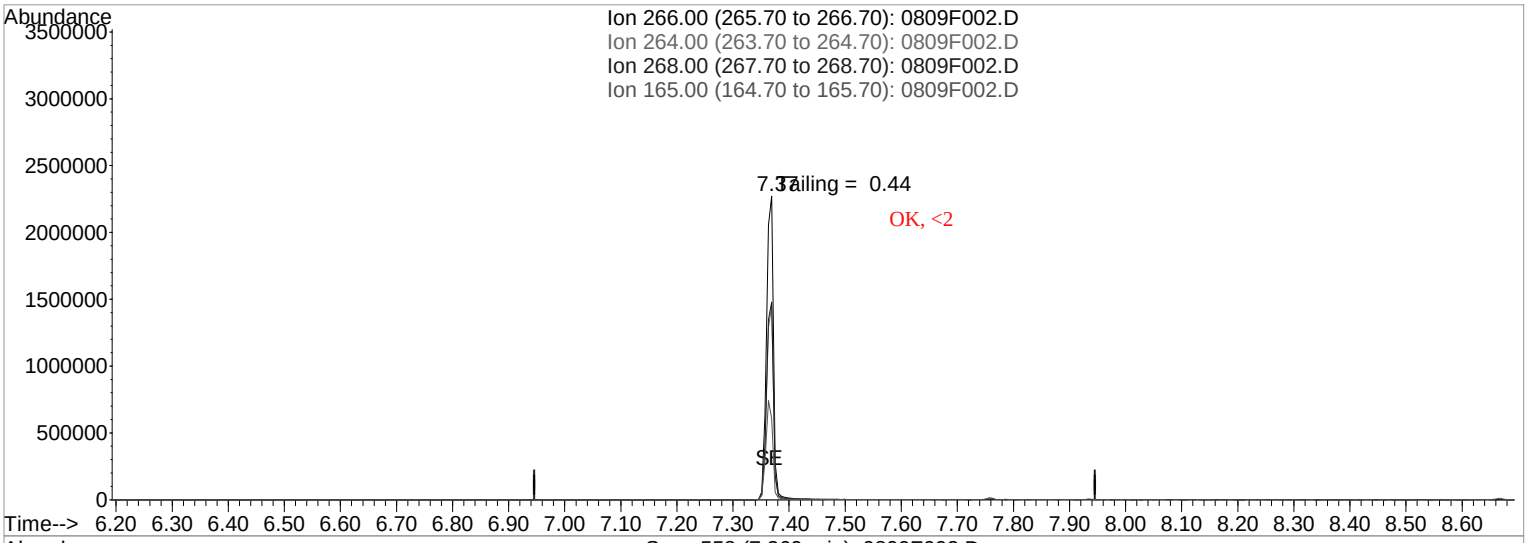
File : J:\MS14\DATA\040124\0809F002.D
Operator : EBruno
Acquired : 1 Apr 2024 1:02 pm using AcqMethod SIMLOC
Instrument : MS14
Sample Name: DFTPP @ 10ug/mL SVM71-21G
Misc Info :
Vial Number: 1

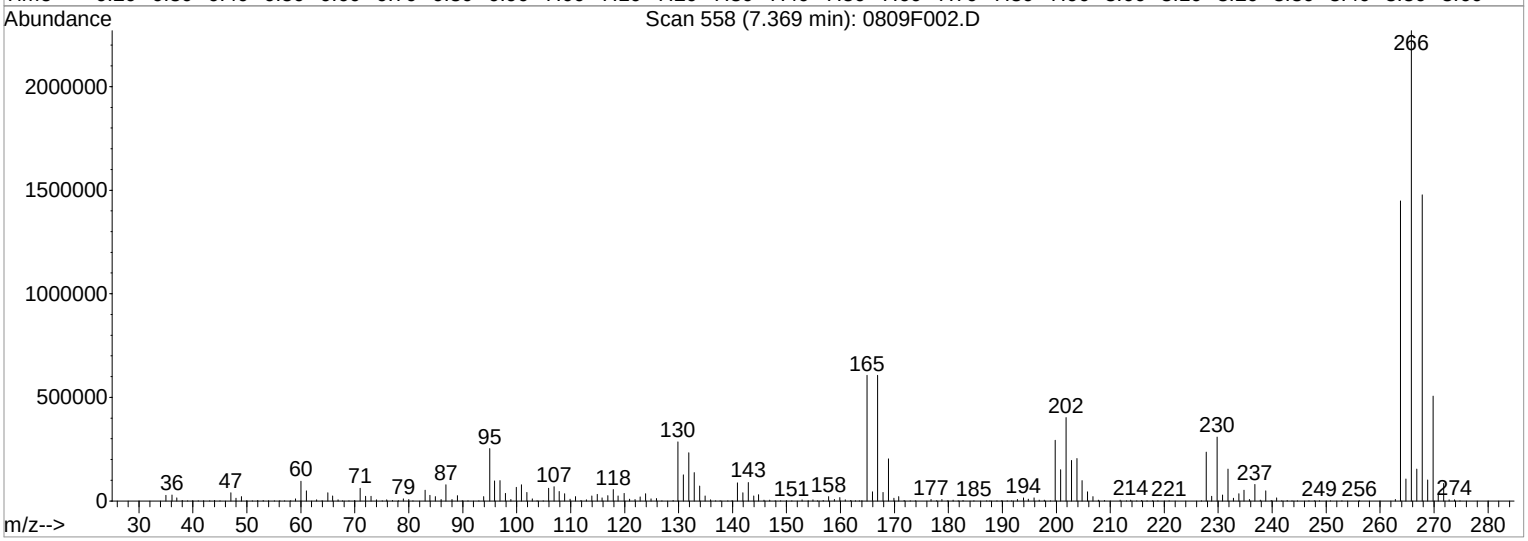


1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F002.D Vial: 1
Acq On : 1 Apr 2024 1:02 pm Operator: EBruno
Sample : DFTPP @ 10ug/mL SVM71-21G Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: rteint.p
Quant Time: Apr 1 13:26 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\A_DFTPP.M (RTE Integrator)
Title : dftpp tune mix
Last Update : Wed Dec 20 16:43:09 2023
Response via : Single Level Calibration





TIC: 0809F002.D

(1) Pentachlorophenol

7.37min 83.85ng/ml

response 1929547

Ion	Exp%	Act%
266.00	100	100
264.00	0.00	63.81#
268.00	0.00	65.07#
165.00	6000.00	26.70#

20	8.551	rBV	0.065	166859	8.516	8.581		
21	8.593	rBV	0.024	59521	8.581	8.604		Breakdown = 3.8%
22	8.616	rVB	0.029	161836	8.604	8.634		<20%, ok
23	8.669	rBV	0.082	9233160	8.634	8.716		
24	8.728	rVB	0.041	310057	8.716	8.757		
25	8.816	rVB	0.053	263212	8.798	8.851	DDE	
26	8.869	rVB	0.118	227701	8.857	8.975		
27	8.998	rBV	0.094	1620787	8.975	9.069		
28	9.145	rVB	0.159	545160	9.110	9.269	DDD	
29	9.292	rVV	0.065	84977	9.269	9.334		
30	9.363	rVV	0.100	204986	9.334	9.434		
31	9.481	rVB	0.165	20582040	9.434	9.598	DDT	
32	9.716	rBV	0.035	9321	9.692	9.728		
33	9.957	rVB	0.065	29406	9.928	9.992		

Quantitation Report (QT Reviewed)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F003.D Vial: 2
Acq On : 1 Apr 2024 1:27 pm Operator: EBruno
Sample : IB Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 01 13:49:02 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Mon Apr 01 08:48:25 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

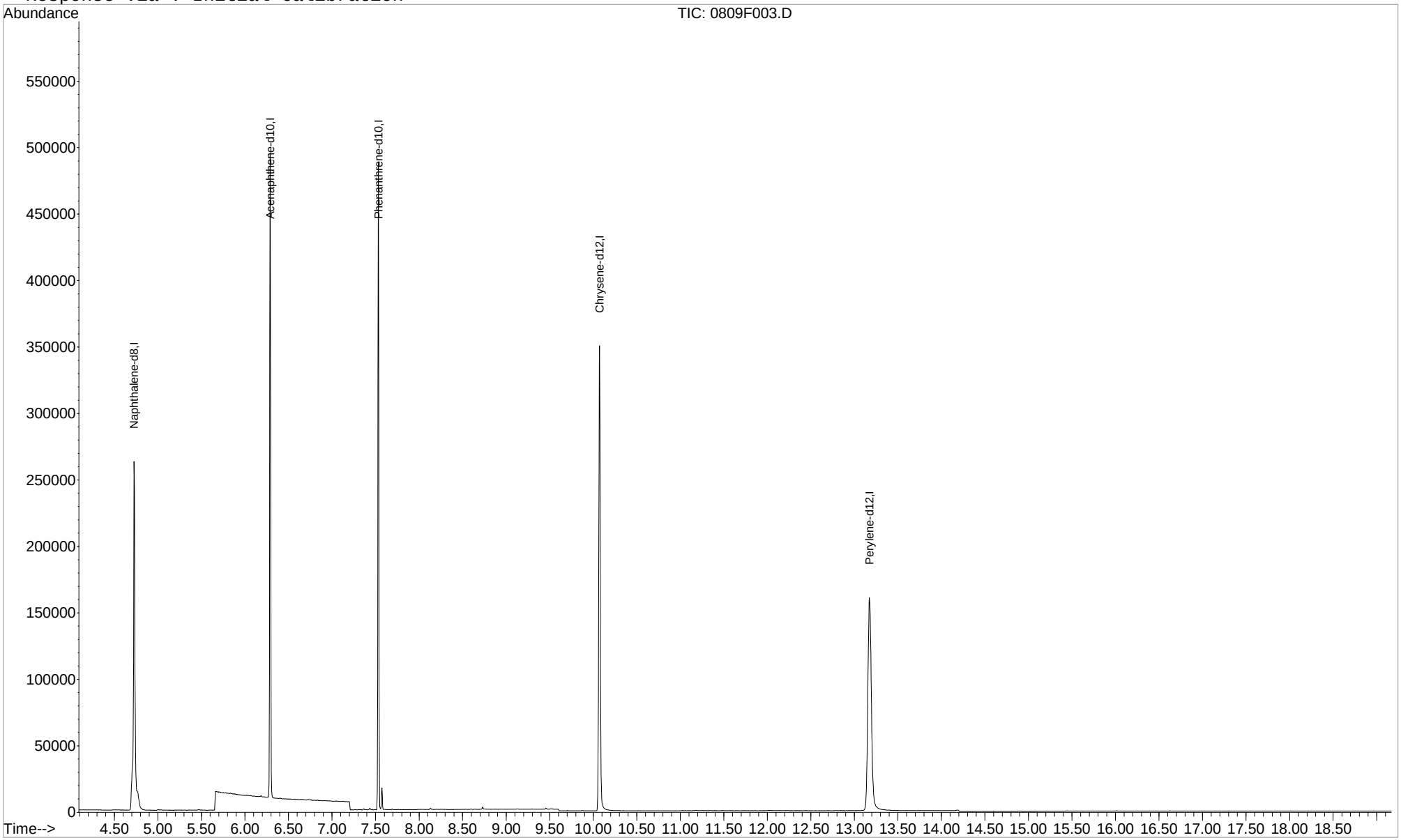
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.73	136	285247	200.00	ng/ml	0.00
8) Acenaphthene-d10	6.29	164	139623	200.00	ng/ml	0.00
15) Phenanthrene-d10	7.53	188	257297	200.00	ng/ml	0.00
23) Chrysene-d12	10.07	240	265291	200.00	ng/ml	0.00
28) Perylene-d12	13.17	264	301446	200.00	ng/ml	-0.01
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	0.00	152	0	0.00	ng/ml	
Spiked Amount 200.000			Recovery =	0.00%		
13) Fluorene-d10	0.00	176	0d	0.00	ng/ml	
Spiked Amount 200.000			Recovery =	0.00%		
22) Fluoranthene-d10	0.00	212	0	0.00	ng/ml	
Spiked Amount 200.000			Recovery =	0.00%		
25) Terphenyl-d14	0.00	244	0d	0.00	ng/ml	
Spiked Amount 200.000			Recovery =	0.00%		
Target Compounds						Qvalue

(#) = qualifier out of range (m) = manual integration

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F003.D Vial: 2
Acq On : 1 Apr 2024 1:27 pm Operator: EBruno
Sample : IB Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 1 13:50 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F004.D Vial: 3
Acq On : 1 Apr 2024 1:54 pm Operator: EBruno
Sample : PAH ICAL .002PPM SVM71-42A Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 01 14:17:07 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Mon Apr 01 08:48:25 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

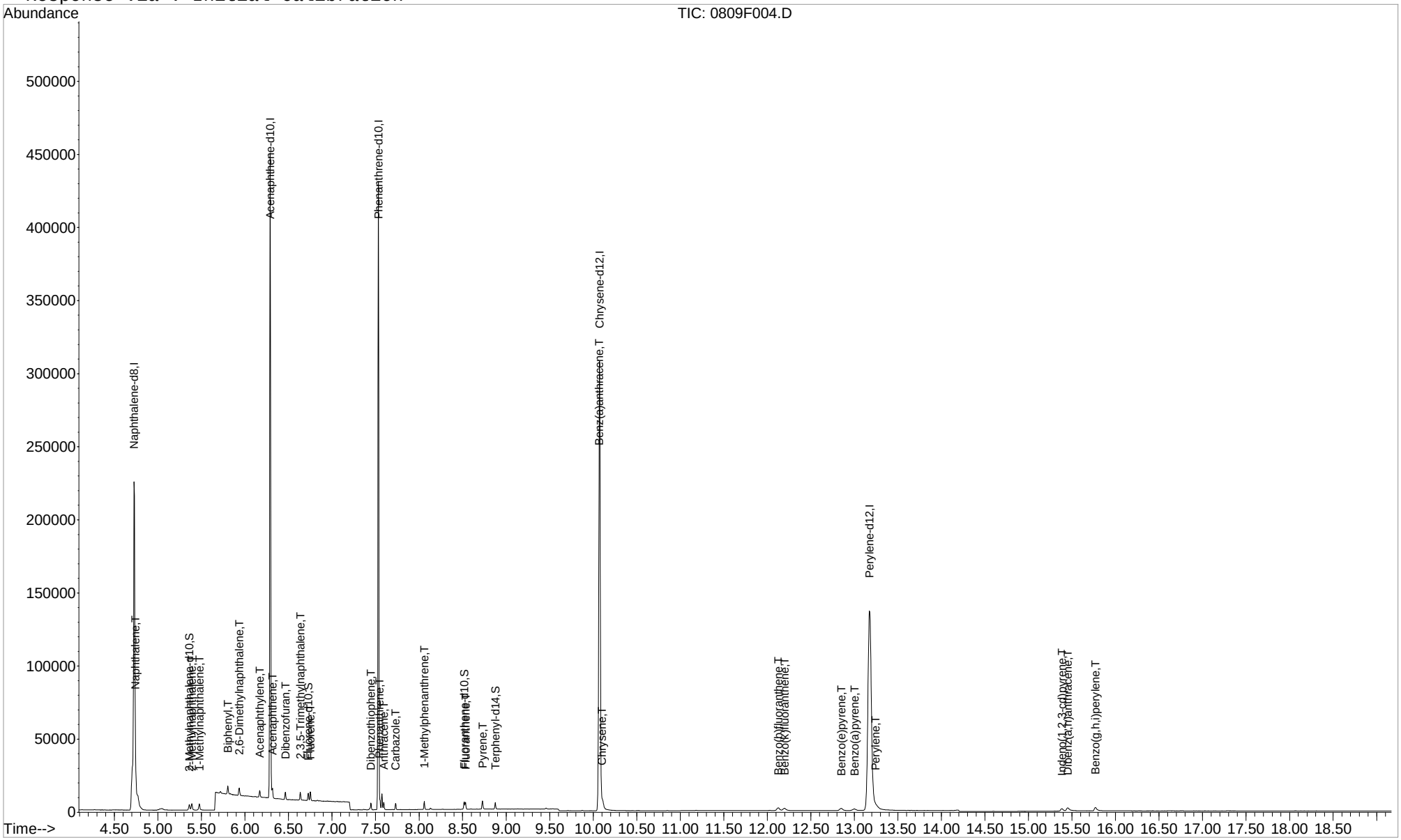
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.73	136	252169	200.00	ng/ml	0.00
8) Acenaphthene-d10	6.29	164	123165	200.00	ng/ml	0.00
15) Phenanthrene-d10	7.53	188	226387	200.00	ng/ml	0.00
23) Chrysene-d12	10.07	240	232002	200.00	ng/ml	0.00
28) Perylene-d12	13.17	264	256168	200.00	ng/ml	-0.01
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.36	152	1668	2.36	ng/ml	0.00
Spiked Amount 200.000			Recovery =	1.18%		
13) Fluorene-d10	6.73	176	1670	2.48	ng/ml	0.00
Spiked Amount 200.000			Recovery =	1.24%		
22) Fluoranthene-d10	8.52	212	2654	2.07	ng/ml	0.00
Spiked Amount 200.000			Recovery =	1.03%		
25) Terphenyl-d14	8.88	244	2841	2.37	ng/ml	0.00
Spiked Amount 200.000			Recovery =	1.19%		
Target Compounds						Qvalue
2) Naphthalene	4.75	128	2604	2.28	ng/ml	98
4) 2-Methylnaphthalene	5.39	142	1979	2.64	ng/ml	99
5) 1-Methylnaphthalene	5.48	142	1818	2.59	ng/ml	96
6) Biphenyl	5.80	154	2301	2.59	ng/ml	96
7) 2,6-Dimethylnaphthalene	5.94	156	1574	2.43	ng/ml	99
9) Acenaphthylene	6.17	152	2413	2.27	ng/ml	99
10) Acenaphthene	6.32	154	1541	2.40	ng/ml	98
11) Dibenzofuran	6.46	168	2331	2.52	ng/ml	92
12) 2,3,5-Trimethylnaphthalene	6.63	170	1477	2.41	ng/ml	91
14) Fluorene	6.75	166	1846	2.47	ng/ml	98
16) Dibenzothiophene	7.45	184	2549	2.34	ng/ml	92
17) Phenanthrene	7.55	178	2802	2.52	ng/ml	100
18) Anthracene	7.59	178	2456	2.27	ng/ml	99
19) Carbazole	7.73	167	2254	2.09	ng/ml	98
20) 1-Methylphenanthrene	8.06	192	1955	2.27	ng/ml	96
21) Fluoranthene	8.53	202	3106	2.34	ng/ml	96
24) Pyrene	8.73	202	3435	2.29	ng/ml	64
26) Benz(a)anthracene	10.06	228	3608	2.34	ng/ml	97
27) Chrysene	10.11	228	3008	2.20	ng/ml	100
29) Benzo(b)fluoranthene	12.13	252	3342	2.10	ng/ml	97
30) Benzo(k)fluoranthene	12.20	252	2961	2.01	ng/ml	95
31) Benzo(e)pyrene	12.85	252	3025	2.05	ng/ml	98
32) Benzo(a)pyrene	13.00	252	2392	1.67	ng/ml	99
33) Perylene	13.25	252	2643	2.02	ng/ml	99
34) Indeno(1,2,3-cd)pyrene	15.39	276	2632	1.87	ng/ml	99
35) Dibenz(a,h)anthracene	15.45	278	3016	2.06	ng/ml	90
36) Benzo(g,h,i)perylene	15.77	276	3900	2.40	ng/ml	96

(#) = qualifier out of range (m) = manual integration

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F004.D Vial: 3
Acq On : 1 Apr 2024 1:54 pm Operator: EBruno
Sample : PAH ICAL .002PPM SVM71-42A Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 1 14:17 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration



1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F005.D Vial: 4
Acq On : 1 Apr 2024 2:20 pm Operator: EBruno
Sample : PAH ICAL .004PPM SVM71-42B Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 01 14:43:34 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Mon Apr 01 14:17:42 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

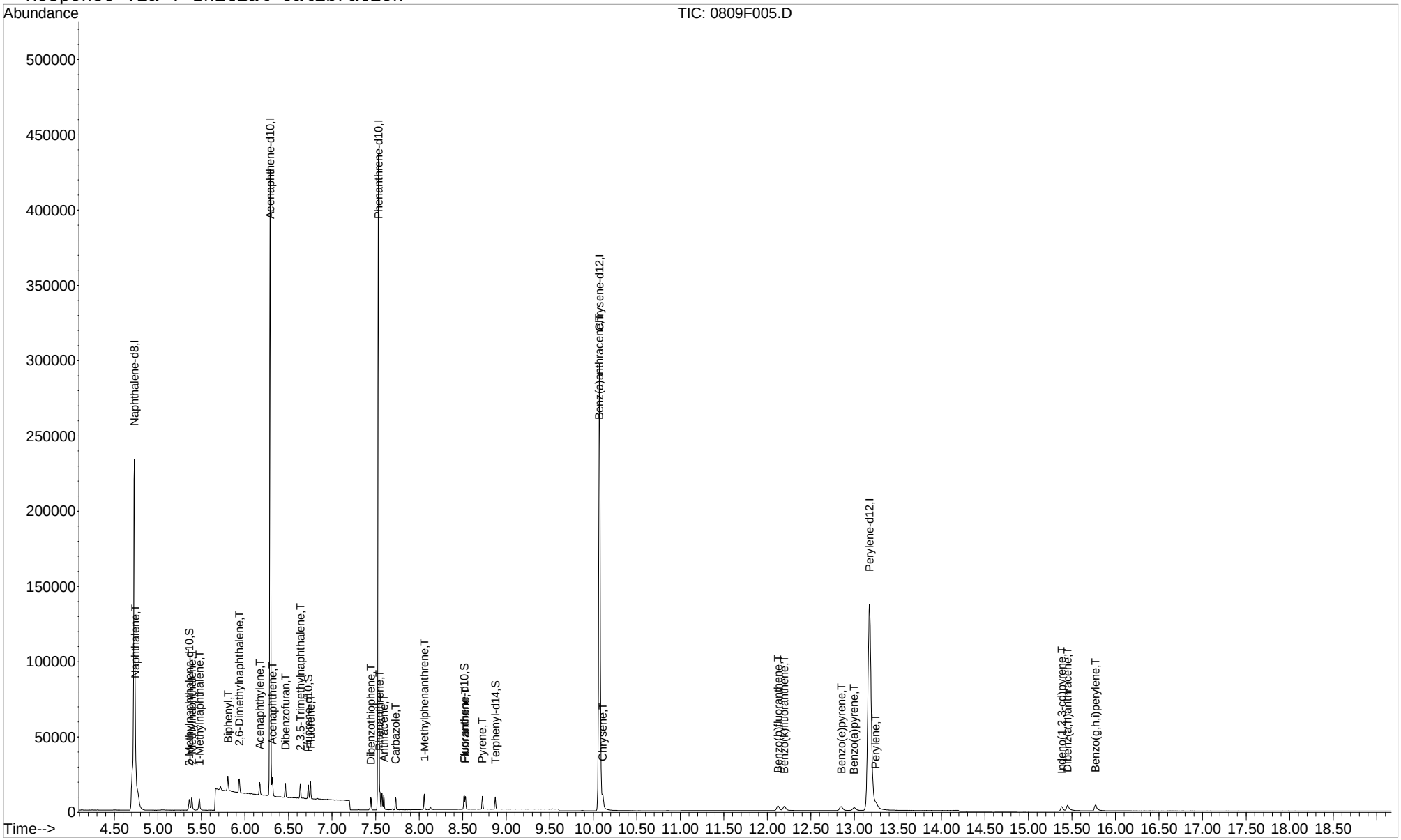
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.73	136	257902	200.00	ng/ml	0.00
8) Acenaphthene-d10	6.29	164	123818	200.00	ng/ml	0.00
15) Phenanthrene-d10	7.53	188	231753	200.00	ng/ml	0.00
23) Chrysene-d12	10.07	240	233225	200.00	ng/ml	0.00
28) Perylene-d12	13.17	264	247780	200.00	ng/ml	-0.01
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.36	152	3209	4.44	ng/ml	0.00
Spiked Amount 200.000			Recovery =	2.22%		
13) Fluorene-d10	6.73	176	3021	4.46	ng/ml	0.00
Spiked Amount 200.000			Recovery =	2.23%		
22) Fluoranthene-d10	8.52	212	5064	3.86	ng/ml	0.00
Spiked Amount 200.000			Recovery =	1.93%		
25) Terphenyl-d14	8.88	244	5266	4.38	ng/ml	0.00
Spiked Amount 200.000			Recovery =	2.19%		
Target Compounds						Qvalue
2) Naphthalene	4.75	128	5349	4.58	ng/ml	99
4) 2-Methylnaphthalene	5.39	142	3605	4.70	ng/ml	98
5) 1-Methylnaphthalene	5.48	142	3398	4.73	ng/ml	96
6) Biphenyl	5.80	154	4397	4.85	ng/ml	99
7) 2,6-Dimethylnaphthalene	5.93	156	2980	4.50	ng/ml	97
9) Acenaphthylene	6.17	152	4586	4.28	ng/ml	99
10) Acenaphthene	6.32	154	2990	4.63	ng/ml	99
11) Dibenzofuran	6.46	168	4430	4.77	ng/ml	96
12) 2,3,5-Trimethylnaphthalene	6.64	170	2718	4.41	ng/ml	98
14) Fluorene	6.75	166	3537	4.70	ng/ml	100
16) Dibenzothiophene	7.44	184	4845	4.34	ng/ml	94
17) Phenanthrene	7.55	178	5246	4.61	ng/ml	99
18) Anthracene	7.59	178	4613	4.17	ng/ml	99
19) Carbazole	7.73	167	4283	3.89	ng/ml	98
20) 1-Methylphenanthrene	8.06	192	3686	4.18	ng/ml	98
21) Fluoranthene	8.53	202	5876	4.33	ng/ml	96
24) Pyrene	8.73	202	6089	4.04	ng/ml	99
26) Benz(a)anthracene	10.06	228	6070	3.91	ng/ml	98
27) Chrysene	10.11	228	5642	4.11	ng/ml	98
29) Benzo(b)fluoranthene	12.12	252	5595	3.64	ng/ml	97
30) Benzo(k)fluoranthene	12.19	252	5027	3.53	ng/ml	96
31) Benzo(e)pyrene	12.85	252	5472	3.84	ng/ml	100
32) Benzo(a)pyrene	13.00	252	4064	2.92	ng/ml	99
33) Perylene	13.25	252	4833	3.82	ng/ml	98
34) Indeno(1,2,3-cd)pyrene	15.38	276	4482	3.29	ng/ml	97
35) Dibenz(a,h)anthracene	15.45	278	5302	3.75	ng/ml	100
36) Benzo(g,h,i)perylene	15.77	276	6708	4.27	ng/ml	97

(#) = qualifier out of range (m) = manual integration

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F005.D Vial: 4
Acq On : 1 Apr 2024 2:20 pm Operator: EBruno
Sample : PAH ICAL .004PPM SVM71-42B Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 1 14:43 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F006.D Vial: 5
Acq On : 1 Apr 2024 2:46 pm Operator: EBruno
Sample : PAH ICAL .008PPM SVM71-42C Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 01 15:12:21 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Mon Apr 01 14:17:42 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

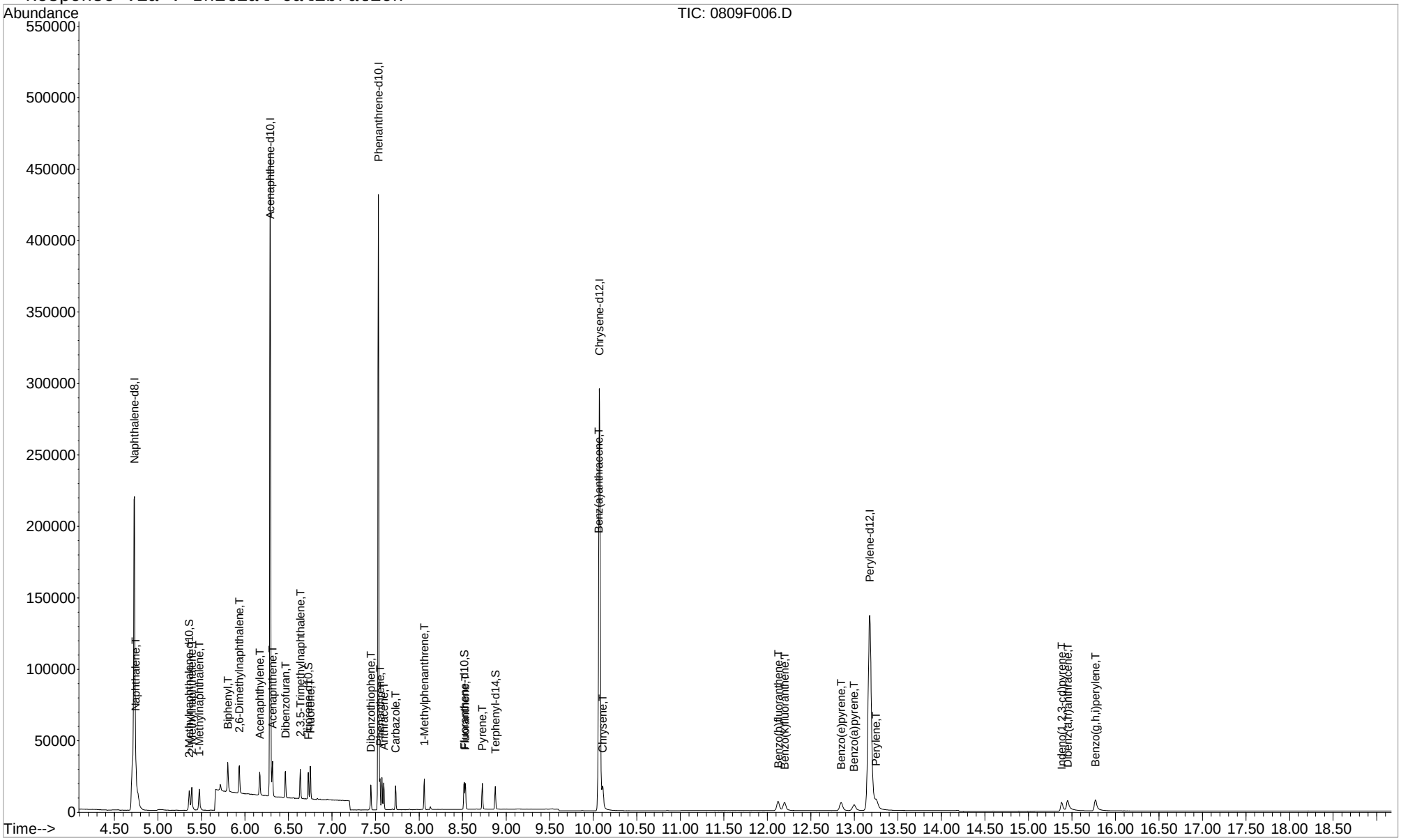
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.73	136	258086	200.00	ng/ml	0.00
8) Acenaphthene-d10	6.29	164	124859	200.00	ng/ml	0.00
15) Phenanthrene-d10	7.53	188	231449	200.00	ng/ml	0.00
23) Chrysene-d12	10.07	240	233647	200.00	ng/ml	0.00
28) Perylene-d12	13.18	264	249042	200.00	ng/ml	0.00
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.36	152	6126	8.47	ng/ml	0.00
Spiked Amount 200.000			Recovery =	4.24%		
13) Fluorene-d10	6.73	176	5955	8.71	ng/ml	0.00
Spiked Amount 200.000			Recovery =	4.36%		
22) Fluoranthene-d10	8.52	212	10191	7.79	ng/ml	0.00
Spiked Amount 200.000			Recovery =	3.90%		
25) Terphenyl-d14	8.88	244	10365	8.60	ng/ml	0.00
Spiked Amount 200.000			Recovery =	4.30%		
Target Compounds						Qvalue
2) Naphthalene	4.75	128	9944	8.50	ng/ml	99
4) 2-Methylnaphthalene	5.39	142	7134	9.30	ng/ml	98
5) 1-Methylnaphthalene	5.47	142	6766	9.40	ng/ml	98
6) Biphenyl	5.80	154	8564	9.44	ng/ml	97
7) 2,6-Dimethylnaphthalene	5.94	156	5804	8.76	ng/ml	98
9) Acenaphthylene	6.17	152	8977	8.31	ng/ml	98
10) Acenaphthene	6.32	154	5965	9.15	ng/ml	99
11) Dibenzofuran	6.46	168	8781	9.37	ng/ml	95
12) 2,3,5-Trimethylnaphthalene	6.63	170	5466	8.79	ng/ml	90
14) Fluorene	6.75	166	6977	9.20	ng/ml	99
16) Dibenzothiophene	7.45	184	9529	8.55	ng/ml	97
17) Phenanthrene	7.55	178	10453	9.20	ng/ml	99
18) Anthracene	7.59	178	9152	8.28	ng/ml	99
19) Carbazole	7.73	167	8266	7.51	ng/ml	98
20) 1-Methylphenanthrene	8.06	192	7402	8.42	ng/ml	99
21) Fluoranthene	8.53	202	11726	8.65	ng/ml	96
24) Pyrene	8.73	202	12343	8.17	ng/ml	95
26) Benz(a)anthracene	10.06	228	11947	7.68	ng/ml	97
27) Chrysene	10.11	228	11448	8.33	ng/ml	98
29) Benzo(b)fluoranthene	12.13	252	11766	7.61	ng/ml	99
30) Benzo(k)fluoranthene	12.20	252	10952	7.65	ng/ml	98
31) Benzo(e)pyrene	12.85	252	11305	7.89	ng/ml	99
32) Benzo(a)pyrene	13.00	252	8393	6.01	ng/ml	98
33) Perylene	13.25	252	9748	7.66	ng/ml	97
34) Indeno(1,2,3-cd)pyrene	15.38	276	8910	6.50	ng/ml	98
35) Dibenz(a,h)anthracene	15.45	278	10675	7.51	ng/ml	98
36) Benzo(g,h,i)perylene	15.77	276	13479	8.55	ng/ml	98

(#) = qualifier out of range (m) = manual integration

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F006.D Vial: 5
Acq On : 1 Apr 2024 2:46 pm Operator: EBruno
Sample : PAH ICAL .008PPM SVM71-42C Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 1 15:12 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F007.D Vial: 6
Acq On : 1 Apr 2024 3:12 pm Operator: EBruno
Sample : PAH ICAL .02PPM SVM71-42D Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 02 10:41:32 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:26:00 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

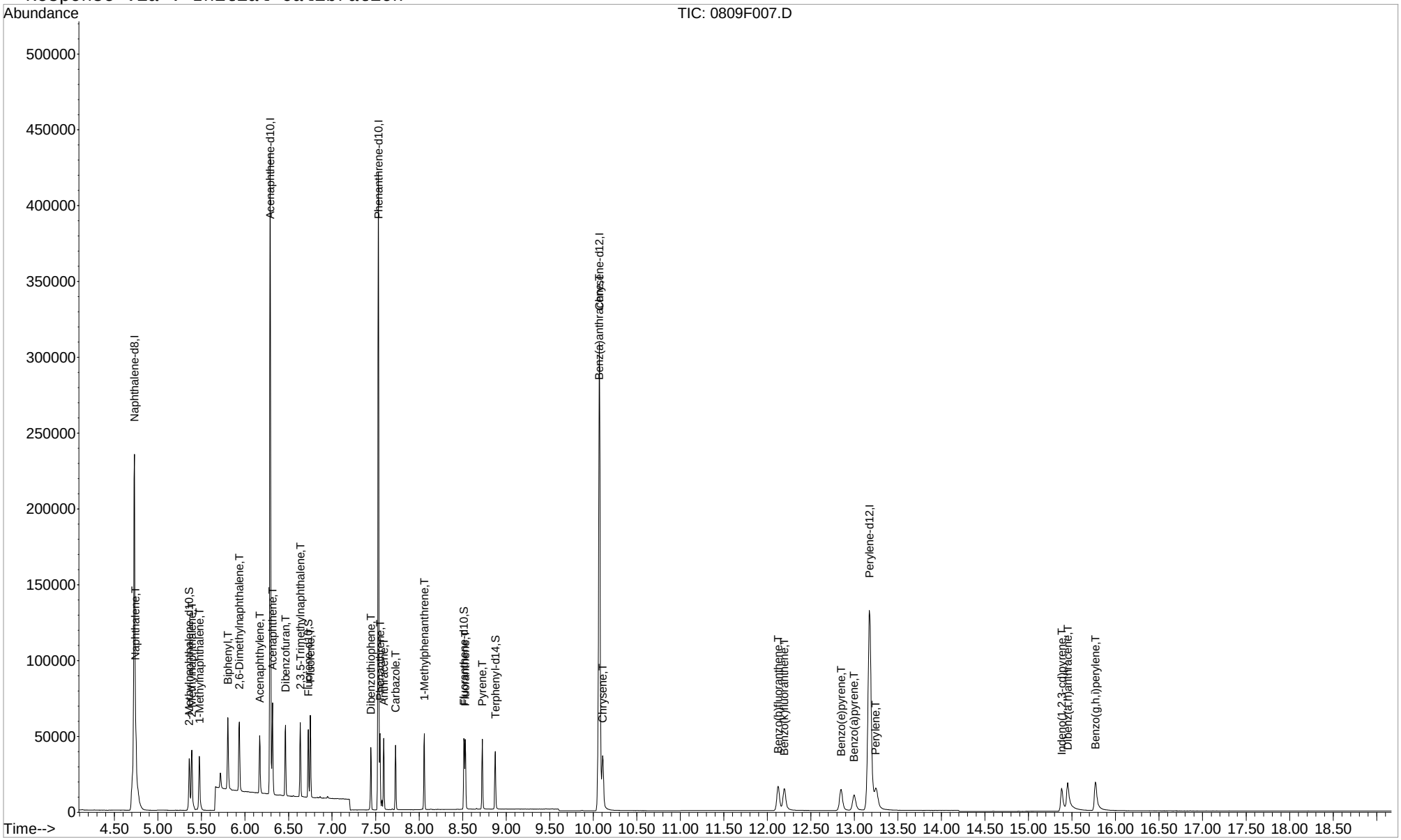
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.73	136	253456	200.00	ng/ml	0.00
8) Acenaphthene-d10	6.29	164	120270	200.00	ng/ml	0.00
15) Phenanthrene-d10	7.53	188	226803	200.00	ng/ml	0.00
23) Chrysene-d12	10.07	240	227981	200.00	ng/ml	0.00
28) Perylene-d12	13.17	264	235680	200.00	ng/ml	0.00
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.36	152	14919	21.04	ng/ml	0.00
Spiked Amount 200.000			Recovery =	10.52%		
13) Fluorene-d10	6.73	176	14311	20.68	ng/ml	0.00
Spiked Amount 200.000			Recovery =	10.34%		
22) Fluoranthene-d10	8.51	212	25010	20.16	ng/ml	0.00
Spiked Amount 200.000			Recovery =	10.08%		
25) Terphenyl-d14	8.88	244	25887	20.55	ng/ml	0.00
Spiked Amount 200.000			Recovery =	10.28%		
Target Compounds						Qvalue
2) Naphthalene	4.75	128	26004	21.40	ng/ml	100
4) 2-Methylnaphthalene	5.39	142	17295	21.93	ng/ml	99
5) 1-Methylnaphthalene	5.48	142	16049	21.62	ng/ml	96
6) Biphenyl	5.81	154	20696	21.58	ng/ml	98
7) 2,6-Dimethylnaphthalene	5.93	156	13922	20.50	ng/ml	96
9) Acenaphthylene	6.17	152	21492	20.09	ng/ml	99
10) Acenaphthene	6.32	154	14321	20.84	ng/ml	96
11) Dibenzofuran	6.46	168	21353	20.96	ng/ml	99
12) 2,3,5-Trimethylnaphthalene	6.63	170	13239	20.57	ng/ml	98
14) Fluorene	6.75	166	16850	21.33	ng/ml	98
16) Dibenzothiophene	7.45	184	23303	20.46	ng/ml	99
17) Phenanthrene	7.55	178	25089	21.19	ng/ml	99
18) Anthracene	7.59	178	21991	19.94	ng/ml	99
19) Carbazole	7.73	167	20821	19.99	ng/ml	100
20) 1-Methylphenanthrene	8.06	192	18007	20.44	ng/ml	99
21) Fluoranthene	8.53	202	29264	21.50	ng/ml	96
24) Pyrene	8.73	202	30161	20.44	ng/ml	99
26) Benz(a)anthracene	10.06	228	27543	18.57	ng/ml	99
27) Chrysene	10.11	228	28627	20.27	ng/ml	99
29) Benzo(b)fluoranthene	12.12	252	28764	19.04	ng/ml	99
30) Benzo(k)fluoranthene	12.20	252	28335	19.85	ng/ml	99
31) Benzo(e)pyrene	12.85	252	27764	19.61	ng/ml	99
32) Benzo(a)pyrene	13.00	252	21136	17.53	ng/ml	100
33) Perylene	13.25	252	25324	19.46	ng/ml	99
34) Indeno(1,2,3-cd)pyrene	15.38	276	21742	17.35	ng/ml	99
35) Dibenz(a,h)anthracene	15.45	278	25769	18.19	ng/ml	100
36) Benzo(g,h,i)perylene	15.77	276	32592	19.65	ng/ml	99

(#) = qualifier out of range (m) = manual integration

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F007.D Vial: 6
Acq On : 1 Apr 2024 3:12 pm Operator: EBruno
Sample : PAH ICAL .02PPM SVM71-42D Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 2 10:41 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration



1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F008.D Vial: 7
Acq On : 1 Apr 2024 3:38 pm Operator: EBruno
Sample : PAH ICAL .1PPM SVM71-42E Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 02 10:41:33 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:26:00 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.73	136	259432	200.00	ng/ml	0.00
8) Acenaphthene-d10	6.29	164	121272	200.00	ng/ml	0.00
15) Phenanthrene-d10	7.53	188	228260	200.00	ng/ml	0.00
23) Chrysene-d12	10.07	240	227138	200.00	ng/ml	0.00
28) Perylene-d12	13.18	264	241685	200.00	ng/ml	0.00
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.36	152	73654	101.46	ng/ml	0.00
Spiked Amount 200.000			Recovery =	50.73%		
13) Fluorene-d10	6.73	176	72579	103.99	ng/ml	0.00
Spiked Amount 200.000			Recovery =	52.00%		
22) Fluoranthene-d10	8.52	212	129977	104.08	ng/ml	0.00
Spiked Amount 200.000			Recovery =	52.04%		
25) Terphenyl-d14	8.88	244	129112	102.86	ng/ml	0.00
Spiked Amount 200.000			Recovery =	51.43%		
Target Compounds						Qvalue
2) Naphthalene	4.75	128	127190	102.26	ng/ml	99
4) 2-Methylnaphthalene	5.39	142	81620	101.11	ng/ml	99
5) 1-Methylnaphthalene	5.48	142	75509	99.39	ng/ml	99
6) Biphenyl	5.80	154	99878	101.72	ng/ml	100
7) 2,6-Dimethylnaphthalene	5.93	156	69930	100.60	ng/ml	99
9) Acenaphthylene	6.17	152	112232	104.05	ng/ml	99
10) Acenaphthene	6.32	154	71934	103.81	ng/ml	99
11) Dibenzofuran	6.46	168	115150	112.12	ng/ml	87
12) 2,3,5-Trimethylnaphthalene	6.63	170	67881	104.60	ng/ml	99
14) Fluorene	6.75	166	84547	106.13	ng/ml	99
16) Dibenzothiophene	7.44	184	121598	106.08	ng/ml	99
17) Phenanthrene	7.55	178	124246	104.26	ng/ml	99
18) Anthracene	7.59	178	116851	105.27	ng/ml	99
19) Carbazole	7.73	167	110719	105.61	ng/ml	100
20) 1-Methylphenanthrene	8.06	192	92450	104.29	ng/ml	100
21) Fluoranthene	8.53	202	148521	108.43	ng/ml	95
24) Pyrene	8.73	202	152732	103.90	ng/ml	99
26) Benz(a)anthracene	10.06	228	143442	97.07	ng/ml	98
27) Chrysene	10.11	228	146198	103.91	ng/ml	99
29) Benzo(b)fluoranthene	12.12	252	163461	105.50	ng/ml	99
30) Benzo(k)fluoranthene	12.20	252	160752	109.83	ng/ml	99
31) Benzo(e)pyrene	12.85	252	151026	104.03	ng/ml	99
32) Benzo(a)pyrene	13.00	252	125597	101.58	ng/ml	100
33) Perylene	13.25	252	140019	104.92	ng/ml	99
34) Indeno(1,2,3-cd)pyrene	15.38	276	130214	101.30	ng/ml	99
35) Dibenz(a,h)anthracene	15.45	278	152935	105.26	ng/ml	99
36) Benzo(g,h,i)perylene	15.77	276	178614	105.00	ng/ml	98

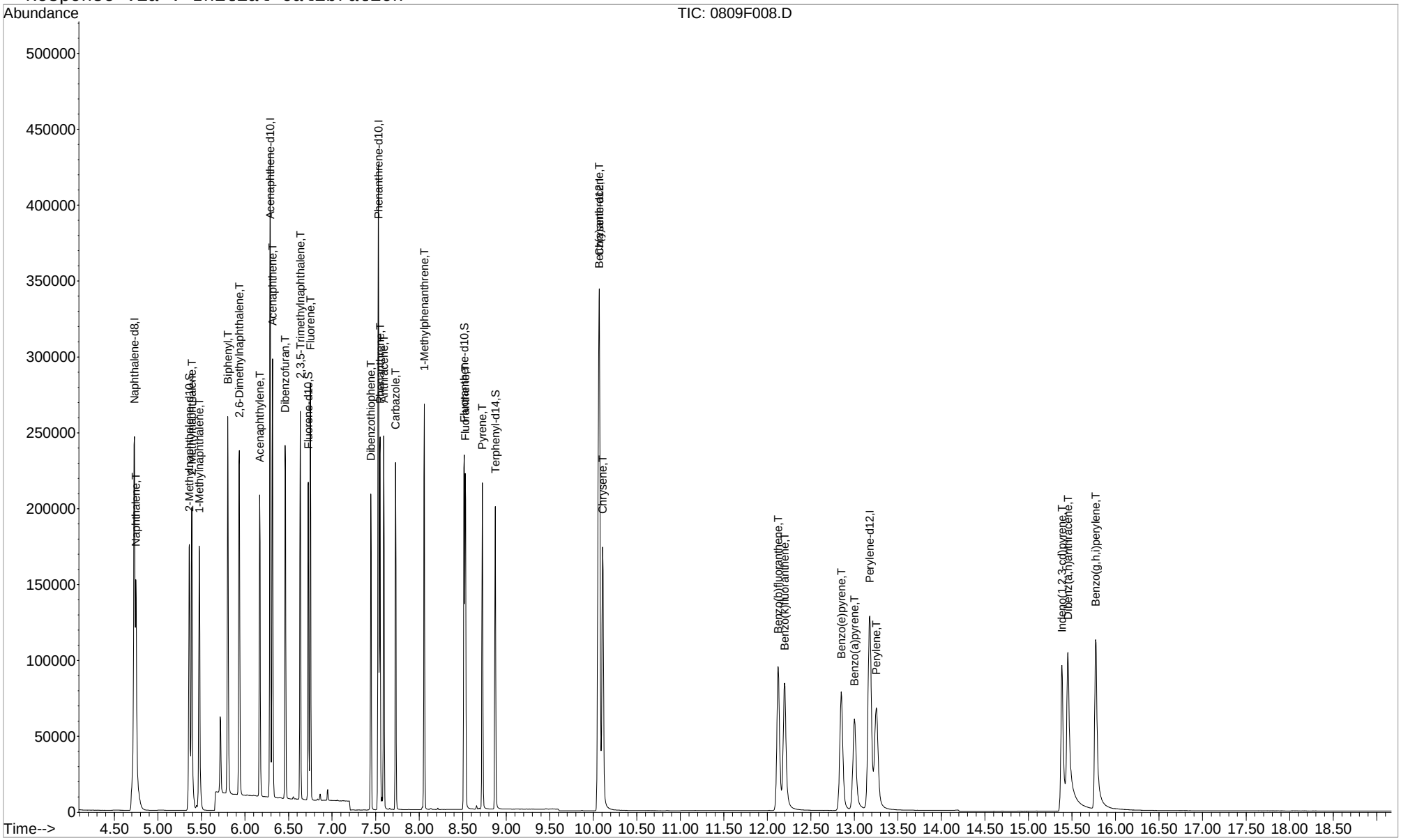
(#) = qualifier out of range (m) = manual integration

Quantitation Report (QT Reviewed)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F008.D Vial: 7
Acq On : 1 Apr 2024 3:38 pm Operator: EBruno
Sample : PAH ICAL .1PPM SVM71-42E Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 2 10:41 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F009.D Vial: 8
Acq On : 1 Apr 2024 4:05 pm Operator: EBruno
Sample : PAH ICAL .2PPM SVM71-42F Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 02 10:41:34 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:26:00 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.73	136	253336	200.00	ng/ml	0.00
8) Acenaphthene-d10	6.29	164	117504	200.00	ng/ml	0.00
15) Phenanthrene-d10	7.53	188	217859	200.00	ng/ml	0.00
23) Chrysene-d12	10.07	240	218105	200.00	ng/ml	0.00
28) Perylene-d12	13.17	264	237200	200.00	ng/ml	0.00
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.36	152	139208	196.38	ng/ml	0.00
Spiked Amount 200.000			Recovery =	98.19%		
13) Fluorene-d10	6.72	176	137722	203.66	ng/ml	0.00
Spiked Amount 200.000			Recovery =	101.83%		
22) Fluoranthene-d10	8.51	212	252910	212.20	ng/ml	0.00
Spiked Amount 200.000			Recovery =	106.10%		
25) Terphenyl-d14	8.88	244	250504	207.85	ng/ml	0.00
Spiked Amount 200.000			Recovery =	103.93%		
Target Compounds						Qvalue
2) Naphthalene	4.75	128	244681	201.45	ng/ml	99
4) 2-Methylnaphthalene	5.39	142	150663	191.13	ng/ml	100
5) 1-Methylnaphthalene	5.47	142	142511	192.09	ng/ml	96
6) Biphenyl	5.80	154	186431	194.45	ng/ml	99
7) 2,6-Dimethylnaphthalene	5.94	156	134187	197.68	ng/ml	100
9) Acenaphthylene	6.17	152	217684	208.29	ng/ml	99
10) Acenaphthene	6.32	154	136596	203.44	ng/ml	99
11) Dibenzofuran	6.46	168	216935	217.99	ng/ml	99
12) 2,3,5-Trimethylnaphthalene	6.63	170	130256	207.15	ng/ml	97
14) Fluorene	6.75	166	158218	204.98	ng/ml	99
16) Dibenzothiophene	7.45	184	232904	212.88	ng/ml	100
17) Phenanthrene	7.55	178	234137	205.85	ng/ml	99
18) Anthracene	7.59	178	224785	212.17	ng/ml	100
19) Carbazole	7.73	167	216782	216.65	ng/ml	100
20) 1-Methylphenanthrene	8.06	192	177665	209.98	ng/ml	100
21) Fluoranthene	8.53	202	276399	211.42	ng/ml	94
24) Pyrene	8.73	202	294485	208.62	ng/ml	100
26) Benz(a)anthracene	10.06	228	283023	199.45	ng/ml	99
27) Chrysene	10.11	228	283196	209.62	ng/ml	99
29) Benzo(b)fluoranthene	12.13	252	330149	217.11	ng/ml	99
30) Benzo(k)fluoranthene	12.20	252	313947	218.56	ng/ml	98
31) Benzo(e)pyrene	12.85	252	306670	215.23	ng/ml	99
32) Benzo(a)pyrene	13.00	252	265550	218.84	ng/ml	100
33) Perylene	13.26	252	282785	215.90	ng/ml	99
34) Indeno(1,2,3-cd)pyrene	15.39	276	270747	214.61	ng/ml	99
35) Dibenz(a,h)anthracene	15.45	278	306252	214.78	ng/ml	99
36) Benzo(g,h,i)perylene	15.77	276	354747	212.49	ng/ml	99

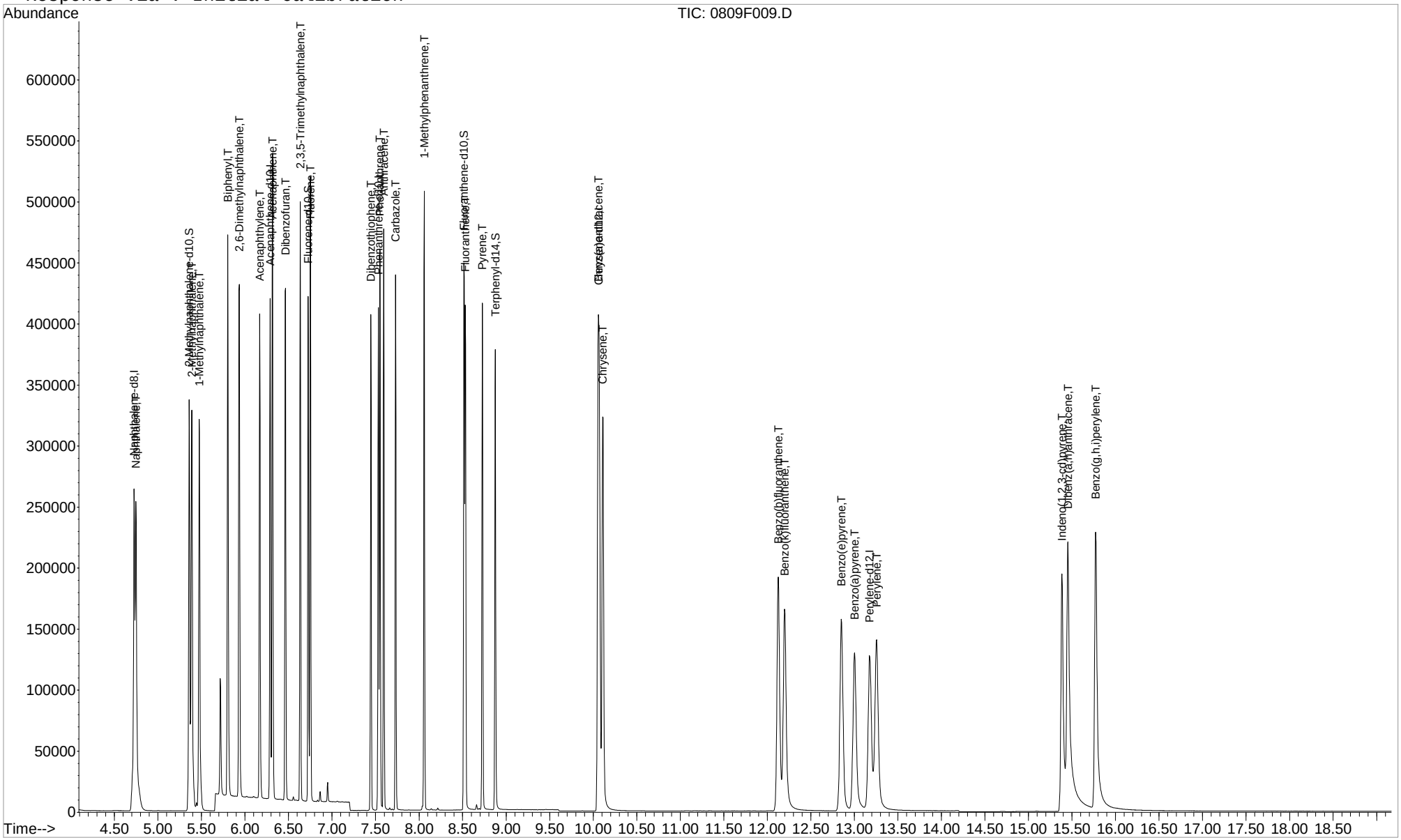
(#) = qualifier out of range (m) = manual integration

Quantitation Report (QT Reviewed)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F009.D Vial: 8
Acq On : 1 Apr 2024 4:05 pm Operator: EBruno
Sample : PAH ICAL .2PPM SVM71-42F Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 2 10:41 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F010.D Vial: 9
Acq On : 1 Apr 2024 4:30 pm Operator: EBruno
Sample : PAH ICAL .4PPM SVM71-42G Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 02 10:41:34 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:26:00 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.73	136	251826	200.00	ng/ml	0.00
8) Acenaphthene-d10	6.29	164	118245	200.00	ng/ml	0.00
15) Phenanthrene-d10	7.53	188	218990	200.00	ng/ml	0.00
23) Chrysene-d12	10.07	240	214452	200.00	ng/ml	0.00
28) Perylene-d12	13.18	264	244106	200.00	ng/ml	0.00
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.36	152	271003	384.59	ng/ml	0.00
Spiked Amount 200.000			Recovery =	192.29%		
13) Fluorene-d10	6.73	176	272780	400.85	ng/ml	0.00
Spiked Amount 200.000			Recovery =	200.43%		
22) Fluoranthene-d10	8.52	212	507572	423.66	ng/ml	0.00
Spiked Amount 200.000			Recovery =	211.83%		
25) Terphenyl-d14	8.88	244	494810	417.54	ng/ml	0.00
Spiked Amount 200.000			Recovery =	208.77%		
Target Compounds						Qvalue
2) Naphthalene	4.75	128	477367	395.39	ng/ml	100
4) 2-Methylnaphthalene	5.39	142	290062	370.17	ng/ml	100
5) 1-Methylnaphthalene	5.48	142	276574	375.04	ng/ml	100
6) Biphenyl	5.80	154	365124	383.10	ng/ml	100
7) 2,6-Dimethylnaphthalene	5.93	156	265667	393.72	ng/ml	100
9) Acenaphthylene	6.17	152	439895	418.27	ng/ml	100
10) Acenaphthene	6.32	154	284324	420.80	ng/ml	100
11) Dibenzofuran	6.46	168	393662	393.10	ng/ml	100
12) 2,3,5-Trimethylnaphthalene	6.63	170	260383	411.50	ng/ml	100
14) Fluorene	6.75	166	309870	398.94	ng/ml	100
16) Dibenzothiophene	7.44	184	464528	422.39	ng/ml	100
17) Phenanthrene	7.55	178	458083	400.66	ng/ml	100
18) Anthracene	7.59	178	452512	424.90	ng/ml	100
19) Carbazole	7.73	167	434073	431.56	ng/ml	100
20) 1-Methylphenanthrene	8.06	192	355426	417.91	ng/ml	100
21) Fluoranthene	8.53	202	529794	403.15	ng/ml	100
24) Pyrene	8.73	202	590628	425.54	ng/ml	100
26) Benz(a)anthracene	10.06	228	572550	410.36	ng/ml	100
27) Chrysene	10.11	228	559970	421.56	ng/ml	100
29) Benzo(b)fluoranthene	12.13	252	679751	434.37	ng/ml	100
30) Benzo(k)fluoranthene	12.20	252	650580	440.10	ng/ml	100
31) Benzo(e)pyrene	12.85	252	632980	431.67	ng/ml	100
32) Benzo(a)pyrene	13.01	252	571850	457.93	ng/ml	100
33) Perylene	13.26	252	593894	440.60	ng/ml	100
34) Indeno(1,2,3-cd)pyrene	15.39	276	579110	446.06	ng/ml	100
35) Dibenz(a,h)anthracene	15.45	278	648604	442.00	ng/ml	100
36) Benzo(g,h,i)perylene	15.77	276	727452	423.40	ng/ml	100

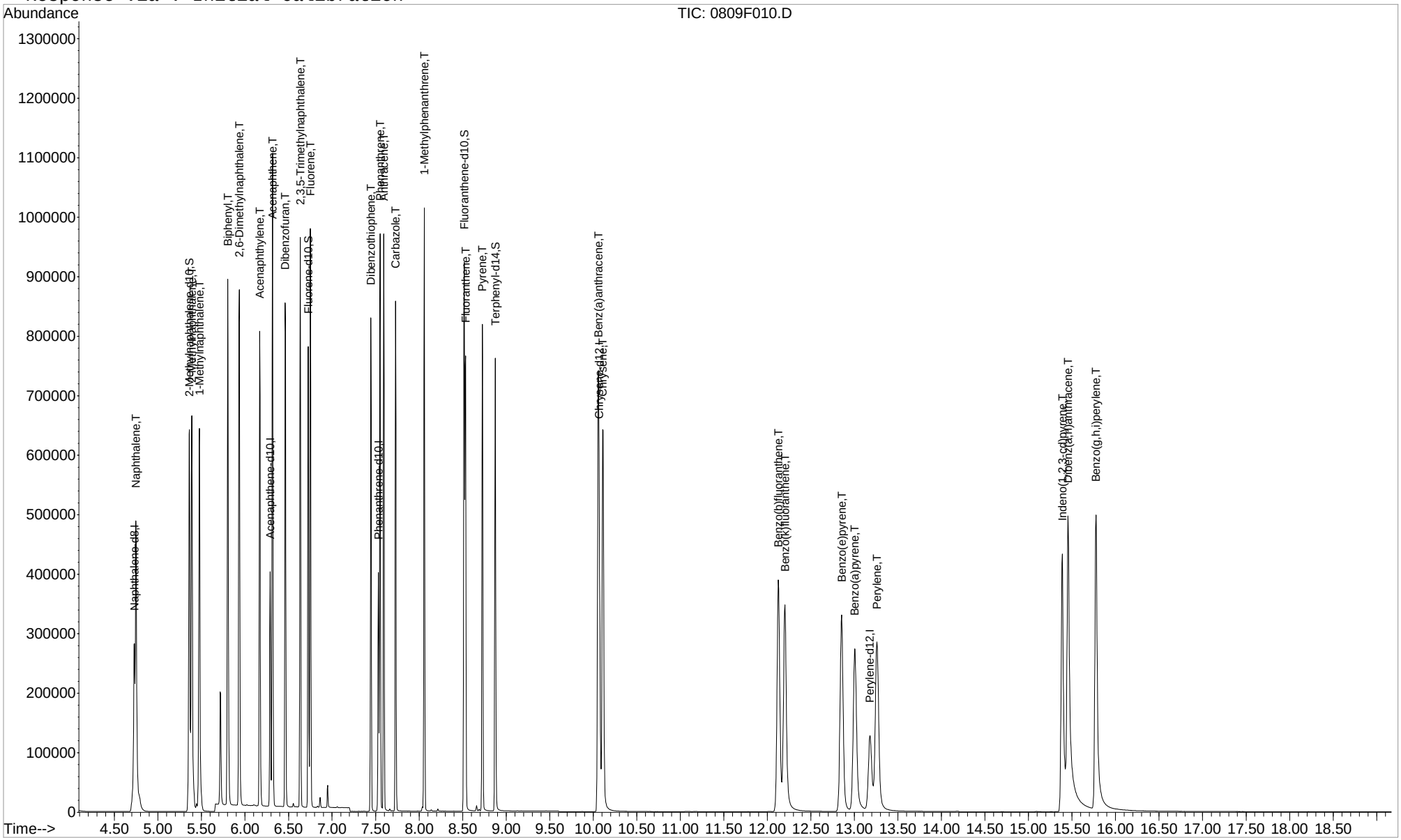
(#) = qualifier out of range (m) = manual integration

Quantitation Report (QT Reviewed)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F010.D Vial: 9
Acq On : 1 Apr 2024 4:30 pm Operator: EBruno
Sample : PAH ICAL .4PPM SVM71-42G Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 2 10:41 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration

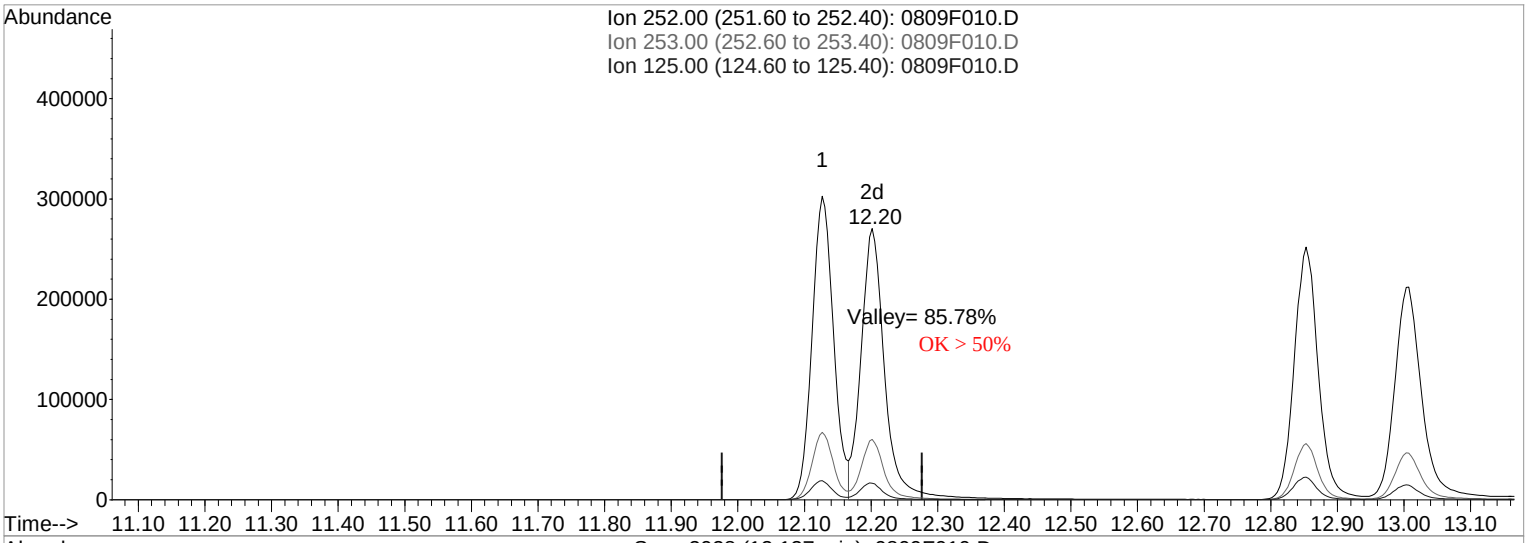


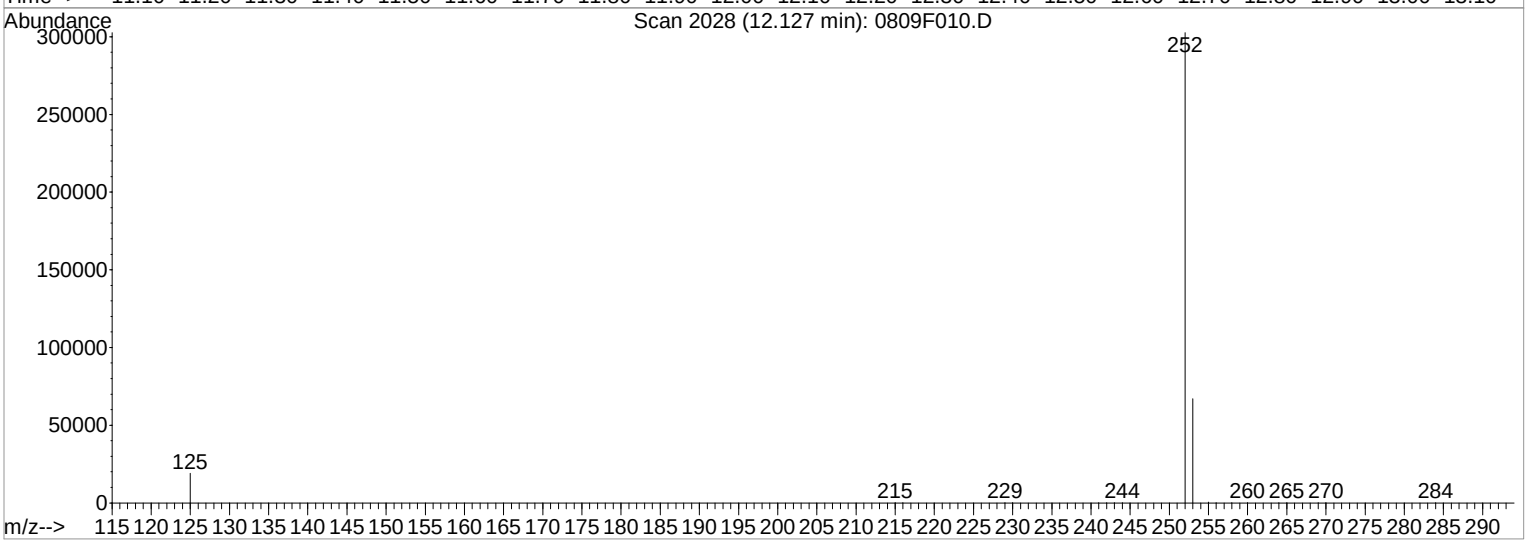
Quantitation Report (Qedit)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F010.D Vial: 9
Acq On : 1 Apr 2024 4:30 pm Operator: EBruno
Sample : PAH ICAL .4PPM SVM71-42G Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 2 10:41 2024 Quant Results File: temp.res

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Multiple Level Calibration





TIC: 0809F010.D

(29) Benzo(b)fluoranthene (T)

12.13min 434.37ng/ml

response 679751

Ion	Exp%	Act%
252.00	100	100
253.00	22.10	22.14
125.00	6.30	6.29
0.00	0.00	0.00

Quantitation Report (QT Reviewed)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F011.D Vial: 10
Acq On : 1 Apr 2024 4:57 pm Operator: EBruno
Sample : PAH ICAL 1PPM SVM71-42H Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 02 10:41:35 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:26:00 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

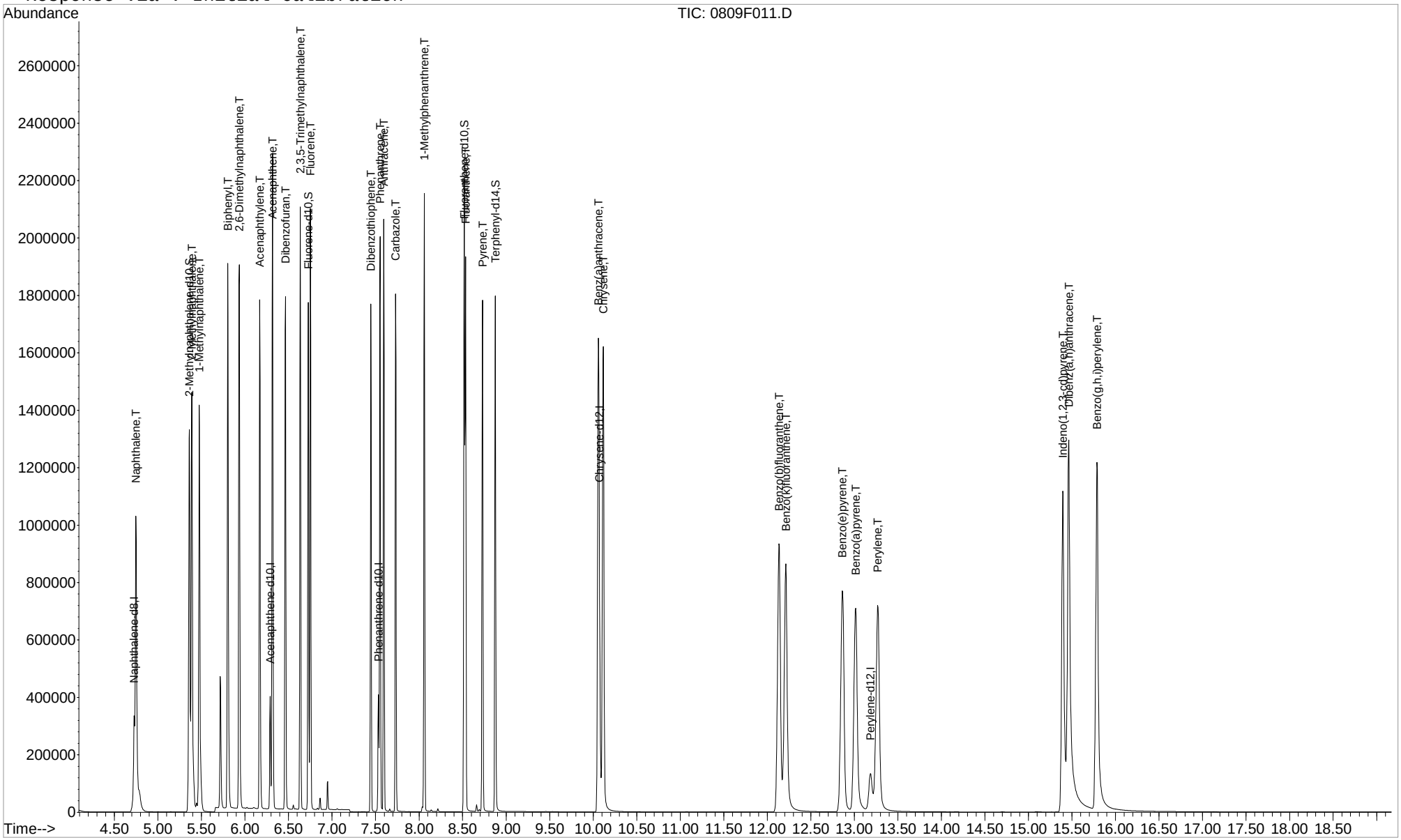
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.73	136	243368	200.00	ng/ml	0.00
8) Acenaphthene-d10	6.29	164	116367	200.00	ng/ml	0.00
15) Phenanthrene-d10	7.53	188	217443	200.00	ng/ml	0.00
23) Chrysene-d12	10.08	240	222027	200.00	ng/ml	0.00
28) Perylene-d12	13.18	264	256181	200.00	ng/ml	0.00
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.36	152	610733	896.83	ng/ml	0.00
Spiked Amount 200.000			Recovery =	448.42%		
13) Fluorene-d10	6.73	176	610819	912.09	ng/ml	0.00
Spiked Amount 200.000			Recovery =	456.05%		
22) Fluoranthene-d10	8.52	212	1163376	977.96	ng/ml	0.00
Spiked Amount 200.000			Recovery =	488.98%		
25) Terphenyl-d14	8.88	244	1154707	941.15	ng/ml	0.00
Spiked Amount 200.000			Recovery =	470.57%		
Target Compounds						Qvalue
2) Naphthalene	4.75	128	1086476	931.17	ng/ml	100
4) 2-Methylnaphthalene	5.39	142	650979	859.64	ng/ml	98
5) 1-Methylnaphthalene	5.47	142	621031	871.39	ng/ml	96
6) Biphenyl	5.80	154	803139	871.98	ng/ml	100
7) 2,6-Dimethylnaphthalene	5.94	156	600051	920.19	ng/ml	100
9) Acenaphthylene	6.17	152	985839	952.50	ng/ml	99
10) Acenaphthene	6.32	154	607431	913.51	ng/ml	99
11) Dibenzofuran	6.46	168	861284	873.93	ng/ml	95
12) 2,3,5-Trimethylnaphthalene	6.63	170	583898	937.66	ng/ml	98
14) Fluorene	6.75	166	683178	893.75	ng/ml	99
16) Dibenzothiophene	7.45	184	1017539	931.82	ng/ml	99
17) Phenanthrene	7.55	178	1013856	893.08	ng/ml	98
18) Anthracene	7.59	178	1007771	953.02	ng/ml	98
19) Carbazole	7.73	167	966728	967.98	ng/ml	99
20) 1-Methylphenanthrene	8.06	192	801732	949.39	ng/ml	100
21) Fluoranthene	8.53	202	1175612	900.96	ng/ml	97
24) Pyrene	8.73	202	1336674	930.20	ng/ml	96
26) Benz(a)anthracene	10.06	228	1433093	992.09	ng/ml	99
27) Chrysene	10.12	228	1351201	982.50	ng/ml	99
29) Benzo(b)fluoranthene	12.13	252	1687658	1027.59	ng/ml	98
30) Benzo(k)fluoranthene	12.21	252	1624076	1046.86	ng/ml	99
31) Benzo(e)pyrene	12.86	252	1571579	1021.25	ng/ml	99
32) Benzo(a)pyrene	13.02	252	1484357	1132.64	ng/ml	98
33) Perylene	13.27	252	1489192	1052.73	ng/ml	98
34) Indeno(1,2,3-cd)pyrene	15.39	276	1506732	1105.86	ng/ml	97
35) Dibenz(a,h)anthracene	15.46	278	1629691	1058.24	ng/ml	98
36) Benzo(g,h,i)perylene	15.79	276	1770506	981.92	ng/ml	98

(#) = qualifier out of range (m) = manual integration

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F011.D Vial: 10
Acq On : 1 Apr 2024 4:57 pm Operator: EBruno
Sample : PAH ICAL 1PPM SVM71-42H Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 2 10:41 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F012.D Vial: 11
Acq On : 1 Apr 2024 5:24 pm Operator: EBruno
Sample : PAH ICAL 1.6PPM SVM71-42I Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 02 10:41:35 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:26:00 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

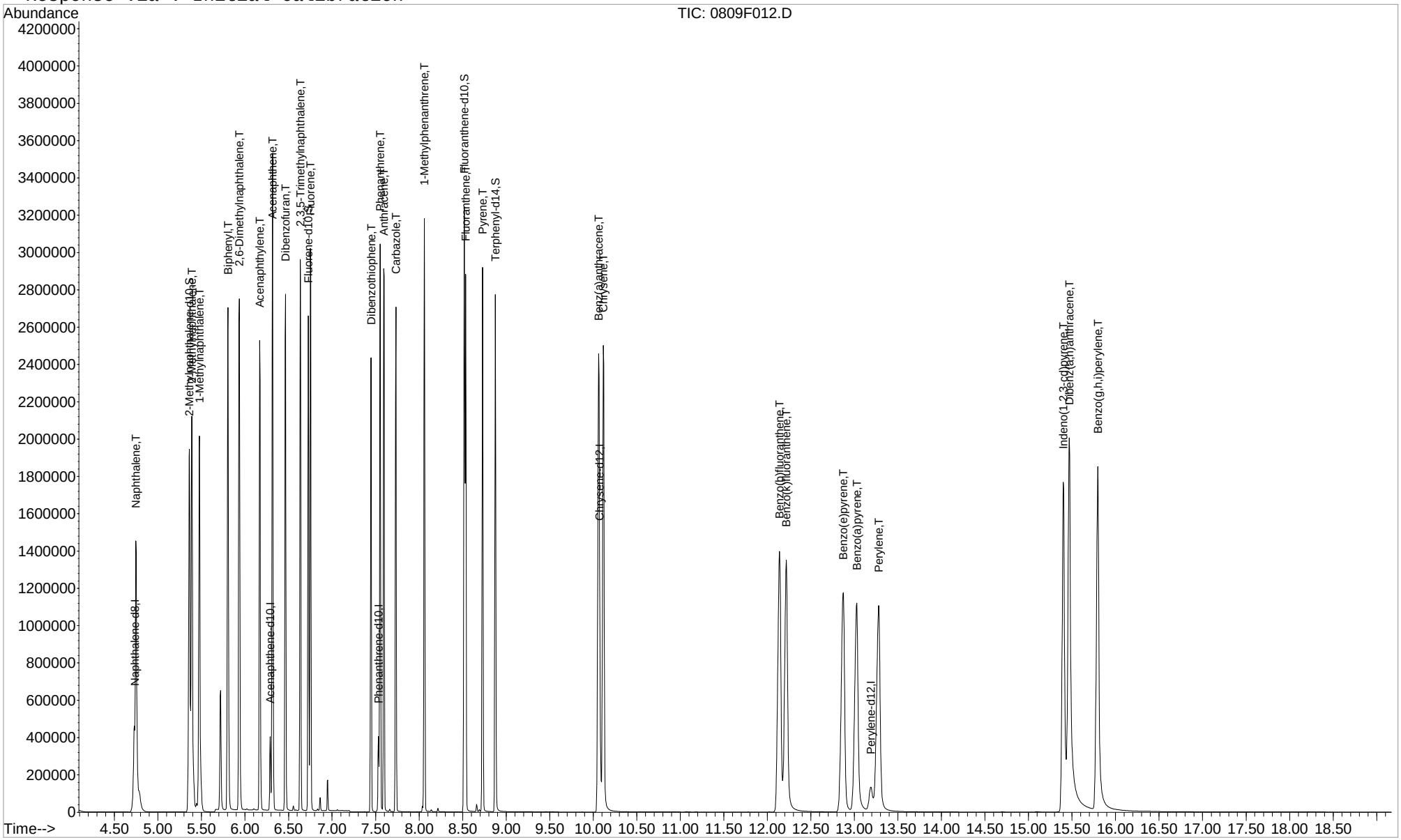
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.73	136	237854	200.00	ng/ml	0.00
8) Acenaphthene-d10	6.29	164	117491	200.00	ng/ml	0.00
15) Phenanthrene-d10	7.53	188	223216	200.00	ng/ml	0.00
23) Chrysene-d12	10.08	240	223052	200.00	ng/ml	0.00
28) Perylene-d12	13.19	264	258367	200.00	ng/ml	0.01
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.36	152	935186	1405.10	ng/ml	0.00
Spiked Amount 200.000			Recovery = 702.55%			
13) Fluorene-d10	6.73	176	944292	1396.55	ng/ml	0.00
Spiked Amount 200.000			Recovery = 698.27%			
22) Fluoranthene-d10	8.52	212	1781004	1458.43	ng/ml	0.00
Spiked Amount 200.000			Recovery = 729.22%			
25) Terphenyl-d14	8.88	244	1791250	1453.25	ng/ml	0.00
Spiked Amount 200.000			Recovery = 726.63%			
Target Compounds						Qvalue
2) Naphthalene	4.75	128	1677676	1471.20	ng/ml	99
4) 2-Methylnaphthalene	5.39	142	990212	1337.92	ng/ml	98
5) 1-Methylnaphthalene	5.48	142	942862	1353.63	ng/ml	99
6) Biphenyl	5.81	154	1217454	1352.45	ng/ml	99
7) 2,6-Dimethylnaphthalene	5.93	156	918119	1440.60	ng/ml	98
9) Acenaphthylene	6.17	152	1502466	1437.76	ng/ml	98
10) Acenaphthene	6.32	154	933119	1389.89	ng/ml	98
11) Dibenzofuran	6.46	168	1412178	1419.21	ng/ml	94
12) 2,3,5-Trimethylnaphthalene	6.64	170	896722	1426.24	ng/ml	90
14) Fluorene	6.75	166	1044182	1352.96	ng/ml	98
16) Dibenzothiophene	7.45	184	1545641	1378.83	ng/ml	95
17) Phenanthrene	7.55	178	1549701	1329.79	ng/ml	97
18) Anthracene	7.60	178	1525786	1405.57	ng/ml	97
19) Carbazole	7.73	167	1476118	1439.80	ng/ml	99
20) 1-Methylphenanthrene	8.06	192	1226048	1414.30	ng/ml	99
21) Fluoranthene	8.53	202	1785612	1333.05	ng/ml	93
24) Pyrene	8.73	202	2033716	1408.78	ng/ml	99
26) Benz(a)anthracene	10.06	228	2238075	1542.24	ng/ml	97
27) Chrysene	10.12	228	2069421	1497.83	ng/ml	97
29) Benzo(b)fluoranthene	12.14	252	2643499	1595.98	ng/ml	97
30) Benzo(k)fluoranthene	12.22	252	2485635	1588.65	ng/ml	97
31) Benzo(e)pyrene	12.87	252	2454996	1581.81	ng/ml	98
32) Benzo(a)pyrene	13.03	252	2348111	1776.56	ng/ml	97
33) Perylene	13.28	252	2350083	1647.25	ng/ml	97
34) Indeno(1,2,3-cd)pyrene	15.40	276	2380811	1732.60	ng/ml	95
35) Dibenz(a,h)anthracene	15.47	278	2569884	1654.63	ng/ml	96
36) Benzo(g,h,i)perylene	15.80	276	2740209	1506.86	ng/ml	96

(#) = qualifier out of range (m) = manual integration

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F012.D Vial: 11
Acq On : 1 Apr 2024 5:24 pm Operator: EBruno
Sample : PAH ICAL 1.6PPM SVM71-42I Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 2 10:41 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration



1st 04/02/24
2nd 04/04/24

Quantitation Report (QT Reviewed)

Data File : J:\MS14\DATA\040124\0809F013.D Vial: 12
Acq On : 1 Apr 2024 5:49 pm Operator: EBruno
Sample : PAH ICAL 2PPM SVM71-42J Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 02 10:41:36 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:26:00 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

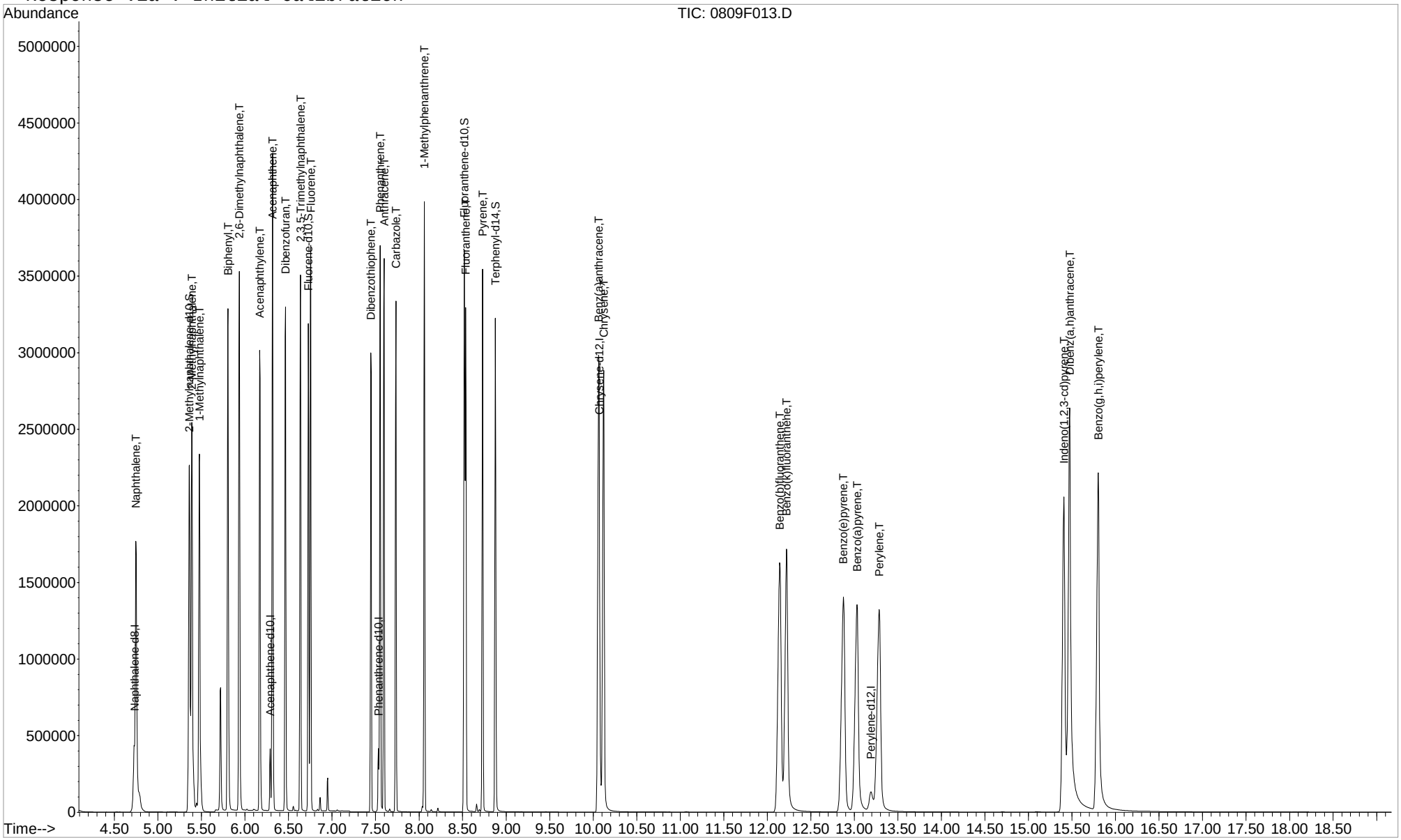
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.73	136	232451	200.00	ng/ml	0.00
8) Acenaphthene-d10	6.29	164	117629	200.00	ng/ml	0.00
15) Phenanthrene-d10	7.53	188	226594	200.00	ng/ml	0.00
23) Chrysene-d12	10.08	240	221966	200.00	ng/ml	0.00
28) Perylene-d12	13.19	264	259018	200.00	ng/ml	0.02
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.36	152	1120484	1722.64	ng/ml	0.00
Spiked Amount 200.000			Recovery = 861.32%			
13) Fluorene-d10	6.73	176	1146827	1694.10	ng/ml	0.00
Spiked Amount 200.000			Recovery = 847.05%			
22) Fluoranthene-d10	8.52	212	2149285	1733.77	ng/ml	0.00
Spiked Amount 200.000			Recovery = 866.88%			
25) Terphenyl-d14	8.88	244	2155870	1757.63	ng/ml	0.00
Spiked Amount 200.000			Recovery = 878.81%			
Target Compounds						Qvalue
2) Naphthalene	4.75	128	2001493	1795.96	ng/ml	98
4) 2-Methylnaphthalene	5.39	142	1187639	1641.97	ng/ml	97
5) 1-Methylnaphthalene	5.48	142	1136869	1670.10	ng/ml	98
6) Biphenyl	5.81	154	1458674	1658.08	ng/ml	99
7) 2,6-Dimethylnaphthalene	5.94	156	1100845	1767.46	ng/ml	97
9) Acenaphthylene	6.17	152	1807667	1727.79	ng/ml	98
10) Acenaphthene	6.32	154	1172560	1744.49	ng/ml	98
11) Dibenzofuran	6.46	168	1565167	1571.11	ng/ml	92
12) 2,3,5-Trimethylnaphthalene	6.64	170	1086914	1726.71	ng/ml	92
14) Fluorene	6.75	166	1266084	1638.55	ng/ml	96
16) Dibenzothiophene	7.45	184	1856590	1631.53	ng/ml	96
17) Phenanthrene	7.55	178	1874537	1584.55	ng/ml	96
18) Anthracene	7.60	178	1853065	1681.62	ng/ml	96
19) Carbazole	7.73	167	1774965	1705.49	ng/ml	98
20) 1-Methylphenanthrene	8.06	192	1481841	1683.89	ng/ml	99
21) Fluoranthene	8.53	202	2140853	1574.43	ng/ml	92
24) Pyrene	8.73	202	2437258	1696.58	ng/ml	99
26) Benz(a)anthracene	10.06	228	2725455	1887.27	ng/ml	97
27) Chrysene	10.12	228	2514408	1828.82	ng/ml	96
29) Benzo(b)fluoranthene	12.14	252	3245769	1954.66	ng/ml	96
30) Benzo(k)fluoranthene	12.22	252	3057071	1948.97	ng/ml	96
31) Benzo(e)pyrene	12.87	252	3010383	1934.79	ng/ml	97
32) Benzo(a)pyrene	13.03	252	2894318	2184.32	ng/ml	96
33) Perylene	13.28	252	2892564	2022.40	ng/ml	97
34) Indeno(1,2,3-cd)pyrene	15.41	276	2991253	2171.37	ng/ml	94
35) Dibenz(a,h)anthracene	15.47	278	3137950	2015.31	ng/ml	95
36) Benzo(g,h,i)perylene	15.80	276	3349525	1837.29	ng/ml	95

(#) = qualifier out of range (m) = manual integration

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F013.D Vial: 12
Acq On : 1 Apr 2024 5:49 pm Operator: EBruno
Sample : PAH ICAL 2PPM SVM71-42J Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 2 10:41 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F014.D Vial: 13
Acq On : 1 Apr 2024 6:15 pm Operator: EBruno
Sample : PAH ICV .4PPM SVM71-42J Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 02 10:43:51 2024 Quant Results File: 040123_PAH.RES

Quant Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration
DataAcq Meth : A_PAHAT05

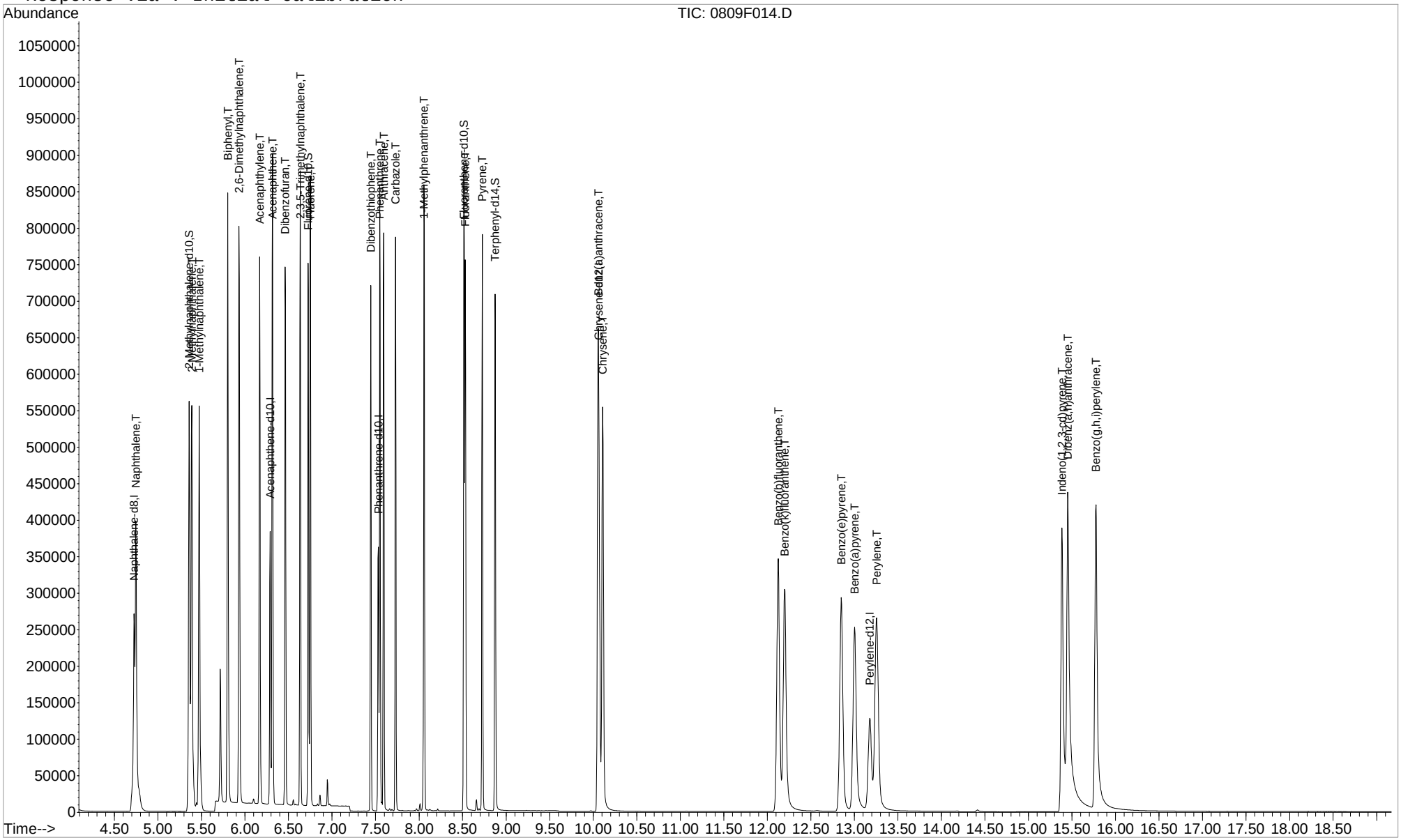
Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(Min)
1) Naphthalene-d8	4.73	136	240363	200.00	ng/ml	0.00
8) Acenaphthene-d10	6.29	164	113884	200.00	ng/ml	0.00
15) Phenanthrene-d10	7.53	188	210774	200.00	ng/ml	0.00
23) Chrysene-d12	10.07	240	208171	200.00	ng/ml	0.00
28) Perylene-d12	13.18	264	238538	200.00	ng/ml	0.00
System Monitoring Compounds						
3) 2-Methylnaphthalene-d10	5.36	152	257007	382.12	ng/ml	0.00
Spiked Amount 200.000			Recovery = 191.06%			
13) Fluorene-d10	6.72	176	259090	395.32	ng/ml	0.00
Spiked Amount 200.000			Recovery = 197.66%			
22) Fluoranthene-d10	8.51	212	475966	412.72	ng/ml	0.00
Spiked Amount 200.000			Recovery = 206.36%			
25) Terphenyl-d14	8.88	244	470617	409.09	ng/ml	0.00
Spiked Amount 200.000			Recovery = 204.54%			
Target Compounds						Qvalue
2) Naphthalene	4.75	128	428913	372.20	ng/ml	100
4) 2-Methylnaphthalene	5.39	142	267541	357.71	ng/ml	100
5) 1-Methylnaphthalene	5.47	142	249716	354.76	ng/ml	97
6) Biphenyl	5.80	154	342148	376.12	ng/ml	99
7) 2,6-Dimethylnaphthalene	5.94	156	247794	384.75	ng/ml	98
9) Acenaphthylene	6.17	152	405892	400.71	ng/ml	99
10) Acenaphthene	6.32	154	231083	355.10	ng/ml	100
11) Dibenzofuran	6.46	168	352593	365.57	ng/ml	89
12) 2,3,5-Trimethylnaphthalene	6.63	170	236876	388.69	ng/ml	97
14) Fluorene	6.75	166	274092	366.39	ng/ml	100
16) Dibenzothiophene	7.45	184	389082	367.58	ng/ml	95
17) Phenanthrene	7.55	178	406676	369.57	ng/ml	99
18) Anthracene	7.59	178	402867	393.03	ng/ml	100
19) Carbazole	7.73	167	399971	413.16	ng/ml	99
20) 1-Methylphenanthrene	8.06	192	327660	400.28	ng/ml	99
21) Fluoranthene	8.53	202	470345	371.85	ng/ml	95
24) Pyrene	8.73	202	505489	375.20	ng/ml	97
26) Benz(a)anthracene	10.06	228	503435	371.73	ng/ml	100
27) Chrysene	10.11	228	487884	378.39	ng/ml	100
29) Benzo(b)fluoranthene	12.13	252	604312	395.17	ng/ml	99
30) Benzo(k)fluoranthene	12.20	252	581969	402.96	ng/ml	100
31) Benzo(e)pyrene	12.85	252	572374	399.45	ng/ml	100
32) Benzo(a)pyrene	13.00	252	513628	420.73	ng/ml	100
33) Perylene	13.26	252	573544	435.43	ng/ml	100
34) Indeno(1,2,3-cd)pyrene	15.39	276	518151	408.42	ng/ml	100
35) Dibenz(a,h)anthracene	15.45	278	569523	397.11	ng/ml	100
36) Benzo(g,h,i)perylene	15.77	276	631076	375.88	ng/ml	99

(#) = qualifier out of range (m) = manual integration

1st 04/02/24
2nd 04/04/24

Data File : J:\MS14\DATA\040124\0809F014.D Vial: 13
Acq On : 1 Apr 2024 6:15 pm Operator: EBruno
Sample : PAH ICV .4PPM SVM71-42J Inst : MS14
Misc : Multiplr: 1.00
MS Integration Params: RTEINT.P
Quant Time: Apr 2 10:43 2024 Quant Results File: 040123_PAH.RES

Method : J:\MS14\METHODS\SIM\040123_PAH.M (RTE Integrator)
Title : PAHS and ALKYLATED HOMOLOGS
Last Update : Tue Apr 02 10:43:27 2024
Response via : Initial Calibration



Injection Log

Directory: J:\MS14\DATA\080524

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	1	0805f001.d	1.	DFTPP @ 10ug/mL SVM71-21G		5 Aug 2024 09:39
2	2	0805f002.d	1.	PAH CCV 0.4PPM SVM71-90A		5 Aug 2024 10:05
3	3	0805f003.d	1.	Silica gel lot 230878 MB NR		5 Aug 2024 10:39
4	4	0805f004.d	1.	Silica gel lot 230878 LCS NR		5 Aug 2024 11:06
5	5	0805f005.d	1.	KQ2411801-04 MB		5 Aug 2024 11:33
6	6	0805f006.d	1.	KQ2411801-03 LCS		5 Aug 2024 11:59
7	7	0805f007.d	1.	KQ2411801-01_K2407810-001MS		5 Aug 2024 12:26
8	8	0805f008.d	1.	KQ2411801-02_K2407810-001DMS		5 Aug 2024 12:53
9	9	0805f009.d	1.	K2407810-001		5 Aug 2024 13:20
10	10	0805f010.d	1.	K2407810-002		5 Aug 2024 13:47
11	11	0805f011.d	1.	K2407810-003		5 Aug 2024 14:14
12	12	0805f012.d	1.	K2407810-004		5 Aug 2024 14:40
13	13	0805f013.d	1.	K2407810-004 10X ✓		5 Aug 2024 15:15
14	1	0805f014.d	1.	~~DFTPP @ 10ug/mL SVM71-21G~~		5 Aug 2024 15:42

Run #: 849989
CAL: KC2400163
8-8-24 eb

8/8/24

✓ 9/9/24

DILUTION LOG MS 14

Date: 8-5-24 Prepared by: EBruno Solvent Lot#: EI507

LAB ID.	µL ALIQUOT	µL FINAL VOLUME	DILUTION FACTOR	COMMENTS
K2407810-4	100	1000	10x	Target

Polycyclic Aromatic Hydrocarbons by GC/MS SIM

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

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ATTACHMENT D
ARCHIVE SEDIMENT SAMPLE ANALYSIS DATA VALIDATION REPORTS

High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry
PCCDs/PCDFs (EPA Method 1613B)
Stage 2A Review
Data Quality Control (QC)

Site: PHSS-Swan Island Basin	SDG #: 22893
Laboratory: CFA	Project #: DT2002.03.03.01.01
HydroGeoLogic, Inc. Validator: Zach Barton	Validation Date: 09-20-2024
HGL Peer Reviewer: Ken Rapuano	Peer Review Date: 9.30.24

Client Sample ID	Laboratory Sample ID	Matrix
SIB-SC-B31-6-7-07/10/2022	22893001	Sediment
SIB-SC-B31-7-8-07/10/2022	22893002	Sediment
SIB-SC-B31-8-9-07/10/2022	22893003	Sediment
SIB-SC-B31-9-10-07/10/2022	22893004	Sediment
SIB-SC-B31-10-11-07/10/2022	22893005	Sediment
SIB-SC-B31-11-12-07/10/2022	22893006	Sediment
SIB-SC-B31-12-13-07/10/2022	22893007	Sediment
SIB-SC-B31-13-13.7-07/10/2022	22893008	Sediment
SIB-SC-E24-7-8-07/12/2022	22893009	Sediment
SIB-SC-E24-8-9-07/12/2022	22893010	Sediment
SIB-SC-E24-9-10-07/12/2022	22893011	Sediment
SIB-SC-B32-6-7-07/25/2022	22893012	Sediment
SIB-SC-B32-7-8-07/25/2022	22893013	Sediment
SIB-SC-B32-8-9-07/25/2022	22893014	Sediment
SIB-SC-B34-0-1-08/22/2022	22893015	Sediment
SIB-SC-B34-6-7-08/22/2022	22893016	Sediment
SIB-SC-B34-7-8-08/22/2022	22893017	Sediment
SIB-SC-B34-8-9-08/22/2022	22893018	Sediment
SIB-SC-B34-9-9.7-08/22/2022	22893019	Sediment
SIB-SC-B35-0-1-07/07/2022	22893020	Sediment
SIB-SC-B35-6-7-07/07/2022	22893021	Sediment
SIB-SC-B35-7-8-07/07/2022	22893022	Sediment
SIB-SC-B35-8-9-07/07/2022	22893023	Sediment
SIB-SC-B35-9-10-07/07/2022	22893024	Sediment
SIB-SC-B35-10-11-07/07/2022	22893025	Sediment
SIB-SC-B35-11-12-07/07/2022	22893026	Sediment
SIB-SC-B35-12-13-07/07/2022	22893027	Sediment
SIB-SC-B35-13-14-07/07/2022	22893028	Sediment
SIB-SC-B35-14-14.7-07/07/2022	22893029	Sediment

The following Stage 2A review was performed on the requested analyses. No results were rejected, and analytical completeness is 100%.

Narrative and Completeness Review – The case narrative and data package were checked for completeness. No completeness issues were noted.

Qualification: None required.

Sample Delivery and Condition – All samples arrived at the laboratory with temperatures within 0-6°C or were frozen. Some sample containers were cracked and the samples were transferred to new containers. Some samples were noted to be missing the dates and times, in which case the laboratory logged these samples in accordance with the information on the custody form.

Qualification: None required.

Holding Times – All samples were frozen. The samples collected in July 2022 were prepared more than 1 year outside of 1 year holding time for frozen samples. Due to the stable nature of PCDD/PCDFs, it is the judgment that all results from July 2022 samples can be accepted with the qualification of J-HTPX (detections) or UJ-HTPX (non-detections). The samples collected in August 2022 were prepared within 2 years of collection and all results from August 2022 should be qualified J-HTP (detections) or UJ-HTP (non-detections).

Qualification: **All results for July 2022 samples are qualified of J-HTPX (detections) or UJ-HTPX (non-detections)**. **All results for August 2022 samples are qualified of J-HTP (detections) or UJ-HTP (non-detections)**.

Method Blanks – The method blank for preparation batch 56594 was contaminated with several analytes, including:

- 0.162 pg/g of 1,2,3,7,8-PeCDD, leading to a qualification limit of 0.81 pg/g
- 1.15 pg/g of 1,2,3,4,6,7,8,9-OCDD, leading to a qualification limit of 5.75 pg/g
- 0.138 pg/g of 1,2,3,4,7,8-HxCDF, leading to a qualification limit of 0.69 pg/g
- 0.104 pg/g of 2,3,4,6,7,8-HxCDF, leading to a qualification limit of 0.52 pg/g
- 0.404 pg/g of 1,2,3,4,6,7,8-HpCDF, leading to a qualification limit of 2.02 pg/g

The following detected results were below the associated qualification limit and should be qualified U:

- The 1,2,3,7,8-PeCDD results for samples SIB-SC-B31-7-8-07/10/2022 and SIB-SC-B32-8-9-07/25/2022
- The 1,2,3,4,6,7,8,9-OCDD results for samples SIB-SC-B31-7-8-07/10/2022, SIB-SC-B31-10-11-07/10/2022, and SIB-SC-B34-0-1-08/22/2022
- The 1,2,3,4,7,8-HxCDF results for samples SIB-SC-B31-7-8-07/10/2022, SIB-SC-B31-8-9-07/10/2022, SIB-SC-B31-9-10-07/10/2022, SIB-SC-B31-11-12-07/10/2022, SIB-SC-B31-13-13.7-07/10/2022, SIB-SC-B32-8-9-07/25/2022, and SIB-SC-B35-0-1-07/07/2022
- The 2,3,4,6,7,8-HxCDF results for sample SIB-SC-B31-7-8-07/10/2022
- The 1,2,3,4,6,7,8-HpCDF result for samples SIB-SC-B31-6-7-07/10/2022, SIB-SC-B31-7-8-07/10/2022, SIB-SC-B31-8-9-07/10/2022, SIB-SC-B31-9-10-07/10/2022, SIB-SC-B31-10-11-07/10/2022, SIB-SC-B31-11-12-07/10/2022, SIB-SC-B31-12-13-07/10/2022, SIB-SC-B31-13-13.7-07/10/2022, SIB-SC-B32-7-8-07/25/2022, SIB-SC-B34-0-1-08/22/2022, SIB-SC-B34-8-9-08/22/2022, SIB-SC-B34-9-9.7-08/22/2022, and SIB-SC-B35-0-1-07/07/2022

The method blank for batch 56680 was contaminated with several analytes, including:

- 0.496 pg/g of 1,2,3,4,6,7,8,9-OCDD, leading to a qualification limit of 2.48 pg/g
- 0.138 pg/g of 1,2,3,7,8-PeCDF, leading to a qualification limit of 0.69 pg/g
- 0.134 pg/g of 2,3,4,7,8-PeCDF, leading to a qualification limit of 0.67 pg/g
- 0.174 pg/g of 1,2,3,6,7,8-HxCDF, leading to a qualification limit of 0.87 pg/g
- 0.288 pg/g of 1,2,3,4,6,7,8-HpCDF, leading to a qualification limit of 1.44 pg/g

The 1,2,3,4,6,7,8-HpCDF results for samples SIB-SC-B35-6-7-07/07/2022, SIB-SC-B35-7-8-07/07/2022, SIB-SC-B35-8-9-07/07/2022, SIB-SC-B35-9-10-07/07/2022, SIB-SC-B35-10-11-07/07/2022, SIB-SC-B35-11-12-07/07/2022, SIB-SC-B35-12-13-07/07/2022, and SIB-SC-B35-14-14.7-07/07/2022 should be qualified U.

Qualification: **The following results were qualified U-MBL; the detect_flag for the affected results is changed from Y to N.**

- **The 1,2,3,7,8-PeCDD results for samples SIB-SC-B31-7-8-07/10/2022 and SIB-SC-B32-8-9-07/25/2022**
- **The 1,2,3,4,6,7,8,9-OCDD results for samples SIB-SC-B31-7-8-07/10/2022, SIB-SC-B31-10-11-07/10/2022, and SIB-SC-B34-0-1-08/22/2022**
- **1,2,3,4,7,8-HxCDF results for samples SIB-SC-B31-7-8-07/10/2022, SIB-SC-B31-8-9-07/10/2022, SIB-SC-B31-9-10-07/10/2022, SIB-SC-B31-11-12-07/10/2022, SIB-SC-B31-13-13.7-07/10/2022, SIB-SC-B32-8-9-07/25/2022, and SIB-SC-B35-0-1-07/07/2022**
- **The 2,3,4,6,7,8-HxCDF result for sample SIB-SC-B31-7-8-07/10/2022**
- **The 1,2,3,4,6,7,8-HpCDF results for samples SIB-SC-B31-6-7-07/10/2022, SIB-SC-B31-7-8-07/10/2022, SIB-SC-B31-8-9-07/10/2022, SIB-SC-B31-9-10-07/10/2022, SIB-SC-B31-10-11-07/10/2022, SIB-SC-B31-11-12-07/10/2022, SIB-SC-B31-12-13-07/10/2022, SIB-SC-B31-13-13.7-07/10/2022, SIB-SC-B32-7-8-07/25/2022, SIB-SC-B34-0-1-08/22/2022, SIB-SC-B34-8-9-08/22/2022, SIB-SC-B34-9-9.7-08/22/2022, and SIB-SC-B35-0-1-07/07/2022**
- **The 1,2,3,4,6,7,8-HpCDF results for samples SIB-SC-B35-6-7-07/07/2022, SIB-SC-B35-7-8-07/07/2022, SIB-SC-B35-8-9-07/07/2022, SIB-SC-B35-9-10-07/07/2022, SIB-SC-B35-10-11-07/07/2022, SIB-SC-B35-11-12-07/07/2022, SIB-SC-B35-11-12-07/07/2022, SIB-SC-B35-14-14.7-07/07/2022 should be qualified U.**

Rinsate Blanks – Equipment rinse blank EB01-07/12/2022 (results reported in SDG 20046) is associated with all sample collected on July 7, 10, and 12, 2022 and equipment blank EB05-07/26/2022 (results reported in SDG 20123) is associated with all samples collected on July 25, 2022. Both equipment blanks were free from contamination.

Equipment rinse blank EB09-08242022 (results reported in SDG 20283) is associated with all samples in this SDG that were collected on 8/22/22. This rinse blank was contaminated with 14 PCDD/PCDFs. The OCDD and 1,2,3,4,6,7,8-HpCDF results are attributable to aqueous preparation batch contamination and are not considered to be the result of cross-contamination in the field; however, this equipment blank was contaminated with 12 other PCDD/PCDF analytes. Due to the differences in preparation factors between aqueous and solid samples, the HGL reviewer determined that a concentration reported as X pg/L in the rinse blank corresponds approximately to a relative soil concentration of X/10 pg/g. The contamination in the equipment blank and the corresponding soil action levels are presented in the following table.

Analyte	Aqueous Concentration (pg/L)	Equivalent Soil Concentration (pg/g)	Soil Qualification Level (pg/g)
1,2,3,7,8-PeCDD	2.36	0.236	1.18
1,2,3,4,7,8-HxCDD	1.58	0.158	0.790
1,2,3,6,7,8-HxCDD	1.58	0.158	0.790
1,2,3,7,8,9-HxCDD	1.84	0.184	0.920
1,2,3,4,6,7,8-HpCDD	1.39	0.139	0.695
1,2,3,7,8-PeCDF	2.78	0.278	1.39
2,3,4,7,8-PeCDF	2.34	0.234	1.17
1,2,3,4,7,8-HxCDF	2.32	0.232	1.16
1,2,3,6,7,8-HxCDF	1.97	0.197	0.985
2,3,4,6,7,8-HxCDF	1.15	0.115	0.575
1,2,3,7,8,9-HxCDF	1.37	0.137	0.685
1,2,3,4,7,8,9-HpCDF	1.37	0.137	0.685

The 1,2,3,7,8,9-HxCDD result for sample SIB-SC-B34-7-8-08/22/2022 and the 1,2,3,6,7,8-HxCDD and 1,2,3,7,8,9-HxCDD results for sample SIB-SC-B34-8-9-08/22/2022 should be qualified U. All other results associated with this equipment rinse blank were non-detections or detected results greater than the qualification level.

Qualification: **The 1,2,3,7,8,9-HxCDD result for sample SIB-SC-B34-7-8-08/22/2022 and the 1,2,3,6,7,8-HxCDD and 1,2,3,7,8,9-HxCDD results for sample SIB-SC-B34-8-9-08/22/2022 are qualified U-EBL.**

Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) – LCS/LCSD %Rs were within QAPP control limits. All RPDs were within QAPP control limits.

Qualification: None required.

Surrogates – All surrogates were within control limits.

Qualification: None required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – An MS/MSD was performed using sample SIB-SC-B31-6-7-07/10/2022. All %Rs and RPDs were within control limits.

Qualification: None required.

Field Duplicate – No field duplicates were submitted with this SDG.

Qualification: None required.

Compound Quantitation – Analyte non-detections were reported as the EDL and qualified U. Analytes detected between the EDL and PQL were reported as J-qualified results by the laboratory. These J qualifiers were retained unless superseded by a more severe qualifier.

If a detected analyte has an ion ratio outside the characteristic ion ratio window, the result is reported as an estimated maximum potential concentration. All results reported as an EMPC (a "K" flag is present in the laboratory qualifier) are qualified J-EMPC unless superseded by a higher priority qualifier.

2,3,7,8-TCDF is not fully resolved on the DB-5MS column; when detected above the PQL on the DB-5MS column, the result was confirmed on a DB-225 column using the instrument ID listed in the case narrative. In cases where two results are reported for 2,3,7,8-TCDF for a sample, the result from the DB-225 column is selected for use and the result from the DB-5MS is qualified DNR-EXC.

Qualification: **The following results are qualified:**

- **All results reported with a laboratory qualifier of only K are qualified J with reason code EMPC. All results reported with a laboratory qualifier of BJK or JK are qualified as simply J to remove non-standard informational qualifiers and to be replaced with a valid final qualifier.**
- **All 2,3,7,8-TCDF results reported from the DB-5MS column that are paired with a 2,3,7,8-TCDF result from the DB-225 column are qualified DNR, reason code EXC; note that the reportable_result field for these results are populated with "Yes" by the laboratory and are changed to "No" for the affected results.**

Qualification Summary Table (results in pg/g):

In addition to the qualifiers assigned below, all detected results <PQL retain the J qualifier assigned by the laboratory. All non-standard qualifiers assigned by the laboratory are removed and are not included as the final qualifier.

Sample	Analyte	Lab Value	Lab Qualifier	Validated Value	Validated Qualifier	Reason Code
SIB-SC-B31-6-7-07/10/2022	1,2,3,7,8-PeCDF	0.134	JK	0.134	J	HTPX, EMPC
	2,3,7,8-TCDF	0.186	JK	0.186	J	HTPX, EMPC
	OCDF	0.482	JK	0.482	J	HTPX, EMPC
SIB-SC-B31-7-8-07/10/2022	1,2,3,4,6,7,8-HpCDF	0.287	BJ	0.287	U	HTPX, MBL
	1,2,3,4,6,7,8-HpCDD	0.631	JK	0.631	J	HTPX, EMPC
	1,2,3,4,7,8-HxCDF	0.145	BJK	0.145	UJ	HTPX, EMPC, MBL
	1,2,3,7,8-PECDD	0.243	BJK	0.243	UJ	HTPX, EMPC, MBL
	2,3,4,6,7,8-HxCDF	0.147	BJK	0.147	UJ	HTPX, EMPC, MBL
	OCDF	0.783	JK	0.783	J	HTPX, EMPC
	OCDD	5.67	BJ	5.67	U	HTPX, MBL
SIB-SC-B31-8-9-07/10/2022	1,2,3,4,6,7,8-HpCDD	1.25	JK	1.25	J	HTPX, EMPC
	1,2,3,4,7,8-HxCDF	0.104	BJ	0.104	U	HTPX, MBL
	2,3,7,8-TCDF	0.287	JK	0.287	J	HTPX, EMPC
SIB-SC-B31-9-10-07/10/2022	1,2,3,4,6,7,8-HpCDF	0.415	BJK	0.415	UJ	HTPX, EMPC, MBL
	1,2,3,4,7,8-HxCDF	0.108	BJ	0.108	U	HTPX, MBL
	2,3,7,8-TCDF	0.228	JK	0.228	J	HTPX, EMPC
SIB-SC-B31-10-11-07/10/2022	1,2,3,4,6,7,8-HpCDF	0.116	BJK	0.116	UJ	HTPX, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	0.271	JK	0.271	J	HTPX, EMPC
	OCDD	2.65	BJ	2.65	U	HTPX, MBL
SIB-SC-B31-11-12-07/10/2022	1,2,3,4,6,7,8-HpCDF	0.245	BJ	0.245	U	HTPX, MBL
	1,2,3,4,7,8-HxCDF	0.0816	BJK	0.0816	UJ	HTPX, EMPC, MBL

Sample	Analyte	Lab Value	Lab Qualifier	Validated Value	Validated Qualifier	Reason Code
SIB-SC-B31-12-13-07/10/2022	1,2,3,4,6,7,8-HpCDF	0.336	BJK	0.336	UJ	HTPX, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	0.96	JK	0.96	J	HTPX, EMPC
SIB-SC-B31-13-13.7-07/10/2022	1,2,3,4,6,7,8-HpCDF	0.293	BJ	0.293	U	MBL
	1,2,3,4,6,7,8-HpCDD	1.32	JK	1.32	J	HTPX, EMPC
	1,2,3,4,7,8-HxCDF	0.149	BJ	0.149	U	HTPX, MBL
SIB-SC-E24-7-8-07/12/2022	1,2,3,4,7,8-HxCDD	1.07	JK	1.07	J	HTPX, EMPC
	1,2,3,6,7,8-HxCDF	2.19	JK	2.19	J	HTPX, EMPC
	1,2,3,7,8,9-HxCDD	2.18	JK	2.18	J	HTPX, EMPC
	1,2,3,7,8-PECDD	0.903	BJK	0.903	J	HTPX, EMPC
	2,3,4,6,7,8-HxCDF	2.27	JK	2.27	J	HTPX, EMPC
	2,3,4,7,8-PeCDF	2.58	JK	2.58	J	HTPX, EMPC
	2,3,7,8-TCDF (initial analysis)	1.74	K	1.74	DNR	EXC
SIB-SC-E24-8-9-07/12/2022	1,2,3,4,7,8-HxCDD	3.14	JK	3.14	J	HTPX, EMPC
	1,2,3,7,8,9-HxCDD	7.84	K	7.84	J	HTPX, EMPC
	1,2,3,7,8-PECDD	2.7	K	2.7	J	HTPX, EMPC
	2,3,7,8-TCDF (initial analysis)	4.05	--	4.05	DNR	EXC
SIB-SC-E24-9-10-07/12/2022	1,2,3,7,8,9-HxCDD	3.55	JK	3.55	J	HTPX, EMPC
	1,2,3,7,8-PECDD	1.23	BJK	1.23	J	HTPX, EMPC
	2,3,7,8-TCDF (initial analysis)	1.25	K	1.25	DNR	EXC
SIB-SC-B32-6-7-07/25/2022	1,2,3,4,6,7,8-HpCDF	0.227	BJK	0.227	UJ	HTPX, EMPC, MBL
SIB-SC-B32-7-8-07/25/2022	1,2,3,4,6,7,8-HpCDF	0.225	BJK	0.225	UJ	HTPX, EMPC, MBL
	2,3,7,8-TCDF	0.171	JK	0.171	J	HTPX, EMPC

Sample	Analyte	Lab Value	Lab Qualifier	Validated Value	Validated Qualifier	Reason Code
SIB-SC-B32-8-9-07/25/2022	1,2,3,4,6,7,8-HpCDF	0.276	BJ	0.276	U	HTPX, MBL
	1,2,3,4,7,8-HxCDF	0.096	BJ	0.096	U	HTPX, MBL
	1,2,3,7,8,9-HxCDD	0.492	JK	0.492	J	HTPX, EMPC
	1,2,3,7,8-PECDD	0.226	BJ	0.226	U	HTPX, MBL
	2,3,4,7,8-PeCDF	0.086	JK	0.086	J	HTPX, EMPC
SIB-SC-B34-0-1-08/22/2022	1,2,3,4,6,7,8-HpCDF	0.176	BJK	0.176	UJ	HTP, EMPC, MBL
	OCDD	5.62	BJ	5.62	U	HTP, MBL
SIB-SC-B34-6-7-08/22/2022	1,2,3,4,6,7,8-HpCDF	0.301	BJK	0.301	UJ	HTP, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	2.05	JK	2.05	J	HTP, EMPC
SIB-SC-B34-7-8-08/22/2022	1,2,3,4,6,7,8-HpCDF	0.17	BJK	0.17	UJ	HTP, EMPC, MBL
	1,2,3,7,8,9-HxCDD	0.26	J	0.26	UJ	HTP, EBL
SIB-SC-B34-8-9-08/22/2022	1,2,3,4,6,7,8-HpCDF	0.259	BJK	0.259	UJ	HTP, EMPC, MBL
	1,2,3,6,7,8-HxCDD	0.212	JK	0.212	UJ	HTPX, EMPC, EBL
	1,2,3,7,8,9-HxCDD	0.202	JK	0.202	UJ	HTPX, EMPC, EBL
SIB-SC-B35-0-1-07/07/2022	1,2,3,4,7,8-HxCDF	0.0995	BJK	0.0995	UJ	HTPX, EMPC, MBL
SIB-SC-B35-6-7-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.308	BJK	0.308	UJ	HTPX, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	1.77	JK	1.77	J	HTPX, EMPC
SIB-SC-B35-7-8-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.315	BJ	0.315	U	HTPX, MBL
	1,2,3,4,6,7,8-HpCDD	2.38	JK	2.38	J	HTPX, EMPC
SIB-SC-B35-8-9-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.292	BJ	0.292	U	HTPX, MBL
SIB-SC-B35-9-10-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.217	BJK	0.217	UJ	HTPX, EMPC, MBL
SIB-SC-B35-10-11-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.165	BJK	0.165	UJ	HTPX, EMPC, MBL
SIB-SC-B35-11-12-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.247	BJK	0.247	UJ	HTPX, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	0.766	JK	0.766	J	HTPX, EMPC

Sample	Analyte	Lab Value	Lab Qualifier	Validated Value	Validated Qualifier	Reason Code
SIB-SC-B35-12-13-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.179	BJK	0.179	UJ	HTPX, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	0.648	JK	0.648	J	HTPX, EMPC
SIB-SC-B35-13-14-07/07/2022	OCDD	3.16	BJK	3.16	J	HTPX, EMPC
SIB-SC-B35-14-14.7-07/07/2022	1,2,3,4,6,7,8-HpCDF	0.205	BJK	0.205	UJ	HTPX, EMPC, MBL
	1,2,3,4,6,7,8-HpCDD	1.15	JK	1.15	J	HTPX, EMPC
All other results (July 2022 samples)	Detections	varies	varies	varies	J	HTPX
	Non-detections	varies	varies	varies	UJ	HTPX
All other results (August 2022 samples)	Detections	varies	varies	varies	J	HTP
	Non-detections	varies	varies	varies	UJ	HTP

Gas Chromatography
PCB Aroclors (EPA Method SW8082A)
Stage 2A Review
Data Quality Control (QC)

Site: PHSS-SIB PDI	SDG #: 24H0046
Laboratory: ARI	Date: 10/02/2024
HydroGeoLogic, Inc. Reviewer: Fern Carter Peer Reviewer: Ken Rapuano (10.2.24)	Project: DT2002

Client Sample ID	Laboratory Sample ID	Analyses	Matrix
SIB-SC-B31-6-7-07/10/2022	24H0046-01	PCB Aroclors	Solid
SIB-SC-B31-7-8-07/10/2022	24H0046-02	PCB Aroclors	Solid
SIB-SC-B31-8-9-07/10/2022	24H0046-03	PCB Aroclors	Solid
SIB-SC-B31-9-10-07/10/2022	24H0046-04	PCB Aroclors	Solid
SIB-SC-B31-10-11-07/10/2022	24H0046-05	PCB Aroclors	Solid
SIB-SC-B31-11-12-07/10/2022	24H0046-06	PCB Aroclors	Solid
SIB-SC-B31-12-13-07/10/2022	24H0046-07	PCB Aroclors	Solid
SIB-SC-B31-13-13.7-07/10/2022	24H0046-08	PCB Aroclors	Solid
SIB-SC-B32-6-7-07/25/2022	24H0046-09	PCB Aroclors	Solid
SIB-SC-B32-7-8-07/25/2022	24H0046-10	PCB Aroclors	Solid
SIB-SC-B32-8-9-07/25/2022	24H0046-11	PCB Aroclors	Solid
SIB-SC-B33-6-7-08/21/2022	24H0046-12	PCB Aroclors	Solid
SIB-SC-B33-7-8-08/21/2022	24H0046-13	PCB Aroclors	Solid
SIB-SC-B33-8-9-08/21/2022	24H0046-14	PCB Aroclors	Solid
SIB-SC-B34-0-1-08/22/2022	24H0046-15	PCB Aroclors	Solid
SIB-SC-B34-6-7-08/22/2022	24H0046-16	PCB Aroclors	Solid
SIB-SC-B34-7-8-08/22/2022	24H0046-17	PCB Aroclors	Solid
SIB-SC-B34-8-9-08/22/2022	24H0046-18	PCB Aroclors	Solid
SIB-SC-B34-9-9.7-08/22/2022	24H0046-19	PCB Aroclors	Solid
SIB-SC-B35-0-1-07/07/2022	24H0046-20	PCB Aroclors	Solid
SIB-SC-B35-6-7-07/07/2022	24H0046-21	PCB Aroclors	Solid
SIB-SC-B35-7-8-07/07/2022	24H0046-22	PCB Aroclors	Solid
SIB-SC-B35-8-9-07/07/2022	24H0046-23	PCB Aroclors	Solid
SIB-SC-B35-9-10-07/07/2022	24H0046-24	PCB Aroclors	Solid
SIB-SC-B35-10-11-07/07/2022	24H0046-25	PCB Aroclors	Solid
SIB-SC-B35-11-12-07/07/2022	24H0046-26	PCB Aroclors	Solid
SIB-SC-B35-12-13-07/07/2022	24H0046-27	PCB Aroclors	Solid
SIB-SC-B35-13-14-07/07/2022	24H0046-28	PCB Aroclors	Solid
SIB-SC-B35-14-14.7-07/07/2022	24H0046-29	PCB Aroclors	Solid
SIB-SC-E24-7-8-07/12/2022	24H0046-30	PCB Aroclors	Solid
SIB-SC-E24-7-8-07/12/2022	24H0046-30RE1	PCB Aroclors (5x dilution)	Solid
SIB-SC-E24-8-9-07/12/2022	24H0046-31	PCB Aroclors	Solid

Client Sample ID	Laboratory Sample ID	Analyses	Matrix
SIB-SC-E24-9-10-07/12/2022	24H0046-32	PCB Aroclors	Solid
SIB-SC-J06-8-9-07/26/2022	24H0046-33	PCB Aroclors	Solid

The following Stage 2A review was performed on the requested analyses. No results were rejected, and analytical completeness is 100%.

Narrative and Completeness Review – The case narrative and data package were checked for completeness. The narrative noted internal standard and ICV/CCV discrepancies. All this has been noted but falls outside of a 2A validation.

Qualification: None required.

Sample Delivery and Condition – All samples arrived intact at the laboratory with temperatures between 0-6°C or frozen and were properly preserved. Lab noted cooler arrived without signed and dated custody seals, and without a temperature blank. No additional qualification required.

Qualification: None required.

Holding Times –The narrative noted that PCB Aroclors samples were frozen to extend holding times; this is in accordance with the QAPP archiving protocols. All Aroclor samples were extracted approximately 12 months beyond the 1-year holding time for frozen Aroclors sample preparation. There is no holding time for PCBs in soil/sediment samples and no qualification is required.

Qualification: None required.

Method Blanks – All method blanks were free from contamination.

Qualification: None required.

Rinsate Blanks – Equipment rinse blanks EB01-07/12/2022, EB05-07/26/2022, and EB08-08/21/2022 (results reported in SDGs 22G0258, 22G0436, and 22H0491) are associated with all sample results reported in this SDG. All rinse blanks were free from contamination.

Qualification: None required.

Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) – All LCS/LCSD %Rs and RPDs were within QAPP control limits. A standard reference material was also reported for each preparation batch; all SRM %Rs met the control limits.

Qualification: None required.

Surrogates – All surrogate %R were within QAPP control limits except for:

- The original analysis of sample SIB-SC-E24-7-8-07/12/2022 showed a high %R for surrogate decachlorobiphenyl on column 1 and a low %R on column 2. All detected results reported for this analysis are reported from column 2 and should be qualified J-SSL. All non-detected results reported for this analysis are reported from column 1 and do not require qualification.
- The 5x diluted analysis of sample SIB-SC-E24-7-8-07/12/2022 had three of the four reported surrogate %Rs below the control limits; no results from this analysis are reported and all results for this analysis should be qualified DNR-EXC.
- Sample SIB-SC-E24-8-9-07/12/2022 had a high %R for surrogate decachlorobiphenyl on column 1 and a low %R for surrogate decachlorobiphenyl on column 2. All detected results reported for

this analysis are reported from column 2 and should be qualified J-SSL. All non-detected results reported for this analysis are reported from column 1 and do not require qualification.

- Sample SIB-SC-J06-8-9-07/26/2022 did not report surrogate values due to intense dilution effects. This sample was analyzed at a 100x dilution.

Qualification: **The following results were adjusted to change the reported_result field from Yes to No: all results from the 5x diluted analysis of sample SIB-SC-E24-7-8-07/12/2022. These results are qualified DNR-EXC.**

The following detected results were qualified J-SSL: Aroclors 1248, 1254, and 1260 for samples SIB-SC-E24-8-9-07/12/2022 and the original analysis of sample SIB-SC-E24-7-8-07/12/2022.

- **Aroclors 1248, 1254, and 1260 for the 5x dilution reanalysis of sample SIB-SC-E24-7-8-07/12/2022 with reason code SSL.**

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – The MS and MSD performed on sample SIB-SC-B31-7-8-07/10/2022 had all %Rs and RPDs in control. The MS and MSD performed on sample SIB-SC-J06-8-9-07/26/2022 had a low %R for Aroclor-1260 in the MS and high %Rs for Aroclor 1016 in the MS and for Aroclors 1016 and 1260 in the MSD; the Aroclor 1260 RPD was above the control limit. The parent sample was analyzed at 100x dilution due to elevated concentrations of multiple Aroclors and matrix effects. The matrix effects confirmed are in the MS/MSD; however, since the parent sample was diluted 100x, these matrix effects should be mitigated and in the judgment of the HGL reviewer, no qualification is required.

The laboratory included a standard reference matrix sample in each preparation batch. All SRM %Rs were in control.

Qualification: None required.

Field Duplicate – A field duplicate was not submitted with the samples in this SDG.

Qualification: None required.

Laboratory Duplicate – A laboratory duplicate was not performed in this SDG.

Qualification: None required.

Compound Quantitation – Analyte results were reported with the associated DL, LOD, and LOQ in the DoD format instead of with the associated MDL and RL. Non-detected results were reported on the hardcopy as <#, where # corresponds to the LOD. The HGL reviewer confirmed that the value associated with non-detected results in the EDD is the MDL, in accordance with the project reporting requirements. Analytes detected between the MDL and LOQ were reported as J-qualified results by the laboratory. These J qualifiers were retained unless superseded by a more severe qualifier.

Qualification: None required.

Qualification Summary Table (concentrations in µg/kg):

Sample	Analyte	Lab Value	Lab Qualifier	Validated Value	Validated Qualifier	Reason Code
SIB-SC-E24-8-9-07/12/2022	Aroclor 1248	101	H, P1	101	J	SSL
	Aroclor 1254	172		172		
	Aroclor 1260	87.9	H	87.9		
SIB-SC-E24-7-8-07/12/2022 (original)	Aroclor 1248	72.0	H, P1	72.0	J	SSL
	Aroclor 1254	152		152		
	Aroclor 1260	82.4		82.4		
SIB-SC-E24-7-8-07/12/2022 (5x dilution)	All results	varies	varies	varies	DNR	EXC

Gas Chromatography Mass Spectrometry
Organochlorine Pesticides (EPA Method 1699M) & PAHs (EPA Method 8270D-SIM)
Stage 2A Review
Data Quality Control (QC)

Site: PHSS-Swan Island Basin	SDG #: K2407810
Laboratory: CFA	Project #: DT2002.03.03.01.01
HydroGeoLogic, Inc. Validator: Zach Barton	Validation Date: 10/1/2024
HGL Peer Reviewer: Ken Rapuano	Peer Review Date: 10.1.24

Client Sample ID	Laboratory Sample ID	Matrix
SIB-SC-E24-7-8-07/12/2022	K2407810-001	Sediment
SIB-SC-E24-8-9-07/12/2022	K2407810-002	Sediment
SIB-SC-E24-9-10-07/12/2022	K2407810-003	Sediment
SIB-SC-J06-8-9-07/26/2022	K2407810-004	Sediment

The following Stage 2A review was performed on the requested analyses. No results were rejected, and analytical completeness is 100%.

Narrative and Completeness Review – The case narrative and data package were checked for completeness. No completeness issues were noted.

Qualification: None required.

Sample Delivery and Condition – Sample delivery and condition were checked; no issues were found.

Qualification: None required.

Holding Times – All samples were prepared outside their acceptable holding times; however, this is acceptable for pesticides and PAHs. Due to pesticides and PAHs potentially not being environmentally stable over an extended period of time, all detects should be qualified J and all non-detects should be qualified UJ.

Qualification: **All detects should be qualified J, and all non-detects should be qualified UJ.**

Method Blanks – The method blank for Method 1699M was free from contamination and no qualification is required.

The method blank for Method 8270D had 0.35 ug/kg benz(a)anthracene, 0.49 ug/kg naphthalene, and 0.36 ug/kg pyrene present leading to qualification limits of 1.75 ug/kg, 2.45 ug/kg, and 1.8 ug/kg, respectively. All associated results are detections >5x the qualification limits and no qualification of sample results is required.

Qualification: None required.

Rinsate Blanks – There was not a rinsate blank associated with this SDG. No qualification required.

Qualification: None required.

Laboratory Control Sample (LCS) – LCS %Rs for Method 1699M were within QAPP control limits, except for 2,4'-DDT which was at 124% and 4,4'-DDT which was at 144%. No qualification is required since the sample results did not yield any detections for these two analytes.

All LCS %Rs for Method 8270D were within QAPP control limits. No qualification is required.

Qualification: None required.

Surrogates – All surrogates for Method 1699M were within control limits, except for the following:

- Endrin-13C12 which was at 156% for sample SIB-SC-E24-8-9-07/12/2022.
- Endrin-13C12 which was at 172% for sample SIB-SC-E24-9-10-07/12/2022.
- 4,4'-DDT-d4 which was at 1334% and S_Endrin-13C12 which was at 165% for sample SIB-SC-J06-8-9-07/26/2022.

All results associated with high pesticide surrogate results are non-detections. All surrogates for Method 8270D were within control limits. No qualification is required for either method.

Qualification: None required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) – An MS/MSD was performed for Method 1699M using sample SIB-SC-E24-7-8-07/12/2022. All %R and RPD values were within control limits except for the following:

- Aldrin %R for the MS was 892% and the %R for the MSD was 723%
- 2,4'-DDD %R for the MS was 137% and the %R for the MSD was 162%
- 4,4'-DDD %R for the MSD was 163%
- 2,4'-DDT %R for the MSD was 37% and the RPD was 75%
- 4,4'-DDT %R for the MSD was 0% and the RPD was not calculated
- cis-Nonachlor %R for the MS was 45% and the %R for the MSD was 49%
- Oxychlordane %R for the MS and MSD was 0% and the RPD was not calculated.

The following qualifications should be applied:

- 4,4'-DDD result for sample SIB-SC-E24-7-8-07/12/2022 should be qualified J.
- 2,4'-DDT result for sample SIB-SC-E24-7-8-07/12/2022 should be qualified UJ.
- 4,4'-DDT result for sample SIB-SC-E24-7-8-07/12/2022 should be qualified UJ; although the MSD %R was 0%, the MS %R was in control.
- cis-Nonachlor results for sample SIB-SC-E24-7-8-07/12/2022 should be qualified UJ.
- Oxychlordane results for sample SIB-SC-E24-7-8-07/12/2022 should be qualified R.

An MS/MSD was performed for Method 8270D using sample SIB-SC-E24-7-8-07/12/2022. All %R and RPD values are within control limits, except the following:

- 2-methylnapthalene %R for the MS was 102%

The following qualifications should be applied:

- 2-methylnaphthalene result for sample SIB-SC-E24-7-8-07/12/2022 should be qualified J.

- ***Qualification:*** **The 4,4'-DDD results for sample SIB-SC-E24-7-8-07/12/2022 is qualified J-MSH. The 2,4'-DDT and cis-nonachlor results for sample SIB-SC-E24-7-8-07/12/2022 are qualified UJ-MSL. The 4,4'-DDT result for sample SIB-SC-E24-7-8-07/12/2022 is qualified UJ, reason code MSLX. The oxychlordane result for sample SIB-SC-E24-7-8-07/12/2022 is qualified R-MSLX. The 2-methylnaphthalene result for sample SIB-SC-E24-7-8-07/12/2022 is qualified J-MSH.**

Field Duplicate – No field duplicates were submitted with this SDG.

Qualification: None required.

Compound Quantitation – Analyte non-detections were reported as ND and qualified U. Analytes detected between the MDL and MRL were reported as J-qualified results by the laboratory. These J qualifiers were retained unless superseded by a more severe qualifier.

Qualification: None Required.

Qualification Summary Table (results in ug/kg):

In addition to the qualifiers assigned below, all detected results <MRL retain the J qualifier assigned by the laboratory. All non-standard qualifiers assigned by the laboratory are removed and are not included as the final qualifier.

Sample	Analyte	Lab Value	Lab Qualifier	Validated Value	Validated Qualifier	Reason Code
SIB-SC-E24-7-8-07/12/2022	4,4'-DDD	6.1	--	6.1	J	MSH, HTP
	2,4'-DDT	ND	U	ND	UJ	MSL, HTP
	4,4'-DDT	ND	U	ND	UJ	MSLX, HTP
	cis-Nonachlor	ND	U	ND	UJ	MSL, HTP
	Oxychlordane	ND	U	ND	R	MSLX, HTP
	2-Methylnaphthalene	93	--	93	J	MSH, HTP
All other detected results	Varies	Varies	Varies	Varies	J	HTP
All other non-detected results	Varies	ND	U	ND	UJ	HTP

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APPENDIX C

HABITAT IMPACT EVALUATION TECHNICAL MEMORANDUM

EARLIER SUBMITTAL TO EPA (SEPTEMBER 17, 2025)

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HABITAT IMPACT EVALUATION TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
REMEDIAL DESIGN SERVICES, SWAN ISLAND BASIN PROJECT AREA
CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

1.0 INTRODUCTION AND PURPOSE

This Habitat Impact Evaluation (HIE) assesses the net effect the Remedial Action (RA) would have on habitat conditions within the Swan Island Basin (SIB) Project Area. This HIE provides the basis for the U.S. Environmental Protection Agency (EPA) to determine whether the RA would be "self-mitigating" with respect to impacts to Waters of the U.S. and associated ecological functions within the SIB Project Area.

The SIB Project Area is within the Portland Harbor Superfund Site (PHSS) in Portland, Multnomah County, Oregon. This HIE evaluates habitat impacts that would result from the RA for the SIB Project Area to support EPA's determination whether the RA will require compensatory mitigation to address unavoidable impacts to habitats. The habitat-related requirements specified in the PHSS Record of Decision (ROD) (EPA, 2017) and the Administrative Settlement Agreement and Order on Consent (ASAOC) (EPA, 2021a) are incorporated into the Pre-Final 90% RD. The ROD anticipates that application of those requirements should result in an RA that yields a net improvement in overall habitat conditions compared to existing pre-RA baseline habitat conditions.

The purpose of this HIE is to complete a quantitative analysis of habitat impacts to either confirm the project will be self-mitigating or to determine that compensatory mitigation is needed and provide a basis for determining the amount and type of mitigation required. This HIE was performed as described in the Remedial Design Work Plan (RDWP), which was approved by EPA on February 28, 2025. The baseline habitat conditions data supporting this HIE were reported and evaluated in the Pre-Design Investigation (PDI) Evaluation Report (ER) (HGL, 2024). The anticipated post-RA habitat conditions are based on the final surface conditions specified in the Pre-Final 90% RD.

This HIE is conducted following the Remedial Design Guidelines and Considerations (RDGC) (EPA, 2021b) to demonstrate that the RA as envisioned in the Pre-Final 90% Remedial Design (RD) will comply with action-specific or location-specific applicable or relevant and appropriate requirements (ARARs) pertaining to habitat and ecological functions within the SIB Project Area. This memorandum presents the evaluation of the net effect of the RA on habitat conditions by comparing the anticipated post-RA habitat conditions to pre-RA baseline habitat conditions within the SIB Project Area. Post-RA habitat conditions used in this evaluation reflect the application of required habitat avoidance and minimization measures outlined in the 2021 Programmatic Biological Assessment (BA) (EPA, 2021c), the 2025 Programmatic Biological Opinion (BO) (NMFS, 2025), the RDGC (EPA, 2021b), and the PHSS ROD (EPA, 2017).

1.1 SITE DESCRIPTION AND HISTORY

The SIB Project Area is the active cleanup area within the PHSS that lies between approximately river mile (RM) 8.1 and RM 9.2 on the northeast side of the Willamette River. The SIB Project Area is approximately 1.1 miles in length and 139 acres in size and includes riverbanks from the top of the bank to the river. The SIB Project Area is adjacent to a federal navigation channel within the main channel of the Willamette River. The navigation channel has an authorized maintained depth of -45 feet (ft) Columbia River Datum (CRD), extending from the confluence of the Lower Willamette River with the Columbia River to RM 11.6. The U.S. Army Corps of Engineers (USACE) maintains the navigation channel, which does not extend into SIB.

The SIB Project Area is bounded by the uplands of Swan Island and Mocks Bottom to the southwest and northeast, respectively. Land use within and adjacent to the SIB Project Area includes light industrial, heavy industrial, and commercial. SIB is an active navigable industrial waterway, and the shoreline hosts many structures supporting light and heavy industrial activities. Except for slopes along the riverbanks, the basin upland topography is generally flat, with elevations varying between +34 ft and +44 ft North American Vertical Datum of 1988 (NAVD88)[1].

The Portland Harbor reach of the Willamette River, including the SIB Project Area, has been dredged, redirected, straightened, filled, and deepened. Most of the riverbank has been filled, stabilized, and engineered for industrial-type operations with riprap, bulkheads, and overwater piers and docks.

1.2 HABITAT EQUIVALENCY ANALYSIS METHODS AND APPROACH

The RDGC, in Appendix B Topic 9 – Habitat Mitigation (EPA, 2021b), presents EPA guidance and framework on how to apply a habitat equivalency analysis (HEA) model approach to perform a quantitative comparison of post-RA habitat conditions to pre-RA baseline habitat conditions. The National Marine Fisheries Service (NMFS) previously prepared a HEA model for the PHSS in cooperation with the Portland Harbor Trustee Council (EPA, 2021b). EPA distributed an updated HEA model template spreadsheet to the SIB RD Team by email on August 14, 2025. The updated HEA model incorporated the time component of the HEA to ensure that the scoring results consider the temporary functional loss of habitats during RA implementation, and the time required for post-RA habitat conditions to reach full ecological function (0 to 5 years for the habitat types anticipated at the SIB Project Area). The quantitative HEA is the tool EPA uses to evaluate if the RA is "self-mitigating" by determining if RA implementation would result in a positive or negative HEA score reported in "Discounted Service Acre Years" (DSAYs). A positive total DSAY score would indicate that the RA is "self-mitigating," while a negative total DSAY score would indicate that additional compensatory mitigation is needed to address the net impacts of RA implementation. The quantity of additional compensatory mitigation would be determined by the ecological deficit calculated by the HEA model.

[1] 5.28 ft NAVD88 = 0 ft CRD. CRD is used as the nautical chart datum for the Lower Willamette River. CRD is a reference plane that the U.S. Army Corps of Engineers (USACE) established in 1912 by observing low water elevations at various points along the Columbia and Willamette rivers (USACE, 1966). Consequently, CRD is not a fixed/level datum but slopes upward as one moves upstream. River users can obtain the depth on a chart and apply tide or river-level gauge readings, relative to CRD, to compute actual water depth. Low water values are used for navigation charting to provide conservative depth values in the event accurate tide data is not available to the river user.

The HEA model is a spreadsheet-based habitat analysis tool designed to support an ecological valuation of diverse habitat types in various states of ecological health or degradation. The model functions by tabulating the acreage of different habitat types, assigning a habitat score to each unit, and summing the products of collective areas and scores. In addition, the effects of time are incorporated into the HEA calculation by considering the duration of temporary impacts incurred during RA implementation and the time required for post-RA habitat conditions to reach full ecological function. This tabulation and calculation are performed for both pre-RA baseline conditions and post-RA habitat conditions based on the final surface conditions shown in the Pre-Final 90% RD. Habitat scores are affected by certain physical attributes of the habitat units such as vegetation conditions, slope, sediment surface composition, presence of riprap or other armoring, and presence of pilings or structures. Details of the scoring system are shown on Table 1-1, which is based on Table B9-1 in Appendix B of the RDGC (EPA, 2021b) and the HEA model template spreadsheet distributed by EPA on August 14, 2025. The HEA model reports overall habitat values in units of DSAYs, which incorporate consideration of the ecological services provided by specific habitat types, the acreage of habitat that provides those services, and the time-variable habitat function scores as they are affected by temporary impacts during RA construction and the time required for post-RA habitats to reach full ecological function. Reported HEA scores are based on the individual line-item scores achieved when the habitat reaches full function, which is zero to five years for all applicable habitat improvements within the SIB Project Area. The HEA model identifies four habitat types based on elevation ranges with respect to defined water levels in the Willamette River.

- **Riparian Habitat Zone** – The riparian habitat zone includes the riverbanks from ordinary high water (OHW) up to the top of bank (SIB Project Area boundary). OHW is +20.1 ft NAVD88 as defined in the *Guidance for Riverbank Characterizations and Evaluations at the Portland Harbor Superfund Site* (EPA, 2025).
- **Active Channel Margin** – The active channel margin (ACM) habitat zone includes the zone where the edge of water meets the riverbanks. The ACM is defined as the elevation zone between ordinary low water (OLW) and OHW. OLW is defined as +7.3 ft NAVD88[2].
- **Main Channel, Shallow Water** – The main channel shallow water zone is defined as the shoreline between water depths of 0 ft (+7.3 ft NAVD88) and 20 ft (-12.7 ft NAVD88) when the river stage is at OLW[3].
- **Main Channel, Deep Water** – The main channel deep water zone is located below shallow water (below -12.7 ft NAVD88).

Each of these habitat zones is subdivided into specific categories for scoring as shown on Table 1-1.

[2] In earlier evaluations at PHSS, OLW was defined as +5.1 ft NAVD88 and OHW as +20.075 ft NAVD88 (Anchor QEA, 2012). However, in the HEA, the MLW elevation of +7.3 ft NAVD88, as measured at the U.S. Geological Survey 14211720, Morrison Street Bridge gage, is used as an approximation of OLW for SIB.

[3] The ROD uses the NMFS definition of the shallow water habitat zone as above -15 feet CRD (EPA, 2017). The most recent HEA model workbook distributed by EPA on August 14, 2025, defines the shallow water zone as an area of water depth below the OLW elevation. As such, the HEA uses the following elevations as the extent of the shallow water zone: +7.3 ft NAVD88 for water depth of 0 ft and -12.7 ft NAVD88 for water dept of 20 ft, when the river stage is at OLW.

The results of the baseline habitat condition survey included in the PDI ER (HGL, 2024) informed the development of inputs to the HEA for pre-RA baseline habitat conditions. Those model inputs include the acreage of habitat units within the SIB Project Area, and HEA habitat values for each of those habitat units developed using Table 1-1.

Inputs to the HEA model for post-RA habitat conditions were developed based on the Pre-Final 90% RD finished surface conditions superimposed on the map of habitat units. In the same approach used for the pre-RA baseline habitat conditions scenario, the HEA habitat values for post-RA habitat units were developed using Table 1-1.

The HEA model was used to evaluate habitat impacts and improvements as envisioned in the Pre-Final 90% RD. This HEA will be updated as part of the Final 100% RD milestone.

2.0 BASELINE HABITAT CONDITIONS

The habitat condition survey conducted during the PDI (PDI ER, Appendix J [HGL, 2024]) established the baseline existing habitat conditions within the SIB Project Area. Baseline habitat conditions were used to determine pre-RA baseline habitat scores in the HEA model analysis. The habitat areas within the SIB Project Area include four components that align with the vertical habitat types defined in the HEA model:

- riparian areas,
- ACM,
- shallow water habitat, and
- deep water habitat.

These components are defined and discussed below. Riparian areas and ACM are discussed together as part of baseline riverbank habitat conditions. Shallow water and deep water habitats are discussed together as baseline aquatic habitat conditions.

2.1 BASELINE RIVERBANK HABITAT CONDITIONS

For purposes of this analysis, riverbanks are characterized by two habitat zones comprised of riparian areas and the ACM. Riparian areas in the Lower Willamette ecosystem are typically dominated by a mix of black cottonwood and alder/conifer forest, while plant communities in the ACM are typically comprised of facultative scrub/shrub species such as Pacific willow. Riverbanks play a critical role in supporting the life history strategies of many native species of the Pacific Northwest. Influences of the riverbank region, which see diurnal, tidal, and seasonal influences, play an essential role in the viability, functionality, and availability of habitat for an array of native species. EPA has emphasized the importance of incorporating riparian and in-river improvements to support these essential functions in the RDGC, Section 4.

> "*For riverbanks, the planning process involves early coordination with the natural resource service agencies, National Marine Fisheries Service, and U.S. Fish and Wildlife Service to ensure incorporation of riparian and in-river habitat improvements into the riverbank remedial design process. The coordination process is described in PHSS ROD Section 15.2.2 as part of the*

requirements for compliance with location-specific ARARs during the implementation of cleanups. Failure to consult with the agencies early in the remedial design process could result in design changes that could delay a remediation project." (EPA, 2021b)

2.1.1 Riparian Habitat Conditions

The riparian area comprises all upland areas above OHW (+20.1 NAVD88 [+14.8 ft CRD]), up to 400 linear ft upland of the ACM. The SIB Project Area boundary extends only to the top of the riverbank, and riparian areas landward of that boundary are outside the scope of the RD. Riparian habitat provides allochthonous biotic inputs to the aquatic food web, a sediment and contaminant runoff filter, floodwater storage, slope stability, and erosion control.

The following are descriptions of project area-specific riparian area types, the extent, and general conditions (vegetation, slope, armoring, and presence of buildings, structures, and impervious surfaces) of the SIB Project Area derived from the PDI ER (HGL, 2024).

2.1.1.1 Riparian Types

Riparian areas within the SIB Project Area are bound by development consisting of commercial and industrial uses ranging between 0 and 100 ft above OHW. The areas between impervious surfaces and structures and OHW have been divided into the following types that align with the habitats and habitat characteristics shown on Table 1-1:

- Naturally vegetated forest, less than 400 ft from active channel margin – 1.11 acres
- Invasive species (e.g., Himalayan blackberry) – 2.08 acres
- Vegetated riprap – 4.30 acres
- Unvegetated/paved/buildings/riprap – 1.62 acres

Much of the tip of Swan Island, at the mouth of SIB, is formed with a sheet pile bulkhead and an overlying pile-supported wharf. The area beneath the wharf is not considered a riparian area for the purposes of the RD. The areas above OHW beneath the wharf consist of steep slopes shored by sheet pile walls.

2.1.1.2 Riparian Extent

Riparian zone habitats occupy 9.10 acres within the SIB Project Area. As described above, most of the riparian area footprint comprises commercially/industrially developed areas. The general extents of riparian habitat reported here were determined based on field estimates and GIS mapping reported in the baseline habitat survey included in the Habitat Conditions Survey Report (Appendix J of the PDI ER; HGL, 2024) and updated by the GIS spatial analysis applied to the Pre-Final 90% RD to develop inputs to the HEA model.

2.1.1.3 General Conditions

General riparian condition is poor through much of the SIB Project Area. Some stands of mature cottonwood exist, but are mostly present in small, scattered patches, offering little continuity. There is

one exception with the riparian forest located on the Mocks Bottom side of the SIB Project Area (Transects 070 to 079), near the head of the basin, as documented in the PDI ER (HGL, 2024)[4], in which there is a more extensive vegetated buffer on shallow slopes with an overstory consisting of mature native trees (black cottonwood, red alder, and Oregon white oak). In contrast to the overstory, the understory at this location is dominated by invasive species (Himalayan blackberry and English ivy). There are examples of some riparian improvement efforts in locations. However, invasive species are prevalent throughout the riparian zone within the SIB Project Area.

Surface substrate conditions are generally sandy loams with some gravels, largely protected by quarry spall and/or riprap armoring. In the more quiescent inner basin locations these sandy loams are largely unprotected.

2.1.2 Active Channel Margin

The ACM is the portion of the river's edge from the OHW mark to OLW (NOAA, 2017). Figure 3 of *Guidance for River Bank Characterizations and Evaluations at the Portland Harbor Superfund Site* (EPA, 2025) presents riverbank conceptual diagrams as cross sections and includes datum for OHW (+20.1 ft NAVD88), mean high water (MHW; +13.0 ft NAVD88), and mean low water (MLW) (+7.3 ft NAVD88).

The ACM provides canopy cover that serves as a shelter for wildlife (and aquatic species during extended high-water events), provides shade that regulates temperature in the shallow water areas, and contributes beneficial large woody debris (LWD) to the shoreline. The habitat in this area can be valuable to juvenile salmon by providing refuge from predators and a location to escape strong currents. Young-of-the-year (less than one year in age) Chinook move in association with the shoreline edge, and persistent vegetation can be significant to their survival. For the ACM to be considered vegetated, it should contain a facultative assemblage of water-tolerant trees and shrubs. Structural complexity in this zone, such as undulating or irregularly shaped shoreline interlaced with LWD and shade-protected topographic diversity, is desirable, both from a geomorphic perspective (sustained undulations create flow complexities) and from an aspect of providing locations for fish to escape from strong currents. The ACM is a preferred habitat for several key predator-prey relationships (NOAA, 2017). Ecological processes within the ACM are driven by tidal flux and riverine hydrology. Remedial technology assignments for the ACM designate and integrate into remedies for riverbank-contaminated sediments with special consideration to the ACM.

The following descriptions provide an overview of ACM conditions from the Habitat Conditions Survey Report (Appendix J of the PDI ER; HGL, 2024).

2.1.2.1 Characterization of the ACM

The ACM along SIB is divided into the following types that align with the "Habitat Characteristics" column in Table 1-1 baseline conditions in the column "Pre-RA Area (acres)":

- Sloped (<5H:1V or 11°), unarmored and vegetated (native) – 0.0 acres

[4] Riverbank transects are shown on Figure 2-1 "Habitat Conditions Survey Transects" in PDI ER Appendix J Habitat Conditions Survey Report.

- Sloped (<5H:1V or 11°), unarmored and vegetated (invasive) – 0.96 acres
- Sloped (>5H:1V or 11°), unarmored and vegetated (native) – 0.01 acres
- Sloped (>5H:1V or 11°), unarmored and vegetated (invasive) – 0.87 acres
- Sloped (<5H:1V), unarmored and unvegetated – 2.65 acres
- Sloped (>5H:1V), unarmored and unvegetated – 1.05 acres
- Riprapped – 5.60 acres
- Suspended structures over channel margins (e.g., docks) – 0.45 acres
- Floating structures (e.g., docks) – 0.01 acres

Suspended structures within the SIB ACM are summarized in Table 2-1. In addition to the suspended structures, much of the tip of Swan Island, at the mouth of SIB, is formed with a sheet pile bulkhead and an overlying pile-supported wharf, and the sheet pile and wooden retaining walls beneath the wharf structure extend into the ACM. The Quay Wall, at the northeastern tip of Swan Island, extends to OLW and is generally lacking an ACM.

2.1.2.2 Extent of the ACM

The ACM types in the SIB Project Area encompass 11.61 acres as modeled in the HEA. The acreages were estimated using field observations and GIS mapping reported in the baseline habitat survey included in the Habitat Conditions Survey Report (Appendix J of the PDI ER; HGL, 2024) and updated by the GIS spatial analysis applied to the Pre-Final 90% RD to develop inputs to the HEA model.

2.1.2.3 General Conditions

The ACM is highly variable throughout the SIB Project Area. It is generally described as dramatically simplified by heavy rock armoring and sparse vegetation when closely associated with industrial activity and moorage. Overwater structures obscure some of the most degraded channel margins. The steep, armored ACM slopes cover over 5 acres of the SIB shoreline.

Conversely, approximately half of the ACM (5.54 acres) can be described as relatively unarmored and in a more “natural” condition, albeit lacking structural complexity in wood, vegetation, and topography. Underlying substrate current conditions along the Swan Island shoreline are predominantly sandy loam, while underlying substrates along the Mocks Bottom shoreline are predominantly silt loam. The beach area at the head of the basin is composed of sand. Baseline and post-RA substrate conditions in the ACM are accounted in the HEA with acreage values reported in Table 1-1. Surficial substrates within the unarmored areas of the ACM are composed of gravel and sand in the lower elevations transitioning to riverbank soils in the upper elevations of the ACM.

2.2 BASELINE IN-WATER AQUATIC HABITAT CONDITIONS

In-water shoreline habitat units for this analysis comprise two principal physical units:

- Shallow Water Habitats
- Deep Water Habitats

In addition, two in-water habitat ecohydrological influences are considered:

- Water Quality
- Habitat Access

2.2.1 Shallow Water Habitat

Shallow water habitats are considered important for juvenile salmonids, because they provide food resources (benthic macroinvertebrates, zooplankton, and emergent insects) and refuge from predators in the main river. Although juvenile outmigrants may occupy the entire river, sub-yearling salmonids are expected to migrate close to the water surface and near the shoreline during rearing (within a few meters of the shoreline at water depths of less than 1 meter) (NMFS, 2005). Reducing current often associated with shallow water habitat provides an additional benefit to juvenile fish by significantly reducing their energy requirements. Because these small juveniles have relatively weak swimming capabilities, feeding is most effective in areas where current velocities are slow. Water velocities of 30 centimeters per second (cm/s) or less are considered best for optimal foraging opportunities (Bottom et al., 2001).

Shallow water habitats also play an important role in providing refugia habitats. Refugia habitats provide spatial and temporal resistance and resilience to aquatic-dependent organisms by sheltering them from impacts of natural and anthropogenic disturbances and offering opportunities for predator avoidance. In SIB, shallow water areas occur along the riverbanks and at the head of the basin, areas outside of the limits of maintenance dredging.

2.2.1.1 Extent

Shallow water areas encompass 22.79 acres of SIB based on data developed from a unified elevation model that integrated multiple data sources including light detection and ranging surveys (HGL, 2024) and refined for the 90% RD. While shallow water habitat areas are not static but change with the rise and fall of river height (flow) and tidal period, for this habitat evaluation, the shallow water area in SIB includes the area from the ACM lower edge (OLW [+7.3 ft NAVD88]) to a maximum depth of 20 ft below OLW (-12.7 ft NAVD88 [Figures 1-1a through 1-1f]).

2.2.1.2 General Conditions

Due to the industrial use of the SIB waterway and shoreline, shallow water habitat is extremely limited on the tip and most of the northeastern side of Swan Island. The most prevalent shallow water habitat in SIB occurs at the head of the basin, outside of the areas within the basin that are used for activities related to commercial vessels. Shallow water habitat also occurs along much of the Mocks Bottom shoreline of SIB in various conditions depending on the level of adjacent industrial development and ongoing activity. Baseline conditions for surficial substrates present in the shallow water habitat areas are predominantly natural substrates composed of gravel, sand, and silt. Some shallow water areas have derelict piling, and debris is present on the surface. Table 1-1 shows the changes in shallow water substate conditions that will result from the RA. Post RA shallow water substrates will include beach mix where slopes are flatter than 3H:1V (11.43 acres) and riprap on submerged slopes steeper than 3H:1V (9.30 acres). These areas and substrate types are incorporated into the HEA model.

2.2.2 Deep water Habitat

The way fish use deep water habitats may include rearing and migration with juvenile salmonids primarily foraging on zooplankton. Although ocean-type salmonids (i.e. sub yearling Chinook) may temporarily occupy these habitats, they are believed to prefer shallow-water habitat for rearing and migration. Deep water habitat is used primarily by those life phases that are more pelagic transitional, stream-type (yearling), and juveniles and adult salmonids from all species.

The deep water area includes the area of SIB with depths greater than 20 ft below OLW (HGL, 2024). This area's location is not static but changes with river height (flow) rise, fall, and tidal period. In SIB, deep water occurs in the basin interior and around dry docks and other dock areas where maintenance dredging occurs.

2.2.2.1 Extent

Deep water areas occupy 95.66 acres of the SIB Project Area as reported on Table 1-1. The reported extent of the deep water areas is based on defining deep water as areas of SIB with depths greater than 20 ft below OLW. While this definition yields a static deep water area of 95.66 acres for the HEA model, actual deep water acreage will vary based on river stage fluctuations.

2.2.2.2 General Condition

Much of the SIB is maintained as deep water to support the industrial uses of the waterway. Sediment evaluations conducted as part of the PDI (HGL, 2024), have determined that SIB sediments are predominantly soft mud with a relatively low bulk density, even at depth. Suspended structures, pilings, and dolphins are prevalent in deep water areas closer to the shoreline, where needed to support industrial activities or remnants of past industrial uses.

2.3 HABITAT SCORES FOR PRE-REMEDIAL ACTION BASELINE CONDITIONS

Habitat scores were assigned to the habitat types defined for the HEA model by NMFS and published in the RDGC, Appendix B, Table B-9. The areas for each habitat type were determined using spatial data (e.g., topography, bathymetry) in the Pre-Final 90% RD drawing set. The scores for each habitat type were determined using data published in the PDI ER pertaining to baseline habitat conditions, the riverbank conditions survey, and surface sediment data.

Table 1-1 shows the resulting habitat scores for pre-RA baseline conditions. The relatively low habitat scores reflect the generally degraded condition of most habitat within the SIB Project Area. Specific habitat degradation that strongly affected the scores includes the following:

- extensive and widespread invasive plant species within the riparian areas and ACM;
- widespread riprap and other forms of bank armoring on the riverbanks and in the ACM;
- derelict piling within the ACM and shallow water zones;
- shoreline and overwater structures.

Figures 2-1a through 2-1f illustrate the habitat areas and their baseline (pre-RA) scores within the SIB Project Area. Areas for each habitat type are reported on Table 1-1.

Figure 2-2 presents an infographic overview of substrates considered in the HEA. For the purpose of the HEA, rounded gravel "beach mix" and sand/silt placed as finished surface materials are considered natural substrates per EPA guidance (EPA, 2021b). Angular rock (e.g., riprap) placed as slope revetment, erosion protection layer, or other surface stabilization is considered an artificial substrate, and areas with those surface treatments are assigned a zero habitat score.

3.0 IMPACT ANALYSIS

The impact analysis applies the HEA model to compare post-RA habitat conditions to pre-RA baseline habitat conditions within the SIB Project Area. Post-RA habitat conditions used in this analysis are based on the final surface conditions specified in the Pre-Final 90% RD. Key considerations for determining HEA scores for post-RA habitat conditions include the following.

- **Vegetation conditions** – higher scores are assigned to areas with native vegetation rather than invasive species or unvegetated areas.
- **Slopes within the ACM** – higher scores are assigned to areas within the ACM that are sloped less than 5H:1V compared to slopes steeper than 5H:1V.
- **Riprap/Armor** – the presence of riprap or other bank armoring yields a score of 0.
- **Substrate** – natural material surface sediments yield a better score compared to sediments that are armored (e.g., riprapped) or adjacent to shorelines that are armored or protected by a seawall. For the purpose of the HEA, EPA considers beach mix and clean sand to be natural substrates. Riprap and armoring are not natural substrates.
- **Structures** – the presence of shoreline and overwater structures decreases the habitat score.
- **Piling** – the presence of piling results in a 50 percent reduction in the habitat score in affected areas.

The HEA incorporates the effects of time into the habitat scores related to impacts and habitat improvements. Time is incorporated and considered in the following ways:

- Duration of temporary construction impacts;
- Effects of ecological benefits and impacts in perpetuity; and
- Time required after RA completion for post-RA habitats to reach full ecological function.

In the Pre-Final 90% RD, the estimated RA construction duration is 9 years, with all in-water work adhering to in-water work periods (i.e., "fish windows") applicable within the Lower Willamette River. Temporary impacts are reduced through construction sequencing that limits active construction to discrete portions of the SIB Project Area. Construction duration is among the largest drivers of habitat impacts calculated by the HEA. The SIB RD Team plans to discuss potential ways to minimize impacts through adjusting the construction schedule. In the context of impact avoidance and minimization, potential adjustments to in-water work periods should be considered as a way of shortening the construction duration and associated ecological impacts.

The following sections discuss each of the habitat zones and the attributes considered in assigning habitat scores for the post-RA habitat conditions.

3.1 RIVERBANK ACTIONS AND IMPACTS

Riverbanks for purposes of this analysis include the riparian area and the ACM extending from the top of the riverbank to the lower ACM (+7.3 ft NAVD88). As reported in the PDI ER (HGL, 2024), soils within almost the entirety of the riverbanks and ACM within the SIB Project Area have concentrations of ROD contaminants of concern that exceed cleanup levels and many exceeding remedial action levels. Therefore, the majority of the riverbanks and ACM will require active remediation to meet Remedial Action Objectives (RAOs) across the entirety of the SIB Project Area. Remediation of the riverbanks and ACM will require removal of most existing vegetation, removal of existing bank armoring, removal of contaminated soil, and placement of clean material as a soil cover or cap depending on contaminant concentrations. Reapplication of heavy bank armoring (including riprap) is limited to locations that cannot be stabilized by bio-engineered design (i.e., bank surface stabilization using living native plant material, soil, and natural fiber erosion mats integrated to support plant establishment and long-term stability provided by the native plant community).

3.1.1 Riparian Area

This HIE evaluates impacts to the riparian area defined as the riverbanks located between the top of the riverbank and OHW (+20.1 ft NAVD88). Existing habitat conditions within the riparian area are dominated by invasive species plants and ubiquitous riprap or other forms of armoring and debris. Riverbank slopes above elevation +8 NAVD88 (which includes a portion of the ACM) will be planted with native vegetation as a final surface condition in locations where armoring is not required to resist wave erosion, protect infrastructure, or achieve geotechnical stability. The conversion of existing degraded riparian areas to native plant communities without riprap or armoring significantly improves the post-RA habitat conditions scores assigned to those riparian areas.

3.1.2 Active Channel Margin

The Pre-Final 90% RD specifies placement of an engineered cap within much of the ACM. In accordance with habitat requirements stipulated in the ROD and detailed in the RDGC, final surfaces for caps within habitat zones will be composed of a “beach mix” natural substrate composed of gravel and finer material. Compliance with seismic design requirements determined that rock revetment (angular rock) was required to ensure stability of slopes steeper than 3H:1V. The impacts of rock revetment placement in the ACM are accounted in the HEA model. Where beach mix is placed, the natural substrate will improve habitat conditions compared to existing portions of the ACM that contain riprap, other armoring, debris, or piling. Additionally, the proposed final grades within the ACM maximize the total area with slopes equal to or flatter than 5H:1V, which also improves the habitat scores assigned to those areas. Riverbank slopes above elevation +8 ft NAVD88 will be planted with native vegetation as a final surface condition in locations where armoring is not required to resist wave erosion, protect infrastructure, or achieve geotechnical and seismic stability.

3.2 AQUATIC IMPACTS

3.2.1 Shallow Water Habitat

The Pre-Final 90% RD specifies a combination of dredging and capping within the shallow water habitat zone to achieve RAOs. Similar to the remedial approach for the ACM, final surfaces for caps

within this habitat zone will be composed of a "beach mix" natural substrate composed of gravel and finer material less than 2.5 inches where feasible. On slopes steeper than 3H:1V, rock revetment (angular stone) is required to comply with seismic design requirements and ensure cap stability. Implementation of the RA will increase the extent of rock revetment within the shallow water habitat zone compared to baseline conditions. Larger aggregate at OLW within toe slope key material will vary in size depending on the steepness of the upper slope to both stabilize the slope and to provide wave dissipation. This approach complies with habitat requirements stipulated in the ROD and detailed in the RDGC. The natural substrate will improve habitat conditions compared to existing portions of the shallow water habitat zone that contain riprap, other armoring, debris, or piling. In the Pre-Final 90% RD, most shallow water slopes are proposed to be graded/filled to a minimum of 2.5H:1V, a slope expected to provide stability of smaller stream gravel material. The extent of riprap and other armoring within the shallow water habitat zone is much less compared to the riverbanks. Because this habitat zone is less degraded by riprap as a baseline condition, there is less potential ecological improvement available within this zone compared to opportunities within the riparian areas and ACM. While implementation of the RA will result in a net impact to the shallow water habitat zone, the design minimizes that impact by specifying a natural substrate (beach mix) where feasible.

3.2.2 Deep Water Habitat

The Pre-Final 90% RD specifies a combination of dredging and capping within 100 percent of the deep water habitat zone located within SIB. The final surface specified in the Pre-Final 90% RD will be the surface of the cap, which is an erosion resistance layer where needed and a biological layer (i.e., clean sand) where erosion protection is not required to protect the integrity of the cap. There is little opportunity to improve habitat conditions within the deep water habitat zone because nearly all of that zone already has a riverbed composed of low gradient slope sand and silt, which is considered to be a natural substrate (Figure 2-2). As a result, the strategy for this zone is to minimize further degradation by maximizing the area where the design specifies natural substrate materials for the final surface layer. The Pre-Final 90% RD reduced impacts to the deep water habitat zone by incorporating cap designs with a sand surface layer. The sand surface layer is applied consistently throughout the deep water habitat zone in two forms: (1) in areas subject to greater erosive forces, the cap design includes an erosion resistance layer composed of angular rock and topped with a layer of sand, and (2) in areas subject to lesser erosive forces, the cap design includes a thicker surface layer of sand that will provide erosion resistance by maintaining a dynamically stable condition. "Dynamically stable" means that temporary episodic scour can occur during a vessel transit, but the depth of scour is shallow enough, episodic, and not cumulative such that the chemical isolation layer at depth is protected. On submerged slopes flatter than 3H:1V, beach mix is sufficiently stable to resist erosion and provide a natural substrate. For slopes greater than 3H:1V, angular rock revetment is necessary to ensure geotechnical stability and comply with seismic design requirements. Habitat scores assigned to deep water habitats were determined primarily by the final surface material specified in the design, which reflects effective minimization of impacts to deep water habitats.

3.3 IMPACT DETERMINATION

A comparison of the individual and composite habitat scores for pre-RA baseline conditions and post-RA conditions as anticipated by the Pre-Final 90% RD is presented in Table 1-1. Habitat scores based

on the HEA methodology[5] were assigned to all habitat areas within the SIB Project Area for a total area of 139.17 acres, which includes both the in-water and riverbank portions of the Project Area. The HEA incorporates changes from pre-RA to post-RA habitat conditions and the variations in habitat score over time related to duration of construction and the time required for post-RA habitats to reach full ecological function (ranges from 0 to 5 years). The HEA score reflecting the post-RA habitat conditions and construction sequence/schedule envisioned by the Pre-Final 90% RD is -36.41DSAYS.

That HEA result considers the combined effects of RA habitat impacts; impact avoidance, minimization, and mitigation integrated into the RD; and the variability of habitat function over time in response to RA construction duration and the time required for post-RA habitat conditions to reach full function. The negative DSAY score indicates that the remedy as designed is not "self-mitigating" and will require additional compensatory mitigation for impacts to Waters of the U.S. and to Threatened and Endangered Species. Design modifications implemented between Pre-Final 90% RD and Final 100% RD may also contribute to improving the HEA score and reducing or eliminating the need for additional compensatory mitigation. Figures 3-1a through 3-1f illustrate the habitat scores assigned to habitat units for post-RA conditions. Figures 3-2a through 3-2f illustrate the HEA scores for post-RA conditions for habitat units within the SIB Project Area. Figures 3-2a through 3-2f illustrate that most of the net improvement in habitat conditions documented by this evaluation will be achieved within the riparian areas and ACM. It is notable that while opportunities to improve habitat conditions within the deep water zone are limited, the Pre-Final 90% RD minimizes impacts by applying sand material as a finished surface instead of the angular rock previously specified in the Draft 50% RD.

Unavoidable net impacts to shallow water habitat are included in the HEA analysis and drive the resulting negative DSAY score and need for compensatory mitigation. Those impacts are not associated with the "cap on grade" area at the head of SIB. The impacts are related to steep riverbanks extending to steep submerged slopes within the ACM and shallow water habitat zones along portions of Mocks Bottom and Swan Island shorelines. The estimated 9-year RA construction duration and the associated temporary construction impacts also contribute to the negative DSAY score suggesting that further impact reduction may be achieved through reducing construction duration. The SIB RD Team will discuss possible adjustments to in-water work periods as a component of reducing construction duration and reducing ecological impacts of RA implementation. The need for additional mitigation was anticipated and provided for in the ROD and RDGC as an allowable alternative to a "self-mitigating" remedy when such impacts cannot be practicably avoided.

The RD seeks to minimize further degradation within the shallow water and deep water habitat zones by limiting the extent of armor placement while specifying natural substrates on the finished leave surface wherever feasible without compromising the protectiveness and effectiveness of the remedy. Between the Draft 50% RD and the 90% RD, the design evolved to develop a cap solution for deep water habitats that provides a natural substrate instead of an erosion resistance layer composed of angular rock. Other notable design refinements reflected in the Pre-Final 90% RD include placement

[5] EPA published the HEA methodology in the Remedial Design Guidelines and Considerations (EPA, 2021a), Appendix B, Topic 9 "Habitat Mitigation." EPA distributed a HEA spreadsheet template to the SIB RD Team on May 20, 2025; an updated version of the HEA spreadsheet template that incorporated bug fixes was distributed on August 14, 2025.

of rock revetment (instead of beach mix) within the ACM and shallow zones on slopes greater than 3H:1V. That placement is necessary to ensure slope stability for seismic design requirements.[6,7]

The negative HEA score of -36.41 DSAYs indicates that the RA will need to include additional compensatory mitigation sufficient to address this score deficit. Two types of mitigation options are considered:

1. **On-site Mitigation** – the Pre-Final 90% RD incorporates feasible and practicable avoidance, minimization, and mitigation as integrated components of the SIB Project Area RD. After receiving EPA comments on the Pre-Final 90% RD, the SIB RD team will explore the potential for additional habitat mitigation in conversation with EPA.

2. **Mitigation Bank Credit Purchase** – mitigation bank credit purchase is allowed by the ROD and the RDGC. There are four existing mitigation banks that have service areas that include the PHSS. The SIB RD team contacted the operators of the Alder Creek Restoration Area mitigation bank located on the southern tip of Sauvie Island to request information about available and anticipated credit inventory and the estimated cost of credits measured in DSAYs. As of July 25, 2025, the Alder Creek Restoration Project has 487 DSAY credits available for sale and approximately 190 DSAY credits that will be released for sale in the future. The quoted pricing is $62,000 per DSAY. That information is confirmed in a web post by the Portland Harbor Natural Resource Trustee Council (2024). Dialogue with EPA and perhaps coordination with NMFS will be needed to confirm that the mitigation bank DSAY credits are suitable to apply to the HEA model calculated DSAY deficit characterizing impacts to Waters of the U.S. and impacts to Threatened and Endangered Species.

The specific mitigation proposal will be completed as part of the preparation of the Final 100% RD. If mitigation opportunities prove infeasible or impracticable, sufficient mitigation bank credit inventory is available to mitigate for the HEA score DSAY deficit calculated for the Pre-Final 90% RD post-RA conditions.

[6] Geotechnical Design Technical Memorandum (Volume I, Appendix I), Section 3.2 Seismic Design Parameters states, "The design-level earthquakes considered include the Contingency Level Event (CLE) and the Design Earthquake (DE), consistent with EPA and USACE guidance for critical infrastructure. The CLE is defined in the RDGC (EPA, 2021a) while the DE is based on ASCE 61-14 and ASCE 7-22."

[7] In a coordination meeting including EPA and the SIB RD Team on July 24, 2025, EPA indicated that there is some flexibility in the application of the seismic design guidance presented in the RDGC.

4.0 REFERENCES

Anchor QEA, 2012. Portland Harbor RI/FS. *Attachment 1. Draft Mitigation Framework Development*. Draft Feasibility Study.

Bottom, D.L., C.A. Simenstad, A.M. Baptista, D.A. Jay, J. Burke, K.K. Jones, E. Casillas, and M.H. Schiewe. 2001 (unpublished). *Salmon at River's End: The Role of the Estuary in the Decline and Recovery of Columbia Salmon.* Draft Report. National Marine Fisheries Service, Seattle, Washington.

HGL, 2024. P*re-Design Investigation Evaluation Report, Revision 2*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. November.

National Marine Fisheries Service (NMFS), 2005. Columbia River Navigation Channel Improvement Project (CRNCIP). Biological Opinion. Endangered Species Act - Section 7 Consultation and Magnuson-Stevens Act Essential Fish Habitat Consultation 2004/01612. February 16, 2005.

NMFS, 2025. *Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Programmatic Consultation on the Portland Harbor Superfund Site Cleanup Activities.* May 16.

National Oceanic and Atmospheric Administration (NOAA), 2017. *Final Portland Harbor Programmatic EIS and Restoration Plan*. Prepared by Parametrix. February 21. Portland Harbor Natural Resource Trustee Council, 2024. Trustee Council Implements First Restoration Project Action in Portland Harbor. Accessed on line 8/15/2025 at: https://www.fws.gov/portlandharbor/news/trustee-council-implements-first-restoration-project-action-portland-harbor

U.S. Army Corps of Engineers (USACE), 1966. Aerial photograph COE 324 taken February 22, 1966.

U.S. Environmental Protection Agency (EPA), 2016. *Feasibility Study, Portland Harbor RI/FS*. U.S. Environmental Protection Agency Region10, Seattle, WA.

EPA, 2017. *Record of Decision, Portland Harbor Superfund Site*, Portland, Oregon. United States Environmental Protection Agency Region 10, Seattle, Washington. January.

EPA, 2021a. *Administrative Settlement Agreement and Order on Consent for Remedial Design*. Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10. January 20.

EPA, 2021b. *Remedial Design Guidelines and Considerations*, Portland Harbor Superfund Site. Portland, Oregon. April 23.

EPA, 2021c. *Programmatic Biological Assessment, Portland Harbor Superfund Site*. Seattle, Washington. July.

EPA, 2025. *Guidance for Riverbank Characterizations and Evaluations at the Portland Harbor Superfund Site*, Portland, Oregon. July 14.

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Table 1-1
HEA Scoring Framework and DSAY Scores for Post-RA Habitat Conditions
Habitat Impact Evaluation Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Habitat *(Elevations are NAVD88)*	Habitat Characteristics	Years Until Full Function	Salmonid Value	Value with Pilings	Pre-RA Area (acres)	Post-RA Area (acres)	Area Change, Acres	DSAY gain/loss
RIPARIAN (above OHW) **[OHW, El +20 - TOB]**	naturally vegetated forest, <400 ft from active channel margin	*40* [1]	*0.5*	*n/a*	1.11	6.38	5.28	41.8
	naturally vegetated forest, <400 ft from active channel margin and in the historic floodplain	*40* [1]	*0.65*	*n/a*	--	--	--	0.0
	naturally vegetated, grass/shrub	*5*	*0.2*	*n/a*	--	1.10	1.10	5.0
	naturally vegetated, grass/shrub and associated with historic floodplain	*5*	*0.35*	*n/a*	--	--	--	0.0
	invasive species (e.g. Himalayan blackberry)	NA	0.1	n/a	2.08	0.00	-2.08	0.0
	vegetated riprap	NA	0.05	n/a	4.30	2.23	-2.07	-0.7
	unvegetated/paved/buildings/riprap	NA	0	n/a	1.62	0.46	-1.17	-0.2
ACTIVE CHANNEL MARGIN (between OHW and OLW) **[OLW, El +7.3 - OHW, El +20]**	sloped (<5:1 or 11°), unarmored and vegetated (native)	*3*	*1*	*n/a*	0.00	5.99	5.99	64.9
	sloped (<5:1 or 11°), unarmored and vegetated (invasive)	3	0.5	n/a	0.96	--	-0.96	0.0
	sloped (>5:1 or 11°), unarmored and vegetated (native)	*3*	*0.8*	*n/a*	0.01	1.61	1.60	26.2
	sloped (>5:1 or 11°), unarmored and vegetated (invasive)	3	0.4	n/a	0.87	0.00	-0.87	0.0
	sloped (<5:1), unarmored and unvegetated	1	0.8	0.4	2.65	0.27	-2.37	-0.3
	sloped (>5:1), unarmored and unvegetated	1	0.1	0.05	1.05	0.00	-1.05	0.0
	sloped (<5:1), bio-engineered	*3*	*0.2*	*0.1*	--	--	--	0.0
	sloped (>5:1), bio-engineered	*3*	*0.2*	*0.1*	--	--	--	0.0
	Riprapped	NA	0	n/a	5.60	4.25	-1.35	-6.5
	sheetpile/seawall	NA	0	n/a	--	0.01	0.01	0.0
	suspended structures over channel margins (e.g. docks)	NA	0.1	n/a	0.45	0.44	-0.01	-0.1
	floating structures (e.g. docks)	NA	0	n/a	0.01	0.00	-0.01	0.0
MAIN CHANNEL (below OLW) **[Shallow water: 0 ft depth = El +7.3 (OLW) 10 ft depth = El -2.7 20 ft depth = El -12.7 Deep water = below El -12.7]**	shallow water, 0-10 ft deep, gravel and finer substrates	1	1	0.5	5.82	2.36	-3.46	-3.7
	shallow water, 10-20 ft deep, gravel and finer substrates	1	0.9	0.45	11.93	9.07	-2.86	-13.1
	shallow water, 0-10 ft deep, natural rock outcrop	NA[2]	1.0	0.5	0.00	--	--	0.0
	shallow water, 10-20 ft deep, natural rock outcrop	NA[2]	0.9	0.45	--	--	--	0.0
	shallow water, 0-20 ft deep, w. riprap/concrete/seawall in adjacent shoreline	NA	0.1	0.05	3.23	7.65	4.42	-127.5
	shallow water, 0-20 ft deep, with suspended structures	NA	0.1	0.05	1.26	1.10	-0.16	-0.2
	shallow water with floating structures	NA	0	n/a	0.55	0.55	0.00	0.0
	deep water with natural substrates	1	0.1	n/a	78.14	72.88	-5.26	-12.7
	deep water with artificial substrates	NA	0.05	n/a	17.52	22.81	5.29	-9.2
				Total	**139.17**	**139.17**		**(36.41)**

Notes:
[1] achieves 80% of full function within 10 years; this time is adequate because of flood protection
[2] cannot be created
The credit for simply removing pilings is limited to 0.1 and for removing covering structures is limited to 0.5.

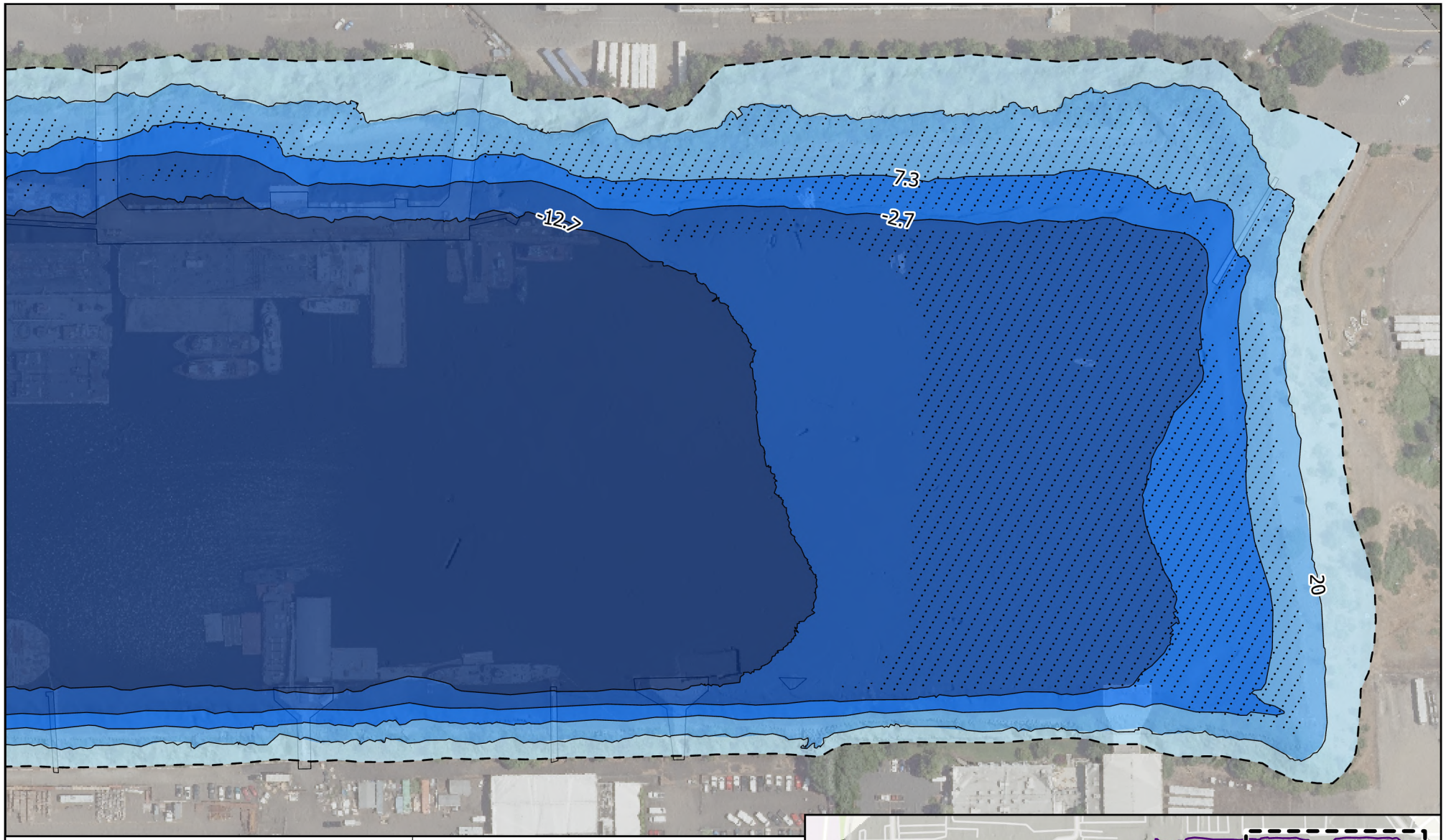
< = less than; > = greater than; ° = degrees
sf = square feet
CRD = Columbia River Datum
DSAY = Discounted Service Acre Years
El = elevation
OHW = ordinary high water
OLW = ordinary low water
NA (n/a) = not applicable
NAVD88 = North American Vertical Datum of 1988
RA = Remedial Action
SIB = Swan Island Basin
TOB = top of [river]bank

Table 2-1
Suspended Structures in Active Channel Margin
Habitat Impact Evaluation Technical Memorandum,
Swan Island Basin Project Area, Portland, Oregon

Transect	Suspended Structure
000	Berth 312-Pier D, Demo Pier
001-002	East/West Pier
012-042	Wharf
011-012	Walkway to Shipyard Commerce Center Floating Dock
013-014	Dry Dock 3
015	Pier C
016-017	Dry Dock 5
018-020	Berth 301-Pier A
044-048	Berth 306
050-052	Berth 307
055-056	Berth 308
061	Wind Tunnel
069	Swan Island Boat Ramp
080-085	Berth 311
099	Dredge Base
107-108	Marine Consortium, Inc. Pier
118	U.S. Navy Pier
123-124	U.S. Coast Guard Dock and Pier

Note: Riverbank transects are shown on Figure 2-1 "Habitat Conditions Survey Transects" in PDI ER Appendix J Habitat Conditions Survey Report.

FIGURES

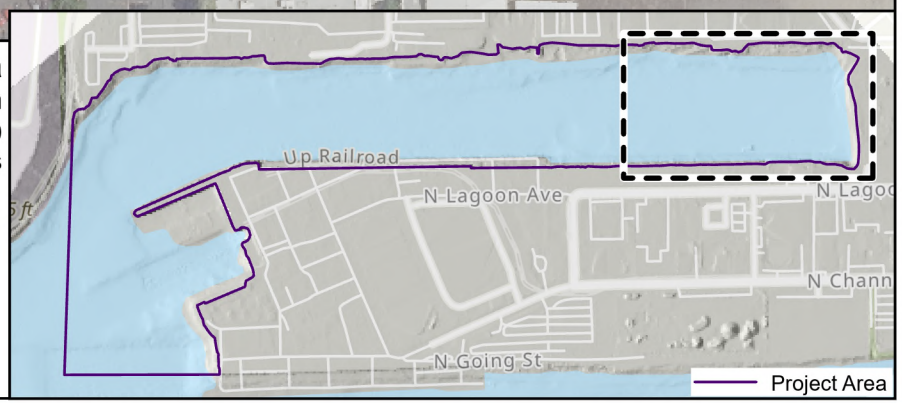


0 45 90 180 Feet

Project Boundary (Top of Bank)
Habitat Area Elevations (NAVD88)
Areas with 5:1 Slope or Flatter

Habitat Areas:
- Riparian
- Active Channel Margin
- Shallow Water 0-10 ft
- Shallow Water 10-20 ft
- Deep Water

Figure: 1-1a
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Existing Habitat Areas



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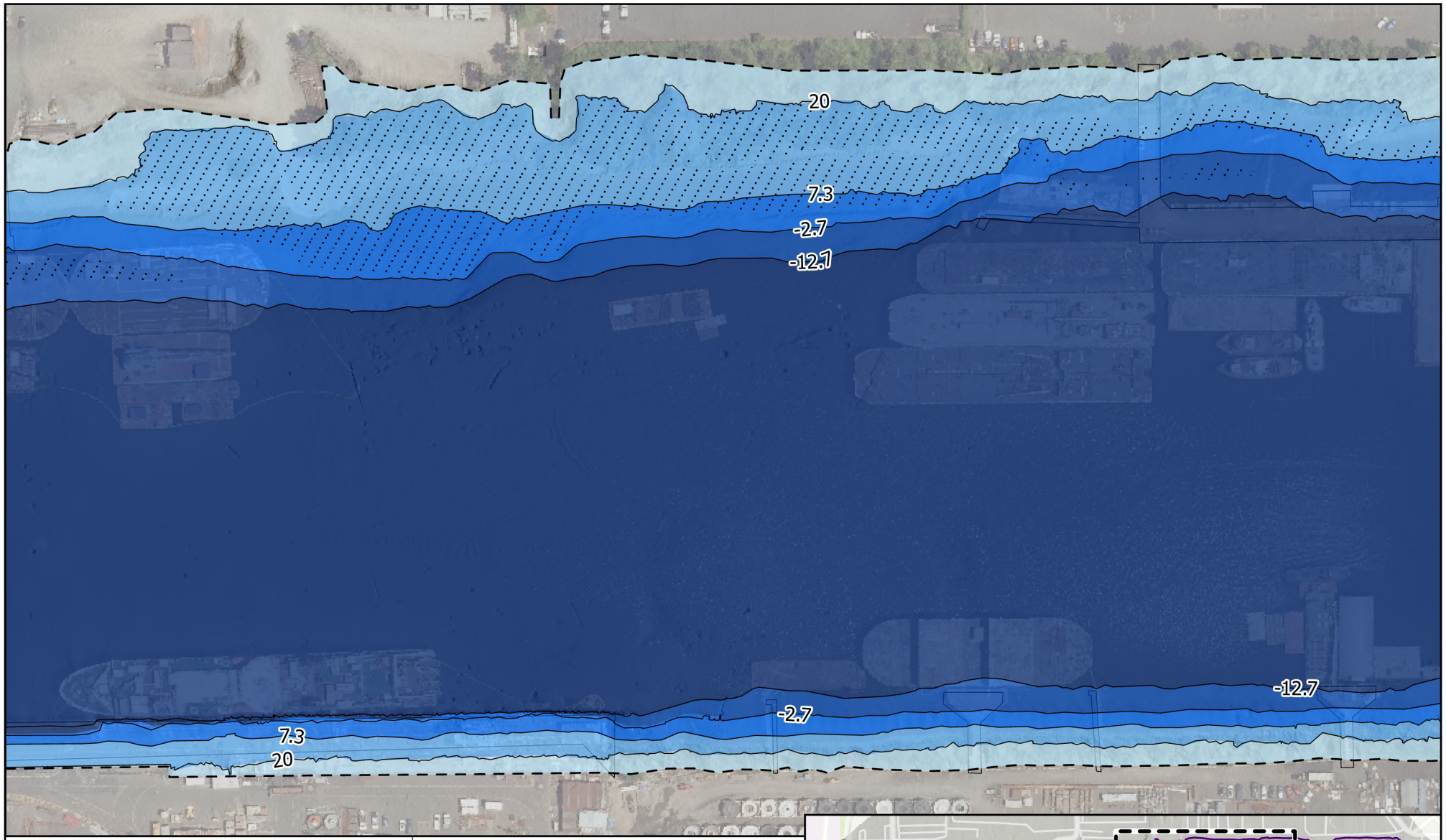

0 45 90 180 Feet

Project Boundary (Top of Bank)

Habitat Area Elevations (NAVD88)

Areas with 5:1 Slope or Flatter

Habitat Areas:

- Riparian
- Active Channel Margin
- Shallow Water 0-10 ft
- Shallow Water 10-20 ft
- Deep Water

Figure: 1-1b
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Existing Habitat Areas

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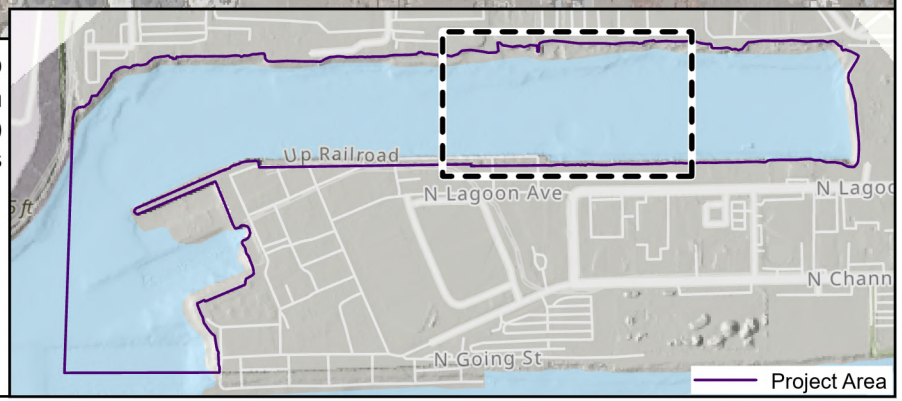

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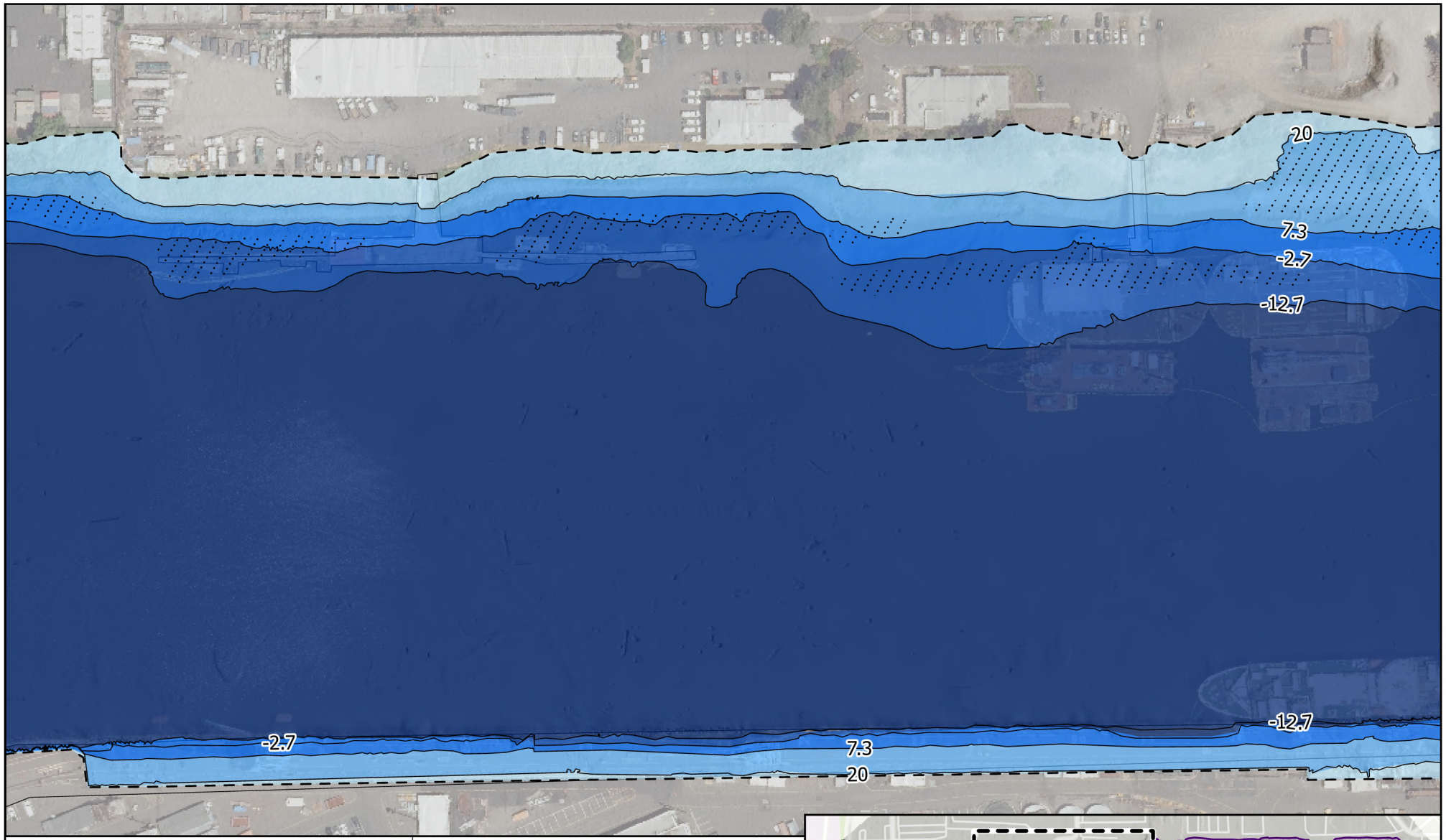

0 45 90 180 Feet

Project Boundary (Top of Bank)

Habitat Area Elevations (NAVD88)

Areas with 5:1 Slope or Flatter

Habitat Areas:

- Riparian
- Active Channel Margin
- Shallow Water 0-10 ft
- Shallow Water 10-20 ft
- Deep Water

Figure: 1-1c
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Existing Habitat Areas

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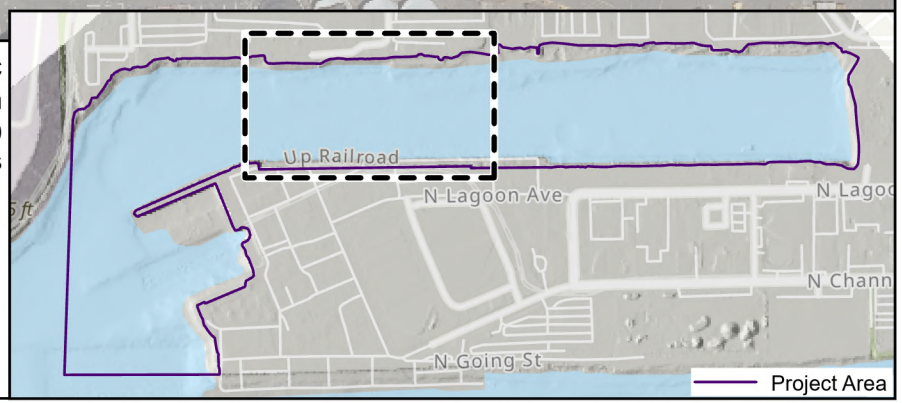

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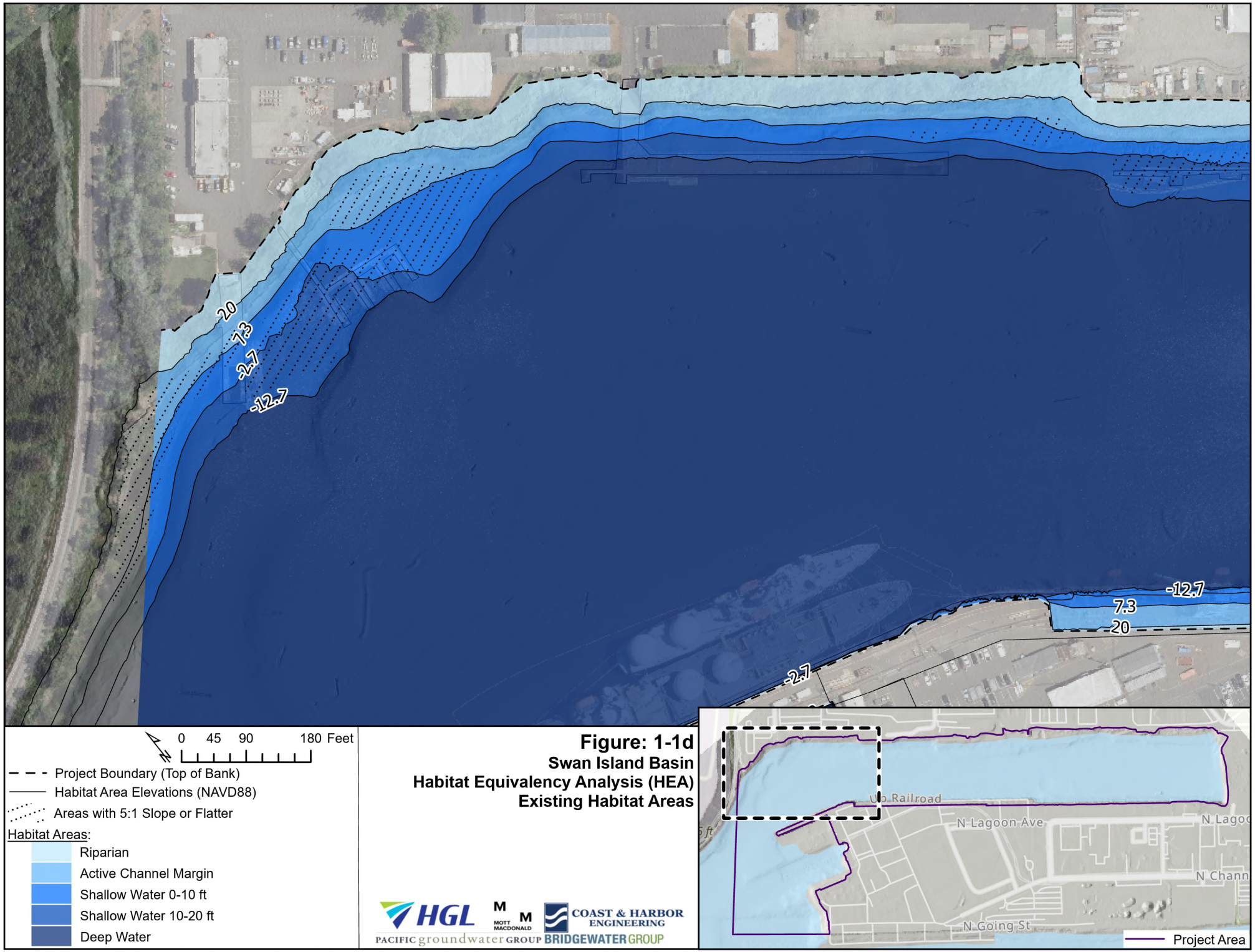


Figure: 1-1d
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Existing Habitat Areas

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

\\srv-gst-01\HGLGIS\Portland_Harbor_DT2002\SIB\RD_90\gis\SIB_Riverbank\SIB_Riverbank.aprx\Series(1-1)_ExistingHabitatAreas

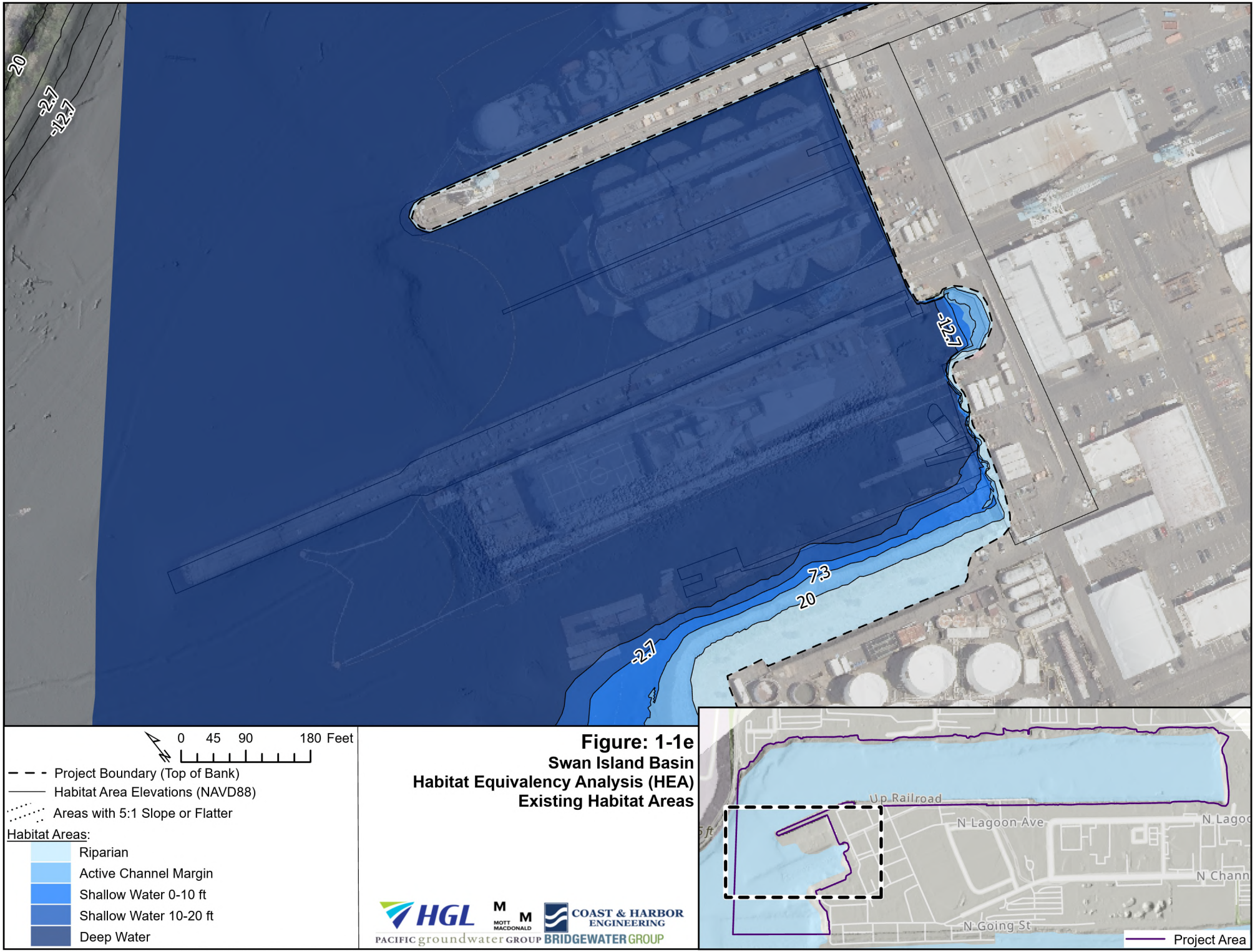


Figure: 1-1e
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Existing Habitat Areas

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

\\srv-gst-01\HGLGIS\Portland_Harbor_DT2002\SIB\RD_90\gis\SIB_Riverbank\SIB_Riverbank.aprx\Series(1-1)_ExistingHabitatAreas



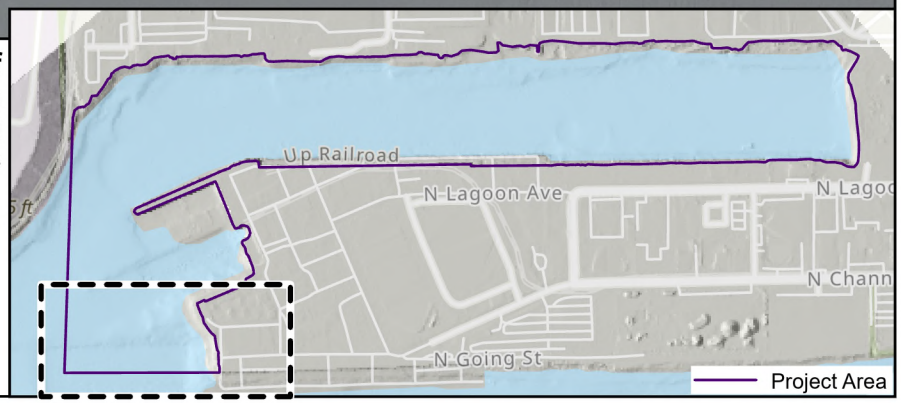
0 45 90 180 Feet

Project Boundary (Top of Bank)
Habitat Area Elevations (NAVD88)
Areas with 5:1 Slope or Flatter

Habitat Areas:
- Riparian
- Active Channel Margin
- Shallow Water 0-10 ft
- Shallow Water 10-20 ft
- Deep Water

Figure: 1-1f
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Existing Habitat Areas

HGL | MOTT MACDONALD | COAST & HARBOR ENGINEERING
PACIFIC groundwater GROUP | BRIDGEWATER GROUP



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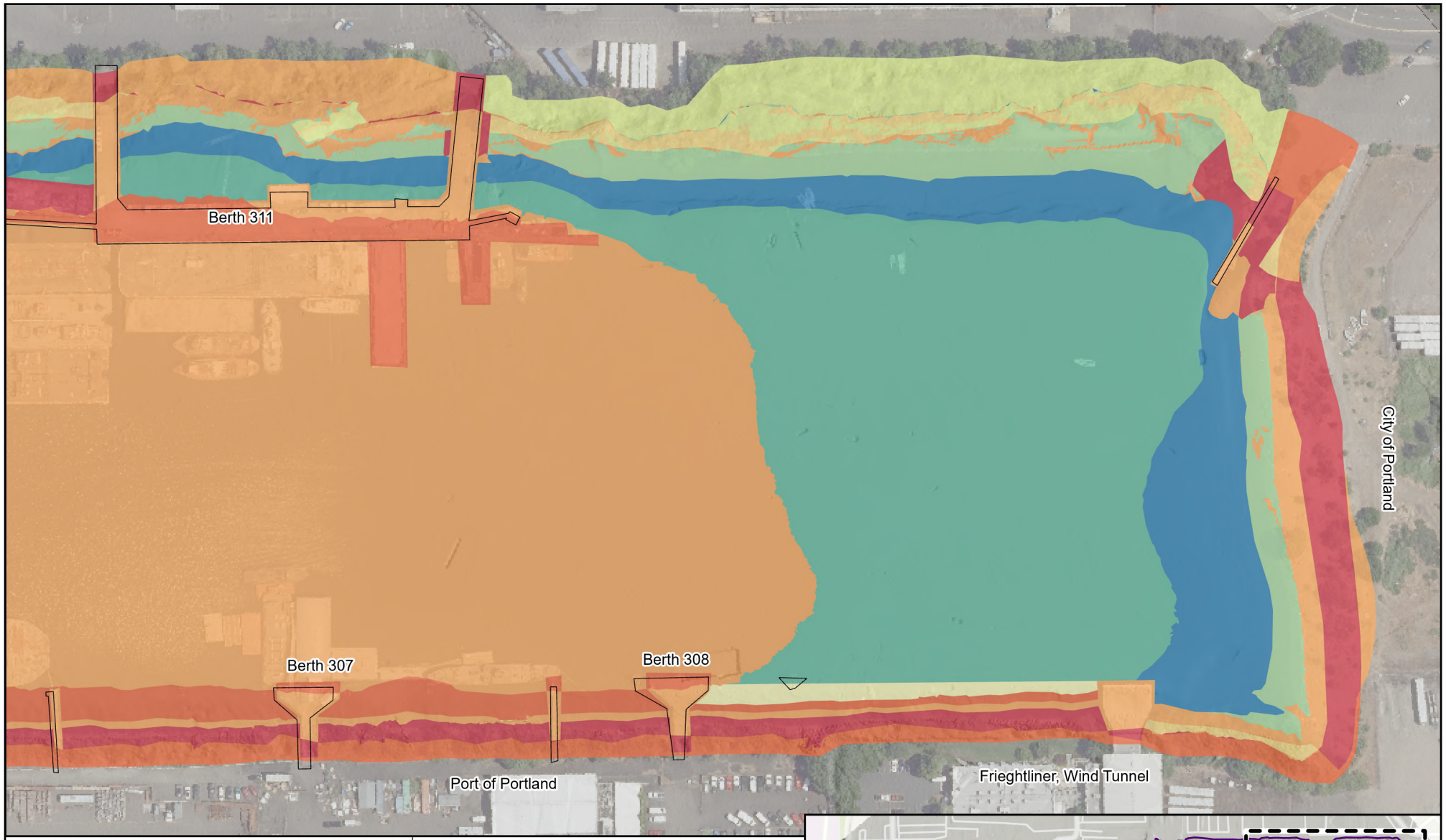

Figure: 2-1a
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Current Conditions Scoring

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

\\srv-gst-01\HGLGIS\Portland_Harbor_DT2002\SIB\RD_90\gis\SIB_Riverbank\SIB_Riverbank.aprx\Series(2-1)_CurrentConditions

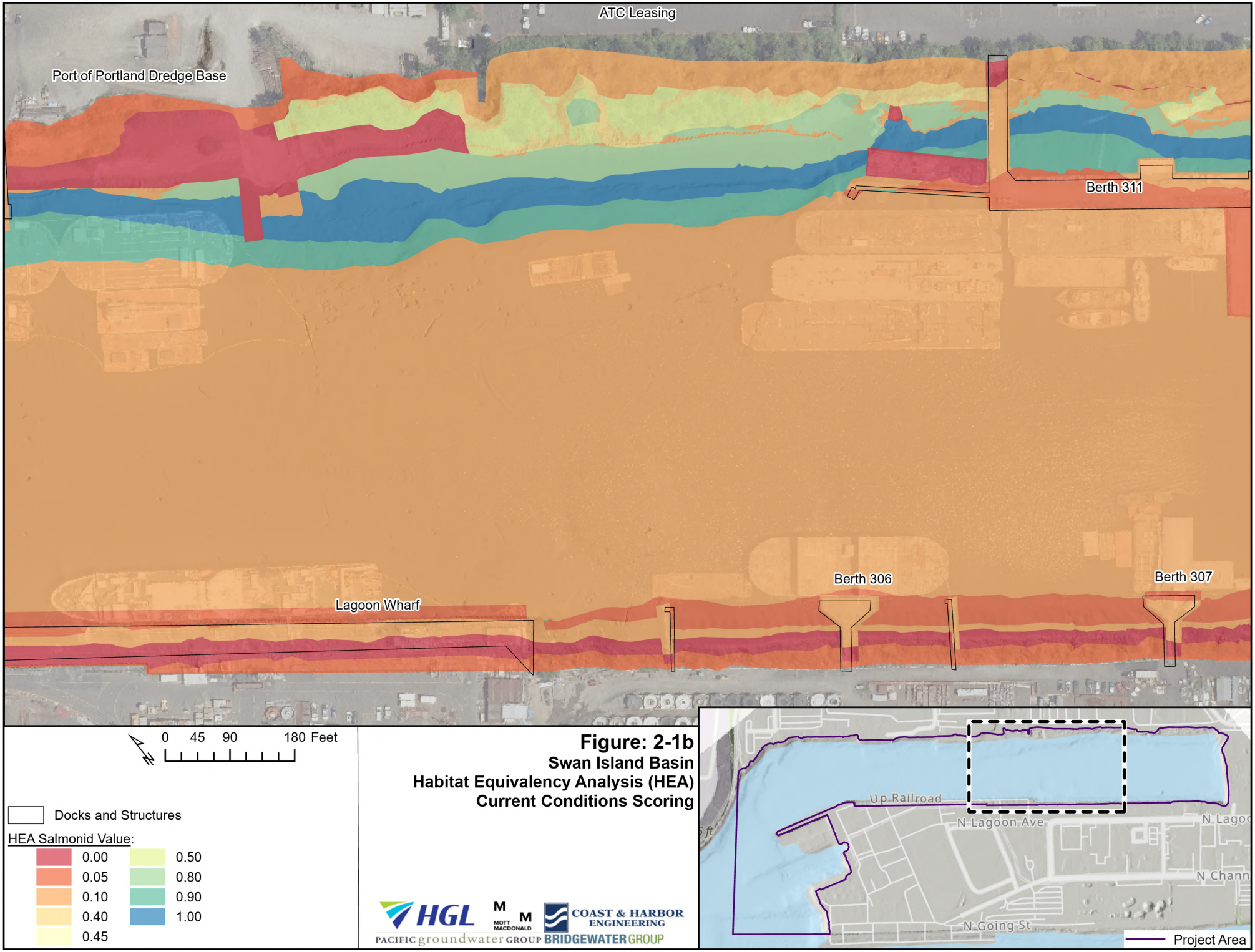

Figure: 2-1b
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Current Conditions Scoring

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

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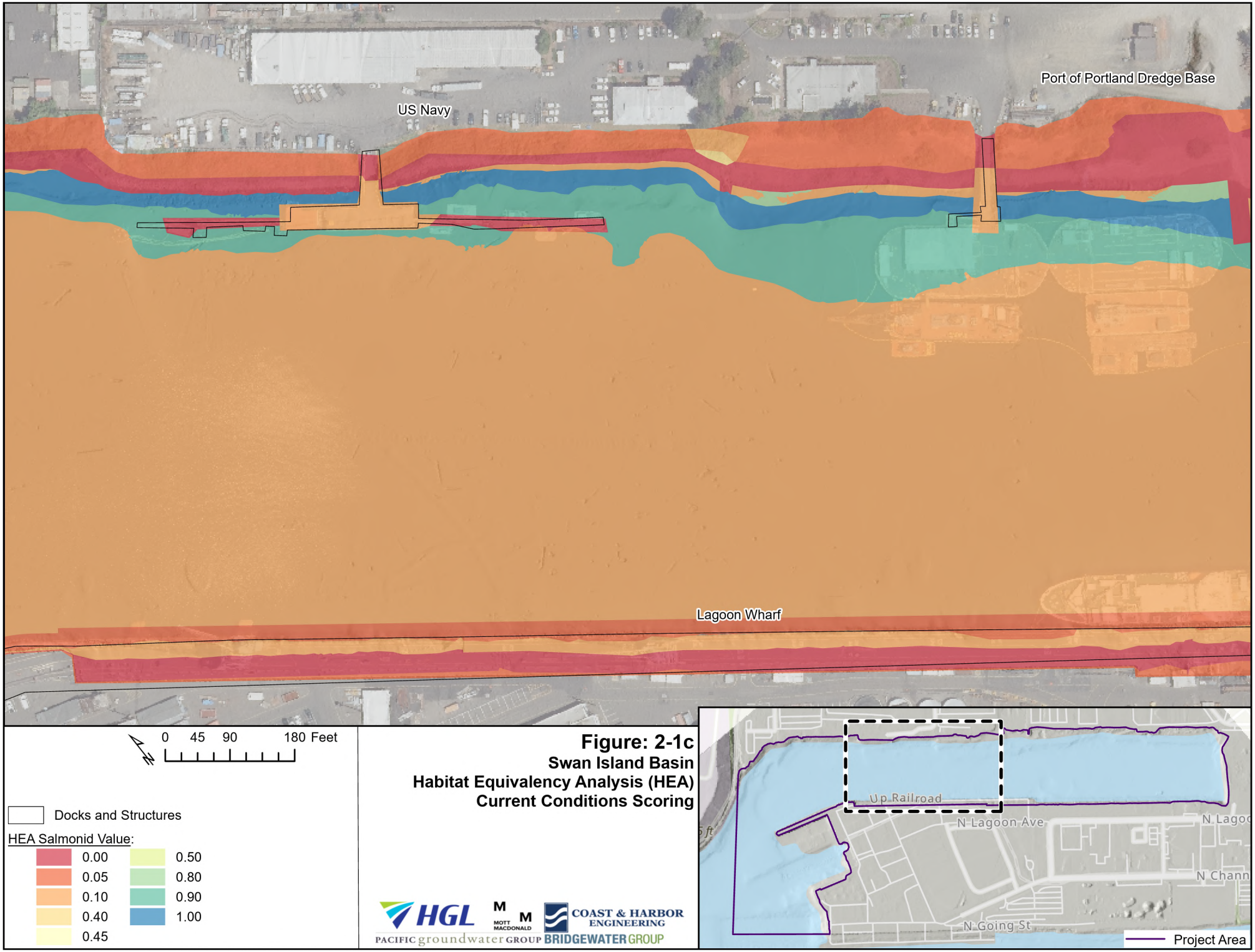

Figure: 2-1c
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Current Conditions Scoring

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

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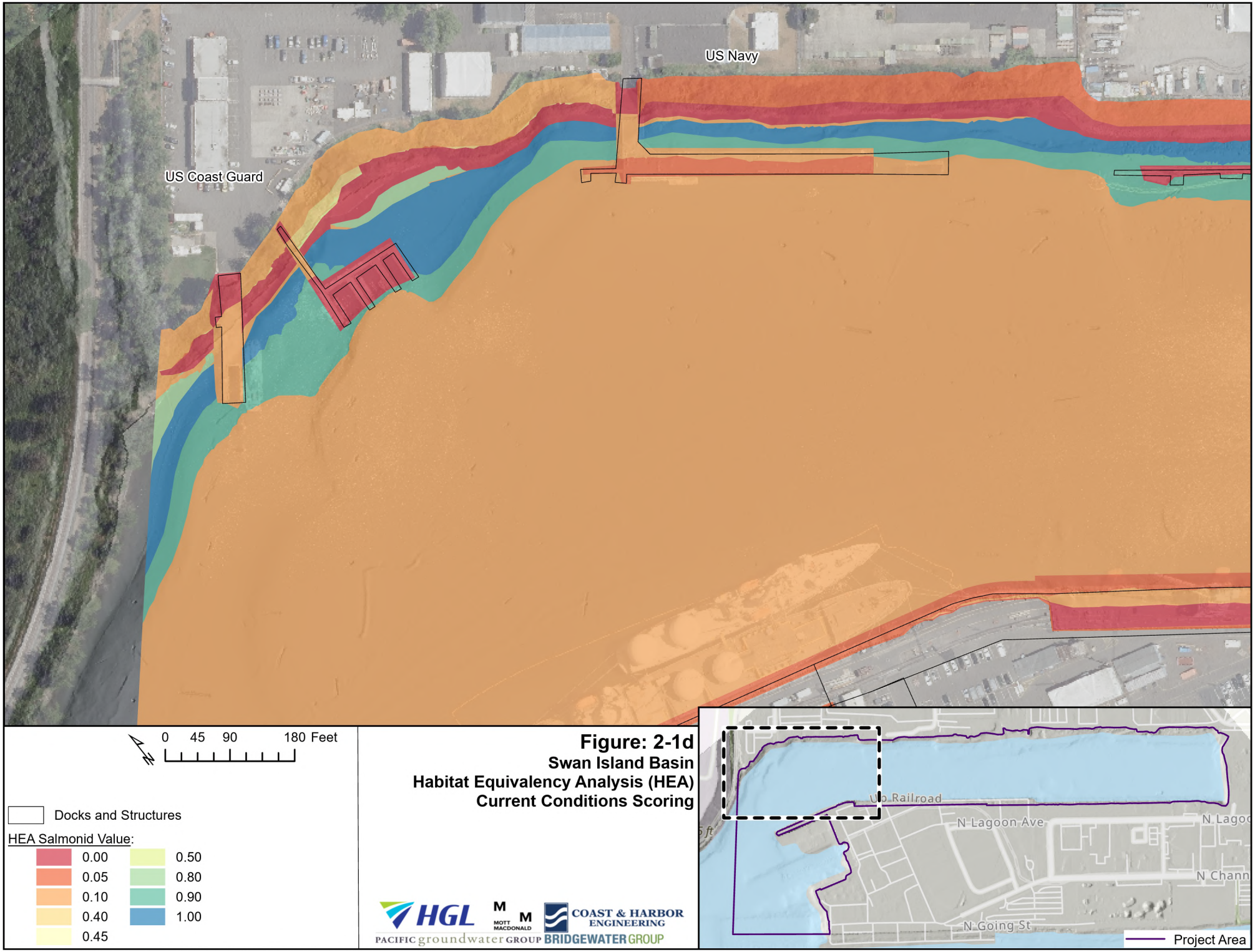


Figure: 2-1d
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Current Conditions Scoring

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

\\srv-gst-01\HGLGIS\Portland_Harbor_DT2002\SIB\RD_90\gis\SIB_Riverbank\SIB_Riverbank.aprx\Series(2-1)_CurrentConditions



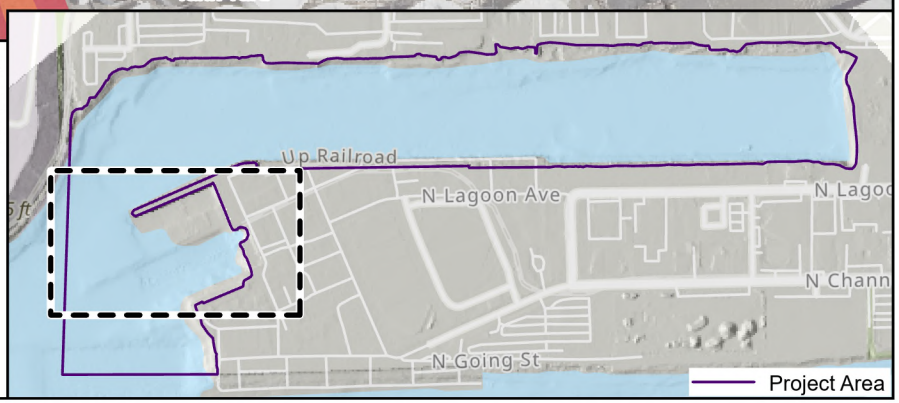
0 45 90 180 Feet

Docks and Structures

HEA Salmonid Value:

0.00	0.50
0.05	0.80
0.10	0.90
0.40	1.00
0.45	

Figure: 2-1e
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Current Conditions Scoring



HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

\\srv-gst-01\HGLGIS\Portland_Harbor_DT2002\SIB\RD_90\gis\SIB_Riverbank\SIB_Riverbank.aprx\Series(2-1)_CurrentConditions



0 45 90 180 Feet

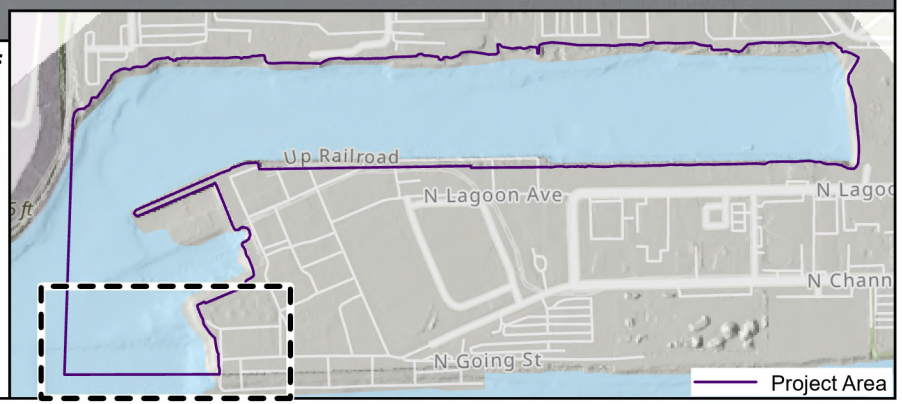
Docks and Structures

HEA Salmonid Value:

0.00	0.50
0.05	0.80
0.10	0.90
0.40	1.00
0.45	

Figure: 2-1f
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Current Conditions Scoring

HGL PACIFIC groundwater GROUP MOTT MACDONALD COAST & HARBOR ENGINEERING BRIDGEWATER GROUP



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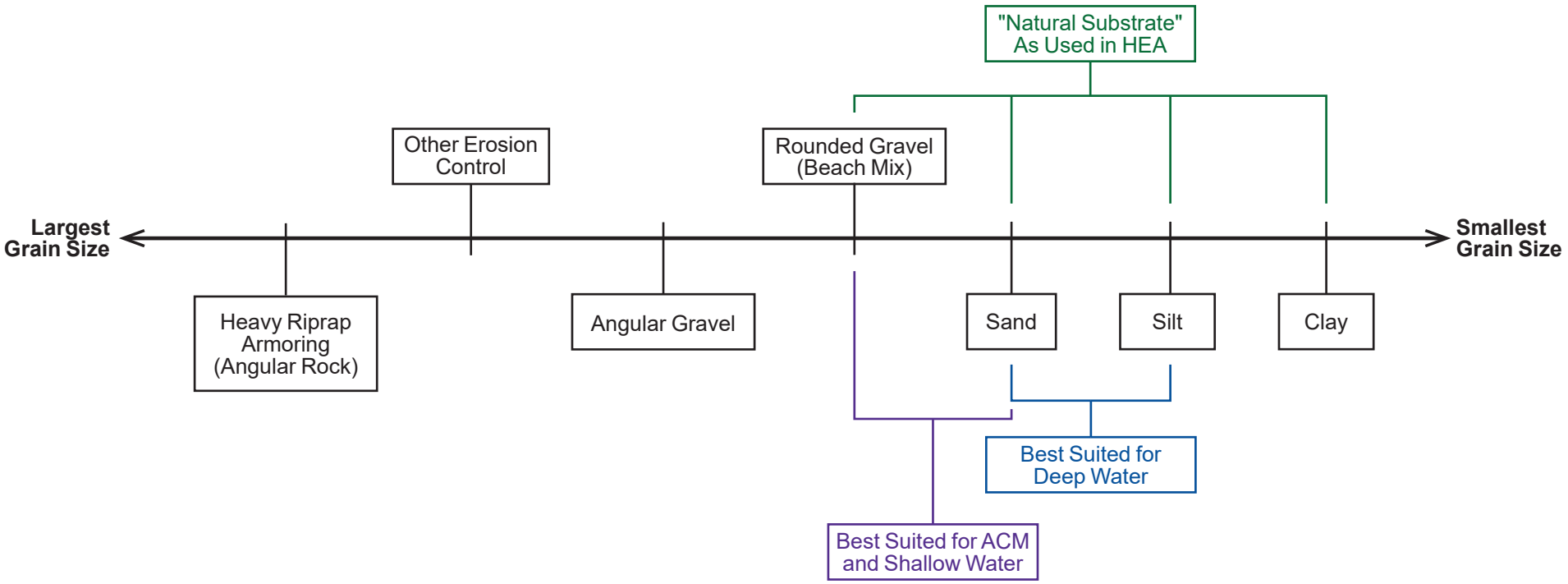


Notes:
1. Remedial Design Guidance and Considerations (EPA, 2021) indicates that for habitat impact evaluation, rounded gravel (beach mix) and clean sand/silt placed as finished surface materials are considered natural substrates.
2. Angular rock used as slope revetment. Erosion resistance layer, or surface stabilization is not considered a natural substrate and receives a zero habitat score in the Habitat Equivalency Analysis.

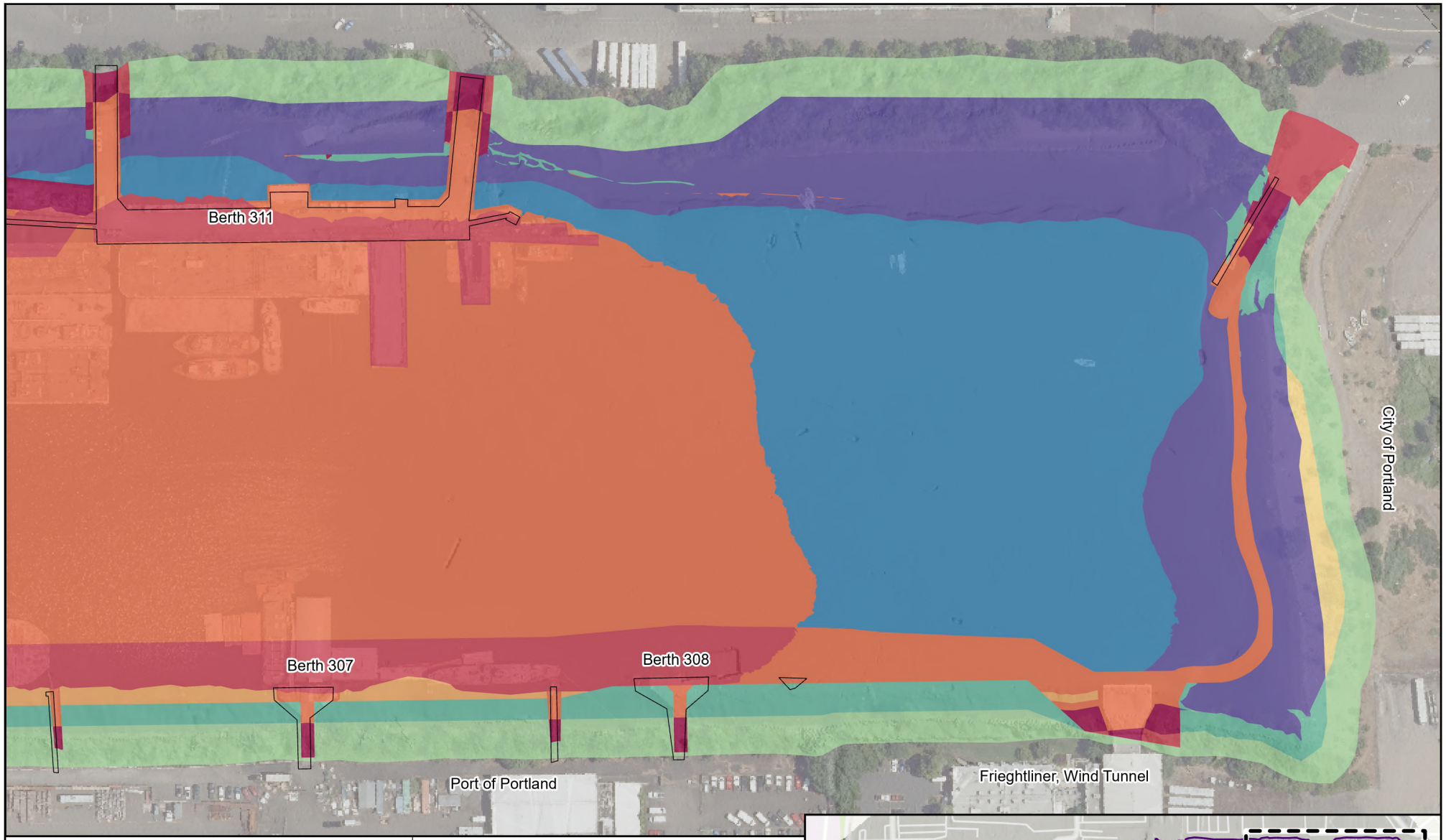
ACM=Active Channel Margin
HEA=Habitat Equivalency Analysis

Figure 2-2
Substrate Infographic

Prepared on 8/18/2025
Habitat Impact Evaluation
Swan Island Basin Remediation Design Group

HGL | M | COAST & HARBOR ENGINEERING
PACIFIC groundwater GROUP | BRIDGEWATER GROUP

\\srv-gst-01\HGLGIS\Portland_Harbor_DT2002\SIB\Habitat_Impact_Evaluation_TM\(2-2)Substrate_Infographic.ai



0 45 90 180 Feet

Docks and Structures

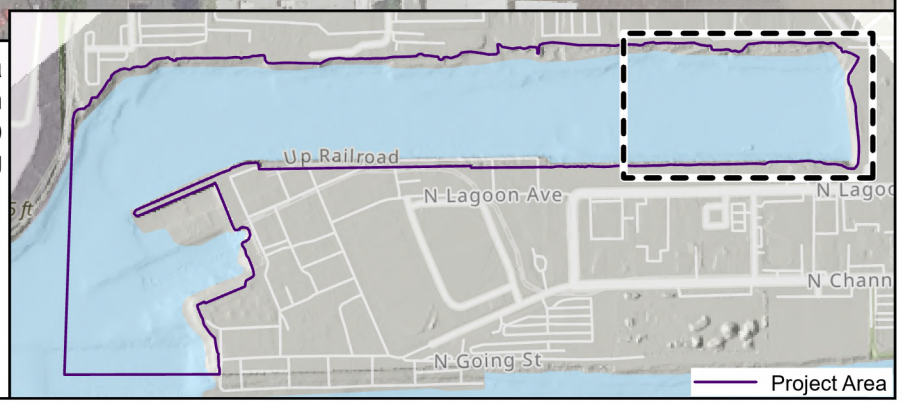
HEA Salmonid Value

90% Remedial Design:

0.00	0.40
0.05	0.50
0.10	0.80
0.15	0.90
0.20	1.00

Figure: 3-1a
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Design Conditions Scoring

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP



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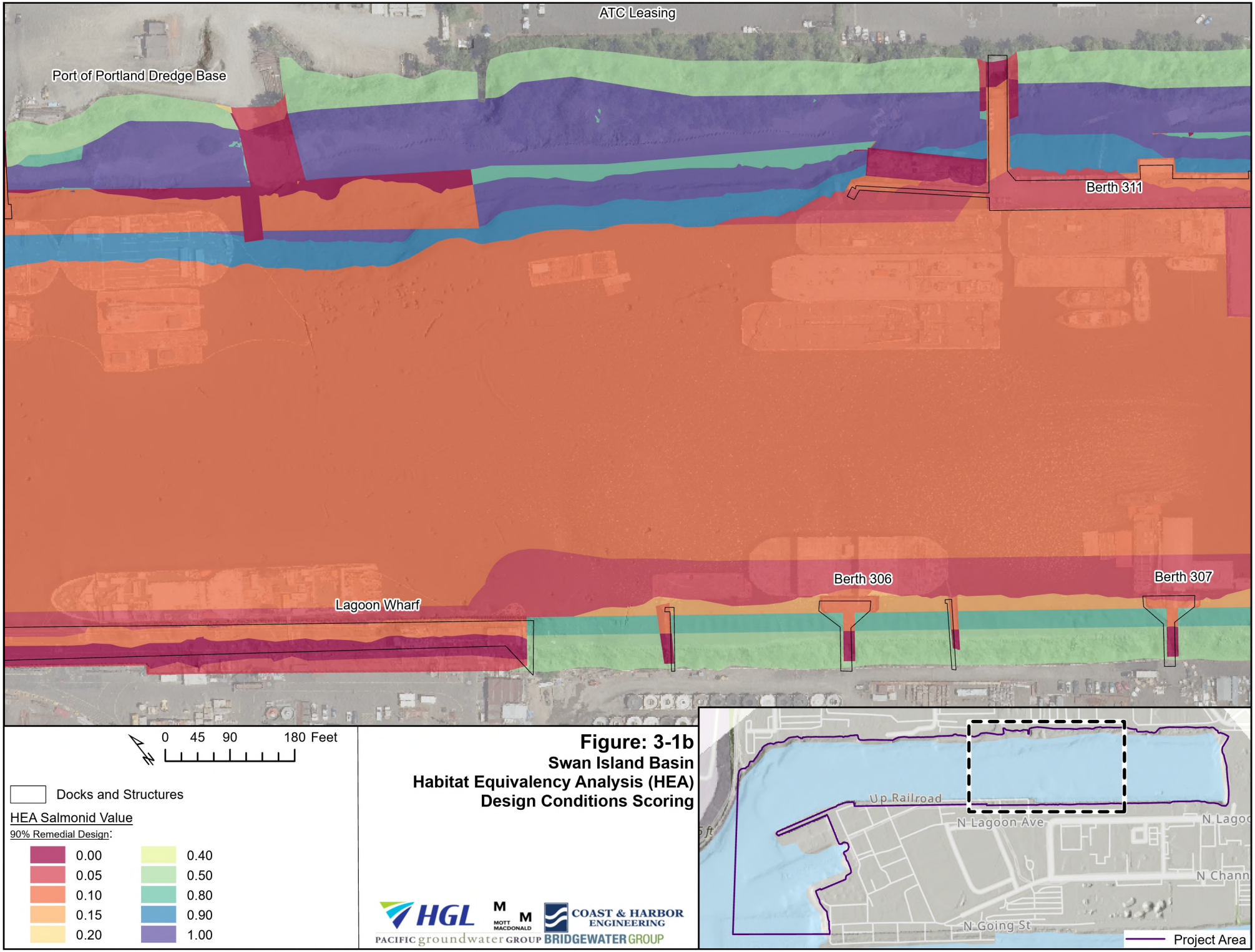

Figure: 3-1b
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Design Conditions Scoring

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

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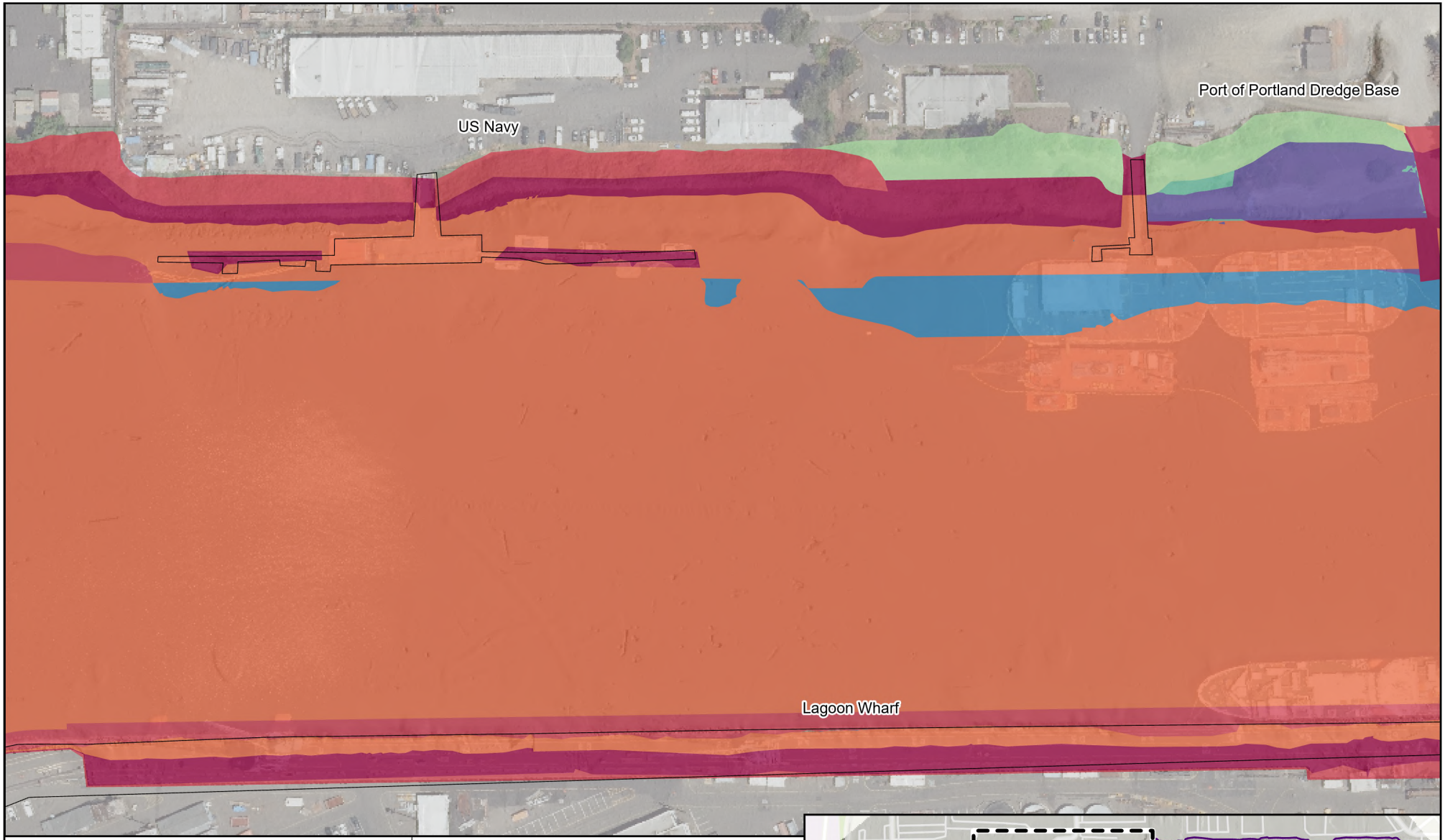


0 45 90 180 Feet

Docks and Structures

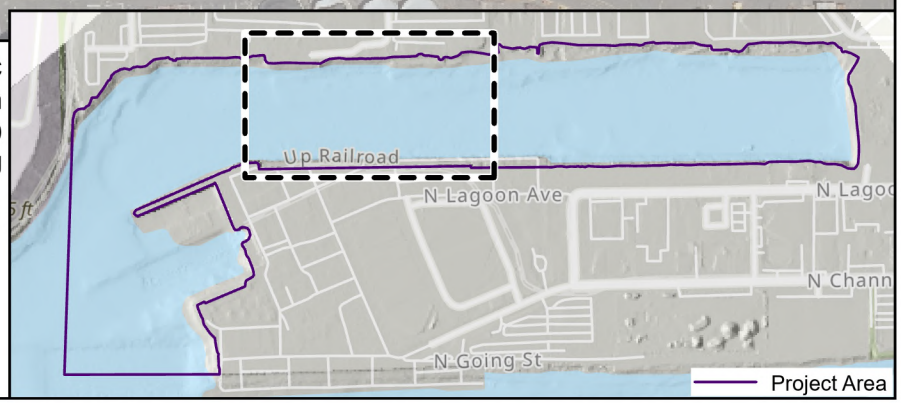
HEA Salmonid Value

90% Remedial Design:

0.00	0.40
0.05	0.50
0.10	0.80
0.15	0.90
0.20	1.00

Figure: 3-1c
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Design Conditions Scoring

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP



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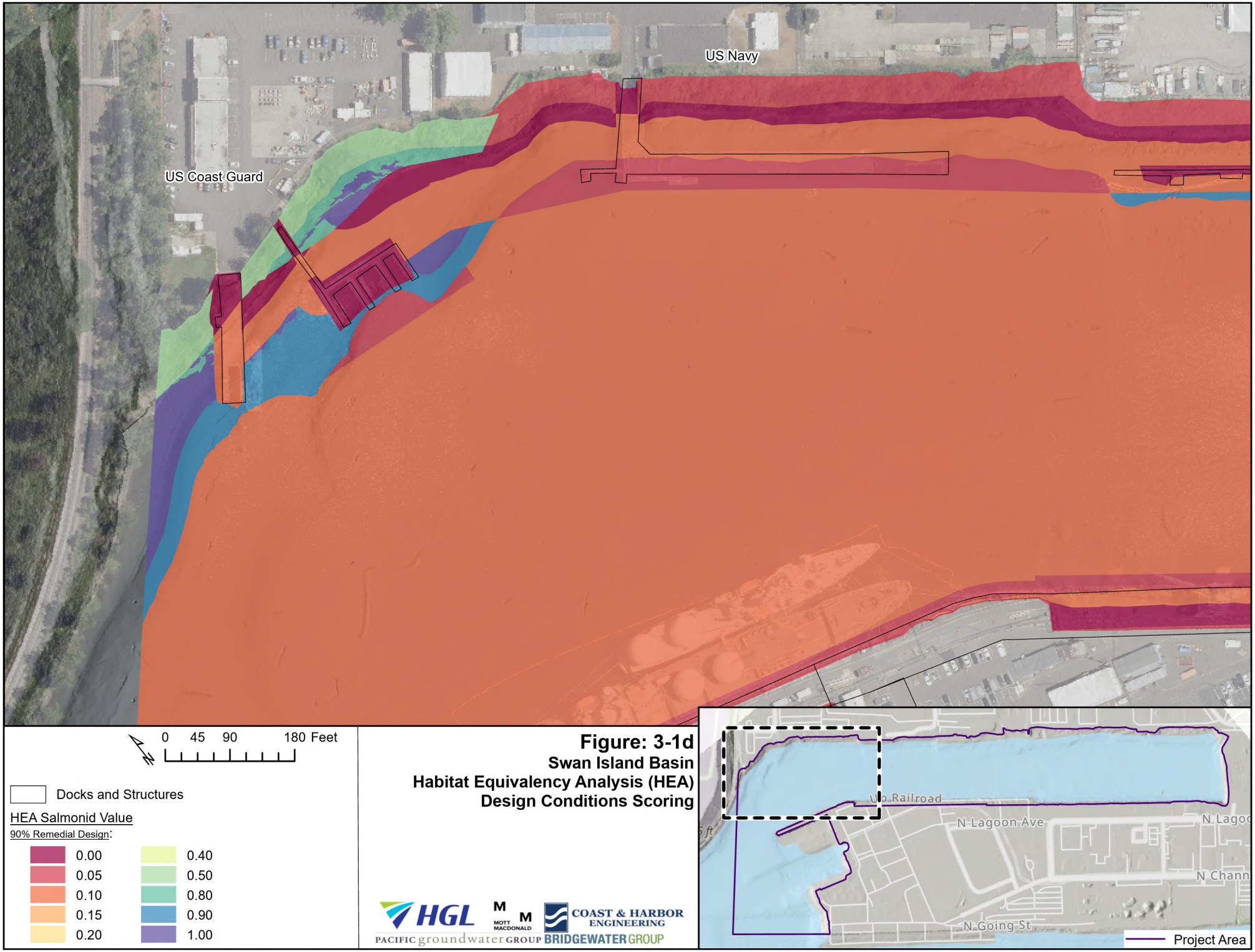

Figure: 3-1d
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Design Conditions Scoring

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

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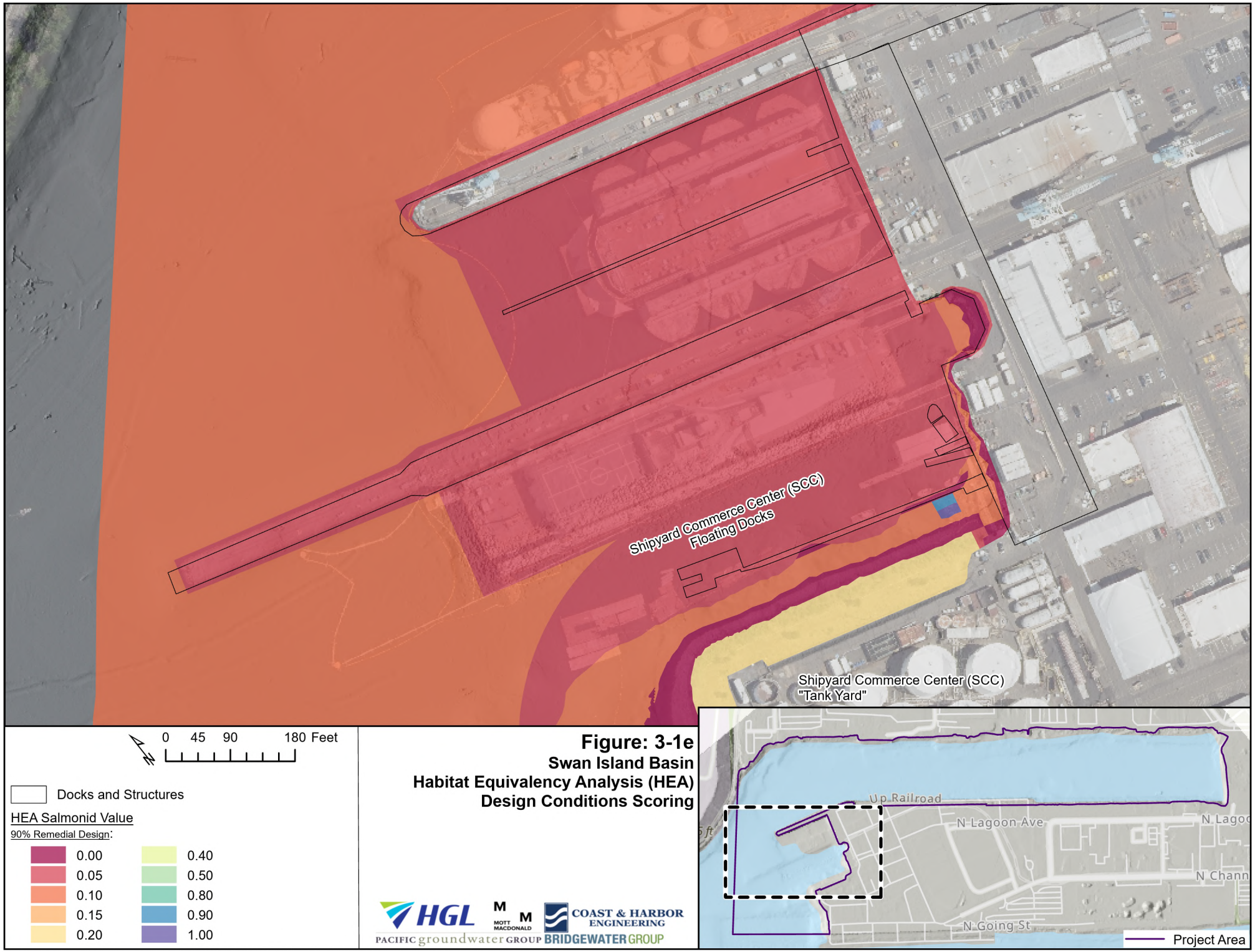

Figure: 3-1e
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Design Conditions Scoring

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

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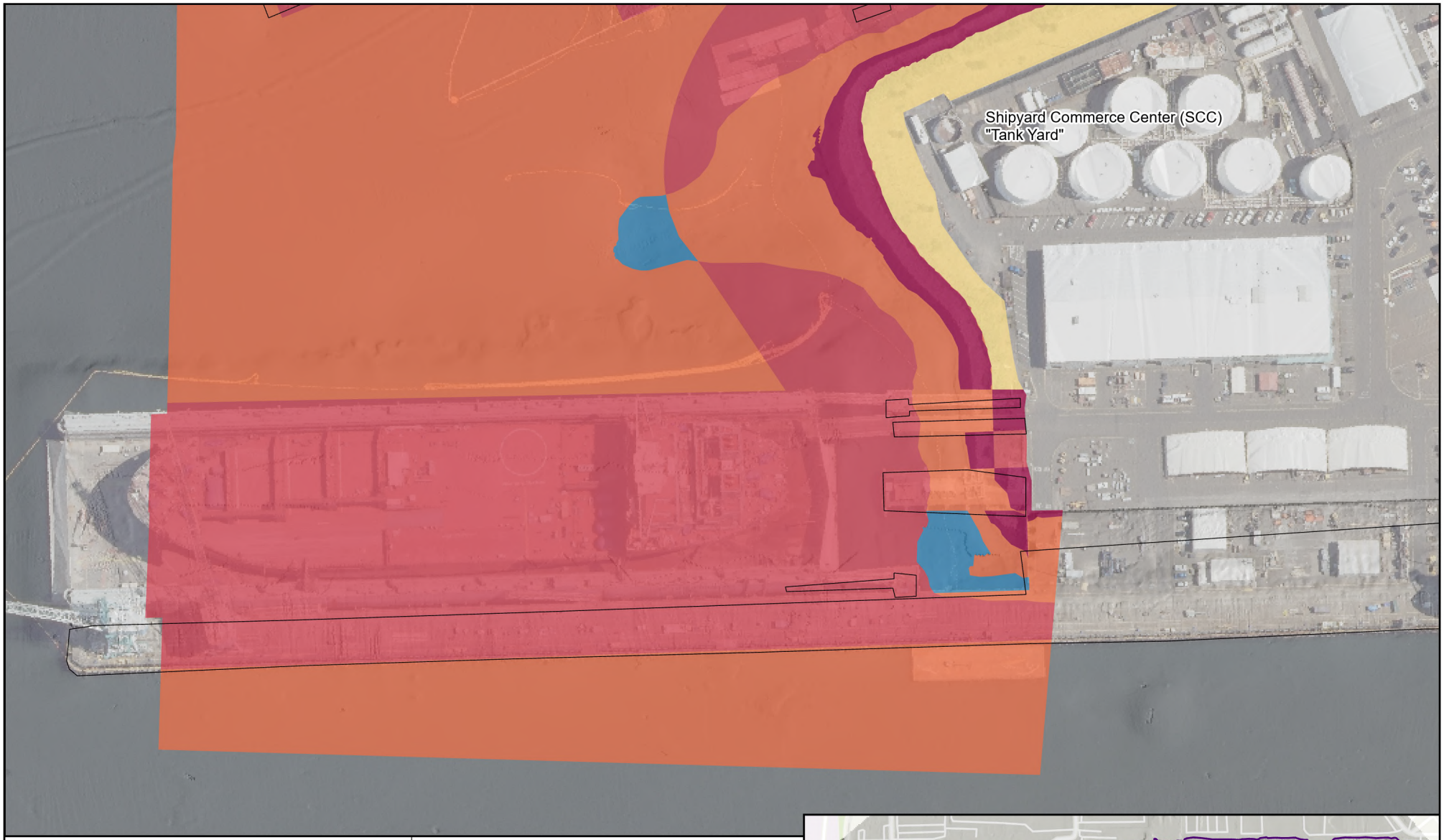


0 45 90 180 Feet

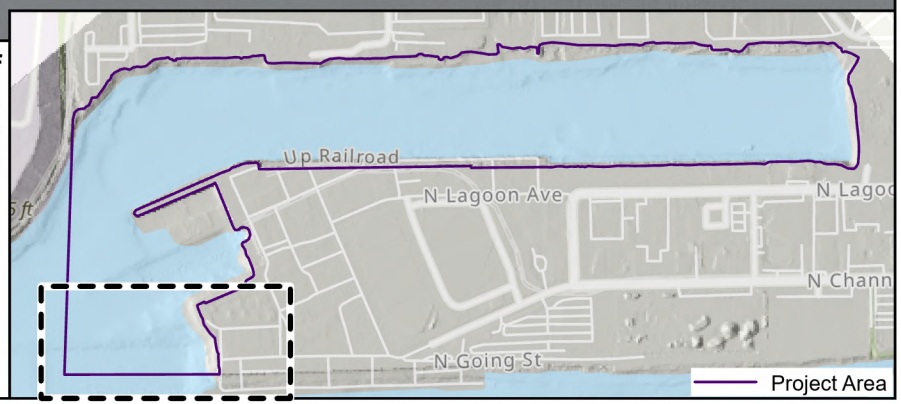
Docks and Structures

HEA Salmonid Value
90% Remedial Design:

0.00	0.40
0.05	0.50
0.10	0.80
0.15	0.90
0.20	1.00

Figure: 3-1f
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Design Conditions Scoring

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP



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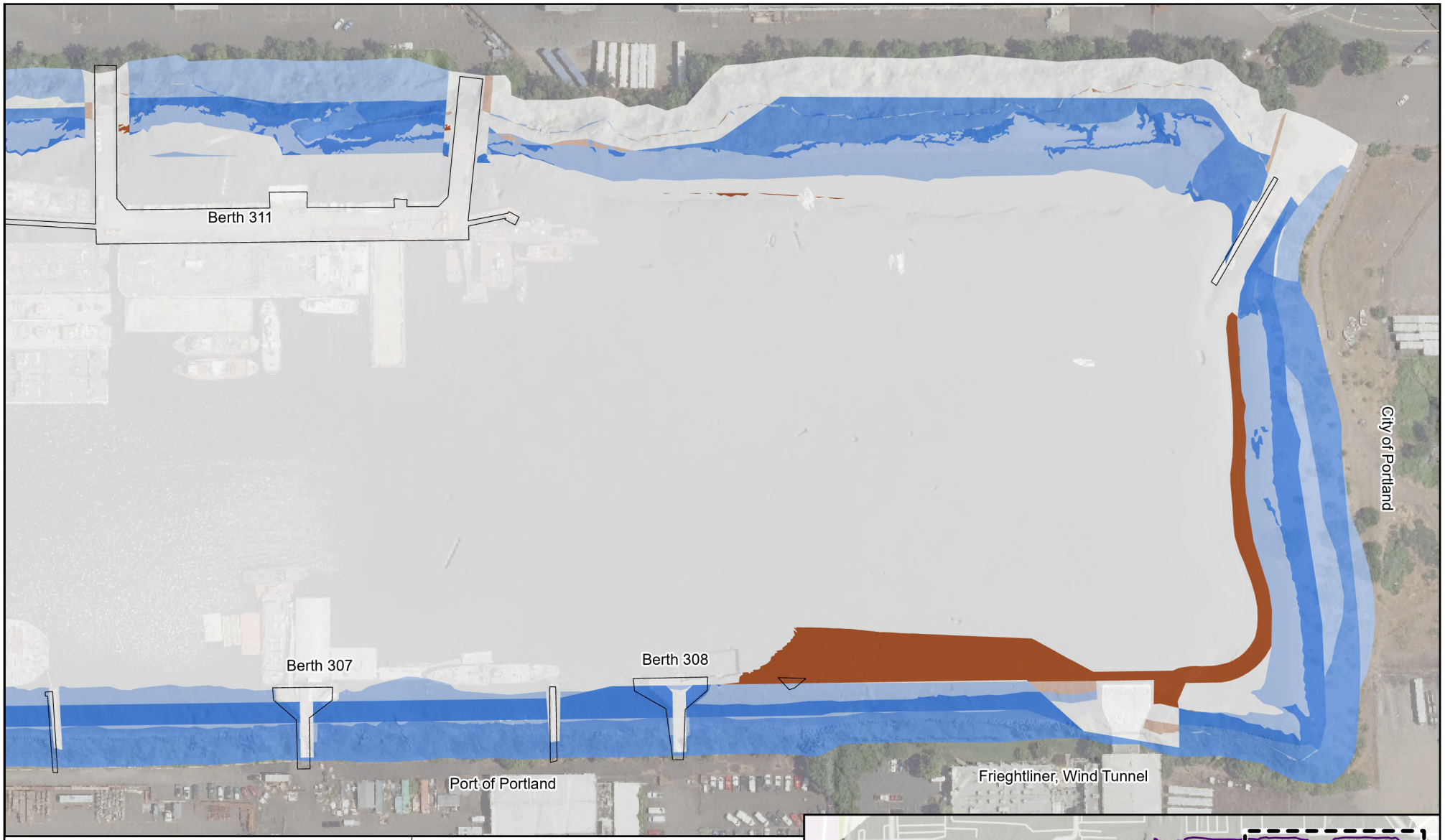


0 45 90 180 Feet

Docks and Structures

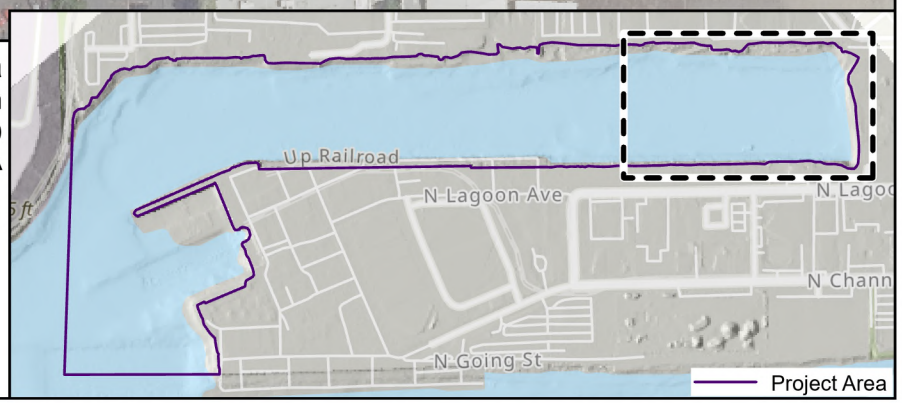
HEA Score Difference
(DSAYs gain/loss per acre)

90% Remedial Design:

≤-22	0 to 8
-24 to -16	8 to 16
-16 to -8	16 to 24
-8 to 0	24 to 32

Figure: 3-2a
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Net Change Pre- to Post-RA

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP



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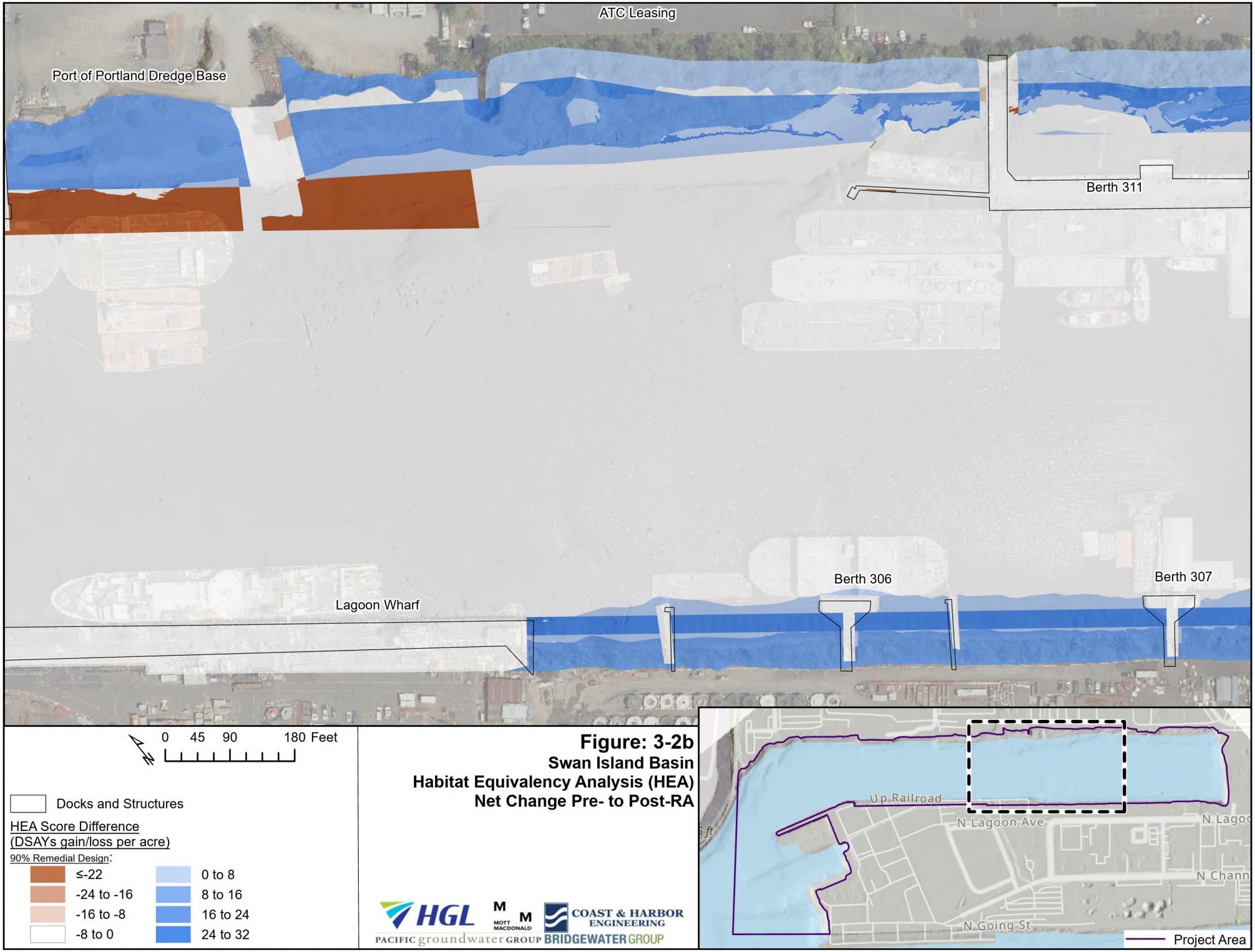


Figure: 3-2b
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Net Change Pre- to Post-RA

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

\\srv-gst-01\HGLGIS\Portland_Harbor_DT2002\SIB\RD_90\gis\SIB_Riverbank\SIB_Riverbank.aprx\Series(3-2)_NetChange_PrePost-RA

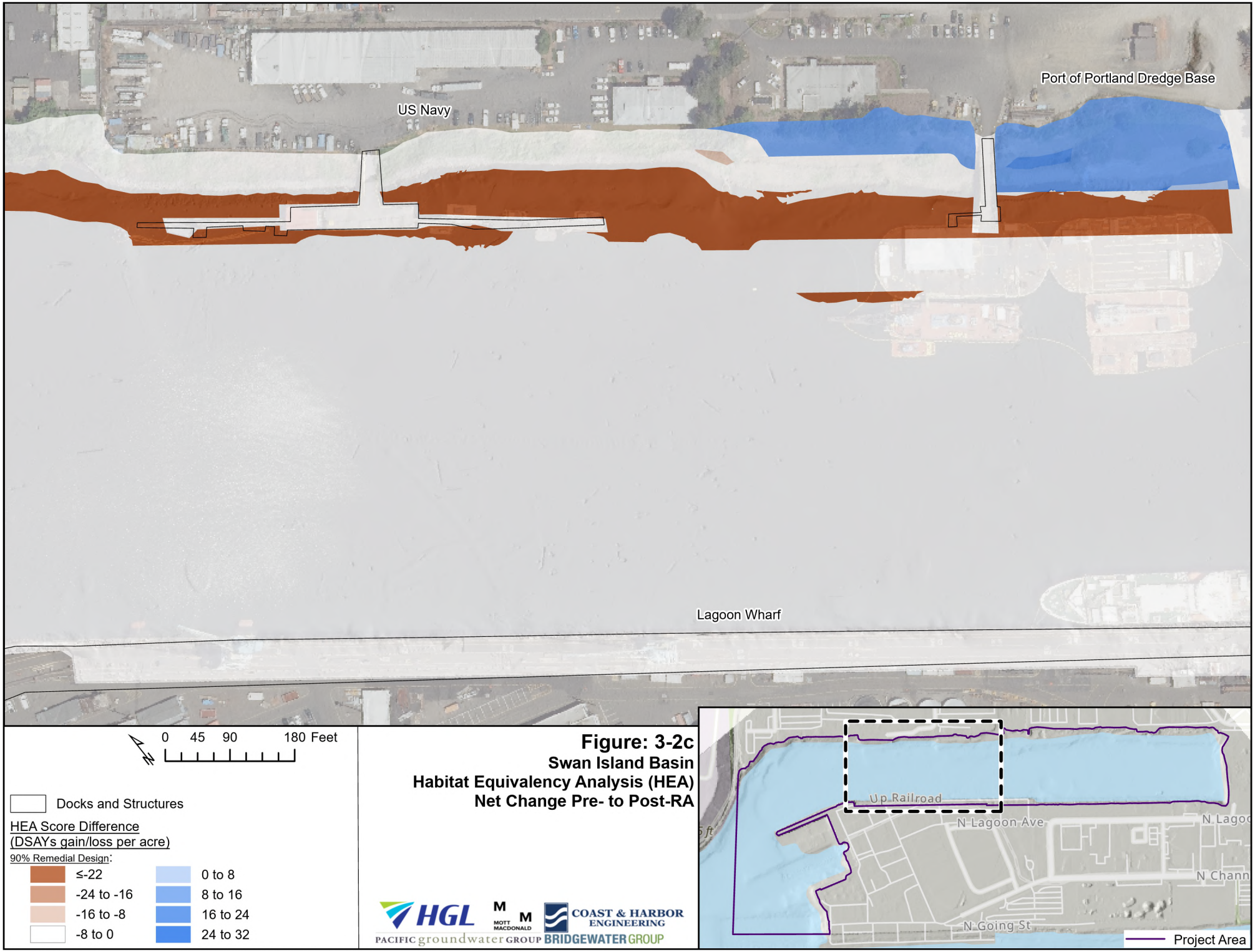
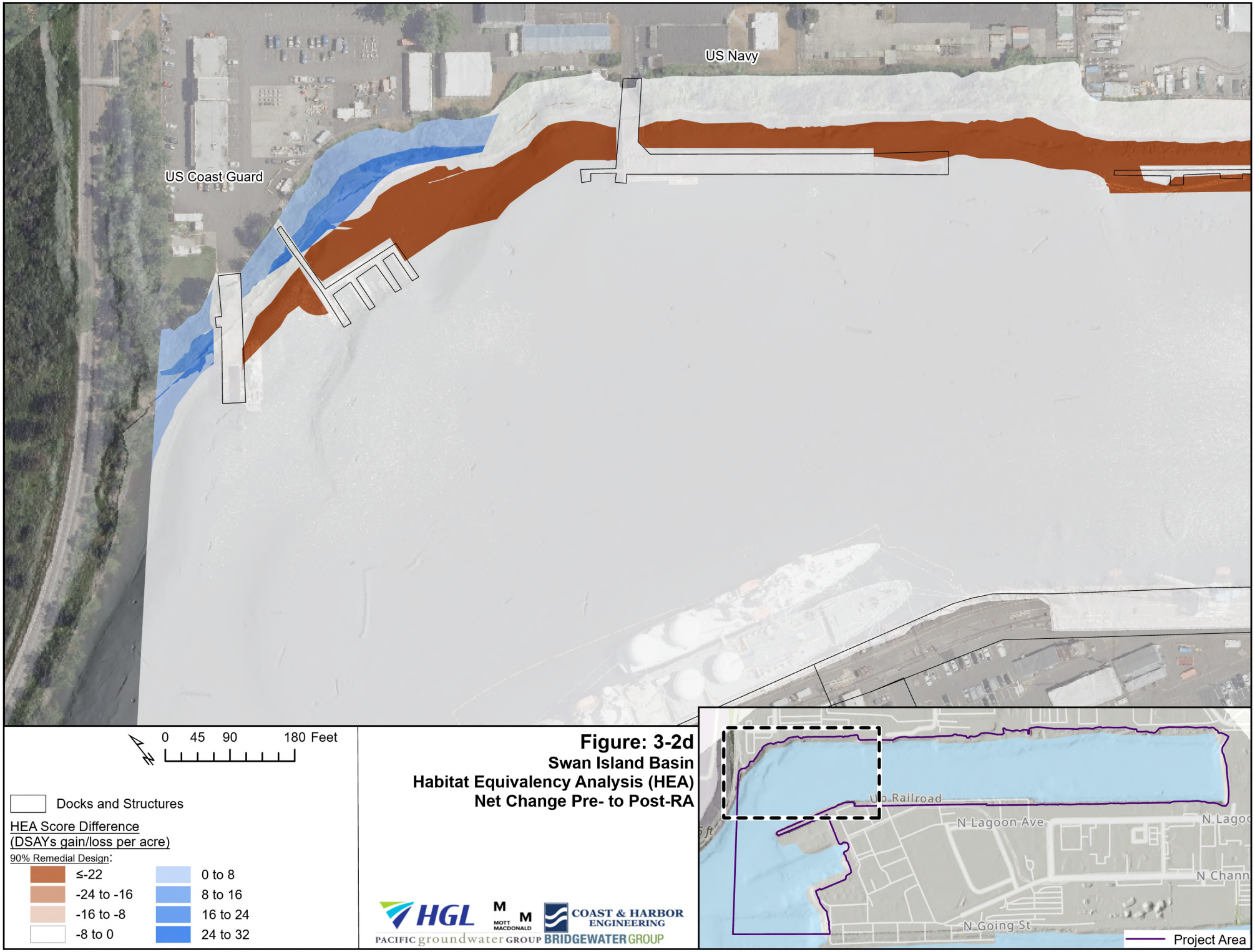


Figure: 3-2c
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Net Change Pre- to Post-RA

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

\\srv-gst-01\HGLGIS\Portland_Harbor_DT2002\SIB\RD_90\gis\SIB_Riverbank\SIB_Riverbank.aprx\Series(3-2)_NetChange_PrePost-RA



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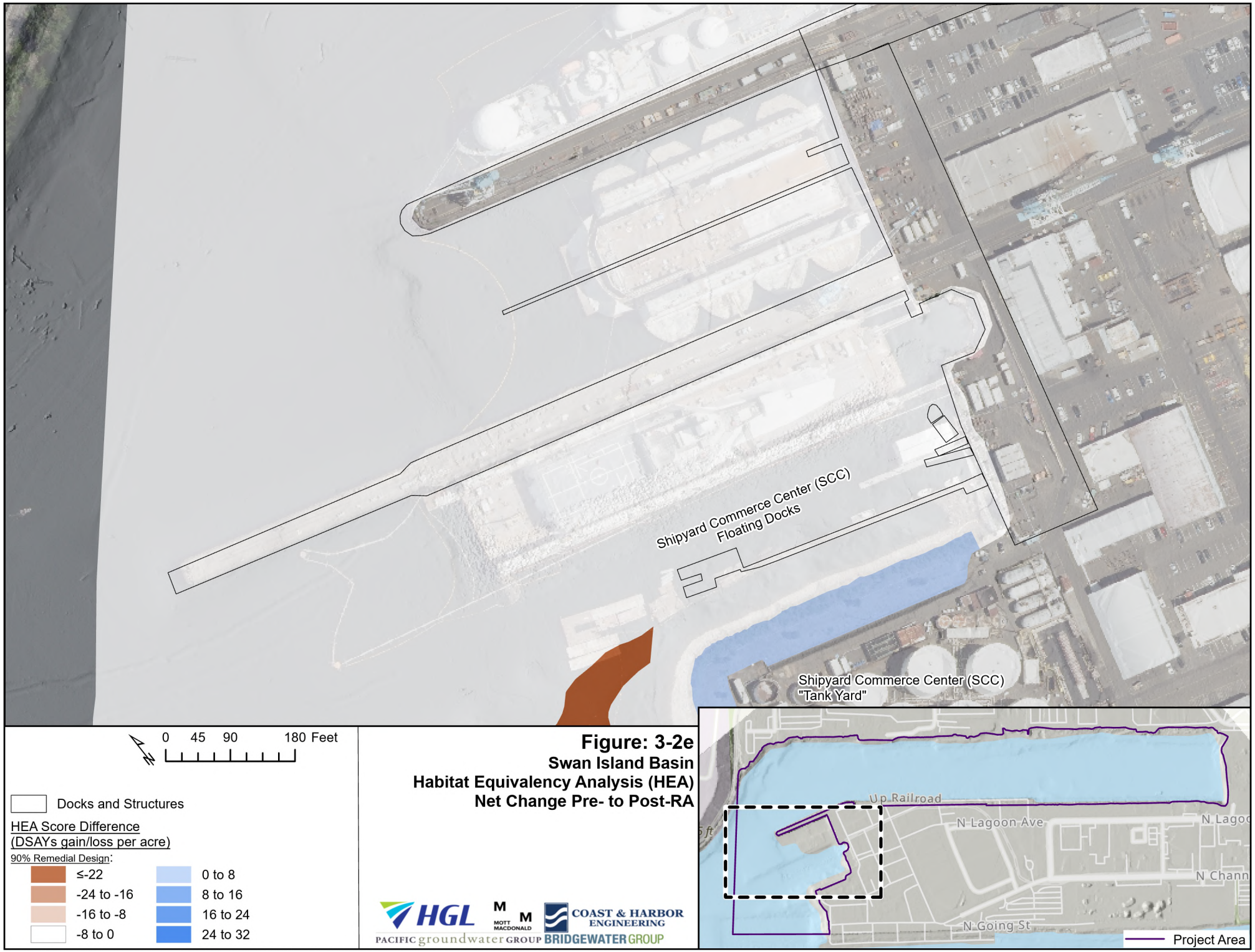

Figure: 3-2e
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Net Change Pre- to Post-RA

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING
PACIFIC groundwater GROUP · BRIDGEWATER GROUP

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0 45 90 180 Feet

Docks and Structures

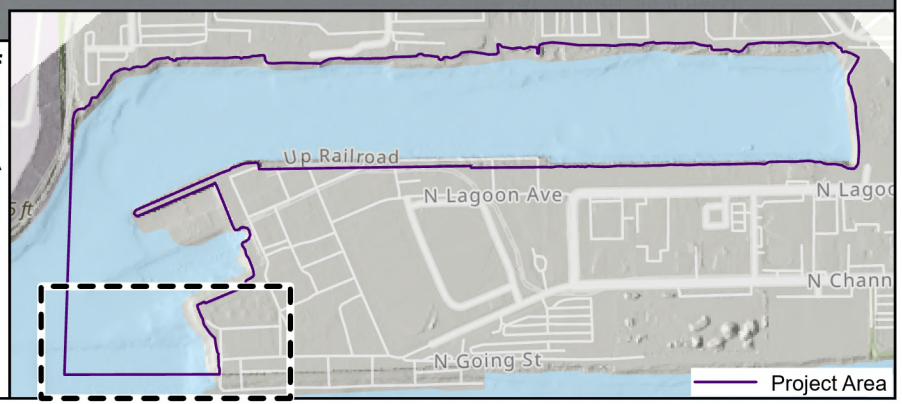
HEA Score Difference
(DSAYs gain/loss per acre)

90% Remedial Design:

≤-22	0 to 8
-24 to -16	8 to 16
-16 to -8	16 to 24
-8 to 0	24 to 32

Figure: 3-2f
Swan Island Basin
Habitat Equivalency Analysis (HEA)
Net Change Pre- to Post-RA

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP



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APPENDIX D

RIVERBANK DESIGN TECHNICAL MEMORANDUM

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RIVERBANK DESIGN TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
REMEDIAL DESIGN SERVICES, SWAN ISLAND BASIN PROJECT AREA
CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

1.0 INTRODUCTION

This Riverbank Design Technical Memorandum (RDTM) presents a summary of the design basis and design criteria for riverbanks in the Swan Island Basin (SIB) Project Area for the Pre-Final 90% Remedial Design (RD). The Pre-Final 90% RD is conducted for the SIB Project Area within the Portland Harbor Superfund Site (PHSS) in Portland, Multnomah County, Oregon. The HydroGeoLogic, Inc. (HGL) team performed the work on behalf of the SIB RD Group based on the requirements of the PHSS Record of Decision (ROD) (EPA, 2017) and the Administrative Settlement Agreement and Order on Consent (EPA, 2021). The data used in the riverbanks design analyses were collected in accordance with the final Pre-Design Investigation (PDI) Work Plan, which the U.S. Environmental Protection Agency (EPA) approved in May 2022 (HGL, 2022) and were reported in the PDI Evaluation Report (ER), which the EPA approved in January 2025 (HGL, 2024a).

Section 2.0 of this RDTM describes the location and physical condition of riverbanks in the SIB Project Area, discusses Remedial Action Objective (RAO) 9, introduces the groundwater modeling memo, and describes the purpose of the riverbank remedial action (RA). Erosion, geotechnical, and habitat information that informs the riverbank remedial technologies selection and basis of the remedy design are summarized in Section 3.0. Section 4.0 presents riverbank design criteria. Attachment A to this RDTM provides a detailed description of the groundwater modeling performed to aid in the design of the riverbank RA. Attachment B provides the flood impact evaluation performed based on the details of the 90% RD, and Attachment C provides the details of the design of the chemical isolation layers (CILs) for riverbank areas.

2.0 EXISTING RIVERBANK INFORMATION AND DESIGN AREA

This section presents a description of the physical condition of SIB Project Area riverbanks, information on the extent of contamination, description of the RAO for PHSS riverbanks, and a summary of the habitat impact evaluation conducted for the SIB Project Area as it relates to the riverbanks.

2.1 PHYSICAL CHARACTERIZATION

SIB is bordered by approximately 2.3 miles of riverbanks bounded by uplands of Swan Island and Mocks Bottom to the southwest and northeast. The SIB Project Area encompasses riverbanks that extend from the top of bank (TOB), which varies in elevation within different portions of the SIB,

CORPORATE HEADQUARTERS
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

to mean high water (MHW) or +13 feet (ft) North American Vertical Datum of 1988 (NAVD88). Existing riverbank slopes in the SIB Project Area range from vertical walls (structures) and steep banks (e.g., steeper than 2.5H:1V) to gradual shoreline. These slopes are presently and predominantly armored with riprap and/or protected from erosion by dense vegetation, bulkheads or other shoreline structures. The shoreline at the head of the basin consists of a beach and boat ramp area. The Mocks Bottom shoreline is more vegetated than the Swan Island shoreline, which is primarily marine industrial facilities.

2.2 PRE-DESIGN INVESTIGATION INFORMATION

The PDI was conducted to perform visual assessments of riverbank conditions and to address data gaps. The physical conditions information collected provided information for the bank stability analysis, and soil samples collected from TOB, ordinary high water (OHW) mark, and at or below the mean low water (MLW) elevation provided detailed nature and extents of ROD contaminants of concern (COCs).

The visual assessment revealed the extent of shoreline development, varying slopes, erosion protection, erosion prone areas, and marine structures extending over and beyond the riverbanks. Features limiting riverbank access include 23 shoreline structures with limited access beneath adjacent to open land areas at TOB. Soil sampling and chemical analyses results indicate the presence of COCs including arsenic, mercury, polychlorinated biphenyls (PCBs), dioxin/furans, pesticides, and bis(2-ethylhexyl)phthalate. Soils containing concentrations of COCs exceeding ROD Table 17 cleanup levels (CULs) are widespread in surface and subsurface (limited dataset to 3 ft below ground surface [bgs]) soil samples (HGL, 2024a). To evaluate riverbank erosion, visual inspection and light detection and ranging (LiDAR) elevation data were analyzed for existing erosional features.

Bank Erosion Hazard Index (BEHI) model ratings indicate erosion probabilities range from low to extreme. Near Bank Stress (NBS) ratings which indicate erosion potential were calculated to be low for all riverbank transects analyzed (HGL, 2024a). Riverbank erosion conditions are discussed further in Section 3.2.

Section 6.6.6 of the ROD (EPA, 2017) includes remediation of contaminated riverbanks to protect the in-water remedy. Beyond the ROD-specified remedial riverbanks, additional areas were added for RD based on the PDI ER finding of widespread contamination in SIB Project Area riverbanks exceeding CULs contiguous with the Sediment Management Area.

2.3 GROUNDWATER INFORMATION AND MODELING

Though the discharge of impacted groundwater is not an identified concern for the SIB Project Area, the presence of riverbank soils with COC impacts above CULs warranted consideration of groundwater discharge through the riverbanks as a potential pathway for contaminant migration. The SIB RD team compiled and reviewed all available groundwater data within the vicinity of the Project Area and geological/stratigraphy information to provide an understanding of groundwater behavior in the SIB Project Area.

Attachment A provides a technical memorandum describing the information available and used to create and fit a two-dimensional numerical groundwater model that provides an understanding of the groundwater movement in the SIB Project Area.

Information from this model was used, in part, to determine the sediment cap and riverbank seepage scenarios that were used in the 90% RD analyses. Section 3.4.3 describes the chemical isolation design that was informed by the groundwater model.

2.4 REMEDIAL ACTION OBJECTIVE

The CULs for riverbank soil are presented in ROD Table 17 (EPA, 2017). The CULs are long term contaminant concentrations that need to be achieved to meet the RAO to reduce migration of COCs in riverbanks to sediment and surface water such that levels are acceptable for human health and ecological exposure (RAO 9). Based on the PDI results for COCs exceeding CULs, significant long term erosion potential for most of the SIB Project Area riverbanks require RA. In addition to CUL exceedances, concentrations of COCs exceeding ROD Table 21 remedial action levels (RALs) and principal threat waste (PTW) thresholds are prevalent throughout the riverbanks and must be remediated in accordance with ROD Figure 28 (EPA, 2017).

The design considerations and remedial technologies to be implemented for the RA to address the physical condition and extent of contamination to achieve the RAO are discussed in Sections 3.0 and 4.0 of this RDTM.

2.5 HABITAT IMPACT EVALUATION SUMMARY

The Habitat Impact Evaluation (HIE) Technical Memorandum (Volume I, Appendix C) uses a Habitat Equivalency Analysis (HEA) model to evaluate the net ecological benefits or impacts of RA implementation according to the Pre-Final 90% RD. The HEA model provides a structured framework for evaluating the ecological effects of RA implementation on Waters of the U.S. and on threatened and endangered species and their habitats within the SIB Project Area. The HIE informs remedial design by identifying specific places and surface treatments that avoid or minimize impacts or provide ecological benefits that mitigate for unavoidable impacts. Specific effects on riverbank design decisions considered and incorporated into the Pre-Final 90% RD are summarized below:

- Establish native riparian vegetation on riverbanks to the maximum extent feasible and practicable without compromising attainment of the RAO.
- Place natural materials (e.g., sand or beach mix, topsoil) on final grades within the riparian, active channel margin, shallow water, and deep water habitat zones.
- Remove derelict piling and related structural members from in-water and shoreline areas.
- Remove riprap, debris, and seawalls wherever feasible and practicable within the riparian, active channel margin, and shallow water zones.
- Limit the installation of new rock revetment to situations where it is required to maintain cap integrity by resisting erosive forces and ensuring geotechnical and seismic stability.

- Establish final grading within the active channel margin (ACM) and shallow water with slopes flatter than 5H:1V.

The HEA quantitatively considered the benefits and impacts of RA implementation across the range of habitats present within the SIB Project Area and determined there would be a deficit score reflecting a need for additional compensatory mitigation to make up for unavoidable impacts of the remedy and mitigation options are being considered for development between the Pre-Final 90% RD and the Final 100% RD.

3.0 RIVERBANK DESIGN CONSIDERATIONS

This section describes the approach to the RD for achieving RAO 9 for SIB Project Area riverbanks, including existing land use, ecological value, erosion, groundwater seepage, and geotechnical stability. The resulting design incorporated these considerations to produce remedial technology assignments.

3.1 REMEDIAL DESIGN TO ACHIEVE THE REMEDIAL ACTION OBJECTIVE

The portions of the SIB Project Area at and above the upper boundary elevation of the shallow water zone (+13 ft NAVD88) are considered riverbanks. A number of evaluations of the SIB Project Area riverbank conditions and applicable remedial technologies were used to develop design criteria for completing the riverbank RD.

The RD addresses the ROD requirement to evaluate riverbank slopes across the SIB Project Area to understand localized impacts on remedial activities. The RD addresses recontamination risk associated with erosion of contaminated riverbank soil through a combination of soil remediation and riverbank stabilization. The RD accomplishes these objectives using multiple components:

- Removal of a layer of riverbank soils (thickness varies by location);
- Providing a chemical barrier to seepage-based migration of dissolved COCs;
- Placement of vegetation or rock armoring surface treatment, to protect the barrier treatment layer; and
- Long-term monitoring of riverbank areas to assure a protective remedy.

The RD was completed to incorporate the placement of a CIL as the long-term barrier to any incidental migration of COCs from riverbank soils and to prevent CULs exceedances in downgradient surface water and sediment (described in Section 3.4.3). Vegetative covers or rock armoring (depending on location and driven by existing land use and geotechnically stable grades) provide physical protection of the CIL. Institutional Controls will guide and restrict disturbance of riverbanks, while long-term monitoring of shoreline conditions and requisite maintenance will ensure continued remedy effectiveness.

The construction details for riverbank work are presented in the CAPPING, SHORELINE PROTECTION AND OUTFALL SCOUR PROTECTION drawings (Volume III, Appendix V). Sheets CA100-CA301 provide the plans and sections of the excavation of riverbank soils,

placement of materials, and planting areas to address areas that have COC concentrations above RALs and PTW thresholds of the riverbank.

The ROD applies multiple considerations and requirements that have guided the determination of final slope, composition, and surface treatment (e.g., riprap, shoring, soil bioengineering, native vegetation). The riverbank design must transition continuously to the ACM and in-water remedy elements with respect to both remedial objectives and ecological requirements and considerations. The RD approach to riverbanks involves removing, grading, and placing material on existing riverbanks, with a focus on maintaining stability both above and below the water level. Significant portions of the existing riverbank slopes are only marginally stable, and slope reconfiguration or stabilization measures will be required to achieve the RAO.

As described in Section 4.3 of this RDTM, the RD incorporates ecological features. As a result, the riverbanks will be finished with native vegetation communities where such treatment is precluded by shoreline structures, steep slopes that require engineering stabilization, or requirements of the property owner or facility operation.

3.2 EROSION EVALUATION

The PDI ER included completion of a bank stability analysis using the BANCS model including BEHI and NBS determinations (Rosgen, 2001; 2014). The BEHI is a procedure for assessing potential stream bank erosion conditions. The riverbank erosion analyses are presented in the PDI ER Appendix D, Riverbank Characterization Data Report (HGL, 2024a). Existing riverbanks in the SIB Project Area are erosive and unstable and require active remediation to prevent additional erosion and recontamination of the in-water areas due to both hydraulic instability (wind-waves, boat wakes, rainfall runoff), and geotechnical instability (global slope stability, surficial material stability).

3.3 GEOTECHNICAL STABILITY

The ROD (EPA, 2017) highlights the necessity of evaluating the geotechnical stability of slopes throughout the SIB Project Area. This assessment is essential for understanding the localized impacts on the design and implementation of remedial activities.

The existing riverbanks are currently marginally stable, with localized areas of instability. The riverbank reconnaissance conducted during the PDI noted multiple areas of surficial soil movements (HGL, 2024a). Slope stability analyses have been undertaken for the existing and proposed remedial condition and reported in the GDTM (Volume I, Appendix I). The results of the stability analyses confirmed that the existing slopes will require reconfiguration as part of the RD. The aim of the reconfiguration is to flatten the slopes to a stable angle, while limiting the impact on the shoreline and overwater structures. This reconfiguration is significantly responsible for the geometry of the RD of side slopes in SIB. The additional fill to be placed for this reconfiguration of slopes has been evaluated within a hydraulic (“no-rise”) analysis of the water surface elevation within SIB, as presented in the Flood Impact Evaluation Technical Memorandum, included as Attachment B.

The recommended maximum slope gradients for the Pre-Final 90% RD range between 2.5H:1V and 2.75H:1V for both temporary and permanent unreinforced slopes. Detailed stability evaluations and design recommendations are provided in the Geotechnical Design Technical Memorandum (GDTM; Volume I, Appendix I). Areas of the side slopes of the SIB below MHW are addressed with capping, and the details of that design are presented in the Cap Design Technical Memorandum (CDTM, Volume I, Appendix E).

3.4 REMEDIAL TECHNOLOGY ASSIGNMENTS

The remedial approach presented in this section utilizes technology assignments for the SIB Project Area riverbanks consistent with the Technology Application Decision Tree as seen in ROD Figure 28 (EPA, 2017). Riverbank guidelines were further refined in the Remedial Design Guidelines and Considerations (RDGC), Appendix D, Figure 4 (EPA, 2025) which contains the *Decision Guide for Characterizing and Implementing Remedial Action for ROD Riverbanks*.

Drawing sheet CA107 presents the plan view of the resulting RD for the CIL protection covers.

3.4.1 Excavation and Grading

Excavation of the riverbanks is intended to be performed as needed for proper construction of bank remediation. Most areas require an initial removal effort for clearing and grubbing, which entails removal of surface materials such as vegetation, debris, and existing riprap. The depth of the excavations vary, depending on the location with the SIB and the elevation on the riverbank. In general, the goal is to develop a smoothly graded slope over which the CIL and armored bank protection or planted areas can be constructed.

The geometric/topographic design of the slopes of riverbanks is governed by static and seismic geotechnical stability, navigation depth considerations at the bottom of the slope (below the riverbanks), the presence of in-water structures, and efficient material use. Stability of the structures and slopes was evaluated according to criteria in the RGDC (EPA, 2021b) and is presented in the GDTM (Volume I, Appendix I). Over the vast majority of the SIB Project Area, the proposed riverbank slope (after remediation) is similar to the existing slope. In these areas, only limited excavation is proposed in some areas to smooth the slope into the design slope from the toe of slope to TOB. Samples will be collected from these riverbank soils at the completion of the excavation work in these areas. These slopes typically require modest backfill in some areas as well, resulting in minimal net excavation. Excavated material with COC concentrations exceeding the CULs cannot be re-used on-site. However, if excavated material is shown to not have CUL exceedances, it could be reused as fill in the RA.

On the Swan Island shoreline, roughly between the Wind Tunnel and Lagoon Wharf, the existing slope is over-steepened and requires flattening to achieve the static and seismic slope stability guidelines in the RDGC. Therefore, in these areas, backfill with imported materials (or excavated material from the riverbank, if it does not contain CUL exceedances) is required after an initial clearing and grubbing effort to remove vegetation and surface debris that represent an undesirable foundation for the slope materials.

3.4.2 Backfill Materials

Imported backfill is required to support bank reconstruction. The structural backfill will consist of clean, angular materials with geotechnical properties (as described in Technical Specification Section 31 00 00) that allows proper compaction and slope performance.

For underwater applications (below the riverbanks), backfill will be placed using a well-graded stone with a D50 between 1 and 3 inches. These materials will be required to limit fines contents, with less than 5 percent (%) passing the No. 200 sieve. Backfill in these areas will follow the general gradation and material quality standards of the Oregon Department of Transportation (ODOT) Standard Specifications 00330.15. Where structural fill is needed for overwater infrastructure, material selection and placement will conform to ODOT Specification 00510.13.

3.4.3 Chemical Isolation

Riverbank areas were sampled as part of the Pre-Design Investigation (PDI), and soil concentrations presented in Table 1-3b of the CDTM (Volume I, Appendix E) show RAL or PTW threshold exceedances from samples collected within each of the future 30 Riverbank Certification Units (RCUs) in the SIB Project Area. Based on Figure 4 of the *Guidelines for Riverbank Characterizations and Evaluations at the Portland Harbor Superfund Site* (RDGC, Appendix D), RCUs will be remediated per ROD Section 14 and design requirements in 14.2.9 (EPA, 2025).

All riverbank areas will be remediated with a CIL placed on the smoothly graded slope, after excavation and backfill placement. The CILs vary in type, depending on the location and land use of the riverbank.

3.4.3.1 Extents of CILs

All riverbank areas have CILs that extend down to the MHW elevation. The upper limit of the extent of the CIL placement for an area depends on the potentiometric conditions of SIB. As described in the groundwater modeling memo (Attachment A), groundwater potentiometric elevations vary, depending on the river stage. Though higher elevations of the riverbank will experience much less potential seepage of groundwater than the bottom sediments of SIB (due to the total time throughout a year that the riverbank experiences different river surface elevations), the stratigraphy and hydraulic conductivity of riverbank soils may allow exfiltration of groundwater from the banks as high as 2.4 ft of vertical elevation above OHW on the Mocks Bottom riverbank slopes. The CIL extends to +22.5 ft NAVD88 from the south corner of SIB (Outfall S2) and all riverbank areas to the northeast and north-northwest (head of the basin and Mocks Bottom slopes).. However, riverbank areas on the Swan Island side of SIB experience much less upgradient groundwater head, and so the CIL extends only to +20.5 ft NAVD88 on riverbanks from the southern-most corner (Outfall S2) west-northwest around the Swan Island portion of the Project Area through the Berth 312 area.

3.4.3.2 Compositions of CIL Evaluated for Riverbank Design

For riverbank areas that are steep grades (steeper than 3H:1V) and around structures, rock revetment is used as the surface treatment. For these areas, a reactive core mat (RCM) CIL will be

placed beneath the stone. The RCM is a geocomposite product that includes an absorbative core composed of activated carbon (AC), sandwiched between geotextile components. The RCM CIL was evaluated for conservative modeled conditions for seepage rates on riverbanks where vegetation will not be drawing down soil moisture through evapotranspiration. The evaluation of the RCM CIL is provided in the CDTM (Volume I, Appendix E) under Selected Constructable Alternatives F and G.

For the remainder of the riverbank areas, a vegetative cover (described in Section 4) will be placed, providing ecological value, a physical barrier to COCs within the riverbank soils, mitigation of potential seepage through evapotranspiration, and long-term protection from erosion. Underneath the vegetative cover, the CIL was designed to be an effective barrier to the migration of dissolved contamination, should groundwater levels produce conditions of seepage from the riverbanks. This vegetative cover CIL comprises a mixture of clean, imported topsoil with 3 percent by weight imported biochar, which is moderately compacted within a cellular confinement system for construction. The requirements of the construction of this topsoil/biochar CIL are detailed in Specification Section 31 32 16 Topsoil Chemical Isolation Layer for Riverbanks (Volume III, Appendix U).

The performance of this CIL at preventing the migration of COCs within groundwater seepage was evaluated using CapSIM, as described in Attachment C. The combination of the CILs and cover systems is described below.

3.4.4 Constructable Alternatives of Riverbank Covers

The CDTM presents the process of assigning selected constructible alternatives for capping areas. Riverbank areas armored with rock layers were similarly assigned cover systems based on minimum alternative protectiveness. Selected constructible alternatives for rock-armored slopes are:

- **Selected Constructible Alternative F**: 0.8 inches (2 centimeters [cm]) of Tektoseal-AC with overlying 3 ft (90 cm) of stone protection system in revetment zones, including 2 ft (60 cm) of armor and 1 ft (30 cm) of bedding stone.
- **Selected Constructible Alternative G**: 1.6 inches (4 cm) of Tektoseal-AC with overlying 3 ft (90 cm) of stone protection system in revetment zones, including 2 ft (60 cm) of armor and 1 ft (30 cm) of bedding stone.

Riverbanks remediated and replanted with vegetation were assigned:

- **Selected Constructible Alternative H**: 12 inches (30.5 cm) of topsoil and biochar mixture with an overlying 24 inches (61 cm) of topsoil, planted according to the habitat types of the ecological design (Section 4).

Bank erosion protection is achieved using a combination of rock revetment in the more energetic areas with steeper slopes, up to elevation +20 ft NAVD88 (OHW). In a few steeper areas, rock revetment is required to extend to top-of-slope. The Design Drawings (Volume III, Appendix V) detail the particular areas addressed by the riverbank covers.

However, the vast majority of the SIB Project Area riverbank includes planted vegetation as the bank stabilization for areas above elevation +20 ft NAVD88.

In areas flatter than 3H:1V and in the low energetic areas predominantly found at the head of SIB, habitat mix (less than 2-inch rounded gravel) serves as erosion protection for the sediment cap and extends from deeper water up to elevation +13 ft NAVD88 on unplanted slopes. Habitat mix will extend to +9.4 ft NAVD88 on planted slopes at the lower elevation of wetland vegetation communities.

Planted areas include lifts of soil bags wrapped in coir fabric (Envirolok or similar) to provide elevation gain and facilitate insertion of flatter areas (minimum 3H:1V, or flatter) above each lift for planting. The lifts themselves are erosion resistant in the short term, due to the bags and coir fabric wrap. In the long term, roots and woody vegetation will provide structural support and erosion resistance. The planted areas will be covered in jute netting or similar to protect the topsoil during initial plant growth.

Figure 3-1 shows the alternative assignments for riverbanks throughout the SIB Project Area.

4.0 RIVERBANK ECOLOGICAL DESIGN CRITERIA

4.1 TOP OF BANK TRANSITION

Upland areas immediately beyond the SIB Project Area boundary (TOB) are largely developed with existing features such as buildings, vertical wall structures, paved/gravel parking areas and access roads, perimeter/security fences and maintained lawn areas. Efforts have been made in the riverbank design to preserve/protect existing structures and minimize disturbance of paved/gravel areas and lawn areas. However, to excavate and construct revetment keys at the TOB for construction of maximum slopes necessary for riverbank stabilization, the disturbance of existing pavement, gravel and lawn areas and removal of existing fencing will be required in some areas where unavoidable. In these cases, the in-kind restoration of these existing features is proposed at the same line and grade as the pre-existing conditions. Therefore, there will be no change in existing stormwater runoff patterns resulting from riverbank stabilization/improvements.

4.2 EROSION CONTROL DURING REMEDIAL ACTION CONSTRUCTION

Temporary erosion control is required to minimize the erosion of excavated/smoothed slopes into SIB during construction, prior to permanent bank protection and planting. Erosion control measures consist of soil logs and similar erosion best management practices placed at the top of slope to minimize flow down the banks. It is not anticipated that the slope will require a complete soil cover throughout the temporarily excavated/smoothed condition.

The RA Contractor will be required to develop a design for a temporary erosion control (TESC) plan. Requirements for that TESC Plan are addressed in Specification Section 31 25 00 Erosion and Sedimentation Control. The TESC Plan to be prepared by the RA Contractor will include best management practices and engineering controls to manage the effects of erosion during active construction on the riverbanks.

4.3 HABITAT TYPES AND LOCATIONS

4.3.1 Reference Condition

The re-introduction of native habitat elements is often centered on the characterization of pre-development conditions which guide design elements. This is done because the common habitat restoration directive is to restore at least a part of natural habitat conditions that once existed prior to human disturbance. However, the SIB Project Area has been manipulated since the late 1800s (HGL, 2024b). Historically, the Project Area was an active riverside habitat with overbank marsh that was once part of the active channel of the Willamette River and connected to a low elevation active floodplain (Mocks Bottom). Industrialization of the Project Area disconnected the area from the flow of the river, converting SIB into a backwater lagoon that is armored and disconnected from the historic floodplain. Therefore, it is infeasible to recreate the pre-disturbance, riverine ecology that once existed. Instead, the habitat elements considered for the Project Area are intended to enhance the existing ecological function of a quiescent backwater refuge with a diverse riparian riverbank. Two nearby freshwater tidal wetland areas that have a backwater slough present were selected for identifying reference conditions. One is Oaks Bottom (USFWS, 1981) which is approximately 7 miles upstream of SIB on the Willamette River. The other is Government Island (USFWS, 2009) approximately 8.5 miles as the crow flies and approximately 12 miles upstream of the confluence of the Willamette and Columbia Rivers.

4.3.2 Current Condition

The current condition of SIB Project Area riverbanks discussed in this section are the segments that are exposed and not under, or immediately adjacent to, existing marine infrastructure. All areas of riverbank that are covered by infrastructure are underlain by weathered riprap.

The conditions that now exist along exposed riverbanks within the SIB Project Area exhibit the characteristics of a tidal wetland in the lower elevations of the riverbank and transition to woody riparian vegetation within the upper banks. The Project Area experiences tidal cycles from which varies the daily water level over a range of 3 ft to 4 ft with a maximum range of approximately 6 ft (HGL, 2024a).

A key characteristic of the tidal conditions and species selection within tidal wetland communities is the range of salinity, particularly during lower water levels when a wedge of ocean waters can propagate upstream. Salinity within SIB was determined to vary between 0.04 and 0.05 parts per thousand (ppt). In freshwater tidal wetlands, the salinity of the oligohaline zone (the low salinity zone, before transitioning to nontidal riparian communities), is typically less than 0.5 ppt. Salinity at SIB is a tenth of the salinity necessary for even a low salinity zone; therefore, SIB is characterized as freshwater.

The lower elevation of portions of the riverbanks is sloped at gradients of 20% (1H:5V) or less. During a 1%-chance flood event, the riverbanks are exposed to maximum shear stresses less than 0.5 Pascal and wave heights typically less than 1.5 ft.

Existing vegetation on the riverbanks is sparse. Most established plants are invasive species such as Himalayan blackberry, English Ivy, and Scotch broom. A stand of mature black cottonwood

grows on a strip of the upper bank of the southwest corner of the basin; however, most trees are not considered healthy, and the understory is mostly invasive vegetation. Details of habitat conditions are described in the Habitat Conditions Survey Report (PDI ER, Appendix J, HGL, 2024a).

The SIB Project Area riverbanks have the capacity to support vegetation communities ranging from tidal freshwater marshes at the wetted shoreline to tree-dominated riparian communities above the ordinary high water line.

4.3.3 Habitat Goals

In addition to the primary goal of reducing migration of COCs in riverbank to sediment and surface water such that levels are acceptable in sediment and surface water for human health and ecological exposure (i.e., achieving RAO 9), applicable or relevant and appropriate requirements (ARARs) further shape the riverbank design in the SIB Project Area in terms of habitat goals. Table 4-1 summarizes the ARARs and other criteria that have been applied to the riverbank habitat design.

Table 4-1 Habitat Goals Related to ARARs

Goal	Related ARAR
Establish viable refuge for ESA-listed fish species	ARAR: OAR 635 100 0135 – Incorporate preferred habitat for federally-protected species ARAR: Magnuson Stevens Fishery Conservation and Management Act – Minimize impact on essential habitats ARAR: ESA – Minimize impact on essential habitats *Other: Yakama Nation – Recover ESA-listed and tribally important species*
Connect lagoon habitat with river	*Other: Yakama Nation – Develop continuum of habitat ("string of pearls, series of stepping stones")*
Create self-sustaining, native riverbank vegetation	*Other: Yakama Nation – Functioning ecosystem; riparian vegetation*
Establish diversity of tidal freshwater wetlands	TBC: EO 11990 – Incorporate nascent wetlands *Other: Yakama Nation – Create off-channel habitat, restore wetlands* *Other: Yakama Nation – Diversity of nearshore shallow habitat (large wood, diverse shallows)*

Notes:
EO = Executive Order
ESA = Endangered Species Act of 1972
OAR = Oregon Administrative Rules

The primary habitat goal met by the RD's proposed riverbank topography is to increase marsh area elevations where the river hydrology supports hydrophytic vegetation (between mean daily low water during growing season or +9.4 ft NAVD88 to +15.4 ft NAVD88). Wherever possible, the slopes within these freshwater tidal elevations have been designed as 5H:1V or less to create maximize the area that supports hydrophytic wetland vegetation.

4.3.4 Native Riparian Vegetation Communities

The following lists the habitat types that will be placed from the upper extent of shallow in-water region to TOB throughout the Project Area. The placement of the habitat types is guided primarily

by the vertical elevation and the associated hydroperiod (each vertical area is outlined in Table 4-2) with adjustments applied horizontally to account for localized site conditions such as stormwater outfalls, groundwater seeps, and proximity to infrastructure.

Table 4-2 Vertical Habitat Zones

Habitat Type	Vertical Zone	Description
Riparian vegetation community – Riparian Tree/Shrub	TOB to OHW	This area will be dominated by trees and shrubs where trees are proposed only in this upper portion of the riverbank. An important consideration for this zone is to allow for proper growth of tree roots.
Palustrine Scrub Shrub	Upper portion of the ACM from MHW to OHW	This scrub-shrub community is a transition between the woody species above OHW and the herbaceous marsh species at the wetted shoreline. The mature height of species in this habitat zone is not expected to exceed 20 ft.
Riparian vegetation community –Tidal Freshwater Wetland Marsh	The typically wetted portion of the ACM (between mean high and mean low water)	This community is proposed for portions of the riverbank where the upper shallows are a minimum of a 5H:1V slope or flatter. This community would include obligate herbaceous species in lower elevations and facultative species in the transition to the scrub-shrub habitat.
In-water Large Wood, Beach mix	Below MLW	Large wood pieces not including treetops or root wads placed on the riverbank to provide cover and foraging for fish. All large wood pieces are placed low on the bank toe and within shallow water zones to ensure submergence throughout most of the year.

A key parameter to species survival is the frequency of water at root depth. The water table changes not only in elevation but seasonally, and in response to the tidal flux. Therefore, the statistic frequency of the water surface is a critical determinant to bound the vertical extents of the vegetation communities. Figure 4-1 charts the frequency that elevations on the riverbank are expected to be submerged, particularly during the growing season. This submergence frequency directly guides the selection of species for elevations on the bank and where transitions between communities are expected.

An important characteristic of the vegetation communities is that they are not bound by a firm demarcation but rather that species plantings emphasize transitions between habitat types. This creates a diverse habitat as well as allow for plant communities to develop along a transitional gradient adaptable to site conditions.

4.3.4.1 Tree/Shrub, Riparian Vegetation Community

This area is a mix of riparian shrubs and trees that are composed of pioneering and long-term species. This area, which is above the OHW mark but below the TOB, is a fractional introduction of a riparian community. The transitional zone shown in Figure 4-2 illustrates the role that this community is expected to occupy in the Project Area. The shrubs and trees planted in this area will provide the vital root matrix and shade to the lower tidal wetland (shown as the “toe zone” and “bank zone” in Figure 4-2). The “overbank zone” depicts a riparian bench that, if not present in this area, will result in the ecological community lacking a natural connection to a mature upland

(the "upland zone") that can provide a diverse seed source. Therefore, the species selection for this community include a diverse understory to introduce a vibrant, self-sustaining community.

4.3.4.2 Considerations Regarding Tidal Freshwater Wetland Marsh

The design will create tidal freshwater wetland marsh community, designated at the wetted shoreline. Marsh vegetation is not currently observed in the Project Area. It is, however, a vegetation community commonly found along natural tidally influenced freshwater shorelines with low gradients. The absence of marshes at the present in the SIB Project Area is likely related to multiple factors, including the ecologically young lagoon environment, bank armoring, steep gradients that reduce the area for wetland species to establish, and dominance of invasive species.

4.3.5 Plant Palette and Rationale

The plant list for the SIB Project Area riverbank habitat design is presented in Table 4-3, attached at the end of this memorandum. This table provides the species selected for planting to establish the habitat communities described below. The species included in this table meet the guidelines specified in the Willamette Greenway Plan referenced in the City of Portland code for greenway landscape planning (Title 33, Chapter 33.440, referred to as the "Greenway Code"). This chapter was also referenced to establish the minimum densities of trees and shrubs included in the plant list. For nearly all communities, plant design densities will exceed those outlined in the Greenway Code to ensure natural clustering and to counter anticipated mortality.

The existing native tree species that were identified in the SIB Project Area above OHW (HGL, 2024a) were contrasted with the plant communities from the Portland Plant List (City of Portland, 2016) as specified in the Greenway Code. The applicable plant communities the existing SIB Project Area native species belong to include Western Hemlock Doug Fir Forest, Mixed Coniferous/Deciduous Riparian Forest, Deciduous Forested Wetlands and Floodplains, and Scrub-Shrub Wetlands. These plant communities are the target plant communities for the riparian planting area. The tree species selected are dominant in the plant communities listed above, present in the SIB Project Area or the Oaks Bottom reference site and are commercially available in the Portland area. A minimum of one tree will be planted every 20 ft of river frontage (required by the Greenway Code) across the hydrologic elevation gradient from TOB down to the lower elevation wetland areas.

The shrub dominant plant community, including scrub-shrub wetland areas will be located below OHW down to MHW or to the geotextile chemical isolation barrier limits. These species were selected based on their presence in the scrub-shrub wetland plant community (City of Portland, 2016), as well as presence in the upper elevation plant communities to be able to adapt and be a seed source throughout the Project Area, their presence at the reference site, and common use in Pacific Northwest tidal restoration projects, as well as commercial availability in the Portland area. Shrubs will be minimally planted every 25 square ft of the intended riverbank community, as required by the Greenway Code.

In areas with geotextile CIL, plant species will be limited to herbaceous plant species with fine roots rather than woody species.

The herbaceous emergent marsh plants will be primarily located below MHW and were predominantly selected based on presence in marsh and scrub-shrub plant communities, hydrophytic wetland indicator status, presence at the reference site, and commercial availability in the Portland area.

4.3.6 Key Design Elevations

The habitat types that will exist in three primary zones are defined by elevation and the relative access to the water level. These habitat types are: shallows, ACM, and upland riparian riverbank to the TOB Project Area boundary extent. Table 4-4 defines the elevations that demark the vertical extents of vegetation communities. The elevations are not considered to be a strict boundary, but rather to identify vertical extents on the riverbank where habitat types transition from one to another and maximum species overlap is expected.

It's important to emphasize that, while the water elevation within SIB is technically sloped from the head to river confluence (draining from the head to the mouth of the basin), the difference is sub-inch. Therefore, for planting considerations, it is assumed that SIB is a flat surface and design elevations are applied equally throughout the Project Area.

4.3.7 Riverbank Substrate and Subgrade Layering

In areas where slope flattening is not required, the riverbanks will be cleared and grubbed to a minimum depth of 18 inches to remove invasive species and armor layer. Grain-size analysis of subsurface soil samples collected during the PDI (HGL, 2024a) indicate that the subgrade media is composed of mostly fine-grained soils, predominantly silty sand or sand with clay that is suitable for vegetation subgrade.

Reference soil conditions indicate silt loam soils predominate in the top 5 ft of analogous wetland reference sites (NRCS, 2025). Reference soils indicate organic matter (OM) content of 1% to 4% in the top 15 inches and 0.5% to 2% in the top 5 ft. Portland area, naturally-occurring wetland soils have an average of 10% OM in the top 2 inches (range of 1% to 45%) and 6% to 7% in the top 12 inches (Schaffer and Ernst, 1999). OM content of 10% is also common for the top 12 inches of newly planted areas to help plants establish. Over time the OM will travel down through the soil profile as water infiltrates and carries with it the OM.

The proposed planting soil medium is 10% OM for the top 12 inches and 2% to 3% OM from 12 to 24 inches. Below 24 inches, soil substrate would be composed of either native soil, an imported backfill made up of predominantly fine-grained soil similar to existing subsoils, or biochar mixed in with soil, as discussed in Section 4.3.8.

5.0 REFERENCES

City of Portland, 2016. *Portland Plant List*. Bureau of Planning and Sustainability, City of Portland, Oregon.

HydroGeoLogic, Inc. (HGL), 2022. *Pre-Design Investigation Work Plan, Revision 3*. Preliminary Remedial Design Services, Swan Island Basin Project Area, Portland Harbor Superfund Site, Portland, Multnomah County, Oregon. Revision 3. May.

HGL, 2024a. *Pre-Design Investigation Evaluation Report, Revision 2*. Remedial Design Services, Swan Island Basin Project Area. CERCLA Docket No. 10-2021-001. December.

HGL, 2024b. *Basis of Design Report, Revision 1.* Remedial Design Services, Swan Island Basin Project Area. CERCLA Docket No. 10-2021-001. November.

Natural Resources Conservation Service (NRCS), 2025. Web Soil Survey. U.S. Department of Agriculture. At URL: https://websoilsurvey.nrcs.usda.gov/app/. Accessed June 9, 2025.

U.S. Environmental Protection Agency (EPA), 2017. *Record of Decision, Portland Harbor Superfund Site, Portland Oregon.* U.S. Environmental Protection Agency Region 10, Seattle, Washington. January.

EPA, 2021a. *Administrative Settlement Agreement and Order on Consent for Remedial Design. Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10*. January 20.

EPA, 2025. *Guidelines for Riverbank Characterizations and Evaluations at the Portland Harbor Superfund Site*. U.S. Environmental Protection Agency Region 10. July 14.

U. S. Fish and Wildlife Service (USFWS), 2009. National Wetlands Inventory. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

USFWS, 1981. National Wetlands Inventory. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

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TABLES

Table 4-3
Plant List of the Swan Island Basin Project Area
Riverbank Design Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Scientific Name (value)	Common Name	Wetland Indicator Status	Plant Community
Herb Strata			
Alisma triviale var. americanum	American Water–plantain	OBL	Emergent/Marsh (MLW - MHW)
Carex stipata	Sawbeak sedge	OBL	Emergent/Marsh (MLW - MHW)
Mimulus guttatus	Monkey flower	OBL	Emergent/Marsh (MLW - MHW)
Scirpus microcarpus	Small-fruited bulrush	OBL	Emergent/Marsh (MLW - MHW)
Beckmannia syzigachne	Slough grass	OBL	Emergent/Marsh (MLW - MHW), Scrub-Shrub Wetland (MHW - Wetland)
Carex obnupta	Slough sedge	OBL	Emergent/Marsh (MLW - MHW)), Scrub-Shrub Wetland (MHW - Wetland)
Eleocharis palustris	Creeping spike–rush	OBL	Emergent/Marsh (MLW - MHW), Scrub-Shrub Wetland (MHW - Wetland')
Glyceria occidentalis	Northwest mannagrass	OBL	Emergent/Marsh (MLW - MHW)
Camassia leichtlinii	Giant camas	FACW	Emergent/Marsh (MLW - MHW)
Deschampsia caespitosa	Tufted hairgrass	FACW	Emergent/Marsh (MLW - MHW'), Scrub-Shrub Wetland (MHW - Wetland)
Hordeum brachyantherum	Meadow barley	FACW	Emergent/Marsh (MLW - MHW)
Juncus effusus var. pacificus	Soft rush	FACW	Emergent/Marsh (MLW - MHW'), Scrub-Shrub Wetland (MHW - Wetland)
Agrostis exarata	Spike bentgrass	FACW	Scrub-Shrub Wetland (MHW- Wetland)
Deschampsia elongata	Slender hairgrass	FACW	Scrub-Shrub Wetland (MHW- Wetland)
Juncus tenuis	Slender rush	FAC	Emergent/Marsh (MLW - MHW')
Athyrium filix-femina	Lady fern	FAC	Riparian Scrub-Shrub (Wetland - OHW), Riparian Forest (OHW - TOB)
Lupinus rivularis	Stream lupine	FAC	Riparian Scrub-Shrub (Wetland - OHW)
Elymus glaucus	Blue wildrye	FACU	Riparian Scrub-Shrub (Wetland - OHW), Riparian Forest (OHW - TOB)
Polystichum munitum	Sword fern	FACU	Riparian Scrub-Shrub (Wetland - OHW), Riparian Forest (OHW - TOB)
Eriophyllum lanatum	Woolly sunflower/ Oregon sunshine	UPL	Riparian Forest (OHW - TOB)
Gilia capitata	Bluefield gilia	UPL	Riparian Forest (OHW - TOB)
Madia sativa	Chile tarweed	UPL	Riparian Forest (OHW - TOB)

Table 4-3
Plant List of the Swan Island Basin Project Area
Riverbank Design Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Scientific Name (value)	Common Name	Wetland Indicator Status	Plant Community
Shrub Strata			
Malus fusca	Oregon (Pacific) crabapple	FACW	Scrub-Shrub Wetland (MHW- Wetland)
Physocarpus capitatus	Pacific ninebark	FACW	Scrub Shrub Wetland (MHW - Wetland), Riparian Scrub-Shrub (Wetland - OHW), Riparian Forest (OHW - TOB)
Salix sitchensis	Sitka willow	FACW	Scrub Shrub Wetland (MHW - Wetland), Riparian Scrub-Shrub (Wetland - OHW), Riparian Forest (OHW - TOB)
Spiraea douglasii	Western spiraea	FACW	Scrub Shrub Wetland (MHW - Wetland), Riparian Scrub-Shrub (Wetland - OHW), Riparian Forest (OHW - TOB)
Cornus sericea	Red osier dogwood	FACW	Scrub Shrub Wetland (MHW - Wetland), Riparian Scrub-Shrub (Wetland - OHW), Riparian Forest (OHW - TOB)
Salix hookeriana	Hooker's/ Coast/ Dune willow	FACW	Scrub-Shrub Wetland (MHW- Wetland)
Lonicera involucrata	Black twinberry	FAC	Scrub-Shrub Wetland (MHW- Wetland)
Ribes sanguineum	Red flowering currant	FACU	Riparian Scrub-Shrub (Wetland - OHW), Riparian Forest (OHW - TOB)
Rubus parviflorus	Thimbleberry	FACU	Riparian Scrub-Shrub (Wetland - OHW), Riparian Forest (OHW - TOB)
Symphoricarpos albus	Snowberry	FACU	Riparian Scrub-Shrub (Wetland - OHW), Riparian Forest (OHW - TOB)
Tree Strata			
Salix lucida var. lasiandra	Pacific Willow	FACW	Riparian Scrub-Shrub (Wetland - OHW); Scrub-Shrub Wetland (MHW-Wetland)
Alnus rhombifolia	White Alder	FACW	Riparian Scrub-Shrub (Wetland - OHW); Scrub-Shrub Wetland (MHW-Wetland)
Alnus rubra	Red alder	FAC	Riparian Forest (OHW – TOB)
Frangula purshiana	Cascara	FAC	Riparian Forest (OHW – TOB)
Populus balsamifera	Black cottonwood	FAC	Riparian Forest (OHW – TOB)
Thuja plicata	Western red cedar	FAC	Riparian Forest (OHW – TOB)
Tsuga heterophylla	Western hemlock	FACU	Riparian Forest (OHW – TOB)
Acer macrophyllum	Bigleaf maple	FACU	Riparian Forest (OHW – TOB)
Populus tremuloides	Quaking aspen	FACU	Riparian Forest (OHW – TOB)

Table 4-3
Plant List of the Swan Island Basin Project Area
Riverbank Design Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Scientific Name (value)	Common Name	Wetland Indicator Status	Plant Community
Pseudotsuga menziesii	Douglas fir	FACU	Riparian Forest (OHW – TOB)
Quercus garryana	Oregon white oak	FACU	Riparian Forest (OHW – TOB)
Arbutus menziesii	Pacific madrone	UPL	Riparian Forest (OHW – TOB)

Notes:
FAC = facultative
FACU = facultative upland
FACW = facultative wetland
OBL = obligate wetland
UPL = upland

Table 4-4
Key Elevations for Defining Approximate Boundaries of Riverbank Vegetation Communities
Riverbank Design Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Elevation (ft NAVD88)[1]	Vertical Habitat Area	Vegetation Community (Elevation range in ft NAVD88)	Significance	Rationale and Sources
TOB[2]	Riparian	Riparian Tree/ Shrub (TOB to +20)	Upper extent of Project Area Boundary	"River banks are defined as the area from the top of bank down to the river." ROD, Section 6.6.6 (EPA, 2017)
+20	ACM	Scrub-Shrub +20 to +15.4	OHW	USACE, Portland-Vancouver Harbor Information Package, 3rd Ed, Table A-2. OHW for Willamette. All of lower Willamette River assigned 16.6' NGVD as OHW (20.04 NAVD88, NOAA vertical datum transformation). Guidance for Riverbank Characterizations. PHSS, Figure 3; references PHSS RI, App A3, Table A3-5, Footnote b: "An elevation of +20 ft NAVD88 (ordinary high water mark [OHWM]) is the upper edge of the riverbank (DEQ, 2003)."
+15.4	ACM	Freshwater Tidal Wetland +15.4 to +9.4	Submerged 10% during the growing season (March 1 to October 31)	In Regional Supplement to the USACE Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region, wetland is defined where hydrophytic vegetation can grow and is submerged 10% of the growing season (Mar 1 – Oct 31). Elevation derived from Morrison Street gage water level data.
+13.0	ACM	N/A	***Upper extent of ROD "shallow region"*** MHW for PHSS	PHSS RI, App A3, Table A3-5, footnote a: An elevation of +13 ft NAVD88 (mean high water mark [MHWM]) is the elevation defining the shoreline boundary of the PHSS. This elevation is based on a DEQ memorandum dated July 9, 2003 to EPA regarding the upland/in-water boundary for the Superfund site (DEQ, 2003). Figure 3 of the Guidelines for Riverbank Characterizations and Evaluations at the Portland Harbor Superfund Site (EPA, 2025) uses +13 ft NAVD88 as the MHW elevation, revised from the 2019 version of the same document that used +10.14 ft NAVD88.
+12.0	ACM	N/A	Mean daily high water (USGS gage)	MHW level from USGS gage at Morrison Bridge. The mean daily high water and mean daily low water have been observed to be the typical boundaries for herbaceous marsh vegetation.

Table 4-4
Key Elevations for Defining Approximate Boundaries of Riverbank Vegetation Communities
Riverbank Design Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Elevation (ft NAVD88)[1]	Vertical Habitat Area	Vegetation Community (Elevation range in ft NAVD88)	Significance	Rationale and Sources
+9.42	ACM	Ballasted Large Wood +7 to +9.5 Beach mix +9.5 to +3.28	Mean daily low water during growing season. Lower extent of wetland plant community.	MLW level calculated using water level data from USGS gage at Morrison Bridge that included only measurements recorded during the growing season between March 1 and October 31.
+7.28	Main Channel	N/A	**OLW [design final].** MLW datum, Morrison Bridge tidal station.	From updated EPA guidance (-Email ref-), because a formal survey of OLW was not performed for PHSS, the tidal MLW is an acceptable determination of OLW.
+5.1	Main Channel	N/A	OLW, initially reported in ROD	OLW was stated in the Final Portland Harbor Programmatic EIS and Restoration Plan, App B Lamprey Monitoring Plan, Section "Restoration project sites" (page B-5) Lamprey will be monitored in off-channel wet areas and areas that are deeper than OLW (5.1 ft NAVD88) at each restoration project site. Also referenced in Habitat Impact Evaluation; source: Anchor QEA, 2012, PH RI/FS, Draft Mitigation Framework (not yet found). Riverbank observations of vegetation and assessment of submergence frequency indicate that +5.1 ft is underwater nearly 100% annually.
+3.28 (-2 CRD)	Main Channel	N/A	Lower extent of ROD "Shallow Region"	Defined in ROD, 14.2.4 Shallow Region, page 108: The shallow region is defined as shoreward of the riverbed elevation of approximately -2 ft CRD. -2 CRD converted to +3.28 NAVD88 using NOAA Vertical Datum Transformation. The NMFS declaration of the extent of shallow water (below) is determined to override this initial ROD determination, and then redefined again in guidance for performing Habitat Equivalency Analysis.
-2.7	Main Channel	N/A	Shallow water, 10 ft water depth	Shallow water 10 ft depth as defined by depth below MLW (El 7.28 – 10 ft = El -2.7).

Table 4-4
Key Elevations for Defining Approximate Boundaries of Riverbank Vegetation Communities
Riverbank Design Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Elevation (ft NAVD88)[1]	Vertical Habitat Area	Vegetation Community (Elevation range in ft NAVD88)	Significance	Rationale and Sources
-9.72 (-14.92 CRD)	Main Channel	N/A	Lower extent of shallow water by NMFS definition for Portland Harbor	ROD, Tribal Comment/Response 3.1.78: "NMFS defines shallow water as above -15 feet CRD and EPA is coordinating with NMFS to ensure consistency."
-12.7	Main Channel	N/A	Shallow water, 20 ft water depth	Shallow water 20 ft depth as defined by depth below MLW (El 7.28 – 20 ft = El -12.7).

Notes:
[1] Elevation values shown in **bold** and highlighted in color are key elevations that define riverbank design elements. Elevations in plain text are provided for informational or historical context.
[2] TOB elevation is not a specific datum but a morphological feature where the riverbank slope breaks to the flat upland surface.

ACM = Active Channel Margin
App = appendix
CRD = Columbia River Datum
DEQ = Oregon Department of Environmental Quality
EIS = Environmental Impact Statement
El = elevation
EPA = U.S. Environmental Protection Agency
FS = feasibility study
MHWM = Mean High Water Mark
MLW = Mean Low Water
N/A = not applicable
NAVD88 = North American Vertical Datum of 1988
NGVD = National Geodetic Vertical Datum
NMFS = National Marine Fisheries Service
NOAA = Oceanic and Atmospheric Administration
OHW = Ordinary High Water
OHWM = Ordinary High Water Mark
OLW = Ordinary Low Water
PHSS = Portland Harbor Superfund Site
RI = remedial investigation
ROD = Record of Decision
SIB = Swan Island Basin
TOB = top of bank
USACE = U.S. Army Corps of Engineers
USGS = U.S. Geological Survey

FIGURES



Head of the Basin

Revetment

Main Basin

Dredge to RAL

No Capping Needed

Swan Island Basin Project Area Boundary

Selected Constructible Alternatives:

Selected Constructible Alternative A
(12" of unamended sand with overlying 24" of erosion protection layer Cap Type 1)

Selected Constructible Alternative B
(12" of 5% GAC-amended sand with overlying 24" of erosion protection layer Cap Type 2)

Selected Constructible Alternative C
(12" of 5% GAC-amended sand with overlying 24" of erosion protection layer Cap Type 1)

Selected Constructible Alternative D
(6" of 5% GAC-amended sand with overlying 36" of stone protection system, including 24" of armor and 12" of bedding stone)

Selected Constructible Alternative E
(12" of 5% GAC-amended sand with overlying 36" of stone protection system, including 24" of armor and 12" of bedding stone)

Selected Constructible Alternative F
(0.8" of RCM with overlying 36" of stone protection system in revetment zones, including 24" of armor and 12" of bedding stone)

Selected Constructible Alternative G
(1.6" of RCM with overlying 36" of stone protection system in revetment zones, including 24" of armor and 12" of bedding stone)

Selected Constructible Alternative H
(12" of topsoil and biochar and 24" of topsoil)

Notes:
% = percent
" = inch
cm = centimeter
DCU = Dredge Certification Unit.
ft = feet
CCU = cap certification unit
GAC = granular activated carbon
RAL = remedial action level
RCU = Riverbank Certification Unit
USCG = United States Coast Guard

Figure 3-1

SIB Project Area Selected Constructible Alternatives

Prepared on 10/22/2025
Riverbank Design Technical Memorandum
Swan Island Basin Remedial Design Group

HGL PACIFIC groundwater GROUP | MM MOTT MACDONALD | COAST & HARBOR ENGINEERING BRIDGEWATER GROUP

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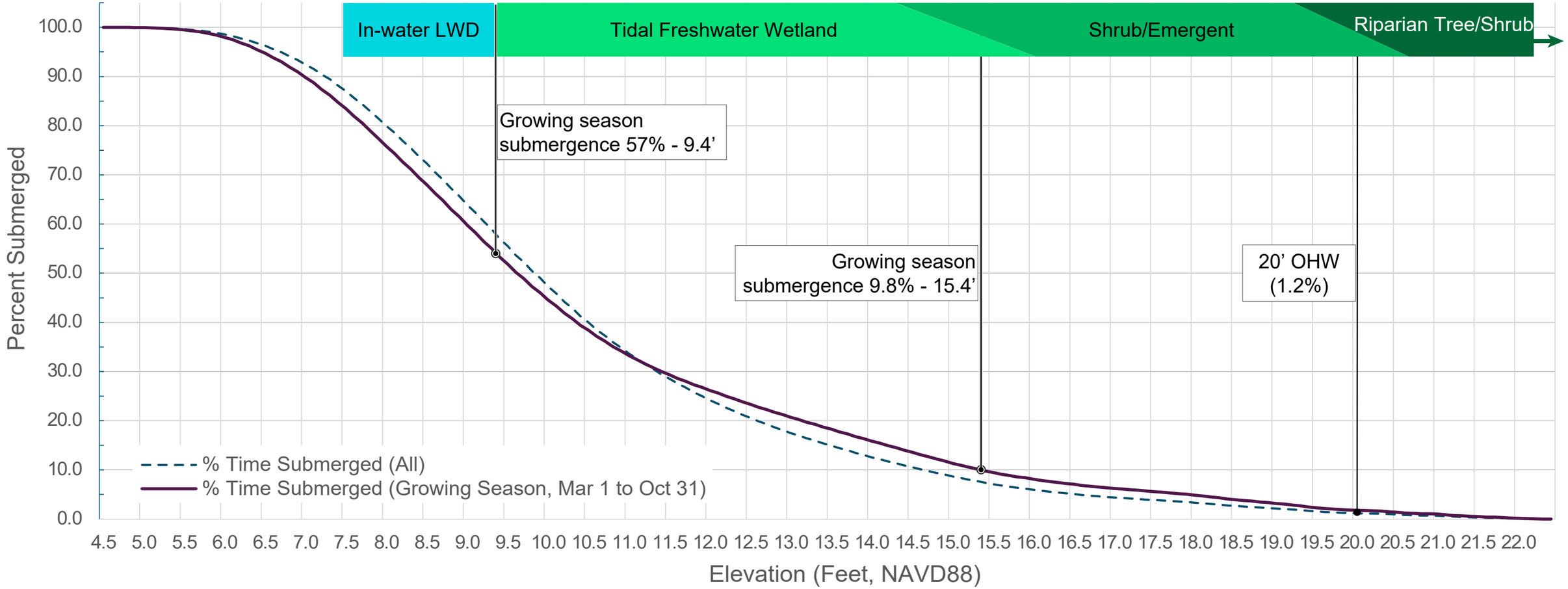

Notes:
LWD - Low Water Datum
NAVD88 - North American Vertical Datum of 1988
OHW - Ordinary High Water

Source: U.S. Geological Survey, Morrison Bridge Gage 14211720, 10/10/2007 to 09/01/2023

Figure 4-1

Riverbank Habitat Types Compared to Seasonal Submergence Percentage

Prepared on 8/1/2025
Riverbank Design Technical Memorandum
Swan Island Basin

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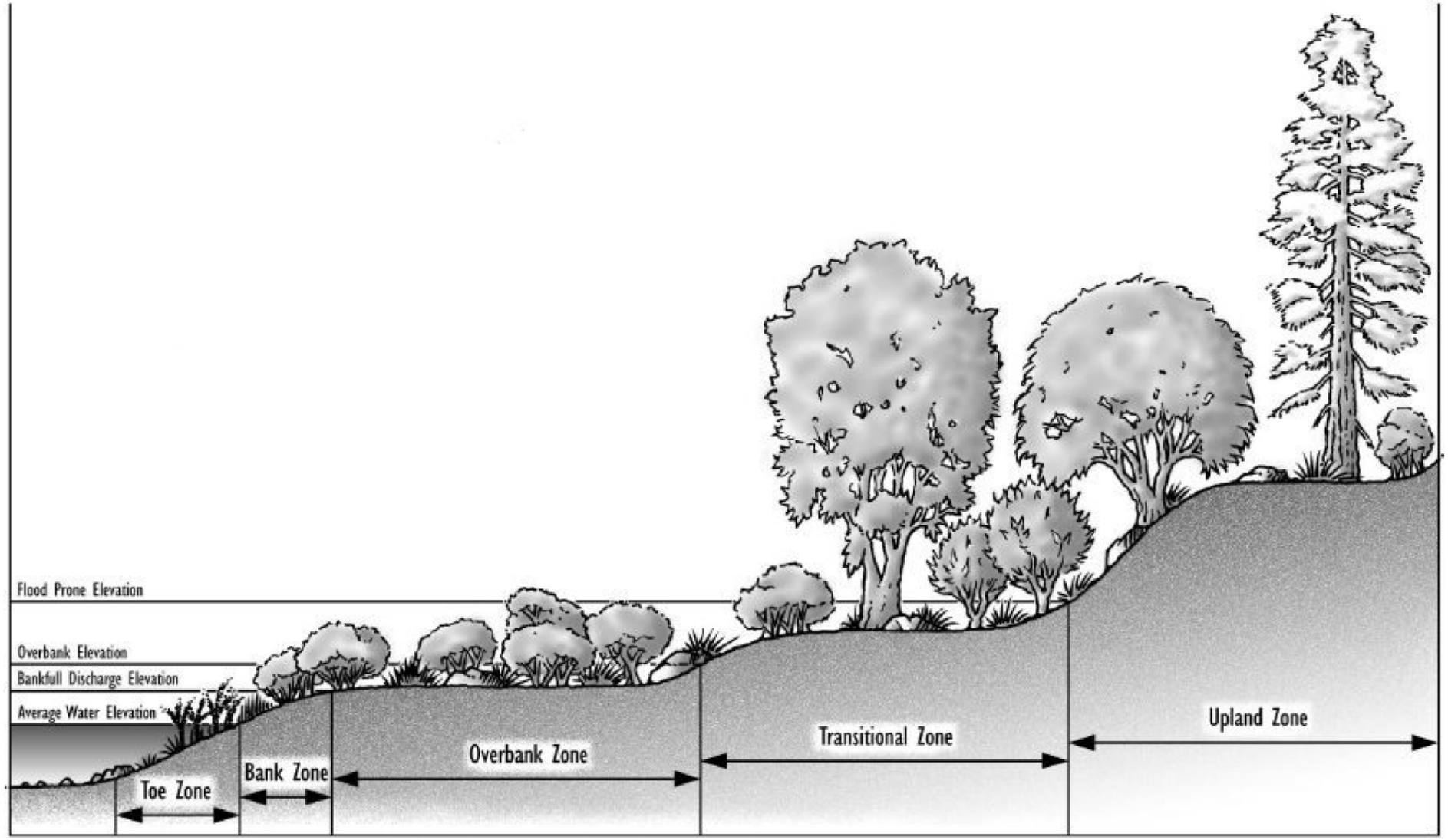

Source: Hoag, J. Chris and Landis, D. Thomas, 2002. Plant materials for riparian revegetation. In: Dumroese, R.K.; Riley, L.E.; Landis, T.D., technical coordinators. National Proceedings: Forest and Conservation Nursery Associations-1999, 2000, and 2001. Proceedings RMRS-P-24. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station: 33-43.

Figure 4-2

Cross-Section of Typical Riparian Zone and Transition from Water Line to Uplands

Prepared on 8/1/2025
Riverbank Design Technical Memorandum
Swan Island Basin

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

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ATTACHMENT A

GROUNDWATER DISCHARGE MODELING TECHNICAL MEMORANDUM

GROUNDWATER DISCHARGE MODELING TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

This Groundwater Discharge Modeling Technical Memorandum presents a summary of modeling performed to evaluate groundwater-surface water exchange at the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site (PHSS). Specifically, the elevation at which groundwater discharges to SIB above the surface water stage was calculated to support the Remedial Design (RD). The data used in this evaluation were collected in accordance with the final Pre-Design Investigation (PDI) Work Plan, approved by the U.S. Environmental Protection Agency (EPA) in May 2022 (HGL, 2022) and were reported in the PDI Evaluation Report (ER), approved by EPA in January 2025 (HGL, 2024a). In addition to PDI data, data sources used in this evaluation included Willamette River stage data (USGS, 2025), topographic and bathymetric data (OLC, 2019; USACE, 2010), impervious surface data (USGS, 2024), and groundwater and lithologic data from area investigations (Brown and Caldwell, 2008; Snyder, 2008; GSI and SSPA, 2020).

Section 1 presents an overview of the conceptual site model (CSM). Section 2 details model development. Section 3 details model fitting and sensitivity analyses performed. Section 4 presents the model results and uncertainty analyses. Section 5 includes discussion and recommendations. Section 6 provides a list of references used in the generation of this technical memorandum.

1.0 CONCEPTUAL SITE MODEL OVERVIEW

The following section presents an overview of the SIB Project Area CSM, specifically related to groundwater hydrology. A more comprehensive CSM is provided in the Basis of Design Report (Section 2; HGL, 2024b).

1.1. PROJECT AREA

The PHSS extends along 9.9 miles of the lower Willamette River in Portland, Oregon, from river mile (RM) 1.9 to RM 11.8. The SIB Project Area is the active cleanup area between approximately RM 8.1 and RM 9.2 on the northeast side of the Willamette River (HGL, 2024a). The SIB Project Area is approximately 1.1 miles in length, 117 acres in size, and includes riverbanks that extend up to the top of the bank (Figure 1-1).

1.2. TOPOGRAPHY AND BATHYMETRY

The SIB Project Area is bounded by the uplands of Swan Island and Mocks Bottom to the southwest and northeast, respectively. Except for the slopes along the riverbanks, the land surface of Swan Island and Mocks Bottom is generally flat, with elevations of about 35 to 45 feet (ft) National Geodetic Vertical Datum of 1988 (NAVD88). The land surface rises rapidly from about

Corporate Headquarters
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

45 ft NAVD88 to about 170 ft NAVD88 at the top of Willamette Bluff (Figure 1-2). Willamette Bluff, also referred to as Mocks Crest bluff or the Willamette Escarpment, was formed when the Willamette River incised primarily fine-grained silts deposited during catastrophic flooding during Pleistocene time (Gannet and Caldwell, 1998; Woodward et al, 1998). As a result, there is a transition from primarily silt to alluvial deposits in the Willamette River floodplain (Beeson et al., 1991; Brown and Caldwell, 2008).

SIB was historically part of the main channel of the Willamette River, and Swan Island was not connected to the shoreline area of Mocks Bottom. The main navigational channel was relocated to the west side of Swan Island in approximately 1932, and SIB was formed when sediments from dredging a new channel were used to connect Swan Island to Mocks Bottom (HGL, 2024b). The bottom elevation of SIB ranges from approximately -3 ft NAVD88 at the southeast to -30 ft NAVD88 at the northwest (Figure 1-2) based on a bathymetric survey performed in 2022 (Appendix E of PDI ER, HGL, 2024a).

Figure 1-2 presents a continuous topobathymetric digital elevation model (DEM) that was generated for the SIB Project Area (as well as Mocks Bottom and Swan Island) by combining the 2019 1-meter Light Detection and Ranging (LiDAR) based DEM (OLC, 2019) compiled from The National Map downloader provided by the U.S. Geological Survey (USGS) with the 2022 bathymetric survey, coarsened to a 1-meter DEM, for locations where the 2019 DEM elevations were less than 7 ft NAVD88 (corresponding to locations slightly above the 2019 DEM surface water elevation). Locations below 7 ft NAVD88 where bathymetric survey data was not available (due to inaccessibility primarily resulting from docks, piers, and ships) were filled using elevations from the 2010 Lower Columbia Digital Terrain Model (USACE, 2010).

1.3. HYDROLOGIC SETTING

The Portland, Oregon area received an average of 45.6 inches of rain per year between 2012 and 2024 (NCDC, 2025). Precipitation occurs primarily between October and April. In the SIB Project Area, Mocks Bottom and Swan Island, precipitation is primarily directed towards stormwater infrastructure from impervious surfaces where it is discharged to SIB. Figure 1-3 depicts percent of impervious surface from the 2023 National Land Cover Database (USGS, 2024). Throughout the SIB Project Area and Mocks Bottom, impervious surfaces cover approximately 80 percent of the land surface.

1.4. GEOLOGIC SETTING

The SIB Project Area is located near the western edge of the Portland Basin, a northwest-trending structural basin bordered by the Tualatin Mountains (Portland West Hills) on the west and the foothills of the Cascade Range on the east. The Portland Basin is one of several structural basins filled with continental, sedimentary rocks of late Miocene, Pliocene, and Pleistocene age and underlain by older Eocene to Miocene volcanic and sedimentary rocks that crop out around the edge of the basin on the west, north, and east (Swanson et al., 1993). As the Portland Basin subsided, upper Miocene to Pliocene-age Sandy River Mudstone and Troutdale Formation were deposited across the Portland Basin, primarily by the ancestral Columbia River (Tsr and Tt in Figure 1-4) (Brown and Caldwell, 2008). The Sandy River Mudstone consists of primarily

siltstone, sandstone, and claystone. The overlying Troutdale Formation consists of conglomerates with minor interbeds of sandstone, siltstone, and claystone (Beeson, et al., 1991).

The Troutdale Formation was weathered and eroded during Pleistocene glaciation when sea levels were approximately 400 ft lower than present day (Brown and Caldwell, 2008). Periodic catastrophic glacial outburst floods during the late Pleistocene caused a series of as many as 40 colossal floods in the Columbia River (Swanson et al., 1993). These catastrophic floods from the periodic failure of ice dams impounding huge lakes in Idaho and Montana repeatedly scoured and then deposited both coarse- and fine-grained sediments in the Portland Basin up to an elevation of approximately 350 to 400 ft (Qfc and Qff on Figure 1-4) (Swanson et al., 1993; Brown and Caldwell, 2008).

Following the last catastrophic flood, sea level gradually rose to current levels resulting in the deposition of fine-grained alluvium consisting of interbedded silt and fine-grained sand within the historical Willamette River channel, scour channels, and tributary stream valleys that border the Willamette River (Qal on Figure 1-4) (Brown and Caldwell, 2008). Swan Island was originally formed as a sandbar of the Willamette River and has had artificial fill applied to raise the topography and connect it to Mocks Bottom (Qaf on Figure 1-4). Mocks Bottom is an infilled abandoned meander channel of the Willamette River consisting of finer-grained alluvium than Swan Island that also had its topography raised with the application of artificial fill (Appendix F of PDI ER, HGL, 2024a).

Artificial fill that covers Swan Island and Mocks Bottom above water level is generally composed of sand, gravel, and rock placed for building foundations (Appendix F of PDI ER, HGL, 2024a). Artificial fill was primarily sourced from Willamette River dredge sand when the main navigational channel was shifted to its current location southwest of Swan Island, but it also included timber dolphins, timber railroad trestles, timber dredge support structures, abandoned dredge pipes, abandoned drainage pipes, railroad embankment material, rip rap, retaining walls, logs, and wood debris (Brown and Caldwell, 2008).

1.5. HYDROGEOLOGY

Hydrogeologic units in the general location of the SIB Project Area within the Portland Basin have been mapped into four major units, depicted on Figure 1-4, which have been grouped into three subsystems: Older Rocks Subsystem discussed in Section 1.5.1, the Lower Sedimentary Subsystem outlined in Section 1.5.2, and the Upper Sedimentary Subsystem described in Section 1.5.3 (Appendix F of PDI ER, HGL, 2024a; Swanson et al., 1993). Section 1.5.4 discusses hydraulic conductivities.

1.5.1. Older Rocks Subsystem

Along the western boundary of the Portland Basin, the Older Rocks Subsystem consists of Columbia River Basalt (Tcr on Figure 1-4), which is used as an aquifer with large capacity wells penetrating several hundred feet of the unit to connect one or more interflow zones. Some wells completed in the Columbia River Basalt can produce over 1,000 gallons per minute; although, the capacity to store water is limited, resulting in water-level declines as a result of overdevelopment (Swanson et al., 1993).

1.5.2. Lower Sedimentary Subsystem

The Older Rocks Subsystem is overlain by undifferentiated fine-grained sediments that make up the Lower Sedimentary Subsystem. These fine-grained sedimentary rocks consisting of mudstone, siltstone, and claystone of the Sandy River Mudstone (Tsr on Figure 1-4) and occasionally the Troutdale Formation (where the Troutdale Sandstone Aquifer is not present) act as a confining layer between the Older Rocks Subsystem and the Upper Sedimentary Subsystem (Swanson et al., 1993).

1.5.3. Upper Sedimentary Subsystem

The consolidated gravel aquifer overlies the undifferentiated fine-grained sedimentary rocks of the Lower Sedimentary Subsystem and is composed of several geologic formations of poorly- to moderately-cemented conglomerate and sandy conglomerate of the Troutdale Formation (Tt on Figure 1-4). In some locations, thick accumulations of lavas and a mantling soil horizon are present. The consolidated gravel aquifer is an important and productive source of groundwater throughout the Portland Basin with yields between 50 and 1,000 gallons per minute (Swanson et al., 1993).

The consolidated gravel aquifer is overlain by the unconsolidated sedimentary aquifer consisting of catastrophic flood deposits of the late Pleistocene (Qff and Qfc on Figure 1-4) and alluvial deposits from the Columbia River and Willamette River (Qal on Figure 1-4) (Swanson et al., 1993). The catastrophic flood deposits of the late Pleistocene are sometimes referred to as the Missoula flood deposits because they are sourced primarily from the periodic draining of Glacial Lake Missoula and flooding of the Columbia River (O'Connor et al., 2001).

The unconsolidated sedimentary aquifer is the upper most aquifer present at the SIB Project Area, extending from ground surface to a depth of between 50 and 100 ft and consisting of alluvial flood deposits of late Pleistocene age varying from bouldery gravel to silt (Appendix F of PDI ER; HGL, 2024a). The uppermost unit has also been defined as the fill, fine-grained facies of flood deposits, and recent alluvium (FFA) unit that is composed of the fill, the combined fine-grained facies of the Pleistocene flood deposits, and the recent alluvium geologic units consisting of silt, clay, silty sand, and fine-to-medium sand (EPA, 2016).

1.5.4. Hydraulic Conductivities

Hydraulic conductivities for stratigraphic and lithologic units were described by Brown and Caldwell (2008) and EPA (2016). The units and hydraulic conductivities (or ranges) are presented in Table 1-1. Hydraulic Conductivities were not measured for all stratigraphic units or lithologic units present at the SIB Project Area. Notably, hydraulic conductivities for the artificial fill have not been measured.

1.6. GROUNDWATER

The elevations at which groundwater was first encountered near the SIB Project Area range from approximately 6 to 27 ft NAVD88. The FFA hydrogeologic unit of the Upper Sedimentary Subsystem is the primary unit of importance in defining interactions between upland groundwater and the Willamette River because the unit forms most of the river channel and surrounding upland

areas and, therefore, controls groundwater interactions (EPA, 2016). Continuous groundwater observations have not been made in the SIB project area to assess seasonal and tidal influences on groundwater elevations.

Within the FFA, the distribution of soil textures controls the horizontal and vertical groundwater flow. Generally, shallow groundwater from the upland area of Mocks Bottom flows toward SIB and the Willamette River, and discharges either above the river stage as seeps or below the river stage as subsurface discharge, generally in nearshore areas. Groundwater levels and fluxes in the shallow system are affected by seasonal river stage changes, as well as by diurnal tidal influences (EPA, 2016).

Groundwater elevations were measured in standpipe piezometers and via vibrating wire piezometers from 2006 through 2008 at five locations near the SIB Project Area as reported in the Portsmouth Force Main Geotechnical Data Report (Brown and Caldwell, 2008). Measurements from PMW-1-02A and PMW-1-06A, adjacent to the SIB Project Area, indicate that shallow groundwater elevations range from about 6 ft NAVD88 to 14 ft NAVD88 and fluctuate seasonally with lower elevations in late summer and higher elevations in spring (Figure 1-5). Measurements from PMW-1-09A (below Willamette Bluff), PMW-2-01R (just above Willamette Bluff), and PMW-2-02A (above Willamette Bluff) suggest that there may be a large groundwater gradient across the bluff from about 45 ft NAVD88 in PMW-2-01R to 18 ft NAVD88 in PMW-1-09A (Figure 1-5). However, groundwater elevations measured at PMW-2-02A suggest that the steep gradient may be dependent on the sampled interval. PMW-2-01R was sampled at an elevation of -17.4 ft NAVD88 via vibrating wire piezometer, while PMW-2-02A was sampled at an interval of -0.3 to 14.7 ft NAVD88, and PMW-1-09A was sampled at an interval of -1.8 to 13.2 ft NAVD88 via standpipe piezometers. Additionally, the bluff slope between PMW-2-01R and PMW-1-09A appeared to be underlain by fine-grained flood deposits with no observed groundwater seeps or springs along the slope; however, bluff slope soil exposures were limited (Brown and Caldwell, 2008).

Groundwater elevations at the Daimler Truck site in the northern portion of Mocks Bottom were collected in September 2019 from several monitoring wells. Groundwater elevations ranged between 16 ft and 26 ft (no specified vertical datum) (GSI and SSPA, 2020). Monitoring wells with higher recorded water elevations (23 to 26 ft) tended to be screened relatively shallow (5-ft screens from 10 to 20 ft below ground surface [16 to 30 ft elevation]). Deeper wells, screened at similar elevations to SIB had groundwater elevations between 16 ft and 20 ft (GSI and SSPA, 2020).

Direct seepage was measured in SIB using Ultraseep meters (US) and differential pressure piezometers. US measurements were collected from 16 locations within SIB and 5 locations at the mouth of SIB between July 12 and July 15, 2023. This date range was selected for monitoring to correspond with expected maximum annual groundwater upwelling to surface water (Appendix B of PDI ER, HGL, 2024a). Fifty-hour tidally-averaged specific discharges range from 0.218 centimeters per day (cm/d) immediately adjacent to the Mocks Bottom shoreline to -0.001 cm/d[1] at the southeastern end of SIB near the middle of the basin. Figure 1-6 presents the average, 50-hour rolling mean specific discharge at each station in SIB. Higher specific discharges were

[1] The negative value indicates a net *recharge* rate into the aquifer over the 50-hour average

generally observed closer to the shore along the Mocks Bottom (northern) side of SIB. Observations for specific discharge and vertical head gradient were used to develop vertical hydraulic conductivities along the bottom of SIB (Appendix B of PDI ER; HGL, 2024a). These station locations are also discussed in Section 3 (and shown on Figure 3-1).

1.7. SURFACE WATER

SIB is a lagoon that is backwatered from the main Willamette River Channel. Currents within the interior of the SIB move slowly over the range of flow conditions in the river, including flood events and daily tidal cycles. Daily tidal fluctuations are on the order of 3 to 4 ft, with a maximum range of approximately 6 ft (HGL, 2024a; HGL, 2024b).

The Willamette River is a major tributary of the Columbia River and flows into the river at Columbia RM 103, approximately 8 miles downstream from the SIB Project Area. The lowest water levels in the Willamette River typically occur between September and early November prior to influence from the seasonal rains in the region. Flow within the Willamette River generally increases in response to regional storms, with record winter flooding (e.g., 1964 and 1996) occurring when periods of heavy snowfall at lower elevations were followed by warming periods and heavy rains, resulting in rapid increases in runoff (EPA, 2016).

The Willamette River stage and SIB stage were assumed to correspond to the closest Willamette River gauge located at Morrison Bridge (approximately RM 13, 5 miles upstream of the head of SIB)[2]. The stage is reported relative to the gauge height of +1.55 ft National Geodetic Vertical Datum of 1929 (NGVD29). For consistency with recent elevation data for the area, reported using NAVD88 for the vertical datum, all stage elevations were converted from reported stage to NAVD88 by adding the gauge zero elevation (1.55 ft NGVD29) to get to NGVD29 and then converted to NAVD88 by adding 3.467 ft to Morrison Bridge measurement using the National Geodetic Survey (NGS) Coordinate Conversion and Transformation tool (NGS, 2025). The Willamette River stage recorded at Morrison Bridge during the SIB specific discharge monitoring from July 12 through July 15, 2023 is presented in Figure 1-7.

2.0 MODEL DEVELOPMENT

An averaged cross-sectional groundwater flow model was developed for the SIB Project Area and upland areas of Mocks Bottom using MODFLOW 6 Version 6.5.0 (Langevin et al., 2024) and Groundwater Vistas Version 9.12 (Environmental Simulations, Inc., 2024). A cross-sectional model was chosen to model average groundwater flow from the upland Mocks Bottom area to the SIB Project Area based on averaged values because detailed hydrogeologic data (e.g., boring logs, groundwater elevations, upland groundwater flux, and hydraulic conductivities) in the upland area was limited. The model was used as a calculator to estimate the upper elevation at which groundwater discharges to SIB under several Willamette River stages. The hypothetical cross-

[2] The next gauge downstream is located along the Columbia River at St. Helens (Columbia RM 85), approximately 26 miles downstream (NWPS, 2025a). The stage difference between the two gauges averages approximately 1 ft or 0.03 ft/mile. This results in an estimated Willamette River stage that is approximately 0.15 ft for the SIB Project Area.

sectional model was set up as a steady state model to simplify the modeling inputs and does not incorporate transient tidal effects or recharge from precipitation.

The hypothetical cross-sectional model was fit to observe groundwater discharges to SIB and incorporated as much site-specific data as was available (Section 3.0); however, required assumptions for modeling parameters result in inherent uncertainty. Both a sensitivity analysis (Section 3.0) and an uncertainty analysis (Section 4.0) were performed to assess the model fit and the potential variation in the estimated upper elevation that groundwater discharges to SIB.

2.1. MODEL GRID AND TOPOGRAPHY

Model properties were averaged within the hypothetical cross-sectional model from an area 2000-ft wide by 6080-ft long perpendicular to the Willamette River (Figure 2-1) to a model area comprising 5-ft by 5-ft grid cells that is one cell wide by 1,216 cells long. The modeled area was selected to approximately intersect the center of SIB in an area where the greatest concentration of specific discharge measurements were collected in July 2023. The modeled area also allowed the model grid to extend farther to the northeast while being entirely contained within Mocks Bottom. The southwestern extents of the modeled area were selected to correspond to roughly the center of the Willamette River, where the source of groundwater discharge to the river can likely transition from the northeastern bank to the southwestern bank. This assumption is reasonable when the watershed areas on both sides of a surface water body are similar with similar geologic formations. In this instance, the presence of the Portland West Hills and the edge of the Portland Basin may alter the location of the groundwater discharge divide.

The hypothetical cross-sectional model is composed of uniform, flat vertical layers that are 2 ft tall and extend from -100 ft NAVD88 to 46 ft NAVD88. Cells where the bottom elevation was above the cross-sectional average topobathymetric DEM elevation (parallel to SIB and the Willamette River) were set as no flow cells.

2.2. MODEL BOUNDARY CONDITIONS

The model used four types of boundary conditions: no flow boundaries, river boundaries, constant head boundaries, and, after model fitting, constant flux boundaries. Each exterior cell of the model was assigned one of these boundary conditions.

The top surface of the model was set to no flow boundaries corresponding to the cross-sectional average land surface (recharge was applied to the top active model cell). The right (southwest) and bottom model edges were also set to no flow boundaries corresponding to the convergence of flow from the northern and southern banks of the Willamette River at the center of the river. The left (northeast) model edge was set to no flow boundaries above an elevation of 2 ft NAVD88 (Figure 2-2). This was done to make the model more flexible when adjusting upgradient heads and prevent model errors from setting constant heads that are lower than the grid cell elevation. The bottom boundary was set to no flow, approximately corresponding to the Troutdale formation.

River boundaries were set in the cell immediately above the cross sectional average topobathymetric DEM surface in locations where the cell bottom elevation was less than 26 ft NAVD88 (Figure 2-2). Each river boundary cell was assigned a specified stage, riverbed vertical hydraulic conductivity, and riverbed thickness. The river stage was specified at 8.09 ft NAVD88

from the tidally averaged Willamette River Stage between July 12, 2023 at 1200 hours PDT and July 14, 2023 at 1400 hours PDT to correspond with the 50-hour tidally averaged specific discharge estimates (Appendix B of PDI ER; HGL, 2024a). The riverbed vertical hydraulic conductivity values were calculated from the tidally averaged vertical gradient and specific discharge at each monitoring location (Appendix B of PDI ER; HGL, 2024a).These values were averaged along seven SIB transects shown on Figure 2-3. Each transect was 80 ft wide to ensure that there was at least one observed value while maintaining the spatial variability of observations with distance from the shoreline. The averaged vertical hydraulic conductivity values were applied to each river cell within the model that intersected the transect. River cells that were not intersected by one of the transects were assigned an average vertical hydraulic conductivity from all calculated values from the July 2023 porewater upwelling investigation (Appendix B of PDI ER; HGL, 2024a). The riverbed thickness was assigned a uniform value of approximately 50 centimeters (~20 inches) based on the set midpoint penetration depth of the subsurface sediment probe for the Trident Probes (Appendix B of PDI ER; HGL, 2024a)

Constant head or constant flux boundaries were set on the left (northeast) edge of the model below and elevation of 2 ft NAVD88 (Figure 2-2). As discussed above, this was done to make the model more flexible when adjusting upgradient heads and prevent model errors from setting constant heads that are lower than the grid cell elevation. Constant heads were set to 18 ft NAVD88 for the initial modeling to fit the model to observed specific discharges in July 2023. An elevation of 18 ft NAVD88 was selected for these boundaries based on observed upland heads near the bluff, specifically at PMW-1-09A of about 18 ft NAVD88 (Figure 1-5) (Brown and Caldwell, 2008). An elevation of 18 ft NAVD88 may be similar to the deeper screened wells from GSI and SSPA (2020), although the vertical datum for the values in that report is unknown. The constant head elevation in the upland area of Mocks Bottom is uncertain and likely varies in response to upgradient precipitation and may include a perched zone within the artificial fill.

Once model parameters were fit, the constant head boundaries were changed to constant flux boundaries based on the calculated flux at each constant head boundary cell. This change was necessary when modeling different river stages to ensure that the potentiometric surface can respond appropriately without being fixed at the upgradient side; however, this approach assumes that the amount of flux from the upgradient boundary (Mocks Bottom) is constant.

Recharge was applied to the uppermost saturated model cell using an annual average recharge value. The annual average recharge to groundwater was estimated using a deep percolation model based on the annual average precipitation, percent impervious area, and the land surface elevation (Snyder et al., 1994; McFarland and Morgan, 1996). The maximum calculated recharge across the 2000-ft-wide modeled area was applied to each grid cell (Figure 2-4). Recharge was not applied over the area that intersected SIB or the Willamette River. The maximum recharge value was selected to account for areas where recharge is likely occurring because using the average recharge across the area results in zero recharge throughout the model except for a small section along the northeastern bank of SIB.

2.3. MODELED HYDRAULIC CONDUCTIVITY

A geological model was developed in Seequent Leapfrog Works (versions 2021 to 2024.1) to define the three-dimensional subsurface stratigraphy. The SIB Project Area geological model

represents a probable but unconfirmed and unverified, simplified model of geological conditions, based on a desktop study, the Geotechnical Data Report (Appendix F of the PDI ER; HGL, 2024a), and historical ground investigation data. There is a key assumption that the data used is factually correct and that generally accepted theories about the structure and stratigraphy of the local area are also correct. Gaps in the data exist, so interpretation and geological judgment were required to interpolate between known data points. Contradictions in data were also found to exist, thus selecting which data to incorporate and which to omit also required significant geological judgment. Interpolated strata boundaries are uncertain and approximate.

Leapfrog Works uses three-dimensional implicit modeling to provide fast and dynamic modeling of the ground conditions, including analysis of the interactions with the engineering design. Meshes are used to represent surfaces in the form of vertices and triangles that define the three-dimensional shape of the surface. Geological surfaces are typically developed from ground investigation point data that can then be advanced through geological interpretation controls within the software. The following delineated hydrostratigraphic units were modeled for the SIB Project Area geological model and used to develop the hydraulic conductivity zones of the cross-sectional groundwater flow model:

1) af – Artificial fill (Holocene, Anthropocene): The modeled layer was developed from interpreted fill contact points from the SIB Project Area PDI, historical ground investigations and, pre-fill surface from digitized 1931 contour map.

2) afb – Recent Basin Sediments: Recent sediment contacts were developed from in-water Cone Penetration Testing (CPT) data, borehole data from the SIB Project Area PDI and historical bathymetric surfaces. The historical bathymetric dataset was the combination of 20 bathymetry surveys from 1938 through 2022 with lowest elevation presented on the surface over this data range.

3) Qa – Alluvium (Holocene) Sand: The surface was developed from interpreted Alluvium (Holocene) sand contacts with other encountered strata from the SIB Project Area PDI.

4) Qa – Alluvium (Holocene) Clay: The surface was developed from interpreted contact between Alluvium (Holocene) Clay contacts and the underling Qf Missoula flood deposits. Data was interpreted from the SIB Project Area PDI and historical ground investigations.

5) Qf Missoula flood deposits – Silt & Sand: The surface was developed from interpreted layers of silt and sand from primarily onshore and in-water CPT data collected during the the SIB Project Area PDI.

6) Qfc – Coarse-grained Missoula flood deposits & Tt - Troutdale Formation (Pliocene and Miocene): Surfaces were developed from historical ground investigation, PB-1003R and geological mapping cross sections. The layers were projected to underlie the entire modeled area and fall below the base of the cross-sectional model.

Hydraulic conductivity was applied to the hypothetical cross-sectional model based on the most common (mode) hydrostratigraphic unit across the 2,000-ft-wide modeled area based on the SIB Project Area geological model. Only the first five hydrostratigraphic units were incorporated into the cross-sectional model because the sixth (coarse-grained Missoula flood deposits and troutdale

formation) were below the bottommost layer in the model. Hydraulic conductivity zones outside of the SIB Project Area geological model area were extrapolated from those areas that overlapped the SIB Project Area geological model (Figure 2-5). This generally involved extrapolating along straight lines, with the exception of recent basin sediments that were added beneath the Willamette River to be consistent with those observed beneath SIB.

3.0 MODEL FITTING AND SENSITIVITY

The hypothetical cross-sectional model was fit to 50-hour tidally averaged specific discharges in SIB from July 2023. Modeling fitting was performed using Parameter Estimation software (PEST), specifically PEST++ (White et al., 2020) using the built-in interface in Groundwater Vistas.

Horizontal hydraulic conductivity was fit for each zone within the range of observed values for similar stratigraphic units and lithologies. Vertical to horizontal hydraulic conductivity anisotropy for each zone was fit within a range of 1:20 to 1:1. Table 3-1 presents the initial horizontal hydraulic conductivity and vertical hydraulic conductivity anisotropy used for each zone as well as the lower and upper bounds for PEST++ and the final fit values that were applied to the hypothetical cross-sectional model.

The model was reasonably fit to observed specific discharge to SIB that were averaged in the same manner as the riverbed vertical hydraulic conductivities (Figure 3-1). The specific discharge for the third reach from the northeast bank was adjusted up from 0.028 cm/d to 0.076 cm/d to better align with adjacent reaches and to account for the higher observed specific discharge at 6D that was located in the second reach, just outside of the third reach. Cross sectional specific discharge targets and modeled specific discharges for each reach are presented in Table 3-2 with the comparison to modeled values. Both specific discharges (cm/d) and groundwater fluxes in cubic ft per day (ft^3/d) are presented. Groundwater fluxes represent the volume of water discharging from each reach that is modeled over an area 5-ft by 80-ft (longitudinally) in the hypothetical cross-sectional model. By convention, modeled groundwater flux values are negative if water is discharging from groundwater to surface water and positive if surface water is discharging to groundwater, this is reversed from the observed specific discharge values presented in the Porewater Upwelling Report where specific discharge from groundwater to surface water was positive (Appendix B of PDI ER; HGL, 2024a). Figure 3-2 visually compares the observed and modeled specific discharges.

Following model fitting, a sensitivity analysis was performed to assess how adjusting horizontal hydraulic conductivity and vertical hydraulic conductivity affected the model fit. A sensitivity analysis was performed for all parameters that were fit using PEST++. Parameters were adjusted both up and down by set multipliers for each zone individually while all other parameters and zones were held constant at their fit values. The sensitivity of a parameter is assessed by how changes to that parameter influence the goodness of fit of the model. In this case, sensitivity is assessed by how parameters affect the sum of square residuals for groundwater discharge to SIB in reaches 1 through 7.

The sensitivity analysis for horizontal hydraulic conductivity zones is presented in Figure 3-3. The Missoula flood deposits zone was the most sensitive to changes; with increases in the horizontal hydraulic conductivity negatively impacting the resulting fit (the sum of square residuals increased

substantially). Most groundwater flow within the hypothetical cross-sectional model occurs within the Missoula flood deposits zone and increasing the horizontal hydraulic conductivity results in more flow from the upland constant head boundary that discharges to SIB and the Willamette River. Similarly, reducing the horizontal hydraulic conductivity of the Missoula flood deposits results in less flow from the upland constant head boundary and less discharge to SIB and the Willamette River.

The sensitivity analysis for vertical hydraulic conductivity zones is presented in Figure 3-4. The recent basin sediments and alluvium clay zones were the most sensitive zones to changes. These two zones directly underlay SIB and groundwater needs to flow vertically upward to discharge to surface water. Therefore, the vertical hydraulic conductivity of these two zones influences the specific discharge. However, the maximum sum of square residuals (approximately 4) is about 35 times lower than the maximum sum of square residuals for the Missoula flood deposits horizontal hydraulic conductivity (approximately 140).

4.0 MODEL RESULTS AND UNCERTAINTY

Three Willamette River stage scenarios were simulated to estimate the groundwater elevation along the banks of SIB. The modeled scenarios were the July 2023 observed specific discharge stage (8.09 ft NAVD88), ordinary high water (20.075 ft NAVD88), and moderate flood stage (29 ft NAVD88) based on classifications from the National Water Prediction Service at Morrison Bridge (NWPS, 2025b).

Models were updated to replace the upland constant head boundary with a constant flux boundary with the same groundwater flux entering the upland boundary as the fit model. The boundary reach report that reports the groundwater flux entering and leaving the model for the fit, July 2023 model is presented in Table 4-1. Reaches 923 through 973 indicate the groundwater flux at each constant head boundary cell with the last two digits (e.g., 23) indicating the model layer where the boundary node is located. Converting to constant flux boundaries allows the groundwater level at the upland boundary to fluctuate with the river stage, but this limits the groundwater flux entering and leaving the model to what was observed in July 2023 (i.e., the model scenarios do not simulate lower or higher groundwater discharge scenarios). As indicated in Section 1.6, July was chosen due to its proximity to maximum annual upwelling to SIB (Appendix B of PDI ER; HGL, 2024a); therefore, the simulated groundwater discharge elevations are considered conservative.

Groundwater elevations were monitored at two points within the cross-sectional model: at an SIB bank elevation of 10 ft NAVD88 screened between 0 and -2 ft NAVD88 and at an SIB bank elevation of 20 ft NAVD88 screened between 0 and -2 ft NAVD88. These locations were selected to provide comparisons between scenarios and to allow for uncertainty to be automatically monitored; however, the extent of groundwater discharge zone varies based on the river stage and the upland boundary.

The groundwater elevations at the two monitoring points and at the water table adjacent to the highest river boundary cell that was saturated are presented in Table 4-2. Groundwater discharges to SIB approximately 0.5 to 0.6 ft above the simulated Willamette River stage from the northeast with groundwater levels about 1 ft above the river stage in the two monitoring wells. The cross-sectional results of the measured SIB discharge model from July 2023 are presented in Figure 4-1,

the result of the ordinary high water scenario is presented in Figure 4-2, and the result of the moderate flooding scenario is presented in Figure 4-3. In each scenario, the groundwater level across Swan Island was approximately at the elevation of the Willamette River stage, indicating that groundwater discharge to surface water is fairly limited along the banks and likely occurs as exchange caused by tidal fluctuations (i.e., groundwater discharge to surface water during low tide and surface water discharge to groundwater during high tide).

The uncertainty of the groundwater discharge to SIB elevation was evaluated similar to the sensitivity analysis (by varying the horizontal hydraulic conductivity, vertical hydraulic conductivity, and constant head boundary for the July 2023 observed specific discharge scenario) and evaluating the resulting change in groundwater levels above the SIB stage. The groundwater level above the SIB stage was monitored at the 20-ft bank elevation monitoring point from 0 to -2 ft NAVD88. The parameters that were fit using PEST++ were included in the uncertainty analysis as was the upgradient constant head to assess how each model parameter that was either fit or assumed influences the groundwater discharge elevation above the SIB stage.

The groundwater level above the SIB stage at the 20-ft bank elevation monitoring point ranged from 1.4 to 3.2 ft above the SIB stage when horizontal hydraulic conductivities were adjusted from $1/10^{th}$ the fit value to 10-times the fit value. Like the sensitivity analysis, adjusting the horizontal hydraulic conductivity of the Missoula flood deposit zone resulted in the largest variation in groundwater levels above the SIB stage (Figure 4-4). Increases to the horizontal hydraulic conductivity of the Missoula flood deposit zone allows more flow through those deposits extending to the model boundaries which caused groundwater levels to increase near SIB (i.e., the resistance to groundwater flow in the Missoula flood deposit zone was lower, so higher heads propagated further into the model). An opposite interaction resulted from increasing the horizontal hydraulic conductivities in the alluvium clay, alluvium sand, and recent basin sediments zones because they are immediately adjacent to SIB and the Willamette River (Figure 4-4). Increasing the hydraulic conductivity in zones adjacent to the river boundaries enables groundwater to more easily discharge to river boundaries and thus lowers the groundwater level adjacent to SIB, especially in the alluvium clay where the 20-ft bank elevation monitoring point was located. Finally, adjusting the horizontal hydraulic conductivity of the artificial fill does little to change the groundwater level in the 20-ft bank elevation monitoring point because the artificial fill has limited saturation upgradient of SIB under the July 2023 observed specific discharge scenario (Figure 4-1).

The groundwater level above the SIB stage at the 20-ft bank elevation monitoring point ranged from 1.2 to 2.3 ft above the SIB stage when the vertical hydraulic conductivities were adjusted from $1/10^{th}$ the fit value to 10-times the fit value. Like the sensitivity analysis, adjusting the vertical hydraulic conductivity of the alluvium clay and recent basin sediments resulted in the largest variation in groundwater levels above the SIB stage (Figure 4-5). Increases to the vertical hydraulic conductivity resulted in lower groundwater levels adjacent to SIB because groundwater was able to move vertically and discharge to SIB more easily. Conversely, decreasing the vertical hydraulic conductivity of the alluvium clay and recent basin sediments resulted in groundwater flow being reduced to SIB and heads increasing adjacent to SIB as a result. Changes to the vertical hydraulic conductivity for the artificial fill, alluvium sand, and Missoula flood deposits had relatively little effect on groundwater levels adjacent to SIB (Figure 4-5).

The groundwater level above the SIB stage at the 20-ft bank elevation monitoring point ranged from 0.7 to 3.0 ft above the SIB stage when the constant head boundary elevation was adjusted between 10 ft NAVD88 to 30 ft NAVD88 (Figure 4-6). The groundwater level adjacent to SIB varied approximately linearly over the range of constant heads simulated. The constant head value of 18 ft NAVD88 was selected for model fitting based on observed groundwater levels in wells from the Portsmouth Force Main Geotechnical Data Report (Brown and Caldwell, 2008) and the Daimler Truck Groundwater Source Control Investigation Report (GSI and SSPA, 2020).

5.0 DISCUSSION AND RECOMMENDATIONS

A hypothetical cross-sectional model was developed for the SIB Project Area and upland area that averaged model properties across a 2,000-foot-wide area near the center of SIB (Figure 2-1). The model was fit to observed specific discharges to SIB from July 2023 and a sensitivity analysis was performed for the fit horizontal and vertical hydraulic conductivity zones. Model results at monitoring points along the banks of SIB at a 10-ft elevation and 20-ft elevation were evaluated for multiple Willamette River stage scenarios and an uncertainty analysis was performed to investigate how groundwater levels adjacent to SIB may change with different model parameters. The range of groundwater levels relative to the SIB ranged between approximately 0.5 and 2 ft above the SIB stage based on the scenarios evaluated and the uncertainty analysis performed.

5.1. ASSUMPTIONS AND LIMITATIONS

The hypothetical cross-sectional model required a number of assumptions and simplifications of the groundwater flow system in the SIB Project Area. The specific assumptions and limitations are listed below.

- The cross-sectional model simplified the topography, bathymetry, lithology, and boundary conditions from a heterogeneous area with likely complex groundwater flow and discharges to an averaged two-dimensional model that limits groundwater flow to only flowing perpendicular to SIB and the Willamette River. Actual groundwater flow is likely not perfectly perpendicular to SIB and most likely has a somewhat semi-circular shape corresponding to Willamette Bluff. As a result, the elevation that groundwater discharges to SIB is likely not constant across the entire bank. Similarly, groundwater was not modeled as flowing into Swan Island from the southeast where it connects to Mocks Bottom. This may occur to a limited degree and would result in the model underestimating groundwater elevations beneath Swan Island.
- Limited groundwater level observations were available for model fitting and determining the upland constant head boundary and no groundwater level observations were available in July 2023 when specific discharge at SIB was measured. As a result, the constant head boundaries were based on available Mocks Bottom groundwater observations from 2006 to 2008 and 2019 that were located near Willamette Bluff. The limited groundwater level observations are a data gap for the modeling.
- The use of an upgradient constant head boundary based on limited observed groundwater elevations for model fitting resulted in the fit horizontal hydraulic conductivity and vertical to horizontal hydraulic conductivity anisotropy being tied to the selected constant head

boundary. If an alternative constant head boundary was selected, the resulting model fitting would have yielded different fit hydraulic conductivities.

- The upland boundary was converted from a constant head boundary to a constant flux boundary for the ordinary high water and moderate flooding scenarios. Because the upland groundwater flux into the model was maintained between the three scenarios, the modeled groundwater discharge to SIB and the Willamette River was identical. This results in fairly similar groundwater elevations relative to the SIB and Willamette River stage, with minor differences attributed to additional groundwater moving through the artificial fill with a higher river stage. The model was not fit to higher or lower groundwater specific discharges and so the modeled scenarios do not provide insight into the elevation of groundwater discharging to SIB with either higher upland groundwater flux or lower upland groundwater flux. The observed groundwater flux in July 2023 was selected to sample the expected maximum specific discharge to SIB (Appendix B of PDI ER; HGL, 2024a). By using the likely annual maximum groundwater specific discharge to SIB, the model is more conservative (i.e., will calculate a higher groundwater discharge elevation above the SIB stage) than if a lower specific discharge had been used for model fitting and for developing the constant flux upland boundary conditions.
- Limited lithologic borings were available in the upland area of the cross-sectional model and this area was not included in the LeapFrog geological model interpolation performed for the SIB Project Area. The modeled hydraulic conductivity zones in the upland area were extrapolated from the available stratigraphic interpretations and boring logs.
- A limited number of hydraulic conductivity measurements were available for site hydrostratigraphic units, including no measured hydraulic conductivities for the artificial fill. This represents a data gap for constraining the fit parameters.
- Uniform horizontal hydraulic conductivity and vertical to horizontal hydraulic conductivity values were applied for each of the five modeled zones (artificial fill, recent basin sediments, alluvium clay, alluvium sand, and Missoula flood deposits). Each of these zones are likely heterogeneous with lenses of fine and coarse material that is not distributed evenly across the modeled area. Heterogeneities may contribute to preferential flow paths that result in groundwater discharging at varying rates along the SIB bank and at varying elevations. The presence of subsurface heterogeneity is a data gap and would be informative if a 3D numerical model were developed in the future.
- The model was fit to and simulates steady-state average tidal conditions. Transient influence from higher and lower river stage resulting from either tidal influence or from increased precipitation over the Willamette River drainage area were not simulated. The higher river stages simulated (ordinary high water and moderate flooding) are likely temporary and upland groundwater levels likely take time to rise in response meaning that discharge at higher river stages is likely lower than at more average river stages and consequently the groundwater discharge elevation is likely closer to the SIB water surface during higher river stages. Because the model was steady state, storage parameters were not adjusted and remained constantT.

5.2. RECOMMENDATIONS

Groundwater modeling using the fit hypothetical cross-sectional model indicates that groundwater-surface water exchange on the Mocks Bottom side of the SIB Project Area occurs within an area up to 2 ft above the SIB stage. Groundwater-surface water exchange on the Swan Island side of SIB occurs over a more limited area that is approximately equal to the SIB stage to approximately 0.5 ft above the SIB stage, which results in very little groundwater discharge at elevations above ordinary high water (approximately +20 ft NAVD88) The chemical isolation layer is designed to intercept groundwater-surface water exchange by extending its coverage above the ordinary high water elevation by 2 feet (+22 ft NAVD88) on the Mocks Bottom (northeast) side of SIB and 0.5 feet (+20.5 ft NAVD88) on the Swan Island (southwest) side of SIB.

6.0 REFERENCES

Beeson, M.H., et al., 1991. *Geologic Map of the Portland Quadrangle, Multnomah and Washington Counties, Oregon, and Clark County, Washington*. State of Oregon Department of Geology and Mineral Industries. GMS-75, at URL https://pubs.oregon.gov/dogami/gms/GMS-075.pdf.

Brown and Caldwell, 2008. *Geotechnical Data Report, Portsmouth Force Main 100% Design, Willamette River CSO Program.* City of Portland Environmental Services. June.

Environmental Simulations, Inc., 2024. *Guide to Using Groundwater Vistas Version 9.*

Gannet, M.W., Caldwell, R.R., 1998. *Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington*. United States Geological Survey Professional Paper 1424-A, at URL https://pubs.usgs.gov/pp/1424a/report.pdf.

GSI Water Solutions, Inc. and S.S. Papadopulos & Associates, Inc. (GSI and SSPA), 2020. *Groundwater Source Control Investigation Report*. Daimler Trucks North America, LLC. March.

HydroGeoLogic, Inc. (HGL), 2022. *Pre-Design Investigation Work Plan, Revision 3.* Preliminary Remedial Design Services, Swan Island Basin Project Area, Portland Harbor Superfund Site, Portland, Multnomah County, Oregon. Revision 3. May.

HGL, 2024a. *Pre-Design Investigation Evaluation Report, Revision 2*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. December.

HGL, 2024b. *Basis of Design Report, Revision 1*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. November.

Langevin, C.D., Hughes, J.D, Provost, A.M., Russcher, M.J., Morway, E.D., Reno, M.J., Bonelli, W.P., Panday, S., Merrick, D., Niswonger, R.G., Boyce, S.E., Banta, E.R., 2024. *MODFLOW 6 Modular Hydrologic Model version 6.5.0*. United States Geological Survey Software Release, at URL https://doi.org/10.5066/P13COJJM.

McFarland W.D., Morgan, D.S., 1996. *Description of the Ground-Water Flow System in the Portland Basin, Oregon and Washington*. United States Geological Survey Water-Supply Paper 2470-A, at URL https://pubs.usgs.gov/wsp/2470a/report.pdf.

National Climactic Data Center (NCDC), 2025. *Global Summary of the Year, 2012 – 2024, Portland 08 ENE, OR US*. National Oceanic and Atmospheric Administration, at URL https://www.ncdc.noaa.gov/cdo-web/datasets/GSOY/stations/GHCND:US1ORMT0033/detail.

National Geodetic Survey (NGS), 2025. *NGS Coordinate Conversion and Transformation Tool (NCAT)*. National Oceanic and Atmospheric Administration, at URL https://geodesy.noaa.gov/NCAT/.

National Weather Prediction Service (NWPS), 2025a. *Columbia River at St. Helens, Gauge SHNO3*. National Oceanic and Atmospheric Administration, at URL https://water.noaa.gov/gauges/SHNO3.

NWPS, 2025b. *Willamette River at Portland, Gauge PRTO3*. National Oceanic and Atmospheric Administration, at URL https://water.noaa.gov/gauges/prto3.

O'Connor, J.E., Sarna-Wojcicki, A., Wozniak, K.C., Polette, D.J., Fleck, R.J., 2001. *Origin, Extent and Thickness of Quaternary Geologic Units in the Willamette Valley, Oregon.* United States Geological Survey Professional Paper 1620, at URL https://pubs.usgs.gov/pp/1620/pdf/pp1620.pdf.

Oregon Lidar Consortium (OLC), 2019. *West Metro 3DEP*. Oregon Department of Geology and Mineral Industries, at URL https://pubs.oregon.gov/dogami/ldq/reports/OLC_West_Metro_2019_3DEP_Technical_Report_signed.pdf.

Snyder, D.T., 2008. *Estimated Depth to Ground Water and Configuration of the Water Table in Portland, Oregon Area*. United States Geological Survey Scientific Investigations Report 2008-5059, at URL https://pubs.usgs.gov/sir/2008/5059/.

Snyder, D.T., Morgan, D.S., McGrath, T.S., 1994. *Estimation of Ground-Water Recharge From Precipitation, Runoff into Drywells, and On-Site Waste-Disposal Systems in the Portland Basin, Oregon and Washington*. United States Geological Survey Water-Resources Investigations Report 92-4010, at URL https://pubs.usgs.gov/wri/1992/4010/report.pdf.

Swanson, R.D., McFarland, W.D., Wilkinson, J.M., 1993. *A Description of Hydrologic Units in the Portland Basin, Oregon and Washington*. United States Geological Survey Water-Resources Investigations Report 90-4196, at URL https://pubs.usgs.gov/wri/1990/4196/report.pdf.

U.S. Army Corps of Engineers (USACE), 2010. *Lower Columbia River Digital Terrain Model Development*. United States Army Corps of Engineers Portland District. October.

U.S. Environmental Protection Agency (EPA), 2016. *Portland Harbor RI/FS, Final Remedial Investigation Report, Portland Oregon.* U.S. Environmental Protection Agency Region 10, Seattle, Washington. February 8.

U.S. Geological Survey (USGS), 2024. *Annual National Land Cover Database, Fraction Impervious Surface*. United States Geological Survey Earth Resources Observation and Science Center. September.

USGS, 2025. *Willamette River at Portland, OR – 14211720*. United States Geological Survey, at URL https://waterdata.usgs.gov/monitoring-location/14211720.

White, J.T., Hunt, R.J., Fienen, M.N., Doherty, J.E., 2020. *Approaches to Highly Parameterized Inversion: PEST++ Version 5, a Software Suite for Parameter Estimation, Uncertainty Analysis, Management Optimization and Sensitivity Analysis.* United States Geological Survey Techniques and Methods 7-C26.

Woodward, D.G., Gannet, M.W., Vaccaro, J.J., 1998. *Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington*. United States Geological Survey Professional Paper 1424-B, at URL https://pubs.usgs.gov/pp/1424b/report.pdf.

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TABLES

Table 1-1
Hydraulic Conductivity Measurements by Stratigraphic Unit and Lithology
Groundwater Discharge Modeling Technical Memorandum, Swan Island Basin Project Area, Portland, Oregon

Stratigraphic Unit	Lithology	Hydraulic Conductivity (ft/d)	Source
Qal - Alluvium (Quaternary)	Interbedded silt, sandy silt, and silt with sand	8.50E-03	Brown and Caldwell, 2008
Qal - Alluvium (Quaternary)	Poorly graded sand with silt	1.53E-01 to 5.95E-01	Brown and Caldwell, 2008
Qal - Alluvium (Quaternary)	Silt/Clay	5.10E-03 to 1.98E+00	EPA, 2016
Qal - Alluvium (Quaternary)	Silty sand	9.92E-02 to 1.98E+00	EPA, 2016
Qal - Alluvium (Quaternary)	Sand	5.10E-03 to 3.12E+01	EPA, 2016
Qfc - Coarse-grained facies (Pleistocene)	Sand and gravel	3.12E+00 to 3.97E+01	EPA, 2016
Qff - Fine-grained facies (Pleistocene)	Poorly graded sand	1.02E-02 to 1.33E-02	Brown and Caldwell, 2008
Qff - Fine-grained facies (Pleistocene)	poorly graded gravel with sand less than 5 feet thick	5.95E-01	Brown and Caldwell, 2008
Tt - Troutdale Formation (Miocene to Pliocene)	Very dense, poorly graded gravel (cemented and uncemented)	1.67E+03	Brown and Caldwell, 2008
Tt - Troutdale Formation (Miocene to Pliocene)	Poorly graded sand with silt lenses less than 12 feet thick	2.83E+00 to 4.54E+00	Brown and Caldwell, 2008
Tt - Troutdale Formation (Miocene to Pliocene)	Silty sand lenses less than 12 feet thick	9.92E-02	Brown and Caldwell, 2008

Notes:

ft/d = feet per day

Source:

Brown and Caldwell, 2008. Geotechnical Data Report, Portsmouth Force Main 100% Design, Willamette River CSO Program. City of Portland Environmental Services. June.

U.S. Environmental Protection Agency (EPA), 2016. Portland Harbor RI/FS, Final Remedial Investigation Report, Portland Oregon. U.S. Environmental Protection Agency Region 10, Seattle, Washington. February 8.

Table 3-1
Horizontal and Vertical Hydraulic Conductivity Fitting
Groundwater Discharge Modeling Technical Memorandum, Swan Island Basin Project Area, Portland, Oregon

Hydraulic Conductivity Description	Zone	Horizontal Hydraulic Conductivity (ft/d)				Vertical Hydraulic Conductivity Anisotropy (Kv/Kh)			
		Initial Value	Lower Bound	Upper Bound	Fit Value	Initial Value	Lower Bound	Upper Bound	Fit Value
Artificial Fill	1	1.5	0.085	2	1.42	0.5	0.05	1	0.48
Recent Basin Sediments	2	0.5	0.05	2	0.33	0.1	0.05	1	0.14
Alluvium, Sand	3	20	0.5	32	28.3	0.1	0.05	1	0.05
Alluvium, Clay	4	0.1	0.005	2	0.38	0.1	0.05	1	0.25
Missoula Flood Deposits	5	4	0.005	32	7.78	0.1	0.05	1	0.05

Notes:

ft/d = feet per day

Kh = Horizontal Hydraulic Conductivity

Kv = Vertical Hydraulic Conductivity

Table 3-2
Swan Island Basin Specific Discharge and Groundwater Flux Residuals
Groundwater Discharge Modeling Technical Memorandum, Swan Island Basin Project Area, Portland, Oregon

Reach[1]	Specific Discharge[2] (cm/d)			Groundwater Flux[2] (ft^3/d)		
	Observed	Computed	Residual	Observed	Computed	Residual
1	0.218	0.211	0.007	-2.860	-2.771	-0.089
2	0.091	0.094	-0.003	-1.194	-1.239	0.045
3	0.076	0.065	0.011	-1.000	-0.852	-0.148
4	0.078	0.053	0.025	-1.024	-0.692	-0.332
5	0.033	0.052	-0.019	-0.433	-0.686	0.252
6	0.059	0.055	0.004	-0.774	-0.727	-0.047
7	0.060	0.095	-0.035	-0.788	-1.242	0.454

Groundwater Flux (ft^3/d) Statistics	
Residual Mean	0.019
Absolute Residual Mean	0.195
Residual Standard Deviation	0.242
Sum of Squares	0.414
Root Mean Squared Error	0.243
Minimum Residual	-0.332
Maximum Residual	0.454
Number of Observations	7
Range in Observations	2.427
Scaled Residual Std. Deviation	0.100
Scaled Absolute Residual Mean	0.080
Scaled Root Mean Squared Error	0.100
Scaled Residual Mean	0.008

Notes:

1. Reaches are numbered from the northeastern (Mocks Bottom) bank of Swan Island Basin
2. The model was calibrated to groundwater flux in each SIB river boundary reach (80 feet by 5 feet). Specific discharge results are presented for comparison to the Porewater Upwelling Report (HGL, 2024e).

cm/d = centimeters per day ft^3/d = cubic feet per day

Table 4-1
Hypothetical Cross Sectional Model Boundary Reach Report
GW Discharge Modeling Technical Memo, Swan Island Basin Project Area, Portland, Oregon

Reach or Zone	Constant Head	River	Recharge
1		-2.77	4.10
2		-1.24	
3		-0.85	
4		-0.69	
5		-0.69	
6		-0.73	
7		-1.24	
9		-1.12	
10		-3.06	
923	0.05		
924	0.02		
925	0.01		
926	0.01		
927	0.01		
928	0.01		
929	0.01		
930	0.01		
931	0.01		
932	0.01		
933	0.01		
934	0.21		
935	0.20		
936	0.20		
937	0.20		
938	0.20		
939	0.20		
940	0.20		
941	0.20		
942	0.20		
943	0.20		
944	0.20		
945	0.20		
946	0.20		
947	0.20		
948	0.20		
949	0.20		
950	0.20		
951	0.20		
952	0.20		
953	0.20		
954	0.20		
955	0.20		
956	0.20		
957	0.20		

Table 4-1
Hypothetical Cross Sectional Model Boundary Reach Report
GW Discharge Modeling Technical Memo, Swan Island Basin Project Area, Portland, Oregon

Reach or Zone	Constant Head	River	Recharge
958	0.20		
959	0.20		
960	0.20		
961	0.20		
962	0.20		
963	0.20		
964	0.20		
965	0.20		
966	0.20		
967	0.20		
968	0.20		
969	0.20		
970	0.20		
971	0.20		
972	0.20		
973	0.20		
Total	8.30	-12.39	4.10

Modeled Flux In (ft^3/d):	12.40
Modeled Flux Out (ft^3/d):	-12.39
Percent Error	0.10%

Notes:
ft^3/d = cubic feet per day
GW = groundwater

Table 4-2
Groundwater Discharge Elevation Results
Groundwater Discharge Modeling Technical Memorandum, Swan Island Basin Project Area, Portland, Oregon

Model Scenario	Groundwater Elevation at Monitoring Point (ft NAVD88) [ft above Willamette River Stage]		
	20-ft SIB Bank Elevation (0- -2 ft NAVD88)	10-ft SIB Bank Elevation (0- -2 ft NAVD88)	Water Table at Highest Model Cell Adjacent to SIB[1]
Measured SIB Discharge - July 2023 Willamette River Stage: 8.09 ft NAVD88	9.7 [1.6]	9.1 [1.0]	8.6 [0.5]
Ordinary High Water Willamette River Stage: 20.075 ft NAVD88	21.0 [0.9]	20.6 [0.5]	20.7 [0.6]
Moderate Flooding Willamette River Stage: 29 ft NAVD88	29.7 [0.7]	29.4 [0.4]	29.6 [0.6]

Notes:

1. The water table elevation was estimated in the cell adjacent to the highest river boundary cell that was saturated.

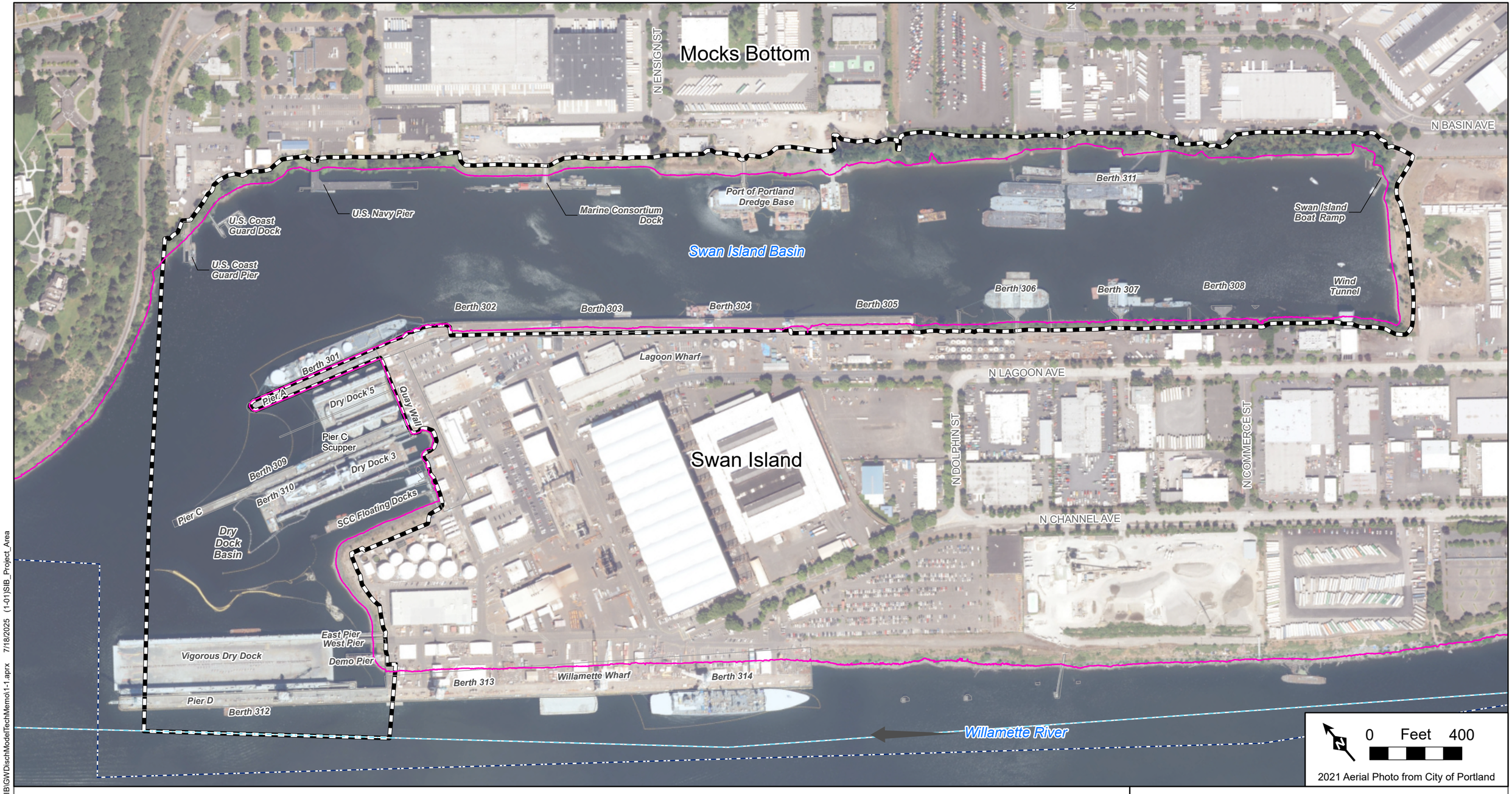
ft = feet

GW = groundwater

NAVD88 = North American Vertical Datum of 1988

SIB = Swan Island Basin

FIGURES



River Flow Direction

13 ft NAVD88

SIB Project Area

ROD Navigation Channel

Federal Navigation Channel (USACE, 2025)

Notes:
ft = feet
NAVD88 = North American Vertical Datum of 1988
ROD = Record of Decision
USACE = U.S. Army Corps of Engineers

Sources:
USACE, 2025, Hydrographic Survey, eHydro
https://www.nwd.usace.army.mil/missions/civil-works/navigation/

Figure 1-1
Swan Island Basin Project Area

Prepared on: 7/18/2025
Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL | MOTT MACDONALD | COAST & HARBOR ENGINEERING | PACIFIC groundwater GROUP | BRIDGEWATER GROUP

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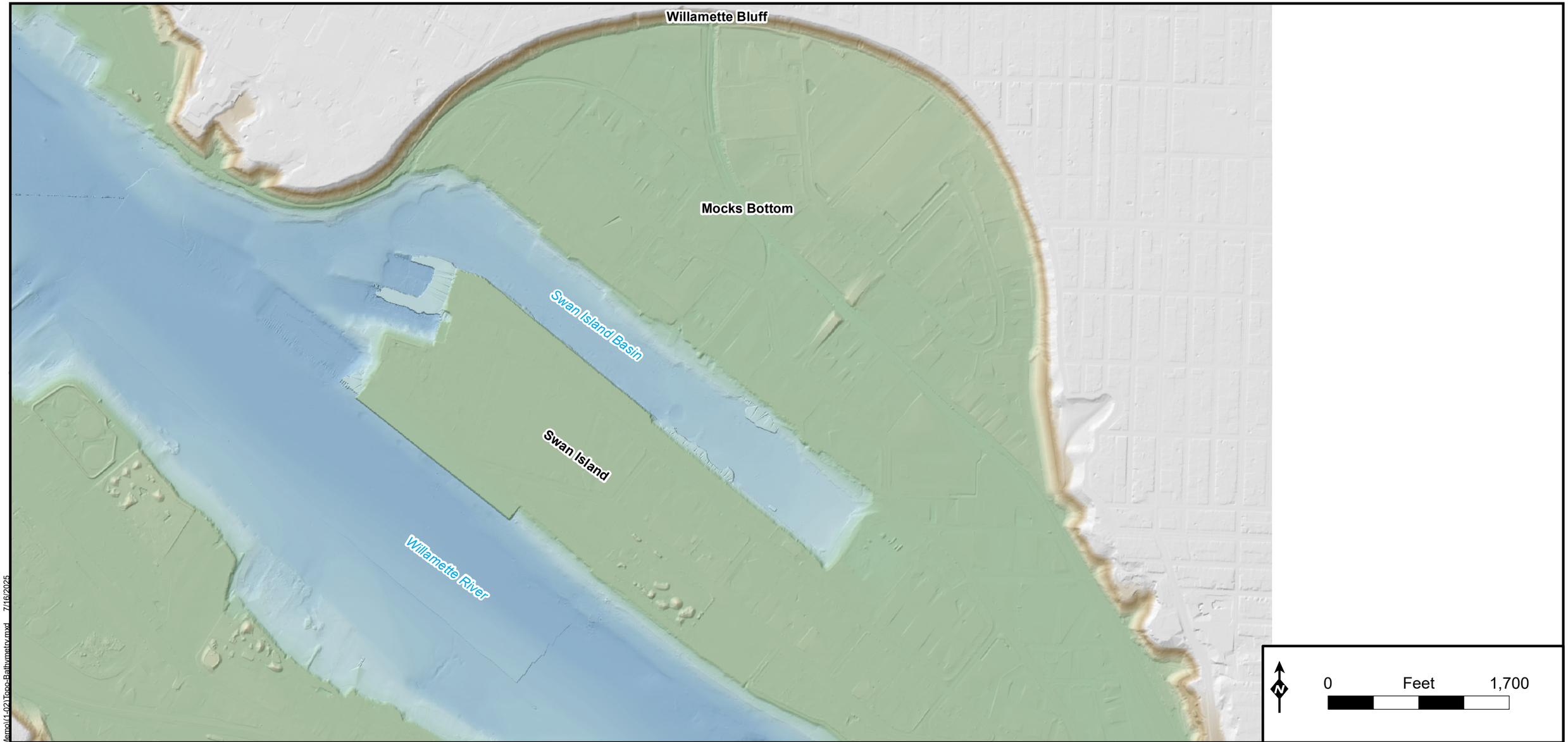

Elevation (ft NAVD 88)

High : 150

Low : -40

Note:
ft NAVD 88= feet North American Vertical Datum of 1988

Sources:
HGL, 2022. Swan Island Bathymetry.
Oregon Lidar Consortium (OLC), 2019. West Metro 3DEP. Oregon Department of Geology and Mineral Industries.
USACE, 2010. Lower Columbia River Digital Terrain Model Development. U.S. Army Corps of Engineers Portland District.

Figure 1-2

Topography and Bathymetry

Prepared on 7/16/2025
Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL | Moffatt & Nichol | Coast & Harbor Engineering | Pacific Groundwater Group | Bridgewater Group

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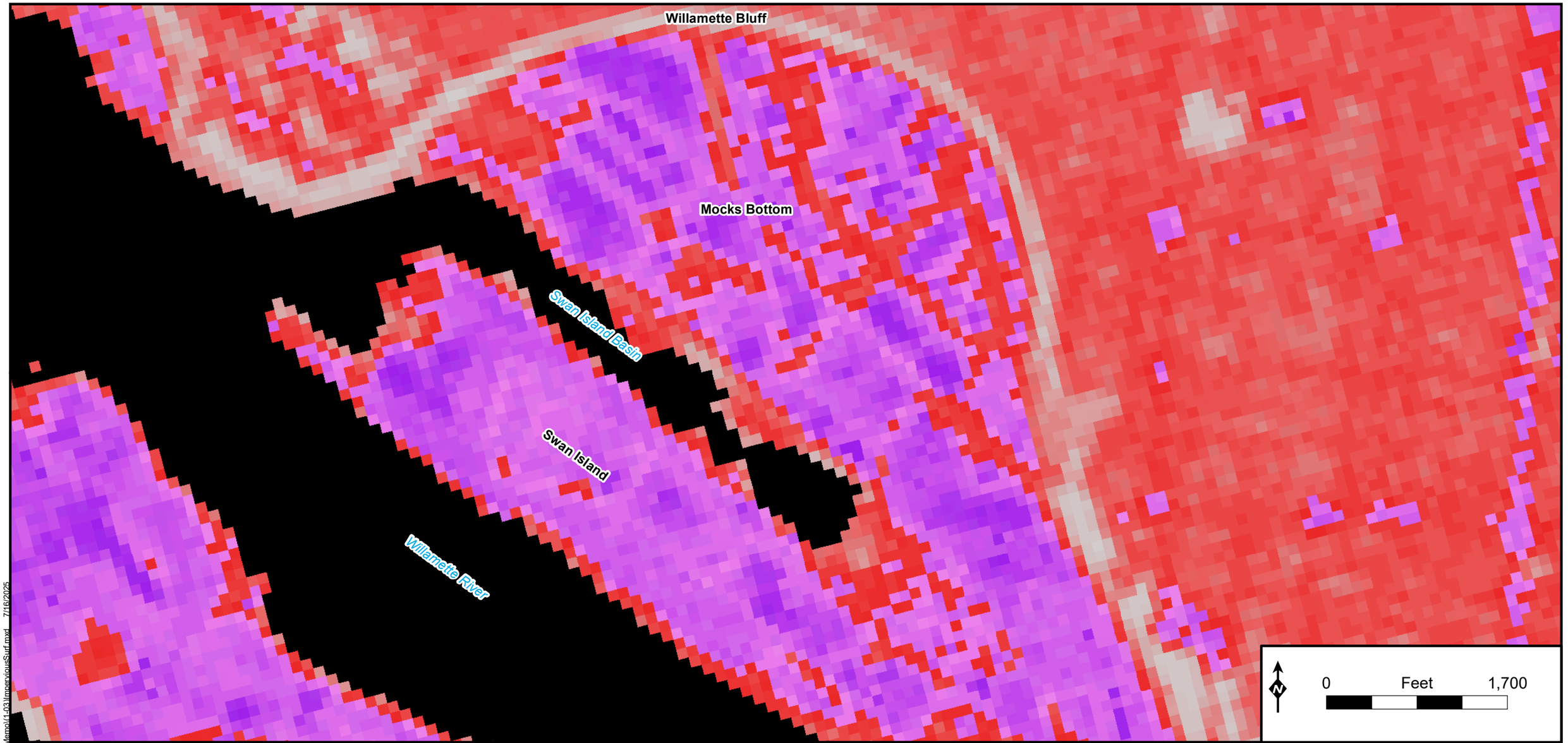

Percent Impervious

100

0

Sources:
USGS, 2024. Annual NLCD Collection 1 Science Products.
U.S. Geological Survey data release, https://doi.org/10.5066/P94UXNTS

Figure 1-3
Impervious Surface

Prepared on 7/16/2025
Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

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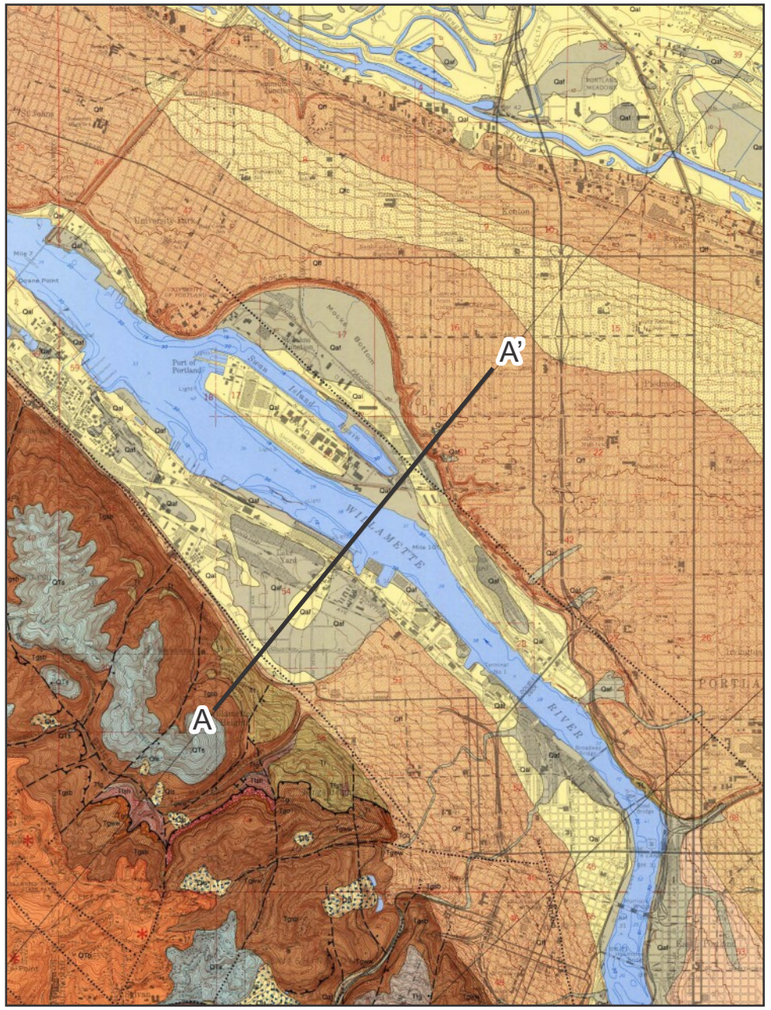

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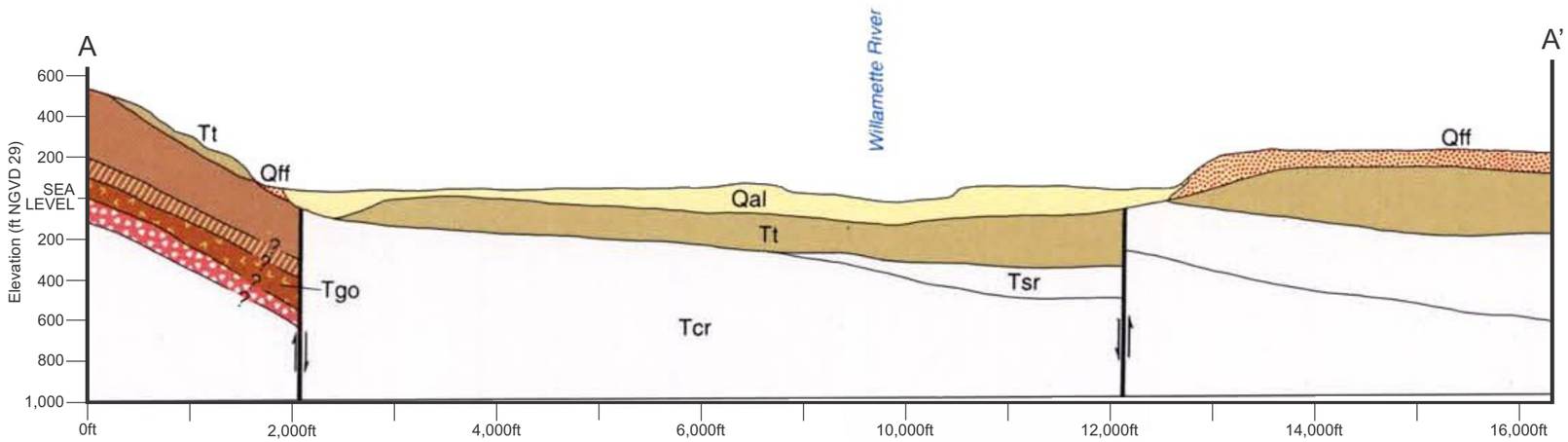


VERTICAL EXAGGERATION 2X

Qaf Artificial Fill (Holocene)

Qal Alluvium (Quaternary)

Qff Fine-grained facies (Pleistocene) [Missoula flood deposits]

Qfc Coarse-grained facies (Pleistocene) [Missoula flood deposits]

Tt Troutdale Formation (Miocene to Pliocene)

Tsr Sandy River Mudstone (Miocene to Pliocene)

Tcr Undifferentiated Columbia River Basalt Group (middle Miocene)

Sources:
Beeson, M.H., et al., 1991. Geologic Map of the Portland Quadrangle, Multnomah and Washington Counties, Oregon, and Clark County, Washington. State of Oregon Department of Geology and Mineral Industries. GMS-75.

Notes:
ft=feet
NGVD 29=National Geodetic Vertical Datum of 1929

Figure 1-4
Regional Stratigraphic Cross Section

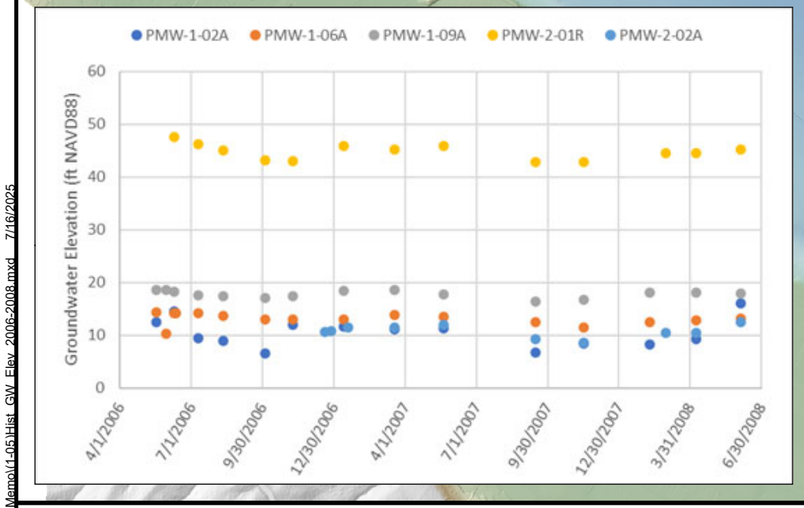
Prepared on 6/23/2025
Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

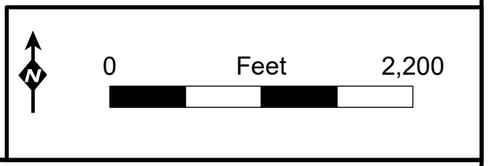
HGL PACIFIC groundwater GROUP | M MOTT MACDONALD | COAST & HARBOR ENGINEERING BRIDGEWATER GROUP

\\srv-gst-01\hgis\Portland_Harbor_DT2002\SIB\GWDischModelTechMemo\(1-04)Regional Stratigraphic Cross Section.cdr

PMW-2-03A
PMW-2-02A
PMW-2-01R
PMW-1-09A
PMW-1-08A
PMW-1-07A
PMW-1-06A
PMW-1-05A
PMW-1-04A
PMW-1-03A
PMW-1-02A
PMW-1-01A
PMW-1-17A
PMW-1-16A
PMW-1-15A
PMW-1-14A
PMW-1-13A
PMW-1-12A
PMW-1-11A
PMW-1-10A

Willamette Bluff
Mocks Bottom
Swan Island Basin
Swan Island
Willamette River





Monitoring Well Locations

- 2 inch Piezometer
- Boring
- Vibrating Wire Piezometer

Elevation (ft NAVD 88)

High : 150

Low : -40

Note:
ft NAVD 88= feet North American Vertical Datum of 1988

Sources:
Brown and Caldwell, 2008. Portsmouth Force Main Geotechnical Data Report.
HGL, 2022. Swan Island Bathymetry.
Oregon Lidar Consortium (OLC), 2019. West Metro 3DEP.
Oregon Department of Geology and Mineral Industries.
USACE, 2010. Lower Columbia River Digital Terrain Model Development.
U.S. Army Corps of Engineers Portland District.

Figure 1-5

Historical Groundwater Elevations 2006 - 2008

Prepared on 7/16/2025
Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL | MOTT MACDONALD | COAST & HARBOR ENGINEERING | PACIFIC groundwater GROUP | BRIDGEWATER GROUP

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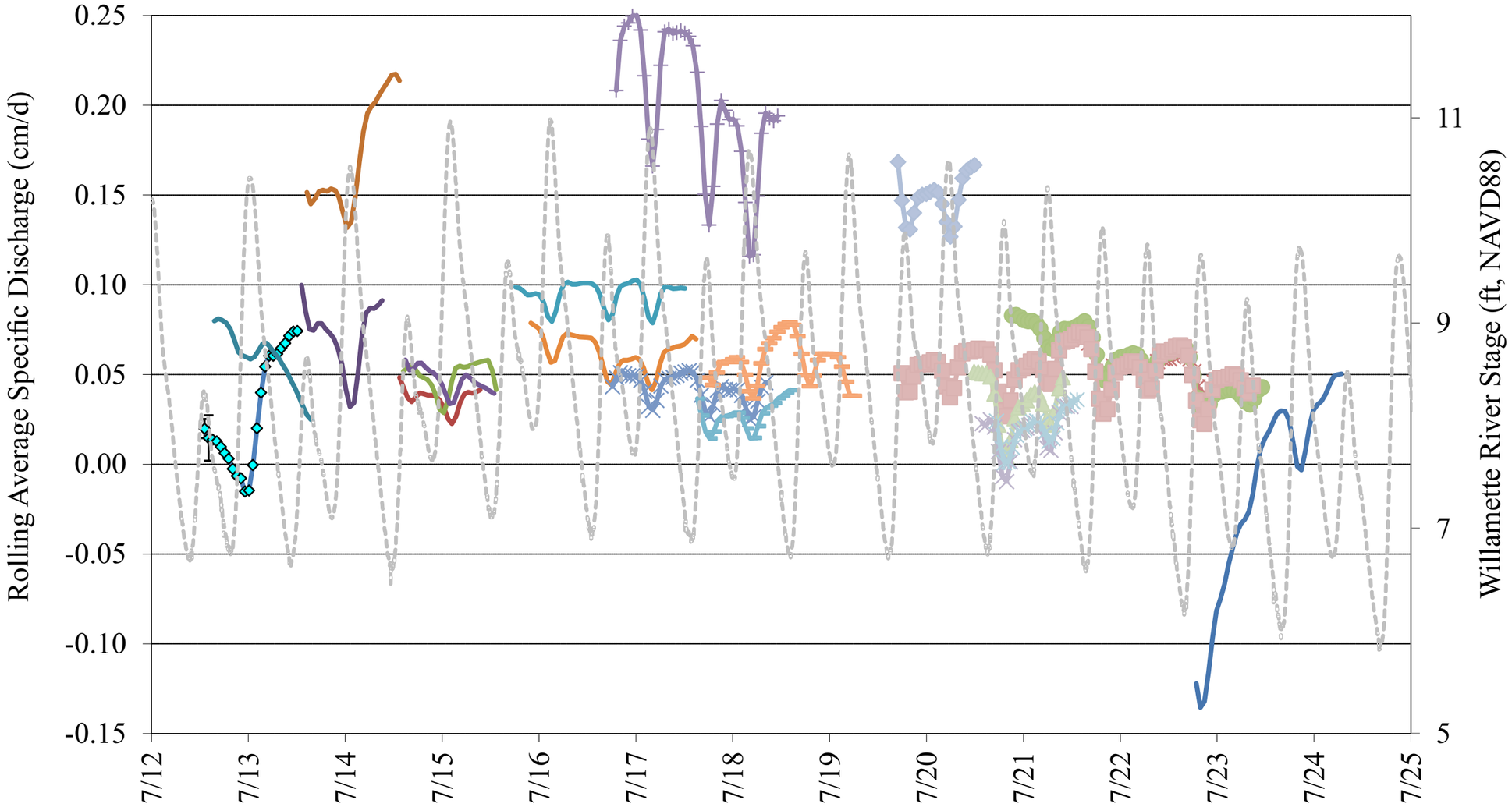

1D 2D 3F 3.5C 4F 5A 5.5AA 5.5B
6D 6F 7I 8D 9F 10A 10.5C 12E
14B 16D 16F 17D 17G River

Notes:
cm/d=centimeter per day
ft NAVD 88= feet North American Vertical Datum of 1988

Sources:
Sources:
HGL, 2024. Porewater Upwelling Report, Rev. 1.
USGS, 2025. Willamette River at Portland OR – 14211720, waterdata.usgs.gov

Figure 1-6
Rolling Average Specific Discharges 7/12/2023 – 7/25/2023

Prepared on 6/23/2025
Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL PACIFIC groundwater GROUP · M MACDONALD · COAST & HARBOR ENGINEERING BRIDGEWATER GROUP

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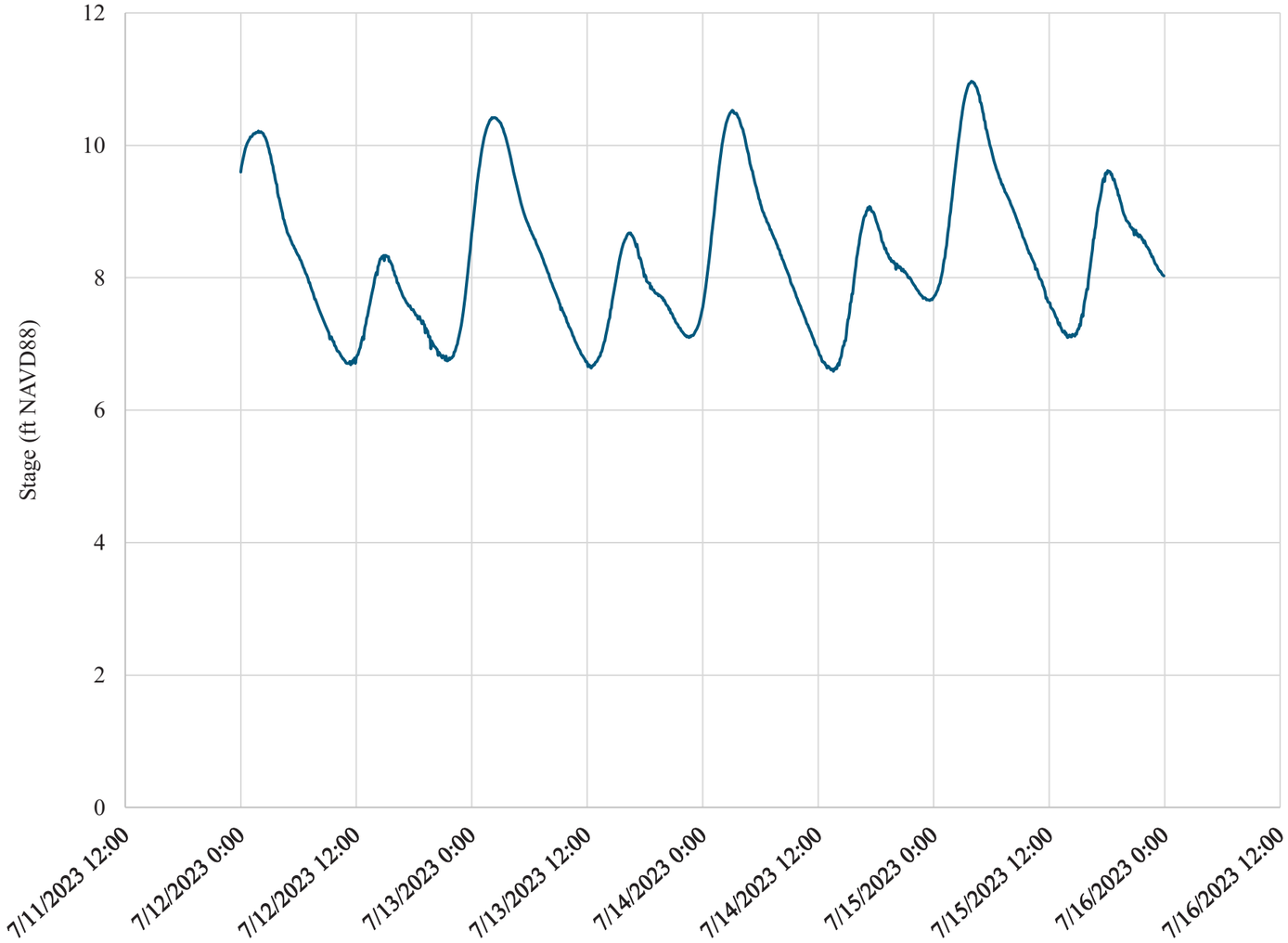

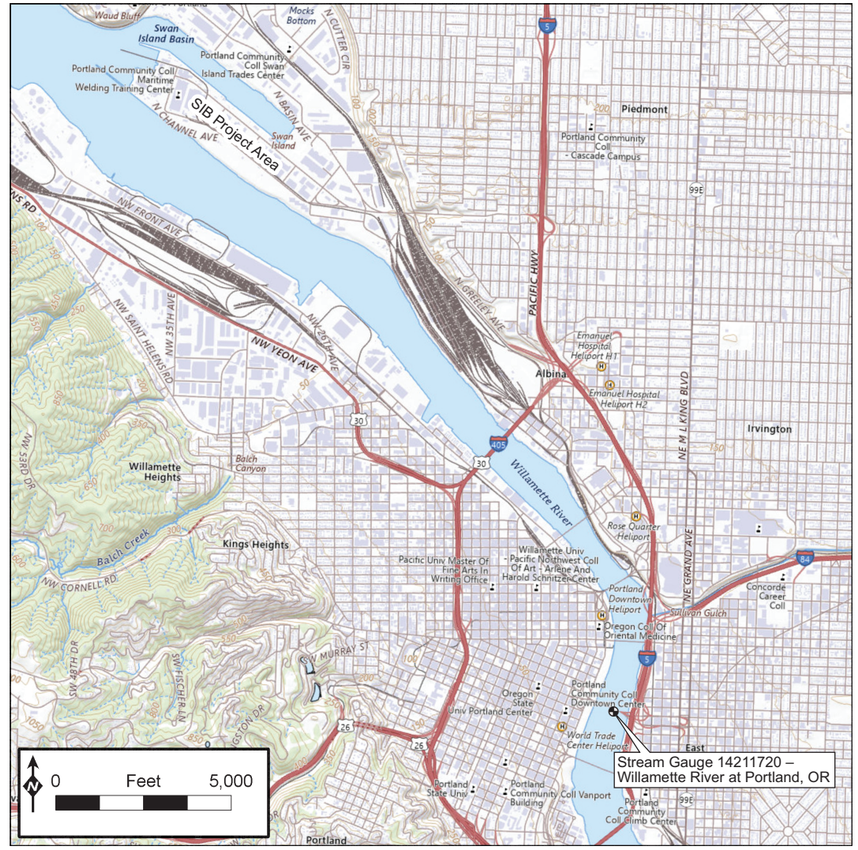

- Stream Gauge

Notes:
ft NAVD 88= feet North American Vertical Datum of 1988

Sources:
USGS, 2025. Willamette River at Portland OR – 14211720, waterdata.usgs.gov

Figure 1-7
Willamette River Stage
7/12/2023 – 7/15/2023

Prepared on 7/7/2025

Groundwater Discharge Modeling
Technical Memorandum

PACIFIC groundwater GROUP
HGL
MOTT MACDONALD
BRIDGEWATER GROUP

\\srv-gst-01\hgljs\Portland_Harbor_DT2002\SIB\GWDischModelTechMemo\(1-07)Willamette River Stage.cdr



Cross Section Model Interpolation

Elevation (ft NAVD 88)

High : 150

Low : -40

Note:
ft NAVD 88= feet North American Vertical Datum of 1988

Sources:
HGL, 2022. Swan Island Bathymetry.
Oregon Lidar Consortium (OLC), 2019. West Metro 3DEP.
Oregon Department of
Geology and Mineral Industries.
USACE, 2010. Lower Columbia River Digital Terrain Model
Development.
U.S. Army Corps of Engineers Portland District.

Figure 2-1

Cross-Sectional Model Interpolation Area

Prepared on 7/16/2025
Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

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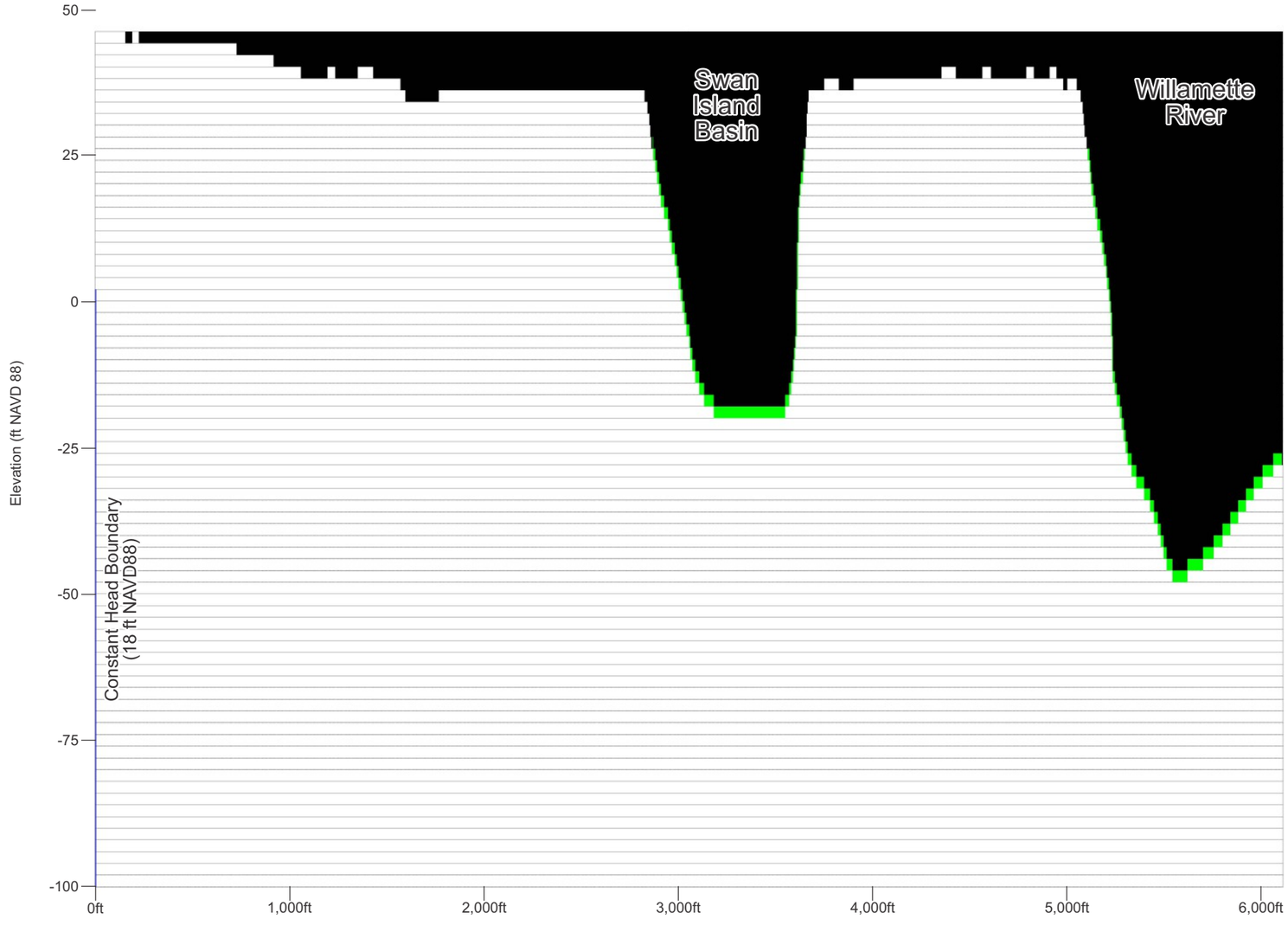
\\srv-gst-01\HGL GIS\Portland_Harbor_DT2002\SIBGWDischModelTechMemo\(2-01)Cross-sec_Model_IA.mxd 7/16/2025



No Flow Boundary

Constant Head Boundary

River Boundary

Note:
Horizontal range = 0ft - 6080ft
Vertical Range = -100ft NAVD88 to - 46ft NAVD88

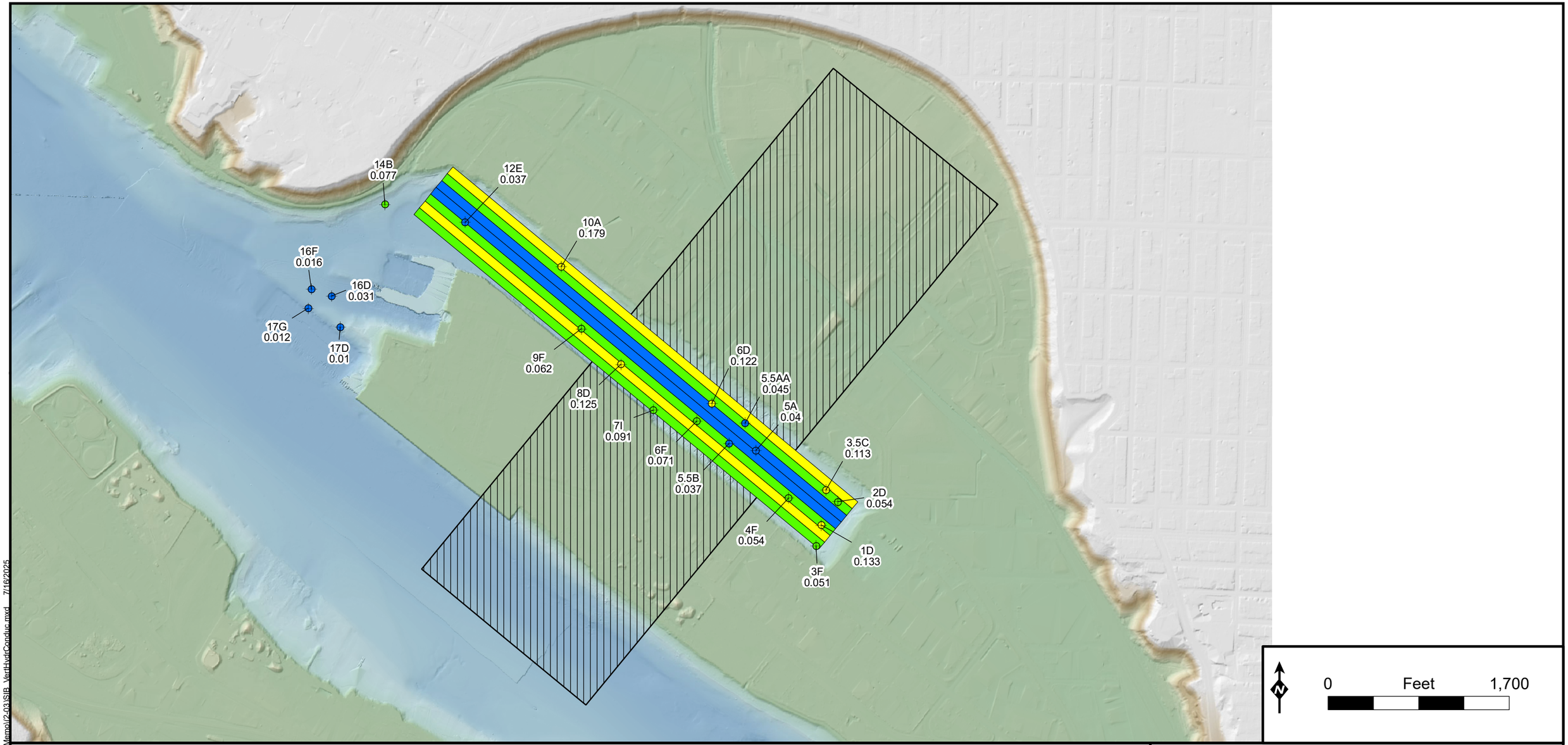
ft=feet
NAVD88=North American Vertical Datum of 1988
SIB=Swan Island Basin

Figure 2-2
Cross-Section
Model Boundaries

Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL PACIFIC groundwater GROUP · MOTT MACDONALD · COAST & HARBOR ENGINEERING · BRIDGEWATER GROUP

\\srv-gst-01\hglgis\Portland_Harbor_DT2002\SIB\GW\DischModelTechMemo\(2-02)Cross-Section Model Boundaries.cdr



\\snv-cst-011\HGL\GIS\Portland_Harbor_DT2002\SIBIGWDischModelTechMemo\2-2\3\SIB_VertHydrConductive.mxd 7/16/2025

Trident Survey Stations
Tidally Avereaged Hydraulic Conductivity (ft/d)

- 0.009 - 0.05
- 0.05 - 0.1
- 0.1 - 0.2

Cross Sectional Average
Vertical Hydraulic Conductivity (ft/d)

- 0.009 - 0.05
- 0.05 - 0.1
- 0.1 - 0.2

Cross Section Model Interpolation

Elevation (ft NAVD 88)

- High : 150
- Low : -40

Notes:
ft/d=feet per day
ft NAVD 88= feet North American Vertical Datum of 1988

Sources:
HGL, 2022. Swan Island Bathymetry.
Oregon Lidar Consortium (OLC), 2019. West Metro 3DEP.
Oregon Department of
Geology and Mineral Industries.
USACE, 2010. Lower Columbia River Digital Terrain
Model Development.
U.S. Army Corps of Engineers Portland District.
HGL, 2024. Porewater Upwelling Report, Rev. 1.

Figure 2-3

Swan Island Basin
Vertical Hydraulic Conductivities

Prepared on 7/16/2025
Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL | MOTT MACDONALD | COAST & HARBOR ENGINEERING
PACIFIC groundwater GROUP | BRIDGEWATER GROUP



Cross Section Maximum Recharge (ft/d)

- 0
- 0 - 0.002
- 0.002 - 0.0031
- 0.0031 - 0.0041
- 0.0041 - 0.0051

Note:
ft/d= feet per day
ft NAVD 88= feet North American Vertical Datum of 1988

Sources:
ESRI Online Imagery
HGL, 2022. Swan Island Bathymetry.
Oregon Lidar Consortium (OLC), 2019. West Metro 3DEP.
Oregon Department of
Geology and Mineral Industries.
USACE, 2010. Lower Columbia River Digital Terrain Model
Development.
U.S. Army Corps of Engineers Portland District.

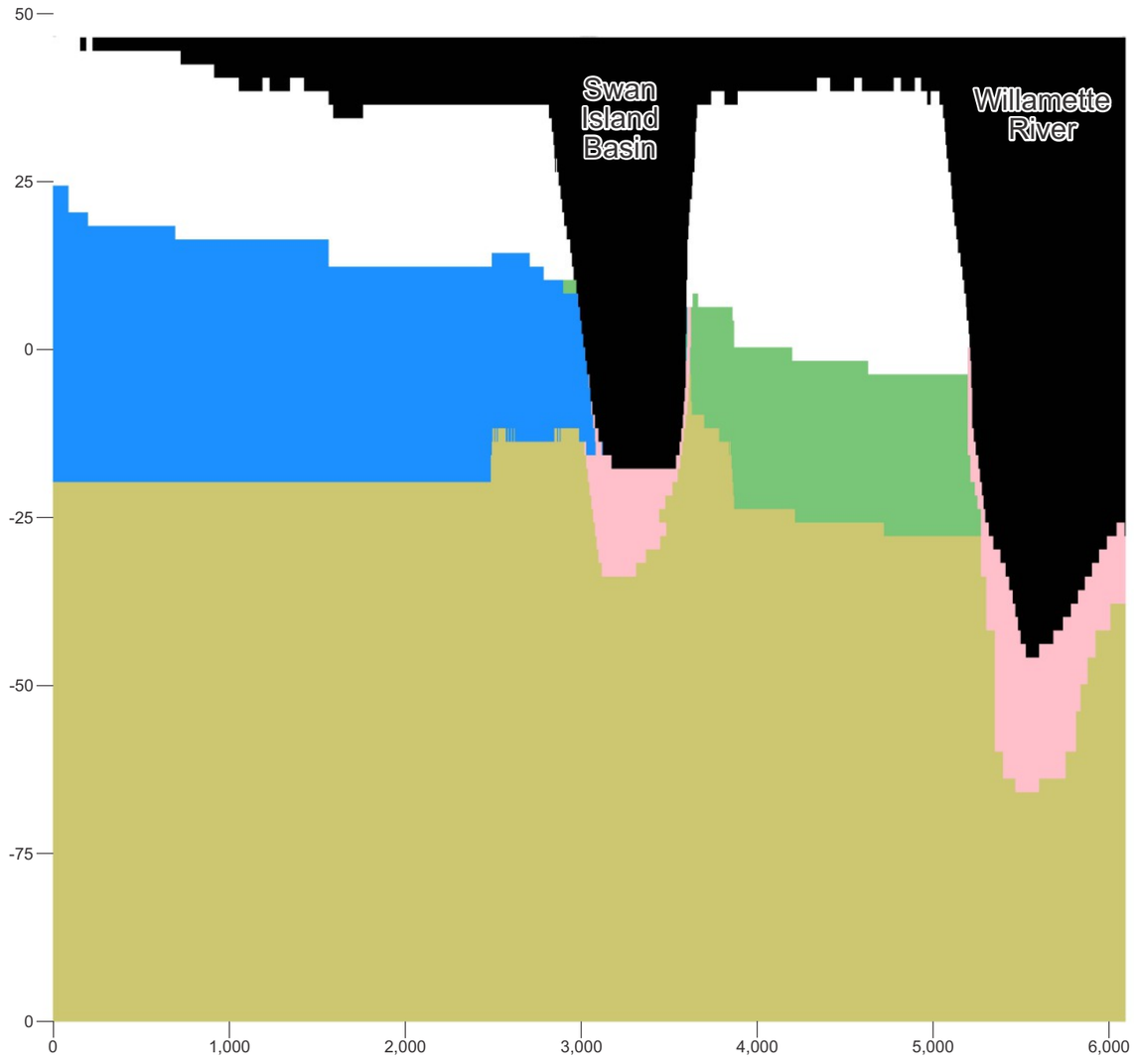
Figure 2-4

Estimated Average Groundwater Recharge

Prepared on 7/16/2025
Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL PACIFIC groundwater GROUP MOTT MACDONALD COAST & HARBOR ENGINEERING BRIDGEWATER GROUP

\\snv-cst-011\HGL GIS\Portland_Harbor_DT2002\SIBIGW\DischModelTechMemo\2-04\FestAveGWRecharge.mxd 7/16/2025



No Flow Boundary

Artificial Fill

Recent Basin Sediments

Alluvium Clay

Alluvium Sand

Missoula Flood Deposits

Note:
Horizontal range = 0ft - 6080ft
Vertical Range = -100ft NAVD88 to - 46ft NAVD88

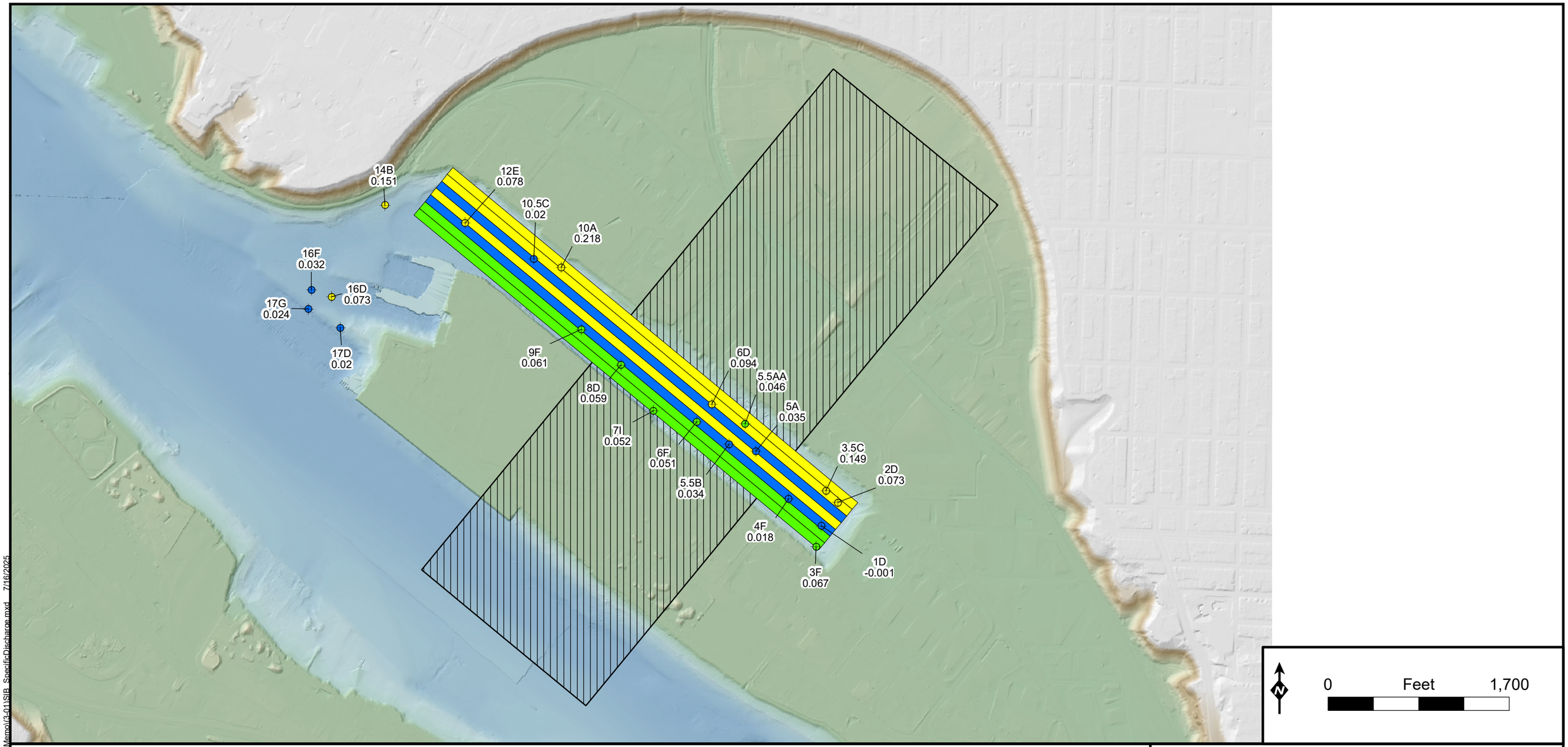
ft=feet
NAVD88=North American Vertical Datum of 1988
SIB=Swan Island Basin

Figure 2-5
Cross-Sectional Model Hydraulic Conductivity Zones

Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL PACIFIC groundwater GROUP · M MOTT MACDONALD · COAST & HARBOR ENGINEERING BRIDGEWATER GROUP

\\srv-gst-01\hgl\gis\Portland_Harbor_DT2002\SIB\GWDischModelTechMemo\(2-05)Cross-Sectional Model Hydraulic Conductivity Zones.cdr



Trident Survey Stations
Tidally Avereaged Specific Discharge (cm/d)

- -0.001 - 0.035
- 0.035 - 0.072
- 0.072 - 0.218

Cross Sectional Average
Specific Discharge (cm/d)

- -0.001 - 0.035
- 0.035 - 0.072
- 0.072 - 0.218

Cross Section Model Interpolation

Elevation (ft NAVD 88)

- High : 150
- Low : -40

Notes:
cm/d=centimeter per day
ft NAVD 88= feet North American Vertical Datum of 1988

Sources:
HGL, 2022. Swan Island Bathymetry.
Oregon Lidar Consortium (OLC), 2019. West Metro 3DEP. Oregon Department of Geology and Mineral Industries.
USACE, 2010. Lower Columbia River Digital Terrain Model Development. U.S. Army Corps of Engineers Portland District.
HGL, 2024. Porewater Upwelling Report, Rev. 1.

Figure 3-1

Swan Island Basin Specific Discharge July 2023

Prepared on 7/16/2025
Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

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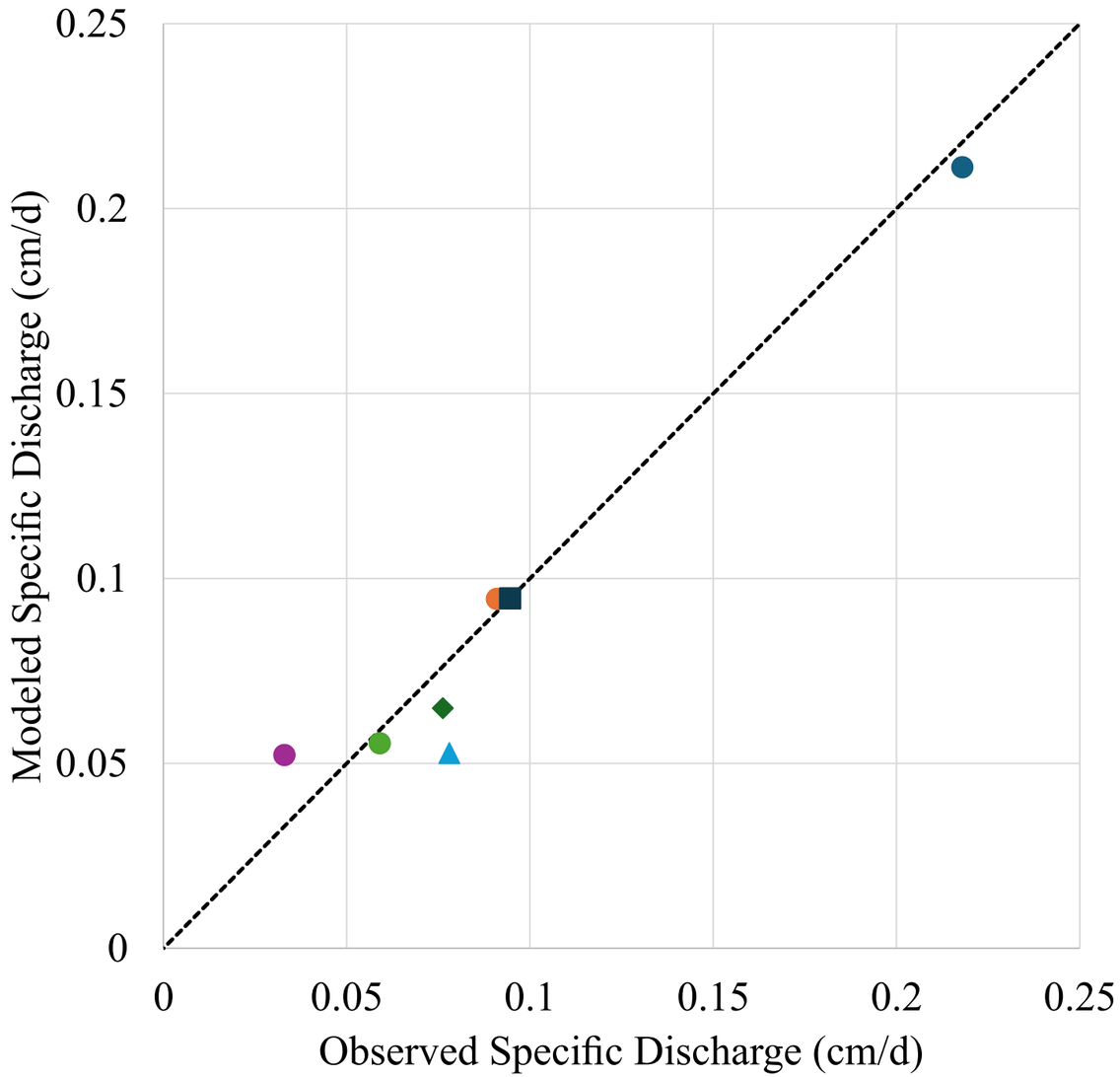
\\srv-ast-01\HGL GIS\Portland_Harbor_DT2002\SIB\GWDisch\ModelTechMemo\(3-01)\SIB_SpecificDischarge.mxd 7/16/2025



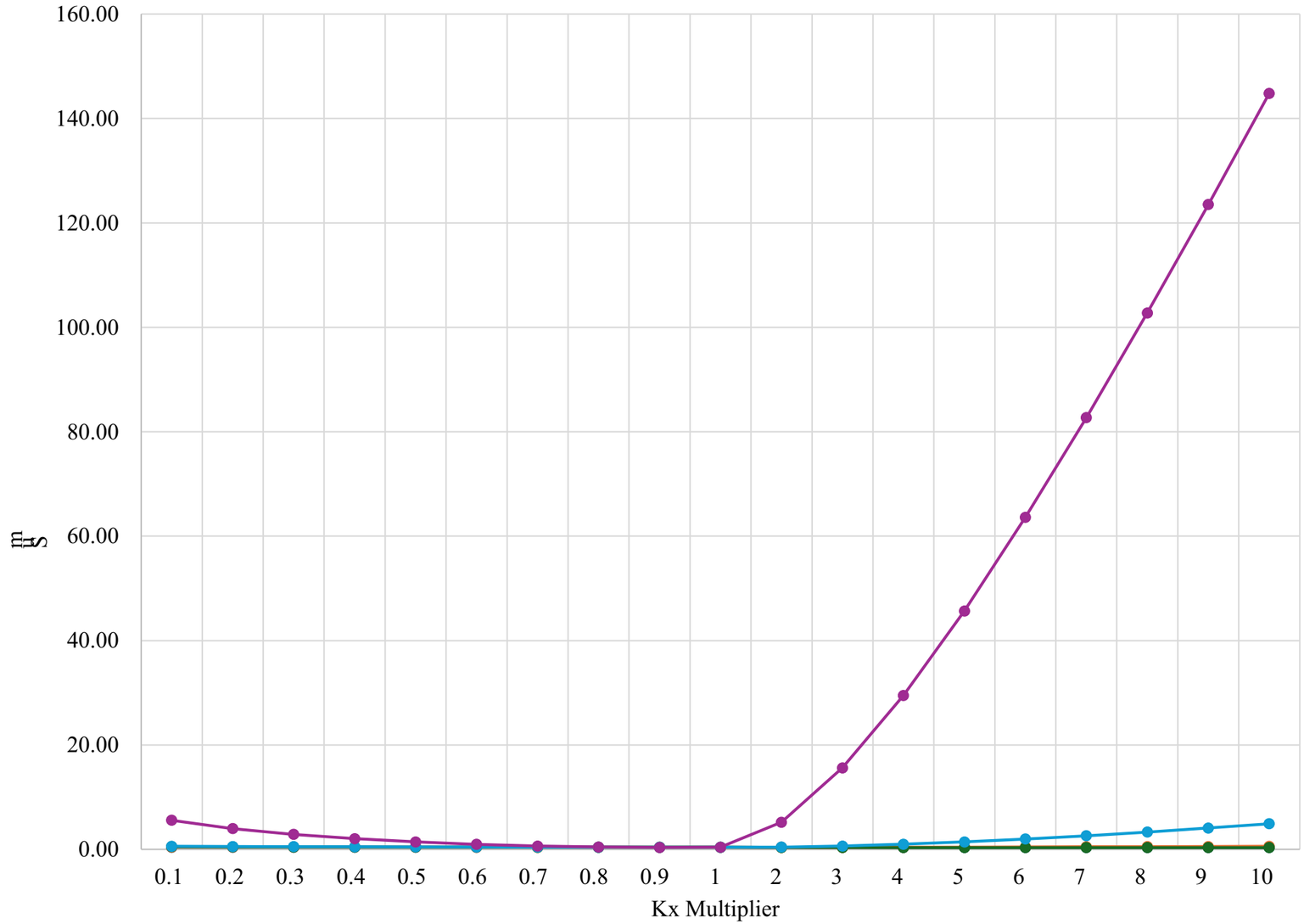
- Reach 1
- Reach 2
- Reach 3
- Reach 4
- Reach 5
- Reach 6
- Reach 7
- 1:1 Line

Notes:
cm/d=centimeters per day
ft NAVD 88= feet North American Vertical Datum of 1988
SIB = Swan Island Basin

Figure 3-2
Swan Island Basin
Specific Discharge Residuals

Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

\\srv-gst-01\hglgis\Portland_Harbor_DT2002\SIB\GWDischModelTechMemo\(3-02)SIB Specific Discharge Residuals.cdr



- Artificial Fill
- Recent Basin Sediments
- Alluvium Sand
- Alluvium Clay
- Missoula Flood Deposits

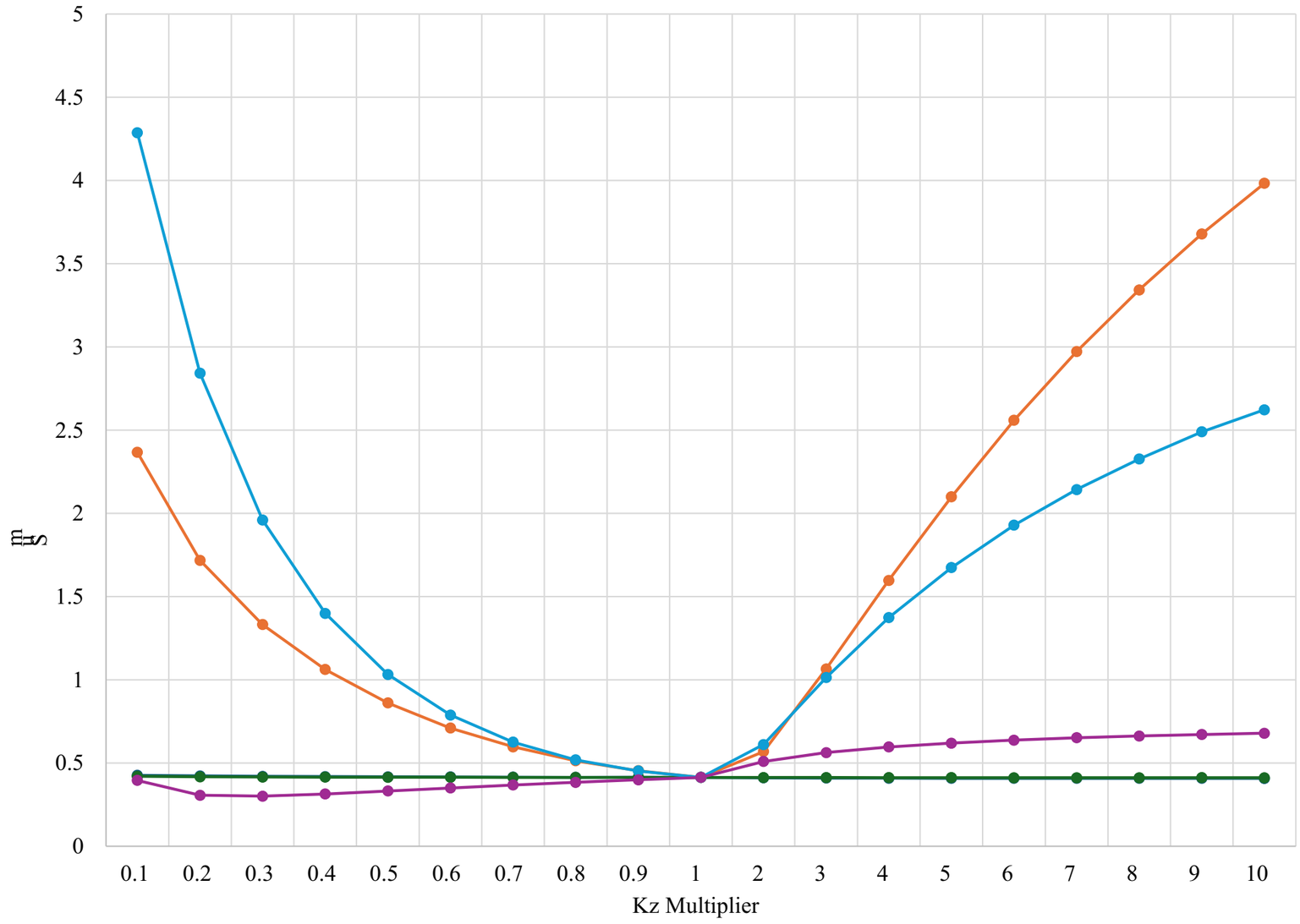
Notes:
ft NAVD 88= feet North American Vertical Datum of 1988
SIB = Swan Island Basin

Figure 3-3
Uncertainty Analysis
Horizontal Hydraulic Conductivity

Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL PACIFIC groundwater GROUP · MOTT MACDONALD · COAST & HARBOR ENGINEERING · BRIDGEWATER GROUP

\\srv-gst-01\hglgis\Portland_Harbor_DT2002\SIB\GWDischModelTechMemo\(3-03)Sensitivity Analysis – Horizontal Hydraulic Conductivity.cdr



Artificial Fill
Recent Basin Sediments
Alluvium Sand
Alluvium Clay
Missoula Flood Deposits

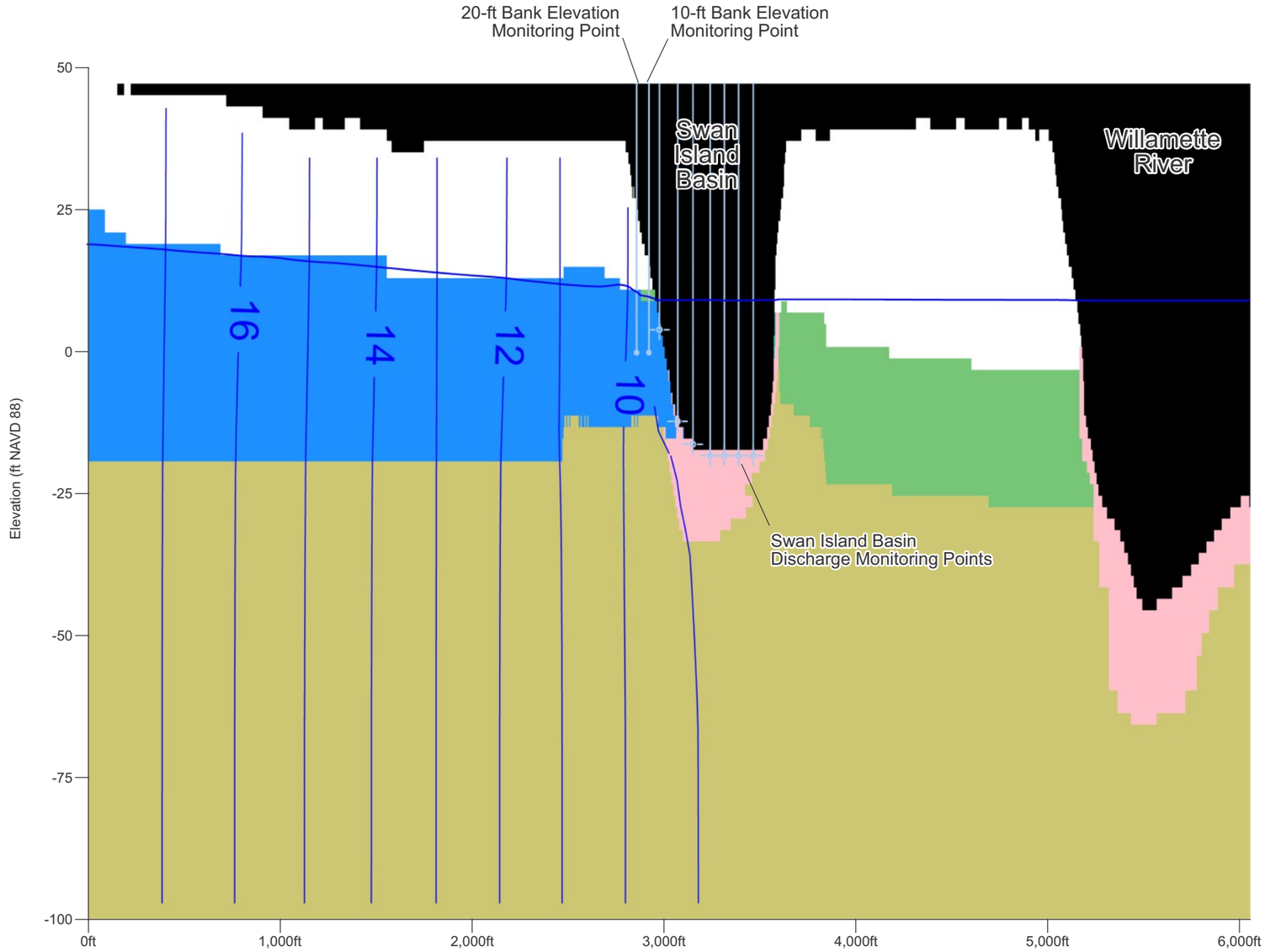
Notes:
ft NAVD 88= feet North American Vertical Datum of 1988
SIB = Swan Island Basin

Figure 3-4
Sensitivity Analysis
Vertical Hydraulic Conductivity

Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL · Moffatt & Nichol · Coast & Harbor Engineering · Pacific Groundwater Group · Bridgewater Group

\\srv-gst-01\hgljsl\Portland_Harbor_DT2002\SIB\GWDischModel\TechMemo\(3-04)Sensitivity Analysis – Vertical Hydraulic Conductivity.cdr



10 Potentiometric Contour 1-ft interval (ft NAVD88)

Water Table

No Flow Boundary

Artificial Fill

Recent Basin Sediments

Alluvium Clay

Alluvium Sand

Missoula Flood Deposits

Note:
Horizontal range = 0ft - 6080ft
Vertical Range = -100ft NAVD88 to - 46ft NAVD88

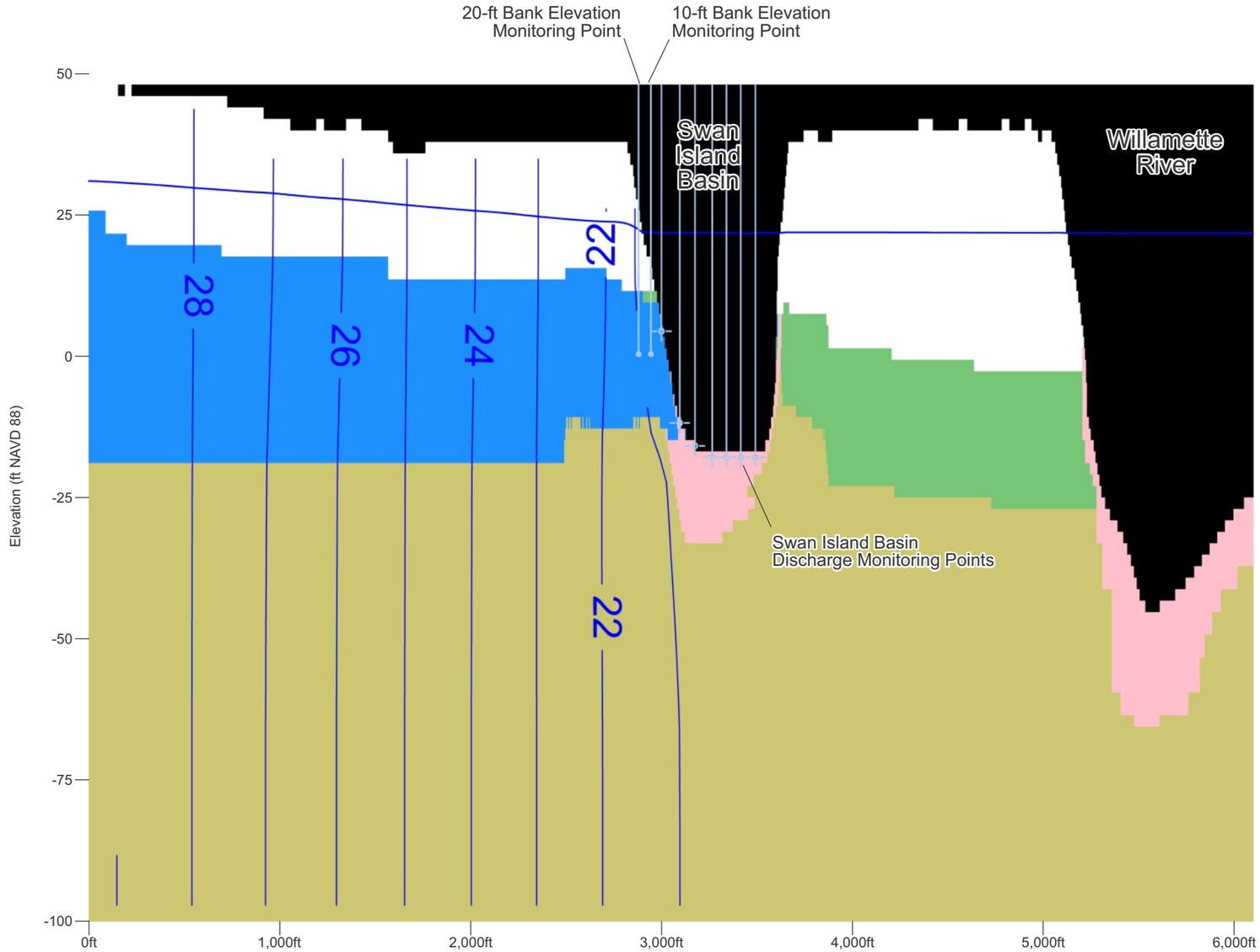
ft=feet
NAVD88=North American Vertical Datum of 1988
SIB=Swan Island Basin

Figure 4-1
Measured Swan Island Basin Discharge Scenario Results
July 2023

Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL PACIFIC groundwater GROUP | MOTT MACDONALD | COAST & HARBOR ENGINEERING BRIDGEWATER GROUP

\\srv-gst-01\hgl\gis\Portland_Harbor_DT2002\SIB\GWDischModelTechMemo\(4-01)Measured Swan Island Basin Discharge Scenario Results – July 2023.cdr



21 Potentiometric Contour 1-ft interval (ft NAVD88)

Water Table

No Flow Boundary

Artificial Fill

Recent Basin Sediments

Alluvium Clay

Alluvium Sand

Missoula Flood Deposits

Note:
Horizontal range = 0ft - 6080ft
Vertical Range = -100ft NAVD88 to - 46ft NAVD88
Ordinary High Water Stage = 20.075ft NAVD88

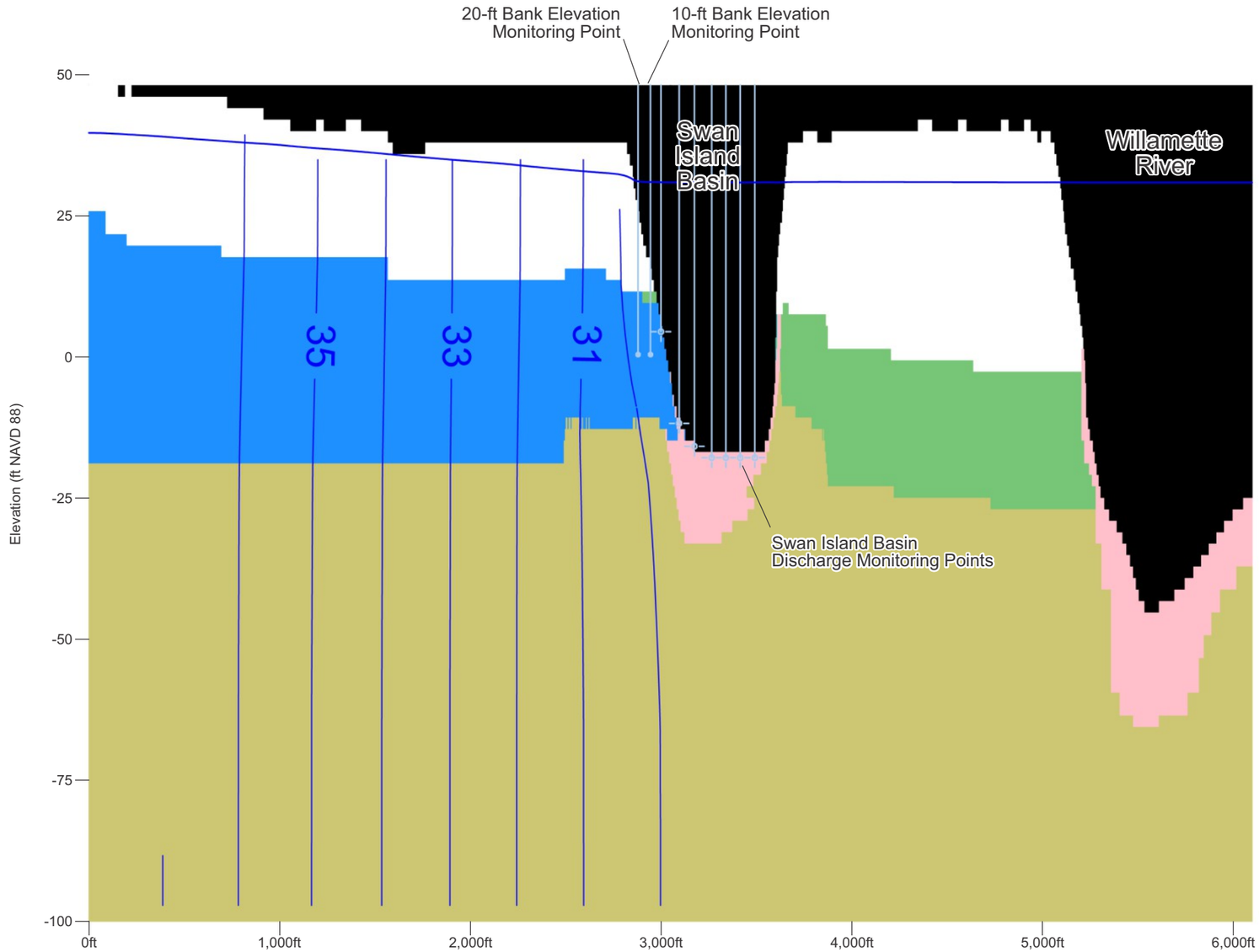
ft=feet
NAVD88=North American Vertical Datum of 1988
SIB=Swan Island Basin

Figure 4-2
Ordinary High Water Scenario Results

Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL PACIFIC groundwater GROUP | M MACDONALD | COAST & HARBOR ENGINEERING BRIDGEWATER GROUP

\\srv-gst-01\hgljs\Portland_Harbor_DT2002\SIB\GWDischModelTechMemo\(4-02)Ordinary High Water Scenario Results.cdr



35 Potentiometric Contour 1-ft interval (ft NAVD88)

Water Table

No Flow Boundary

Artificial Fill

Recent Basin Sediments

Alluvium Clay

Alluvium Sand

Missoula Flood Deposits

Note:
Horizontal range = 0ft - 6080ft
Vertical Range = -100ft NAVD88 to - 46ft NAVD88
Moderate Willamette River Flood Stage = 29ft NAVD88

ft=feet
NAVD88=North American Vertical Datum of 1988
SIB=Swan Island Basin

Figure 4-3
Moderate Flood Stage Scenario Results

Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

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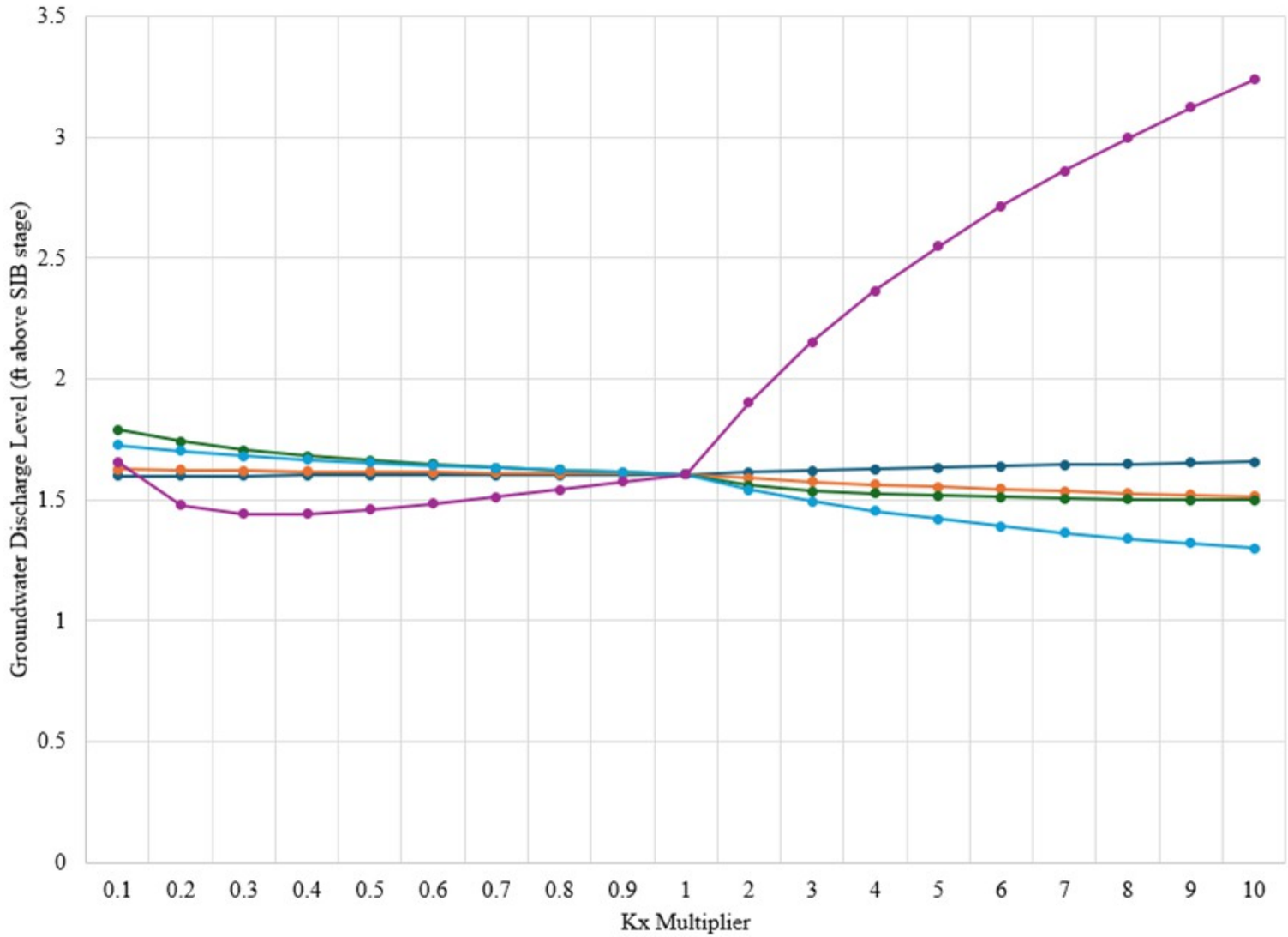
\\srv-gst-01\hgis\Portland_Harbor_DT2002\SIB\GWDischModelTechMemo\(4-03)Moderate Flood Stage Scenario Results.cdr



- Artificial Fill
- Recent Basin Sediments
- Alluvium Sand
- Alluvium Clay
- Missoula Flood Deposits

Notes:
ft NAVD 88= feet North American Vertical Datum of 1988
SIB = Swan Island Basin

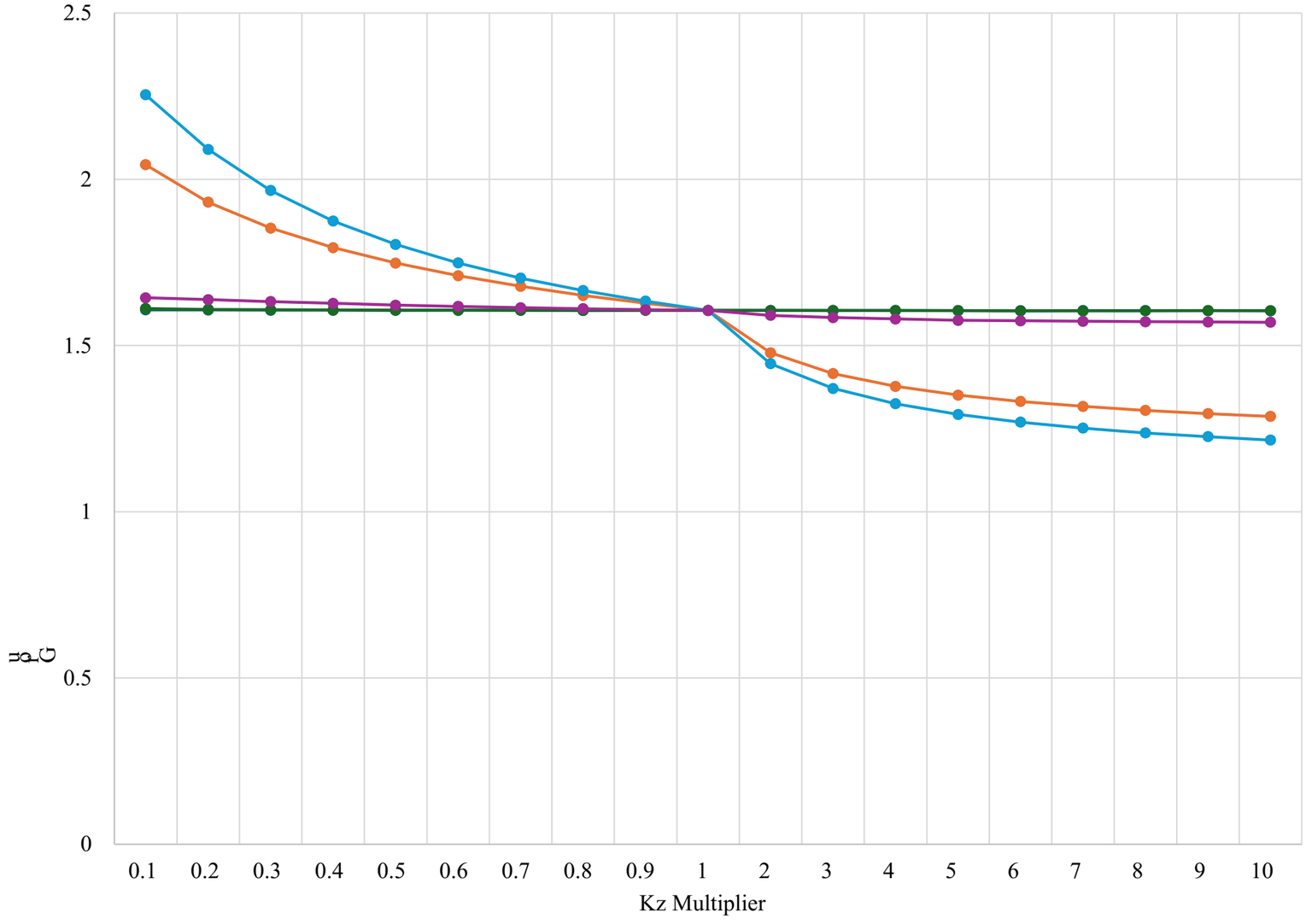
Groundwater discharge level was monitored at the 20-ft bank monitoring point
0 to -2 ft NAVD88

Figure 4-4
Uncertainty Analysis
Horizontal Hydraulic Conductivity

Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL · MM MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

\\srv-gst-01\hgljs\Portland_Harbor_DT2002\SIB\GWDischModelTechMemo\(1-04)Regional Stratigraphic Cross Section.cdr



- Artificial Fill
- Recent Basin Sediments
- Alluvium Sand
- Alluvium Clay
- Missoula Flood Deposits

Notes:
ft NAVD 88= feet North American Vertical Datum of 1988
SIB = Swan Island Basin

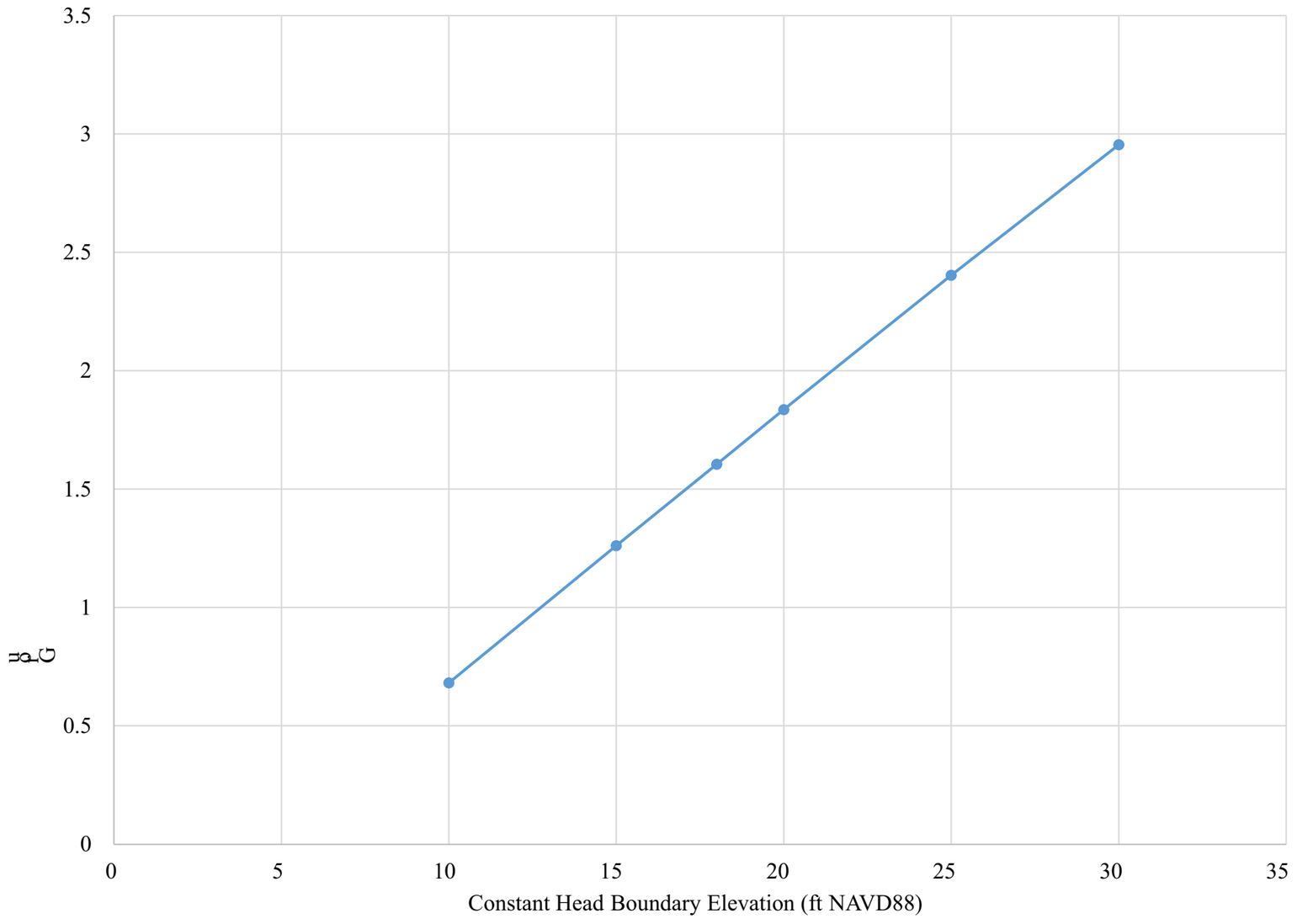
Groundwater discharge level was monitored at the 20-ft bank monitoring point 0 to -2 ft NAVD88

Figure 4-5
Uncertainty Analysis
Vertical Hydraulic Conductivity

Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

HGL PACIFIC groundwater GROUP | MM MOTT MACDONALD | COAST & HARBOR ENGINEERING BRIDGEWATER GROUP

\\srv-gst-01\hgl\gis\Portland_Harbor_DT2002\SIB\GWD\schModelTechMemo\(1-04)Regional Stratigraphic Cross Section.cdr



Notes:
ft NAVD 88= feet North American Vertical Datum of 1988
SIB = Swan Island Basin

Groundwater discharge level was monitored at the 20-ft bank monitoring point 0 to -2 ft NAVD88.

Figure 4-6
Uncertainty Analysis
Constant Head Boundary

Groundwater Discharge Modeling
Swan Island Basin Remedial Design Group

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\\srv-gst-01\hgljs\Portland_Harbor_DT2002\SIB\GWDischModelTechMemo\(1-04)Regional Stratigraphic Cross Section.cdr

ATTACHMENT B

FLOOD IMPACT EVALUATION TECHNICAL MEMORANDUM

FLOOD IMPACT EVALUATION TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

This Flood Impact Evaluation Technical Memorandum presents a summary of no-rise analysis efforts for the Pre-Final 90% Remedial Design (RD). The Pre-Final 90% RD was conducted for the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site (PHSS) in Portland, Multnomah County, Oregon. The HydroGeoLogic, Inc. (HGL) team performed the work on behalf of the SIB RD Group based on the requirements of the PHSS Record of Decision (ROD) (EPA, 2017) and the Administrative Settlement Agreement and Order on Consent (EPA, 2021a).

The objective of this memorandum is to summarize the no-rise analysis for SIB Project Area, which assessed whether proposed Remedial Actions (RA) would increase the 100-year flood water surface elevation (WSE). The SIB Existing Conditions Model and Proposed Conditions Model were developed using the original Hydrologic Engineering Center River Analysis System (HEC-RAS; USACE, 2020) setup to represent conditions in the SIB Project Area. The Corrected Effective Model for the PHSS, developed by CDM Smith (2024a; 2024b), served as the basis for both models. This memorandum outlines the modeling methodology, analysis approach, and relevant data.

Section 1 presents an overview of the PHSS Corrected Effective Model (CDM Smith, 2024a). Section 2 describes the development of the SIB Existing Conditions Model for the SIB Project Area and demonstrates consistency with flood predictions from the Corrected Effective Model. Section 3 describes the development of SIB Proposed Conditions Model (post-RA conditions) and presents the results of the no-rise analysis. Section 4 provides analysis conclusions.

1.0 PORTLAND HARBOR SUPERFUND SITE CORRECTED EFFECTIVE MODEL

CDM Smith (2024a, 2024b) developed the Corrected Effective Model to represent current conditions on the Willamette River in Portland, Oregon, as part of the no-rise analysis for proposed remedial actions at the PHSS. Per CDM Smith (2024a), the model satisfies the substantive requirements of Executive Orders related to Floodplain Management, as well as the City of Portland's floodplain management regulations under its participation in the National Flood Insurance Program. CDM Smith (2024a) recommended that project stakeholders use this model as the foundation for developing existing and proposed conditions models to demonstrate compliance with no-rise criteria for their remedial actions.

The Corrected Effective Model, based on the HEC-RAS framework, provided flood water level results for River Stations (RS) 0.25 to 25.895, as documented in CDM Smith (2024a). Additional background on model development including Manning's n values, ineffective flow areas and channel geometry is available in CDM Smith (2024a, 2022). This model served as the foundation

Corporate Headquarters
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

for both the SIB Existing Conditions Model and Proposed Conditions Models discussed in Sections 2.0 and 3.0.

2.0 SIB EXISTING CONDITIONS MODEL

2.1. MODEL DEVELOPMENT

The SIB Existing Conditions Model was developed by incorporating six additional cross sections into the Corrected Effective Model to better represent the site-specific geometry in the SIB Project Area, and to reflect anticipated bathymetric changes from remedial activities—specifically dredging and capping—in SIB. These cross sections, added between river miles (RM) 7.826 and 9.095 (shown as red lines in Figure 2-1), were introduced solely to enhance geometric representation; the underlying terrain in the SIB Existing Conditions Model remains unchanged from the Corrected Effective Model. This approach ensures accurate representation of current site conditions while maintaining a consistent framework for evaluating proposed conditions.

The new cross-sections maintain continuity with adjacent sections from the Corrected Effective Model by using consistent parameters such as Manning's n values, contraction and expansion coefficients, and ineffective flow areas defined in the Corrected Effective Model. Specifically, both models use contraction and expansion coefficients of 0.1 and 0.3, respectively, across the entire model domain. For the cross sections added in the Existing Conditions Model, Manning's n roughness coefficients range from 0.08 to 0.12 in the overbank areas and 0.03 in the main channel, consistent with adjacent cross-sections from the Corrected Effective Model

The hydrology used in the SIB Existing Conditions Model including 100-year recurrence interval flow data for the Willamette River below the Clackamas River (375,000 cubic feet per second [cfs]) and below the Multnomah Channel (263,000 cfs) is identical to that applied in the Corrected Effective Model. As in the Corrected Effective Model, the downstream boundary condition at the confluence of the Willamette and Columbia Rivers was defined using water surface elevations from the Federal Emergency Management Agency Flood Insurance Study (2004/2010): 30.8 feet (ft) North American Vertical Datum of 1988 (NAVD88) 100-year flood event. Additional information on hydrology, boundary conditions, and terrain data is available in CDM Smith (2024a).

2.2. ANALYSIS AND RESULTS

The SIB Existing Conditions Model was used to simulate the 100-year flood WSEs. Figure 2-2 shows example WSE distributions near the SIB Project Area for the Corrected Effective Model (left) and the SIB Existing Conditions Model (right). Modeled WSE results along the river centerline (shown as the blue line in Figure 2-1) were extracted for analysis. Figure 2-2 compares WSE profiles from the SIB Existing Conditions Model and the Corrected Effective Model, showing elevation differences less than 0.035 ft. These differences are only a result of additional cross sections added to the SIB Existing Conditions Model.

Table 2-1 summarizes modeled WSEs and WSE differences for the Corrected Effective Model and the SIB Existing Conditions Model. WSE differences were observed near the SIB (although negligible), between RM 7.826 and RM 9.095, where new cross sections were added in the SIB Existing Conditions Model.

3.0 SIB PROPOSED CONDITIONS MODEL

3.1. MODEL DEVELOPMENT

The Proposed Conditions Model was next developed to perform the no-rise analysis, a regulatory requirement that ensures floodplain modifications, such as RA involving dredging and capping, do not result in a measurable increase in the 100-year flood WSEs. The Proposed Conditions Model represents the future site conditions including proposed RA within the SIB Project Area between RM 7.826 and 9.095, representative of the Pre-Final 90% RD. Figure 3-1 compares terrain surfaces in the SIB Existing Conditions Model (left) and Proposed Conditions Model (right). The Proposed Conditions Model terrain surface was developed by incorporating the final elevations in the Pre-Final 90% RD. Terrain modifications were only prescribed in the SIB Project Area, and all cross-section related input parameters such as Manning's n values, contraction and expansion coefficients, and ineffective flow area treatments were kept consistent with the SIB Existing Conditions Model.

3.2. NO-RISE ANALYSIS RESULTS

The 100-year flood event was simulated using the Proposed Conditions Model, applying the same hydrology (see Sectio 2.1) and downstream boundary conditions as in the Existing Conditions Model. Results were analyzed to assess changes in WSE for the no-rise analysis. Figure 3-2 illustrates the example WSE distribution near the SIB Project Area for the SIB Existing Conditions Model (left) and Proposed Conditions Model (right). Figure 3-3 compares WSE profiles along the river centerline from the Existing Conditions Model and the Proposed Conditions Model. Table 2-1 summarizes modeled WSEs for the Proposed Conditions Model, along with differences relative to the SIB Existing Conditions Model. Results show that changes in WSE caused by the proposed RA in SIB are below 0.01 ft. These results confirm that the RA for the SIB Project Area, as designed, does not cause a measurable increase in WSEs in the river. These changes are logical given that the RA for the SIB Project Area is largely located within a backwater area, and no significant capping above existing grade is proposed in the outermost area of SIB.

4.0 CONCLUSIONS

The current modeling effort successfully incorporated additional cross sections into the SIB Existing Conditions Model and confirmed consistency with the PHSS Corrected Effective Model. The geometric enhancements improved representation of SIB Project Area flow conditions. Results confirmed consistency with the Corrected Effective Model, showing minimal differences in simulated 100-year flood WSEs.

The Proposed Conditions Model, representing future conditions with RA, demonstrated no measurable increase in 100-year flood WSE compared to existing conditions. The project was demonstrated to meet the no-rise criteria.

5.0 REFERENCES

CDM Smith, 2022. *Portland Harbor Corrected Effective Model Overview*, October 28, 2022.

CDM Smith, 2024a. *Updated Portland Harbor Corrected Effective Model Overview*, May 24, 2024.

CDM Smith, 2024b. *Updated Portland Harbor Superfund Site Existing and Conservative Future Conditions Model*, June 17, 2024.

U.S Environmental Protection Agency (EPA), 2017. *Record of Decision, Portland Harbor Superfund Site, Portland Oregon*. United States Environmental Protection Agency Region 10, Seattle, Washington. January.

EPA, 2021. *Administrative Settlement Agreement and Order on Consent for Remedial Design. Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10*. January 20.

U.S. Army Corps of Engineers (USACE), 2020. *HEC-RAS Hydraulic Reference Manual*. December.

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Comparison of Modeled Results at all River Stations
Flood Impact Evaluation Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Station	Corrected Effective Model (ft NAVD88)	Existing Condition Model (ft NAVD88)	Difference Existing minus Corrective model (ft)	Existing Condition Model (ft NAVD88)	Difference (Proposed minus Existing model) (ft)
0.250	30.800	30.800	0.000	30.800	0
0.375	30.810	30.810	0.000	30.810	0
0.718	30.861	30.861	0.000	30.861	0
0.917	30.902	30.902	0.000	30.902	0
1.388	30.946	30.946	0.000	30.946	0
1.777	31.012	31.012	0.000	31.012	0
2.119	31.034	31.034	0.000	31.034	0
2.432	31.040	31.040	0.000	31.040	0
2.769	31.049	31.049	0.000	31.049	0
3.387	31.029	31.029	0.000	31.029	0
3.769	31.077	31.077	0.000	31.077	0
4.056	31.128	31.128	0.000	31.128	0
4.379	31.160	31.160	0.000	31.160	0
4.819	31.176	31.176	0.000	31.176	0
5.141	31.159	31.159	0.000	31.159	0
5.454	31.156	31.156	0.000	31.156	0
5.600	31.180	31.180	0.000	31.180	0
5.724	31.254	31.254	0.000	31.254	0
6.000	31.299	31.299	0.000	31.299	0
6.020	31.295	31.295	0.000	31.295	0
6.133	31.355	31.355	0.000	31.355	0
6.843	31.423	31.423	0.000	31.423	0
6.700	31.603	31.603	0.000	31.603	0
6.740	31.565	31.565	0.000	31.565	0
6.784	31.589	31.589	0.000	31.589	0
7.000	31.695	31.695	0.000	31.695	0
7.096	31.731	31.731	0.000	31.731	0
7.468	31.765	31.765	0.000	31.765	0
7.826	31.877	31.877	0.000	31.877	0
7.946	31.860	31.871	0.011	31.871	0
8.066	31.850	31.870	0.020	31.870	0
8.186	31.837	31.832	-0.005	31.832	0
8.352	31.860	31.888	0.028	31.887	-0.001
8.519	31.880	31.904	0.024	31.904	0
8.686	31.899	31.900	0.001	31.900	0
8.822	31.900	31.895	-0.005	31.895	0
8.958	31.910	31.897	-0.013	31.896	-0.001
9.095	31.909	31.914	0.005	31.914	0
9.472	31.990	31.995	0.005	31.995	0
10.018	32.011	32.017	0.006	32.016	-0.001
10.413	32.019	32.024	0.005	32.024	0
10.700	32.117	32.122	0.005	32.122	0
10.841	32.097	32.102	0.005	32.102	0

Table 2-1
Comparison of Modeled Results at all River Stations
Flood Impact Evaluation Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Station	Corrected Effective Model (ft NAVD88)	Existing Condition Model (ft NAVD88)	Difference Existing minus Corrective model (ft)	Existing Condition Model (ft NAVD88)	Difference (Proposed minus Existing model) (ft)
11.000	32.122	32.127	0.005	32.127	0
11.209	32.237	32.243	0.006	32.242	-0.001
11.400	32.278	32.283	0.005	32.283	0
11.500	32.197	32.202	0.005	32.202	0
11.568	32.217	32.222	0.005	32.222	0
11.600	32.228	32.233	0.005	32.233	0
11.786	32.317	32.322	0.005	32.322	0
11.915	32.643	32.648	0.005	32.647	-0.001
11.948	32.667	32.672	0.005	32.672	0
12.116	32.798	32.803	0.005	32.803	0
12.200	32.828	32.833	0.005	32.833	0
12.283	32.867	32.872	0.005	32.872	0
12.442	32.952	32.957	0.005	32.957	0
12.600	33.113	33.118	0.005	33.118	0
12.629	33.181	33.186	0.005	33.185	-0.001
12.808	33.345	33.350	0.005	33.350	0
12.900	33.515	33.520	0.005	33.520	0
12.975	33.531	33.536	0.005	33.536	0
13.152	33.617	33.622	0.005	33.622	0
13.300	33.673	33.678	0.005	33.678	0
13.352	33.695	33.700	0.005	33.700	0
13.444	33.712	33.716	0.004	33.716	0
13.526	33.876	33.881	0.005	33.881	0
13.545	33.918	33.923	0.005	33.923	0
13.645	34.022	34.027	0.005	34.026	-0.001
13.776	33.968	33.973	0.005	33.973	0
13.980	34.006	34.011	0.005	34.011	0
13.999	34.063	34.068	0.005	34.068	0
14.001	33.950	33.955	0.005	33.955	0
14.266	34.171	34.175	0.004	34.175	0
14.509	34.222	34.227	0.005	34.227	0
14.728	34.512	34.516	0.004	34.516	0
14.909	34.685	34.689	0.004	34.689	0
15.112	34.821	34.826	0.005	34.826	0
15.280	34.884	34.889	0.005	34.889	0
15.487	34.947	34.952	0.005	34.952	0
15.756	34.827	34.831	0.004	34.831	0
15.895	34.777	34.781	0.004	34.781	0
16.044	34.967	34.972	0.005	34.971	-0.001
16.195	34.936	34.941	0.005	34.941	0
16.354	34.814	34.819	0.005	34.819	0
16.476	34.869	34.874	0.005	34.874	0
16.500	35.015	35.019	0.004	35.019	0

Table 2-1
Comparison of Modeled Results at all River Stations
Flood Impact Evaluation Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

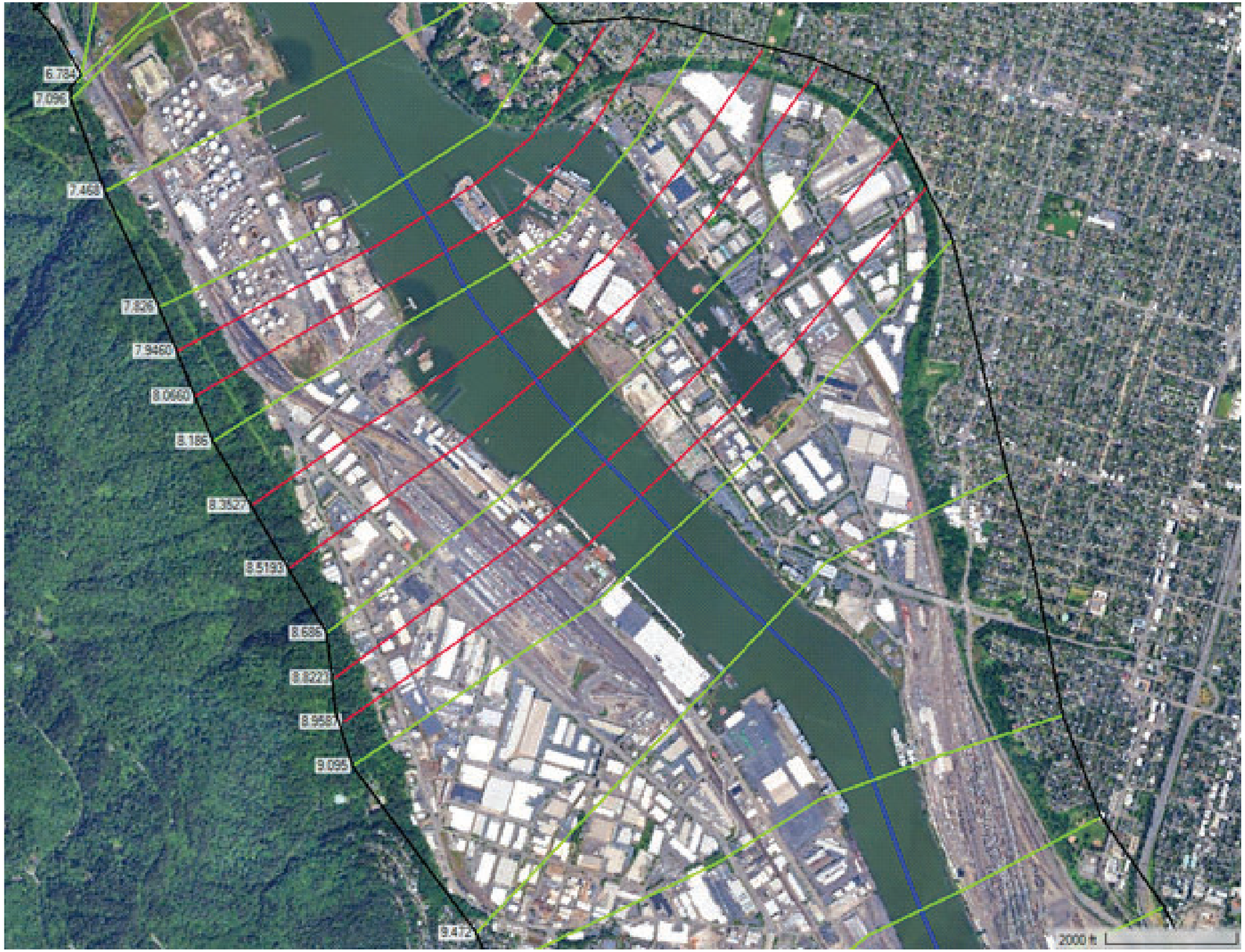
Station	Corrected Effective Model (ft NAVD88)	Existing Condition Model (ft NAVD88)	Difference Existing minus Corrective model (ft)	Existing Condition Model (ft NAVD88)	Difference (Proposed minus Existing model) (ft)
16.598	35.301	35.305	0.004	35.305	0
16.768	35.436	35.440	0.004	35.440	0
16.967	35.445	35.450	0.005	35.450	0
17.186	35.314	35.319	0.005	35.319	0
17.427	35.339	35.343	0.004	35.343	0
17.663	35.526	35.531	0.005	35.531	0
17.910	35.532	35.537	0.005	35.537	0
18.159	35.608	35.612	0.004	35.612	0
18.322	36.002	36.007	0.005	36.007	0
18.488	36.109	36.113	0.004	36.113	0
18.620	36.105	36.109	0.004	36.109	0
18.840	35.883	35.887	0.004	35.887	0
18.995	35.977	35.982	0.005	35.981	-0.001
19.175	36.356	36.360	0.004	36.360	0
19.366	36.353	36.357	0.004	36.357	0
19.545	36.607	36.611	0.004	36.611	0
19.699	36.427	36.432	0.005	36.431	-0.001
19.800	36.435	36.440	0.005	36.439	-0.001
19.841	36.487	36.492	0.005	36.492	0
19.984	36.901	36.905	0.004	36.905	0
20.177	36.692	36.696	0.004	36.696	0
20.372	36.941	36.945	0.004	36.945	0
20.561	36.846	36.850	0.004	36.850	0
20.750	36.882	36.886	0.004	36.886	0
20.881	38.079	38.083	0.004	38.083	0
21.053	38.032	38.036	0.004	38.036	0
21.203	37.869	37.873	0.004	37.873	0
21.359	38.757	38.761	0.004	38.761	0
21.497	39.255	39.259	0.004	39.259	0
21.655	39.804	39.808	0.004	39.808	0
21.770	39.827	39.831	0.004	39.831	0
21.905	40.613	40.616	0.003	40.616	0
22.035	40.899	40.903	0.004	40.903	0
22.121	40.915	40.918	0.003	40.918	0
22.207	42.067	42.070	0.003	42.070	0
22.377	42.829	42.832	0.003	42.832	0
22.526	43.600	43.603	0.003	43.603	0
22.664	44.761	44.764	0.003	44.764	0
22.815	45.433	45.435	0.002	45.435	0
22.959	45.694	45.696	0.002	45.696	0
23.152	46.279	46.281	0.002	46.281	0
23.379	46.658	46.661	0.003	46.660	-0.001
23.581	47.129	47.131	0.002	47.131	0

Table 2-1
Comparison of Modeled Results at all River Stations
Flood Impact Evaluation Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Station	Corrected Effective Model (ft NAVD88)	Existing Condition Model (ft NAVD88)	Difference Existing minus Corrective model (ft)	Existing Condition Model (ft NAVD88)	Difference (Proposed minus Existing model) (ft)
23.630	47.034	47.036	0.002	47.036	0
23.728	47.787	47.789	0.002	47.789	0
23.845	48.191	48.193	0.002	48.193	0
24.055	48.720	48.722	0.002	48.722	0
24.255	48.879	48.881	0.002	48.881	0
24.453	49.163	49.165	0.002	49.165	0
24.621	49.618	49.620	0.002	49.620	0
24.825	50.499	50.500	0.001	50.500	0
24.998	51.013	51.015	0.002	51.015	0
25.143	52.250	52.252	0.002	52.252	0
25.292	52.962	52.963	0.001	52.963	0
25.358	53.082	53.084	0.002	53.084	0
25.423	53.289	53.291	0.002	53.291	0
25.537	53.387	53.389	0.002	53.389	0
25.627	53.316	53.317	0.001	53.317	0
25.718	53.556	53.557	0.001	53.557	0
25.817	54.356	54.357	0.001	54.357	0
25.895	54.245	54.246	0.001	54.246	0
Split Flow Reach					
1.91 (Ross Island)	35.480	35.484	0.004	35.484	0
1.647 (Ross Island)	35.188	35.193	0.005	35.192	-0.001
1.428 (Ross Island)	34.872	34.876	0.004	34.876	0
1.092 (Ross Island)	34.700	34.705	0.005	34.705	0
0.781 (Ross Island)	34.719	34.724	0.004	34.724	0
0.505 (Ross Island)	34.443	34.448	0.005	34.448	0
0.197 (Ross Island)	34.379	34.384	0.005	34.384	0
		Minimum	-0.013		-0.001
		Maximum	0.028		0.000

Notes:
ft = feet
NAVD88 = North American Vertical Datum of 1988

FIGURES



Notes:
SIB = Swan Island Basin

New Cross-sections
Corrective Effective Model Cross-sections

Figure 2-1

Location of New Cross-Sections in SIB Existing Conditions Model

Prepared on:08/15/2025
Flood Impact Evaluation Tech Memo
Swan Island Basin

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Notes:
SIB = Swan Island Basin
WSE = Water Surface Elevation

N

Figure 2-2

Modeled WSE from Corrected Effective Model (Left) and SIB Existing Conditions Model (Right)

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Flood Impact Evaluation Tech Memo
Swan Island Basin

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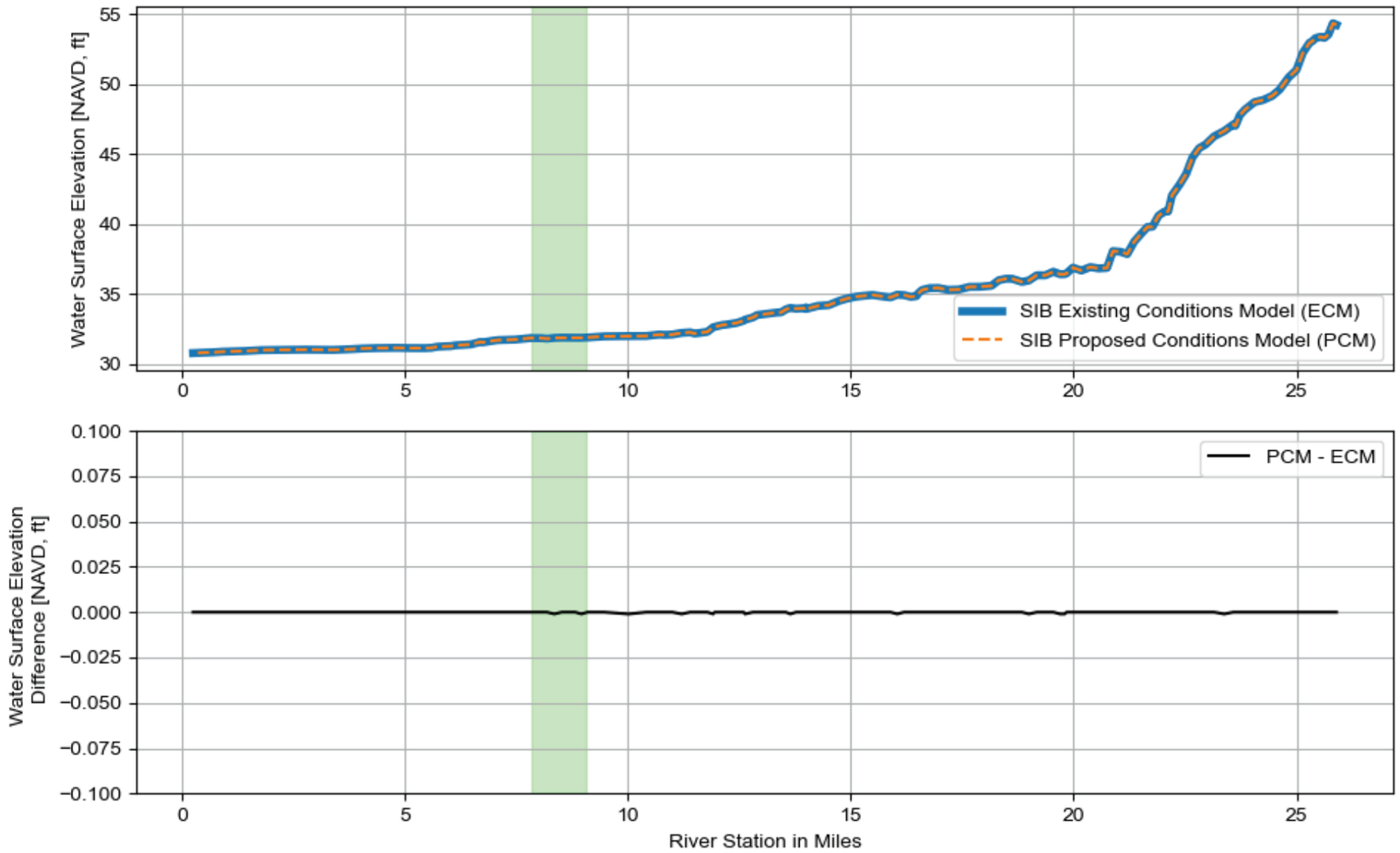

Notes:
SIB = Swan Island Basin
WSE = Water Surface Elevation
ECM = SIB Existing Conditions Model
CEM = Corrected Effective Model

Figure 2-3

Comparison between Corrected Effective Model (CEM) and SIB Existing Conditions Model (ECM) WSEs (Top) and Differences (ECM - CEM, Bottom)

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Swan Island Basin

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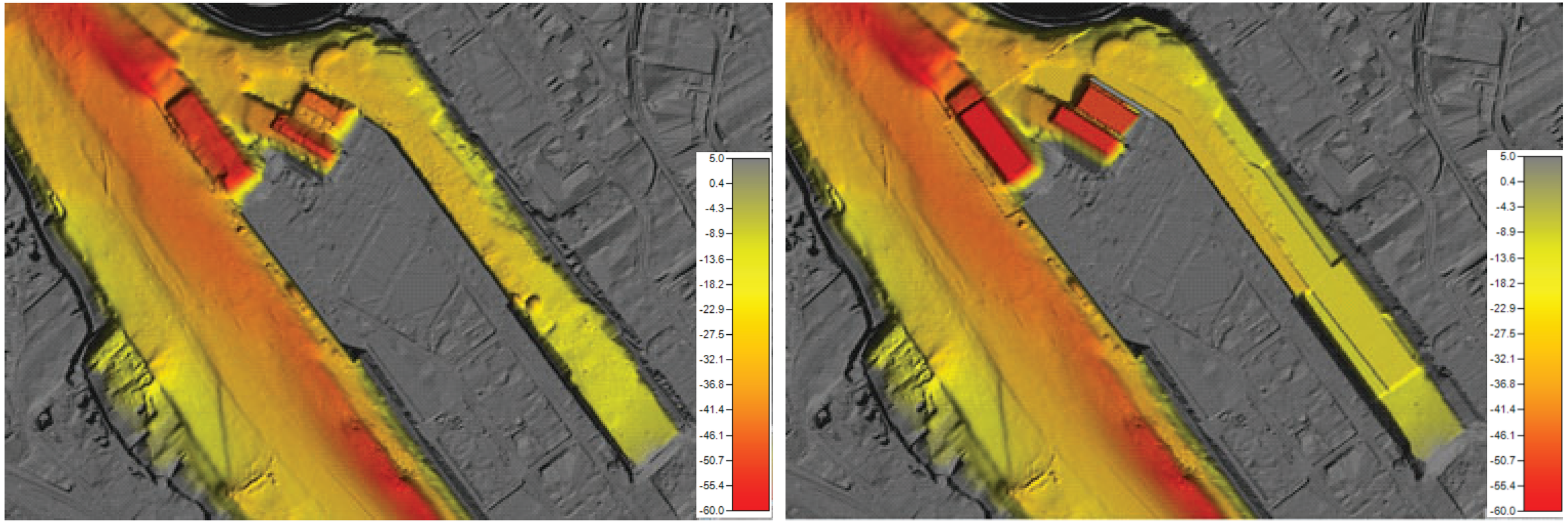

Notes:
NAVD = North American Vertical Datum of 1988

N

Figure 3-1

SIB Existing (Left) and Proposed Conditions (Right) Terrain Surface Elevations

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Flood Impact Evaluation Tech Memo
Swan Island Basin

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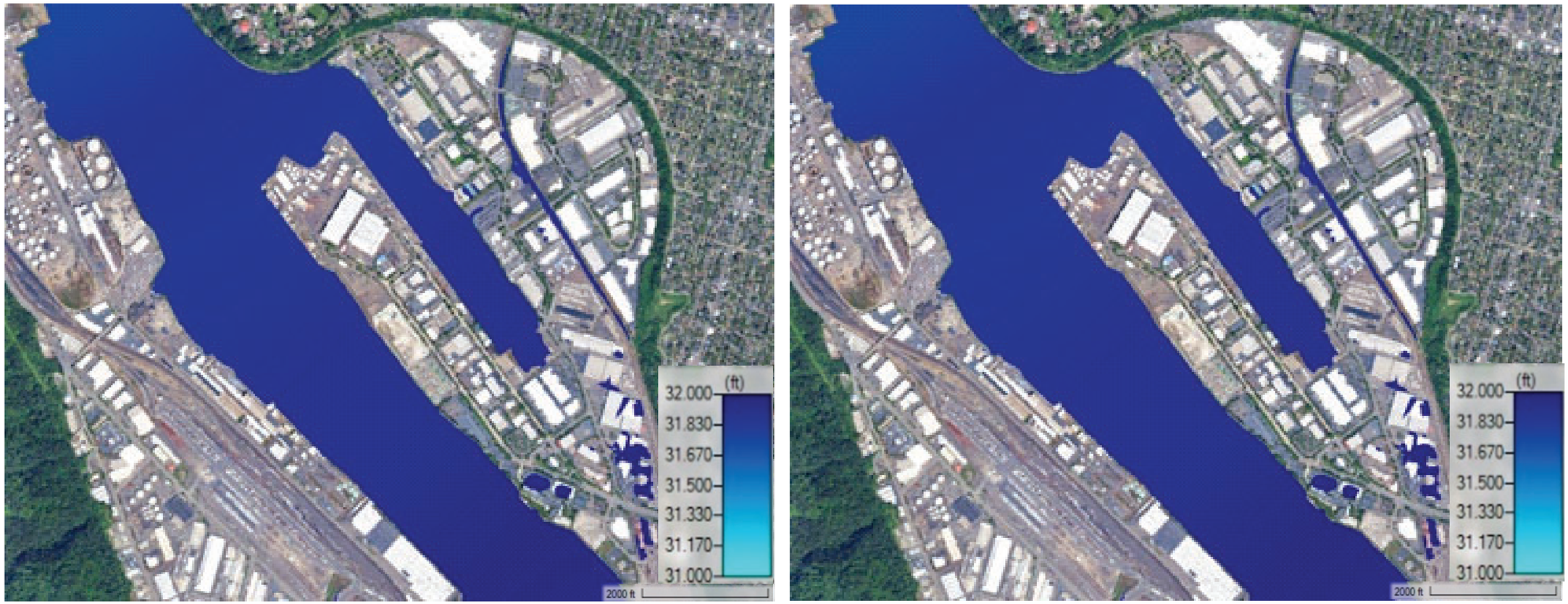

Notes:
WSE = Water Surface Elevation

N

Figure 3-2

Modeled WSE from SIB Existing Conditions Model (Left) and SIB Proposed Conditions Model (Right)

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Flood Impact Evaluation Tech Memo
Swan Island Basin

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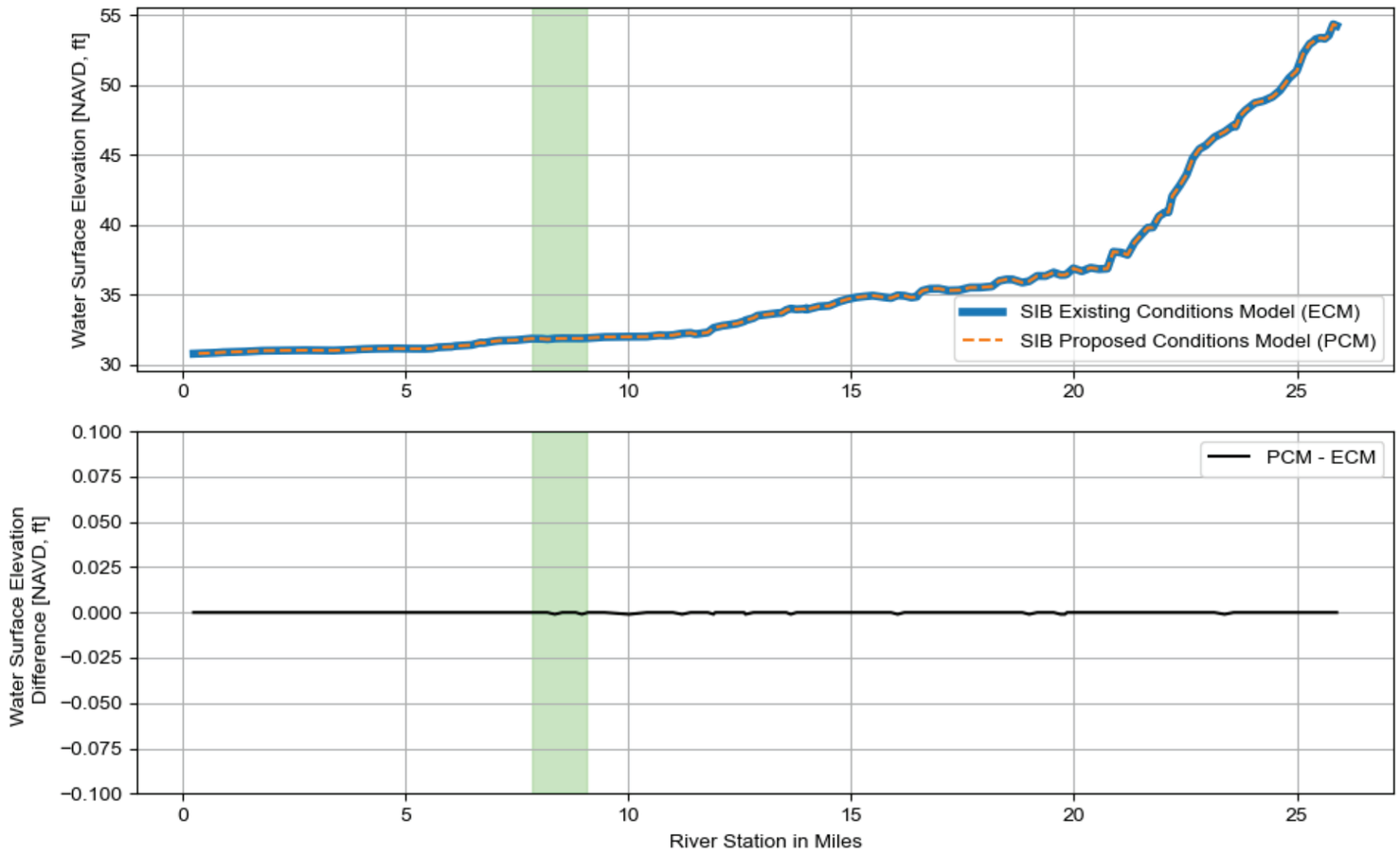

Notes:
WSE = Water Surface Elevation
ECM = SIB Existing Conditions Model
PCM = SIB Proposed Conditions Model

Figure 3-3

Comparison between SIB Existing Conditions Model (ECM) and SIB Proposed Conditions Model (PCM) WSEs (Top) and Differences (PCM - ECM, Bottom)

Prepared on:08/15/2025
Flood Impact Evaluation Tech Memo
Swan Island Basin

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ATTACHMENT C

RIVERBANK CHEMICAL ISOLATION LAYER MODELING TECHNICAL MEMORANDUM

RIVERBANK CHEMICAL ISOLATION LAYER DESIGN TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

This Riverbank Chemical Isolation Layer (CIL) Design Technical Memorandum presents a summary of the design basis of the CIL for vegetated areas of Swan Island Basin (SIB) Project Area riverbanks above the mean high water (MHW) elevation.

Section 1 presents an overview of the considerations made for the design of the CIL for vegetated areas on riverbanks. Section 2 presents the modeling approach and parameters used to evaluate the protectiveness of the CIL, as well as the modeling results. Section 3 describes the construction requirements for the vegetated CIL on riverbanks. Section 4 provides a list of references used in the generation of this technical memorandum.

1.0 CIL CONSIDERATIONS FOR VEGETATED RIVERBANK AREAS

Surface soils on the riverbank portion of the Project Area are generally dry. A chemical isolation layer design for the riverbanks will experience significantly less net seepage than the submerged areas of the river. The riverbank CIL design requirements are therefore different than the subaqueous cap that is designed for regions of SIB that are below the MHW elevation (+13 ft NAVD88).

For riverbank areas that are steep grades (steeper than 3H:1V) and around structures, rock revetment is used as the surface treatment. For these areas, a reactive core mat (RCM) CIL will be placed beneath the stone. The RCM CIL was evaluated for conservative modeled conditions for seepage rates on riverbanks where vegetation will not be drawing down soil moisture through evapotranspiration. The evaluation of the RCM CIL is provided in the Cap Design Technical Memorandum (CDTM) (Volume I, Appendix E).

The SIB Project Area Pre-Final 90% Remedial Design incorporates ecological features. As a result, the riverbanks will be planted and protected against erosion with native vegetation communities where such treatment is precluded by shoreline structures, steep slopes that require engineering stabilization, or requirements of the property owner or facility operation. The vegetated areas require a subsurface that is amenable to vegetation root growth and health, and so the CIL in these areas was designed to encourage plant growth.

The medium of topsoil is an organic-rich, natural material that meets this requirement. The vegetated CIL is designed to be a topsoil amended with a biochar, a high-carbon product with significant reactive surface area that is produced from the pyrolysis of agricultural waste products. The biochar is reactive in a similar way to the activated carbon used in the subaqueous capping system in that the amendment. Additionally, biochar is often used in agricultural settings to

improve soil fertility as well as being a renewable resource. Biochar has the added benefit of having a much smaller environmental footprint than activated carbon because it is manufactured at lower temperatures, making it an excellent green remediation product.

2.0 MODELING APPROACH AND PARAMETERS

This section describes the groundwater modeling basis for the CIL design in Section 2.1. The 1-dimensional advective transport modeling for the CIL effectiveness was measured in CapSIM, as described in Section 2.2

2.1. GROUNDWATER MODELING INFORMATION FOR CIL DESIGN

Attachment A (Groundwater Modeling Technical Memorandum) of the Riverbank Design Technical Memorandum (RDTM) presents an overview of the SIB Project Area conceptual site model, specifically related to surface water and groundwater hydrology. Attachment A also provides details of the numerical groundwater model created and used in the riverbank design.

The numerical groundwater model was calibrated to the ordinary low water conditions. However, to understand the magnitude of the daily groundwater flux from the riverbank at different intervals, this groundwater model was set to reflect ordinary high water (OHW) conditions (approximately 20.1 ft NAVD88). Figure C–1 shows the relative contributions to a flux at discreet intervals along the cross-section averaged riverbank at the inundated elevations. These fluxes are anticipated to be very short-lived as the water level drops and the water table subsequently drops. On the Mocks Bottom side of SIB, the water table is driven by a combination of the upgradient areas (from the north-northeast) and the river surface. However, the Swan Island side of SIB does not have the same “upgradient” potentiometric effect; this peninsula has river water on both sides of it, and the river surface fluctuation alone drives the groundwater elevations and behavior on this side of SIB. Figure C-1 shows the findings of the modeling for the OHW condition, which indicates that groundwater tends to discharge at slightly higher rates at near the water surface elevation for these ephemeral conditions. Figure C-2 shows a plot of the model-produced seepage flux values from the riverbanks at river stage 8 ft NAVD88 and OHW (20 ft NAVD88) conditions, and this plot visually shows that seepage rates are at their maximum near the water surface elevations; the 8 ft NAVD88 stage has a noticeably higher peak Darcy flux lower on the slope (the ordinate axis shows the groundwater model “reach” identifier, but the reaches are displayed in the same orientation as the cross section in Figure C-1) where the water meets the bank. A similar effect is shown for the river elevation at the 8 ft NAVD88 condition. Though the 8 ft NAVD88 condition is below the riverbank areas, it is useful to understand a more complete picture of the modeled groundwater seepage behavior at this river stage.

The elevated seepage rates at the river surface were used to conservatively determine an annual equivalent Darcy flux at different riverbank elevations, as shown in Table C-1. The percent of the year that the river surface submerges the different riverbank elevations is determined from the data presented[1] in the RDTM Figure 4-1. Because the modeled seepage rates diminish (as shown in Figure C-2) when the river surface exceeds these elevations, a Darcy flux value of 0.4 centimeter (cm)/day is a conservative, single-value estimate for the time-varying Darcy flux.

[1] The values are derived for the percent of time submerged “All” (dashed line), rather than the “Growing Season” line.

Table C-1 Equivalent Annual Darcy Flux at Different Riverbank Elevations from Groundwater Model

Elevation (ft NAVD88)	Percentage of year river surface exceeds elevation	Equivalent Days	Total Dary flux (cm/yr) at 0.4 cm/day discharge rate	Notes
13	17.5-18	64	25.6	Lowest riverbank elevation/MHW
14.5	11	40	16	Emergent Wetland Boundary
15.5	8	29.2	11	Interim elevation
17	5	18.3	7.4	Interim elevation
20	1.2	4.4	1.8	OHW

The highest annual total Darcy seepage (in units of cubic cm [cm^3] per year per square cm [cm^2] of riverbank in the vertical plane, simplifying to cm/year) occurs at the lowest elevation of the riverbank. This maximum discharge was used as the "seepage velocity" to evaluate the performance of the chemical isolation layer, as described in Section 2.2. As shown in these results, a significant decrease (57 percent) in the total seepage occurs at an elevation 2.5 ft above the MHW elevation (15.5 ft NAVD88), so a significant portion of the riverbanks experiences much less Darcy flux throughout the year than the lowest elevations of the Project Area riverbank.

Attachment A provides additional discussion of the groundwater model created for riverbank design considerations. There are limitations to this model because the measurement information (piezometers and monitoring wells elevations) is limited within SIB. However, the physical model, based on best practices (in the absence of complete monitoring conditions), is helpful to produce scenarios that are useful for design purposes.

2.2. CIL MODELING IN CAPSIM

The maximum annual discharge value (rounded up to 26 cm per year) was selected to model the effectiveness of riverbank topsoil and biochar mixtures as a CIL. This evaluation of the migration of contaminants of concern within groundwater, through the CIL was performed in CapSIM. The CapSIM platform is described in more detail within the Section 2.1 and 2.2 of the CDTM (Volume I, Appendix E). Similarly to the cap design modeling, the sitewide SIB 95th percentile values of COCs were assigned within riverbank soils, which is a more conservative (higher) value for all COCs than the investigation sample set from only riverbank samples.

The CIL is designed as a mixture of topsoil and 3 percent by weight biochar (assumed to contain 70 percent organic carbon). Within CapSIM, the sorption parameters of the underlying riverbank soil were the same as detailed in the CDTM Attachment C – Sorption Parameter Memorandum. This material uses Project Area-adjacent linear partitioning coefficients within this bottom layer of the model. The sorption relationship used for all organic constituents is the organic-carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} of the topsoil and biochar mixture. Due to the porous nature of biochar and the reactive nature of the carbon within the material, the use of the sorption coefficients used in CapSIM are anticipated to be conservative in the estimates of sorption for this component of the CIL. The organic carbon content of the imported

topsoil component of the CIL mixture was assumed to be the minimum required by the specifications of 2 percent.

These results of the CapSIM modeling for inorganic and organic COCs are presented in Table C–2. This table reports the modeled porewater concentrations at 100 years of cap performance (assuming no degradation of COCs). Even for the conservative conditions modeled, the riverbank CIL performs well in protecting the bottom of the topsoil layer (24 inches below the vegetated surface).

2.3. NATURAL PHENOMENA UNACCOUNTED FOR WITHIN THE CHEMICAL MODEL

The CapSIM model created for the RD does not account for biodegradation or phytoremediation of the COCs, evapotranspiration that significantly reduces the actual seepage from the riverbank. These aspects of the physical and biological phenomena setting of the riverbank environment serve to reduce the actual water, seepage and flux of COCs. The most significant is the rooting zone in the woody vegetation above 14.5 ft will evapotranspire soil moisture such that much of the riverbank soil will be dry, especially during the growing season. This will diminish the total annual COC flux and so actual contaminant migration will occur at a fraction of the rate modeled.

Another feature of the riverbank environment is the intermittent nature of the surface water elevations above high water. The varying surface and groundwater elevations will result in a significant mass of oxygen pushed and pulled into the pore space of the riverbank soils, creating variably aerobic and anoxic conditions within the soils. This gas exchange serves to maintain a highly biologically active soil, and these conditions create biologically-mediated degradation of degradable COCs. It is very difficult to produce quantitative estimates of the reduction of contaminants, but these phenomena in total provide a highly protective soil cover system for the remediation of SIB Project Area riverbanks.

3.0 CONSTRUCTION REQUIREMENTS FOR VEGETATED AREAS

Both the imported topsoil and the biochar amendments will be tested to verify the materials contain no COCs above CUL concentrations before importing the material to the Project Area.

The selected RA contractor will produce and place this CIL mixture in a cellular containment system (geocells) to provide assurance of the full thickness for the CIL. The cellular contain system also provides a quality control function during the construction in requiring placement in layers and compaction to the density required from the design, as well as providing resistance to erosion during construction. The topsoil placed on top and the establishment of vegetation on top of the CIL will provide a permanent protection to the CIL.

4.0 REFERENCES

Beesly, L., Marmiroli, M., 2011. *The immobilisation and retention of soluble arsenic, cadmium and zinc by biochar*. Environmental Pollution, Volume 159, Issue 2 pp. 474-480 at URL https://doi.org/10.1016/j.envpol.2010.10.016.

Environmental Simulations, Inc., 2024. *Guide to Using Groundwater Vistas Version 9.*

HGL, 2024a. *Pre-Design Investigation Evaluation Report, Revision 2*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. December.

Texas Commission on Environmental Quality [TCEQ]. 2019. *Toxicity Values and Chemical - Physical Properties*, at URL: https://www.tceq.texas.gov/downloads/remediation/pst/responsible-party/pchemproperties.pdf

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Table C-2
100 Year CapSIM Modeling Summary Results of Biochar-Top Soil Cover, 95th Percentile
Riverbank Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

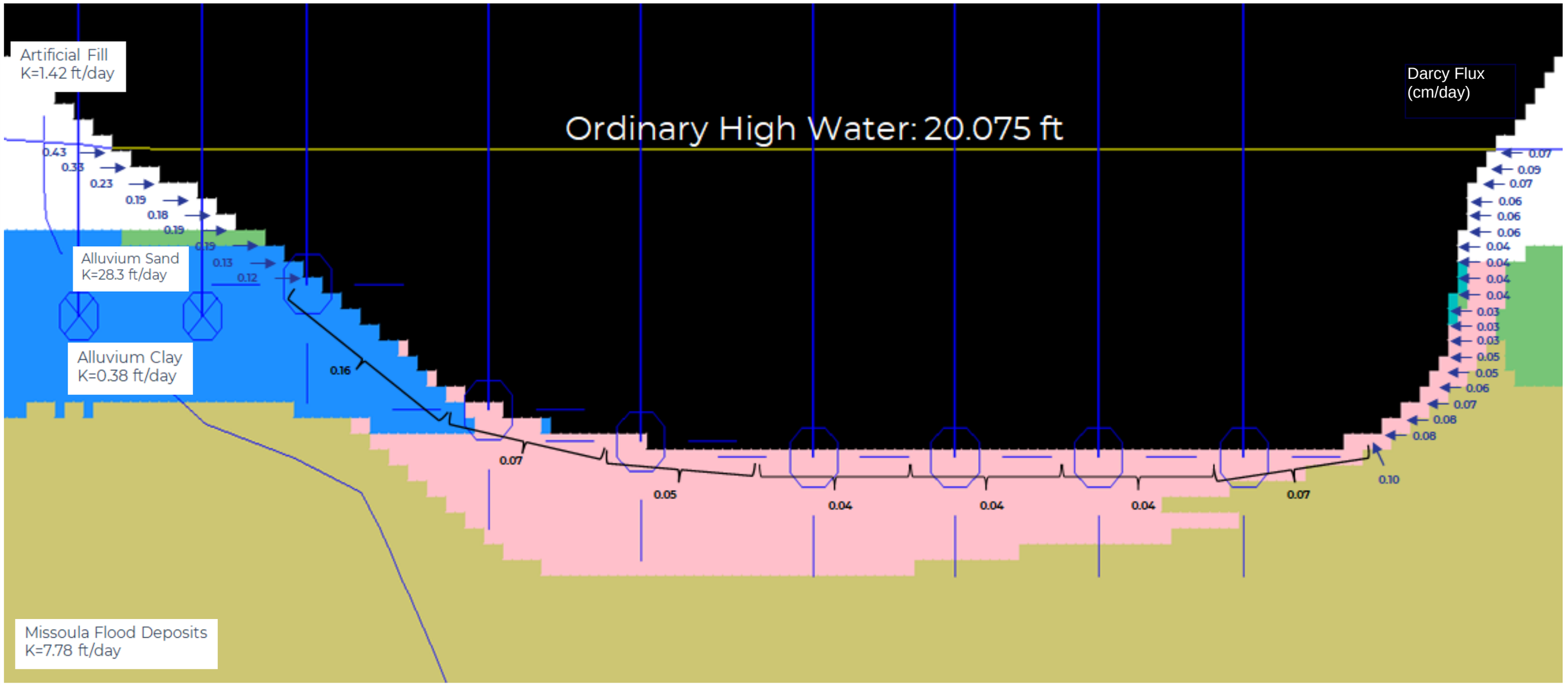
Modeled COCs		[Underlying Riverbank] CUL Sediment-Porewater Equilibrium Calculation (µg/L)	100-year Porewater Equilibrium Concentration (µg/L)
			30 cm of 3% biochar and topsoil 30 cm of topsoil
Dioxins/Furans	1,2,3,4,7,8-HxCDF	2.005E-09	0
	1,2,3,7,8-PeCDD	3.292E-09	0
	2,3,4,7,8-PeCDF	2.865E-08	0
	2,3,7,8-TCDD	3.37E-08	0
	2,3,7,8-TCDF	3.463E-09	0
	Total Dioxins/Furans (2,3,7,8-TCDD Eq.)	0.000001685	5.88E-20
	Summed Dioxins/Furans	1.69E-06	0
DDx	DDD	0.005568	0
	DDE	0.002707584	0
	DDT	0.004094138	0
	DDx	0.00006164	0
	Summed DDx	0.00006164	0
Hydrocarbons	Diesel	146	0
	Xylenes	0	0.0265
Metals	Arsenic	8.015	6.97
	Cadmium	0.01018	0
	Chromium (III)	0	0.972
	Copper	6.065	3.18
	Lead	9.823	2.04
	Manganese	0	5720
	Mercury	0.190644706	1.74E-10
	Vanadium	0	0.136
	Zinc	13.48	8.37
Organochloride	Aldrin	0.001769	5.66E-16
	Chlordanes	0.000504321	0
	Dieldrin	0.00007615	2.17E-14
	Lindane	0.1431	0.00698
	Pentachlorophenol	0	0.215
Organotin	Tributyltin	1.679	3.17E-16
cPAHs	Benzo(a)anthracene	0	0
	Benzo(a)pyrene	0	0
	Benzo(b)fluoranthene	0	0
	Benzo(k)fluoranthene	0	0
	Chrysene	0	0
	Dibenz(a,h)anthracene	0	0
	Indeno(1,2,3-c,d)pyrene	0	0
	Total cPAHS [B(a)P Eq.]	0.00611	0
	Summed cPAHs	0.00611	0

Table C-2
100 Year CapSIM Modeling Summary Results of Biochar-Top Soil Cover, 95th Percentile
Riverbank Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		[Underlying Riverbank] CUL Sediment-Porewater Equilibrium Calculation (µg/L)	100-year Porewater Equilibrium Concentration (µg/L)
			30 cm of 3% biochar and topsoil 30 cm of topsoil
PAHs	1-Methylnaphthalene	0	1.13
	2-Methylnaphthalene	0	1.13
	Acenaphthene	0	0.214
	Acenaphthylene	0	0.0684
	Anthracene	0	1.43E-07
	Benzo(e)pyrene	0	0
	Benzo(g,h,i)perylene	0	0
	Fluoranthene	0	9.11E-13
	Fluorene	0	0.00200
	Naphthalene	-	1.16
	Phenanthrene	0	7.42E-06
	Pyrene	0	1.09E-10
	Total PAHs	3.841304348	0
	Summed PAHs	3.841304348	3.70
PCBs	Total PCBs	0.00002013	0
Phthalates/ Plasticizers	BEHP	0.05092	7.77E-20

Notes:
Values of "0" indicate result is < 1E-20
% = percent
BEHP = bis(2-ethylhexyl) phthalate
Chlordanes = Total Chlordane (Calculated U = 1/2)
COC = contaminant of concern
cPAHs = carcinogenic polycyclic aromatic hydrocarbons
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
DDx = DDD + DDE + DDT
Diesel = Residual Range Organics (C25-C36)
GAC = granular activated carbon
HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran
Lindane = Gamma BHC
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
TCDD = tetrachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzofuran
Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent
Total cPAHs = Benzo(a)pyrene Equivalent
GAC amendment percentage is by weight.
CIL evaluated at bottom of topsoil placed above the biochar and topsoil CIL.

FIGURES



Notes:
Flux calibrated reaches in black

Uncalibrated reaches in blue – where the river cells in each layer outside of the calibrated reaches corresponds to a new subreach

River reach length * model thickness = cross sectional area

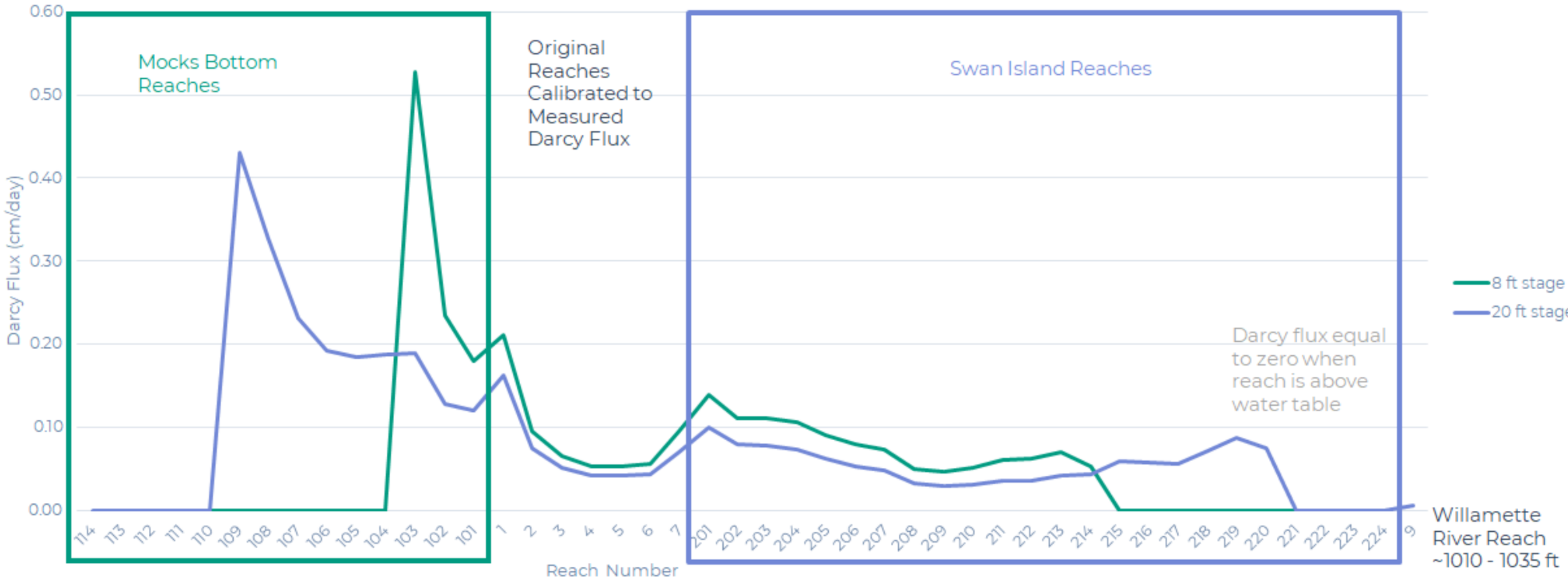
Darcy flux out of Willamette River is 0.006 cm/day (1035 ft reach)

Figure C-1

Discrete Interval Discharges from Groundwater Model

Prepared on: 10/6/2025
Riverbank Design Technical Memorandum
Swan Island Basin Remedial Design Group

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP



Notes:
cm = centimter
ft = feet
NAVD88 = North American Vertical Datum of 1988
OHW = Ordinary High Water

Figure C-2
Darcy Fluxes from Groundwater Model at 8 ft NAVD88 and OHW River Stages

Prepared on: 10/6/2025
Riverbank Design Technical Memorandum
Swan Island Basin Remedial Design Group

HGL · Mott MacDonald · Coast & Harbor Engineering · Pacific Groundwater Group · Bridgewater Group

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APPENDIX E

CAP DESIGN TECHNICAL MEMORANDUM

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CAP DESIGN TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

This Cap Design Technical Memorandum (CDTM) presents a summary of cap design efforts and recommendations for the Pre-Final 90% Remedial Design (RD). The 90% RD is conducted for the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site (PHSS) in Portland, Multnomah County, Oregon. The HydroGeoLogic, Inc. (HGL) team performed the work on behalf of the SIB RD Group based on the requirements of the PHSS Record of Decision (ROD) (EPA, 2017) and the Administrative Settlement Agreement and Order on Consent at the SIB Project Area (EPA, 2021a). The data used in this cap evaluation were collected in accordance with the final Pre-Design Investigation (PDI) Work Plan, which the U.S. Environmental Protection Agency (EPA) and were reported in the PDI Evaluation Report (ER), which the EPA approved in January 2025 (HGL, 2024a).

The Cap Evaluation Technical Memorandum was included in the Basis of Design Report (BODR) (HGL, 2024b) and was subsequently updated and appended as Appendix A– Cap Evaluation to the Remedial Design Work Plan (RDWP) (HGL, 2025a), which was conditionally approved on February 28, 2025. The Draft 50% RD CDTM used the same guidance documents and criteria, as well as design performance standards available, to develop recommendations for cap design. This 90% RD CDTM presents area-specific cap design for the SIB Project Area. It resolves limitations of the Draft 50% RD Design, builds upon recommendations in the Draft 50% RD (e.g., geotechnical analysis consolidation parameters), and incorporates the latest 2025 Cap Design Criteria at Portland Harbor (EPA, 2025a), Portland Harbor Superfund Site Monitoring Guidelines (EPA, 2025b), EPA's Guidelines for Reporting Porewater Studies Using Polymeric Passive Samplers (EPA, 2025c), and EPA's DRAFT Guidelines for Riverbank Characterizations and Evaluations at the Portland Harbor Superfund Site (EPA, 2025d).

This CDTM describes the cap design based on individual layers. Section 1 describes area-specific analysis of the underlying sediment driving cap design. Section 2 describes cap evaluation efforts for quantifying maximum contained sediment concentration and breakthrough for each chemical isolation layer (CIL) alternative. Section 3 discusses physical considerations used in this cap evaluation as well as the selection of erosion protection and unamended habitat mix layers. Section 4 discusses area-specific cap alternative assignments. Structural and geotechnical considerations for cap placement are detailed in the Geotechnical Design Technical Memorandum (GDTM, Volume I, Appendix I) and the Structural Design Technical Memorandum (SDTM, Volume I, Appendix J), respectively. Attachment C discusses the selection of sorption parameters for cap modeling efforts.

1.0 UNDERLYING SEDIMENT CONSIDERATIONS

Underlying sediment concentration considerations have been updated to balance the cost-efficiency of RD with a conservative design approach. The main update in this 90% RD is the shift

Corporate Headquarters
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

from Project Area-wide concentrations to area-specific design, defined by certification units (CUs). CUs were developed in alignment with the Project-Area specific construction verification monitoring and remedy performance standards (EPA, 2025a; 2025b). This section also details parameters used for the underlying sediment in CapSIM modeling efforts for evaluating cap performance. These parameters include CU-specific chemical concentrations, sediment characteristics (e.g., total organic carbon [TOC], partitioning coefficients), and non-aqueous phase liquid (NAPL) observations.

Section 1.1 discusses area-specific concentrations used for each CU. Section 1.2 discusses site-specific linear partitioning coefficients. Section 1.3 discusses total organic carbon and the fraction of organic carbon inputs used. Section 1.4 includes a description of porewater concentrations used in modeling. Section 1.5 specifies the upwelling velocity used. Section 1.6 discusses NAPL observations.

1.1. CERTIFICATION UNIT AREA-SPECIFIC SEDIMENT CONCENTRATIONS

CU area-specific sediment concentrations evaluated in the cap design included validated and approved PDI ER and historical data from the SIB Project Area. CUs were determined using the following chemistry, constructability, and geotechnical considerations:

- **Size:** CUs comprise a 0.5-acre area for riverbank certification units (RCUs) and 1-acre area for cap certification units (CCUs) and dredge certification units (DCUs), in accordance with EPA's Portland Harbor Superfund Site Monitoring Guidelines (EPA, 2025b).
- **Outliers:** 95th percentile was calculated for all post-dredging analytes Project Area wide. If the CU-specific concentration exceeded this Project Area-wide 95th percentile concentration, it was considered an outlier and excluded from the cap alternative assignment matrix.
- **Requested Navigable Depths and Constructability:** Dredge prisms developed to address requested navigable depths were incorporated into the determination of CUs, alongside other constructability considerations.
- **Physical Design Considerations:** Considerations were made to include separation based on top capping layer (e.g., unamended habitat mix, erosion protection layer, revetment, and revegetation).
- **Dredge-to-RAL:** As detailed in the 90% RD Dredging Design Technical Memorandum (DDTM; Volume I, Appendix H), DCUs were defined for areas where spudding or other activities have the potential to compromise the cap and its performance.

Figure 1-1 shows all certification units, including 109 sediment CCUs, 30 RCUs, and 23 DCUs. As listed in Table 1-1, CCUs range in size from 0.73 to 1.00 acre, with an average size of 0.95 acre. RCUs range in size from 0.19 to 0.50 acre, with an average size of 0.48 acre. DCUs range in size from 0.73 to 0.99 acre, with an average size of 0.89 acre. As seen in both Figure 1-2 and Table 1-1, 83 CCUs will be (partially or fully) dredged prior to capping.

This cap design update was completed in accordance with EPA's Cap Design Criteria at Portland Harbor (EPA, 2025a) and EPA's Errata #4 for Portland Harbor Superfund Site Record of Decision

(EPA, 2025e). The 90% RD cap is designed to be protective of sediment cleanup levels (CULs) in the underlying sediment (EPA, 2025a). The cap design evaluation was completed by calculating CUL sediment-porewater equilibrium equivalents (CUL equivalent) using Project Area-specific sediment properties. Modeled porewater concentrations at the cap performance point (CPP) were compared to the groundwater/porewater CULs for informational purposes, but not used as a cap design evaluation metric (EPA, 2025a). As a result of this updated EPA guidance, a total of 27[1] sediment contaminants of concern (COCs) were used for cap design. Table 1-2 provides all CUL, remedial action level (RAL), and principal threat waste (PTW) threshold sediment criteria driving cap design, including calculated CUL equivalent concentrations.

As compared to Draft 50% RD, the calculation of 95th percentile sediment concentrations for each CU in the Pre-Final 90% RD included the following considerations:

- Sediment samples in 90% RD include data that was previously assigned as riverbank data, for samples collected below 13 feet (ft) North American Vertical Datum of 1988 (NAVD88), as seen in Attachment A;
- Riverbank data include samples collected from above 13 ft NAVD88, as seen in Attachment A;
- For each CU, geospatial analysis was conducted to assign all available sediment core data, including both PDI ER and historical data;
- The higher of duplicate sample results was used in the calculations, and the lower of the duplicate values was removed.
- Non-detect sample results were included in calculations at one-half the reporting limit;
- Sediment samples for location depths that will be dredged per the Dredging Design Tech Memo (DDTM; Volume I, Appendix H) to allow for placement of a 3-ft thick cap and 1-ft overdredge were excluded (list of samples available in Attachment B); and
- Sediment samples for location depths that will be partially dredged per the DDTM (Volume I, Appendix H) were included in calculations of sediment column concentrations remaining after dredging.

Uniform sediment concentration was assigned throughout the modeled sediment thickness for each CU using the following considerations:

- For CU concentrations below Project Area-wide 95th percentiles, the maximum concentration across all depth intervals for ROD Tables 17 and 21 analytes was used in the cap alternative assignments; and
- For CU concentrations exceeding Project Area-wide 95th percentiles, the Project Area-wide 95th percentile value was used instead of the maximum concentration to assign cap alternatives[2].

[1] From Field Sampling Plan (Appendix A PDI Work Plan; HGL, 2022), Section 4.2, page 4-2: “Chlorobenzene was not detected in surface or subsurface sediment samples from the SIB Project Area, and is not considered further."
[2] This approach prevents overdesigning based on outliers not considered representative of the CUs or overall Project Area conditions.

Table 1-3a summarizes Project Area-wide 95th percentile concentrations, as well as maximum CU concentrations detected at each sediment CCU. Table 1-3b summarizes Project Area-wide 95th percentile concentrations, as well as maximum CU concentrations detected at each riverbank RCU. Table 1-4 compares Draft 50% RD 95th percentile concentrations to 90% RD 95th percentile concentrations, with the main difference in the 90% RD being the inclusion of riverbank data (above and below 13 ft NAVD88) into overall concentration calculations. This table includes the relative percent difference (RPD)[3] between these percentile concentrations, including sample count and a 95 percent upper confidence limit (95% UCL) value of the sample mean for each analyte. An average of 1,375 samples evaluated for reported analytes, with counts ranging from 1,121 (tributyltin) to 1,519 (2,3,7,8-tetrachlorodibenzofuran). As expected, 95th percentile values of the COC concentrations are generally higher than the 95 percent UCL value for each COC.[4]

1.2. PROJECT AREA-ADJACENT LINEAR PARTITIONING COEFFICIENTS

The linear sorption model was applied to the sediment, sand, unamended habitat mix, and erosion protection materials, while Freundlich and Langmuir non-linear sorption isotherms were applied to the granular activated carbon (GAC) amendment. The linear sorption model is a widely accepted model for sorption of hydrophobic organic compounds onto sediments and natural organic matter (Karickhoff et al., 1979; Reible, 2023) as follows:

$$K_D = K_{oc} * f_{oc}$$

where K_D is a constant related to the organic carbon normalized partitioning coefficient, K_{OC} is organic carbon normalized partition coefficient, and f_{OC} is fraction of organic carbon primarily responsible for accumulation of contaminants to sediments (Goring CA, 1962; Reible, 2014).

K_D is also defined as:

$$K_D = \frac{C_{sed}}{C_{PW}}$$

where K_D is adsorption-desorption linear partitioning coefficient, C_{SED} is chemical concentration in the sediment at equilibrium and C_{PW} is chemical concentration in the porewater at equilibrium.

K_D values were calculated using Project Area-adjacent data, where available, and scientific literature already presented in the Draft 50% RD where Project Area-adjacent data wasn't available. An update from Draft 50% RD linear partitioning coefficients, arsenic values were updated in accordance with parameters available for commercially available material, as detailed in Attachment C.

Literature-derived values have limitations because they may not accurately represent Project Area-specific conditions. The primary concern is that using these K_D values could underestimate actual sediment porewater concentrations at the site. To address this limitation, Project Area-adjacent

[3] RPD is the ratio of the absolute difference between two values to the average of the two values, calculated as a percentage using the following formula: $(absolute\ difference/average) * 100\%$.
[4] Figures A-1 through A-49 visualize maximum concentrations in sediment and riverbank soil and indicate ROD Table 17 and 21 thresholds, where applicable.

values were used when available, as they better represent SIB Project Area conditions due to the physical proximity of these reference sites to the SIB Project Area. Project Area-adjacent data included the 2020 Transition Zone Water investigation from River Mile 9 West (RM9W) and 2023 porewater sampling data collected from EPA-led Cathedral Park, Fund-Lead (FL) 3, and FL 9 project areas (CDM Smith, 2025). RM9W is located on the opposite riverbank of the Willamette River from the SIB Project Area. FL 9 is upstream on the east riverbank between river miles (RM) 9 and 10. FL-3 is immediately downstream from the SIB Project Area, whereas Cathedral Park is further downstream (Figure 1-3). The following were excluded from Project Area-adjacent average calculations so they wouldn't incorrectly impact K_D values:

- RM9W T9-Duplicate results;
- RM9W T15-Duplicate results;
- Anomalously high sediment concentration for copper at T15 (a dataset outlier); and
- Supplemental PDI Site-Wide Partitioning Coefficient calculations from EPA FL-sites.

For K_D values not available from Project Area-adjacent data, literature values documented in Attachment C were used instead. An evaluation was conducted to assess the differences between literature-derived partitioning coefficients and Project Area-adjacent partitioning coefficients. Table 1-5 compares K_D values reported in the Draft 50% RD to 90% RD values using Project Area-adjacent K_D values, where data were available. As seen in Table 1-5, Project-Area specific K_D values were on average 134 percent higher as compared to the literature value (with RPD ranging from 8 percent [manganese] to 199 percent [polychlorinated biphenyl {PCB}-44]).

Because K_D and porewater concentration are inversely related, applying higher K_D values from Project Area-adjacent data to known sediment concentration yields a lower calculated porewater concentration compared to those used in the Draft 50% RD. This finding indicates that, on average, using lower literature-derived K_D values for other analytes provides more conservative (higher) porewater concentrations used for modeling efforts. These higher porewater concentrations lead to a more protective, and perhaps a more conservative, cap design. This finding also addresses the primary concern about whether literature-derived values adequately represent Project Area-specific conditions.

1.3. ORGANIC CARBON

The total organic carbon (TOC) results from SIB sediment samples of areas where it is anticipated that sediment will remain in place following dredging efforts were averaged and used as the fraction organic carbon (f_{OC}) of the sediment layer. Current dredging design efforts are presented in DDTM (Volume I, Appendix H). For intervals with partial dredging, TOC results for the interval were included in calculations. The dataset of 165 samples, including depth intervals not within the dredge prism area, used in the calculation of organic carbon is included in Table 1-6. The TOC value calculated as a result of this evaluation was 23,627 milligrams per kilogram (mg/kg) or 2.363 percent, which is reduced by 13.2 percent as compared to the value reported in the Draft 50% RD (2.697 percent). The 90% RD analysis was completed using this updated TOC value of 2.363 percent and f_{OC} of 0.02363.

1.4. POREWATER CONCENTRATIONS

Underlying sediment porewater equivalent concentrations were calculated for each CU based on the following parameters:

- Project Area-specific sediment f_{OC} discussed in Section 1.3.
- Equilibrium phase partitioning assumption;
- CU area-specific sediment concentrations for each CCU and RCU (Section 1.1); and
- Project Area-specific sediment K_D values (Section 1.2).

These model-calculated initial porewater concentrations were used as the bottom boundary concentrations. They were assumed to provide a constant supply of contamination, without depletion through time to integrate conservatism into the modeling efforts presented in Section 2.0.

1.5. UPWELLING VELOCITY

The Draft 50% RD utilized the highest 50-hour maximum specific discharge of 158 inches per year from Station 10A recorded during PDI ER efforts (1.1 centimeters [cm] per day) for upwelling velocity. For the 90% RD, refinements were completed to analyze the specific discharge Project Area-wide, and to delineate and assign upwelling velocity for "low discharge areas" to avoid applying overly conservative value for cap design.

For the Project Area-wide upwelling velocity, 50 inches per year (128 cm per year) was used in the 90% RD. As shown in Figure 1-4, this value applied Project Area-wide is still conservative, as the 95% UCL for all specific discharge measurements is 11 inches per year (28 cm per year). Utilizing value 4.6 times higher than this conservative estimate of the mean for Project Area-wide cap assignment provides for a reasonable level of conservatism to account for some limitations of the modeling approach (e.g., competitive sorption).

Groundwater modeling was completed and is included as an attachment to the Riverbank Design Technical Memorandum (RDTM) (Volume I, Attachment D). These modeling efforts, in conjunction with data from UltraSeeps deployed adjacent to riverbanks during the PDI, helped delineate "low discharge" areas within the SIB Project Area. These "low discharge" areas included all of the riverbanks (RCUs) and CCUs that are in revetment zone (CCUs 1 through 10 and 17), as well as CCUs adjacent to Swan Island uplands (CCU 79 through 86, 93, 94, and 100 through 104). To prevent a higher degree of conservatism than is appropriate, UltraSeep data of Swan Island-adjacent locations was evaluated and a value of 0.022 inches per day (20 cm per year) was selected for the cap in these low discharge areas. This is derived from the maximum rolling average of specific discharge for UltraSeep locations adjacent to Swan Island bank slopes (Appendix B of PDI ER; HGL, 2024a).

As documented in Draft 50% CDTM sensitivity analyses, the SIB SMA is subject to tidal influence, which was previously modeled using a diurnal oscillation period. However, the oscillating upwelling velocity did not impact the time-to-breakthrough as compared to steady-flow velocity, so only steady-flow velocity was used in the 90% RD.

1.6. NON-AQUEOUS PHASE LIQUID OBSERVATIONS

Visual screening observations of sheen and NAPL are documented in PDI ER Appendix A, Surface and Subsurface Sediment Sampling Data Report Table 2-5 (HGL, 2024a). The 90% RD NAPL Screening Technical Memorandum (Volume I, Appendix B) provides further detail regarding NAPL screening of SIB samples collected during the PDI. In summary, extensive sampling of SIB has provided relatively few locations where visible NAPL is present in the sediment; only 17 observations of NAPL (sheen) were noted in more than 1,200 sediment samples collected. These areas are well-delineated based on the extensive sampling completed for the Project Area. The RD anticipates that NAPL may be observed at the river surface during dredging, as the process of cutting and drawing material through the water column can result in the release of NAPL entrained within the sediment pore space to the water column, where NAPL less dense than water may float to the surface.

The 90% RD Water Quality Monitoring Plan (Attachment B of Construction Quality Assurance/Quality Control Plan [Volume II, Appendix N]) Section 3.2 and Table 1-2 provide triggers and actions to be taken during dredging if immediate NAPL releases due to sediment disturbance are encountered during RA. The Water Quality Monitoring Plan further states that the RA Contractor will be responsible for updating the plan prior to implementing construction activities to address any additional NAPL considerations. Additionally, the water treatment system required for dredged material water treatment will include a separations step that includes a NAPL adsorbent, as well as carbon filtration, so the NAPL released during the RA dredging is expected to be sufficiently controlled.

The dredge prisms designed for SIB will generally avoid a leave surface that intersects known NAPL-impacted sediments; and most sediment intervals with identified NAPL impacts will either be removed during dredging or remain under multiple feet of sediment that do not contain entrained NAPL. Figure 1-5 shows the locations of NAPL observations and intervals containing NAPL blebs that will be left in buried sediments post-dredge. As seen in Figure 1-5, this includes five locations of NAPL bleb observances (in grid cells D18, E33, E24, and F21). Post-dredge buried sediment intervals containing these blebs vary in depth from 0 to 1 ft (D18 and F21) to 7 to10 ft (E24).

Based on the design inputs listed above, CILs presented in this CDTM have been designed to address dissolved contaminant concentrations remaining at the post-dredge/pre-cap surface. It is unlikely that deeper intervals of sediment that contain sheen would produce any mobile NAPL at the mudline. However, a contingency capping plan is also being developed in the event that mobile NAPL evolves from the sediment surface after dredging activities have ceased.

Monitoring of the SIB surface water over time is the primary method of determining the need for the contingency cap. Observations of surface sheens will be continuously logged during the dredging work. The RA contractor will provide the observation records, including locations mapped of observed sheens. If multiple instances (multiple subsequent days) of discreet NAPL sheens are observed within a previously dredged area, the contractor will mobilize an aerial monitoring contractor (i.e. unmanned aerial vehicle [UAV] imaging) to document the precise locations of the NAPL source and the information will be used to estimate the aerial extent and mass of organoclay absorbent to be used for the contingency capping.

As stated in NAPL Screening Technical Memorandum (Volume I, Appendix B), for two core locations (E24 and E33) with observed NAPL within sample cores that intersect dredge leave surface, 3 inches of organoclay-containing granules will be placed within a 50-ft radius centered on these two locations after dredging and prior to capping. If any other mobile NAPL is encountered, a 3-inch cap with a small mass of organoclay (2 percent by weight) will be placed post dredging and prior to capping. The aerial monitoring data will provide additional semi-quantitative information to determine the appropriate absorbent mass and location to be placed for the NAPL contingency along with the designed CIL type for that CCU.

The Final 100% RD will include the details of the quantity of NAPL contingency cap materials required to be immediately available by the RA Contractor to enable contingency cap placement within 3 days of the determination of need during RA construction.

2.0 CHEMICAL ISOLATION LAYER CONSIDERATIONS

This section includes details regarding 11 different cap alternatives evaluated to select a protective CIL in Pre-Final 90% RD (Figure 2-1). These evaluated cap alternatives include the following CILs:

1. 1 ft (30 cm[5]) of unamended sand;
2. 6 inches (15 cm) of 5 percent[6] GAC-amended sand[7];
3. 1 ft (30 cm) of 5 percent GAC-amended sand;
4. 1 ft (30 cm) of 10 percent GAC-amended sand;
5. 1 ft (30 cm) of 20 percent GAC-amended sand;
6. 2.5 ft (75 cm) of 20 percent GAC-amended sand[8];
7. 0.8 inches (2 cm) of GAC reactive core mat – Tektoseal-AC[9].
8. 1.6 inches (4 cm) of Tektoseal-AC;
9. 0.8 inches (2 cm) of hybrid GAC reactive core mat and Tektoseal-HM (Zeolite-reactive core mat or similar);
10. 1.6 inches (4 cm) of GAC reactive core mat and Tektoseal-HM; and
11. 1.6 inches (4 cm) of Tektoseal-AC.

Modeling efforts were conducted using CapSIM for each cap alternative to identify selected constructible alternatives for each certification unit (CU), as detailed in Section 4.2. A selected

[5] CapSIM uses metric system in evaluations, whereas this RD is typically using imperial system. To overcome this discrepancy, lengths related to CIL are reported in both systems.
[6] Amendment percentage by weight.
[7] 5 percent GAC was determined to be the minimum constructible percentage.
[8] 2.5 ft (75 cm) CIL is maximum constructible alternative thickness from geotechnical considerations and GAC percentage from constructability considerations.
[9] This CDTM evaluated Tektoseal-AC GAC reactive core mat, and it refers to Tektoseal-AC specifically due to availability of material properties and sorption parameters. Any GAC-reactive core mat with similar or better performance for design analytes can be used during the RA Construction.

constructible alternative for each CU was selected to contain contamination and meet the remedial action objectives established in the ROD. The analysis accounted for the composition of the CIL required to control the migration of contaminants under fate and transport mechanisms such as advection, diffusion, dispersion, biodegradation, and bioturbation. The modeling was performed in accordance with the ROD (EPA, 2017), Remedial Design Guidelines and Considerations (RDGC; EPA, 2021b), U.S. Army Corps of Engineers (Palermo et al. 1998), and Sediment Cap Chemical Isolation Guidance (SD-1) (ITRC, 2023).

Section 2.1 discussed chemical transport modeling approach. Section 2.2 outlines modeling inputs. Section 2.3 summarizes results of the cap modeling. Section 2.4 discusses sensitivity analyses.

2.1. CHEMICAL TRANSPORT MODELING APPROACH

One-dimensional chemical mass transport modeling was conducted to determine the maximum contaminant concentration in underlying sediments that each cap alternative can contain for 100 years while remaining protective. The modeling was performed using CapSIM Version 4.2 modeling software (Shen et al, 2018; Reible, 2023) and following Sediment Cap Chemical Isolation Guidance (SD 1) guidance (ITRC, 2023). CapSIM modeling evaluated the containment time and effectiveness of the cap in maintaining a theoretical sediment solids concentration below sediment CUL, RAL, and PTW thresholds (EPA, 2021b) at CPP. Porewater concentrations at CPP were compared to groundwater/surface water CULs for informational purposes only (EPA, 2025b). The CapSIM-modeled values of porewater at the top of the CIL are used to evaluate a cap design's effectiveness by using a calculated sediment-porewater equilibrium value based on a sediment CUL for each COC and assuming that sediment contains the same sorption coefficient as the existing SIB sediment.

The CapSIM modeling software was used to predict the containment time of sediment concentrations below sediment thresholds. Evaluation was completed immediately above the chemical isolation layer at the CPP[10]. To complete the evaluation, a total of 59 individual contaminants and 5 COC totals (total carcinogenic polycyclic aromatic hydrocarbons [cPAHs], total DDx[11], total dioxins/furans, total polycyclic aromatic hydrocarbons [PAHs], and total PCBs), which were each evaluated both as summations and as modeled averages, were modeled. The analytes included in this evaluation are based on Table 17 of the ROD Errata #2 (EPA, 2020). Individual cPAHs and PAHs for which sediment data was available were modeled and summed over the 100-year model run time as another point of evaluation for total cPAHs and total PAHs[12]. In addition to total PCBs, all 10 homologs were represented by modeling 14 individual PCB congeners with high detection rates compared to the average detection rate across all PCB congeners and encompassing most of the published range of sorption coefficients to organic carbon

[10] Footnote 5 in the Draft 50% RD states that 90% Remedial Cap Design for SIB, the CPP will be 1 ft (30 cm) below the armoring layer consistent with RDGC Table 3-1 and included in the 50% RD considerations. However, EPA's Monitoring Guidelines footnote 9 states that "Immediately above the CIL may be a filter layer, an armor layer, or a habitat layer, depending upon the project-area-specific cap design" (EPA, 2025b), eliminating request for additional feet of sand to be placed between chemical isolation layer and armor/habitat layer. As a result, CPP remained positioned above chemical isolation layer, which now has erosion protection layer immediately on top.

[11] DDx = dichlorodiphenyldichloroethane (DDD) + dichlorodiphenyldichloroethylene (DDE) + dichlorodiphenyltrichloroethane (DDT)

[12] Total PAHs include summation of individual PAHs and cPAHs.

and GAC (Attachment C). These congeners were additionally summed over the 100-year model run time; however, as the 14 congeners do not represent all PCB detections, their summation analogue provides a more qualitative indicator of COC migration.

The cap performance is reported as a time-to-breakthrough. Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC concentration in porewater that exceeds the relevant porewater concentration that is in equilibrium with SIB sediment containing that COC at the CUL concentration at the CPP. For example, a time-to-breakthrough of 80 indicates that a modeled COC would surpass the relevant sediment CUL equilibrium porewater concentration at the CPP 80 years after cap installation. The sediment CUL equilibrium porewater concentration was calculated within CapSIM using the sediment f_{OC} (Section 1.3) and the sediment sorption parameters, either K_{OC} or K_D, for each COC. The application sediment sorption parameters are discussed in Attachment C. Cap alternatives that did not experience a breakthrough within the modeled 100-year design life are reported to have a time-to-breakthrough of more than 100 years (100+).

The model input parameters were based on Project Area-specific data, where available, or literature values for comparable conditions. All chemical concentrations and 16 percent of physical capping material and sediment process input parameters were Project Area-specific input parameters. The Project Area-specific input values were supplemented by typical modeling values or available literature values for chemical and material properties. Sensitivity testing was performed to confirm that selected literature values produced a conservative cap design, as detailed in Section 2.4.

The CPP was selected to be at the top of CIL and below the erosion protection layer (EPL). Using the top surface of the CIL as the CPP ensures consistency in the evaluation of CIL performance for modeled COCs between the 11 cap alternatives. In all CIL alternatives evaluated, the CPP is below the conservative estimate of bioturbation reported in the ROD of 7.87 inches (20 cm) (EPA, 2017). Figure 2-1 illustrates the 11 conceptual CIL cap design alternatives modeled.

2.2. MODEL INPUTS

Input parameters were based on Project Area-specific data when available, such as upwelling velocities and sediment COC concentrations, along with information from scientific literature, including inputs from other regional CapSIM applications (Tables 2-1 and 2-2). Details on the development of the select model input parameters are provided in the following sections. The sources for material input parameters not discussed below are provided in Table 2-1.

2.2.1. Sorption Coefficients

The linear sorption model was applied to the sediment, sand, EPL, the zeolite amendment within Tektoseal-HM, and the bedding and armor stones. Properties of bedding and amor stone didn't impact cap design as the design is based on the performance at the CPP, and the CPP is located below bedding and armor stones for all evaluated CILs. Freundlich and Langmuir non-linear sorption isotherms were applied to the GAC amendment and the activated carbon within Tektoseal-AC. In the amended cap layer models, it was assumed that GAC and clean sand were evenly mixed within the chemical isolation layer and the above sorption isotherms were applied to their respective particles in the mixture.

The Freundlich and Langmuir sorption isotherms are frequently used to predict particle concentrations (q) from porewater concentrations (C) for activated carbon. The relation for the Freundlich isotherm is as follows:

$$q = K_f * C^{1/n}$$

where K_f is the adsorption capacity at unit concentration and 1/n (N) is the adsorption intensity (Reible, 2014).

The Langmuir isotherm is:

$$\frac{1}{q} = \frac{1}{q_m} + \left(\frac{1}{bq_m}\right)\left(\frac{1}{C}\right)$$

where q_m is the maximum adsorption capacity and b is the Langmuir constant (Patnukao et al., 2008).

For each COC, both parameters for the Freundlich or Langmuir isotherms originated from the same literature source of data. The selected sorption isotherm for each COC and material was dependent on the available literature. If multiple sorption isotherm equations were reported by one literature source, the isotherm with the better fit (higher R^2 value) to the literature data was selected. Attachment C includes detailed sources of specific sorption isotherms and sources applicable to each COC and modeled material. Table 2-2 summarizes selected inputs.

2.2.2. Fraction Organic Carbon in Capping Materials

Consistent with Draft 50% RD CDTM (HGL, 2025b), the sand present in the CIL and the habitat mix was assumed to have a f_{OC} of 0.1 percent. The modeled EPL materials were assumed to have a f_{OC} of 0.0 percent as this layer is not intended to provide chemical sequestration. The GAC amendment to the CIL is assumed to have a f_{OC} of 100 percent, which is the CapSIM default for the material (Reible, 2023).

2.2.3. Initial Concentrations

As described in Section 1.1, sediment concentrations remaining in CUs post-dredging were evaluated across the Project Area to determine 95th percentile sediment concentrations. This approach prevents outlier values from driving the cap assignment and leading to an overly conservative cap design. The modeled 95th percentile sediment concentrations are shown in Table 1-4 for most COCs, and include values used in Draft 50% RD and evaluates change between the Draft 50% and Pre-Final 90% RD values. Table 1-4 excludes modeled individual PCBs, PAHs, and cPAHs which are evaluated as a summed total. These COCs were each modeled using an even distribution of the 95th percentile sediment concentration of the total. Each of the 14 individual PCBs were modeled using an initial sediment concentration of 65.96 micrograms per kilogram (µg/kg), equivalent to 1/14 of the 95th percentile total PCB congener sediment concentration (923.4 µg/kg). All individual PAHs, excluding naphthalene, which has a calculated 95th percentile sediment concentration in Table 1-4, and cPAHs were modeled using an initial sediment concentration of 244.2 µg/kg, equivalent to 1/19 of the 95th percentile total PAHs sediment

concentration (4,640 µg/kg). This value was more conservative than using an even distribution of the 95th percentile total cPAHs sediment concentration (510 µg/kg) to model the seven individual cPAHs. Additionally, five modeled COCs (chromium, manganese, pentachlorophenol, vanadium, xylenes) have porewater CULs but do not have sediment CULs or sediment-porewater equilibrium equivalent and are therefore not included in Table 1-4. The modeled initial sediment and equivalent porewater concentrations for these five COCs are shown in the sensitivity modeling tables (Tables 2-4 through 2-14).

2.2.4. Bioturbation and Benthic Boundary Layer Condition

Consistent with Draft 50% RD, cap evaluation simulations modeled bioturbation using a conservative bioturbation layer thickness of 7.87 inches (20 cm) and a mass transfer coefficient of 0.1 cm per hour (876 cm per year) for all COCs. This mass transfer coefficient is one order of magnitude lower than the CapSIM default value (1.0 cm per hour) and falls within the EPA recommendation of using a mass transfer coefficient less than 0.5 cm per hour.

2.2.5. Model Input Summary

All chemical properties and partitioning coefficients are presented in Table 2-2 and discussed in Attachment C. The non-chemical specific model input parameters are presented in Table 2-1. This table is divided into sections that are specific to the sediment or capping materials and those that are general system parameters.

2.3. RESULTS OF CAP MODELING EVALUATION

The results of the cap chemical transport modeling indicate that a CIL composed of 1 ft (30 cm) of 5 percent to 20 percent GAC-amended sand will reliably contain the flux of all modeled COCs, including all Table 21 COCs. In accordance with EPA's Cap Design Criteria at Portland Harbor (EPA, 2025a), the time-to-breakthrough was based on time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the calculated sediment-porewater CUL equivalent concentrations (Section 1.1; Table 1-2). The time-to-breakthrough of the 95th percentile sediment concentrations compared to the sediment-porewater CUL equivalent concentrations are summarized in Tables 2-3a and 2-3c for all modeled amended sand and reactive core mat alternatives, respectively. EPA's Cap Design Criteria at Portland Harbor (EPA, 2025a) further indicates that modeled porewater concentrations should be compared to the porewater (surface water and groundwater) CULs for informational purposes but not used as a cap design evaluation metric. The time-to-exceedance of surface water and groundwater CULs are included for all amended sand and Tektoseal cap alternatives in Tables 2-3b and 2-3d, respectively, for informational purposes only. Concentration profiles of the porewater and total solid concentrations compared to depth for each modeled cap alternative are included in Attachment D.

The CIL alternative composed of 1 ft (30 cm) of unamended sand (Cap Alternative 1), is not protective for every evaluated COC. Table 2-3a shows 21 exceedances of the calculated sediment-porewater CUL equivalent concentrations occur within 100 years following cap installation. Of the exceedances, seven occur within ten years following cap installation: summed PAHs (1 year), PCB-1 (1 year), summed PCBs (1 year), PCB-15 (3 years), mercury (6 years), dieldrin (7 years), and cadmium (8 years). Table 2-3b shows 27 exceedances of the informational ROD Table 17

porewater CULs. Of the COCs with porewater CUL exceedances, nine have an applicable calculated sediment-porewater CUL equivalent concentration that is not exceeded within the 100-year design life: aldrin, total and summed cPAHs, DDD, DDE, DDT, summed dioxins/furans, PCB-141, and tributyltin.

The CIL alternative containing 6 inches (15 cm) chemical isolation layer of 5 percent GAC-amended sand (Cap Alternative 2), is protective of all modeled COCs except for arsenic. The 100-year porewater concentration of arsenic is 16.4 micrograms per liter (µg/L), and porewater concentrations exceed the calculated sediment-porewater CUL equivalent concentration (8.02 µg/L) 77 years following cap installation (Table 2-3a). The maximum contained arsenic sediment concentration that can be reliably contained by Cap Alternative 2 for the 100-year design life is 6.625 mg/kg (6,625 µg/kg), which equates to 79th percentile of all post-dredge arsenic sediment data. For informational purposes only, arsenic porewater concentrations exceed the porewater CULs (0.018 µg/L) 55 years following cap installation (Table 2-3b).

The Tektoseal-HM reactive core mat product is designed for heavy metals, and sorption parameters to the amendment material are only available for arsenic, cadmium, chromium, copper, lead, mercury, and zinc (Table 2-2). Tektoseal products containing activated carbon (Tektoseal-AC) performed better than the Tektoseal-HM products for all COCs, including the targeted heavy metals (Tables 2-3c and 2-3d). One 2 cm layer of Tektoseal-AC is protective of all modeled COCs except for arsenic, BEHP, and cadmium. The 100-year porewater concentration of arsenic is 24.6 µg/L. Arsenic porewater concentrations exceed the calculated sediment-porewater CUL equivalent concentration (8.015 µg/L) 13 years following cap installation, and exceeded the informational porewater CULs (0.018 µg/L) 5 years following cap installation. The 100-year porewater concentration of BEHP is 0.0597 µg/L, below the surface water CUL (0.2 µg/L), and porewater concentrations exceeded the calculated sediment-porewater CUL equivalent concentration (0.05092 µg/L) 88 years following cap installation. The 100-year porewater concentration of cadmium is 0.0128 µg/L, below the groundwater CUL (0.094 µg/L), and porewater concentrations exceeded the calculated sediment-porewater CUL equivalent concentration (0.01018 µg/L) 20 years following cap installation. Adding a second 2 cm Tektoseal-AC layer increased the time-to-breakthrough for arsenic, BEHP, and cadmium to 33 years, 100+ years, and 68 years, respectively (Table 2-3c).

2.4. SENSITIVITY ANALYSES

Sensitivity analyses were performed for parameters that were determined to impact the design in Pre-Final 90% RD or were requested based on EPA's review of the Draft 50% CDTM. These analyses included the following:

- GAC amendment percentage;
- Chemical isolation layer thickness;
- Linear and nonlinear sorption parameters;
- EPL thickness;
- Bottom boundary condition;
- Cap consolidation;
- Sand and GAC settling separation; and
- CIL and sediment mixing.

Several of the model input parameters have uncertainty or variability associated with them, such as sorption parameters, bottom boundary conditions, cap consolidation, and variable settlement velocities. The sensitivity analyses were performed for the 95th percentile concentrations (Section 2.2.3) using a 1 ft (30 cm) thick sand cap amended with 5 percent GAC by weight, and including 1 ft (30 cm) of EPL (See Section 2.4.4) with Project Area-wide upwelling velocity of 50 inches per year (128 cm/year). The CPP for all sensitivity scenarios remained consistent (top of the CIL). The completed sensitivity analyses and the resulting differences in time-to-breakthrough and 100-year porewater concentrations are detailed in Tables 2-4 through 2-14. The reported percentage change in the 100-year porewater concentration resulting from the varied input parameter values shown in Tables 2-6 through 2-14 is the RPD.

2.4.1. GAC Amendment Percentage

The GAC amendment used in the sensitivity analyses base case was selected to be 5 percent by weight as that is the minimum constructible GAC amendment. The CIL alternatives evaluated included 10 percent and 20 percent GAC by weight, Cap Alternatives 4 and 5 respectively, and are applicable to CCUs with higher sediment concentrations than cannot be reliably contained by 5 percent of GAC-amended sand. Additionally, natural inconsistencies in mixing have the potential to increase or reduce the GAC percentage present in areas of an amended cap. A 1 ft (30 cm) thick sand cap amended with 2.5 percent GAC by weight was modeled to evaluate if contaminants would be contained in areas with a reduced amendment percentage.

For 1 ft (30 cm) CIL alternatives containing 5, 10, and 20 percent GAC amended sand and Project Area-wide upwelling velocity of 50 inches per year (128 cm per year), no modeled contaminants exceeded the sediment CUL-porewater equivalent concentration at the CPP for the 95th percentile concentrations. Copper and lead behaved inversely to other modeled contaminants, with higher 100-year porewater concentrations observed for higher modeled amendment percentages. Results of the analyses for the 95th percentile concentrations are presented in Table 2-4.

A comparison between the base case CIL, 1 ft amended with 5 percent GAC by weight, and a 1 ft thick sand cap amended with 2.5 percent[13] GAC by weight topped with 1 ft (30 cm) of EPL is included in Table 2-4. When modeled using the 95th percentile concentrations, a 100-year porewater concentration of 9.58 µg/L was observed for arsenic, exceeding the 8.02 µg/L sediment CUL-porewater equivalent concentration after 96 years. All other modeled COCs were effectively contained by a 1 ft (30 cm) thick sand cap amended with 2.5 percent GAC by weight. Consistent with the comparison between 1 ft (30 cm) 5 percent 10 percent, and 20 percent GAC-amended CIL alternatives, copper and lead behaved inversely to other modeled contaminants and lower 100-year porewater concentrations were observed for the cap alternative with the lower GAC amendment percentage.

2.4.2. Chemical Isolation Layer Thickness

To understand the potential impact of variability in the applied layer thickness of capping materials, the alternatives with CILs containing 6 inches (15 cm), 1 ft (30 cm) and 2 ft (60 cm) were compared (Table 2-5). Spatial discretization of 20 grids per layer was maintained. A 6-inch

[13] 2.5 percent-GAC amended sand was evaluated to understand potential implication of uneven distribution of GAC within sand.

(15 cm) CIL containing 5 percent GAC amended sand (Cap Alternative 2), is applicable to CCUs with lower sediment concentrations. When modeled using the 95th percentile concentrations, a 100-year porewater concentration of 16.4 µg/L was observed for arsenic, exceeding the 8.015 µg/L sediment CUL-porewater equivalent concentration after 77 years. The maximum contained concentration for 6-inch (15 cm) CIL containing 5 percent GAC-amended sand (Cap Alternative 2) is 6.63 mg/kg, a RPD of 34.7 percent compared to the 95th percentile sediment concentration (9.41 mg/kg). Summed cPAHs, driven by benzo(b)fluoranthene, and summed PAHs, driven by fluoranthene, behaved inversely to other modeled contaminants and lower 100-year porewater concentrations were observed for Cap Alternative 2. The 100-year porewater concentrations for benzo(b)fluoranthene and fluoranthene appear to be influenced primarily by the benthic boundary, therefore, the observed response to this sensitivity analysis may be different than if modeled with a higher initial sediment concentration or observed in situ. The porewater concentrations for other modeled contaminants, with the exception of copper, manganese, and zinc, showed a roughly proportional response to the halving of the chemical isolation layer thickness. A 2.5 ft (76 cm) CIL containing 20 percent GAC-amended sand (Cap Alternative 6), applies to CCUs with very high sediment concentrations. When compared to the results of 1 ft (30 cm) CIL containing 20 percent GAC-amended sand (Cap Alternative 5), similar conclusions can be drawn as from the comparison between 6 in (15 cm) and 1 ft (30cm) CIL alternatives containing 5 percent GAC-amended sand (Cap Alternatives 2 and 3, respectively) for the modeled COCs with 100-year porewater concentrations greater than 0.

2.4.3. Sorption Coefficients

The derivation of the Freundlich and Langmuir sorption parameters for organic carbon, activated carbon, sediment, and granular capping materials that were used in modeling is described in Attachment C. Sensitivity testing completed to date found the model to be very sensitive to changes in the nonlinear sorption parameters. According to ITRC guidance, “if site-specific testing is not conducted, literature values may be used, although isotherms derived from the literature may not account for particle size differences (e.g., GAC vs. powdered activated carbon), competition of sorption sites for the full suite of chemicals present in the sediment porewater at a site, the potential for fouling or dechlorination and the formation and precipitation of metal sulfides, or the competitive effects of natural organic matter (NOM). It may be appropriate to reduce the sorptive capacity of activated carbon by a factor of 2 to 5 to account for the effects of NOM” (ITRC, 2023). As a sensitivity analysis, the K_f and q_m values were reduced by one order of magnitude for all modeled COCs. This sensitivity analysis evaluates if the available literature values over-represent the sorption of the modeled COCs due to differences from experimental conditions such as the specific capping materials acquired or the geochemical conditions in SIB. When modeled using the 95th percentile concentrations, a 100-year porewater concentration of 24.0 µg/L was observed for arsenic, exceeding the 8.02 µg/L sediment CUL-porewater equivalent concentration after 38 years, and a 100-year porewater concentration of 0.0134 µg/L was observed for cadmium, exceeding the 0.0102 µg/L sediment CUL-porewater equivalent concentration after 39 years (Table 2-6). The time-to-breakthrough for all other COCs remained greater than 100 years. Copper did not exhibit a sensitivity to the reduced sorption parameter (q_m) and the 100-year porewater concentration was unchanged. Lead and manganese were minimally sensitive to the reduced sorption parameters, with 100-year porewater concentration changes having RPDs of less than 1 percent. Summed cPAHs, driven by benzo(b)fluoranthene, behaved inversely to other modeled contaminants and lower 100-year porewater concentrations were observed for the reduced sorption

parameter sensitivity analysis. The 100-year porewater concentrations for benzo(b)fluoranthene appear to be influenced primarily by the benthic boundary, therefore, the observed response to this sensitivity analysis may be different than if modeled with a higher initial sediment concentration or observed in situ.

Three modeled COCs, BEHP, phenanthrene, and PCB-15, utilize a Freundlich parameter (1/n) that is greater than 1 (Attachment C). To evaluate the conservativism of these literature values, BEHP and PCB-15 were modeled with the parameter (1/n) set to 1.0, exhibiting linear partitioning. For the sensitivity analysis, the Freundlich sorption parameters published in Walters & Luthy (1984) were utilized for phenanthrene (K_f = 1.653E+07; 1/n = 0.406). When modeling the reduced Freundlich parameter (1/n), the 100-year porewater concentration of BEHP was reduced from 7.25E-04 µg/L to 2.98E-20 µg/L and was unchanged from 0 µg/L for phenanthrene and PCB-15 (Table 2-6). The time-to-breakthrough for the impacted COCs remained greater than 100 years.

Linear sorption parameters for all COCs were independently varied as sensitivity analyses to understand the impact of linear sorption coefficient changes on overall cap performance. The organic carbon partitioning coefficient, K_{OC}, was multiplied by 1.2 and 0.8 for all organic COCs (Table 2-7). This scaling factor creates a range of K_{OC} values for each COC that generally encompasses most or all of the range of literature K_{OC} values. K_{OC} affects the sorption to all capping materials containing organic carbon, which includes sediment and capping sand, except for metals and the COCs with Project Area-adjacent K_D values for sorption to sediment (Table 1-5). Additionally, K_{OC} is utilized for sorption to GAC for diesel. When modeling 1.2 times K_{OC}, the 100-year porewater concentration of BEHP was reduced from 7.25E-04 µg/L to 2.63E-05 µg/L, an RPD of 186 percent, and diesel decreased from 7.36E-14 µg/L to 0 µg/L, an RPD of 200 percent. When modeling 0.8 times K_{OC}, the 100-year porewater concentration of BEHP increased from 7.25E-04 µg/L to 9.64E-04 µg/L, an RPD of 28.3 percent, and diesel increased from 7.36E-14 µg/L to 5.61 µg/L, an RPD of 200 percent. Tributyltin exhibited a similar responsiveness to diesel; when modeling 1.2 times K_{OC}, the 100-year porewater concentration was reduced from 7.91E-10 µg/L to 0 µg/L, an RPD of 200 percent, and when modeling 0.8 times K_{OC}, the 100-year porewater concentration increased to 8.67E-04 µg/L, an RPD of 200 percent. The linear partitioning coefficient for metals to capping sand, K_D, was multiplied by 1.2 and 0.8 for all modeled metals (Table 2-8). This scaling factor is consistent with the K_{OC} sensitivity analysis. Manganese exhibited the least sensitivity of all metals with non-zero 100-year porewater concentrations to the change in K_D to sand. When modeling 1.2 times K_D, the 100-year porewater concentration was reduced from 1.20E+04 µg/L to 1.19E+04 µg/L, an RPD of 0.837 percent, and when modeling 0.8 times K_D, the 100-year porewater concentration increased to 1.21E+04 µg/L, an RPD of 0.830 percent. Lead exhibited the highest sensitivity of all metals with non-zero 100-year porewater concentrations to the change in K_D to sand. When modeling 1.2 times K_D, the 100-year porewater concentration was reduced from 6.79E-09 µg/L to 4.66E-10 µg/L, an RPD of 174 percent, and when modeling 0.8 times K_D, the 100-year porewater concentration increased to 1.35E-07 µg/L, an RPD of 181 percent. The time-to-breakthrough for the impacted COCs remained greater than 100 years.

The linear partitioning coefficient to sediment for metals and COCs with Project Area-adjacent K_D values was additionally multiplied by 1.2 and 0.8 for all applicable COCs (Table 2-9). Diesel exhibited the least sensitivity of all COCs with non-zero 100-year porewater concentrations to the change in K_D to sediment. When modeling 1.2 times K_D, the 100-year porewater concentration

was reduced from 7.36E-14 µg/L to 6.70E-14 µg/L, an RPD of 9.39 percent, and when modeling 0.8 times K_{OC}, the 100-year porewater concentration increased to 8.28E-14 µg/L, an RPD of 11.8 percent. Manganese exhibited the highest sensitivity of all COCs with non-zero 100-year porewater concentrations to the change in K_D to sediment. When modeling 1.2 times K_D, the 100-year porewater concentration was reduced from 1.20E+04 µg/L to 1.00E+04 µg/L, an RPD of 18.2 percent, and when modeling 0.8 times K_D, the 100-year porewater concentration increased to 1.51E+04 µg/L, an RPD of 22.9 percent. The time-to-breakthrough for the impacted COCs remained greater than 100 years.

The linear partitioning coefficient for metals to the EPL, K_D, was multiplied by 1.2 and 0.8 for all modeled metals (Table 2-10). This scaling factor is consistent with the K_{OC} sensitivity analysis. The partitioning coefficient was additionally multiplied by 2.5 and 0.5 to encompass the greater uncertainty associated with utilizing K_D values published for sand to also model sorption to larger gravels and erosion protection materials. Of the metals with non-zero 100-year porewater concentrations, lead exhibited the highest sensitivity to the change in K_D to the EPL. When modeling 1.2 times K_D, the 100-year porewater concentration was reduced from 6.57E-09 µg/L to 6.05E-09 µg/L, an RPD of 8.24 percent, and when modeling 0.8 times K_D, the 100-year porewater concentration increased to 7.21E-09 µg/L, an RPD of 9.29 percent. When modeling 2.5 times K_D, the 100-year porewater concentration was decreased from 6.57E-09 µg/L to 4.00E-09 µg/L, an RPD of 48.6 percent, and when modeling 0.5 times K_D, the 100-year porewater concentration increased to 8.45E-09 µg/L, an RPD of 25 percent. The time-to-breakthrough for the impacted COCs remained greater than 100 years.

2.4.4. Erosion Protection Layer Thickness

As discussed in Section 3.8, the CIL will have 2 ft of EPL[14] placed on top of CIL (see Figure 2-1). Although no substantial change in performance was expected due to negligible sorption of COCs to this type of material, comparison of performance of 1 ft to 2 ft of EPL thickness was evaluated for 6 inches (15 cm) and 1 ft (30 cm) of 5 percent GAC-amended sand (Cap Alternatives 2 and 3, respectively) (Table 2-11). Spatial discretization of 20 grids per layer was maintained, and the CPP remained at the top surface of the CIL. As expected, for 1 ft of 5 percent GAC-amended sand (Cap Alternative 2), with 2 ft of EPL a negligible increase in 100-year porewater equivalent concentrations was observed for arsenic compared to 1 ft of EPL, which increased from 0 µg/L to 7.23E-20 µg/L, and acenaphthylene, which increased from 0 µg/L to 1.29E-16 µg/L. The 100-year porewater equivalent concentrations of benzo(b)fluoranthene, copper, summed cPAHs, lead, fluoranthene, manganese, summed PAHs, and zinc all decreased with RPDs between 0.837 and 200 percent. The time-to-breakthrough for all COCs remained greater than 100 years. For 6 inches (15 cm) CIL containing 5 percent GAC-amended sand (Cap Alternative 3), a negligible increase in 100-year porewater concentrations was observed for summed PAHs, driven by fluoranthene, with sensitivity 100-year porewater concentrations of 9.55E-18 µg/L and 9.52E-18 µg/L, respectively. The only notable difference for Cap Alternative 2 was 100-year porewater equivalent concentration of arsenic, which decreased from 16.4 µg/L (1 ft of EPL) to 15.1 µg/L (2 ft of EPL), an RPD of 8.25 percent, and the time-to-breakthrough was extended from 77 to 79 years for sensitivity analysis containing 1 ft (30 cm) of EPL and EPL thickness used in 90% RD. The time-

[14] In the Pre-Final 90% RD Design Drawings, what is referred to as EPL consists of either 2 ft of rounded gravel or 18 inches of angular rock with 6 inches of unamended sand on top as a habitat layer.

to-breakthrough for all other COCs remained greater than 100 years. The design impact of this evaluation is that sensitivity analyses performed with 1 ft (30 cm) of EPL are more conservative than cap performances for 90% RD, which all contain 2 ft (60 cm) of EPL (Figure 2-1).

2.4.5. Bottom Boundary Condition

The bottom boundary condition type was conservatively assumed to be a fixed concentration. The flux-matching bottom boundary condition is commonly used to model advective and reactive transport (Reible, 2023). Sensitivity testing using the flux matching bottom boundary condition type and matched boundary concentrations set to the calculated equilibrium porewater concentration in the sediment only affected the 100-year porewater concentration for arsenic, which increased from 0 µg/L to 1.69E-19 µg/L, an RPD of 200 percent (Table 2-12). The time-to-breakthrough for all COCs remained greater than 100 years. The sensitivity analysis was repeated for 6 inches (15 cm) CIL containing 5 percent of GAC-amended sand (Cap Alternative 2). Only the 100-year porewater concentration for manganese was affected, which decreased from 1.22E+04 µg/L to 1.21E+04 µg/L, an RPD of 0.823 percent (Table 2-12). The time-to-breakthrough remained 77 years for arsenic and greater than 100 years for all other COCs.

2.4.6. Consolidation of Underlying Sediment

The consolidation depth and time to 90 percent consolidation for all modeled cap alternatives was modeled using the predicted Project Area-specific maximum consolidation of 29.2 cm and 1.2 years, respectively. Due to differences in selected constructible alternatives (Section 4.1), consolidation values will differ across the SIB Project Area. As a sensitivity analysis, the maximum consolidation and time to 90 percent consolidation were doubled both independently and collectively (Table 2-13). All combinations of the sensitivity analysis had an insignificant impact on overall cap performance. For example, all combinations reduced the 100-year porewater concentration of fluoranthene from 1.09E-17 µg/L to 0 µg/L, both values negligible. The 100-year porewater concentrations of benzo(k)fluoranthene were reduced from 2.25E-20 µg/L to 0 µg/L from the independently varied consolidation parameters, and to 1.69E-20 µg/L for the collectively varied consolidation parameters, all values being effectively zero. The time-to-breakthrough for all COCs remained greater than 100 years. Based on the consolidation settlement analysis discussed in Section 4.2.2 of the GDTM (Volume I, Appendix I), additional sensitivity analysis was completed to evaluate 20 inches (50.8 cm) consolidation over 2.5 years. As seen in Table 2-13, the difference is also negligible, with a maximum difference of porewater values greater than parts per quadrillion range of 0.41% (e.g., 0.000725 µg/L vs 0.000728 µg/L for BEHP in porewater). The time-to-breakthrough for all COCs remained greater than 100 years.

2.4.7. Sand and GAC Settling Separation

CapSIM assumes the sand and GAC in GAC-amended sand alternatives are uniformly mixed. Although this challenge is expected to be addressed using proven proprietary capping broadcasting technology, sensitivity analysis was completed to understand the impact of potential sand and GAC settling separation during cap installation. It is anticipated that if this separation was to happen, the resulting CIL would have more GAC near the surface of the CIL and less near the surface of

the sediment. As a sensitivity analysis, the sand and GAC materials were modeled as two separate layers with the layer thickness determined by the volume fraction of each material (Table 2-14). The 1 ft (30 cm) CIL containing 5 percent GAC-amended sand (Cap Alternative 3) was first modeled assuming 2 lifts performed during installation, resulting in alternating layers of 0.92 inches (2.34 cm) of GAC on top of 4.98 inches (12.66 cm) of sand. Of the modeled COCs, only manganese and benzo(g,h,i)perylene were observed to have an increase in 100-year porewater concentrations for the separated materials, from 1.20E+04 µg/L to 1.21E+04 µg/L and from 0 µg/L to 7.56E-20 µg/L, respectively. The 100-year porewater concentration for benzo(g,h,i)perylene appears to be influenced primarily by the benthic boundary; therefore, the observed response to this sensitivity analysis may be different if modeled with a higher initial sediment concentration or observed in situ. The time-to-breakthrough for all COCs remained greater than 100 years.

The 1 ft (30 cm) CIL containing 5 percent of GAC-amended sand (Cap Alternative 3) was then modeled assuming 3 lifts are performed during installation, resulting in alternating layers of 0.61 inches (1.56 cm) of GAC on top of 3.32 inches (8.44 cm) of sand (Table 2-14). Of the modeled COCs, only manganese and PCB-1 were observed to have an increase in 100-year porewater concentrations for the separated materials, from 1.20E+04 µg/L to 1.21E+04 µg/L and from 0 µg/L to 1.49E-17 µg/L, respectively. The time-to-breakthrough for all COCs remained greater than 100 years.

2.4.8. CIL and Sediment Mixing

All cap alternatives were modeled assuming no mixing occurs between the underlying sediment and the applied capping materials. Depending on the compactness of the surface sediment onto which the capping material is applied, there may be mixing of the CIL and the underlying sediment. As a sensitivity analysis, a 1.98-inch (5 cm) layer depicting an even mixture of 50 percent sand and GAC and 50 percent sediment was modeled (Table 2-15). The unmixed CIL and sediment layers were both reduced to 10.8 inches (27.5 cm) to maintain the 3 ft (90 cm) total model thickness. Spatial discretization of 20 grids per layer was maintained, and the CPP remained at the top surface of the CIL. Initial loading concentrations were assigned to the sediment and porewater components of the mixture, equivalent to the initial conditions of the underlying sediment. A negligible decrease in 100-year porewater concentrations was observed for diesel, which decreased from 7.36E-14 µg/L to 6.06E-14 µg/L, an RPD of 19.4 percent, and tributyltin, which decreased from 7.91E-10 µg/L to 6.35E-11 µg/L, an RPD of 170 percent. The 100-year porewater concentrations for BEHP, copper, lead, manganese, and zinc all increased in response to this sensitivity analysis with RPDs between 0.830 and 64.3 percent. The 100-year porewater concentration for summed cPAHs, driven by benzo(b)fluoranthene, and summed PAHs, driven by benzo(g,h,i)perylene and fluoranthene, all varied in this sensitivity test, however, the porewater concentration appears to be influenced primarily by the benthic boundary, therefore, the observed response to this sensitivity analysis may be different than if modeled with a higher initial sediment concentration or observed in situ. The time-to-breakthrough for all COCs remained greater than 100 years.

The sensitivity analysis was repeated with a 4-inch (10 cm) layer depicting an even mixture of 50 percent sand and GAC and 50 percent sediment (Table 2-15). The unmixed CIL and sediment layers were similarly both reduced to 25 cm to maintain the 90 cm total model thickness. An increase in 100-year porewater concentrations was only observed for summed cPAHs, driven by

benzo(b)fluoranthene, and summed PAHs, driven by fluoranthene. The 100-year porewater concentrations for BEHP, cadmium, copper, diesel, lead, manganese, tributyltin, and zinc all increased in response to this sensitivity analysis with RPDs between 0.830 and 200 percent. The time-to-breakthrough for all COCs remained greater than 100 years.

2.4.9. Summary of Sensitivity Testing

The preceding sensitivity analyses reiterate the previous findings that, for an amended cap, the majority of considered COCs are sensitive to changes in the following parameters:

- GAC amendment percentage,
- Amended CIL thickness, and
- Sorption parameters.

With 1 ft (30 cm) of 5 percent GAC-amended sand (Cap Alternative 3), the 95th percentile sediment concentrations are contained far enough below CPP that, despite some high RPD changes in 100-year porewater concentrations, cap breakthrough was generally not observed in the sensitivity analyses.

3.0 PHYSICAL DESIGN CONSIDERATIONS

Two key physical factors considered for cap design were geotechnical stability and erosion protection. The cap must be structurally stable, which requires analysis of geotechnical conditions presented in the GDTM (Volume I, Appendix I). Additionally, an EPL is necessary to prevent damage to the CIL. A preliminary analysis was presented in Draft 50% RD (HGL, 2025b). This CDTM describes climate change evaluations, bank erosion protection, and 90% RD post-construction elevations. Sections 3.1 to 3.7 describe the hydrodynamic modeling and analysis for various forces in SIB. Section 3.8 presents Pre-Final 90% RD erosion protection requirements.

3.1. RIVER CURRENTS IN SWAN ISLAND BASIN

Erosive forces created by river currents during a 100-year flood were evaluated, including climate change considerations in the form of potential increases in river discharge and sea level rise. The inclusion of climate change effects in river hydrodynamics (for the purpose of erosion protection) requires an understanding of sea level rise effects at the Project Area and increased discharges. The United States Geological Survey (USGS) model of the Columbia and Willamette Rivers (Wherry et al., 2018), developed to analyze sea level rise effects, was executed to provide local boundary conditions for use with the SIB validated nested river model described in the Cap Evaluation Technical Memorandum (HGL, 2025a).

3.1.1. Summary of USGS Climate Change Model and Simulations (Work by Others)

The USGS developed a hydrodynamic model application using the Delft3D Flexible Mesh (Deltares, 2023) modeling platform to simulate the effects of plausible extreme high water during the 2030 to 2059 period. The USGS included the Columbia River from the Pacific Ocean to Bonneville Dam at RM 145 in their model. The USGS also included the Willamette River from the Columbia River confluence to Willamette Falls at RM 26.2 in their model. The USGS included

five upstream river boundaries and one downstream ocean tidal boundary in their model. The USGS calibrated their model for two historical periods: (1) January 15 to February 28, 1996, and (2) April 12 to July 12, 1997.

Future conditions simulated by the USGS in their model were based on climate science data developed by the U.S. Army Corps of Engineers (USACE) and others. These conditions included future streamflow and coastal ocean water levels. The hypothetical, extreme but plausible, upstream boundary was developed by the USGS by scaling up the hydrographs from the 1996 flood. The USGS determined scaling factors by comparing the peak flow rankings determined from flood frequency analyses of historical unregulated periods and 2040s simulated unregulated winter streamflow. The comparison resulted in the USGS scaling up the Columbia River hydrograph by 40 percent and scaling up the Willamette River, Sandy, Lewis, and Cowlitz River hydrographs by 20 percent in their model.

The water surface elevations imposed at the Pacific Ocean Boundary comprise three parts: (1) mean sea level, (2) storm surge deviations from mean sea level, and (3) deviations from mean sea level because of astronomical tides. The following low, intermediate, and high scenarios were considered for projections of future changes in mean sea level: 0.0 meter (USACE low scenario for sea level rise anticipated by the year 2040), 0.25 meter (USACE intermediate scenario for sea level rise anticipated by the year 2094), and 1.0 meter (USACE high scenario for sea level rise anticipated by the year 2088).

All scenarios described above were simulated using the USGS model as part of 90% RD, to provide a full range of conditions that would encompass worst-case design velocities for cap design. The results of the USGS model included water levels and discharges at all locations in the domain from the Pacific Ocean to the upstream boundaries at Bonneville Dam/Willamette Falls. These modeling results were used as boundary conditions for local 3D hydrodynamic modeling simulations using the SIB validated nested 3D model (HGL, 2025b).

3.1.2. SIB Nested River Model Simulations with USGS Climate Change Model Boundary Conditions

The SIB validated nested model (structured Delft3Dv4; HGL, 2025b) was employed to estimate bed shear stress and velocity at SIB, while considering the effects of climate change. Boundary conditions for the SIB validated nested model included daily inflow hydrographs and water levels for both the upstream and downstream sections of the Willamette River, taken from results of the USGS Climate Change Model. The upstream conditions were developed using hydrographs from the USGS climate change model boundary conditions (SLC Scenarios). Water levels at the downstream end of the SIB validated nested model were obtained by executing the USGS model described above and extracting time histories.

Maximum velocities in the SIB occurred at the interface with the main river. The maximum near-bed velocity in SIB of 6.9 ft per second resulted from the SLC of 0 ft (0.0 meter) scenario, which is approximately 3 percent higher than the maximum near-bed velocity for the SLC of 3 ft (1.0 meter) scenario. Therefore, the future flood event with increased discharges, but without any sea level rise, generates the largest bed shear stress in the project area (approximately 6.1 Pascals [Pa]). Figure 3-1 shows the maximum bed shear stress values from the river modeling simulations, to be

used in cap erosion protection design for all three SLC Scenarios. The shear stresses from river currents, even considering increased river discharges and sea level rise, only control cap erosion protection design in a very small portion of SIB on the main river. These bed shear stresses were added to the overall maximum bed shear stress data from all hydrodynamic forces, and material size requirements were calculated (see Section 3.7.1).

3.2. WIND-WAVES

Wind-waves were evaluated and simulated for 100-year wind conditions during the Draft 50% RD (HGL, 2025b). The inputs for this memorandum were consistent with those in the Draft 50% RD except for the elevation surface used in the model, which represented post-construction conditions in the Pre-Final 90% RD.

Wave conditions were analyzed at various transects around SIB. The largest waves were predicted around the entrance to SIB, which is exposed to longer fetches within the Willamette River. Logically the smallest wave heights were predicted at the head of the SIB. Near Vigorous Dry Dock along the Willamette River, significant wave heights reach up to 2.7 ft with peak periods of 3.2 seconds. Near the entrance of the basin, at U.S. Coast Guard Pier, significant wave heights reach up to 2.4 ft and peak periods of 2.8 seconds. Midway through SIB, at the Port of Portland Dredge Base, significant wave heights reach up to 1.6 ft and peak periods of 2.8 seconds. Significant wave heights reach only 1.1 ft and peak periods of 1.9 seconds at the Swan Island Boat Ramp at the head of the SIB.

Figure 3-2 shows the maximum 100-year significant wave heights during 100-year winds from all directions. Figure 3-2 was generated by finding the largest wave height in each grid cell from all the different simulations with varying wind directions. No substantial changes in wave conditions resulted from those predicted during the BODR (HGL, 2024b), since SIB is relatively deep in comparison to wind-wave heights. Shear stresses from waves were calculated on the slopes, although shear stresses were not used in the analysis of slope protection design (design methods for slope protection use wave parameters, not shear stresses). The wave-induced shear stresses, which are consistent with prior calculations, are included in the combined bed shear stress model, and are clearly visible along the shoreline (see Section 3.7.1).

As previously noted in the Draft 50% RD, vessel wakes do not control erosion protection design anywhere in SIB (HGL, 2025b) and were not considered further in the Pre-Final 90% RD.

3.3. PROPELLER WASH

High-frequency (30-second) Automatic Information System (AIS) data collection was commissioned for the SIB and a portion of the river surrounding the SIB from February 21 to May 27, 2022 (RDWP; HGL, 2025a). Consistent with Draft 50% RD (HGL, 2025b), these data were used to model propeller wash (prop wash) from all vessel traffic, resulting in a bed shear stress map suitable for conceptually sizing erosion protection materials.

During Pre-Final 90% RD, this analysis was updated using the same methodology, but with revised input data and more conservative assumptions. A post-construction elevation surface (after dredging and capping) was used, rather than the existing riverbed elevations. In some areas, this resulted in shallower water and more potential for prop wash to induce erosive forces on the cap.

The same vessel traffic was assumed in the analysis, since the prediction of future vessel characteristics is not feasible. However, additional conservatism was included by assuming that all vessels utilize 100 percent of the applied power in the prop wash calculations. This approach is consistent with, but more conservative than, recommendations in the Remedial Investigation/ Feasibility Study (RI/FS; EPA, 2016). Further modifications have been made through refinement of vessel traffic data such as confirming realistic underkeel clearances during the actual transits.

Bottom velocity was computed on the riverbed (unified elevation model) with time-varying river water levels at every 3.2 ft (1 meter) along each passing vessel route. Bottom velocities were computed on the riverbed using the post-construction surface elevations from the 90% RD. Bed shear stress was computed using near-bed velocity and shear stress according to Maynord (2000). Results indicate that prop wash generates maximum bed shear stresses of approximately 60 Pa in the main navigation areas when assuming 100 percent applied power for all vessels (see Figure 3-3). An example bed shear stress calculation is also shown in Figure 3-3 (inset) for a single vessel position. These bed shear stresses were added to the overall maximum bed shear stress data from all hydrodynamic forces, and material size requirements were calculated.

3.4. DRY DOCK ACTIVITIES

Dry dock operations were analyzed and documented in the Cap Evaluation Technical Memorandum (HGL, 2025a), including raising and lowering of the dry docks, and ballast water dewatering (water jet discharges). During Pre-Final 90% RD, this analysis was updated using the same methodology and input data, but a post-construction surface (elevations after proposed dredging and capping) was inserted. While the position of the dry docks in the previous analysis was determined based on the shallowest point in the existing bathymetry, the updated bathymetry with the post-construction surface allowed the dry docks to be positioned at their intended navigation depths, with 1-ft (0.3-meter) clearance above the bed (cap). This assumption results in more of the side slopes of the dredge cut being exposed to the dewatering jets. The simulated raising and lowering of the dry docks that were performed during the BODR resulted in negligible bottom shear stresses; therefore, these simulations were not repeated for the Pre-Final 90% RD.

Figure 3-4 shows peak bed shear stresses from all simulations performed for all dry docks. Shear stresses resulting from bottom velocities imposed by dry dock operations were computed in the Draft 50% RD and Pre-Final 90% RD in a slightly different manner (using updated bottom material roughness) more consistent with shear stress calculations for river currents, which govern erosion protection design in the area. Ballast water intake/discharge jets are likely to impinge on the slopes of the dredge cuts and bulkheads and could also interact with other dry docks if they happen to be in the lowered position at the same time. Dewatering jets would cause peak bed shear stress of approximately 3.6 Pa on the dredged slope on the south side of Vigorous Dry Dock. At Dry Dock 5 the dewatering jets would result in a peak bed shear of 0.7 Pa directly below the dry dock, and up to 1.9 Pa along the dredged slope east of the dry dock. Dry Dock 3 operations do not generate significant bed shear stresses. These shear stresses were combined with the peak shear stresses Project Area-wide from other physical processes and used for erosion protection design.

3.5. OUTFALLS

This section contains physical design considerations as they pertain to City of Portland (City) outfalls in Section 3.5.1, and non-City outfalls in Section 3.5.2.

3.5.1. City Outfalls

Erosion protection requirements around outfalls are the most robust of any location in SIB. During peak rainfalls, outfall discharges result in large water velocities and bed shear stresses, which are presently resisted by deteriorated riprap and/or concrete headwalls surrounding the outfalls. Discharges were estimated previously during the BODR (HGL, 2024b) using the Pacific Coast Stormwater Management Manual (PCSWMM) stormwater system model (advanced modeling software for EPA Stormwater Management Manual (SWMM) 5 stormwater, wastewater, and watershed systems), which was created to represent the City outfalls.

The analysis included 100-year flows, and climate change-related increases in peak rainfall intensity. 100-year outfall flows were re-evaluated, because other data sources are relatively outdated and under-conservative (e.g., NOAA Precipitation Atlas). Extreme value analysis was performed using data from the 7-year time history of discharges from PCSWMM, using a Fisher-Tippet Type I statistical distribution that best fit the annual discharge maxima.

The time history of discharge was relatively short for use in preparation of 100-year predictions. Therefore, additional safety factors were incorporated into the scour protection design (see Section 3.7). Increased rainfall intensity to represent Year 2100 was taken from the Climate Impacts Group at the University of Washington. To project to the Year 2100 (Climate Impacts Group data only extend to 2080), a polynomial fit was applied to the available rainfall intensity future prediction data. Rainfall intensity is estimated to increase by 83 percent by the Year 2100. The polynomial fit quality is further discussed during the discussion of the outfall velocities below.

The 100-yr discharges were scaled linearly to incorporate peak rainfall intensity increases under climate change. The PCSWMM modeling was not repeated for the higher rainfall intensity, since the drainage areas are small and changes in peak rainfall intensity correlate well with changes in peak outfall discharges. Future changes in temperature, evaporation, and wind were not considered since the ultimate goal of the analysis is concrete mattress scour protection design, for which these factors are negligible.

The computational fluid dynamics (CFD) model (Flow3D) was used to simulate M1, M2, M3, S1, S2 100-year outfall flows for the Year 2100. Computed peak 100-year flows in the Year 2100 were 413 cubic feet per second (cfs), 405 cfs, 315 cfs, 70 cfs, and 79 cfs, respectively. The CFD model was used to simulate discharges at a conservative low river water level of -0.6 ft Columbia River Datum CRD (4.7 ft NAVD88), which results in higher near-bed velocities than higher water levels. This water level was the lowest observed water level in the river from 2007 to 2023. Exit velocities were computed using Manning's equation and pipe system details documented in the Draft 50% RD CDTM (HGL, 2025b).

Figure 3-5 shows the maximum 100-year velocities predicted in the CFD model for City Outfalls M1, M2, M3, and S2, including climate change effects. Figure 3-5 (bottom left) also shows the

polynomial fit used to determine the estimated Year 2100 rainfall intensity; the polynomial shows an excellent fit to the University of Washington data, indicating a reliable estimate for design. Figure 3-6 shows the maximum bed shear stresses computed during the simulations, which have not changed significantly during the analysis except for climate change modifications. City Outfall S1 was not considered at this time pending updates to the RD at Lagoon Wharf, because resulting hydrodynamics or scour protection requirements for Outfall S-1 depend on slope modifications under the wharf and/or outfall discharge location. Peak velocities up to 30 ft per second were identified for the larger outfalls (M1, M2) and lower velocities were identified for the smaller outfalls (M3, S2). Due to the high velocities predicted in front of the outfalls, typical rock protection was deemed impractical. The 90% RD includes scour protection in the form of cast-in-place, fabric-formed concrete mattresses in relatively small, localized areas in front of City Outfalls M1, M2, M3, and S2. Scour protection at City Outfall S1 is not included in Pre-Final 90% RD.

3.5.2. Non-City Outfalls

Non-City outfalls are anticipated to be extended through any increased bank elevation areas, and discharge near top of bank. These outfalls are significantly smaller and require less robust armor protection.

3.6. RAINFALL RUNOFF

As compared to the conclusions outlined in Draft 50% RD, rainfall runoff is no longer a potential cap design criterion. Runoff from upland areas (above the Project Area boundary) will be controlled and directed to outfalls. All riverbanks will be stabilized, protected, and/or remediated. Wind-waves govern material stability on banks where rainfall runoff is active. However, rainfall-induced shear stresses were combined with the peak shear stresses Project Area-wide from other physical processes. Upland stormwater runoff onto riverbanks is precluded through stormwater controls.

3.7. MATERIAL STABILITY REQUIREMENTS

Material stability requirements were evaluated for in-water cap armor (Section 3.7.1), riverbank armoring required at steep slopes (Section 3.7.2), and for areas around City outfalls needing additional scouring considerations (Section 3.7.3).

3.7.1. In-Water Cap Armor

For in-water cap erosion protection (i.e., caps at the head of the basin and main basin outside of riverbanks), maximum bed shear stresses from all physical design considerations and related hydrodynamic processes listed above, except the City Outfalls, were used to identify stable grain sizes. A dynamic stability approach to EPL design (perhaps with larger thickness) may result in lower material sizes and overall costs, while remaining protective of the chemical isolation layer.

The Shields parameter was calculated using the maximum bed shear stresses from all considered hydrodynamic effects. The Shields parameter quantifies the ratio of the fluid force acting on a sediment particle to the gravitational force holding the particle in place. An empirical equation for initiation of motion (movement of particles along the bed) is given by Soulsby (1997), which

calculates the critical Shields parameter as a function of particle diameter. If the Shields parameter is greater than the critical Shields parameter, surface particle movement is likely to occur. The critical Shields parameter was also modified to account for bed slope effects and relative shear stress directions using a force balance equation (Soulsby, 1997). Stable median grain diameter was then calculated such that the shields parameter calculated using the design bed shear stresses did not exceed the modified critical Shields parameter.

Figure 3-7 shows the Pre-Final 90% RD combined bed shear stress map, including all hydrodynamic forces Project Area-wide, except rainfall runoff. The shear stress map has minor changes made relative to prior versions due to improvements in vessel traffic data sources and changes in outfall discharges noted in this CDTM. Figure 3-8 shows the median grain sizes of material suitable for in-water cap erosion protection if pure static stability of the surface materials is required, based on bed shear stress. The map of stable grain sizes excludes wave effects, outfall flows, and rainfall runoff, since bed shear stress is not used for the design of slope protection for these forces. Static stability of the surface materials in the EPL is not necessarily required to protect the CIL, if the EPL has sufficient thickness to accommodate a certain level of surface material dynamic equilibrium.

The Pre-Final 90% RD specifies material types based on both elevation (to comply with habitat requirements), estimated bed shear stresses, and significant additional conservatism to account for future uncertainties in future maritime operations in SIB. These erosion protection requirements are applicable to the EPL above the CIL. The habitat layer surface material is expected to periodically mobilize under propeller wash and other forces, but is not anticipated to lose substantial thickness due to spatial variability of the forces. It is anticipated that periodic maintenance of the habitat layer may be required in localized areas.

3.7.2. Bank Protection Armor

Riverbank armoring in the form of rock revetments is required in some areas due to steep slopes and relatively energetic wave conditions, as shown in Section 3.2. In most areas, the proposed armoring is intended to replace existing armoring after slope remediation. Van Der Meer (CIRIA, 2007 and Battjes et al., 2000) shallow water calculations were utilized to determine the minimum armor stone size requirements. The formulation considers parameters including significant wave height and peak wave period, slope, number of incident waves to be considered during a storm, and structure permeability. These parameters were developed for each facility in the SIB Project Area, and minimum armor stone median diameters were calculated.

Table 3-1 shows a summary of the assumed rock slope, wave parameters, and minimum stable median stone diameter used in the Pre-Final 90% RD. Two armor stone median diameters were selected: 12 inch (30 cm) and 8 inch (20 cm). The 12-inch median armor stone diameter was specified for areas nearest the main river (e.g., shipyard), and properties where wind-waves from the main river penetrate to the shoreline (e.g., U.S. Coast Guard). The 8-inch median armor stone diameter was prescribed in the interior of SIB in less energetic areas.

3.7.3. City Outfall Scour Protection

City Outfalls discharge at high velocity near the in-water cap, which has more mobile erosion protection materials (e.g., habitat mix) in shallow water. As noted above, due to high discharge velocities, cast-in-place fabric-formed concrete mattresses were designed for the 90% RD. Mattress design at each City Outfall was developed using modeling efforts discussed in Section 3.5.

The critical shear stress for initiation of motion for the habitat mix surrounding some of the mattresses (approximately less than 2.5-inch rounded gravel) was calculated to be 43 Pa, using Soulsby (1997). Using the spatial distribution of shear stresses in the model results at each City Outfall, mattress extents were designed to cover areas with shear stresses greater than 43 Pa. Mattress thicknesses were calculated using Hawkswood (2023), based generally on design velocity and mattress geometry information. To account for the relatively short time history of discharge used to predict 100-year discharge values, conservative values were used for mattress thickness design parameters such as the mattress surface undulation factor (I_Q) and the stability coefficient for concrete mattresses (C_F). The I_Q was assumed to be 1.15 which is the maximum value to be used for "low surface undulation" (Hawkswood, 2023). Mattresses with low surface undulation are preferred as they are subject to lower suction loads and distribute loading better (Hawkswood, 2023). The stability coefficient (CF) was assumed to be 0.19, which represents a high stability coefficient (Hawkswood, 2023). Both parameters selected resulted in a larger mattress thickness to ensure stability based on limited discharge data. PIANC (2015) also includes mattress stability formulations but recommends the use of Hawkswood-type formulations for design of in-situ (cast-in-place) concrete protection types.

While sufficient conservatism is present in the stable concrete mattress thicknesses noted here, practical design considerations for the mattresses have resulted in an increase in thickness for all mattresses to 24 inches. This allows the mattress to be installed on top of bedding stone, while the top surface remains flush with the top of the surrounding armor stone (or cap, in some areas). In addition, mattress extents were slightly increased in different dimensions for better inclusion into the slope design.

Table 3-2 shows a summary of the design velocities and computed minimum concrete mattress thicknesses at City Outfalls M1, M2, M3, and S2 (note: during 90% RD, all mattress thicknesses have been increased to 24 inch). City Outfall S1 was not evaluated in the mattress design because a mattress is not proposed (or required) under Lagoon Wharf.

3.7.4. Non-City Outfall Scour Protection

Local protection has been developed in the form of small, erosion-resistant drainage channels from each outfall discharge locations down the slope to the revetment areas. The drainage channels have been developed based on City specifications (City of Portland, 2025). Details can be found in the City of Portland Stormwater Management Manual, Appendix B, Section B.3.2. Rock specified for the drainage channels following City guidelines will be approximately 4 to 8-inch angular rock. The channel dimensions were specified according to City guidelines.

3.8. EROSION PROTECTION LAYER ASSIGNMENT

The two types of EPL in areas outside the revetment zone (Figure 1-1) consist of 2 ft (60 cm) of materials as specified in Section 35 37 10 (Engineered Caps, Volume III, Appendix S) and shown in Capping Drawings (Volume III, Appendix T). Cap Type 1 comprises 2 ft of habitat gravel on top of the CIL. Cap Type 2 consists of 18 inches of approximately 3-inch median diameter rock for erosion protection, and 6 inches of habitat layer (unamended coarse sand) on top of the rock for habitat improvement. Capping in revetment zones consists of a rock revetment (stone protection system) with 2 ft of armor stone (either 8-inch or 12-inch median diameter angular rock) placed over 1 ft of bedding stone (3-in median diameter angular rock). On slopes 3H:1V or flatter, less than 2-inch rounded gravel will also be placed on top of the revetment to improve habitat quality. Complete riverbank design specifications, including revegetation considerations and revetment details, are provided in the Drawings (Volume III, Appendix T) and RDTM (Volume I, Appendix D).

4.0 AREA-SPECIFIC CAP ALTERNATIVE ASSIGNMENT

Area-specific cap alternative assignment was completed using a cap assignment matrix that systematically evaluated the protective capability of 11 CIL alternatives (detailed in Section 2, Tables 2-3a and 2-3c) against CU area-specific sediment concentrations described in Section 1.1. The matrix analyzed each of the 27 COCs driving cap design in each RCU and CCU, then assigned the minimum protective alternative for each analyte within each CU, if that analyte exceeded CUL (otherwise, “No Cap Needed” was assigned). After evaluating all assigned alternatives, the matrix identified the most protective alternative for each CU to ensure containment of all analytes. The matrix incorporated additional design considerations into these assignments, as described in Section 4.1, before generating the final cap alternative assignments for each CU, described in Section 4.2.

4.1. CAP ALTERNATIVE ASSIGNMENT CONSIDERATIONS

Cap alternative assignment included the following special considerations:

- Riverbanks and sediment grid cells adjacent to riverbanks within revetment zone had Tektoseal alternatives assigned to them as the preferred remedial assignment (as compared to GAC amended sand), if Tektoseal is protective for all analytes. This consideration was driven by constructability consideration which determined that placement of Tektoseal is preferred to placement of loose GAC-amended sand on a steep slope.

- For CCUs outside of the revetment zone, 1 ft of amended sand was selected instead of 6 inches of amended sand due to constructability considerations, mainly due to tolerance needed for placement of a thin cap. As seen in Table 4-1 and on Figure 4-1, this applied to 20 CCUs.

- If cores didn’t have sufficient data to assign a protective alternative (e.g., due to dredging removing the analyte concentrations that would drive the design as seen in the Attachment A figures), the adjacent most protective alternative assigned was applied to that cell for

continuity and conservative capping approach. As seen in Table 4-1 and in Figure 4-1, this applied to five CCUs (CCU 93, CCU 95, CCU 103, CCU 104, and CCU 107).

4.2. FINAL CAP ALTERNATIVE ASSIGNMENTS

As seen in Figure 4-1 and Table 4-1, cap alternative assignments were determined for 107 CCUs and 30 RCUs. Two CCUs (CCU 5 and CCU 84) didn't need caps because their maximum sediment concentrations were below CULs. Out of 11 alternatives (described in Section 2.0), Cap Design Alternatives 1, 2, 3, 7, and 11 were selected for selected constructible concepts, alongside erosion protection layer assignments (Section 3.8). These alternatives were assigned to the minimum constructible cap designs as shown in Figure 4-2 and comprise:

- **Selected Constructible Alternative A:** 1 ft (30 cm) of unamended sand with overlying 2 ft (60 cm) Cap Type 1.
- **Selected Constructible Alternative B:** 1 foot (30 cm) of 5 percent GAC-amended sand with overlying 2 ft (60 cm) Cap Type 2.
- **Selected Constructible Alternative C:** 1 foot (30 cm) of 5 percent GAC-amended sand with overlying 2 ft (60 cm) Cap Type 1.
- **Selected Constructible Alternative D**: 6 inches of 5 percent GAC-amended sand with overlying 3 ft (90 cm) of stone protection system, including 2 ft (60 cm) of armor and 1 ft (30 cm) of bedding stone.
- **Selected Constructible Alternative E**: 1 foot (30 cm) of 5 percent GAC-amended sand with overlying 3 ft (90 cm) of stone protection system, including 2 ft (60cm) of armor and 1 ft (30 cm) of bedding stone.
- **Selected Constructible Alternative F**: 0.8 inches (2 cm) of Tektoseal-AC with overlying 3 ft (90 cm) of stone protection system in revetment zones, including 2 ft (60 cm) of armor and 1 ft (30 cm) of bedding stone.
- **Selected Constructible Alternative G**: 1.6 inches (4 cm) of Tektoseal-AC with overlying 3 ft (90 cm) of stone protection system in revetment zones, including 2 ft (60 cm) of armor and 1 ft (30 cm) of bedding stone

Minimum constructible protective alternative assignment includes:

- Selected Constructible Alternative A assigned to a single CCU – CCU 92.
- Selected Constructible Alternative B assigned to 71 CCUs. This includes 18 CCUs that were assigned 1 foot of 5 percent GAC-amended sand instead of 6 inches of 5 percent GAC-amended sand due to constructability considerations.
- Selected Constructible Alternative C assigned to 11 CCUs. This includes two CCUs that were assigned 1 foot of 5 percent GAC-amended sand instead of 6 inches of 5 percent GAC-amended sand due to constructability considerations.
- Selected Constructible Alternative D assigned to five CCUs – CCU 1 through CCU 3, CCU 8, and CCU 9.

- Selected Constructible Alternative E assigned to three CCUs – CCU 4, CCU 10, and CCU 62.
- Selected Constructible Alternative F assigned to seven CCUs and 11 RCUs.
- Selected Constructible Alternative G assigned to nine CCUs and 19 RCUs.

Drawings (Volume III, Appendix T) include additional details related to cap design:

- Transitions from cap design in CCU to RCUs
- Transitions from CCUs to DCUs (see Figure 4-1 and Table 1-1).
- Revegetation on top of EPL, if applicable.

5.0 REFERENCES

Battjes J.A. and Groenendijk H.,W. 2000. Wave height distributions on shallow foreshores. Coastal Engineering 40 2000.161–182

CDM Smith, 2025. Final Supplemental Pre-Design Investigation Evaluation Report. Prepared for U.S. Environmental Protection Agency. Contract 68HE0318D0003. Task order 68HE0720F0078. April.

City of Portland, 2025. City of Portland Stormwater Management Manual. Appendix B, Section B.3.2.

Deltares, 2023. Deflt3D-Flow User Manual. Simulation of multi-dimensional hydrodynamic flows and transport phenomena, including sediments. Version:4.05 Revision:78731, at URL https://content.oss.deltares.nl/delft3d4/Delft3D-FLOW_User_Manual.pdf/. November 5.

Goring CA, 1962. Control of nitrification by 2-chloro-6-(trichloro-methyl) pyridine. Soil Sci 93: 211–218.

Hawkswood, M., Hawkswood, G., and Groom, J. 2023. Berth Scour Protection Design for Azipods, Falling Hinged Edges & Maintenance Dredging, PIANC America 2023, Fort Lauderdale – USA.

HydroGeoLogic, Inc. (HGL), 2022. Pre-Design Investigation Work Plan, Revision 3. Preliminary Remedial Design Services, Swan Island Basin Project Area, Portland Harbor Superfund Site, Portland, Multnomah County, Oregon. Revision 3. May.

HGL, 2024a. Pre-Design Investigation Evaluation Report, Revision 2. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. December.

HGL, 2024b. Basis of Design Report, Revision 1. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. November.

HGL, 2025a. Remedial Design Work Plan, Revision 1. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. February.

HGL, 2025b. Design Criteria Report Draft 50% Remedial Design. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. March.

Interstate Technology & Regulatory Council (ITRC), 2023. Sediment Cap Chemical Isolation Guidance (SD-1). Washington, D.C.: Interstate Technology & Regulatory Council, at URL www.itrcweb.org.

Karickhoff S, Brown D, Scott T., 1979. Sorption of hydrophobic pollutants on natural sediments. Water Res 13:241–248.

Lampert, D. J., & Reible, D., 2009. An analytical modeling approach for evaluation of capping of contaminated sediments. Soil and Sediment Contamination, 18(4), 470–488, at URL https://doi.org/10.1080/15320380902962387.

Maynord, S. T., 2000. Physical forces near commercial tows. ENV Report 19. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Palermo, M.R., Clausner, J.E., Rollings, M.P., Williams, G.L., Myers, T.E., Fredette, T.J., and Randall, R.E., 1998. Guidance for subaqueous dredged material capping. Technical Report DOER-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, at URL https://semspub.epa.gov/work/HQ/189671.pdf.

Patnukao, P., Kongsuwan, A., & Pavasant, P. 2008. Batch studies of adsorption of copper and lead on activated carbon from Eucalyptus camaldulensis Dehn. bark. Journal of Environmental Sciences, 20(9), 1028–1034. at URL https://doi.org/10.1016/S1001-0742(08)62145-2

Reible, D. D., 2014. Sediment and Contaminant Processes. In D. D. Reible (Ed.), Processes, Assessment and Remediation of Contaminated Sediments (pp. 13–24). Springer, at URL https://doi.org/10.1007/978-1-4614-6726-7_2.

Reible, D. D., 2023. CapSIM 4.2, at URL https://www.depts.ttu.edu/ceweb/research/reiblesgroup/.

Shen X., Lampert D., Ogle S., Reible D., 2018. A Software Tool for Simulating Contaminant Transport and Remedial Effectiveness in Sediment Environments. Environ. Model. Softw. 2018;109:104–113. doi: 10.1016/j.envsoft.2018.08.014. – DOI, https://www.depts.ttu.edu/ceweb/research/reiblesgroup/docs/Research_paper.pdf.

Soulsby, R. (1997) Dynamics of Marine Sands: A Manual for Practical Applications. Thomas Telford, London.

TIG 2023, Sediment Cap Design Report for the Bagnoli-Coroglio Site, August 2023.

U.S. Environmental Protection Agency (EPA), 2016. Portland Harbor RI/FS, Final Remedial Investigation Report, Portland Oregon. U.S. Environmental Protection Agency Region 10, Seattle, Washington. February 8.

EPA, 2017. Record of Decision, Portland Harbor Superfund Site, Portland Oregon. United States Environmental Protection Agency Region 10, Seattle, Washington. January.

EPA, 2020. Errata #2 for Portland Harbor Superfund Site Record of Decision ROD Table 17. Memorandum from Sean Sheldrake to Portland Harbor Site File. January 14.

EPA, 2021a. Administrative Settlement Agreement and Order on Consent for Remedial Design. Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10. January 20.

EPA, 2021b. Remedial Design Guidelines and Considerations, Portland Harbor Superfund Site. Portland, Oregon. April 23.

EPA, 2022. Errata #3 for Portland Harbor Superfund Site Record of Decision, Table 6 and Table 21, at URL https://semspub.epa.gov/work/10/100416743.pdf.

EPA, 2025a. Cap Design Criteria at Portland Harbor. Email from the EPA Region 10 Remedial Project Manager to site performing parties. February 14.

EPA, 2025b. Portland Harbor Superfund Site Monitoring Guidelines. Portland Harbor Superfund Site. Portland, Oregon. April 18.

EPA, 2025c. Guidelines for Reporting Porewater Studies Using Polymeric Passive Samplers. Portland Harbor Superfund Site. Portland, Oregon. July 9.

EPA, 2025d. DRAFT Guidelines for Riverbank Characterizations and Evaluations at the Portland Harbor Superfund Site. Portland Harbor Superfund Site. Portland, Oregon. July 14.

EPA, 2025e Errata #4 for Portland Harbor Superfund Site Record of Decision. Portland Harbor Superfund Site. Portland, Oregon. September 12.

PIANC, 2015. *Report 180: Guidelines for Protecting Berthing Structures from Scour Caused by Ships*.

Wherry, S.A., Wood, T.M., Moritz, H.R. and Duffy, K.B., 2019. Assessment of Columbia and Willamette River flood stage on the Columbia Corridor Levee System at Portland, Oregon, in a future climate. Prepared in cooperation with U.S. Army Corps of Engineers and Levee Ready Columbia, Scientific Investigation Report 2018-5161

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Table 1-1
Certification Units
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Area	CU	Acres	Dredge Before Capping
Sediment	CCU 1	0.973	Yes
Sediment	CCU 2	0.977	No
Sediment	CCU 3	0.977	Yes
Sediment	CCU 4	0.977	Yes
Sediment	CCU 5	0.977	Yes
Sediment	CCU 6	0.978	Yes
Sediment	CCU 7	0.976	Yes
Sediment	CCU 8	0.977	Yes
Sediment	CCU 9	0.977	No
Sediment	CCU 10	0.976	Yes
Sediment	CCU 11	0.986	Yes
Sediment	CCU 12	0.921	No
Sediment	CCU 13	0.921	No
Sediment	CCU 14	0.921	No
Sediment	CCU 15	0.921	No
Sediment	CCU 16	0.921	No
Sediment	CCU 17	0.909	No
Sediment	CCU 18	0.982	Yes
Sediment	CCU 19	0.983	Yes
Sediment	CCU 20	0.983	Yes
Sediment	CCU 21	0.983	Yes
Sediment	CCU 22	0.983	Yes
Sediment	CCU 23	0.983	Yes
Sediment	CCU 24	0.983	Yes
Sediment	CCU 25	0.983	Yes
Sediment	CCU 26	0.983	Yes
Sediment	CCU 27	0.983	Yes
Sediment	CCU 28	0.983	Yes
Sediment	CCU 29	0.983	Yes
Sediment	CCU 30	0.978	Yes
Sediment	CCU 31	0.981	Yes
Sediment	CCU 32	0.863	Yes
Sediment	CCU 33	0.984	No
Sediment	CCU 34	0.992	No
Sediment	CCU 35	0.992	No
Sediment	CCU 36	0.992	No
Sediment	CCU 37	0.992	No
Sediment	CCU 38	0.992	No
Sediment	CCU 39	0.992	No
Sediment	CCU 40	0.992	No
Sediment	CCU 41	0.992	Yes

Table 1-1
Certification Units
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Area	CU	Acres	Dredge Before Capping
Sediment	CCU 42	0.992	No
Sediment	CCU 43	0.903	No
Sediment	CCU 44	0.997	Yes
Sediment	CCU 45	0.997	Yes
Sediment	CCU 46	0.997	Yes
Sediment	CCU 47	0.997	Yes
Sediment	CCU 48	0.993	Yes
Sediment	CCU 49	0.998	Yes
Sediment	CCU 50	0.998	Yes
Sediment	CCU 51	0.998	Yes
Sediment	CCU 52	0.998	Yes
Sediment	CCU 53	0.998	Yes
Sediment	CCU 54	0.998	Yes
Sediment	CCU 55	0.998	Yes
Sediment	CCU 56	0.998	Yes
Sediment	CCU 57	0.993	Yes
Sediment	CCU 58	0.904	No
Sediment	CCU 59	0.904	No
Sediment	CCU 60	0.904	No
Sediment	CCU 61	0.904	No
Sediment	CCU 62	0.915	No
Sediment	CCU 63	0.905	Yes
Sediment	CCU 64	0.905	Yes
Sediment	CCU 65	0.905	Yes
Sediment	CCU 66	0.905	Yes
Sediment	CCU 67	0.905	Yes
Sediment	CCU 68	0.919	Yes
Sediment	CCU 69	0.919	Yes
Sediment	CCU 70	0.919	Yes
Sediment	CCU 71	0.919	Yes
Sediment	CCU 72	0.919	Yes
Sediment	CCU 73	0.919	Yes
Sediment	CCU 74	0.919	Yes
Sediment	CCU 75	0.919	Yes
Sediment	CCU 76	0.919	Yes
Sediment	CCU 77	0.919	Yes
Sediment	CCU 78	0.919	Yes
Sediment	CCU 79	0.913	Yes
Sediment	CCU 80	0.913	Yes
Sediment	CCU 81	0.913	No
Sediment	CCU 82	0.913	No

Table 1-1
Certification Units
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Area	CU	Acres	Dredge Before Capping
Sediment	CCU 83	0.913	Yes
Sediment	CCU 84	0.913	Yes
Sediment	CCU 85	0.913	Yes
Sediment	CCU 86	0.913	No
Sediment	CCU 87	0.905	Yes
Sediment	CCU 88	0.905	Yes
Sediment	CCU 89	0.905	Yes
Sediment	CCU 90	0.905	Yes
Sediment	CCU 91	0.905	Yes
Sediment	CCU 92	0.873	Yes
Sediment	CCU 93	0.936	Yes
Sediment	CCU 94	0.734	Yes
Sediment	CCU 95	0.992	Yes
Sediment	CCU 96	0.992	Yes
Sediment	CCU 97	0.992	Yes
Sediment	CCU 98	0.992	Yes
Sediment	CCU 99	0.992	Yes
Sediment	CCU 100	0.989	Yes
Sediment	CCU 101	0.989	Yes
Sediment	CCU 102	0.980	Yes
Sediment	CCU 103	0.980	Yes
Sediment	CCU 104	0.980	Yes
Sediment	CCU 105	0.980	Yes
Sediment	CCU 106	0.986	Yes
Sediment	CCU 107	0.986	Yes
Sediment	CCU 108	0.986	Yes
Sediment	CCU 109	0.986	Yes
Dredging	DCU 1	0.986	Yes
Dredging	DCU 2	0.953	Yes
Dredging	DCU 3	0.936	Yes
Dredging	DCU 4	0.913	Yes
Dredging	DCU 5	0.889	Yes
Dredging	DCU 6	0.895	Yes
Dredging	DCU 7	0.918	Yes
Dredging	DCU 8	0.943	Yes
Dredging	DCU 9	0.949	Yes
Dredging	DCU 10	0.956	Yes
Dredging	DCU 11	0.963	Yes
Dredging	DCU 12	0.895	Yes
Dredging	DCU 13	0.900	Yes
Dredging	DCU 14	0.900	Yes

Table 1-1
Certification Units
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Area	CU	Acres	Dredge Before Capping
Dredging	DCU 15	0.900	Yes
Dredging	DCU 16	0.734	Yes
Dredging	DCU 17	0.734	Yes
Dredging	DCU 18	0.734	Yes
Dredging	DCU 19	0.877	Yes
Dredging	DCU 20	0.877	Yes
Dredging	DCU 21	0.877	Yes
Dredging	DCU 22	0.877	Yes
Dredging	DCU 23	0.877	Yes
Riverbank	RCU 1	0.480	No
Riverbank	RCU 2	0.470	No
Riverbank	RCU 3	0.484	No
Riverbank	RCU 4	0.499	No
Riverbank	RCU 5	0.499	No
Riverbank	RCU 6	0.499	No
Riverbank	RCU 7	0.490	No
Riverbank	RCU 8	0.490	No
Riverbank	RCU 9	0.490	No
Riverbank	RCU 10	0.490	No
Riverbank	RCU 11	0.490	No
Riverbank	RCU 12	0.490	No
Riverbank	RCU 13	0.490	No
Riverbank	RCU 14	0.490	No
Riverbank	RCU 15	0.490	No
Riverbank	RCU 16	0.499	No
Riverbank	RCU 17	0.499	No
Riverbank	RCU 18	0.499	No
Riverbank	RCU 19	0.457	No
Riverbank	RCU 20	0.496	No
Riverbank	RCU 21	0.496	No
Riverbank	RCU 22	0.462	No
Riverbank	RCU 23	0.462	No
Riverbank	RCU 24	0.462	No
Riverbank	RCU 25	0.462	No
Riverbank	RCU 26	0.496	No
Riverbank	RCU 27	0.186	No
Riverbank	RCU 28	0.487	No
Riverbank	RCU 29	0.495	No
Riverbank	RCU 30	0.500	No

Table 1-1
Certification Units
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:
CCU = cap certification unit
CU = certification unit
DCU = dredging certification unit
DBC = dredge before capping area
RCU = riverbank certification unit

Table 1-2
Criteria for Modeled COCs
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Chemicals Analyzed①	Sediment			Porewater	
	RAL (µg/kg)	PTW (µg/kg)	CUL (µg/kg)	CUL Equivalent* (µg/L)	Table 17 Porewater CUL* (µg/L)
1,2,3,4,7,8-HxCDF	N/A	0.4	0.0004	2.01E-09	N/A
1,2,3,7,8-PeCDD	0.0008	0.01	0.0002	3.29E-09	N/A
2,3,4,7,8-PeCDF	0.2	0.2	0.0003	2.87E-08	N/A
2,3,7,8-TCDD	0.0006	0.01	0.0002	3.37E-08	N/A
2,3,7,8-TCDF	N/A	0.6	0.000407	3.46E-09	N/A
Aldrin	N/A	N/A	2	0.0018	N/A
Arsenic	N/A	N/A	3,000	8.0	0.018
BEHP	N/A	N/A	135	0.051	N/A
Cadmium	N/A	N/A	510	0.010	0.094
Chlordanes	N/A	N/A	1.5	0.00050	N/A
Copper	N/A	N/A	359,000	6.1	2.7
DDD	160	7,050	114	0.0056	0.000031
DDE			176	0.00271	0.000018
DDT			866	0.00409	0.000022
DDx			6.1	0.000062	0.001
Dieldrin	N/A	N/A	0.07	0.000076	N/A
Diesel	N/A	N/A	320,000	146	N/A
Lead	N/A	N/A	196,000	9.8	0.54
Lindane	N/A	N/A	5	0.14	N/A
Mercury	N/A	N/A	240	0.191	N/A
Naphthalene	N/A	>140,000	N/A	N/A	12
Total cPAHS [B(a)P Eq.]	N/A	774,000	85	0.0061	0.00012
Total Dioxins/Furans (2,3,7,8-TCDD Eq.)	N/A	N/A	0.01	1.69E-06	N/A
Total PAHs	30,000	N/A	22,800	3.8	N/A
Total PCBs	75	200	9	0.000020	0.014
Tributyltin	N/A	N/A	3,080	1.7	N/A
Zinc	N/A	N/A	459,000	13	37

Notes:

* = CUL Sediment-Porewater Equilibrium Equivalent Calculation

** = comparison for informational purposes only

^ Surface water cleanup levels TEF-adjusted 2,3,7,8-TCDD eq.

> = greatear than

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

B(a)P = benzo(a)pyrene

BEHP = bis(2-ethylhexyl) phthalate

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

CUL = cleanup level

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Eq. = equivalents

HxCDF = hexachlorodibenzofuran

N/A = criteria not applicable

PAHs = polycyclic aromatic hydrocarbons

PCBs = polychlorinated biphenyls

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

PTW = principal threat waste

RAL = remedial action level

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 1	CCU 2	CCU 3	CCU 4	CCU 5	CCU 6	CCU 7
HxCDF	pg/g	29.9	29.9	12	1.16	3.4	#N/A	0.108	0.075
PeCDD	pg/g	5.14	5.14	4.21	0.329	0.61	#N/A	0.203	0.19
PeCDF	pg/g	11.5	11.5	5.19	0.892	1.1	#N/A	0.1485	0.149
Total D/F (TCDD-Eq)	pg/g	43.6	43.6	43.6	1.1	4.1439	#N/A	0.61	0.44
TCDF	pg/g	5.29	1.97	0.655	0.334	0.88	#N/A	0.299	0.213
TCDD	pg/g	1.92	1.18	0.3125	0.201	0.29	#N/A	0.2245	0.0565
Aldrin	µg/kg	0.4	0.285	0.27	0.3	0.4	#N/A	0.27	0.24
Arsenic	mg/kg	9.69	4.34	6.15	5.59	8.98	2.36	3.42	3.96
BEHP	µg/kg	1200	230	130	22	250	1.4	7	7
Cadmium	mg/kg	0.68	0.19	0.11	0.16	0.32	0.138	0.1	0.05
Copper	mg/kg	223	74.6	71.6	34.8	39	29.2	41.3	29.3
Dieldrin	µg/kg	0.55	0.28	0.24	0.55	0.4745	#N/A	0.23	0.235
Lindane	µg/kg	0.383	0.115	0.11	0.383	0.383	#N/A	0.105	0.095
Lead	mg/kg	110	30	58.3	22.4	25	5.04	9.5	4.44
Mercury	mg/kg	0.530	0.0759	0.530	0.155	0.088	0.032	0.0597	0.0321
Naphthalene	µg/kg	130	120	8.6	0.385	59	1.7	0.345	0.35
Diesel	mg/kg	1100	500	6	3.15	2.25	#N/A	4.25	3.05
Chlordanes	µg/kg	5.24	1.6	1.8	5.236	2.89	#N/A	0.44	0.395
Total cPAHs (BaP Eq)	µg/kg	510	154	114	48.3	190	0.21	20.8	0.58
DDD	µg/kg	8.08	0.96	6.60	5.40	2.89	#N/A	0.22	0.19
DDE	µg/kg	9.65	0.84	5.5	2.8	2.89	#N/A	0.27	0.24
DDT	µg/kg	10.3	3.4	10.3	4.1	2.89	#N/A	0.32	0.285
DDx	µg/kg	23.1	4.6	23.1	10.6	2.89	#N/A	0.32	0.285
Total PAHs	µg/kg	4640	1420	871	256	2200	1.7	142	5.2
Total PCBs	µg/kg	923	1.19	#N/A	43	#N/A	#N/A	1.28	0.757
TBT	µg/kg	710	53	18	0.73	0.245	#N/A	0.325	0.335
Zinc	mg/kg	382	147	86.8	82.2	180	64.2	76	54.6

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 8	CCU 9	CCU 10	CCU 11	CCU 12	CCU 13	CCU 14
HxCDF	pg/g	29.9	7.24	6.22	7.23	3.25	29.945	13.6	7.2
PeCDD	pg/g	5.14	3.2	2.35	2.51	2.6	5.141	5.14	3.5
PeCDF	pg/g	11.5	4.54	3.58	5.31	2.6	11.51	8.45	2.5
Total D/F (TCDD-Eq)	pg/g	43.6	14.5	11.8	12.5	5.9	43.555	39.3	16.997
TCDF	pg/g	5.29	1.81	2.26	0.759	0.779	5.2865	5.11	2.6
TCDD	pg/g	1.92	0.444	0.208	0.232	1.8	1.88	1.92	0.89
Aldrin	µg/kg	0.4	0.4	0.25	0.295	0.4	0.39	0.38	0.24
Arsenic	mg/kg	9.69	4.805	5.12	8.04	7.06	8.38	7.99	4.14
BEHP	µg/kg	1200	790	38	27	870	1200	1200	7
Cadmium	mg/kg	0.68	0.54	0.24	0.56	0.507	0.68	0.68	0.14
Copper	mg/kg	223	36.3	35.6	223.15	110	114	154	40.8
Dieldrin	µg/kg	0.55	0.55	0.24	0.29	0.55	0.38	0.37	0.235
Lindane	µg/kg	0.383	0.383	0.383	0.12	0.383	0.155	0.15	0.095
Lead	mg/kg	110	40.2	21.2	110	51.2	58.8	87	6.04
Mercury	mg/kg	0.530	0.111	0.157	0.231	0.275	0.375	0.5295	0.0505
Naphthalene	µg/kg	130	33.2	1.65	0.39	59	130	110	24
Diesel	mg/kg	1100	62	310	3.2	6	1100	730	2.95
Chlordanes	µg/kg	5.24	4.98	0.41	0.485	5.236	2.7	2.4	0.395
Total cPAHs (BaP Eq)	µg/kg	510	180	57.3	30.1	320	427	293	0.53
DDD	µg/kg	8.08	8.08	0.60	6.80	5.72	6.40	6.20	3.45
DDE	µg/kg	9.65	2.98	0.25	6.9	5.32	8.7	8.9	5.55
DDT	µg/kg	10.3	4.72	2.9	10.27	2.17	0.765	0.45	0.75
DDx	µg/kg	23.1	16.1	4.4	23.1	12.9	14.4	15.7	8.25
Total PAHs	µg/kg	4640	3300	453	422	2800	4260	3170	6.4
Total PCBs	µg/kg	923	#N/A	35.3	13.6	#N/A	608	900	104
TBT	µg/kg	710	0.325	2.2	11	80	520	260	370
Zinc	mg/kg	382	169	124	382	252	281	305	71.3

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 15	CCU 16	CCU 17	CCU 18	CCU 19	CCU 20	CCU 21
HxCDF	pg/g	29.9	19.4	6.2	5.79	29.9	#N/A	7.1	12.8
PeCDD	pg/g	5.14	4.94	3.57	1.9	5.141	#N/A	1.8	3.615
PeCDF	pg/g	11.5	11.5	5.31	3.4	11.51	#N/A	10.4	6.25
Total D/F (TCDD-Eq)	pg/g	43.6	38.4	21.3	12.1	43.555	#N/A	18.9	29.5
TCDF	pg/g	5.29	5.29	5.29	1.66	5.2865	#N/A	4.6	5.2865
TCDD	pg/g	1.92	1.92	1.37	1.92	1.92	#N/A	1.1	1.22
Aldrin	µg/kg	0.4	0.345	0.4	0.26	0.395	0.01755	0.36	0.4
Arsenic	mg/kg	9.69	7.73	6.4	3.3	8.77	6.7	6.11	7.75
BEHP	µg/kg	1200	720	1200	440	310	1200	760	1200
Cadmium	mg/kg	0.68	0.6	0.537	0.34	0.68	0.548	0.68	0.54
Copper	mg/kg	223	99.7	72	42.9	166	96.9	131	186
Dieldrin	µg/kg	0.55	0.335	0.55	0.25	0.55	0.02865	0.35	0.55
Lindane	µg/kg	0.383	0.383	0.383	0.105	0.345	0.04275	0.14	0.383
Lead	mg/kg	110	81.2	47	16.6	110	110	42.3	66.7
Mercury	mg/kg	0.530	0.5295	0.224	0.0831	0.5295	0.37	0.5295	0.348
Naphthalene	µg/kg	130	130	90	9.5	130	116	130	92
Diesel	mg/kg	1100	1100	470	410	1100	#N/A	1100	1100
Chlordanes	µg/kg	5.24	5.236	5.236	0.425	3.8	2.8	0.6	5.236
Total cPAHs (BaP Eq)	µg/kg	510	441	510	63.1	401	350	510	510
DDD	µg/kg	8.08	8.08	8.08	2.60	8.08	8.08	6.50	7.80
DDE	µg/kg	9.65	8.1	9.655	0.89	9.655	4.95	9.655	9
DDT	µg/kg	10.3	8.6	10.27	0.47	5.8	4.74	0.425	10.27
DDx	µg/kg	23.1	23.1	21.4	3.4	21.1	21.3	21.6	23.1
Total PAHs	µg/kg	4640	4640	4640	558	4640	4640	4640	2915
Total PCBs	µg/kg	923	923.4	271	21.7	80.6	#N/A	3.16	#N/A
TBT	µg/kg	710	410	310	710	460	#N/A	1.1	710
Zinc	mg/kg	382	257	236	97.2	382	262	279	322

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 22	CCU 23	CCU 24	CCU 25	CCU 26	CCU 27	CCU 28
HxCDF	pg/g	29.9	13.6	10.835	19.2	10.3	19.9	13	22.8
PeCDD	pg/g	5.14	4.35	5.141	3.36	2.27	4.71	1.8	3.86
PeCDF	pg/g	11.5	7.25	7.195	10.08	6.06	7.59	6.73	11.2
Total D/F (TCDD-Eq)	pg/g	43.6	36	43.555	30.1	20.6	38.2	22.9595	38.1
TCDF	pg/g	5.29	4.36	4.17	5.2865	3.7	5.2865	4.7	4.3
TCDD	pg/g	1.92	1.16	1.8765	1.67	1.7	1.39	0.829	1.41
Aldrin	µg/kg	0.4	0.4	0.32	0.4	0.4	0.36	0.33	0.355
Arsenic	mg/kg	9.69	6.63	8	7.96	8.87	9.691	9.2	8.2
BEHP	µg/kg	1200	490	1200	1200	860	1045	1200	660
Cadmium	mg/kg	0.68	0.59	0.68	0.575	0.67	0.65	0.64	0.55
Copper	mg/kg	223	123	130	126	146	168	170	120
Dieldrin	µg/kg	0.55	0.41	0.55	0.55	0.55	0.355	0.325	0.345
Lindane	µg/kg	0.383	0.165	0.32	0.383	0.383	0.145	0.13	0.383
Lead	mg/kg	110	75.3	70.5	110	79	110	93.3	74.8
Mercury	mg/kg	0.530	0.338	0.417	0.412	0.394	0.33	0.525	0.467
Naphthalene	µg/kg	130	130	130	66	130	40	29	130
Diesel	mg/kg	1100	880	1100	1100	510	4.15	910	680
Chlordanes	µg/kg	5.24	0.7	0.495	5.236	5.236	0.6	2.1	5.14
Total cPAHs (BaP Eq)	µg/kg	510	349	391	510	330	342	408	193
DDD	µg/kg	8.08	8.08	2.90	8.08	8.08	8.08	4.20	7.31
DDE	µg/kg	9.65	6.4	2.8	9.655	6.7	9.25	8.5	8.21
DDT	µg/kg	10.3	10.27	0.355	8.2	7.9	10.27	4.9	10.27
DDx	µg/kg	23.1	20.3	6	23.1	23.1	23.1	17.6	23.1
Total PAHs	µg/kg	4640	2980	3970	4640	2830	2900	3750	4640
Total PCBs	µg/kg	923	923.4	18.4	923.4	#N/A	140	761	0.0531
TBT	µg/kg	710	710	465	710	710	710	310	8.6
Zinc	mg/kg	382	279	277.5	369.5	339	373.5	360	283

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 29	CCU 30	CCU 31	CCU 32	CCU 33	CCU 34	CCU 35
HxCDF	pg/g	29.9	22.9	24.9	29.945	29.945	17.6	29.945	18.7
PeCDD	pg/g	5.14	4.87	5.141	4.4	5.141	3.42	5.141	4.79
PeCDF	pg/g	11.5	9.4	10.5	11	11.51	11.51	11.51	10.5
Total D/F (TCDD-Eq)	pg/g	43.6	41.4	39.9	40.417	43.555	30.4	43.1	37.4
TCDF	pg/g	5.29	5.18	5.2865	2.9	5.2865	5.2865	4.8	5.2865
TCDD	pg/g	1.92	1.92	1.92	1.6	1.88	1.56	1.92	1.22
Aldrin	µg/kg	0.4	0.375	0.39	0.4	0.4	0.4	0.4	0.375
Arsenic	mg/kg	9.69	7.1	8.59	9.691	9.691	7.55	9.691	8.87
BEHP	µg/kg	1200	370	1200	1200	1200	500	760	960
Cadmium	mg/kg	0.68	0.66	0.66	0.68	0.68	0.62	0.68	0.62
Copper	mg/kg	223	100	138.5	110	184	190	223.15	223.15
Dieldrin	µg/kg	0.55	0.365	0.38	0.55	0.425	0.55	0.405	0.55
Lindane	µg/kg	0.383	0.15	0.315	0.383	0.383	0.383	0.383	0.383
Lead	mg/kg	110	92.3	110	110	110	70.6	70.9	74
Mercury	mg/kg	0.530	0.5295	0.5295	0.5295	0.5295	0.47	0.492	0.5295
Naphthalene	µg/kg	130	19	21	130	16	45	90	93
Diesel	mg/kg	1100	860	810	1100	1000	1000	1100	640
Chlordanes	µg/kg	5.24	2.3	2.3	5.236	2.3	2.9	2.6	5.236
Total cPAHs (BaP Eq)	µg/kg	510	245	348	398	353	510	398	456
DDD	µg/kg	8.08	1.80	2.82	7.20	7.10	7.90	5.90	7.00
DDE	µg/kg	9.65	9.655	9.655	9.655	9.655	7.3	9.655	9.3
DDT	µg/kg	10.3	2.75	0.76	8.1	10.27	10.27	6.6	10.27
DDx	µg/kg	23.1	11.6	18.9	19.1	23.1	23.1	18.6	23.1
Total PAHs	µg/kg	4640	2026	2540	4640	2850	4640	2890	3790
Total PCBs	µg/kg	923	923	234	20.2	#N/A	509	462	923
TBT	µg/kg	710	200	710	14	710	710	710	710
Zinc	mg/kg	382	322	363	382	382	300	382	332

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 36	CCU 37	CCU 38	CCU 39	CCU 40	CCU 41	CCU 42
HxCDF	pg/g	29.9	8.1	16.8	15.4	19.3	15	16.3	18
PeCDD	pg/g	5.14	2.32	4.29	3.34	4.13	3.56	3.71	5.141
PeCDF	pg/g	11.5	6.62	8.29	7.82	10.1	8.01	11.51	8.18
Total D/F (TCDD-Eq)	pg/g	43.6	16.4	35.2	27.9	37	30.1	33.4	41.1
TCDF	pg/g	5.29	1.86	4.125	4.96	4.27	2.89	4.3	3.85
TCDD	pg/g	1.92	0.865	1.92	1.92	1.92	1.73	1.58	1.92
Aldrin	µg/kg	0.4	0.4	0.395	0.3	0.335	0.4	0.4	0.4
Arsenic	mg/kg	9.69	7.33	5.72	5.47	6.43	8.2	9.691	8.2
BEHP	µg/kg	1200	200	8.5	150	1200	390	1200	725
Cadmium	mg/kg	0.68	0.43	0.375	0.42	0.68	0.43	0.59	0.675
Copper	mg/kg	223	114	77.2	97.1	118	120	150	110
Dieldrin	µg/kg	0.55	0.55	0.55	0.5	0.325	0.55	0.55	0.39
Lindane	µg/kg	0.383	0.383	0.383	0.12	0.383	0.383	0.383	0.16
Lead	mg/kg	110	56.8	54.8	110	69.4	53.6	110	94.75
Mercury	mg/kg	0.530	0.449	0.408	0.5295	0.456	0.452	0.461	0.398
Naphthalene	µg/kg	130	130	130	3.65	130	14	130	26
Diesel	mg/kg	1100	580	580	570	900	740	710	580
Chlordanes	µg/kg	5.24	2.1	5.236	2	5.236	0.5	5.236	2.2
Total cPAHs (BaP Eq)	µg/kg	510	476	221	229	264	296	510	294
DDD	µg/kg	8.08	8.08	8.08	5.50	6.70	2.20	8.08	8.08
DDE	µg/kg	9.65	5.6	9.655	7.8	9.6	5.9	9.655	7.1
DDT	µg/kg	10.3	10.27	4.9	6	5.6	1.1	7.6	4.8
DDx	µg/kg	23.1	23.1	17.7	16.4	17.8	4.1	23.1	19.7
Total PAHs	µg/kg	4640	4640	2430	1850	2390	2010	4640	3050
Total PCBs	µg/kg	923	#N/A	188	#N/A	114	#N/A	923	923
TBT	µg/kg	710	110	660	42	230	20	165	160
Zinc	mg/kg	382	310	233.5	267	283	223	382	360.5

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 43	CCU 44	CCU 45	CCU 46	CCU 47	CCU 48	CCU 49
HxCDF	pg/g	29.9	29.945	29.945	29.945	29.945	29.945	29.945	23
PeCDD	pg/g	5.14	5.141	5.141	4.31	4.91	5.141	5.141	2.96
PeCDF	pg/g	11.5	11.51	10.5	8.96	9.87	11.51	11.51	7.19
Total D/F (TCDD-Eq)	pg/g	43.6	43.555	43.5	39.6	41.7	43.555	43.555	25.8
TCDF	pg/g	5.29	5.11	5.2865	4.16	5.2865	5.2865	5.2865	5.2865
TCDD	pg/g	1.92	1.92	1.92	1.76	1.92	1.92	1.92	1.04
Aldrin	µg/kg	0.4	0.395	0.4	0.355	0.4	0.4	0.4	0.4
Arsenic	mg/kg	9.69	9	9.691	9.691	9.691	9.691	9.691	8.58
BEHP	µg/kg	1200	1200	1200	1100	1200	690	690	660
Cadmium	mg/kg	0.68	0.67	0.68	0.68	0.68	0.68	0.68	0.63
Copper	mg/kg	223	135	140	160	165	187	166	115
Dieldrin	µg/kg	0.55	0.385	0.55	0.55	0.36	0.55	0.55	0.55
Lindane	µg/kg	0.383	0.155	0.383	0.383	0.383	0.155	0.175	0.215
Lead	mg/kg	110	110	110	65.4	80.5	85.4	82.3	63.2
Mercury	mg/kg	0.530	0.5295	0.5295	0.5295	0.5295	0.5295	0.5295	0.364
Naphthalene	µg/kg	130	8.6	110	25	130	130	130	130
Diesel	mg/kg	1100	920	4.3	1000	1100	1100	1100	1100
Chlordanes	µg/kg	5.24	2.4	2.7	5.236	4.4	2.2	2.2	1.5
Total cPAHs (BaP Eq)	µg/kg	510	269	310	510	359	510	510	510
DDD	µg/kg	8.08	5.10	4.40	7.20	7.50	8.08	8.08	6.20
DDE	µg/kg	9.65	9.655	9.655	9.655	8.3	9.655	9.655	6.3
DDT	µg/kg	10.3	1.9	2.7	5.1	6.3	10.27	0.55	0.65
DDx	µg/kg	23.1	20.9	16.4	23.1	18.4	23.1	22.4	11.8
Total PAHs	µg/kg	4640	2240	3000	3880	3220	4640	4640	4640
Total PCBs	µg/kg	923	1.22	#N/A	#N/A	841	193	923	#N/A
TBT	µg/kg	710	710	180	230	710	710	680	600
Zinc	mg/kg	382	343	382	382	382	382	382	300

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 50	CCU 51	CCU 52	CCU 53	CCU 54	CCU 55	CCU 56
HxCDF	pg/g	29.9	22	29.945	26.9	0.1125	2.7	26.3	16.6
PeCDD	pg/g	5.14	5.141	5.141	4.49	3.9	0.21	5.141	4.8
PeCDF	pg/g	11.5	11.51	11.51	8.4	2.9	0.57	11.51	10
Total D/F (TCDD-Eq)	pg/g	43.6	37.6	43.555	34.2	0.68	5.127	43.555	38.7
TCDF	pg/g	5.29	4.72	5.2865	5.2865	0.2835	0.61	5.2865	4.59
TCDD	pg/g	1.92	1.92	1.92	1.92	1.9	0.34	1.92	1.92
Aldrin	µg/kg	0.4	0.38	0.36	0.385	0.235	0.24	0.305	0.35
Arsenic	mg/kg	9.69	9.691	8.79	7.11	2.93	3.18	6.03	6.89
BEHP	µg/kg	1200	720	54	9.5	6.5	6	340	140
Cadmium	mg/kg	0.68	0.68	0.57	0.64	0.05	0.05	0.5	0.49
Copper	mg/kg	223	223.15	72.3	78.2	25.1	24.2	64.5	75.2
Dieldrin	µg/kg	0.55	0.55	0.35	0.375	0.23	0.048	0.3	0.34
Lindane	µg/kg	0.383	0.24	0.145	0.38275	0.095	0.095	0.12	0.14
Lead	mg/kg	110	110	43.3	48.6	4.03	4.02	54.1	49.9
Mercury	mg/kg	0.530	0.412	0.346	0.5295	0.0234	0.0207	0.261	0.401
Naphthalene	µg/kg	130	130	130	120	36	65	23	110
Diesel	mg/kg	1100	1100	1100	740	2.85	2.55	1100	1100
Chlordanes	µg/kg	5.24	2.5	2.3	5.236	0.385	0.395	2.5	2.3
Total cPAHs (BaP Eq)	µg/kg	510	510	301	507	0.27	3.6	133	207
DDD	µg/kg	8.08	8.08	8.08	8.00	0.19	6.80	2.00	8.08
DDE	µg/kg	9.65	9.655	9.655	7.4	0.235	4.145	4.9	7.8
DDT	µg/kg	10.3	10.27	0.43	3.1	0.28	0.29	2.6	0.415
DDx	µg/kg	23.1	23.1	22	14.7	0.28	11.15	9.5	8.65
Total PAHs	µg/kg	4640	4640	3930	4290	1228	43.2	1020	2120
Total PCBs	µg/kg	923	571	826	#N/A	#N/A	#N/A	#N/A	#N/A
TBT	µg/kg	710	77	44	430	0.305	0.275	17	130
Zinc	mg/kg	382	310	255	248	57	58.9	259	296

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 57	CCU 58	CCU 59	CCU 60	CCU 61	CCU 62	CCU 63
HxCDF	pg/g	29.9	28.2	8.98	12.2	17.9	29.945	24.7	15.8
PeCDD	pg/g	5.14	5.141	3.28	4.57	4.92	5.141	5.141	3.73
PeCDF	pg/g	11.5	11.51	7.93	8.64	9.64	11.51	11.51	7.35
Total D/F (TCDD-Eq)	pg/g	43.6	43.555	28.7	31.6	34.5	43.555	43.555	31.6
TCDF	pg/g	5.29	5.2865	4.98	5.2865	5.2865	5.2865	3.19	3.35
TCDD	pg/g	1.92	1.92	1.92	1.92	1.89	1.92	1.45	1.92
Aldrin	µg/kg	0.4	0.365	0.4	0.365	0.345	0.37	0.4	0.4
Arsenic	mg/kg	9.69	7.26	7.59	7.93	7.1	7.45	9.691	6.3
BEHP	µg/kg	1200	570	830	130	640	270	1000	400
Cadmium	mg/kg	0.68	0.62	0.53	0.5	0.67	0.68	0.63	0.5
Copper	mg/kg	223	87.5	78.8	112	87.7	175	217	149
Dieldrin	µg/kg	0.55	0.355	0.39	0.355	0.34	0.55	0.4345	0.415
Lindane	µg/kg	0.383	0.145	0.16	0.145	0.14	0.383	0.383	0.17
Lead	mg/kg	110	64.6	64.2	51.2	80.5	85.2	80.4	55.6
Mercury	mg/kg	0.530	0.482	0.419	0.5295	0.442	0.5295	0.5295	0.464
Naphthalene	µg/kg	130	130	130	130	130	130	46	0.6
Diesel	mg/kg	1100	1100	920	990	1100	1100	1100	580
Chlordanes	µg/kg	5.24	3.1	2.4	2	2.2	5.236	5.236	2.2
Total cPAHs (BaP Eq)	µg/kg	510	296	412	435	240	510	510	298
DDD	µg/kg	8.08	6.30	5.60	6.80	6.10	8.08	8.08	8.08
DDE	µg/kg	9.65	9.1	6.4	8	6	9.46	4.4	7.8
DDT	µg/kg	10.3	0.78	10.27	0.435	0.67	6.1	1.325	9.4
DDx	µg/kg	23.1	10.2	21.5	9.1	12	23.1	11.9	22.1
Total PAHs	µg/kg	4640	2440	4640	3910	2590	4640	4640	2210
Total PCBs	µg/kg	923	#N/A	89.9	#N/A	83.722	340	210	#N/A
TBT	µg/kg	710	250	120	140	320	240	220	500
Zinc	mg/kg	382	313	253	250	272	280	270	318

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 64	CCU 65	CCU 66	CCU 67	CCU 68	CCU 69	CCU 70
HxCDF	pg/g	29.9	2.5	14.9	5.02	22.4	10	3.58	19.2
PeCDD	pg/g	5.14	0.95	3.6	1.78	2.77	2	0.959	5.11
PeCDF	pg/g	11.5	0.69	8.14	6.46	7.7	2.6	2.93	9.49
Total D/F (TCDD-Eq)	pg/g	43.6	5.8404	30.5	14.2	21.5	18.454	6	38.2
TCDF	pg/g	5.29	2.2	2.76	0.673	3.77	3.9	1.36	4.63
TCDD	pg/g	1.92	0.21	1.84	0.471	1.04	1.92	0.479	1.92
Aldrin	µg/kg	0.4	0.19	0.31	0.285	0.33	0.29	0.29	0.335
Arsenic	mg/kg	9.69	6.22	6.29	5.05	8	6	9.691	9.691
BEHP	µg/kg	1200	70	100	8	970	680	440	950
Cadmium	mg/kg	0.68	0.483	0.54	0.47	0.6	0.5	0.59	0.68
Copper	mg/kg	223	76.1	113	54.3	223.15	223.15	223.15	223.15
Dieldrin	µg/kg	0.55	0.038	0.305	0.28	0.325	0.55	0.28	0.325
Lindane	µg/kg	0.383	0.18	0.125	0.115	0.38275	0.115	0.115	0.135
Lead	mg/kg	110	38.4	59.7	31.2	110	110	104	109
Mercury	mg/kg	0.530	0.489	0.305	0.399	0.5295	0.46	0.5295	0.5295
Naphthalene	µg/kg	130	53	130	0.405	130	130	0.75	3.35
Diesel	mg/kg	1100	#N/A	560	620	7	75	800	1100
Chlordanes	µg/kg	5.24	5.236	0.55	0.47	0.61	0.7	1.5	1.9
Total cPAHs (BaP Eq)	µg/kg	510	150	441	394	510	380	201	397
DDD	µg/kg	8.08	8.08	5.90	0.54	5.20	5.31	3.90	4.70
DDE	µg/kg	9.65	9.655	7.2	0.285	9.655	9.655	8.4	9.655
DDT	µg/kg	10.3	7	0.37	1.3	10.27	1.52	0.345	4.6
DDx	µg/kg	23.1	23.1	11.8	2.3	23.1	23.1	12.5	20.5
Total PAHs	µg/kg	4640	1300	3310	2750	4640	3800	2220	3340
Total PCBs	µg/kg	923	120	716	44.4	923	326	#N/A	923
TBT	µg/kg	710	#N/A	76	4.6	510	2.9	20	710
Zinc	mg/kg	382	165	293	140	361	347	379	382

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 71	CCU 72	CCU 73	CCU 74	CCU 75	CCU 76	CCU 77
HxCDF	pg/g	29.9	7	24.5	9.43	29.945	29.945	29.945	29.945
PeCDD	pg/g	5.14	2.1	4.85	1.6	2.61	3.16	3.81	2.36
PeCDF	pg/g	11.5	2.28	8.36	3.58	11.51	11.51	8.66	11.51
Total D/F (TCDD-Eq)	pg/g	43.6	23.667	32.5	14.9	43.555	43.555	31.6	28.6
TCDF	pg/g	5.29	1.6	5.2865	2.8	5.2865	5.2865	3.58	2.54
TCDD	pg/g	1.92	0.91	1.6	0.8055	1.92	1.92	1.7	0.781
Aldrin	µg/kg	0.4	0.285	0.315	0.32	0.36	0.4	0.36	0.4
Arsenic	mg/kg	9.69	5.42	9.691	8.56	9.64	9.69	7	9.691
BEHP	µg/kg	1200	72	1200	1200	690	1000	210	1200
Cadmium	mg/kg	0.68	0.518	0.68	0.68	0.55	0.56	0.51	0.68
Copper	mg/kg	223	121	223.15	223.15	223.15	223.15	119	223.15
Dieldrin	µg/kg	0.55	0.275	0.31	0.55	0.35	0.395	0.35	0.41
Lindane	µg/kg	0.383	0.38275	0.13	0.32	0.14	0.2225	0.38275	0.32
Lead	mg/kg	110	98.4	110	110	110	110	110	103
Mercury	mg/kg	0.530	0.458	0.5295	0.5295	0.5295	0.5295	0.378	0.4
Naphthalene	µg/kg	130	19	46	83	130	38	12	0.495
Diesel	mg/kg	1100	3.15	1100	780	760	980	510	1100
Chlordanes	µg/kg	5.24	5.236	3.5	1.7	1.7	3.1	0.6	1.9
Total cPAHs (BaP Eq)	µg/kg	510	199	471	510	510	282	510	440
DDD	µg/kg	8.08	8.08	8.08	4.50	5.47	4.50	2.74	8.08
DDE	µg/kg	9.65	9.655	9.655	9.655	9.655	9.655	4.17	9.655
DDT	µg/kg	10.3	6.65	0.375	1.2	6.52	1.72	0.89	0.5
DDx	µg/kg	23.1	23.1	23.1	23.1	23.1	22.9	7.43	23.1
Total PAHs	µg/kg	4640	1105	4640	4640	4640	2200	4640	4570
Total PCBs	µg/kg	923	290	0.424	923	923	310	259	#N/A
TBT	µg/kg	710	4.5	340	16	450	200	34	710
Zinc	mg/kg	382	241	382	382	382	382	285	382

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 78	CCU 79	CCU 80	CCU 81	CCU 82	CCU 83	CCU 84
HxCDF	pg/g	29.9	29.945	29.945	29.945	29.945	29.945	0.388	#N/A
PeCDD	pg/g	5.14	4.3	5.141	5.141	5.141	3.96	0.145	#N/A
PeCDF	pg/g	11.5	11.51	10.6	11.51	11.51	11.51	0.0975	#N/A
Total D/F (TCDD-Eq)	pg/g	43.6	43.555	43.555	43.555	43.555	42.5	0.46	#N/A
TCDF	pg/g	5.29	2.91	1.66	5.2865	5.2865	2.9	0.218	#N/A
TCDD	pg/g	1.92	1.11	0.905	1.92	1.22	1.13	0.122	#N/A
Aldrin	µg/kg	0.4	0.4	0.17	0.24	0.245	0.3	0.24	0.07
Arsenic	mg/kg	9.69	9.691	9.691	9.691	9.691	9.691	3.6	1.8
BEHP	µg/kg	1200	1200	740	1200	1200	290	14	#N/A
Cadmium	mg/kg	0.68	0.59	0.68	0.68	0.68	0.68	0.15	0.06
Copper	mg/kg	223	175	223.15	223.15	223.15	223.15	33.3	25.6
Dieldrin	µg/kg	0.55	0.55	0.165	0.235	0.235	0.29	0.235	0.06
Lindane	µg/kg	0.383	0.205	0.07	0.095	0.095	0.12	0.095	0.07
Lead	mg/kg	110	110	86.1	110	110	110	44.4	4.48
Mercury	mg/kg	0.530	0.211	0.0554	0.397	0.366	0.5295	0.056	#N/A
Naphthalene	µg/kg	130	0.65	0.285	2.95	3.1	130	7	#N/A
Diesel	mg/kg	1100	730	490	1100	1100	7.5	2.7	#N/A
Chlordanes	µg/kg	5.24	3	1.1	5.236	5.236	3.4	0.39	0.27
Total cPAHs (BaP Eq)	µg/kg	510	312	510	510	510	510	120	#N/A
DDD	µg/kg	8.08	4.00	2.10	8.08	8.08	8.08	1.74	1.3
DDE	µg/kg	9.65	9.655	0.64	2.3	7.1	8.4	0.536	0.17
DDT	µg/kg	10.3	0.65	2	9.4	10.27	0.607	0.285	0.34
DDx	µg/kg	23.1	14.5	4.8	23.1	23.1	23.1	2.32	1.8
Total PAHs	µg/kg	4640	4640	4640	4640	4640	4640	820	#N/A
Total PCBs	µg/kg	923	234	#N/A	#N/A	138	923	0.595	#N/A
TBT	µg/kg	710	440	290	230	100	36	0.29	#N/A
Zinc	mg/kg	382	382	382	382	382	382	74.4	58

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 85	CCU 86	CCU 94	CCU 87	CCU 88	CCU 89	CCU 90
HxCDF	pg/g	29.9	20	16	#N/A	3.1	22.1	24.1	18
PeCDD	pg/g	5.14	4.7	5.141	#N/A	1.2	5.141	5.141	5.04
PeCDF	pg/g	11.5	11	10.2	#N/A	0.66	9.86	11.51	6.87
Total D/F (TCDD-Eq)	pg/g	43.6	43.555	43.555	#N/A	#N/A	41.8	43.555	41.7
TCDF	pg/g	5.29	4.5	4.94	#N/A	3.2	5.2865	5.2865	5.2865
TCDD	pg/g	1.92	1.17	1.92	#N/A	0.62	1.92	1.92	1.63
Aldrin	µg/kg	0.4	0.37	0.4	0.4	0.4	0.35	0.4	0.4
Arsenic	mg/kg	9.69	6.82	9.691	5.61	6.4	9.691	9.691	9.691
BEHP	µg/kg	1200	1200	1200	40	780	1200	1200	1200
Cadmium	mg/kg	0.68	0.68	0.63	0.1	0.354	0.68	0.61	0.68
Copper	mg/kg	223	128	143	94.6	210	223.15	223.15	223.15
Dieldrin	µg/kg	0.55	0.36	0.55	0.35	0.55	0.345	0.4	0.405
Lindane	µg/kg	0.383	0.38275	0.38275	0.2	0.38275	0.14	0.16	0.33
Lead	mg/kg	110	110	92.1	77.7	43.6	91.7	110	110
Mercury	mg/kg	0.530	0.423	0.443	0.279	0.459	0.5295	0.5295	0.5295
Naphthalene	µg/kg	130	130	130	4.9	31	5	89	0.55
Diesel	mg/kg	1100	1100	1100	#N/A	#N/A	910	1100	940
Chlordanes	µg/kg	5.24	3.5	5.236	0.25	5.236	4.8	3.3	2.8
Total cPAHs (BaP Eq)	µg/kg	510	510	510	510	210	510	510	510
DDD	µg/kg	8.08	8.08	8.08	8.08	7.90	8.08	8.08	8.08
DDE	µg/kg	9.65	9.655	9.655	1.6	9.655	9.655	9.655	9.655
DDT	µg/kg	10.3	2.35	8.1	10.27	10.27	10.27	10.27	10.27
DDx	µg/kg	23.1	19	20.5	23.1	23.1	23.1	23.1	23.1
Total PAHs	µg/kg	4640	4640	4640	4640	1900	4640	4640	4640
Total PCBs	µg/kg	923	260	91.9	#N/A	250	724	803	32.6
TBT	µg/kg	710	51	436.3	#N/A	#N/A	710	710	710
Zinc	mg/kg	382	382	303	101	253	382	382	382

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 91	CCU 92	CCU 96	CCU 97	CCU 98	CCU 99	CCU 100
HxCDF	pg/g	29.9	3.2	#N/A	1.4	9.44	0.076	1.58	3.8
PeCDD	pg/g	5.14	2	#N/A	0.57	2.46	0.1	0.726	0.8
PeCDF	pg/g	11.5	1.31	#N/A	0.36	4.68	0.079	3.51	0.94
Total D/F (TCDD-Eq)	pg/g	43.6	11.6633	#N/A	3.0756	20	0.34	5.5	8.395
TCDF	pg/g	5.29	1.5	#N/A	0.67	5.2865	0.135	0.578	0.76
TCDD	pg/g	1.92	0.42	#N/A	0.1	1.46	0.0725	0.283	1.1
Aldrin	µg/kg	0.4	0.27	#N/A	#N/A	0.385	0.23	0.367	0.23
Arsenic	mg/kg	9.69	8	3	2.5	9.691	5.59	6.7	3
BEHP	µg/kg	1200	1200	14	770	1200	779	1200	15
Cadmium	mg/kg	0.68	0.53	0.05	0.5	0.46	0.25	0.403	0.09
Copper	mg/kg	223	223.15	23.1	162	223.15	146	223.15	115
Dieldrin	µg/kg	0.55	0.26	#N/A	#N/A	0.375	0.0475	0.245	0.225
Lindane	µg/kg	0.383	0.105	#N/A	#N/A	0.15	0.09	0.351	0.095
Lead	mg/kg	110	88.2	4.2	24	58.8	20.2	52.5	22.7
Mercury	mg/kg	0.530	0.5295	0.025	0.07	0.371	0.0885	0.136	0.5295
Naphthalene	µg/kg	130	50	5	58	54	12.1	110	100
Diesel	mg/kg	1100	4.8	#N/A	#N/A	690	2.4	6	2.7
Chlordanes	µg/kg	5.24	1.7	#N/A	#N/A	2.4	0.38	1.3	0.38
Total cPAHs (BaP Eq)	µg/kg	510	510	5	170	329	151	510	220
DDD	µg/kg	8.08	5.3	#N/A	1.41	7	0.185	5.26	8.08
DDE	µg/kg	9.65	7	#N/A	2.01	6.1	0.23	5.71	3.468
DDT	µg/kg	10.3	3.5	#N/A	1.11	2.5	0.275	1.39	1.1
DDx	µg/kg	23.1	18.125	#N/A	4.11	15.6	0.275	9.86	20.318
Total PAHs	µg/kg	4640	4500	5	1900	2630	1300	4640	2100
Total PCBs	µg/kg	923	247	#N/A	39.1	327	2.55	94.9	#N/A
TBT	µg/kg	710	560	#N/A	#N/A	710	710	130	1.2
Zinc	mg/kg	382	296	44	195	382	169	382	68

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th %ile	CCU 101	CCU 102	CCU 105	CCU 106	CCU 108	CCU 109
HxCDF	pg/g	29.9	13.1	1.27	1	3.51	11.9	8.36
PeCDD	pg/g	5.14	3.7	0.322	0.31	2.4	2.17	3.3
PeCDF	pg/g	11.5	5.53	0.373	0.26	2.52	8.59	5.48
Total D/F (TCDD-Eq)	pg/g	43.6	27.6	2.1	2.078	11.6	15.6	22.3
TCDF	pg/g	5.29	5.2865	0.431	0.56	5.2865	5.2865	3.95
TCDD	pg/g	1.92	1.92	0.1105	0.17	0.948	0.994	1.92
Aldrin	µg/kg	0.4	0.345	0.225	0.17	0.36	0.315	0.335
Arsenic	mg/kg	9.69	9.691	4.62	4.4	9.691	4.81	6.8
BEHP	µg/kg	1200	1200	1200	140	1200	1100	280
Cadmium	mg/kg	0.68	0.64	0.14	0.15	0.33	0.33	0.4
Copper	mg/kg	223	223.15	113	72	223.15	105	72.3
Dieldrin	µg/kg	0.55	0.335	0.2	0.335	0.35	0.31	0.355
Lindane	µg/kg	0.383	0.135	0.1	0.17	0.14	0.125	0.175
Lead	mg/kg	110	110	30.5	10	37.5	31.2	41.5
Mercury	mg/kg	0.530	0.5295	0.347	0.053	0.14	0.314	0.519
Naphthalene	µg/kg	130	0.95	10	31	27	5	20
Diesel	mg/kg	1100	650	2.75	#N/A	910	980	480
Chlordanes	µg/kg	5.24	1.7	0.365	#N/A	3.9	2.3	2.8
Total cPAHs (BaP Eq)	µg/kg	510	510	140	#N/A	240	209	109
DDD	µg/kg	8.08	8.08	0.9	0.86	2.6	8.08	8.08
DDE	µg/kg	9.65	9.655	1.05	1.27	2.8	8.2	4.7
DDT	µg/kg	10.3	10.27	1.15	0.35	0.425	0.91	10.27
DDx	µg/kg	23.1	23.1	1.15	2.14	4.6	16.3	23.1
Total PAHs	µg/kg	4640	4640	1100	#N/A	3500	2000	1050
Total PCBs	µg/kg	923	61.3	93	9.84	51.8	34	634
TBT	µg/kg	710	710	21	#N/A	710	710	180
Zinc	mg/kg	382	382	149	110	382	180	240

Table 1-3a
Sediment Concentrations by Cap Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Notes:
Blue values are maximum concentrations that were replaced with the Project area-wide 95th percentile value for capping evalaution.
#N/A = post-dredge analyte value not available for the certification unit
µg = microgram
95th %ile = Project area-wide 95th percentile concentrations for each analyte.
g = gram
kg = kilogram
pg = picogram
BEHP = BIS(2-ETHYLHEXYL) PHTHALATE
CCU = Cap Certification Unit
Chlordanes = Total Chlordane (Calculated U = 1/2)
CDTM = Cap Design Technical Memorandum
DDD = Total DDD (Calculated U = 1/2)
DDE = Total DDE (Calculated U = 1/2)
DDT = Total DDT (Calculated U = 1/2)
DDx = Total DDx (Calculated U = 1/2)
Diesel = Residual Range Organics (C25-C36)
HxCDF = 1,2,3,4,7,8-HEXACHLORODIBENZOFURAN
Lindane = GAMMA BHC (LINDANE)
N/A = Data not available for this analyte at this certification unit
PeCDD = 1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN
TBT = Tributyltin
TCDD = 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN
TCDF = 2,3,4,7,8-PENTACHLORODIBENZOFURAN
TCDF = 2,3,7,8-TETRACHLORODIBENZOFURAN
Total cPAHs (BaP Eq) = Total cPAH/BaPEq TEQ (EPA 1993) (Calculated U = 1/2)
Total D/F (TCDD-Eq) = 2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), (ND = 0.5)
Total PAHs = Total PAH (Calculated U = 1/2)
Total PCBs = Total PCB Aroclors (Calculated U = 1/2)

Table 1-3b
Riverbank Concentrations by Riverbank Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit	RAL	PTW	95th %ile	RCU 1	RCU 2	RCU 3	RCU 4	RCU 5	RCU 6	RCU 7
HxCDF	pg/g	N/A	400	29.9	29.9	29.945	20.5	17.9	5.57	9.26	3.99
PeCDD	pg/g	0.8	10	5.14	5.14	5.14	5.14	5.14	5.14	1.54	4.39
PeCDF	pg/g	200	200	11.5	11.0	11.51	6.82	6.68	11.5	9.25	6.22
Total D/F (TCDD-Eq)	pg/g	N/A	N/A	43.6	43.6	43.6	43.6	43.6	26.6	6.9	17.9
TCDF	pg/g	N/A	600	5.29	4.02	3.13	2.31	1.7	2.42	1.64	0.916
TCDD	pg/g	0.6	10	1.92	1.92	1.04	1.36	1.11	0.79	1.81	0.826
Aldrin	µg/kg	N/A	N/A	0.4	0.2	0.225	0.21	0.195	0.21	0.2	0.2
Arsenic	mg/kg	N/A	N/A	9.69	9.69	5.52	4.95	9.69	5.68	6.79	2.99
BEHP	µg/kg	N/A	N/A	1200	1200	510	480	130	1200	34	74
Cadmium	mg/kg	N/A	N/A	0.68	0.68	0.54	0.52	0.3	0.68	0.48	0.18
Copper	mg/kg	N/A	N/A	223	223.15	111	81.7	33.4	150	48	37.3
Dieldrin	µg/kg	N/A	N/A	0.55	0.55	0.54	0.205	0.19	0.52	0.195	0.195
Lindane	µg/kg	N/A	N/A	0.383	0.08	0.09	0.085	0.08	0.383	0.08	0.08
Lead	mg/kg	N/A	N/A	110	110	46.3	75.6	15.9	110	28.6	15
Mercury	mg/kg	N/A	N/A	0.530	0.105	0.3960	0.0763	0.043	0.121	0.2	0.0549
Naphthalene	µg/kg	N/A	140,000	130	0.275	130	0.255	0.25	0.27	0.25	0.235
Diesel	mg/kg	N/A	N/A	1100	380	820	370	2.1	640	22	2.05
Chlordanes	µg/kg	N/A	N/A	5.24	5.24	5.236	3.3	0.32	4.8	5.24	1.1
Total cPAHs (BaP Eq)	µg/kg	N/A	######	510	510	510	296	74.9	510	47.1	118
DDD	µg/kg	N/A	N/A	8.082	0.86	1.20	8.08	0.155	8.08	0.34	0.57
DDE	µg/kg	N/A	N/A	9.655	0.6	9.655	2.2	0.195	2.1	0.86	0.2
DDT	µg/kg	N/A	N/A	10.27	10	10.3	10.3	0.68	10	1.1	2.7
DDx	µg/kg	160	7,050	23.1	11.2	23.1	23.1	1.3	23.1	2.2	3.6
Total PAHs	µg/kg	75	200	689	4640	4640	1660	561	4640	293	959
Total PCBs	µg/kg	75	200	923	38.8	59.5	32.6	7.64	19.6	11.2	11.4
TBT	µg/kg	N/A	N/A	710	140	54	67	15	290	26	34
Zinc	mg/kg	N/A	N/A	382	304	228	157	157	382	182	95.9

Table 1-3b
Riverbank Concentrations by Riverbank Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit	RAL	PTW	95th %ile	RCU 8	RCU 9	RCU 10	RCU 11	RCU 12	RCU 13	RCU 14
HxCDF	pg/g	N/A	400	29.9	15.6	29.9	29.9	21.2	29.9	16.9	27.9
PeCDD	pg/g	0.8	10	5.14	1.92	5.14	5.14	3.05	5.14	3.09	5.14
PeCDF	pg/g	200	200	11.5	4.35	11.5	11.5	6.17	11.5	7.63	11.5
Total D/F (TCDD-Eq)	pg/g	N/A	N/A	43.6	18.7	43.6	43.6	34.4	43.6	20.1	37.7
TCDF	pg/g	N/A	600	5.29	4.63	5.29	5.29	5.29	5.29	5.29	4.77
TCDD	pg/g	0.6	10	1.92	0.445	0.865	1.4	1.92	1.92	0.926	0.89
Aldrin	µg/kg	N/A	N/A	0.4	0.2	0.18	0.205	0.205	0.22	0.215	0.27
Arsenic	mg/kg	N/A	N/A	9.69	3.86	9.69	5.79	4.98	5.16	4.91	3.55
BEHP	µg/kg	N/A	N/A	1200	1200	65.5	1200	130	820	200	200
Cadmium	mg/kg	N/A	N/A	0.68	0.44	0.34	0.68	0.68	0.68	0.53	0.68
Copper	mg/kg	N/A	N/A	223	59.3	50	139	142	191	91.3	47
Dieldrin	µg/kg	N/A	N/A	0.55	0.195	0.175	0.55	0.55	0.55	0.21	0.265
Lindane	µg/kg	N/A	N/A	0.383	0.08	0.07	0.08	0.08	0.09	0.085	0.11
Lead	mg/kg	N/A	N/A	110	32.4	28.9	110	78.9	110	104	44.2
Mercury	mg/kg	N/A	N/A	0.530	0.322	0.248	0.433	0.24	0.413	0.446	0.19
Naphthalene	µg/kg	N/A	140,000	130	0.255	0.25	2.6	2.55	2.75	4.9	0.365
Diesel	mg/kg	N/A	N/A	1100	2.1	2.1	1100	890	1100	540	500
Chlordanes	µg/kg	N/A	N/A	5.24	2.6	5.24	4	5.24	5.24	3	0.445
Total cPAHs (BaP Eq)	µg/kg	N/A	######	510	153	222	510	118	241	117	148
DDD	µg/kg	N/A	N/A	8.082	0.44	0.42	1.1	8.08	1.4	1.5	1.2
DDE	µg/kg	N/A	N/A	9.655	0.2	0.18	2.9	1.5	2.2	0.68	2.2
DDT	µg/kg	N/A	N/A	10.27	1.7	2	10.27	6.9	10.3	2.4	7.9
DDx	µg/kg	160	7,050	23.1	2.5	2.8	23.1	13.5	20.5	3.4	10.4
Total PAHs	µg/kg	75	200	689	988	1550	4640	559	2720	710	1050
Total PCBs	µg/kg	75	200	923	83.2	74.2	56.8	80	190	28.5	186
TBT	µg/kg	N/A	N/A	710	16	18	15	4.8	32	14	7.2
Zinc	mg/kg	N/A	N/A	382	167	184	382	382	382	209	212

Table 1-3b
Riverbank Concentrations by Riverbank Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit	RAL	PTW	95th %ile	RCU 15	RCU 16	RCU 17	RCU 18	RCU 19	RCU 20	RCU 21
HxCDF	pg/g	N/A	400	29.9	29.9	29.9	17.6	29.9	4.8	29.9	0.76
PeCDD	pg/g	0.8	10	5.14	5.14	5.14	2.86	5.14	1.44	5.14	2.86
PeCDF	pg/g	200	200	11.5	11.5	11.5	5.44	11.5	4.01	11.51	2.79
Total D/F (TCDD-Eq)	pg/g	N/A	N/A	43.6	43.6	43.6	12.2	43.6	8.9	43.6	4.5
TCDF	pg/g	N/A	600	5.29	5.29	4.85	5.29	5.29	1.34	2.46	0.474
TCDD	pg/g	0.6	10	1.92	1.92	1.29	0.238	1.57	0.397	1.86	0.404
Aldrin	µg/kg	N/A	N/A	0.4	0.225	0.4	0.205	0.4	0.2	0.185	0.18
Arsenic	mg/kg	N/A	N/A	9.69	9.35	5.62	3.38	6.99	3.73	3.01	2.74
BEHP	µg/kg	N/A	N/A	1200	1200	110	120	250	230	32	4.6
Cadmium	mg/kg	N/A	N/A	0.68	0.68	0.68	0.5	0.68	0.49	0.08	0.07
Copper	mg/kg	N/A	N/A	223	176	49.8	36.8	69	50.1	31.9	17.9
Dieldrin	µg/kg	N/A	N/A	0.55	0.55	0.55	0.2	0.55	0.0415	0.16	0.175
Lindane	µg/kg	N/A	N/A	0.383	0.19	0.383	0.08	0.09	0.08	0.075	0.07
Lead	mg/kg	N/A	N/A	110	110	110	45.6	110	77.6	10.7	6.43
Mercury	mg/kg	N/A	N/A	0.530	0.119	0.206	0.0842	0.530	0.027	0.0512	0.0228
Naphthalene	µg/kg	N/A	140,000	130	0.28	5.5	0.245	7.5	0.25	0.26	0.245
Diesel	mg/kg	N/A	N/A	1100	1100	1100	190	810	350	35	2.05
Chlordanes	µg/kg	N/A	N/A	5.24	5.24	5.24	0.335	5.236	0.33	0.305	0.29
Total cPAHs (BaP Eq)	µg/kg	N/A	######	510	171	510	41.3	127	68.9	18.4	73
DDD	µg/kg	N/A	N/A	8.082	1.9	7.3	0.37	1.8	6.1	0.15	0.37
DDE	µg/kg	N/A	N/A	9.655	1.8	9.65	1.1	6.5	0.75	0.185	0.18
DDT	µg/kg	N/A	N/A	10.27	10.3	10.3	10.2	10.3	1.2	0.7	1.4
DDx	µg/kg	160	7,050	23.1	19.2	23.1	11.3	23.1	8.1	0.95	2.1
Total PAHs	µg/kg	75	200	689	2250	4560	255	938	388	123	446
Total PCBs	µg/kg	75	200	923	6.34	75.3	44.1	130	25	36.9	2.47
TBT	µg/kg	N/A	N/A	710	5.9	7.7	4.9	6.1	5.1	710	25
Zinc	mg/kg	N/A	N/A	382	382	235	191	236	135	62	49.8

Table 1-3b
Riverbank Concentrations by Riverbank Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit	RAL	PTW	95th %ile	RCU 22	RCU 23	RCU 24	RCU 25	RCU 26	RCU 27	RCU 28
HxCDF	pg/g	N/A	400	29.9	29.9	29.9	29.9	29.9	29.9	29.9	15.6
PeCDD	pg/g	0.8	10	5.14	5.14	5.14	5.14	5.14	5.14	5.14	1.3
PeCDF	pg/g	200	200	11.5	11.5	11.5	11.5	11.5	11.5	11.3	3.35
Total D/F (TCDD-Eq)	pg/g	N/A	N/A	43.6	43.6	43.6	43.6	43.6	43.6	43.6	13.4
TCDF	pg/g	N/A	600	5.29	3.96	5.29	5.29	5.29	5.29	5.29	1.91
TCDD	pg/g	0.6	10	1.92	1.92	1.17	1.45	1.12	1.92	1.92	0.296
Aldrin	µg/kg	N/A	N/A	0.4	0.26	0.195	0.210	0.225	0.37	0.21	0.225
Arsenic	mg/kg	N/A	N/A	9.69	4.88	7.48	9.69	9.69	9.691	9.69	6.37
BEHP	µg/kg	N/A	N/A	1200	140	730	740	1200	1000	290	710
Cadmium	mg/kg	N/A	N/A	0.68	0.68	0.51	0.68	0.68	0.68	0.68	0.22
Copper	mg/kg	N/A	N/A	223	205	118	220	223	223	223	223
Dieldrin	µg/kg	N/A	N/A	0.55	0.41	0.19	0.55	0.205	0.48	0.205	0.215
Lindane	µg/kg	N/A	N/A	0.383	0.105	0.08	0.085	0.09	0.145	0.085	0.09
Lead	mg/kg	N/A	N/A	110	110	110	110	110	110	110	65.1
Mercury	mg/kg	N/A	N/A	0.530	0.454	0.179	0.127	0.189	0.530	0.376	0.365
Naphthalene	µg/kg	N/A	140,000	130	2.5	2.45	0.265	0.27	4.8	0.255	0.26
Diesel	mg/kg	N/A	N/A	1100	1100	670	1100	1100	1100	1100	2.25
Chlordanes	µg/kg	N/A	N/A	5.24	5.24	1.7	5	2	5.24	1.7	3.6
Total cPAHs (BaP Eq)	µg/kg	N/A	######	510	510	436	227	510	510	99	202
DDD	µg/kg	N/A	N/A	8.082	1.7	1.5	7.7	3	8.08	4.3	8.08
DDE	µg/kg	N/A	N/A	9.655	2.7	2.8	2.4	2.7	4.6	1.2	9.65
DDT	µg/kg	N/A	N/A	10.27	7	10.3	10.3	10.3	10.3	10.3	10.3
DDx	µg/kg	160	7,050	23.1	9.4	22	23.1	19.1	23.1	23.1	23.1
Total PAHs	µg/kg	75	200	689	4640	2870	1590	4640	4640	680	1270
Total PCBs	µg/kg	75	200	923	364	6.59	633	3.17	800	181	#N/A
TBT	µg/kg	N/A	N/A	710	22	710	290	710	130	200	660
Zinc	mg/kg	N/A	N/A	382	382	298	382	382	382	382	291

Table 1-3b
Riverbank Concentrations by Riverbank Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit	RAL	PTW	95th %ile	RCU 29	RCU 30
HxCDF	pg/g	N/A	400	29.9	28.1	3.33
PeCDD	pg/g	0.8	10	5.14	1.46	2.35
PeCDF	pg/g	200	200	11.5	1.21	1.54
Total D/F (TCDD-Eq)	pg/g	N/A	N/A	43.6	10.1	5.1
TCDF	pg/g	N/A	600	5.29	3.35	2.58
TCDD	pg/g	0.6	10	1.92	0.141	0.210
Aldrin	µg/kg	N/A	N/A	0.4	0.23	0.205
Arsenic	mg/kg	N/A	N/A	9.69	7.44	9.69
BEHP	µg/kg	N/A	N/A	1200	1200	1200
Cadmium	mg/kg	N/A	N/A	0.68	0.41	0.58
Copper	mg/kg	N/A	N/A	223	223	223
Dieldrin	µg/kg	N/A	N/A	0.55	0.225	0.2
Lindane	µg/kg	N/A	N/A	0.383	0.09	0.08
Lead	mg/kg	N/A	N/A	110	78.4	92.9
Mercury	mg/kg	N/A	N/A	0.530	0.275	0.166
Naphthalene	µg/kg	N/A	140,000	130	0.31	0.255
Diesel	mg/kg	N/A	N/A	1100	2.6	180
Chlordanes	µg/kg	N/A	N/A	5.24	0.375	0.33
Total cPAHs (BaP Eq)	µg/kg	N/A	######	510	234	510
DDD	µg/kg	N/A	N/A	8.082	1.4	0.44
DDE	µg/kg	N/A	N/A	9.655	1.5	0.34
DDT	µg/kg	N/A	N/A	10.27	10.3	3.3
DDx	µg/kg	160	7,050	23.1	13.6	4.2
Total PAHs	µg/kg	75	200	689	1740	3690
Total PCBs	µg/kg	75	200	923	440	#N/A
TBT	µg/kg	N/A	N/A	710	710	710
Zinc	mg/kg	N/A	N/A	382	382	382

Table 1-3b
Riverbank Concentrations by Riverbank Certification Units
CDTM; Swan Island Basin Project Area, Portland, Oregon

Notes:

Blue values are maximum concentrations that were replaced with the Project area-wide 95th percentile value for capping evalaution.

RAL Exceedance

PTW Exceedance

#N/A = post-dredge analyte value not available for the certification unit

95th %ile = Project area-wide 95th percentile concentrations for each analyte.

µg = microgram

g = gram

kg = kilogram

pg = picogram

BEHP = BIS(2-ETHYLHEXYL) PHTHALATE

Chlordanes = Total Chlordane (Calculated U = 1/2)

CDTM = Cap Design Technical Memorandum

DDD = Total DDD (Calculated U = 1/2)

DDE = Total DDE (Calculated U = 1/2)

DDT = Total DDT (Calculated U = 1/2)

DDx = Total DDx (Calculated U = 1/2)

Diesel = Residual Range Organics (C25-C36)

HxCDF = 1,2,3,4,7,8-HEXACHLORODIBENZOFURAN

Lindane = GAMMA BHC (LINDANE)

PeCDD = 1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN

PTW = principal threat waste

RAL = remedial action level

RCU = Riverbank Certification Unit

TBT = Tributyltin

TCDD = 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN

TCDF = 2,3,4,7,8-PENTACHLORODIBENZOFURAN

TCDF = 2,3,7,8-TETRACHLORODIBENZOFURAN

Total cPAHs (BaP Eq) = Total cPAH/BaPEq TEQ (EPA 1993) (Calc

Total D/F (TCDD-Eq) = 2,3,7,8-TCDD TOXIC EQUIVALENT (TE(

Total PAHs = Total PAH (Calculated U = 1/2)

Total PCBs = Total PCB Aroclors (Calculated U = 1/2)

Table 1-4
Statistical Evaluation - All Post-Dredging Samples
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Analyte	Unit Final	95th percentile in 90% RD	95th Percentile in 50% RD	RPD	Sample Count	95 UCL	RPD 95th percentile vs 95UCL
HxCDF	pg/g	29.95	20	39.8%	1,502	24.6	19.4%
PeCDD	pg/g	5.141	4.5	13.3%	1,519	1.96	89.7%
TCDF	pg/g	11.51	10	14.0%	1,519	5.72	67.2%
Total D/F (TCDD-Eq)	pg/g	43.555	30	36.9%	1,470	20.2	73.4%
TCDF	pg/g	5.2865	5	5.6%	1,502	1.75	100.6%
TCDD	pg/g	1.92	N/A	N/A	1,519	0.69	94.1%
Aldrin	µg/kg	0.4	0.405	1.2%	1,295	0.28	35.6%
Arsenic	mg/kg	9.691	8.9	8.5%	1,419	6.82	34.8%
BEHP	µg/kg	1,200	1,100	8.7%	1,369	1324	9.8%
Cadmium	mg/kg	0.68	0.65	4.5%	1,419	0.35	64.6%
Copper	mg/kg	223	187	17.6%	1,418	79.9	94.5%
Dieldrin	µg/kg	0.55	0.55	0.0%	1,343	0.98	55.7%
Lindane	µg/kg	0.38275	0.39	1.9%	1,310	0.20	64.1%
Lead	mg/kg	110	92.75	17.0%	1,419	42.6	88.4%
Mercury	mg/kg	0.5295	0.552	4.2%	1,412	0.22	81.9%
Naphthalene	µg/kg	130	130	0.0%	1,517	31.1	122.8%
Diesel	mg/kg	1,100	N/A	N/A	1,127	316	110.8%
Chlordanes	µg/kg	5.236	8.8975	51.8%	1,229	1.80	97.7%
Total cPAHs (BaP Eq)	µg/kg	510	4,700	160.8%	1,263	179	96.1%
DDD	µg/kg	8.082	12.7	44.4%	1,305	3.20	86.5%
DDE	µg/kg	9.655	11.57	18.0%	1,310	3.30	98.0%
DDT	µg/kg	10.27	6.5975	43.5%	1,307	3.16	105.9%
DDx	µg/kg	23.1	30.8675	28.8%	1,311	9.11	86.9%
Total PAHs	µg/kg	4,640	4,700	1.3%	1,402	1697	92.9%
Total PCBs	µg/kg	689	972	34.2%	1,390	244	95.3%
TBT	µg/kg	710	2,730	117.4%	1,121	285	85.4%
Zinc	mg/kg	382	353	8.0%	1,418	180	72.0%

Table 1-4
Statistical Evaluation - All Post-Dredging Samples
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:

Yellow highlighted values are maximum concentrations that were replaced with the Project area-wide 95th percentile value for capping evalaution.

µg = microgram

95th %ile = Project area-wide 95th percentile concentrations for each analyte.

g = gram

kg = kilogram

pg = picogram

BEHP = Bis(2-Ethylhexyl) Phthalate

CCU = Cap Certification Unit

Chlordanes = Total Chlordane (Calculated U = 1/2)

CDTM = Cap Design Technical Memorandum

DDD = Total DDD (Calculated U = 1/2)

DDE = Total DDE (Calculated U = 1/2)

DDT = Total DDT (Calculated U = 1/2)

DDx = Total DDx (Calculated U = 1/2)

Diesel = Residual Range Organics (C25-C36)

HxCDF = 1,2,3,4,7,8-HEXACHLORODIBENZOFURAN

Lindane = GAMMA BHC (LINDANE)

N/A = Data not available for this analyte

PeCDD = 1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN

TBT = Tributyltin

TCDD = 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN

TCDF = 2,3,4,7,8-PENTACHLORODIBENZOFURAN

TCDF = 2,3,7,8-TETRACHLORODIBENZOFURAN

Total cPAHs (BaP Eq) = Total cPAH/BaPEq TEQ (EPA 1993) (Calculated U = 1/2)

Total D/F (TCDD-Eq) = 2,3,7,8-TCDD TOXIC EQUIVALENT (TEQ), (ND = 0.5)

Total PAHs = Total PAH (Calculated U = 1/2)

Total PCBs = Total PCB Congeners (Calculated U = 1/2)

Table 1-5
Comparison of Literature and Project Area-Adjacent Partitioning Coefficients
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

COCs	Linear Paritioning Coefficient (L/kg)									
	SIB 50% RD K_D	SIB 50% RD Koc	SIB 50% RD Kd*	River Mile 9W	Cathedral Park	Fund-Lead 3	Fund-Lead 9	SPDI Site Wide	Project Area-Measured Average	RPD (%)
1,2,3,4,7,8-HxCDF	N/A	25,118,864	584,333	N/A	N/A	199,526	N/A	199,526	199,526	98%
1,2,3,7,8-PeCDD	N/A	3,981,072	92,610	N/A	48,978	83,176	50,119	1,318,257	60,758	42%
1-Methylnaphthalene	N/A	2,512	58	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,3,4,7,8-PeCDF	N/A	141,254	3,286	N/A	10,471	N/A	N/A	10,471	10,471	104%
Total Dioxins/Furans (2,3,7,8-TCDD Eq.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2,3,7,8-TCDF	N/A	151,356	3,521	N/A	234,423	661	N/A	83,176	117,542	188%
2-Methylnaphthalene	N/A	2,512	58	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Acenaphthene	N/A	3,981	93	N/A	2,754	7.079	N/A	2,399	1,381	175%
Acenaphthylene	N/A	5,012	117	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aldrin	N/A	47,863	1,113	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Anthracene	N/A	23,442	545	N/A	14,125	N/A	N/A	14,125	14,125	185%
Arsenic	237	N/A	237	233	646	309	309	389	374	45%
BEHP	N/A	112,202	2,610	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)anthracene	N/A	354,813	8,254	N/A	125,893	N/A	N/A	125,893	125,893	175%
Benzo(a)pyrene	N/A	588,844	13,698	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	N/A	1,202,264	27,968	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(e)pyrene	N/A	1,778,279	41,368	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(g,h,i)perylene	N/A	1,949,845	45,359	N/A	N/A	13,490	N/A	13,490	13,490	108%
Benzo(k)fluoranthene	N/A	1,230,269	28,619	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cadmium	237	N/A	237	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chlordanes	N/A	125,893	2,929	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chromium (III)	39,811	N/A	39,811	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chrysene	N/A	309,030	7,189	N/A	245,471	N/A	N/A	245,471	245,471	189%
Copper	31,623	N/A	31,623	2,885	100,000	46,774	87,096	58,884	59,189	61%
DDD	N/A	323,594	7,528	N/A	47,863	7,244	6,310	707,946	20,472	92%
DDE	N/A	436,516	10,155	N/A	58,884	60,256	75,858	1,047,129	64,999	146%

Table 1-5
Comparison of Literature and Project Area-Adjacent Partitioning Coefficients
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

COCs	Linear Paritioning Coefficient (L/kg)									
	SIB 50% RD K_D	SIB 50% RD Koc	SIB 50% RD Kd*	River Mile 9W	Cathedral Park	Fund-Lead 3	Fund-Lead 9	SPDI Site Wide	Project Area-Measured Average	RPD (%)
DDT	N/A	138,038	3,211	N/A	407,380	15,488	N/A	2,630,268	211,434	194%
Dibenz(a,h)anthracene	N/A	1,905,461	44,326	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dieldrin	N/A	38,905	905	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Diesel	N/A	251,189	5,843	N/A	2,188	N/A	N/A	2,188	2,188	91%
Fluoranthene	N/A	48,978	1,139	N/A	58,884	N/A	N/A	58,884	58,884	192%
Fluorene	N/A	9,120	212	N/A	3,631	N/A	N/A	3,631	3,631	178%
Indeno(1,2,3-c,d)pyrene	N/A	3,467,369	80,660	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lead	19,953	N/A	19,953	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lindane	N/A	1,479	34	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	65	N/A	65	70.22	N/A	N/A	N/A	N/A	70.22	8%
Mercury	1,259	N/A	1,259	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene	N/A	1,995	46	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PCB-1	N/A	6,918	161	1,559	N/A	N/A	N/A	N/A	1,559	163%
PCB-15	N/A	34,674	807	24,902	N/A	N/A	N/A	N/A	24,902	187%
PCB-31	N/A	70,795	1,647	413,538	N/A	N/A	N/A	N/A	413,538	198%
PCB-44	N/A	83,176	1,935	987,326	N/A	N/A	N/A	N/A	987,326	199%
PCB-99	N/A	288,403	6,709	452,549	N/A	N/A	N/A	N/A	452,549	194%
PCB-141	N/A	660,693	15,370	596,986	N/A	N/A	N/A	N/A	596,986	190%
PCB-153	N/A	794,328	18,478	549,502	N/A	N/A	N/A	N/A	549,502	187%
PCB-174	N/A	1,148,154	26,709	790,045	N/A	N/A	N/A	N/A	790,045	187%
PCB-177	N/A	1,071,519	24,926	843,078	N/A	N/A	N/A	N/A	843,078	189%
PCB-180	N/A	1,862,087	43,317	668,697	N/A	N/A	N/A	N/A	668,697	176%
PCB-183	N/A	1,348,963	31,381	729,681	N/A	N/A	N/A	N/A	729,681	184%
PCB-199	N/A	1,348,963	31,381	7,281,539	N/A	N/A	N/A	N/A	7,281,539	198%
PCB-206	N/A	7,585,776	176,466	2,812,709	N/A	N/A	N/A	N/A	2,812,709	176%
PCB-209	N/A	9,120,108	212,158	9,321,883	N/A	N/A	N/A	N/A	9,321,883	191%
Pentachlorophenol	N/A	2,818	66	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 1-5
Comparison of Literature and Project Area-Adjacent Partitioning Coefficients
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

COCs	Linear Paritioning Coefficient (L/kg)									
	SIB 50% RD K_D	SIB 50% RD Koc	SIB 50% RD Kd*	River Mile 9W	Cathedral Park	Fund-Lead 3	Fund-Lead 9	SPDI Site Wide	Project Area-Measured Average	RPD (%)
Phenanthrene	N/A	16,596	386	N/A	9,120	213.8	N/A	9,120	4,667	169%
Pyrene	N/A	38,019	884	N/A	58,884	2,188	N/A	58,884	30,536	189%
Total cPAHS [B(a)P Eq.	N/A	588,844	13,698	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total PAHs	N/A	251,189	5,843	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total PCBs	N/A	301,995	7,025	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tributyltin	N/A	77,625	1,806	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium	1,000	N/A	1,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Xylenes	N/A	1,288	30	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc	34,054	N/A	34,054	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

For purpose of evaluating Kd update based on Project Area-adjacent values, Kd values were used as reported in Draft 50% RD. Koc values were converted to Kd using Kd=Koc*foc and using site-average foc value of 0.0232627 (See Table 1-6).

SPDI Site Wide calculation reported for EPA FL-sites was excluded from the Project Area-Measured Average.

% = percent

K_D = adsorption-desorption linear partitioning coefficient

Koc = organic carbon normalized partition coefficient

L/kg = Liter per kilogram

N/A =Value not available

RPD = relative percent difference

SIB = Swan Island Basin Project Area

SPDI = Supplemental Pre-Design Investigation

Table 1-6
Total Organic Carbon
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Location ID	Sample ID	Sample Type	Start Depth (feet)	End Depth (feet)	TOC Result (mg/kg)	Qualifier
A2	A2-0TO26-100818	N	0	0.9	35,000	
A3	A3-0TO31-100818	N	0	1	40,000	
A4	A4-0TO25-100818	N	0	0.8	29,000	
A5	A5-0TO25-100818	N	0	0.8	33,000	
A-9.03	A-9.03-0TO26-102418	N	0	0.9	51,000	
B3	B3-0TO21-100818	N	0	0.7	23,000	
B5	B5-0TO26-100818	N	0	0.9	33,000	
B-9.15	B-9.15-0TO30-102418	N	0	1	34,000	
C4	C4-0TO27-100918	N	0	0.9	30,000	
D3	D3-0TO26-101018	N	0	0.9	28,000	
D5	D5-0TO28-100918	N	0	0.9	31,500	
D6-SC	D6-SC-108TO123-102118	N	10.8	12.3	5,300	
D6-SC	D6-SC1B-100TO110-82619	N	10	11	5,300	
D6-SC	D6-SC1B-110TO120-82619	N	11	12	4,300	
D6-SC	D6-SC1B-20TO30-82619	N	2	3	22,500	
D6-SC	D6-SC1B-30TO40-82619	N	3	4	21,200	
D6-SC	D6-SC1B-40TO50-82619	N	4	5	20,300	
D6-SC	D6-SC1B-50TO60-82619	N	5	6	17,600	
D6-SC	D6-SC1B-60TO70-82619	N	6	7	14,100	
D6-SC	D6-SC1B-70TO80-82619	N	7	8	7,700	
D6-SC	D6-SC1B-80TO90-82619	N	8	9	8,700	
D6-SC	D6-SC1B-90TO100-82619	N	9	10	5,600	
D6-SC	D6-SC-1TO2-102118	N	1	2	28,000	J
D6-SC	D6-SC-2TO4-102118	N	2	4	25,000	
D6-SC	D6-SC-40TO64-102118	N	4	6.4	25,000	J
D6-SC	D6-SC-64TO88-102118	N	6.4	8.8	11,000	J
D6-SC	D6-SC-88TO108-102118	N	8.8	10.8	7,200	J
D-8.90-SC	D-8.90-SC-103TO120-102318	N	10.3	12	30,000	
D-8.90-SC	D-8.90-SC-120TO140-102318	N	12	14	45,000	
D-8.90-SC	D-8.90-SC-140TO160-102318	N	14	16	35,000	J
D-8.90-SC	D-8.90-SC-40TO62-102318	N	4	6.2	38,000	
D-8.90-SC	D-8.90-SC-62TO80-102318	N	6.2	8	34,000	
D-8.90-SC	D-8.90-SC-80TO103-102318	N	8	10.3	44,000	
D-9.09	D-9.09-0TO29-102418	N	0	1	36,000	
D-9.09-SC	D-9.09-SC-00TO10-102318	N	0	1	35,000	
D-9.09-SC	D-9.09-SC-100TO117-102318	N	10	11.7	30,000	
D-9.09-SC	D-9.09-SC-10TO20-102318	N	1	2	36,000	
D-9.09-SC	D-9.09-SC-20TO40-102318	N	2	4	38,000	
D-9.09-SC	D-9.09-SC-40TO60-102318	N	4	6	43,000	
D-9.09-SC	D-9.09-SC-60TO80-102318	N	6	8	33,000	
D-9.09-SC	D-9.09-SC-80TO100-102318	N	8	10	36,000	
E-9.02-SC	E-9.02-SC-100TO115-102318	N	10	11.5	31,000	
E-9.02-SC	E-9.02-SC-115TO130-102318	N	11.5	13	32,000	

Table 1-6
Total Organic Carbon
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Location ID	Sample ID	Sample Type	Start Depth (feet)	End Depth (feet)	TOC Result (mg/kg)	Qualifier
E-9.02-SC	E-9.02-SC-60TO80-102318	N	6	8	29,000	
E-9.02-SC	E-9.02-SC-80TO100-102318	N	8	10	33,000	
F3	F3-0TO27-101118	N	0	0.9	24,000	
F5	F5-0TO28-101118	N	0	0.9	36,000	
G-9.15	G-9.15-0TO18-102418	N	0	0.6	6,200	
H1	H1-0TO24-101418	N	0	0.8	18,000	J
H3	H3-0TO28-101118	N	0	0.9	37,000	
H3-SC	H3-SC-0TO1-102118	N	0	1	78,000	
H3-SC	H3-SC1B-110TO114-82919	N	11	11.4	6,500	
H3-SC	H3-SC1B-20TO30-82819	N	2	3	43,600	J
H3-SC	H3-SC-1TO2-102118	N	1	2	55,000	J
H3-SC	H3-SC-29TO46-102118	N	2.9	4.6	6,800	
H3-SC	H3-SC-2TO29-102118	N	2	2.9	25,000	
H3-SC	H3-SC-46TO63-102118	N	4.6	6.3	16,000	J
H3-SC	H3-SC-63TO85-102118	N	6.3	8.5	43,000	
H3-SC	H3-SC-85TO99-102118	N	8.5	9.9	12,000	
H3-SC	H3-SC-99TO114-102118	N	9.9	11	6,600	J
H5	H5-0TO29-101118	N	0	1	37,000	
J1	J1-0TO20-101318	N	0	0.7	4,700	J
J3-SC	J3-SC1B-50TO60-82719	N	5	6	4,900	
J3-SC	J3-SC1B-60TO70-82719	N	6	7	600	
J3-SC	J3-SC1B-70TO80-82719	N	7	8	600	
J3-SC	J3-SC1B-80TO90-82719	N	8	9	3,700	
J3-SC	J3-SC1B-90TO100-82719	N	9	10	4,000	
J3-SC	J3-SC-55TO76-102218	N	5.5	7.6	2,200	J
J3-SC	J3-SC-76TO98-102218	N	7.6	9.8	3,700	J
J5	J5-0TO29-101318	N	0	1	39,000	J
J5-SC	J5-SC-00TO10-102218	N	0	1	34,000	
J5-SC	J5-SC-10TO20-102218	N	1	2	32,000	J
J5-SC	J5-SC-20TO40-102218	N	2	4	41,000	J
J5-SC	J5-SC-40TO60-102218	N	4	6	21,000	J
J5-SC	J5-SC-60TO80-102218	N	6	8	30,000	J
J5-SC	J5-SC-80TO95-102218	N	8	9.5	7,500	J
J5-SC	J5-SC-95TO110-102218	N	9.5	11	7,800	J
J6-SC	J6-SC-111TO121-102218	N	11.1	12.1	3,000	J
J6-SC	J6-SC1B-100TO110-82819	N	10	11	4,800	
J6-SC	J6-SC1B-110TO120-82819	N	11	12	2,500	
J6-SC	J6-SC1B-20TO30-82819	N	2	3	31,700	
J6-SC	J6-SC1B-30TO40-82819	N	3	4	30,700	
J6-SC	J6-SC1B-40TO50-82819	N	4	5	29,500	
J6-SC	J6-SC1B-50TO60-82819	N	5	6	18,800	
J6-SC	J6-SC1B-60TO70-82819	N	6	7	13,500	
J6-SC	J6-SC1B-70TO80-82819	N	7	8	6,200	

Table 1-6
Total Organic Carbon
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Location ID	Sample ID	Sample Type	Start Depth (feet)	End Depth (feet)	TOC Result (mg/kg)	Qualifier
J6-SC	J6-SC1B-80TO90-82819	N	8	9	5,200	
J6-SC	J6-SC1B-90TO100-82819	N	9	10	7,200	
J6-SC	J6-SC-20TO40-102218	N	2	4	39,000	
J6-SC	J6-SC-40TO60-102218	N	4	6	31,000	J
J6-SC	J6-SC-60TO80-102218	N	6	8	14,000	J
J6-SC	J6-SC-80TO96-102218	N	8	9.6	7,500	J
J6-SC	J6-SC-96TO111-102218	N	9.6	11.1	6,300	J
L5	L5-0TO26-101318	N	0	0.9	36,500	J
M4	M4-0TO26-101918	N	0	0.9	33,000	
N5	N5-0TO28-101418	N	0	0.9	35,000	
P3	P3-0TO29-101618	N	0	1	31,000	
P5	P5-0TO26-101618	N	0	0.9	34,000	
SC-S172	PDI-SC-S172-0TO2	N	0	2	44,000	
SC-S172	PDI-SC-S172-2TO4D	FD	2	4	38,000	
SC-S172	PDI-SC-S172-4TO6	N	4	6	24,000	
SC-S172	PDI-SC-S172-6TO8.1	N	6	8.1	23,000	
SC-S185	PDI-SC-S185-0TO2	N	0	2	1,100	J
SC-S185	PDI-SC-S185-2TO4	N	2	4	2,500	
SC-S185	PDI-SC-S185-4TO5.5	N	4	5.5	3,900	
SC-S185	PDI-SC-S185-5.5TO6.5	N	5.5	6.5	8,000	
B252	PDI-SG-B252-BL1	N	0	0.85	10,000	
B254	PDI-SG-B254-BL1	N	0	0.98	24,000	
B255	PDI-SG-B255-BL1	N	0	0.98	25,000	
B258	PDI-SG-B258-BL1	N	0	0.92	21,000	
B260	PDI-SG-B260-BL1	N	0	0.89	19,000	
B263	PDI-SG-B263-BL1	N	0	0.95	22,000	
B265	PDI-SG-B265-BL1	N	0	0.92	18,000	
B271	PDI-SG-B271-BL1	N	0	0.98	25,000	
B272	PDI-SG-B272-BL1	N	0	0.89	13,000	
B273	PDI-SG-B273-BL1	N	0	0.89	25,000	
B279	PDI-SG-B279-BL1	N	0	0.98	22,000	
B280	PDI-SG-B280-BL1	N	0	0.95	30,000	
B284	PDI-SG-B284-BL1	N	0	0.98	29,000	
B288	PDI-SG-B288-BL1	N	0	0.95	27,000	
B296	PDI-SG-B296-BL1	N	0	0.85	28,000	
B313	PDI-SG-B313-BL1-D	FD	0	0.89	40,000	
B315	PDI-SG-B315-BL1	N	0	0.82	6,700	
S172	PDI-SG-S172	N	0	0.98	10,000	
S177	PDI-SG-S177	N	0	0.98	23,000	
S178	PDI-SG-S178	N	0	0.98	23,000	
S186	PDI-SG-S186	N	0	0.98	27,000	
R3	R3-0TO33-101718	N	0	1	32,000	
R4-SC	R4-SC-0TO1-102118	N	0	1	34,000	J

Table 1-6
Total Organic Carbon
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Location ID	Sample ID	Sample Type	Start Depth (feet)	End Depth (feet)	TOC Result (mg/kg)	Qualifier
R4-SC	R4-SC-10TO12-102118	N	10	12	46,000	
R4-SC	R4-SC-120TO138-102118	N	12	13.8	23,000	
R4-SC	R4-SC-138TO147-102118	N	13.8	14.7	1,600	J
R4-SC	R4-SC1B-100TO110-82819	N	10	11	40,600	
R4-SC	R4-SC1B-110TO120-82819	N	11	12	36,500	
R4-SC	R4-SC1B-120TO130-82819	N	12	13	24,900	
R4-SC	R4-SC1B-130TO140-82819	N	13	14	7,900	
R4-SC	R4-SC1B-140TO150-82819	N	14	15	2,400	
R4-SC	R4-SC1B-20TO30-82819	N	2	3	31,100	
R4-SC	R4-SC1B-30TO40-82819	N	3	4	23,800	
R4-SC	R4-SC1B-40TO50-82819	N	4	5	25,000	
R4-SC	R4-SC1B-50TO60-82819	N	5	6	21,300	
R4-SC	R4-SC1B-60TO70-82819	N	6	7	23,800	
R4-SC	R4-SC1B-70TO80-82819	N	7	8	29,300	
R4-SC	R4-SC1B-80TO90-82819	N	8	9	32,100	
R4-SC	R4-SC1B-90TO100-82819	N	9	10	31,400	
R4-SC	R4-SC-1TO2-102118	N	1	2	36,000	J
R4-SC	R4-SC-2TO4-102118	N	2	4	32,000	J
R4-SC	R4-SC-4TO6-102118	N	4	6	29,000	J
R4-SC	R4-SC-6TO8-102118	N	6	8	34,000	J
R4-SC	R4-SC-8TO10-102118	N	8	10	40,000	
R5	R5-0TO25-101618	N	0	0.8	35,000	
SIL-00	SIL-00_20160302_0-30_N	N	0	1	18,000	
SIL-02	SIL-02_20160302_0-30_N	N	0	1	19,000	
SIL-03	SIL-03_20160302_0-30_N	N	0	1	15,000	
SIL-05	SIL-05_20160302_0-30_N	N	0	1	20,000	
SIL-06	SIL-06_20160302_0-30_N	N	0	1	20,000	
SIL-07	SIL-07_20160302_0-30_N	N	0	1	17,000	
SIL-08	SIL-08_20160302_0-30_N	N	0	1	19,000	
SIL-10	SIL-10_20160302_0-30_N	N	0	1	19,000	
SIL-11	SIL-11_20160302_0-30_N	N	0	1	22,000	
SIL-14	SIL-14_20160302_0-30_N	N	0	1	21,000	
SIL-16	SIL-16_20160302_0-30_N	N	0	1	7,500	
SIL-18	SIL-18_20160302_0-30_N	N	0	1	22,000	
SIL-19	SIL-19_20160302_0-30_N	N	0	1	21,000	
T5	T5-0TO26-101618	N	0	0.9	31,000	

Notes:

mg/kg = milligrams per kilogram

FD = Field Duplicate

J = estimated value

N = normal sample

TOC = total organic carbon

Table 2-1
CapSIM Model Input Parameters
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Parameter		Units	Value	Site-Specific	Notes
Underlying Sediment					
Thickness	h_{sed}	cm	30	N/A	Selected largest value in range of sediment thicknesses suggested by ITRC, 2023.
Porosity	f_{sed}		0.449	No	Table 3.2 Total Porosity values assuming an even mixture of fine and coarse sand (Yu et al.,1993) and the average clay, silt, and sand content in subsurface cores (D-8.90, E-9.02, and D-9.09) in the Head of Swan Island Lagoon FSDR Appendix I (PGG, 2019).
Bulk Density	r_{sed}	g/cm^3	1.28	No	Table 2.1 (Yu et al, 1993), and assuming the average clay, silt, and sand content in the subsurface cores (D-8.90, E-9.02, and D-9.09) in the Head of Swan Island Lagoon FSDR Appendix I (PGG, 2019).
Total Organic Carbon	f_{ocsed}	%	2.363	Yes	See Table 1-6 and Section 1.3.
Fraction Organic Carbon	f_{ocsed}		0.02363		
Particle Size		mm	0.06	No	CapSIM default
Permeability		cm^2	6.0E-08	No	Kozeny & Carman calculation completed within CapSIM
Sorption Isotherm			Linear: $K_{oc}f_{oc}$ or K_D	N/A	CapSIM default
Capping Sand					
Porosity	f_{sand}		0.32	No	Table 3.2 Effective Porosity for medium sand (Yu et al, 1993).
Bulk Density	r_{sand}	g/cm^3	1.6	No	Regularly cited bulk density for dry sand.
Total Organic Carbon	$f_{tocsand}$	%	0.1	Yes	Mode of regionally tested and assumed sand cap f_{oc} including the following sites: Former Portland Gas Manufacturing Site (Anchor QEA, 2020), Crawford Street BODR (GeoEngineers, 2022), Pacific Gas & Electric Pier 39 (Haley & Aldrich, 2020), Quendall Terminals Site FS (Aspect & Arcadis, 2013).
Fraction Organic Carbon	f_{ocsand}		0.001		
Particle Size		mm	1.2125	No	Table 3-1 median of United Soil Classification System range of medium sand (0.425-2.0mm) (USDA, 2012).
Permeability		cm^2	5.8E-06	No	Kozeny & Carman calculation completed within CapSIM
Sorption Isotherm			Linear: $K_{oc}f_{oc}$ or K_D	N/A	CapSIM default
Activated Carbon					
Porosity	f_{ac}		0.6	No	CapSIM default
Bulk Density	r_{ac}	g/cm^3	0.5126	No	Equivalent to approximate bulk density of Filtrasorb 400 (32 lbs/ft^3) received from Calgon Carbon in email communiction (Calgon Carbon, 2025)
Total Organic Carbon	f_{tocac}	%	100	No	CapSIM default
Fraction Organic Carbon	f_{ocac}		1.0		
Particle Size		mm	0.65	No	Median effective size of Filtrasorb 400 (CalgonCarbon, 2018)
Permeability		cm^2	3.2E-05	No	Kozeny & Carman calculation completed within CapSIM
Sorption Isotherm			Non-linear	N/A	CapSIM default. See Table 2-2 for specific sorption isotherm and values used.

Table 2-1
CapSIM Model Input Parameters
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Parameter		Units	Value	Site-Specific	Notes
Tektoseal (Textile)					
Porosity	f_{ac}		0.96	No	CapSIM default
Bulk Density	r_{ac}	g/cm^3	0.04	No	CapSIM default
Total Organic Carbon	f_{tocac}	%	0.0	No	CapSIM default
Fraction Organic Carbon	f_{ocac}		0.0		
Particle Size		mm	20	No	CapSIM default
Permeability		cm^2	1.0E-06	No	CapSIM default
Sorption Isotherm			Linear: K_D	N/A	CapSIM default. See Table 2-2 for specific sorption isotherm and values used.
Tektoseal-AC (Activated Carbon)					
Porosity	f_{ac}		0.6	No	Porosity of activated carbon layer in Tektoseal Active AC 3400 received from Huesker, Inc. in email communication (Huesker, 2024).
Bulk Density	r_{ac}	g/cm^3	0.37	No	Bulk density of activated carbon layer in Tektoseal Active AC 3400 received from Huesker, Inc. in email communication (Huesker, 2024).
Total Organic Carbon	f_{tocac}	%	100	No	CapSIM default
Fraction Organic Carbon	f_{ocac}		1.0		
Particle Size		mm	1.5	No	Median particle size of the range (0.5-2.5 mm; 8x30 mesh) of the activated carbon layer in Tektoseal Active AC 3400 received from Huesker, Inc. in email communication (Huesker, 2024).
Permeability		cm^2	1.0E-05	No	Minimum permeability of activated carbon layer in Tektoseal Active AC 3400 received from Huesker, Inc. in email communication (Huesker, 2024).
Sorption Isotherm			Non-linear	N/A	CapSIM default. See Table 2-2 for specific sorption isotherm and values used.
Tektoseal-HM (Heavy Metals)					
Porosity	f_{ac}		0.57	No	(TIG, 2023)
Bulk Density	r_{ac}	g/cm^3	0.43	No	(TIG, 2023)
Total Organic Carbon	f_{tocac}	%	0.0	No	(TIG, 2023)
Fraction Organic Carbon	f_{ocac}		0.0		
Particle Size		mm	1.25	No	(TIG, 2023)
Permeability		cm^2	1.07E-08	No	(TIG, 2023)
Sorption Isotherm			Linear: K_D	N/A	See Table 2-2 for specific sorption isotherm and values used.

Table 2-1
CapSIM Model Input Parameters
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Parameter		Units	Value	Site-Specific	Notes
Erosion Protection Layer (EPL)					
Thickness	h_{ep}	cm	60	N/A	EPL thickness is 2 ft (60 cm), see Figure 4-2.
Porosity	f_{ep}		0.3	No	Yu et al. (1993) Table 3.2 Total Porosity average of range for coarse gravel
Bulk Density	r_{ep}	g/cm^3	1.8	No	From Table 2 from Sakr et al. (2016)
Total Organic Carbon	f_{tocep}	%	0	No	Assumed 0% organic carbon for clean gravel to remove possibility for chemical adsorption in the erosion protection layer
Fraction Organic Carbon	f_{ocep}		0.0		
Particle Size		mm	152.4	Yes	The Project area-wide minimum median armor stone diameter (6 inch) specified in Table 3-1
Permeability		cm^2	0.071	No	Kozeny & Carman calculation completed within CapSIM
Sorption Isotherm			Linear: $K_{oc}f_{oc}$ or K_D	N/A	CapSIM default
Bedding Stone					
Thickness	h_{ep}	cm	30	N/A	The bedding stone thickness is 1 ft (30 cm), see Figure 4-2.
Porosity	f_{ep}		0.28	No	Yu et al. (1993) Table 3.2 Total Porosity arithmetic mean for coarse gravel
Bulk Density	r_{ep}	g/cm^3	1.8	No	From Table 2 from Sakr et al. (2016)
Total Organic Carbon	$f_{tocsand}$	%	0.00	No	Assumed 0% organic carbon for clean gravel to remove possibility for chemical adsorption in the erosion protection layer
Fraction Organic Carbon	f_{ocsand}		0.0		
Particle Size		mm	63.5	Yes	Median of the 2-3 inch diameter angular rock used for bedding stone
Permeability		cm^2	9.5E-03	No	Kozeny & Carman calculation completed within CapSIM
Sorption Isotherm			Linear: $K_{oc}f_{oc}$ or K_D	N/A	CapSIM default
Armor Stone					
Thickness	h_{ep}	cm	60	N/A	Armor stone thickness is 2 ft, see Figure 4-2.
Porosity	f_{ep}		0.3	No	Yu et al. (1993) Table 3.2 Total Porosity average of range for coarse gravel
Bulk Density	r_{ep}	g/cm^3	1.8	No	From Table 2 from Sakr et al. (2016)
Total Organic Carbon	$f_{tocsand}$	%	0.00	No	Assumed 0% organic carbon for clean gravel to remove possibility for chemical adsorption in the erosion protection layer
Fraction Organic Carbon	f_{ocsand}		0.0		
Particle Size		mm	254	Yes	Median of the 2-3 inch diameter angular rock used for armor stone
Permeability		cm^2	2.0E-01	No	Kozeny & Carman calculation completed within CapSIM
Sorption Isotherm			Linear: $K_{oc}f_{oc}$ or K_D	N/A	CapSIM default

Table 2-1
CapSIM Model Input Parameters
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Parameter		Units	Value	Site-Specific	Notes
General Input					
Darcy Velocity		cm/year	128	Yes	Steady flow upwelling assumed (sensitivity analysis completed previously showed no impact of diurnal oscillation period). The value for the main evaluation used was 128 cm/year, consistent with the maximum 50-hour average specific discharge recorded during the Porewater Upwelling Study and reported in Appendix B of the PDI ER (HGL, 2024).
Hyporheic Exchange			None	N/A	Assumed
Erosion			None	N/A	Assumed
Bioturbation		cm	20	Yes	Uniform bioturbation within modeled depth with particle size impact. Depth estimated is the high end of the estimated range reported in Portland Harbor RI/FS Appendix D (EPA, 2016)
Particle Biodiffusion Coefficient		cm^2/year	8.74	No	Selected average literature values (Reible 2014, Sections 2.3.2 and 2.3.3)
Pore Water Biodiffusion Coefficient		cm^2/year	173	No	
Maximum Consolidation Depth		cm	29.2	Yes	Upper bound consolidation values assuming 1 ft minimum dredge of existing material, 3 ft cap thickness, and no allowance for construction staging.
Time to 90% Consolidation		year	1.2	Yes	
Ionic Activity			None	N/A	Assumed
Deposition			None	N/A	Conservatively assumed no sediment deposition
Decay			None	N/A	Conservatively assumed no contaminant decay
Number of Grids per Layer			20	N/A	CapSIM guidance documents recommends using a uniform number of grid cells in each layer (Reible, 2022).
Time Step Size		year	0.1	N/A	CapSIM default
Hydrodynamic Dispersivity		%	10	N/A	CapSIM guidance documents recommend 10% of layer thickness (Reible, 2022)
Porewater DOC Concentration		mg/L	0.0	No	Assumed
Boundary Conditions					
Benthic Boundary Condition Type			Mass Transfer	N/A	CapSIM guidance documents recommendation for evaluating cap breakthrough (Reible, 2022)
Water Dissolved Organic Matter		mg/L	1.0	No	Assumed
Benthic Boundary Water DOC Concentration		µg/L	1.0E-25	No	Assumed value close to 0.
Mass Transfer Coefficient		cm/year	876	No	Equivalent to 0.1 cm/hr, which is one order of magnitude lower than the CapSIM default value (1.0 cm/hr) and falls within EPA recommendation of using a mass transfer coefficient less than 0.5 cm/hr.
Bottom Boundary Condition Type			Fixed Concentration	N/A	Conservatively assumed constant supply of contaminants
Bottom Concentration		µg/L	Variable	N/A	See Tables 1-3a and 1-3b for boundary concentrations for each modeled scenario

Table 2-1
CapSIM Model Input Parameters
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:
% = percent
cm = centimeter
cm/hr = centimeter per hour
cm/year = centimeter per year
cm^2 = centimeter squared
cm^2/year = centimeter squared per year
g/cm^3 = grams per meter cubic
µg/L = micrograms per liter
mg/L = milligrams per liter
mm = millimeter
BODR = basis of design report
N/A = not applicable

References:

Anchor QEA, LLC (Anchor QEA), 2020. Former Portland Gas Manufacturing Site, Appendix C: Cap Modeling Analysis (ECSI No. 1138; p. C–4). At URL: https://www.deq.state.or.us/Webdocs/Controls/Output/PdfHandler.ashx?p=a0e075ed-2d0a-4bab-a24f-2d45f5caf405pdf&s=PGM%20Final%20Design%20Report_Appendix%20C_Cap%20Modeling.pdf

Anchor QEA & Windward Environmental, LLC (Windward), 2023. Preliminary (60%) Remedial Design Remedial Design, Basis of Design Report for Lower Duwamish Waterway Upper Reach, Appendix G: Engineered Cap Chemical Isolation Design Analysis (p. Table G-1) [Basis of Design Report], at URL: https:// https://ldwg.org/wp-content/uploads/2023/02/LDW_BODR_60Pct_AppG_2023-02-20.pdf.

Aspect Consulting, LLC, & Arcadis U.S., Inc., 2013. *Feasibility Study Appendices: Quendall Terminals Site (p. Table B2.4) [Feasibility Study]* , at URL https://apps.ecology.wa.gov/cleanupsearch/document/55399

GeoEngineers, 2022. Riverbank Source Control Measure: Crawford Street South Site (p. Table 15) *[Basis of Design Report]* .

Haley & Aldrich, Inc., 2020. Pacific Gas and Electric Company, Piers 39 To 45 Sediment Investigation Area, Feasibility Study/Remedial Action Plan (p. Table G-2: Cap Model Input Parameters) [Feasibility Study/Remedial Action Plan].

Idriss, I. M., Boulanger, R. W., 2008. Soil Liquefaction During Earthquakes. Monograph, Earthquake Engineering Research Institute (EERI) Publication No. MNO-12, Oakland

HGL, 2024a. *Pre-Design Investigation Evaluation Report, Revision 2* . Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. December.

HGL, 2024b. *Basis of Design Report, Revision 1.* Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. November.

Pacific Groundwater Group (PGG), 2019. *Surface and Subsurface Sediment Field Sampling and Data Report (Head of Swan Island Lagoon Field Sampling and Data Report [FSDR])*

Reible, D. D. 2014. *Sediment and Contaminant Processes* . In D. D. Reible (Ed.), *Processes, Assessment and Remediation of Contaminated Sediments* (pp. 13–24). Springer. https://doi.org/10.1007/978-1-4614-6726-7_2

Reible, D. D., 2022. CapSIM 4.0, at URL https://www.depts.ttu.edu/ceweb/research/reiblesgroup/.

Sakr, M., El-Dash, K., & El-Mahdy, O. 2016. *A Model to Predict Life-Cycle-Cost of Reinforced Concrete Structures in Marine Environments* . Table 2. https://www.semanticscholar.org/paper/A-Model-to-Predict-Life-Cycle-Cost-of-Reinforced-in-Sakr-El-Dash/7c511d2a6e84cbb61a8ac2e9d6e82fcc9a2a4a4b

TIG. 2023, Sediment Cap Design Report for the Bagnoli-Coroglio Site, August 2023.

United States Department of Agriculture, Natural Resources Conservation Service. 2012. National Engineering Handbook (Part 631), Chapter 3: Engineering Classification of Earth Materials. https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=31847.wba

U.S. Environmental Protection Agency (EPA), 2016. *Portland Harbor RI/FS, Final Remedial Investigation Report,* Portland Oregon. United States Environmental Protection Agency Region 10, Seattle, Washington. February 8.

Yu, C., Cheng, J. J., Jones, L. G., Wang, Y. Y., Faillace, E., Loureiro, C., & Chia, Y. P., 1993. Data collection handbook to support modeling the impacts of radioactive material in soil (ANL/EAIS-8). Argonne National Lab., IL (United States). Environmental Assessment and Information Sciences Div, at URL https://doi.org/10.2172/10162250

Table 2-2
Chemical Properties and Partitioning Coefficients for Modeled COCs
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs			Molecular Weight	Diffusivity in Water, D_w[b] [cm^2/s]	Log K_{oc}[c] [log(L/kg)]	$K_{d,sand}$[c] [L/kg]	$K_{d,sediment}$[c] [L/kg]	$K_{d,HM}$[d] [L/kg]	Log K_{doc}[e] [log(L/kg)]	q_{max}[c] [µg/kg]	b[c] [L/µg]	K_F[c] [µg/kg/(µg/L)^N]	Log K_F[c] [log(µg/kg/(µg/L)^N)]	N[c]
Dioxins/Furans	Individual Dioxins/Furans	1,2,3,4,7,8-HxCDF	374.90	4.23E-06	7.40	$K_{oc}f_{oc}$	2.00E+05	-	6.86	-	-	6.31E+07	7.80	0.61
		1,2,3,7,8-PeCDD	356.00	4.16E-06	6.60	$K_{oc}f_{oc}$	6.08E+04	-	6.31	-	-	1.26E+07	7.10	0.61
		2,3,4,7,8-PeCDF	340.00	8.00E-06	5.15	$K_{oc}f_{oc}$	1.05E+04	-	6.23	-	-	2.00E+07	7.30	0.61
		2,3,7,8-TCDD	322.00	5.10E-05	5.40	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	5.65	-	-	3.98E+06	6.60	0.61
		2,3,7,8-TCDF	305.98	4.85E-06	5.18	$K_{oc}f_{oc}$	1.18E+05	-	5.44	-	-	6.31E+06	6.80	0.61
	Total Dioxins/Furans	2,3,7,8-TCDD Eq.[a]	322.00	5.10E-05	5.40	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	5.65	-	-	3.98E+06	6.60	0.61
DDx	DDD		320.04	4.76E-06	5.51	$K_{oc}f_{oc}$	2.05E+04	-	4.78	-	-	2.00E+08	8.30	0.73
	DDE		318.02	5.87E-06	5.64	$K_{oc}f_{oc}$	6.50E+04	-	4.91	-	-	3.16E+08	8.50	0.69
	DDT		354.48	4.95E-06	5.14	$K_{oc}f_{oc}$	2.11E+05	-	5.70	-	-	1.02E+07	7.01	0.50
	DDx[a]		330.85	5.19E-06	5.43	$K_{oc}f_{oc}$	9.90E+04	-	5.13	-	-	1.75E+08	8.24	0.64
Hydrocarbons	TPH-Diesel		200.00	1.00E-05	5.40	$K_{oc}f_{oc}$	2.19E+03	-	0	-	-	$K_{oc}f_{oc}$	-	-
	Xylenes		106.17	8.75E-06	3.11	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	2.08	-	-	1.93E+07	7.29	0.38
Metals	Arsenic		74.92	1.75E-05	0	102.1	374.3	925.4	0	-	-	4.64E+04	4.67	0.50
	Cadmium		112.41	1.75E-05	0	14.85	5.01E+04	615.1	0	-	-	4.62E+03	3.66	0.67
	Chromium (III)		52.00	2.48E-05	0	1.00E+03	3.98E+04	946.6	0	-	-	1.10E+05	5.04	0.44
	Copper		63.55	2.50E-05	0	226.0	5.92E+04	1.15E+03	0	2.86E+07	2.99E-06	-	-	-
	Lead		207.20	1.43E-05	0	5.45E+03	2.00E+04	955.8	0	1.14E+09	1.11E-06	-	-	-
	Manganese		54.94	4.56E-05	0	65.00	70.22	-	0	-	-	6.70E+05	5.83	0.26
	Mercury		200.95	6.30E-06	0	26.10	1.26E+03	934.2	0	-	-	8.34E+05	5.92	0.46
	Vanadium		50.94	4.25E-05	0	1.00E+03	1.00E+03	-	0	-	-	9.34E+04	4.97	0.53
	Zinc		64.39	4.10E-05	0	42.50	3.41E+04	768.9	0	-	-	1.40E+04	4.15	0.56
Organochloride	Aldrin		364.90	4.86E-06	4.68	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	5.66	-	-	1.13E+06	6.05	0.92
	Chlordanes		409.78	4.37E-06	5.10	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	5.51	-	-	1.77E+07	7.25	0.38
	Dieldrin		380.91	4.74E-06	4.59	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	4.44	-	-	1.79E+07	7.25	0.51
	Lindane		290.83	7.34E-06	3.17	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	2.25	-	-	1.46E+07	7.16	0.43
	Pentachlorophenol		266.34	6.10E-06	3.45	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	3.90	-	-	2.49E+07	7.40	0.38
Organotin	Tributyltin		291.04	5.35E-06	4.89	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	3.95	-	-	2.05E+04	4.31	0.84
	cPAHs	Benzo(a)anthracene	228.29	9.00E-06	5.55	$K_{oc}f_{oc}$	1.26E+05	-	4.95	-	-	6.83E+06	6.83	0.50
		Benzo(a)pyrene	252.32	9.00E-06	5.77	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	5.65	-	-	1.61E+06	6.21	0.44
		Benzo(b)fluoranthene	252.31	5.56E-06	6.08	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	5.65	-	-	4.42E+06	6.65	0.37
		Benzo(k)fluoranthene	252.31	5.56E-06	6.09	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	5.65	-	-	3.53E+06	6.55	0.57
		Chrysene	228.30	6.21E-06	5.49	$K_{oc}f_{oc}$	2.45E+05	-	4.95	-	-	3.03E+07	7.48	0.46
		Dibenz(a,h)anthracene	278.36	5.18E-06	6.28	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	6.35	-	-	3.90E+05	5.59	0.75
		Indeno(1,2,3-cd)pyrene	276.33	5.66E-06	6.54	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	6.35	-	-	2.00E+08	8.30	0.82
	Total cPAHs[a]		252.32	9.00E-06	5.77	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	5.65	-	-	1.61E+06	6.21	0.44

Table 2-2
Chemical Properties and Partitioning Coefficients for Modeled COCs
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs			Molecular Weight	Diffusivity in Water, D_w[b] [cm^2/s]	Log K_{oc}[c] [log(L/kg)]	$K_{d,sand}$[c] [L/kg]	$K_{d,sediment}$[c] [L/kg]	$K_{d,HM}$[d] [L/kg]	Log K_{doc}[e] [log(L/kg)]	q_{max}[c] [µg/kg]	b[c] [L/µg]	K_F[c] [µg/kg/(µg/L)^N]	Log K_F[c] [log(µg/kg/(µg/L)^N)]	N[c]
PAHs	PAHs	1-Methylnaphthalene	142.20	7.80E-06	3.40	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	4.59	-	-	2.01E+07	7.30	0.43
		2-Methylnaphthalene	142.20	7.80E-06	3.40	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	4.78	-	-	2.01E+07	7.30	0.43
		Acenaphthene	154.21	7.69E-06	3.60	$K_{oc}f_{oc}$	1.38E+03	-	3.34	-	-	2.66E+07	7.42	0.46
		Acenaphthylene	152.20	6.98E-06	3.70	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	3.09	-	-	3.30E+07	7.52	0.30
		Anthracene	178.23	7.74E-06	4.37	$K_{oc}f_{oc}$	1.41E+04	-	3.56	-	-	4.56E+06	6.66	0.62
		Benzo(e)pyrene	252.32	5.49E-06	6.25	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	6.35	-	-	2.51E+08	8.40	0.82
		Benzo(g,h,i)perylene	276.34	5.23E-06	6.29	$K_{oc}f_{oc}$	1.35E+04	-	6.35	-	-	8.31E+05	5.92	0.37
		Fluoranthene	202.25	6.35E-06	4.69	$K_{oc}f_{oc}$	5.89E+04	-	4.26	-	-	2.77E+07	7.44	0.31
		Fluorene	166.22	7.88E-06	3.96	$K_{oc}f_{oc}$	3.63E+03	-	3.18	-	-	1.04E+07	7.02	0.60
		Naphthalene	128.18	7.50E-06	3.30	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	2.18	-	-	1.42E+07	7.15	0.43
		Phenanthrene	178.24	7.47E-06	4.22	$K_{oc}f_{oc}$	4.67E+03	-	3.56	-	-	5.13E+08	8.71	1.11
		Pyrene	202.26	7.24E-06	4.58	$K_{oc}f_{oc}$	3.05E+04	-	4.26	-	-	2.70E+07	7.43	0.39
	Total PAHs[a]		213.00	6.52E-06	5.40	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	4.40	-	-	1.45E+07	7.16	0.47
PCBs	PCBs	PCB-1	188.65	6.07E-06	3.84	$K_{oc}f_{oc}$	1.56E+03	-	2.67	-	-	7.94E+07	7.90	0.34
		PCB-15	223.10	5.83E-06	4.54	$K_{oc}f_{oc}$	2.49E+04	-	3.26	-	-	3.98E+08	8.60	1.01
		PCB-31	257.54	5.59E-06	4.85	$K_{oc}f_{oc}$	4.14E+05	-	3.53	-	-	7.94E+08	8.90	0.99
		PCB-44	291.99	5.38E-06	4.92	$K_{oc}f_{oc}$	9.87E+05	-	3.58	-	-	3.98E+08	8.60	0.92
		PCB-99	326.43	5.19E-06	5.46	$K_{oc}f_{oc}$	4.53E+05	-	4.04	-	-	5.01E+07	7.70	0.71
		PCB-141	360.88	5.03E-06	5.82	$K_{oc}f_{oc}$	5.97E+05	-	4.34	-	-	2.00E+09	9.30	0.95
		PCB-153	360.88	5.03E-06	5.90	$K_{oc}f_{oc}$	5.50E+05	-	4.41	-	-	2.51E+08	8.40	0.72
		PCB-174	395.32	4.89E-06	6.06	$K_{oc}f_{oc}$	7.90E+05	-	4.55	-	-	2.51E+08	8.40	0.71
		PCB-177	395.32	4.89E-06	6.03	$K_{oc}f_{oc}$	8.43E+05	-	4.53	-	-	2.00E+09	9.30	0.70
		PCB-180	395.32	4.88E-06	6.27	$K_{oc}f_{oc}$	6.69E+05	-	4.73	-	-	1.26E+09	9.10	0.82
		PCB-183	395.32	4.88E-06	6.13	$K_{oc}f_{oc}$	7.30E+05	-	4.61	-	-	2.00E+08	8.30	0.69
		PCB-199	429.77	4.75E-06	6.13	$K_{oc}f_{oc}$	7.28E+06	-	4.61	-	-	1.00E+08	8.00	0.70
		PCB-206	464.21	4.62E-06	6.88	$K_{oc}f_{oc}$	2.81E+06	-	5.24	-	-	1.00E+08	8.00	0.60
		PCB-209	498.66	4.51E-06	6.96	$K_{oc}f_{oc}$	9.32E+06	-	5.31	-	-	7.94E+06	6.90	1.00
	Total PCBs[a]		376.00	5.11E-06	5.48	$K_{oc}f_{oc}$	4.47E+05	-	3.81	-	-	2.40E+08	8.38	0.81
Phthalates/ Plasticizers	BEHP		390.56	3.66E-06	5.05	$K_{oc}f_{oc}$	$K_{oc}f_{oc}$	-	6.35	-	-	3.57E+05	5.55	1.50

Table 2-2
Chemical Properties and Partitioning Coefficients for Modeled COCs
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:
cm = centimeter
cm^2 = centimeter squared
cm^2/year = centimeter squared per year
µg/L = micrograms per liter
K_{oc} = organic carbon-water partition coefficient
K_{doc} = dissolved organic carbon-water partition coefficient
K_F = Freundlich partition coefficient
B(a)P = benzo(a)pyrene
cPAHs = carcinogenic polycyclic aromatic hydrocarbons
Eq. = equivalents
PAHs = polycyclic aromatic hydrocarbons
PCBs = polychlorinated biphenyls
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
TCDD = tetrachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzofuran
a. Model inputs for DDx, Total PAHs, and Total PCBs are based on the average values of the individual COCs. Total cPAHs is based on benzo(a)pyrene. Total Dioxins/Furans is based on 2,3,7,8-TCDD.
b. Diffisivities were sourced from: (New Mexico Environment Department, 2021) for 1-Methylnaphthalene, 2-Methylnaphthalene, Beta-chloronaphthalene, Phenanthrene; (Division of Spill Prevention and Response Contaminated Sites Program, 2018) for Acenaphthylene and Benzo(g,h,i)perylene; (EPA, 1996) for B(a)P, Fluorene, Naphthalene, DDD, DDE, DDT; (NJDEP, 2014) for BEHP, Chlordanes, Dieldrin, Lindane, Pentachlorophenol; (California Department of Toxic Substances Control, 2009) for Diesel; (Addeck et al., 2014) for HxCDF and TCDF; (GeoEnginers, 2022) for PeCDD; (Gilkinson, 1999) for PeCDF; (Addeck et al., 2012) for TCDD; (RAIS Toxicity Values and Physical Parameters Search, n.d.) for Tributyltin; (Center for Environmental & Human Toxicology, University of Florida, 2005) for Vanadium; and the CapSim defaults for all individual cPAHs and PCBs, Acenaphthene, Aldrin, Anthracene, Arsenic, Benzene, Benzo(e)pyrene, Cadmium, Chromium, Copper, Fluoranthene, Lead, Manganese, Mercury, Pyrene, Total PAHs, Total PCBs.
c. The sources for COC sorption to sediment and capping materials are detailed in Appendix C.
d. COC sorption parameters for the amendment material of the Tektoseal-HM product were obtained from TIG (2023).
e. Log Kdoc were sourced from: (The Louis Berger Group, 2014) and the Burkhard (2000) method for HxCDF, TCDF; (EPA, 2023) and the Burkhard method for BEHP; (The Louis Berger Group, 2014) and estimating method Kdoc = Kow/10 for PeCDF, TCDD; (Meador et al, 1995) and estimating method Kdoc = Kow/10 for 1-Methylnaphthalene, 2-Methylnaphthalene; (Mabey et al, 1982) for Beta-chloronaphthalene; (Burgess et al, 2012) for Dieldrin; (Fukushima et al, 2005) for Lindane, Pentachlorophenol, Tributyltin; (GeoEngineers, 2022) for PeCDD, Total PAHs, Total PCBs; CapSim reference documents for Acenaphthylene, Fluorene, Phenanthrene; and the CapSim Defaults for all Individual cPAHs and PCBs, Acenaphthene, Aldrin, Anthracene, Arsenic, Benzo(e)pyrene, Benzene, Cadmium, Chlordanes, Chromium, Copper, DDD, DDE, DDT, Fluoranthene, Lead, Manganese, Mercury, Pyrene, Naphthalene, Toluene, Xylenes, Zine. Data was unavailable for Diesel, and 0 was assumed.

References

Addeck, A., Croes, K., Van Langenhove, K., Denison, M., Elskens, M., & Baeyens, W., (2012). *Dioxin analysis in water by using a passive sampler and CALUX bioassay* . Talanta, 88, 73–78, at URL https://doi.org/10.1016/j.talanta.2011.10.009.

Addeck, A., Croes, K., Van Langenhove, K., Denison, M. S., Elhamalawy, A., Elskens, M., & Baeyens, W. (2014). *Time-integrated Monitoring of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDD/Fs) in Urban and Industrial Wastewaters Using a Ceramic Toximeter and the CALUX Bioassay* . Chemosphere, 94, 27–35, at URL https://doi.org/10.1016/j.chemosphere.2013.08.075.

Burgess, R. M., Kane Driscoll, S. B., Ozretich, R. J., Mount, D. R., & Reiley, M. C. (2012). *Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: Procedures for the Determination of the Freely Dissolved Interstitial Water Concentrations of Nonionic Organics* . U.S. Environmental Protection Agency (USEPA). www.epa.gov/ord

Burkhard, L. P. (2000). *Estimating Dissolved Organic Carbon Partition Coefficients for Nonionic Organic Chemicals* . Environmental Science & Technology, 34(22), 4663–4668. https://doi.org/10.1021/es001269l

California Department of Toxic Substances Control. (2009). *Evaluating Human Health Risks from Total Petroleum Hydrocarbons (TPH) [Interim Guidance]* . https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/01/TPH-Guidance-final-June-16-2009.pdf

Center for Environmental & Human Toxicology, University of Florida. (2005). *Technical Report: Development of Cleanup Target Levels (CTLs)* For Chapter 62-777, F.A.C. (p. Table 4). https://floridadep.gov/sites/default/files/1-TechnicalReport2FinalFeb2005_0.pdf

Division of Spill Prevention and Response Contaminated Sites Program, (2018). *Procedures for Calculating Cleanup Levels. Alaska Department of Environmental Conservation* , at URL https://dec.alaska.gov/media/7543/20180201_pccl.pdf&sa=U&ved=2ahUKEwj86_fR6rKCAxXoFjQIHYYtC4wQFnoECAIQAg&usg=AOvVaw3qVJbLJoCPaQKExlBG-YVF. November.

EPA, (1996). *Soil Screening Guidance* (Technical Background Document No. 9355.4-17A). Office of Solid Waste and Emergency Response. https://archive.epa.gov/region9/superfund/web/pdf/ssg_nonrad_technical-2.pdf

EPA, (2023). *Technical Background Document Part 5: Chemical-Specific Parameters (Superfund Soil Screening Guidance, p. Table 39)* , at URL https://semspub.epa.gov/work/HQ/175235.pdf.

Fukushima, M., Terashima, M., Yabuta, H., Tanaka, F., & Tatsumi, K. (2005). *Evaluation of Interactions between Hydrophobic Organic Pollutants and Humic Substances* . Humic Substances Research, 2, Table 1. https://www.research.kobe-u.ac.jp/ans-soil/jhss/_userdata/hsr2_pp1.pdf

GeoEngineers, (2022). *Riverbank Source Control Measure: Crawford Street South Site (p. Table 15) [Basis of Design Report]* .

Gilkinson, M., (1999). *Sample Calculation for Dioxin in Support of the HWC Background Document* . U.S. Environmental Protection Agency, at URL https://archive.epa.gov/epawaste/hazard/tsd/td/web/pdf/dfsample.pdf.

Mabey, W. R., Smith, J. H., Podoll, R. T., Johnson, H. L., Mill, T., Chou, T.-W., Gates, J., Waight Partridge, I., Jaber, H., & Vandenberg, D., (1982). *Aquatic Fate Process Data for Organic Priority Pollutants (p. 129).* U.S. EPA Office of Water Regulations and Standards, at URL https://nepis.epa.gov/Exe/ZyPDF.cgi/9100O12M.PDF?Dockey=9100O12M.PDF.

Meador, J. P., Casillas, E., Sloan, C. A., & Varanasi, U., (1995). *Comparative bioaccumulation of polycyclic aromatic hydrocarbons from sediment by two infaunal invertebrates. Marine Ecology Progress Series, 123, 107–124* , at URL https://www.int-res.com/articles/meps/123/m123p107.pdf.

New Jersey Department of Environmental Protection [NJDEP], (2014). *Using The Combined Sesoil/At123d Models To Develop Site-Specific Impact To Ground Water Soil Remediation Standards For Mobile Contaminants (Guidance Document Version 2.1; p. Table 1*), at URL https://www.nj.gov/dep/srp/guidance/rs/at123d_guidance.pdf.

New Mexico Environment Department. (2021). Risk Assessment Guidance for Site Investigations and Remediation Volume 1: Soil Screening Guidance for Human Health Risk Assessments. at URL https://www.env.nm.gov/hazardous-waste/wp-content/uploads/sites/10/2021/12/NMED_SSG-VOL_I_Dec_2_2021.pdf

RAIS Toxicity Values and Physical Parameters Search , (n.d.). The Risk Assessment Information System. Retrieved November 22, 2023, from https://rais.ornl.gov/cgi-bin/tools/TOX_search

The Louis Berger Group, Battelle, & HDR|HydroQual, (2014). *Lower Passaic River: Contaminant Fate and Transport Model.* U.S. Environmental Protection Agency, at URL https://sharepoint.ourpassaic.org/Public%20Documents/2014_02_10_App_BIII-Carbon_Contaminants_HDR.pdf.

Table 2-3a
Time-to-Breakthrough Summary Results of Sand and Amended Sand Cap Modeling, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Time-to-Breakthrough of CUL Sediment-Porewater Equilibrium Calculation					
		30 cm of Unamended Sand	15 cm of 5% GAC-Amended Sand	30 cm of 5% GAC-Amended Sand	30 cm of 10% GAC-Amended Sand	30 cm of 20% GAC-Amended Sand	76 cm of 20% GAC-Amended Sand
Dioxins/Furans	1,2,3,4,7,8-HxCDF	100+	100+	100+	100+	100+	100+
	1,2,3,7,8-PeCDD	100+	100+	100+	100+	100+	100+
	2,3,4,7,8-PeCDF	**17**	100+	100+	100+	100+	100+
	2,3,7,8-TCDD	**33**	100+	100+	100+	100+	100+
	2,3,7,8-TCDF	**23**	100+	100+	100+	100+	100+
	Total Dioxins/Furans	**45**	100+	100+	100+	100+	100+
	Summed Dioxins/Furans	100+	100+	100+	100+	100+	100+
DDx	DDD	100+	100+	100+	100+	100+	100+
	DDE	100+	100+	100+	100+	100+	100+
	DDT	100+	100+	100+	100+	100+	100+
	DDx	**59**	100+	100+	100+	100+	100+
	Summed DDx	**48**	100+	100+	100+	100+	100+
Hydrocarbons	TPH-Diesel	**39**	100+	100+	100+	100+	100+
	Xylenes	-	-	-	-	-	-
Metals	Arsenic	**29**	**77**	100+	100+	100+	100+
	Cadmium	**8**	100+	100+	100+	100+	100+
	Chromium (III)	-	-	-	-	-	-
	Copper	100+	100+	100+	100+	100+	100+
	Lead	100+	100+	100+	100+	100+	100+
	Manganese	-	-	-	-	-	-
	Mercury	**6**	100+	100+	100+	100+	100+
	Vanadium	-	-	-	-	-	-
	Zinc	100+	100+	100+	100+	100+	100+
Organochloride	Aldrin	100+	100+	100+	100+	100+	100+
	Chlordanes	**29**	100+	100+	100+	100+	100+
	Dieldrin	**7**	100+	100+	100+	100+	100+
	Lindane	100+	100+	100+	100+	100+	100+
	Pentachlorophenol	-	-	-	-	-	-
Organotin	Tributyltin	100+	100+	100+	100+	100+	100+

Table 2-3a
Time-to-Breakthrough Summary Results of Sand and Amended Sand Cap Modeling, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Time-to-Breakthrough of CUL Sediment-Porewater Equilibrium Calculation					
		30 cm of Unamended Sand	15 cm of 5% GAC-Amended Sand	30 cm of 5% GAC-Amended Sand	30 cm of 10% GAC-Amended Sand	30 cm of 20% GAC-Amended Sand	76 cm of 20% GAC-Amended Sand
cPAHs	Benzo(a)anthracene	-	-	-	-	-	-
	Benzo(a)pyrene	-	-	-	-	-	-
	Benzo(b)fluoranthene	-	-	-	-	-	-
	Benzo(k)fluoranthene	-	-	-	-	-	-
	Chrysene	-	-	-	-	-	-
	Dibenz(a,h)anthracene	-	-	-	-	-	-
	Indeno(1,2,3-cd)pyrene	-	-	-	-	-	-
	Total cPAHs	100+	100+	100+	100+	100+	100+
	Summed cPAHs	100+	100+	100+	100+	100+	100+
PAHs	1-Methylnaphthalene	-	-	-	-	-	-
	2-Methylnaphthalene	-	-	-	-	-	-
	Acenaphthene	-	-	-	-	-	-
	Acenaphthylene	-	-	-	-	-	-
	Anthracene	-	-	-	-	-	-
	Benzo(e)pyrene	-	-	-	-	-	-
	Benzo(g,h,i)perylene	-	-	-	-	-	-
	Fluoranthene	-	-	-	-	-	-
	Fluorene	-	-	-	-	-	-
	Naphthalene	-	-	-	-	-	-
	Phenanthrene	-	-	-	-	-	-
	Pyrene	-	-	-	-	-	-
	Total PAHs	100+	100+	100+	100+	100+	100+
	Summed PAHs	**1**	100+	100+	100+	100+	100+

Table 2-3a
Time-to-Breakthrough Summary Results of Sand and Amended Sand Cap Modeling, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Time-to-Breakthrough of CUL Sediment-Porewater Equilibrium Calculation					
		30 cm of Unamended Sand	**15 cm of 5% GAC-Amended Sand**	**30 cm of 5% GAC-Amended Sand**	**30 cm of 10% GAC-Amended Sand**	**30 cm of 20% GAC-Amended Sand**	**76 cm of 20% GAC-Amended Sand**
PCBs	PCB-1	**1**	100+	100+	100+	100+	100+
	PCB-15	**3**	100+	100+	100+	100+	100+
	PCB-31	**12**	100+	100+	100+	100+	100+
	PCB-44	**19**	100+	100+	100+	100+	100+
	PCB-99	**52**	100+	100+	100+	100+	100+
	PCB-141	100+	100+	100+	100+	100+	100+
	PCB-153	100+	100+	100+	100+	100+	100+
	PCB-174	100+	100+	100+	100+	100+	100+
	PCB-177	100+	100+	100+	100+	100+	100+
	PCB-180	100+	100+	100+	100+	100+	100+
	PCB-183	100+	100+	100+	100+	100+	100+
	PCB-199	100+	100+	100+	100+	100+	100+
	PCB-206	100+	100+	100+	100+	100+	100+
	PCB-209	100+	100+	100+	100+	100+	100+
	Total PCBs	**30**	100+	100+	100+	100+	100+
	Summed PCBs	**1**	100+	100+	100+	100+	100+
Phthalates/ Plasticizers	BEHP	**19**	100+	100+	100+	100+	100+

Table 2-3a
Time-to-Breakthrough Summary Results of Sand and Amended Sand Cap Modeling, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:
100+ = time-to-breakthrough exceeds 100 years
% = percent
BEHP = bis(2-ethylhexyl) phthalate
Chlordanes = Total Chlordane (Calculated U = 1/2)
COC = contaminant of concern
cPAHs = carcinogenic polycyclic aromatic hydrocarbons
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
DDx = DDD + DDE + DDT
Diesel = Residual Range Organics (C25-C36)
GAC = granular activated carbon
HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran
Lindane = Gamma BHC
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
TCDD = tetrachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzofuran
Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent
Total cPAHs = Benzo(a)pyrene Equivalent
GAC amendment percentage is by weight.
Time-to-breakthrough is defined as the time in years elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.
Cap performance point (CPP) is at the top surface of the chemical isolation layer, 30cm below cap-surface water interface.

Table 2-3b
Time-to-Breakthrough Summary Results of Sand and Amended Sand Cap Modeling, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Time-to-Exceedance of Groundwater and Surface Water CUL					
		30 cm of Unamended Sand	15 cm of 5% GAC-Amended Sand	30 cm of 5% GAC-Amended Sand	30 cm of 10% GAC-Amended Sand	30 cm of 20% GAC-Amended Sand	76 cm of 20% GAC-Amended Sand
Dioxins/Furans	1,2,3,4,7,8-HxCDF	100+	100+	100+	100+	100+	100+
	1,2,3,7,8-PeCDD	100+	100+	100+	100+	100+	100+
	2,3,4,7,8-PeCDF	11	100+	100+	100+	100+	100+
	2,3,7,8-TCDD	14	100+	100+	100+	100+	100+
	2,3,7,8-TCDF	25	100+	100+	100+	100+	100+
	Total Dioxins/Furans	10	100+	100+	100+	100+	100+
	Summed Dioxins/Furans	9	100+	100+	100+	100+	100+
DDx	DDD	50	100+	100+	100+	100+	100+
	DDE	74	100+	100+	100+	100+	100+
	DDT	38	100+	100+	100+	100+	100+
	DDx	100+	100+	100+	100+	100+	100+
	Summed DDx	100+	100+	100+	100+	100+	100+
Hydrocarbons	TPH-Diesel	-	-	-	-	-	-
	Xylenes	100+	100+	100+	100+	100+	100+
Metals	Arsenic	7	55	100+	100+	100+	100+
	Cadmium	100+	100+	100+	100+	100+	100+
	Chromium (III)	100+	100+	100+	100+	100+	100+
	Copper	100+	53	94	83	66	100+
	Lead	100+	100+	100+	100+	100+	100+
	Manganese	8	8	18	25	35	95
	Mercury	-	-	-	-	-	-
	Vanadium	100+	100+	100+	100+	100+	100+
	Zinc	100+	100+	100+	100+	100+	100+
Organochloride	Aldrin	4	100+	100+	100+	100+	100+
	Chlordanes	17	100+	100+	100+	100+	100+
	Dieldrin	-	-	-	-	-	-
	Lindane	-	-	-	-	-	-
	Pentachlorophenol	1	100+	100+	100+	100+	100+
Organotin	Tributyltin	15	100+	100+	100+	100+	100+

Table 2-3b
Time-to-Breakthrough Summary Results of Sand and Amended Sand Cap Modeling, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Time-to-Exceedance of Groundwater and Surface Water CUL					
		30 cm of Unamended Sand	15 cm of 5% GAC-Amended Sand	30 cm of 5% GAC-Amended Sand	30 cm of 10% GAC-Amended Sand	30 cm of 20% GAC-Amended Sand	76 cm of 20% GAC-Amended Sand
cPAHs	Benzo(a)anthracene	100+	100+	100+	100+	100+	100+
	Benzo(a)pyrene	55	100+	100+	100+	100+	100+
	Benzo(b)fluoranthene	100+	100+	100+	100+	100+	100+
	Benzo(k)fluoranthene	100+	100+	100+	100+	100+	100+
	Chrysene	100+	100+	100+	100+	100+	100+
	Dibenz(a,h)anthracene	100+	100+	100+	100+	100+	100+
	Indeno(1,2,3-cd)pyrene	100+	100+	100+	100+	100+	100+
	Total cPAHs	49	100+	100+	100+	100+	100+
	Summed cPAHs	42	100+	100+	100+	100+	100+
PAHs	1-Methylnaphthalene	-	-	-	-	-	-
	2-Methylnaphthalene	1	100+	100+	100+	100+	100+
	Acenaphthene	100+	100+	100+	100+	100+	100+
	Acenaphthylene	-	-	-	-	-	-
	Anthracene	100+	100+	100+	100+	100+	100+
	Benzo(e)pyrene	-	-	-	-	-	-
	Benzo(g,h,i)perylene	100+	100+	100+	100+	100+	100+
	Fluoranthene	100+	100+	100+	100+	100+	100+
	Fluorene	100+	100+	100+	100+	100+	100+
	Naphthalene	100+	100+	100+	100+	100+	100+
	Phenanthrene	100+	100+	100+	100+	100+	100+
	Pyrene	100+	100+	100+	100+	100+	100+
	Total PAHs	-	-	-	-	-	-
	Summed PAHs	-	-	-	-	-	-

Table 2-3b
Time-to-Breakthrough Summary Results of Sand and Amended Sand Cap Modeling, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Time-to-Exceedance of Groundwater and Surface Water CUL					
		30 cm of Unamended Sand	15 cm of 5% GAC-Amended Sand	30 cm of 5% GAC-Amended Sand	30 cm of 10% GAC-Amended Sand	30 cm of 20% GAC-Amended Sand	76 cm of 20% GAC-Amended Sand
PCBs	PCB-1	1 (SW) / 2 (GW)	100+	100+	100+	100+	100+
	PCB-15	3 (SW)	100+	100+	100+	100+	100+
	PCB-31	9 (SW)	100+	100+	100+	100+	100+
	PCB-44	13 (SW)	100+	100+	100+	100+	100+
	PCB-99	38 (SW)	100+	100+	100+	100+	100+
	PCB-141	93 (SW)	100+	100+	100+	100+	100+
	PCB-153	100+ (SW)	100+	100+	100+	100+	100+
	PCB-174	100+	100+	100+	100+	100+	100+
	PCB-177	100+	100+	100+	100+	100+	100+
	PCB-180	100+	100+	100+	100+	100+	100+
	PCB-183	100+	100+	100+	100+	100+	100+
	PCB-199	100+	100+	100+	100+	100+	100+
	PCB-206	100+	100+	100+	100+	100+	100+
	PCB-209	100+	100+	100+	100+	100+	100+
	Total PCBs	26 (SW)	100+	100+	100+	100+	100+
	Summed PCBs	1 (SW) / 2 (GW)	100+	100+	100+	100+	100+
Phthalates/ Plasticizers	BEHP	33	100+	100+	100+	100+	100+

Table 2-3b
Time-to-Breakthrough Summary Results of Sand and Amended Sand Cap Modeling, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:

100+ = time-to-breakthrough exceeds 100 years

% = percent

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

Total cPAHs = Benzo(a)pyrene Equivalent

GAC amendment percentage is by weight.

Time-to-breakthrough is defined as the time elapsed in years between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Cap performance point (CPP) is at the top surface of the chemical isolation layer, 30cm below cap-surface water interface.

Chromium (III), DDx, and PCBs have different Table 17 surface water (SW) and groundwater (GW) CULs. For these COCs, the applicable criteria is notated alongside the time-to-exceedance, with the lower CUL listed first if both are exceeded.

Table 2-3c
Time-to-Breakthrough Summary Results of Tektoseal Modeling, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Time-to-Breakthrough (TTB) of CUL Sediment-Porewater Equilibrium Calculation				
		2 cm Tektoseal-AC	2 cm Tektoseal-HM	2 cm Hybrid Tektoseal-AC and Tektoseal-HM	2 cm Tektoseal-AC and 2 cm Tektoseal-HM	2 Layers of 2 cm Tektoseal-AC
Dioxins/Furans	1,2,3,4,7,8-HxCDF	100+	**1**	100+	100+	100+
	1,2,3,7,8-PeCDD	100+	**1**	100+	100+	100+
	2,3,4,7,8-PeCDF	100+	**1**	100+	100+	100+
	2,3,7,8-TCDD	100+	**1**	100+	100+	100+
	2,3,7,8-TCDF	100+	**1**	100+	100+	100+
	Total Dioxins/Furans	100+	**1**	100+	100+	100+
	Summed Dioxins/Furans	100+	**1**	100+	100+	100+
DDx	DDD	100+	100+	100+	100+	100+
	DDE	100+	100+	100+	100+	100+
	DDT	100+	100+	100+	100+	100+
	DDx	100+	**1**	100+	100+	100+
	Summed DDx	100+	**1**	100+	100+	100+
Hydrocarbons	TPH-Diesel	100+	**1**	**53**	100+	100+
	Xylenes	-	-	-	-	-
Metals	Arsenic	**13**	**1**	**7**	**16**	**33**
	Cadmium	**20**	**2**	**10**	**22**	**68**
	Chromium (III)	-	-	-	-	-
	Copper	100+	100+	100+	100+	100+
	Lead	100+	100+	100+	100+	100+
	Manganese	-	-	-	-	-
	Mercury	100+	**1**	100+	100+	100+
	Vanadium	-	-	-	-	-
	Zinc	100+	100+	100+	100+	100+
Organochloride	Aldrin	100+	100+	100+	100+	100+
	Chlordanes	100+	**1**	100+	100+	100+
	Dieldrin	100+	**1**	100+	100+	100+
	Lindane	100+	100+	100+	100+	100+
	Pentachlorophenol	-	-	-	-	-
Organotin	Tributyltin	100+	100+	100+	100+	100+

Table 2-3c
Time-to-Breakthrough Summary Results of Tektoseal Modeling, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Time-to-Breakthrough (TTB) of CUL Sediment-Porewater Equilibrium Calculation				
		2 cm Tektoseal-AC	2 cm Tektoseal-HM	2 cm Hybrid Tektoseal-AC and Tektoseal-HM	2 cm Tektoseal-AC and 2 cm Tektoseal-HM	2 Layers of 2 cm Tektoseal-AC
cPAHs	Benzo(a)anthracene	-	-	-	-	-
	Benzo(a)pyrene	-	-	-	-	-
	Benzo(b)fluoranthene	-	-	-	-	-
	Benzo(k)fluoranthene	-	-	-	-	-
	Chrysene	-	-	-	-	-
	Dibenz(a,h)anthracene	-	-	-	-	-
	Indeno(1,2,3-cd)pyrene	-	-	-	-	-
	Total cPAHs	100+	**1**	100+	100+	100+
	Summed cPAHs	100+	**1**	100+	100+	100+
PAHs	1-Methylnaphthalene	-	-	-	-	-
	2-Methylnaphthalene	-	-	-	-	-
	Acenaphthene	-	-	-	-	-
	Acenaphthylene	-	-	-	-	-
	Anthracene	-	-	-	-	-
	Benzo(e)pyrene	-	-	-	-	-
	Benzo(g,h,i)perylene	-	-	-	-	-
	Fluoranthene	-	-	-	-	-
	Fluorene	-	-	-	-	-
	Naphthalene	-	-	-	-	-
	Phenanthrene	-	-	-	-	-
	Pyrene	-	-	-	-	-
	Total PAHs	100+	100+	100+	100+	100+
	Summed PAHs	100+	**1**	100+	100+	100+

Table 2-3c
Time-to-Breakthrough Summary Results of Tektoseal Modeling, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Time-to-Breakthrough (TTB) of CUL Sediment-Porewater Equilibrium Calculation				
		2 cm Tektoseal-AC	2 cm Tektoseal-HM	2 cm Hybrid Tektoseal-AC and Tektoseal-HM	2 cm Tektoseal-AC and 2 cm Tektoseal-HM	2 Layers of 2 cm Tektoseal-AC
PCBs	PCB-1	100+	**1**	100+	100+	100+
	PCB-15	100+	**1**	100+	100+	100+
	PCB-31	100+	**1**	100+	100+	100+
	PCB-44	100+	**1**	100+	100+	100+
	PCB-99	100+	**1**	100+	100+	100+
	PCB-141	100+	**1**	100+	100+	100+
	PCB-153	100+	**1**	100+	100+	100+
	PCB-174	100+	**1**	100+	100+	100+
	PCB-177	100+	**1**	100+	100+	100+
	PCB-180	100+	**1**	100+	100+	100+
	PCB-183	100+	**1**	100+	100+	100+
	PCB-199	100+	100+	100+	100+	100+
	PCB-206	100+	**1**	100+	100+	100+
	PCB-209	100+	100+	100+	100+	100+
	Total PCBs	100+	**1**	100+	100+	100+
	Summed PCBs	100+	**1**	100+	100+	100+
Phthalates/ Plasticizers	BEHP	**88**	**1**	**43**	**88**	100+

Table 2-3c
Time-to-Breakthrough Summary Results of Tektoseal Modeling, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:

100+ = time-to-breakthrough exceeds 100 years

% = percent

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

Total cPAHs = Benzo(a)pyrene Equivalent

GAC amendment percentage is by weight.

Time-to-breakthrough is defined as the time in years elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Cap performance point (CPP) is at the top surface of the chemical isolation layer, 30cm below cap-surface water interface.

Table 2-3d
Time-to-Exceedance of Groundwater and Surface Water CUL, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Time-to-Breakthrough (TTB) of Groundwater and Surface Water CUL				
		2 cm Tektoseal-AC	2 cm Tektoseal-HM	2 cm Hybrid Tektoseal-AC and Tektoseal-HM	2 cm Tektoseal-AC and 2 cm Tektoseal-HM	2 Layers of 2 cm Tektoseal-AC
Dioxins/Furans	1,2,3,4,7,8-HxCDF	100+	1	100+	100+	100+
	1,2,3,7,8-PeCDD	100+	1	100+	100+	100+
	2,3,4,7,8-PeCDF	100+	1	100+	100+	100+
	2,3,7,8-TCDD	100+	1	100+	100+	100+
	2,3,7,8-TCDF	100+	1	100+	100+	100+
	Total Dioxins/Furans	100+	1	100+	100+	100+
	Summed Dioxins/Furans	100+	1	100+	100+	100+
DDx	DDD	100+	1	100+	100+	100+
	DDE	100+	1	100+	100+	100+
	DDT	100+	1	100+	100+	100+
	DDx	100+	100+	100+	100+	100+
	Summed DDx	100+	100+	100+	100+	100+
Hydrocarbons	TPH-Diesel	-	-	-	-	-
	Xylenes	100+	100+	100+	100+	100+
Metals	Arsenic	5	1	2	5	16
	Cadmium	100+	100+	100+	100+	100+
	Chromium (III)	100+	100+	100+	100+	100+
	Copper	4	5	4	10	8
	Lead	4	4	4	6	5
	Manganese	1	1	1	1	2
	Mercury	-	-	-	-	-
	Vanadium	7	1	4	10	21
	Zinc	100+	100+	100+	100+	100+
Organochloride	Aldrin	100+	1	100+	100+	100+
	Chlordanes	100+	1	100+	100+	100+
	Dieldrin	-	-	-	-	-
	Lindane	-	-	-	-	-
	Pentachlorophenol	100+	1	100+	100+	100+
Organotin	Tributyltin	21	1	10	21	61

Table 2-3d
Time-to-Exceedance of Groundwater and Surface Water CUL, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Time-to-Breakthrough (TTB) of Groundwater and Surface Water CUL				
		2 cm Tektoseal-AC	2 cm Tektoseal-HM	2 cm Hybrid Tektoseal-AC and Tektoseal-HM	2 cm Tektoseal-AC and 2 cm Tektoseal-HM	2 Layers of 2 cm Tektoseal-AC
cPAHs	Benzo(a)anthracene	100+	1	100+	100+	100+
	Benzo(a)pyrene	100+	1	100+	100+	100+
	Benzo(b)fluoranthene	100+	1	100+	100+	100+
	Benzo(k)fluoranthene	100+	1	100+	100+	100+
	Chrysene	100+	100+	100+	100+	100+
	Dibenz(a,h)anthracene	100+	1	100+	100+	100+
	Indeno(1,2,3-cd)pyrene	100+	1	100+	100+	100+
	Total cPAHs	100+	1	100+	100+	100+
	Summed cPAHs	100+	1	100+	100+	100+
PAHs	1-Methylnaphthalene	-	-	-	-	-
	2-Methylnaphthalene	100+	1	100+	100+	100+
	Acenaphthene	100+	100+	100+	100+	100+
	Acenaphthylene	-	-	-	-	-
	Anthracene	100+	100+	100+	100+	100+
	Benzo(e)pyrene	-	-	-	-	-
	Benzo(g,h,i)perylene	100+	100+	100+	100+	100+
	Fluoranthene	100+	100+	100+	100+	100+
	Fluorene	100+	100+	100+	100+	100+
	Naphthalene	100+	100+	100+	100+	100+
	Phenanthrene	100+	100+	100+	100+	100+
	Pyrene	100+	100+	100+	100+	100+
	Total PAHs	-	-	-	-	-
	Summed PAHs	-	-	-	-	-

Table 2-3d
Time-to-Exceedance of Groundwater and Surface Water CUL, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Time-to-Breakthrough (TTB) of Groundwater and Surface Water CUL				
		2 cm Tektoseal-AC	2 cm Tektoseal-HM	2 cm Hybrid Tektoseal-AC and Tektoseal-HM	2 cm Tektoseal-AC and 2 cm Tektoseal-HM	2 Layers of 2 cm Tektoseal-AC
PCBs	PCB-1	100+	1 (SW) / 1 (GW)	100+	100+	100+
	PCB-15	100+	1 (SW)	100+	100+	100+
	PCB-31	100+	1 (SW)	100+	100+	100+
	PCB-44	100+	1 (SW)	100+	100+	100+
	PCB-99	100+	1 (SW)	100+	100+	100+
	PCB-141	100+	1 (SW)	100+	100+	100+
	PCB-153	100+	1 (SW)	100+	100+	100+
	PCB-174	100+	1 (SW)	100+	100+	100+
	PCB-177	100+	1 (SW)	100+	100+	100+
	PCB-180	100+	1 (SW)	100+	100+	100+
	PCB-183	100+	1 (SW)	100+	100+	100+
	PCB-199	100+	1 (SW)	100+	100+	100+
	PCB-206	100+	1 (SW)	100+	100+	100+
	PCB-209	100+	1 (SW)	100+	100+	100+
	Total PCBs	100+	1 (SW)	100+	100+	100+
	Summed PCBs	100+	1 (SW) / 1 (GW)	100+	100+	100+
Phthalates/ Plasticizers	BEHP	100+	1	100+	100+	100+

Table 2-3d
Time-to-Exceedance of Groundwater and Surface Water CUL, 95th Percentile
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:

RPDs are calculated based on the 100-year porewater concentrations. RPDs in red indicate that the sensitivity concentration is higher than the base case concentration. RPDs in green indicate that the sensitivity concentration is lower than the base case concentration. A dash (-) is used for a COC when both the base case and sensitivity scenarios have 100-year porewater concentrations of 0 µg/L.

100+ = time-to-breakthrough exceeds 100 years

% = percent

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

cm = centimeter

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

C_{PW} = porewater concentration

C_{Sed} = sediment concentration

CPP = Cap Performance Point -> top of chemical isolation layer.

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon, amendment percentage by weight

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

RPD = Relative Percent Difference

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total cPAHs = Benzo(a)pyrene Equivalent

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

TTB = Time-to-breakthrough is defined as the time in years elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 2-4
Cap Modeling Input Parameters Sensitivity Analyses, GAC Amendment Percentage
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 2.5% GAC-Amended Sand		30 cm of 5% GAC-Amended Sand		30 cm of 10% GAC-Amended Sand		30 cm of 20% GAC-Amended Sand	
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	100+	0	100+	0
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	100+	0	100+	0
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	100+	0	100+	0
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	100+	0	100+	0
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	100+	0	100+	0
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	100+	0	100+	0
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	100+	0	100+	0
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	100+	0	100+	0
	DDE	9.65	1.49E-04	100+	0	100+	0	100+	0	100+	0
	DDT	10.3	4.86E-05	100+	0	100+	0	100+	0	100+	0
	DDx	23.1	2.33E-04	100+	0	100+	0	100+	0	100+	0
	Summed DDx	28.0	8.25E-04	100+	0	100+	0	100+	0	100+	0
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	3.34E-09	100+	7.36E-14	100+	1.34E-18	100+	0
	Xylenes	1.10	0.0361	-	0	-	0	-	0	-	0
Metals	Arsenic	9,691	25.9	**96**	9.58	100+	0	100+	0	100+	0
	Cadmium	680	0.0136	100+	1.17E-03	100+	0	100+	0	100+	0
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-	0	-	0
	Copper	2.23E+05	3.77	100+	2.75	100+	2.87	100+	3.07	100+	3.33
	Lead	1.10E+05	5.51	100+	1.92E-09	100+	6.57E-09	100+	6.28E-08	100+	2.91E-06
	Manganese	8.61E+05	1.23E+04	-	1.21E+04	-	1.20E+04	-	1.20E+04	-	1.19E+04
	Mercury	530	0.421	100+	0	100+	0	100+	0	100+	0
	Vanadium	1.10E+05	110	-	0	-	0	-	0	-	0
	Zinc	3.82E+05	11.2	100+	10.6	100+	8.75	100+	2.72	100+	9.06E-11
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	100+	0	100+	0
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	100+	0	100+	0
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	100+	0	100+	0
	Lindane	0.383	0.0110	100+	0	100+	0	100+	0	100+	0
	Pentachlorophenol	72.0	1.08	-	0	-	0	-	0	-	0
Organotin	Tributyltin	710	0.387	100+	5.02E-03	100+	7.91E-10	100+	0	100+	0
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	-	0	-	0
	Benzo(a)pyrene	244	0.0176	-	0	-	0	-	0	-	0
	Benzo(b)fluoranthene	244	8.60E-03	-	0	-	2.25E-20	-	0	-	0
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	-	0	-	0
	Chrysene	244	9.95E-04	-	0	-	0	-	0	-	0
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	-	0	-	0
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	-	0	-	0
	Total cPAHs	510	0.0367	100+	0	100+	0	100+	0	100+	0
	Summed cPAHs	1,709	0.0825	100+	0	100+	2.25E-20	100+	0	100+	0

Table 2-4
Cap Modeling Input Parameters Sensitivity Analyses, GAC Amendment Percentage
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 2.5% GAC-Amended Sand		30 cm of 5% GAC-Amended Sand		30 cm of 10% GAC-Amended Sand		30 cm of 20% GAC-Amended Sand	
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	-	0	-	0
	2-Methylnaphthalene	244	4.12	-	0	-	0	-	0	-	0
	Acenaphthene	244	0.177	-	0	-	0	-	0	-	0
	Acenaphthylene	244	2.06	-	0	-	0	-	0	-	0
	Anthracene	244	0.0173	-	0	-	0	-	0	-	0
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	-	0	-	0
	Benzo(g,h,i)perylene	244	0.0181	-	0	-	0	-	0	-	2.72E-20
	Fluoranthene	244	4.15E-03	-	0	-	1.09E-17	-	0	-	0
	Fluorene	244	0.0673	-	0	-	0	-	0	-	0
	Naphthalene	130	2.76	-	0	-	0	-	0	-	0
	Phenanthrene	244	0.0523	-	0	-	0	-	0	-	0
	Pyrene	244	8.00E-03	-	0	-	0	-	0	-	0
	Total PAHs	4,640	0.782	100+	0	100+	0	100+	0	100+	0
	Summed PAHs	4,526	13.4	100+	0	100+	1.09E-17	100+	0	100+	2.72E-20
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	100+	0	100+	0
	PCB-15	66.0	2.65E-03	100+	0	100+	0	100+	0	100+	0
	PCB-31	66.0	1.60E-04	100+	0	100+	0	100+	0	100+	0
	PCB-44	66.0	6.68E-05	100+	0	100+	0	100+	0	100+	0
	PCB-99	66.0	1.46E-04	100+	0	100+	0	100+	0	100+	0
	PCB-141	66.0	1.11E-04	100+	0	100+	0	100+	0	100+	0
	PCB-153	65.9	1.20E-04	100+	0	100+	0	100+	0	100+	0
	PCB-174	66.0	8.35E-05	100+	0	100+	0	100+	0	100+	0
	PCB-177	66.0	7.82E-05	100+	0	100+	0	100+	0	100+	0
	PCB-180	66.0	9.86E-05	100+	0	100+	0	100+	0	100+	0
	PCB-183	66.0	9.04E-05	100+	0	100+	0	100+	0	100+	0
	PCB-199	66.0	9.06E-06	100+	0	100+	0	100+	0	100+	0
	PCB-206	66.0	2.35E-05	100+	0	100+	0	100+	0	100+	0
	PCB-209	66.0	7.08E-06	100+	0	100+	0	100+	0	100+	0
	Total PCBs	923	2.07E-03	100+	0	100+	0	100+	0	100+	0
	Summed PCBs	923	4.60E-02	100+	0	100+	0	100+	0	100+	0
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	2.30E-03	100+	7.25E-04	100+	2.45E-04	100+	9.51E-05

Table 2-4
Cap Modeling Input Parameters Sensitivity Analyses, GAC Amendment Percentage
CDTM; Swan Island Basin Project Area, Portland, Oregon

Notes:

100+ = time-to-breakthrough exceeds 100 years

% = percent

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

cm = centimeter

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

C_{PW} = porewater concentration

C_{Sed} = sediment concentration

CPP = Cap Performance Point -> top of chemical isolation layer.

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon, amendment percentage by weight

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

RPD = Relative Percent Difference

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total cPAHs = Benzo(a)pyrene Equivalent

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

TTB = Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 2-5
Cap Modeling Input Parameters Sensitivity Analyses, Chemical Isolation Layer Thickness
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		15 cm of 5% GAC-Amended Sand		30 cm of 5% GAC-Amended Sand		30 cm of 20% GAC-Amended Sand		76 cm of 20% GAC-Amended Sand	
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	100+	0	100+	0
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	100+	0	100+	0
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	100+	0	100+	0
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	100+	0	100+	0
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	100+	0	100+	0
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	100+	0	100+	0
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	100+	0	100+	0
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	100+	0	100+	0
	DDE	9.65	1.49E-04	100+	0	100+	0	100+	0	100+	0
	DDT	10.3	4.86E-05	100+	0	100+	0	100+	0	100+	0
	DDx	23.1	2.33E-04	100+	0	100+	0	100+	0	100+	0
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	100+	0	100+	0
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	6.02E-08	100+	7.36E-14	100+	0	100+	0
	Xylenes	1.10	0.0361	-	0	-	0	-	0	-	0
Metals	Arsenic	9,691	25.9	**77**	16.4	100+	0	100+	0	100+	0
	Cadmium	680	0.0136	100+	3.21E-03	100+	0	100+	0	100+	0
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-	0	-	0
	Copper	2.23E+05	3.77	100+	3.47	100+	2.87	100+	3.33	100+	1.74
	Lead	1.10E+05	5.51	100+	1.29E-04	100+	6.57E-09	100+	2.91E-06	100+	8.12E-13
	Manganese	8.61E+05	1.23E+04	-	1.22E+04	-	1.20E+04	-	1.19E+04	-	2.31E+03
	Mercury	530	0.421	100+	0	100+	0	100+	0	100+	0
	Vanadium	1.10E+05	110	-	4.64	-	0	-	0	-	0
	Zinc	3.82E+05	11.2	100+	10.8	100+	8.75	100+	9.06E-11	100+	0
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	100+	0	100+	0
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	100+	0	100+	0
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	100+	0	100+	0
	Lindane	0.383	0.0110	100+	0	100+	0	100+	0	100+	0
	Pentachlorophenol	72.0	1.08	-	0	-	0	-	0	-	0
Organotin	Tributyltin	710	0.387	100+	0.0163	100+	7.91E-10	100+	0	100+	0
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	-	0	-	0
	Benzo(a)pyrene	244	0.0176	-	0	-	0	-	0	-	0
	Benzo(b)fluoranthene	244	8.60E-03	-	1.97E-20	-	2.25E-20	-	0	-	0
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	-	0	-	0
	Chrysene	244	9.95E-04	-	0	-	0	-	0	-	0
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	-	0	-	0
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	-	0	-	0
	Total cPAHs	510	0.0367	100+	0	100+	0	100+	0	100+	0
	Summed cPAHs	1,709	0.0825	100+	1.97E-20	100+	2.25E-20	100+	0	100+	0

Table 2-5
Cap Modeling Input Parameters Sensitivity Analyses, Chemical Isolation Layer Thickness
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		15 cm of 5% GAC-Amended Sand		30 cm of 5% GAC-Amended Sand		30 cm of 20% GAC-Amended Sand		76 cm of 20% GAC-Amended Sand	
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	-	0	-	0
	2-Methylnaphthalene	244	4.12	-	0	-	0	-	0	-	0
	Acenaphthene	244	0.177	-	0	-	0	-	0	-	0
	Acenaphthylene	244	2.06	-	0	-	0	-	0	-	0
	Anthracene	244	0.0173	-	0	-	0	-	0	-	0
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	-	0	-	0
	Benzo(g,h,i)perylene	244	0.0181	-	1.74E-20	-	0	-	2.72E-20	-	0
	Fluoranthene	244	4.15E-03	-	0	-	1.09E-17	-	0	-	0
	Fluorene	244	0.0673	-	0	-	0	-	0	-	0
	Naphthalene	130	2.76	-	0	-	0	-	0	-	0
	Phenanthrene	244	0.0523	-	0	-	0	-	0	-	0
	Pyrene	244	8.00E-03	-	0	-	0	-	0	-	0
	Total PAHs	4,640	0.782	100+	0	100+	0	100+	0	100+	0
	Summed PAHs	4,526	13.4	100+	3.71E-20	100+	1.09E-17	100+	2.72E-20	100+	0
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	100+	0	100+	0
	PCB-15	66.0	2.65E-03	100+	0	100+	0	100+	0	100+	0
	PCB-31	66.0	1.60E-04	100+	0	100+	0	100+	0	100+	0
	PCB-44	66.0	6.68E-05	100+	0	100+	0	100+	0	100+	0
	PCB-99	66.0	1.46E-04	100+	0	100+	0	100+	0	100+	0
	PCB-141	66.0	1.11E-04	100+	0	100+	0	100+	0	100+	0
	PCB-153	65.9	1.20E-04	100+	0	100+	0	100+	0	100+	0
	PCB-174	66.0	8.35E-05	100+	0	100+	0	100+	0	100+	0
	PCB-177	66.0	7.82E-05	100+	0	100+	0	100+	0	100+	0
	PCB-180	66.0	9.86E-05	100+	0	100+	0	100+	0	100+	0
	PCB-183	66.0	9.04E-05	100+	0	100+	0	100+	0	100+	0
	PCB-199	66.0	9.06E-06	100+	0	100+	0	100+	0	100+	0
	PCB-206	66.0	2.35E-05	100+	0	100+	0	100+	0	100+	0
	PCB-209	66.0	7.08E-06	100+	0	100+	0	100+	0	100+	0
	Total PCBs	923	2.07E-03	100+	0	100+	0	100+	0	100+	0
	Summed PCBs	923	4.60E-02	100+	0	100+	0	100+	0	100+	0
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	3.10E-03	100+	7.25E-04	100+	9.51E-05	100+	1.22E-05

Table 2-5
Cap Modeling Input Parameters Sensitivity Analyses, Chemical Isolation Layer Thickness
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:
100+ = time-to-breakthrough exceeds 100 years
% = percent
µg/kg = micrograms per kilogram
µg/L = micrograms per liter
BEHP = bis(2-ethylhexyl) phthalate
Chlordanes = Total Chlordane (Calculated U = 1/2)
cm = centimeter
COC = contaminant of concern
cPAHs = carcinogenic polycyclic aromatic hydrocarbons
C_{PW} = porewater concentration
C_{Sed} = sediment concentration
CPP = Cap Performance Point -> top of chemical isolation layer.
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
DDx = DDD + DDE + DDT
Diesel = Residual Range Organics (C25-C36)
GAC = granular activated carbon, amendment percentage by weight
HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran
Lindane = Gamma BHC
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
RPD = Relative Percent Difference
TCDD = tetrachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzofuran
Total cPAHs = Benzo(a)pyrene Equivalent
Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent
TTB = Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 2-6
Cap Modeling Input Parameters Sensitivity Analyses, Freundlich Sorption Parameters
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Literature $K_F \div 10$			Literature Shape Parameter (1/n) ≤ 1		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	-	100+	0	N/A
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	-	100+	0	N/A
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	-	100+	0	N/A
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	-	100+	0	N/A
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	-	100+	0	N/A
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	-	100+	0	N/A
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	-	100+	0	N/A
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	-	100+	0	N/A
	DDE	9.65	1.49E-04	100+	0	100+	0	-	100+	0	N/A
	DDT	10.3	4.86E-05	100+	0	100+	0	-	100+	0	N/A
	DDx	23.1	2.33E-04	100+	0	100+	0	-	100+	0	N/A
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	-	100+	0	N/A
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	7.36E-14	100+	7.36E-14	N/A	100+	7.36E-14	N/A
	Xylenes	1.10	0.0361	-	0	-	0	-	-	0	N/A
Metals	Arsenic	9,691	25.9	100+	0	**38**	24.0	200%	100+	0	N/A
	Cadmium	680	0.0136	100+	0	**39**	0.0134	200%	100+	0	N/A
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-	-	0	N/A
	Copper	2.23E+05	3.77	100+	2.87	100+	2.87	0%	100+	2.87	N/A
	Lead	1.10E+05	5.51	100+	6.57E-09	100+	6.58E-09	0.152%	100+	6.57E-09	N/A
	Manganese	8.61E+05	1.23E+04	-	1.20E+04	-	1.21E+04	0.830%	-	1.20E+04	N/A
	Mercury	530	0.421	100+	0	100+	0	-	100+	0	N/A
	Vanadium	1.10E+05	110	-	0	-	1.64	200%	-	0	N/A
	Zinc	3.82E+05	11.2	100+	8.75	100+	11.1	23.7%	100+	8.75	N/A
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	-	100+	0	N/A
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	-	100+	0	N/A
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	-	100+	0	N/A
	Lindane	0.383	0.0110	100+	0	100+	0	-	100+	0	N/A
	Pentachlorophenol	72.0	1.08	-	0	-	0	-	-	0	N/A
Organotin	Tributyltin	710	0.387	100+	7.91E-10	100+	0.343	200%	100+	7.91E-10	N/A
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	-	-	0	N/A
	Benzo(a)pyrene	244	0.0176	-	0	-	0	-	-	0	N/A
	Benzo(b)fluoranthene	244	8.60E-03	-	2.25E-20	-	0	200%	-	2.25E-20	N/A
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	-	-	0	N/A
	Chrysene	244	9.95E-04	-	0	-	0	-	-	0	N/A
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	-	-	0	N/A
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	-	-	0	N/A
	Total cPAHs	510	0.0367	100+	0	100+	0	-	100+	0	N/A
	Summed cPAHs	1,709	0.0825	100+	2.25E-20	100+	0	200%	100+	2.25E-20	N/A

Table 2-6
Cap Modeling Input Parameters Sensitivity Analyses, Freundlich Sorption Parameters
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Literature $K_F \div 10$			Literature Shape Parameter (1/n) ≤ 1		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	-	-	0	N/A
	2-Methylnaphthalene	244	4.12	-	0	-	0	-	-	0	N/A
	Acenaphthene	244	0.177	-	0	-	0	-	-	0	N/A
	Acenaphthylene	244	2.06	-	0	-	0	-	-	0	N/A
	Anthracene	244	0.0173	-	0	-	0	-	-	0	N/A
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	-	-	0	N/A
	Benzo(g,h,i)perylene	244	0.0181	-	0	-	0	-	-	0	N/A
	Fluoranthene	244	4.15E-03	-	1.09E-17	-	2.80E-17	88%	-	1.09E-17	N/A
	Fluorene	244	0.0673	-	0	-	0	-	-	0	N/A
	Naphthalene	130	2.76	-	0	-	0	-	-	0	N/A
	Phenanthrene	244	0.0523	-	0	-	0	-	-	0	-
	Pyrene	244	8.00E-03	-	0	-	0	-	-	0	N/A
	Total PAHs	4,640	0.782	100+	0	100+	0	-	100+	0	N/A
	Summed PAHs	4,526	13.4	100+	1.09E-17	100+	2.80E-17	88%	100+	1.09E-17	0%
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	-	100+	0	N/A
	PCB-15	66.0	2.65E-03	100+	0	100+	0	-	100+	0	-
	PCB-31	66.0	1.60E-04	100+	0	100+	0	-	100+	0	N/A
	PCB-44	66.0	6.68E-05	100+	0	100+	0	-	100+	0	N/A
	PCB-99	66.0	1.46E-04	100+	0	100+	0	-	100+	0	N/A
	PCB-141	66.0	1.11E-04	100+	0	100+	0	-	100+	0	N/A
	PCB-153	65.9	1.20E-04	100+	0	100+	0	-	100+	0	N/A
	PCB-174	66.0	8.35E-05	100+	0	100+	0	-	100+	0	N/A
	PCB-177	66.0	7.82E-05	100+	0	100+	0	-	100+	0	N/A
	PCB-180	66.0	9.86E-05	100+	0	100+	0	-	100+	0	N/A
	PCB-183	66.0	9.04E-05	100+	0	100+	0	-	100+	0	N/A
	PCB-199	66.0	9.06E-06	100+	0	100+	0	-	100+	0	N/A
	PCB-206	66.0	2.35E-05	100+	0	100+	0	-	100+	0	N/A
	PCB-209	66.0	7.08E-06	100+	0	100+	0	-	100+	0	N/A
	Total PCBs	923	2.07E-03	100+	0	100+	0	-	100+	0	N/A
	Summed PCBs	923	4.60E-02	100+	0	100+	0	-	100+	0	-
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	7.25E-04	100+	3.86E-02	193%	100+	2.98E-20	200%

Table 2-6
Cap Modeling Input Parameters Sensitivity Analyses, Freundlich Sorption Parameters
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:

RPDs are calculated based on the 100-year porewater concentrations. RPDs in red indicate that the sensitivity concentration is higher than the base case concentration. RPDs in green indicate that the sensitivity concentration is lower than the base case concentration. A dash (-) is used for a COC when both the base case and sensitivity scenarios have 100-year porewater concentrations of 0 µg/L.

100+ = time-to-breakthrough exceeds 100 years

% = percent

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

cm = centimeter

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

C_{PW} = porewater concentration

C_{Sed} = sediment concentration

CPP = Cap Performance Point -> top of chemical isolation layer.

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon, amendment percentage by weight

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

RPD = Relative Percent Difference

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total cPAHs = Benzo(a)pyrene Equivalent

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

TTB = Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 2-7
Cap Modeling Input Parameters Sensitivity Analyses, Organic Carbon Sorption Parameters
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Literature K_{OC} × 1.2			Literature K_{OC} × 0.8		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	-	100+	0	-
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	-	100+	0	-
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	-	100+	0	-
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	-	100+	0	-
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	-	100+	0	-
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	-	100+	0	-
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	-	100+	0	-
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	-	100+	0	-
	DDE	9.65	1.49E-04	100+	0	100+	0	-	100+	0	-
	DDT	10.3	4.86E-05	100+	0	100+	0	-	100+	0	-
	DDx	23.1	2.33E-04	100+	0	100+	0	-	100+	0	-
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	-	100+	0	-
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	7.36E-14	100+	0	200%	100+	5.61	200%
	Xylenes	1.10	0.0361	-	0	-	0	-	-	0	-
Metals	Arsenic	9,691	25.9	100+	0	100+	0	N/A	100+	0	N/A
	Cadmium	680	0.0136	100+	0	100+	0	N/A	100+	0	N/A
	Chromium (III)	4.57E+04	1.15	-	0	-	0	N/A	-	0	N/A
	Copper	2.23E+05	3.77	100+	2.87	100+	2.87	N/A	100+	2.87	N/A
	Lead	1.10E+05	5.51	100+	6.57E-09	100+	6.57E-09	N/A	100+	6.57E-09	N/A
	Manganese	8.61E+05	1.23E+04	-	1.20E+04	-	1.20E+04	N/A	-	1.20E+04	N/A
	Mercury	530	0.421	100+	0	100+	0	N/A	100+	0	N/A
	Vanadium	1.10E+05	110	-	0	-	0	N/A	-	0	N/A
	Zinc	3.82E+05	11.2	100+	8.75	100+	8.75	N/A	100+	8.75	N/A
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	-	100+	0	-
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	-	100+	1.10E-20	200%
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	-	100+	0	-
	Lindane	0.383	0.0110	100+	0	100+	0	-	100+	0	-
	Pentachlorophenol	72.0	1.08	-	0	-	0	-	-	0	-
Organotin	Tributyltin	710	0.387	100+	7.91E-10	100+	0	200%	100+	8.67E-04	200%
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	-	-	0	-
	Benzo(a)pyrene	244	0.0176	-	0	-	0	-	-	0	-
	Benzo(b)fluoranthene	244	8.60E-03	-	2.25E-20	-	0	-	-	0	-
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	-	-	0	-
	Chrysene	244	9.95E-04	-	0	-	0	-	-	0	-
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	-	-	0	-
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	-	-	0	-
	Total cPAHs	510	0.0367	100+	0	100+	0	-	100+	0	-
	Summed cPAHs	1,709	0.0825	100+	2.25E-20	100+	0	-	100+	0	-

Table 2-7
Cap Modeling Input Parameters Sensitivity Analyses, Organic Carbon Sorption Parameters
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Literature K_{OC} × 1.2			Literature K_{OC} × 0.8		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	-	-	0	-
	2-Methylnaphthalene	244	4.12	-	0	-	0	-	-	0	-
	Acenaphthene	244	0.177	-	0	-	0	-	-	0	-
	Acenaphthylene	244	2.06	-	0	-	0	-	-	0	-
	Anthracene	244	0.0173	-	0	-	0	-	-	0	-
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	-	-	0	-
	Benzo(g,h,i)perylene	244	0.0181	-	0	-	1.60E-20	200%	-	8.54E-20	200%
	Fluoranthene	244	4.15E-03	-	1.09E-17	-	0	200%	-	0	200%
	Fluorene	244	0.0673	-	0	-	0	-	-	0	-
	Naphthalene	130	2.76	-	0	-	0	-	-	0	-
	Phenanthrene	244	0.0523	-	0	-	0	-	-	0	-
	Pyrene	244	8.00E-03	-	0	-	0	-	-	0	-
	Total PAHs	4,640	0.782	100+	0	100+	0	-	100+	0	-
	Summed PAHs	4,526	13.4	100+	1.09E-17	100+	1.60E-20	199%	100+	8.54E-20	197%
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	-	100+	0	-
	PCB-15	66.0	2.65E-03	100+	0	100+	0	-	100+	0	-
	PCB-31	66.0	1.60E-04	100+	0	100+	0	-	100+	0	-
	PCB-44	66.0	6.68E-05	100+	0	100+	0	-	100+	0	-
	PCB-99	66.0	1.46E-04	100+	0	100+	0	-	100+	0	-
	PCB-141	66.0	1.11E-04	100+	0	100+	0	-	100+	0	-
	PCB-153	65.9	1.20E-04	100+	0	100+	0	-	100+	0	-
	PCB-174	66.0	8.35E-05	100+	0	100+	0	-	100+	0	-
	PCB-177	66.0	7.82E-05	100+	0	100+	0	-	100+	0	-
	PCB-180	66.0	9.86E-05	100+	0	100+	0	-	100+	0	-
	PCB-183	66.0	9.04E-05	100+	0	100+	0	-	100+	0	-
	PCB-199	66.0	9.06E-06	100+	0	100+	0	-	100+	0	-
	PCB-206	66.0	2.35E-05	100+	0	100+	0	-	100+	0	-
	PCB-209	66.0	7.08E-06	100+	0	100+	0	-	100+	0	-
	Total PCBs	923	2.07E-03	100+	0	100+	0	-	100+	0	-
	Summed PCBs	923	4.60E-02	100+	0	100+	0	-	100+	0	-
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	7.25E-04	100+	2.63E-05	186%	100+	9.64E-04	28.3%

Table 2-7
Cap Modeling Input Parameters Sensitivity Analyses, Organic Carbon Sorption Parameters
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:

RPDs are calculated based on the 100-year porewater concentrations. RPDs in red indicate that the sensitivity concentration is higher than the base case concentration. RPDs in green indicate that the sensitivity concentration is lower than the base case concentration. A dash (-) is used for a COC when both the base case and sensitivity scenarios have 100-year porewater concentrations of 0 µg/L.

100+ = time-to-breakthrough exceeds 100 years

% = percent

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

cm = centimeter

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

C_{PW} = porewater concentration

C_{Sed} = sediment concentration

CPP = Cap Performance Point -> top of chemical isolation layer.

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon, amendment percentage by weight

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

RPD = Relative Percent Difference

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total cPAHs = Benzo(a)pyrene Equivalent

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

TTB = Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 2-8
Cap Modeling Input Parameters Sensitivity Analyses, Linear Sorption to Sand
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Literature $K_{D,Sand}$ × 1.2			Literature $K_{D,Sand}$ × 0.8		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	N/A	100+	0	N/A
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	N/A	100+	0	N/A
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	N/A	100+	0	N/A
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	N/A	100+	0	N/A
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	N/A	100+	0	N/A
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	N/A	100+	0	N/A
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	N/A	100+	0	N/A
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	N/A	100+	0	N/A
	DDE	9.65	1.49E-04	100+	0	100+	0	N/A	100+	0	N/A
	DDT	10.3	4.86E-05	100+	0	100+	0	N/A	100+	0	N/A
	DDx	23.1	2.33E-04	100+	0	100+	0	N/A	100+	0	N/A
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	N/A	100+	0	N/A
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	7.36E-14	100+	7.36E-14	N/A	100+	7.36E-14	N/A
	Xylenes	1.10	0.0361	-	0	-	0	N/A	-	0	N/A
Metals	Arsenic	9,691	25.9	100+	0	100+	0	-	100+	3.84E-18	200%
	Cadmium	680	0.0136	100+	0	100+	0	-	100+	0	-
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-	-	0	-
	Copper	2.23E+05	3.77	100+	2.87	100+	2.56	11.4%	100+	3.16	9.62%
	Lead	1.10E+05	5.51	100+	6.57E-09	100+	4.66E-10	174%	100+	1.35E-07	181%
	Manganese	8.61E+05	1.23E+04	-	1.20E+04	-	1.19E+04	0.837%	-	1.21E+04	0.830%
	Mercury	530	0.421	100+	0	100+	0	-	100+	0	-
	Vanadium	1.10E+05	110	-	0	-	0	-	-	0	-
	Zinc	3.82E+05	11.2	100+	8.75	100+	8.52	2.66%	100+	8.98	2.59%
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	N/A	100+	0	N/A
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	N/A	100+	0	N/A
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	N/A	100+	0	N/A
	Lindane	0.383	0.0110	100+	0	100+	0	N/A	100+	0	N/A
	Pentachlorophenol	72.0	1.08	-	0	-	0	N/A	-	0	N/A
Organotin	Tributyltin	710	0.387	100+	7.91E-10	100+	7.91E-10	N/A	100+	7.91E-10	N/A
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	N/A	-	0	N/A
	Benzo(a)pyrene	244	0.0176	-	0	-	0	N/A	-	0	N/A
	Benzo(b)fluoranthene	244	8.60E-03	-	2.25E-20	-	2.25E-20	N/A	-	2.25E-20	N/A
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	N/A	-	0	N/A
	Chrysene	244	9.95E-04	-	0	-	0	N/A	-	0	N/A
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	N/A	-	0	N/A
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	N/A	-	0	N/A
	Total cPAHs	510	0.0367	100+	0	100+	0	N/A	100+	0	N/A
	Summed cPAHs	1,709	0.0825	100+	2.25E-20	100+	2.25E-20	N/A	100+	2.25E-20	N/A

Table 2-8
Cap Modeling Input Parameters Sensitivity Analyses, Linear Sorption to Sand
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Literature $K_{D,Sand}$ × 1.2			Literature $K_{D,Sand}$ × 0.8		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	N/A	-	0	N/A
	2-Methylnaphthalene	244	4.12	-	0	-	0	N/A	-	0	N/A
	Acenaphthene	244	0.177	-	0	-	0	N/A	-	0	N/A
	Acenaphthylene	244	2.06	-	0	-	0	N/A	-	0	N/A
	Anthracene	244	0.0173	-	0	-	0	N/A	-	0	N/A
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	N/A	-	0	N/A
	Benzo(g,h,i)perylene	244	0.0181	-	0	-	0	N/A	-	0	N/A
	Fluoranthene	244	4.15E-03	-	1.09E-17	-	1.09E-17	N/A	-	1.09E-17	N/A
	Fluorene	244	0.0673	-	0	-	0	N/A	-	0	N/A
	Naphthalene	130	2.76	-	0	-	0	N/A	-	0	N/A
	Phenanthrene	244	0.0523	-	0	-	0	N/A	-	0	N/A
	Pyrene	244	8.00E-03	-	0	-	0	N/A	-	0	N/A
	Total PAHs	4,640	0.782	100+	0	100+	0	N/A	100+	0	N/A
	Summed PAHs	4,526	13.4	100+	1.09E-17	100+	1.09E-17	N/A	100+	1.09E-17	N/A
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	N/A	100+	0	N/A
	PCB-15	66.0	2.65E-03	100+	0	100+	0	N/A	100+	0	N/A
	PCB-31	66.0	1.60E-04	100+	0	100+	0	N/A	100+	0	N/A
	PCB-44	66.0	6.68E-05	100+	0	100+	0	N/A	100+	0	N/A
	PCB-99	66.0	1.46E-04	100+	0	100+	0	N/A	100+	0	N/A
	PCB-141	66.0	1.11E-04	100+	0	100+	0	N/A	100+	0	N/A
	PCB-153	65.9	1.20E-04	100+	0	100+	0	N/A	100+	0	N/A
	PCB-174	66.0	8.35E-05	100+	0	100+	0	N/A	100+	0	N/A
	PCB-177	66.0	7.82E-05	100+	0	100+	0	N/A	100+	0	N/A
	PCB-180	66.0	9.86E-05	100+	0	100+	0	N/A	100+	0	N/A
	PCB-183	66.0	9.04E-05	100+	0	100+	0	N/A	100+	0	N/A
	PCB-199	66.0	9.06E-06	100+	0	100+	0	N/A	100+	0	N/A
	PCB-206	66.0	2.35E-05	100+	0	100+	0	N/A	100+	0	N/A
	PCB-209	66.0	7.08E-06	100+	0	100+	0	N/A	100+	0	N/A
	Total PCBs	923	2.07E-03	100+	0	100+	0	N/A	100+	0	N/A
	Summed PCBs	923	4.60E-02	100+	0	100+	0	N/A	100+	0	N/A
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	7.25E-04	100+	7.25E-04	N/A	100+	7.25E-04	N/A

Table 2-8
Cap Modeling Input Parameters Sensitivity Analyses, Linear Sorption to Sand
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:
RPDs are calculated based on the 100-year porewater concentrations. RPDs in red indicate that the sensitivity concentration is higher than the base case concentration. RPDs in green indicate that the sensitivity concentration is lower than the base case concentration. A dash (-) is used for a COC when both the base case and sensitivity scenarios have 100-year porewater concentrations of 0 µg/L.

100+ = time-to-breakthrough exceeds 100 years

% = percent

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

cm = centimeter

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

C_{PW} = porewater concentration

C_{Sed} = sediment concentration

CPP = Cap Performance Point -> top of chemical isolation layer.

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon, amendment percentage by weight

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

RPD = Relative Percent Difference

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total cPAHs = Benzo(a)pyrene Equivalent

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

TTB = Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 2-9
Cap Modeling Input Parameters Sensitivity Analyses, Linear Sorption to Sediment
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Literature $K_{D,Sediment}$ × 1.2			Literature $K_{D,Sediment}$ × 0.8		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	-	100+	0	-
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	-	100+	0	-
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	-	100+	0	-
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	N/A	100+	0	N/A
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	-	100+	0	-
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	N/A	100+	0	N/A
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	-	100+	0	-
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	-	100+	0	-
	DDE	9.65	1.49E-04	100+	0	100+	0	-	100+	0	-
	DDT	10.3	4.86E-05	100+	0	100+	0	-	100+	0	-
	DDx	23.1	2.33E-04	100+	0	100+	0	-	100+	0	-
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	-	100+	0	-
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	7.36E-14	100+	6.70E-14	9.39%	100+	8.28E-14	11.8%
	Xylenes	1.10	0.0361	-	0	-	0	N/A	-	0	N/A
Metals	Arsenic	9,691	25.9	100+	0	100+	0	-	100+	6.62E-08	200%
	Cadmium	680	0.0136	100+	0	100+	0	-	100+	0	-
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-	-	0	-
	Copper	2.23E+05	3.77	100+	2.87	100+	2.40	17.8%	100+	3.58	22.0%
	Lead	1.10E+05	5.51	100+	6.57E-09	100+	5.69E-09	14.4%	100+	7.80E-09	17.1%
	Manganese	8.61E+05	1.23E+04	-	1.20E+04	-	1.00E+04	18.2%	-	1.51E+04	22.9%
	Mercury	530	0.421	100+	0	100+	0	-	100+	0	-
	Vanadium	1.10E+05	110	-	0	-	0	-	-	0	-
	Zinc	3.82E+05	11.2	100+	8.75	100+	6.87	24.1%	100+	11.50	27.2%
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	N/A	100+	0	N/A
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	N/A	100+	0	N/A
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	N/A	100+	0	N/A
	Lindane	0.383	0.0110	100+	0	100+	0	N/A	100+	0	N/A
	Pentachlorophenol	72.0	1.08	-	0	-	0	N/A	-	0	N/A
Organotin	Tributyltin	710	0.387	100+	7.91E-10	100+	7.91E-10	N/A	100+	7.91E-10	N/A

Table 2-9
Cap Modeling Input Parameters Sensitivity Analyses, Linear Sorption to Sediment
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Literature $K_{D,Sediment}$ × 1.2			Literature $K_{D,Sediment}$ × 0.8		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	-	-	0	-
	Benzo(a)pyrene	244	0.0176	-	0	-	0	N/A	-	0	N/A
	Benzo(b)fluoranthene	244	8.60E-03	-	2.25E-20	-	2.25E-20	N/A	-	2.25E-20	N/A
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	N/A	-	0	N/A
	Chrysene	244	9.95E-04	-	0	-	0	-	-	0	-
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	N/A	-	0	N/A
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	N/A	-	0	N/A
	Total cPAHs	510	0.0367	100+	0	100+	0	N/A	100+	0	N/A
	Summed cPAHs	1,709	0.0825	100+	2.25E-20	100+	2.25E-20	0%	100+	2.25E-20	0%
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	N/A	-	0	N/A
	2-Methylnaphthalene	244	4.12	-	0	-	0	N/A	-	0	N/A
	Acenaphthene	244	0.177	-	0	-	0	-	-	0	-
	Acenaphthylene	244	2.06	-	0	-	0	N/A	-	0	N/A
	Anthracene	244	0.0173	-	0	-	0	-	-	0	-
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	N/A	-	0	N/A
	Benzo(g,h,i)perylene	244	0.0181	-	0	-	0	-	-	0	-
	Fluoranthene	244	4.15E-03	-	1.09E-17	-	0	-	-	0	-
	Fluorene	244	0.0673	-	0	-	0	-	-	0	-
	Naphthalene	130	2.76	-	0	-	0	N/A	-	0	N/A
	Phenanthrene	244	0.0523	-	0	-	0	-	-	0	-
	Pyrene	244	8.00E-03	-	0	-	0	-	-	0	-
	Total PAHs	4,640	0.782	100+	0	100+	0	N/A	100+	0	N/A
	Summed PAHs	4,526	13.4	100+	1.09E-17	100+	2.25E-20	199%	100+	2.25E-20	199%

Table 2-9
Cap Modeling Input Parameters Sensitivity Analyses, Linear Sorption to Sediment
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Literature $K_{D,Sediment}$ × 1.2			Literature $K_{D,Sediment}$ × 0.8		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	-	100+	0	-
	PCB-15	66.0	2.65E-03	100+	0	100+	0	-	100+	0	-
	PCB-31	66.0	1.60E-04	100+	0	100+	0	-	100+	0	-
	PCB-44	66.0	6.68E-05	100+	0	100+	0	-	100+	0	-
	PCB-99	66.0	1.46E-04	100+	0	100+	0	-	100+	0	-
	PCB-141	66.0	1.11E-04	100+	0	100+	0	-	100+	0	-
	PCB-153	65.9	1.20E-04	100+	0	100+	0	-	100+	0	-
	PCB-174	66.0	8.35E-05	100+	0	100+	0	-	100+	0	-
	PCB-177	66.0	7.82E-05	100+	0	100+	0	-	100+	0	-
	PCB-180	66.0	9.86E-05	100+	0	100+	0	-	100+	0	-
	PCB-183	66.0	9.04E-05	100+	0	100+	0	-	100+	0	-
	PCB-199	66.0	9.06E-06	100+	0	100+	0	-	100+	0	-
	PCB-206	66.0	2.35E-05	100+	0	100+	0	-	100+	0	-
	PCB-209	66.0	7.08E-06	100+	0	100+	0	-	100+	0	-
	Total PCBs	923	2.07E-03	100+	0	100+	0	-	100+	0	-
	Summed PCBs	923	4.60E-02	100+	0	100+	0	-	100+	0	-
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	7.25E-04	100+	7.25E-04	N/A	100+	7.25E-04	N/A

Table 2-9
Cap Modeling Input Parameters Sensitivity Analyses, Linear Sorption to Sediment
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:

RPDs are calculated based on the 100-year porewater concentrations. RPDs in red indicate that the sensitivity concentration is higher than the base case concentration. RPDs in green indicate that the sensitivity concentration is lower than the base case concentration. A dash (-) is used for a COC when both the base case and sensitivity scenarios have 100-year porewater concentrations of 0 µg/L.

100+ = time-to-breakthrough exceeds 100 years

% = percent

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

cm = centimeter

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

C_{PW} = porewater concentration

C_{Sed} = sediment concentration

CPP = Cap Performance Point -> top of chemical isolation layer.

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon, amendment percentage by weight

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

RPD = Relative Percent Difference

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total cPAHs = Benzo(a)pyrene Equivalent

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

TTB = Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 2-10
Sensitivity Analyses, Linear Sorption to EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Literature $K_{D,EPL}$ × 1.2		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	N/A
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	N/A
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	N/A
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	N/A
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	N/A
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	N/A
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	N/A
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	N/A
	DDE	9.65	1.49E-04	100+	0	100+	0	N/A
	DDT	10.3	4.86E-05	100+	0	100+	0	N/A
	DDx	23.1	2.33E-04	100+	0	100+	0	N/A
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	N/A
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	7.36E-14	100+	7.36E-14	N/A
	Xylenes	1.10	0.0361	-	0	-	0	N/A
Metals	Arsenic	9,691	25.9	100+	0	100+	0	-
	Cadmium	680	0.0136	100+	0	100+	0	-
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-
	Copper	2.23E+05	3.77	100+	2.87	100+	2.80	2.47%
	Lead	1.10E+05	5.51	100+	6.57E-09	100+	6.05E-09	8.24%
	Manganese	8.61E+05	1.23E+04	-	1.20E+04	-	1.20E+04	0%
	Mercury	530	0.421	100+	0	100+	0	-
	Vanadium	1.10E+05	110	-	0	-	0	-
	Zinc	3.82E+05	11.2	100+	8.75	100+	8.67	0.918%
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	N/A
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	N/A
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	N/A
	Lindane	0.383	0.0110	100+	0	100+	0	N/A
	Pentachlorophenol	72.0	1.08	-	0	-	0	N/A
Organotin	Tributyltin	710	0.387	100+	7.91E-10	100+	7.91E-10	N/A
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	N/A
	Benzo(a)pyrene	244	0.0176	-	0	-	0	N/A
	Benzo(b)fluoranthene	244	8.60E-03	-	2.25E-20	-	2.25E-20	N/A
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	N/A
	Chrysene	244	9.95E-04	-	0	-	0	N/A
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	N/A
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	N/A
	Total cPAHs	510	0.0367	100+	0	100+	0	N/A
	Summed cPAHs	1,709	0.0825	100+	2.25E-20	100+	2.25E-20	N/A

Table 2-10
Sensitivity Analyses, Linear Sorption to EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Literature $K_{D,EPL}$ × 1.2		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	N/A
	2-Methylnaphthalene	244	4.12	-	0	-	0	N/A
	Acenaphthene	244	0.177	-	0	-	0	N/A
	Acenaphthylene	244	2.06	-	0	-	0	N/A
	Anthracene	244	0.0173	-	0	-	0	N/A
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	N/A
	Benzo(g,h,i)perylene	244	0.0181	-	0	-	0	N/A
	Fluoranthene	244	4.15E-03	-	1.09E-17	-	1.09E-17	N/A
	Fluorene	244	0.0673	-	0	-	0	N/A
	Naphthalene	130	2.76	-	0	-	0	N/A
	Phenanthrene	244	0.0523	-	0	-	0	N/A
	Pyrene	244	8.00E-03	-	0	-	0	N/A
	Total PAHs	4,640	0.782	100+	0	100+	0	N/A
	Summed PAHs	4,526	13.4	100+	1.09E-17	100+	1.09E-17	N/A
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	N/A
	PCB-15	66.0	2.65E-03	100+	0	100+	0	N/A
	PCB-31	66.0	1.60E-04	100+	0	100+	0	N/A
	PCB-44	66.0	6.68E-05	100+	0	100+	0	N/A
	PCB-99	66.0	1.46E-04	100+	0	100+	0	N/A
	PCB-141	66.0	1.11E-04	100+	0	100+	0	N/A
	PCB-153	65.9	1.20E-04	100+	0	100+	0	N/A
	PCB-174	66.0	8.35E-05	100+	0	100+	0	N/A
	PCB-177	66.0	7.82E-05	100+	0	100+	0	N/A
	PCB-180	66.0	9.86E-05	100+	0	100+	0	N/A
	PCB-183	66.0	9.04E-05	100+	0	100+	0	N/A
	PCB-199	66.0	9.06E-06	100+	0	100+	0	N/A
	PCB-206	66.0	2.35E-05	100+	0	100+	0	N/A
	PCB-209	66.0	7.08E-06	100+	0	100+	0	N/A
	Total PCBs	923	2.07E-03	100+	0	100+	0	N/A
	Summed PCBs	923	4.60E-02	100+	0	100+	0	N/A
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	7.25E-04	100+	7.25E-04	N/A

Table 2-10
Sensitivity Analyses, Linear Sorption to EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		Literature $K_{D,EPL}$ × 0.8			Literature $K_{D,EPL}$ × 2.5			Literature $K_{D,EPL}$ × 0.5		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	N/A	100+	0	N/A	100+	0	N/A
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	N/A	100+	0	N/A	100+	0	N/A
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	N/A	100+	0	N/A	100+	0	N/A
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	N/A	100+	0	N/A	100+	0	N/A
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	N/A	100+	0	N/A	100+	0	N/A
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	N/A	100+	0	N/A	100+	0	N/A
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	N/A	100+	0	N/A	100+	0	N/A
DDx	DDD	8.08	3.95E-04	100+	0	N/A	100+	0	N/A	100+	0	N/A
	DDE	9.65	1.49E-04	100+	0	N/A	100+	0	N/A	100+	0	N/A
	DDT	10.3	4.86E-05	100+	0	N/A	100+	0	N/A	100+	0	N/A
	DDx	23.1	2.33E-04	100+	0	N/A	100+	0	N/A	100+	0	N/A
	Summed DDx	28.0	5.92E-04	100+	0	N/A	100+	0	N/A	100+	0	N/A
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	7.36E-14	N/A	100+	7.36E-14	N/A	100+	7.36E-14	N/A
	Xylenes	1.10	0.0361	-	0	N/A	-	0	N/A	-	0	N/A
Metals	Arsenic	9,691	25.9	100+	0	-	100+	0	-	100+	3.69E-20	200%
	Cadmium	680	0.0136	100+	0	-	100+	0	-	100+	0	-
	Chromium (III)	4.57E+04	1.15	-	0	-	-	0	-	-	0	-
	Copper	2.23E+05	3.77	100+	2.95	2.75%	100+	2.44	16.2%	100+	3.08	7.06%
	Lead	1.10E+05	5.51	100+	7.21E-09	9.29%	100+	4.00E-09	48.6%	100+	8.45E-09	25.0%
	Manganese	8.61E+05	1.23E+04	-	1.21E+04	0.830%	-	1.16E+04	3.39%	-	1.21E+04	0.830%
	Mercury	530	0.421	100+	0	-	100+	0	-	100+	0	-
	Vanadium	1.10E+05	110	-	0	-	-	0	-	-	0	-
	Zinc	3.82E+05	11.2	100+	8.83	0.910%	100+	8.17	6.86%	100+	8.94	2.15%
Organochloride	Aldrin	0.400	3.54E-04	100+	0	N/A	100+	0	N/A	100+	0	N/A
	Chlordanes	5.24	1.76E-03	100+	0	N/A	100+	0	N/A	100+	0	N/A
	Dieldrin	0.550	5.98E-04	100+	0	N/A	100+	0	N/A	100+	0	N/A
	Lindane	0.383	0.0110	100+	0	N/A	100+	0	N/A	100+	0	N/A
	Pentachlorophenol	72.0	1.08	-	0	N/A	-	0	N/A	-	0	N/A
Organotin	Tributyltin	710	0.387	100+	7.91E-10	N/A	100+	7.91E-10	N/A	100+	7.91E-10	N/A
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	N/A	-	0	N/A	-	0	N/A
	Benzo(a)pyrene	244	0.0176	-	0	N/A	-	0	N/A	-	0	N/A
	Benzo(b)fluoranthene	244	8.60E-03	-	2.25E-20	N/A	-	2.25E-20	N/A	-	2.25E-20	N/A
	Benzo(k)fluoranthene	244	8.40E-03	-	0	N/A	-	0	N/A	-	0	N/A
	Chrysene	244	9.95E-04	-	0	N/A	-	0	N/A	-	0	N/A
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	N/A	-	0	N/A	-	0	N/A
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	N/A	-	0	N/A	-	0	N/A
	Total cPAHs	510	0.0367	100+	0	N/A	100+	0	N/A	100+	0	N/A
	Summed cPAHs	1,709	0.0825	100+	2.25E-20	N/A	100+	2.25E-20	N/A	100+	2.25E-20	N/A

Table 2-10
Sensitivity Analyses, Linear Sorption to EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		Literature $K_{D,EPL}$ × 0.8			Literature $K_{D,EPL}$ × 2.5			Literature $K_{D,EPL}$ × 0.5		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
PAHs	1-Methylnaphthalene	244	4.12	-	0	N/A	-	0	N/A	-	0	N/A
	2-Methylnaphthalene	244	4.12	-	0	N/A	-	0	N/A	-	0	N/A
	Acenaphthene	244	0.177	-	0	N/A	-	0	N/A	-	0	N/A
	Acenaphthylene	244	2.06	-	0	N/A	-	0	N/A	-	0	N/A
	Anthracene	244	0.0173	-	0	N/A	-	0	N/A	-	0	N/A
	Benzo(e)pyrene	244	5.81E-03	-	0	N/A	-	0	N/A	-	0	N/A
	Benzo(g,h,i)perylene	244	0.0181	-	0	N/A	-	0	N/A	-	0	N/A
	Fluoranthene	244	4.15E-03	-	1.09E-17	N/A	-	1.09E-17	N/A	-	1.09E-17	N/A
	Fluorene	244	0.0673	-	0	N/A	-	0	N/A	-	0	N/A
	Naphthalene	130	2.76	-	0	N/A	-	0	N/A	-	0	N/A
	Phenanthrene	244	0.0523	-	0	N/A	-	0	N/A	-	0	N/A
	Pyrene	244	8.00E-03	-	0	N/A	-	0	N/A	-	0	N/A
	Total PAHs	4,640	0.782	100+	0	N/A	100+	0	N/A	100+	0	N/A
	Summed PAHs	4,526	13.4	100+	1.09E-17	N/A	100+	1.09E-17	N/A	100+	1.09E-17	N/A
PCBs	PCB-1	66.0	0.0423	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-15	66.0	2.65E-03	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-31	66.0	1.60E-04	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-44	66.0	6.68E-05	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-99	66.0	1.46E-04	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-141	66.0	1.11E-04	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-153	65.9	1.20E-04	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-174	66.0	8.35E-05	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-177	66.0	7.82E-05	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-180	66.0	9.86E-05	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-183	66.0	9.04E-05	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-199	66.0	9.06E-06	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-206	66.0	2.35E-05	100+	0	N/A	100+	0	N/A	100+	0	N/A
	PCB-209	66.0	7.08E-06	100+	0	N/A	100+	0	N/A	100+	0	N/A
	Total PCBs	923	2.07E-03	100+	0	N/A	100+	0	N/A	100+	0	N/A
	Summed PCBs	923	4.60E-02	100+	0	N/A	100+	0	N/A	100+	0	N/A
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	7.25E-04	N/A	100+	7.25E-04	N/A	100+	7.25E-04	N/A

Table 2-10
Sensitivity Analyses, Linear Sorption to EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Notes:

RPDs are calculated based on the 100-year porewater concentrations. RPDs in red indicate that the sensitivity concentration is higher than the base case concentration. RPDs in green indicate that the sensitivity concentration is lower than the base case concentration. A dash (-) is used for a COC when both the base case and sensitivity scenarios have 100-year porewater concentrations of 0 µg/L.

100+ = time-to-breakthrough exceeds 100 years

% = percent

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

cm = centimeter

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

C_{PW} = porewater concentration

C_{Sed} = sediment concentration

CPP = Cap Performance Point -> top of chemical isolation layer.

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon, amendment percentage by weight

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

RPD = Relative Percent Difference

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total cPAHs = Benzo(a)pyrene Equivalent

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

TTB = Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 2-11
Sensitivity Analyses, Thickness of EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand				
				30 cm EPL		60 cm EPL		RPD (%)
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	-
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	-
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	-
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	-
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	-
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	-
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	-
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	-
	DDE	9.65	1.49E-04	100+	0	100+	0	-
	DDT	10.3	4.86E-05	100+	0	100+	0	-
	DDx	23.1	2.33E-04	100+	0	100+	0	-
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	-
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	7.36E-14	100+	7.36E-14	0%
	Xylenes	1.10	0.0361	-	0	-	0	-
Metals	Arsenic	9,691	25.9	100+	0	100+	7.23E-20	200.0%
	Cadmium	680	0.0136	100+	0	100+	0	-
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-
	Copper	2.23E+05	3.77	100+	2.87	100+	2.63	8.73%
	Lead	1.10E+05	5.51	100+	6.57E-09	100+	4.63E-09	34.6%
	Manganese	8.61E+05	1.23E+04	-	1.20E+04	-	1.19E+04	0.837%
	Mercury	530	0.421	100+	0	100+	0	-
	Vanadium	1.10E+05	110	-	0	-	0	-
	Zinc	3.82E+05	11.2	100+	8.75	100+	8.51	2.78%

Table 2-11
Sensitivity Analyses, Thickness of EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand				
				30 cm EPL		60 cm EPL		RPD (%)
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	-
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	-
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	-
	Lindane	0.383	0.0110	100+	0	100+	0	-
	Pentachlorophenol	72.0	1.08	-	0	-	0	-
Organotin	Tributyltin	710	0.387	100+	7.91E-10	100+	7.91E-10	0%
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	-
	Benzo(a)pyrene	244	0.0176	-	0	-	0	-
	Benzo(b)fluoranthene	244	8.60E-03	-	2.25E-20	-	0	200%
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	-
	Chrysene	244	9.95E-04	-	0	-	0	-
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	-
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	-
	Total cPAHs	510	0.0367	100+	0	100+	0	-
	Summed cPAHs	1,709	0.0825	100+	2.25E-20	100+	0	200%

Table 2-11
Sensitivity Analyses, Thickness of EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand				
				30 cm EPL		60 cm EPL		RPD (%)
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	-
	2-Methylnaphthalene	244	4.12	-	0	-	0	-
	Acenaphthene	244	0.177	-	0	-	0	-
	Acenaphthylene	244	2.06	-	0	-	1.29E-16	200%
	Anthracene	244	0.0173	-	0	-	0	-
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	-
	Benzo(g,h,i)perylene	244	0.0181	-	0	-	0	-
	Fluoranthene	244	4.15E-03	-	1.09E-17	-	0	200%
	Fluorene	244	0.0673	-	0	-	0	-
	Naphthalene	130	2.76	-	0	-	0	-
	Phenanthrene	244	0.0523	-	0	-	0	-
	Pyrene	244	8.00E-03	-	0	-	0	-
	Total PAHs	4,640	0.782	100+	0	100+	0	-
	Summed PAHs	4,526	13.4	100+	1.09E-17	100+	1.29E-16	169%

Table 2-11
Sensitivity Analyses, Thickness of EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand				
				30 cm EPL		60 cm EPL		RPD (%)
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	-
	PCB-15	66.0	2.65E-03	100+	0	100+	0	-
	PCB-31	66.0	1.60E-04	100+	0	100+	0	-
	PCB-44	66.0	6.68E-05	100+	0	100+	0	-
	PCB-99	66.0	1.46E-04	100+	0	100+	0	-
	PCB-141	66.0	1.11E-04	100+	0	100+	0	-
	PCB-153	65.9	1.20E-04	100+	0	100+	0	-
	PCB-174	66.0	8.35E-05	100+	0	100+	0	-
	PCB-177	66.0	7.82E-05	100+	0	100+	0	-
	PCB-180	66.0	9.86E-05	100+	0	100+	0	-
	PCB-183	66.0	9.04E-05	100+	0	100+	0	-
	PCB-199	66.0	9.06E-06	100+	0	100+	0	-
	PCB-206	66.0	2.35E-05	100+	0	100+	0	-
	PCB-209	66.0	7.08E-06	100+	0	100+	0	-
	Total PCBs	923	2.07E-03	100+	0	100+	0	-
	Summed PCBs	923	4.60E-02	100+	0	100+	0	-
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	7.25E-04	100+	7.25E-04	0%

Table 2-11
Sensitivity Analyses, Thickness of EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		15 cm of 5% GAC-Amended Sand				
				30 cm EPL		60 cm EPL		RPD (%)
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	-
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	-
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	-
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	-
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	-
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	-
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	-
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	-
	DDE	9.65	1.49E-04	100+	0	100+	0	-
	DDT	10.3	4.86E-05	100+	0	100+	0	-
	DDx	23.1	2.33E-04	100+	0	100+	0	-
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	-
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	6.02E-08	100+	6.02E-08	0%
	Xylenes	1.10	0.0361	-	0	-	0	-
Metals	Arsenic	9,691	25.9	**77**	16.4	**79**	15.1	8.25%
	Cadmium	680	0.0136	100+	3.21E-03	100+	3.14E-03	2.20%
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-
	Copper	2.23E+05	3.77	100+	3.47	100+	3.23	7.16%
	Lead	1.10E+05	5.51	100+	1.29E-04	100+	8.89E-05	36.8%
	Manganese	8.61E+05	1.23E+04	-	1.22E+04	-	1.21E+04	0.823%
	Mercury	530	0.421	100+	0	100+	0	-
	Vanadium	1.10E+05	110	-	4.64	-	3.98	15.3%
	Zinc	3.82E+05	11.2	100+	10.8	100+	10.8	0%

Table 2-11
Sensitivity Analyses, Thickness of EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		15 cm of 5% GAC-Amended Sand				
				30 cm EPL		60 cm EPL		RPD (%)
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	-
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	-
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	-
	Lindane	0.383	0.0110	100+	0	100+	0	-
	Pentachlorophenol	72.0	1.08	-	0	-	0	-
Organotin	Tributyltin	710	0.387	100+	0.0163	100+	0.0163	0%
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	-
	Benzo(a)pyrene	244	0.0176	-	0	-	0	-
	Benzo(b)fluoranthene	244	8.60E-03	-	1.97E-20	-	1.33E-20	38.8%
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	-
	Chrysene	244	9.95E-04	-	0	-	0	-
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	-
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	-
	Total cPAHs	510	0.0367	100+	0	100+	0	-
	Summed cPAHs	1,709	0.0825	100+	1.97E-20	100+	1.33E-20	38.8%

Table 2-11
Sensitivity Analyses, Thickness of EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		15 cm of 5% GAC-Amended Sand				
				30 cm EPL		60 cm EPL		RPD (%)
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	-
	2-Methylnaphthalene	244	4.12	-	0	-	0	-
	Acenaphthene	244	0.177	-	0	-	0	-
	Acenaphthylene	244	2.06	-	0	-	0	-
	Anthracene	244	0.0173	-	0	-	0	-
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	-
	Benzo(g,h,i)perylene	244	0.0181	-	1.74E-20	-	1.63E-20	6.53%
	Fluoranthene	244	4.15E-03	-	0	-	9.52E-18	200%
	Fluorene	244	0.0673	-	0	-	0	-
	Naphthalene	130	2.76	-	0	-	0	-
	Phenanthrene	244	0.0523	-	0	-	0	-
	Pyrene	244	8.00E-03	-	0	-	0	-
	Total PAHs	4,640	0.782	100+	0	100+	0	-
	Summed PAHs	4,526	13.4	100+	3.71E-20	100+	9.55E-18	198%

Table 2-11
Sensitivity Analyses, Thickness of EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		15 cm of 5% GAC-Amended Sand				
				30 cm EPL		60 cm EPL		RPD (%)
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	-
	PCB-15	66.0	2.65E-03	100+	0	100+	0	-
	PCB-31	66.0	1.60E-04	100+	0	100+	0	-
	PCB-44	66.0	6.68E-05	100+	0	100+	0	-
	PCB-99	66.0	1.46E-04	100+	0	100+	0	-
	PCB-141	66.0	1.11E-04	100+	0	100+	0	-
	PCB-153	65.9	1.20E-04	100+	0	100+	0	-
	PCB-174	66.0	8.35E-05	100+	0	100+	0	-
	PCB-177	66.0	7.82E-05	100+	0	100+	0	-
	PCB-180	66.0	9.86E-05	100+	0	100+	0	-
	PCB-183	66.0	9.04E-05	100+	0	100+	0	-
	PCB-199	66.0	9.06E-06	100+	0	100+	0	-
	PCB-206	66.0	2.35E-05	100+	0	100+	0	-
	PCB-209	66.0	7.08E-06	100+	0	100+	0	-
	Total PCBs	923	2.07E-03	100+	0	100+	0	-
	Summed PCBs	923	4.60E-02	100+	0	100+	0	-
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	3.10E-03	100+	3.10E-03	0%

Table 2-11
Sensitivity Analyses, Thickness of EPL
CDTM; Swan Island Basin Project Area, Portland, Oregon

Notes:

concentration. RPDs in green indicate that the sensitivity concentration is lower than the base case concentration. A dash (-) is used for a COC when both the base case and sensitivity scenarios have 100-year porewater concentrations of 0 µg/L.

100+ = time-to-breakthrough exceeds 100 years

% = percent

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

cm = centimeter

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

C_{PW} = porewater concentration

C_{Sed} = sediment concentration

CPP = Cap Performance Point -> top of chemical isolation layer.

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon, amendment percentage by weight

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

RPD = Relative Percent Difference

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total cPAHs = Benzo(a)pyrene Equivalent

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

TTB = Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 2-12
Sensitivity Analyses, Flux Matching Bottom Boundary Condition
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand				
				Fixed Concentration		Flux Matching		RPD (%)
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	-
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	-
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	-
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	-
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	-
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	-
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	-
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	-
	DDE	9.65	1.49E-04	100+	0	100+	0	-
	DDT	10.3	4.86E-05	100+	0	100+	0	-
	DDx	23.1	2.33E-04	100+	0	100+	0	-
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	-
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	7.36E-14	100+	7.36E-14	0%
	Xylenes	1.10	0.0361	-	0	-	0	-
Metals	Arsenic	9,691	25.9	100+	0	100+	1.69E-19	200%
	Cadmium	680	0.0136	100+	0	100+	0	-
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-
	Copper	2.23E+05	3.77	100+	2.87	100+	2.87	0%
	Lead	1.10E+05	5.51	100+	6.57E-09	100+	6.57E-09	0%
	Manganese	8.61E+05	1.23E+04	-	1.20E+04	-	1.20E+04	0%
	Mercury	530	0.421	100+	0	100+	0	-
	Vanadium	1.10E+05	110	-	0	-	0	-
	Zinc	3.82E+05	11.2	100+	8.75	100+	8.75	0%
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	-
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	-
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	-
	Lindane	0.383	0.0110	100+	0	100+	0	-
	Pentachlorophenol	72.0	1.08	-	0	-	0	-
Organotin	Tributyltin	710	0.387	100+	7.91E-10	100+	7.91E-10	0%
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	-
	Benzo(a)pyrene	244	0.0176	-	0	-	0	-
	Benzo(b)fluoranthene	244	8.60E-03	-	2.25E-20	-	2.25E-20	0%
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	-
	Chrysene	244	9.95E-04	-	0	-	0	-
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	-
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	-
	Total cPAHs	510	0.0367	100+	0	100+	0	-
	Summed cPAHs	1,709	0.0825	100+	2.25E-20	100+	2.25E-20	0%

Table 2-12
Sensitivity Analyses, Flux Matching Bottom Boundary Condition
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand				
				Fixed Concentration		Flux Matching		RPD (%)
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	-
	2-Methylnaphthalene	244	4.12	-	0	-	0	-
	Acenaphthene	244	0.177	-	0	-	0	-
	Acenaphthylene	244	2.06	-	0	-	0	-
	Anthracene	244	0.0173	-	0	-	0	-
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	-
	Benzo(g,h,i)perylene	244	0.0181	-	0	-	0	-
	Fluoranthene	244	4.15E-03	-	1.09E-17	-	1.09E-17	0%
	Fluorene	244	0.0673	-	0	-	0	-
	Naphthalene	130	2.76	-	0	-	0	-
	Phenanthrene	244	0.0523	-	0	-	0	-
	Pyrene	244	8.00E-03	-	0	-	0	-
	Total PAHs	4,640	0.782	100+	0	100+	0	-
	Summed PAHs	4,526	13.4	100+	1.09E-17	100+	1.09E-17	0%
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	-
	PCB-15	66.0	2.65E-03	100+	0	100+	0	-
	PCB-31	66.0	1.60E-04	100+	0	100+	0	-
	PCB-44	66.0	6.68E-05	100+	0	100+	0	-
	PCB-99	66.0	1.46E-04	100+	0	100+	0	-
	PCB-141	66.0	1.11E-04	100+	0	100+	0	-
	PCB-153	65.9	1.20E-04	100+	0	100+	0	-
	PCB-174	66.0	8.35E-05	100+	0	100+	0	-
	PCB-177	66.0	7.82E-05	100+	0	100+	0	-
	PCB-180	66.0	9.86E-05	100+	0	100+	0	-
	PCB-183	66.0	9.04E-05	100+	0	100+	0	-
	PCB-199	66.0	9.06E-06	100+	0	100+	0	-
	PCB-206	66.0	2.35E-05	100+	0	100+	0	-
	PCB-209	66.0	7.08E-06	100+	0	100+	0	-
	Total PCBs	923	2.07E-03	100+	0	100+	0	-
	Summed PCBs	923	4.60E-02	100+	0	100+	0	-
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	7.25E-04	100+	7.25E-04	0%

Table 2-12
Sensitivity Analyses, Flux Matching Bottom Boundary Condition
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		15 cm of 5% GAC-Amended Sand				
				Fixed Concentration		Flux Matching		RPD (%)
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	-
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	-
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	-
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	-
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	-
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	-
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	-
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	-
	DDE	9.65	1.49E-04	100+	0	100+	0	-
	DDT	10.3	4.86E-05	100+	0	100+	0	-
	DDx	23.1	2.33E-04	100+	0	100+	0	-
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	-
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	6.02E-08	100+	6.02E-08	0%
	Xylenes	1.10	0.0361	-	0	-	0	-
Metals	Arsenic	9,691	25.9	**77**	16.4	**77**	16.4	0%
	Cadmium	680	0.0136	100+	3.21E-03	100+	3.21E-03	0%
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-
	Copper	2.23E+05	3.77	100+	3.47	100+	3.47	0%
	Lead	1.10E+05	5.51	100+	1.29E-04	100+	1.29E-04	0%
	Manganese	8.61E+05	1.23E+04	-	1.22E+04	-	1.21E+04	0.823%
	Mercury	530	0.421	100+	0	100+	0	-
	Vanadium	1.10E+05	110	-	4.64	-	4.64	0%
	Zinc	3.82E+05	11.2	100+	10.8	100+	10.8	0%
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	-
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	-
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	-
	Lindane	0.383	0.0110	100+	0	100+	0	-
	Pentachlorophenol	72.0	1.08	-	0	-	0	-
Organotin	Tributyltin	710	0.387	100+	0.0163	100+	0.0163	0%
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	-
	Benzo(a)pyrene	244	0.0176	-	0	-	0	-
	Benzo(b)fluoranthene	244	8.60E-03	-	1.97E-20	-	1.97E-20	0%
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	-
	Chrysene	244	9.95E-04	-	0	-	0	-
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	-
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	-
	Total cPAHs	510	0.0367	100+	0	100+	0	-
	Summed cPAHs	1,709	0.0825	100+	1.97E-20	100+	1.97E-20	0%

Table 2-12
Sensitivity Analyses, Flux Matching Bottom Boundary Condition
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		15 cm of 5% GAC-Amended Sand				
				Fixed Concentration		Flux Matching		RPD (%)
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	-
	2-Methylnaphthalene	244	4.12	-	0	-	0	-
	Acenaphthene	244	0.177	-	0	-	0	-
	Acenaphthylene	244	2.06	-	0	-	0	-
	Anthracene	244	0.0173	-	0	-	0	-
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	-
	Benzo(g,h,i)perylene	244	0.0181	-	1.74E-20	-	1.74E-20	0%
	Fluoranthene	244	4.15E-03	-	0	-	0	-
	Fluorene	244	0.0673	-	0	-	0	-
	Naphthalene	130	2.76	-	0	-	0	-
	Phenanthrene	244	0.0523	-	0	-	0	-
	Pyrene	244	8.00E-03	-	0	-	0	-
	Total PAHs	4,640	0.782	100+	0	100+	0	-
	Summed PAHs	4,526	13.4	100+	3.71E-20	100+	3.71E-20	0%
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	-
	PCB-15	66.0	2.65E-03	100+	0	100+	0	-
	PCB-31	66.0	1.60E-04	100+	0	100+	0	-
	PCB-44	66.0	6.68E-05	100+	0	100+	0	-
	PCB-99	66.0	1.46E-04	100+	0	100+	0	-
	PCB-141	66.0	1.11E-04	100+	0	100+	0	-
	PCB-153	65.9	1.20E-04	100+	0	100+	0	-
	PCB-174	66.0	8.35E-05	100+	0	100+	0	-
	PCB-177	66.0	7.82E-05	100+	0	100+	0	-
	PCB-180	66.0	9.86E-05	100+	0	100+	0	-
	PCB-183	66.0	9.04E-05	100+	0	100+	0	-
	PCB-199	66.0	9.06E-06	100+	0	100+	0	-
	PCB-206	66.0	2.35E-05	100+	0	100+	0	-
	PCB-209	66.0	7.08E-06	100+	0	100+	0	-
	Total PCBs	923	2.07E-03	100+	0	100+	0	-
	Summed PCBs	923	4.60E-02	100+	0	100+	0	-
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	3.10E-03	100+	3.10E-03	0%

Table 2-12
Sensitivity Analyses, Flux Matching Bottom Boundary Condition
CDTM; Swan Island Basin Project Area, Portland, Oregon

Notes:
RPDs are calculated based on the 100-year porewater concentrations. RPDs in red indicate that the sensitivity concentration is higher than the base case concentration. RPDs in green indicate that the sensitivity concentration is lower than the base case concentration. A dash (-) is used for a COC when both the base case and

100+ = time-to-breakthrough exceeds 100 years

% = percent

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

cm = centimeter

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

C_{PW} = porewater concentration

C_{Sed} = sediment concentration

CPP = Cap Performance Point -> top of chemical isolation layer.

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon, amendment percentage by weight

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

RPD = Relative Percent Difference

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total cPAHs = Benzo(a)pyrene Equivalent

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

TTB = Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 2-13
Sensitivity Analyses, Cap Consolidation
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		2x Consolidation Depth (58.4 cm)		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	-
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	-
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	-
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	-
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	-
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	-
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	-
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	-
	DDE	9.65	1.49E-04	100+	0	100+	0	-
	DDT	10.3	4.86E-05	100+	0	100+	0	-
	DDx	23.1	2.33E-04	100+	0	100+	0	-
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	-
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	7.36E-14	100+	7.61E-14	3.34%
	Xylenes	1.10	0.0361	-	0	-	0	-
Metals	Arsenic	9,691	25.9	100+	0	100+	1.92E-19	200%
	Cadmium	680	0.0136	100+	0	100+	0	-
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-
	Copper	2.23E+05	3.77	100+	2.87	100+	2.87	0%
	Lead	1.10E+05	5.51	100+	6.57E-09	100+	6.58E-09	0.152%
	Manganese	8.61E+05	1.23E+04	-	1.20E+04	-	1.20E+04	0%
	Mercury	530	0.421	100+	0	100+	0	-
	Vanadium	1.10E+05	110	-	0	-	0	-
	Zinc	3.82E+05	11.2	100+	8.75	100+	8.75	0%

Table 2-13
Sensitivity Analyses, Cap Consolidation
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		2x Consolidation Depth (58.4 cm)		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	-
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	-
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	-
	Lindane	0.383	0.0110	100+	0	100+	0	-
	Pentachlorophenol	72.0	1.08	-	0	-	0	-
Organotin	Tributyltin	710	0.387	100+	7.91E-10	100+	8.68E-10	9.28%
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	-
	Benzo(a)pyrene	244	0.0176	-	0	-	0	-
	Benzo(b)fluoranthene	244	8.60E-03	-	2.25E-20	-	0	200%
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	-
	Chrysene	244	9.95E-04	-	0	-	0	-
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	-
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	-
	Total cPAHs	510	0.0367	100+	0	100+	0	-
	Summed cPAHs	1,709	0.0825	100+	2.25E-20	100+	0	200%
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	-
	2-Methylnaphthalene	244	4.12	-	0	-	0	-
	Acenaphthene	244	0.177	-	0	-	0	-
	Acenaphthylene	244	2.06	-	0	-	0	-
	Anthracene	244	0.0173	-	0	-	0	-
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	-
	Benzo(g,h,i)perylene	244	0.0181	-	0	-	2.14E-20	200%
	Fluoranthene	244	4.15E-03	-	1.09E-17	-	0	200%
	Fluorene	244	0.0673	-	0	-	0	-
	Naphthalene	130	2.76	-	0	-	0	-
	Phenanthrene	244	0.0523	-	0	-	0	-
	Pyrene	244	8.00E-03	-	0	-	0	-
	Total PAHs	4,640	0.782	100+	0	100+	0	-
	Summed PAHs	4,526	13.4	100+	1.09E-17	100+	2.14E-20	199%

Table 2-13
Sensitivity Analyses, Cap Consolidation
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		2x Consolidation Depth (58.4 cm)		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	-
	PCB-15	66.0	2.65E-03	100+	0	100+	0	-
	PCB-31	66.0	1.60E-04	100+	0	100+	0	-
	PCB-44	66.0	6.68E-05	100+	0	100+	0	-
	PCB-99	66.0	1.46E-04	100+	0	100+	0	-
	PCB-141	66.0	1.11E-04	100+	0	100+	0	-
	PCB-153	65.9	1.20E-04	100+	0	100+	0	-
	PCB-174	66.0	8.35E-05	100+	0	100+	0	-
	PCB-177	66.0	7.82E-05	100+	0	100+	0	-
	PCB-180	66.0	9.86E-05	100+	0	100+	0	-
	PCB-183	66.0	9.04E-05	100+	0	100+	0	-
	PCB-199	66.0	9.06E-06	100+	0	100+	0	-
	PCB-206	66.0	2.35E-05	100+	0	100+	0	-
	PCB-209	66.0	7.08E-06	100+	0	100+	0	-
	Total PCBs	923	2.07E-03	100+	0	100+	0	-
	Summed PCBs	923	4.60E-02	100+	0	100+	0	-
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	7.25E-04	100+	7.28E-04	0.413%

Table 2-13
Sensitivity Analyses, Cap Consolidation
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		2x Consolidation Time (2.4 years)			2x Consolidation Values (58.4 cm ; 2.4 years)			Overall Consolidation (50.8 cm ; 2.5 years)		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	-	100+	0	-	100+	0	-
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	-	100+	0	-	100+	0	-
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	-	100+	0	-	100+	0	-
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	-	100+	0	-	100+	0	-
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	-	100+	0	-	100+	0	-
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	-	100+	0	-	100+	0	-
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	-	100+	0	-	100+	0	-
DDx	DDD	8.08	3.95E-04	100+	0	-	100+	0	-	100+	0	-
	DDE	9.65	1.49E-04	100+	0	-	100+	0	-	100+	0	-
	DDT	10.3	4.86E-05	100+	0	-	100+	0	-	100+	0	-
	DDx	23.1	2.33E-04	100+	0	-	100+	0	-	100+	0	-
	Summed DDx	28.0	5.92E-04	100+	0	-	100+	0	-	100+	0	-
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	7.37E-14	0.136%	100+	7.63E-14	3.60%	100+	7.57E-14	2.81%
	Xylenes	1.10	0.0361	-	0	-	-	0	-	-	0	-
Metals	Arsenic	9,691	25.9	100+	1.92E-19	200%	100+	2.17E-19	200%	100+	1.13E-19	200%
	Cadmium	680	0.0136	100+	0	-	100+	0	-	100+	0	-
	Chromium (III)	4.57E+04	1.15	-	0	-	-	0	-	-	0	-
	Copper	2.23E+05	3.77	100+	2.87	0%	100+	2.88	0.348%	100+	2.87	0%
	Lead	1.10E+05	5.51	100+	6.58E-09	0.152%	100+	6.76E-09	2.85%	100+	6.71E-09	2.11%
	Manganese	8.61E+05	1.23E+04	-	1.20E+04	0%	-	1.20E+04	0%	-	1.20E+04	0%
	Mercury	530	0.421	100+	0	-	100+	0	-	100+	0	-
	Vanadium	1.10E+05	110	-	0	-	-	0	-	-	0	-
	Zinc	3.82E+05	11.2	100+	8.75	0%	100+	8.76	0.114%	100+	8.76	0.114%

Table 2-13
Sensitivity Analyses, Cap Consolidation
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		2x Consolidation Time (2.4 years)			2x Consolidation Values (58.4 cm ; 2.4 years)			Overall Consolidation (50.8 cm ; 2.5 years)		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
Organochloride	Aldrin	0.400	3.54E-04	100+	0	-	100+	0	-	100+	0	-
	Chlordanes	5.24	1.76E-03	100+	4.03E-20	200%	100+	0	-	100+	0	-
	Dieldrin	0.550	5.98E-04	100+	0	-	100+	0	-	100+	0	-
	Lindane	0.383	0.0110	100+	0	-	100+	0	-	100+	0	-
	Pentachlorophenol	72.0	1.08	-	0	-	-	0	-	-	0	-
Organotin	Tributyltin	710	0.387	100+	7.95E-10	0.504%	100+	8.76E-10	10.2%	100+	8.55E-10	7.78%
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	-	0	-	-	0	-
	Benzo(a)pyrene	244	0.0176	-	0	-	-	0	-	-	0	-
	Benzo(b)fluoranthene	244	8.60E-03	-	0	200%	-	1.69E-20	28.4%	-	0	200%
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	-	0	-	-	0	-
	Chrysene	244	9.95E-04	-	0	-	-	0	-	-	0	-
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	-	0	-	-	0	-
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	-	0	-	-	0	-
	Total cPAHs	510	0.0367	100+	0	-	100+	0	-	100+	0	-
	Summed cPAHs	1,709	0.0825	100+	0	200%	100+	1.69E-20	28.4%	100+	0	200%
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	-	0	-	-	0	-
	2-Methylnaphthalene	244	4.12	-	0	-	-	0	-	-	0	-
	Acenaphthene	244	0.177	-	0	-	-	0	-	-	0	-
	Acenaphthylene	244	2.06	-	0	-	-	0	-	-	0	-
	Anthracene	244	0.0173	-	0	-	-	0	-	-	0	-
	Benzo(e)pyrene	244	5.81E-03	-	0	-	-	0	-	-	0	-
	Benzo(g,h,i)perylene	244	0.0181	-	0	-	-	0	-	-	1.64E-20	200%
	Fluoranthene	244	4.15E-03	-	0	200%	-	0	200%	-	0	200%
	Fluorene	244	0.0673	-	0	-	-	0	-	-	0	-
	Naphthalene	130	2.76	-	0	-	-	0	-	-	0	-
	Phenanthrene	244	0.0523	-	0	-	-	0	-	-	0	-
	Pyrene	244	8.00E-03	-	0	-	-	0	-	-	0	-
	Total PAHs	4,640	0.782	100+	0	-	100+	0	-	100+	0	-
	Summed PAHs	4,526	13.4	100+	0	200%	100+	1.69E-20	199%	100+	1.64E-20	199%

Table 2-13
Sensitivity Analyses, Cap Consolidation
CDTM; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		2x Consolidation Time (2.4 years)			2x Consolidation Values (58.4 cm ; 2.4 years)			Overall Consolidation (50.8 cm ; 2.5 years)		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
PCBs	PCB-1	66.0	0.0423	100+	0	-	100+	0	-	100+	0	-
	PCB-15	66.0	2.65E-03	100+	0	-	100+	0	-	100+	0	-
	PCB-31	66.0	1.60E-04	100+	0	-	100+	0	-	100+	0	-
	PCB-44	66.0	6.68E-05	100+	0	-	100+	0	-	100+	0	-
	PCB-99	66.0	1.46E-04	100+	0	-	100+	0	-	100+	0	-
	PCB-141	66.0	1.11E-04	100+	0	-	100+	0	-	100+	0	-
	PCB-153	65.9	1.20E-04	100+	0	-	100+	0	-	100+	0	-
	PCB-174	66.0	8.35E-05	100+	0	-	100+	0	-	100+	0	-
	PCB-177	66.0	7.82E-05	100+	0	-	100+	0	-	100+	0	-
	PCB-180	66.0	9.86E-05	100+	0	-	100+	0	-	100+	0	-
	PCB-183	66.0	9.04E-05	100+	0	-	100+	0	-	100+	0	-
	PCB-199	66.0	9.06E-06	100+	0	-	100+	0	-	100+	0	-
	PCB-206	66.0	2.35E-05	100+	0	-	100+	0	-	100+	0	-
	PCB-209	66.0	7.08E-06	100+	0	-	100+	0	-	100+	0	-
	Total PCBs	923	2.07E-03	100+	0	-	100+	0	-	100+	0	-
	Summed PCBs	923	4.60E-02	100+	0	-	100+	0	-	100+	0	-
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	7.25E-04	0%	100+	7.29E-04	0.550%	100+	7.28E-04	0.413%

Table 2-13
Sensitivity Analyses, Cap Consolidation
CDTM; Swan Island Basin Project Area, Portland, Oregon

Notes:

RPDs are calculated based on the 100-year porewater concentrations. RPDs in red indicate that the sensitivity concentration is higher than the base case concentration. RPDs in green indicate that the sensitivity concentration is lower than the base case concentration. A dash (-) is used for a COC when both the base case and sensitivity scenarios have 100-year porewater concentrations of 0 µg/L.

100+ = time-to-breakthrough exceeds 100 years

% = percent

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

cm = centimeter

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

C_{PW} = porewater concentration

C_{Sed} = sediment concentration

CPP = Cap Performance Point -> top of chemical isolation layer.

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon, amendment percentage by weight

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

RPD = Relative Percent Difference

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total cPAHs = Benzo(a)pyrene Equivalent

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

TTB = Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 2-14
Cap Modeling Input Parameters Sensitivity Analyses, Sand and GAC Settling Separation
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Total Material Separation - 2 Lifts			Total Material Separation - 3 Lifts		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	-	100+	0	-
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	-	100+	0	-
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	-	100+	0	-
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	-	100+	0	-
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	-	100+	0	-
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	-	100+	0	-
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	-	100+	0	-
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	-	100+	0	-
	DDE	9.65	1.49E-04	100+	0	100+	0	-	100+	0	-
	DDT	10.3	4.86E-05	100+	0	100+	0	-	100+	0	-
	DDx	23.1	2.33E-04	100+	0	100+	0	-	100+	0	-
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	-	100+	0	-
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	7.36E-14	100+	7.53E-18	200%	100+	0	200%
	Xylenes	1.10	0.0361	-	0	-	0	-	-	0	-
Metals	Arsenic	9,691	25.9	100+	0	100+	0	-	100+	0	-
	Cadmium	680	0.0136	100+	0	100+	0	-	100+	0	-
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-	-	0	-
	Copper	2.23E+05	3.77	100+	2.87	100+	2.87	0%	100+	2.86	0.349%
	Lead	1.10E+05	5.51	100+	6.57E-09	100+	3.61E-16	200%	100+	0	200%
	Manganese	8.61E+05	1.23E+04	-	1.20E+04	-	1.21E+04	0.830%	-	1.21E+04	0.830%
	Mercury	530	0.421	100+	0	100+	0	-	100+	0	-
	Vanadium	1.10E+05	110	-	0	-	0	-	-	0	-
	Zinc	3.82E+05	11.2	100+	8.75	100+	6.07	36.2%	100+	6.02	37.0%
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	-	100+	0	-
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	-	100+	0	-
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	-	100+	0	-
	Lindane	0.383	0.0110	100+	0	100+	0	-	100+	0	-
	Pentachlorophenol	72.0	1.08	-	0	-	0	-	-	0	-
Organotin	Tributyltin	710	0.387	100+	7.91E-10	100+	0	200%	100+	0	200%
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	-	-	0	-
	Benzo(a)pyrene	244	0.0176	-	0	-	0	-	-	0	-
	Benzo(b)fluoranthene	244	8.60E-03	-	2.25E-20	-	1.66E-20	30.2%	-	0	-
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	-	-	0	-
	Chrysene	244	9.95E-04	-	0	-	0	-	-	0	-
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	-	-	0	-
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	-	-	0	-
	Total cPAHs	510	0.0367	100+	0	100+	0	-	100+	0	-
	Summed cPAHs	1,709	0.0825	100+	2.25E-20	100+	1.66E-20	30.2%	100+	0	-

Table 2-14
Cap Modeling Input Parameters Sensitivity Analyses, Sand and GAC Settling Separation
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		Total Material Separation - 2 Lifts			Total Material Separation - 3 Lifts		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	-	-	0	-
	2-Methylnaphthalene	244	4.12	-	0	-	0	-	-	0	-
	Acenaphthene	244	0.177	-	0	-	0	-	-	0	-
	Acenaphthylene	244	2.06	-	0	-	0	-	-	0	-
	Anthracene	244	0.0173	-	0	-	0	-	-	0	-
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	-	-	0	-
	Benzo(g,h,i)perylene	244	0.0181	-	0	-	7.56E-20	200%	-	0	-
	Fluoranthene	244	4.15E-03	-	1.09E-17	-	0	200%	-	0	200%
	Fluorene	244	0.0673	-	0	-	0	-	-	0	-
	Naphthalene	130	2.76	-	0	-	0	-	-	0	-
	Phenanthrene	244	0.0523	-	0	-	0	-	-	0	-
	Pyrene	244	8.00E-03	-	0	-	0	-	-	0	-
	Total PAHs	4,640	0.782	100+	0	100+	0	-	100+	0	-
	Summed PAHs	4,526	13.4	100+	1.09E-17	100+	9.22E-20	197%	100+	0	200%
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	-	100+	1.49E-17	200%
	PCB-15	66.0	2.65E-03	100+	0	100+	0	-	100+	0	-
	PCB-31	66.0	1.60E-04	100+	0	100+	0	-	100+	0	-
	PCB-44	66.0	6.68E-05	100+	0	100+	0	-	100+	0	-
	PCB-99	66.0	1.46E-04	100+	0	100+	0	-	100+	0	-
	PCB-141	66.0	1.11E-04	100+	0	100+	0	-	100+	0	-
	PCB-153	65.9	1.20E-04	100+	0	100+	0	-	100+	0	-
	PCB-174	66.0	8.35E-05	100+	0	100+	0	-	100+	0	-
	PCB-177	66.0	7.82E-05	100+	0	100+	0	-	100+	0	-
	PCB-180	66.0	9.86E-05	100+	0	100+	0	-	100+	0	-
	PCB-183	66.0	9.04E-05	100+	0	100+	0	-	100+	0	-
	PCB-199	66.0	9.06E-06	100+	0	100+	0	-	100+	0	-
	PCB-206	66.0	2.35E-05	100+	0	100+	0	-	100+	0	-
	PCB-209	66.0	7.08E-06	100+	0	100+	0	-	100+	0	-
	Total PCBs	923	2.07E-03	100+	0	100+	0	-	100+	0	-
	Summed PCBs	923	4.60E-02	100+	0	100+	0	-	100+	0	-
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	7.25E-04	100+	4.14E-04	54.6%	100+	3.01E-04	82.7%

Table 2-14
Cap Modeling Input Parameters Sensitivity Analyses, Sand and GAC Settling Separation
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:

RPDs are calculated based on the 100-year porewater concentrations. RPDs in red indicate that the sensitivity concentration is higher than the base case concentration. RPDs in green indicate that the sensitivity concentration is lower than the base case concentration. A dash (-) is used for a COC when both the base case and sensitivity scenarios have 100-year porewater concentrations of 0 µg/L.

100+ = time-to-breakthrough exceeds 100 years

% = percent

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

cm = centimeter

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

C_{PW} = porewater concentration

C_{Sed} = sediment concentration

CPP = Cap Performance Point -> top of chemical isolation layer.

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon, amendment percentage by weight

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

RPD = Relative Percent Difference

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total cPAHs = Benzo(a)pyrene Equivalent

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

TTB = Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 2-15
Cap Modeling Input Parameters Sensitivity Analyses, CIL and Sediment Mixing
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		5 cm Mixing Layer			10 cm Mixing Layer		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
Dioxins/Furans	1,2,3,4,7,8-HxCDF	0.0299	1.50E-07	100+	0	100+	0	-	100+	0	-
	1,2,3,7,8-PeCDD	5.14E-03	8.46E-08	100+	0	100+	0	-	100+	0	-
	2,3,4,7,8-PeCDF	0.0115	1.10E-06	100+	0	100+	0	-	100+	0	-
	2,3,7,8-TCDD	1.92E-03	3.24E-07	100+	0	100+	0	-	100+	0	-
	2,3,7,8-TCDF	5.29E-03	4.50E-08	100+	0	100+	0	-	100+	0	-
	Total Dioxins/Furans	0.0436	7.34E-06	100+	0	100+	0	-	100+	0	-
	Summed Dioxins/Furans	0.0538	1.70E-06	100+	0	100+	0	-	100+	0	-
DDx	DDD	8.08	3.95E-04	100+	0	100+	0	-	100+	0	-
	DDE	9.65	1.49E-04	100+	0	100+	0	-	100+	0	-
	DDT	10.3	4.86E-05	100+	0	100+	0	-	100+	0	-
	DDx	23.1	2.33E-04	100+	0	100+	0	-	100+	0	-
	Summed DDx	28.0	5.92E-04	100+	0	100+	0	-	100+	0	-
Hydrocarbons	TPH-Diesel	1.10E+06	503	100+	7.36E-14	100+	6.06E-14	19.4%	100+	5.09E-13	149%
	Xylenes	1.10	0.0361	-	0	-	0	-	-	0	-
Metals	Arsenic	9,691	25.9	100+	0	100+	0	-	100+	0	-
	Cadmium	680	0.0136	100+	0	100+	0	-	100+	1.70E-14	200%
	Chromium (III)	4.57E+04	1.15	-	0	-	0	-	-	0	-
	Copper	2.23E+05	3.77	100+	2.87	100+	2.93	2.07%	100+	3.06	6.41%
	Lead	1.10E+05	5.51	100+	6.57E-09	100+	1.28E-08	64.3%	100+	6.66E-08	164%
	Manganese	8.61E+05	1.23E+04	-	1.20E+04	-	1.21E+04	0.830%	-	1.21E+04	0.830%
	Mercury	530	0.421	100+	0	100+	0	-	100+	0	-
	Vanadium	1.10E+05	110	-	0	-	0	-	-	0	-
	Zinc	3.82E+05	11.2	100+	8.75	100+	9.00	2.82%	100+	9.56	8.85%
Organochloride	Aldrin	0.400	3.54E-04	100+	0	100+	0	-	100+	0	-
	Chlordanes	5.24	1.76E-03	100+	0	100+	0	-	100+	0	-
	Dieldrin	0.550	5.98E-04	100+	0	100+	0	-	100+	0	-
	Lindane	0.383	0.0110	100+	0	100+	0	-	100+	0	-
	Pentachlorophenol	72.0	1.08	-	0	-	0	-	-	0	-
Organotin	Tributyltin	710	0.387	100+	7.91E-10	100+	6.35E-11	170%	100+	1.27E-08	177%
cPAHs	Benzo(a)anthracene	244	1.94E-03	-	0	-	0	-	-	0	-
	Benzo(a)pyrene	244	0.0176	-	0	-	0	-	-	0	-
	Benzo(b)fluoranthene	244	8.60E-03	-	2.25E-20	-	0	200%	-	0	200%
	Benzo(k)fluoranthene	244	8.40E-03	-	0	-	0	-	-	0	-
	Chrysene	244	9.95E-04	-	0	-	0	-	-	0	-
	Dibenz(a,h)anthracene	244	5.42E-03	-	0	-	0	-	-	0	-
	Indeno(1,2,3-cd)pyrene	244	2.98E-03	-	0	-	0	-	-	0	-
	Total cPAHs	510	0.0367	100+	0	100+	0	-	100+	0	-
	Summed cPAHs	1,709	0.0825	100+	2.25E-20	100+	0	200%	100+	0	200%

Table 2-15
Cap Modeling Input Parameters Sensitivity Analyses, CIL and Sediment Mixing
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Modeled COCs		Initial Concentration		30 cm of 5% GAC-Amended Sand		5 cm Mixing Layer			10 cm Mixing Layer		
		C_{Sed} [µg/kg]	C_{PW} [µg/L]	TTB	100-Year Cpw [µg/L]	TTB	100-Year Cpw [µg/L]	RPD (%)	TTB	100-Year Cpw [µg/L]	RPD (%)
PAHs	1-Methylnaphthalene	244	4.12	-	0	-	0	-	-	0	-
	2-Methylnaphthalene	244	4.12	-	0	-	0	-	-	0	-
	Acenaphthene	244	0.177	-	0	-	0	-	-	0	-
	Acenaphthylene	244	2.06	-	0	-	0	-	-	0	-
	Anthracene	244	0.0173	-	0	-	0	-	-	0	-
	Benzo(e)pyrene	244	5.81E-03	-	0	-	0	-	-	0	-
	Benzo(g,h,i)perylene	244	0.0181	-	0	-	1.94E-20	200%	-	0	-
	Fluoranthene	244	4.15E-03	-	1.09E-17	-	0	200%	-	0	200%
	Fluorene	244	0.0673	-	0	-	0	-	-	0	-
	Naphthalene	130	2.76	-	0	-	0	-	-	0	-
	Phenanthrene	244	0.0523	-	0	-	0	-	-	0	-
	Pyrene	244	8.00E-03	-	0	-	0	-	-	0	-
	Total PAHs	4,640	0.782	100+	0	100+	0	-	100+	0	-
	Summed PAHs	4,526	13.4	100+	1.09E-17	100+	1.94E-20	199%	100+	0	200%
PCBs	PCB-1	66.0	0.0423	100+	0	100+	0	-	100+	0	-
	PCB-15	66.0	2.65E-03	100+	0	100+	0	-	100+	0	-
	PCB-31	66.0	1.60E-04	100+	0	100+	0	-	100+	0	-
	PCB-44	66.0	6.68E-05	100+	0	100+	0	-	100+	0	-
	PCB-99	66.0	1.46E-04	100+	0	100+	0	-	100+	0	-
	PCB-141	66.0	1.11E-04	100+	0	100+	0	-	100+	0	-
	PCB-153	65.9	1.20E-04	100+	0	100+	0	-	100+	0	-
	PCB-174	66.0	8.35E-05	100+	0	100+	0	-	100+	0	-
	PCB-177	66.0	7.82E-05	100+	0	100+	0	-	100+	0	-
	PCB-180	66.0	9.86E-05	100+	0	100+	0	-	100+	0	-
	PCB-183	66.0	9.04E-05	100+	0	100+	0	-	100+	0	-
	PCB-199	66.0	9.06E-06	100+	0	100+	0	-	100+	0	-
	PCB-206	66.0	2.35E-05	100+	0	100+	0	-	100+	0	-
	PCB-209	66.0	7.08E-06	100+	0	100+	0	-	100+	0	-
	Total PCBs	923	2.07E-03	100+	0	100+	0	-	100+	0	-
	Summed PCBs	923	4.60E-02	100+	0	100+	0	-	100+	0	-
Phthalates/ Plasticizers	BEHP	1,200	0.453	100+	7.25E-04	100+	7.66E-04	5.50%	100+	9.52E-04	27.1%

Table 2-15
Cap Modeling Input Parameters Sensitivity Analyses, CIL and Sediment Mixing
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:
RPDs are calculated based on the 100-year porewater concentrations. RPDs in red indicate that the sensitivity concentration is higher than the base case concentration. RPDs in green indicate that the sensitivity concentration is lower than the base case concentration. A dash (-) is used for a COC when both the base case and sensitivity scenarios have 100-year porewater concentrations of 0 µg/L.

100+ = time-to-breakthrough exceeds 100 years

% = percent

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

BEHP = bis(2-ethylhexyl) phthalate

Chlordanes = Total Chlordane (Calculated U = 1/2)

cm = centimeter

COC = contaminant of concern

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

C_{PW} = porewater concentration

C_{Sed} = sediment concentration

CPP = Cap Performance Point -> top of chemical isolation layer.

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethylene

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

Diesel = Residual Range Organics (C25-C36)

GAC = granular activated carbon, amendment percentage by weight

HxCDF = 1,2,3,4,7,8-hexachlorodibenzofuran

Lindane = Gamma BHC

PeCDD = pentachlorodibenzo-p-dioxin

PeCDF = pentachlorodibenzofuran

RPD = Relative Percent Difference

TCDD = tetrachlorodibenzo-p-dioxin

TCDF = tetrachlorodibenzofuran

Total cPAHs = Benzo(a)pyrene Equivalent

Total Dioxins/Furans = 2,3,7,8-TCDD Equivalent

TTB = Time-to-breakthrough is defined as the time elapsed between cap installation and the first occurrence of a COC porewater concentration equaling or surpassing the relevant CUL at the CPP.

Table 3-1

Minimum Median Armor Stone Diameters for Slope Protection

Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Location	Slope (H:V)	Significant Wave Height (feet)	Peak Wave Period (seconds)	Minimum Armor Stone Median Diameter (inches)
USCG	2.75	2.3	2.8	9.5
Navy	2.375	1.9	2.5	8
MC Pier	2.15	1.4	1.7	6
Port of Portland	2.5	1.5	1.9	6
Berth 311	3	1.5	1.9	6
Berth 305-307	2.5	1.2	1.9	6
Lagoon Wharf	3	1.3	2.2	6
DD3, DD5	2.75	2	2.6	8.2
Vigorous	2.75	2.6	2.7	10

Notes:

DD = Drydock

H:V = horizontal to vertical ratio

MC = Marine Consortium, Inc.

USCG = U.S. Coast Guard

Table 3-2

Design Conditions and Required Cast-In-Place Mattress Thickness

Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

City Outfall	Design Velocity (feet/second)	Mattress Thickness (inches)
M1	30	22
M2	30	22
M3	22	14
S2	24	14

Table 4-1
Selected Constructible Alternatives
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes	CU	Selected Constructible Alternative	Revetment Zone?	Additional Selection Rationale
Riverbank	RCU 1	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 2	Selected Constructible Alternative F	Yes	None
Riverbank	RCU 3	Selected Constructible Alternative F	Yes	None
Riverbank	RCU 4	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 5	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 6	Selected Constructible Alternative F	Yes	None
Riverbank	RCU 7	Selected Constructible Alternative F	Yes	None
Riverbank	RCU 8	Selected Constructible Alternative F	Yes	None
Riverbank	RCU 9	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 10	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 11	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 12	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 13	Selected Constructible Alternative F	Yes	None
Riverbank	RCU 14	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 15	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 16	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 17	Selected Constructible Alternative F	Yes	None
Riverbank	RCU 18	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 19	Selected Constructible Alternative F	Yes	None
Riverbank	RCU 20	Selected Constructible Alternative F	Yes	None
Riverbank	RCU 21	Selected Constructible Alternative F	Yes	None
Riverbank	RCU 22	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 23	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 24	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 25	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 26	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 27	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 28	Selected Constructible Alternative F	Yes	None
Riverbank	RCU 29	Selected Constructible Alternative G	Yes	None
Riverbank	RCU 30	Selected Constructible Alternative G	Yes	None
Sediment	CCU 1	Selected Constructible Alternative D	Yes	None
Sediment	CCU 2	Selected Constructible Alternative D	Yes	None
Sediment	CCU 3	Selected Constructible Alternative D	Yes	None
Sediment	CCU 4	Selected Constructible Alternative E	Yes	None
Sediment	CCU 5	No Capping Needed	Yes	None
Sediment	CCU 6	Selected Constructible Alternative G	Yes	None
Sediment	CCU 7	Selected Constructible Alternative G	Yes	None
Sediment	CCU 8	Selected Constructible Alternative D	Yes	None
Sediment	CCU 9	Selected Constructible Alternative D	Yes	None
Sediment	CCU 10	Selected Constructible Alternative E	Yes	None
Sediment	CCU 11	Selected Constructible Alternative C	No	None
Sediment	CCU 12	Selected Constructible Alternative C	No	None

Table 4-1
Selected Constructible Alternatives
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes	CU	Selected Constructible Alternative	Revetment Zone?	Additional Selection Rationale
Sediment	CCU 13	Selected Constructible Alternative C	No	None
Sediment	CCU 14	Selected Constructible Alternative C	No	Constructibility
Sediment	CCU 15	Selected Constructible Alternative C	No	None
Sediment	CCU 16	Selected Constructible Alternative C	No	Constructibility
Sediment	CCU 17	Selected Constructible Alternative F	Yes	None
Sediment	CCU 18	Selected Constructible Alternative B	No	None
Sediment	CCU 19	Selected Constructible Alternative B	No	None
Sediment	CCU 20	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 21	Selected Constructible Alternative B	No	None
Sediment	CCU 22	Selected Constructible Alternative B	No	None
Sediment	CCU 23	Selected Constructible Alternative B	No	None
Sediment	CCU 24	Selected Constructible Alternative B	No	None
Sediment	CCU 25	Selected Constructible Alternative B	No	None
Sediment	CCU 26	Selected Constructible Alternative B	No	None
Sediment	CCU 27	Selected Constructible Alternative B	No	None
Sediment	CCU 28	Selected Constructible Alternative B	No	None
Sediment	CCU 29	Selected Constructible Alternative B	No	None
Sediment	CCU 30	Selected Constructible Alternative B	No	None
Sediment	CCU 31	Selected Constructible Alternative B	No	None
Sediment	CCU 32	Selected Constructible Alternative B	No	None
Sediment	CCU 33	Selected Constructible Alternative B	No	None
Sediment	CCU 34	Selected Constructible Alternative B	No	None
Sediment	CCU 35	Selected Constructible Alternative B	No	None
Sediment	CCU 36	Selected Constructible Alternative B	No	None
Sediment	CCU 37	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 38	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 39	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 40	Selected Constructible Alternative B	No	None
Sediment	CCU 41	Selected Constructible Alternative B	No	None
Sediment	CCU 42	Selected Constructible Alternative B	No	None
Sediment	CCU 43	Selected Constructible Alternative B	No	None
Sediment	CCU 44	Selected Constructible Alternative B	No	None
Sediment	CCU 45	Selected Constructible Alternative B	No	None
Sediment	CCU 46	Selected Constructible Alternative B	No	None
Sediment	CCU 47	Selected Constructible Alternative B	No	None
Sediment	CCU 48	Selected Constructible Alternative B	No	None
Sediment	CCU 49	Selected Constructible Alternative B	No	None
Sediment	CCU 50	Selected Constructible Alternative B	No	None
Sediment	CCU 51	Selected Constructible Alternative B	No	None
Sediment	CCU 52	Selected Constructible Alternative B	No	None
Sediment	CCU 53	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 54	Selected Constructible Alternative B	No	Constructibility

Table 4-1
Selected Constructible Alternatives
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes	CU	Selected Constructible Alternative	Revetment Zone?	Additional Selection Rationale
Sediment	CCU 55	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 56	Selected Constructible Alternative B	No	None
Sediment	CCU 57	Selected Constructible Alternative C	No	None
Sediment	CCU 58	Selected Constructible Alternative C	No	None
Sediment	CCU 59	Selected Constructible Alternative C	No	None
Sediment	CCU 60	Selected Constructible Alternative C	No	None
Sediment	CCU 61	Selected Constructible Alternative C	No	None
Sediment	CCU 62	Selected Constructible Alternative E	Yes	None
Sediment	CCU 63	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 64	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 65	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 66	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 67	Selected Constructible Alternative B	No	None
Sediment	CCU 68	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 69	Selected Constructible Alternative B	No	None
Sediment	CCU 70	Selected Constructible Alternative B	No	None
Sediment	CCU 71	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 72	Selected Constructible Alternative B	No	None
Sediment	CCU 73	Selected Constructible Alternative B	No	None
Sediment	CCU 74	Selected Constructible Alternative B	No	None
Sediment	CCU 75	Selected Constructible Alternative B	No	None
Sediment	CCU 76	Selected Constructible Alternative B	No	None
Sediment	CCU 77	Selected Constructible Alternative B	No	None
Sediment	CCU 78	Selected Constructible Alternative B	No	None
Sediment	CCU 79	Selected Constructible Alternative G	Yes	None
Sediment	CCU 80	Selected Constructible Alternative G	Yes	None
Sediment	CCU 81	Selected Constructible Alternative G	Yes	None
Sediment	CCU 82	Selected Constructible Alternative G	Yes	None
Sediment	CCU 83	Selected Constructible Alternative F	Yes	None
Sediment	CCU 84	No Capping Needed	Yes	None
Sediment	CCU 85	Selected Constructible Alternative G	Yes	None
Sediment	CCU 86	Selected Constructible Alternative G	Yes	None
Sediment	CCU 87	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 88	Selected Constructible Alternative B	No	None
Sediment	CCU 89	Selected Constructible Alternative B	No	None
Sediment	CCU 90	Selected Constructible Alternative B	No	None
Sediment	CCU 91	Selected Constructible Alternative B	No	None
Sediment	CCU 92	Selected Constructible Alternative A	No	None
Sediment	CCU 93	Selected Constructible Alternative B	Yes	Adjacent CCU
Sediment	CCU 94	Selected Constructible Alternative F	Yes	None
Sediment	CCU 95	Selected Constructible Alternative B	No	Adjacent CCU
Sediment	CCU 96	Selected Constructible Alternative B	No	Constructibility

Table 4-1
Selected Constructible Alternatives
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes	CU	Selected Constructible Alternative	Revetment Zone?	Additional Selection Rationale
Sediment	CCU 97	Selected Constructible Alternative B	No	None
Sediment	CCU 98	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 99	Selected Constructible Alternative B	No	None
Sediment	CCU 100	Selected Constructible Alternative F	Yes	None
Sediment	CCU 101	Selected Constructible Alternative G	Yes	None
Sediment	CCU 102	Selected Constructible Alternative F	Yes	None
Sediment	CCU 103	Selected Constructible Alternative F	Yes	Adjacent CCU
Sediment	CCU 104	Selected Constructible Alternative F	Yes	Adjacent CCU
Sediment	CCU 105	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 106	Selected Constructible Alternative B	No	None
Sediment	CCU 107	Selected Constructible Alternative B	No	Adjacent CCU
Sediment	CCU 108	Selected Constructible Alternative B	No	Constructibility
Sediment	CCU 109	Selected Constructible Alternative B	No	None

Notes:

Selected Constructible Alternative A: 1 ft (30 cm) of unamended sand with overlying 2 ft (60 cm) EPL Cap Type 1.

Selected Constructible Alternative B: 1 foot (30 cm) of 5 percent GAC-amended sand with overlying 2 ft (60 cm) EPL Cap Type 2.

Selected Constructible Alternative C: 1 foot (30 cm) of 5 percent GAC-amended sand with overlying 2 ft (60 cm) EPL Cap Type 1.

Selected Constructible Alternative D: 6 inches of 5 percent GAC-amended sand with overlying 3 ft (90 cm) of stone protection system, including 2 ft (60 cm) of armor and 1 ft (30 cm) of bedding stone.

Selected Constructible Alternative E: 1 foot (30 cm) of 5 percent GAC-amended sand with overlying 3 ft (90 cm) of stone protection system, including 2 ft (60cm) of armor and 1 ft (30 cm) of bedding stone.

Selected Constructible Alternative F: 0.8 inches (2 cm) of Tektoseal-AC with overlying 3 ft (90 cm) of stone protection system in revetment zones, including 2 ft (60 cm) of armor and 1 ft (30 cm) of bedding stone.

Selected Constructible Alternative G: 1.6 inches (4 cm) of Tektoseal-AC with overlying 3 ft (90 cm) of stone protection system in revetment zones, including 2 ft (60 cm) of armor and 1 ft (30 cm) of bedding stone

No Capping Needed

ft = feet

in = inch

CCU = Cap Certification Unit

CU = Certification Unit

GAC = Granular Activated Carbon

RCU = Riverbank Certification Unit

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FIGURES

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Core Location

Head of the Basin

Revetment

Main Basin

Cap Certification Unit (CCU)

Dredge Certification Unit (DCU)

Riverbank Certification Unit (RCU)

Swan Island Basin Project Area Boundary

Notes:
CCU=cap certification unit,
EPL=erosion protection layer
RCU=riverbank certification unit
UHM=unamended habitat mix
USCG=United States Coast Guard

Figure 1-1

SIB Project Area Certification Units

Prepared on 10/9/2025
Cap Design Tech Memo
Swan Island Basin Remedial Design Group

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

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Dredging Area

Head of the Basin

Revetment

Main Basin

Cap Certification Unit (CCU)

Dredge Certification Unit (DCU)

Riverbank Certification Unit (RCU)

Swan Island Basin Project Area Boundary

Notes:
CCU=cap certification unit,
EPL=erosion protection layer
RCU=riverbank certification unit
UHM=unamended habitat mix
USCG=United States Coast Guard

Highlighted CCUs and DCUs are either fully or partially dredged. See Figure 1-1 for all certification units.

Figure 1-2

SIB Project Area Certification Units with Dredging Area

Prepared on 10/9/2025
Cap Design Tech Memo
Swan Island Basin Remedial Design Group

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N

0 Miles 1

2021 Aerial Photo from City of Portland

River Flow Direction

Adjacent Project Area

SIB Project Area

Notes:
Kd = linear partitioning coefficient
RM9W = River Mile 9 West
SIB = Swan Island Basin

Figure 1-3
Project Area-Adjacent Linear Partitioning Coefficients

Prepared on 7/16/2025
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Swan Island Basin Remedial Design Group

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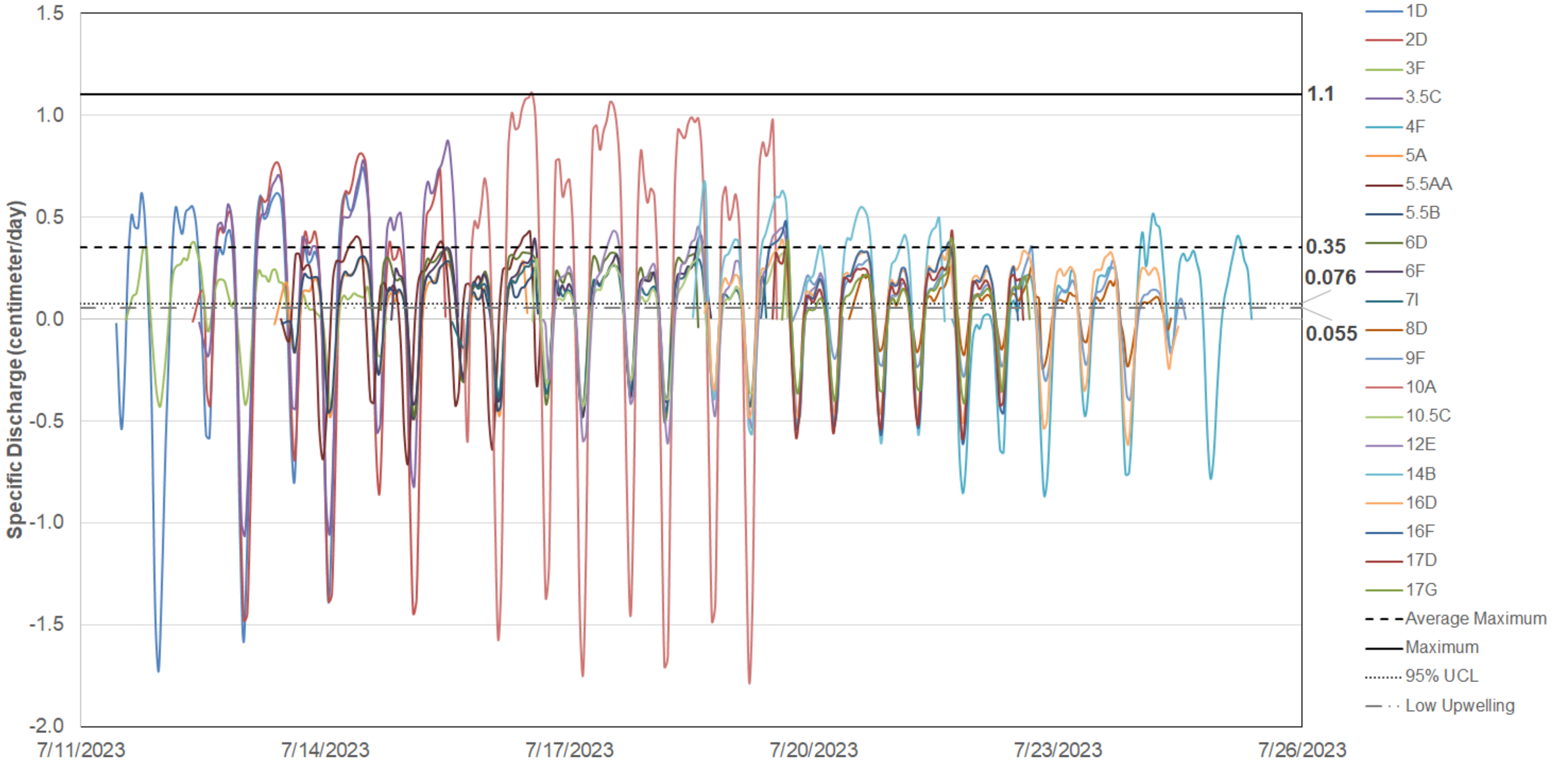

Notes:
% = percentile
UCL = Upper Confidence Limit

Figure 1-4

SIB Project Area Specific Discharge

Prepared on:07/30/2025
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Swan Island Basin

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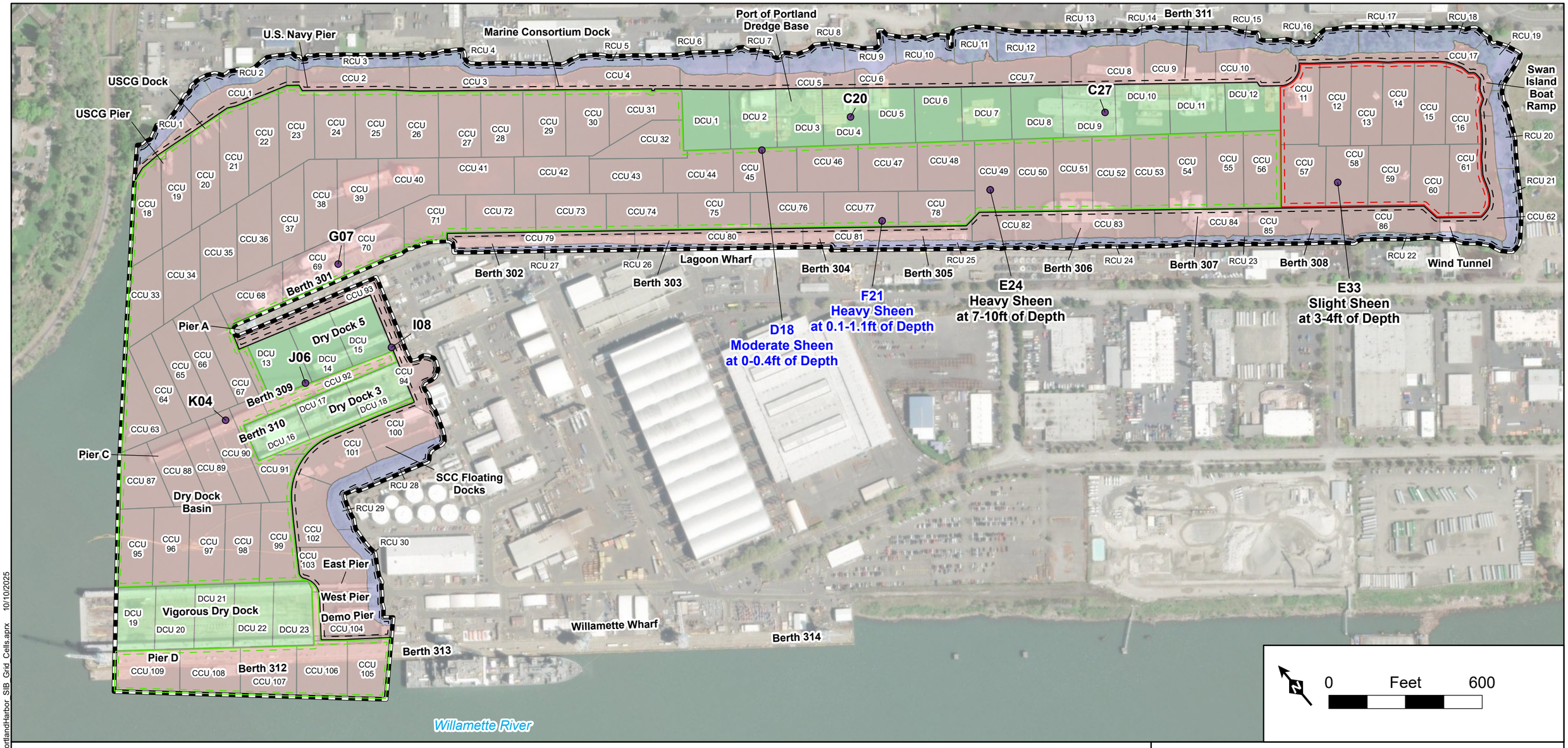

Core Location

Head of the Basin

Revetment

Main Basin

Cap Certification Unit (CCU)

Dredge Certification Unit (DCU)

Riverbank Certification Unit (RCU)

Swan Island Basin Project Area Boundary

Notes:
Locations where post-dredge surface intersects intervals with known NAPL observation.
Callout locations indicate post-dredging buried sediment intervals where NAPL was observed during the PDI ER and will not be removed by dredging.

ft=feet
EPL=erosion protection layer
NAPL=nonaqueous phase liquid
PDI ER=pre-design investigation evaluation report
RAL=remedial action level
UHM=unamended habitat mix
USCG=United States Coast Guard

Figure 1-5

Observed NAPL Below Dredge Depths

Prepared on 10/9/2025
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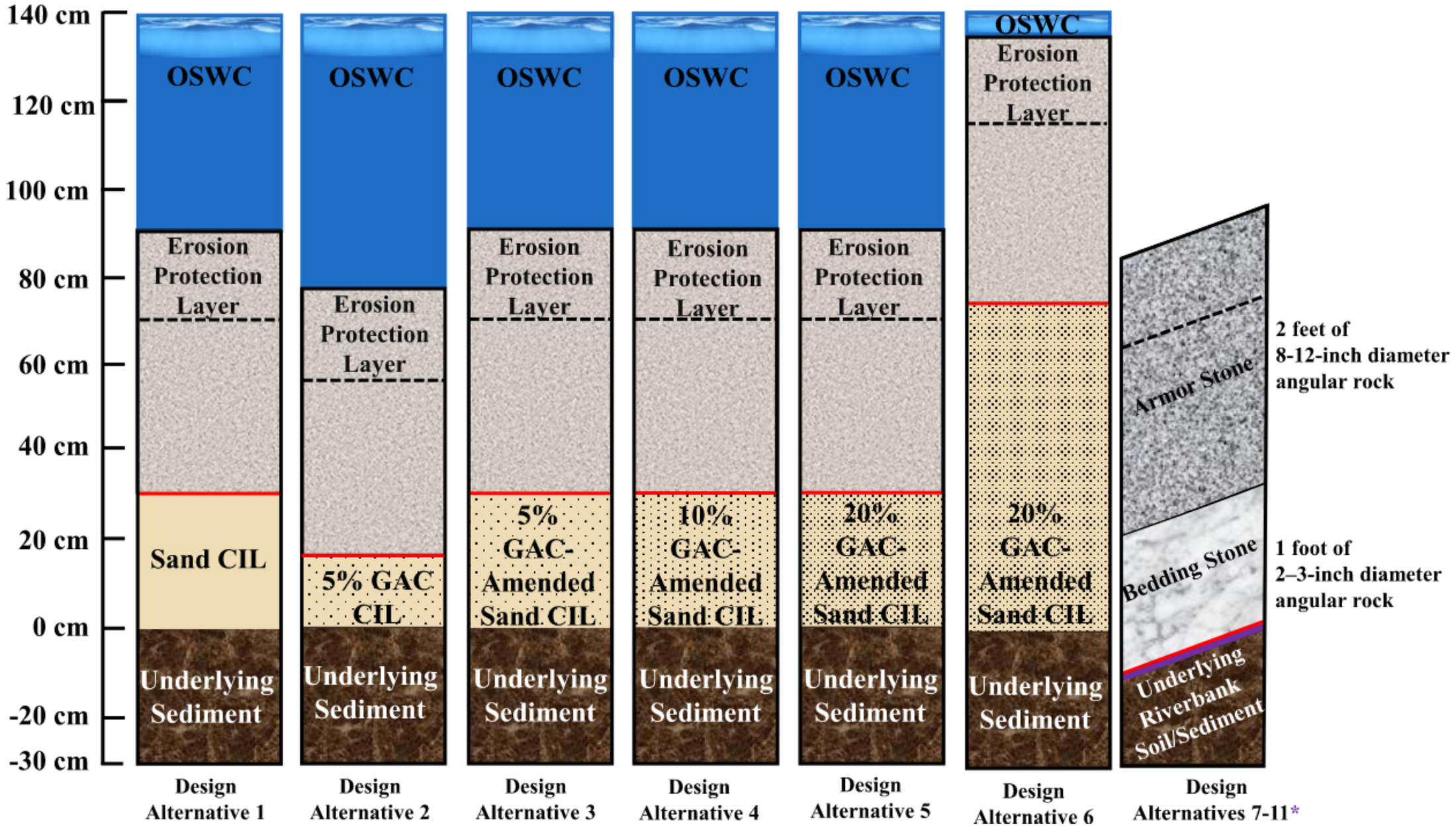
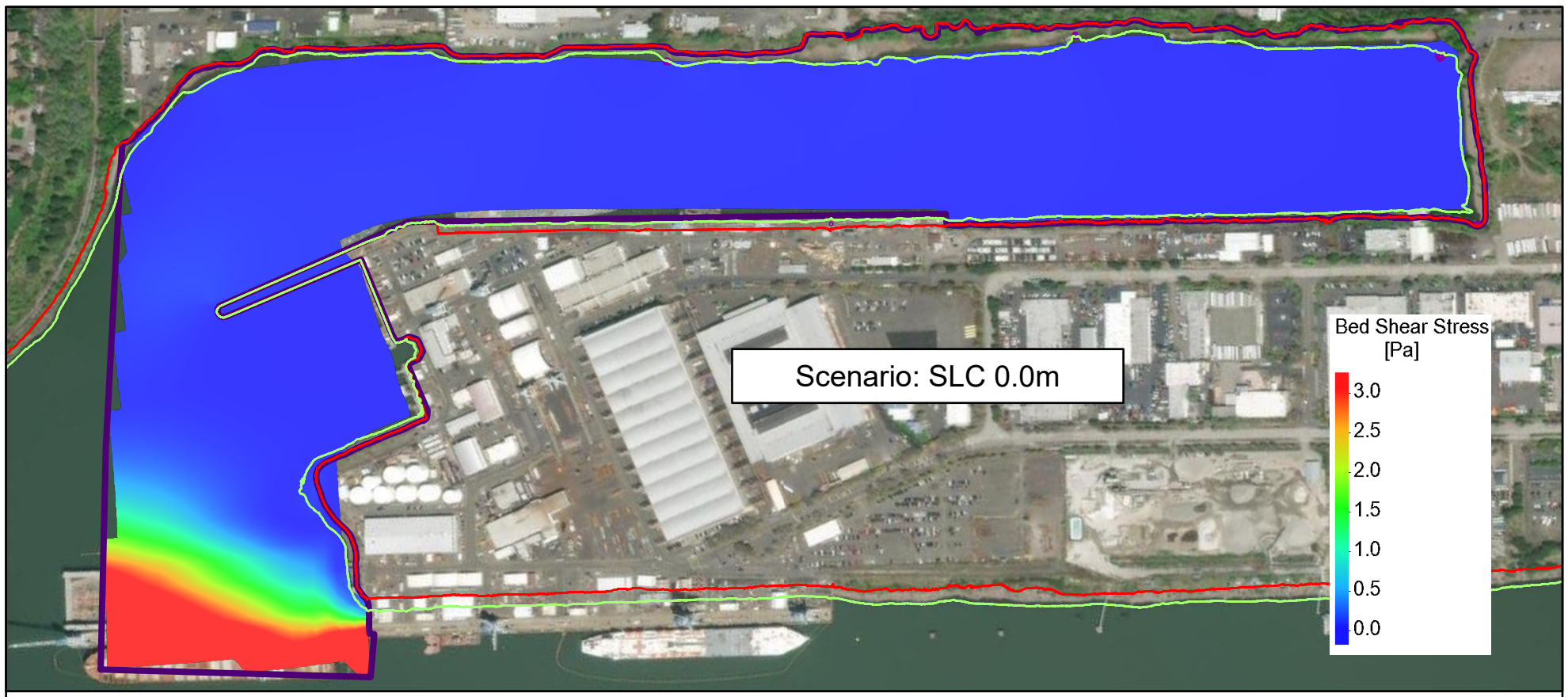


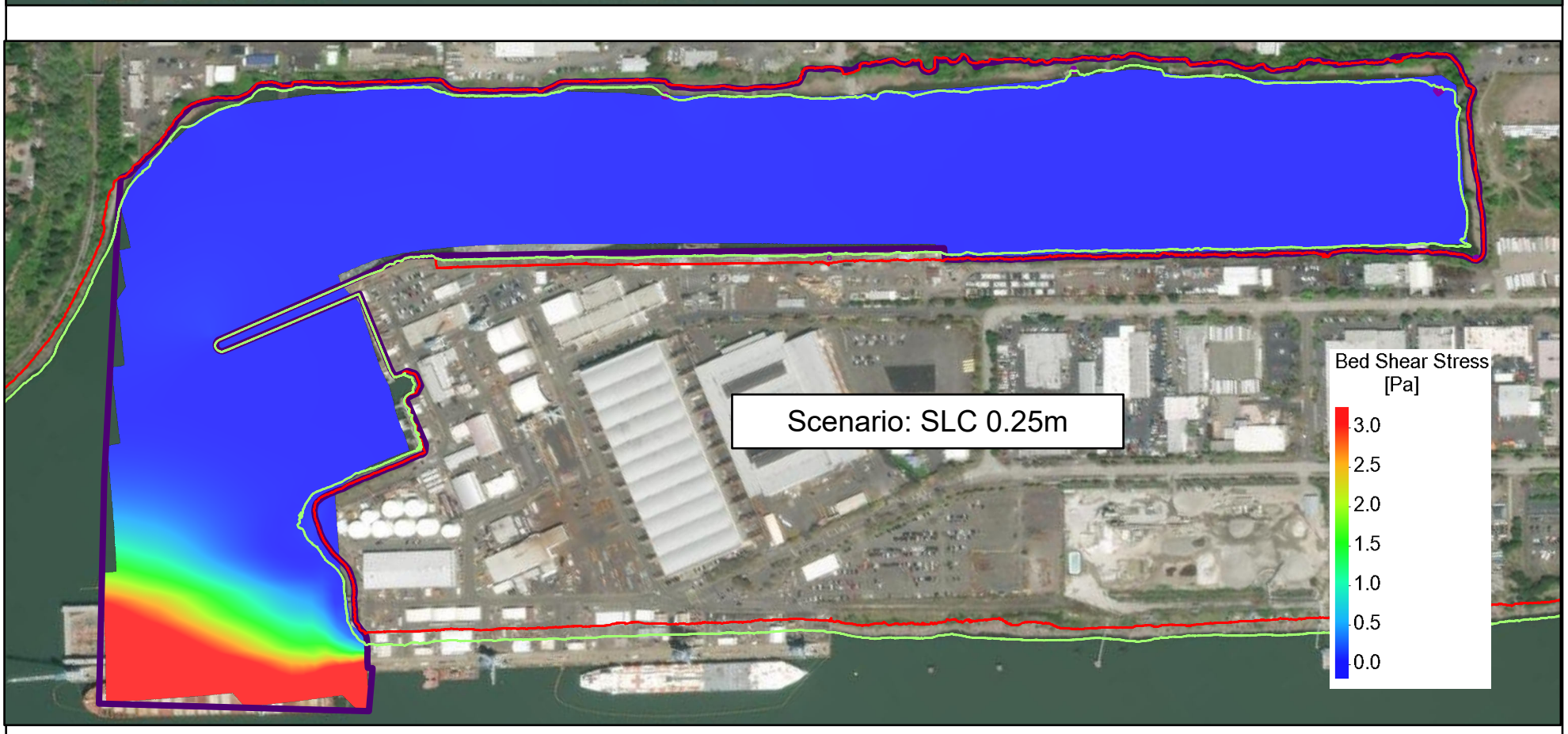
Notes:
*Alternative 7 - 2 cm Tektoseal-AC
*Alternative 8 - 2 cm Tektoseal-HM
*Alternative 9 – 2 cm hybrid Tektoseal-AC+Tektoseal-HM
*Alternative 10 – 4 cm Tektoseal-AC&HM
*Alternative 11 – 4 cm Tektoseal-AC
Dashed line = maximum depth of bioturbation (20 cm)
Red line = cap performance point (top of CIL)
% = percent
cm = centimeter
CIL = Chemical Isolation Layer
GAC = Granular Activated Carbon
OSWC = Overlying Surface Water Column

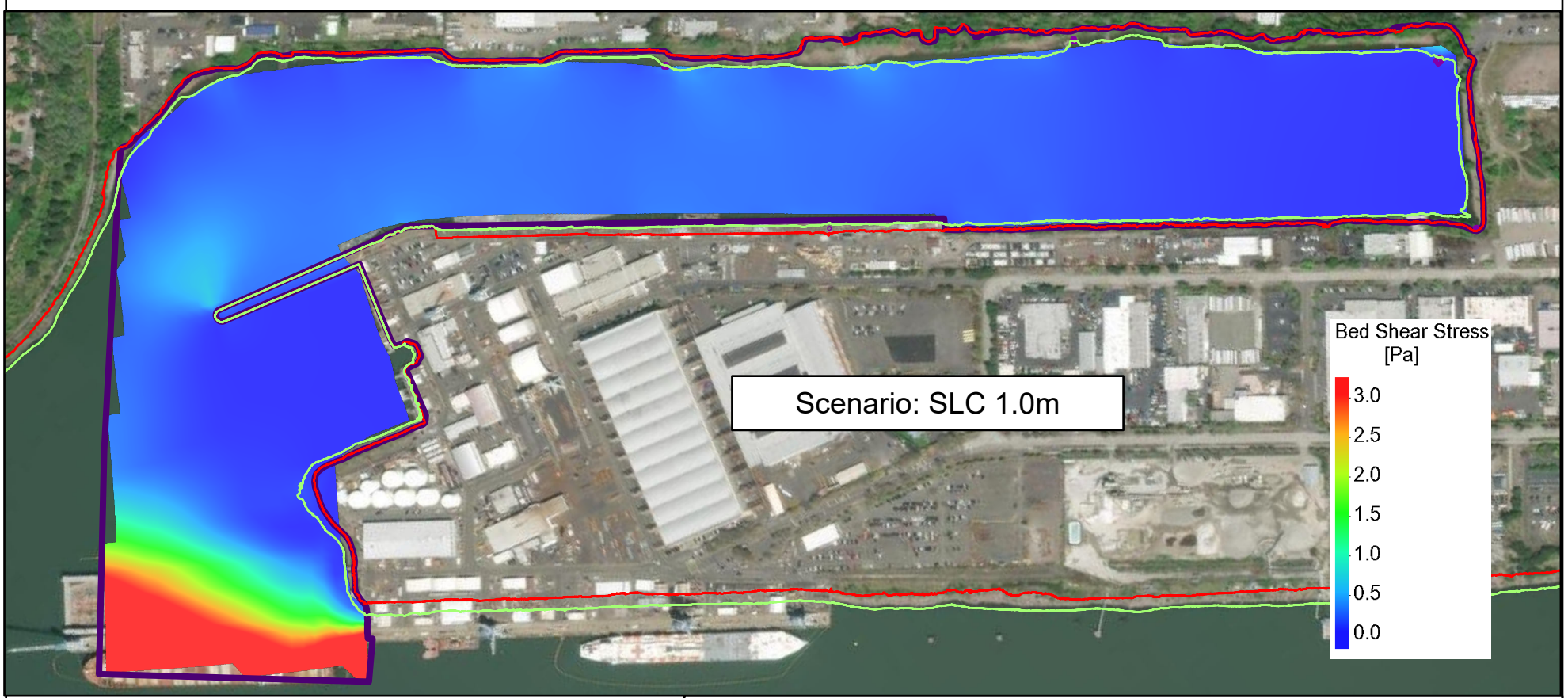
Figure 2-1
Evaluated Design Alternatives

Prepared on: 07/28/2025
Cap Design Tech Memo
Swan Island Basin

HGL PACIFIC groundwater GROUP MOTT MACDONALD COAST & HARBOR ENGINEERING BRIDGEWATER GROUP







Swan Island Sediment Decision Unit (SDU)
Mean Low Water (MLW)
Ordinary High Water (OHW)
Existing Outfalls and Armoring

Notes:
m – meters
Pa – Pascals
SLC – Sea Level Change

0 Feet 1,000

Figure 3-1
Maximum Bed Shear Stress

Prepared on: 02/18/2025
Cap Design Tech Memo
Swan Island Basin

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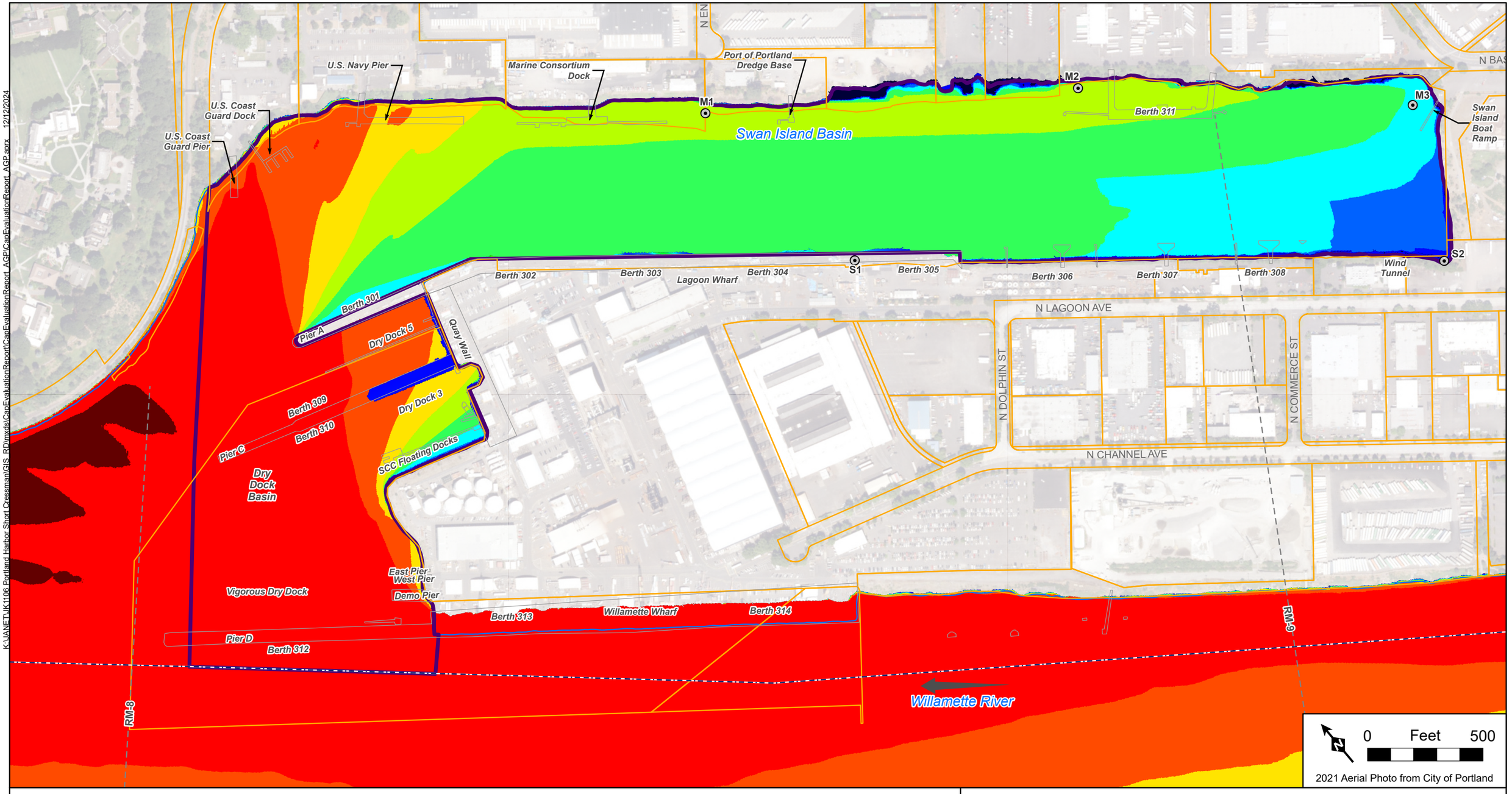

- City Stormwater Outfall
- River Mile (RM)
- Swan Island Sediment Decision Unit (SDU)
- Federal Navigation Channel (USACE, 2020)
- Docks and Structures
- Tax Lot Boundary
- Ordinary High Water (City of Portland, 2013)
- River Flow Direction

Significant Wave Height (ft)

3.00
2.75
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00

Notes:
ft – feet
SCC – Shipyard Commerce Center
SIB – Swan Island Basin
SMA – Sediment Management Area
USACE – U.S. Army Corps of Engineers

Figure 3-2
Significant Wave Height, 100-year

Prepared on: 02/18/2025
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Swan Island Basin

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U.S. Navy Pier
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Marine Consortium Dock
Port of Portland Dredge Base
N EN
M1
M2
M3
Swan Island Basin
Berth 311
Swan Island Boat Ramp
S1
S2
Berth 302
Berth 303
Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
N BAS
Berth 301
Pier A
Dry Dock 5
Quay Wall
Berth 309
Berth 310
Pier C
Dry Dock 3
SCC Floating Docks
Dry Dock Basin
East Pier
West Pier
Demo Pier
Vigorous Dry Dock
Pier D
Berth 312
Berth 313
Willamette Wharf
Berth 314
N COMMERCE ST
NNEL AVE
RM-9
RM-8
Willamette River

Example bed shear stress from propeller wash

0 Feet 500

2021 Aerial Photo from City of Portland

City Stormwater Outfall
River Mile (RM)
Swan Island Sediment Decision Unit (SDU)
Federal Navigation Channel (USACE, 2020)
Docks and Structures
Tax Lot Boundary
Ordinary High Water (City of Portland, 2013)
River Flow Direction

Bed Shear Stress [Pa]
40
36
32
28
24
20
16
12
8
4
0

Notes:
Pa – Pascals
SCC – Shipyard Commerce Center
SIB – Swan Island Basin
SMA – Sediment Management Area
USACE – U.S. Army Corps of Engineers

Figure 3-3

Maximum Propeller Wash Bed Shear Stresses

Prepared on: 02/18/2025
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Swan Island Basin

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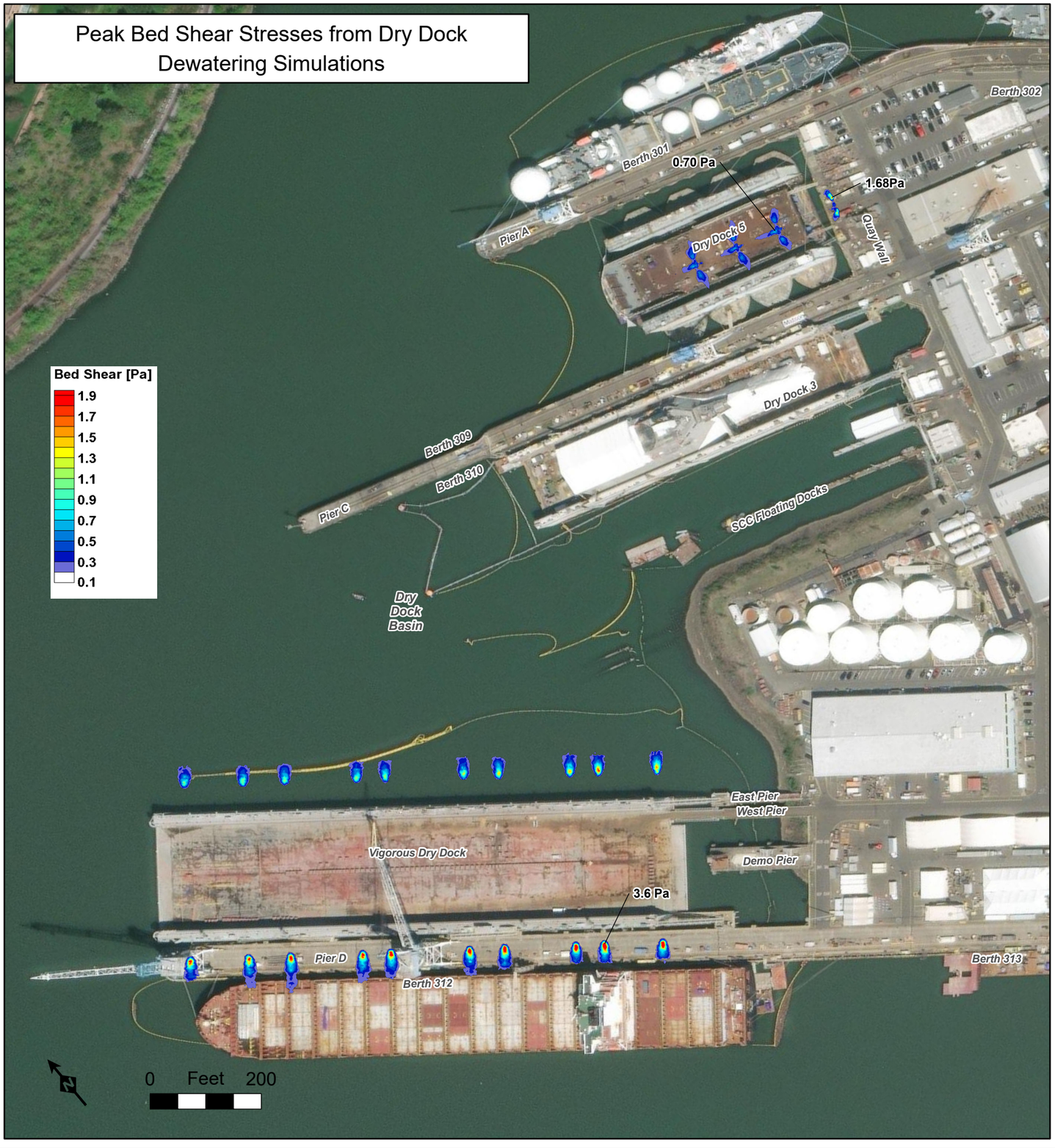
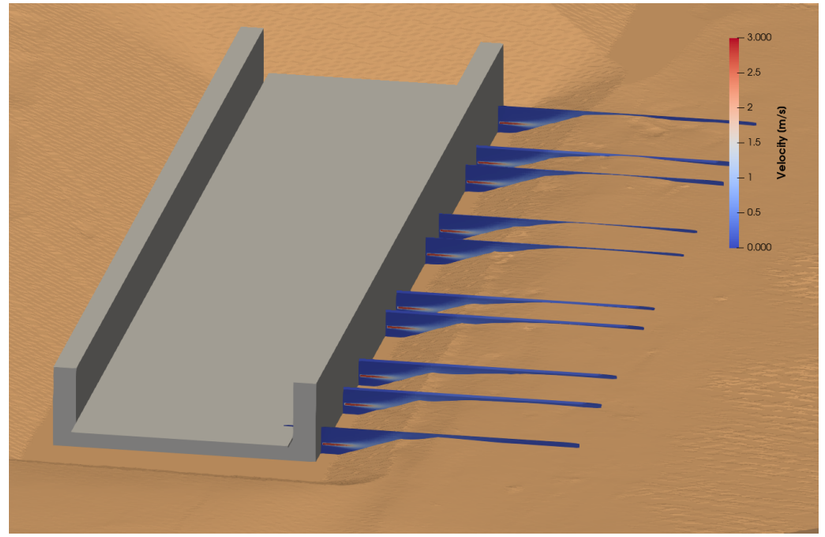
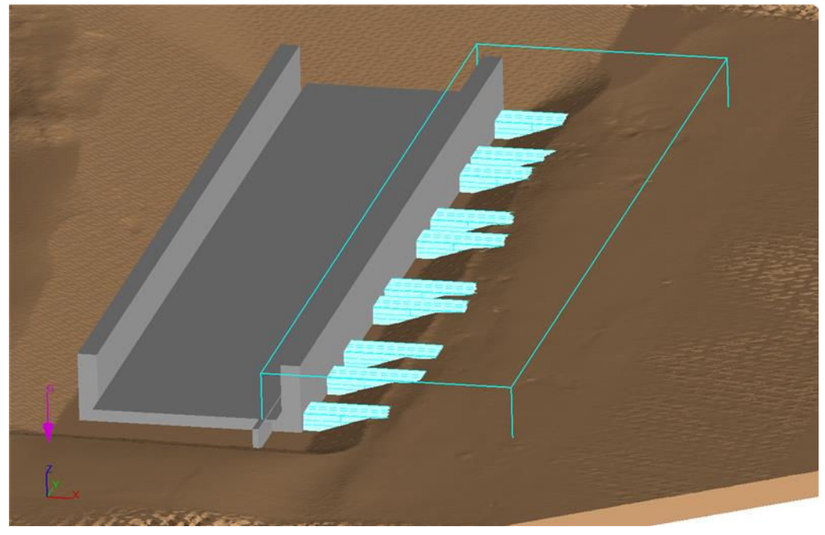
Peak Bed Shear Stresses from Dry Dock Dewatering Simulations





CFD Model Setup for Vigorous Dry Dock



Notes:
CFD – Computational Fluid Dynamics
m/s – meters per second
Pa – Pascals
SCC – Shipyard Commerce Center

Figure 3-4

Maximum Dry Dock Operations Bed Shear Stress

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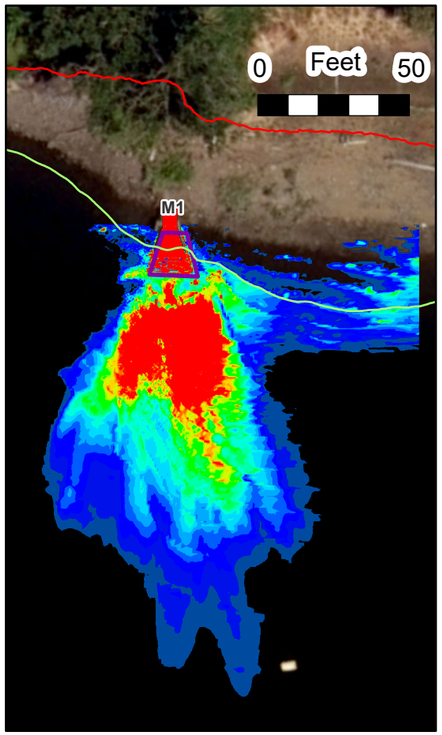

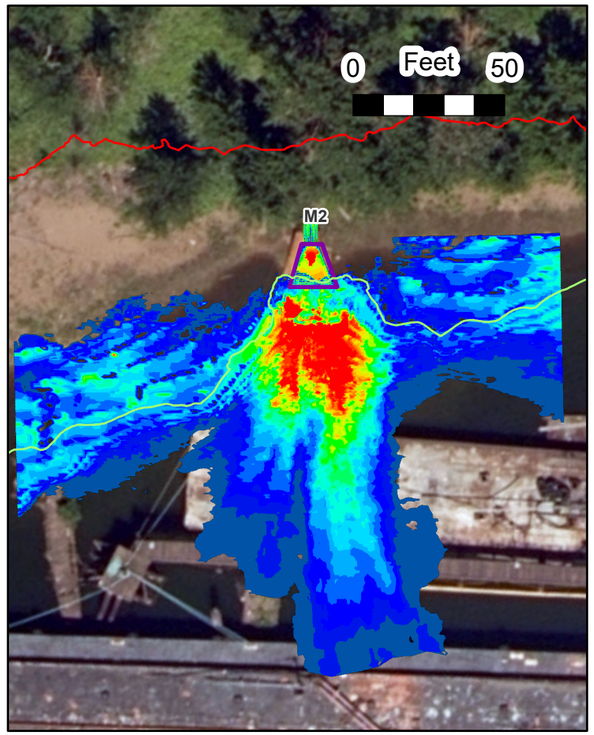

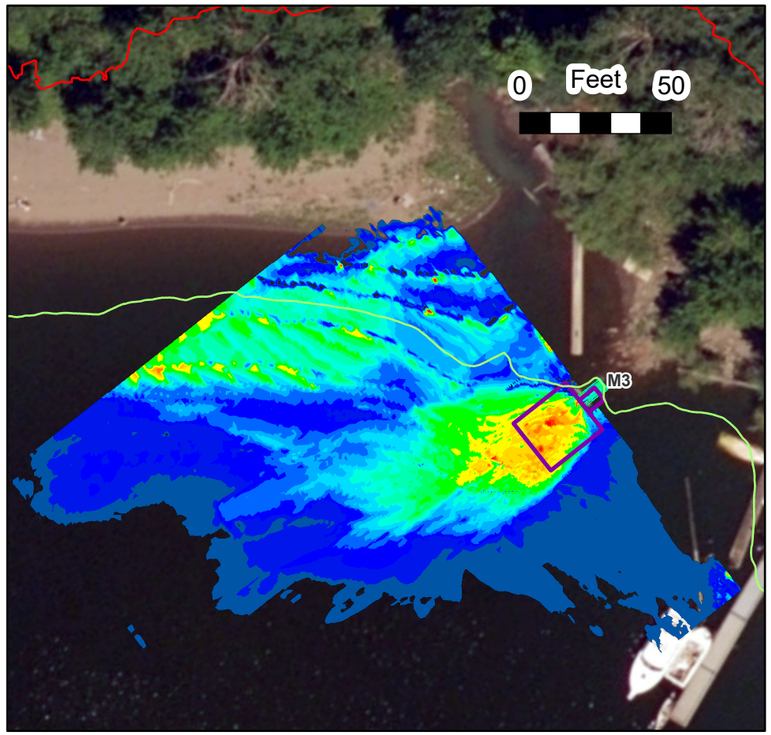

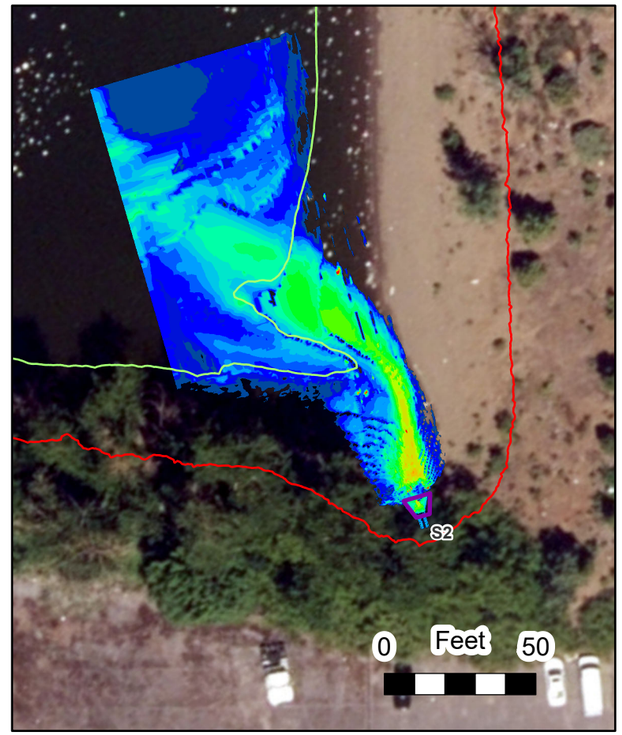

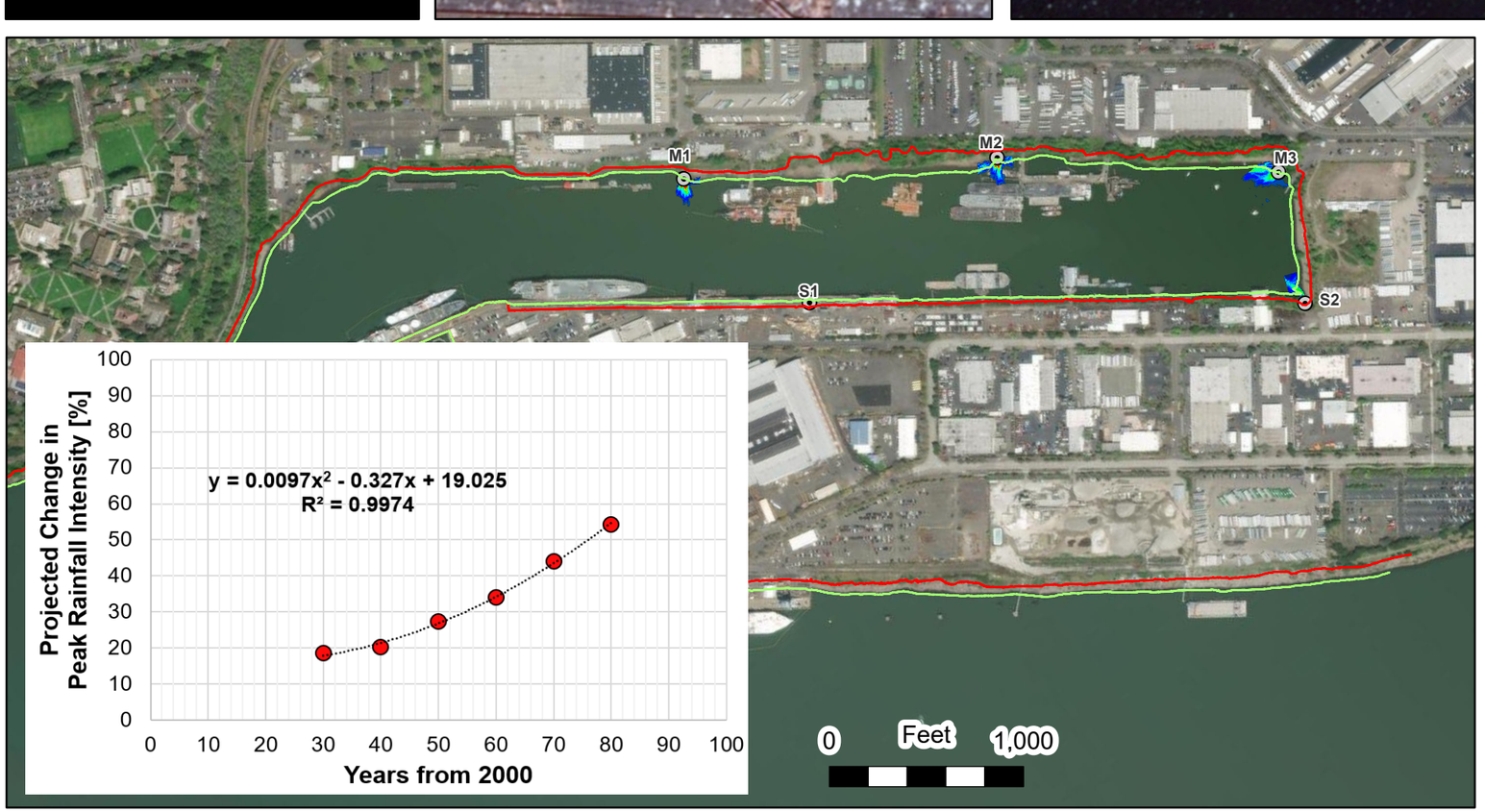

Velocity [ft/s]

- 30.0
- 27.0
- 24.0
- 21.0
- 18.0
- 15.0
- 12.0
- 9.0
- 6.0
- 3.0

Notes:
ft/s - feet per second

- Mean Low Water (MLW)
- Ordinary High Water (OHW)
- City Stormwater Outfall
- Existing Outfalls and Armoring

Figure 3-5
Maximum Bed Velocities - City Outfalls, 100-year

Prepared on: 02/18/2025
Cap Design Tech Memo
Swan Island Basin

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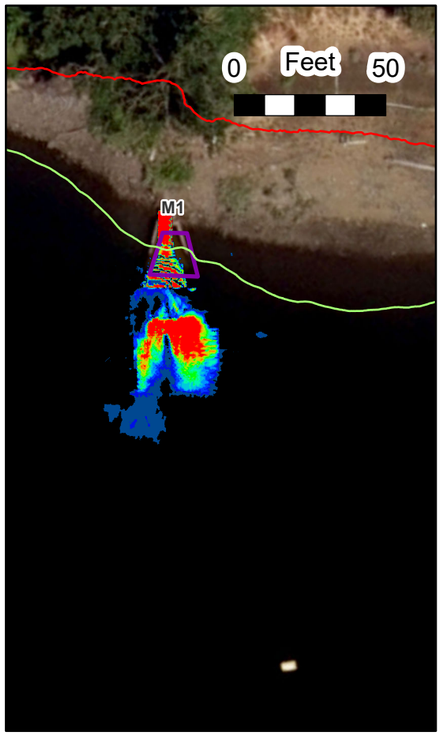

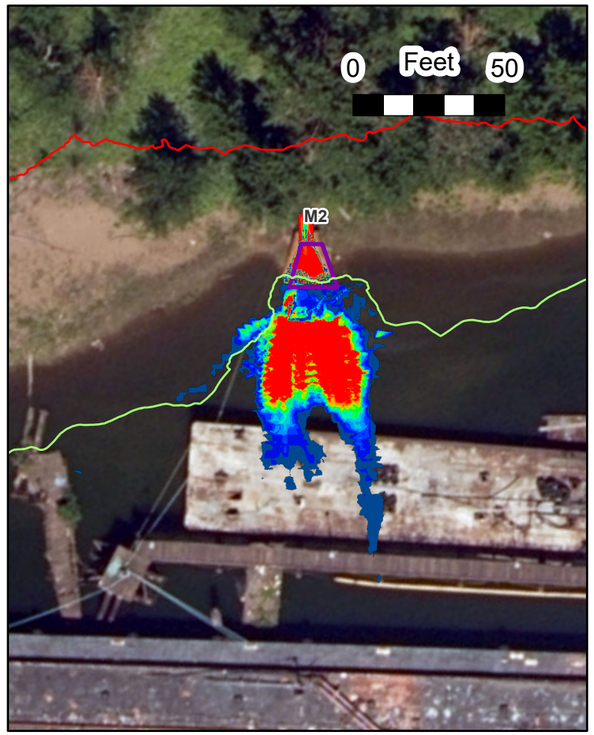

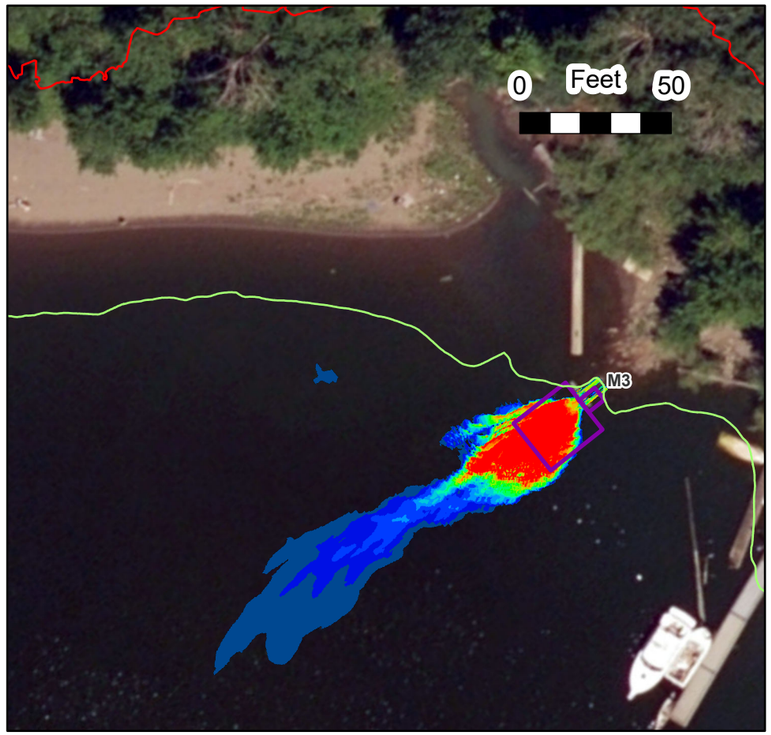

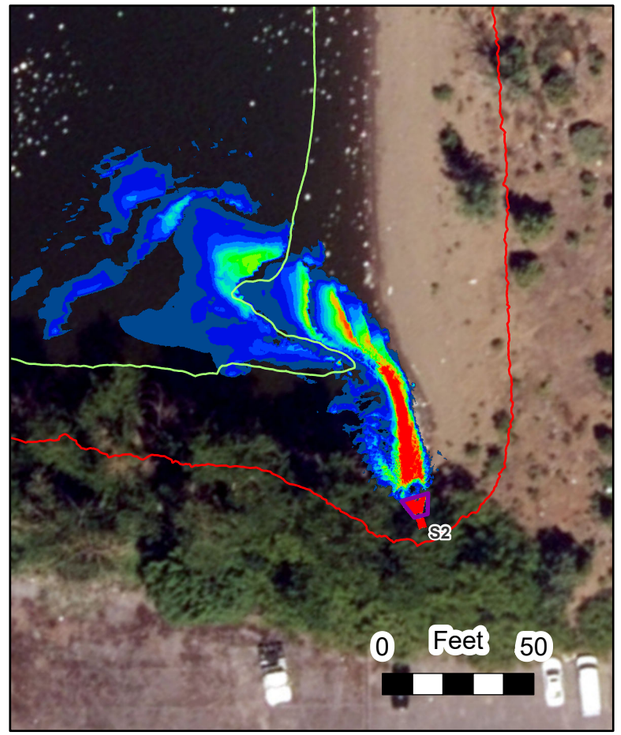



Bottom Shear Stress [Pa]

- 45
- 42
- 39
- 36
- 33
- 30
- 27
- 24
- 21
- 18
- 15
- 12
- 9
- 6
- 3

Notes:
Pa - Pascals

N

- Mean Low Water (MLW)
- Ordinary High Water (OHW)
- City Stormwater Outfall
- Existing Outfalls and Armoring

Figure 3-6
Maximum Bed Bottom Shear Stress
City Outfalls, 100-year

Prepared on: 07/30/2025
50% RD Cap Design Tech Memo
Swan Island Basin

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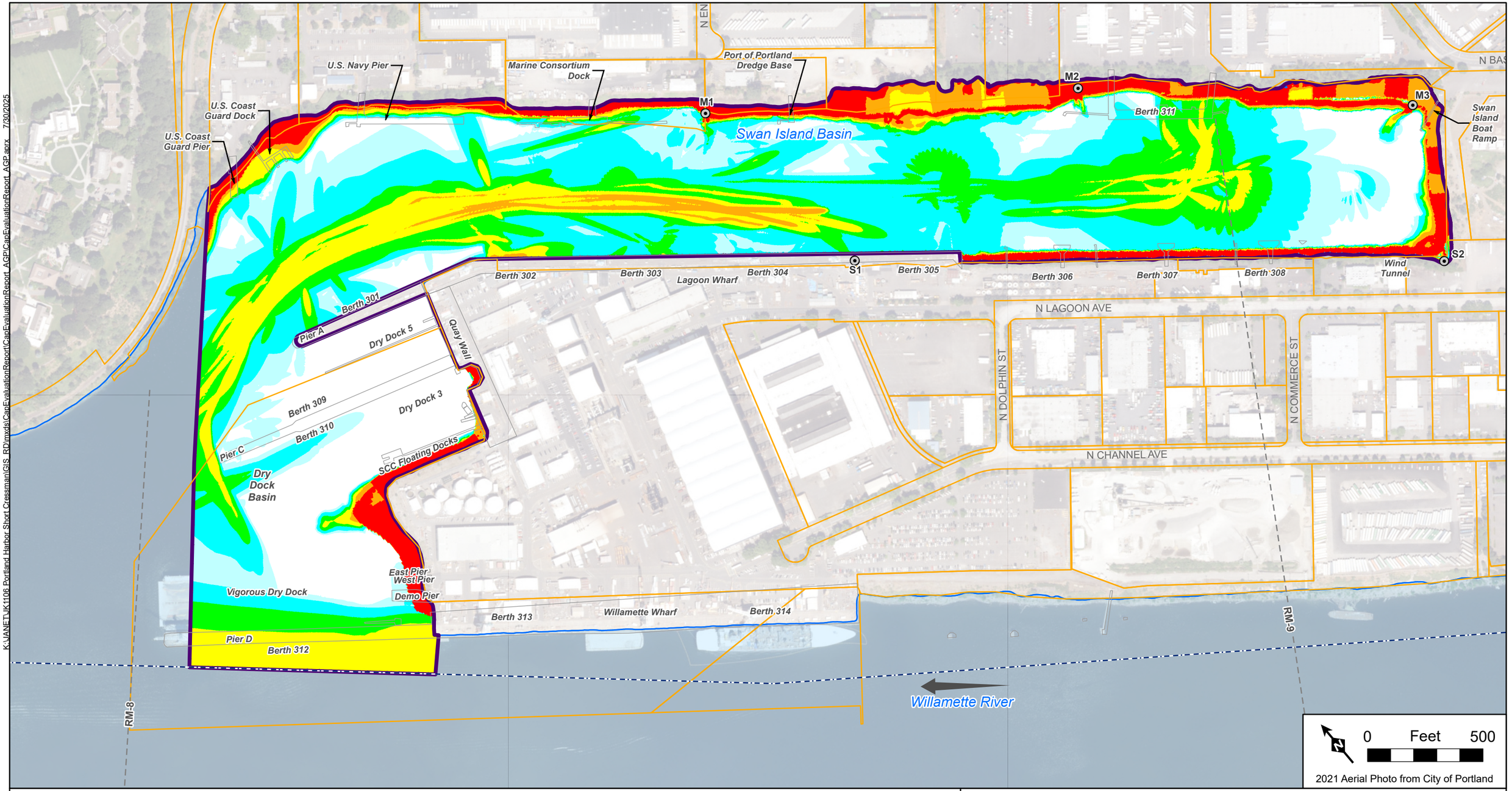

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- City Stormwater Outfall
- River Mile (RM)
- Swan Island Sediment Decision Unit (SDU)
- Federal Navigation Channel (USACE, 2020)
- Docks and Structures
- Tax Lot Boundary
- Ordinary High Water (City of Portland, 2013)
- River Flow Direction

Bed Shear Stress [Pa]
25.9
12.2
5.7
2.7
1.3
0.47
0.27
0.0

Notes:
Pa – Pascals
SCC – Shipyard Commerce Center
SIB – Swan Island Basin
SMA – Sediment Management Area
USACE – U.S. Army Corps of Engineers

Figure 3-7

Peak Bed Shear Stresses from All Hydrodynamic Effects

Prepared on: 07/30/2025
50% RD Cap Design Tech Memo
Swan Island Basin

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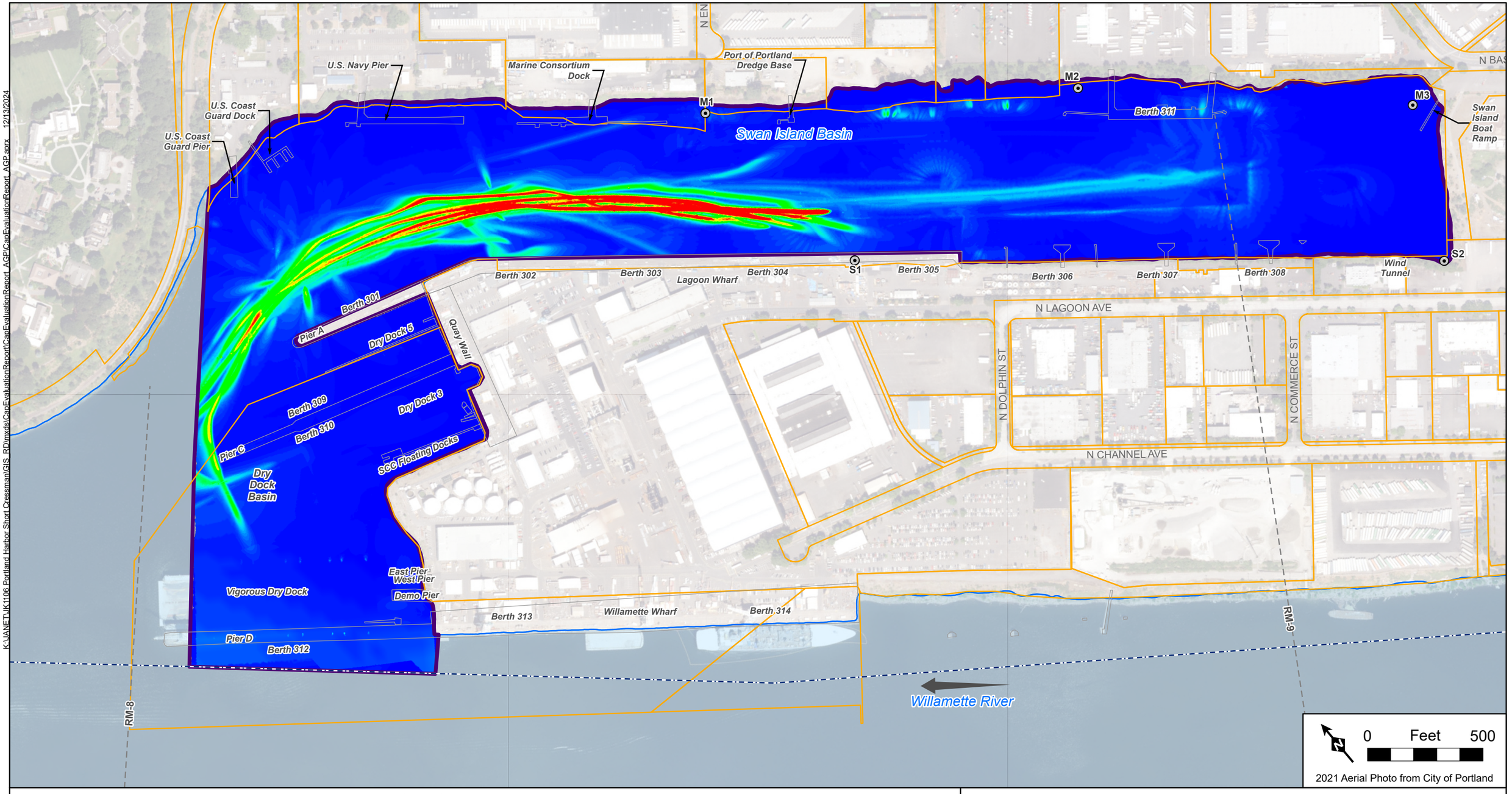

City Stormwater Outfall
River Mile (RM)
Swan Island Sediment Decision Unit (SDU)
Federal Navigation Channel (USACE, 2020)
Docks and Structures
Tax Lot Boundary
Ordinary High Water (City of Portland, 2013)

River Flow Direction

Particle Diameter [in]

2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0

Notes:
in – inch
SCC – Shipyard Commerce Center
SIB – Swan Island Basin
SMA – Sediment Management Area
USACE – U.S. Army Corps of Engineers

Figure 3-8

Minimum Statically Stable Material Size

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Cap Design Tech Memo
Swan Island Basin

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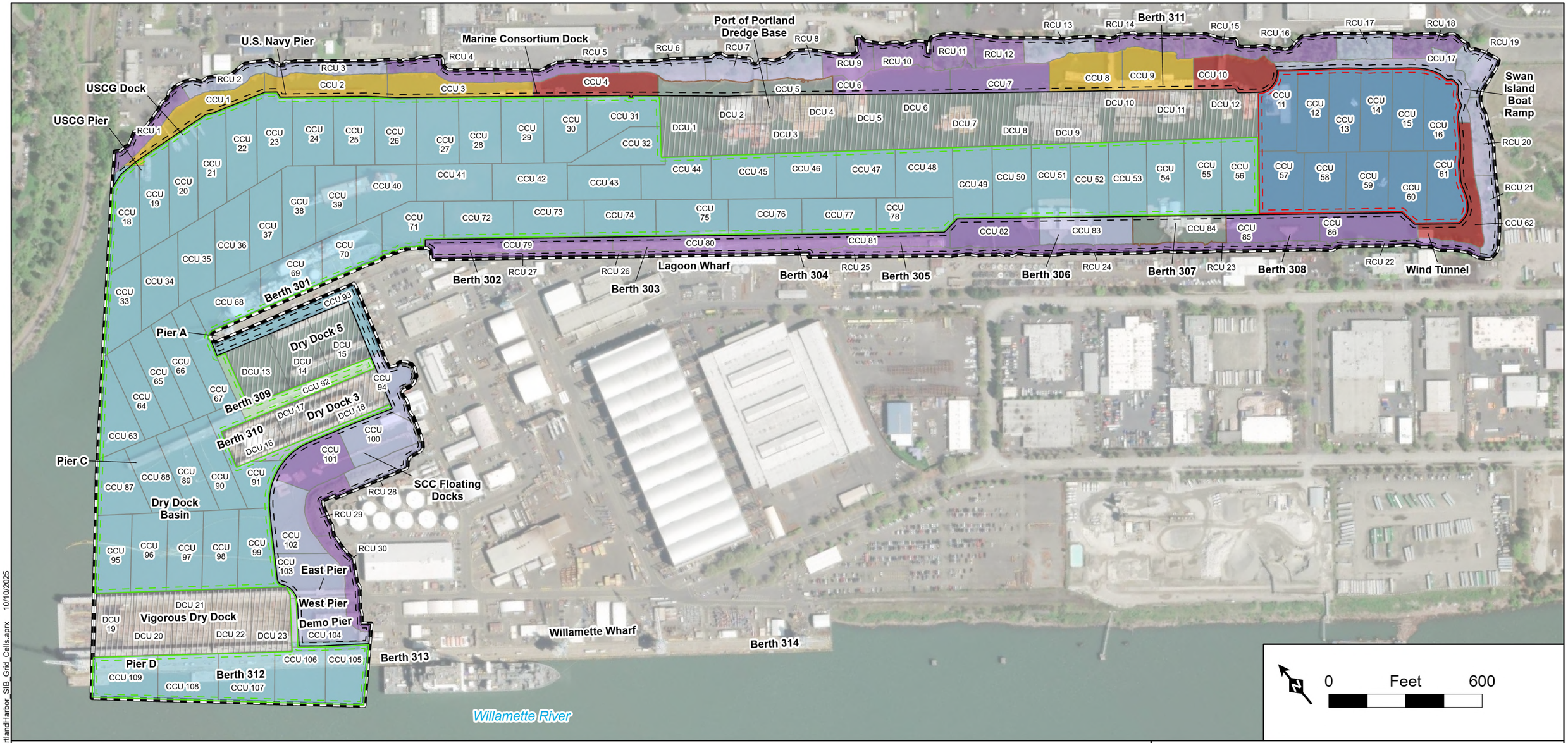

Head of the Basin

Revetment

Main Basin

Dredge to RAL

No Capping Needed

Swan Island Basin Project Area Boundary

Selected Constructible Alternatives:

Selected Constructible Alternative A (12" of unamended sand with overlying 24" of erosion protection layer Cap Type 1)

Selected Constructible Alternative B (12" of 5% GAC-amended sand with overlying 24" of erosion protection layer Cap Type 2)

Selected Constructible Alternative C (12" of 5% GAC-amended sand with overlying 24" of erosion protection layer Cap Type 1)

Selected Constructible Alternative D (6" of 5% GAC-amended sand with overlying 36" of stone protection system, including 24" of armor and 12" of bedding stone)

Selected Constructible Alternative E (12" of 5% GAC-amended sand with overlying 36" of stone protection system, including 24" of armor and 12" of bedding stone)

Selected Constructible Alternative F (0.8" of RCM with overlying 36" of stone protection system in revetment zones, including 24" of armor and 12" of bedding stone)

Selected Constructible Alternative G (1.6" of RCM with overlying 36" of stone protection system in revetment zones, including 24" of armor and 12" of bedding stone)

Notes:
% = percent
" = inch
cm = centimeter
DCU = Dredge Certification Unit.
ft = feet
CCU = cap certification unit
GAC = granular activated carbon
RAL = remedial action level
RCU = Riverbank Certification Unit
USCG = United States Coast Guard

Figure 4-1

SIB Project Area Selected Constructible Alternatives

Prepared on 10/10/2025
Cap Design Tech Memo
Swan Island Basin Remedial Design Group

HGL PACIFIC groundwater GROUP | M MOTT MACDONALD | COAST & HARBOR ENGINEERING BRIDGEWATER GROUP

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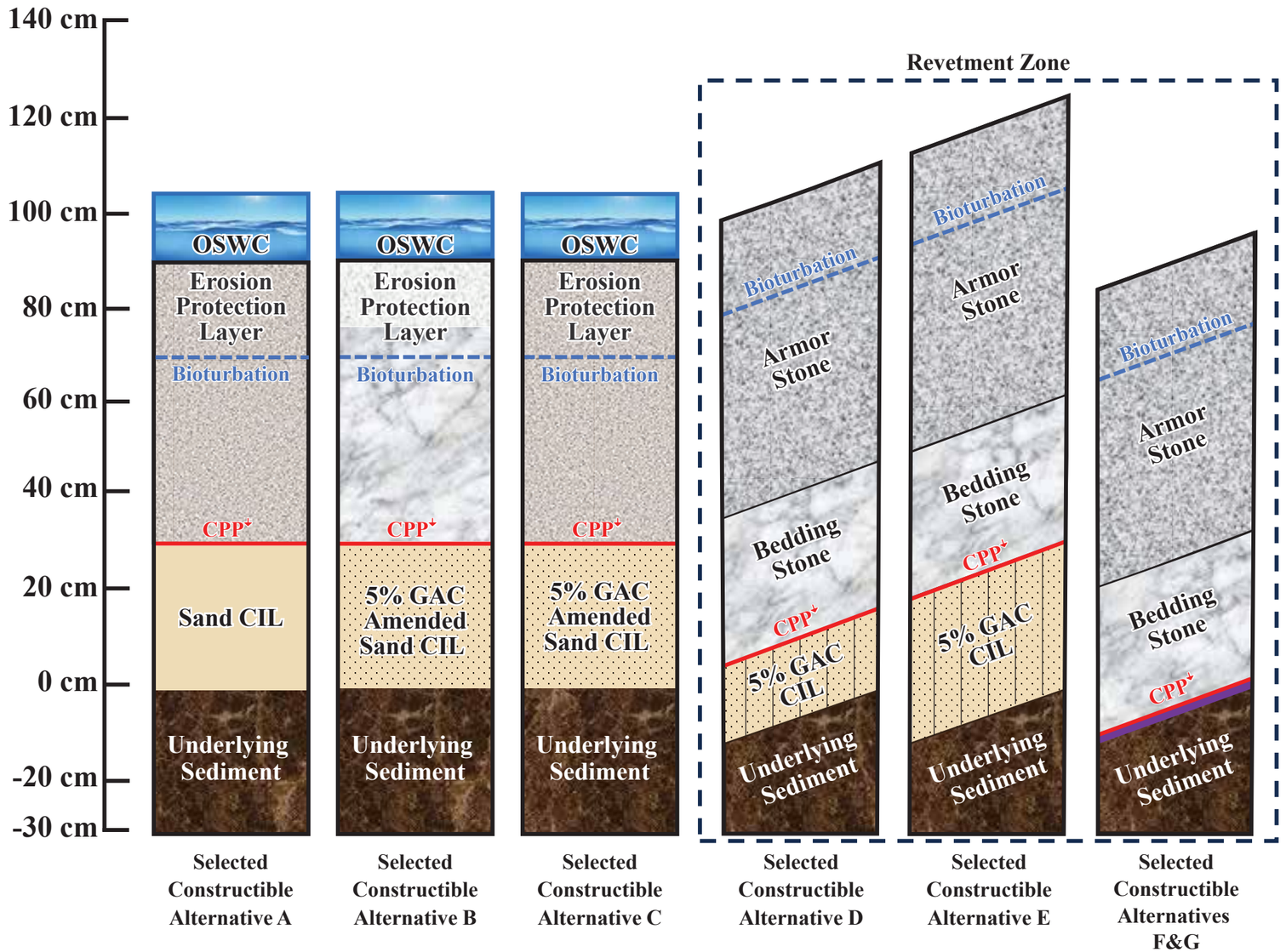

Notes:
EPL in Selected Alternatives A and C consists of <2.5-in rounded gravel.
EPL in Selected Alternative B consists of:
6-in unamended coarse sand
18-in approximately 3-in median diameter angular rock.
Selected Constructible Alternatives D through G consist of:
Armor stone comprises 2-ft of 8-in or 12-in diameter angular rock.
Bedding stone comprises 1-ft of 3-in median diameter angular rock.
Selected Constructible Alternatives D and E contain 5% GAC Amended Sand CIL placed within geocell grids.
Selected Constructible Alternative F contains one layer of Tektoseal-AC reactive core mat.
Selected Constructible Alternative G contains two layers of Tektoseal-AC reactive core mat.
Red line = cap performance point (top of CIL)

% = percent
< = less than
CIL = Chemical Isolation Layer
cm = centimeter
Dashed line = maximum depth of bioturbation (20 cm)
EPL = Erosion Protection Layer
ft = feet
GAC = Granular Activated Carbon
in = inch
OSWC = Overlying Surface Water Column

Figure 4-2

Selected Design Alternatives

Prepared on 9/30/2025
Cap Design Tech Memo
Swan Island Basin

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ATTACHMENTS

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ATTACHMENT A

MAXIMUM CONCENTRATIONS IN SEDIMENT AND RIVERBANK SOIL

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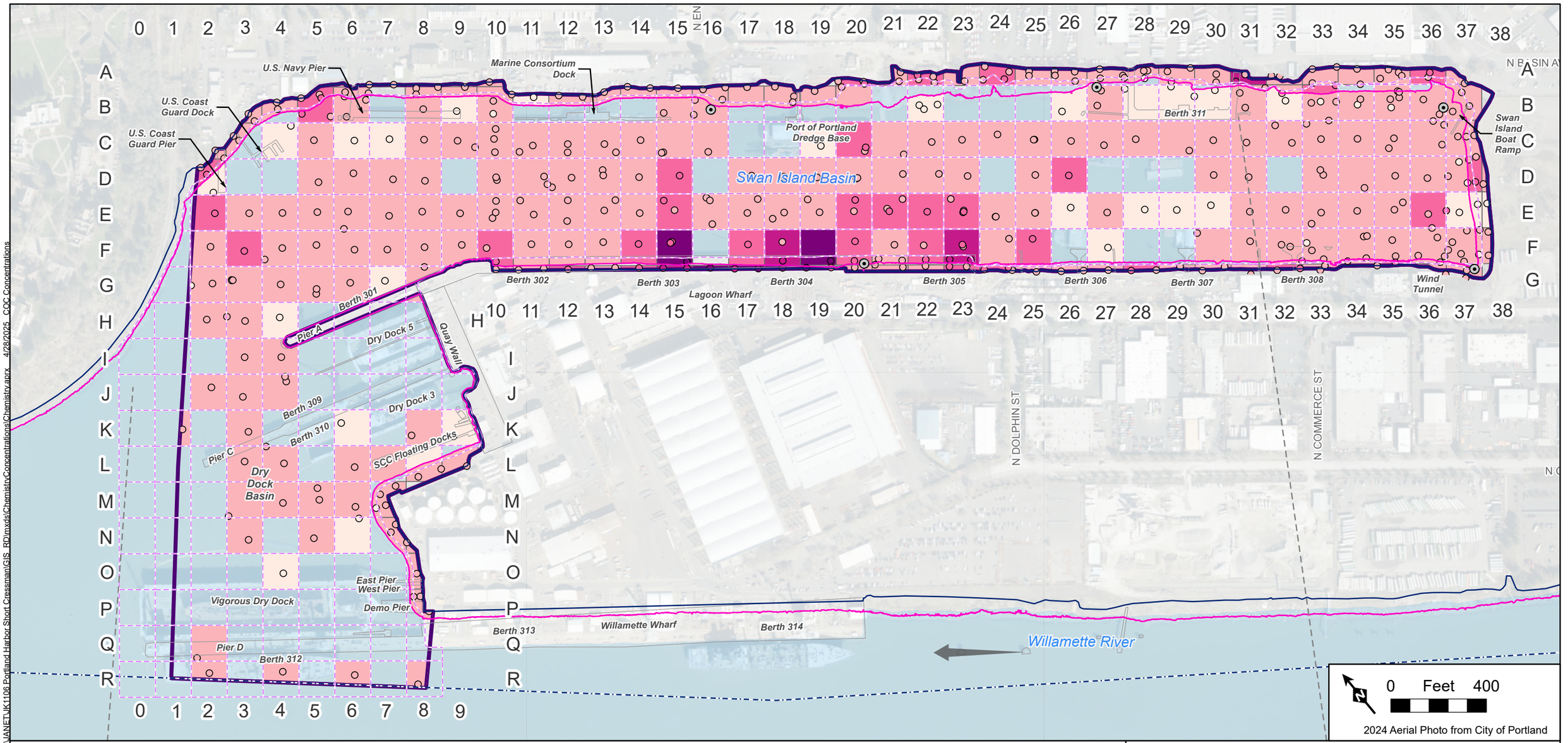

K:\ANET\WK1106 Portland Harbor Short Cressman\GIS_RD\mxds\Chemistry\Concentrations\Chemistry.aprx 4/28/2025 COC Concentrations

Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum 1,2,3,4,7,8-HxCDF concentration (µg/kg) per core
- < 0.0004 (below sediment CUL)
- ≥ 0.0004 to < 0.04
- ≥ 0.04 to < 0.4 (below PTW)
- ≥ 0.4 to < 1.0
- ≥ 1.0

Maximum 1,2,3,4,7,8-HxCDF concentration (µg/kg) per grid cell
- < 0.0004 (below sediment CUL)
- ≥ 0.0004 to < 0.04
- ≥ 0.04 to < 0.4 (below PTW)
- ≥ 0.4 to < 1.0
- ≥ 1.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

CUL – Cleanup Level
HxCDF – hexachlorodibenzofuran
PTW – Principal Threat Waste

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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SWAN ISLAND RD INFORMATION - SUBJECT TO JOINT DEFENSE AGREEMENT AND IN ANTICIPATION OF LITIGATION

Figure A-1

Maximum Concentrations in Sediment and Riverbank Soil - 1,2,3,4,7,8-HxCDF

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL | M M | COAST & HARBOR ENGINEERING | PACIFIC groundwater GROUP | BRIDGEWATER GROUP

U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Port of Portland Dredge Base
Berth 311
Swan Island Boat Ramp
Swan Island Basin
Berth 301
Pier A
Dry Dock 5
Quay Wall
Berth 302
Berth 303
Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Berth 309
Dry Dock 3
Berth 310
Pier C
SCC Floating Docks
Dry Dock Basin
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Berth 313
Willamette Wharf
Berth 314
Pier D
Berth 312
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AV

0 Feet 400

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum 1,2,3,7,8-PeCDD concentration (µg/kg) per core
- < 0.0002 (below sediment CUL)
- ≥ 0.0002 to < 0.0008 (below RAL)
- ≥ 0.0008 to < 0.003 (below Navigation Channel RAL)
- ≥ 0.003 to < 0.01 (below PTW)
- ≥ 0.01

Maximum 1,2,3,7,8-PeCDD concentration (µg/kg) per grid cell
- < 0.0002 (below sediment CUL)
- ≥ 0.0002 to < 0.0008 (below RAL)
- ≥ 0.0008 to < 0.003 (below Navigation Channel RAL)
- ≥ 0.003 to < 0.01 (below PTW)
- ≥ 0.01

Notes:
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µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

CUL – Cleanup Level
PeCDD – pentachlorodibenzo-p-dioxin
PTW – Principal Threat Waste
RAL – Remedial Action Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-2

Maximum Concentrations in Sediment and Riverbank Soil - 1,2,3,7,8-PeCDD

Prepared on: 4/28/2025
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Swan Island Basin Remedial Design Group

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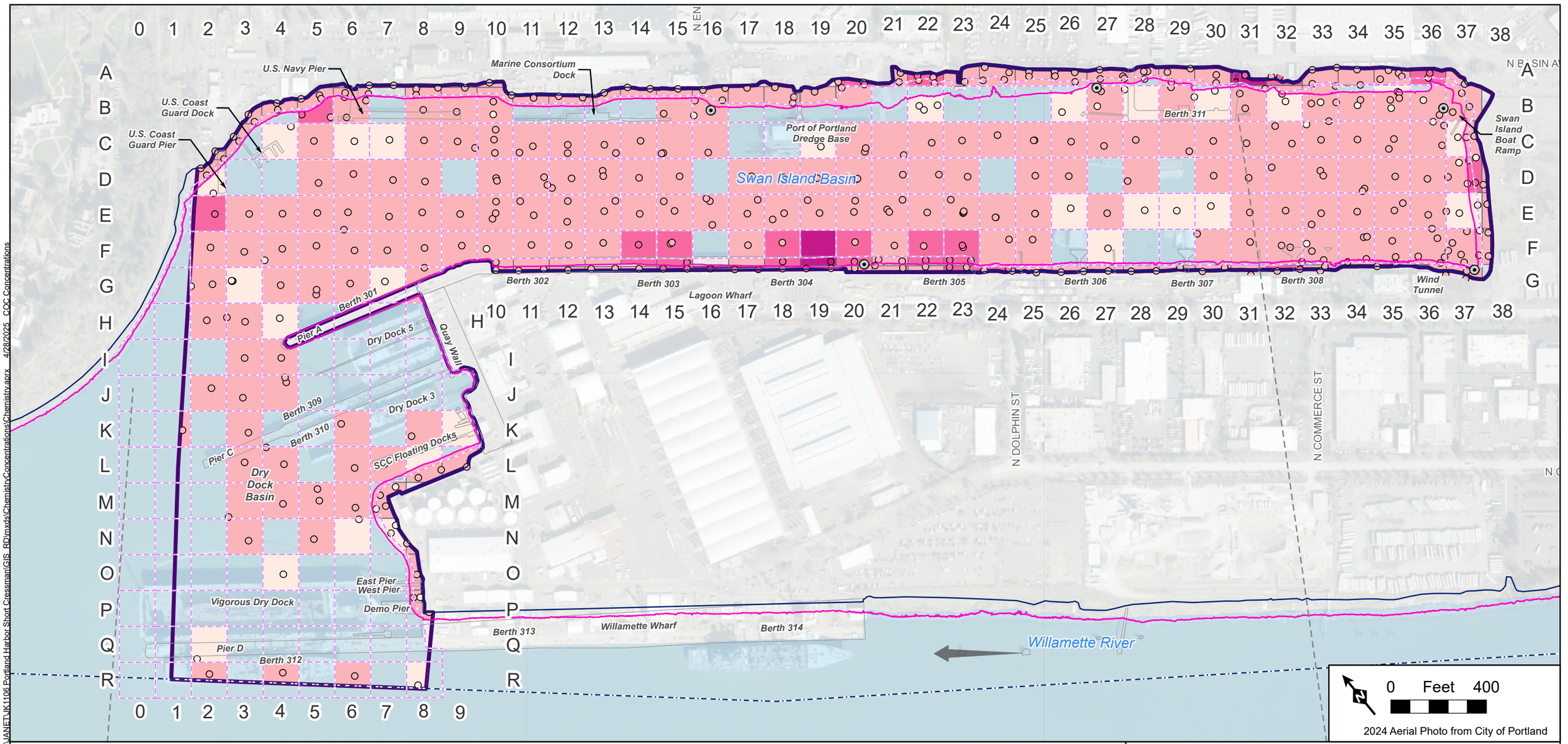

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- Project Area Grid
- Federal Navigation Channel (USACE, 2020)
- River Mile (RM)
- Docks and Structures
- Top of Bank
- 13-foot NAVD88 Mean High Water
- Swan Island Basin Project Area Boundary

River Flow Direction

Maximum 2,3,4,7,8-PeCDF concentration (µg/kg) per core
- < 0.0003 (below sediment CUL)
- ≥ 0.0003 to < 0.02
- ≥ 0.02 to < 0.2 (below RAL and PTW)
- ≥ 0.2 to < 1.0 (below Navigation Channel RAL)
- ≥ 1.0

Maximum 2,3,4,7,8-PeCDF concentration (µg/kg) per grid cell
- < 0.0003 (below sediment CUL)
- ≥ 0.0003 to < 0.02
- ≥ 0.02 to < 0.2 (below RAL and PTW)
- ≥ 0.2 to < 1.0 (below Navigation Channel RAL)
- ≥ 1.0

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CUL – Cleanup Level
PeCDf – pentachlorodibenzofuran
PTW – Principal Threat Waste
RAL – Remedial Action Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-3

Maximum Concentrations in Sediment and Riverbank Soil - 2,3,4,7,8-PeCDF

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Swan Island Basin Remedial Design Group

U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
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Swan Island Boat Ramp
Swan Island Basin
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Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Berth 301
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Berth 314
Pier D
Berth 312
Willamette River
N DOLPHIN ST
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0 Feet 400
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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

Maximum 2,3,7,8-TCDD concentration (µg/kg) per core
- < 0.0002 (below sediment CUL)
- ≥ 0.0002 to < 0.0006 (below RAL)
- ≥ 0.0006 to < 0.002 (below Navigation Channel RAL)
- ≥ 0.002 to < 0.01 (below PTW)
- ≥ 0.01

Maximum 2,3,7,8-TCDD concentration (µg/kg) per grid cell
- < 0.0002 (below sediment CUL)
- ≥ 0.0002 to < 0.0006 (below RAL)
- ≥ 0.0006 to < 0.002 (below Navigation Channel RAL)
- ≥ 0.002 to < 0.01 (below PTW)
- ≥ 0.01

River Flow Direction

Notes:
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NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

CUL – Cleanup Level
PTW – Principal Threat Waste
RAL – Remedial Action Level
TCDD – tetrachlorodibenzo-p-dioxin

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-4

Maximum Concentrations in Sediment and Riverbank Soil - 2,3,7,8-TCDD

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Swan Island Basin Remedial Design Group

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0 Feet 400

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum 2,3,7,8-TCDF concentration (µg/kg) per core
- < 0.00040658 (below sediment CUL)
- ≥ 0.00040658 to < 0.00081318
- ≥ 0.00081318 to < 0.0040658
- ≥ 0.0040658 to < 0.6 (below PTW)
- ≥ 0.6

Maximum 2,3,7,8-TCDF concentration (µg/kg) per grid cell
- < 0.00040658 (below sediment CUL)
- ≥ 0.00040658 to < 0.00081318
- ≥ 0.00081318 to < 0.0040658
- ≥ 0.0040658 to < 0.6 (below PTW)
- ≥ 0.6

Notes:
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< – Less than
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µg/kg – microgram per kilogram
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CUL – Cleanup Level
PTW – Principal Threat Waste
TCDf – tetrachlorodibenzofuran

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-5

Maximum Concentrations in Sediment and Riverbank Soil - 2,3,7,8-TCDF

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Swan Island Basin Remedial Design Group

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum 2-methylnaphthalene concentration (µg/kg) per core
- 0.0 - 1.0
- 1.1 - 5.0
- 5.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0

Maximum 2-methylnaphthalene concentration (µg/kg) per grid cell
- 0.0 - 1.0
- 1.1 - 5.0
- 5.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0

Notes:
≥ – Greater than or equal to
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NAVD88 – North American Vertical Datum of 1988
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Figure A-6

Maximum Concentrations in Sediment and Riverbank Soil - 2-methylnaphthalene

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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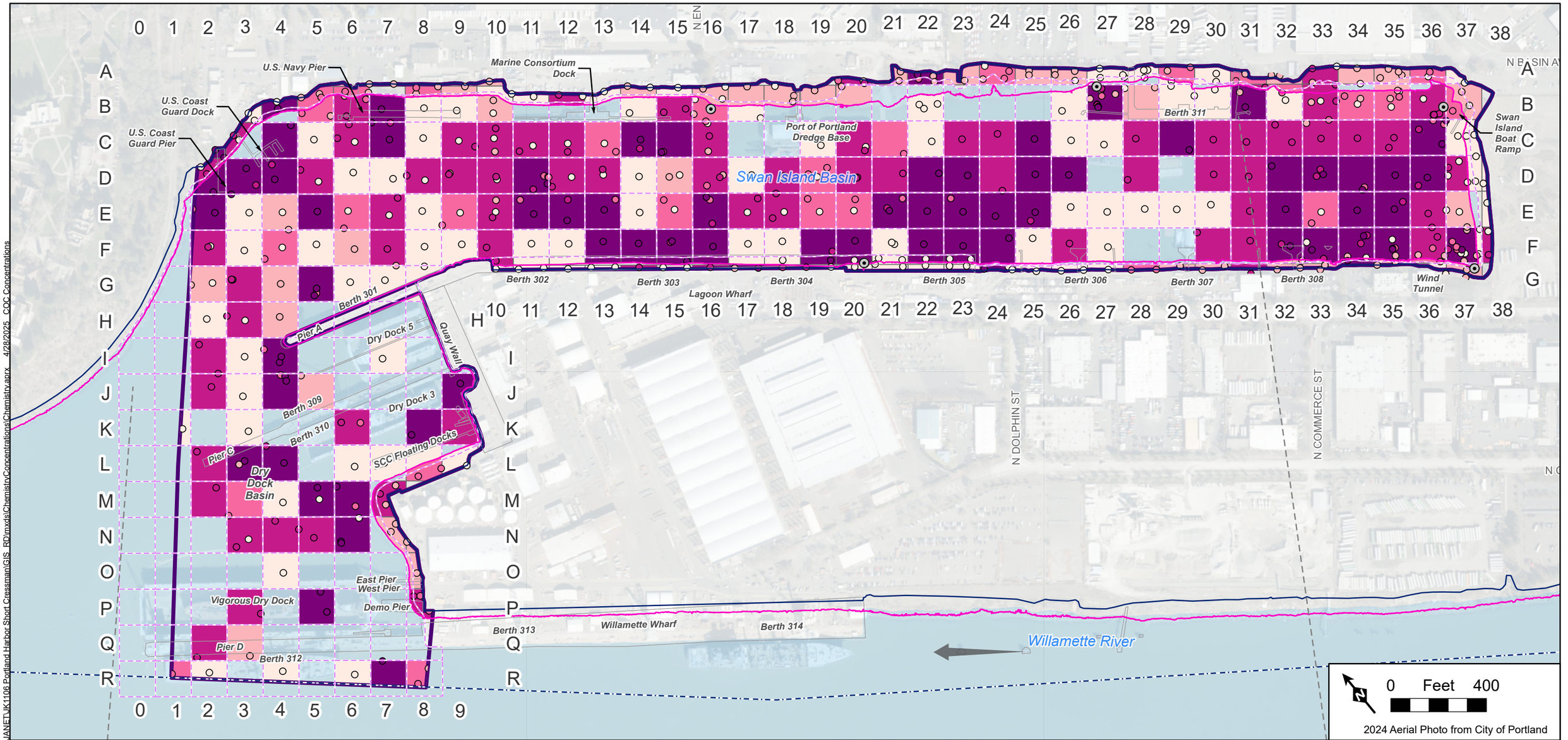

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Acenaphthene concentration (µg/kg) per core
- 0.0 - 1.0
- 1.1 - 5.0
- 5.1 - 10.0
- 10.1 - 50.0
- 50.1 - 10000.0

Maximum Acenaphthene concentration (µg/kg) per grid cell
- 0.0 - 1.0
- 1.1 - 5.0
- 5.1 - 10.0
- 10.1 - 50.0
- 50.1 - 10000.0

Notes:
≥ – Greater than or equal to
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NAVD88 – North American Vertical Datum of 1988
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µg/kg – microgram per kilogram
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Figure A-7

Maximum Concentrations in Sediment and Riverbank Soil - Acenaphthene

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Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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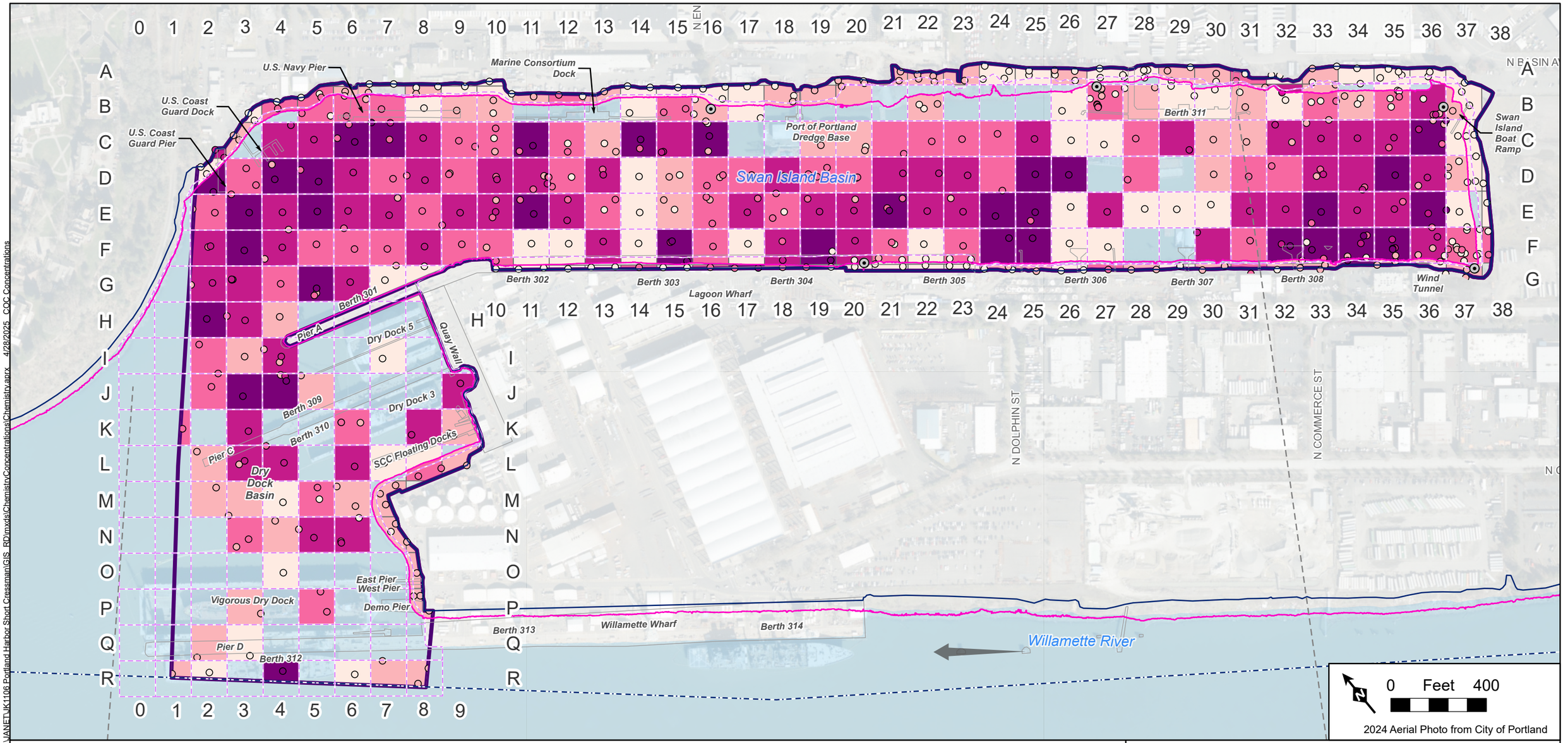

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Project Area Grid
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Swan Island Basin Project Area Boundary

Maximum Acenaphthylene concentration (µg/kg) per core
- 0.0 - 2.0
- 2.1 - 10.0
- 10.1 - 25.0
- 25.1 - 50.0
- 50.1 - 500.0

Maximum Acenaphthylene concentration (µg/kg) per grid cell
- 0.0 - 2.0
- 2.1 - 10.0
- 10.1 - 25.0
- 25.1 - 50.0
- 50.1 - 500.0

River Flow Direction

Notes:
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Figure A-8

Maximum Concentrations in Sediment and Riverbank Soil - Acenaphthylene

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Swan Island Basin Remedial Design Group

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0 Feet 400

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Project Area Grid
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River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Aldrin concentration (µg/kg) per core
- < 0.25
- ≥ 0.25 and < 0.5
- ≥ 0.50 and < 1.00
- ≥ 1.00 and < 2.00 (below sediment CUL)
- ≥ 2.00

Maximum Aldrin concentration (µg/kg) per grid cell
- < 0.25
- ≥ 0.25 and < 0.5
- ≥ 0.50 and < 1.00
- ≥ 1.00 and < 2.00 (below sediment CUL)
- ≥ 2.00

Notes:
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µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level

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Figure A-9

Maximum Concentrations in Sediment and Riverbank Soil - Aldrin

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Swan Island Basin Remedial Design Group

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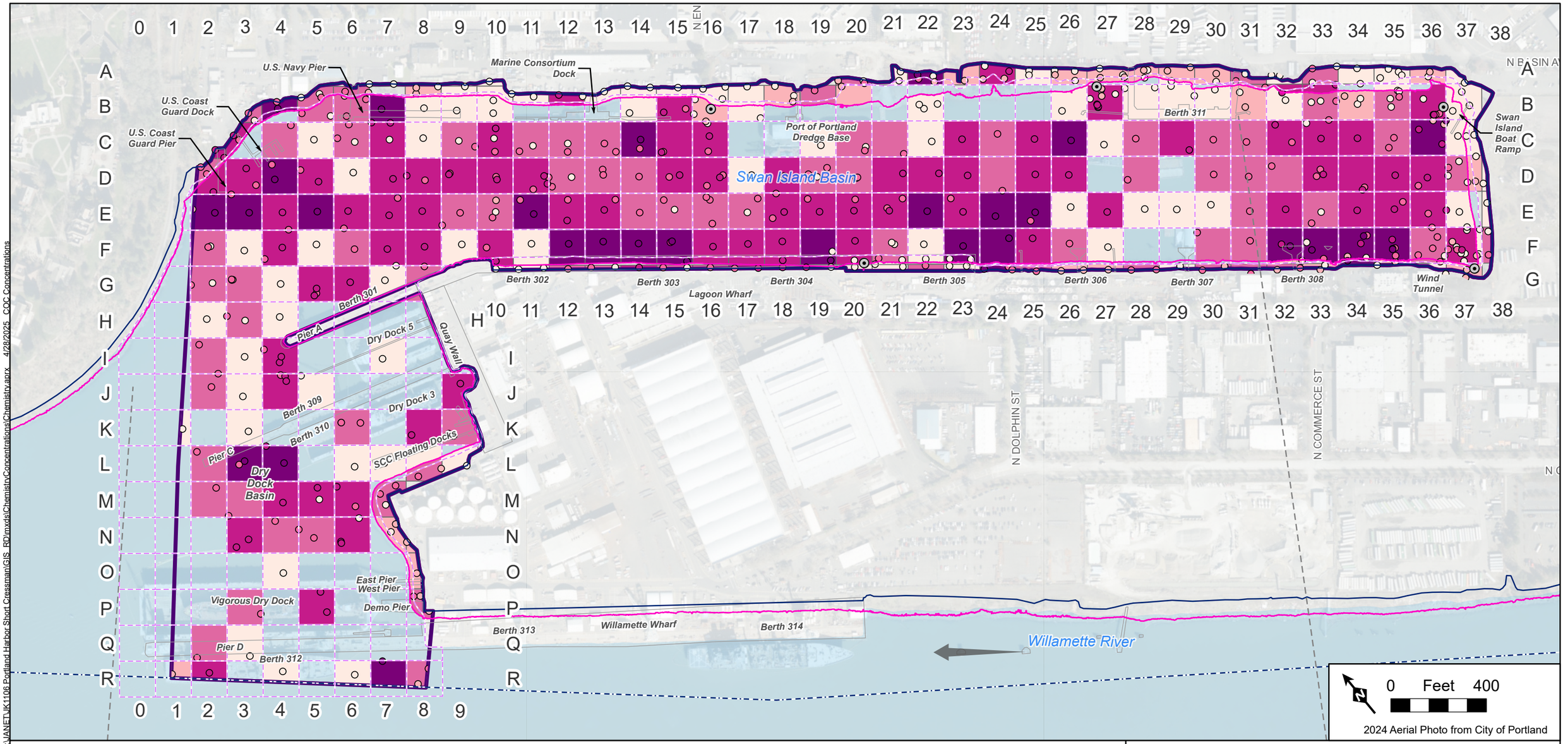

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Anthracene concentration (µg/kg) per core
- 0.0 - 5.0
- 5.1 - 10.0
- 10.1 - 50.0
- 50.1 - 200.0
- 200.1 - 20000.0

Maximum Anthracene concentration (µg/kg) per grid cell
- 0.0 - 5.0
- 5.1 - 10.0
- 10.1 - 50.0
- 50.1 - 200.0
- 200.1 - 20000.0

Notes:
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< – Less than
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µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-10

Maximum Concentrations in Sediment and Riverbank Soil - Anthracene

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Swan Island Basin Remedial Design Group

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0 Feet 400

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Arsenic concentration (µg/kg) per core
- < 3000 (below riverbank soil/sediment CUL)
- ≥ 3000 and < 7000
- ≥ 7000 and < 8000
- ≥ 8000 and < 16000
- ≥ 16000

Maximum Arsenic concentration (µg/kg) per grid cell
- < 3000 (below riverbank soil/sediment CUL)
- ≥ 3000 and < 7000
- ≥ 7000 and < 8000
- ≥ 8000 and < 16000
- ≥ 16000

Notes:
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USACE – United States Army Corps of Engineers
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Figure A-11

Maximum Concentrations in Sediment and Riverbank Soil - Arsenic

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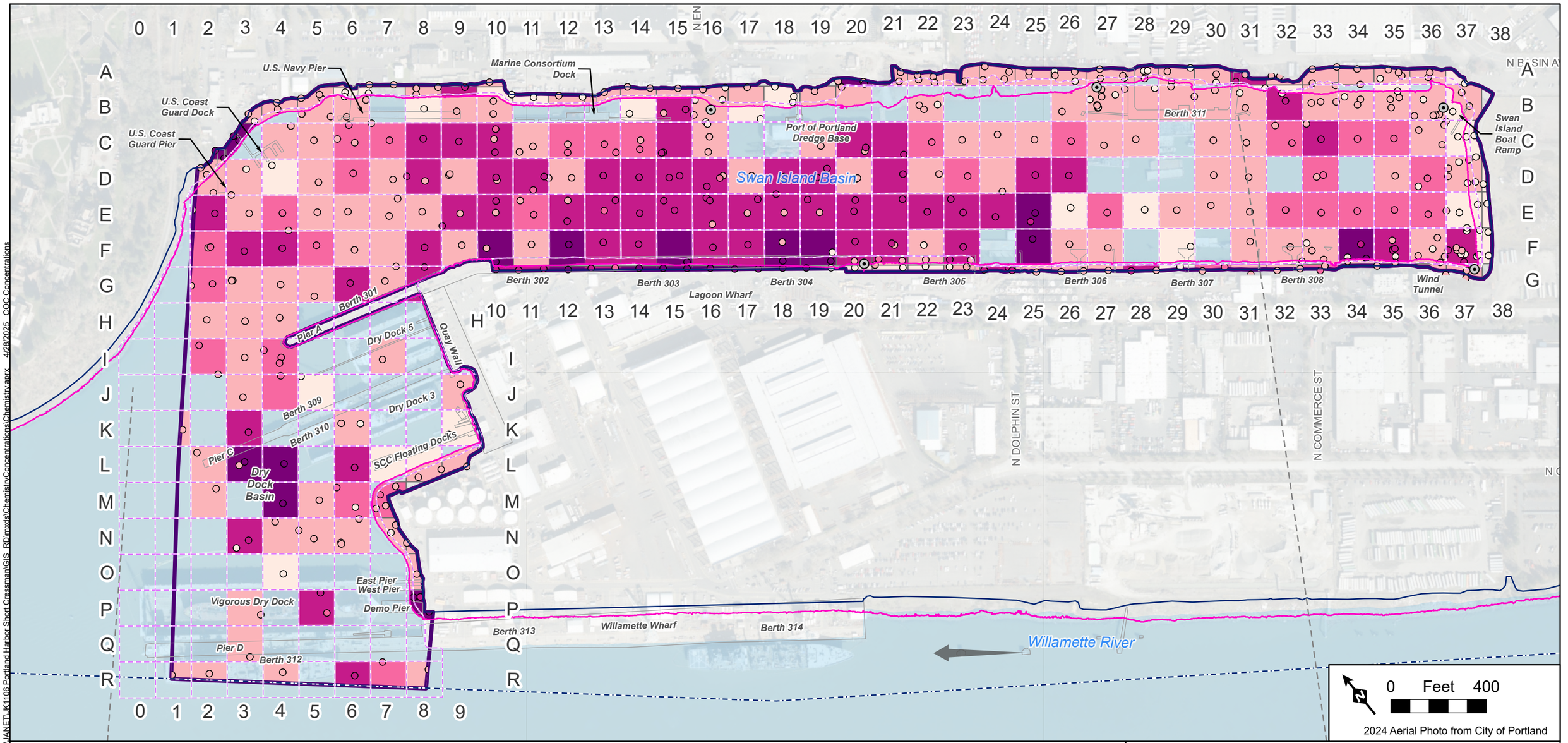

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Arsenic concentration (µg/kg) per core
- < 3000 (below riverbank soil/sediment CUL)
- ≥ 3000 and < 7000
- ≥ 7000 and < 8000
- ≥ 8000 and < 16000
- ≥ 16000

Maximum Arsenic concentration (µg/kg) per grid cell
- < 3000 (below riverbank soil/sediment CUL)
- ≥ 3000 and < 7000
- ≥ 7000 and < 8000
- ≥ 8000 and < 16000
- ≥ 16000

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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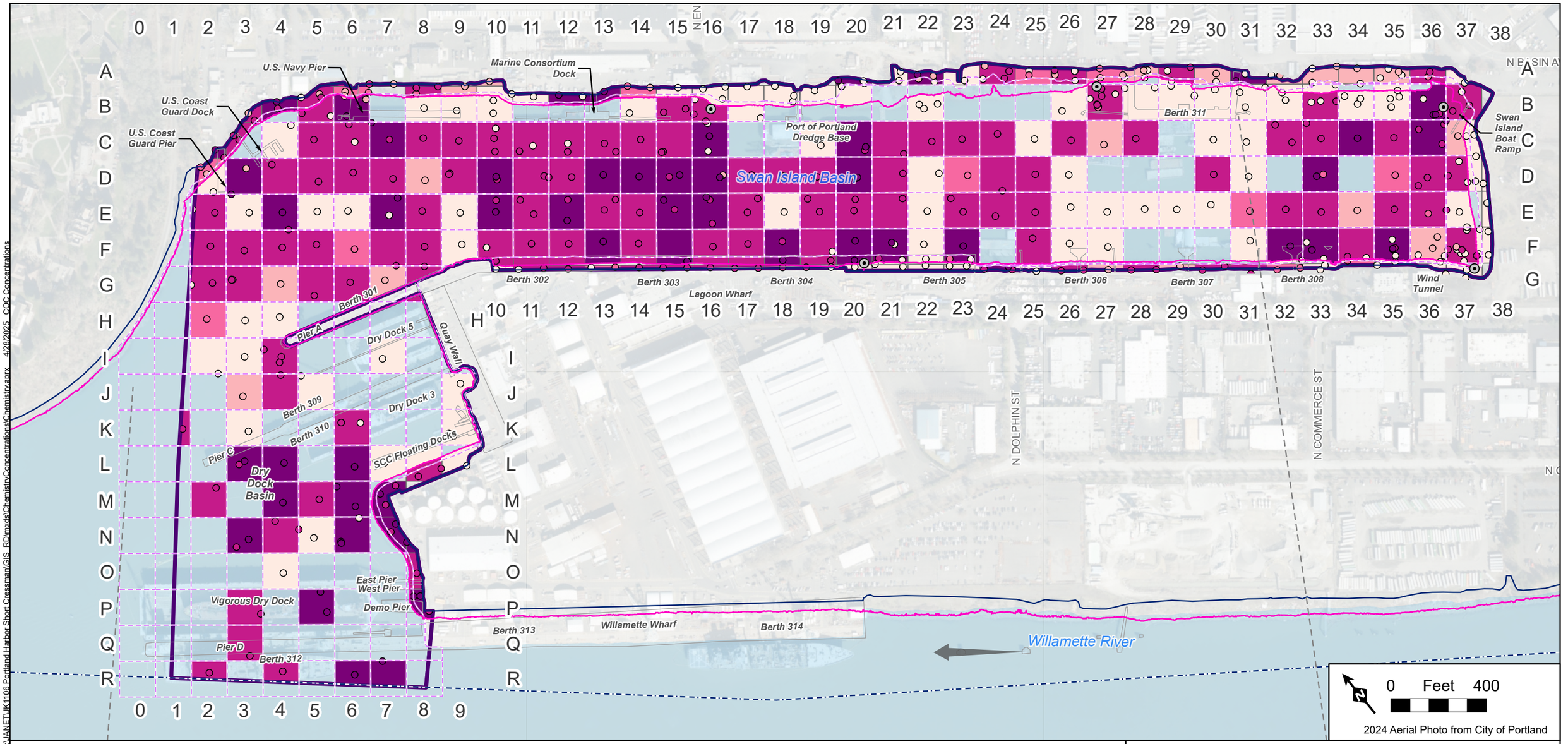
SWAN ISLAND RD INFORMATION - SUBJECT TO JOINT DEFENSE AGREEMENT AND IN ANTICIPATION OF LITIGATION

Figure A-12

Maximum Concentrations in Sediment and Riverbank Soil - Arsenic

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL · M M Scott Macdonald · Coast & Harbor Engineering · Pacific Groundwater Group · Bridgewater Group



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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum BEHP concentration (µg/kg) per core
- < 80
- ≥ 80 and < 135 (below sediment CUL)
- ≥ 135 and < 180
- ≥ 180 and < 1100
- ≥ 1100

Maximum BEHP concentration (µg/kg) per grid cell
- < 80
- ≥ 80 and < 135 (below sediment CUL)
- ≥ 135 and < 180
- ≥ 180 and < 1100
- ≥ 1100

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

BEHP = Bis(2-ethylhexyl) Phthalate
CUL – Cleanup Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-13

Maximum Concentrations in Sediment and Riverbank Soil - BEHP

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Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Port of Portland Dredge Base
Berth 311
Swan Island Boat Ramp
Swan Island Basin
Berth 302
Berth 303
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Lagoon Wharf
Berth 301
Pier A
Dry Dock 5
Quay Wall
Berth 309
Dry Dock 3
Berth 310
Pier C
SCC Floating Docks
Dry Dock Basin
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Berth 313
Willamette Wharf
Berth 314
Pier D
Berth 312
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AV
NEN

0 Feet 400

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Benzene concentration (µg/kg) per core
- < 1.0
- ≥ 1.0 and < 2.0
- ≥ 2.0 and < 4.0
- ≥ 4.0 and < 10.0
- ≥ 10.0

Maximum Benzene concentration (µg/kg) per grid cell
- < 1.0
- ≥ 1.0 and < 2.0
- ≥ 2.0 and < 4.0
- ≥ 4.0 and < 10.0
- ≥ 10.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-14

Maximum Concentrations in Sediment and Riverbank Soil - Benzene

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Port of Portland Dredge Base
Berth 311
Swan Island Boat Ramp
Swan Island Basin
Berth 302
Berth 303
Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Berth 301
Pier A
Dry Dock 5
Quay Wall
Berth 309
Dry Dock 3
Berth 310
Pier C
SCC Floating Docks
Dry Dock Basin
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Pier D
Berth 312
Berth 313
Willamette Wharf
Berth 314
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AVE
0 Feet 400
2024 Aerial Photo from City of Portland

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- Project Area Grid
- Federal Navigation Channel (USACE, 2020)
- River Mile (RM)
- Docks and Structures
- Top of Bank
- 13-foot NAVD88 Mean High Water
- Swan Island Basin Project Area Boundary

Maximum Benzo(a)anthracene concentration (µg/kg) per core
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 10000.0

Maximum Benzo(a)anthracene concentration (µg/kg) per grid cell
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 10000.0

River Flow Direction

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-15

Maximum Concentrations in Sediment and Riverbank Soil - Benzo(a)anthracene

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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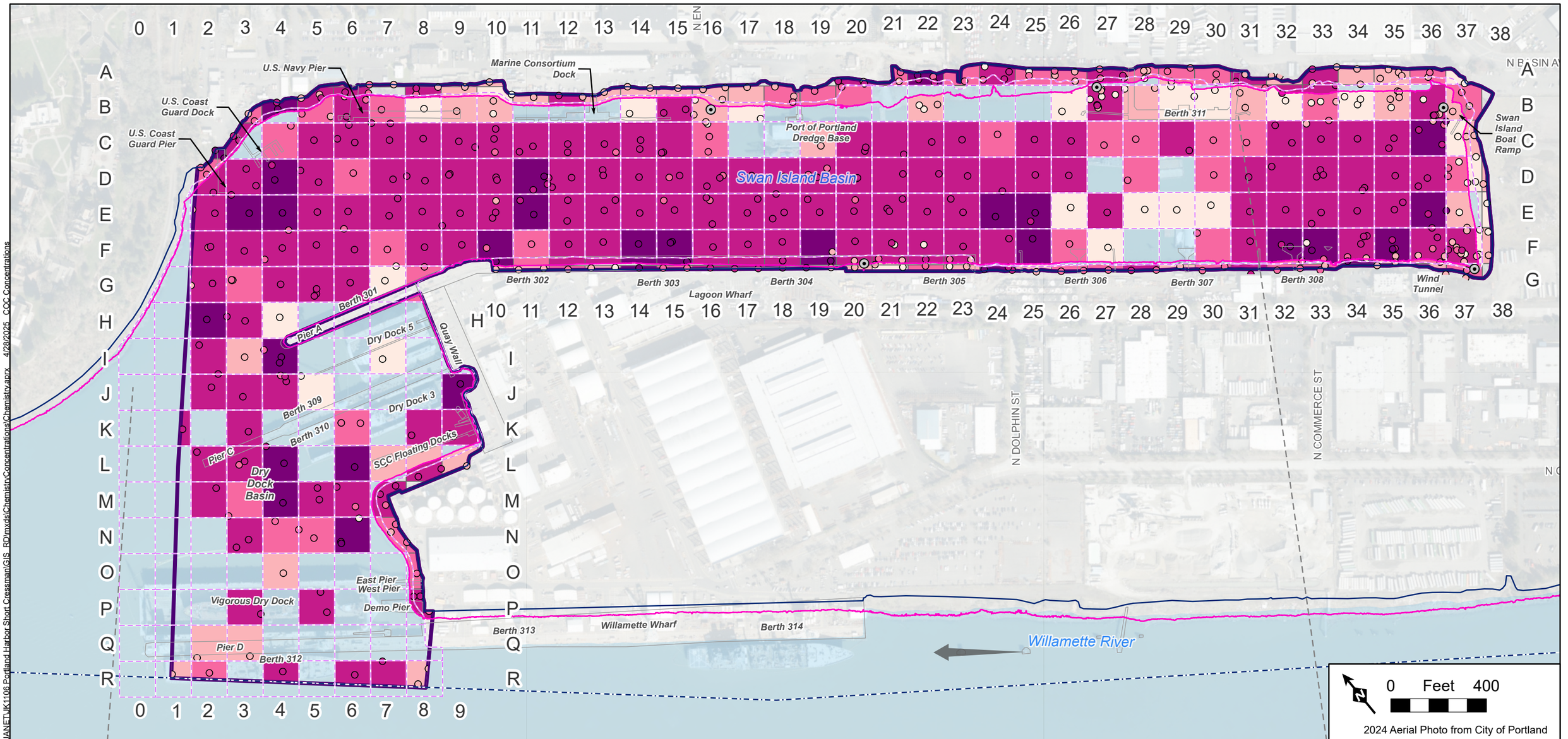

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

Maximum Benzo(a)pyrene concentration (µg/kg) per core
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 10000.0

Maximum Benzo(a)pyrene concentration (µg/kg) per grid cell
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 10000.0

River Flow Direction

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-16

Maximum Concentrations in Sediment and Riverbank Soil - Benzo(a)pyrene

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Swan Island Basin Remedial Design Group

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U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
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Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Berth 301
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Berth 309
Dry Dock 3
Berth 310
Pier C
SCC Floating Docks
Dry Dock Basin
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Berth 313
Willamette Wharf
Berth 314
Pier D
Berth 312
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AVE

0 Feet 400

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Benzo(b)fluoranthene concentration (µg/kg) per core
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 10000.0

Maximum Benzo(b)fluoranthene concentration (µg/kg) per grid cell
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 10000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-17

Maximum Concentrations in Sediment and Riverbank Soil - Benzo(b)fluoranthene

Prepared on: 4/28/2025
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Swan Island Basin Remedial Design Group

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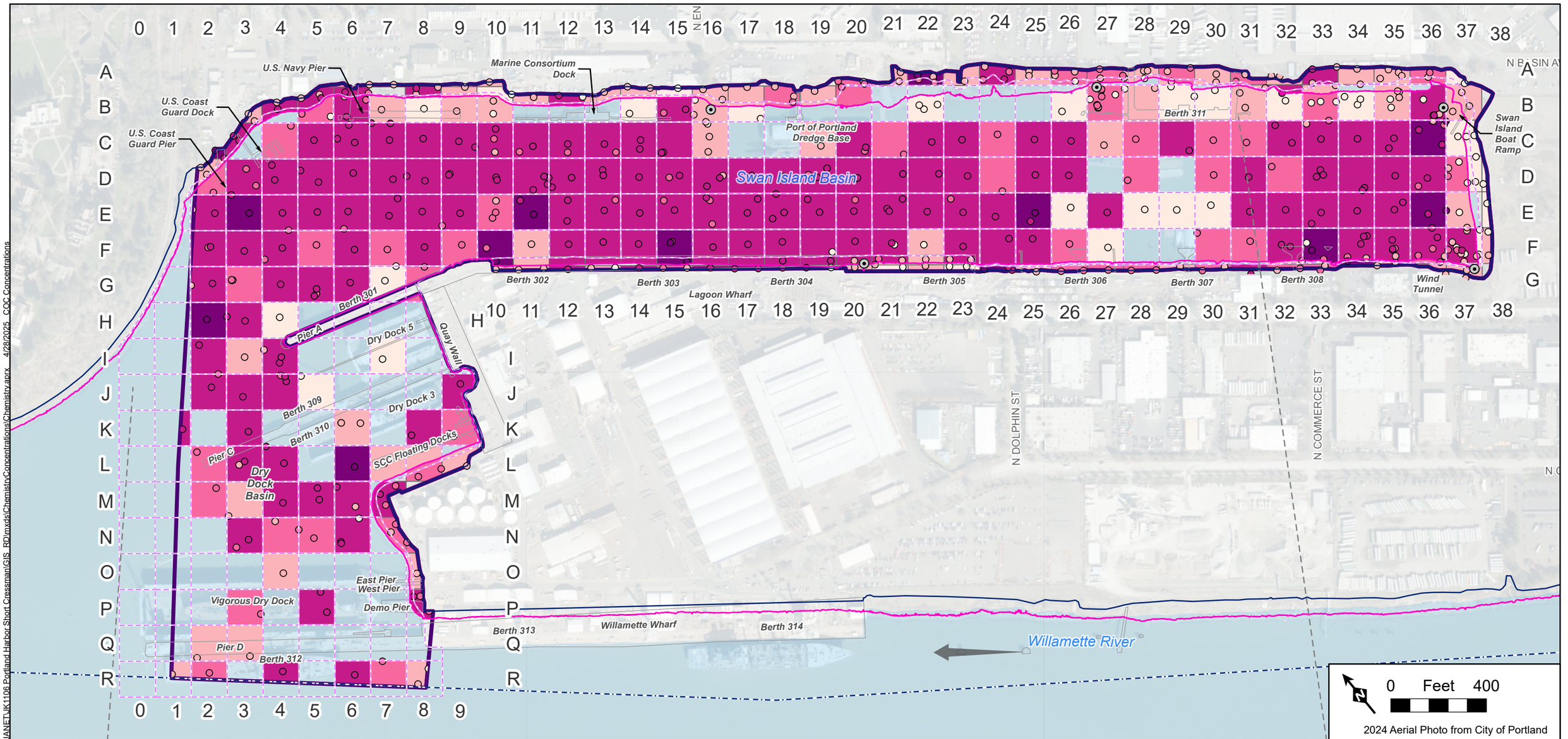

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Benzo(g,h,i)perylene concentration (µg/kg) per core
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 10000.0

Maximum Benzo(g,h,i)perylene concentration (µg/kg) per grid cell
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 10000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-18

Maximum Concentrations in Sediment and Riverbank Soil - Benzo(g,h,i)perylene

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Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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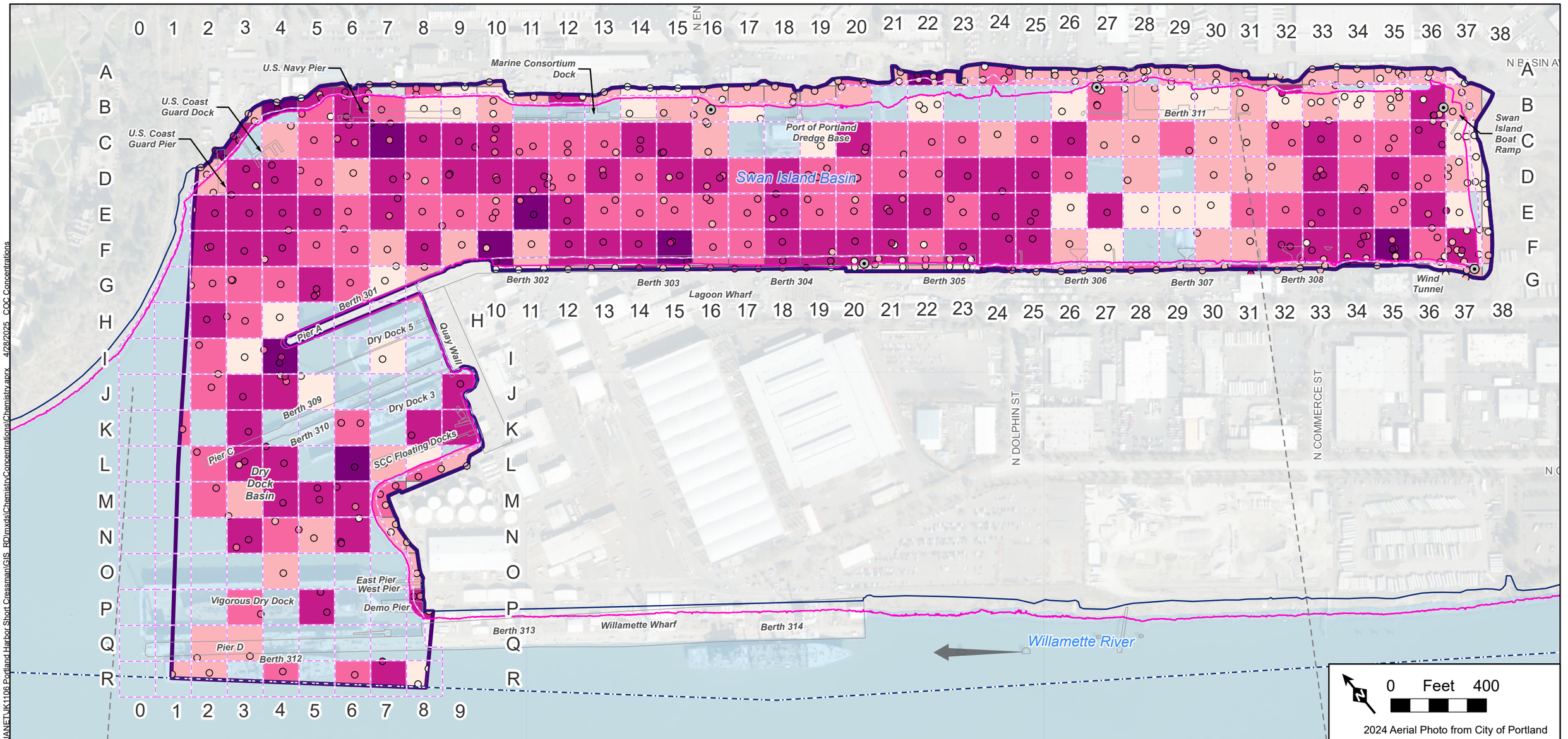

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Benzo(k)fluoranthene concentration (µg/kg) per core
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 10000.0

Maximum Benzo(k)fluoranthene concentration (µg/kg) per grid cell
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 10000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-19

Maximum Concentrations in Sediment and Riverbank Soil - Benzo(k)fluoranthene

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Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Port of Portland Dredge Base
Berth 311
Swan Island Boat Ramp
Swan Island Basin
Berth 302
Berth 303
Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Berth 301
Pier A
Dry Dock 5
Quay Wall
Berth 309
Dry Dock 3
Berth 310
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West Pier
Vigorous Dry Dock
Demo Pier
Pier D
Berth 312
Berth 313
Willamette Wharf
Berth 314
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AV

0 Feet 400

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Cadmium concentration (µg/kg) per core
- 0.0 - 100.0
- 100.1 - 255.0
- 255.1 - 510.0
- 510.1 - 1020.0
- 1020.1 - 10000.0

Maximum Cadmium concentration (µg/kg) per grid cell
- 0.0 - 100.0
- 100.1 - 255.0
- 255.1 - 510.0
- 510.1 - 1020.0
- 1020.1 - 10000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-20

Maximum Concentrations in Sediment and Riverbank Soil - Cadmium

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Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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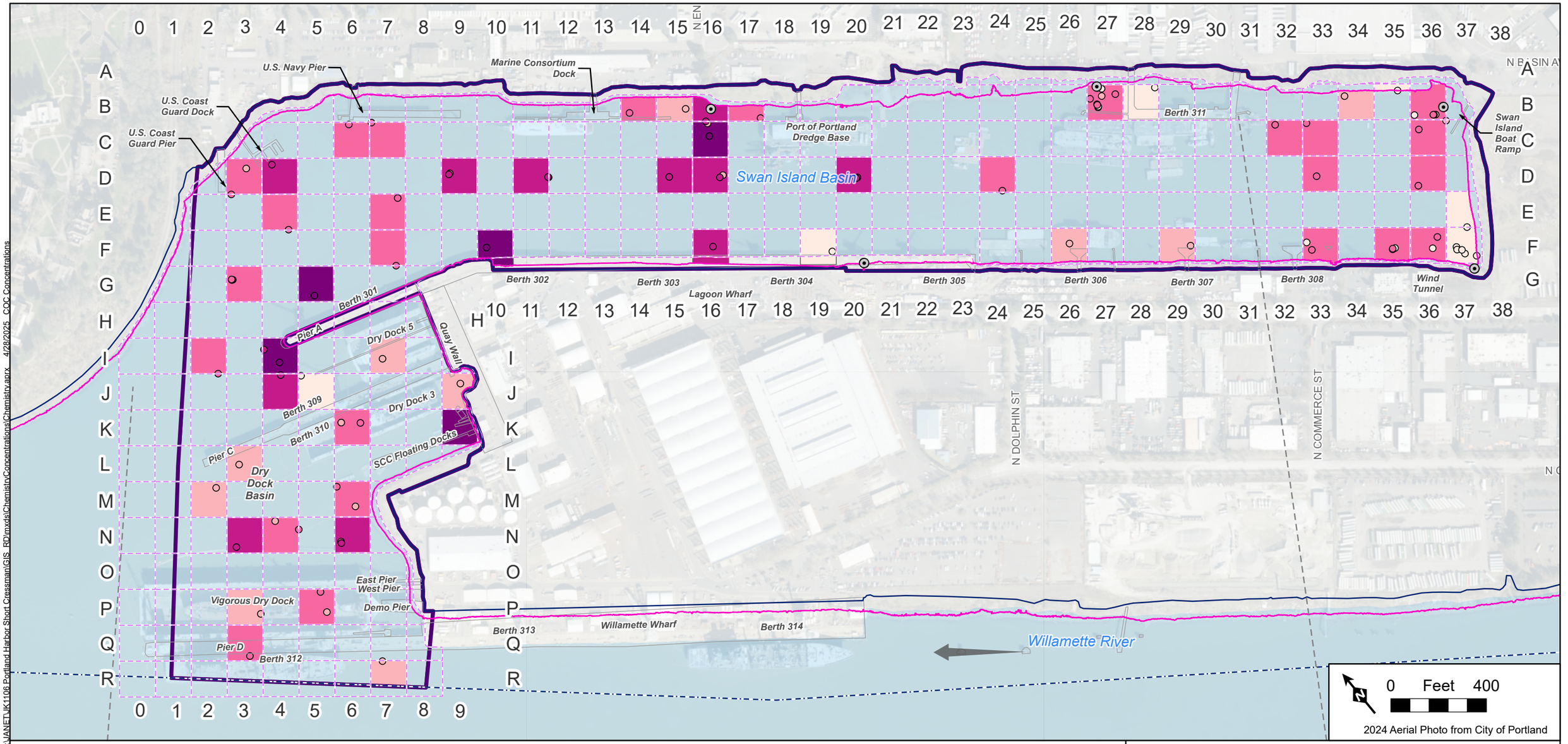

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Chromium concentration (µg/kg) per core
- 0.0 - 20000.0
- 20000.1 - 30000.0
- 30000.1 - 40000.0
- 40000.1 - 50000.0
- 50000.1 - 1000000.0

Maximum Chromium concentration (µg/kg) per grid cell
- 0.0 - 20000.0
- 20000.1 - 30000.0
- 30000.1 - 40000.0
- 40000.1 - 50000.0
- 50000.1 - 1000000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-21

Maximum Concentrations in Sediment and Riverbank Soil - Chromium

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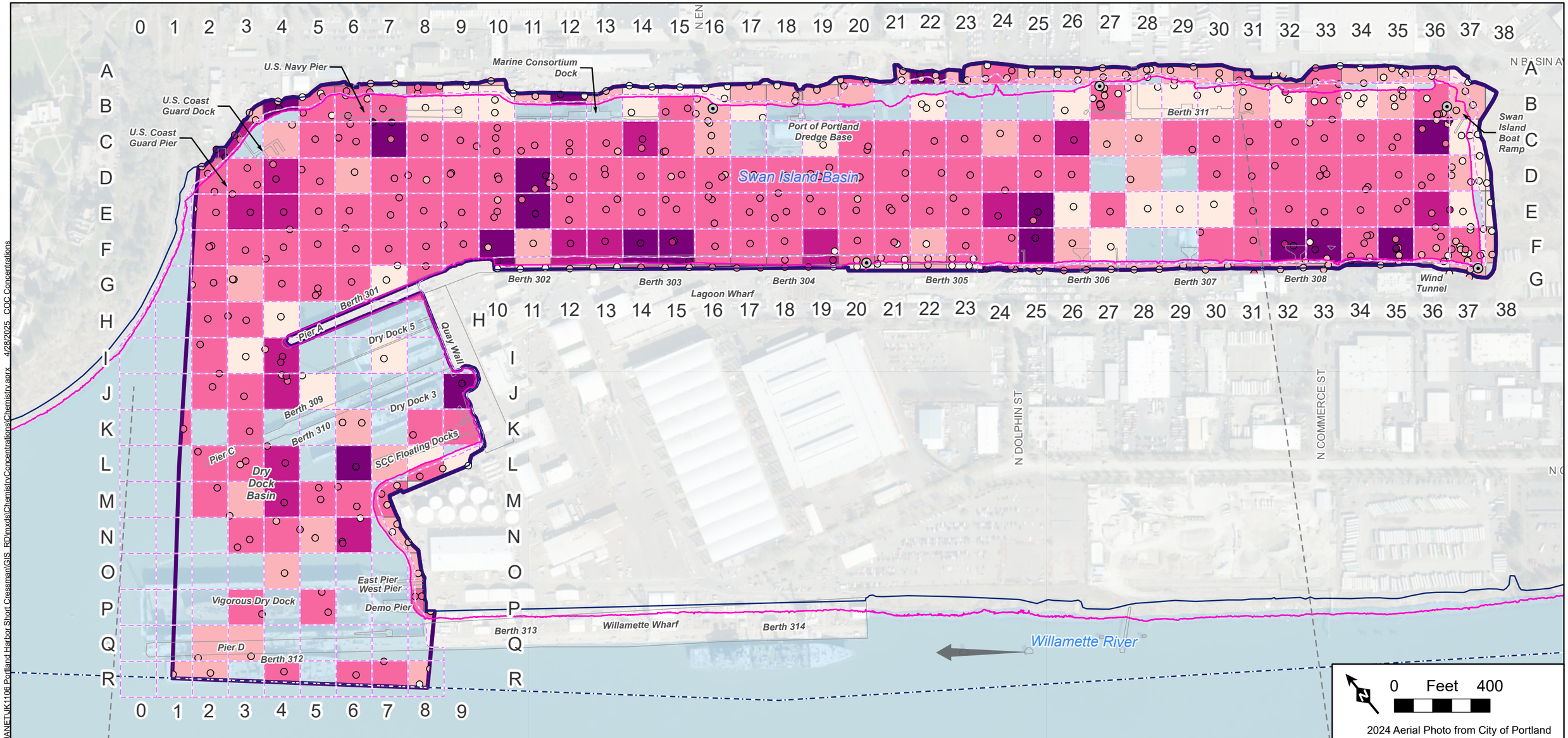
Swan Island Basin Remedial Design Group



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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Chrysene concentration (µg/kg) per core
- 0.0 - 25.0
- 25.1 - 100.0
- 100.1 - 500.0
- 500.1 - 1000.0
- 1000.1 - 15000.0

Maximum Chrysene concentration (µg/kg) per grid cell
- 0.0 - 25.0
- 25.1 - 100.0
- 100.1 - 500.0
- 500.1 - 1000.0
- 1000.1 - 15000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-22

Maximum Concentrations in Sediment and Riverbank Soil - Chrysene

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Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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U.S. Navy Pier
Marine Consortium Dock
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Swan Island Boat Ramp
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Lagoon Wharf
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Berth 309
Dry Dock 3
Berth 310
Pier C
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Dry Dock Basin
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Demo Pier
Pier D
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Berth 313
Willamette Wharf
Berth 314
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AV

0 Feet 400

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- Project Area Grid
- Federal Navigation Channel (USACE, 2020)
- River Mile (RM)
- Docks and Structures
- Top of Bank
- 13-foot NAVD88 Mean High Water
- Swan Island Basin Project Area Boundary

Maximum Copper concentration (µg/kg) per core

- < 89750
- ≥ 89750 to < 179500
- ≥ 179500 to < 359000 (below sediment CUL)
- ≥ 359000 to < 718000
- ≥ 718000

Maximum Copper concentration (µg/kg) per grid cell

- < 89750
- ≥ 89750 to < 179500
- ≥ 179500 to < 359000 (below sediment CUL)
- ≥ 359000 to < 718000
- ≥ 718000

River Flow Direction

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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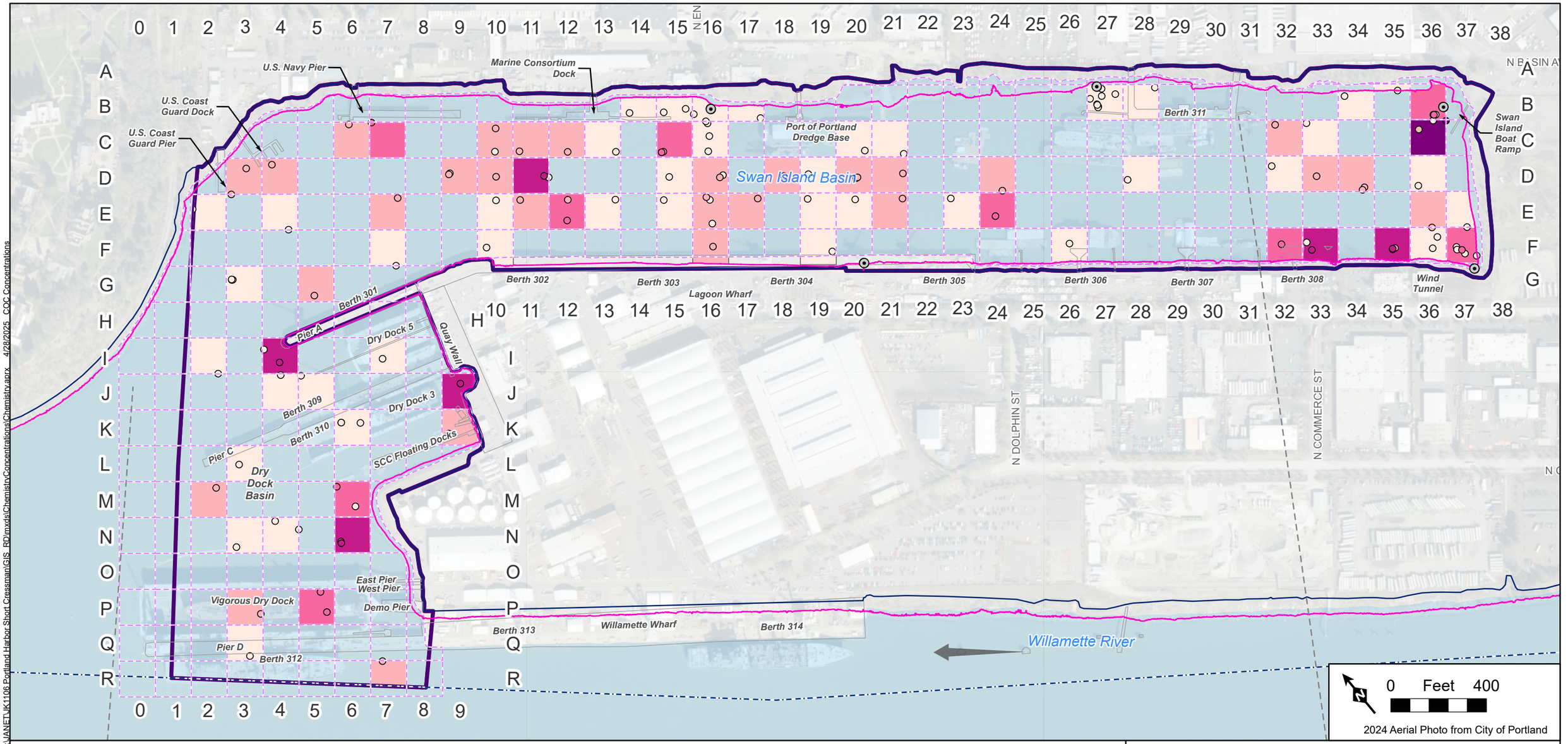
SWAN ISLAND RD INFORMATION - SUBJECT TO JOINT DEFENSE AGREEMENT AND IN ANTICIPATION OF LITIGATION

Figure A-23

Maximum Concentrations in Sediment and Riverbank Soil - Copper

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL | M | COAST & HARBOR ENGINEERING | PACIFIC groundwater GROUP | BRIDGEWATER GROUP



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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum cPAHs concentration (µg/kg) per core
- < 193.5
- ≥ 193.5 to < 387.0
- ≥ 387.0 to < 774.0 (below sediment CUL)
- ≥ 774.0 to < 1548.0
- ≥ 1548.0 to < 774000.0 (below PTW)

Maximum cPAHs concentration (µg/kg) per grid cell
- < 193.5
- ≥ 193.5 to < 387.0
- ≥ 387.0 to < 774.0 (below sediment CUL)
- ≥ 774.0 to < 1548.0
- ≥ 1548.0 to < 774000.0 (below PTW)

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
cPAHs– carcinogenic polycyclic aromatic hydrocarbons

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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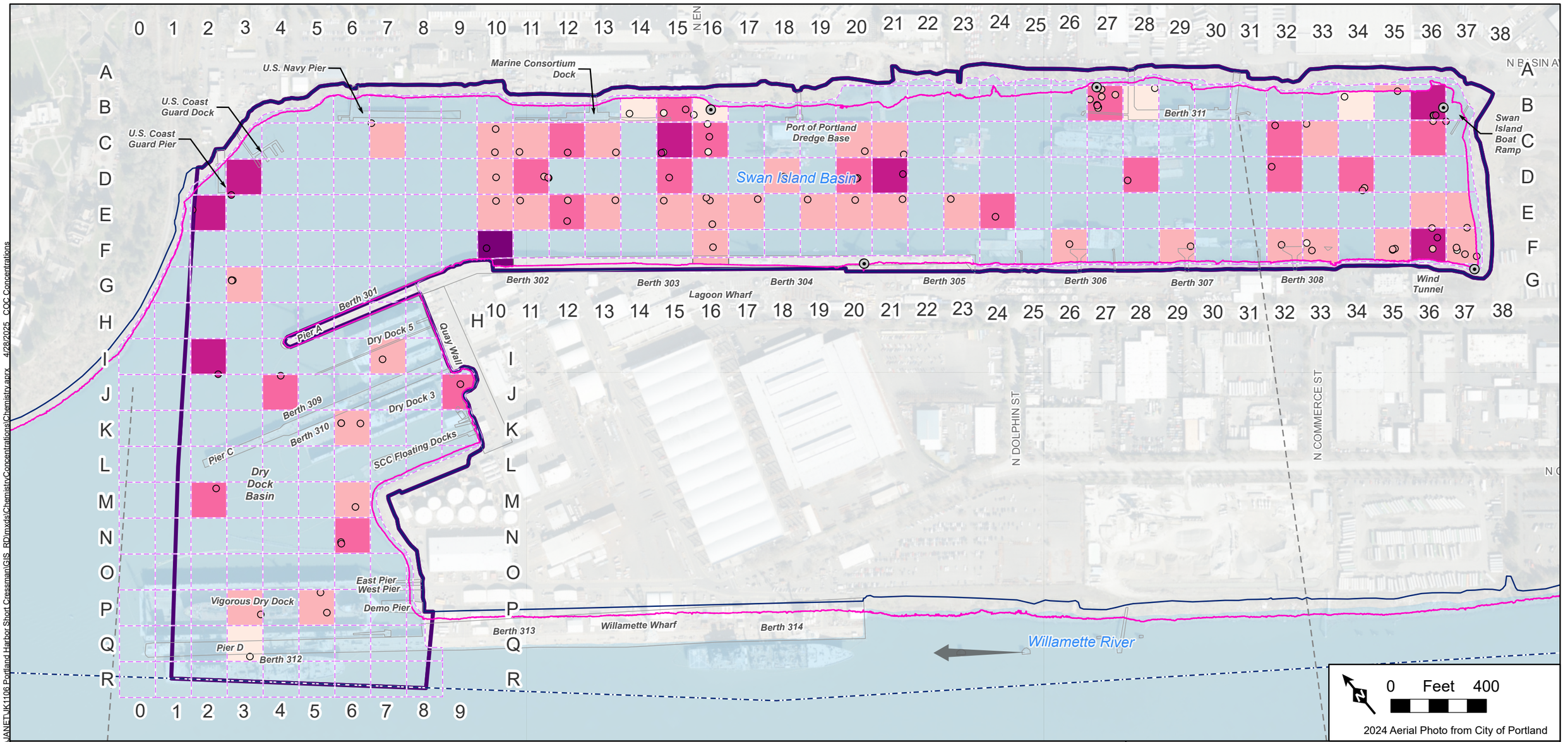
Figure A-24

Maximum Concentrations in Sediment and Riverbank Soil - cPAHs

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL · M · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP



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- Project Area Grid
- Federal Navigation Channel (USACE, 2020)
- River Mile (RM)
- Docks and Structures
- Top of Bank
- 13-foot NAVD88 Mean High Water
- Swan Island Basin Project Area Boundary

Maximum DDD concentration (µg/kg) per core
- < 1.0
- ≥ 1.0 to < 5.0
- ≥ 5.0 to < 10.0
- ≥ 10.0 to < 114.0 (below sediment CUL)
- ≥ 114.0

Maximum DDD concentration (µg/kg) per grid cell
- < 1.0
- ≥ 1.0 to < 5.0
- ≥ 5.0 to < 10.0
- ≥ 10.0 to < 114.0 (below sediment CUL)
- ≥ 114.0

River Flow Direction

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level
DDD – dichlorodiphenyldichloroethane

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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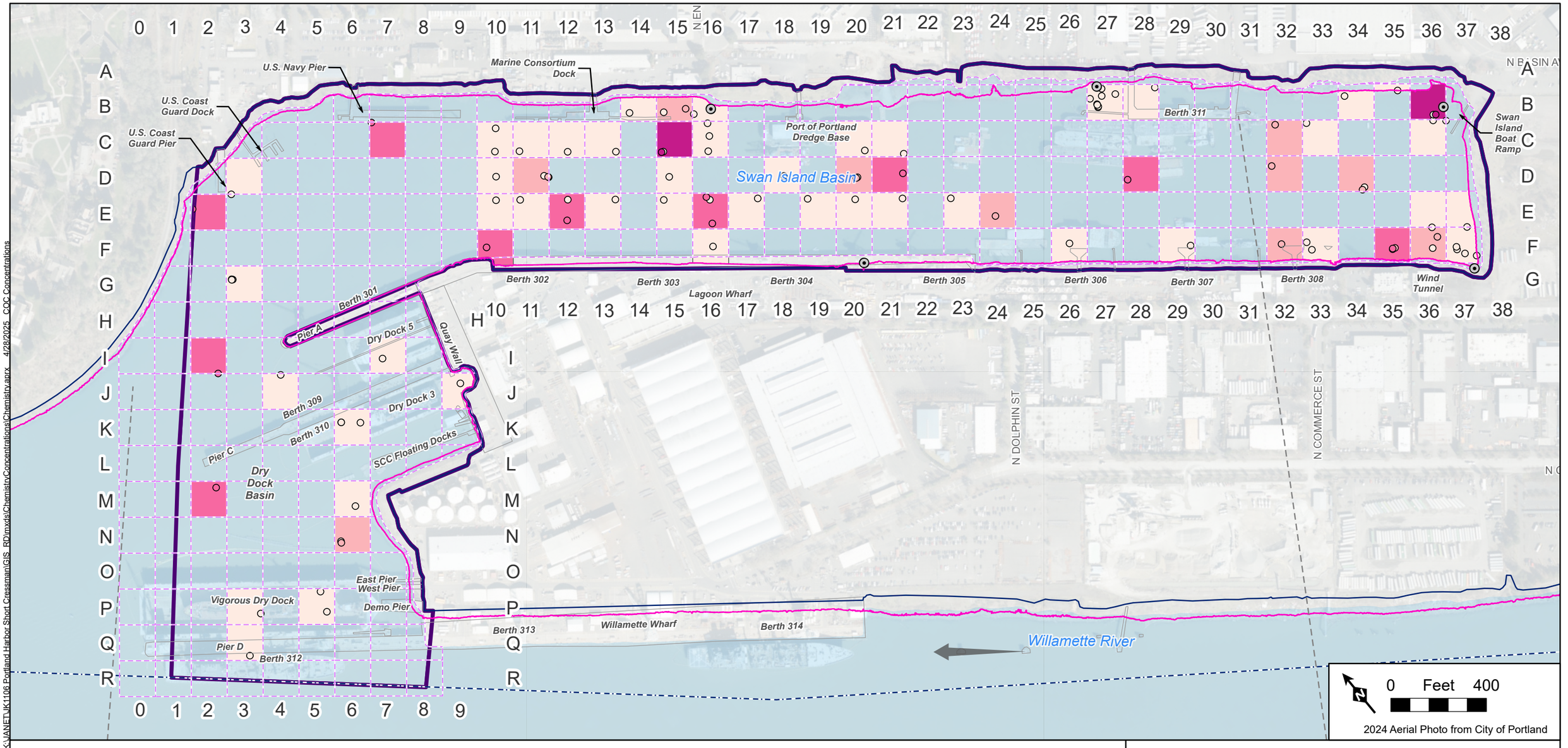
Figure A-25

Maximum Concentrations in Sediment and Riverbank Soil - DDD

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL · Coast & Harbor Engineering · Pacific Groundwater Group · Bridgewater Group



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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum DDE concentration (µg/kg) per core
- < 5.0
- ≥ 5.0 to < 10.0
- ≥ 10.0 to < 25.0
- ≥ 25.0 to < 50.0 (below sediment CUL)
- ≥ 50.0

Maximum DDE concentration (µg/kg) per grid cell
- < 5.0
- ≥ 5.0 to < 10.0
- ≥ 10.0 to < 25.0
- ≥ 25 to < 50.0 (below sediment CUL)
- ≥ 50.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level
DDE – dichlorodiphenyldichloroethylene

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-26

Maximum Concentrations in Sediment and Riverbank Soil - DDE

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Port of Portland Dredge Base
Berth 311
Swan Island Boat Ramp
Swan Island Basin
Berth 302
Berth 303
Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Berth 301
Pier A
Dry Dock 5
Quay Wall
Berth 309
Dry Dock 3
Berth 310
Pier C
SCC Floating Docks
Dry Dock Basin
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Pier D
Berth 312
Berth 313
Willamette Wharf
Berth 314
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AVE
0 Feet 400
2024 Aerial Photo from City of Portland

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum DDT concentration (µg/kg) per core
- < 5.0
- ≥ 5.0 to < 10.0
- ≥ 10.0 to < 123.0
- ≥ 123.0 to < 246.0 (below sediment CUL)
- ≥ 246.0

Maximum DDT concentration (µg/kg) per grid cell
- < 5.0
- ≥ 5.0 to < 10.0
- ≥ 10.0 to < 123.0
- ≥ 123.0 to < 246.0 (below sediment CUL)
- ≥ 246.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

CUL – Cleanup Level
DDT – dichlorodiphenyltrichloroethane

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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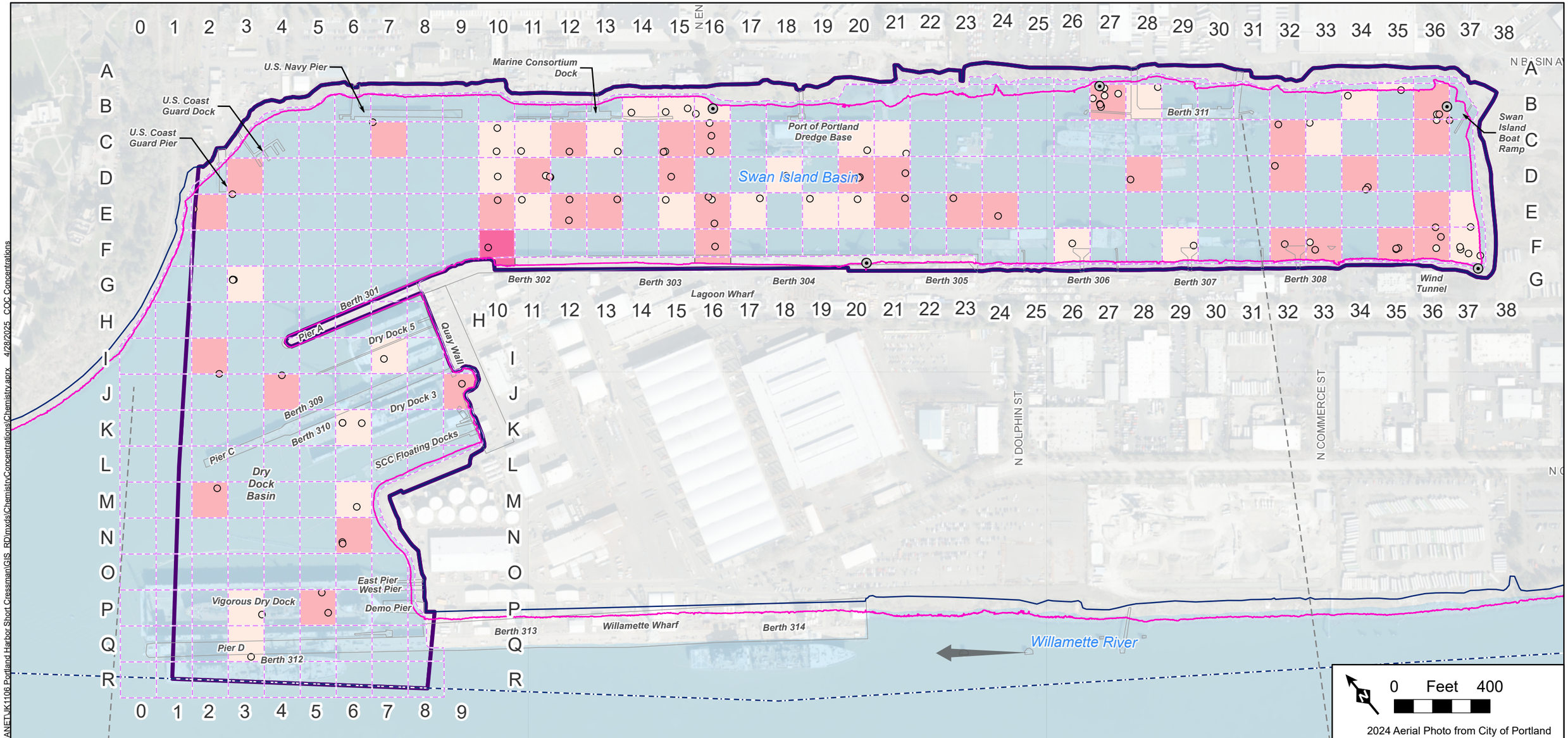
Figure A-27

Maximum Concentrations in Sediment and Riverbank Soil - DDT

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL | M Mott MacDonald | Coast & Harbor Engineering | Pacific Groundwater Group | Bridgewater Group



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- Project Area Grid
- Federal Navigation Channel (USACE, 2020)
- River Mile (RM)
- Docks and Structures
- Top of Bank
- 13-foot NAVD88 Mean High Water
- Swan Island Basin Project Area Boundary

River Flow Direction

Maximum DDx concentration (µg/kg) per core
- < 6.1 (below sediment CUL)
- ≥ 6.1 to < 160 (below RAL)
- ≥ 160 to < 650 (below Navigation Channel RAL)
- ≥ 650 to < 7050 (below PTW)
- ≥ 7050

Maximum DDx concentration (µg/kg) per grid cell
- < 6.1 (below sediment CUL)
- ≥ 6.1 to < 160 (below RAL)
- ≥ 160 to < 650 (below Navigation Channel RAL)
- ≥ 650 to < 7050 (below PTW)
- ≥ 7050

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
DDx = DDD + DDE + DDT
PTW – Principal Threat Waste
RAL – Remedial Action Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-28

Maximum Concentrations in Sediment and Riverbank Soil - DDx

Prepared on: 4/28/2025
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Swan Island Basin Remedial Design Group

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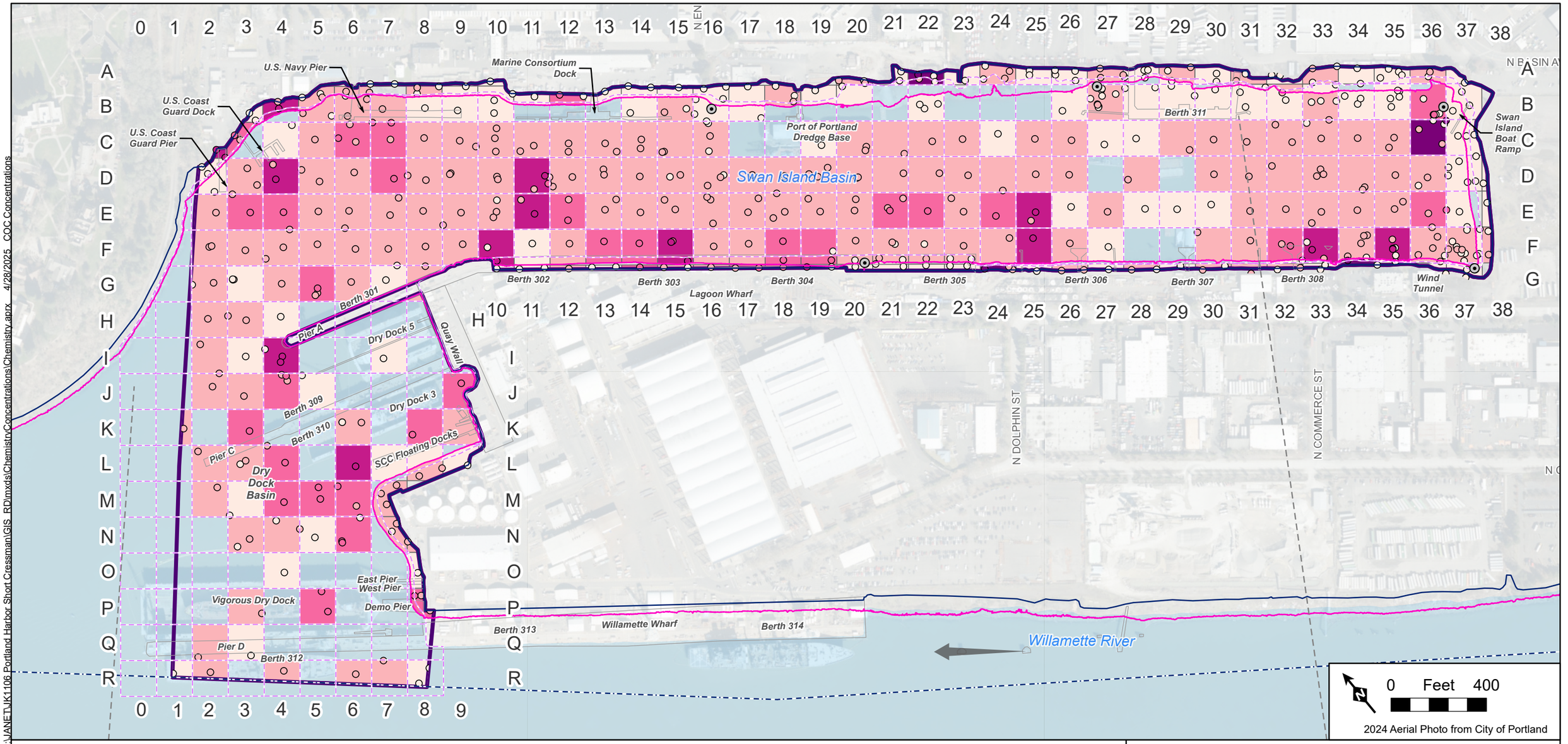

Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Dibenzo(a,h)anthracene concentration (µg/kg) per core
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 200.0
- 200.1 - 1000.0

Maximum Dibenzo(a,h)anthracene concentration (µg/kg) per grid cell
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 200.0
- 200.1 - 1000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-29

Maximum Concentrations in Sediment and Riverbank Soil - Dibenzo(a,h)anthracene

Prepared on: 4/28/2025
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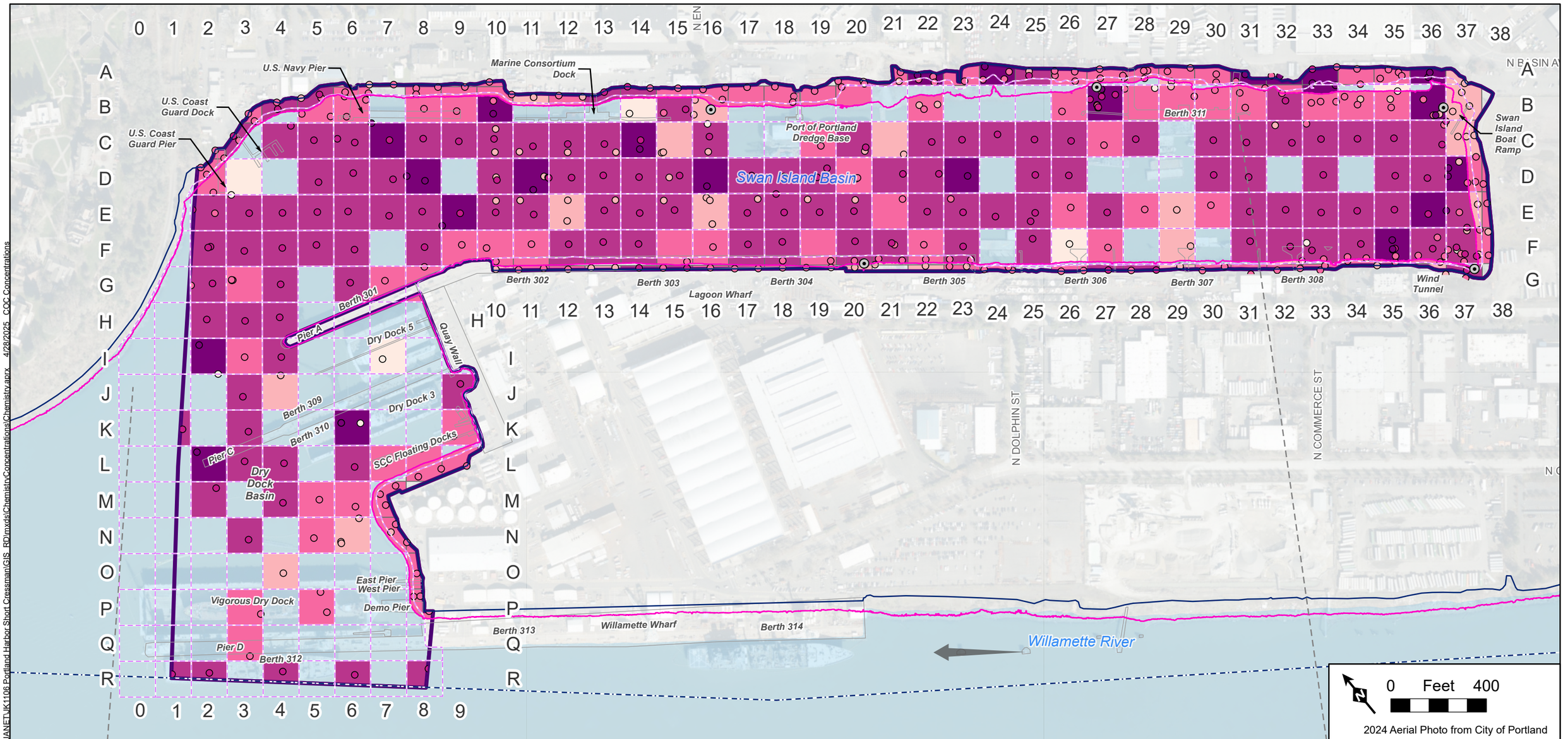
Swan Island Basin Remedial Design Group

HGL | Mott MacDonald | Coast & Harbor Engineering | Pacific Groundwater Group | Bridgewater Group



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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Dieldrin concentration (µg/kg) per core
- < 0.035
- ≥ 0.035 to < 0.07 (below sediment CUL)
- ≥ 0.07 to < 0.28
- ≥ 0.28 to < 1.0
- ≥ 1.0

Maximum Dieldrin concentration (µg/kg) per grid cell
- < 0.035
- ≥ 0.035 to < 0.07 (below sediment CUL)
- ≥ 0.07 to < 0.28
- ≥ 0.28 to < 1.0
- ≥ 1.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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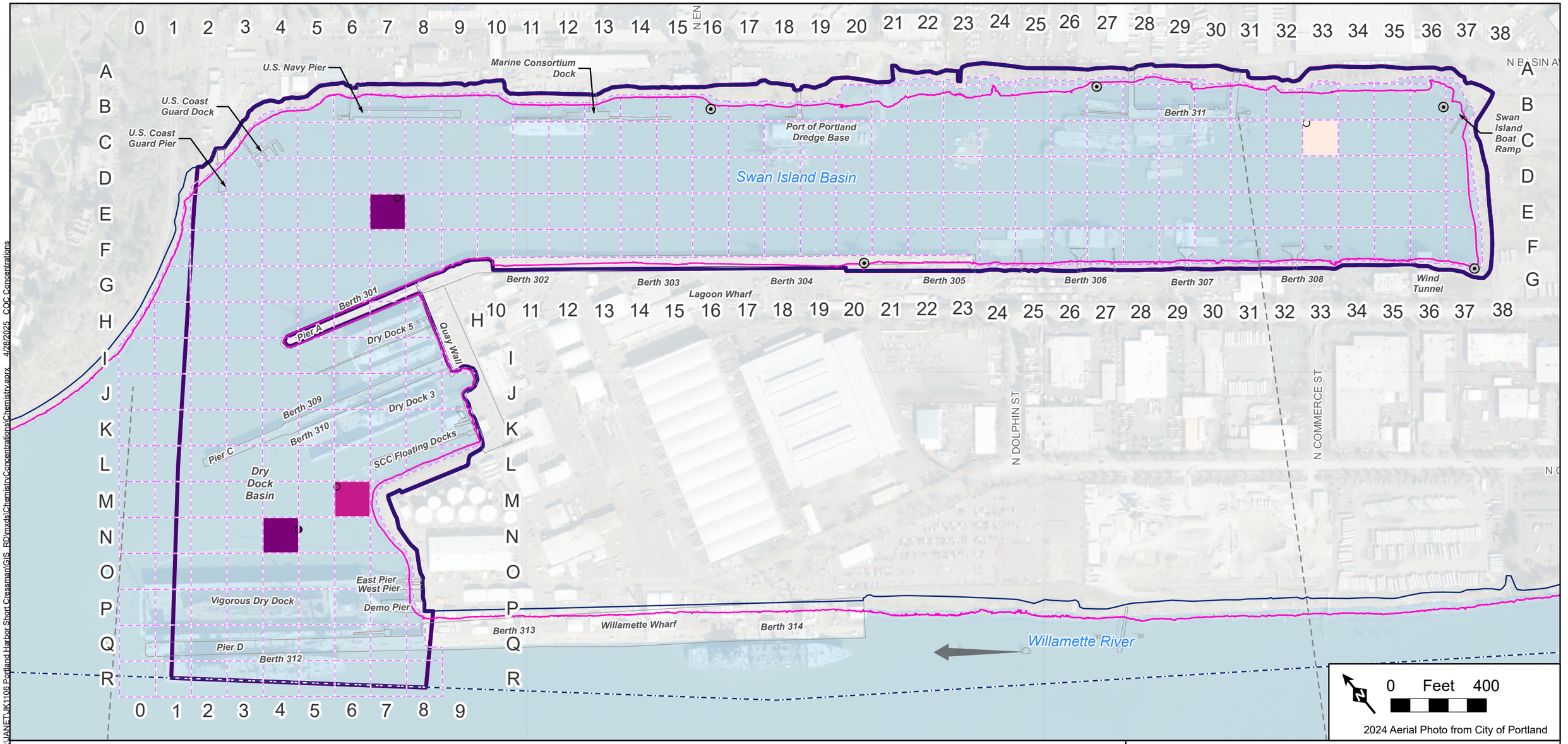
Figure A-30

Maximum Concentrations in Sediment and Riverbank Soil - Dieldrin

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group



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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

Maximum Ethylbenzene concentration (µg/kg) per core
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 10.00
- 10.01 - 20.00
- 20.01 - 25.00

Maximum Ethylbenzene concentration (µg/kg) per grid cell
- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 10.00
- 10.01 - 20.00
- 20.01 - 25.00

River Flow Direction

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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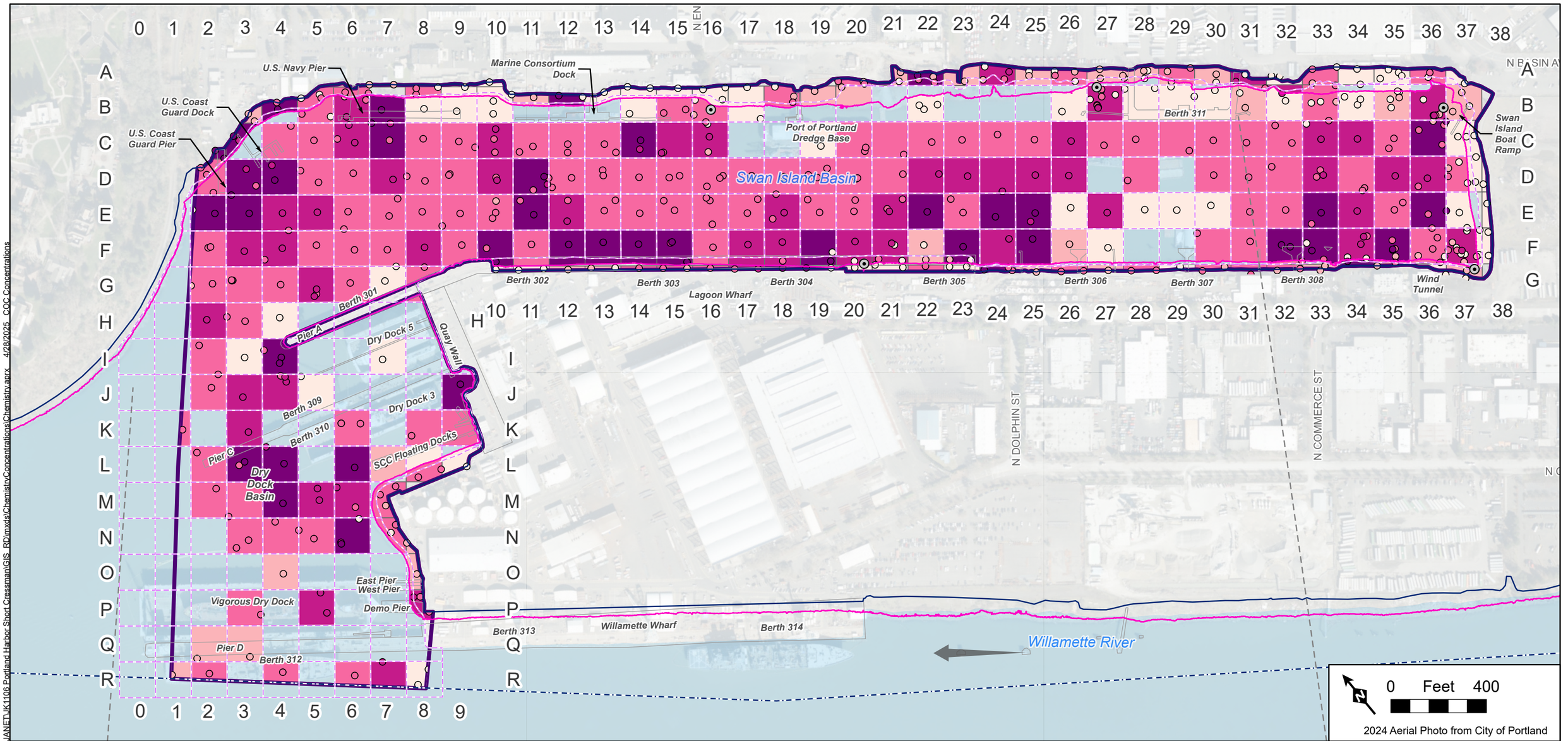
Figure A-31

Maximum Concentrations in Sediment and Riverbank Soil - Ethylbenzene

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group



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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Fluoranthene concentration (µg/kg) per core
- 0.0 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 1000.0
- 1000.1 - 50000.0

Maximum Fluoranthene concentration (µg/kg) per grid cell
- 0.0 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 1000.0
- 1000.1 - 50000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-32

Maximum Concentrations in Sediment and Riverbank Soil - Fluoranthene

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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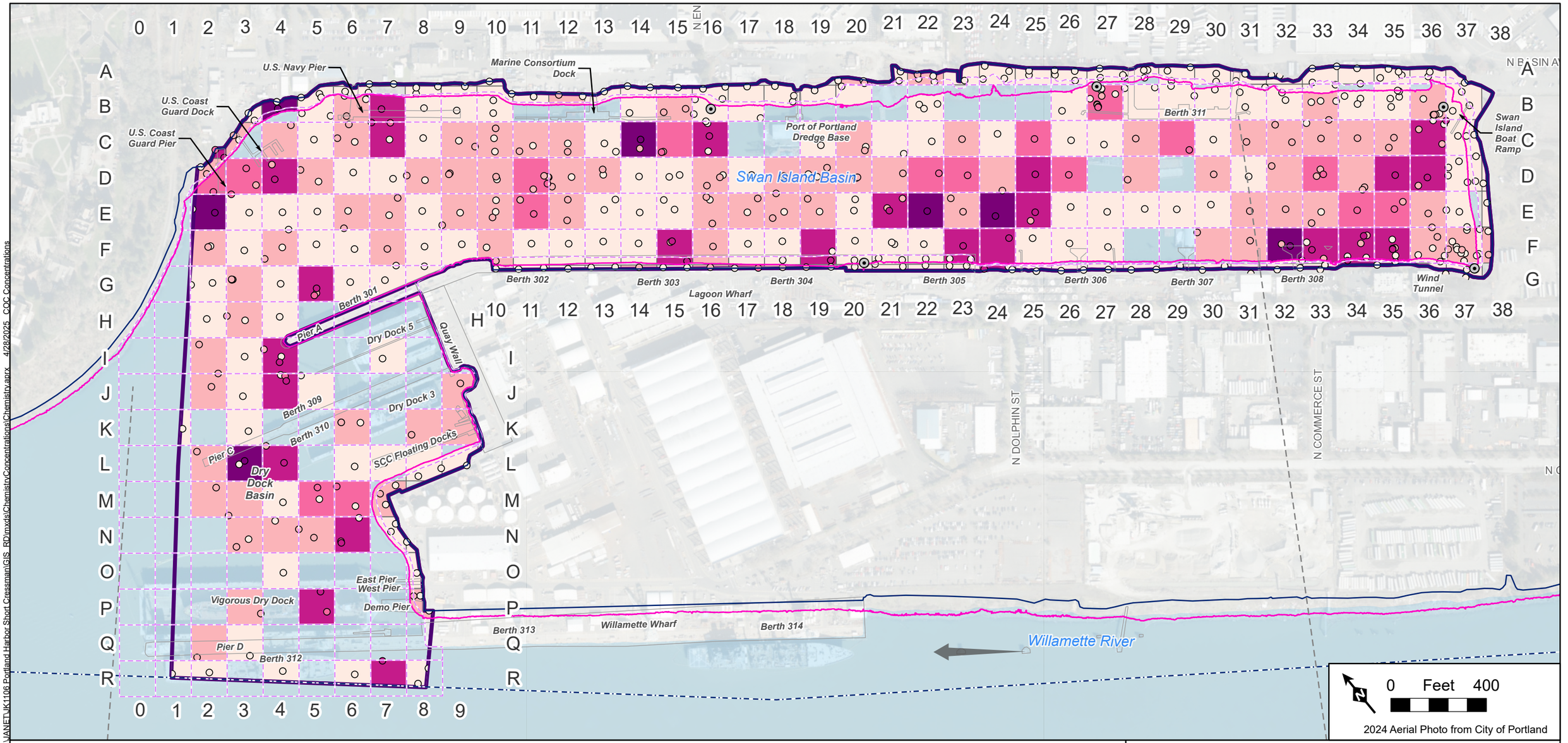

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

Maximum Fluorene concentration (µg/kg) per core
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 2000.0

Maximum Fluorene concentration (µg/kg) per grid cell
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 2000.0

River Flow Direction

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-33

Maximum Concentrations in Sediment and Riverbank Soil - Fluorene

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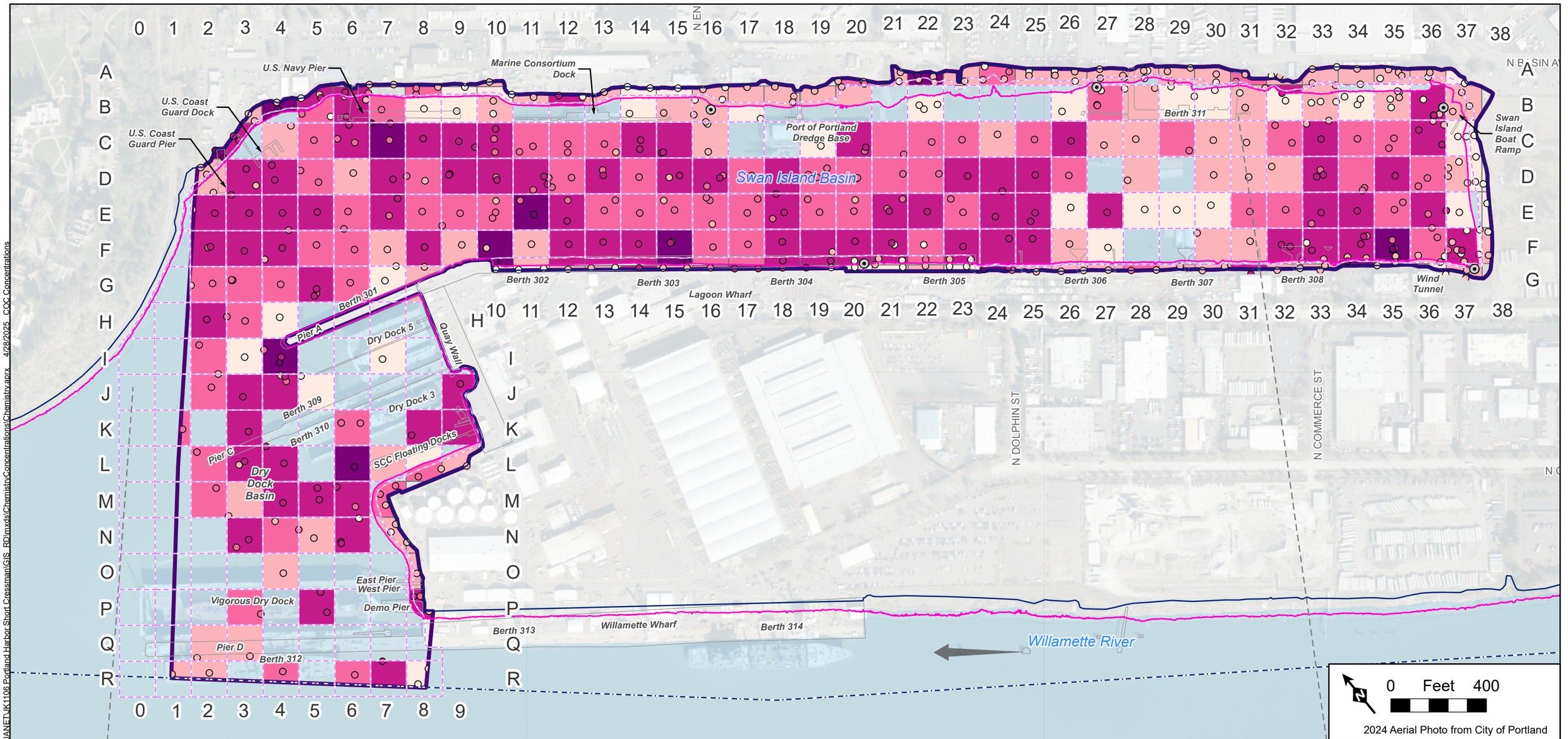
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group



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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Indeno(1,2,3-cd)pyrene concentration (µg/kg) per core
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 10000.0

Maximum Indeno(1,2,3-cd)pyrene concentration (µg/kg) per grid cell
- 0.0 - 10.0
- 10.1 - 50.0
- 50.1 - 100.0
- 100.1 - 500.0
- 500.1 - 10000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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SWAN ISLAND RD INFORMATION - SUBJECT TO JOINT DEFENSE AGREEMENT AND IN ANTICIPATION OF LITIGATION

Figure A-34

Maximum Concentrations in Sediment and Riverbank Soil - Indeno(1,2,3-cd)pyrene

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Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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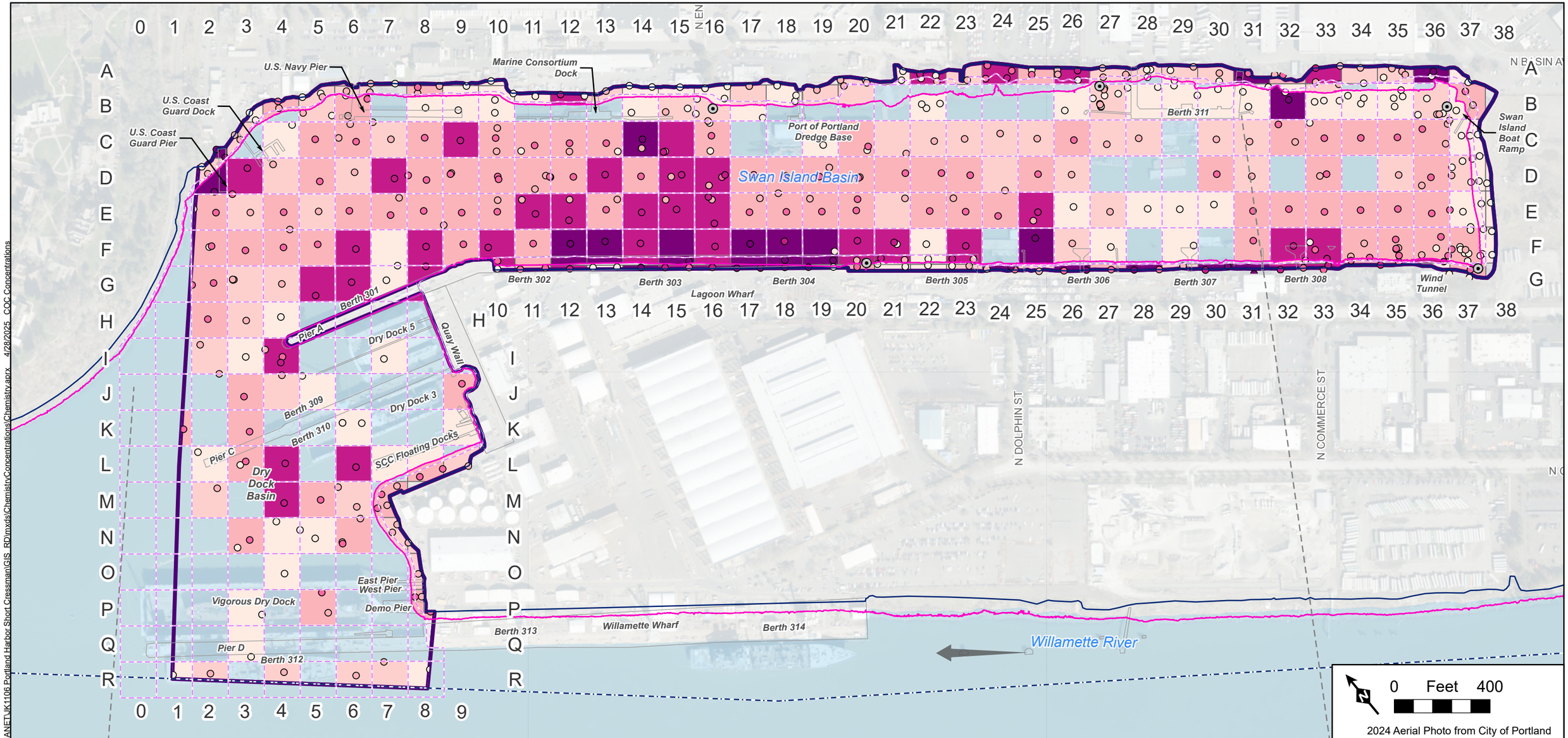

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Lead concentration (µg/kg) per core
- < 24500
- ≥ 24500 to < 49000
- ≥ 49000 to < 98000
- ≥ 98000 to < 196000 (below sediment CUL)
- ≥ 196000

Maximum Lead concentration (µg/kg) per grid cell
- < 24500
- ≥ 24500 to < 49000
- ≥ 49000 to < 98000
- ≥ 98000 to < 196000 (below sediment CUL)
- ≥ 196000

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-35

Maximum Concentrations in Sediment and Riverbank Soil - Lead

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL MOTT MACDONALD COAST & HARBOR ENGINEERING PACIFIC groundwater GROUP BRIDGEWATER GROUP

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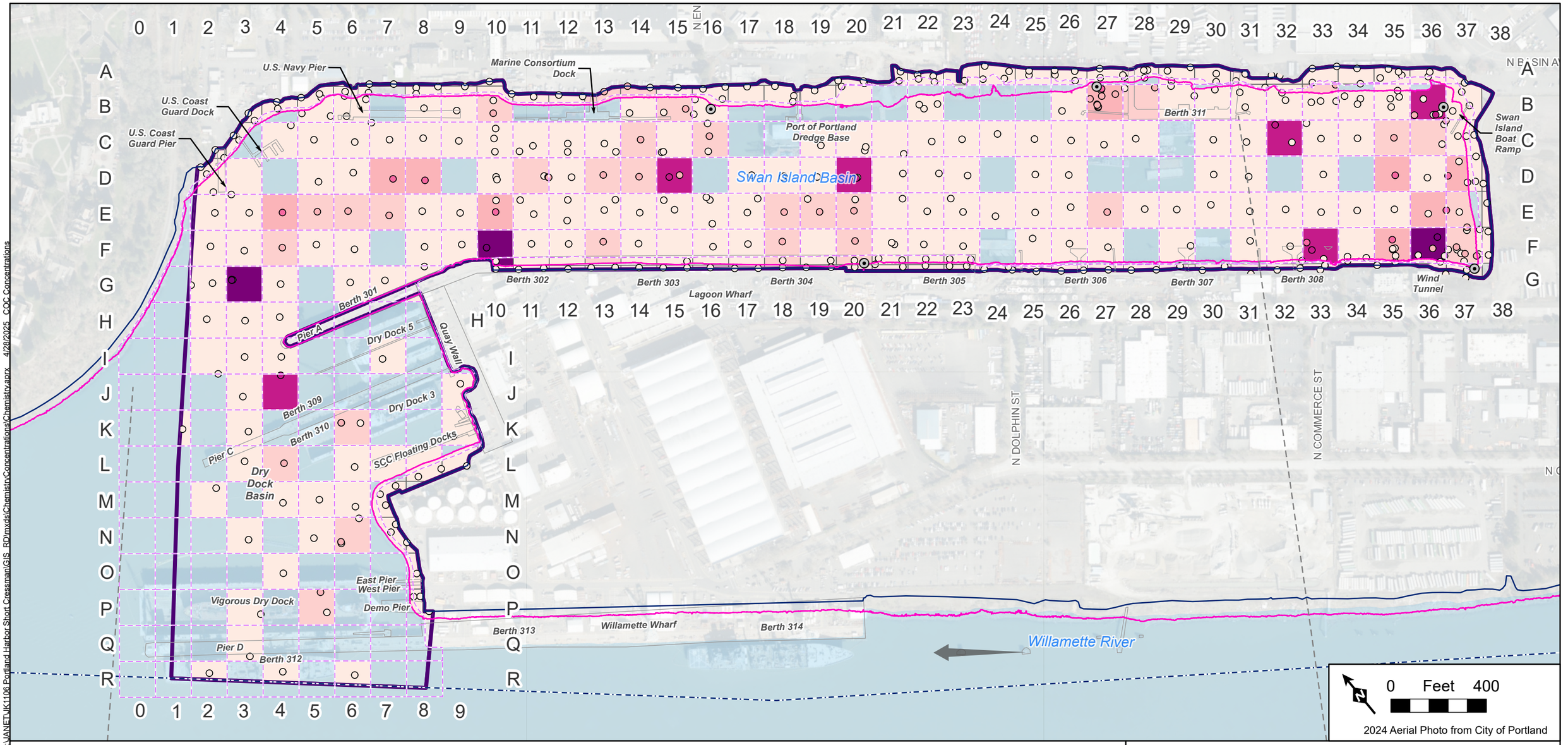

Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Lindane concentration (µg/kg) per core
- < 0.25
- ≥ 0.25 to < 1.0
- ≥ 1.0 to < 2.5
- ≥ 2.5 to < 5.0 (below sediment CUL)
- ≥ 5.0

Maximum Lindane concentration (µg/kg) per grid cell
- < 0.25
- ≥ 0.25 to < 1.0
- ≥ 1.0 to < 2.5
- ≥ 2.5 to < 5.0 (below sediment CUL)
- ≥ 5.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-36

Maximum Concentrations in Sediment and Riverbank Soil - Lindane

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL · Mott MacDonald · Coast & Harbor Engineering · Pacific Groundwater Group · Bridgewater Group

U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Port of Portland Dredge Base
Berth 311
Swan Island Boat Ramp
Swan Island Basin
Berth 302
Berth 303
Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Berth 301
Pier A
Dry Dock 5
Quay Wall
Berth 309
Dry Dock 3
Berth 310
Pier C
SCC Floating Docks
Dry Dock Basin
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Berth 313
Willamette Wharf
Berth 314
Pier D
Berth 312
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AV
0 Feet 400
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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Manganese concentration (µg/kg) per core
- 0.0 - 600000.0
- 600000.1 - 700000.0
- 700000.1 - 800000.0
- 800000.1 - 900000.0
- 900000.1 - 1000000.0

Maximum Manganese concentration (µg/kg) per grid cell
- 0.0 - 600000.0
- 600000.1 - 700000.0
- 700000.1 - 800000.0
- 800000.1 - 900000.0
- 900000.1 - 1000000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-37

Maximum Concentrations in Sediment and Riverbank Soil - Manganese

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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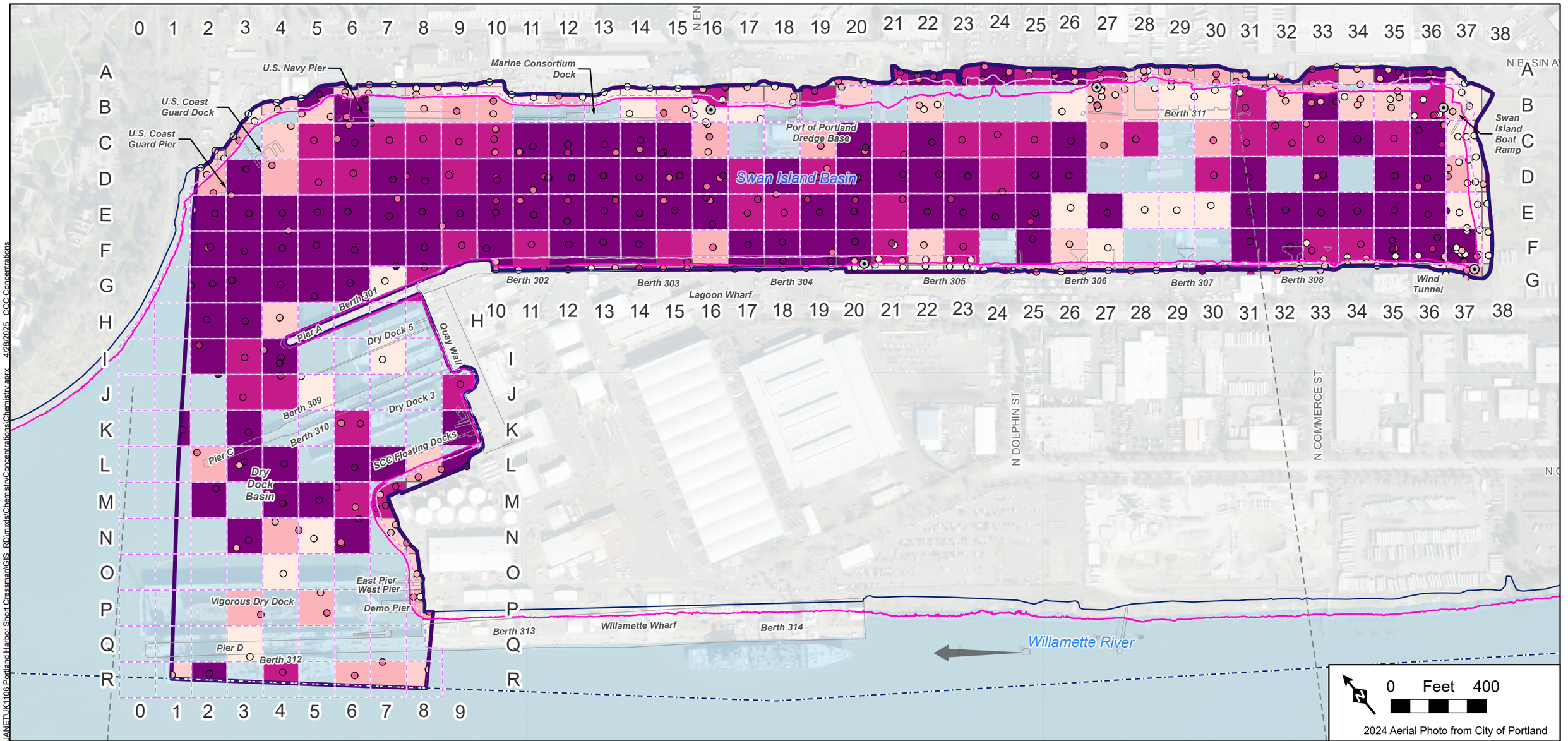

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Mercury concentration (µg/kg) per core
- < 42.5
- ≥ 42.5 to < 85.0 (below sediment CUL)
- ≥ 85.0 to < 170.0
- ≥ 170.0 to < 340.0
- ≥ 340.0

Maximum Mercury concentration (µg/kg) per grid cell
- < 42.5
- ≥ 42.5 to < 85.0 (below sediment CUL)
- ≥ 85.0 to < 170.0
- ≥ 170.0 to < 340.0
- ≥ 340.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-38

Maximum Concentrations in Sediment and Riverbank Soil - Mercury

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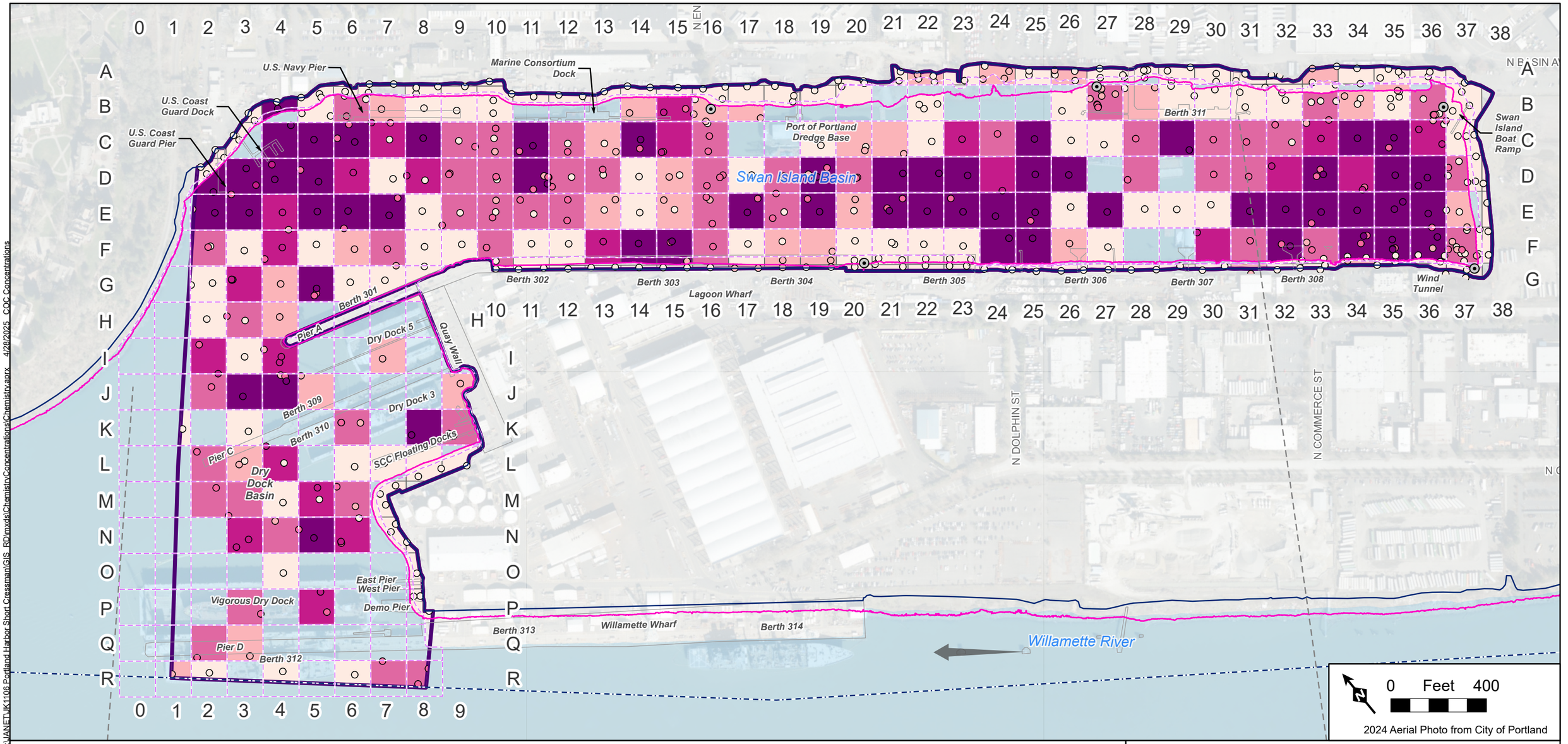
Swan Island Basin Remedial Design Group



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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Naphthalene concentration (µg/kg) per core
- < 1.0
- ≥ 1.0 to < 10.0
- ≥ 10.0 to < 50.0
- ≥ 50.0 to < 100.0
- ≥ 100.0 to < 140000 (below PTW)

Maximum Naphthalene concentration (µg/kg) per grid cell
- < 1.0
- ≥ 1.0 to < 10.0
- ≥ 10.0 to < 50.0
- ≥ 50.0 to < 100.0
- ≥ 100.0 to < 140000 (below PTW)

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
PTW – Principal Threat Waste

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-39

Maximum Concentrations in Sediment and Riverbank Soil - Naphthalene

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Port of Portland Dredge Base
Berth 311
Swan Island Boat Ramp
Swan Island Basin
Berth 302
Berth 303
Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Berth 301
Pier A
Dry Dock 5
Quay Wall
Dry Dock 3
Berth 309
Berth 310
Pier C
Dry Dock Basin
SCC Floating Docks
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Pier D
Berth 312
Berth 313
Willamette Wharf
Berth 314
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AVE

0 Feet 400

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

Maximum Phenanthrene concentration (µg/kg) per core
- 0.0 - 50.0
- 50.1 - 500.0
- 500.1 - 1000.0
- 1000.1 - 10000.0
- 10000.1 - 20000.0

Maximum Phenanthrene concentration (µg/kg) per grid cell
- 0.0 - 50.0
- 50.1 - 500.0
- 500.1 - 1000.0
- 1000.1 - 10000.0
- 10000.1 - 20000.0

River Flow Direction

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-40

Maximum Concentrations in Sediment and Riverbank Soil - Phenanthrene

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Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

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U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Port of Portland Dredge Base
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Swan Island Boat Ramp
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Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
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Dry Dock 3
Berth 309
Berth 310
Pier C
Dry Dock Basin
SCC Floating Docks
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Pier D
Berth 312
Berth 313
Willamette Wharf
Berth 314
Willamette River
N DOLPHIN ST
N COMMERCE ST

0 Feet 400

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Pyrene concentration (µg/kg) per core
- 0.0 - 100.0
- 100.1 - 500.0
- 500.1 - 1000.0
- 1000.1 - 2000.0
- 2000.1 - 30000.0

Maximum Pyrene concentration (µg/kg) per grid cell
- 0.0 - 100.0
- 100.1 - 500.0
- 500.1 - 1000.0
- 1000.1 - 2000.0
- 2000.1 - 30000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-41

Maximum Concentrations in Sediment and Riverbank Soil - Pyrene

Prepared on: 4/28/2025
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Swan Island Basin Remedial Design Group

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U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Port of Portland Dredge Base
Berth 311
Swan Island Boat Ramp
Swan Island Basin
Berth 301
Pier A
Dry Dock 5
Quay Wall
Berth 302
Berth 303
Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Berth 309
Dry Dock 3
Berth 310
Pier C
SCC Floating Docks
Dry Dock Basin
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Berth 313
Willamette Wharf
Berth 314
Pier D
Berth 312
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AV

0 Feet 400

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum TCDD-TEQ (ND=1/2) concentration (µg/kg) per core
- < 0.005
- ≥ 0.005 to < 0.01 (below sediment CUL)
- ≥ 0.01 to < 0.02
- ≥ 0.02 to < 0.04
- ≥ 0.04

Maximum TCDD-TEQ (ND=1/2) concentration (ug/kg) per grid cell
- < 0.005
- ≥ 0.005 to < 0.01 (below sediment CUL)
- ≥ 0.01 to < 0.02
- ≥ 0.02 to < 0.04
- ≥ 0.04

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

CUL – Cleanup Level
ND – non-detect
TCDD – tetrachlorodibenzo-p-dioxin
TEQ – toxicity equivalency quotient

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-42

Maximum Concentrations in Sediment and Riverbank Soil - TCDD-TEQ (ND=1/2)

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL | M Mott MacDonald | Coast & Harbor Engineering | Pacific Groundwater Group | Bridgewater Group

U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Port of Portland Dredge Base
Berth 311
Swan Island Boat Ramp
Swan Island Basin
Berth 302
Berth 303
Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Berth 301
Pier A
Dry Dock 5
Quay Wall
Berth 309
Dry Dock 3
Berth 310
Pier C
SCC Floating Docks
Dry Dock Basin
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Pier D
Berth 312
Berth 313
Willamette Wharf
Berth 314
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AVE

0 Feet 400

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Total Chlordanes concentration (µg/kg) per core
- < 1.4 (below sediment CUL)
- ≥ 1.4 to < 2.8
- ≥ 2.8 to < 5.0
- ≥ 5.0 to < 10.0
- ≥ 10.0

Maximum Total Chlordanes concentration (µg/kg) per grid cell
- < 1.4 (below sediment CUL)
- ≥ 1.4 to < 2.8
- ≥ 2.8 to < 5.0
- ≥ 5.0 to < 10.0
- ≥ 10.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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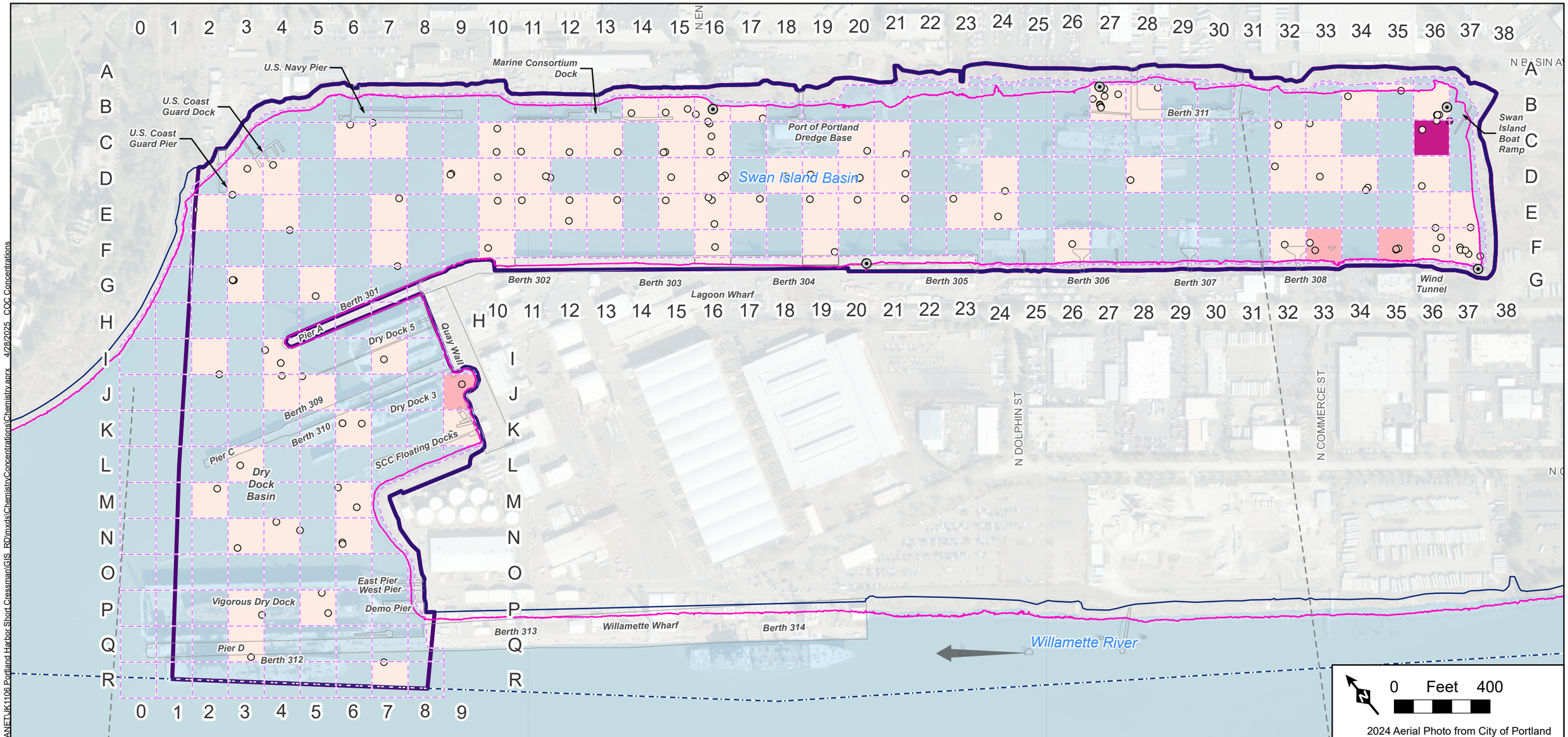
Figure A-43

Maximum Concentrations in Sediment and Riverbank Soil - Total Chlordanes

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL | M Moffatt & Nichol | Coast & Harbor Engineering | Pacific Groundwater Group | Bridgewater Group



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- Project Area Grid
- Federal Navigation Channel (USACE, 2020)
- River Mile (RM)
- Docks and Structures
- Top of Bank
- 13-foot NAVD88 Mean High Water
- Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Total PAHs concentration (µg/kg) per core

- < 11500
- ≥ 11500 to < 23000 (below sediment CUL)
- ≥ 23000 to < 30000 (below RAL)
- ≥ 30000 to < 170000 (below Navigation Channel RAL)
- ≥ 170000

Maximum Total PAHs concentration (µg/kg) per grid cell

- < 11500
- ≥ 11500 to < 23000 (below sediment CUL)
- ≥ 23000 to < 30000 (below RAL)
- ≥ 30000 to < 170000 (below Navigation Channel RAL)
- ≥ 170000

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level
PAHs– polycyclic aromatic hydrocarbons
RAL – Remedial Action Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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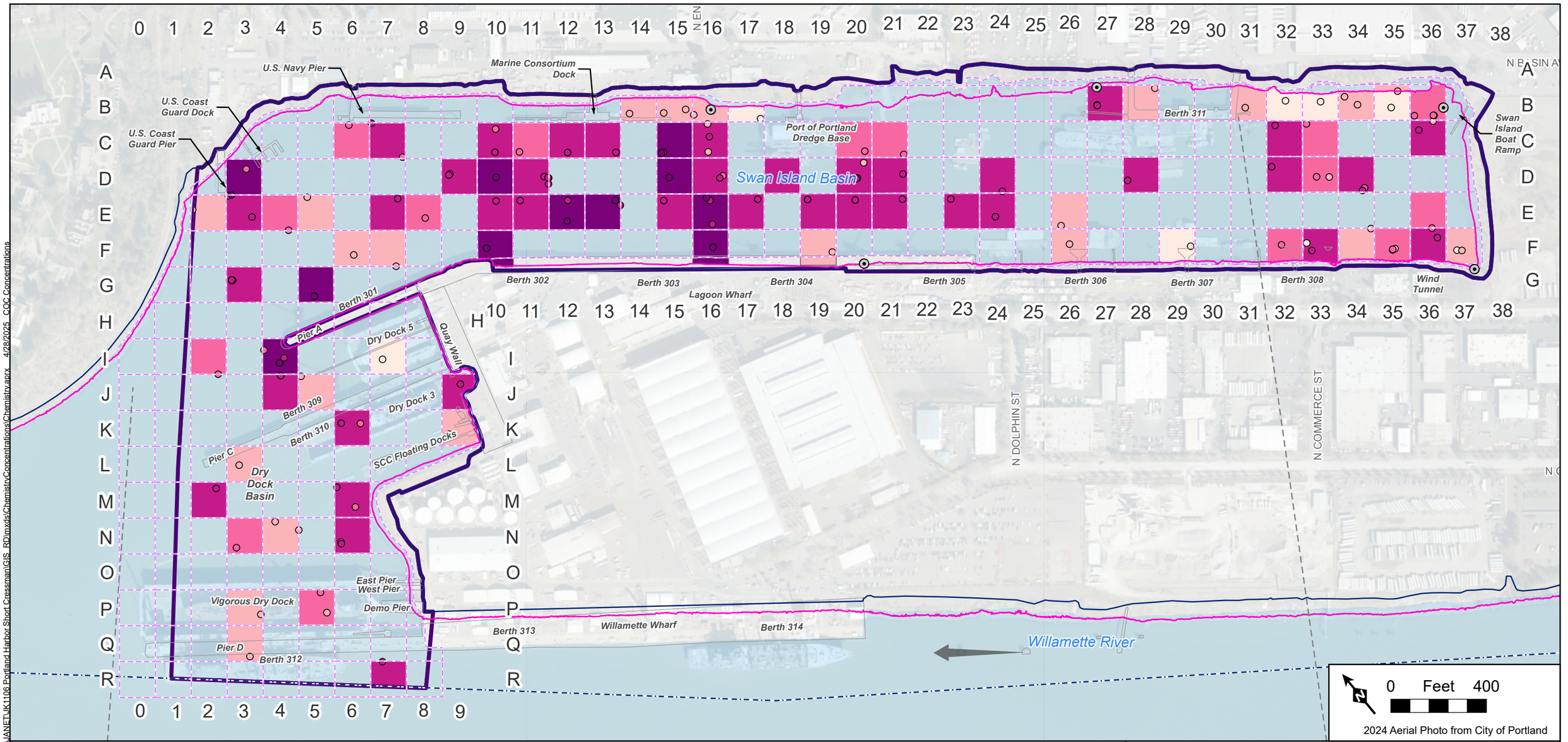
Figure A-44

Maximum Concentrations in Sediment and Riverbank Soil - Total PAHs

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL MOTT MACDONALD COAST & HARBOR ENGINEERING PACIFIC groundwater GROUP BRIDGEWATER GROUP



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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Total PCBs - Aroclors concentration (µg/kg) per core
- < 9.0 (below sediment CUL)
- ≥ 9.0 to < 75.0 (below RAL)
- ≥ 75.0 to < 200 (below PTW)
- ≥ 200.0 to < 1000.0 (below Navigation Channel RAL)
- < 1000.0

Maximum Total PCBs - Aroclors concentration (µg/kg) per grid cell
- < 9.0 (below sediment CUL)
- ≥ 9.0 to < 75.0 (below RAL)
- ≥ 75.0 to < 200 (below PTW)
- ≥ 200.0 to < 1000.0 (below Navigation Channel RAL)
- < 1000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

CUL – Cleanup Level
PCBs– polychlorinated biphenyls
PTW – Principal Threat Waste
RAL – Remedial Action Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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Figure A-45

Maximum Concentrations in Sediment and Riverbank Soil - Total PCBs - Aroclors

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Swan Island Basin Remedial Design Group

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Willamette Wharf
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Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AVE

0 Feet 400

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum TPH-Diesel concentration (µg/kg) per core
- < 91000 (below sediment CUL)
- ≥ 91000 to < 200000
- ≥ 200000 to < 400000
- ≥ 400000 to < 1000000
- ≥ 1000000

Maximum TPH-Diesel concentration (µg/kg) per grid cell
- < 91000 (below sediment CUL)
- ≥ 91000 to < 200000
- ≥ 200000 to < 400000
- ≥ 400000 to < 1000000
- ≥ 1000000

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

CUL – Cleanup Level
TPH – total petroleum hydrocarbon

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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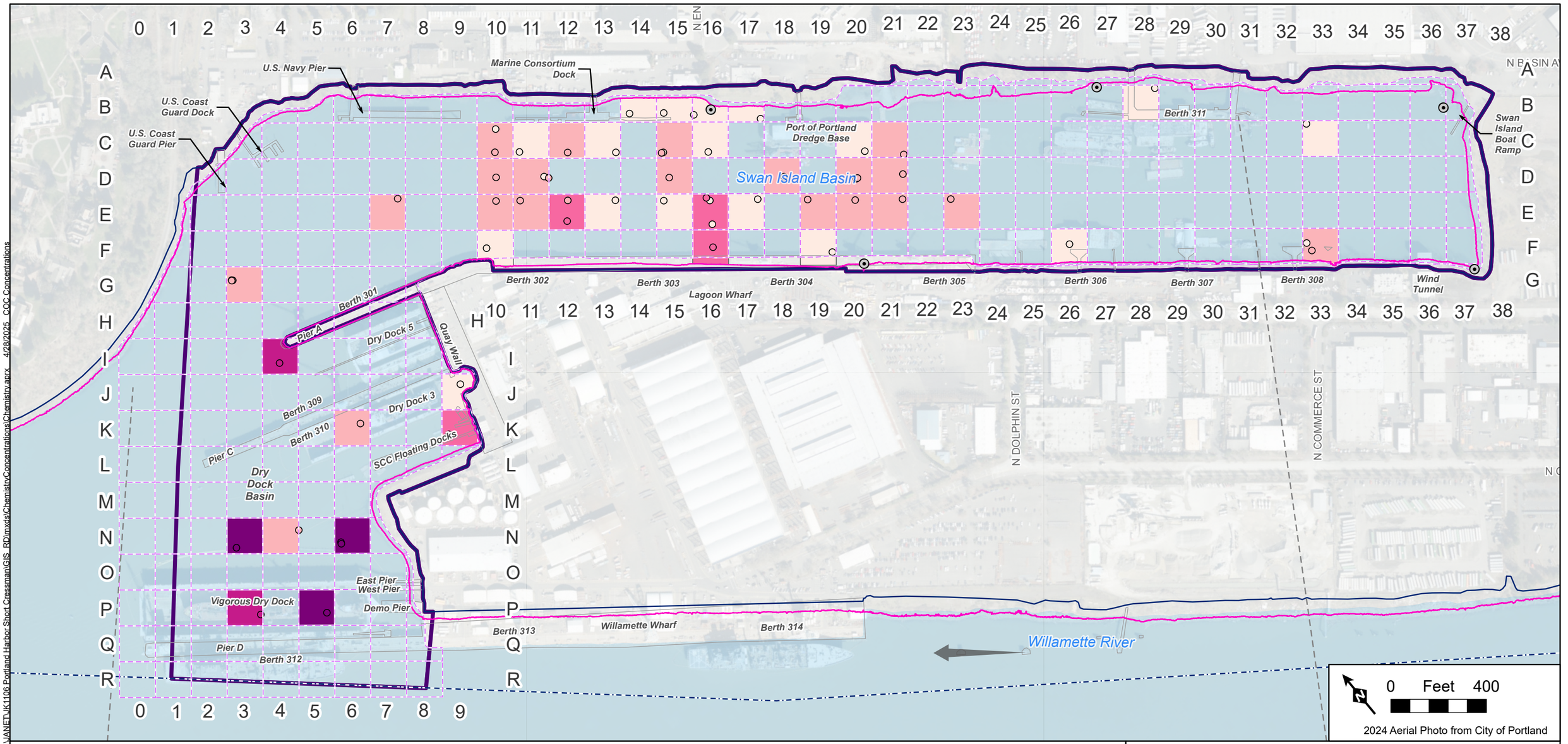
SWAN ISLAND RD INFORMATION - SUBJECT TO JOINT DEFENSE AGREEMENT AND IN ANTICIPATION OF LITIGATION

Figure A-46

Maximum Concentrations in Sediment and Riverbank Soil - TPH-Diesel

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL | M Mott MacDonald | Coast & Harbor Engineering | Pacific Groundwater Group | Bridgewater Group



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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Tributyltin Cation concentration (µg/kg) per core
- < 100
- ≥ 100 to < 1000
- ≥ 1000 to < 3080 (below sediment CUL)
- ≥ 3080 to < 6160
- ≥ 6160

Maximum Tributyltin Cation concentration (µg/kg) per grid cell
- < 100
- ≥ 100 to < 1000
- ≥ 1000 to < 3080 (below sediment CUL)
- ≥ 3080 to < 6160
- ≥ 6160

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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SWAN ISLAND RD INFORMATION - SUBJECT TO JOINT DEFENSE AGREEMENT AND IN ANTICIPATION OF LITIGATION

Figure A-47

Maximum Concentrations in Sediment and Riverbank Soil - Tributyltin

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Port of Portland Dredge Base
Berth 311
Swan Island Boat Ramp
Swan Island Basin
Berth 302
Berth 303
Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Berth 301
Pier A
Dry Dock 5
Quay Wall
Berth 309
Dry Dock 3
Berth 310
Pier C
SCC Floating Docks
Dry Dock Basin
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Berth 313
Willamette Wharf
Berth 314
Pier D
Berth 312
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AV

0 Feet 400

2024 Aerial Photo from City of Portland

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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Vanadium concentration (µg/kg) per core
- 80000.0 - 95000.0
- 95000.1 - 100000.0
- 100000.1 - 105000.0
- 105000.1 - 110000.0
- 110000.1 - 120000.0

Maximum Vanadium concentration (µg/kg) per grid cell
- 80000.0 - 95000.0
- 95000.1 - 100000.0
- 100000.1 - 105000.0
- 105000.1 - 110000.0
- 110000.1 - 120000.0

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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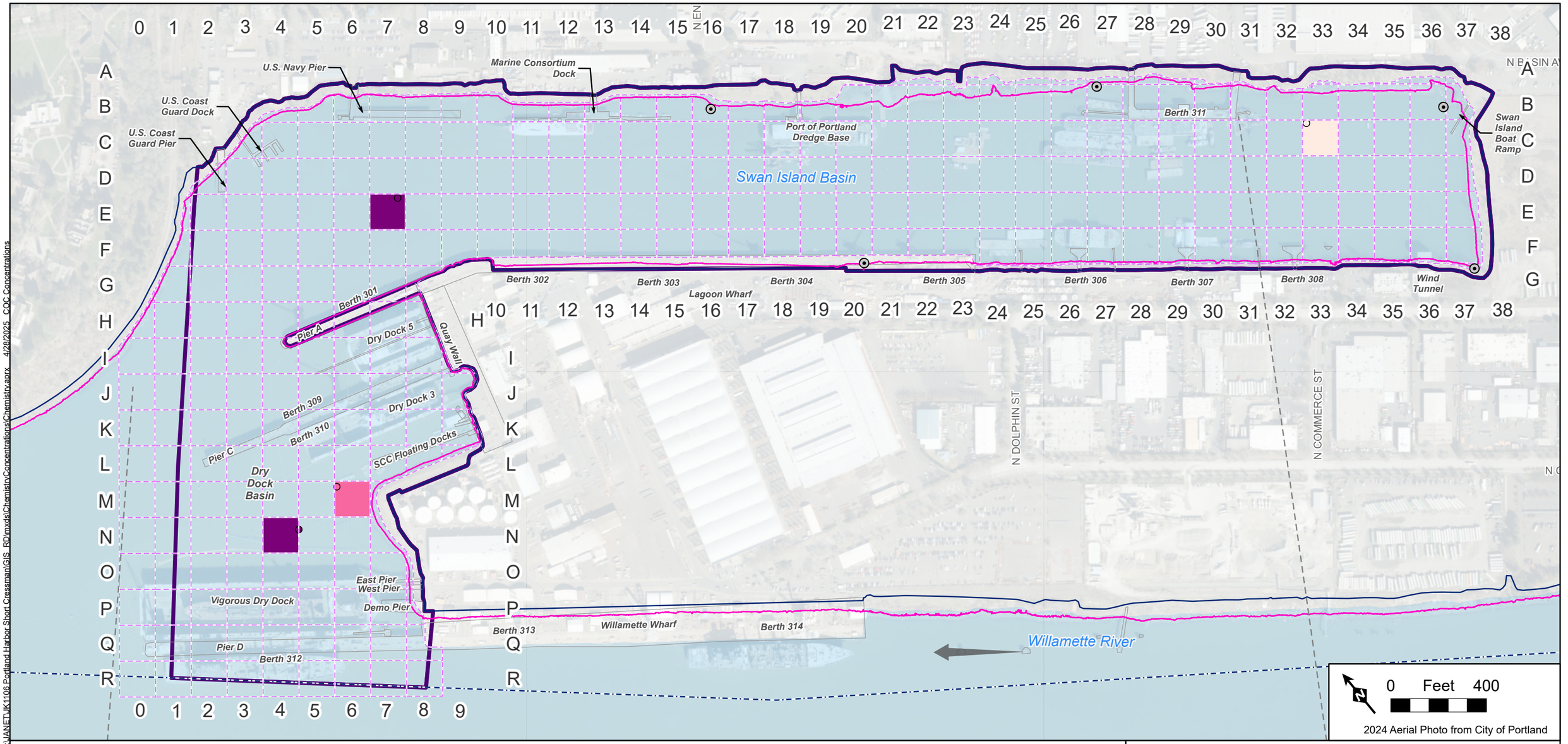
SWAN ISLAND RD INFORMATION - SUBJECT TO JOINT DEFENSE AGREEMENT AND IN ANTICIPATION OF LITIGATION

Figure A-48

Maximum Concentrations in Sediment and Riverbank Soil - Vanadium

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL | M M | COAST & HARBOR ENGINEERING | PACIFIC groundwater GROUP | BRIDGEWATER GROUP



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Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

Maximum Xylenes concentration (µg/kg) per core
- 0.0 - 5.0
- 5.1 - 10.0
- 10.1 - 15.0
- 15.1 - 20.0
- 20.1 - 30.0

Maximum Xylenes concentration (µg/kg) per grid cell
- 0.0 - 5.0
- 5.1 - 10.0
- 10.1 - 15.0
- 15.1 - 20.0
- 20.1 - 30.0

River Flow Direction

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

THIS DRAFT FIGURE IS PRIVILEGED AND CONFIDENTIAL - DISTRIBUTION IS STRICTLY LIMITED
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SWAN ISLAND RD INFORMATION - SUBJECT TO JOINT DEFENSE AGREEMENT AND IN ANTICIPATION OF LITIGATION

Figure A-49

Maximum Concentrations in Sediment and Riverbank Soil - Xylenes

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

U.S. Navy Pier
Marine Consortium Dock
U.S. Coast Guard Dock
U.S. Coast Guard Pier
Port of Portland Dredge Base
Berth 311
Swan Island Boat Ramp
Swan Island Basin
Berth 301
Berth 302
Berth 303
Lagoon Wharf
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
Wind Tunnel
Pier A
Dry Dock 5
Quay Wall
Berth 309
Dry Dock 3
Berth 310
SCC Floating Docks
Pier C
Dry Dock Basin
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Pier D
Berth 312
Berth 313
Willamette Wharf
Berth 314
Willamette River
N DOLPHIN ST
N COMMERCE ST
N BASIN AVE

0 Feet 400

2024 Aerial Photo from City of Portland

Project Area Grid
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Top of Bank
13-foot NAVD88 Mean High Water
Swan Island Basin Project Area Boundary

River Flow Direction

Maximum Zinc concentration (µg/kg) per core
- < 14750
- ≥ 114750 to < 229500
- ≥ 229500 to < 459000 (below sediment CUL)
- ≥ 459000 to < 918000
- ≥ 918000

Maximum Zinc concentration (µg/kg) per grid cell
- < 14750
- ≥ 114750 to < 229500
- ≥ 229500 to < 459000 (below sediment CUL)
- ≥ 459000 to < 918000
- ≥ 918000

Notes:
≥ – Greater than or equal to
< – Less than
NAVD88 – North American Vertical Datum of 1988
SIB – Swan Island Basin
µg/kg – microgram per kilogram
USACE – United States Army Corps of Engineers
CUL – Cleanup Level

For areas with requested navigable depths (RNDs), concentrations shown exclude depths that would be dredged to accommodate RND + 3 foot cap (preliminary design estimate) + 1 foot overdredge allowance/buffer zone.

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SWAN ISLAND RD INFORMATION - SUBJECT TO JOINT DEFENSE AGREEMENT AND IN ANTICIPATION OF LITIGATION

Figure A-50

Maximum Concentrations in Sediment and Riverbank Soil - Zinc

Prepared on: 4/28/2025
Pre-Final 90% RD Cap Design
Swan Island Basin Remedial Design Group

HGL | M | COAST & HARBOR ENGINEERING | PACIFIC groundwater GROUP | BRIDGEWATER GROUP

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ATTACHMENT B

DREDGED INTERVAL CHEMISTRY

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Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
A1-0TO30-102018	Sediment	5.65	N	0	1	1,2,3,4,7,8-HxCDF	0.000082	U	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	1,2,3,4,7,8-HxCDF	0.0076		µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	1,2,3,4,7,8-HxCDF	0.011		µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	1,2,3,4,7,8-HxCDF	0.00106	J	µg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	1,2,3,4,7,8-HxCDF	0.011		µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	1,2,3,4,7,8-HxCDF	0.003	J	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	1,2,3,4,7,8-HxCDF	0.014		µg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	1,2,3,4,7,8-HxCDF	0.017		µg/kg
E-9.02-0TO26-102418	Sediment	2.84	N	0	0.9	1,2,3,4,7,8-HxCDF	0.0086		µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	1,2,3,4,7,8-HxCDF	0.00101	J	µg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	1,2,3,4,7,8-HxCDF	0.0016	J	µg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	1,2,3,4,7,8-HxCDF	0.08		µg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	1,2,3,4,7,8-HxCDF	0.03		µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	1,2,3,4,7,8-HxCDF	0.0086		µg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	1,2,3,4,7,8-HxCDF	0.13		µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	1,2,3,4,7,8-HxCDF	0.0011	U	µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	1,2,3,4,7,8-HxCDF	0.031		µg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	1,2,3,4,7,8-HxCDF	0.0071		µg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	1,2,3,4,7,8-HxCDF	0.000886	J	µg/kg
J3-SC1B-20TO30-82719	Sediment	5.73	N	2	3	1,2,3,4,7,8-HxCDF	0.0023	J	µg/kg
J3-SC1B-30TO40-82719	Sediment	5.73	N	3	4	1,2,3,4,7,8-HxCDF	0.011		µg/kg
J3-SC1B-40TO50-82719	Sediment	5.73	N	4	5	1,2,3,4,7,8-HxCDF	0.00087	J	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	1,2,3,4,7,8-HxCDF	0.02		µg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	1,2,3,4,7,8-HxCDF	0.0057		µg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	1,2,3,4,7,8-HxCDF	0.0032	J	µg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	1,2,3,4,7,8-HxCDF	0.029		µg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	1,2,3,4,7,8-HxCDF	0.017		µg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	1,2,3,4,7,8-HxCDF	0.173		µg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	1,2,3,4,7,8-HxCDF	0.0018	J	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	1,2,3,4,7,8-HxCDF	0.0043		µg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	1,2,3,4,7,8-HxCDF	0.00336	J	µg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	1,2,3,4,7,8-HxCDF	0.0009	J	µg/kg
L3-SC1B-20TO30-82619	Sediment	7.22	N	2	3	1,2,3,4,7,8-HxCDF	0.0091		µg/kg
L3-SC1B-30TO40-82619	Sediment	7.22	N	3	4	1,2,3,4,7,8-HxCDF	0.00082	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	1,2,3,4,7,8-HxCDF	0.0012	J	µg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	1,2,3,4,7,8-HxCDF	0.026		µg/kg
LW2-C426-A	Sediment	6.87	N	0	1	1,2,3,4,7,8-HxCDF	0.00121	J	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	1,2,3,4,7,8-HxCDF	0.000711	J	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	1,2,3,4,7,8-HxCDF	0.001339	J	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	1,2,3,4,7,8-HxCDF	0.00017	U	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	1,2,3,4,7,8-HxCDF	0.003691		µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	1,2,3,4,7,8-HxCDF	0.00104	J	µg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	1,2,3,4,7,8-HxCDF	0.00025	J	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	1,2,3,4,7,8-HxCDF	0.045		µg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	1,2,3,4,7,8-HxCDF	0.069		µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	1,2,3,4,7,8-HxCDF	0.065		µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	1,2,3,4,7,8-HxCDF	0.00064	J	µg/kg
PDI-SC-S188-0TO1.5	Sediment	6.04	N	0	1	1,2,3,4,7,8-HxCDF	0.0052	J	µg/kg
PDI-SC-S191-0TO2	Sediment	6.59	N	0	2	1,2,3,4,7,8-HxCDF	0.0065		µg/kg
PDI-SC-S191-2TO4	Sediment	6.59	N	2	4	1,2,3,4,7,8-HxCDF	0.0092		µg/kg
PDI-SC-S191-4TO6	Sediment	6.59	N	4	6	1,2,3,4,7,8-HxCDF	0.012		µg/kg
PDI-SC-S192-0TO1.5	Sediment	8.19	N	0	1	1,2,3,4,7,8-HxCDF	0.17	J	µg/kg
PDI-SC-S192-1.5TO3	Sediment	8.19	N	1	3	1,2,3,4,7,8-HxCDF	0.12	J	µg/kg
PDI-SC-S192-3TO4.2	Sediment	8.19	N	3	4	1,2,3,4,7,8-HxCDF	0.008		µg/kg
PDI-SC-S229-0TO2	Sediment	2.78	N	0	2	1,2,3,4,7,8-HxCDF	0.012		µg/kg
PDI-SC-S230-0TO2	Sediment	6.26	N	0	2	1,2,3,4,7,8-HxCDF	0.005	J	µg/kg
PDI-SC-S230-2TO4	Sediment	6.26	N	2	4	1,2,3,4,7,8-HxCDF	0.01		µg/kg
PDI-SC-S230-4TO6	Sediment	6.26	N	4	6	1,2,3,4,7,8-HxCDF	0.0046	J	µg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	1,2,3,4,7,8-HxCDF	0.0017	J	µg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	1,2,3,4,7,8-HxCDF	0.00098	J	µg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	1,2,3,4,7,8-HxCDF	0.0017	J	µg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	1,2,3,4,7,8-HxCDF	0.0083		µg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	1,2,3,4,7,8-HxCDF	0.0094		µg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	1,2,3,4,7,8-HxCDF	0.007	J	µg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	1,2,3,4,7,8-HxCDF	0.013	J	µg/kg
PDI-SG-S168	Sediment	11.36	N	0	30	1,2,3,4,7,8-HxCDF	0.001	J	µg/kg
PDI-SG-S175	Sediment	10.83	N	0	30	1,2,3,4,7,8-HxCDF	0.00053	NJ	µg/kg
PDI-SG-S182	Sediment	1.15	N	0	30	1,2,3,4,7,8-HxCDF	0.0037	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SG-S183	Sediment	6.81	N	0	27	1,2,3,4,7,8-HxCDF	0.0048	J	µg/kg
PDI-SG-S184	Sediment	14.30	N	0	28	1,2,3,4,7,8-HxCDF	0.021		µg/kg
PDI-SG-S191	Sediment	5.82	N	0	26	1,2,3,4,7,8-HxCDF	0.0095		µg/kg
PDI-SG-S199	Sediment	7.43	N	0	18	1,2,3,4,7,8-HxCDF	0.0016	J	µg/kg
PDI-SG-S201	Sediment	2.37	N	0	30	1,2,3,4,7,8-HxCDF	0.017		µg/kg
PDI-SG-S204	Sediment	0.96	N	0	17	1,2,3,4,7,8-HxCDF	0.0037		µg/kg
PDI-SG-S211	Sediment	2.21	N	0	30	1,2,3,4,7,8-HxCDF	0.025		µg/kg
PDI-SG-S214	Sediment	14.23	N	0	15	1,2,3,4,7,8-HxCDF	0.00011	U	µg/kg
PDI-SG-S215	Sediment	3.28	N	0	30	1,2,3,4,7,8-HxCDF	0.034	J	µg/kg
PDI-SG-S216	Sediment	1.43	N	0	30	1,2,3,4,7,8-HxCDF	0.02		µg/kg
PDI-SG-S220	Sediment	3.87	N	0	30	1,2,3,4,7,8-HxCDF	0.009		µg/kg
PDI-SG-S223	Sediment	4.48	N	0	23	1,2,3,4,7,8-HxCDF	0.018		µg/kg
PDI-SG-S224	Sediment	4.49	N	0	24	1,2,3,4,7,8-HxCDF	0.0048		µg/kg
PDI-SG-S225	Sediment	1.58	N	0	25	1,2,3,4,7,8-HxCDF	0.0039	NJ	µg/kg
PDI-SG-S229	Sediment	2.55	N	0	28	1,2,3,4,7,8-HxCDF	0.016	J	µg/kg
PDI-SG-S230	Sediment	6.15	N	0	27	1,2,3,4,7,8-HxCDF	0.0092		µg/kg
PDI-SG-S231	Sediment	6.54	N	0	28	1,2,3,4,7,8-HxCDF	0.0093		µg/kg
PDI-SG-S233	Sediment	8.78	N	0	24	1,2,3,4,7,8-HxCDF	0.0084		µg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	1,2,3,4,7,8-HxCDF	0.00014	U	µg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	1,2,3,4,7,8-HxCDF	0.043		µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	1,2,3,4,7,8-HxCDF	0.000362	J	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	1,2,3,4,7,8-HxCDF	1.58	J	pg/g
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	1,2,3,4,7,8-HxCDF	1.68	J	pg/g
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	1,2,3,4,7,8-HxCDF	2.76	J	pg/g
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	1,2,3,4,7,8-HxCDF	0.545	U	pg/g
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	1,2,3,4,7,8-HxCDF	3.99	J	pg/g
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	1,2,3,4,7,8-HxCDF	1.95	J	pg/g
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	1,2,3,4,7,8-HxCDF	1.12	J	pg/g
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	1,2,3,4,7,8-HxCDF	2.51	J	pg/g
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	1,2,3,4,7,8-HxCDF	1.01	J	pg/g
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	1,2,3,4,7,8-HxCDF	8.06		pg/g
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	1,2,3,4,7,8-HxCDF	63.7		pg/g
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	1,2,3,4,7,8-HxCDF	12.9		pg/g
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	1,2,3,4,7,8-HxCDF	3.78	J	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	1,2,3,4,7,8-HxCDF	24.9		pg/g
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	1,2,3,4,7,8-HxCDF	15		pg/g
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	1,2,3,4,7,8-HxCDF	11.4		pg/g
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	1,2,3,4,7,8-HxCDF	6.23		pg/g
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	1,2,3,4,7,8-HxCDF	10		pg/g
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	1,2,3,4,7,8-HxCDF	68.3		pg/g
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	1,2,3,4,7,8-HxCDF	14.3		pg/g
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	1,2,3,4,7,8-HxCDF	24.7		pg/g
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	1,2,3,4,7,8-HxCDF	29.88	J	pg/g
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	1,2,3,4,7,8-HxCDF	0.166	U	pg/g
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	1,2,3,4,7,8-HxCDF	4.28	J	pg/g
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	1,2,3,4,7,8-HxCDF	14.6		pg/g
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	1,2,3,4,7,8-HxCDF	8.69		pg/g
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	1,2,3,4,7,8-HxCDF	12.3		pg/g
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	1,2,3,4,7,8-HxCDF	10.7		pg/g
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	1,2,3,4,7,8-HxCDF	1.83	J	pg/g
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	1,2,3,4,7,8-HxCDF	3.62	J	pg/g
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	1,2,3,4,7,8-HxCDF	8.73	J	pg/g
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	1,2,3,4,7,8-HxCDF	34.4		pg/g
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	1,2,3,4,7,8-HxCDF	0.534	U	pg/g
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	1,2,3,4,7,8-HxCDF	1.39	J	pg/g
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	1,2,3,4,7,8-HxCDF	1.53	J	pg/g
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	1,2,3,4,7,8-HxCDF	53.5		pg/g
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	1,2,3,4,7,8-HxCDF	0.247	U	pg/g
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	1,2,3,4,7,8-HxCDF	0.138	J	pg/g
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	1,2,3,4,7,8-HxCDF	0.233	J	pg/g
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	1,2,3,4,7,8-HxCDF	0.629	J	pg/g
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	1,2,3,4,7,8-HxCDF	2.51	J	pg/g
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	1,2,3,4,7,8-HxCDF	0.408	J	pg/g
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	1,2,3,4,7,8-HxCDF	0.547	J	pg/g
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	1,2,3,4,7,8-HxCDF	0.4	J	pg/g
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	1,2,3,4,7,8-HxCDF	0.162	U	pg/g
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	1,2,3,4,7,8-HxCDF	0.231	U	pg/g
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	1,2,3,4,7,8-HxCDF	0.139	UJ	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	1,2,3,4,7,8-HxCDF	9.21		pg/g
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	1,2,3,4,7,8-HxCDF	0.278	U	pg/g
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	1,2,3,4,7,8-HxCDF	0.171	UJ	pg/g
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	1,2,3,4,7,8-HxCDF	1.23	J	pg/g
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	1,2,3,4,7,8-HxCDF	1.17	J	pg/g
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	1,2,3,4,7,8-HxCDF	3.45	J	pg/g
SIB-098-OHW-1-2-10072022	Sediment	8.22	N	1	2	1,2,3,4,7,8-HxCDF	2.91	J	pg/g
SIB-098-OHW-2-3-10072022	Sediment	8.22	N	2	3	1,2,3,4,7,8-HxCDF	0.438	UJ	pg/g
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	1,2,3,4,7,8-HxCDF	0.192	UJ	pg/g
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	1,2,3,4,7,8-HxCDF	0.222	U	pg/g
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	1,2,3,4,7,8-HxCDF	4.87	J	pg/g
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	1,2,3,4,7,8-HxCDF	0.0819	U	pg/g
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	1,2,3,4,7,8-HxCDF	0.0791	UJ	pg/g
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	1,2,3,4,7,8-HxCDF	1.84	J	pg/g
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	1,2,3,4,7,8-HxCDF	0.152	U	pg/g
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	1,2,3,4,7,8-HxCDF	0.13	U	pg/g
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	1,2,3,4,7,8-HxCDF	0.0384	U	pg/g
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	1,2,3,4,7,8-HxCDF	0.776	J	pg/g
SIB-103-OHW-1-2-10062022	Sediment	3.26	N	1	2	1,2,3,4,7,8-HxCDF	0.045	UJ	pg/g
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	1,2,3,4,7,8-HxCDF	0.357	U	pg/g
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	1,2,3,4,7,8-HxCDF	1.45	J	pg/g
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	1,2,3,4,7,8-HxCDF	4.76	J	pg/g
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	1,2,3,4,7,8-HxCDF	3.01	J	pg/g
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	1,2,3,4,7,8-HxCDF	3.38	J	pg/g
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	1,2,3,4,7,8-HxCDF	4.7	J	pg/g
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	1,2,3,4,7,8-HxCDF	1.45	U	pg/g
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	1,2,3,4,7,8-HxCDF	0.121	U	pg/g
SIB-110-MLW-1-2-10052022	Sediment	7.81	N	1	2	1,2,3,4,7,8-HxCDF	0.0332	UJ	pg/g
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	1,2,3,4,7,8-HxCDF	13.1		pg/g
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	1,2,3,4,7,8-HxCDF	34		pg/g
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	1,2,3,4,7,8-HxCDF	0.85	J	pg/g
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	1,2,3,4,7,8-HxCDF	0.292	U	pg/g
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	1,2,3,4,7,8-HxCDF	1.535	J	pg/g
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	1,2,3,4,7,8-HxCDF	7.33	J	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	1,2,3,4,7,8-HxCDF	0.512	U	pg/g
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	1,2,3,4,7,8-HxCDF	3.41	J	pg/g
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	1,2,3,4,7,8-HxCDF	1.63	J	pg/g
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	1,2,3,4,7,8-HxCDF	4.395	J	pg/g
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	1,2,3,4,7,8-HxCDF	2.6	J	pg/g
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	1,2,3,4,7,8-HxCDF	2.34	J	pg/g
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	1,2,3,4,7,8-HxCDF	0.0935	U	pg/g
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	1,2,3,4,7,8-HxCDF	0.13	U	pg/g
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	1,2,3,4,7,8-HxCDF	0.151	U	pg/g
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	1,2,3,4,7,8-HxCDF	0.177	U	pg/g
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	1,2,3,4,7,8-HxCDF	0.188	U	pg/g
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	1,2,3,4,7,8-HxCDF	0.345	U	pg/g
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	1,2,3,4,7,8-HxCDF	0.186	UJ	pg/g
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	1,2,3,4,7,8-HxCDF	0.167	U	pg/g
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	1,2,3,4,7,8-HxCDF	0.134	U	pg/g
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	1,2,3,4,7,8-HxCDF	0.176	U	pg/g
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	1,2,3,4,7,8-HxCDF	0.189	U	pg/g
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	1,2,3,4,7,8-HxCDF	0.282	U	pg/g
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	1,2,3,4,7,8-HxCDF	0.203	U	pg/g
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	1,2,3,4,7,8-HxCDF	0.375	U	pg/g
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	1,2,3,4,7,8-HxCDF	0.165	U	pg/g
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	1,2,3,4,7,8-HxCDF	0.117	U	pg/g
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	1,2,3,4,7,8-HxCDF	0.147	U	pg/g
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	1,2,3,4,7,8-HxCDF	0.275	U	pg/g
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	1,2,3,4,7,8-HxCDF	0.235	U	pg/g
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	1,2,3,4,7,8-HxCDF	0.154	U	pg/g
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	1,2,3,4,7,8-HxCDF	0.138	U	pg/g
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	1,2,3,4,7,8-HxCDF	0.266	U	pg/g
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	1,2,3,4,7,8-HxCDF	0.155	U	pg/g
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	1,2,3,4,7,8-HxCDF	0.13	U	pg/g
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	1,2,3,4,7,8-HxCDF	0.199	U	pg/g
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	1,2,3,4,7,8-HxCDF	0.135	U	pg/g
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	1,2,3,4,7,8-HxCDF	0.15	J	pg/g
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	1,2,3,4,7,8-HxCDF	0.137	U	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	1,2,3,4,7,8-HxCDF	0.122	U	pg/g
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	1,2,3,4,7,8-HxCDF	0.218	U	pg/g
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	1,2,3,4,7,8-HxCDF	0.176	J	pg/g
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	1,2,3,4,7,8-HxCDF	0.175	U	pg/g
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	1,2,3,4,7,8-HxCDF	0.174	U	pg/g
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	1,2,3,4,7,8-HxCDF	0.18	U	pg/g
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	1,2,3,4,7,8-HxCDF	0.215	U	pg/g
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	1,2,3,4,7,8-HxCDF	0.138	U	pg/g
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	1,2,3,4,7,8-HxCDF	0.26	U	pg/g
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	1,2,3,4,7,8-HxCDF	0.14	U	pg/g
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	1,2,3,4,7,8-HxCDF	0.115	U	pg/g
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	1,2,3,4,7,8-HxCDF	0.143	U	pg/g
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	1,2,3,4,7,8-HxCDF	0.102	U	pg/g
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	1,2,3,4,7,8-HxCDF	0.161	U	pg/g
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	1,2,3,4,7,8-HxCDF	12.7		pg/g
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	1,2,3,4,7,8-HxCDF	1.53	J	pg/g
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	1,2,3,4,7,8-HxCDF	6.51		pg/g
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	1,2,3,4,7,8-HxCDF	3.96	J	pg/g
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	1,2,3,4,7,8-HxCDF	0.22	U	pg/g
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	1,2,3,4,7,8-HxCDF	0.191	UJ	pg/g
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	1,2,3,4,7,8-HxCDF	5.17	J	pg/g
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	1,2,3,4,7,8-HxCDF	3.08	J	pg/g
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	1,2,3,4,7,8-HxCDF	6.57		pg/g
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	1,2,3,4,7,8-HxCDF	0.205	U	pg/g
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	1,2,3,4,7,8-HxCDF	0.113	U	pg/g
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	1,2,3,4,7,8-HxCDF	10.9		pg/g
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	1,2,3,4,7,8-HxCDF	9.72	J	pg/g
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	1,2,3,4,7,8-HxCDF	7.575		pg/g
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	1,2,3,4,7,8-HxCDF	14.3		pg/g
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	1,2,3,4,7,8-HxCDF	12.4		pg/g
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	1,2,3,4,7,8-HxCDF	13.9		pg/g
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	1,2,3,4,7,8-HxCDF	21.8		pg/g
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	1,2,3,4,7,8-HxCDF	19.7		pg/g
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	1,2,3,4,7,8-HxCDF	14.8		pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C25-0-1-07/23/2022	Sediment	4.21	N	0	1	1,2,3,4,7,8-HxCDF	18.7		pg/g
SIB-SC-C25-1-2-07/23/2022	Sediment	4.21	N	1	2	1,2,3,4,7,8-HxCDF	13		pg/g
SIB-SC-C25-2-3-07/23/2022	Sediment	4.21	N	2	3	1,2,3,4,7,8-HxCDF	3.48	J	pg/g
SIB-SC-C25-3-4-07/23/2022	Sediment	4.21	N	3	4	1,2,3,4,7,8-HxCDF	23.9		pg/g
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	1,2,3,4,7,8-HxCDF	10.3		pg/g
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	1,2,3,4,7,8-HxCDF	16.2		pg/g
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	1,2,3,4,7,8-HxCDF	6.32		pg/g
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	1,2,3,4,7,8-HxCDF	3.65	J	pg/g
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	1,2,3,4,7,8-HxCDF	16		pg/g
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	1,2,3,4,7,8-HxCDF	7.13		pg/g
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	1,2,3,4,7,8-HxCDF	13.5		pg/g
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	1,2,3,4,7,8-HxCDF	9.4		pg/g
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	1,2,3,4,7,8-HxCDF	27.3		pg/g
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	1,2,3,4,7,8-HxCDF	2.23	J	pg/g
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	1,2,3,4,7,8-HxCDF	6.12		pg/g
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	1,2,3,4,7,8-HxCDF	6.77		pg/g
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	1,2,3,4,7,8-HxCDF	8.13		pg/g
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	1,2,3,4,7,8-HxCDF	1.65	J	pg/g
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	1,2,3,4,7,8-HxCDF	0.625	J	pg/g
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	1,2,3,4,7,8-HxCDF	5.43		pg/g
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	1,2,3,4,7,8-HxCDF	5.3		pg/g
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	1,2,3,4,7,8-HxCDF	7.57		pg/g
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	1,2,3,4,7,8-HxCDF	0.265	UJ	pg/g
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	1,2,3,4,7,8-HxCDF	0.144	U	pg/g
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	1,2,3,4,7,8-HxCDF	0.447	U	pg/g
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	1,2,3,4,7,8-HxCDF	3.08	J	pg/g
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	1,2,3,4,7,8-HxCDF	0.319	U	pg/g
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	1,2,3,4,7,8-HxCDF	23.5		pg/g
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	1,2,3,4,7,8-HxCDF	15.7		pg/g
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	1,2,3,4,7,8-HxCDF	10.3		pg/g
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	1,2,3,4,7,8-HxCDF	3.75	J	pg/g
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	1,2,3,4,7,8-HxCDF	9.22		pg/g
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	1,2,3,4,7,8-HxCDF	9.27		pg/g
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	1,2,3,4,7,8-HxCDF	5.12		pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	1,2,3,4,7,8-HxCDF	2.26	J	pg/g
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	1,2,3,4,7,8-HxCDF	1.49	J	pg/g
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	1,2,3,4,7,8-HxCDF	8.3		pg/g
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	1,2,3,4,7,8-HxCDF	7.09		pg/g
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	1,2,3,4,7,8-HxCDF	7.91		pg/g
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	1,2,3,4,7,8-HxCDF	0.216	U	pg/g
SIB-SC-E25-1-2-07/23/2022	Sediment	3.42	N	1	2	1,2,3,4,7,8-HxCDF	6.4		pg/g
SIB-SC-E25-2-3-07/23/2022	Sediment	3.42	N	2	3	1,2,3,4,7,8-HxCDF	2.84	J	pg/g
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	1,2,3,4,7,8-HxCDF	8.21		pg/g
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	1,2,3,4,7,8-HxCDF	13.2		pg/g
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	1,2,3,4,7,8-HxCDF	2.92	J	pg/g
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	1,2,3,4,7,8-HxCDF	0.213	U	pg/g
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	1,2,3,4,7,8-HxCDF	0.124	U	pg/g
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	1,2,3,4,7,8-HxCDF	13.3		pg/g
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	1,2,3,4,7,8-HxCDF	0.438	U	pg/g
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	1,2,3,4,7,8-HxCDF	3.77	J	pg/g
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	1,2,3,4,7,8-HxCDF	0.339	U	pg/g
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	1,2,3,4,7,8-HxCDF	0.165	U	pg/g
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	1,2,3,4,7,8-HxCDF	2.81	J	pg/g
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	1,2,3,4,7,8-HxCDF	8.03		pg/g
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	1,2,3,4,7,8-HxCDF	24.2		pg/g
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	1,2,3,4,7,8-HxCDF	3.36	J	pg/g
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	1,2,3,4,7,8-HxCDF	3.87	J	pg/g
SIB-SC-E30-1-2-07/23/2022	Sediment	7.41	N	1	2	1,2,3,4,7,8-HxCDF	13.9		pg/g
SIB-SC-E30-2-3-07/23/2022	Sediment	7.41	N	2	3	1,2,3,4,7,8-HxCDF	12.9		pg/g
SIB-SC-E30-3-4-07/23/2022	Sediment	7.41	N	3	4	1,2,3,4,7,8-HxCDF	10.9		pg/g
SIB-SC-E30-4-5-07/23/2022	Sediment	7.41	N	4	5	1,2,3,4,7,8-HxCDF	8.7		pg/g
SIB-SC-E30-5-6-07/23/2022	Sediment	7.41	N	5	6	1,2,3,4,7,8-HxCDF	5.25		pg/g
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	1,2,3,4,7,8-HxCDF	9.94	J	pg/g
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	1,2,3,4,7,8-HxCDF	4.76	J	pg/g
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	1,2,3,4,7,8-HxCDF	11.2		pg/g
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	1,2,3,4,7,8-HxCDF	44.2	J	pg/g
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	1,2,3,4,7,8-HxCDF	4.61	J	pg/g
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	1,2,3,4,7,8-HxCDF	37.2		pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	1,2,3,4,7,8-HxCDF	6.35	J	pg/g
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	1,2,3,4,7,8-HxCDF	61.1		pg/g
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	1,2,3,4,7,8-HxCDF	10.3		pg/g
SIB-SC-F21-1-2-07/24/2022	Sediment	3.89	N	1	2	1,2,3,4,7,8-HxCDF	93.15	J	pg/g
SIB-SC-F21-2-3-07/24/2022	Sediment	3.89	N	2	3	1,2,3,4,7,8-HxCDF	26.4	J	pg/g
SIB-SC-F22-1-2-08/17/2022	Sediment	3.66	N	1	2	1,2,3,4,7,8-HxCDF	23.1		pg/g
SIB-SC-F22-2-3-08/17/2022	Sediment	3.66	N	2	3	1,2,3,4,7,8-HxCDF	10.565	J	pg/g
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	1,2,3,4,7,8-HxCDF	6.81		pg/g
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	1,2,3,4,7,8-HxCDF	0.293	UJ	pg/g
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	1,2,3,4,7,8-HxCDF	0.238	J	pg/g
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	1,2,3,4,7,8-HxCDF	0.419	J	pg/g
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	1,2,3,4,7,8-HxCDF	7.11		pg/g
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	1,2,3,4,7,8-HxCDF	1.26	J	pg/g
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	1,2,3,4,7,8-HxCDF	6.13		pg/g
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	1,2,3,4,7,8-HxCDF	4.72	J	pg/g
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	1,2,3,4,7,8-HxCDF	6.61	J	pg/g
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	1,2,3,4,7,8-HxCDF	6.35	J	pg/g
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	1,2,3,4,7,8-HxCDF	6.39		pg/g
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	1,2,3,4,7,8-HxCDF	1.67	J	pg/g
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	1,2,3,4,7,8-HxCDF	1.78	J	pg/g
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	1,2,3,4,7,8-HxCDF	1.29	J	pg/g
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	1,2,3,4,7,8-HxCDF	7.88		pg/g
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	1,2,3,4,7,8-HxCDF	6.52		pg/g
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	1,2,3,4,7,8-HxCDF	35.1		pg/g
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	1,2,3,4,7,8-HxCDF	7.68		pg/g
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	1,2,3,4,7,8-HxCDF	29.9		pg/g
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	1,2,3,4,7,8-HxCDF	12.4	J	pg/g
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	1,2,3,4,7,8-HxCDF	18.7	J	pg/g
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	1,2,3,4,7,8-HxCDF	0.248	U	pg/g
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	1,2,3,4,7,8-HxCDF	0.15	U	pg/g
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	1,2,3,4,7,8-HxCDF	18.6		pg/g
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	1,2,3,4,7,8-HxCDF	1.65	J	pg/g
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	1,2,3,4,7,8-HxCDF	0.215	U	pg/g
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	1,2,3,4,7,8-HxCDF	0.174	U	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	1,2,3,4,7,8-HxCDF	0.136	U	pg/g
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	1,2,3,4,7,8-HxCDF	0.115	U	pg/g
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	1,2,3,4,7,8-HxCDF	2.36	J	pg/g
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	1,2,3,4,7,8-HxCDF	21.1		pg/g
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	1,2,3,4,7,8-HxCDF	40.2		pg/g
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	1,2,3,4,7,8-HxCDF	48.8		pg/g
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	1,2,3,4,7,8-HxCDF	37.3		pg/g
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	1,2,3,4,7,8-HxCDF	1.86	J	pg/g
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	1,2,3,4,7,8-HxCDF	0.271	J	pg/g
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	1,2,3,4,7,8-HxCDF	0.17	J	pg/g
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	1,2,3,4,7,8-HxCDF	0.106	U	pg/g
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	1,2,3,4,7,8-HxCDF	25.2		pg/g
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	1,2,3,4,7,8-HxCDF	3.77	J	pg/g
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	1,2,3,4,7,8-HxCDF	13.9		pg/g
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	1,2,3,4,7,8-HxCDF	7.99		pg/g
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	1,2,3,4,7,8-HxCDF	7.17		pg/g
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	1,2,3,4,7,8-HxCDF	6.31		pg/g
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	1,2,3,4,7,8-HxCDF	1.13	U	pg/g
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	1,2,3,4,7,8-HxCDF	0.342	U	pg/g
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	1,2,3,4,7,8-HxCDF	5.64		pg/g
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	1,2,3,4,7,8-HxCDF	9.26		pg/g
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	1,2,3,4,7,8-HxCDF	22.2		pg/g
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	1,2,3,4,7,8-HxCDF	18		pg/g
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	1,2,3,4,7,8-HxCDF	21.7		pg/g
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	1,2,3,4,7,8-HxCDF	13		pg/g
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	1,2,3,4,7,8-HxCDF	18		pg/g
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	1,2,3,4,7,8-HxCDF	1.54	U	pg/g
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	1,2,3,4,7,8-HxCDF	0.641	U	pg/g
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	1,2,3,4,7,8-HxCDF	14.7		pg/g
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	1,2,3,4,7,8-HxCDF	0.575	J	pg/g
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	1,2,3,4,7,8-HxCDF	0.442	U	pg/g
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	1,2,3,4,7,8-HxCDF	92.6	J	pg/g
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	1,2,3,4,7,8-HxCDF	37.2	J	pg/g
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	1,2,3,4,7,8-HxCDF	48.6		pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	1,2,3,4,7,8-HxCDF	62.1		pg/g
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	1,2,3,4,7,8-HxCDF	27.8		pg/g
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	1,2,3,4,7,8-HxCDF	1.08	J	pg/g
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	1,2,3,4,7,8-HxCDF	10.8		pg/g
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	1,2,3,4,7,8-HxCDF	115		pg/g
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	1,2,3,4,7,8-HxCDF	10.4		pg/g
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	1,2,3,4,7,8-HxCDF	7.97		pg/g
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	1,2,3,4,7,8-HxCDF	14.7		pg/g
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	1,2,3,4,7,8-HxCDF	22.7		pg/g
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	1,2,3,4,7,8-HxCDF	13.1		pg/g
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	1,2,3,4,7,8-HxCDF	44.1		pg/g
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	1,2,3,4,7,8-HxCDF	5.29		pg/g
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	1,2,3,4,7,8-HxCDF	2.34	J	pg/g
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	1,2,3,4,7,8-HxCDF	6.76		pg/g
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	1,2,3,4,7,8-HxCDF	1.36	J	pg/g
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	1,2,3,4,7,8-HxCDF	9.45		pg/g
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	1,2,3,4,7,8-HxCDF	2.81	J	pg/g
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	1,2,3,4,7,8-HxCDF	8.86		pg/g
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	1,2,3,4,7,8-HxCDF	7.95		pg/g
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	1,2,3,4,7,8-HxCDF	18.5		pg/g
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	1,2,3,4,7,8-HxCDF	0.111	U	pg/g
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	1,2,3,4,7,8-HxCDF	1.86	J	pg/g
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	1,2,3,4,7,8-HxCDF	0.159	U	pg/g
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	1,2,3,4,7,8-HxCDF	0.0826	UJ	pg/g
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	1,2,3,4,7,8-HxCDF	0.103	UJ	pg/g
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	1,2,3,4,7,8-HxCDF	6.11		pg/g
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	1,2,3,4,7,8-HxCDF	12.7		pg/g
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	1,2,3,4,7,8-HxCDF	1.14	J	pg/g
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	1,2,3,4,7,8-HxCDF	0.64	J	pg/g
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	1,2,3,4,7,8-HxCDF	0.184	U	pg/g
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	1,2,3,4,7,8-HxCDF	2.14	J	pg/g
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	1,2,3,4,7,8-HxCDF	3.69	J	pg/g
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	1,2,3,4,7,8-HxCDF	5.84		pg/g
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	1,2,3,4,7,8-HxCDF	0.169	U	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	1,2,3,4,7,8-HxCDF	0.219	U	pg/g
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	1,2,3,4,7,8-HxCDF	0.298	J	pg/g
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	1,2,3,4,7,8-HxCDF	0.119	U	pg/g
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	1,2,3,4,7,8-HxCDF	0.222	U	pg/g
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	1,2,3,4,7,8-HxCDF	1.97	J	pg/g
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	1,2,3,4,7,8-HxCDF	1.82	J	pg/g
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	1,2,3,4,7,8-HxCDF	0.36	U	pg/g
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	1,2,3,4,7,8-HxCDF	0.12	U	pg/g
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	1,2,3,4,7,8-HxCDF	0.212	U	pg/g
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	1,2,3,4,7,8-HxCDF	0.259	UJ	pg/g
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	1,2,3,4,7,8-HxCDF	0.237	U	pg/g
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	1,2,3,4,7,8-HxCDF	0.299	U	pg/g
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	1,2,3,4,7,8-HxCDF	0.333	UJ	pg/g
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	1,2,3,4,7,8-HxCDF	0.257	UJ	pg/g
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	1,2,3,4,7,8-HxCDF	1.48	J	pg/g
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	1,2,3,4,7,8-HxCDF	2.78	J	pg/g
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	1,2,3,4,7,8-HxCDF	3.38	J	pg/g
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	1,2,3,4,7,8-HxCDF	1.44	J	pg/g
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	1,2,3,4,7,8-HxCDF	0.184	U	pg/g
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	1,2,3,4,7,8-HxCDF	1.64	J	pg/g
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	1,2,3,4,7,8-HxCDF	3.22	J	pg/g
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	1,2,3,4,7,8-HxCDF	7.44		pg/g
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	1,2,3,4,7,8-HxCDF	4.59	J	pg/g
T1-0TO30-101518	Sediment	5.81	N	0	1	1,2,3,4,7,8-HxCDF	0.00014	UJ	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	1,2,3,4,7,8-HxCDF	0.014		µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	1,2,3,4,7,8-HxCDF	0.017		µg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	1,2,3,4,7,8-HxCDF	0.043		µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	1,2,3,4,7,8-HxCDF	2.64	J	pg/g
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	1,2,3,4,7,8-HxCDF	2.26	J	pg/g
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	1,2,3,4,7,8-HxCDF	3.41	J	pg/g
A1-0TO30-102018	Sediment	5.65	N	0	1	1,2,3,7,8-PeCDD	0.00025	U	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	1,2,3,7,8-PeCDD	0.00096	U	µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	1,2,3,7,8-PeCDD	0.00093	U	µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	1,2,3,7,8-PeCDD	0.000067	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
B7-0TO30-100918	Sediment	3.03	N	0	1	1,2,3,7,8-PeCDD	0.0015	J	µg/kg
B-9.00-0TO29-102418	Sediment	3.03	N	0	1	1,2,3,7,8-PeCDD	0.0027	J	µg/kg
C-8.94-0TO27-102418	Sediment	6.38	N	0	0.9	1,2,3,7,8-PeCDD	0.002	U	µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	1,2,3,7,8-PeCDD	0.0002	U	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	1,2,3,7,8-PeCDD	0.0012	J	µg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	1,2,3,7,8-PeCDD	0.0023	J	µg/kg
D-8.83-0TO25-102418	Sediment	2.42	N	0	0.8	1,2,3,7,8-PeCDD	0.0024	J	µg/kg
D-8.90-0TO27-102418	Sediment	5.15	N	0	0.9	1,2,3,7,8-PeCDD	0.0022	U	µg/kg
D-8.90-SC-00TO10-102318	Sediment	5.11	N	0	1	1,2,3,7,8-PeCDD	0.0027	J	µg/kg
D-8.90-SC-10TO20-102318	Sediment	5.11	N	1	2	1,2,3,7,8-PeCDD	0.0022	J	µg/kg
D-8.90-SC-20TO40-102318	Sediment	5.11	N	2	4	1,2,3,7,8-PeCDD	0.0022	J	µg/kg
E-8.99-0TO28-102418	Sediment	6.32	N	0	0.9	1,2,3,7,8-PeCDD	0.003	J	µg/kg
E-9.02-0TO26-102418	Sediment	2.84	N	0	0.9	1,2,3,7,8-PeCDD	0.0024	J	µg/kg
E-9.02-SC-00TO10-102318	Sediment	6.38	N	0	1	1,2,3,7,8-PeCDD	0.0032	J	µg/kg
E-9.02-SC-10TO20-102318	Sediment	6.38	N	1	2	1,2,3,7,8-PeCDD	0.0029	J	µg/kg
E-9.02-SC-20TO40-102318	Sediment	6.38	N	2	4	1,2,3,7,8-PeCDD	0.0033	J	µg/kg
E-9.02-SC-40TO60-102318	Sediment	6.38	N	4	6	1,2,3,7,8-PeCDD	0.0028	J	µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	1,2,3,7,8-PeCDD	0.000343	J	µg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	1,2,3,7,8-PeCDD	0.00024	U	µg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	1,2,3,7,8-PeCDD	0.002	J	µg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	1,2,3,7,8-PeCDD	0.00077	U	µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	1,2,3,7,8-PeCDD	0.00071	U	µg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	1,2,3,7,8-PeCDD	0.0026	U	µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	1,2,3,7,8-PeCDD	0.00031	U	µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	1,2,3,7,8-PeCDD	0.0019	J	µg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	1,2,3,7,8-PeCDD	0.00057	J	µg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	1,2,3,7,8-PeCDD	0.00024	JU	µg/kg
J3-SC1B-20TO30-82719	Sediment	5.73	N	2	3	1,2,3,7,8-PeCDD	0.00039	J	µg/kg
J3-SC1B-30TO40-82719	Sediment	5.73	N	3	4	1,2,3,7,8-PeCDD	0.0017	J	µg/kg
J3-SC1B-40TO50-82719	Sediment	5.73	N	4	5	1,2,3,7,8-PeCDD	0.00026	J	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	1,2,3,7,8-PeCDD	0.0034	J	µg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	1,2,3,7,8-PeCDD	0.0016	J	µg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	1,2,3,7,8-PeCDD	0.00045	J	µg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	1,2,3,7,8-PeCDD	0.0023	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	1,2,3,7,8-PeCDD	0.00052	U	µg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	1,2,3,7,8-PeCDD	0.00383	J	µg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	1,2,3,7,8-PeCDD	0.00032	J	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	1,2,3,7,8-PeCDD	0.00021	J	µg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	1,2,3,7,8-PeCDD	0.00041	J	µg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	1,2,3,7,8-PeCDD	0.00013	U	µg/kg
L3-SC1B-20TO30-82619	Sediment	7.22	N	2	3	1,2,3,7,8-PeCDD	0.0049	U	µg/kg
L3-SC1B-30TO40-82619	Sediment	7.22	N	3	4	1,2,3,7,8-PeCDD	0.0048	U	µg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	1,2,3,7,8-PeCDD	0.00014	U	µg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	1,2,3,7,8-PeCDD	0.0014	J	µg/kg
LW2-C426-A	Sediment	6.87	N	0	1	1,2,3,7,8-PeCDD	0.000344	J	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	1,2,3,7,8-PeCDD	0.000129	J	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	1,2,3,7,8-PeCDD	0.000216	U	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	1,2,3,7,8-PeCDD	0.00002	U	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	1,2,3,7,8-PeCDD	0.00008	J	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	1,2,3,7,8-PeCDD	0.0000743	J	µg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	1,2,3,7,8-PeCDD	0.00012	UJ	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	1,2,3,7,8-PeCDD	0.0016	J	µg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	1,2,3,7,8-PeCDD	0.0016	J	µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	1,2,3,7,8-PeCDD	0.0019	J	µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	1,2,3,7,8-PeCDD	0.00013	UJ	µg/kg
PDI-SC-S188-0TO1.5	Sediment	6.04	N	0	1	1,2,3,7,8-PeCDD	0.0015	J	µg/kg
PDI-SC-S191-0TO2	Sediment	6.59	N	0	2	1,2,3,7,8-PeCDD	0.0014	JN	µg/kg
PDI-SC-S191-2TO4	Sediment	6.59	N	2	4	1,2,3,7,8-PeCDD	0.0016	JN	µg/kg
PDI-SC-S191-4TO6	Sediment	6.59	N	4	6	1,2,3,7,8-PeCDD	0.0032	J	µg/kg
PDI-SC-S192-0TO1.5	Sediment	8.19	N	0	1	1,2,3,7,8-PeCDD	0.03	J	µg/kg
PDI-SC-S192-1.5TO3	Sediment	8.19	N	1	3	1,2,3,7,8-PeCDD	0.019		µg/kg
PDI-SC-S192-3TO4.2	Sediment	8.19	N	3	4	1,2,3,7,8-PeCDD	0.0012	J	µg/kg
PDI-SC-S229-0TO2	Sediment	2.78	N	0	2	1,2,3,7,8-PeCDD	0.0023	J	µg/kg
PDI-SC-S230-0TO2	Sediment	6.26	N	0	2	1,2,3,7,8-PeCDD	0.0023	J	µg/kg
PDI-SC-S230-2TO4	Sediment	6.26	N	2	4	1,2,3,7,8-PeCDD	0.0025	J	µg/kg
PDI-SC-S230-4TO6	Sediment	6.26	N	4	6	1,2,3,7,8-PeCDD	0.0018	J	µg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	1,2,3,7,8-PeCDD	0.00073	J	µg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	1,2,3,7,8-PeCDD	0.00063	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	1,2,3,7,8-PeCDD	0.00021	J+	µg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	1,2,3,7,8-PeCDD	0.0017	J	µg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	1,2,3,7,8-PeCDD	0.002	J	µg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	1,2,3,7,8-PeCDD	0.002	JN	µg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	1,2,3,7,8-PeCDD	0.0013	UJ	µg/kg
PDI-SG-S168	Sediment	11.36	N	0	30	1,2,3,7,8-PeCDD	0.00043	JN	µg/kg
PDI-SG-S175	Sediment	10.83	N	0	30	1,2,3,7,8-PeCDD	0.00033	J	µg/kg
PDI-SG-S182	Sediment	1.15	N	0	30	1,2,3,7,8-PeCDD	0.0051	U	µg/kg
PDI-SG-S183	Sediment	6.81	N	0	27	1,2,3,7,8-PeCDD	0.00078	JN	µg/kg
PDI-SG-S184	Sediment	14.30	N	0	28	1,2,3,7,8-PeCDD	0.0035	JN	µg/kg
PDI-SG-S191	Sediment	5.82	N	0	26	1,2,3,7,8-PeCDD	0.0012	U	µg/kg
PDI-SG-S199	Sediment	7.43	N	0	18	1,2,3,7,8-PeCDD	0.00021	J	µg/kg
PDI-SG-S201	Sediment	2.37	N	0	30	1,2,3,7,8-PeCDD	0.0013	JN	µg/kg
PDI-SG-S204	Sediment	0.96	N	0	17	1,2,3,7,8-PeCDD	0.00057	J	µg/kg
PDI-SG-S211	Sediment	2.21	N	0	30	1,2,3,7,8-PeCDD	0.0004	U	µg/kg
PDI-SG-S214	Sediment	14.23	N	0	15	1,2,3,7,8-PeCDD	0.000063	U	µg/kg
PDI-SG-S215	Sediment	3.28	N	0	30	1,2,3,7,8-PeCDD	0.0026	J	µg/kg
PDI-SG-S216	Sediment	1.43	N	0	30	1,2,3,7,8-PeCDD	0.0019	JN	µg/kg
PDI-SG-S220	Sediment	3.87	N	0	30	1,2,3,7,8-PeCDD	0.0019	J	µg/kg
PDI-SG-S223	Sediment	4.48	N	0	23	1,2,3,7,8-PeCDD	0.0027	J	µg/kg
PDI-SG-S224	Sediment	4.49	N	0	24	1,2,3,7,8-PeCDD	0.0011	J	µg/kg
PDI-SG-S225	Sediment	1.58	N	0	25	1,2,3,7,8-PeCDD	0.0022	J	µg/kg
PDI-SG-S229	Sediment	2.55	N	0	28	1,2,3,7,8-PeCDD	0.0027	J	µg/kg
PDI-SG-S230	Sediment	6.15	N	0	27	1,2,3,7,8-PeCDD	0.0025	J	µg/kg
PDI-SG-S231	Sediment	6.54	N	0	28	1,2,3,7,8-PeCDD	0.0023	J	µg/kg
PDI-SG-S233	Sediment	8.78	N	0	24	1,2,3,7,8-PeCDD	0.0028	J	µg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	1,2,3,7,8-PeCDD	0.00025	U	µg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	1,2,3,7,8-PeCDD	0.0011	U	µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	1,2,3,7,8-PeCDD	0.000024	U	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	1,2,3,7,8-PeCDD	0.469	U	pg/g
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	1,2,3,7,8-PeCDD	0.43	J	pg/g
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	1,2,3,7,8-PeCDD	0.866	J	pg/g
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	1,2,3,7,8-PeCDD	0.465	U	pg/g
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	1,2,3,7,8-PeCDD	0.532	J	pg/g

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	1,2,3,7,8-PeCDD	0.415	J	pg/g
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	1,2,3,7,8-PeCDD	0.62	U	pg/g
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	1,2,3,7,8-PeCDD	0.881	J	pg/g
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	1,2,3,7,8-PeCDD	0.845	U	pg/g
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	1,2,3,7,8-PeCDD	1.3	J	pg/g
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	1,2,3,7,8-PeCDD	3.23	J	pg/g
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	1,2,3,7,8-PeCDD	3.81	J	pg/g
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	1,2,3,7,8-PeCDD	1.87	J	pg/g
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	1,2,3,7,8-PeCDD	7.3	J	pg/g
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	1,2,3,7,8-PeCDD	3.42	J	pg/g
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	1,2,3,7,8-PeCDD	1.66	J	pg/g
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	1,2,3,7,8-PeCDD	2.56	J	pg/g
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	1,2,3,7,8-PeCDD	2.03	J	pg/g
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	1,2,3,7,8-PeCDD	4.02	J	pg/g
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	1,2,3,7,8-PeCDD	5.08		pg/g
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	1,2,3,7,8-PeCDD	34.9		pg/g
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	1,2,3,7,8-PeCDD	0.198	UJ	pg/g
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	1,2,3,7,8-PeCDD	0.224	U	pg/g
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	1,2,3,7,8-PeCDD	0.292	U	pg/g
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	1,2,3,7,8-PeCDD	3.06	J	pg/g
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	1,2,3,7,8-PeCDD	1.97	J	pg/g
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	1,2,3,7,8-PeCDD	2.81	J	pg/g
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	1,2,3,7,8-PeCDD	1.76	J	pg/g
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	1,2,3,7,8-PeCDD	0.618	U	pg/g
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	1,2,3,7,8-PeCDD	0.865	J	pg/g
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	1,2,3,7,8-PeCDD	3.26		pg/g
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	1,2,3,7,8-PeCDD	20.1		pg/g
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	1,2,3,7,8-PeCDD	0.418	U	pg/g
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	1,2,3,7,8-PeCDD	0.959	U	pg/g
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	1,2,3,7,8-PeCDD	0.892	J	pg/g
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	1,2,3,7,8-PeCDD	47.8		pg/g
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	1,2,3,7,8-PeCDD	0.385	U	pg/g
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	1,2,3,7,8-PeCDD	0.27	J	pg/g
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	1,2,3,7,8-PeCDD	0.271	U	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	1,2,3,7,8-PeCDD	0.547	UJ	pg/g
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	1,2,3,7,8-PeCDD	0.361	J	pg/g
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	1,2,3,7,8-PeCDD	0.318	J	pg/g
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	1,2,3,7,8-PeCDD	0.301	U	pg/g
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	1,2,3,7,8-PeCDD	0.288	U	pg/g
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	1,2,3,7,8-PeCDD	0.164	U	pg/g
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	1,2,3,7,8-PeCDD	0.249	U	pg/g
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	1,2,3,7,8-PeCDD	0.277	J	pg/g
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	1,2,3,7,8-PeCDD	1.12	J	pg/g
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	1,2,3,7,8-PeCDD	0.45	U	pg/g
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	1,2,3,7,8-PeCDD	0.327	U	pg/g
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	1,2,3,7,8-PeCDD	0.33	J	pg/g
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	1,2,3,7,8-PeCDD	0.415	U	pg/g
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	1,2,3,7,8-PeCDD	2.13	J	pg/g
SIB-098-OHW-1-2-10072022	Sediment	8.22	N	1	2	1,2,3,7,8-PeCDD	1.15	J	pg/g
SIB-098-OHW-2-3-10072022	Sediment	8.22	N	2	3	1,2,3,7,8-PeCDD	0.415	U	pg/g
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	1,2,3,7,8-PeCDD	0.391	J	pg/g
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	1,2,3,7,8-PeCDD	0.292	U	pg/g
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	1,2,3,7,8-PeCDD	1.16	J	pg/g
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	1,2,3,7,8-PeCDD	0.155	U	pg/g
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	1,2,3,7,8-PeCDD	0.126	U	pg/g
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	1,2,3,7,8-PeCDD	0.584	J	pg/g
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	1,2,3,7,8-PeCDD	0.228	U	pg/g
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	1,2,3,7,8-PeCDD	0.185	J	pg/g
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	1,2,3,7,8-PeCDD	0.133	J	pg/g
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	1,2,3,7,8-PeCDD	0.149	U	pg/g
SIB-103-OHW-1-2-10062022	Sediment	3.26	N	1	2	1,2,3,7,8-PeCDD	0.166	J	pg/g
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	1,2,3,7,8-PeCDD	0.455	U	pg/g
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	1,2,3,7,8-PeCDD	0.436	J	pg/g
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	1,2,3,7,8-PeCDD	0.67	J	pg/g
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	1,2,3,7,8-PeCDD	0.767	J	pg/g
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	1,2,3,7,8-PeCDD	0.613	J	pg/g
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	1,2,3,7,8-PeCDD	1.59	J	pg/g
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	1,2,3,7,8-PeCDD	5.22	J	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	1,2,3,7,8-PeCDD	0.135	U	pg/g
SIB-110-MLW-1-2-10052022	Sediment	7.81	N	1	2	1,2,3,7,8-PeCDD	0.126	J	pg/g
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	1,2,3,7,8-PeCDD	2.09	J	pg/g
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	1,2,3,7,8-PeCDD	5.39	J	pg/g
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	1,2,3,7,8-PeCDD	0.299	U	pg/g
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	1,2,3,7,8-PeCDD	0.369	U	pg/g
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	1,2,3,7,8-PeCDD	1.0375	J	pg/g
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	1,2,3,7,8-PeCDD	1.42	U	pg/g
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	1,2,3,7,8-PeCDD	0.528	U	pg/g
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	1,2,3,7,8-PeCDD	0.707	J	pg/g
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	1,2,3,7,8-PeCDD	0.768	J	pg/g
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	1,2,3,7,8-PeCDD	1.715	J	pg/g
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	1,2,3,7,8-PeCDD	1.24	J	pg/g
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	1,2,3,7,8-PeCDD	0.763	J	pg/g
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	1,2,3,7,8-PeCDD	0.112	U	pg/g
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	1,2,3,7,8-PeCDD	0.232	U	pg/g
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	1,2,3,7,8-PeCDD	0.287	U	pg/g
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	1,2,3,7,8-PeCDD	0.234	U	pg/g
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	1,2,3,7,8-PeCDD	0.278	U	pg/g
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	1,2,3,7,8-PeCDD	0.708	U	pg/g
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	1,2,3,7,8-PeCDD	0.238	U	pg/g
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	1,2,3,7,8-PeCDD	0.17	U	pg/g
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	1,2,3,7,8-PeCDD	0.214	U	pg/g
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	1,2,3,7,8-PeCDD	0.19	U	pg/g
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	1,2,3,7,8-PeCDD	0.263	U	pg/g
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	1,2,3,7,8-PeCDD	0.333	U	pg/g
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	1,2,3,7,8-PeCDD	0.499	U	pg/g
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	1,2,3,7,8-PeCDD	0.682	U	pg/g
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	1,2,3,7,8-PeCDD	0.153	U	pg/g
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	1,2,3,7,8-PeCDD	0.132	U	pg/g
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	1,2,3,7,8-PeCDD	0.174	U	pg/g
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	1,2,3,7,8-PeCDD	0.405	U	pg/g
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	1,2,3,7,8-PeCDD	0.333	U	pg/g
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	1,2,3,7,8-PeCDD	0.241	U	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	1,2,3,7,8-PeCDD	0.224	U	pg/g
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	1,2,3,7,8-PeCDD	0.42	U	pg/g
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	1,2,3,7,8-PeCDD	0.226	U	pg/g
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	1,2,3,7,8-PeCDD	0.252	U	pg/g
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	1,2,3,7,8-PeCDD	0.291	U	pg/g
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	1,2,3,7,8-PeCDD	0.353	U	pg/g
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	1,2,3,7,8-PeCDD	0.379	U	pg/g
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	1,2,3,7,8-PeCDD	0.293	U	pg/g
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	1,2,3,7,8-PeCDD	0.295	U	pg/g
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	1,2,3,7,8-PeCDD	0.37	U	pg/g
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	1,2,3,7,8-PeCDD	0.244	J	pg/g
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	1,2,3,7,8-PeCDD	0.263	U	pg/g
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	1,2,3,7,8-PeCDD	0.334	U	pg/g
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	1,2,3,7,8-PeCDD	0.415	U	pg/g
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	1,2,3,7,8-PeCDD	0.461	U	pg/g
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	1,2,3,7,8-PeCDD	0.362	U	pg/g
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	1,2,3,7,8-PeCDD	0.33	U	pg/g
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	1,2,3,7,8-PeCDD	0.252	U	pg/g
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	1,2,3,7,8-PeCDD	0.15	U	pg/g
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	1,2,3,7,8-PeCDD	0.27	U	pg/g
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	1,2,3,7,8-PeCDD	0.163	U	pg/g
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	1,2,3,7,8-PeCDD	0.434	U	pg/g
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	1,2,3,7,8-PeCDD	2.49	J	pg/g
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	1,2,3,7,8-PeCDD	0.287	U	pg/g
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	1,2,3,7,8-PeCDD	1.87	J	pg/g
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	1,2,3,7,8-PeCDD	0.875	J	pg/g
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	1,2,3,7,8-PeCDD	0.366	U	pg/g
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	1,2,3,7,8-PeCDD	0.325	U	pg/g
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	1,2,3,7,8-PeCDD	1.43	J	pg/g
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	1,2,3,7,8-PeCDD	1.09	J	pg/g
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	1,2,3,7,8-PeCDD	1.42	J	pg/g
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	1,2,3,7,8-PeCDD	0.233	U	pg/g
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	1,2,3,7,8-PeCDD	0.211	U	pg/g
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	1,2,3,7,8-PeCDD	1.52	J	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	1,2,3,7,8-PeCDD	1.76	J	pg/g
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	1,2,3,7,8-PeCDD	1.755	J	pg/g
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	1,2,3,7,8-PeCDD	2.12	J	pg/g
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	1,2,3,7,8-PeCDD	2	J	pg/g
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	1,2,3,7,8-PeCDD	2.49	J	pg/g
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	1,2,3,7,8-PeCDD	2.74	J	pg/g
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	1,2,3,7,8-PeCDD	4.87	J	pg/g
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	1,2,3,7,8-PeCDD	4.51	J	pg/g
SIB-SC-C25-0-1-07/23/2022	Sediment	4.21	N	0	1	1,2,3,7,8-PeCDD	2.74		pg/g
SIB-SC-C25-1-2-07/23/2022	Sediment	4.21	N	1	2	1,2,3,7,8-PeCDD	3.225	J	pg/g
SIB-SC-C25-2-3-07/23/2022	Sediment	4.21	N	2	3	1,2,3,7,8-PeCDD	0.942	J	pg/g
SIB-SC-C25-3-4-07/23/2022	Sediment	4.21	N	3	4	1,2,3,7,8-PeCDD	4.69	J	pg/g
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	1,2,3,7,8-PeCDD	2.15	J	pg/g
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	1,2,3,7,8-PeCDD	4.22	J	pg/g
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	1,2,3,7,8-PeCDD	2.58		pg/g
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	1,2,3,7,8-PeCDD	1.72	J	pg/g
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	1,2,3,7,8-PeCDD	4.26	J	pg/g
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	1,2,3,7,8-PeCDD	2.73		pg/g
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	1,2,3,7,8-PeCDD	4.44		pg/g
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	1,2,3,7,8-PeCDD	4.05		pg/g
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	1,2,3,7,8-PeCDD	4.16		pg/g
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	1,2,3,7,8-PeCDD	0.541	J	pg/g
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	1,2,3,7,8-PeCDD	2.14	J	pg/g
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	1,2,3,7,8-PeCDD	2.8		pg/g
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	1,2,3,7,8-PeCDD	4.08		pg/g
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	1,2,3,7,8-PeCDD	0.748	J	pg/g
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	1,2,3,7,8-PeCDD	0.345	U	pg/g
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	1,2,3,7,8-PeCDD	1.09	J	pg/g
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	1,2,3,7,8-PeCDD	1.61	J	pg/g
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	1,2,3,7,8-PeCDD	3.11		pg/g
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	1,2,3,7,8-PeCDD	0.293	UJ	pg/g
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	1,2,3,7,8-PeCDD	0.136	U	pg/g
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	1,2,3,7,8-PeCDD	0.314	U	pg/g
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	1,2,3,7,8-PeCDD	0.549	U	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	1,2,3,7,8-PeCDD	0.327	U	pg/g
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	1,2,3,7,8-PeCDD	4.275	J	pg/g
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	1,2,3,7,8-PeCDD	3.32	J	pg/g
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	1,2,3,7,8-PeCDD	3.09	J	pg/g
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	1,2,3,7,8-PeCDD	1.44	J	pg/g
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	1,2,3,7,8-PeCDD	2.09	J	pg/g
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	1,2,3,7,8-PeCDD	2.91		pg/g
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	1,2,3,7,8-PeCDD	1.89	J	pg/g
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	1,2,3,7,8-PeCDD	0.598	J	pg/g
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	1,2,3,7,8-PeCDD	0.614	J	pg/g
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	1,2,3,7,8-PeCDD	1.93	J	pg/g
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	1,2,3,7,8-PeCDD	2.47		pg/g
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	1,2,3,7,8-PeCDD	3.33		pg/g
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	1,2,3,7,8-PeCDD	0.202	U	pg/g
SIB-SC-E25-1-2-07/23/2022	Sediment	3.42	N	1	2	1,2,3,7,8-PeCDD	1.64	J	pg/g
SIB-SC-E25-2-3-07/23/2022	Sediment	3.42	N	2	3	1,2,3,7,8-PeCDD	0.773	J	pg/g
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	1,2,3,7,8-PeCDD	1.21	J	pg/g
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	1,2,3,7,8-PeCDD	2.89		pg/g
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	1,2,3,7,8-PeCDD	0.9705	J	pg/g
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	1,2,3,7,8-PeCDD	0.245	U	pg/g
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	1,2,3,7,8-PeCDD	0.194	U	pg/g
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	1,2,3,7,8-PeCDD	3.61		pg/g
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	1,2,3,7,8-PeCDD	0.348	U	pg/g
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	1,2,3,7,8-PeCDD	0.325	UJ	pg/g
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	1,2,3,7,8-PeCDD	0.228	U	pg/g
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	1,2,3,7,8-PeCDD	0.271	U	pg/g
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	1,2,3,7,8-PeCDD	0.244	UJ	pg/g
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	1,2,3,7,8-PeCDD	2.56	J	pg/g
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	1,2,3,7,8-PeCDD	5.4	J	pg/g
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	1,2,3,7,8-PeCDD	0.295	U	pg/g
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	1,2,3,7,8-PeCDD	0.419	U	pg/g
SIB-SC-E30-1-2-07/23/2022	Sediment	7.41	N	1	2	1,2,3,7,8-PeCDD	4.73		pg/g
SIB-SC-E30-2-3-07/23/2022	Sediment	7.41	N	2	3	1,2,3,7,8-PeCDD	5.05		pg/g
SIB-SC-E30-3-4-07/23/2022	Sediment	7.41	N	3	4	1,2,3,7,8-PeCDD	3.8		pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E30-4-5-07/23/2022	Sediment	7.41	N	4	5	1,2,3,7,8-PeCDD	2.56	J	pg/g
SIB-SC-E30-5-6-07/23/2022	Sediment	7.41	N	5	6	1,2,3,7,8-PeCDD	1.73	J	pg/g
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	1,2,3,7,8-PeCDD	4.04	J	pg/g
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	1,2,3,7,8-PeCDD	1.58	J	pg/g
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	1,2,3,7,8-PeCDD	0.889	J	pg/g
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	1,2,3,7,8-PeCDD	12.5	U	pg/g
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	1,2,3,7,8-PeCDD	0.968	J	pg/g
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	1,2,3,7,8-PeCDD	4.8	J	pg/g
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	1,2,3,7,8-PeCDD	1.388	J	pg/g
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	1,2,3,7,8-PeCDD	1.57	J	pg/g
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	1,2,3,7,8-PeCDD	1.21	J	pg/g
SIB-SC-F21-1-2-07/24/2022	Sediment	3.89	N	1	2	1,2,3,7,8-PeCDD	2.36	J	pg/g
SIB-SC-F21-2-3-07/24/2022	Sediment	3.89	N	2	3	1,2,3,7,8-PeCDD	0.618	J	pg/g
SIB-SC-F22-1-2-08/17/2022	Sediment	3.66	N	1	2	1,2,3,7,8-PeCDD	1.51	U	pg/g
SIB-SC-F22-2-3-08/17/2022	Sediment	3.66	N	2	3	1,2,3,7,8-PeCDD	0.643	U	pg/g
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	1,2,3,7,8-PeCDD	1.16	J	pg/g
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	1,2,3,7,8-PeCDD	0.197	UJ	pg/g
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	1,2,3,7,8-PeCDD	0.249	U	pg/g
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	1,2,3,7,8-PeCDD	0.148	U	pg/g
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	1,2,3,7,8-PeCDD	1.39	J	pg/g
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	1,2,3,7,8-PeCDD	0.528	J	pg/g
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	1,2,3,7,8-PeCDD	1.93	J	pg/g
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	1,2,3,7,8-PeCDD	1.73	J	pg/g
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	1,2,3,7,8-PeCDD	3.215	J	pg/g
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	1,2,3,7,8-PeCDD	1.51	J	pg/g
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	1,2,3,7,8-PeCDD	1.77	J	pg/g
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	1,2,3,7,8-PeCDD	0.937	J	pg/g
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	1,2,3,7,8-PeCDD	0.519	J	pg/g
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	1,2,3,7,8-PeCDD	0.475	J	pg/g
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	1,2,3,7,8-PeCDD	1.99	J	pg/g
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	1,2,3,7,8-PeCDD	1.13	J	pg/g
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	1,2,3,7,8-PeCDD	14.6	J	pg/g
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	1,2,3,7,8-PeCDD	2.44	J	pg/g
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	1,2,3,7,8-PeCDD	7.08	J	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	1,2,3,7,8-PeCDD	8.58	J	pg/g
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	1,2,3,7,8-PeCDD	9.98	J	pg/g
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	1,2,3,7,8-PeCDD	0.313	J	pg/g
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	1,2,3,7,8-PeCDD	0.226	U	pg/g
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	1,2,3,7,8-PeCDD	7.86	J	pg/g
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	1,2,3,7,8-PeCDD	1.25	J	pg/g
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	1,2,3,7,8-PeCDD	0.263	U	pg/g
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	1,2,3,7,8-PeCDD	0.3	J	pg/g
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	1,2,3,7,8-PeCDD	0.171	J	pg/g
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	1,2,3,7,8-PeCDD	0.192	U	pg/g
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	1,2,3,7,8-PeCDD	0.837	J	pg/g
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	1,2,3,7,8-PeCDD	7.11	J	pg/g
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	1,2,3,7,8-PeCDD	12.8	J	pg/g
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	1,2,3,7,8-PeCDD	14.3	J	pg/g
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	1,2,3,7,8-PeCDD	12.1	J	pg/g
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	1,2,3,7,8-PeCDD	0.574	J	pg/g
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	1,2,3,7,8-PeCDD	0.271	U	pg/g
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	1,2,3,7,8-PeCDD	0.262	U	pg/g
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	1,2,3,7,8-PeCDD	0.222	U	pg/g
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	1,2,3,7,8-PeCDD	8.18	J	pg/g
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	1,2,3,7,8-PeCDD	1.11	J	pg/g
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	1,2,3,7,8-PeCDD	3.33	J	pg/g
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	1,2,3,7,8-PeCDD	1.77	J	pg/g
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	1,2,3,7,8-PeCDD	2.33	J	pg/g
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	1,2,3,7,8-PeCDD	2.38	J	pg/g
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	1,2,3,7,8-PeCDD	0.881	U	pg/g
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	1,2,3,7,8-PeCDD	0.244	U	pg/g
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	1,2,3,7,8-PeCDD	1.87	J	pg/g
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	1,2,3,7,8-PeCDD	3.29		pg/g
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	1,2,3,7,8-PeCDD	7.2	J	pg/g
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	1,2,3,7,8-PeCDD	6.86	J	pg/g
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	1,2,3,7,8-PeCDD	6.12	J	pg/g
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	1,2,3,7,8-PeCDD	4.5		pg/g
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	1,2,3,7,8-PeCDD	3.75	J	pg/g

Attachment B
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	1,2,3,7,8-PeCDD	1.43	U	pg/g
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	1,2,3,7,8-PeCDD	0.553	U	pg/g
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	1,2,3,7,8-PeCDD	3.44	J	pg/g
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	1,2,3,7,8-PeCDD	0.719	U	pg/g
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	1,2,3,7,8-PeCDD	0.65	U	pg/g
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	1,2,3,7,8-PeCDD	16.74	J	pg/g
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	1,2,3,7,8-PeCDD	7.6		pg/g
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	1,2,3,7,8-PeCDD	11.7	J	pg/g
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	1,2,3,7,8-PeCDD	15		pg/g
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	1,2,3,7,8-PeCDD	6.58		pg/g
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	1,2,3,7,8-PeCDD	0.856	U	pg/g
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	1,2,3,7,8-PeCDD	2.47	J	pg/g
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	1,2,3,7,8-PeCDD	10.5	J	pg/g
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	1,2,3,7,8-PeCDD	2.2	J	pg/g
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	1,2,3,7,8-PeCDD	2.27	J	pg/g
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	1,2,3,7,8-PeCDD	4.87	J	pg/g
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	1,2,3,7,8-PeCDD	6.31	J	pg/g
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	1,2,3,7,8-PeCDD	2.93	J	pg/g
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	1,2,3,7,8-PeCDD	12	J	pg/g
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	1,2,3,7,8-PeCDD	1.75	J	pg/g
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	1,2,3,7,8-PeCDD	0.592	J	pg/g
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	1,2,3,7,8-PeCDD	1.73	J	pg/g
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	1,2,3,7,8-PeCDD	0.392	U	pg/g
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	1,2,3,7,8-PeCDD	2.61	J	pg/g
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	1,2,3,7,8-PeCDD	1.29	J	pg/g
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	1,2,3,7,8-PeCDD	3.16	J	pg/g
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	1,2,3,7,8-PeCDD	1.61	J	pg/g
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	1,2,3,7,8-PeCDD	0.674	J	pg/g
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	1,2,3,7,8-PeCDD	0.194	U	pg/g
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	1,2,3,7,8-PeCDD	0.903	J	pg/g
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	1,2,3,7,8-PeCDD	0.193	U	pg/g
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	1,2,3,7,8-PeCDD	0.149	J	pg/g
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	1,2,3,7,8-PeCDD	0.134	U	pg/g
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	1,2,3,7,8-PeCDD	2.06	J	pg/g

Attachment B
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	1,2,3,7,8-PeCDD	4.2		pg/g
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	1,2,3,7,8-PeCDD	0.308	J	pg/g
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	1,2,3,7,8-PeCDD	0.296	U	pg/g
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	1,2,3,7,8-PeCDD	0.284	U	pg/g
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	1,2,3,7,8-PeCDD	0.483	J	pg/g
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	1,2,3,7,8-PeCDD	0.585	J	pg/g
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	1,2,3,7,8-PeCDD	1.12	J	pg/g
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	1,2,3,7,8-PeCDD	0.219	J	pg/g
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	1,2,3,7,8-PeCDD	0.329	U	pg/g
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	1,2,3,7,8-PeCDD	0.232	U	pg/g
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	1,2,3,7,8-PeCDD	0.164	UJ	pg/g
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	1,2,3,7,8-PeCDD	0.218	U	pg/g
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	1,2,3,7,8-PeCDD	0.705	J	pg/g
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	1,2,3,7,8-PeCDD	0.425	UJ	pg/g
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	1,2,3,7,8-PeCDD	0.584	U	pg/g
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	1,2,3,7,8-PeCDD	0.15	U	pg/g
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	1,2,3,7,8-PeCDD	0.263	U	pg/g
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	1,2,3,7,8-PeCDD	0.362	U	pg/g
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	1,2,3,7,8-PeCDD	0.35	UJ	pg/g
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	1,2,3,7,8-PeCDD	0.583	U	pg/g
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	1,2,3,7,8-PeCDD	0.439	UJ	pg/g
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	1,2,3,7,8-PeCDD	0.527	U	pg/g
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	1,2,3,7,8-PeCDD	0.576	UJ	pg/g
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	1,2,3,7,8-PeCDD	0.932	U	pg/g
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	1,2,3,7,8-PeCDD	2.26	J	pg/g
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	1,2,3,7,8-PeCDD	0.671	J	pg/g
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	1,2,3,7,8-PeCDD	0.233	U	pg/g
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	1,2,3,7,8-PeCDD	0.766	J	pg/g
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	1,2,3,7,8-PeCDD	1.6	J	pg/g
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	1,2,3,7,8-PeCDD	2.51		pg/g
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	1,2,3,7,8-PeCDD	2.81		pg/g
T1-0TO30-101518	Sediment	5.81	N	0	1	1,2,3,7,8-PeCDD	0.000071	UJ	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	1,2,3,7,8-PeCDD	0.0015	J	µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	1,2,3,7,8-PeCDD	0.0014	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
T7-0TO31-101618	Sediment	3.98	N	0	1	1,2,3,7,8-PeCDD	0.0021	J	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	1,2,3,7,8-PeCDD	0.482	J	pg/g
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	1,2,3,7,8-PeCDD	1.06	U	pg/g
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	1,2,3,7,8-PeCDD	0.544	U	pg/g
A1-0TO30-102018	Sediment	5.65	N	0	1	2,3,4,7,8-PeCDF	0.00016	U	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	2,3,4,7,8-PeCDF	0.0016	J	µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	2,3,4,7,8-PeCDF	0.0026	J	µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	2,3,4,7,8-PeCDF	0.000217	J	µg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	2,3,4,7,8-PeCDF	0.0023	J	µg/kg
B-9.00-0TO29-102418	Sediment	3.03	N	0	1	2,3,4,7,8-PeCDF	0.0034	J	µg/kg
C-8.94-0TO27-102418	Sediment	6.38	N	0	0.9	2,3,4,7,8-PeCDF	0.0031	J	µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	2,3,4,7,8-PeCDF	0.00048	J	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	2,3,4,7,8-PeCDF	0.0019	J	µg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	2,3,4,7,8-PeCDF	0.0037	J	µg/kg
D-8.83-0TO25-102418	Sediment	2.42	N	0	0.8	2,3,4,7,8-PeCDF	0.0045	J	µg/kg
D-8.90-0TO27-102418	Sediment	5.15	N	0	0.9	2,3,4,7,8-PeCDF	0.0031	J	µg/kg
D-8.90-SC-00TO10-102318	Sediment	5.11	N	0	1	2,3,4,7,8-PeCDF	0.0024	U	µg/kg
D-8.90-SC-10TO20-102318	Sediment	5.11	N	1	2	2,3,4,7,8-PeCDF	0.0039	J	µg/kg
D-8.90-SC-20TO40-102318	Sediment	5.11	N	2	4	2,3,4,7,8-PeCDF	0.0026	J	µg/kg
E-8.99-0TO28-102418	Sediment	6.32	N	0	0.9	2,3,4,7,8-PeCDF	0.003	U	µg/kg
E-9.02-0TO26-102418	Sediment	2.84	N	0	0.9	2,3,4,7,8-PeCDF	0.0026	J	µg/kg
E-9.02-SC-00TO10-102318	Sediment	6.38	N	0	1	2,3,4,7,8-PeCDF	0.00089	U	µg/kg
E-9.02-SC-10TO20-102318	Sediment	6.38	N	1	2	2,3,4,7,8-PeCDF	0.002	J	µg/kg
E-9.02-SC-20TO40-102318	Sediment	6.38	N	2	4	2,3,4,7,8-PeCDF	0.0042	J	µg/kg
E-9.02-SC-40TO60-102318	Sediment	6.38	N	4	6	2,3,4,7,8-PeCDF	0.0022	U	µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	2,3,4,7,8-PeCDF	0.00032	J	µg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	2,3,4,7,8-PeCDF	0.00038	J	µg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	2,3,4,7,8-PeCDF	0.0055	J	µg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	2,3,4,7,8-PeCDF	0.0039	J	µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	2,3,4,7,8-PeCDF	0.0014	J	µg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	2,3,4,7,8-PeCDF	0.0074		µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	2,3,4,7,8-PeCDF	0.00011	U	µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	2,3,4,7,8-PeCDF	0.0029	J	µg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	2,3,4,7,8-PeCDF	0.00074	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	2,3,4,7,8-PeCDF	0.000334	J	µg/kg
J3-SC1B-20TO30-82719	Sediment	5.73	N	2	3	2,3,4,7,8-PeCDF	0.00086	J	µg/kg
J3-SC1B-30TO40-82719	Sediment	5.73	N	3	4	2,3,4,7,8-PeCDF	0.0036	J	µg/kg
J3-SC1B-40TO50-82719	Sediment	5.73	N	4	5	2,3,4,7,8-PeCDF	0.0014	J	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	2,3,4,7,8-PeCDF	0.0032	J	µg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	2,3,4,7,8-PeCDF	0.0019	J	µg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	2,3,4,7,8-PeCDF	0.001	J	µg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	2,3,4,7,8-PeCDF	0.0046	J	µg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	2,3,4,7,8-PeCDF	0.0042	J	µg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	2,3,4,7,8-PeCDF	0.0156		µg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	2,3,4,7,8-PeCDF	0.00049	J	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	2,3,4,7,8-PeCDF	0.00059	J	µg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	2,3,4,7,8-PeCDF	0.000519	J	µg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	2,3,4,7,8-PeCDF	0.0002	J	µg/kg
L3-SC1B-20TO30-82619	Sediment	7.22	N	2	3	2,3,4,7,8-PeCDF	0.0012	J	µg/kg
L3-SC1B-30TO40-82619	Sediment	7.22	N	3	4	2,3,4,7,8-PeCDF	0.00032	U	µg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	2,3,4,7,8-PeCDF	0.00033	J	µg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	2,3,4,7,8-PeCDF	0.0028	J	µg/kg
LW2-C426-A	Sediment	6.87	N	0	1	2,3,4,7,8-PeCDF	0.000349	J	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	2,3,4,7,8-PeCDF	0.000176	U	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	2,3,4,7,8-PeCDF	0.000307	J	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	2,3,4,7,8-PeCDF	0.000011	U	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	2,3,4,7,8-PeCDF	0.000258	J	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	2,3,4,7,8-PeCDF	0.0002	J	µg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	2,3,4,7,8-PeCDF	0.00011	UJ	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	2,3,4,7,8-PeCDF	0.0037	J	µg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	2,3,4,7,8-PeCDF	0.006	J	µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	2,3,4,7,8-PeCDF	0.0062	J	µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	2,3,4,7,8-PeCDF	0.00015	UJ	µg/kg
PDI-SC-S188-0TO1.5	Sediment	6.04	N	0	1	2,3,4,7,8-PeCDF	0.0017	J	µg/kg
PDI-SC-S191-0TO2	Sediment	6.59	N	0	2	2,3,4,7,8-PeCDF	0.0014	J	µg/kg
PDI-SC-S191-2TO4	Sediment	6.59	N	2	4	2,3,4,7,8-PeCDF	0.0033	J	µg/kg
PDI-SC-S191-4TO6	Sediment	6.59	N	4	6	2,3,4,7,8-PeCDF	0.0032	J	µg/kg
PDI-SC-S192-0TO1.5	Sediment	8.19	N	0	1	2,3,4,7,8-PeCDF	0.019	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SC-S192-1.5TO3	Sediment	8.19	N	1	3	2,3,4,7,8-PeCDF	0.011		µg/kg
PDI-SC-S192-3TO4.2	Sediment	8.19	N	3	4	2,3,4,7,8-PeCDF	0.00088	J	µg/kg
PDI-SC-S229-0TO2	Sediment	2.78	N	0	2	2,3,4,7,8-PeCDF	0.0027	J	µg/kg
PDI-SC-S230-0TO2	Sediment	6.26	N	0	2	2,3,4,7,8-PeCDF	0.0015	J	µg/kg
PDI-SC-S230-2TO4	Sediment	6.26	N	2	4	2,3,4,7,8-PeCDF	0.0034	J	µg/kg
PDI-SC-S230-4TO6	Sediment	6.26	N	4	6	2,3,4,7,8-PeCDF	0.0016	J	µg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	2,3,4,7,8-PeCDF	0.00063	J	µg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	2,3,4,7,8-PeCDF	0.0003	J	µg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	2,3,4,7,8-PeCDF	0.00039	J	µg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	2,3,4,7,8-PeCDF	0.0017	J	µg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	2,3,4,7,8-PeCDF	0.0024	J	µg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	2,3,4,7,8-PeCDF	0.002	J	µg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	2,3,4,7,8-PeCDF	0.0029	J	µg/kg
PDI-SG-S168	Sediment	11.36	N	0	30	2,3,4,7,8-PeCDF	0.00026	J	µg/kg
PDI-SG-S175	Sediment	10.83	N	0	30	2,3,4,7,8-PeCDF	0.00023	J	µg/kg
PDI-SG-S182	Sediment	1.15	N	0	30	2,3,4,7,8-PeCDF	0.0034	U	µg/kg
PDI-SG-S183	Sediment	6.81	N	0	27	2,3,4,7,8-PeCDF	0.001	J	µg/kg
PDI-SG-S184	Sediment	14.30	N	0	28	2,3,4,7,8-PeCDF	0.0057		µg/kg
PDI-SG-S191	Sediment	5.82	N	0	26	2,3,4,7,8-PeCDF	0.0034	J	µg/kg
PDI-SG-S199	Sediment	7.43	N	0	18	2,3,4,7,8-PeCDF	0.00034	J	µg/kg
PDI-SG-S201	Sediment	2.37	N	0	30	2,3,4,7,8-PeCDF	0.0026	J	µg/kg
PDI-SG-S204	Sediment	0.96	N	0	17	2,3,4,7,8-PeCDF	0.00073	J	µg/kg
PDI-SG-S211	Sediment	2.21	N	0	30	2,3,4,7,8-PeCDF	0.0043	J	µg/kg
PDI-SG-S214	Sediment	14.23	N	0	15	2,3,4,7,8-PeCDF	0.000044	U	µg/kg
PDI-SG-S215	Sediment	3.28	N	0	30	2,3,4,7,8-PeCDF	0.0057	J	µg/kg
PDI-SG-S216	Sediment	1.43	N	0	30	2,3,4,7,8-PeCDF	0.004	J	µg/kg
PDI-SG-S220	Sediment	3.87	N	0	30	2,3,4,7,8-PeCDF	0.0025	J	µg/kg
PDI-SG-S223	Sediment	4.48	N	0	23	2,3,4,7,8-PeCDF	0.0056	J	µg/kg
PDI-SG-S224	Sediment	4.49	N	0	24	2,3,4,7,8-PeCDF	0.00087	J	µg/kg
PDI-SG-S225	Sediment	1.58	N	0	25	2,3,4,7,8-PeCDF	0.0029	J	µg/kg
PDI-SG-S229	Sediment	2.55	N	0	28	2,3,4,7,8-PeCDF	0.0034	J	µg/kg
PDI-SG-S230	Sediment	6.15	N	0	27	2,3,4,7,8-PeCDF	0.0028	J	µg/kg
PDI-SG-S231	Sediment	6.54	N	0	28	2,3,4,7,8-PeCDF	0.0027	J	µg/kg
PDI-SG-S233	Sediment	8.78	N	0	24	2,3,4,7,8-PeCDF	0.0025	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	2,3,4,7,8-PeCDF	0.00015	U	µg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	2,3,4,7,8-PeCDF	0.0047	J	µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	2,3,4,7,8-PeCDF	0.000136	J	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	2,3,4,7,8-PeCDF	0.758	U	pg/g
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	2,3,4,7,8-PeCDF	0.364	U	pg/g
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	2,3,4,7,8-PeCDF	1.32	J	pg/g
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	2,3,4,7,8-PeCDF	0.654	U	pg/g
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	2,3,4,7,8-PeCDF	0.492	U	pg/g
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	2,3,4,7,8-PeCDF	0.349	U	pg/g
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	2,3,4,7,8-PeCDF	0.684	U	pg/g
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	2,3,4,7,8-PeCDF	0.783	U	pg/g
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	2,3,4,7,8-PeCDF	0.973	U	pg/g
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	2,3,4,7,8-PeCDF	2.78	J	pg/g
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	2,3,4,7,8-PeCDF	20.2	J	pg/g
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	2,3,4,7,8-PeCDF	9.1		pg/g
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	2,3,4,7,8-PeCDF	2.75	J	pg/g
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	2,3,4,7,8-PeCDF	7.6	J	pg/g
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	2,3,4,7,8-PeCDF	4.32	J	pg/g
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	2,3,4,7,8-PeCDF	8.01		pg/g
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	2,3,4,7,8-PeCDF	4.38	J	pg/g
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	2,3,4,7,8-PeCDF	5.04		pg/g
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	2,3,4,7,8-PeCDF	0.38	U	pg/g
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	2,3,4,7,8-PeCDF	8.74	J	pg/g
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	2,3,4,7,8-PeCDF	11.9		pg/g
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	2,3,4,7,8-PeCDF	3.965	J	pg/g
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	2,3,4,7,8-PeCDF	0.282	U	pg/g
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	2,3,4,7,8-PeCDF	2.4	J	pg/g
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	2,3,4,7,8-PeCDF	5.55		pg/g
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	2,3,4,7,8-PeCDF	3.6	J	pg/g
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	2,3,4,7,8-PeCDF	9.84	J	pg/g
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	2,3,4,7,8-PeCDF	5.21		pg/g
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	2,3,4,7,8-PeCDF	1.31	J	pg/g
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	2,3,4,7,8-PeCDF	1.83	J	pg/g
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	2,3,4,7,8-PeCDF	4.56	J	pg/g

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	2,3,4,7,8-PeCDF	8.69	J	pg/g
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	2,3,4,7,8-PeCDF	0.442	U	pg/g
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	2,3,4,7,8-PeCDF	1.09	U	pg/g
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	2,3,4,7,8-PeCDF	3.42	J	pg/g
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	2,3,4,7,8-PeCDF	35.3		pg/g
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	2,3,4,7,8-PeCDF	0.453	J	pg/g
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	2,3,4,7,8-PeCDF	0.115	U	pg/g
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	2,3,4,7,8-PeCDF	0.219	U	pg/g
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	2,3,4,7,8-PeCDF	0.373	UJ	pg/g
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	2,3,4,7,8-PeCDF	1.86	J	pg/g
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	2,3,4,7,8-PeCDF	0.93	J	pg/g
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	2,3,4,7,8-PeCDF	0.775	J	pg/g
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	2,3,4,7,8-PeCDF	0.879	J	pg/g
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	2,3,4,7,8-PeCDF	0.221	J	pg/g
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	2,3,4,7,8-PeCDF	1.02	J	pg/g
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	2,3,4,7,8-PeCDF	1.38	J	pg/g
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	2,3,4,7,8-PeCDF	2.36	J	pg/g
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	2,3,4,7,8-PeCDF	2.96	J	pg/g
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	2,3,4,7,8-PeCDF	0.224	U	pg/g
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	2,3,4,7,8-PeCDF	1.07	J	pg/g
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	2,3,4,7,8-PeCDF	1.21	J	pg/g
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	2,3,4,7,8-PeCDF	4.65	J	pg/g
SIB-098-OHW-1-2-10072022	Sediment	8.22	N	1	2	2,3,4,7,8-PeCDF	5.75		pg/g
SIB-098-OHW-2-3-10072022	Sediment	8.22	N	2	3	2,3,4,7,8-PeCDF	1.14	J	pg/g
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	2,3,4,7,8-PeCDF	0.362	J	pg/g
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	2,3,4,7,8-PeCDF	0.627	J	pg/g
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	2,3,4,7,8-PeCDF	50.7		pg/g
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	2,3,4,7,8-PeCDF	2.73	J	pg/g
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	2,3,4,7,8-PeCDF	0.401	J	pg/g
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	2,3,4,7,8-PeCDF	1.26	J	pg/g
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	2,3,4,7,8-PeCDF	0.182	U	pg/g
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	2,3,4,7,8-PeCDF	0.705	J	pg/g
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	2,3,4,7,8-PeCDF	0.0614	U	pg/g
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	2,3,4,7,8-PeCDF	0.195	U	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-103-OHW-1-2-10062022	Sediment	3.26	N	1	2	2,3,4,7,8-PeCDF	0.132	J	pg/g
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	2,3,4,7,8-PeCDF	0.396	U	pg/g
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	2,3,4,7,8-PeCDF	0.479	J	pg/g
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	2,3,4,7,8-PeCDF	0.923	J	pg/g
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	2,3,4,7,8-PeCDF	0.791	J	pg/g
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	2,3,4,7,8-PeCDF	0.918	J	pg/g
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	2,3,4,7,8-PeCDF	2.63	J	pg/g
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	2,3,4,7,8-PeCDF	3.07	J	pg/g
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	2,3,4,7,8-PeCDF	0.471	J	pg/g
SIB-110-MLW-1-2-10052022	Sediment	7.81	N	1	2	2,3,4,7,8-PeCDF	0.0719	J	pg/g
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	2,3,4,7,8-PeCDF	2.99	J	pg/g
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	2,3,4,7,8-PeCDF	8.49		pg/g
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	2,3,4,7,8-PeCDF	0.372	U	pg/g
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	2,3,4,7,8-PeCDF	0.302	U	pg/g
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	2,3,4,7,8-PeCDF	0.8685	J	pg/g
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	2,3,4,7,8-PeCDF	2.8	J	pg/g
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	2,3,4,7,8-PeCDF	0.384	J	pg/g
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	2,3,4,7,8-PeCDF	2.23	J	pg/g
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	2,3,4,7,8-PeCDF	2.32	J	pg/g
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	2,3,4,7,8-PeCDF	4.785	J	pg/g
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	2,3,4,7,8-PeCDF	6.36		pg/g
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	2,3,4,7,8-PeCDF	3.6	J	pg/g
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	2,3,4,7,8-PeCDF	0.105	J	pg/g
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	2,3,4,7,8-PeCDF	0.108	U	pg/g
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	2,3,4,7,8-PeCDF	0.139	U	pg/g
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	2,3,4,7,8-PeCDF	0.205	U	pg/g
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	2,3,4,7,8-PeCDF	0.17	U	pg/g
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	2,3,4,7,8-PeCDF	0.494	U	pg/g
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	2,3,4,7,8-PeCDF	0.175	U	pg/g
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	2,3,4,7,8-PeCDF	0.17	U	pg/g
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	2,3,4,7,8-PeCDF	0.14	U	pg/g
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	2,3,4,7,8-PeCDF	0.132	U	pg/g
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	2,3,4,7,8-PeCDF	0.144	U	pg/g
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	2,3,4,7,8-PeCDF	0.268	U	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	2,3,4,7,8-PeCDF	0.165	U	pg/g
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	2,3,4,7,8-PeCDF	0.483	U	pg/g
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	2,3,4,7,8-PeCDF	0.159	U	pg/g
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	2,3,4,7,8-PeCDF	0.139	U	pg/g
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	2,3,4,7,8-PeCDF	0.124	U	pg/g
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	2,3,4,7,8-PeCDF	0.333	U	pg/g
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	2,3,4,7,8-PeCDF	0.293	U	pg/g
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	2,3,4,7,8-PeCDF	0.186	U	pg/g
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	2,3,4,7,8-PeCDF	0.123	U	pg/g
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	2,3,4,7,8-PeCDF	0.26	U	pg/g
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	2,3,4,7,8-PeCDF	0.132	U	pg/g
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	2,3,4,7,8-PeCDF	0.103	U	pg/g
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	2,3,4,7,8-PeCDF	0.201	U	pg/g
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	2,3,4,7,8-PeCDF	0.19	U	pg/g
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	2,3,4,7,8-PeCDF	0.169	U	pg/g
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	2,3,4,7,8-PeCDF	0.242	U	pg/g
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	2,3,4,7,8-PeCDF	0.165	U	pg/g
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	2,3,4,7,8-PeCDF	0.268	U	pg/g
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	2,3,4,7,8-PeCDF	0.11	U	pg/g
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	2,3,4,7,8-PeCDF	0.24	U	pg/g
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	2,3,4,7,8-PeCDF	0.167	U	pg/g
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	2,3,4,7,8-PeCDF	0.219	U	pg/g
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	2,3,4,7,8-PeCDF	0.211	U	pg/g
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	2,3,4,7,8-PeCDF	0.177	U	pg/g
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	2,3,4,7,8-PeCDF	0.183	U	pg/g
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	2,3,4,7,8-PeCDF	0.125	U	pg/g
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	2,3,4,7,8-PeCDF	0.129	U	pg/g
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	2,3,4,7,8-PeCDF	0.182	U	pg/g
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	2,3,4,7,8-PeCDF	0.167	U	pg/g
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	2,3,4,7,8-PeCDF	0.276	U	pg/g
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	2,3,4,7,8-PeCDF	5.46		pg/g
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	2,3,4,7,8-PeCDF	0.739	J	pg/g
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	2,3,4,7,8-PeCDF	6.82		pg/g
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	2,3,4,7,8-PeCDF	3.74	J	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	2,3,4,7,8-PeCDF	0.565	J	pg/g
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	2,3,4,7,8-PeCDF	0.206	U	pg/g
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	2,3,4,7,8-PeCDF	5.94		pg/g
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	2,3,4,7,8-PeCDF	6.93		pg/g
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	2,3,4,7,8-PeCDF	8.4		pg/g
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	2,3,4,7,8-PeCDF	0.181	UJ	pg/g
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	2,3,4,7,8-PeCDF	0.157	U	pg/g
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	2,3,4,7,8-PeCDF	3.21	J	pg/g
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	2,3,4,7,8-PeCDF	3.58	J	pg/g
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	2,3,4,7,8-PeCDF	3.245	J	pg/g
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	2,3,4,7,8-PeCDF	5.04		pg/g
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	2,3,4,7,8-PeCDF	4.51	J	pg/g
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	2,3,4,7,8-PeCDF	5.73		pg/g
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	2,3,4,7,8-PeCDF	5.86		pg/g
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	2,3,4,7,8-PeCDF	11.4		pg/g
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	2,3,4,7,8-PeCDF	9.17		pg/g
SIB-SC-C25-0-1-07/23/2022	Sediment	4.21	N	0	1	2,3,4,7,8-PeCDF	5.99		pg/g
SIB-SC-C25-1-2-07/23/2022	Sediment	4.21	N	1	2	2,3,4,7,8-PeCDF	6.045	J	pg/g
SIB-SC-C25-2-3-07/23/2022	Sediment	4.21	N	2	3	2,3,4,7,8-PeCDF	1.78	J	pg/g
SIB-SC-C25-3-4-07/23/2022	Sediment	4.21	N	3	4	2,3,4,7,8-PeCDF	11.6		pg/g
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	2,3,4,7,8-PeCDF	3.81	J	pg/g
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	2,3,4,7,8-PeCDF	8.21		pg/g
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	2,3,4,7,8-PeCDF	4.99	J	pg/g
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	2,3,4,7,8-PeCDF	2.92	J	pg/g
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	2,3,4,7,8-PeCDF	7.36		pg/g
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	2,3,4,7,8-PeCDF	3.74	J	pg/g
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	2,3,4,7,8-PeCDF	8.13		pg/g
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	2,3,4,7,8-PeCDF	5.74		pg/g
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	2,3,4,7,8-PeCDF	10.6		pg/g
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	2,3,4,7,8-PeCDF	1.55	J	pg/g
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	2,3,4,7,8-PeCDF	4.79	J	pg/g
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	2,3,4,7,8-PeCDF	5.07		pg/g
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	2,3,4,7,8-PeCDF	5.54		pg/g
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	2,3,4,7,8-PeCDF	1.49	J	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	2,3,4,7,8-PeCDF	0.533	J	pg/g
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	2,3,4,7,8-PeCDF	2.83	J	pg/g
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	2,3,4,7,8-PeCDF	3.92	J	pg/g
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	2,3,4,7,8-PeCDF	6.02		pg/g
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	2,3,4,7,8-PeCDF	0.15	U	pg/g
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	2,3,4,7,8-PeCDF	0.129	UJ	pg/g
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	2,3,4,7,8-PeCDF	1.49	J	pg/g
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	2,3,4,7,8-PeCDF	1.88	J	pg/g
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	2,3,4,7,8-PeCDF	1.81	J	pg/g
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	2,3,4,7,8-PeCDF	8.675		pg/g
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	2,3,4,7,8-PeCDF	7.03		pg/g
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	2,3,4,7,8-PeCDF	6.62		pg/g
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	2,3,4,7,8-PeCDF	2.42	J	pg/g
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	2,3,4,7,8-PeCDF	5.04		pg/g
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	2,3,4,7,8-PeCDF	7.16		pg/g
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	2,3,4,7,8-PeCDF	3.75	J	pg/g
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	2,3,4,7,8-PeCDF	1.54	J	pg/g
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	2,3,4,7,8-PeCDF	1.07	J	pg/g
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	2,3,4,7,8-PeCDF	4.9		pg/g
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	2,3,4,7,8-PeCDF	5.33		pg/g
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	2,3,4,7,8-PeCDF	5.19		pg/g
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	2,3,4,7,8-PeCDF	0.727	J	pg/g
SIB-SC-E25-1-2-07/23/2022	Sediment	3.42	N	1	2	2,3,4,7,8-PeCDF	3.5	J	pg/g
SIB-SC-E25-2-3-07/23/2022	Sediment	3.42	N	2	3	2,3,4,7,8-PeCDF	2.97	J	pg/g
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	2,3,4,7,8-PeCDF	4.16	J	pg/g
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	2,3,4,7,8-PeCDF	6.79		pg/g
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	2,3,4,7,8-PeCDF	2.71	J	pg/g
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	2,3,4,7,8-PeCDF	1.55	J	pg/g
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	2,3,4,7,8-PeCDF	0.11	U	pg/g
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	2,3,4,7,8-PeCDF	8.89		pg/g
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	2,3,4,7,8-PeCDF	0.187	U	pg/g
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	2,3,4,7,8-PeCDF	2.42	J	pg/g
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	2,3,4,7,8-PeCDF	0.198	U	pg/g
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	2,3,4,7,8-PeCDF	0.139	U	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	2,3,4,7,8-PeCDF	1.79	J	pg/g
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	2,3,4,7,8-PeCDF	4.69	J	pg/g
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	2,3,4,7,8-PeCDF	11.4		pg/g
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	2,3,4,7,8-PeCDF	2.31	J	pg/g
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	2,3,4,7,8-PeCDF	3.45	J	pg/g
SIB-SC-E30-1-2-07/23/2022	Sediment	7.41	N	1	2	2,3,4,7,8-PeCDF	9.6		pg/g
SIB-SC-E30-2-3-07/23/2022	Sediment	7.41	N	2	3	2,3,4,7,8-PeCDF	9.32		pg/g
SIB-SC-E30-3-4-07/23/2022	Sediment	7.41	N	3	4	2,3,4,7,8-PeCDF	7.27		pg/g
SIB-SC-E30-4-5-07/23/2022	Sediment	7.41	N	4	5	2,3,4,7,8-PeCDF	6.14		pg/g
SIB-SC-E30-5-6-07/23/2022	Sediment	7.41	N	5	6	2,3,4,7,8-PeCDF	3.34	J	pg/g
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	2,3,4,7,8-PeCDF	5.78		pg/g
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	2,3,4,7,8-PeCDF	4.92		pg/g
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	2,3,4,7,8-PeCDF	1.61	J	pg/g
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	2,3,4,7,8-PeCDF	14.3	J	pg/g
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	2,3,4,7,8-PeCDF	1.92	J	pg/g
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	2,3,4,7,8-PeCDF	12.1		pg/g
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	2,3,4,7,8-PeCDF	3.225	J	pg/g
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	2,3,4,7,8-PeCDF	8.73		pg/g
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	2,3,4,7,8-PeCDF	2.16	J	pg/g
SIB-SC-F21-1-2-07/24/2022	Sediment	3.89	N	1	2	2,3,4,7,8-PeCDF	16.95	J	pg/g
SIB-SC-F21-2-3-07/24/2022	Sediment	3.89	N	2	3	2,3,4,7,8-PeCDF	5.3		pg/g
SIB-SC-F22-1-2-08/17/2022	Sediment	3.66	N	1	2	2,3,4,7,8-PeCDF	5.07		pg/g
SIB-SC-F22-2-3-08/17/2022	Sediment	3.66	N	2	3	2,3,4,7,8-PeCDF	2.025	J	pg/g
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	2,3,4,7,8-PeCDF	3.75	J	pg/g
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	2,3,4,7,8-PeCDF	0.191	UJ	pg/g
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	2,3,4,7,8-PeCDF	0.215	U	pg/g
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	2,3,4,7,8-PeCDF	0.208	U	pg/g
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	2,3,4,7,8-PeCDF	2.8	J	pg/g
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	2,3,4,7,8-PeCDF	0.754	J	pg/g
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	2,3,4,7,8-PeCDF	3.47	J	pg/g
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	2,3,4,7,8-PeCDF	4.57	J	pg/g
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	2,3,4,7,8-PeCDF	12		pg/g
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	2,3,4,7,8-PeCDF	7.87		pg/g
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	2,3,4,7,8-PeCDF	7		pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	2,3,4,7,8-PeCDF	1.92	J	pg/g
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	2,3,4,7,8-PeCDF	1.02	J	pg/g
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	2,3,4,7,8-PeCDF	0.18	U	pg/g
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	2,3,4,7,8-PeCDF	3.64	J	pg/g
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	2,3,4,7,8-PeCDF	2.8	J	pg/g
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	2,3,4,7,8-PeCDF	15.7	J	pg/g
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	2,3,4,7,8-PeCDF	3.7	J	pg/g
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	2,3,4,7,8-PeCDF	12	J	pg/g
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	2,3,4,7,8-PeCDF	6.7	J	pg/g
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	2,3,4,7,8-PeCDF	9.07	J	pg/g
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	2,3,4,7,8-PeCDF	0.216	U	pg/g
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	2,3,4,7,8-PeCDF	0.161	U	pg/g
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	2,3,4,7,8-PeCDF	8.77		pg/g
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	2,3,4,7,8-PeCDF	0.948	J	pg/g
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	2,3,4,7,8-PeCDF	0.264	J	pg/g
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	2,3,4,7,8-PeCDF	0.161	J	pg/g
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	2,3,4,7,8-PeCDF	0.119	U	pg/g
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	2,3,4,7,8-PeCDF	0.164	U	pg/g
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	2,3,4,7,8-PeCDF	0.124	U	pg/g
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	2,3,4,7,8-PeCDF	9.07	J	pg/g
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	2,3,4,7,8-PeCDF	15.6	J	pg/g
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	2,3,4,7,8-PeCDF	25.9		pg/g
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	2,3,4,7,8-PeCDF	22.4	J	pg/g
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	2,3,4,7,8-PeCDF	0.985	J	pg/g
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	2,3,4,7,8-PeCDF	0.186	J	pg/g
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	2,3,4,7,8-PeCDF	0.134	U	pg/g
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	2,3,4,7,8-PeCDF	0.123	U	pg/g
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	2,3,4,7,8-PeCDF	11.1	J	pg/g
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	2,3,4,7,8-PeCDF	2.04	J	pg/g
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	2,3,4,7,8-PeCDF	6.12		pg/g
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	2,3,4,7,8-PeCDF	4.12	J	pg/g
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	2,3,4,7,8-PeCDF	2.86	J	pg/g
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	2,3,4,7,8-PeCDF	2.96	J	pg/g
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	2,3,4,7,8-PeCDF	0.759	U	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	2,3,4,7,8-PeCDF	0.284	U	pg/g
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	2,3,4,7,8-PeCDF	4.19	J	pg/g
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	2,3,4,7,8-PeCDF	4.53	J	pg/g
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	2,3,4,7,8-PeCDF	10.9		pg/g
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	2,3,4,7,8-PeCDF	11		pg/g
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	2,3,4,7,8-PeCDF	12.7		pg/g
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	2,3,4,7,8-PeCDF	5.78		pg/g
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	2,3,4,7,8-PeCDF	7.76		pg/g
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	2,3,4,7,8-PeCDF	1	U	pg/g
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	2,3,4,7,8-PeCDF	0.429	U	pg/g
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	2,3,4,7,8-PeCDF	23.4		pg/g
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	2,3,4,7,8-PeCDF	0.453	U	pg/g
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	2,3,4,7,8-PeCDF	0.352	U	pg/g
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	2,3,4,7,8-PeCDF	43.85		pg/g
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	2,3,4,7,8-PeCDF	20.5		pg/g
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	2,3,4,7,8-PeCDF	17.4	J	pg/g
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	2,3,4,7,8-PeCDF	26.7		pg/g
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	2,3,4,7,8-PeCDF	11.8		pg/g
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	2,3,4,7,8-PeCDF	0.7	U	pg/g
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	2,3,4,7,8-PeCDF	4.57	J	pg/g
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	2,3,4,7,8-PeCDF	20.7	J	pg/g
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	2,3,4,7,8-PeCDF	4.55	J	pg/g
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	2,3,4,7,8-PeCDF	4.27	J	pg/g
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	2,3,4,7,8-PeCDF	5.32		pg/g
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	2,3,4,7,8-PeCDF	11.6		pg/g
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	2,3,4,7,8-PeCDF	5.94		pg/g
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	2,3,4,7,8-PeCDF	19.8	J	pg/g
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	2,3,4,7,8-PeCDF	2.46	J	pg/g
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	2,3,4,7,8-PeCDF	1.14	J	pg/g
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	2,3,4,7,8-PeCDF	2.48	J	pg/g
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	2,3,4,7,8-PeCDF	0.677	J	pg/g
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	2,3,4,7,8-PeCDF	3.36	J	pg/g
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	2,3,4,7,8-PeCDF	1.29	J	pg/g
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	2,3,4,7,8-PeCDF	4.42	J	pg/g

Attachment B
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	2,3,4,7,8-PeCDF	3.76	J	pg/g
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	2,3,4,7,8-PeCDF	3.51	J	pg/g
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	2,3,4,7,8-PeCDF	0.134	U	pg/g
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	2,3,4,7,8-PeCDF	3.35	J	pg/g
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	2,3,4,7,8-PeCDF	0.161	U	pg/g
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	2,3,4,7,8-PeCDF	0.084	U	pg/g
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	2,3,4,7,8-PeCDF	0.11	U	pg/g
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	2,3,4,7,8-PeCDF	0.452	J	pg/g
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	2,3,4,7,8-PeCDF	0.758	J	pg/g
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	2,3,4,7,8-PeCDF	0.454	J	pg/g
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	2,3,4,7,8-PeCDF	0.166	U	pg/g
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	2,3,4,7,8-PeCDF	0.133	U	pg/g
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	2,3,4,7,8-PeCDF	0.137	U	pg/g
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	2,3,4,7,8-PeCDF	0.97	J	pg/g
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	2,3,4,7,8-PeCDF	2.03	J	pg/g
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	2,3,4,7,8-PeCDF	0.112	U	pg/g
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	2,3,4,7,8-PeCDF	0.136	U	pg/g
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	2,3,4,7,8-PeCDF	0.171	U	pg/g
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	2,3,4,7,8-PeCDF	0.112	UJ	pg/g
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	2,3,4,7,8-PeCDF	0.214	U	pg/g
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	2,3,4,7,8-PeCDF	3.44	J	pg/g
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	2,3,4,7,8-PeCDF	0.253	U	pg/g
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	2,3,4,7,8-PeCDF	0.354	U	pg/g
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	2,3,4,7,8-PeCDF	0.144	U	pg/g
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	2,3,4,7,8-PeCDF	0.188	U	pg/g
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	2,3,4,7,8-PeCDF	0.198	UJ	pg/g
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	2,3,4,7,8-PeCDF	0.211	U	pg/g
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	2,3,4,7,8-PeCDF	0.238	U	pg/g
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	2,3,4,7,8-PeCDF	0.194	U	pg/g
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	2,3,4,7,8-PeCDF	0.267	UJ	pg/g
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	2,3,4,7,8-PeCDF	1.27	J	pg/g
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	2,3,4,7,8-PeCDF	2.06	J	pg/g
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	2,3,4,7,8-PeCDF	1.98	J	pg/g
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	2,3,4,7,8-PeCDF	0.504	J	pg/g

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	2,3,4,7,8-PeCDF	0.174	U	pg/g
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	2,3,4,7,8-PeCDF	1.04	J	pg/g
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	2,3,4,7,8-PeCDF	2.09	J	pg/g
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	2,3,4,7,8-PeCDF	4.18	J	pg/g
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	2,3,4,7,8-PeCDF	2.7	J	pg/g
T1-0TO30-101518	Sediment	5.81	N	0	1	2,3,4,7,8-PeCDF	0.000051	UJ	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	2,3,4,7,8-PeCDF	0.0021	J	µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	2,3,4,7,8-PeCDF	0.0025	J	µg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	2,3,4,7,8-PeCDF	0.0066	J	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	2,3,4,7,8-PeCDF	0.44	U	pg/g
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	2,3,4,7,8-PeCDF	1.31	U	pg/g
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	2,3,4,7,8-PeCDF	0.818	U	pg/g
A1-0TO30-102018	Sediment	5.65	N	0	1	2,3,7,8-TCDD	0.00016	U	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	2,3,7,8-TCDD	0.00045	U	µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	2,3,7,8-TCDD	0.00047	U	µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	2,3,7,8-TCDD	0.000078	JU	µg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	2,3,7,8-TCDD	0.00034	U	µg/kg
B-9.00-0TO29-102418	Sediment	3.03	N	0	1	2,3,7,8-TCDD	0.00074	J	µg/kg
C-8.94-0TO27-102418	Sediment	6.38	N	0	0.9	2,3,7,8-TCDD	0.00061	U	µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	2,3,7,8-TCDD	0.00013	U	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	2,3,7,8-TCDD	0.00071	J	µg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	2,3,7,8-TCDD	0.001	UJ	µg/kg
D-8.83-0TO25-102418	Sediment	2.42	N	0	0.8	2,3,7,8-TCDD	0.00076	U	µg/kg
D-8.90-0TO27-102418	Sediment	5.15	N	0	0.9	2,3,7,8-TCDD	0.0013	J	µg/kg
D-8.90-SC-00TO10-102318	Sediment	5.11	N	0	1	2,3,7,8-TCDD	0.0012		µg/kg
D-8.90-SC-10TO20-102318	Sediment	5.11	N	1	2	2,3,7,8-TCDD	0.0011	J	µg/kg
D-8.90-SC-20TO40-102318	Sediment	5.11	N	2	4	2,3,7,8-TCDD	0.0015	J	µg/kg
E-8.99-0TO28-102418	Sediment	6.32	N	0	0.9	2,3,7,8-TCDD	0.00095	J	µg/kg
E-9.02-0TO26-102418	Sediment	2.84	N	0	0.9	2,3,7,8-TCDD	0.0011	J	µg/kg
E-9.02-SC-00TO10-102318	Sediment	6.38	N	0	1	2,3,7,8-TCDD	0.00041	U	µg/kg
E-9.02-SC-10TO20-102318	Sediment	6.38	N	1	2	2,3,7,8-TCDD	0.0013		µg/kg
E-9.02-SC-20TO40-102318	Sediment	6.38	N	2	4	2,3,7,8-TCDD	0.0016		µg/kg
E-9.02-SC-40TO60-102318	Sediment	6.38	N	4	6	2,3,7,8-TCDD	0.0014		µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	2,3,7,8-TCDD	0.000093	JU	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
F2-0TO19-101018	Sediment	5.10	N	0	0.6	2,3,7,8-TCDD	0.00039	J	µg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	2,3,7,8-TCDD	0.00077	J	µg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	2,3,7,8-TCDD	0.00053	U	µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	2,3,7,8-TCDD	0.00043	U	µg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	2,3,7,8-TCDD	0.00073	J	µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	2,3,7,8-TCDD	0.00011	U	µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	2,3,7,8-TCDD	0.00052	J	µg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	2,3,7,8-TCDD	0.00022	J	µg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	2,3,7,8-TCDD	0.00014	J	µg/kg
J3-SC1B-20TO30-82719	Sediment	5.73	N	2	3	2,3,7,8-TCDD	0.00091	U	µg/kg
J3-SC1B-30TO40-82719	Sediment	5.73	N	3	4	2,3,7,8-TCDD	0.0005	J	µg/kg
J3-SC1B-40TO50-82719	Sediment	5.73	N	4	5	2,3,7,8-TCDD	0.00092	U	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	2,3,7,8-TCDD	0.0011		µg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	2,3,7,8-TCDD	0.00068	J	µg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	2,3,7,8-TCDD	0.0002	J	µg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	2,3,7,8-TCDD	0.0016		µg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	2,3,7,8-TCDD	0.0014		µg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	2,3,7,8-TCDD	0.000902	J	µg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	2,3,7,8-TCDD	0.00011	J	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	2,3,7,8-TCDD	0.00028	J	µg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	2,3,7,8-TCDD	0.00022	J	µg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	2,3,7,8-TCDD	0.000062	U	µg/kg
L3-SC1B-20TO30-82619	Sediment	7.22	N	2	3	2,3,7,8-TCDD	0.00098	U	µg/kg
L3-SC1B-30TO40-82619	Sediment	7.22	N	3	4	2,3,7,8-TCDD	0.00095	U	µg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	2,3,7,8-TCDD	0.000065	U	µg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	2,3,7,8-TCDD	0.0006	J	µg/kg
LW2-C426-A	Sediment	6.87	N	0	1	2,3,7,8-TCDD	0.000168	J	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	2,3,7,8-TCDD	0.00009	U	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	2,3,7,8-TCDD	0.000066	U	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	2,3,7,8-TCDD	0.000012	U	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	2,3,7,8-TCDD	0.000008	U	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	2,3,7,8-TCDD	0.0000366	U	µg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	2,3,7,8-TCDD	0.000038	U	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	2,3,7,8-TCDD	0.00048	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
N7-0TO27-101418	Sediment	4.03	N	0	0.9	2,3,7,8-TCDD	0.00062	J	µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	2,3,7,8-TCDD	0.00066	U	µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	2,3,7,8-TCDD	0.000055	U	µg/kg
PDI-SC-S188-0TO1.5	Sediment	6.04	N	0	1	2,3,7,8-TCDD	0.00095	J	µg/kg
PDI-SC-S191-0TO2	Sediment	6.59	N	0	2	2,3,7,8-TCDD	0.00077	NJ	µg/kg
PDI-SC-S191-2TO4	Sediment	6.59	N	2	4	2,3,7,8-TCDD	0.0013		µg/kg
PDI-SC-S191-4TO6	Sediment	6.59	N	4	6	2,3,7,8-TCDD	0.0026		µg/kg
PDI-SC-S192-0TO1.5	Sediment	8.19	N	0	1	2,3,7,8-TCDD	0.0057	J	µg/kg
PDI-SC-S192-1.5TO3	Sediment	8.19	N	1	3	2,3,7,8-TCDD	0.0036		µg/kg
PDI-SC-S192-3TO4.2	Sediment	8.19	N	3	4	2,3,7,8-TCDD	0.0003	NJ	µg/kg
PDI-SC-S229-0TO2	Sediment	2.78	N	0	2	2,3,7,8-TCDD	0.0011	NJ	µg/kg
PDI-SC-S230-0TO2	Sediment	6.26	N	0	2	2,3,7,8-TCDD	0.0012		µg/kg
PDI-SC-S230-2TO4	Sediment	6.26	N	2	4	2,3,7,8-TCDD	0.0013		µg/kg
PDI-SC-S230-4TO6	Sediment	6.26	N	4	6	2,3,7,8-TCDD	0.00093	J	µg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	2,3,7,8-TCDD	0.00046	JN	µg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	2,3,7,8-TCDD	0.0003	JN	µg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	2,3,7,8-TCDD	0.00012	JN	µg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	2,3,7,8-TCDD	0.00051	J	µg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	2,3,7,8-TCDD	0.0008	J	µg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	2,3,7,8-TCDD	0.00096	J	µg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	2,3,7,8-TCDD	0.0011	J	µg/kg
PDI-SG-S168	Sediment	11.36	N	0	30	2,3,7,8-TCDD	0.00029	NJ	µg/kg
PDI-SG-S175	Sediment	10.83	N	0	30	2,3,7,8-TCDD	0.0002	NJ	µg/kg
PDI-SG-S182	Sediment	1.15	N	0	30	2,3,7,8-TCDD	0.0029	U	µg/kg
PDI-SG-S183	Sediment	6.81	N	0	27	2,3,7,8-TCDD	0.00057	NJ	µg/kg
PDI-SG-S184	Sediment	14.30	N	0	28	2,3,7,8-TCDD	0.0027		µg/kg
PDI-SG-S191	Sediment	5.82	N	0	26	2,3,7,8-TCDD	0.0023		µg/kg
PDI-SG-S199	Sediment	7.43	N	0	18	2,3,7,8-TCDD	0.000076	U	µg/kg
PDI-SG-S201	Sediment	2.37	N	0	30	2,3,7,8-TCDD	0.0012	J	µg/kg
PDI-SG-S204	Sediment	0.96	N	0	17	2,3,7,8-TCDD	0.00022	NJ	µg/kg
PDI-SG-S211	Sediment	2.21	N	0	30	2,3,7,8-TCDD	0.00071	NJ	µg/kg
PDI-SG-S214	Sediment	14.23	N	0	15	2,3,7,8-TCDD	0.0011		µg/kg
PDI-SG-S215	Sediment	3.28	N	0	30	2,3,7,8-TCDD	0.00056	NJ	µg/kg
PDI-SG-S216	Sediment	1.43	N	0	30	2,3,7,8-TCDD	0.00074	NJ	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SG-S220	Sediment	3.87	N	0	30	2,3,7,8-TCDD	0.00046	NJ	µg/kg
PDI-SG-S223	Sediment	4.48	N	0	23	2,3,7,8-TCDD	0.0007	NJ	µg/kg
PDI-SG-S224	Sediment	4.49	N	0	24	2,3,7,8-TCDD	0.00035	NJ	µg/kg
PDI-SG-S225	Sediment	1.58	N	0	25	2,3,7,8-TCDD	0.00058	NJ	µg/kg
PDI-SG-S229	Sediment	2.55	N	0	28	2,3,7,8-TCDD	0.0013	J	µg/kg
PDI-SG-S230	Sediment	6.15	N	0	27	2,3,7,8-TCDD	0.00075	NJ	µg/kg
PDI-SG-S231	Sediment	6.54	N	0	28	2,3,7,8-TCDD	0.00074	J	µg/kg
PDI-SG-S233	Sediment	8.78	N	0	24	2,3,7,8-TCDD	0.00092	NJ	µg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	2,3,7,8-TCDD	0.00015	U	µg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	2,3,7,8-TCDD	0.001	U	µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	2,3,7,8-TCDD	0.000044	U	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	2,3,7,8-TCDD	0.396	U	pg/g
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	2,3,7,8-TCDD	0.257	U	pg/g
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	2,3,7,8-TCDD	0.291	U	pg/g
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	2,3,7,8-TCDD	0.473	U	pg/g
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	2,3,7,8-TCDD	0.254	U	pg/g
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	2,3,7,8-TCDD	0.234	U	pg/g
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	2,3,7,8-TCDD	0.491	U	pg/g
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	2,3,7,8-TCDD	0.366	U	pg/g
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	2,3,7,8-TCDD	0.254	U	pg/g
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	2,3,7,8-TCDD	0.491	U	pg/g
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	2,3,7,8-TCDD	0.791	J	pg/g
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	2,3,7,8-TCDD	0.489	U	pg/g
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	2,3,7,8-TCDD	0.4	U	pg/g
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	2,3,7,8-TCDD	0.737	J	pg/g
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	2,3,7,8-TCDD	0.854	U	pg/g
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	2,3,7,8-TCDD	0.214	U	pg/g
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	2,3,7,8-TCDD	0.722	U	pg/g
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	2,3,7,8-TCDD	0.278	U	pg/g
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	2,3,7,8-TCDD	0.416	U	pg/g
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	2,3,7,8-TCDD	0.648	J	pg/g
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	2,3,7,8-TCDD	2.6		pg/g
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	2,3,7,8-TCDD	0.22	U	pg/g
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	2,3,7,8-TCDD	0.272	U	pg/g

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	2,3,7,8-TCDD	0.26	U	pg/g
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	2,3,7,8-TCDD	0.356	U	pg/g
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	2,3,7,8-TCDD	0.314	U	pg/g
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	2,3,7,8-TCDD	0.516		pg/g
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	2,3,7,8-TCDD	0.448	J	pg/g
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	2,3,7,8-TCDD	0.374	U	pg/g
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	2,3,7,8-TCDD	0.189	U	pg/g
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	2,3,7,8-TCDD	0.502		pg/g
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	2,3,7,8-TCDD	1.82	J	pg/g
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	2,3,7,8-TCDD	0.315	U	pg/g
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	2,3,7,8-TCDD	0.401	U	pg/g
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	2,3,7,8-TCDD	0.294	U	pg/g
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	2,3,7,8-TCDD	3.33	J	pg/g
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	2,3,7,8-TCDD	0.277	U	pg/g
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	2,3,7,8-TCDD	0.314	U	pg/g
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	2,3,7,8-TCDD	0.211	U	pg/g
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	2,3,7,8-TCDD	0.785	UJ	pg/g
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	2,3,7,8-TCDD	0.261	U	pg/g
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	2,3,7,8-TCDD	0.352	U	pg/g
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	2,3,7,8-TCDD	0.23	U	pg/g
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	2,3,7,8-TCDD	0.348	U	pg/g
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	2,3,7,8-TCDD	0.167	J	pg/g
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	2,3,7,8-TCDD	0.167	U	pg/g
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	2,3,7,8-TCDD	0.12	U	pg/g
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	2,3,7,8-TCDD	0.224	U	pg/g
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	2,3,7,8-TCDD	0.202	U	pg/g
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	2,3,7,8-TCDD	0.254	U	pg/g
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	2,3,7,8-TCDD	0.162	U	pg/g
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	2,3,7,8-TCDD	0.358	U	pg/g
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	2,3,7,8-TCDD	0.515		pg/g
SIB-098-OHW-1-2-10072022	Sediment	8.22	N	1	2	2,3,7,8-TCDD	0.33	U	pg/g
SIB-098-OHW-2-3-10072022	Sediment	8.22	N	2	3	2,3,7,8-TCDD	0.466	U	pg/g
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	2,3,7,8-TCDD	0.146	U	pg/g
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	2,3,7,8-TCDD	0.218	U	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	2,3,7,8-TCDD	0.113	U	pg/g
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	2,3,7,8-TCDD	0.128	U	pg/g
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	2,3,7,8-TCDD	0.115	U	pg/g
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	2,3,7,8-TCDD	0.234	U	pg/g
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	2,3,7,8-TCDD	0.206	U	pg/g
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	2,3,7,8-TCDD	0.17	U	pg/g
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	2,3,7,8-TCDD	0.0916	U	pg/g
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	2,3,7,8-TCDD	0.461	J	pg/g
SIB-103-OHW-1-2-10062022	Sediment	3.26	N	1	2	2,3,7,8-TCDD	0.0785	U	pg/g
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	2,3,7,8-TCDD	0.418	U	pg/g
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	2,3,7,8-TCDD	0.206	J	pg/g
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	2,3,7,8-TCDD	0.173	J	pg/g
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	2,3,7,8-TCDD	0.203	U	pg/g
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	2,3,7,8-TCDD	0.39	U	pg/g
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	2,3,7,8-TCDD	0.363	J	pg/g
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	2,3,7,8-TCDD	0.93	U	pg/g
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	2,3,7,8-TCDD	0.113	U	pg/g
SIB-110-MLW-1-2-10052022	Sediment	7.81	N	1	2	2,3,7,8-TCDD	0.0819	U	pg/g
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	2,3,7,8-TCDD	0.305	U	pg/g
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	2,3,7,8-TCDD	1.09		pg/g
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	2,3,7,8-TCDD	0.184	U	pg/g
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	2,3,7,8-TCDD	0.226	U	pg/g
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	2,3,7,8-TCDD	0.186	U	pg/g
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	2,3,7,8-TCDD	0.29	U	pg/g
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	2,3,7,8-TCDD	0.178	J	pg/g
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	2,3,7,8-TCDD	0.233	U	pg/g
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	2,3,7,8-TCDD	0.313	U	pg/g
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	2,3,7,8-TCDD	0.491	J	pg/g
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	2,3,7,8-TCDD	0.467	U	pg/g
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	2,3,7,8-TCDD	0.412	U	pg/g
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	2,3,7,8-TCDD	0.182	U	pg/g
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	2,3,7,8-TCDD	0.24	U	pg/g
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	2,3,7,8-TCDD	0.316	U	pg/g
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	2,3,7,8-TCDD	0.355	U	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	2,3,7,8-TCDD	0.264	U	pg/g
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	2,3,7,8-TCDD	0.939	U	pg/g
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	2,3,7,8-TCDD	0.136	U	pg/g
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	2,3,7,8-TCDD	0.123	U	pg/g
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	2,3,7,8-TCDD	0.131	U	pg/g
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	2,3,7,8-TCDD	0.102	U	pg/g
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	2,3,7,8-TCDD	0.102	U	pg/g
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	2,3,7,8-TCDD	0.432	U	pg/g
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	2,3,7,8-TCDD	0.456	U	pg/g
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	2,3,7,8-TCDD	0.441	U	pg/g
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	2,3,7,8-TCDD	0.458	U	pg/g
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	2,3,7,8-TCDD	0.362	U	pg/g
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	2,3,7,8-TCDD	0.404	U	pg/g
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	2,3,7,8-TCDD	0.46	U	pg/g
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	2,3,7,8-TCDD	0.519	U	pg/g
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	2,3,7,8-TCDD	0.394	U	pg/g
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	2,3,7,8-TCDD	0.326	U	pg/g
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	2,3,7,8-TCDD	0.463	U	pg/g
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	2,3,7,8-TCDD	0.366	U	pg/g
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	2,3,7,8-TCDD	0.365	U	pg/g
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	2,3,7,8-TCDD	0.293	U	pg/g
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	2,3,7,8-TCDD	0.254	U	pg/g
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	2,3,7,8-TCDD	0.356	U	pg/g
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	2,3,7,8-TCDD	0.311	U	pg/g
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	2,3,7,8-TCDD	0.3	U	pg/g
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	2,3,7,8-TCDD	0.515	U	pg/g
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	2,3,7,8-TCDD	0.189	U	pg/g
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	2,3,7,8-TCDD	0.317	U	pg/g
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	2,3,7,8-TCDD	0.239	U	pg/g
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	2,3,7,8-TCDD	0.38	U	pg/g
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	2,3,7,8-TCDD	0.246	U	pg/g
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	2,3,7,8-TCDD	0.234	U	pg/g
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	2,3,7,8-TCDD	0.326	U	pg/g
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	2,3,7,8-TCDD	0.266	U	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	2,3,7,8-TCDD	0.221	U	pg/g
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	2,3,7,8-TCDD	0.392	U	pg/g
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	2,3,7,8-TCDD	0.306	U	pg/g
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	2,3,7,8-TCDD	0.0829	U	pg/g
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	2,3,7,8-TCDD	1.13		pg/g
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	2,3,7,8-TCDD	0.162	J	pg/g
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	2,3,7,8-TCDD	0.7	J	pg/g
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	2,3,7,8-TCDD	0.367	U	pg/g
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	2,3,7,8-TCDD	0.486	U	pg/g
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	2,3,7,8-TCDD	0.38	U	pg/g
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	2,3,7,8-TCDD	0.447	U	pg/g
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	2,3,7,8-TCDD	0.407	U	pg/g
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	2,3,7,8-TCDD	0.457	U	pg/g
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	2,3,7,8-TCDD	0.364	U	pg/g
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	2,3,7,8-TCDD	0.352	U	pg/g
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	2,3,7,8-TCDD	0.303	J	pg/g
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	2,3,7,8-TCDD	0.624	U	pg/g
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	2,3,7,8-TCDD	0.393	U	pg/g
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	2,3,7,8-TCDD	0.404	J	pg/g
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	2,3,7,8-TCDD	0.558		pg/g
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	2,3,7,8-TCDD	0.798		pg/g
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	2,3,7,8-TCDD	0.938		pg/g
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	2,3,7,8-TCDD	1.73		pg/g
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	2,3,7,8-TCDD	2.15		pg/g
SIB-SC-C25-0-1-07/23/2022	Sediment	4.21	N	0	1	2,3,7,8-TCDD	0.621		pg/g
SIB-SC-C25-1-2-07/23/2022	Sediment	4.21	N	1	2	2,3,7,8-TCDD	0.914	J	pg/g
SIB-SC-C25-2-3-07/23/2022	Sediment	4.21	N	2	3	2,3,7,8-TCDD	0.401	J	pg/g
SIB-SC-C25-3-4-07/23/2022	Sediment	4.21	N	3	4	2,3,7,8-TCDD	1.59		pg/g
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	2,3,7,8-TCDD	0.728	J	pg/g
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	2,3,7,8-TCDD	1.63		pg/g
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	2,3,7,8-TCDD	1.52		pg/g
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	2,3,7,8-TCDD	1.08	J	pg/g
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	2,3,7,8-TCDD	1.74		pg/g
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	2,3,7,8-TCDD	0.949	J	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	2,3,7,8-TCDD	1.73	J	pg/g
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	2,3,7,8-TCDD	1.66		pg/g
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	2,3,7,8-TCDD	2.07		pg/g
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	2,3,7,8-TCDD	0.325	U	pg/g
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	2,3,7,8-TCDD	1.07	J	pg/g
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	2,3,7,8-TCDD	1.2		pg/g
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	2,3,7,8-TCDD	1.4		pg/g
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	2,3,7,8-TCDD	0.291	U	pg/g
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	2,3,7,8-TCDD	0.4	U	pg/g
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	2,3,7,8-TCDD	0.54		pg/g
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	2,3,7,8-TCDD	0.769		pg/g
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	2,3,7,8-TCDD	1.41		pg/g
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	2,3,7,8-TCDD	0.309	J	pg/g
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	2,3,7,8-TCDD	0.207	J	pg/g
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	2,3,7,8-TCDD	0.223	U	pg/g
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	2,3,7,8-TCDD	0.405	J	pg/g
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	2,3,7,8-TCDD	0.406	J	pg/g
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	2,3,7,8-TCDD	1.4		pg/g
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	2,3,7,8-TCDD	1.24		pg/g
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	2,3,7,8-TCDD	1.4		pg/g
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	2,3,7,8-TCDD	0.538	J	pg/g
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	2,3,7,8-TCDD	0.845		pg/g
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	2,3,7,8-TCDD	1.38		pg/g
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	2,3,7,8-TCDD	0.868		pg/g
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	2,3,7,8-TCDD	0.487	U	pg/g
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	2,3,7,8-TCDD	0.25	J	pg/g
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	2,3,7,8-TCDD	0.748		pg/g
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	2,3,7,8-TCDD	1.04		pg/g
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	2,3,7,8-TCDD	1.23		pg/g
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	2,3,7,8-TCDD	0.268	U	pg/g
SIB-SC-E25-1-2-07/23/2022	Sediment	3.42	N	1	2	2,3,7,8-TCDD	0.68		pg/g
SIB-SC-E25-2-3-07/23/2022	Sediment	3.42	N	2	3	2,3,7,8-TCDD	0.438	U	pg/g
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	2,3,7,8-TCDD	0.469	J	pg/g
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	2,3,7,8-TCDD	1.3		pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	2,3,7,8-TCDD	0.247	J	pg/g
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	2,3,7,8-TCDD	0.225	U	pg/g
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	2,3,7,8-TCDD	0.181	U	pg/g
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	2,3,7,8-TCDD	1.49		pg/g
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	2,3,7,8-TCDD	0.163	U	pg/g
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	2,3,7,8-TCDD	0.291	J	pg/g
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	2,3,7,8-TCDD	0.198	U	pg/g
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	2,3,7,8-TCDD	0.222	U	pg/g
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	2,3,7,8-TCDD	0.366	J	pg/g
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	2,3,7,8-TCDD	1.07		pg/g
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	2,3,7,8-TCDD	2.63		pg/g
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	2,3,7,8-TCDD	0.402	J	pg/g
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	2,3,7,8-TCDD	0.495	J	pg/g
SIB-SC-E30-1-2-07/23/2022	Sediment	7.41	N	1	2	2,3,7,8-TCDD	1.47		pg/g
SIB-SC-E30-2-3-07/23/2022	Sediment	7.41	N	2	3	2,3,7,8-TCDD	2.09		pg/g
SIB-SC-E30-3-4-07/23/2022	Sediment	7.41	N	3	4	2,3,7,8-TCDD	1.86		pg/g
SIB-SC-E30-4-5-07/23/2022	Sediment	7.41	N	4	5	2,3,7,8-TCDD	1.25		pg/g
SIB-SC-E30-5-6-07/23/2022	Sediment	7.41	N	5	6	2,3,7,8-TCDD	0.85		pg/g
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	2,3,7,8-TCDD	1.39	J	pg/g
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	2,3,7,8-TCDD	0.481		pg/g
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	2,3,7,8-TCDD	0.253	U	pg/g
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	2,3,7,8-TCDD	9.63	U	pg/g
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	2,3,7,8-TCDD	0.464	J	pg/g
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	2,3,7,8-TCDD	2.4		pg/g
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	2,3,7,8-TCDD	0.704	J	pg/g
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	2,3,7,8-TCDD	0.369	J	pg/g
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	2,3,7,8-TCDD	0.261	U	pg/g
SIB-SC-F21-1-2-07/24/2022	Sediment	3.89	N	1	2	2,3,7,8-TCDD	0.885		pg/g
SIB-SC-F21-2-3-07/24/2022	Sediment	3.89	N	2	3	2,3,7,8-TCDD	0.468	J	pg/g
SIB-SC-F22-1-2-08/17/2022	Sediment	3.66	N	1	2	2,3,7,8-TCDD	0.882	U	pg/g
SIB-SC-F22-2-3-08/17/2022	Sediment	3.66	N	2	3	2,3,7,8-TCDD	0.366	U	pg/g
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	2,3,7,8-TCDD	0.375	J	pg/g
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	2,3,7,8-TCDD	0.295	UJ	pg/g
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	2,3,7,8-TCDD	0.34	U	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	2,3,7,8-TCDD	0.229	U	pg/g
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	2,3,7,8-TCDD	0.396	J	pg/g
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	2,3,7,8-TCDD	0.244	J	pg/g
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	2,3,7,8-TCDD	0.472	J	pg/g
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	2,3,7,8-TCDD	0.89		pg/g
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	2,3,7,8-TCDD	1.08	J	pg/g
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	2,3,7,8-TCDD	0.511		pg/g
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	2,3,7,8-TCDD	0.369	J	pg/g
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	2,3,7,8-TCDD	0.285	U	pg/g
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	2,3,7,8-TCDD	0.292	U	pg/g
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	2,3,7,8-TCDD	0.126	U	pg/g
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	2,3,7,8-TCDD	0.668		pg/g
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	2,3,7,8-TCDD	0.418	J	pg/g
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	2,3,7,8-TCDD	3.81	J	pg/g
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	2,3,7,8-TCDD	0.715		pg/g
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	2,3,7,8-TCDD	1.78	U	pg/g
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	2,3,7,8-TCDD	1.61	J	pg/g
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	2,3,7,8-TCDD	1.52	U	pg/g
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	2,3,7,8-TCDD	0.273	U	pg/g
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	2,3,7,8-TCDD	0.262	U	pg/g
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	2,3,7,8-TCDD	1.83		pg/g
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	2,3,7,8-TCDD	0.353	U	pg/g
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	2,3,7,8-TCDD	0.272	U	pg/g
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	2,3,7,8-TCDD	0.18	U	pg/g
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	2,3,7,8-TCDD	0.261	U	pg/g
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	2,3,7,8-TCDD	0.394	U	pg/g
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	2,3,7,8-TCDD	0.259	J	pg/g
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	2,3,7,8-TCDD	1.685	J	pg/g
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	2,3,7,8-TCDD	2.93		pg/g
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	2,3,7,8-TCDD	2.97		pg/g
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	2,3,7,8-TCDD	4.11		pg/g
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	2,3,7,8-TCDD	0.29	U	pg/g
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	2,3,7,8-TCDD	0.196	U	pg/g
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	2,3,7,8-TCDD	0.127	U	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	2,3,7,8-TCDD	0.183	U	pg/g
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	2,3,7,8-TCDD	2.18	J	pg/g
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	2,3,7,8-TCDD	0.386	U	pg/g
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	2,3,7,8-TCDD	1.07		pg/g
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	2,3,7,8-TCDD	0.735		pg/g
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	2,3,7,8-TCDD	0.912		pg/g
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	2,3,7,8-TCDD	0.781		pg/g
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	2,3,7,8-TCDD	0.399	U	pg/g
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	2,3,7,8-TCDD	0.31	U	pg/g
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	2,3,7,8-TCDD	0.506		pg/g
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	2,3,7,8-TCDD	1.08	J	pg/g
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	2,3,7,8-TCDD	2.28		pg/g
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	2,3,7,8-TCDD	2.25		pg/g
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	2,3,7,8-TCDD	1.96		pg/g
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	2,3,7,8-TCDD	1.26		pg/g
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	2,3,7,8-TCDD	1.12		pg/g
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	2,3,7,8-TCDD	0.441	U	pg/g
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	2,3,7,8-TCDD	0.467	U	pg/g
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	2,3,7,8-TCDD	0.879		pg/g
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	2,3,7,8-TCDD	0.377	U	pg/g
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	2,3,7,8-TCDD	0.474	U	pg/g
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	2,3,7,8-TCDD	5.365	J	pg/g
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	2,3,7,8-TCDD	3.03		pg/g
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	2,3,7,8-TCDD	2.8		pg/g
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	2,3,7,8-TCDD	4.61		pg/g
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	2,3,7,8-TCDD	1.32	J	pg/g
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	2,3,7,8-TCDD	0.224	U	pg/g
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	2,3,7,8-TCDD	5.19		pg/g
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	2,3,7,8-TCDD	3.37	J	pg/g
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	2,3,7,8-TCDD	0.674		pg/g
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	2,3,7,8-TCDD	0.755		pg/g
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	2,3,7,8-TCDD	1.27		pg/g
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	2,3,7,8-TCDD	2.25		pg/g
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	2,3,7,8-TCDD	0.792		pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	2,3,7,8-TCDD	4.93		pg/g
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	2,3,7,8-TCDD	0.474	J	pg/g
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	2,3,7,8-TCDD	0.369	J	pg/g
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	2,3,7,8-TCDD	0.799	J	pg/g
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	2,3,7,8-TCDD	0.211	J	pg/g
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	2,3,7,8-TCDD	1.09		pg/g
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	2,3,7,8-TCDD	0.421	J	pg/g
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	2,3,7,8-TCDD	1.15		pg/g
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	2,3,7,8-TCDD	0.851		pg/g
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	2,3,7,8-TCDD	0.577	J	pg/g
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	2,3,7,8-TCDD	0.242	U	pg/g
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	2,3,7,8-TCDD	0.438	U	pg/g
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	2,3,7,8-TCDD	0.281	U	pg/g
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	2,3,7,8-TCDD	0.205	U	pg/g
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	2,3,7,8-TCDD	0.299	U	pg/g
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	2,3,7,8-TCDD	0.438	U	pg/g
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	2,3,7,8-TCDD	1.36		pg/g
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	2,3,7,8-TCDD	0.286	U	pg/g
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	2,3,7,8-TCDD	0.46	U	pg/g
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	2,3,7,8-TCDD	0.452	U	pg/g
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	2,3,7,8-TCDD	0.267	U	pg/g
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	2,3,7,8-TCDD	0.279	U	pg/g
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	2,3,7,8-TCDD	0.374	J	pg/g
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	2,3,7,8-TCDD	0.267	U	pg/g
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	2,3,7,8-TCDD	0.321	U	pg/g
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	2,3,7,8-TCDD	0.392	U	pg/g
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	2,3,7,8-TCDD	0.171	U	pg/g
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	2,3,7,8-TCDD	0.236	U	pg/g
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	2,3,7,8-TCDD	0.514	U	pg/g
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	2,3,7,8-TCDD	0.391	J	pg/g
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	2,3,7,8-TCDD	0.224	U	pg/g
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	2,3,7,8-TCDD	0.133	U	pg/g
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	2,3,7,8-TCDD	0.261	U	pg/g
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	2,3,7,8-TCDD	0.484	U	pg/g

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	2,3,7,8-TCDD	0.492	U	pg/g
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	2,3,7,8-TCDD	0.445	U	pg/g
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	2,3,7,8-TCDD	0.475	U	pg/g
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	2,3,7,8-TCDD	0.575		pg/g
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	2,3,7,8-TCDD	0.514	J	pg/g
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	2,3,7,8-TCDD	0.412	U	pg/g
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	2,3,7,8-TCDD	0.737	J	pg/g
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	2,3,7,8-TCDD	0.164	U	pg/g
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	2,3,7,8-TCDD	0.133	U	pg/g
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	2,3,7,8-TCDD	0.415	J	pg/g
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	2,3,7,8-TCDD	0.751		pg/g
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	2,3,7,8-TCDD	1.09	J	pg/g
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	2,3,7,8-TCDD	1.07	J	pg/g
T1-0TO30-101518	Sediment	5.81	N	0	1	2,3,7,8-TCDD	0.000022	U	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	2,3,7,8-TCDD	0.00065	J	µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	2,3,7,8-TCDD	0.0004	U	µg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	2,3,7,8-TCDD	0.0006	J	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	2,3,7,8-TCDD	0.311	U	pg/g
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	2,3,7,8-TCDD	0.548	J	pg/g
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	2,3,7,8-TCDD	0.398	U	pg/g
A1-0TO30-102018	Sediment	5.65	N	0	1	2,3,7,8-TCDF	0.00011	U	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	2,3,7,8-TCDF	0.0017		µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	2,3,7,8-TCDF	0.0027		µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	2,3,7,8-TCDF	0.000316	J	µg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	2,3,7,8-TCDF	0.0017		µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	2,3,7,8-TCDF	0.00045	J	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	2,3,7,8-TCDF	0.0026		µg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	2,3,7,8-TCDF	0.003		µg/kg
E-9.02-0TO26-102418	Sediment	2.84	N	0	0.9	2,3,7,8-TCDF	0.0055		µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	2,3,7,8-TCDF	0.000163	J	µg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	2,3,7,8-TCDF	0.00053	J	µg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	2,3,7,8-TCDF	0.0025		µg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	2,3,7,8-TCDF	0.0036		µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	2,3,7,8-TCDF	0.0013		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
H7-0TO24-101218	Sediment	1.35	N	0	0.8	2,3,7,8-TCDF	0.0023		µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	2,3,7,8-TCDF	0.0004	J	µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	2,3,7,8-TCDF	0.0014		µg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	2,3,7,8-TCDF	0.00066	J	µg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	2,3,7,8-TCDF	0.00035	J	µg/kg
J3-SC1B-20TO30-82719	Sediment	5.73	N	2	3	2,3,7,8-TCDF	0.00091	U	µg/kg
J3-SC1B-30TO40-82719	Sediment	5.73	N	3	4	2,3,7,8-TCDF	0.001		µg/kg
J3-SC1B-40TO50-82719	Sediment	5.73	N	4	5	2,3,7,8-TCDF	0.00035	U	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	2,3,7,8-TCDF	0.0019		µg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	2,3,7,8-TCDF	0.0012		µg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	2,3,7,8-TCDF	0.0015		µg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	2,3,7,8-TCDF	0.0048		µg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	2,3,7,8-TCDF	0.0036		µg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	2,3,7,8-TCDF	0.00308		µg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	2,3,7,8-TCDF	0.00043	J	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	2,3,7,8-TCDF	0.00026	J	µg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	2,3,7,8-TCDF	0.000743	J	µg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	2,3,7,8-TCDF	0.00029	UJ	µg/kg
L3-SC1B-20TO30-82619	Sediment	7.22	N	2	3	2,3,7,8-TCDF	0.0005	J	µg/kg
L3-SC1B-30TO40-82619	Sediment	7.22	N	3	4	2,3,7,8-TCDF	0.00048	J	µg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	2,3,7,8-TCDF	0.00042	UJ	µg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	2,3,7,8-TCDF	0.0012	J	µg/kg
LW2-C426-A	Sediment	6.87	N	0	1	2,3,7,8-TCDF	0.00088		µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	2,3,7,8-TCDF	0.000275		µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	2,3,7,8-TCDF	0.000368	J	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	2,3,7,8-TCDF	0.0002	U	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	2,3,7,8-TCDF	0.000125	U	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	2,3,7,8-TCDF	0.0000347	U	µg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	2,3,7,8-TCDF	0.000095	UJ	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	2,3,7,8-TCDF	0.0016		µg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	2,3,7,8-TCDF	0.0015		µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	2,3,7,8-TCDF	0.0023		µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	2,3,7,8-TCDF	0.00015	UJ	µg/kg
PDI-SC-S188-0TO1.5	Sediment	6.04	N	0	1	2,3,7,8-TCDF	0.013		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SC-S191-0TO2	Sediment	6.59	N	0	2	2,3,7,8-TCDF	0.0073		µg/kg
PDI-SC-S191-2TO4	Sediment	6.59	N	2	4	2,3,7,8-TCDF	0.0067		µg/kg
PDI-SC-S191-4TO6	Sediment	6.59	N	4	6	2,3,7,8-TCDF	0.005		µg/kg
PDI-SC-S192-0TO1.5	Sediment	8.19	N	0	1	2,3,7,8-TCDF	0.032	J	µg/kg
PDI-SC-S192-1.5TO3	Sediment	8.19	N	1	3	2,3,7,8-TCDF	0.018		µg/kg
PDI-SC-S192-3TO4.2	Sediment	8.19	N	3	4	2,3,7,8-TCDF	0.0015		µg/kg
PDI-SC-S229-0TO2	Sediment	2.78	N	0	2	2,3,7,8-TCDF	0.0047		µg/kg
PDI-SC-S230-0TO2	Sediment	6.26	N	0	2	2,3,7,8-TCDF	0.0053		µg/kg
PDI-SC-S230-2TO4	Sediment	6.26	N	2	4	2,3,7,8-TCDF	0.0044		µg/kg
PDI-SC-S230-4TO6	Sediment	6.26	N	4	6	2,3,7,8-TCDF	0.0023		µg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	2,3,7,8-TCDF	0.0048		µg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	2,3,7,8-TCDF	0.00058	J	µg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	2,3,7,8-TCDF	0.00052	J	µg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	2,3,7,8-TCDF	0.0015		µg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	2,3,7,8-TCDF	0.0033		µg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	2,3,7,8-TCDF	0.0037		µg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	2,3,7,8-TCDF	0.0027	J	µg/kg
PDI-SG-S168	Sediment	11.36	N	0	30	2,3,7,8-TCDF	0.00046	J	µg/kg
PDI-SG-S175	Sediment	10.83	N	0	30	2,3,7,8-TCDF	0.0004	J	µg/kg
PDI-SG-S182	Sediment	1.15	N	0	30	2,3,7,8-TCDF	0.0016		µg/kg
PDI-SG-S183	Sediment	6.81	N	0	27	2,3,7,8-TCDF	0.0021		µg/kg
PDI-SG-S184	Sediment	14.30	N	0	28	2,3,7,8-TCDF	0.013		µg/kg
PDI-SG-S191	Sediment	5.82	N	0	26	2,3,7,8-TCDF	0.0062		µg/kg
PDI-SG-S199	Sediment	7.43	N	0	18	2,3,7,8-TCDF	0.00039	NJ	µg/kg
PDI-SG-S201	Sediment	2.37	N	0	30	2,3,7,8-TCDF	0.0015		µg/kg
PDI-SG-S204	Sediment	0.96	N	0	17	2,3,7,8-TCDF	0.00067	J	µg/kg
PDI-SG-S211	Sediment	2.21	N	0	30	2,3,7,8-TCDF	0.0019		µg/kg
PDI-SG-S214	Sediment	14.23	N	0	15	2,3,7,8-TCDF	0.00013	J	µg/kg
PDI-SG-S215	Sediment	3.28	N	0	30	2,3,7,8-TCDF	0.0022	J	µg/kg
PDI-SG-S216	Sediment	1.43	N	0	30	2,3,7,8-TCDF	0.0026		µg/kg
PDI-SG-S220	Sediment	3.87	N	0	30	2,3,7,8-TCDF	0.0019		µg/kg
PDI-SG-S223	Sediment	4.48	N	0	23	2,3,7,8-TCDF	0.0038		µg/kg
PDI-SG-S224	Sediment	4.49	N	0	24	2,3,7,8-TCDF	0.00081	J	µg/kg
PDI-SG-S225	Sediment	1.58	N	0	25	2,3,7,8-TCDF	0.0026		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SG-S229	Sediment	2.55	N	0	28	2,3,7,8-TCDF	0.003	J	µg/kg
PDI-SG-S230	Sediment	6.15	N	0	27	2,3,7,8-TCDF	0.0031		µg/kg
PDI-SG-S231	Sediment	6.54	N	0	28	2,3,7,8-TCDF	0.0025		µg/kg
PDI-SG-S233	Sediment	8.78	N	0	24	2,3,7,8-TCDF	0.002		µg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	2,3,7,8-TCDF	0.00012	U	µg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	2,3,7,8-TCDF	0.0024		µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	2,3,7,8-TCDF	0.000109	J	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	2,3,7,8-TCDF	0.664	U	pg/g
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	2,3,7,8-TCDF	0.95	J	pg/g
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	2,3,7,8-TCDF	2.14		pg/g
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	2,3,7,8-TCDF	0.797	U	pg/g
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	2,3,7,8-TCDF	0.669	J	pg/g
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	2,3,7,8-TCDF	0.453	J	pg/g
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	2,3,7,8-TCDF	0.862	U	pg/g
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	2,3,7,8-TCDF	0.975	U	pg/g
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	2,3,7,8-TCDF	0.911	U	pg/g
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	2,3,7,8-TCDF	1.23	J	pg/g
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	2,3,7,8-TCDF	6.31	J	pg/g
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	2,3,7,8-TCDF	5.41		pg/g
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	2,3,7,8-TCDF	2.5	J	pg/g
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	2,3,7,8-TCDF	3.3		pg/g
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	2,3,7,8-TCDF	1.97		pg/g
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	2,3,7,8-TCDF	2.9	J	pg/g
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	2,3,7,8-TCDF	1.21		pg/g
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	2,3,7,8-TCDF	2.38		pg/g
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	2,3,7,8-TCDF	0.729	U	pg/g
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	2,3,7,8-TCDF	1.82		pg/g
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	2,3,7,8-TCDF	2.49		pg/g
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	2,3,7,8-TCDF	0.909	J	pg/g
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	2,3,7,8-TCDF	0.342	U	pg/g
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	2,3,7,8-TCDF	1.14		pg/g
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	2,3,7,8-TCDF	1.36		pg/g
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	2,3,7,8-TCDF	1.57		pg/g
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	2,3,7,8-TCDF	3.64		pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	2,3,7,8-TCDF	1.8	J	pg/g
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	2,3,7,8-TCDF	0.722	U	pg/g
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	2,3,7,8-TCDF	0.643	U	pg/g
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	2,3,7,8-TCDF	1.44		pg/g
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	2,3,7,8-TCDF	3.5	U	pg/g
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	2,3,7,8-TCDF	0.546	U	pg/g
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	2,3,7,8-TCDF	0.843	U	pg/g
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	2,3,7,8-TCDF	0.635	U	pg/g
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	2,3,7,8-TCDF	29.5		pg/g
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	2,3,7,8-TCDF	0.373	U	pg/g
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	2,3,7,8-TCDF	0.19	J	pg/g
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	2,3,7,8-TCDF	0.447	J	pg/g
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	2,3,7,8-TCDF	0.793	UJ	pg/g
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	2,3,7,8-TCDF	0.568	J	pg/g
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	2,3,7,8-TCDF	0.466	U	pg/g
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	2,3,7,8-TCDF	0.519	U	pg/g
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	2,3,7,8-TCDF	0.362	U	pg/g
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	2,3,7,8-TCDF	0.374	J	pg/g
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	2,3,7,8-TCDF	0.41	J	pg/g
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	2,3,7,8-TCDF	0.471	U	pg/g
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	2,3,7,8-TCDF	1.07		pg/g
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	2,3,7,8-TCDF	0.79	J	pg/g
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	2,3,7,8-TCDF	0.315	U	pg/g
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	2,3,7,8-TCDF	0.558	J	pg/g
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	2,3,7,8-TCDF	0.626	U	pg/g
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	2,3,7,8-TCDF	1.23	U	pg/g
SIB-098-OHW-1-2-10072022	Sediment	8.22	N	1	2	2,3,7,8-TCDF	0.85	U	pg/g
SIB-098-OHW-2-3-10072022	Sediment	8.22	N	2	3	2,3,7,8-TCDF	0.485	U	pg/g
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	2,3,7,8-TCDF	0.214	U	pg/g
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	2,3,7,8-TCDF	0.248	U	pg/g
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	2,3,7,8-TCDF	1.23		pg/g
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	2,3,7,8-TCDF	0.199	U	pg/g
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	2,3,7,8-TCDF	0.168	UJ	pg/g
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	2,3,7,8-TCDF	0.314	U	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	2,3,7,8-TCDF	0.252	U	pg/g
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	2,3,7,8-TCDF	0.203	U	pg/g
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	2,3,7,8-TCDF	0.0992	UJ	pg/g
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	2,3,7,8-TCDF	0.123	UJ	pg/g
SIB-103-OHW-1-2-10062022	Sediment	3.26	N	1	2	2,3,7,8-TCDF	0.107	U	pg/g
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	2,3,7,8-TCDF	0.489	U	pg/g
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	2,3,7,8-TCDF	0.15	U	pg/g
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	2,3,7,8-TCDF	0.183	U	pg/g
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	2,3,7,8-TCDF	0.329	J	pg/g
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	2,3,7,8-TCDF	0.75	J	pg/g
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	2,3,7,8-TCDF	0.907	J	pg/g
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	2,3,7,8-TCDF	2.48	J	pg/g
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	2,3,7,8-TCDF	0.161	J	pg/g
SIB-110-MLW-1-2-10052022	Sediment	7.81	N	1	2	2,3,7,8-TCDF	0.104	U	pg/g
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	2,3,7,8-TCDF	0.777	UJ	pg/g
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	2,3,7,8-TCDF	3.25	J	pg/g
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	2,3,7,8-TCDF	0.257	UJ	pg/g
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	2,3,7,8-TCDF	0.655	U	pg/g
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	2,3,7,8-TCDF	0.673	J	pg/g
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	2,3,7,8-TCDF	0.646	J	pg/g
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	2,3,7,8-TCDF	0.812	U	pg/g
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	2,3,7,8-TCDF	0.441	J	pg/g
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	2,3,7,8-TCDF	0.584	J	pg/g
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	2,3,7,8-TCDF	1.2515	J	pg/g
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	2,3,7,8-TCDF	1.01	J	pg/g
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	2,3,7,8-TCDF	0.728	U	pg/g
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	2,3,7,8-TCDF	0.203	J	pg/g
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	2,3,7,8-TCDF	0.179	U	pg/g
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	2,3,7,8-TCDF	0.245	U	pg/g
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	2,3,7,8-TCDF	0.33	U	pg/g
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	2,3,7,8-TCDF	0.252	U	pg/g
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	2,3,7,8-TCDF	0.471	U	pg/g
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	2,3,7,8-TCDF	0.172	UJ	pg/g
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	2,3,7,8-TCDF	0.201	U	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	2,3,7,8-TCDF	0.176	U	pg/g
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	2,3,7,8-TCDF	0.189	UJ	pg/g
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	2,3,7,8-TCDF	0.221	U	pg/g
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	2,3,7,8-TCDF	0.43	U	pg/g
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	2,3,7,8-TCDF	0.308	U	pg/g
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	2,3,7,8-TCDF	0.421	U	pg/g
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	2,3,7,8-TCDF	0.244	U	pg/g
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	2,3,7,8-TCDF	0.213	U	pg/g
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	2,3,7,8-TCDF	0.217	U	pg/g
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	2,3,7,8-TCDF	0.497	U	pg/g
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	2,3,7,8-TCDF	0.519	U	pg/g
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	2,3,7,8-TCDF	0.371	U	pg/g
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	2,3,7,8-TCDF	0.283	U	pg/g
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	2,3,7,8-TCDF	0.434	U	pg/g
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	2,3,7,8-TCDF	0.311	U	pg/g
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	2,3,7,8-TCDF	0.266	J	pg/g
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	2,3,7,8-TCDF	0.449	U	pg/g
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	2,3,7,8-TCDF	0.302	U	pg/g
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	2,3,7,8-TCDF	0.292	U	pg/g
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	2,3,7,8-TCDF	0.369	U	pg/g
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	2,3,7,8-TCDF	0.291	U	pg/g
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	2,3,7,8-TCDF	0.456	U	pg/g
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	2,3,7,8-TCDF	0.263	UJ	pg/g
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	2,3,7,8-TCDF	0.365	U	pg/g
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	2,3,7,8-TCDF	0.16	U	pg/g
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	2,3,7,8-TCDF	0.235	U	pg/g
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	2,3,7,8-TCDF	0.185	U	pg/g
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	2,3,7,8-TCDF	0.171	U	pg/g
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	2,3,7,8-TCDF	0.314	U	pg/g
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	2,3,7,8-TCDF	0.262	U	pg/g
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	2,3,7,8-TCDF	0.239	U	pg/g
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	2,3,7,8-TCDF	0.272	U	pg/g
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	2,3,7,8-TCDF	0.208	U	pg/g
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	2,3,7,8-TCDF	0.303	UJ	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	2,3,7,8-TCDF	2.78		pg/g
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	2,3,7,8-TCDF	0.539	J	pg/g
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	2,3,7,8-TCDF	1.38		pg/g
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	2,3,7,8-TCDF	0.798	J	pg/g
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	2,3,7,8-TCDF	0.372	U	pg/g
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	2,3,7,8-TCDF	0.505	J	pg/g
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	2,3,7,8-TCDF	0.966	J	pg/g
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	2,3,7,8-TCDF	0.881	J	pg/g
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	2,3,7,8-TCDF	1.52		pg/g
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	2,3,7,8-TCDF	0.373	U	pg/g
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	2,3,7,8-TCDF	0.299	U	pg/g
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	2,3,7,8-TCDF	1.4		pg/g
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	2,3,7,8-TCDF	3.44	J	pg/g
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	2,3,7,8-TCDF	2.265	J	pg/g
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	2,3,7,8-TCDF	2.08	J	pg/g
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	2,3,7,8-TCDF	1.62	J	pg/g
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	2,3,7,8-TCDF	3.31		pg/g
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	2,3,7,8-TCDF	3.04		pg/g
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	2,3,7,8-TCDF	5.63		pg/g
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	2,3,7,8-TCDF	4.93	J	pg/g
SIB-SC-C25-0-1-07/23/2022	Sediment	4.21	N	0	1	2,3,7,8-TCDF	2.07		pg/g
SIB-SC-C25-1-2-07/23/2022	Sediment	4.21	N	1	2	2,3,7,8-TCDF	4.26	J	pg/g
SIB-SC-C25-2-3-07/23/2022	Sediment	4.21	N	2	3	2,3,7,8-TCDF	1.76		pg/g
SIB-SC-C25-3-4-07/23/2022	Sediment	4.21	N	3	4	2,3,7,8-TCDF	5.12		pg/g
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	2,3,7,8-TCDF	3.1		pg/g
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	2,3,7,8-TCDF	5		pg/g
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	2,3,7,8-TCDF	3.26		pg/g
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	2,3,7,8-TCDF	1.96	J	pg/g
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	2,3,7,8-TCDF	6.6		pg/g
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	2,3,7,8-TCDF	4.31	J	pg/g
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	2,3,7,8-TCDF	3.92		pg/g
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	2,3,7,8-TCDF	3.22	J	pg/g
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	2,3,7,8-TCDF	10.3		pg/g
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	2,3,7,8-TCDF	0.952		pg/g

Attachment B
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	2,3,7,8-TCDF	2.9		pg/g
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	2,3,7,8-TCDF	3.32		pg/g
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	2,3,7,8-TCDF	3.65		pg/g
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	2,3,7,8-TCDF	1.39		pg/g
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	2,3,7,8-TCDF	0.785	J	pg/g
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	2,3,7,8-TCDF	1.45		pg/g
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	2,3,7,8-TCDF	1.73		pg/g
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	2,3,7,8-TCDF	3.17		pg/g
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	2,3,7,8-TCDF	0.482	U	pg/g
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	2,3,7,8-TCDF	0.259	U	pg/g
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	2,3,7,8-TCDF	0.595	UJ	pg/g
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	2,3,7,8-TCDF	0.285	U	pg/g
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	2,3,7,8-TCDF	0.45	U	pg/g
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	2,3,7,8-TCDF	8.44		pg/g
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	2,3,7,8-TCDF	5.7		pg/g
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	2,3,7,8-TCDF	5.12		pg/g
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	2,3,7,8-TCDF	2.21	J	pg/g
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	2,3,7,8-TCDF	3.11		pg/g
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	2,3,7,8-TCDF	3.19		pg/g
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	2,3,7,8-TCDF	1.75		pg/g
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	2,3,7,8-TCDF	0.898	J	pg/g
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	2,3,7,8-TCDF	1.15		pg/g
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	2,3,7,8-TCDF	2.39		pg/g
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	2,3,7,8-TCDF	3.28		pg/g
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	2,3,7,8-TCDF	2.93		pg/g
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	2,3,7,8-TCDF	0.406	U	pg/g
SIB-SC-E25-1-2-07/23/2022	Sediment	3.42	N	1	2	2,3,7,8-TCDF	1.44		pg/g
SIB-SC-E25-2-3-07/23/2022	Sediment	3.42	N	2	3	2,3,7,8-TCDF	0.967	J	pg/g
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	2,3,7,8-TCDF	2.96		pg/g
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	2,3,7,8-TCDF	3.27		pg/g
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	2,3,7,8-TCDF	0.95	J	pg/g
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	2,3,7,8-TCDF	0.438	J	pg/g
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	2,3,7,8-TCDF	0.244	J	pg/g
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	2,3,7,8-TCDF	3.18		pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	2,3,7,8-TCDF	0.472	UJ	pg/g
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	2,3,7,8-TCDF	0.436	UJ	pg/g
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	2,3,7,8-TCDF	0.31	U	pg/g
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	2,3,7,8-TCDF	0.247	U	pg/g
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	2,3,7,8-TCDF	1.71		pg/g
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	2,3,7,8-TCDF	2.38		pg/g
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	2,3,7,8-TCDF	4.05		pg/g
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	2,3,7,8-TCDF	0.57	U	pg/g
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	2,3,7,8-TCDF	0.651	UJ	pg/g
SIB-SC-E30-1-2-07/23/2022	Sediment	7.41	N	1	2	2,3,7,8-TCDF	5.58		pg/g
SIB-SC-E30-2-3-07/23/2022	Sediment	7.41	N	2	3	2,3,7,8-TCDF	4.67		pg/g
SIB-SC-E30-3-4-07/23/2022	Sediment	7.41	N	3	4	2,3,7,8-TCDF	2.69		pg/g
SIB-SC-E30-4-5-07/23/2022	Sediment	7.41	N	4	5	2,3,7,8-TCDF	1.83	J	pg/g
SIB-SC-E30-5-6-07/23/2022	Sediment	7.41	N	5	6	2,3,7,8-TCDF	1.17		pg/g
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	2,3,7,8-TCDF	6.8	J	pg/g
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	2,3,7,8-TCDF	1.13		pg/g
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	2,3,7,8-TCDF	1.24		pg/g
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	2,3,7,8-TCDF	11.8	J	pg/g
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	2,3,7,8-TCDF	0.873	J	pg/g
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	2,3,7,8-TCDF	9.31		pg/g
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	2,3,7,8-TCDF	1.6405	J	pg/g
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	2,3,7,8-TCDF	1.74		pg/g
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	2,3,7,8-TCDF	2.79		pg/g
SIB-SC-F21-1-2-07/24/2022	Sediment	3.89	N	1	2	2,3,7,8-TCDF	2.205		pg/g
SIB-SC-F21-2-3-07/24/2022	Sediment	3.89	N	2	3	2,3,7,8-TCDF	0.699	J	pg/g
SIB-SC-F22-1-2-08/17/2022	Sediment	3.66	N	1	2	2,3,7,8-TCDF	0.763	J	pg/g
SIB-SC-F22-2-3-08/17/2022	Sediment	3.66	N	2	3	2,3,7,8-TCDF	0.306	U	pg/g
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	2,3,7,8-TCDF	1.15		pg/g
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	2,3,7,8-TCDF	0.422	UJ	pg/g
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	2,3,7,8-TCDF	0.44	U	pg/g
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	2,3,7,8-TCDF	0.394	U	pg/g
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	2,3,7,8-TCDF	1.58		pg/g
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	2,3,7,8-TCDF	0.522	J	pg/g
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	2,3,7,8-TCDF	1.51	J	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	2,3,7,8-TCDF	1.5	J	pg/g
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	2,3,7,8-TCDF	1.675	J	pg/g
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	2,3,7,8-TCDF	1.27		pg/g
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	2,3,7,8-TCDF	0.921	J	pg/g
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	2,3,7,8-TCDF	0.551	J	pg/g
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	2,3,7,8-TCDF	0.766	J	pg/g
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	2,3,7,8-TCDF	0.8425	J	pg/g
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	2,3,7,8-TCDF	2.5		pg/g
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	2,3,7,8-TCDF	1.64		pg/g
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	2,3,7,8-TCDF	16.2		pg/g
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	2,3,7,8-TCDF	3.28		pg/g
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	2,3,7,8-TCDF	16.8		pg/g
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	2,3,7,8-TCDF	7.7		pg/g
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	2,3,7,8-TCDF	11.8		pg/g
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	2,3,7,8-TCDF	0.458	J	pg/g
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	2,3,7,8-TCDF	0.28	U	pg/g
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	2,3,7,8-TCDF	9.52		pg/g
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	2,3,7,8-TCDF	1.25		pg/g
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	2,3,7,8-TCDF	0.491	J	pg/g
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	2,3,7,8-TCDF	0.326	J	pg/g
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	2,3,7,8-TCDF	0.223	J	pg/g
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	2,3,7,8-TCDF	0.236	J	pg/g
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	2,3,7,8-TCDF	2.08		pg/g
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	2,3,7,8-TCDF	9.88		pg/g
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	2,3,7,8-TCDF	12.3	J	pg/g
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	2,3,7,8-TCDF	47.7		pg/g
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	2,3,7,8-TCDF	36		pg/g
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	2,3,7,8-TCDF	1.12	J	pg/g
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	2,3,7,8-TCDF	0.369	J	pg/g
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	2,3,7,8-TCDF	0.254	J	pg/g
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	2,3,7,8-TCDF	0.33	J	pg/g
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	2,3,7,8-TCDF	10.5		pg/g
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	2,3,7,8-TCDF	2.43		pg/g
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	2,3,7,8-TCDF	8.88		pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	2,3,7,8-TCDF	4.81		pg/g
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	2,3,7,8-TCDF	3.43		pg/g
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	2,3,7,8-TCDF	4.4		pg/g
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	2,3,7,8-TCDF	0.755	U	pg/g
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	2,3,7,8-TCDF	0.454	U	pg/g
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	2,3,7,8-TCDF	2.78		pg/g
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	2,3,7,8-TCDF	3.55		pg/g
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	2,3,7,8-TCDF	8.01		pg/g
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	2,3,7,8-TCDF	8.15		pg/g
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	2,3,7,8-TCDF	10.6		pg/g
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	2,3,7,8-TCDF	6		pg/g
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	2,3,7,8-TCDF	6.18		pg/g
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	2,3,7,8-TCDF	0.887	J	pg/g
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	2,3,7,8-TCDF	0.703	U	pg/g
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	2,3,7,8-TCDF	4.96		pg/g
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	2,3,7,8-TCDF	0.751	U	pg/g
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	2,3,7,8-TCDF	0.416	U	pg/g
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	2,3,7,8-TCDF	32.6	J	pg/g
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	2,3,7,8-TCDF	9.74	J	pg/g
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	2,3,7,8-TCDF	11.4		pg/g
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	2,3,7,8-TCDF	9.82		pg/g
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	2,3,7,8-TCDF	6.56		pg/g
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	2,3,7,8-TCDF	0.816	U	pg/g
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	2,3,7,8-TCDF	2.49		pg/g
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	2,3,7,8-TCDF	5.6	J	pg/g
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	2,3,7,8-TCDF	1.62		pg/g
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	2,3,7,8-TCDF	3.42		pg/g
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	2,3,7,8-TCDF	5.54		pg/g
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	2,3,7,8-TCDF	7.41		pg/g
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	2,3,7,8-TCDF	6.25		pg/g
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	2,3,7,8-TCDF	16.5	J	pg/g
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	2,3,7,8-TCDF	1.96		pg/g
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	2,3,7,8-TCDF	1.4	J	pg/g
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	2,3,7,8-TCDF	2.65		pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	2,3,7,8-TCDF	0.656	J	pg/g
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	2,3,7,8-TCDF	3.6	J	pg/g
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	2,3,7,8-TCDF	1.74		pg/g
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	2,3,7,8-TCDF	6.6		pg/g
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	2,3,7,8-TCDF	2.26		pg/g
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	2,3,7,8-TCDF	0.633	J	pg/g
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	2,3,7,8-TCDF	0.275	J	pg/g
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	2,3,7,8-TCDF	0.616	J	pg/g
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	2,3,7,8-TCDF	0.331	J	pg/g
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	2,3,7,8-TCDF	0.288	J	pg/g
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	2,3,7,8-TCDF	0.247	U	pg/g
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	2,3,7,8-TCDF	4.94		pg/g
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	2,3,7,8-TCDF	4.06	J	pg/g
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	2,3,7,8-TCDF	0.454	J	pg/g
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	2,3,7,8-TCDF	0.354	U	pg/g
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	2,3,7,8-TCDF	0.376	U	pg/g
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	2,3,7,8-TCDF	0.793	J	pg/g
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	2,3,7,8-TCDF	0.942	J	pg/g
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	2,3,7,8-TCDF	0.79	J	pg/g
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	2,3,7,8-TCDF	0.289	J	pg/g
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	2,3,7,8-TCDF	0.293	U	pg/g
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	2,3,7,8-TCDF	0.322	U	pg/g
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	2,3,7,8-TCDF	0.156	U	pg/g
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	2,3,7,8-TCDF	0.36	U	pg/g
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	2,3,7,8-TCDF	0.9	J	pg/g
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	2,3,7,8-TCDF	2.78		pg/g
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	2,3,7,8-TCDF	0.596	J	pg/g
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	2,3,7,8-TCDF	0.123	J	pg/g
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	2,3,7,8-TCDF	0.246	U	pg/g
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	2,3,7,8-TCDF	0.62	J	pg/g
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	2,3,7,8-TCDF	0.502	U	pg/g
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	2,3,7,8-TCDF	0.952	J	pg/g
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	2,3,7,8-TCDF	0.944	J	pg/g
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	2,3,7,8-TCDF	1.31		pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	2,3,7,8-TCDF	1.38		pg/g
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	2,3,7,8-TCDF	2.85		pg/g
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	2,3,7,8-TCDF	3.93		pg/g
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	2,3,7,8-TCDF	0.953	J	pg/g
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	2,3,7,8-TCDF	0.185	J	pg/g
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	2,3,7,8-TCDF	1.2		pg/g
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	2,3,7,8-TCDF	4.96		pg/g
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	2,3,7,8-TCDF	14.3		pg/g
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	2,3,7,8-TCDF	8.67		pg/g
T1-0TO30-101518	Sediment	5.81	N	0	1	2,3,7,8-TCDF	0.00003	UJ	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	2,3,7,8-TCDF	0.0015	J	µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	2,3,7,8-TCDF	0.002		µg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	2,3,7,8-TCDF	0.0019		µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	2,3,7,8-TCDF	0.806	J	pg/g
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	2,3,7,8-TCDF	0.317	U	pg/g
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	2,3,7,8-TCDF	0.622	J	pg/g
514-0TO29-101618	Sediment	3.32	N	0	1	Aldrin	0.098	U	µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Aldrin	0.079	U	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Aldrin	0.089	U	µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Aldrin	0.079	U	µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Aldrin	0.079	U	µg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Aldrin	0.11	UJ	µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Aldrin	0.079	U	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Aldrin	0.092	U	µg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Aldrin	0.13	UJ	µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Aldrin	0.079	U	µg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Aldrin	0.079	U	µg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Aldrin	0.079	U	µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Aldrin	0.079	U	µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Aldrin	0.079	U	µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Aldrin	0.091	U	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Aldrin	0.079	U	µg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Aldrin	0.079	U	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Aldrin	0.079	U	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
L7-0TO29-101318	Sediment	3.18	N	0	1	Aldrin	0.12	U	µg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Aldrin	0.173	UJ	µg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Aldrin	0.195	UJ	µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Aldrin	0.0299	UJ	µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Aldrin	0.461	UJ	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Aldrin	0.0381	UJ	µg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Aldrin	0.0409	UJ	µg/kg
LW2-C421-A	Sediment	4.45	N	0	1	Aldrin	0.22	U	µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Aldrin	0.18	U	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Aldrin	0.0471	UJ	µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Aldrin	0.0377	UJ	µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Aldrin	0.154	UJ	µg/kg
LW2-G382	Sediment	2.65	N	0	1	Aldrin	0.0623	UJ	µg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Aldrin	0.306	UJ	µg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Aldrin	0.0686	UJT	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Aldrin	0.076	UJ	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Aldrin	0.327	UJ	µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Aldrin	5.51	UJ	µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Aldrin	0.0389	UJ	µg/kg
LW2-G398	Sediment	8.99	N	0	1	Aldrin	0.204	UJ	µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Aldrin	0.0672	UJ	µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Aldrin	0.249	UJ	µg/kg
LW2-G416	Sediment	5.63	N	0	1	Aldrin	0.0682	UJ	µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Aldrin	0.491	J	µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Aldrin	0.0325	UJ	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Aldrin	0.101	J	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Aldrin	0.112	J	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Aldrin	0.027	J	µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Aldrin	0.24	NJ	µg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Aldrin	0.24	J	µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Aldrin	6.7	U	µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Aldrin	6	U	µg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Aldrin	0.12	U	µg/kg
LW3-G706	Sediment	9.49	N	0	1	Aldrin	0.5	U	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW3-GSP08E	Sediment	2.16	N	0	0.4	Aldrin	0.12	U	µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Aldrin	0.19	U	µg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	Aldrin	0.079	U	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Aldrin	0.079	U	µg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Aldrin	0.11	U	µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	Aldrin	0.0601	UJ	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Aldrin	0.0538	UJ	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Aldrin	0.257	NJ	µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Aldrin	0.11	U	µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Aldrin	0.079	U	µg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	Aldrin	0.36	U	µg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	Aldrin	0.47	U	µg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	Aldrin	0.31	U	µg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	Aldrin	0.7	UJ	µg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	Aldrin	0.66	UJ	µg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	Aldrin	0.71	UJ	µg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	Aldrin	0.88	UJ	µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Aldrin	6		µg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Aldrin	6	UT	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Aldrin	6	U	µg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Aldrin	6	U	µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Aldrin	2	U	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Aldrin	2	U	µg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Aldrin	0.079	U	µg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Aldrin	0.11	U	µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Aldrin	0.079	U	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Aldrin	0.37	U	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Aldrin	0.3	U	µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Aldrin	0.41	U	µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Aldrin	0.41	U	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Aldrin	0.42	U	µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Aldrin	0.44	U	µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Aldrin	0.43	U	µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Aldrin	0.46	U	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Aldrin	0.41	U	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Aldrin	0.42	U	µg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Aldrin	0.4	U	µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Aldrin	0.4	U	µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Aldrin	0.44	U	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Aldrin	0.38	U	µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Aldrin	0.41	U	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Aldrin	0.4	U	µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Aldrin	0.37	U	µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Aldrin	0.33	U	µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Aldrin	0.4	U	µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Aldrin	0.43	U	µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Aldrin	0.33	U	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Aldrin	0.29	U	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Aldrin	0.32	U	µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Aldrin	0.34	U	µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Aldrin	0.32	U	µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Aldrin	0.38	U	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Aldrin	0.37	U	µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Aldrin	0.39	U	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Aldrin	0.33	U	µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Aldrin	0.36	U	µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Aldrin	0.38	U	µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Aldrin	0.45	U	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Aldrin	0.48	U	µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Aldrin	0.3	UJ	µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Aldrin	0.53	U	µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Aldrin	0.56	U	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Aldrin	0.74	U	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Aldrin	0.4	U	µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Aldrin	0.51	U	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Aldrin	0.5	U	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Aldrin	0.37	U	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Aldrin	0.39	U	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Aldrin	0.37	U	µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Aldrin	0.41	U	µg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Aldrin	0.44	U	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Aldrin	0.42	U	µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Aldrin	0.39	U	µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Aldrin	0.42	U	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Aldrin	0.43	U	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Aldrin	0.37	U	µg/kg
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	Aldrin	0.33	U	µg/kg
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	Aldrin	0.33	U	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Aldrin	0.46	U	µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Aldrin	0.36	U	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Aldrin	0.49	U	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Aldrin	0.38	U	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Aldrin	0.45	U	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Aldrin	0.39	U	µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Aldrin	0.35	UJ	µg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Aldrin	0.39	UJ	µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Aldrin	0.3	UJ	µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Aldrin	0.33	UJ	µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Aldrin	0.46	UJ	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Aldrin	0.34	U	µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Aldrin	0.35	U	µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Aldrin	0.31	U	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Aldrin	0.52	U	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Aldrin	0.46	U	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Aldrin	0.4	U	µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Aldrin	0.44	U	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Aldrin	0.54	U	µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Aldrin	0.57	U	µg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Aldrin	0.55	U	µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Aldrin	0.54	U	µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Aldrin	0.55	U	µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Aldrin	0.52	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Aldrin	0.55	UJ	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Aldrin	0.49	UJ	µg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Aldrin	0.49	UJ	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Aldrin	0.51	UJ	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Aldrin	0.42	UJ	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Aldrin	0.53	U	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Aldrin	0.55	U	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Aldrin	0.62	U	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Aldrin	0.58	U	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Aldrin	0.58	U	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Aldrin	0.45	U	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Aldrin	0.56	U	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Aldrin	0.52	U	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Aldrin	0.54	U	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Aldrin	0.55	U	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Aldrin	0.61	U	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Aldrin	0.45	U	µg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Aldrin	0.43	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Aldrin	0.44	U	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Aldrin	0.45	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Aldrin	0.55	U	µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Aldrin	0.46	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Aldrin	0.44	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Aldrin	0.47	U	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Aldrin	0.5	U	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Aldrin	0.46	U	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Aldrin	0.42	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Aldrin	0.43	U	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Aldrin	0.5	U	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Aldrin	0.55	U	µg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Aldrin	0.49	U	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Aldrin	0.52	U	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Aldrin	0.46	U	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Aldrin	0.51	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Aldrin	0.44	U	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Aldrin	0.41	U	µg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Aldrin	0.57	UJ	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Aldrin	0.62	UJ	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Aldrin	0.65	UJ	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Aldrin	0.65	UJ	µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Aldrin	0.49	U	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Aldrin	0.59	U	µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Aldrin	0.57	U	µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Aldrin	0.64	U	µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Aldrin	0.46	U	µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Aldrin	0.5	U	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Aldrin	0.64	U	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Aldrin	0.57	U	µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Aldrin	0.46	U	µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Aldrin	0.47	U	µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Aldrin	0.64	U	µg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Aldrin	0.63	U	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Aldrin	0.6	U	µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Aldrin	0.44	U	µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Aldrin	0.48	U	µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Aldrin	0.67	U	µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Aldrin	0.84	U	µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Aldrin	0.58	U	µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Aldrin	0.54	U	µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Aldrin	0.69	U	µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Aldrin	0.72	U	µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Aldrin	0.9	U	µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Aldrin	0.79	U	µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Aldrin	0.74	U	µg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Aldrin	0.66	U	µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Aldrin	0.88	U	µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Aldrin	0.65	U	µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Aldrin	0.5	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Aldrin	0.53	U	µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Aldrin	0.7	U	µg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Aldrin	0.6	U	µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Aldrin	0.58	U	µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Aldrin	0.52	U	µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Aldrin	0.72	U	µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Aldrin	0.81	U	µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Aldrin	0.65	U	µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Aldrin	0.75	U	µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Aldrin	0.65	U	µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Aldrin	0.77	U	µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Aldrin	0.74	U	µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Aldrin	0.71	U	µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Aldrin	0.79	U	µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Aldrin	0.68	U	µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Aldrin	0.69	U	µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Aldrin	0.73	U	µg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Aldrin	0.75	U	µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Aldrin	0.7	U	µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Aldrin	0.61	U	µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Aldrin	0.54	U	µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Aldrin	0.51	U	µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Aldrin	0.74	U	µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Aldrin	0.81	U	µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Aldrin	0.7	U	µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Aldrin	0.79	U	µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Aldrin	0.79	U	µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Aldrin	0.65	U	µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Aldrin	0.91	U	µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Aldrin	0.78	U	µg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Aldrin	0.8	U	µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Aldrin	0.75	U	µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Aldrin	0.61	U	µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Aldrin	0.65	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Aldrin	0.64	U	µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Aldrin	0.55	U	µg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Aldrin	0.62	U	µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Aldrin	0.51	U	µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Aldrin	0.52	U	µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Aldrin	0.37	U	µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Aldrin	0.69	U	µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Aldrin	0.61	U	µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Aldrin	0.46	U	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Aldrin	0.4	U	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Aldrin	0.5	U	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Aldrin	0.69	U	µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Aldrin	0.72	U	µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Aldrin	0.69	U	µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Aldrin	0.6	U	µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Aldrin	0.43	U	µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Aldrin	0.89	U	µg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Aldrin	0.66	U	µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Aldrin	0.57	U	µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Aldrin	0.46	U	µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Aldrin	0.58	U	µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Aldrin	0.75	U	µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Aldrin	0.54	U	µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Aldrin	0.54	U	µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Aldrin	0.56	U	µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Aldrin	0.58	U	µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Aldrin	0.73	U	µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Aldrin	0.74	U	µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Aldrin	0.7	U	µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Aldrin	0.74	U	µg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Aldrin	0.87	U	µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Aldrin	0.84	U	µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Aldrin	0.48	U	µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Aldrin	0.5	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Aldrin	0.59	U	µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Aldrin	0.54	U	µg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Aldrin	0.52	U	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Aldrin	0.46	U	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Aldrin	0.34	U	µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Aldrin	0.36	U	µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Aldrin	0.55	U	µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Aldrin	0.71	U	µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Aldrin	0.59	U	µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Aldrin	0.39	U	µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Aldrin	0.43	U	µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Aldrin	0.49	U	µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Aldrin	0.5	U	µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Aldrin	0.61	U	µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Aldrin	0.53	U	µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Aldrin	0.61	U	µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Aldrin	0.64	U	µg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Aldrin	0.52	U	µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Aldrin	0.42	U	µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Aldrin	0.62	U	µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Aldrin	0.81	U	µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Aldrin	0.49	U	µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Aldrin	0.68	U	µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Aldrin	0.42	U	µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Aldrin	0.52	U	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Aldrin	0.46	U	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Aldrin	0.73	U	µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Aldrin	0.47	U	µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Aldrin	0.53	U	µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Aldrin	0.38	U	µg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Aldrin	0.49	U	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Aldrin	0.44	U	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Aldrin	0.8	U	µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Aldrin	0.6	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Aldrin	0.82	U	µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Aldrin	0.74	U	µg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Aldrin	0.52	U	µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Aldrin	0.41	U	µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Aldrin	0.51	U	µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Aldrin	0.55	U	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Aldrin	0.48	U	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Aldrin	0.78	U	µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Aldrin	0.61	U	µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Aldrin	0.66	U	µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Aldrin	0.75	U	µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Aldrin	0.66	U	µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Aldrin	0.56	U	µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Aldrin	0.44	U	µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Aldrin	0.4	U	µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Aldrin	0.78	U	µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Aldrin	0.67	U	µg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Aldrin	0.72	U	µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Aldrin	0.64	U	µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Aldrin	0.57	U	µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Aldrin	0.67	U	µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Aldrin	0.58	U	µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Aldrin	0.4	U	µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Aldrin	0.54	U	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Aldrin	0.71	U	µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Aldrin	0.51	U	µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Aldrin	0.41	U	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Aldrin	0.72	U	µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Aldrin	0.73	U	µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Aldrin	0.7	U	µg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Aldrin	0.67	U	µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Aldrin	0.7	U	µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Aldrin	0.43	U	µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Aldrin	0.67	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Aldrin	0.61	U	µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Aldrin	0.61	U	µg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Aldrin	0.83	U	µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Aldrin	0.75	U	µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Aldrin	0.77	U	µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Aldrin	0.58	U	µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Aldrin	0.66	U	µg/kg
SIB-SC-J06-8-9-07/26/2022	Sediment	16.33	N	8	9	Aldrin	0.13	UJ	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Aldrin	0.76	U	µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Aldrin	0.71	U	µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Aldrin	0.8	U	µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Aldrin	0.68	U	µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Aldrin	0.61	U	µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Aldrin	0.79	U	µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Aldrin	0.68	U	µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Aldrin	0.56	U	µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Aldrin	0.43	U	µg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Aldrin	0.46	U	µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Aldrin	0.47	U	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Aldrin	0.43	U	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Aldrin	0.51	U	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Aldrin	0.37	U	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Aldrin	0.76	U	µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Aldrin	0.61	U	µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Aldrin	0.43	U	µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Aldrin	0.47	U	µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Aldrin	0.4	U	µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Aldrin	0.65	U	µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Aldrin	0.66	U	µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Aldrin	0.61	U	µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Aldrin	0.46	U	µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Aldrin	0.5	U	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Aldrin	0.38	U	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Aldrin	0.43	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Aldrin	0.42	U	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Aldrin	0.58	U	µg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Aldrin	0.78	U	µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Aldrin	0.6	UJ	µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Aldrin	0.48	UJ	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Aldrin	0.49	UJ	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Aldrin	0.56	U	µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Aldrin	0.59	U	µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Aldrin	0.56	U	µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Aldrin	0.64	U	µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Aldrin	0.55	U	µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Aldrin	0.56	U	µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Aldrin	0.62	U	µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Aldrin	0.71	U	µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Aldrin	0.46	U	µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Aldrin	0.43	U	µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Aldrin	0.66	U	µg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Aldrin	0.61	U	µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Aldrin	0.96	U	µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Aldrin	0.62	U	µg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Aldrin	0.079	U	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Aldrin	0.09	U	µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Aldrin	0.11	U	µg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Aldrin	0.11	U	µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Aldrin	1.42	U	µg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Aldrin	1.11	U	µg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Aldrin	1.28	U	µg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Aldrin	1.06	U	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Aldrin	1.1	U	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Aldrin	1.28	U	µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Aldrin	1.07	U	µg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Aldrin	1.09	U	µg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Aldrin	1.16	U	µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Aldrin	0.77	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WLCPSK094-A	Sediment	10.57	N	0	2.9	Aldrin	0.17	U	µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Aldrin	0.16	UT	µg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Aldrin	0.18	U	µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Aldrin	0.16	U	µg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Aldrin	0.96	UJ	µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Aldrin	0.98	UT	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Aldrin	0.37	U	µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Aldrin	0.34	U	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Aldrin	0.35	U	µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Arsenic	4		mg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Arsenic	9.1		mg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Arsenic	9.5		mg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Arsenic	5.3		mg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Arsenic	6.9		mg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Arsenic	5.9		mg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Arsenic	10		mg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Arsenic	8.7		mg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Arsenic	11		mg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Arsenic	3.6		mg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	Arsenic	16		mg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Arsenic	14		mg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Arsenic	7.9		mg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	Arsenic	9.1		mg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Arsenic	4.1		mg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Arsenic	8.4		mg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	Arsenic	3.7		mg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	Arsenic	2.7		mg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Arsenic	8.5		mg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	Arsenic	6.9		mg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	Arsenic	5.6		mg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	Arsenic	11		mg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	Arsenic	7.9		mg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	Arsenic	19		mg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Arsenic	1.6		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Arsenic	3.9		mg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	Arsenic	3.9		mg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	Arsenic	3.1		mg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	Arsenic	2.9		mg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	Arsenic	11		mg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Arsenic	2.98	J	mg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Arsenic	3.43	J	mg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Arsenic	1.52		mg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Arsenic	44.5	J	mg/kg
LW2-C388-B	Sediment	6.46	N	1	5.1	Arsenic	2.27		mg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Arsenic	1.89		mg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Arsenic	1.73	T	mg/kg
LW2-C402-B	Sediment	5.83	N	1	2.1	Arsenic	16.1	J	mg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Arsenic	6.02		mg/kg
LW2-C421-C	Sediment	4.45	N	2	4	Arsenic	3.71		mg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Arsenic	4.97		mg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Arsenic	3.5	J	mg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Arsenic	8.44		mg/kg
LW2-G382	Sediment	2.65	N	0	1	Arsenic	13.8	J	mg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Arsenic	1.52	J	mg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Arsenic	6.22	T	mg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Arsenic	5.36		mg/kg
LW2-G388	Sediment	7.36	N	0	0.9	Arsenic	1.77	J	mg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Arsenic	16.5		mg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Arsenic	15.6		mg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Arsenic	2.1	J	mg/kg
LW2-G398	Sediment	8.99	N	0	1	Arsenic	5.25		mg/kg
LW2-G402	Sediment	4.06	N	0	1	Arsenic	9.4	J	mg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Arsenic	8.9		mg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Arsenic	8.44		mg/kg
LW2-G416	Sediment	5.63	N	0	1	Arsenic	7.56		mg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Arsenic	2.57		mg/kg
LW2-G421	Sediment	4.56	N	0	1	Arsenic	13.8	J	mg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Arsenic	2	J	mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-GBT022	Sediment	0.30	N	0	0.3	Arsenic	5.25		mg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Arsenic	6.76		mg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Arsenic	6.7		mg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Arsenic	4.29		mg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Arsenic	4.55		mg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Arsenic	13.3		mg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Arsenic	51.4		mg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Arsenic	8.57		mg/kg
LW3-G706	Sediment	9.49	N	0	1	Arsenic	4.52		mg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Arsenic	2.64	T	mg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Arsenic	2.2		mg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	Arsenic	8.7		mg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Arsenic	7		mg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Arsenic	13		mg/kg
NA-4A-0005	Sediment	5.42	N	0	0.2	Arsenic	5.6	J	mg/kg
NA-4A-0508	Sediment	5.42	N	0.2	0.3	Arsenic	5.2	J	mg/kg
NA-4A-0812	Sediment	5.42	N	0.3	0.4	Arsenic	4.6	J	mg/kg
NA-4A-1216	Sediment	5.42	N	0.4	0.5	Arsenic	4.4	J	mg/kg
NA-4A-1620	Sediment	5.42	N	0.5	0.7	Arsenic	4	J	mg/kg
NA-4A-2024	Sediment	5.42	N	0.7	0.8	Arsenic	4.7	J	mg/kg
NA-4A-2428	Sediment	5.42	N	0.8	0.9	Arsenic	4.9	J	mg/kg
NA-4A-2832	Sediment	5.42	N	0.9	1	Arsenic	4.5	J	mg/kg
NA-4A-3238	Sediment	5.42	N	1	1.2	Arsenic	4.2	J	mg/kg
NA-4A-3844	Sediment	5.42	N	1.2	1.4	Arsenic	4.1	J	mg/kg
NA-4A-4448	Sediment	5.42	N	1.4	1.6	Arsenic	3.8	J	mg/kg
NA-4A-5864	Sediment	5.42	N	1.9	2.1	Arsenic	4.4	J	mg/kg
NA-4A-6874	Sediment	5.42	N	2.2	2.4	Arsenic	4.1	J	mg/kg
NA-4A-7884	Sediment	5.42	N	2.6	2.8	Arsenic	4.1	J	mg/kg
NA-4A-8894	Sediment	5.42	N	2.9	3.1	Arsenic	4.45	JT	mg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Arsenic	12		mg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Arsenic	1.9		mg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	Arsenic	11		mg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	Arsenic	5.7		mg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	Arsenic	6.2		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	Arsenic	7.1		mg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	Arsenic	9.3		mg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	Arsenic	8.6		mg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	Arsenic	9.2		mg/kg
PSYD&M97DM16DM16	Sediment	0.66	N	0	0.3	Arsenic	7.18		mg/kg
PSYD&M97DM20DM20C	Sediment	10.29	N	3.5	4.5	Arsenic	4.6		mg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Arsenic	5		mg/kg
PSYSEA98PSY05PSY05S	Sediment	7.29	N	0	0.3	Arsenic	6		mg/kg
PSYSEA98PSY06PSY06S	Sediment	14.49	N	0	0.3	Arsenic	2		mg/kg
PSYSEA98PSY07PSY07S	Sediment	1.44	N	0	0.3	Arsenic	6		mg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Arsenic	6.5	T	mg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Arsenic	6		mg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Arsenic	5		mg/kg
PSYSEA98PSY10PSY10S	Sediment	1.89	N	0	0.3	Arsenic	15		mg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Arsenic	17		mg/kg
PSYSEA98PSY14PSY14S	Sediment	2.71	N	0	0.3	Arsenic	9		mg/kg
PSYSEA98PSY17PSY17S	Sediment	3.87	N	0	0.3	Arsenic	9		mg/kg
PSYSEA98PSY18CPSY18A	Sediment	6.14	N	0	4	Arsenic	4		mg/kg
PSYSEA98PSY18PSY18S	Sediment	5.56	N	0	0.3	Arsenic	7		mg/kg
PSYSEA98PSY20PSY20S	Sediment	0.48	N	0	0.3	Arsenic	13		mg/kg
PSYSEA98PSY21PSY21S	Sediment	0.83	N	0	0.3	Arsenic	6		mg/kg
PSYSEA98PSY23CPSY23A	Sediment	9.68	N	0	4	Arsenic	6		mg/kg
PSYSEA98PSY23CPSY23B	Sediment	9.68	N	4	8	Arsenic	2	U	mg/kg
PSYSEA98PSY23PSY23S	Sediment	10.52	N	0	0.3	Arsenic	6		mg/kg
PSYSEA98PSY25PSY25S	Sediment	4.12	N	0	0.3	Arsenic	6		mg/kg
PSYSEA98PSY26PSY26S	Sediment	0.44	N	0	0.3	Arsenic	6		mg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Arsenic	17		mg/kg
PSYSEA98PSY28PSY28S	Sediment	0.33	N	0	0.3	Arsenic	4		mg/kg
PSYSEA98PSY30CPSY30A	Sediment	9.14	N	0	4	Arsenic	6		mg/kg
PSYSEA98PSY30CPSY30B	Sediment	9.14	N	4	8	Arsenic	5		mg/kg
PSYSEA98PSY30CY30A01	Sediment	9.14	N	0	1	Arsenic	6		mg/kg
PSYSEA98PSY30CY30A02	Sediment	9.14	N	1	2	Arsenic	6		mg/kg
PSYSEA98PSY30CY30A03	Sediment	9.14	N	2	3	Arsenic	5		mg/kg
PSYSEA98PSY30CY30A04	Sediment	9.14	N	3	4	Arsenic	7		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYSEA98PSY30CY30B05	Sediment	9.14	N	4	5	Arsenic	21		mg/kg
PSYSEA98PSY30CY30B06	Sediment	9.14	N	5	6	Arsenic	4		mg/kg
PSYSEA98PSY30CY30B07	Sediment	9.14	N	6	7	Arsenic	2	U	mg/kg
PSYSEA98PSY30CY30B08	Sediment	9.14	N	7	8	Arsenic	2	U	mg/kg
PSYSEA98PSY30PSY30S	Sediment	9.69	N	0	0.3	Arsenic	5		mg/kg
PSYSEA98PSY33PSY33S	Sediment	0.80	N	0	0.3	Arsenic	5		mg/kg
PSYSEA98PSY43PSY43S	Sediment	0.82	N	0	0.3	Arsenic	4		mg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Arsenic	4.7		mg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Arsenic	9.4		mg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Arsenic	3.1		mg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Arsenic	46.1	J	mg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Arsenic	3.9	J	mg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Arsenic	3.18	J	mg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Arsenic	2.3		mg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Arsenic	2.66		mg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Arsenic	2.41		mg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Arsenic	2.06		mg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Arsenic	2.5		mg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Arsenic	1.81		mg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Arsenic	4.24		mg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Arsenic	68.5		mg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Arsenic	29.4		mg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Arsenic	10.7	J	mg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Arsenic	3.37		mg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Arsenic	5.52		mg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Arsenic	2.71		mg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Arsenic	615	J	mg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Arsenic	4.08	J	mg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Arsenic	2.36	J	mg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Arsenic	2.56	J	mg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Arsenic	2.86	J	mg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Arsenic	2.485	J	mg/kg
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	Arsenic	2.32	J	mg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Arsenic	7.63	J	mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Arsenic	3.15	J	mg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Arsenic	2.59	J	mg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Arsenic	4.17	J	mg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Arsenic	3.15		mg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Arsenic	2.1		mg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Arsenic	2.34		mg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Arsenic	3.43		mg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Arsenic	1.8		mg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Arsenic	8.23		mg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Arsenic	3.72		mg/kg
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	Arsenic	4.53		mg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Arsenic	16.7		mg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Arsenic	11.7		mg/kg
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	Arsenic	5.53		mg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Arsenic	2.94	J	mg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Arsenic	2.48		mg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Arsenic	6.02		mg/kg
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	Arsenic	7.53		mg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Arsenic	7.4		mg/kg
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	Arsenic	3.39		mg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Arsenic	2.52		mg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Arsenic	5.17		mg/kg
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	Arsenic	5.48		mg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Arsenic	1.71		mg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Arsenic	4.35		mg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Arsenic	2.88		mg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Arsenic	1.9		mg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Arsenic	4.52		mg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Arsenic	1.77		mg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Arsenic	3.44		mg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Arsenic	7.84		mg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Arsenic	2.25		mg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Arsenic	10.2		mg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Arsenic	1.93		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Arsenic	5.84		mg/kg
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	Arsenic	3.63	J	mg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Arsenic	2.61		mg/kg
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	Arsenic	2.53	J	mg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Arsenic	4.45		mg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Arsenic	2.45		mg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Arsenic	1.79		mg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Arsenic	2.48		mg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Arsenic	3.07		mg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Arsenic	3.22		mg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Arsenic	1.98		mg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Arsenic	3.05		mg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Arsenic	2.64		mg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Arsenic	11.9		mg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Arsenic	4.25		mg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Arsenic	5.825		mg/kg
SIB-122-MLW-1-2-10262022	Sediment	4.02	N	1	2	Arsenic	6.17	J	mg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Arsenic	7.72		mg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Arsenic	2.03		mg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Arsenic	5.37	J	mg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Arsenic	3.92	J	mg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Arsenic	4.74		mg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Arsenic	4.08		mg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Arsenic	3.76		mg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Arsenic	3.35		mg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Arsenic	3.09		mg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Arsenic	3.06		mg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Arsenic	3.21		mg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Arsenic	2.91		mg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Arsenic	2.71		mg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Arsenic	2.54		mg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Arsenic	2.86		mg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Arsenic	2.69		mg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Arsenic	2.92		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Arsenic	2.94		mg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Arsenic	2.1		mg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Arsenic	2.19		mg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Arsenic	2.35		mg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Arsenic	2.44		mg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Arsenic	2.7		mg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Arsenic	2.48		mg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Arsenic	2.79		mg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Arsenic	2.93		mg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Arsenic	3.04		mg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Arsenic	2.96		mg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Arsenic	3.25		mg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Arsenic	2.84		mg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Arsenic	3.59		mg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Arsenic	2.89		mg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Arsenic	3.28		mg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Arsenic	2.9		mg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Arsenic	2.76		mg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Arsenic	2.76		mg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Arsenic	2.16		mg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Arsenic	2.57		mg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Arsenic	3.31		mg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Arsenic	3.04		mg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Arsenic	3.25		mg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Arsenic	3.13		mg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Arsenic	3.26		mg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Arsenic	3.29		mg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Arsenic	3.245		mg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Arsenic	3.23		mg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Arsenic	3.93		mg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Arsenic	3.71		mg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Arsenic	2.87		mg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Arsenic	8.05	J	mg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Arsenic	3.24		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Arsenic	4.73		mg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Arsenic	3.09		mg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Arsenic	2.95		mg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Arsenic	3.5		mg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Arsenic	4.78		mg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Arsenic	4.33		mg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Arsenic	4.01		mg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Arsenic	4.74		mg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Arsenic	3.89		mg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Arsenic	6.27		mg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Arsenic	4.49		mg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Arsenic	5.395		mg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Arsenic	6.59		mg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Arsenic	5.7		mg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Arsenic	7.22		mg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Arsenic	5.38		mg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Arsenic	5.14		mg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Arsenic	5.84		mg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Arsenic	7.74		mg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Arsenic	8.515		mg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Arsenic	9.24		mg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Arsenic	6.64		mg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Arsenic	8.16		mg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Arsenic	7.76		mg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Arsenic	5.8		mg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Arsenic	4.19		mg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Arsenic	10.3		mg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Arsenic	17		mg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Arsenic	7.86		mg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Arsenic	6.59		mg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Arsenic	6.57		mg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Arsenic	6.44		mg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Arsenic	5.73		mg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Arsenic	6.79		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Arsenic	5.81		mg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Arsenic	6.16		mg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Arsenic	6.18		mg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Arsenic	7.07		mg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Arsenic	7		mg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Arsenic	4.74		mg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Arsenic	6.46		mg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Arsenic	7.03		mg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Arsenic	8.04		mg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Arsenic	6.08		mg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Arsenic	5.92		mg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Arsenic	8.25		mg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Arsenic	7.57		mg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Arsenic	6.27		mg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Arsenic	7.27		mg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Arsenic	6.84		mg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Arsenic	6.84		mg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Arsenic	5.98		mg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Arsenic	5.38		mg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Arsenic	6.62		mg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Arsenic	6.99		mg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Arsenic	6.25		mg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Arsenic	5.74		mg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Arsenic	5.68		mg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Arsenic	7.04	J	mg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Arsenic	6.41	J	mg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Arsenic	9.42		mg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Arsenic	6.56		mg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Arsenic	4.865		mg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Arsenic	4.53		mg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Arsenic	2.71		mg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Arsenic	5.28		mg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Arsenic	5.47		mg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Arsenic	4.565		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Arsenic	2.87		mg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Arsenic	3.6		mg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Arsenic	6.95		mg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Arsenic	6.05		mg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Arsenic	5.99		mg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Arsenic	4.64		mg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Arsenic	4.17		mg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Arsenic	6.79	J	mg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Arsenic	6.08	J	mg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Arsenic	5.74	J	mg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Arsenic	5.44		mg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Arsenic	4.32		mg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Arsenic	6.93		mg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Arsenic	5.17		mg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Arsenic	8.46	J	mg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Arsenic	7.51	J	mg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Arsenic	9.8		mg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Arsenic	8.05		mg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Arsenic	7.365	J	mg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Arsenic	9.22		mg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Arsenic	10.8	J	mg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Arsenic	8.5		mg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Arsenic	8.71		mg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Arsenic	5.43		mg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Arsenic	3.44		mg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Arsenic	5.77		mg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Arsenic	3.18		mg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Arsenic	3.03		mg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Arsenic	2.99		mg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Arsenic	2.78		mg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Arsenic	2.79		mg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Arsenic	6.54		mg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Arsenic	6		mg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Arsenic	4.86		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Arsenic	5.17	J	mg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Arsenic	5.55	J	mg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Arsenic	4.19	J	mg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Arsenic	3.74	J	mg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Arsenic	3.9	J	mg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Arsenic	9.85	J	mg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Arsenic	12.6		mg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Arsenic	20.6	J	mg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Arsenic	5.56	J	mg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Arsenic	8.73		mg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Arsenic	23.3		mg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Arsenic	11		mg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Arsenic	55.7		mg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Arsenic	47		mg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Arsenic	20.2		mg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Arsenic	3.27		mg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Arsenic	2.67		mg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Arsenic	24.4		mg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Arsenic	6.71		mg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Arsenic	4.01		mg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Arsenic	4.37		mg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Arsenic	3.69		mg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Arsenic	3.36		mg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Arsenic	24.4		mg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Arsenic	11.8		mg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Arsenic	11.2		mg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Arsenic	17.6		mg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Arsenic	22.6		mg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Arsenic	7.73		mg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Arsenic	4.08		mg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Arsenic	4.12		mg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Arsenic	4.58		mg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Arsenic	13.8		mg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Arsenic	12.7		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Arsenic	37.9		mg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Arsenic	34.2		mg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Arsenic	53.2		mg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Arsenic	39.8		mg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Arsenic	5.19		mg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Arsenic	2.31		mg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Arsenic	10.7		mg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Arsenic	10.7		mg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Arsenic	14.9		mg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Arsenic	15.5		mg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Arsenic	48.8		mg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Arsenic	44.1		mg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Arsenic	30.2		mg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Arsenic	5.13		mg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Arsenic	4.12		mg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Arsenic	10.2		mg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Arsenic	3.66		mg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Arsenic	3.43		mg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Arsenic	17.95		mg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Arsenic	11.4		mg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Arsenic	16.7		mg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Arsenic	35.8		mg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Arsenic	31.7		mg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Arsenic	4.25		mg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Arsenic	5.79		mg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Arsenic	66.6		mg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Arsenic	18.2		mg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Arsenic	10.1		mg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Arsenic	17.6		mg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Arsenic	8.87		mg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Arsenic	10.6		mg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Arsenic	15.2		mg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Arsenic	8.43		mg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Arsenic	9.07		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Arsenic	8.66		mg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Arsenic	8.34		mg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Arsenic	12		mg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Arsenic	6.03		mg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Arsenic	8.32	J	mg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Arsenic	6.38	J	mg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Arsenic	6.21		mg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Arsenic	3.82		mg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Arsenic	2.41		mg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Arsenic	3.81		mg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Arsenic	3.16		mg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Arsenic	2.73		mg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Arsenic	51.5		mg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Arsenic	16		mg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Arsenic	4.82		mg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Arsenic	3.29		mg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Arsenic	2.66		mg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Arsenic	18.2		mg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Arsenic	15.6		mg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Arsenic	15.5		mg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Arsenic	3.55		mg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Arsenic	4.14		mg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Arsenic	2.84		mg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Arsenic	3.38		mg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Arsenic	2.05		mg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Arsenic	3.91		mg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Arsenic	21.9		mg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Arsenic	4.12		mg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Arsenic	2.2		mg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Arsenic	2.01		mg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Arsenic	4.31		mg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Arsenic	4.22		mg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Arsenic	4.88		mg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Arsenic	4.89		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Arsenic	4		mg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Arsenic	5.01		mg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Arsenic	7.8		mg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Arsenic	31.7		mg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Arsenic	8.67		mg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Arsenic	2.25		mg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Arsenic	6.82		mg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Arsenic	19.6		mg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Arsenic	159		mg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Arsenic	41.1		mg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Arsenic	2.9		mg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Arsenic	9.3		mg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Arsenic	10		mg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Arsenic	9		mg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Arsenic	5.81		mg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Arsenic	3.86		mg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Arsenic	4.11		mg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Arsenic	4.1		mg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Arsenic	2.81		mg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Arsenic	4.84		mg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Arsenic	3.65		mg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Arsenic	2.21		mg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Arsenic	3.87	J	mg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Arsenic	8.95		mg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Arsenic	4.98		mg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Arsenic	3.92	T	mg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Arsenic	5.5		mg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Arsenic	3.61		mg/kg
WR-WSI98SD1300	Sediment	2.09	N	0	0.3	Arsenic	5	U	mg/kg
WR-WSI98SD1320	Sediment	1.21	N	0	0.3	Arsenic	4	U	mg/kg
WR-WSI98SD1330	Sediment	5.72	N	0	0.3	Arsenic	16		mg/kg
WR-WSI98SD1330000A	Sediment	5.72	N	0	3	Arsenic	14		mg/kg
WR-WSI98SD1340	Sediment	2.58	N	0	0.3	Arsenic	7	U	mg/kg
WR-WSI98SD1360	Sediment	2.50	N	0	0.3	Arsenic	7	U	mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WR-WSI98SD1390	Sediment	3.67	N	0	0.3	Arsenic	7	U	mg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Arsenic	5	U	mg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Arsenic	7	UT	mg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Arsenic	4.44	J	mg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Arsenic	3.355		mg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Arsenic	3.1		mg/kg
514-0TO29-101618	Sediment	3.32	N	0	1	Bis(2-ethylhexyl) Phthalate	470		µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Bis(2-ethylhexyl) Phthalate	61	J	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Bis(2-ethylhexyl) Phthalate	26	J	µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Bis(2-ethylhexyl) Phthalate	230		µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Bis(2-ethylhexyl) Phthalate	37	J	µg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Bis(2-ethylhexyl) Phthalate	330	J	µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Bis(2-ethylhexyl) Phthalate	120	J	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Bis(2-ethylhexyl) Phthalate	580		µg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Bis(2-ethylhexyl) Phthalate	390	J	µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Bis(2-ethylhexyl) Phthalate	210		µg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Bis(2-ethylhexyl) Phthalate	70		µg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	Bis(2-ethylhexyl) Phthalate	1100		µg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Bis(2-ethylhexyl) Phthalate	770		µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Bis(2-ethylhexyl) Phthalate	3700		µg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	Bis(2-ethylhexyl) Phthalate	900		µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Bis(2-ethylhexyl) Phthalate	720		µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Bis(2-ethylhexyl) Phthalate	2100		µg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	Bis(2-ethylhexyl) Phthalate	250		µg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	Bis(2-ethylhexyl) Phthalate	56	J	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Bis(2-ethylhexyl) Phthalate	270		µg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	Bis(2-ethylhexyl) Phthalate	130		µg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	Bis(2-ethylhexyl) Phthalate	71	J	µg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	Bis(2-ethylhexyl) Phthalate	1100		µg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	Bis(2-ethylhexyl) Phthalate	170		µg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	Bis(2-ethylhexyl) Phthalate	920		µg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Bis(2-ethylhexyl) Phthalate	30	J	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Bis(2-ethylhexyl) Phthalate	100		µg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	Bis(2-ethylhexyl) Phthalate	90		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	Bis(2-ethylhexyl) Phthalate	13	J	µg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	Bis(2-ethylhexyl) Phthalate	22	J	µg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	Bis(2-ethylhexyl) Phthalate	770		µg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Bis(2-ethylhexyl) Phthalate	59	J	µg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Bis(2-ethylhexyl) Phthalate	24	U	µg/kg
LW2-C364-D	Sediment	12.48	N	6	7.4	Bis(2-ethylhexyl) Phthalate	2.5	U	µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Bis(2-ethylhexyl) Phthalate	290	U	µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Bis(2-ethylhexyl) Phthalate	6800		µg/kg
LW2-C388-B	Sediment	6.46	N	1	5.1	Bis(2-ethylhexyl) Phthalate	7.1	J	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Bis(2-ethylhexyl) Phthalate	37	U	µg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Bis(2-ethylhexyl) Phthalate	41	U	µg/kg
LW2-C402-B	Sediment	5.83	N	1	2.1	Bis(2-ethylhexyl) Phthalate	180		µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Bis(2-ethylhexyl) Phthalate	300		µg/kg
LW2-C421-C	Sediment	4.45	N	2	4	Bis(2-ethylhexyl) Phthalate	39	J	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Bis(2-ethylhexyl) Phthalate	63	U	µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Bis(2-ethylhexyl) Phthalate	56	J	µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Bis(2-ethylhexyl) Phthalate	1700		µg/kg
LW2-G382	Sediment	2.65	N	0	1	Bis(2-ethylhexyl) Phthalate	2400	J	µg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Bis(2-ethylhexyl) Phthalate	2000	J	µg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Bis(2-ethylhexyl) Phthalate	395	T	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Bis(2-ethylhexyl) Phthalate	550		µg/kg
LW2-G388	Sediment	7.36	N	0	0.9	Bis(2-ethylhexyl) Phthalate	180	UJ	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Bis(2-ethylhexyl) Phthalate	3000		µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Bis(2-ethylhexyl) Phthalate	8600		µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
LW2-G398	Sediment	8.99	N	0	1	Bis(2-ethylhexyl) Phthalate	320		µg/kg
LW2-G402	Sediment	4.06	N	0	1	Bis(2-ethylhexyl) Phthalate	3900	J	µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Bis(2-ethylhexyl) Phthalate	2400	J	µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Bis(2-ethylhexyl) Phthalate	2700		µg/kg
LW2-G416	Sediment	5.63	N	0	1	Bis(2-ethylhexyl) Phthalate	310		µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Bis(2-ethylhexyl) Phthalate	140		µg/kg
LW2-G421	Sediment	4.56	N	0	1	Bis(2-ethylhexyl) Phthalate	960	UJ	µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Bis(2-ethylhexyl) Phthalate	660	J	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Bis(2-ethylhexyl) Phthalate	57	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-GBT023	Sediment	0.93	N	0	0.3	Bis(2-ethylhexyl) Phthalate	460		µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1600	J	µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Bis(2-ethylhexyl) Phthalate	120		µg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Bis(2-ethylhexyl) Phthalate	640		µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Bis(2-ethylhexyl) Phthalate	2000		µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Bis(2-ethylhexyl) Phthalate	700	U	µg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Bis(2-ethylhexyl) Phthalate	40		µg/kg
LW3-G706	Sediment	9.49	N	0	1	Bis(2-ethylhexyl) Phthalate	330		µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Bis(2-ethylhexyl) Phthalate	44	U	µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Bis(2-ethylhexyl) Phthalate	45		µg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	Bis(2-ethylhexyl) Phthalate	13	J	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Bis(2-ethylhexyl) Phthalate	220		µg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Bis(2-ethylhexyl) Phthalate	810		µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	Bis(2-ethylhexyl) Phthalate	250	U	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Bis(2-ethylhexyl) Phthalate	110	U	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Bis(2-ethylhexyl) Phthalate	110	U	µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Bis(2-ethylhexyl) Phthalate	88	J	µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Bis(2-ethylhexyl) Phthalate	19	J	µg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	Bis(2-ethylhexyl) Phthalate	840		µg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	Bis(2-ethylhexyl) Phthalate	230	J	µg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	Bis(2-ethylhexyl) Phthalate	200		µg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	Bis(2-ethylhexyl) Phthalate	450		µg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	Bis(2-ethylhexyl) Phthalate	640		µg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	Bis(2-ethylhexyl) Phthalate	430		µg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	Bis(2-ethylhexyl) Phthalate	640		µg/kg
PSYD&M97DM16DM16	Sediment	0.66	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1810		µg/kg
PSYD&M97DM20DM20C	Sediment	10.29	N	3.5	4.5	Bis(2-ethylhexyl) Phthalate	425	J	µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Bis(2-ethylhexyl) Phthalate	33300		µg/kg
PSYSEA98PSY05PSY05S	Sediment	7.29	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1380		µg/kg
PSYSEA98PSY06PSY06S	Sediment	14.49	N	0	0.3	Bis(2-ethylhexyl) Phthalate	94	J	µg/kg
PSYSEA98PSY07PSY07S	Sediment	1.44	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1440	J	µg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Bis(2-ethylhexyl) Phthalate	7180	JT	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Bis(2-ethylhexyl) Phthalate	11400	J	µg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Bis(2-ethylhexyl) Phthalate	11600	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYSEA98PSY10PSY10S	Sediment	1.89	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1930		µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Bis(2-ethylhexyl) Phthalate	440		µg/kg
PSYSEA98PSY14PSY14S	Sediment	2.71	N	0	0.3	Bis(2-ethylhexyl) Phthalate	2220		µg/kg
PSYSEA98PSY17PSY17S	Sediment	3.87	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1370		µg/kg
PSYSEA98PSY18CPSY18A	Sediment	6.14	N	0	4	Bis(2-ethylhexyl) Phthalate	715		µg/kg
PSYSEA98PSY18PSY18S	Sediment	5.56	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1390	J	µg/kg
PSYSEA98PSY20PSY20S	Sediment	0.48	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1050		µg/kg
PSYSEA98PSY21PSY21S	Sediment	0.83	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1110		µg/kg
PSYSEA98PSY23CPSY23A	Sediment	9.68	N	0	4	Bis(2-ethylhexyl) Phthalate	950		µg/kg
PSYSEA98PSY23CPSY23B	Sediment	9.68	N	4	8	Bis(2-ethylhexyl) Phthalate	37	J	µg/kg
PSYSEA98PSY23PSY23S	Sediment	10.52	N	0	0.3	Bis(2-ethylhexyl) Phthalate	778		µg/kg
PSYSEA98PSY25PSY25S	Sediment	4.12	N	0	0.3	Bis(2-ethylhexyl) Phthalate	547		µg/kg
PSYSEA98PSY26PSY26S	Sediment	0.44	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1920		µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Bis(2-ethylhexyl) Phthalate	2140		µg/kg
PSYSEA98PSY28PSY28S	Sediment	0.33	N	0	0.3	Bis(2-ethylhexyl) Phthalate	135	J	µg/kg
PSYSEA98PSY30CPSY30A	Sediment	9.14	N	0	4	Bis(2-ethylhexyl) Phthalate	1780		µg/kg
PSYSEA98PSY30CPSY30B	Sediment	9.14	N	4	8	Bis(2-ethylhexyl) Phthalate	409		µg/kg
PSYSEA98PSY30PSY30S	Sediment	9.69	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1400		µg/kg
PSYSEA98PSY33PSY33S	Sediment	0.80	N	0	0.3	Bis(2-ethylhexyl) Phthalate	660		µg/kg
PSYSEA98PSY43PSY43S	Sediment	0.82	N	0	0.3	Bis(2-ethylhexyl) Phthalate	510		µg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Bis(2-ethylhexyl) Phthalate	160		µg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Bis(2-ethylhexyl) Phthalate	67	J	µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Bis(2-ethylhexyl) Phthalate	27	J	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Bis(2-ethylhexyl) Phthalate	90	J	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Bis(2-ethylhexyl) Phthalate	200		µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Bis(2-ethylhexyl) Phthalate	73	J	µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Bis(2-ethylhexyl) Phthalate	11	UJ	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Bis(2-ethylhexyl) Phthalate	930	J	µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Bis(2-ethylhexyl) Phthalate	360		µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Bis(2-ethylhexyl) Phthalate	800		µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Bis(2-ethylhexyl) Phthalate	550		µg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Bis(2-ethylhexyl) Phthalate	250	J	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Bis(2-ethylhexyl) Phthalate	480	J	µg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Bis(2-ethylhexyl) Phthalate	2700	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Bis(2-ethylhexyl) Phthalate	860	J	µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Bis(2-ethylhexyl) Phthalate	370	J	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Bis(2-ethylhexyl) Phthalate	950	J	µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Bis(2-ethylhexyl) Phthalate	280	J	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Bis(2-ethylhexyl) Phthalate	37	J	µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Bis(2-ethylhexyl) Phthalate	240	J	µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Bis(2-ethylhexyl) Phthalate	86	J	µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Bis(2-ethylhexyl) Phthalate	43	J	µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Bis(2-ethylhexyl) Phthalate	47	J	µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Bis(2-ethylhexyl) Phthalate	47	J	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Bis(2-ethylhexyl) Phthalate	29.5	J	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Bis(2-ethylhexyl) Phthalate	40	J	µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Bis(2-ethylhexyl) Phthalate	180		µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Bis(2-ethylhexyl) Phthalate	71	J	µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Bis(2-ethylhexyl) Phthalate	38	J	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Bis(2-ethylhexyl) Phthalate	62	J	µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Bis(2-ethylhexyl) Phthalate	8.9	UJ	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Bis(2-ethylhexyl) Phthalate	9.3	U	µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Bis(2-ethylhexyl) Phthalate	11	UJ	µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Bis(2-ethylhexyl) Phthalate	9.2	UJ	µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	Bis(2-ethylhexyl) Phthalate	45	J	µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Bis(2-ethylhexyl) Phthalate	4100		µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Bis(2-ethylhexyl) Phthalate	5700		µg/kg
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Bis(2-ethylhexyl) Phthalate	17	J	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Bis(2-ethylhexyl) Phthalate	17	U	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Bis(2-ethylhexyl) Phthalate	49	J	µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Bis(2-ethylhexyl) Phthalate	15	J	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Bis(2-ethylhexyl) Phthalate	20	J	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Bis(2-ethylhexyl) Phthalate	68	J	µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Bis(2-ethylhexyl) Phthalate	9.9	UJ	µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Bis(2-ethylhexyl) Phthalate	8.9	U	µg/kg
SIB-098-OHW-1-2-10072022	Sediment	8.22	N	1	2	Bis(2-ethylhexyl) Phthalate	95	J	µg/kg
SIB-098-OHW-2-3-10072022	Sediment	8.22	N	2	3	Bis(2-ethylhexyl) Phthalate	8.9	U	µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Bis(2-ethylhexyl) Phthalate	9.9	UJ	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Bis(2-ethylhexyl) Phthalate	9.1	U	µg/kg
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	Bis(2-ethylhexyl) Phthalate	34	J	µg/kg
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	Bis(2-ethylhexyl) Phthalate	9.2	U	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Bis(2-ethylhexyl) Phthalate	9.2	U	µg/kg
SIB-101-OHW-1-2-10062022	Sediment	8.83	N	1	2	Bis(2-ethylhexyl) Phthalate	9.2	U	µg/kg
SIB-101-OHW-2-3-10062022	Sediment	8.83	N	2	3	Bis(2-ethylhexyl) Phthalate	9.3	U	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	Bis(2-ethylhexyl) Phthalate	35	J	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Bis(2-ethylhexyl) Phthalate	9.4	U	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Bis(2-ethylhexyl) Phthalate	9.3	U	µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Bis(2-ethylhexyl) Phthalate	90	J	µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Bis(2-ethylhexyl) Phthalate	170		µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Bis(2-ethylhexyl) Phthalate	190	U	µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Bis(2-ethylhexyl) Phthalate	100	J	µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Bis(2-ethylhexyl) Phthalate	310	J	µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Bis(2-ethylhexyl) Phthalate	140	J	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Bis(2-ethylhexyl) Phthalate	51	J	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Bis(2-ethylhexyl) Phthalate	30	J	µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Bis(2-ethylhexyl) Phthalate	14	J	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Bis(2-ethylhexyl) Phthalate	48	J	µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Bis(2-ethylhexyl) Phthalate	33	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Bis(2-ethylhexyl) Phthalate	50	J	µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Bis(2-ethylhexyl) Phthalate	59	J	µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Bis(2-ethylhexyl) Phthalate	29	J	µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Bis(2-ethylhexyl) Phthalate	15	U	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Bis(2-ethylhexyl) Phthalate	15	U	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Bis(2-ethylhexyl) Phthalate	15	U	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Bis(2-ethylhexyl) Phthalate	15	U	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Bis(2-ethylhexyl) Phthalate	15	U	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Bis(2-ethylhexyl) Phthalate	91	J	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Bis(2-ethylhexyl) Phthalate	8.9	U	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Bis(2-ethylhexyl) Phthalate	15	U	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Bis(2-ethylhexyl) Phthalate	55	J	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Bis(2-ethylhexyl) Phthalate	15	U	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Bis(2-ethylhexyl) Phthalate	15	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Bis(2-ethylhexyl) Phthalate	4000	J	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Bis(2-ethylhexyl) Phthalate	15	J	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Bis(2-ethylhexyl) Phthalate	19	J	µg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Bis(2-ethylhexyl) Phthalate	16.5	J	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Bis(2-ethylhexyl) Phthalate	17	J	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Bis(2-ethylhexyl) Phthalate	740		µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Bis(2-ethylhexyl) Phthalate	280		µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Bis(2-ethylhexyl) Phthalate	32	J	µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Bis(2-ethylhexyl) Phthalate	160		µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Bis(2-ethylhexyl) Phthalate	35	J	µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Bis(2-ethylhexyl) Phthalate	15	J	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Bis(2-ethylhexyl) Phthalate	15	J	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Bis(2-ethylhexyl) Phthalate	150	J	µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Bis(2-ethylhexyl) Phthalate	9400		µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Bis(2-ethylhexyl) Phthalate	240		µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Bis(2-ethylhexyl) Phthalate	260		µg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Bis(2-ethylhexyl) Phthalate	84	J	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Bis(2-ethylhexyl) Phthalate	670		µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Bis(2-ethylhexyl) Phthalate	390		µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Bis(2-ethylhexyl) Phthalate	305		µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Bis(2-ethylhexyl) Phthalate	620		µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Bis(2-ethylhexyl) Phthalate	19	UJ	µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Bis(2-ethylhexyl) Phthalate	160	J	µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Bis(2-ethylhexyl) Phthalate	140	J	µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Bis(2-ethylhexyl) Phthalate	17	UJ	µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Bis(2-ethylhexyl) Phthalate	17	UJ	µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Bis(2-ethylhexyl) Phthalate	250	J	µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Bis(2-ethylhexyl) Phthalate	320	J	µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Bis(2-ethylhexyl) Phthalate	200	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Bis(2-ethylhexyl) Phthalate	120	J	µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Bis(2-ethylhexyl) Phthalate	1100		µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Bis(2-ethylhexyl) Phthalate	270		µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Bis(2-ethylhexyl) Phthalate	140	J	µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Bis(2-ethylhexyl) Phthalate	63	J	µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Bis(2-ethylhexyl) Phthalate	1000		µg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Bis(2-ethylhexyl) Phthalate	420		µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Bis(2-ethylhexyl) Phthalate	280		µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Bis(2-ethylhexyl) Phthalate	110	J	µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Bis(2-ethylhexyl) Phthalate	520		µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Bis(2-ethylhexyl) Phthalate	75	J	µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Bis(2-ethylhexyl) Phthalate	69	J	µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Bis(2-ethylhexyl) Phthalate	100	J	µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Bis(2-ethylhexyl) Phthalate	91	J	µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Bis(2-ethylhexyl) Phthalate	140	J	µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Bis(2-ethylhexyl) Phthalate	390		µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Bis(2-ethylhexyl) Phthalate	510		µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Bis(2-ethylhexyl) Phthalate	100	J	µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Bis(2-ethylhexyl) Phthalate	91	J	µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Bis(2-ethylhexyl) Phthalate	57	J	µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Bis(2-ethylhexyl) Phthalate	160	J	µg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Bis(2-ethylhexyl) Phthalate	210		µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Bis(2-ethylhexyl) Phthalate	41	J	µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Bis(2-ethylhexyl) Phthalate	51	J	µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Bis(2-ethylhexyl) Phthalate	150.5	J	µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Bis(2-ethylhexyl) Phthalate	96	J	µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Bis(2-ethylhexyl) Phthalate	77	J	µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Bis(2-ethylhexyl) Phthalate	200	J	µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Bis(2-ethylhexyl) Phthalate	220		µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Bis(2-ethylhexyl) Phthalate	110	J	µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Bis(2-ethylhexyl) Phthalate	150	J	µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Bis(2-ethylhexyl) Phthalate	140	J	µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Bis(2-ethylhexyl) Phthalate	270		µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Bis(2-ethylhexyl) Phthalate	190	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Bis(2-ethylhexyl) Phthalate	100	J	µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Bis(2-ethylhexyl) Phthalate	110	J	µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Bis(2-ethylhexyl) Phthalate	120	J	µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Bis(2-ethylhexyl) Phthalate	170	J	µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Bis(2-ethylhexyl) Phthalate	51	J	µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Bis(2-ethylhexyl) Phthalate	16	U	µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Bis(2-ethylhexyl) Phthalate	62	J	µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Bis(2-ethylhexyl) Phthalate	75	J	µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Bis(2-ethylhexyl) Phthalate	32	J	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Bis(2-ethylhexyl) Phthalate	57	J	µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Bis(2-ethylhexyl) Phthalate	48	J	µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Bis(2-ethylhexyl) Phthalate	170	J	µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Bis(2-ethylhexyl) Phthalate	150	J	µg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Bis(2-ethylhexyl) Phthalate	110	J	µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Bis(2-ethylhexyl) Phthalate	89	J	µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Bis(2-ethylhexyl) Phthalate	75	J	µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Bis(2-ethylhexyl) Phthalate	220		µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Bis(2-ethylhexyl) Phthalate	16	J	µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Bis(2-ethylhexyl) Phthalate	830		µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Bis(2-ethylhexyl) Phthalate	1100		µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Bis(2-ethylhexyl) Phthalate	630		µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Bis(2-ethylhexyl) Phthalate	1000		µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Bis(2-ethylhexyl) Phthalate	240		µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Bis(2-ethylhexyl) Phthalate	4700		µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Bis(2-ethylhexyl) Phthalate	6200		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Bis(2-ethylhexyl) Phthalate	865		µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Bis(2-ethylhexyl) Phthalate	1000		µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Bis(2-ethylhexyl) Phthalate	80	J	µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Bis(2-ethylhexyl) Phthalate	13	J	µg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Bis(2-ethylhexyl) Phthalate	28	J	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Bis(2-ethylhexyl) Phthalate	41	J	µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Bis(2-ethylhexyl) Phthalate	49	J	µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Bis(2-ethylhexyl) Phthalate	340		µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Bis(2-ethylhexyl) Phthalate	110	J	µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Bis(2-ethylhexyl) Phthalate	120	J	µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Bis(2-ethylhexyl) Phthalate	14	U	µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Bis(2-ethylhexyl) Phthalate	15	U	µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Bis(2-ethylhexyl) Phthalate	88	J	µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Bis(2-ethylhexyl) Phthalate	1600		µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Bis(2-ethylhexyl) Phthalate	405		µg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Bis(2-ethylhexyl) Phthalate	140	J	µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Bis(2-ethylhexyl) Phthalate	190		µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Bis(2-ethylhexyl) Phthalate	6700		µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Bis(2-ethylhexyl) Phthalate	460		µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Bis(2-ethylhexyl) Phthalate	5900	J	µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Bis(2-ethylhexyl) Phthalate	1300		µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Bis(2-ethylhexyl) Phthalate	860		µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Bis(2-ethylhexyl) Phthalate	24	J	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Bis(2-ethylhexyl) Phthalate	5900	J	µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Bis(2-ethylhexyl) Phthalate	380	J	µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Bis(2-ethylhexyl) Phthalate	15	J	µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Bis(2-ethylhexyl) Phthalate	65	J	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Bis(2-ethylhexyl) Phthalate	7700		µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Bis(2-ethylhexyl) Phthalate	11500	J	µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Bis(2-ethylhexyl) Phthalate	2700		µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Bis(2-ethylhexyl) Phthalate	6100	J	µg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Bis(2-ethylhexyl) Phthalate	2700	J	µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Bis(2-ethylhexyl) Phthalate	98	J	µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Bis(2-ethylhexyl) Phthalate	33	J	µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Bis(2-ethylhexyl) Phthalate	4700		µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Bis(2-ethylhexyl) Phthalate	1600		µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Bis(2-ethylhexyl) Phthalate	1900		µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Bis(2-ethylhexyl) Phthalate	350	U	µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Bis(2-ethylhexyl) Phthalate	3700	J	µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Bis(2-ethylhexyl) Phthalate	600		µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Bis(2-ethylhexyl) Phthalate	66	J	µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Bis(2-ethylhexyl) Phthalate	900		µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Bis(2-ethylhexyl) Phthalate	630		µg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Bis(2-ethylhexyl) Phthalate	1600		µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Bis(2-ethylhexyl) Phthalate	3300	J	µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Bis(2-ethylhexyl) Phthalate	1000		µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Bis(2-ethylhexyl) Phthalate	1100		µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Bis(2-ethylhexyl) Phthalate	1400	J	µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Bis(2-ethylhexyl) Phthalate	85	J	µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Bis(2-ethylhexyl) Phthalate	2500		µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Bis(2-ethylhexyl) Phthalate	2500	J	µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Bis(2-ethylhexyl) Phthalate	350	U	µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Bis(2-ethylhexyl) Phthalate	350	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Bis(2-ethylhexyl) Phthalate	330	U	µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Bis(2-ethylhexyl) Phthalate	320	U	µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Bis(2-ethylhexyl) Phthalate	740		µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Bis(2-ethylhexyl) Phthalate	700	J	µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Bis(2-ethylhexyl) Phthalate	580	J	µg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Bis(2-ethylhexyl) Phthalate	530		µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Bis(2-ethylhexyl) Phthalate	2100		µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Bis(2-ethylhexyl) Phthalate	550		µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Bis(2-ethylhexyl) Phthalate	590		µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Bis(2-ethylhexyl) Phthalate	440	J	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Bis(2-ethylhexyl) Phthalate	660		µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Bis(2-ethylhexyl) Phthalate	420		µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Bis(2-ethylhexyl) Phthalate	1300		µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Bis(2-ethylhexyl) Phthalate	750		µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Bis(2-ethylhexyl) Phthalate	2700	J	µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Bis(2-ethylhexyl) Phthalate	250		µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Bis(2-ethylhexyl) Phthalate	930		µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Bis(2-ethylhexyl) Phthalate	83	J	µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Bis(2-ethylhexyl) Phthalate	48	J	µg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Bis(2-ethylhexyl) Phthalate	13	U	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Bis(2-ethylhexyl) Phthalate	15	U	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Bis(2-ethylhexyl) Phthalate	2500		µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Bis(2-ethylhexyl) Phthalate	1100		µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Bis(2-ethylhexyl) Phthalate	160		µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Bis(2-ethylhexyl) Phthalate	73	J	µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Bis(2-ethylhexyl) Phthalate	34	J	µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Bis(2-ethylhexyl) Phthalate	1200		µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Bis(2-ethylhexyl) Phthalate	1400		µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Bis(2-ethylhexyl) Phthalate	1500		µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Bis(2-ethylhexyl) Phthalate	40	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Bis(2-ethylhexyl) Phthalate	12	U	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Bis(2-ethylhexyl) Phthalate	26	J	µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Bis(2-ethylhexyl) Phthalate	540		µg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Bis(2-ethylhexyl) Phthalate	32000		µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Bis(2-ethylhexyl) Phthalate	2900		µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Bis(2-ethylhexyl) Phthalate	14	J	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Bis(2-ethylhexyl) Phthalate	220		µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Bis(2-ethylhexyl) Phthalate	74	J	µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Bis(2-ethylhexyl) Phthalate	120	J	µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Bis(2-ethylhexyl) Phthalate	1200		µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Bis(2-ethylhexyl) Phthalate	33	J	µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Bis(2-ethylhexyl) Phthalate	370		µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Bis(2-ethylhexyl) Phthalate	5300		µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Bis(2-ethylhexyl) Phthalate	8100	J	µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Bis(2-ethylhexyl) Phthalate	6800		µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Bis(2-ethylhexyl) Phthalate	11	U	µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Bis(2-ethylhexyl) Phthalate	150	J	µg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Bis(2-ethylhexyl) Phthalate	3400		µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Bis(2-ethylhexyl) Phthalate	15000		µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Bis(2-ethylhexyl) Phthalate	15000		µg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Bis(2-ethylhexyl) Phthalate	8.9	U	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Bis(2-ethylhexyl) Phthalate	340		µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Bis(2-ethylhexyl) Phthalate	30	J	µg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Bis(2-ethylhexyl) Phthalate	340		µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Bis(2-ethylhexyl) Phthalate	32500	J	µg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Bis(2-ethylhexyl) Phthalate	163	J	µg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Bis(2-ethylhexyl) Phthalate	2250	J	µg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Bis(2-ethylhexyl) Phthalate	2260	J	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Bis(2-ethylhexyl) Phthalate	68.4	U	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Bis(2-ethylhexyl) Phthalate	994		µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Bis(2-ethylhexyl) Phthalate	377		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Bis(2-ethylhexyl) Phthalate	71.4		µg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Bis(2-ethylhexyl) Phthalate	4210		µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Bis(2-ethylhexyl) Phthalate	1800		µg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Bis(2-ethylhexyl) Phthalate	220		µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Bis(2-ethylhexyl) Phthalate	295	T	µg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Bis(2-ethylhexyl) Phthalate	1400		µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Bis(2-ethylhexyl) Phthalate	240		µg/kg
WR-WSI98SD1300	Sediment	2.09	N	0	0.3	Bis(2-ethylhexyl) Phthalate	400		µg/kg
WR-WSI98SD1320	Sediment	1.21	N	0	0.3	Bis(2-ethylhexyl) Phthalate	490		µg/kg
WR-WSI98SD1330	Sediment	5.72	N	0	0.3	Bis(2-ethylhexyl) Phthalate	650		µg/kg
WR-WSI98SD1330000A	Sediment	5.72	N	0	3	Bis(2-ethylhexyl) Phthalate	1200		µg/kg
WR-WSI98SD1340	Sediment	2.58	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1300		µg/kg
WR-WSI98SD1360	Sediment	2.50	N	0	0.3	Bis(2-ethylhexyl) Phthalate	2100		µg/kg
WR-WSI98SD1390	Sediment	3.67	N	0	0.3	Bis(2-ethylhexyl) Phthalate	1200		µg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Bis(2-ethylhexyl) Phthalate	200		µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Bis(2-ethylhexyl) Phthalate	895	T	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Bis(2-ethylhexyl) Phthalate	9.3	U	µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Bis(2-ethylhexyl) Phthalate	9	UJ	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Bis(2-ethylhexyl) Phthalate	9.2	UJ	µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Cadmium	0.074	J	mg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Cadmium	0.41		mg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Cadmium	0.32		mg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Cadmium	0.089	J	mg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Cadmium	0.26		mg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Cadmium	0.18		mg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Cadmium	0.5		mg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Cadmium	0.37		mg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Cadmium	0.16	J	mg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Cadmium	0.17	J	mg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	Cadmium	0.67		mg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Cadmium	1.1		mg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Cadmium	0.62		mg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	Cadmium	0.43		mg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Cadmium	0.73		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Cadmium	1.1		mg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	Cadmium	0.29		mg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	Cadmium	0.24		mg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Cadmium	0.66		mg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	Cadmium	0.72		mg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	Cadmium	0.35		mg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	Cadmium	0.74		mg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	Cadmium	0.48		mg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	Cadmium	0.51		mg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Cadmium	0.1	J	mg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Cadmium	0.24		mg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	Cadmium	0.2		mg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	Cadmium	0.13	J	mg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	Cadmium	0.13		mg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	Cadmium	0.47		mg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Cadmium	0.234		mg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Cadmium	0.223		mg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Cadmium	0.178		mg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Cadmium	3.25	J	mg/kg
LW2-C388-B	Sediment	6.46	N	1	5.1	Cadmium	0.126		mg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Cadmium	0.095		mg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Cadmium	0.099	T	mg/kg
LW2-C402-B	Sediment	5.83	N	1	2.1	Cadmium	0.194	J	mg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Cadmium	0.64		mg/kg
LW2-C421-C	Sediment	4.45	N	2	4	Cadmium	0.343		mg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Cadmium	0.47		mg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Cadmium	0.283		mg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Cadmium	0.422		mg/kg
LW2-G382	Sediment	2.65	N	0	1	Cadmium	0.533		mg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Cadmium	0.422		mg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Cadmium	0.313	T	mg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Cadmium	0.29		mg/kg
LW2-G388	Sediment	7.36	N	0	0.9	Cadmium	0.229		mg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Cadmium	0.663		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-G393	Sediment	2.99	N	0	0.9	Cadmium	0.997		mg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Cadmium	0.09	J	mg/kg
LW2-G398	Sediment	8.99	N	0	1	Cadmium	0.237	J	mg/kg
LW2-G402	Sediment	4.06	N	0	1	Cadmium	0.558		mg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Cadmium	0.569		mg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Cadmium	0.651		mg/kg
LW2-G416	Sediment	5.63	N	0	1	Cadmium	0.631		mg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Cadmium	0.265		mg/kg
LW2-G421	Sediment	4.56	N	0	1	Cadmium	0.688		mg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Cadmium	0.19		mg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Cadmium	0.537		mg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Cadmium	0.257		mg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Cadmium	0.697		mg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Cadmium	0.197		mg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Cadmium	0.259		mg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Cadmium	0.764		mg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Cadmium	1.25		mg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Cadmium	0.175		mg/kg
LW3-G706	Sediment	9.49	N	0	1	Cadmium	0.18	J	mg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Cadmium	0.0855	T	mg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Cadmium	0.07		mg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	Cadmium	0.027	U	mg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Cadmium	0.41		mg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Cadmium	0.53		mg/kg
NA-4A-0005	Sediment	5.42	N	0	0.2	Cadmium	0.52		mg/kg
NA-4A-0508	Sediment	5.42	N	0.2	0.3	Cadmium	0.52		mg/kg
NA-4A-0812	Sediment	5.42	N	0.3	0.4	Cadmium	0.5		mg/kg
NA-4A-1216	Sediment	5.42	N	0.4	0.5	Cadmium	0.45		mg/kg
NA-4A-1620	Sediment	5.42	N	0.5	0.7	Cadmium	0.44		mg/kg
NA-4A-2024	Sediment	5.42	N	0.7	0.8	Cadmium	0.49		mg/kg
NA-4A-2428	Sediment	5.42	N	0.8	0.9	Cadmium	0.51		mg/kg
NA-4A-2832	Sediment	5.42	N	0.9	1	Cadmium	0.49		mg/kg
NA-4A-3238	Sediment	5.42	N	1	1.2	Cadmium	0.49		mg/kg
NA-4A-3844	Sediment	5.42	N	1.2	1.4	Cadmium	0.47		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
NA-4A-4448	Sediment	5.42	N	1.4	1.6	Cadmium	0.45		mg/kg
NA-4A-5864	Sediment	5.42	N	1.9	2.1	Cadmium	0.52		mg/kg
NA-4A-6874	Sediment	5.42	N	2.2	2.4	Cadmium	0.46		mg/kg
NA-4A-7884	Sediment	5.42	N	2.6	2.8	Cadmium	0.49		mg/kg
NA-4A-8894	Sediment	5.42	N	2.9	3.1	Cadmium	0.5	T	mg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Cadmium	0.44		mg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Cadmium	0.071	J	mg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	Cadmium	0.3		mg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	Cadmium	0.17	J	mg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	Cadmium	0.22		mg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	Cadmium	0.32	J	mg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	Cadmium	0.58		mg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	Cadmium	0.28	J	mg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	Cadmium	0.4	J	mg/kg
PSYD&M97DM16DM16	Sediment	0.66	N	0	0.3	Cadmium	1.53		mg/kg
PSYD&M97DM20DM20C	Sediment	10.29	N	3.5	4.5	Cadmium	1.98	J	mg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Cadmium	1.1		mg/kg
PSYSEA98PSY05PSY05S	Sediment	7.29	N	0	0.3	Cadmium	0.5		mg/kg
PSYSEA98PSY06PSY06S	Sediment	14.49	N	0	0.3	Cadmium	0.1	U	mg/kg
PSYSEA98PSY07PSY07S	Sediment	1.44	N	0	0.3	Cadmium	0.5		mg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Cadmium	2.25	T	mg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Cadmium	2.8		mg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Cadmium	1.5		mg/kg
PSYSEA98PSY10PSY10S	Sediment	1.89	N	0	0.3	Cadmium	0.6		mg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Cadmium	0.4		mg/kg
PSYSEA98PSY14PSY14S	Sediment	2.71	N	0	0.3	Cadmium	0.6		mg/kg
PSYSEA98PSY17PSY17S	Sediment	3.87	N	0	0.3	Cadmium	0.4		mg/kg
PSYSEA98PSY18CPSY18A	Sediment	6.14	N	0	4	Cadmium	0.5		mg/kg
PSYSEA98PSY18PSY18S	Sediment	5.56	N	0	0.3	Cadmium	0.7		mg/kg
PSYSEA98PSY20PSY20S	Sediment	0.48	N	0	0.3	Cadmium	0.4		mg/kg
PSYSEA98PSY21PSY21S	Sediment	0.83	N	0	0.3	Cadmium	0.3		mg/kg
PSYSEA98PSY23CPSY23A	Sediment	9.68	N	0	4	Cadmium	0.3		mg/kg
PSYSEA98PSY23CPSY23B	Sediment	9.68	N	4	8	Cadmium	0.1	U	mg/kg
PSYSEA98PSY23PSY23S	Sediment	10.52	N	0	0.3	Cadmium	0.2		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYSEA98PSY25PSY25S	Sediment	4.12	N	0	0.3	Cadmium	0.2		mg/kg
PSYSEA98PSY26PSY26S	Sediment	0.44	N	0	0.3	Cadmium	0.6		mg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Cadmium	0.7		mg/kg
PSYSEA98PSY28PSY28S	Sediment	0.33	N	0	0.3	Cadmium	0.1		mg/kg
PSYSEA98PSY30CPSY30A	Sediment	9.14	N	0	4	Cadmium	0.4		mg/kg
PSYSEA98PSY30CPSY30B	Sediment	9.14	N	4	8	Cadmium	0.1	U	mg/kg
PSYSEA98PSY30CY30A01	Sediment	9.14	N	0	1	Cadmium	0.3		mg/kg
PSYSEA98PSY30CY30A02	Sediment	9.14	N	1	2	Cadmium	0.3		mg/kg
PSYSEA98PSY30CY30A03	Sediment	9.14	N	2	3	Cadmium	0.4		mg/kg
PSYSEA98PSY30CY30A04	Sediment	9.14	N	3	4	Cadmium	1.6		mg/kg
PSYSEA98PSY30CY30B05	Sediment	9.14	N	4	5	Cadmium	0.8		mg/kg
PSYSEA98PSY30CY30B06	Sediment	9.14	N	5	6	Cadmium	0.1	U	mg/kg
PSYSEA98PSY30CY30B07	Sediment	9.14	N	6	7	Cadmium	0.1	U	mg/kg
PSYSEA98PSY30CY30B08	Sediment	9.14	N	7	8	Cadmium	0.1	U	mg/kg
PSYSEA98PSY30PSY30S	Sediment	9.69	N	0	0.3	Cadmium	0.2		mg/kg
PSYSEA98PSY33PSY33S	Sediment	0.80	N	0	0.3	Cadmium	0.2		mg/kg
PSYSEA98PSY43PSY43S	Sediment	0.82	N	0	0.3	Cadmium	0.1		mg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Cadmium	0.12	J	mg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Cadmium	0.44		mg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Cadmium	0.066	J	mg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Cadmium	0.12		mg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Cadmium	0.09	J	mg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Cadmium	0.15		mg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Cadmium	0.11	J	mg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Cadmium	0.1	J	mg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Cadmium	0.15		mg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Cadmium	0.15		mg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Cadmium	0.21		mg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Cadmium	0.11	J	mg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Cadmium	0.17		mg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Cadmium	1.27		mg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Cadmium	2.25		mg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Cadmium	0.5		mg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Cadmium	0.21		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Cadmium	0.15		mg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Cadmium	0.35		mg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Cadmium	1.9		mg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Cadmium	0.22		mg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Cadmium	0.24		mg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Cadmium	0.2		mg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Cadmium	0.13		mg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Cadmium	0.09	J	mg/kg
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	Cadmium	0.05	J	mg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Cadmium	0.26		mg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Cadmium	0.22		mg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Cadmium	0.32		mg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Cadmium	0.21		mg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Cadmium	0.16		mg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Cadmium	0.07	J	mg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Cadmium	0.2		mg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Cadmium	0.1	J	mg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Cadmium	0.09	J	mg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Cadmium	0.07		mg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Cadmium	0.14		mg/kg
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	Cadmium	0.22		mg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Cadmium	1.89		mg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Cadmium	0.06	J	mg/kg
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	Cadmium	0.15	J	mg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Cadmium	0.095	J	mg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Cadmium	0.05	U	mg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Cadmium	0.08	J	mg/kg
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	Cadmium	0.13	J	mg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Cadmium	0.11	J	mg/kg
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	Cadmium	0.18		mg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Cadmium	0.07	J	mg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Cadmium	0.08	J	mg/kg
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	Cadmium	0.22		mg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Cadmium	0.24		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Cadmium	0.07	J	mg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Cadmium	0.08	J	mg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Cadmium	0.06	J	mg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Cadmium	0.04	J	mg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Cadmium	0.17		mg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Cadmium	0.1	J	mg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Cadmium	0.05	J	mg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Cadmium	0.1		mg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Cadmium	0.03	U	mg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Cadmium	0.05	J	mg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Cadmium	0.15		mg/kg
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	Cadmium	0.11	J	mg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Cadmium	0.12		mg/kg
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	Cadmium	0.05	J	mg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Cadmium	0.1	J	mg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Cadmium	0.22		mg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Cadmium	0.2		mg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Cadmium	0.24		mg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Cadmium	0.25		mg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Cadmium	0.16		mg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Cadmium	0.26		mg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Cadmium	0.12		mg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Cadmium	0.28		mg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Cadmium	0.1	J	mg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Cadmium	0.09	J	mg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Cadmium	0.1	J	mg/kg
SIB-122-MLW-1-2-10262022	Sediment	4.02	N	1	2	Cadmium	0.06	J	mg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Cadmium	0.18		mg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Cadmium	0.07	J	mg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Cadmium	0.39		mg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Cadmium	0.24		mg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Cadmium	0.355		mg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Cadmium	0.4		mg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Cadmium	0.34		mg/kg

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Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Cadmium	0.12	J	mg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Cadmium	0.08	J	mg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Cadmium	0.095	J	mg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Cadmium	0.08	J	mg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Cadmium	0.09	J	mg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Cadmium	0.08	J	mg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Cadmium	0.1	J	mg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Cadmium	0.11	J	mg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Cadmium	0.11	J	mg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Cadmium	0.11	J	mg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Cadmium	0.11	J	mg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Cadmium	0.07	J	mg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Cadmium	0.08	J	mg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Cadmium	0.09	J	mg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Cadmium	0.09	J	mg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Cadmium	0.1	J	mg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Cadmium	0.1	J	mg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Cadmium	0.065	J	mg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Cadmium	0.04	U	mg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Cadmium	0.08	J	mg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Cadmium	0.09	J	mg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Cadmium	0.12	J	mg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Cadmium	0.12	J	mg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Cadmium	0.12	J	mg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Cadmium	0.17		mg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Cadmium	0.08	J	mg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Cadmium	0.06	J	mg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Cadmium	0.15		mg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Cadmium	0.11	J	mg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Cadmium	0.08	J	mg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Cadmium	0.11	J	mg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Cadmium	0.08	J	mg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Cadmium	0.15	J	mg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Cadmium	0.08	J	mg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Cadmium	0.07	J	mg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Cadmium	0.07	J	mg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Cadmium	0.1	J	mg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Cadmium	0.105	J	mg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Cadmium	0.11	J	mg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Cadmium	0.11	J	mg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Cadmium	0.11	J	mg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Cadmium	0.1	J	mg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Cadmium	0.73		mg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Cadmium	0.15		mg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Cadmium	0.55		mg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Cadmium	0.2		mg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Cadmium	0.11		mg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Cadmium	0.14		mg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Cadmium	0.56		mg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Cadmium	0.7		mg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Cadmium	0.39		mg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Cadmium	0.34		mg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Cadmium	0.17		mg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Cadmium	0.29		mg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Cadmium	0.29		mg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Cadmium	0.425		mg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Cadmium	0.32		mg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Cadmium	0.35	J	mg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Cadmium	0.34	J	mg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Cadmium	0.43	J	mg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Cadmium	0.37		mg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Cadmium	0.4		mg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Cadmium	0.44		mg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Cadmium	0.615	J	mg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Cadmium	0.67	J	mg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Cadmium	0.6	J	mg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Cadmium	0.65		mg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Cadmium	0.64		mg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Cadmium	0.35		mg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Cadmium	0.15	J	mg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Cadmium	0.62		mg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Cadmium	0.63		mg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Cadmium	0.48		mg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Cadmium	0.43		mg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Cadmium	0.41		mg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Cadmium	0.42		mg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Cadmium	0.32		mg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Cadmium	0.44		mg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Cadmium	0.32		mg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Cadmium	0.43		mg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Cadmium	0.44		mg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Cadmium	0.53		mg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Cadmium	0.58		mg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Cadmium	0.29		mg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Cadmium	0.45		mg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Cadmium	0.46		mg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Cadmium	0.57		mg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Cadmium	0.5		mg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Cadmium	0.41		mg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Cadmium	0.52	J	mg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Cadmium	0.39	J	mg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Cadmium	0.39	J	mg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Cadmium	0.46		mg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Cadmium	0.5		mg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Cadmium	0.5		mg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Cadmium	0.39		mg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Cadmium	0.35		mg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Cadmium	0.48		mg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Cadmium	0.53		mg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Cadmium	0.49		mg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Cadmium	0.38		mg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Cadmium	0.4		mg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Cadmium	0.54		mg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Cadmium	0.55		mg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Cadmium	0.35		mg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Cadmium	0.47		mg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Cadmium	0.31		mg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Cadmium	0.4		mg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Cadmium	0.04	J	mg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Cadmium	0.38		mg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Cadmium	0.39		mg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Cadmium	0.215		mg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Cadmium	0.07	J	mg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Cadmium	0.09	J	mg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Cadmium	0.48		mg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Cadmium	0.38		mg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Cadmium	0.51		mg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Cadmium	0.32		mg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Cadmium	0.16		mg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Cadmium	0.45		mg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Cadmium	0.49		mg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Cadmium	0.43		mg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Cadmium	0.4		mg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Cadmium	0.28		mg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Cadmium	0.44		mg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Cadmium	0.4		mg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Cadmium	0.41		mg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Cadmium	0.66		mg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Cadmium	0.59		mg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Cadmium	0.67	J	mg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Cadmium	0.44		mg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Cadmium	0.53		mg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Cadmium	0.55		mg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Cadmium	0.51		mg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Cadmium	0.51		mg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Cadmium	1.08		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Cadmium	0.21		mg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Cadmium	0.39		mg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Cadmium	0.05	J	mg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Cadmium	0.09	J	mg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Cadmium	0.09	J	mg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Cadmium	0.17		mg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Cadmium	0.12		mg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Cadmium	0.5		mg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Cadmium	0.45		mg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Cadmium	0.4		mg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Cadmium	0.6		mg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Cadmium	0.635		mg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Cadmium	0.46		mg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Cadmium	0.24		mg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Cadmium	0.32		mg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Cadmium	0.52		mg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Cadmium	0.63		mg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Cadmium	0.83	J	mg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Cadmium	0.29		mg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Cadmium	0.47		mg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Cadmium	0.55		mg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Cadmium	0.89		mg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Cadmium	0.8		mg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Cadmium	1.31		mg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Cadmium	0.26		mg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Cadmium	0.08	J	mg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Cadmium	0.06		mg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Cadmium	0.95		mg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Cadmium	0.15		mg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Cadmium	0.09	J	mg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Cadmium	0.11	J	mg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Cadmium	0.1	J	mg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Cadmium	0.11		mg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Cadmium	1.02		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Cadmium	0.785		mg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Cadmium	0.77		mg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Cadmium	0.99		mg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Cadmium	0.87		mg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Cadmium	0.28		mg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Cadmium	0.11		mg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Cadmium	0.1		mg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Cadmium	0.08		mg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Cadmium	0.5		mg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Cadmium	0.37		mg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Cadmium	0.72		mg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Cadmium	0.77		mg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Cadmium	0.82		mg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Cadmium	0.39		mg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Cadmium	0.1	J	mg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Cadmium	0.04	U	mg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Cadmium	0.41		mg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Cadmium	0.86		mg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Cadmium	0.73		mg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Cadmium	0.52		mg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Cadmium	0.73		mg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Cadmium	0.8		mg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Cadmium	0.53		mg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Cadmium	0.1	J	mg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Cadmium	0.09	J	mg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Cadmium	0.71		mg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Cadmium	0.04	J	mg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Cadmium	0.07	J	mg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Cadmium	1.305		mg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Cadmium	0.8		mg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Cadmium	0.96		mg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Cadmium	0.99		mg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Cadmium	1.95		mg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Cadmium	0.1	J	mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Cadmium	0.4		mg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Cadmium	1.09		mg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Cadmium	0.34		mg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Cadmium	0.46		mg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Cadmium	0.94		mg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Cadmium	0.58		mg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Cadmium	0.64		mg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Cadmium	0.9		mg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Cadmium	0.32		mg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Cadmium	0.31		mg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Cadmium	0.22		mg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Cadmium	0.26		mg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Cadmium	0.4		mg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Cadmium	0.24		mg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Cadmium	0.5		mg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Cadmium	0.38		mg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Cadmium	0.24		mg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Cadmium	0.1	J	mg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Cadmium	0.1	J	mg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Cadmium	0.3		mg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Cadmium	0.13	J	mg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Cadmium	0.08	J	mg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Cadmium	1.11		mg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Cadmium	0.4		mg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Cadmium	0.12	J	mg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Cadmium	0.07	J	mg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Cadmium	0.05	J	mg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Cadmium	0.36		mg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Cadmium	0.36		mg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Cadmium	0.44		mg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Cadmium	0.08	J	mg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Cadmium	0.11	J	mg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Cadmium	0.06	J	mg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Cadmium	0.05	J	mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Cadmium	0.04	U	mg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Cadmium	0.21		mg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Cadmium	0.83		mg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Cadmium	0.21		mg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Cadmium	0.05	J	mg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Cadmium	0.05	J	mg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Cadmium	0.21		mg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Cadmium	0.15	J	mg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Cadmium	0.17	J	mg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Cadmium	0.22		mg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Cadmium	0.2		mg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Cadmium	0.25		mg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Cadmium	0.41		mg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Cadmium	1.58		mg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Cadmium	0.24		mg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Cadmium	0.05	J	mg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Cadmium	0.21		mg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Cadmium	0.8		mg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Cadmium	1.77		mg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Cadmium	0.57		mg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Cadmium	0.076	J	mg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Cadmium	0.4	J	mg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Cadmium	0.46		mg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Cadmium	0.37	J	mg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Cadmium	1.31		mg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Cadmium	0.348	J	mg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Cadmium	1.89		mg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Cadmium	1.26		mg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Cadmium	0.00927	U	mg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Cadmium	0.488	J	mg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Cadmium	0.18	J	mg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Cadmium	0.00172	U	mg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Cadmium	0.195	J	mg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Cadmium	0.338		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WLCPSK094-A	Sediment	10.57	N	0	2.9	Cadmium	0.193		mg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Cadmium	0.192	T	mg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Cadmium	0.19		mg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Cadmium	0.185		mg/kg
WR-WSI98SD1300	Sediment	2.09	N	0	0.3	Cadmium	0.4		mg/kg
WR-WSI98SD1320	Sediment	1.21	N	0	0.3	Cadmium	0.3		mg/kg
WR-WSI98SD1330	Sediment	5.72	N	0	0.3	Cadmium	0.6		mg/kg
WR-WSI98SD1330000A	Sediment	5.72	N	0	3	Cadmium	0.7		mg/kg
WR-WSI98SD1340	Sediment	2.58	N	0	0.3	Cadmium	0.7		mg/kg
WR-WSI98SD1360	Sediment	2.50	N	0	0.3	Cadmium	1		mg/kg
WR-WSI98SD1390	Sediment	3.67	N	0	0.3	Cadmium	0.8		mg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Cadmium	0.6		mg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Cadmium	0.8	T	mg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Cadmium	0.1	J	mg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Cadmium	0.11	J	mg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Cadmium	0.07	J	mg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	CHLOROBENZENE	0.24	U	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	CHLOROBENZENE	0.2	U	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	CHLOROBENZENE	0.19	U	µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	CHLOROBENZENE	0.19	U	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	CHLOROBENZENE	0.17	U	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	CHLOROBENZENE	0.16	U	µg/kg
PSYD&M97DM16DM16	Sediment	0.66	N	0	0.3	CHLOROBENZENE	50	U	µg/kg
PSYSEA98PSY17PSY17S	Sediment	3.87	N	0	0.3	CHLOROBENZENE	25	U	µg/kg
PSYSEA98PSY26PSY26S	Sediment	0.44	N	0	0.3	CHLOROBENZENE	5	U	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	CHLOROBENZENE	5	U	µg/kg
PSYSEA98PSY30PSY30S	Sediment	9.69	N	0	0.3	CHLOROBENZENE	5	U	µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Copper	46		mg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Copper	160		mg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Copper	150		mg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Copper	25		mg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Copper	84	J	mg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Copper	95		mg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Copper	210		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Copper	130	J	mg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Copper	180		mg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Copper	46		mg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	Copper	370		mg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Copper	260		mg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Copper	100		mg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	Copper	150		mg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Copper	34		mg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Copper	120		mg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	Copper	32		mg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	Copper	27		mg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Copper	76		mg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	Copper	69		mg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	Copper	37		mg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	Copper	290		mg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	Copper	95		mg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	Copper	450		mg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Copper	19		mg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Copper	33		mg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	Copper	29		mg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	Copper	18		mg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	Copper	19		mg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	Copper	200		mg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Copper	27.3		mg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Copper	32.4		mg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Copper	16.2		mg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Copper	3290		mg/kg
LW2-C388-B	Sediment	6.46	N	1	5.1	Copper	26.2		mg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Copper	30.3		mg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Copper	28.5	T	mg/kg
LW2-C402-B	Sediment	5.83	N	1	2.1	Copper	309		mg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Copper	109		mg/kg
LW2-C421-C	Sediment	4.45	N	2	4	Copper	47.4		mg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Copper	55.8		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-G364	Sediment	14.72	N	0	0.9	Copper	54.9		mg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Copper	170		mg/kg
LW2-G382	Sediment	2.65	N	0	1	Copper	230		mg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Copper	33.8		mg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Copper	349	T	mg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Copper	480		mg/kg
LW2-G388	Sediment	7.36	N	0	0.9	Copper	20.4		mg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Copper	1080		mg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Copper	330		mg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Copper	28.9		mg/kg
LW2-G398	Sediment	8.99	N	0	1	Copper	203		mg/kg
LW2-G402	Sediment	4.06	N	0	1	Copper	155		mg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Copper	354		mg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Copper	242		mg/kg
LW2-G416	Sediment	5.63	N	0	1	Copper	94.4		mg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Copper	22.9		mg/kg
LW2-G421	Sediment	4.56	N	0	1	Copper	128		mg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Copper	19.2		mg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Copper	113		mg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Copper	235		mg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Copper	110		mg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Copper	92.7		mg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Copper	81.8		mg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Copper	1570		mg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Copper	2510		mg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Copper	103		mg/kg
LW3-G706	Sediment	9.49	N	0	1	Copper	180		mg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Copper	14.6	T	mg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Copper	23.9		mg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	Copper	12		mg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Copper	100		mg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Copper	230		mg/kg
NA-4A-0005	Sediment	5.42	N	0	0.2	Copper	92.2		mg/kg
NA-4A-0508	Sediment	5.42	N	0.2	0.3	Copper	64.9		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
NA-4A-0812	Sediment	5.42	N	0.3	0.4	Copper	73.4		mg/kg
NA-4A-1216	Sediment	5.42	N	0.4	0.5	Copper	57.7		mg/kg
NA-4A-1620	Sediment	5.42	N	0.5	0.7	Copper	66.1		mg/kg
NA-4A-2024	Sediment	5.42	N	0.7	0.8	Copper	59.4		mg/kg
NA-4A-2428	Sediment	5.42	N	0.8	0.9	Copper	63.7		mg/kg
NA-4A-2832	Sediment	5.42	N	0.9	1	Copper	60.2		mg/kg
NA-4A-3238	Sediment	5.42	N	1	1.2	Copper	57.7		mg/kg
NA-4A-3844	Sediment	5.42	N	1.2	1.4	Copper	72.5		mg/kg
NA-4A-4448	Sediment	5.42	N	1.4	1.6	Copper	68.4		mg/kg
NA-4A-5864	Sediment	5.42	N	1.9	2.1	Copper	86.6		mg/kg
NA-4A-6874	Sediment	5.42	N	2.2	2.4	Copper	73.5		mg/kg
NA-4A-7884	Sediment	5.42	N	2.6	2.8	Copper	61.1		mg/kg
NA-4A-8894	Sediment	5.42	N	2.9	3.1	Copper	80	T	mg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Copper	150		mg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Copper	19		mg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	Copper	510		mg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	Copper	130		mg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	Copper	150		mg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	Copper	76		mg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	Copper	100		mg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	Copper	95		mg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	Copper	100		mg/kg
PSYD&M97DM16DM16	Sediment	0.66	N	0	0.3	Copper	122		mg/kg
PSYD&M97DM20DM20C	Sediment	10.29	N	3.5	4.5	Copper	55.8		mg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Copper	71.1		mg/kg
PSYSEA98PSY05PSY05S	Sediment	7.29	N	0	0.3	Copper	106		mg/kg
PSYSEA98PSY06PSY06S	Sediment	14.49	N	0	0.3	Copper	15.6		mg/kg
PSYSEA98PSY07PSY07S	Sediment	1.44	N	0	0.3	Copper	94.3		mg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Copper	82	T	mg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Copper	42.6		mg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Copper	66.6		mg/kg
PSYSEA98PSY10PSY10S	Sediment	1.89	N	0	0.3	Copper	188		mg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Copper	119		mg/kg
PSYSEA98PSY14PSY14S	Sediment	2.71	N	0	0.3	Copper	140		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYSEA98PSY17PSY17S	Sediment	3.87	N	0	0.3	Copper	154		mg/kg
PSYSEA98PSY18CPSY18A	Sediment	6.14	N	0	4	Copper	65.1	J	mg/kg
PSYSEA98PSY18PSY18S	Sediment	5.56	N	0	0.3	Copper	163		mg/kg
PSYSEA98PSY20PSY20S	Sediment	0.48	N	0	0.3	Copper	209		mg/kg
PSYSEA98PSY21PSY21S	Sediment	0.83	N	0	0.3	Copper	96.6		mg/kg
PSYSEA98PSY23CPSY23A	Sediment	9.68	N	0	4	Copper	297		mg/kg
PSYSEA98PSY23CPSY23B	Sediment	9.68	N	4	8	Copper	26.3		mg/kg
PSYSEA98PSY23PSY23S	Sediment	10.52	N	0	0.3	Copper	136		mg/kg
PSYSEA98PSY25PSY25S	Sediment	4.12	N	0	0.3	Copper	86		mg/kg
PSYSEA98PSY26PSY26S	Sediment	0.44	N	0	0.3	Copper	267		mg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Copper	655		mg/kg
PSYSEA98PSY28PSY28S	Sediment	0.33	N	0	0.3	Copper	28.6		mg/kg
PSYSEA98PSY30CPSY30A	Sediment	9.14	N	0	4	Copper	301		mg/kg
PSYSEA98PSY30CPSY30B	Sediment	9.14	N	4	8	Copper	50		mg/kg
PSYSEA98PSY30CY30A01	Sediment	9.14	N	0	1	Copper	264		mg/kg
PSYSEA98PSY30CY30A02	Sediment	9.14	N	1	2	Copper	277		mg/kg
PSYSEA98PSY30CY30A03	Sediment	9.14	N	2	3	Copper	284		mg/kg
PSYSEA98PSY30CY30A04	Sediment	9.14	N	3	4	Copper	602		mg/kg
PSYSEA98PSY30CY30B05	Sediment	9.14	N	4	5	Copper	1580		mg/kg
PSYSEA98PSY30CY30B06	Sediment	9.14	N	5	6	Copper	85.8		mg/kg
PSYSEA98PSY30CY30B07	Sediment	9.14	N	6	7	Copper	17.9		mg/kg
PSYSEA98PSY30CY30B08	Sediment	9.14	N	7	8	Copper	10.8		mg/kg
PSYSEA98PSY30PSY30S	Sediment	9.69	N	0	0.3	Copper	397	J	mg/kg
PSYSEA98PSY33PSY33S	Sediment	0.80	N	0	0.3	Copper	61.8	J	mg/kg
PSYSEA98PSY43PSY43S	Sediment	0.82	N	0	0.3	Copper	53.2	J	mg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Copper	33		mg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Copper	120		mg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Copper	17		mg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Copper	119		mg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Copper	152		mg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Copper	118		mg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Copper	59.8		mg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Copper	112		mg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Copper	149		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Copper	68.9		mg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Copper	182		mg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Copper	91.8		mg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Copper	203		mg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Copper	1310		mg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Copper	1820		mg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Copper	527		mg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Copper	269		mg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Copper	738		mg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Copper	38.2	J	mg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Copper	1580	J	mg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Copper	50.9	J	mg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Copper	29.2	J	mg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Copper	32	J	mg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Copper	33.2	J	mg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Copper	22.7	J	mg/kg
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	Copper	20.3		mg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Copper	40.1	J	mg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Copper	52.5	J	mg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Copper	21.6	J	mg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Copper	36.2	J	mg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Copper	32.2		mg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Copper	25.8	J	mg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Copper	21.3	J	mg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Copper	25	J	mg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Copper	18.7	J	mg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Copper	17.8		mg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Copper	24.1		mg/kg
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	Copper	36.3		mg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Copper	124		mg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Copper	16.2		mg/kg
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	Copper	32.8		mg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Copper	31.4		mg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Copper	30.1		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Copper	20.5		mg/kg
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	Copper	24.5		mg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Copper	26.1		mg/kg
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	Copper	31.4		mg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Copper	19.3	J	mg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Copper	21.4	J	mg/kg
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	Copper	28.5		mg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Copper	26.1	J	mg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Copper	26.9	J	mg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Copper	23.6	J	mg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Copper	20.6		mg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Copper	14.2		mg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Copper	41.1		mg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Copper	13.4		mg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Copper	13.9		mg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Copper	23.6		mg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Copper	18.1		mg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Copper	18.1		mg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Copper	27.5		mg/kg
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	Copper	32.6		mg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Copper	36.1		mg/kg
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	Copper	17.5		mg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Copper	27.7		mg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Copper	34.6		mg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Copper	40.7		mg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Copper	41.1		mg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Copper	37.5		mg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Copper	55.9		mg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Copper	34.3		mg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Copper	42		mg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Copper	68.2		mg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Copper	18.8		mg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Copper	20.3		mg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Copper	33.6		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-122-MLW-1-2-10262022	Sediment	4.02	N	1	2	Copper	49.4		mg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Copper	50.3		mg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Copper	17.95	J	mg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Copper	79.4		mg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Copper	44.6		mg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Copper	45.15		mg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Copper	47.5		mg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Copper	39.6		mg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Copper	34.3		mg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Copper	32.9		mg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Copper	32.55		mg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Copper	31		mg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Copper	32.2		mg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Copper	28.3		mg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Copper	26.1		mg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Copper	32.3		mg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Copper	33.5		mg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Copper	33.1		mg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Copper	33.5		mg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Copper	22.2		mg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Copper	23.8		mg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Copper	24.4		mg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Copper	26.5		mg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Copper	31.1		mg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Copper	24.4		mg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Copper	32.7		mg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Copper	31.1		mg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Copper	35		mg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Copper	32.7		mg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Copper	35.9		mg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Copper	34.2		mg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Copper	37.4		mg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Copper	35.7		mg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Copper	35		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Copper	36.6		mg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Copper	36.9		mg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Copper	35.4		mg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Copper	26.4		mg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Copper	32.6		mg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Copper	27		mg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Copper	34		mg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Copper	33.2		mg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Copper	34.6		mg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Copper	34.9		mg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Copper	34.4		mg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Copper	32.8		mg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Copper	27.8		mg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Copper	35.2		mg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Copper	31		mg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Copper	27		mg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Copper	123	J	mg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Copper	35.6		mg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Copper	55		mg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Copper	26.5		mg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Copper	26.4		mg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Copper	37.9		mg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Copper	59.2		mg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Copper	59.1		mg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Copper	38.6		mg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Copper	46.5		mg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Copper	39.9		mg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Copper	66.7		mg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Copper	154	J	mg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Copper	83.2		mg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Copper	74.8		mg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Copper	67.2		mg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Copper	181		mg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Copper	73.4		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Copper	62.7		mg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Copper	55.8		mg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Copper	96.2		mg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Copper	119		mg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Copper	124		mg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Copper	99.1		mg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Copper	100		mg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Copper	77		mg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Copper	51.1		mg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Copper	39		mg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Copper	122		mg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Copper	103		mg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Copper	75.5		mg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Copper	60.2		mg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Copper	65.3		mg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Copper	57.7		mg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Copper	51.5		mg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Copper	63.9		mg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Copper	55.9		mg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Copper	55.9		mg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Copper	61.5		mg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Copper	81.3		mg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Copper	71.7		mg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Copper	45.2		mg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Copper	59.2		mg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Copper	62.5		mg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Copper	110		mg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Copper	58.7		mg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Copper	53.2		mg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Copper	95.25		mg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Copper	99.4		mg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Copper	57.6		mg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Copper	75.8		mg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Copper	78.9		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Copper	66.6		mg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Copper	56.1		mg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Copper	51.8		mg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Copper	69		mg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Copper	104		mg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Copper	61.4		mg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Copper	55.8		mg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Copper	54		mg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Copper	112	J	mg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Copper	61.8	J	mg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Copper	102		mg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Copper	72.1		mg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Copper	54		mg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Copper	43.5		mg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Copper	17.1		mg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Copper	52.4		mg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Copper	50.6		mg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Copper	37.3		mg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Copper	21.6		mg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Copper	30.1		mg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Copper	64.2		mg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Copper	56.9		mg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Copper	69.2		mg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Copper	42.7		mg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Copper	29.1		mg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Copper	67.4	J	mg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Copper	67	J	mg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Copper	67.1	J	mg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Copper	54		mg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Copper	38.1		mg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Copper	82.5		mg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Copper	68.8		mg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Copper	117		mg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Copper	167		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Copper	259		mg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Copper	338		mg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Copper	76.05		mg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Copper	248		mg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Copper	195		mg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Copper	129.5		mg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Copper	124		mg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Copper	55.4		mg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Copper	36.6		mg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Copper	74.6		mg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Copper	26		mg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Copper	21.4		mg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Copper	22.4		mg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Copper	28		mg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Copper	25.5		mg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Copper	106		mg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Copper	65.4		mg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Copper	55.1		mg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Copper	96.4		mg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Copper	105.5		mg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Copper	51.8		mg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Copper	43.1		mg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Copper	45.1		mg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Copper	302		mg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Copper	277		mg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Copper	363.5		mg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Copper	86.8		mg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Copper	189		mg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Copper	1460		mg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Copper	550		mg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Copper	1500		mg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Copper	1440		mg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Copper	418		mg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Copper	51.1		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Copper	23.2	J	mg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Copper	1320		mg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Copper	402		mg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Copper	46.8		mg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Copper	61.2		mg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Copper	37.3		mg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Copper	25.3	J	mg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Copper	1220		mg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Copper	1395		mg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Copper	1290		mg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Copper	1370		mg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Copper	1680		mg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Copper	568		mg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Copper	38.4	J	mg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Copper	28.4	J	mg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Copper	31.6	J	mg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Copper	1010		mg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Copper	679	J	mg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Copper	1220	J	mg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Copper	1070	J	mg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Copper	1300	J	mg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Copper	543	J	mg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Copper	60.5		mg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Copper	20.8		mg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Copper	519		mg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Copper	418		mg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Copper	783		mg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Copper	1010		mg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Copper	1240		mg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Copper	1130		mg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Copper	900		mg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Copper	95.6		mg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Copper	34.4		mg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Copper	1000		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Copper	34.2		mg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Copper	29.8		mg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Copper	1590	J	mg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Copper	897	J	mg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Copper	1200	J	mg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Copper	1320	J	mg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Copper	750	J	mg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Copper	48.8		mg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Copper	141		mg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Copper	2060		mg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Copper	265		mg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Copper	535		mg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Copper	880		mg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Copper	793		mg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Copper	641		mg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Copper	1040		mg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Copper	339		mg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Copper	462		mg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Copper	543		mg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Copper	396		mg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Copper	558		mg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Copper	161		mg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Copper	322		mg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Copper	129		mg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Copper	65.3		mg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Copper	23.7		mg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Copper	17		mg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Copper	38.4		mg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Copper	27.7		mg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Copper	24.4		mg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Copper	1040	J	mg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Copper	839	J	mg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Copper	136	J	mg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Copper	46	J	mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Copper	24.6	J	mg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Copper	871		mg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Copper	574		mg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Copper	443		mg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Copper	48.3		mg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Copper	39.9		mg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Copper	22.5		mg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Copper	55.1		mg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Copper	15.5		mg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Copper	98.1		mg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Copper	2150		mg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Copper	253		mg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Copper	16.3		mg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Copper	16.9		mg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Copper	122		mg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Copper	106		mg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Copper	99.6		mg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Copper	134		mg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Copper	51.9		mg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Copper	115	J	mg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Copper	329	J	mg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Copper	2080		mg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Copper	578		mg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Copper	21.1		mg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Copper	218	J	mg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Copper	2330	J	mg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Copper	4610	J	mg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Copper	2320	J	mg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Copper	32		mg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Copper	100		mg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Copper	150		mg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Copper	110		mg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Copper	79.9	J	mg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Copper	25.6	J	mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Copper	73.6	J	mg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Copper	49.5	J	mg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Copper	15	J	mg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Copper	63.8	J	mg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Copper	36	J	mg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Copper	21.2		mg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Copper	44.6	J	mg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Copper	593		mg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Copper	452		mg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Copper	213	T	mg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Copper	596		mg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Copper	156		mg/kg
WR-WSI98SD1300	Sediment	2.09	N	0	0.3	Copper	74.5		mg/kg
WR-WSI98SD1320	Sediment	1.21	N	0	0.3	Copper	64.1		mg/kg
WR-WSI98SD1330	Sediment	5.72	N	0	0.3	Copper	543		mg/kg
WR-WSI98SD1330000A	Sediment	5.72	N	0	3	Copper	729		mg/kg
WR-WSI98SD1340	Sediment	2.58	N	0	0.3	Copper	169		mg/kg
WR-WSI98SD1360	Sediment	2.50	N	0	0.3	Copper	81.5		mg/kg
WR-WSI98SD1390	Sediment	3.67	N	0	0.3	Copper	133		mg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Copper	68.9		mg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Copper	96	T	mg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Copper	62.2		mg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Copper	20	J	mg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Copper	22.4		mg/kg
514-0TO29-101618	Sediment	3.32	N	0	1	Dieldrin	0.095	U	µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Dieldrin	0.077	U	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Dieldrin	0.087	U	µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Dieldrin	0.077	U	µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Dieldrin	0.077	U	µg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Dieldrin	0.098	UJ	µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Dieldrin	0.077	U	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Dieldrin	0.089	U	µg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Dieldrin	0.13	UJ	µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Dieldrin	0.077	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Dieldrin	0.077	U	µg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	Dieldrin	0.099	U	µg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Dieldrin	0.077	U	µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Dieldrin	0.077	U	µg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	Dieldrin	0.09	U	µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Dieldrin	0.077	U	µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Dieldrin	0.089	U	µg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	Dieldrin	0.077	U	µg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	Dieldrin	0.21	J	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Dieldrin	0.077	U	µg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	Dieldrin	0.077	U	µg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	Dieldrin	0.077	U	µg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	Dieldrin	0.091	U	µg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	Dieldrin	0.082	U	µg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	Dieldrin	0.094	U	µg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Dieldrin	0.077	U	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Dieldrin	0.077	U	µg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	Dieldrin	0.077	U	µg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	Dieldrin	0.077	U	µg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	Dieldrin	0.077	U	µg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	Dieldrin	0.12	U	µg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Dieldrin	0.283	U	µg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Dieldrin	0.319	U	µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Dieldrin	0.0489	UJ	µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Dieldrin	0.755	UJ	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Dieldrin	0.0623	U	µg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Dieldrin	0.067	U	µg/kg
LW2-C421-A	Sediment	4.45	N	0	1	Dieldrin	4.2	NJ	µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Dieldrin	5.1	U	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Dieldrin	0.077	UJ	µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Dieldrin	0.0617	U	µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Dieldrin	0.252	U	µg/kg
LW2-G382	Sediment	2.65	N	0	1	Dieldrin	0.102	U	µg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Dieldrin	0.501	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-G384-1	Sediment	5.37	N	0	0.9	Dieldrin	0.112	UT	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Dieldrin	0.124	U	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Dieldrin	0.535	UJ	µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Dieldrin	9.02	U	µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Dieldrin	0.0636	U	µg/kg
LW2-G398	Sediment	8.99	N	0	1	Dieldrin	0.204	U	µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Dieldrin	0.11	U	µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Dieldrin	0.407	U	µg/kg
LW2-G416	Sediment	5.63	N	0	1	Dieldrin	0.112	U	µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Dieldrin	0.0548	U	µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Dieldrin	0.0532	U	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Dieldrin	0.0904	J	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Dieldrin	0.0989	J	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Dieldrin	0.0378	J	µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Dieldrin	0.26	U	µg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Dieldrin	0.03	U	µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Dieldrin	1.7	U	µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Dieldrin	1.5	U	µg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Dieldrin	0.03	U	µg/kg
LW3-G706	Sediment	9.49	N	0	1	Dieldrin	0.037	U	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Dieldrin	0.03	U	µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Dieldrin	0.39	U	µg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	Dieldrin	0.077	U	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Dieldrin	0.077	U	µg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Dieldrin	0.12	J	µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	Dieldrin	0.0984	U	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Dieldrin	0.088	U	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Dieldrin	0.0843	U	µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Dieldrin	0.099	U	µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Dieldrin	0.077	U	µg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	Dieldrin	0.72	U	µg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	Dieldrin	0.94	U	µg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	Dieldrin	0.63	U	µg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	Dieldrin	1.4	UJ	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	Dieldrin	1.3	UJ	µg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	Dieldrin	1.4	UJ	µg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	Dieldrin	1.8	UJ	µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Dieldrin	6		µg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Dieldrin	4.5	T	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Dieldrin	6	U	µg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Dieldrin	6	U	µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Dieldrin	2	U	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Dieldrin	10		µg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Dieldrin	0.077	U	µg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Dieldrin	0.11	U	µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Dieldrin	0.077	U	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Dieldrin	0.36	U	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Dieldrin	0.29	U	µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Dieldrin	0.4	U	µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Dieldrin	0.088	U	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Dieldrin	0.41	U	µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Dieldrin	0.092	U	µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Dieldrin	0.09	U	µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Dieldrin	0.088	U	µg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Dieldrin	0.085	U	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Dieldrin	0.41	U	µg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Dieldrin	0.39	U	µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Dieldrin	0.39	U	µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Dieldrin	0.43	U	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Dieldrin	0.37	U	µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Dieldrin	0.4	U	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Dieldrin	0.39	UJ	µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Dieldrin	0.36	UJ	µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Dieldrin	0.32	U	µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Dieldrin	0.39	U	µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Dieldrin	0.42	U	µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Dieldrin	0.33	U	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Dieldrin	0.28	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	Dieldrin	0.08	U	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Dieldrin	0.08	U	µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Dieldrin	0.33	U	µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Dieldrin	0.31	U	µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Dieldrin	0.38	U	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Dieldrin	0.08	U	µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Dieldrin	0.077	U	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Dieldrin	0.078	U	µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Dieldrin	0.35	U	µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Dieldrin	0.37	U	µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Dieldrin	0.44	U	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Dieldrin	0.47	U	µg/kg
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	Dieldrin	0.12	U	µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Dieldrin	0.29	U	µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Dieldrin	0.51	U	µg/kg
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	Dieldrin	0.12	UJ	µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Dieldrin	0.55	U	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Dieldrin	0.14	UJ	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Dieldrin	0.39	U	µg/kg
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	Dieldrin	0.12	UJ	µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Dieldrin	0.49	U	µg/kg
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	Dieldrin	0.11	UJ	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Dieldrin	0.11	UJ	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Dieldrin	0.36	U	µg/kg
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	Dieldrin	0.11	UJ	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Dieldrin	0.089	UJ	µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Dieldrin	0.087	UJ	µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Dieldrin	0.093	UJ	µg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Dieldrin	0.099	UJ	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Dieldrin	0.088	UJ	µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Dieldrin	0.38	U	µg/kg
SIB-098-OHW-2-3-10072022	Sediment	8.22	N	2	3	Dieldrin	0.077	UJ	µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Dieldrin	0.089	UJ	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Dieldrin	0.088	UJ	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Dieldrin	0.36	U	µg/kg
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	Dieldrin	0.32	U	µg/kg
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	Dieldrin	0.08	UJ	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Dieldrin	0.31	J	µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Dieldrin	0.36	U	µg/kg
SIB-101-OHW-2-3-10062022	Sediment	8.83	N	2	3	Dieldrin	0.52	J	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Dieldrin	0.48	U	µg/kg
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	Dieldrin	0.55	J	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Dieldrin	0.37	U	µg/kg
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	Dieldrin	0.081	UJ	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Dieldrin	0.091	UJ	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Dieldrin	0.083	UJ	µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Dieldrin	0.088	UJ	µg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Dieldrin	0.085	UJ	µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Dieldrin	0.083	UJ	µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Dieldrin	0.32	U	µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Dieldrin	0.44	U	µg/kg
SIB-110-MLW-1-2-10052022	Sediment	7.81	N	1	2	Dieldrin	0.12	UJ	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Dieldrin	0.083	UJ	µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Dieldrin	0.34	U	µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Dieldrin	0.088	UJ	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Dieldrin	0.45	UJ	µg/kg
SIB-122-MLW-1-2-10262022	Sediment	4.02	N	1	2	Dieldrin	0.11	U	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Dieldrin	0.097	U	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Dieldrin	0.53	U	µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Dieldrin	0.56	U	µg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Dieldrin	0.54	U	µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Dieldrin	0.53	U	µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Dieldrin	0.53	U	µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Dieldrin	0.13	U	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Dieldrin	0.53	U	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Dieldrin	0.47	U	µg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Dieldrin	0.48	U	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Dieldrin	0.5	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Dieldrin	0.41	U	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Dieldrin	0.13	U	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Dieldrin	0.13	U	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Dieldrin	0.61	U	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Dieldrin	0.56	U	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Dieldrin	0.56	U	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Dieldrin	0.11	U	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Dieldrin	0.11	U	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Dieldrin	0.12	U	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Dieldrin	0.53	U	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Dieldrin	0.53	U	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Dieldrin	0.6	U	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Dieldrin	0.12	U	µg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Dieldrin	0.12	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Dieldrin	0.12	U	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Dieldrin	0.11	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Dieldrin	0.54	U	µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Dieldrin	0.45	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Dieldrin	0.43	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Dieldrin	0.13	U	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Dieldrin	0.13	U	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Dieldrin	0.13	U	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Dieldrin	0.4	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Dieldrin	0.42	U	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Dieldrin	0.49	U	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Dieldrin	0.54	U	µg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Dieldrin	0.12	U	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Dieldrin	0.13	U	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Dieldrin	0.45	U	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Dieldrin	0.5	U	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Dieldrin	0.43	U	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Dieldrin	0.12	U	µg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Dieldrin	0.12	U	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Dieldrin	0.6	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Dieldrin	0.63	U	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Dieldrin	0.64	U	µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Dieldrin	0.48	U	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Dieldrin	1.5	J	µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Dieldrin	0.55	U	µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Dieldrin	0.62	U	µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Dieldrin	0.45	U	µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Dieldrin	0.11	U	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Dieldrin	0.12	U	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Dieldrin	0.56	U	µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Dieldrin	0.45	U	µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Dieldrin	0.46	U	µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Dieldrin	0.14	U	µg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Dieldrin	0.13	U	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Dieldrin	0.58	U	µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Dieldrin	0.43	U	µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Dieldrin	0.47	U	µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Dieldrin	0.65	U	µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Dieldrin	0.82	U	µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Dieldrin	0.57	U	µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Dieldrin	0.53	U	µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Dieldrin	0.67	U	µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Dieldrin	0.7	U	µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Dieldrin	0.88	U	µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Dieldrin	0.77	U	µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Dieldrin	0.72	U	µg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Dieldrin	0.65	U	µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Dieldrin	0.18	U	µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Dieldrin	0.63	U	µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Dieldrin	0.49	U	µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Dieldrin	0.52	U	µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Dieldrin	0.2	U	µg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Dieldrin	0.58	U	µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Dieldrin	0.57	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Dieldrin	0.51	U	µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Dieldrin	0.7	U	µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Dieldrin	0.79	U	µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Dieldrin	0.63	U	µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Dieldrin	0.73	U	µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Dieldrin	0.63	U	µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Dieldrin	0.75	U	µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Dieldrin	0.73	U	µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Dieldrin	0.69	U	µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Dieldrin	0.77	U	µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Dieldrin	0.66	U	µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Dieldrin	0.67	U	µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Dieldrin	0.71	U	µg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Dieldrin	0.73	U	µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Dieldrin	0.69	U	µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Dieldrin	0.59	U	µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Dieldrin	0.53	U	µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Dieldrin	0.5	U	µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Dieldrin	0.72	U	µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Dieldrin	0.79	U	µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Dieldrin	0.68	U	µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Dieldrin	0.77	U	µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Dieldrin	0.77	U	µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Dieldrin	0.63	U	µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Dieldrin	0.89	U	µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Dieldrin	0.76	U	µg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Dieldrin	0.78	U	µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Dieldrin	0.73	U	µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Dieldrin	0.6	U	µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Dieldrin	0.63	U	µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Dieldrin	0.62	U	µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Dieldrin	0.54	U	µg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Dieldrin	0.61	U	µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Dieldrin	0.5	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Dieldrin	0.51	U	µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Dieldrin	0.095	U	µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Dieldrin	0.67	U	µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Dieldrin	0.59	U	µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Dieldrin	0.45	U	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Dieldrin	0.11	U	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Dieldrin	0.11	U	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Dieldrin	0.68	U	µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Dieldrin	0.7	U	µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Dieldrin	0.67	U	µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Dieldrin	0.58	U	µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Dieldrin	0.42	U	µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Dieldrin	0.87	U	µg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Dieldrin	0.65	U	µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Dieldrin	0.55	U	µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Dieldrin	0.44	U	µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Dieldrin	0.57	U	µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Dieldrin	0.73	U	µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Dieldrin	0.52	U	µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Dieldrin	0.53	U	µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Dieldrin	0.55	U	µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Dieldrin	0.56	U	µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Dieldrin	1.5	U	µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Dieldrin	0.72	UJ	µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Dieldrin	0.68	U	µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Dieldrin	0.72	UJ	µg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Dieldrin	0.85	U	µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Dieldrin	0.82	U	µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Dieldrin	0.47	U	µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Dieldrin	0.49	U	µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Dieldrin	0.57	U	µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Dieldrin	0.11	U	µg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Dieldrin	0.11	U	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Dieldrin	0.45	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Dieldrin	0.33	U	µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Dieldrin	0.35	U	µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Dieldrin	0.54	U	µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Dieldrin	0.69	U	µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Dieldrin	0.57	U	µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Dieldrin	0.38	U	µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Dieldrin	0.42	U	µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Dieldrin	0.47	U	µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Dieldrin	0.49	U	µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Dieldrin	0.085	UJ	µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Dieldrin	0.52	U	µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Dieldrin	0.6	U	µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Dieldrin	0.63	U	µg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Dieldrin	0.51	U	µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Dieldrin	0.41	U	µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Dieldrin	0.6	U	µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Dieldrin	0.79	U	µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Dieldrin	0.48	U	µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Dieldrin	0.66	U	µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Dieldrin	0.41	U	µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Dieldrin	0.1	U	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Dieldrin	0.1	U	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Dieldrin	0.71	U	µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Dieldrin	0.46	U	µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Dieldrin	0.52	U	µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Dieldrin	0.37	U	µg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Dieldrin	0.098	U	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Dieldrin	0.099	U	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Dieldrin	0.78	U	µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Dieldrin	0.59	U	µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Dieldrin	0.8	U	µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Dieldrin	0.72	U	µg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Dieldrin	0.51	U	µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Dieldrin	0.4	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Dieldrin	0.5	U	µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Dieldrin	0.11	U	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Dieldrin	0.1	U	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Dieldrin	0.76	U	µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Dieldrin	0.59	U	µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Dieldrin	0.64	U	µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Dieldrin	0.73	U	µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Dieldrin	0.64	U	µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Dieldrin	0.55	U	µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Dieldrin	0.43	U	µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Dieldrin	0.096	U	µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Dieldrin	0.76	U	µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Dieldrin	0.65	U	µg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Dieldrin	0.7	U	µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Dieldrin	0.62	U	µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Dieldrin	0.56	U	µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Dieldrin	0.66	U	µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Dieldrin	0.56	U	µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Dieldrin	0.39	U	µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Dieldrin	0.52	U	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Dieldrin	0.69	U	µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Dieldrin	0.5	U	µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Dieldrin	0.4	U	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Dieldrin	0.7	U	µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Dieldrin	0.71	U	µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Dieldrin	0.69	U	µg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Dieldrin	0.65	U	µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Dieldrin	0.68	U	µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Dieldrin	0.42	U	µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Dieldrin	0.14	UJ	µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Dieldrin	0.59	U	µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Dieldrin	0.6	U	µg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Dieldrin	0.81	U	µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Dieldrin	0.73	UJ	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Dieldrin	0.75	U	µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Dieldrin	0.57	U	µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Dieldrin	0.64	U	µg/kg
SIB-SC-J06-8-9-07/26/2022	Sediment	16.33	N	8	9	Dieldrin	0.019	UJ	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Dieldrin	0.74	U	µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Dieldrin	0.69	U	µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Dieldrin	0.78	U	µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Dieldrin	0.67	U	µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Dieldrin	0.6	U	µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Dieldrin	0.77	U	µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Dieldrin	0.67	U	µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Dieldrin	0.54	U	µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Dieldrin	0.42	U	µg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Dieldrin	0.45	U	µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Dieldrin	0.46	U	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Dieldrin	0.12	U	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Dieldrin	0.11	U	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Dieldrin	0.36	U	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Dieldrin	0.74	U	µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Dieldrin	0.6	U	µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Dieldrin	0.42	U	µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Dieldrin	0.11	U	µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Dieldrin	0.093	U	µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Dieldrin	0.63	U	µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Dieldrin	0.64	U	µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Dieldrin	0.6	U	µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Dieldrin	0.097	U	µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Dieldrin	0.095	U	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Dieldrin	0.099	U	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Dieldrin	0.094	U	µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Dieldrin	0.089	U	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Dieldrin	0.57	U	µg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Dieldrin	0.17	U	µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Dieldrin	0.59	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Dieldrin	0.096	U	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Dieldrin	0.093	U	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Dieldrin	0.88	J	µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Dieldrin	0.57	U	µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Dieldrin	0.54	U	µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Dieldrin	0.62	U	µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Dieldrin	0.53	U	µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Dieldrin	0.54	U	µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Dieldrin	0.61	U	µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Dieldrin	0.69	U	µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Dieldrin	0.8	J	µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Dieldrin	0.092	UJ	µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Dieldrin	0.13	U	µg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Dieldrin	0.59	U	µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Dieldrin	0.94	U	µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Dieldrin	0.61	U	µg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Dieldrin	0.077	U	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Dieldrin	0.087	U	µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Dieldrin	0.1	U	µg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Dieldrin	0.098	U	µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Dieldrin	1.08	U	µg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Dieldrin	0.845	U	µg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Dieldrin	0.974	U	µg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Dieldrin	0.804	U	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Dieldrin	0.84	U	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Dieldrin	0.973	U	µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Dieldrin	0.815	U	µg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Dieldrin	0.83	U	µg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Dieldrin	0.884	U	µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Dieldrin	0.77	U	µg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Dieldrin	0.21	U	µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Dieldrin	0.14	UT	µg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Dieldrin	0.23	U	µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Dieldrin	0.3	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Dieldrin	1.9	UJ	µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Dieldrin	2	UT	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Dieldrin	0.36	U	µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Dieldrin	0.33	U	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Dieldrin	0.34	U	µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Lead	12		mg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Lead	31		mg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Lead	30		mg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Lead	11	J	mg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Lead	25		mg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Lead	24		mg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Lead	45		mg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Lead	79		mg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Lead	16	J	mg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Lead	12		mg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	Lead	82	J	mg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Lead	64		mg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Lead	32		mg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	Lead	48	J	mg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Lead	19		mg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Lead	44	J	mg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	Lead	25	J	mg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	Lead	11	J	mg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Lead	98	J	mg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	Lead	74	J	mg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	Lead	38	J	mg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	Lead	120		mg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	Lead	67		mg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	Lead	160	J	mg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Lead	10		mg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Lead	12	J	mg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	Lead	21		mg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	Lead	27	J	mg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	Lead	12	J	mg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
L7-0TO29-101318	Sediment	3.18	N	0	1	Lead	110	J	mg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Lead	29.9		mg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Lead	28.6		mg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Lead	15.3		mg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Lead	329		mg/kg
LW2-C388-B	Sediment	6.46	N	1	5.1	Lead	4.93	J	mg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Lead	4.64	J	mg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Lead	4.49	JT	mg/kg
LW2-C402-B	Sediment	5.83	N	1	2.1	Lead	70.4		mg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Lead	106	J	mg/kg
LW2-C421-C	Sediment	4.45	N	2	4	Lead	46.2	J	mg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Lead	53.1	J	mg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Lead	31.3	J	mg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Lead	22.7		mg/kg
LW2-G382	Sediment	2.65	N	0	1	Lead	76.3	J	mg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Lead	10.3	J	mg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Lead	20.2	T	mg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Lead	22.2		mg/kg
LW2-G388	Sediment	7.36	N	0	0.9	Lead	23.3		mg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Lead	102		mg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Lead	94.9		mg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Lead	4.91		mg/kg
LW2-G398	Sediment	8.99	N	0	1	Lead	13.9		mg/kg
LW2-G402	Sediment	4.06	N	0	1	Lead	67.4		mg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Lead	54.7	J	mg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Lead	86.1		mg/kg
LW2-G416	Sediment	5.63	N	0	1	Lead	53.5	J	mg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Lead	14		mg/kg
LW2-G421	Sediment	4.56	N	0	1	Lead	63.1		mg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Lead	12.7	J	mg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Lead	41.2		mg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Lead	22.9	J	mg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Lead	49.8	J	mg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Lead	14.5		mg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW3-C706-C	Sediment	9.39	N	5	8.3	Lead	18.5		mg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Lead	633		mg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Lead	711		mg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Lead	39.1		mg/kg
LW3-G706	Sediment	9.49	N	0	1	Lead	10.5		mg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Lead	6.07	T	mg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Lead	10.2		mg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	Lead	4.6		mg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Lead	38		mg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Lead	45		mg/kg
NA-4A-0005	Sediment	5.42	N	0	0.2	Lead	44.7		mg/kg
NA-4A-0508	Sediment	5.42	N	0.2	0.3	Lead	47.8		mg/kg
NA-4A-0812	Sediment	5.42	N	0.3	0.4	Lead	45.5		mg/kg
NA-4A-1216	Sediment	5.42	N	0.4	0.5	Lead	40.7		mg/kg
NA-4A-1620	Sediment	5.42	N	0.5	0.7	Lead	39.3		mg/kg
NA-4A-2024	Sediment	5.42	N	0.7	0.8	Lead	42.3		mg/kg
NA-4A-2428	Sediment	5.42	N	0.8	0.9	Lead	42.3		mg/kg
NA-4A-2832	Sediment	5.42	N	0.9	1	Lead	42.5		mg/kg
NA-4A-3238	Sediment	5.42	N	1	1.2	Lead	42.2		mg/kg
NA-4A-3844	Sediment	5.42	N	1.2	1.4	Lead	40.4		mg/kg
NA-4A-4448	Sediment	5.42	N	1.4	1.6	Lead	38.9		mg/kg
NA-4A-5864	Sediment	5.42	N	1.9	2.1	Lead	46		mg/kg
NA-4A-6874	Sediment	5.42	N	2.2	2.4	Lead	39.6		mg/kg
NA-4A-7884	Sediment	5.42	N	2.6	2.8	Lead	44		mg/kg
NA-4A-8894	Sediment	5.42	N	2.9	3.1	Lead	48	T	mg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Lead	42		mg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Lead	15		mg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	Lead	38		mg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	Lead	13		mg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	Lead	14		mg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	Lead	24		mg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	Lead	39		mg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	Lead	33		mg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	Lead	30		mg/kg

Attachment B
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYD&M97DM16DM16	Sediment	0.66	N	0	0.3	Lead	53.5		mg/kg
PSYD&M97DM20DM20C	Sediment	10.29	N	3.5	4.5	Lead	28.9		mg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Lead	68.1	J	mg/kg
PSYSEA98PSY05PSY05S	Sediment	7.29	N	0	0.3	Lead	33.6	J	mg/kg
PSYSEA98PSY06PSY06S	Sediment	14.49	N	0	0.3	Lead	10.5	J	mg/kg
PSYSEA98PSY07PSY07S	Sediment	1.44	N	0	0.3	Lead	36.2	J	mg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Lead	48.4	JT	mg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Lead	55.8	J	mg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Lead	36.6	J	mg/kg
PSYSEA98PSY10PSY10S	Sediment	1.89	N	0	0.3	Lead	50.2	J	mg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Lead	26.6		mg/kg
PSYSEA98PSY14PSY14S	Sediment	2.71	N	0	0.3	Lead	62.5		mg/kg
PSYSEA98PSY17PSY17S	Sediment	3.87	N	0	0.3	Lead	56		mg/kg
PSYSEA98PSY18CPSY18A	Sediment	6.14	N	0	4	Lead	57.2	J	mg/kg
PSYSEA98PSY18PSY18S	Sediment	5.56	N	0	0.3	Lead	52.2		mg/kg
PSYSEA98PSY20PSY20S	Sediment	0.48	N	0	0.3	Lead	44.8		mg/kg
PSYSEA98PSY21PSY21S	Sediment	0.83	N	0	0.3	Lead	96.6		mg/kg
PSYSEA98PSY23CPSY23A	Sediment	9.68	N	0	4	Lead	91.3		mg/kg
PSYSEA98PSY23CPSY23B	Sediment	9.68	N	4	8	Lead	4.9		mg/kg
PSYSEA98PSY23PSY23S	Sediment	10.52	N	0	0.3	Lead	22.4		mg/kg
PSYSEA98PSY25PSY25S	Sediment	4.12	N	0	0.3	Lead	18.1		mg/kg
PSYSEA98PSY26PSY26S	Sediment	0.44	N	0	0.3	Lead	79.1		mg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Lead	94.6		mg/kg
PSYSEA98PSY28PSY28S	Sediment	0.33	N	0	0.3	Lead	14.8		mg/kg
PSYSEA98PSY30CPSY30A	Sediment	9.14	N	0	4	Lead	36.1		mg/kg
PSYSEA98PSY30CPSY30B	Sediment	9.14	N	4	8	Lead	8.5		mg/kg
PSYSEA98PSY30CY30A01	Sediment	9.14	N	0	1	Lead	25.3		mg/kg
PSYSEA98PSY30CY30A02	Sediment	9.14	N	1	2	Lead	24.2		mg/kg
PSYSEA98PSY30CY30A03	Sediment	9.14	N	2	3	Lead	27.3		mg/kg
PSYSEA98PSY30CY30A04	Sediment	9.14	N	3	4	Lead	146		mg/kg
PSYSEA98PSY30CY30B05	Sediment	9.14	N	4	5	Lead	107		mg/kg
PSYSEA98PSY30CY30B06	Sediment	9.14	N	5	6	Lead	9.7		mg/kg
PSYSEA98PSY30CY30B07	Sediment	9.14	N	6	7	Lead	3.1		mg/kg
PSYSEA98PSY30CY30B08	Sediment	9.14	N	7	8	Lead	2.1		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYSEA98PSY30PSY30S	Sediment	9.69	N	0	0.3	Lead	25.9		mg/kg
PSYSEA98PSY33PSY33S	Sediment	0.80	N	0	0.3	Lead	14.7		mg/kg
PSYSEA98PSY43PSY43S	Sediment	0.82	N	0	0.3	Lead	12.5		mg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Lead	14		mg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Lead	36		mg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Lead	15		mg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Lead	35	J	mg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Lead	27.4	J	mg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Lead	90.4	J	mg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Lead	15.1		mg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Lead	20.1		mg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Lead	14.7		mg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Lead	8.13		mg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Lead	22.5		mg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Lead	10.3		mg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Lead	44.8		mg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Lead	222		mg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Lead	623		mg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Lead	125	J	mg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Lead	40.2		mg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Lead	119		mg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Lead	60	J	mg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Lead	852	J	mg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Lead	85	J	mg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Lead	93.3	J	mg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Lead	51.5	J	mg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Lead	40	J	mg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Lead	28.6	J	mg/kg
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	Lead	21.7	J	mg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Lead	67.1	J	mg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Lead	84.3	J	mg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Lead	136	J	mg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Lead	84.1	J	mg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Lead	54.8		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Lead	8.84	J	mg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Lead	32.8	J	mg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Lead	81.9	J	mg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Lead	16.9	J	mg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Lead	10.5		mg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Lead	14.5		mg/kg
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	Lead	15.7	J	mg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Lead	262		mg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Lead	10.6		mg/kg
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	Lead	6.7		mg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Lead	6.505		mg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Lead	5.69		mg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Lead	11.6		mg/kg
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	Lead	11.4		mg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Lead	13.7		mg/kg
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	Lead	6.21		mg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Lead	6.02		mg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Lead	27.9		mg/kg
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	Lead	10.6		mg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Lead	14.6		mg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Lead	40.9		mg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Lead	38.1		mg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Lead	15.7		mg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Lead	6.1		mg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Lead	26.3		mg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Lead	4.51		mg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Lead	3.98		mg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Lead	19.7		mg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Lead	10.8		mg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Lead	3.95		mg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Lead	15.7		mg/kg
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	Lead	4.98		mg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Lead	8.09		mg/kg
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	Lead	5.85		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Lead	5.95		mg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Lead	11.8		mg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Lead	7.02		mg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Lead	10.8		mg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Lead	24		mg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Lead	35.7		mg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Lead	9.46		mg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Lead	18.3		mg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Lead	30.2		mg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Lead	6.01		mg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Lead	11.2		mg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Lead	15.55		mg/kg
SIB-122-MLW-1-2-10262022	Sediment	4.02	N	1	2	Lead	14.9	J	mg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Lead	15.6		mg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Lead	12.05	J	mg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Lead	49.9		mg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Lead	41.9		mg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Lead	31.45		mg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Lead	30		mg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Lead	32.1		mg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Lead	6.79		mg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Lead	5.51		mg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Lead	5.64		mg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Lead	5.34		mg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Lead	5.45		mg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Lead	4.81		mg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Lead	4.37		mg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Lead	5.55		mg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Lead	5.5		mg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Lead	4.99		mg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Lead	5.07		mg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Lead	4.01		mg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Lead	4.1		mg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Lead	4.19		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Lead	4.23		mg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Lead	4.81		mg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Lead	4.21		mg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Lead	5.565		mg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Lead	5.58		mg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Lead	6.125		mg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Lead	5.8		mg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Lead	6.05		mg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Lead	5.81		mg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Lead	5.93		mg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Lead	6.31		mg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Lead	6.25		mg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Lead	6.49		mg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Lead	6.18		mg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Lead	5.99		mg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Lead	4.07		mg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Lead	5.79		mg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Lead	5.22		mg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Lead	6.64		mg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Lead	6.27		mg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Lead	6.55		mg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Lead	6.43		mg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Lead	5.71		mg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Lead	5.75		mg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Lead	5.11		mg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Lead	5.71		mg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Lead	5.93		mg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Lead	4.66	J	mg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Lead	138	J	mg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Lead	10.9		mg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Lead	59.1		mg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Lead	22		mg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Lead	10.1		mg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Lead	15.2		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Lead	37.4		mg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Lead	65.7		mg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Lead	27.4		mg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Lead	25.3		mg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Lead	15.1		mg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Lead	24.9		mg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Lead	33	J	mg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Lead	51.7		mg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Lead	23.1		mg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Lead	27.1		mg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Lead	53.7		mg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Lead	45		mg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Lead	36.5		mg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Lead	32.9		mg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Lead	34.7		mg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Lead	46.7		mg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Lead	68.5		mg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Lead	68		mg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Lead	41.5		mg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Lead	51.1		mg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Lead	33.2		mg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Lead	26.1		mg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Lead	55.4		mg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Lead	62.9		mg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Lead	50.9		mg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Lead	40		mg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Lead	41.6		mg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Lead	45.6		mg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Lead	39.3		mg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Lead	49		mg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Lead	38.2		mg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Lead	43		mg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Lead	49		mg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Lead	61		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Lead	51.1		mg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Lead	35		mg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Lead	45		mg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Lead	48		mg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Lead	68.6		mg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Lead	40.5		mg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Lead	34.7		mg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Lead	63.55		mg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Lead	39.4		mg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Lead	37.9		mg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Lead	50.7		mg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Lead	70.2		mg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Lead	43.8		mg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Lead	37.4		mg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Lead	34.4		mg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Lead	49.4		mg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Lead	65		mg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Lead	42		mg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Lead	35.6		mg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Lead	34.8		mg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Lead	59.2	J	mg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Lead	41	J	mg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Lead	32.8		mg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Lead	41.9		mg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Lead	23		mg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Lead	31		mg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Lead	5.16		mg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Lead	36.9		mg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Lead	39.1		mg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Lead	24.7		mg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Lead	4.08		mg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Lead	4.98		mg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Lead	46.9		mg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Lead	35.1		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Lead	77.3		mg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Lead	26.2		mg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Lead	12.9		mg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Lead	44.4	J	mg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Lead	45.5	J	mg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Lead	43.8	J	mg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Lead	39.9		mg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Lead	20.3		mg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Lead	49.55		mg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Lead	44	J	mg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Lead	57.5		mg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Lead	142		mg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Lead	287		mg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Lead	221	J	mg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Lead	43.3	J	mg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Lead	50.1		mg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Lead	67.6	J	mg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Lead	51.15		mg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Lead	49.1		mg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Lead	87.2		mg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Lead	14.85	J	mg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Lead	69.3		mg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Lead	6.63		mg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Lead	3.64		mg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Lead	3.57		mg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Lead	43.2		mg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Lead	40.6		mg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Lead	70	J	mg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Lead	58.1	J	mg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Lead	95	J	mg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Lead	59		mg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Lead	91.5	J	mg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Lead	52.7		mg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Lead	27		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Lead	34.9		mg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Lead	138	J	mg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Lead	84.8		mg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Lead	133	J	mg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Lead	31.5	J	mg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Lead	58.7	J	mg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Lead	452		mg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Lead	109		mg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Lead	318		mg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Lead	313		mg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Lead	104		mg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Lead	53.7		mg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Lead	4.32	J	mg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Lead	328		mg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Lead	52.5		mg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Lead	13.2		mg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Lead	7.33		mg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Lead	9.43		mg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Lead	3.93	J	mg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Lead	251		mg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Lead	338.5		mg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Lead	529		mg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Lead	896		mg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Lead	1950		mg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Lead	85.3		mg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Lead	10.1	J	mg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Lead	4.81	J	mg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Lead	5.11	J	mg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Lead	225		mg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Lead	130		mg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Lead	297		mg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Lead	291		mg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Lead	471		mg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Lead	102		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Lead	13.1		mg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Lead	3.07		mg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Lead	51.9		mg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Lead	73		mg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Lead	185		mg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Lead	244		mg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Lead	386		mg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Lead	251		mg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Lead	315		mg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Lead	23.7		mg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Lead	4.86		mg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Lead	354		mg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Lead	4.55		mg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Lead	4.59		mg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Lead	1070		mg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Lead	409		mg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Lead	768		mg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Lead	426		mg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Lead	506		mg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Lead	9.96		mg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Lead	55.4		mg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Lead	684		mg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Lead	50.5		mg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Lead	56.2		mg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Lead	143		mg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Lead	177		mg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Lead	422		mg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Lead	611		mg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Lead	28.6		mg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Lead	38.8		mg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Lead	34		mg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Lead	41.1		mg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Lead	90		mg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Lead	22.9		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Lead	56.8	J	mg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Lead	116	J	mg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Lead	75.7		mg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Lead	6.5		mg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Lead	5.34		mg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Lead	16.7		mg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Lead	10.6		mg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Lead	5.28		mg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Lead	85.6		mg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Lead	136		mg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Lead	11.8		mg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Lead	42.6		mg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Lead	3.99		mg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Lead	92.3		mg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Lead	69.5		mg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Lead	77.6		mg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Lead	9.78		mg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Lead	9.94		mg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Lead	4.87		mg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Lead	11.1		mg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Lead	5.2		mg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Lead	37.2		mg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Lead	96.7		mg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Lead	38.5		mg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Lead	4.22		mg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Lead	2.7		mg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Lead	21.7		mg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Lead	13		mg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Lead	15.5		mg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Lead	17.1		mg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Lead	14.1		mg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Lead	20.2	J	mg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Lead	40.5	J	mg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Lead	158		mg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Lead	31.3		mg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Lead	6.21		mg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Lead	16.8		mg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Lead	122		mg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Lead	354		mg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Lead	115		mg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Lead	6.5		mg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Lead	32		mg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Lead	39		mg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Lead	32		mg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Lead	43.4	J	mg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Lead	34	J	mg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Lead	57.6	J	mg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Lead	38.6	J	mg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Lead	5.45	J	mg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Lead	24.6	J	mg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Lead	10.8	J	mg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Lead	14.6		mg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Lead	29	J	mg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Lead	118		mg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Lead	11.6		mg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Lead	11.9	T	mg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Lead	11.7		mg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Lead	11.6		mg/kg
WR-WSI98SD1300	Sediment	2.09	N	0	0.3	Lead	12		mg/kg
WR-WSI98SD1320	Sediment	1.21	N	0	0.3	Lead	12		mg/kg
WR-WSI98SD1330	Sediment	5.72	N	0	0.3	Lead	70		mg/kg
WR-WSI98SD1330000A	Sediment	5.72	N	0	3	Lead	178		mg/kg
WR-WSI98SD1340	Sediment	2.58	N	0	0.3	Lead	40		mg/kg
WR-WSI98SD1360	Sediment	2.50	N	0	0.3	Lead	24		mg/kg
WR-WSI98SD1390	Sediment	3.67	N	0	0.3	Lead	44		mg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Lead	42		mg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Lead	35.5	T	mg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Lead	27.8	J	mg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Lead	6.26		mg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Lead	11.9		mg/kg
514-0TO29-101618	Sediment	3.32	N	0	1	Lindane	0.039	U	µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Lindane	0.031	U	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Lindane	0.035	U	µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Lindane	0.031	U	µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Lindane	0.031	U	µg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Lindane	0.04	UJ	µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Lindane	0.031	U	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Lindane	0.036	U	µg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Lindane	0.049	UJ	µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Lindane	0.031	U	µg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Lindane	0.031	U	µg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	Lindane	0.04	U	µg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Lindane	0.031	U	µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Lindane	0.031	U	µg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	Lindane	0.036	U	µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Lindane	0.031	U	µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Lindane	0.036	U	µg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	Lindane	0.031	U	µg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	Lindane	0.031	U	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Lindane	0.031	U	µg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	Lindane	0.031	U	µg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	Lindane	0.031	U	µg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	Lindane	0.037	U	µg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	Lindane	0.038	J	µg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	Lindane	0.038	U	µg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Lindane	0.031	U	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Lindane	0.031	U	µg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	Lindane	0.031	U	µg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	Lindane	0.031	U	µg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	Lindane	0.031	U	µg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	Lindane	0.047	U	µg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Lindane	0.422	U	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-C364-C	Sediment	12.48	N	2.5	6	Lindane	0.476	U	µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Lindane	0.0729	UJ	µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Lindane	1.13	UJ	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Lindane	0.0929	UJ	µg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Lindane	0.0999	UJ	µg/kg
LW2-C421-A	Sediment	4.45	N	0	1	Lindane	0.17	U	µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Lindane	0.53	NJ	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Lindane	0.115	UJ	µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Lindane	0.092	U	µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Lindane	0.375	U	µg/kg
LW2-G382	Sediment	2.65	N	0	1	Lindane	0.152	U	µg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Lindane	0.747	U	µg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Lindane	0.168	UT	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Lindane	0.185	U	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Lindane	1.31	J	µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Lindane	13.4	U	µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Lindane	0.0949	U	µg/kg
LW2-G398	Sediment	8.99	N	0	1	Lindane	4.62	J	µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Lindane	7.33	NJ	µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Lindane	0.608	U	µg/kg
LW2-G416	Sediment	5.63	N	0	1	Lindane	7.16	NJ	µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Lindane	0.0818	U	µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Lindane	0.0793	U	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Lindane	0.00995	J	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Lindane	0.00735	U	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Lindane	0.0173	U	µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Lindane	0.22	U	µg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Lindane	0.062	U	µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Lindane	6.7	J	µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Lindane	7.2	J	µg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Lindane	0.062	U	µg/kg
LW3-G706	Sediment	9.49	N	0	1	Lindane	0.25	U	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Lindane	0.062	U	µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Lindane	0.19	U	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
N1-0TO30-101518	Sediment	8.00	N	0	1	Lindane	0.031	U	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Lindane	0.031	U	µg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Lindane	0.044	U	µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	Lindane	0.147	U	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Lindane	0.131	U	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Lindane	2.38	NJ	µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Lindane	0.04	U	µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Lindane	0.031	U	µg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	Lindane	0.36	U	µg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	Lindane	0.47	U	µg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	Lindane	0.31	U	µg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	Lindane	0.7	UJ	µg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	Lindane	0.66	UJ	µg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	Lindane	0.3	J	µg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	Lindane	0.88	UJ	µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Lindane	6		µg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Lindane	6	UT	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Lindane	6	U	µg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Lindane	6	U	µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Lindane	2	U	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Lindane	2	U	µg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Lindane	0.031	U	µg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Lindane	0.043	U	µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Lindane	0.031	U	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Lindane	0.15	U	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Lindane	0.12	U	µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Lindane	0.16	U	µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Lindane	0.16	U	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Lindane	0.17	U	µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Lindane	0.18	U	µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Lindane	0.17	U	µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Lindane	0.18	U	µg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Lindane	0.16	U	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Lindane	0.17	U	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Lindane	0.16	U	µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Lindane	0.16	U	µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Lindane	0.18	U	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Lindane	0.15	U	µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Lindane	0.16	U	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Lindane	0.16	U	µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Lindane	0.15	U	µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Lindane	0.13	UJ	µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Lindane	0.16	UJ	µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Lindane	0.17	UJ	µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Lindane	0.13	UJ	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Lindane	0.12	UJ	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Lindane	0.13	UJ	µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Lindane	0.14	UJ	µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Lindane	0.13	UJ	µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Lindane	0.15	UJ	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Lindane	0.15	UJ	µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Lindane	0.16	UJ	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Lindane	0.13	UJ	µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Lindane	0.15	UJ	µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Lindane	0.15	U	µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Lindane	0.18	U	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Lindane	0.19	U	µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Lindane	0.12	UJ	µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Lindane	0.21	UJ	µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Lindane	0.22	UJ	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Lindane	0.29	UJ	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Lindane	0.16	UJ	µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Lindane	0.2	UJ	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Lindane	0.2	UJ	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Lindane	0.15	UJ	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Lindane	0.16	UJ	µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Lindane	0.15	UJ	µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Lindane	0.16	UJ	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Lindane	0.17	UJ	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Lindane	0.17	UJ	µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Lindane	0.16	UJ	µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Lindane	0.17	UJ	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Lindane	0.17	UJ	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Lindane	0.15	UJ	µg/kg
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	Lindane	0.13	U	µg/kg
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	Lindane	0.13	U	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Lindane	0.18	UJ	µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Lindane	0.15	UJ	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Lindane	0.19	UJ	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Lindane	0.15	UJ	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Lindane	0.18	UJ	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Lindane	0.15	UJ	µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Lindane	0.14	UJ	µg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Lindane	0.16	UJ	µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Lindane	0.12	UJ	µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Lindane	0.13	UJ	µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Lindane	0.18	UJ	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Lindane	0.14	UJ	µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Lindane	0.14	UJ	µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Lindane	0.13	UJ	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Lindane	0.21	U	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Lindane	0.18	U	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Lindane	0.16	U	µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Lindane	0.18	U	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Lindane	0.22	U	µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Lindane	0.23	U	µg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Lindane	0.22	U	µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Lindane	0.22	U	µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Lindane	0.22	U	µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Lindane	0.21	U	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Lindane	0.22	U	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Lindane	0.19	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Lindane	0.2	U	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Lindane	0.2	U	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Lindane	0.17	U	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Lindane	0.21	U	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Lindane	0.22	U	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Lindane	0.25	U	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Lindane	0.23	U	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Lindane	0.23	U	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Lindane	0.18	U	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Lindane	0.22	U	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Lindane	0.21	U	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Lindane	0.22	U	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Lindane	0.22	U	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Lindane	0.24	U	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Lindane	0.18	U	µg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Lindane	0.17	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Lindane	0.17	U	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Lindane	0.18	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Lindane	0.22	U	µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Lindane	0.18	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Lindane	0.18	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Lindane	0.19	U	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Lindane	0.2	U	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Lindane	0.18	U	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Lindane	0.17	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Lindane	0.17	U	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Lindane	0.2	U	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Lindane	0.22	U	µg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Lindane	0.2	U	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Lindane	0.21	U	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Lindane	0.18	U	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Lindane	0.2	U	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Lindane	0.23	J	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Lindane	0.16	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Lindane	0.23	UJ	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Lindane	0.24	UJ	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Lindane	0.26	UJ	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Lindane	0.26	UJ	µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Lindane	0.2	U	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Lindane	1.3		µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Lindane	0.22	U	µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Lindane	0.25	U	µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Lindane	0.18	U	µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Lindane	0.2	U	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Lindane	0.25	U	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Lindane	0.23	U	µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Lindane	0.19	U	µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Lindane	0.19	U	µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Lindane	0.25	U	µg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Lindane	0.25	U	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Lindane	0.24	U	µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Lindane	0.17	U	µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Lindane	0.19	U	µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Lindane	0.27	U	µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Lindane	0.33	U	µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Lindane	0.23	U	µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Lindane	0.21	U	µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Lindane	0.27	U	µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Lindane	0.28	U	µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Lindane	0.36	U	µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Lindane	0.31	U	µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Lindane	0.29	U	µg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Lindane	0.26	U	µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Lindane	0.35	U	µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Lindane	0.26	U	µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Lindane	0.2	U	µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Lindane	0.21	U	µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Lindane	0.28	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Lindane	0.24	U	µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Lindane	0.23	U	µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Lindane	0.21	U	µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Lindane	0.29	UJ	µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Lindane	0.32	UJ	µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Lindane	0.26	UJ	µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Lindane	0.3	UJ	µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Lindane	0.26	UJ	µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Lindane	0.3	UJ	µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Lindane	0.3	UJ	µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Lindane	0.28	UJ	µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Lindane	0.31	UJ	µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Lindane	0.27	UJ	µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Lindane	0.27	U	µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Lindane	0.29	U	µg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Lindane	0.3	U	µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Lindane	0.28	U	µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Lindane	0.24	U	µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Lindane	0.22	UJ	µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Lindane	0.2	UJ	µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Lindane	0.29	UJ	µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Lindane	0.32	UJ	µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Lindane	0.28	UJ	µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Lindane	0.31	UJ	µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Lindane	0.31	UJ	µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Lindane	0.26	UJ	µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Lindane	0.36	UJ	µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Lindane	0.31	UJ	µg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Lindane	0.32	UJ	µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Lindane	0.3	UJ	µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Lindane	0.24	UJ	µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Lindane	0.26	U	µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Lindane	0.25	U	µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Lindane	0.22	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Lindane	0.25	U	µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Lindane	0.2	U	µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Lindane	0.21	U	µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Lindane	0.15	UJ	µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Lindane	0.27	U	µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Lindane	0.24	U	µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Lindane	0.18	U	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Lindane	0.16	U	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Lindane	0.2	U	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Lindane	0.28	U	µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Lindane	0.28	U	µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Lindane	0.27	U	µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Lindane	0.24	U	µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Lindane	0.17	U	µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Lindane	0.35	U	µg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Lindane	0.26	U	µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Lindane	0.23	U	µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Lindane	0.18	U	µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Lindane	0.23	U	µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Lindane	0.3	UJ	µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Lindane	0.21	U	µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Lindane	0.22	U	µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Lindane	0.22	U	µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Lindane	0.23	U	µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Lindane	0.73	U	µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Lindane	0.29	U	µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Lindane	0.28	U	µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Lindane	0.32	J	µg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Lindane	0.35	U	µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Lindane	0.33	U	µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Lindane	0.19	U	µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Lindane	0.2	U	µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Lindane	0.23	U	µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Lindane	0.21	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Lindane	0.21	U	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Lindane	0.18	U	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Lindane	0.14	U	µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Lindane	0.14	U	µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Lindane	0.22	UJ	µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Lindane	0.28	U	µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Lindane	0.23	U	µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Lindane	0.16	U	µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Lindane	0.17	U	µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Lindane	0.19	U	µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Lindane	0.2	U	µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Lindane	0.24	U	µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Lindane	0.21	U	µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Lindane	0.24	U	µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Lindane	0.26	U	µg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Lindane	0.21	U	µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Lindane	0.17	U	µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Lindane	0.25	U	µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Lindane	0.32	U	µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Lindane	0.2	U	µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Lindane	0.27	U	µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Lindane	0.17	U	µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Lindane	0.21	U	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Lindane	0.18	U	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Lindane	0.29	U	µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Lindane	0.19	U	µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Lindane	0.21	U	µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Lindane	0.15	U	µg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Lindane	0.19	U	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Lindane	0.18	U	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Lindane	0.32	U	µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Lindane	0.36	J	µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Lindane	0.5	J	µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Lindane	0.29	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Lindane	0.21	U	µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Lindane	0.16	U	µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Lindane	0.2	U	µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Lindane	0.22	U	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Lindane	0.19	U	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Lindane	0.31	U	µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Lindane	0.24	UJ	µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Lindane	0.32	J	µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Lindane	0.3	UJ	µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Lindane	0.39	J	µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Lindane	0.22	UJ	µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Lindane	0.18	U	µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Lindane	0.16	U	µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Lindane	0.31	U	µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Lindane	0.26	U	µg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Lindane	0.29	U	µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Lindane	0.25	U	µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Lindane	0.23	U	µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Lindane	0.27	U	µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Lindane	0.23	U	µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Lindane	0.16	U	µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Lindane	0.21	U	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Lindane	0.28	U	µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Lindane	0.2	U	µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Lindane	0.17	U	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Lindane	0.28	UJ	µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Lindane	0.29	UJ	µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Lindane	0.28	UJ	µg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Lindane	0.26	UJ	µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Lindane	0.28	UJ	µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Lindane	0.17	U	µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Lindane	0.27	U	µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Lindane	0.24	U	µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Lindane	0.24	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Lindane	0.33	U	µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Lindane	0.3	U	µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Lindane	0.3	U	µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Lindane	0.23	U	µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Lindane	0.26	U	µg/kg
SIB-SC-J06-8-9-07/26/2022	Sediment	16.33	N	8	9	Lindane	0.052	UJ	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Lindane	0.3	U	µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Lindane	0.28	U	µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Lindane	0.32	U	µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Lindane	0.27	U	µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Lindane	0.24	U	µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Lindane	0.31	U	µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Lindane	0.3	J	µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Lindane	0.22	U	µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Lindane	0.17	U	µg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Lindane	0.18	U	µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Lindane	0.19	U	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Lindane	0.17	U	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Lindane	0.2	U	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Lindane	0.15	U	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Lindane	0.3	UJ	µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Lindane	0.24	UJ	µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Lindane	0.17	UJ	µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Lindane	0.19	UJ	µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Lindane	0.16	UJ	µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Lindane	0.26	U	µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Lindane	0.26	U	µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Lindane	0.24	U	µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Lindane	0.19	U	µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Lindane	0.2	U	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Lindane	0.15	U	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Lindane	0.17	U	µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Lindane	0.17	U	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Lindane	0.23	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Lindane	0.31	U	µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Lindane	0.24	UJ	µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Lindane	0.19	UJ	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Lindane	0.19	UJ	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Lindane	0.61	J	µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Lindane	0.23	U	µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Lindane	0.22	U	µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Lindane	0.25	U	µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Lindane	0.22	U	µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Lindane	0.22	U	µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Lindane	0.25	U	µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Lindane	0.28	U	µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Lindane	0.58		µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Lindane	0.17	U	µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Lindane	0.26	UJ	µg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Lindane	0.24	UJ	µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Lindane	0.38	UJ	µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Lindane	0.25	UJ	µg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Lindane	0.031	U	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Lindane	0.035	U	µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Lindane	0.041	U	µg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Lindane	0.04	U	µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Lindane	1.26	U	µg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Lindane	0.984	U	µg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Lindane	1.14	U	µg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Lindane	0.937	U	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Lindane	0.979	U	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Lindane	1.13	U	µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Lindane	0.95	U	µg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Lindane	0.967	U	µg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Lindane	1.03	U	µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Lindane	0.8		µg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Lindane	0.084	U	µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Lindane	0.08	UT	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WLCPSK095-A	Sediment	8.95	N	0	1.9	Lindane	0.15	J	µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Lindane	0.08	U	µg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Lindane	0.96	UJ	µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Lindane	0.98	UT	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Lindane	0.15	U	µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Lindane	0.14	U	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Lindane	0.14	U	µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Mercury	0.059	J	mg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Mercury	0.16	J	mg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Mercury	0.14	J	mg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Mercury	0.042	J	mg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Mercury	0.12		mg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Mercury	0.028	J	mg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Mercury	0.64	J	mg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Mercury	0.18		mg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Mercury	0.036	J	mg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Mercury	0.07	J	mg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	Mercury	0.23	J	mg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Mercury	0.3	J	mg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Mercury	0.16	J	mg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	Mercury	0.33		mg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Mercury	0.024	J	mg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Mercury	0.13		mg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	Mercury	0.18		mg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	Mercury	0.056		mg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Mercury	0.94		mg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	Mercury	1.2		mg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	Mercury	0.61		mg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	Mercury	0.4		mg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	Mercury	0.48		mg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	Mercury	0.43	J	mg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Mercury	0.038	J	mg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Mercury	0.036		mg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	Mercury	0.13		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	Mercury	0.083		mg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	Mercury	0.07		mg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	Mercury	0.18		mg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Mercury	0.198		mg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Mercury	0.358		mg/kg
LW2-C364-D	Sediment	12.48	N	6	7.4	Mercury	0.16	J	mg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Mercury	0.046		mg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Mercury	1.24		mg/kg
LW2-C388-B	Sediment	6.46	N	1	5.1	Mercury	0.0425	T	mg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Mercury	0.028		mg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Mercury	0.035		mg/kg
LW2-C402-B	Sediment	5.83	N	1	2.1	Mercury	0.138		mg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Mercury	0.489		mg/kg
LW2-C421-C	Sediment	4.45	N	2	4	Mercury	0.318		mg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Mercury	0.233		mg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Mercury	0.446		mg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Mercury	0.049		mg/kg
LW2-G382	Sediment	2.65	N	0	1	Mercury	0.137		mg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Mercury	0.032		mg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Mercury	0.072	JT	mg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Mercury	0.066	J	mg/kg
LW2-G388	Sediment	7.36	N	0	0.9	Mercury	0.057		mg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Mercury	0.308	J	mg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Mercury	0.163		mg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Mercury	0.038	J	mg/kg
LW2-G398	Sediment	8.99	N	0	1	Mercury	0.057		mg/kg
LW2-G402	Sediment	4.06	N	0	1	Mercury	0.122		mg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Mercury	0.122		mg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Mercury	0.325		mg/kg
LW2-G416	Sediment	5.63	N	0	1	Mercury	0.182		mg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Mercury	0.183		mg/kg
LW2-G421	Sediment	4.56	N	0	1	Mercury	0.274		mg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Mercury	0.053		mg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Mercury	0.142		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-GBT023	Sediment	0.93	N	0	0.3	Mercury	0.152		mg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Mercury	0.127		mg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Mercury	0.061		mg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Mercury	0.061		mg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Mercury	4.88		mg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Mercury	16.8		mg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Mercury	0.938		mg/kg
LW3-G706	Sediment	9.49	N	0	1	Mercury	0.058		mg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Mercury	0.036		mg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Mercury	0.06	U	mg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	Mercury	0.022	J	mg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Mercury	0.17	J	mg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Mercury	0.18	J	mg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Mercury	0.2	J	mg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Mercury	0.041	J	mg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	Mercury	0.13		mg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	Mercury	0.078		mg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	Mercury	0.056		mg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	Mercury	0.13		mg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	Mercury	0.45		mg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	Mercury	0.18		mg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	Mercury	0.17		mg/kg
PSYD&M97DM16DM16	Sediment	0.66	N	0	0.3	Mercury	0.251		mg/kg
PSYD&M97DM20DM20C	Sediment	10.29	N	3.5	4.5	Mercury	0.397		mg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Mercury	0.1		mg/kg
PSYSEA98PSY05PSY05S	Sediment	7.29	N	0	0.3	Mercury	0.13		mg/kg
PSYSEA98PSY06PSY06S	Sediment	14.49	N	0	0.3	Mercury	0.05	U	mg/kg
PSYSEA98PSY07PSY07S	Sediment	1.44	N	0	0.3	Mercury	0.13		mg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Mercury	0.11	T	mg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Mercury	0.12		mg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Mercury	0.08		mg/kg
PSYSEA98PSY10PSY10S	Sediment	1.89	N	0	0.3	Mercury	0.15		mg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Mercury	0.05	U	mg/kg
PSYSEA98PSY14PSY14S	Sediment	2.71	N	0	0.3	Mercury	0.14		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYSEA98PSY17PSY17S	Sediment	3.87	N	0	0.3	Mercury	0.16		mg/kg
PSYSEA98PSY18CPSY18A	Sediment	6.14	N	0	4	Mercury	0.37		mg/kg
PSYSEA98PSY18PSY18S	Sediment	5.56	N	0	0.3	Mercury	0.16		mg/kg
PSYSEA98PSY20PSY20S	Sediment	0.48	N	0	0.3	Mercury	0.13		mg/kg
PSYSEA98PSY21PSY21S	Sediment	0.83	N	0	0.3	Mercury	0.1		mg/kg
PSYSEA98PSY23CPSY23A	Sediment	9.68	N	0	4	Mercury	0.55		mg/kg
PSYSEA98PSY23CPSY23B	Sediment	9.68	N	4	8	Mercury	0.05		mg/kg
PSYSEA98PSY23PSY23S	Sediment	10.52	N	0	0.3	Mercury	0.11		mg/kg
PSYSEA98PSY25PSY25S	Sediment	4.12	N	0	0.3	Mercury	0.07		mg/kg
PSYSEA98PSY26PSY26S	Sediment	0.44	N	0	0.3	Mercury	0.13		mg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Mercury	0.21		mg/kg
PSYSEA98PSY28PSY28S	Sediment	0.33	N	0	0.3	Mercury	0.06		mg/kg
PSYSEA98PSY30CPSY30A	Sediment	9.14	N	0	4	Mercury	0.1		mg/kg
PSYSEA98PSY30CPSY30B	Sediment	9.14	N	4	8	Mercury	0.05	U	mg/kg
PSYSEA98PSY30CY30A01	Sediment	9.14	N	0	1	Mercury	0.13		mg/kg
PSYSEA98PSY30CY30A02	Sediment	9.14	N	1	2	Mercury	0.1		mg/kg
PSYSEA98PSY30CY30A03	Sediment	9.14	N	2	3	Mercury	0.08		mg/kg
PSYSEA98PSY30CY30A04	Sediment	9.14	N	3	4	Mercury	0.11		mg/kg
PSYSEA98PSY30CY30B05	Sediment	9.14	N	4	5	Mercury	0.09		mg/kg
PSYSEA98PSY30CY30B06	Sediment	9.14	N	5	6	Mercury	0.02		mg/kg
PSYSEA98PSY30CY30B07	Sediment	9.14	N	6	7	Mercury	0.05	U	mg/kg
PSYSEA98PSY30CY30B08	Sediment	9.14	N	7	8	Mercury	0.05	U	mg/kg
PSYSEA98PSY30PSY30S	Sediment	9.69	N	0	0.3	Mercury	0.07		mg/kg
PSYSEA98PSY33PSY33S	Sediment	0.80	N	0	0.3	Mercury	0.05		mg/kg
PSYSEA98PSY43PSY43S	Sediment	0.82	N	0	0.3	Mercury	0.05	U	mg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Mercury	0.043	J	mg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Mercury	0.16	J	mg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Mercury	0.03	J	mg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Mercury	0.082		mg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Mercury	0.0771		mg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Mercury	0.24		mg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Mercury	0.00652	J	mg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Mercury	0.0442		mg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Mercury	0.0189	J	mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Mercury	0.00962	J	mg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Mercury	0.0184	J	mg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Mercury	0.00503	U	mg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Mercury	0.0782		mg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Mercury	0.0182	J	mg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Mercury	0.149		mg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Mercury	0.0459		mg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Mercury	0.107		mg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Mercury	0.0871		mg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Mercury	0.0777	J	mg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Mercury	1.23	J	mg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Mercury	0.0486	J	mg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Mercury	0.0293	J	mg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Mercury	0.0283	J	mg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Mercury	0.0405	J	mg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Mercury	0.137	J	mg/kg
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	Mercury	0.122	J	mg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Mercury	0.0482	J	mg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Mercury	0.0596	J	mg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Mercury	0.0767	J	mg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Mercury	0.0364	J	mg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Mercury	0.0901		mg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Mercury	0.0237		mg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Mercury	0.0875		mg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Mercury	0.0475		mg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Mercury	0.0263		mg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Mercury	0.0385	J	mg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Mercury	0.055	J	mg/kg
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	Mercury	0.178	J	mg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Mercury	0.221	J	mg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Mercury	0.019	J	mg/kg
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	Mercury	0.0327	J	mg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Mercury	0.03285	J	mg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Mercury	0.0359	J	mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Mercury	0.0705		mg/kg
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	Mercury	0.0439	J	mg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Mercury	0.0721		mg/kg
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	Mercury	0.0451	J	mg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Mercury	0.0338		mg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Mercury	0.0939		mg/kg
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	Mercury	0.0896	J	mg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Mercury	0.0495		mg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Mercury	0.0227	J	mg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Mercury	0.0588		mg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Mercury	0.0354		mg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Mercury	0.0278		mg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Mercury	0.0414		mg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Mercury	0.0189	J	mg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Mercury	0.0229	J	mg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Mercury	0.0342		mg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Mercury	0.025		mg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Mercury	0.0292		mg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Mercury	0.154		mg/kg
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	Mercury	0.0526	J	mg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Mercury	0.0526		mg/kg
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	Mercury	0.0144	J	mg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Mercury	0.0112	J	mg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Mercury	0.0137	J	mg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Mercury	0.00752	J	mg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Mercury	0.0224	J	mg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Mercury	0.0208	J	mg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Mercury	0.12		mg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Mercury	0.0755		mg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Mercury	0.00492	U	mg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Mercury	0.101		mg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Mercury	0.00863	J	mg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Mercury	0.0388		mg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Mercury	0.02285	J	mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-122-MLW-1-2-10262022	Sediment	4.02	N	1	2	Mercury	0.0273	J	mg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Mercury	0.143		mg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Mercury	0.00478	U	mg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Mercury	0.626	J	mg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Mercury	0.358	J	mg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Mercury	0.381	J	mg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Mercury	0.359	J	mg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Mercury	0.259	J	mg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Mercury	0.0418		mg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Mercury	0.0346	J	mg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Mercury	0.04915	J	mg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Mercury	0.0418	J	mg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Mercury	0.0429	J	mg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Mercury	0.0408	J	mg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Mercury	0.0404	J	mg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Mercury	0.0442	J	mg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Mercury	0.0471	J	mg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Mercury	0.0552	J	mg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Mercury	0.0444	J	mg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Mercury	0.0354		mg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Mercury	0.0293	J	mg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Mercury	0.0334		mg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Mercury	0.0392		mg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Mercury	0.0356		mg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Mercury	0.0362		mg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Mercury	0.0444		mg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Mercury	0.0367		mg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Mercury	0.03205	J	mg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Mercury	0.0453		mg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Mercury	0.0412		mg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Mercury	0.0339		mg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Mercury	0.0507		mg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Mercury	0.0495		mg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Mercury	0.0452		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Mercury	0.0359		mg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Mercury	0.0334		mg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Mercury	0.0347	J	mg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Mercury	0.0895		mg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Mercury	0.0406	J	mg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Mercury	0.0569	J	mg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Mercury	0.063	J	mg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Mercury	0.0549	J	mg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Mercury	0.0572	J	mg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Mercury	0.0549	J	mg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Mercury	0.0458		mg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Mercury	0.03775		mg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Mercury	0.0451		mg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Mercury	0.0663		mg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Mercury	0.0407	J	mg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Mercury	0.0453	J	mg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Mercury	0.5	J	mg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Mercury	0.11	J	mg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Mercury	0.206	J	mg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Mercury	0.172	J	mg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Mercury	0.0717	J	mg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Mercury	0.106	J	mg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Mercury	0.405		mg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Mercury	0.451		mg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Mercury	0.384		mg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Mercury	0.398		mg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Mercury	0.163	J	mg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Mercury	0.104	J	mg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Mercury	0.146		mg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Mercury	0.41		mg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Mercury	0.097	J	mg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Mercury	0.0811	J	mg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Mercury	0.0852	J	mg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Mercury	0.201	J	mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Mercury	0.323	J	mg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Mercury	0.269	J	mg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Mercury	0.174	J	mg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Mercury	0.0557	J	mg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Mercury	0.258	J	mg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Mercury	0.254	J	mg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Mercury	0.179		mg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Mercury	0.314		mg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Mercury	0.177		mg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Mercury	0.137		mg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Mercury	0.302		mg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Mercury	0.263		mg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Mercury	0.302		mg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Mercury	0.188		mg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Mercury	0.219	J	mg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Mercury	0.26	J	mg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Mercury	0.117	J	mg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Mercury	0.283	J	mg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Mercury	0.162	J	mg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Mercury	0.204	J	mg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Mercury	0.508	J	mg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Mercury	0.265	J	mg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Mercury	0.33	J	mg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Mercury	0.183	J	mg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Mercury	0.162		mg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Mercury	0.163		mg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Mercury	0.406		mg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Mercury	0.241		mg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Mercury	0.217		mg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Mercury	0.211	J	mg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Mercury	0.192	J	mg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Mercury	0.262	J	mg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Mercury	0.142		mg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Mercury	0.241	J	mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Mercury	0.265	J	mg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Mercury	0.182	J	mg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Mercury	0.168	J	mg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Mercury	0.219	J	mg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Mercury	0.469	J	mg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Mercury	0.261	J	mg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Mercury	0.18	J	mg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Mercury	0.177	J	mg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Mercury	0.315	J	mg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Mercury	0.191	J	mg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Mercury	0.33	J	mg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Mercury	0.185	J	mg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Mercury	0.2595	J	mg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Mercury	0.388	J	mg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Mercury	0.0341	J	mg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Mercury	0.29	J	mg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Mercury	0.213	J	mg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Mercury	0.16815	J	mg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Mercury	0.0279		mg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Mercury	0.0417	J	mg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Mercury	0.217	J	mg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Mercury	0.167	J	mg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Mercury	0.0681	J	mg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Mercury	0.25	J	mg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Mercury	0.0455	J	mg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Mercury	0.0223		mg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Mercury	0.319		mg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Mercury	0.0654		mg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Mercury	0.443	J	mg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Mercury	0.176	J	mg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Mercury	0.2325		mg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Mercury	0.359	J	mg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Mercury	3.47	J	mg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Mercury	0.334	J	mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Mercury	0.555		mg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Mercury	0.226	J	mg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Mercury	0.249	J	mg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Mercury	0.173	J	mg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Mercury	0.101	J	mg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Mercury	0.1745	J	mg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Mercury	0.21	J	mg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Mercury	0.209	J	mg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Mercury	0.0608	J	mg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Mercury	0.372	J	mg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Mercury	0.0422	J	mg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Mercury	0.019	J	mg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Mercury	0.055	J	mg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Mercury	0.127	J	mg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Mercury	0.152	J	mg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Mercury	0.582		mg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Mercury	0.355		mg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Mercury	0.47		mg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Mercury	0.346		mg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Mercury	0.8645		mg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Mercury	0.414		mg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Mercury	0.25		mg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Mercury	0.41		mg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Mercury	0.437		mg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Mercury	0.248	J	mg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Mercury	0.2845	J	mg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Mercury	0.142	J	mg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Mercury	0.135	J	mg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Mercury	0.322	J	mg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Mercury	0.313		mg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Mercury	0.0842		mg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Mercury	2.05		mg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Mercury	1.18		mg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Mercury	0.0485		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Mercury	0.0215	J	mg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Mercury	0.101		mg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Mercury	0.142		mg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Mercury	0.0792		mg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Mercury	0.0765		mg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Mercury	0.04		mg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Mercury	0.03	J	mg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Mercury	0.423	J	mg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Mercury	0.626	J	mg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Mercury	1.47	J	mg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Mercury	5.37	J	mg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Mercury	7.57	J	mg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Mercury	0.533	J	mg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Mercury	0.0775	J	mg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Mercury	0.0483	J	mg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Mercury	0.0264	J	mg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Mercury	0.88	J	mg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Mercury	0.41	J	mg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Mercury	1.56	J	mg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Mercury	0.768	J	mg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Mercury	0.109	J	mg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Mercury	0.587	J	mg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Mercury	0.0403	J	mg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Mercury	0.00776	J	mg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Mercury	0.192	J	mg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Mercury	0.302		mg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Mercury	0.0743		mg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Mercury	0.0869		mg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Mercury	0.077		mg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Mercury	0.27		mg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Mercury	1.47	J	mg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Mercury	0.168	J	mg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Mercury	0.0303	J	mg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Mercury	0.29	J	mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Mercury	0.0321	J	mg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Mercury	0.18	J	mg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Mercury	8.375	J	mg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Mercury	0.135	J	mg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Mercury	0.217	J	mg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Mercury	18.6	J	mg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Mercury	8.82	J	mg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Mercury	0.173	J	mg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Mercury	0.348	J	mg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Mercury	14.3	J	mg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Mercury	1.96	J	mg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Mercury	0.106		mg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Mercury	0.451		mg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Mercury	0.654		mg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Mercury	1.19		mg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Mercury	3.27		mg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Mercury	0.131	J	mg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Mercury	0.188		mg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Mercury	0.167		mg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Mercury	0.164		mg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Mercury	0.317		mg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Mercury	0.149	J	mg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Mercury	0.283	J	mg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Mercury	0.424	J	mg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Mercury	0.171	J	mg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Mercury	0.0343		mg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Mercury	0.0782		mg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Mercury	0.249		mg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Mercury	0.0921		mg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Mercury	0.0255	J	mg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Mercury	0.352		mg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Mercury	0.474		mg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Mercury	0.0474		mg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Mercury	0.0431		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Mercury	0.0197	J	mg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Mercury	0.562		mg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Mercury	0.211		mg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Mercury	0.495		mg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Mercury	0.129		mg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Mercury	0.158		mg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Mercury	0.0305	J	mg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Mercury	0.067	J	mg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Mercury	0.027		mg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Mercury	0.115		mg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Mercury	0.15		mg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Mercury	0.129		mg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Mercury	0.0283		mg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Mercury	0.0138	J	mg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Mercury	0.0588		mg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Mercury	0.0594		mg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Mercury	0.0703		mg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Mercury	0.117		mg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Mercury	0.0669		mg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Mercury	0.0884	J	mg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Mercury	0.176	J	mg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Mercury	0.175		mg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Mercury	0.091		mg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Mercury	0.0707		mg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Mercury	0.0688	J	mg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Mercury	0.128	J	mg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Mercury	0.142	J	mg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Mercury	0.202	J	mg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Mercury	0.045		mg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Mercury	0.93		mg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Mercury	0.25	J	mg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Mercury	0.18		mg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Mercury	0.131		mg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Mercury	0.0104	U	mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Mercury	0.108		mg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Mercury	0.0102	U	mg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Mercury	0.0103	U	mg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Mercury	0.0124	U	mg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Mercury	0.0111	U	mg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Mercury	0.0225	J	mg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Mercury	0.0162	J	mg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Mercury	0.293		mg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Mercury	0.061		mg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Mercury	0.0705	T	mg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Mercury	0.057		mg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Mercury	0.06		mg/kg
WR-WSI98SD1300	Sediment	2.09	N	0	0.3	Mercury	0.06		mg/kg
WR-WSI98SD1320	Sediment	1.21	N	0	0.3	Mercury	0.05		mg/kg
WR-WSI98SD1330	Sediment	5.72	N	0	0.3	Mercury	0.3		mg/kg
WR-WSI98SD1330000A	Sediment	5.72	N	0	3	Mercury	0.8		mg/kg
WR-WSI98SD1340	Sediment	2.58	N	0	0.3	Mercury	0.12		mg/kg
WR-WSI98SD1360	Sediment	2.50	N	0	0.3	Mercury	0.06		mg/kg
WR-WSI98SD1390	Sediment	3.67	N	0	0.3	Mercury	0.16		mg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Mercury	0.18		mg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Mercury	0.15	T	mg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Mercury	0.273		mg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Mercury	0.01485	J	mg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Mercury	0.0396		mg/kg
514-0TO29-101618	Sediment	3.32	N	0	1	Naphthalene	8.3		µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Naphthalene	0.25	J	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Naphthalene	1.8	J	µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Naphthalene	2.2	J	µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Naphthalene	12		µg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Naphthalene	7.7	J	µg/kg
B-9.00-0TO29-102418	Sediment	3.03	N	0	1	Naphthalene	10.5		µg/kg
C-8.94-0TO27-102418	Sediment	6.38	N	0	0.9	Naphthalene	17		µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Naphthalene	5.4	J	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Naphthalene	17		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Naphthalene	11	J	µg/kg
D-8.83-0TO25-102418	Sediment	2.42	N	0	0.8	Naphthalene	16		µg/kg
D-8.90-0TO27-102418	Sediment	5.15	N	0	0.9	Naphthalene	17		µg/kg
D-8.90-SC-00TO10-102318	Sediment	5.11	N	0	1	Naphthalene	18		µg/kg
D-8.90-SC-10TO20-102318	Sediment	5.11	N	1	2	Naphthalene	51		µg/kg
D-8.90-SC-20TO40-102318	Sediment	5.11	N	2	4	Naphthalene	43		µg/kg
E-8.99-0TO28-102418	Sediment	6.32	N	0	0.9	Naphthalene	17		µg/kg
E-9.02-0TO26-102418	Sediment	2.84	N	0	0.9	Naphthalene	41	J	µg/kg
E-9.02-SC-00TO10-102318	Sediment	6.38	N	0	1	Naphthalene	19		µg/kg
E-9.02-SC-10TO20-102318	Sediment	6.38	N	1	2	Naphthalene	52		µg/kg
E-9.02-SC-20TO40-102318	Sediment	6.38	N	2	4	Naphthalene	81		µg/kg
E-9.02-SC-40TO60-102318	Sediment	6.38	N	4	6	Naphthalene	45		µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Naphthalene	9.7		µg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Naphthalene	6.8	J	µg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	Naphthalene	16		µg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Naphthalene	5.9	J	µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Naphthalene	28	J	µg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	Naphthalene	11		µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Naphthalene	4.3	J	µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Naphthalene	17		µg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	Naphthalene	9.4		µg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	Naphthalene	1.12	J	µg/kg
J3-SC1B-20TO30-82719	Sediment	5.73	N	2	3	Naphthalene	19	J	µg/kg
J3-SC1B-30TO40-82719	Sediment	5.73	N	3	4	Naphthalene	32	J	µg/kg
J3-SC1B-40TO50-82719	Sediment	5.73	N	4	5	Naphthalene	19	J	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Naphthalene	38		µg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	Naphthalene	37		µg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	Naphthalene	23		µg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	Naphthalene	36		µg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	Naphthalene	43		µg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	Naphthalene	12	J	µg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Naphthalene	0.65	J	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Naphthalene	8.6		µg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	Naphthalene	5.7		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	Naphthalene	1.7		µg/kg
L3-SC1B-20TO30-82619	Sediment	7.22	N	2	3	Naphthalene	1.4	J	µg/kg
L3-SC1B-30TO40-82619	Sediment	7.22	N	3	4	Naphthalene	1.1	J	µg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	Naphthalene	2.7		µg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	Naphthalene	9.9		µg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Naphthalene	74		µg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Naphthalene	200		µg/kg
LW2-C364-D	Sediment	12.48	N	6	7.4	Naphthalene	110		µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Naphthalene	13		µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Naphthalene	590		µg/kg
LW2-C388-B	Sediment	6.46	N	1	5.1	Naphthalene	3.6	U	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Naphthalene	2.2	U	µg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Naphthalene	2	U	µg/kg
LW2-C402-B	Sediment	5.83	N	1	2.1	Naphthalene	5.7	U	µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Naphthalene	35	U	µg/kg
LW2-C421-C	Sediment	4.45	N	2	4	Naphthalene	16	U	µg/kg
LW2-C426-A	Sediment	6.87	N	0	1	Naphthalene	7.3	U	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Naphthalene	27		µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Naphthalene	37		µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Naphthalene	32		µg/kg
LW2-G382	Sediment	2.65	N	0	1	Naphthalene	32		µg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Naphthalene	4.8	U	µg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Naphthalene	6.6	T	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Naphthalene	11		µg/kg
LW2-G388	Sediment	7.36	N	0	0.9	Naphthalene	6.9	U	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Naphthalene	62		µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Naphthalene	23	U	µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Naphthalene	2	U	µg/kg
LW2-G398	Sediment	8.99	N	0	1	Naphthalene	35		µg/kg
LW2-G402	Sediment	4.06	N	0	1	Naphthalene	14		µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Naphthalene	8.9		µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Naphthalene	30		µg/kg
LW2-G416	Sediment	5.63	N	0	1	Naphthalene	20		µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Naphthalene	20		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-G421	Sediment	4.56	N	0	1	Naphthalene	28		µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Naphthalene	5.2	U	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Naphthalene	1.2	UJ	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Naphthalene	0.99	U	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Naphthalene	11		µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Naphthalene	5.9		µg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Naphthalene	8.5		µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Naphthalene	130		µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Naphthalene	150		µg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Naphthalene	12		µg/kg
LW3-G706	Sediment	9.49	N	0	1	Naphthalene	11		µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Naphthalene	8		µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Naphthalene	19	U	µg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	Naphthalene	0.33	J	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Naphthalene	6.7		µg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Naphthalene	10		µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	Naphthalene	25		µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Naphthalene	31		µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Naphthalene	16		µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Naphthalene	0.44	J	µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Naphthalene	1.1	J	µg/kg
PDI-SC-S188-0TO1.5	Sediment	6.04	N	0	1	Naphthalene	280		µg/kg
PDI-SC-S191-0TO2	Sediment	6.59	N	0	2	Naphthalene	200		µg/kg
PDI-SC-S191-2TO4	Sediment	6.59	N	2	4	Naphthalene	75		µg/kg
PDI-SC-S191-4TO6	Sediment	6.59	N	4	6	Naphthalene	180		µg/kg
PDI-SC-S192-0TO1.5	Sediment	8.19	N	0	1	Naphthalene	540		µg/kg
PDI-SC-S192-1.5TO3	Sediment	8.19	N	1	3	Naphthalene	450		µg/kg
PDI-SC-S192-3TO4.2	Sediment	8.19	N	3	4	Naphthalene	12	U	µg/kg
PDI-SC-S229-0TO2	Sediment	2.78	N	0	2	Naphthalene	110		µg/kg
PDI-SC-S230-0TO2	Sediment	6.26	N	0	2	Naphthalene	170		µg/kg
PDI-SC-S230-2TO4	Sediment	6.26	N	2	4	Naphthalene	210		µg/kg
PDI-SC-S230-4TO6	Sediment	6.26	N	4	6	Naphthalene	150		µg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	Naphthalene	130		µg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	Naphthalene	19		µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	Naphthalene	11	J	µg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	Naphthalene	11		µg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	Naphthalene	32		µg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	Naphthalene	37		µg/kg
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	Naphthalene	14		µg/kg
PDI-SG-S168	Sediment	11.36	N	0	30	Naphthalene	12		µg/kg
PDI-SG-S175	Sediment	10.83	N	0	30	Naphthalene	15		µg/kg
PDI-SG-S182	Sediment	1.15	N	0	30	Naphthalene	220		µg/kg
PDI-SG-S183	Sediment	6.81	N	0	27	Naphthalene	65		µg/kg
PDI-SG-S184	Sediment	14.30	N	0	28	Naphthalene	320		µg/kg
PDI-SG-S191	Sediment	5.82	N	0	26	Naphthalene	420	J	µg/kg
PDI-SG-S199	Sediment	7.43	N	0	18	Naphthalene	29		µg/kg
PDI-SG-S201	Sediment	2.37	N	0	30	Naphthalene	20		µg/kg
PDI-SG-S204	Sediment	0.96	N	0	17	Naphthalene	7.9	J	µg/kg
PDI-SG-S211	Sediment	2.21	N	0	30	Naphthalene	16		µg/kg
PDI-SG-S214	Sediment	14.23	N	0	15	Naphthalene	0.44	J	µg/kg
PDI-SG-S215	Sediment	3.28	N	0	30	Naphthalene	17		µg/kg
PDI-SG-S216	Sediment	1.43	N	0	30	Naphthalene	17		µg/kg
PDI-SG-S220	Sediment	3.87	N	0	30	Naphthalene	17		µg/kg
PDI-SG-S223	Sediment	4.48	N	0	23	Naphthalene	38		µg/kg
PDI-SG-S224	Sediment	4.49	N	0	24	Naphthalene	11		µg/kg
PDI-SG-S225	Sediment	1.58	N	0	25	Naphthalene	30		µg/kg
PDI-SG-S229	Sediment	2.55	N	0	28	Naphthalene	44		µg/kg
PDI-SG-S230	Sediment	6.15	N	0	27	Naphthalene	23		µg/kg
PDI-SG-S231	Sediment	6.54	N	0	28	Naphthalene	50		µg/kg
PDI-SG-S233	Sediment	8.78	N	0	24	Naphthalene	19		µg/kg
PSYD&M97DM16DM16	Sediment	0.66	N	0	0.3	Naphthalene	33.6		µg/kg
PSYD&M97DM20DM20C	Sediment	10.29	N	3.5	4.5	Naphthalene	58.7		µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Naphthalene	65		µg/kg
PSYSEA98PSY05PSY05S	Sediment	7.29	N	0	0.3	Naphthalene	15		µg/kg
PSYSEA98PSY06PSY06S	Sediment	14.49	N	0	0.3	Naphthalene	10	U	µg/kg
PSYSEA98PSY07PSY07S	Sediment	1.44	N	0	0.3	Naphthalene	11		µg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Naphthalene	55.5	T	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Naphthalene	53		µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Naphthalene	38		µg/kg
PSYSEA98PSY10PSY10S	Sediment	1.89	N	0	0.3	Naphthalene	148		µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Naphthalene	34		µg/kg
PSYSEA98PSY14PSY14S	Sediment	2.71	N	0	0.3	Naphthalene	24		µg/kg
PSYSEA98PSY17PSY17S	Sediment	3.87	N	0	0.3	Naphthalene	19		µg/kg
PSYSEA98PSY18CPSY18A	Sediment	6.14	N	0	4	Naphthalene	115		µg/kg
PSYSEA98PSY18PSY18S	Sediment	5.56	N	0	0.3	Naphthalene	31		µg/kg
PSYSEA98PSY20PSY20S	Sediment	0.48	N	0	0.3	Naphthalene	15		µg/kg
PSYSEA98PSY21PSY21S	Sediment	0.83	N	0	0.3	Naphthalene	33		µg/kg
PSYSEA98PSY23CPSY23A	Sediment	9.68	N	0	4	Naphthalene	12		µg/kg
PSYSEA98PSY23CPSY23B	Sediment	9.68	N	4	8	Naphthalene	10	U	µg/kg
PSYSEA98PSY23PSY23S	Sediment	10.52	N	0	0.3	Naphthalene	10	U	µg/kg
PSYSEA98PSY25PSY25S	Sediment	4.12	N	0	0.3	Naphthalene	10	U	µg/kg
PSYSEA98PSY26PSY26S	Sediment	0.44	N	0	0.3	Naphthalene	48	U	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Naphthalene	48		µg/kg
PSYSEA98PSY28PSY28S	Sediment	0.33	N	0	0.3	Naphthalene	10	U	µg/kg
PSYSEA98PSY30PSY30S	Sediment	9.69	N	0	0.3	Naphthalene	16		µg/kg
PSYSEA98PSY33PSY33S	Sediment	0.80	N	0	0.3	Naphthalene	10	U	µg/kg
PSYSEA98PSY43PSY43S	Sediment	0.82	N	0	0.3	Naphthalene	10	U	µg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Naphthalene	0.23	J	µg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Naphthalene	0.33	J	µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Naphthalene	5.4		µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Naphthalene	0.49	U	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Naphthalene	0.49	U	µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Naphthalene	0.49	U	µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Naphthalene	0.54	U	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Naphthalene	0.51	U	µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Naphthalene	0.56	U	µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Naphthalene	0.55	U	µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Naphthalene	0.56	U	µg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Naphthalene	0.54	U	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Naphthalene	0.51	U	µg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Naphthalene	4.8	U	µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Naphthalene	0.47	U	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Naphthalene	0.59	U	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Naphthalene	0.53	U	µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Naphthalene	5.4	U	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Naphthalene	0.53	U	µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Naphthalene	0.49	U	µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Naphthalene	0.53	U	µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Naphthalene	0.5	U	µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Naphthalene	0.55	U	µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Naphthalene	0.51	U	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Naphthalene	0.47	U	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Naphthalene	0.5	U	µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Naphthalene	0.49	U	µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Naphthalene	0.49	U	µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Naphthalene	0.54	U	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Naphthalene	0.49	U	µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Naphthalene	0.47	U	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Naphthalene	0.49	U	µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Naphthalene	5.3	U	µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Naphthalene	0.48	U	µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Naphthalene	0.63	U	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Naphthalene	0.59	U	µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Naphthalene	5	U	µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Naphthalene	0.66	UJ	µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Naphthalene	0.78	UJ	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Naphthalene	0.89	UJ	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Naphthalene	0.56	UJ	µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Naphthalene	0.66	UJ	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Naphthalene	0.65	UJ	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Naphthalene	0.55	U	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Naphthalene	0.54	U	µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Naphthalene	0.54	U	µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Naphthalene	0.55	U	µg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Naphthalene	0.61	U	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Naphthalene	0.52	U	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Naphthalene	4.7	U	µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Naphthalene	0.53	U	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Naphthalene	0.53	U	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Naphthalene	4.7	U	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Naphthalene	0.51	U	µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Naphthalene	0.49	U	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Naphthalene	120		µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Naphthalene	0.48	U	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Naphthalene	0.52	U	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Naphthalene	0.47	U	µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Naphthalene	0.5	U	µg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Naphthalene	0.51	U	µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Naphthalene	200		µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Naphthalene	4000		µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Naphthalene	0.69	U	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Naphthalene	0.49	U	µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Naphthalene	0.53	U	µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Naphthalene	0.53	U	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Naphthalene	0.72	U	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Naphthalene	0.55	U	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Naphthalene	0.56	U	µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Naphthalene	0.63	U	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Naphthalene	47		µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Naphthalene	49		µg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Naphthalene	48		µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Naphthalene	1.4	U	µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Naphthalene	48		µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Naphthalene	0.74	U	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Naphthalene	0.63	U	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Naphthalene	0.69	U	µg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Naphthalene	0.68	U	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Naphthalene	0.66	U	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Naphthalene	0.66	U	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Naphthalene	0.67	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Naphthalene	0.77	U	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Naphthalene	0.76	U	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Naphthalene	0.74	U	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Naphthalene	0.74	U	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Naphthalene	0.64	U	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Naphthalene	0.66	U	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Naphthalene	0.64	U	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Naphthalene	0.73	U	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Naphthalene	0.77	U	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Naphthalene	0.56	U	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Naphthalene	0.63	U	µg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Naphthalene	0.66	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Naphthalene	0.64	U	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Naphthalene	0.69	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Naphthalene	0.63	U	µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Naphthalene	0.67	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Naphthalene	0.67	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Naphthalene	0.74	U	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Naphthalene	0.73	U	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Naphthalene	0.7	U	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Naphthalene	0.68	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Naphthalene	0.65	U	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Naphthalene	0.68	U	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Naphthalene	0.77	U	µg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Naphthalene	0.67	UJ	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Naphthalene	0.74	UJ	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Naphthalene	0.67	UJ	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Naphthalene	0.68	UJ	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Naphthalene	0.69	UJ	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Naphthalene	0.66	U	µg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Naphthalene	0.7	U	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Naphthalene	0.73	U	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Naphthalene	0.78	UJ	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Naphthalene	0.78	UJ	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Naphthalene	0.74	U	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Naphthalene	0.87	U	µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Naphthalene	0.82	U	µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Naphthalene	1.5	U	µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Naphthalene	1.3	U	µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Naphthalene	1.3	U	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Naphthalene	0.74	U	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Naphthalene	0.86	U	µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Naphthalene	0.78	U	µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Naphthalene	0.79	U	µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Naphthalene	0.87	U	µg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Naphthalene	0.78	U	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Naphthalene	0.94	U	µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Naphthalene	1.3	U	µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Naphthalene	1.5	U	µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Naphthalene	0.98	U	µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Naphthalene	0.99	U	µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Naphthalene	20		µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Naphthalene	27		µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Naphthalene	61		µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Naphthalene	94		µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Naphthalene	1.2	U	µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Naphthalene	0.99	U	µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Naphthalene	72		µg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Naphthalene	78		µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Naphthalene	2	U	µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Naphthalene	0.88	U	µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Naphthalene	210		µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Naphthalene	0.71	U	µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Naphthalene	2	U	µg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Naphthalene	0.94	U	µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Naphthalene	0.91	U	µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Naphthalene	0.87	U	µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Naphthalene	140		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Naphthalene	150		µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Naphthalene	160		µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Naphthalene	170		µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Naphthalene	65		µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Naphthalene	81		µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Naphthalene	170		µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Naphthalene	120		µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Naphthalene	120		µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Naphthalene	46		µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Naphthalene	66		µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Naphthalene	100		µg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Naphthalene	83		µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Naphthalene	66		µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Naphthalene	88		µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Naphthalene	59		µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Naphthalene	44		µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Naphthalene	170		µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Naphthalene	110		µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Naphthalene	290		µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Naphthalene	62		µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Naphthalene	150		µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Naphthalene	44		µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Naphthalene	130		µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Naphthalene	110		µg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Naphthalene	67		µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Naphthalene	39		µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Naphthalene	69		µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Naphthalene	70		µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Naphthalene	65		µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Naphthalene	93		µg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Naphthalene	75		µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Naphthalene	25.5		µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Naphthalene	42		µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Naphthalene	170		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Naphthalene	120		µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Naphthalene	38		µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Naphthalene	1.4	U	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Naphthalene	0.61	U	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Naphthalene	0.66	U	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Naphthalene	160		µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Naphthalene	44		µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Naphthalene	1.8	U	µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Naphthalene	37		µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Naphthalene	54		µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Naphthalene	97		µg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Naphthalene	91		µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Naphthalene	210		µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Naphthalene	53		µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Naphthalene	40		µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Naphthalene	50.5	J	µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Naphthalene	0.78	UJ	µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Naphthalene	0.82	U	µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Naphthalene	0.83	U	µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Naphthalene	1.8	U	µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Naphthalene	0.83	U	µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Naphthalene	90.5		µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Naphthalene	0.95	U	µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Naphthalene	0.93	U	µg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Naphthalene	1.1	U	µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Naphthalene	1.1	U	µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Naphthalene	0.65	U	µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Naphthalene	0.65	U	µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Naphthalene	22		µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Naphthalene	0.64	U	µg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Naphthalene	0.64	U	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Naphthalene	0.62	U	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Naphthalene	14		µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Naphthalene	28		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Naphthalene	55		µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Naphthalene	190		µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Naphthalene	110		µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Naphthalene	49		µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Naphthalene	51		µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Naphthalene	50		µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Naphthalene	64		µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Naphthalene	68		µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Naphthalene	1.6	U	µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Naphthalene	0.92	U	µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Naphthalene	110		µg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Naphthalene	1.3	U	µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Naphthalene	1.3	U	µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Naphthalene	3.8	U	µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Naphthalene	0.98	U	µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Naphthalene	89		µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Naphthalene	98		µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Naphthalene	0.62	U	µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Naphthalene	0.59	U	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Naphthalene	0.59	U	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Naphthalene	0.91	UJ	µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Naphthalene	0.63	UJ	µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Naphthalene	0.62	UJ	µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Naphthalene	0.67	UJ	µg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Naphthalene	0.59	U	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Naphthalene	0.59	U	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Naphthalene	110		µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Naphthalene	1.8	UJ	µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Naphthalene	110	J	µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Naphthalene	0.94	UJ	µg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Naphthalene	1.5	UJ	µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Naphthalene	0.62	UJ	µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Naphthalene	0.67	U	µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Naphthalene	0.64	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Naphthalene	0.61	U	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Naphthalene	100		µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Naphthalene	0.89	U	µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Naphthalene	1.7	U	µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Naphthalene	1.9	U	µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Naphthalene	170		µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Naphthalene	0.68	U	µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Naphthalene	0.66	U	µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Naphthalene	0.56	U	µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Naphthalene	1.1	U	µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Naphthalene	0.95	U	µg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Naphthalene	190		µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Naphthalene	0.83	U	µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Naphthalene	0.86	U	µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Naphthalene	110		µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Naphthalene	0.7	U	µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Naphthalene	0.66	U	µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Naphthalene	0.63	U	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Naphthalene	4.9	U	µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Naphthalene	0.61	U	µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Naphthalene	0.63	U	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Naphthalene	215		µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Naphthalene	1.8	U	µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Naphthalene	1.9	U	µg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Naphthalene	1.6	U	µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Naphthalene	1.5	U	µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Naphthalene	0.59	U	µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Naphthalene	0.94	U	µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Naphthalene	4	U	µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Naphthalene	0.72	U	µg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Naphthalene	0.96	U	µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Naphthalene	1.1	U	µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Naphthalene	0.98	U	µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Naphthalene	0.88	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Naphthalene	0.82	U	µg/kg
SIB-SC-J06-8-9-07/26/2022	Sediment	16.33	N	8	9	Naphthalene	180	J	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Naphthalene	1.1	U	µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Naphthalene	1.1	U	µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Naphthalene	1.1	U	µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Naphthalene	0.95	U	µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Naphthalene	41		µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Naphthalene	1.1	U	µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Naphthalene	0.92	UJ	µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Naphthalene	0.77	UJ	µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Naphthalene	0.61	U	µg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Naphthalene	0.56	UJ	µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Naphthalene	0.56	UJ	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Naphthalene	72	J	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Naphthalene	83	J	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Naphthalene	0.57	UJ	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Naphthalene	1.9	U	µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Naphthalene	1.5	U	µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Naphthalene	0.61	U	µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Naphthalene	0.62	U	µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Naphthalene	0.59	U	µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Naphthalene	0.82	U	µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Naphthalene	0.91	U	µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Naphthalene	0.84	U	µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Naphthalene	0.59	U	µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Naphthalene	0.58	U	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Naphthalene	0.59	U	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Naphthalene	0.56	U	µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Naphthalene	0.56	U	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Naphthalene	180		µg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Naphthalene	360		µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Naphthalene	0.74	UJ	µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Naphthalene	0.59	UJ	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Naphthalene	0.57	UJ	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Naphthalene	0.79	U	µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Naphthalene	0.82	U	µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Naphthalene	0.78	U	µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Naphthalene	0.77	U	µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Naphthalene	0.77	U	µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Naphthalene	0.75	U	µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Naphthalene	0.78	U	µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Naphthalene	73		µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Naphthalene	51		µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Naphthalene	0.56	U	µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Naphthalene	0.89	U	µg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Naphthalene	0.91	U	µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Naphthalene	380		µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Naphthalene	1.7	U	µg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Naphthalene	0.18	J	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Naphthalene	17		µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Naphthalene	0.3	J	µg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Naphthalene	7.7		µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Naphthalene	96.8	UJ	µg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Naphthalene	12.8	J	µg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Naphthalene	83.4	UJ	µg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Naphthalene	79.8	UJ	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Naphthalene	7.81	U	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Naphthalene	19.2	J	µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Naphthalene	13.7	J	µg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Naphthalene	2.13	J	µg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Naphthalene	29.7	J	µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Naphthalene	130		µg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Naphthalene	30		µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Naphthalene	7.5	JT	µg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Naphthalene	32		µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Naphthalene	6.5	J	µg/kg
WR-WSI98SD1300	Sediment	2.09	N	0	0.3	Naphthalene	19	U	µg/kg
WR-WSI98SD1320	Sediment	1.21	N	0	0.3	Naphthalene	20	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WR-WSI98SD1330	Sediment	5.72	N	0	0.3	Naphthalene	29		µg/kg
WR-WSI98SD1330000A	Sediment	5.72	N	0	3	Naphthalene	110		µg/kg
WR-WSI98SD1340	Sediment	2.58	N	0	0.3	Naphthalene	23		µg/kg
WR-WSI98SD1360	Sediment	2.50	N	0	0.3	Naphthalene	19	U	µg/kg
WR-WSI98SD1390	Sediment	3.67	N	0	0.3	Naphthalene	22		µg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Naphthalene	120		µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Naphthalene	31	T	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Naphthalene	0.48	U	µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Naphthalene	0.47	U	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Naphthalene	0.49	U	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Residual Range Organics (C25-C36)	4.2	U	mg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Residual Range Organics (C25-C36)	4	U	mg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Residual Range Organics (C25-C36)	4.1	U	mg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Residual Range Organics (C25-C36)	110	J	mg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Residual Range Organics (C25-C36)	4.3	U	mg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Residual Range Organics (C25-C36)	4.7	UJ	mg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Residual Range Organics (C25-C36)	4.6	UJ	mg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Residual Range Organics (C25-C36)	4.7	U	mg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Residual Range Organics (C25-C36)	4.6	UJ	mg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Residual Range Organics (C25-C36)	4.3	U	mg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Residual Range Organics (C25-C36)	890	J	mg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Residual Range Organics (C25-C36)	310		mg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Residual Range Organics (C25-C36)	240		mg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Residual Range Organics (C25-C36)	4.5	U	mg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Residual Range Organics (C25-C36)	860	J	mg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Residual Range Organics (C25-C36)	730		mg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Residual Range Organics (C25-C36)	4600		mg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Residual Range Organics (C25-C36)	500	J	mg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Residual Range Organics (C25-C36)	42	U	mg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Residual Range Organics (C25-C36)	1400		mg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Residual Range Organics (C25-C36)	4.3	U	mg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Residual Range Organics (C25-C36)	450	J	mg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Residual Range Organics (C25-C36)	510	J	mg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Residual Range Organics (C25-C36)	1100		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Residual Range Organics (C25-C36)	1900		mg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Residual Range Organics (C25-C36)	1800		mg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Residual Range Organics (C25-C36)	530	J	mg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Residual Range Organics (C25-C36)	4	UJ	mg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Residual Range Organics (C25-C36)	4.1	UJ	mg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Residual Range Organics (C25-C36)	1400		mg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Residual Range Organics (C25-C36)	4.1	U	mg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Residual Range Organics (C25-C36)	65	J	mg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Residual Range Organics (C25-C36)	220		mg/kg
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	Residual Range Organics (C25-C36)	300		mg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Residual Range Organics (C25-C36)	8900	J	mg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Residual Range Organics (C25-C36)	44	J	mg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Residual Range Organics (C25-C36)	16	J	mg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Residual Range Organics (C25-C36)	7.4	U	mg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Residual Range Organics (C25-C36)	83	J	mg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Residual Range Organics (C25-C36)	47	J	mg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Residual Range Organics (C25-C36)	5.4	U	mg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Residual Range Organics (C25-C36)	55	J	mg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Residual Range Organics (C25-C36)	87	J	mg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Residual Range Organics (C25-C36)	4.6	U	mg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Residual Range Organics (C25-C36)	4.7	U	mg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Residual Range Organics (C25-C36)	5.2	U	mg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Residual Range Organics (C25-C36)	4.4	U	mg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Residual Range Organics (C25-C36)	40	U	mg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Residual Range Organics (C25-C36)	4.4	U	mg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Residual Range Organics (C25-C36)	4.7	U	mg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Residual Range Organics (C25-C36)	410	J	mg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Residual Range Organics (C25-C36)	4.6	U	mg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Residual Range Organics (C25-C36)	4.1	U	mg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Residual Range Organics (C25-C36)	5.3	U	mg/kg
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	Residual Range Organics (C25-C36)	6.2	U	mg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Residual Range Organics (C25-C36)	4.2	U	mg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Residual Range Organics (C25-C36)	4.6	U	mg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Residual Range Organics (C25-C36)	4.1	U	mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Residual Range Organics (C25-C36)	4.3	U	mg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Residual Range Organics (C25-C36)	4.2	U	mg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Residual Range Organics (C25-C36)	1500	J	mg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Residual Range Organics (C25-C36)	5800	J	mg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Residual Range Organics (C25-C36)	6.1	U	mg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Residual Range Organics (C25-C36)	4.2	U	mg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Residual Range Organics (C25-C36)	4.4	U	mg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Residual Range Organics (C25-C36)	4.6	U	mg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Residual Range Organics (C25-C36)	6.1	U	mg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Residual Range Organics (C25-C36)	4.9	U	mg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Residual Range Organics (C25-C36)	4.7	UJ	mg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Residual Range Organics (C25-C36)	5.3	UJ	mg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Residual Range Organics (C25-C36)	490		mg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Residual Range Organics (C25-C36)	5.8	U	mg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Residual Range Organics (C25-C36)	510		mg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Residual Range Organics (C25-C36)	12	U	mg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Residual Range Organics (C25-C36)	5.9	U	mg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Residual Range Organics (C25-C36)	6.2	U	mg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Residual Range Organics (C25-C36)	5.8	U	mg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Residual Range Organics (C25-C36)	5.8	U	mg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Residual Range Organics (C25-C36)	5.7	U	mg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Residual Range Organics (C25-C36)	5.8	U	mg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Residual Range Organics (C25-C36)	6.3	U	mg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Residual Range Organics (C25-C36)	6.3	U	mg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Residual Range Organics (C25-C36)	6.3	U	mg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Residual Range Organics (C25-C36)	6.3	U	mg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Residual Range Organics (C25-C36)	5.5	U	mg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Residual Range Organics (C25-C36)	5.7	U	mg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Residual Range Organics (C25-C36)	6.3	U	mg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Residual Range Organics (C25-C36)	9.7	U	mg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Residual Range Organics (C25-C36)	6.1	U	mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Residual Range Organics (C25-C36)	5.7	U	mg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Residual Range Organics (C25-C36)	5.8	U	mg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Residual Range Organics (C25-C36)	5.9	U	mg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Residual Range Organics (C25-C36)	6	U	mg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Residual Range Organics (C25-C36)	6.4	U	mg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Residual Range Organics (C25-C36)	6.1	U	mg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Residual Range Organics (C25-C36)	5.8	U	mg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Residual Range Organics (C25-C36)	5.8	U	mg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Residual Range Organics (C25-C36)	6.5	U	mg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Residual Range Organics (C25-C36)	6	U	mg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Residual Range Organics (C25-C36)	6.2	U	mg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Residual Range Organics (C25-C36)	6	U	mg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Residual Range Organics (C25-C36)	6.1	U	mg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Residual Range Organics (C25-C36)	5.8	U	mg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Residual Range Organics (C25-C36)	5.8	U	mg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Residual Range Organics (C25-C36)	5.9	U	mg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Residual Range Organics (C25-C36)	6.2	U	mg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Residual Range Organics (C25-C36)	6.7	U	mg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Residual Range Organics (C25-C36)	6.8	U	mg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Residual Range Organics (C25-C36)	6.1	U	mg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Residual Range Organics (C25-C36)	990		mg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Residual Range Organics (C25-C36)	7.1	U	mg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Residual Range Organics (C25-C36)	14	U	mg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Residual Range Organics (C25-C36)	11	U	mg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Residual Range Organics (C25-C36)	12	U	mg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Residual Range Organics (C25-C36)	6.5	U	mg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Residual Range Organics (C25-C36)	330		mg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Residual Range Organics (C25-C36)	700	J	mg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Residual Range Organics (C25-C36)	6.6	U	mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Residual Range Organics (C25-C36)	400		mg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Residual Range Organics (C25-C36)	6.7	U	mg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Residual Range Organics (C25-C36)	580		mg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Residual Range Organics (C25-C36)	630		mg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Residual Range Organics (C25-C36)	13	U	mg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Residual Range Organics (C25-C36)	570		mg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Residual Range Organics (C25-C36)	180	J	mg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Residual Range Organics (C25-C36)	290		mg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Residual Range Organics (C25-C36)	240		mg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Residual Range Organics (C25-C36)	300		mg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Residual Range Organics (C25-C36)	450		mg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Residual Range Organics (C25-C36)	300		mg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Residual Range Organics (C25-C36)	340	J	mg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Residual Range Organics (C25-C36)	450		mg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Residual Range Organics (C25-C36)	420		mg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Residual Range Organics (C25-C36)	1000		mg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Residual Range Organics (C25-C36)	520		mg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Residual Range Organics (C25-C36)	380		mg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Residual Range Organics (C25-C36)	270		mg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Residual Range Organics (C25-C36)	790		mg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Residual Range Organics (C25-C36)	330		mg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Residual Range Organics (C25-C36)	590		mg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Residual Range Organics (C25-C36)	680		mg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Residual Range Organics (C25-C36)	8.7	U	mg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Residual Range Organics (C25-C36)	340		mg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Residual Range Organics (C25-C36)	210		mg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Residual Range Organics (C25-C36)	380		mg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Residual Range Organics (C25-C36)	250		mg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Residual Range Organics (C25-C36)	250		mg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Residual Range Organics (C25-C36)	120	J	mg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Residual Range Organics (C25-C36)	260		mg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Residual Range Organics (C25-C36)	430		mg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Residual Range Organics (C25-C36)	220		mg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Residual Range Organics (C25-C36)	520		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Residual Range Organics (C25-C36)	710		mg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Residual Range Organics (C25-C36)	570		mg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Residual Range Organics (C25-C36)	450		mg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Residual Range Organics (C25-C36)	370		mg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Residual Range Organics (C25-C36)	290		mg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Residual Range Organics (C25-C36)	350		mg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Residual Range Organics (C25-C36)	370		mg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Residual Range Organics (C25-C36)	340		mg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Residual Range Organics (C25-C36)	200	J	mg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Residual Range Organics (C25-C36)	350		mg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Residual Range Organics (C25-C36)	7.9	U	mg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Residual Range Organics (C25-C36)	280		mg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Residual Range Organics (C25-C36)	340		mg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Residual Range Organics (C25-C36)	550		mg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Residual Range Organics (C25-C36)	200	J	mg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Residual Range Organics (C25-C36)	7.8	U	mg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Residual Range Organics (C25-C36)	180	J	mg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Residual Range Organics (C25-C36)	150	J	mg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Residual Range Organics (C25-C36)	270		mg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Residual Range Organics (C25-C36)	160		mg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Residual Range Organics (C25-C36)	200	J	mg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Residual Range Organics (C25-C36)	150	J	mg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Residual Range Organics (C25-C36)	290		mg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Residual Range Organics (C25-C36)	120		mg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Residual Range Organics (C25-C36)	610		mg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Residual Range Organics (C25-C36)	400		mg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Residual Range Organics (C25-C36)	240	J	mg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Residual Range Organics (C25-C36)	5.2	U	mg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Residual Range Organics (C25-C36)	5.5	U	mg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Residual Range Organics (C25-C36)	190	J	mg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Residual Range Organics (C25-C36)	470		mg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Residual Range Organics (C25-C36)	560		mg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Residual Range Organics (C25-C36)	350		mg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Residual Range Organics (C25-C36)	120	J	mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Residual Range Organics (C25-C36)	180	J	mg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Residual Range Organics (C25-C36)	440		mg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Residual Range Organics (C25-C36)	140	J	mg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Residual Range Organics (C25-C36)	170		mg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Residual Range Organics (C25-C36)	220		mg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Residual Range Organics (C25-C36)	340	J	mg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Residual Range Organics (C25-C36)	6.4	U	mg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Residual Range Organics (C25-C36)	6.7	U	mg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Residual Range Organics (C25-C36)	1300		mg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Residual Range Organics (C25-C36)	1100		mg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Residual Range Organics (C25-C36)	730		mg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Residual Range Organics (C25-C36)	600		mg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Residual Range Organics (C25-C36)	1400		mg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Residual Range Organics (C25-C36)	550		mg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Residual Range Organics (C25-C36)	8.9	U	mg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Residual Range Organics (C25-C36)	8.7	U	mg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Residual Range Organics (C25-C36)	5.5	U	mg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Residual Range Organics (C25-C36)	420		mg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Residual Range Organics (C25-C36)	180		mg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Residual Range Organics (C25-C36)	5.3	U	mg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Residual Range Organics (C25-C36)	5.2	U	mg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Residual Range Organics (C25-C36)	840	J	mg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Residual Range Organics (C25-C36)	350		mg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Residual Range Organics (C25-C36)	720		mg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Residual Range Organics (C25-C36)	450		mg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Residual Range Organics (C25-C36)	770		mg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Residual Range Organics (C25-C36)	550		mg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Residual Range Organics (C25-C36)	12	U	mg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Residual Range Organics (C25-C36)	5.7	U	mg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Residual Range Organics (C25-C36)	420		mg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Residual Range Organics (C25-C36)	6.4	U	mg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Residual Range Organics (C25-C36)	13	U	mg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Residual Range Organics (C25-C36)	1200		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Residual Range Organics (C25-C36)	880		mg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Residual Range Organics (C25-C36)	12	U	mg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Residual Range Organics (C25-C36)	12	U	mg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Residual Range Organics (C25-C36)	1200		mg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Residual Range Organics (C25-C36)	16	U	mg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Residual Range Organics (C25-C36)	13	U	mg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Residual Range Organics (C25-C36)	14	U	mg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Residual Range Organics (C25-C36)	11	U	mg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Residual Range Organics (C25-C36)	5.1	U	mg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Residual Range Organics (C25-C36)	5.1	U	mg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Residual Range Organics (C25-C36)	7.6	U	mg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Residual Range Organics (C25-C36)	5.5	U	mg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Residual Range Organics (C25-C36)	5.4	U	mg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Residual Range Organics (C25-C36)	5.5	U	mg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Residual Range Organics (C25-C36)	5.2	U	mg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Residual Range Organics (C25-C36)	5.1	U	mg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Residual Range Organics (C25-C36)	8.8	U	mg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Residual Range Organics (C25-C36)	16	U	mg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Residual Range Organics (C25-C36)	82	U	mg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Residual Range Organics (C25-C36)	79	U	mg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Residual Range Organics (C25-C36)	130	U	mg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Residual Range Organics (C25-C36)	5.5	U	mg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Residual Range Organics (C25-C36)	5.5	U	mg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Residual Range Organics (C25-C36)	5.4	U	mg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Residual Range Organics (C25-C36)	1300		mg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Residual Range Organics (C25-C36)	310		mg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Residual Range Organics (C25-C36)	16	U	mg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Residual Range Organics (C25-C36)	15	U	mg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Residual Range Organics (C25-C36)	7.5	U	mg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Residual Range Organics (C25-C36)	5.7	U	mg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Residual Range Organics (C25-C36)	5.5	U	mg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Residual Range Organics (C25-C36)	5	U	mg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Residual Range Organics (C25-C36)	8.7	U	mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Residual Range Organics (C25-C36)	8.2	U	mg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Residual Range Organics (C25-C36)	960		mg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Residual Range Organics (C25-C36)	14	U	mg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Residual Range Organics (C25-C36)	1500	J	mg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Residual Range Organics (C25-C36)	15	U	mg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Residual Range Organics (C25-C36)	1800		mg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Residual Range Organics (C25-C36)	2100		mg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Residual Range Organics (C25-C36)	5.4	U	mg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Residual Range Organics (C25-C36)	5.3	U	mg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Residual Range Organics (C25-C36)	5100		mg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Residual Range Organics (C25-C36)	16	U	mg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Residual Range Organics (C25-C36)	4600		mg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Residual Range Organics (C25-C36)	3500	J	mg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Residual Range Organics (C25-C36)	2500		mg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Residual Range Organics (C25-C36)	5.3	U	mg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Residual Range Organics (C25-C36)	1500	J	mg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Residual Range Organics (C25-C36)	4400		mg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Residual Range Organics (C25-C36)	4000		mg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Residual Range Organics (C25-C36)	8.3	U	mg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Residual Range Organics (C25-C36)	9.1	U	mg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Residual Range Organics (C25-C36)	870		mg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Residual Range Organics (C25-C36)	1300	J	mg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Residual Range Organics (C25-C36)	2200		mg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Residual Range Organics (C25-C36)	8.8	U	mg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Residual Range Organics (C25-C36)	8.6	U	mg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Residual Range Organics (C25-C36)	8.5	U	mg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Residual Range Organics (C25-C36)	8	U	mg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Residual Range Organics (C25-C36)	530		mg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Residual Range Organics (C25-C36)	8.5	U	mg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Residual Range Organics (C25-C36)	7.5	U	mg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Residual Range Organics (C25-C36)	6.6	U	mg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Residual Range Organics (C25-C36)	5.2	U	mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Residual Range Organics (C25-C36)	4.8	U	mg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Residual Range Organics (C25-C36)	4.8	U	mg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Residual Range Organics (C25-C36)	5.6	U	mg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Residual Range Organics (C25-C36)	6.1	U	mg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Residual Range Organics (C25-C36)	5.1	U	mg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Residual Range Organics (C25-C36)	600		mg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Residual Range Organics (C25-C36)	13	U	mg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Residual Range Organics (C25-C36)	5.2	U	mg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Residual Range Organics (C25-C36)	5.3	U	mg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Residual Range Organics (C25-C36)	5	U	mg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Residual Range Organics (C25-C36)	7.1	U	mg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Residual Range Organics (C25-C36)	7.6	U	mg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Residual Range Organics (C25-C36)	7.1	U	mg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Residual Range Organics (C25-C36)	5	U	mg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Residual Range Organics (C25-C36)	4.9	U	mg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Residual Range Organics (C25-C36)	5.1	U	mg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Residual Range Organics (C25-C36)	210		mg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Residual Range Organics (C25-C36)	4.6	U	mg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Residual Range Organics (C25-C36)	13	U	mg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Residual Range Organics (C25-C36)	1800		mg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Residual Range Organics (C25-C36)	240		mg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Residual Range Organics (C25-C36)	5	U	mg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Residual Range Organics (C25-C36)	4.9	U	mg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Residual Range Organics (C25-C36)	6.7	U	mg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Residual Range Organics (C25-C36)	6.8	U	mg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Residual Range Organics (C25-C36)	13	U	mg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Residual Range Organics (C25-C36)	14	U	mg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Residual Range Organics (C25-C36)	6.4	U	mg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Residual Range Organics (C25-C36)	500		mg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Residual Range Organics (C25-C36)	850		mg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Residual Range Organics (C25-C36)	8.4	U	mg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Residual Range Organics (C25-C36)	5.5	U	mg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Residual Range Organics (C25-C36)	4.7	U	mg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Residual Range Organics (C25-C36)	7.5	U	mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Residual Range Organics (C25-C36)	960		mg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Residual Range Organics (C25-C36)	2400		mg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Residual Range Organics (C25-C36)	15	U	mg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Residual Range Organics (C25-C36)	4.1	U	mg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Residual Range Organics (C25-C36)	4	U	mg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Residual Range Organics (C25-C36)	30	J	mg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	TCDD-TEQ (ND=1/2)	0.000299201	JT	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	TCDD-TEQ (ND=1/2)	0.0147057	JT	µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	TCDD-TEQ (ND=1/2)	0.01888	JT	µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	TCDD-TEQ (ND=1/2)	0.0014829	JT	µg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	TCDD-TEQ (ND=1/2)	0.025628	JT	µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	TCDD-TEQ (ND=1/2)	0.0034949	JT	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	TCDD-TEQ (ND=1/2)	0.0166405	JT	µg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	TCDD-TEQ (ND=1/2)	0.041858	JT	µg/kg
E-9.02-0TO26-102418	Sediment	2.84	N	0	0.9	TCDD-TEQ (ND=1/2)	0.015917	JT	µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	TCDD-TEQ (ND=1/2)	0.00184686	JT	µg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	TCDD-TEQ (ND=1/2)	0.00344845	JT	µg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	TCDD-TEQ (ND=1/2)	0.051711	JT	µg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	TCDD-TEQ (ND=1/2)	0.028681	JT	µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	TCDD-TEQ (ND=1/2)	0.0092518	JT	µg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	TCDD-TEQ (ND=1/2)	0.052802	JT	µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	TCDD-TEQ (ND=1/2)	0.00115365	JT	µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	TCDD-TEQ (ND=1/2)	0.02353	JT	µg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	TCDD-TEQ (ND=1/2)	0.0057535	JT	µg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	TCDD-TEQ (ND=1/2)	0.001297935	JT	µg/kg
J3-SC1B-20TO30-82719	Sediment	5.73	N	2	3	TCDD-TEQ (ND=1/2)	0.00327555	JT	µg/kg
J3-SC1B-30TO40-82719	Sediment	5.73	N	3	4	TCDD-TEQ (ND=1/2)	0.0137205	JT	µg/kg
J3-SC1B-40TO50-82719	Sediment	5.73	N	4	5	TCDD-TEQ (ND=1/2)	0.0026401	JT	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	TCDD-TEQ (ND=1/2)	0.0244175	JT	µg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	TCDD-TEQ (ND=1/2)	0.009583	JT	µg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	TCDD-TEQ (ND=1/2)	0.0055324	JT	µg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	TCDD-TEQ (ND=1/2)	0.029227	JT	µg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	TCDD-TEQ (ND=1/2)	0.024082	JT	µg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	TCDD-TEQ (ND=1/2)	0.0979777	JT	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
L1-0TO30-101518	Sediment	5.22	N	0	1	TCDD-TEQ (ND=1/2)	0.0021814	JT	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	TCDD-TEQ (ND=1/2)	0.00301245	JT	µg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	TCDD-TEQ (ND=1/2)	0.00348817	JT	µg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	TCDD-TEQ (ND=1/2)	0.0008473	JT	µg/kg
L3-SC1B-20TO30-82619	Sediment	7.22	N	2	3	TCDD-TEQ (ND=1/2)	0.00646695	JT	µg/kg
L3-SC1B-30TO40-82619	Sediment	7.22	N	3	4	TCDD-TEQ (ND=1/2)	0.0038703	JT	µg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	TCDD-TEQ (ND=1/2)	0.0014889	JT	µg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	TCDD-TEQ (ND=1/2)	0.015927	JT	µg/kg
LW2-C426-A	Sediment	6.87	N	0	1	TCDD-TEQ (ND=1/2)	0.0034	JT	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	TCDD-TEQ (ND=1/2)	0.0013	JT	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	TCDD-TEQ (ND=1/2)	0.003	JT	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	TCDD-TEQ (ND=1/2)	0.00024	JT	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	TCDD-TEQ (ND=1/2)	0.002	JT	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	TCDD-TEQ (ND=1/2)	0.00098	JT	µg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	TCDD-TEQ (ND=1/2)	0.000339575	JT	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	TCDD-TEQ (ND=1/2)	0.022831	JT	µg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	TCDD-TEQ (ND=1/2)	0.030109	JT	µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	TCDD-TEQ (ND=1/2)	0.032584	JT	µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	TCDD-TEQ (ND=1/2)	0.00109035	JT	µg/kg
PDI-SC-S188-0TO1.5	Sediment	6.04	N	0	1	TCDD-TEQ (ND=1/2)	0.011821	NJ	µg/kg
PDI-SC-S191-0TO2	Sediment	6.59	N	0	2	TCDD-TEQ (ND=1/2)	0.012825	NJ	µg/kg
PDI-SC-S191-2TO4	Sediment	6.59	N	2	4	TCDD-TEQ (ND=1/2)	0.020066	NJ	µg/kg
PDI-SC-S191-4TO6	Sediment	6.59	N	4	6	TCDD-TEQ (ND=1/2)	0.023483	NJ	µg/kg
PDI-SC-S192-0TO1.5	Sediment	8.19	N	0	1	TCDD-TEQ (ND=1/2)	0.29026	J	µg/kg
PDI-SC-S192-1.5TO3	Sediment	8.19	N	1	3	TCDD-TEQ (ND=1/2)	0.187591	J	µg/kg
PDI-SC-S192-3TO4.2	Sediment	8.19	N	3	4	TCDD-TEQ (ND=1/2)	0.014028	NJ	µg/kg
PDI-SC-S229-0TO2	Sediment	2.78	N	0	2	TCDD-TEQ (ND=1/2)	0.016932	NJ	µg/kg
PDI-SC-S230-0TO2	Sediment	6.26	N	0	2	TCDD-TEQ (ND=1/2)	0.0138849	J	µg/kg
PDI-SC-S230-2TO4	Sediment	6.26	N	2	4	TCDD-TEQ (ND=1/2)	0.021329	J	µg/kg
PDI-SC-S230-4TO6	Sediment	6.26	N	4	6	TCDD-TEQ (ND=1/2)	0.012917	J	µg/kg
PDI-SG-S168	Sediment	11.36	N	0	30	TCDD-TEQ (ND=1/2)	0.0026117	NJ	µg/kg
PDI-SG-S175	Sediment	10.83	N	0	30	TCDD-TEQ (ND=1/2)	0.0019587	NJ	µg/kg
PDI-SG-S182	Sediment	1.15	N	0	30	TCDD-TEQ (ND=1/2)	0.018542	NJ	µg/kg
PDI-SG-S183	Sediment	6.81	N	0	27	TCDD-TEQ (ND=1/2)	0.011004	NJ	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SG-S184	Sediment	14.30	N	0	28	TCDD-TEQ (ND=1/2)	0.068693	NJ	µg/kg
PDI-SG-S191	Sediment	5.82	N	0	26	TCDD-TEQ (ND=1/2)	0.024826	J	µg/kg
PDI-SG-S199	Sediment	7.43	N	0	18	TCDD-TEQ (ND=1/2)	0.0027989	NJ	µg/kg
PDI-SG-S201	Sediment	2.37	N	0	30	TCDD-TEQ (ND=1/2)	0.0265264	NJ	µg/kg
PDI-SG-S204	Sediment	0.96	N	0	17	TCDD-TEQ (ND=1/2)	0.0144915	NJ	µg/kg
PDI-SG-S211	Sediment	2.21	N	0	30	TCDD-TEQ (ND=1/2)	0.020841	NJ	µg/kg
PDI-SG-S214	Sediment	14.23	N	0	15	TCDD-TEQ (ND=1/2)	0.002031697	J	µg/kg
PDI-SG-S215	Sediment	3.28	N	0	30	TCDD-TEQ (ND=1/2)	0.024849	NJ	µg/kg
PDI-SG-S216	Sediment	1.43	N	0	30	TCDD-TEQ (ND=1/2)	0.018127	NJ	µg/kg
PDI-SG-S220	Sediment	3.87	N	0	30	TCDD-TEQ (ND=1/2)	0.012261	NJ	µg/kg
PDI-SG-S223	Sediment	4.48	N	0	23	TCDD-TEQ (ND=1/2)	0.018917	NJ	µg/kg
PDI-SG-S224	Sediment	4.49	N	0	24	TCDD-TEQ (ND=1/2)	0.0085791	NJ	µg/kg
PDI-SG-S225	Sediment	1.58	N	0	25	TCDD-TEQ (ND=1/2)	0.014594	NJ	µg/kg
PDI-SG-S229	Sediment	2.55	N	0	28	TCDD-TEQ (ND=1/2)	0.022617	J	µg/kg
PDI-SG-S230	Sediment	6.15	N	0	27	TCDD-TEQ (ND=1/2)	0.015466	NJ	µg/kg
PDI-SG-S231	Sediment	6.54	N	0	28	TCDD-TEQ (ND=1/2)	0.01509	NJ	µg/kg
PDI-SG-S233	Sediment	8.78	N	0	24	TCDD-TEQ (ND=1/2)	0.018268	NJ	µg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	TCDD-TEQ (ND=1/2)	0.00037934	JT	µg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	TCDD-TEQ (ND=1/2)	0.030234	JT	µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	TCDD-TEQ (ND=1/2)	0.00059768	JT	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	TCDD-TEQ (ND=1/2)	1.8	J	pg/g
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	TCDD-TEQ (ND=1/2)	2.2	J	pg/g
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	TCDD-TEQ (ND=1/2)	6.8	J	pg/g
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	TCDD-TEQ (ND=1/2)	1.2	J	pg/g
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	TCDD-TEQ (ND=1/2)	3.5	J	pg/g
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	TCDD-TEQ (ND=1/2)	1.7	J	pg/g
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	TCDD-TEQ (ND=1/2)	1.9	J	pg/g
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	TCDD-TEQ (ND=1/2)	3.5	J	pg/g
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	TCDD-TEQ (ND=1/2)	1.7	J	pg/g
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	TCDD-TEQ (ND=1/2)	6.9	J	pg/g
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	TCDD-TEQ (ND=1/2)	75.9	J	pg/g
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	TCDD-TEQ (ND=1/2)	16.9	J	pg/g
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	TCDD-TEQ (ND=1/2)	10.3	J	pg/g
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	TCDD-TEQ (ND=1/2)	45.8	J	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	TCDD-TEQ (ND=1/2)	28.3	J	pg/g
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	TCDD-TEQ (ND=1/2)	13.2	J	pg/g
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	TCDD-TEQ (ND=1/2)	24.5	J	pg/g
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	TCDD-TEQ (ND=1/2)	16.2	J	pg/g
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	TCDD-TEQ (ND=1/2)	26.2	J	pg/g
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	TCDD-TEQ (ND=1/2)	22.9	J	pg/g
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	TCDD-TEQ (ND=1/2)	82.7	J	pg/g
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	TCDD-TEQ (ND=1/2)	1.2	J	pg/g
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	TCDD-TEQ (ND=1/2)	0.62	J	pg/g
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	TCDD-TEQ (ND=1/2)	5.9	J	pg/g
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	TCDD-TEQ (ND=1/2)	31.5	J	pg/g
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	TCDD-TEQ (ND=1/2)	13.4	J	pg/g
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	TCDD-TEQ (ND=1/2)	19	J	pg/g
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	TCDD-TEQ (ND=1/2)	10.2	J	pg/g
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	TCDD-TEQ (ND=1/2)	2.8	J	pg/g
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	TCDD-TEQ (ND=1/2)	3.9	J	pg/g
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	TCDD-TEQ (ND=1/2)	15.5	J	pg/g
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	TCDD-TEQ (ND=1/2)	92	J	pg/g
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	TCDD-TEQ (ND=1/2)	0.84	J	pg/g
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	TCDD-TEQ (ND=1/2)	2.9	J	pg/g
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	TCDD-TEQ (ND=1/2)	5.4	J	pg/g
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	TCDD-TEQ (ND=1/2)	174	J	pg/g
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	TCDD-TEQ (ND=1/2)	0.76	J	pg/g
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	TCDD-TEQ (ND=1/2)	0.63	J	pg/g
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	TCDD-TEQ (ND=1/2)	0.27	J	pg/g
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	TCDD-TEQ (ND=1/2)	0.99	J	pg/g
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	TCDD-TEQ (ND=1/2)	3.6	J	pg/g
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	TCDD-TEQ (ND=1/2)	1.3	J	pg/g
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	TCDD-TEQ (ND=1/2)	1.4	J	pg/g
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	TCDD-TEQ (ND=1/2)	1.1	J	pg/g
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	TCDD-TEQ (ND=1/2)	0.51	J	pg/g
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	TCDD-TEQ (ND=1/2)	1.8	J	pg/g
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	TCDD-TEQ (ND=1/2)	1.6	J	pg/g
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	TCDD-TEQ (ND=1/2)	8	J	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	TCDD-TEQ (ND=1/2)	2.5	J	pg/g
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	TCDD-TEQ (ND=1/2)	0.48	J	pg/g
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	TCDD-TEQ (ND=1/2)	1.8	J	pg/g
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	TCDD-TEQ (ND=1/2)	2	J	pg/g
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	TCDD-TEQ (ND=1/2)	10.2	J	pg/g
SIB-098-OHW-1-2-10072022	Sediment	8.22	N	1	2	TCDD-TEQ (ND=1/2)	6.5	J	pg/g
SIB-098-OHW-2-3-10072022	Sediment	8.22	N	2	3	TCDD-TEQ (ND=1/2)	1.3	J	pg/g
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	TCDD-TEQ (ND=1/2)	1.7	J	pg/g
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	TCDD-TEQ (ND=1/2)	0.99	J	pg/g
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	TCDD-TEQ (ND=1/2)	22.4	J	pg/g
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	TCDD-TEQ (ND=1/2)	1.5	J	pg/g
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	TCDD-TEQ (ND=1/2)	0.33	J	pg/g
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	TCDD-TEQ (ND=1/2)	3.9	J	pg/g
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	TCDD-TEQ (ND=1/2)	0.55	J	pg/g
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	TCDD-TEQ (ND=1/2)	1.3	J	pg/g
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	TCDD-TEQ (ND=1/2)	0.28	J	pg/g
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	TCDD-TEQ (ND=1/2)	1	J	pg/g
SIB-103-OHW-1-2-10062022	Sediment	3.26	N	1	2	TCDD-TEQ (ND=1/2)	0.37	J	pg/g
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	TCDD-TEQ (ND=1/2)	0.74	J	pg/g
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	TCDD-TEQ (ND=1/2)	1.9	J	pg/g
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	TCDD-TEQ (ND=1/2)	3.8	J	pg/g
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	TCDD-TEQ (ND=1/2)	3.6	J	pg/g
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	TCDD-TEQ (ND=1/2)	3.6	J	pg/g
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	TCDD-TEQ (ND=1/2)	10.7	J	pg/g
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	TCDD-TEQ (ND=1/2)	21.3	JA	pg/g
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	TCDD-TEQ (ND=1/2)	0.48	J	pg/g
SIB-110-MLW-1-2-10052022	Sediment	7.81	N	1	2	TCDD-TEQ (ND=1/2)	0.27	J	pg/g
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	TCDD-TEQ (ND=1/2)	13.2	J	pg/g
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	TCDD-TEQ (ND=1/2)	40.5	J	pg/g
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	TCDD-TEQ (ND=1/2)	0.98	J	pg/g
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	TCDD-TEQ (ND=1/2)	0.35	J	pg/g
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	TCDD-TEQ (ND=1/2)	1.4	J	pg/g
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	TCDD-TEQ (ND=1/2)	8.8	J	pg/g
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	TCDD-TEQ (ND=1/2)	0.56	J	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	TCDD-TEQ (ND=1/2)	6.7	J	pg/g
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	TCDD-TEQ (ND=1/2)	5	J	pg/g
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	TCDD-TEQ (ND=1/2)	9.9	J	pg/g
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	TCDD-TEQ (ND=1/2)	8.5	J	pg/g
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	TCDD-TEQ (ND=1/2)	7.1	J	pg/g
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	TCDD-TEQ (ND=1/2)	0.31	J	pg/g
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	TCDD-TEQ (ND=1/2)	0.34	J	pg/g
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	TCDD-TEQ (ND=1/2)	0.45	J	pg/g
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	TCDD-TEQ (ND=1/2)	0.36	UJ	pg/g
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	TCDD-TEQ (ND=1/2)	0.43	J	pg/g
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	TCDD-TEQ (ND=1/2)	1.1	J	pg/g
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	TCDD-TEQ (ND=1/2)	0.32	UJ	pg/g
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	TCDD-TEQ (ND=1/2)	0.3	J	pg/g
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	TCDD-TEQ (ND=1/2)	0.29	J	pg/g
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	TCDD-TEQ (ND=1/2)	0.34	J	pg/g
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	TCDD-TEQ (ND=1/2)	0.33	J	pg/g
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	TCDD-TEQ (ND=1/2)	0.77	J	pg/g
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	TCDD-TEQ (ND=1/2)	0.77	J	pg/g
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	TCDD-TEQ (ND=1/2)	0.91	J	pg/g
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	TCDD-TEQ (ND=1/2)	0.44	J	pg/g
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	TCDD-TEQ (ND=1/2)	0.34	J	pg/g
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	TCDD-TEQ (ND=1/2)	0.4	J	pg/g
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	TCDD-TEQ (ND=1/2)	0.67	J	pg/g
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	TCDD-TEQ (ND=1/2)	0.74	J	pg/g
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	TCDD-TEQ (ND=1/2)	0.48	J	pg/g
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	TCDD-TEQ (ND=1/2)	0.33	U	pg/g
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	TCDD-TEQ (ND=1/2)	0.46	UJ	pg/g
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	TCDD-TEQ (ND=1/2)	0.46	J	pg/g
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	TCDD-TEQ (ND=1/2)	0.42	J	pg/g
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	TCDD-TEQ (ND=1/2)	0.47	J	pg/g
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	TCDD-TEQ (ND=1/2)	0.46	J	pg/g
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	TCDD-TEQ (ND=1/2)	0.52	J	pg/g
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	TCDD-TEQ (ND=1/2)	0.46	J	pg/g
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	TCDD-TEQ (ND=1/2)	0.43	J	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	TCDD-TEQ (ND=1/2)	0.62	J	pg/g
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	TCDD-TEQ (ND=1/2)	0.49	J	pg/g
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	TCDD-TEQ (ND=1/2)	0.46	J	pg/g
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	TCDD-TEQ (ND=1/2)	0.48	J	pg/g
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	TCDD-TEQ (ND=1/2)	0.6	J	pg/g
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	TCDD-TEQ (ND=1/2)	0.53	J	pg/g
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	TCDD-TEQ (ND=1/2)	0.46	J	pg/g
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	TCDD-TEQ (ND=1/2)	0.51	J	pg/g
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	TCDD-TEQ (ND=1/2)	0.38	J	pg/g
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	TCDD-TEQ (ND=1/2)	0.29	J	pg/g
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	TCDD-TEQ (ND=1/2)	0.51	J	pg/g
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	TCDD-TEQ (ND=1/2)	0.33	J	pg/g
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	TCDD-TEQ (ND=1/2)	0.49	J	pg/g
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	TCDD-TEQ (ND=1/2)	19.2		pg/g
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	TCDD-TEQ (ND=1/2)	1.8	J	pg/g
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	TCDD-TEQ (ND=1/2)	12.8	J	pg/g
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	TCDD-TEQ (ND=1/2)	6.5	J	pg/g
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	TCDD-TEQ (ND=1/2)	1.3	J	pg/g
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	TCDD-TEQ (ND=1/2)	0.55	J	pg/g
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	TCDD-TEQ (ND=1/2)	12.1	J	pg/g
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	TCDD-TEQ (ND=1/2)	8.7	J	pg/g
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	TCDD-TEQ (ND=1/2)	16.7	J	pg/g
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	TCDD-TEQ (ND=1/2)	0.62	J	pg/g
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	TCDD-TEQ (ND=1/2)	0.66	J	pg/g
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	TCDD-TEQ (ND=1/2)	12	J	pg/g
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	TCDD-TEQ (ND=1/2)	12.9	J	pg/g
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	TCDD-TEQ (ND=1/2)	10.8	J	pg/g
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	TCDD-TEQ (ND=1/2)	17.9	J	pg/g
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	TCDD-TEQ (ND=1/2)	15.8	J	pg/g
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	TCDD-TEQ (ND=1/2)	18.7	J	pg/g
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	TCDD-TEQ (ND=1/2)	20.2	J	pg/g
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	TCDD-TEQ (ND=1/2)	36.2	J	pg/g
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	TCDD-TEQ (ND=1/2)	36.7	J	pg/g
SIB-SC-C25-0-1-07/23/2022	Sediment	4.21	N	0	1	TCDD-TEQ (ND=1/2)	21.3	J	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C25-1-2-07/23/2022	Sediment	4.21	N	1	2	TCDD-TEQ (ND=1/2)	21	J	pg/g
SIB-SC-C25-2-3-07/23/2022	Sediment	4.21	N	2	3	TCDD-TEQ (ND=1/2)	5.9	J	pg/g
SIB-SC-C25-3-4-07/23/2022	Sediment	4.21	N	3	4	TCDD-TEQ (ND=1/2)	34.4	J	pg/g
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	TCDD-TEQ (ND=1/2)	16.2	J	pg/g
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	TCDD-TEQ (ND=1/2)	28.1	J	pg/g
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	TCDD-TEQ (ND=1/2)	17.5	J	pg/g
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	TCDD-TEQ (ND=1/2)	10.3	J	pg/g
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	TCDD-TEQ (ND=1/2)	32.7	J	pg/g
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	TCDD-TEQ (ND=1/2)	16.5	J	pg/g
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	TCDD-TEQ (ND=1/2)	32.1	J	pg/g
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	TCDD-TEQ (ND=1/2)	37.6	J	pg/g
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	TCDD-TEQ (ND=1/2)	31.4	J	pg/g
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	TCDD-TEQ (ND=1/2)	4.4	J	pg/g
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	TCDD-TEQ (ND=1/2)	16	J	pg/g
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	TCDD-TEQ (ND=1/2)	19.5	J	pg/g
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	TCDD-TEQ (ND=1/2)	25.3	J	pg/g
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	TCDD-TEQ (ND=1/2)	5.1	J	pg/g
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	TCDD-TEQ (ND=1/2)	1.6	J	pg/g
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	TCDD-TEQ (ND=1/2)	9	J	pg/g
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	TCDD-TEQ (ND=1/2)	13.2	J	pg/g
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	TCDD-TEQ (ND=1/2)	22.8	J	pg/g
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	TCDD-TEQ (ND=1/2)	2.2	J	pg/g
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	TCDD-TEQ (ND=1/2)	1.4	J	pg/g
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	TCDD-TEQ (ND=1/2)	3.3	J	pg/g
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	TCDD-TEQ (ND=1/2)	5.3	J	pg/g
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	TCDD-TEQ (ND=1/2)	4.8	J	pg/g
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	TCDD-TEQ (ND=1/2)	32.4	J	pg/g
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	TCDD-TEQ (ND=1/2)	24.9	J	pg/g
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	TCDD-TEQ (ND=1/2)	22.7	J	pg/g
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	TCDD-TEQ (ND=1/2)	9.2	J	pg/g
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	TCDD-TEQ (ND=1/2)	17.4	J	pg/g
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	TCDD-TEQ (ND=1/2)	24.9	J	pg/g
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	TCDD-TEQ (ND=1/2)	13.8	J	pg/g
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	TCDD-TEQ (ND=1/2)	5.8	J	pg/g

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	TCDD-TEQ (ND=1/2)	4.6	J	pg/g
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	TCDD-TEQ (ND=1/2)	16.4	J	pg/g
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	TCDD-TEQ (ND=1/2)	19.5	J	pg/g
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	TCDD-TEQ (ND=1/2)	22.4	J	pg/g
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	TCDD-TEQ (ND=1/2)	2	J	pg/g
SIB-SC-E25-1-2-07/23/2022	Sediment	3.42	N	1	2	TCDD-TEQ (ND=1/2)	12.1	J	pg/g
SIB-SC-E25-2-3-07/23/2022	Sediment	3.42	N	2	3	TCDD-TEQ (ND=1/2)	5.3	J	pg/g
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	TCDD-TEQ (ND=1/2)	12.4	J	pg/g
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	TCDD-TEQ (ND=1/2)	25.6	J	pg/g
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	TCDD-TEQ (ND=1/2)	6.4	J	pg/g
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	TCDD-TEQ (ND=1/2)	2.1	J	pg/g
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	TCDD-TEQ (ND=1/2)	0.32	J	pg/g
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	TCDD-TEQ (ND=1/2)	30.5	J	pg/g
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	TCDD-TEQ (ND=1/2)	1.4	J	pg/g
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	TCDD-TEQ (ND=1/2)	5.4	J	pg/g
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	TCDD-TEQ (ND=1/2)	0.44	J	pg/g
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	TCDD-TEQ (ND=1/2)	0.36	UJ	pg/g
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	TCDD-TEQ (ND=1/2)	5.5	J	pg/g
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	TCDD-TEQ (ND=1/2)	20	J	pg/g
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	TCDD-TEQ (ND=1/2)	40.4	J	pg/g
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	TCDD-TEQ (ND=1/2)	7.4	J	pg/g
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	TCDD-TEQ (ND=1/2)	10.6	J	pg/g
SIB-SC-E30-1-2-07/23/2022	Sediment	7.41	N	1	2	TCDD-TEQ (ND=1/2)	31	J	pg/g
SIB-SC-E30-2-3-07/23/2022	Sediment	7.41	N	2	3	TCDD-TEQ (ND=1/2)	35	J	pg/g
SIB-SC-E30-3-4-07/23/2022	Sediment	7.41	N	3	4	TCDD-TEQ (ND=1/2)	27.8	J	pg/g
SIB-SC-E30-4-5-07/23/2022	Sediment	7.41	N	4	5	TCDD-TEQ (ND=1/2)	23	J	pg/g
SIB-SC-E30-5-6-07/23/2022	Sediment	7.41	N	5	6	TCDD-TEQ (ND=1/2)	15.6	J	pg/g
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	TCDD-TEQ (ND=1/2)	19.8	J	pg/g
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	TCDD-TEQ (ND=1/2)	11.5	J	pg/g
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	TCDD-TEQ (ND=1/2)	10.3	J	pg/g
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	TCDD-TEQ (ND=1/2)	74.2	J	pg/g
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	TCDD-TEQ (ND=1/2)	9.4	J	pg/g
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	TCDD-TEQ (ND=1/2)	57.3	J	pg/g
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	TCDD-TEQ (ND=1/2)	11.5	J	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	TCDD-TEQ (ND=1/2)	31	J	pg/g
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	TCDD-TEQ (ND=1/2)	7.8	J	pg/g
SIB-SC-F21-1-2-07/24/2022	Sediment	3.89	N	1	2	TCDD-TEQ (ND=1/2)	43.9	J	pg/g
SIB-SC-F21-2-3-07/24/2022	Sediment	3.89	N	2	3	TCDD-TEQ (ND=1/2)	11.4	J	pg/g
SIB-SC-F22-1-2-08/17/2022	Sediment	3.66	N	1	2	TCDD-TEQ (ND=1/2)	13.3	J	pg/g
SIB-SC-F22-2-3-08/17/2022	Sediment	3.66	N	2	3	TCDD-TEQ (ND=1/2)	5.8	J	pg/g
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	TCDD-TEQ (ND=1/2)	10.8	J	pg/g
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	TCDD-TEQ (ND=1/2)	0.46	J	pg/g
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	TCDD-TEQ (ND=1/2)	0.47	J	pg/g
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	TCDD-TEQ (ND=1/2)	0.35	J	pg/g
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	TCDD-TEQ (ND=1/2)	10.2	J	pg/g
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	TCDD-TEQ (ND=1/2)	3.1	J	pg/g
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	TCDD-TEQ (ND=1/2)	14	J	pg/g
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	TCDD-TEQ (ND=1/2)	12.6	J	pg/g
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	TCDD-TEQ (ND=1/2)	19.3	J	pg/g
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	TCDD-TEQ (ND=1/2)	17.4	J	pg/g
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	TCDD-TEQ (ND=1/2)	20.5	J	pg/g
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	TCDD-TEQ (ND=1/2)	5.1	J	pg/g
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	TCDD-TEQ (ND=1/2)	3.1	J	pg/g
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	TCDD-TEQ (ND=1/2)	3.4	J	pg/g
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	TCDD-TEQ (ND=1/2)	14.7	J	pg/g
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	TCDD-TEQ (ND=1/2)	11.8	J	pg/g
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	TCDD-TEQ (ND=1/2)	103	J	pg/g
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	TCDD-TEQ (ND=1/2)	15.9	J	pg/g
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	TCDD-TEQ (ND=1/2)	83.2	J	pg/g
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	TCDD-TEQ (ND=1/2)	46	J	pg/g
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	TCDD-TEQ (ND=1/2)	64	J	pg/g
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	TCDD-TEQ (ND=1/2)	1.1	J	pg/g
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	TCDD-TEQ (ND=1/2)	0.4	J	pg/g
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	TCDD-TEQ (ND=1/2)	51.8	J	pg/g
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	TCDD-TEQ (ND=1/2)	5.1	J	pg/g
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	TCDD-TEQ (ND=1/2)	1.4	J	pg/g
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	TCDD-TEQ (ND=1/2)	1.2	J	pg/g
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	TCDD-TEQ (ND=1/2)	0.42	J	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	TCDD-TEQ (ND=1/2)	0.42	J	pg/g
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	TCDD-TEQ (ND=1/2)	7.7	J	pg/g
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	TCDD-TEQ (ND=1/2)	56.7	J	pg/g
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	TCDD-TEQ (ND=1/2)	111	J	pg/g
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	TCDD-TEQ (ND=1/2)	130	J	pg/g
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	TCDD-TEQ (ND=1/2)	96.2	J	pg/g
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	TCDD-TEQ (ND=1/2)	3.6	J	pg/g
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	TCDD-TEQ (ND=1/2)	0.65	J	pg/g
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	TCDD-TEQ (ND=1/2)	0.41	J	pg/g
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	TCDD-TEQ (ND=1/2)	0.35	J	pg/g
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	TCDD-TEQ (ND=1/2)	64.5	J	pg/g
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	TCDD-TEQ (ND=1/2)	9	J	pg/g
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	TCDD-TEQ (ND=1/2)	32.1	J	pg/g
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	TCDD-TEQ (ND=1/2)	16.1	J	pg/g
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	TCDD-TEQ (ND=1/2)	19.4	J	pg/g
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	TCDD-TEQ (ND=1/2)	17.4	J	pg/g
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	TCDD-TEQ (ND=1/2)	2.1	J	pg/g
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	TCDD-TEQ (ND=1/2)	0.61	J	pg/g
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	TCDD-TEQ (ND=1/2)	19.4	J	pg/g
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	TCDD-TEQ (ND=1/2)	24.6	J	pg/g
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	TCDD-TEQ (ND=1/2)	55.9	J	pg/g
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	TCDD-TEQ (ND=1/2)	51.9	J	pg/g
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	TCDD-TEQ (ND=1/2)	48.3	J	pg/g
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	TCDD-TEQ (ND=1/2)	35.1	J	pg/g
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	TCDD-TEQ (ND=1/2)	34.2	J	pg/g
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	TCDD-TEQ (ND=1/2)	3	J	pg/g
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	TCDD-TEQ (ND=1/2)	1.1	J	pg/g
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	TCDD-TEQ (ND=1/2)	38.8	J	pg/g
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	TCDD-TEQ (ND=1/2)	1.2	J	pg/g
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	TCDD-TEQ (ND=1/2)	0.95	J	pg/g
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	TCDD-TEQ (ND=1/2)	173	J	pg/g
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	TCDD-TEQ (ND=1/2)	65.5	J	pg/g
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	TCDD-TEQ (ND=1/2)	89	J	pg/g
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	TCDD-TEQ (ND=1/2)	116	J	pg/g

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	TCDD-TEQ (ND=1/2)	47.7	J	pg/g
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	TCDD-TEQ (ND=1/2)	2	J	pg/g
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	TCDD-TEQ (ND=1/2)	24.2	J	pg/g
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	TCDD-TEQ (ND=1/2)	471	J	pg/g
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	TCDD-TEQ (ND=1/2)	32.4	J	pg/g
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	TCDD-TEQ (ND=1/2)	20	J	pg/g
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	TCDD-TEQ (ND=1/2)	39.6	J	pg/g
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	TCDD-TEQ (ND=1/2)	58.3	J	pg/g
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	TCDD-TEQ (ND=1/2)	31.7	J	pg/g
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	TCDD-TEQ (ND=1/2)	96.7	J	pg/g
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	TCDD-TEQ (ND=1/2)	12.8	J	pg/g
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	TCDD-TEQ (ND=1/2)	6.1	J	pg/g
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	TCDD-TEQ (ND=1/2)	15.2	J	pg/g
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	TCDD-TEQ (ND=1/2)	3.4	J	pg/g
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	TCDD-TEQ (ND=1/2)	22.9	J	pg/g
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	TCDD-TEQ (ND=1/2)	7.1	J	pg/g
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	TCDD-TEQ (ND=1/2)	24.4	J	pg/g
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	TCDD-TEQ (ND=1/2)	12.8	J	pg/g
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	TCDD-TEQ (ND=1/2)	10.9	J	pg/g
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	TCDD-TEQ (ND=1/2)	0.55	J	pg/g
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	TCDD-TEQ (ND=1/2)	6.5	J	pg/g
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	TCDD-TEQ (ND=1/2)	0.45	J	pg/g
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	TCDD-TEQ (ND=1/2)	0.44	J	pg/g
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	TCDD-TEQ (ND=1/2)	0.35	J	pg/g
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	TCDD-TEQ (ND=1/2)	14.3	J	pg/g
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	TCDD-TEQ (ND=1/2)	39.2	J	pg/g
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	TCDD-TEQ (ND=1/2)	4.1	J	pg/g
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	TCDD-TEQ (ND=1/2)	1.5	J	pg/g
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	TCDD-TEQ (ND=1/2)	0.64	J	pg/g
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	TCDD-TEQ (ND=1/2)	4.8	J	pg/g
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	TCDD-TEQ (ND=1/2)	6.4	J	pg/g
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	TCDD-TEQ (ND=1/2)	9.3	J	pg/g
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	TCDD-TEQ (ND=1/2)	1.1	J	pg/g
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	TCDD-TEQ (ND=1/2)	1.4	J	pg/g

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	TCDD-TEQ (ND=1/2)	0.57	J	pg/g
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	TCDD-TEQ (ND=1/2)	0.65	J	pg/g
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	TCDD-TEQ (ND=1/2)	0.44	J	pg/g
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	TCDD-TEQ (ND=1/2)	5.8	J	pg/g
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	TCDD-TEQ (ND=1/2)	3.9	J	pg/g
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	TCDD-TEQ (ND=1/2)	3.6	J	pg/g
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	TCDD-TEQ (ND=1/2)	0.26	J	pg/g
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	TCDD-TEQ (ND=1/2)	0.44	J	pg/g
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	TCDD-TEQ (ND=1/2)	1.2	J	pg/g
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	TCDD-TEQ (ND=1/2)	1.2	J	pg/g
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	TCDD-TEQ (ND=1/2)	2.6	J	pg/g
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	TCDD-TEQ (ND=1/2)	2.6	J	pg/g
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	TCDD-TEQ (ND=1/2)	3.4	J	pg/g
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	TCDD-TEQ (ND=1/2)	4.5	J	pg/g
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	TCDD-TEQ (ND=1/2)	6.6	J	pg/g
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	TCDD-TEQ (ND=1/2)	13.4	J	pg/g
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	TCDD-TEQ (ND=1/2)	3.7	J	pg/g
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	TCDD-TEQ (ND=1/2)	0.38	J	pg/g
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	TCDD-TEQ (ND=1/2)	4.7	J	pg/g
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	TCDD-TEQ (ND=1/2)	9.6	J	pg/g
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	TCDD-TEQ (ND=1/2)	17.7	J	pg/g
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	TCDD-TEQ (ND=1/2)	15.2	J	pg/g
T1-0TO30-101518	Sediment	5.81	N	0	1	TCDD-TEQ (ND=1/2)	0.000139478	JT	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	TCDD-TEQ (ND=1/2)	0.012527	JT	µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	TCDD-TEQ (ND=1/2)	0.01328195	JT	µg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	TCDD-TEQ (ND=1/2)	0.026238	JT	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	TCDD-TEQ (ND=1/2)	2.4	J	pg/g
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	TCDD-TEQ (ND=1/2)	1.3	J	pg/g
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	TCDD-TEQ (ND=1/2)	3.5	J	pg/g
LW2-C364-B	Sediment	12.48	N	1	2.5	Total Chlordanes	3	NJT	µg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Total Chlordanes	0.26	UT	µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Total Chlordanes	0.83	JNT	µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Total Chlordanes	2.8	NJT	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Total Chlordanes	0.0507	UT	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-C396-C	Sediment	13.44	N	5	9.1	Total Chlordanes	0.0545	UT	µg/kg
LW2-C421-A	Sediment	4.45	N	0	1	Total Chlordanes	7	T	µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Total Chlordanes	12	T	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Total Chlordanes	0.58	NJT	µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Total Chlordanes	0.14	JT	µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Total Chlordanes	0.205	UJT	µg/kg
LW2-G382	Sediment	2.65	N	0	1	Total Chlordanes	0.855	NJT	µg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Total Chlordanes	0.972	NJT	µg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Total Chlordanes	0.349	JT	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Total Chlordanes	6.11	JNT	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Total Chlordanes	26	JNT	µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Total Chlordanes	7.3	UJT	µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Total Chlordanes	0.0518	UT	µg/kg
LW2-G398	Sediment	8.99	N	0	1	Total Chlordanes	0.204	UT	µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Total Chlordanes	0.802	JT	µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Total Chlordanes	3.03	NJT	µg/kg
LW2-G416	Sediment	5.63	N	0	1	Total Chlordanes	0.602	JT	µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Total Chlordanes	5.85	JT	µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Total Chlordanes	1.4	JT	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Total Chlordanes	0.75	JT	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Total Chlordanes	0.728	JT	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Total Chlordanes	0.435	JT	µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Total Chlordanes	0.96	NJT	µg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Total Chlordanes	2.5	T	µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Total Chlordanes	390	JT	µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Total Chlordanes	380	NJT	µg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Total Chlordanes	7.7	JNT	µg/kg
LW3-G706	Sediment	9.49	N	0	1	Total Chlordanes	1	T	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Total Chlordanes	0.21	JT	µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Total Chlordanes	0.39	UT	µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	Total Chlordanes	2.3	NJT	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Total Chlordanes	2.5	JNT	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Total Chlordanes	3.12	JNT	µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Total Chlordanes	13	T	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Total Chlordanes	8	T	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Total Chlordanes	6	JT	µg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Total Chlordanes	3	UJT	µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Total Chlordanes	3	UJT	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Total Chlordanes	6	T	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Total Chlordanes	0.61	U	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Total Chlordanes	0.48	U	µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Total Chlordanes	0.66	U	µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Total Chlordanes	0.67	U	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Total Chlordanes	0.69	U	µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Total Chlordanes	0.72	U	µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Total Chlordanes	0.71	U	µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Total Chlordanes	0.76	U	µg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Total Chlordanes	0.68	U	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Total Chlordanes	0.69	U	µg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Total Chlordanes	1.5	J	µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Total Chlordanes	4.1	J	µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Total Chlordanes	0.72	U	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Total Chlordanes	0.62	U	µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Total Chlordanes	1.6	J	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Total Chlordanes	3.3	J	µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Total Chlordanes	1.6	J	µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Total Chlordanes	0.53	U	µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Total Chlordanes	0.65	U	µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Total Chlordanes	1.4	J	µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Total Chlordanes	0.55	U	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Total Chlordanes	0.48	U	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Total Chlordanes	0.52	U	µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Total Chlordanes	0.56	U	µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Total Chlordanes	1	J	µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Total Chlordanes	11.1	J	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Total Chlordanes	0.61	U	µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Total Chlordanes	0.65	U	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Total Chlordanes	0.53	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Total Chlordanes	15.8		µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Total Chlordanes	0.62	U	µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Total Chlordanes	3.6	J	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Total Chlordanes	0.79	UJ	µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Total Chlordanes	10.2	J	µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Total Chlordanes	0.87	U	µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Total Chlordanes	0.92	U	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Total Chlordanes	1.3	U	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Total Chlordanes	0.65	U	µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Total Chlordanes	0.83	U	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Total Chlordanes	0.82	U	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Total Chlordanes	0.6	U	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Total Chlordanes	0.64	U	µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Total Chlordanes	0.61	U	µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Total Chlordanes	0.67	U	µg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Total Chlordanes	0.72	U	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Total Chlordanes	0.68	U	µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Total Chlordanes	0.64	U	µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Total Chlordanes	0.68	U	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Total Chlordanes	0.7	U	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Total Chlordanes	0.61	U	µg/kg
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	Total Chlordanes	0.54	U	µg/kg
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	Total Chlordanes	0.54	U	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Total Chlordanes	0.75	U	µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Total Chlordanes	0.6	U	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Total Chlordanes	0.8	U	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Total Chlordanes	0.62	U	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Total Chlordanes	0.74	U	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Total Chlordanes	1.3	J	µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Total Chlordanes	0.57	UJ	µg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Total Chlordanes	0.65	UJ	µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Total Chlordanes	0.5	UJ	µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Total Chlordanes	1	J	µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Total Chlordanes	0.75	UJ	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Total Chlordanes	0.55	U	µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Total Chlordanes	0.57	U	µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Total Chlordanes	0.51	U	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Total Chlordanes	0.85	U	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Total Chlordanes	0.75	U	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Total Chlordanes	0.65	U	µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Total Chlordanes	0.73	U	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Total Chlordanes	0.89	UJ	µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Total Chlordanes	0.94	UJ	µg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Total Chlordanes	0.91	UJ	µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Total Chlordanes	0.89	UJ	µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Total Chlordanes	0.9	UJ	µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Total Chlordanes	0.85	U	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Total Chlordanes	0.9	U	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Total Chlordanes	2.4	J	µg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Total Chlordanes	0.81	U	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Total Chlordanes	0.83	U	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Total Chlordanes	0.69	U	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Total Chlordanes	0.86	U	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Total Chlordanes	0.91	U	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Total Chlordanes	1.1	U	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Total Chlordanes	0.95	U	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Total Chlordanes	0.95	U	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Total Chlordanes	0.74	U	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Total Chlordanes	0.92	U	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Total Chlordanes	0.85	U	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Total Chlordanes	0.89	U	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Total Chlordanes	0.89	U	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Total Chlordanes	1.1	U	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Total Chlordanes	0.73	U	µg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Total Chlordanes	0.71	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Total Chlordanes	0.71	U	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Total Chlordanes	0.73	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Total Chlordanes	0.9	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Total Chlordanes	0.76	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Total Chlordanes	0.72	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Total Chlordanes	0.77	U	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Total Chlordanes	0.82	U	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Total Chlordanes	0.75	U	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Total Chlordanes	0.68	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Total Chlordanes	0.7	U	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Total Chlordanes	0.83	U	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Total Chlordanes	0.91	U	µg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Total Chlordanes	0.81	U	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Total Chlordanes	0.86	U	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Total Chlordanes	0.76	U	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Total Chlordanes	0.84	U	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Total Chlordanes	0.72	U	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Total Chlordanes	0.67	U	µg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Total Chlordanes	0.94	UJ	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Total Chlordanes	1.1	UJ	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Total Chlordanes	1.1	UJ	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Total Chlordanes	3.8	J	µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Total Chlordanes	0.8	U	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Total Chlordanes	12.4		µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Total Chlordanes	0.93	U	µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Total Chlordanes	2	J	µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Total Chlordanes	0.75	U	µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Total Chlordanes	0.81	U	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Total Chlordanes	1.1	U	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Total Chlordanes	0.94	U	µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Total Chlordanes	0.76	U	µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Total Chlordanes	0.77	U	µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Total Chlordanes	1.1	U	µg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Total Chlordanes	1.1	U	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Total Chlordanes	0.98	U	µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Total Chlordanes	1.4	J	µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Total Chlordanes	0.79	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Total Chlordanes	1.1	U	µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Total Chlordanes	1.4	U	µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Total Chlordanes	0.96	U	µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Total Chlordanes	0.88	U	µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Total Chlordanes	1.2	U	µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Total Chlordanes	1.2	U	µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Total Chlordanes	1.5	U	µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Total Chlordanes	1.3	U	µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Total Chlordanes	1.3	U	µg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Total Chlordanes	2	J	µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Total Chlordanes	1.5	U	µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Total Chlordanes	2.1	J	µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Total Chlordanes	1.6	J	µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Total Chlordanes	0.87	U	µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Total Chlordanes	1.2	U	µg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Total Chlordanes	0.98	U	µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Total Chlordanes	1.8	J	µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Total Chlordanes	1.6	J	µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Total Chlordanes	1.2	U	µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Total Chlordanes	1.4	U	µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Total Chlordanes	1.1	U	µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Total Chlordanes	1.3	U	µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Total Chlordanes	2.1	J	µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Total Chlordanes	1.3	U	µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Total Chlordanes	1.3	U	µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Total Chlordanes	1.2	U	µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Total Chlordanes	2.6	J	µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Total Chlordanes	1.2	U	µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Total Chlordanes	1.2	U	µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Total Chlordanes	1.2	U	µg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Total Chlordanes	1.3	U	µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Total Chlordanes	1.2	U	µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Total Chlordanes	1.9	J	µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Total Chlordanes	0.89	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Total Chlordanes	0.83	U	µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Total Chlordanes	2.3	J	µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Total Chlordanes	1.4	U	µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Total Chlordanes	1.2	U	µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Total Chlordanes	1.3	U	µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Total Chlordanes	1.3	U	µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Total Chlordanes	2.4	J	µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Total Chlordanes	1.5	U	µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Total Chlordanes	1.3	U	µg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Total Chlordanes	1.4	U	µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Total Chlordanes	1.3	U	µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Total Chlordanes	1.1	U	µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Total Chlordanes	1.1	U	µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Total Chlordanes	1.1	U	µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Total Chlordanes	0.91	U	µg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Total Chlordanes	1.1	U	µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Total Chlordanes	0.84	U	µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Total Chlordanes	0.86	U	µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Total Chlordanes	0.61	U	µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Total Chlordanes	1.2	U	µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Total Chlordanes	1	U	µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Total Chlordanes	0.76	U	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Total Chlordanes	0.65	U	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Total Chlordanes	0.81	U	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Total Chlordanes	1.2	U	µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Total Chlordanes	2.2	J	µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Total Chlordanes	1.2	U	µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Total Chlordanes	0.98	U	µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Total Chlordanes	0.7	U	µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Total Chlordanes	1.5	U	µg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Total Chlordanes	1.1	U	µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Total Chlordanes	0.93	U	µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Total Chlordanes	1.4	J	µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Total Chlordanes	0.95	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Total Chlordanes	1.3	U	µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Total Chlordanes	0.88	U	µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Total Chlordanes	0.89	U	µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Total Chlordanes	1.9	J	µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Total Chlordanes	2.1	J	µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Total Chlordanes	3.3	J	µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Total Chlordanes	1.3	U	µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Total Chlordanes	1.2	U	µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Total Chlordanes	1.3	U	µg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Total Chlordanes	1.5	U	µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Total Chlordanes	1.4	U	µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Total Chlordanes	0.79	U	µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Total Chlordanes	0.83	U	µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Total Chlordanes	0.97	U	µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Total Chlordanes	0.88	U	µg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Total Chlordanes	0.86	U	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Total Chlordanes	0.76	U	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Total Chlordanes	0.56	U	µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Total Chlordanes	0.59	U	µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Total Chlordanes	1.7	J	µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Total Chlordanes	1.2	U	µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Total Chlordanes	2.1	J	µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Total Chlordanes	1.4	J	µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Total Chlordanes	1.6	J	µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Total Chlordanes	0.8	U	µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Total Chlordanes	0.82	U	µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Total Chlordanes	1	U	µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Total Chlordanes	0.87	UJ	µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Total Chlordanes	1	U	µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Total Chlordanes	1.1	UJ	µg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Total Chlordanes	0.86	UJ	µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Total Chlordanes	0.7	UJ	µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Total Chlordanes	1.1	U	µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Total Chlordanes	1.4	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Total Chlordanes	0.81	U	µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Total Chlordanes	1.2	U	µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Total Chlordanes	0.69	U	µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Total Chlordanes	0.85	U	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Total Chlordanes	0.76	U	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Total Chlordanes	1.2	U	µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Total Chlordanes	0.77	U	µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Total Chlordanes	0.88	U	µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Total Chlordanes	0.62	U	µg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Total Chlordanes	0.8	U	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Total Chlordanes	0.72	U	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Total Chlordanes	1.4	U	µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Total Chlordanes	0.99	U	µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Total Chlordanes	1.4	U	µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Total Chlordanes	1.3	U	µg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Total Chlordanes	1.7	J	µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Total Chlordanes	0.66	U	µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Total Chlordanes	0.84	U	µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Total Chlordanes	0.9	U	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Total Chlordanes	0.79	U	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Total Chlordanes	1.3	U	µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Total Chlordanes	1	U	µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Total Chlordanes	1.1	U	µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Total Chlordanes	1.3	U	µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Total Chlordanes	1.1	U	µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Total Chlordanes	0.92	U	µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Total Chlordanes	0.73	U	µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Total Chlordanes	0.65	U	µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Total Chlordanes	1.3	U	µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Total Chlordanes	1.1	U	µg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Total Chlordanes	1.2	U	µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Total Chlordanes	1.1	U	µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Total Chlordanes	1.8	J	µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Total Chlordanes	1.1	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Total Chlordanes	0.95	U	µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Total Chlordanes	0.65	U	µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Total Chlordanes	0.88	U	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Total Chlordanes	1.2	U	µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Total Chlordanes	0.84	U	µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Total Chlordanes	0.68	U	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Total Chlordanes	1.2	U	µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Total Chlordanes	1.2	U	µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Total Chlordanes	2.2	J	µg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Total Chlordanes	3.8	J	µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Total Chlordanes	6.2	J	µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Total Chlordanes	0.7	U	µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Total Chlordanes	2.4	J	µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Total Chlordanes	4.1	J	µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Total Chlordanes	3	J	µg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Total Chlordanes	1.4	U	µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Total Chlordanes	1.3	U	µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Total Chlordanes	1.3	U	µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Total Chlordanes	3.2	J	µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Total Chlordanes	3	J	µg/kg
SIB-SC-J06-8-9-07/26/2022	Sediment	16.33	N	8	9	Total Chlordanes	3.3	J	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Total Chlordanes	1.3	U	µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Total Chlordanes	1.2	U	µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Total Chlordanes	1.4	U	µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Total Chlordanes	1.2	U	µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Total Chlordanes	1	U	µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Total Chlordanes	1.3	U	µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Total Chlordanes	1.2	U	µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Total Chlordanes	2	J	µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Total Chlordanes	0.7	U	µg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Total Chlordanes	0.76	U	µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Total Chlordanes	0.78	U	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Total Chlordanes	0.7	U	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Total Chlordanes	0.83	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Total Chlordanes	0.6	U	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Total Chlordanes	1.3	U	µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Total Chlordanes	1	U	µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Total Chlordanes	0.7	U	µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Total Chlordanes	0.77	U	µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Total Chlordanes	0.65	U	µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Total Chlordanes	1.1	U	µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Total Chlordanes	1.1	U	µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Total Chlordanes	1	U	µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Total Chlordanes	0.76	U	µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Total Chlordanes	0.82	U	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Total Chlordanes	0.63	U	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Total Chlordanes	2.5	J	µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Total Chlordanes	2.5	J	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Total Chlordanes	0.96	U	µg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Total Chlordanes	1.3	U	µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Total Chlordanes	0.99	UJ	µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Total Chlordanes	0.78	UJ	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Total Chlordanes	0.8	UJ	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Total Chlordanes	5.8	J	µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Total Chlordanes	0.96	U	µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Total Chlordanes	0.92	U	µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Total Chlordanes	1.1	U	µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Total Chlordanes	0.89	U	µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Total Chlordanes	0.91	U	µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Total Chlordanes	1.1	U	µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Total Chlordanes	1.2	U	µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Total Chlordanes	5.8	J	µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Total Chlordanes	0.71	U	µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Total Chlordanes	1.1	U	µg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Total Chlordanes	1	U	µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Total Chlordanes	1.6	U	µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Total Chlordanes	1.1	U	µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Total Chlordanes	12.5	JT	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Total Chlordanes	5.15	UT	µg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Total Chlordanes	13	JT	µg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Total Chlordanes	4.9	UT	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Total Chlordanes	5.12	UT	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Total Chlordanes	5.9	UT	µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Total Chlordanes	4.97	UT	µg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Total Chlordanes	2.53	UT	µg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Total Chlordanes	2.7	UT	µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Total Chlordanes	0.1	UT	µg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Total Chlordanes	0.11	UT	µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Total Chlordanes	0.31	JT	µg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Total Chlordanes	0.24	UT	µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Total Chlordanes	0.18	JT	µg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Total Chlordanes	1.5	UJT	µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Total Chlordanes	0.98	UT	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Total Chlordanes	0.6	U	µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Total Chlordanes	0.56	U	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Total Chlordanes	0.57	U	µg/kg
514-0TO29-101618	Sediment	3.32	N	0	1	Total cPAHs	150.19	T	µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Total cPAHs	0.05777	JT	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Total cPAHs	33.062	JT	µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Total cPAHs	27.543	JT	µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Total cPAHs	168.97	T	µg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Total cPAHs	162.35	JT	µg/kg
B-9.00-0TO29-102418	Sediment	3.03	N	0	1	Total cPAHs	165.845	T	µg/kg
C-8.94-0TO27-102418	Sediment	6.38	N	0	0.9	Total cPAHs	184.78	T	µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Total cPAHs	133.82	JT	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Total cPAHs	188.89	T	µg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Total cPAHs	129.61	JT	µg/kg
D-8.83-0TO25-102418	Sediment	2.42	N	0	0.8	Total cPAHs	215.09	T	µg/kg
D-8.90-0TO27-102418	Sediment	5.15	N	0	0.9	Total cPAHs	223.05	T	µg/kg
D-8.90-SC-00TO10-102318	Sediment	5.11	N	0	1	Total cPAHs	96.84	T	µg/kg
D-8.90-SC-10TO20-102318	Sediment	5.11	N	1	2	Total cPAHs	261.77	T	µg/kg
D-8.90-SC-20TO40-102318	Sediment	5.11	N	2	4	Total cPAHs	154.75	T	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
E-8.99-0TO28-102418	Sediment	6.32	N	0	0.9	Total cPAHs	171.86	T	µg/kg
E-9.02-0TO26-102418	Sediment	2.84	N	0	0.9	Total cPAHs	176.56	JT	µg/kg
E-9.02-SC-00TO10-102318	Sediment	6.38	N	0	1	Total cPAHs	64.51	T	µg/kg
E-9.02-SC-10TO20-102318	Sediment	6.38	N	1	2	Total cPAHs	99.94	T	µg/kg
E-9.02-SC-20TO40-102318	Sediment	6.38	N	2	4	Total cPAHs	1638.3	T	µg/kg
E-9.02-SC-40TO60-102318	Sediment	6.38	N	4	6	Total cPAHs	122.17	T	µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Total cPAHs	242.01	T	µg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Total cPAHs	54.356	JT	µg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	Total cPAHs	470.81	T	µg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Total cPAHs	97.52	JT	µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Total cPAHs	393.76	JT	µg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	Total cPAHs	195.72	T	µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Total cPAHs	164.14	JT	µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Total cPAHs	510.1	T	µg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	Total cPAHs	71.986	T	µg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	Total cPAHs	12.78365	T	µg/kg
J3-SC1B-20TO30-82719	Sediment	5.73	N	2	3	Total cPAHs	90.735	T	µg/kg
J3-SC1B-30TO40-82719	Sediment	5.73	N	3	4	Total cPAHs	162.02	T	µg/kg
J3-SC1B-40TO50-82719	Sediment	5.73	N	4	5	Total cPAHs	55.78	T	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Total cPAHs	246.85	T	µg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	Total cPAHs	155.32115	JT	µg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	Total cPAHs	74.744	T	µg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	Total cPAHs	576.49	T	µg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	Total cPAHs	182.92	T	µg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	Total cPAHs	324.48	T	µg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Total cPAHs	20.273	T	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Total cPAHs	117.98	T	µg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	Total cPAHs	46.909	T	µg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	Total cPAHs	14.207	T	µg/kg
L3-SC1B-20TO30-82619	Sediment	7.22	N	2	3	Total cPAHs	21.978	T	µg/kg
L3-SC1B-30TO40-82619	Sediment	7.22	N	3	4	Total cPAHs	13.1498	T	µg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	Total cPAHs	19.437	T	µg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	Total cPAHs	241.03	T	µg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Total cPAHs	220	T	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-C364-C	Sediment	12.48	N	2.5	6	Total cPAHs	650	T	µg/kg
LW2-C364-D	Sediment	12.48	N	6	7.4	Total cPAHs	190	T	µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Total cPAHs	38	T	µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Total cPAHs	2800	T	µg/kg
LW2-C388-B	Sediment	6.46	N	1	5.1	Total cPAHs	0.39	UT	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Total cPAHs	1.2	JT	µg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Total cPAHs	0.4	UT	µg/kg
LW2-C402-B	Sediment	5.83	N	1	2.1	Total cPAHs	99	T	µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Total cPAHs	380	T	µg/kg
LW2-C421-C	Sediment	4.45	N	2	4	Total cPAHs	82	T	µg/kg
LW2-C426-A	Sediment	6.87	N	0	1	Total cPAHs	53	T	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Total cPAHs	63	T	µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Total cPAHs	110	T	µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Total cPAHs	620	T	µg/kg
LW2-G382	Sediment	2.65	N	0	1	Total cPAHs	260	T	µg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Total cPAHs	62	T	µg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Total cPAHs	48	T	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Total cPAHs	77	T	µg/kg
LW2-G388	Sediment	7.36	N	0	0.9	Total cPAHs	36	T	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Total cPAHs	1700	T	µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Total cPAHs	2000	T	µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Total cPAHs	3	JT	µg/kg
LW2-G398	Sediment	8.99	N	0	1	Total cPAHs	37	T	µg/kg
LW2-G402	Sediment	4.06	N	0	1	Total cPAHs	290	T	µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Total cPAHs	130	T	µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Total cPAHs	1200	T	µg/kg
LW2-G416	Sediment	5.63	N	0	1	Total cPAHs	310	T	µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Total cPAHs	18	JT	µg/kg
LW2-G421	Sediment	4.56	N	0	1	Total cPAHs	650	T	µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Total cPAHs	23	T	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Total cPAHs	27	JT	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Total cPAHs	120	T	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Total cPAHs	260	T	µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Total cPAHs	20	JT	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW3-C706-C	Sediment	9.39	N	5	8.3	Total cPAHs	44	T	µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Total cPAHs	4800	T	µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Total cPAHs	5000	T	µg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Total cPAHs	180	T	µg/kg
LW3-G706	Sediment	9.49	N	0	1	Total cPAHs	27	JT	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Total cPAHs	440	JT	µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Total cPAHs	22	JT	µg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	Total cPAHs	3.4714	T	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Total cPAHs	134.72	T	µg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Total cPAHs	303.25	T	µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	Total cPAHs	77	T	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Total cPAHs	41	T	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Total cPAHs	50	T	µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Total cPAHs	27.298	JT	µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Total cPAHs	145.36	T	µg/kg
PSYD&M97DM16DM16	Sediment	0.66	N	0	0.3	Total cPAHs	290	T	µg/kg
PSYD&M97DM20DM20C	Sediment	10.29	N	3.5	4.5	Total cPAHs	240	T	µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Total cPAHs	540	T	µg/kg
PSYSEA98PSY05PSY05S	Sediment	7.29	N	0	0.3	Total cPAHs	180	T	µg/kg
PSYSEA98PSY06PSY06S	Sediment	14.49	N	0	0.3	Total cPAHs	25	T	µg/kg
PSYSEA98PSY07PSY07S	Sediment	1.44	N	0	0.3	Total cPAHs	170	T	µg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Total cPAHs	940	T	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Total cPAHs	570	T	µg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Total cPAHs	320	T	µg/kg
PSYSEA98PSY10PSY10S	Sediment	1.89	N	0	0.3	Total cPAHs	270	T	µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Total cPAHs	2120	T	µg/kg
PSYSEA98PSY14PSY14S	Sediment	2.71	N	0	0.3	Total cPAHs	170	T	µg/kg
PSYSEA98PSY17PSY17S	Sediment	3.87	N	0	0.3	Total cPAHs	170	T	µg/kg
PSYSEA98PSY18CPSY18A	Sediment	6.14	N	0	4	Total cPAHs	380	T	µg/kg
PSYSEA98PSY18PSY18S	Sediment	5.56	N	0	0.3	Total cPAHs	470	T	µg/kg
PSYSEA98PSY20PSY20S	Sediment	0.48	N	0	0.3	Total cPAHs	190	T	µg/kg
PSYSEA98PSY21PSY21S	Sediment	0.83	N	0	0.3	Total cPAHs	290	T	µg/kg
PSYSEA98PSY23CPSY23A	Sediment	9.68	N	0	4	Total cPAHs	570	T	µg/kg
PSYSEA98PSY23CPSY23B	Sediment	9.68	N	4	8	Total cPAHs	10	UT	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYSEA98PSY23PSY23S	Sediment	10.52	N	0	0.3	Total cPAHs	100	T	µg/kg
PSYSEA98PSY25PSY25S	Sediment	4.12	N	0	0.3	Total cPAHs	68	T	µg/kg
PSYSEA98PSY26PSY26S	Sediment	0.44	N	0	0.3	Total cPAHs	680	T	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Total cPAHs	490	T	µg/kg
PSYSEA98PSY28PSY28S	Sediment	0.33	N	0	0.3	Total cPAHs	24	T	µg/kg
PSYSEA98PSY30PSY30S	Sediment	9.69	N	0	0.3	Total cPAHs	180	T	µg/kg
PSYSEA98PSY33PSY33S	Sediment	0.80	N	0	0.3	Total cPAHs	47	T	µg/kg
PSYSEA98PSY43PSY43S	Sediment	0.82	N	0	0.3	Total cPAHs	33	T	µg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Total cPAHs	12.2687	JT	µg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Total cPAHs	8.0943	JT	µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Total cPAHs	48.102	T	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Total cPAHs	39.6	J	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Total cPAHs	55.6		µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Total cPAHs	189		µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Total cPAHs	6.4	J	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Total cPAHs	131		µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Total cPAHs	46.8	J	µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Total cPAHs	22.9	J	µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Total cPAHs	83.4		µg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Total cPAHs	24.8	J	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Total cPAHs	108		µg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Total cPAHs	848		µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Total cPAHs	360		µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Total cPAHs	1650	J	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Total cPAHs	162		µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Total cPAHs	501	J	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Total cPAHs	233		µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Total cPAHs	21600		µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Total cPAHs	81.2		µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Total cPAHs	197		µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Total cPAHs	58.4		µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Total cPAHs	33.1	J	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Total cPAHs	26.5	J	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Total cPAHs	982		µg/kg

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Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Total cPAHs	162		µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Total cPAHs	85.8		µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Total cPAHs	67.5		µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Total cPAHs	34.3		µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Total cPAHs	7.2	J	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Total cPAHs	58.3	J	µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Total cPAHs	285	J	µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Total cPAHs	14.7	J	µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Total cPAHs	7.4	J	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Total cPAHs	57.3	J	µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Total cPAHs	231	J	µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Total cPAHs	5.5	J	µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Total cPAHs	0.65	J	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Total cPAHs	0.72	UJ	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Total cPAHs	76.1	J	µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Total cPAHs	36	J	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Total cPAHs	3.8	J	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Total cPAHs	20.5	J	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Total cPAHs	53.1	J	µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Total cPAHs	13.8	J	µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Total cPAHs	84.1		µg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Total cPAHs	6.9	J	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Total cPAHs	7.8	J	µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Total cPAHs	204	J	µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Total cPAHs	16.9	J	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Total cPAHs	8.9	J	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Total cPAHs	39.7	J	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Total cPAHs	23	J	µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Total cPAHs	7.9	J	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Total cPAHs	151	J	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Total cPAHs	0.73	J	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Total cPAHs	15.5	J	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Total cPAHs	19.2	J	µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Total cPAHs	22.3	J	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Total cPAHs	35.9	J	µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Total cPAHs	2480		µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Total cPAHs	50500		µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Total cPAHs	5.9	J	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Total cPAHs	63.3		µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Total cPAHs	272		µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Total cPAHs	4.3	J	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Total cPAHs	39.9	J	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Total cPAHs	5.7	J	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Total cPAHs	55.3		µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Total cPAHs	4.8	J	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Total cPAHs	239		µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Total cPAHs	86	J	µg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Total cPAHs	113	J	µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Total cPAHs	131	J	µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Total cPAHs	99.1	J	µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Total cPAHs	1.7	J	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Total cPAHs	4.5	J	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Total cPAHs	3.9	J	µg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Total cPAHs	3.7	J	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Total cPAHs	3.9	J	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Total cPAHs	4.4	J	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Total cPAHs	0.61	J	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Total cPAHs	0.68	J	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Total cPAHs	0.64	J	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Total cPAHs	0.65	J	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Total cPAHs	0.6	J	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Total cPAHs	5.9	J	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Total cPAHs	3.8	J	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Total cPAHs	0.57	J	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Total cPAHs	0.6	J	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Total cPAHs	0.66	J	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Total cPAHs	0.5	J	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Total cPAHs	0.51	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Total cPAHs	0.53	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Total cPAHs	0.58	J	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Total cPAHs	0.56	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Total cPAHs	0.51	U	µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Total cPAHs	0.54	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Total cPAHs	0.55	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Total cPAHs	0.6	J	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Total cPAHs	332	J	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Total cPAHs	3.4	J	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Total cPAHs	0.55	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Total cPAHs	0.53	U	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Total cPAHs	0.52	J	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Total cPAHs	0.63	J	µg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Total cPAHs	0.65	J	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Total cPAHs	0.63	J	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Total cPAHs	0.55	J	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Total cPAHs	0.55	J	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Total cPAHs	0.56	J	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Total cPAHs	0.55	J	µg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Total cPAHs	1.5	J	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Total cPAHs	0.62	J	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Total cPAHs	0.64	J	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Total cPAHs	0.63	UJ	µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Total cPAHs	0.63	J	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Total cPAHs	345		µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Total cPAHs	13	J	µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Total cPAHs	112	J	µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Total cPAHs	62.7	J	µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Total cPAHs	32.1	J	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Total cPAHs	29.3	J	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Total cPAHs	110	J	µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Total cPAHs	115		µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Total cPAHs	198		µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Total cPAHs	84.5	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Total cPAHs	51.7	J	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Total cPAHs	121	J	µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Total cPAHs	173		µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Total cPAHs	276		µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Total cPAHs	129	J	µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Total cPAHs	234		µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Total cPAHs	175		µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Total cPAHs	159		µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Total cPAHs	290		µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Total cPAHs	242		µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Total cPAHs	152		µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Total cPAHs	187		µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Total cPAHs	265		µg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Total cPAHs	418		µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Total cPAHs	364		µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Total cPAHs	423		µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Total cPAHs	366		µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Total cPAHs	158		µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Total cPAHs	266	J	µg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Total cPAHs	118	J	µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Total cPAHs	231		µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Total cPAHs	118	J	µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Total cPAHs	425		µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Total cPAHs	611		µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Total cPAHs	219		µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Total cPAHs	193		µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Total cPAHs	79.9	J	µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Total cPAHs	131		µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Total cPAHs	184		µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Total cPAHs	384		µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Total cPAHs	261		µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Total cPAHs	99.8	J	µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Total cPAHs	87.3	J	µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Total cPAHs	97.8	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Total cPAHs	272		µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Total cPAHs	148	J	µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Total cPAHs	214	J	µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Total cPAHs	275	J	µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Total cPAHs	228		µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Total cPAHs	438		µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Total cPAHs	156		µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Total cPAHs	394		µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Total cPAHs	206		µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Total cPAHs	191		µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Total cPAHs	169		µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Total cPAHs	168		µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Total cPAHs	348		µg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Total cPAHs	179		µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Total cPAHs	95	J	µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Total cPAHs	182		µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Total cPAHs	294		µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Total cPAHs	203		µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Total cPAHs	943		µg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Total cPAHs	208		µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Total cPAHs	92.8		µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Total cPAHs	465		µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Total cPAHs	176		µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Total cPAHs	137		µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Total cPAHs	129	J	µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Total cPAHs	62.7	J	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Total cPAHs	3.1	J	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Total cPAHs	0.54	J	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Total cPAHs	125	J	µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Total cPAHs	193	J	µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Total cPAHs	139	J	µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Total cPAHs	135	J	µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Total cPAHs	99	J	µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Total cPAHs	67.7	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Total cPAHs	93.4	J	µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Total cPAHs	225		µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Total cPAHs	108	J	µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Total cPAHs	60.6	J	µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Total cPAHs	150	J	µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Total cPAHs	162		µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Total cPAHs	127		µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Total cPAHs	230		µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Total cPAHs	286		µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Total cPAHs	267		µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Total cPAHs	250		µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Total cPAHs	337	J	µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Total cPAHs	555		µg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Total cPAHs	197		µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Total cPAHs	259		µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Total cPAHs	100		µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Total cPAHs	33.7	J	µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Total cPAHs	105		µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Total cPAHs	15.8	J	µg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Total cPAHs	0.51	U	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Total cPAHs	0.5	U	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Total cPAHs	74.3		µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Total cPAHs	176		µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Total cPAHs	1120		µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Total cPAHs	439		µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Total cPAHs	140		µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Total cPAHs	211		µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Total cPAHs	226		µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Total cPAHs	145		µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Total cPAHs	383		µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Total cPAHs	159		µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Total cPAHs	227		µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Total cPAHs	195	J	µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Total cPAHs	366		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Total cPAHs	134	J	µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Total cPAHs	112	J	µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Total cPAHs	6480		µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Total cPAHs	449		µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Total cPAHs	3380		µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Total cPAHs	2580		µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Total cPAHs	199		µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Total cPAHs	35.9	J	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Total cPAHs	0.48	U	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Total cPAHs	2480		µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Total cPAHs	771		µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Total cPAHs	29.4	J	µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Total cPAHs	23	J	µg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Total cPAHs	42.3	J	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Total cPAHs	0.48	J	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Total cPAHs	3520		µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Total cPAHs	3310		µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Total cPAHs	4180		µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Total cPAHs	4980		µg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Total cPAHs	3580		µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Total cPAHs	238		µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Total cPAHs	57.2	J	µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Total cPAHs	1.3	J	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Total cPAHs	1.9	J	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Total cPAHs	2920		µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Total cPAHs	1170		µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Total cPAHs	2630		µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Total cPAHs	2500		µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Total cPAHs	3600		µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Total cPAHs	624		µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Total cPAHs	34.5	J	µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Total cPAHs	24.7	J	µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Total cPAHs	561		µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Total cPAHs	218		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Total cPAHs	2890		µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Total cPAHs	2760		µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Total cPAHs	3210		µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Total cPAHs	2660		µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Total cPAHs	2850		µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Total cPAHs	198		µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Total cPAHs	2.2	J	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Total cPAHs	4120		µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Total cPAHs	60.1		µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Total cPAHs	8.4	J	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Total cPAHs	6460		µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Total cPAHs	1930		µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Total cPAHs	4170		µg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Total cPAHs	4180		µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Total cPAHs	3400		µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Total cPAHs	83.1		µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Total cPAHs	414		µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Total cPAHs	7380		µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Total cPAHs	1020		µg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Total cPAHs	610		µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Total cPAHs	2930		µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Total cPAHs	2590		µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Total cPAHs	3570		µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Total cPAHs	6020		µg/kg
SIB-SC-J06-8-9-07/26/2022	Sediment	16.33	N	8	9	Total cPAHs	6230	J	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Total cPAHs	362		µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Total cPAHs	330		µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Total cPAHs	385		µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Total cPAHs	158		µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Total cPAHs	726		µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Total cPAHs	90.1	J	µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Total cPAHs	349		µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Total cPAHs	240		µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Total cPAHs	138		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Total cPAHs	15.1	J	µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Total cPAHs	30.5	J	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Total cPAHs	68	J	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Total cPAHs	53.2	J	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Total cPAHs	1.7	J	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Total cPAHs	1190		µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Total cPAHs	1240		µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Total cPAHs	491		µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Total cPAHs	26.7	J	µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Total cPAHs	6.1	J	µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Total cPAHs	814		µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Total cPAHs	509		µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Total cPAHs	388		µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Total cPAHs	44.7	J	µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Total cPAHs	11.4	J	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Total cPAHs	14.3	J	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Total cPAHs	55.4	J	µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Total cPAHs	12.6	J	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Total cPAHs	218		µg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Total cPAHs	3460		µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Total cPAHs	379	J	µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Total cPAHs	21.6	J	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Total cPAHs	2.5	J	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Total cPAHs	97.4		µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Total cPAHs	51	J	µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Total cPAHs	49.7	J	µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Total cPAHs	97.3		µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Total cPAHs	38.5	J	µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Total cPAHs	100		µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Total cPAHs	385		µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Total cPAHs	2150		µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Total cPAHs	1120		µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Total cPAHs	10.1	J	µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Total cPAHs	244		µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Total cPAHs	2170		µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Total cPAHs	5120		µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Total cPAHs	2740		µg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Total cPAHs	0.81696	JT	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Total cPAHs	110.84	T	µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Total cPAHs	9.1865	JT	µg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Total cPAHs	167.57	T	µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Total cPAHs	151	JT	µg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Total cPAHs	11	T	µg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Total cPAHs	85.2	JT	µg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Total cPAHs	170	JT	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Total cPAHs	9.8	UT	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Total cPAHs	160	T	µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Total cPAHs	21.7	T	µg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Total cPAHs	18.8	T	µg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Total cPAHs	149	T	µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Total cPAHs	3600	T	µg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Total cPAHs	80	T	µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Total cPAHs	33	JT	µg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Total cPAHs	180	T	µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Total cPAHs	38	JT	µg/kg
WR-WSI98SD1300	Sediment	2.09	N	0	0.3	Total cPAHs	46	T	µg/kg
WR-WSI98SD1320	Sediment	1.21	N	0	0.3	Total cPAHs	57	T	µg/kg
WR-WSI98SD1330	Sediment	5.72	N	0	0.3	Total cPAHs	520	T	µg/kg
WR-WSI98SD1330000A	Sediment	5.72	N	0	3	Total cPAHs	1800	T	µg/kg
WR-WSI98SD1340	Sediment	2.58	N	0	0.3	Total cPAHs	200	T	µg/kg
WR-WSI98SD1360	Sediment	2.50	N	0	0.3	Total cPAHs	120	T	µg/kg
WR-WSI98SD1390	Sediment	3.67	N	0	0.3	Total cPAHs	210	T	µg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Total cPAHs	310	T	µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Total cPAHs	150	T	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Total cPAHs	43.1	J	µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Total cPAHs	70	J	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Total cPAHs	227		µg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Total DDD	48	JNT	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-C364-C	Sediment	12.48	N	2.5	6	Total DDD	1	NJT	µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Total DDD	1.53	JNT	µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Total DDD	17.3	NJT	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Total DDD	1.84	JNT	µg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Total DDD	0.186	NJT	µg/kg
LW2-C421-A	Sediment	4.45	N	0	1	Total DDD	3.3	T	µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Total DDD	5.1	JT	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Total DDD	2.66	NJT	µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Total DDD	5	NJT	µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Total DDD	1.8	JNT	µg/kg
LW2-G382	Sediment	2.65	N	0	1	Total DDD	6.01	JNT	µg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Total DDD	1.26	JNT	µg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Total DDD	2.46	JT	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Total DDD	1.79	NJT	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Total DDD	29.1	JT	µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Total DDD	17.6	NJT	µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Total DDD	0.06	UT	µg/kg
LW2-G398	Sediment	8.99	N	0	1	Total DDD	0.419	JT	µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Total DDD	6.8	NJT	µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Total DDD	10.1	JNT	µg/kg
LW2-G416	Sediment	5.63	N	0	1	Total DDD	6.03	NJT	µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Total DDD	3.84	JT	µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Total DDD	0.37	NJT	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Total DDD	2.62	T	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Total DDD	2.36	T	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Total DDD	1.1	T	µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Total DDD	1.7	JT	µg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Total DDD	5.1	JT	µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Total DDD	340	T	µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Total DDD	230	T	µg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Total DDD	7.9	T	µg/kg
LW3-G706	Sediment	9.49	N	0	1	Total DDD	2	JT	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Total DDD	0.49	JT	µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Total DDD	0.39	UT	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
NA-4B-0024	Sediment	5.95	N	0	0.8	Total DDD	3.63	JNT	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Total DDD	4.54	JNT	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Total DDD	5.61	JNT	µg/kg
PDI-SC-S188-0TO1.5	Sediment	6.04	N	0	1	Total DDD	2.038	J	µg/kg
PDI-SC-S191-0TO2	Sediment	6.59	N	0	2	Total DDD	5.41	J	µg/kg
PDI-SC-S191-2TO4	Sediment	6.59	N	2	4	Total DDD	24.88	J	µg/kg
PDI-SC-S191-4TO6	Sediment	6.59	N	4	6	Total DDD	16.13	J	µg/kg
PDI-SC-S192-0TO1.5	Sediment	8.19	N	0	1	Total DDD	13	J	µg/kg
PDI-SC-S192-1.5TO3	Sediment	8.19	N	1	3	Total DDD	6.43	J	µg/kg
PDI-SC-S192-3TO4.2	Sediment	8.19	N	3	4	Total DDD	1.556	J	µg/kg
PDI-SC-S229-0TO2	Sediment	2.78	N	0	2	Total DDD	2.553	J	µg/kg
PDI-SC-S230-0TO2	Sediment	6.26	N	0	2	Total DDD	2.206	J	µg/kg
PDI-SC-S230-2TO4	Sediment	6.26	N	2	4	Total DDD	4.26	J	µg/kg
PDI-SC-S230-4TO6	Sediment	6.26	N	4	6	Total DDD	2.929	J	µg/kg
PDI-SG-S168	Sediment	11.36	N	0	30	Total DDD	1.325		µg/kg
PDI-SG-S175	Sediment	10.83	N	0	30	Total DDD	2.1	J	µg/kg
PDI-SG-S199	Sediment	7.43	N	0	18	Total DDD	2.7	U	µg/kg
PDI-SG-S201	Sediment	2.37	N	0	30	Total DDD	2.5	J	µg/kg
PDI-SG-S204	Sediment	0.96	N	0	17	Total DDD	1.27		µg/kg
PDI-SG-S211	Sediment	2.21	N	0	30	Total DDD	2.67	J	µg/kg
PDI-SG-S214	Sediment	14.23	N	0	15	Total DDD	0.75	U	µg/kg
PDI-SG-S215	Sediment	3.28	N	0	30	Total DDD	3.2	J	µg/kg
PDI-SG-S216	Sediment	1.43	N	0	30	Total DDD	2.33	J	µg/kg
PDI-SG-S220	Sediment	3.87	N	0	30	Total DDD	2.65	J	µg/kg
PDI-SG-S223	Sediment	4.48	N	0	23	Total DDD	3	J	µg/kg
PDI-SG-S224	Sediment	4.49	N	0	24	Total DDD	0.88	J	µg/kg
PDI-SG-S225	Sediment	1.58	N	0	25	Total DDD	3.13	J	µg/kg
PDI-SG-S229	Sediment	2.55	N	0	28	Total DDD	1.54		µg/kg
PDI-SG-S230	Sediment	6.15	N	0	27	Total DDD	2.51	J	µg/kg
PDI-SG-S231	Sediment	6.54	N	0	28	Total DDD	2.81	J	µg/kg
PDI-SG-S233	Sediment	8.78	N	0	24	Total DDD	2.75	J	µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Total DDD	6	AUT	µg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Total DDD	2	AUT	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Total DDD	2	AUT	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Total DDD	2	AUT	µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Total DDD	2	AUT	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Total DDD	7	T	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Total DDD	0.3	UJ	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Total DDD	0.24	UJ	µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Total DDD	0.32	UJ	µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Total DDD	0.33	U	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Total DDD	0.34	UJ	µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Total DDD	0.35	U	µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Total DDD	0.35	U	µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Total DDD	0.37	U	µg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Total DDD	0.33	U	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Total DDD	16.8	J	µg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Total DDD	7.3	J	µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Total DDD	17.2	J	µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Total DDD	7.6	J	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Total DDD	0.63	J	µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Total DDD	1.1	J	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Total DDD	0.74	J	µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Total DDD	5	J	µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Total DDD	1.1	J	µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Total DDD	0.37	J	µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Total DDD	1.6	J	µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Total DDD	0.27	U	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Total DDD	0.26	J	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Total DDD	0.39	J	µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Total DDD	0.59	J	µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Total DDD	0.83	J	µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Total DDD	1.6	J	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Total DDD	0.53	J	µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Total DDD	0.32	U	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Total DDD	0.26	U	µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Total DDD	0.29	U	µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Total DDD	0.3	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Total DDD	0.36	U	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Total DDD	0.89		µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Total DDD	0.24	UJ	µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Total DDD	0.92		µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Total DDD	0.45	U	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Total DDD	0.59	U	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Total DDD	0.96	J	µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Total DDD	1.9	J	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Total DDD	0.4	U	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Total DDD	0.41	J	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Total DDD	0.31	U	µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Total DDD	0.42	J	µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Total DDD	0.33	U	µg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Total DDD	0.35	U	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Total DDD	1.1		µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Total DDD	0.31	U	µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Total DDD	0.33	U	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Total DDD	0.34	U	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Total DDD	0.56	J	µg/kg
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	Total DDD	0.26	U	µg/kg
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	Total DDD	0.26	U	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Total DDD	0.37	U	µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Total DDD	0.29	U	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Total DDD	0.39	U	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Total DDD	0.3	U	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Total DDD	0.36	U	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Total DDD	0.81		µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Total DDD	0.28	UJ	µg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Total DDD	0.32	UJ	µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Total DDD	0.58	U	µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Total DDD	0.26	UJ	µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Total DDD	0.36	UJ	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Total DDD	0.27	U	µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Total DDD	0.3	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Total DDD	0.25	U	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Total DDD	0.55	J	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Total DDD	0.37	U	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Total DDD	0.4	J	µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Total DDD	0.35	U	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Total DDD	11.9		µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Total DDD	6.4		µg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Total DDD	6		µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Total DDD	6.8		µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Total DDD	2.5		µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Total DDD	0.41	U	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Total DDD	0.44	UJ	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Total DDD	0.69	J	µg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Total DDD	0.39	UJ	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Total DDD	0.41	UJ	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Total DDD	0.34	UJ	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Total DDD	0.42	U	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Total DDD	0.44	U	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Total DDD	0.5	U	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Total DDD	0.46	U	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Total DDD	0.46	U	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Total DDD	0.36	U	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Total DDD	0.45	U	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Total DDD	0.41	U	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Total DDD	0.43	U	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Total DDD	0.44	U	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Total DDD	0.49	U	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Total DDD	0.36	U	µg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Total DDD	0.35	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Total DDD	0.35	U	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Total DDD	0.36	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Total DDD	0.44	U	µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Total DDD	0.37	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Total DDD	0.35	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Total DDD	0.37	U	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Total DDD	0.4	U	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Total DDD	0.37	U	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Total DDD	0.33	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Total DDD	0.34	U	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Total DDD	0.4	U	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Total DDD	0.44	U	µg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Total DDD	0.39	U	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Total DDD	0.42	U	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Total DDD	0.37	U	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Total DDD	0.41	U	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Total DDD	0.53	J	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Total DDD	0.33	U	µg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Total DDD	0.46	UJ	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Total DDD	0.49	UJ	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Total DDD	0.52	UJ	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Total DDD	2.1	J	µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Total DDD	0.39	U	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Total DDD	8.1	J	µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Total DDD	1.8		µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Total DDD	15.9		µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Total DDD	2.7		µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Total DDD	0.4	U	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Total DDD	0.51	U	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Total DDD	11.8		µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Total DDD	10.1		µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Total DDD	0.38	U	µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Total DDD	0.51	U	µg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Total DDD	0.5	U	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Total DDD	1		µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Total DDD	2.5		µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Total DDD	2.8		µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Total DDD	1.1	J	µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Total DDD	1.3	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Total DDD	5.7		µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Total DDD	6.8		µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Total DDD	6.2		µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Total DDD	6.5		µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Total DDD	4.7	J	µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Total DDD	2.8	J	µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Total DDD	4.4	J	µg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Total DDD	6.3		µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Total DDD	0.7	U	µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Total DDD	12.1		µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Total DDD	11.2		µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Total DDD	7.9		µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Total DDD	0.56	U	µg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Total DDD	0.48	U	µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Total DDD	5.7		µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Total DDD	3.6		µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Total DDD	5.3		µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Total DDD	8.8		µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Total DDD	5.6		µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Total DDD	4.4		µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Total DDD	4.9		µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Total DDD	2.6		µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Total DDD	3.2		µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Total DDD	3.1		µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Total DDD	6.4		µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Total DDD	3.1		µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Total DDD	1.5		µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Total DDD	1.3		µg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Total DDD	3.5	J	µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Total DDD	2.5		µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Total DDD	3.8		µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Total DDD	3.1	J	µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Total DDD	6.7		µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Total DDD	15.1		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Total DDD	2.6		µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Total DDD	3.2		µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Total DDD	3.8		µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Total DDD	4.6		µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Total DDD	3.5		µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Total DDD	3.8		µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Total DDD	6.1		µg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Total DDD	5.7		µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Total DDD	3.4		µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Total DDD	3.1		µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Total DDD	5.5		µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Total DDD	6.7		µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Total DDD	3.2	J	µg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Total DDD	3.5		µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Total DDD	1.4		µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Total DDD	3.3		µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Total DDD	0.3	U	µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Total DDD	3.3		µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Total DDD	1.7		µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Total DDD	1.8		µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Total DDD	0.32	U	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Total DDD	0.4	U	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Total DDD	2.4		µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Total DDD	2.1		µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Total DDD	1.3		µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Total DDD	1.3		µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Total DDD	1.6		µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Total DDD	3.3		µg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Total DDD	2.8		µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Total DDD	3.5		µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Total DDD	3.4		µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Total DDD	1.8		µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Total DDD	2.3		µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Total DDD	3.9		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Total DDD	1.8		µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Total DDD	4.1		µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Total DDD	9.6		µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Total DDD	7.6	J	µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Total DDD	2.5		µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Total DDD	1.1	J	µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Total DDD	2.7		µg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Total DDD	2.3		µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Total DDD	2.1		µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Total DDD	3.6		µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Total DDD	0.73	J	µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Total DDD	1.6		µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Total DDD	0.43	U	µg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Total DDD	0.42	U	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Total DDD	0.37	U	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Total DDD	12.3		µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Total DDD	15.4		µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Total DDD	2.5		µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Total DDD	2.7		µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Total DDD	6.1		µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Total DDD	29.4		µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Total DDD	36.3		µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Total DDD	6.3		µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Total DDD	0.4	U	µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Total DDD	0.49	U	µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Total DDD	3.6	J	µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Total DDD	0.49	U	µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Total DDD	21.3	J	µg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Total DDD	0.42	U	µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Total DDD	0.34	U	µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Total DDD	4.4		µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Total DDD	5	J	µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Total DDD	46.3	J	µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Total DDD	57.9	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Total DDD	45.9	J	µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Total DDD	0.6	J	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Total DDD	0.37	U	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Total DDD	48.4		µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Total DDD	4.9		µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Total DDD	1.6		µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Total DDD	0.35	J	µg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Total DDD	0.39	UJ	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Total DDD	0.35	U	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Total DDD	134		µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Total DDD	9.3		µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Total DDD	180		µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Total DDD	251		µg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Total DDD	63		µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Total DDD	9.2		µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Total DDD	1		µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Total DDD	0.44	U	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Total DDD	0.39	U	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Total DDD	39.1		µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Total DDD	22.1		µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Total DDD	24		µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Total DDD	51		µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Total DDD	17.7		µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Total DDD	3.8		µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Total DDD	0.5	J	µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Total DDD	0.32	U	µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Total DDD	3.4	J	µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Total DDD	6.3	J	µg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Total DDD	16.7	J	µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Total DDD	7.2	UJ	µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Total DDD	67	J	µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Total DDD	69	J	µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Total DDD	37.4		µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Total DDD	4.9		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Total DDD	0.43	U	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Total DDD	41.7		µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Total DDD	0.41	U	µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Total DDD	0.33	U	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Total DDD	130		µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Total DDD	33.3		µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Total DDD	45		µg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Total DDD	50.3		µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Total DDD	68		µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Total DDD	0.92		µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Total DDD	6.5		µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Total DDD	106		µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Total DDD	71		µg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Total DDD	0.66	UJ	µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Total DDD	3.3	UJ	µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Total DDD	18.3	J	µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Total DDD	244	J	µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Total DDD	137	J	µg/kg
SIB-SC-J06-8-9-07/26/2022	Sediment	16.33	N	8	9	Total DDD	109	J	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Total DDD	1.5		µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Total DDD	1.9		µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Total DDD	1.9		µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Total DDD	4.1	J	µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Total DDD	9.3		µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Total DDD	1.4		µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Total DDD	3.8		µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Total DDD	9.4		µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Total DDD	5.7		µg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Total DDD	1.6		µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Total DDD	0.45	J	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Total DDD	0.34	U	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Total DDD	0.41	U	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Total DDD	0.3	U	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Total DDD	2.2		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Total DDD	6.5		µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Total DDD	1.3		µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Total DDD	0.38	U	µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Total DDD	0.32	U	µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Total DDD	6.5		µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Total DDD	5.9		µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Total DDD	11.3		µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Total DDD	1.4		µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Total DDD	0.46	J	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Total DDD	0.31	U	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Total DDD	1.9	J	µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Total DDD	0.54	J	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Total DDD	9.3		µg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Total DDD	0.62	U	µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Total DDD	7.1	J	µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Total DDD	0.52	J	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Total DDD	0.39	UJ	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Total DDD	3.5		µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Total DDD	0.97		µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Total DDD	0.79	J	µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Total DDD	5.7		µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Total DDD	1.9		µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Total DDD	1.1		µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Total DDD	1.3		µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Total DDD	1.6		µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Total DDD	3.7		µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Total DDD	1.1		µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Total DDD	2.4		µg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Total DDD	0.49	U	µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Total DDD	0.77	U	µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Total DDD	0.5	U	µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Total DDD	5.79	JT	µg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Total DDD	5.15	UT	µg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Total DDD	5.94	UT	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Total DDD	4.9	UT	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Total DDD	5.12	UT	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Total DDD	5.93	UT	µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Total DDD	4.97	UT	µg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Total DDD	2.53	UT	µg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Total DDD	2.7	UT	µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Total DDD	1.6	T	µg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Total DDD	0.27	AJT	µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Total DDD	0.83	AJT	µg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Total DDD	0.35	AJT	µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Total DDD	0.88	AJT	µg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Total DDD	3.3	AJT	µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Total DDD	49.9	AJT	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Total DDD	0.3	UJ	µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Total DDD	0.46	J	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Total DDD	0.28	U	µg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Total DDE	11.5	JNT	µg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Total DDE	0.282	UT	µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Total DDE	0.436	JNT	µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Total DDE	9.42	NJT	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Total DDE	0.275	JT	µg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Total DDE	0.0591	UT	µg/kg
LW2-C421-A	Sediment	4.45	N	0	1	Total DDE	2.5	NJT	µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Total DDE	4.6	UT	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Total DDE	2.9	NJT	µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Total DDE	6.05	T	µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Total DDE	2.42	JNT	µg/kg
LW2-G382	Sediment	2.65	N	0	1	Total DDE	1.5	NJT	µg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Total DDE	0.442	UT	µg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Total DDE	2.75	T	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Total DDE	3.3	NJT	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Total DDE	8.5	NJT	µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Total DDE	7.96	UT	µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Total DDE	0.0562	UT	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-G398	Sediment	8.99	N	0	1	Total DDE	0.887	JT	µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Total DDE	3.2	NJT	µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Total DDE	6.35	NJT	µg/kg
LW2-G416	Sediment	5.63	N	0	1	Total DDE	4.69	NJT	µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Total DDE	0.66	NJT	µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Total DDE	0.159	JT	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Total DDE	2.21	JT	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Total DDE	2.93	JT	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Total DDE	0.808	JT	µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Total DDE	2.9	T	µg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Total DDE	4.9	T	µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Total DDE	400	NJT	µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Total DDE	20	UT	µg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Total DDE	2.4	UT	µg/kg
LW3-G706	Sediment	9.49	N	0	1	Total DDE	1.8	T	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Total DDE	0.2	JT	µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Total DDE	0.76	UT	µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	Total DDE	5.16	NJT	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Total DDE	5.58	T	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Total DDE	6.2	NJT	µg/kg
PDI-SC-S188-0TO1.5	Sediment	6.04	N	0	1	Total DDE	7.696	J	µg/kg
PDI-SC-S191-0TO2	Sediment	6.59	N	0	2	Total DDE	7.474	J	µg/kg
PDI-SC-S191-2TO4	Sediment	6.59	N	2	4	Total DDE	19.237	J	µg/kg
PDI-SC-S191-4TO6	Sediment	6.59	N	4	6	Total DDE	18.76	J	µg/kg
PDI-SC-S192-0TO1.5	Sediment	8.19	N	0	1	Total DDE	17.084	J	µg/kg
PDI-SC-S192-1.5TO3	Sediment	8.19	N	1	3	Total DDE	9.314	J	µg/kg
PDI-SC-S192-3TO4.2	Sediment	8.19	N	3	4	Total DDE	1.6066	J	µg/kg
PDI-SC-S229-0TO2	Sediment	2.78	N	0	2	Total DDE	7.338	J	µg/kg
PDI-SC-S230-0TO2	Sediment	6.26	N	0	2	Total DDE	4.099	J	µg/kg
PDI-SC-S230-2TO4	Sediment	6.26	N	2	4	Total DDE	6.846	J	µg/kg
PDI-SC-S230-4TO6	Sediment	6.26	N	4	6	Total DDE	4.564	J	µg/kg
PDI-SG-S168	Sediment	11.36	N	0	30	Total DDE	1.825	J	µg/kg
PDI-SG-S175	Sediment	10.83	N	0	30	Total DDE	3.2		µg/kg
PDI-SG-S182	Sediment	1.15	N	0	30	Total DDE	5.04	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SG-S183	Sediment	6.81	N	0	27	Total DDE	3.79	J	µg/kg
PDI-SG-S184	Sediment	14.30	N	0	28	Total DDE	252.05		µg/kg
PDI-SG-S191	Sediment	5.82	N	0	26	Total DDE	11.43	J	µg/kg
PDI-SG-S199	Sediment	7.43	N	0	18	Total DDE	2.7	U	µg/kg
PDI-SG-S201	Sediment	2.37	N	0	30	Total DDE	4.5	J	µg/kg
PDI-SG-S204	Sediment	0.96	N	0	17	Total DDE	1.21		µg/kg
PDI-SG-S211	Sediment	2.21	N	0	30	Total DDE	4.48		µg/kg
PDI-SG-S214	Sediment	14.23	N	0	15	Total DDE	0.79	U	µg/kg
PDI-SG-S215	Sediment	3.28	N	0	30	Total DDE	5.92		µg/kg
PDI-SG-S216	Sediment	1.43	N	0	30	Total DDE	4.635	J	µg/kg
PDI-SG-S220	Sediment	3.87	N	0	30	Total DDE	3.955		µg/kg
PDI-SG-S223	Sediment	4.48	N	0	23	Total DDE	5.195		µg/kg
PDI-SG-S224	Sediment	4.49	N	0	24	Total DDE	1.39		µg/kg
PDI-SG-S225	Sediment	1.58	N	0	25	Total DDE	5.85		µg/kg
PDI-SG-S229	Sediment	2.55	N	0	28	Total DDE	4.44		µg/kg
PDI-SG-S230	Sediment	6.15	N	0	27	Total DDE	4.69		µg/kg
PDI-SG-S231	Sediment	6.54	N	0	28	Total DDE	5.4		µg/kg
PDI-SG-S233	Sediment	8.78	N	0	24	Total DDE	4.75	J	µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Total DDE	8	T	µg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Total DDE	4	AT	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Total DDE	5	T	µg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Total DDE	2	T	µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Total DDE	2	AUT	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Total DDE	6	T	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Total DDE	0.37	UJ	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Total DDE	0.3	UJ	µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Total DDE	0.41	UJ	µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Total DDE	0.41	U	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Total DDE	0.42	UJ	µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Total DDE	0.44	U	µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Total DDE	0.43	U	µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Total DDE	0.46	U	µg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Total DDE	0.41	U	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Total DDE	7.9	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Total DDE	2.1	J	µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Total DDE	15.9	J	µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Total DDE	21.7	J	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Total DDE	0.38	U	µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Total DDE	0.41	U	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Total DDE	1.2	J	µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Total DDE	5.9	J	µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Total DDE	0.52	J	µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Total DDE	0.4	U	µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Total DDE	1	J	µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Total DDE	0.33	U	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Total DDE	0.29	U	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Total DDE	0.32	U	µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Total DDE	0.81	J	µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Total DDE	0.8	J	µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Total DDE	0.81	J	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Total DDE	0.66	J	µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Total DDE	0.39	U	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Total DDE	0.33	U	µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Total DDE	0.61	J	µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Total DDE	0.38	U	µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Total DDE	0.45	U	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Total DDE	0.48	U	µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Total DDE	0.3	UJ	µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Total DDE	0.53	U	µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Total DDE	0.56	U	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Total DDE	0.74	U	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Total DDE	0.4	U	µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Total DDE	0.51	U	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Total DDE	0.5	U	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Total DDE	0.37	U	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Total DDE	0.39	U	µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Total DDE	0.37	U	µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Total DDE	0.41	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Total DDE	0.44	U	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Total DDE	0.42	U	µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Total DDE	0.39	U	µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Total DDE	0.42	U	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Total DDE	0.43	U	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Total DDE	0.54	J	µg/kg
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	Total DDE	0.33	U	µg/kg
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	Total DDE	0.33	U	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Total DDE	0.46	U	µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Total DDE	0.36	U	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Total DDE	0.49	U	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Total DDE	0.38	U	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Total DDE	0.45	U	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Total DDE	1.9		µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Total DDE	0.35	U	µg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Total DDE	0.39	U	µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Total DDE	0.3	U	µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Total DDE	1.5	J	µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Total DDE	0.46	U	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Total DDE	0.34	U	µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Total DDE	0.35	U	µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Total DDE	0.31	U	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Total DDE	0.52	U	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Total DDE	0.46	U	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Total DDE	0.4	U	µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Total DDE	1.9	J	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Total DDE	10.8		µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Total DDE	2.4		µg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Total DDE	7.2		µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Total DDE	10.5		µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Total DDE	2.3		µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Total DDE	0.52	U	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Total DDE	0.55	U	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Total DDE	1.3		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Total DDE	0.49	U	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Total DDE	0.51	U	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Total DDE	0.42	U	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Total DDE	0.53	U	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Total DDE	0.55	U	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Total DDE	0.62	U	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Total DDE	0.58	U	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Total DDE	0.58	U	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Total DDE	0.45	U	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Total DDE	0.56	U	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Total DDE	0.52	U	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Total DDE	0.54	U	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Total DDE	0.55	U	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Total DDE	0.61	U	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Total DDE	0.45	U	µg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Total DDE	0.43	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Total DDE	0.44	U	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Total DDE	0.45	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Total DDE	0.55	U	µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Total DDE	0.46	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Total DDE	0.44	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Total DDE	0.47	U	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Total DDE	0.5	U	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Total DDE	0.46	U	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Total DDE	0.42	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Total DDE	0.43	U	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Total DDE	0.5	U	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Total DDE	0.55	U	µg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Total DDE	0.49	U	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Total DDE	0.52	U	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Total DDE	0.46	U	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Total DDE	0.51	U	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Total DDE	0.68	J	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Total DDE	0.41	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Total DDE	0.57	U	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Total DDE	0.62	U	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Total DDE	0.65	U	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Total DDE	1.6		µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Total DDE	0.49	U	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Total DDE	10.2		µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Total DDE	2.9		µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Total DDE	13.8		µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Total DDE	1.5		µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Total DDE	0.5	U	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Total DDE	0.64	U	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Total DDE	33.2		µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Total DDE	14.8		µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Total DDE	1.3		µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Total DDE	0.64	U	µg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Total DDE	0.9	J	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Total DDE	1.5		µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Total DDE	1.8		µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Total DDE	3		µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Total DDE	1.7		µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Total DDE	2.6		µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Total DDE	3.3		µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Total DDE	3.1		µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Total DDE	8.3		µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Total DDE	8.4		µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Total DDE	4.4		µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Total DDE	4.8		µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Total DDE	6.7		µg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Total DDE	8		µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Total DDE	4.1		µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Total DDE	6.9		µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Total DDE	5.7		µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Total DDE	4.1		µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Total DDE	4.9		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Total DDE	5.6		µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Total DDE	6.4		µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Total DDE	6		µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Total DDE	5.9		µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Total DDE	10		µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Total DDE	5.8		µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Total DDE	7.2		µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Total DDE	7.1		µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Total DDE	6		µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Total DDE	5.7		µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Total DDE	5.6		µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Total DDE	9.7		µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Total DDE	5.1		µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Total DDE	2.8		µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Total DDE	2.1		µg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Total DDE	5.4		µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Total DDE	3.7		µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Total DDE	6.1		µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Total DDE	5.8		µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Total DDE	5.1		µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Total DDE	9.1		µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Total DDE	5.9		µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Total DDE	6.8		µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Total DDE	7.1		µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Total DDE	7.9		µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Total DDE	8.3		µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Total DDE	5.8		µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Total DDE	8.9		µg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Total DDE	7.4		µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Total DDE	6.9		µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Total DDE	6.5		µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Total DDE	7.2		µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Total DDE	8.2		µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Total DDE	3.1		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Total DDE	6		µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Total DDE	2.6		µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Total DDE	5.3	J	µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Total DDE	0.37	U	µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Total DDE	5.9		µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Total DDE	3.8		µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Total DDE	3.2	J	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Total DDE	0.4	U	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Total DDE	0.5	U	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Total DDE	4.7		µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Total DDE	5.3		µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Total DDE	5		µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Total DDE	2.5		µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Total DDE	1.6		µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Total DDE	6.8		µg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Total DDE	6.1		µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Total DDE	7.5		µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Total DDE	6.4		µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Total DDE	2.6		µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Total DDE	5		µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Total DDE	3.2		µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Total DDE	2.4		µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Total DDE	5.7		µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Total DDE	17.5		µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Total DDE	13.5		µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Total DDE	4.2		µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Total DDE	1.9		µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Total DDE	5.5		µg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Total DDE	5.9		µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Total DDE	8.7		µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Total DDE	5.3		µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Total DDE	1.1	J	µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Total DDE	4.2		µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Total DDE	0.54	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Total DDE	0.52	U	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Total DDE	0.46	U	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Total DDE	3.4	J	µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Total DDE	4		µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Total DDE	4.8		µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Total DDE	6.3		µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Total DDE	6.7	J	µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Total DDE	9		µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Total DDE	18.6		µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Total DDE	3.6		µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Total DDE	0.94		µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Total DDE	0.61	U	µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Total DDE	4.9	J	µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Total DDE	3.1		µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Total DDE	5.7	J	µg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Total DDE	2.2		µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Total DDE	5.5		µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Total DDE	6.5		µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Total DDE	5.2	J	µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Total DDE	20	J	µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Total DDE	19.3	J	µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Total DDE	10.6	J	µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Total DDE	0.52	UJ	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Total DDE	0.46	U	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Total DDE	30.7		µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Total DDE	3.9		µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Total DDE	1.5		µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Total DDE	0.38	U	µg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Total DDE	0.49	UJ	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Total DDE	0.44	U	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Total DDE	81.5		µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Total DDE	18.9	J	µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Total DDE	157		µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Total DDE	139		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Total DDE	37.1		µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Total DDE	2.8		µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Total DDE	0.51	U	µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Total DDE	0.55	U	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Total DDE	0.48	U	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Total DDE	18		µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Total DDE	12.3		µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Total DDE	22.3		µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Total DDE	35.8		µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Total DDE	15.8	J	µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Total DDE	5.5		µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Total DDE	0.77	J	µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Total DDE	0.4	U	µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Total DDE	4.7		µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Total DDE	4.9	J	µg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Total DDE	9.2	J	µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Total DDE	6.3	J	µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Total DDE	19.9	J	µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Total DDE	15.4	J	µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Total DDE	13.9		µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Total DDE	4.9		µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Total DDE	0.54	U	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Total DDE	30.7		µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Total DDE	0.51	U	µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Total DDE	0.41	U	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Total DDE	143	J	µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Total DDE	31.8		µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Total DDE	36.9		µg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Total DDE	33.6		µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Total DDE	23.1		µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Total DDE	0.43	U	µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Total DDE	4.7		µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Total DDE	14		µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Total DDE	7.6		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Total DDE	4.2	J	µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Total DDE	2.5	J	µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Total DDE	12.8	J	µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Total DDE	89.2	J	µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Total DDE	29.4	J	µg/kg
SIB-SC-J06-8-9-07/26/2022	Sediment	16.33	N	8	9	Total DDE	23.6	J	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Total DDE	2.3		µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Total DDE	2.9		µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Total DDE	3.2		µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Total DDE	5.4		µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Total DDE	6.6		µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Total DDE	1.8		µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Total DDE	6.8		µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Total DDE	9.3		µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Total DDE	0.88		µg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Total DDE	0.46	U	µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Total DDE	0.47	U	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Total DDE	0.43	U	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Total DDE	0.51	U	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Total DDE	0.37	U	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Total DDE	4.5		µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Total DDE	5		µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Total DDE	0.78		µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Total DDE	0.47	U	µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Total DDE	0.4	U	µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Total DDE	5.3		µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Total DDE	6.3		µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Total DDE	9.3		µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Total DDE	0.82		µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Total DDE	0.5	U	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Total DDE	0.38	U	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Total DDE	0.43	U	µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Total DDE	0.42	U	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Total DDE	1	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Total DDE	4.2		µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Total DDE	2.5		µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Total DDE	0.48	U	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Total DDE	0.49	U	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Total DDE	2.9		µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Total DDE	2.3		µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Total DDE	2.8		µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Total DDE	2.8		µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Total DDE	4		µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Total DDE	1.7		µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Total DDE	2.2		µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Total DDE	4.4		µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Total DDE	3.1		µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Total DDE	0.43	U	µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Total DDE	4.6		µg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Total DDE	3.3		µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Total DDE	6.3		µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Total DDE	4.2		µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Total DDE	5.2	JT	µg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Total DDE	5.15	UT	µg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Total DDE	4	JT	µg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Total DDE	4.9	UT	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Total DDE	5.12	UT	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Total DDE	4.03	JT	µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Total DDE	4.97	UT	µg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Total DDE	2.53	UT	µg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Total DDE	2.7	UT	µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Total DDE	1.4	AUT	µg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Total DDE	1.3	T	µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Total DDE	1.95	AT	µg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Total DDE	1.3	T	µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Total DDE	1.9	T	µg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Total DDE	2.6	AUJT	µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Total DDE	1.7	AJT	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Total DDE	0.37	UJ	µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Total DDE	1		µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Total DDE	0.35	U	µg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Total DDT	1.6	NJT	µg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Total DDT	0.737	AJT	µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Total DDT	0.673	NJT	µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Total DDT	23.8	JT	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Total DDT	3.1	NJT	µg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Total DDT	0.304	JT	µg/kg
LW2-C421-A	Sediment	4.45	N	0	1	Total DDT	25	T	µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Total DDT	84	T	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Total DDT	0.37	JT	µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Total DDT	0.807	JT	µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Total DDT	2.32	JNT	µg/kg
LW2-G382	Sediment	2.65	N	0	1	Total DDT	2.31	JT	µg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Total DDT	3.28	NJT	µg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Total DDT	0.12	UT	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Total DDT	0.14	UT	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Total DDT	24.6	JT	µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Total DDT	19.3	JT	µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Total DDT	0.0692	UJT	µg/kg
LW2-G398	Sediment	8.99	N	0	1	Total DDT	0.204	UT	µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Total DDT	3.46	JNT	µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Total DDT	13.8	JT	µg/kg
LW2-G416	Sediment	5.63	N	0	1	Total DDT	0.507	JT	µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Total DDT	0.441	JT	µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Total DDT	0.188	JT	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Total DDT	0.847	JT	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Total DDT	1.85	T	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Total DDT	0.231	JT	µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Total DDT	0.83	UT	µg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Total DDT	1.1	JT	µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Total DDT	1400	NJT	µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Total DDT	1100	JT	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW3-C708-D	Sediment	16.09	N	7.7	10	Total DDT	16	JT	µg/kg
LW3-G706	Sediment	9.49	N	0	1	Total DDT	3.8	NJT	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Total DDT	0.58	T	µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Total DDT	1.1	UT	µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	Total DDT	0.971	NJT	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Total DDT	0.696	JT	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Total DDT	0.92	T	µg/kg
PDI-SC-S188-0TO1.5	Sediment	6.04	N	0	1	Total DDT	2.033	J	µg/kg
PDI-SC-S191-0TO2	Sediment	6.59	N	0	2	Total DDT	5.51	J	µg/kg
PDI-SC-S191-2TO4	Sediment	6.59	N	2	4	Total DDT	55.2	J	µg/kg
PDI-SC-S191-4TO6	Sediment	6.59	N	4	6	Total DDT	13.99	J	µg/kg
PDI-SC-S192-0TO1.5	Sediment	8.19	N	0	1	Total DDT	8.88	J	µg/kg
PDI-SC-S192-1.5TO3	Sediment	8.19	N	1	3	Total DDT	8.15	J	µg/kg
PDI-SC-S192-3TO4.2	Sediment	8.19	N	3	4	Total DDT	1.103	J	µg/kg
PDI-SC-S229-0TO2	Sediment	2.78	N	0	2	Total DDT	0.643	J	µg/kg
PDI-SC-S230-0TO2	Sediment	6.26	N	0	2	Total DDT	0.21	NJ	µg/kg
PDI-SC-S230-2TO4	Sediment	6.26	N	2	4	Total DDT	0.66	J	µg/kg
PDI-SC-S230-4TO6	Sediment	6.26	N	4	6	Total DDT	0.361	J	µg/kg
PDI-SG-S168	Sediment	11.36	N	0	30	Total DDT	0.995		µg/kg
PDI-SG-S175	Sediment	10.83	N	0	30	Total DDT	2	U	µg/kg
PDI-SG-S182	Sediment	1.15	N	0	30	Total DDT	1.6	UJ	µg/kg
PDI-SG-S191	Sediment	5.82	N	0	26	Total DDT	27.6	J	µg/kg
PDI-SG-S199	Sediment	7.43	N	0	18	Total DDT	2.7	U	µg/kg
PDI-SG-S201	Sediment	2.37	N	0	30	Total DDT	1.8	J	µg/kg
PDI-SG-S204	Sediment	0.96	N	0	17	Total DDT	0.66	U	µg/kg
PDI-SG-S211	Sediment	2.21	N	0	30	Total DDT	1.19		µg/kg
PDI-SG-S214	Sediment	14.23	N	0	15	Total DDT	0.94	U	µg/kg
PDI-SG-S215	Sediment	3.28	N	0	30	Total DDT	1.39		µg/kg
PDI-SG-S216	Sediment	1.43	N	0	30	Total DDT	0.985	J	µg/kg
PDI-SG-S220	Sediment	3.87	N	0	30	Total DDT	0.755	J	µg/kg
PDI-SG-S223	Sediment	4.48	N	0	23	Total DDT	0.865	J	µg/kg
PDI-SG-S224	Sediment	4.49	N	0	24	Total DDT	0.38	U	µg/kg
PDI-SG-S225	Sediment	1.58	N	0	25	Total DDT	0.88	J	µg/kg
PDI-SG-S229	Sediment	2.55	N	0	28	Total DDT	0.75	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SG-S230	Sediment	6.15	N	0	27	Total DDT	1	J	µg/kg
PDI-SG-S231	Sediment	6.54	N	0	28	Total DDT	1.06	J	µg/kg
PDI-SG-S233	Sediment	8.78	N	0	24	Total DDT	1.5	UJ	µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Total DDT	10	T	µg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Total DDT	5	AT	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Total DDT	8	T	µg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Total DDT	3	T	µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Total DDT	2	AUT	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Total DDT	140	T	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Total DDT	1.1	UJ	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Total DDT	1.8	UJ	µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Total DDT	1.6	UJ	µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Total DDT	0.49	UJ	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Total DDT	1.2	UJ	µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Total DDT	0.88	J	µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Total DDT	0.63	J	µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Total DDT	0.76	J	µg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Total DDT	0.92	J	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Total DDT	78.3	J	µg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Total DDT	21.3	J	µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Total DDT	256	J	µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Total DDT	6.9	J	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Total DDT	0.74	J	µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Total DDT	0.48	UJ	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Total DDT	7.1	J	µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Total DDT	41.7	J	µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Total DDT	6.3	J	µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Total DDT	2	J	µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Total DDT	12.2	J	µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Total DDT	1.8	J	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Total DDT	1.8	J	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Total DDT	3.6	J	µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Total DDT	7.7	J	µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Total DDT	10.1	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Total DDT	7.2	J	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Total DDT	5.1	J	µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Total DDT	0.69	J	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Total DDT	0.39	U	µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Total DDT	2.1		µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Total DDT	0.51	J	µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Total DDT	0.53	UJ	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Total DDT	0.57	UJ	µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Total DDT	0.36	UJ	µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Total DDT	0.63	U	µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Total DDT	0.67	U	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Total DDT	0.88	U	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Total DDT	0.47	U	µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Total DDT	0.6	U	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Total DDT	0.6	U	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Total DDT	0.44	UJ	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Total DDT	0.56	J	µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Total DDT	0.44	UJ	µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Total DDT	0.49	UJ	µg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Total DDT	0.52	UJ	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Total DDT	0.49	U	µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Total DDT	1.6		µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Total DDT	0.49	U	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Total DDT	0.51	U	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Total DDT	9.9		µg/kg
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	Total DDT	0.83		µg/kg
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	Total DDT	0.39	U	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Total DDT	0.54	U	µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Total DDT	0.43	U	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Total DDT	0.58	U	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Total DDT	0.45	U	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Total DDT	0.62	J	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Total DDT	9.2		µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Total DDT	0.41	UJ	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Total DDT	0.47	UJ	µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Total DDT	1.9	J	µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Total DDT	10.2	J	µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Total DDT	0.54	UJ	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Total DDT	0.4	J	µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Total DDT	1.2		µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Total DDT	0.37	U	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Total DDT	0.62	U	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Total DDT	0.55	U	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Total DDT	0.47	UJ	µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Total DDT	0.7	J	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Total DDT	2.8		µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Total DDT	2		µg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Total DDT	0.66	U	µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Total DDT	0.65	U	µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Total DDT	0.65	U	µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Total DDT	0.62	UJ	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Total DDT	0.65	UJ	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Total DDT	0.58	UJ	µg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Total DDT	0.59	UJ	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Total DDT	0.6	UJ	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Total DDT	0.5	UJ	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Total DDT	0.62	U	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Total DDT	0.66	U	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Total DDT	0.74	U	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Total DDT	0.69	U	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Total DDT	0.69	U	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Total DDT	0.54	U	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Total DDT	0.67	U	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Total DDT	0.62	U	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Total DDT	0.64	U	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Total DDT	0.65	U	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Total DDT	0.73	U	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Total DDT	0.53	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Total DDT	0.52	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Total DDT	0.52	U	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Total DDT	0.53	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Total DDT	0.65	U	µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Total DDT	0.55	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Total DDT	0.52	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Total DDT	0.56	U	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Total DDT	0.59	U	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Total DDT	0.54	U	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Total DDT	0.49	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Total DDT	0.51	U	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Total DDT	0.6	U	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Total DDT	0.66	U	µg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Total DDT	0.58	U	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Total DDT	0.62	U	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Total DDT	0.55	U	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Total DDT	0.61	U	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Total DDT	0.54	J	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Total DDT	0.49	U	µg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Total DDT	0.68	UJ	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Total DDT	0.73	UJ	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Total DDT	0.77	UJ	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Total DDT	0.78	UJ	µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Total DDT	0.58	U	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Total DDT	12.1	J	µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Total DDT	0.67	U	µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Total DDT	0.76	U	µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Total DDT	0.54	U	µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Total DDT	0.59	U	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Total DDT	0.75	U	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Total DDT	0.68	U	µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Total DDT	0.55	U	µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Total DDT	0.56	U	µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Total DDT	0.76	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Total DDT	0.74	U	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Total DDT	0.71	U	µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Total DDT	0.52	U	µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Total DDT	1.3		µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Total DDT	0.8	U	µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Total DDT	1	U	µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Total DDT	0.69	U	µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Total DDT	0.64	U	µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Total DDT	0.82	U	µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Total DDT	0.85	U	µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Total DDT	1.1	U	µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Total DDT	0.94	U	µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Total DDT	0.88	U	µg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Total DDT	0.79	U	µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Total DDT	1.1	U	µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Total DDT	0.77	U	µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Total DDT	0.59	U	µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Total DDT	0.63	U	µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Total DDT	0.83	U	µg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Total DDT	2.3		µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Total DDT	0.69	U	µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Total DDT	0.62	U	µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Total DDT	0.86	UJ	µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Total DDT	0.96	UJ	µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Total DDT	0.77	UJ	µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Total DDT	0.89	UJ	µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Total DDT	0.77	UJ	µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Total DDT	0.91	UJ	µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Total DDT	0.89	UJ	µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Total DDT	0.84	UJ	µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Total DDT	0.93	UJ	µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Total DDT	0.81	UJ	µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Total DDT	0.81	U	µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Total DDT	0.87	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Total DDT	0.89	U	µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Total DDT	0.84	U	µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Total DDT	0.89	J	µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Total DDT	0.65	U	µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Total DDT	1.8		µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Total DDT	0.88	U	µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Total DDT	0.96	UJ	µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Total DDT	0.83	UJ	µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Total DDT	0.93	UJ	µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Total DDT	0.94	UJ	µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Total DDT	0.77	UJ	µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Total DDT	1.1	UJ	µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Total DDT	0.93	UJ	µg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Total DDT	0.96	UJ	µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Total DDT	0.89	UJ	µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Total DDT	0.73	UJ	µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Total DDT	0.77	U	µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Total DDT	0.76	U	µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Total DDT	0.66	U	µg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Total DDT	2.4		µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Total DDT	0.61	U	µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Total DDT	0.62	U	µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Total DDT	0.44	U	µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Total DDT	0.81	U	µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Total DDT	0.72	U	µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Total DDT	0.55	U	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Total DDT	0.47	U	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Total DDT	0.59	U	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Total DDT	0.82	U	µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Total DDT	0.85	U	µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Total DDT	0.82	U	µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Total DDT	0.71	U	µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Total DDT	0.51	U	µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Total DDT	1.1	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Total DDT	0.79	U	µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Total DDT	0.68	U	µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Total DDT	0.54	U	µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Total DDT	0.69	U	µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Total DDT	0.89	UJ	µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Total DDT	0.64	U	µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Total DDT	0.64	U	µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Total DDT	0.67	U	µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Total DDT	0.69	U	µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Total DDT	18.4		µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Total DDT	0.88	U	µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Total DDT	0.83	U	µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Total DDT	0.88	U	µg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Total DDT	2.5		µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Total DDT	1	U	µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Total DDT	0.57	U	µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Total DDT	0.64	J	µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Total DDT	0.7	U	µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Total DDT	0.64	U	µg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Total DDT	0.62	U	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Total DDT	0.55	U	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Total DDT	0.44	J	µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Total DDT	18.1		µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Total DDT	0.65	UJ	µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Total DDT	0.85	U	µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Total DDT	0.7	U	µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Total DDT	0.47	U	µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Total DDT	0.51	U	µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Total DDT	0.58	U	µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Total DDT	0.59	U	µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Total DDT	0.72	U	µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Total DDT	9.2		µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Total DDT	0.73	U	µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Total DDT	0.76	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Total DDT	0.62	U	µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Total DDT	0.5	U	µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Total DDT	14.2		µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Total DDT	8.8		µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Total DDT	75		µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Total DDT	49		µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Total DDT	190		µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Total DDT	0.67	J	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Total DDT	0.55	U	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Total DDT	133		µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Total DDT	6.4		µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Total DDT	1.6		µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Total DDT	0.45	U	µg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Total DDT	0.58	U	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Total DDT	0.53	U	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Total DDT	418		µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Total DDT	18.6	J	µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Total DDT	252		µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Total DDT	830		µg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Total DDT	35.3		µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Total DDT	11.5		µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Total DDT	1.5		µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Total DDT	0.65	U	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Total DDT	0.57	U	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Total DDT	168		µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Total DDT	85	J	µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Total DDT	18.4	UJ	µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Total DDT	97	J	µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Total DDT	12.4	UJ	µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Total DDT	4.5	UJ	µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Total DDT	1		µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Total DDT	0.47	U	µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Total DDT	2.8		µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Total DDT	15.4		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Total DDT	99		µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Total DDT	0.76	U	µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Total DDT	25.3		µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Total DDT	25.4		µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Total DDT	30.7		µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Total DDT	3.1	J	µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Total DDT	0.64	U	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Total DDT	58.8		µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Total DDT	0.61	U	µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Total DDT	0.49	U	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Total DDT	257	J	µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Total DDT	41	J	µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Total DDT	13.4	UJ	µg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Total DDT	0.79	UJ	µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Total DDT	0.83	UJ	µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Total DDT	0.51	U	µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Total DDT	0.8	U	µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Total DDT	0.72	U	µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Total DDT	0.73	U	µg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Total DDT	0.99	U	µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Total DDT	6.3		µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Total DDT	14.5		µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Total DDT	420		µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Total DDT	68		µg/kg
SIB-SC-J06-8-9-07/26/2022	Sediment	16.33	N	8	9	Total DDT	0.16	UJ	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Total DDT	0.91	U	µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Total DDT	1.2	J	µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Total DDT	1.1	J	µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Total DDT	1.8		µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Total DDT	5.7		µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Total DDT	1.7		µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Total DDT	12.4		µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Total DDT	2.1		µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Total DDT	0.51	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Total DDT	2.1		µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Total DDT	0.56	U	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Total DDT	0.51	U	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Total DDT	0.6	U	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Total DDT	0.44	U	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Total DDT	1.4		µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Total DDT	6.3		µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Total DDT	0.74	J	µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Total DDT	0.56	U	µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Total DDT	0.47	U	µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Total DDT	13.6		µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Total DDT	12.3		µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Total DDT	15.5		µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Total DDT	0.55	U	µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Total DDT	0.59	U	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Total DDT	0.46	U	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Total DDT	2.4		µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Total DDT	0.5	U	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Total DDT	1	J	µg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Total DDT	0.93	U	µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Total DDT	0.72	UJ	µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Total DDT	0.57	UJ	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Total DDT	0.58	UJ	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Total DDT	2.8		µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Total DDT	0.7	U	µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Total DDT	0.66	U	µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Total DDT	0.76	U	µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Total DDT	0.65	U	µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Total DDT	0.66	U	µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Total DDT	0.74	U	µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Total DDT	0.84	U	µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Total DDT	4.3		µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Total DDT	0.51	U	µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Total DDT	0.78	UJ	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Total DDT	0.72	UJ	µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Total DDT	1.2	UJ	µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Total DDT	0.74	UJ	µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Total DDT	6.59	UT	µg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Total DDT	5.15	UT	µg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Total DDT	5.9	UT	µg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Total DDT	4.9	UT	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Total DDT	3.89	JT	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Total DDT	5.93	UT	µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Total DDT	4.97	UT	µg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Total DDT	2.53	UT	µg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Total DDT	2.7	UT	µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Total DDT	1.6	T	µg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Total DDT	0.38	AUT	µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Total DDT	0.17	AUT	µg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Total DDT	1.6	T	µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Total DDT	0.17	AUT	µg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Total DDT	3.1	AUJT	µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Total DDT	54	AT	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Total DDT	2.2	UJ	µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Total DDT	0.44	J	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Total DDT	0.41	UJ	µg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Total DDx	61	JNT	µg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Total DDx	2	AJNT	µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Total DDx	2.63	JNT	µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Total DDx	50.5	JNT	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Total DDx	5.21	JNT	µg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Total DDx	0.542	JNT	µg/kg
LW2-C421-A	Sediment	4.45	N	0	1	Total DDx	31	NJT	µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Total DDx	92	JT	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Total DDx	6	JNT	µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Total DDx	12	JNT	µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Total DDx	6.6	JNT	µg/kg
LW2-G382	Sediment	2.65	N	0	1	Total DDx	9.8	JNT	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-G383	Sediment	4.35	N	0	0.7	Total DDx	4.93	JNT	µg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Total DDx	5.3	JT	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Total DDx	5.2	NJT	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Total DDx	62	JNT	µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Total DDx	43.9	JNT	µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Total DDx	0.069	UJT	µg/kg
LW2-G398	Sediment	8.99	N	0	1	Total DDx	1.51	JT	µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Total DDx	13	JNT	µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Total DDx	30.3	JNT	µg/kg
LW2-G416	Sediment	5.63	N	0	1	Total DDx	11.2	JNT	µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Total DDx	4.9	JNT	µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Total DDx	0.71	JNT	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Total DDx	5.67	JT	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Total DDx	7.13	JT	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Total DDx	2.1	JT	µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Total DDx	5.4	JT	µg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Total DDx	11	JT	µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Total DDx	2200	NJT	µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Total DDx	1400	JT	µg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Total DDx	25	JT	µg/kg
LW3-G706	Sediment	9.49	N	0	1	Total DDx	7.6	JNT	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Total DDx	1.3	JT	µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Total DDx	1.1	UT	µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	Total DDx	9.76	JNT	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Total DDx	10.8	JNT	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Total DDx	13	JNT	µg/kg
PDI-SC-S188-0TO1.5	Sediment	6.04	N	0	1	Total DDx	11.767	J	µg/kg
PDI-SC-S191-0TO2	Sediment	6.59	N	0	2	Total DDx	18.394	J	µg/kg
PDI-SC-S191-2TO4	Sediment	6.59	N	2	4	Total DDx	99.317	J	µg/kg
PDI-SC-S191-4TO6	Sediment	6.59	N	4	6	Total DDx	48.88	J	µg/kg
PDI-SC-S192-0TO1.5	Sediment	8.19	N	0	1	Total DDx	38.964	J	µg/kg
PDI-SC-S192-1.5TO3	Sediment	8.19	N	1	3	Total DDx	23.894	J	µg/kg
PDI-SC-S192-3TO4.2	Sediment	8.19	N	3	4	Total DDx	4.2656	J	µg/kg
PDI-SC-S229-0TO2	Sediment	2.78	N	0	2	Total DDx	10.534	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SC-S230-0TO2	Sediment	6.26	N	0	2	Total DDx	6.515	NJ	µg/kg
PDI-SC-S230-2TO4	Sediment	6.26	N	2	4	Total DDx	11.766	J	µg/kg
PDI-SC-S230-4TO6	Sediment	6.26	N	4	6	Total DDx	7.854	J	µg/kg
PDI-SG-S168	Sediment	11.36	N	0	30	Total DDx	3.695	J	µg/kg
PDI-SG-S175	Sediment	10.83	N	0	30	Total DDx	4.3	J	µg/kg
PDI-SG-S182	Sediment	1.15	N	0	30	Total DDx	20.94	J	µg/kg
PDI-SG-S183	Sediment	6.81	N	0	27	Total DDx	16.39	J	µg/kg
PDI-SG-S184	Sediment	14.30	N	0	28	Total DDx	989.05		µg/kg
PDI-SG-S191	Sediment	5.82	N	0	26	Total DDx	58.73	J	µg/kg
PDI-SG-S199	Sediment	7.43	N	0	18	Total DDx	2.7	U	µg/kg
PDI-SG-S201	Sediment	2.37	N	0	30	Total DDx	7.4	J	µg/kg
PDI-SG-S204	Sediment	0.96	N	0	17	Total DDx	2.15		µg/kg
PDI-SG-S211	Sediment	2.21	N	0	30	Total DDx	7.96	J	µg/kg
PDI-SG-S214	Sediment	14.23	N	0	15	Total DDx	0.94	U	µg/kg
PDI-SG-S215	Sediment	3.28	N	0	30	Total DDx	10.09	J	µg/kg
PDI-SG-S216	Sediment	1.43	N	0	30	Total DDx	7.615	J	µg/kg
PDI-SG-S220	Sediment	3.87	N	0	30	Total DDx	7.005	J	µg/kg
PDI-SG-S223	Sediment	4.48	N	0	23	Total DDx	8.765	J	µg/kg
PDI-SG-S224	Sediment	4.49	N	0	24	Total DDx	2.27	J	µg/kg
PDI-SG-S225	Sediment	1.58	N	0	25	Total DDx	9.51	J	µg/kg
PDI-SG-S229	Sediment	2.55	N	0	28	Total DDx	6.05	J	µg/kg
PDI-SG-S230	Sediment	6.15	N	0	27	Total DDx	7.81	J	µg/kg
PDI-SG-S231	Sediment	6.54	N	0	28	Total DDx	8.87	J	µg/kg
PDI-SG-S233	Sediment	8.78	N	0	24	Total DDx	6.75	J	µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Total DDx	21	AT	µg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Total DDx	10	AT	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Total DDx	14	AT	µg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Total DDx	6	AT	µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Total DDx	2	AUT	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Total DDx	150	T	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Total DDx	1.7	UJ	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Total DDx	2.2	UJ	µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Total DDx	2.3	UJ	µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Total DDx	0.49	UJ	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Total DDx	1.8	UJ	µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Total DDx	1.6	J	µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Total DDx	1.3	J	µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Total DDx	1.5	J	µg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Total DDx	1.6	J	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Total DDx	103	J	µg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Total DDx	30.7	J	µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Total DDx	289	J	µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Total DDx	36.2	J	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Total DDx	1.7	J	µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Total DDx	1.9	J	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Total DDx	9	J	µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Total DDx	52.6	J	µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Total DDx	7.9	J	µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Total DDx	2.8	J	µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Total DDx	14.8	J	µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Total DDx	2.3	J	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Total DDx	2.3	J	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Total DDx	4.3	J	µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Total DDx	9.1	J	µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Total DDx	11.7	J	µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Total DDx	9.6	J	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Total DDx	6.3	J	µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Total DDx	1.3	J	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Total DDx	0.39	U	µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Total DDx	3	J	µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Total DDx	1.1	J	µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Total DDx	0.53	UJ	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Total DDx	1.8	UJ	µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Total DDx	0.36	UJ	µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Total DDx	1.9		µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Total DDx	0.67	U	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Total DDx	0.88	U	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Total DDx	1.7	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Total DDx	2.8	J	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Total DDx	0.6	U	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Total DDx	1.1	J	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Total DDx	1.2	J	µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Total DDx	1.1	J	µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Total DDx	0.49	UJ	µg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Total DDx	0.52	UJ	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Total DDx	1.9		µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Total DDx	2.2		µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Total DDx	0.49	U	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Total DDx	0.51	U	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Total DDx	11	J	µg/kg
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	Total DDx	1.3		µg/kg
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	Total DDx	0.39	U	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Total DDx	0.54	U	µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Total DDx	0.43	U	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Total DDx	0.58	U	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Total DDx	0.45	U	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Total DDx	1.3	J	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Total DDx	11.9		µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Total DDx	0.41	UJ	µg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Total DDx	0.47	UJ	µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Total DDx	2.7	J	µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Total DDx	11.9	J	µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Total DDx	0.54	UJ	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Total DDx	0.93	J	µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Total DDx	1.8	J	µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Total DDx	0.37	U	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Total DDx	1.5	J	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Total DDx	0.55	U	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Total DDx	1.1	J	µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Total DDx	2.9	J	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Total DDx	25.5		µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Total DDx	10.8		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Total DDx	13.7		µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Total DDx	17.8		µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Total DDx	5.3		µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Total DDx	0.62	UJ	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Total DDx	0.65	UJ	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Total DDx	2.5	J	µg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Total DDx	0.59	UJ	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Total DDx	0.6	UJ	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Total DDx	0.5	UJ	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Total DDx	0.62	U	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Total DDx	0.66	U	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Total DDx	0.74	U	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Total DDx	0.69	U	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Total DDx	0.69	U	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Total DDx	0.54	U	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Total DDx	0.67	U	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Total DDx	0.62	U	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Total DDx	0.64	U	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Total DDx	0.65	U	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Total DDx	0.73	U	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Total DDx	0.53	U	µg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Total DDx	0.52	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Total DDx	0.52	U	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Total DDx	0.53	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Total DDx	0.65	U	µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Total DDx	0.55	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Total DDx	0.52	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Total DDx	0.56	U	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Total DDx	0.59	U	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Total DDx	0.54	U	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Total DDx	0.49	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Total DDx	0.51	U	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Total DDx	0.6	U	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Total DDx	0.66	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Total DDx	0.58	U	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Total DDx	0.62	U	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Total DDx	0.55	U	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Total DDx	0.61	U	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Total DDx	1.7	J	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Total DDx	0.49	U	µg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Total DDx	0.68	UJ	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Total DDx	0.73	UJ	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Total DDx	0.77	UJ	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Total DDx	4.3	J	µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Total DDx	0.58	U	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Total DDx	30.4	J	µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Total DDx	5.2		µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Total DDx	30.3		µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Total DDx	4.6		µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Total DDx	0.59	U	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Total DDx	0.75	U	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Total DDx	45.5		µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Total DDx	25.3		µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Total DDx	2.1		µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Total DDx	0.76	U	µg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Total DDx	1.8	J	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Total DDx	3		µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Total DDx	4.7		µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Total DDx	7.1		µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Total DDx	3.4	J	µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Total DDx	4.7	J	µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Total DDx	9.5		µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Total DDx	10.4		µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Total DDx	15.2		µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Total DDx	15.5		µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Total DDx	9.9	J	µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Total DDx	8.3	J	µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Total DDx	11.8	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Total DDx	14.9		µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Total DDx	5.5		µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Total DDx	19.6		µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Total DDx	17.3		µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Total DDx	12.4		µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Total DDx	5.9		µg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Total DDx	8.2		µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Total DDx	12.6		µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Total DDx	10		µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Total DDx	11.8		µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Total DDx	19.5		µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Total DDx	12	UJ	µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Total DDx	12.2	UJ	µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Total DDx	12.6	UJ	µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Total DDx	9.3	UJ	µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Total DDx	9.5	UJ	µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Total DDx	9.3	UJ	µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Total DDx	16.8	UJ	µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Total DDx	8.8	UJ	µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Total DDx	4.9		µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Total DDx	4		µg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Total DDx	9.6	J	µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Total DDx	6.8		µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Total DDx	10.8	J	µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Total DDx	9.4	J	µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Total DDx	13.6		µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Total DDx	24.8		µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Total DDx	9.2	UJ	µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Total DDx	10.6	UJ	µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Total DDx	11.6	UJ	µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Total DDx	13.2	UJ	µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Total DDx	12.4	UJ	µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Total DDx	10.3	UJ	µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Total DDx	15.7	UJ	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Total DDx	13.8	UJ	µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Total DDx	10.9	UJ	µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Total DDx	10.2	UJ	µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Total DDx	13.3		µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Total DDx	15.5		µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Total DDx	6.8	J	µg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Total DDx	11.8		µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Total DDx	4.4		µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Total DDx	9.1	J	µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Total DDx	0.44	U	µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Total DDx	9.8		µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Total DDx	6.1		µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Total DDx	5.4	J	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Total DDx	0.47	U	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Total DDx	0.59	U	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Total DDx	7.7		µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Total DDx	8		µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Total DDx	6.9		µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Total DDx	4.4		µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Total DDx	3.6		µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Total DDx	10.9		µg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Total DDx	9.5		µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Total DDx	11.5		µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Total DDx	10.2		µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Total DDx	4.9		µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Total DDx	8	UJ	µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Total DDx	7.6		µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Total DDx	4.7		µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Total DDx	10.3		µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Total DDx	27.6		µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Total DDx	39.5	J	µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Total DDx	7.4		µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Total DDx	3.6	J	µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Total DDx	8.8		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Total DDx	10.6		µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Total DDx	11.6		µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Total DDx	9.3		µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Total DDx	2.4	J	µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Total DDx	6.4		µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Total DDx	0.64	U	µg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Total DDx	0.62	U	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Total DDx	0.55	U	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Total DDx	16.1	J	µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Total DDx	37.5		µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Total DDx	7.8	UJ	µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Total DDx	9.6		µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Total DDx	13.4	J	µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Total DDx	38.8		µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Total DDx	55.3		µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Total DDx	10.4		µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Total DDx	1.7		µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Total DDx	0.72	U	µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Total DDx	17.7	J	µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Total DDx	4		µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Total DDx	27.5	J	µg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Total DDx	3		µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Total DDx	6.1		µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Total DDx	25.2		µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Total DDx	19	J	µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Total DDx	141	J	µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Total DDx	126	J	µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Total DDx	246	J	µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Total DDx	1.8	J	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Total DDx	0.55	U	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Total DDx	212		µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Total DDx	15.2		µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Total DDx	4.7		µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Total DDx	1.1	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Total DDx	0.58	UJ	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Total DDx	0.53	U	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Total DDx	634		µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Total DDx	46.7	J	µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Total DDx	589		µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Total DDx	1220		µg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Total DDx	135		µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Total DDx	23.5		µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Total DDx	3		µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Total DDx	0.65	U	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Total DDx	0.57	U	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Total DDx	225		µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Total DDx	119	J	µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Total DDx	64.7	UJ	µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Total DDx	184	J	µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Total DDx	45.9	J	µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Total DDx	13.8	UJ	µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Total DDx	2.3	J	µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Total DDx	0.47	U	µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Total DDx	10.8	J	µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Total DDx	26.6	J	µg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Total DDx	125	J	µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Total DDx	14	J	µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Total DDx	112	J	µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Total DDx	110	J	µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Total DDx	82		µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Total DDx	12.9	J	µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Total DDx	0.64	U	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Total DDx	131		µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Total DDx	0.61	U	µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Total DDx	0.49	U	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Total DDx	529	J	µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Total DDx	106	J	µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Total DDx	95.3	UJ	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Total DDx	84.5	UJ	µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Total DDx	91.7	UJ	µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Total DDx	1.7		µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Total DDx	11.8		µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Total DDx	121		µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Total DDx	79.2		µg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Total DDx	5.5	J	µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Total DDx	12.1	J	µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Total DDx	45.6	J	µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Total DDx	753	J	µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Total DDx	234	J	µg/kg
SIB-SC-J06-8-9-07/26/2022	Sediment	16.33	N	8	9	Total DDx	133	J	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Total DDx	4.5		µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Total DDx	6	J	µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Total DDx	6.2	J	µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Total DDx	11.4	J	µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Total DDx	21.6		µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Total DDx	4.9		µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Total DDx	23		µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Total DDx	20.8		µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Total DDx	7		µg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Total DDx	4.1		µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Total DDx	1.3	J	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Total DDx	0.51	U	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Total DDx	0.6	U	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Total DDx	0.44	U	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Total DDx	8.1		µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Total DDx	17.8		µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Total DDx	2.8	J	µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Total DDx	0.56	U	µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Total DDx	0.47	U	µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Total DDx	25.4		µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Total DDx	24.5		µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Total DDx	36.1		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Total DDx	2.6		µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Total DDx	1.4	J	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Total DDx	0.46	U	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Total DDx	4.7	J	µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Total DDx	1.3	J	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Total DDx	11.3	J	µg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Total DDx	5.4		µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Total DDx	10.1	J	µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Total DDx	1.4	J	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Total DDx	0.58	UJ	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Total DDx	9.2		µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Total DDx	3.8		µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Total DDx	4.1	J	µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Total DDx	9.1		µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Total DDx	6.4		µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Total DDx	3.3		µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Total DDx	4		µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Total DDx	6.6		µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Total DDx	11.1		µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Total DDx	1.9		µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Total DDx	7.6	UJ	µg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Total DDx	4.2	UJ	µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Total DDx	7.8	UJ	µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Total DDx	5.2	UJ	µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Total DDx	15	JT	µg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Total DDx	5.15	UT	µg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Total DDx	11	JT	µg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Total DDx	4.9	UT	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Total DDx	9.55	JT	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Total DDx	10.6	JT	µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Total DDx	4.97	UT	µg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Total DDx	2.53	UT	µg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Total DDx	2.7	UT	µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Total DDx	3.9	AT	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WLCPSK094-A	Sediment	10.57	N	0	2.9	Total DDx	1.8	AJT	µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Total DDx	2.9	AJT	µg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Total DDx	3.3	AJT	µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Total DDx	2.9	AJT	µg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Total DDx	6.2	AJT	µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Total DDx	110	AJT	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Total DDx	2.8	UJ	µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Total DDx	1.9	J	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Total DDx	0.41	UJ	µg/kg
514-0TO29-101618	Sediment	3.32	N	0	1	Total PAHs	1220.3	JT	µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Total PAHs	2.085	JT	µg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Total PAHs	254.3	JT	µg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Total PAHs	221.63	JT	µg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Total PAHs	1395	T	µg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Total PAHs	1233.4	JT	µg/kg
B-9.00-0TO29-102418	Sediment	3.03	N	0	1	Total PAHs	1581.25	JT	µg/kg
C-8.94-0TO27-102418	Sediment	6.38	N	0	0.9	Total PAHs	1744.9	JT	µg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Total PAHs	1431.4	JT	µg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Total PAHs	1695.9	T	µg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Total PAHs	1184.2	JT	µg/kg
D-8.83-0TO25-102418	Sediment	2.42	N	0	0.8	Total PAHs	1900.5	T	µg/kg
D-8.90-0TO27-102418	Sediment	5.15	N	0	0.9	Total PAHs	1900.8	T	µg/kg
D-8.90-SC-00TO10-102318	Sediment	5.11	N	0	1	Total PAHs	779.5	JT	µg/kg
D-8.90-SC-10TO20-102318	Sediment	5.11	N	1	2	Total PAHs	2251	JT	µg/kg
D-8.90-SC-20TO40-102318	Sediment	5.11	N	2	4	Total PAHs	1406	JT	µg/kg
E-8.99-0TO28-102418	Sediment	6.32	N	0	0.9	Total PAHs	1799.5	JT	µg/kg
E-9.02-0TO26-102418	Sediment	2.84	N	0	0.9	Total PAHs	1625	JT	µg/kg
E-9.02-SC-00TO10-102318	Sediment	6.38	N	0	1	Total PAHs	527.7	JT	µg/kg
E-9.02-SC-10TO20-102318	Sediment	6.38	N	1	2	Total PAHs	1002	JT	µg/kg
E-9.02-SC-20TO40-102318	Sediment	6.38	N	2	4	Total PAHs	11679	JT	µg/kg
E-9.02-SC-40TO60-102318	Sediment	6.38	N	4	6	Total PAHs	1160	JT	µg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Total PAHs	2248.2	T	µg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Total PAHs	473.4	JT	µg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	Total PAHs	3713.5	T	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Total PAHs	871	JT	µg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Total PAHs	3534	JT	µg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	Total PAHs	1701.6	T	µg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Total PAHs	1264.4	JT	µg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Total PAHs	5515	JT	µg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	Total PAHs	680.8	T	µg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	Total PAHs	112.63	JT	µg/kg
J3-SC1B-20TO30-82719	Sediment	5.73	N	2	3	Total PAHs	947.5	JT	µg/kg
J3-SC1B-30TO40-82719	Sediment	5.73	N	3	4	Total PAHs	2024	JT	µg/kg
J3-SC1B-40TO50-82719	Sediment	5.73	N	4	5	Total PAHs	672.8	JT	µg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Total PAHs	2383	T	µg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	Total PAHs	1634.115	JT	µg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	Total PAHs	860.2	T	µg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	Total PAHs	4706	T	µg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	Total PAHs	1710	T	µg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	Total PAHs	2638.2	JT	µg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Total PAHs	153.78	JT	µg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Total PAHs	1326.7	T	µg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	Total PAHs	461.6	JT	µg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	Total PAHs	120.85	JT	µg/kg
L3-SC1B-20TO30-82619	Sediment	7.22	N	2	3	Total PAHs	163.87	JT	µg/kg
L3-SC1B-30TO40-82619	Sediment	7.22	N	3	4	Total PAHs	97.59	JT	µg/kg
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	Total PAHs	164.4	JT	µg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	Total PAHs	2021	JT	µg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Total PAHs	2400	T	µg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Total PAHs	5900	T	µg/kg
LW2-C364-D	Sediment	12.48	N	6	7.4	Total PAHs	2100	T	µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Total PAHs	580	T	µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Total PAHs	33000	T	µg/kg
LW2-C388-B	Sediment	6.46	N	1	5.1	Total PAHs	3.6	UT	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Total PAHs	11	JT	µg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Total PAHs	2	UT	µg/kg
LW2-C402-B	Sediment	5.83	N	1	2.1	Total PAHs	2000	JT	µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Total PAHs	7700	T	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-C421-C	Sediment	4.45	N	2	4	Total PAHs	780	T	µg/kg
LW2-C426-A	Sediment	6.87	N	0	1	Total PAHs	510	JT	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Total PAHs	640	T	µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Total PAHs	1000	T	µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Total PAHs	9300	T	µg/kg
LW2-G382	Sediment	2.65	N	0	1	Total PAHs	2100	T	µg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Total PAHs	530	JT	µg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Total PAHs	400	JT	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Total PAHs	680	JT	µg/kg
LW2-G388	Sediment	7.36	N	0	0.9	Total PAHs	330	JT	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Total PAHs	16000	T	µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Total PAHs	17000	JT	µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Total PAHs	42	JT	µg/kg
LW2-G398	Sediment	8.99	N	0	1	Total PAHs	430	T	µg/kg
LW2-G402	Sediment	4.06	N	0	1	Total PAHs	2500	T	µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Total PAHs	1300	T	µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Total PAHs	12000	T	µg/kg
LW2-G416	Sediment	5.63	N	0	1	Total PAHs	5000	T	µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Total PAHs	200	JT	µg/kg
LW2-G421	Sediment	4.56	N	0	1	Total PAHs	6400	T	µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Total PAHs	250	JT	µg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Total PAHs	220	JT	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Total PAHs	940	JT	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Total PAHs	2200	T	µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Total PAHs	170	JT	µg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Total PAHs	420	T	µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Total PAHs	49000	T	µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Total PAHs	55000	T	µg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Total PAHs	1900	T	µg/kg
LW3-G706	Sediment	9.49	N	0	1	Total PAHs	270	JT	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Total PAHs	7600	JT	µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Total PAHs	230	JT	µg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	Total PAHs	23.975	JT	µg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Total PAHs	1285.6	T	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Total PAHs	2311.7	T	µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	Total PAHs	690	T	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Total PAHs	400	T	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Total PAHs	410	T	µg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Total PAHs	159.39	JT	µg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Total PAHs	1434.99	JT	µg/kg
PSYD&M97DM16DM16	Sediment	0.66	N	0	0.3	Total PAHs	2600	T	µg/kg
PSYD&M97DM20DM20C	Sediment	10.29	N	3.5	4.5	Total PAHs	2100	T	µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Total PAHs	6700	T	µg/kg
PSYSEA98PSY05PSY05S	Sediment	7.29	N	0	0.3	Total PAHs	1900	T	µg/kg
PSYSEA98PSY06PSY06S	Sediment	14.49	N	0	0.3	Total PAHs	290	T	µg/kg
PSYSEA98PSY07PSY07S	Sediment	1.44	N	0	0.3	Total PAHs	1800	T	µg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Total PAHs	12000	T	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Total PAHs	7300	T	µg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Total PAHs	3400	T	µg/kg
PSYSEA98PSY10PSY10S	Sediment	1.89	N	0	0.3	Total PAHs	4300	T	µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Total PAHs	20000	T	µg/kg
PSYSEA98PSY14PSY14S	Sediment	2.71	N	0	0.3	Total PAHs	2000	T	µg/kg
PSYSEA98PSY17PSY17S	Sediment	3.87	N	0	0.3	Total PAHs	2000	T	µg/kg
PSYSEA98PSY18CPSY18A	Sediment	6.14	N	0	4	Total PAHs	4400	T	µg/kg
PSYSEA98PSY18PSY18S	Sediment	5.56	N	0	0.3	Total PAHs	4600	T	µg/kg
PSYSEA98PSY20PSY20S	Sediment	0.48	N	0	0.3	Total PAHs	1900	T	µg/kg
PSYSEA98PSY21PSY21S	Sediment	0.83	N	0	0.3	Total PAHs	2400	T	µg/kg
PSYSEA98PSY23CPSY23A	Sediment	9.68	N	0	4	Total PAHs	5800	T	µg/kg
PSYSEA98PSY23CPSY23B	Sediment	9.68	N	4	8	Total PAHs	10	UT	µg/kg
PSYSEA98PSY23PSY23S	Sediment	10.52	N	0	0.3	Total PAHs	1200	T	µg/kg
PSYSEA98PSY25PSY25S	Sediment	4.12	N	0	0.3	Total PAHs	720	T	µg/kg
PSYSEA98PSY26PSY26S	Sediment	0.44	N	0	0.3	Total PAHs	9968	T	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Total PAHs	6100	T	µg/kg
PSYSEA98PSY28PSY28S	Sediment	0.33	N	0	0.3	Total PAHs	220	T	µg/kg
PSYSEA98PSY30PSY30S	Sediment	9.69	N	0	0.3	Total PAHs	1800	T	µg/kg
PSYSEA98PSY33PSY33S	Sediment	0.80	N	0	0.3	Total PAHs	500	T	µg/kg
PSYSEA98PSY43PSY43S	Sediment	0.82	N	0	0.3	Total PAHs	320	T	µg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Total PAHs	101.33	JT	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Total PAHs	64.835	JT	µg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Total PAHs	480.8	T	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Total PAHs	244	J	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Total PAHs	358	J	µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Total PAHs	1230	J	µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Total PAHs	36.8	J	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Total PAHs	1970	J	µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Total PAHs	310	J	µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Total PAHs	157	J	µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Total PAHs	590	J	µg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Total PAHs	168	J	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Total PAHs	709	J	µg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Total PAHs	6530	J	µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Total PAHs	3670	J	µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Total PAHs	13600	J	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Total PAHs	1160		µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Total PAHs	3620	J	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Total PAHs	1520		µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Total PAHs	187000		µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Total PAHs	619		µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Total PAHs	1460		µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Total PAHs	712		µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Total PAHs	272	J	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Total PAHs	167	J	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Total PAHs	5340	J	µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Total PAHs	1100	J	µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Total PAHs	492	J	µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Total PAHs	530	J	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Total PAHs	263	J	µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Total PAHs	47.3	J	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Total PAHs	322	J	µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Total PAHs	3310	J	µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Total PAHs	114	J	µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Total PAHs	43.3	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Total PAHs	806	J	µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Total PAHs	1880	J	µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Total PAHs	37.7	J	µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Total PAHs	12.6	J	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Total PAHs	36.9	J	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Total PAHs	566	J	µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Total PAHs	302	J	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Total PAHs	28.2	J	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Total PAHs	176	J	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Total PAHs	349	J	µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Total PAHs	146	J	µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Total PAHs	938	J	µg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Total PAHs	39.4	J	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Total PAHs	56.2	J	µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Total PAHs	1600	J	µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Total PAHs	144	J	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Total PAHs	48.1	J	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Total PAHs	199	J	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Total PAHs	161	J	µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Total PAHs	41.2	J	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Total PAHs	1940	J	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Total PAHs	22	J	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Total PAHs	145	J	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Total PAHs	120	J	µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Total PAHs	126	J	µg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Total PAHs	212	J	µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Total PAHs	16300		µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Total PAHs	458000		µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Total PAHs	46.3	J	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Total PAHs	430	J	µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Total PAHs	2320		µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Total PAHs	31.4	J	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Total PAHs	326	J	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Total PAHs	49.2	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Total PAHs	314	J	µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Total PAHs	19.2	J	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Total PAHs	1950		µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Total PAHs	980	J	µg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Total PAHs	1180	J	µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Total PAHs	1060	J	µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Total PAHs	917	J	µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Total PAHs	20.7	J	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Total PAHs	14.8	J	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Total PAHs	12.2	J	µg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Total PAHs	11.1	J	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Total PAHs	12.4	J	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Total PAHs	13	J	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Total PAHs	9.9	J	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Total PAHs	8.6	J	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Total PAHs	7.5	J	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Total PAHs	10	J	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Total PAHs	6.4	J	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Total PAHs	24.7	J	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Total PAHs	11.5	J	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Total PAHs	5.2	J	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Total PAHs	5.4	J	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Total PAHs	6	J	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Total PAHs	4.5	J	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Total PAHs	0.84	U	µg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Total PAHs	0.88	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Total PAHs	5.9	J	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Total PAHs	0.92	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Total PAHs	4.6	J	µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Total PAHs	0.9	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Total PAHs	0.9	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Total PAHs	6	J	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Total PAHs	2500	J	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Total PAHs	9.4	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Total PAHs	0.91	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Total PAHs	4.9	J	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Total PAHs	5.3	J	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Total PAHs	6.1	J	µg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Total PAHs	7.6	J	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Total PAHs	6.3	J	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Total PAHs	5.3	J	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Total PAHs	5.3	J	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Total PAHs	5.4	J	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Total PAHs	5.2	J	µg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Total PAHs	25	J	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Total PAHs	6	J	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Total PAHs	5.8	J	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Total PAHs	1.1	UJ	µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Total PAHs	5.7	J	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Total PAHs	3400		µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Total PAHs	137	J	µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Total PAHs	851	J	µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Total PAHs	465	J	µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Total PAHs	240	J	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Total PAHs	207	J	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Total PAHs	936	J	µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Total PAHs	966	J	µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Total PAHs	1470	J	µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Total PAHs	785	J	µg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Total PAHs	385	J	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Total PAHs	1060	J	µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Total PAHs	2050		µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Total PAHs	1820		µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Total PAHs	1260	J	µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Total PAHs	1740	J	µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Total PAHs	1540		µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Total PAHs	2640		µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Total PAHs	2560		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Total PAHs	2410		µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Total PAHs	1670	J	µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Total PAHs	1760	J	µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Total PAHs	2780		µg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Total PAHs	3710		µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Total PAHs	2950		µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Total PAHs	3340	J	µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Total PAHs	3160	J	µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Total PAHs	1110	J	µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Total PAHs	2410	J	µg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Total PAHs	1020	J	µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Total PAHs	1810	J	µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Total PAHs	946	J	µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Total PAHs	4430		µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Total PAHs	5870		µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Total PAHs	2500		µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Total PAHs	2400		µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Total PAHs	1010	J	µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Total PAHs	1400		µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Total PAHs	2070		µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Total PAHs	3820		µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Total PAHs	2640		µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Total PAHs	981	J	µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Total PAHs	962	J	µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Total PAHs	1170	J	µg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Total PAHs	2540		µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Total PAHs	1480	J	µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Total PAHs	2450	J	µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Total PAHs	2820	J	µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Total PAHs	2650	J	µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Total PAHs	4870	J	µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Total PAHs	1720		µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Total PAHs	3500		µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Total PAHs	1950		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Total PAHs	2410		µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Total PAHs	1680		µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Total PAHs	1890		µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Total PAHs	3230		µg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Total PAHs	1750		µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Total PAHs	1030	J	µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Total PAHs	1930		µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Total PAHs	2670		µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Total PAHs	1980		µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Total PAHs	8190		µg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Total PAHs	2000		µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Total PAHs	810	J	µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Total PAHs	3740		µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Total PAHs	4050	J	µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Total PAHs	1820		µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Total PAHs	1150	J	µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Total PAHs	497	J	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Total PAHs	17.4	J	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Total PAHs	8.1	J	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Total PAHs	1800	J	µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Total PAHs	1700	J	µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Total PAHs	1210	J	µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Total PAHs	1090	J	µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Total PAHs	1020	J	µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Total PAHs	878	J	µg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Total PAHs	1060	J	µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Total PAHs	2890		µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Total PAHs	1120	J	µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Total PAHs	650	J	µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Total PAHs	1160	J	µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Total PAHs	1740	UJ	µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Total PAHs	1060		µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Total PAHs	2070		µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Total PAHs	3510		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Total PAHs	3030	UJ	µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Total PAHs	2240		µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Total PAHs	2660	J	µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Total PAHs	3780		µg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Total PAHs	1740		µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Total PAHs	2310		µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Total PAHs	1070		µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Total PAHs	244	J	µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Total PAHs	2040		µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Total PAHs	291	J	µg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Total PAHs	14.9	J	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Total PAHs	4.8	J	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Total PAHs	811		µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Total PAHs	1500		µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Total PAHs	7930		µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Total PAHs	4730		µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Total PAHs	2070		µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Total PAHs	1920		µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Total PAHs	2340		µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Total PAHs	1390		µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Total PAHs	2690		µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Total PAHs	1620		µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Total PAHs	1800		µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Total PAHs	1790	J	µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Total PAHs	3610		µg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Total PAHs	1260	J	µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Total PAHs	889	J	µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Total PAHs	57600		µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Total PAHs	3720		µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Total PAHs	33300		µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Total PAHs	30600		µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Total PAHs	1730		µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Total PAHs	258	J	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Total PAHs	0.79	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Total PAHs	20700	UJ	µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Total PAHs	5910	UJ	µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Total PAHs	201	J	µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Total PAHs	166	J	µg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Total PAHs	284	J	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Total PAHs	4.3	J	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Total PAHs	33600		µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Total PAHs	27400	UJ	µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Total PAHs	39400	J	µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Total PAHs	45000	UJ	µg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Total PAHs	29800	UJ	µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Total PAHs	2410	UJ	µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Total PAHs	405	J	µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Total PAHs	8.3	J	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Total PAHs	10.4	J	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Total PAHs	22300		µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Total PAHs	9280		µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Total PAHs	23400		µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Total PAHs	21200		µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Total PAHs	36200		µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Total PAHs	5560		µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Total PAHs	280	J	µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Total PAHs	150	J	µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Total PAHs	4430		µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Total PAHs	1600		µg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Total PAHs	28600		µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Total PAHs	25000		µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Total PAHs	28000		µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Total PAHs	25700		µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Total PAHs	25800		µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Total PAHs	1430		µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Total PAHs	10.7	J	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Total PAHs	43300		µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Total PAHs	418		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Total PAHs	66.1	J	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Total PAHs	59400		µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Total PAHs	17800		µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Total PAHs	36100		µg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Total PAHs	39300		µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Total PAHs	37900		µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Total PAHs	682		µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Total PAHs	2890		µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Total PAHs	90800		µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Total PAHs	11500		µg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Total PAHs	4380		µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Total PAHs	31000		µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Total PAHs	27400		µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Total PAHs	32200		µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Total PAHs	55400		µg/kg
SIB-SC-J06-8-9-07/26/2022	Sediment	16.33	N	8	9	Total PAHs	58700	J	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Total PAHs	3120		µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Total PAHs	2820		µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Total PAHs	3210		µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Total PAHs	1460	J	µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Total PAHs	7000		µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Total PAHs	716	J	µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Total PAHs	3080	UJ	µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Total PAHs	1620	J	µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Total PAHs	1150		µg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Total PAHs	110	J	µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Total PAHs	206	J	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Total PAHs	706	J	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Total PAHs	603	J	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Total PAHs	7.6	J	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Total PAHs	9380		µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Total PAHs	9060		µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Total PAHs	3310		µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Total PAHs	107	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Total PAHs	23.2	J	µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Total PAHs	6590		µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Total PAHs	5130		µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Total PAHs	2970		µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Total PAHs	304	J	µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Total PAHs	87.7	J	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Total PAHs	53.4	J	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Total PAHs	292	J	µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Total PAHs	48.6	J	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Total PAHs	2620		µg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Total PAHs	43600		µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Total PAHs	2830	J	µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Total PAHs	73.4	J	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Total PAHs	6.1	J	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Total PAHs	668		µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Total PAHs	330	J	µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Total PAHs	326	J	µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Total PAHs	683		µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Total PAHs	153	J	µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Total PAHs	629		µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Total PAHs	2470		µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Total PAHs	18800		µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Total PAHs	11000		µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Total PAHs	71.5	J	µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Total PAHs	2390		µg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Total PAHs	19100		µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Total PAHs	52500		µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Total PAHs	27700		µg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Total PAHs	5.99	JT	µg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Total PAHs	993.8	T	µg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Total PAHs	77.17	JT	µg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Total PAHs	1441.4	JT	µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Total PAHs	3240	JT	µg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Total PAHs	230	JT	µg/kg

Attachment B
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Total PAHs	3200	JT	µg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Total PAHs	3500	JT	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Total PAHs	120	JT	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Total PAHs	1400	JT	µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Total PAHs	530	JT	µg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Total PAHs	193	JT	µg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Total PAHs	1880	JT	µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Total PAHs	43000	T	µg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Total PAHs	920	JT	µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Total PAHs	280	JT	µg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Total PAHs	2000	JT	µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Total PAHs	310	JT	µg/kg
WR-WSI98SD1300	Sediment	2.09	N	0	0.3	Total PAHs	390	T	µg/kg
WR-WSI98SD1320	Sediment	1.21	N	0	0.3	Total PAHs	420	T	µg/kg
WR-WSI98SD1330	Sediment	5.72	N	0	0.3	Total PAHs	4700	T	µg/kg
WR-WSI98SD1330000A	Sediment	5.72	N	0	3	Total PAHs	17000	T	µg/kg
WR-WSI98SD1340	Sediment	2.58	N	0	0.3	Total PAHs	1900	T	µg/kg
WR-WSI98SD1360	Sediment	2.50	N	0	0.3	Total PAHs	1200	T	µg/kg
WR-WSI98SD1390	Sediment	3.67	N	0	0.3	Total PAHs	2000	JT	µg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Total PAHs	3300	T	µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Total PAHs	1500	T	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Total PAHs	282	J	µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Total PAHs	497	J	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Total PAHs	1640		µg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Total PCB - Congeners	11000	JT	µg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Total PCB - Congeners	97	JT	µg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Total PCB - Congeners	130	JT	µg/kg
LW2-G382	Sediment	2.65	N	0	1	Total PCB - Congeners	470	T	µg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Total PCB - Congeners	730	T	µg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Total PCB - Congeners	13000	JT	µg/kg
LW2-G402	Sediment	4.06	N	0	1	Total PCB - Congeners	660	T	µg/kg
LW2-G416	Sediment	5.63	N	0	1	Total PCB - Congeners	120	T	µg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Total PCB - Congeners	90	JT	µg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Total PCB - Congeners	11	JT	µg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-GBT022	Sediment	0.30	N	0	0.3	Total PCB - Congeners	220	T	µg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Total PCB - Congeners	82	JT	µg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Total PCB - Congeners	600	JT	µg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Total PCB - Congeners	7000	JT	µg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Total PCB - Congeners	6900	JT	µg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Total PCB - Congeners	200	JT	µg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Total PCB - Congeners	9.4	JT	µg/kg
PDI-SG-S168	Sediment	11.36	N	0	30	Total PCB - Congeners	12.2996	NJ	µg/kg
PDI-SG-S175	Sediment	10.83	N	0	30	Total PCB - Congeners	8.4216	NJ	µg/kg
PDI-SG-S182	Sediment	1.15	N	0	30	Total PCB - Congeners	238.4529	NJ	µg/kg
PDI-SG-S183	Sediment	6.81	N	0	27	Total PCB - Congeners	865.776	NJ	µg/kg
PDI-SG-S184	Sediment	14.30	N	0	28	Total PCB - Congeners	2955.22	NJ	µg/kg
PDI-SG-S191	Sediment	5.82	N	0	26	Total PCB - Congeners	3898.33	NJ	µg/kg
PDI-SG-S199	Sediment	7.43	N	0	18	Total PCB - Congeners	21.7893	NJ	µg/kg
PDI-SG-S201	Sediment	2.37	N	0	30	Total PCB - Congeners	420.062	NJ	µg/kg
PDI-SG-S204	Sediment	0.96	N	0	17	Total PCB - Congeners	92.5335	NJ	µg/kg
PDI-SG-S211	Sediment	2.21	N	0	30	Total PCB - Congeners	128.1158	NJ	µg/kg
PDI-SG-S214	Sediment	14.23	N	0	15	Total PCB - Congeners	0.59565	NJ	µg/kg
PDI-SG-S215	Sediment	3.28	N	0	30	Total PCB - Congeners	134.844	NJ	µg/kg
PDI-SG-S216	Sediment	1.43	N	0	30	Total PCB - Congeners	147.6248	NJ	µg/kg
PDI-SG-S220	Sediment	3.87	N	0	30	Total PCB - Congeners	80.1619	NJ	µg/kg
PDI-SG-S223	Sediment	4.48	N	0	23	Total PCB - Congeners	154.7395	NJ	µg/kg
PDI-SG-S224	Sediment	4.49	N	0	24	Total PCB - Congeners	23.8822	NJ	µg/kg
PDI-SG-S225	Sediment	1.58	N	0	25	Total PCB - Congeners	115.7213	NJ	µg/kg
PDI-SG-S229	Sediment	2.55	N	0	28	Total PCB - Congeners	74.135	NJ	µg/kg
PDI-SG-S230	Sediment	6.15	N	0	27	Total PCB - Congeners	81.9301	NJ	µg/kg
PDI-SG-S231	Sediment	6.54	N	0	28	Total PCB - Congeners	86.7487	NJ	µg/kg
PDI-SG-S233	Sediment	8.78	N	0	24	Total PCB - Congeners	84.2425	NJ	µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Total PCB - Congeners	161000		pg/g
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Total PCB - Congeners	102000		pg/g
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Total PCB - Congeners	1480000	J	pg/g
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Total PCB - Congeners	522000	J	pg/g
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Total PCB - Congeners	1850	J	pg/g
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	Total PCB - Congeners	1020	J	pg/g

Attachment B
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Total PCB - Congeners	8130		pg/g
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Total PCB - Congeners	70000		pg/g
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Total PCB - Congeners	9340	J	pg/g
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Total PCB - Congeners	12700	J	pg/g
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Total PCB - Congeners	2180	J	pg/g
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Total PCB - Congeners	1480	J	pg/g
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Total PCB - Congeners	8070	J	pg/g
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	Total PCB - Congeners	10600		pg/g
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Total PCB - Congeners	5120	J	pg/g
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	Total PCB - Congeners	984	J	pg/g
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Total PCB - Congeners	5730	J	pg/g
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	Total PCB - Congeners	658	J	pg/g
SIB-103-OHW-1-2-10062022	Sediment	3.26	N	1	2	Total PCB - Congeners	611	J	pg/g
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	Total PCB - Congeners	761	J	pg/g
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Total PCB - Congeners	8830	J	pg/g
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Total PCB - Congeners	6430	J	pg/g
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Total PCB - Congeners	24400	J	pg/g
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Total PCB - Congeners	3600		pg/g
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Total PCB - Congeners	9840		pg/g
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Total PCB - Congeners	68200	J	pg/g
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Total PCB - Congeners	1650	J	pg/g
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Total PCB - Congeners	241	J	pg/g
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Total PCB - Congeners	327	J	pg/g
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Total PCB - Congeners	255	J	pg/g
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Total PCB - Congeners	220	J	pg/g
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Total PCB - Congeners	219	J	pg/g
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Total PCB - Congeners	1020	J	pg/g
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Total PCB - Congeners	585	J	pg/g
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Total PCB - Congeners	1340	J	pg/g
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Total PCB - Congeners	650	J	pg/g
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Total PCB - Congeners	465	J	pg/g
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Total PCB - Congeners	497	J	pg/g
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Total PCB - Congeners	113000	J	pg/g
SIB-SC-C25-0-1-07/23/2022	Sediment	4.21	N	0	1	Total PCB - Congeners	85000	J	pg/g

Attachment B
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C25-1-2-07/23/2022	Sediment	4.21	N	1	2	Total PCB - Congeners	173000	J	pg/g
SIB-SC-C25-2-3-07/23/2022	Sediment	4.21	N	2	3	Total PCB - Congeners	785000	J	pg/g
SIB-SC-C25-3-4-07/23/2022	Sediment	4.21	N	3	4	Total PCB - Congeners	582000	J	pg/g
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Total PCB - Congeners	3130000	J	pg/g
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Total PCB - Congeners	425000	J	pg/g
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Total PCB - Congeners	812000	J	pg/g
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Total PCB - Congeners	33300	J	pg/g
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Total PCB - Congeners	820	J	pg/g
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Total PCB - Congeners	396	J	pg/g
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Total PCB - Congeners	310000	J	pg/g
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Total PCB - Congeners	270	J	pg/g
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Total PCB - Congeners	130000	J	pg/g
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Total PCB - Congeners	5470000	J	pg/g
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Total PCB - Congeners	345000	J	pg/g
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Total PCB - Congeners	5420000	J	pg/g
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Total PCB - Congeners	153000	J	pg/g
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Total PCB - Congeners	118000	J	pg/g
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Total PCB - Congeners	262000	J	pg/g
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Total PCB - Congeners	2720000	J	pg/g
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Total PCB - Congeners	41800	J	pg/g
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Total PCB - Congeners	42600	J	pg/g
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Total PCB - Congeners	65500	J	pg/g
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Total PCB - Congeners	246000	J	pg/g
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Total PCB - Congeners	937000	J	pg/g
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Total PCB - Congeners	1780	J	pg/g
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Total PCB - Congeners	458	J	pg/g
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Total PCB - Congeners	27400	J	pg/g
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Total PCB - Congeners	3210	J	pg/g
LW2-C364-B	Sediment	12.48	N	1	2.5	Total PCBs - Aroclors	400	JT	µg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Total PCBs - Aroclors	2.93	UT	µg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Total PCBs - Aroclors	230	T	µg/kg
LW2-C388-B	Sediment	6.46	N	1	5.1	Total PCBs - Aroclors	2.9	UT	µg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Total PCBs - Aroclors	2.75	UT	µg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Total PCBs - Aroclors	3.1	UT	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW2-C402-B	Sediment	5.83	N	1	2.1	Total PCBs - Aroclors	425	JT	µg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Total PCBs - Aroclors	1300	JT	µg/kg
LW2-C421-C	Sediment	4.45	N	2	4	Total PCBs - Aroclors	340	JT	µg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Total PCBs - Aroclors	200	JT	µg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Total PCBs - Aroclors	40	JT	µg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Total PCBs - Aroclors	57	JT	µg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Total PCBs - Aroclors	100	JT	µg/kg
LW2-G388	Sediment	7.36	N	0	0.9	Total PCBs - Aroclors	120	JT	µg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Total PCBs - Aroclors	2.82	UT	µg/kg
LW2-G398	Sediment	8.99	N	0	1	Total PCBs - Aroclors	5.2	UJT	µg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Total PCBs - Aroclors	134	JT	µg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Total PCBs - Aroclors	902	JT	µg/kg
LW2-G421	Sediment	4.56	N	0	1	Total PCBs - Aroclors	600	JT	µg/kg
LW3-C706-B	Sediment	9.39	N	1	5	Total PCBs - Aroclors	9.3	JT	µg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Total PCBs - Aroclors	10	T	µg/kg
LW3-G706	Sediment	9.49	N	0	1	Total PCBs - Aroclors	69	UT	µg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Total PCBs - Aroclors	29	JT	µg/kg
NA-4B-0024	Sediment	5.95	N	0	0.8	Total PCBs - Aroclors	170	JT	µg/kg
NA-4B-2450	Sediment	5.95	N	0.8	1.6	Total PCBs - Aroclors	190	JT	µg/kg
NA-4B-5094	Sediment	5.95	N	1.6	3.1	Total PCBs - Aroclors	130	JT	µg/kg
PDI-SC-S188-0TO1.5	Sediment	6.04	N	0	1	Total PCBs - Aroclors	225		µg/kg
PDI-SC-S191-0TO2	Sediment	6.59	N	0	2	Total PCBs - Aroclors	292.4	J	µg/kg
PDI-SC-S191-2TO4	Sediment	6.59	N	2	4	Total PCBs - Aroclors	1385	J	µg/kg
PDI-SC-S191-4TO6	Sediment	6.59	N	4	6	Total PCBs - Aroclors	810	J	µg/kg
PDI-SC-S192-0TO1.5	Sediment	8.19	N	0	1	Total PCBs - Aroclors	1980	J	µg/kg
PDI-SC-S192-1.5TO3	Sediment	8.19	N	1	3	Total PCBs - Aroclors	1630	J	µg/kg
PDI-SC-S192-3TO4.2	Sediment	8.19	N	3	4	Total PCBs - Aroclors	192	J	µg/kg
PDI-SC-S229-0TO2	Sediment	2.78	N	0	2	Total PCBs - Aroclors	132.25	J	µg/kg
PDI-SC-S230-0TO2	Sediment	6.26	N	0	2	Total PCBs - Aroclors	15.3	J	µg/kg
PDI-SC-S230-2TO4	Sediment	6.26	N	2	4	Total PCBs - Aroclors	29.05	J	µg/kg
PDI-SC-S230-4TO6	Sediment	6.26	N	4	6	Total PCBs - Aroclors	33.8		µg/kg
PSYD&M97DM16DM16	Sediment	0.66	N	0	0.3	Total PCBs - Aroclors	140	T	µg/kg
PSYD&M97DM20DM20C	Sediment	10.29	N	3.5	4.5	Total PCBs - Aroclors	220	T	µg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Total PCBs - Aroclors	140	T	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYSEA98PSY05PSY05S	Sediment	7.29	N	0	0.3	Total PCBs - Aroclors	78	T	µg/kg
PSYSEA98PSY06PSY06S	Sediment	14.49	N	0	0.3	Total PCBs - Aroclors	10	UT	µg/kg
PSYSEA98PSY07PSY07S	Sediment	1.44	N	0	0.3	Total PCBs - Aroclors	140	T	µg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Total PCBs - Aroclors	170	T	µg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Total PCBs - Aroclors	260	T	µg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Total PCBs - Aroclors	130	T	µg/kg
PSYSEA98PSY10PSY10S	Sediment	1.89	N	0	0.3	Total PCBs - Aroclors	150	T	µg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Total PCBs - Aroclors	82	T	µg/kg
PSYSEA98PSY14PSY14S	Sediment	2.71	N	0	0.3	Total PCBs - Aroclors	2500	AT	µg/kg
PSYSEA98PSY17PSY17S	Sediment	3.87	N	0	0.3	Total PCBs - Aroclors	420	T	µg/kg
PSYSEA98PSY18CPSY18A	Sediment	6.14	N	0	4	Total PCBs - Aroclors	660	T	µg/kg
PSYSEA98PSY18PSY18S	Sediment	5.56	N	0	0.3	Total PCBs - Aroclors	280	T	µg/kg
PSYSEA98PSY20PSY20S	Sediment	0.48	N	0	0.3	Total PCBs - Aroclors	280	T	µg/kg
PSYSEA98PSY21PSY21S	Sediment	0.83	N	0	0.3	Total PCBs - Aroclors	94	T	µg/kg
PSYSEA98PSY23CPSY23A	Sediment	9.68	N	0	4	Total PCBs - Aroclors	1700	T	µg/kg
PSYSEA98PSY23CPSY23B	Sediment	9.68	N	4	8	Total PCBs - Aroclors	10	UT	µg/kg
PSYSEA98PSY23PSY23S	Sediment	10.52	N	0	0.3	Total PCBs - Aroclors	68	T	µg/kg
PSYSEA98PSY25PSY25S	Sediment	4.12	N	0	0.3	Total PCBs - Aroclors	10	UT	µg/kg
PSYSEA98PSY26PSY26S	Sediment	0.44	N	0	0.3	Total PCBs - Aroclors	400	T	µg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Total PCBs - Aroclors	310	T	µg/kg
PSYSEA98PSY28PSY28S	Sediment	0.33	N	0	0.3	Total PCBs - Aroclors	87	T	µg/kg
PSYSEA98PSY30CPSY30A	Sediment	9.14	N	0	4	Total PCBs - Aroclors	52	T	µg/kg
PSYSEA98PSY30CPSY30B	Sediment	9.14	N	4	8	Total PCBs - Aroclors	10	UT	µg/kg
PSYSEA98PSY30PSY30S	Sediment	9.69	N	0	0.3	Total PCBs - Aroclors	46	T	µg/kg
PSYSEA98PSY33PSY33S	Sediment	0.80	N	0	0.3	Total PCBs - Aroclors	10	UT	µg/kg
PSYSEA98PSY43PSY43S	Sediment	0.82	N	0	0.3	Total PCBs - Aroclors	10	UT	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Total PCBs - Aroclors	97.4	J	µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Total PCBs - Aroclors	108	J	µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Total PCBs - Aroclors	392		µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Total PCBs - Aroclors	14.5	J	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Total PCBs - Aroclors	148		µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Total PCBs - Aroclors	50.3		µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Total PCBs - Aroclors	22.3		µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Total PCBs - Aroclors	28.2		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Total PCBs - Aroclors	31		µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Total PCBs - Aroclors	225		µg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Total PCBs - Aroclors	879	J	µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Total PCBs - Aroclors	3380		µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Total PCBs - Aroclors	513	J	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Total PCBs - Aroclors	278	J	µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Total PCBs - Aroclors	209	J	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Total PCBs - Aroclors	117		µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Total PCBs - Aroclors	264	J	µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Total PCBs - Aroclors	107	J	µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Total PCBs - Aroclors	3470	J	µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Total PCBs - Aroclors	76.1	J	µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Total PCBs - Aroclors	104	J	µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Total PCBs - Aroclors	16.9	J	µg/kg
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Total PCBs - Aroclors	68.2	J	µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Total PCBs - Aroclors	97.3	J	µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Total PCBs - Aroclors	83.5	J	µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Total PCBs - Aroclors	145	J	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Total PCBs - Aroclors	68.8		µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Total PCBs - Aroclors	9.5	J	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Total PCBs - Aroclors	14.7	J	µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Total PCBs - Aroclors	72.4		µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Total PCBs - Aroclors	15.2	J	µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Total PCBs - Aroclors	123	J	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Total PCBs - Aroclors	14.8	J	µg/kg
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	Total PCBs - Aroclors	25.2	J	µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Total PCBs - Aroclors	491	J	µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Total PCBs - Aroclors	11.6		µg/kg
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	Total PCBs - Aroclors	8.8	J	µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Total PCBs - Aroclors	12.1		µg/kg
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	Total PCBs - Aroclors	7.7	J	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Total PCBs - Aroclors	1.6	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Total PCBs - Aroclors	8.7	J	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Total PCBs - Aroclors	37.1		µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Total PCBs - Aroclors	16	J	µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Total PCBs - Aroclors	12.5		µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Total PCBs - Aroclors	71.9		µg/kg
SIB-098-OHW-1-2-10072022	Sediment	8.22	N	1	2	Total PCBs - Aroclors	20.9		µg/kg
SIB-098-OHW-2-3-10072022	Sediment	8.22	N	2	3	Total PCBs - Aroclors	10.8		µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Total PCBs - Aroclors	10.2	J	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Total PCBs - Aroclors	7.3	J	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Total PCBs - Aroclors	58.6	J	µg/kg
SIB-100-OHW-1-2-10062022	Sediment	7.64	N	1	2	Total PCBs - Aroclors	11.2	J	µg/kg
SIB-100-OHW-2-3-10062022	Sediment	7.64	N	2	3	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Total PCBs - Aroclors	24.9		µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Total PCBs - Aroclors	6	J	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Total PCBs - Aroclors	8.4	J	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Total PCBs - Aroclors	6.3	J	µg/kg
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Total PCBs - Aroclors	11.1	J	µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Total PCBs - Aroclors	15.2	J	µg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Total PCBs - Aroclors	57.1	J	µg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Total PCBs - Aroclors	16.7		µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Total PCBs - Aroclors	69.2		µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Total PCBs - Aroclors	59.7	J	µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Total PCBs - Aroclors	2.5	U	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Total PCBs - Aroclors	67.9		µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Total PCBs - Aroclors	102	J	µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Total PCBs - Aroclors	13	J	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Total PCBs - Aroclors	12	J	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Total PCBs - Aroclors	30.9		µg/kg
SIB-122-MLW-1-2-10262022	Sediment	4.02	N	1	2	Total PCBs - Aroclors	17.3	J	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Total PCBs - Aroclors	74.5	J	µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Total PCBs - Aroclors	6.8	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Total PCBs - Aroclors	153		µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Total PCBs - Aroclors	100		µg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Total PCBs - Aroclors	113	J	µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Total PCBs - Aroclors	92	J	µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Total PCBs - Aroclors	88.2		µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Total PCBs - Aroclors	1.5	U	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Total PCBs - Aroclors	1.5	U	µg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Total PCBs - Aroclors	1.6	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Total PCBs - Aroclors	961	J	µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Total PCBs - Aroclors	67.5		µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Total PCBs - Aroclors	301	J	µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Total PCBs - Aroclors	96.8		µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Total PCBs - Aroclors	232		µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Total PCBs - Aroclors	188	J	µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Total PCBs - Aroclors	86.2		µg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Total PCBs - Aroclors	26.3		µg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Total PCBs - Aroclors	82.4		µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Total PCBs - Aroclors	186		µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Total PCBs - Aroclors	338		µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Total PCBs - Aroclors	78.4		µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Total PCBs - Aroclors	126		µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Total PCBs - Aroclors	170		µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Total PCBs - Aroclors	208		µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Total PCBs - Aroclors	291		µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Total PCBs - Aroclors	268		µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Total PCBs - Aroclors	122	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Total PCBs - Aroclors	160		µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Total PCBs - Aroclors	241		µg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Total PCBs - Aroclors	367		µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Total PCBs - Aroclors	171		µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Total PCBs - Aroclors	322		µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Total PCBs - Aroclors	177		µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Total PCBs - Aroclors	166		µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Total PCBs - Aroclors	129	J	µg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Total PCBs - Aroclors	176		µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Total PCBs - Aroclors	281		µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Total PCBs - Aroclors	223		µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Total PCBs - Aroclors	250		µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Total PCBs - Aroclors	337		µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Total PCBs - Aroclors	310		µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Total PCBs - Aroclors	328		µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Total PCBs - Aroclors	288		µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Total PCBs - Aroclors	209		µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Total PCBs - Aroclors	189		µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Total PCBs - Aroclors	499	J	µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Total PCBs - Aroclors	398		µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Total PCBs - Aroclors	272		µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Total PCBs - Aroclors	195		µg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Total PCBs - Aroclors	116		µg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Total PCBs - Aroclors	309		µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Total PCBs - Aroclors	224		µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Total PCBs - Aroclors	213		µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Total PCBs - Aroclors	342		µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Total PCBs - Aroclors	643		µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Total PCBs - Aroclors	300		µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Total PCBs - Aroclors	235		µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Total PCBs - Aroclors	318	UJ	µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Total PCBs - Aroclors	337	UJ	µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Total PCBs - Aroclors	352	UJ	µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Total PCBs - Aroclors	284	UJ	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Total PCBs - Aroclors	218	J	µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Total PCBs - Aroclors	537	J	µg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Total PCBs - Aroclors	327		µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Total PCBs - Aroclors	273		µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Total PCBs - Aroclors	283		µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Total PCBs - Aroclors	462		µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Total PCBs - Aroclors	324		µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Total PCBs - Aroclors	254		µg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Total PCBs - Aroclors	559		µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Total PCBs - Aroclors	166	J	µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Total PCBs - Aroclors	193		µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Total PCBs - Aroclors	22.8		µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Total PCBs - Aroclors	320		µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Total PCBs - Aroclors	206		µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Total PCBs - Aroclors	110	J	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Total PCBs - Aroclors	10	NJ	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Total PCBs - Aroclors	186		µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Total PCBs - Aroclors	410		µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Total PCBs - Aroclors	270		µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Total PCBs - Aroclors	145		µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Total PCBs - Aroclors	80.3		µg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Total PCBs - Aroclors	166		µg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Total PCBs - Aroclors	192		µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Total PCBs - Aroclors	262		µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Total PCBs - Aroclors	458		µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Total PCBs - Aroclors	74.3		µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Total PCBs - Aroclors	215		µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Total PCBs - Aroclors	191	J	µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Total PCBs - Aroclors	688	J	µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Total PCBs - Aroclors	4020	J	µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Total PCBs - Aroclors	928	J	µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Total PCBs - Aroclors	1380		µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Total PCBs - Aroclors	298		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Total PCBs - Aroclors	322		µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Total PCBs - Aroclors	271		µg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Total PCBs - Aroclors	356		µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Total PCBs - Aroclors	247		µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Total PCBs - Aroclors	153		µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Total PCBs - Aroclors	40.6	J	µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Total PCBs - Aroclors	429		µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Total PCBs - Aroclors	1.5	U	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Total PCBs - Aroclors	95.7		µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Total PCBs - Aroclors	123		µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Total PCBs - Aroclors	327		µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Total PCBs - Aroclors	254		µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Total PCBs - Aroclors	433		µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Total PCBs - Aroclors	310	J	µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Total PCBs - Aroclors	198		µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Total PCBs - Aroclors	151		µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Total PCBs - Aroclors	55.8		µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Total PCBs - Aroclors	9.7		µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Total PCBs - Aroclors	1330		µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Total PCBs - Aroclors	676		µg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Total PCBs - Aroclors	3370	J	µg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Total PCBs - Aroclors	453		µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Total PCBs - Aroclors	251	J	µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Total PCBs - Aroclors	9440		µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Total PCBs - Aroclors	345		µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Total PCBs - Aroclors	5150		µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Total PCBs - Aroclors	9020		µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Total PCBs - Aroclors	2080		µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Total PCBs - Aroclors	57.9		µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Total PCBs - Aroclors	1.5	U	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Total PCBs - Aroclors	5180		µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Total PCBs - Aroclors	223		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Total PCBs - Aroclors	104	J	µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Total PCBs - Aroclors	604		µg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Total PCBs - Aroclors	10.4		µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Total PCBs - Aroclors	1.5	U	µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Total PCBs - Aroclors	840		µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Total PCBs - Aroclors	2630		µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Total PCBs - Aroclors	5330		µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Total PCBs - Aroclors	16400		µg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Total PCBs - Aroclors	11800		µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Total PCBs - Aroclors	591		µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Total PCBs - Aroclors	84.3	J	µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Total PCBs - Aroclors	1.5	U	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Total PCBs - Aroclors	1.5	U	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Total PCBs - Aroclors	2050		µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Total PCBs - Aroclors	872		µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Total PCBs - Aroclors	2820	J	µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Total PCBs - Aroclors	5450	J	µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Total PCBs - Aroclors	5460	J	µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Total PCBs - Aroclors	1020	J	µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Total PCBs - Aroclors	108		µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Total PCBs - Aroclors	11.1		µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Total PCBs - Aroclors	337		µg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Total PCBs - Aroclors	408		µg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Total PCBs - Aroclors	1270	J	µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Total PCBs - Aroclors	863	J	µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Total PCBs - Aroclors	3920	J	µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Total PCBs - Aroclors	2410	J	µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Total PCBs - Aroclors	1230		µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Total PCBs - Aroclors	165		µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Total PCBs - Aroclors	2800	J	µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Total PCBs - Aroclors	9.3		µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Total PCBs - Aroclors	10.3		µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Total PCBs - Aroclors	15500	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Total PCBs - Aroclors	2430	UJ	µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Total PCBs - Aroclors	4240	J	µg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Total PCBs - Aroclors	8230	J	µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Total PCBs - Aroclors	5370	J	µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Total PCBs - Aroclors	301		µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Total PCBs - Aroclors	664		µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Total PCBs - Aroclors	5890		µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Total PCBs - Aroclors	448		µg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Total PCBs - Aroclors	415		µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Total PCBs - Aroclors	875	J	µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Total PCBs - Aroclors	1280	J	µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Total PCBs - Aroclors	5890		µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Total PCBs - Aroclors	4860		µg/kg
SIB-SC-J06-8-9-07/26/2022	Sediment	16.33	N	8	9	Total PCBs - Aroclors	10200		µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Total PCBs - Aroclors	62	J	µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Total PCBs - Aroclors	389	J	µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Total PCBs - Aroclors	224	J	µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Total PCBs - Aroclors	194	J	µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Total PCBs - Aroclors	1440	J	µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Total PCBs - Aroclors	84.3		µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Total PCBs - Aroclors	446		µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Total PCBs - Aroclors	392		µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Total PCBs - Aroclors	120		µg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Total PCBs - Aroclors	15		µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Total PCBs - Aroclors	9.6		µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Total PCBs - Aroclors	10.9		µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Total PCBs - Aroclors	812	J	µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Total PCBs - Aroclors	942	J	µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Total PCBs - Aroclors	219		µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Total PCBs - Aroclors	43.4	J	µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Total PCBs - Aroclors	9.7		µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Total PCBs - Aroclors	952	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Total PCBs - Aroclors	662		µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Total PCBs - Aroclors	562	J	µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Total PCBs - Aroclors	61.9		µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Total PCBs - Aroclors	11.5		µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Total PCBs - Aroclors	8.1	J	µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Total PCBs - Aroclors	26		µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Total PCBs - Aroclors	10.9		µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Total PCBs - Aroclors	62.4	J	µg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Total PCBs - Aroclors	213	J	µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Total PCBs - Aroclors	404		µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Total PCBs - Aroclors	1.6	U	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Total PCBs - Aroclors	33.9	J	µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Total PCBs - Aroclors	24.7	J	µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Total PCBs - Aroclors	10.5	J	µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Total PCBs - Aroclors	7.8	U	µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Total PCBs - Aroclors	31.5	J	µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Total PCBs - Aroclors	35.5	J	µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Total PCBs - Aroclors	107	J	µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Total PCBs - Aroclors	199		µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Total PCBs - Aroclors	257	J	µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Total PCBs - Aroclors	10.9	J	µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Total PCBs - Aroclors	20.9	J	µg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Total PCBs - Aroclors	115		µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Total PCBs - Aroclors	325	J	µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Total PCBs - Aroclors	269	J	µg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Total PCBs - Aroclors	138	T	µg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Total PCBs - Aroclors	6.8	UT	µg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Total PCBs - Aroclors	350	T	µg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Total PCBs - Aroclors	47.4	T	µg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Total PCBs - Aroclors	6.2	UT	µg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Total PCBs - Aroclors	200	T	µg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Total PCBs - Aroclors	23.7	T	µg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Total PCBs - Aroclors	390	T	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WLCPSK094-A	Sediment	10.57	N	0	2.9	Total PCBs - Aroclors	4.7	UT	µg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Total PCBs - Aroclors	4.7	UT	µg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Total PCBs - Aroclors	5.3	UT	µg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Total PCBs - Aroclors	5.4	UT	µg/kg
WR-WSI98SD1300	Sediment	2.09	N	0	0.3	Total PCBs - Aroclors	39	UT	µg/kg
WR-WSI98SD1330	Sediment	5.72	N	0	0.3	Total PCBs - Aroclors	1200	T	µg/kg
WR-WSI98SD1330000A	Sediment	5.72	N	0	3	Total PCBs - Aroclors	2400	JT	µg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Total PCBs - Aroclors	200	JT	µg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Total PCBs - Aroclors	100	T	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Total PCBs - Aroclors	104		µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Total PCBs - Aroclors	9.2	J	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Total PCBs - Aroclors	76.9	JA	µg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Tributyltin Hydride	8.2		µg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Tributyltin Hydride	92		µg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Tributyltin Hydride	280		µg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Tributyltin Hydride	1.1	J	µg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Tributyltin Hydride	85		µg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Tributyltin Hydride	170	J	µg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Tributyltin Hydride	56	J	µg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Tributyltin Hydride	570	J	µg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Tributyltin Hydride	190	J	µg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Tributyltin Hydride	180	J	µg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Tributyltin Hydride	3800	J	µg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Tributyltin Hydride	900	J	µg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Tributyltin Hydride	110	J	µg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Tributyltin Hydride	3300	J	µg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Tributyltin Hydride	480	J	µg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Tributyltin Hydride	2.1	J	µg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Tributyltin Hydride	25	J	µg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Tributyltin Hydride	4.3		µg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Tributyltin Hydride	1.2		µg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Tributyltin Hydride	3.4		µg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Tributyltin Hydride	5.7		µg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Tributyltin Hydride	1.1	J	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Tributyltin Hydride	4		µg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Tributyltin Hydride	25	J	µg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Tributyltin Hydride	1.4		µg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Tributyltin Hydride	6.2	J	µg/kg
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Tributyltin Hydride	2.3		µg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Tributyltin Hydride	0.43	U	µg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Tributyltin Hydride	1.2		µg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Tributyltin Hydride	16		µg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Tributyltin Hydride	6.5		µg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Tributyltin Hydride	1.2	J	µg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Tributyltin Hydride	15		µg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Tributyltin Hydride	27		µg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Tributyltin Hydride	0.63	U	µg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Tributyltin Hydride	0.73	U	µg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Tributyltin Hydride	0.81	U	µg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Tributyltin Hydride	2.9		µg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Tributyltin Hydride	0.6	U	µg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Tributyltin Hydride	0.6	U	µg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Tributyltin Hydride	0.5	U	µg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Tributyltin Hydride	4.9		µg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Tributyltin Hydride	2.2		µg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Tributyltin Hydride	0.51	U	µg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Tributyltin Hydride	0.59	J	µg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Tributyltin Hydride	0.48	U	µg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Tributyltin Hydride	36		µg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Tributyltin Hydride	0.48	U	µg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Tributyltin Hydride	0.5	U	µg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Tributyltin Hydride	3.3		µg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Tributyltin Hydride	4.9		µg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Tributyltin Hydride	0.53	J	µg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Tributyltin Hydride	0.57	U	µg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Tributyltin Hydride	0.46	U	µg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Tributyltin Hydride	34		µg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Tributyltin Hydride	5		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Tributyltin Hydride	4.2		µg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Tributyltin Hydride	19		µg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Tributyltin Hydride	11		µg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Tributyltin Hydride	3.5	J	µg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Tributyltin Hydride	0.67	U	µg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Tributyltin Hydride	13		µg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Tributyltin Hydride	45		µg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Tributyltin Hydride	0.51	U	µg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Tributyltin Hydride	0.67	U	µg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Tributyltin Hydride	0.85	J	µg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Tributyltin Hydride	3.1		µg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Tributyltin Hydride	1.4	J	µg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Tributyltin Hydride	0.69	U	µg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Tributyltin Hydride	0.64	U	µg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Tributyltin Hydride	0.66	U	µg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Tributyltin Hydride	0.64	U	µg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Tributyltin Hydride	0.63	U	µg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Tributyltin Hydride	0.68	U	µg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Tributyltin Hydride	0.63	U	µg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Tributyltin Hydride	0.63	U	µg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Tributyltin Hydride	0.62	U	µg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Tributyltin Hydride	0.62	U	µg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Tributyltin Hydride	0.59	U	µg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Tributyltin Hydride	0.64	U	µg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Tributyltin Hydride	0.7	U	µg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Tributyltin Hydride	0.7	U	µg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Tributyltin Hydride	0.7	U	µg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Tributyltin Hydride	5.4		µg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Tributyltin Hydride	6.8	U	µg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Tributyltin Hydride	0.62	U	µg/kg
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Tributyltin Hydride	0.61	U	µg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Tributyltin Hydride	0.67	U	µg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Tributyltin Hydride	0.7	U	µg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Tributyltin Hydride	0.67	U	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Tributyltin Hydride	0.61	U	µg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Tributyltin Hydride	1.4	U	µg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Tributyltin Hydride	0.75	J	µg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Tributyltin Hydride	0.63	U	µg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Tributyltin Hydride	1.8		µg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Tributyltin Hydride	0.64	U	µg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Tributyltin Hydride	0.63	U	µg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Tributyltin Hydride	0.66	U	µg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Tributyltin Hydride	0.71	U	µg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Tributyltin Hydride	0.8	J	µg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Tributyltin Hydride	0.61	U	µg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Tributyltin Hydride	0.63	U	µg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Tributyltin Hydride	21		µg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Tributyltin Hydride	0.71	U	µg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Tributyltin Hydride	0.66	UJ	µg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Tributyltin Hydride	0.73	J	µg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Tributyltin Hydride	0.65	UJ	µg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Tributyltin Hydride	0.66	UJ	µg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Tributyltin Hydride	0.63	R	µg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Tributyltin Hydride	0.65	U	µg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Tributyltin Hydride	0.66	U	µg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Tributyltin Hydride	0.68	U	µg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Tributyltin Hydride	0.74	U	µg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Tributyltin Hydride	0.74	U	µg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Tributyltin Hydride	0.67	U	µg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Tributyltin Hydride	92		µg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Tributyltin Hydride	1.3	J	µg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Tributyltin Hydride	1.4	J	µg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Tributyltin Hydride	0.71	J	µg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Tributyltin Hydride	0.66	U	µg/kg
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Tributyltin Hydride	0.69	U	µg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Tributyltin Hydride	1.7	J	µg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Tributyltin Hydride	1	J	µg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Tributyltin Hydride	1.2	J	µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Tributyltin Hydride	1.4	J	µg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Tributyltin Hydride	0.82	J	µg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Tributyltin Hydride	40		µg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Tributyltin Hydride	150		µg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Tributyltin Hydride	140		µg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Tributyltin Hydride	52		µg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Tributyltin Hydride	56		µg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Tributyltin Hydride	110		µg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Tributyltin Hydride	360		µg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Tributyltin Hydride	81		µg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Tributyltin Hydride	15		µg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Tributyltin Hydride	38	J	µg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Tributyltin Hydride	165		µg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Tributyltin Hydride	300		µg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Tributyltin Hydride	120		µg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Tributyltin Hydride	61	J	µg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Tributyltin Hydride	120		µg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Tributyltin Hydride	41		µg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Tributyltin Hydride	5.2		µg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Tributyltin Hydride	390	J	µg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Tributyltin Hydride	340	J	µg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Tributyltin Hydride	260	J	µg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Tributyltin Hydride	14		µg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Tributyltin Hydride	480		µg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Tributyltin Hydride	11		µg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Tributyltin Hydride	7.7		µg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Tributyltin Hydride	17		µg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Tributyltin Hydride	6.8		µg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Tributyltin Hydride	7.7		µg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Tributyltin Hydride	220		µg/kg
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Tributyltin Hydride	260		µg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Tributyltin Hydride	62		µg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Tributyltin Hydride	3.4		µg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Tributyltin Hydride	6		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Tributyltin Hydride	9.7		µg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Tributyltin Hydride	220		µg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Tributyltin Hydride	69		µg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Tributyltin Hydride	22		µg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Tributyltin Hydride	710	J	µg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Tributyltin Hydride	120	J	µg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Tributyltin Hydride	9.8		µg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Tributyltin Hydride	180		µg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Tributyltin Hydride	170		µg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Tributyltin Hydride	49	J	µg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Tributyltin Hydride	6.1		µg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Tributyltin Hydride	4.5		µg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Tributyltin Hydride	280		µg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Tributyltin Hydride	100		µg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Tributyltin Hydride	45		µg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Tributyltin Hydride	5.6		µg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Tributyltin Hydride	4.9		µg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Tributyltin Hydride	120		µg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Tributyltin Hydride	19		µg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Tributyltin Hydride	110		µg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Tributyltin Hydride	80		µg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Tributyltin Hydride	149		µg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Tributyltin Hydride	1.1	J	µg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Tributyltin Hydride	0.55	J	µg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Tributyltin Hydride	6.6		µg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Tributyltin Hydride	4.1		µg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Tributyltin Hydride	4.9	J	µg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Tributyltin Hydride	0.56	U	µg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Tributyltin Hydride	0.61	U	µg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Tributyltin Hydride	43		µg/kg
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Tributyltin Hydride	17		µg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Tributyltin Hydride	1.3	J	µg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Tributyltin Hydride	0.67	U	µg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Tributyltin Hydride	0.57	U	µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Tributyltin Hydride	92		µg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Tributyltin Hydride	120		µg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Tributyltin Hydride	62		µg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Tributyltin Hydride	5.4		µg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Tributyltin Hydride	0.63	U	µg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Tributyltin Hydride	165	J	µg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Tributyltin Hydride	9.9		µg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Tributyltin Hydride	910		µg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Tributyltin Hydride	710		µg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Tributyltin Hydride	17		µg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Tributyltin Hydride	0.78	U	µg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Tributyltin Hydride	195		µg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Tributyltin Hydride	260		µg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Tributyltin Hydride	1900		µg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Tributyltin Hydride	340		µg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Tributyltin Hydride	860		µg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Tributyltin Hydride	6		µg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Tributyltin Hydride	4.05		µg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Tributyltin Hydride	50		µg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Tributyltin Hydride	0.69	J	µg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Tributyltin Hydride	0.58	U	µg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Tributyltin Hydride	0.57	U	µg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Tributyltin Hydride	0.51	U	µg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Tributyltin Hydride	0.54	U	µg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Tributyltin Hydride	140		µg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Tributyltin Hydride	37		µg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Tributyltin Hydride	16		µg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Tributyltin Hydride	35		µg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Tributyltin Hydride	3.3		µg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Tributyltin Hydride	0.62	U	µg/kg
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Tributyltin Hydride	0.66	UJ	µg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Tributyltin Hydride	0.7	U	µg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Tributyltin Hydride	59		µg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Tributyltin Hydride	1400		µg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Tributyltin Hydride	1450		µg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Tributyltin Hydride	320		µg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Tributyltin Hydride	590		µg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Tributyltin Hydride	7200	J	µg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Tributyltin Hydride	5400	J	µg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Tributyltin Hydride	12000	J	µg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Tributyltin Hydride	16000	J	µg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Tributyltin Hydride	1300	J	µg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Tributyltin Hydride	74	J	µg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Tributyltin Hydride	0.69	J	µg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Tributyltin Hydride	2200	J	µg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Tributyltin Hydride	71	J	µg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Tributyltin Hydride	200	J	µg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Tributyltin Hydride	82	J	µg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Tributyltin Hydride	16	J	µg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Tributyltin Hydride	1.9		µg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Tributyltin Hydride	9900		µg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Tributyltin Hydride	8800	J	µg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Tributyltin Hydride	8100	J	µg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Tributyltin Hydride	3000	J	µg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Tributyltin Hydride	470	J	µg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Tributyltin Hydride	6.5	J	µg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Tributyltin Hydride	11		µg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Tributyltin Hydride	0.59	U	µg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Tributyltin Hydride	1.2	J	µg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Tributyltin Hydride	9000		µg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Tributyltin Hydride	2200		µg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Tributyltin Hydride	7100		µg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Tributyltin Hydride	3900		µg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Tributyltin Hydride	4400		µg/kg
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Tributyltin Hydride	1900		µg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Tributyltin Hydride	210		µg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Tributyltin Hydride	43		µg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Tributyltin Hydride	580		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Tributyltin Hydride	5400	J	µg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Tributyltin Hydride	13000	J	µg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Tributyltin Hydride	10000	J	µg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Tributyltin Hydride	4100	J	µg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Tributyltin Hydride	6700	J	µg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Tributyltin Hydride	3900		µg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Tributyltin Hydride	280		µg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Tributyltin Hydride	8.7		µg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Tributyltin Hydride	3700		µg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Tributyltin Hydride	0.58	U	µg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Tributyltin Hydride	0.59	U	µg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Tributyltin Hydride	4700		µg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Tributyltin Hydride	840		µg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Tributyltin Hydride	350		µg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Tributyltin Hydride	170		µg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Tributyltin Hydride	200		µg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Tributyltin Hydride	0.57	U	µg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Tributyltin Hydride	720		µg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Tributyltin Hydride	0.73	U	µg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Tributyltin Hydride	2.1		µg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Tributyltin Hydride	4000	J	µg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Tributyltin Hydride	13000	J	µg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Tributyltin Hydride	14000	J	µg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Tributyltin Hydride	5000	J	µg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Tributyltin Hydride	840	J	µg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Tributyltin Hydride	690		µg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Tributyltin Hydride	3700		µg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Tributyltin Hydride	4300		µg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Tributyltin Hydride	11000		µg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Tributyltin Hydride	8600		µg/kg
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Tributyltin Hydride	350		µg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Tributyltin Hydride	4300		µg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Tributyltin Hydride	59		µg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Tributyltin Hydride	6.6		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Tributyltin Hydride	2.2		µg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Tributyltin Hydride	0.53	U	µg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Tributyltin Hydride	1.2	J	µg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Tributyltin Hydride	0.97	J	µg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Tributyltin Hydride	0.54	U	µg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Tributyltin Hydride	14000		µg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Tributyltin Hydride	8000		µg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Tributyltin Hydride	850		µg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.34	N	4	5	Tributyltin Hydride	84		µg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Tributyltin Hydride	53		µg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Tributyltin Hydride	1800		µg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Tributyltin Hydride	2100		µg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.36	N	3	4	Tributyltin Hydride	810		µg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.36	N	4	5	Tributyltin Hydride	35		µg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.36	N	5	6	Tributyltin Hydride	0.7	U	µg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.30	N	1	2	Tributyltin Hydride	11		µg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.10	N	0	1	Tributyltin Hydride	29		µg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.10	N	1	2	Tributyltin Hydride	0.51	U	µg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.11	N	1	2	Tributyltin Hydride	910		µg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.68	N	0	1	Tributyltin Hydride	77000		µg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Tributyltin Hydride	3600		µg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Tributyltin Hydride	0.56	U	µg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Tributyltin Hydride	0.53	U	µg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Tributyltin Hydride	3800	J	µg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Tributyltin Hydride	560		µg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Tributyltin Hydride	800		µg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Tributyltin Hydride	1700		µg/kg
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Tributyltin Hydride	170		µg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Tributyltin Hydride	4600		µg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Tributyltin Hydride	25000		µg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Tributyltin Hydride	23000	J	µg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Tributyltin Hydride	13000	J	µg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Tributyltin Hydride	12		µg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Tributyltin Hydride	1600		µg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Tributyltin Hydride	51000	J	µg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Tributyltin Hydride	200000	J	µg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Tributyltin Hydride	150000	J	µg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Tributyltin Hydride	280		µg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Tributyltin Hydride	23.05	J	µg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Tributyltin Hydride	15	J	µg/kg
A1-0TO30-102018	Sediment	5.65	N	0	1	Zinc	65		mg/kg
A6-0TO23-100818	Sediment	1.95	N	0	0.8	Zinc	240		mg/kg
A7-0TO26-100918	Sediment	3.35	N	0	0.9	Zinc	240		mg/kg
B1-0TO20-101418	Sediment	9.40	N	0	0.7	Zinc	90	J	mg/kg
B7-0TO30-100918	Sediment	3.03	N	0	1	Zinc	210		mg/kg
D2-0TO19-101018	Sediment	4.25	N	0	0.6	Zinc	150		mg/kg
D6-SC-0TO1-102118	Sediment	1.58	N	0	1	Zinc	330		mg/kg
D7-0TO28-100918	Sediment	2.68	N	0	0.9	Zinc	360		mg/kg
F1-0TO23-101418	Sediment	6.19	N	0	0.8	Zinc	200	J	mg/kg
F2-0TO19-101018	Sediment	5.10	N	0	0.6	Zinc	130		mg/kg
F7-0TO27-101118	Sediment	3.00	N	0	0.9	Zinc	460	J	mg/kg
G6-0TO27-101819	Sediment	1.35	N	0	0.9	Zinc	570		mg/kg
H2-0TO30-101219	Sediment	5.24	N	0	1	Zinc	270		mg/kg
H7-0TO24-101218	Sediment	1.35	N	0	0.8	Zinc	310	J	mg/kg
J2A3-0TO18-101219	Sediment	2.34	N	0	0.6	Zinc	190		mg/kg
J3-0TO26-101318	Sediment	5.16	N	0	0.9	Zinc	360	J	mg/kg
J3-SC-00TO10-102218	Sediment	5.73	N	0	1	Zinc	120		mg/kg
J3-SC-10TO20-102218	Sediment	5.73	N	1	2	Zinc	91		mg/kg
J3-SC-20TO36-102218	Sediment	5.73	N	2	3.6	Zinc	270		mg/kg
J3-SC-36TO45-102218	Sediment	5.73	N	3.6	4.5	Zinc	230		mg/kg
J3-SC-45TO55-102218	Sediment	5.73	N	4.5	5.5	Zinc	120		mg/kg
J6-SC-00TO10-102218	Sediment	2.47	N	0	1	Zinc	410		mg/kg
J6-SC-10TO20-102218	Sediment	2.47	N	1	2	Zinc	270		mg/kg
J7-0TO26-101218	Sediment	3.34	N	0	0.9	Zinc	480	J	mg/kg
L1-0TO30-101518	Sediment	5.22	N	0	1	Zinc	56		mg/kg
L3-0TO20-101318	Sediment	8.90	N	0	0.7	Zinc	110	J	mg/kg
L3-SC-00TO10-102218	Sediment	7.22	N	0	1	Zinc	120		mg/kg
L3-SC-10TO20-102218	Sediment	7.22	N	1	2	Zinc	88		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
L3-SC-20TO40-102218	Sediment	7.22	N	2	4	Zinc	87		mg/kg
L7-0TO29-101318	Sediment	3.18	N	0	1	Zinc	440	J	mg/kg
LW2-C364-B	Sediment	12.48	N	1	2.5	Zinc	98.7		mg/kg
LW2-C364-C	Sediment	12.48	N	2.5	6	Zinc	89.2		mg/kg
LW2-C383-B	Sediment	2.78	N	1	2.1	Zinc	82.8		mg/kg
LW2-C384-B	Sediment	5.40	N	1	4.2	Zinc	1930		mg/kg
LW2-C388-B	Sediment	6.46	N	1	5.1	Zinc	60.7		mg/kg
LW2-C396-B	Sediment	13.44	N	1	5	Zinc	68.2		mg/kg
LW2-C396-C	Sediment	13.44	N	5	9.1	Zinc	64.7	T	mg/kg
LW2-C402-B	Sediment	5.83	N	1	2.1	Zinc	366		mg/kg
LW2-C421-B	Sediment	4.45	N	1	2	Zinc	314		mg/kg
LW2-C421-C	Sediment	4.45	N	2	4	Zinc	164		mg/kg
LW2-C426-B	Sediment	6.87	N	1	4.3	Zinc	189		mg/kg
LW2-G364	Sediment	14.72	N	0	0.9	Zinc	136		mg/kg
LW2-G380	Sediment	2.10	N	0	0.7	Zinc	203		mg/kg
LW2-G382	Sediment	2.65	N	0	1	Zinc	362		mg/kg
LW2-G383	Sediment	4.35	N	0	0.7	Zinc	173		mg/kg
LW2-G384-1	Sediment	5.37	N	0	0.9	Zinc	241	T	mg/kg
LW2-G384-2	Sediment	5.23	N	0	1	Zinc	260		mg/kg
LW2-G388	Sediment	7.36	N	0	0.9	Zinc	95.3		mg/kg
LW2-G390	Sediment	1.45	N	0	0.9	Zinc	731		mg/kg
LW2-G393	Sediment	2.99	N	0	0.9	Zinc	597		mg/kg
LW2-G396	Sediment	14.99	N	0	0.8	Zinc	66.2		mg/kg
LW2-G398	Sediment	8.99	N	0	1	Zinc	162		mg/kg
LW2-G402	Sediment	4.06	N	0	1	Zinc	326		mg/kg
LW2-G408	Sediment	3.21	N	0	0.8	Zinc	477		mg/kg
LW2-G415	Sediment	4.81	N	0	0.8	Zinc	469		mg/kg
LW2-G416	Sediment	5.63	N	0	1	Zinc	302		mg/kg
LW2-G417	Sediment	6.52	N	0	0.9	Zinc	103		mg/kg
LW2-G421	Sediment	4.56	N	0	1	Zinc	338		mg/kg
LW2-G425	Sediment	1.45	N	0	0.8	Zinc	127		mg/kg
LW2-GBT022	Sediment	0.30	N	0	0.3	Zinc	219		mg/kg
LW2-GBT023	Sediment	0.93	N	0	0.3	Zinc	220		mg/kg
LW2-GBT026	Sediment	7.93	N	0	0.3	Zinc	301		mg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
LW3-C706-B	Sediment	9.39	N	1	5	Zinc	141		mg/kg
LW3-C706-C	Sediment	9.39	N	5	8.3	Zinc	126		mg/kg
LW3-C708-B	Sediment	16.09	N	1	4.9	Zinc	986		mg/kg
LW3-C708-C	Sediment	16.09	N	4.9	7.7	Zinc	1100		mg/kg
LW3-C708-D	Sediment	16.09	N	7.7	10	Zinc	118		mg/kg
LW3-G706	Sediment	9.49	N	0	1	Zinc	165		mg/kg
LW3-GSP08E	Sediment	2.16	N	0	0.4	Zinc	61.3	T	mg/kg
LWG0108B032SDS015C00	Sediment	5.91	N	0	0.5	Zinc	71.7		mg/kg
N1-0TO30-101518	Sediment	8.00	N	0	1	Zinc	39		mg/kg
N3-0TO26-101518	Sediment	4.72	N	0	0.9	Zinc	330		mg/kg
N7-0TO27-101418	Sediment	4.03	N	0	0.9	Zinc	360		mg/kg
NA-4A-0005	Sediment	5.42	N	0	0.2	Zinc	270		mg/kg
NA-4A-0508	Sediment	5.42	N	0.2	0.3	Zinc	286		mg/kg
NA-4A-0812	Sediment	5.42	N	0.3	0.4	Zinc	281		mg/kg
NA-4A-1216	Sediment	5.42	N	0.4	0.5	Zinc	251		mg/kg
NA-4A-1620	Sediment	5.42	N	0.5	0.7	Zinc	243		mg/kg
NA-4A-2024	Sediment	5.42	N	0.7	0.8	Zinc	261		mg/kg
NA-4A-2428	Sediment	5.42	N	0.8	0.9	Zinc	275		mg/kg
NA-4A-2832	Sediment	5.42	N	0.9	1	Zinc	255		mg/kg
NA-4A-3238	Sediment	5.42	N	1	1.2	Zinc	258		mg/kg
NA-4A-3844	Sediment	5.42	N	1.2	1.4	Zinc	245		mg/kg
NA-4A-4448	Sediment	5.42	N	1.4	1.6	Zinc	251		mg/kg
NA-4A-5864	Sediment	5.42	N	1.9	2.1	Zinc	262		mg/kg
NA-4A-6874	Sediment	5.42	N	2.2	2.4	Zinc	198		mg/kg
NA-4A-7884	Sediment	5.42	N	2.6	2.8	Zinc	218		mg/kg
NA-4A-8894	Sediment	5.42	N	2.9	3.1	Zinc	244	T	mg/kg
O7-0TO27-101918	Sediment	4.07	N	0	0.9	Zinc	300		mg/kg
P1-0TO30-101518	Sediment	10.29	N	0	1	Zinc	79		mg/kg
PDI-SG-B259-BL1	Sediment	3.01	N	0	30	Zinc	340		mg/kg
PDI-SG-B264-BL1	Sediment	9.17	N	0	30	Zinc	130		mg/kg
PDI-SG-B266-BL1	Sediment	4.36	N	0	29	Zinc	170		mg/kg
PDI-SG-B294-BL1	Sediment	3.07	N	0	29	Zinc	190		mg/kg
PDI-SG-B302-BL1	Sediment	1.65	N	0	27	Zinc	280		mg/kg
PDI-SG-B303-BL1	Sediment	5.62	N	0	28	Zinc	240		mg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PDI-SG-B308-BL1	Sediment	3.19	N	0	30	Zinc	250		mg/kg
PSYD&M97DM16DM16	Sediment	0.66	N	0	0.3	Zinc	397		mg/kg
PSYD&M97DM20DM20C	Sediment	10.29	N	3.5	4.5	Zinc	141		mg/kg
PSYSEA98PSY01PSY01S	Sediment	0.81	N	0	0.3	Zinc	435	J	mg/kg
PSYSEA98PSY05PSY05S	Sediment	7.29	N	0	0.3	Zinc	254	J	mg/kg
PSYSEA98PSY06PSY06S	Sediment	14.49	N	0	0.3	Zinc	66	J	mg/kg
PSYSEA98PSY07PSY07S	Sediment	1.44	N	0	0.3	Zinc	262	J	mg/kg
PSYSEA98PSY08PSY08S	Sediment	1.15	N	0	0.3	Zinc	332	JT	mg/kg
PSYSEA98PSY08PSY52S	Sediment	1.15	N	0	0.3	Zinc	424	J	mg/kg
PSYSEA98PSY08PSY53S	Sediment	1.15	N	0	0.3	Zinc	322	J	mg/kg
PSYSEA98PSY10PSY10S	Sediment	1.89	N	0	0.3	Zinc	683	J	mg/kg
PSYSEA98PSY12PSY12S	Sediment	11.76	N	0	0.3	Zinc	264		mg/kg
PSYSEA98PSY14PSY14S	Sediment	2.71	N	0	0.3	Zinc	443		mg/kg
PSYSEA98PSY17PSY17S	Sediment	3.87	N	0	0.3	Zinc	374		mg/kg
PSYSEA98PSY18CPSY18A	Sediment	6.14	N	0	4	Zinc	159		mg/kg
PSYSEA98PSY18PSY18S	Sediment	5.56	N	0	0.3	Zinc	375		mg/kg
PSYSEA98PSY20PSY20S	Sediment	0.48	N	0	0.3	Zinc	359		mg/kg
PSYSEA98PSY21PSY21S	Sediment	0.83	N	0	0.3	Zinc	190		mg/kg
PSYSEA98PSY23CPSY23A	Sediment	9.68	N	0	4	Zinc	257	J	mg/kg
PSYSEA98PSY23CPSY23B	Sediment	9.68	N	4	8	Zinc	44	J	mg/kg
PSYSEA98PSY23PSY23S	Sediment	10.52	N	0	0.3	Zinc	173		mg/kg
PSYSEA98PSY25PSY25S	Sediment	4.12	N	0	0.3	Zinc	137		mg/kg
PSYSEA98PSY26PSY26S	Sediment	0.44	N	0	0.3	Zinc	314		mg/kg
PSYSEA98PSY27PSY27S	Sediment	7.94	N	0	0.3	Zinc	593		mg/kg
PSYSEA98PSY28PSY28S	Sediment	0.33	N	0	0.3	Zinc	101		mg/kg
PSYSEA98PSY30CPSY30A	Sediment	9.14	N	0	4	Zinc	327		mg/kg
PSYSEA98PSY30CPSY30B	Sediment	9.14	N	4	8	Zinc	91		mg/kg
PSYSEA98PSY30CY30A01	Sediment	9.14	N	0	1	Zinc	183		mg/kg
PSYSEA98PSY30CY30A02	Sediment	9.14	N	1	2	Zinc	222		mg/kg
PSYSEA98PSY30CY30A03	Sediment	9.14	N	2	3	Zinc	251		mg/kg
PSYSEA98PSY30CY30A04	Sediment	9.14	N	3	4	Zinc	1340		mg/kg
PSYSEA98PSY30CY30B05	Sediment	9.14	N	4	5	Zinc	872		mg/kg
PSYSEA98PSY30CY30B06	Sediment	9.14	N	5	6	Zinc	85		mg/kg
PSYSEA98PSY30CY30B07	Sediment	9.14	N	6	7	Zinc	35		mg/kg

Attachment B
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
PSYSEA98PSY30CY30B08	Sediment	9.14	N	7	8	Zinc	26		mg/kg
PSYSEA98PSY30PSY30S	Sediment	9.69	N	0	0.3	Zinc	238	J	mg/kg
PSYSEA98PSY33PSY33S	Sediment	0.80	N	0	0.3	Zinc	106	J	mg/kg
PSYSEA98PSY43PSY43S	Sediment	0.82	N	0	0.3	Zinc	96	J	mg/kg
Q2-0TO13-101818	Sediment	6.37	N	0	0.4	Zinc	110		mg/kg
Q6-0TO27-102018	Sediment	3.20	N	0	0.9	Zinc	280		mg/kg
R1-0TO30-101518	Sediment	7.45	N	0	1	Zinc	75		mg/kg
SIB-000-OHW-0-1-10172022	Sediment	1.27	N	0	1	Zinc	137		mg/kg
SIB-002-OHW-0-1-10172022	Sediment	6.50	N	0	1	Zinc	119		mg/kg
SIB-003-OHW-0-1-10172022	Sediment	14.01	N	0	1	Zinc	128		mg/kg
SIB-004-MLW-0-1-10172022	Sediment	11.94	N	0	1	Zinc	126		mg/kg
SIB-006-OHW-0-1-10172022	Sediment	2.80	N	0	1	Zinc	116		mg/kg
SIB-007-OHW-0-1-10172022	Sediment	10.28	N	0	1	Zinc	205		mg/kg
SIB-008-MLW-0-1-10172022	Sediment	13.07	N	0	1	Zinc	138		mg/kg
SIB-008-OHW-0-1-10172022	Sediment	12.62	N	0	1	Zinc	215		mg/kg
SIB-009-OHW-0-1-10172022	Sediment	13.17	N	0	1	Zinc	118		mg/kg
SIB-010-OHW-0-1-10172022	Sediment	14.25	N	0	1	Zinc	239		mg/kg
SIB-011-OHW-0-1-10172022	Sediment	20.15	N	0	1	Zinc	1840		mg/kg
SIB-011-TOB-0-1-10172022	Sediment	29.10	N	0	1	Zinc	1220		mg/kg
SIB-012-MLW-0-1-10172022	Sediment	37.46	N	0	1	Zinc	555		mg/kg
SIB-013-MLW-0-1-10172022	Sediment	8.38	N	0	1	Zinc	251		mg/kg
SIB-014-MLW-0-1-10172022	Sediment	20.82	N	0	1	Zinc	359		mg/kg
SIB-043-OHW-0-1-10242022	Sediment	18.75	N	0	1	Zinc	130		mg/kg
SIB-045-OHW-0-1-10242022	Sediment	10.41	N	0	1	Zinc	3670		mg/kg
SIB-046-OHW-0-1-10242022	Sediment	10.98	N	0	1	Zinc	176		mg/kg
SIB-047-OHW-0-1-10242022	Sediment	17.00	N	0	1	Zinc	118		mg/kg
SIB-048-MLW-0-1-10242022	Sediment	9.91	N	0	1	Zinc	123		mg/kg
SIB-048-OHW-0-1-10242022	Sediment	10.51	N	0	1	Zinc	118		mg/kg
SIB-049-OHW-0-1-10202022	Sediment	15.02	N	0	1	Zinc	69.15		mg/kg
SIB-049-OHW-1-2-10202022	Sediment	15.02	N	1	2	Zinc	54.3		mg/kg
SIB-050-OHW-0-1-10202022	Sediment	14.32	N	0	1	Zinc	121		mg/kg
SIB-051-OHW-0-1-10202022	Sediment	11.01	N	0	1	Zinc	162		mg/kg
SIB-052-OHW-0-1-10202022	Sediment	14.51	N	0	1	Zinc	118		mg/kg
SIB-053-MLW-0-1-10202022	Sediment	9.73	N	0	1	Zinc	119		mg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-053-OHW-0-1-10202022	Sediment	9.65	N	0	1	Zinc	87.2		mg/kg
SIB-054-OHW-0-1-10192022	Sediment	9.91	N	0	1	Zinc	51.9		mg/kg
SIB-055-OHW-0-1-10192022	Sediment	12.62	N	0	1	Zinc	590		mg/kg
SIB-056-MLW-0-1-10192022	Sediment	1.51	N	0	1	Zinc	101		mg/kg
SIB-061-OHW-0-1-10192022	Sediment	1.35	N	0	1	Zinc	55.6		mg/kg
SIB-078-MLW-0-1-10122022	Sediment	5.58	N	0	1	Zinc	82.4		mg/kg
SIB-079-MLW-0-1-10122022	Sediment	4.26	N	0	1	Zinc	93.5		mg/kg
SIB-079-MLW-1-2-10122022	Sediment	4.26	N	1	2	Zinc	92.8		mg/kg
SIB-082-OHW-0-1-10112022	Sediment	1.92	N	0	1	Zinc	338		mg/kg
SIB-087-MLW-0-1-10102022	Sediment	2.25	N	0	1	Zinc	76.5		mg/kg
SIB-087-MLW-1-2-10102022	Sediment	2.25	N	1	2	Zinc	72.1		mg/kg
SIB-088-MLW-0-1-10102022	Sediment	8.44	N	0	1	Zinc	61.25	J	mg/kg
SIB-088-MLW-1-2-10102022	Sediment	8.44	N	1	2	Zinc	59.5		mg/kg
SIB-089-MLW-0-1-10102022	Sediment	5.86	N	0	1	Zinc	71		mg/kg
SIB-089-MLW-1-2-10102022	Sediment	5.86	N	1	2	Zinc	77.4		mg/kg
SIB-090-MLW-0-1-10102022	Sediment	8.63	N	0	1	Zinc	81.3		mg/kg
SIB-090-MLW-1-2-10102022	Sediment	8.63	N	1	2	Zinc	72.2		mg/kg
SIB-091-MLW-0-1-10102022	Sediment	8.72	N	0	1	Zinc	58.1		mg/kg
SIB-092-MLW-0-1-10102022	Sediment	6.65	N	0	1	Zinc	86.2		mg/kg
SIB-092-MLW-1-2-10102022	Sediment	6.65	N	1	2	Zinc	76.9		mg/kg
SIB-092-OHW-0-1-10102022	Sediment	3.54	N	0	1	Zinc	140		mg/kg
SIB-095-MLW-0-1-10072022	Sediment	8.52	N	0	1	Zinc	78.2		mg/kg
SIB-096-MLW-0-1-10072022	Sediment	11.97	N	0	1	Zinc	152		mg/kg
SIB-097-MLW-0-1-10072022	Sediment	6.35	N	0	1	Zinc	69.7		mg/kg
SIB-098-MLW-0-1-10072022	Sediment	5.72	N	0	1	Zinc	41.2		mg/kg
SIB-098-OHW-0-1-10072022	Sediment	8.22	N	0	1	Zinc	106		mg/kg
SIB-099-MLW-0-1-10072022	Sediment	9.51	N	0	1	Zinc	50.2		mg/kg
SIB-100-MLW-0-1-10062022	Sediment	5.58	N	0	1	Zinc	50.5		mg/kg
SIB-100-OHW-0-1-10062022	Sediment	7.64	N	0	1	Zinc	71.1		mg/kg
SIB-101-MLW-0-1-10062022	Sediment	6.57	N	0	1	Zinc	59		mg/kg
SIB-101-OHW-0-1-10062022	Sediment	8.83	N	0	1	Zinc	51.9		mg/kg
SIB-102-MLW-0-1-10062022	Sediment	11.07	N	0	1	Zinc	85.2		mg/kg
SIB-102-MLW-1-2-10062022	Sediment	11.07	N	1	2	Zinc	62.1		mg/kg
SIB-103-OHW-0-1-10062022	Sediment	3.26	N	0	1	Zinc	73.9		mg/kg

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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-103-OHW-2-3-10062022	Sediment	3.26	N	2	3	Zinc	48.4	J	mg/kg
SIB-104-MLW-0-1-10062022	Sediment	1.02	N	0	1	Zinc	84.8		mg/kg
SIB-104-OHW-0-1-10062022	Sediment	5.01	N	0	1	Zinc	93.5		mg/kg
SIB-105-OHW-0-1-10052022	Sediment	4.28	N	0	1	Zinc	121		mg/kg
SIB-106-OHW-0-1-10052022	Sediment	4.59	N	0	1	Zinc	122		mg/kg
SIB-107-OHW-0-1-10052022	Sediment	10.80	N	0	1	Zinc	118		mg/kg
SIB-109-OHW-0-1-10052022	Sediment	13.82	N	0	1	Zinc	96		mg/kg
SIB-110-MLW-0-1-10052022	Sediment	7.81	N	0	1	Zinc	147		mg/kg
SIB-112-OHW-0-1-10042022	Sediment	1.76	N	0	1	Zinc	107		mg/kg
SIB-114-OHW-0-1-10042022	Sediment	3.12	N	0	1	Zinc	156		mg/kg
SIB-120-MLW-0-1-10032022	Sediment	1.46	N	0	1	Zinc	56.8		mg/kg
SIB-121-MLW-0-1-10262022	Sediment	4.00	N	0	1	Zinc	81.55		mg/kg
SIB-122-MLW-0-1-10262022	Sediment	4.02	N	0	1	Zinc	101.5		mg/kg
SIB-122-MLW-1-2-10262022	Sediment	4.02	N	1	2	Zinc	94.3		mg/kg
SIB-124-MLW-0-1-10262022	Sediment	10.65	N	0	1	Zinc	96.9		mg/kg
SIB-125-MLW-0-1-10262022	Sediment	2.24	N	0	1	Zinc	67.95		mg/kg
SIB-SC-B04-1-2-09/04/2022	Sediment	6.97	N	1	2	Zinc	161	J	mg/kg
SIB-SC-B04-2-3-09/04/2022	Sediment	6.97	N	2	3	Zinc	125	J	mg/kg
SIB-SC-B04-3-4-09/04/2022	Sediment	6.97	N	3	4	Zinc	134.5		mg/kg
SIB-SC-B04-4-5-09/04/2022	Sediment	6.97	N	4	5	Zinc	133		mg/kg
SIB-SC-B04-5-6-09/04/2022	Sediment	6.97	N	5	6	Zinc	117		mg/kg
SIB-SC-B09-0-1-07/22/2022	Sediment	1.00	N	0	1	Zinc	70.6		mg/kg
SIB-SC-B11-1-2-08/11/2022	Sediment	9.79	N	1	2	Zinc	65.8		mg/kg
SIB-SC-B11-2-3-08/11/2022	Sediment	9.79	N	2	3	Zinc	79.1		mg/kg
SIB-SC-B11-3-4-08/11/2022	Sediment	9.79	N	3	4	Zinc	65.3		mg/kg
SIB-SC-B11-4-5-08/11/2022	Sediment	9.79	N	4	5	Zinc	66.2		mg/kg
SIB-SC-B11-5-6-08/11/2022	Sediment	9.79	N	5	6	Zinc	60.7		mg/kg
SIB-SC-B13-1-2-07/05/2022	Sediment	6.28	N	1	2	Zinc	58.7		mg/kg
SIB-SC-B13-2-3-07/05/2022	Sediment	6.28	N	2	3	Zinc	66.7		mg/kg
SIB-SC-B13-3-4-07/05/2022	Sediment	6.28	N	3	4	Zinc	67.7		mg/kg
SIB-SC-B13-4-5-07/05/2022	Sediment	6.28	N	4	5	Zinc	67.1		mg/kg
SIB-SC-B13-5-6-07/05/2022	Sediment	6.28	N	5	6	Zinc	67		mg/kg
SIB-SC-B18-0-1-08/20/2022	Sediment	6.79	N	0	1	Zinc	50.7		mg/kg
SIB-SC-B18-1-2-08/20/2022	Sediment	6.79	N	1	2	Zinc	54.2		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-B18-2-3-08/20/2022	Sediment	6.79	N	2	3	Zinc	54.6		mg/kg
SIB-SC-B18-3-4-08/20/2022	Sediment	6.79	N	3	4	Zinc	54.7		mg/kg
SIB-SC-B18-4-5-08/20/2022	Sediment	6.79	N	4	5	Zinc	62.3		mg/kg
SIB-SC-B18-5-6-08/20/2022	Sediment	6.79	N	5	6	Zinc	54.5		mg/kg
SIB-SC-B22-1-2-08/20/2022	Sediment	3.80	N	1	2	Zinc	59.6		mg/kg
SIB-SC-B22-2-3-08/20/2022	Sediment	3.80	N	2	3	Zinc	63.1		mg/kg
SIB-SC-B23-1-2-08/20/2022	Sediment	13.48	N	1	2	Zinc	70.75		mg/kg
SIB-SC-B23-2-3-08/20/2022	Sediment	13.48	N	2	3	Zinc	66.9		mg/kg
SIB-SC-B23-3-4-08/20/2022	Sediment	13.48	N	3	4	Zinc	71.9		mg/kg
SIB-SC-B23-4-5-08/20/2022	Sediment	13.48	N	4	5	Zinc	68.1		mg/kg
SIB-SC-B23-5-6-08/20/2022	Sediment	13.48	N	5	6	Zinc	72.2		mg/kg
SIB-SC-B24-0-1-08/20/2022	Sediment	13.79	N	0	1	Zinc	79.4		mg/kg
SIB-SC-B24-1-2-08/20/2022	Sediment	13.79	N	1	2	Zinc	79.6		mg/kg
SIB-SC-B24-2-3-08/20/2022	Sediment	13.79	N	2	3	Zinc	74.2		mg/kg
SIB-SC-B24-3-4-08/20/2022	Sediment	13.79	N	3	4	Zinc	73.5		mg/kg
SIB-SC-B24-4-5-08/20/2022	Sediment	13.79	N	4	5	Zinc	73		mg/kg
SIB-SC-B24-5-6-08/20/2022	Sediment	13.79	N	5	6	Zinc	53.5		mg/kg
SIB-SC-B25-0-1-07/25/2022	Sediment	7.36	N	0	1	Zinc	67.3		mg/kg
SIB-SC-B25-1-2-07/25/2022	Sediment	7.36	N	1	2	Zinc	58.9		mg/kg
SIB-SC-B25-2-3-07/25/2022	Sediment	7.36	N	2	3	Zinc	70.9		mg/kg
SIB-SC-B25-3-4-07/25/2022	Sediment	7.36	N	3	4	Zinc	68.9		mg/kg
SIB-SC-B25-4-5-07/25/2022	Sediment	7.36	N	4	5	Zinc	69.5		mg/kg
SIB-SC-B25-5-6-07/25/2022	Sediment	7.36	N	5	6	Zinc	70.9		mg/kg
SIB-SC-B26-1-2-08/23/2022	Sediment	10.71	N	1	2	Zinc	70.7		mg/kg
SIB-SC-B26-2-3-08/23/2022	Sediment	10.71	N	2	3	Zinc	70.15		mg/kg
SIB-SC-B26-3-4-08/23/2022	Sediment	10.71	N	3	4	Zinc	62.6		mg/kg
SIB-SC-B26-4-5-08/23/2022	Sediment	10.71	N	4	5	Zinc	70.8		mg/kg
SIB-SC-B26-5-6-08/23/2022	Sediment	10.71	N	5	6	Zinc	66.6		mg/kg
SIB-SC-B26-6-7-08/23/2022	Sediment	10.71	N	6	7	Zinc	108		mg/kg
SIB-SC-C14-1-2-08/04/2022	Sediment	2.43	N	1	2	Zinc	430		mg/kg
SIB-SC-C18-1-2-07/19/2022	Sediment	7.16	N	1	2	Zinc	86.5		mg/kg
SIB-SC-C18-2-3-07/19/2022	Sediment	7.16	N	2	3	Zinc	225		mg/kg
SIB-SC-C18-3-4-07/19/2022	Sediment	7.16	N	3	4	Zinc	93.3		mg/kg
SIB-SC-C18-4-5-07/19/2022	Sediment	7.16	N	4	5	Zinc	61.4		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C18-5-6-07/19/2022	Sediment	7.16	N	5	6	Zinc	79		mg/kg
SIB-SC-C19-1-2-08/19/2022	Sediment	6.06	N	1	2	Zinc	159		mg/kg
SIB-SC-C19-2-3-08/19/2022	Sediment	6.06	N	2	3	Zinc	197		mg/kg
SIB-SC-C19-3-4-08/19/2022	Sediment	6.06	N	3	4	Zinc	111		mg/kg
SIB-SC-C19-4-5-08/19/2022	Sediment	6.06	N	4	5	Zinc	140		mg/kg
SIB-SC-C19-5-6-08/19/2022	Sediment	6.06	N	5	6	Zinc	92.1		mg/kg
SIB-SC-C22-0-1-08/10/2022	Sediment	3.25	N	0	1	Zinc	190		mg/kg
SIB-SC-C22-1-2-08/10/2022	Sediment	3.25	N	1	2	Zinc	145		mg/kg
SIB-SC-C22-2-3-08/10/2022	Sediment	3.25	N	2	3	Zinc	210		mg/kg
SIB-SC-C23-0-1-07/06/2022	Sediment	1.69	N	0	1	Zinc	200		mg/kg
SIB-SC-C24-0-1-07/11/2022	Sediment	5.61	N	0	1	Zinc	191		mg/kg
SIB-SC-C24-1-2-07/11/2022	Sediment	5.61	N	1	2	Zinc	225		mg/kg
SIB-SC-C24-2-3-07/11/2022	Sediment	5.61	N	2	3	Zinc	190		mg/kg
SIB-SC-C24-3-4-07/11/2022	Sediment	5.61	N	3	4	Zinc	204		mg/kg
SIB-SC-C24-4-5-07/11/2022	Sediment	5.61	N	4	5	Zinc	227		mg/kg
SIB-SC-C25-0-1-07/11/2022	Sediment	4.24	N	0	1	Zinc	246		mg/kg
SIB-SC-C25-1-2-07/11/2022	Sediment	4.24	N	1	2	Zinc	329.5		mg/kg
SIB-SC-C25-2-3-07/11/2022	Sediment	4.24	N	2	3	Zinc	333		mg/kg
SIB-SC-C25-3-4-07/11/2022	Sediment	4.24	N	3	4	Zinc	258		mg/kg
SIB-SC-C26-0-1-08/23/2022	Sediment	4.71	N	0	1	Zinc	280		mg/kg
SIB-SC-C26-1-2-08/23/2022	Sediment	4.71	N	1	2	Zinc	258		mg/kg
SIB-SC-C26-2-3-08/23/2022	Sediment	4.71	N	2	3	Zinc	225		mg/kg
SIB-SC-C26-3-4-08/23/2022	Sediment	4.71	N	3	4	Zinc	161		mg/kg
SIB-SC-C27-0-1-08/23/2022	Sediment	4.92	N	0	1	Zinc	358		mg/kg
SIB-SC-C27-1-2-08/23/2022	Sediment	4.92	N	1	2	Zinc	359		mg/kg
SIB-SC-C27-2-3-08/23/2022	Sediment	4.92	N	2	3	Zinc	245		mg/kg
SIB-SC-C27-3-4-08/23/2022	Sediment	4.92	N	3	4	Zinc	233		mg/kg
SIB-SC-C28-0-1-07/09/2022	Sediment	5.72	N	0	1	Zinc	207		mg/kg
SIB-SC-C28-1-2-07/09/2022	Sediment	5.72	N	1	2	Zinc	243		mg/kg
SIB-SC-C28-2-3-07/09/2022	Sediment	5.72	N	2	3	Zinc	231		mg/kg
SIB-SC-C28-3-4-07/09/2022	Sediment	5.72	N	3	4	Zinc	267		mg/kg
SIB-SC-C28-4-5-07/09/2022	Sediment	5.72	N	4	5	Zinc	190		mg/kg
SIB-SC-C30-1-2-07/09/2022	Sediment	6.58	N	1	2	Zinc	246		mg/kg
SIB-SC-C30-2-3-07/09/2022	Sediment	6.58	N	2	3	Zinc	228		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-C30-3-4-07/09/2022	Sediment	6.58	N	3	4	Zinc	237		mg/kg
SIB-SC-C30-4-5-07/09/2022	Sediment	6.58	N	4	5	Zinc	258		mg/kg
SIB-SC-C30-5-6-07/09/2022	Sediment	6.58	N	5	6	Zinc	193		mg/kg
SIB-SC-C31-1-2-07/10/2022	Sediment	7.79	N	1	2	Zinc	237		mg/kg
SIB-SC-C31-2-3-07/10/2022	Sediment	7.79	N	2	3	Zinc	213		mg/kg
SIB-SC-C31-3-4-07/10/2022	Sediment	7.79	N	3	4	Zinc	314		mg/kg
SIB-SC-C31-4-5-07/10/2022	Sediment	7.79	N	4	5	Zinc	234		mg/kg
SIB-SC-C31-5-6-07/10/2022	Sediment	7.79	N	5	6	Zinc	228		mg/kg
SIB-SC-D25-1-2-07/11/2022	Sediment	2.61	N	1	2	Zinc	290.5		mg/kg
SIB-SC-D26-1-2-07/11/2022	Sediment	3.71	N	1	2	Zinc	227		mg/kg
SIB-SC-D26-2-3-07/11/2022	Sediment	3.71	N	2	3	Zinc	245		mg/kg
SIB-SC-D30-1-2-07/09/2022	Sediment	6.32	N	1	2	Zinc	261		mg/kg
SIB-SC-D30-2-3-07/09/2022	Sediment	6.32	N	2	3	Zinc	238		mg/kg
SIB-SC-D30-3-4-07/09/2022	Sediment	6.32	N	3	4	Zinc	252		mg/kg
SIB-SC-D30-4-5-07/09/2022	Sediment	6.32	N	4	5	Zinc	211		mg/kg
SIB-SC-D30-5-6-07/09/2022	Sediment	6.32	N	5	6	Zinc	236		mg/kg
SIB-SC-D31-1-2-07/09/2022	Sediment	7.40	N	1	2	Zinc	239		mg/kg
SIB-SC-D31-2-3-07/09/2022	Sediment	7.40	N	2	3	Zinc	283		mg/kg
SIB-SC-D31-3-4-07/09/2022	Sediment	7.40	N	3	4	Zinc	235		mg/kg
SIB-SC-D31-4-5-07/09/2022	Sediment	7.40	N	4	5	Zinc	209		mg/kg
SIB-SC-D31-5-6-07/09/2022	Sediment	7.40	N	5	6	Zinc	233		mg/kg
SIB-SC-E25-1-2-07/12/2022	Sediment	3.44	N	1	2	Zinc	258	J	mg/kg
SIB-SC-E25-2-3-07/12/2022	Sediment	3.44	N	2	3	Zinc	251	J	mg/kg
SIB-SC-E26-1-2-07/06/2022	Sediment	6.41	N	1	2	Zinc	225		mg/kg
SIB-SC-E26-2-3-07/06/2022	Sediment	6.41	N	2	3	Zinc	254		mg/kg
SIB-SC-E26-3-4-07/06/2022	Sediment	6.41	N	3	4	Zinc	137		mg/kg
SIB-SC-E26-4-5-07/06/2022	Sediment	6.41	N	4	5	Zinc	134		mg/kg
SIB-SC-E26-5-6-07/06/2022	Sediment	6.41	N	5	6	Zinc	52.3		mg/kg
SIB-SC-E28-1-2-07/10/2022	Sediment	6.36	N	1	2	Zinc	217		mg/kg
SIB-SC-E28-2-3-07/10/2022	Sediment	6.36	N	2	3	Zinc	155		mg/kg
SIB-SC-E28-3-4-07/10/2022	Sediment	6.36	N	3	4	Zinc	113		mg/kg
SIB-SC-E28-4-5-07/10/2022	Sediment	6.36	N	4	5	Zinc	53.8		mg/kg
SIB-SC-E28-5-6-07/10/2022	Sediment	6.36	N	5	6	Zinc	67.1		mg/kg
SIB-SC-E29-1-2-07/10/2022	Sediment	6.45	N	1	2	Zinc	248		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-E29-2-3-07/10/2022	Sediment	6.45	N	2	3	Zinc	236		mg/kg
SIB-SC-E29-3-4-07/10/2022	Sediment	6.45	N	3	4	Zinc	251		mg/kg
SIB-SC-E29-4-5-07/10/2022	Sediment	6.45	N	4	5	Zinc	144		mg/kg
SIB-SC-E29-5-6-07/10/2022	Sediment	6.45	N	5	6	Zinc	90		mg/kg
SIB-SC-E30-1-2-07/12/2022	Sediment	7.52	N	1	2	Zinc	257	J	mg/kg
SIB-SC-E30-2-3-07/12/2022	Sediment	7.52	N	2	3	Zinc	216	J	mg/kg
SIB-SC-E30-3-4-07/12/2022	Sediment	7.52	N	3	4	Zinc	220	J	mg/kg
SIB-SC-E30-4-5-07/12/2022	Sediment	7.52	N	4	5	Zinc	222		mg/kg
SIB-SC-E30-5-6-07/12/2022	Sediment	7.52	N	5	6	Zinc	130		mg/kg
SIB-SC-E31-1-2-07/09/2022	Sediment	2.86	N	1	2	Zinc	271		mg/kg
SIB-SC-F09-1-2-07/14/2022	Sediment	2.52	N	1	2	Zinc	158		mg/kg
SIB-SC-F11-1-2-08/06/2022	Sediment	3.09	N	1	2	Zinc	335		mg/kg
SIB-SC-F11-2-3-08/06/2022	Sediment	3.09	N	2	3	Zinc	540		mg/kg
SIB-SC-F12-1-2-08/06/2022	Sediment	2.31	N	1	2	Zinc	558		mg/kg
SIB-SC-F13-1-2-08/08/2022	Sediment	2.75	N	1	2	Zinc	454	J	mg/kg
SIB-SC-F18-1-2-07/21/2022	Sediment	2.57	N	1	2	Zinc	256.5	J	mg/kg
SIB-SC-F20-0-1-07/21/2022	Sediment	2.65	N	0	1	Zinc	334		mg/kg
SIB-SC-F20-1-2-07/21/2022	Sediment	2.65	N	1	2	Zinc	423	J	mg/kg
SIB-SC-F21-1-2-07/13/2022	Sediment	3.87	N	1	2	Zinc	305		mg/kg
SIB-SC-F21-2-3-07/13/2022	Sediment	3.87	N	2	3	Zinc	319		mg/kg
SIB-SC-F22-1-2-07/13/2022	Sediment	3.58	N	1	2	Zinc	274		mg/kg
SIB-SC-F22-2-3-07/13/2022	Sediment	3.58	N	2	3	Zinc	83.05		mg/kg
SIB-SC-F27-1-2-07/10/2022	Sediment	5.50	N	1	2	Zinc	222		mg/kg
SIB-SC-F27-2-3-07/10/2022	Sediment	5.50	N	2	3	Zinc	65.4		mg/kg
SIB-SC-F27-3-4-07/10/2022	Sediment	5.50	N	3	4	Zinc	56		mg/kg
SIB-SC-F27-4-5-07/10/2022	Sediment	5.50	N	4	5	Zinc	56.3		mg/kg
SIB-SC-F28-1-2-07/12/2022	Sediment	5.89	N	1	2	Zinc	111		mg/kg
SIB-SC-F28-2-2.8-07/12/2022	Sediment	5.89	N	2	2.8	Zinc	85.3		mg/kg
SIB-SC-F31-1-2-07/08/2022	Sediment	4.09	N	1	2	Zinc	250		mg/kg
SIB-SC-F31-2-3-07/08/2022	Sediment	4.09	N	2	3	Zinc	233		mg/kg
SIB-SC-F31-3-4-07/08/2022	Sediment	4.09	N	3	4	Zinc	246		mg/kg
SIB-SC-G01-0-1-09/02/2022	Sediment	5.93	N	0	1	Zinc	222		mg/kg
SIB-SC-G01-1-2-09/02/2022	Sediment	5.93	N	1	2	Zinc	249		mg/kg
SIB-SC-G01-2-3-09/02/2022	Sediment	5.93	N	2	3	Zinc	161		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-G01-3-4-09/02/2022	Sediment	5.93	N	3	4	Zinc	116		mg/kg
SIB-SC-G01-4-5-09/02/2022	Sediment	5.93	N	4	5	Zinc	129		mg/kg
SIB-SC-G06-1-2-07/14/2022	Sediment	2.37	N	1	2	Zinc	352		mg/kg
SIB-SC-G07-0-1-07/14/2022	Sediment	3.79	N	0	1	Zinc	543		mg/kg
SIB-SC-G07-1-2-07/14/2022	Sediment	3.79	N	1	2	Zinc	895		mg/kg
SIB-SC-G07-2-3-07/14/2022	Sediment	3.79	N	2	3	Zinc	174		mg/kg
SIB-SC-G08-1-2-07/14/2022	Sediment	2.81	N	1	2	Zinc	318		mg/kg
SIB-SC-H06-0-1-07/26/2022	Sediment	7.73	N	0	1	Zinc	1030		mg/kg
SIB-SC-H06-1-2-07/26/2022	Sediment	7.73	N	1	2	Zinc	811		mg/kg
SIB-SC-H06-2-3-07/26/2022	Sediment	7.73	N	2	3	Zinc	939		mg/kg
SIB-SC-H06-3-4-07/26/2022	Sediment	7.73	N	3	4	Zinc	940		mg/kg
SIB-SC-H06-4-5-07/26/2022	Sediment	7.73	N	4	5	Zinc	528		mg/kg
SIB-SC-H06-5-6-07/26/2022	Sediment	7.73	N	5	6	Zinc	98		mg/kg
SIB-SC-H06-6-7-07/26/2022	Sediment	7.73	N	6	7	Zinc	55.4	J	mg/kg
SIB-SC-H07-1-2-07/26/2022	Sediment	8.38	N	1	2	Zinc	1110		mg/kg
SIB-SC-H07-2-3-07/26/2022	Sediment	8.38	N	2	3	Zinc	162		mg/kg
SIB-SC-H07-3-4-07/26/2022	Sediment	8.38	N	3	4	Zinc	70.2		mg/kg
SIB-SC-H07-4-5-07/26/2022	Sediment	8.38	N	4	5	Zinc	74.6		mg/kg
SIB-SC-H07-5-6-07/26/2022	Sediment	8.38	N	5	6	Zinc	77.3		mg/kg
SIB-SC-H07-6-7-07/26/2022	Sediment	8.38	N	6	7	Zinc	53.5	J	mg/kg
SIB-SC-H08-0-1-07/26/2022	Sediment	12.01	N	0	1	Zinc	1380		mg/kg
SIB-SC-H08-1-2-07/26/2022	Sediment	12.01	N	1	2	Zinc	771		mg/kg
SIB-SC-H08-2-3-07/26/2022	Sediment	12.01	N	2	3	Zinc	798		mg/kg
SIB-SC-H08-3-4-07/26/2022	Sediment	12.01	N	3	4	Zinc	970		mg/kg
SIB-SC-H08-4-5-07/26/2022	Sediment	12.01	N	4	5	Zinc	1100		mg/kg
SIB-SC-H08-5-6-07/26/2022	Sediment	12.01	N	5	6	Zinc	216		mg/kg
SIB-SC-H08-6-7-07/26/2022	Sediment	12.01	N	6	7	Zinc	65.6	J	mg/kg
SIB-SC-H08-7-8-07/26/2022	Sediment	12.01	N	7	8	Zinc	57.1	J	mg/kg
SIB-SC-H08-8-8.3-07/26/2022	Sediment	12.01	N	8	8.3	Zinc	60.4	J	mg/kg
SIB-SC-I05-0-1-07/28/2022	Sediment	9.23	N	0	1	Zinc	433		mg/kg
SIB-SC-I05-1-2-07/28/2022	Sediment	9.23	N	1	2	Zinc	376		mg/kg
SIB-SC-I05-2-3-07/28/2022	Sediment	9.23	N	2	3	Zinc	832		mg/kg
SIB-SC-I05-3-4-07/28/2022	Sediment	9.23	N	3	4	Zinc	810		mg/kg
SIB-SC-I05-4-5-07/28/2022	Sediment	9.23	N	4	5	Zinc	1030		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-I05-5-6-07/28/2022	Sediment	9.23	N	5	6	Zinc	552		mg/kg
SIB-SC-I05-6-7-07/28/2022	Sediment	9.23	N	6	7	Zinc	98.6		mg/kg
SIB-SC-I05-7-8-07/28/2022	Sediment	9.23	N	7	8	Zinc	51.4		mg/kg
SIB-SC-I06-0-1-07/26/2022	Sediment	10.77	N	0	1	Zinc	318		mg/kg
SIB-SC-I06-1-2-07/26/2022	Sediment	10.77	N	1	2	Zinc	385		mg/kg
SIB-SC-I06-2-3-07/26/2022	Sediment	10.77	N	2	3	Zinc	582		mg/kg
SIB-SC-I06-3-4-07/26/2022	Sediment	10.77	N	3	4	Zinc	566		mg/kg
SIB-SC-I06-4-5-07/26/2022	Sediment	10.77	N	4	5	Zinc	823		mg/kg
SIB-SC-I06-5-6-07/26/2022	Sediment	10.77	N	5	6	Zinc	750		mg/kg
SIB-SC-I06-6-7-07/26/2022	Sediment	10.77	N	6	7	Zinc	693		mg/kg
SIB-SC-I06-7-8-07/26/2022	Sediment	10.77	N	7	8	Zinc	91.1		mg/kg
SIB-SC-I06-8-9-07/26/2022	Sediment	10.77	N	8	9	Zinc	64		mg/kg
SIB-SC-I08-0-1-07/28/2022	Sediment	16.98	N	0	1	Zinc	1220		mg/kg
SIB-SC-I08-10-11-07/28/2022	Sediment	16.98	N	10	11	Zinc	63.8		mg/kg
SIB-SC-I08-11-12-07/28/2022	Sediment	16.98	N	11	12	Zinc	61.9		mg/kg
SIB-SC-I08-1-2-07/28/2022	Sediment	16.98	N	1	2	Zinc	1175		mg/kg
SIB-SC-I08-2-3-07/28/2022	Sediment	16.98	N	2	3	Zinc	696		mg/kg
SIB-SC-I08-3-4-07/28/2022	Sediment	16.98	N	3	4	Zinc	1050		mg/kg
SIB-SC-I08-4-5-07/28/2022	Sediment	16.98	N	4	5	Zinc	791		mg/kg
SIB-SC-I08-5-6-07/28/2022	Sediment	16.98	N	5	6	Zinc	758		mg/kg
SIB-SC-I08-9-10-07/28/2022	Sediment	16.98	N	9	10	Zinc	72.7		mg/kg
SIB-SC-J03-0-1-08/19/2022	Sediment	1.30	N	0	1	Zinc	241		mg/kg
SIB-SC-J06-10-11-07/26/2022	Sediment	16.33	N	10	11	Zinc	866		mg/kg
SIB-SC-J06-11-11.5-07/26/2022	Sediment	16.33	N	11	11.5	Zinc	170		mg/kg
SIB-SC-J06-1-2-07/26/2022	Sediment	16.33	N	1	2	Zinc	363		mg/kg
SIB-SC-J06-2-3-07/26/2022	Sediment	16.33	N	2	3	Zinc	813		mg/kg
SIB-SC-J06-3-4-07/26/2022	Sediment	16.33	N	3	4	Zinc	458		mg/kg
SIB-SC-J06-4-5-07/26/2022	Sediment	16.33	N	4	5	Zinc	480		mg/kg
SIB-SC-J06-5-6-07/26/2022	Sediment	16.33	N	5	6	Zinc	730		mg/kg
SIB-SC-J08-0-1-09/01/2022	Sediment	6.10	N	0	1	Zinc	252		mg/kg
SIB-SC-J08-1-2-09/01/2022	Sediment	6.10	N	1	2	Zinc	311		mg/kg
SIB-SC-J08-2-3-09/01/2022	Sediment	6.10	N	2	3	Zinc	352		mg/kg
SIB-SC-J08-3-4-09/01/2022	Sediment	6.10	N	3	4	Zinc	295		mg/kg
SIB-SC-J08-4-5-09/01/2022	Sediment	6.10	N	4	5	Zinc	481		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-K03-0-1-07/27/2022	Sediment	3.61	N	0	1	Zinc	178		mg/kg
SIB-SC-K03-1-2-07/27/2022	Sediment	3.61	N	1	2	Zinc	340		mg/kg
SIB-SC-K03-2-3-07/27/2022	Sediment	3.61	N	2	3	Zinc	458		mg/kg
SIB-SC-K04-0-1-07/27/2022	Sediment	9.64	N	0	1	Zinc	165		mg/kg
SIB-SC-K04-1-2-07/27/2022	Sediment	9.64	N	1	2	Zinc	62.5		mg/kg
SIB-SC-K04-2-3-07/27/2022	Sediment	9.64	N	2	3	Zinc	53.9		mg/kg
SIB-SC-K04-3-4-07/27/2022	Sediment	9.64	N	3	4	Zinc	101		mg/kg
SIB-SC-K04-4-5-07/27/2022	Sediment	9.64	N	4	5	Zinc	73.9		mg/kg
SIB-SC-K04-5-6-07/27/2022	Sediment	9.64	N	5	6	Zinc	59		mg/kg
SIB-SC-K07-1-2-08/21/2022	Sediment	6.34	N	1	2	Zinc	876		mg/kg
SIB-SC-K07-2-3-08/21/2022	Sediment	6.34	N	2	3	Zinc	613		mg/kg
SIB-SC-K07-3-4-08/21/2022	Sediment	6.34	N	3	4	Zinc	109		mg/kg
SIB-SC-K07-4-5-08/21/2022	Sediment	6.3370012	N	4	5	Zinc	70.7		mg/kg
SIB-SC-K07-5-6-08/21/2022	Sediment	6.34	N	5	6	Zinc	54.4		mg/kg
SIB-SC-L05-1-2-07/27/2022	Sediment	9.36	N	1	2	Zinc	459		mg/kg
SIB-SC-L05-2-3-07/27/2022	Sediment	9.36	N	2	3	Zinc	542		mg/kg
SIB-SC-L05-3-4-07/27/2022	Sediment	9.3649201	N	3	4	Zinc	410		mg/kg
SIB-SC-L05-4-5-07/27/2022	Sediment	9.3649201	N	4	5	Zinc	73.6		mg/kg
SIB-SC-L05-5-6-07/27/2022	Sediment	9.3649201	N	5	6	Zinc	71.2		mg/kg
SIB-SC-L08-1-2-08/21/2022	Sediment	2.3045348	N	1	2	Zinc	55.8		mg/kg
SIB-SC-L09-0-1-08/21/2022	Sediment	2.1015542	N	0	1	Zinc	82		mg/kg
SIB-SC-L09-1-2-08/21/2022	Sediment	2.1015542	N	1	2	Zinc	52.7		mg/kg
SIB-SC-N05-1-2-09/01/2022	Sediment	2.1119739	N	1	2	Zinc	135		mg/kg
SIB-SC-N07-0-1-08/24/2022	Sediment	9.6807108	N	0	1	Zinc	940		mg/kg
SIB-SC-N07-1-2-08/24/2022	Sediment	9.68	N	1	2	Zinc	166		mg/kg
SIB-SC-N07-2-3-08/24/2022	Sediment	9.68	N	2	3	Zinc	48.1		mg/kg
SIB-SC-N07-3-3.6-08/24/2022	Sediment	9.68	N	3	3.6	Zinc	48.9		mg/kg
SIB-SC-O04-1-2-08/25/2022	Sediment	8.22	N	1	2	Zinc	133		mg/kg
SIB-SC-O04-2-3-08/25/2022	Sediment	8.22	N	2	3	Zinc	115		mg/kg
SIB-SC-O04-3-4-08/25/2022	Sediment	8.22	N	3	4	Zinc	127		mg/kg
SIB-SC-O04-4-5-08/25/2022	Sediment	8.22	N	4	5	Zinc	197		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
SIB-SC-O04-5-6-08/25/2022	Sediment	8.22	N	5	6	Zinc	101		mg/kg
SIB-SC-O04-6-7-08/25/2022	Sediment	8.22	N	6	7	Zinc	160	J	mg/kg
SIB-SC-O04-7-8-08/25/2022	Sediment	8.22	N	7	8	Zinc	344	J	mg/kg
SIB-SC-O07-1-2-09/04/2022	Sediment	8.82	N	1	2	Zinc	1820		mg/kg
SIB-SC-O07-2-3-09/04/2022	Sediment	8.82	N	2	3	Zinc	303		mg/kg
SIB-SC-O07-3-4-09/04/2022	Sediment	8.82	N	3	4	Zinc	55.7		mg/kg
SIB-SC-P07-0-1-07/28/2022	Sediment	9.66	N	0	1	Zinc	179		mg/kg
SIB-SC-P07-1-2-07/28/2022	Sediment	9.66	N	1	2	Zinc	1420		mg/kg
SIB-SC-P07-2-3-07/28/2022	Sediment	9.66	N	2	3	Zinc	3720		mg/kg
SIB-SC-P07-3-3.9-07/28/2022	Sediment	9.66	N	3	3.9	Zinc	1260		mg/kg
T1-0TO30-101518	Sediment	5.81	N	0	1	Zinc	58		mg/kg
T3-0TO28-101618	Sediment	2.18	N	0	0.9	Zinc	260		mg/kg
T6-0TO29-101618	Sediment	4.16	N	0	1	Zinc	310		mg/kg
T7-0TO31-101618	Sediment	3.98	N	0	1	Zinc	250		mg/kg
WLCOFH02M103M103	Sediment	1.38	N	0	0.5	Zinc	318	J	mg/kg
WLCOFH02M104M104	Sediment	5.84	N	0	0.5	Zinc	359	J	mg/kg
WLCOFH02M105M105	Sediment	7.05	N	0	0.5	Zinc	362	J	mg/kg
WLCOFH02M106M106	Sediment	2.75	N	0	0.5	Zinc	357	J	mg/kg
WLCOFH02M107M107	Sediment	7.68	N	0	0.5	Zinc	57	J	mg/kg
WLCOFH02M109M109	Sediment	1.76	N	0	0.5	Zinc	193	J	mg/kg
WLCOFH02M110M110	Sediment	7.57	N	0	0.5	Zinc	123	J	mg/kg
WLCOFJ02M0302M3020	Sediment	1.24	N	0	0.2	Zinc	80.1		mg/kg
WLCOFJ02M0305M3050	Sediment	0.68	N	0	0.5	Zinc	176	J	mg/kg
WLCPSK091-A	Sediment	7.88	N	0	5.8	Zinc	354		mg/kg
WLCPSK094-A	Sediment	10.57	N	0	2.9	Zinc	223		mg/kg
WLCPSK094-B	Sediment	10.57	N	2.9	7.9	Zinc	129	T	mg/kg
WLCPSK095-A	Sediment	8.95	N	0	1.9	Zinc	262		mg/kg
WLCPSK095-B	Sediment	8.95	N	1.9	7	Zinc	137		mg/kg
WR-WSI98SD1300	Sediment	2.09	N	0	0.3	Zinc	106		mg/kg
WR-WSI98SD1320	Sediment	1.21	N	0	0.3	Zinc	102		mg/kg

Attachment B
Dredged Interval Chemistry
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Sample ID	Interval Type	Dredged Depth (ft)	Sample Type	Start Depth (ft)	End Depth (ft)	Analyte Final	Result	Q	Unit
WR-WSI98SD1330	Sediment	5.72	N	0	0.3	Zinc	539		mg/kg
WR-WSI98SD1330000A	Sediment	5.72	N	0	3	Zinc	598		mg/kg
WR-WSI98SD1340	Sediment	2.58	N	0	0.3	Zinc	335		mg/kg
WR-WSI98SD1360	Sediment	2.50	N	0	0.3	Zinc	178		mg/kg
WR-WSI98SD1390	Sediment	3.67	N	0	0.3	Zinc	465		mg/kg
WR-WSI98SD1410000A	Sediment	5.22	N	0	3	Zinc	236		mg/kg
WR-WSI98SD1410000CC	Sediment	5.22	N	0	0.3	Zinc	279	T	mg/kg
SIB-005-OHW-0-1-10172022	Riverbank	1.62	N	0	1	Zinc	88		mg/kg
SIB-066-OHW-0-1-10182022	Riverbank	1.14	N	0	1	Zinc	65.95		mg/kg
SIB-068-OHW-0-1-10142022	Riverbank	1.42	N	0	1	Zinc	67.1		mg/kg

Attachment B
Dredged Interval Chemistry
Cap Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Notes:

ft = feet

µg/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

pg/g = picograms per gram

A = sample archived

BaP eq = benzo(a)pyrene equivalent

cPAH = carcinogenic polycyclic aromatic hydrocarbons

DDD = dichlorodiphenyldichloroethane

DDE = dichlorodiphenyldichloroethane

DDT = dichlorodiphenyltrichloroethane

DDx = DDD + DDE + DDT

J = estimated value

J+ = estimated high value

N = analyte is detected, but the analysis didn't fully meet the quality control requirements for confirmation

N = normal sample

PAH = polycyclic aromatic hydrocarbons

PCB = polychlorinated biphenyl

Q = qualifier

R = rejected/unusable result

T = reported result is below the laboratory's method detection limit

TCDD = 2,3,7,8-tetrachlorodibenzofuran

TEQ = TCDD Toxic Equivalency

U = analyte not detected above laboratory reporting limit

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ATTACHMENT C

SORPTION PARAMETER MEMORANDUM

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SORPTION PARAMETER MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

1.0 INTRODUCTION

The purpose of this Sorption Parameter Memorandum (SPM) is to present the sorption parameters selected from literature values for CapSIM modeling efforts of chemical isolation layer (CIL) performance. The CIL performance was evaluated for the remedial design (RD) of Swan Island Basin (SIB) Project Area. Values presented in this memo are incorporated into the Pre-Final 90% RD Cap Design Technical Memorandum (CDTM; Volume I, Appendix E).

Sorption models include linear, Freundlich and Langmuir sorption isotherms. The linear sorption model is a widely accepted model for the sorption of organic compounds onto both sediments and natural organic matter (Karickhoff et al., 1979; Reible, 2023) and inorganic constituents to mineral surfaces. Linear model input parameters include adsorption-desorption linear partitioning coefficient (K_D), which depends on the organic carbon-water partition coefficient (Koc), the organic carbon content associated with the solids (foc), and the octanol-water partition coefficient (Kow). Freundlich and Langmuir (non-linear) sorption isotherms are also frequently used to predict particle concentrations from porewater concentrations for cap amendment materials, for compounds and settings that are more appropriately modeled as having non-linear sorption characteristics.

Section 2 discusses literature-based sorption parameters outlined in this SPM. Section 3 discusses Project Area-adjacent sorption parameters. Section 4 details chemical isolation materials used in the design. Section 5 discusses selected sorption parameters for all analytes. Section 6 lists all the references.

2.0 LITERATURE-BASED SORPTION PARAMETERS

A review of sorption parameters available in literature was performed. The values were screened based on conditions under which the sorption parameters were measured such as material type, redox conditions, pH, and environmental setting. The most appropriate available values were selected based on the degree of similarity to in-situ conditions within SIB. The selected sorption parameters for each ROD Errata #2 Table 17 (EPA, 2020) contaminant of concern (COC) and for each capping material are described in detail in Section 5.

3.0 PROJECT AREA-ADJACENT SORPTION PARAMETERS

The SPM evaluates literature K_D values against the Project Area-adjacent K_D values. These Project Area-adjacent specific measurements include 2020 Transition Zone Water investigation from River Mile 9 West (RM9W, Bridgewater Group, 2020), as well as Cathedral Park, and Fund-Lead 3, and Fund-Lead 9 (CDM Smith, 2025) project areas. As discussed in Section 1.2 of the Cap

Corporate Headquarters
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

Design Technical Memorandum, these Project Areas are adjacent to the SIB Project Area, both upstream and downstream and represent the most-similar spatial conditions to the SIB Project Area within the Willamette River. Project Area-adjacent K_D values are used for evaluating partitioning within the SIB sediments when available, as they better represent SIB Project Area conditions than literature values, due to the physical proximity of these reference sites to the SIB Project Area.

These Project Area-adjacent K_D values were:

- calculated from sediment and porewater sampling results (Bridgewater Group, 2020; CDM Smith, 2025);
- available for 34 individual COCs and Total PCBs; and
- compared to literature values previously applied to SIB Project Area in Draft 50% RD.

The Project Area-adjacent measured sorption parameters are lower for 1,2,3,4,7,8-hexachlorodibenzofuran (HxCDF), 1,2,3,7,8- pentachlorodibenzo-p-dioxin (PeCDD), benzo(g,h,i)perylene, and diesel compared to the selected literature values, resulting in equivalent porewater concentrations that are between 170 and 375 percent (average of 292 percent) of the literature equivalent porewater concentrations for the same initial sediment concentrations. The measured sorption parameters for the other 31 COCs are higher than the selected literature values, resulting in equivalent porewater concentrations that are between 0.22 and 93 percent (average of 15 percent) of the literature equivalent porewater concentrations for the same initial sediment concentrations. Section 1.2 of Pre-Final 90% RD discussed the impact of selecting Project Area-adjacent values on cap design.

4.0 MODELED MATERIALS

Section 4 provides a discussion of the sediment and capping materials present in the CIL and evaluated in the CapSIM model. The main CIL components evaluated included sand and activated carbon as an amendment. Multiple additional cap amendment materials were evaluated for arsenic, BEHP, and tributyltin for the 100-year design life based on cap breakthrough of the GAC-amended sand alternatives modeled in the 50% RD CDTM. These additional materials are apatite, bauxite, and organoclay.

4.1 ACTIVATED CARBON

Activated carbon is known to strongly adsorb hydrophobic organic contaminants that are commonly associated with sediments and is one of the most widely accepted treatment amendments (ITRC, 2023). Activated carbon can be used in its raw granulated form (GAC) mixed with sand, in a powdered form (PAC), or in the form of a geotextile mat containing GAC (ITRC, 2023). GAC and GAC geotextile were evaluated in this design due to challenges with uniform placement of PAC and potentially better performance of GAC as compared to PAC for the 100-year cap design life. A key attribute for activated carbon is its high specific surface area resulting from its porous structure. Polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), dioxins/furans, and pesticides, all of which are present in the sediment within SIB Project Area, are strongly adsorbed by activated carbon, often in a granular form, making them less bioavailable (EPA, 2013). Adsorption of hydrophobic organic contaminants to activated carbon in

sediments is often 10 to 100 times greater than absorption to organic carbon (OC) (EPA, 2013). Pre-hydrated activated carbon mixed with sand, as specified in the CDTM, has been applied on full and pilot scales at multiple sites over the last decade (ITRC, 2023).

The physical parameters for GAC as modeled in the Final 90% RD CDTM are based on the commercially available product FILTRASORB 400 manufactured by Calgon Carbon Corporation. FILTRASORB 400 is produced from a pulverized and reagglomerated blend of bituminous coals and has been used in treatment and purification applications for over 40 years (Calgon Carbon Corporation, 2019).

4.2 APATITE

Apatites are a class of naturally occurring minerals that consist of a matrix of phosphate minerals, including calcium phosphate, and other common ions like fluoride, chloride, and hydroxide that sequester metals through direct ion exchange with the calcium atom or by dissolution of hydroxyapatite followed by precipitation of the metal phosphate mineral (ITRC, 2023). Common sources for apatite are processed animal bones and mined fossilized bones, such as from fish. The partition coefficient is sensitive to the equilibrium solution pH and temperature, and the uptake of the contaminant may be diminished by the presence of interfering ions that can affect the solid phase by competitive sorption or by altering of the surface properties (Bostick et al., 2003). Pilot-scale apatite caps have shown reductions in lead, cadmium, and zinc porewater concentrations compared to sand caps (ITRC, 2023).

4.3 BAUXITE

Bauxite is capable of sequestering many heavy metals, including mercury, arsenic, chromium, cadmium, lead, zinc, and nickel (EPA, 2013). Bauxite is a clay-like mineral and a primary ore of aluminum composed of a mixture of aluminum oxides and aluminum hydroxides. The surface properties of bauxite allow it to sequester both cationic and oxy-anionic forms of heavy metals through a combination of sorption, ion-exchange, and precipitation (EPA, 2013). Bench-scale studies have been conducted to evaluate the effectiveness of bauxite, bauxite residue, and red mud (Alcoa), however, there have been no pilot- or full-scale applications (EPA, 2013; ITRC, 2023).

Red mud and bauxite residue have been a growing focus of research efforts, due in part to its quantity generated annually as a solid waste from the alumina, the precursor to aluminum, industry. Bauxite products are attractive adsorbents for arsenic in particular due to the naturally high aluminum oxide (Al_2O_3), iron oxide (Fe_2O_3), and rutile (TiO_2) contents (Anang et al., 2022). However, due to its alkalinity and chemical and mineralogical properties, red mud is classified as a toxic industrial waste which needs to be treated before discharge (Liu et al., 2011). The treatment, or activation, methods vary depending on the origin of the adsorbent and the pollutant to be addressed and changes the physiochemical properties of the material. These are summarized in Table 4 of Liu et al. (2011).

4.4 ORGANOCLAY

Clay minerals are low-cost and nontoxic sorbents. Organophilic clays, also known generically as organoclay, are created by introducing a cationic surfactant to surface of clays (i.e. bentonite), which creates hydrophobic, sorbing layers for nonpolar organics and metals (ITRC, 2023). Organoclays are particularly effective for NAPLs, such as fuels and heavy oils, and dissolved

PAHs. Raw clays are able to sorb cations owing to their negatively charged surface; however, they display low sorption efficiency for negatively charged contaminants such as arsenic (Tuchowska et al., 2019). Similar to activated carbon, weighting agents can be applied to organoclays to overcome placement challenges, and granular organophilic clay can be applied within a geotextile mat.

According to EPA (2007), common earth materials such as clays used in environmental remediation applications can contain traces of the same contaminants creating the hazardous condition at a cleanup site. For instance, common clays often contain heavy metals in some concentration given the ubiquitous geologic presence of metals and the high affinity clays have for metals through cation exchange. However, it is likely that the hazardous condition at a cleanup site would be significantly greater in terms of concentration compared to naturally occurring metal loads in a clay material applied at a site.

4.5 SAND AND SEDIMENT

Unamended granular cap materials are generally intended to physically separate the underlying contaminated sediment and the overlying benthic community and surface water, reducing the diffusive flux of contaminants to the benthically active zone (BAZ) and surface water and the accumulation of contaminants in the BAZ (ITRC, 2023). Granular materials such as sand also compose a major portion of chemical isolation layers, providing both density, stability and a porous, durable material to be combined with reactive amendments.

Sorption for metals to sediment and granular materials, such as capping sand, uses the linear partition coefficient, KD. The relationship between soil organic carbon content and sorption observed for organic chemicals (KOC) does not apply to inorganic constituents. The distribution coefficient KD for metals and other inorganic compounds is affected by numerous geochemical parameters and processes, including pH; sorption to clays, organic matter, iron oxides, and other soil constituents; oxidation/reduction conditions; major ion chemistry; other processes such as precipitation or encapsulation; and the chemical form of the metal (EPA, 2023; European Chemicals Agency, 2008).

4.6 UNIT CONVERSIONS

Sorption isotherms in CapSIM utilize the following units:

- Linear, K_{OC}: log(L/kg)
- Linear, K_D: L/kg
- Freundlich, K_F: $\mu g/kg \Big/ (\mu g/L)^N$
- Freundlich, N (1/n): unitless
- Langmuir, q_{max}: µg/kg
- Langmuir, b: L/µg

Literature sorption parameters are presented in numerous forms depending on experimental measurements[1].

5.0 SELECTED SORPTION PARAMETERS

Section 5 provides a discussion of the selected sorption parameters for the applicable cap materials, including all modeled chemical isolation, erosion protection, and sediment layers.

5.1 APPLICABILITY OF REFERENCED LITATURE

Resources that are were referenced for the sorption parameters for multiple modeled contaminants are described here.

Addeck et al. (2014): The value presented in the Annex of Addeck et al. (2014) was sourced from the Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals (Mackay et al., 2006) and used as a point of comparison for a Project Area-specific K_D determination. The handbook contains physical-chemical property data from peer-reviewed journals and other valuable sources on over 1,200 chemicals of environmental concern.

AECOM (2017): The values presented in Table C-6-2 of AECOM (2017) were used in the transient modeling to support a final cap design for the River Mile (RM) 13.1 Study Area. This site is approximately five miles upstream of the mouth of SIB on the Willamette River. The values were sourced from the Risk-Based Concentrations for Decision Making tables published by the Department of Environmental Quality (DEQ). The modeled cap design was approved, and cleanup was completed in 2017.

Alaska Department of Environmental Conservation, Division of Spill Prevention and Response Contaminated Sites Program (2018): The values presented in Table 7 of Division of Spill Prevention and Response Contaminated Sites Program (2018) are used by the Alaska Department of Environmental Conservation in the selection or development of cleanup levels for contaminated soil and groundwater. The K_{OC} values presented in Table 7 of Division of Spill Prevention and Response Contaminated Sites Program (2018) were selected using the following hierarchy: EPA's Estimation Programs Interface (EPI) Suite software, EPA Soil Screening Level (SSL), Yaws' Handbook of Thermodynamic and Physical Properties of Chemical Compounds, EPI Suite experimental values, and Yaws' Handbook of Thermodynamic and Physical Properties of Chemical Compounds.

Allison & Allison (2005): The values presented in Table 4 of Allison & Allison (2005) are from a literature review of metal partition coefficients for sediment from porewater, and the mean value was used in the Lower Duwamish Waterway Upper Reach 30% RD Basis of Design Report as the partition coefficient for arsenic to sand. The study was contracted by the U.S. Environmental Protection Agency to develop metal partition coefficients for the surface water pathway to be used in the Multimedia, Multi-pathway, Multi-receptor Exposure and Risk Assessment (3MRA) technology. Reviewed studies characterized whole natural media; values were rejected from

[1] Conversions employed in this sorption parameter literature review include the following:

$$\frac{\frac{mmol}{kg}}{\left(\frac{mmol}{L}\right)^{1/n}} \times \frac{\frac{g}{mol}\times 1000}{\left(\frac{g}{mol}\times 1000\right)^{1/n}} = \frac{\frac{ug}{kg}}{\left(\frac{ug}{L}\right)^{1/n}}; \quad \frac{\frac{mmol}{g}}{\left(\frac{mmol}{L}\right)^{1/n}} \times \frac{\frac{g}{mol}\times 1000\times 1000}{\left(\frac{g}{mol}\times 1000\right)^{1/n}} = \frac{\frac{ug}{kg}}{\left(\frac{ug}{L}\right)^{1/n}}; \; and \; \frac{\frac{mg}{g}}{\left(\frac{mg}{L}\right)^{1/n}} \times \frac{1000\times 1000}{(1000)^{1/n}} = \frac{\frac{ug}{kg}}{\left(\frac{ug}{L}\right)^{1/n}}$$

studies that used pure mineral phases or treated soils. The pH values in the studies reviewed by Allison & Allison (2005) were in the natural range (4 to 10). Where multiple partition coefficients are presented for a system due to experimental variation of pH or other parameters, the partition coefficient corresponding to the conditions most closely approximating natural conditions and lowest metal concentration was selected.

Bureau of Habitat (2014): The Bureau of Habitat is a part of the New York State Department of Environmental Conservation. The values presented in Table 2-2 of Pre-Final CDTM (Volume I, Appendix E) are intended to be used to derive Project Area-specific numeric sediment concentrations of individual contaminants that classify the sediment based on the potential for adverse impacts to aquatic life. Table 7, referenced for naphthalene, cites the EPA Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures.

California Department of Toxic Substances Control (2009): The guidance document was developed by the Department of Toxic Substances Control (DTSC) Human and Ecological Risk Division (HERD) to address the characterization and risk evaluation of total petroleum hydrocarbons (TPH). The values present in Table 1 are separated by carbon chain length for both aliphatic and aromatic hydrocarbons and the K_{OC} value for C9- C18 aliphatic hydrocarbons was selected as representative of diesel-range hydrocarbons. California Department of Toxic Substances Control (2009) utilized work performed by the Total Petroleum Hydrocarbon Criteria Working Group in 1997 in *Volume 3. Selection of Representative TPH Fractions Based on Fate and Transport Considerations*.

Center for Environmental & Human Toxicology, University of Florida (2005): The value presented in Table 4 was sourced from the EPA Superfund Chemical Data Matrix (SCDM) (EPA/540/R96/028). The SCDM is a database that can be accessed and downloaded via the Internet. The SCDM database is composed of information selected from specified literature sources or other databases, and calculated values. The SCDM then ranks those values that reasonably apply to a hazardous substance and reports a single value for each of the physical/chemical parameters. If the K_{OC} value was not presented in the SCDM, the value was selected using the following hierarchy: calculated from the K_D published in the SCDM using the equation $K_{OC} = K_D / 0.002$, the Estimation Program Interface Suite for Windows (EPIWIN), the Hazardous Substances Data Bank (HSDB), the Agency for Toxic Substances and Disease Registry's Toxicological Profiles (ATSDR), and finally reference texts.

CLARC (2025): The CLARC (2025) data table presents K_{OC}, K_D, and other physical parameters and toxicity of chemicals alongside Washington State and Federal cleanup levels.

Cornelissen et al. (2008): Table 3 of this study reports linear sorption parameters and derived Freundlich sorption parameters using three n parameters in different units. Cornelissen et al. (2008) studied the sorption of PCDD/Fs to total organic carbon, black carbon, and dissolved organic carbon in five soils affected by chlorophenol wood impregnation. All 2,3,7,8-chlorinated PCDD/F congeners were included in the study. Soil samples were collected at a former sawmill site at Marieberg, Sweden where around 260 kg WHO-TEQ PCDD/F are present. The black carbon (BC) was environmental, mainly consisting of soot, and sourced from the collected samples. The BC content was measured in triplicate for each sample and was present at between 0.04 to 0.4 percent. The referenced parameters for CapSIM modeling is under the header $Log\ K_{F,BC}\ n_{F,BC} = 0.61$.

Dobbs & Cohen (1980): This research program was initiated with the overall objective of determining the capability of activated carbon to sorb priority pollutants and other hazardous organic compounds from aqueous solution. Another objective of the study was to standardize the experimental procedure as well as the method of reporting results so that information on adsorption can be compared on a common basis. The approach chosen to describe adsorption was batch equilibrium carbon adsorption isotherms with the results plotted according to the Freundlich adsorption equation. Among the conclusions of the study are that pesticides, PAHs, phthalates, phenolics, and substituted benzenes are readily adsorbed by activated carbon and certain low molecular weight compounds with high polarity are not amenable to activated carbon treatment. Compounds in this category include low molecular weight amines, nitrosamines, glycols, and certain ethers.

EPA (2023): Table 38 of the Superfund Soil Screening Guidance (EPA, 2023) reports summary statistics for K_{OC} values found in a literature review. When K_D was reported instead of K_{OC}, the K_D value was converted using the fractional soil organic carbon content or, if the partition content was normalized to soil organic matter, it was converted using a conversion factor of 1.724 citing Dragun (1988). The geometric mean of the K_{OC} was used because it is a more suitable estimate of the central tendency of a distribution of environmental values with wide variability. For DDD and DDE, Table 39 of the Superfund Soil Screening Guidance (EPA, 2023) was referenced instead of Table 38 due to the sample size of 1 used for K_{OC} determination in Table 38. In Table 39, the K_{OC} value is calculated from the K_{OW} value in the Superfund Chemical Data Matrix using the relationship published by Di Toro (1985).

EPA (n.d.): The Technical Factsheet on Lindane is an archived part of the EPA National Primary Drinking Water Regulations publication. A mean K_{OC} of 1080.9 was obtained from K_{OC} determinations on three soils. The average organic carbon content of the soils used was 13 percent, higher than the f_{OC} measured within SIB sediments (2.36 percent).

Erto et al. (2015): Table 2 of Erto et al. (2015) reports sorption equation parameters for four isotherm regressions. Erto et al. (2015) aimed to study the single and binary adsorption of zinc and cadmium from model aqueous solutions at a constant pH (6.8±0.3) and temperature (20°C). The sorbent used was Aquacarb 207EA™, a commercially available non-impregnated granular activated carbon (GAC), produced by Sutcliffe Carbon starting from a bituminous coal. This study was performed in response to a finding reported in multiple studies that zinc and cadmium compete with one another in binary mixtures, leading to a reduction of their adsorption capacity. Erto et al. (2015) found that while cadmium adsorption is affected by the presence of zinc in solution, zinc adsorption is not affected by the presence of cadmium.

Gomez-Eyles et al. (2013): Table S2 within the supporting information of Gomez-Eyles et al. (2013) reporting the Freundlich isotherm parameters for commercially available carbons. This study aimed to address whether biochars could provide viable alternatives to activated carbons for the in situ remediation of sediments based on partitioning behavior and which types of activated carbons and biochars are most suitable for the in situ treatment of mercury and methylmercury. Gomez-Eyles et al. (2013) evaluated the sorption potential of PCBs, PAHs, DDXs mercury, and methylmercury for 17 commercially available and laboratory synthesized activated carbons and unactivated biochars. The referenced material for CapSIM modeling is the bituminous coal based activated carbon (CAC-Coal) sourced from Calgon Corporation.

Götz et al. (1994): Table 2a presents the calculated K_{OC} values for two sampling points in the river Elbe. The calculated value at the Blankenese sampling station was connected as it is downstream of Hamburg, similar to the positioning of SIB in relation to Portland.

Hawker & Connell (1988): The accuracy of the measurement method used by Hawker & Connell was first confirmed by comparing their results to other accepted literature. After validating a high correlation between the total surface area of the molecule and the K_{OW}, they were able to estimate K_{OW} values for all 209 PCB congeners. This paper has been cited by nearly 700 other publications, most recently in 2023.

Kupryianchyk et al. (2011): Table 1 presents the calculated Freundlich sorption parameters. The study aimed to understand to what extent hydrophobic organic contaminants binding to activated carbon could be generalized for different activated carbon types applied to natural sediment. The analyzed dataset was compiled from four published studies. Equations were derived to represent the equilibrium distributions of contaminants in the sediment before and after the addition of activated carbon. The optimized n value was determined from the smallest variation in calculated Freundlich equations, which was then used in the derived equation to determine the $LogK_F$ value. Kupryianchyk et al. (2011) notes that the derived equation shows the effect of activated carbon dose decreases if more organic matter and black carbon are present in the sediment.

Lin (2014): This is the 3rd edition of the textbook Water and Wastewater Calculations Manual. The isotherms are for the compounds in distilled water, with different activated carbons. Summary sorption isotherms from Lin (2014) are presented in Pre-Final 90% RD (Volume I, Appendix E). The values were sourced from a prior literature review (Snoeyink, 1990).

MFA (2009): The Zidell Waterfront Property on the west side of the Willamette River in Portland, Oregon, upstream of the PHSS. MFA measured Project Area-specific partitioning coefficients during a 2008 sampling event by collecting and analyzing bulk sediment and pore water (K_D). For hydrophobic organic compounds, the partitioning coefficients were normalized to the organic matter found in the sample (K_{OC}). Table 3-2 of MFA (2009) reports the Project Area-specific partitioning coefficient for tributyltin measured at the Zidell Waterfront Property as the standard value, which was used as the K_{OC} in cap design modeling for the Zidell project area. The standard was also determined to fall within the literature review completed by the Zidell Waterfront Property design team. Table 3-4 of MFA (2009) reports a summary of Project Area-specific partitioning coefficients that were measured at the Zidell Waterfront Property and were used in their chemical isolation layer model, a precursor to CapSIM.

New Mexico Environment Department (2021): The values presented in Table B-2 of New Mexico Environment Department (2021) were used by the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) and the Ground Water Quality Bureau Voluntary Remediation Program to derive the State of New Mexico Soil Screening Levels. The K_{OC} value presented in Table B-2 of New Mexico Environment Department (2021) was selected from EPA's Estimation Programs Interface (EPI) Suite software. This K_{OC} value is in agreement with Alaska Department of Environmental Conservation, Division of Spill Prevention and Response Contaminated Sites Program (2018).

NJDEP (2014): Table 1 in the NJDEP (2014) guidance document presents the chemical properties approved by NJDEP for use in the SESOIL and AT123D models when evaluating contaminated

sites managed by the New Jersey Department of Environmental Protection. These values are taken from the 2008 New Jersey DEP Remediation Standards Chemical Properties and Soil Saturation Limits.

PHSS Remedial Investigation (RI)/Feasibility Study (FS) (2016): The values presented in Table D-7 in Appendix D, Supporting Information for Alternative Development, of the PHSS RI/FS were calculated using the regression equation: $\log(K_{OC}) = 0.903 \times \log(K_{OW}) + 0.904$. This report was prepared for, and accepted by, the EPA specifically for PHSS.

Roy F. Weston, Inc. (1996): The value reported in Section 3.6 was sourced from measurements completed by Meador et al. (1996). The research completed by Meador et al. (1996) varied the organic carbon content and studied the bioavailability of tributyltin by measuring the bulk sediment, interstitial water, and tissue concentrations. The sediment used was a mixture from three sites within the northern Puget Sound. The average K_{OC} value was measured as 25,100 L/kg, and referenced similarity to Unger et al. (1988). The range in calculated K_{OC} values was 23,400 to 104,700 L/kg for organic carbon ranging from 0.1 to 1.0 percent. Roy F. Weston, Inc. (1996) notes that environmental factors such as salinity, pH, organic carbon, and sorption capacity of the sediment strongly influence the form and fate of tributyltin in aquatic environments and thus its bioavailability, as does the phase and form in which tributyltin is introduced into the environment. Roy F. Weston, Inc. (1996) additionally notes that there are uncertainties associated with the use of a single K_{OC} value to estimate interstitial water tributyltin concentrations as statistical analyses of existing data suggest there is not a strong correlation between sediment tributyltin concentrations and total organic carbon.

Schwarzenbach et al. (2017): This is the 3rd edition of the textbook Environmental Organic Chemistry. EPA's Health & Environmental Research Online (HERO) entry for the second edition of the textbook shows 8,400 citations.

The Louis Berger Group et al. (2014): Table 3-7 of The Louis Berger Group et al. (2014) lists the constants used for each chemical in the contaminant fate and transport modeling completed for the Lower Passaic River as part of the analysis of potential remedial alternatives. The remedial alternatives were evaluated by EPA as part of a focused feasibility study of the lower eight miles of the Lower Passaic River. The chemical properties used and presented in Table 3-7 are largely the same as those used in the peer reviewed model developed for NY/NJ Harbor Contaminant Assessment and Reduction Project (CARP).

Unger et al. (1988): Unger et al. (1988) measured the sorption of tributyltin in aqueous solution to natural sediments under various salinity conditions. Sorption coefficients were calculated from environmental water and sediment concentrations at various locations in the Chesapeake Bay region and compared to equilibrium sorption coefficients determined in the laboratory. The organic carbon content for the collected samples ranged from 0.34 to 19.8 percent and the clay content ranged from 17.9 to 58.4 percent. In the SIB project area, the organic carbon content is 2.36 percent and the average clay content is approximately 27 percent. The K_{OC} value utilized is the average of the four calculated K_{OC} values presented in Table 2.

Walters and Luthy (1984): The isotherm equations are presented in Table III of Walters and Luthy (1984). The study measured the sorption of 11 PAHs from water onto FILTRASORB 400 at 25°C. To reduce equilibration time, the activated carbon was mechanically ground and classified to 200

mesh (0.074 mm). The water used for preparation of the aqueous solutions typically had a pH in the range 6.8-7.2, similar to slightly higher than the expected pH at the site (approximately 6.4). This research was prompted by the World Health Organization (WHO) recommending a limit for PAHs in drinking water and the inclusion of PAHs in the EPA list of priority pollutants.

5.2 1,2,3,4,7,8-HXCDF

5.2.1 Activated Carbon

The utilized sorption parameter for 1,2,3,4,7,8-HxCDF to GAC was sourced from Cornelissen et al. (2008). The Freundlich sorption isotherms are presented in Table 3.

5.2.1.1 Modeled Sorption Isotherm

Cornelissen et al. (2008) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 7.80$; $K_F = 6.31 \times 10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.61

5.2.2 Sand

Sorption for 1,2,3,4,7,8-HxCDF to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. A literature review was conducted, and the source identified to be applicable to the sorption of 1,2,3,4,7,8-HxCDF to Sand was Addeck et al. (2014).

5.2.3 Sediment

5.2.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for 1,2,3,4,7,8-HxCDF to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area Fund-Lead 3 and presented in Table E-2 of the SPDI Evaluation. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.2.3.2 Modeled Sorption Isotherm

The Fund-Lead linear (K_D) isotherm, used in CapSIM modeling:

- $K_D = 5.30$ log(L/kg) = 199,526.23 L/kg
- n = 1

5.3 1,2,3,7,8-PECDD

5.3.1 Activated Carbon

The utilized sorption parameter for 1,2,3,7,8-PeCDD to GAC was sourced from Cornelissen et al. (2008). The Freundlich sorption isotherms are presented in Table 3.

5.3.1.1 Modeled Sorption Isotherm

Cornelissen et al. (2008) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 7.10$; $K_F = 1.26 \times 10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.61

5.3.2 Sand

Sorption for 1,2,3,7,8-PeCDD to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The sorption parameter for 1,2,3,7,8-PeCDD to Sand was retrieved from Götz et al. (1994).

5.3.3 Sediment

5.3.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for 1,2,3,7,8-PeCDD to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project areas Cathedral Park, Fund-Lead 3, and Fund-Lead 9. The calculated K_D values from Cathedral Park, Fund-Lead 3, and Fund-Lead 9 presented in Table E-2 of the SPDI Evaluation were averaged. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.3.3.2 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm:

- $K_D = 4.69$ log(L/kg) = 48,977.88 L/kg L/kg
- $R^2 = 0.80$
- n = 4

The Fund-Lead 3 linear (K_D) isotherm:

- $K_D = 4.92$ log(L/kg) = 83,176.38 L/kg
- n = 1

The Fund-Lead 9 linear (K_D) isotherm:

- $K_D = 4.70$ log(L/kg) = 50,118.72 L/kg
- n = 1

The average linear (K_D) isotherm used in CapSIM modeling:

- K_D = 60,757.66 L/kg

5.4 1-METHYLNAPHTHALENE

5.4.1 Activated Carbon

The utilized sorption parameter for 1-methylnaphthalene to GAC was sourced from GeoEngineers (2022). GeoEngineers (2022) is the Basis of Design Report for the Crawford Street South Site in Portland, Oregon. This site is upland approximately two miles downstream of the mouth of SIB on the Willamette River. The sorption isotherms are presented in Table 15 of this report and credit Walters and Luty (1984), Cohen and Dobbs (1980), Hu et al. (2007), and Kupryianchyk et al. (2012) for PAHs.

5.4.1.1 Modeled Sorption Isotherm

GeoEngineers (2022) reports a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 2.01\times10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.43

5.4.2 Sand and Sediment

Sorption for 1-methylnaphthalene to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. A literature review was conducted, and the source identified to be applicable to the sorption of 1-methylnaphthalene to sand and sediment was Table B-2 of New Mexico Environment Department (2021). This K_{OC} value is in agreement with Alaska Department of Environmental Conservation, Division of Spill Prevention and Response Contaminated Sites Program (2018).

5.5 2,3,4,7,8-PECDF

5.5.1 Activated Carbon

The utilized sorption parameter for 2,3,4,7,8-PeCDF to GAC was sourced from Cornelissen et al. (2008). The Freundlich sorption isotherms are presented in Table 3.

5.5.1.1 Modeled Sorption Isotherm

Cornelissen et al. (2008) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 7.30$; $K_F = 2.00\times10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.61

5.5.2 Sand

Sorption for 2,3,4,7,8-PeCDF to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The sorption parameter for 2,3,4,7,8-PeCDF to Sand was retrieved from PubChem (n.d.). PubChem is an open chemistry database at the National Institutes of Health (NIH) National Library of Medicine that accepts data from academic labs, governmental agencies, chemical supply and pharmaceutical companies, journal publishers, and individual researchers. The estimated K_{OC} was

determined from a published log K_{OW} (Sijm et al., 1989) and a regression-derived equation (Lyman et al., 1990).

5.5.3 Sediment

5.5.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for 2,3,4,7,8-PeCDF to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area Cathedral Park and presented in Table E-2 of the SPDI Evaluation. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.5.3.1 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm, used in CapSIM modeling:

- K_D = 4.02 log(L/kg) = 10,471.29 L/kg
- n = 1

5.6 2,3,7,8-TCDD

5.6.1 Activated Carbon

The utilized sorption parameter for 2,3,7,8-TCDD to GAC was sourced from Cornelissen et al. (2008). The Freundlich sorption isotherms are presented in Table 3.

5.6.1.1 Modeled Sorption Isotherm

Cornelissen et al. (2008) reports a non-linear isotherm, used in the CapSIM modeling:

- Log(K_F) = 6.60 ; $K_F = 3.98 \times 10^6$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.61

5.6.2 Sand and Sediment

Sorption for 1,3,7,8-TCDD to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. The sorption parameter for 2,3,7,8-TCDD to sand and sediment was retrieved from Washington State Department of Ecology's CLARC database (CLARC, 2025). This K_{OC} value is in agreement with New Mexico Environment Department (2021).

5.7 2,3,7,8-TCDF

5.7.1 Activated Carbon

The utilized sorption parameter for 2,3,7,8-TCDF to GAC was sourced from Cornelissen et al. (2008). The Freundlich sorption isotherms are presented in Table 3.

5.7.1.1 Modeled Sorption Isotherm

Cornelissen et al. (2008) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 6.80$; $K_F = 6.31 \times 10^6$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.61

5.7.2 Sand

Sorption for 2,3,7,8-TCDF to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. A literature review was conducted, and the source identified to be applicable to the sorption of 2,3,7,8-TCDF to Sand was Addeck et al. (2014).

5.7.3 Sediment

5.7.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for 2,3,7,8-TCDF to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project areas Cathedral Park and Fund-Lead 3. The calculated K_D values from Cathedral Park and Fund-Lead 3 presented in Table E-2 of the SPDI Evaluation were averaged. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.7.3.2 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm:

- K_D = 5.37 log(L/kg) = 234,422.88 L/kg L/kg
- $R^2 = 0.39$
- n = 6

The Fund-Lead 3 linear (K_D) isotherm:

- K_D = 2.82 log(L/kg) = 660.69 L/kg
- $R^2 = 0.05$
- n = 2

The average linear (K_D) isotherm used in CapSIM modeling:

- K_D = 117,542 L/kg

5.8 2-METHYLNAPHTHALENE

5.8.1 Activated Carbon

The utilized sorption parameter for 2-methylnaphthalene to GAC was sourced from GeoEngineers (2022). GeoEngineers (2022) is the Basis of Design Report for the Crawford Street South Site in Portland, Oregon. This site is upland approximately two miles downstream of the mouth of SIB on the Willamette River. The sorption isotherms are presented in Table 15 of this report and credit Walters and Luty (1984), Cohen and Dobbs (1980), Hu et al. (2007), and Kupryianchyk et al. (2012) for PAHs.

5.8.1.1 Modeled Sorption Isotherm

GeoEngineers (2022) reports a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 2.01 \times 10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.43

5.8.2 Sand and Sediment

Sorption for 2-methylnaphthalene to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. A literature review was conducted, and the source identified to be applicable to the sorption of 2-methylnaphthalene to sand and sediment was Table B-2 of New Mexico Environment Department (2021). This K_{OC} value is in agreement with Alaska Department of Environmental Conservation, Division of Spill Prevention and Response Contaminated Sites Program (2018).

5.9 ACENAPHTHENE

5.9.1 Activated Carbon

The utilized sorption parameter for acenaphthene to GAC was sourced from Walters & Luthy (1984). The sorption isotherms are presented in Table III of this study. The Langmuir isotherm was determined by the researchers to be the most useful of the evaluated equations for representing the data. However, the Langmuir equation was not capable of describing the adsorption over the entire concentration range. The experimental data was reasonably fit by the Freundlich isotherm and was therefore selected. This value was additionally utilized by GeoEngineers (2022) and is lower, and therefore more conservative, than the reported isotherm in Gomez-Eyles et al. (2013).

5.9.1.1 Modeled Sorption Isotherm

Walters & Luthy (1984) reports a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 624$ (mg/g)/((mg/L)^(1/n)) = 2.66×10^7 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.457
- $R^2 = 0.87$

5.9.2 Sand

Sorption for acenaphthene to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Texas Commission on Environmental Quality's published Toxicity Values and Chemical – Physical Properties (TCEQ, 2019).

5.9.3 Sediment

5.9.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for acenaphthene to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project areas Cathedral Park and Fund-Lead 3. The calculated K_D values from Cathedral Park and Fund-Lead 3 presented in Table E-2 of the SPDI Evaluation were averaged. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.9.3.2 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm:

- K_D = 3.44 log(L/kg) = 2,754.23 L/kg L/kg
- R^2 = 0.95
- n = 14

The Fund-Lead 3 linear (K_D) isotherm:

- K_D = 0.85 log(L/kg) = 7.08 L/kg
- R^2 = 0.70
- n = 3

The average linear (K_D) isotherm used in CapSIM modeling:

- K_D = 1,380.65 L/kg

5.10 ACENAPHTHYLENE

5.10.1 Activated Carbon

The utilized sorption parameter for acenaphthylene to GAC was sourced from Walters & Luthy (1984). The sorption isotherms are presented in Table III of this study. The Langmuir isotherm was determined by the researchers to be the most useful of the evaluated equations for representing the data. However, the Langmuir equation was not capable of describing the adsorption over the entire concentration range. The experimental data was reasonably fit by the Freundlich isotherm and was therefore selected. This value was additionally utilized by GeoEngineers (2022).

5.10.1.1 Modeled Sorption Isotherm

Walters & Luthy (1984) reports a non-linear isotherm, used in the CapSIM modeling:

- K_F = 266 (mg/g)/((mg/L)^(1/n)) = 3.30×10^7 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.302
- R^2 = 0.88

5.10.2 Sand and Sediment

Sorption for acenaphthylene to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. A literature review was conducted, and the source identified to be applicable to the sorption of acenaphthylene to sand and sediment was Table 7 of Alaska Department of Environmental Conservation, Division of Spill Prevention and Response Contaminated Sites Program (2018).

5.11 ALDRIN

5.11.1 Activated Carbon

The utilized sorption parameter for aldrin to GAC was sourced from Dobbs & Cohen (1980). This is the same value as is reported in Lin (2014).

5.11.1.1 Modeled Sorption Isotherm

Dobbs & Cohen (1980) reports a non-linear isotherm, used in the CapSIM modeling:

- K_F = 651 (mg/g)/((mg/L)^(1/n)) = 1.13×10^6 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.92
- R^2 = 0.97

5.11.2 Sand and Sediment

Sorption for aldrin to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. The default K_{OC} value in CapSIM was utilized, which was sourced from Texas Commission on Environmental Quality's published Chemical/Physical Properties Table accompanying the Texas Risk Reduction Program (TRRP) Rule (TCEQ, 2023). This K_{OC} value is in agreement with the geometric mean in Table 38 of the Superfund Soil Screening Guidance (EPA, 2023).

5.12 ANTHRACENE

5.12.1 Activated Carbon

The utilized sorption parameter for anthracene to GAC was sourced from Walters & Luthy (1984). The sorption isotherms are presented in Table III of this study. The Langmuir isotherm was determined by the researchers to be the most useful of the evaluated equations for representing the data. However, the Langmuir equation was not capable of describing the adsorption over the entire

concentration range. The experimental data was reasonably fit by the Freundlich isotherm and was therefore selected. This value was additionally utilized by GeoEngineers (2022).

5.12.1.1 Modeled Sorption Isotherm

Walters & Luthy (1984) reports a non-linear isotherm, used in the CapSIM modeling:

- K_F = 330 (mg/g)/((mg/L)^(1/n)) = 4.56×10^6 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.62
- R^2 = 0.81

5.12.2 Sand

Sorption for anthracene to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Texas Commission on Environmental Quality's published Toxicity Values and Chemical – Physical Properties (TCEQ, 2019). This K_{OC} value is in agreement with the geometric mean in Table 38 of the Superfund Soil Screening Guidance (EPA, 2023).

5.12.3 Sediment

5.12.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for anthracene to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area Cathedral Park and presented in Table E-2 of the SPDI Evaluation. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.12.3.1 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm, used in CapSIM modeling:

- K_D = 4.15 log(L/kg) = 14,125.38 L/kg
- n = 1

5.13 ARSENIC

Arsenic can combine with other elements to form both organic and inorganic compounds. In soil and water, arsenic exists primarily in the more toxic inorganic forms, including arsenite [As(III)] and arsenate [As(V)], and As(V) predominates near pH 6-9 and in oxic environments (Kanel et al., 2005; Bostick et al., 2003). As(V) adsorption onto soil components are better understood compared to As(III) and takes place through an inner-sphere complex via ligand-exchange mechanism (Müller et al., 2010). As(III) may form under mildly reducing conditions and in addition to a higher toxicity it is also more mobile due to its neutral character in a wide pH range, resulting in a weaker adsorption to soil constituents such as iron and aluminum hydroxides (Müller

et al., 2010). The speciation of arsenic in sediment samples collected at SIB and other PHSS project areas is not specified in analytical reports.

5.13.1 Activated Carbon

5.13.1.1 Literature Review

In the Draft 50% RD CDTM, the utilized sorption parameter for arsenic to GAC was sourced from Gu et al. (2005) and reduced by an order of magnitude to have a conservative model. The research presented in Gu et al. (2005) focused on iron-impregnated GAC (GAC-Fe) for effective drinking water treatment. The sorption isotherms for un-modified GAC are presented in Table 3 of this study as a control. Notable experimental assumptions and processes include:

- Analyzed total arsenic (As(III) and As(V))
- 13 GAC materials were modified and analyzed in the study, and the untreated GAC was Dacro20 × 40LI, sourced from ANCI
- Solution pH was 4.70, lower than the expected pH at the site (approximately 6.4)
- Temperature was 25.0 ± 1°C, higher than the expected temperature at the site (averaging between 4°C and 22°C)

Values from Gu et al (2005) study were used in the Draft 50% RD. However, sorption of arsenic seemed to have limitations. To overcome this limitation, additional literature review was conducted, evaluating if perhaps a different material (as opposed to GAC produced by Dacro), had better performance. Four additional sources were identified that are applicable to the sorption of arsenic to GAC: Deliyanni & Bandosz (2011), Nieto-Delgado et al. (2019), Velazquez-Jimenez et al. (2018), and Vitela-Rodriguez & Rangel-Mendez (2013). Deliyanni & Bandosz (2011) utilized activated carbon BAX-1500 manufactured by Mead Westvaco. The study analyzed As(V) at a pH of 5.84, closer to expected conditions in the sediment cap. Nieto-Delgado et al. (2019) performed their study using FILTRASORB® F-400 that was reduced to a particle diameter of 850 micrometers and analyzed As(V) sorption. Velazquez-Jimenez et al. (2018) also studied As(V) sorption to FILTRASORB® F-400, maintaining experimental conditions of pH 7 and a temperature of 25°C. Vitela-Rodriguez & Rangel-Mendez (2013) also studied As(V) sorption to FILTRASORB® F-400. Vitela-Rodriguez & Rangel-Mendez (2013) additionally concluded that the As(V) adsorption capacity of activated carbons increases after modification to impregnate the material with additional iron, temperature does not significantly affect As(V) adsorption capacity, and As(V) adsorption capacity decreases 32 percent when the solution pH increases from 6 to 8.

The experimental amount adsorbed (q; µg/kg) was plotted against the equilibrium concentration (C; µg/L) for all five studies (Figure C-1 below) and it was determined that the literature values reported in Gu et al (2005) for sorption of arsenic to GAC, for GAC manufactured by Dacro appear to substantially underestimate GAC performance as compared to studies that evaluated sorption of arsenic to FILTRASORB® GAC material manufactured by CalgonCarbon or Nuchar® BAX-1500 GAC material, manufactured by Ingevity. FILTRASORB® GAC and BAX-1500 seemed to have comparable performance, indicating that using Gu et al. (2005) values might have underestimated GAC performance in the 50% RD. As a result of this evaluation and due to availability of literature values for FILTRASORB® F-400, F-400 was used in modeling efforts in Pre-Final 90% RD CDTM, alongside its material properties (bulk density, particle size, and permeability). Sorption parameters used in Pre-Final 90%RD include data from both

FILTRASORB® F-400 and BAX-1500 performance (as indicated by black squares in Figure C-1 below).

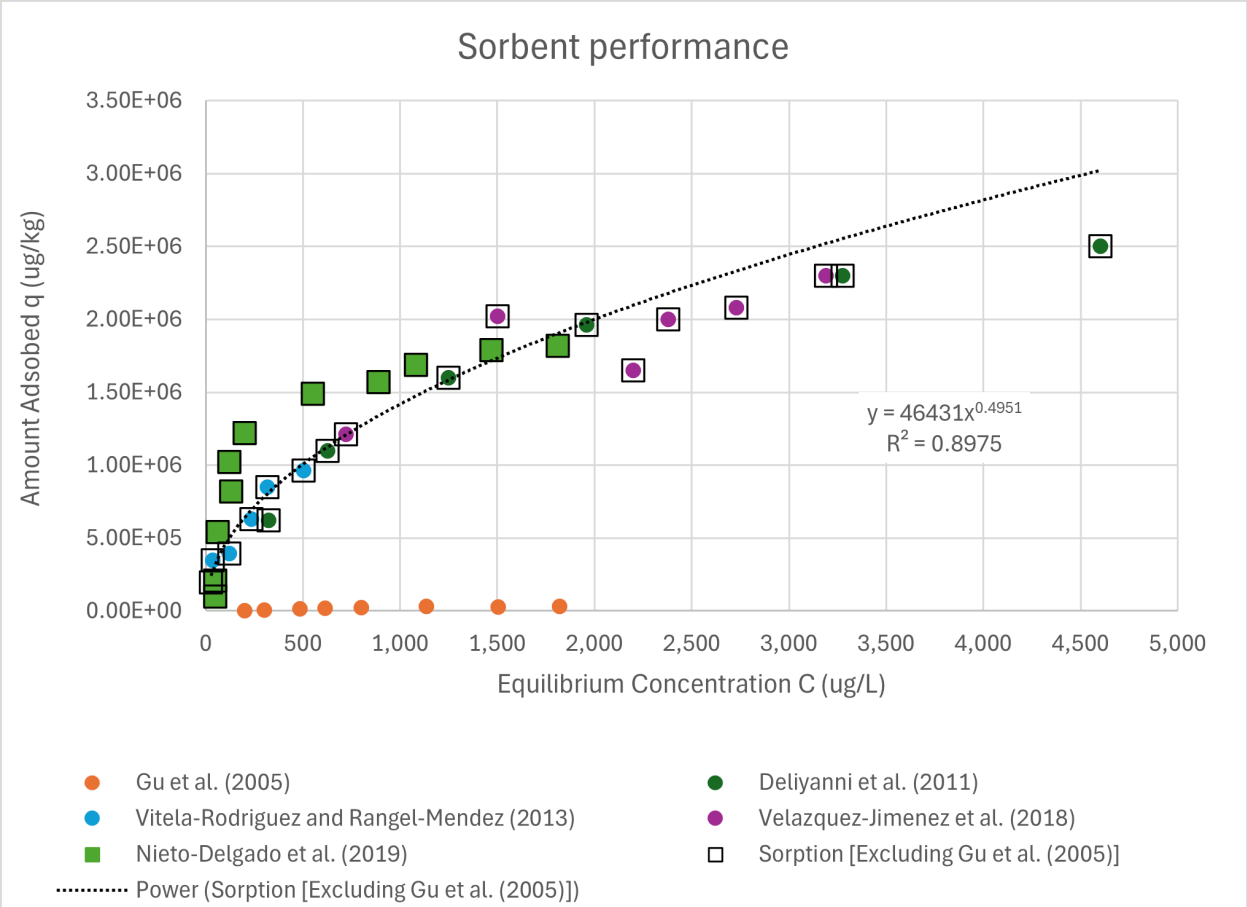

Figure C-1. GAC sorption of Arsenic

5.13.1.2 Modeled Sorption Isotherm

The combined experimental data from Deliyanni & Bandosz (2011), Nieto-Delgado et al. (2019), Velazquez-Jimenez et al. (2018), and Vitela-Rodriguez & Rangel-Mendez (2013) was fit with the Freundlich (nonlinear) equation. The modeled sorption isotherm in the Pre-Final 90% RD CDTM is:

- K_F = 46,430.86 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.4951
- R^2 = 0.8975

5.13.2 Apatite

5.13.2.1 Literature Review

Akartasse et al. (2017) found that hydroxyapatite (HAp) has low adsorption capacity for metal, attributed to the limited number of coordination sites on HAp. However, its highly porous structure

makes it attractive for enhancing its adsorbent efficiency for metals by binding it with a material that has a good chemical affinity for HAp and metals. Consistent with this finding, the majority of available literature that presented experimental results and calculated sorption parameters applicable for arsenic in sediment focused on various HAp composites as the primary sorbent.

The work completed by Bostick et al. (2003) was contracted by the U.S. Department of Energy to understand the performance of remedial technologies for metal-contaminated Federal and civilian sites. The study utilized commercially available biogenic (fish bone) Apatite II^{TM}. Apatite II works by providing phosphate ion to the solution phase to precipitate metal phosphate solids and inducing the precipitation of metals into other phases such as carbonates, oxides, and hydroxides. Nanocrystals in the Apatite II structure additionally provide sites to nucleate the metal precipitates (Bostick et al., 2003). The sorption isotherms for raw apatite are presented in Table 11 of Bostick et al. (2003). Notable experimental assumptions and processes include:

- Analyzed As(V)
- Initial pH was 7.6 and Final pH was 7.15, higher than the expected pH at the site (approximately 6.4)

Bostick et al. (2003) notes that the conditional value for K_D is sensitive to the equilibrium solution pH value and the solution temperature. Additionally, in batch tests for a number of media (natural and synthetic apatites, tricalcium phosphate, bone char, zeolite, magnetite, etc.) only a limited affinity for As(V) was observed, however, improvement was observed in column tests containing multi-metals. Therefore, it is possible that removal of As(V) is enhanced by synergistic co-precipitation with other cationic metals, which are present in the sediment at SIB, in the formation of a mixed phosphate-arsenate mineral phase or phases.

5.13.2.2 Modeled Sorption Isotherm

The slope of the short-term (52-hour) sorption data, presented as a linearized Freundlich isotherm, is near unity, suggesting that the data can be adequately represented as a simple linear sorption isotherm:

- K_D = S(calc)/Ce = 18.4 mL/g

5.13.3 Bauxite

5.13.3.1 Literature Review

A literature review was conducted, and two sources were identified that are applicable to the sorption of arsenic to bauxite: Anang et al., (2022) and Genç-Fuhrman et al., (2004). Anang et al., (2022) utilized five combinations of unmodified and thermally modified yellow and red lateritic bauxite (TYB + TRB) that was reduced to a particle diameter of 850 µm and analyzed total arsenic. Genç-Fuhrman et al. (2004) evaluated As(V) sorption to Bauxsol and activated Bauxsol and As(III) sorption to activated Bauxsol.

Anang et al. (2022) studied multiple bauxite combinations to quantify the affect of bauxite type and modification processes. Thermal modification has been reported to increase the surface area of an earth material, change its chemical composition, and improve its adsorption property. Similarly, the blended yellow and red lateritic bauxite have markedly significant levels of chemical

composition. The observed removal efficiency was observed at pH 4 and 400°C, below the expected sediment pH and far exceeding natural temperatures. The sorption isotherms for the best performing combination, TYB + TRB, are presented in Table 2 of Anang et al. (2022). Notable experimental assumptions and processes include:

- pH was 6.0 ± 0.1, similar to the expected pH at the site (approximately 6.4)
- Temperature was 25 ± 1 °C, higher than the expected temperature at the site (averaging between 4°C and 22°C)

Genç-Fuhrman et al. (2004) was also studying the impact of activating bauxite prior to use as an adsorbent for arsenic and the influence of contact time, particle size, pH, and initial arsenic concentration on the efficacy of the treatment. The calculated sorption isotherms for the varied initial concentrations, temperatures, pH, and sorbent are presented in Table 3 of Genç-Fuhrman et al. (2004) and the conditions most similar to SIB were selected. Notable experimental assumptions and processes for the selected sorption parameters include:

- As(V) to Bauxsol
- Initial arsenic concentration was between 0.80-32.00 µmol/L (59.94-2,397 µg/L)
- Performed at room temperature (23°C ± 1 °C), higher than the expected temperature at the site (averaging between 4°C and 22°C)
- pH was 6.3 ± 0.1, similar to the expected pH at the site (approximately 6.4)

5.13.3.2 Modeled Sorption Isotherm

The experimental adsorption from Anang et al., (2022) most closely followed the Freundlich (nonlinear) equation, however, the Freundlich isotherm was not reported with the necessary shape parameter (N). The Langmuir (nonlinear) fit is consistent with the better fit from Genç-Fuhrman et al. (2004) and was retained:

- q_{max} = 57.77 mg/g = 5.777×10^7 µg/kg
- b = 27.31 L/mg = 0.02731 L/ug
- R^2 = 0.6337

The experimental adsorption from Genç-Fuhrman et al. (2004) most closely followed the Langmuir (nonlinear) equation and was presented in units of mmol. The values below were converted using the molecular weight of arsenic (74.9216 g/mol):

- q_{max} = 14.43 mmol/g = 1.081×10^9 µg/kg
- b = 0.27 L/umol = 0.003604 L/ug
- R^2 = 0.95

The sorption parameters were modeled individually as they represent different bauxite sources and treatments.

5.13.4 Organoclay

5.13.4.1 Literature Review

A literature review was conducted, and two sources were identified that are applicable to the sorption of arsenic to organoclay: Sarkar et al. (2012) and Tuchowska et al. (2019). Tuchowska et al. (2019) notes that raw clays are low-cost, nontoxic sorbents that are able to sorb cations owing to their negatively charged surface; however, they display low sorption efficiency for negatively charged contaminants such as arsenic. Both studies tested surface modifications, and the experimental results using hexadecyl trimethylammonium bromide (HDTMA) were chosen based on the frequency of the treatment in organoclay literature. Sarkar et al. (2012) utilized bentonite clay prepared with HDTMA and analyzed As(V) sorption. Tuchowska et al. (2019) utilized organo-vermiculite with a size fraction of 0.25–1 mm modified with HDTMA and analyzed both As(III) and As(V) sorption. The sorption parameters for As(V) were selected.

Sarkar et al. (2012) studied the modification of silicate clay minerals by the introduction of organic molecules into the mineral structure. The calculated sorption isotherms for the HDTMA and Arquad modified organoclays from are presented in Table 1 of Sarkar et al. (2012). Notable experimental assumptions and processes include:

- Temperature was 23°C, higher than the expected temperature at the site (averaging between 4°C and 22°C)
- Initial pH of the contaminated soil was 6.7, similar to the expected pH at the site (approximately 6.4)

Tuchowska et al., (2019) expanded on the available organoclay literature by studying modified organo-vermiculites. Vermiculite is a 2:1 phyllosilicate mineral that has a large internal surface, high cation exchange capacity (CEC), and high negative charge on the silicate layers. Therefore, addition of a surfactant is necessary for the sorption of anions. The sorption isotherms from Tuchowska et al. (2019) onto raw and modified vermiculite are presented in Table S1. Notable experimental assumptions and processes include:

- Temperature was 20 ± 1 °C, within the expected temperature range at the site (averaging between 4°C and 22°C)
- Initial pH value equal to 6, similar to the expected pH at the site (approximately 6.4)

5.13.4.2 Modeled Sorption Isotherm

The experimental adsorption is reported in Table 1 of Sarkar et al. (2012) for both HDTMA and Arquad modified organoclay and closely followed the Freundlich (nonlinear) equation. The applicable units were defined in Section 4.2.1.

- K_F = 2.69 (mg/g)/((mg/L)^(1/n)) = 33,964 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.6329
- R^2 = 0.982

The experimental adsorption is reported in Table S1 of Tuchowska et al. (2019) for 1.0 HDTMA-As(V) in both the Freundlich and Langmuir (nonlinear) equations and was presented in units of

mmol. The conversions below were converted following the convention shown in Section 4.6 using the molecular weight of arsenic (74.9216 g/mol):

- K_F = 12.7 (mmol/kg)/((mmol/L) ^(1/n)) = 1,210.3 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.594
- R^2 = 0.9143

The experimental amount adsorbed (q; µg/kg) and equilibrium concentration (C; µg/L) were interpreted from available plots in Sarkar et al. (2012) and Tuchowska et al. (2019). The data from the two studies were plotted together (Figure C-2 below) and fit with the Freundlich (nonlinear) equation to reflect the best fit of the original studies:

- Kf = 344,862 (µg/kg)/((µg/L)^(1/n))
- N = 1/n = 0.1619
- R^2 = 0.3886

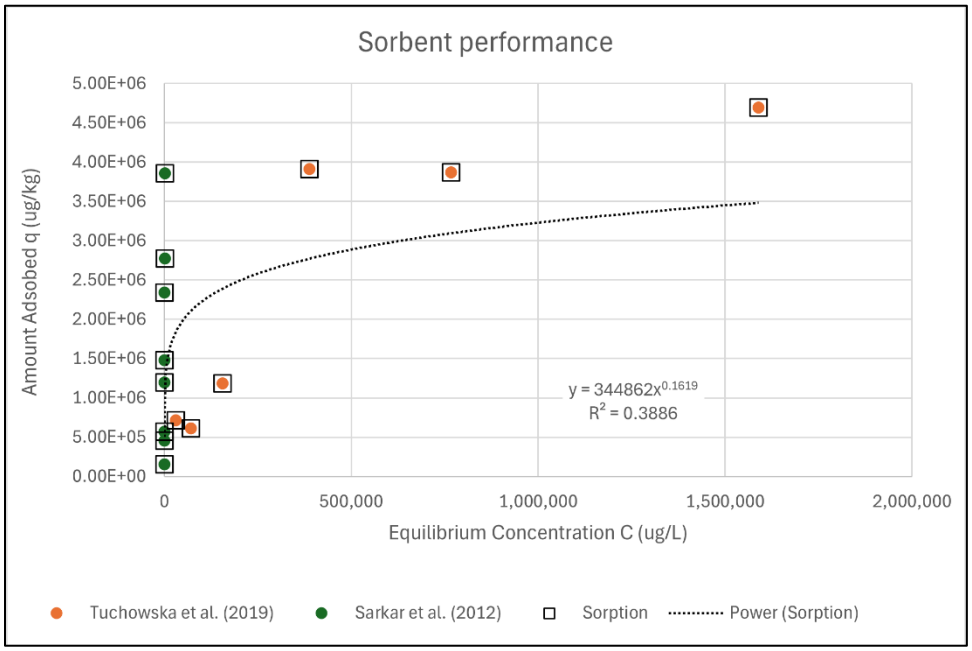

Figure C-2. Organoclay sorption of Arsenic – Freundlich

The combined experimental data was additionally fit with the Langmuir (nonlinear) equation (Figure C-3 below), which better fit the larger dataset. Q_{max} is defined as the inverse of the slope, and b is the inverse of the intercept multiplied by q_{max}.

- $q_{max} = 4.74 \times 10^6$ µg/kg
- $b = 1.000 \times 10^{-5}$ L/ug
- R^2 = 0.8761

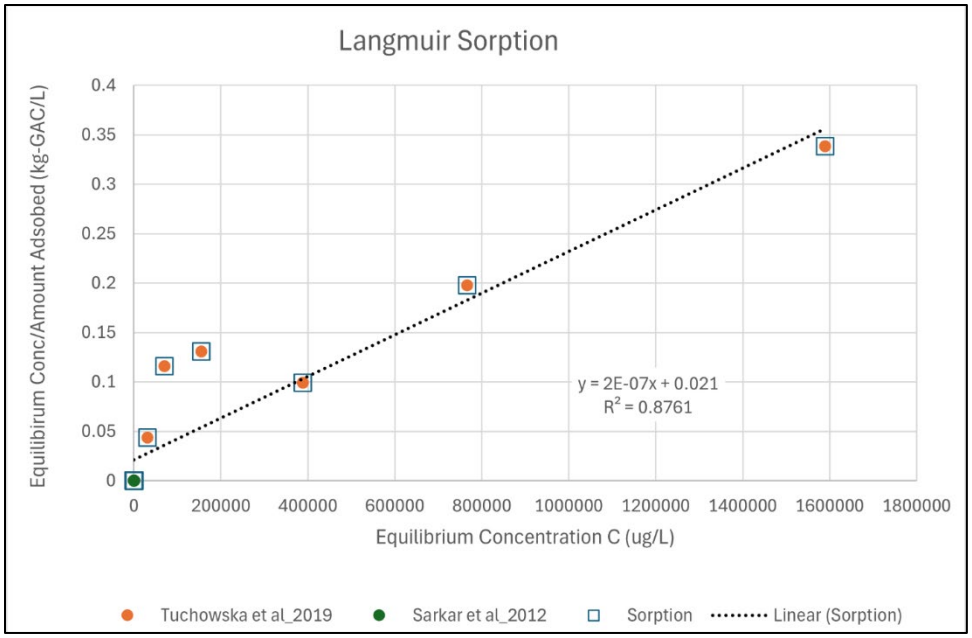

Figure C-3 Organoclay sorption of Arsenic – Langmuir

5.13.5 Sand

5.13.5.1 Literature Review

Sorption for arsenic to granular materials, such as capping Sand, uses the linear partition coefficient, K_D. A literature review was conducted, and three sources were identified that are applicable to the sorption of arsenic to Sand: Allison & Allison (2005), CLARC (2025), and NJDEP (2014). The published metal partitioning data does not allow differentiation of As(III) and As(V). It is probable that the data presented include results for both oxidation states.

5.13.5.2 Modeled Sorption Isotherm

The Allison & Allison (2005) literature review reports a linear (K_D) isotherm:

- K_D = 2.4 log(L/kg) = 251.19 L/kg

The CLARC (2025) data table reports a linear (K_D) isotherm:

- K_D = 29 L/kg

The NJDEP (2014) guidance document reports a linear (K_D) isotherm:

- K_D = 26 L/kg

An average of the three sources was used in CapSIM modeling:

- K_D = 102.06 L/kg

5.13.6 Sediment

5.13.6.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, the utilized sorption parameter (K_D) for arsenic to sediment, 237.36 L/kg, was based on the average of the median linear sorption parameters presented in Tables 1 and 4 of Allison & Allison (2005). Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project areas River Mile 9 West (RM9W), Cathedral Park, Fund-Lead 3, and Fund-Lead 9. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. A K_D value for each sample location, excluding duplicates, was calculated and then averaged. The averaged RM9W K_D was then averaged with the calculated K_D values from Cathedral Park, Fund-Lead 3, and Fund-Lead 9 presented in Table E-2 of the SPDI Evaluation. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided. Table E-2 of the SPDI Evaluation additionally includes a Site-Wide sorption value that was not included in the average to prevent EPA-lead project areas from being weighted more heavily in the average K_D value.

5.13.6.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm:

- K_D = 233.431 L/kg

The Cathedral Park linear (K_D) isotherm:

- K_D = 2.81 log(L/kg) = 645.65 L/kg
- R^2 = 0.24
- n = 25

The Fund-Lead 3 linear (K_D) isotherm:

- K_D = 2.49 log(L/kg) = 309.03 L/kg
- R^2 = 0.75
- n = 15

The Fund-Lead 9 linear (K_D) isotherm:

- K_D = 2.49 log(L/kg) = 309.03 L/kg
- R^2 = 0.96
- n = 9

The average linear (K_D) isotherm used in CapSIM modeling:

- K_D = 374.29 L/kg

5.14 BEHP

5.14.1 Activated Carbon

The utilized sorption parameter for BEHP to GAC was sourced from Lin (2014). The sorption isotherms are presented in Table 2-2 of Pre-Final CDTM (Volume I, Appendix E).

5.14.1.1 Modeled Sorption Isotherm

Lin (2014) reports a non-linear isotherm, used in the CapSIM modeling:

- K_F = 11,300 (mg/g)/((mg/L)^(1/n)) = 3.57×10^5 (µg/kg)/((µg/L)^(1/n))
- 1/n = 1.5

5.14.2 Apatite

Literature describing BEHP sorption to apatite could not be found.

5.14.3 Bauxite

Literature describing BEHP sorption to bauxite could not be found.

5.14.4 Organoclay

Literature describing BEHP sorption to organoclay could not be found.

5.14.5 Sand and Sediment

5.14.5.1 Literature Review

Sorption for BEHP to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. A literature review was conducted, and two sources were identified that are applicable to the sorption of BEHP to sands and sediments: CLARC (2025), and EPA (2023).

5.14.5.2 Modeled Sorption Isotherm

EPA (2023) Table 38 reports a linear (K_{OC}) isotherm:

- K_{OC} = 111,123 L/kg = 5.05 log(L/kg)

The CLARC (2025) data table reports a linear (K_{OC}) isotherm:

- K_{OC} = 111,123 L/kg = 5.05 log(L/kg)

The value shared by the two sources was used in CapSIM modeling:

- K_{OC} = 5.05 log(L/kg)

5.15 BENZO(A)ANTHRACENE

5.15.1 Activated Carbon

The utilized sorption parameter for benzo(a)anthracene to GAC was the CapSIM default value. CapSIM documentation references two sources for isotherm parameters for PAHs: Walters & Luthy (1984) and Dobbs & Cohen (1980). The CapSIM default parameter for benzo(a)anthracene was sourced from Walters & Luthy (1984). This value was additionally utilized by GeoEngineers (2022).

5.15.1.1 Modeled Sorption Isotherm

The CapSIM default is a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 6.83 \times 10^6$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.50
- $R^2 = 0.67$

5.15.2 Sand

Sorption for benzo(a)anthracene to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Texas Commission on Environmental Quality's published Toxicity Values and Chemical – Physical Properties (TCEQ, 2019). This K_{OC} value is in agreement with the geometric mean in Table 38 of the Superfund Soil Screening Guidance (EPA, 2023).

5.15.3 Sediment

5.15.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for benzo(a)anthracene to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values were measured at adjacent PHSS project area Cathedral Park and presented in Table E-2 of the SPDI Evaluation. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.15.3.2 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm, used in CapSIM modeling:

- $K_D = 5.10$ log(L/kg) = 125892.54 L/kg
- n = 1

5.16 BENZO(A)PYRENE

5.16.1 Activated Carbon

The utilized sorption parameter for benzo(a)pyrene to GAC was the CapSIM default value. CapSIM documentation references two sources for isotherm parameters for PAHs: Walters & Luthy (1984) and Dobbs & Cohen (1980). The CapSIM default parameter for benzo(a)pyrene was sourced from Dobbs & Cohen (1980). This value was additionally utilized by GeoEngineers (2022).

5.16.1.1 Modeled Sorption Isotherm

The CapSIM default is a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 1.61 \times 10^6$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.44
- $R^2 = 0.90$

5.16.2 Sand and Sediment

Sorption for benzo(a)pyrene to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. The source identified to be applicable to the sorption of benzo(a)pyrene to sand and sediment is presented in Table D7-1 of the PHSS Remedial Investigation (RI)/Feasibility Study (FS) Appendix D, Supporting Information for Alternative Development. This K_{OC} value is in agreement with New Mexico Environment Department (2021) and Alaska Department of Environmental Conservation, Division of Spill Prevention and Response Contaminated Sites Program (2018).

5.17 BENZO(B)FLUORANTHENE

5.17.1 Activated Carbon

The utilized sorption parameter for benzo(b)fluoranthene to GAC was the CapSIM default value. CapSIM documentation references two sources for isotherm parameters for PAHs: Walters & Luthy (1984) and Dobbs & Cohen (1980). The CapSIM default parameter source for benzo(b)fluoranthene could not be verified from the listed sources. This value was additionally utilized by GeoEngineers (2022).

5.17.1.1 Modeled Sorption Isotherm

The CapSIM default is a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 4.42 \times 10^6$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.37

5.17.2 Sand and Sediment

Sorption for benzo(b)fluoranthene to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. The default K_{OC} value in CapSIM was utilized, which was sourced from Texas Commission on Environmental Quality's published Toxicity Values and Chemical – Physical Properties (TCEQ, 2019).

5.18 BENZO(E)PYRENE

5.18.1 Activated Carbon

The utilized sorption parameter for benzo(e)pyrene to GAC was sourced from Kupryianchyk et al. (2011). The sorption isotherms are presented in Table 1 of this report, and the optimum $LogK_{AC}$ with $n_{F,AC}$ of 0.82 was selected.

5.18.1.1 Modeled Sorption Isotherm

Kupryianchyk et al. (2011) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 8.4$; $K_F = 2.51\times10^8$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.82

5.18.2 Sand and Sediment

Sorption for benzo(e)pyrene to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. The default K_{OC} value in CapSIM was utilized, which uses the K_{OW} conversion $\log(K_{OC}) = 0.98\times\log(K_{OW})-0.32$. TCEQ (2023) is cited for the K_{OW} value and Schwarzenbach et al. (2017) is cited for the conversion method.

5.19 BENZO(G,H,I)PERYLENE

5.19.1 Activated Carbon

The utilized sorption parameter for benzo(g,h,i)perylene to GAC was the CapSIM default value. CapSIM documentation references two sources for isotherm parameters for PAHs: Walters & Luthy (1984) and Dobbs & Cohen (1980). The CapSIM default parameter for benzo(g,h,i)perylene was sourced from Dobbs & Cohen (1980). This value is similar to the value utilized by GeoEngineers (2022).

5.19.1.1 Modeled Sorption Isotherm

Dobbs & Cohen (1980) reports a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 10.7$ (mg/g)/((mg/L)^(1/n)) = 8.31×10^5 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.37
- $R^2 = 0.92$

5.19.2 Sand

Sorption for benzo(g,h,i)perylene to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. A literature review was conducted, and the source identified to be applicable to the sorption of benzo(g,h,i)perylene to Sand was in Table 7 of Alaska Department of Environmental Conservation, Division of Spill Prevention and Response Contaminated Sites Program (2018).

5.19.3 Sediment

5.19.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for benzo(g,h,i)perylene to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values were measured at adjacent PHSS project area Fund-Lead 3 and presented in Table E-2 of the SPDI Evaluation. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.19.3.2 Modeled Sorption Isotherm

The Fund-Lead 3 linear (K_D) isotherm, used in CapSIM modeling:

- K_D = 4.13 log(L/kg) = 13489.63 L/kg
- n = 1

5.20 BENZO(K)FLUORANTHENE

5.20.1 Activated Carbon

The utilized sorption parameter for benzo(k)fluoranthene to GAC was the CapSIM default value. CapSIM documentation references two sources for isotherm parameters for PAHs: Walters & Luthy (1984) and Dobbs & Cohen (1980). The CapSIM default parameter for benzo(k)fluoranthene appears to have been sourced from Dobbs & Cohen (1980). This is the same value as is reported in Lin (2014) and the value was additionally utilized by GeoEngineers (2022).

5.20.1.1 Modeled Sorption Isotherm

The CapSIM default is a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 3.53\times10^6$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.57

5.20.2 Sand and Sediment

Sorption for benzo(k)fluoranthene to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. The default K_{OC} value in CapSIM was utilized, which was sourced from Texas

Commission on Environmental Quality's published Toxicity Values and Chemical – Physical Properties (TCEQ, 2019).

5.21 CADMIUM

5.21.1 Activated Carbon

The utilized sorption parameter for cadmium to GAC was sourced from Erto et al. (2015). The sorption isotherms are presented in Table 2 of this report, and the Freundlich isotherm was selected as the coefficient determination (R^2) was the highest and standard error was the lowest for both modeled contaminants.

5.21.1.1 Modeled Sorption Isotherm

Erto et al. (2015) reports a non-linear isotherm, used in the CapSIM modeling:

- K_F = 0.096 (mmol/g)/((mmol/L)^(1/n)) = 4.62×10^3 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.667
- R^2 = 0.992

5.21.2 Sand

Sorption for cadmium to granular materials, such as capping Sand, uses the linear partition coefficient, K_D. A literature review was conducted, and two sources were identified that are applicable to the sorption of cadmium to Sand: CLARC (2025) and NJDEP (2014).

5.21.2.1 Modeled Sorption Isotherm

The CLARC (2025) data table reports a linear (K_D) isotherm:

- K_D = 6.7 L/kg

The NJDEP (2014) guidance document reports a linear (K_D) isotherm:

- K_D = 23 L/kg

An average of the two sources was used in CapSIM modeling:

- K_D = 14.85 L/kg

5.21.3 Sediment

Sorption for cadmium to sediment uses the linear partition coefficient, K_D. A literature review was conducted, and MFA (2009) was identified as applicable to the sorption of cadmium to sediment.

5.21.3.1 Modeled Sorption Isotherm

MFA (2009) Table 3-4 reports a linear (K_D) isotherm, used in CapSIM modeling:

- K_D = 4.7 log(L/kg) = 50,118 L/kg

5.22 CHLORDANES

5.22.1 Activated Carbon

The utilized sorption parameter for chlordanes to GAC was the CapSIM default value for chlordane (technical). CapSIM documentation references three sources for isotherm parameters for pesticides and other compounds: Dobbs & Cohen (1980), Speth & Miltner (1990), and Speth et al. (1988). Speth et al. (1988) could not be verified. The CapSIM default parameter for chlordanes appears to have been sourced from Dobbs & Cohen (1980). This is slightly lower, and therefore more conservative, than the reported isotherm in Lin (2014).

5.22.1.1 Modeled Sorption Isotherm

The CapSIM default is a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 1.77 \times 10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.38

5.22.2 Sand and Sediment

5.22.2.1 Literature Review

Sorption for chlordanes to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. A literature review was conducted, and four sources were identified to be applicable to the sorption of chlordanes to sands and sediments: Appendix D from Bureau of Habitat (2014), Table 1 of NJDEP (2014), the geometric mean from Table 38 of Superfund Soil Screening Guidance (EPA, 2023), and CLARC (2025). The log(K_{OC}) values were averaged and then utilized within CapSIM.

5.22.2.1 Modeled Sorption Isotherm

Bureau of Habitat (2014) Appendix D reports a linear (K_{OC}) isotherm:

- K_{OC} = 791189 L/kg = 5.90 log(L/kg)

NJDEP (2014) Table 1 reports a linear (K_{OC}) isotherm:

- K_{OC} = 120000 L/kg = 5.08 log(L/kg)

EPA (2023) Table 38 reports a linear (K_{OC}) isotherm:

- K_{OC} = 51310 L/kg = 4.71 log(L/kg)

The CLARC (2025) data table reports a linear (K_{OC}) isotherm:

- K_{OC} = 51310 L/kg = 4.71 log(L/kg)

The average log(K_{OC}) value from the four sources was used in CapSIM modeling:

- K_{OC} = 5.10 log(L/kg)

5.23 CHROMIUM

5.23.1 Activated Carbon

The utilized sorption parameter for chromium to GAC was the CapSIM default value for chromium (III). CapSIM documentation references McKay et al. (1985) for isotherm parameters for metals. The research presented in McKay et al. (1985) focused on the capacity of FILTRASORB 400 activated carbon to adsorb several contaminants from aqueous solutions for the purpose of removing contaminants from wastewater. The sorption parameters are presented in Table 3 of the study. McKay et al. (1985) additionally observed that the adsorption capacity of activated carbon shows a small particle size dependence possibly because the solute molecules cannot completely penetrate all the pores within the carbon particles.

5.23.1.1 Modeled Sorption Isotherm

The CapSIM default is a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 1.10 \times 10^5$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.44

5.23.2 Sand

Sorption for chromium to granular materials, such as capping Sand, uses the linear partition coefficient, K_D. A literature review was conducted, and CLARC (2025) was identified as applicable to the sorption of total chromium to Sand. CLARC (2025) reports K_D values for two oxidation states: Cr(III) and Cr(VI). The K_D value reported for total chromium is the same as for Cr(III) and higher than is reported for Cr(VI).

5.23.2.1 Modeled Sorption Isotherm

The CLARC (2025) data table reports a linear (K_D) isotherm, used in CapSIM modeling:

- K_D = 1000 L/kg

5.23.3 Sediment

Sorption for chromium to sediment uses the linear partition coefficient, K_D. A literature review was conducted, and MFA (2009) was identified as applicable to the sorption of chromium to sediment.

5.23.3.1 Modeled Sorption Isotherm

MFA (2009) Table 3-4 reports a linear (K_D) isotherm, used in CapSIM modeling:

- K_D = 4.6 log(L/kg) = 39,811 L/kg

5.24 CHRYSENE

5.24.1 Activated Carbon

The utilized sorption parameter for chrysene to GAC was the CapSIM default value. CapSIM documentation references two sources for isotherm parameters for PAHs: Walters & Luthy (1984) and Dobbs & Cohen (1980). The CapSIM default parameter for chrysene appears to have been sourced from Walters & Luthy (1984). This value was additionally utilized by GeoEngineers (2022).

5.24.1.1 Modeled Sorption Isotherm

The CapSIM default is a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 3.03 \times 10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.458
- $R^2 = 0.62$

5.24.2 Sand

Sorption for chrysene to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Texas Commission on Environmental Quality's published Toxicity Values and Chemical – Physical Properties (TCEQ, 2019).

5.24.3 Sediment

5.24.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for chrysene to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area Cathedral Park and presented in Table E-2 of the SPDI Evaluation. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.24.3.1 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm, used in CapSIM modeling:

- $K_D = 5.39$ log(L/kg) = 245470.89 L/kg
- $R^2 = 0.56$
- n = 5

5.25 COPPER

5.25.1 Activated Carbon

The utilized sorption parameter for copper to GAC was sourced from Patnukao et al. (2008). The research presented in Patnukao et al. (2008) focused on the effects of pH, contact time, initial concentration and temperature. The sorption isotherms are presented in Table 4 of this study. The Langmuir isotherm is used as it fits the experimental data better than the Freundlich isotherm. Notable experimental assumptions and processes include:

- Eucalyptus bark was sourced from Advance Agro Co., Ltd, Prachinburi Province, Thailand and then activated and crushed into PAC (size range of 0.045-0.150mm).
- Solution pH was 5, lower than the expected pH at the site (approximately 6.4).
- Temperature was 25.0 ± 1°C, higher than the expected temperature at the site (averaging between 4°C and 22°C).

Patnukao et al. (2008) notes that at pH values above 6 the electrostatic repulsion between cations and the positively charged surface is reduced, promoting a higher adsorption, however, insoluble hydrolyzed species could also form and lead to misunderstanding the adsorption capacity of the sorbent. Additionally, higher temperatures were found to increase the adsorption capacity.

5.25.1.1 Modeled Sorption Isotherm

Patnukao et al. (2008) reports a non-linear isotherm, used in the CapSIM modeling:

- q_m = 0.45 mmol/g = 2.86×10^{7} µg/kg
- b = 0.19 L/mmol = 2.99×10^{-6} L/µg
- R^2 = 0.9911

5.25.2 Sand

Sorption for copper to granular materials, such as capping Sand, uses the linear partition coefficient, K_D. A literature review was conducted, and two sources were identified that are applicable to the sorption of copper to Sand: CLARC (2025) and NJDEP (2014).

5.25.2.1 Modeled Sorption Isotherm

The CLARC (2025) data table reports a linear (K_D) isotherm:

- K_D = 22 L/kg

The NJDEP (2014) guidance document reports a linear (K_D) isotherm:

- K_D = 430 L/kg

An average of the two sources was used in CapSIM modeling:

- K_D = 226 L/kg

5.25.3 Sediment

5.25.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, the utilized sorption parameter (K_D) for copper to sediment, 31622.8 L/kg, was based on the value used in the sediment cap modeling for the Zidell Waterfront Property (MFA, 2009), on the west side of the Willamette River upstream of the PHSS. Project Area-specific partitioning values were measured at adjacent PHSS project areas RM9W, Cathedral Park, Fund-Lead 3, and Fund-Lead 9. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. A K_D value for each sample location was calculated. The K_D value from sample T15 and its duplicate was excluded from the average K_D calculation along with the T9 sample duplicate. At T15, the measured Copper concentrations in sediment (450 mg/kg and 140 mg/kg) are very high compared to the other samples taken at RM9W (36-98 mg/kg) and the transition zone water concentration is non-detect at a lab reporting limit of 20 µg/L. Copper was detected in transition zone water at two other sample locations where sediment concentrations lower than those at T15 were observed, T14 (53 mg/kg) and T18 (98 mg/kg). The resulting K_D values calculated for T15 and its duplicate, 34615.4 and 10769.2 respectively, are between 2.1 and 38.9 times higher than the K_D values calculated for the other sample locations.

The averaged RM9W K_D was then averaged with the calculated K_D values from Cathedral Park, Fund-Lead 3, and Fund-Lead 9 presented in Table E-2 of the SPDI Evaluation. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided. Table E-2 of the SPDI Evaluation additionally includes a Project Area-Wide sorption value that was not included in the average to prevent EPA-lead project areas from being weighted more heavily in the average K_D value.

5.25.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm:

- K_D = 2885.483 L/kg

The Cathedral Park linear (K_D) isotherm:

- K_D = 5.00 log(L/kg) = 100000.00 L/kg
- R^2 = 0.76
- n = 11

The Fund-Lead 3 linear (K_D) isotherm:

- K_D = 4.67 log(L/kg) = 46773.51 L/kg
- R^2 = 0.37
- n = 13

The Fund-Lead 9 linear (K_D) isotherm:

- K_D = 4.94 log(L/kg) = 87096.36 L/kg
- R^2 = 0.98

- n = 7

The average linear (K_D) isotherm used in CapSIM modeling:

- K_D = 59,189 L/kg

5.26 DDD

5.26.1 Activated Carbon

The utilized sorption parameter for DDD to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2.

5.26.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 8.30$; $K_F = 2.00\times10^8$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.73
- $R^2 = 0.95$

5.26.2 Sand

5.26.2.1 Literature Review

Sorption for DDD to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material.
A literature review was conducted, and six sources were identified to be applicable to the sorption of DDD to sands and sediments: Table 1 of NJDEP(2014), Table 39 of Superfund Soil Screening Guidance (EPA, 2023), CLARC (2025), the CapSIM default value sourced from TCEQ (2023), Table C-6-2 of AECOM (2017), and Table 3-7 of the Lower Passaic River Contaminant Fate and Transport Model (The Louis Berger Group et al., 2014). To encapsulate the range of found literature values, the average log(K_{OC}) was utilized within CapSIM.

5.26.2.2 Modeled Sorption Isotherm

NJDEP (2014) Table 1 reports a linear (K_{OC}) isotherm:

- K_{OC} = 1.00E+06 L/kg = 6.00 log(L/kg)

EPA (2023) Table 39 reports a linear (K_{OC}) isotherm:

- K_{OC} = 1.00E+06 L/kg = 6.00 log(L/kg)

The CLARC (2025) data table reports a linear (K_{OC}) isotherm:

- K_{OC} = 45800 L/kg = 4.66 log(L/kg)

The CapSIM default is a linear (K_{OC}) isotherm:

- K_{OC} = 4.93 log(L/kg)

AECOM (2017) Table C-6-2 reports a linear (K_{OC}) isotherm:

- K_{OC} = 117500 cm^3/g = 5.07 log(L/kg)

The Louis Berger Group et al. (2014) Table 3-7 reports a linear (K_{OC}) isotherm:

- K_{OC} = 6.42 log(L/kg)

The average log(K_{OC}) value from the four sources was used in CapSIM modeling:

- K_{OC} = 5.51 log(L/kg)

5.26.3 Sediment

5.26.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for DDD to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project areas Cathedral Park, Fund-Lead 3, and Fund-Lead 9. The calculated K_D values from Cathedral Park, Fund-Lead 3, and Fund-Lead 9 presented in Table E-2 of the SPDI Evaluation were averaged. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.26.3.2 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm:

- K_D = 4.68 log(L/kg) = 47863.01 L/kg L/kg
- R^2 = 0.56
- n = 19

The Fund-Lead 3 linear (K_D) isotherm:

- K_D = 3.86 log(L/kg) = 7244.36 L/kg
- R^2 = 0.45
- n = 15

The Fund-Lead 9 linear (K_D) isotherm:

- K_D = 3.80 log(L/kg) = 6309.57 L/kg
- R^2 = 0.59
- n = 7

The average linear (K_D) isotherm used in CapSIM modeling:

- K_D = 20472.31 L/kg

5.27 DDE

5.27.1 Activated Carbon

The utilized sorption parameter for DDE to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2. This value is higher than the reported isotherm in Lin (2014).

5.27.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 8.50$; $K_F = 3.16\times10^8$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.69
- $R^2 = 0.95$

5.27.2 Sand

5.27.2.1 Literature Review

Sorption for DDE to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material.

A literature review was conducted, and five sources were identified to be applicable to the sorption of DDD to sands and sediments: Table 1 of NJDEP(2014), Table 39 of Superfund Soil Screening Guidance (EPA, 2023), CLARC (2025), the CapSIM default value sourced from TCEQ (2023), and Table 3-7 of the Lower Passaic River Contaminant Fate and Transport Model (The Louis Berger Group et al., 2014). To encapsulate the range of found literature values, the average log(K_{OC}) was utilized within CapSIM.

5.27.2.2 Modeled Sorption Isotherm

NJDEP (2014) Table 1 reports a linear (K_{OC}) isotherm:

- K_{OC} = 4.47E+06 L/kg = 6.65 log(L/kg)

EPA (2023) Table 39 reports a linear (K_{OC}) isotherm:

- K_{OC} = 4.47E+06 L/kg = 6.65 log(L/kg)

The CLARC (2025) data table reports a linear (K_{OC}) isotherm:

- K_{OC} = 86405 L/kg = 4.94 log(L/kg)

The CapSIM default is a linear (K_{OC}) isotherm:

- K_{OC} = 2.7 log(L/kg)

The Louis Berger Group et al. (2014) Table 3-7 reports a linear (K_{OC}) isotherm:

- K_{OC} = 7.26 log(L/kg)

The average log(K_{OC}) value from the five sources was used in CapSIM modeling:

- K_{OC} = 5.64 log(L/kg)

5.27.3 Sediment

5.27.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for DDE to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project areas Cathedral Park, Fund-Lead 3, and Fund-Lead 9. The calculated K_D values from Cathedral Park, Fund-Lead 3, and Fund-Lead 9 presented in Table E-2 of the SPDI Evaluation were averaged. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.27.3.2 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm:

- K_D = 4.77 log(L/kg) = 58884.37 L/kg L/kg
- R^2 = 0.70
- n = 6

The Fund-Lead 3 linear (K_D) isotherm:

- K_D = 4.78 log(L/kg) = 60255.96 L/kg
- R^2 = 0.33
- n = 6

The Fund-Lead 9 linear (K_D) isotherm:

- K_D = 4.88 log(L/kg) = 75857.76 L/kg
- n = 1

The average linear (K_D) isotherm used in CapSIM modeling:

- K_D = 64999.36 L/kg

5.28 DDT

5.28.1 Activated Carbon

The utilized sorption parameter for DDT to GAC was the CapSIM default value. CapSIM documentation references three sources for isotherm parameters for pesticides and other compounds: Dobbs & Cohen (1980), Speth & Miltner (1990), and Speth et al. (1988). Speth et al.

(1988) could not be verified. The CapSIM default parameter for DDT appears to have been sourced from Dobbs & Cohen (1980). This is consistent with the reported isotherm in Lin (2014).

5.28.1.1 Modeled Sorption Isotherm

The CapSIM default is a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 1.02 \times 10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.50
- $R^2 = 0.89$

5.28.2 Sand

Sorption for DDT to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Texas Commission on Environmental Quality's published Chemical/Physical Properties Table accompanying the Texas Risk Reduction Program (TRRP) Rule (TCEQ, 2023).

5.28.3 Sediment

5.28.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for DDT to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the DDT organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project areas Cathedral Park and Fund-Lead 3. The calculated K_D values from Cathedral Park and Fund-Lead 3 presented in Table E-2 of the SPDI Evaluation were averaged. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.28.3.2 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm:

- K_D = 5.61 log(L/kg) = 407380.28 L/kg L/kg
- $R^2 = 0.40$
- n = 4

The Fund-Lead 3 linear (K_D) isotherm:

- K_D = 4.19 log(L/kg) = 15488.17 L/kg
- $R^2 = 0.98$
- n = 2

The average linear (K_D) isotherm used in CapSIM modeling:

- K_D = 211434.22 L/kg

5.29 DIBENZ(A,H)ANTHRACENE

5.29.1 Activated Carbon

The utilized sorption parameter for benzo(b)fluoranthene to GAC was the CapSIM default value. CapSIM documentation references two sources for isotherm parameters for PAHs: Walters & Luthy (1984) and Dobbs & Cohen (1980). The CapSIM default parameter source for dibenz(a,h)fluoranthene could not be verified from the listed sources. This value was additionally utilized by GeoEngineers (2022).

5.29.1.1 Modeled Sorption Isotherm

The CapSIM default is a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 3.90\times10^5$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.75

5.29.2 Sand and Sediment

Sorption for dibenz(a,h)anthracene to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. The default K_{OC} value in CapSIM was utilized, which was sourced from Texas Commission on Environmental Quality's published Toxicity Values and Chemical – Physical Properties (TCEQ, 2019). This K_{OC} value is slightly higher than the geometric mean in Table 38 of the Superfund Soil Screening Guidance (EPA, 2023): 6.25 log(L/kg).

5.30 DIELDRIN

5.30.1 Activated Carbon

The utilized sorption parameter for dieldrin to GAC was sourced from Lin (2014). The Freundlich sorption isotherms are presented in Table 2-2 of Pre-Final CDTM (Volume I, Appendix E).

5.30.1.1 Modeled Sorption Isotherm

Lin (2014) reports a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 606$ (mg/g)/((mg/L)^(1/n)) = 1.79×10^7 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.51

5.30.2 Sand and Sediment

5.30.2.1 Literature Review

Sorption for dieldrin to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. A literature review was conducted, and four sources were identified to be applicable to the sorption of dieldrin to sands and sediments: Appendix D from Bureau of Habitat (2014), Table 1 of NJDEP (2014), the geometric mean from Table 38 of Superfund Soil Screening Guidance (EPA, 2023),

and CLARC (2025). To encapsulate the range of found literature values, the average log(K_{OC}) was utilized within CapSIM.

5.30.2.2 Modeled Sorption Isotherm

Bureau of Habitat (2014) Appendix D reports a linear (K_{OC}) isotherm:

- K_{OC} = 161881 L/kg = 5.21 log(L/kg)

EPA (2023) Table 38 reports a linear (K_{OC}) isotherm:

- K_{OC} = 25546 L/kg = 4.41 log(L/kg)

NJDEP (2014) Table 1 reports a linear (K_{OC}) isotherm:

- K_{OC} = 21400 L/kg = 4.33 log(L/kg)

The CLARC (2025) data table reports a linear (K_{OC}) isotherm:

- K_{OC} = 25546 L/kg = 4.41 log(L/kg)

The average log(K_{OC}) value from the four sources was used in CapSIM modeling:

- K_{OC} = 4.59 log(L/kg)

5.31 DIESEL

5.31.1 Activated Carbon

Limited literature is available investigating the sorption of diesel to activated carbon. In the Draft 50% RD CDTM, the utilized sorption parameter for diesel to GAC was sourced from Adeyoye (1999). The research presented in Adeyoye (1999) focused on treating hydrocarbons contaminated groundwater. The sorption isotherm is presented in Table 3.1 of this paper. Notable experimental assumptions and processes include:

- Analyzed aged total petroleum hydrocarbon (TPH)
- The untreated GAC was FILTRASORB 400, sourced from Calgon Carbon
- Solution pH was 6.8, similar to the expected pH at the project area (approximately 6.4)

Additional literature review was conducted, and two additional sources were identified that are applicable to the sorption of diesel to GAC: Giustra and Di Bella (2017) and Ayotamuno (2006). The experimental amount adsorbed (q; µg/kg) was plotted against the equilibrium concentration (C; µg/L) for all three studies (Figure C-4 below).

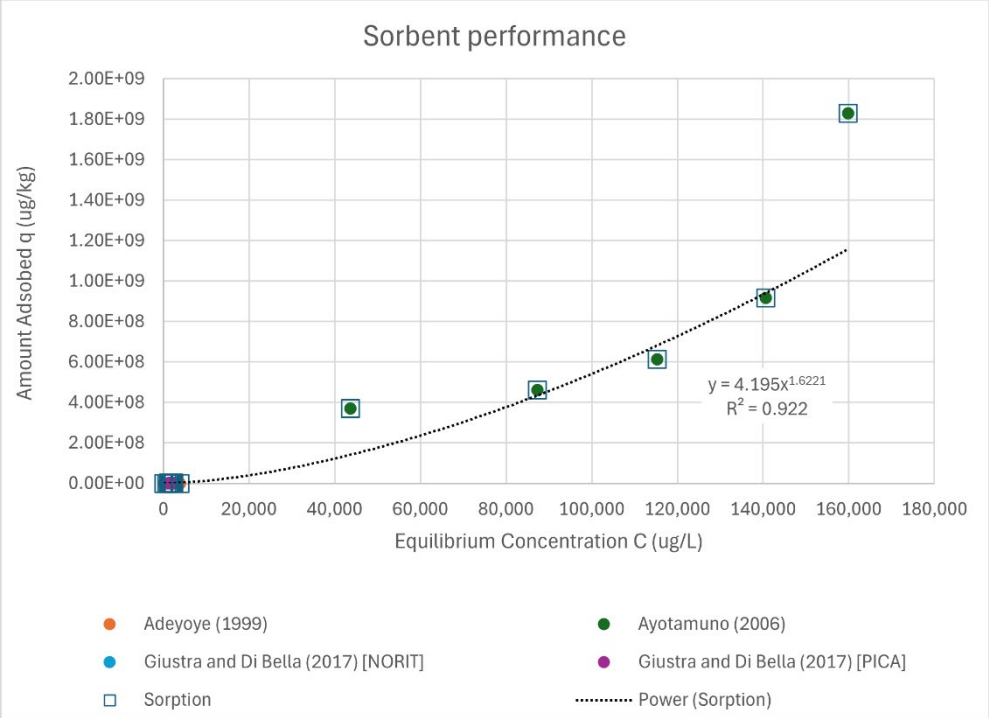

Figure C-4. GAC sorption of Diesel

The log of the experimental amount adsorbed was additionally plotted against the log of the equilibrium concentration to aide in visualization for the lower concentration experimental data (Figure C-5 below).

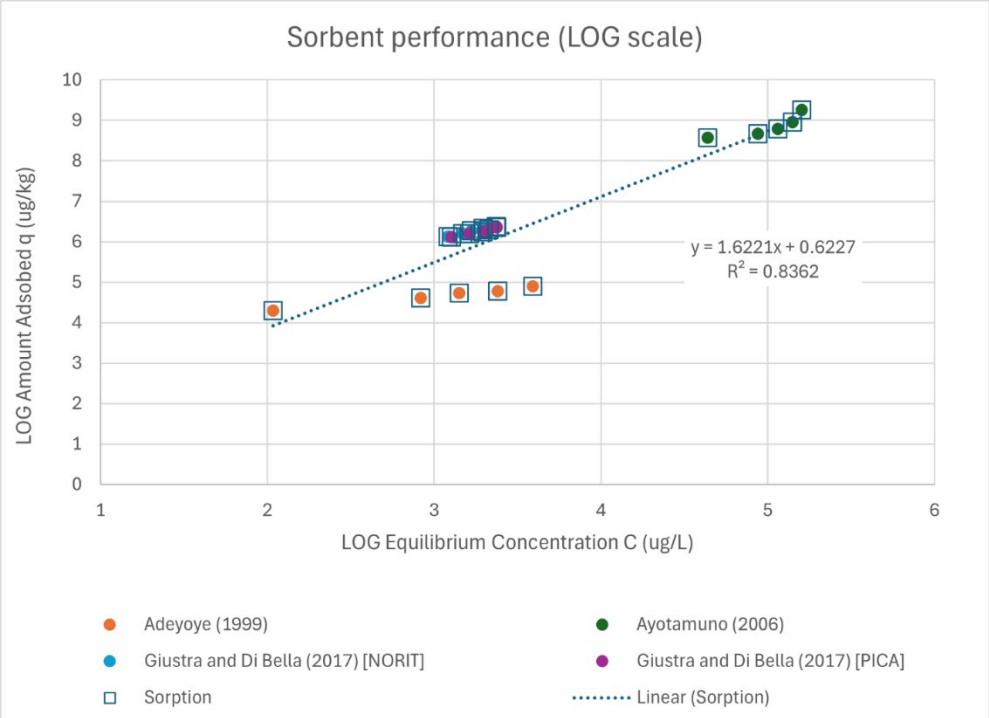

Figure C-5. GAC sorption of Diesel – log scale

Giustra and Di Bella (2017) utilized two different commercial samples of GAC: PIC-Anhydro S23 and NORIT GAC 830W. The study analyzed sorption at a pH of 7.8, higher than expected conditions in the sediment cap. Ayotamuno (2006) studied the performance of GAC compared to powdered activated carbon (PAC) at a pH of 5.5, lower than expected conditions in the sediment cap, and did not specify the source of the studied materials, however, the paper cites Norit and Ultra Carbon as common trade names. The experimental data from the three studies represent different sediment pH and capping material combinations, the log scale of the sorbent performance (Figure C-5) shows distinct groupings that are not in clear agreement, and all values result in weaker adsorption than expected.

Aged diesel is more likely to be the lower solubility constituents, as the lighter, more soluble, and more bioavailable compounds have diminished over extended periods of time in an aqueous environment. That process and the representative compounds within diesel, including decane hexadecane, and naphthalene, would result in a higher expected sorption coefficient than is reported in the literature referenced above. Therefore, diesel sorption to GAC was modeled using the linear organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the GAC.

5.31.2 Sand

Sorption for diesel to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. A literature review was conducted, and the source identified to be applicable to the sorption of diesel to Sand was Table 1 of California Department of Toxic Substances Control (2009).

5.31.3 Sediment

5.31.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for diesel to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area Cathedral Park and presented in Table E-2 of the SPDI Evaluation. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.31.3.1 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm, used in CapSIM modeling:

- K_D = 3.34 log(L/kg) = 2187.76 L/kg
- n = 1

5.32 FLUORANTHENE

5.32.1 Activated Carbon

The utilized sorption parameter for fluoranthene to GAC was sourced from Walters & Luthy (1984). The sorption isotherms are presented in Table III of this study. The Langmuir isotherm was determined by the researchers to be the most useful of the evaluated equations for representing

the data. However, the Langmuir equation was not capable of describing the adsorption over the entire concentration range. The experimental data was reasonably fit by the Freundlich isotherm and was therefore selected. This value is lower, and therefore more conservative, than the reported isotherm in Gomez-Eyles et al. (2013) and slightly higher than the value utilized by GeoEngineers (2022).

5.32.1.1 Modeled Sorption Isotherm

Walters & Luthy (1984) reports a non-linear isotherm, used in the CapSIM modeling:

- K_F = 242 (mg/g)/((mg/L)^(1/n)) = 2.77×10^7 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.314
- R^2 = 0.81

5.32.2 Sand

Sorption for fluoranthene to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Texas Commission on Environmental Quality's published Toxicity Values and Chemical – Physical Properties (TCEQ, 2019). This K_{OC} value is in agreement with the geometric mean in Table 38 of the Superfund Soil Screening Guidance (EPA, 2023).

5.32.3 Sediment

5.32.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for fluoranthene to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area Cathedral Park and presented in Table E-2 of the SPDI Evaluation. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.32.3.2 Modeled Sorption Isotherm

The average Cathedral Park linear (K_D) isotherm, used in CapSIM modeling:

- K_D = 4.77 log(L/kg) = 58884.37 L/kg
- R^2 = 0.71
- n = 9

5.33 FLUORENE

5.33.1 Activated Carbon

The utilized sorption parameter for fluorene to GAC was sourced from Walters & Luthy (1984). The sorption isotherms are presented in Table III of this study. The Langmuir isotherm was

determined by the researchers to be the most useful of the evaluated equations for representing the data. However, the Langmuir equation was not capable of describing the adsorption over the entire concentration range. The experimental data was reasonably fit by the Freundlich isotherm and was therefore selected. This value was additionally utilized by GeoEngineers (2022).

5.33.1.1 Modeled Sorption Isotherm

Walters & Luthy (1984) reports a non-linear isotherm, used in the CapSIM modeling:

- K_F = 674 (mg/g)/((mg/L)^(1/n)) = 1.04×10^7 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.604
- R^2 = 0.90

5.33.2 Sand

Sorption for fluorene to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. A literature review was conducted, and the source identified to be applicable to the sorption of fluorene to sand and sediment was Table B-2 of New Mexico Environment Department (2021). This K_{OC} value is in agreement with Alaska Department of Environmental Conservation, Division of Spill Prevention and Response Contaminated Sites Program (2018).

5.33.3 Sediment

5.33.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for fluorene to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area Cathedral Park and presented in Table E-2 of the SPDI Evaluation. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.33.3.1 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm, used in CapSIM modeling:

- K_D = 3.56 log(L/kg) = 3630.78 L/kg
- R^2 = 0.98
- n = 6

5.34 INDENO(1,2,3-CD)PYRENE

5.34.1 Activated Carbon

The utilized sorption parameter for indendo(1,2,3-cd)pyrene to GAC was sourced from Kupryianchyk et al. (2011). The sorption isotherms are presented in Table 1 of this report, and the optimum $LogK_{AC}$ with $n_{F,AC}$ of 0.82 was selected. This value is slightly higher than the value utilized by GeoEngineers (2022).

5.34.1.1 Modeled Sorption Isotherm

Kupryianchyk et al. (2011) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 8.3$; $K_F = 2.00\times10^8$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.82

5.34.2 Sand and Sediment

Sorption for indeno(1,2,3-cd)pyrene to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. The default K_{OC} value in CapSIM was utilized, which was sourced from Texas Commission on Environmental Quality's published Toxicity Values and Chemical – Physical Properties (TCEQ, 2019).

5.35 LEAD

5.35.1 Activated Carbon

The utilized sorption parameter for lead to GAC was sourced from Patnukao et al. (2008). The research presented in Patnukao et al. (2008) focused on the effects of pH, contact time, initial concentration and temperature. The sorption isotherms are presented in Table 4 of this study. The Langmuir isotherm is used as it fits the experimental data better than the Freundlich isotherm. Notable experimental assumptions and processes include:

- Eucalyptus bark was sourced from Advance Agro Co., Ltd, Prachinburi Province, Thailand and then activated and crushed into PAC (size range of 0.045-0.150mm).
- Solution pH was 5, lower than the expected pH at the site (approximately 6.4).
- Temperature was 25.0 ± 1°C, higher than the expected temperature at the site (averaging between 4°C and 22°C).

Patnukao et al. (2008) notes that at pH values above 6 the electrostatic repulsion between cations and the positively charged surface is reduced, promoting a higher adsorption, however, insoluble hydrolyzed species could also form and lead to misunderstanding the adsorption capacity of the sorbent. Additionally, higher temperatures were found to increase the adsorption capacity.

5.35.1.1 Modeled Sorption Isotherm

Patnukao et al. (2008) reports a non-linear isotherm, used in the CapSIM modeling:

- $q_m = 0.55$ mmol/g = 1.14×10^9 µg/kg
- b = 0.23 L/mmol = 1.11×10^{-6} L/µg
- $R^2 = 0.9969$

5.35.2 Sand

Sorption for lead to granular materials, such as capping Sand, uses the linear partition coefficient, K_D. A literature review was conducted, and two sources were identified that are applicable to the sorption of lead to Sand: CLARC (2025) and NJDEP (2014).

5.35.2.1 Modeled Sorption Isotherm

The CLARC (2025) data table reports a linear (K_D) isotherm:

- K_D = 10000 L/kg

The NJDEP (2014) guidance document reports a linear (K_D) isotherm:

- K_D = 900 L/kg

An average of the two sources was used in CapSIM modeling:

- K_D = 5450 L/kg

5.35.3 Sediment

Sorption for lead to sediment uses the linear partition coefficient, K_D. A literature review was conducted, and MFA (2009) was identified as applicable to the sorption of lead to sediment.

5.35.3.1 Modeled Sorption Isotherm

MFA (2009) Table 3-4 reports a linear (K_D) isotherm, used in CapSIM modeling:

- K_D = 4.3 log(L/kg) = 19,953 L/kg

5.36 LINDANE

5.36.1 Activated Carbon

The utilized sorption parameter for lindane to GAC was sourced from Lin (2014). The sorption isotherms are presented in Table 2-2 of Pre-Final CDTM (Volume I, Appendix E).

5.36.1.1 Modeled Sorption Isotherm

Lin (2014) reports a non-linear isotherm, used in the CapSIM modeling:

- K_F = 285 (mg/g)/((mg/L)^(1/n)) = 1.46×10^7 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.43

5.36.2 Sand and Sediment

5.36.2.1 Literature Review

Sorption for lindane to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. A literature review was conducted, and five sources were identified to be applicable to the sorption

of lindane to sands and sediments: Appendix D from Bureau of Habitat (2014), Table 1 of NJDEP (2014), the geometric mean from Table 38 of Superfund Soil Screening Guidance (EPA, 2023), TCEQ (2023), and the EPA National Primary Drinking Water Regulations Technical Factsheet on Lindane (EPA, n.d.). To encapsulate the range of found literature values, the average log(K_{OC}) was utilized within CapSIM.

5.36.2.2 Modeled Sorption Isotherm

Bureau of Habitat (2014) Appendix D reports a linear (K_{OC}) isotherm:

- K_{OC} = 4082 L/kg = 3.61 log(L/kg)

NJDEP (2014) Table 1 reports a linear (K_{OC}) isotherm:

- K_{OC} = 1070 L/kg = 3.03 log(L/kg)

EPA (2023) Table 38 reports a linear (K_{OC}) isotherm:

- K_{OC} = 1352 L/kg = 3.13 log(L/kg)

The TCEQ (2023) data table reports a linear (K_{OC}) isotherm:

- K_{OC} = 3.04 log(L/kg)

The EPA (n.d.) factsheet reports a linear (K_{OC}) isotherm:

- K_{OC} = 1081 = 3.03 log(L/kg)

The average log(K_{OC}) value from the five sources was used in CapSIM modeling:

- K_{OC} = 3.17 log(L/kg)

5.37 MANGANESE

5.37.1 Activated Carbon

A literature review was conducted, and two sources were identified that are applicable to the sorption of manganese to GAC: bin Jusoh et al. (2005) and Tran et al. (2018). The research presented in bin Jusoh et al. (2005) focused on the effectiveness of GAC in removing iron and manganese for the palatability of drinking water. The Freundlich sorption isotherms are presented in Table 1 of this study. Langmuir isotherms are additionally presented in Table 2 of this study, however, in a non-standard form. bin Jusoh et al. (2005) observed that activated carbon has a higher adsorption capacity for Fe(II) compared to Mn(II) and concluded it may relate to electronegativity and ionic radius; Fe(II) is more electronegative and has a smaller ionic radius than Mn(II). Notable experimental assumptions and processes include:

- Analyzed Mn(II)

- The coconut shell GAC was supplied by local manufacturer Kekwa Indah Sdn Bhd in Nilai, Negeri Sembilan, Malaysia. The crushed carbon utilized was between sieve sizes of 850 mm and 1000 mm.
- Temperature was 30°C, higher than the expected temperature at the site (averaging between 4°C and 22°C).

The research presented in Tran et al. (2018) focused on characterizing the properties and functional groups of acid-modified GAC. Mn(II) removal was studied under different experimental conditions including pH, temperature, initial contaminant concentration, and adsorbent dose. The sorption isotherms for un-modified GAC (R-GAC) are presented in Table 4 of this study as a control, and the Freundlich isotherm was selected for comparison with the other applicable source. Tran et al. (2018) observed that nitric acid treatment greatly enhanced the adsorption performance of modified GAC (M-GAC). The higher adsorption capacity was determined to be related mainly to the development of new carboxylic groups (-COOH) on the GAC surface, ultimately enabling the formation of surface complexes between Mn(II) ions and functional groups. Notable experimental assumptions and processes include:

- Analyzed Mn(II)
- The adsorbent used was NORIT® GAC 1240 acquired from Norit Americas Inc., USA.
- Solution pH was 6.0, slightly lower than the expected pH at the site (approximately 6.4).
- Temperature was 25°C, higher than the expected temperature at the site (averaging between 4°C and 22°C).

5.37.1.1 Modeled Sorption Isotherm

bin Jusoh et al. (2005) reports a non-linear isotherm:

- K_F = 2.3372 (mg/g)/((mg/L)^(1/n)) = 1.32×10^6 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.0824
- R^2 = 0.9227

Tran et al. (2018) reports a non-linear isotherm:

- K_F = 0.33 (mg/g)/((mg/L)^(1/n)) = 1.66×10^4 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.433
- R^2 = 0.9379

An average of the two sources was used in CapSIM modeling:

- K_F = 6.70×10^5 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.258

5.37.2 Sand

Sorption for manganese to granular materials, such as capping Sand, uses the linear partition coefficient, K_D. A literature review was conducted, and two sources were identified that are applicable to the sorption of manganese to Sand: CLARC (2025) and NJDEP (2014).

5.37.2.1 Modeled Sorption Isotherm

The CLARC (2025) data table reports a linear (K_D) isotherm:

- K_D = 65 L/kg

The NJDEP (2014) guidance document reports a linear (K_D) isotherm:

- K_D = 65 L/kg

An average of the two sources was used in CapSIM modeling:

- K_D = 65 L/kg

5.37.3 Sediment

5.37.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, the utilized sorption parameter (K_D) for manganese to sediment, 65.0 L/kg, was the average of the sorption values available in CLARC (2025) and NJDEP (2014). This is the value that is being utilized as the K_D for manganese to Sand. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.37.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- K_D = 70.22 L/kg

5.38 MERCURY

5.38.1 Activated Carbon

The utilized sorption parameter for mercury to GAC was the CapSIM default value. CapSIM documentation references McKay et al. (1985) for isotherm parameters for metals. The research presented in McKay et al. (1985) focused on the capacity of FILTRASORB 400 activated carbon to adsorb several contaminants from aqueous solutions for the purpose of removing contaminants from wastewater. The sorption parameters are presented in Table 3 of the study. McKay et al. (1985) additionally observed that the adsorption capacity of activated carbon shows a small particle size dependence possibly because the solute molecules cannot completely penetrate all the pores within the carbon particles.

5.38.1.1 Modeled Sorption Isotherm

The CapSIM default is a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 8.34 \times 10^5$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.46

5.38.2 Sand

Sorption for mercury to granular materials, such as capping Sand, uses the linear partition coefficient, K_D. A literature review was conducted, and two sources were identified that are applicable to the sorption of mercury to Sand: CLARC (2025) and NJDEP (2014).

5.38.2.1 Modeled Sorption Isotherm

The CLARC (2025) data table reports a linear (K_D) isotherm:

- K_D = 52 L/kg

The NJDEP (2014) guidance document reports a linear (K_D) isotherm:

- K_D = 0.2 L/kg

An average of the two sources was used in CapSIM modeling:

- K_D = 26.1 L/kg

5.38.3 Sediment

Sorption for mercury to sediment uses the linear partition coefficient, K_D. A literature review was conducted, and MFA (2009) was identified as applicable to the sorption of mercury to sediment.

5.38.3.1 Modeled Sorption Isotherm

MFA (2009) Table 3-4 reports a linear (K_D) isotherm, used in CapSIM modeling:

- K_D = 3.1 log(L/kg) = 1,259 L/kg

5.39 NAPHTHALENE

5.39.1 Activated Carbon

The utilized sorption parameter for naphthalene to GAC was sourced from Walters & Luthy (1984). The sorption isotherms are presented in Table III of this study. The Langmuir isotherm was determined by the researchers to be the most useful of the evaluated equations for representing the data. However, the Langmuir equation was not capable of describing the adsorption over the entire concentration range. The experimental data was reasonably fit by the Freundlich isotherm and was therefore selected. This value was additionally utilized by GeoEngineers (2022) and is slightly lower and therefore more conservative, than the reported isotherm in Table 5.7 of Chattopadhyay (2011).

5.39.1.1 Modeled Sorption Isotherm

Walters & Luthy (1984) reports a non-linear isotherm, used in the CapSIM modeling:

- K_F = 277 (mg/g)/((mg/L)^(1/n)) = 1.42×10^7 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.43
- R^2 = 0.87

5.39.2 Sand and Sediment

Sorption for naphthalene to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. A literature review was conducted, and the source identified to be applicable to the sorption of naphthalene to Sand and Sediments was Table 4 of Center for Environmental & Human Toxicology, University of Florida (2005). This K_{OC} value is in agreement with the value presented in Table 7 of Bureau of Habitat (2014).

5.40 PCB-1

5.40.1 Activated Carbon

The utilized sorption parameter for PCB-1 to GAC was sourced from Chattopadhyay (2011). The research presented in Chattopadhyay (2011) focused on granular materials as direct amendments to conventional caps including; granular activated carbon (GAC), iron (Fe)/palladium (Pd) amended GAC, alumina pillared clay, rice husk char, and organically modified clays. This report was prepared for the EPA. The sorption isotherms adapted from Sharma (2008) are presented in Table 2.3 of this study. The original study utilized activated carbon created from coconut shells. Chattopadhyay (2011) observed that PCB partitioning to activated carbon is strongly related to K_{OW} and influenced by the total number of chlorines and the number of chlorines in the ortho position.

5.40.1.1 Modeled Sorption Isotherm

Chattopadhyay (2011) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 7.90$; $K_F = 7.94 \times 10^7$ (µg/kg)/((µg/L)^(1/n))
- $1/n = 0.34$

5.40.2 Sand

Sorption for PCB-1 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.40.3 Sediment

5.40.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-1 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.40.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- K_D = 1558.74 L/kg

5.41 PCB-15

5.41.1 Activated Carbon

The utilized sorption parameter for PCB-15 to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2. In this study, PCB-15 was coeluted with PCB-17.

5.41.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F)$ = 8.60 ; $K_F = 3.98 \times 10^8$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 1.01
- R^2 = 0.98

5.41.2 Sand

Sorption for PCB-15 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.41.3 Sediment

5.41.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-15 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.41.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- K_D = 24901.577 L/kg

5.42 PCB-31

5.42.1 Activated Carbon

The utilized sorption parameter for PCB-31 to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2.

5.42.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 8.90$; $K_F = 7.94 \times 10^8$ (µg/kg)/((µg/L)^(1/n))
- $1/n = 0.99$
- $R^2 = 0.98$

5.42.2 Sand

Sorption for PCB-31 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.42.3 Sediment

5.42.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-31 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.42.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- $K_D = 413537.83$ L/kg

5.43 PCB-44

5.43.1 Activated Carbon

The utilized sorption parameter for PCB-44 to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2.

5.43.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 8.60$; $K_F = 3.98 \times 10^8$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.92
- $R^2 = 0.99$

5.43.2 Sand

Sorption for PCB-44 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.43.3 Sediment

5.43.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-44 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. The results for PCB-44 was reported with coeluters (PCB-44/47/65). A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.43.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- $K_D = 987325.54$ L/kg

5.44 PCB-99

5.44.1 Activated Carbon

The utilized sorption parameter for PCB-99 to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2.

5.44.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 7.70$; $K_F = 5.01 \times 10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.71
- $R^2 = 0.98$

5.44.2 Sand

Sorption for PCB-99 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.44.3 Sediment

5.44.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-99 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. The results for PCB-99 was reported with coeluters (PCB-83/99). A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.44.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- K_D = 452549.15 L/kg

5.45 PCB-141

5.45.1 Activated Carbon

The utilized sorption parameter for PCB-141 to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2.

5.45.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 9.30$; $K_F = 2.00\times10^9$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.95
- $R^2 = 0.99$

5.45.2 Sand

Sorption for PCB-141 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.45.3 Sediment

5.45.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-141 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.45.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- K_D = 596986.12 L/kg

5.46 PCB-153

5.46.1 Activated Carbon

The utilized sorption parameter for PCB-153 to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2. This value is slightly higher than the value presented in Chattopadhyay (2011).

5.46.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F)$ = 8.40 ; $K_F = 2.51 \times 10^8$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.72
- R^2 = 0.98

5.46.2 Sand

Sorption for PCB-153 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.46.3 Sediment

5.46.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-153 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. The results for PCB-153 was reported with coeluters (PCB-153/168). A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.46.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- K_D = 509501.86 L/kg

5.47 PCB-174

5.47.1 Activated Carbon

The utilized sorption parameter for PCB-174 to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2.

5.47.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 8.70$; $K_F = 2.51 \times 10^8$ (µg/kg)/((µg/L)^(1/n))
- $1/n = 0.71$
- $R^2 = 0.98$

5.47.2 Sand

Sorption for PCB-174 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.47.3 Sediment

5.47.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-174 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.47.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- $K_D = 790044.96$ L/kg

5.48 PCB-177

5.48.1 Activated Carbon

The utilized sorption parameter for PCB-177 to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2.

5.48.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 9.30$; $K_F = 2.00 \times 10^9$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.70
- $R^2 = 0.98$

5.48.2 Sand

Sorption for PCB-177 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.48.3 Sediment

5.48.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-177 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.48.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- $K_D = 843077.63$ L/kg

5.49 PCB-180

5.49.1 Activated Carbon

The utilized sorption parameter for PCB-180 to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2.

5.49.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 9.10$; $K_F = 1.26 \times 10^9$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.82
- $R^2 = 0.99$

5.49.2 Sand

Sorption for PCB-180 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.49.3 Sediment

5.49.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-180 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. The results for PCB-180 was reported with coeluters (PCB-180/193). A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.49.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- K_D = 668697.14 L/kg

5.50 PCB-183

5.50.1 Activated Carbon

The utilized sorption parameter for PCB-183 to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2.

5.50.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 8.30$; $K_F = 2.00\times10^8$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.69
- $R^2 = 0.98$

5.50.2 Sand

Sorption for PCB-183 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.50.3 Sediment

5.50.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-183 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. The results for PCB-183 was reported with coeluters (PCB-183/185). A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.50.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- K_D = 729680.97 L/kg

5.51 PCB-199

5.51.1 Activated Carbon

The utilized sorption parameter for PCB-199 to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2.

5.51.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F)$ = 8.00 ; $K_F = 1.00\times10^8$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.70
- R^2 = 0.98

5.51.2 Sand

Sorption for PCB-199 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.51.3 Sediment

5.51.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-199 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. The results for PCB-199 was reported with coeluters (PCB-198/199). A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.51.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- K_D = 7281538.79 L/kg

5.52 PCB-206

5.52.1 Activated Carbon

The utilized sorption parameter for PCB-206 to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2.

5.52.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 8.00$; $K_F = 1.00\times10^8$ (µg/kg)/((µg/L)^(1/n))
- $1/n = 0.60$
- $R^2 = 0.96$

5.52.2 Sand

Sorption for PCB-206 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.52.3 Sediment

5.52.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-206 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.52.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- $K_D = 2812708.78$ L/kg

5.53 PCB-209

5.53.1 Activated Carbon

Literature could not be found identifying the sorption of PCB-209 to activated carbon. As a conservative assumption, the utilized K_F sorption parameter for PCB-209 to GAC was assumed to be equal to the minimum K_F from the reported PCBs (PCB-136) in Gomez-Eyles et al. (2013). The Freundlich shape parameter, n, was assumed to equal 1, resulting in a linear relationship between aqueous and adsorbed concentrations. The Freundlich sorption isotherms are presented in Table S2.

5.53.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- $Log(K_F) = 6.90$; $K_F = 7.94 \times 10^6$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 1.00
- $R^2 = 0.94$

5.53.2 Sand

Sorption for PCB-209 to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Hawker & Connell (1988).

5.53.3 Sediment

5.53.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for PCB-209 to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.53.3.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- $K_D = 9321883.44$ L/kg

5.54 PENTACHLOROPHENOL

5.54.1 Activated Carbon

A literature review was conducted, and two sources were identified that are applicable to the sorption of pentachlorophenol to GAC: Lin (2014) and Dobbs & Cohen (1980). The sorption isotherms from Lin (2014) are presented in Table 2-2 of Pre-Final CDTM (Volume I, Appendix E). The sorption isotherm corresponding to pH 7.0 was selected from Dobbs & Cohen (1980) as it is closest to the expected conditions in SIB.

5.54.1.1 Modeled Sorption Isotherm

Lin (2014) reports a non-linear isotherm:

- $K_F = 436$ (mg/g)/((mg/L)^(1/n)) = 4.16×10^7 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.34

Dobbs & Cohen (1980) reports a non-linear isotherm:

- K_F = 0.33 (mg/g)/((mg/L)^(1/n)) = 8.24×10^6 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.42

An average of the two sources was used in CapSIM modeling:

- K_F = 2.49×10^7 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.38

5.54.2 Sand and Sediment

5.54.2.1 Literature Review

Sorption for pentachlorophenol to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. A literature review was conducted, and six sources were identified to be applicable to the sorption of pentachlorophenol to sands and sediments: Appendix D from Bureau of Habitat (2014), Table 1 of NJDEP(2014), the value for pH 6.8 from Table 42 of Superfund Soil Screening Guidance (EPA, 2023), Table 4 from Center for Environmental & Human Toxicology, University of Florida (2005), Table B-2 of New Mexico Environment Department (2021), and Table 7 of Division of Spill Prevention and Response Contaminated Sites Program (2018). To encapsulate the range of found literature values, the average log(K_{OC}) was utilized within CapSIM.

5.54.2.2 Modeled Sorption Isotherm

Bureau of Habitat (2014) Appendix D reports a linear (K_{OC}) isotherm:

- K_{OC} = 107954 L/kg = 5.03 log(L/kg)

NJDEP (2014) Table 1 reports a linear (K_{OC}) isotherm:

- K_{OC} = 5100 L/kg = 3.71 log(L/kg)

EPA (2023) Table 42 reports a linear (K_{OC}) isotherm:

- K_{OC} = 592 L/kg = 2.77 log(L/kg)

Center for Environmental & Human Toxicology, University of Florida (2005) Table 4 reports a linear (K_{OC}) isotherm:

- K_{OC} = 592 L/kg = 2.77 log(L/kg)

New Mexico Environment Department (2021) Table B-2 reports a linear (K_{OC}) isotherm:

- K_{OC} = 4960 L/kg = 3.695 log(L/kg)

Division of Spill Prevention and Response Contaminated Sites Program (2018) Table 7 reports a linear (K_{OC}) isotherm:

- K_{OC} = 592 L/kg = 2.77 log(L/kg)

The average log(K_{OC}) value from the five sources was used in CapSIM modeling:

- K_{OC} = 3.45 log(L/kg)

5.55 PHENANTHRENE

5.55.1 Activated Carbon

The utilized sorption parameter for phenanthrene to GAC was sourced from Gomez-Eyles et al. (2013). The Freundlich sorption isotherms are presented in Table S2. This value is higher than the reported isotherm in Lin (2014) and utilized in GeoEngineers (2022).

5.55.1.1 Modeled Sorption Isotherm

Gomez-Eyles et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- Log(K_F) = 8.71 ; K_F = 5.13×10^8 (µg/kg)/((µg/L)^(1/n))
- 1/n = 1.11
- R^2 = 0.95

5.55.2 Sand

Sorption for phenanthrene to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. A literature review was conducted, and the source identified to be applicable to the sorption of phenanthrene to sand and sediment was New Mexico Environment Department (2021). This K_{OC} value is in agreement with Alaska Department of Environmental Conservation, Division of Spill Prevention and Response Contaminated Sites Program (2018).

5.55.3 Sediment

5.55.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for phenanthrene to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project areas Cathedral Park and Fund-Lead 3. The calculated K_D values from Cathedral Park and Fund-Lead 3 presented in Table E-2 of the SPDI Evaluation were averaged. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.55.3.2 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm:

- K_D = 3.96 log(L/kg) = 9120.11 L/kg L/kg
- R^2 = 0.90

- n = 4

The Fund-Lead 3 linear (K_D) isotherm:

- K_D = 2.33 log(L/kg) = 213.80 L/kg
- n = 1

The average linear (K_D) isotherm used in CapSIM modeling:

- K_D = 4666.95 L/kg

5.56 PYRENE

5.56.1 Activated Carbon

The utilized sorption parameter for pyrene to GAC was sourced from Walters & Luthy (1984). The sorption isotherms are presented in Table III of this study. The Langmuir isotherm was determined by the researchers to be the most useful of the evaluated equations for representing the data. However, the Langmuir equation was not capable of describing the adsorption over the entire concentration range. The experimental data was reasonably fit by the Freundlich isotherm and was therefore selected. This value was additionally utilized by GeoEngineers (2022).

5.56.1.1 Modeled Sorption Isotherm

Walters & Luthy (1984) reports a non-linear isotherm, used in the CapSIM modeling:

- K_F = 389 (mg/g)/((mg/L)^(1/n)) = 2.70×10^7 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.386
- R^2 = 0.78

5.56.2 Sand

Sorption for pyrene to granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the granular material. The default K_{OC} value in CapSIM was utilized, which was sourced from Texas Commission on Environmental Quality's published Toxicity Values and Chemical – Physical Properties (TCEQ, 2019).

5.56.3 Sediment

5.56.3.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for pyrene to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent Cathedral Park and Fund-Lead 3. The calculated K_D values from Cathedral Park and Fund-Lead 3 presented in Table E-2 of the SPDI Evaluation were averaged. Individual sample sediment and transition zone water results are not available from the EPA-lead project areas, but the sample size is provided.

5.56.3.2 Modeled Sorption Isotherm

The Cathedral Park linear (K_D) isotherm:

- K_D = 4.77 log(L/kg) = 58884.37 L/kg L/kg
- R^2 = 0.65
- n = 16

The Fund-Lead 3 linear (K_D) isotherm:

- K_D = 3.34 log(L/kg) = 2187.76 L/kg
- n = 1

The average linear (K_D) isotherm used in CapSIM modeling:

- K_D = 4666.95 L/kg

5.57 TOTAL CPAHS

The ROD Table 17 Total cPAHs CULs are based on a benzo(a)pyrene equivalent. Total cPAHs were modeled using the same chemical and sorption properties as benzo(a)pyrene, the initial concentrations of Total cPAHs detected within the SIB project area, and resulting concentrations were compared to the CULs for Total cPAHs. See Section 5.16 for information on the sorption parameters used for Total cPAHs.

5.58 TOTAL DIOXINS/FURANS

The ROD Table 17 Total Dioxins/Furans CULs are based on a 2,3,7,8-TCDD equivalent. Total Dioxins/Furans were modeled using the same chemical and sorption properties as 2,3,7,8-TCDD, the initial concentrations of Total Dioxins/Furans detected within the SIB project area, and resulting concentrations were compared to the CULs for Total Dioxins/Furans. See Section 5.6 for information on the sorption parameters used for Total Dioxins/Furans.

5.59 TOTAL PAHS

Chemical inputs for Total PAHs, including sorption parameters, are the average values for the modeled individual PAHs, including cPAHs.

5.59.1 Activated Carbon

The utilized sorption parameter for Total PAHs to GAC was the average of the CapSIM default values for all PAHs included in the supporting materials. The PAHs where the sorption parameters were sourced from Dobbs & Cohen (1980) include benzo(a)pyrene, benzo(k)fluoranthene, and benzo(g,h,i)perylene. The PAHs where the sorption parameters were sourced from Walters & Luthy (1984) include acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene, and triphenylene.

5.59.1.1 Modeled Sorption Isotherm

An average of the 14 analytes was used in CapSIM modeling:

- $K_F = 1.45\times10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.47

5.60 TOTAL PCBS

Chemical inputs for Total PCBs, including sorption parameters for activated carbon and granular capping materials, are the average values for the modeled individual PCB congeners.

5.60.1 Activated Carbon

The utilized sorption parameter for Total PCBs to GAC was the average of all PCBs reported in Table S2 of Gomez-Eyles et al. (2013). Gomez-Eyles et al. (2013) reported 72 values representing 101 PCB congeners. Of the reported values, 25 report the sorption parameters for two or three coeluting congeners. Additionally, parameters are only reported for isotherms with more than three points and when the R^2 of the Freundlich fit is greater than 0.70.

5.60.1.1 Modeled Sorption Isotherm

An average of the 72 values was used in CapSIM modeling:

- $K_F = 2.40\times10^8$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.805

5.60.2 Sediment

5.60.2.1 Project Area-Adjacent Data Review

In the Draft 50% RD CDTM, sorption for Total PCBs to sediment used the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the sediment. Project Area-specific partitioning values (K_D) were measured at adjacent PHSS project area RM9W. RM9W presents the sediment and transition zone water results from eight sample locations and one duplicate per media. A K_D value for each sample location, excluding duplicates, was calculated and then averaged.

5.60.2.2 Modeled Sorption Isotherm

The average RM9W linear (K_D) isotherm, used in CapSIM modeling

- K_D = 447157.07 L/kg

5.61 TRIBUTYLTIN

5.61.1 Activated Carbon

Limited literature is available investigating the sorption of tributyltin to activated carbon. In the Draft 50% RD CDTM, the utilized sorption parameter for tributyltin to GAC was sourced from Ma et el. (2000). The research presented in Ma et al. (2000) focused on the distribution of tributyltin at the interfaces of the overlying water-sediment-pore water system under simulated estuarine conditions. The Freundlich sorption isotherms for tributyltin to sediment are presented in Figure 2 of this study, providing a conservative estimate of adsorption, and the value for experimental temperature of 25°C was selected. Ma et al. (2000) observed a strong influence of pH on both sorption of tributyltin on the sediment and partitioning into the porewater. Notable experimental assumptions and processes include:

- Sediment samples were acquired from sampling sites in Haihe estuary, Tianjin, China.
- Solution pH was 7.9, higher than the expected pH at the site (approximately 6.4).

Additional literature review was conducted, and Ayanda et al. (2013) was identified as applicable to the sorption of tributyltin to GAC. The research presented in Ayanda et al. (2013) focused on the adsorption potential of nFe3O4, activated carbon, and a composite in the removal of tributyltin from artificial seawater. The study utilized activated carbon (100–400 mesh) sourced from Sigma Aldrich. The adsorbent amount, contact time, pH, stirring speed, initial concentration, and temperature were varied to understand effect on adsorption capacity. The sorption isotherms are presented in Table 4 of this study. The Freundlich isotherm is used as the Langmuir constants are negative, indicating an inadequacy of the model to fit the data.

Ayanda et al. (2013) notes that increasing pH from 3 to 8 steadily increases the adsorbed percentage of tributyltin, followed by equilibrium at pH values above 8. It was also observed that the adsorption capacity increases with increased solution temperature as well as increased initial concentrations.

5.61.1.1 Modeled Sorption Isotherm

Ayanda et al. (2013) reports a non-linear isotherm, used in the CapSIM modeling:

- K_F = 6.6589 (mg/g)/((mg/L)^(1/n)) = 2.05×10^4 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.8375
- R^2 = 0.9977

5.61.2 Apatite

Literature describing tributyltin sorption to apatite could not be found.

5.61.3 Bauxite

Literature describing tributyltin sorption to bauxite could not be found.

5.61.4 Organoclay

A literature review was conducted and Du et al. (2000) was identified as applicable to the sorption of tributyltin to organoclay. The research presented in Du et al. (2000) focused on a new method to synthesize porous bentonite granules and assessing their removal capacity of tributyltin from wastewater. The sorption isotherms are presented in Figure 5 of Du et al. (2000) and the results for the porous organoclay granule were selected. Du et al. (2000) observed that all of the tested porous organoclay granules have a higher tributyltin adsorptive capacity than granules without surfactant (HDTMA) modification. Additionally, bentonite granules were determined to be a more practical amendment than bentonite powder, despite the higher sorptive capacity of the bentonite powder, due to the lack of swelling when wet and no dispersion into the water matrix. Notable experimental assumptions and processes include:

- Bentonite (Active Gel 150) was supplied from Sibelco Australia. Active Gel 150 is a sodium activated bentonite, mined and processed in Sandgate, New South Wales.
- Temperature was 23°C, higher than the expected temperature at the site (averaging between 4°C and 22°C)

5.61.4.1 Sorption Isotherm

Du et al. (2000) reports a non-linear isotherm, used in the CapSIM modeling:

- K_F = 2.8864 (mg/g)/((mg/L)^(1/n)) = 0.02161 (µg/kg)/((µg/L)^(1/n))
- 1/n = 2.7086

5.61.5 Sand and Sediment

5.61.5.1 Literature Review

Sorption for tributyltin to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. A literature review was conducted, and four sources were identified to be applicable to the sorption of tributyltin to sands and sediments: Table 3-2 of MFA (2009), Table 4 of Center for Environmental & Human Toxicology, University of Florida (2005), the average of the measured values in Table 2 of Unger et al. (1988), and Roy F. Weston, Inc. (1996). To encapsulate the range of found literature values, the average log(K_{OC}) was utilized within CapSIM.

5.61.5.2 Modeled Sorption Isotherm

MFA (2009) Table 3-2 reports a linear (K_{OC}) isotherm:

- K_{OC} = 5.17 log(L/kg)

Center for Environmental & Human Toxicology, University of Florida (2005) Table 4 reports a linear (K_{OC}) isotherm:

- K_{OC} = 9.08E+04 L/kg = 4.96 log(L/kg)

The average from Unger et al. (1988) Table 2 reports a linear (K_{OC}) isotherm:

- K_{OC} = 109250 L/kg = 5.04 log(L/kg)

Roy F. Weston, Inc. (1996) Section 3.6.1 reports a linear (K_{OC}) isotherm:

- K_{OC} = 25100 L/kg = 4.40 log(L/kg)

An average of the four sources was used in CapSIM modeling:

- K_{OC} = 4.89 log(L/kg)

5.62 VANADIUM

5.62.1 Activated Carbon

A literature review was conducted, and two sources were identified that are applicable to the sorption of vanadium to GAC: Chaudhari (2009) and Dessouki et al. (2000). The research presented in Chaudhari (2009) focused on improving the adsorption efficiency of GAC in removing vanadium from drinking water. The sorption isotherms for un-modified GAC are presented in Table 1 of this study as a control, and the Freundlich isotherm was selected for comparison with the other applicable source. Chaudhari (2009) observed a higher percentage removal at pH 2 and then a decreasing removal efficiency with increasing pH. Notable experimental assumptions and processes include:

- The commercially available GAC was supplied by an unknown manufacturer. The carbon was sieved through a mesh size (-12 × 18) (m/s Jayant Test sieves, Mumbai).
- Temperature was 25°C, higher than the expected temperature at the site (averaging between 4°C and 22°C).

The research presented in Dessouki et al. (2000) focused on the sorption of four heavy metals (uranium, molybdenum, zirconium, vanadium) to GAC and ion exchangers for the purposes of wastewater treatment. Heavy metal removal was studied under various pH values and initial concentrations ranging from 10 to 100 mg/L. The Freundlich sorption isotherms for GAC are presented in Table 1 of this study, and the sorption isotherm corresponding to pH 7.0 was selected as it is closest to the expected conditions in SIB. Dessouki et al. (2000) observed that GAC exhibited a higher adsorption capacity than the tested ion exchange resins and variation was noted depending on the chemical valency of the heavy metals. Notable experimental assumptions and processes include:

- Analyzed vanadium chloride (VCl_4) as V^{4+}
- Solution pH was 7.0, higher than the expected pH at the site (approximately 6.4).
- Temperature was 25°C, higher than the expected temperature at the site (averaging between 4°C and 22°C).

5.62.1.1 Modeled Sorption Isotherm

Chaudhari (2009) reports a non-linear isotherm:

- K_F = 1.228 (mg/g)/((mg/L)^(1/n)) = 1.55×10^5 (µg/kg)/((µg/L)^(1/n))

- 1/n = 0.2993
- R^2 = 0.9477

Dessouki et al. (2000) reports a non-linear isotherm:

- K_F = 5.60 (mg/g)/((mg/L)^(1/n)) = 3.15×10^4 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.75

An average of the two sources was used in CapSIM modeling:

- K_F = 9.34×10^4 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.525

5.62.2 Sand and Sediment

Sorption for vanadium to sediment and granular materials, such as capping Sand, uses the linear partition coefficient, K_D. A literature review was conducted, and two sources were identified that are applicable to the sorption of vanadium to Sand and Sediment: CLARC (2025) and NJDEP (2014).

5.62.2.1 Modeled Sorption Isotherm

The CLARC (2025) data table reports a linear (K_D) isotherm:

- K_D = 1000 L/kg

The NJDEP (2014) guidance document reports a linear (K_D) isotherm:

- K_D = 1000 L/kg

An average of the two sources was used in CapSIM modeling:

- K_D = 1000 L/kg

5.63 XYLENES

5.63.1 Activated Carbon

The utilized sorption parameter for xylenes to GAC was the average of the CapSIM default values for m-, o-, and p-xylenes. CapSIM documentation references three sources for isotherm parameters for pesticides and other compounds: Dobbs & Cohen (1980), Speth & Miltner (1990), and Speth et al. (1988). Speth et al. (1988) could not be verified. The CapSIM default parameters for o- and p-xylenes appear to have been sourced from Speth & Miltner (1990). The CapSIM default parameter source for m-xylene could not be verified from Dobbs & Cohen (1980) or Speth & Miltner (1990). The values for m-, o- and p-xylenes are slightly higher than the reported isotherms in Lin (2014).

5.63.1.1 Modeled Sorption Isotherm

The CapSIM default for m-xylene is a non-linear isotherm:

- $K_F = 3.56\times10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.25

The CapSIM default for o-xylene is a non-linear isotherm:

- $K_F = 9.76\times10^6$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.474

The CapSIM default for p-xylene is a non-linear isotherm:

- $K_F = 1.26\times10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.418

An average of the three analytes was used in CapSIM modeling:

- $K_F = 1.93\times10^7$ (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.381

5.63.2 Sand and Sediment

Sorption for xylenes to sediment and granular materials, such as capping Sand, uses the organic carbon normalized partition coefficient, K_{OC}, and the fraction organic carbon f_{OC} in the material. A literature review was conducted, and the source identified to be applicable to the sorption of xylenes to sand and sediment was Appendix D from Bureau of Habitat (2014). The log of presented K_{OC} values for 1,2-Xylene [3.07 log(L/kg)], 1,3-Xylene [3.15 log(L/kg)], and 1,4-Xylene [3.10 log(L/kg)] were calculated and the average of these values was used in CapSIM modeling.

5.64 ZINC

5.64.1 Activated Carbon

The utilized sorption parameter for zinc to GAC was sourced from Erto et al. (2015). The sorption isotherms are presented in Table 2 of this report, and the Freundlich isotherm was selected as the coefficient determination (R^2) was the highest and standard error was the lowest for both modeled contaminants.

5.64.1.1 Modeled Sorption Isotherm

Erto et al. (2015) reports a non-linear isotherm, used in the CapSIM modeling:

- $K_F = 0.101$ (mmol/g)/((mmol/L)^(1/n)) = 1.40×10^4 (µg/kg)/((µg/L)^(1/n))
- 1/n = 0.555
- $R^2 = 0.992$

5.64.2 Sand

Sorption for zinc to granular materials, such as capping Sand, uses the linear partition coefficient, K_D. A literature review was conducted, and two sources were identified that are applicable to the sorption of zinc to Sand: CLARC (2025) and NJDEP (2014).

5.64.2.1 Modeled Sorption Isotherm

The CLARC (2025) data table reports a linear (K_D) isotherm:

- K_D = 62 L/kg

The NJDEP (2014) guidance document reports a linear (K_D) isotherm:

- K_D = 23 L/kg

An average of the two sources was used in CapSIM modeling:

- K_D = 42.5 L/kg

5.64.3 Sediment

Sorption for zinc to sediment uses the linear partition coefficient, K_D. A literature review was conducted, and Allison & Allison (2005) was identified as applicable to the sorption of zinc to sediment.

5.64.3.1 Modeled Sorption Isotherm

The average of the median linear sorption parameters presented in Tables 1 and 4 of Allison & Allison (2005) reports a linear (K_D) isotherm, used in CapSIM modeling:

- K_D = 34,054 L/kg

6.0 REFERENCES

Addeck, A., Croes, K., Van Langenhove, K., Denison, M., Elskens, M., & Baeyens, W. 2012. *Dioxin analysis in water by using a passive sampler and CALUX bioassay*. Talanta, 88, 73–78, at URL: https://doi.org/10.1016/j.talanta.2011.10.009

Adeyoye, A. O. 1999. *Adsorbtion of Total Petroleum Hydrocarbons Contaminated Water with Granular Activated Carbon [Master of Science, University of Rhode Island]* at URL: https://digitalcommons.uri.edu/cgi/viewcontent.cgi?article=1877&context=theses

Akartasse, N., Mejdoubi, E., Razzouki, B., Azzaoui, K., Jodeh, S., Hamed, O., Ramdani, M., Lamhamdi, A., Berrabah, M., Lahmass, I., Jodeh, W., & El Hajjaji, S. 2017. *Natural product based composite for extraction of arsenic (III) from waste water. Chemistry Central Journal,* 11(1), 33, at URL: https://doi.org/10.1186/s13065-017-0261-9

AECOM. 2017. *Final Remedial Design Report River Mile 13.1 Sediment Study Area, Appendix C-6 Isolation Layer Modeling (p. Table C-6-2)*

Allison, J. D., & Allison, T. L. 2005. P*artition Coefficients for Metals in Surface Water, Soil, and Waste.* U.S. Environmental Protection Agency, Office of Research and Development, at URL: https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NERL&dirEntryId=135783

Anang, E., Tei, M., & Aduboffour, V. K. (2022). *Enhanced arsenic removal using lateritic bauxite modified by heating and blending*. Water Science and Technology, 85(5), 1568–1580, at URL: https://doi.org/10.2166/wst.2022.055

Ayanda, O. S., Fatoki, O. S., Adekola, F. A., & Ximba, B. J. 2013. *Remediation of Tributyltin Contaminated Seawater by Adsorption Using nFe3O4, Activated Carbon and nFe3O4/Activated Carbon Composite Material*. Water, Air, & Soil Pollution, 224(9), 1684, at URL: https://doi.org/10.1007/s11270-013-1684-0

bin Jusoh, A., Cheng, W. H., Low, W. M., Nora'aini, A., & Megat Mohd Noor, M. J. 2005. Study on the removal of iron and manganese in groundwater by granular activated carbon. Desalination, 182(1), 347–353 at URL: https://doi.org/10.1016/j.desal.2005.03.022

Bostick, W. D., Stevenson, R. J., Harris, L. A., Peery, D., Hall, J. R., Shoemaker, J. L., Jarabek, R. J., & Munday, E. B. 2003. *USE OF APATITE FOR CHEMICAL STABILIZATION OF SUBSURFACE CONTAMINANTS (No. Contract DE-AD26-01NT41306;* p. Table 11). Materials and Chemistry Laboratory, Inc. (US), at URL: https://doi.org/10.2172/820754

Bridgewater Group. 2020. *Transition Zone Water Evaluation.* Prepared for Tube Forgings of America, Inc./Front Avenue LLCs. Portland, Oregon

Bureau of Habitat. 2014. *Screening and Assessment of Contaminated Sediment, Appendix D.* New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources, at URL: https://extapps.dec.ny.gov/docs/fish_marine_pdf/screenasssedfin.pdf

Calgon Carbon Corporation. 2019. *FILTRASORB 400 Granular Activated Carbon Data Sheet,* at URL: https://www.calgoncarbon.com/app/uploads/DS-FILTRA40019-EIN-E1.pdf

California Department of Toxic Substances Control. 2009. *Evaluating Human Health Risks from Total Petroleum Hydrocarbons (TPH) [Interim Guidance],* at URL: https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/01/TPH-Guidance-final-June-16-2009.pdf

CDM Smith, 2025. *Final Supplemental Pre-Design Investigation Evaluation Report.* Prepared for U.S. Environmental Protection Agency. Contract 68HE0318D0003. Task order 68HE0720F0078. April.

Center for Environmental & Human Toxicology, University of Florida. 2005. *Technical Report: Development of Cleanup Target Levels (CTLs) For Chapter 62-777, F.A.C. (p. Table 4),* at URL: https://floridadep.gov/sites/default/files/1-TechnicalReport2FinalFeb2005_0.pdf

Chattopadhyay, S. 2011. Evaluation of Sorption of Organic Compounds by Various Novel Sorbents - An Assessment of Potential as Amendments, at URL: https://doi.org/10.13140/RG.2.2.11637.06886

Chaudhari, U. E. 2009. *Removal of Vanadium (V) from water by adsorption using GAC loaded with ethylene di-amine tetra acetic acid (EDTA) and nitrilo tri-acetic acid (NTA).* Oriental

Journal of Chemistry, 25(3), 799–803, at URL: https://www.orientjchem.org/pdf/vol25no3/OJC_Vol25_No3_p_799-803.pdf

CLARC data tables - Washington State Department of Ecology. 2025, at URL: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC/Data-tables. February.

Water Temperature. 2025.*Columbia River Water Temperature: current values, trends, historical data and forecast*, at URL: https://seatemperature.net/rivers/water-temp-in-columbia-river. June 17.

Cornelissen, G., Cousins, I. T., Wiberg, K., Tysklind, M., Holmström, H., & Broman, D. 2008. *Black carbon-dominated PCDD/Fs sorption to soils at a former wood impregnation site.* Chemosphere, 72(10), 1455–1461, at URL: https://doi.org/10.1016/j.chemosphere.2008.05.010

Deliyanni, E., & Bandosz, T. J. 2011. *Importance of carbon surface chemistry in development of iron–carbon composite adsorbents for arsenate removal*. Journal of Hazardous Materials, 186(1), 667–674, at URL: https://doi.org/10.1016/j.jhazmat.2010.11.055

Dessouki, A. M., Hegazy, E. A., EL-Korashy, S. A., & EL-Kelesh, N. A. (2000). *Removal of Some Heavy Metals from Wastewater using Radiation- Adsorption Method*. 481–493, at URL: https://www.osti.gov/etdeweb/servlets/purl/20153207

Di Toro, D. M. 1985. *A particle interaction model of reversible organic chemical sorption. Chemosphere,* 14(10), 1503–1538, at URL: https://doi.org/10.1016/0045-6535(85)90008-6

Division of Spill Prevention and Response Contaminated Sites Program. 2018. *Procedures for Calculating Cleanup Levels. Alaska Department of Environmental Conservation,* at URL: https://www.google.com/url?client=internal-element-cse&cx=016629259767872399745:k960dr43-7e&q=https://dec.alaska.gov/media/7543/20180201_pccl.pdf&sa=U&ved=2ahUKEwj86_fR6rKCAxXoFjQIHYYtC4wQFnoECAIQAg&usg=AOvVaw3qVJbLJoCPaQKExlBG-YVF

Dobbs, R. A., & Cohen, J. M. 1980. *Carbon Adsorption Isotherms for Toxic Organics* (No. EPA-600/8-80-023; Special Reports).

Du, J., Chadalavada, S., & Naidu, R. 2017. *Synthesis of porous bentonite organoclay granule and its adsorption of tributyltin.* Applied Clay Science, 148, 131–137, at URL: https://doi.org/10.1016/j.clay.2017.07.033

U.S. Environmental Protection Agency [EPA]. 2007. *Demonstration of the AquaBlok® Sediment Capping Technology (Innovative Technology Evaluation Report No. EPA/540/R-07/008).* National Risk Management Research Laboratory Office of Research and Development, At URL: https://nepis.epa.gov/Exe/ZyPDF.cgi/P10030OW.PDF?Dockey=P10030OW.PDF

EPA. 2013. *Use of Amendments for In Situ Remediation at Superfund Sediment Sites* at URL: https://clu-in.org/download/contaminantfocus/sediments/In_situ_AmendmentReportandAppendix_FinalApril2013.pdf

EPA. 2017. *Record of Decision, Portland Harbor Superfund Site, Portland Oregon.* United States Environmental Protection Agency Region 10, Seattle, Washington. January.

EPA. 2020. *Errata #2 for Portland Harbor Superfund Site Record of Decision ROD Table 17,* at URL: https://semspub.epa.gov/work/10/100200076.pdf

EPA. 2021. *Administrative Settlement Agreement and Order on Consent for Remedial Design, Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10*. January 20.

EPA. 2022. *Errata #3 for Portland Harbor Superfund Site Record of Decision*, Table 6 and Table 21, at URL: https://semspub.epa.gov/work/10/100416743.pdf

EPA. 2023. *Technical Background Document Part 5: CHEMICAL-SPECIFIC PARAMETERS (Superfund Soil Screening Guidance*). U.S. Environmental Protection Agency, at URL: https://semspub.epa.gov/work/HQ/175235.pdf

EPA. (n.d.). *Technical Factsheet on: LINDANE, at URL:* https://archive.epa.gov/water/archive/web/pdf/archived-technical-fact-sheet-on-lindane.pdf

Erto, A., Di Natale, F., Musmarra, D., & Lancia, A. 2015. *Modeling of single and competitive adsorption of cadmium and zinc onto activated carbon. Adsorption*, *21*(8), 611–621, at URL: https://doi.org/10.1007/s10450-015-9712-6

European Chemicals Agency. 2008. *Guidance on information requirements and chemical safety assessment, Appendix R.7.13-2: Environmental risk assessment for metals and metal compounds*. At URL: https://arche-consulting.be/media/pages/tools/reach-guidance-metals-and-metal-compounds/7c2fbf068e-1673879755/information_requirements_r7_13_2_en.pdf

Genç-Fuhrman, H., Tjell, J. C., & McConchie, D. 2004. Adsorption of Arsenic from Water Using Activated Neutralized Red Mud. Environmental Science & Technology, 38(8), 2428–2434, at URL: https://doi.org/10.1021/es035207h

GeoEngineers. 2022. *Riverbank Source Control Measure: Crawford Street South Site* (p. Table 15).

Gomez-Eyles, J. L., Yupanqui, C., Beckingham, B., Riedel, G., Gilmour, C., & Ghosh, U. 2013. *Evaluation of Biochars and Activated Carbons for In Situ Remediation Of Sediments Impacted With Organics, Mercury, And Methylmercury*. Environmental Science & Technology, at URL: 47(23), 13721–13729, at URL: https://doi.org/10.1021/es403712q

Götz, R., Enge, P., Friesel, P., Roch, K., Kjeller, L.-O., Kulp, S. E., & Rappe, C. 1994. *Sampling and analysis of water and suspended particulate matter of the river Elbe for polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs).* Chemosphere, 28(1), 63–74, at URL: https://doi.org/10.1016/0045-6535(94)90201-1

Gu, Z., Fang, J., & Deng, B. 2005. *Preparation and Evaluation of GAC-Based Iron-Containing Adsorbents for Arsenic Removal.* Environmental Science & Technology, 39(10), 3833–3843, at URL: https://doi.org/10.1021/es048179r

Hawker, D. W., & Connell, D. W. (1988). Octanol-Water Partition Coefficients of Polychlorinated Biphenyl Congeners. Environmental Science & Technology, 22(4), 382–387, at URL: https://www.scribd.com/document/470744382/Hawker-and-Connell-1988

HydroGeoLogic, Inc. [HGL]. (2024a). *Remedial Design Work Plan, Revision 1,* CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Overland Park, Kansas. November.

HGL. 2024b. *Pre-Design Investigation Evaluation Report, Revision 2, CERCLA Docket No. 10-2021-001.* Prepared for the Swan Island Remedial Design Group, Overland Park, Kansas. December.

ITRC. 2023. Chemical Isolation Layer Modeling. Sediment Cap Chemical Isolation Guidance, at URL: https://sd-1.itrcweb.org/5-chemical-isolation-layer-modeling/#5

Kanel, S. R., Manning, B., Charlet, L., & Choi, H. 2005. *Removal of Arsenic(III) from Groundwater by Nanoscale Zero-Valent Iron.* Environmental Science & Technology, 39(5), 1291–1298, at URL: https://doi.org/10.1021/es048991u

Karickhoff, S., Brown, D., & Scott, T. 1979. *Sorption of hydrophobic pollutants on natural sediments.* Water Research, 13(3), 241–248, at URL: https://doi.org/10.1016/0043-1354(79)90201-X

Kupryianchyk, D., Rakowska, M. I., Grotenhuis, J. T. C., & Koelmans, A. A. 2012. *In situ sorption of hydrophobc organic compounds to sediment amended with activated carbon. Environmental Pollution*, *161*, 23–29, at URL: https://doi.org/10.1016/j.envpol.2011.09.043

Lin, S. D. 2014. *Freundlich Adsorption Isotherm Constants for Toxic Organic Compounds*. In Water and Wastewater Calculations Manual (3rd ed.). McGraw-Hill Education, at URL: https://www.accessengineeringlibrary.com/content/book/9780071819817

Liu, Y., Naidu, R., & Ming, H. 2011. *Red mud as an amendment for pollutants in solid and liquid phases.* Geoderma, 163(1–2), 1–12, at URL: https://doi.org/10.1016/j.geoderma.2011.04.002

Lyman, W. J., Reehl, W. F., & Rosenblatt, D. H. (1990). *Handbook of chemical property estimation methods: environmental behavior of organic compounds*. American chemical society.

Ma, H., Dai, S., & Huang, G. 2000. *Distribution of tributyltin chloride in laboratory simulated estuarine microcosms. Water Research*, 34(10), 2829–2841, at URL: https://doi.org/10.1016/S0043-1354(00)00032-4

Maul Foster & Alongi, Inc. [MFA]. 2009. *Sediment Cap Chemical Isolation Layer Model Report, Zidell Waterfront Property.*

McKay, G., Bino, M. J., & Altamemi, A. R. 1985. *The adsorption of various pollutants from aqueous solutions on to activated carbon*. Water Research, 19(4), 491–495, at URL: https://doi.org/10.1016/0043-1354(85)90041-7

Meador, J. P., Krone, C. A., Dyer, D. W., & Varanasi, U. 1997. *Toxicity of sediment-associated tributyltin to infaunal invertebrates: Species comparison and the role of organic carbon.* Marine Environmental Research, 43(3), 219–241, at URL: https://doi.org/10.1016/0141-1136(96)00090-6

Müller, K., Ciminelli, V. S. T., Dantas, M. S. S., & Willscher, S. 2010. *A comparative study of As(III) and As(V) in aqueous solutions and adsorbed on iron oxy-hydroxides by Raman spectroscopy.* Water Research, 44(19), 5660–5672, at URL: https://doi.org/10.1016/j.watres.2010.05.053

New Jersey Department of Environmental Protection [NJDEP]. 2014. *Using The Combined SESOIL/AT123D Models to Develop Project Area-Specific Impact to Ground Water Soil Remediation Standards for Mobile Contaminants (Guidance Document No. Version 2.1; P. Table 1).* New Jersey Department of Environmental Protection, at URL: https://www.nj.gov/dep/srp/guidance/rs/at123d_guidance.pdf

New Mexico Environment Department. 2021. *Risk Assessment Guidance for Site Investigations and Remediation Volume 1: Soil Screening Guidance for Human Health Risk Assessments*, at URL: https://www.env.nm.gov/hazardous-waste/wp-content/uploads/sites/10/2021/12/NMED_SSG-VOL_I_Dec_2_2021.pdf

Nieto-Delgado, C., Gutiérrez-Martínez, J., & Rangel-Méndez, J. R. 2019. *Modified activated carbon with interconnected fibrils of iron-oxyhydroxides using Mn2+ as morphology regulator, for a superior arsenic removal from water.* Journal of Environmental Sciences, 76, 403–414, at URL: https://doi.org/10.1016/j.jes.2018.06.002

Patnukao, P., Kongsuwan, A., & Pavasant, P. 2008. *Batch studies of adsorption of copper and lead on activated carbon from Eucalyptus camaldulensis Dehn. bark*. Journal of Environmental Sciences, 20(9), 1028–1034, at URL: https://doi.org/10.1016/S1001-0742(08)62145-2

PubChem. (n.d.). *2,3,4,7,8-Pentachlorodibenzofuran*. Retrieved October 11, 2023, from https://pubchem.ncbi.nlm.nih.gov/compound/42128

Roy F. Weston, Inc. 1996. *Recommendations for Screening Values for Tributyltin in Sediments at Superfund Sites in Puget Sound, Washington (DCN 4000-09-01-AADS, 13-01-AADK. 33-01-AAAV),* at URL: https://semspub.epa.gov/work/10/500011149.pdfv

Sarkar, B., Naidu, R., Rahman, M. M., Megharaj, M., & Xi, Y. 2012. *Organoclays reduce arsenic bioavailability and bioaccessibility in contaminated soils.* Journal of Soils and Sediments, 12(5), 704–712, at URL: https://doi.org/10.1007/s11368-012-0487-z

Schwarzenbach, R. P., Gschwend, P. M., & Imboden, D. M. 2017. Environmental organic chemistry (Third edition). Wiley.

Sijm, D. T. H. M., Wever, H., de Vries, P. J., & Opperhuizen, A. 1989. Octan-1-ol / water partition coefficients of polychlorinated dibenzo-p-dioxins and dibenzofurans : Experimental values determined with a stirring method. *Chemosphere*, *19*(1), 263–266. https://doi.org/10.1016/0045-6535(89)90321-4

Snoeyink, V. L. 1990. Adsorption of organic compounds. In: AWWA, Water Quality and Treatment. New York: McGraw-Hill. Reprinted with permission of the McGraw-Hill Co.

Speth, T.F., Miltner, R., Crittenden, J.C., and Hand, D.W., "An Evaluation of GAC Adsorption Capacities for SOCs," submitted to Journal AWWA, 1988.

Speth, T. F., & Miltner, R. J. (1990). Technical Note: Adsorption Capacity of GAC for Synthetic Organics. *Journal AWWA*, *82*(2), 72–75, at URL: https://doi.org/10.1002/j.1551-8833.1990.tb06922.x

Texas Commission on Environmental Quality [TCEQ]. 2019. *Toxicity Values and Chemical - Physical Properties*, at URL: https://www.tceq.texas.gov/downloads/remediation/pst/responsible-party/pchemproperties.pdf

TCEQ. 2023. *Tables Accompanying the Texas Risk Reduction Program (TRRP) Rule,* at URL: https://www.tceq.texas.gov/downloads/remediation/trrp/march-2023-pcl-tables.pdf

The Louis Berger Group, Battelle, & HDR|HydroQual. 2014. *Lower Passaic River: Contaminant Fate and Transport Model. U.S. Environmental Protection Agency*, at URL: https://sharepoint.ourpassaic.org/Public%20Documents/2014_02_10_App_BIII-Carbon_Contaminants_HDR.pdf

Tran, T. N., Kim, D.-G., & Ko, S.-O. 2018. *Adsorption Mechanisms of Manganese (II) Ions onto Acid-treated Activated Carbon.* KSCE Journal of Civil Engineering, 22(10), 3772–3782, at URL: https://doi.org/10.1007/s12205-018-1334-6

Tuchowska, M., Wołowiec, M., Solińska, A., Kościelniak, A., & Bajda, T. 2019. *Organo-Modified Vermiculite: Preparation, Characterization, and Sorption of Arsenic Compounds. Minerals,* 9(8), 483, at URL: https://doi.org/10.3390/min9080483

Unger, M. A., MacIntyre, W. G., & Huggett, R. J. 1988. *Sorption behavior of tributyltin on estuarine and freshwater sediments.* Environmental Toxicology and Chemistry, 7(11), 907–915, at URL: https://doi.org/10.1002/etc.5620071107

Velazquez-Jimenez, L. H., Arcibar-Orozco, J. A., & Rangel-Mendez, J. R. 2018. *Overview of As(V) adsorption on Zr-functionalized activated carbon for aqueous streams remediation.*

Journal of Environmental Management, 212, 121–130, at URL: https://doi.org/10.1016/j.jenvman.2018.01.072

Vitela-Rodriguez, A. V., & Rangel-Mendez, J. R. 2013. *Arsenic removal by modified activated carbons with iron hydro(oxide) nanoparticles.* Journal of Environmental Management, 114, 225–231, at URL: https://doi.org/10.1016/j.jenvman.2012.10.004

Walters, R. W., & Luthy, R. G. 1984. *Equilibrium adsorption of polycyclic aromatic hydrocarbons from water onto activated carbon.* Environmental Science & Technology, 18(6), 395–403, at URL: https://doi.org/10.1021/es00124a002

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ATTACHMENT D

CAPSIM TIME SERIES CONCENTRATION PROFILES

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Porewater Concentration - Depth 458
Total Solids Concentration – Depth 491
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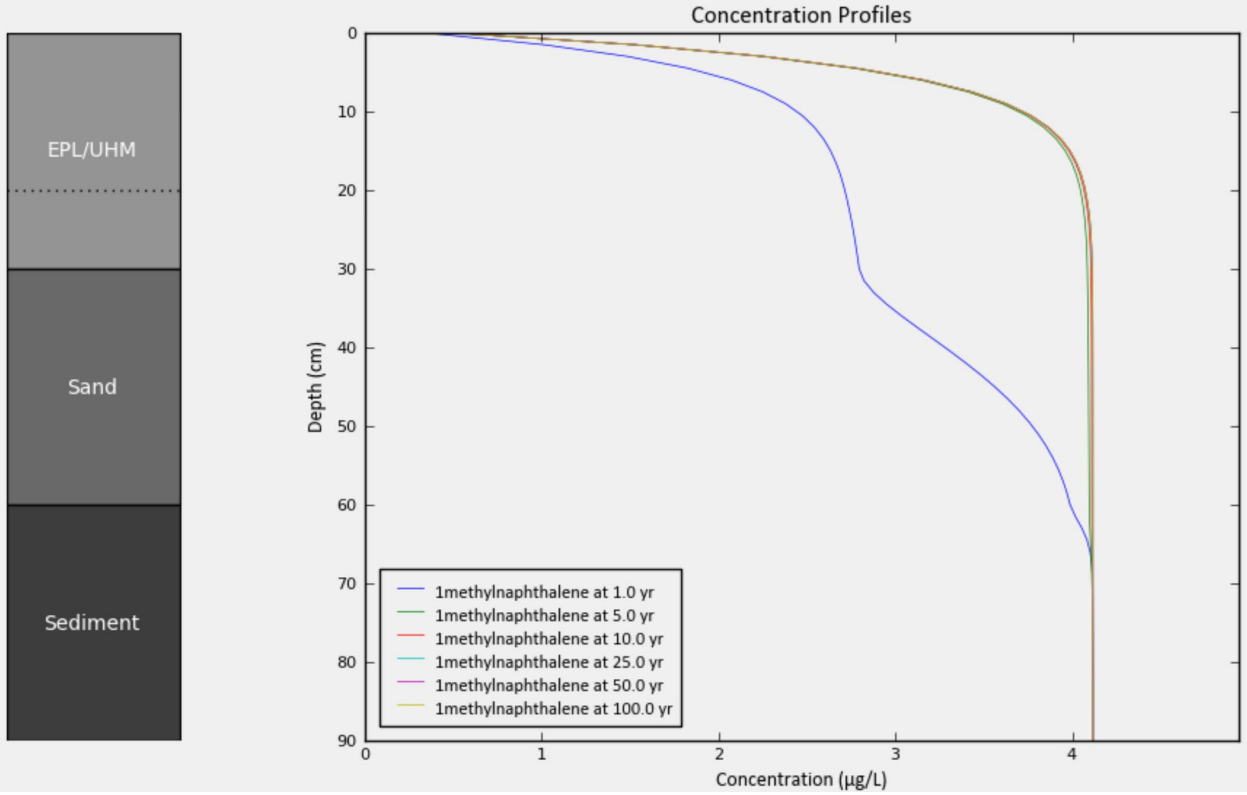
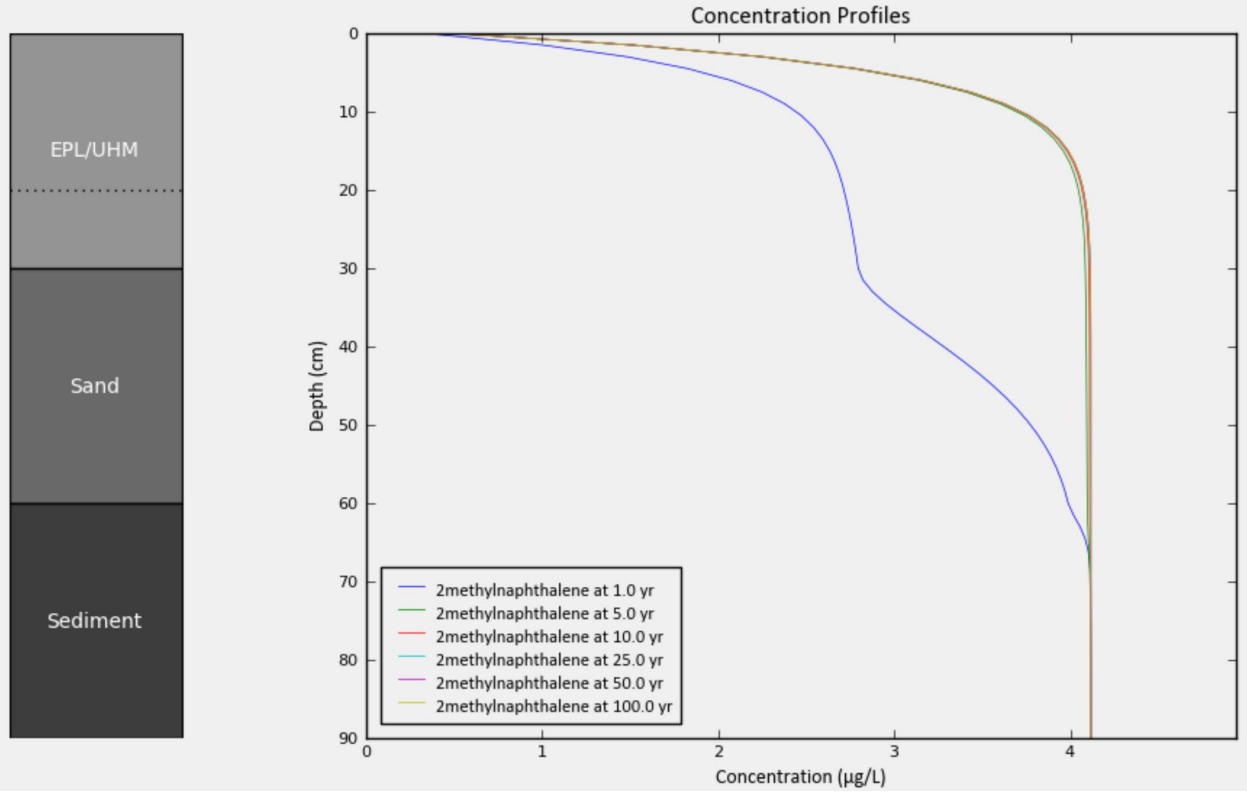
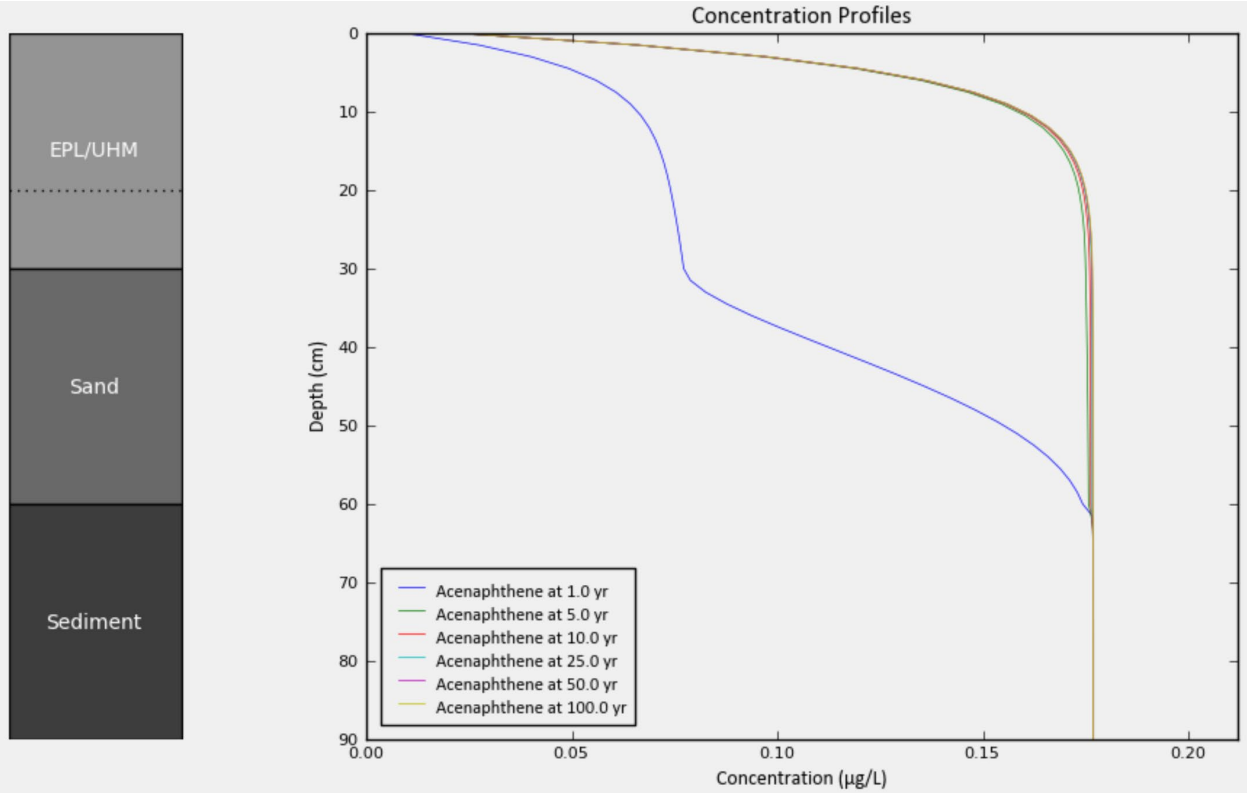
The Cap Performance Point (CPP) is at the top surface of the chemical isolation layer and under Erosion Protection Layer (EPL)/Unamended Habitat Mix (UHM).

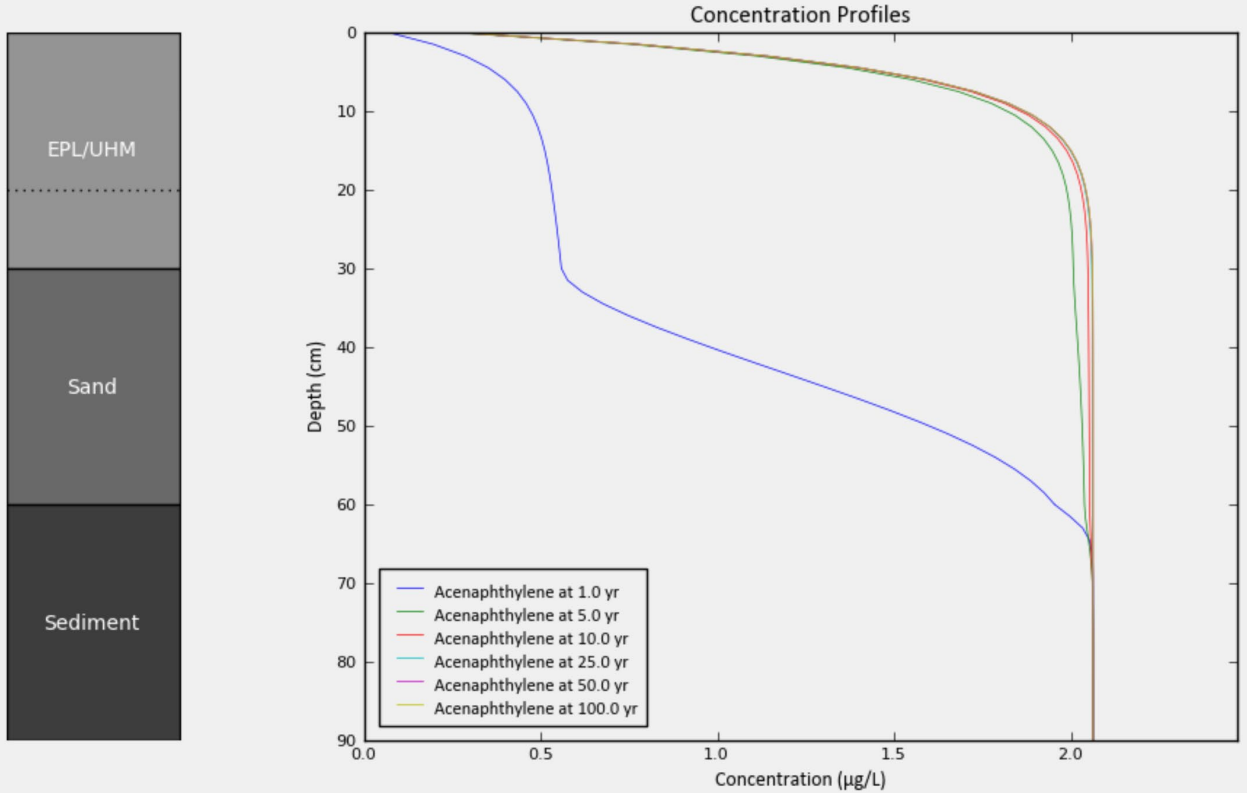
Cap Alternative 1: 30 centimeters [cm] of unamended sand with 30 cm erosion protection layer/unamended habitat mix (EPL/UHM)

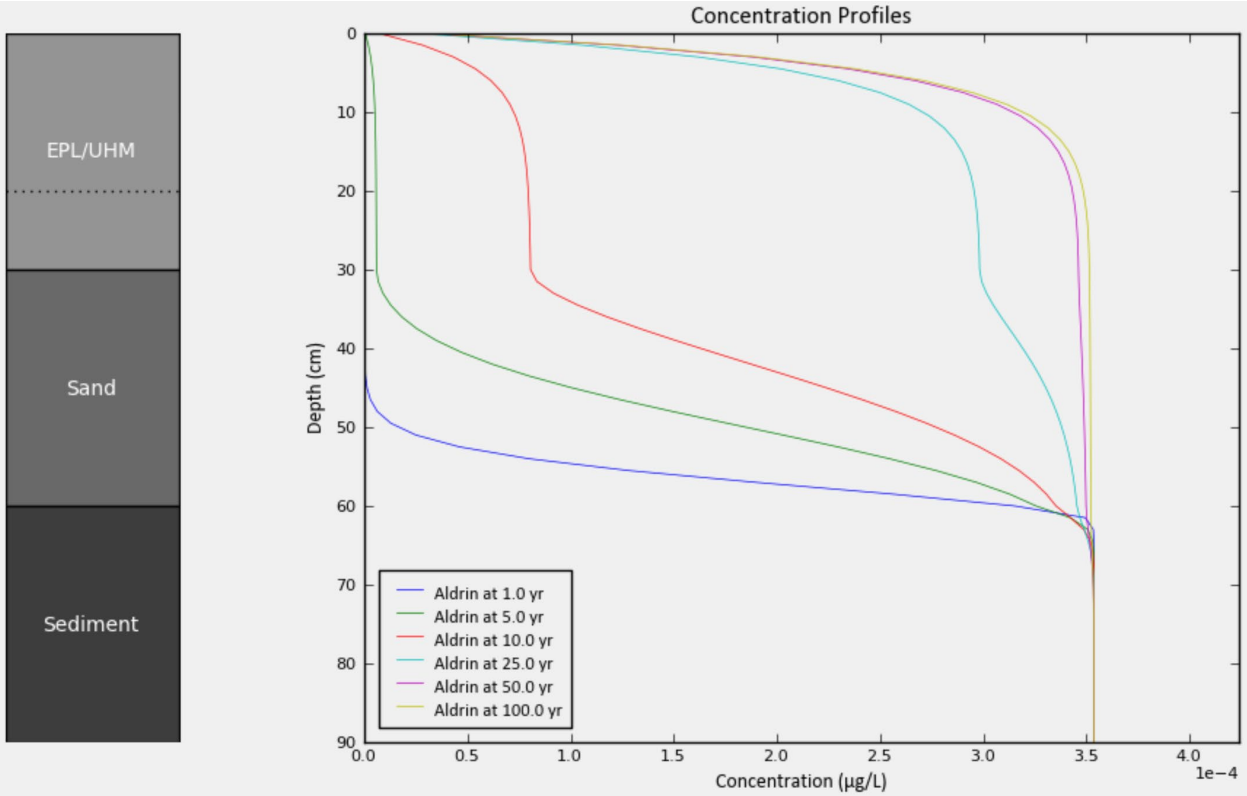
Porewater Concentration – Depth

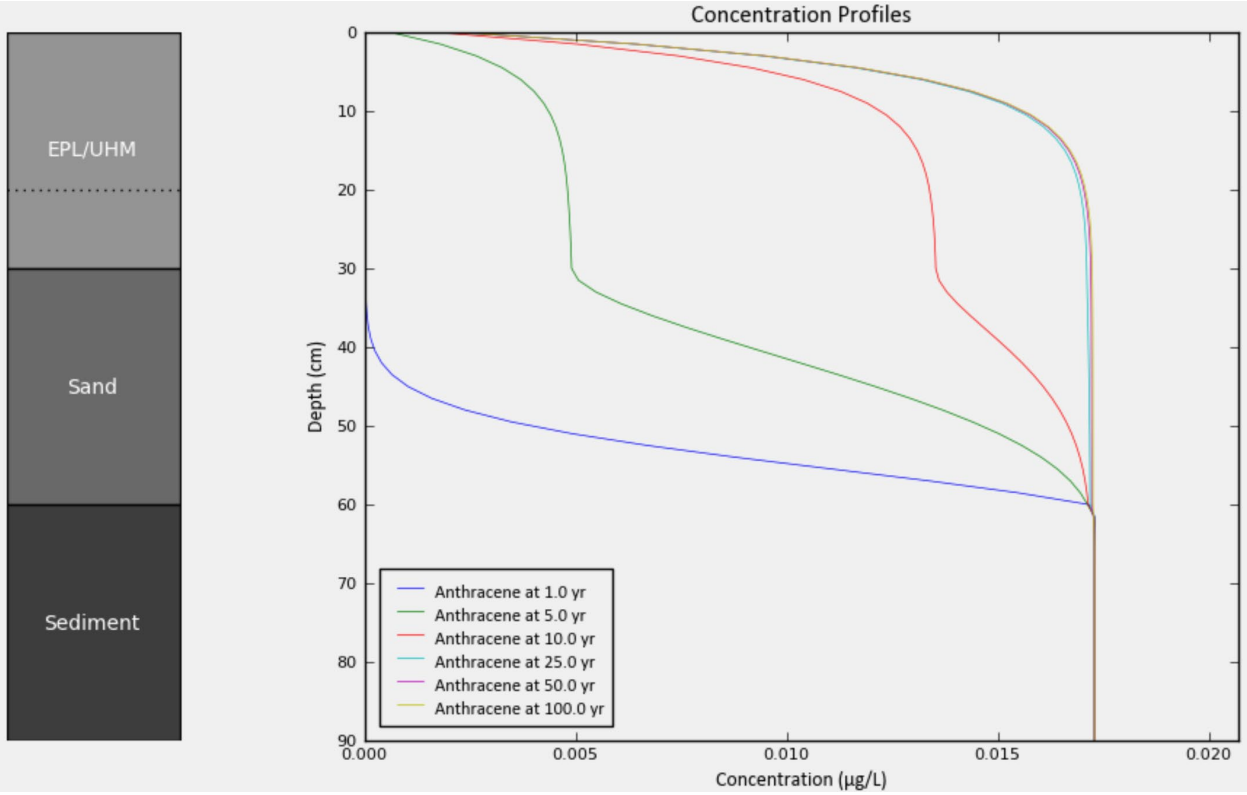


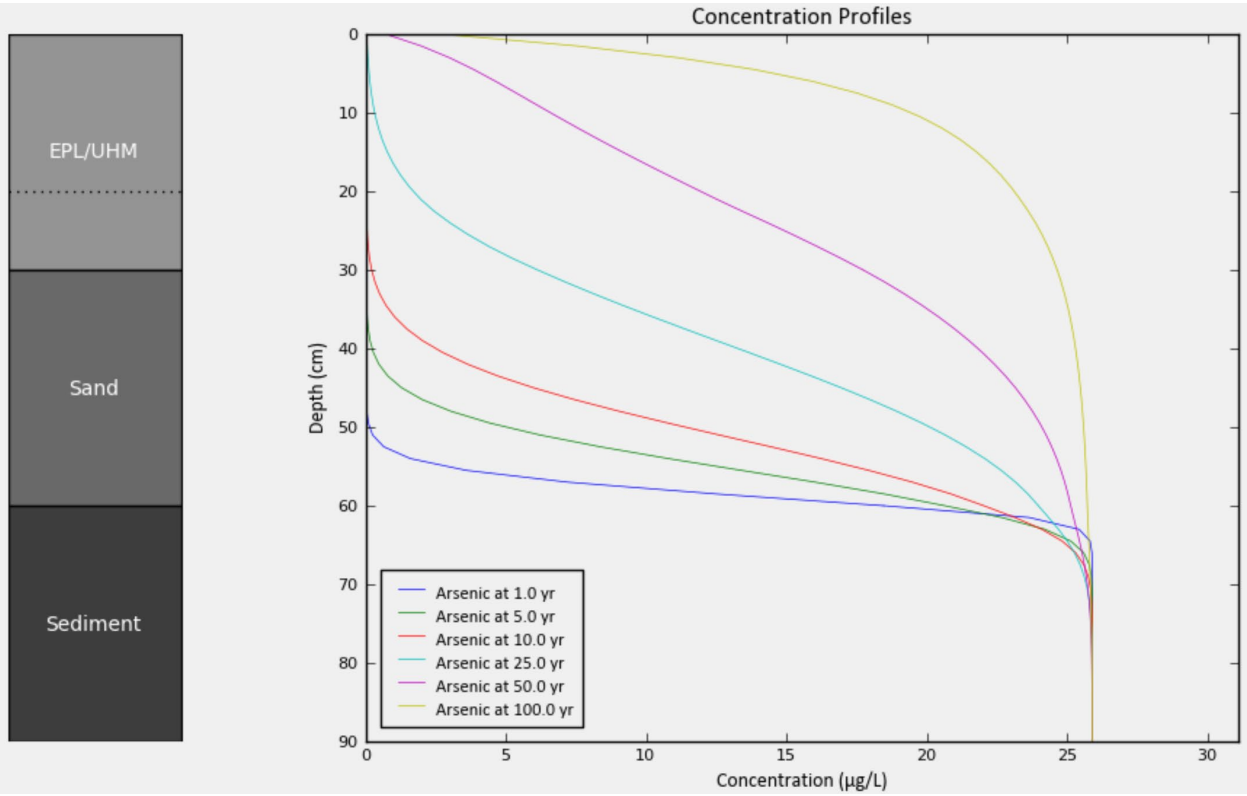

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
2methylnaphthalene at 1.0 yr
2methylnaphthalene at 5.0 yr
2methylnaphthalene at 10.0 yr
2methylnaphthalene at 25.0 yr
2methylnaphthalene at 50.0 yr
2methylnaphthalene at 100.0 yr

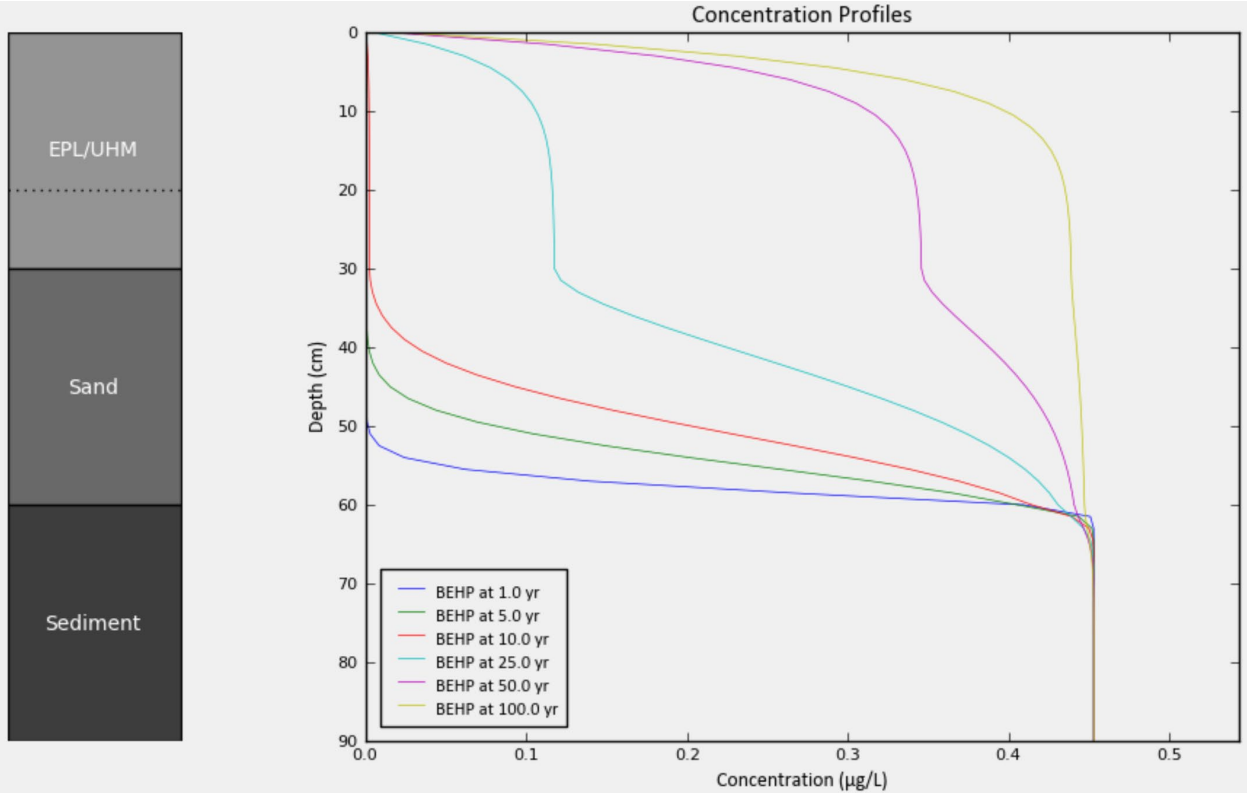

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Acenaphthene at 1.0 yr
Acenaphthene at 5.0 yr
Acenaphthene at 10.0 yr
Acenaphthene at 25.0 yr
Acenaphthene at 50.0 yr
Acenaphthene at 100.0 yr

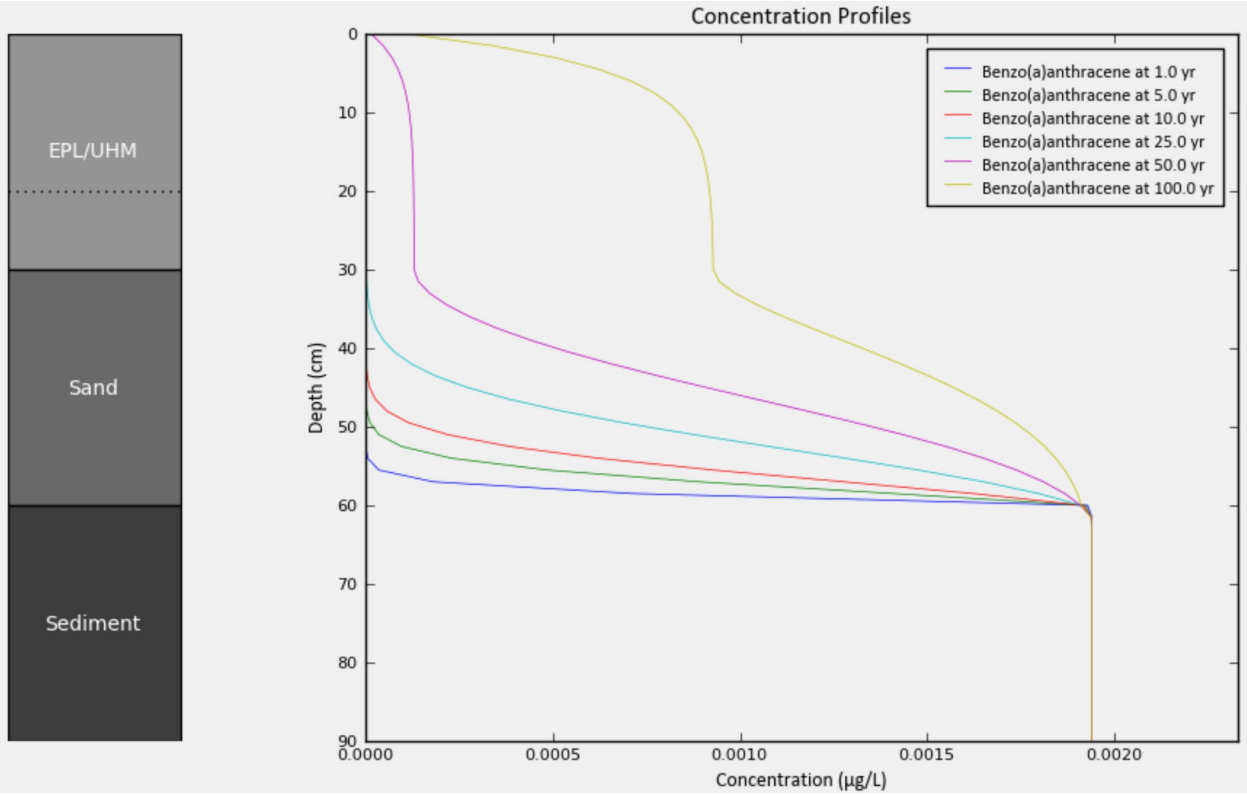

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Acenaphthylene at 1.0 yr
Acenaphthylene at 5.0 yr
Acenaphthylene at 10.0 yr
Acenaphthylene at 25.0 yr
Acenaphthylene at 50.0 yr
Acenaphthylene at 100.0 yr

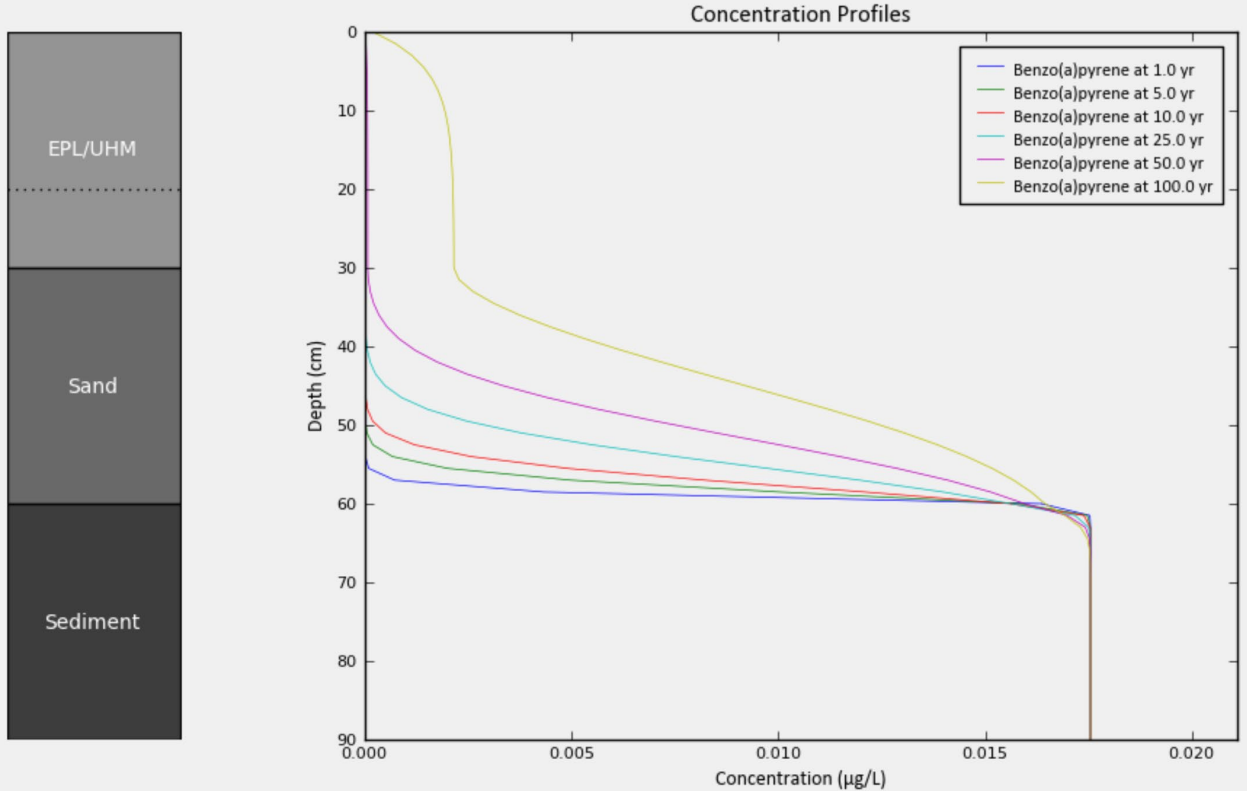

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
1e−4
Aldrin at 1.0 yr
Aldrin at 5.0 yr
Aldrin at 10.0 yr
Aldrin at 25.0 yr
Aldrin at 50.0 yr
Aldrin at 100.0 yr

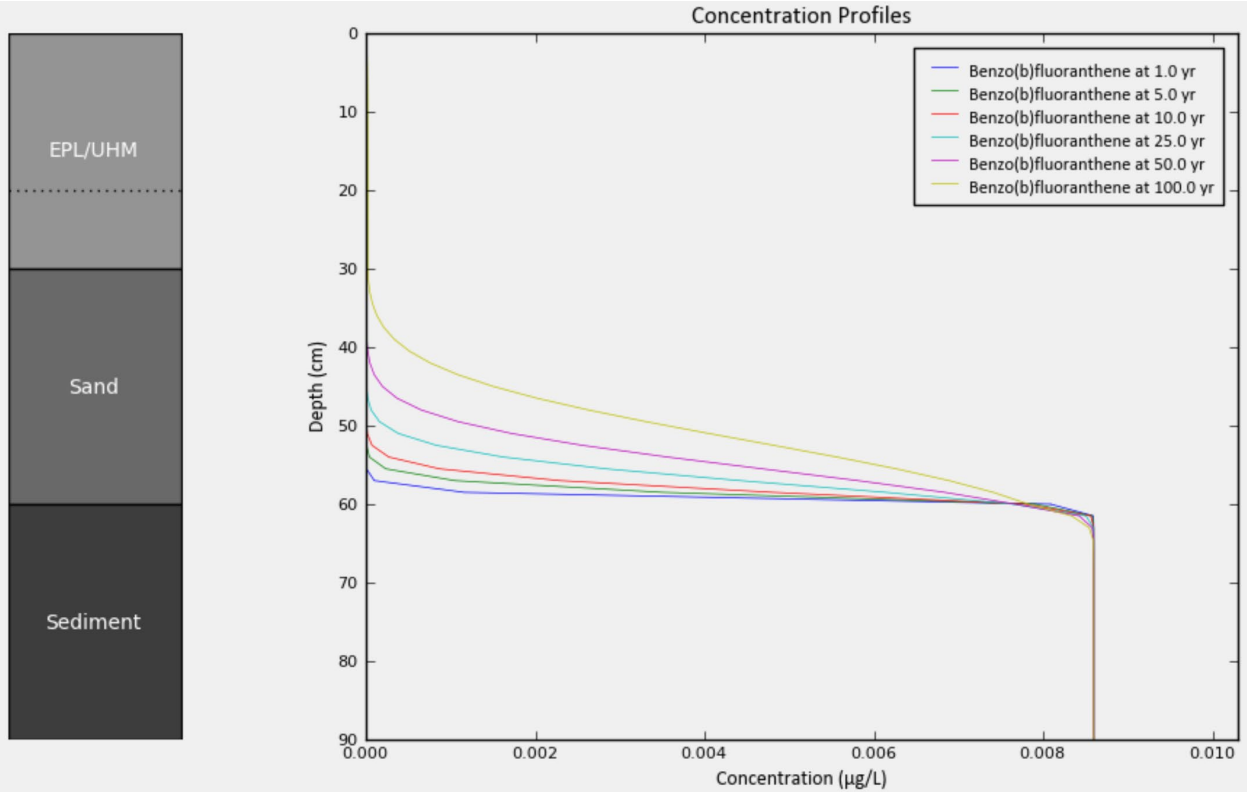

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
Anthracene at 1.0 yr
Anthracene at 5.0 yr
Anthracene at 10.0 yr
Anthracene at 25.0 yr
Anthracene at 50.0 yr
Anthracene at 100.0 yr

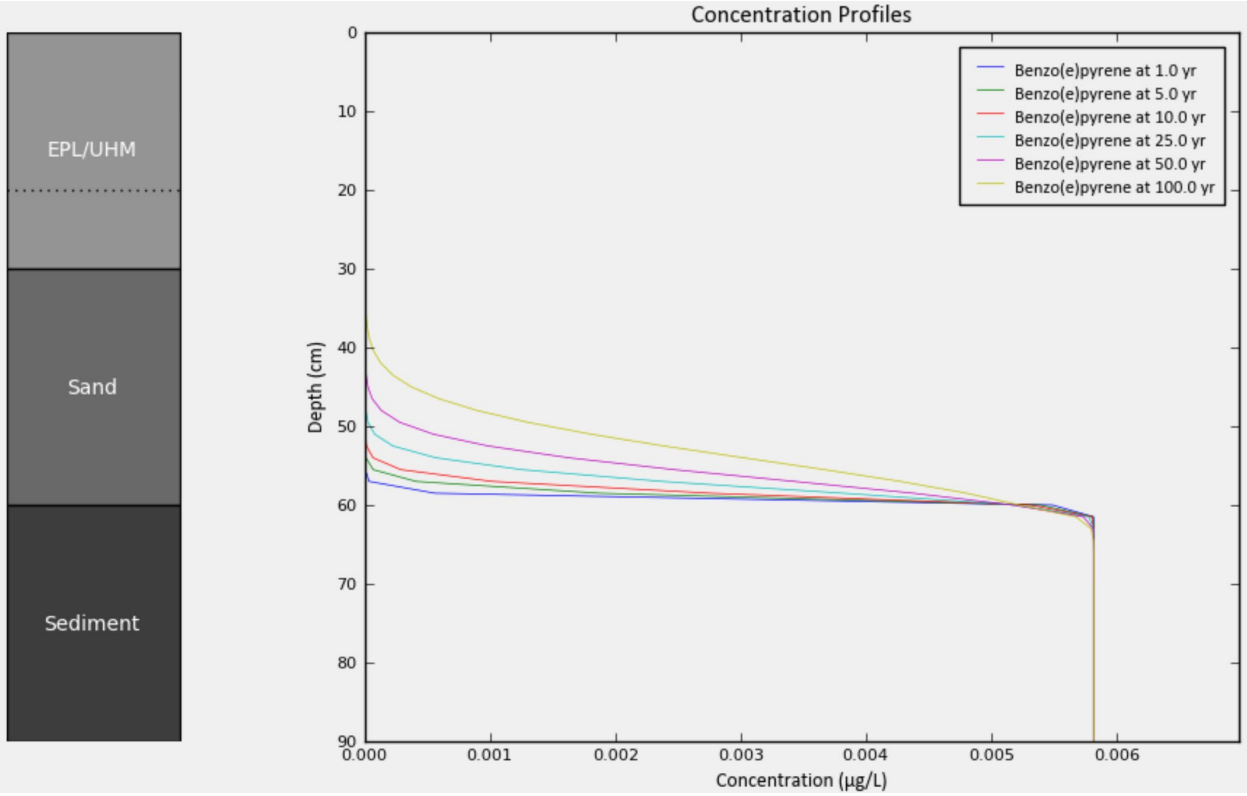

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
5
10
15
20
25
30
Arsenic at 1.0 yr
Arsenic at 5.0 yr
Arsenic at 10.0 yr
Arsenic at 25.0 yr
Arsenic at 50.0 yr
Arsenic at 100.0 yr

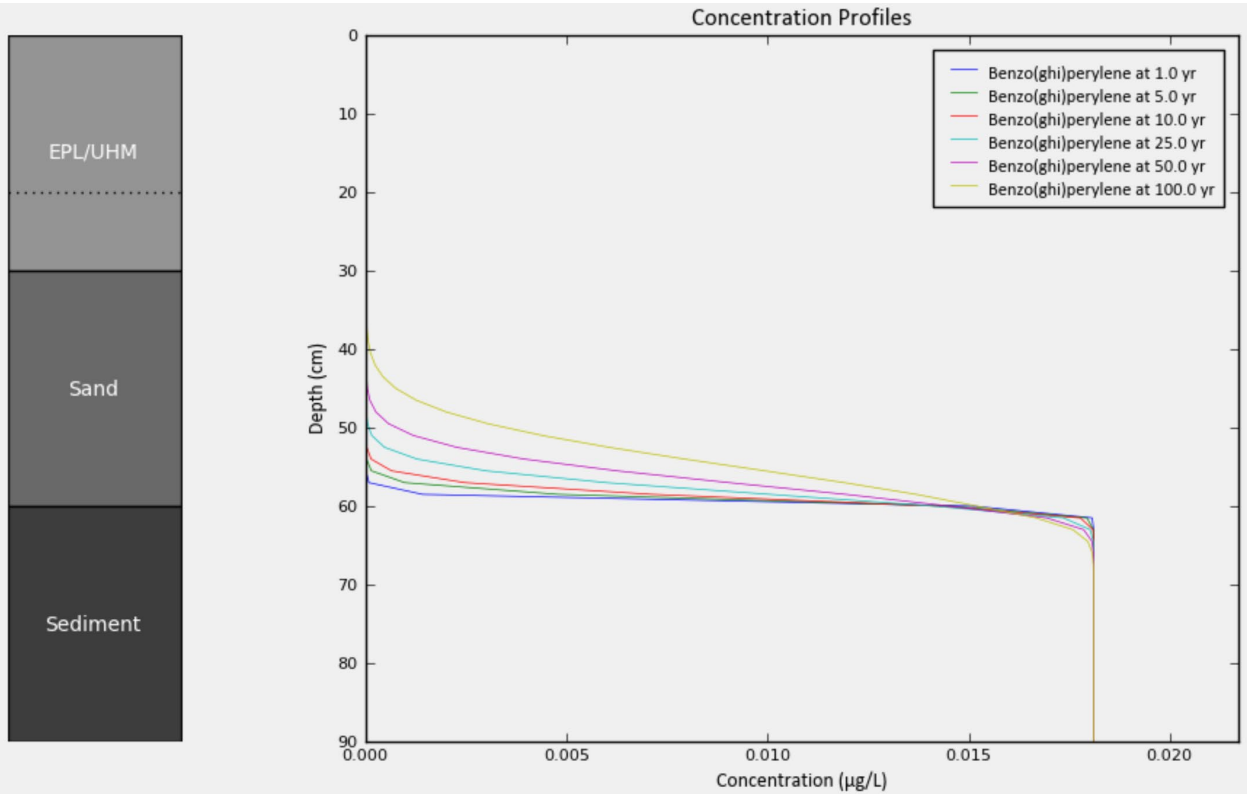

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
BEHP at 1.0 yr
BEHP at 5.0 yr
BEHP at 10.0 yr
BEHP at 25.0 yr
BEHP at 50.0 yr
BEHP at 100.0 yr

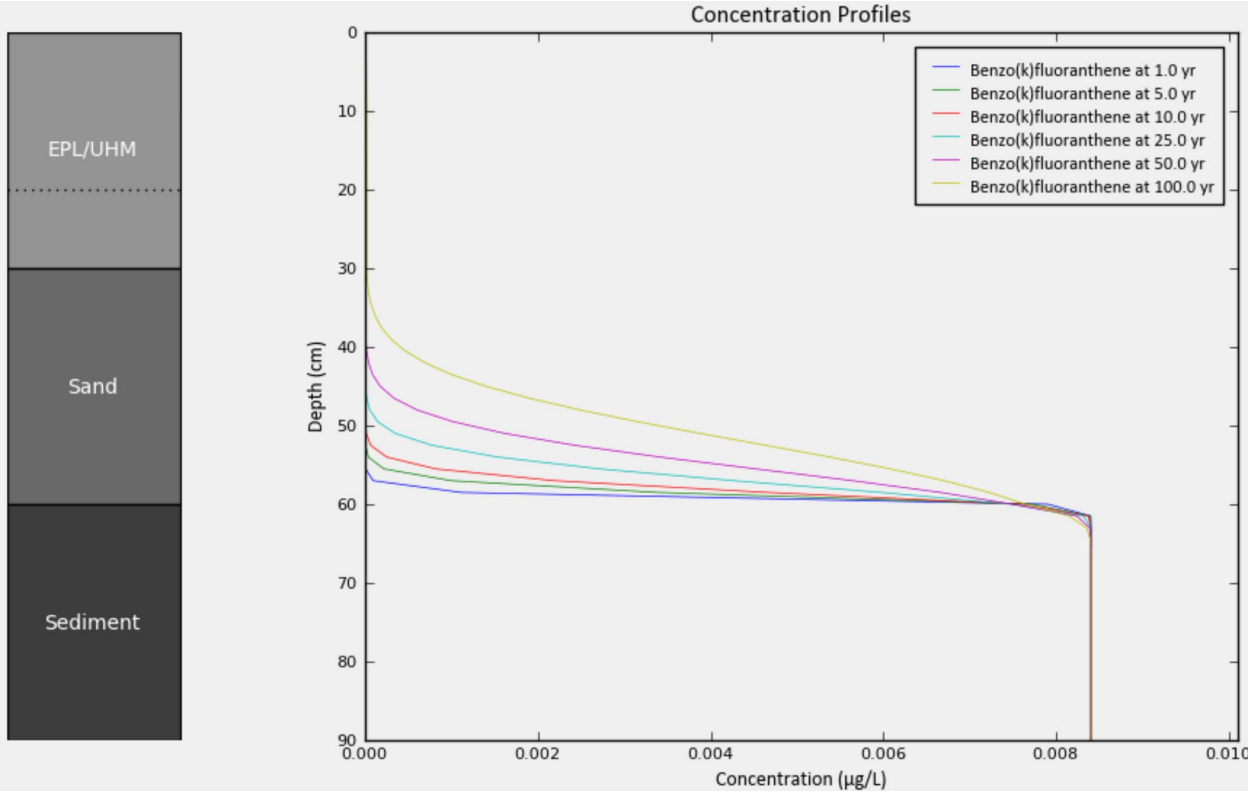

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Benzo(a)anthracene at 1.0 yr
Benzo(a)anthracene at 5.0 yr
Benzo(a)anthracene at 10.0 yr
Benzo(a)anthracene at 25.0 yr
Benzo(a)anthracene at 50.0 yr
Benzo(a)anthracene at 100.0 yr

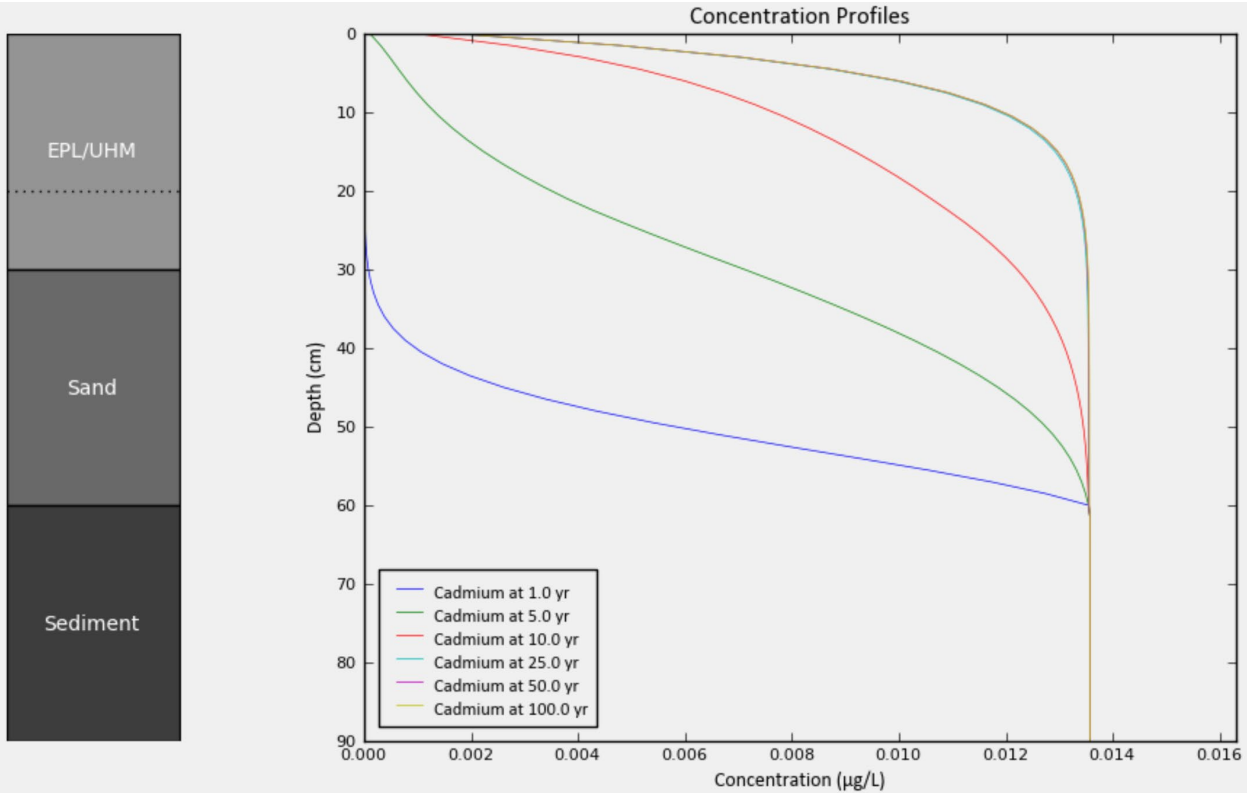

EPL/UHM
Sand
Sediment
Concentration Profiles
Benzo(a)pyrene at 1.0 yr
Benzo(a)pyrene at 5.0 yr
Benzo(a)pyrene at 10.0 yr
Benzo(a)pyrene at 25.0 yr
Benzo(a)pyrene at 50.0 yr
Benzo(a)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

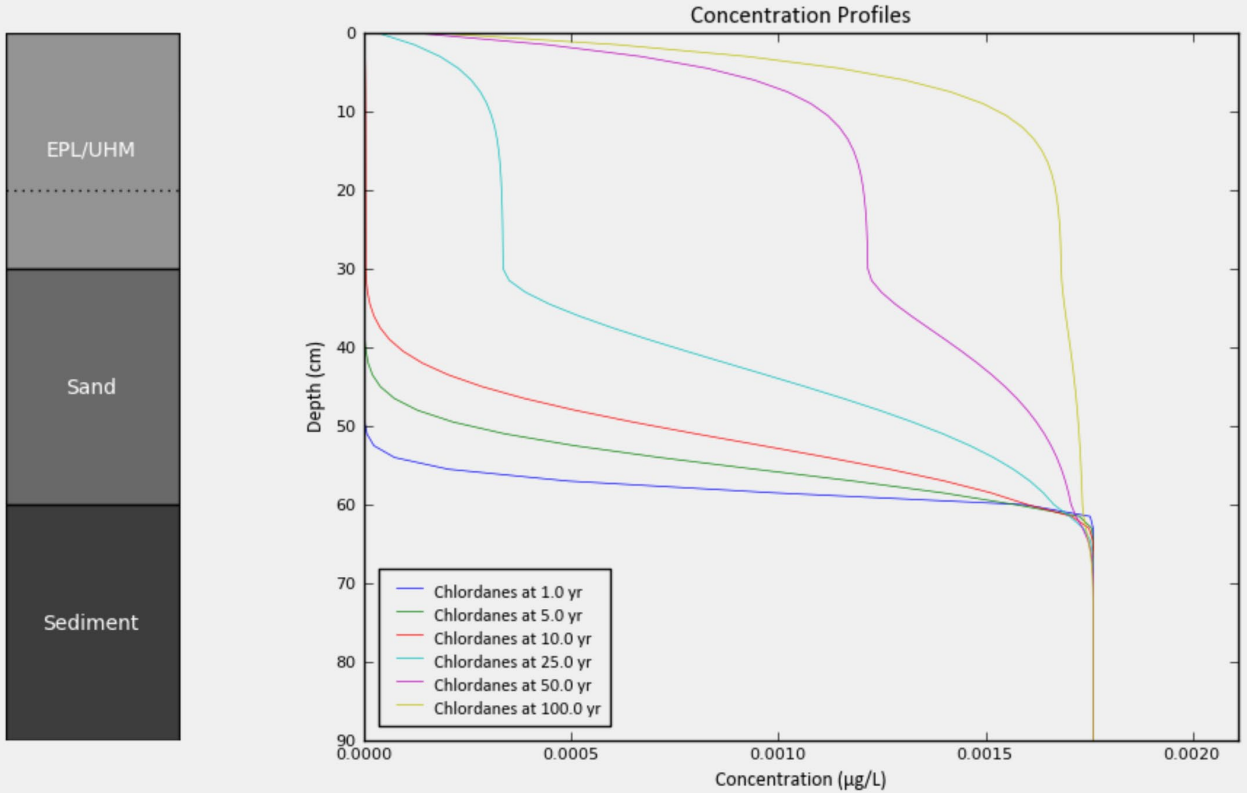

EPL/UHM
Sand
Sediment
Concentration Profiles
Benzo(b)fluoranthene at 1.0 yr
Benzo(b)fluoranthene at 5.0 yr
Benzo(b)fluoranthene at 10.0 yr
Benzo(b)fluoranthene at 25.0 yr
Benzo(b)fluoranthene at 50.0 yr
Benzo(b)fluoranthene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
Concentration (µg/L)

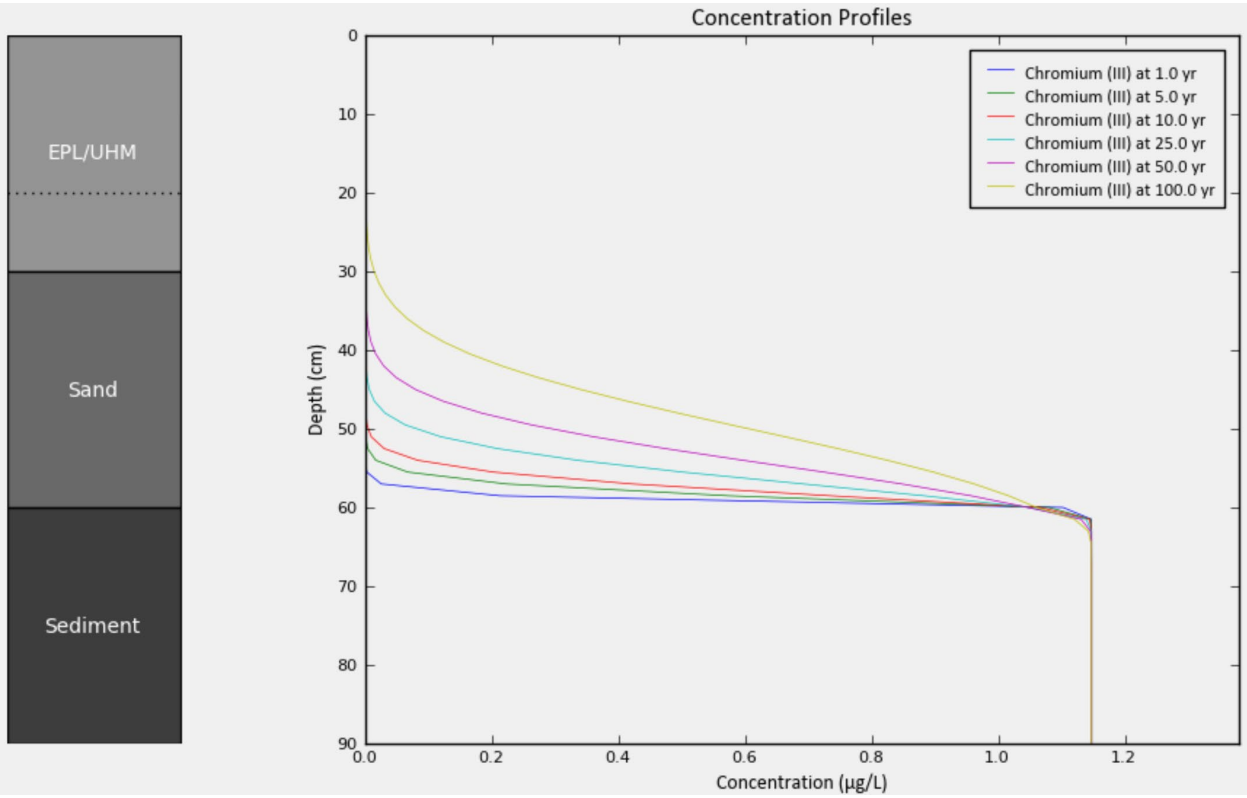

EPL/UHM
Sand
Sediment
Concentration Profiles
Benzo(e)pyrene at 1.0 yr
Benzo(e)pyrene at 5.0 yr
Benzo(e)pyrene at 10.0 yr
Benzo(e)pyrene at 25.0 yr
Benzo(e)pyrene at 50.0 yr
Benzo(e)pyrene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004
0.005
0.006

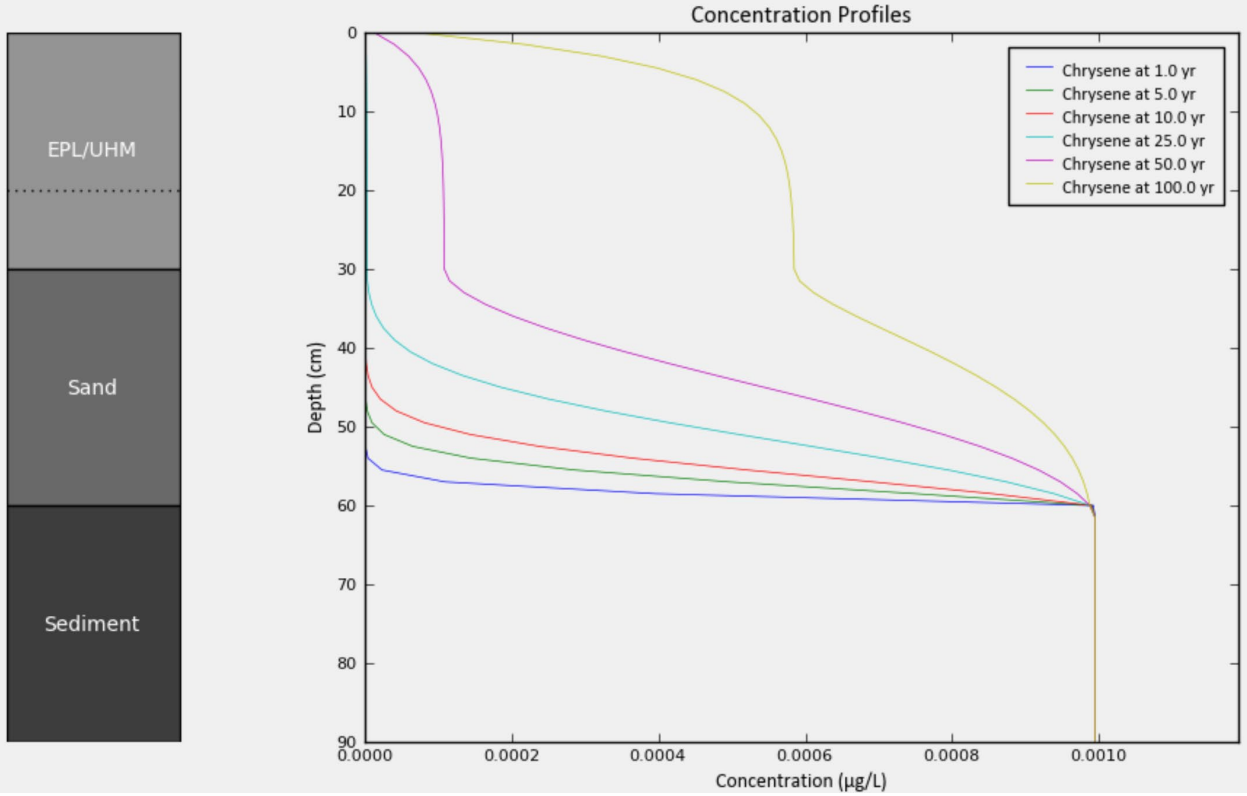

EPL/UHM
Sand
Sediment
Concentration Profiles
Benzo(ghi)perylene at 1.0 yr
Benzo(ghi)perylene at 5.0 yr
Benzo(ghi)perylene at 10.0 yr
Benzo(ghi)perylene at 25.0 yr
Benzo(ghi)perylene at 50.0 yr
Benzo(ghi)perylene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020

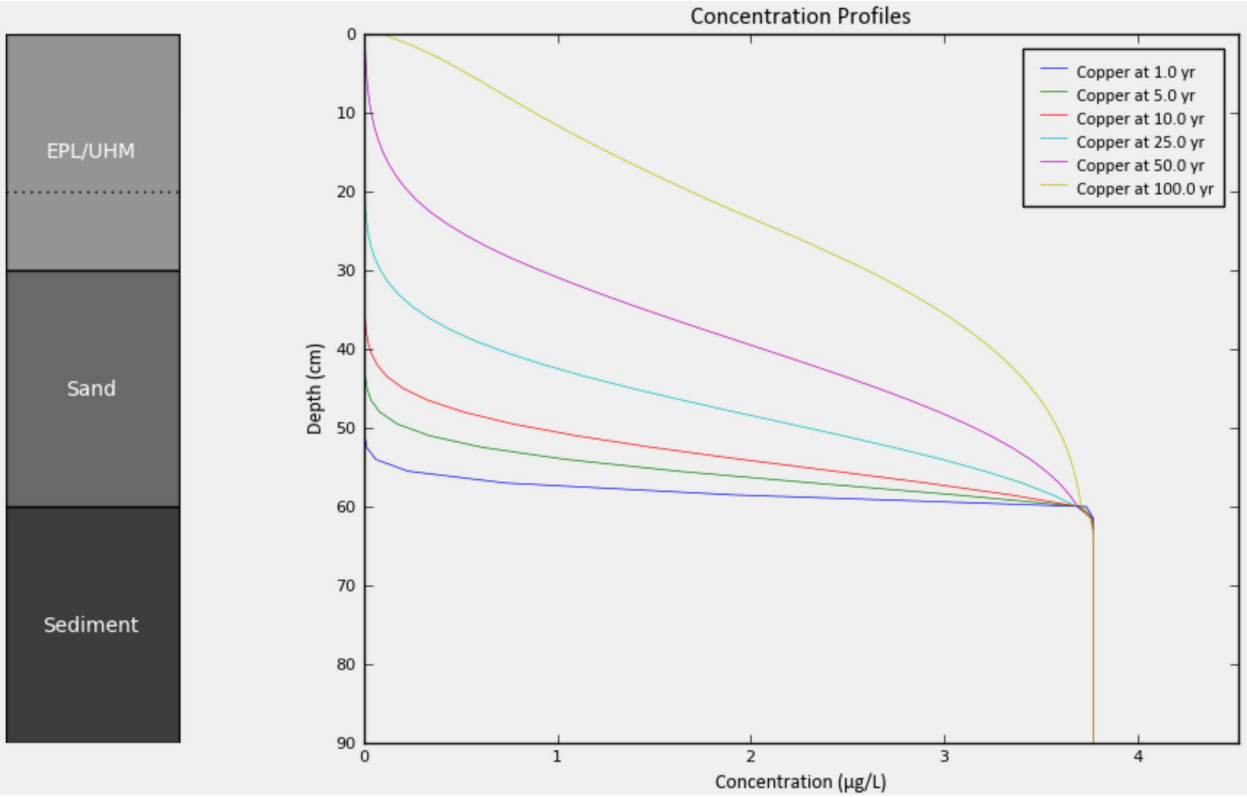

EPL/UHM
Sand
Sediment
Concentration Profiles
Benzo(k)fluoranthene at 1.0 yr
Benzo(k)fluoranthene at 5.0 yr
Benzo(k)fluoranthene at 10.0 yr
Benzo(k)fluoranthene at 25.0 yr
Benzo(k)fluoranthene at 50.0 yr
Benzo(k)fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)

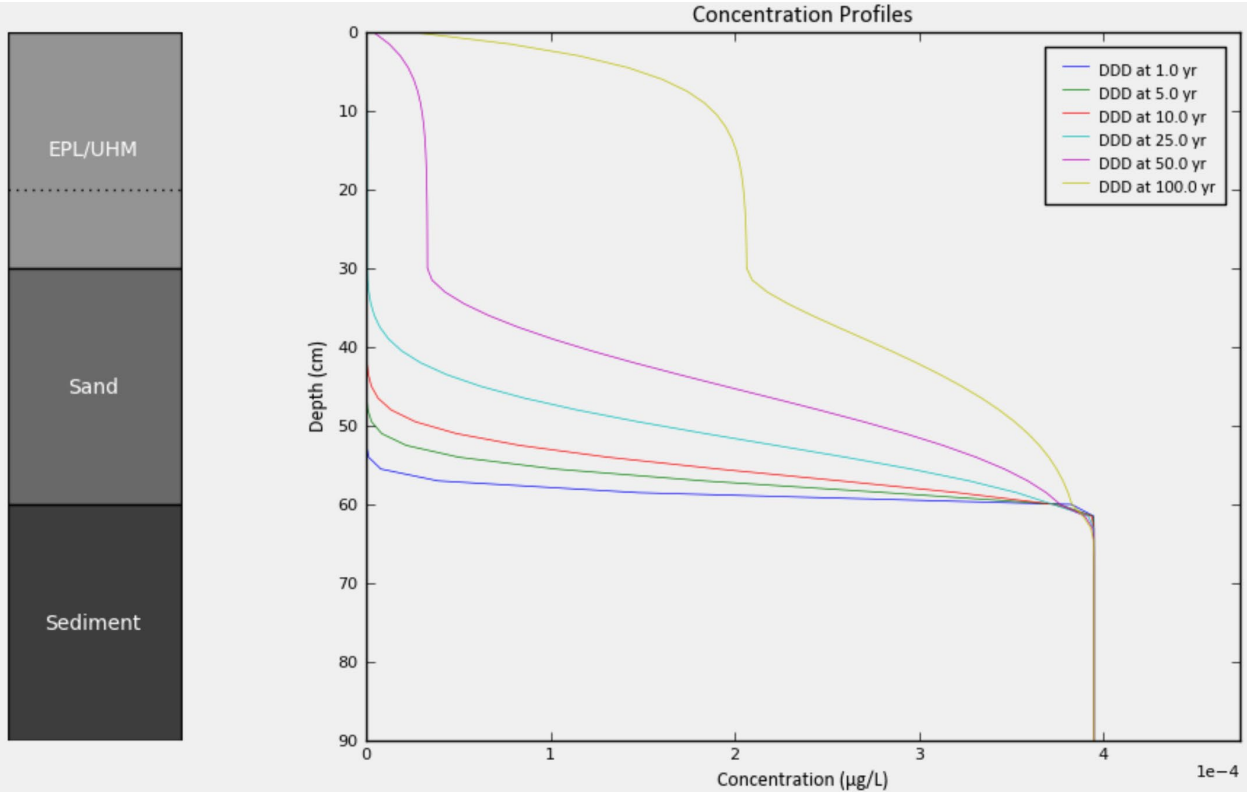

EPL/UHM
Sand
Sediment
Concentration Profiles
Cadmium at 1.0 yr
Cadmium at 5.0 yr
Cadmium at 10.0 yr
Cadmium at 25.0 yr
Cadmium at 50.0 yr
Cadmium at 100.0 yr
Depth (cm)
Concentration (µg/L)

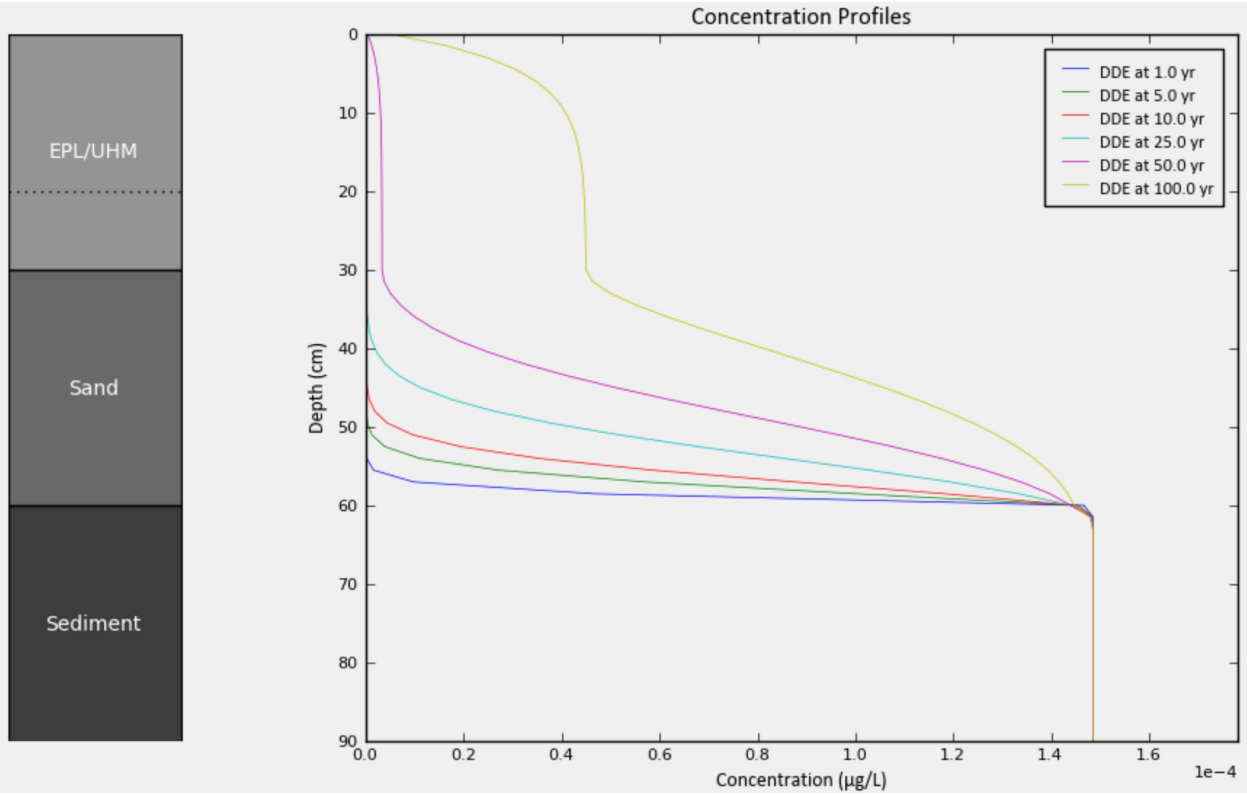

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
Chlordanes at 1.0 yr
Chlordanes at 5.0 yr
Chlordanes at 10.0 yr
Chlordanes at 25.0 yr
Chlordanes at 50.0 yr
Chlordanes at 100.0 yr

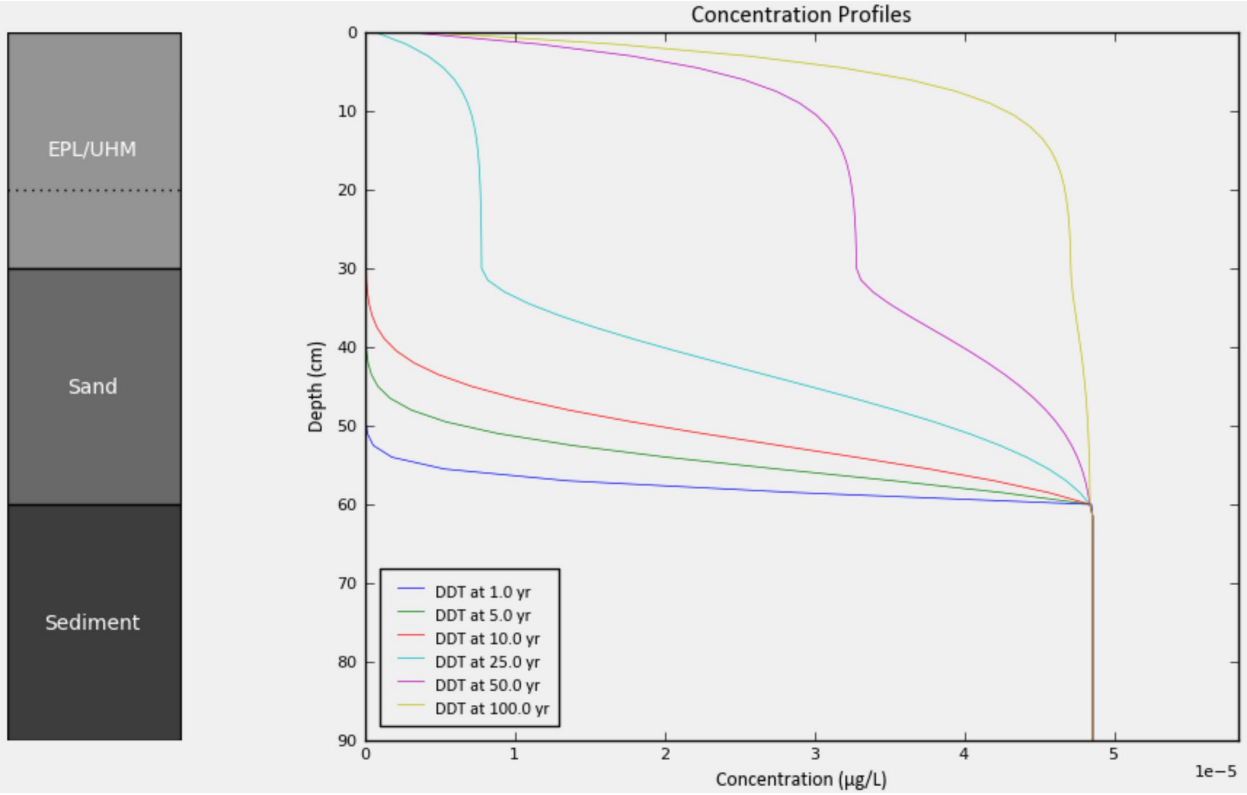

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Chromium (III) at 1.0 yr
Chromium (III) at 5.0 yr
Chromium (III) at 10.0 yr
Chromium (III) at 25.0 yr
Chromium (III) at 50.0 yr
Chromium (III) at 100.0 yr

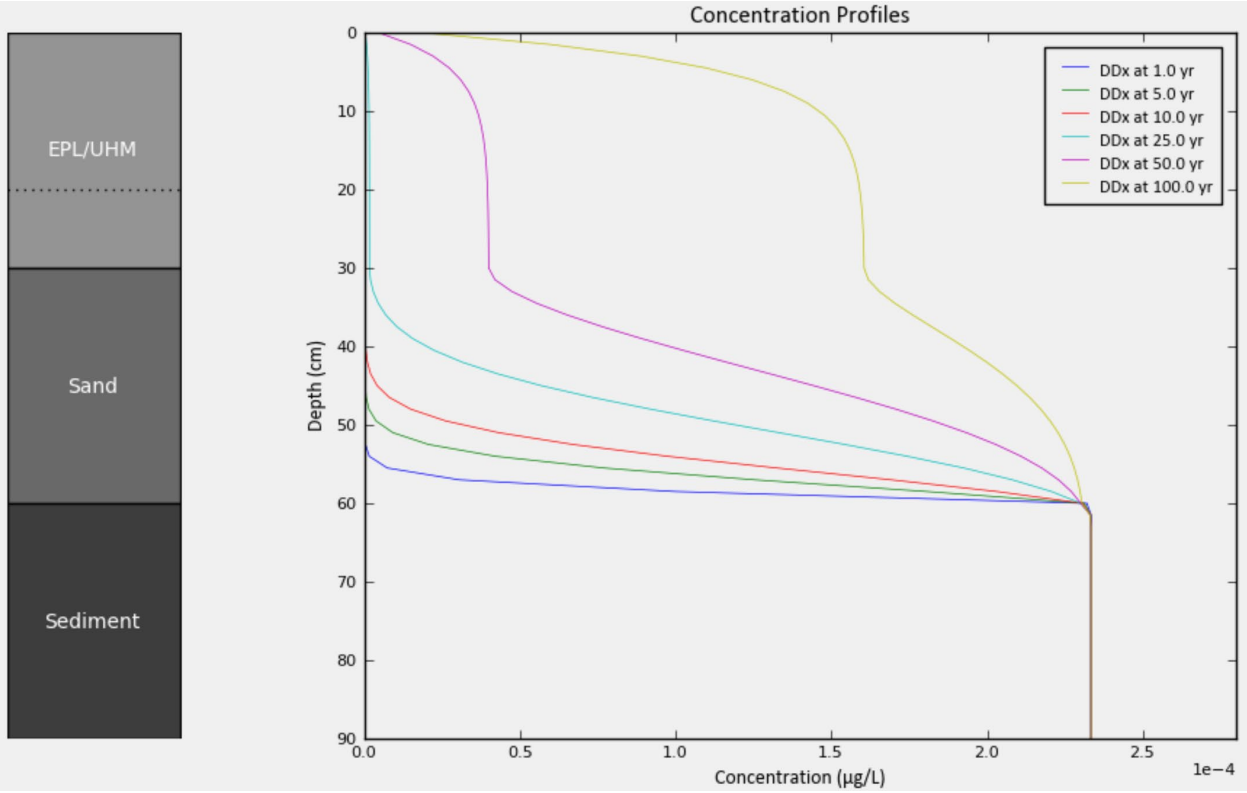

EPL/UHM
Sand
Sediment
Concentration Profiles
Chrysene at 1.0 yr
Chrysene at 5.0 yr
Chrysene at 10.0 yr
Chrysene at 25.0 yr
Chrysene at 50.0 yr
Chrysene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010

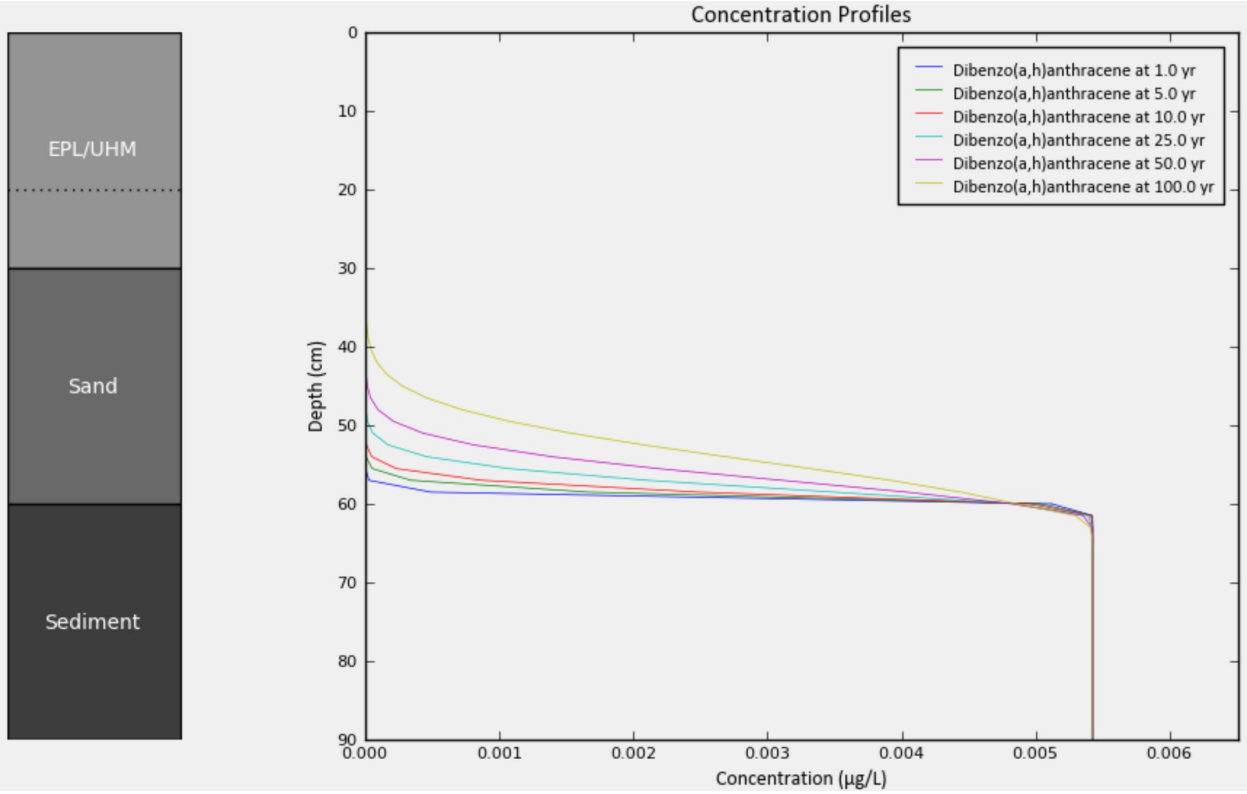

EPL/UHM
Sand
Sediment
Concentration Profiles
Copper at 1.0 yr
Copper at 5.0 yr
Copper at 10.0 yr
Copper at 25.0 yr
Copper at 50.0 yr
Copper at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4

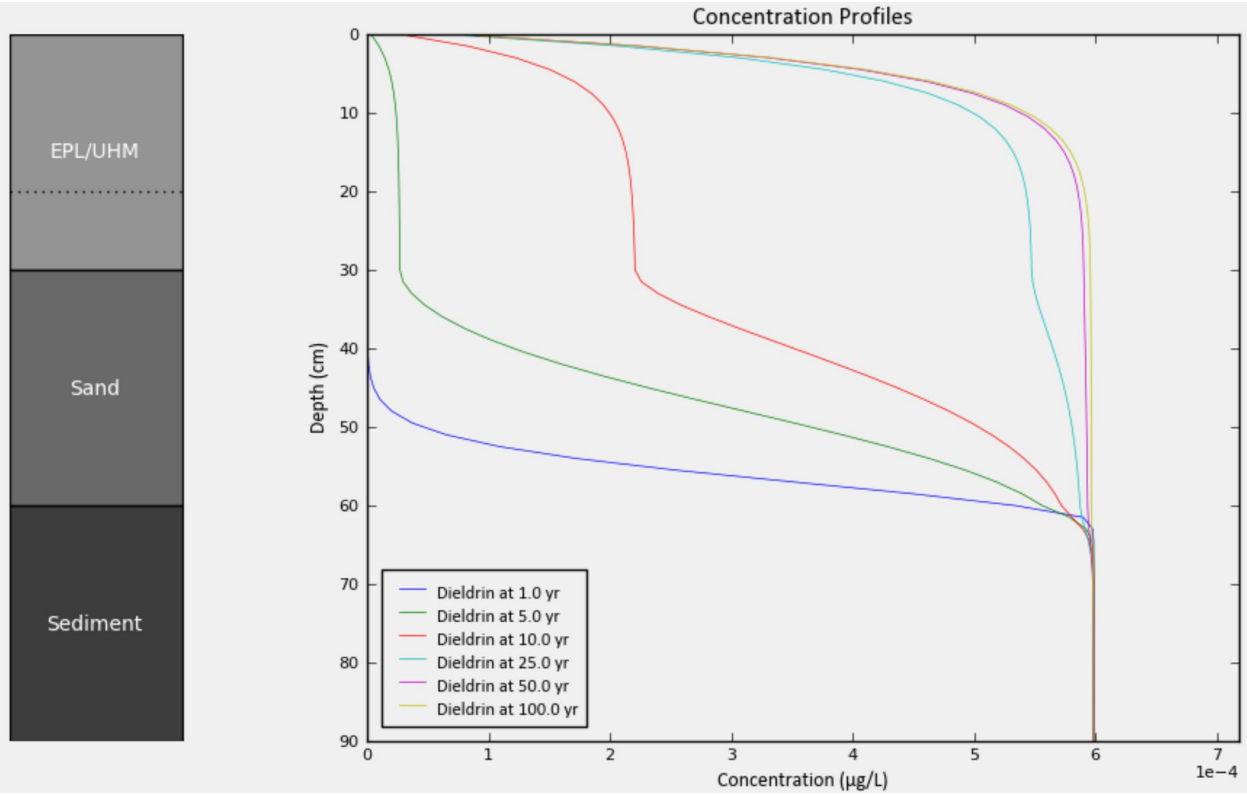

EPL/UHM
Sand
Sediment
Concentration Profiles
DDD at 1.0 yr
DDD at 5.0 yr
DDD at 10.0 yr
DDD at 25.0 yr
DDD at 50.0 yr
DDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

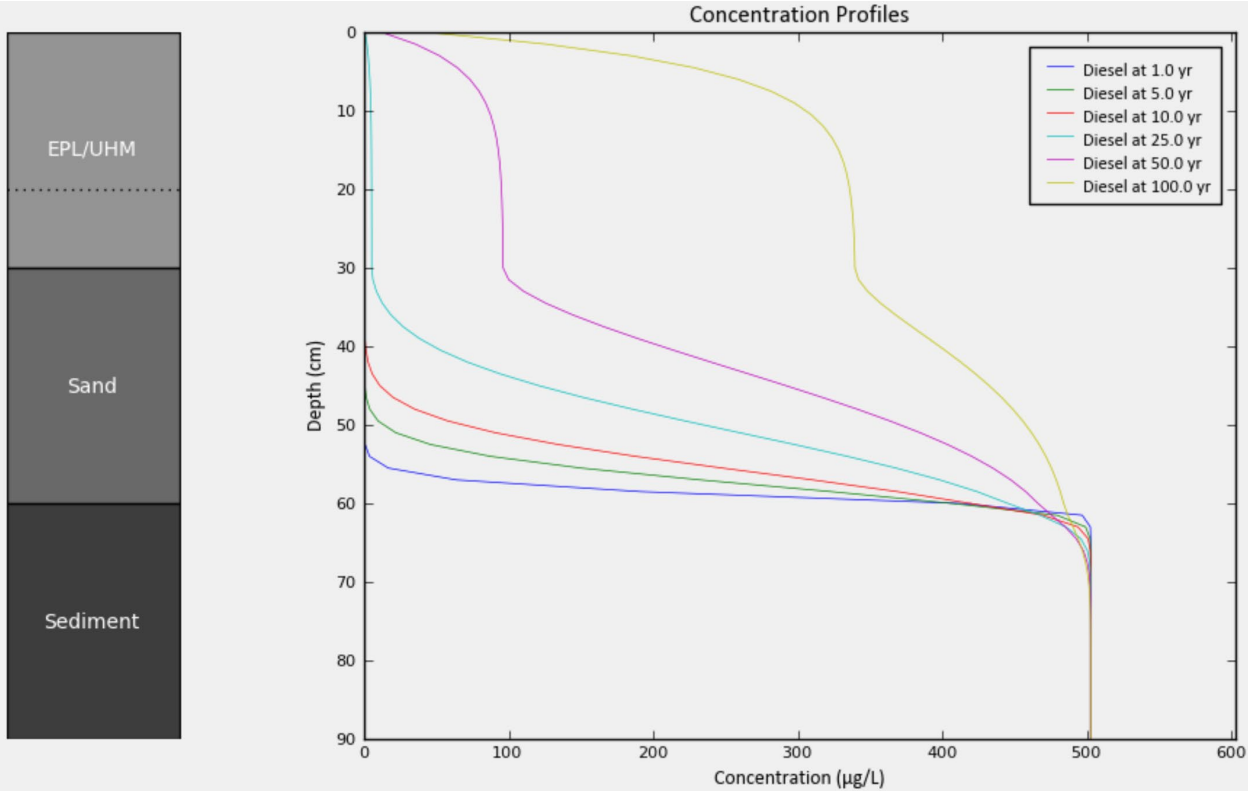

EPL/UHM
Sand
Sediment
Concentration Profiles
DDE at 1.0 yr
DDE at 5.0 yr
DDE at 10.0 yr
DDE at 25.0 yr
DDE at 50.0 yr
DDE at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

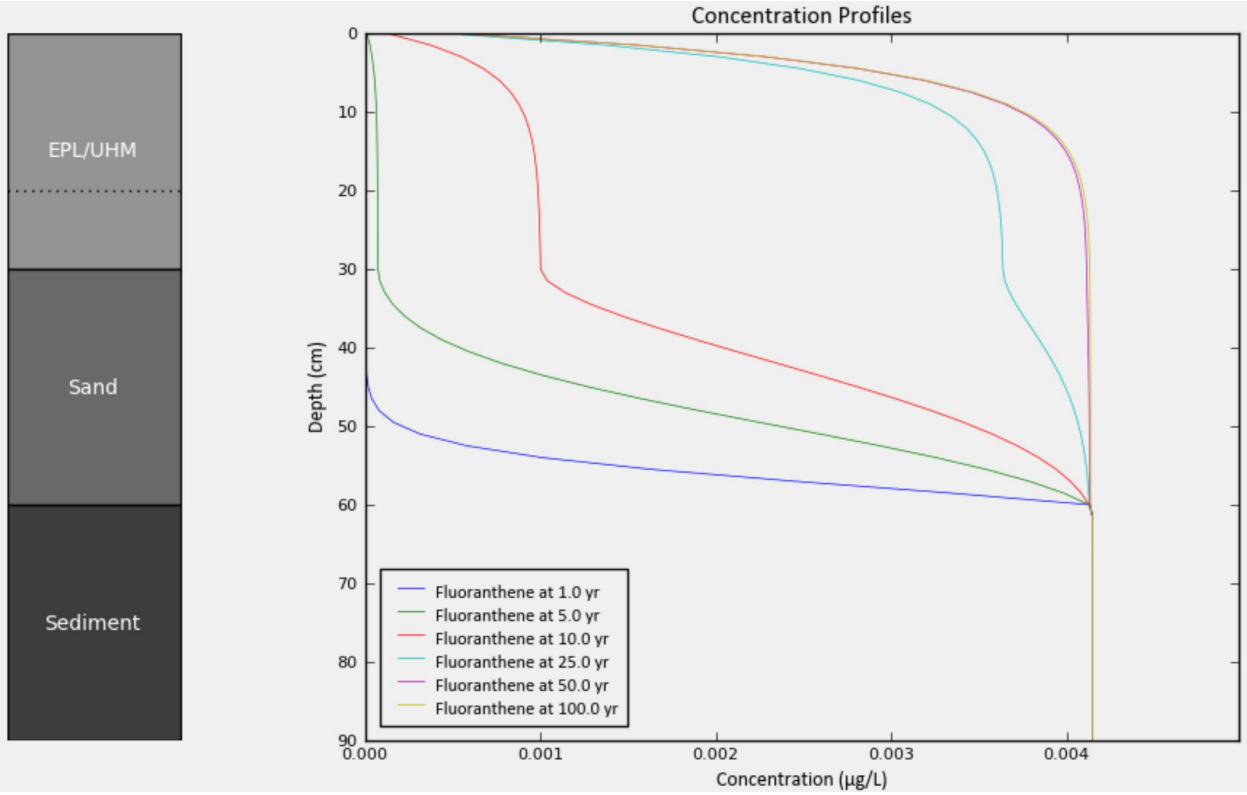

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
1e−5
DDT at 1.0 yr
DDT at 5.0 yr
DDT at 10.0 yr
DDT at 25.0 yr
DDT at 50.0 yr
DDT at 100.0 yr

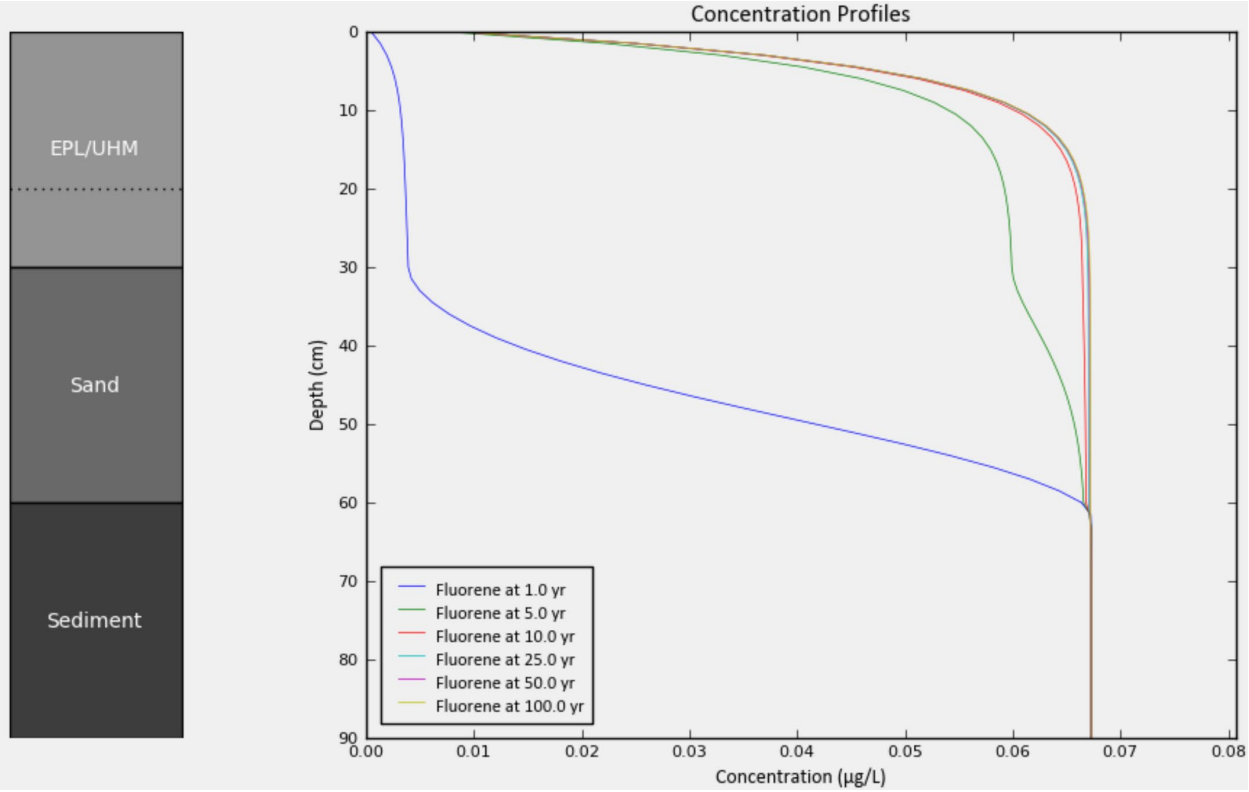

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
1e−4
DDx at 1.0 yr
DDx at 5.0 yr
DDx at 10.0 yr
DDx at 25.0 yr
DDx at 50.0 yr
DDx at 100.0 yr

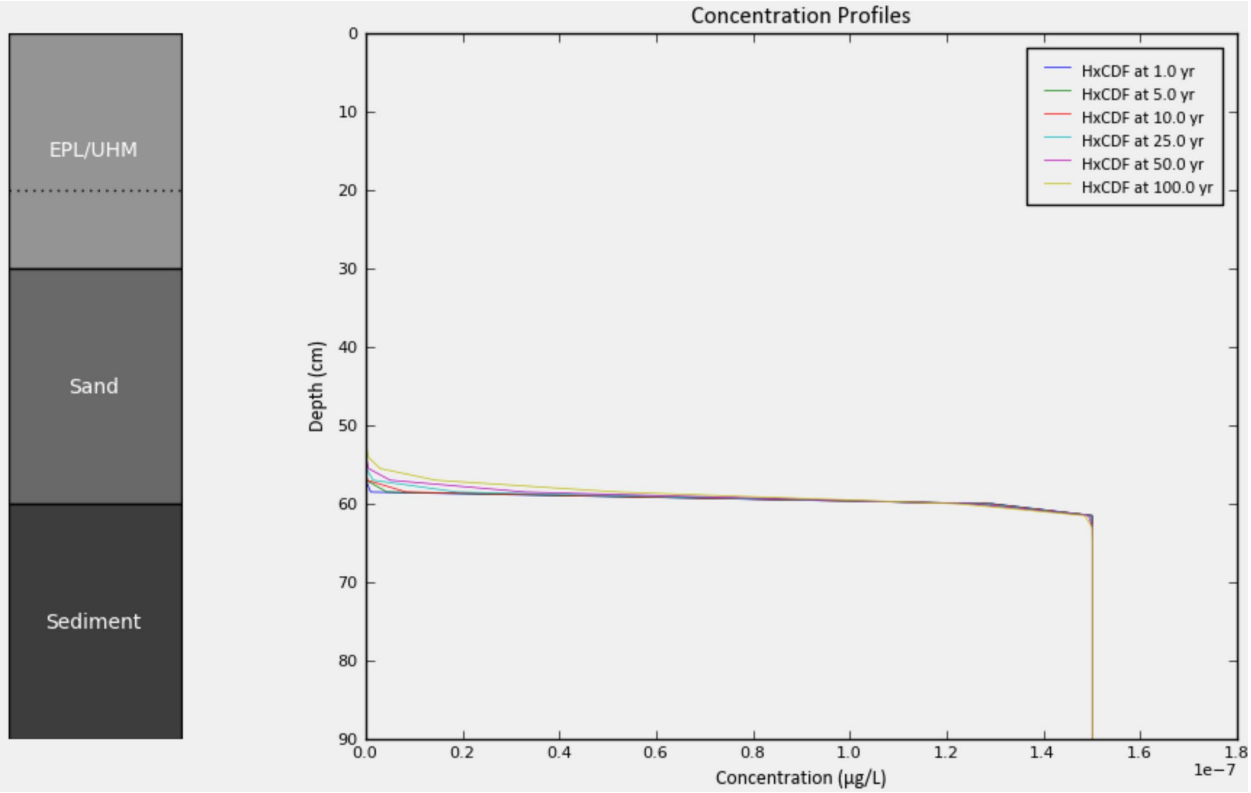

EPL/UHM
Sand
Sediment
Concentration Profiles
Dibenzo(a,h)anthracene at 1.0 yr
Dibenzo(a,h)anthracene at 5.0 yr
Dibenzo(a,h)anthracene at 10.0 yr
Dibenzo(a,h)anthracene at 25.0 yr
Dibenzo(a,h)anthracene at 50.0 yr
Dibenzo(a,h)anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004
0.005
0.006

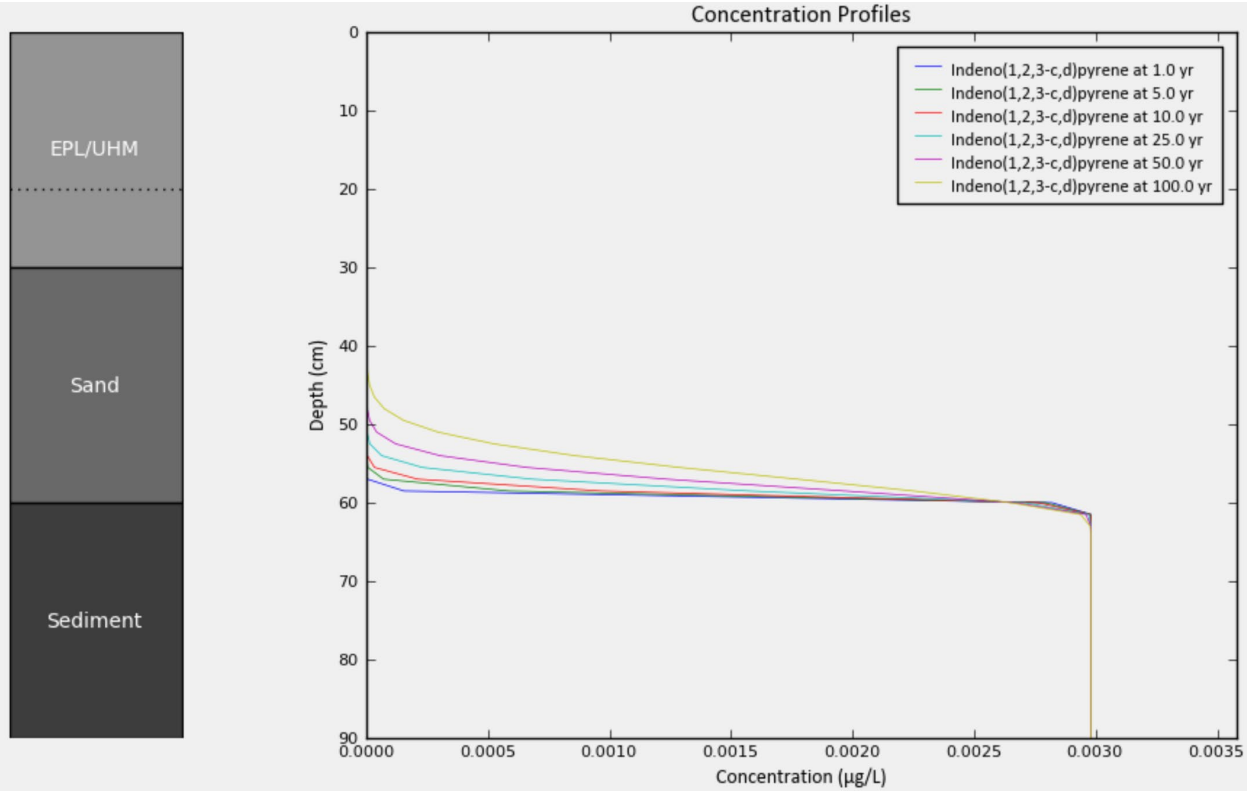

EPL/UHM
Sand
Sediment
Concentration Profiles
Dieldrin at 1.0 yr
Dieldrin at 5.0 yr
Dieldrin at 10.0 yr
Dieldrin at 25.0 yr
Dieldrin at 50.0 yr
Dieldrin at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
7

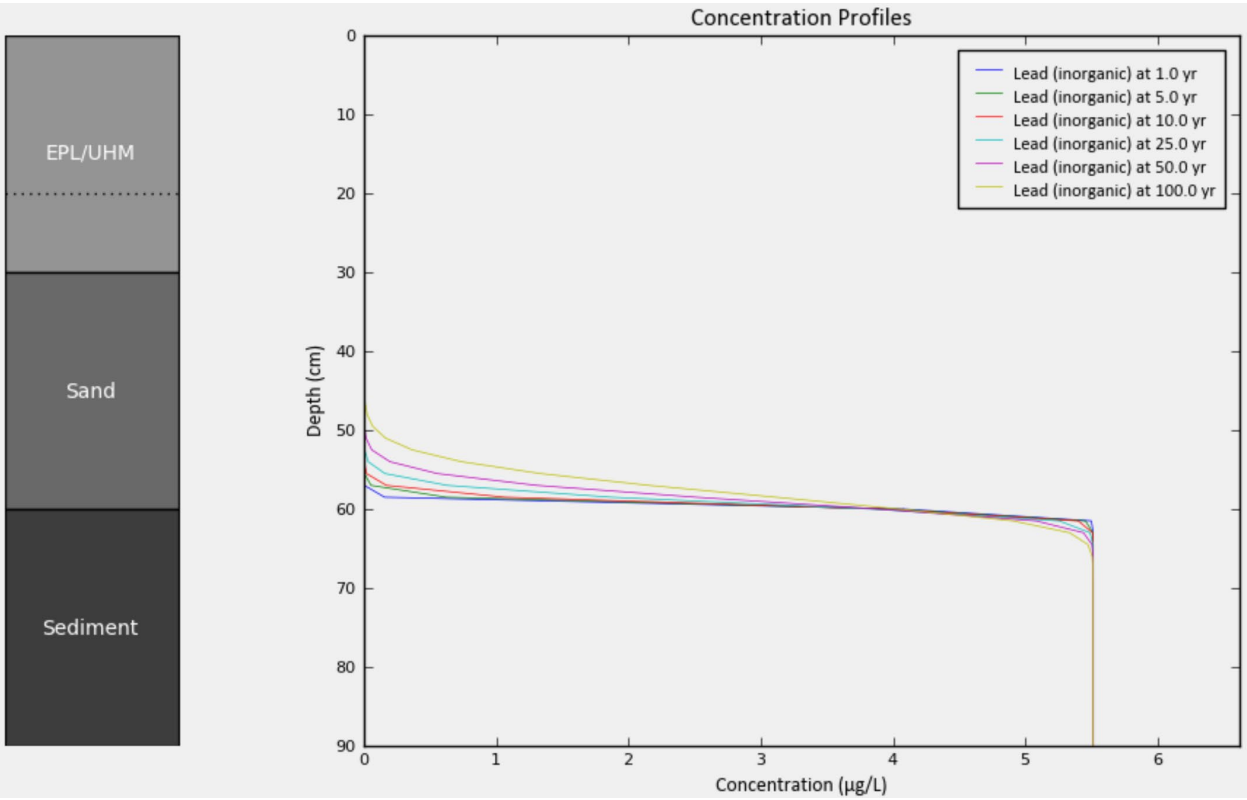

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Diesel at 1.0 yr
Diesel at 5.0 yr
Diesel at 10.0 yr
Diesel at 25.0 yr
Diesel at 50.0 yr
Diesel at 100.0 yr

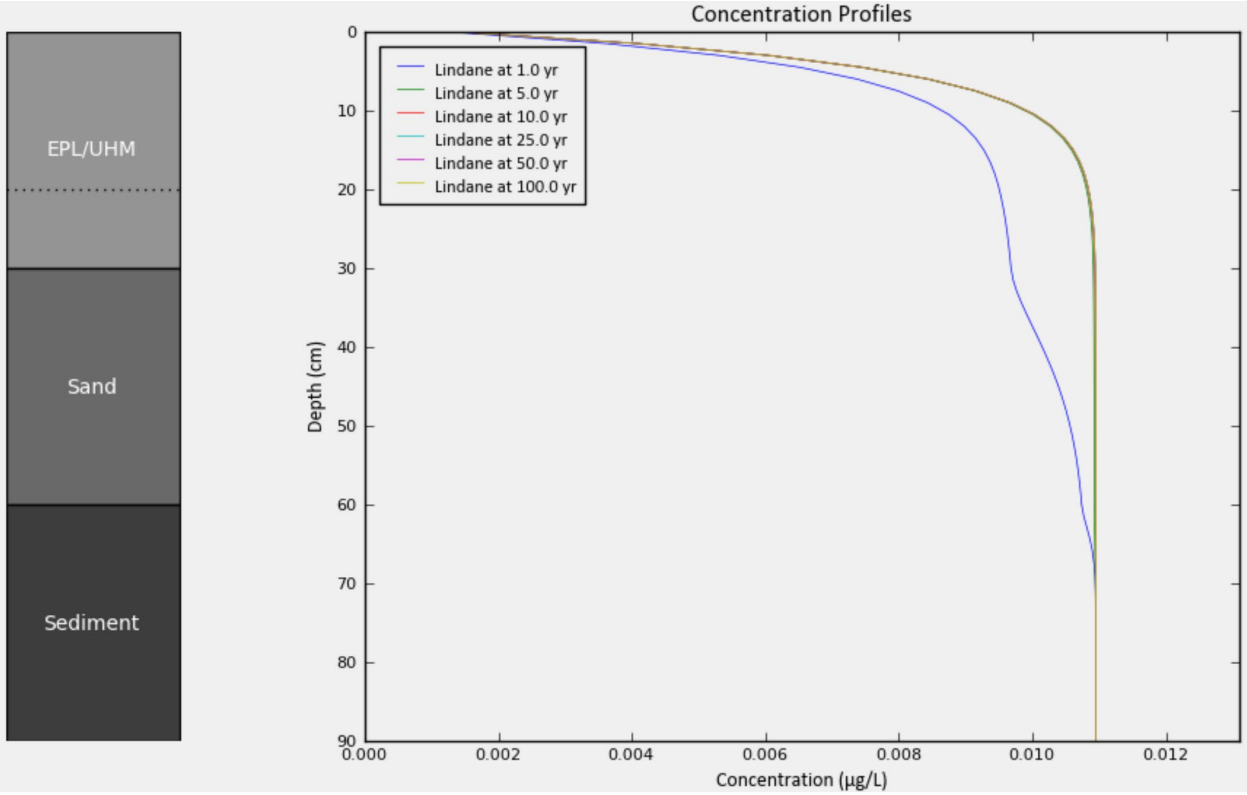

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Fluoranthene at 1.0 yr
Fluoranthene at 5.0 yr
Fluoranthene at 10.0 yr
Fluoranthene at 25.0 yr
Fluoranthene at 50.0 yr
Fluoranthene at 100.0 yr

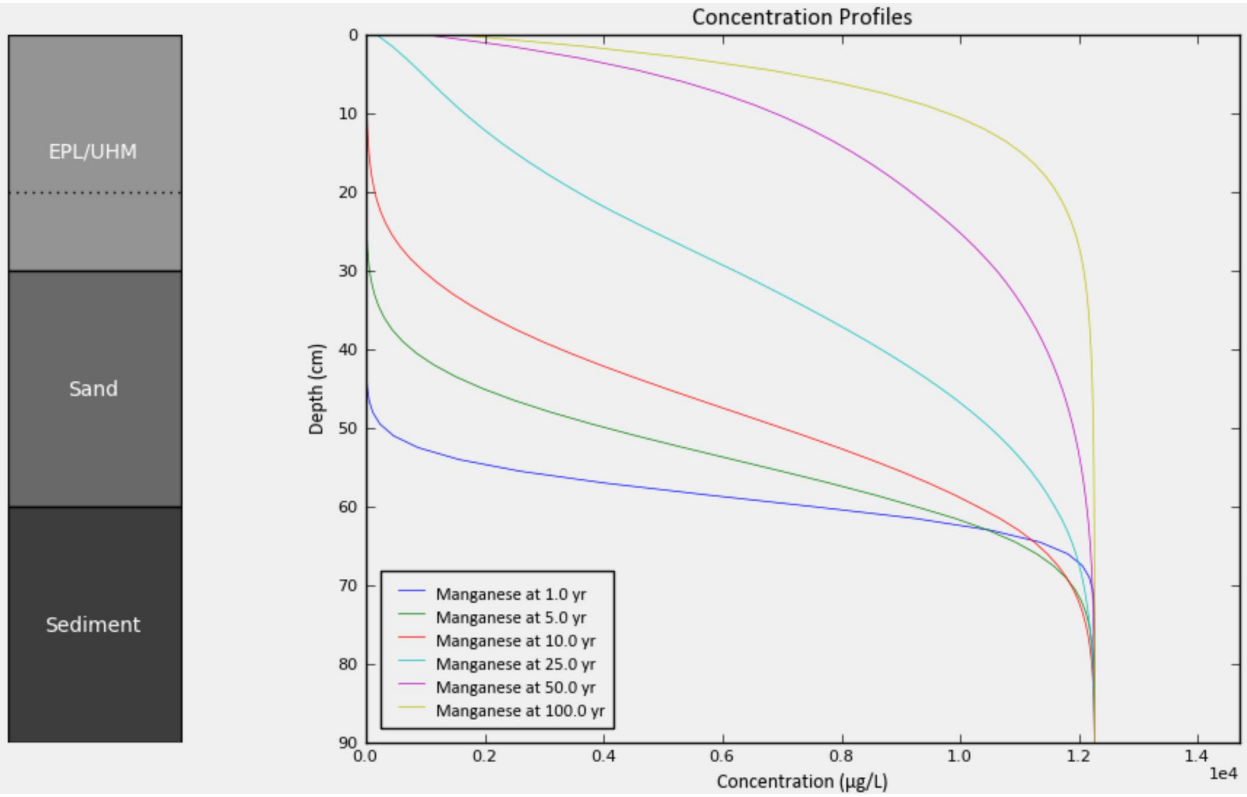

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Fluorene at 1.0 yr
Fluorene at 5.0 yr
Fluorene at 10.0 yr
Fluorene at 25.0 yr
Fluorene at 50.0 yr
Fluorene at 100.0 yr

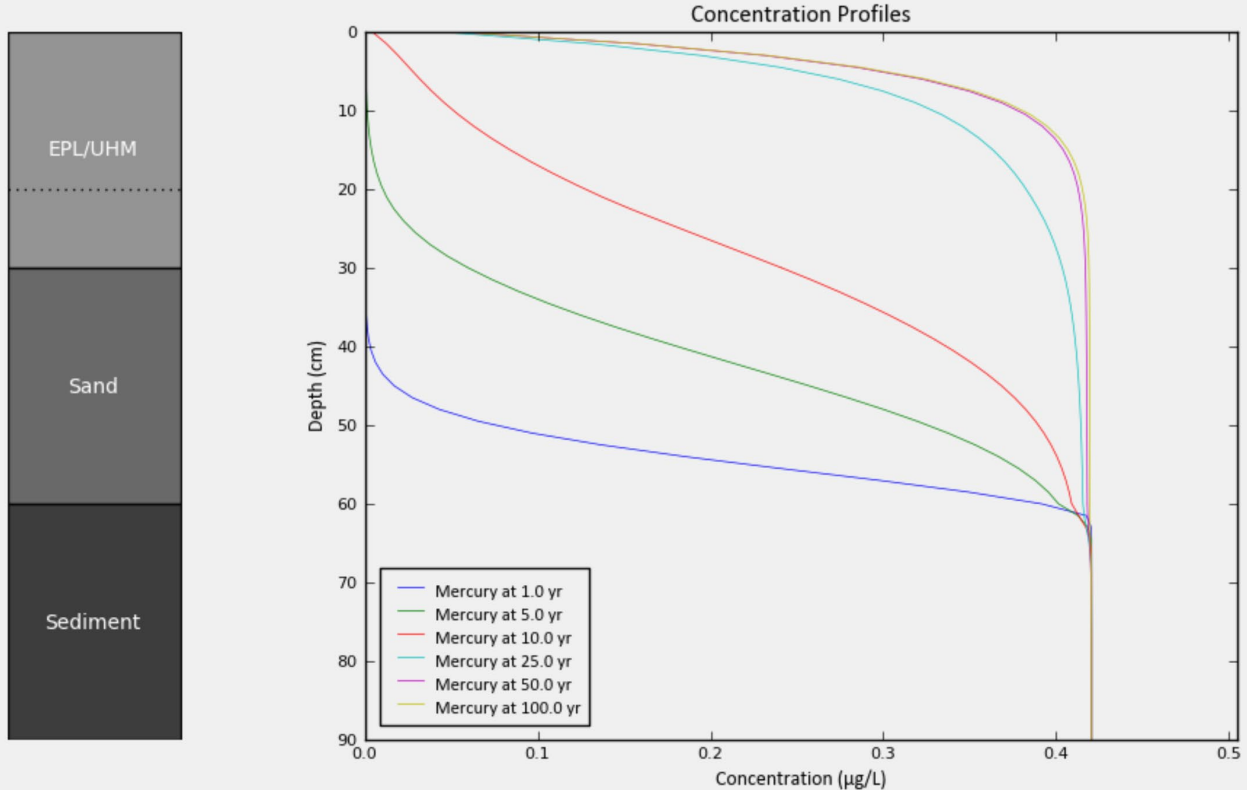

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
1e−7
HxCDF at 1.0 yr
HxCDF at 5.0 yr
HxCDF at 10.0 yr
HxCDF at 25.0 yr
HxCDF at 50.0 yr
HxCDF at 100.0 yr

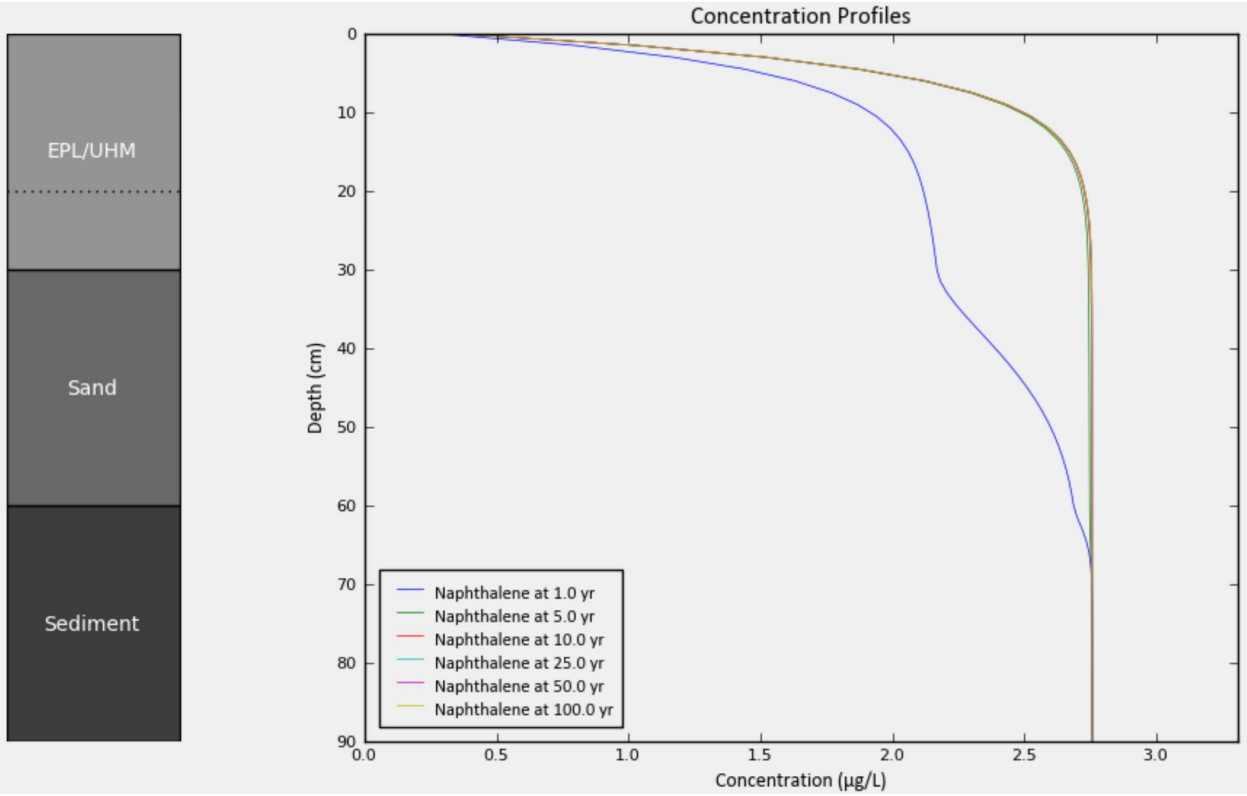

EPL/UHM
Sand
Sediment
Concentration Profiles
Indeno(1,2,3-c,d)pyrene at 1.0 yr
Indeno(1,2,3-c,d)pyrene at 5.0 yr
Indeno(1,2,3-c,d)pyrene at 10.0 yr
Indeno(1,2,3-c,d)pyrene at 25.0 yr
Indeno(1,2,3-c,d)pyrene at 50.0 yr
Indeno(1,2,3-c,d)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
0.0035
Concentration (µg/L)

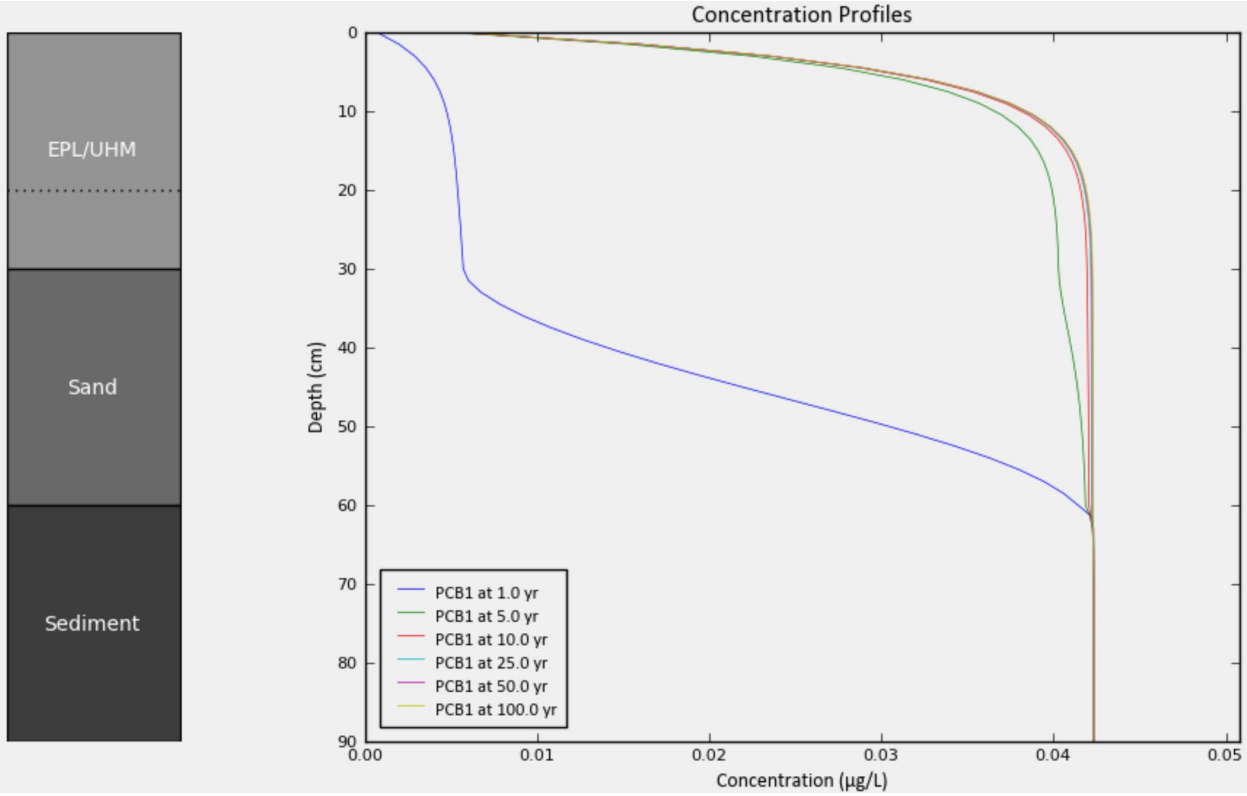

EPL/UHM
Sand
Sediment
Concentration Profiles
Lead (inorganic) at 1.0 yr
Lead (inorganic) at 5.0 yr
Lead (inorganic) at 10.0 yr
Lead (inorganic) at 25.0 yr
Lead (inorganic) at 50.0 yr
Lead (inorganic) at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
Concentration (µg/L)

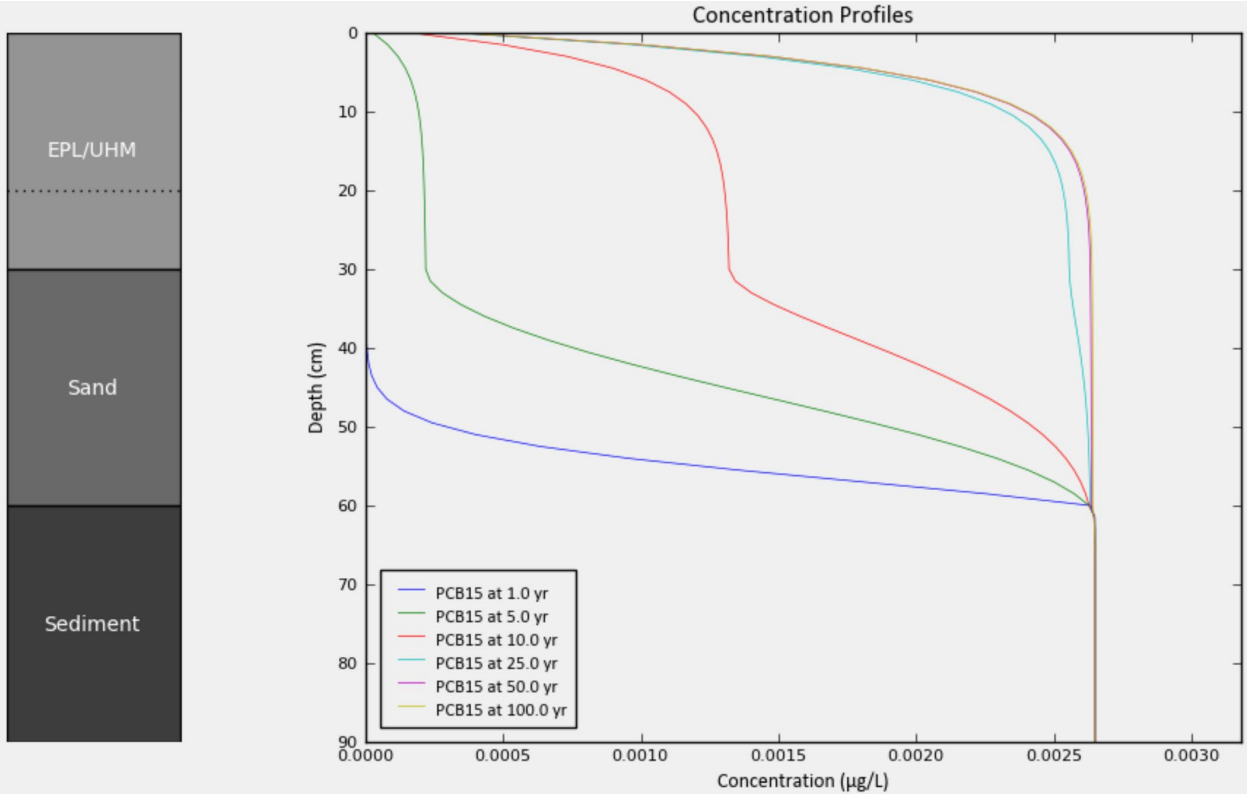

EPL/UHM
Sand
Sediment
Concentration Profiles
Lindane at 1.0 yr
Lindane at 5.0 yr
Lindane at 10.0 yr
Lindane at 25.0 yr
Lindane at 50.0 yr
Lindane at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
0.012

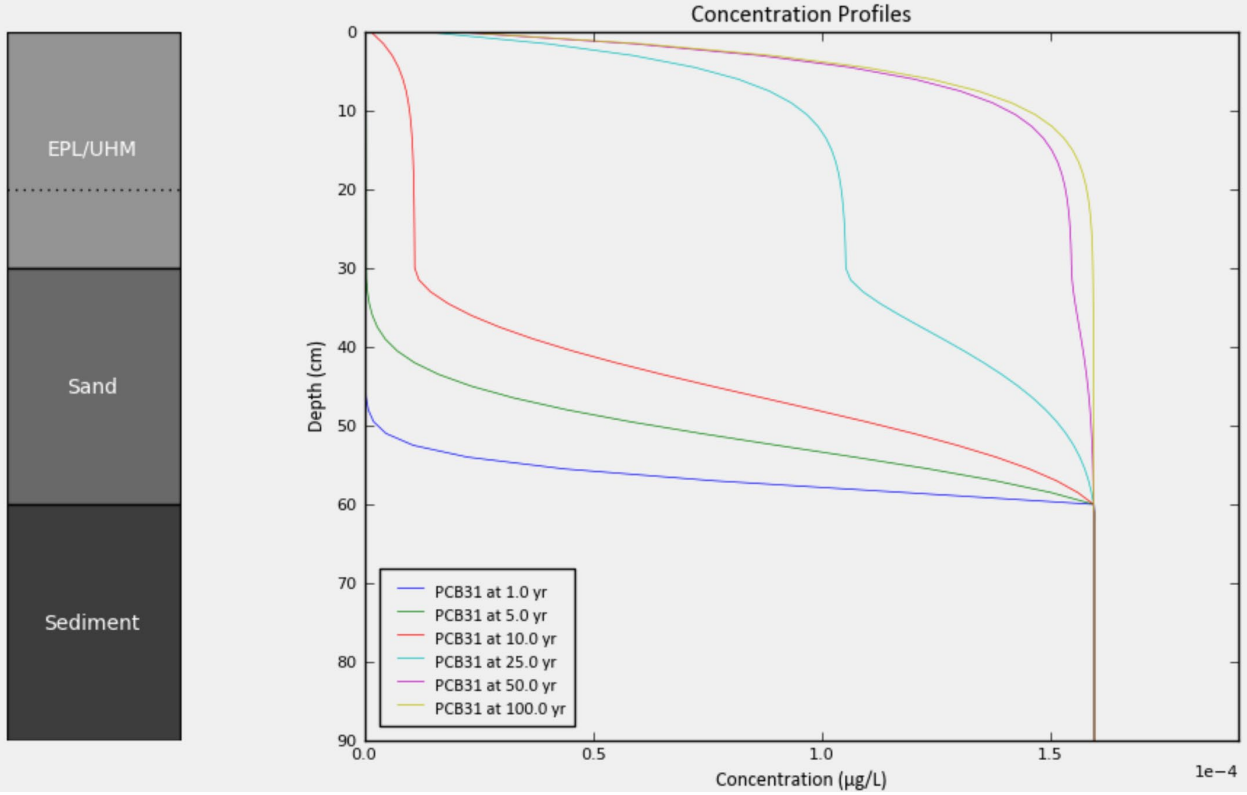

EPL/UHM
Sand
Sediment
Concentration Profiles
Manganese at 1.0 yr
Manganese at 5.0 yr
Manganese at 10.0 yr
Manganese at 25.0 yr
Manganese at 50.0 yr
Manganese at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e4
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4

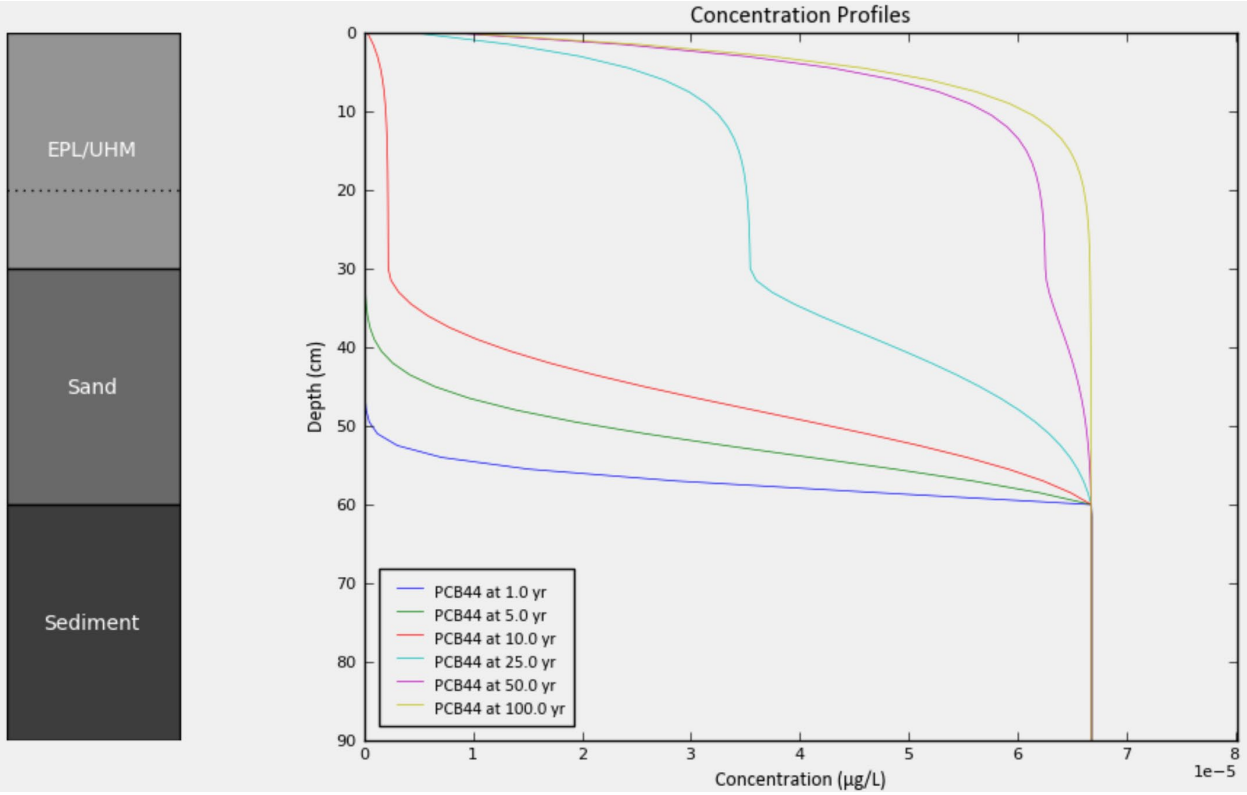

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Mercury at 1.0 yr
Mercury at 5.0 yr
Mercury at 10.0 yr
Mercury at 25.0 yr
Mercury at 50.0 yr
Mercury at 100.0 yr

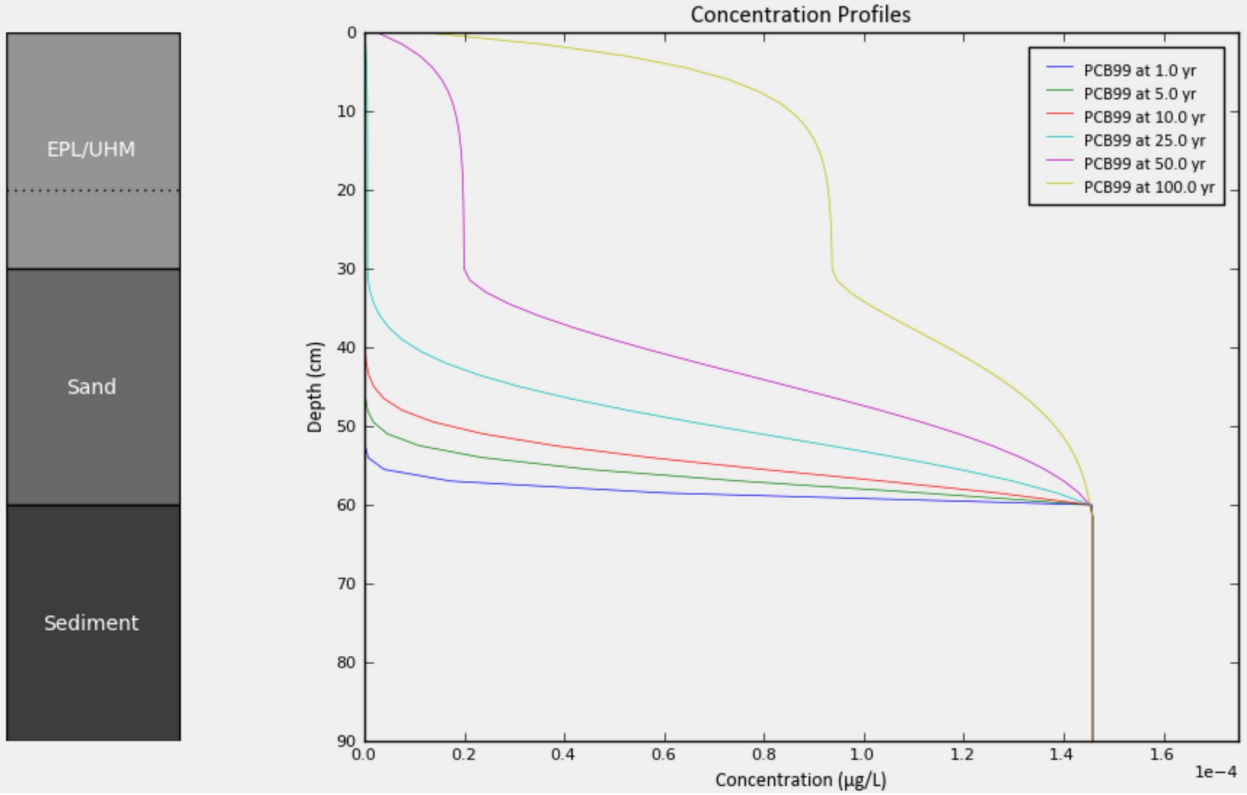

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Naphthalene at 1.0 yr
Naphthalene at 5.0 yr
Naphthalene at 10.0 yr
Naphthalene at 25.0 yr
Naphthalene at 50.0 yr
Naphthalene at 100.0 yr

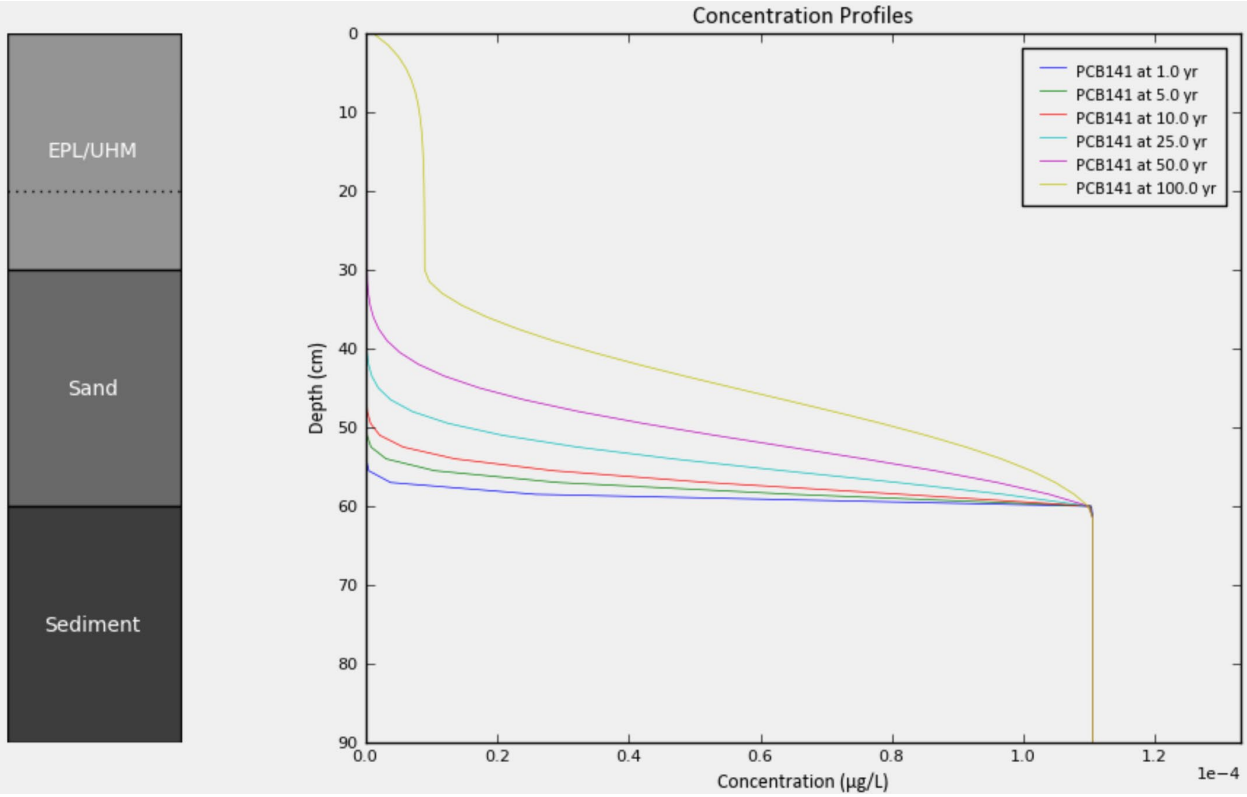

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
PCB1 at 1.0 yr
PCB1 at 5.0 yr
PCB1 at 10.0 yr
PCB1 at 25.0 yr
PCB1 at 50.0 yr
PCB1 at 100.0 yr

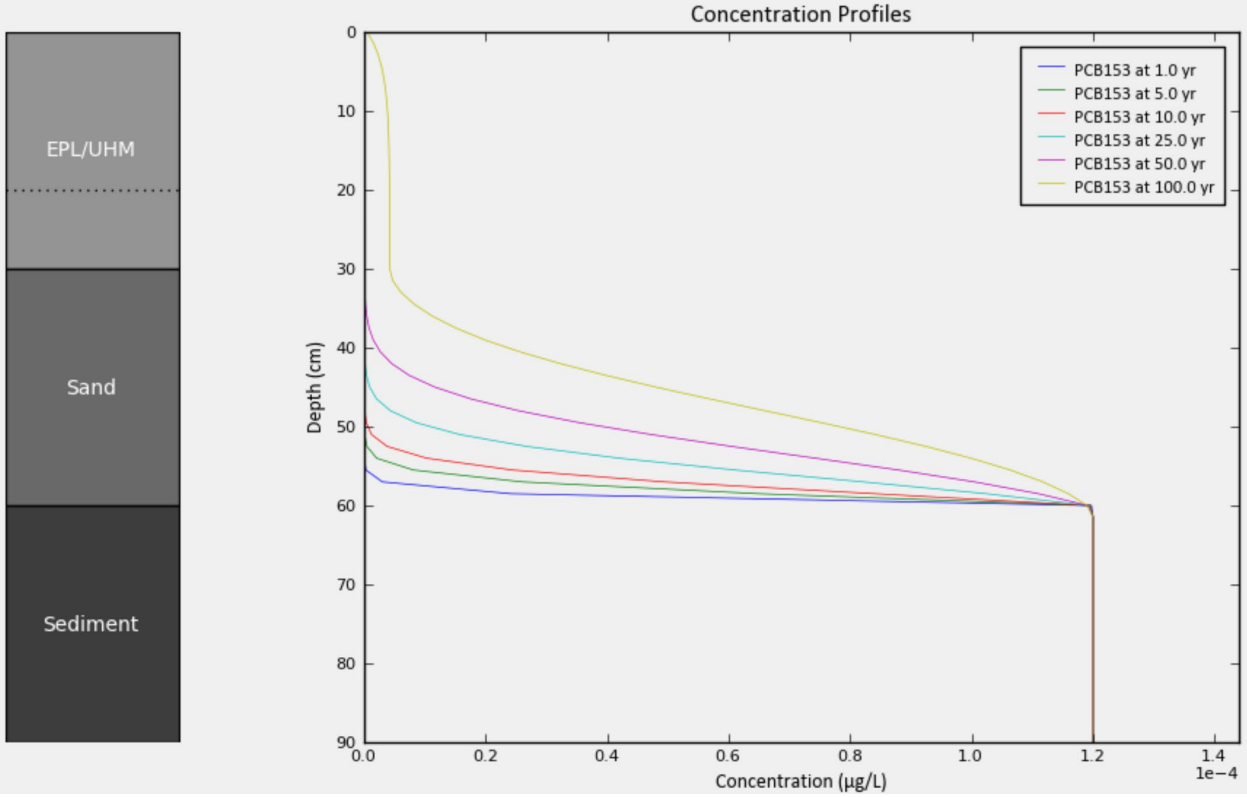

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
PCB15 at 1.0 yr
PCB15 at 5.0 yr
PCB15 at 10.0 yr
PCB15 at 25.0 yr
PCB15 at 50.0 yr
PCB15 at 100.0 yr

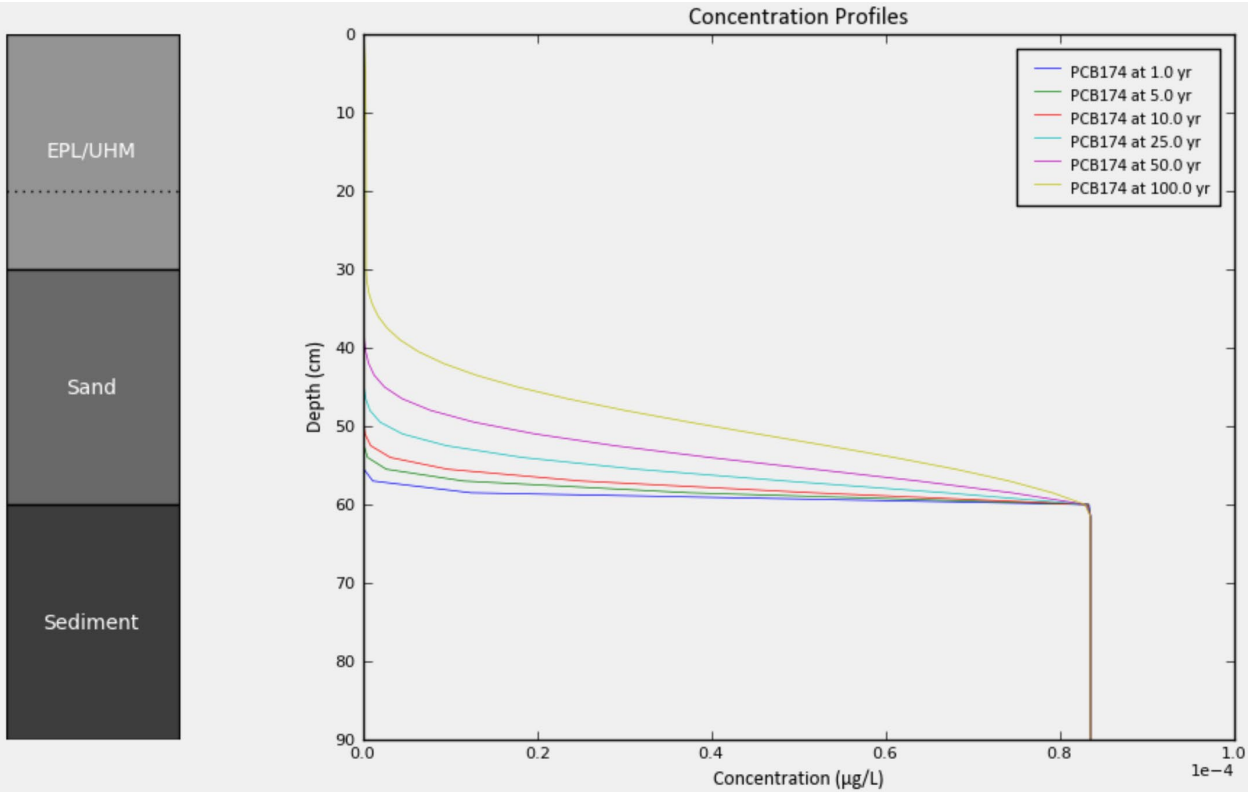

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
1e−4
PCB31 at 1.0 yr
PCB31 at 5.0 yr
PCB31 at 10.0 yr
PCB31 at 25.0 yr
PCB31 at 50.0 yr
PCB31 at 100.0 yr

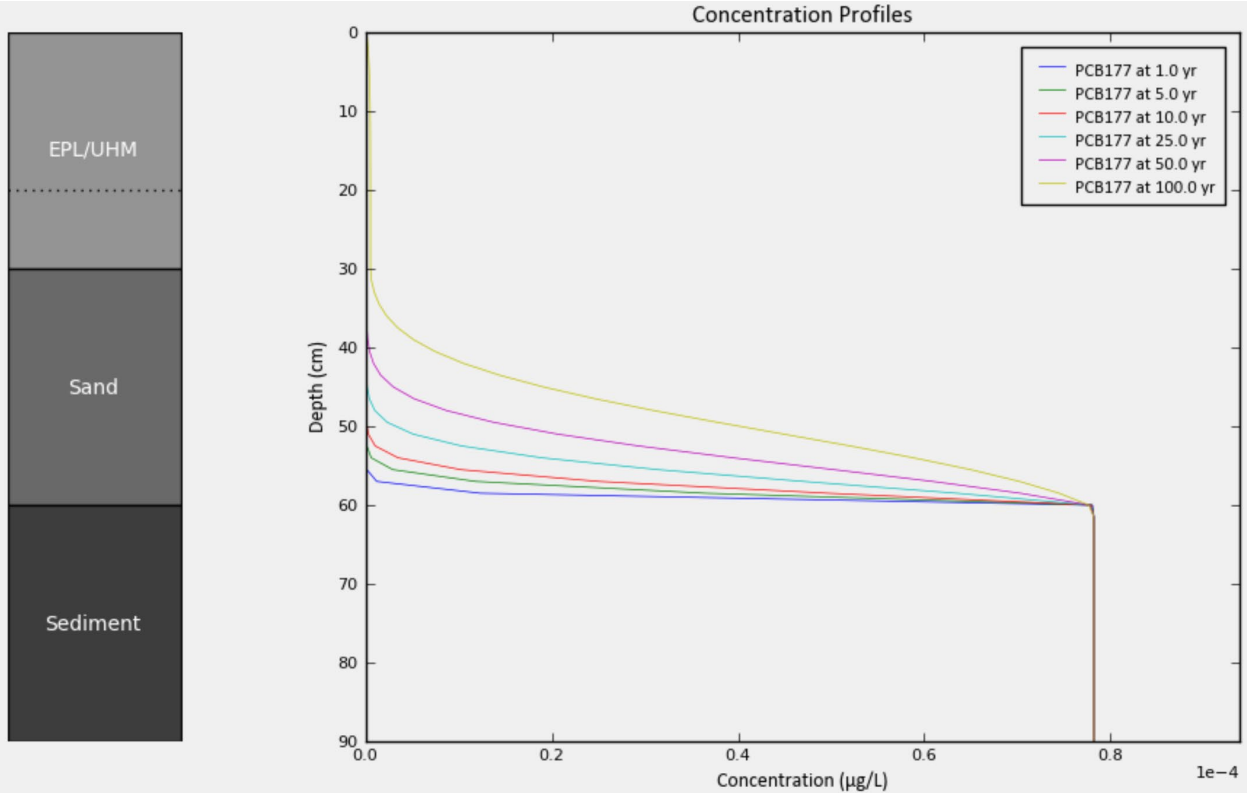

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
1e−5
PCB44 at 1.0 yr
PCB44 at 5.0 yr
PCB44 at 10.0 yr
PCB44 at 25.0 yr
PCB44 at 50.0 yr
PCB44 at 100.0 yr

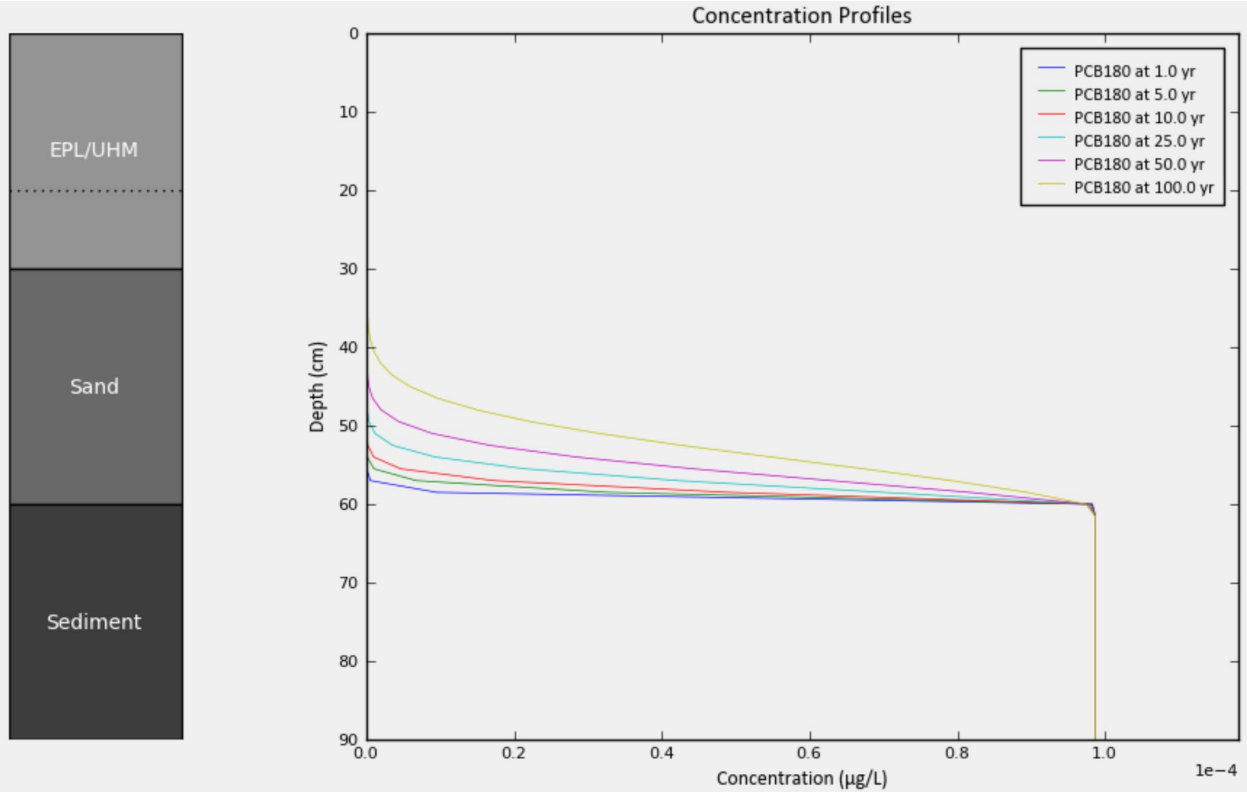

EPL/UHM
Sand
Sediment
Concentration Profiles
PCB99 at 1.0 yr
PCB99 at 5.0 yr
PCB99 at 10.0 yr
PCB99 at 25.0 yr
PCB99 at 50.0 yr
PCB99 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

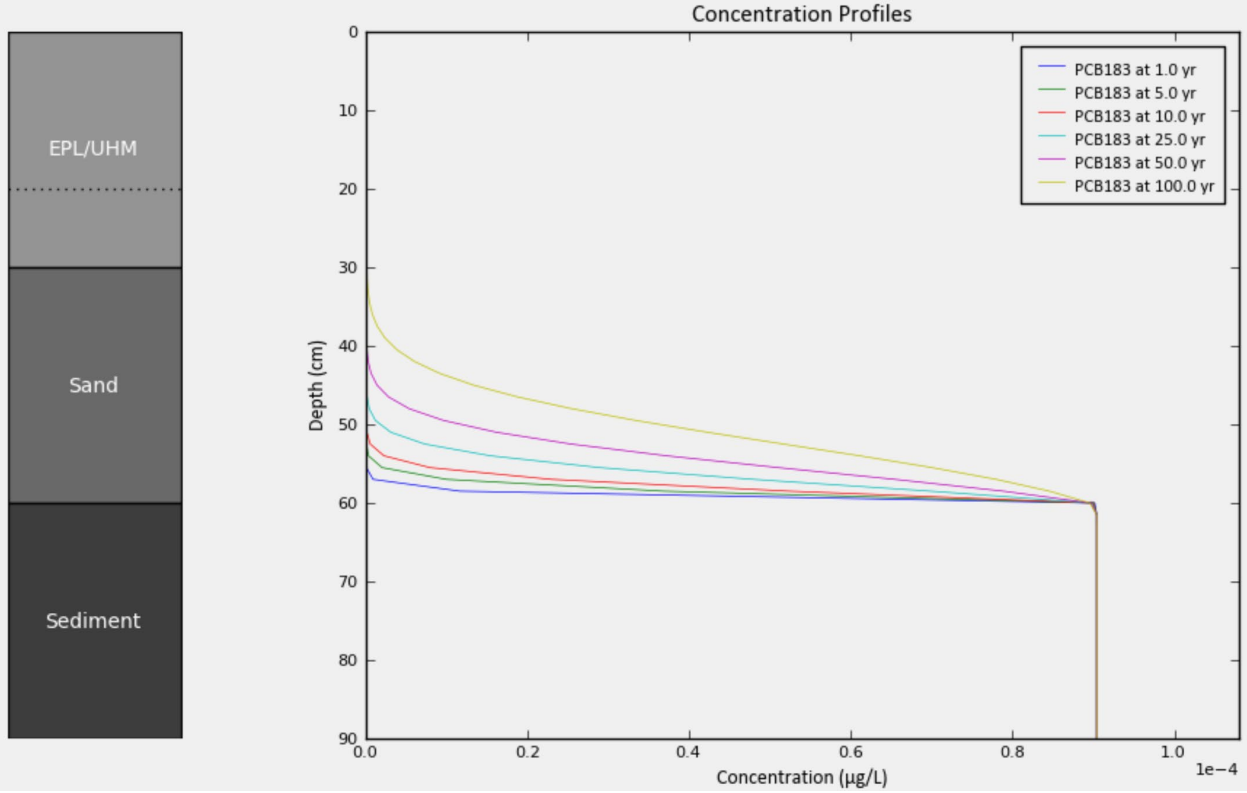

EPL/UHM
Sand
Sediment
Concentration Profiles
PCB141 at 1.0 yr
PCB141 at 5.0 yr
PCB141 at 10.0 yr
PCB141 at 25.0 yr
PCB141 at 50.0 yr
PCB141 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

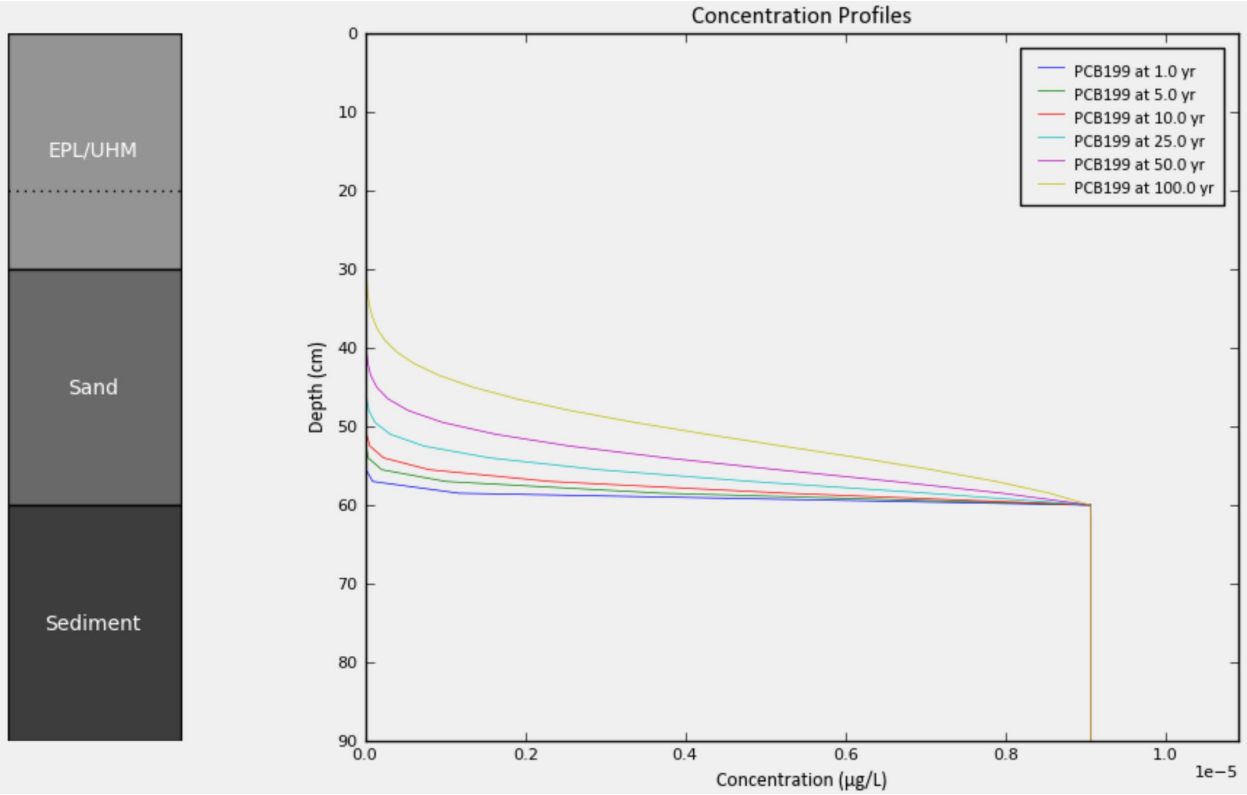

EPL/UHM
Sand
Sediment
Concentration Profiles
PCB153 at 1.0 yr
PCB153 at 5.0 yr
PCB153 at 10.0 yr
PCB153 at 25.0 yr
PCB153 at 50.0 yr
PCB153 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

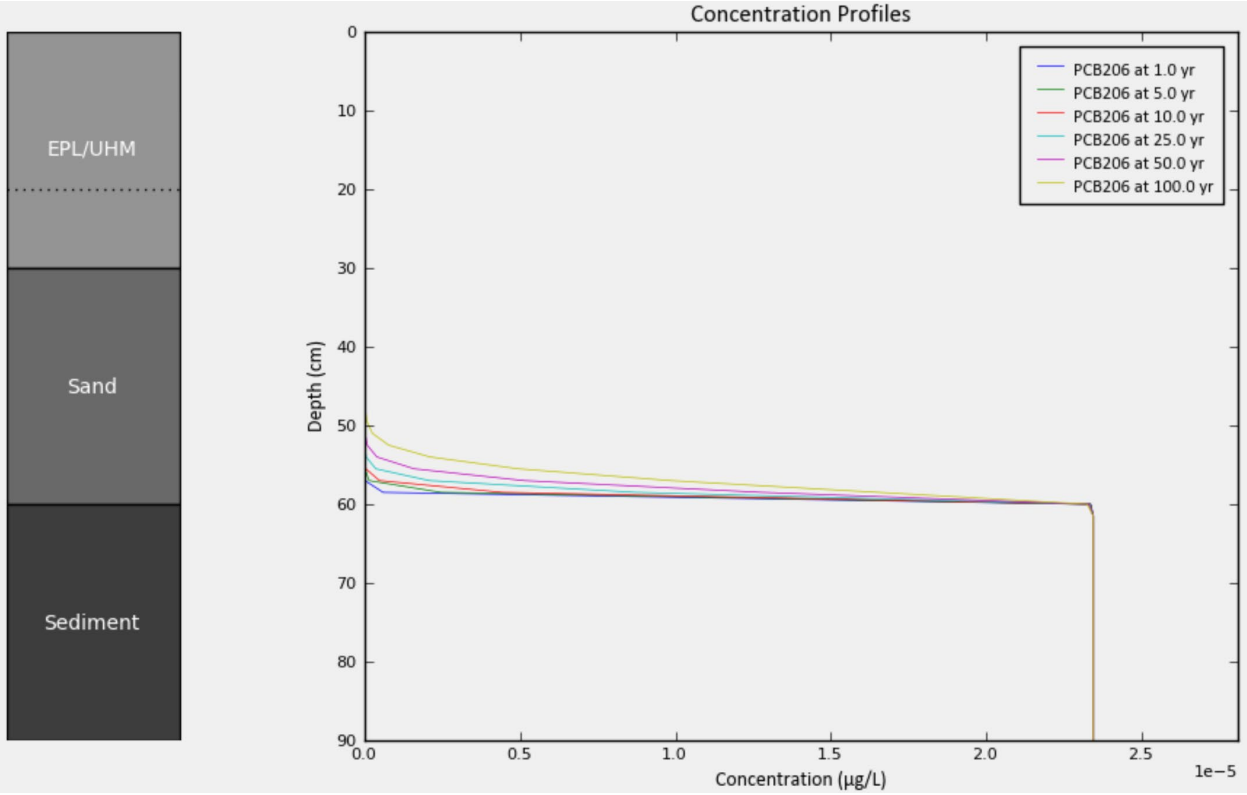

EPL/UHM
Sand
Sediment
Concentration Profiles
PCB174 at 1.0 yr
PCB174 at 5.0 yr
PCB174 at 10.0 yr
PCB174 at 25.0 yr
PCB174 at 50.0 yr
PCB174 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

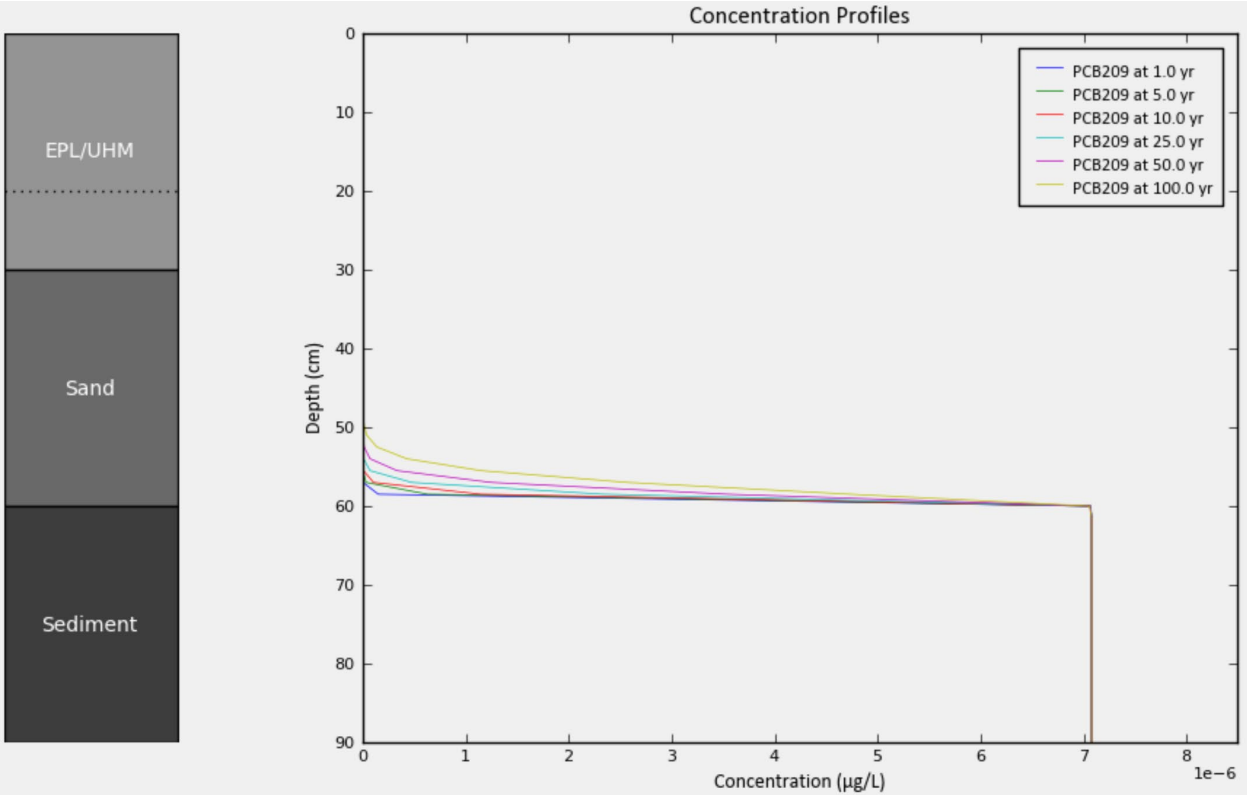

EPL/UHM
Sand
Sediment
Concentration Profiles
PCB177 at 1.0 yr
PCB177 at 5.0 yr
PCB177 at 10.0 yr
PCB177 at 25.0 yr
PCB177 at 50.0 yr
PCB177 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

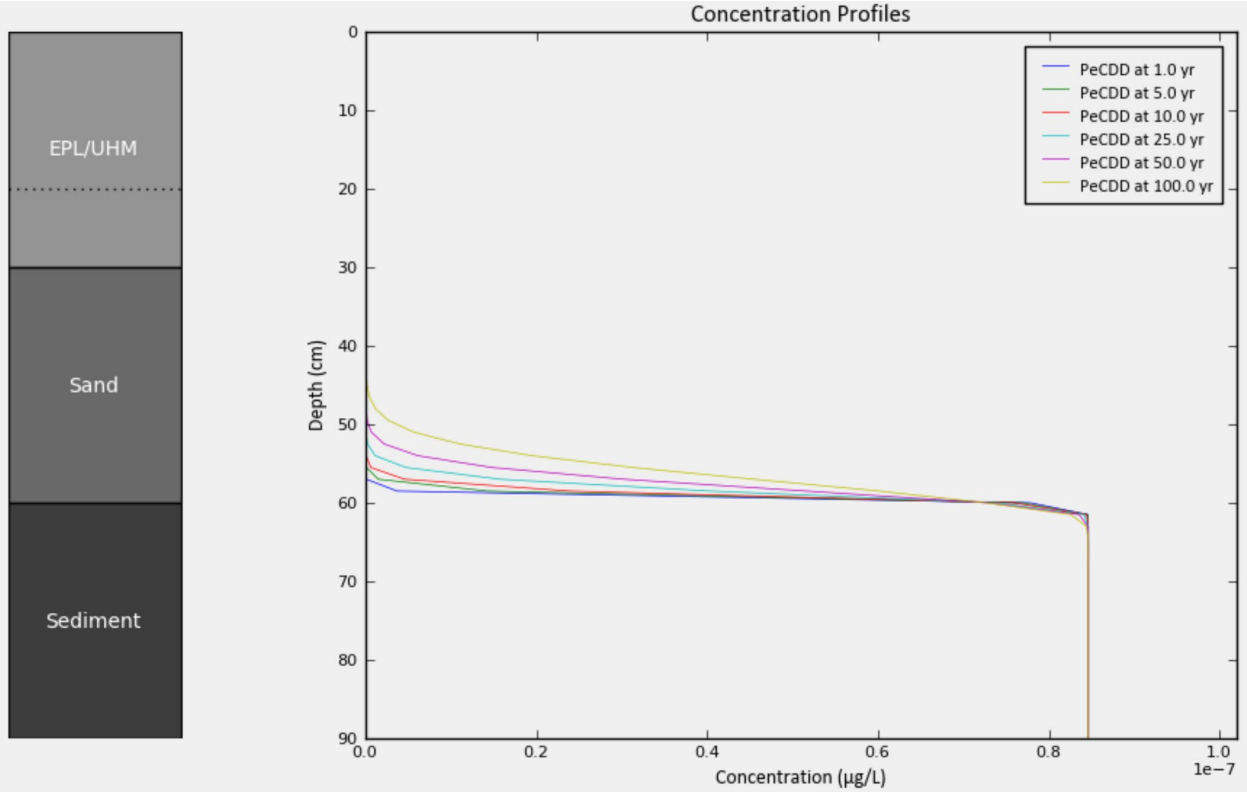

EPL/UHM
Sand
Sediment
Concentration Profiles
PCB180 at 1.0 yr
PCB180 at 5.0 yr
PCB180 at 10.0 yr
PCB180 at 25.0 yr
PCB180 at 50.0 yr
PCB180 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

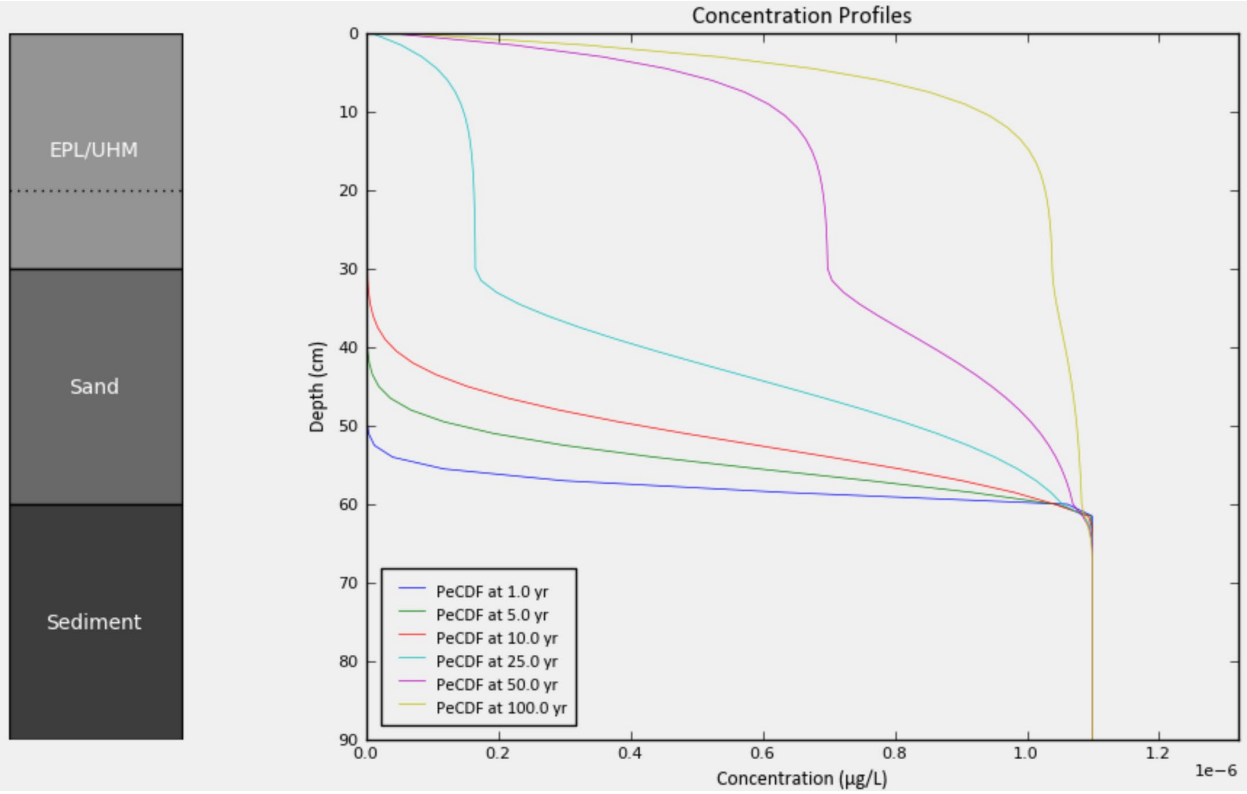

EPL/UHM
Sand
Sediment
Concentration Profiles
PCB183 at 1.0 yr
PCB183 at 5.0 yr
PCB183 at 10.0 yr
PCB183 at 25.0 yr
PCB183 at 50.0 yr
PCB183 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

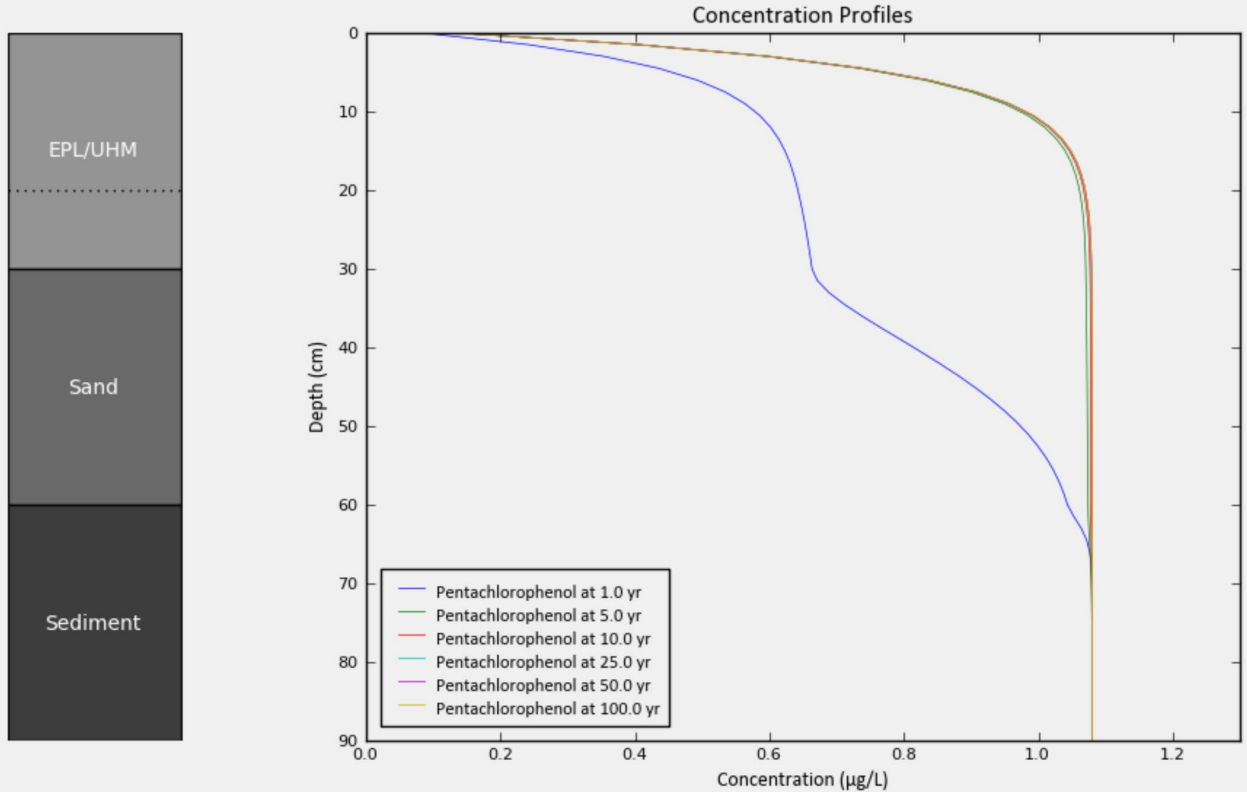

EPL/UHM
Sand
Sediment
Concentration Profiles
PCB199 at 1.0 yr
PCB199 at 5.0 yr
PCB199 at 10.0 yr
PCB199 at 25.0 yr
PCB199 at 50.0 yr
PCB199 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

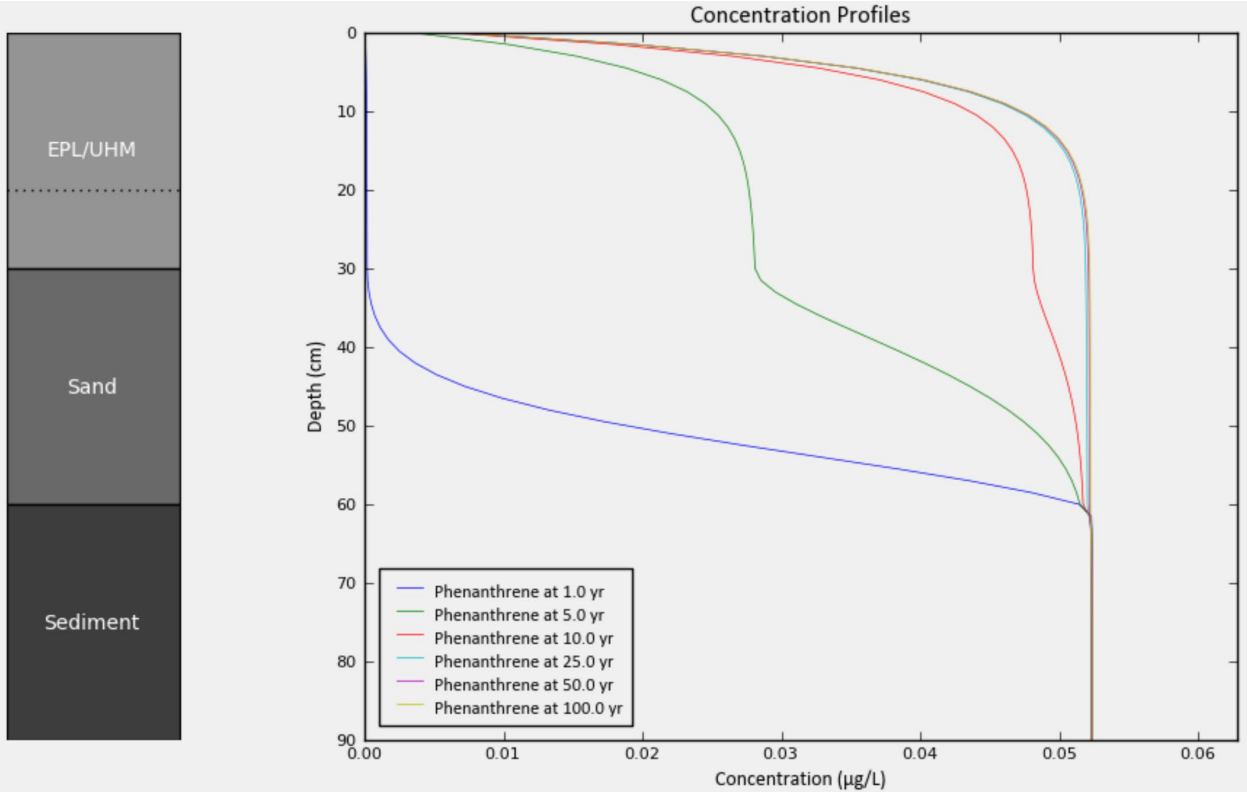

EPL/UHM
Sand
Sediment
Concentration Profiles
PCB206 at 1.0 yr
PCB206 at 5.0 yr
PCB206 at 10.0 yr
PCB206 at 25.0 yr
PCB206 at 50.0 yr
PCB206 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

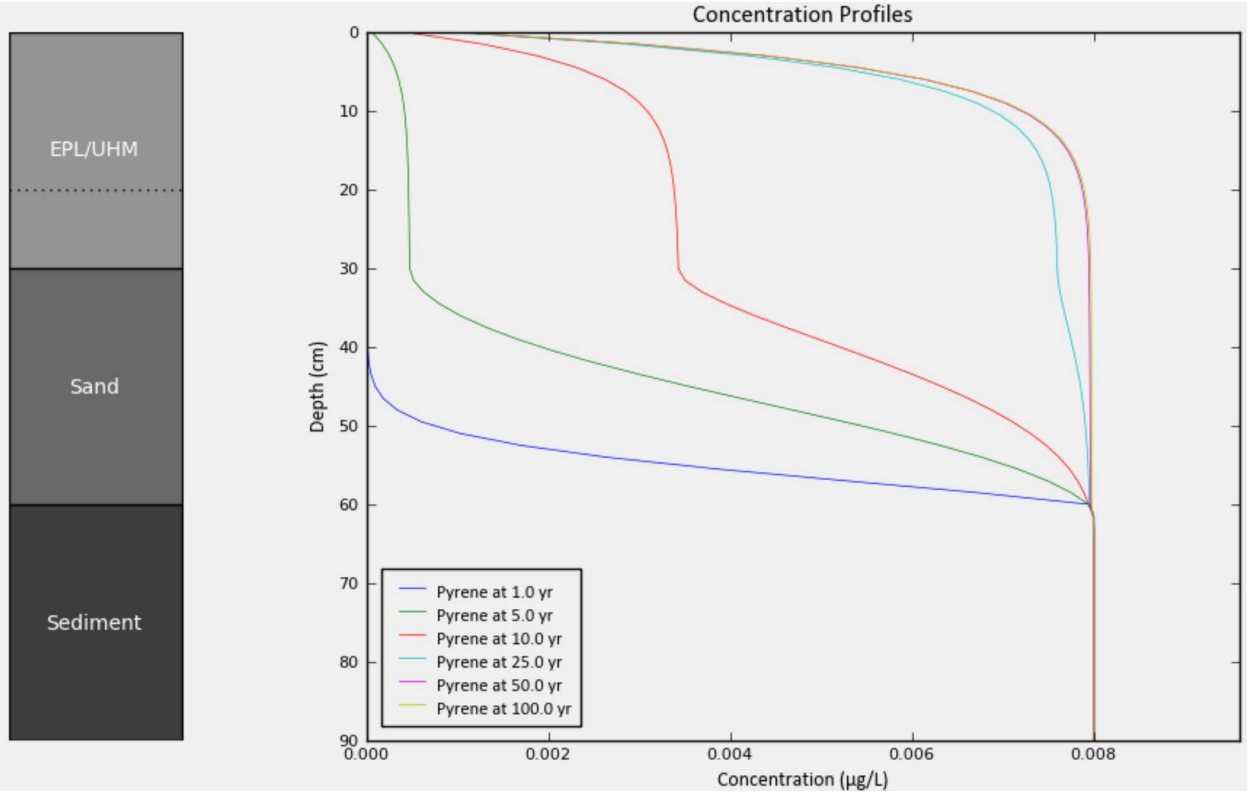

EPL/UHM
Sand
Sediment
Concentration Profiles
PCB209 at 1.0 yr
PCB209 at 5.0 yr
PCB209 at 10.0 yr
PCB209 at 25.0 yr
PCB209 at 50.0 yr
PCB209 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

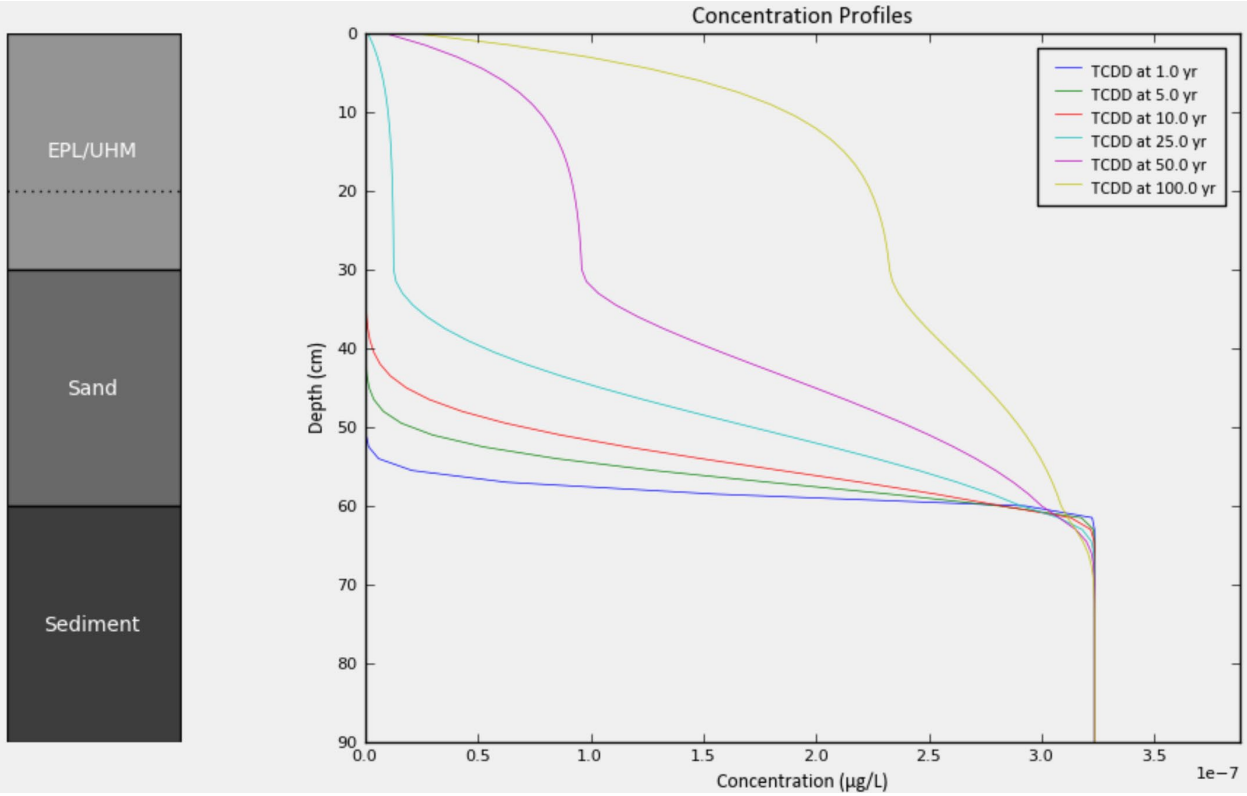

EPL/UHM
Sand
Sediment
Concentration Profiles
PeCDD at 1.0 yr
PeCDD at 5.0 yr
PeCDD at 10.0 yr
PeCDD at 25.0 yr
PeCDD at 50.0 yr
PeCDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

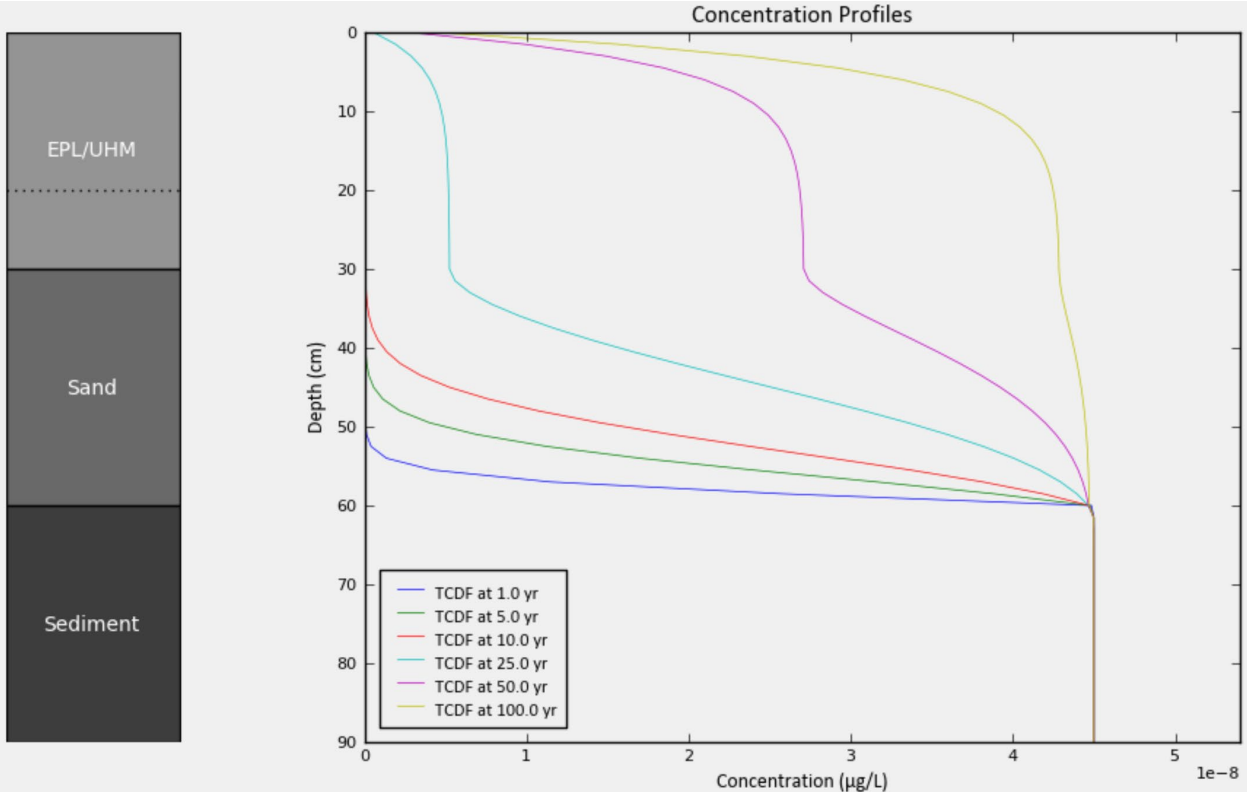

EPL/UHM
Sand
Sediment
Concentration Profiles
PeCDF at 1.0 yr
PeCDF at 5.0 yr
PeCDF at 10.0 yr
PeCDF at 25.0 yr
PeCDF at 50.0 yr
PeCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

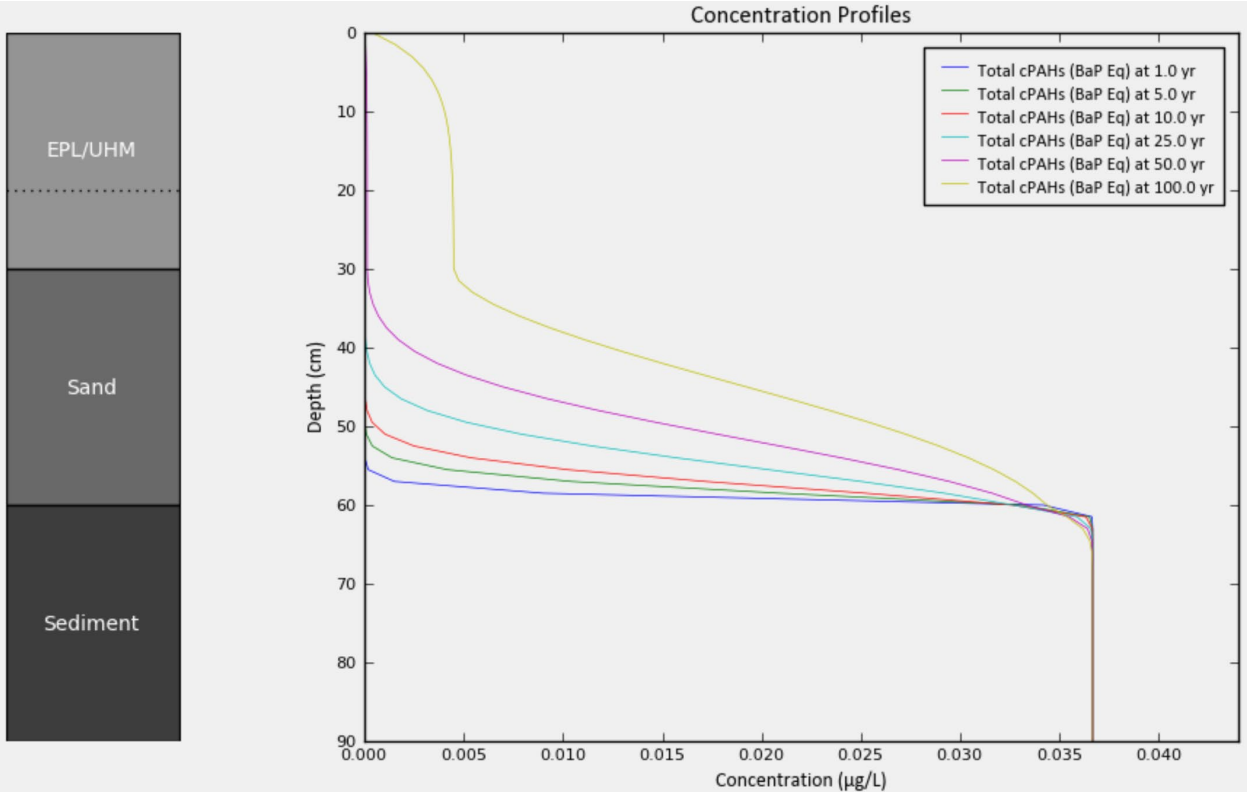

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Pentachlorophenol at 1.0 yr
Pentachlorophenol at 5.0 yr
Pentachlorophenol at 10.0 yr
Pentachlorophenol at 25.0 yr
Pentachlorophenol at 50.0 yr
Pentachlorophenol at 100.0 yr

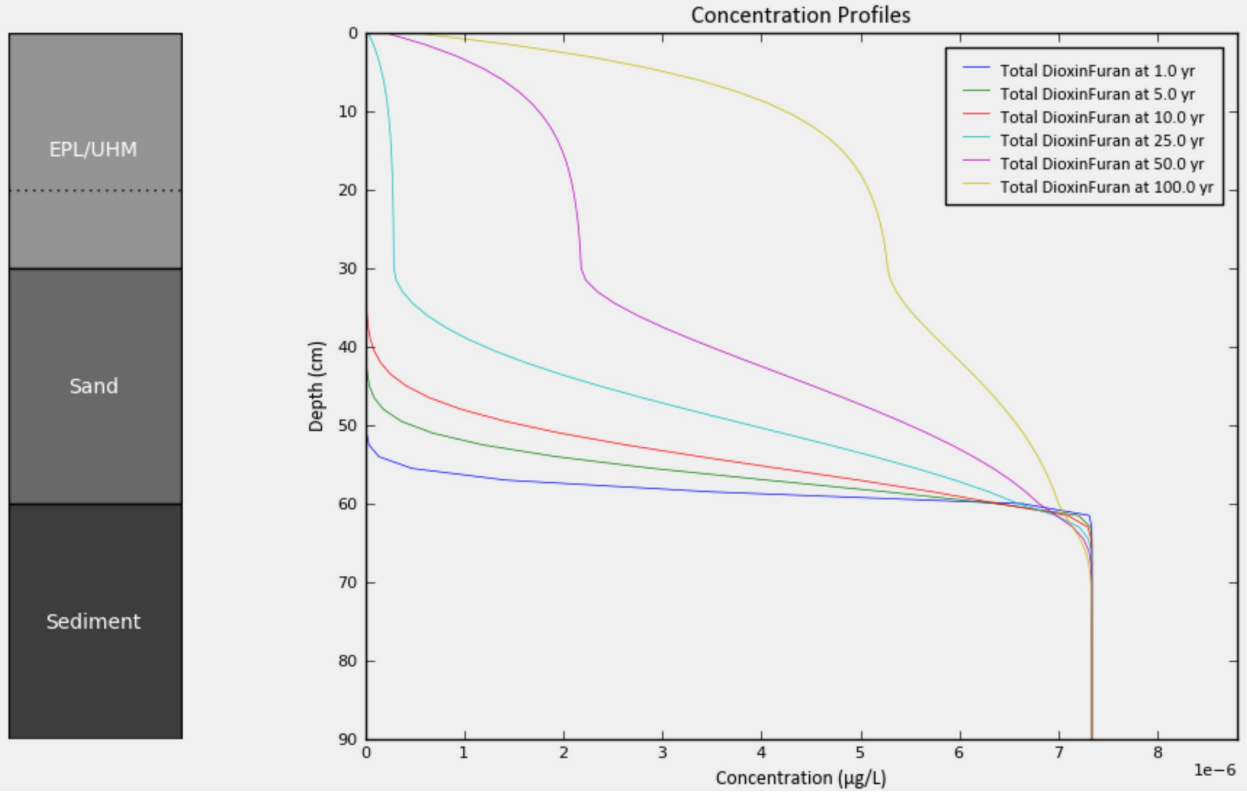

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Phenanthrene at 1.0 yr
Phenanthrene at 5.0 yr
Phenanthrene at 10.0 yr
Phenanthrene at 25.0 yr
Phenanthrene at 50.0 yr
Phenanthrene at 100.0 yr

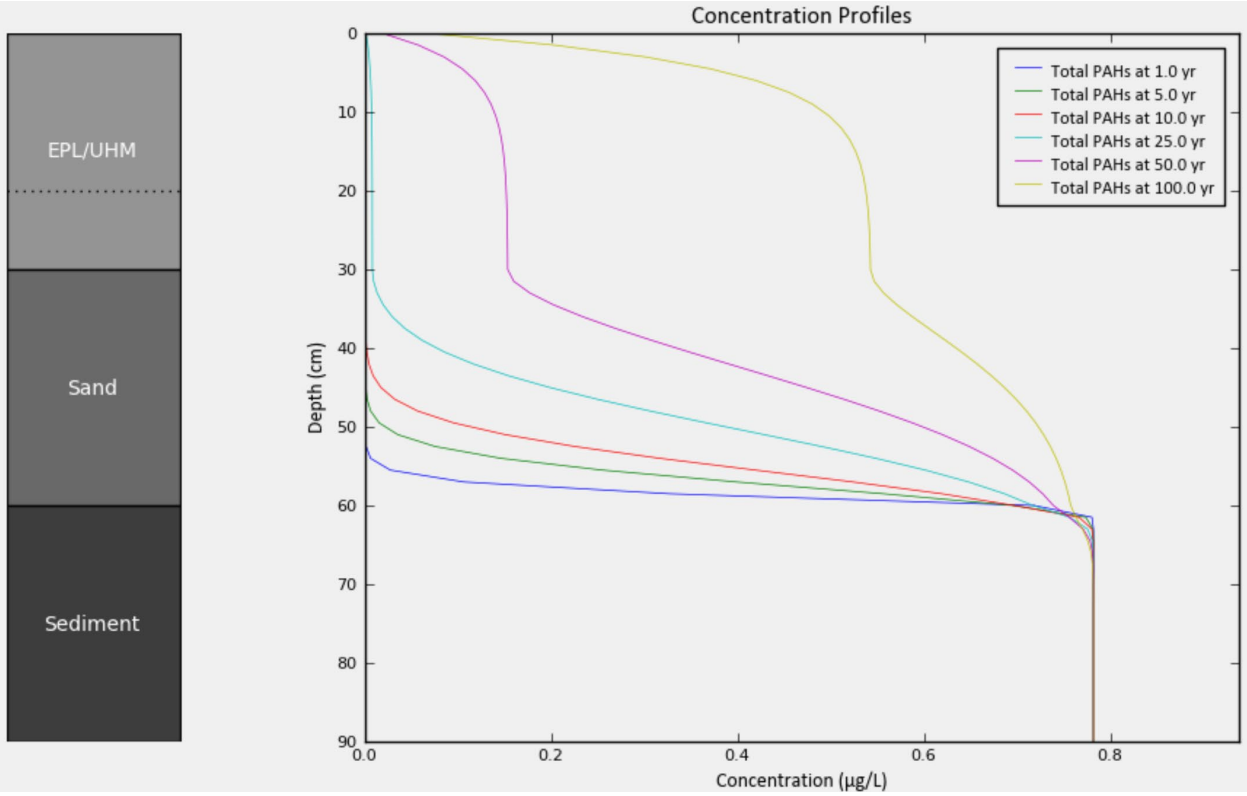

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Pyrene at 1.0 yr
Pyrene at 5.0 yr
Pyrene at 10.0 yr
Pyrene at 25.0 yr
Pyrene at 50.0 yr
Pyrene at 100.0 yr

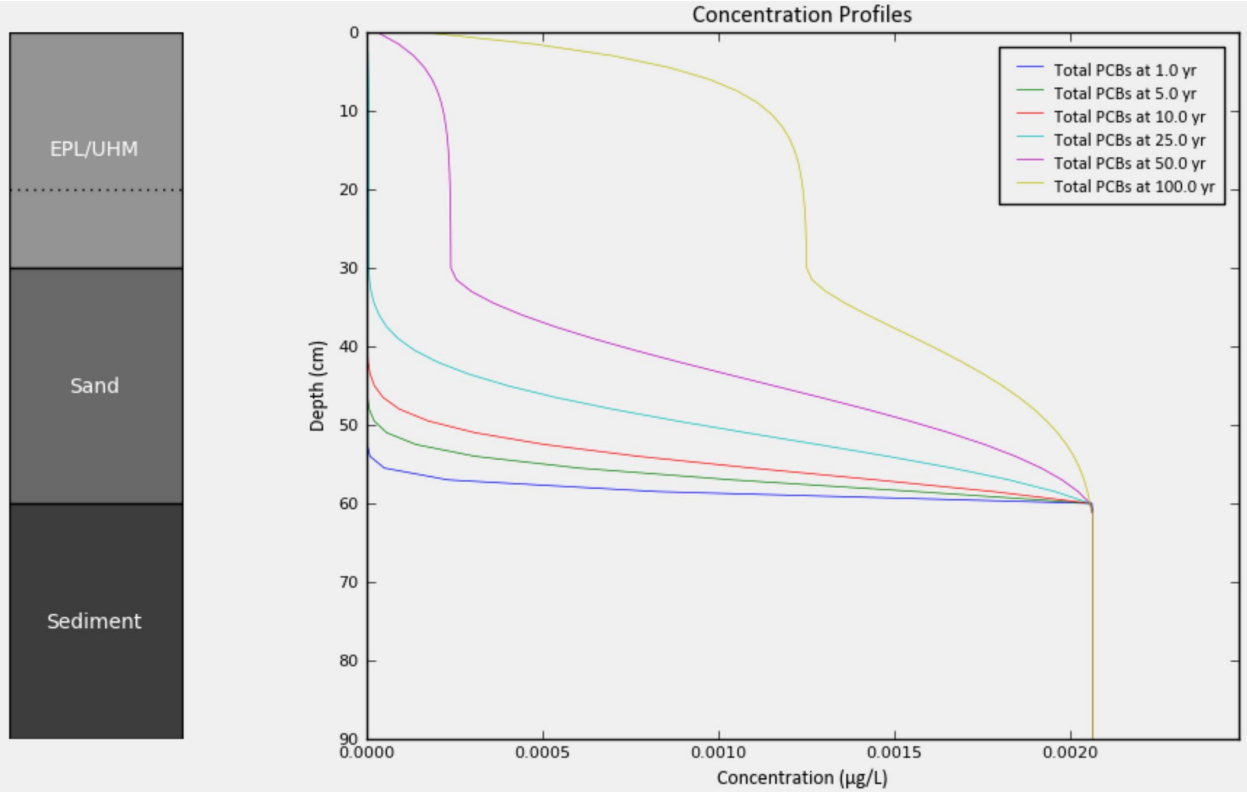

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
1e−7
TCDD at 1.0 yr
TCDD at 5.0 yr
TCDD at 10.0 yr
TCDD at 25.0 yr
TCDD at 50.0 yr
TCDD at 100.0 yr

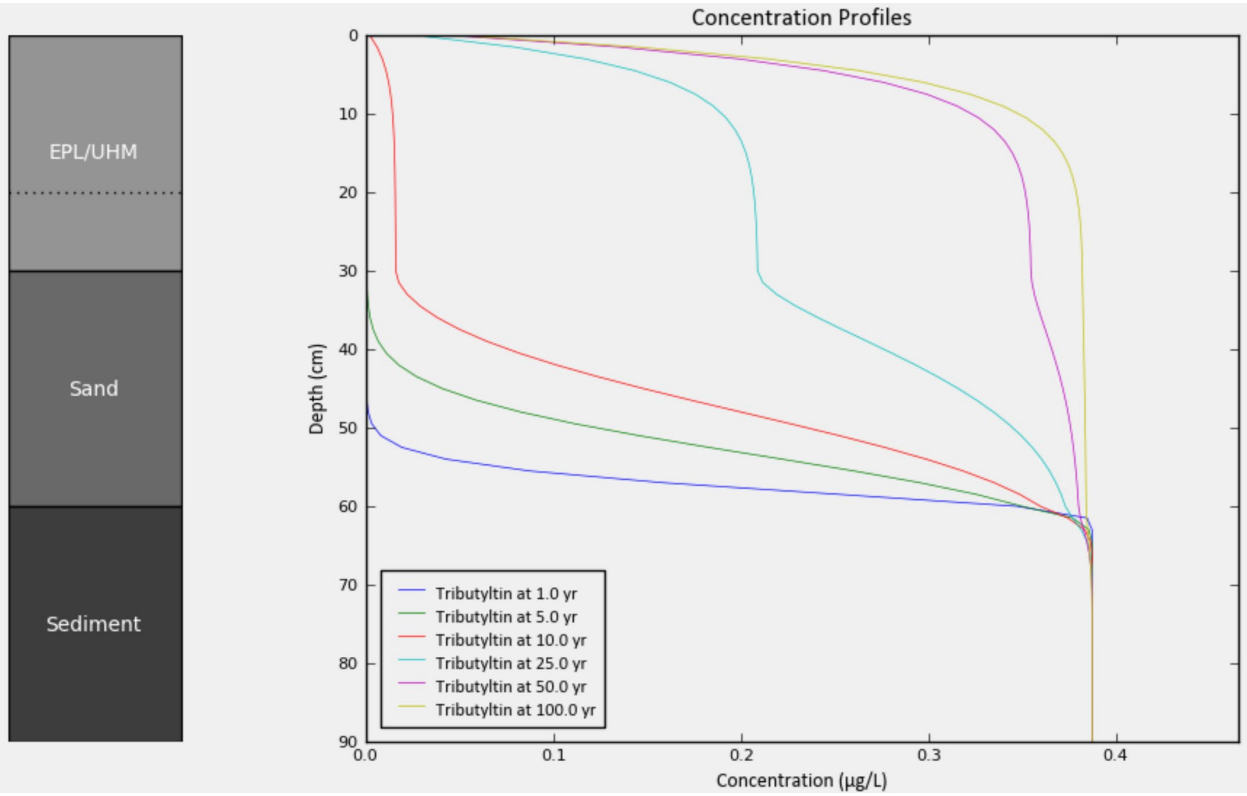

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
1e−8
TCDF at 1.0 yr
TCDF at 5.0 yr
TCDF at 10.0 yr
TCDF at 25.0 yr
TCDF at 50.0 yr
TCDF at 100.0 yr

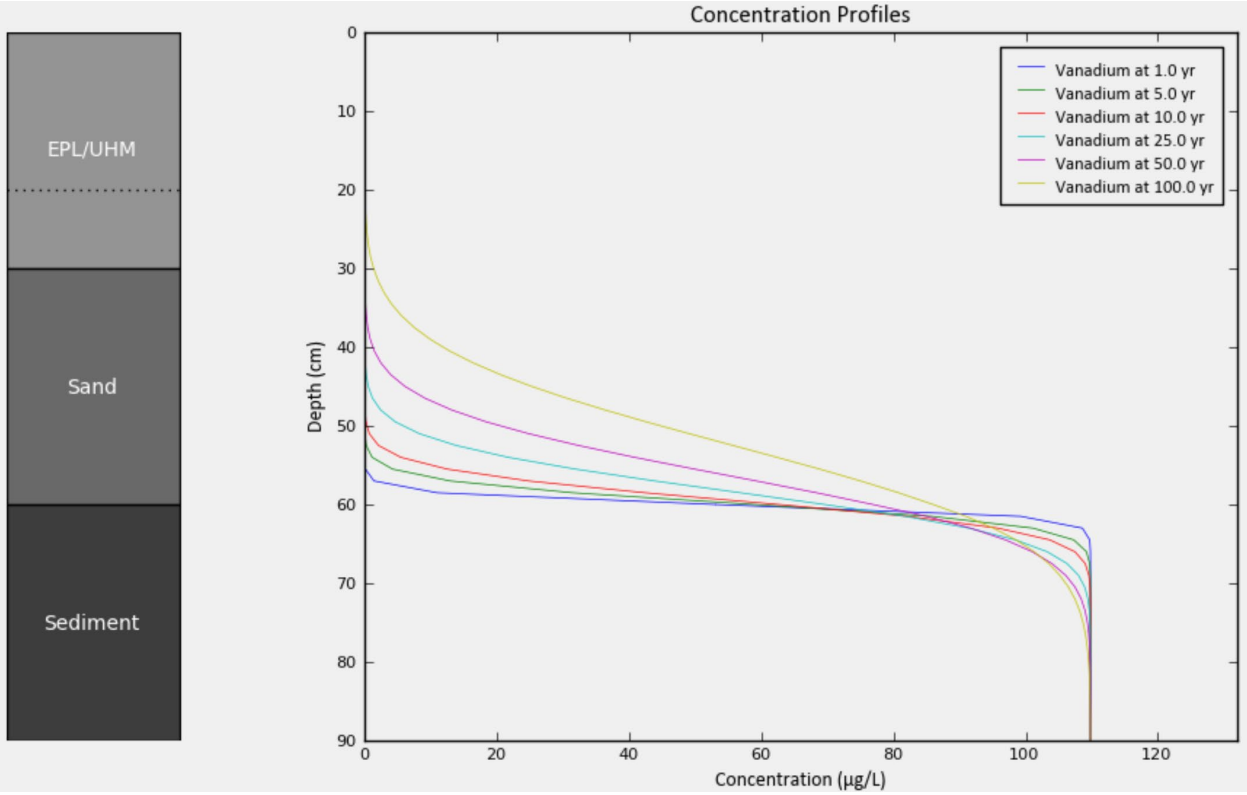

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Total cPAHs (BaP Eq) at 1.0 yr
Total cPAHs (BaP Eq) at 5.0 yr
Total cPAHs (BaP Eq) at 10.0 yr
Total cPAHs (BaP Eq) at 25.0 yr
Total cPAHs (BaP Eq) at 50.0 yr
Total cPAHs (BaP Eq) at 100.0 yr

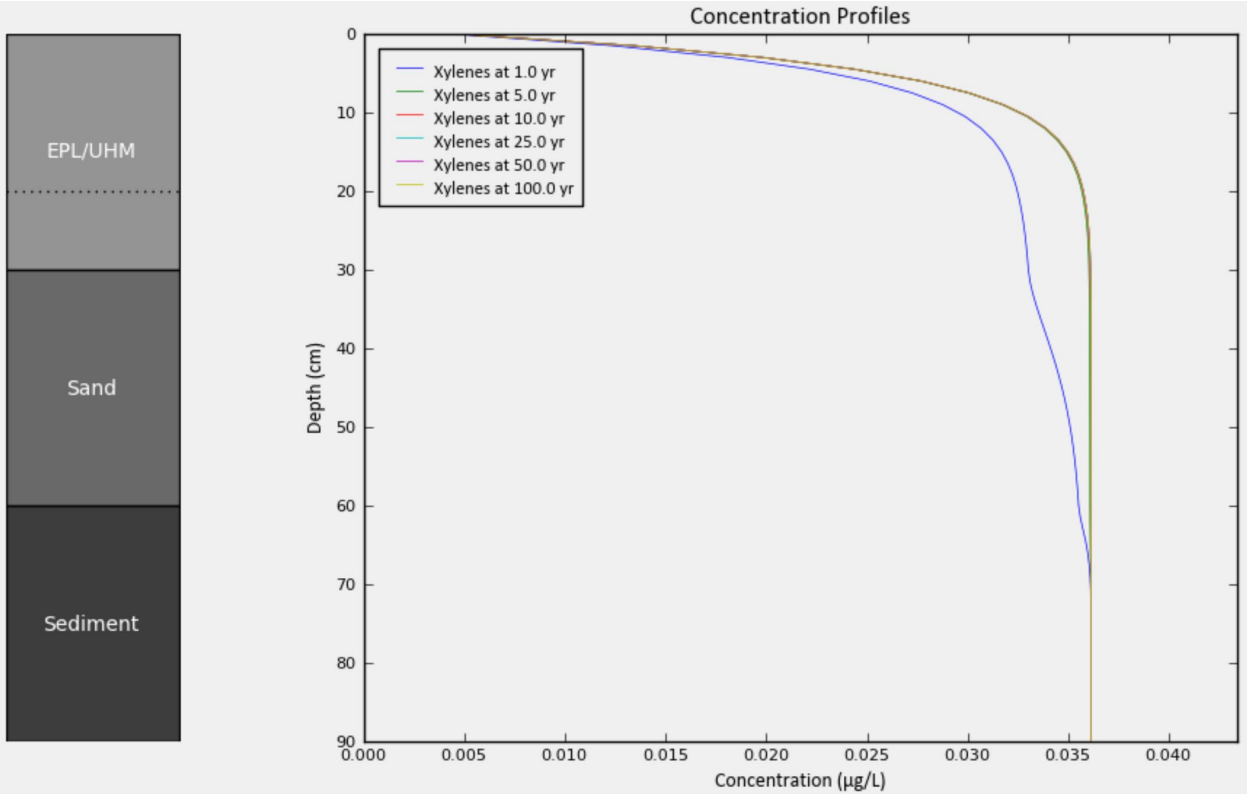

EPL/UHM
Sand
Sediment
Concentration Profiles
Total DioxinFuran at 1.0 yr
Total DioxinFuran at 5.0 yr
Total DioxinFuran at 10.0 yr
Total DioxinFuran at 25.0 yr
Total DioxinFuran at 50.0 yr
Total DioxinFuran at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

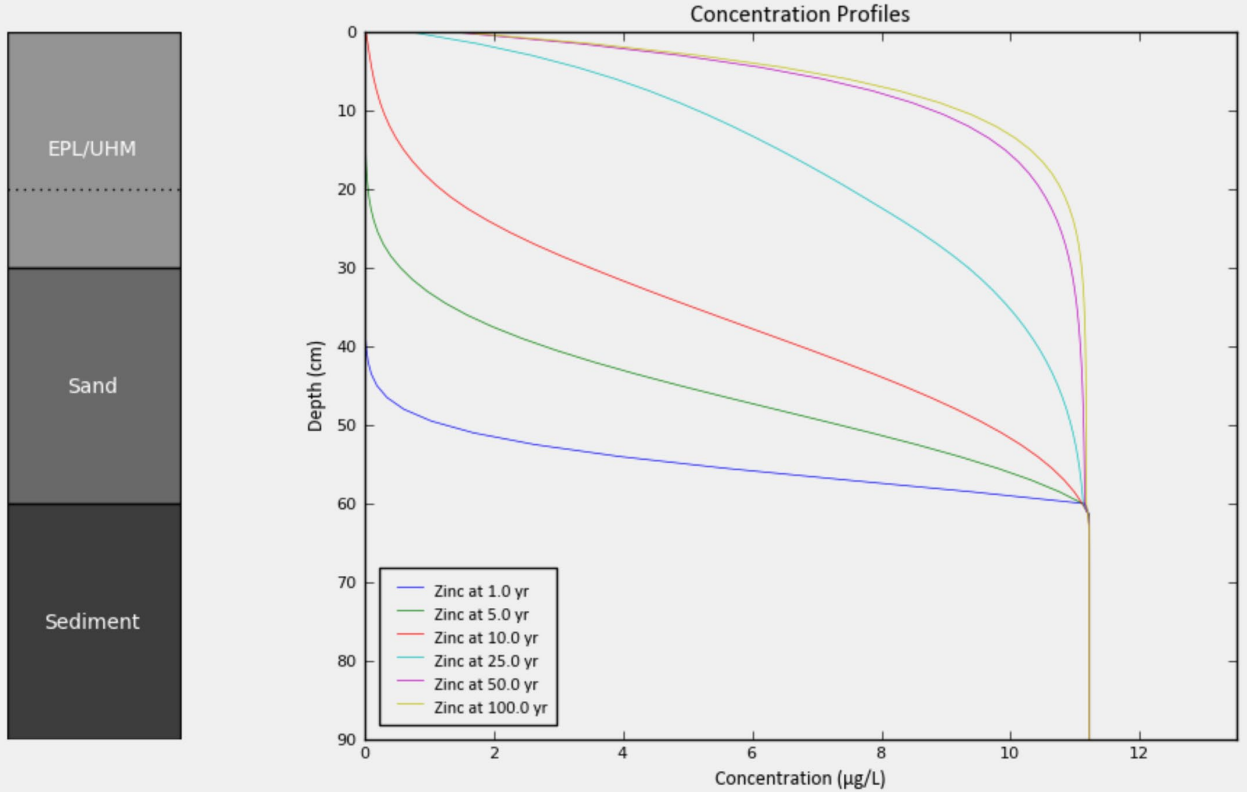

EPL/UHM
Sand
Sediment
Concentration Profiles
Total PAHs at 1.0 yr
Total PAHs at 5.0 yr
Total PAHs at 10.0 yr
Total PAHs at 25.0 yr
Total PAHs at 50.0 yr
Total PAHs at 100.0 yr
Depth (cm)
Concentration (µg/L)


EPL/UHM
Sand
Sediment
Concentration Profiles
Total PCBs at 1.0 yr
Total PCBs at 5.0 yr
Total PCBs at 10.0 yr
Total PCBs at 25.0 yr
Total PCBs at 50.0 yr
Total PCBs at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020

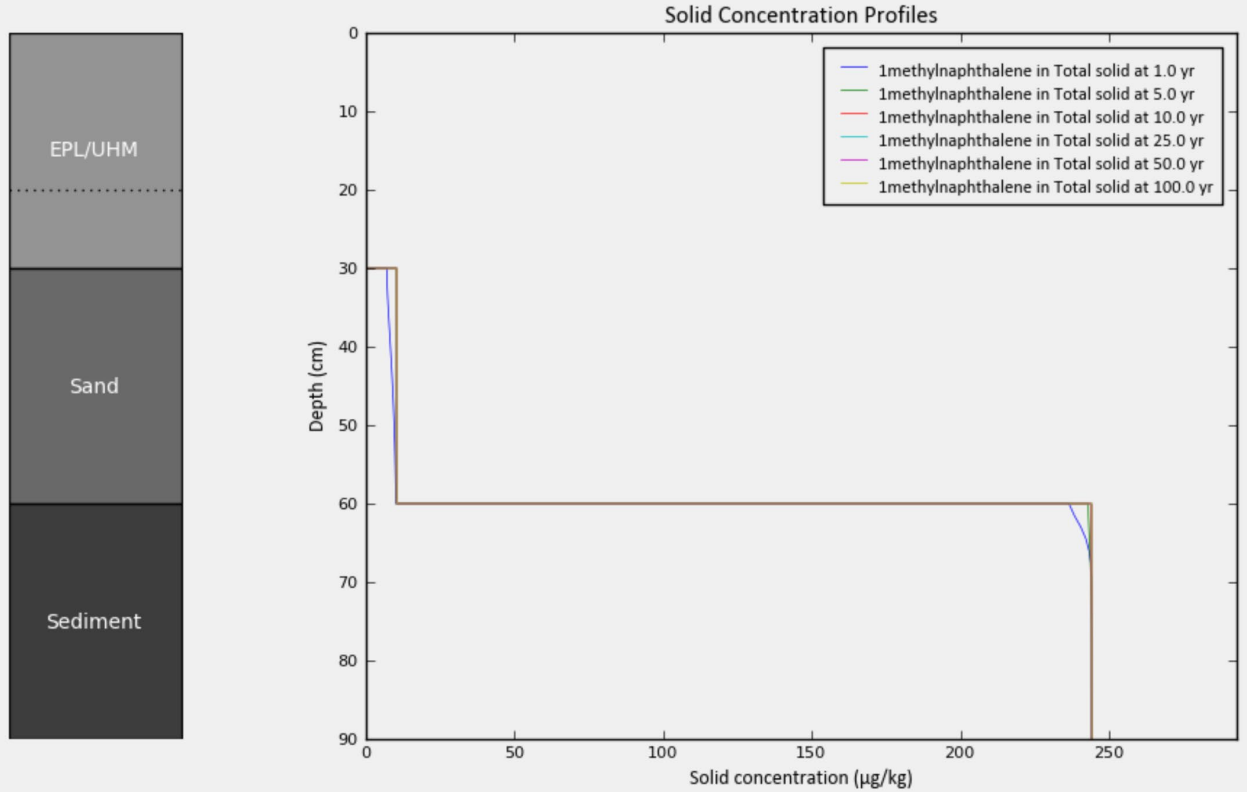

EPL/UHM
Sand
Sediment
Concentration Profiles
Tributyltin at 1.0 yr
Tributyltin at 5.0 yr
Tributyltin at 10.0 yr
Tributyltin at 25.0 yr
Tributyltin at 50.0 yr
Tributyltin at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.0
0.1
0.2
0.3
0.4

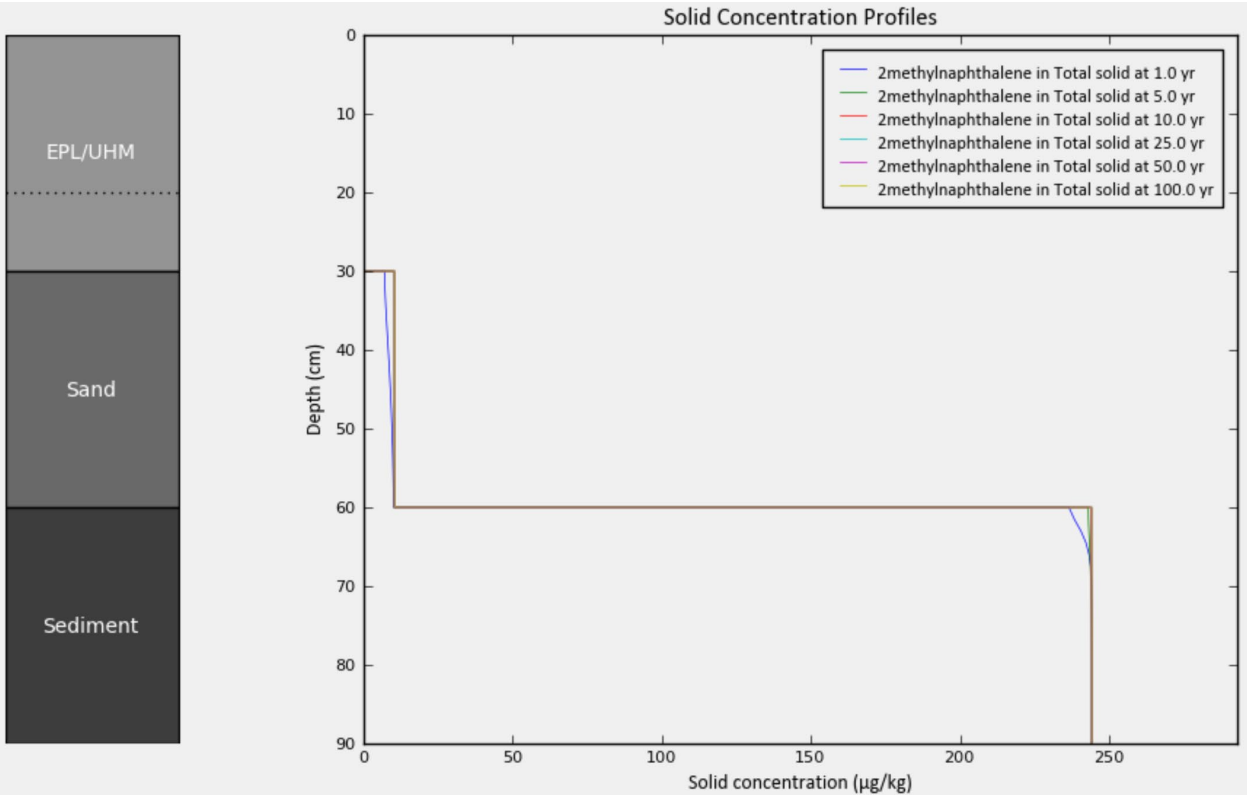

EPL/UHM
Sand
Sediment
Concentration Profiles
Vanadium at 1.0 yr
Vanadium at 5.0 yr
Vanadium at 10.0 yr
Vanadium at 25.0 yr
Vanadium at 50.0 yr
Vanadium at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80
100
120

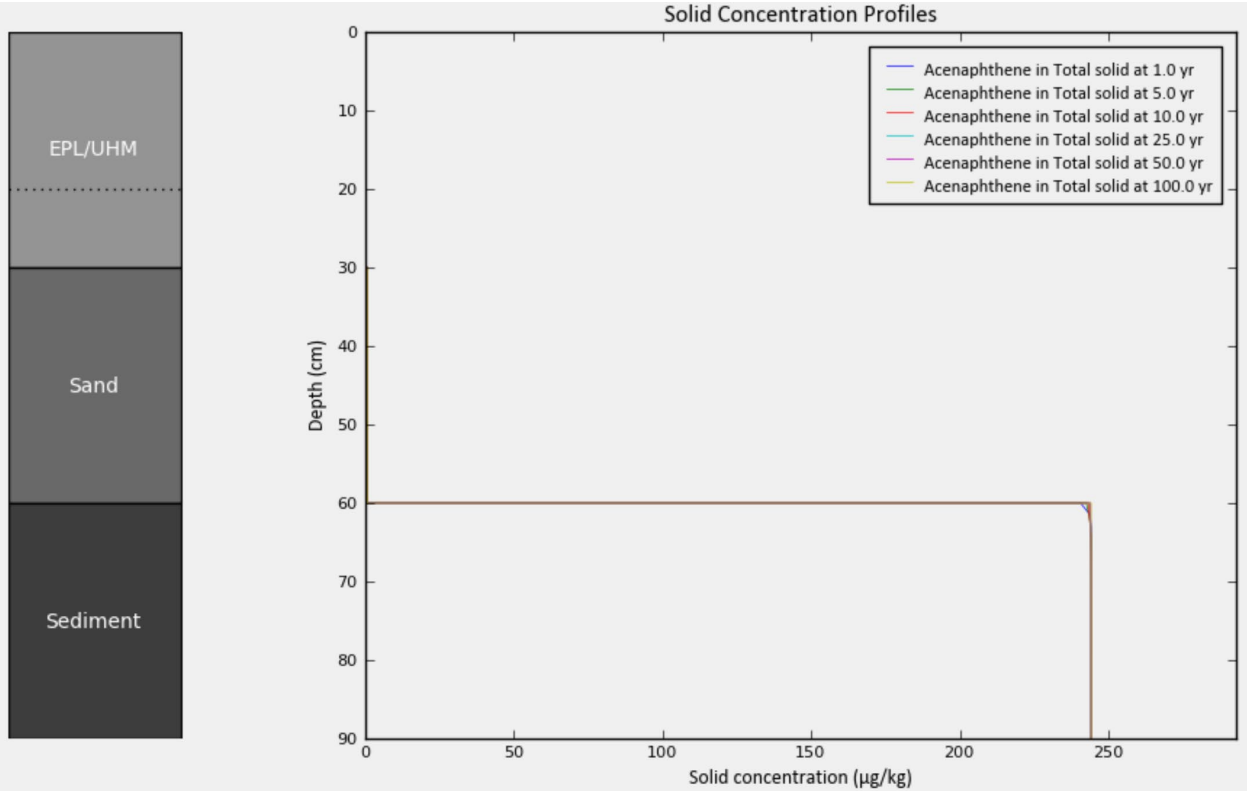

EPL/UHM
Sand
Sediment
Concentration Profiles
Xylenes at 1.0 yr
Xylenes at 5.0 yr
Xylenes at 10.0 yr
Xylenes at 25.0 yr
Xylenes at 50.0 yr
Xylenes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040

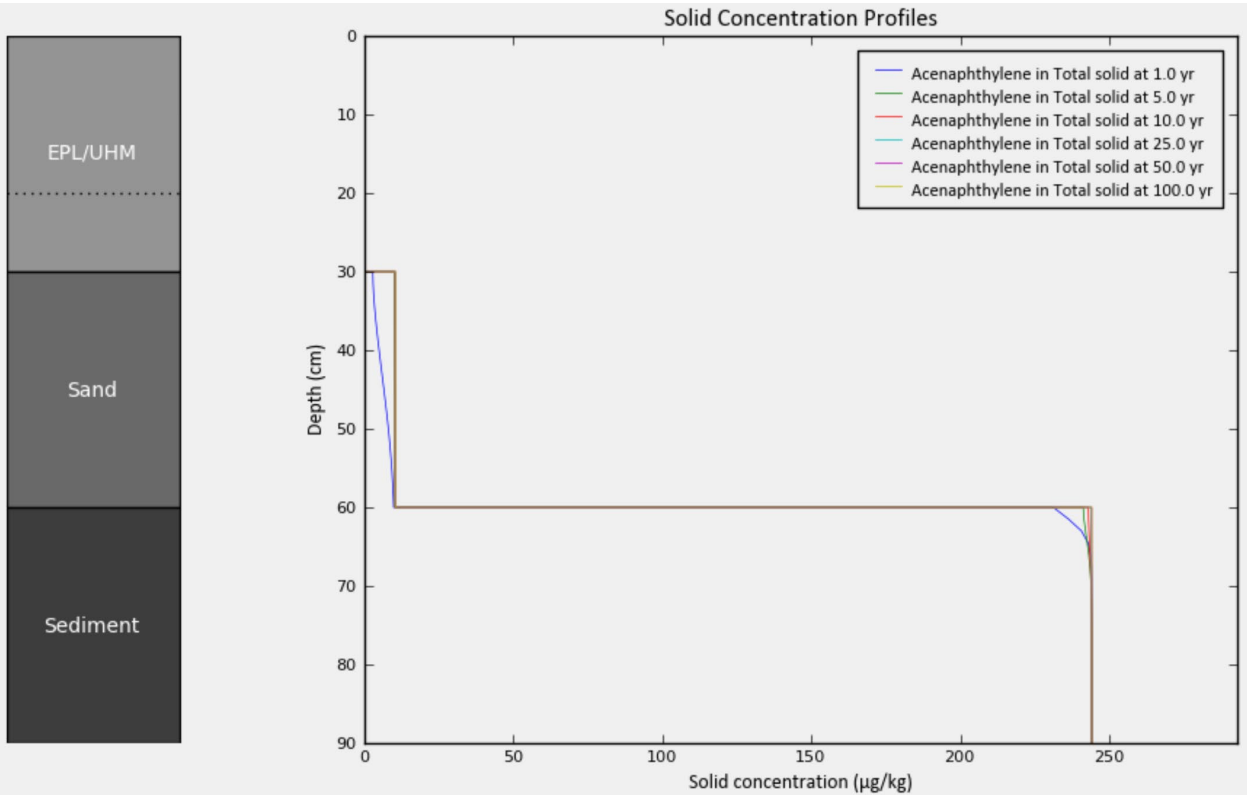

EPL/UHM
Sand
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
2
4
6
8
10
12
Zinc at 1.0 yr
Zinc at 5.0 yr
Zinc at 10.0 yr
Zinc at 25.0 yr
Zinc at 50.0 yr
Zinc at 100.0 yr

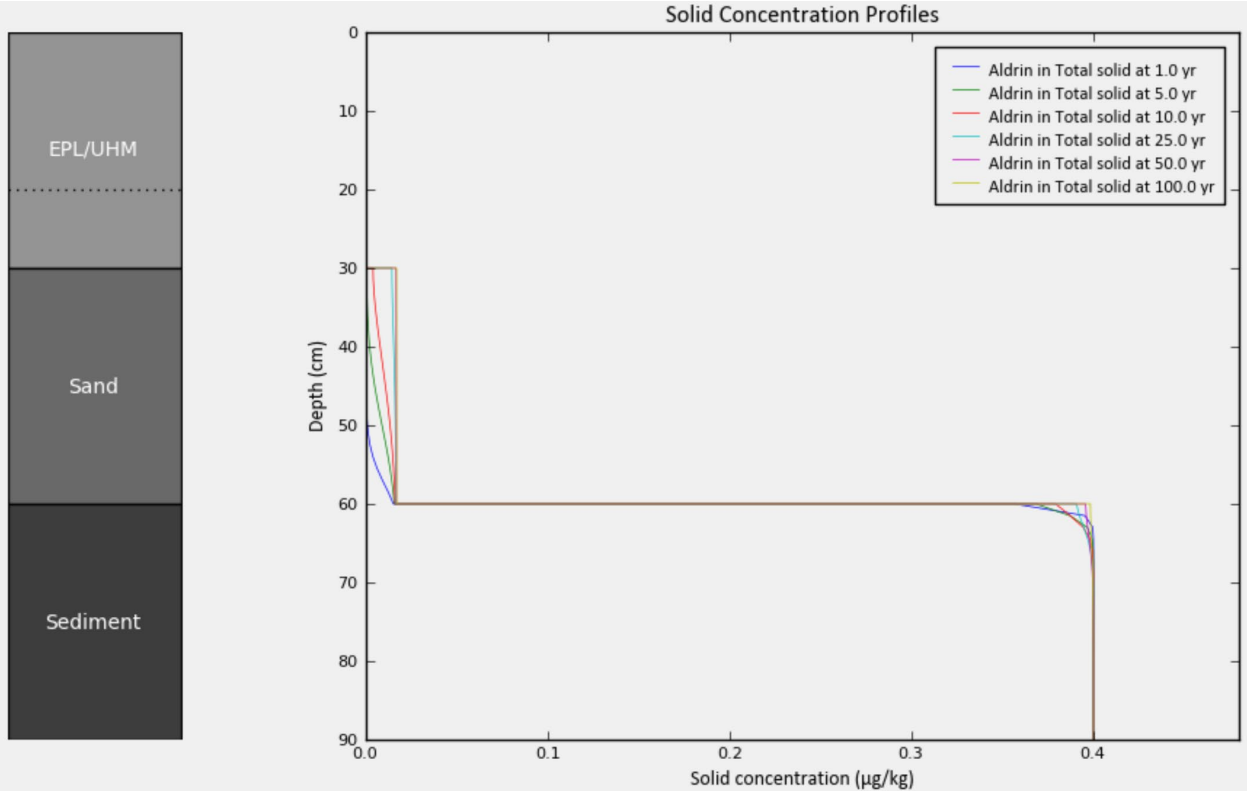
Total Solids Concentration – Depth

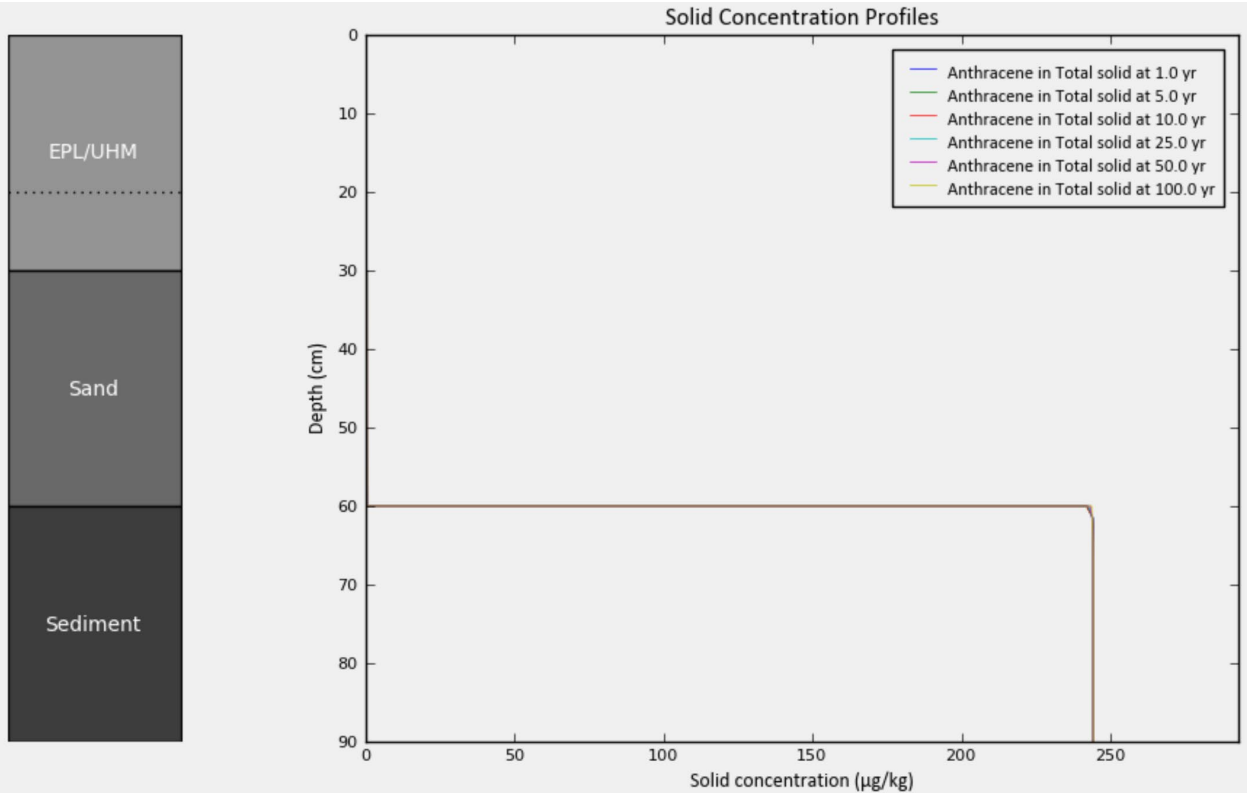


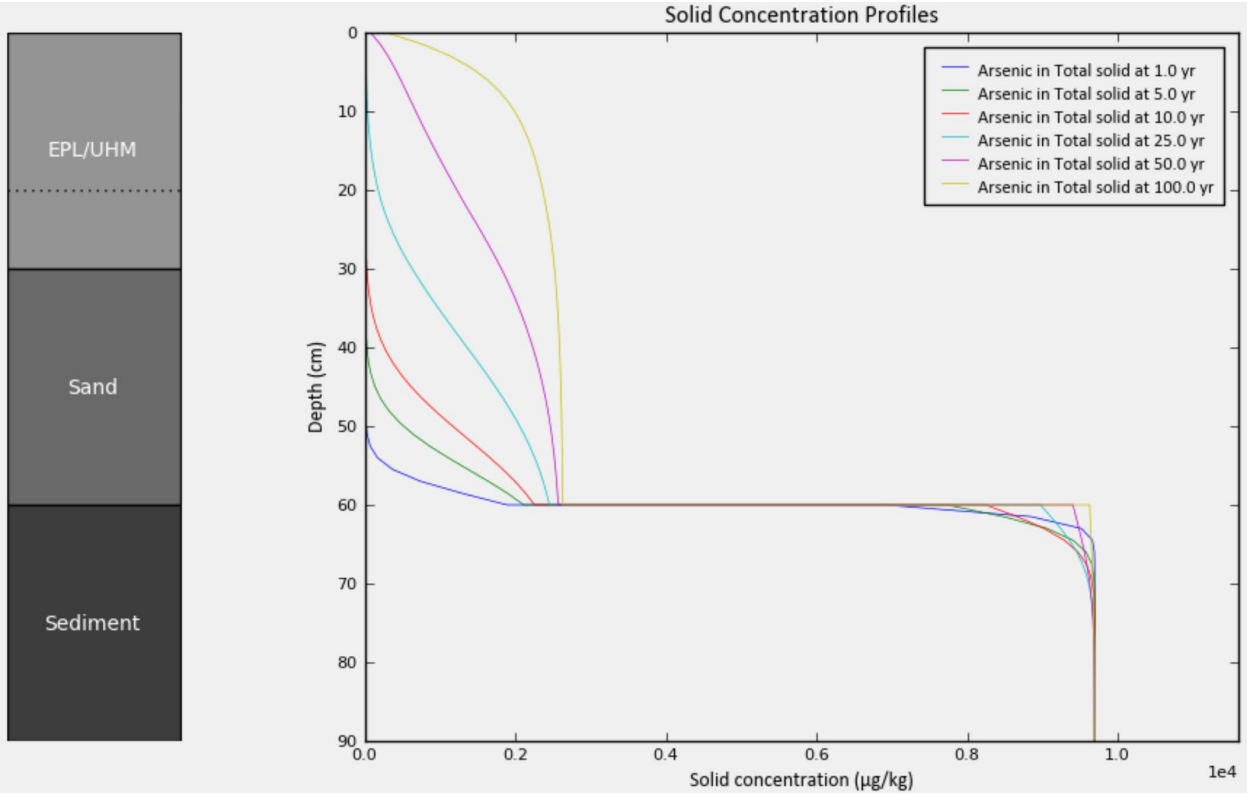


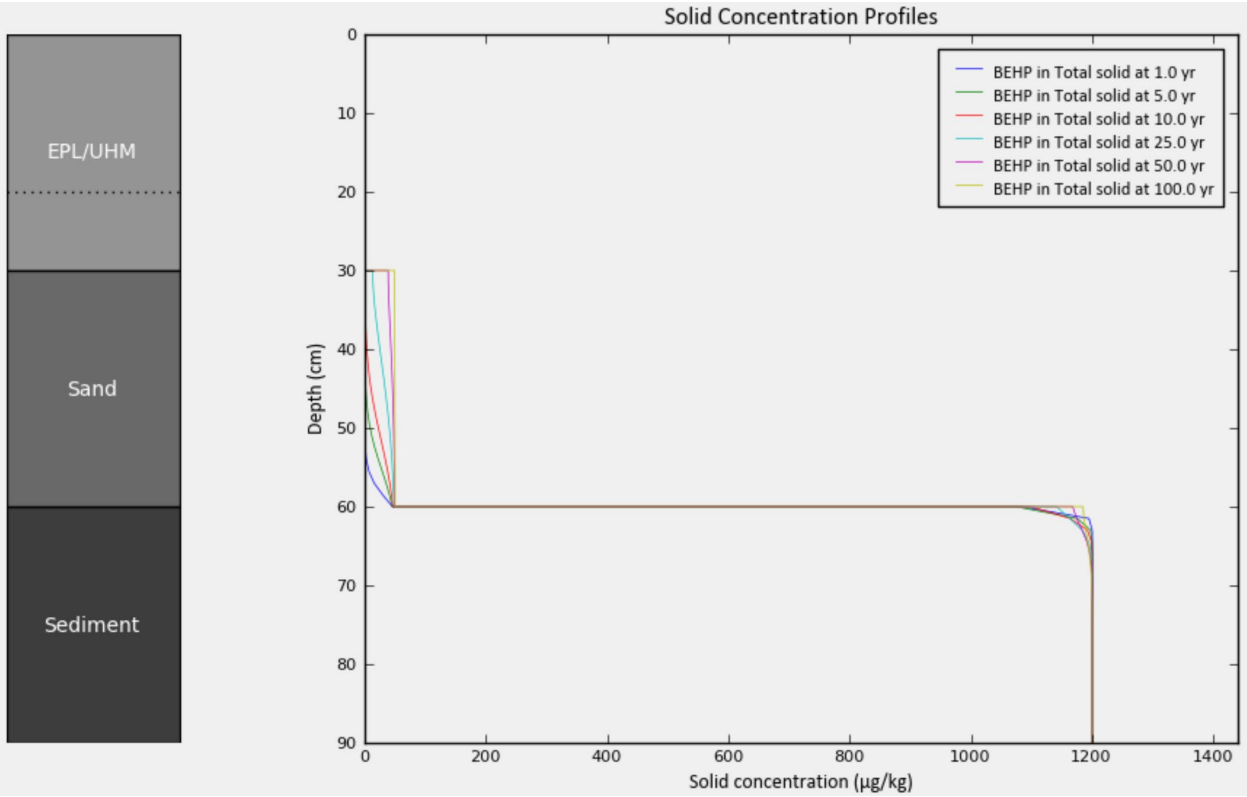

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Acenaphthene in Total solid at 1.0 yr
Acenaphthene in Total solid at 5.0 yr
Acenaphthene in Total solid at 10.0 yr
Acenaphthene in Total solid at 25.0 yr
Acenaphthene in Total solid at 50.0 yr
Acenaphthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

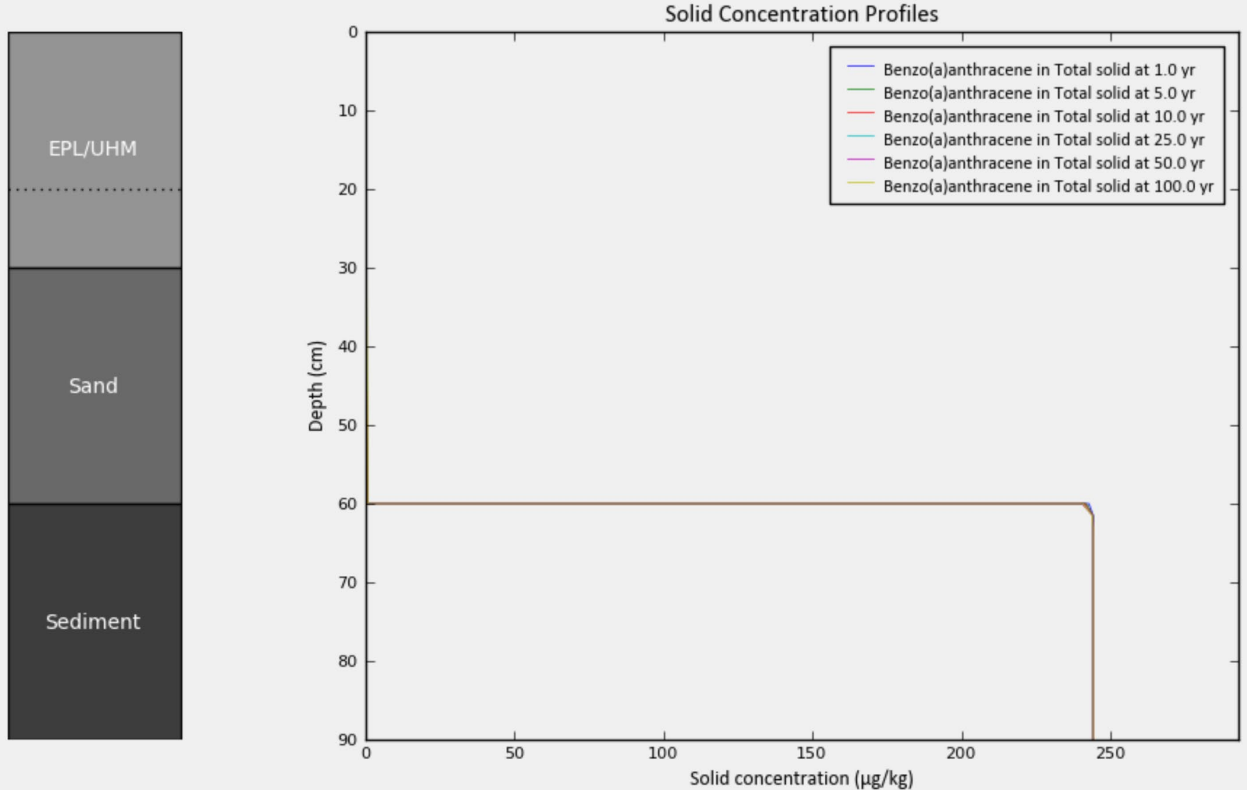

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Acenaphthylene in Total solid at 1.0 yr
Acenaphthylene in Total solid at 5.0 yr
Acenaphthylene in Total solid at 10.0 yr
Acenaphthylene in Total solid at 25.0 yr
Acenaphthylene in Total solid at 50.0 yr
Acenaphthylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

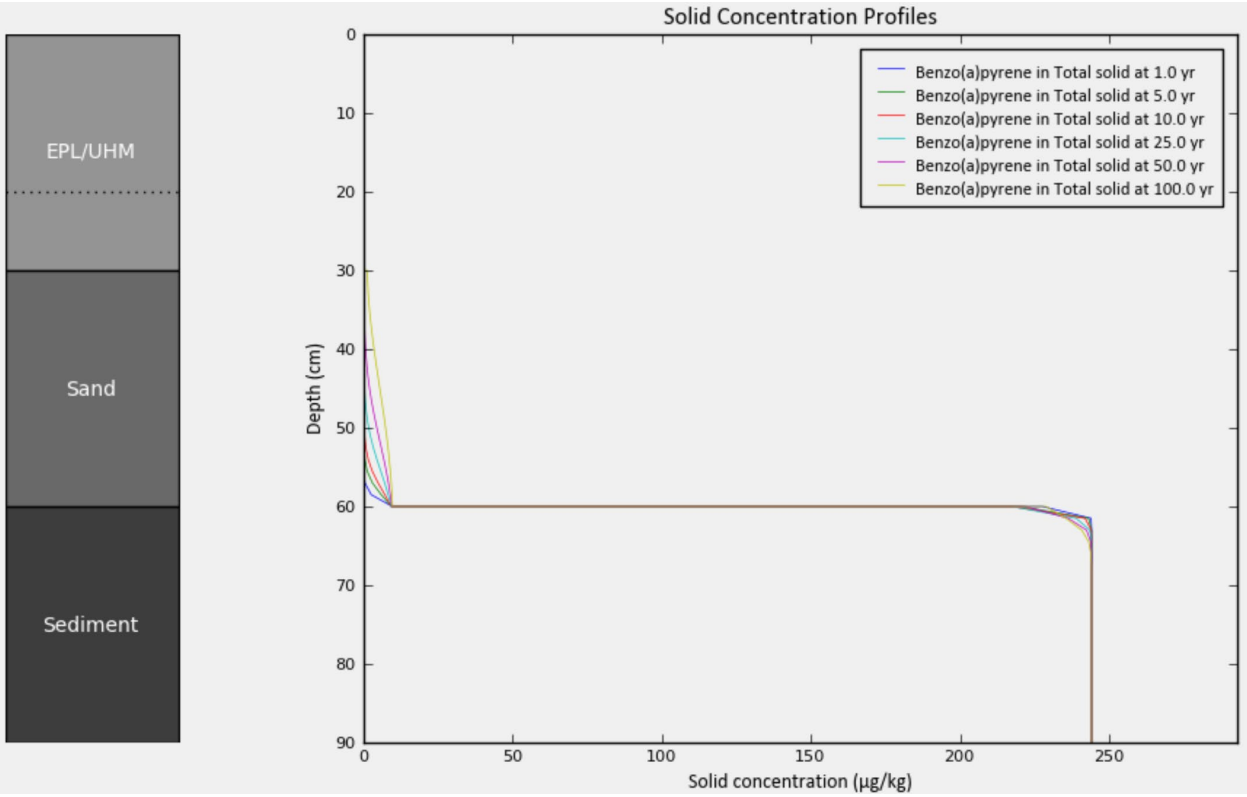

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Aldrin in Total solid at 1.0 yr
Aldrin in Total solid at 5.0 yr
Aldrin in Total solid at 10.0 yr
Aldrin in Total solid at 25.0 yr
Aldrin in Total solid at 50.0 yr
Aldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

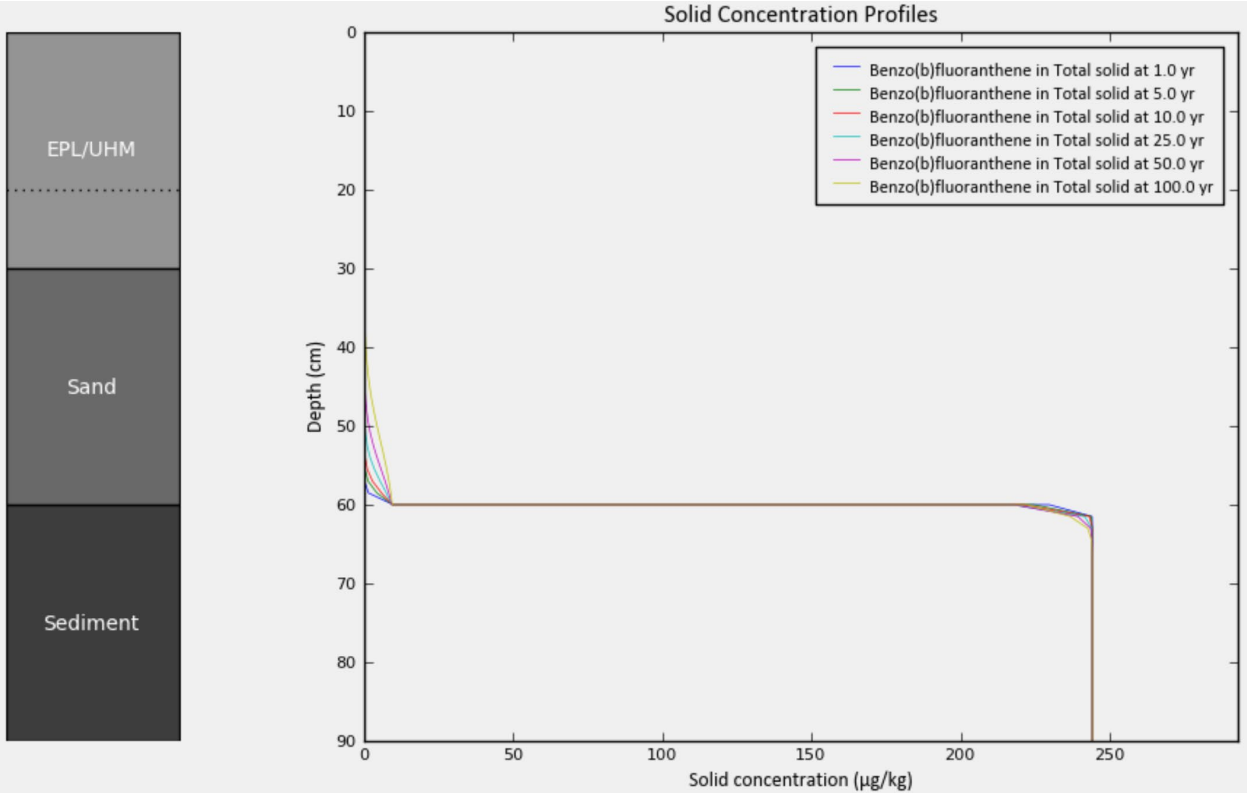

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Anthracene in Total solid at 1.0 yr
Anthracene in Total solid at 5.0 yr
Anthracene in Total solid at 10.0 yr
Anthracene in Total solid at 25.0 yr
Anthracene in Total solid at 50.0 yr
Anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

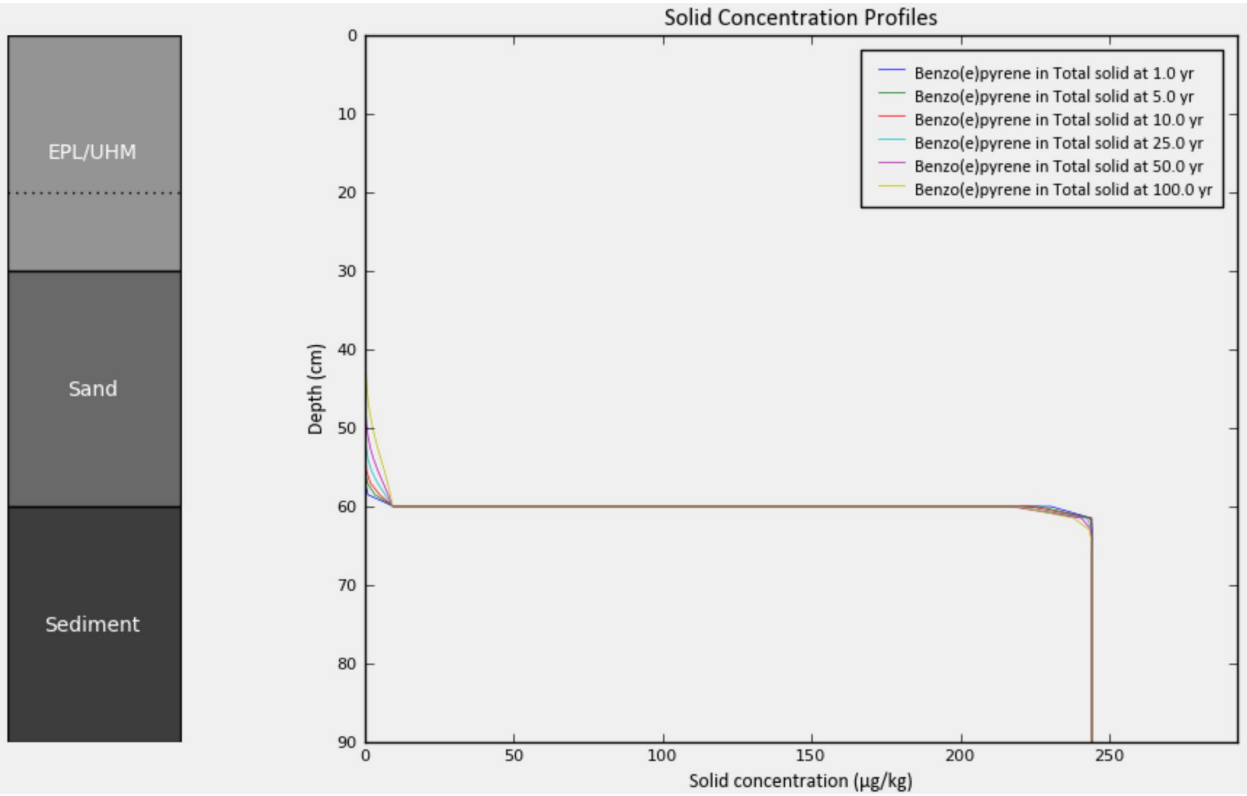

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Arsenic in Total solid at 1.0 yr
Arsenic in Total solid at 5.0 yr
Arsenic in Total solid at 10.0 yr
Arsenic in Total solid at 25.0 yr
Arsenic in Total solid at 50.0 yr
Arsenic in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

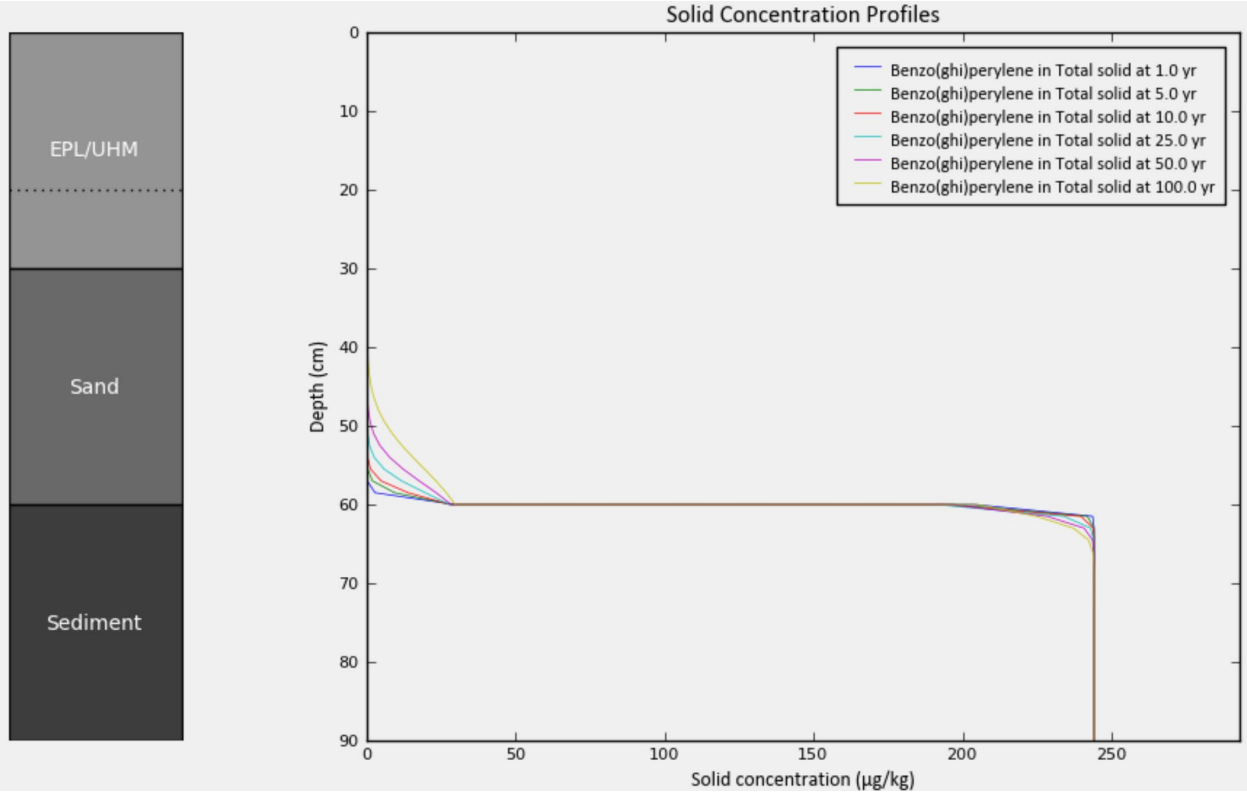

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
BEHP in Total solid at 1.0 yr
BEHP in Total solid at 5.0 yr
BEHP in Total solid at 10.0 yr
BEHP in Total solid at 25.0 yr
BEHP in Total solid at 50.0 yr
BEHP in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

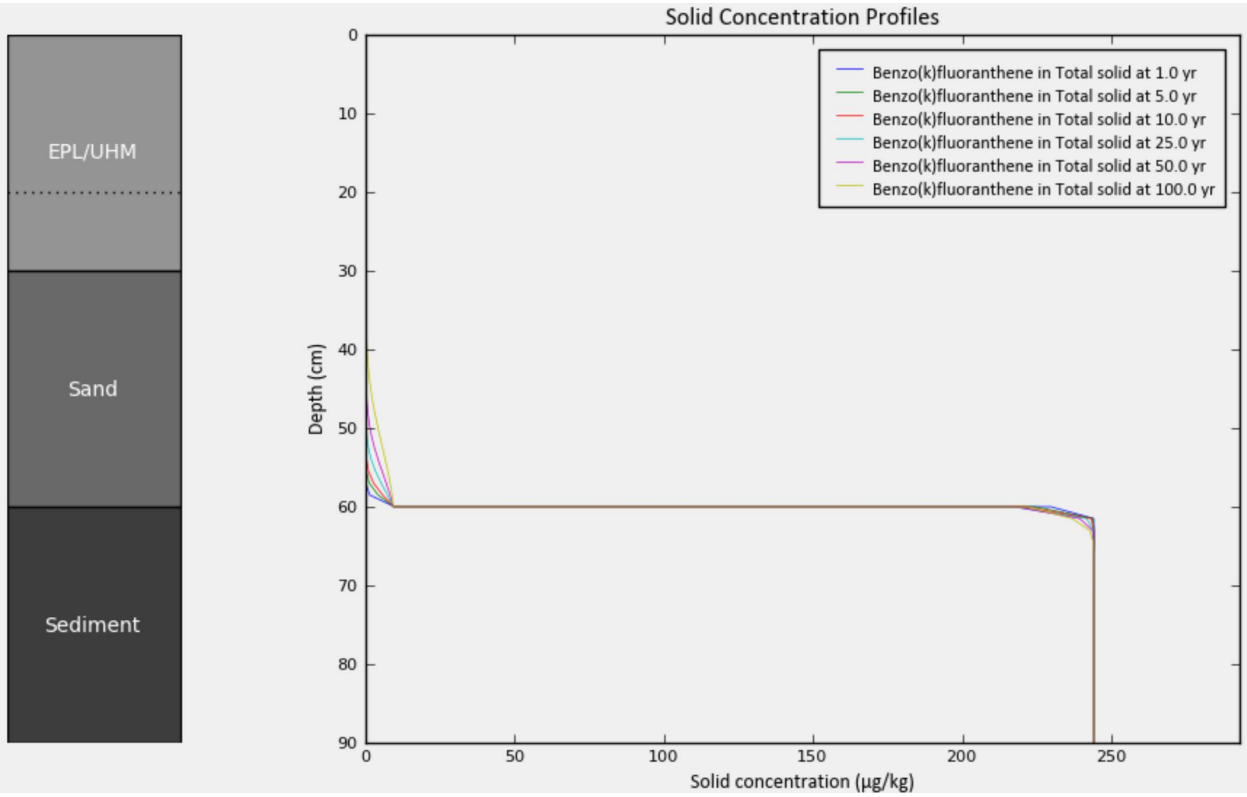

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Benzo(a)anthracene in Total solid at 1.0 yr
Benzo(a)anthracene in Total solid at 5.0 yr
Benzo(a)anthracene in Total solid at 10.0 yr
Benzo(a)anthracene in Total solid at 25.0 yr
Benzo(a)anthracene in Total solid at 50.0 yr
Benzo(a)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
50
100
150
200
250

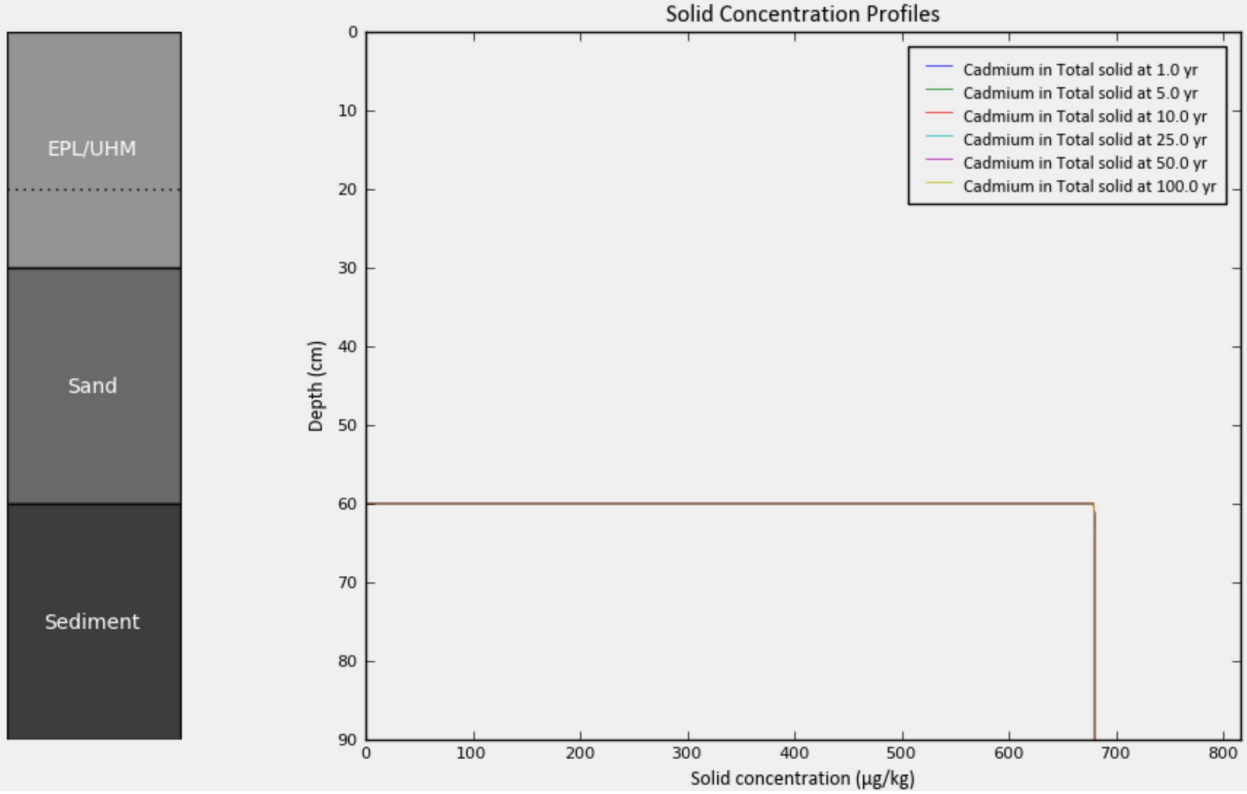

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Benzo(a)pyrene in Total solid at 1.0 yr
Benzo(a)pyrene in Total solid at 5.0 yr
Benzo(a)pyrene in Total solid at 10.0 yr
Benzo(a)pyrene in Total solid at 25.0 yr
Benzo(a)pyrene in Total solid at 50.0 yr
Benzo(a)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
50
100
150
200
250

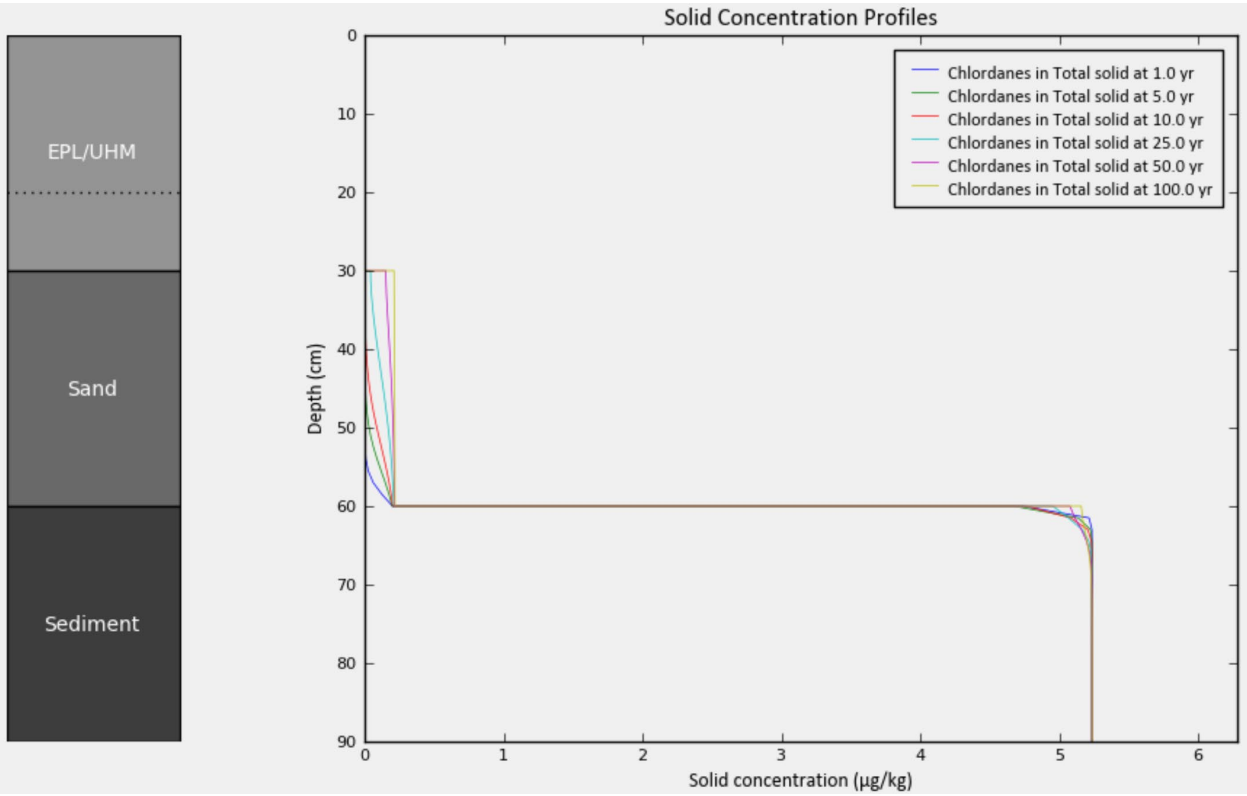

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Benzo(b)fluoranthene in Total solid at 1.0 yr
Benzo(b)fluoranthene in Total solid at 5.0 yr
Benzo(b)fluoranthene in Total solid at 10.0 yr
Benzo(b)fluoranthene in Total solid at 25.0 yr
Benzo(b)fluoranthene in Total solid at 50.0 yr
Benzo(b)fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

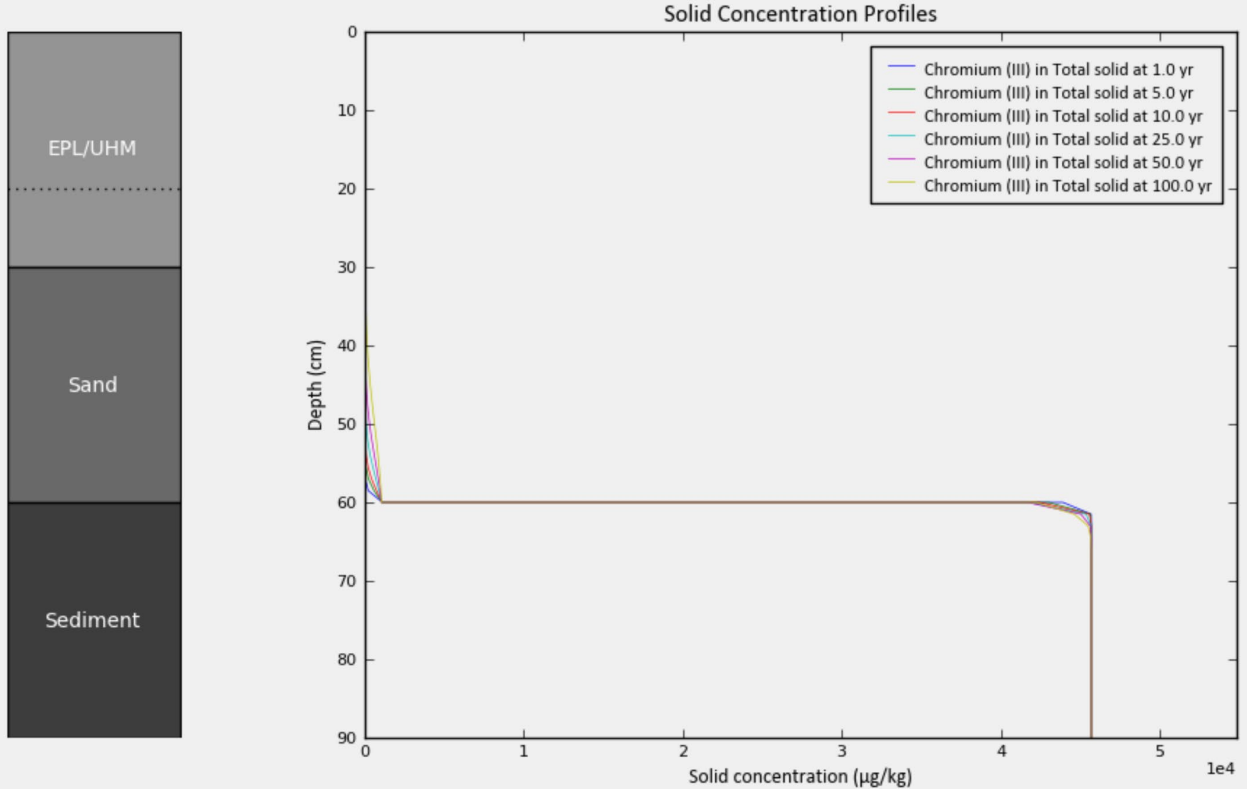

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Benzo(e)pyrene in Total solid at 1.0 yr
Benzo(e)pyrene in Total solid at 5.0 yr
Benzo(e)pyrene in Total solid at 10.0 yr
Benzo(e)pyrene in Total solid at 25.0 yr
Benzo(e)pyrene in Total solid at 50.0 yr
Benzo(e)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

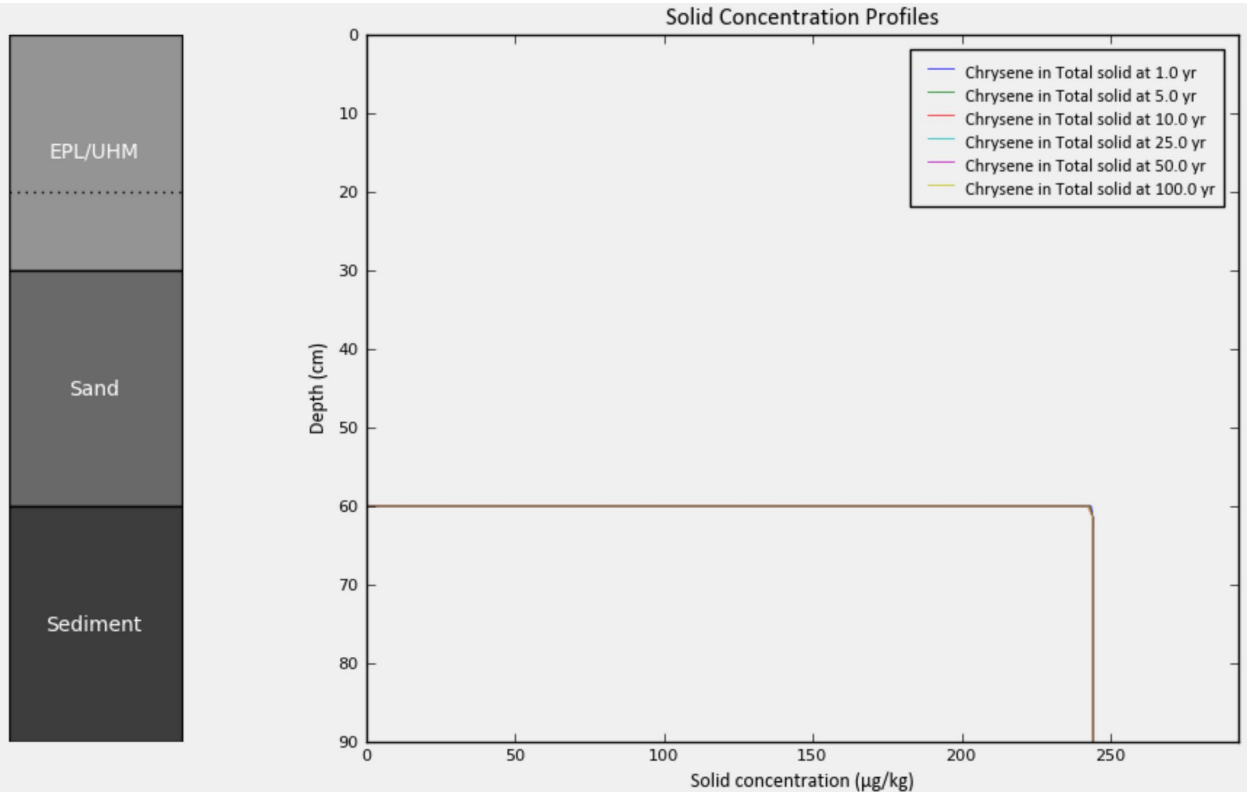

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Benzo(ghi)perylene in Total solid at 1.0 yr
Benzo(ghi)perylene in Total solid at 5.0 yr
Benzo(ghi)perylene in Total solid at 10.0 yr
Benzo(ghi)perylene in Total solid at 25.0 yr
Benzo(ghi)perylene in Total solid at 50.0 yr
Benzo(ghi)perylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

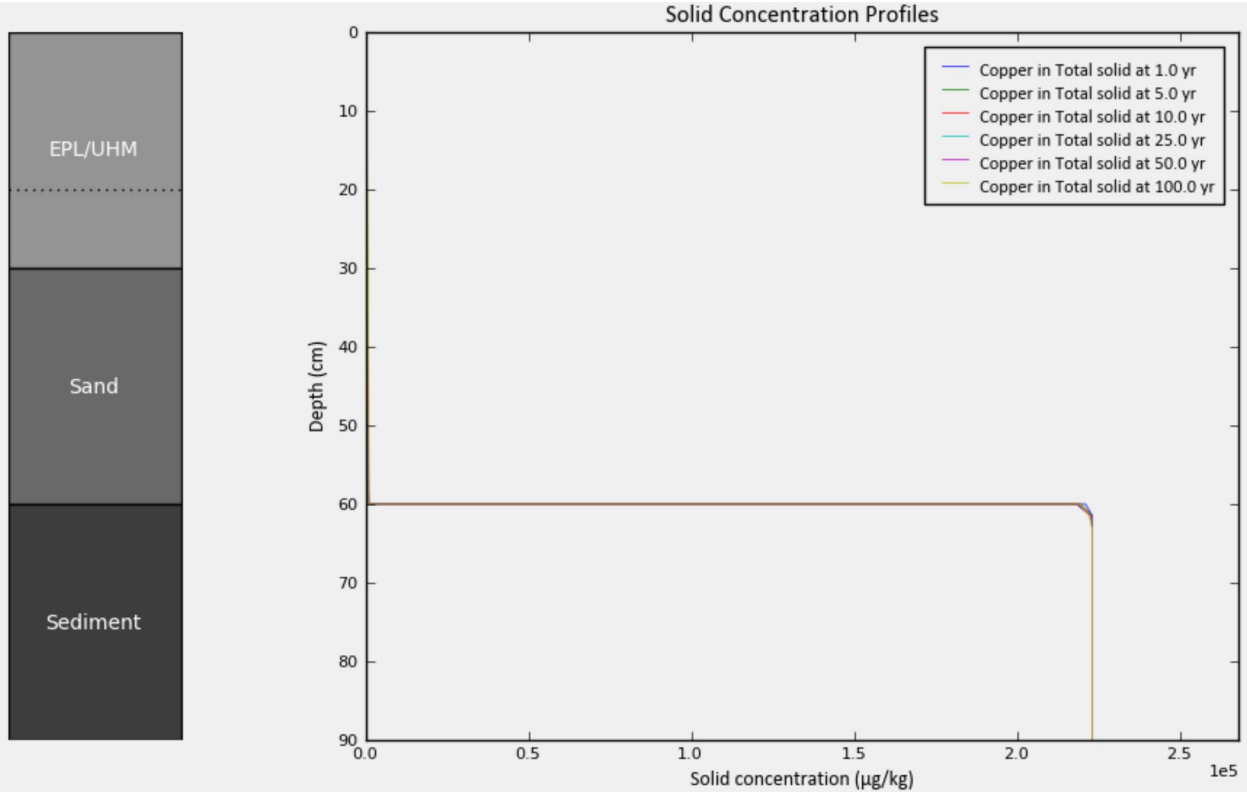

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Benzo(k)fluoranthene in Total solid at 1.0 yr
Benzo(k)fluoranthene in Total solid at 5.0 yr
Benzo(k)fluoranthene in Total solid at 10.0 yr
Benzo(k)fluoranthene in Total solid at 25.0 yr
Benzo(k)fluoranthene in Total solid at 50.0 yr
Benzo(k)fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

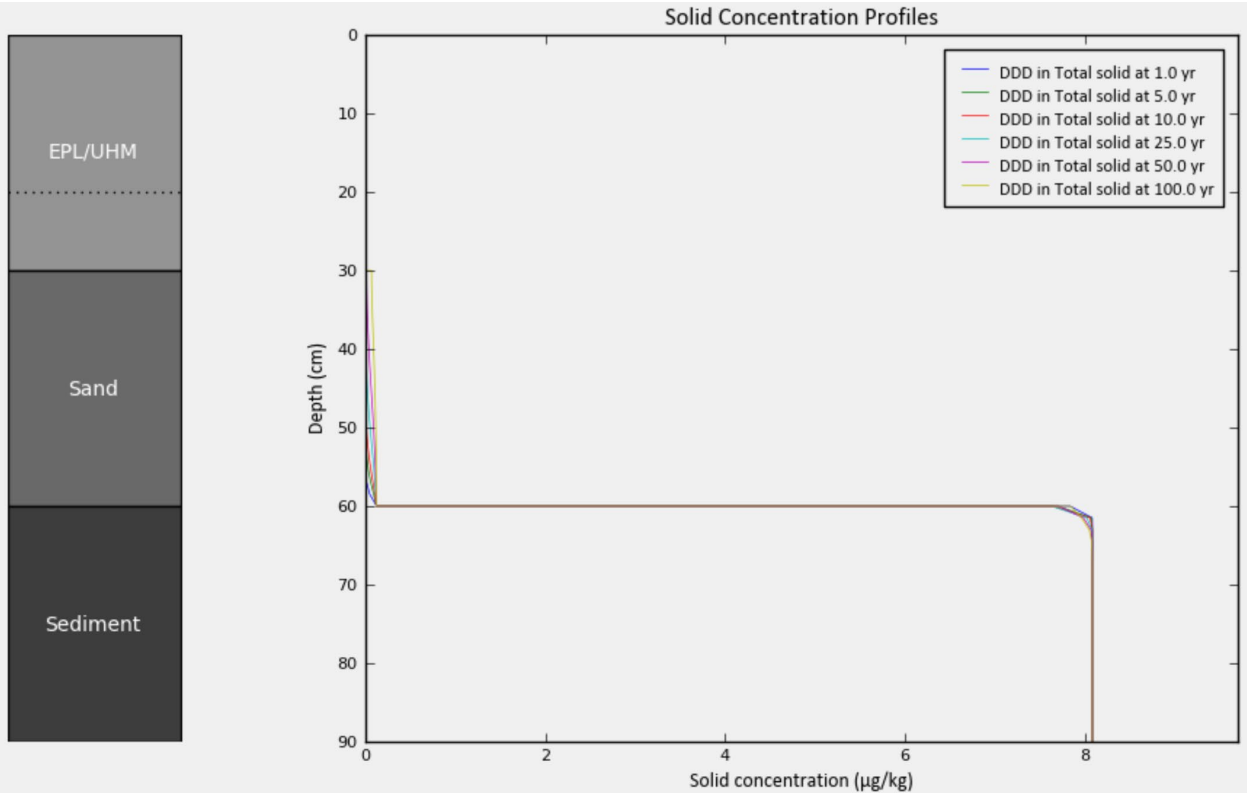

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Cadmium in Total solid at 1.0 yr
Cadmium in Total solid at 5.0 yr
Cadmium in Total solid at 10.0 yr
Cadmium in Total solid at 25.0 yr
Cadmium in Total solid at 50.0 yr
Cadmium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

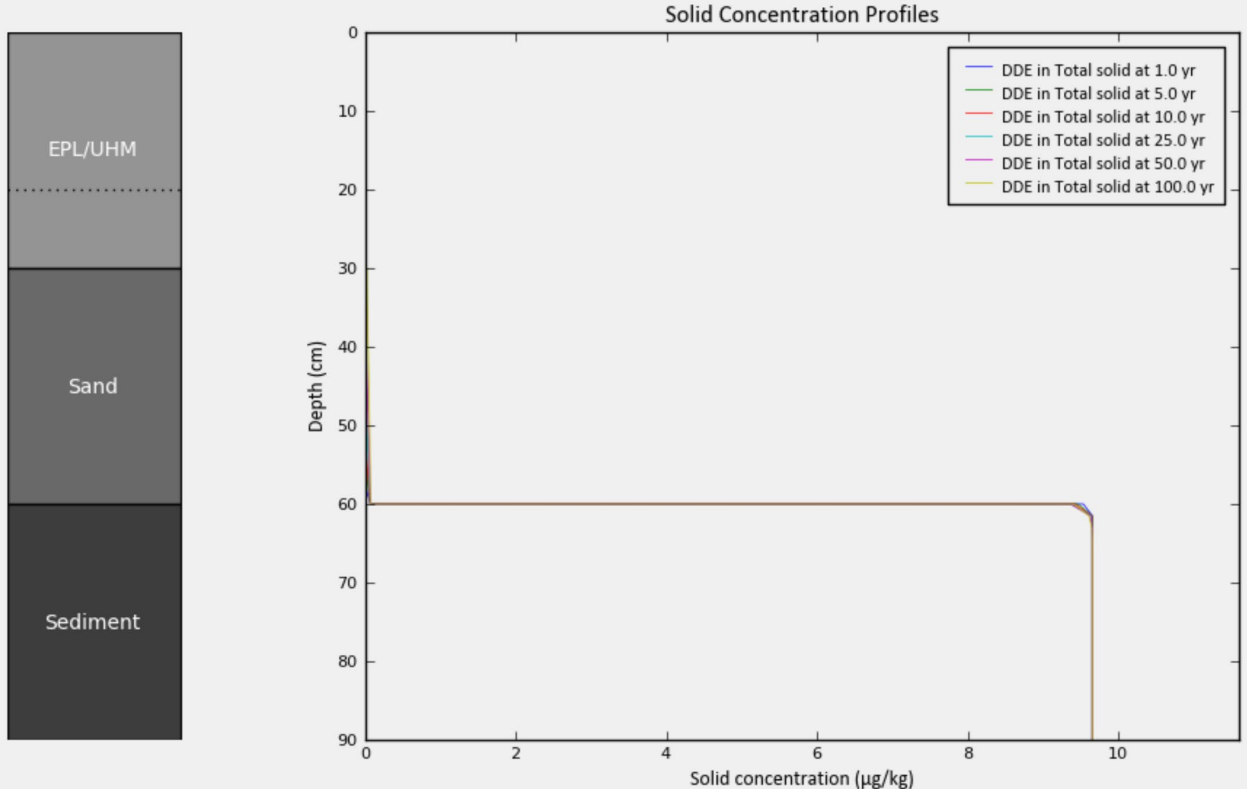

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Chlordanes in Total solid at 1.0 yr
Chlordanes in Total solid at 5.0 yr
Chlordanes in Total solid at 10.0 yr
Chlordanes in Total solid at 25.0 yr
Chlordanes in Total solid at 50.0 yr
Chlordanes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

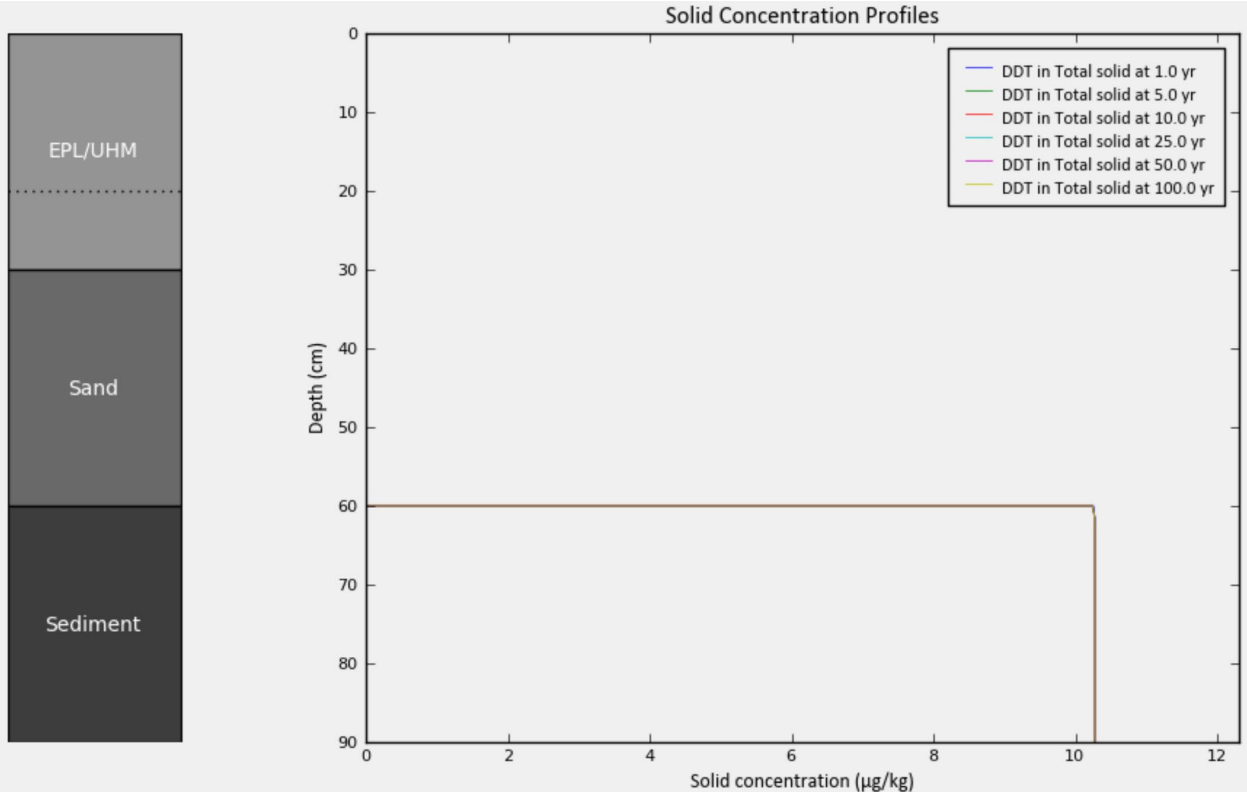

Solid Concentration Profiles
EPL/UHM
Sand
Sediment
Chromium (III) in Total solid at 1.0 yr
Chromium (III) in Total solid at 5.0 yr
Chromium (III) in Total solid at 10.0 yr
Chromium (III) in Total solid at 25.0 yr
Chromium (III) in Total solid at 50.0 yr
Chromium (III) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

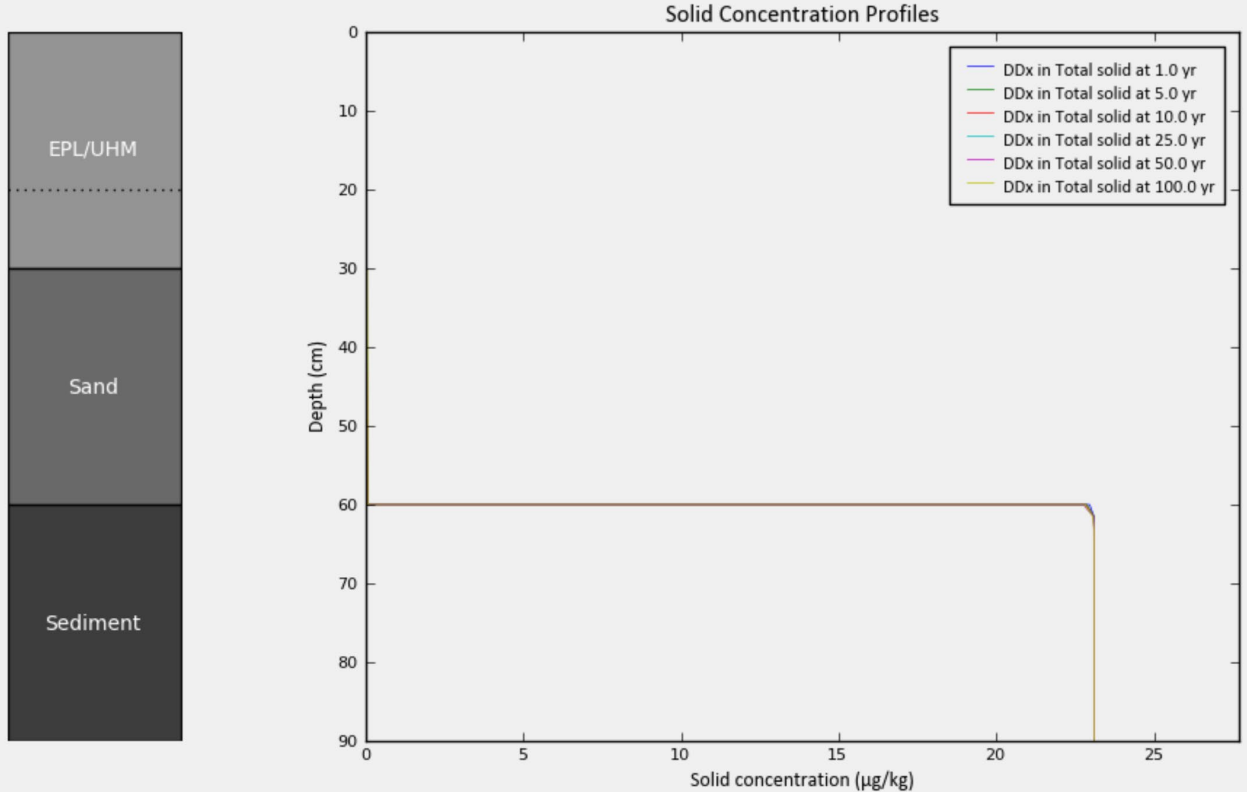

Solid Concentration Profiles
EPL/UHM
Sand
Sediment
Chrysene in Total solid at 1.0 yr
Chrysene in Total solid at 5.0 yr
Chrysene in Total solid at 10.0 yr
Chrysene in Total solid at 25.0 yr
Chrysene in Total solid at 50.0 yr
Chrysene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

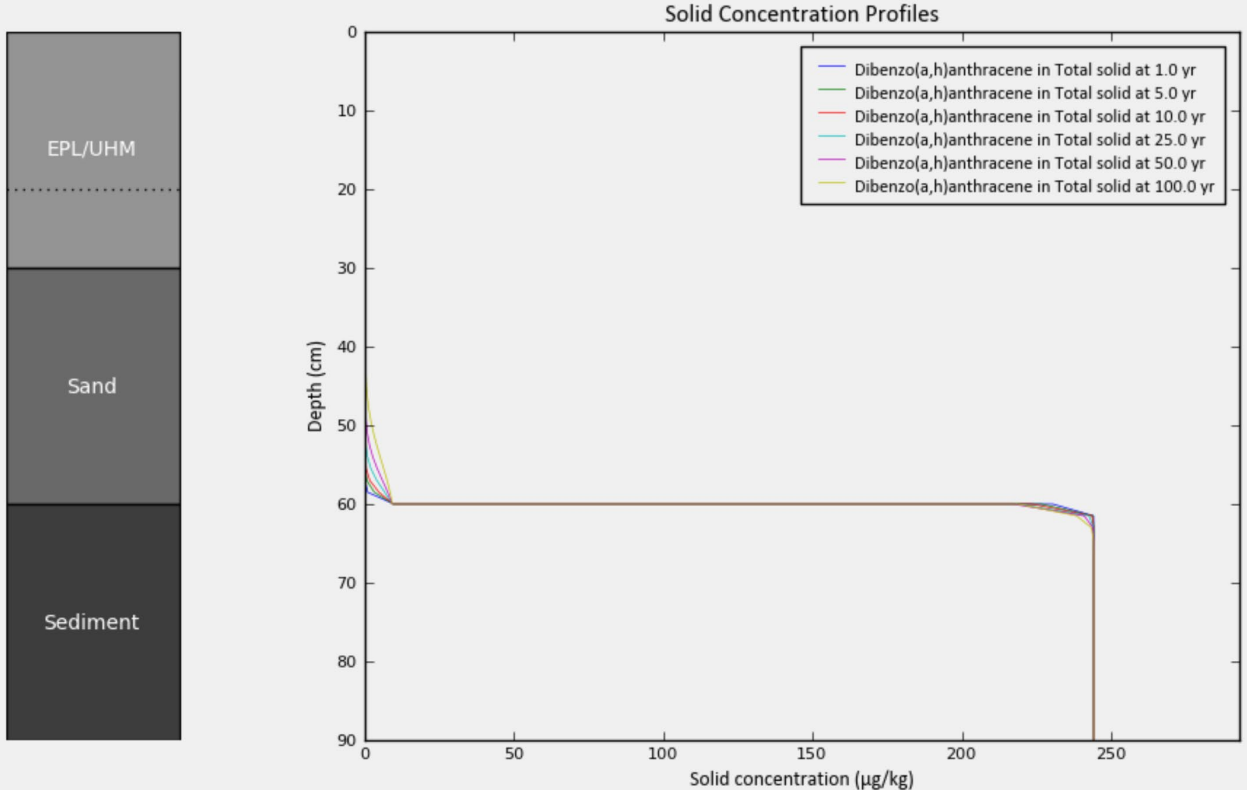

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Copper in Total solid at 1.0 yr
Copper in Total solid at 5.0 yr
Copper in Total solid at 10.0 yr
Copper in Total solid at 25.0 yr
Copper in Total solid at 50.0 yr
Copper in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

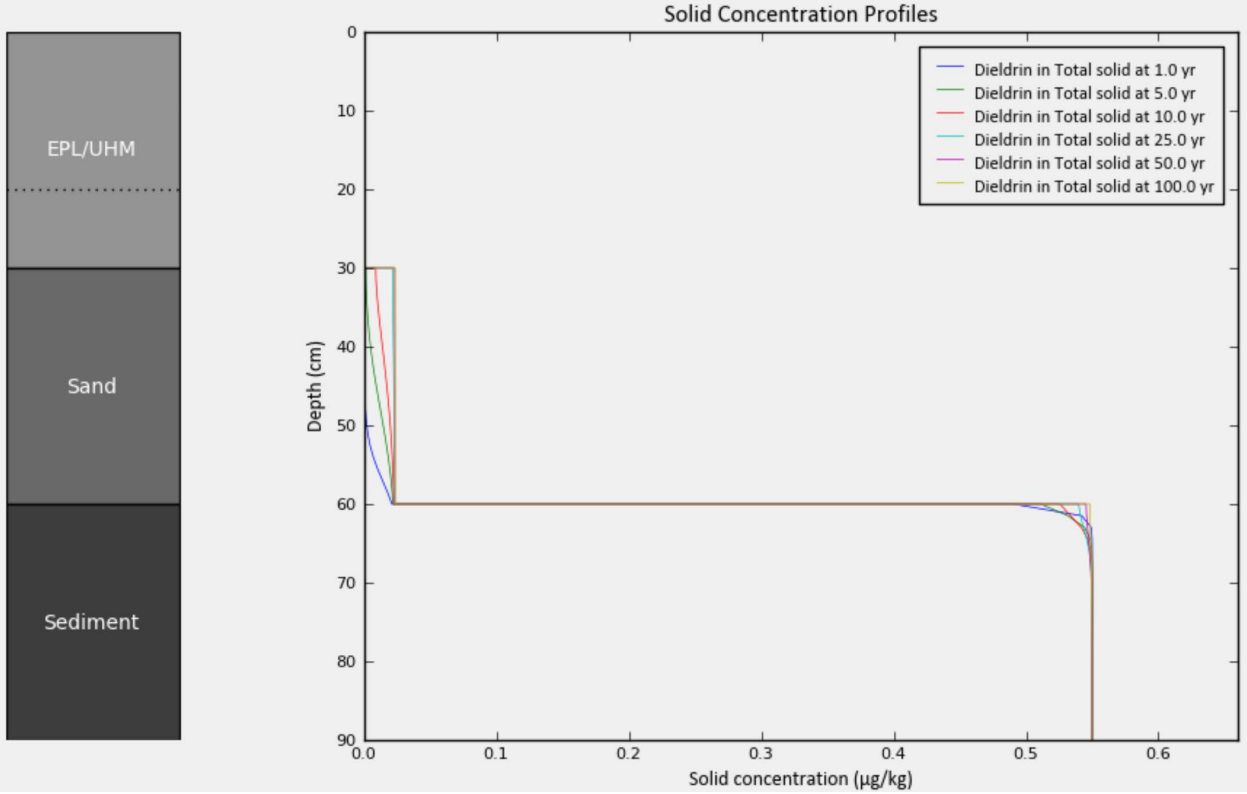

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
DDD in Total solid at 1.0 yr
DDD in Total solid at 5.0 yr
DDD in Total solid at 10.0 yr
DDD in Total solid at 25.0 yr
DDD in Total solid at 50.0 yr
DDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

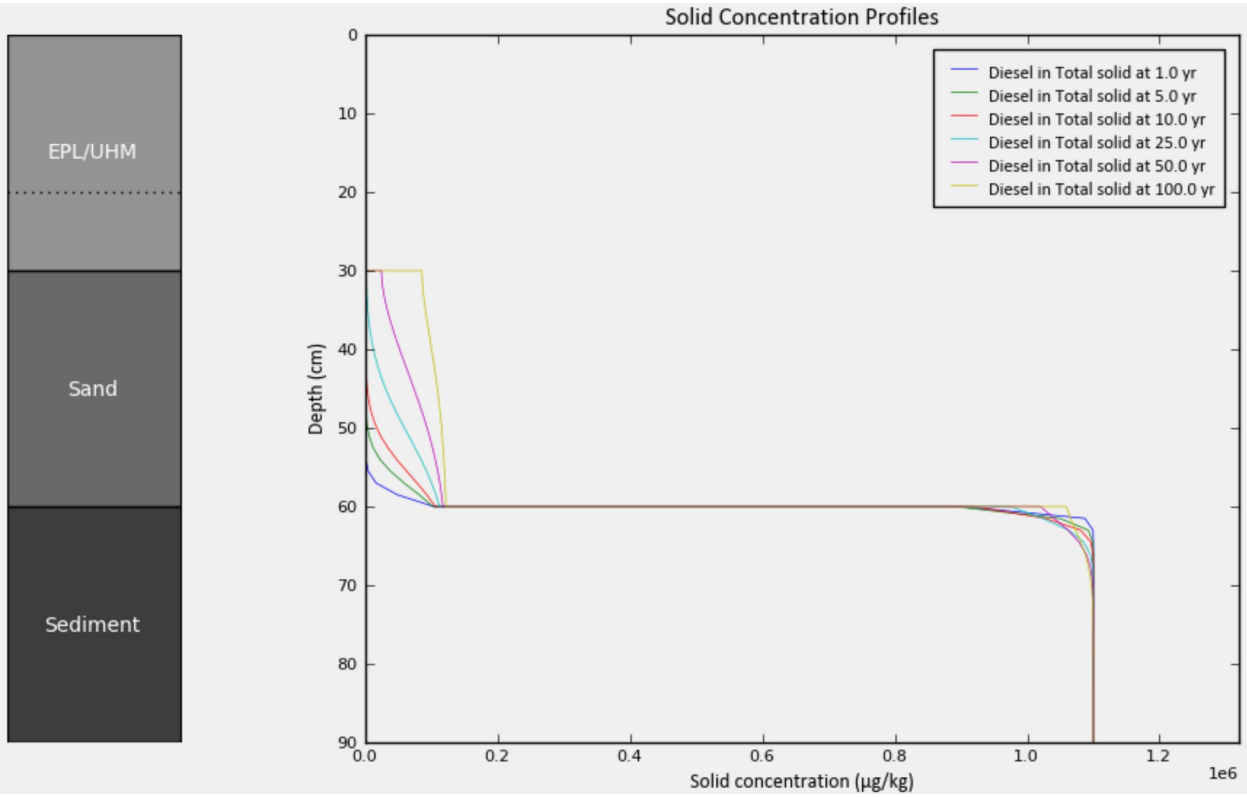

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
DDE in Total solid at 1.0 yr
DDE in Total solid at 5.0 yr
DDE in Total solid at 10.0 yr
DDE in Total solid at 25.0 yr
DDE in Total solid at 50.0 yr
DDE in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

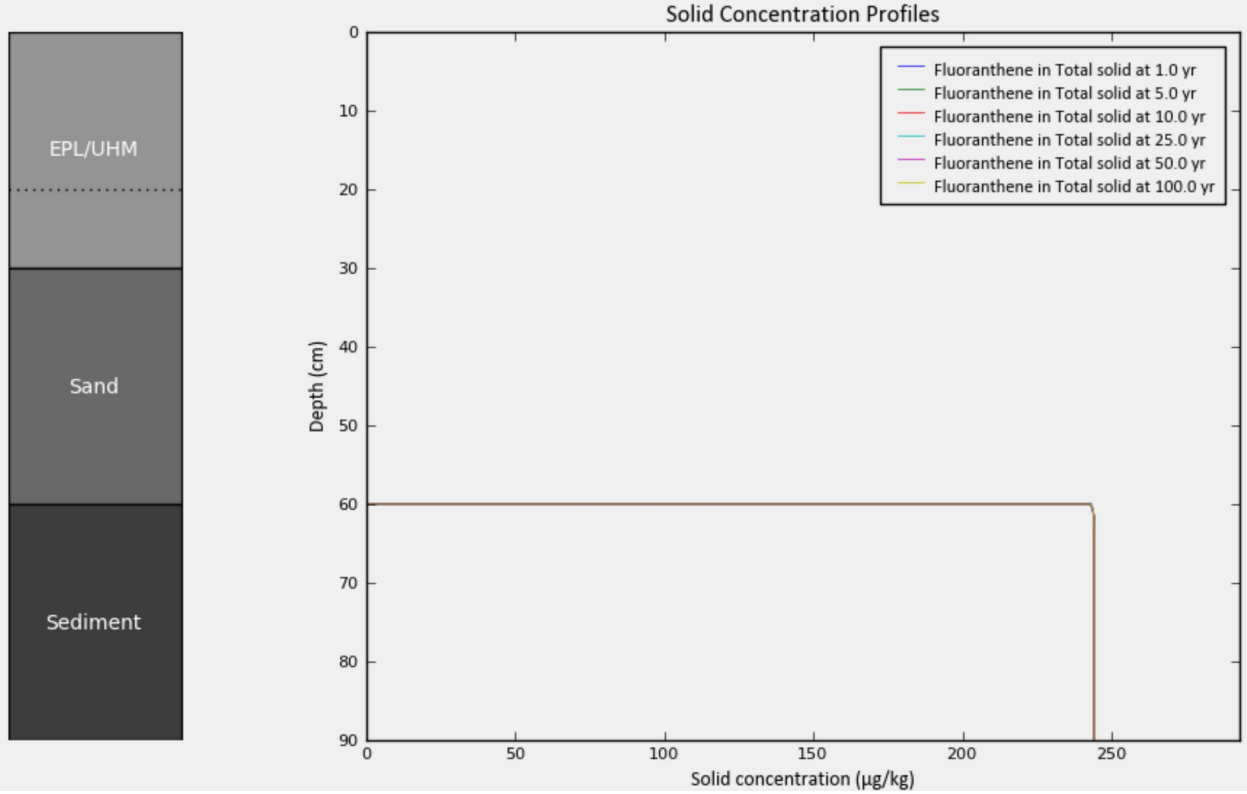

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
DDT in Total solid at 1.0 yr
DDT in Total solid at 5.0 yr
DDT in Total solid at 10.0 yr
DDT in Total solid at 25.0 yr
DDT in Total solid at 50.0 yr
DDT in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

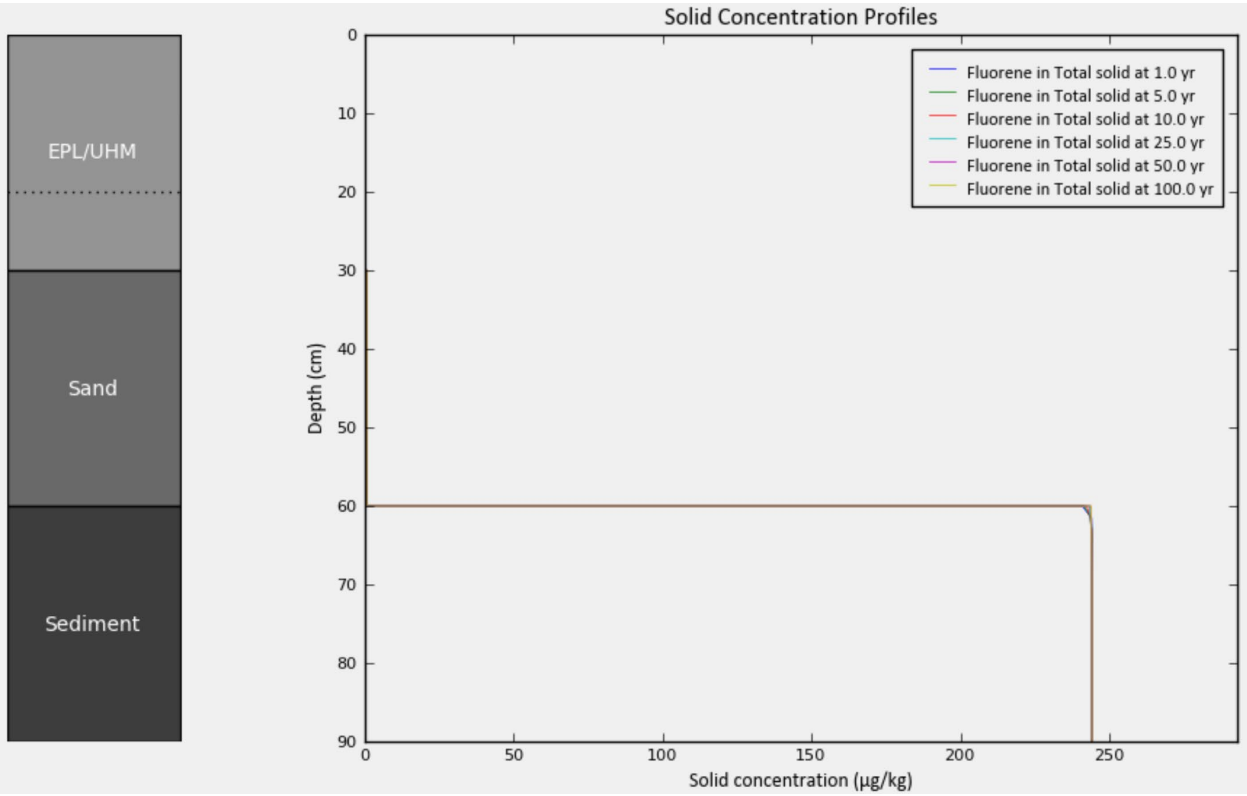

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
DDx in Total solid at 1.0 yr
DDx in Total solid at 5.0 yr
DDx in Total solid at 10.0 yr
DDx in Total solid at 25.0 yr
DDx in Total solid at 50.0 yr
DDx in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

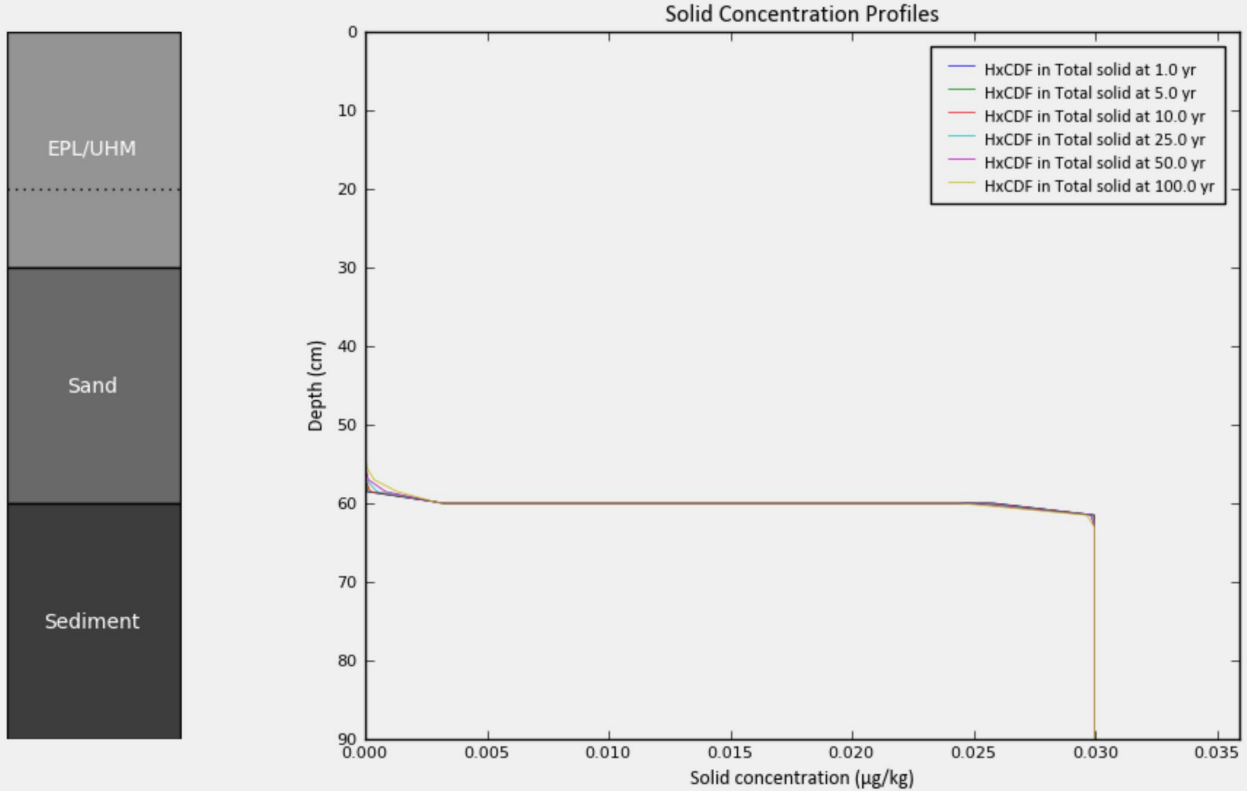

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Dibenzo(a,h)anthracene in Total solid at 1.0 yr
Dibenzo(a,h)anthracene in Total solid at 5.0 yr
Dibenzo(a,h)anthracene in Total solid at 10.0 yr
Dibenzo(a,h)anthracene in Total solid at 25.0 yr
Dibenzo(a,h)anthracene in Total solid at 50.0 yr
Dibenzo(a,h)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

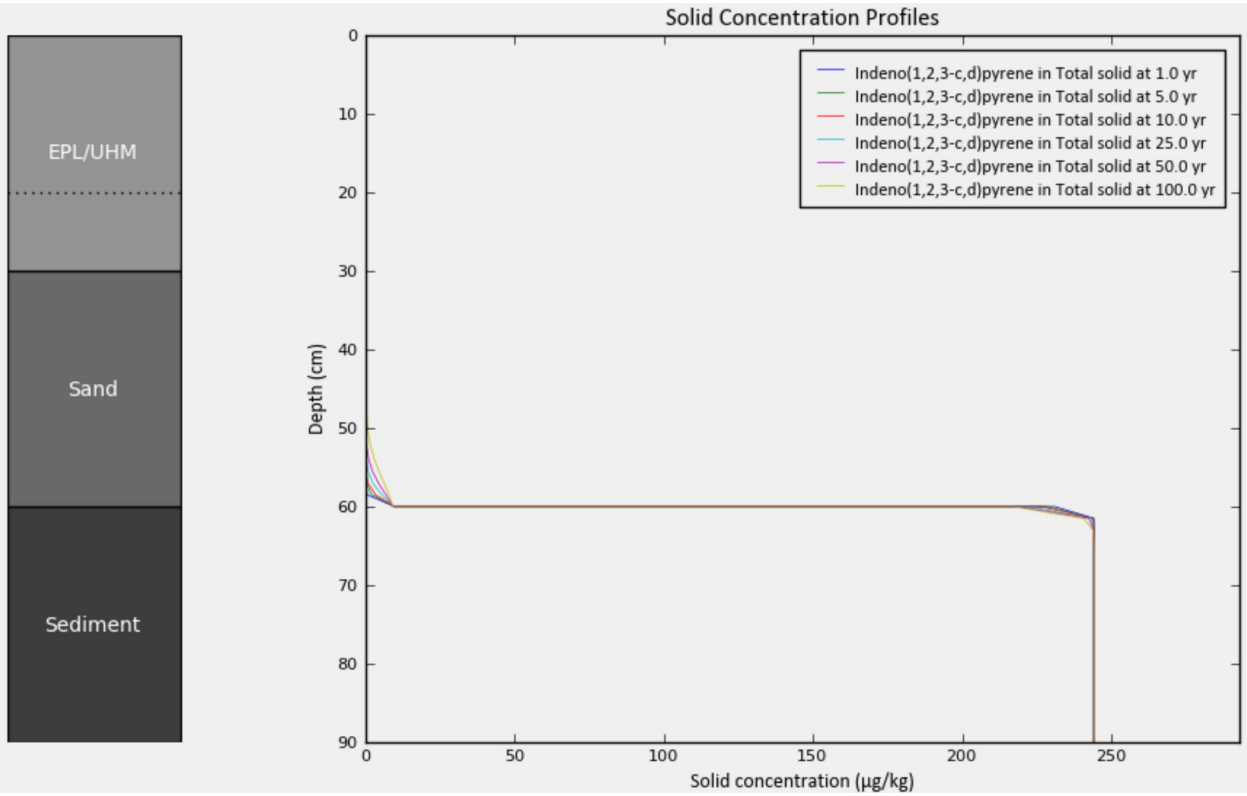

Solid Concentration Profiles
EPL/UHM
Sand
Sediment
Dieldrin in Total solid at 1.0 yr
Dieldrin in Total solid at 5.0 yr
Dieldrin in Total solid at 10.0 yr
Dieldrin in Total solid at 25.0 yr
Dieldrin in Total solid at 50.0 yr
Dieldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

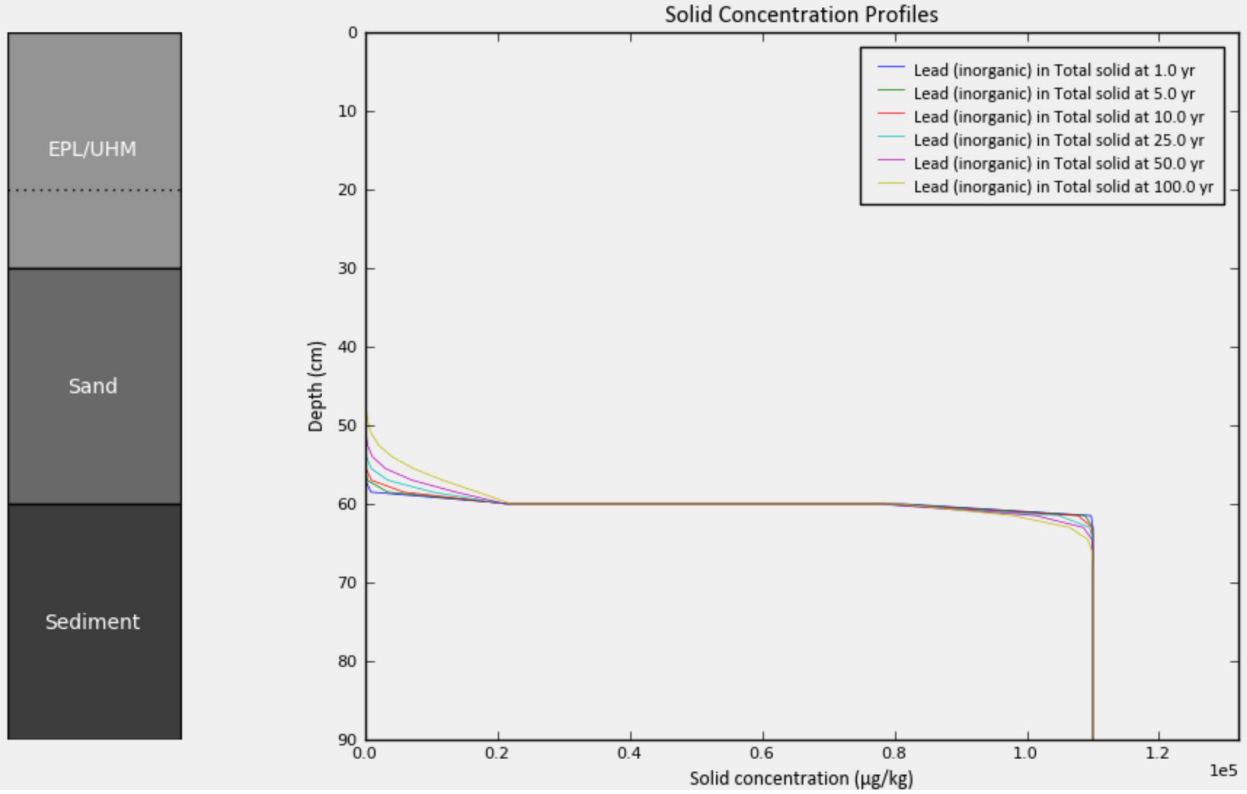

Solid Concentration Profiles
EPL/UHM
Sand
Sediment
Diesel in Total solid at 1.0 yr
Diesel in Total solid at 5.0 yr
Diesel in Total solid at 10.0 yr
Diesel in Total solid at 25.0 yr
Diesel in Total solid at 50.0 yr
Diesel in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

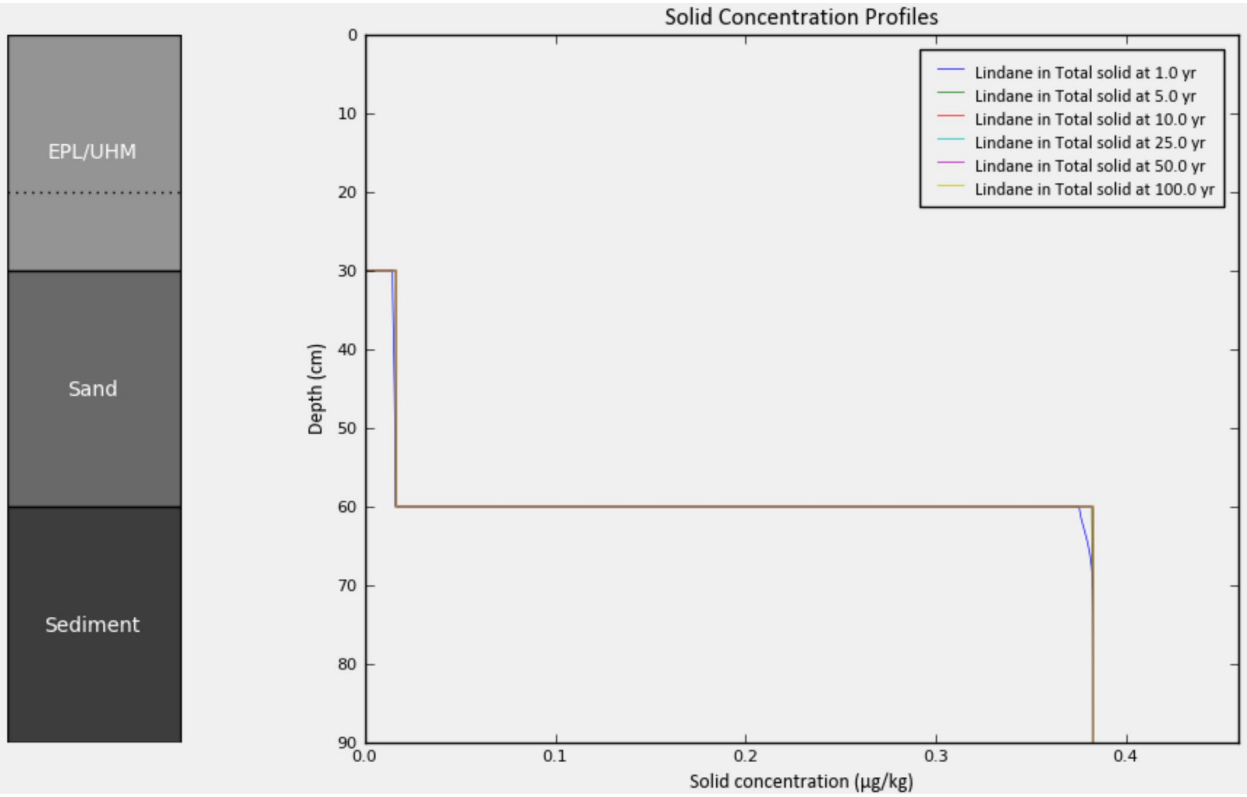

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Fluoranthene in Total solid at 1.0 yr
Fluoranthene in Total solid at 5.0 yr
Fluoranthene in Total solid at 10.0 yr
Fluoranthene in Total solid at 25.0 yr
Fluoranthene in Total solid at 50.0 yr
Fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

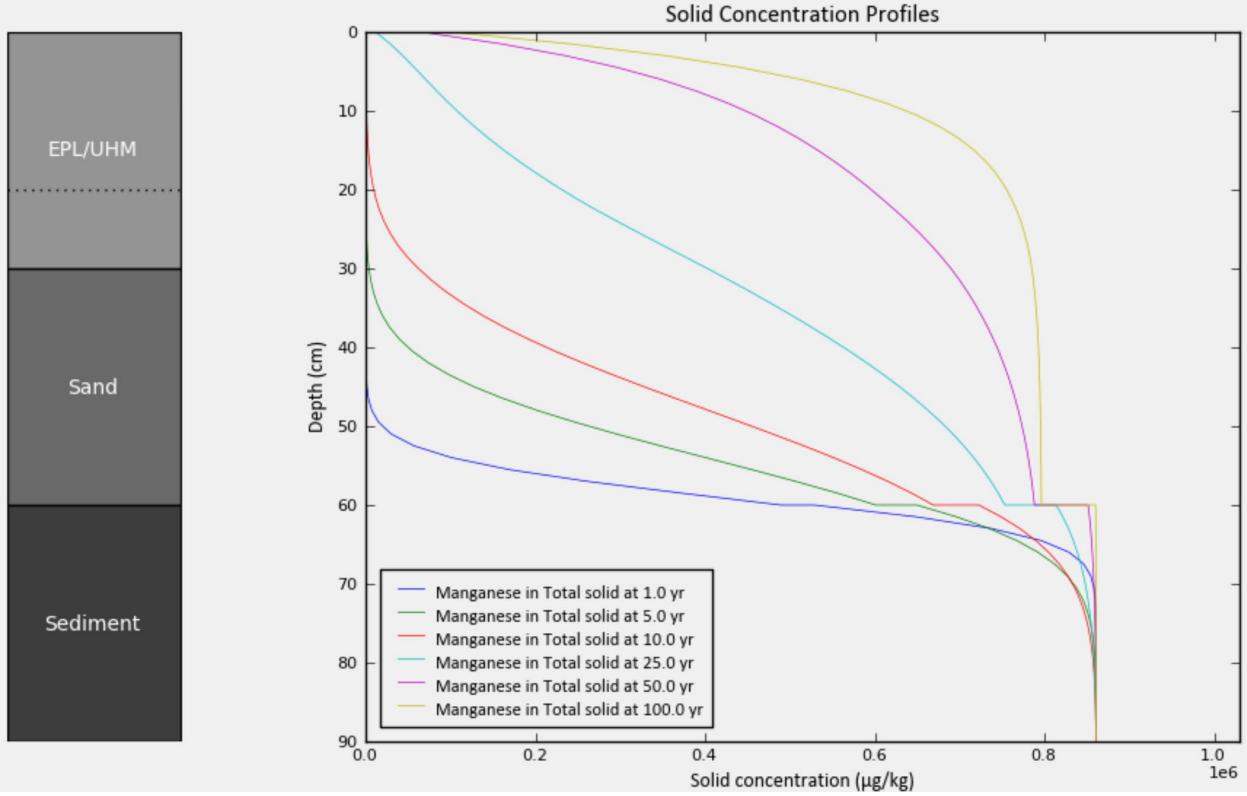

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Fluorene in Total solid at 1.0 yr
Fluorene in Total solid at 5.0 yr
Fluorene in Total solid at 10.0 yr
Fluorene in Total solid at 25.0 yr
Fluorene in Total solid at 50.0 yr
Fluorene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

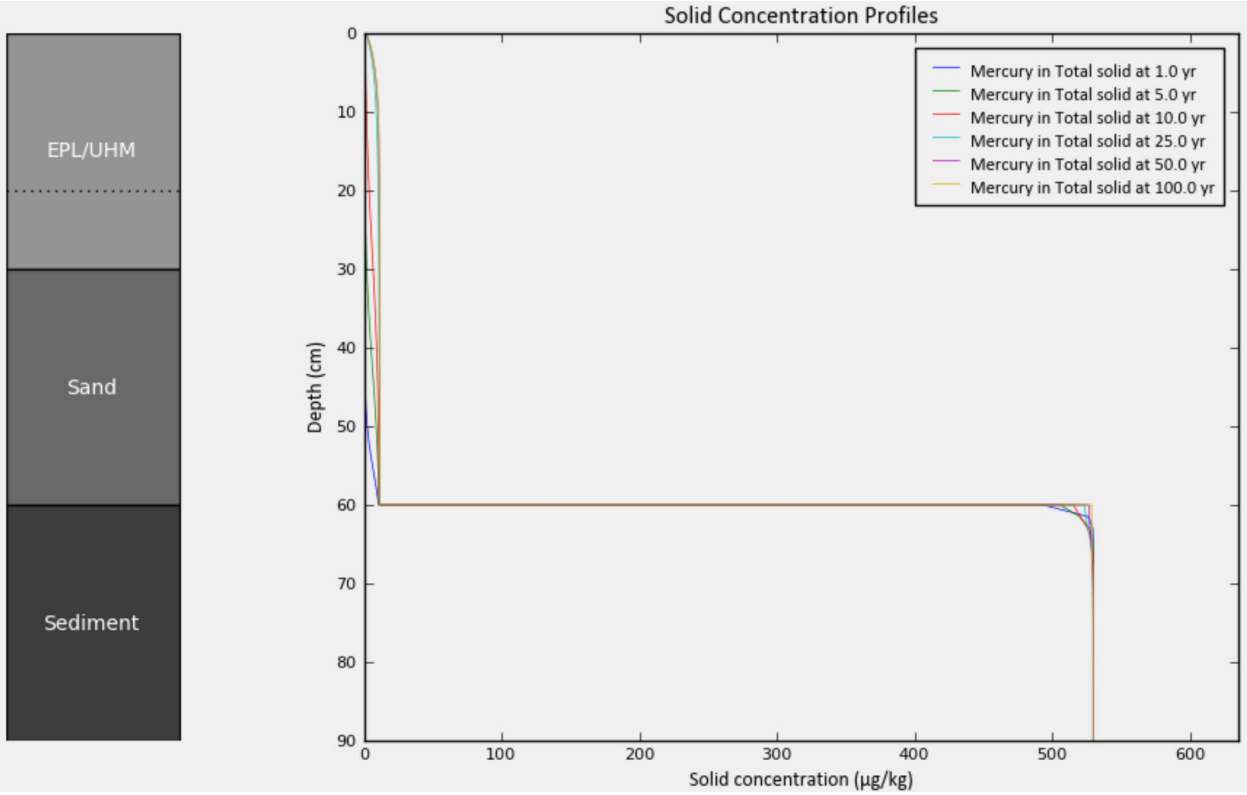

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
HxCDF in Total solid at 1.0 yr
HxCDF in Total solid at 5.0 yr
HxCDF in Total solid at 10.0 yr
HxCDF in Total solid at 25.0 yr
HxCDF in Total solid at 50.0 yr
HxCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
Solid concentration (µg/kg)

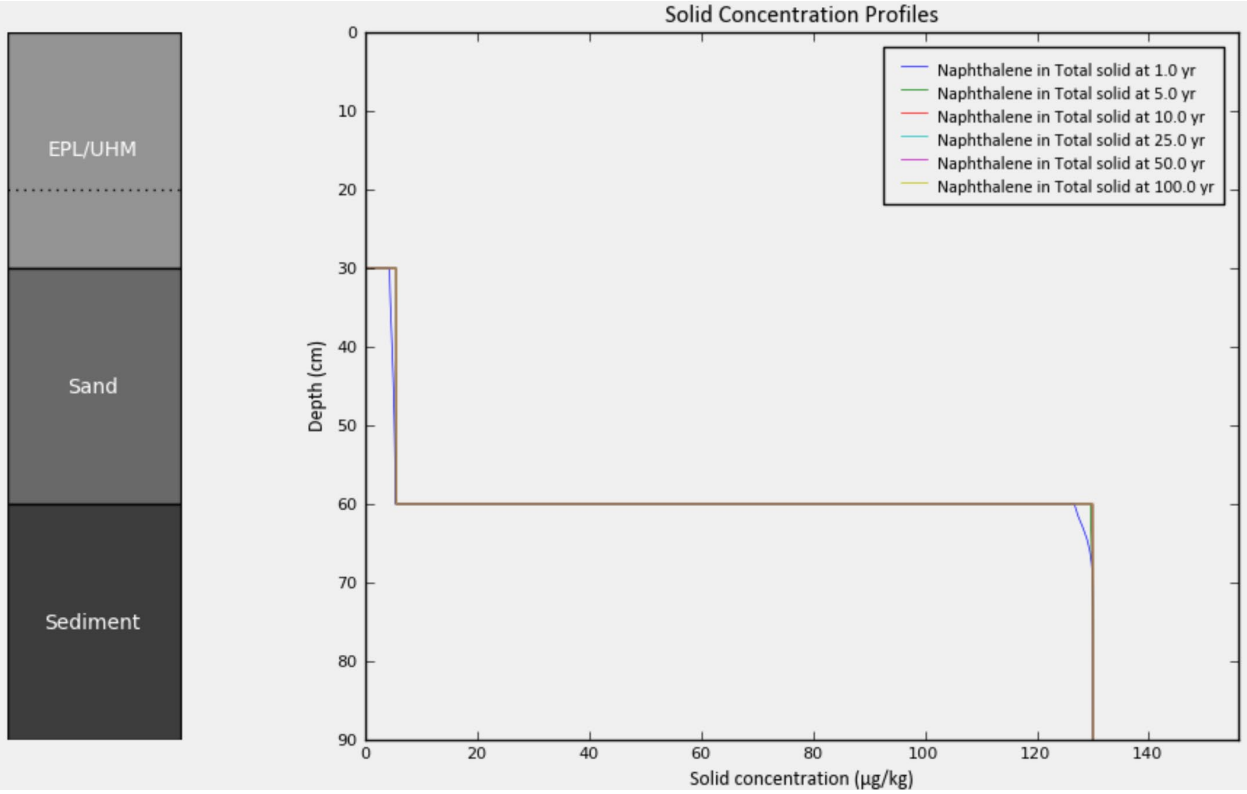

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Indeno(1,2,3-c,d)pyrene in Total solid at 1.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 5.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 10.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 25.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 50.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
50
100
150
200
250
Solid concentration (µg/kg)

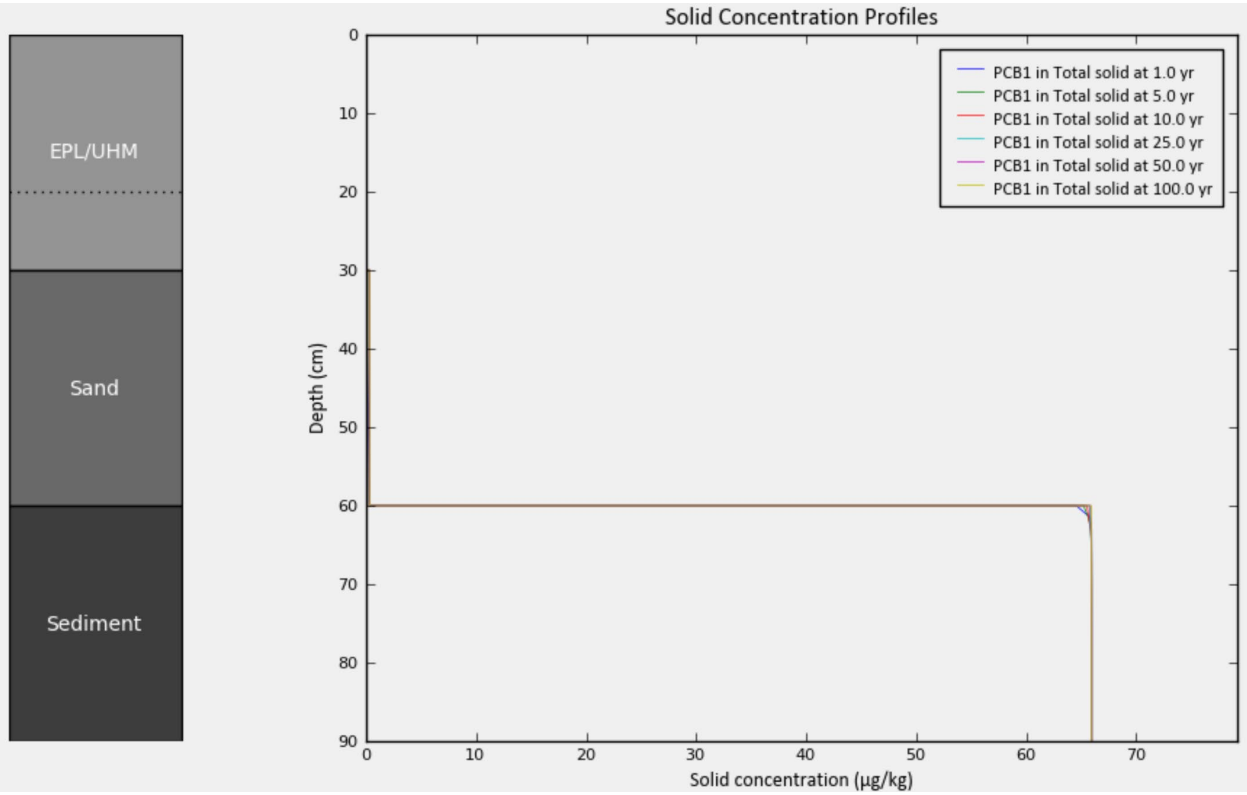

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Lead (inorganic) in Total solid at 1.0 yr
Lead (inorganic) in Total solid at 5.0 yr
Lead (inorganic) in Total solid at 10.0 yr
Lead (inorganic) in Total solid at 25.0 yr
Lead (inorganic) in Total solid at 50.0 yr
Lead (inorganic) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

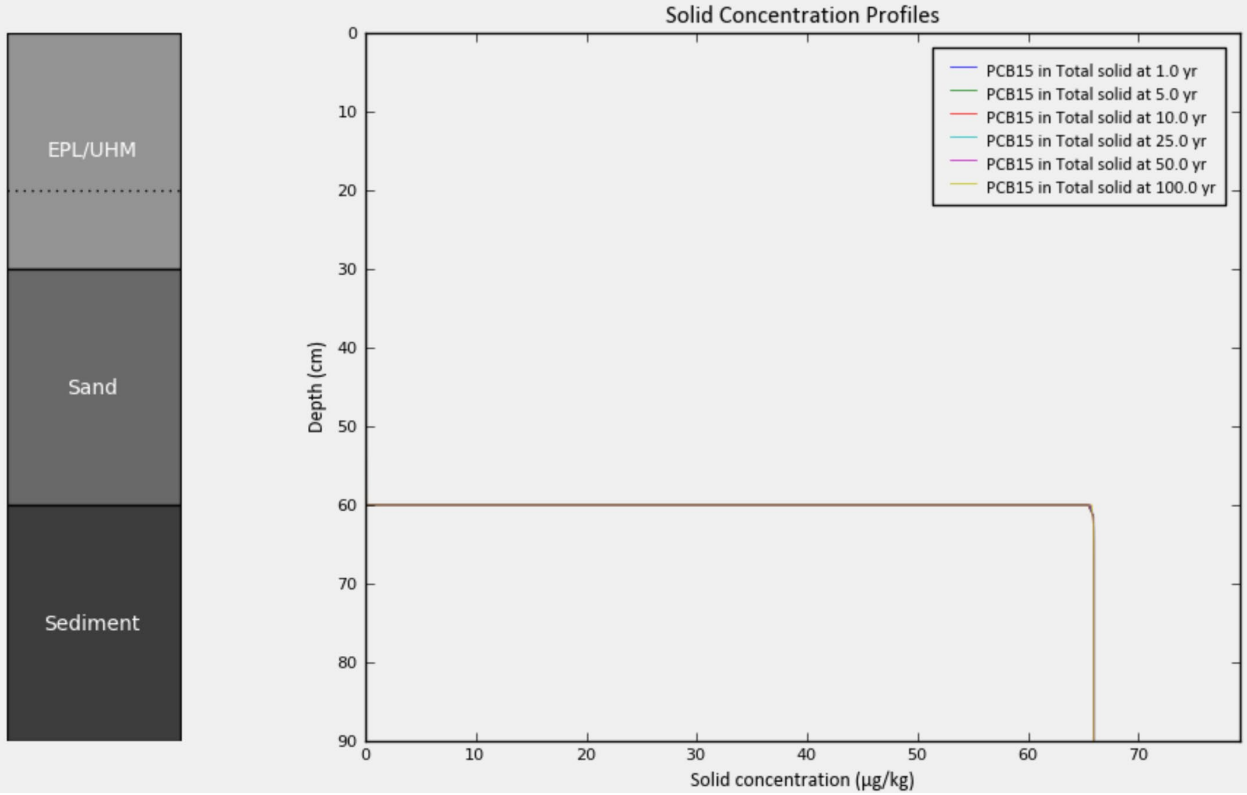

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Lindane in Total solid at 1.0 yr
Lindane in Total solid at 5.0 yr
Lindane in Total solid at 10.0 yr
Lindane in Total solid at 25.0 yr
Lindane in Total solid at 50.0 yr
Lindane in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

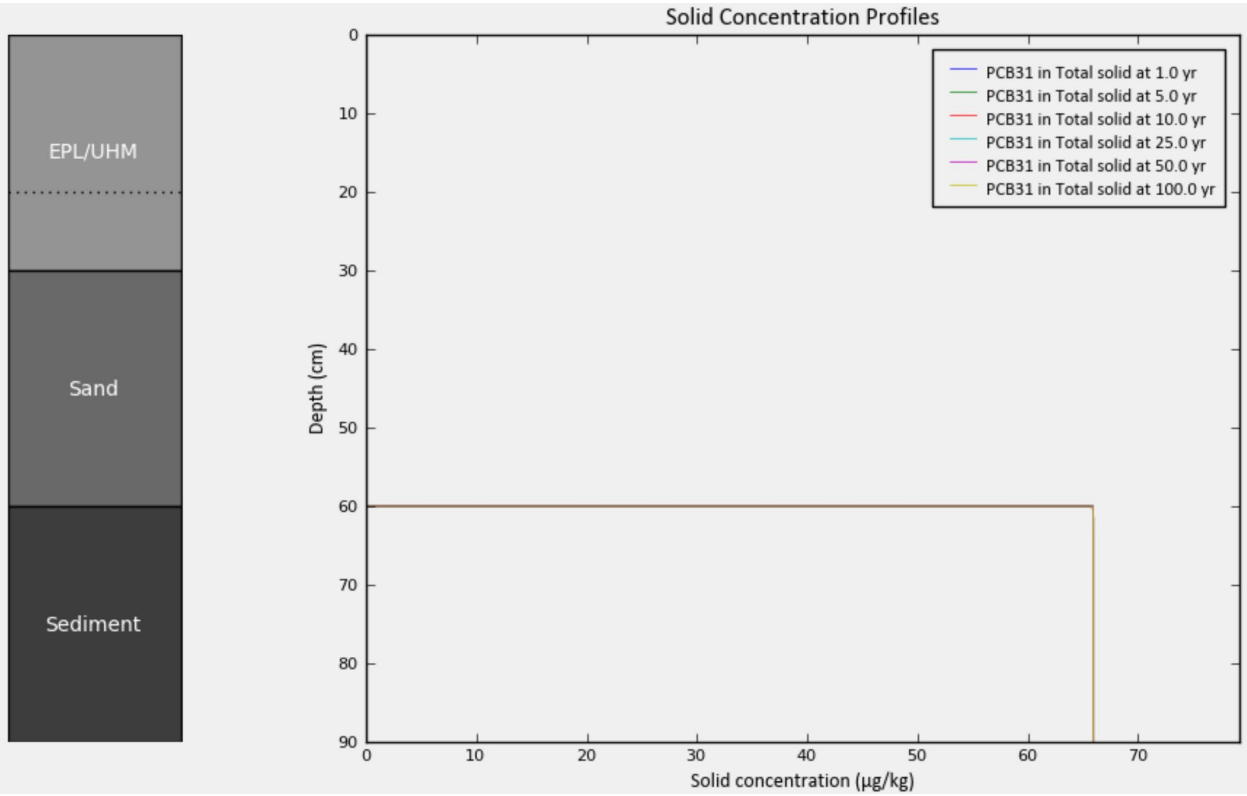

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Depth (cm)
Solid concentration (µg/kg)
1e6
Manganese in Total solid at 1.0 yr
Manganese in Total solid at 5.0 yr
Manganese in Total solid at 10.0 yr
Manganese in Total solid at 25.0 yr
Manganese in Total solid at 50.0 yr
Manganese in Total solid at 100.0 yr

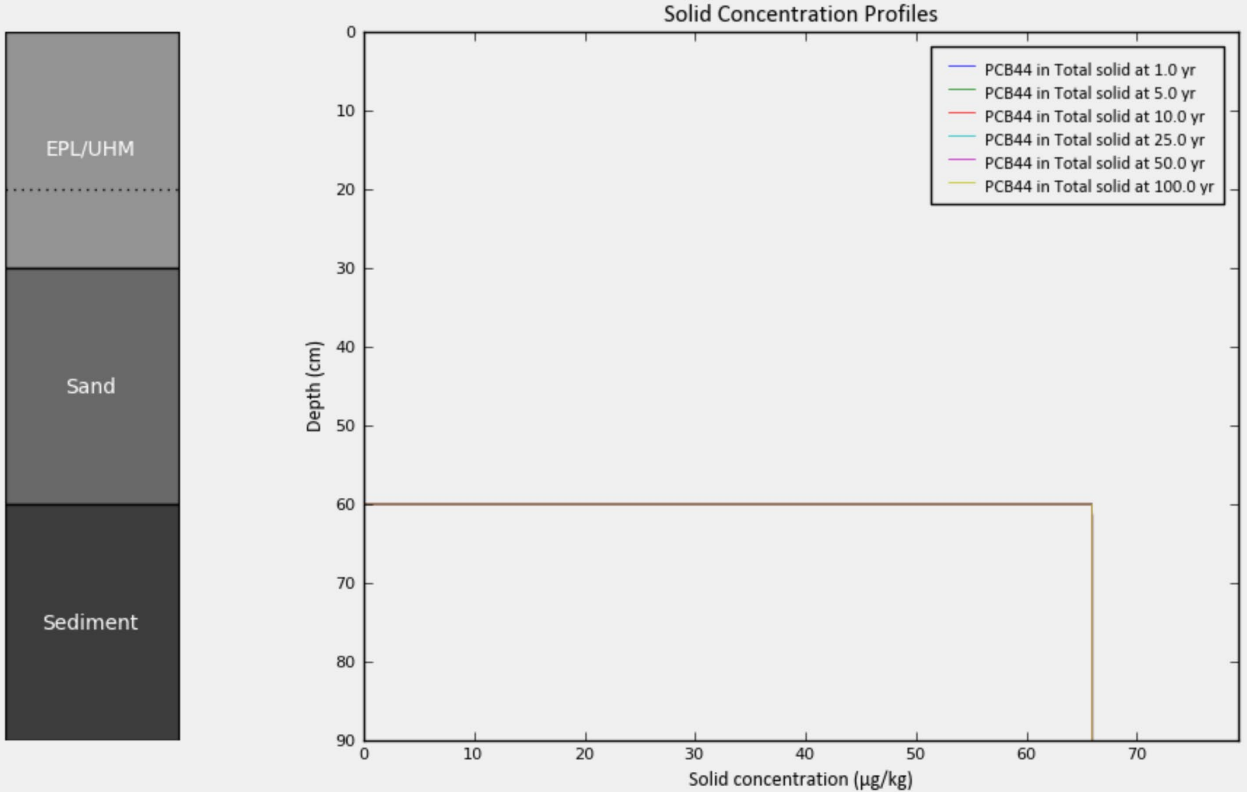

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Depth (cm)
Solid concentration (µg/kg)
Mercury in Total solid at 1.0 yr
Mercury in Total solid at 5.0 yr
Mercury in Total solid at 10.0 yr
Mercury in Total solid at 25.0 yr
Mercury in Total solid at 50.0 yr
Mercury in Total solid at 100.0 yr

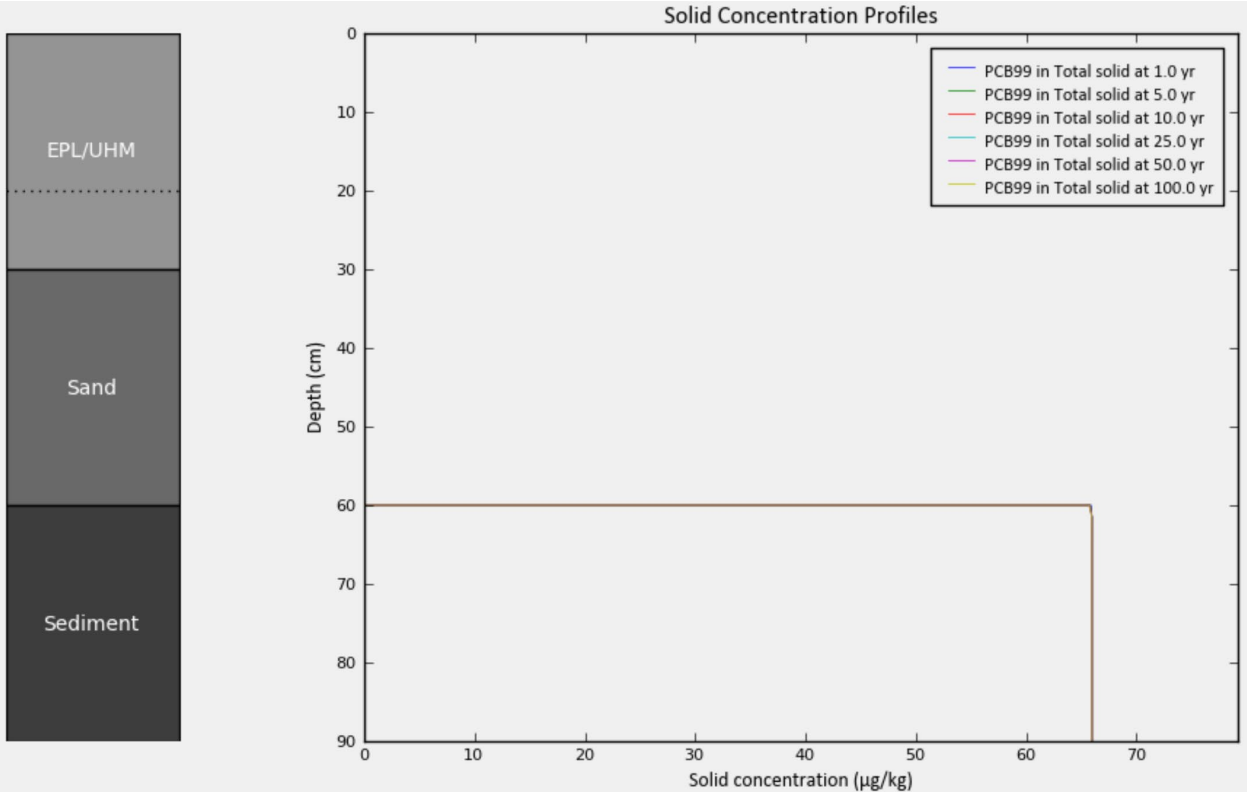

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Naphthalene in Total solid at 1.0 yr
Naphthalene in Total solid at 5.0 yr
Naphthalene in Total solid at 10.0 yr
Naphthalene in Total solid at 25.0 yr
Naphthalene in Total solid at 50.0 yr
Naphthalene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

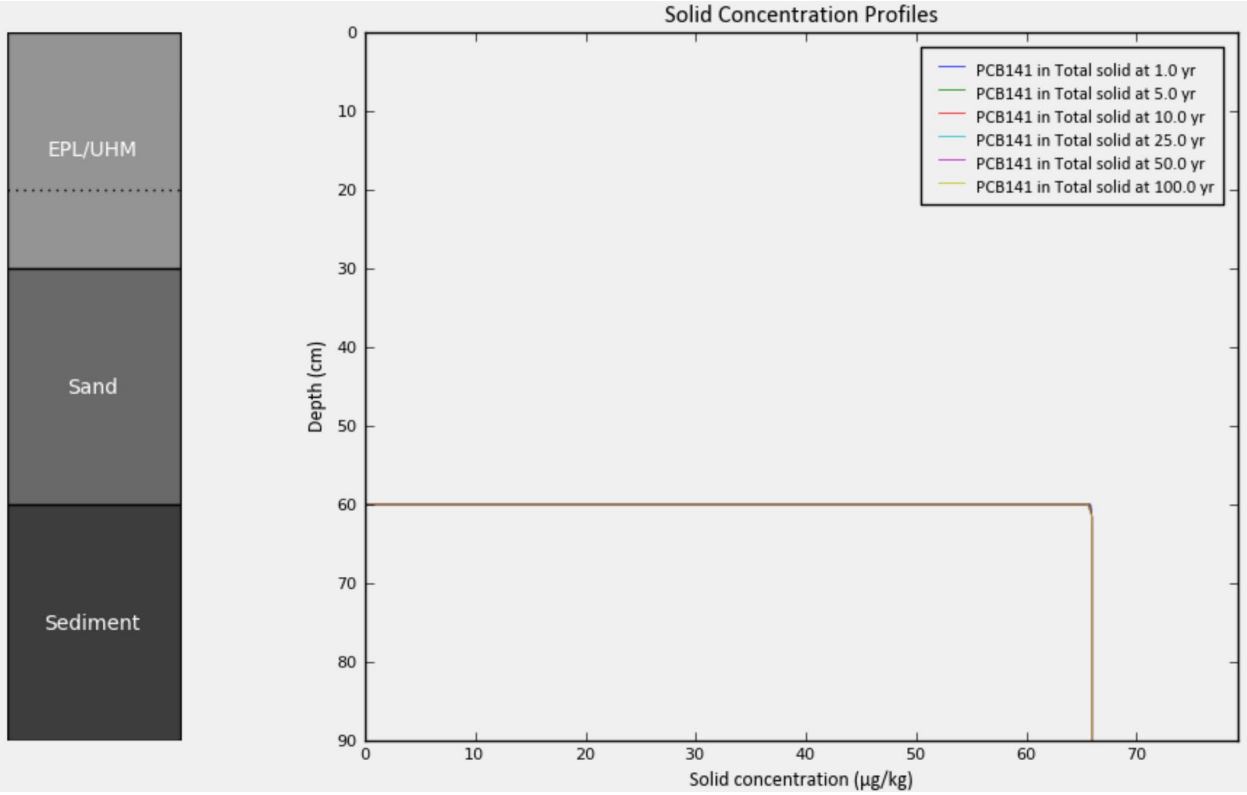

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB1 in Total solid at 1.0 yr
PCB1 in Total solid at 5.0 yr
PCB1 in Total solid at 10.0 yr
PCB1 in Total solid at 25.0 yr
PCB1 in Total solid at 50.0 yr
PCB1 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

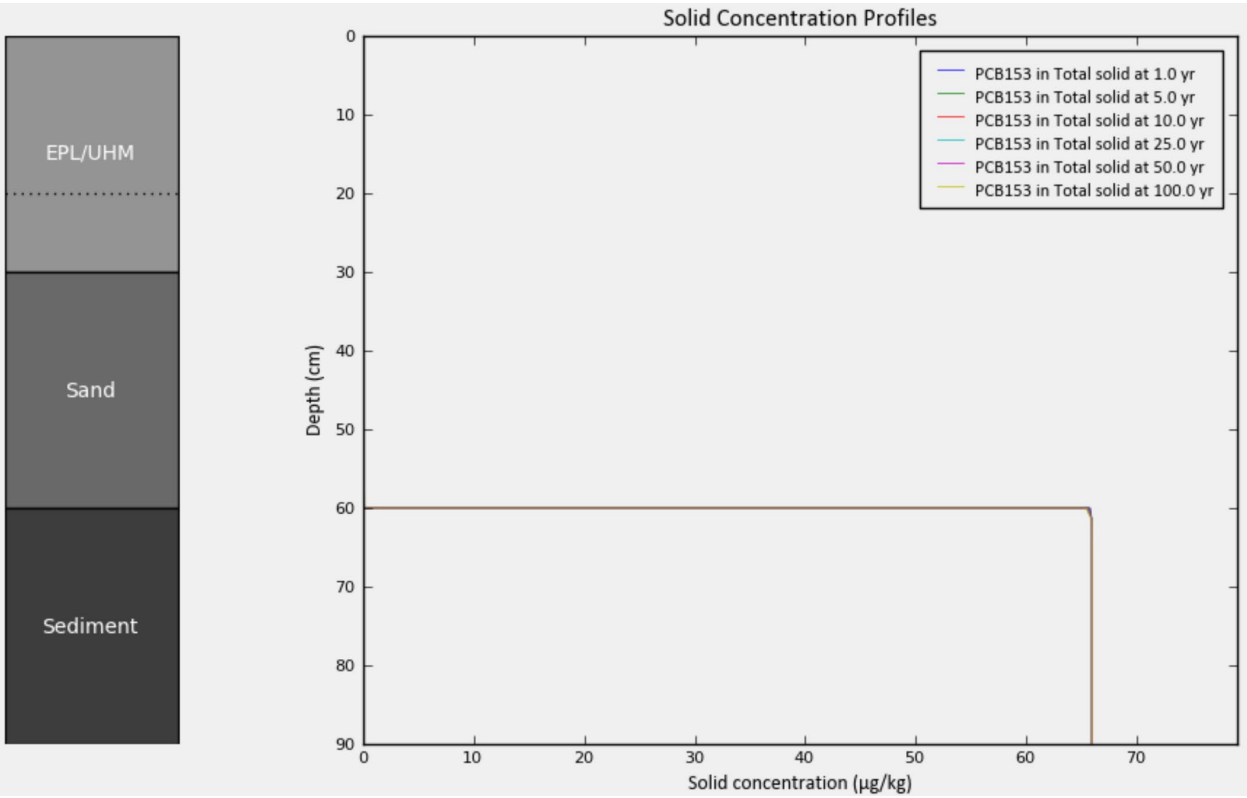

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB15 in Total solid at 1.0 yr
PCB15 in Total solid at 5.0 yr
PCB15 in Total solid at 10.0 yr
PCB15 in Total solid at 25.0 yr
PCB15 in Total solid at 50.0 yr
PCB15 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

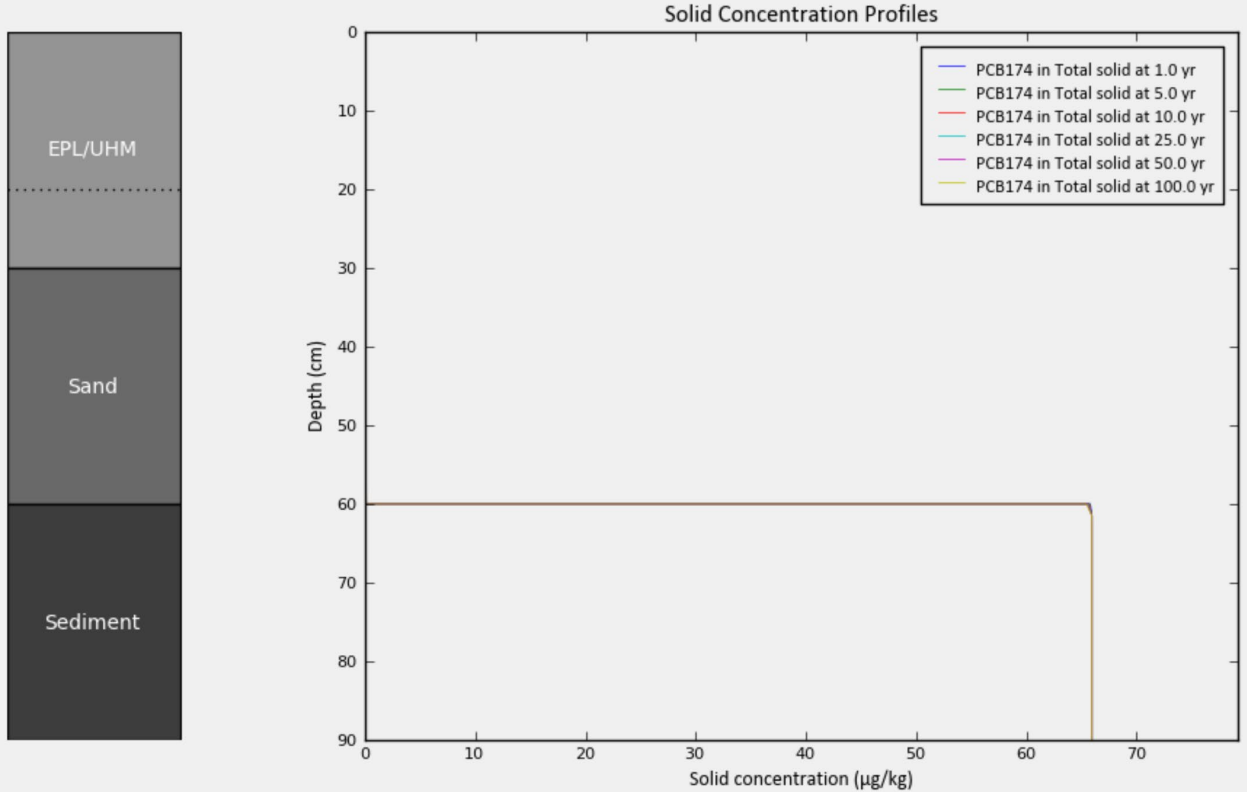

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB31 in Total solid at 1.0 yr
PCB31 in Total solid at 5.0 yr
PCB31 in Total solid at 10.0 yr
PCB31 in Total solid at 25.0 yr
PCB31 in Total solid at 50.0 yr
PCB31 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

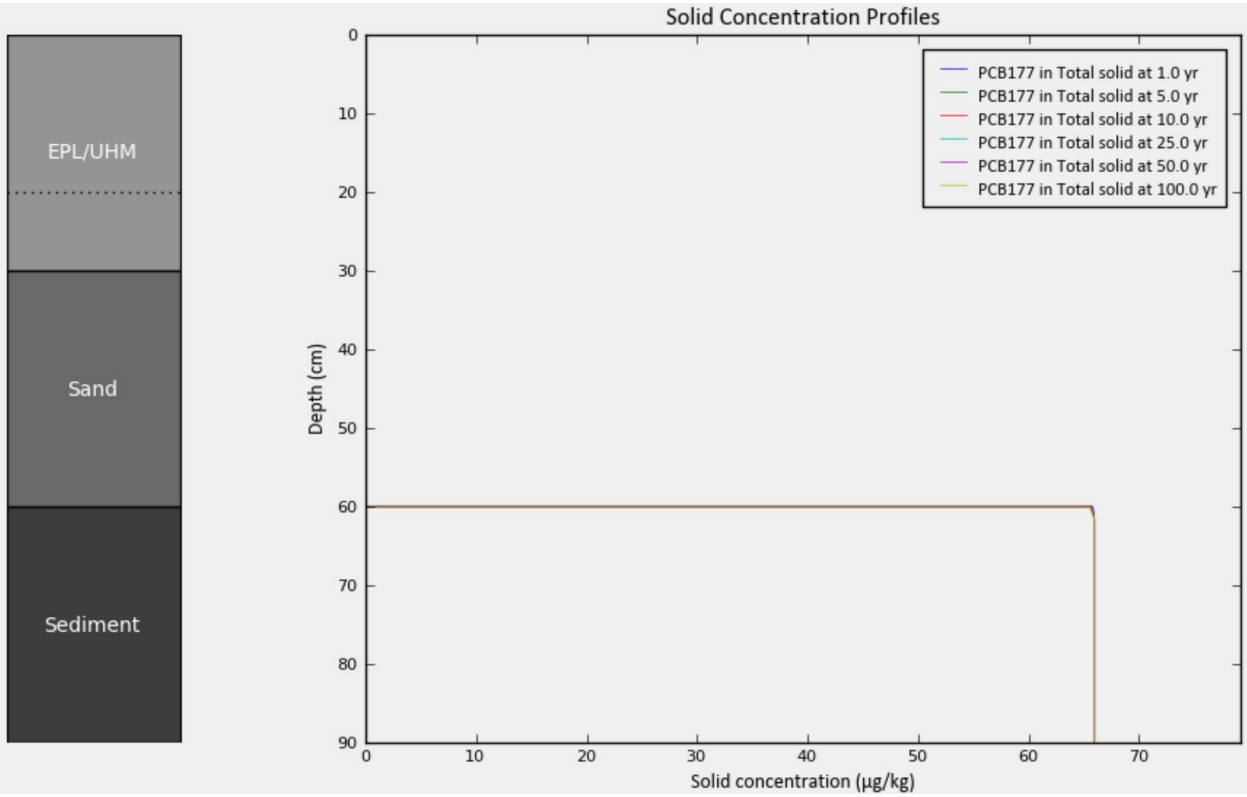

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB44 in Total solid at 1.0 yr
PCB44 in Total solid at 5.0 yr
PCB44 in Total solid at 10.0 yr
PCB44 in Total solid at 25.0 yr
PCB44 in Total solid at 50.0 yr
PCB44 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

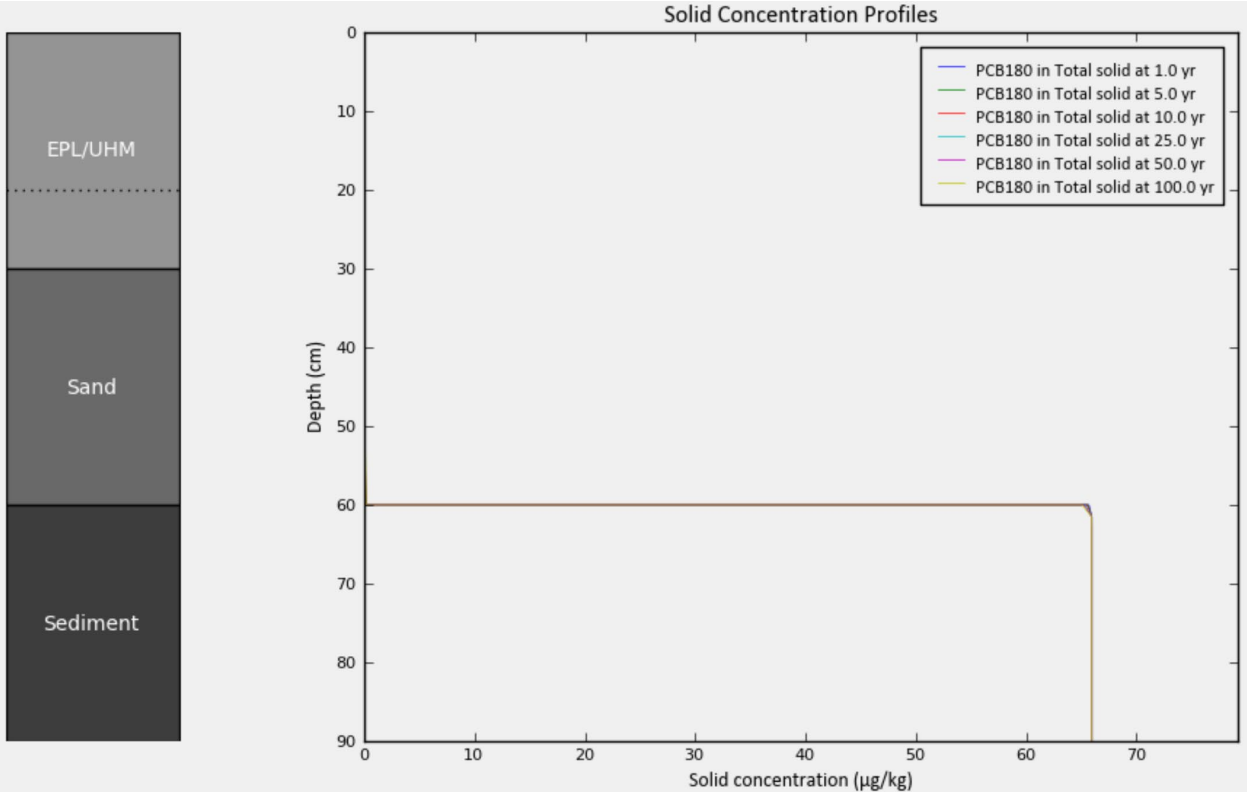

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB99 in Total solid at 1.0 yr
PCB99 in Total solid at 5.0 yr
PCB99 in Total solid at 10.0 yr
PCB99 in Total solid at 25.0 yr
PCB99 in Total solid at 50.0 yr
PCB99 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

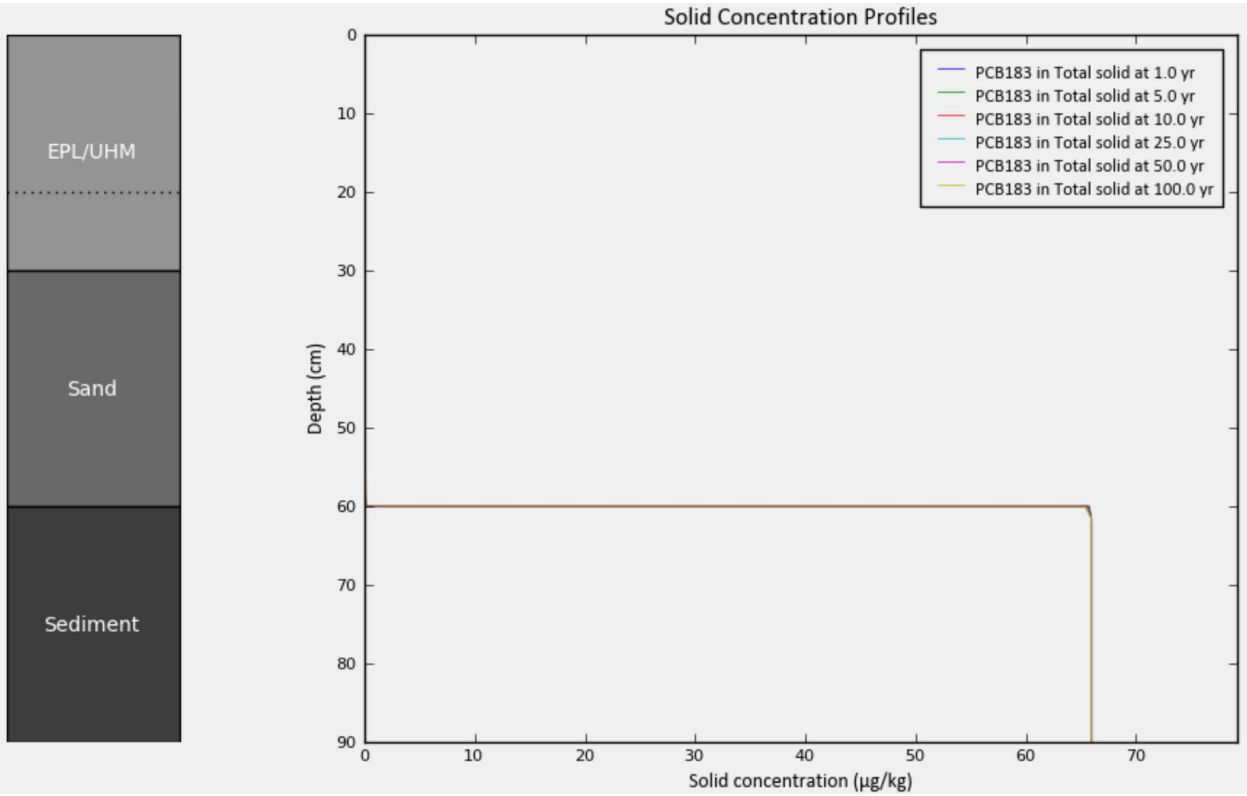

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB141 in Total solid at 1.0 yr
PCB141 in Total solid at 5.0 yr
PCB141 in Total solid at 10.0 yr
PCB141 in Total solid at 25.0 yr
PCB141 in Total solid at 50.0 yr
PCB141 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

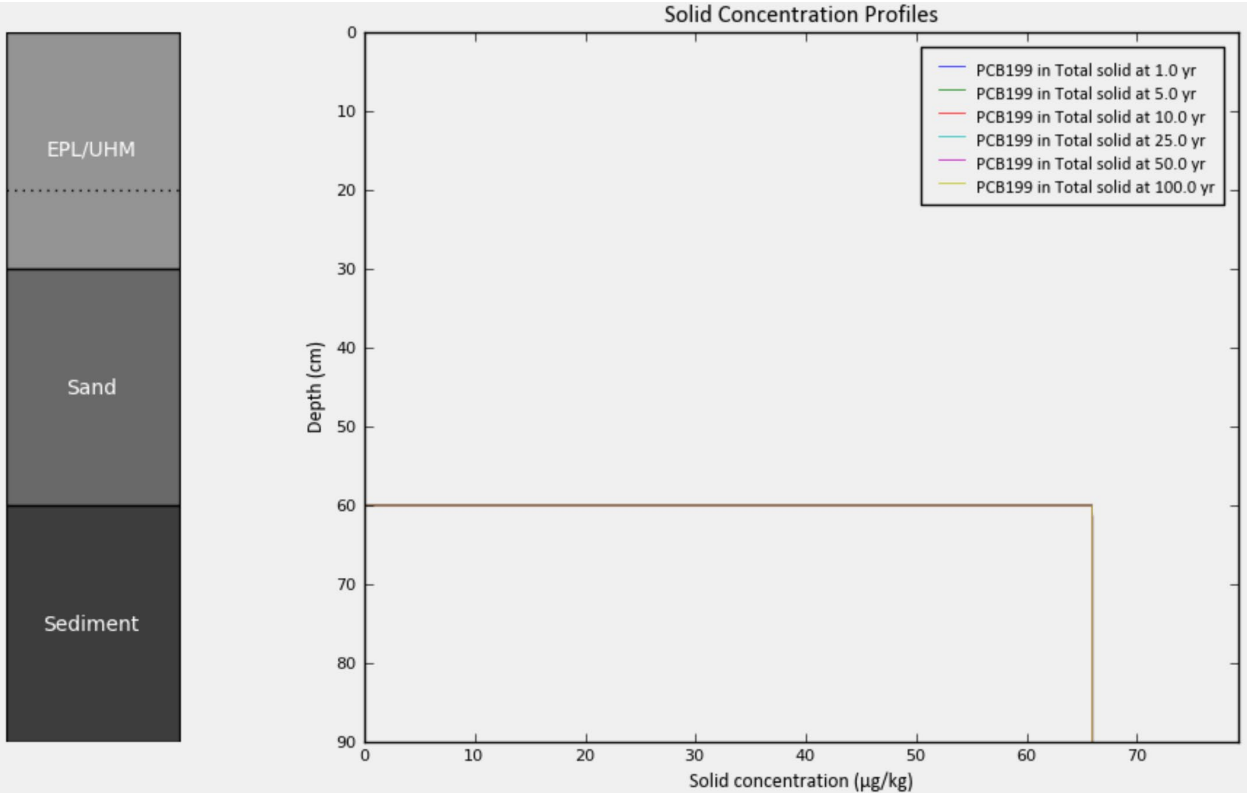

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB153 in Total solid at 1.0 yr
PCB153 in Total solid at 5.0 yr
PCB153 in Total solid at 10.0 yr
PCB153 in Total solid at 25.0 yr
PCB153 in Total solid at 50.0 yr
PCB153 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

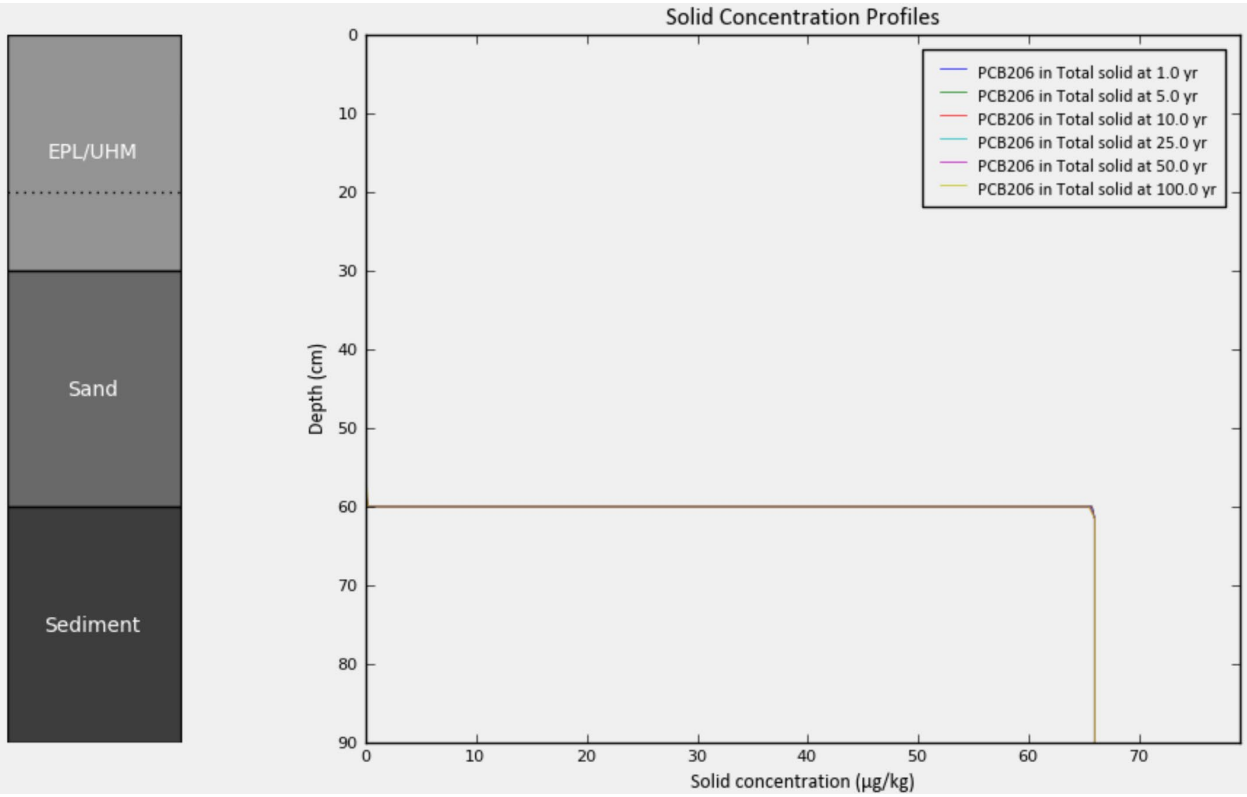

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB174 in Total solid at 1.0 yr
PCB174 in Total solid at 5.0 yr
PCB174 in Total solid at 10.0 yr
PCB174 in Total solid at 25.0 yr
PCB174 in Total solid at 50.0 yr
PCB174 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

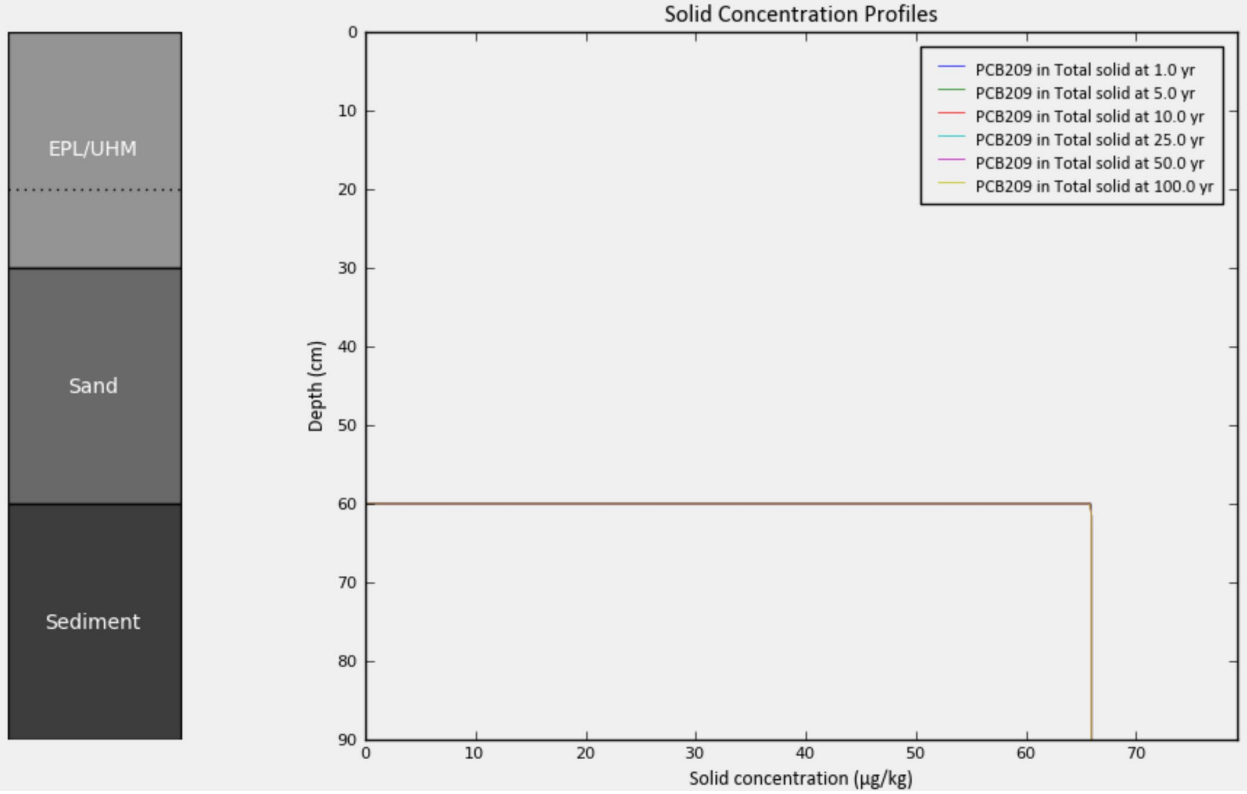

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB177 in Total solid at 1.0 yr
PCB177 in Total solid at 5.0 yr
PCB177 in Total solid at 10.0 yr
PCB177 in Total solid at 25.0 yr
PCB177 in Total solid at 50.0 yr
PCB177 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

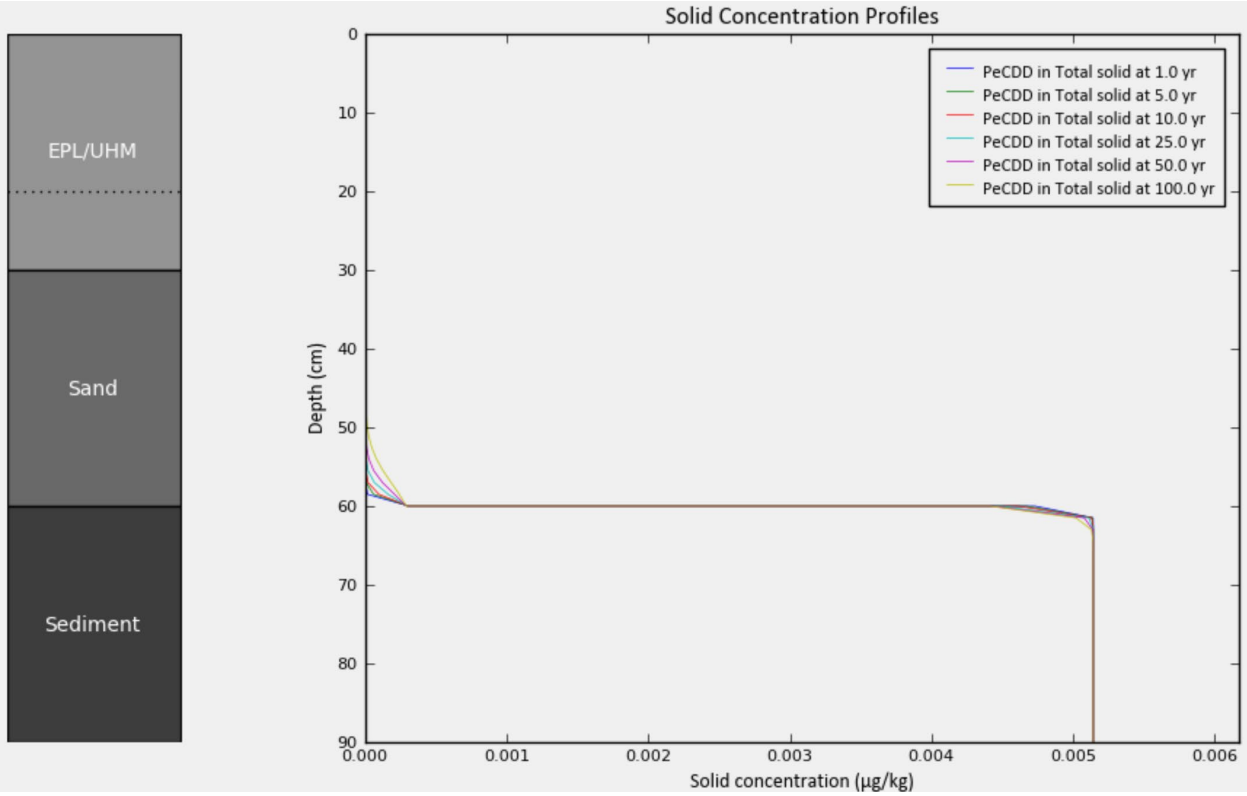

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB180 in Total solid at 1.0 yr
PCB180 in Total solid at 5.0 yr
PCB180 in Total solid at 10.0 yr
PCB180 in Total solid at 25.0 yr
PCB180 in Total solid at 50.0 yr
PCB180 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

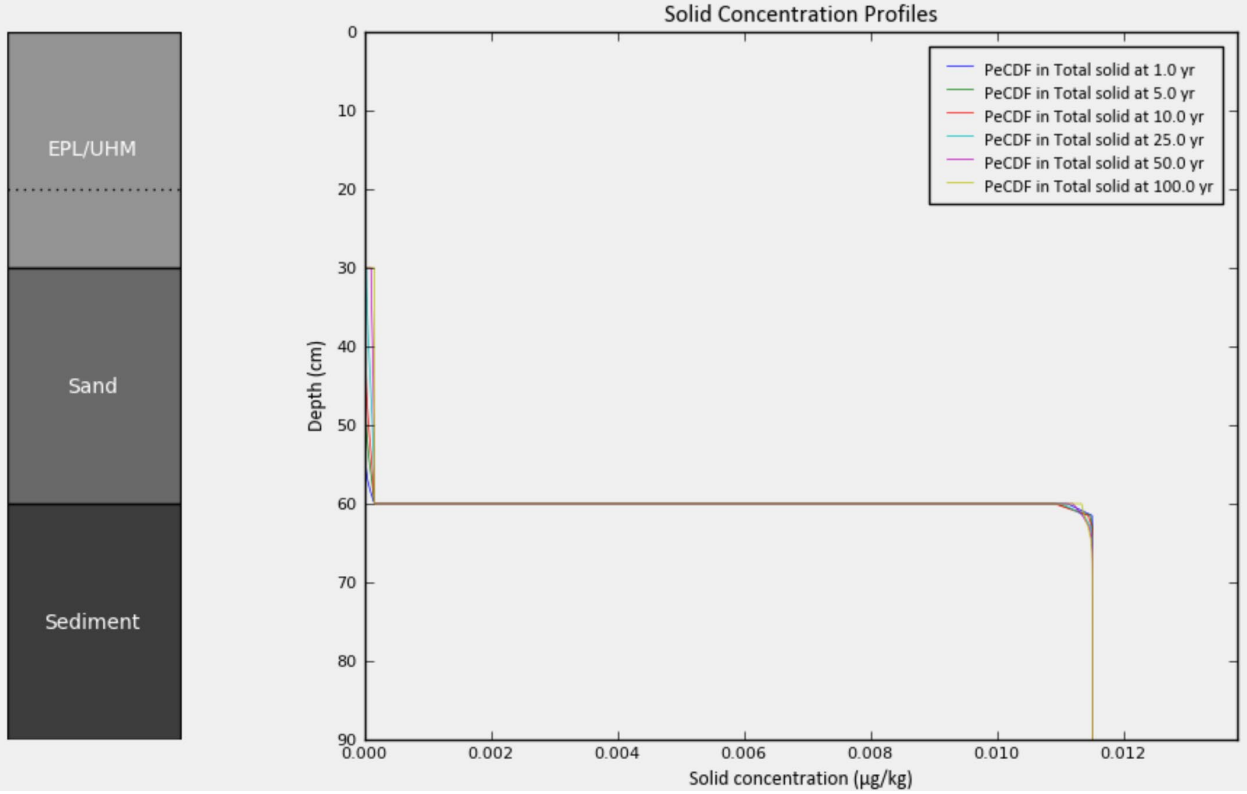

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB183 in Total solid at 1.0 yr
PCB183 in Total solid at 5.0 yr
PCB183 in Total solid at 10.0 yr
PCB183 in Total solid at 25.0 yr
PCB183 in Total solid at 50.0 yr
PCB183 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

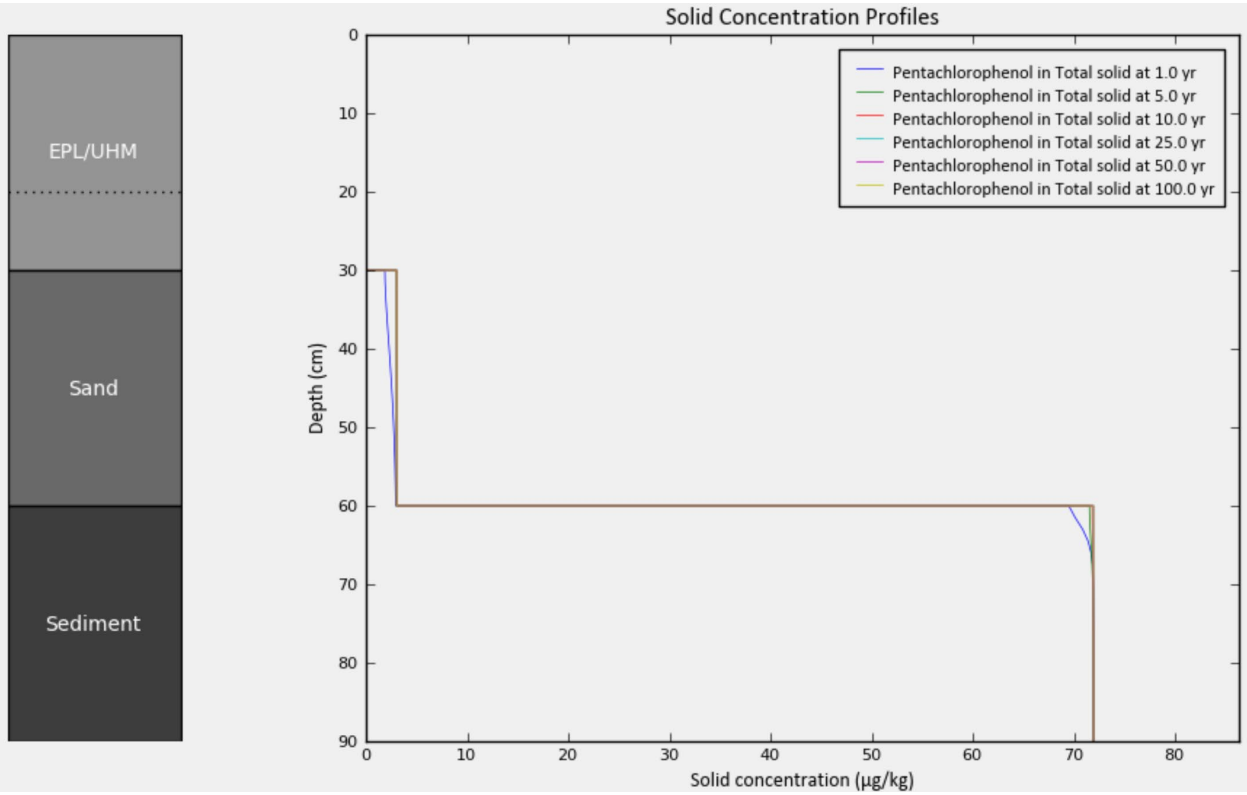

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB199 in Total solid at 1.0 yr
PCB199 in Total solid at 5.0 yr
PCB199 in Total solid at 10.0 yr
PCB199 in Total solid at 25.0 yr
PCB199 in Total solid at 50.0 yr
PCB199 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

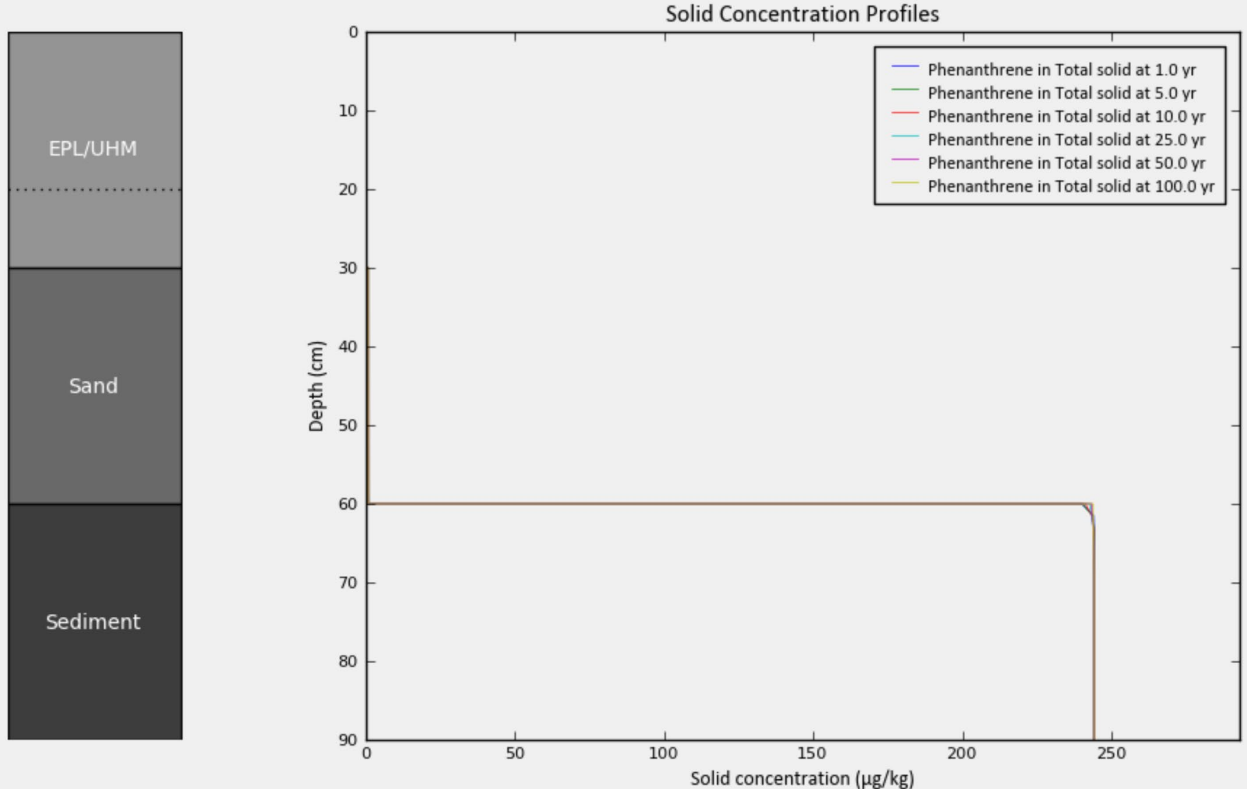

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB206 in Total solid at 1.0 yr
PCB206 in Total solid at 5.0 yr
PCB206 in Total solid at 10.0 yr
PCB206 in Total solid at 25.0 yr
PCB206 in Total solid at 50.0 yr
PCB206 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

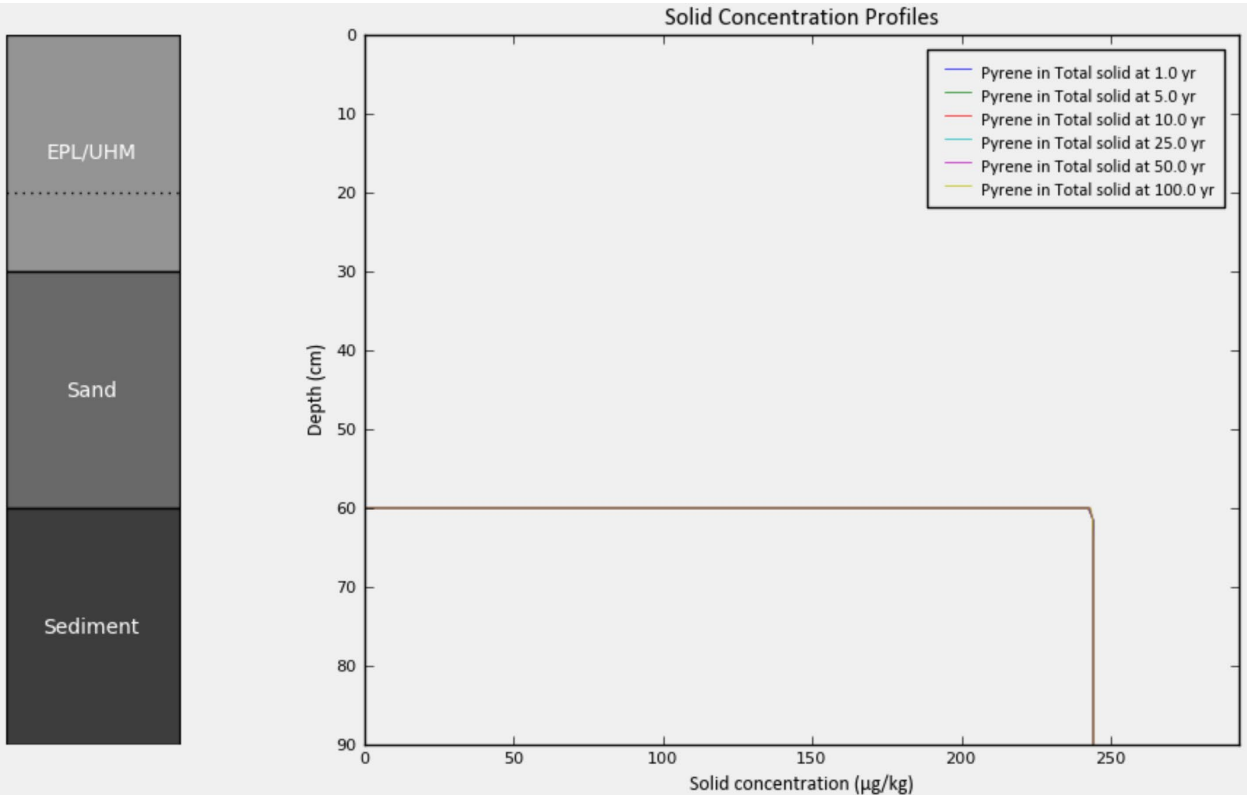

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PCB209 in Total solid at 1.0 yr
PCB209 in Total solid at 5.0 yr
PCB209 in Total solid at 10.0 yr
PCB209 in Total solid at 25.0 yr
PCB209 in Total solid at 50.0 yr
PCB209 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

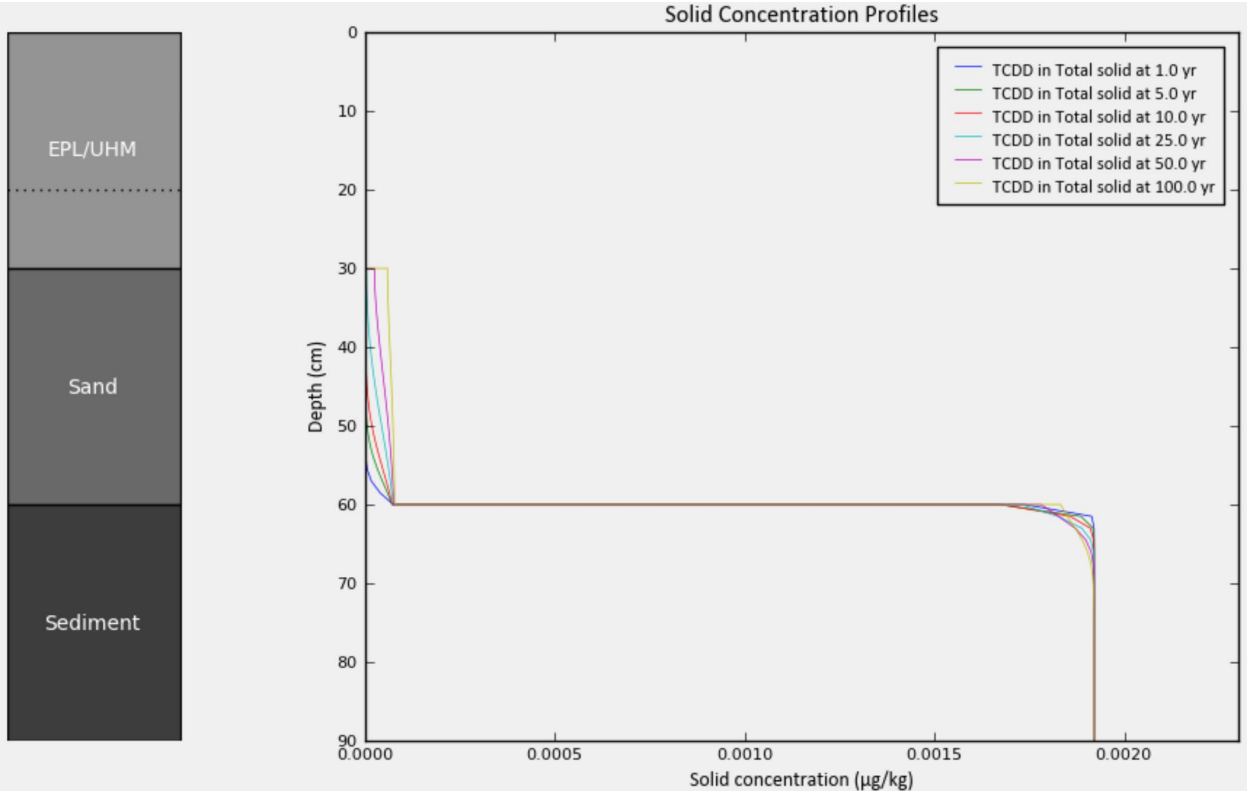

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PeCDD in Total solid at 1.0 yr
PeCDD in Total solid at 5.0 yr
PeCDD in Total solid at 10.0 yr
PeCDD in Total solid at 25.0 yr
PeCDD in Total solid at 50.0 yr
PeCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

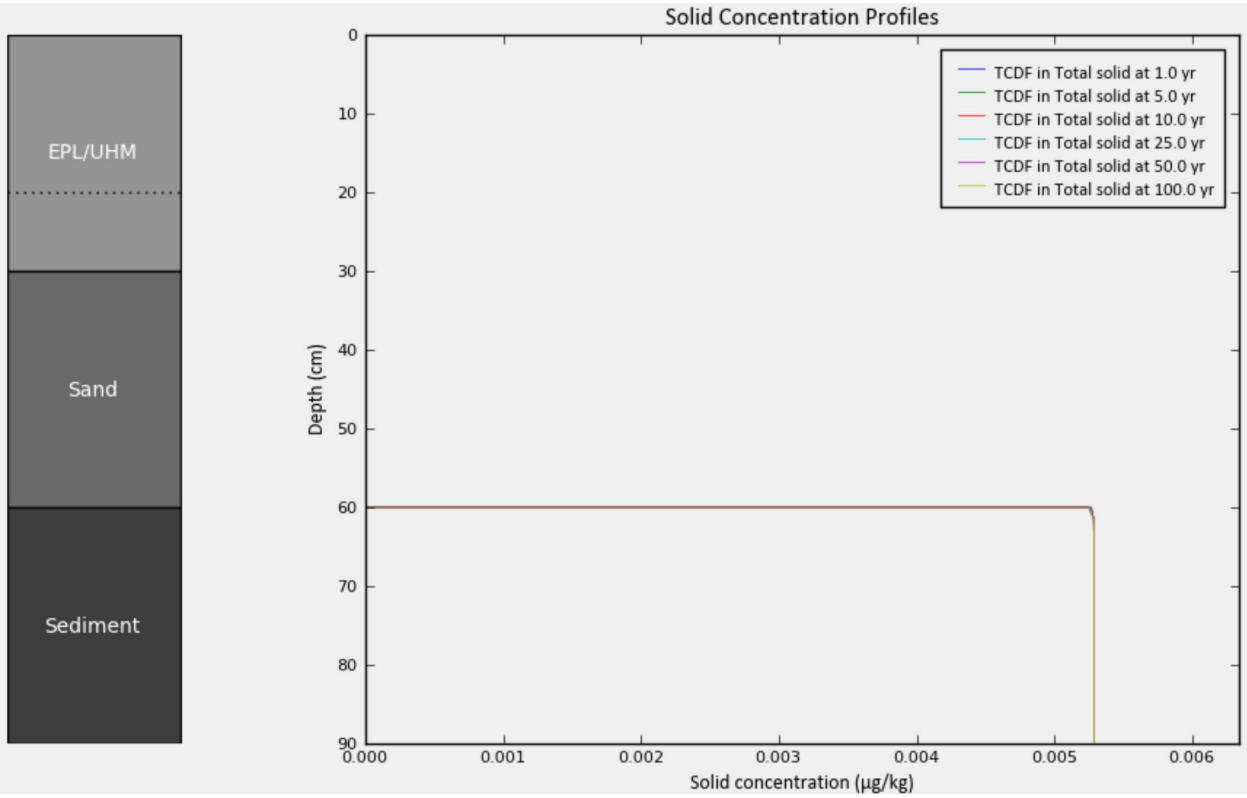

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
PeCDF in Total solid at 1.0 yr
PeCDF in Total solid at 5.0 yr
PeCDF in Total solid at 10.0 yr
PeCDF in Total solid at 25.0 yr
PeCDF in Total solid at 50.0 yr
PeCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
0.012
Solid concentration (µg/kg)

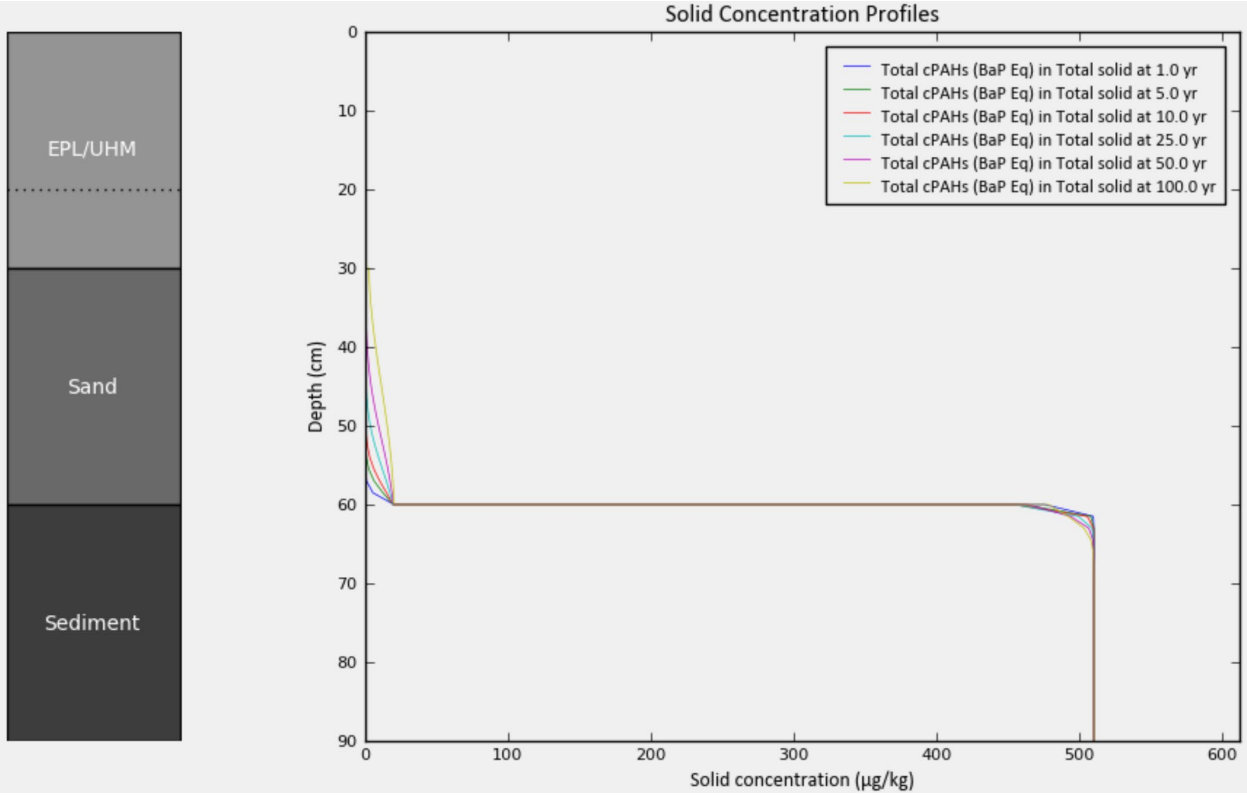

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Pentachlorophenol in Total solid at 1.0 yr
Pentachlorophenol in Total solid at 5.0 yr
Pentachlorophenol in Total solid at 10.0 yr
Pentachlorophenol in Total solid at 25.0 yr
Pentachlorophenol in Total solid at 50.0 yr
Pentachlorophenol in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
10
20
30
40
50
60
70
80
Solid concentration (µg/kg)

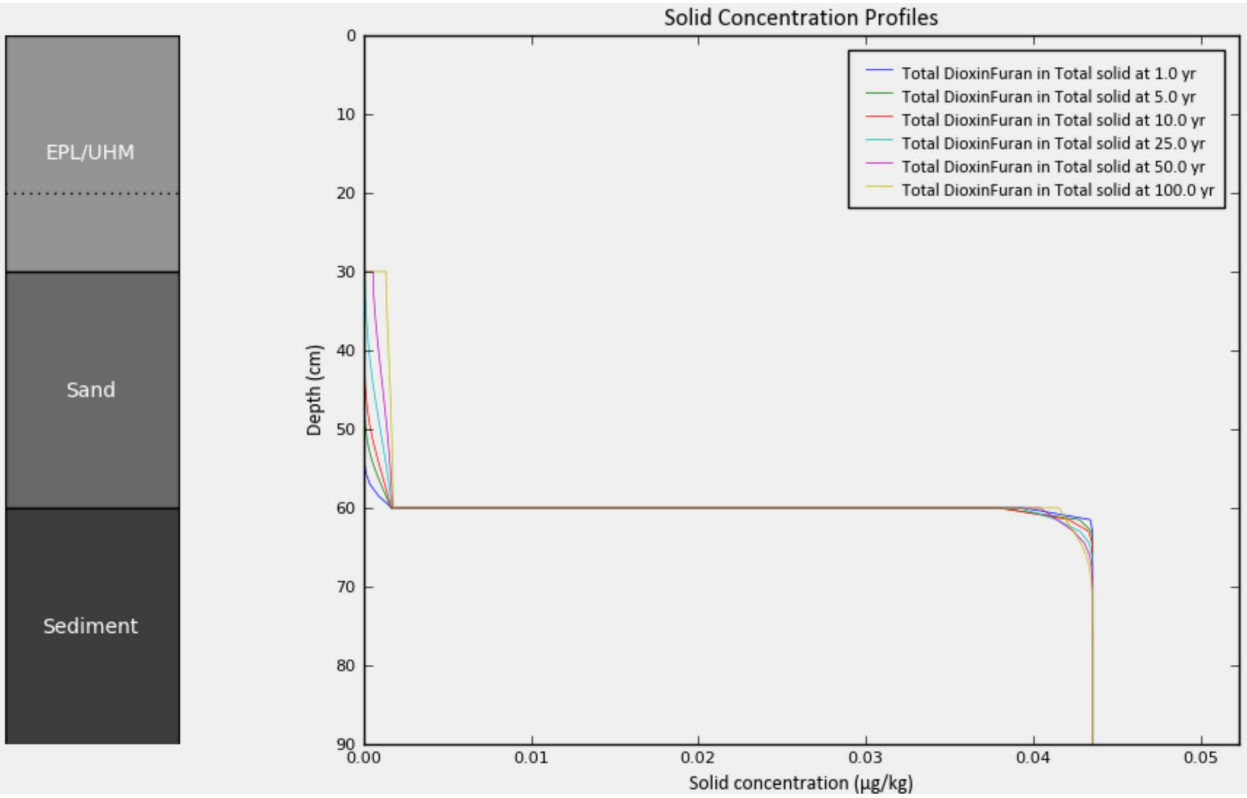

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Phenanthrene in Total solid at 1.0 yr
Phenanthrene in Total solid at 5.0 yr
Phenanthrene in Total solid at 10.0 yr
Phenanthrene in Total solid at 25.0 yr
Phenanthrene in Total solid at 50.0 yr
Phenanthrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

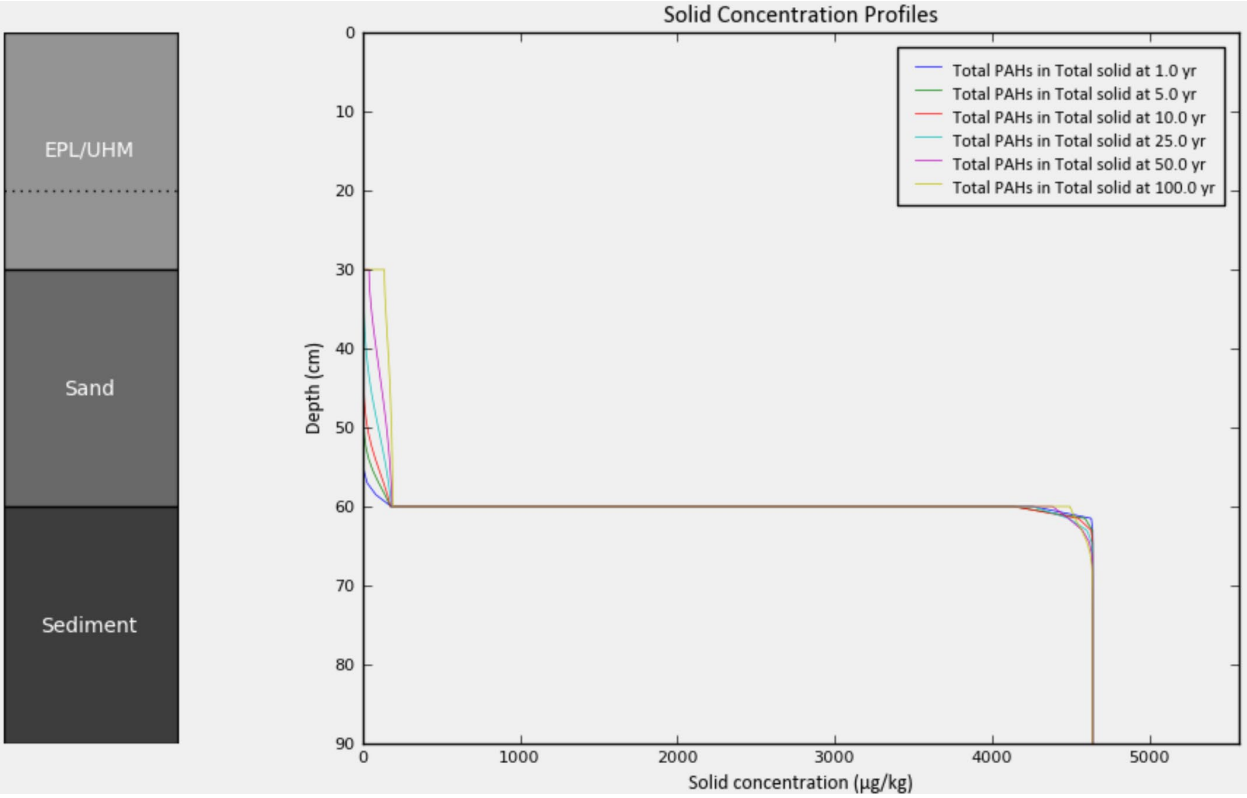

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Pyrene in Total solid at 1.0 yr
Pyrene in Total solid at 5.0 yr
Pyrene in Total solid at 10.0 yr
Pyrene in Total solid at 25.0 yr
Pyrene in Total solid at 50.0 yr
Pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

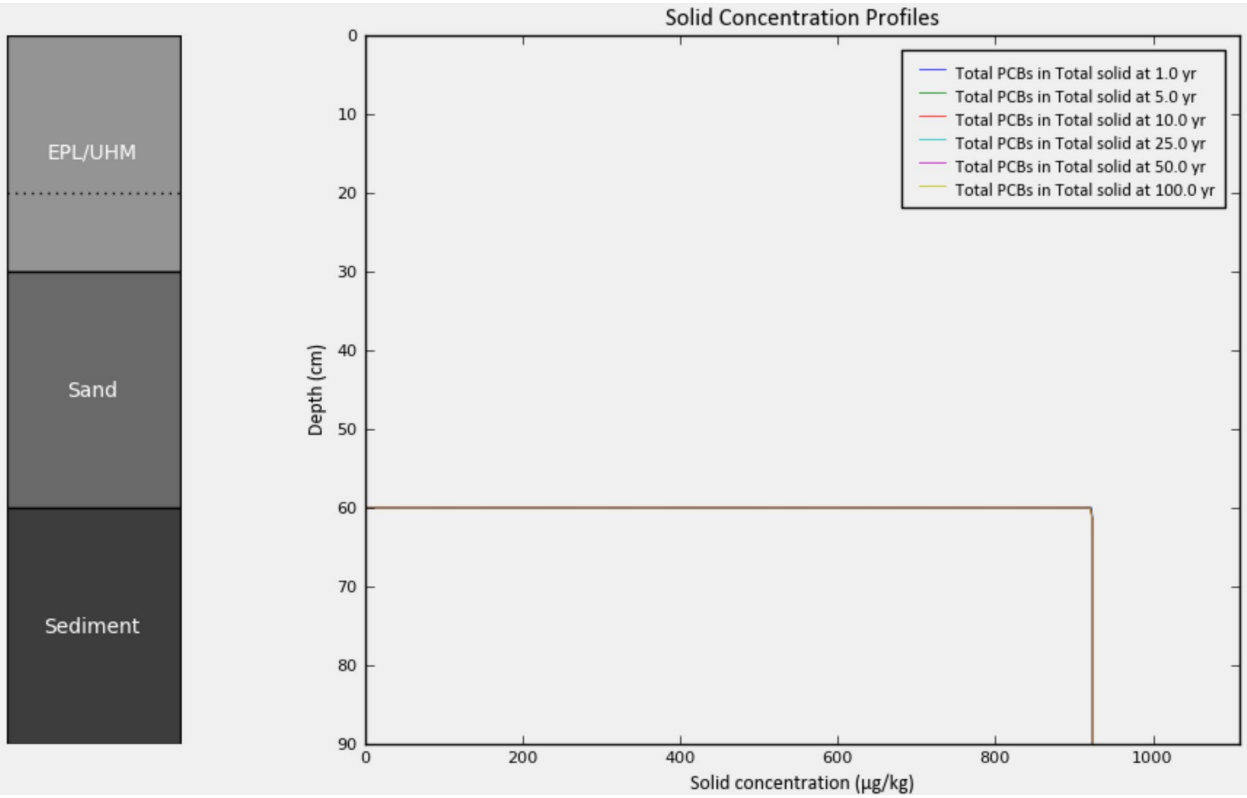

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
TCDD in Total solid at 1.0 yr
TCDD in Total solid at 5.0 yr
TCDD in Total solid at 10.0 yr
TCDD in Total solid at 25.0 yr
TCDD in Total solid at 50.0 yr
TCDD in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
Solid concentration (µg/kg)

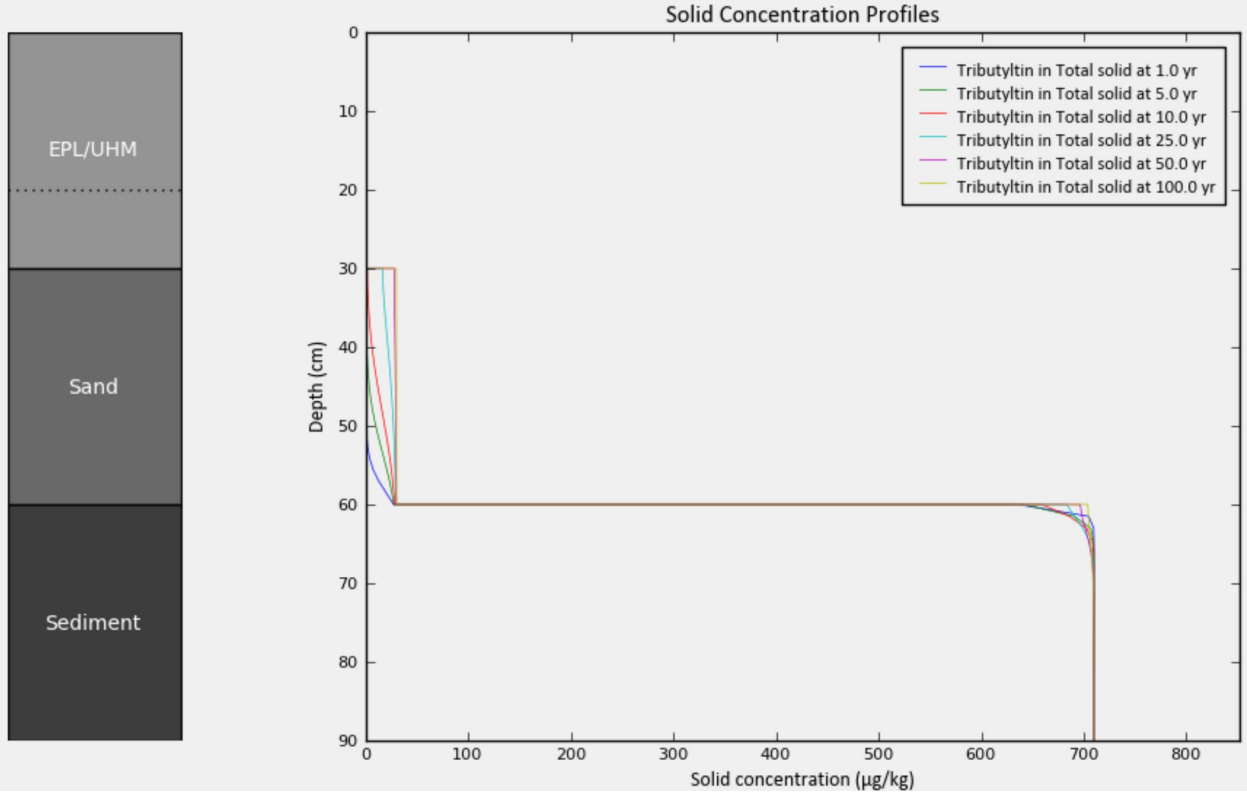

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
TCDF in Total solid at 1.0 yr
TCDF in Total solid at 5.0 yr
TCDF in Total solid at 10.0 yr
TCDF in Total solid at 25.0 yr
TCDF in Total solid at 50.0 yr
TCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Solid concentration (µg/kg)

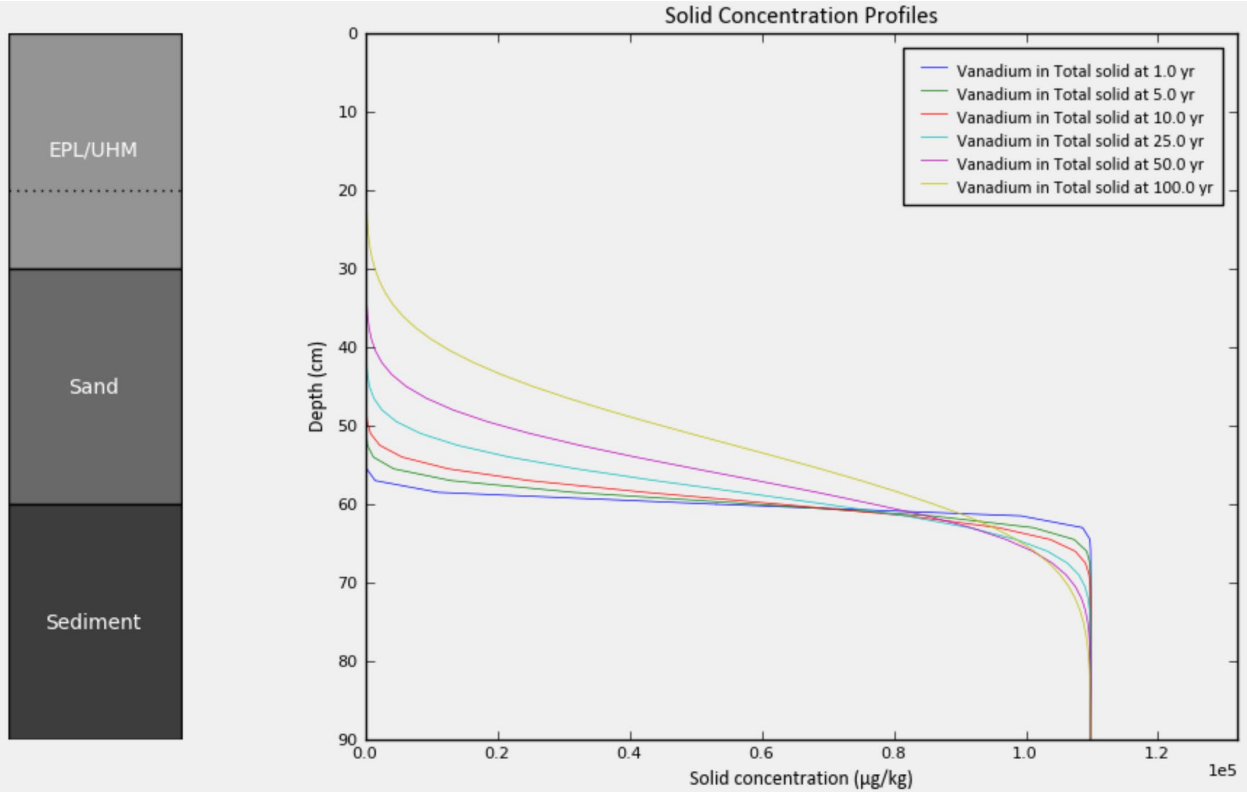

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Total cPAHs (BaP Eq) in Total solid at 1.0 yr
Total cPAHs (BaP Eq) in Total solid at 5.0 yr
Total cPAHs (BaP Eq) in Total solid at 10.0 yr
Total cPAHs (BaP Eq) in Total solid at 25.0 yr
Total cPAHs (BaP Eq) in Total solid at 50.0 yr
Total cPAHs (BaP Eq) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500
600

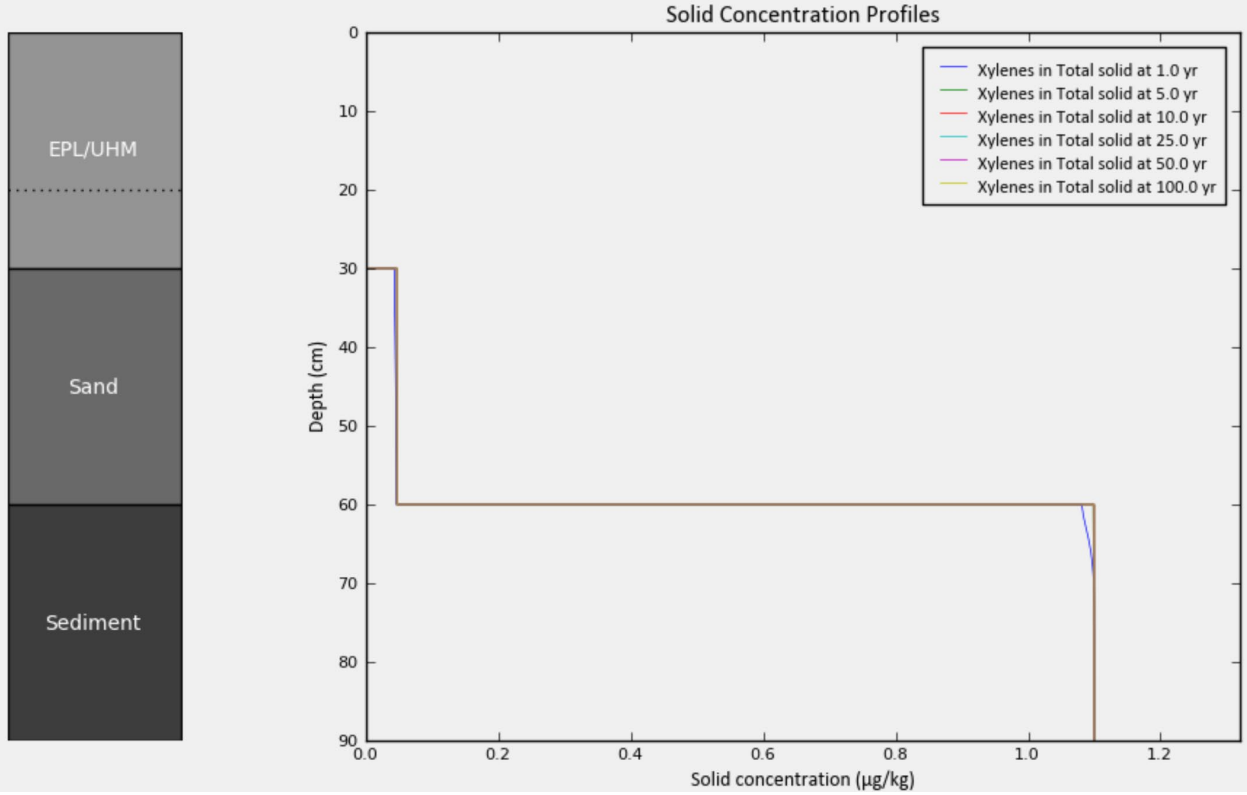

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Total DioxinFuran in Total solid at 1.0 yr
Total DioxinFuran in Total solid at 5.0 yr
Total DioxinFuran in Total solid at 10.0 yr
Total DioxinFuran in Total solid at 25.0 yr
Total DioxinFuran in Total solid at 50.0 yr
Total DioxinFuran in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0.00
0.01
0.02
0.03
0.04
0.05

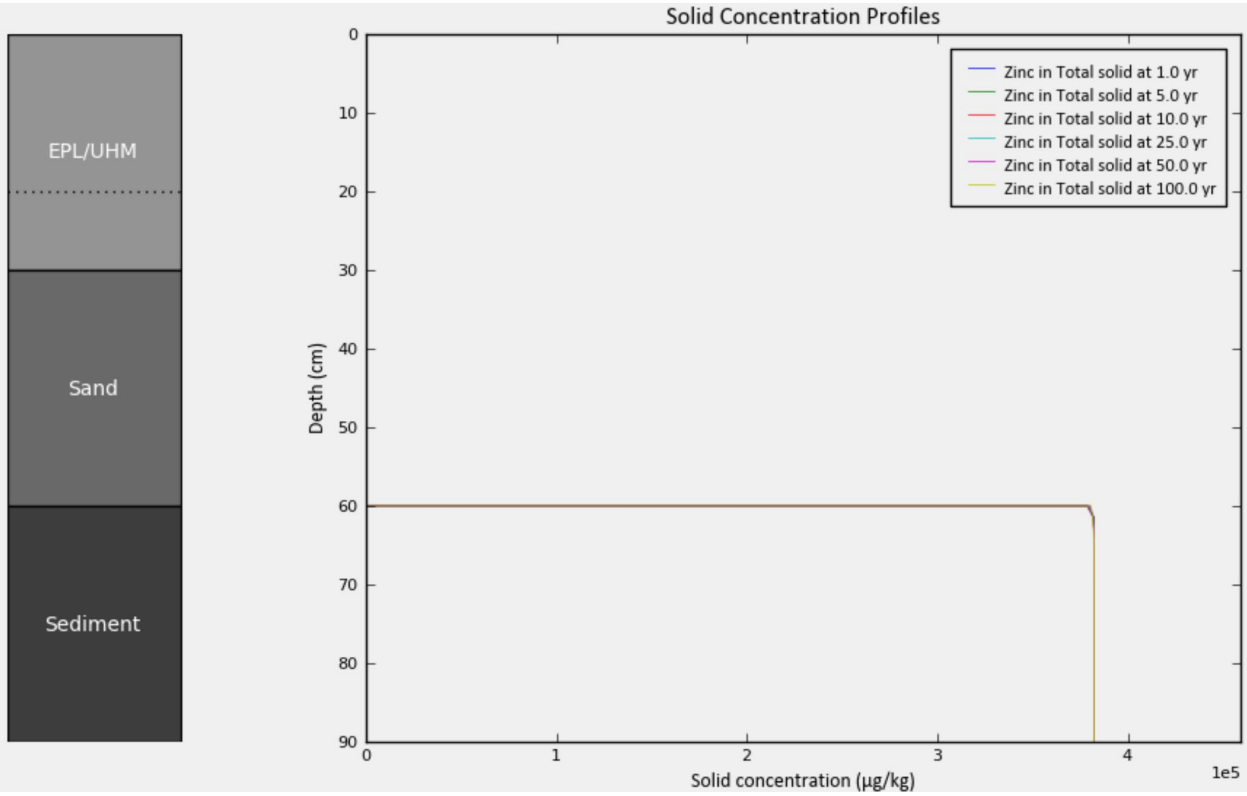

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Total PAHs in Total solid at 1.0 yr
Total PAHs in Total solid at 5.0 yr
Total PAHs in Total solid at 10.0 yr
Total PAHs in Total solid at 25.0 yr
Total PAHs in Total solid at 50.0 yr
Total PAHs in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
1000
2000
3000
4000
5000
Solid concentration (µg/kg)


EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Total PCBs in Total solid at 1.0 yr
Total PCBs in Total solid at 5.0 yr
Total PCBs in Total solid at 10.0 yr
Total PCBs in Total solid at 25.0 yr
Total PCBs in Total solid at 50.0 yr
Total PCBs in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
200
400
600
800
1000
Solid concentration (µg/kg)


EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Tributyltin in Total solid at 1.0 yr
Tributyltin in Total solid at 5.0 yr
Tributyltin in Total solid at 10.0 yr
Tributyltin in Total solid at 25.0 yr
Tributyltin in Total solid at 50.0 yr
Tributyltin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

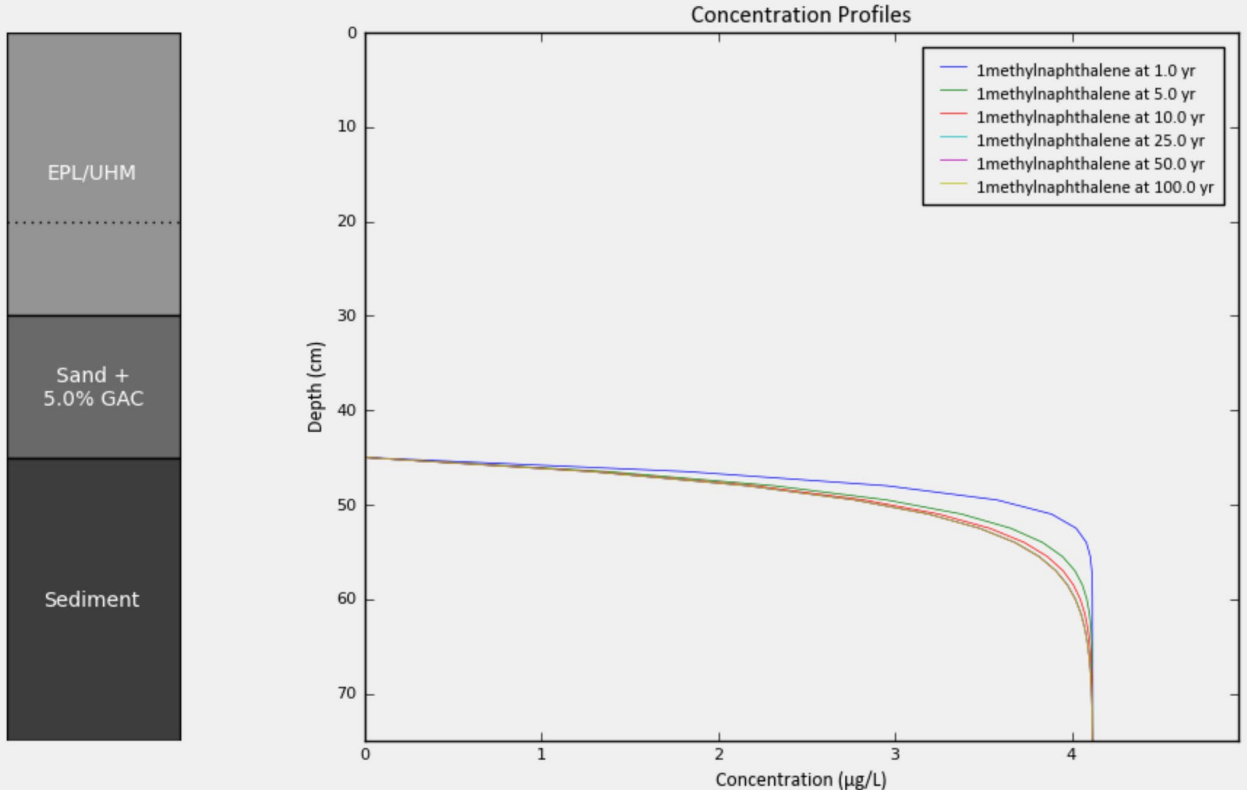

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Vanadium in Total solid at 1.0 yr
Vanadium in Total solid at 5.0 yr
Vanadium in Total solid at 10.0 yr
Vanadium in Total solid at 25.0 yr
Vanadium in Total solid at 50.0 yr
Vanadium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

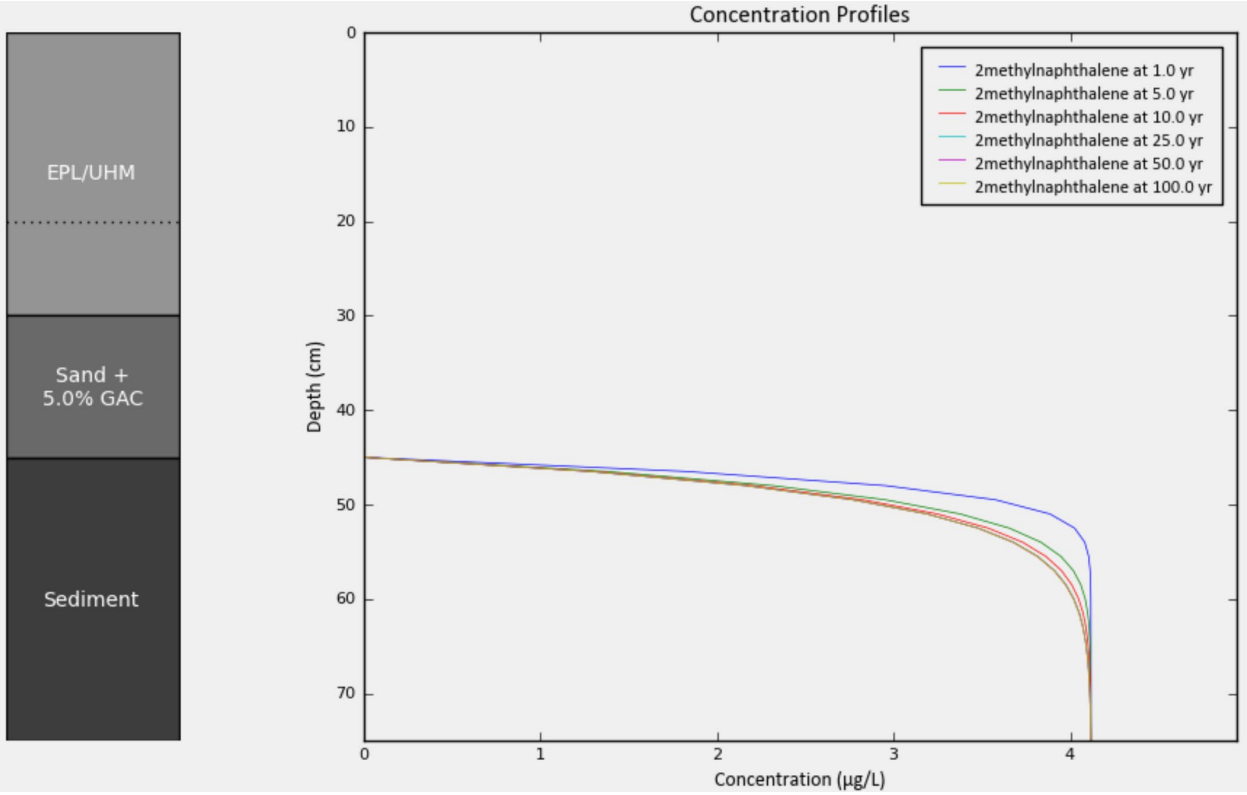

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Xylenes in Total solid at 1.0 yr
Xylenes in Total solid at 5.0 yr
Xylenes in Total solid at 10.0 yr
Xylenes in Total solid at 25.0 yr
Xylenes in Total solid at 50.0 yr
Xylenes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

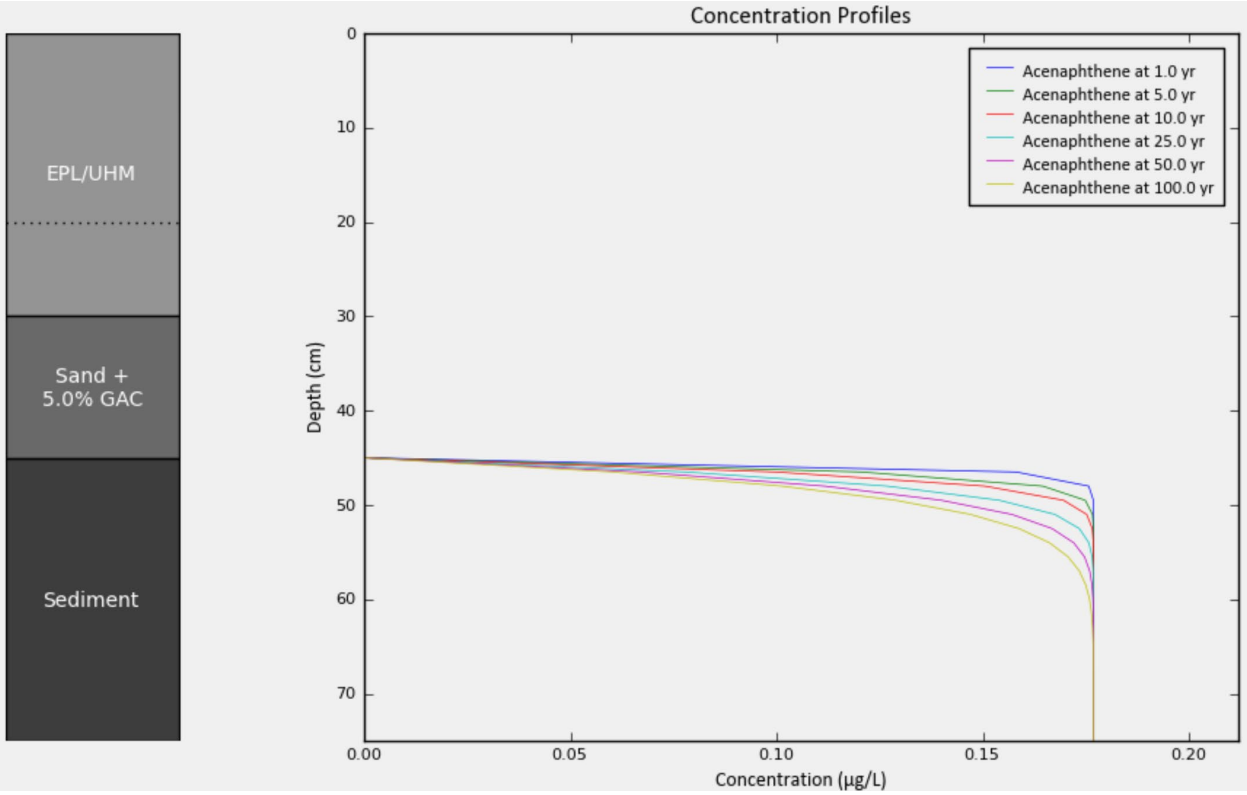

EPL/UHM
Sand
Sediment
Solid Concentration Profiles
Zinc in Total solid at 1.0 yr
Zinc in Total solid at 5.0 yr
Zinc in Total solid at 10.0 yr
Zinc in Total solid at 25.0 yr
Zinc in Total solid at 50.0 yr
Zinc in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

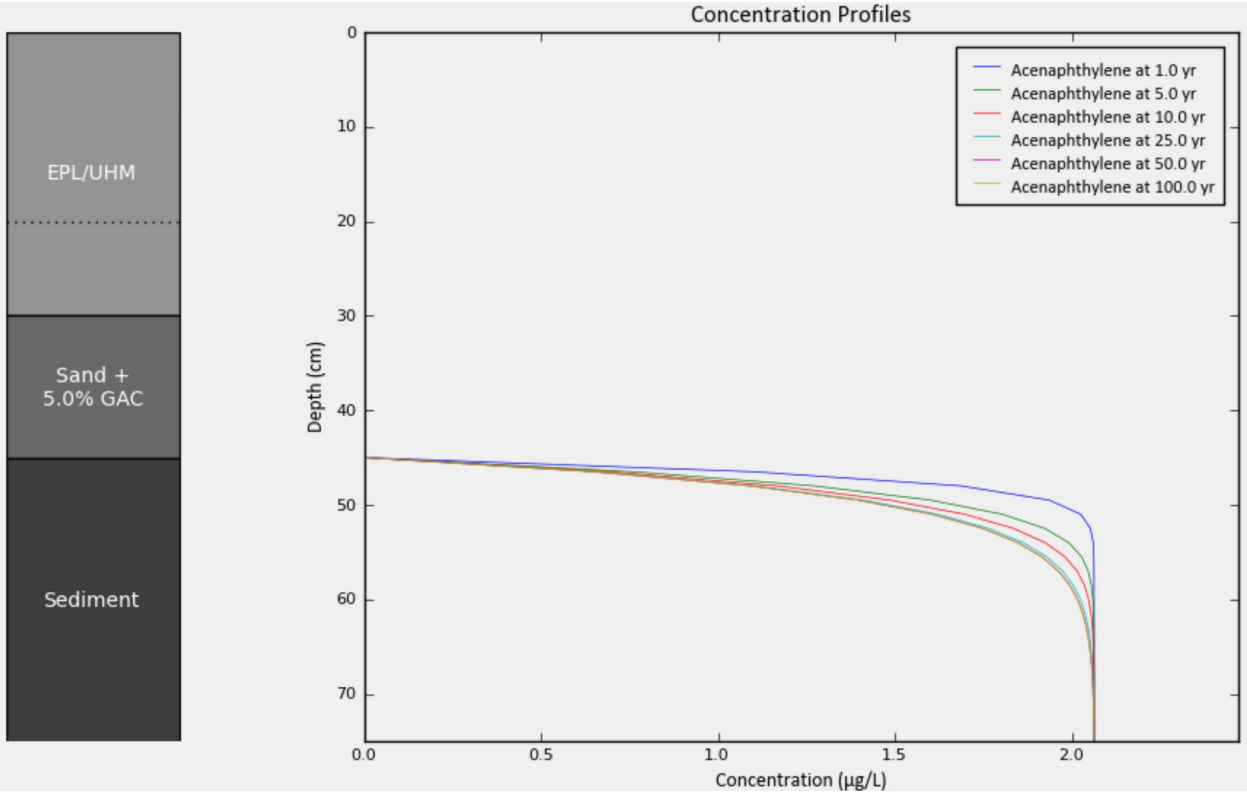
Cap Alternative 2: 15 cm of 5.0% GAC amended sand with 30 cm EPL/UHM

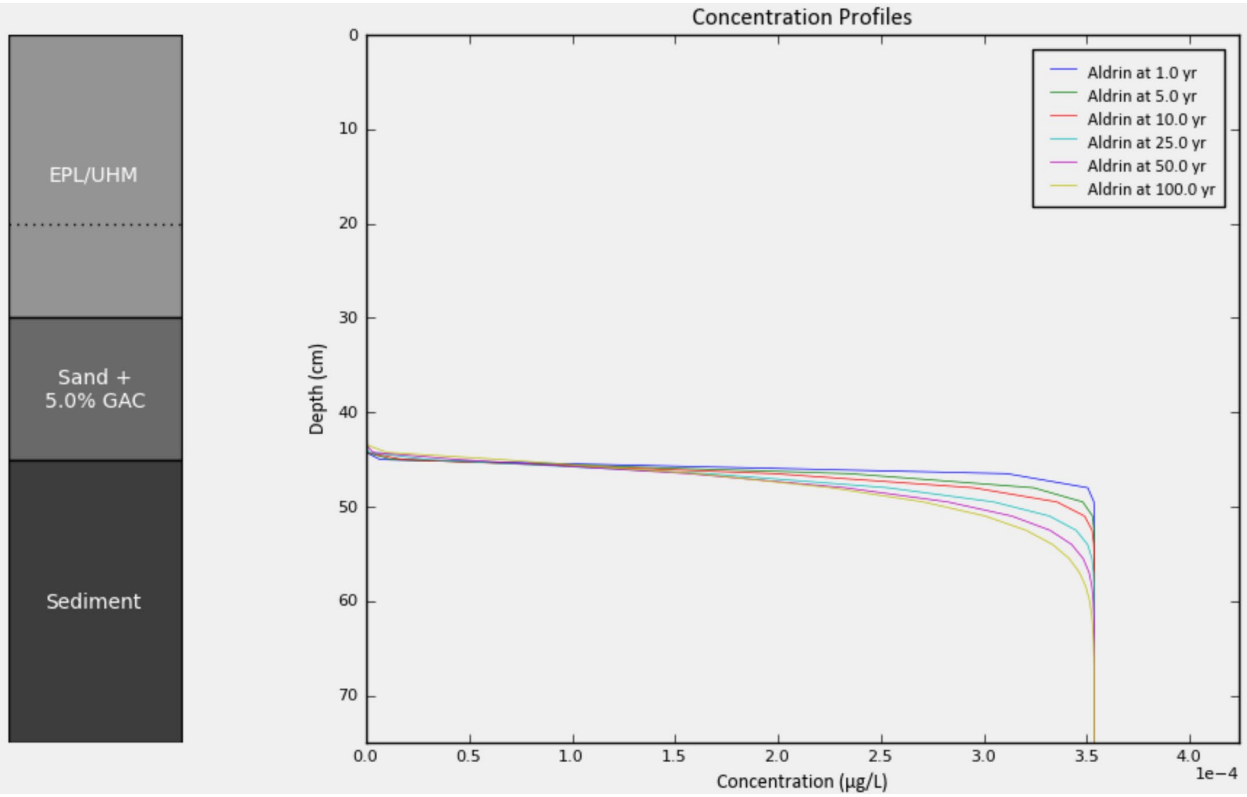
Porewater Concentration - Depth

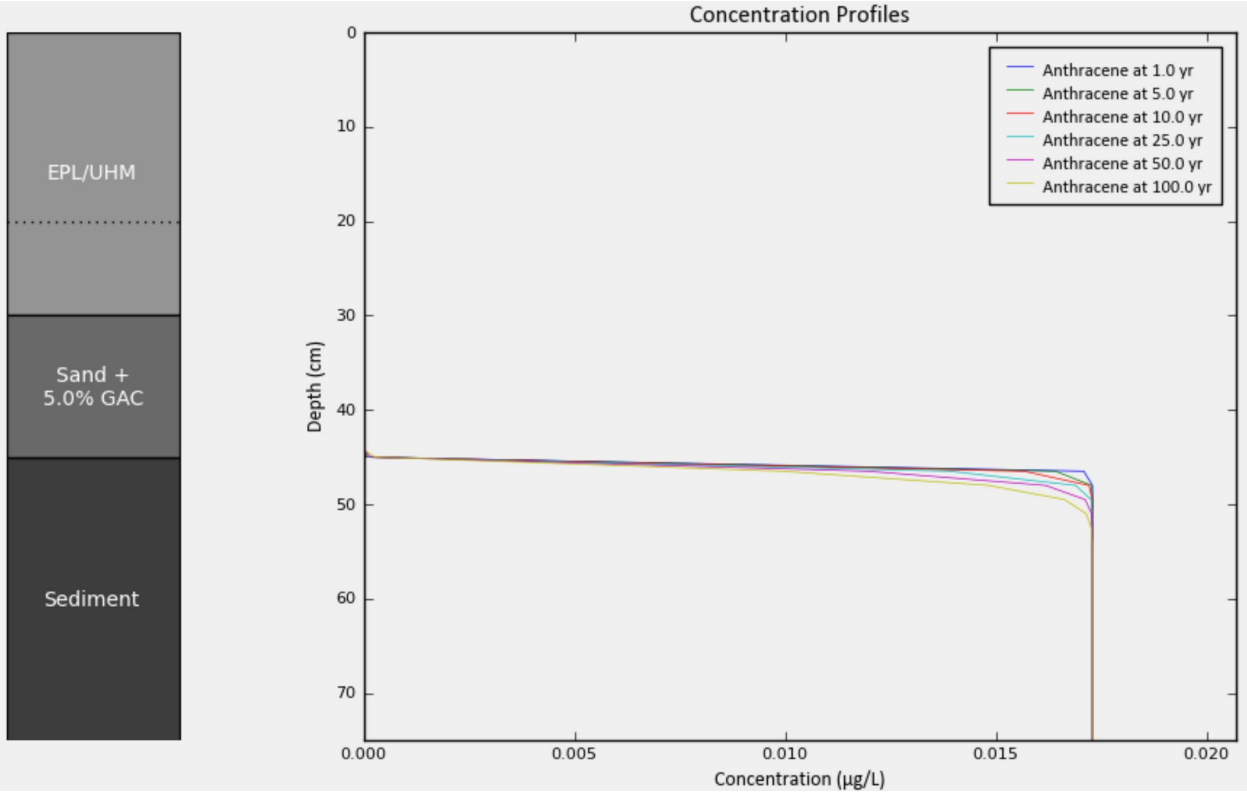


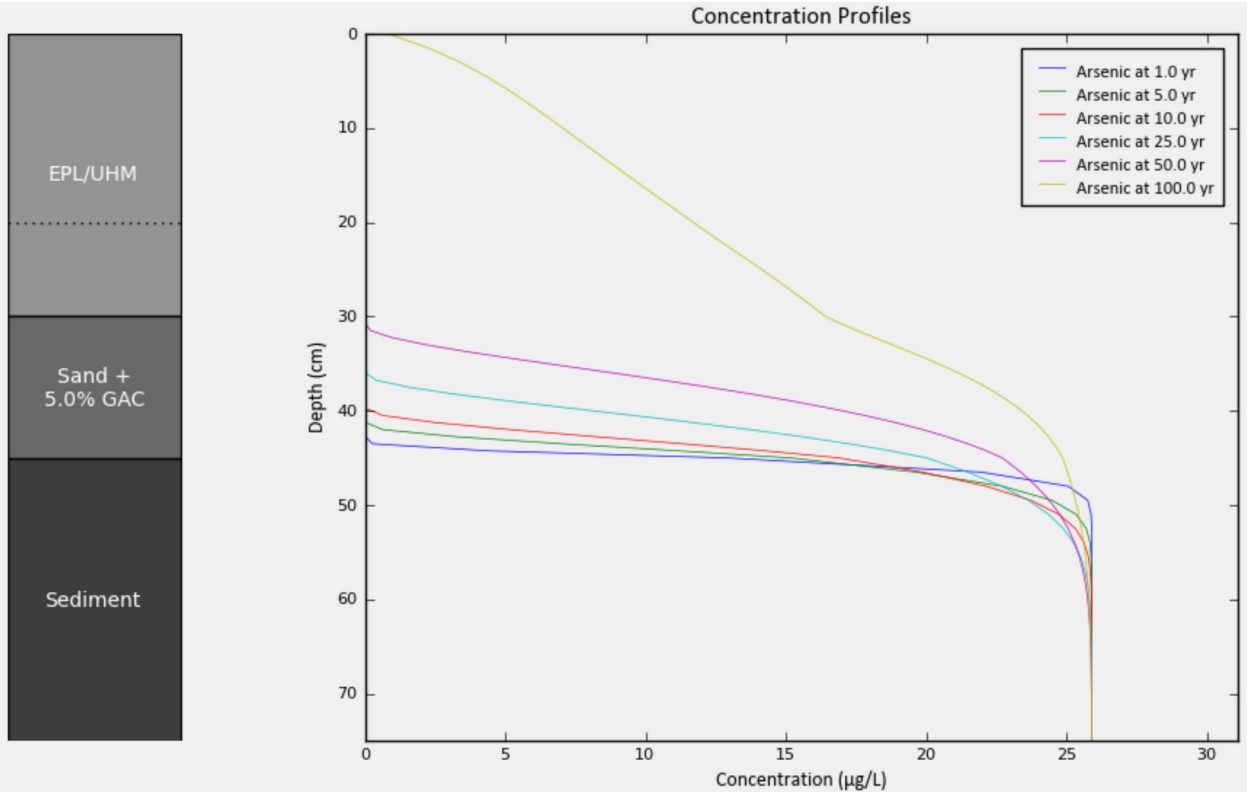

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
2methylnaphthalene at 1.0 yr
2methylnaphthalene at 5.0 yr
2methylnaphthalene at 10.0 yr
2methylnaphthalene at 25.0 yr
2methylnaphthalene at 50.0 yr
2methylnaphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

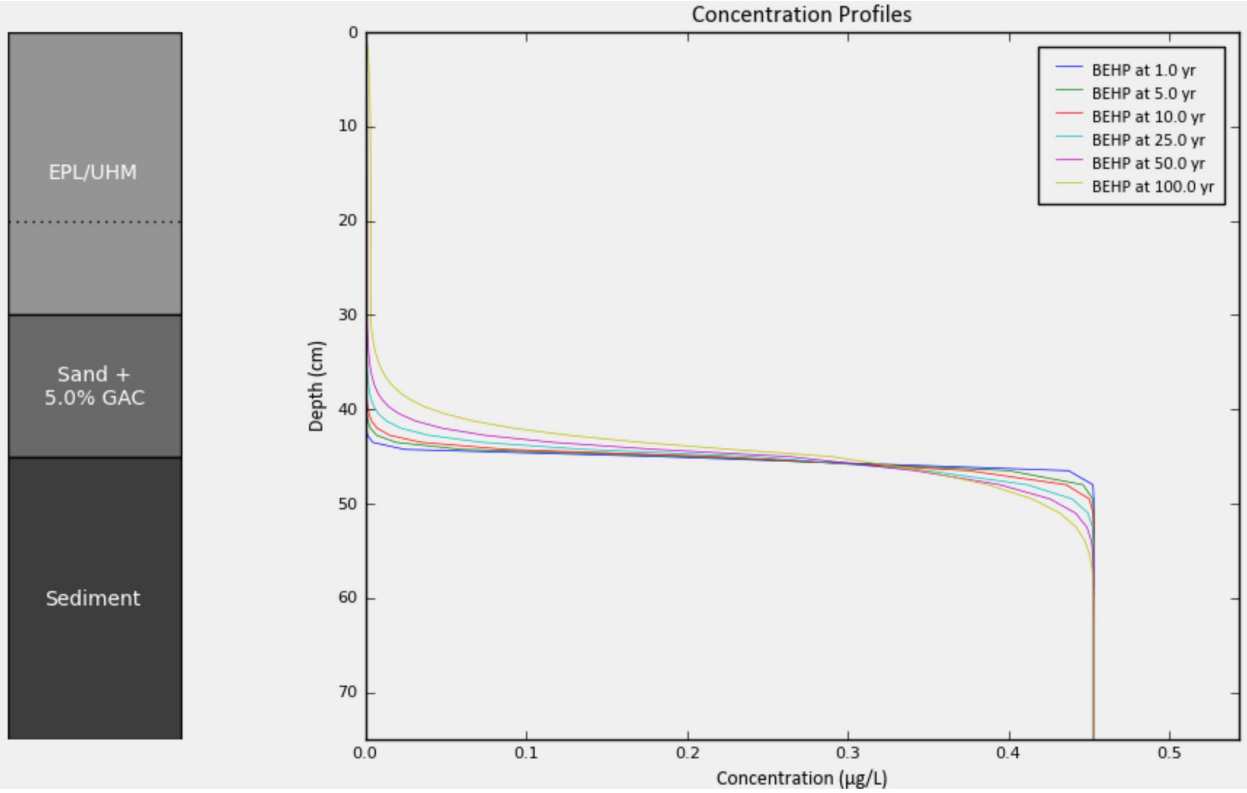

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Acenaphthene at 1.0 yr
Acenaphthene at 5.0 yr
Acenaphthene at 10.0 yr
Acenaphthene at 25.0 yr
Acenaphthene at 50.0 yr
Acenaphthene at 100.0 yr
Depth (cm)
Concentration (µg/L)

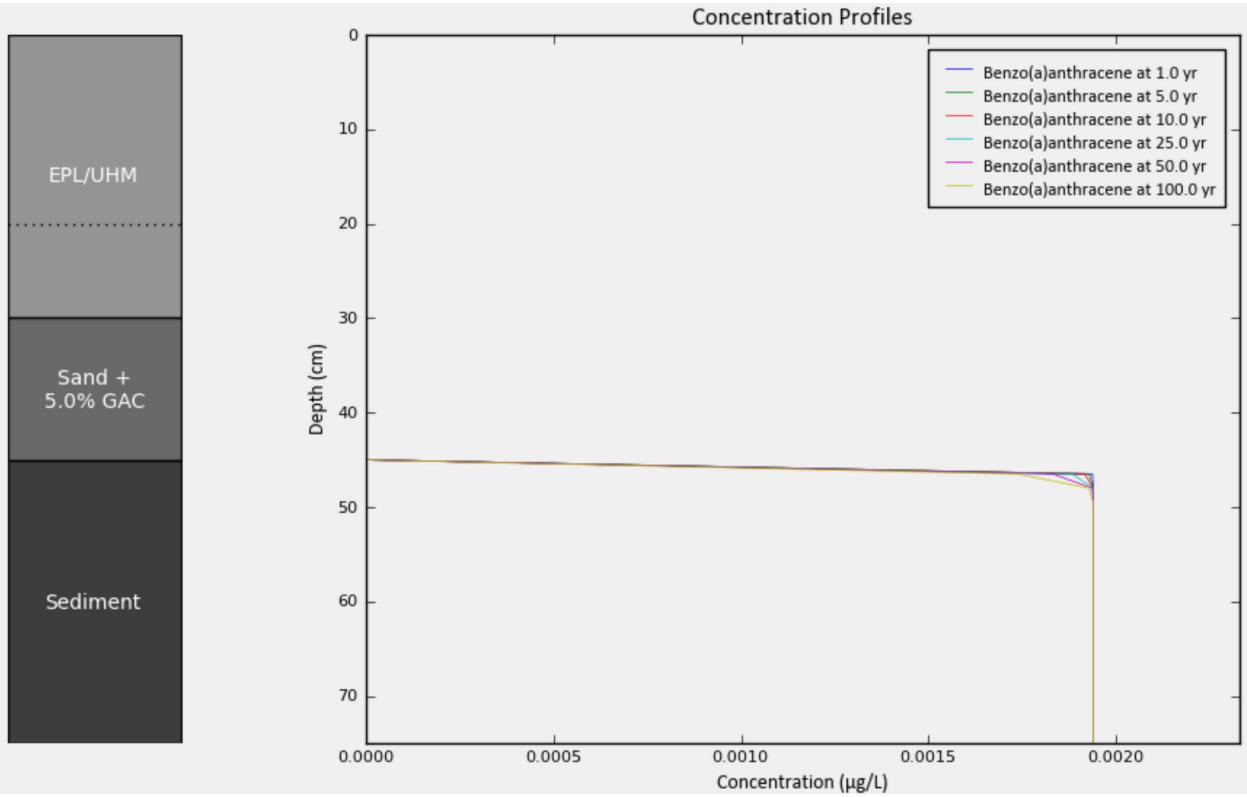

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Acenaphthylene at 1.0 yr
Acenaphthylene at 5.0 yr
Acenaphthylene at 10.0 yr
Acenaphthylene at 25.0 yr
Acenaphthylene at 50.0 yr
Acenaphthylene at 100.0 yr
Depth (cm)
Concentration (µg/L)

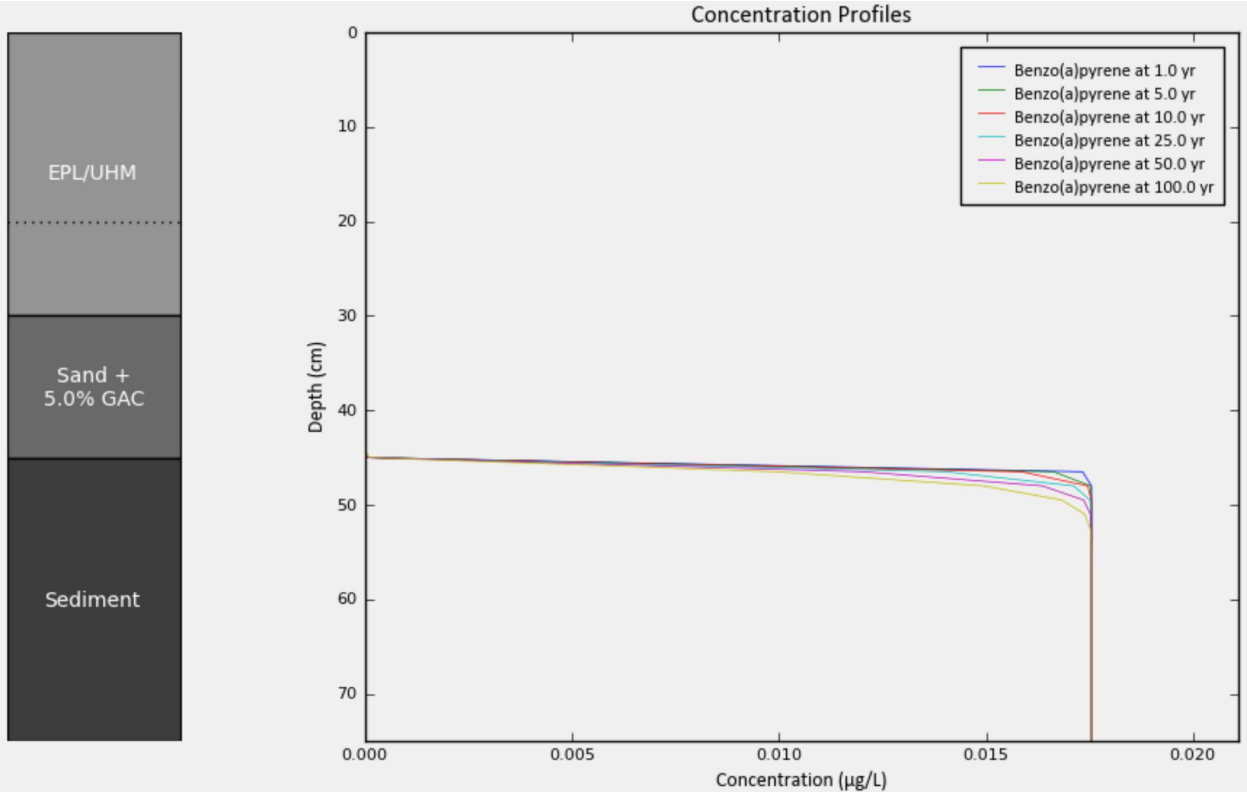

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Aldrin at 1.0 yr
Aldrin at 5.0 yr
Aldrin at 10.0 yr
Aldrin at 25.0 yr
Aldrin at 50.0 yr
Aldrin at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

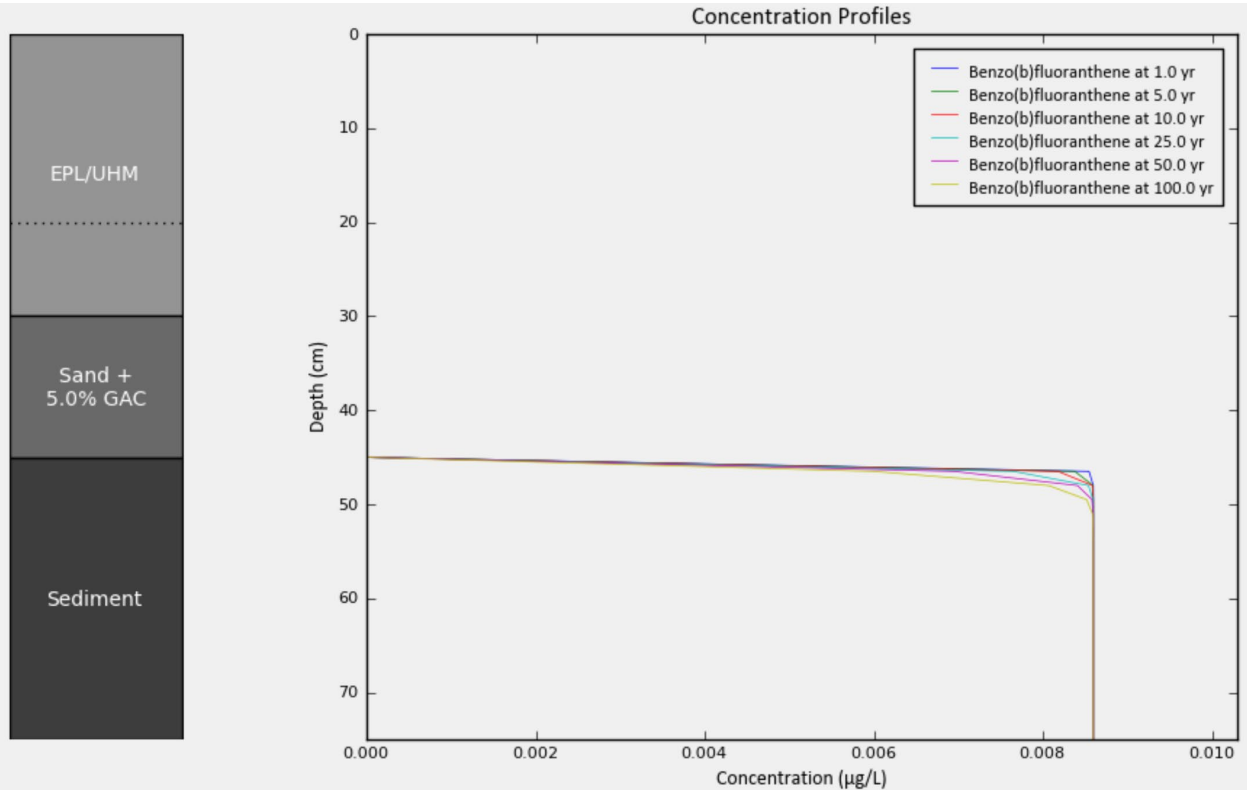

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Anthracene at 1.0 yr
Anthracene at 5.0 yr
Anthracene at 10.0 yr
Anthracene at 25.0 yr
Anthracene at 50.0 yr
Anthracene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

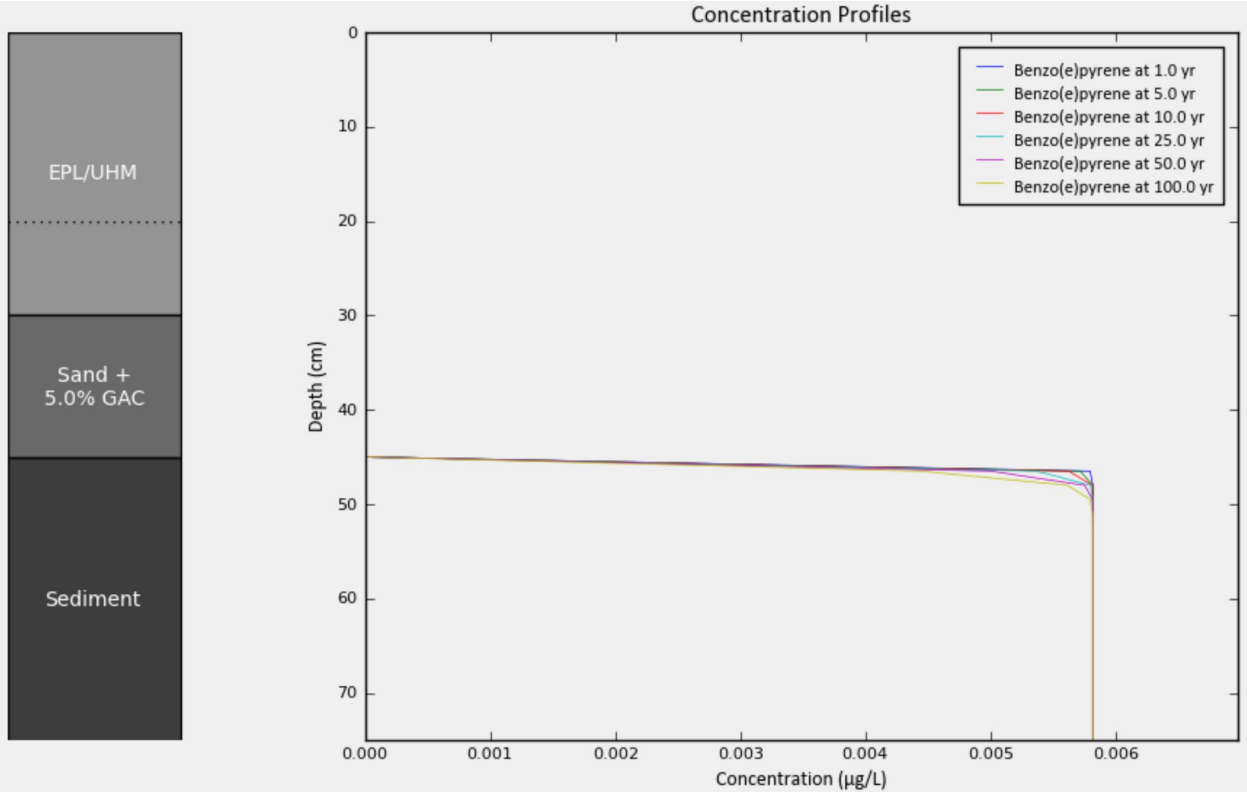

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Arsenic at 1.0 yr
Arsenic at 5.0 yr
Arsenic at 10.0 yr
Arsenic at 25.0 yr
Arsenic at 50.0 yr
Arsenic at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
5
10
15
20
25
30
Concentration (µg/L)

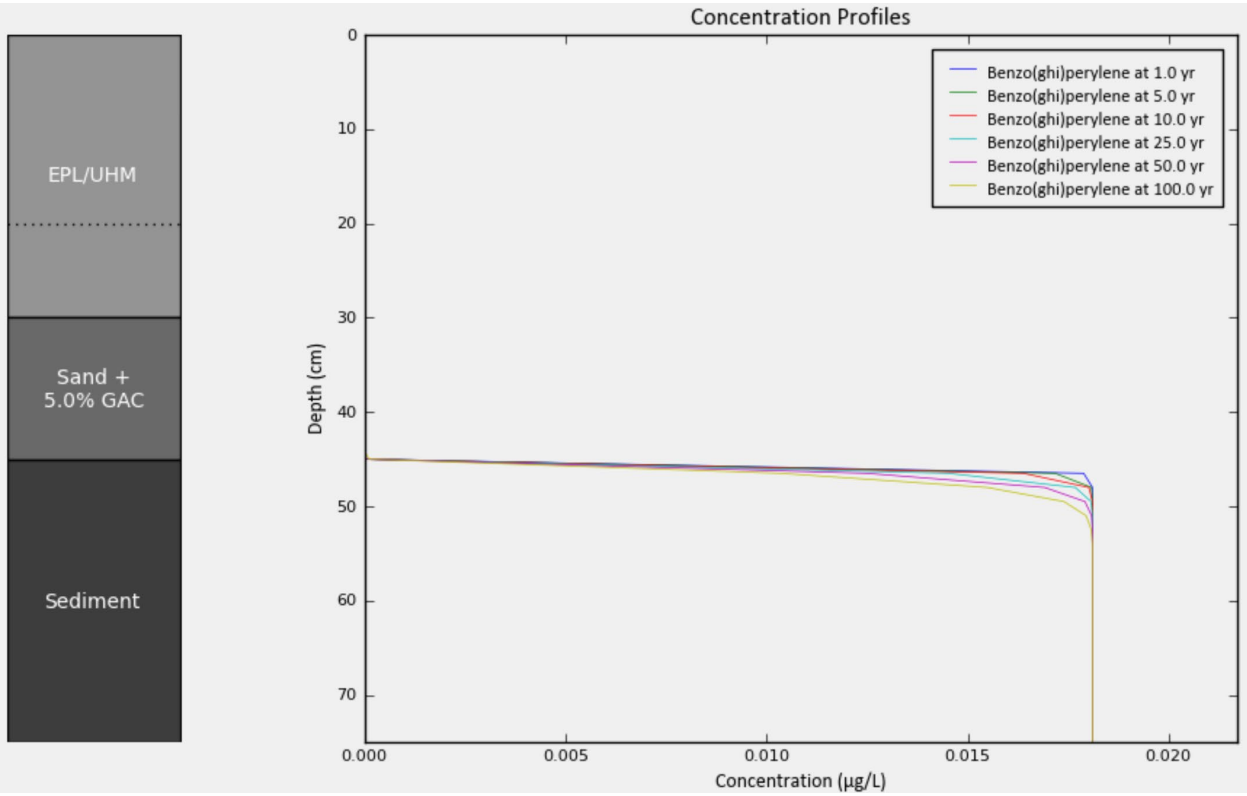

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
BEHP at 1.0 yr
BEHP at 5.0 yr
BEHP at 10.0 yr
BEHP at 25.0 yr
BEHP at 50.0 yr
BEHP at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
0.0
0.1
0.2
0.3
0.4
0.5

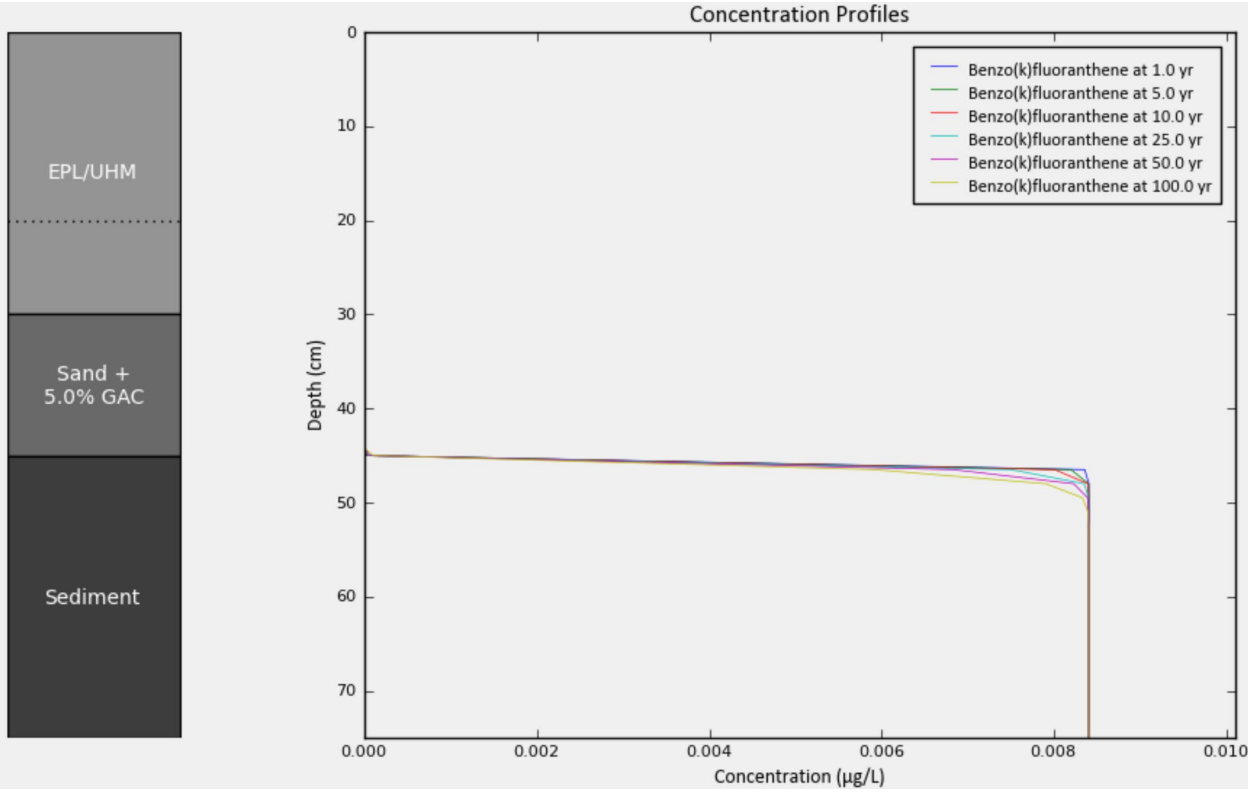

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Benzo(a)anthracene at 1.0 yr
Benzo(a)anthracene at 5.0 yr
Benzo(a)anthracene at 10.0 yr
Benzo(a)anthracene at 25.0 yr
Benzo(a)anthracene at 50.0 yr
Benzo(a)anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
0.0000
0.0005
0.0010
0.0015
0.0020

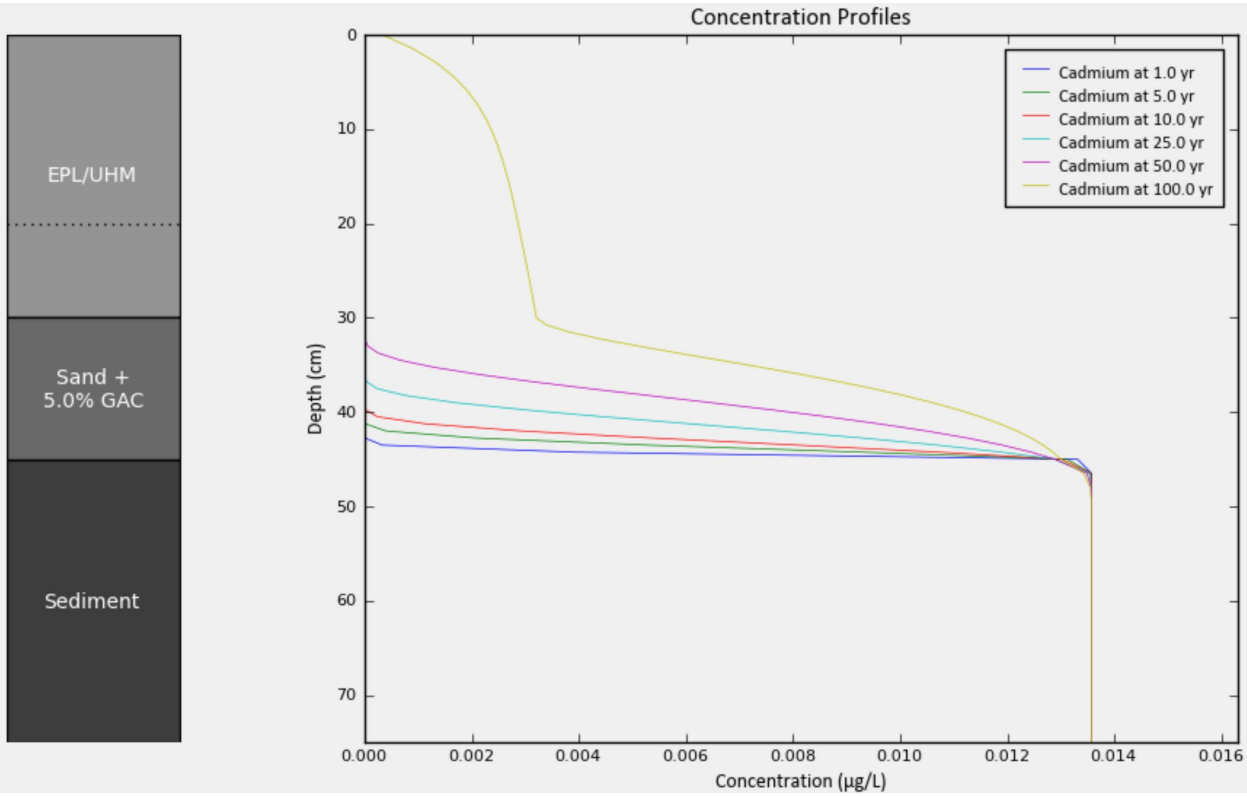

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Benzo(a)pyrene at 1.0 yr
Benzo(a)pyrene at 5.0 yr
Benzo(a)pyrene at 10.0 yr
Benzo(a)pyrene at 25.0 yr
Benzo(a)pyrene at 50.0 yr
Benzo(a)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

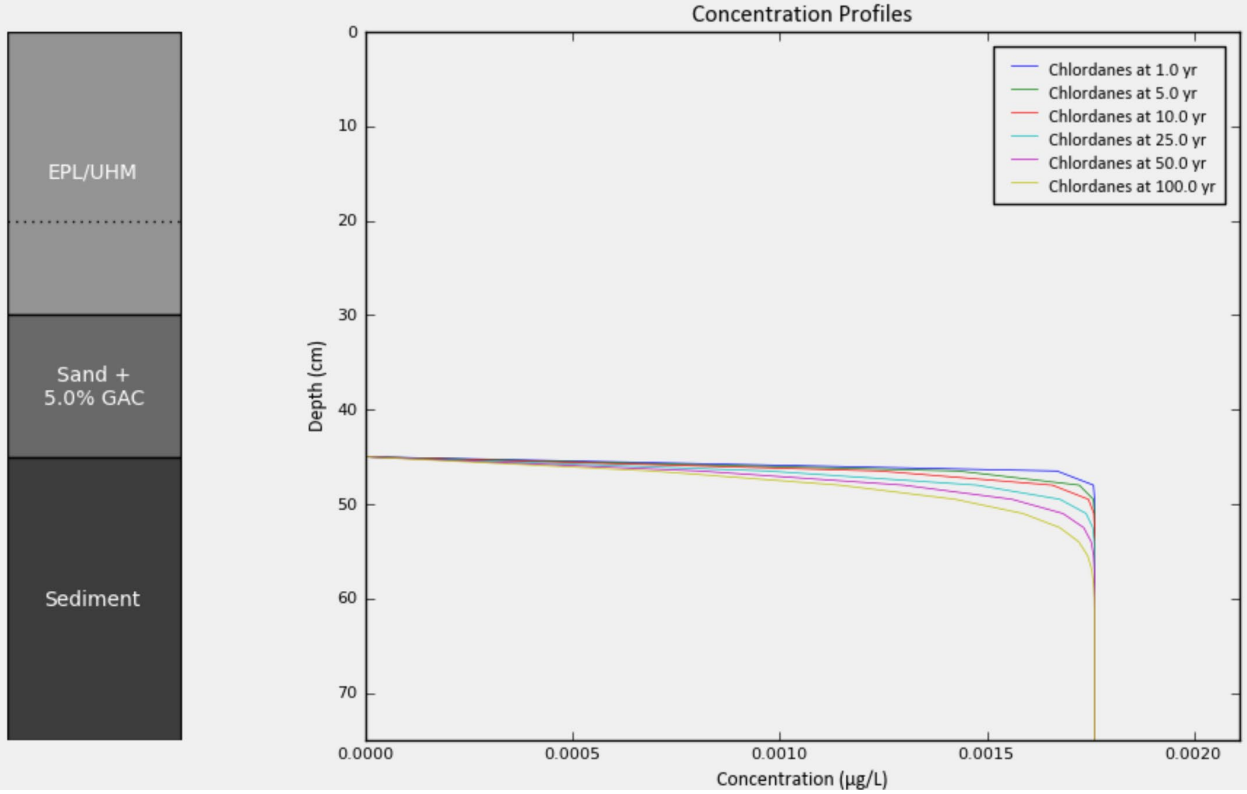

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Benzo(b)fluoranthene at 1.0 yr
Benzo(b)fluoranthene at 5.0 yr
Benzo(b)fluoranthene at 10.0 yr
Benzo(b)fluoranthene at 25.0 yr
Benzo(b)fluoranthene at 50.0 yr
Benzo(b)fluoranthene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.000
0.002
0.004
0.006
0.008
0.010
Concentration (µg/L)

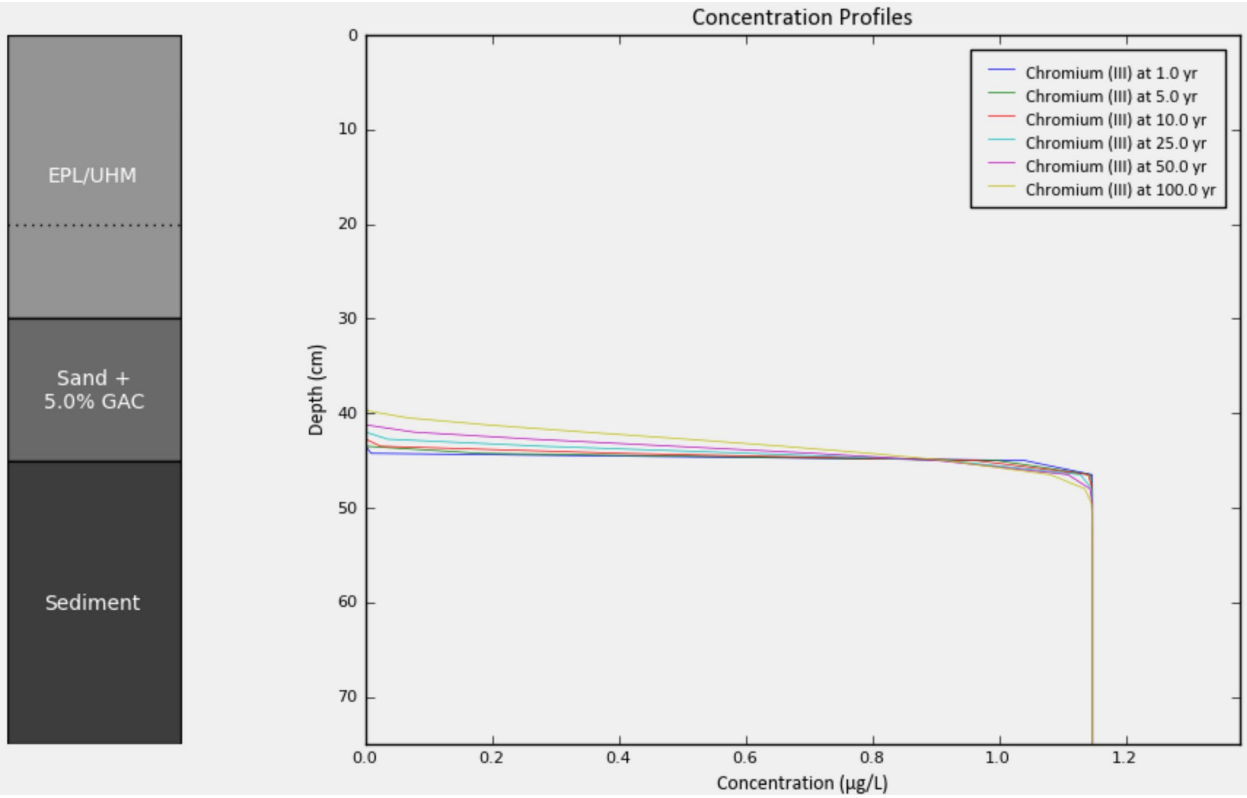

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Benzo(e)pyrene at 1.0 yr
Benzo(e)pyrene at 5.0 yr
Benzo(e)pyrene at 10.0 yr
Benzo(e)pyrene at 25.0 yr
Benzo(e)pyrene at 50.0 yr
Benzo(e)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

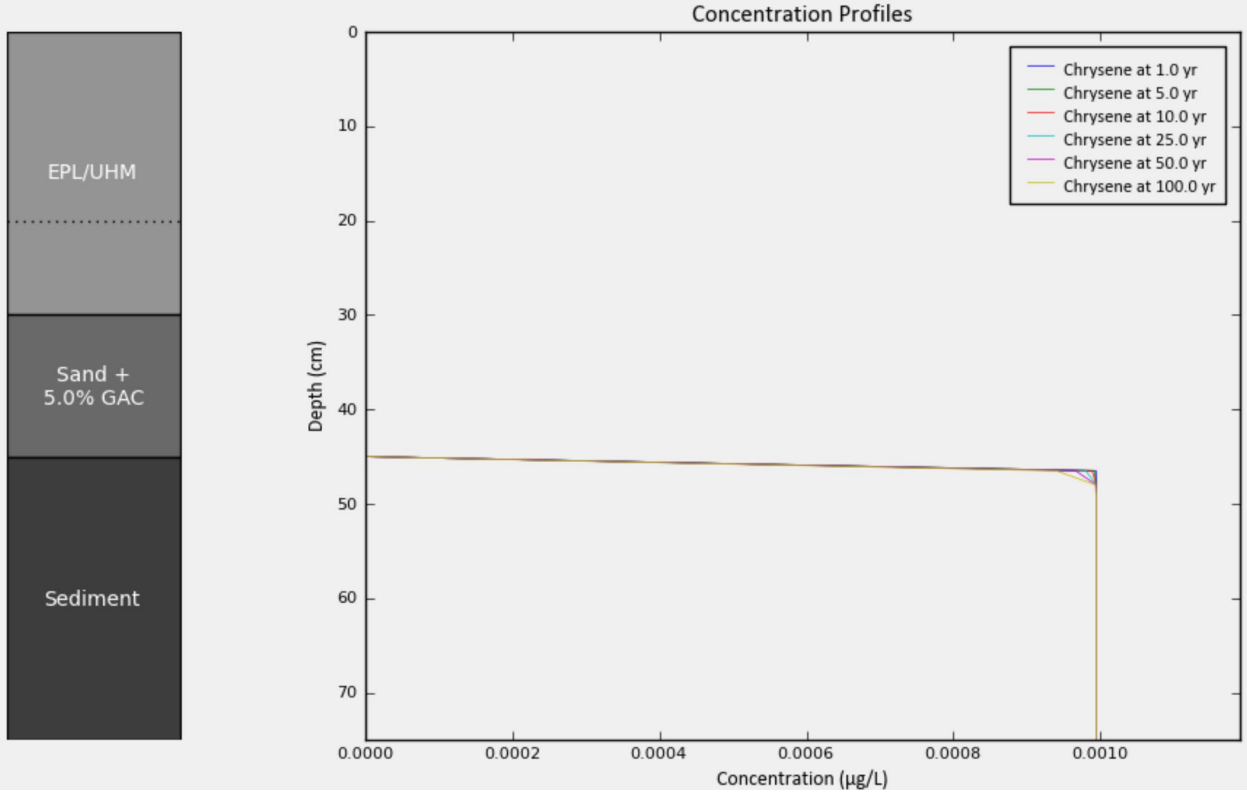

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Benzo(ghi)perylene at 1.0 yr
Benzo(ghi)perylene at 5.0 yr
Benzo(ghi)perylene at 10.0 yr
Benzo(ghi)perylene at 25.0 yr
Benzo(ghi)perylene at 50.0 yr
Benzo(ghi)perylene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

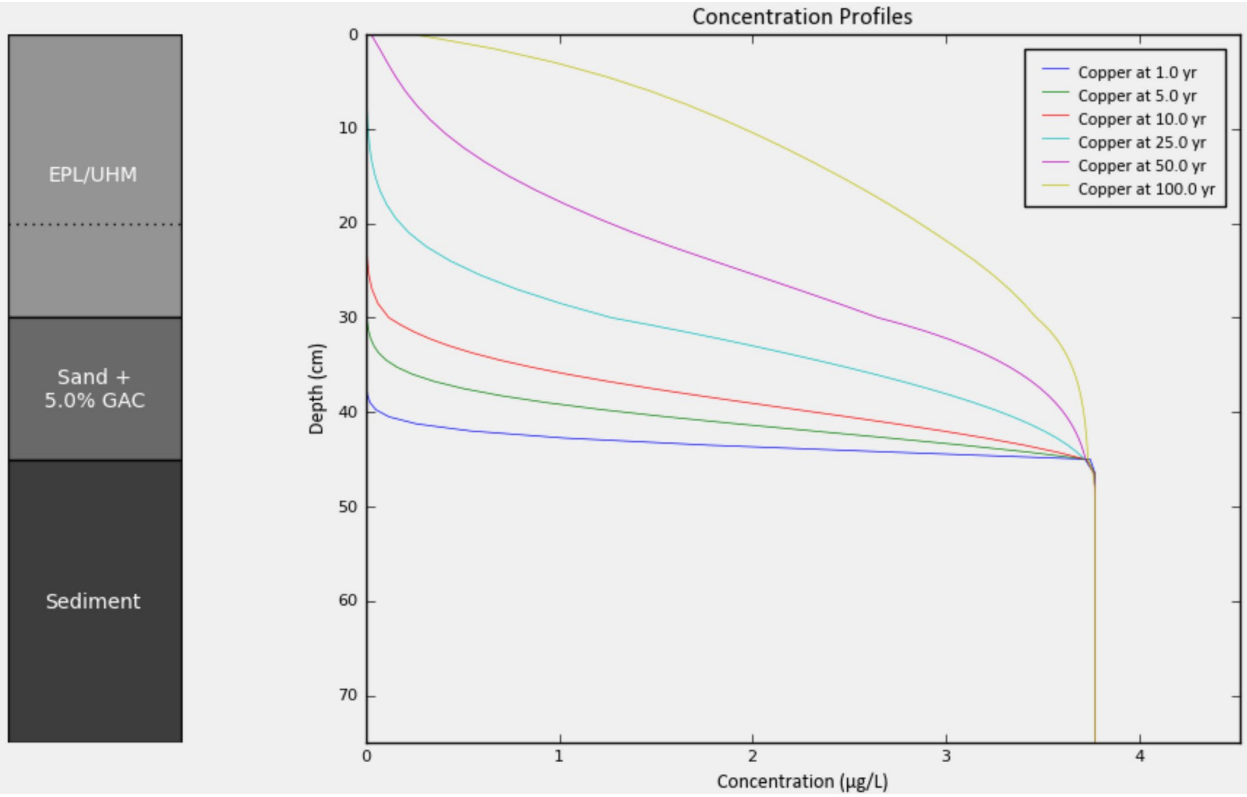

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Benzo(k)fluoranthene at 1.0 yr
Benzo(k)fluoranthene at 5.0 yr
Benzo(k)fluoranthene at 10.0 yr
Benzo(k)fluoranthene at 25.0 yr
Benzo(k)fluoranthene at 50.0 yr
Benzo(k)fluoranthene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.000
0.002
0.004
0.006
0.008
0.010
Concentration (µg/L)

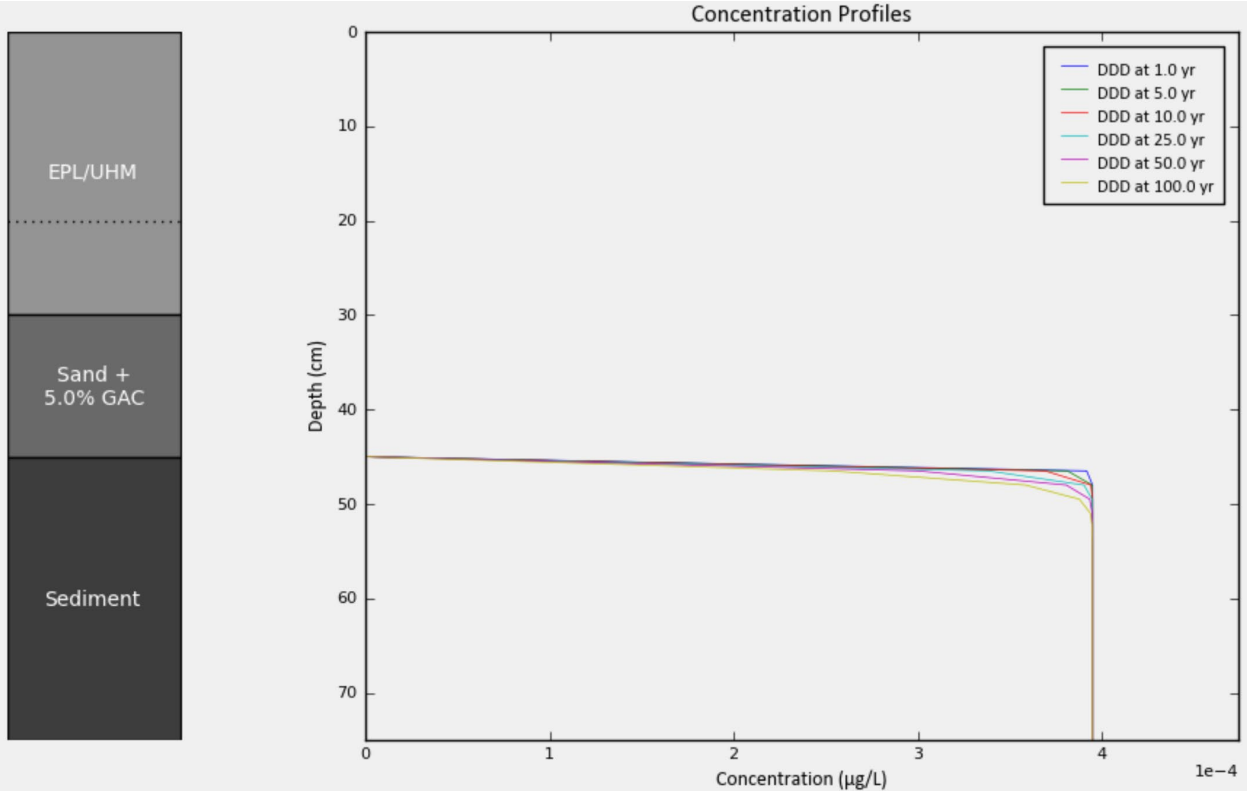

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Cadmium at 1.0 yr
Cadmium at 5.0 yr
Cadmium at 10.0 yr
Cadmium at 25.0 yr
Cadmium at 50.0 yr
Cadmium at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.000
0.002
0.004
0.006
0.008
0.010
0.012
0.014
0.016
Concentration (µg/L)

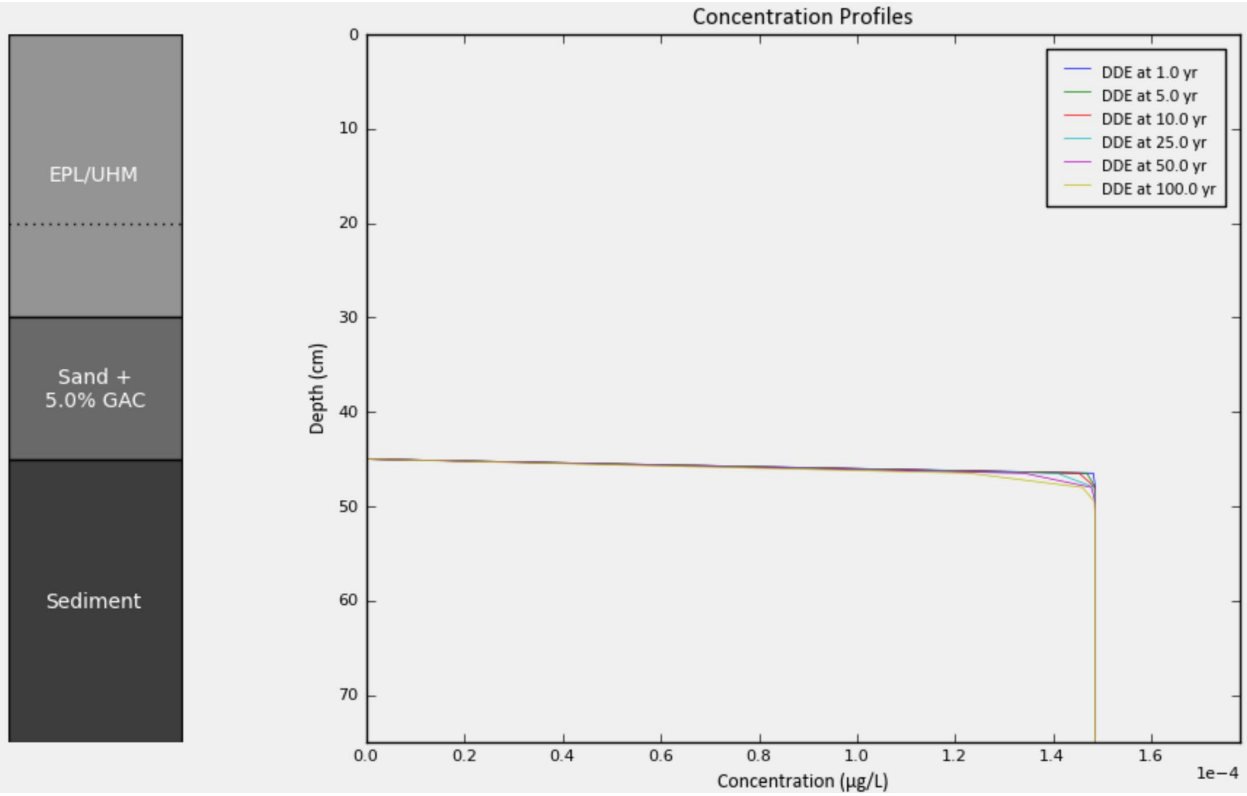

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Chlordanes at 1.0 yr
Chlordanes at 5.0 yr
Chlordanes at 10.0 yr
Chlordanes at 25.0 yr
Chlordanes at 50.0 yr
Chlordanes at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

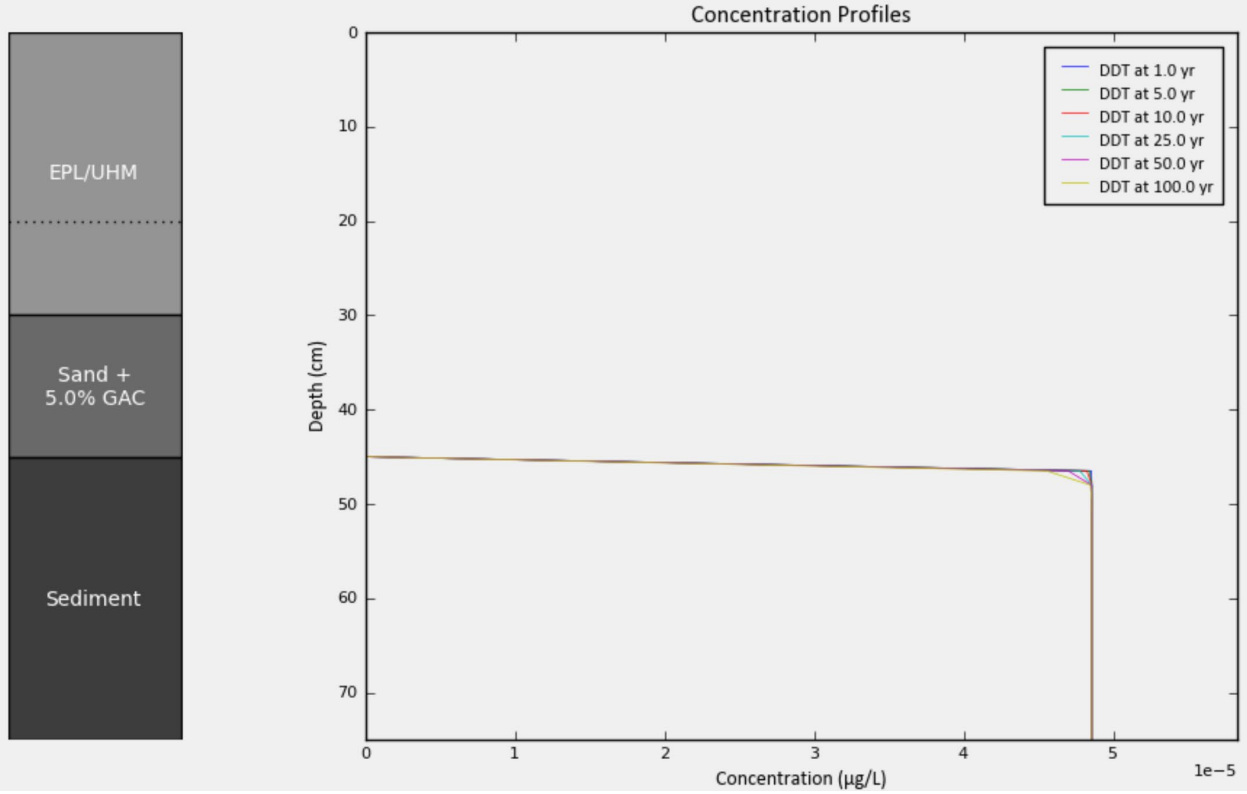

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Chromium (III) at 1.0 yr
Chromium (III) at 5.0 yr
Chromium (III) at 10.0 yr
Chromium (III) at 25.0 yr
Chromium (III) at 50.0 yr
Chromium (III) at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Concentration (µg/L)

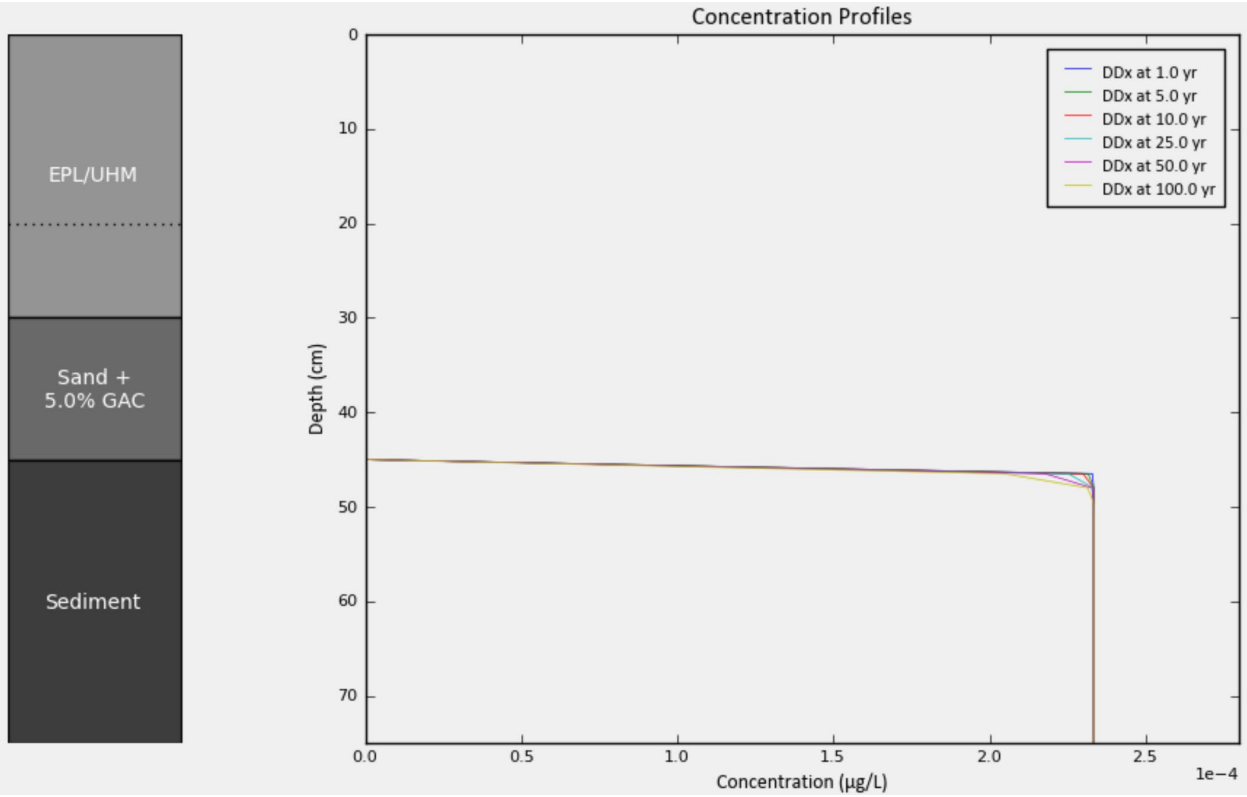

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Chrysene at 1.0 yr
Chrysene at 5.0 yr
Chrysene at 10.0 yr
Chrysene at 25.0 yr
Chrysene at 50.0 yr
Chrysene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010
Concentration (µg/L)

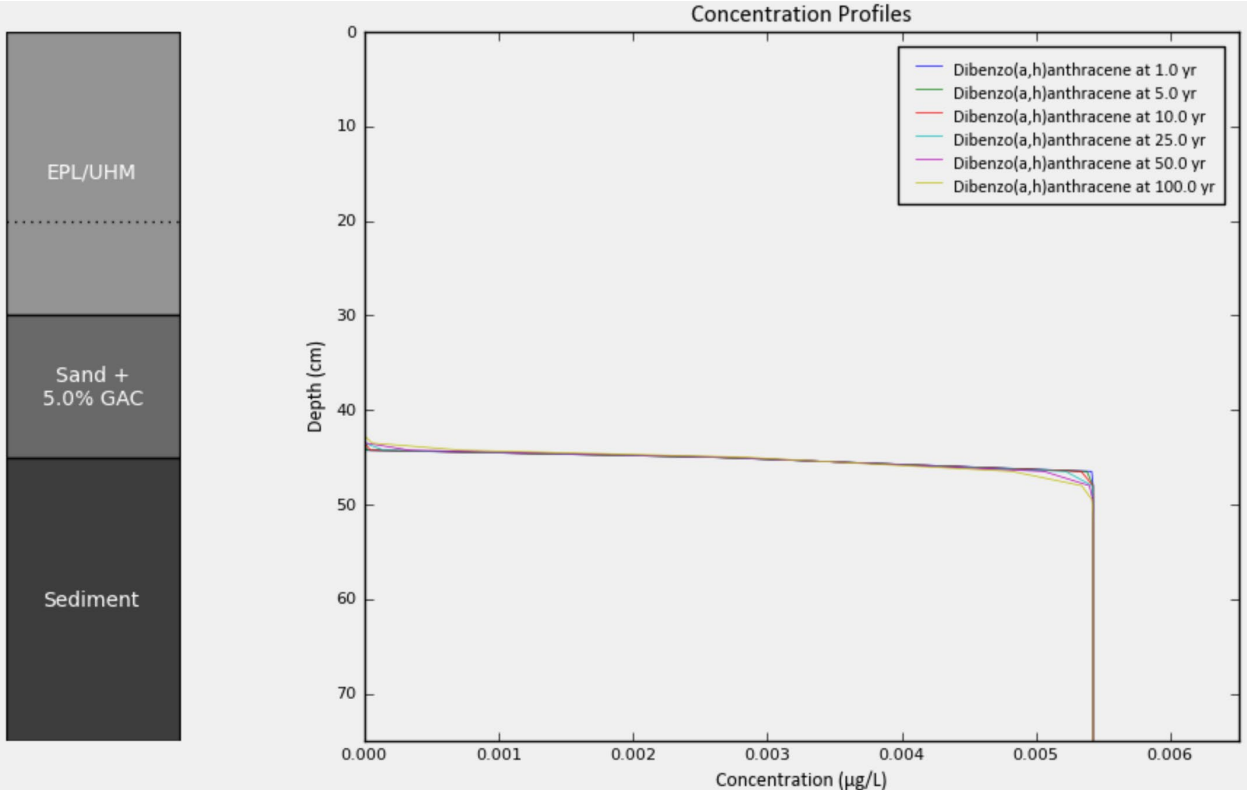

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Copper at 1.0 yr
Copper at 5.0 yr
Copper at 10.0 yr
Copper at 25.0 yr
Copper at 50.0 yr
Copper at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
1
2
3
4
Concentration (µg/L)

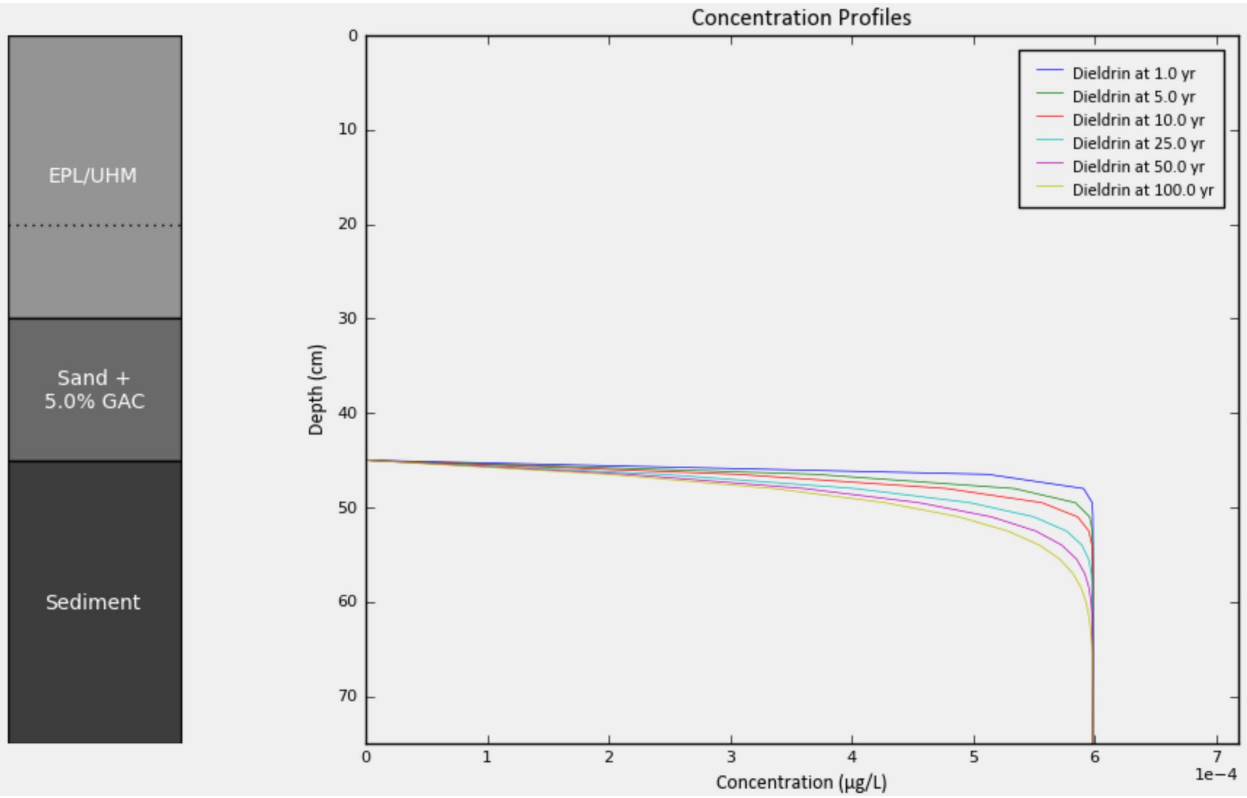

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
DDD at 1.0 yr
DDD at 5.0 yr
DDD at 10.0 yr
DDD at 25.0 yr
DDD at 50.0 yr
DDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

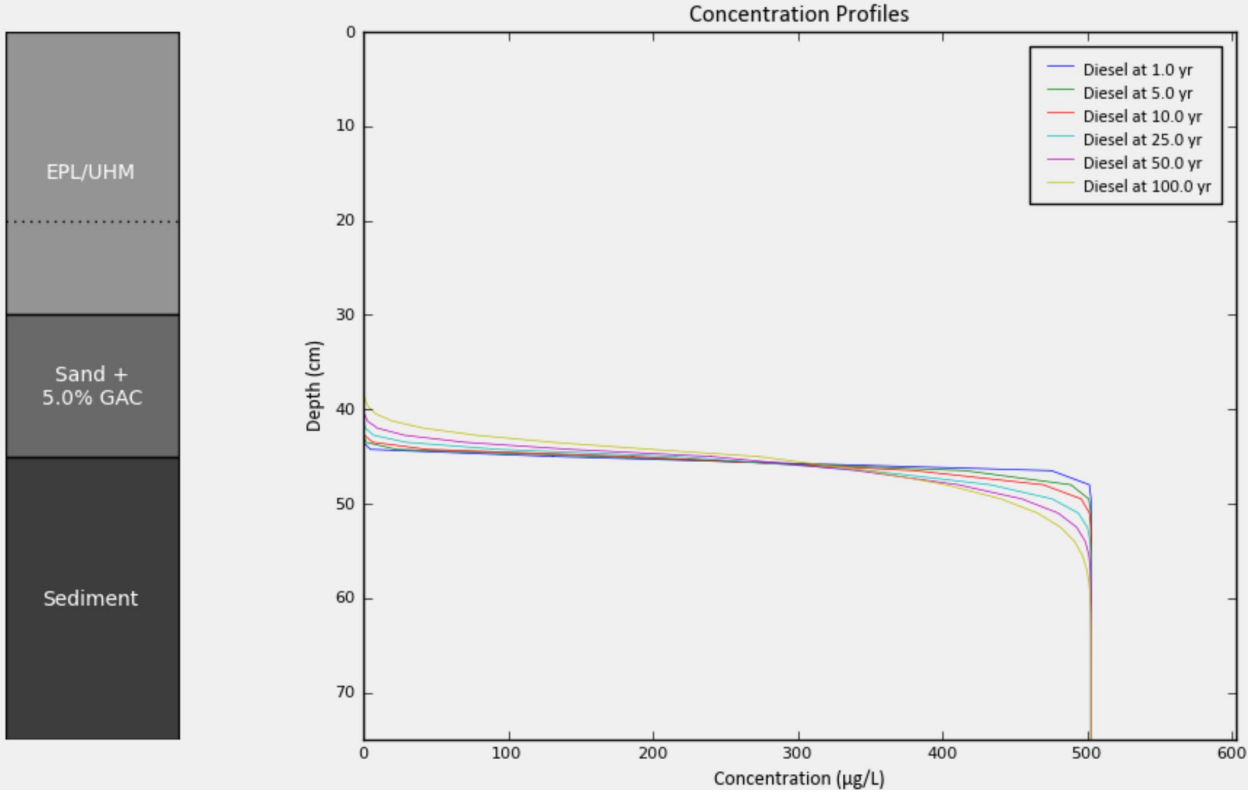

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
DDE at 1.0 yr
DDE at 5.0 yr
DDE at 10.0 yr
DDE at 25.0 yr
DDE at 50.0 yr
DDE at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

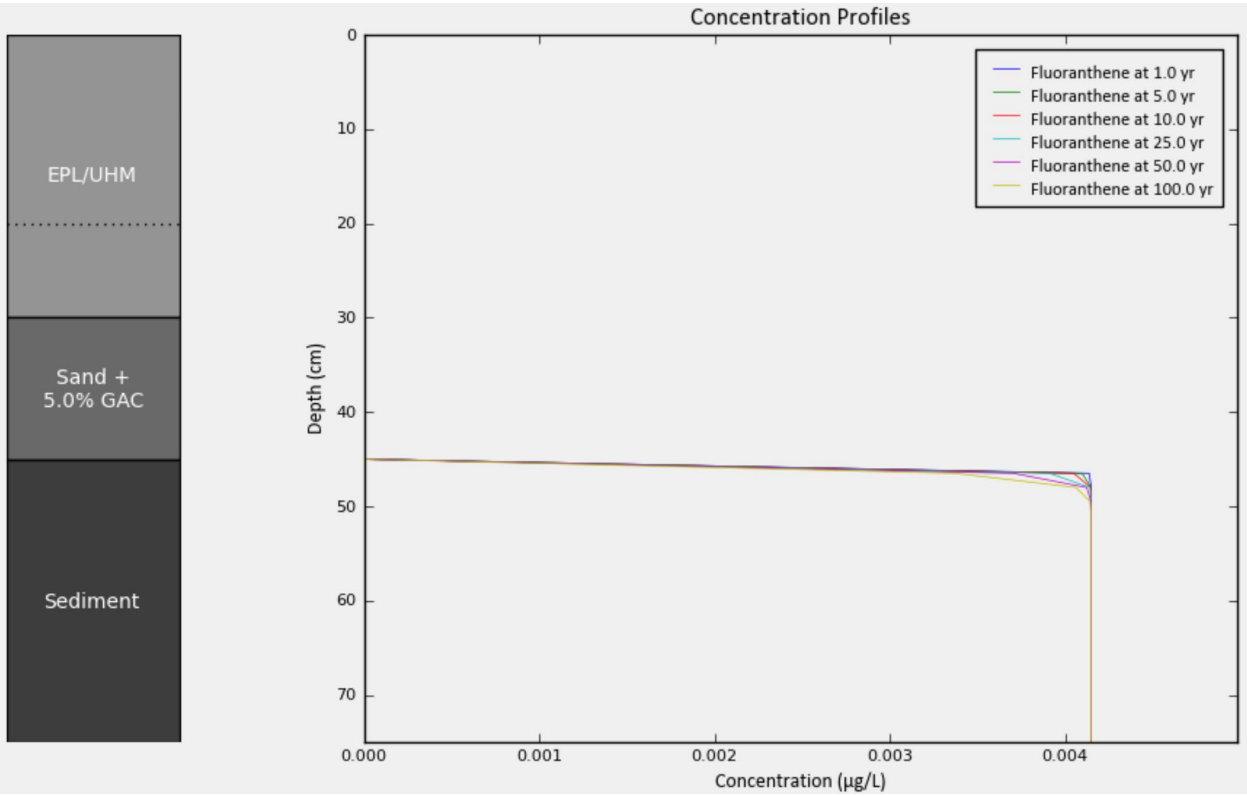

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
DDT at 1.0 yr
DDT at 5.0 yr
DDT at 10.0 yr
DDT at 25.0 yr
DDT at 50.0 yr
DDT at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

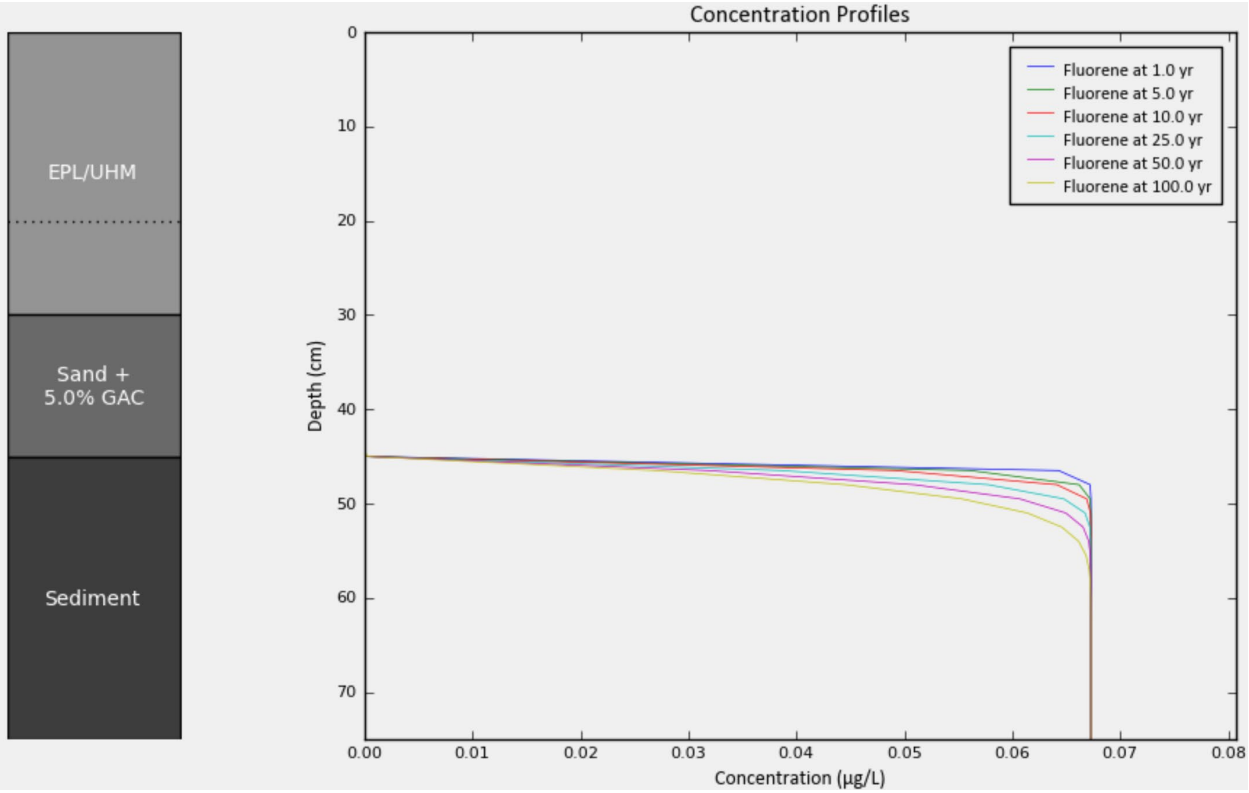

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
DDx at 1.0 yr
DDx at 5.0 yr
DDx at 10.0 yr
DDx at 25.0 yr
DDx at 50.0 yr
DDx at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

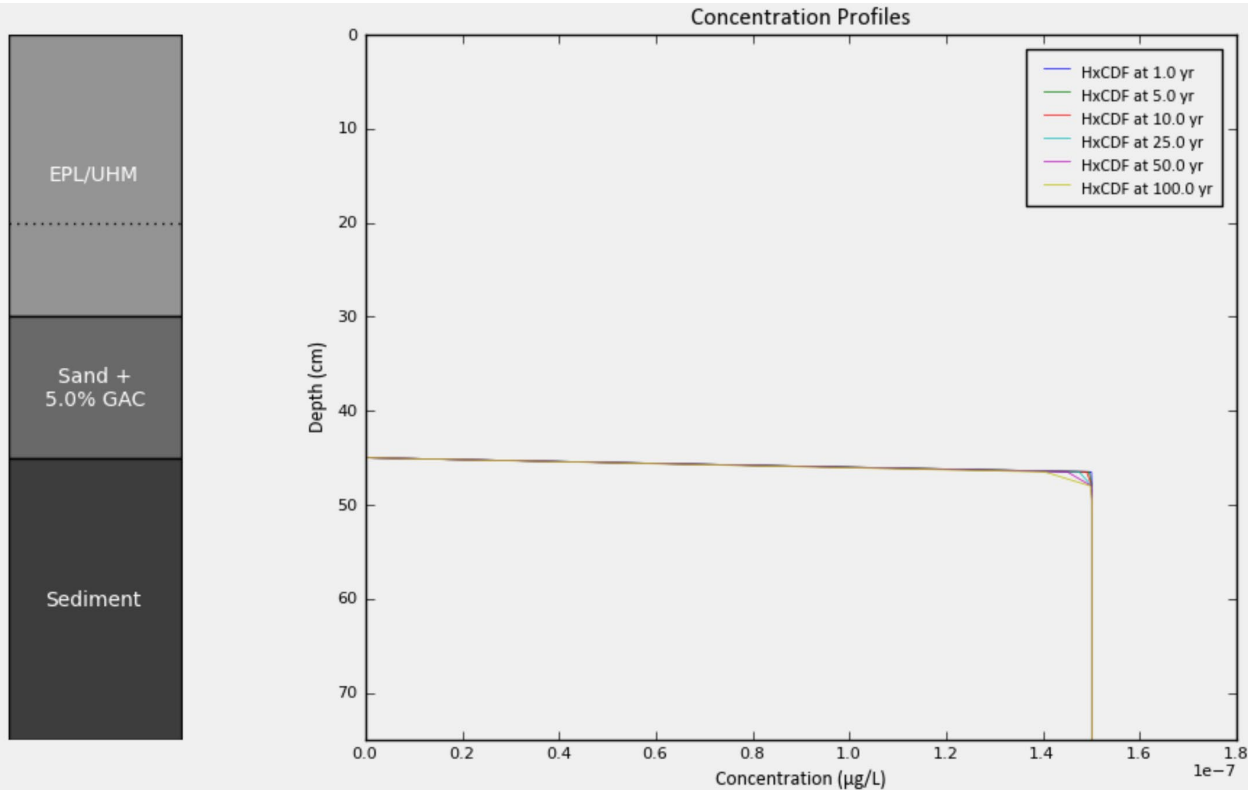

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Dibenzo(a,h)anthracene at 1.0 yr
Dibenzo(a,h)anthracene at 5.0 yr
Dibenzo(a,h)anthracene at 10.0 yr
Dibenzo(a,h)anthracene at 25.0 yr
Dibenzo(a,h)anthracene at 50.0 yr
Dibenzo(a,h)anthracene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

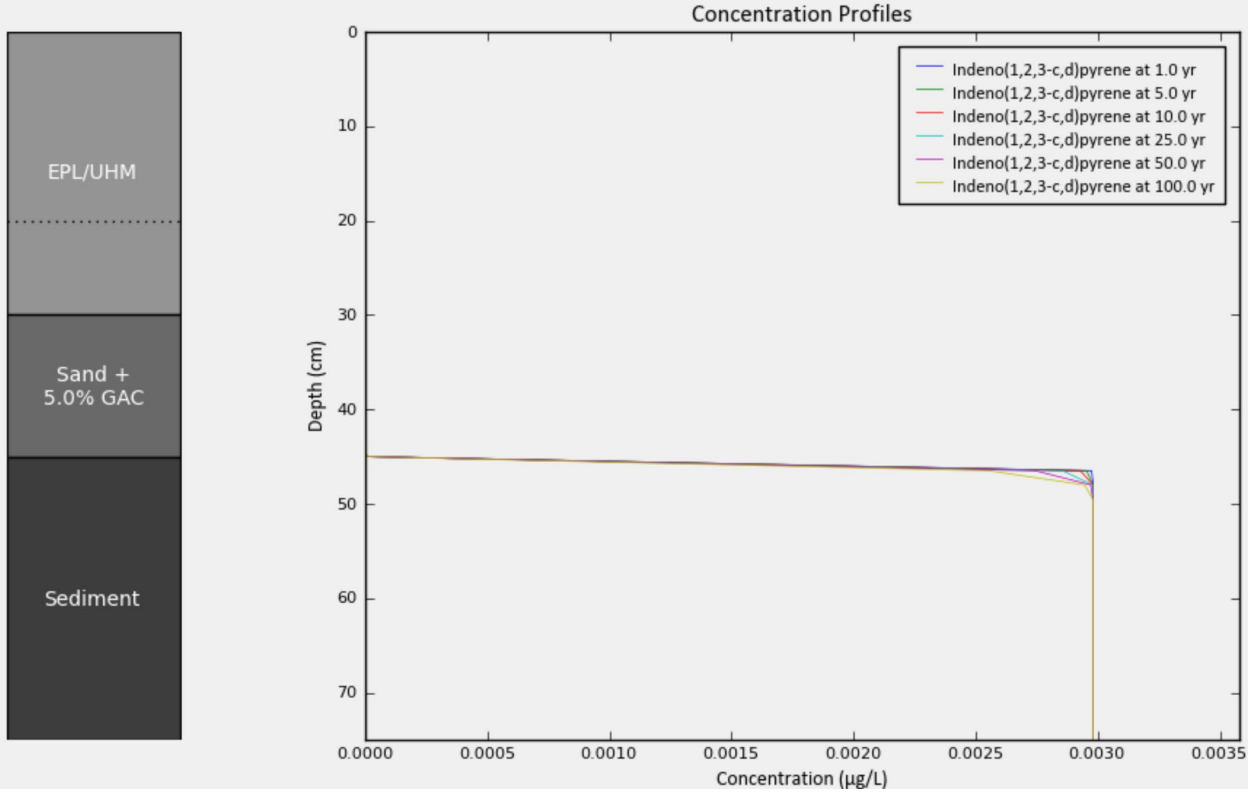

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Dieldrin at 1.0 yr
Dieldrin at 5.0 yr
Dieldrin at 10.0 yr
Dieldrin at 25.0 yr
Dieldrin at 50.0 yr
Dieldrin at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
1
2
3
4
5
6
7
1e−4
Concentration (µg/L)

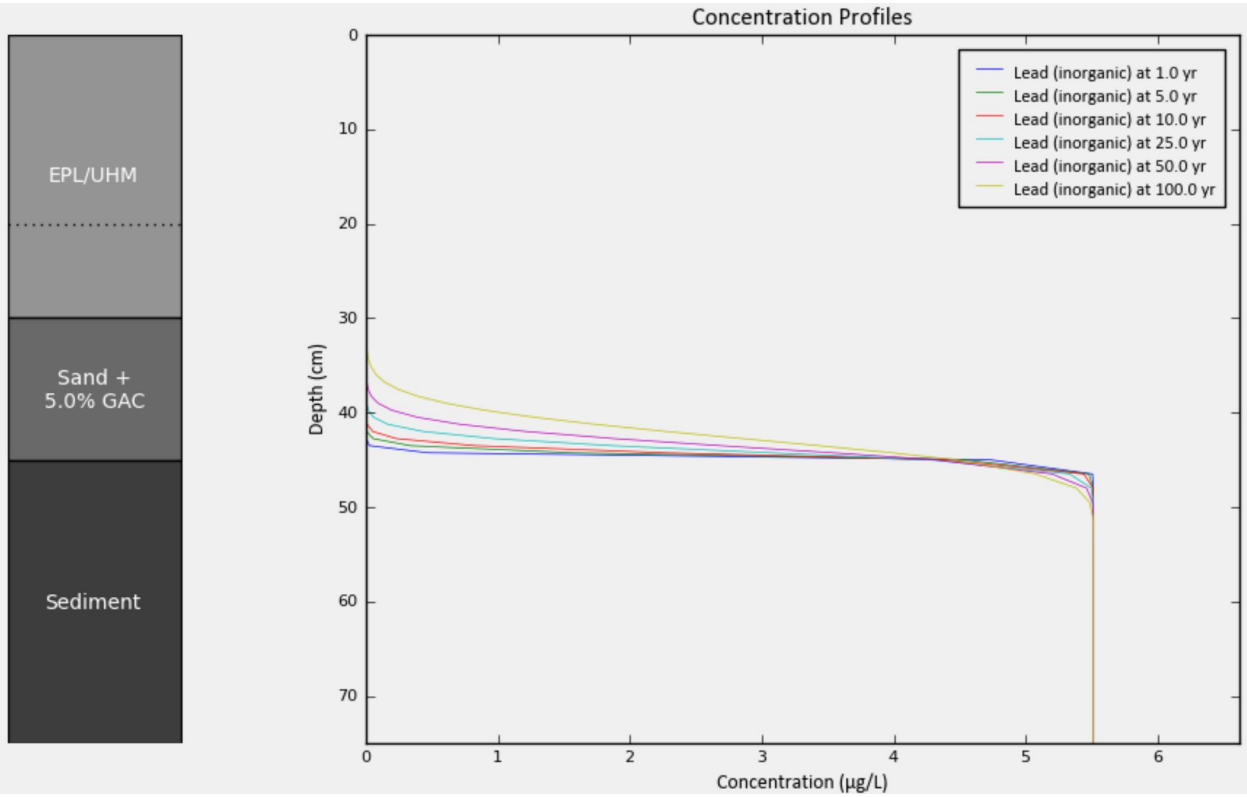

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Diesel at 1.0 yr
Diesel at 5.0 yr
Diesel at 10.0 yr
Diesel at 25.0 yr
Diesel at 50.0 yr
Diesel at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
0
100
200
300
400
500
600

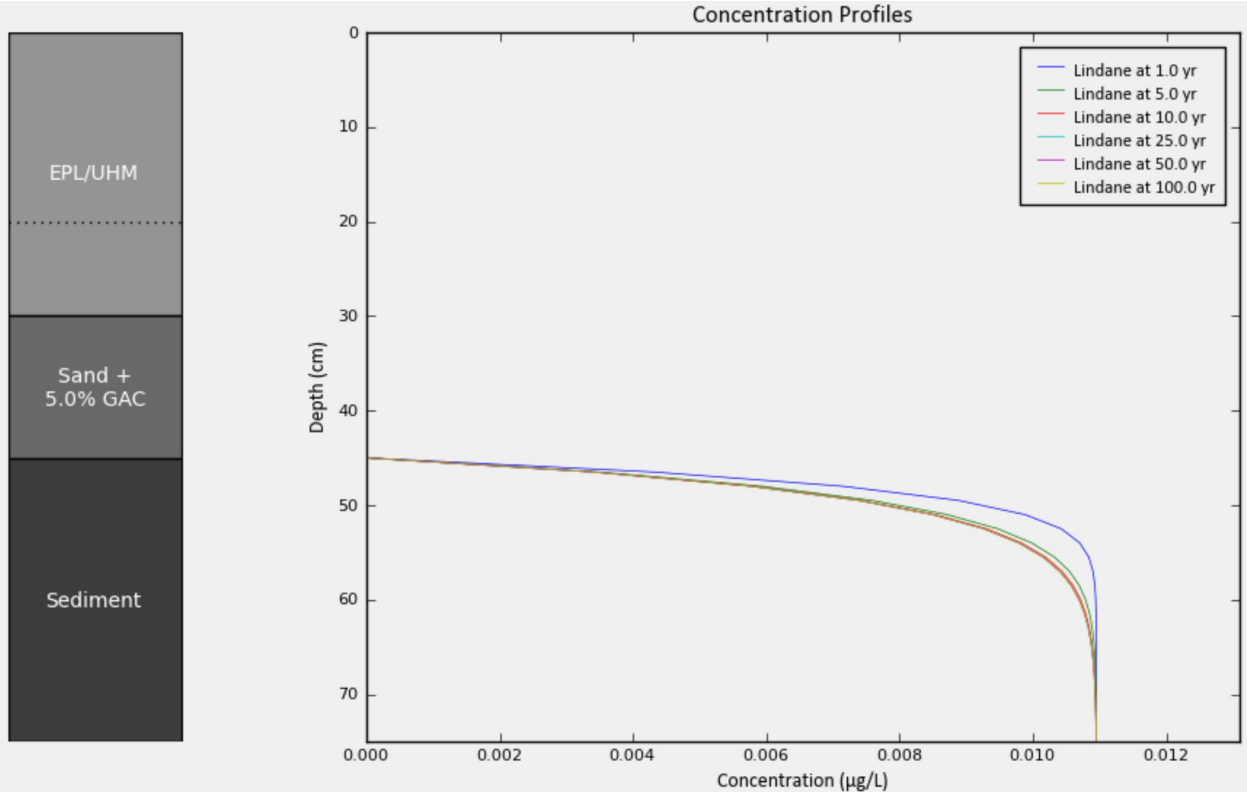

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Fluoranthene at 1.0 yr
Fluoranthene at 5.0 yr
Fluoranthene at 10.0 yr
Fluoranthene at 25.0 yr
Fluoranthene at 50.0 yr
Fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
0.000
0.001
0.002
0.003
0.004

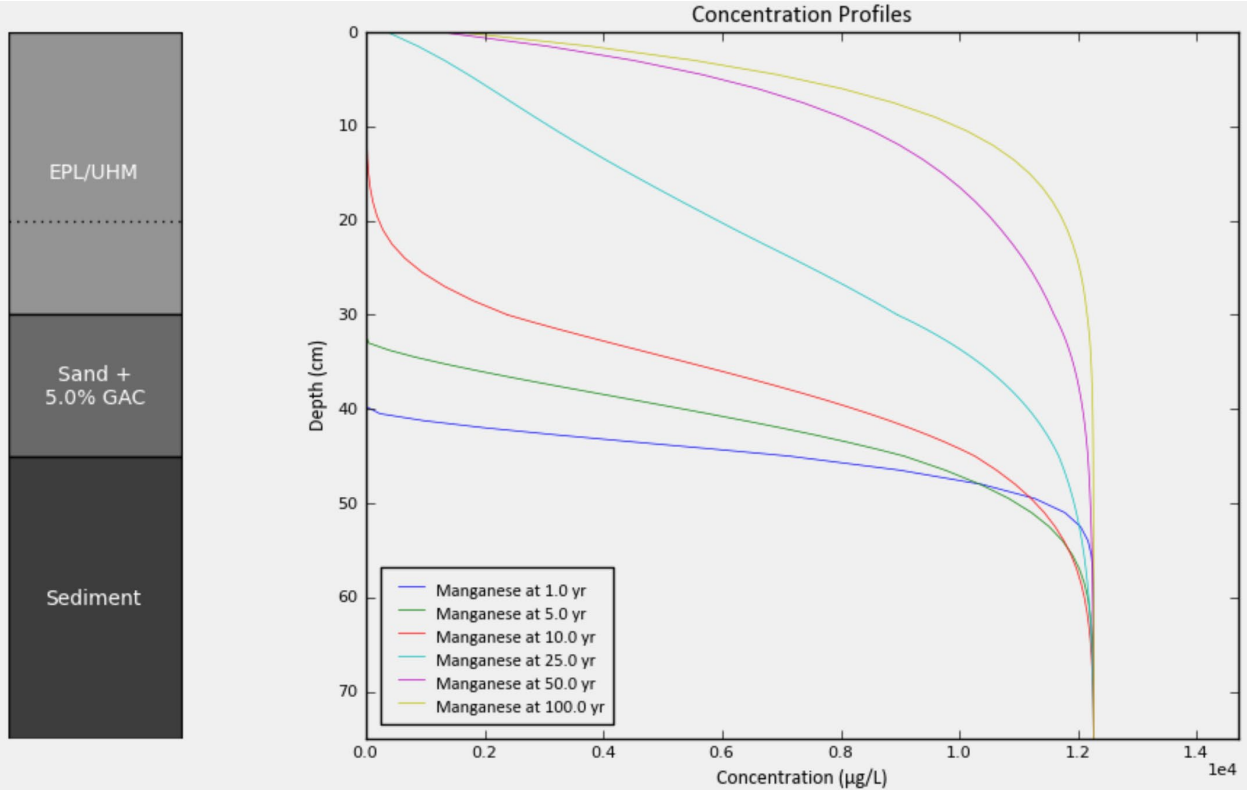

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Fluorene at 1.0 yr
Fluorene at 5.0 yr
Fluorene at 10.0 yr
Fluorene at 25.0 yr
Fluorene at 50.0 yr
Fluorene at 100.0 yr
Depth (cm)
Concentration (µg/L)

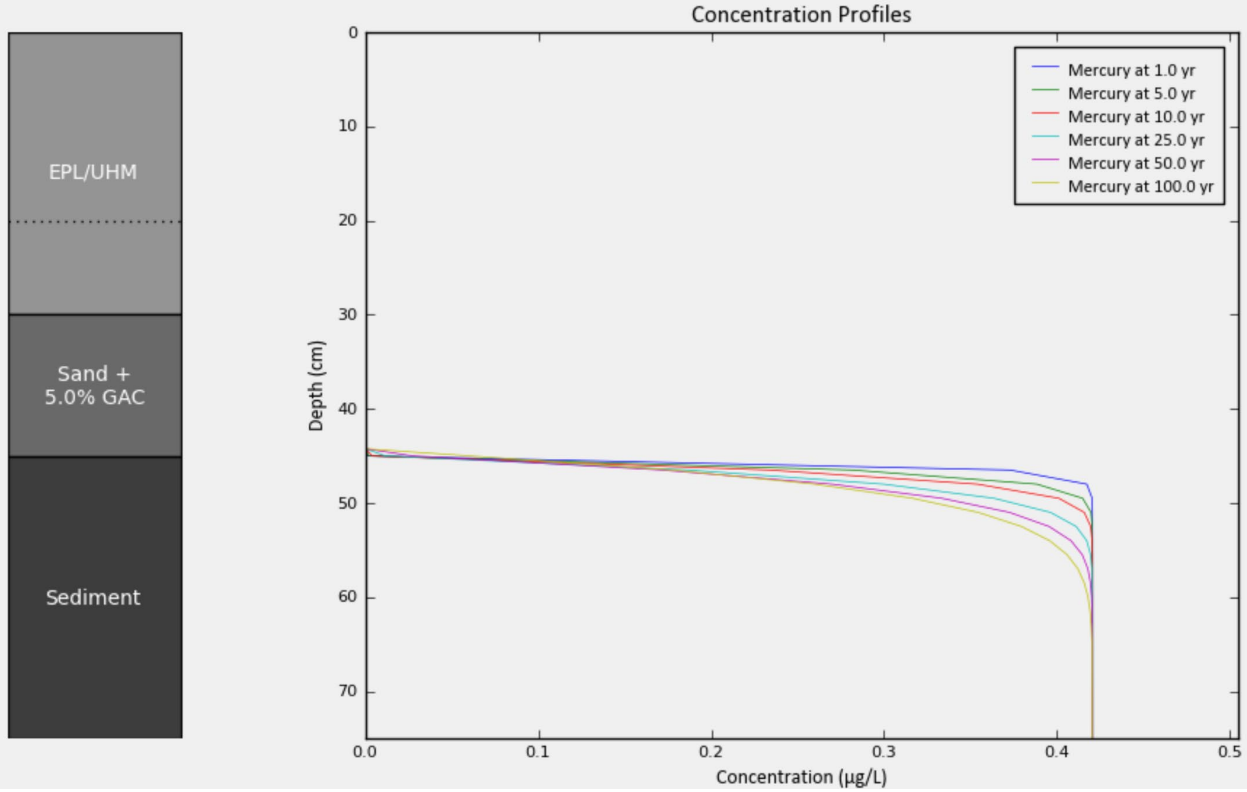

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
HxCDF at 1.0 yr
HxCDF at 5.0 yr
HxCDF at 10.0 yr
HxCDF at 25.0 yr
HxCDF at 50.0 yr
HxCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

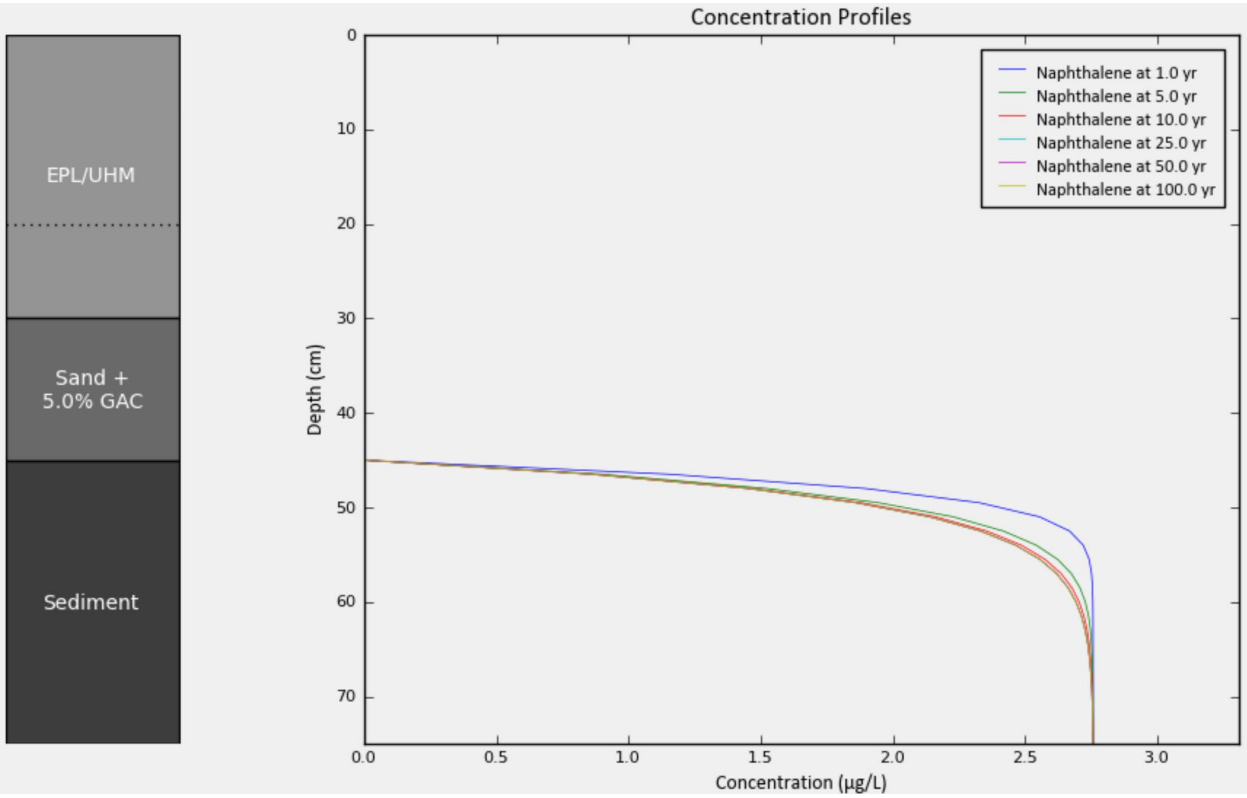

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Indeno(1,2,3-c,d)pyrene at 1.0 yr
Indeno(1,2,3-c,d)pyrene at 5.0 yr
Indeno(1,2,3-c,d)pyrene at 10.0 yr
Indeno(1,2,3-c,d)pyrene at 25.0 yr
Indeno(1,2,3-c,d)pyrene at 50.0 yr
Indeno(1,2,3-c,d)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
0.0035
Concentration (µg/L)

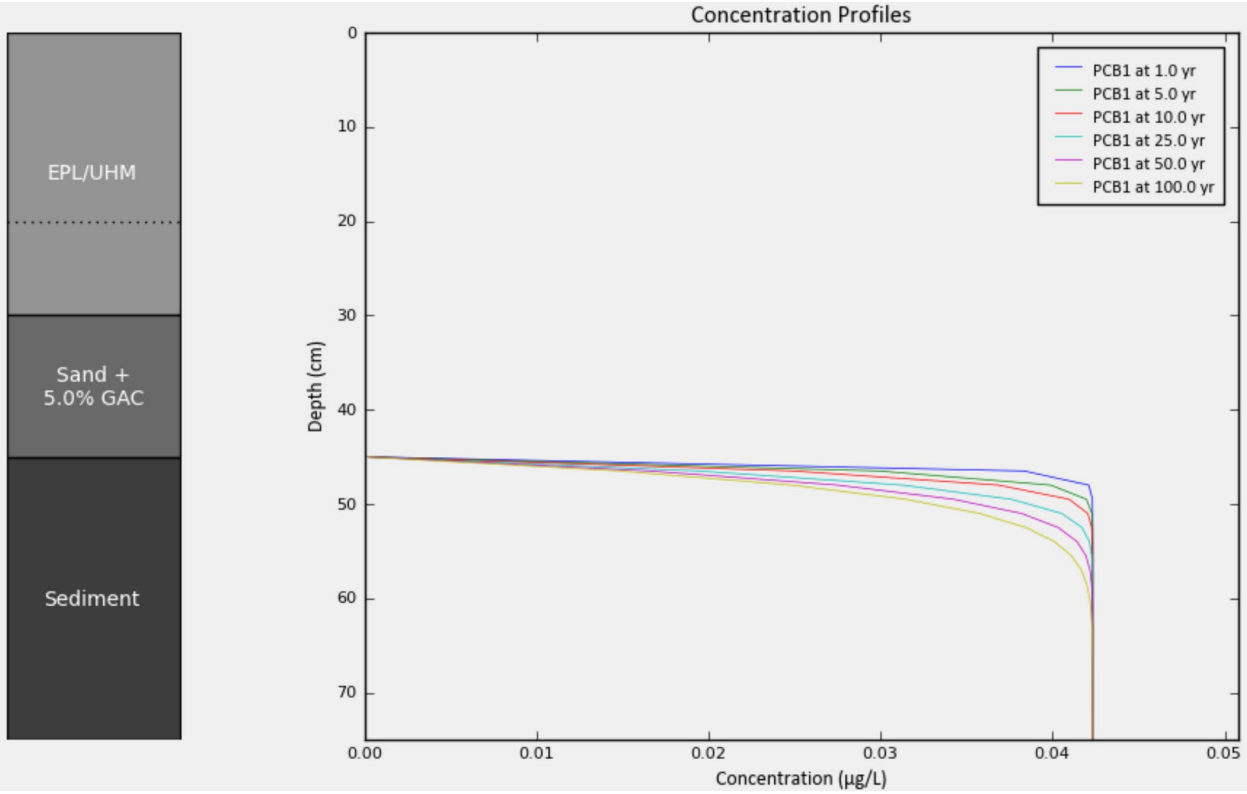

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Lead (inorganic) at 1.0 yr
Lead (inorganic) at 5.0 yr
Lead (inorganic) at 10.0 yr
Lead (inorganic) at 25.0 yr
Lead (inorganic) at 50.0 yr
Lead (inorganic) at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
1
2
3
4
5
6
Concentration (µg/L)

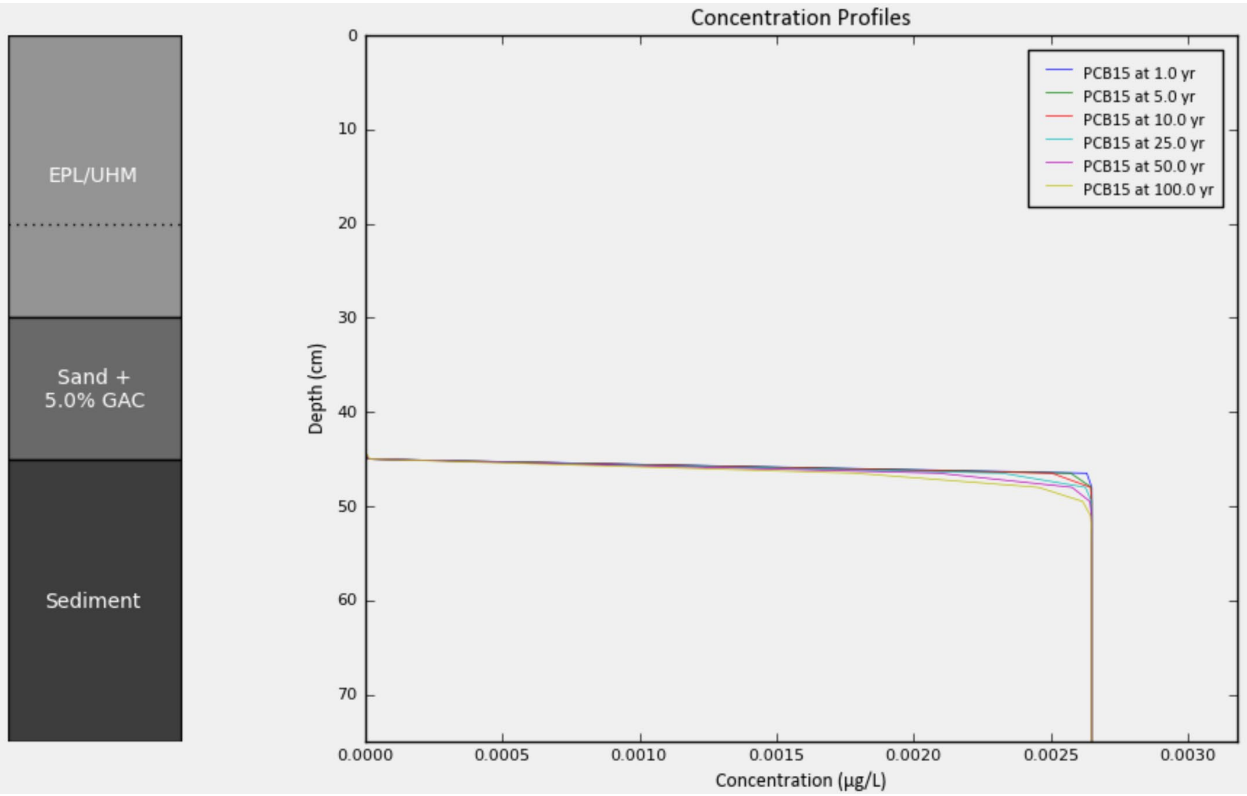

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Lindane at 1.0 yr
Lindane at 5.0 yr
Lindane at 10.0 yr
Lindane at 25.0 yr
Lindane at 50.0 yr
Lindane at 100.0 yr
Depth (cm)
Concentration (µg/L)

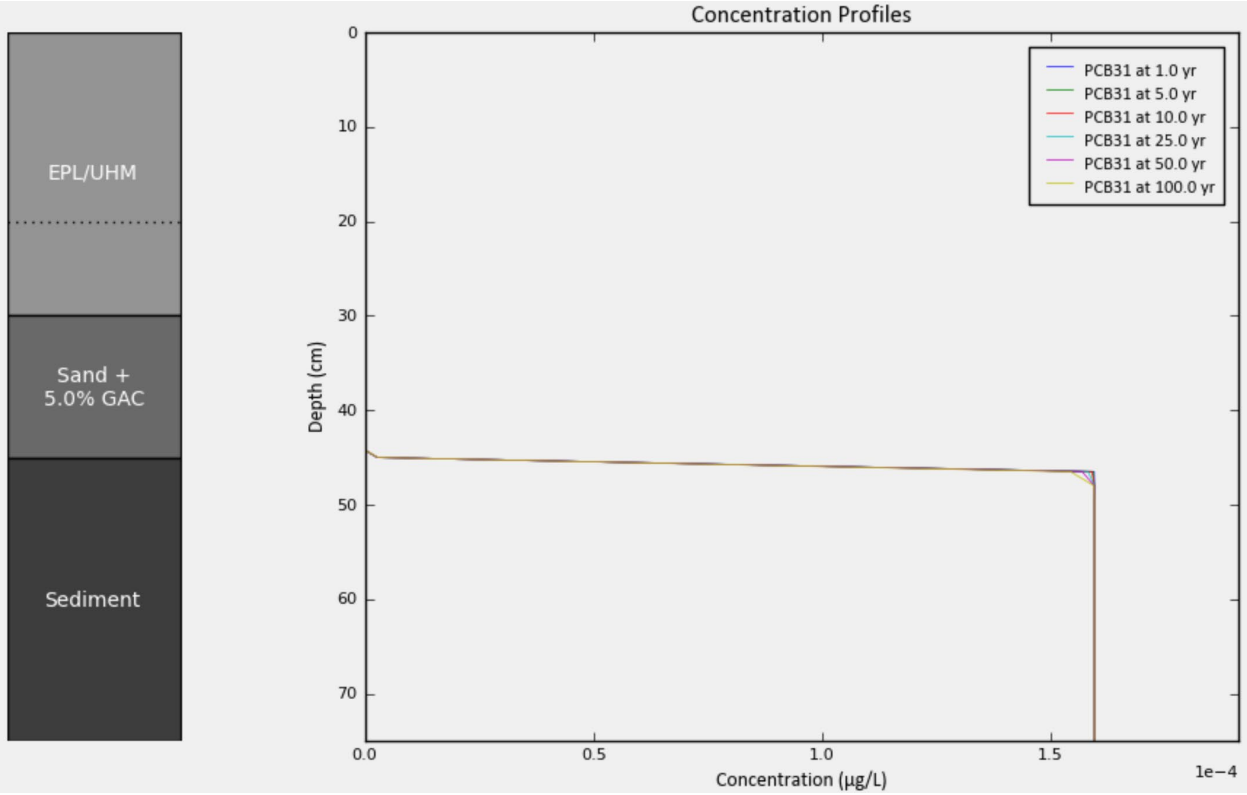

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Manganese at 1.0 yr
Manganese at 5.0 yr
Manganese at 10.0 yr
Manganese at 25.0 yr
Manganese at 50.0 yr
Manganese at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e4

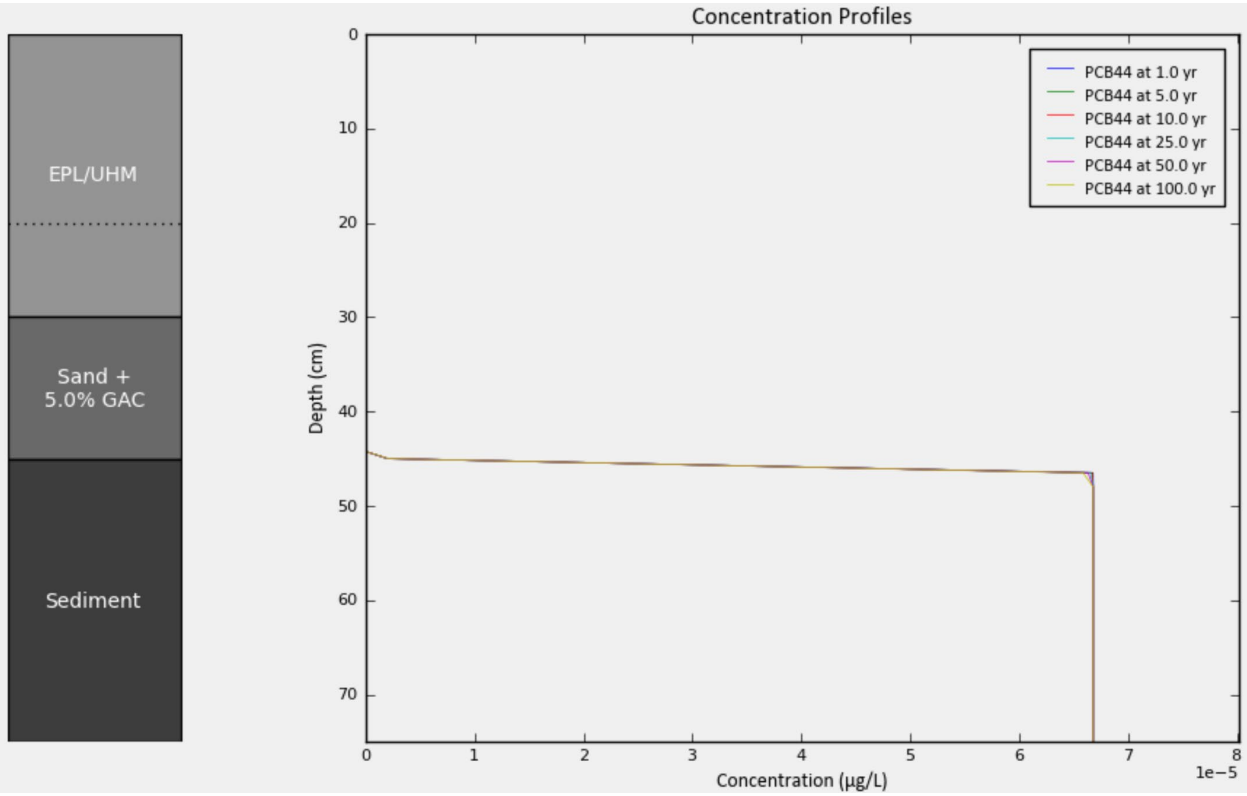

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Mercury at 1.0 yr
Mercury at 5.0 yr
Mercury at 10.0 yr
Mercury at 25.0 yr
Mercury at 50.0 yr
Mercury at 100.0 yr
Depth (cm)
Concentration (µg/L)

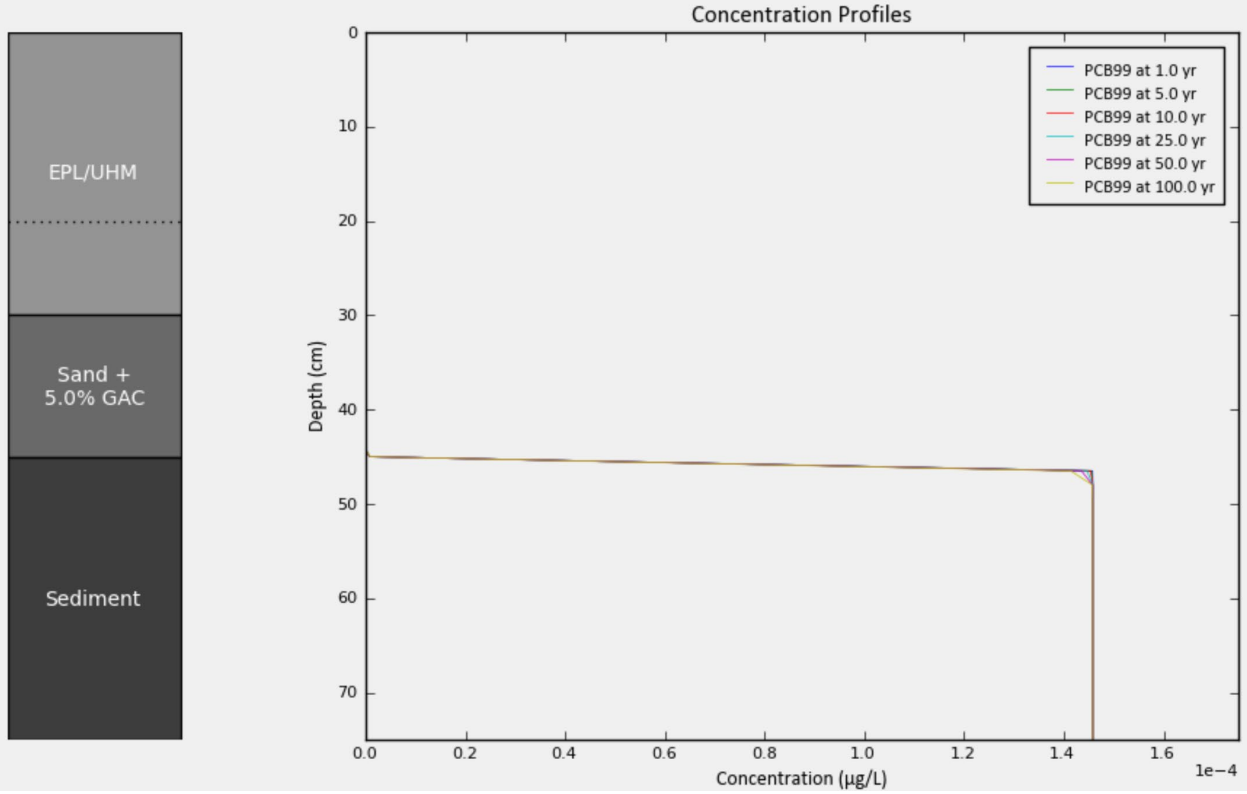

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Naphthalene at 1.0 yr
Naphthalene at 5.0 yr
Naphthalene at 10.0 yr
Naphthalene at 25.0 yr
Naphthalene at 50.0 yr
Naphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

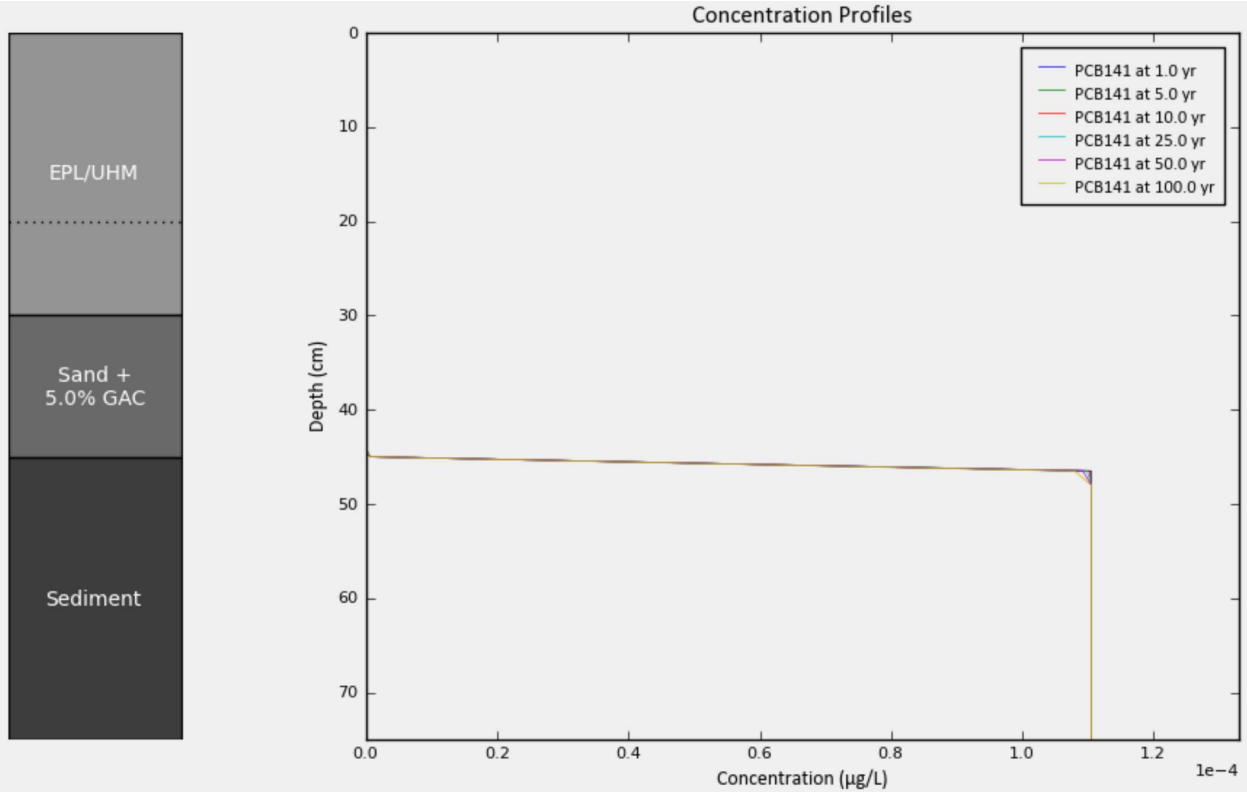

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB1 at 1.0 yr
PCB1 at 5.0 yr
PCB1 at 10.0 yr
PCB1 at 25.0 yr
PCB1 at 50.0 yr
PCB1 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.00
0.01
0.02
0.03
0.04
0.05
Concentration (µg/L)

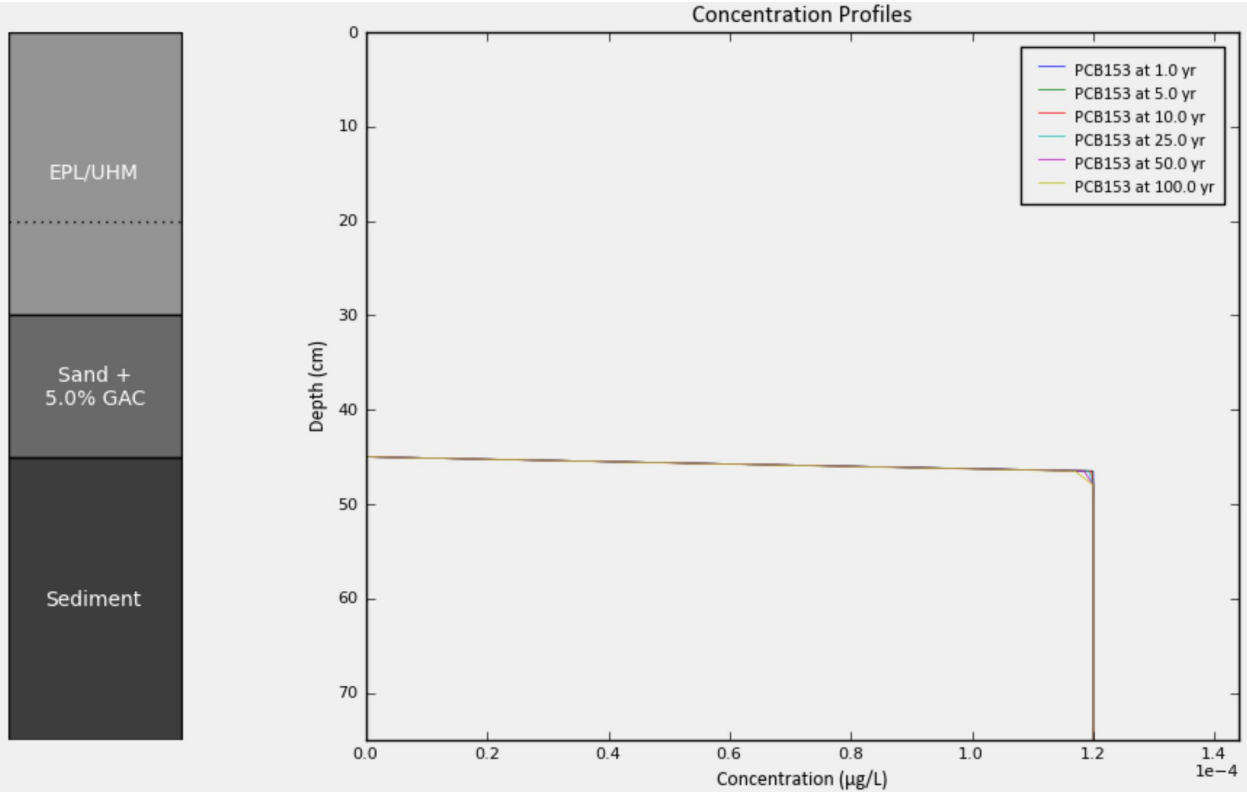

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB15 at 1.0 yr
PCB15 at 5.0 yr
PCB15 at 10.0 yr
PCB15 at 25.0 yr
PCB15 at 50.0 yr
PCB15 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
Concentration (µg/L)

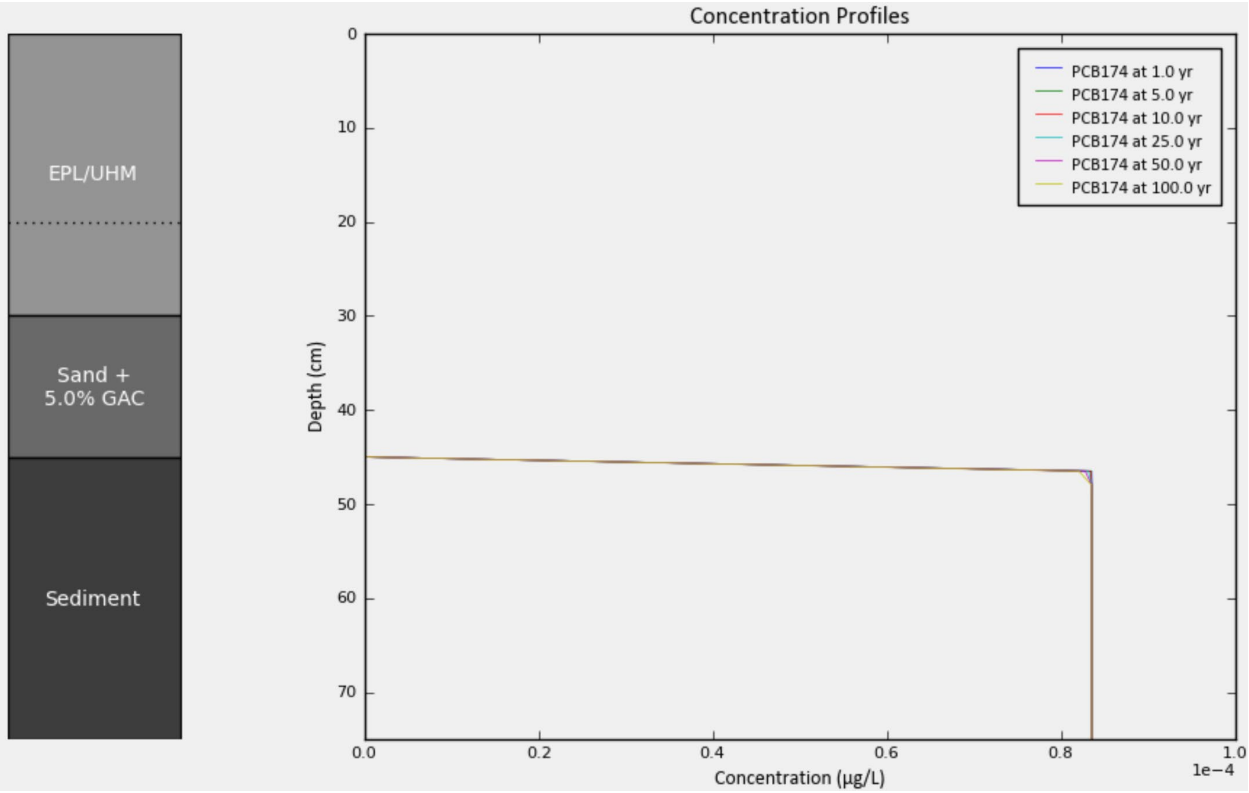

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB31 at 1.0 yr
PCB31 at 5.0 yr
PCB31 at 10.0 yr
PCB31 at 25.0 yr
PCB31 at 50.0 yr
PCB31 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.5
1.0
1.5
Concentration (µg/L)
1e−4

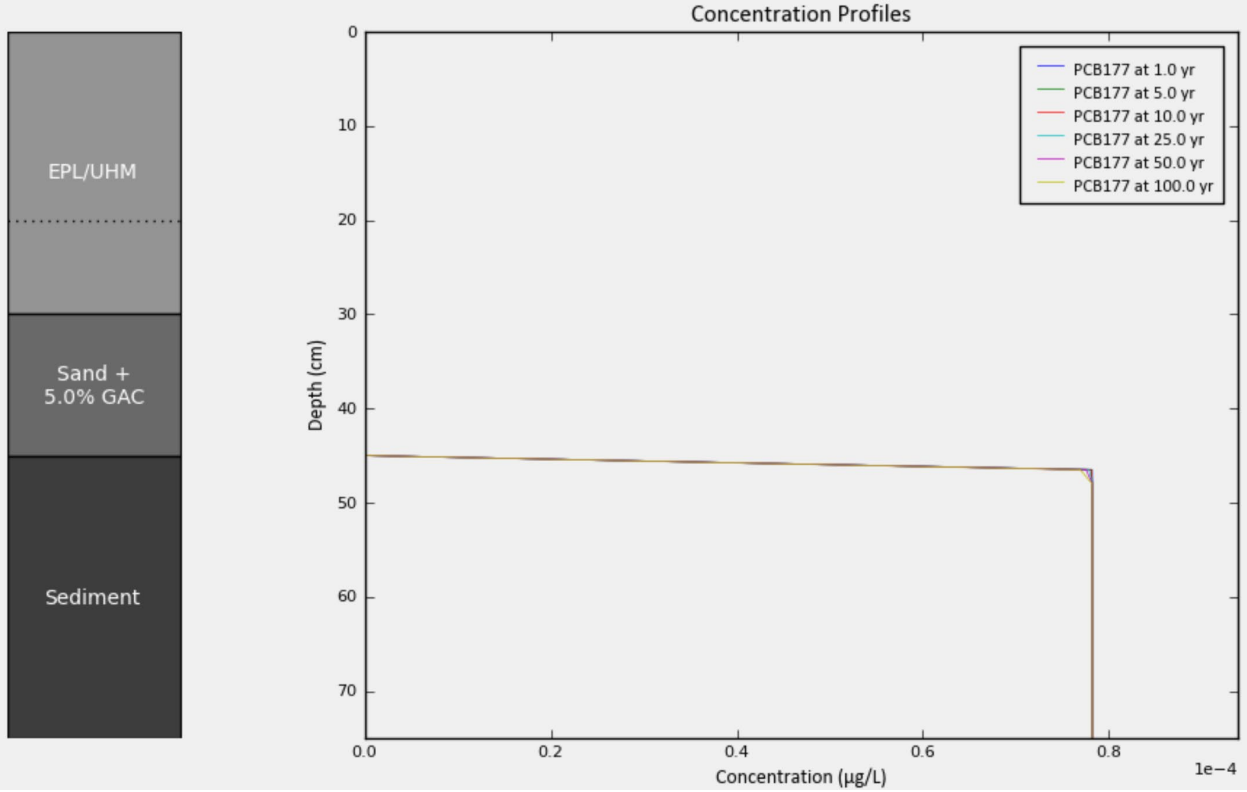

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB44 at 1.0 yr
PCB44 at 5.0 yr
PCB44 at 10.0 yr
PCB44 at 25.0 yr
PCB44 at 50.0 yr
PCB44 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
1
2
3
4
5
6
7
8
Concentration (µg/L)
1e−5

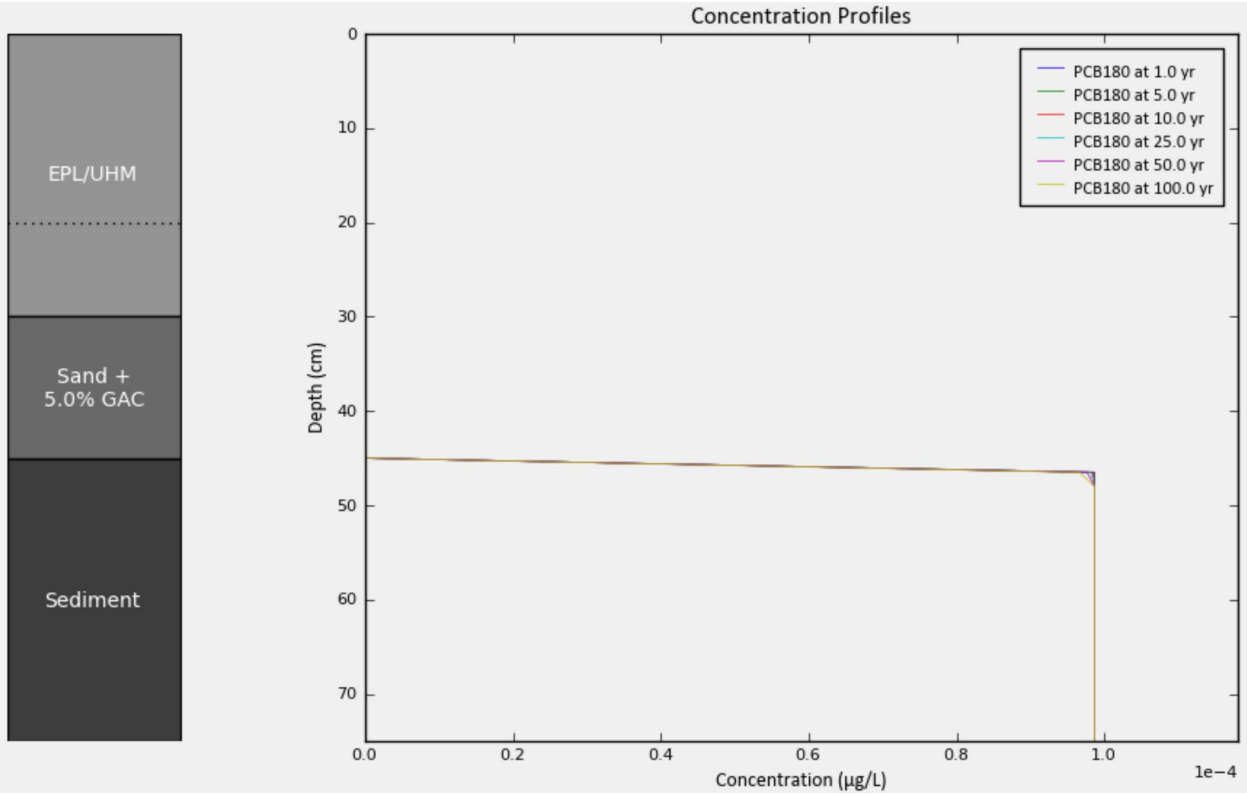

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB99 at 1.0 yr
PCB99 at 5.0 yr
PCB99 at 10.0 yr
PCB99 at 25.0 yr
PCB99 at 50.0 yr
PCB99 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

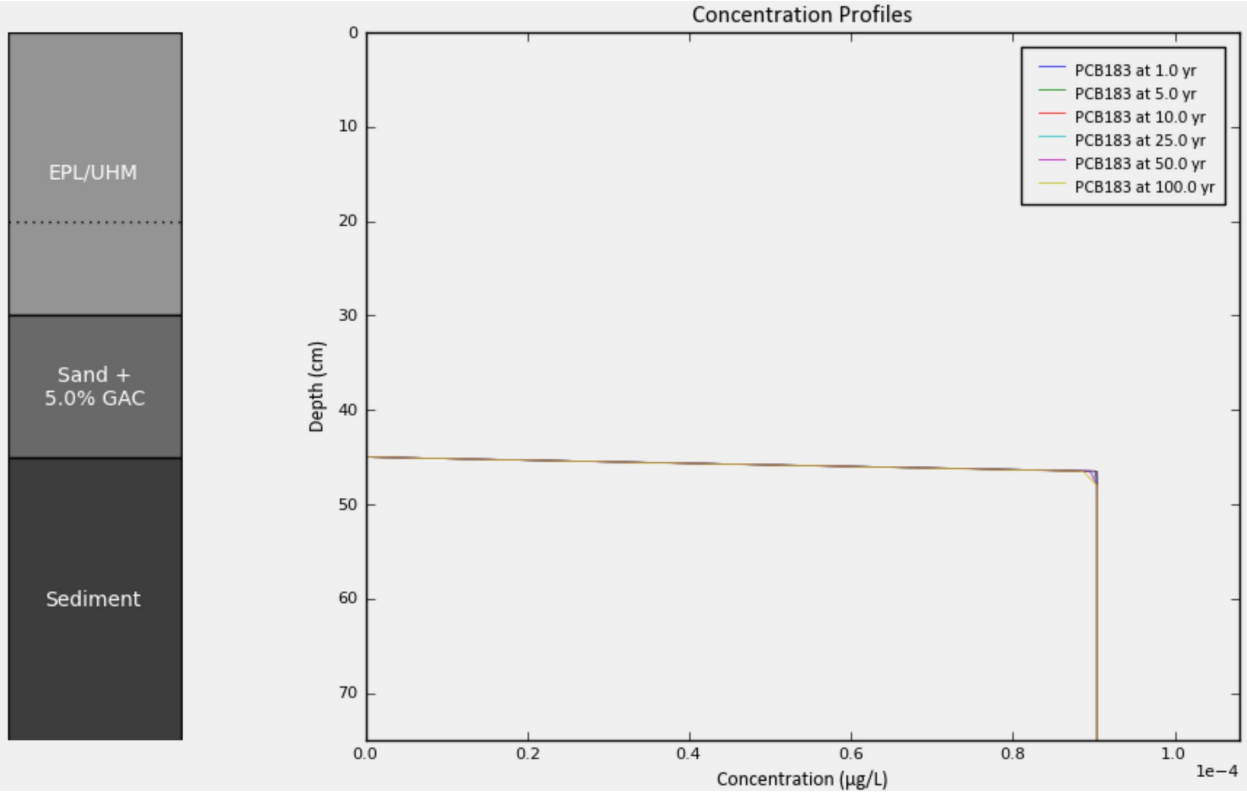

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB141 at 1.0 yr
PCB141 at 5.0 yr
PCB141 at 10.0 yr
PCB141 at 25.0 yr
PCB141 at 50.0 yr
PCB141 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

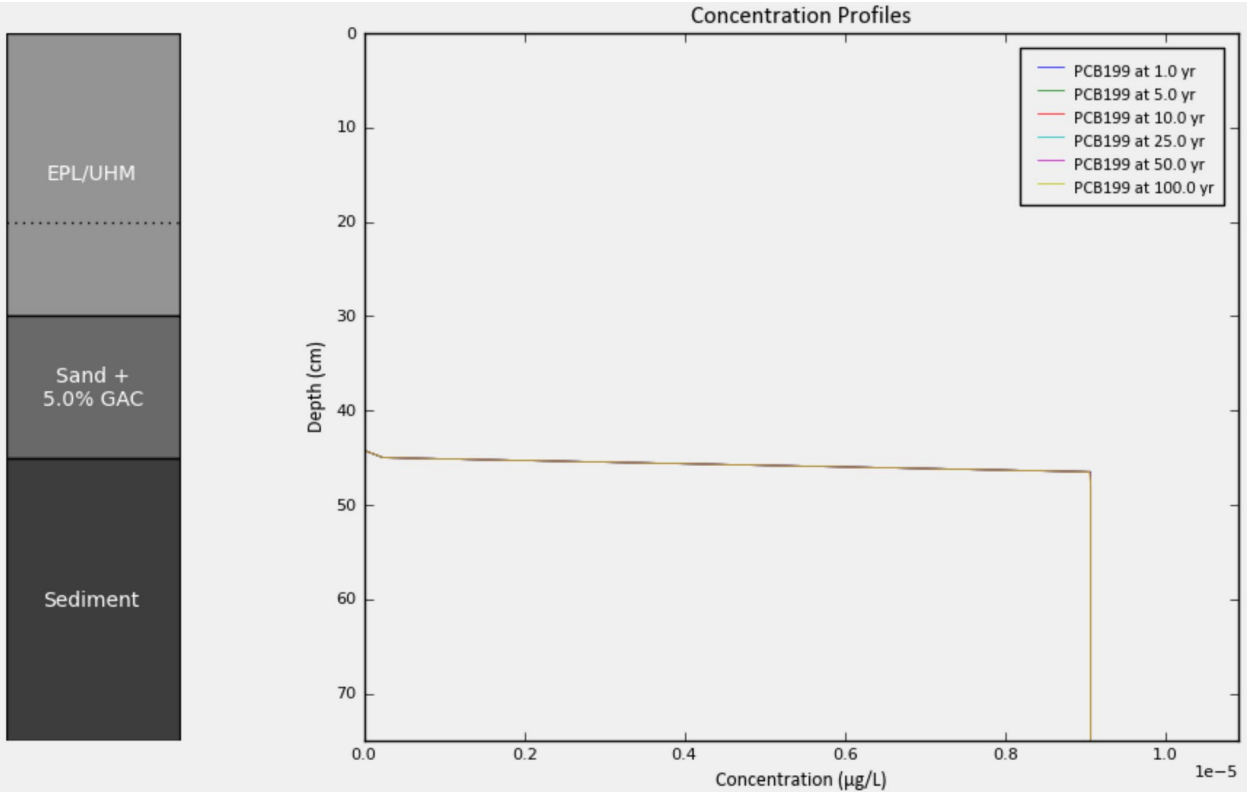

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB153 at 1.0 yr
PCB153 at 5.0 yr
PCB153 at 10.0 yr
PCB153 at 25.0 yr
PCB153 at 50.0 yr
PCB153 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

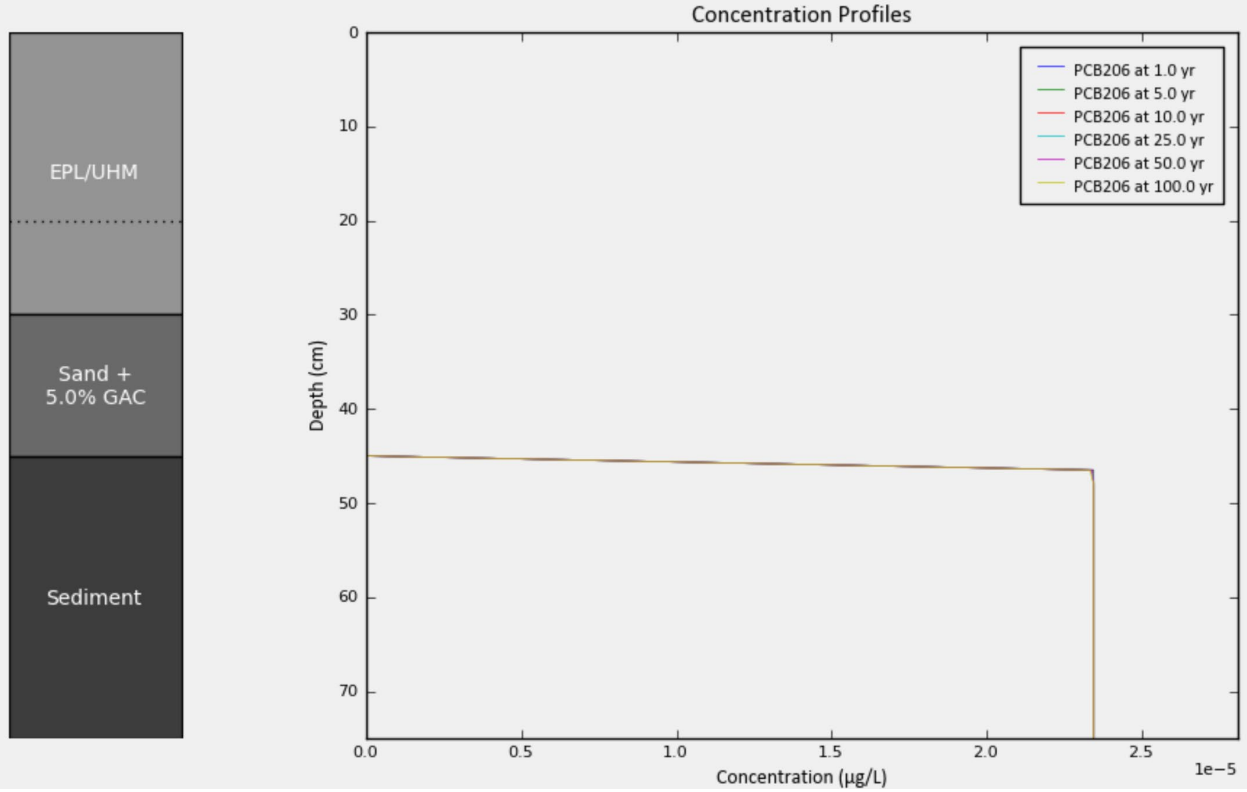

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB174 at 1.0 yr
PCB174 at 5.0 yr
PCB174 at 10.0 yr
PCB174 at 25.0 yr
PCB174 at 50.0 yr
PCB174 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

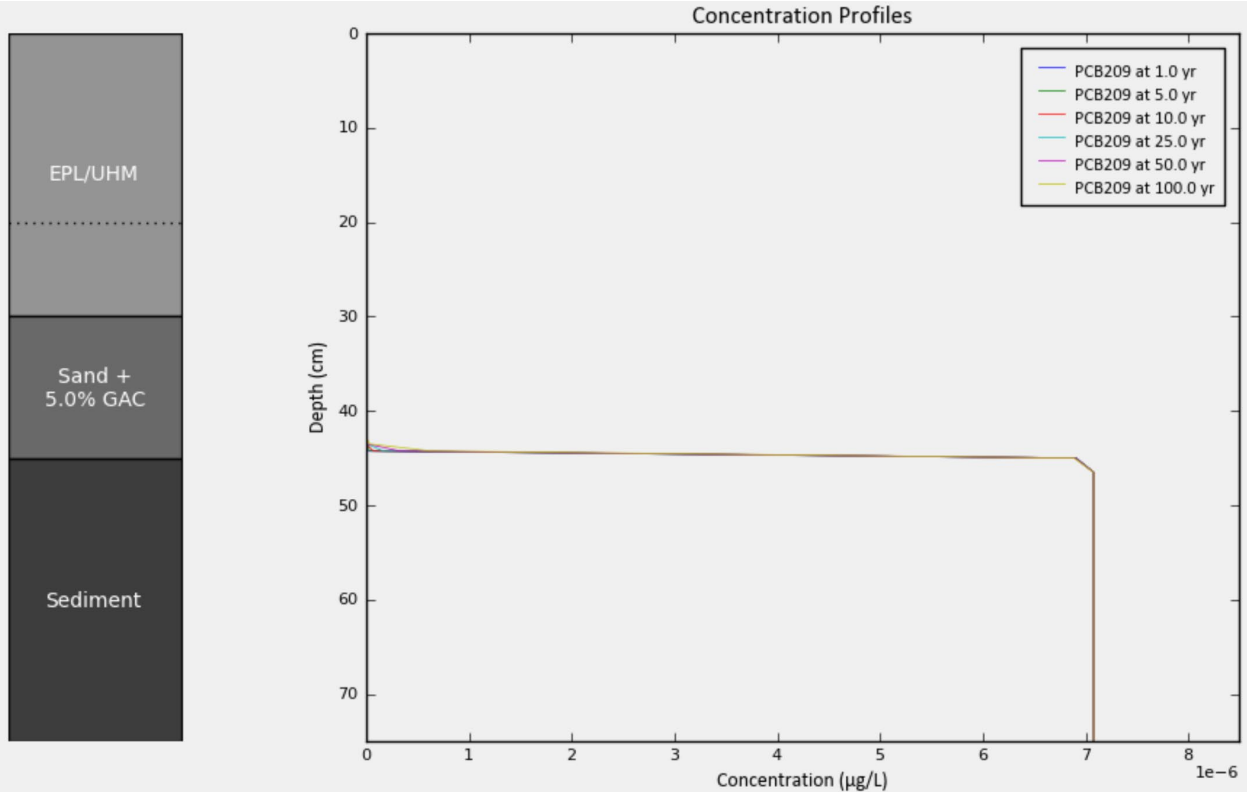

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB177 at 1.0 yr
PCB177 at 5.0 yr
PCB177 at 10.0 yr
PCB177 at 25.0 yr
PCB177 at 50.0 yr
PCB177 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
1e−4
Concentration (µg/L)

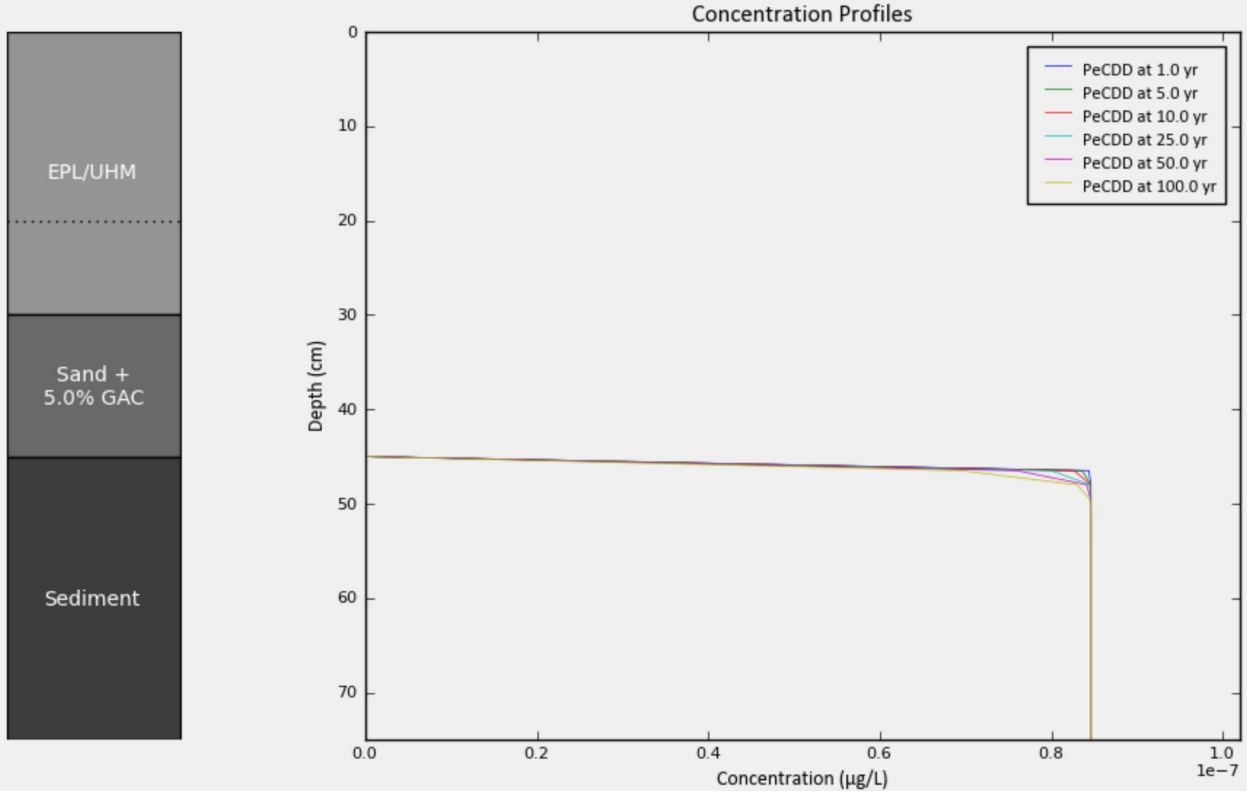

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB180 at 1.0 yr
PCB180 at 5.0 yr
PCB180 at 10.0 yr
PCB180 at 25.0 yr
PCB180 at 50.0 yr
PCB180 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

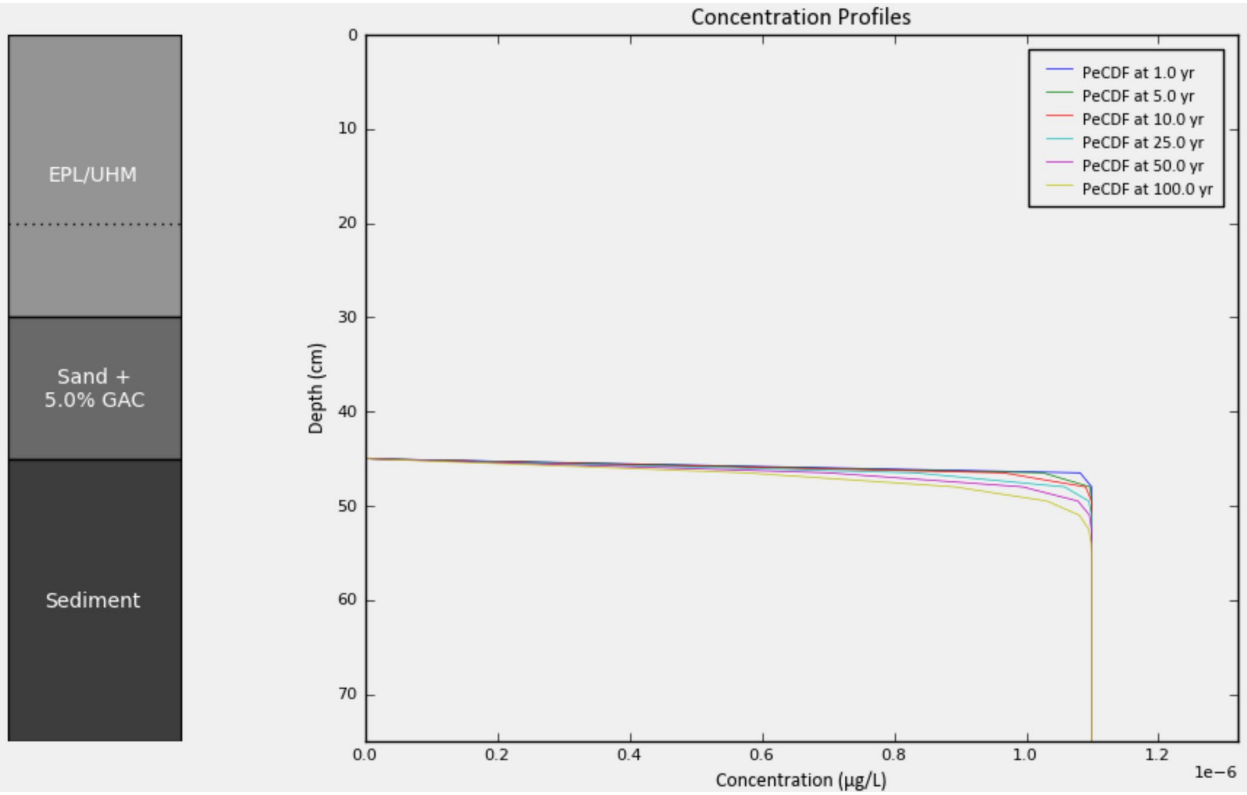

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB183 at 1.0 yr
PCB183 at 5.0 yr
PCB183 at 10.0 yr
PCB183 at 25.0 yr
PCB183 at 50.0 yr
PCB183 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

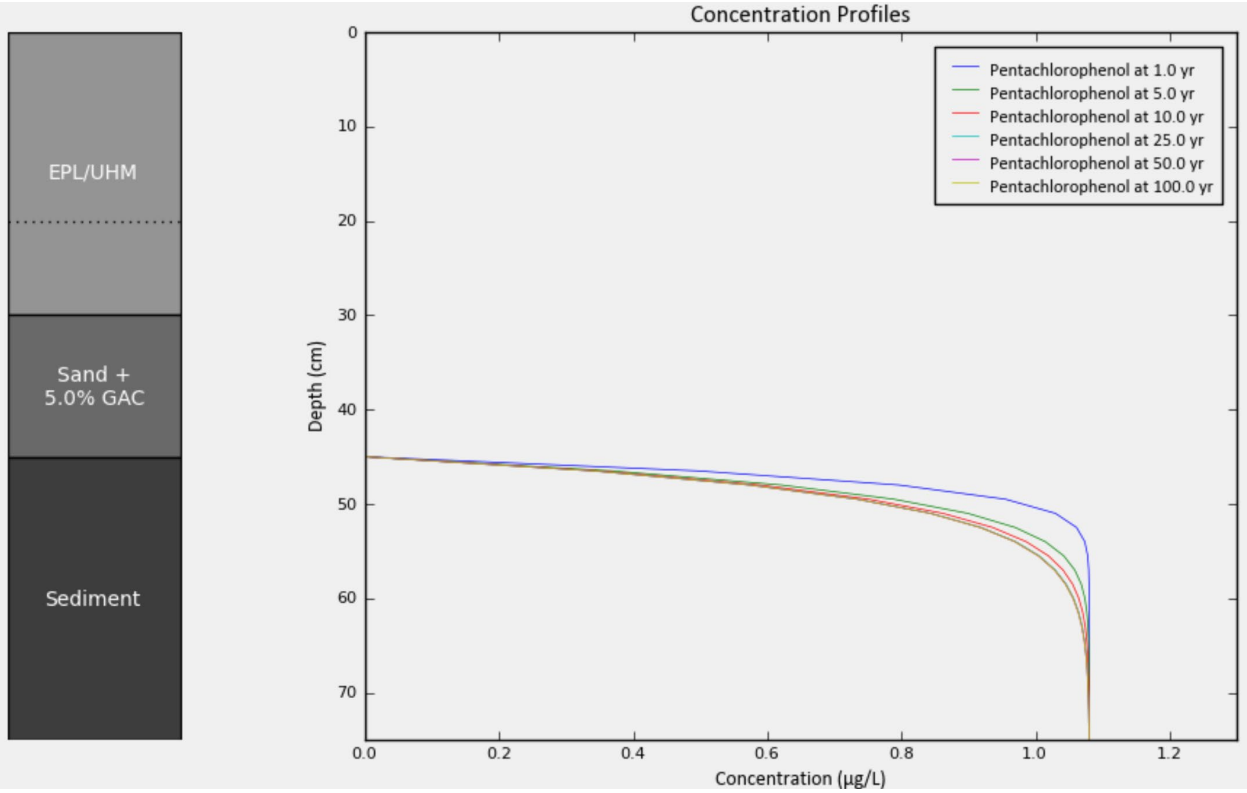

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB199 at 1.0 yr
PCB199 at 5.0 yr
PCB199 at 10.0 yr
PCB199 at 25.0 yr
PCB199 at 50.0 yr
PCB199 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
1.0
1e−5
Concentration (µg/L)

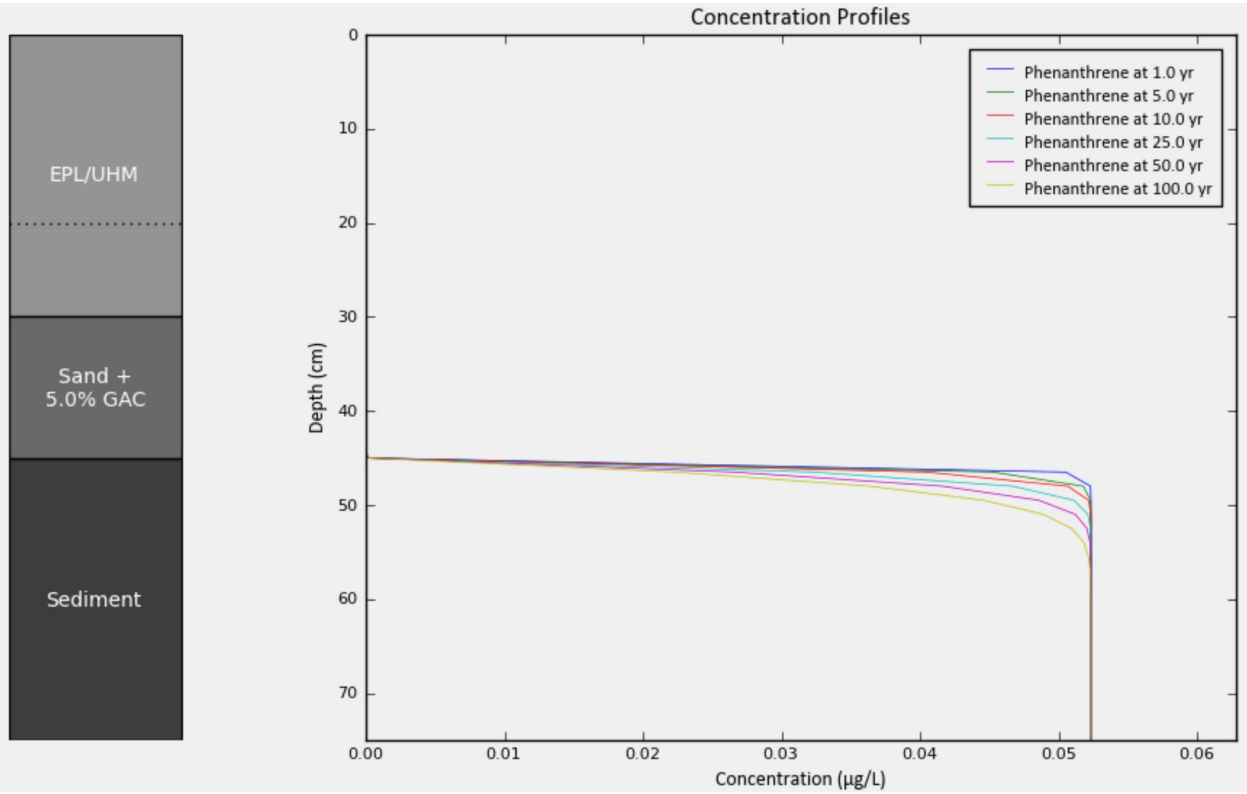

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB206 at 1.0 yr
PCB206 at 5.0 yr
PCB206 at 10.0 yr
PCB206 at 25.0 yr
PCB206 at 50.0 yr
PCB206 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

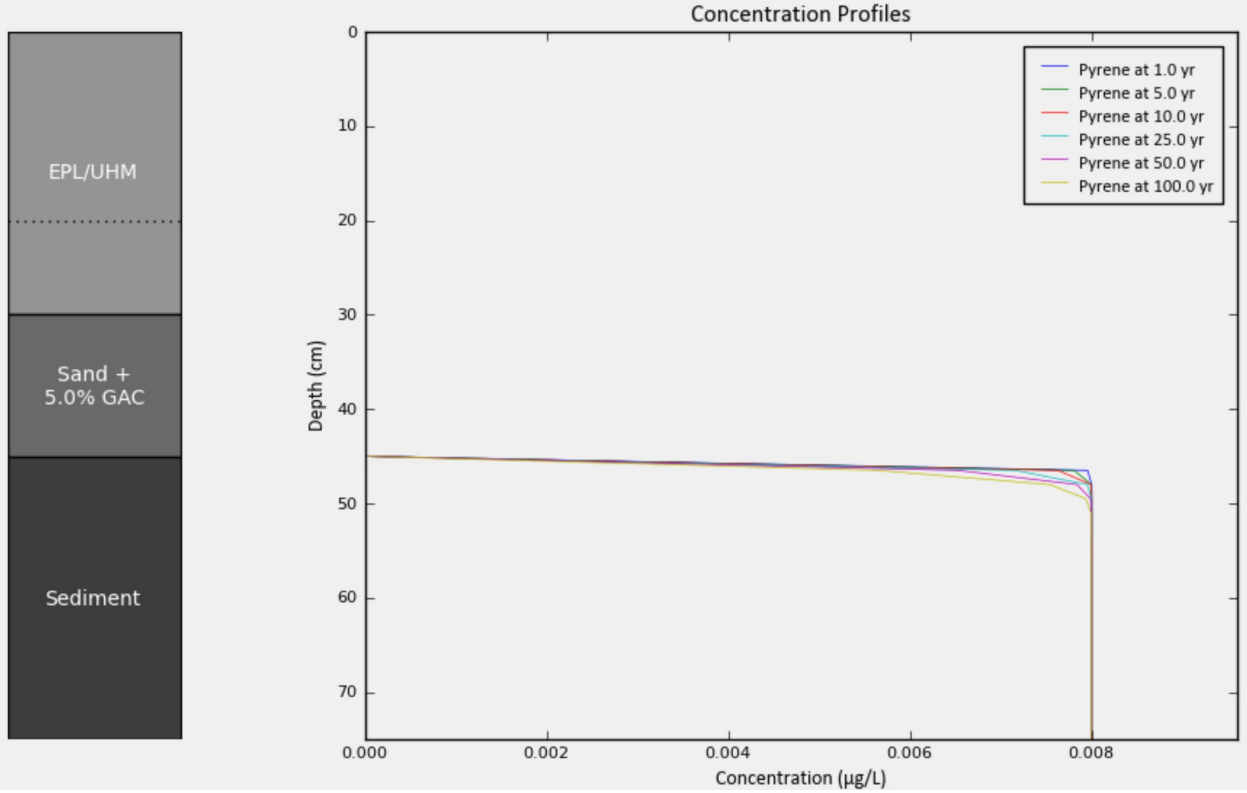

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB209 at 1.0 yr
PCB209 at 5.0 yr
PCB209 at 10.0 yr
PCB209 at 25.0 yr
PCB209 at 50.0 yr
PCB209 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

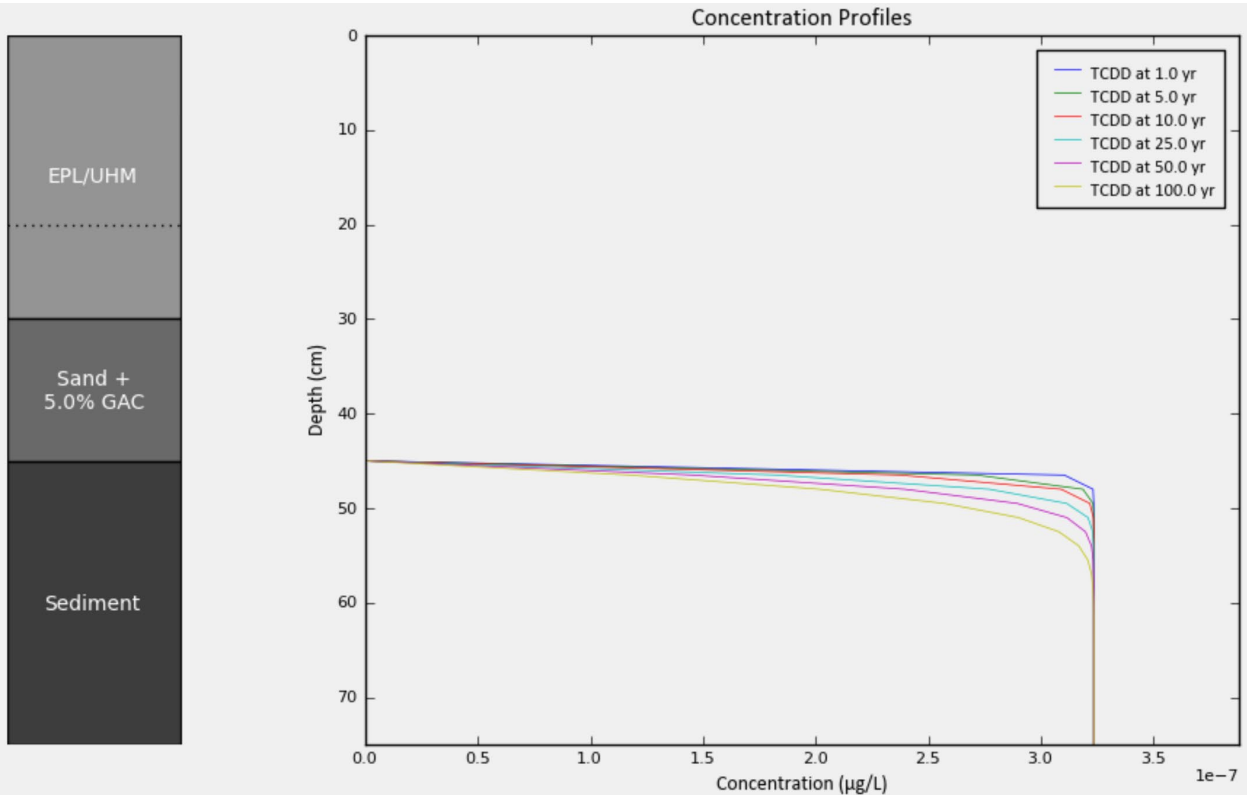

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PeCDD at 1.0 yr
PeCDD at 5.0 yr
PeCDD at 10.0 yr
PeCDD at 25.0 yr
PeCDD at 50.0 yr
PeCDD at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
1.0
1e−7
Concentration (µg/L)

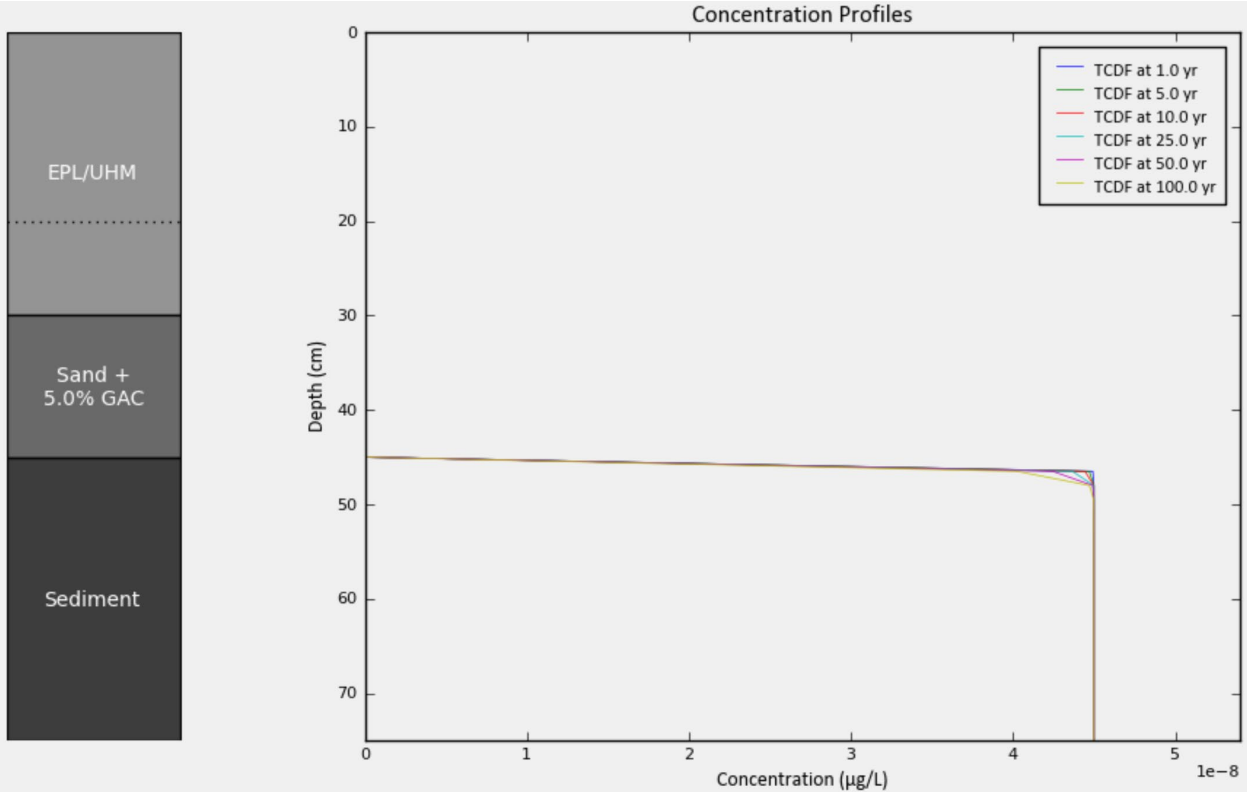

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PeCDF at 1.0 yr
PeCDF at 5.0 yr
PeCDF at 10.0 yr
PeCDF at 25.0 yr
PeCDF at 50.0 yr
PeCDF at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e−6
Concentration (µg/L)

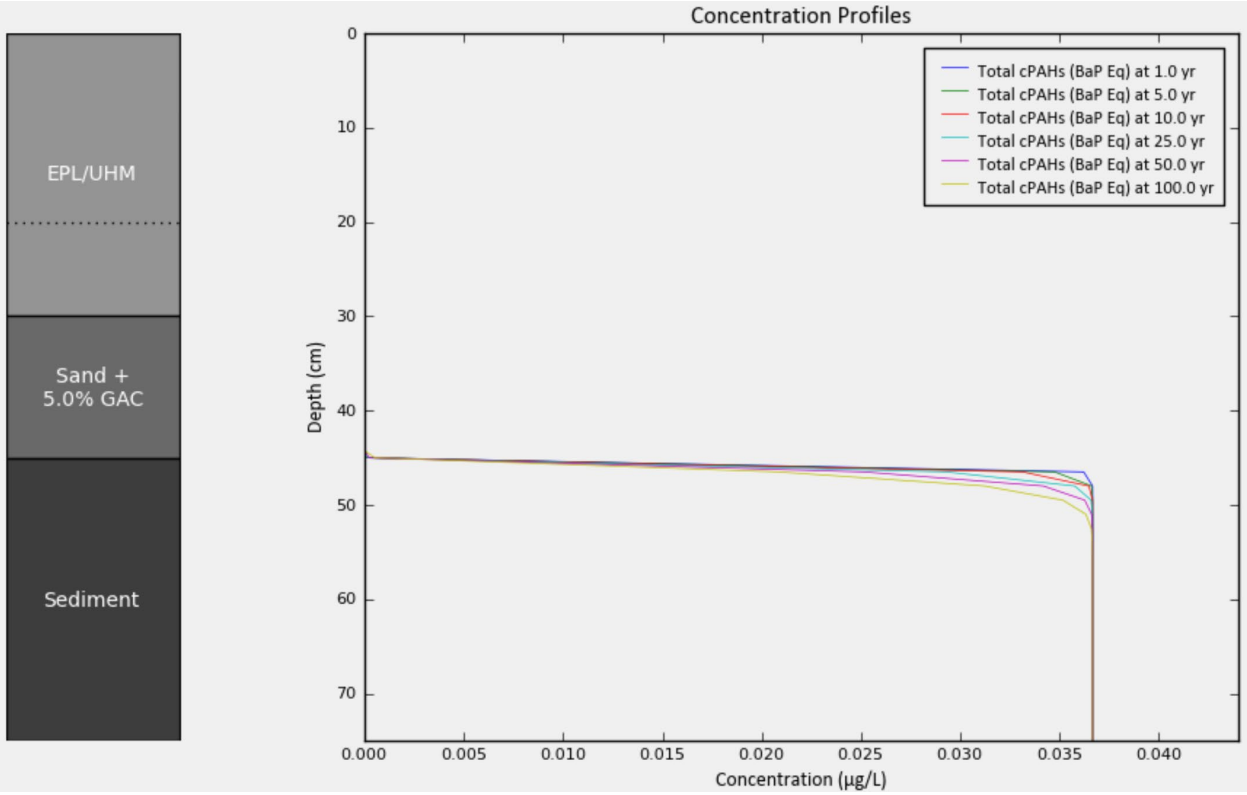

Concentration Profiles
EPL/UHM
Sand +
5.0% GAC
Sediment
Pentachlorophenol at 1.0 yr
Pentachlorophenol at 5.0 yr
Pentachlorophenol at 10.0 yr
Pentachlorophenol at 25.0 yr
Pentachlorophenol at 50.0 yr
Pentachlorophenol at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
1.0
1.2

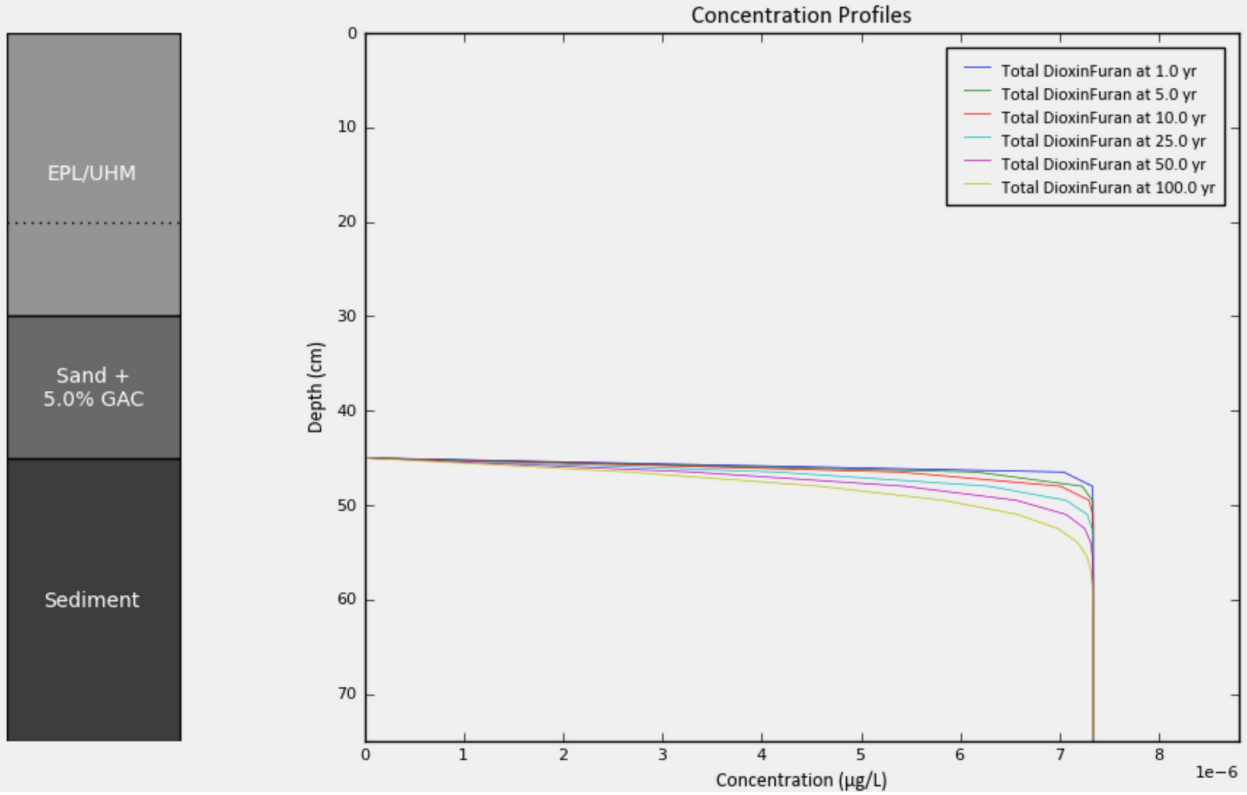

Concentration Profiles
EPL/UHM
Sand +
5.0% GAC
Sediment
Phenanthrene at 1.0 yr
Phenanthrene at 5.0 yr
Phenanthrene at 10.0 yr
Phenanthrene at 25.0 yr
Phenanthrene at 50.0 yr
Phenanthrene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
0.00
0.01
0.02
0.03
0.04
0.05
0.06

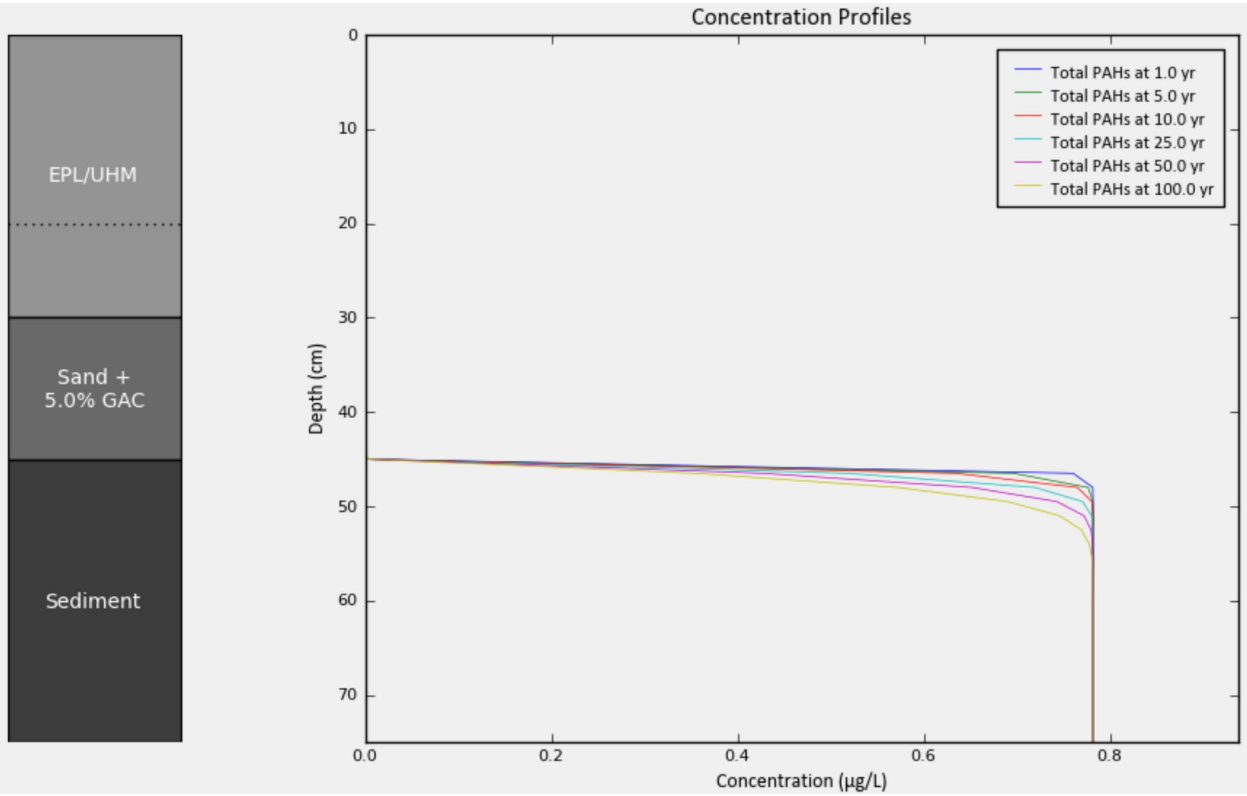

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Pyrene at 1.0 yr
Pyrene at 5.0 yr
Pyrene at 10.0 yr
Pyrene at 25.0 yr
Pyrene at 50.0 yr
Pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.000
0.002
0.004
0.006
0.008
Concentration (µg/L)

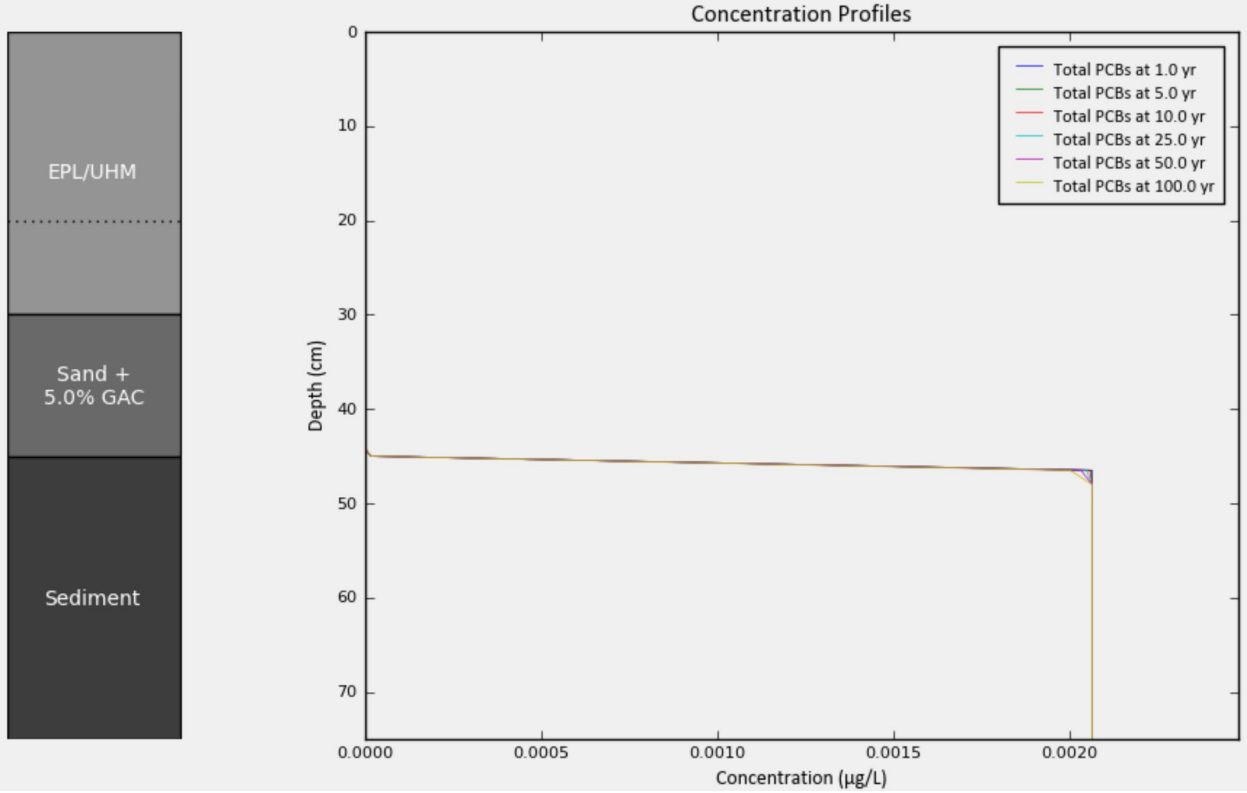

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
TCDD at 1.0 yr
TCDD at 5.0 yr
TCDD at 10.0 yr
TCDD at 25.0 yr
TCDD at 50.0 yr
TCDD at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e−7
Concentration (µg/L)

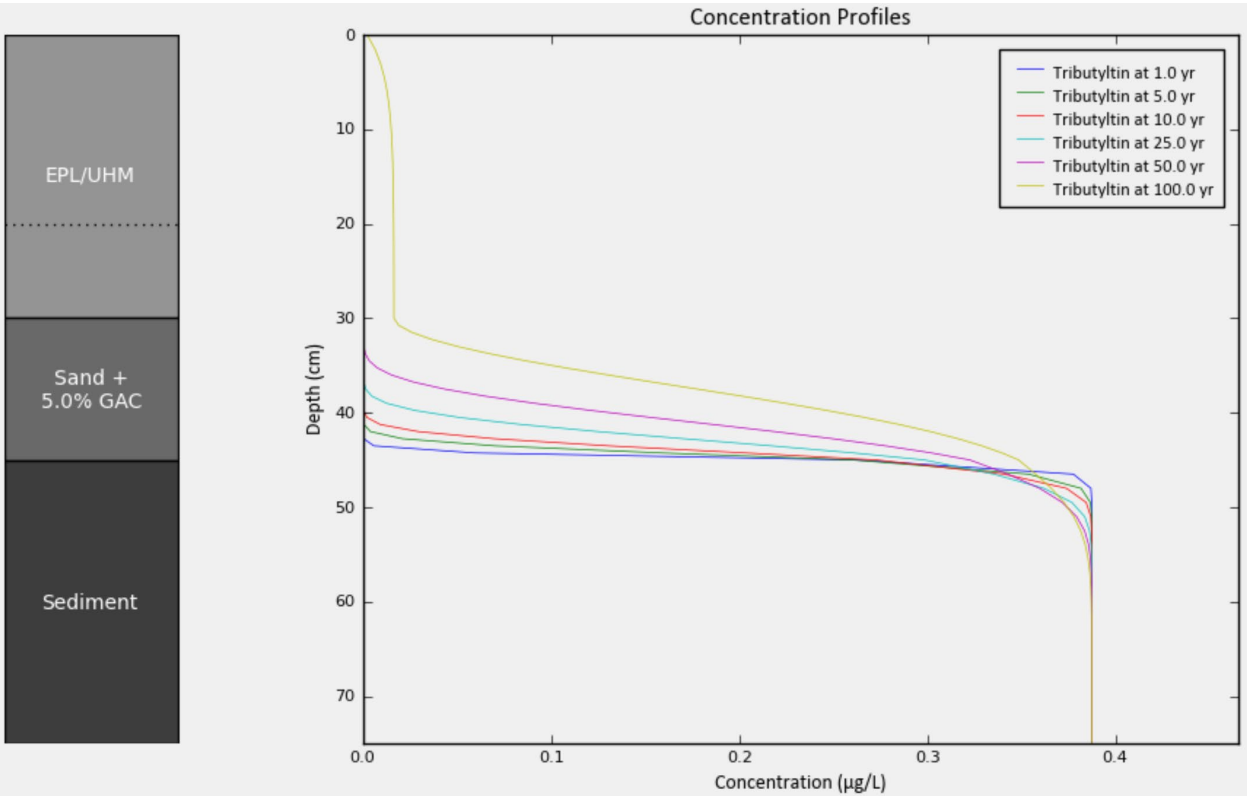

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
TCDF at 1.0 yr
TCDF at 5.0 yr
TCDF at 10.0 yr
TCDF at 25.0 yr
TCDF at 50.0 yr
TCDF at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
1
2
3
4
5
1e−8
Concentration (µg/L)

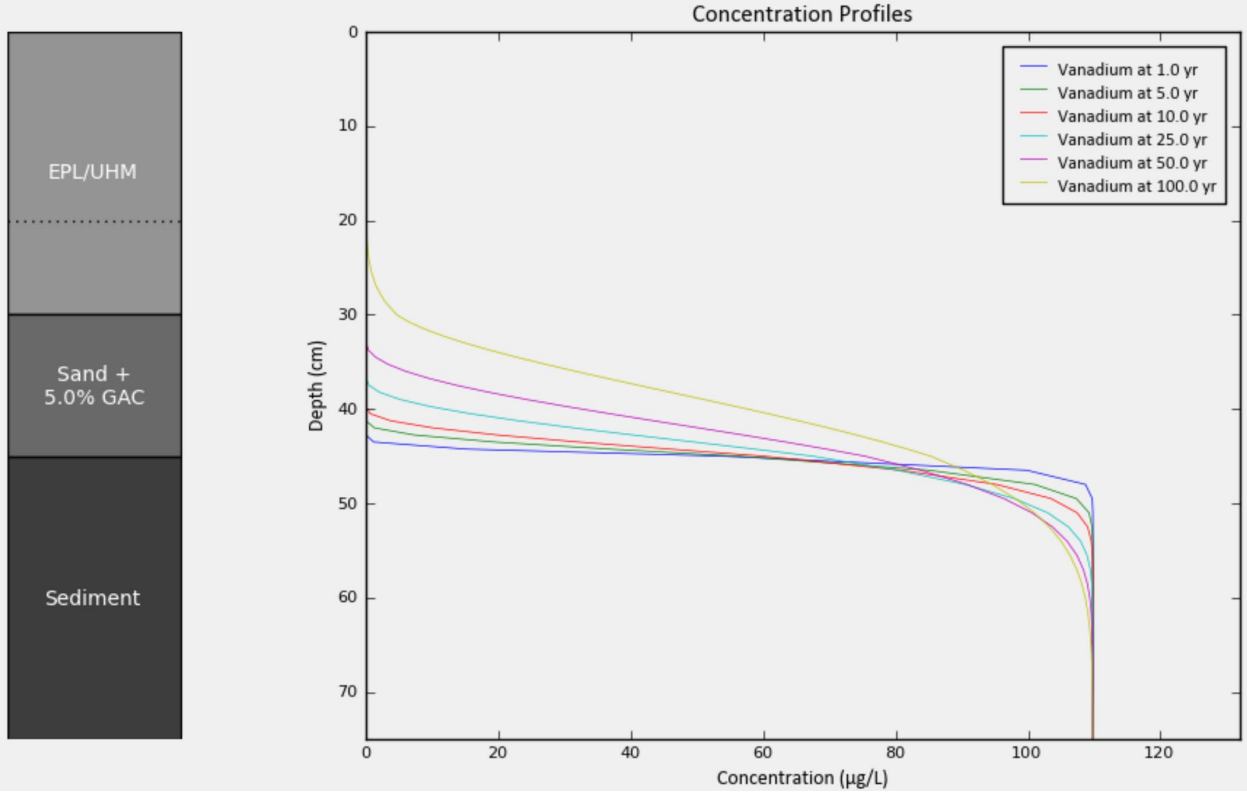

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Total cPAHs (BaP Eq) at 1.0 yr
Total cPAHs (BaP Eq) at 5.0 yr
Total cPAHs (BaP Eq) at 10.0 yr
Total cPAHs (BaP Eq) at 25.0 yr
Total cPAHs (BaP Eq) at 50.0 yr
Total cPAHs (BaP Eq) at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040
Concentration (µg/L)

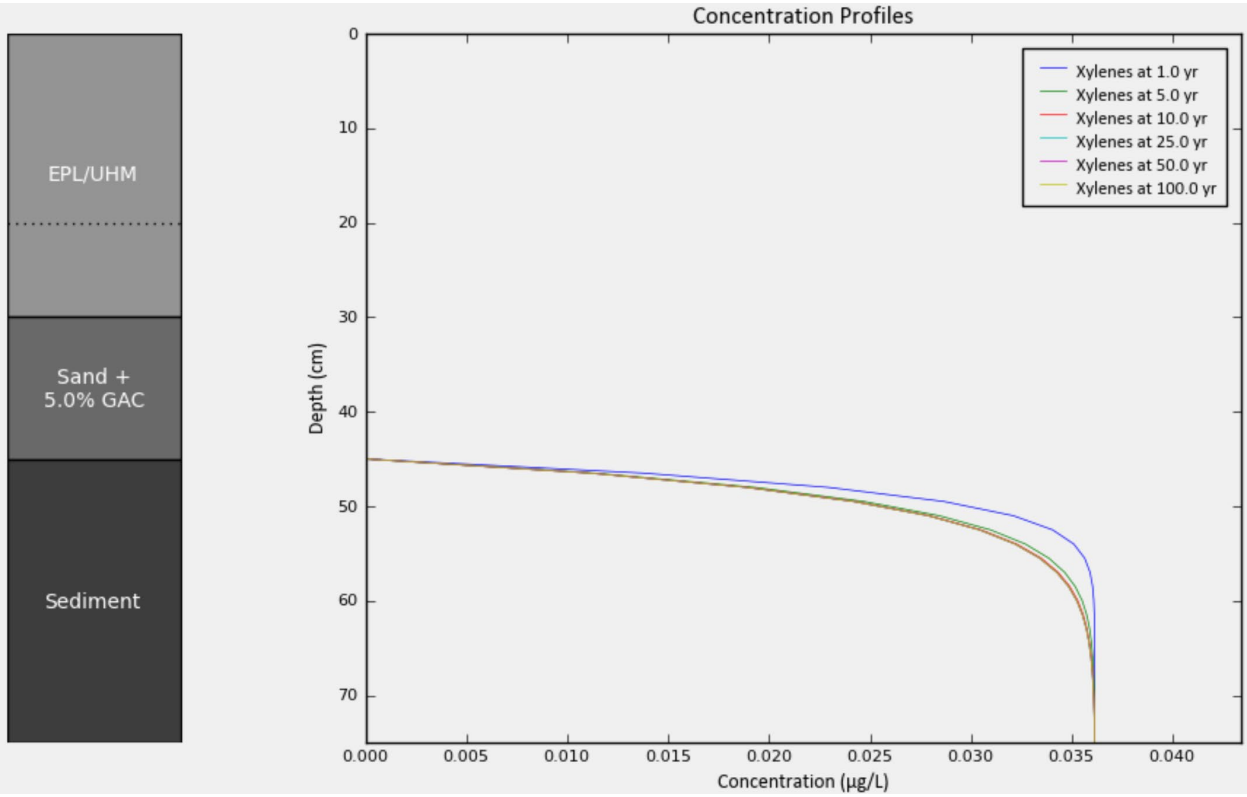

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Total DioxinFuran at 1.0 yr
Total DioxinFuran at 5.0 yr
Total DioxinFuran at 10.0 yr
Total DioxinFuran at 25.0 yr
Total DioxinFuran at 50.0 yr
Total DioxinFuran at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
1
2
3
4
5
6
7
8
1e−6
Concentration (µg/L)

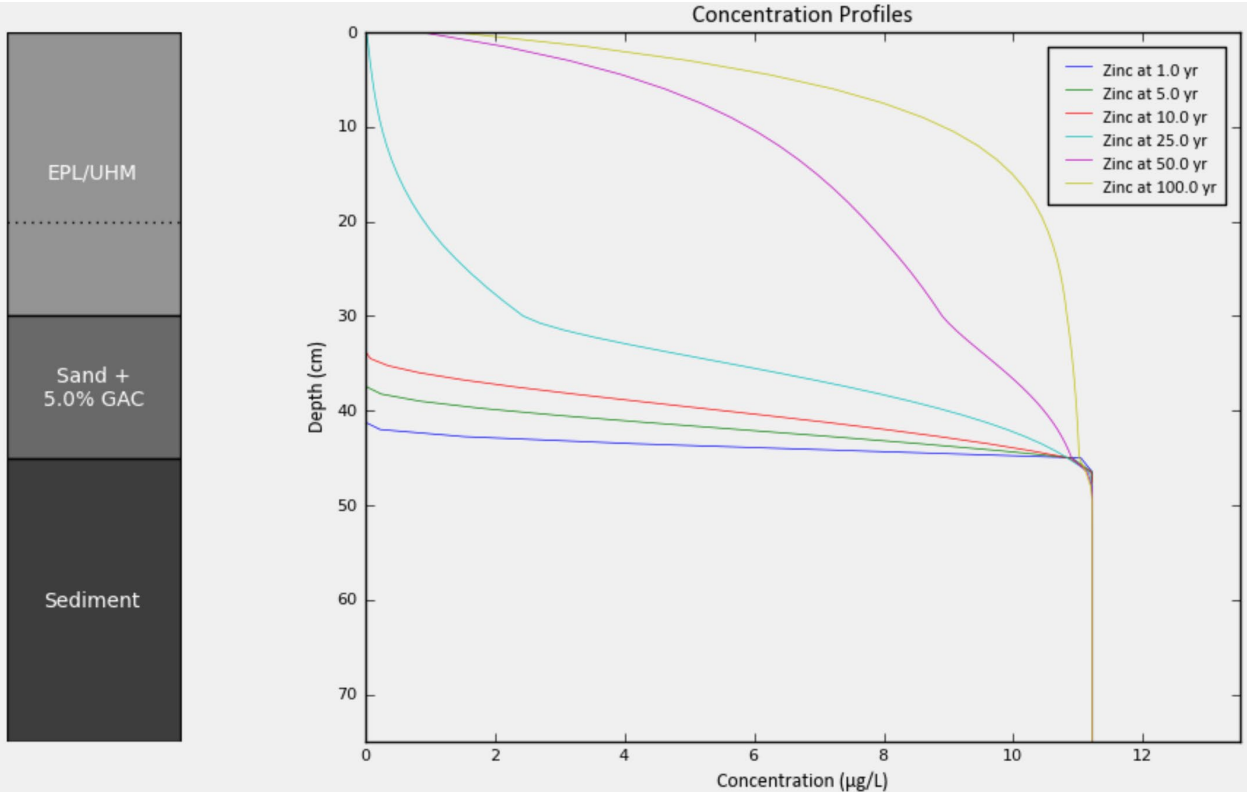

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Total PAHs at 1.0 yr
Total PAHs at 5.0 yr
Total PAHs at 10.0 yr
Total PAHs at 25.0 yr
Total PAHs at 50.0 yr
Total PAHs at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
Concentration (µg/L)


EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Total PCBs at 1.0 yr
Total PCBs at 5.0 yr
Total PCBs at 10.0 yr
Total PCBs at 25.0 yr
Total PCBs at 50.0 yr
Total PCBs at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

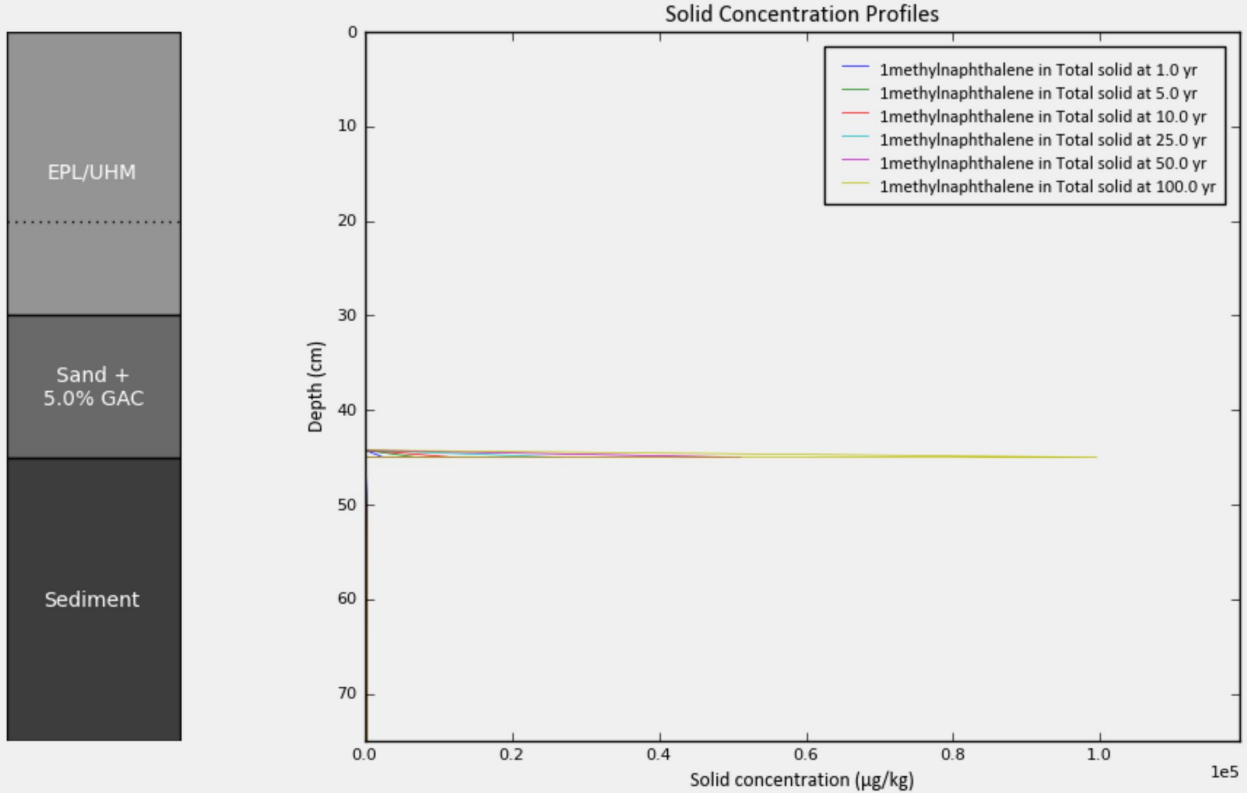

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Tributyltin at 1.0 yr
Tributyltin at 5.0 yr
Tributyltin at 10.0 yr
Tributyltin at 25.0 yr
Tributyltin at 50.0 yr
Tributyltin at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.1
0.2
0.3
0.4
Concentration (µg/L)

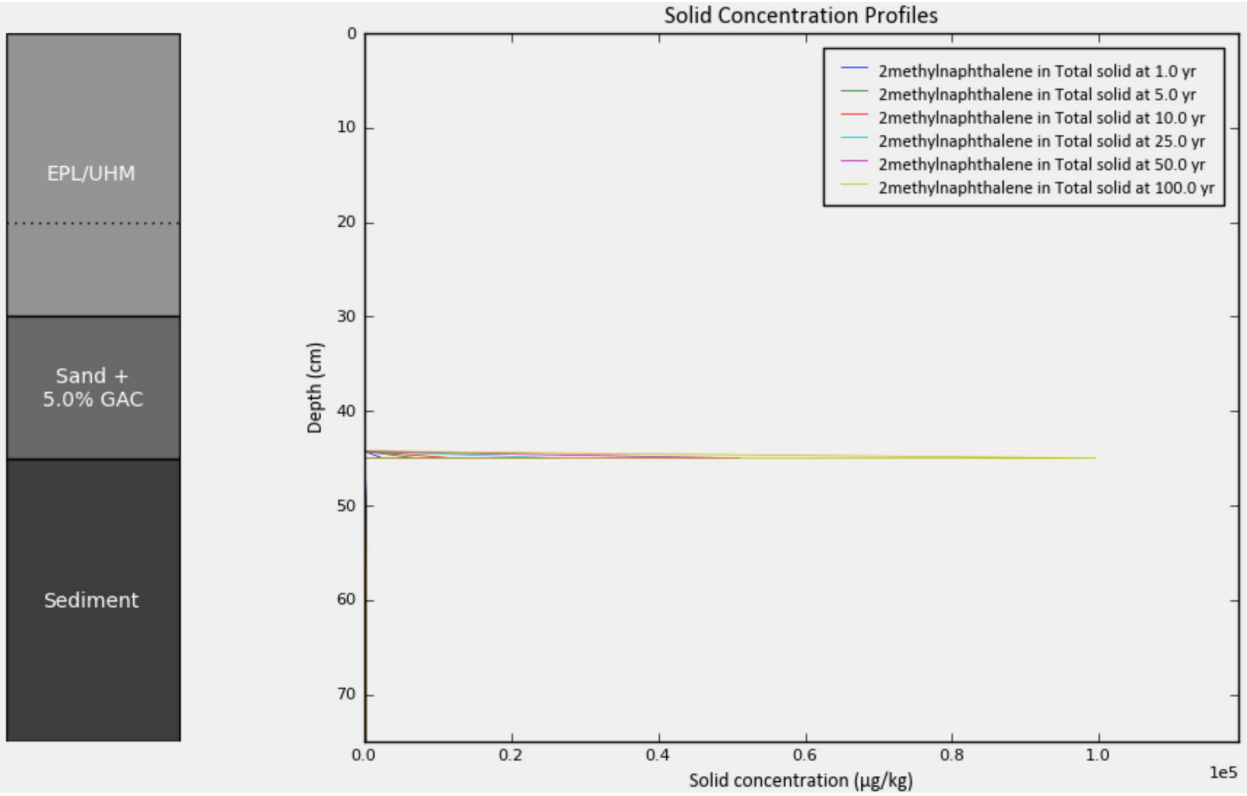

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Vanadium at 1.0 yr
Vanadium at 5.0 yr
Vanadium at 10.0 yr
Vanadium at 25.0 yr
Vanadium at 50.0 yr
Vanadium at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
0
20
40
60
80
100
120

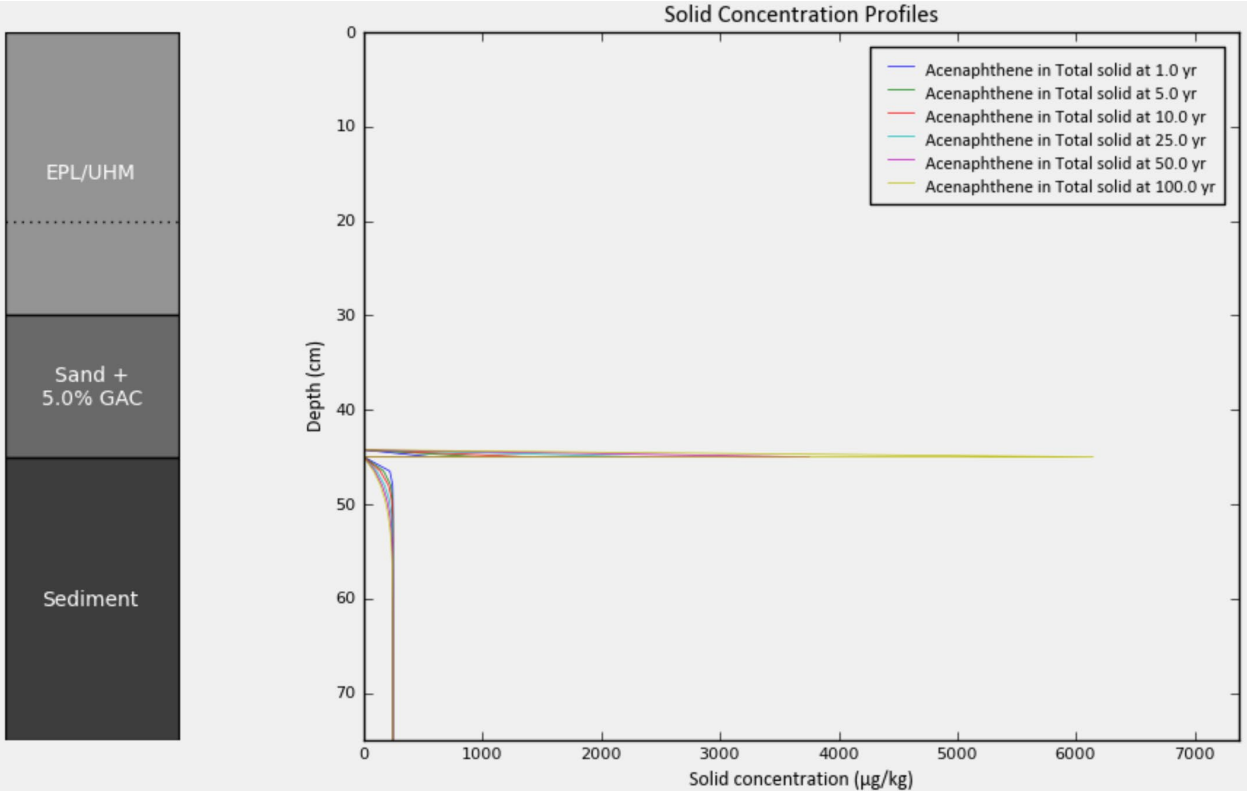

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Xylenes at 1.0 yr
Xylenes at 5.0 yr
Xylenes at 10.0 yr
Xylenes at 25.0 yr
Xylenes at 50.0 yr
Xylenes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040

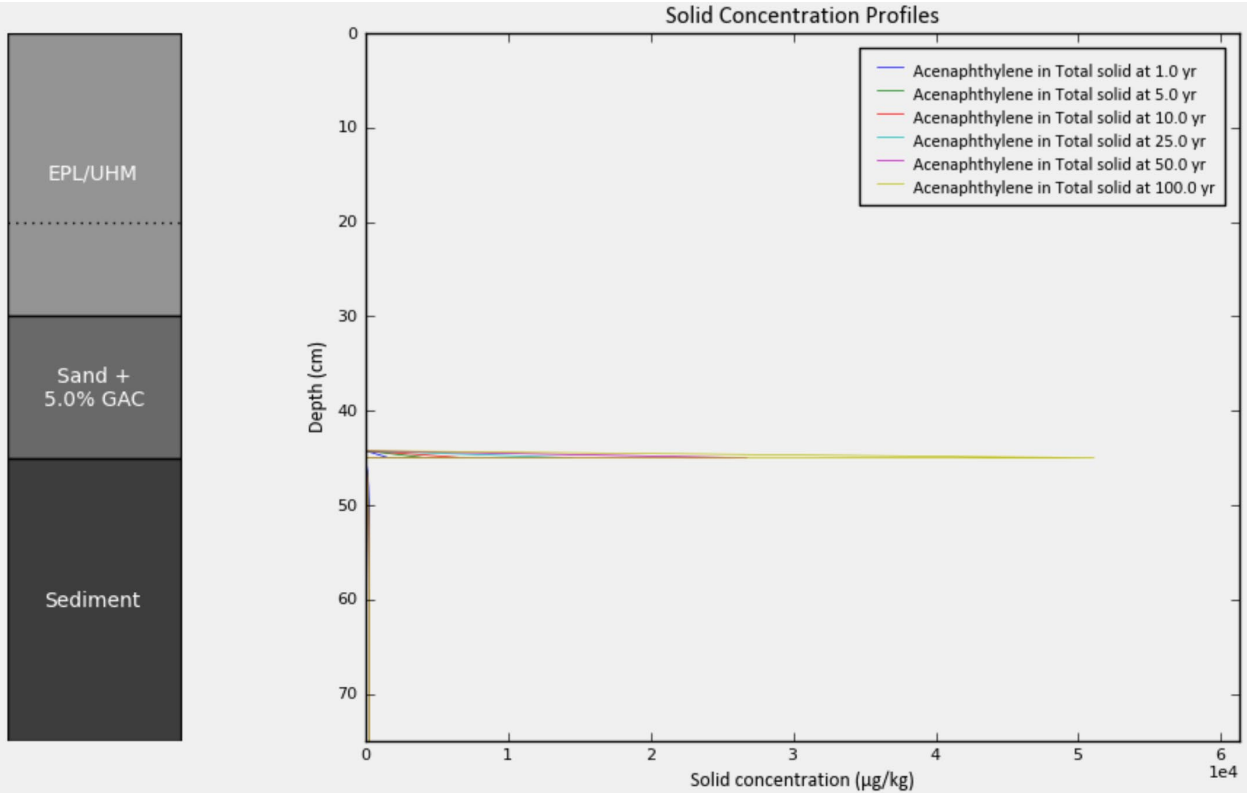

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Zinc at 1.0 yr
Zinc at 5.0 yr
Zinc at 10.0 yr
Zinc at 25.0 yr
Zinc at 50.0 yr
Zinc at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
0
2
4
6
8
10
12

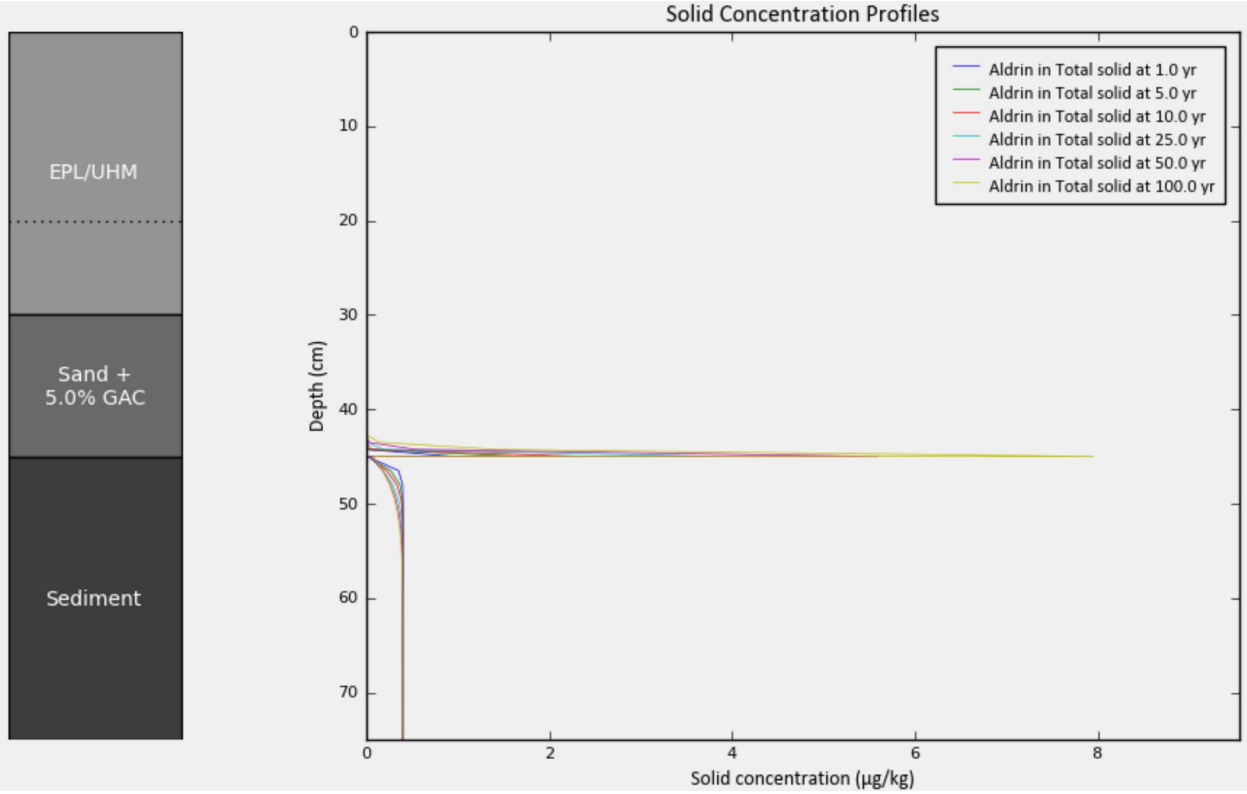
Total Solids Concentration – Depth

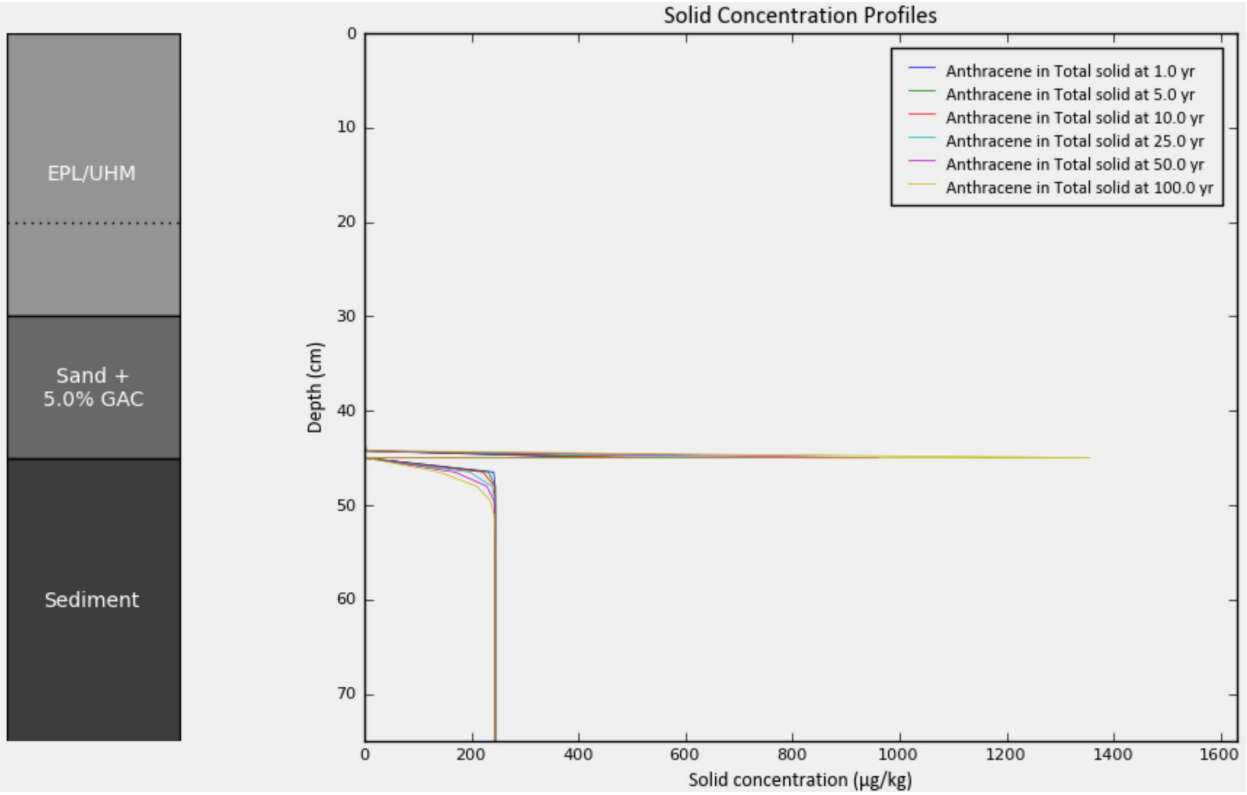


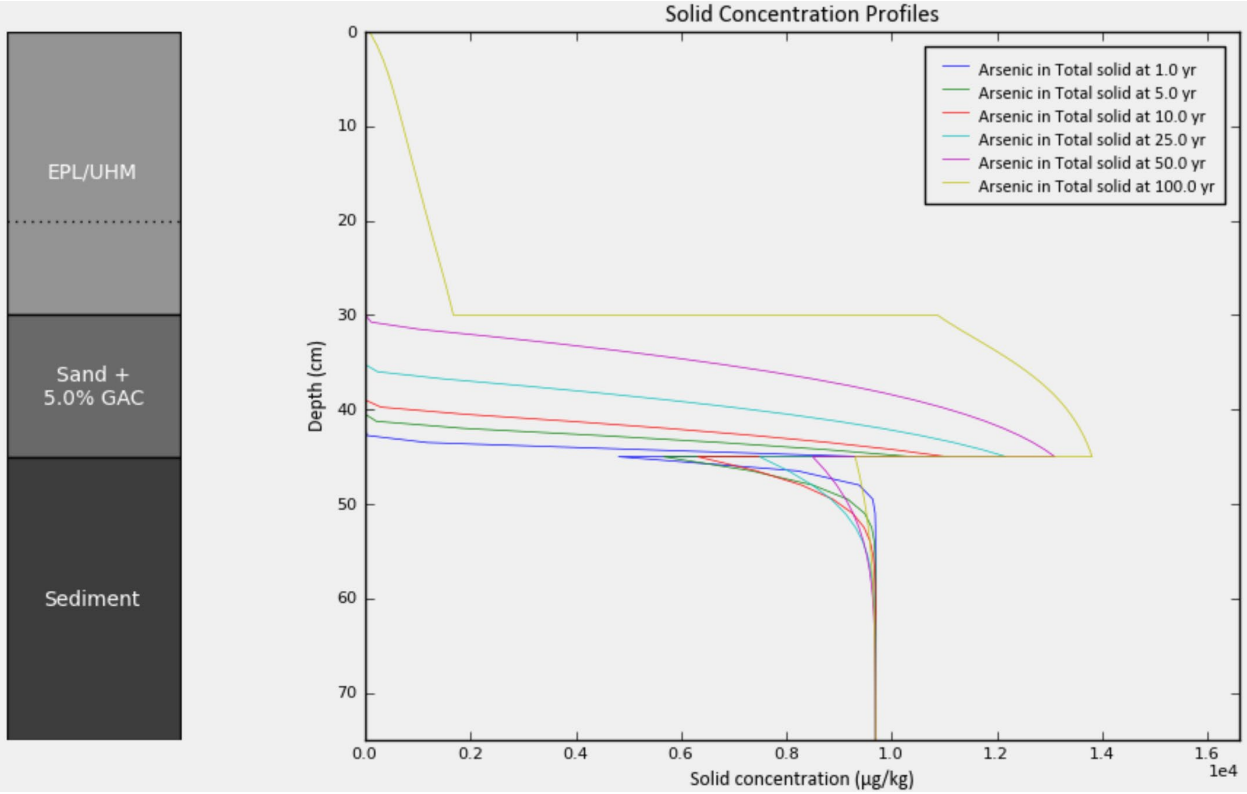


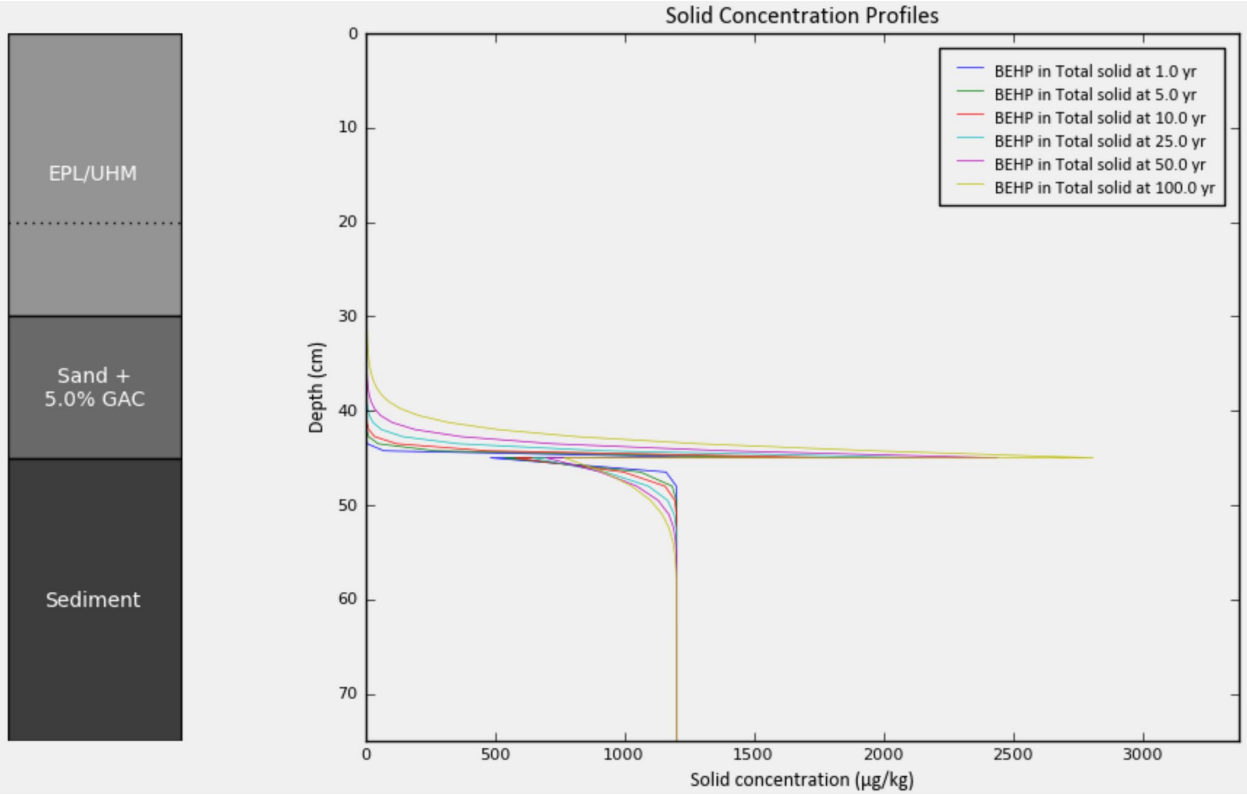

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Acenaphthene in Total solid at 1.0 yr
Acenaphthene in Total solid at 5.0 yr
Acenaphthene in Total solid at 10.0 yr
Acenaphthene in Total solid at 25.0 yr
Acenaphthene in Total solid at 50.0 yr
Acenaphthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

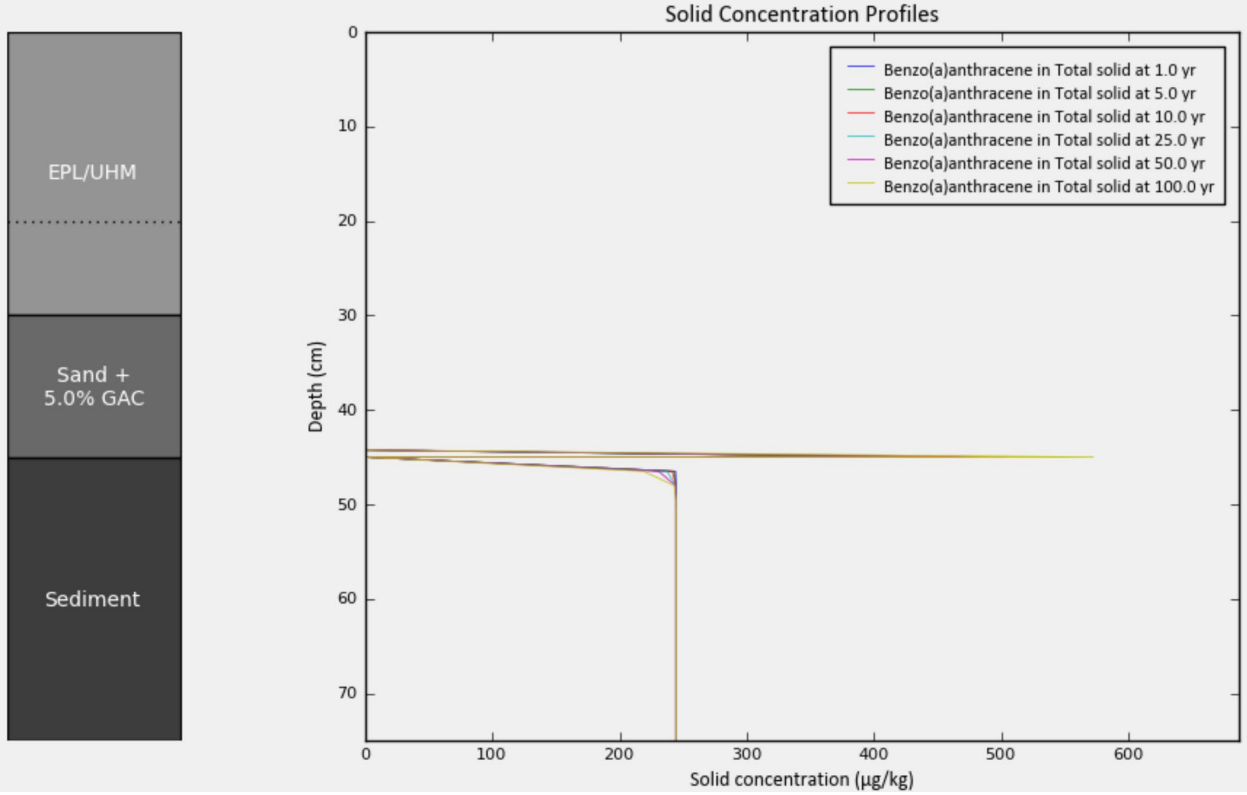

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Acenaphthylene in Total solid at 1.0 yr
Acenaphthylene in Total solid at 5.0 yr
Acenaphthylene in Total solid at 10.0 yr
Acenaphthylene in Total solid at 25.0 yr
Acenaphthylene in Total solid at 50.0 yr
Acenaphthylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

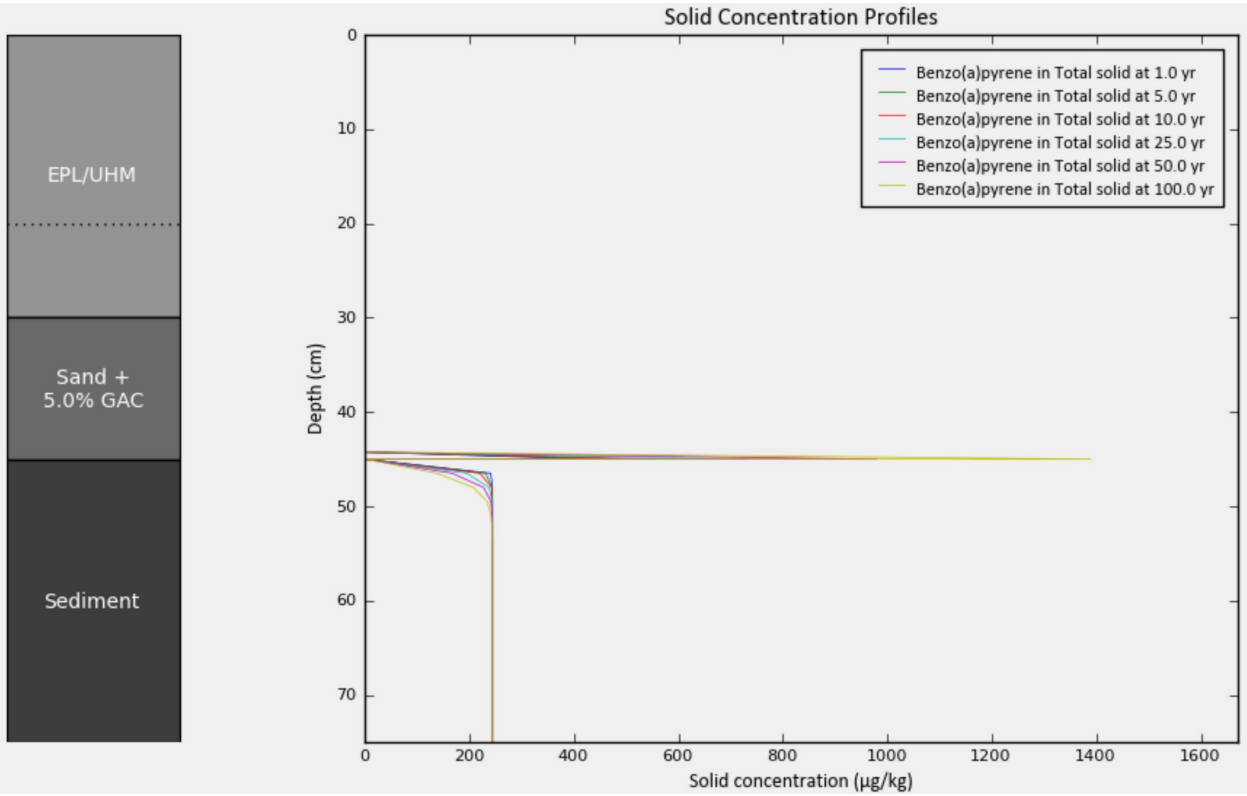

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Aldrin in Total solid at 1.0 yr
Aldrin in Total solid at 5.0 yr
Aldrin in Total solid at 10.0 yr
Aldrin in Total solid at 25.0 yr
Aldrin in Total solid at 50.0 yr
Aldrin in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
2
4
6
8
Solid concentration (µg/kg)

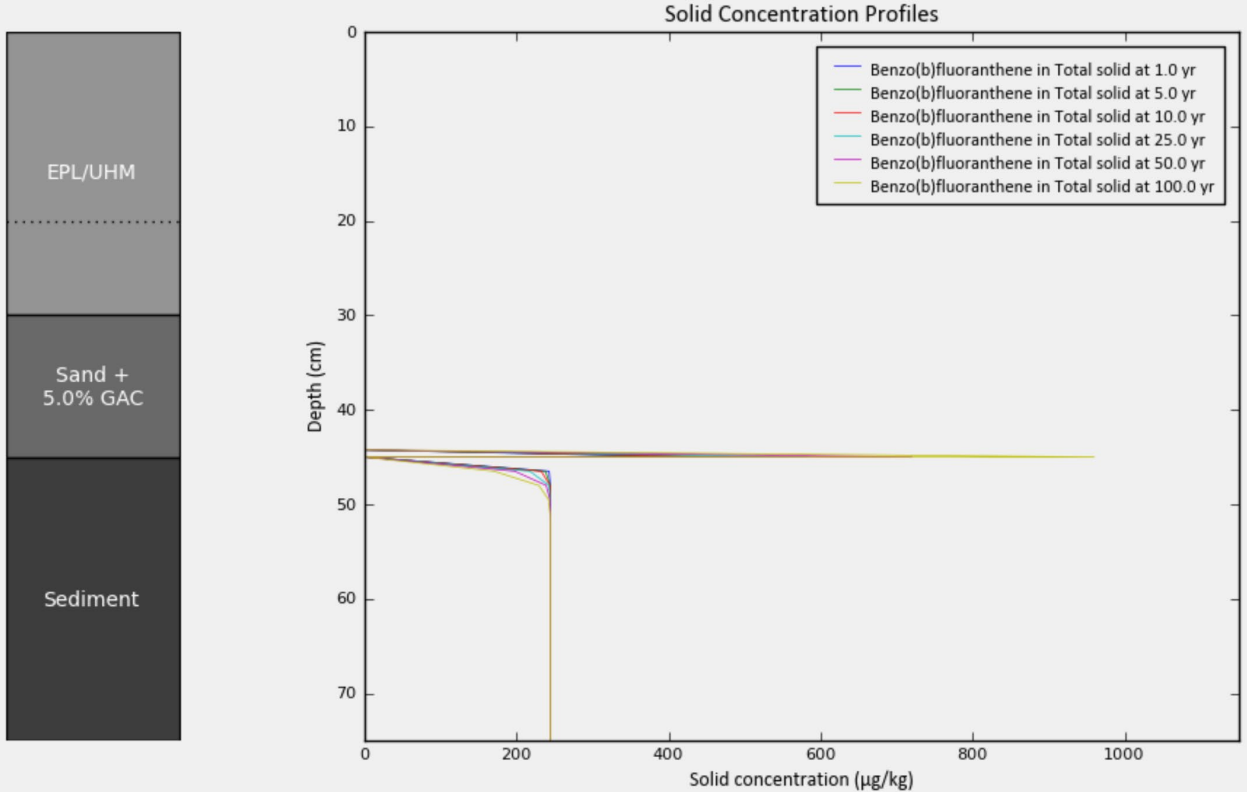

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Anthracene in Total solid at 1.0 yr
Anthracene in Total solid at 5.0 yr
Anthracene in Total solid at 10.0 yr
Anthracene in Total solid at 25.0 yr
Anthracene in Total solid at 50.0 yr
Anthracene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
200
400
600
800
1000
1200
1400
1600
Solid concentration (µg/kg)

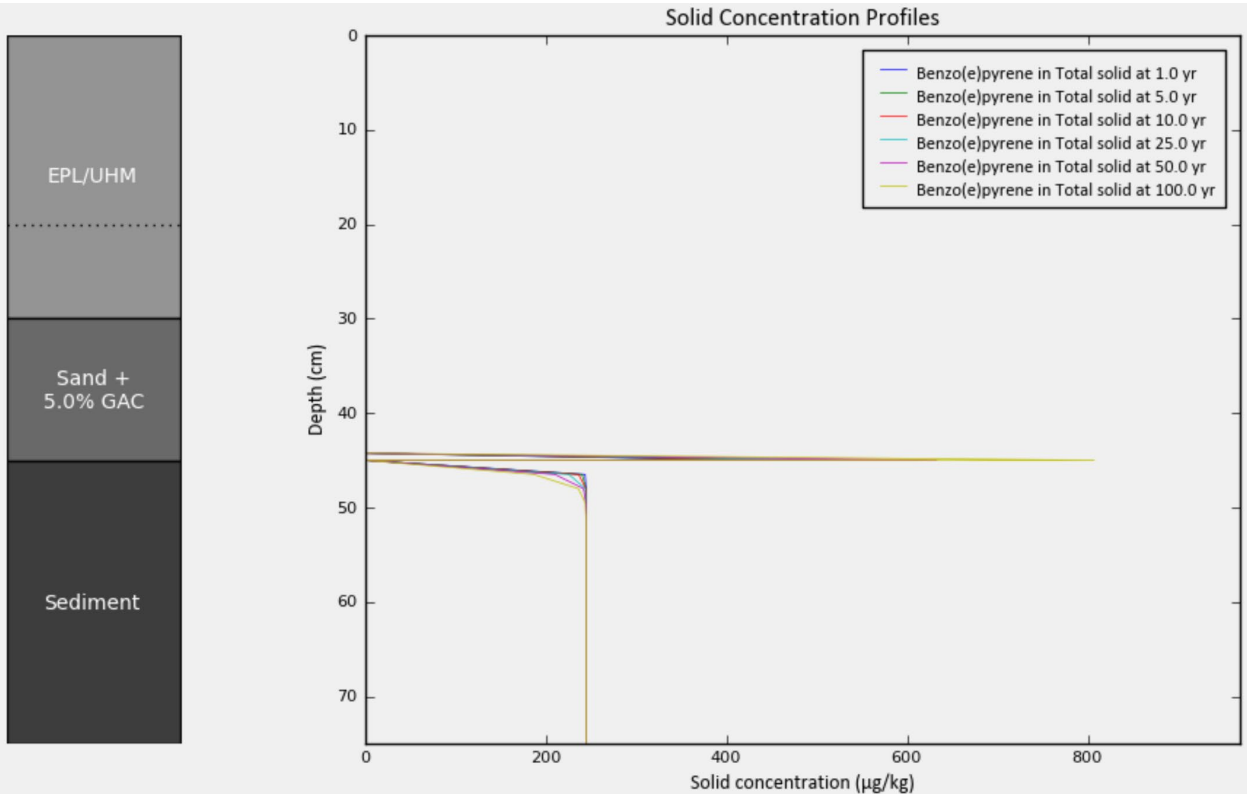

Solid Concentration Profiles
EPL/UHM
Sand +
5.0% GAC
Sediment
Arsenic in Total solid at 1.0 yr
Arsenic in Total solid at 5.0 yr
Arsenic in Total solid at 10.0 yr
Arsenic in Total solid at 25.0 yr
Arsenic in Total solid at 50.0 yr
Arsenic in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

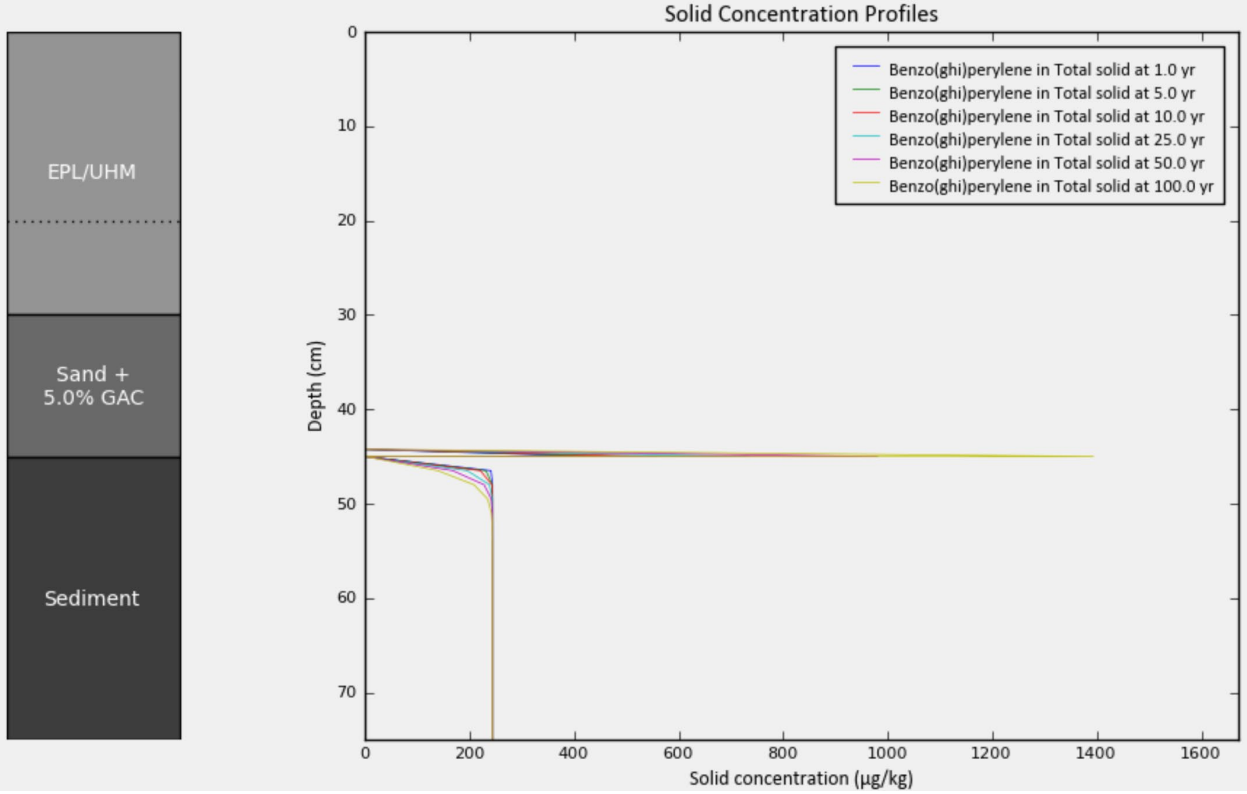

Solid Concentration Profiles
EPL/UHM
Sand +
5.0% GAC
Sediment
BEHP in Total solid at 1.0 yr
BEHP in Total solid at 5.0 yr
BEHP in Total solid at 10.0 yr
BEHP in Total solid at 25.0 yr
BEHP in Total solid at 50.0 yr
BEHP in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

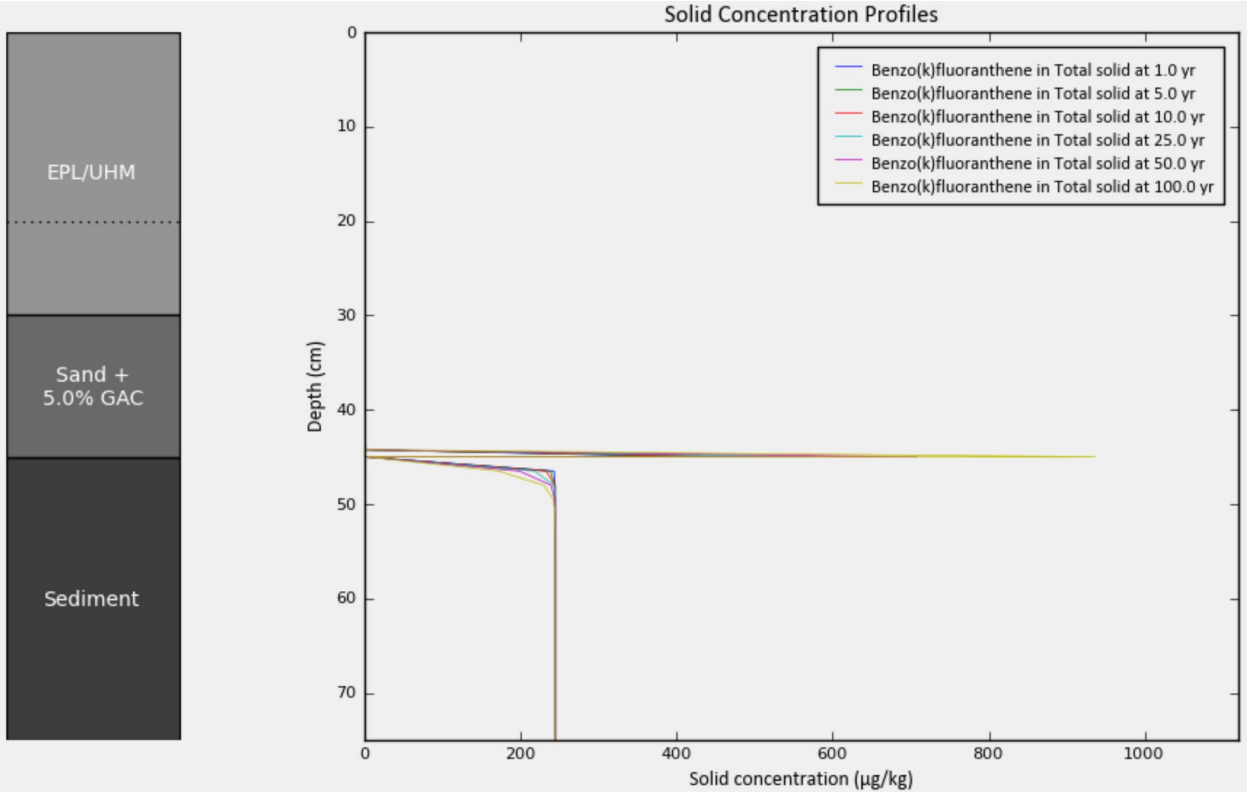

Solid Concentration Profiles
EPL/UHM
Sand +
5.0% GAC
Sediment
Benzo(a)anthracene in Total solid at 1.0 yr
Benzo(a)anthracene in Total solid at 5.0 yr
Benzo(a)anthracene in Total solid at 10.0 yr
Benzo(a)anthracene in Total solid at 25.0 yr
Benzo(a)anthracene in Total solid at 50.0 yr
Benzo(a)anthracene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
100
200
300
400
500
600
Solid concentration (µg/kg)

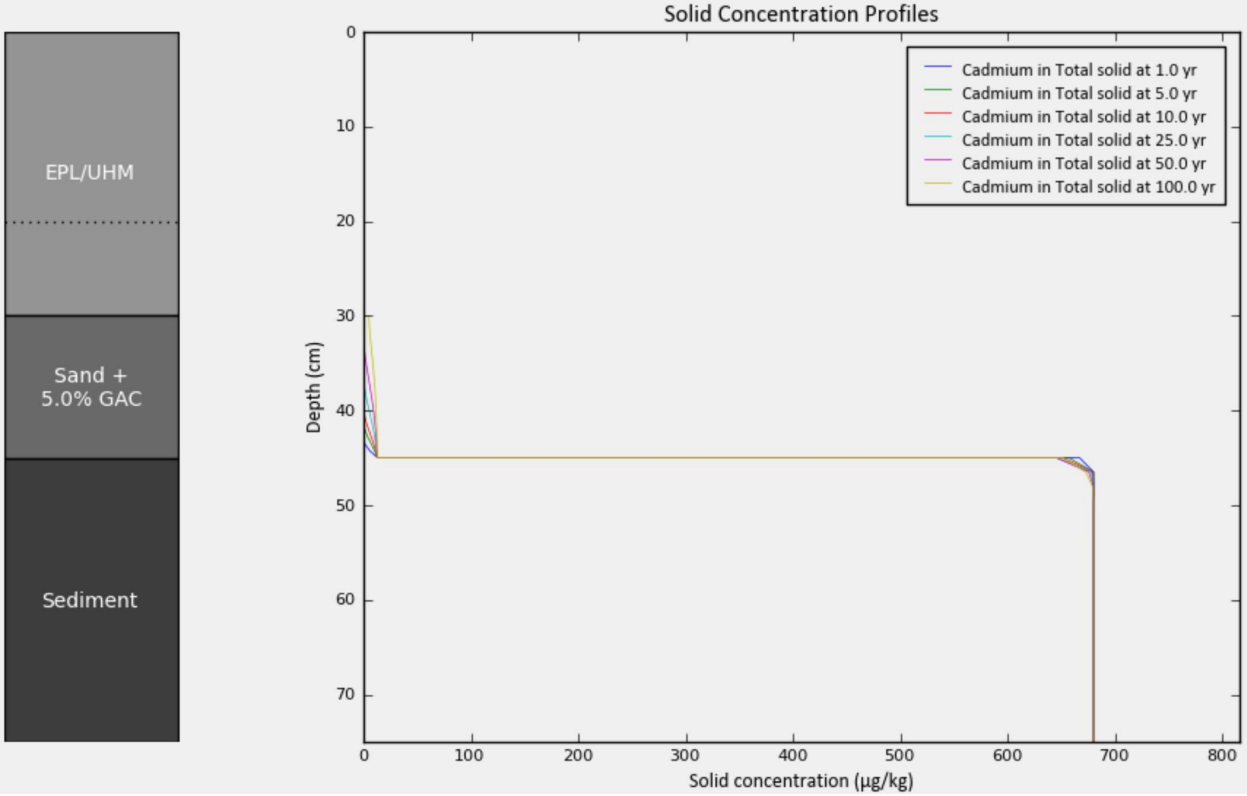

Solid Concentration Profiles
EPL/UHM
Sand +
5.0% GAC
Sediment
Benzo(a)pyrene in Total solid at 1.0 yr
Benzo(a)pyrene in Total solid at 5.0 yr
Benzo(a)pyrene in Total solid at 10.0 yr
Benzo(a)pyrene in Total solid at 25.0 yr
Benzo(a)pyrene in Total solid at 50.0 yr
Benzo(a)pyrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
200
400
600
800
1000
1200
1400
1600
Solid concentration (µg/kg)

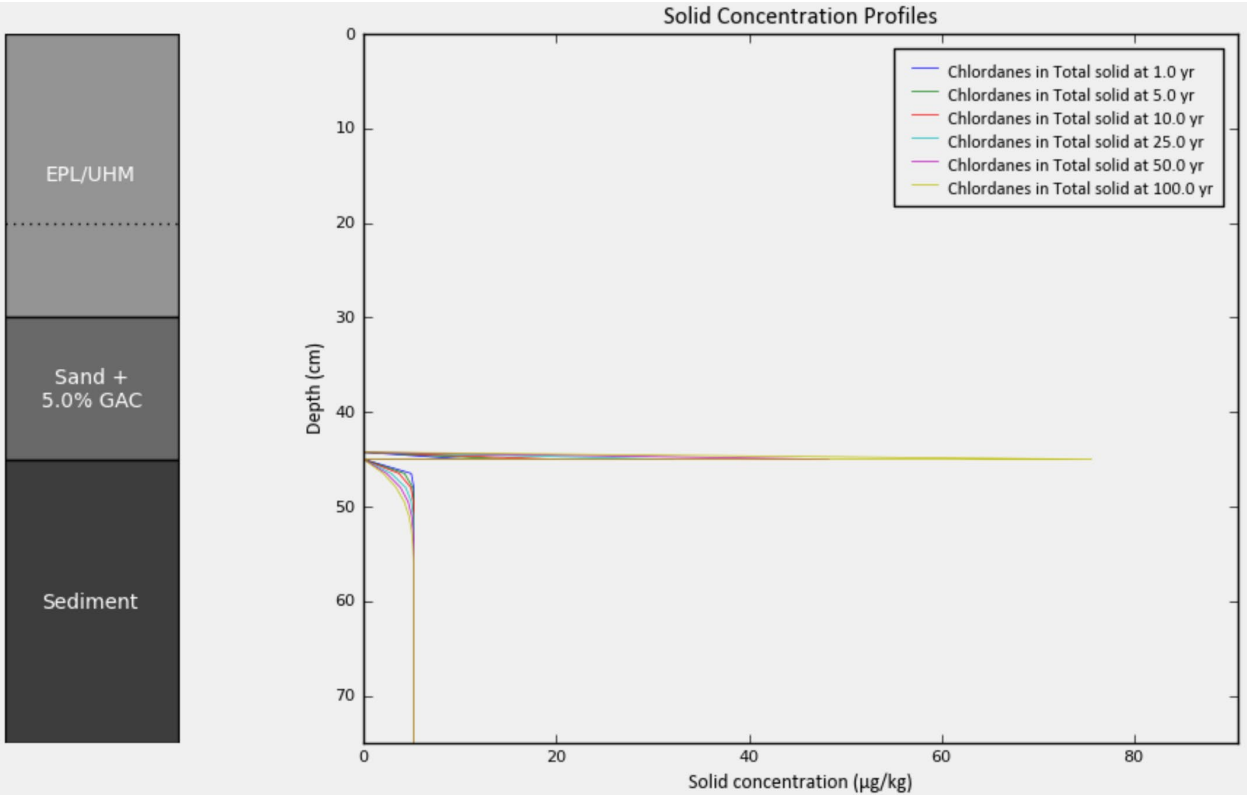

Solid Concentration Profiles
EPL/UHM
Sand +
5.0% GAC
Sediment
Benzo(b)fluoranthene in Total solid at 1.0 yr
Benzo(b)fluoranthene in Total solid at 5.0 yr
Benzo(b)fluoranthene in Total solid at 10.0 yr
Benzo(b)fluoranthene in Total solid at 25.0 yr
Benzo(b)fluoranthene in Total solid at 50.0 yr
Benzo(b)fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
200
400
600
800
1000
Solid concentration (µg/kg)

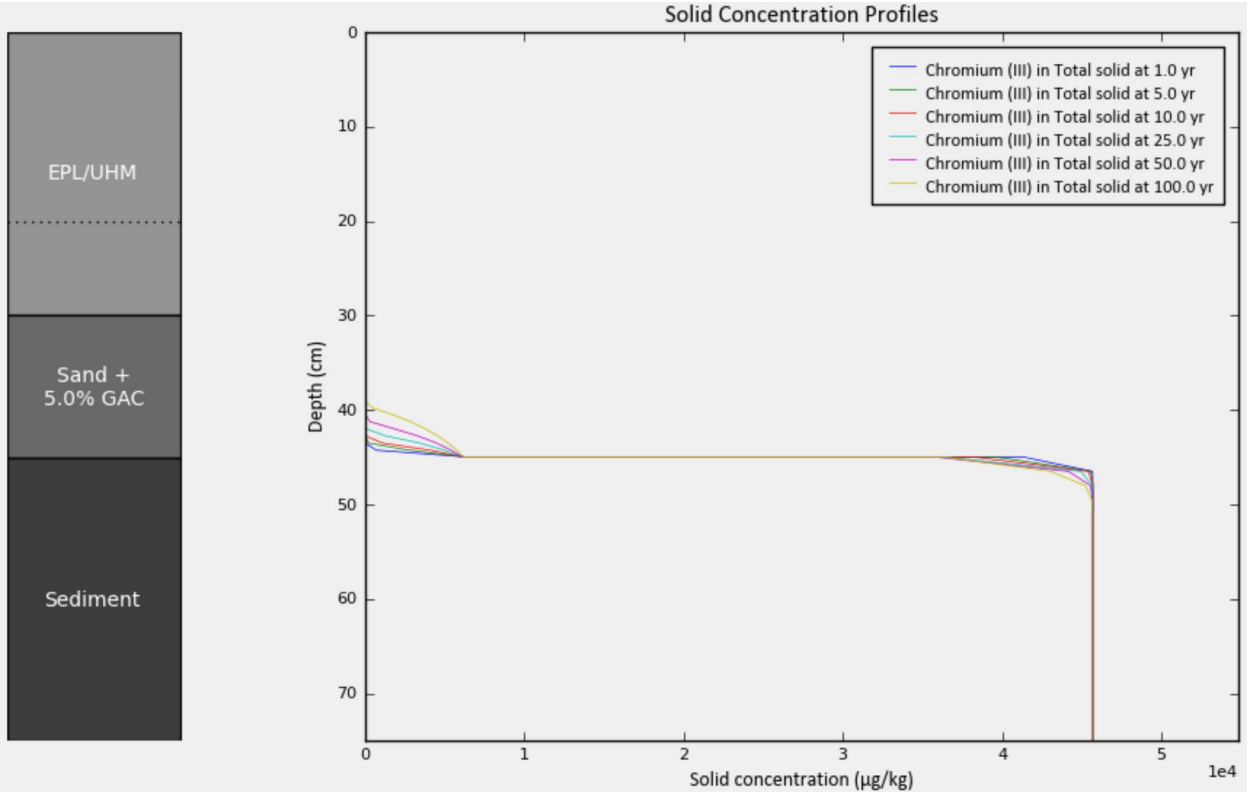

Solid Concentration Profiles
EPL/UHM
Sand +
5.0% GAC
Sediment
Benzo(e)pyrene in Total solid at 1.0 yr
Benzo(e)pyrene in Total solid at 5.0 yr
Benzo(e)pyrene in Total solid at 10.0 yr
Benzo(e)pyrene in Total solid at 25.0 yr
Benzo(e)pyrene in Total solid at 50.0 yr
Benzo(e)pyrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
200
400
600
800
Solid concentration (µg/kg)

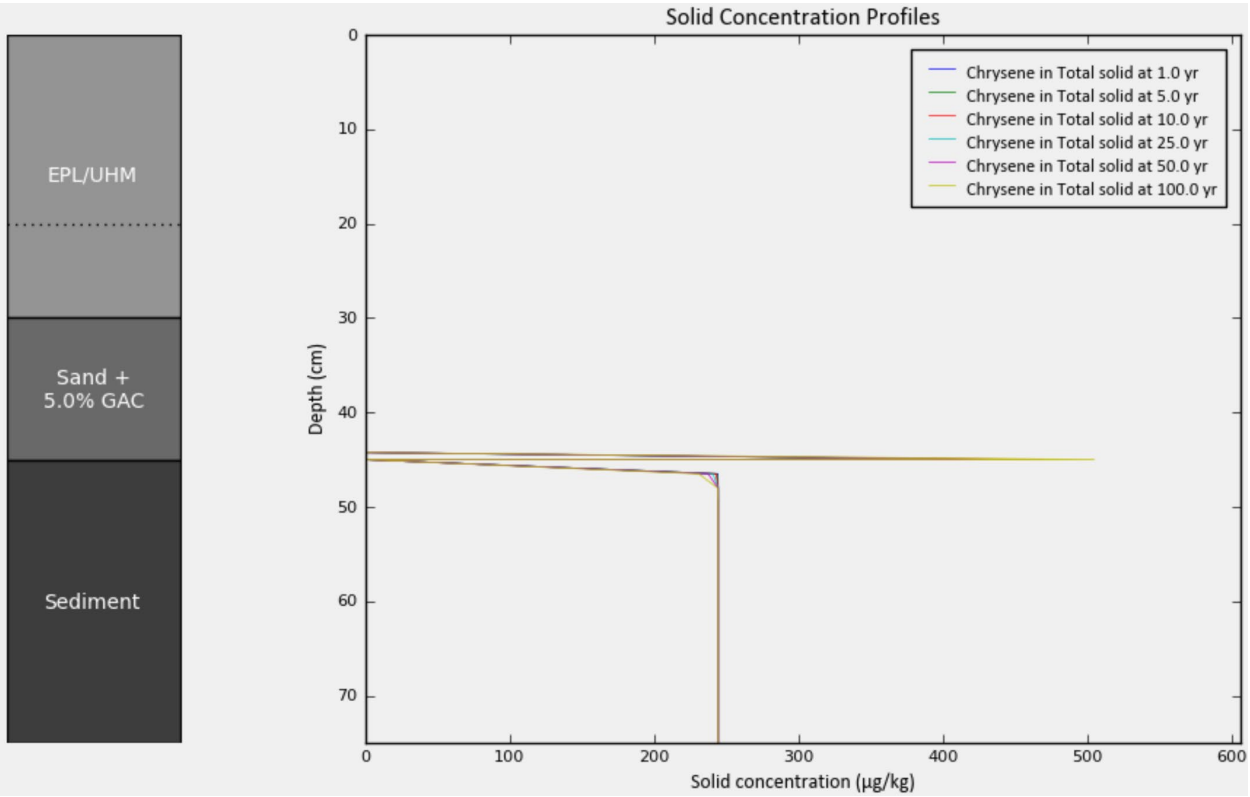

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Benzo(ghi)perylene in Total solid at 1.0 yr
Benzo(ghi)perylene in Total solid at 5.0 yr
Benzo(ghi)perylene in Total solid at 10.0 yr
Benzo(ghi)perylene in Total solid at 25.0 yr
Benzo(ghi)perylene in Total solid at 50.0 yr
Benzo(ghi)perylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

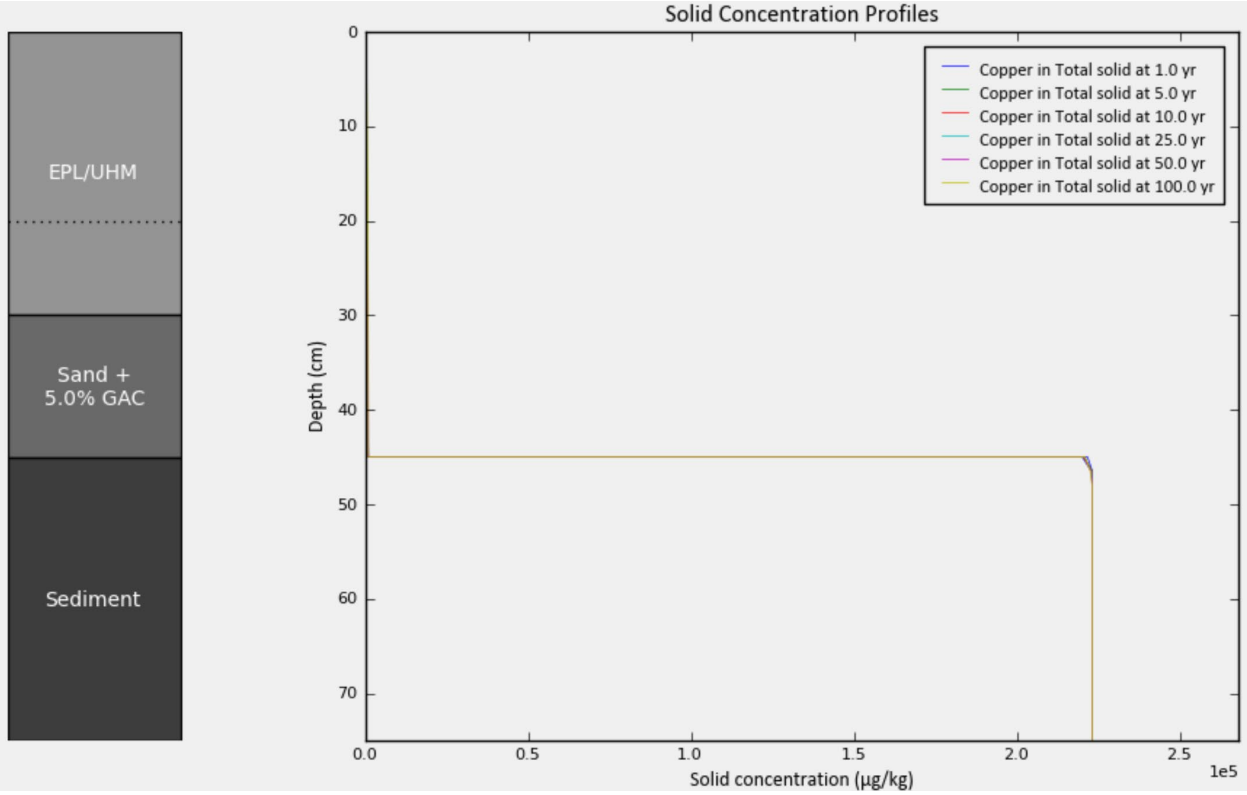

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Benzo(k)fluoranthene in Total solid at 1.0 yr
Benzo(k)fluoranthene in Total solid at 5.0 yr
Benzo(k)fluoranthene in Total solid at 10.0 yr
Benzo(k)fluoranthene in Total solid at 25.0 yr
Benzo(k)fluoranthene in Total solid at 50.0 yr
Benzo(k)fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

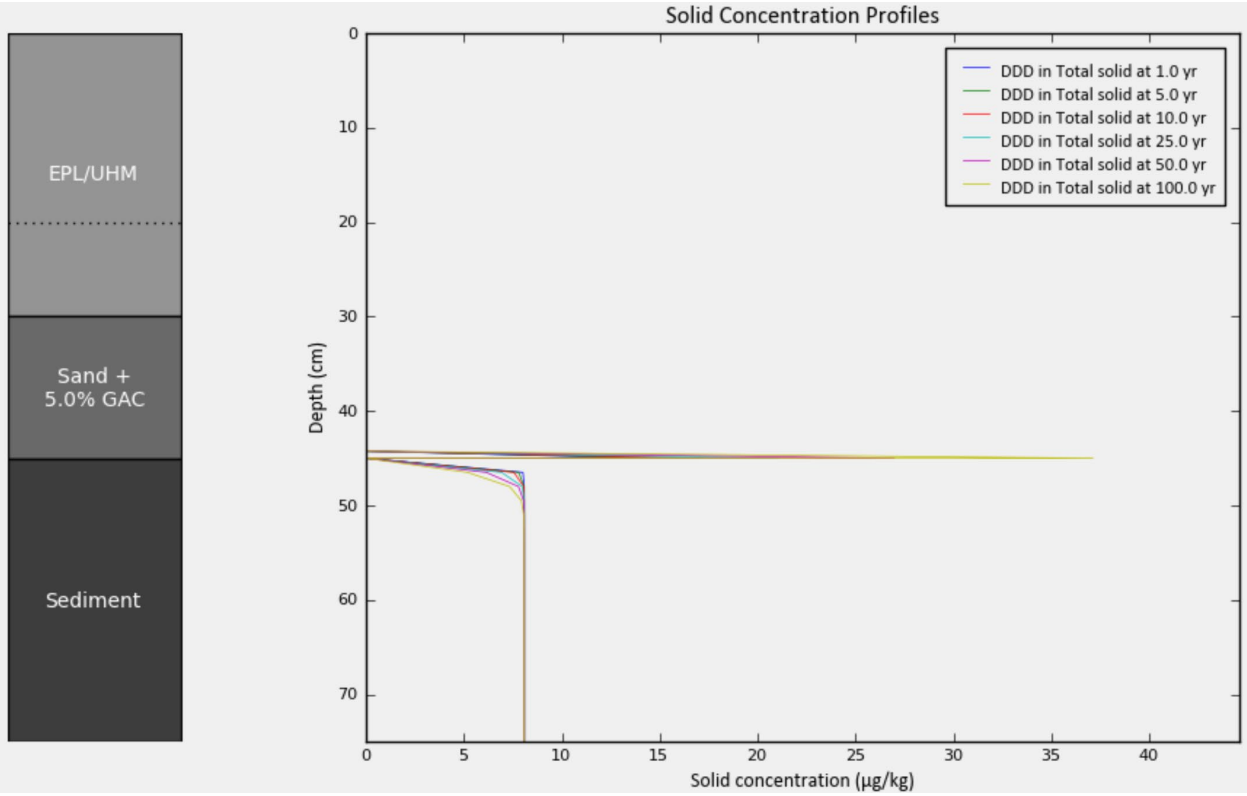

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Cadmium in Total solid at 1.0 yr
Cadmium in Total solid at 5.0 yr
Cadmium in Total solid at 10.0 yr
Cadmium in Total solid at 25.0 yr
Cadmium in Total solid at 50.0 yr
Cadmium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
0
100
200
300
400
500
600
700
800

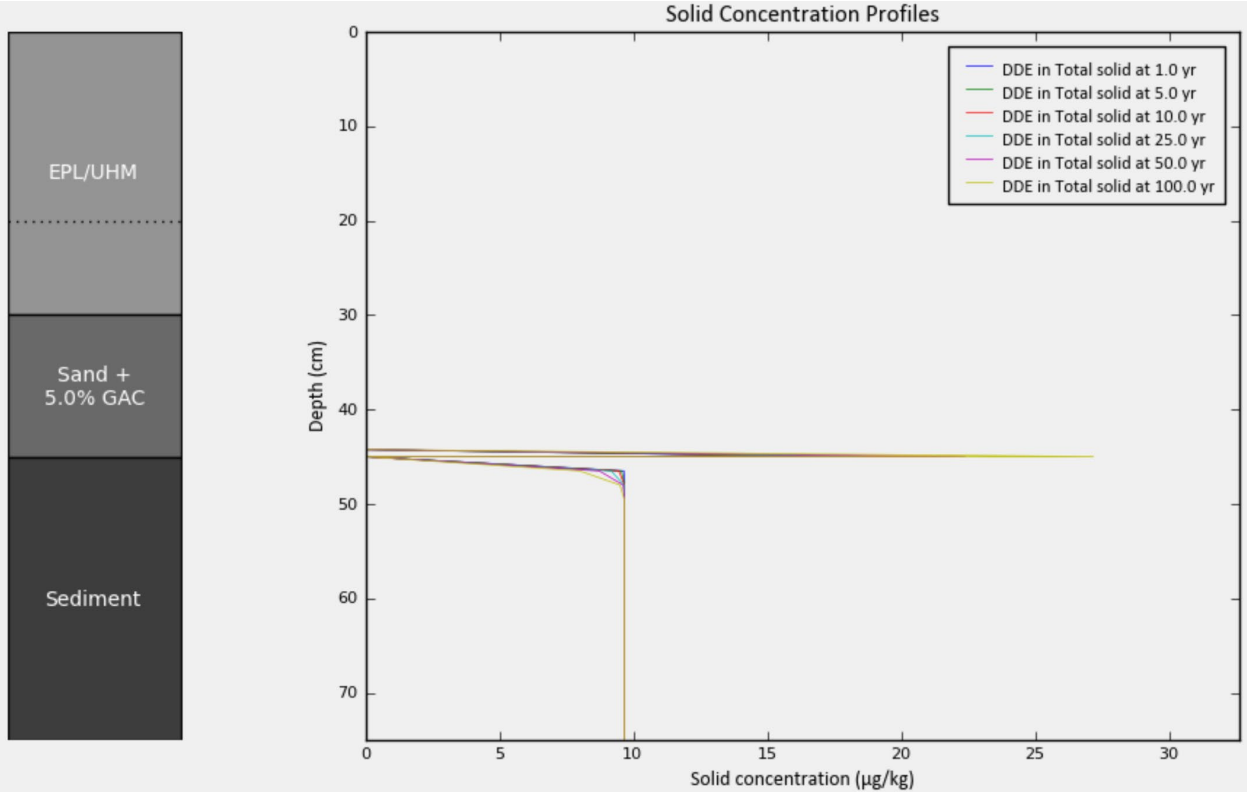

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Chlordanes in Total solid at 1.0 yr
Chlordanes in Total solid at 5.0 yr
Chlordanes in Total solid at 10.0 yr
Chlordanes in Total solid at 25.0 yr
Chlordanes in Total solid at 50.0 yr
Chlordanes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
0
20
40
60
80

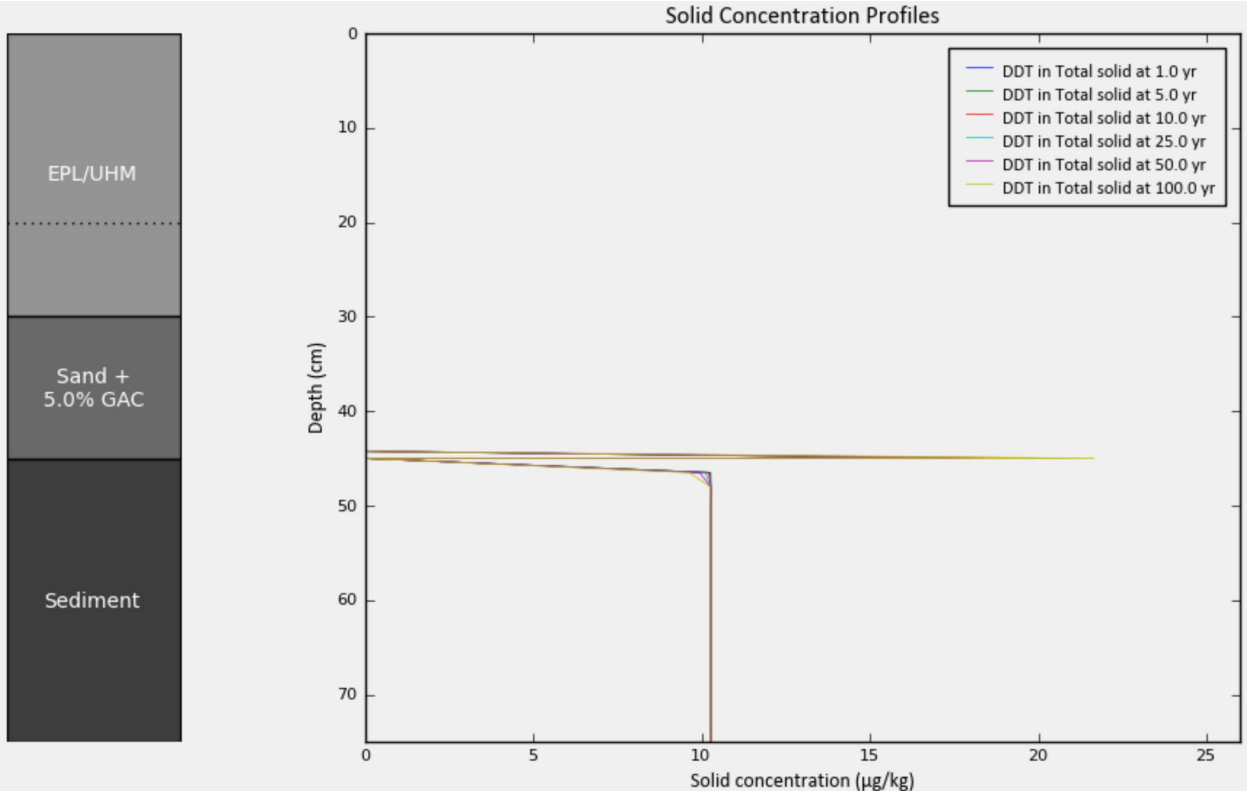

Solid Concentration Profiles
EPL/UHM
Sand +
5.0% GAC
Sediment
Chromium (III) in Total solid at 1.0 yr
Chromium (III) in Total solid at 5.0 yr
Chromium (III) in Total solid at 10.0 yr
Chromium (III) in Total solid at 25.0 yr
Chromium (III) in Total solid at 50.0 yr
Chromium (III) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

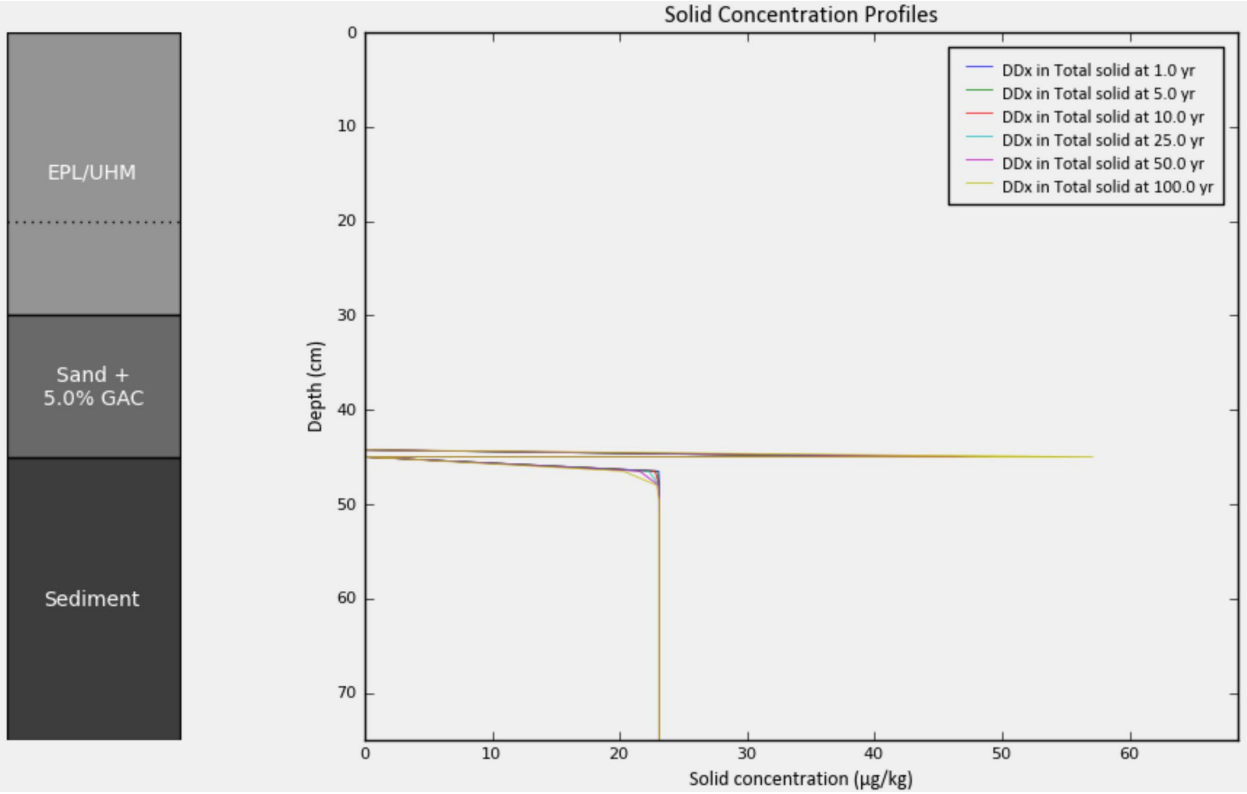

Solid Concentration Profiles
EPL/UHM
Sand +
5.0% GAC
Sediment
Chrysene in Total solid at 1.0 yr
Chrysene in Total solid at 5.0 yr
Chrysene in Total solid at 10.0 yr
Chrysene in Total solid at 25.0 yr
Chrysene in Total solid at 50.0 yr
Chrysene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

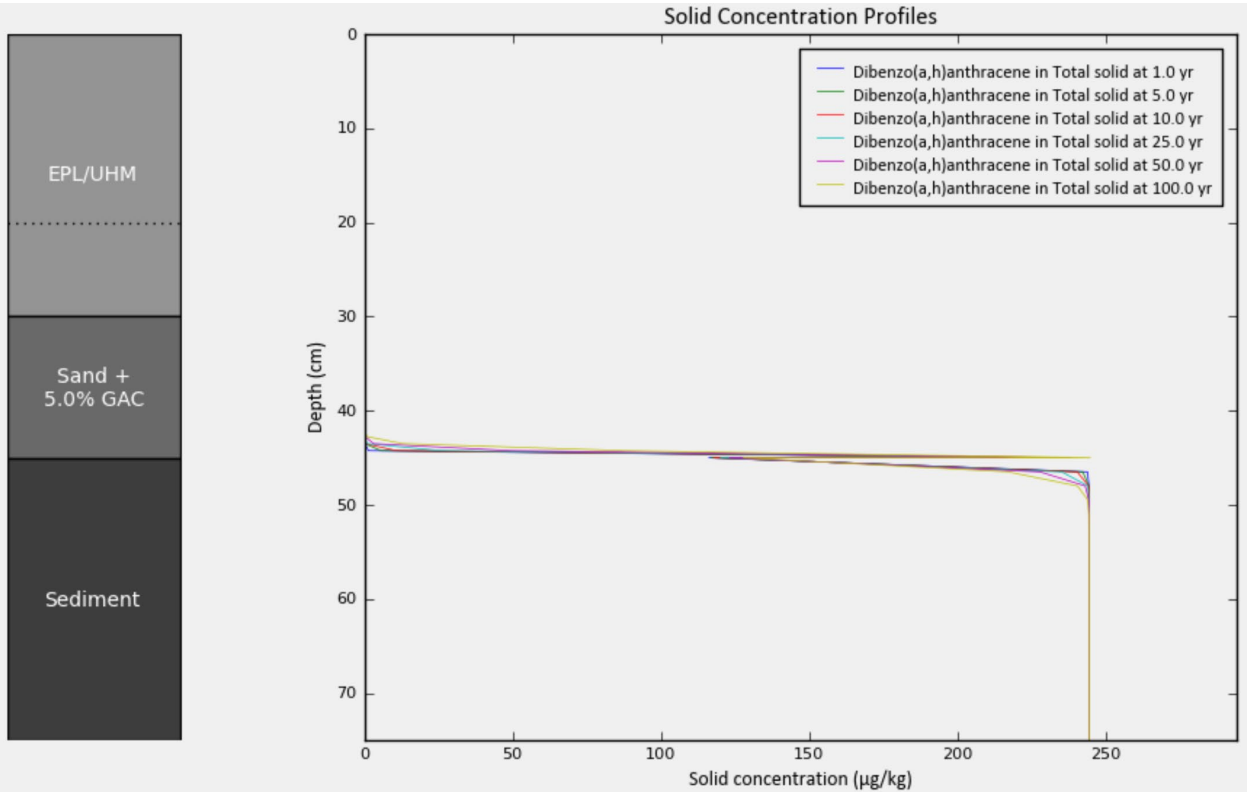

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Copper in Total solid at 1.0 yr
Copper in Total solid at 5.0 yr
Copper in Total solid at 10.0 yr
Copper in Total solid at 25.0 yr
Copper in Total solid at 50.0 yr
Copper in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

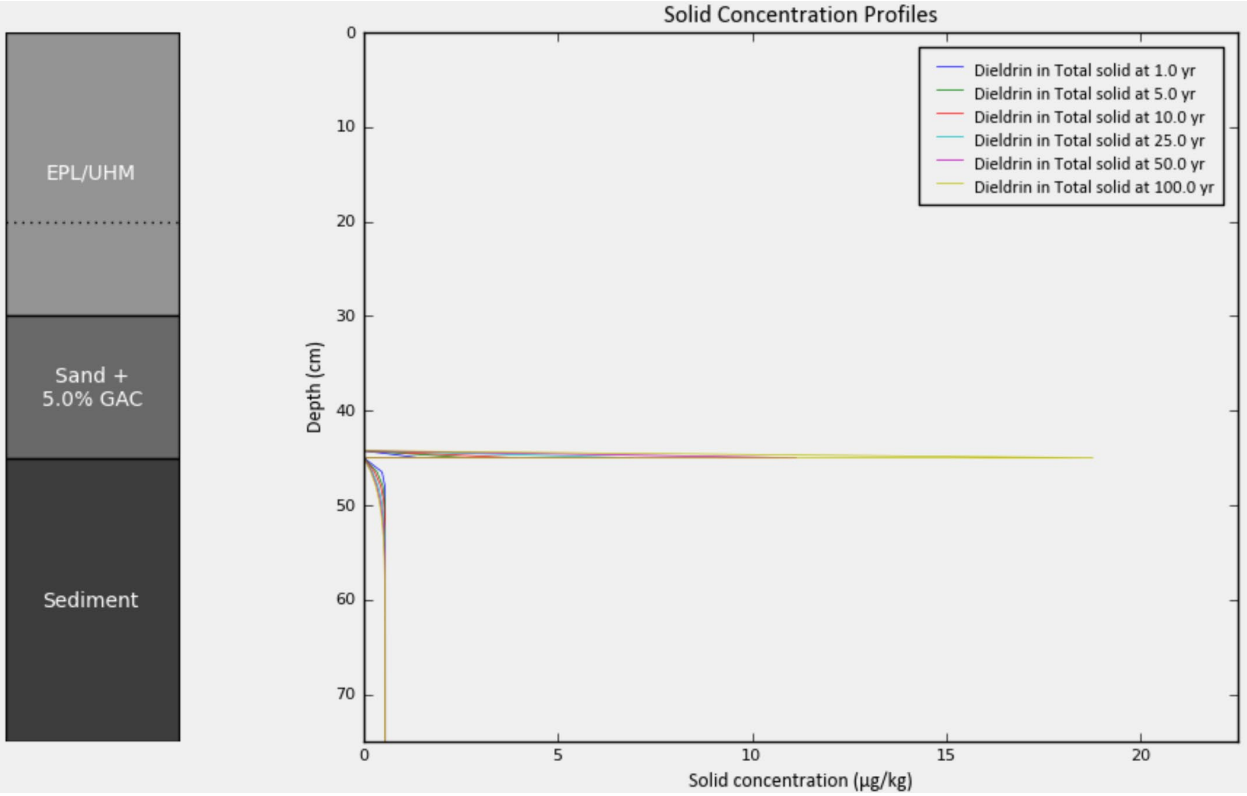

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
DDD in Total solid at 1.0 yr
DDD in Total solid at 5.0 yr
DDD in Total solid at 10.0 yr
DDD in Total solid at 25.0 yr
DDD in Total solid at 50.0 yr
DDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

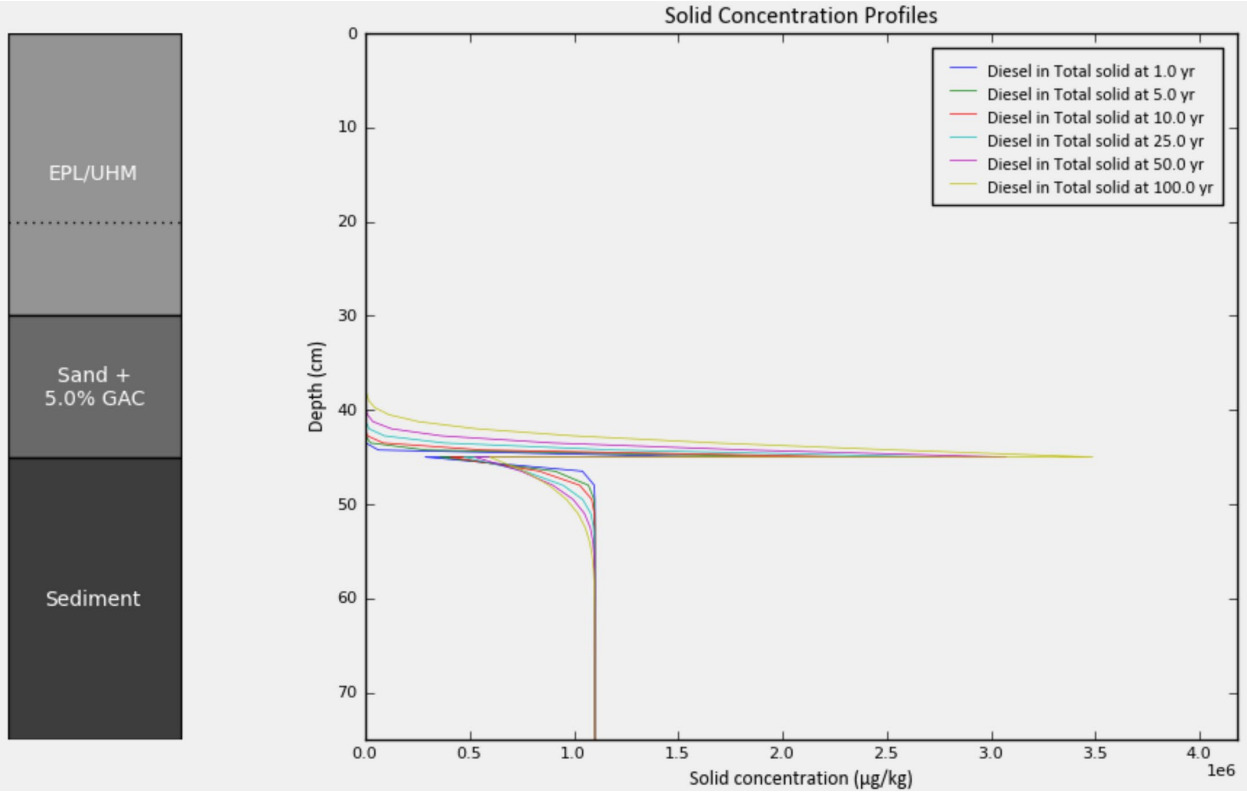

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
DDE in Total solid at 1.0 yr
DDE in Total solid at 5.0 yr
DDE in Total solid at 10.0 yr
DDE in Total solid at 25.0 yr
DDE in Total solid at 50.0 yr
DDE in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

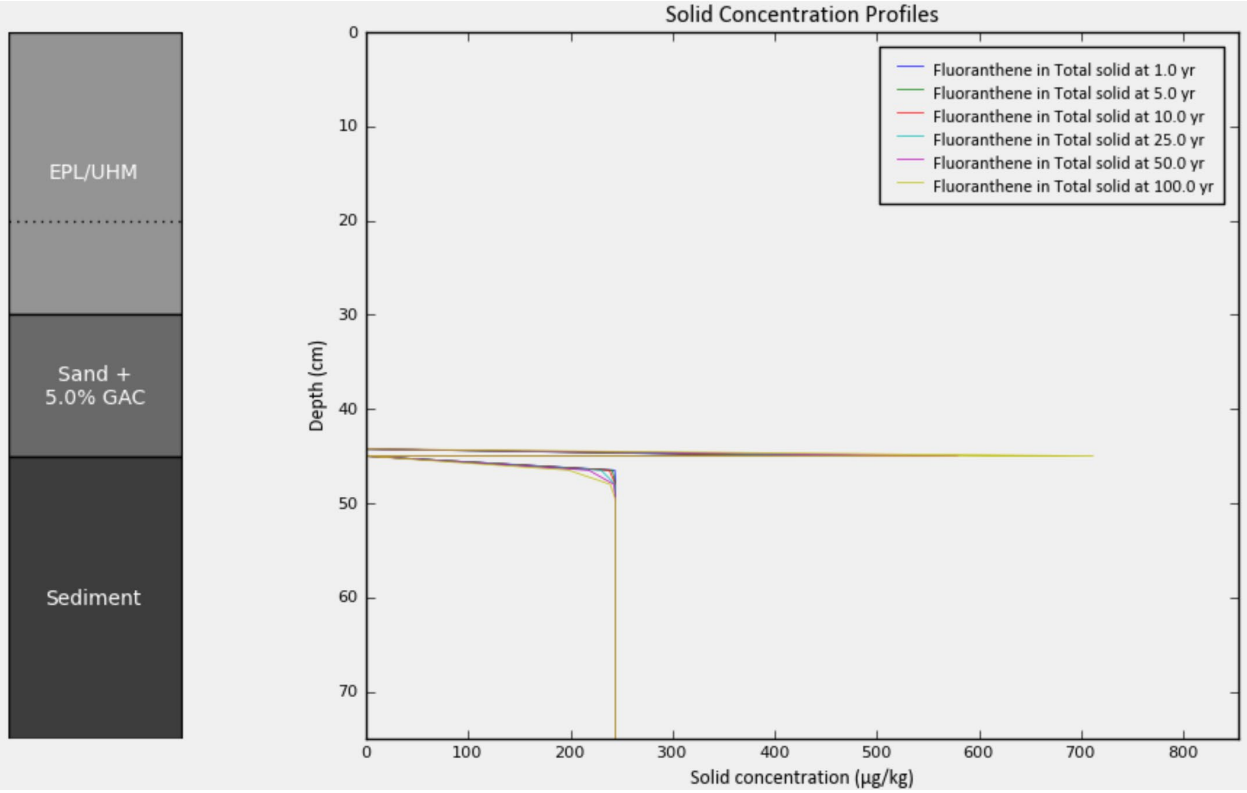

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
DDT in Total solid at 1.0 yr
DDT in Total solid at 5.0 yr
DDT in Total solid at 10.0 yr
DDT in Total solid at 25.0 yr
DDT in Total solid at 50.0 yr
DDT in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

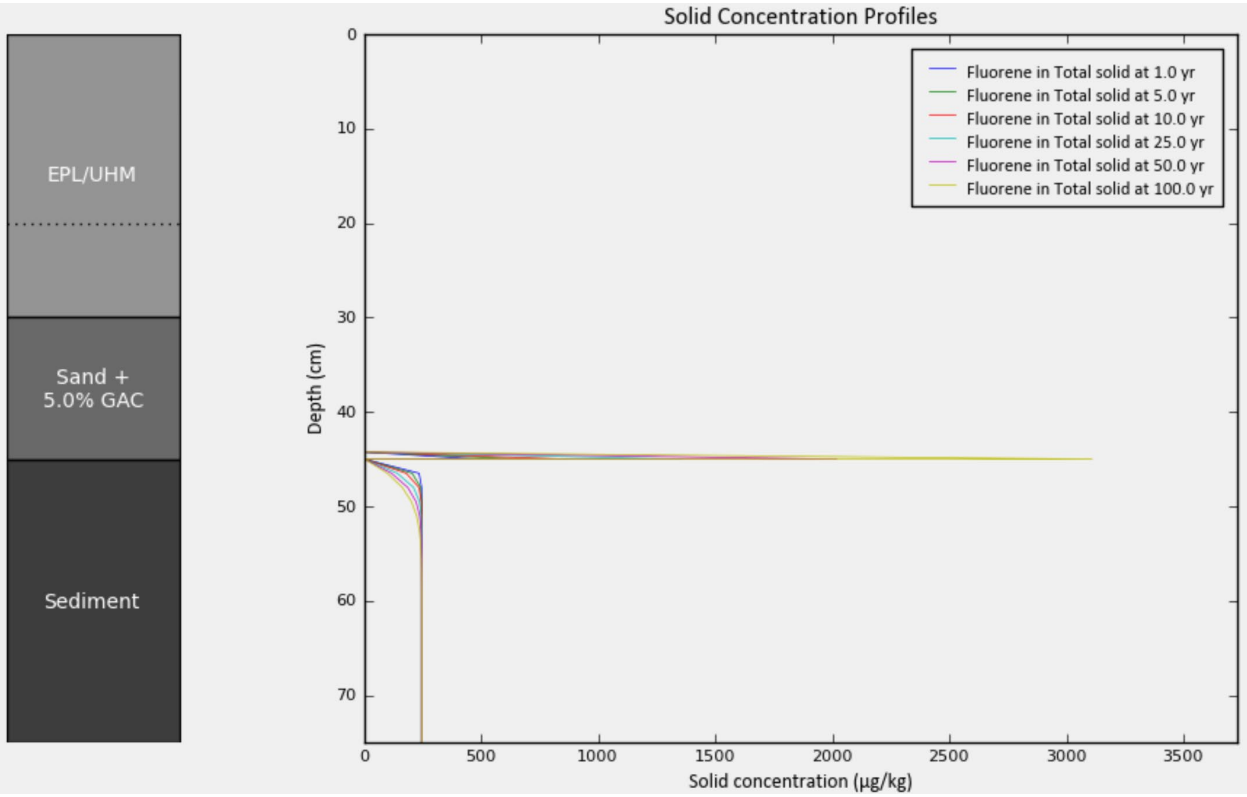

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
DDx in Total solid at 1.0 yr
DDx in Total solid at 5.0 yr
DDx in Total solid at 10.0 yr
DDx in Total solid at 25.0 yr
DDx in Total solid at 50.0 yr
DDx in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

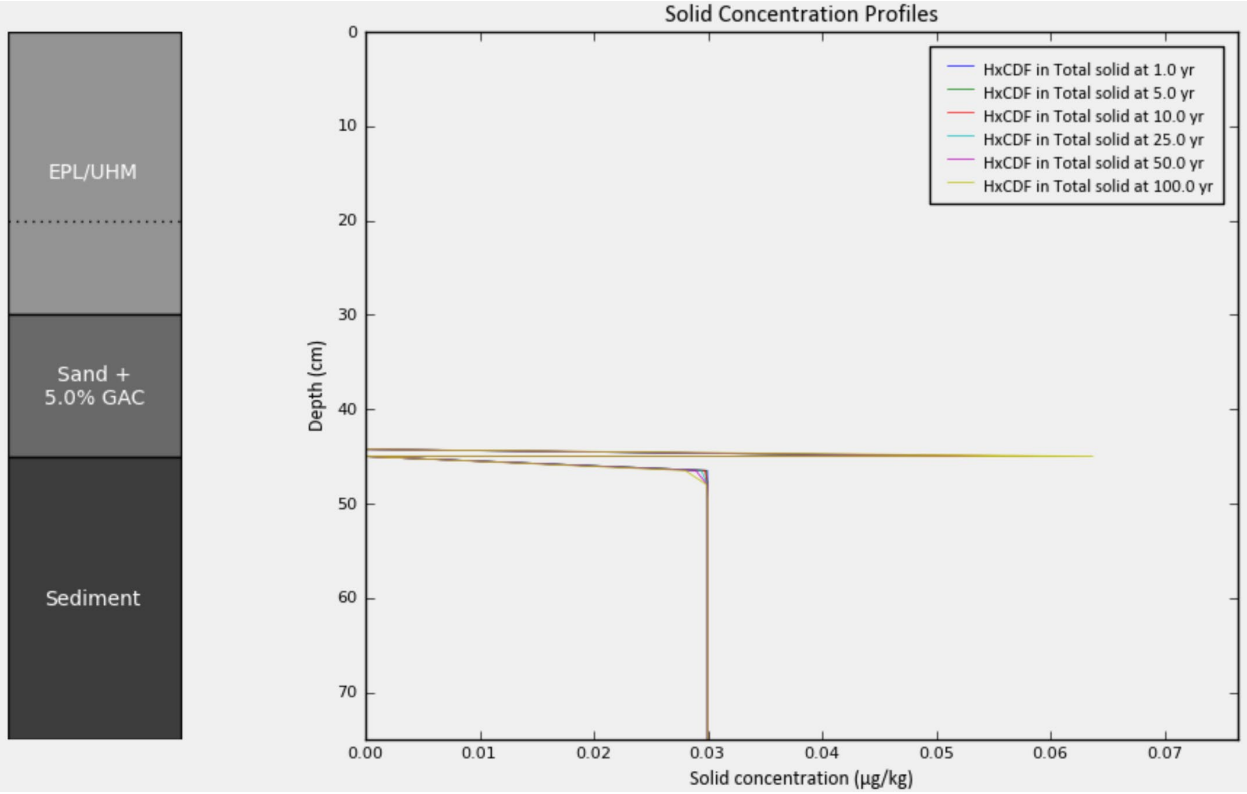

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Dibenzo(a,h)anthracene in Total solid at 1.0 yr
Dibenzo(a,h)anthracene in Total solid at 5.0 yr
Dibenzo(a,h)anthracene in Total solid at 10.0 yr
Dibenzo(a,h)anthracene in Total solid at 25.0 yr
Dibenzo(a,h)anthracene in Total solid at 50.0 yr
Dibenzo(a,h)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

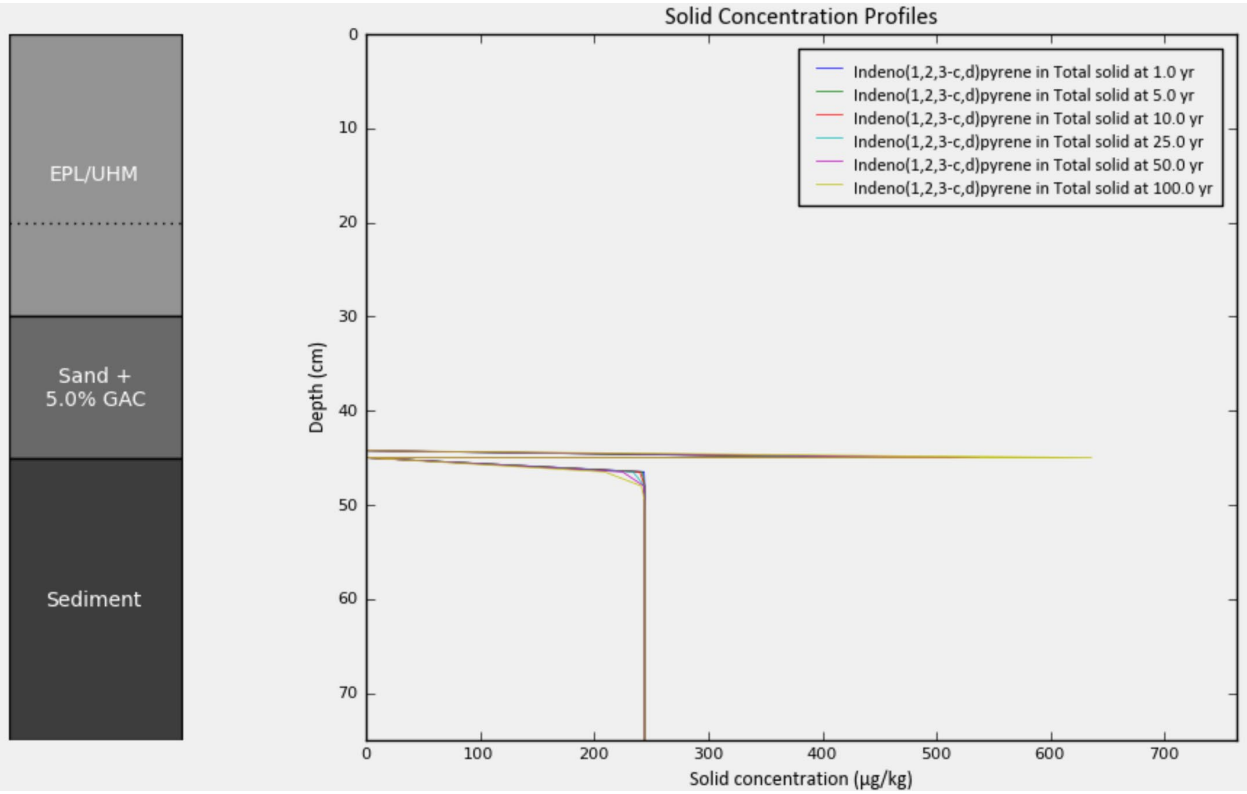

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Dieldrin in Total solid at 1.0 yr
Dieldrin in Total solid at 5.0 yr
Dieldrin in Total solid at 10.0 yr
Dieldrin in Total solid at 25.0 yr
Dieldrin in Total solid at 50.0 yr
Dieldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

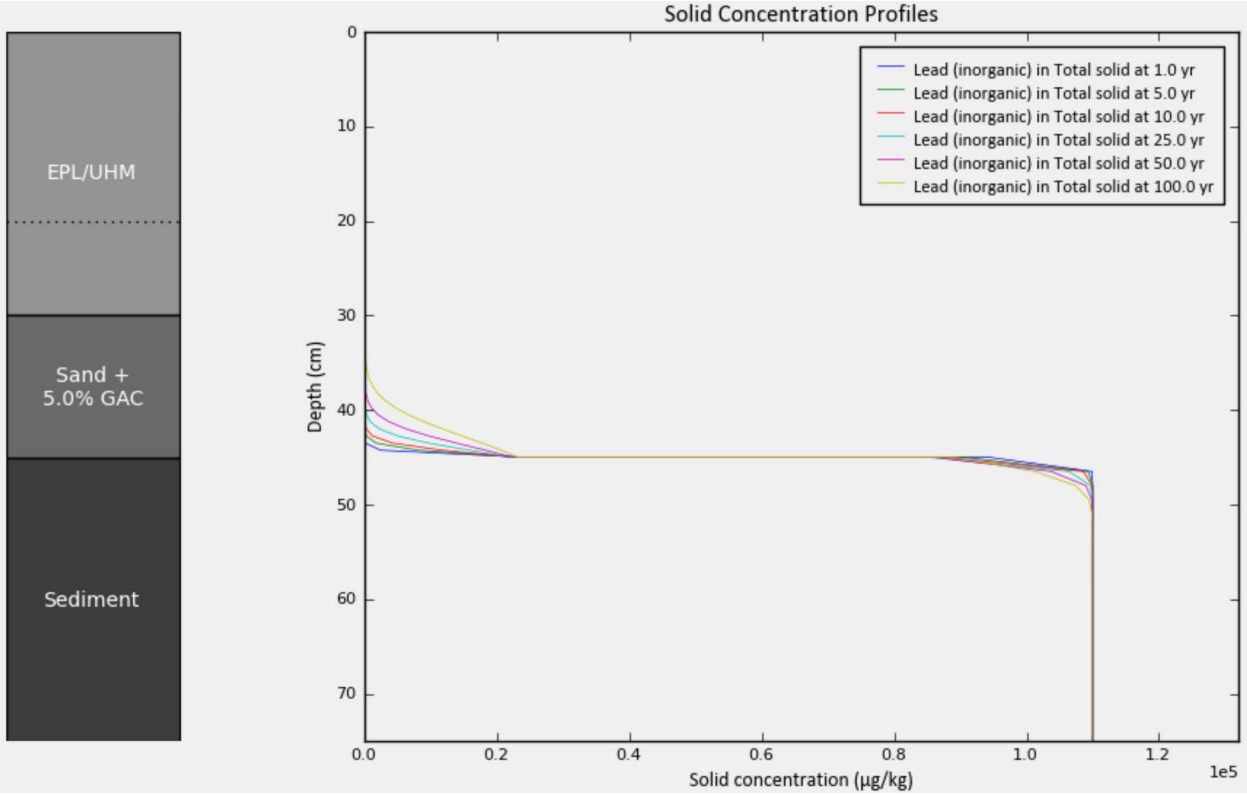

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Diesel in Total solid at 1.0 yr
Diesel in Total solid at 5.0 yr
Diesel in Total solid at 10.0 yr
Diesel in Total solid at 25.0 yr
Diesel in Total solid at 50.0 yr
Diesel in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

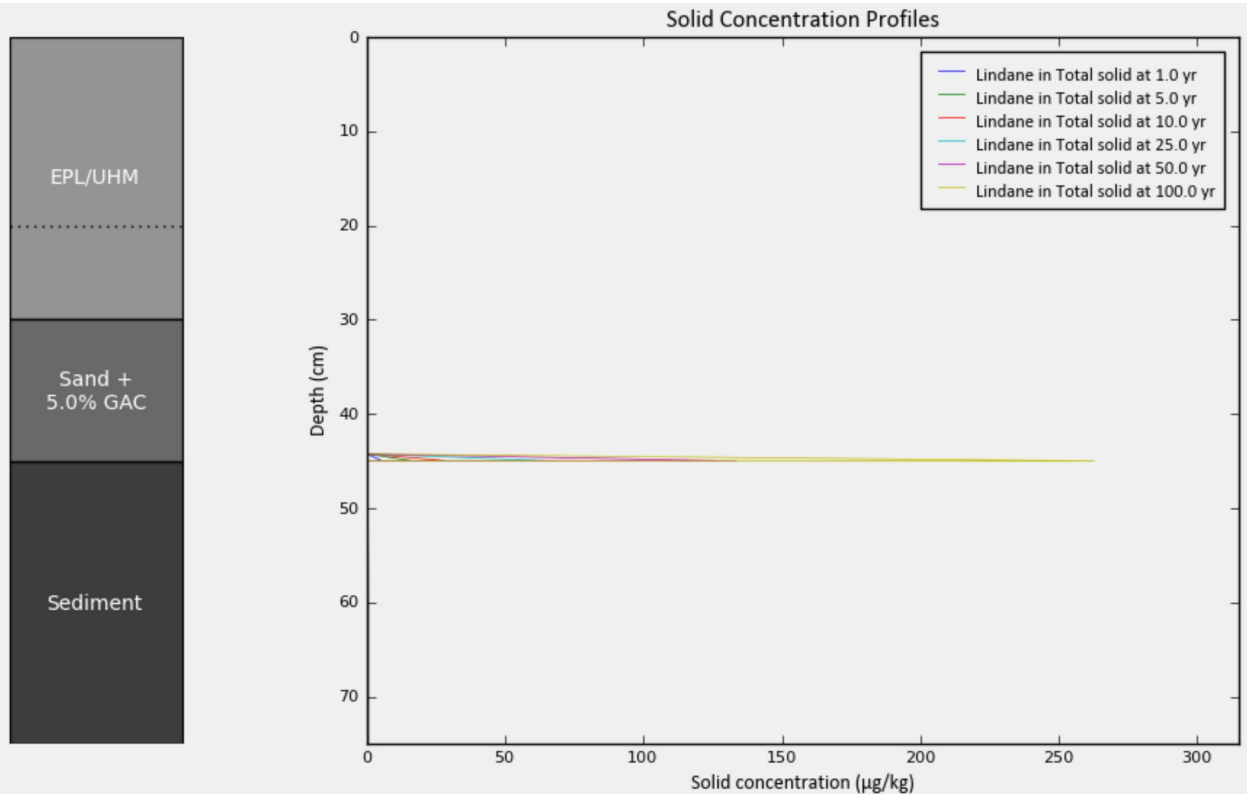

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Fluoranthene in Total solid at 1.0 yr
Fluoranthene in Total solid at 5.0 yr
Fluoranthene in Total solid at 10.0 yr
Fluoranthene in Total solid at 25.0 yr
Fluoranthene in Total solid at 50.0 yr
Fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
100
200
300
400
500
600
700
800
Solid concentration (µg/kg)

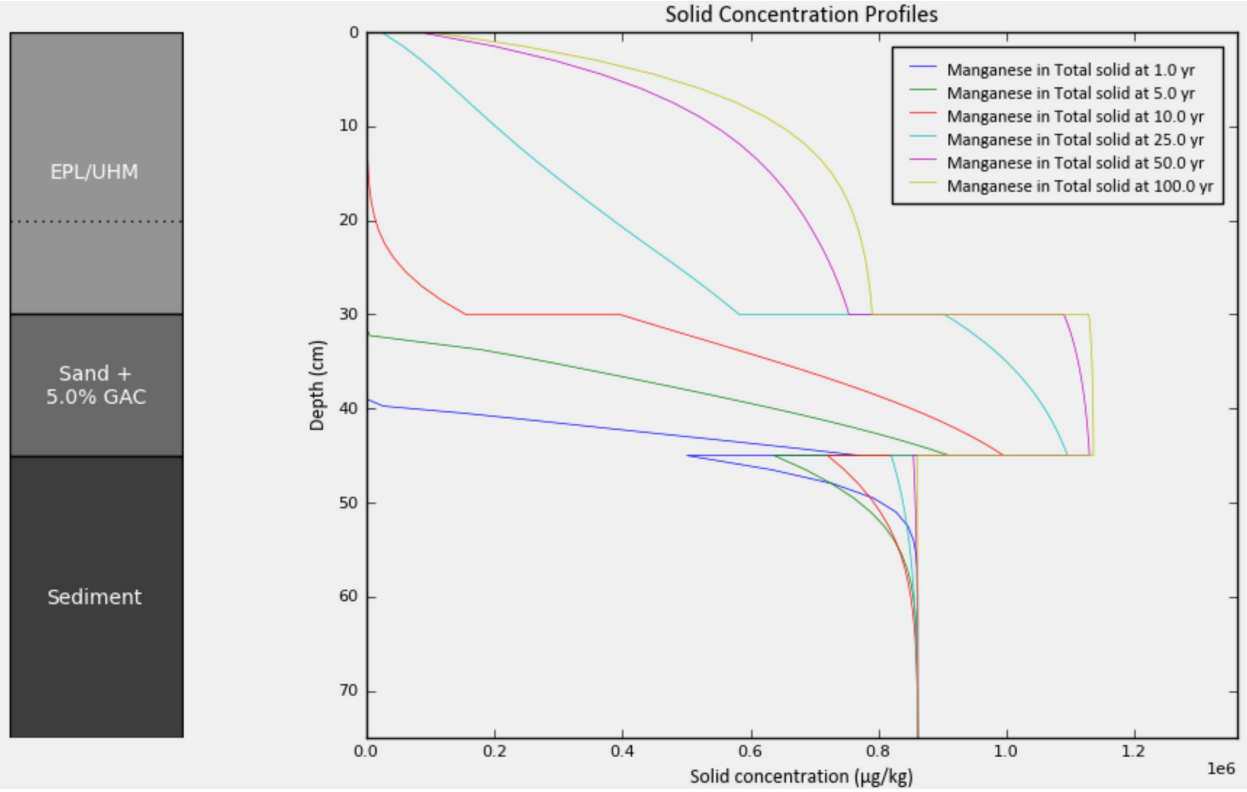

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Fluorene in Total solid at 1.0 yr
Fluorene in Total solid at 5.0 yr
Fluorene in Total solid at 10.0 yr
Fluorene in Total solid at 25.0 yr
Fluorene in Total solid at 50.0 yr
Fluorene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
500
1000
1500
2000
2500
3000
3500
Solid concentration (µg/kg)

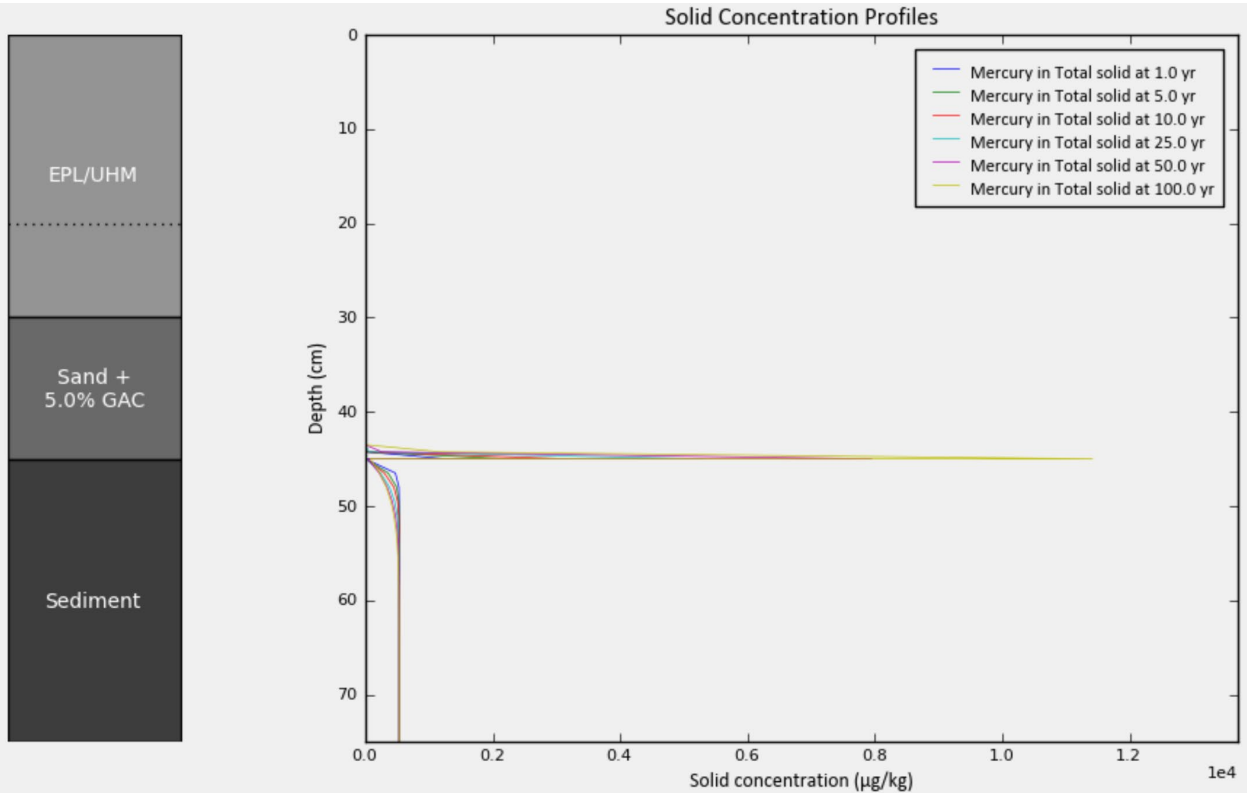

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
HxCDF in Total solid at 1.0 yr
HxCDF in Total solid at 5.0 yr
HxCDF in Total solid at 10.0 yr
HxCDF in Total solid at 25.0 yr
HxCDF in Total solid at 50.0 yr
HxCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
Solid concentration (µg/kg)

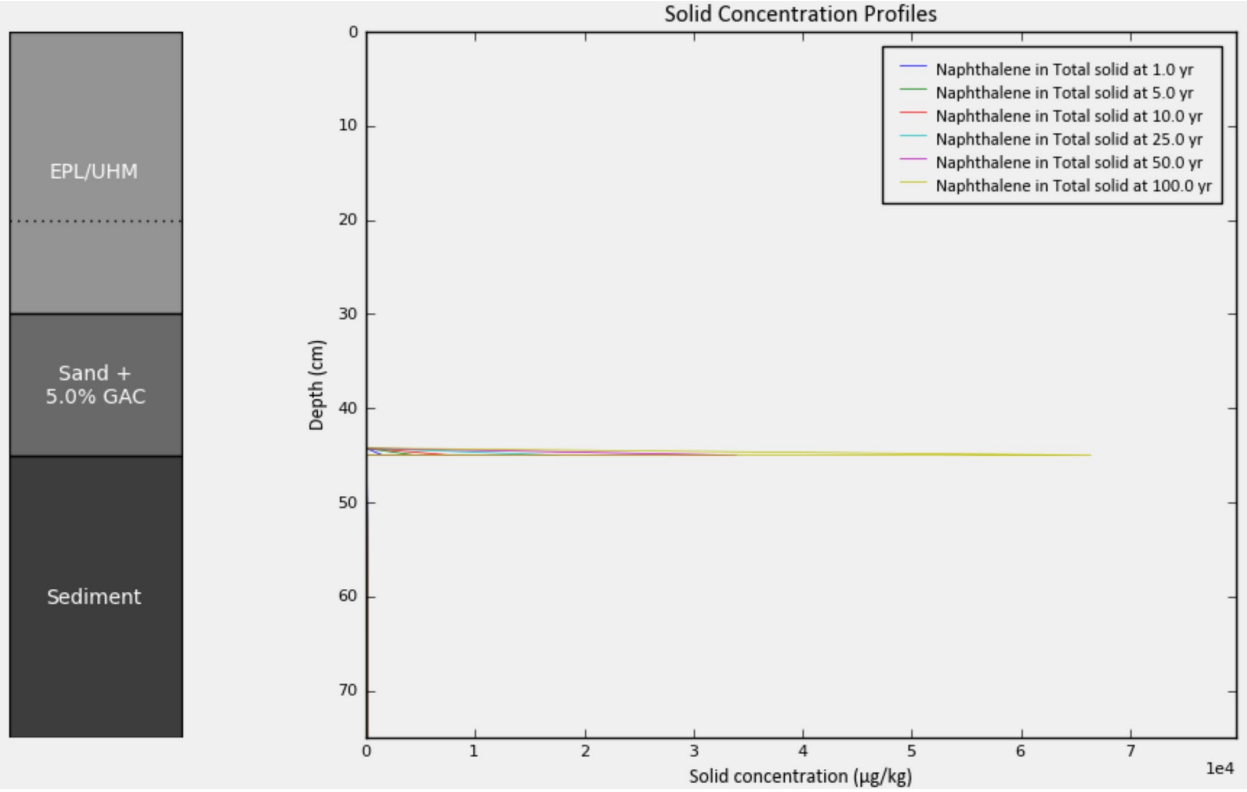

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Indeno(1,2,3-c,d)pyrene in Total solid at 1.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 5.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 10.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 25.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 50.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
100
200
300
400
500
600
700
Solid concentration (µg/kg)

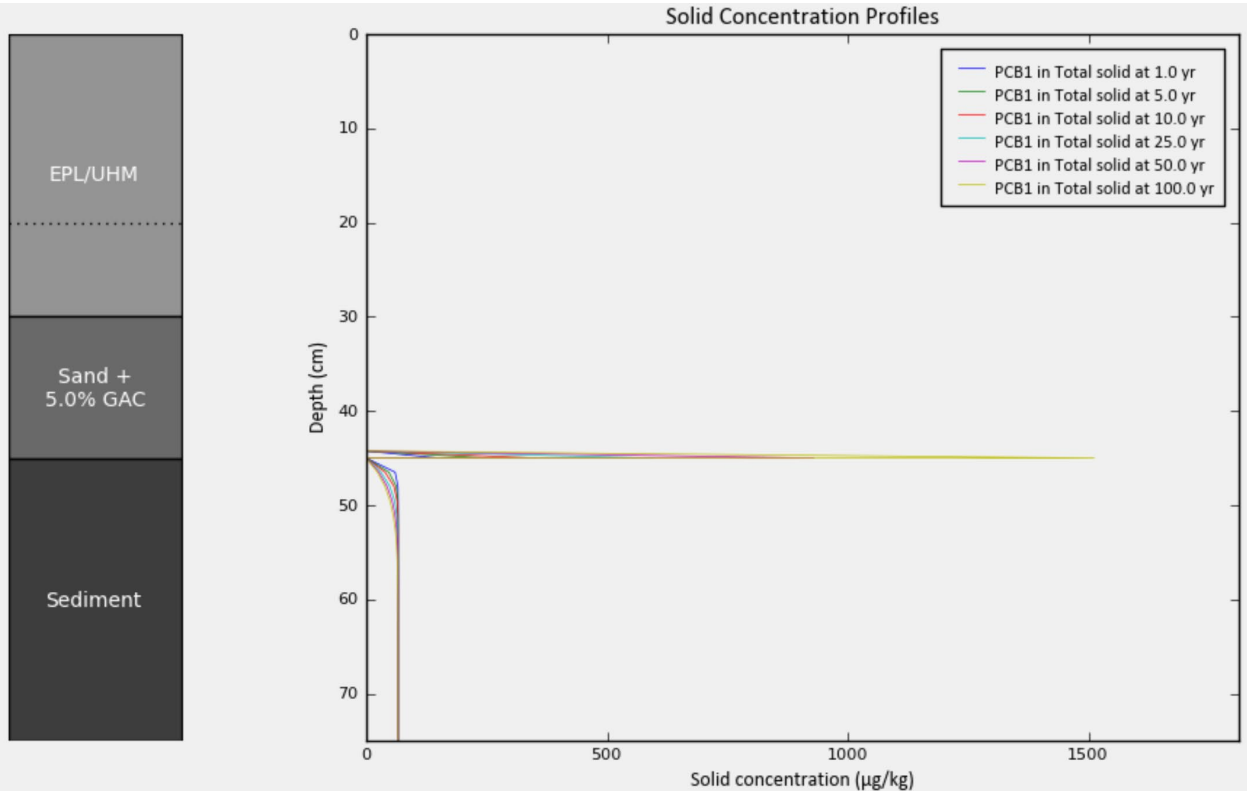

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Lead (inorganic) in Total solid at 1.0 yr
Lead (inorganic) in Total solid at 5.0 yr
Lead (inorganic) in Total solid at 10.0 yr
Lead (inorganic) in Total solid at 25.0 yr
Lead (inorganic) in Total solid at 50.0 yr
Lead (inorganic) in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e5
Solid concentration (µg/kg)

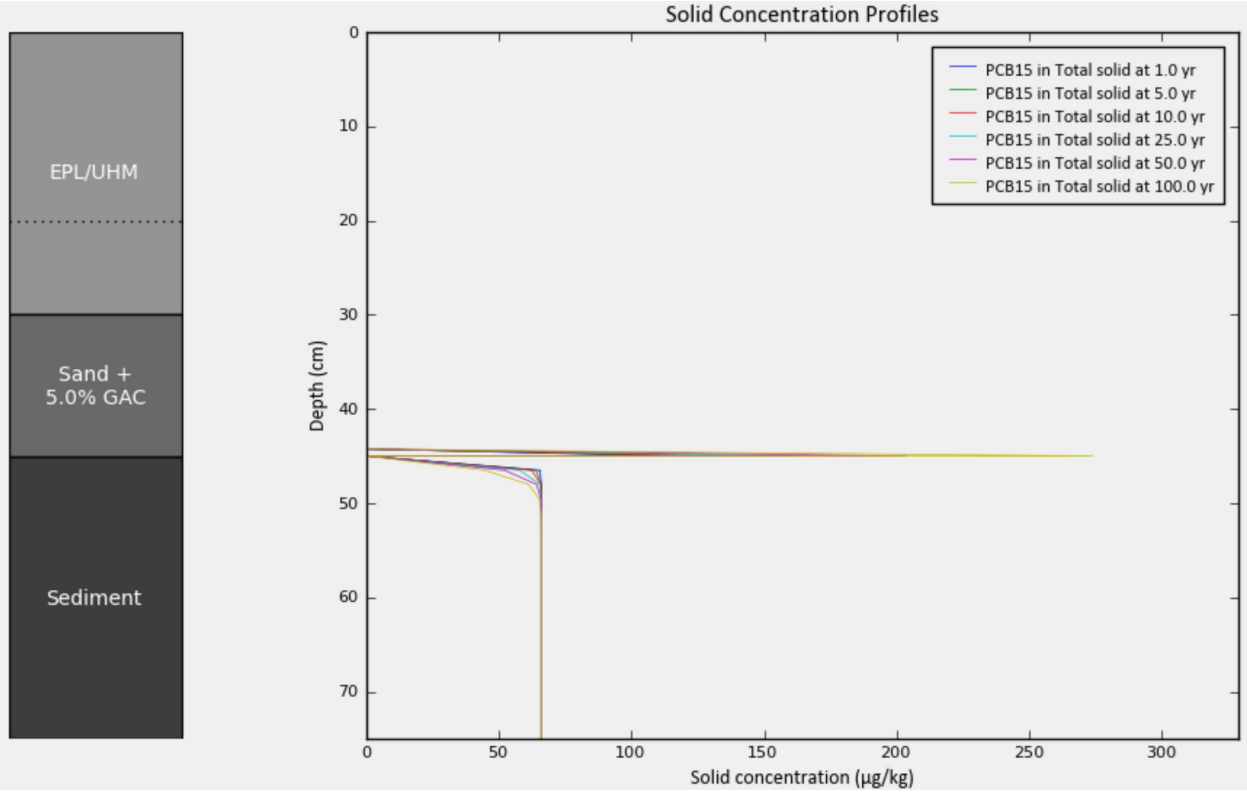

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Lindane in Total solid at 1.0 yr
Lindane in Total solid at 5.0 yr
Lindane in Total solid at 10.0 yr
Lindane in Total solid at 25.0 yr
Lindane in Total solid at 50.0 yr
Lindane in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
50
100
150
200
250
300
Solid concentration (µg/kg)

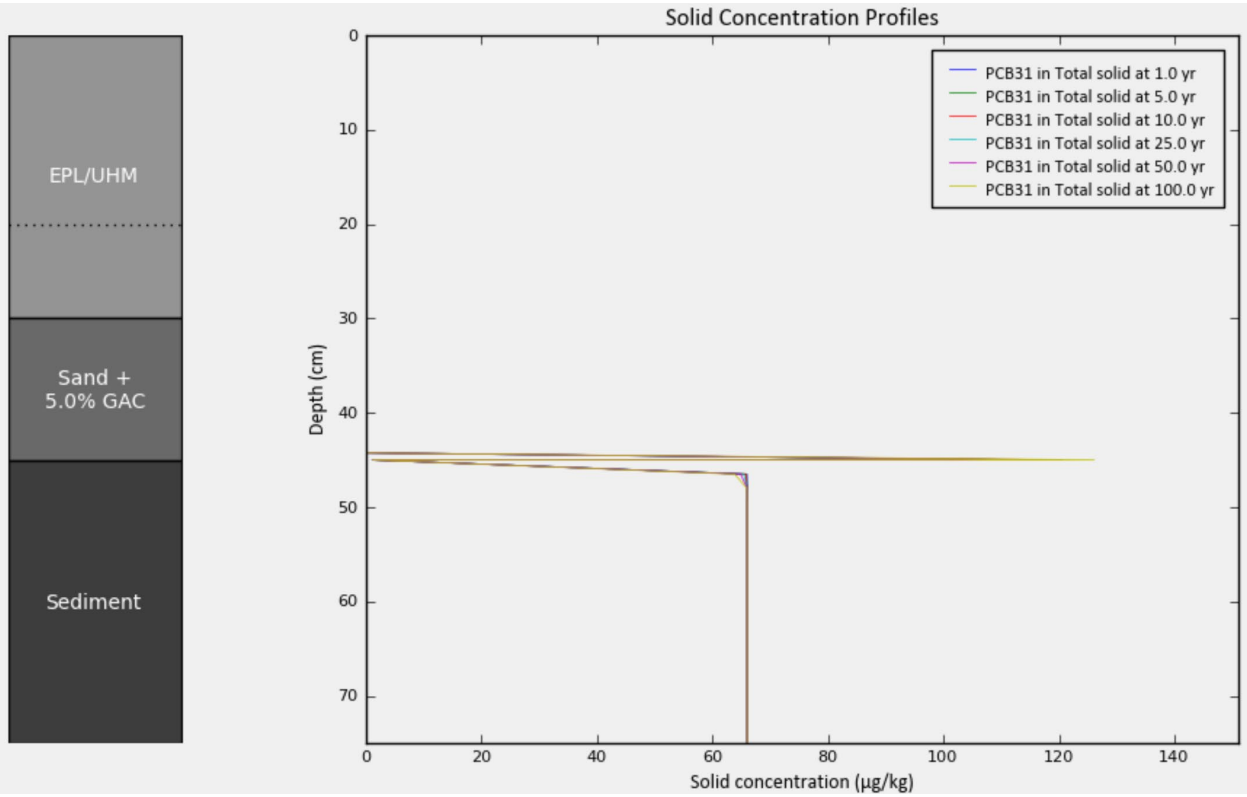

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
Manganese in Total solid at 1.0 yr
Manganese in Total solid at 5.0 yr
Manganese in Total solid at 10.0 yr
Manganese in Total solid at 25.0 yr
Manganese in Total solid at 50.0 yr
Manganese in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

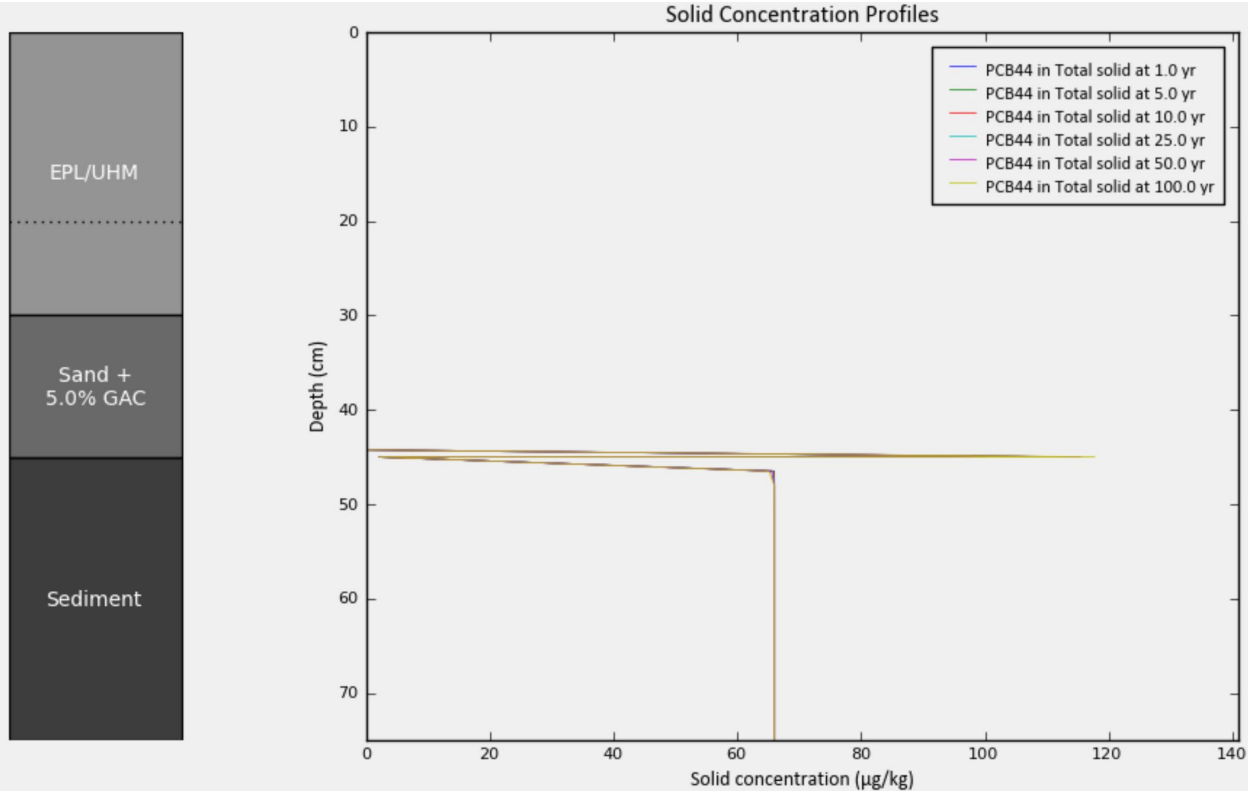

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
Mercury in Total solid at 1.0 yr
Mercury in Total solid at 5.0 yr
Mercury in Total solid at 10.0 yr
Mercury in Total solid at 25.0 yr
Mercury in Total solid at 50.0 yr
Mercury in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

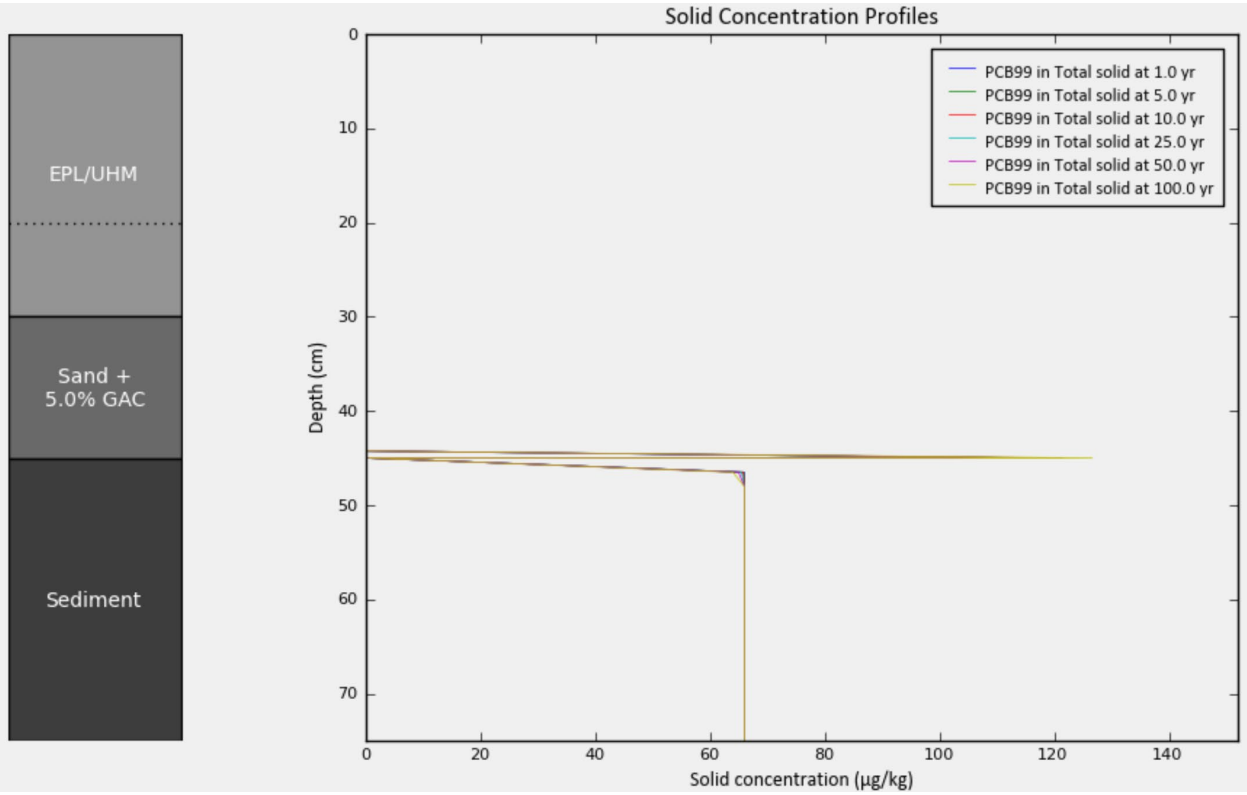

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Naphthalene in Total solid at 1.0 yr
Naphthalene in Total solid at 5.0 yr
Naphthalene in Total solid at 10.0 yr
Naphthalene in Total solid at 25.0 yr
Naphthalene in Total solid at 50.0 yr
Naphthalene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

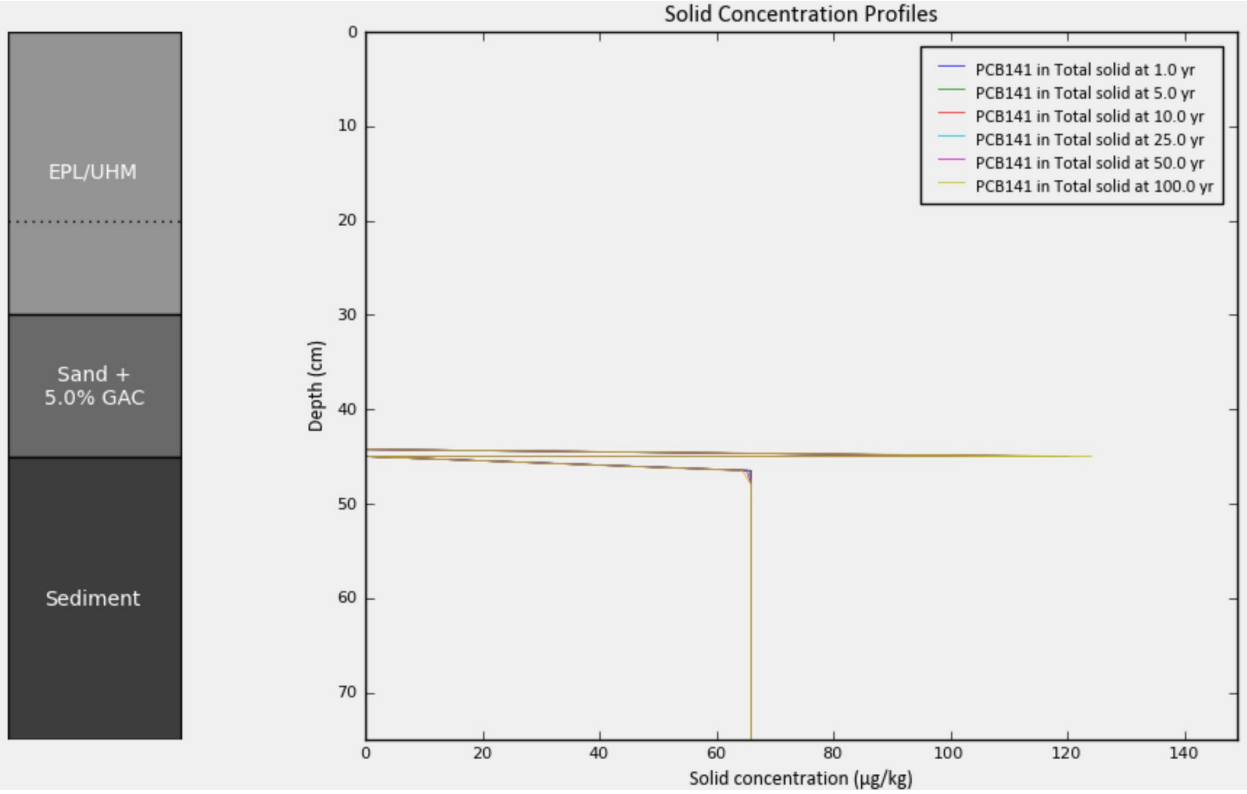

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB1 in Total solid at 1.0 yr
PCB1 in Total solid at 5.0 yr
PCB1 in Total solid at 10.0 yr
PCB1 in Total solid at 25.0 yr
PCB1 in Total solid at 50.0 yr
PCB1 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

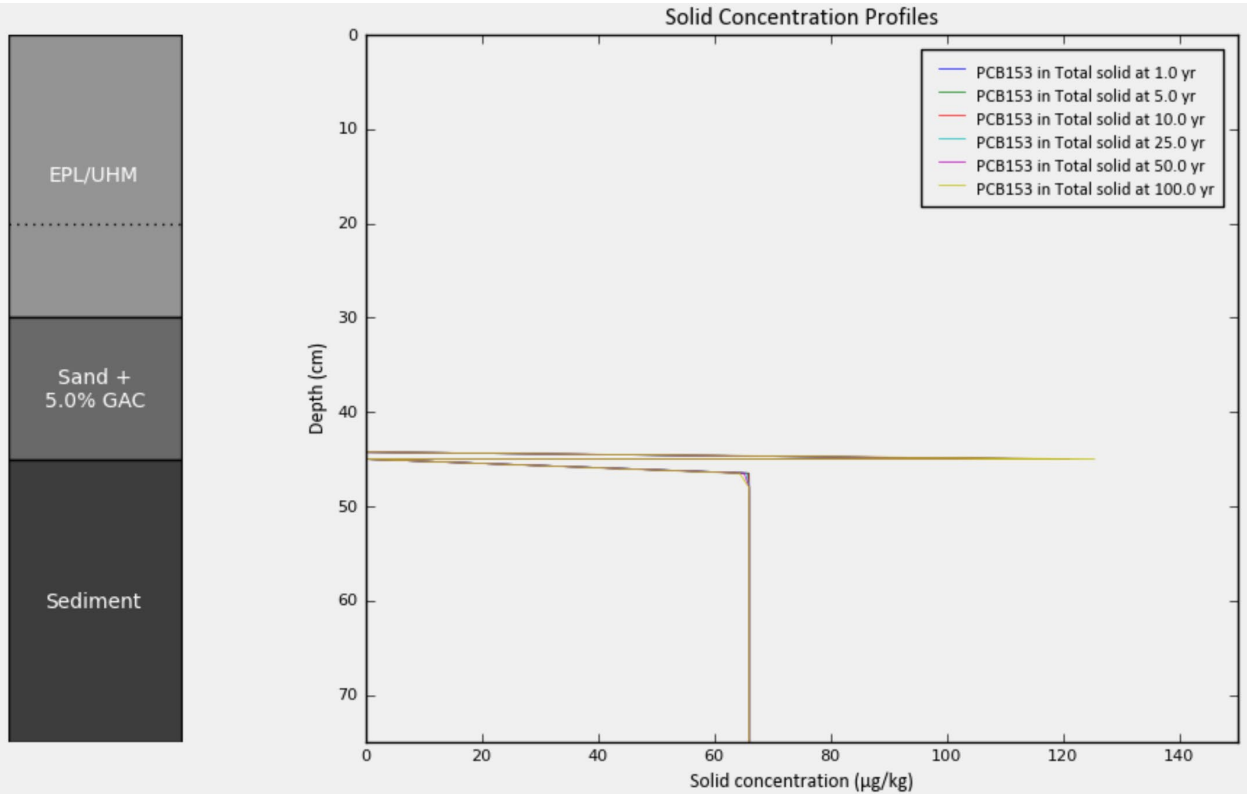

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB15 in Total solid at 1.0 yr
PCB15 in Total solid at 5.0 yr
PCB15 in Total solid at 10.0 yr
PCB15 in Total solid at 25.0 yr
PCB15 in Total solid at 50.0 yr
PCB15 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

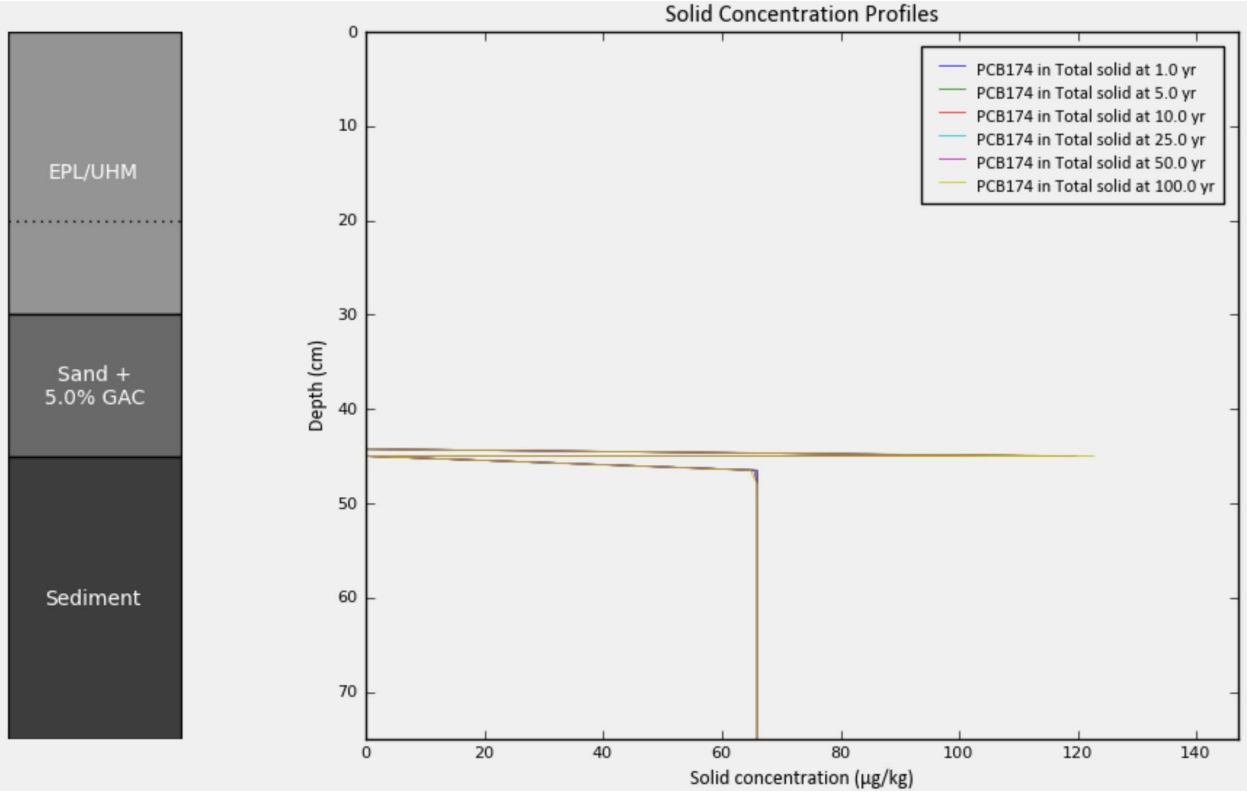

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB31 in Total solid at 1.0 yr
PCB31 in Total solid at 5.0 yr
PCB31 in Total solid at 10.0 yr
PCB31 in Total solid at 25.0 yr
PCB31 in Total solid at 50.0 yr
PCB31 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

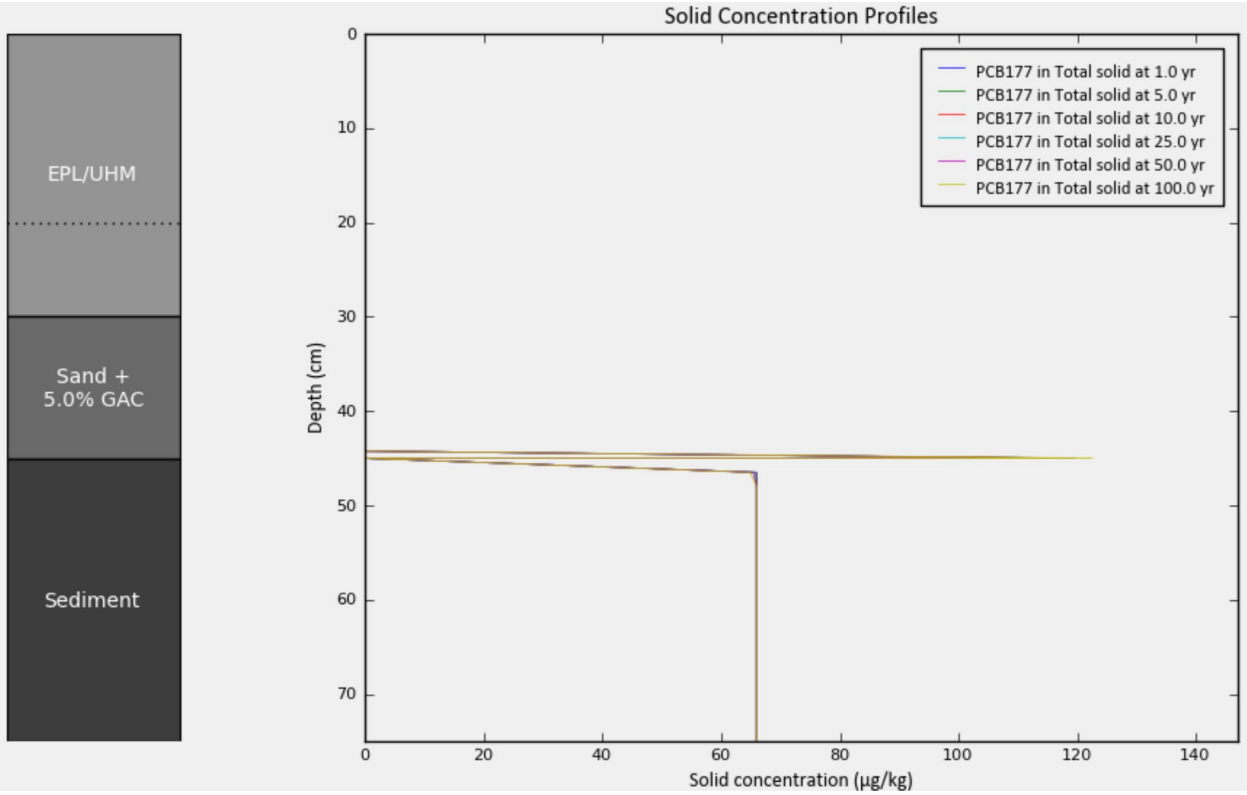

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB44 in Total solid at 1.0 yr
PCB44 in Total solid at 5.0 yr
PCB44 in Total solid at 10.0 yr
PCB44 in Total solid at 25.0 yr
PCB44 in Total solid at 50.0 yr
PCB44 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

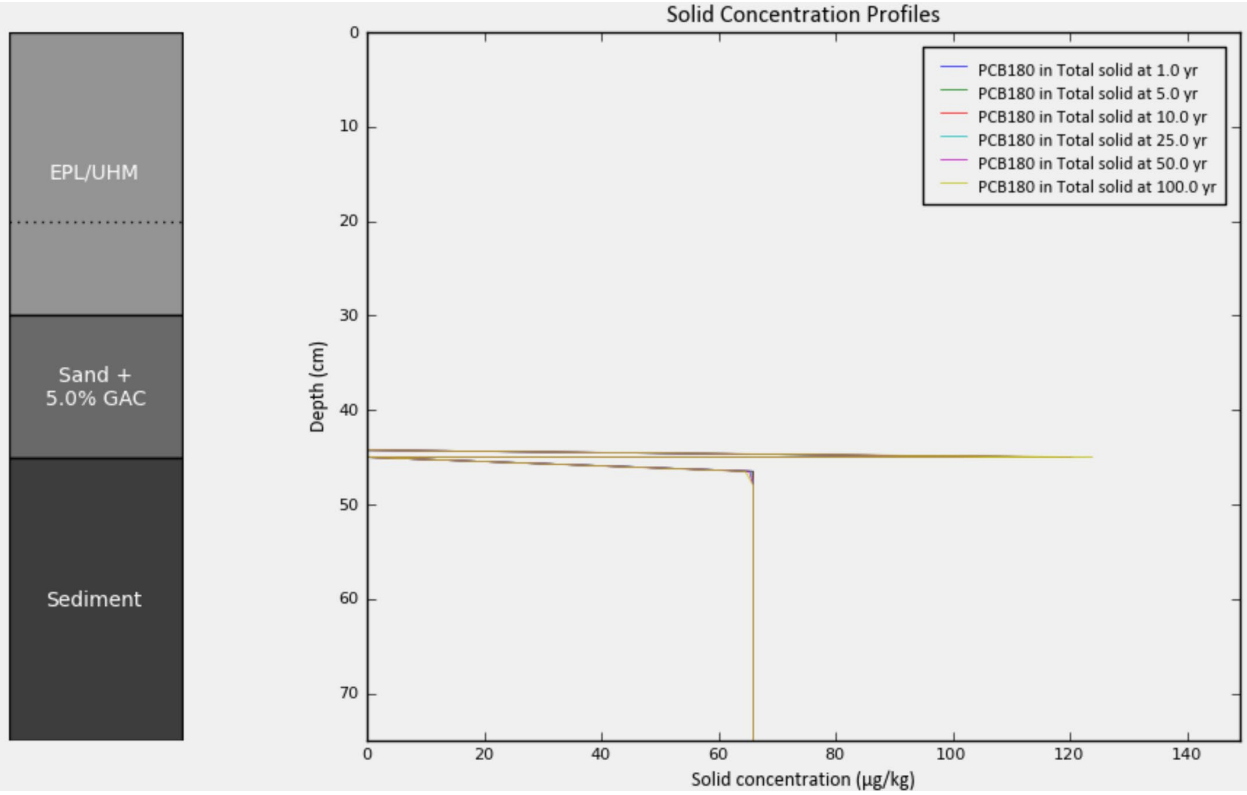

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB99 in Total solid at 1.0 yr
PCB99 in Total solid at 5.0 yr
PCB99 in Total solid at 10.0 yr
PCB99 in Total solid at 25.0 yr
PCB99 in Total solid at 50.0 yr
PCB99 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

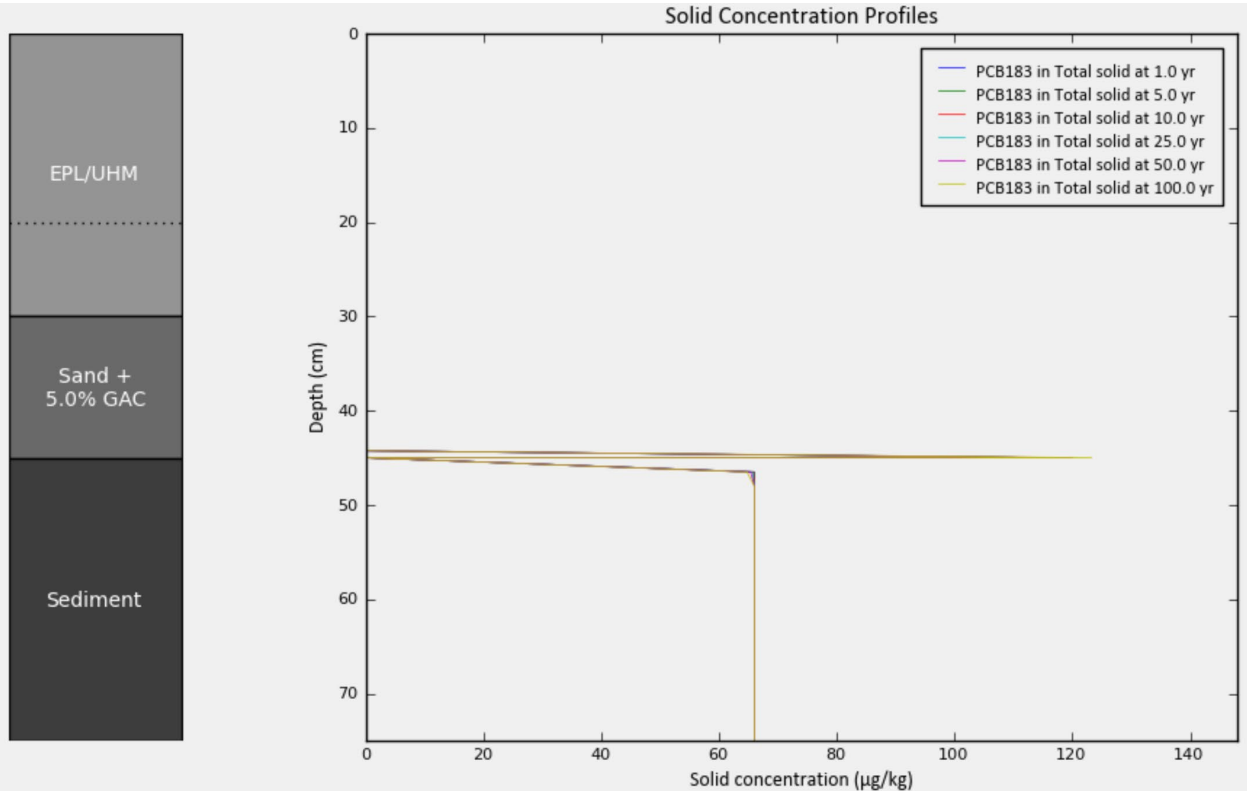

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB141 in Total solid at 1.0 yr
PCB141 in Total solid at 5.0 yr
PCB141 in Total solid at 10.0 yr
PCB141 in Total solid at 25.0 yr
PCB141 in Total solid at 50.0 yr
PCB141 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

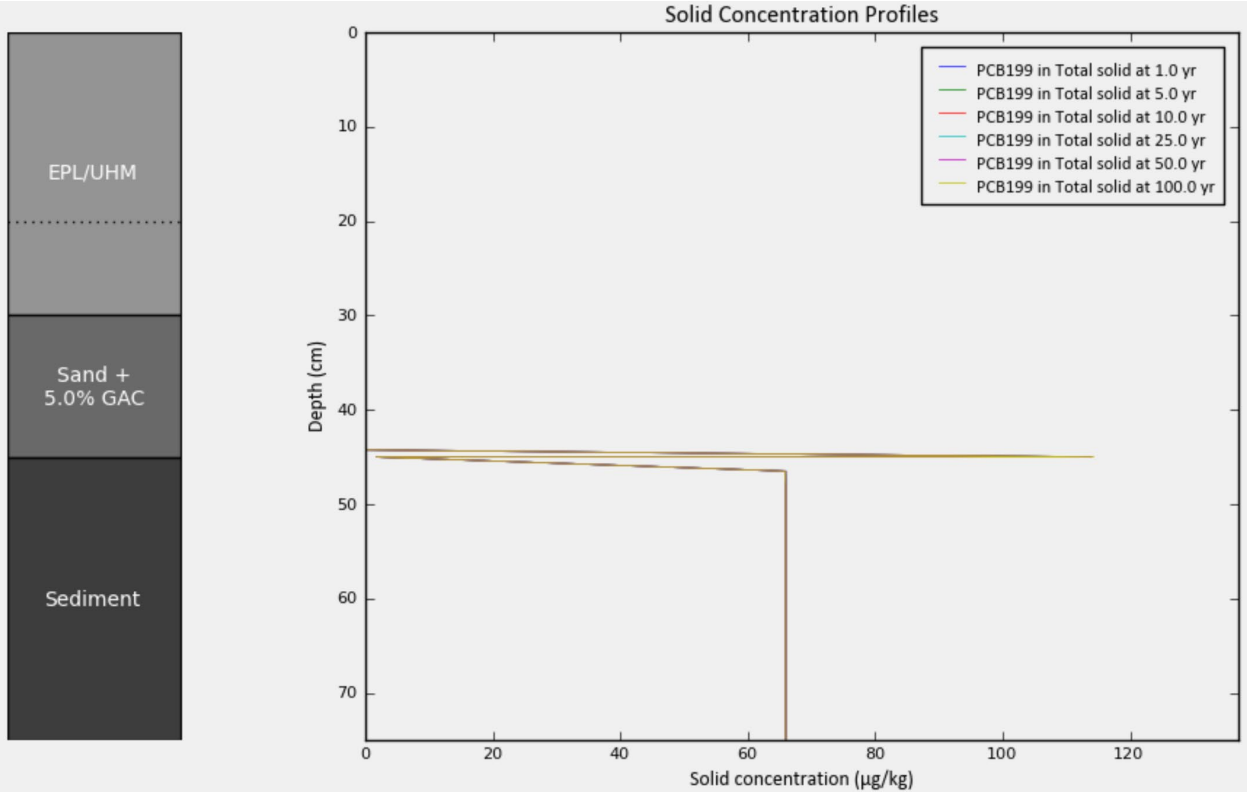

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB153 in Total solid at 1.0 yr
PCB153 in Total solid at 5.0 yr
PCB153 in Total solid at 10.0 yr
PCB153 in Total solid at 25.0 yr
PCB153 in Total solid at 50.0 yr
PCB153 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

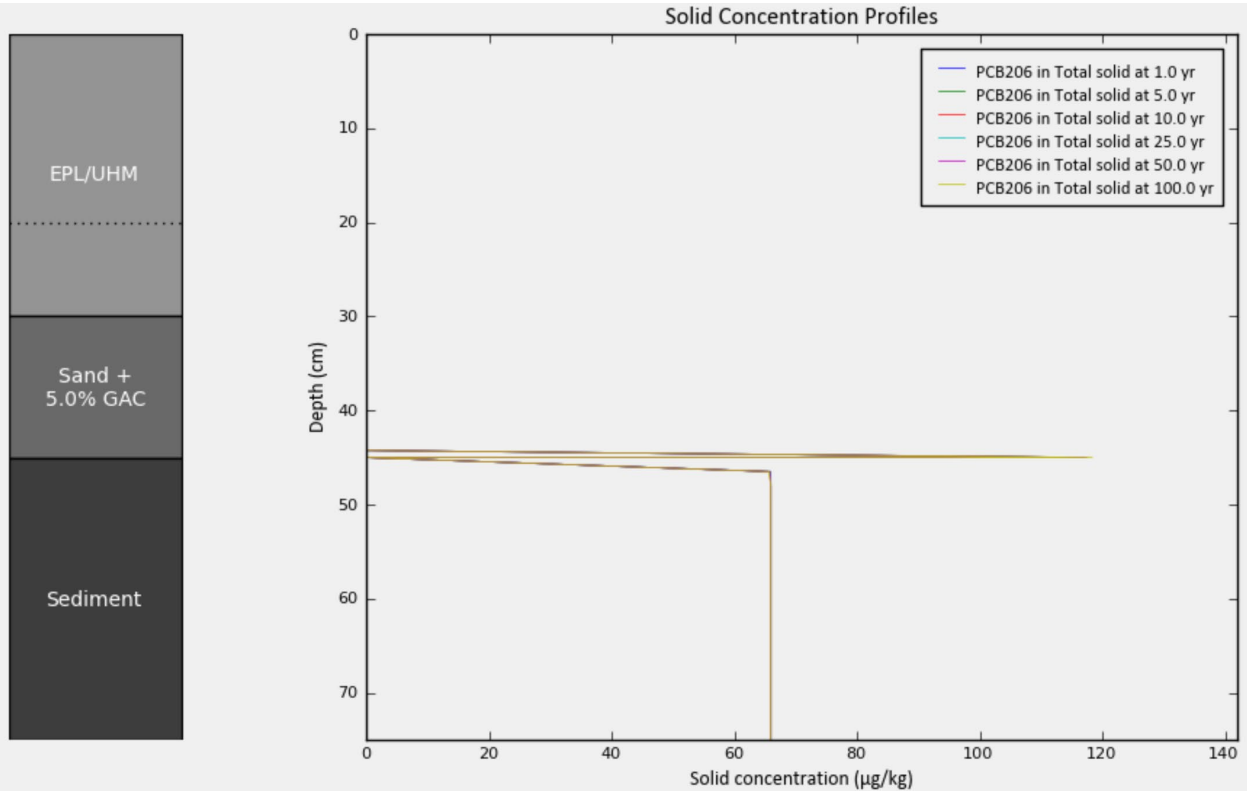

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB174 in Total solid at 1.0 yr
PCB174 in Total solid at 5.0 yr
PCB174 in Total solid at 10.0 yr
PCB174 in Total solid at 25.0 yr
PCB174 in Total solid at 50.0 yr
PCB174 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

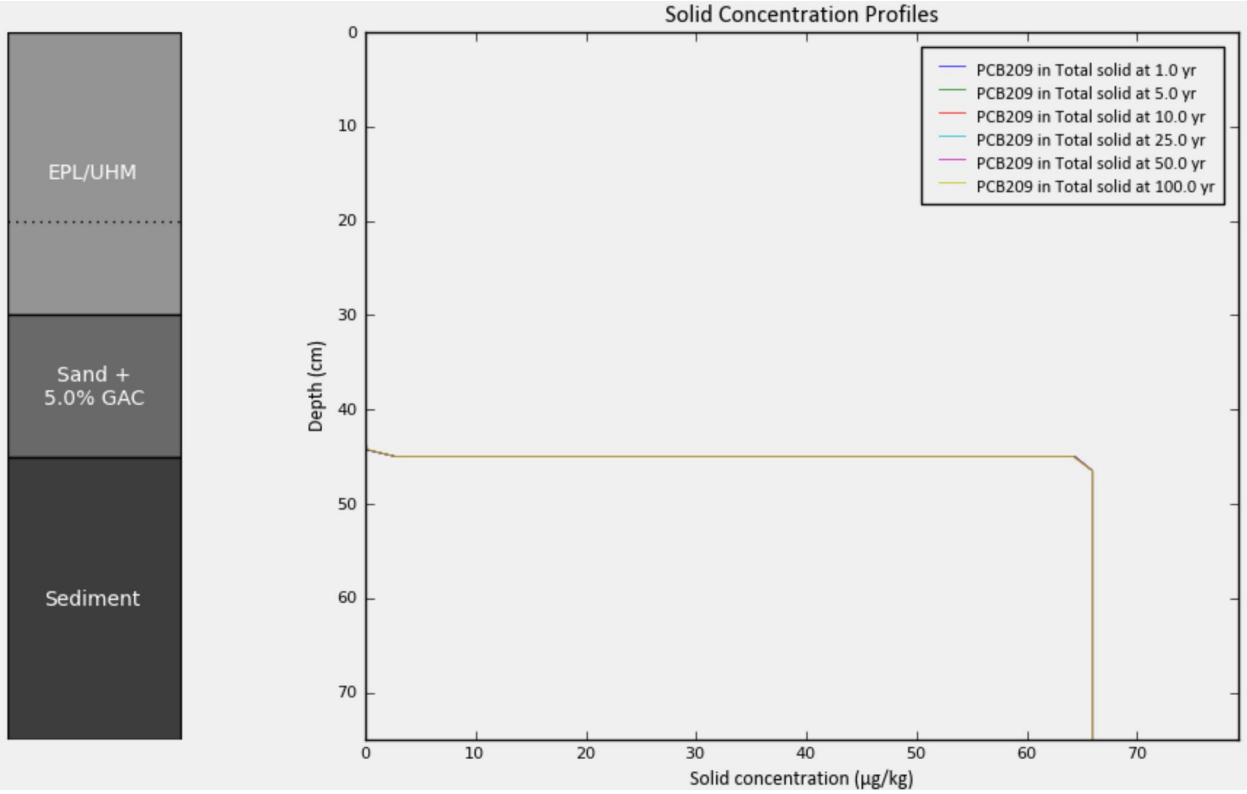

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB177 in Total solid at 1.0 yr
PCB177 in Total solid at 5.0 yr
PCB177 in Total solid at 10.0 yr
PCB177 in Total solid at 25.0 yr
PCB177 in Total solid at 50.0 yr
PCB177 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

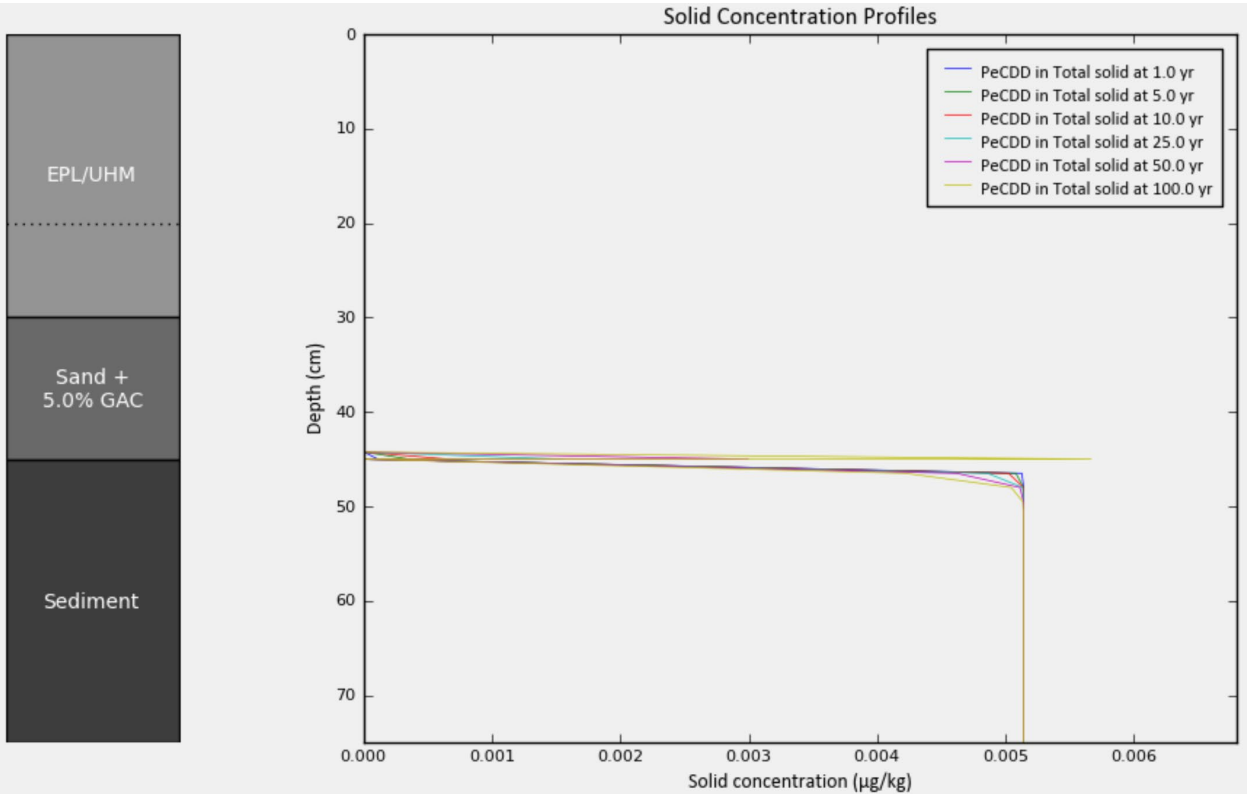

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB180 in Total solid at 1.0 yr
PCB180 in Total solid at 5.0 yr
PCB180 in Total solid at 10.0 yr
PCB180 in Total solid at 25.0 yr
PCB180 in Total solid at 50.0 yr
PCB180 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

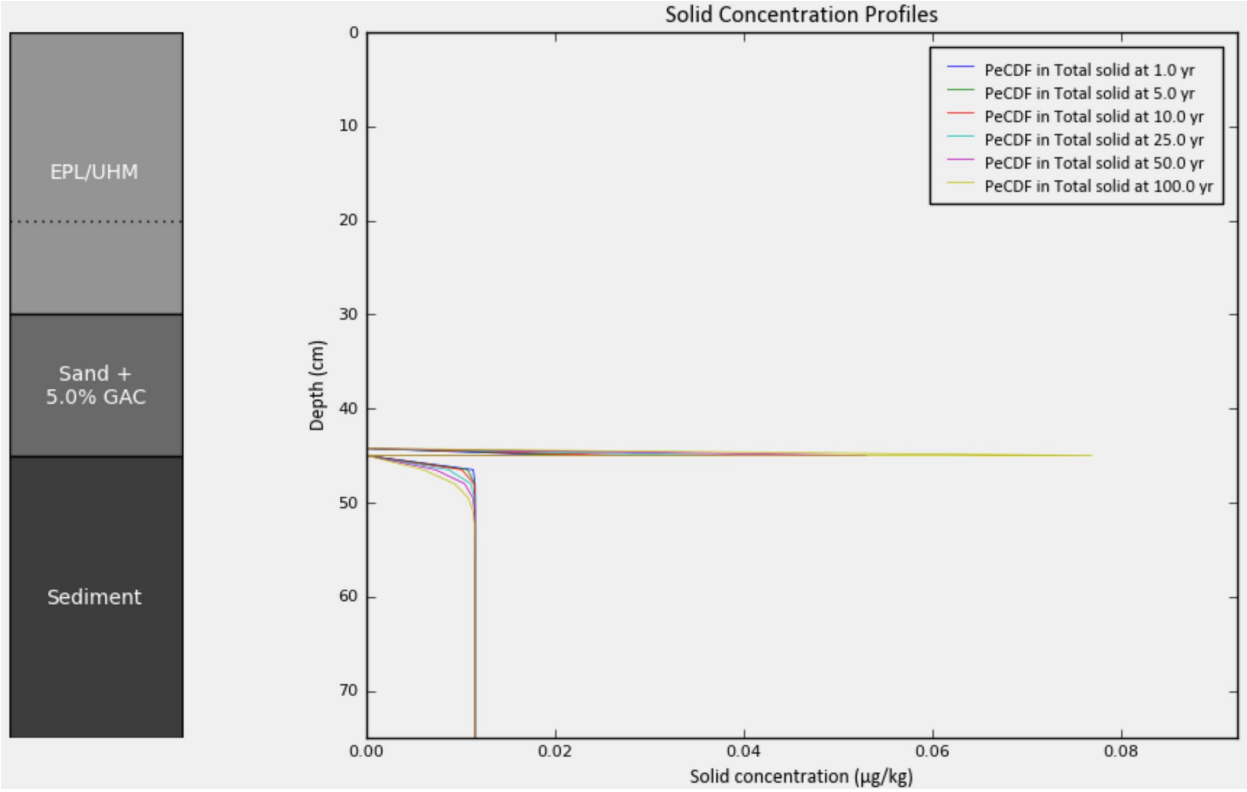

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB183 in Total solid at 1.0 yr
PCB183 in Total solid at 5.0 yr
PCB183 in Total solid at 10.0 yr
PCB183 in Total solid at 25.0 yr
PCB183 in Total solid at 50.0 yr
PCB183 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

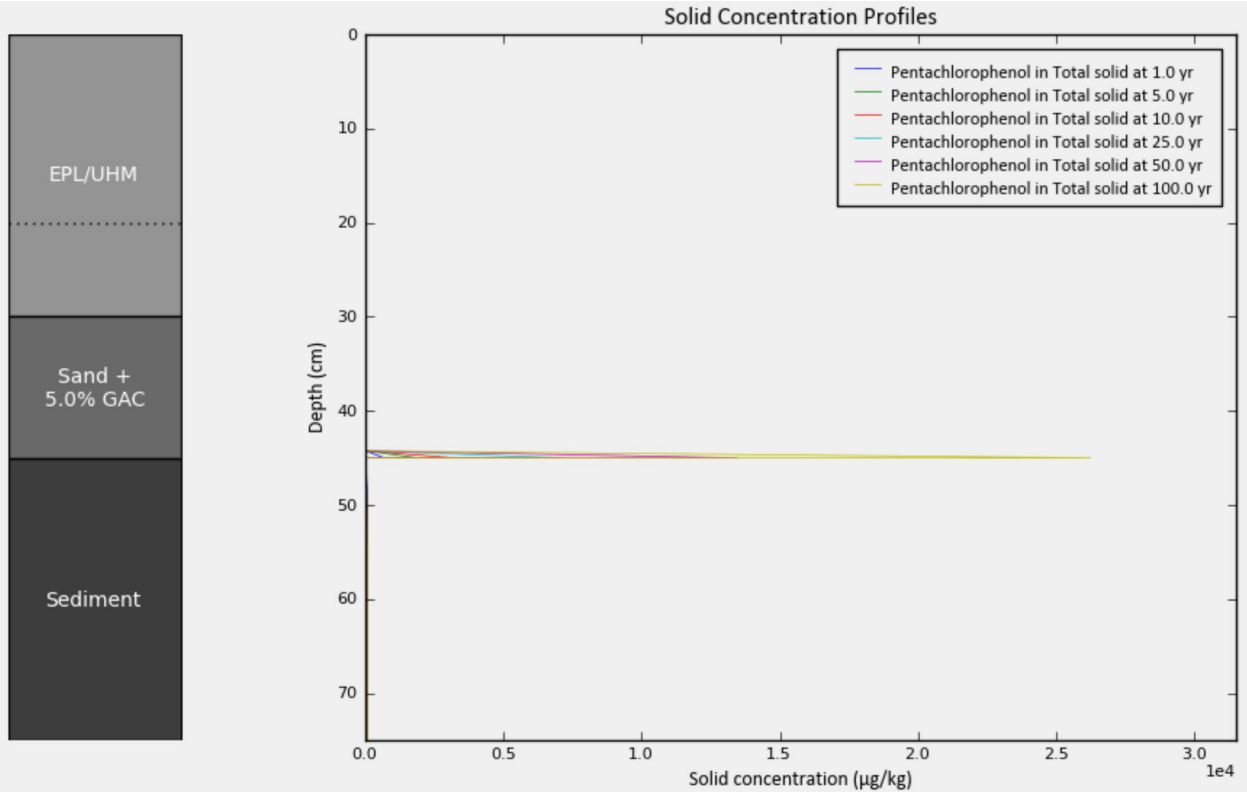

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB199 in Total solid at 1.0 yr
PCB199 in Total solid at 5.0 yr
PCB199 in Total solid at 10.0 yr
PCB199 in Total solid at 25.0 yr
PCB199 in Total solid at 50.0 yr
PCB199 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

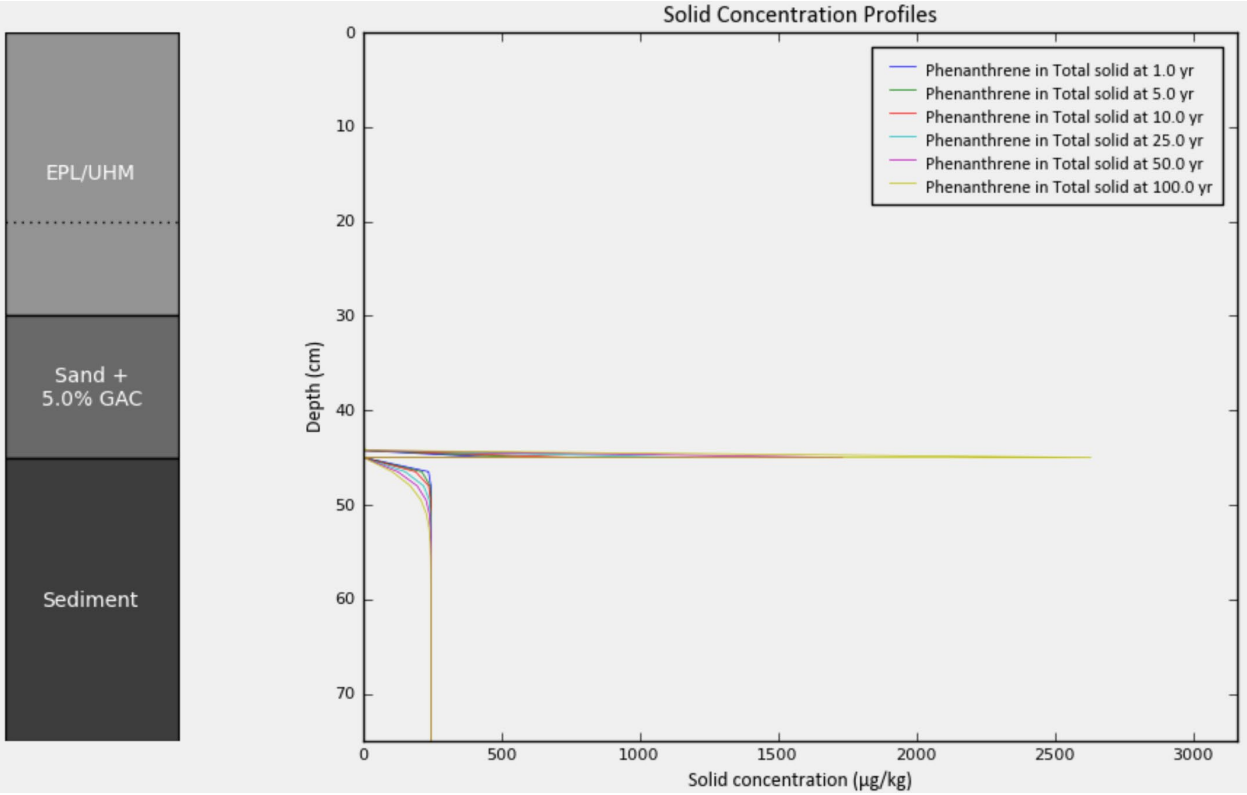

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB206 in Total solid at 1.0 yr
PCB206 in Total solid at 5.0 yr
PCB206 in Total solid at 10.0 yr
PCB206 in Total solid at 25.0 yr
PCB206 in Total solid at 50.0 yr
PCB206 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

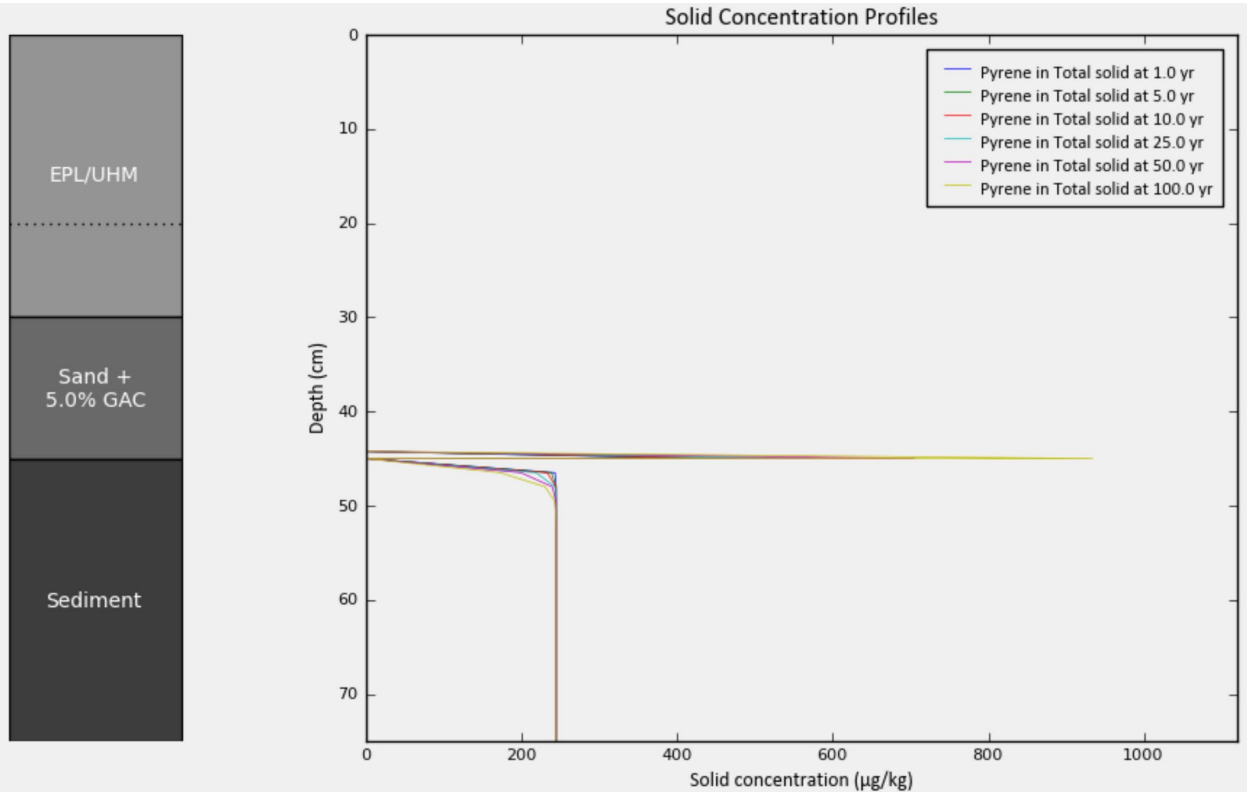

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB209 in Total solid at 1.0 yr
PCB209 in Total solid at 5.0 yr
PCB209 in Total solid at 10.0 yr
PCB209 in Total solid at 25.0 yr
PCB209 in Total solid at 50.0 yr
PCB209 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

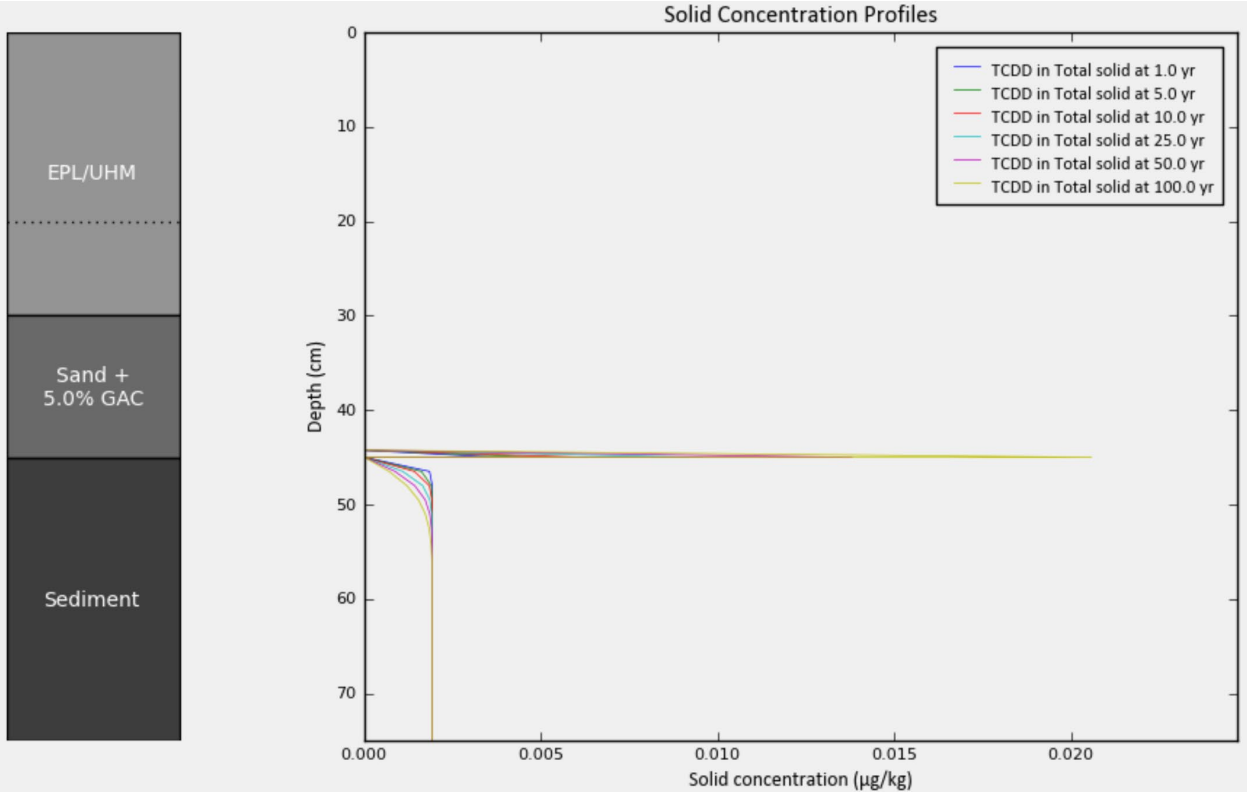

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PeCDD in Total solid at 1.0 yr
PeCDD in Total solid at 5.0 yr
PeCDD in Total solid at 10.0 yr
PeCDD in Total solid at 25.0 yr
PeCDD in Total solid at 50.0 yr
PeCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

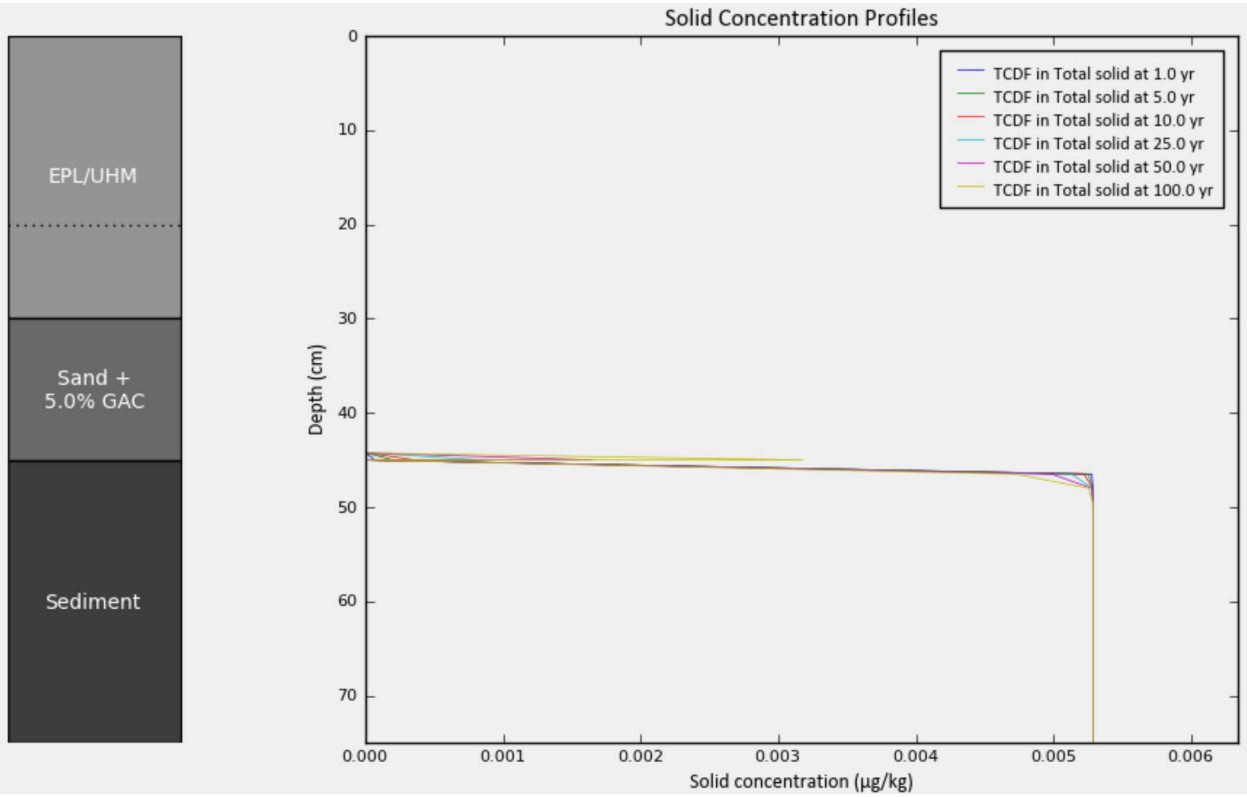

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PeCDF in Total solid at 1.0 yr
PeCDF in Total solid at 5.0 yr
PeCDF in Total solid at 10.0 yr
PeCDF in Total solid at 25.0 yr
PeCDF in Total solid at 50.0 yr
PeCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.00
0.02
0.04
0.06
0.08
Solid concentration (µg/kg)

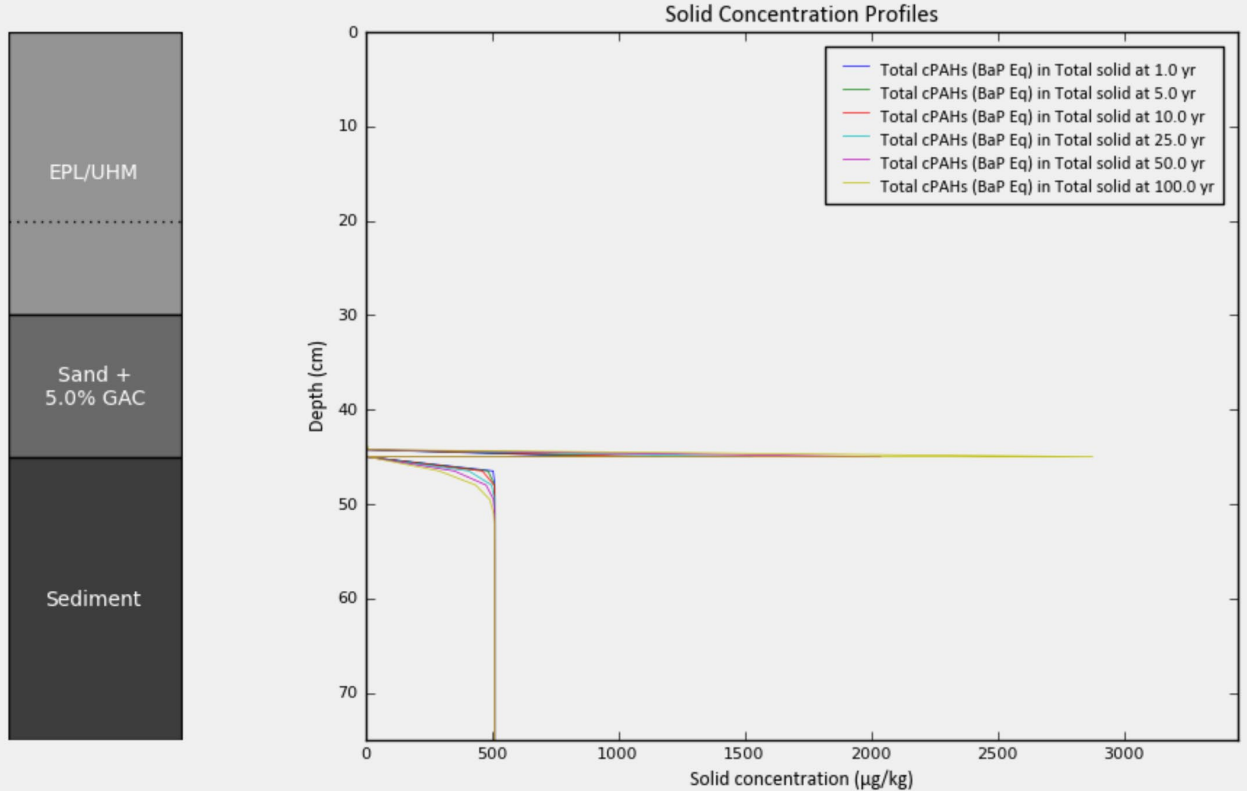

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Pentachlorophenol in Total solid at 1.0 yr
Pentachlorophenol in Total solid at 5.0 yr
Pentachlorophenol in Total solid at 10.0 yr
Pentachlorophenol in Total solid at 25.0 yr
Pentachlorophenol in Total solid at 50.0 yr
Pentachlorophenol in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1e4
Solid concentration (µg/kg)

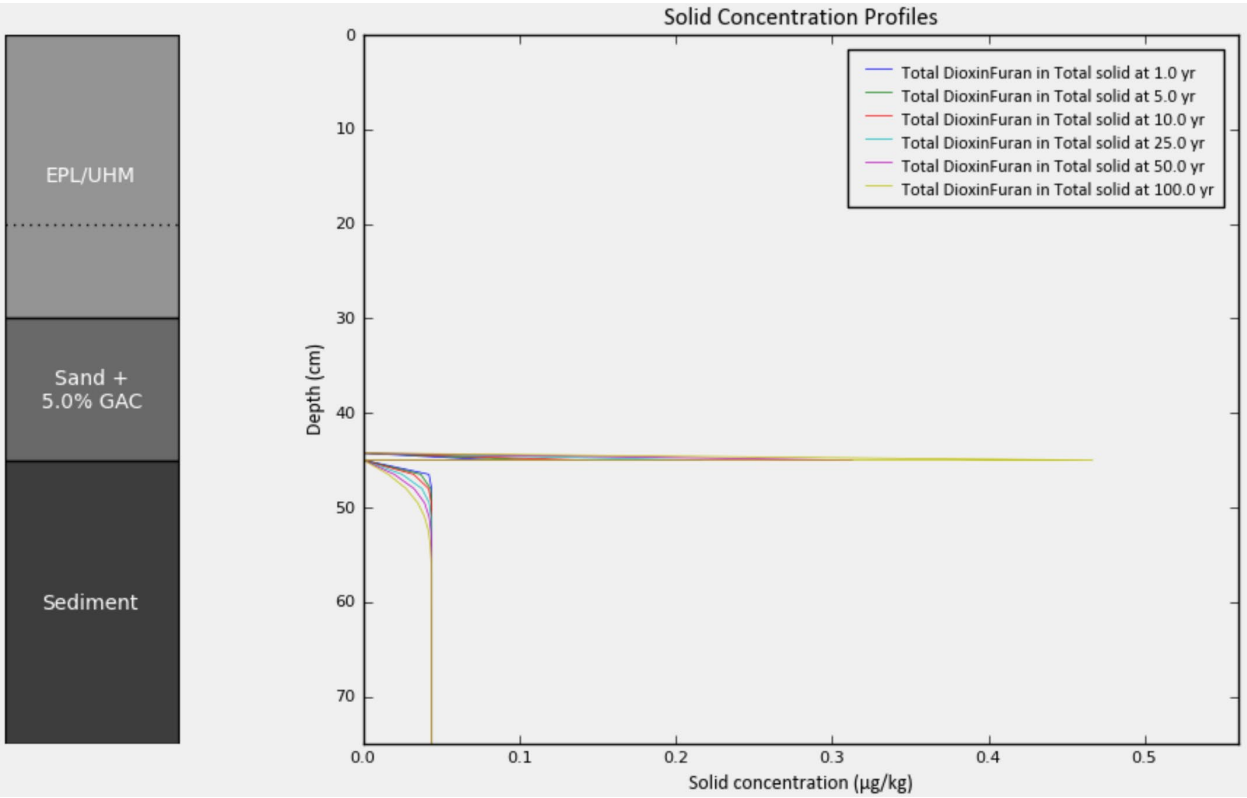

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Phenanthrene in Total solid at 1.0 yr
Phenanthrene in Total solid at 5.0 yr
Phenanthrene in Total solid at 10.0 yr
Phenanthrene in Total solid at 25.0 yr
Phenanthrene in Total solid at 50.0 yr
Phenanthrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
500
1000
1500
2000
2500
3000
Solid concentration (µg/kg)

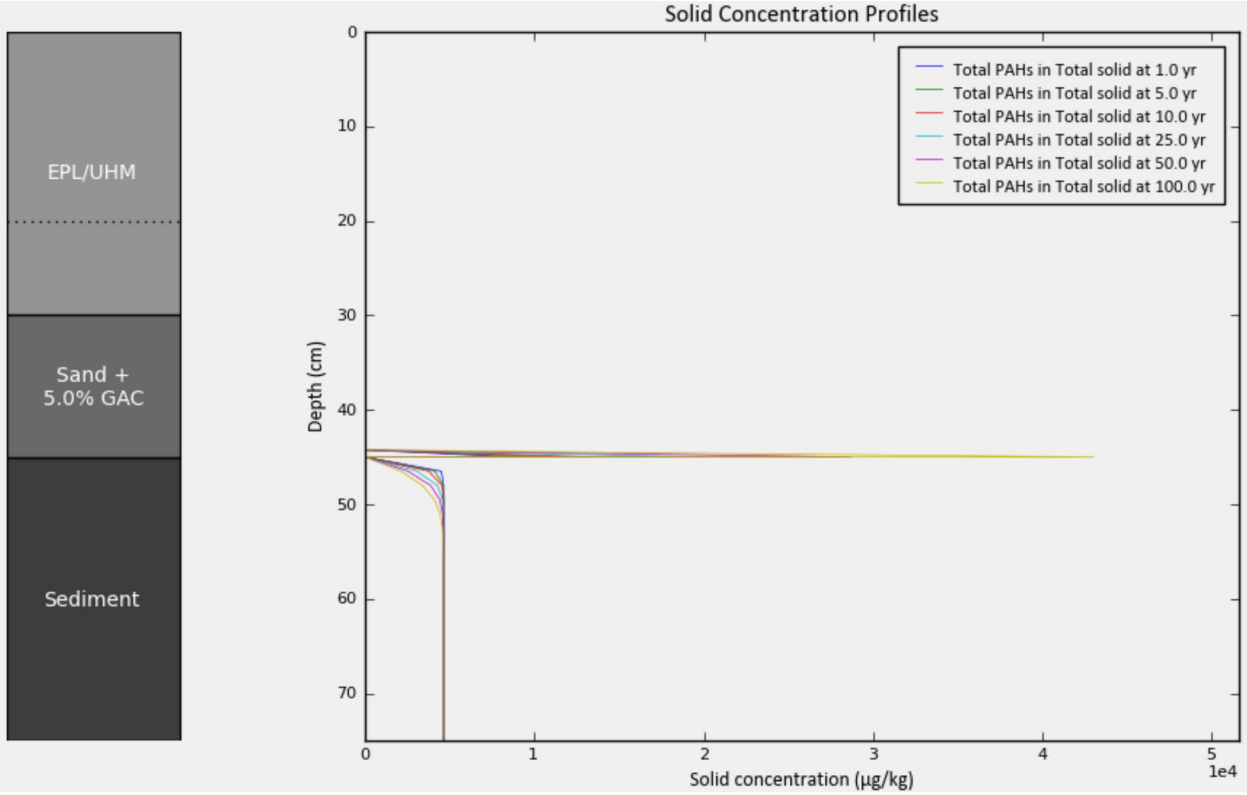

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Pyrene in Total solid at 1.0 yr
Pyrene in Total solid at 5.0 yr
Pyrene in Total solid at 10.0 yr
Pyrene in Total solid at 25.0 yr
Pyrene in Total solid at 50.0 yr
Pyrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
200
400
600
800
1000
Solid concentration (µg/kg)

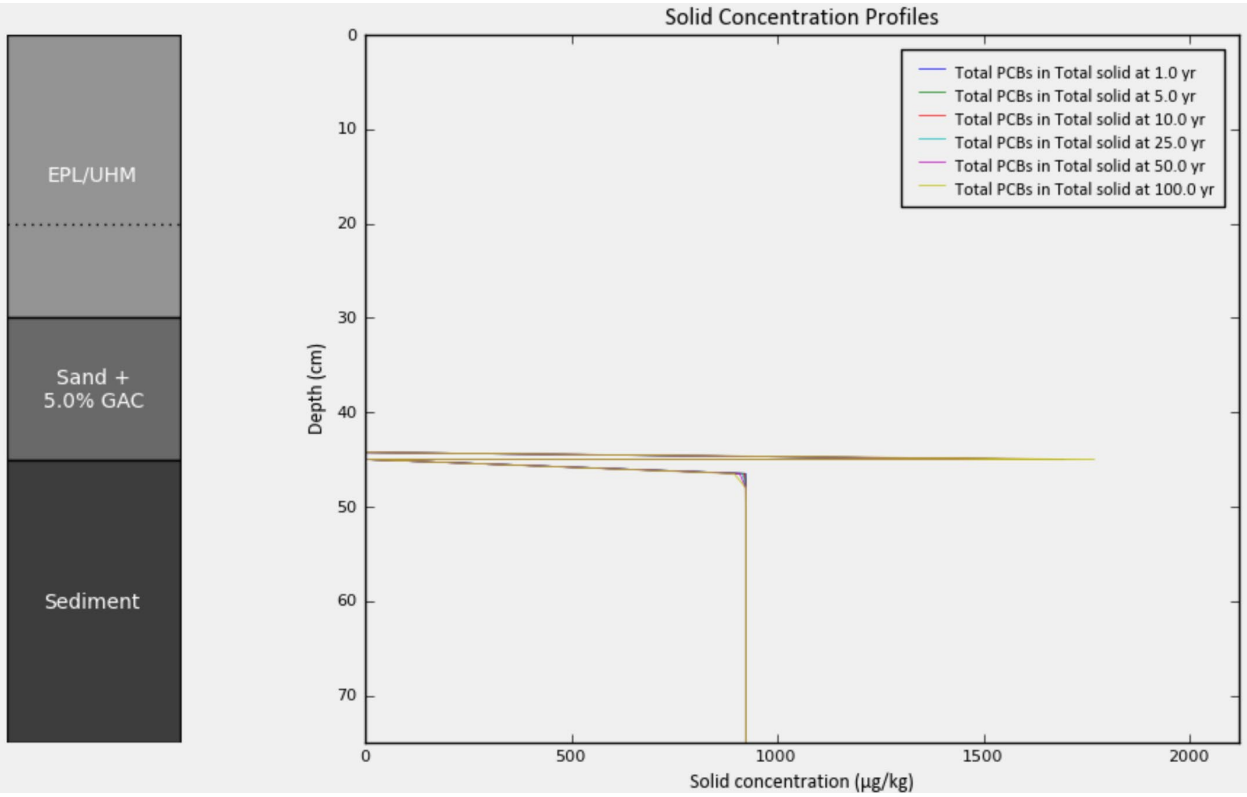

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
TCDD in Total solid at 1.0 yr
TCDD in Total solid at 5.0 yr
TCDD in Total solid at 10.0 yr
TCDD in Total solid at 25.0 yr
TCDD in Total solid at 50.0 yr
TCDD in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.000
0.005
0.010
0.015
0.020
Solid concentration (µg/kg)

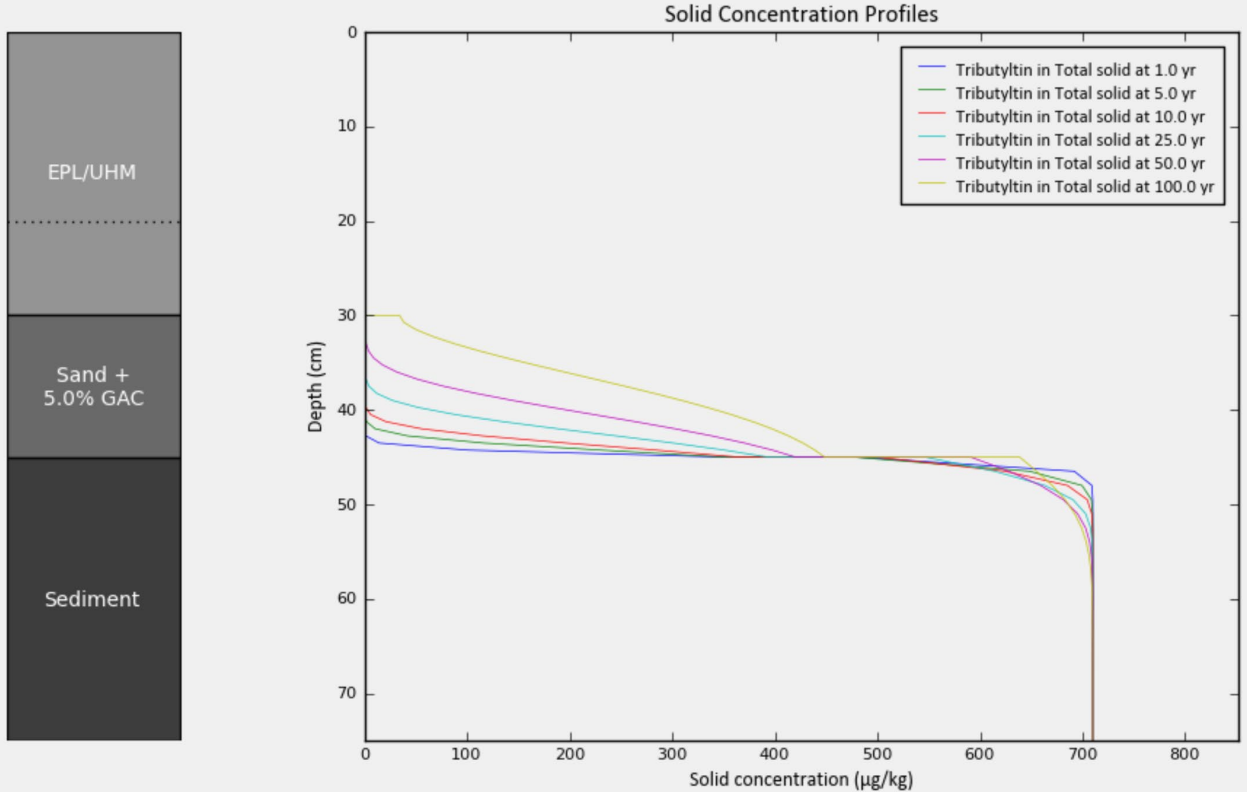

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
TCDF in Total solid at 1.0 yr
TCDF in Total solid at 5.0 yr
TCDF in Total solid at 10.0 yr
TCDF in Total solid at 25.0 yr
TCDF in Total solid at 50.0 yr
TCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Solid concentration (µg/kg)

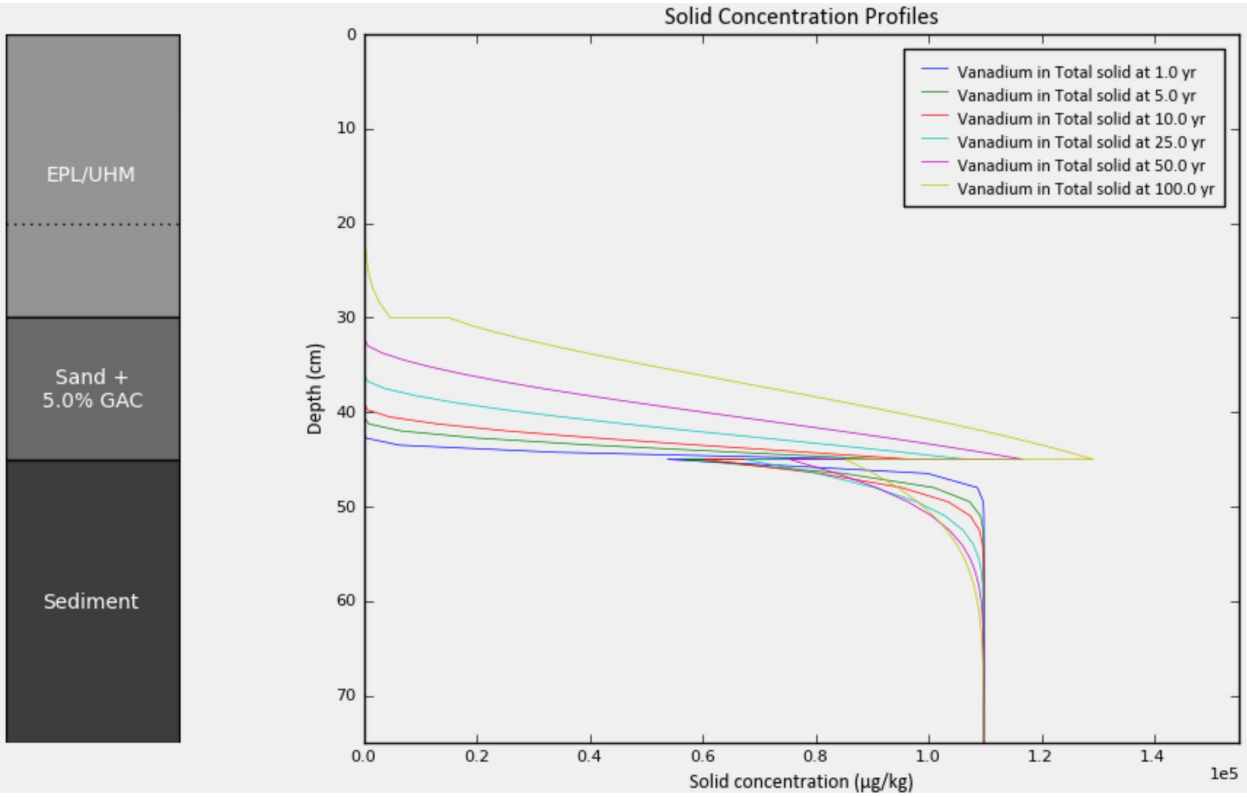

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Total cPAHs (BaP Eq) in Total solid at 1.0 yr
Total cPAHs (BaP Eq) in Total solid at 5.0 yr
Total cPAHs (BaP Eq) in Total solid at 10.0 yr
Total cPAHs (BaP Eq) in Total solid at 25.0 yr
Total cPAHs (BaP Eq) in Total solid at 50.0 yr
Total cPAHs (BaP Eq) in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
500
1000
1500
2000
2500
3000
Solid concentration (µg/kg)

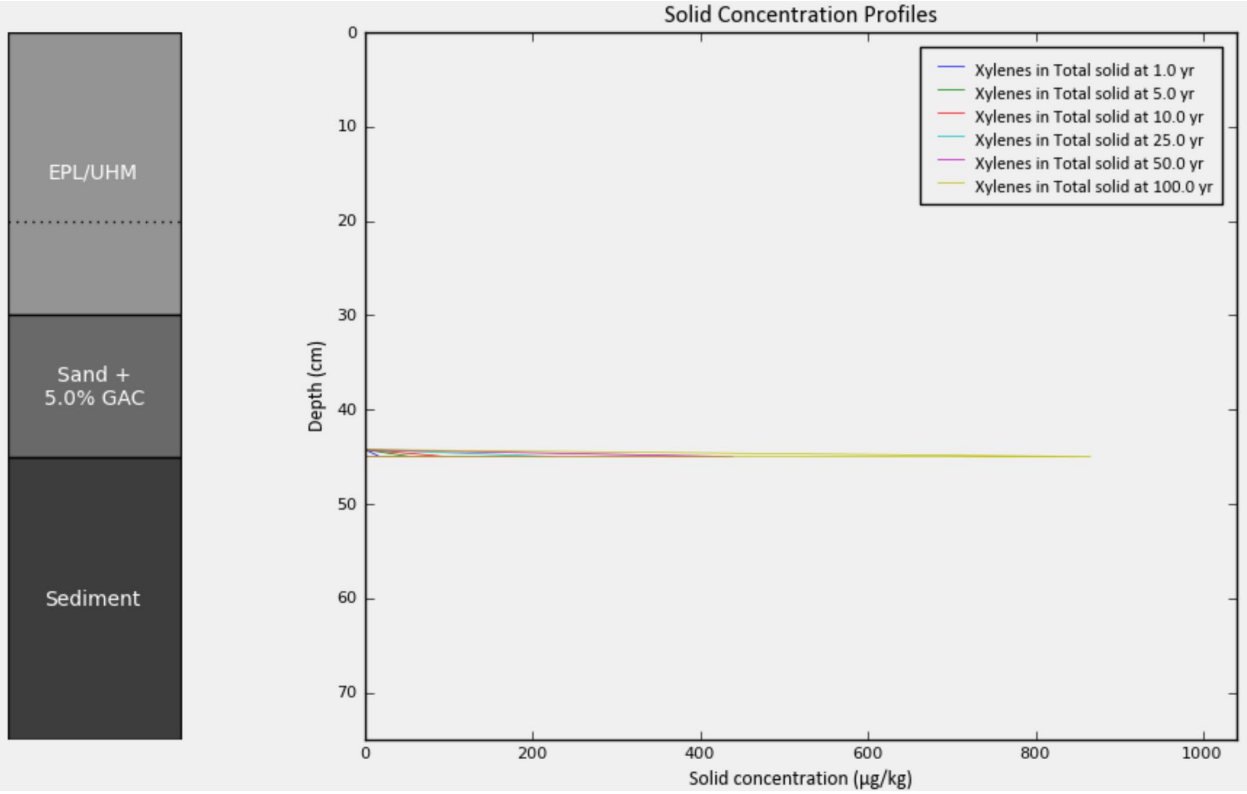

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Total DioxinFuran in Total solid at 1.0 yr
Total DioxinFuran in Total solid at 5.0 yr
Total DioxinFuran in Total solid at 10.0 yr
Total DioxinFuran in Total solid at 25.0 yr
Total DioxinFuran in Total solid at 50.0 yr
Total DioxinFuran in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0.0
0.1
0.2
0.3
0.4
0.5
Solid concentration (µg/kg)

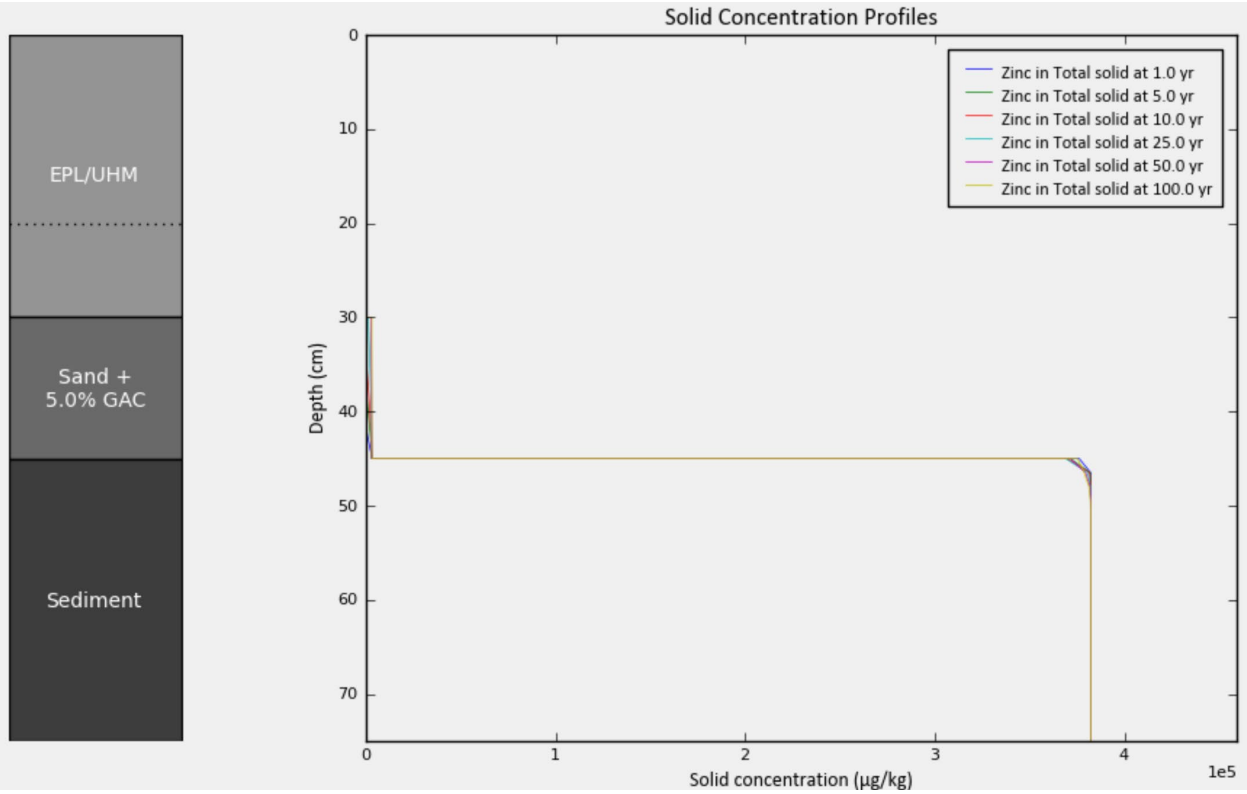

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Total PAHs in Total solid at 1.0 yr
Total PAHs in Total solid at 5.0 yr
Total PAHs in Total solid at 10.0 yr
Total PAHs in Total solid at 25.0 yr
Total PAHs in Total solid at 50.0 yr
Total PAHs in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
1
2
3
4
5
1e4
Solid concentration (µg/kg)


EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Total PCBs in Total solid at 1.0 yr
Total PCBs in Total solid at 5.0 yr
Total PCBs in Total solid at 10.0 yr
Total PCBs in Total solid at 25.0 yr
Total PCBs in Total solid at 50.0 yr
Total PCBs in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
500
1000
1500
2000
Solid concentration (µg/kg)


EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Tributyltin in Total solid at 1.0 yr
Tributyltin in Total solid at 5.0 yr
Tributyltin in Total solid at 10.0 yr
Tributyltin in Total solid at 25.0 yr
Tributyltin in Total solid at 50.0 yr
Tributyltin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

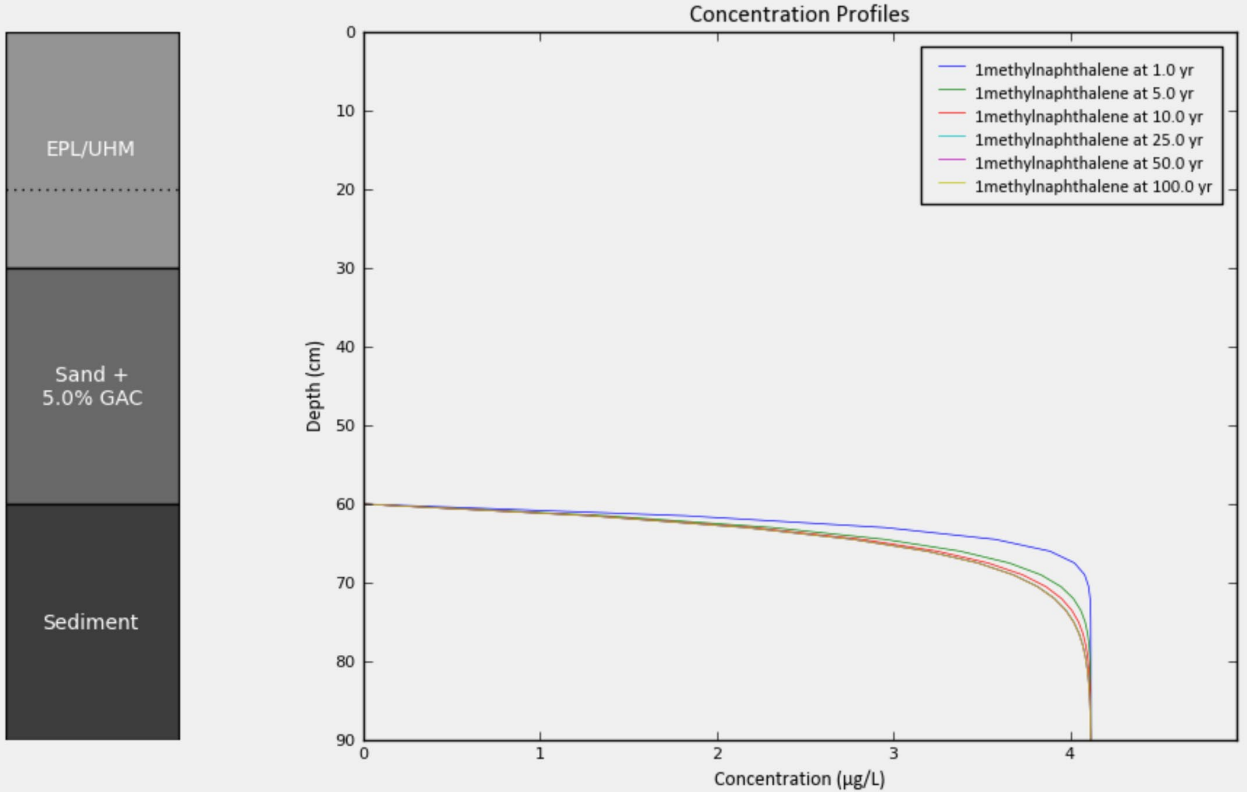

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Vanadium in Total solid at 1.0 yr
Vanadium in Total solid at 5.0 yr
Vanadium in Total solid at 10.0 yr
Vanadium in Total solid at 25.0 yr
Vanadium in Total solid at 50.0 yr
Vanadium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

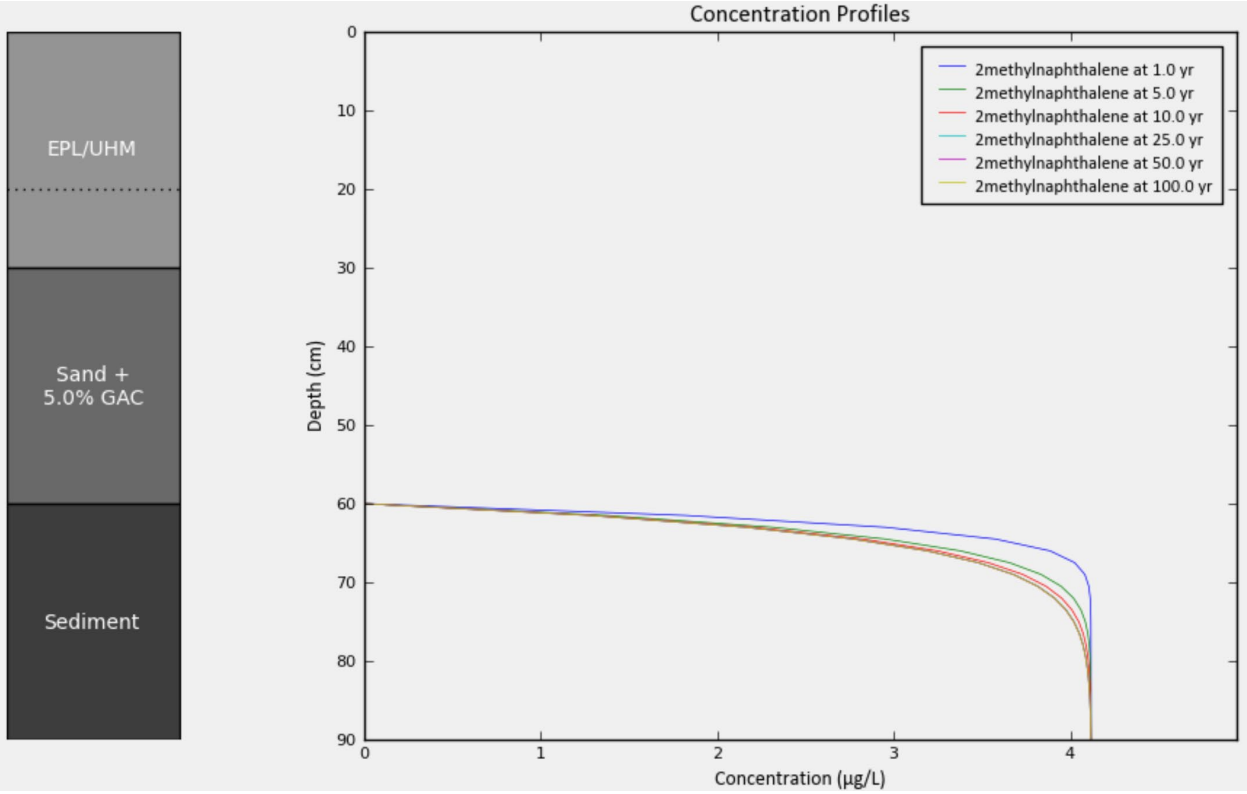

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Xylenes in Total solid at 1.0 yr
Xylenes in Total solid at 5.0 yr
Xylenes in Total solid at 10.0 yr
Xylenes in Total solid at 25.0 yr
Xylenes in Total solid at 50.0 yr
Xylenes in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
200
400
600
800
1000
Solid concentration (µg/kg)

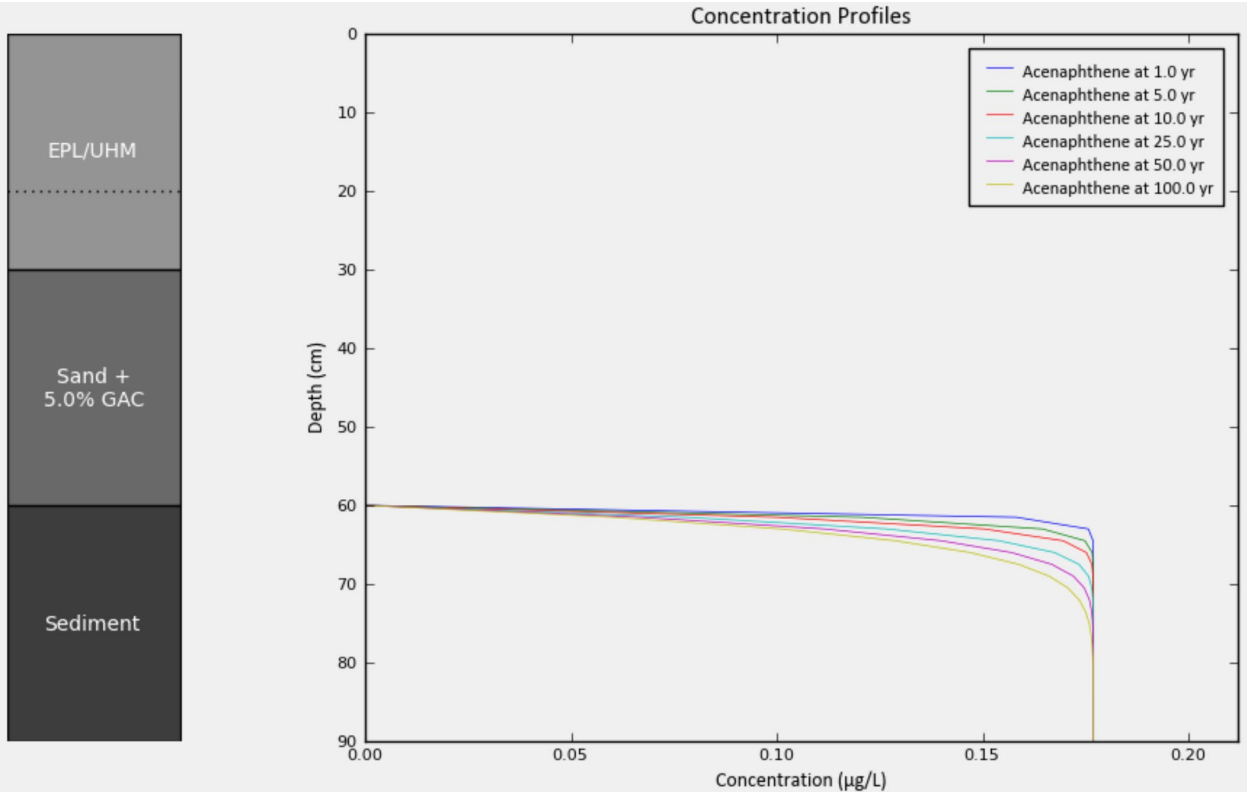

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Zinc in Total solid at 1.0 yr
Zinc in Total solid at 5.0 yr
Zinc in Total solid at 10.0 yr
Zinc in Total solid at 25.0 yr
Zinc in Total solid at 50.0 yr
Zinc in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
0
1
2
3
4
1e5
Solid concentration (µg/kg)

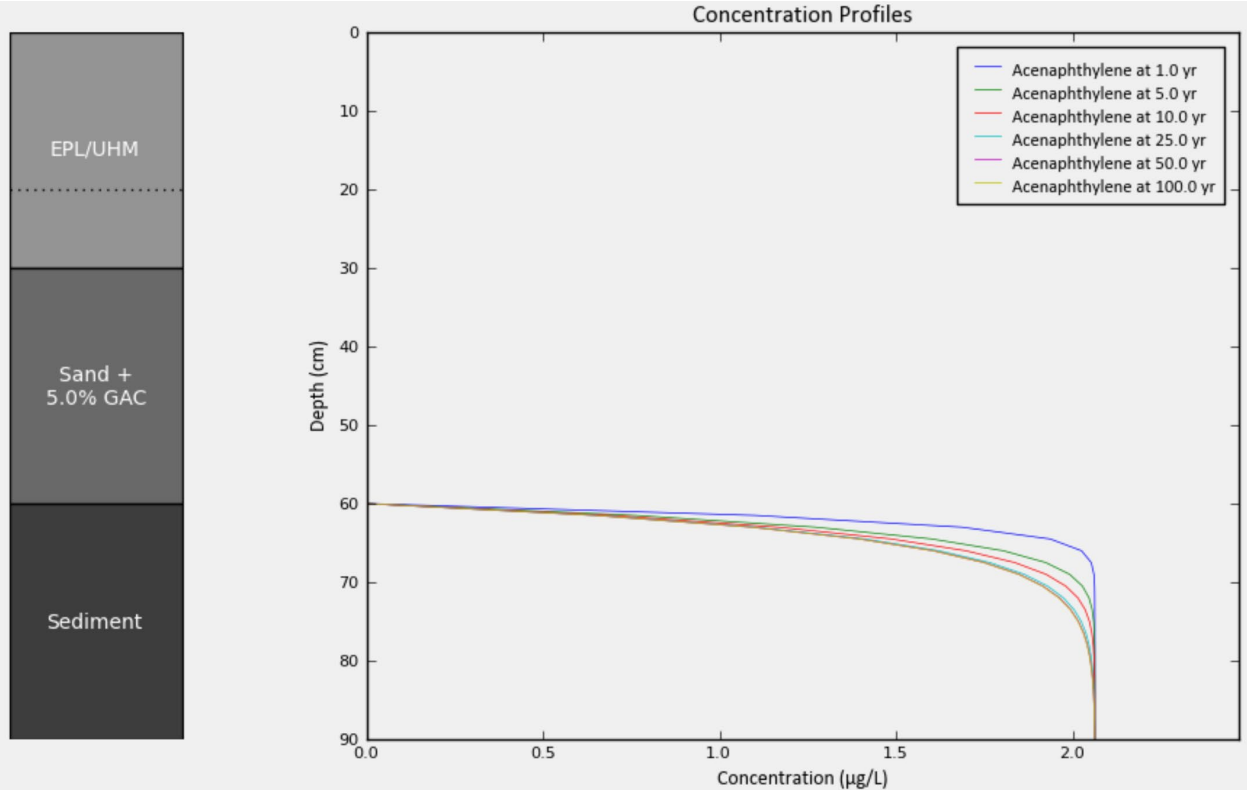
Cap Alternative 3: 30 cm of 5.0% GAC amended sand with 30 cm EPL/UHM

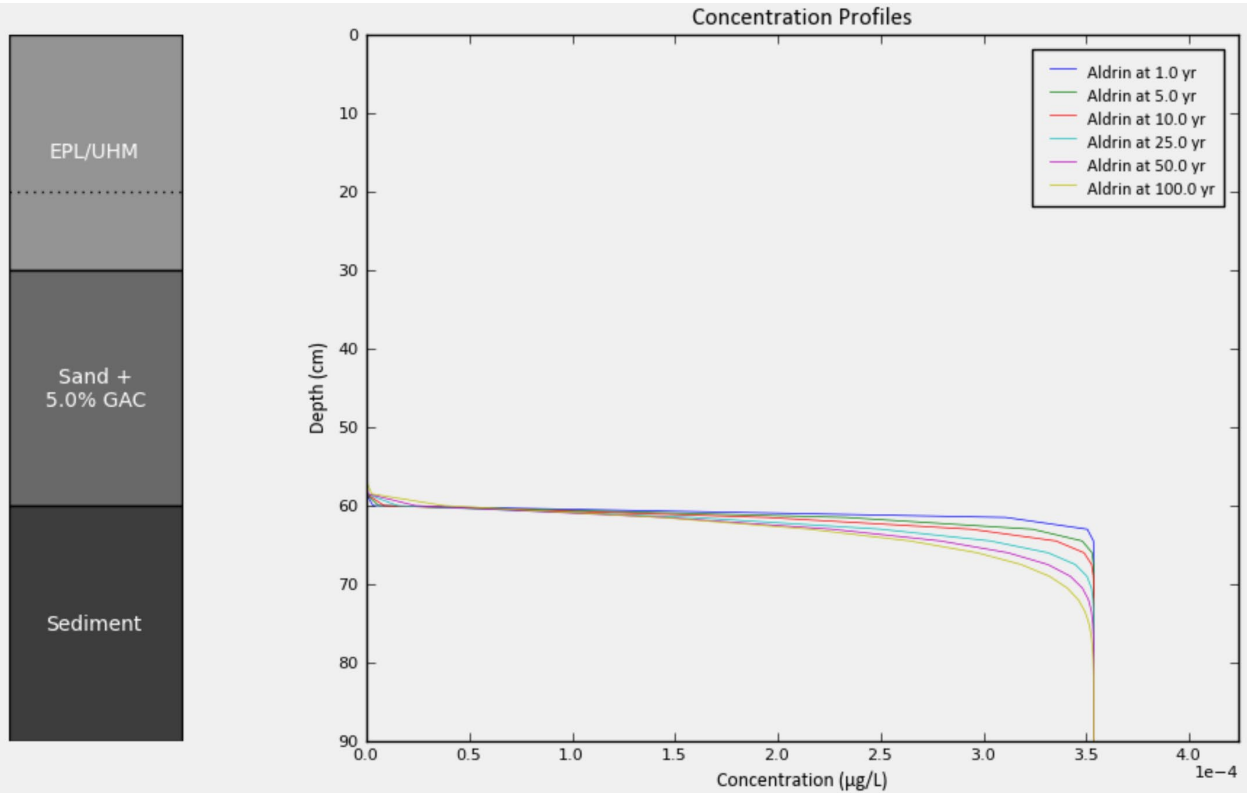
Porewater Concentration - Depth

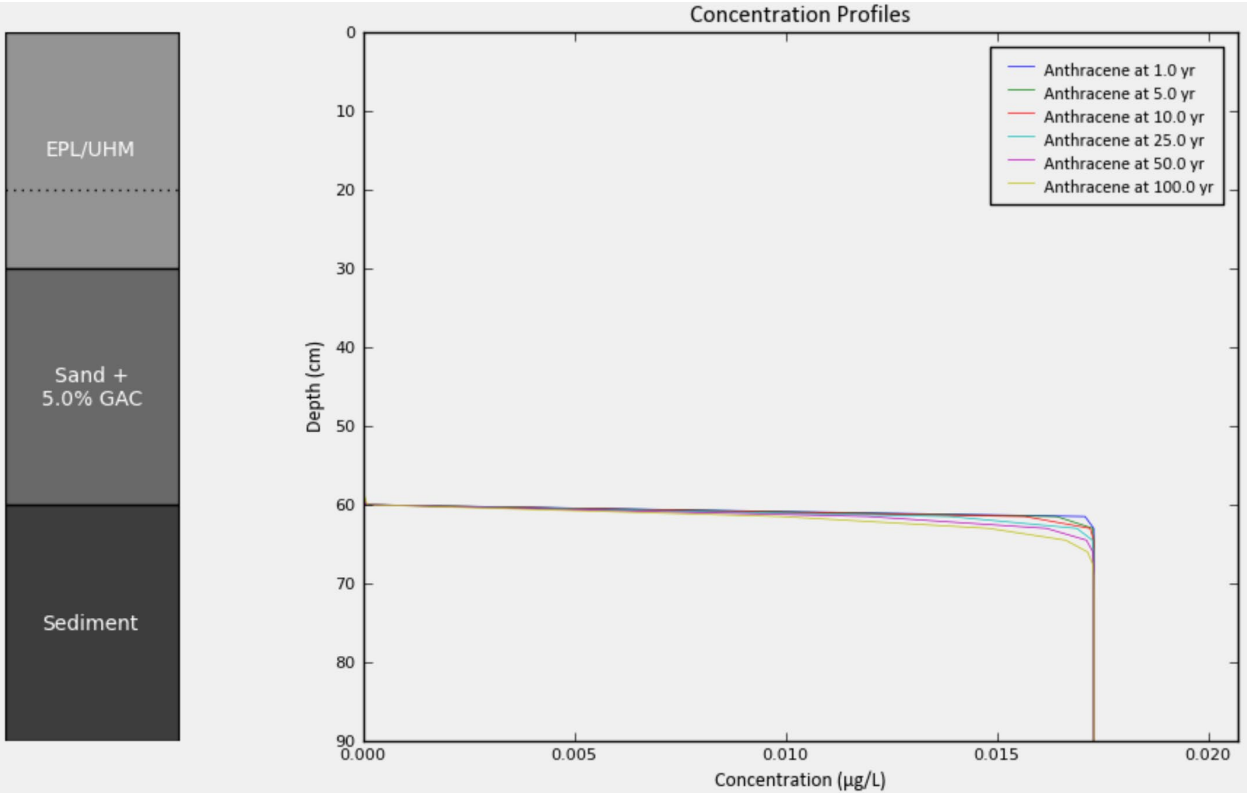


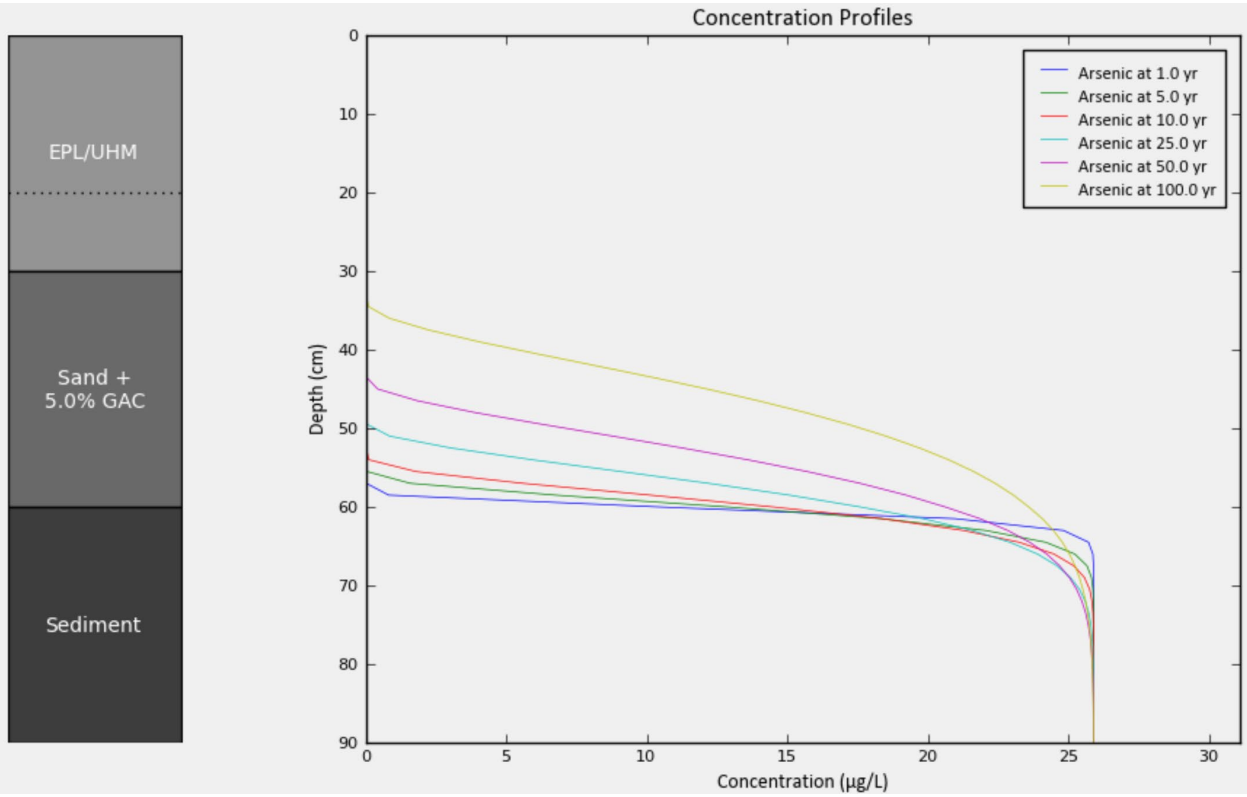

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
2methylnaphthalene at 1.0 yr
2methylnaphthalene at 5.0 yr
2methylnaphthalene at 10.0 yr
2methylnaphthalene at 25.0 yr
2methylnaphthalene at 50.0 yr
2methylnaphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

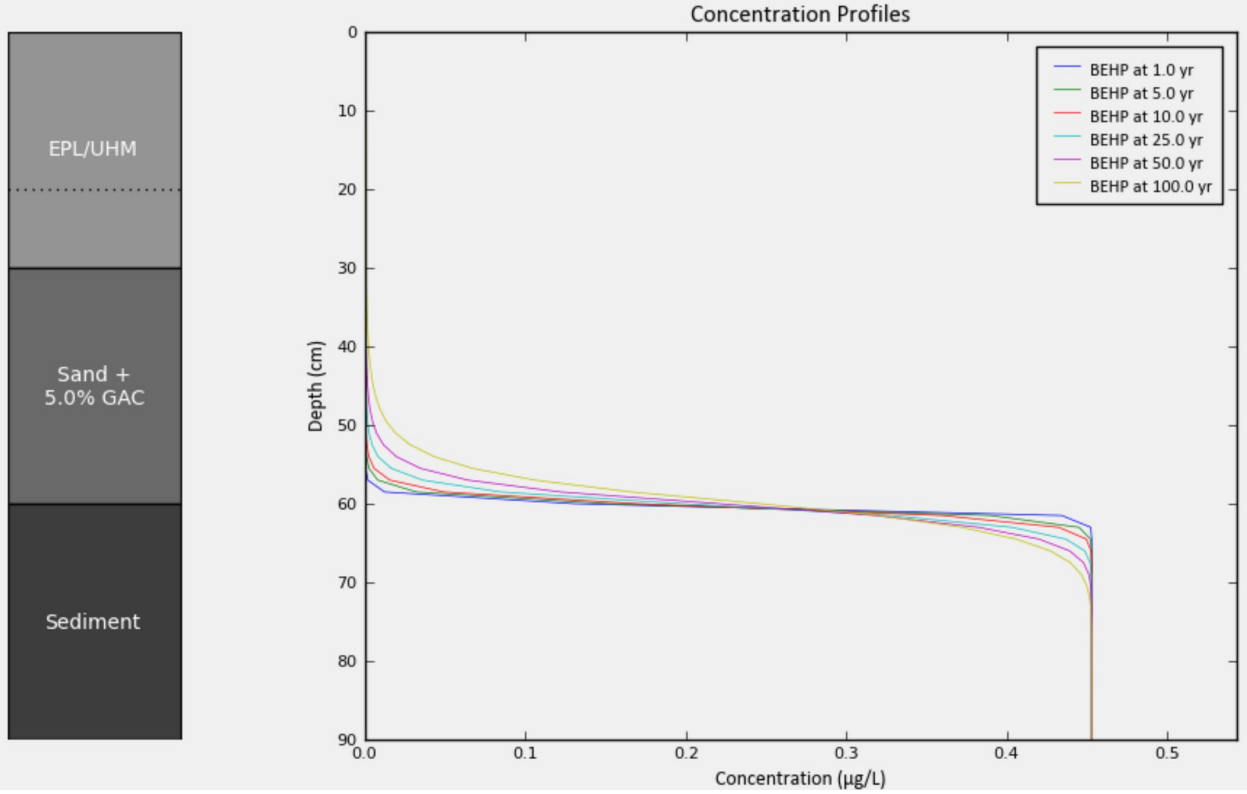

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Acenaphthene at 1.0 yr
Acenaphthene at 5.0 yr
Acenaphthene at 10.0 yr
Acenaphthene at 25.0 yr
Acenaphthene at 50.0 yr
Acenaphthene at 100.0 yr
Depth (cm)
Concentration (µg/L)

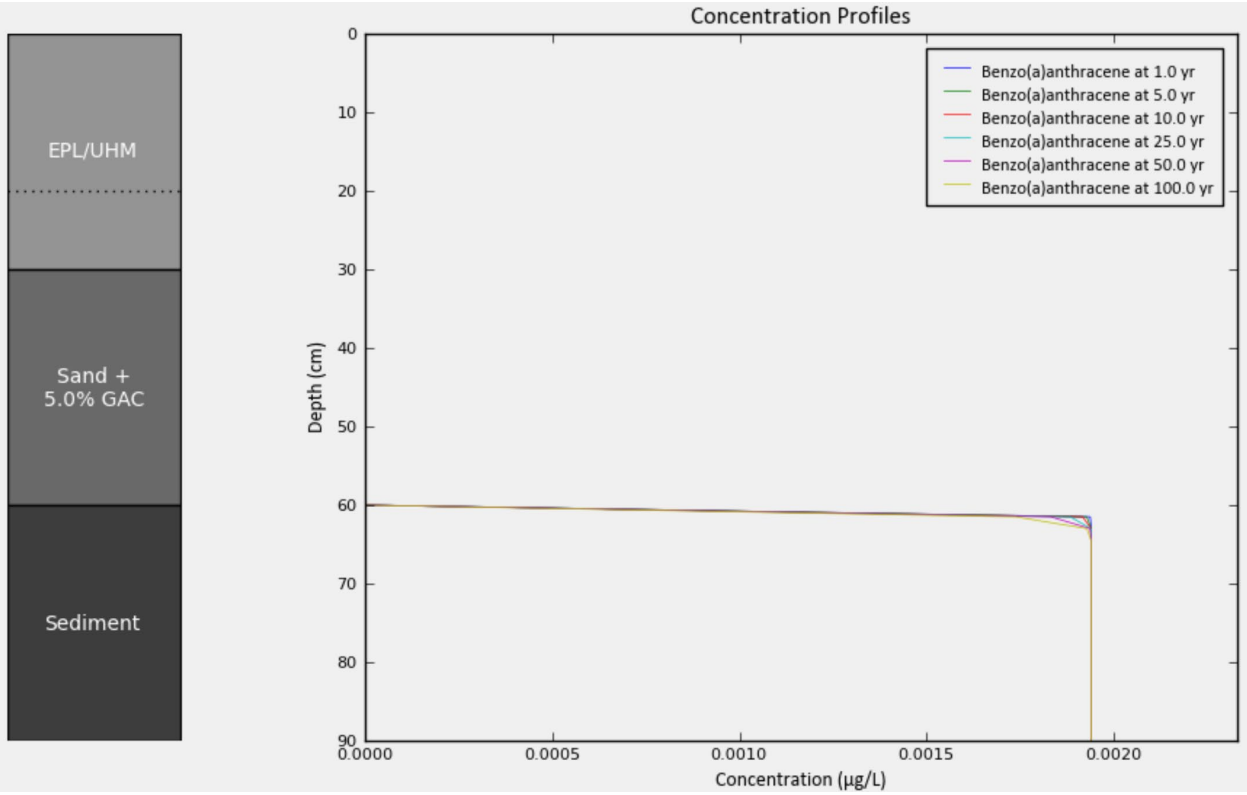

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Acenaphthylene at 1.0 yr
Acenaphthylene at 5.0 yr
Acenaphthylene at 10.0 yr
Acenaphthylene at 25.0 yr
Acenaphthylene at 50.0 yr
Acenaphthylene at 100.0 yr
Depth (cm)
Concentration (µg/L)

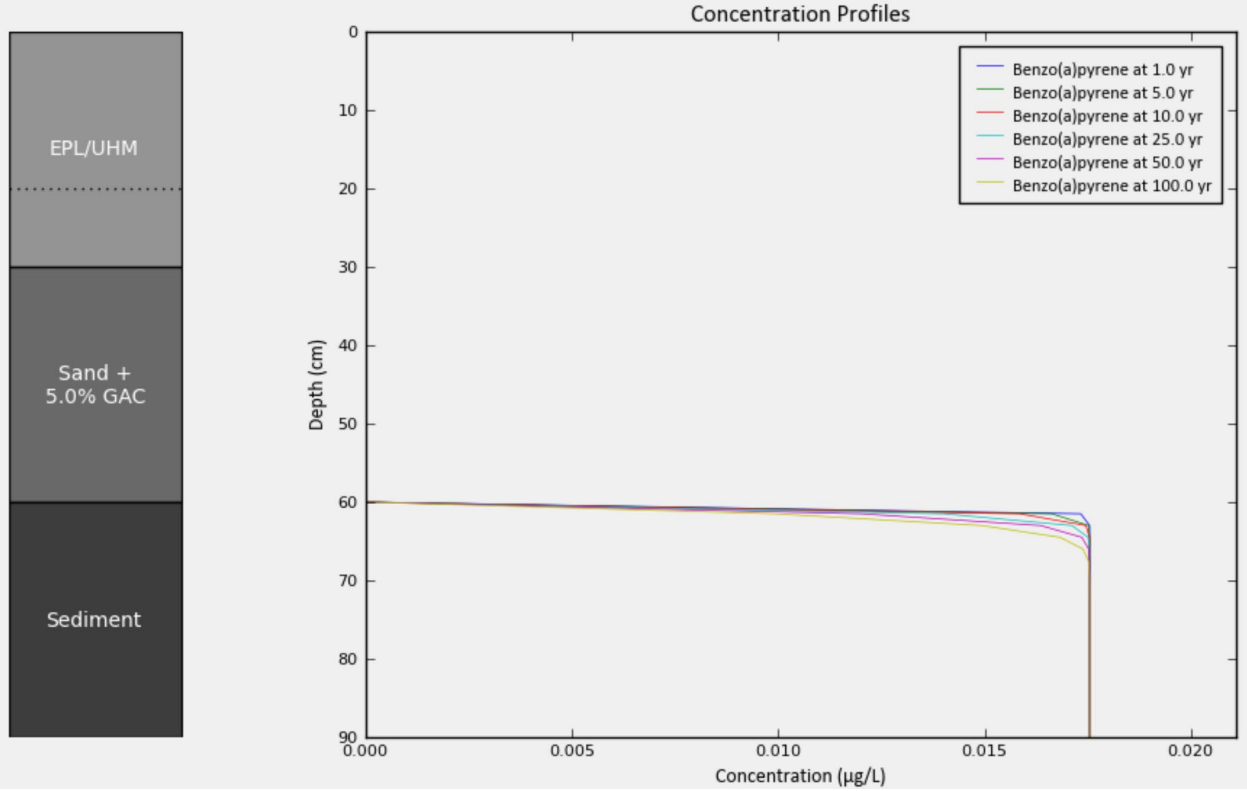

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Aldrin at 1.0 yr
Aldrin at 5.0 yr
Aldrin at 10.0 yr
Aldrin at 25.0 yr
Aldrin at 50.0 yr
Aldrin at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

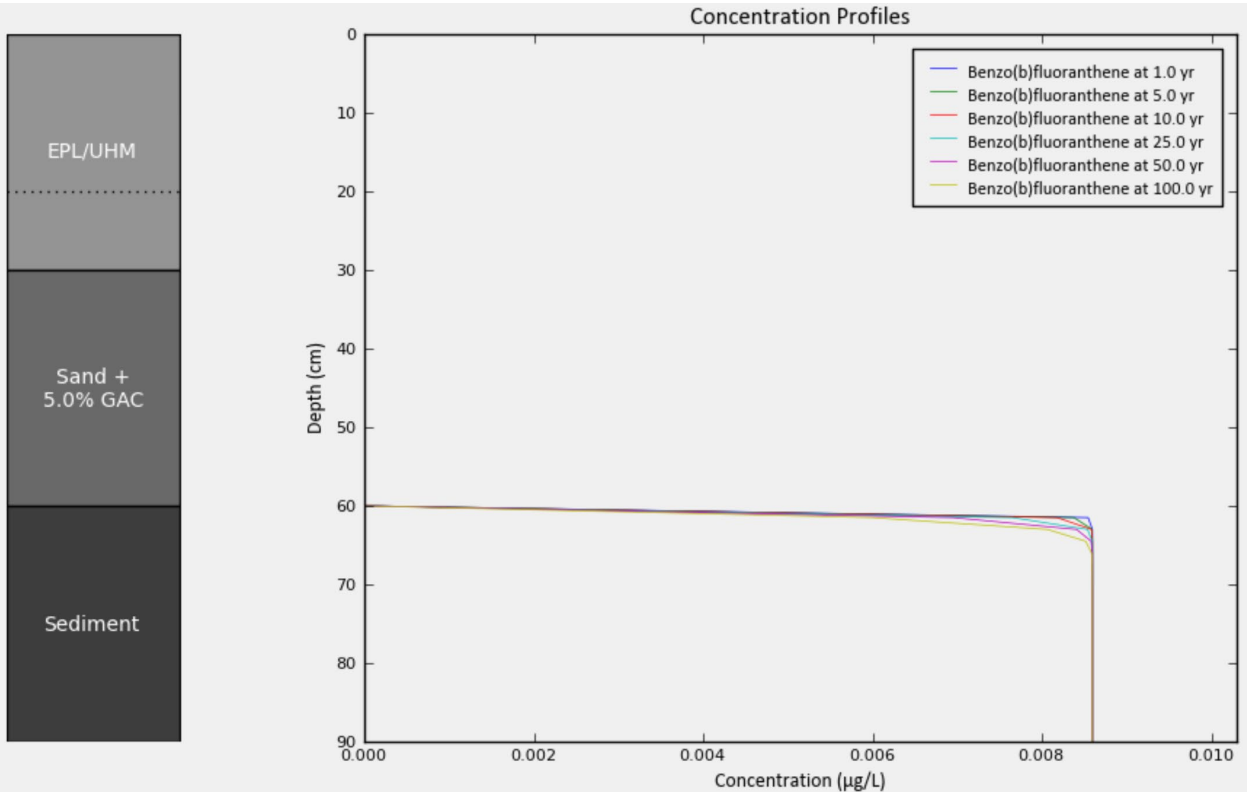

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Anthracene at 1.0 yr
Anthracene at 5.0 yr
Anthracene at 10.0 yr
Anthracene at 25.0 yr
Anthracene at 50.0 yr
Anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020

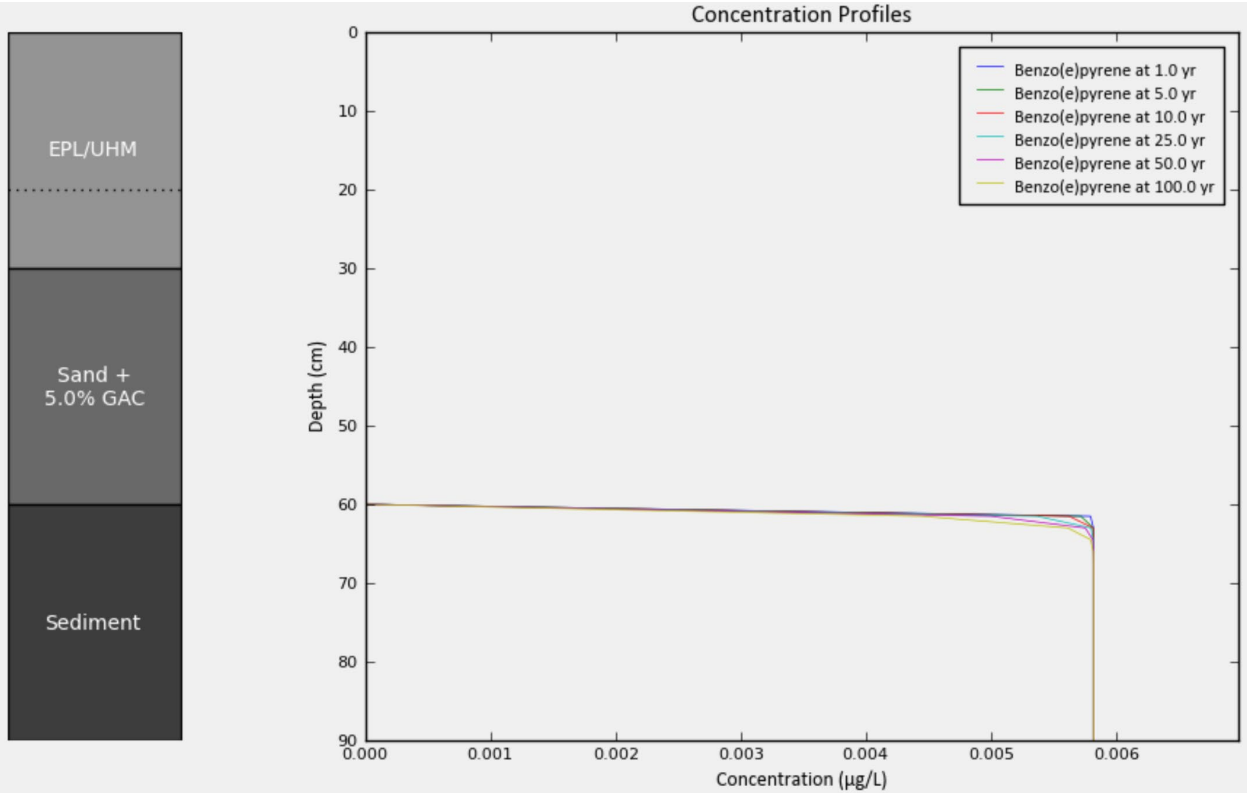

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Arsenic at 1.0 yr
Arsenic at 5.0 yr
Arsenic at 10.0 yr
Arsenic at 25.0 yr
Arsenic at 50.0 yr
Arsenic at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
5
10
15
20
25
30

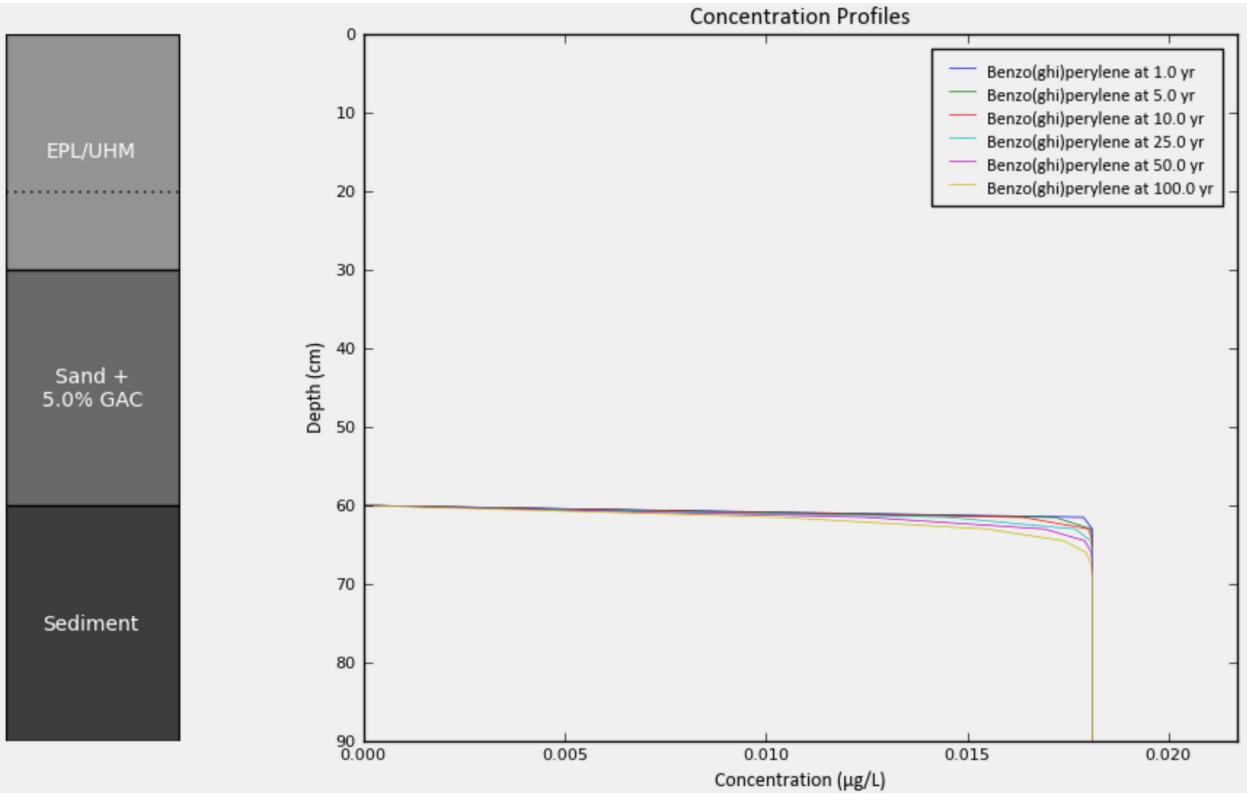

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
BEHP at 1.0 yr
BEHP at 5.0 yr
BEHP at 10.0 yr
BEHP at 25.0 yr
BEHP at 50.0 yr
BEHP at 100.0 yr
Depth (cm)
Concentration (µg/L)

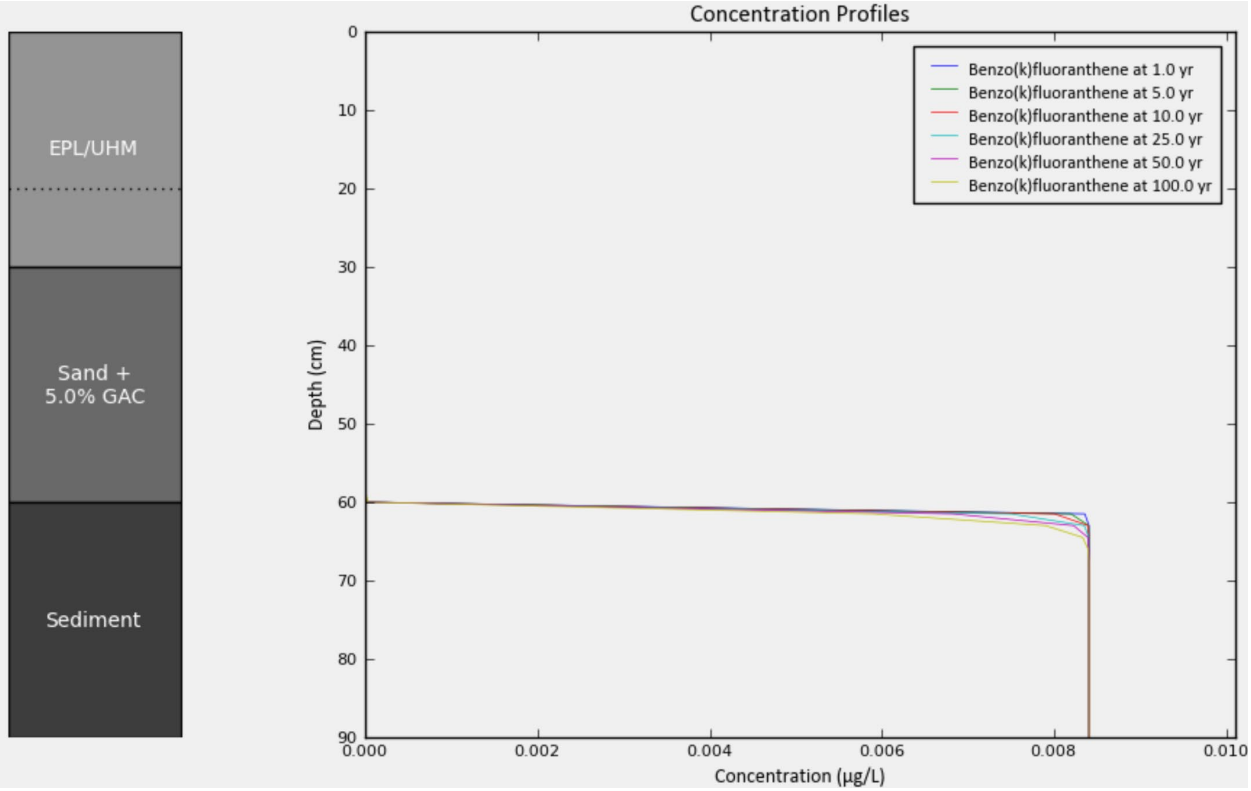

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Benzo(a)anthracene at 1.0 yr
Benzo(a)anthracene at 5.0 yr
Benzo(a)anthracene at 10.0 yr
Benzo(a)anthracene at 25.0 yr
Benzo(a)anthracene at 50.0 yr
Benzo(a)anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)

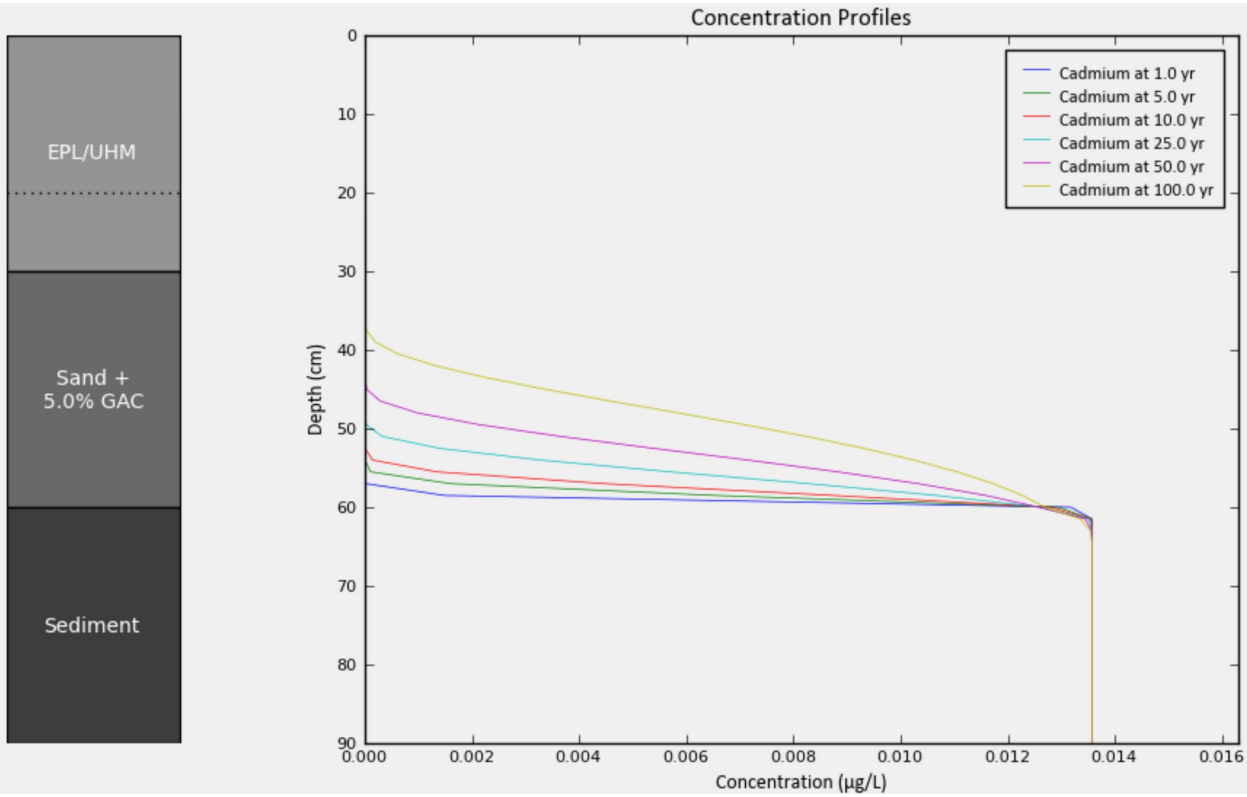

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Benzo(a)pyrene at 1.0 yr
Benzo(a)pyrene at 5.0 yr
Benzo(a)pyrene at 10.0 yr
Benzo(a)pyrene at 25.0 yr
Benzo(a)pyrene at 50.0 yr
Benzo(a)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

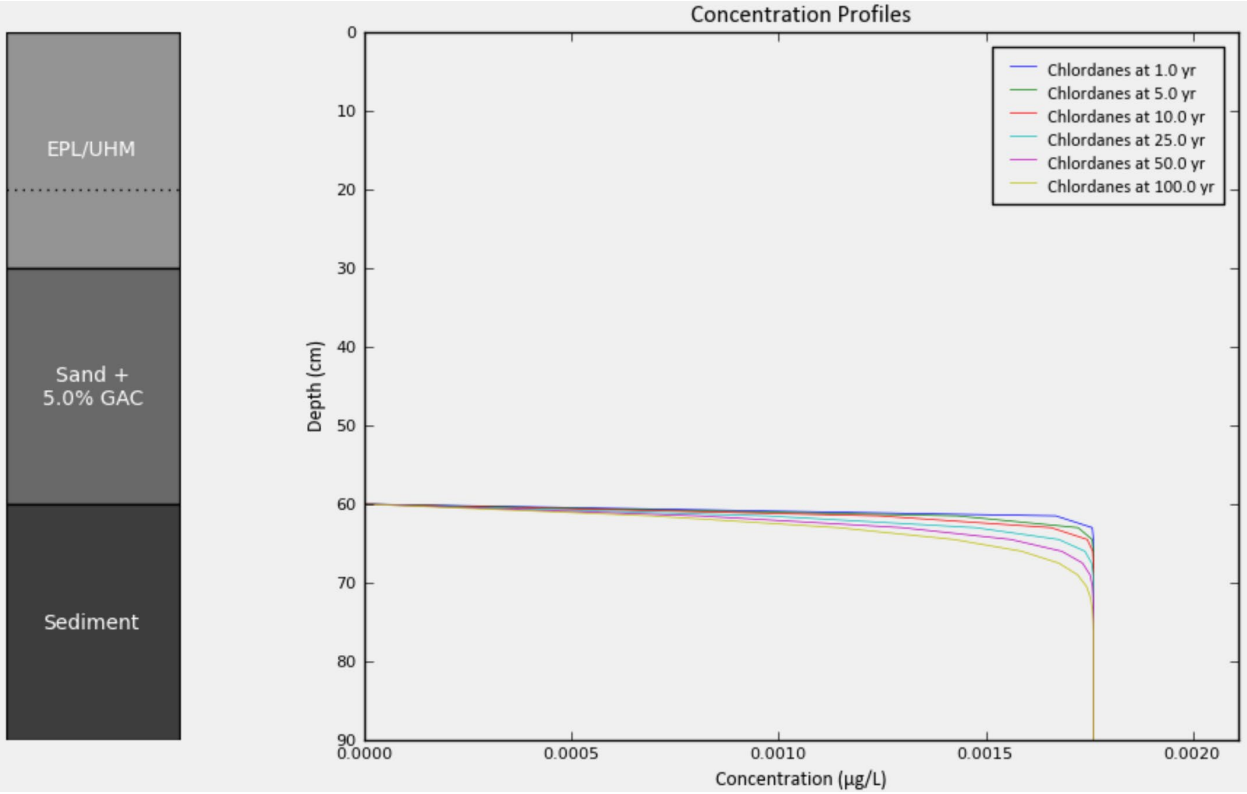

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Benzo(b)fluoranthene at 1.0 yr
Benzo(b)fluoranthene at 5.0 yr
Benzo(b)fluoranthene at 10.0 yr
Benzo(b)fluoranthene at 25.0 yr
Benzo(b)fluoranthene at 50.0 yr
Benzo(b)fluoranthene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
Concentration (µg/L)

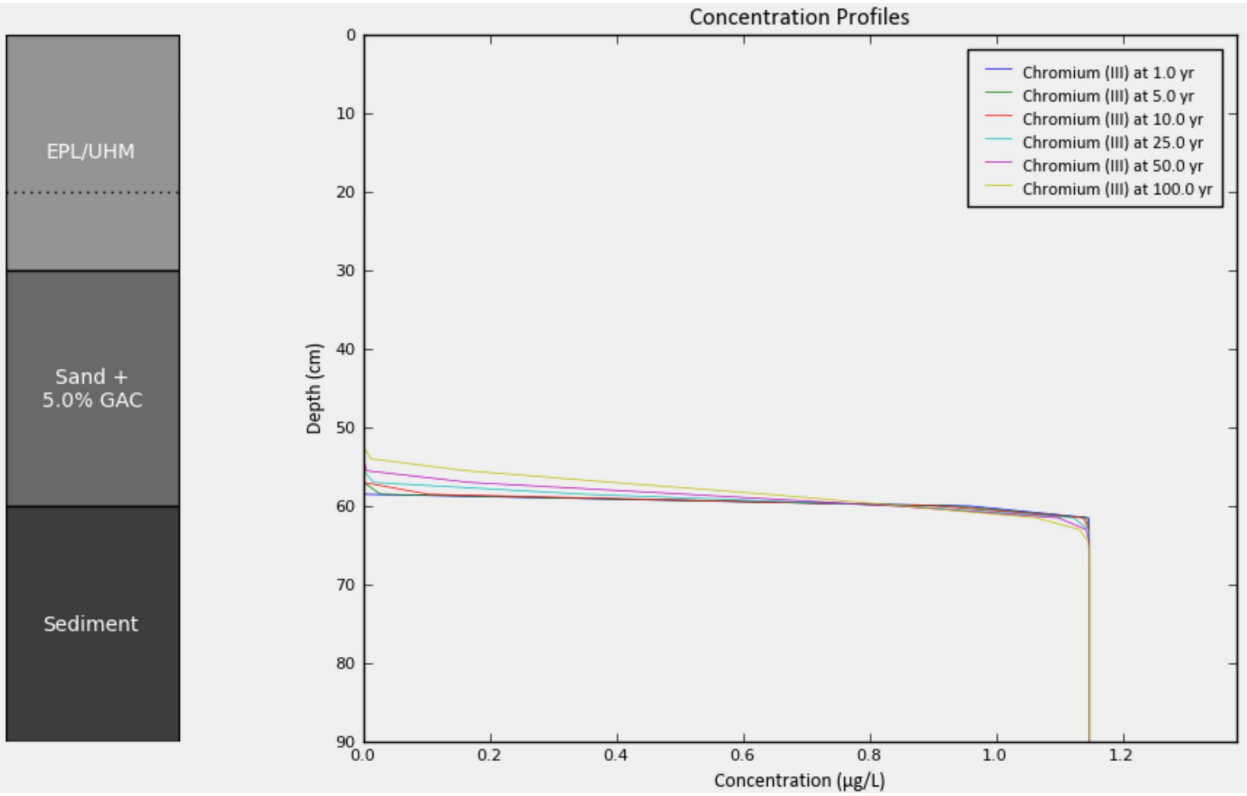

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Benzo(e)pyrene at 1.0 yr
Benzo(e)pyrene at 5.0 yr
Benzo(e)pyrene at 10.0 yr
Benzo(e)pyrene at 25.0 yr
Benzo(e)pyrene at 50.0 yr
Benzo(e)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

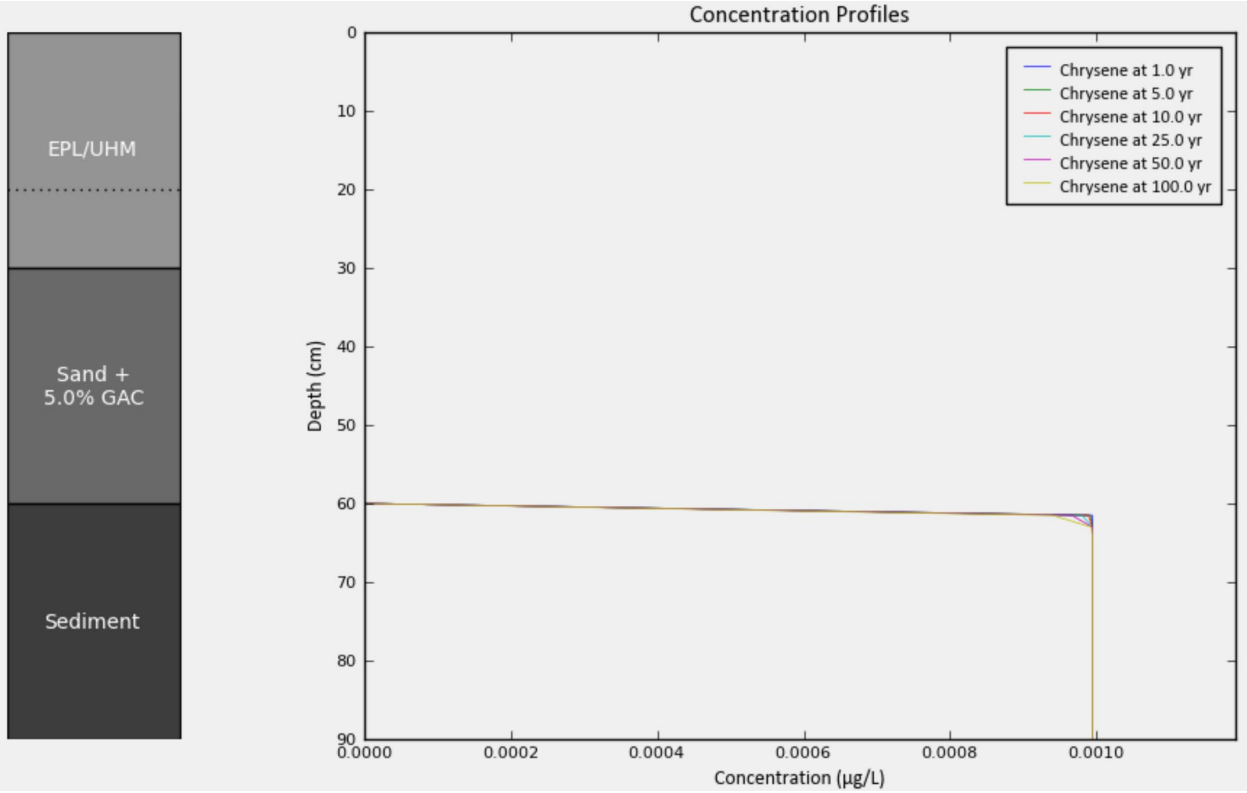

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Benzo(ghi)perylene at 1.0 yr
Benzo(ghi)perylene at 5.0 yr
Benzo(ghi)perylene at 10.0 yr
Benzo(ghi)perylene at 25.0 yr
Benzo(ghi)perylene at 50.0 yr
Benzo(ghi)perylene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

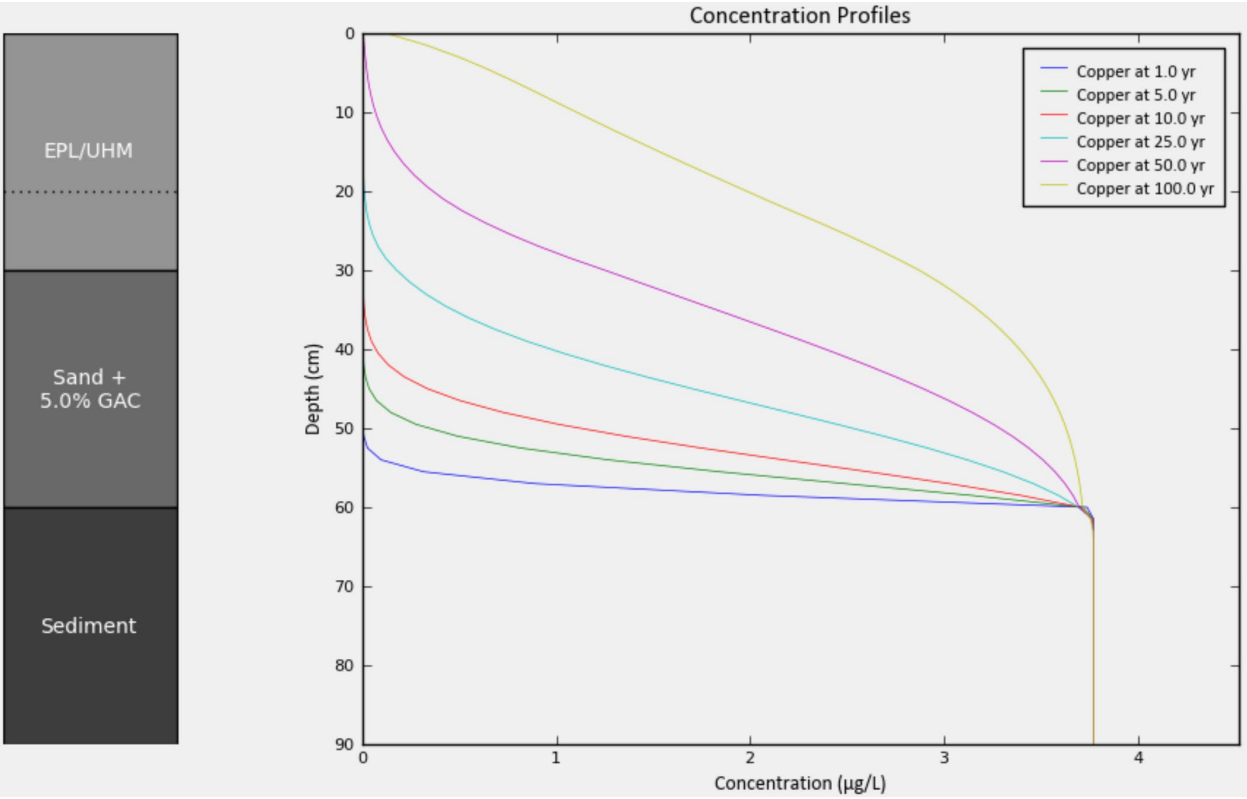

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Benzo(k)fluoranthene at 1.0 yr
Benzo(k)fluoranthene at 5.0 yr
Benzo(k)fluoranthene at 10.0 yr
Benzo(k)fluoranthene at 25.0 yr
Benzo(k)fluoranthene at 50.0 yr
Benzo(k)fluoranthene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
Concentration (µg/L)

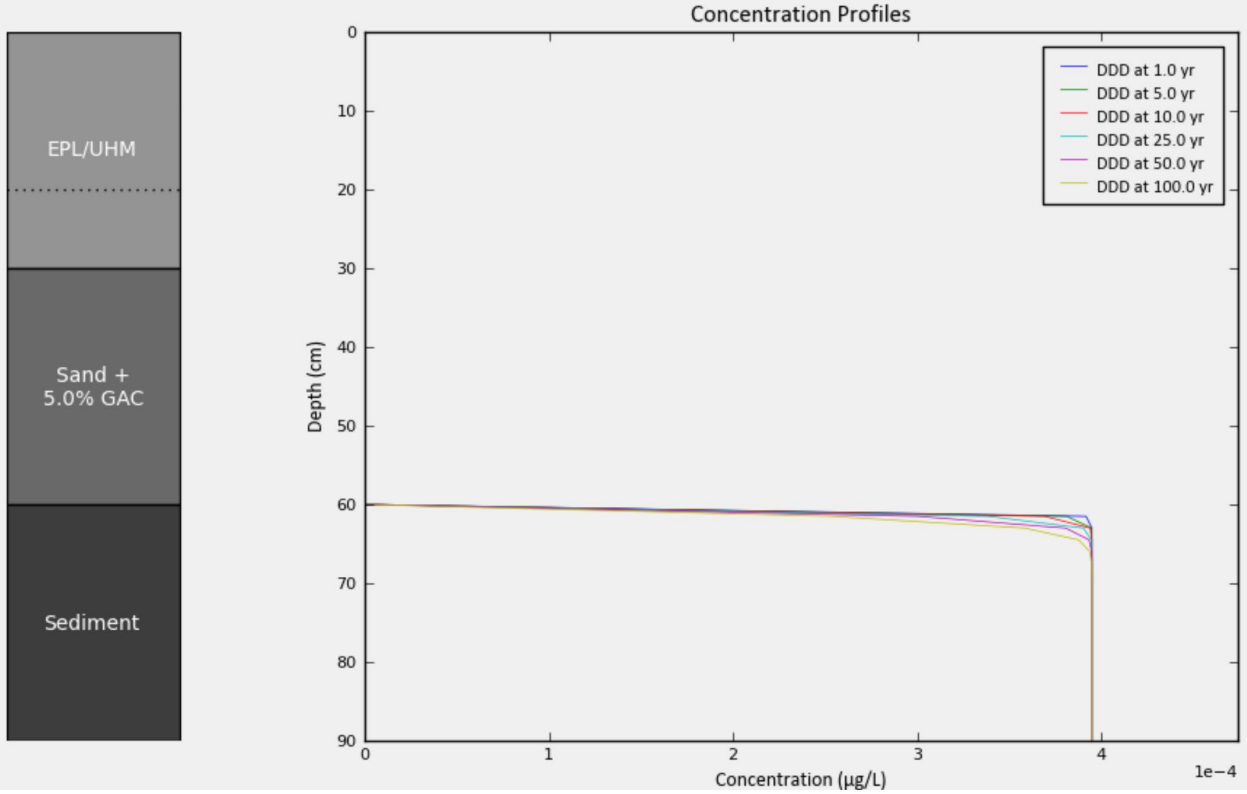

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Cadmium at 1.0 yr
Cadmium at 5.0 yr
Cadmium at 10.0 yr
Cadmium at 25.0 yr
Cadmium at 50.0 yr
Cadmium at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
0.012
0.014
0.016
Concentration (µg/L)

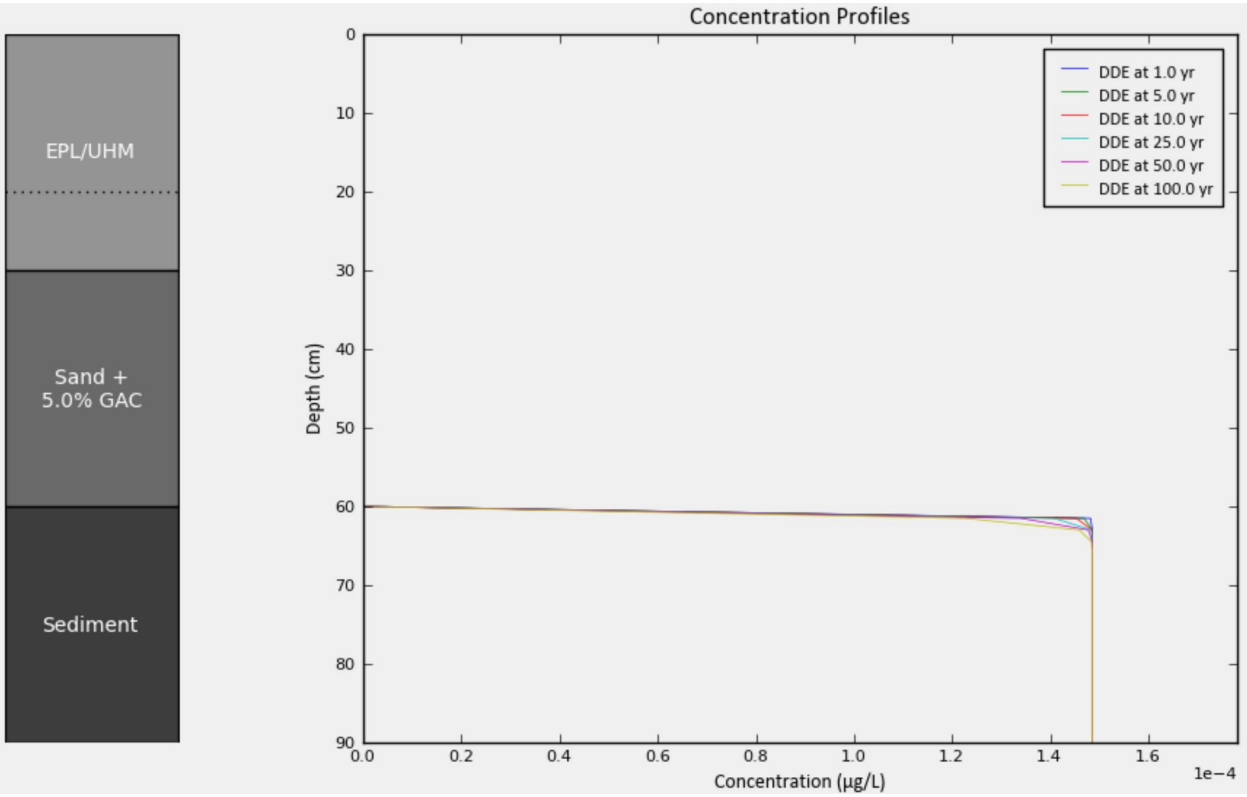

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Chlordanes at 1.0 yr
Chlordanes at 5.0 yr
Chlordanes at 10.0 yr
Chlordanes at 25.0 yr
Chlordanes at 50.0 yr
Chlordanes at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

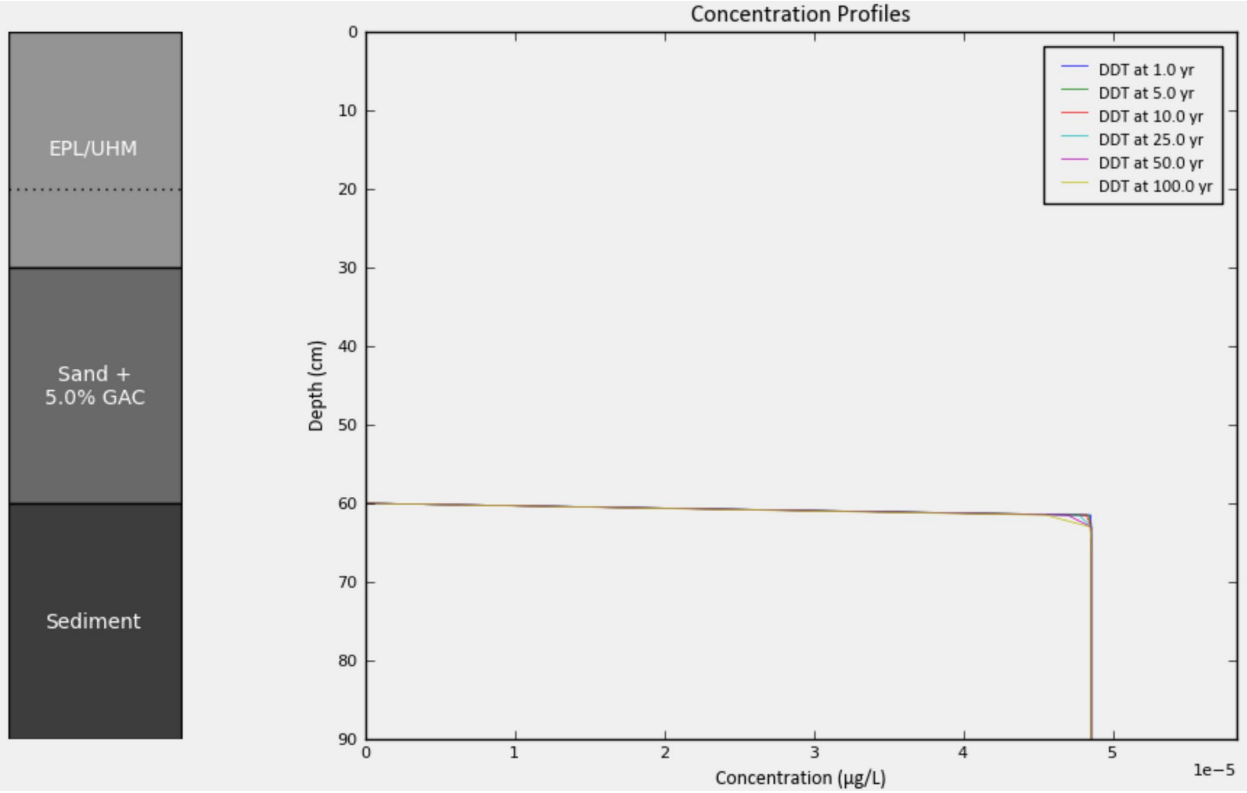

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Chromium (III) at 1.0 yr
Chromium (III) at 5.0 yr
Chromium (III) at 10.0 yr
Chromium (III) at 25.0 yr
Chromium (III) at 50.0 yr
Chromium (III) at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Concentration (µg/L)

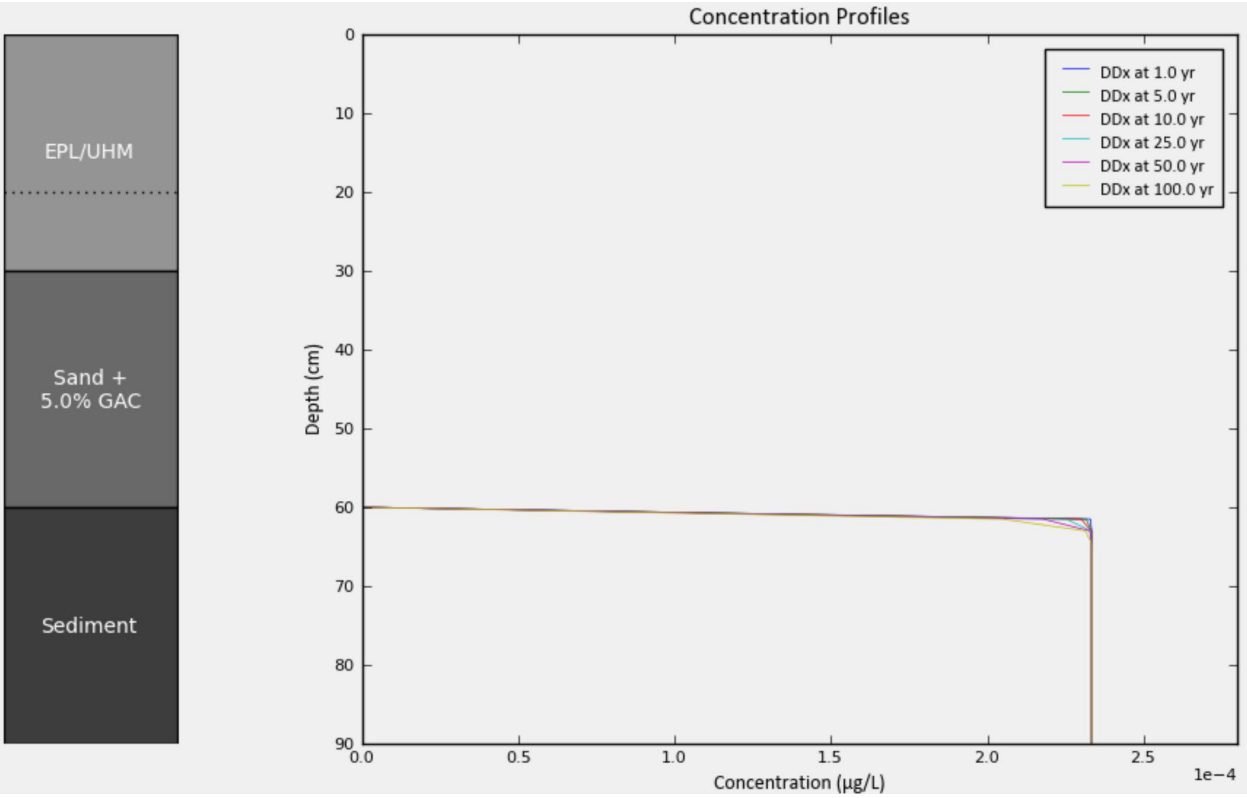

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Chrysene at 1.0 yr
Chrysene at 5.0 yr
Chrysene at 10.0 yr
Chrysene at 25.0 yr
Chrysene at 50.0 yr
Chrysene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010

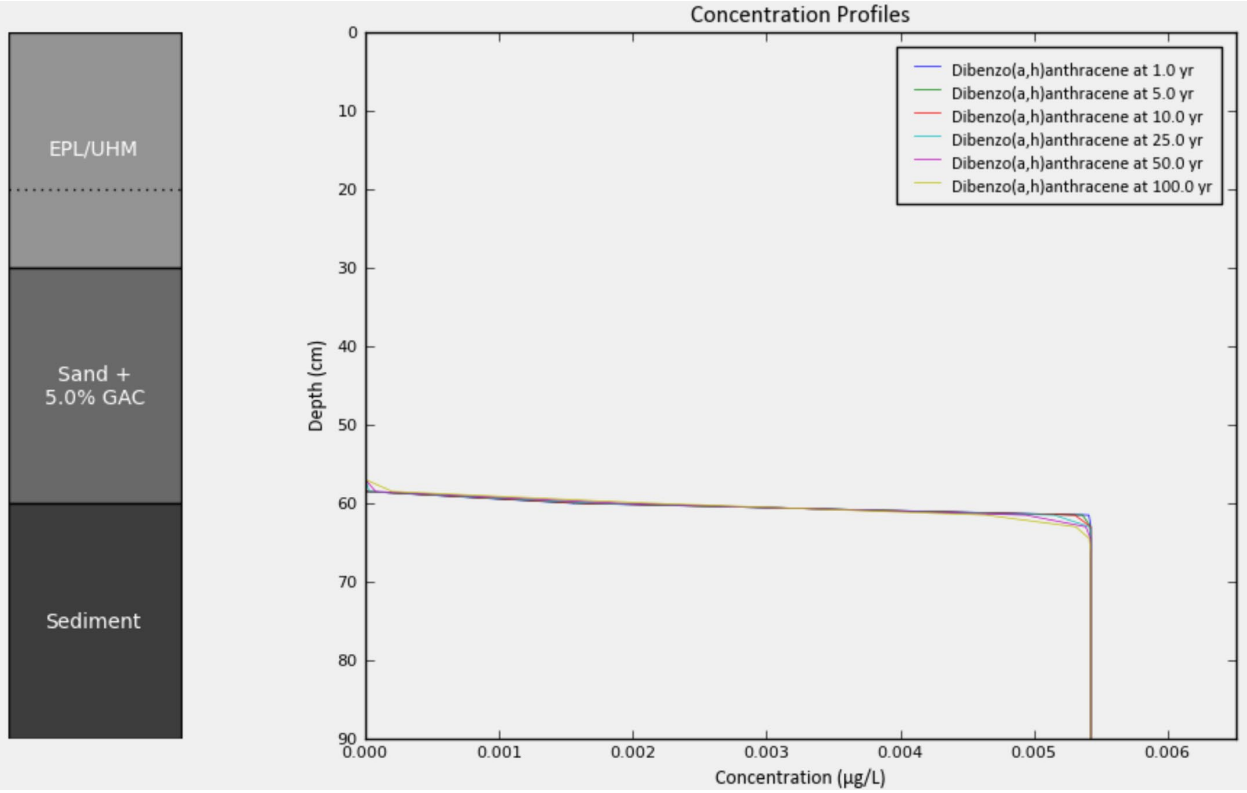

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Copper at 1.0 yr
Copper at 5.0 yr
Copper at 10.0 yr
Copper at 25.0 yr
Copper at 50.0 yr
Copper at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4

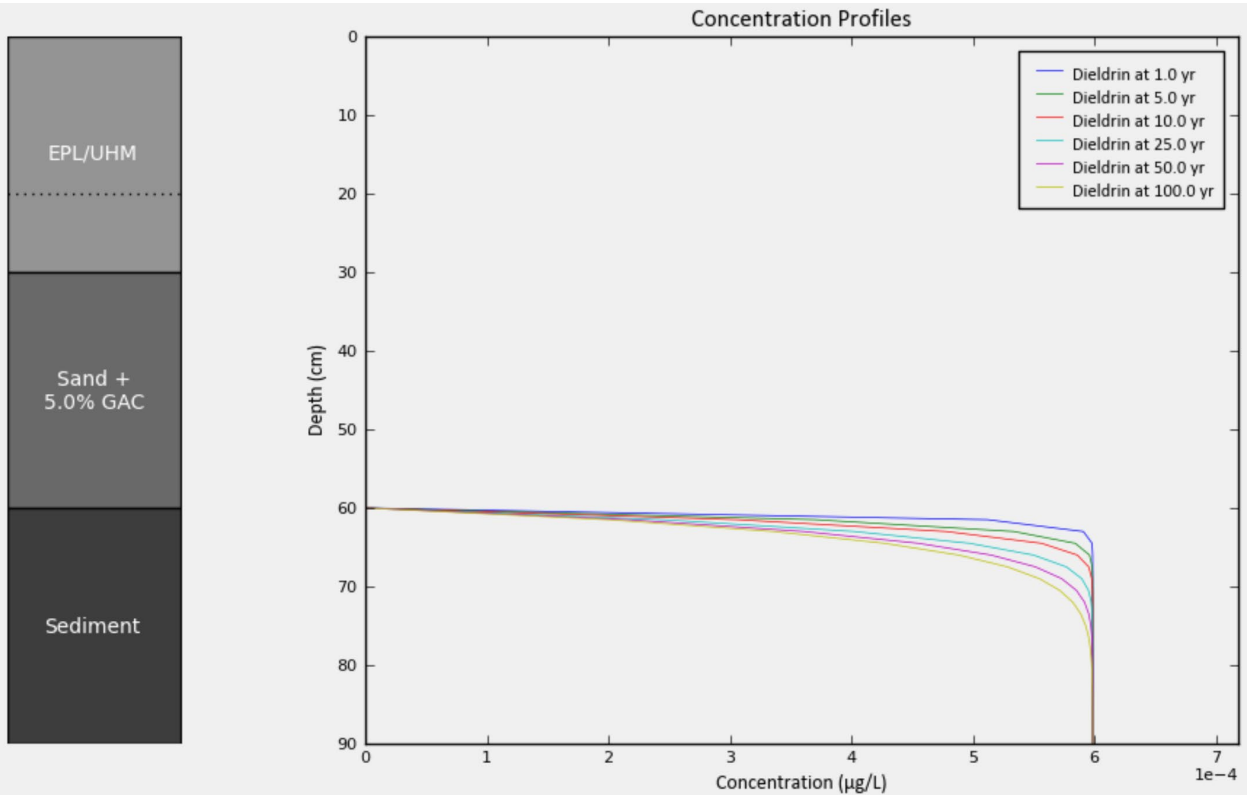

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
DDD at 1.0 yr
DDD at 5.0 yr
DDD at 10.0 yr
DDD at 25.0 yr
DDD at 50.0 yr
DDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

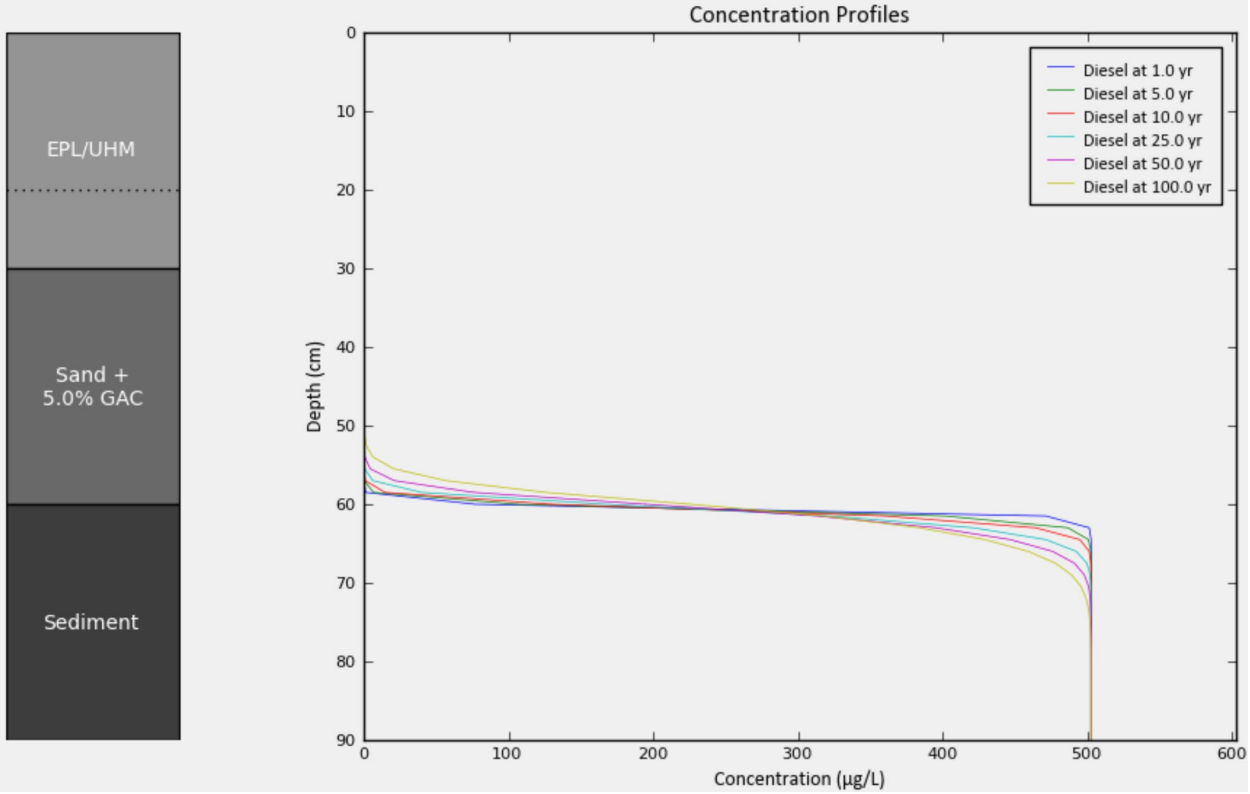

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
DDE at 1.0 yr
DDE at 5.0 yr
DDE at 10.0 yr
DDE at 25.0 yr
DDE at 50.0 yr
DDE at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

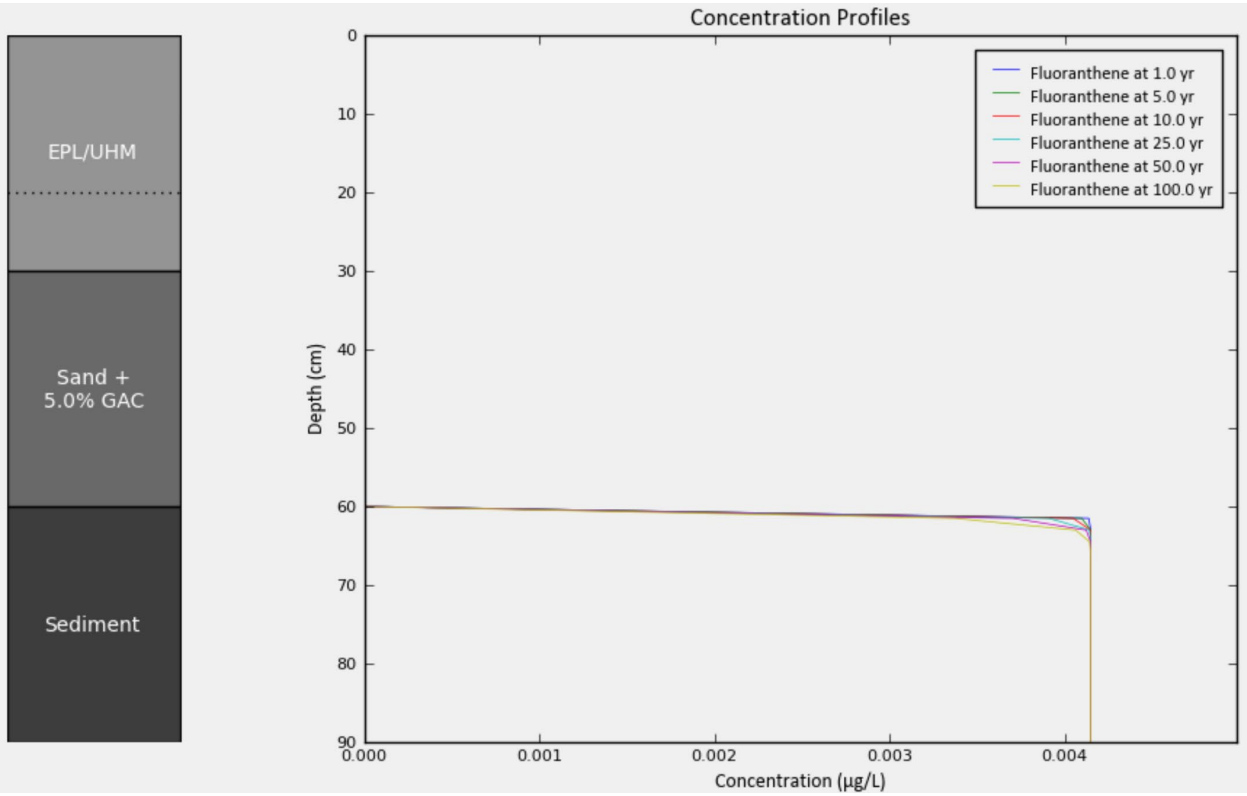

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
DDT at 1.0 yr
DDT at 5.0 yr
DDT at 10.0 yr
DDT at 25.0 yr
DDT at 50.0 yr
DDT at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

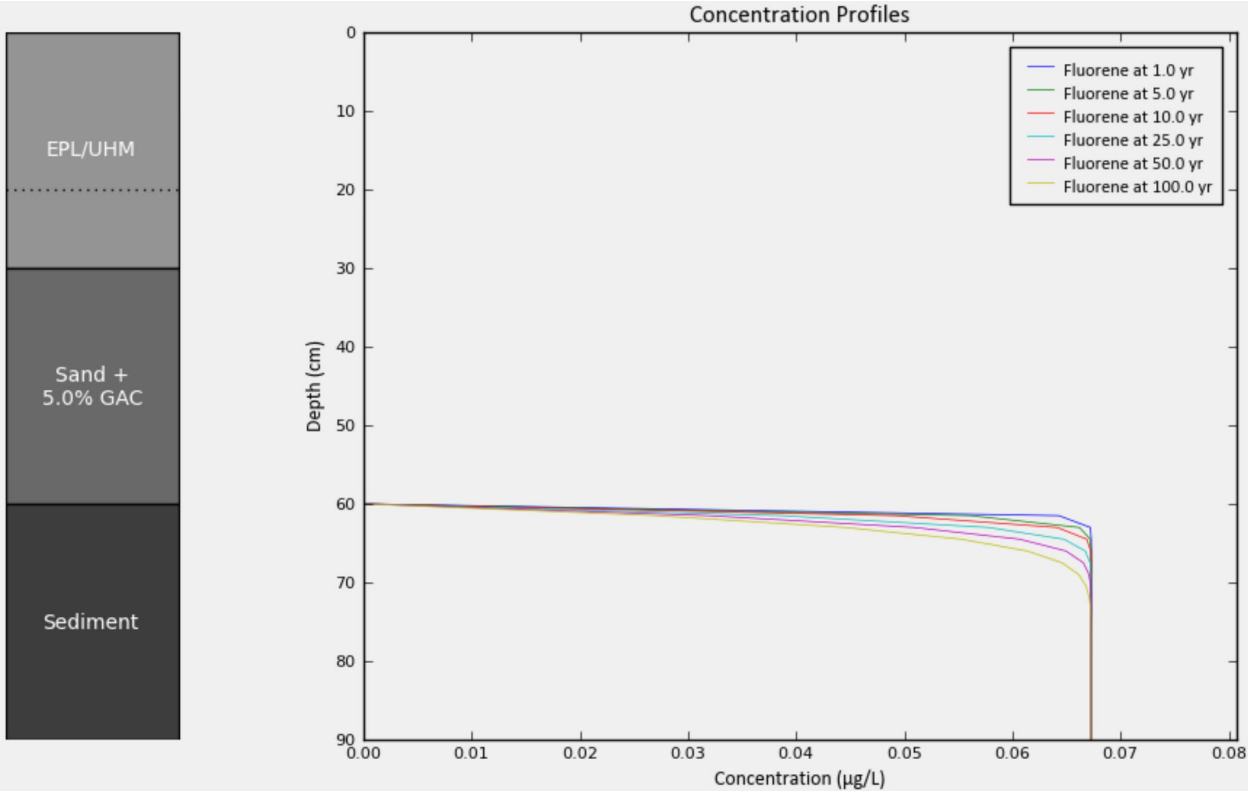

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
DDx at 1.0 yr
DDx at 5.0 yr
DDx at 10.0 yr
DDx at 25.0 yr
DDx at 50.0 yr
DDx at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

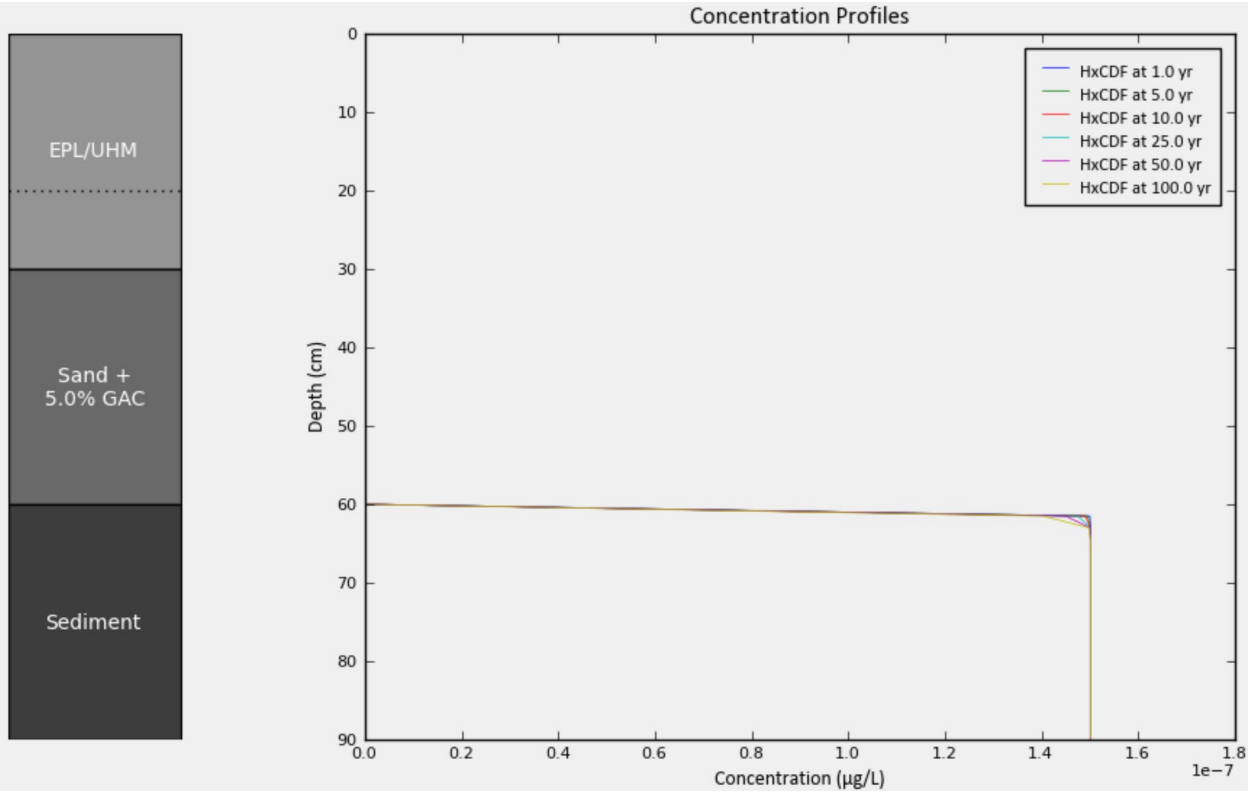

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Dibenzo(a,h)anthracene at 1.0 yr
Dibenzo(a,h)anthracene at 5.0 yr
Dibenzo(a,h)anthracene at 10.0 yr
Dibenzo(a,h)anthracene at 25.0 yr
Dibenzo(a,h)anthracene at 50.0 yr
Dibenzo(a,h)anthracene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

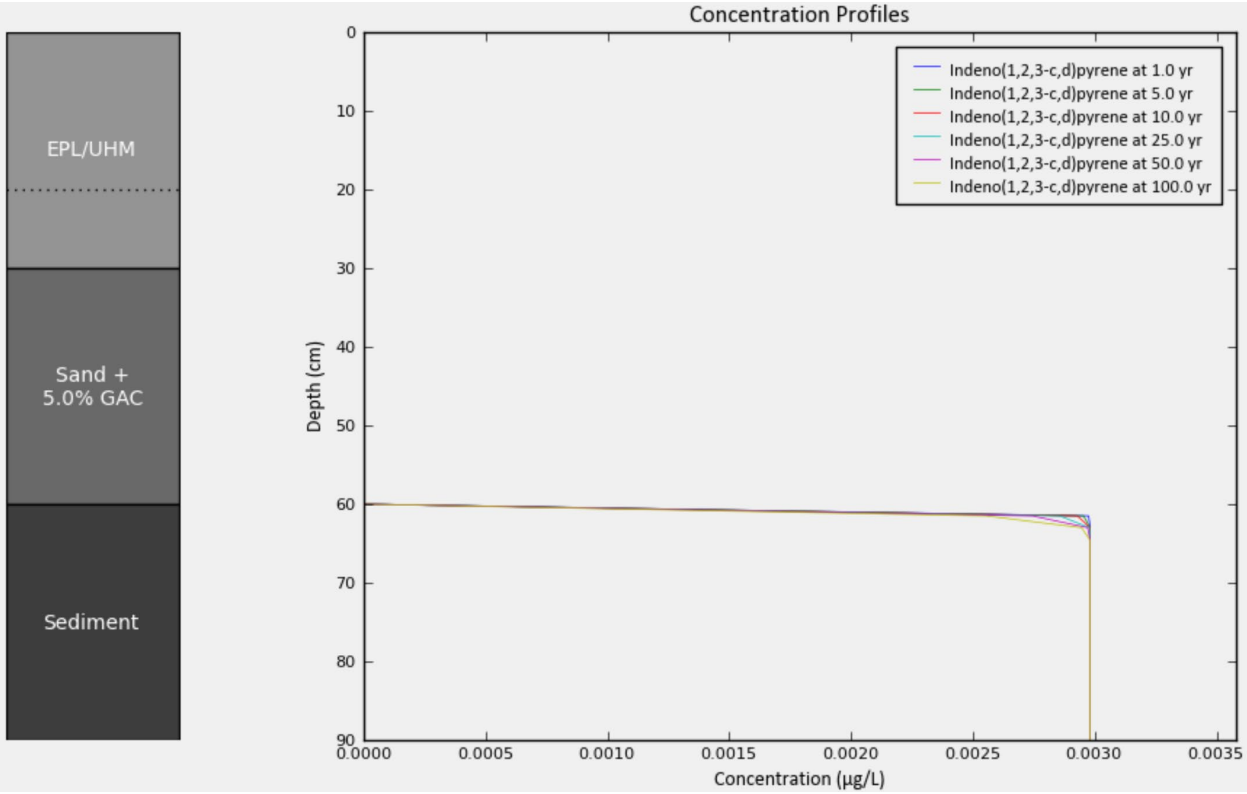

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Dieldrin at 1.0 yr
Dieldrin at 5.0 yr
Dieldrin at 10.0 yr
Dieldrin at 25.0 yr
Dieldrin at 50.0 yr
Dieldrin at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
7
1e−4
Concentration (µg/L)

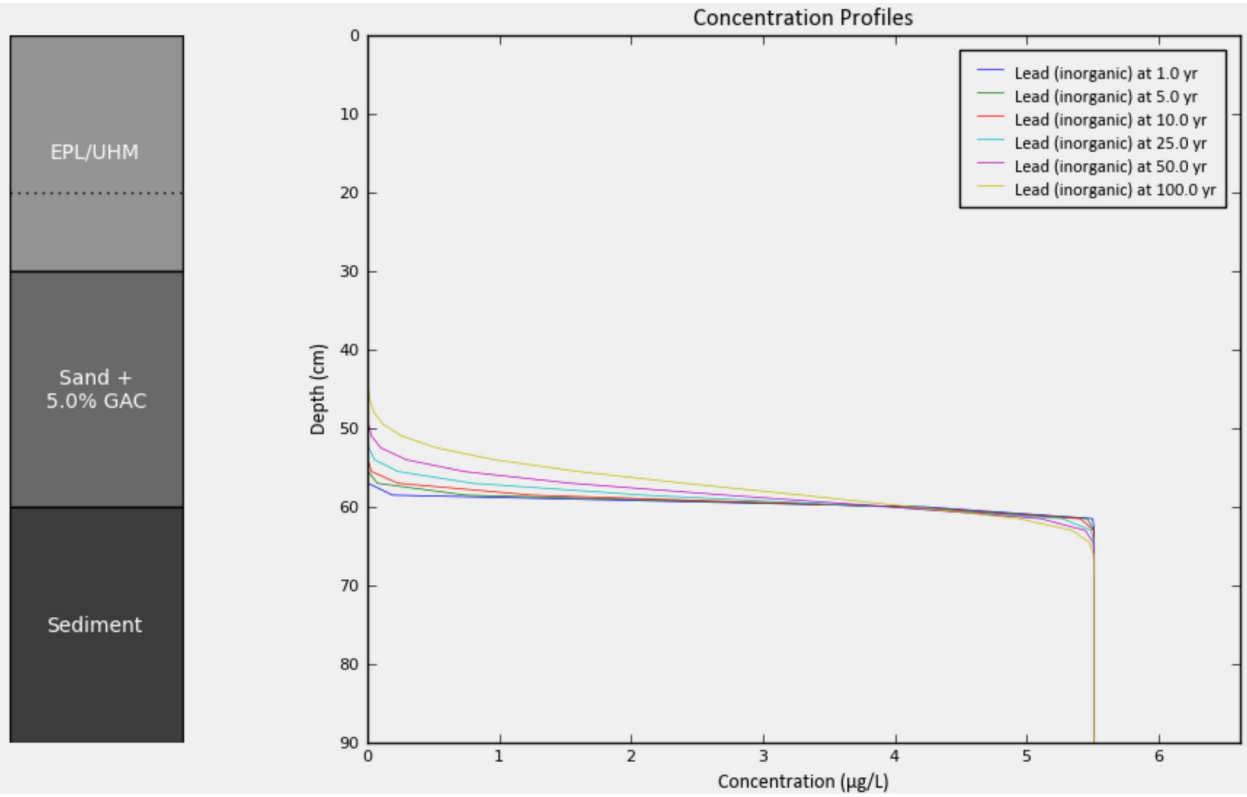

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Diesel at 1.0 yr
Diesel at 5.0 yr
Diesel at 10.0 yr
Diesel at 25.0 yr
Diesel at 50.0 yr
Diesel at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500
600

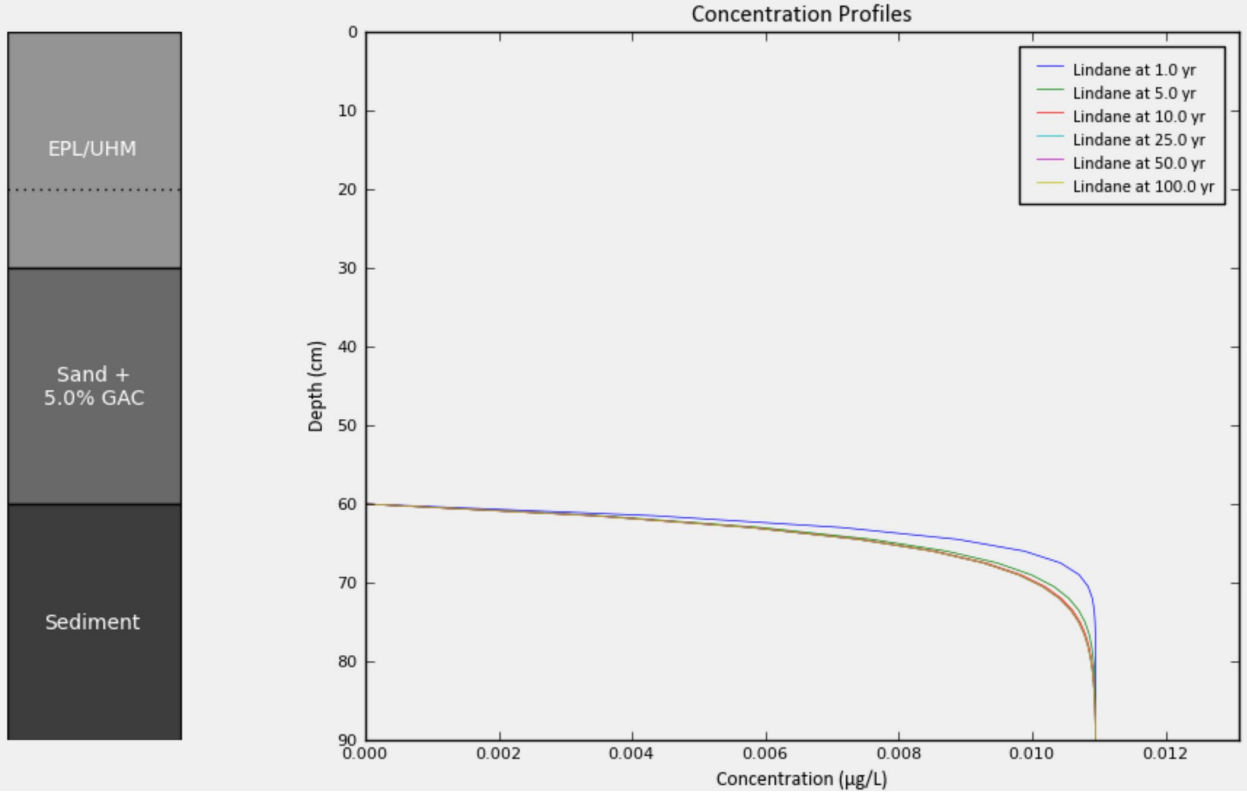

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Fluoranthene at 1.0 yr
Fluoranthene at 5.0 yr
Fluoranthene at 10.0 yr
Fluoranthene at 25.0 yr
Fluoranthene at 50.0 yr
Fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004

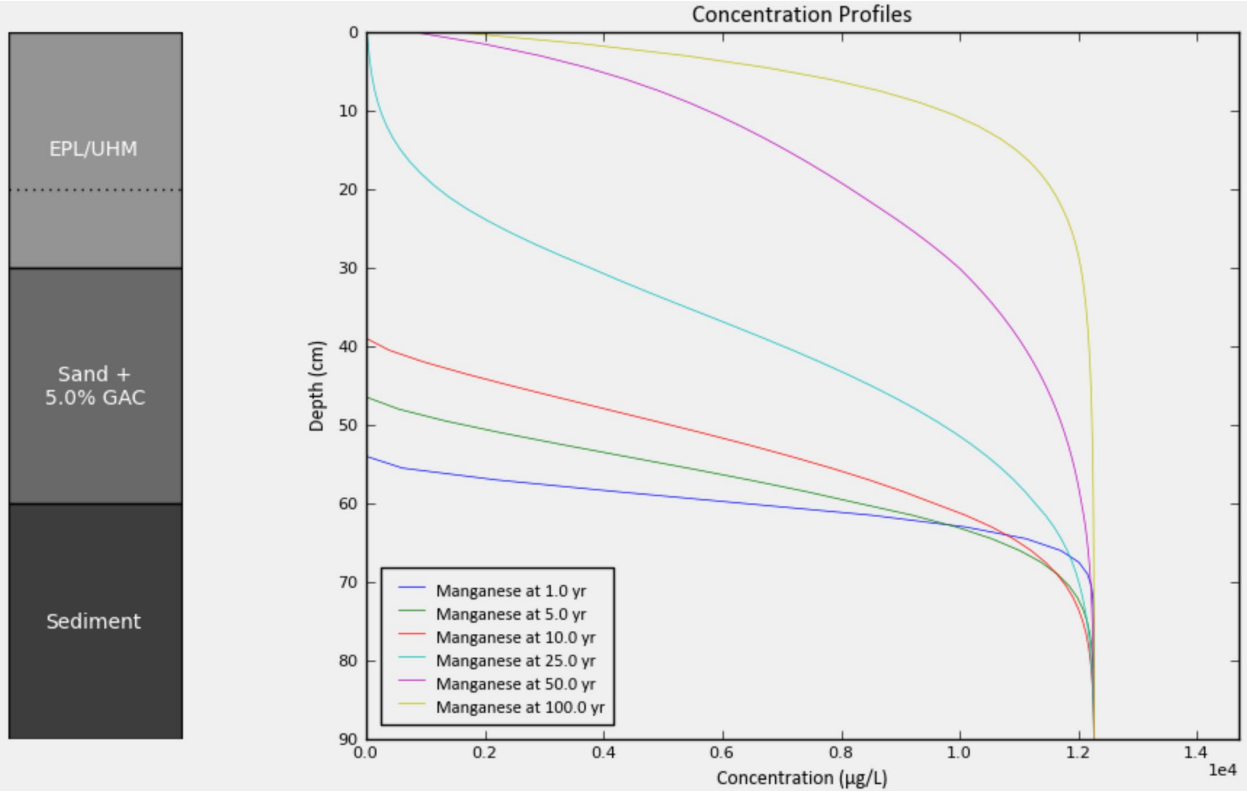

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Fluorene at 1.0 yr
Fluorene at 5.0 yr
Fluorene at 10.0 yr
Fluorene at 25.0 yr
Fluorene at 50.0 yr
Fluorene at 100.0 yr
Depth (cm)
Concentration (µg/L)

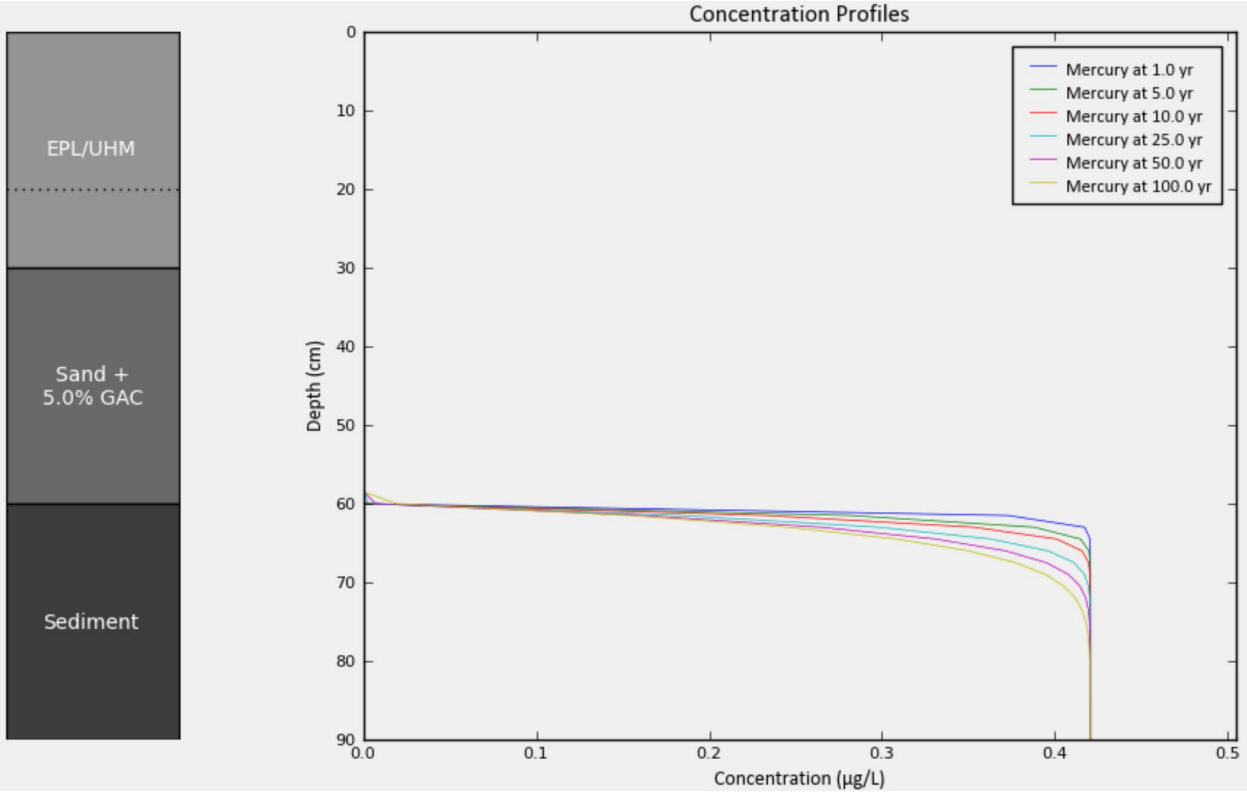

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
HxCDF at 1.0 yr
HxCDF at 5.0 yr
HxCDF at 10.0 yr
HxCDF at 25.0 yr
HxCDF at 50.0 yr
HxCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

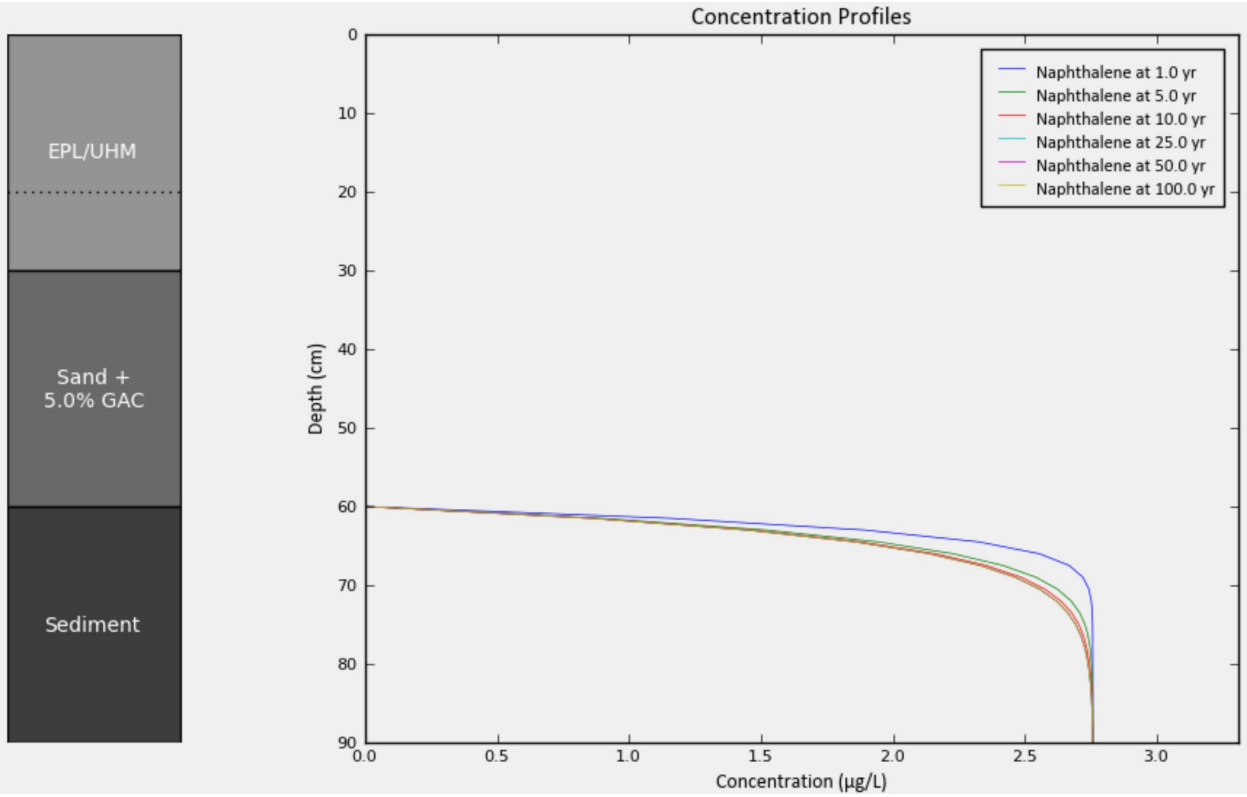

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Indeno(1,2,3-c,d)pyrene at 1.0 yr
Indeno(1,2,3-c,d)pyrene at 5.0 yr
Indeno(1,2,3-c,d)pyrene at 10.0 yr
Indeno(1,2,3-c,d)pyrene at 25.0 yr
Indeno(1,2,3-c,d)pyrene at 50.0 yr
Indeno(1,2,3-c,d)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
0.0035
Concentration (µg/L)

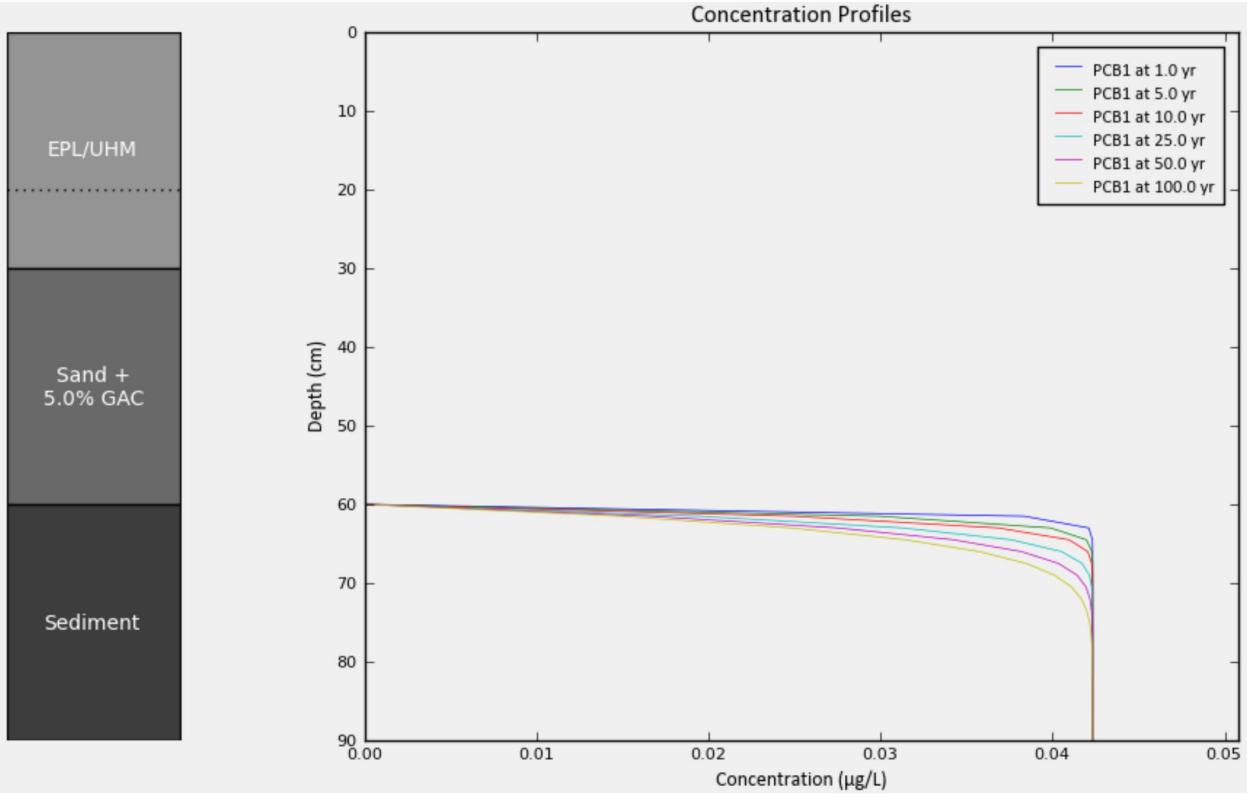

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Lead (inorganic) at 1.0 yr
Lead (inorganic) at 5.0 yr
Lead (inorganic) at 10.0 yr
Lead (inorganic) at 25.0 yr
Lead (inorganic) at 50.0 yr
Lead (inorganic) at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
Concentration (µg/L)

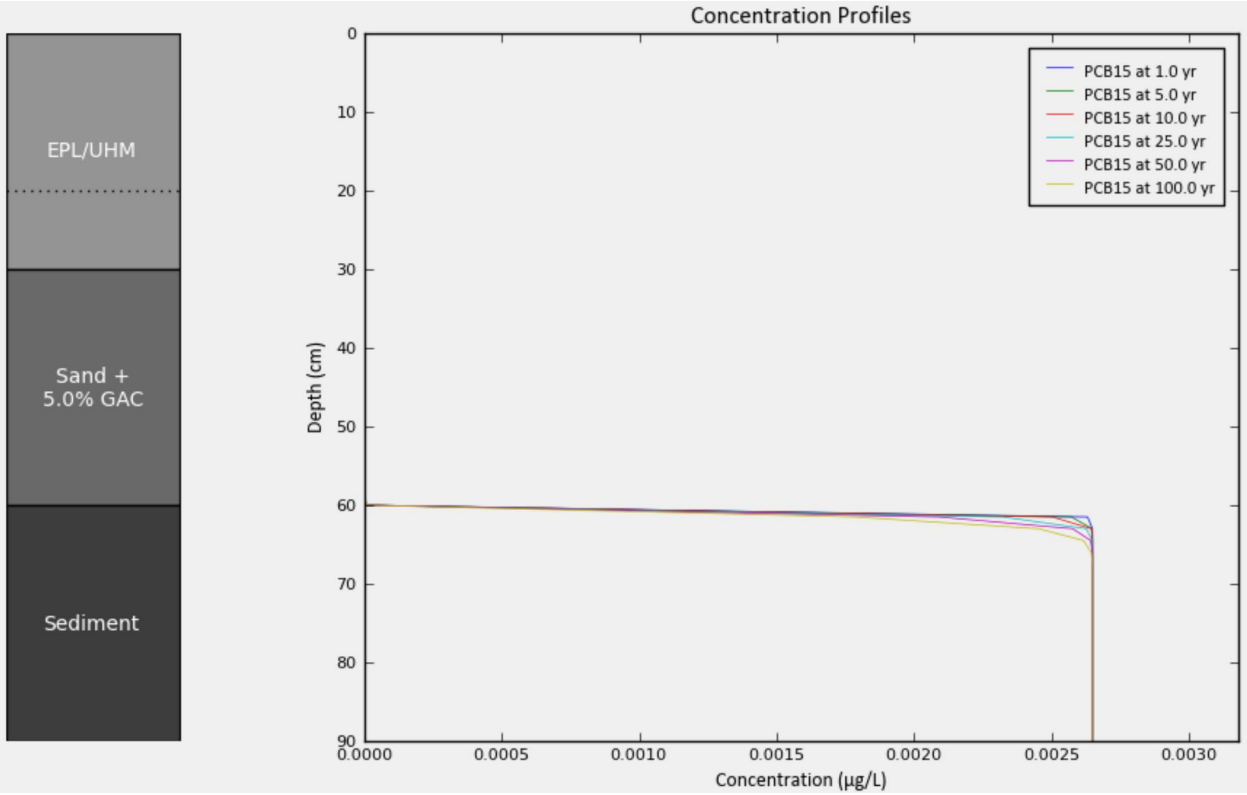

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Lindane at 1.0 yr
Lindane at 5.0 yr
Lindane at 10.0 yr
Lindane at 25.0 yr
Lindane at 50.0 yr
Lindane at 100.0 yr
Depth (cm)
Concentration (µg/L)

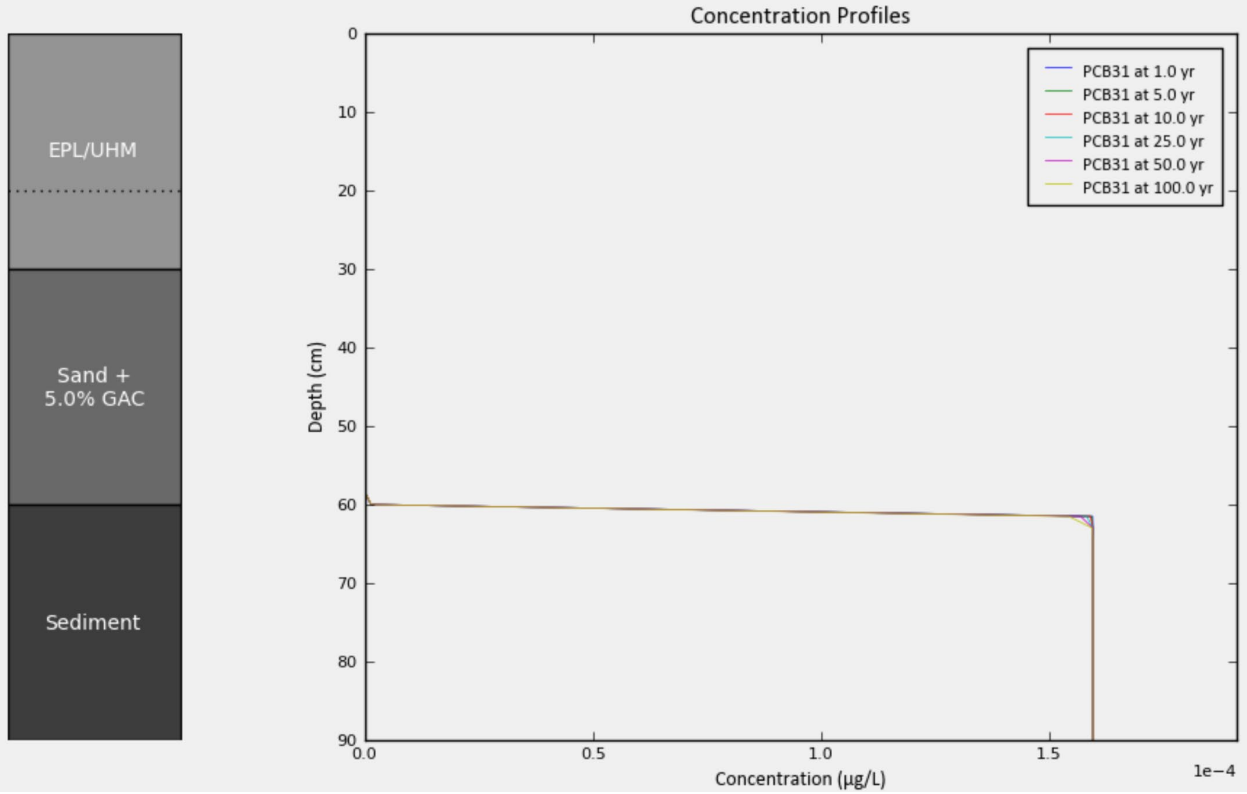

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Manganese at 1.0 yr
Manganese at 5.0 yr
Manganese at 10.0 yr
Manganese at 25.0 yr
Manganese at 50.0 yr
Manganese at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e4

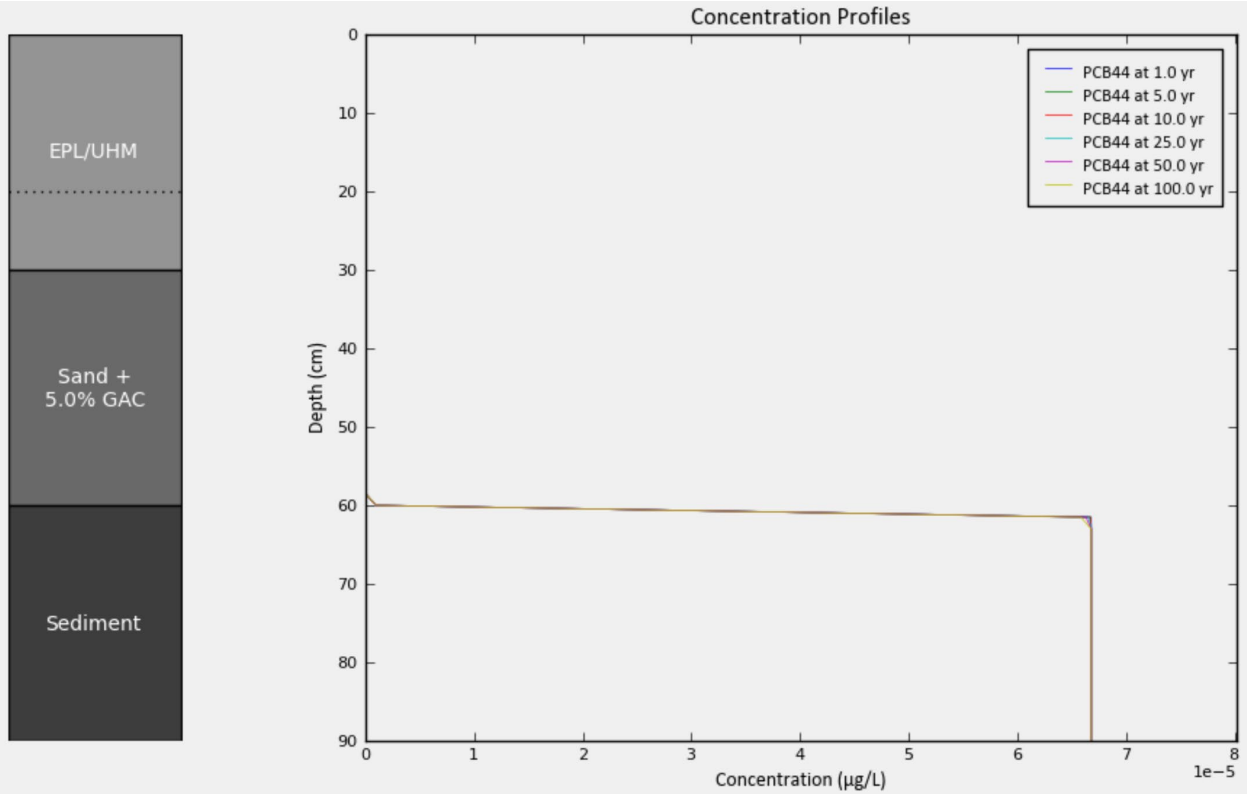

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Mercury at 1.0 yr
Mercury at 5.0 yr
Mercury at 10.0 yr
Mercury at 25.0 yr
Mercury at 50.0 yr
Mercury at 100.0 yr
Depth (cm)
Concentration (µg/L)

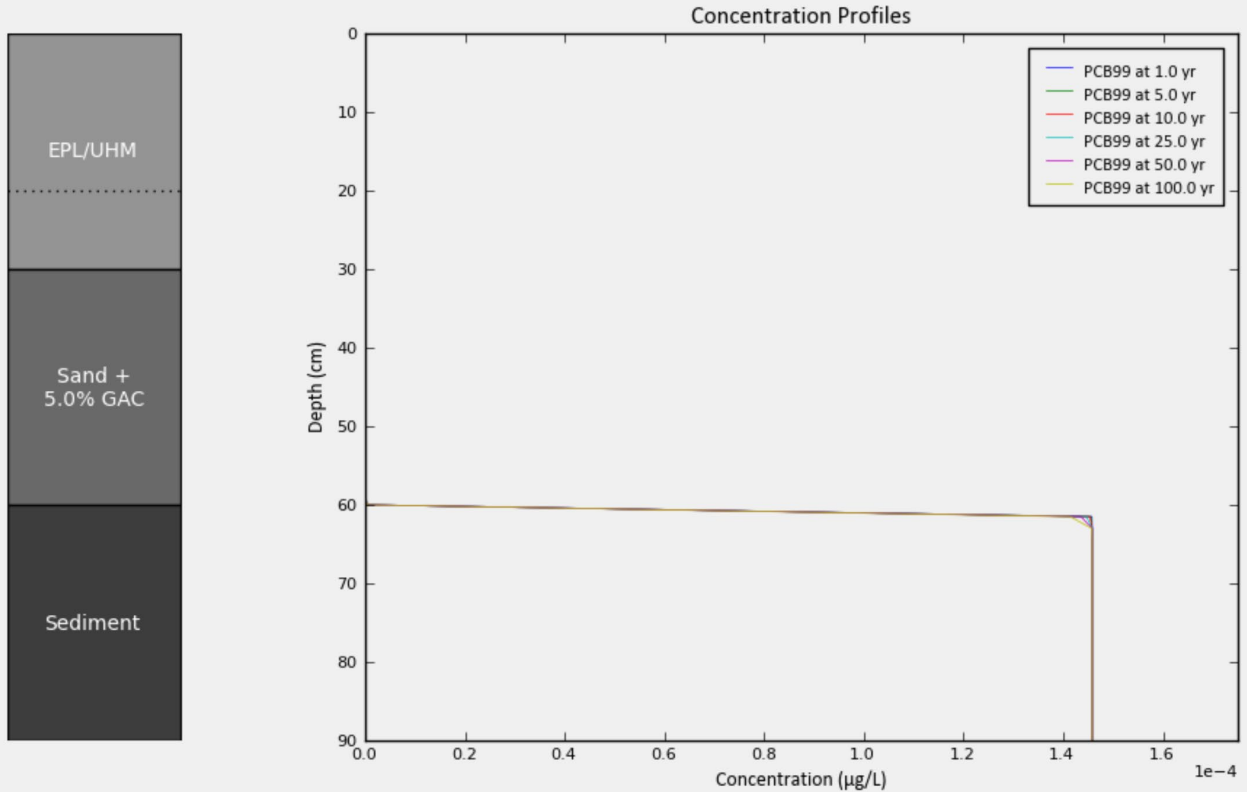

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Naphthalene at 1.0 yr
Naphthalene at 5.0 yr
Naphthalene at 10.0 yr
Naphthalene at 25.0 yr
Naphthalene at 50.0 yr
Naphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

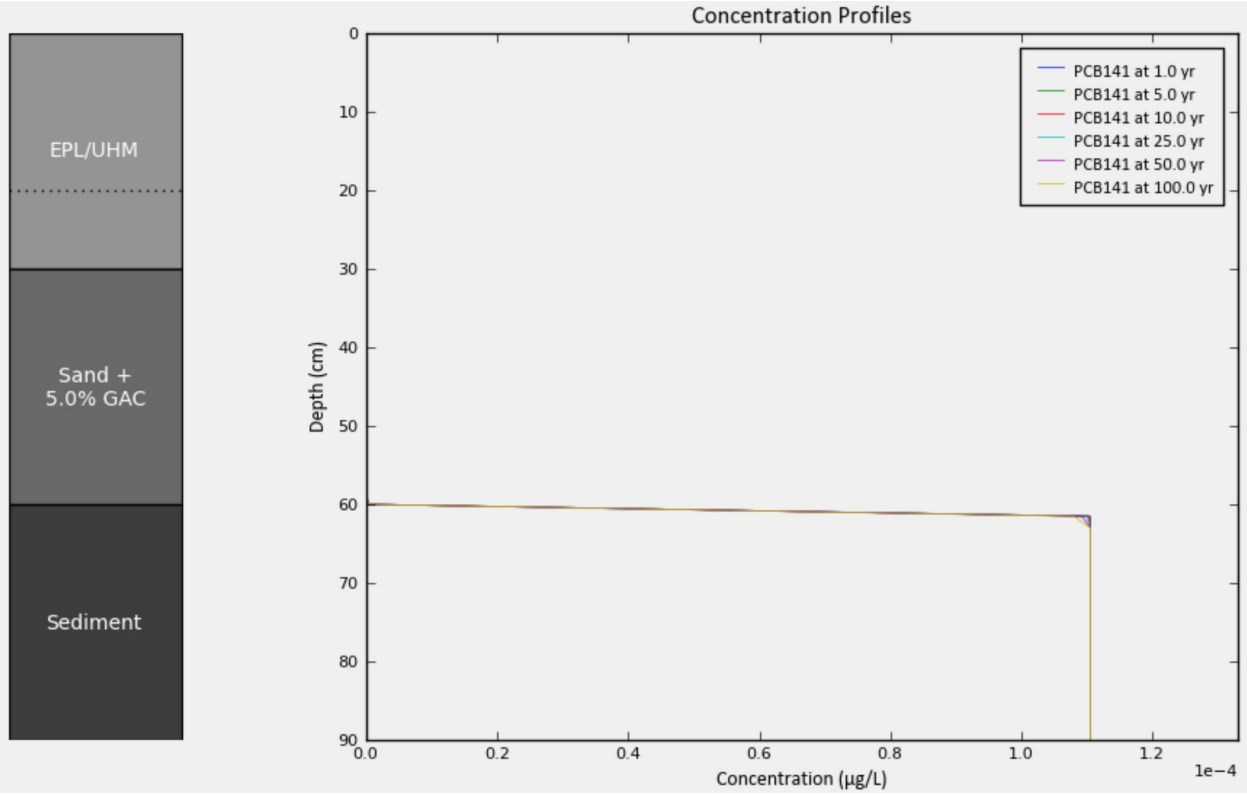

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB1 at 1.0 yr
PCB1 at 5.0 yr
PCB1 at 10.0 yr
PCB1 at 25.0 yr
PCB1 at 50.0 yr
PCB1 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.00
0.01
0.02
0.03
0.04
0.05

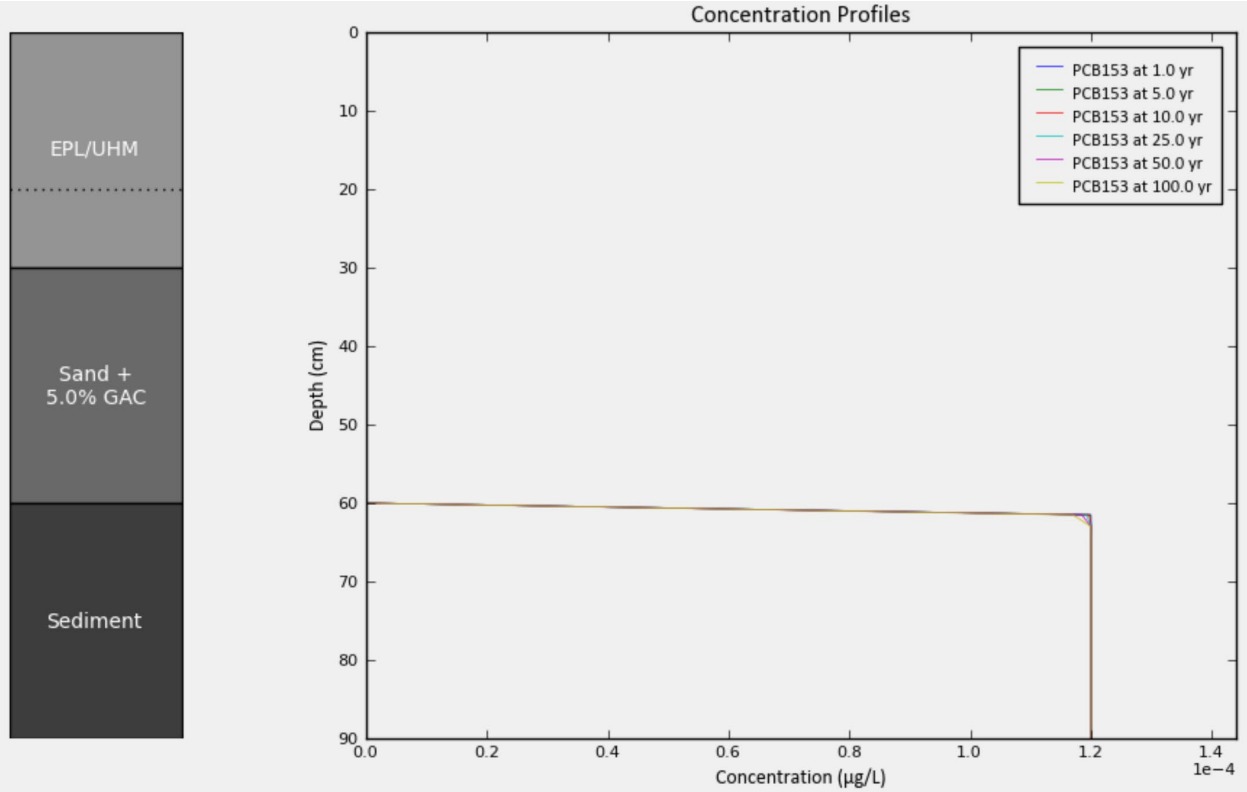

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB15 at 1.0 yr
PCB15 at 5.0 yr
PCB15 at 10.0 yr
PCB15 at 25.0 yr
PCB15 at 50.0 yr
PCB15 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030

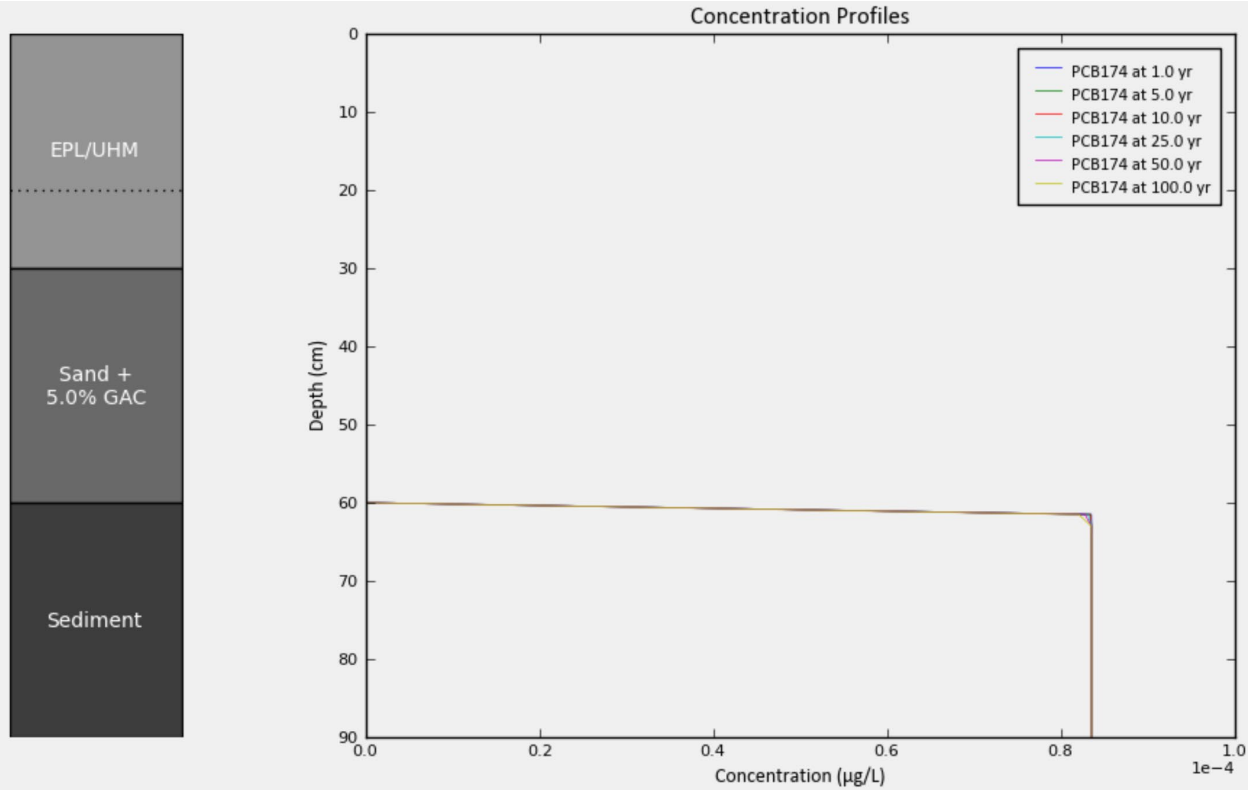

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB31 at 1.0 yr
PCB31 at 5.0 yr
PCB31 at 10.0 yr
PCB31 at 25.0 yr
PCB31 at 50.0 yr
PCB31 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

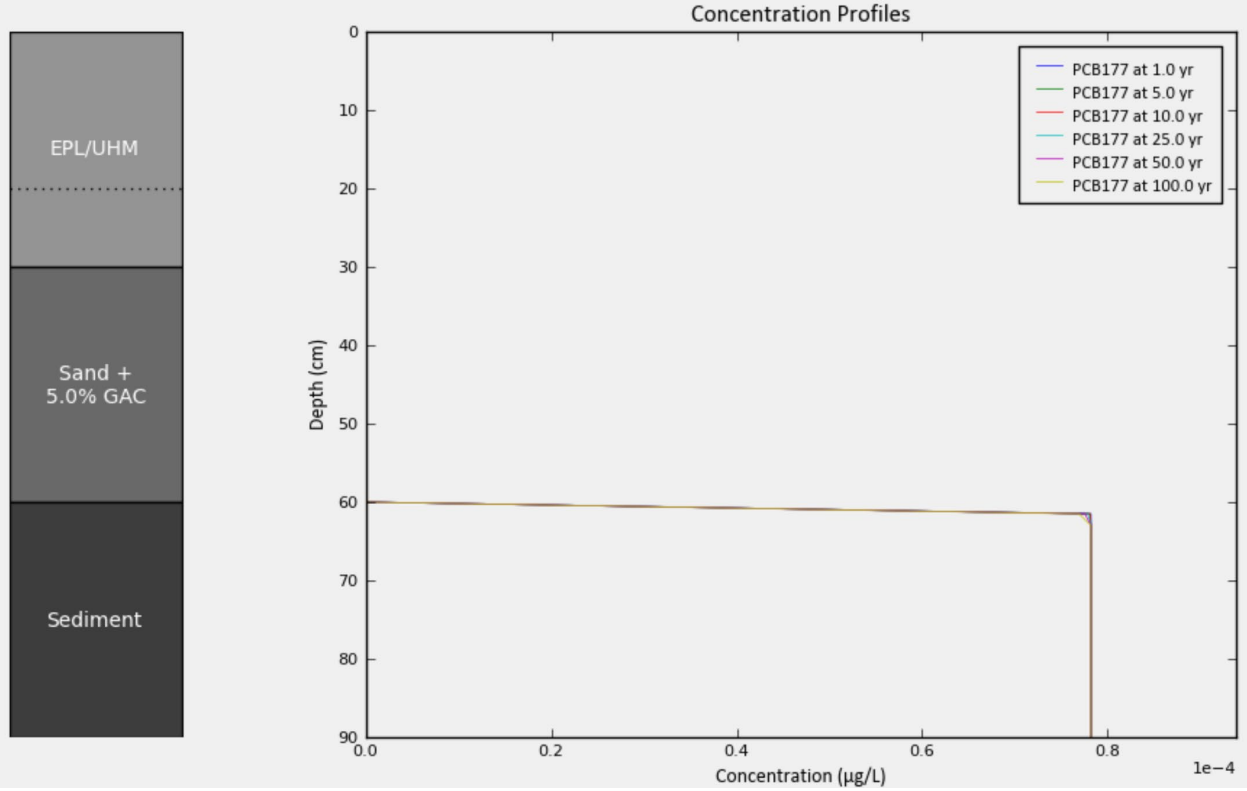

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB44 at 1.0 yr
PCB44 at 5.0 yr
PCB44 at 10.0 yr
PCB44 at 25.0 yr
PCB44 at 50.0 yr
PCB44 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

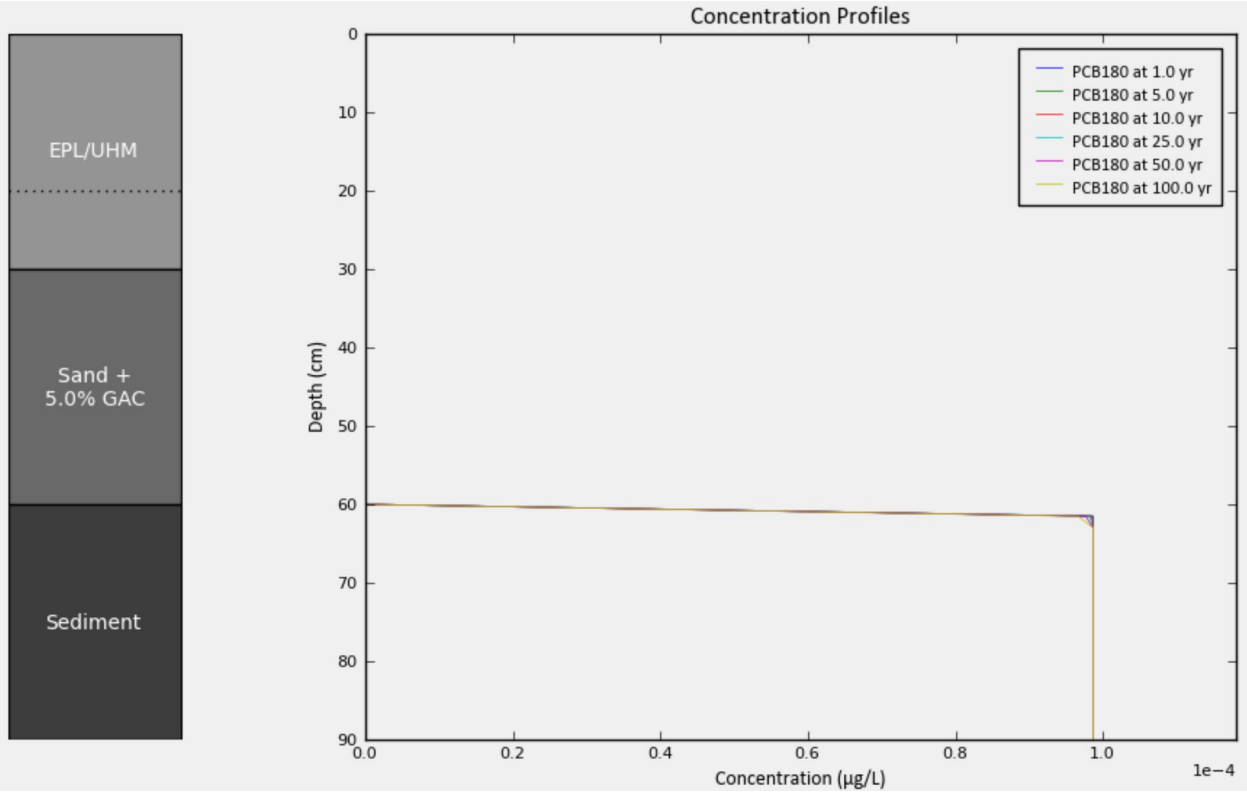

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB99 at 1.0 yr
PCB99 at 5.0 yr
PCB99 at 10.0 yr
PCB99 at 25.0 yr
PCB99 at 50.0 yr
PCB99 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

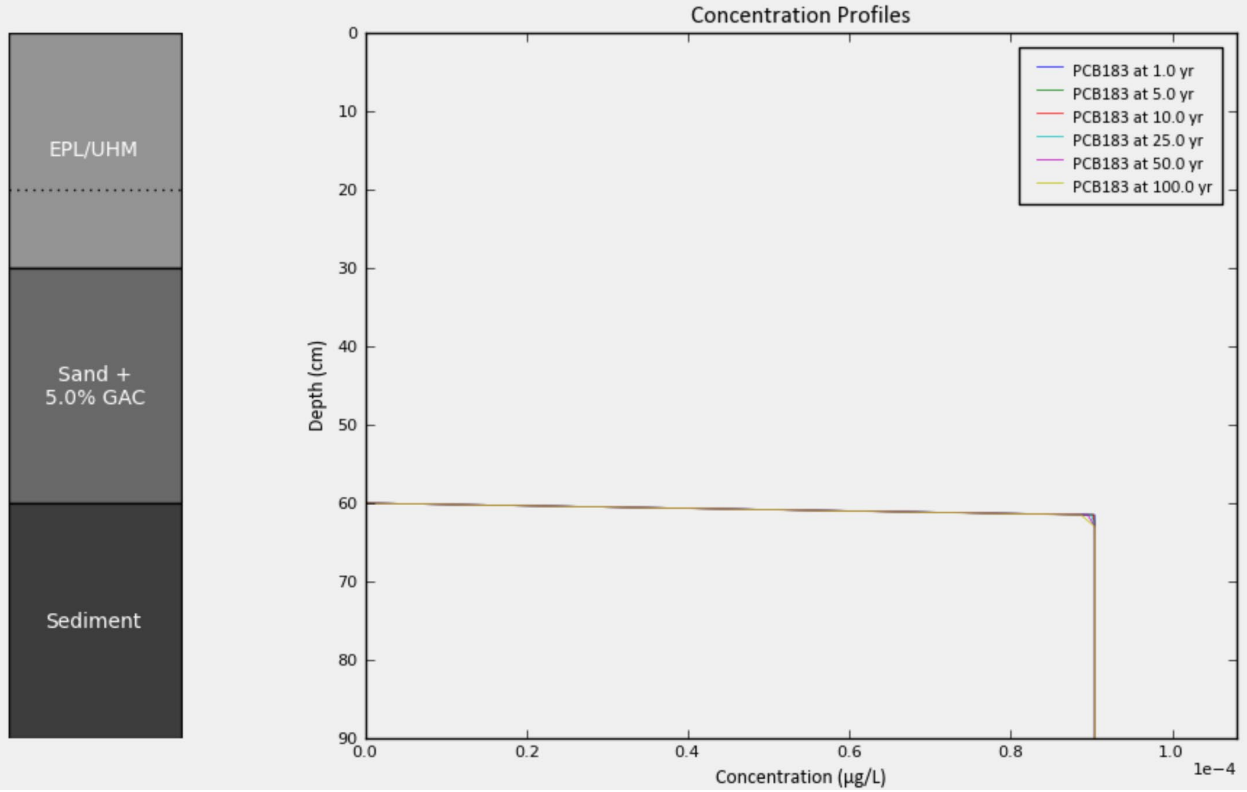

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB141 at 1.0 yr
PCB141 at 5.0 yr
PCB141 at 10.0 yr
PCB141 at 25.0 yr
PCB141 at 50.0 yr
PCB141 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

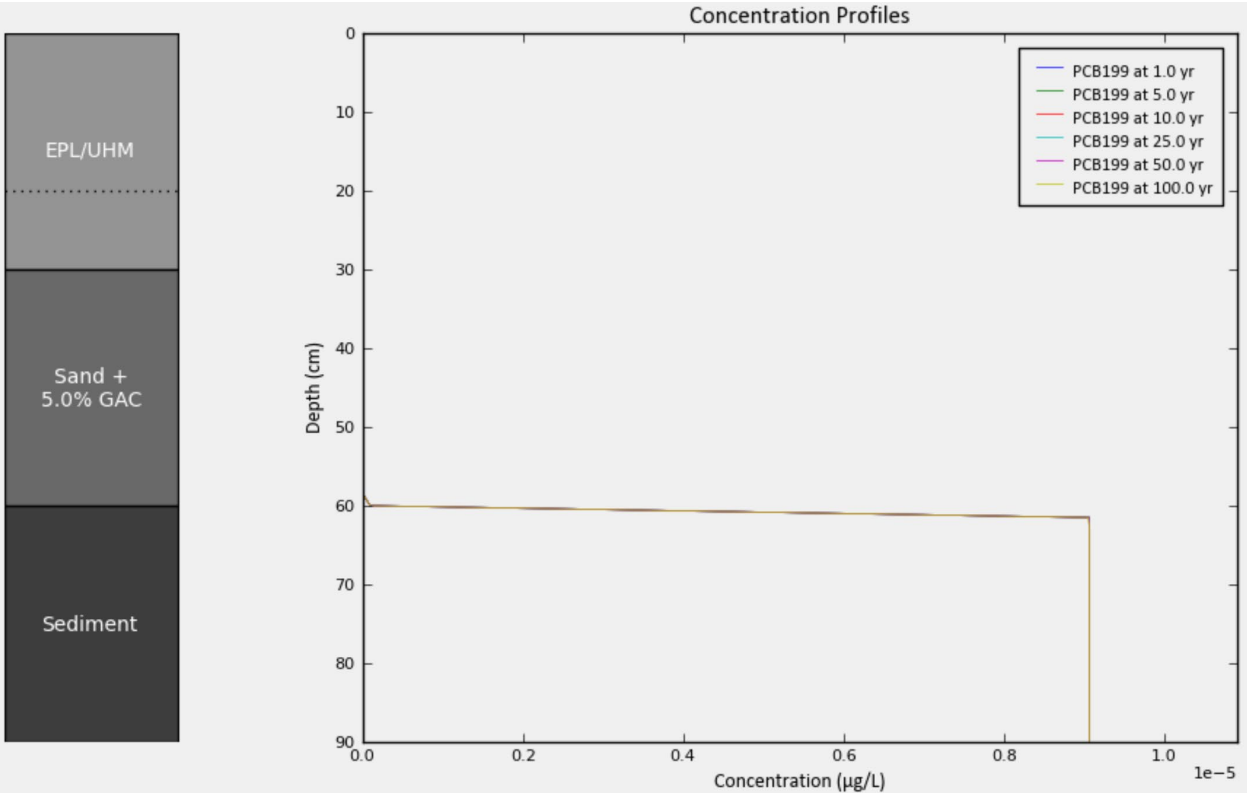

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB153 at 1.0 yr
PCB153 at 5.0 yr
PCB153 at 10.0 yr
PCB153 at 25.0 yr
PCB153 at 50.0 yr
PCB153 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

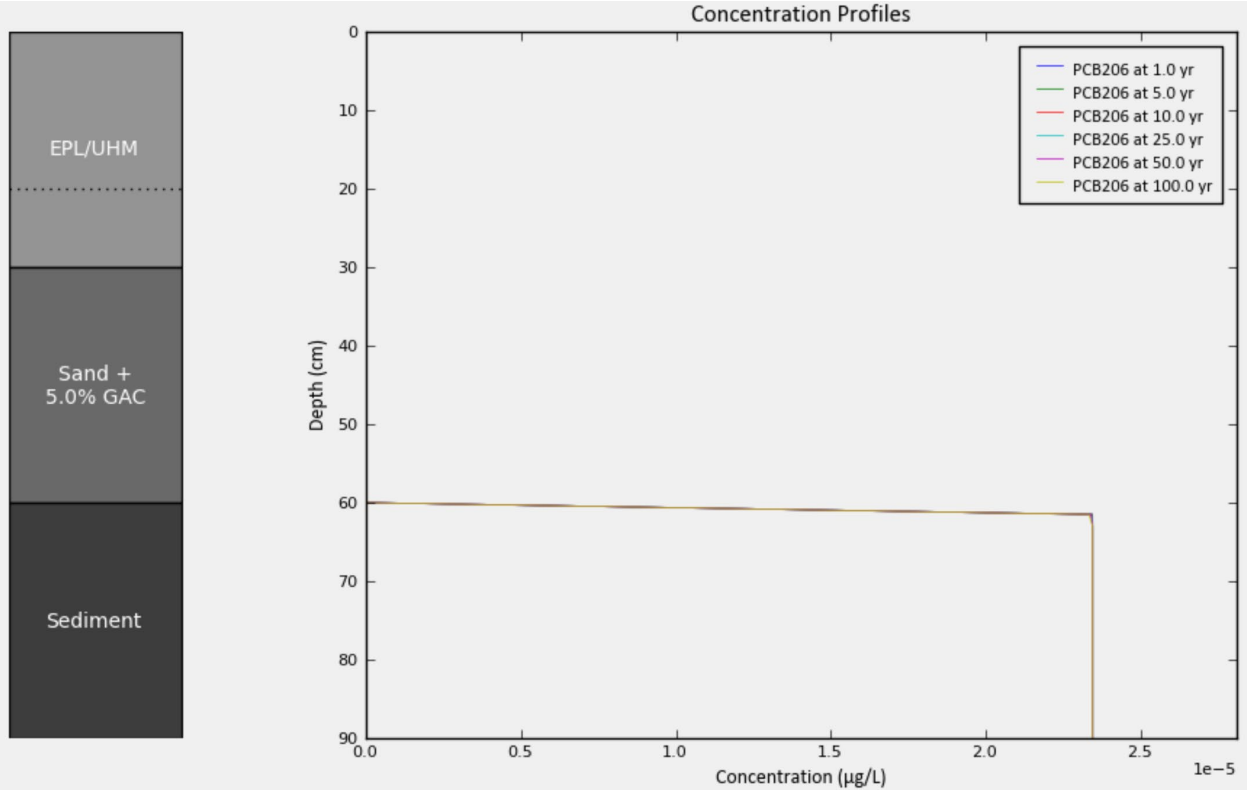

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB174 at 1.0 yr
PCB174 at 5.0 yr
PCB174 at 10.0 yr
PCB174 at 25.0 yr
PCB174 at 50.0 yr
PCB174 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

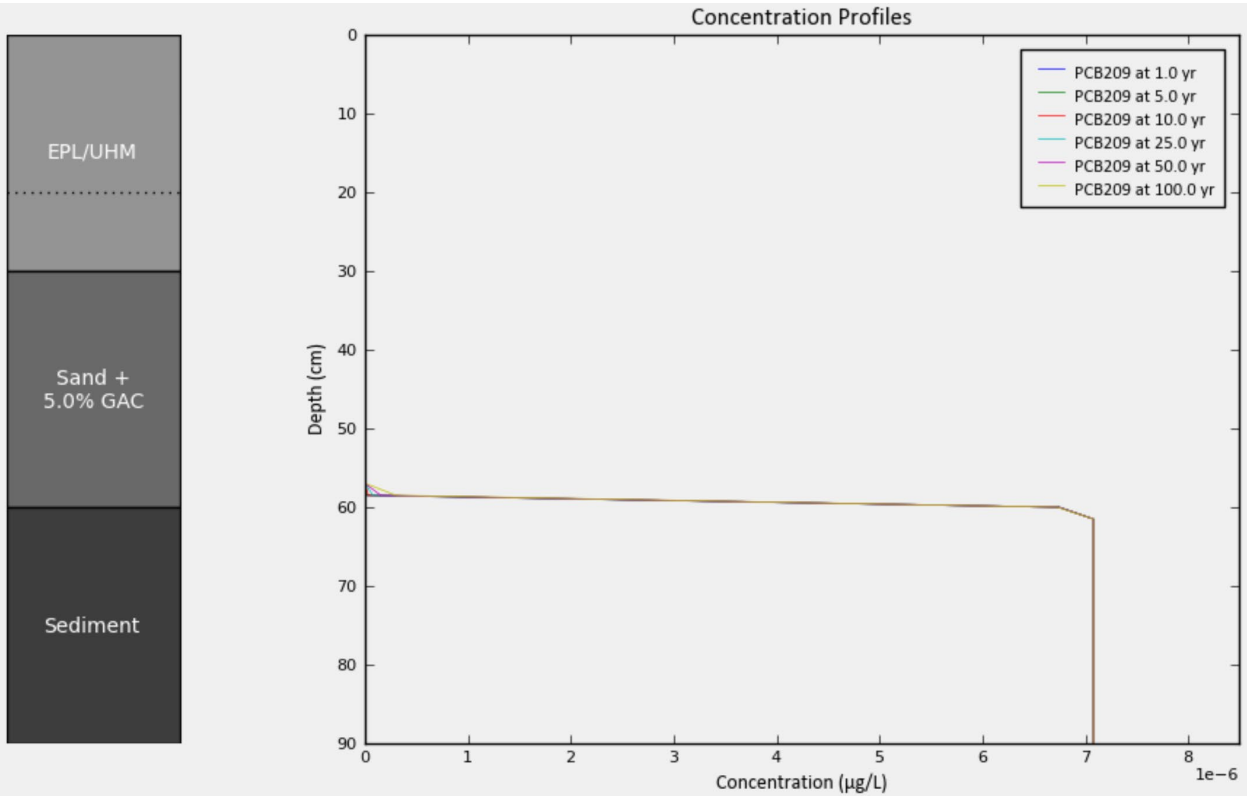

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB177 at 1.0 yr
PCB177 at 5.0 yr
PCB177 at 10.0 yr
PCB177 at 25.0 yr
PCB177 at 50.0 yr
PCB177 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

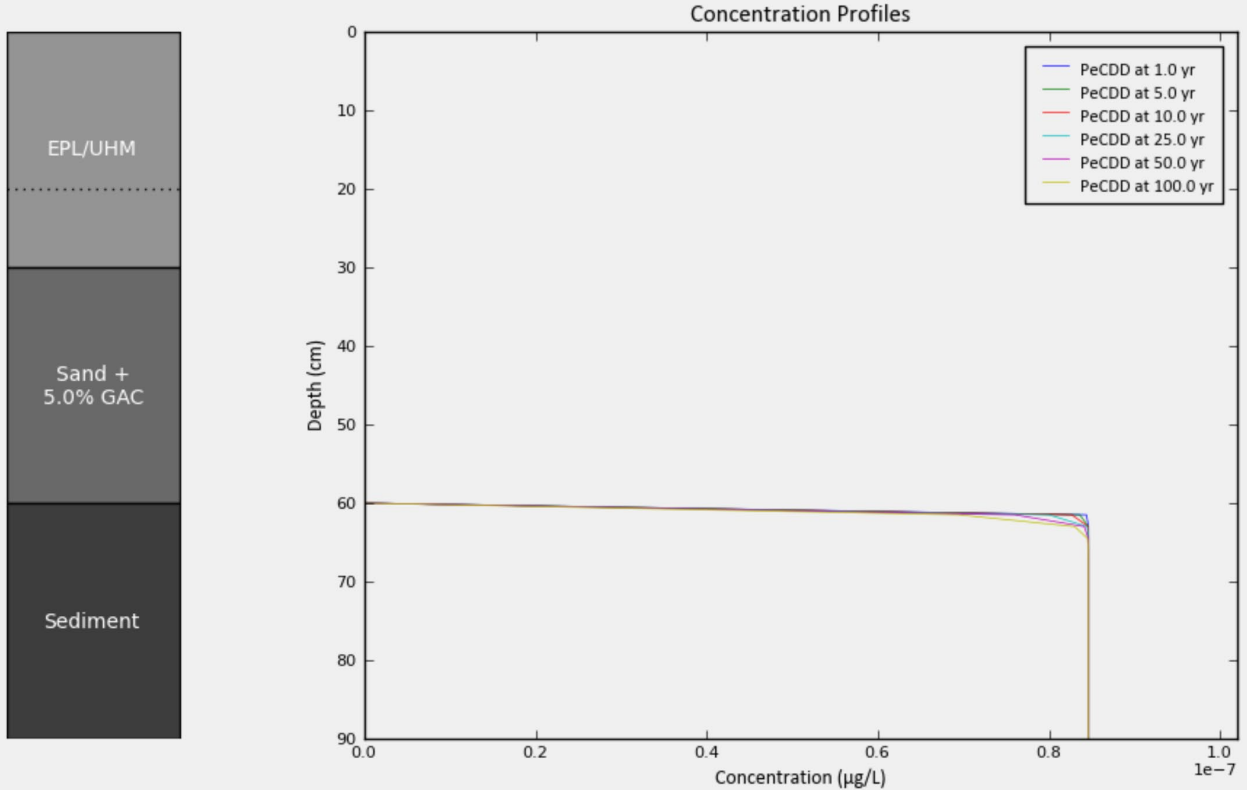

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB180 at 1.0 yr
PCB180 at 5.0 yr
PCB180 at 10.0 yr
PCB180 at 25.0 yr
PCB180 at 50.0 yr
PCB180 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

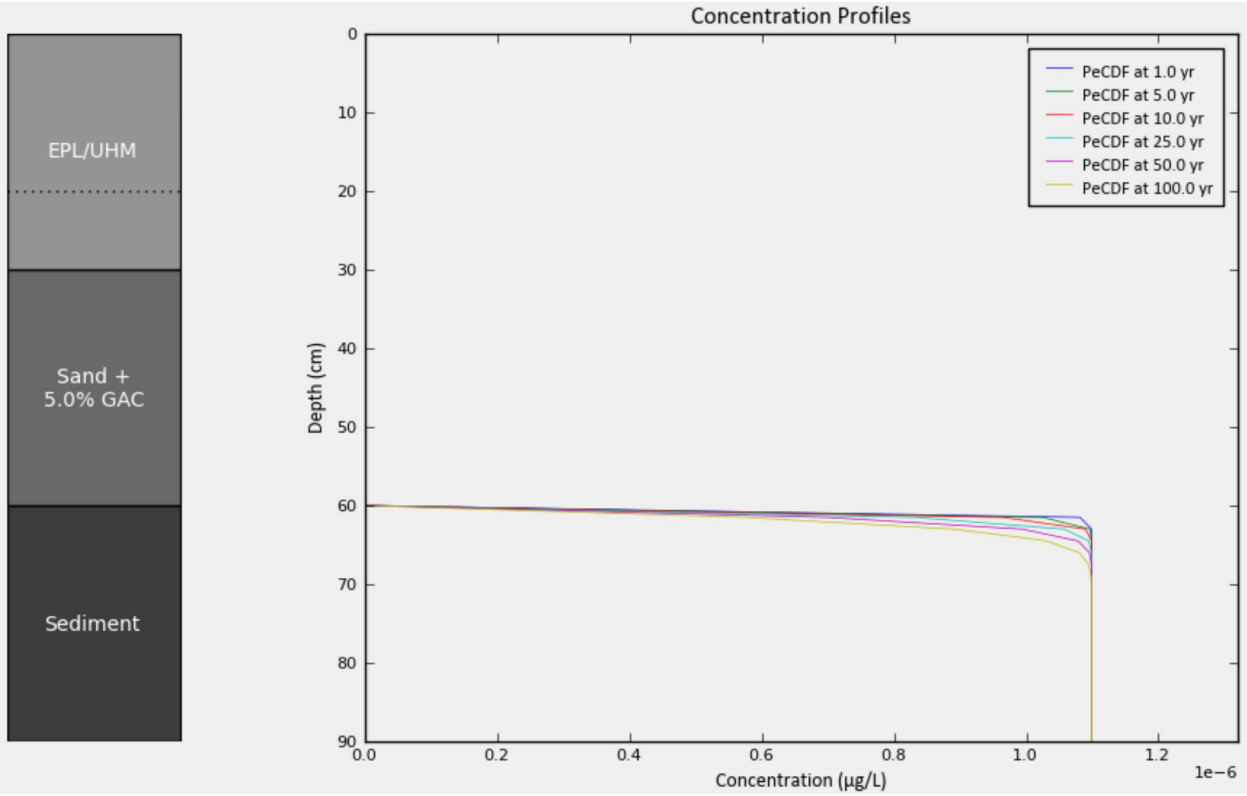

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB183 at 1.0 yr
PCB183 at 5.0 yr
PCB183 at 10.0 yr
PCB183 at 25.0 yr
PCB183 at 50.0 yr
PCB183 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

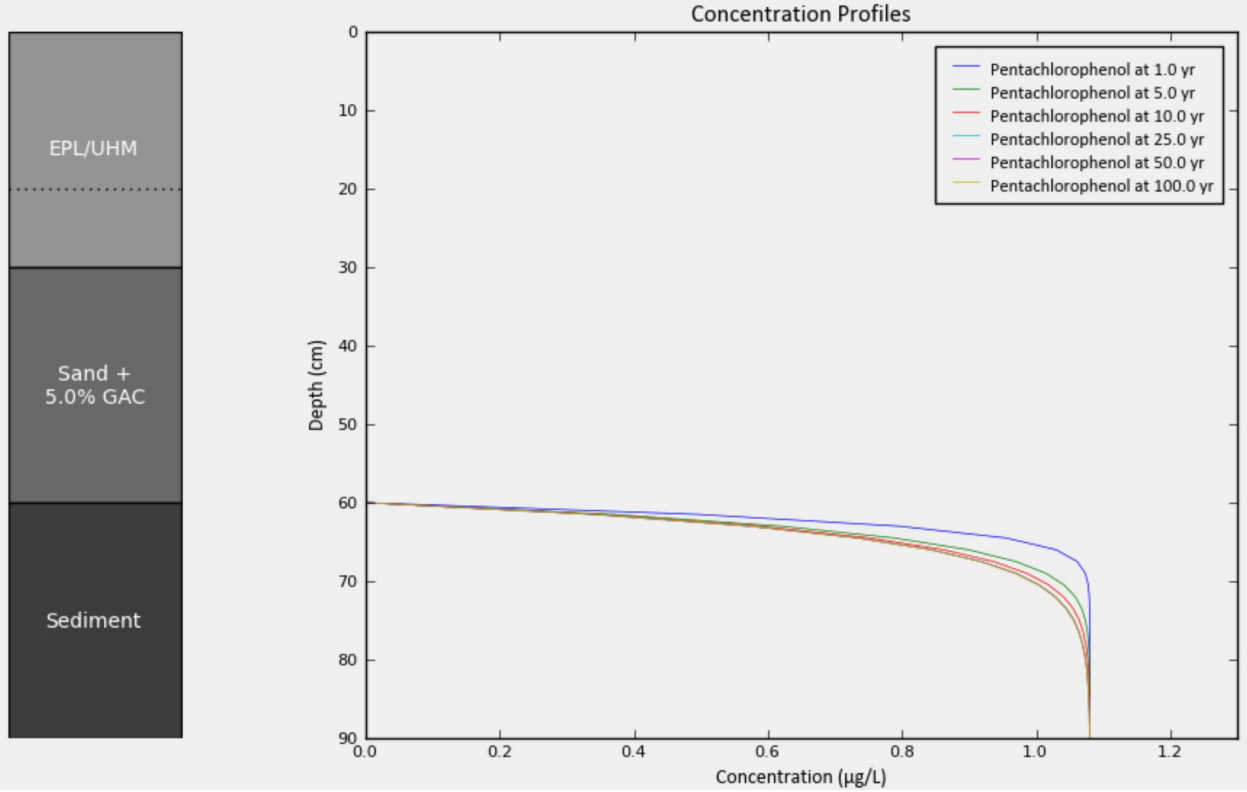

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB199 at 1.0 yr
PCB199 at 5.0 yr
PCB199 at 10.0 yr
PCB199 at 25.0 yr
PCB199 at 50.0 yr
PCB199 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

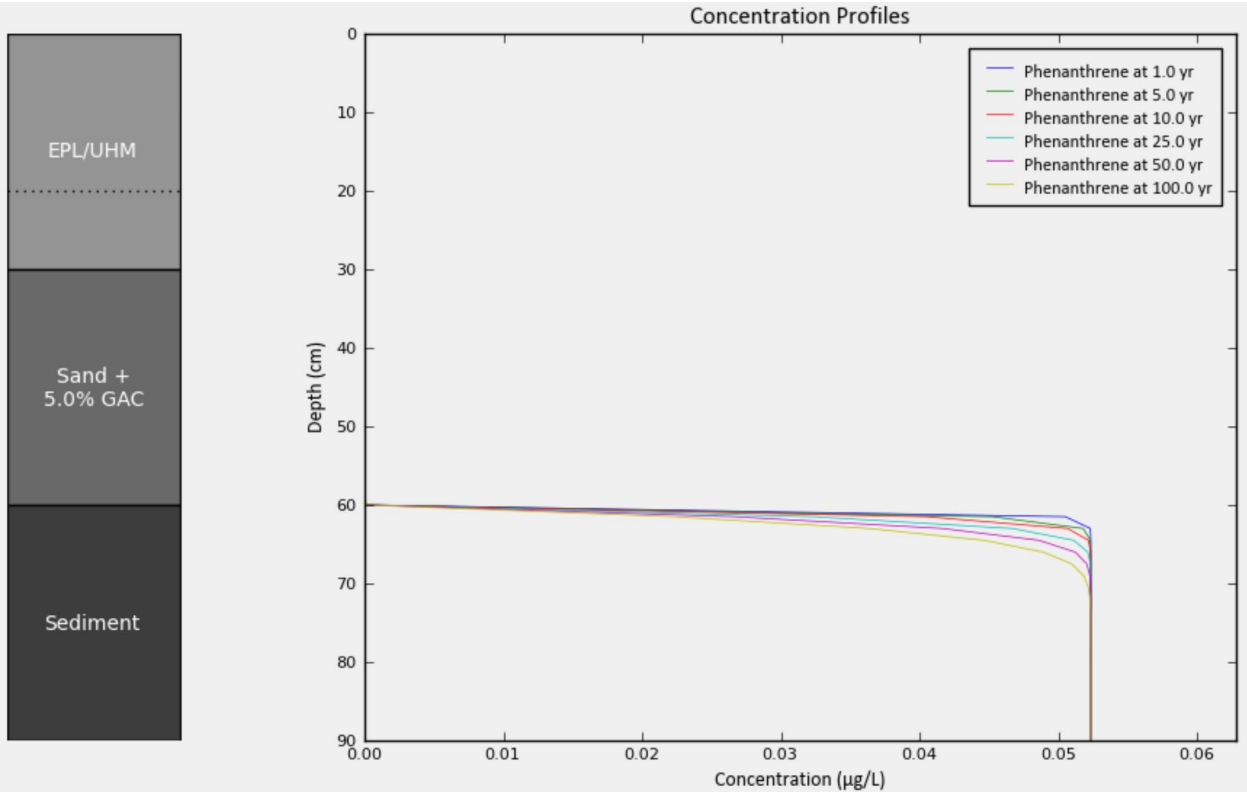

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB206 at 1.0 yr
PCB206 at 5.0 yr
PCB206 at 10.0 yr
PCB206 at 25.0 yr
PCB206 at 50.0 yr
PCB206 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

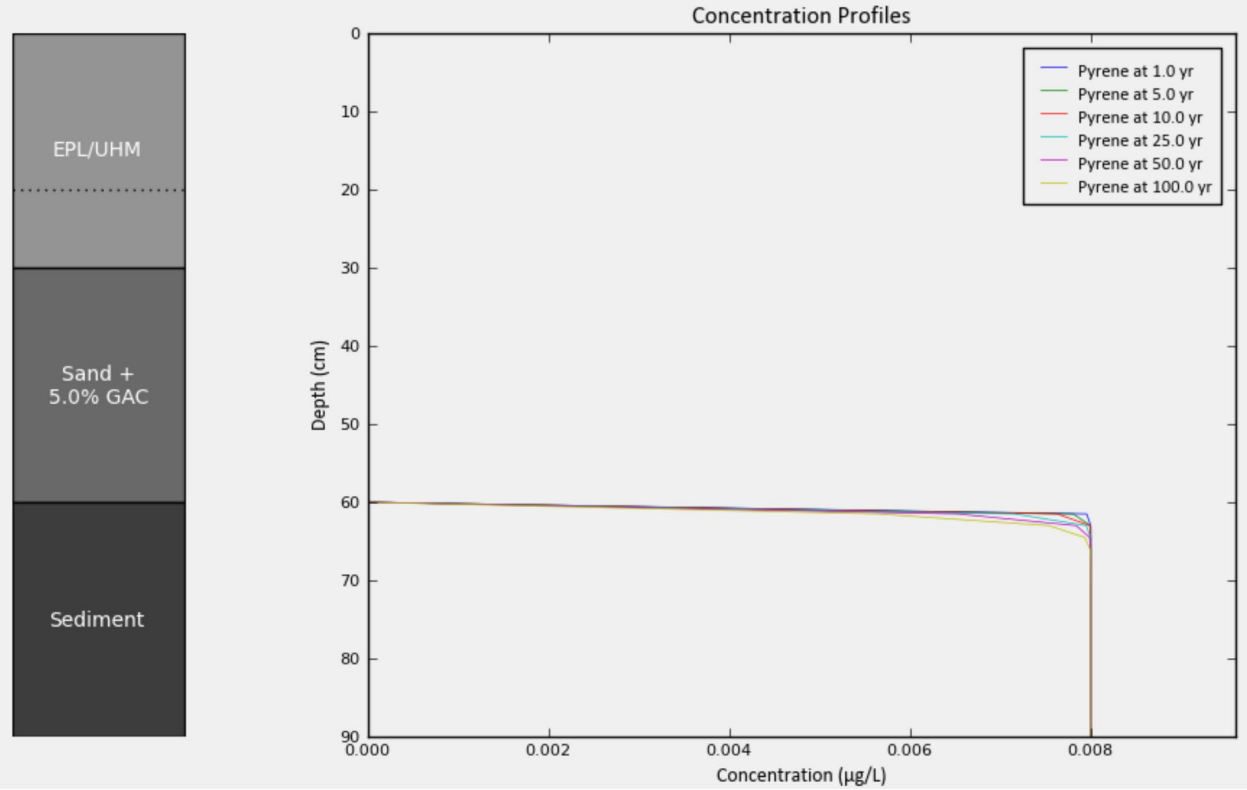

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PCB209 at 1.0 yr
PCB209 at 5.0 yr
PCB209 at 10.0 yr
PCB209 at 25.0 yr
PCB209 at 50.0 yr
PCB209 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

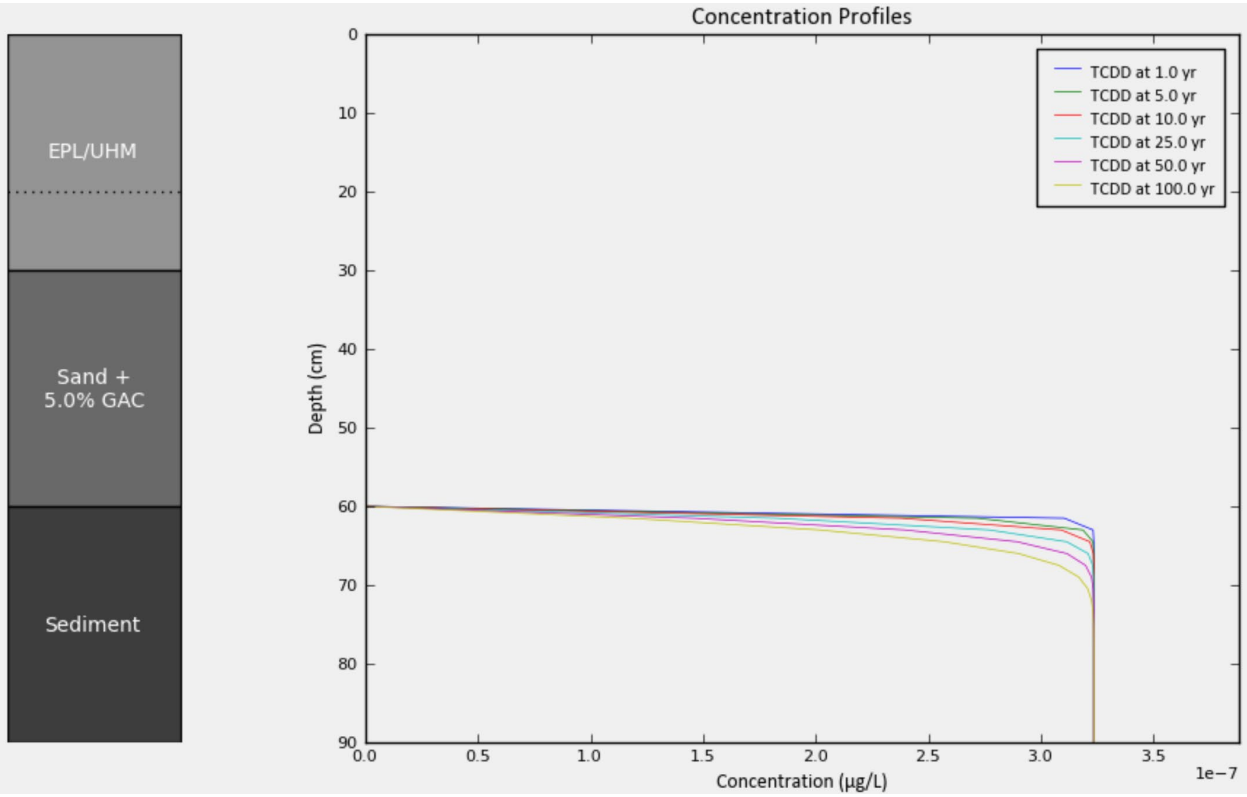

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PeCDD at 1.0 yr
PeCDD at 5.0 yr
PeCDD at 10.0 yr
PeCDD at 25.0 yr
PeCDD at 50.0 yr
PeCDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

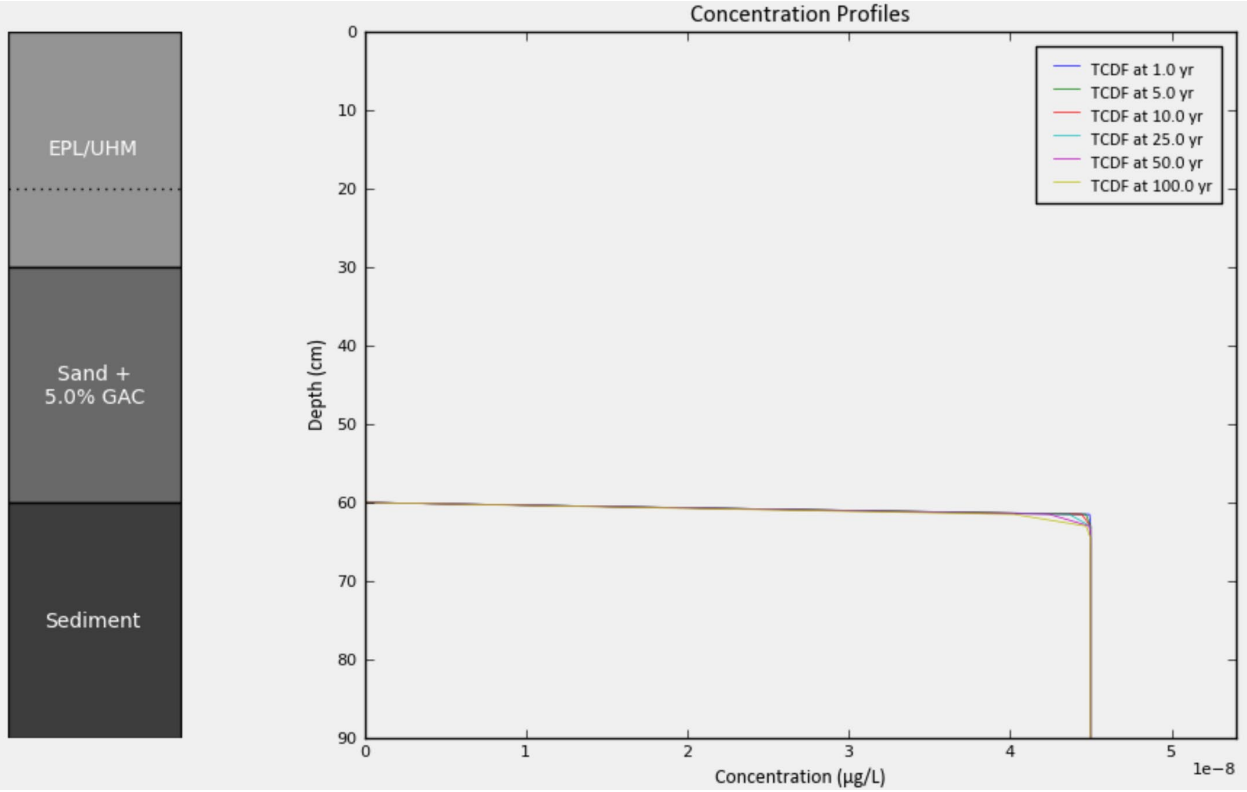

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
PeCDF at 1.0 yr
PeCDF at 5.0 yr
PeCDF at 10.0 yr
PeCDF at 25.0 yr
PeCDF at 50.0 yr
PeCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

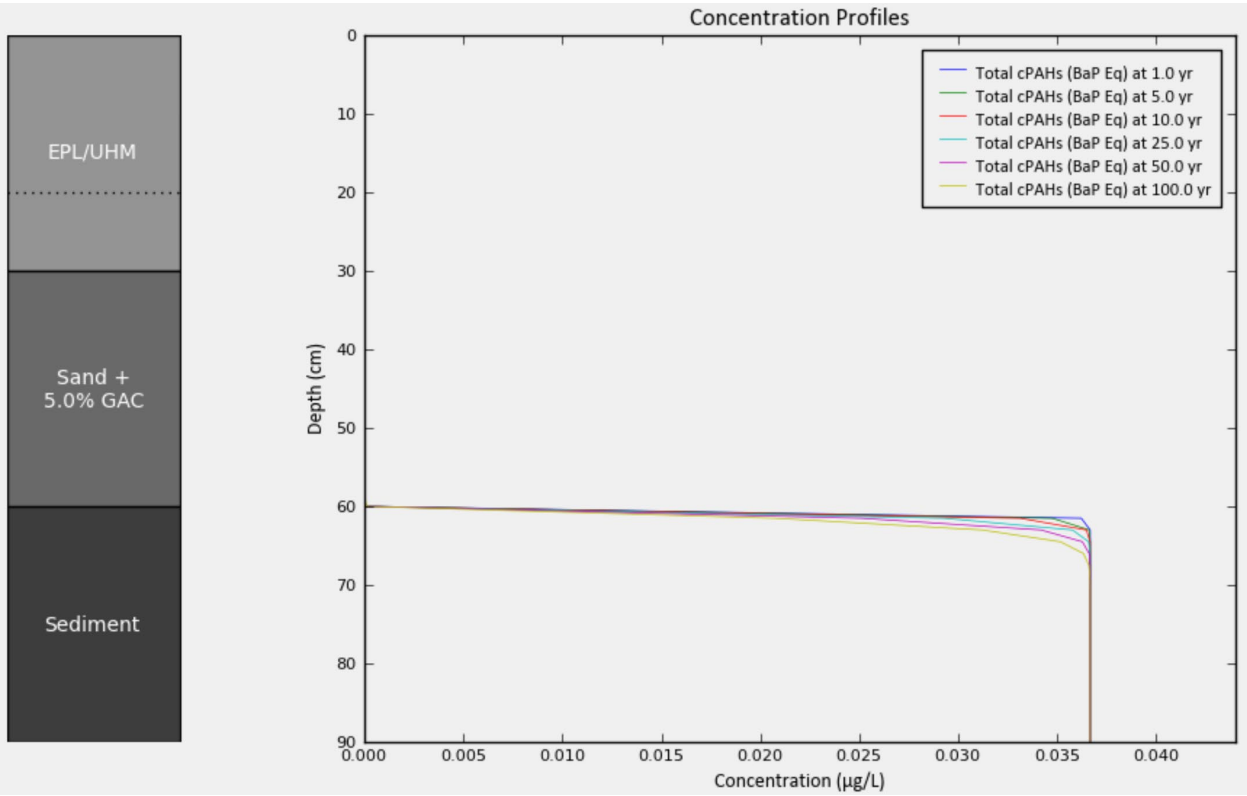

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Pentachlorophenol at 1.0 yr
Pentachlorophenol at 5.0 yr
Pentachlorophenol at 10.0 yr
Pentachlorophenol at 25.0 yr
Pentachlorophenol at 50.0 yr
Pentachlorophenol at 100.0 yr
Depth (cm)
Concentration (µg/L)

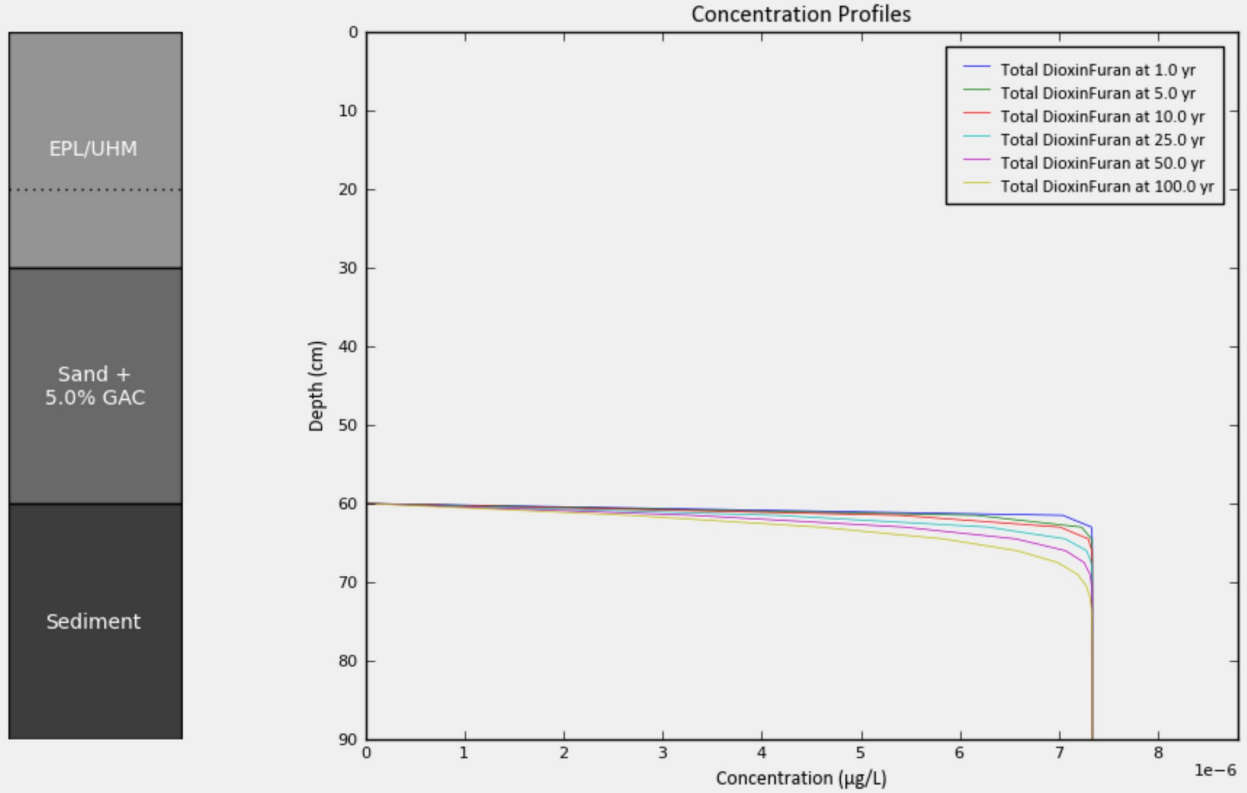

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Phenanthrene at 1.0 yr
Phenanthrene at 5.0 yr
Phenanthrene at 10.0 yr
Phenanthrene at 25.0 yr
Phenanthrene at 50.0 yr
Phenanthrene at 100.0 yr
Depth (cm)
Concentration (µg/L)

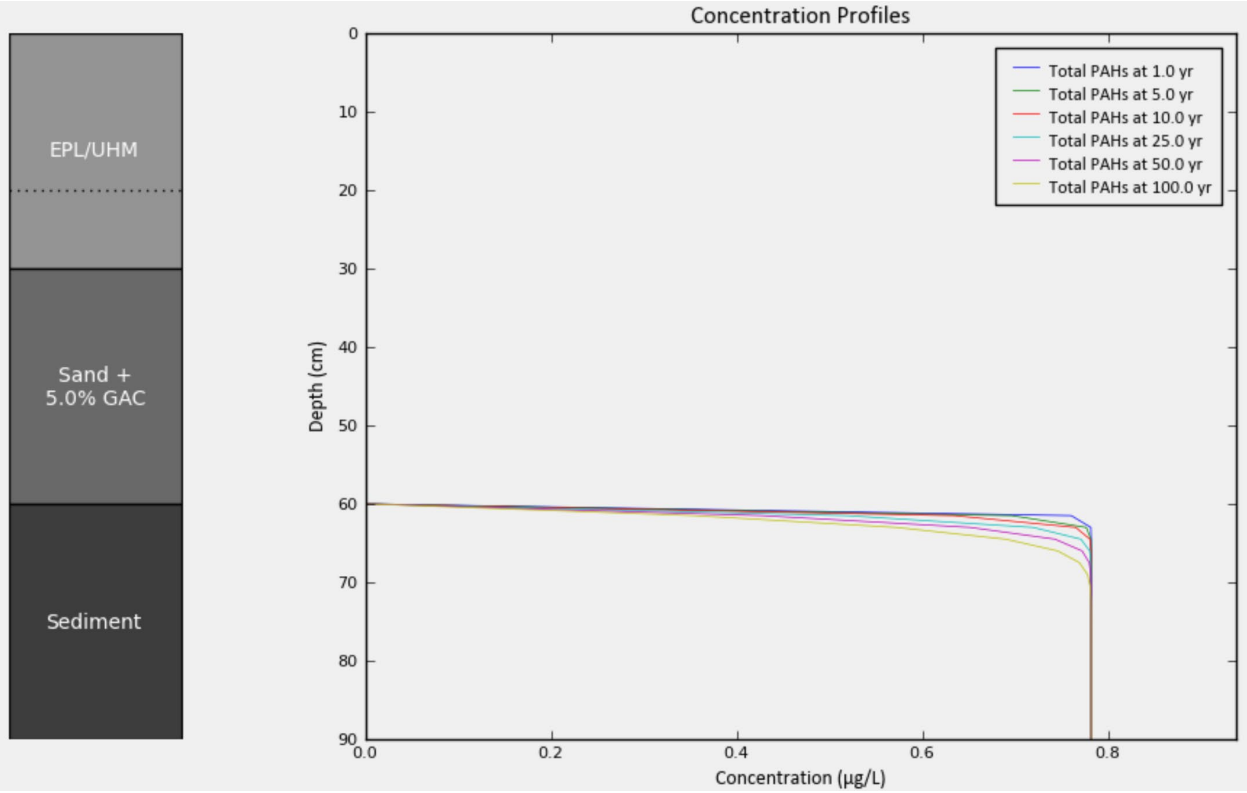

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Pyrene at 1.0 yr
Pyrene at 5.0 yr
Pyrene at 10.0 yr
Pyrene at 25.0 yr
Pyrene at 50.0 yr
Pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
Concentration (µg/L)

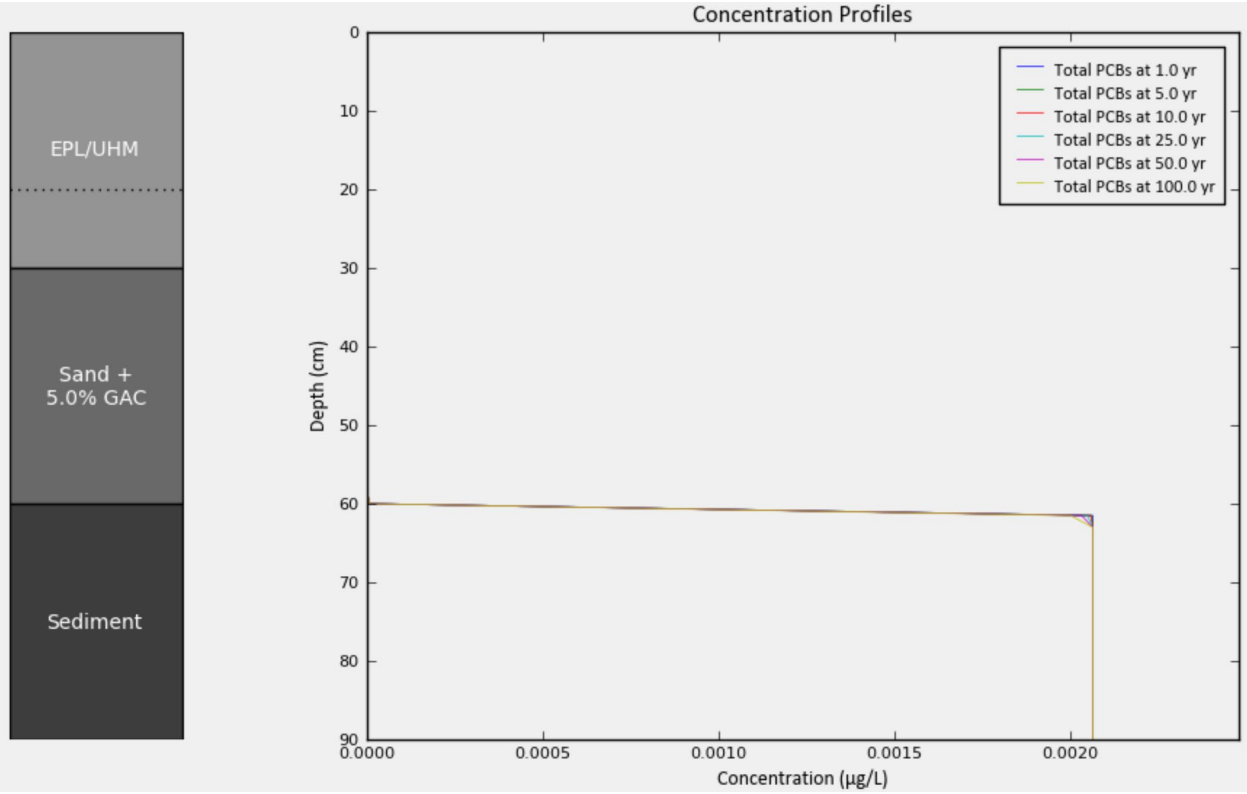

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
TCDD at 1.0 yr
TCDD at 5.0 yr
TCDD at 10.0 yr
TCDD at 25.0 yr
TCDD at 50.0 yr
TCDD at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e−7
Concentration (µg/L)

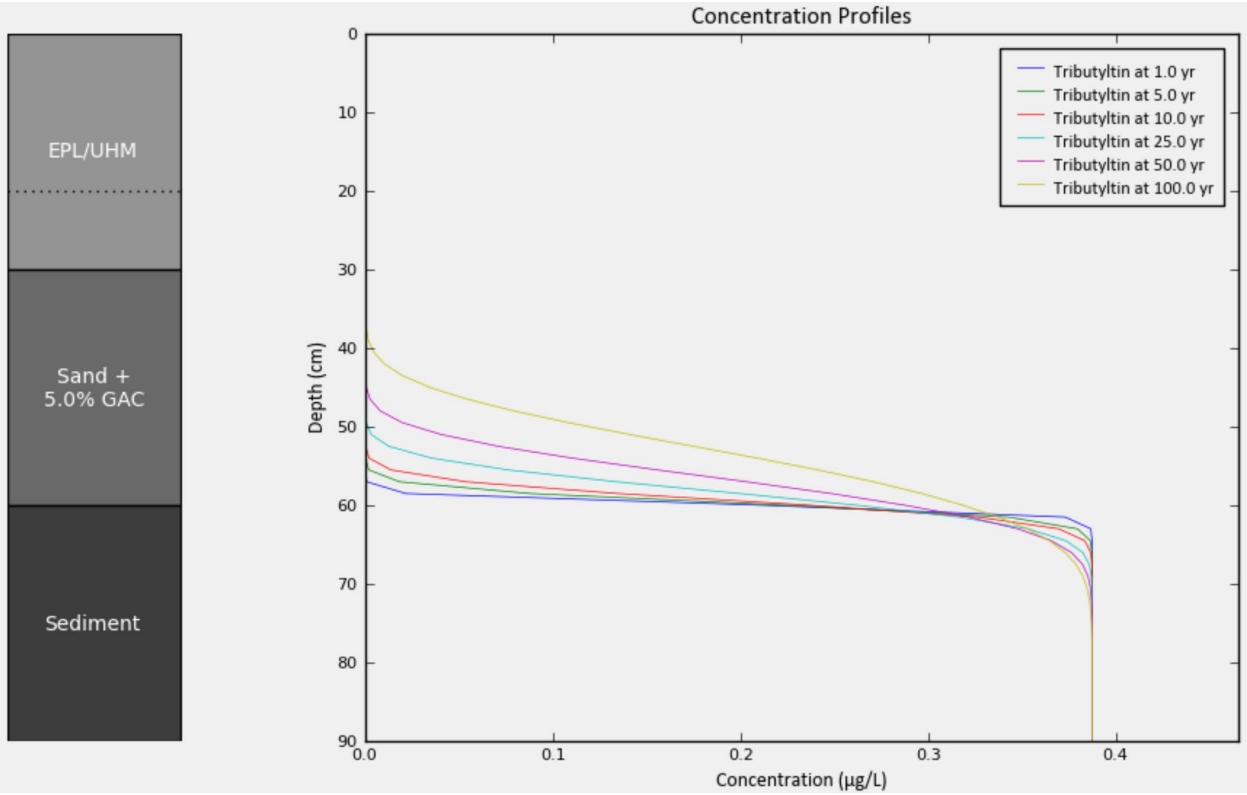

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
TCDF at 1.0 yr
TCDF at 5.0 yr
TCDF at 10.0 yr
TCDF at 25.0 yr
TCDF at 50.0 yr
TCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−8

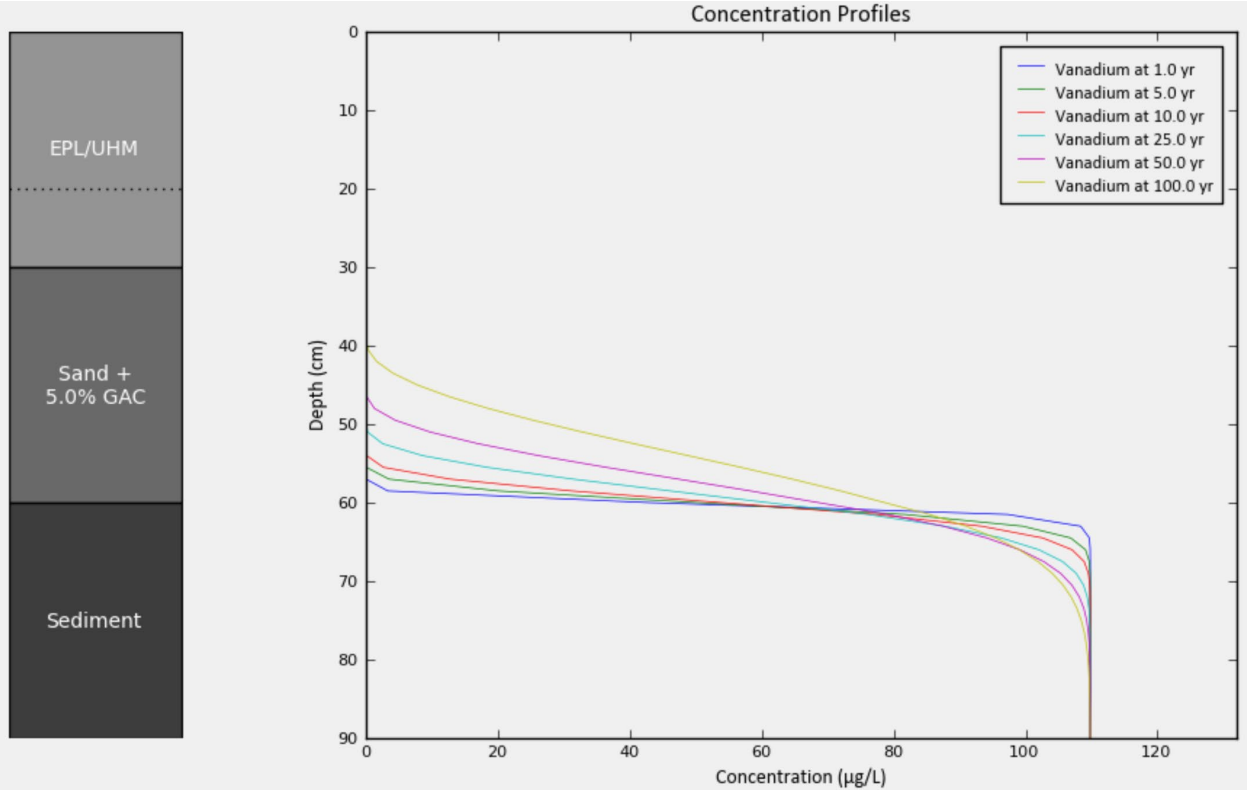

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Total cPAHs (BaP Eq) at 1.0 yr
Total cPAHs (BaP Eq) at 5.0 yr
Total cPAHs (BaP Eq) at 10.0 yr
Total cPAHs (BaP Eq) at 25.0 yr
Total cPAHs (BaP Eq) at 50.0 yr
Total cPAHs (BaP Eq) at 100.0 yr
Depth (cm)
Concentration (µg/L)

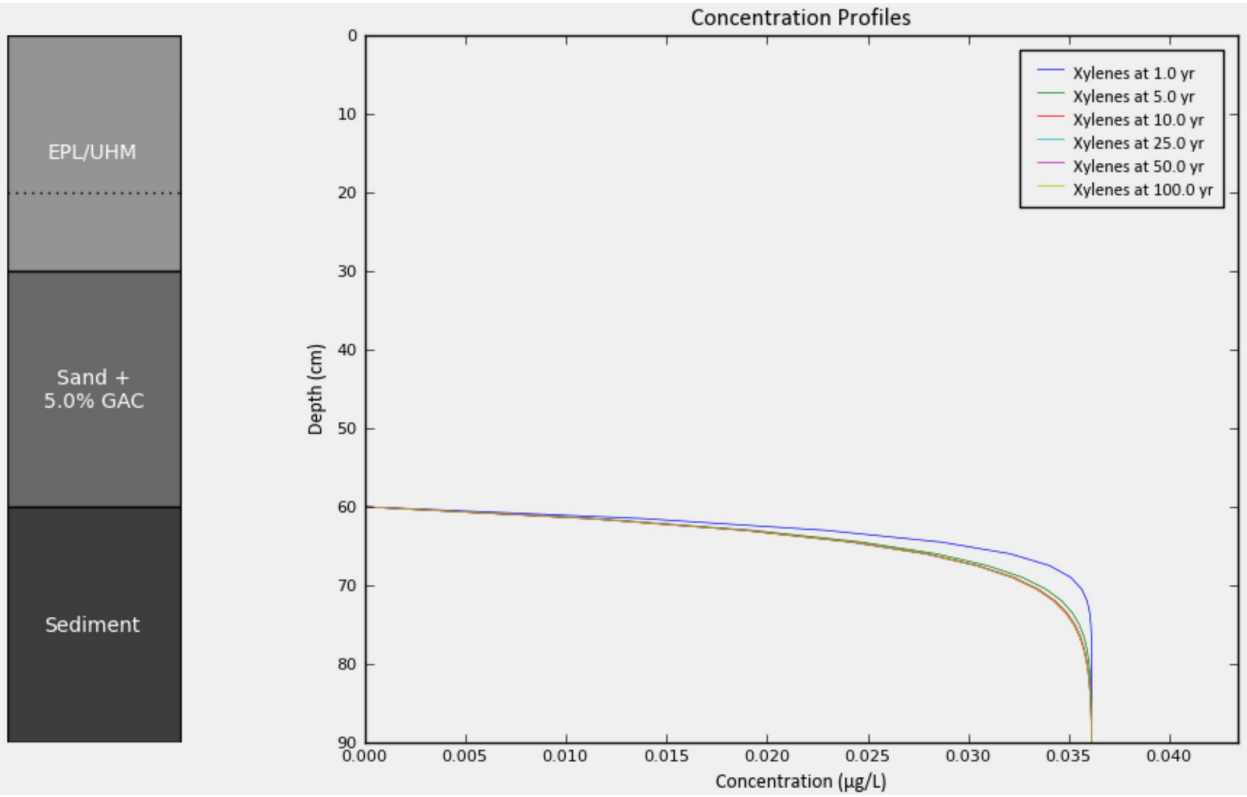

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Total DioxinFuran at 1.0 yr
Total DioxinFuran at 5.0 yr
Total DioxinFuran at 10.0 yr
Total DioxinFuran at 25.0 yr
Total DioxinFuran at 50.0 yr
Total DioxinFuran at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

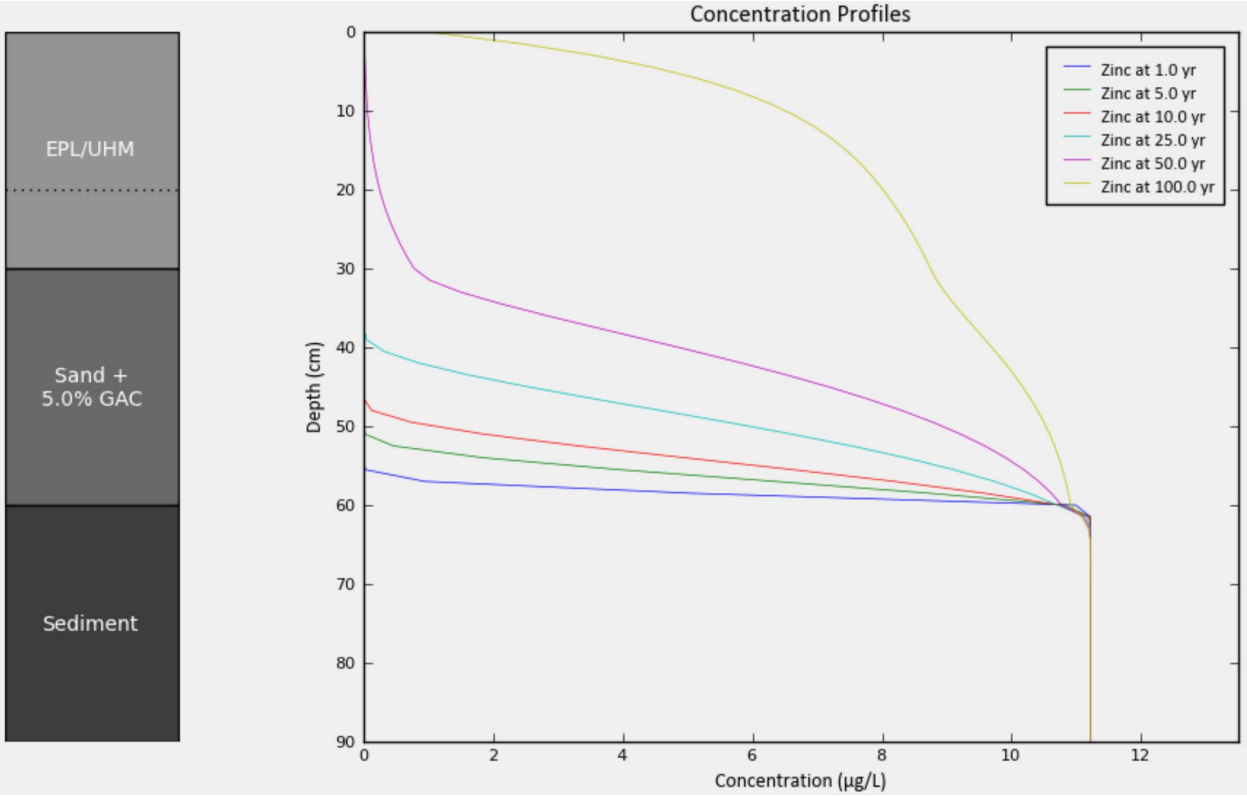

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Total PAHs at 1.0 yr
Total PAHs at 5.0 yr
Total PAHs at 10.0 yr
Total PAHs at 25.0 yr
Total PAHs at 50.0 yr
Total PAHs at 100.0 yr
Depth (cm)
Concentration (µg/L)


EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Total PCBs at 1.0 yr
Total PCBs at 5.0 yr
Total PCBs at 10.0 yr
Total PCBs at 25.0 yr
Total PCBs at 50.0 yr
Total PCBs at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

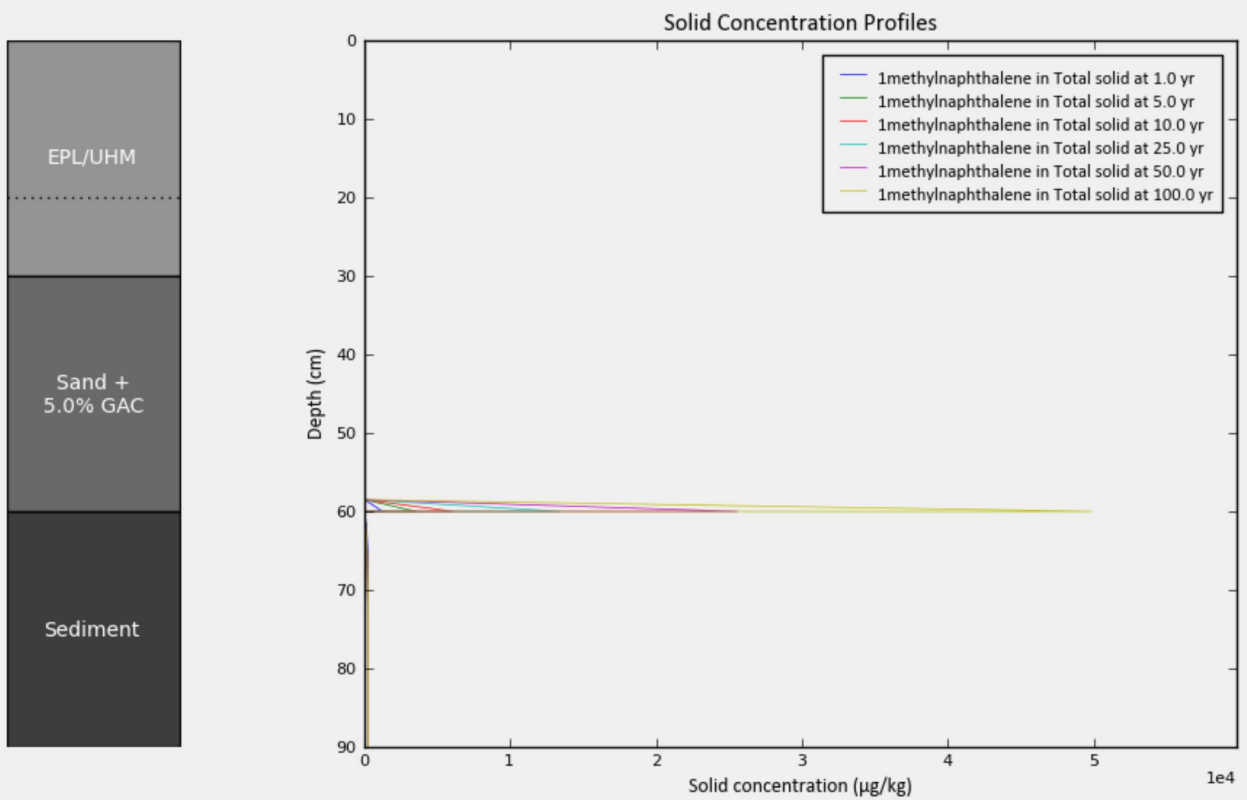

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Tributyltin at 1.0 yr
Tributyltin at 5.0 yr
Tributyltin at 10.0 yr
Tributyltin at 25.0 yr
Tributyltin at 50.0 yr
Tributyltin at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.1
0.2
0.3
0.4
Concentration (µg/L)

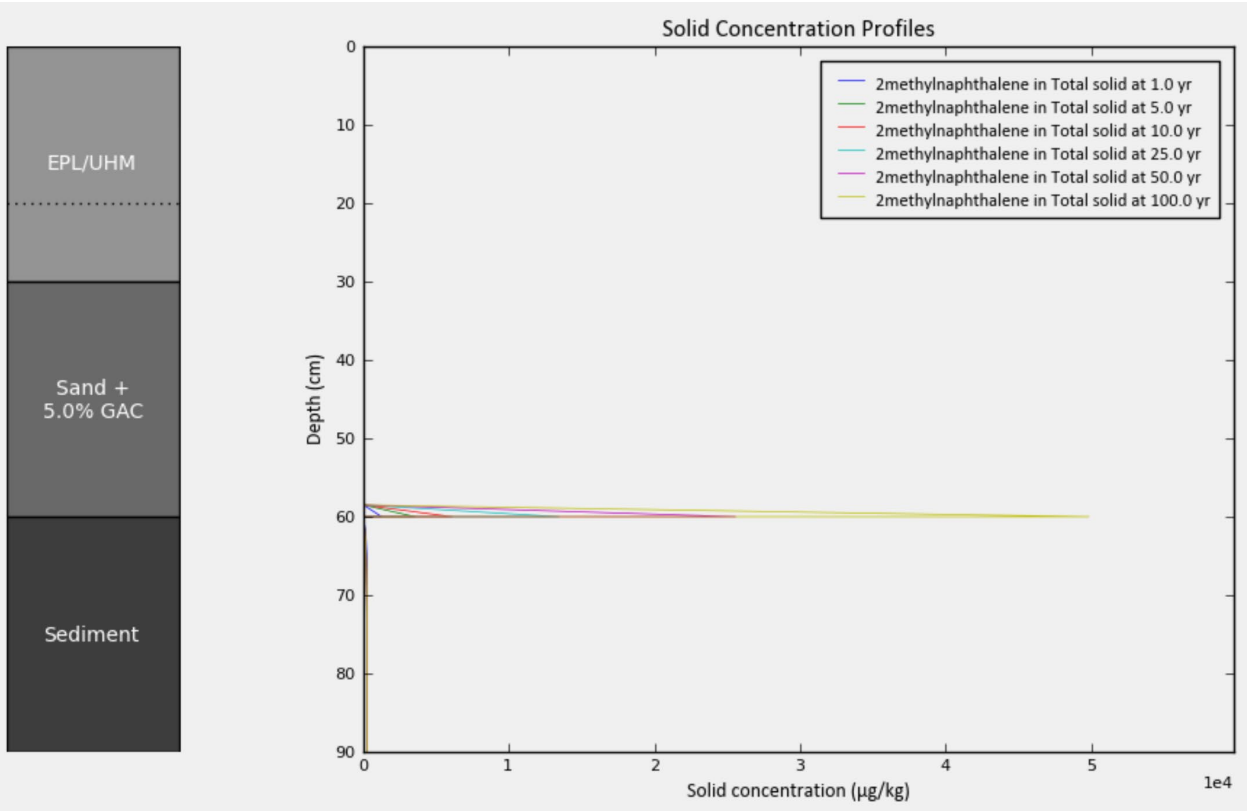

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Vanadium at 1.0 yr
Vanadium at 5.0 yr
Vanadium at 10.0 yr
Vanadium at 25.0 yr
Vanadium at 50.0 yr
Vanadium at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80
100
120

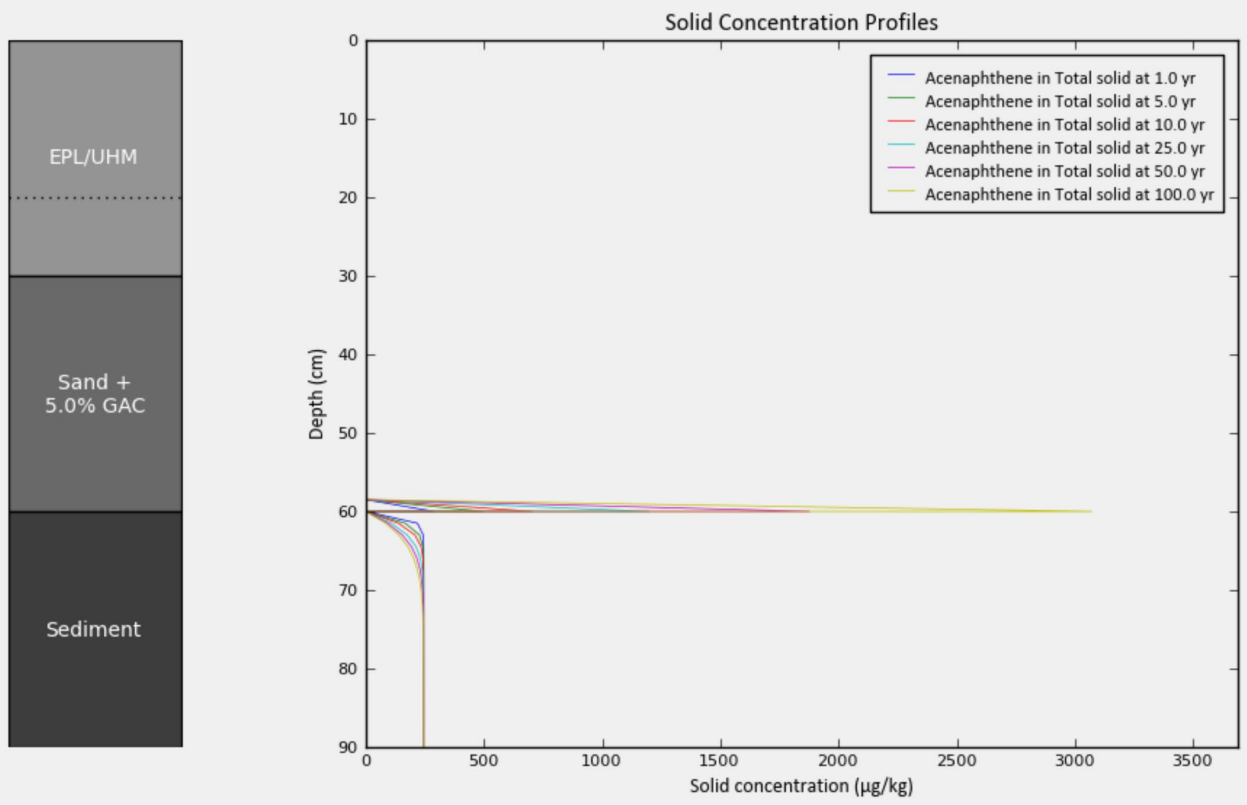

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Xylenes at 1.0 yr
Xylenes at 5.0 yr
Xylenes at 10.0 yr
Xylenes at 25.0 yr
Xylenes at 50.0 yr
Xylenes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040

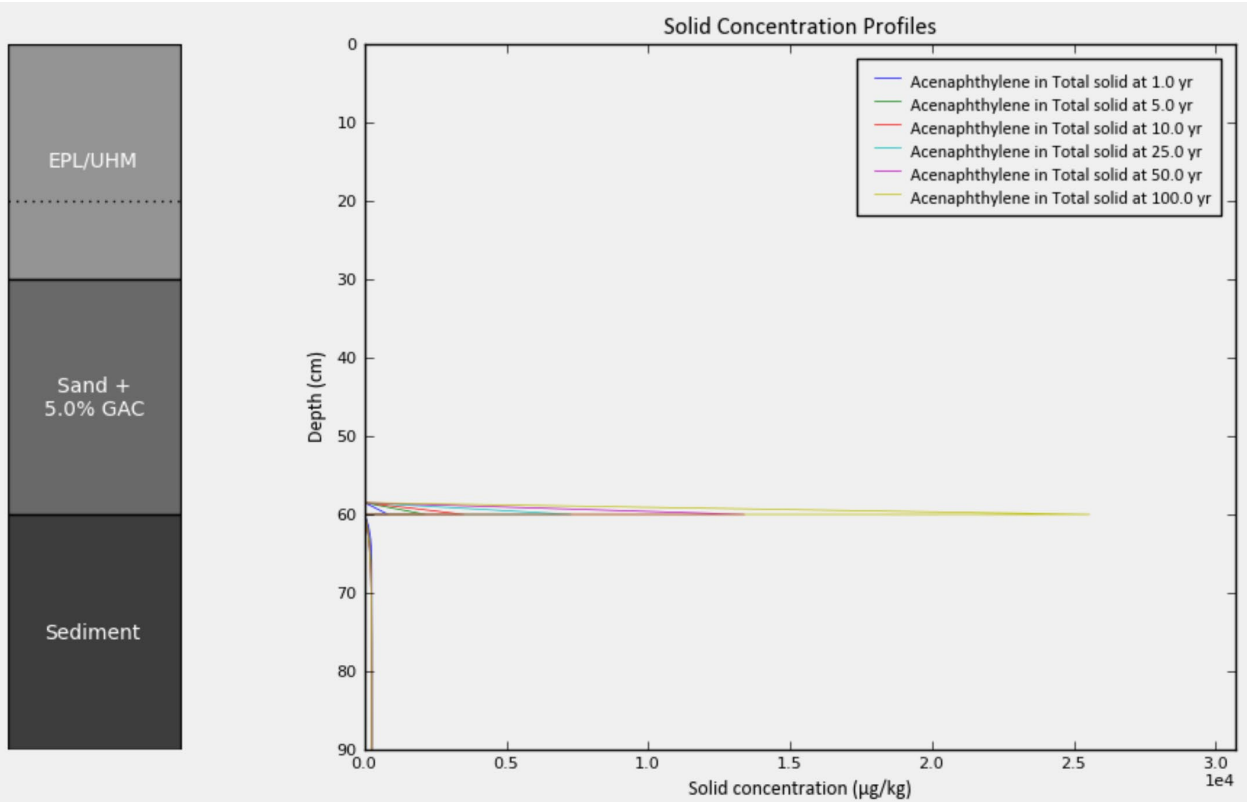

EPL/UHM
Sand +
5.0% GAC
Sediment
Concentration Profiles
Zinc at 1.0 yr
Zinc at 5.0 yr
Zinc at 10.0 yr
Zinc at 25.0 yr
Zinc at 50.0 yr
Zinc at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
2
4
6
8
10
12

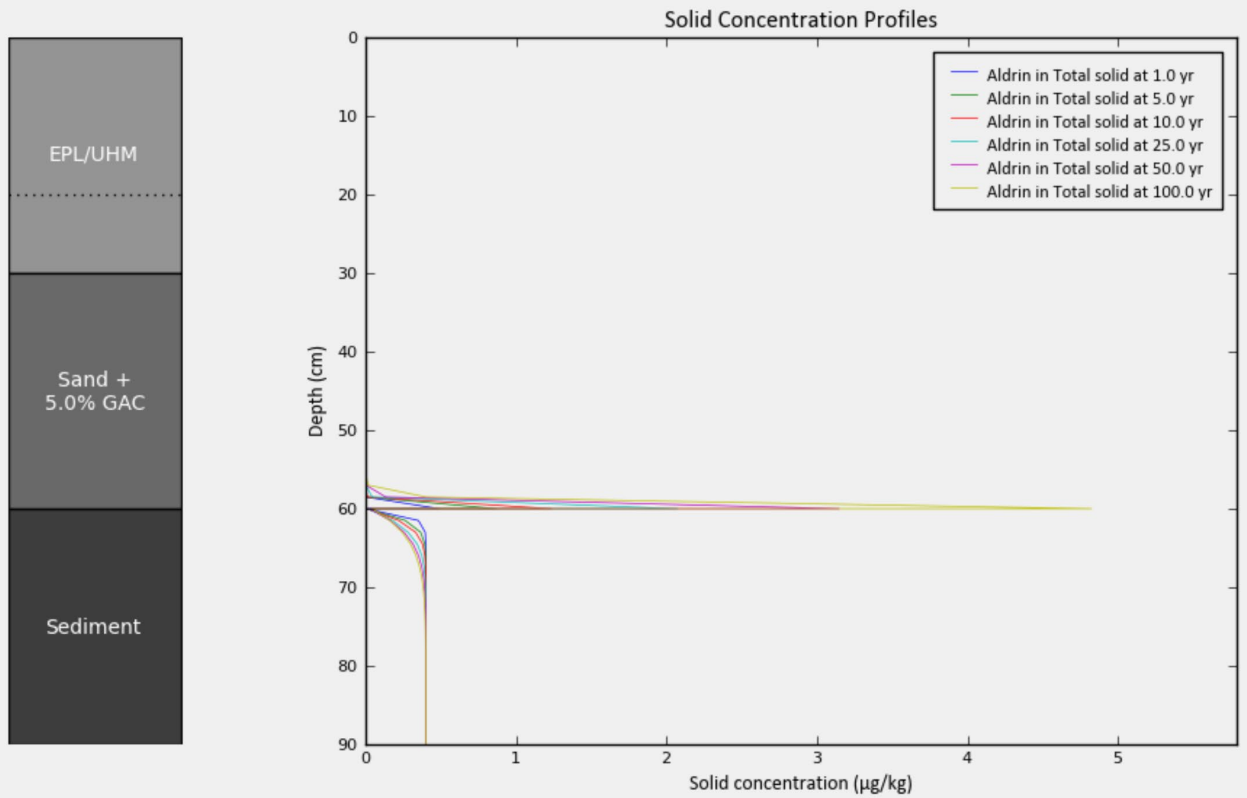
Total Solids Concentration – Depth

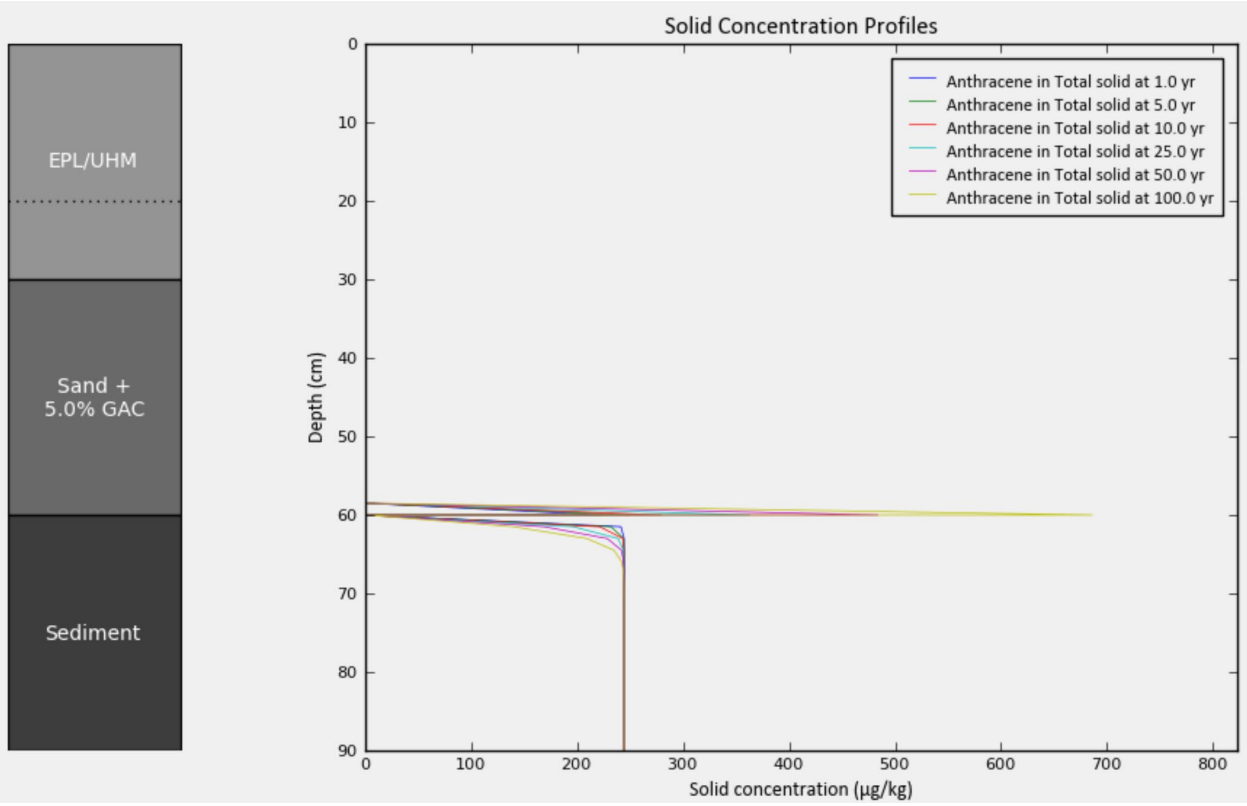


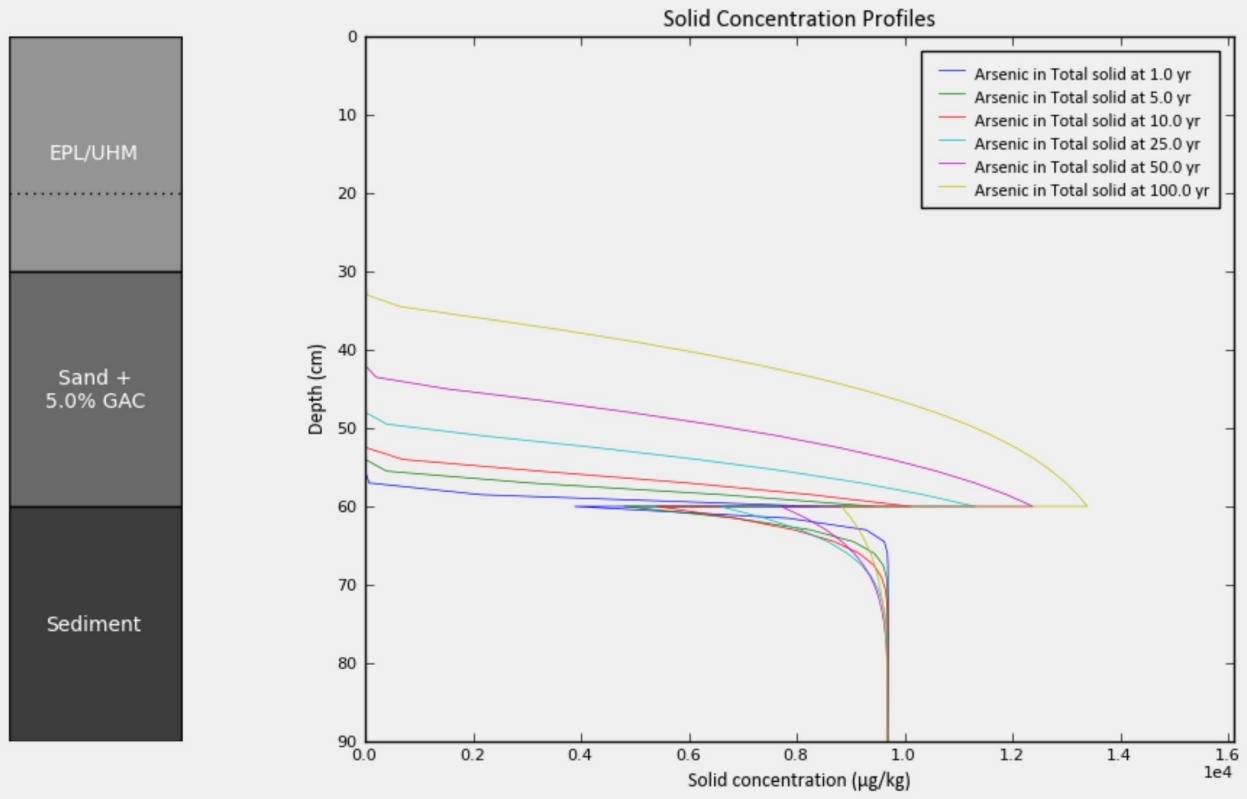


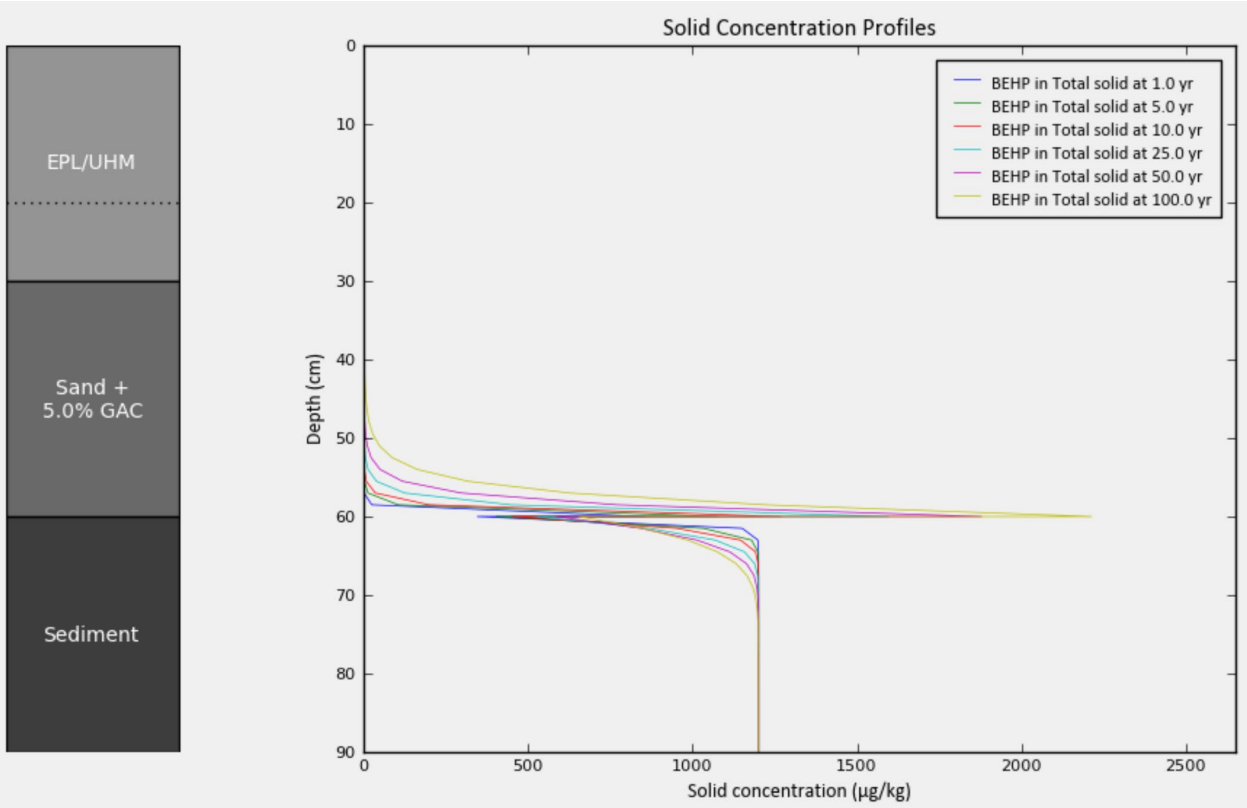

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Acenaphthene in Total solid at 1.0 yr
Acenaphthene in Total solid at 5.0 yr
Acenaphthene in Total solid at 10.0 yr
Acenaphthene in Total solid at 25.0 yr
Acenaphthene in Total solid at 50.0 yr
Acenaphthene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
500
1000
1500
2000
2500
3000
3500
Solid concentration (µg/kg)

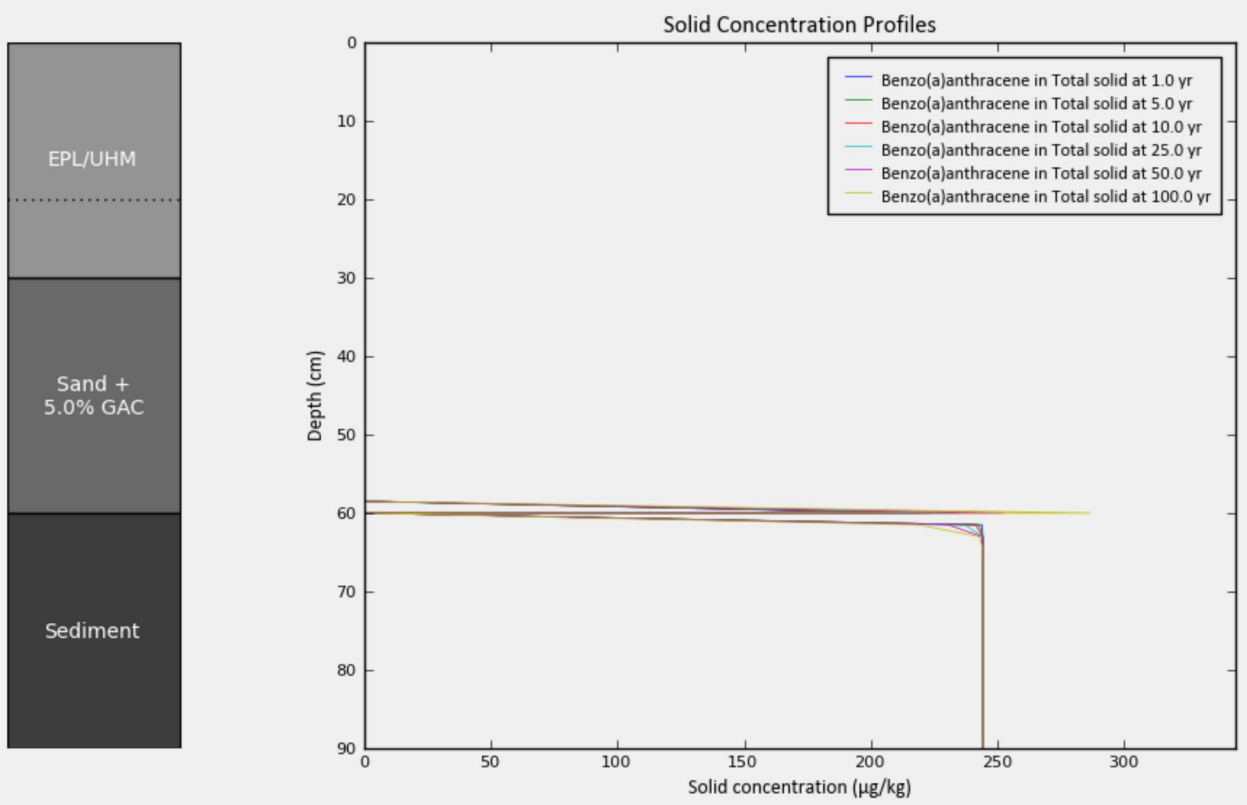

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Acenaphthylene in Total solid at 1.0 yr
Acenaphthylene in Total solid at 5.0 yr
Acenaphthylene in Total solid at 10.0 yr
Acenaphthylene in Total solid at 25.0 yr
Acenaphthylene in Total solid at 50.0 yr
Acenaphthylene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1e4
Solid concentration (µg/kg)

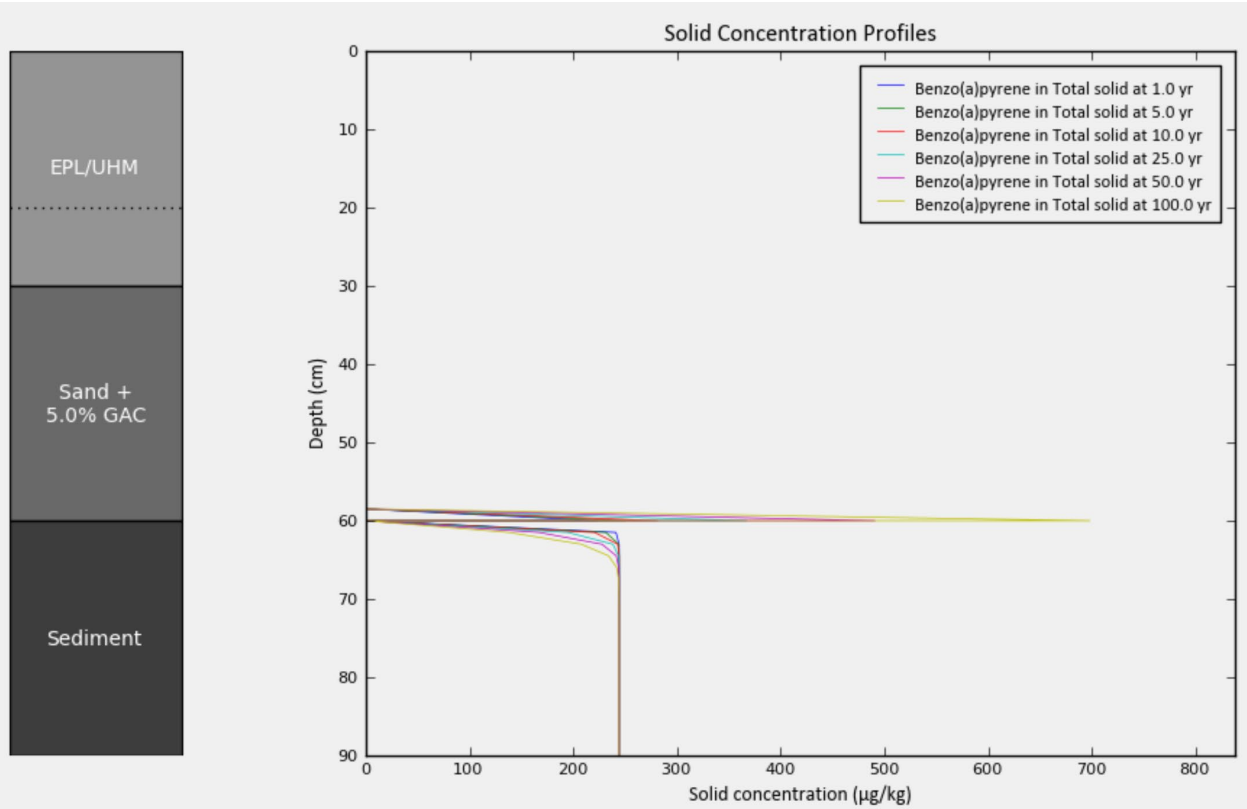

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Aldrin in Total solid at 1.0 yr
Aldrin in Total solid at 5.0 yr
Aldrin in Total solid at 10.0 yr
Aldrin in Total solid at 25.0 yr
Aldrin in Total solid at 50.0 yr
Aldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

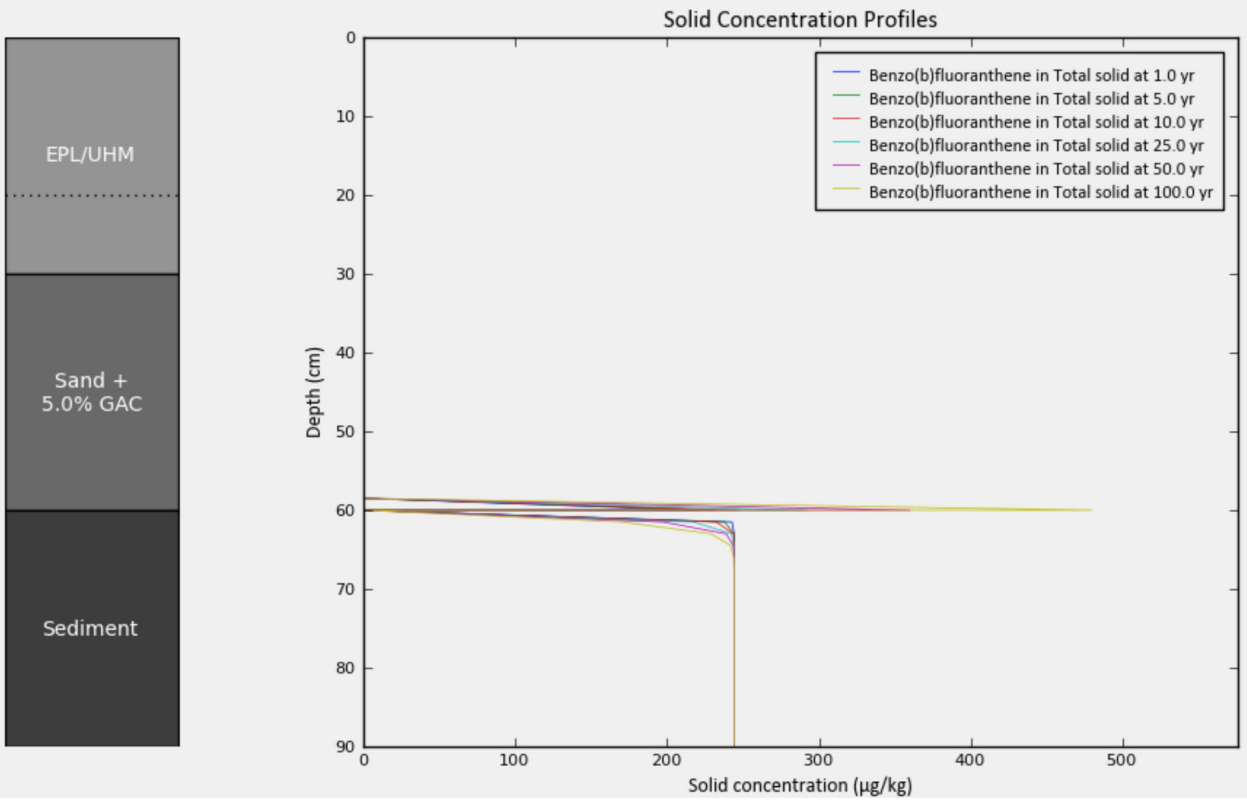

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Anthracene in Total solid at 1.0 yr
Anthracene in Total solid at 5.0 yr
Anthracene in Total solid at 10.0 yr
Anthracene in Total solid at 25.0 yr
Anthracene in Total solid at 50.0 yr
Anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

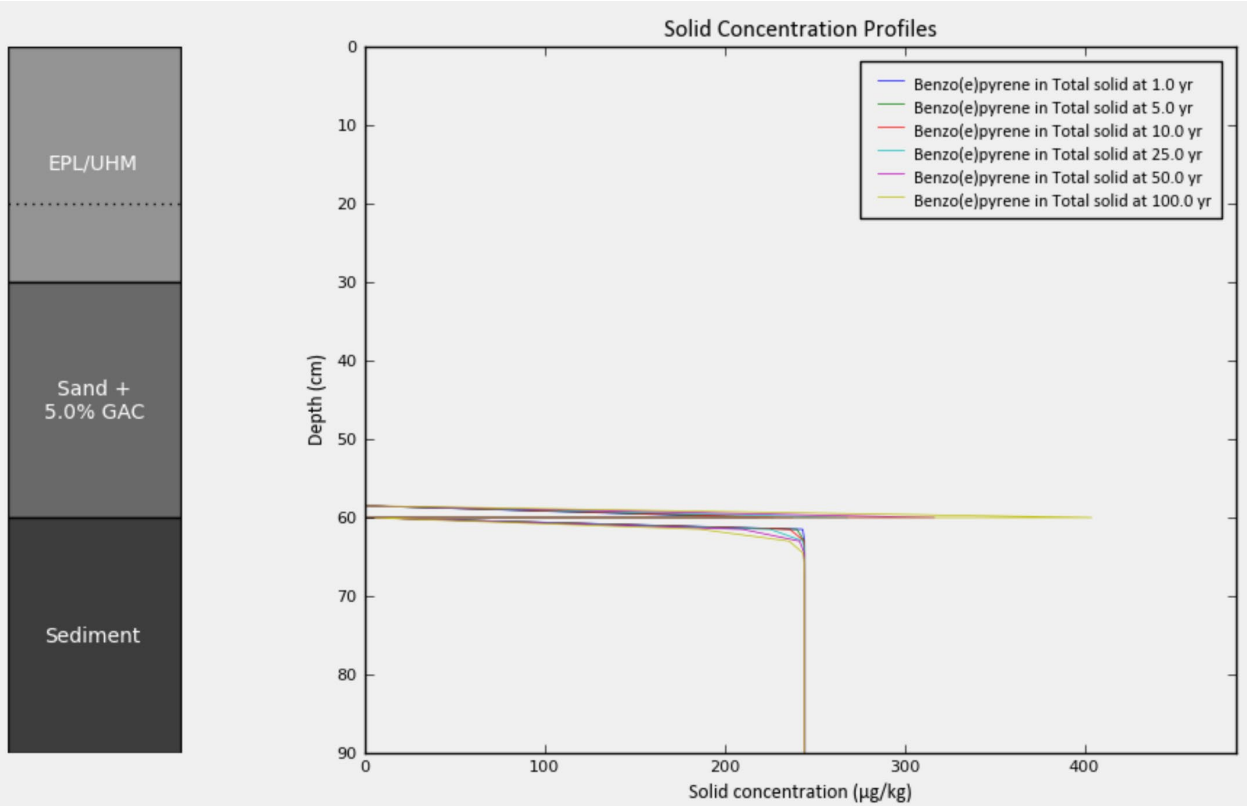

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Arsenic in Total solid at 1.0 yr
Arsenic in Total solid at 5.0 yr
Arsenic in Total solid at 10.0 yr
Arsenic in Total solid at 25.0 yr
Arsenic in Total solid at 50.0 yr
Arsenic in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

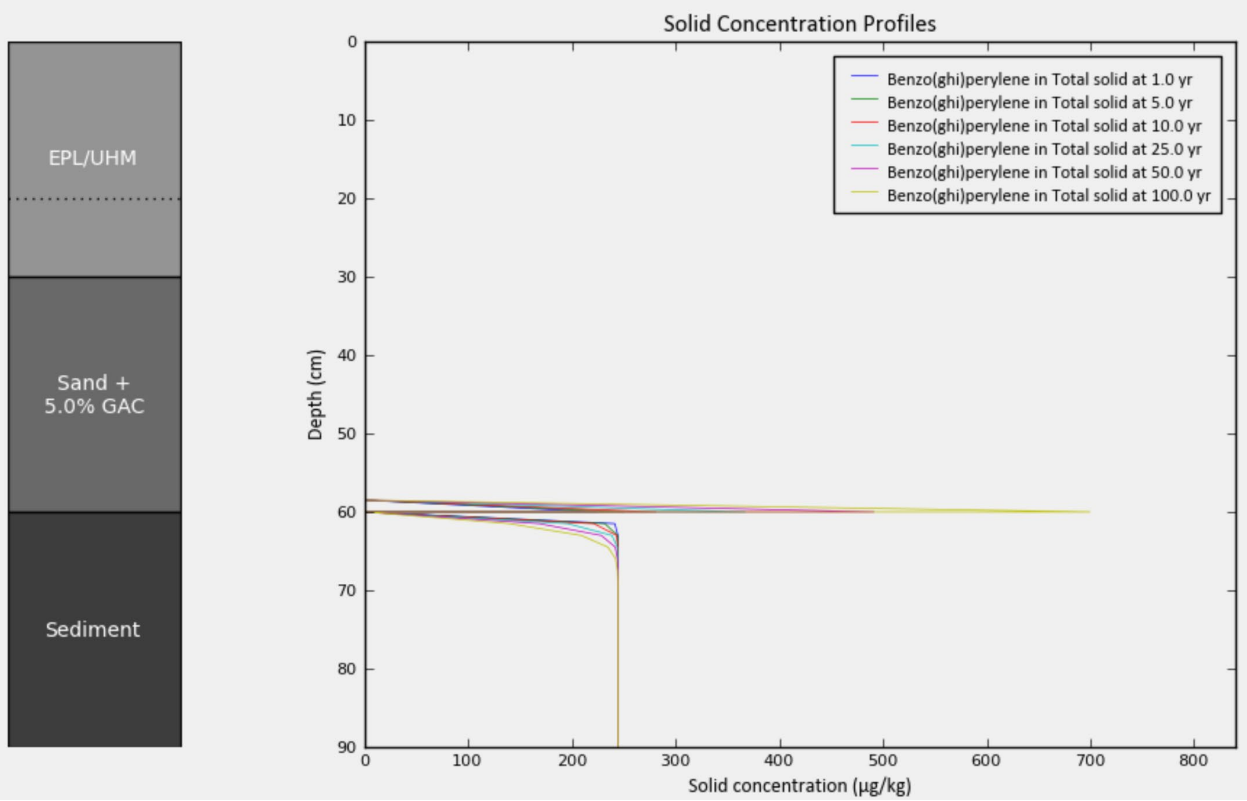

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
BEHP in Total solid at 1.0 yr
BEHP in Total solid at 5.0 yr
BEHP in Total solid at 10.0 yr
BEHP in Total solid at 25.0 yr
BEHP in Total solid at 50.0 yr
BEHP in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

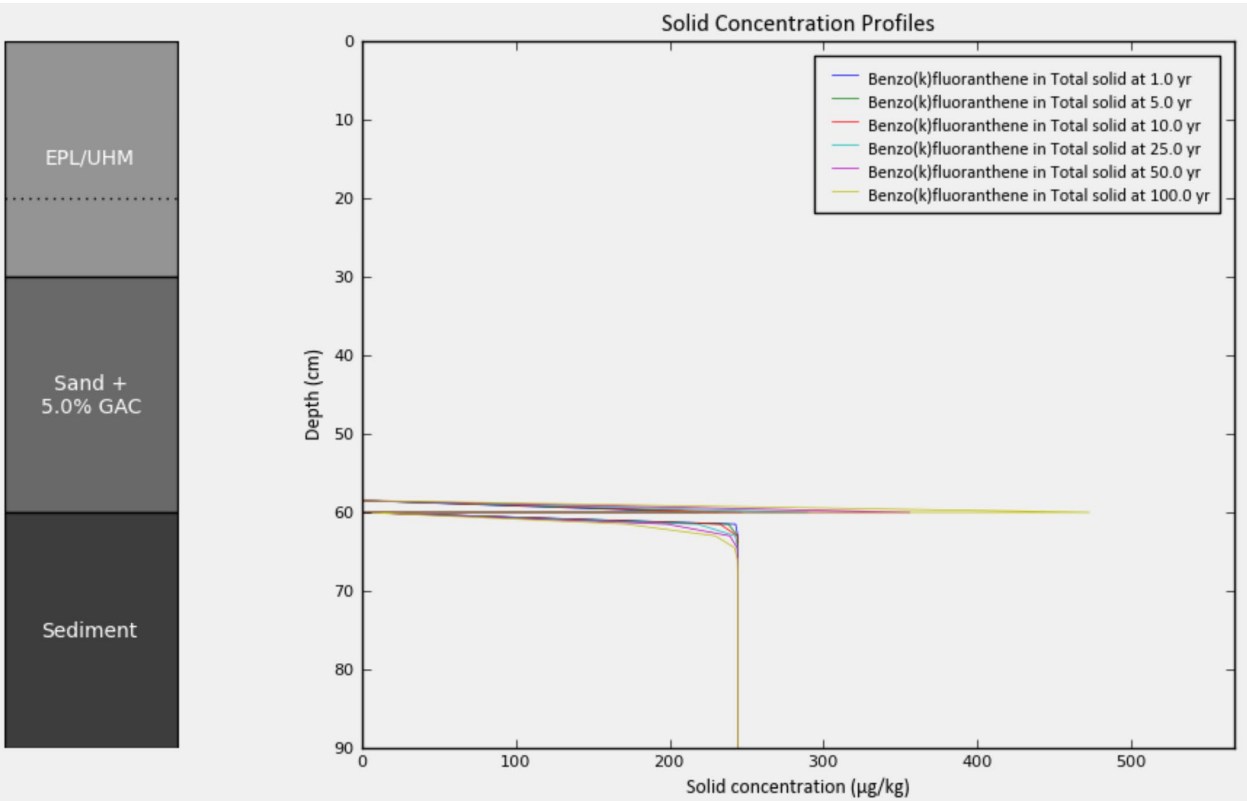

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
Benzo(a)anthracene in Total solid at 1.0 yr
Benzo(a)anthracene in Total solid at 5.0 yr
Benzo(a)anthracene in Total solid at 10.0 yr
Benzo(a)anthracene in Total solid at 25.0 yr
Benzo(a)anthracene in Total solid at 50.0 yr
Benzo(a)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

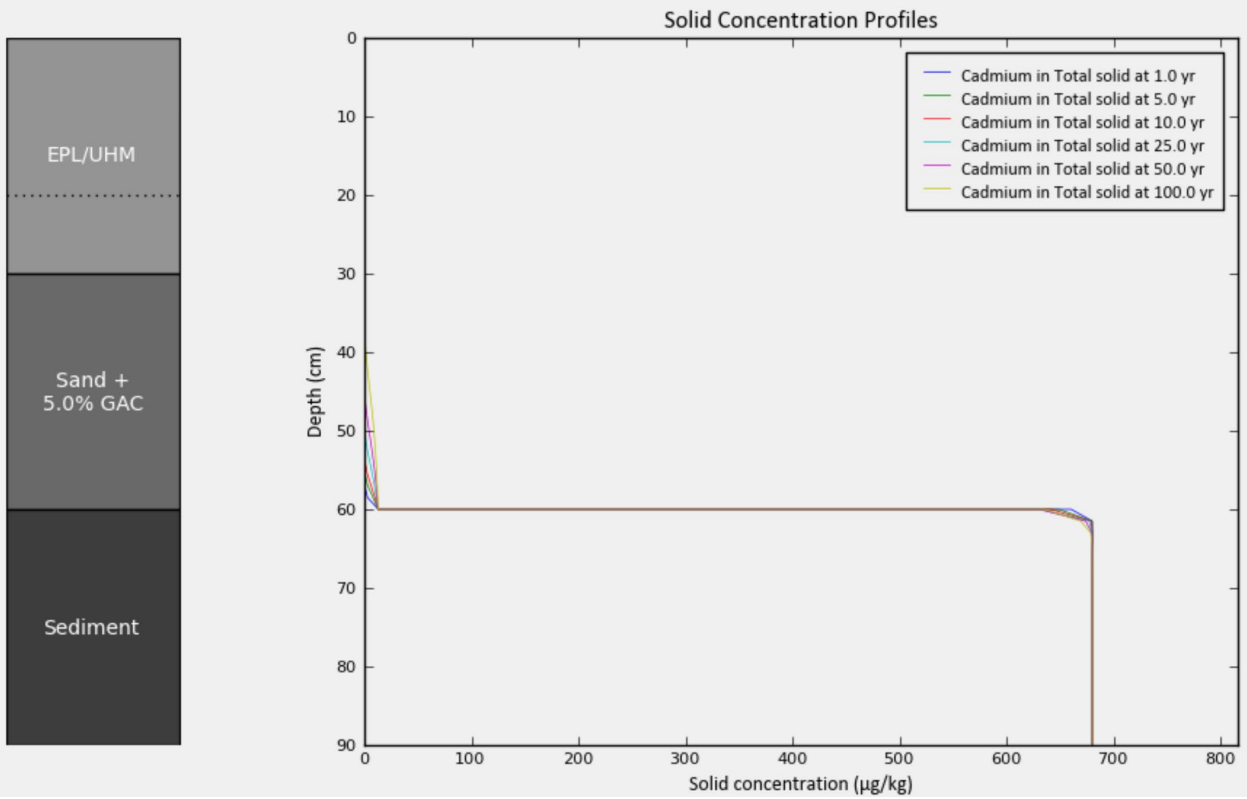

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
Benzo(a)pyrene in Total solid at 1.0 yr
Benzo(a)pyrene in Total solid at 5.0 yr
Benzo(a)pyrene in Total solid at 10.0 yr
Benzo(a)pyrene in Total solid at 25.0 yr
Benzo(a)pyrene in Total solid at 50.0 yr
Benzo(a)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

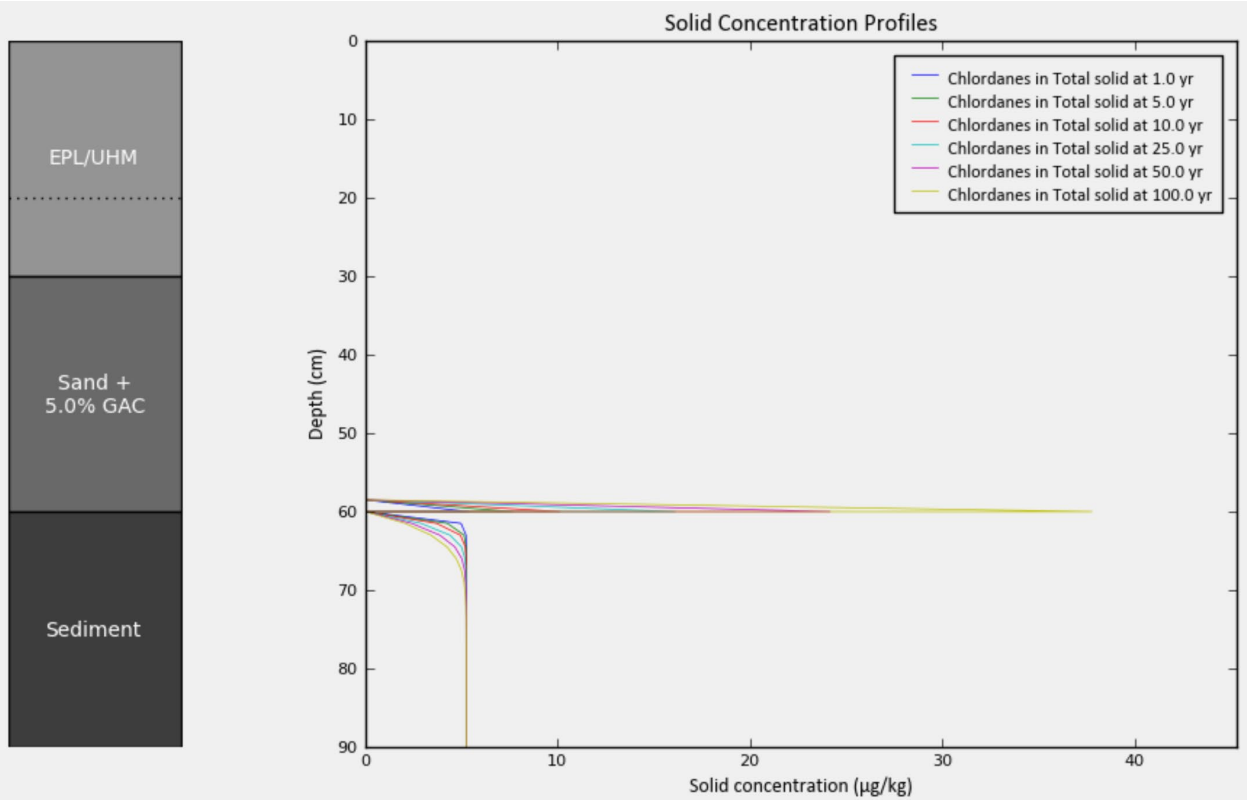

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
Benzo(b)fluoranthene in Total solid at 1.0 yr
Benzo(b)fluoranthene in Total solid at 5.0 yr
Benzo(b)fluoranthene in Total solid at 10.0 yr
Benzo(b)fluoranthene in Total solid at 25.0 yr
Benzo(b)fluoranthene in Total solid at 50.0 yr
Benzo(b)fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500
Solid concentration (µg/kg)

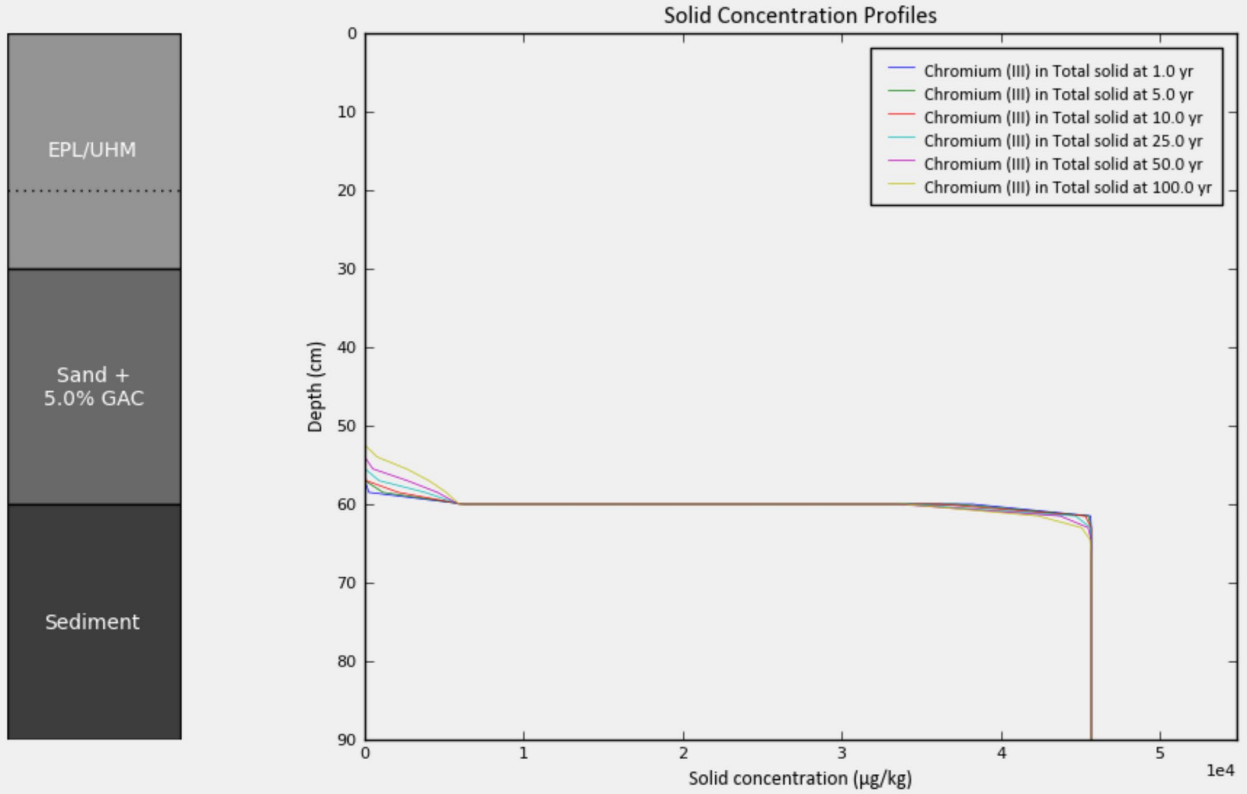

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
Benzo(e)pyrene in Total solid at 1.0 yr
Benzo(e)pyrene in Total solid at 5.0 yr
Benzo(e)pyrene in Total solid at 10.0 yr
Benzo(e)pyrene in Total solid at 25.0 yr
Benzo(e)pyrene in Total solid at 50.0 yr
Benzo(e)pyrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
Solid concentration (µg/kg)

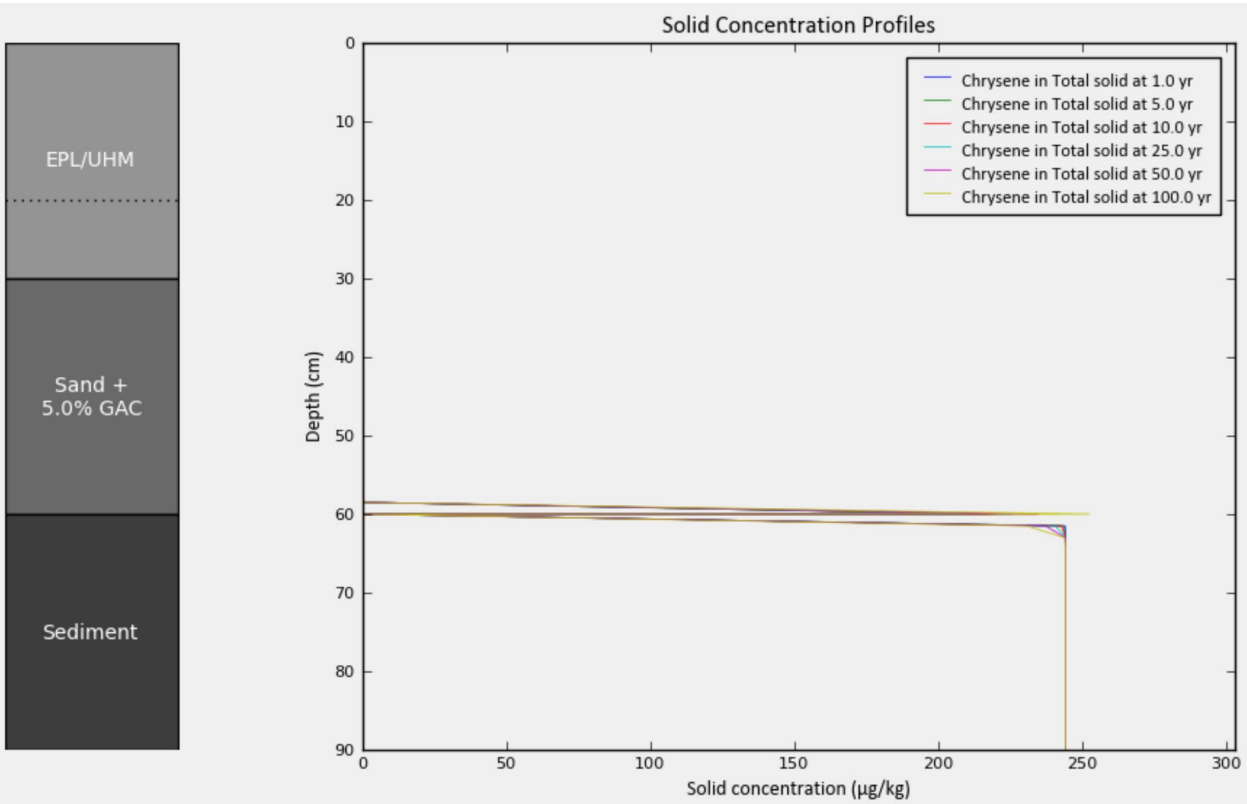

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
Benzo(ghi)perylene in Total solid at 1.0 yr
Benzo(ghi)perylene in Total solid at 5.0 yr
Benzo(ghi)perylene in Total solid at 10.0 yr
Benzo(ghi)perylene in Total solid at 25.0 yr
Benzo(ghi)perylene in Total solid at 50.0 yr
Benzo(ghi)perylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

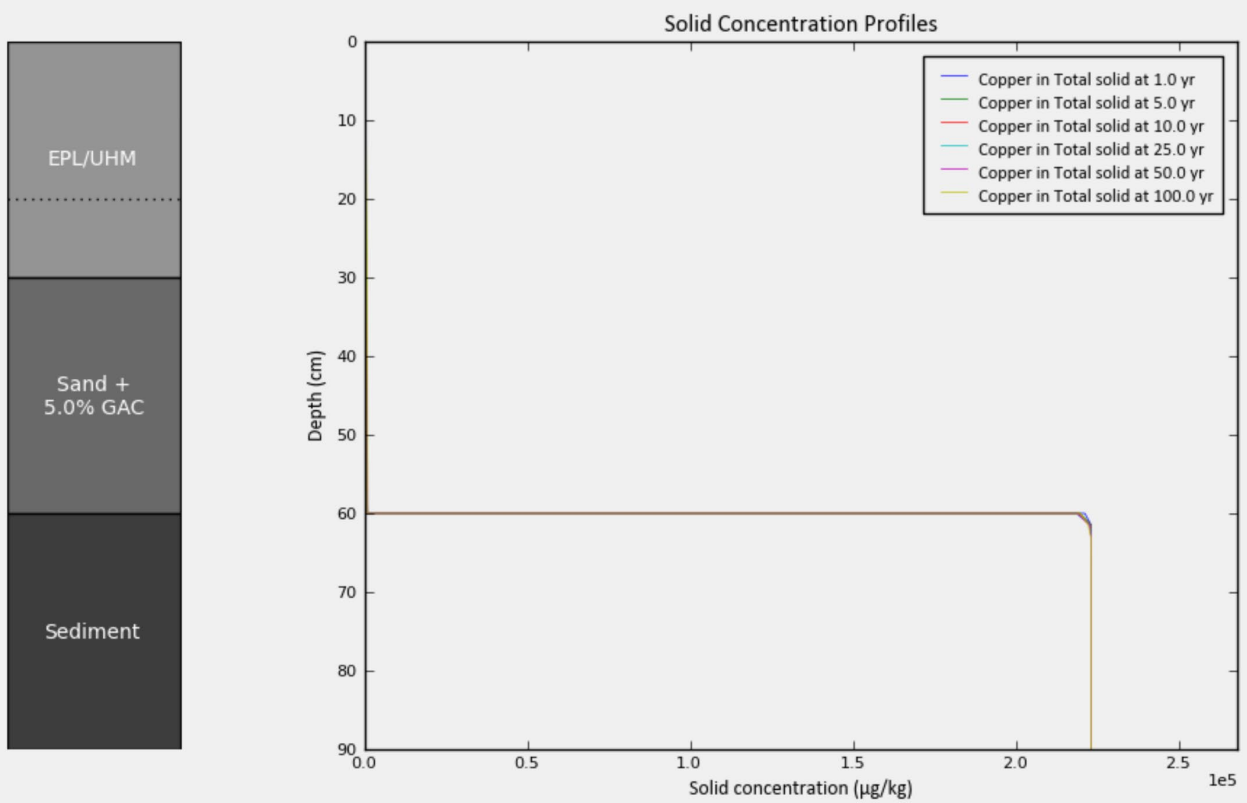

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
Benzo(k)fluoranthene in Total solid at 1.0 yr
Benzo(k)fluoranthene in Total solid at 5.0 yr
Benzo(k)fluoranthene in Total solid at 10.0 yr
Benzo(k)fluoranthene in Total solid at 25.0 yr
Benzo(k)fluoranthene in Total solid at 50.0 yr
Benzo(k)fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

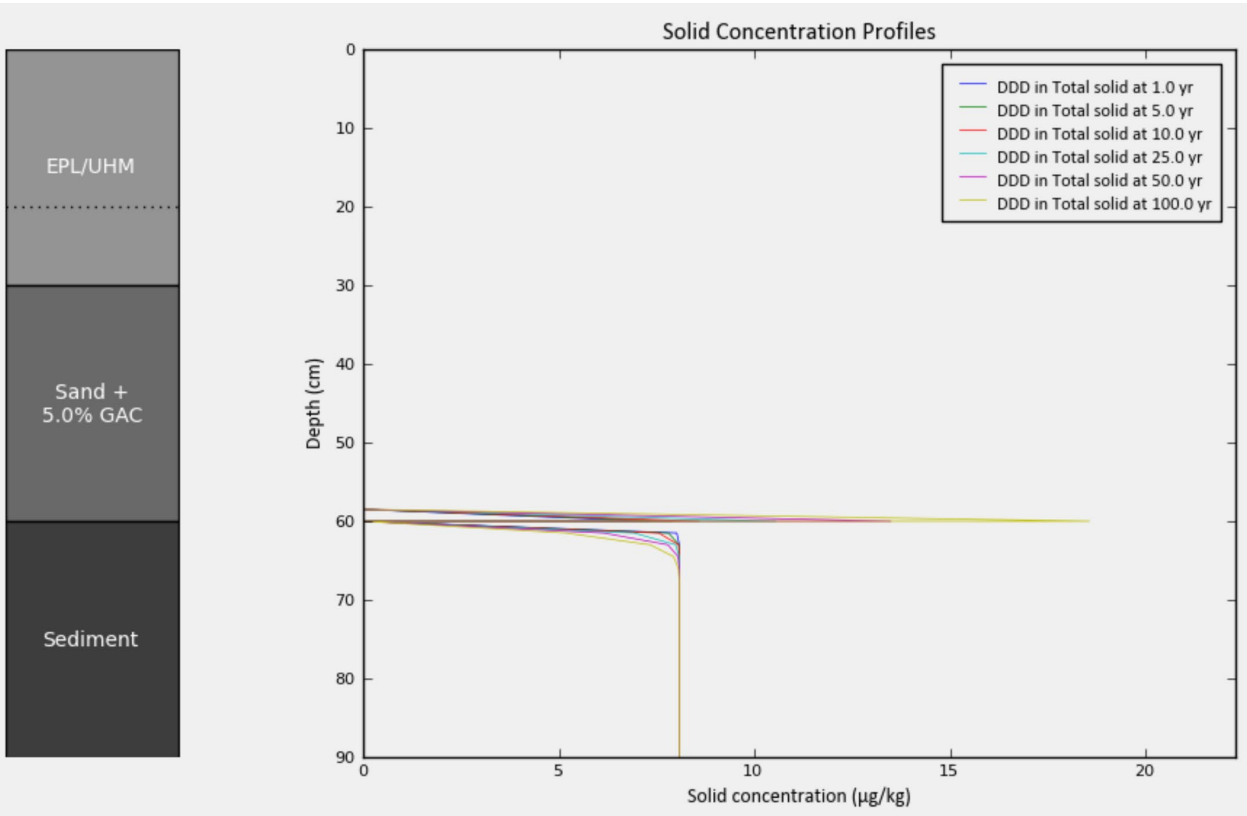

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Cadmium in Total solid at 1.0 yr
Cadmium in Total solid at 5.0 yr
Cadmium in Total solid at 10.0 yr
Cadmium in Total solid at 25.0 yr
Cadmium in Total solid at 50.0 yr
Cadmium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

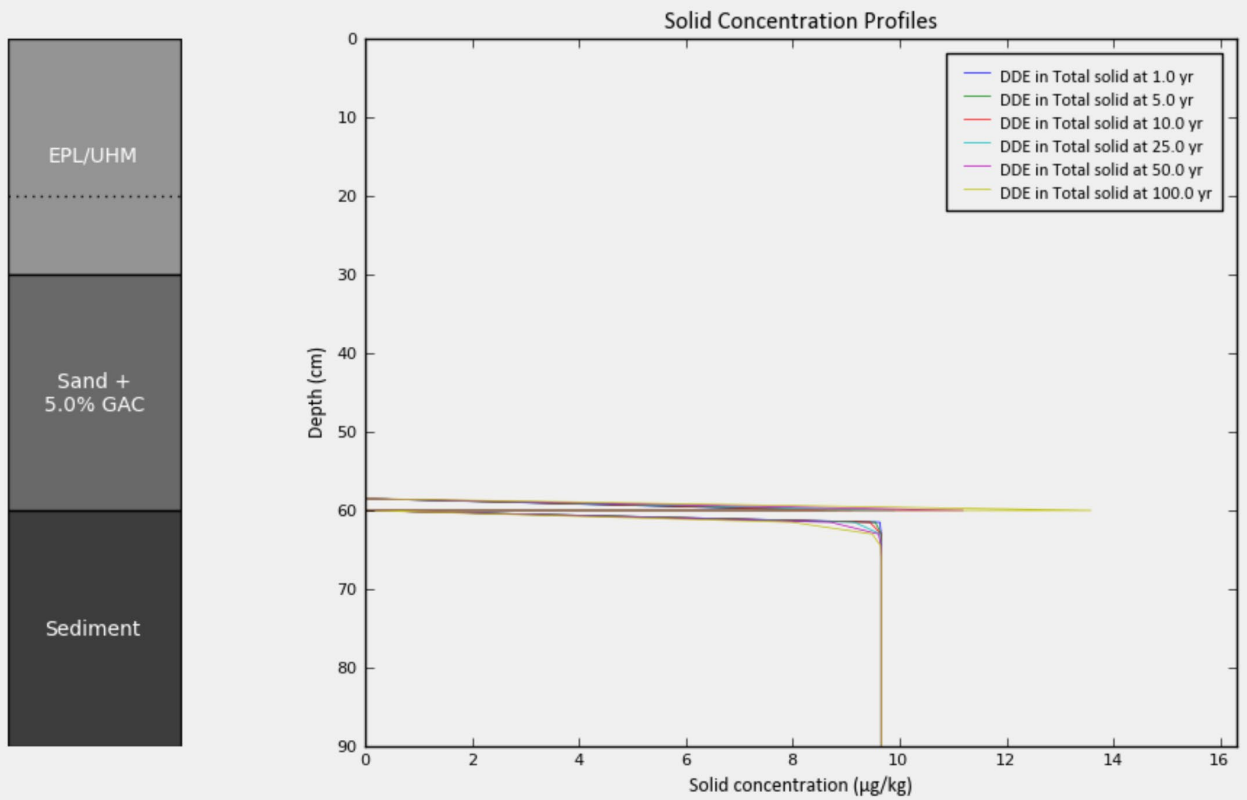

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Chlordanes in Total solid at 1.0 yr
Chlordanes in Total solid at 5.0 yr
Chlordanes in Total solid at 10.0 yr
Chlordanes in Total solid at 25.0 yr
Chlordanes in Total solid at 50.0 yr
Chlordanes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

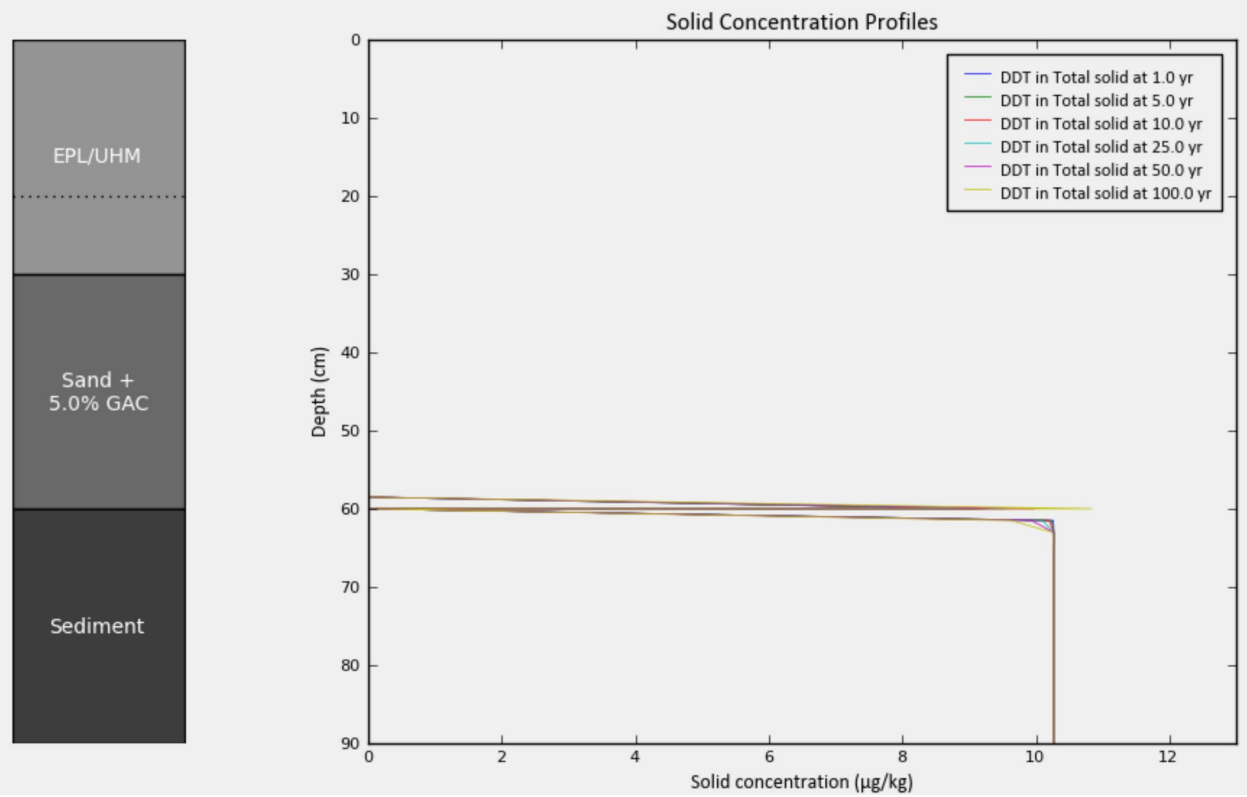

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
Chromium (III) in Total solid at 1.0 yr
Chromium (III) in Total solid at 5.0 yr
Chromium (III) in Total solid at 10.0 yr
Chromium (III) in Total solid at 25.0 yr
Chromium (III) in Total solid at 50.0 yr
Chromium (III) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

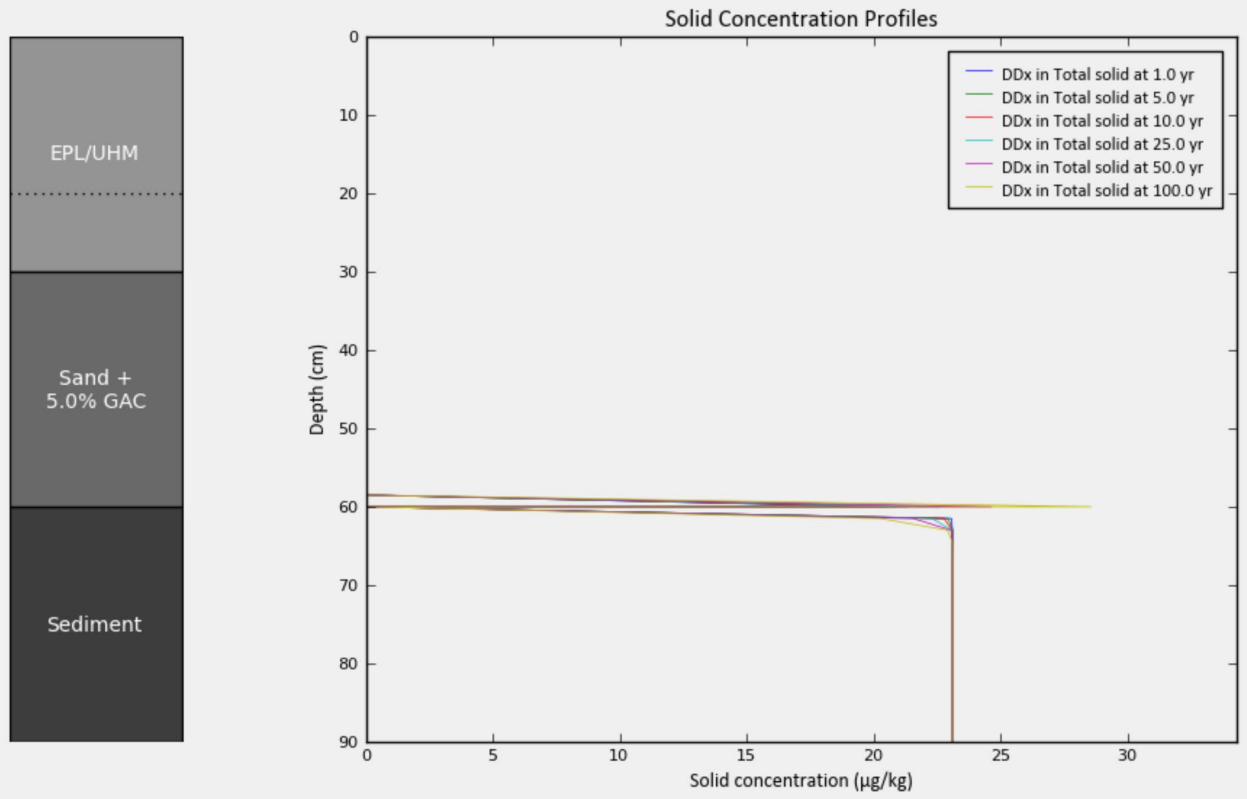

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
Chrysene in Total solid at 1.0 yr
Chrysene in Total solid at 5.0 yr
Chrysene in Total solid at 10.0 yr
Chrysene in Total solid at 25.0 yr
Chrysene in Total solid at 50.0 yr
Chrysene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

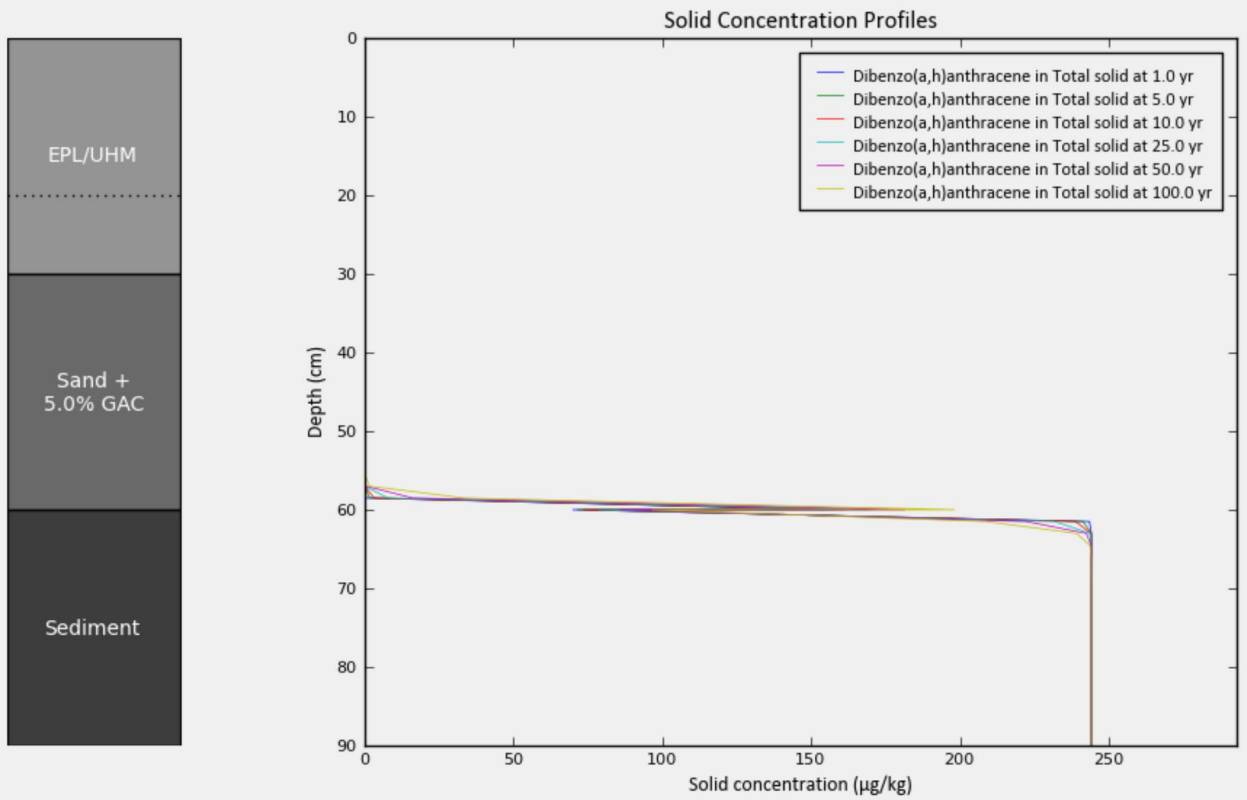

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Copper in Total solid at 1.0 yr
Copper in Total solid at 5.0 yr
Copper in Total solid at 10.0 yr
Copper in Total solid at 25.0 yr
Copper in Total solid at 50.0 yr
Copper in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

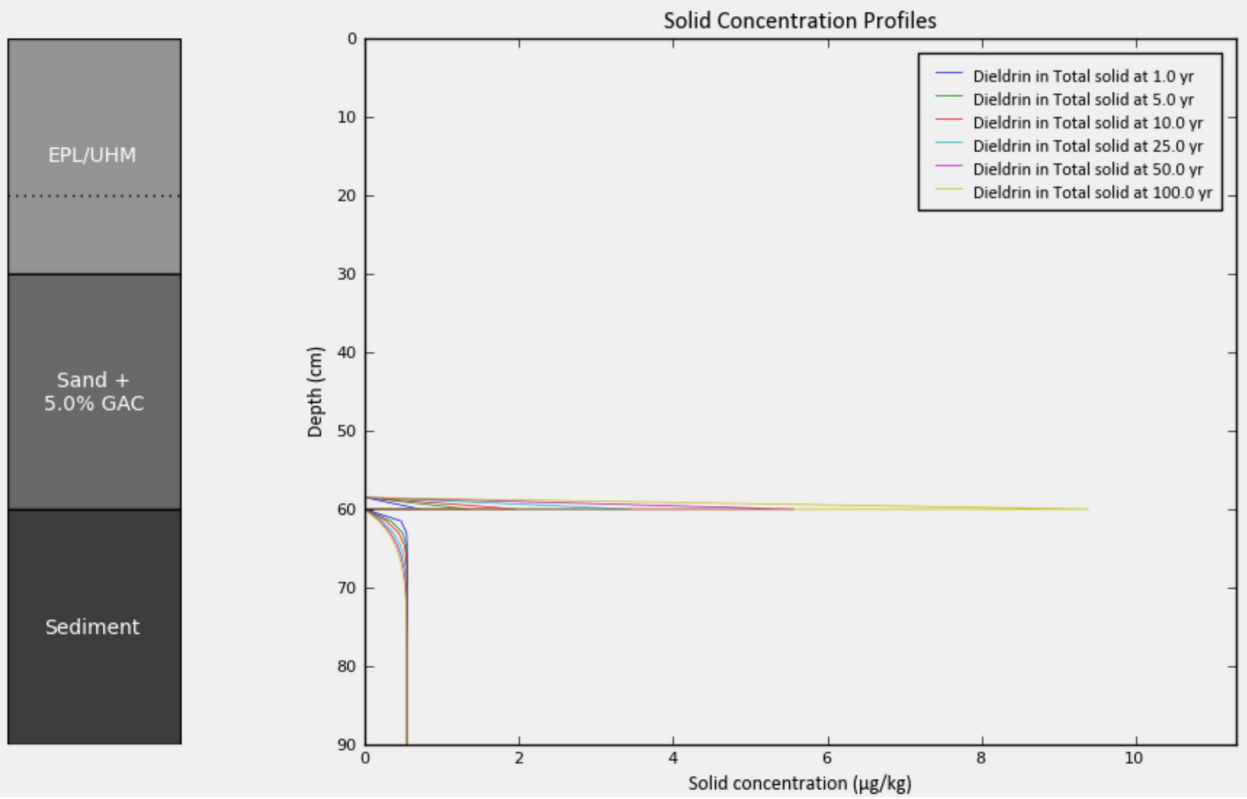

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
DDD in Total solid at 1.0 yr
DDD in Total solid at 5.0 yr
DDD in Total solid at 10.0 yr
DDD in Total solid at 25.0 yr
DDD in Total solid at 50.0 yr
DDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

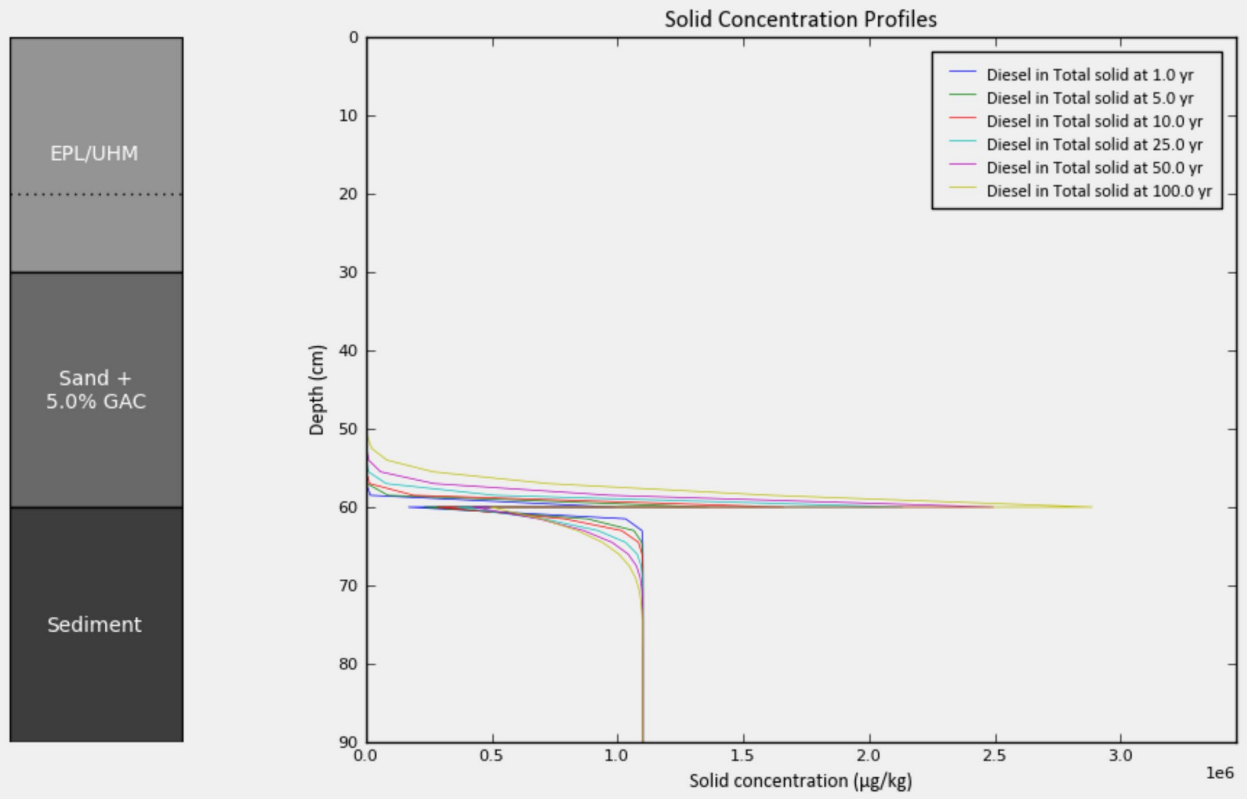

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
DDE in Total solid at 1.0 yr
DDE in Total solid at 5.0 yr
DDE in Total solid at 10.0 yr
DDE in Total solid at 25.0 yr
DDE in Total solid at 50.0 yr
DDE in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

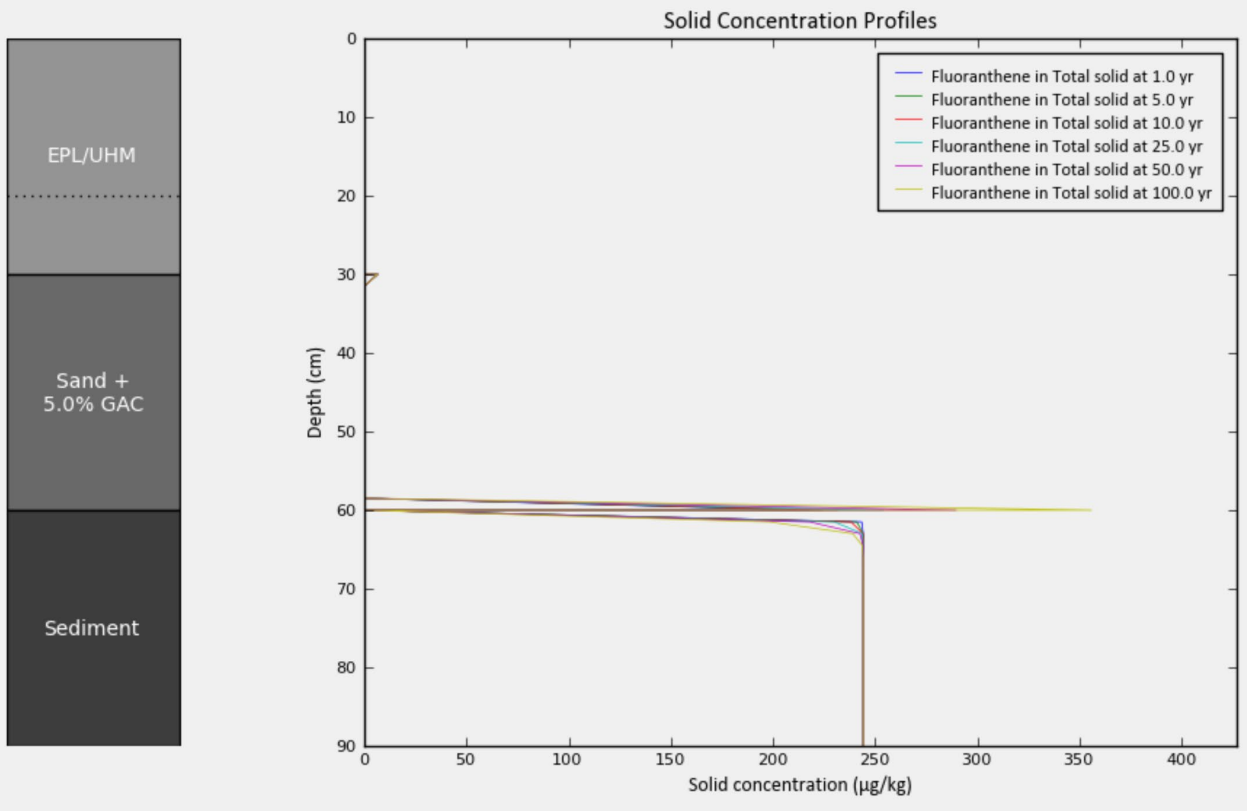

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
DDT in Total solid at 1.0 yr
DDT in Total solid at 5.0 yr
DDT in Total solid at 10.0 yr
DDT in Total solid at 25.0 yr
DDT in Total solid at 50.0 yr
DDT in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

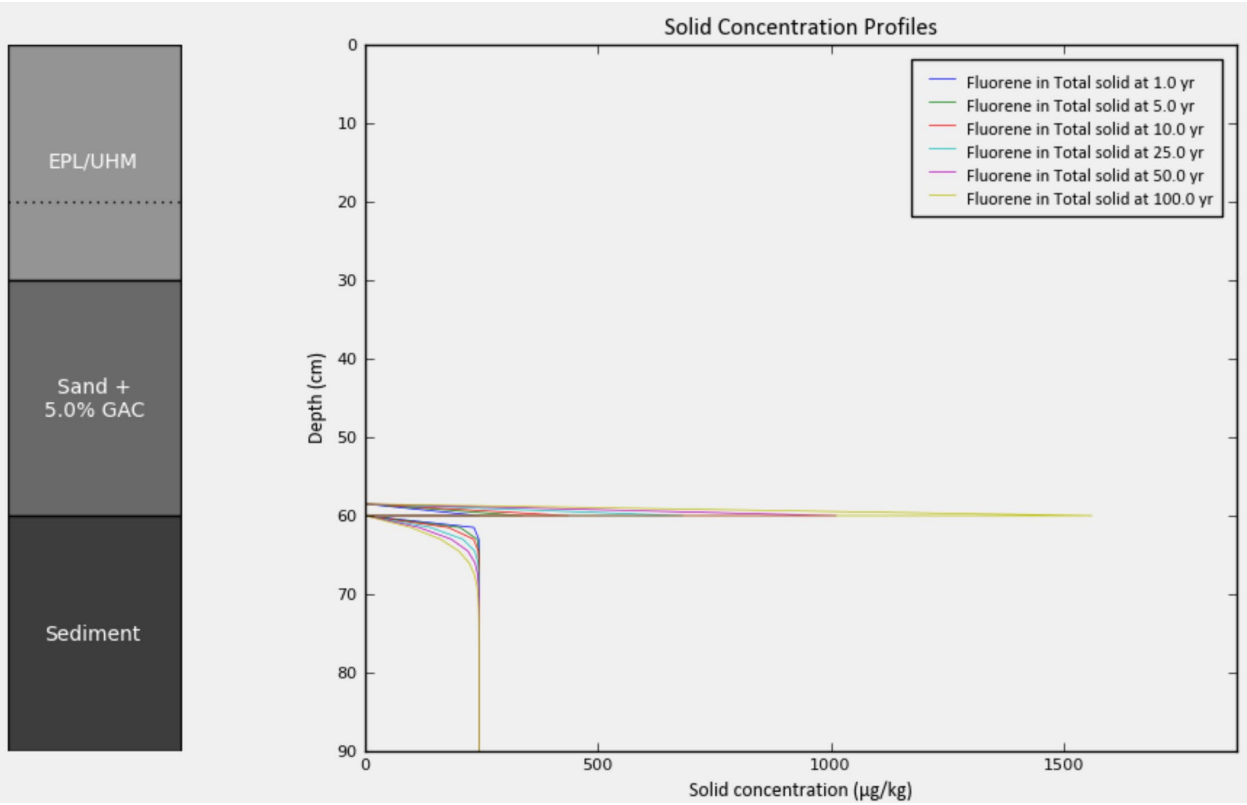

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
DDx in Total solid at 1.0 yr
DDx in Total solid at 5.0 yr
DDx in Total solid at 10.0 yr
DDx in Total solid at 25.0 yr
DDx in Total solid at 50.0 yr
DDx in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

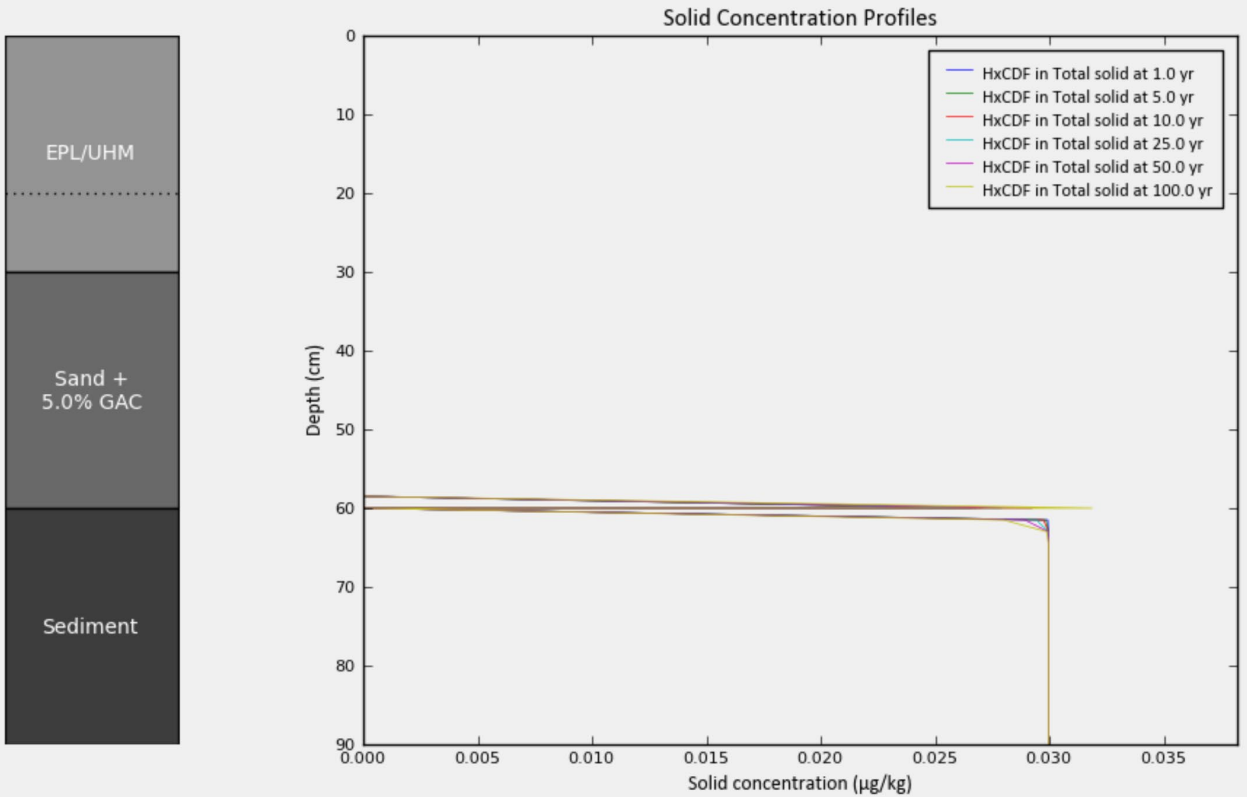

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
Dibenzo(a,h)anthracene in Total solid at 1.0 yr
Dibenzo(a,h)anthracene in Total solid at 5.0 yr
Dibenzo(a,h)anthracene in Total solid at 10.0 yr
Dibenzo(a,h)anthracene in Total solid at 25.0 yr
Dibenzo(a,h)anthracene in Total solid at 50.0 yr
Dibenzo(a,h)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

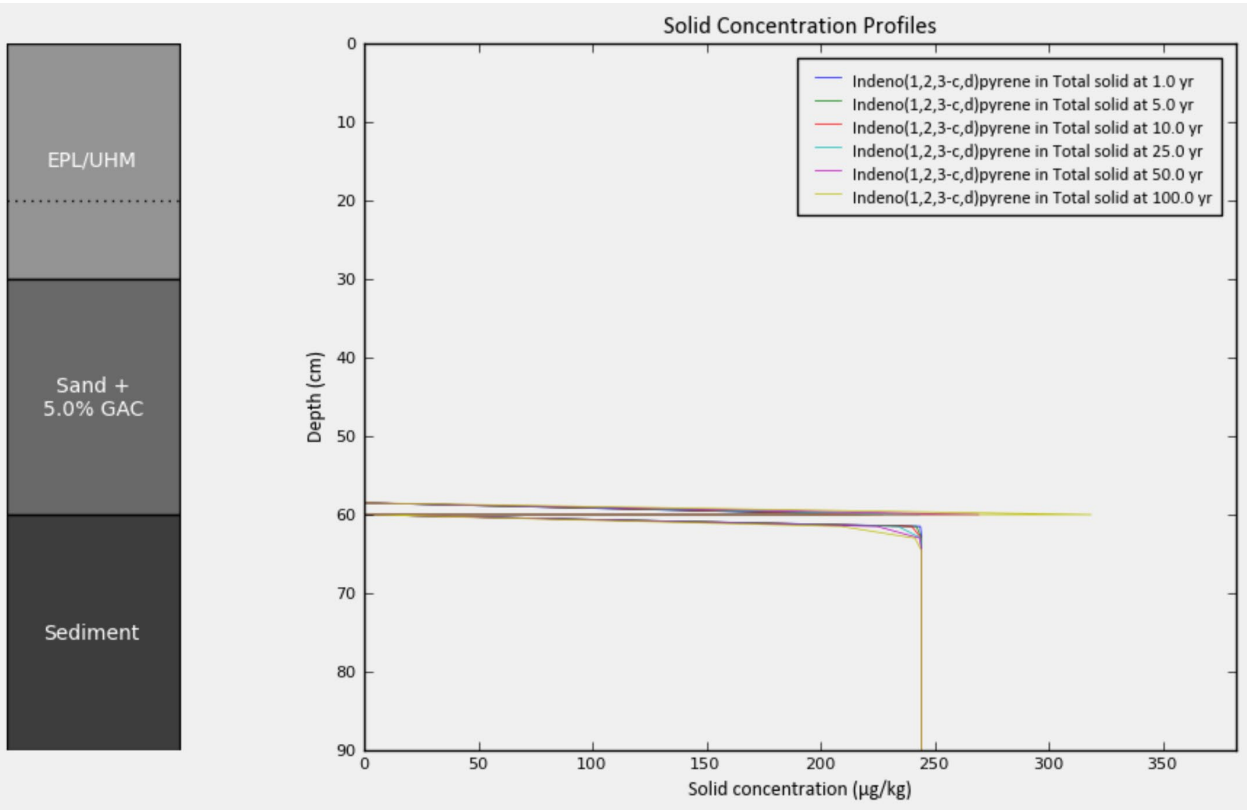

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Dieldrin in Total solid at 1.0 yr
Dieldrin in Total solid at 5.0 yr
Dieldrin in Total solid at 10.0 yr
Dieldrin in Total solid at 25.0 yr
Dieldrin in Total solid at 50.0 yr
Dieldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

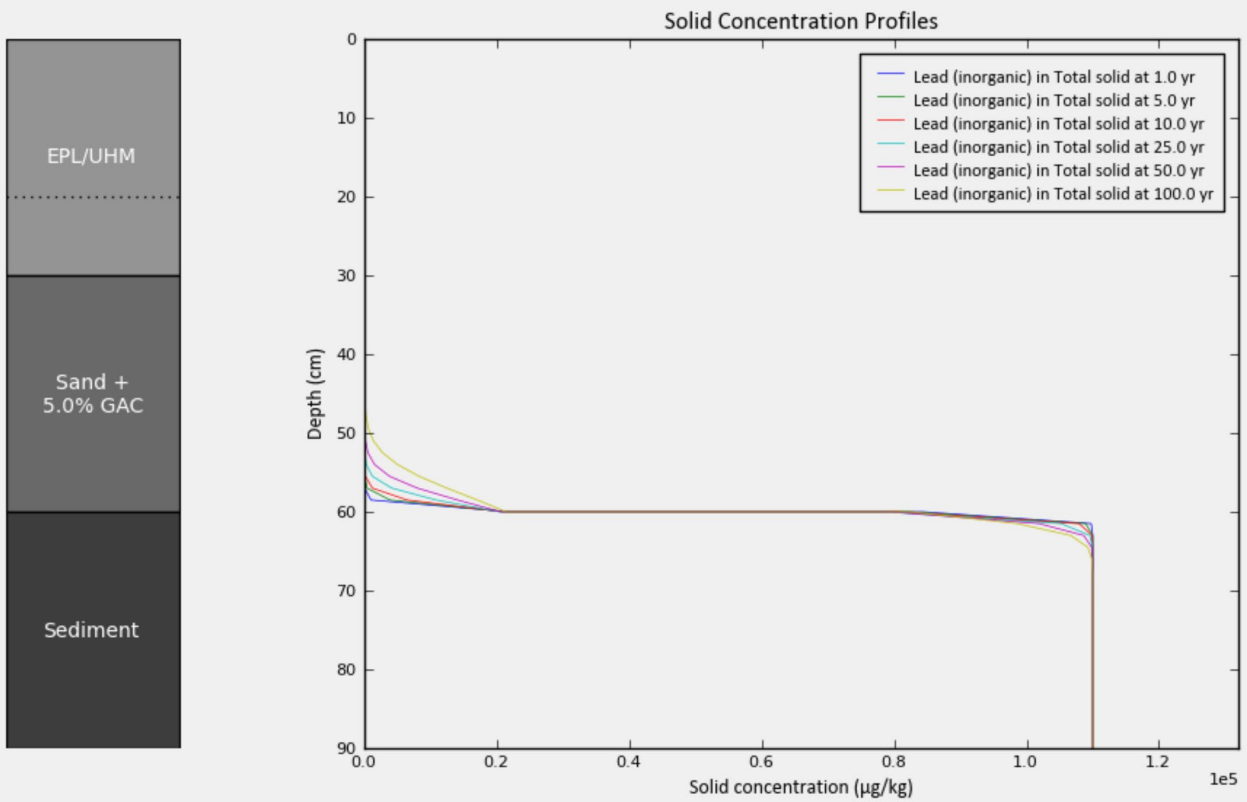

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Diesel in Total solid at 1.0 yr
Diesel in Total solid at 5.0 yr
Diesel in Total solid at 10.0 yr
Diesel in Total solid at 25.0 yr
Diesel in Total solid at 50.0 yr
Diesel in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

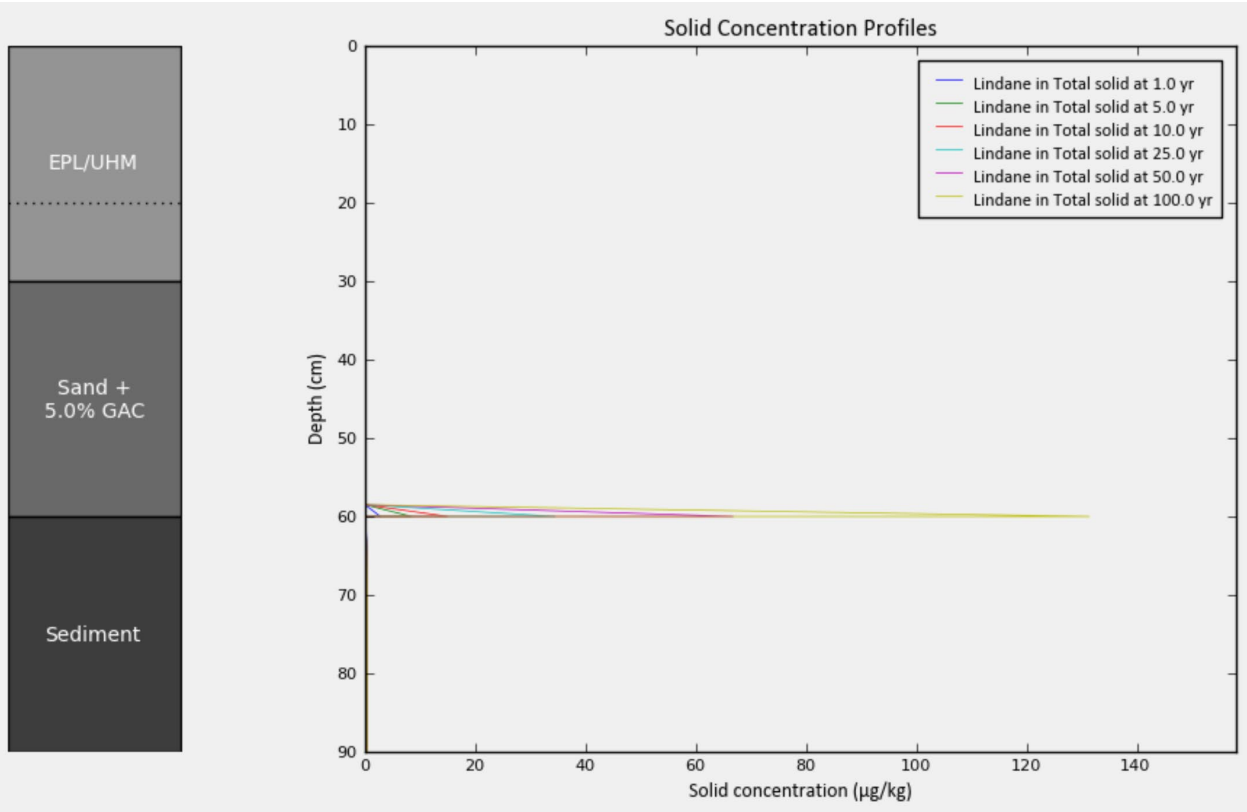

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Fluoranthene in Total solid at 1.0 yr
Fluoranthene in Total solid at 5.0 yr
Fluoranthene in Total solid at 10.0 yr
Fluoranthene in Total solid at 25.0 yr
Fluoranthene in Total solid at 50.0 yr
Fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
50
100
150
200
250
300
350
400
Solid concentration (µg/kg)

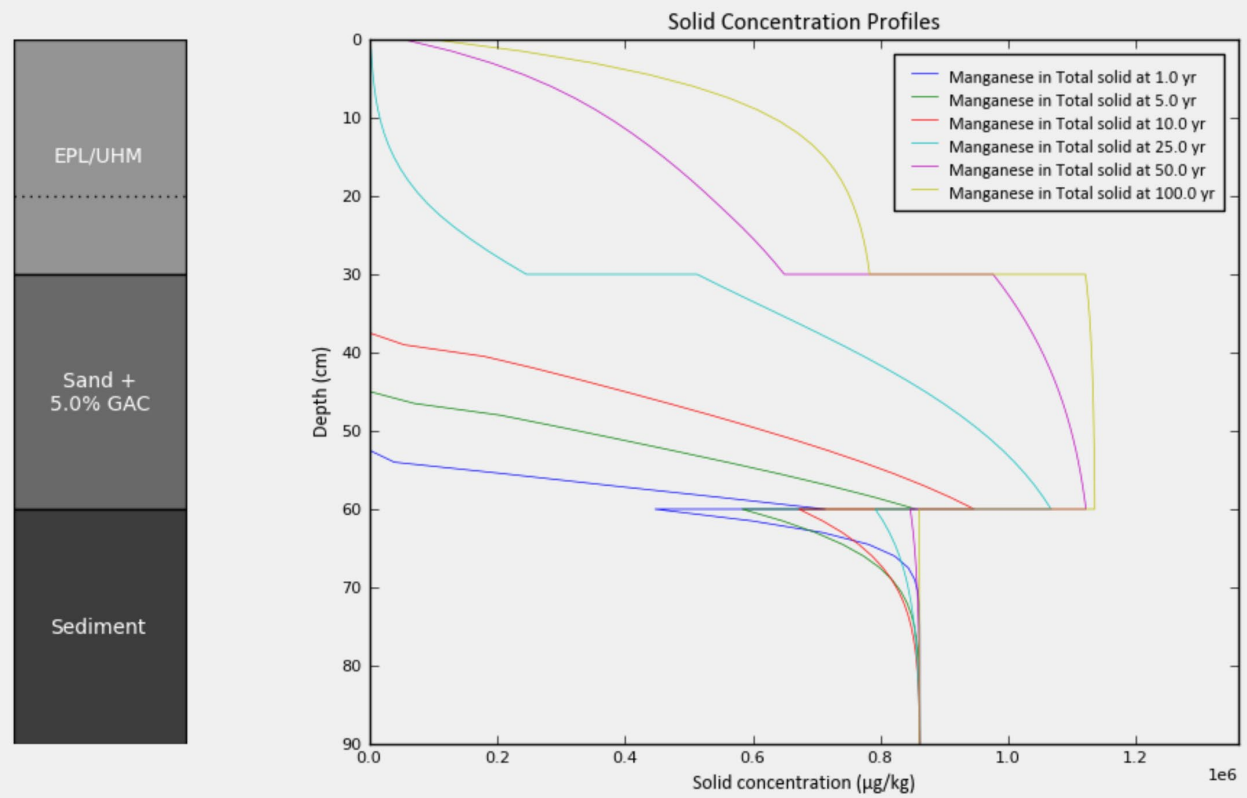

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Fluorene in Total solid at 1.0 yr
Fluorene in Total solid at 5.0 yr
Fluorene in Total solid at 10.0 yr
Fluorene in Total solid at 25.0 yr
Fluorene in Total solid at 50.0 yr
Fluorene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
500
1000
1500
Solid concentration (µg/kg)

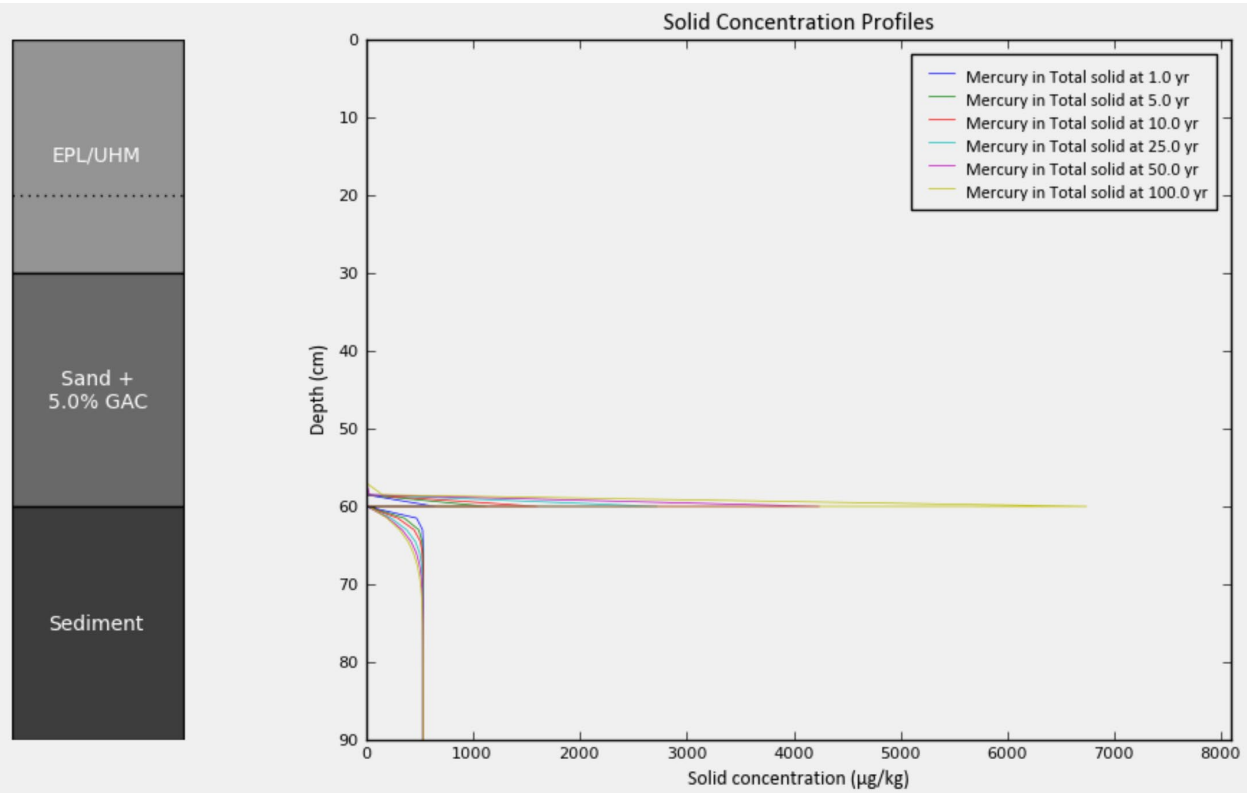

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
HxCDF in Total solid at 1.0 yr
HxCDF in Total solid at 5.0 yr
HxCDF in Total solid at 10.0 yr
HxCDF in Total solid at 25.0 yr
HxCDF in Total solid at 50.0 yr
HxCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
Solid concentration (µg/kg)

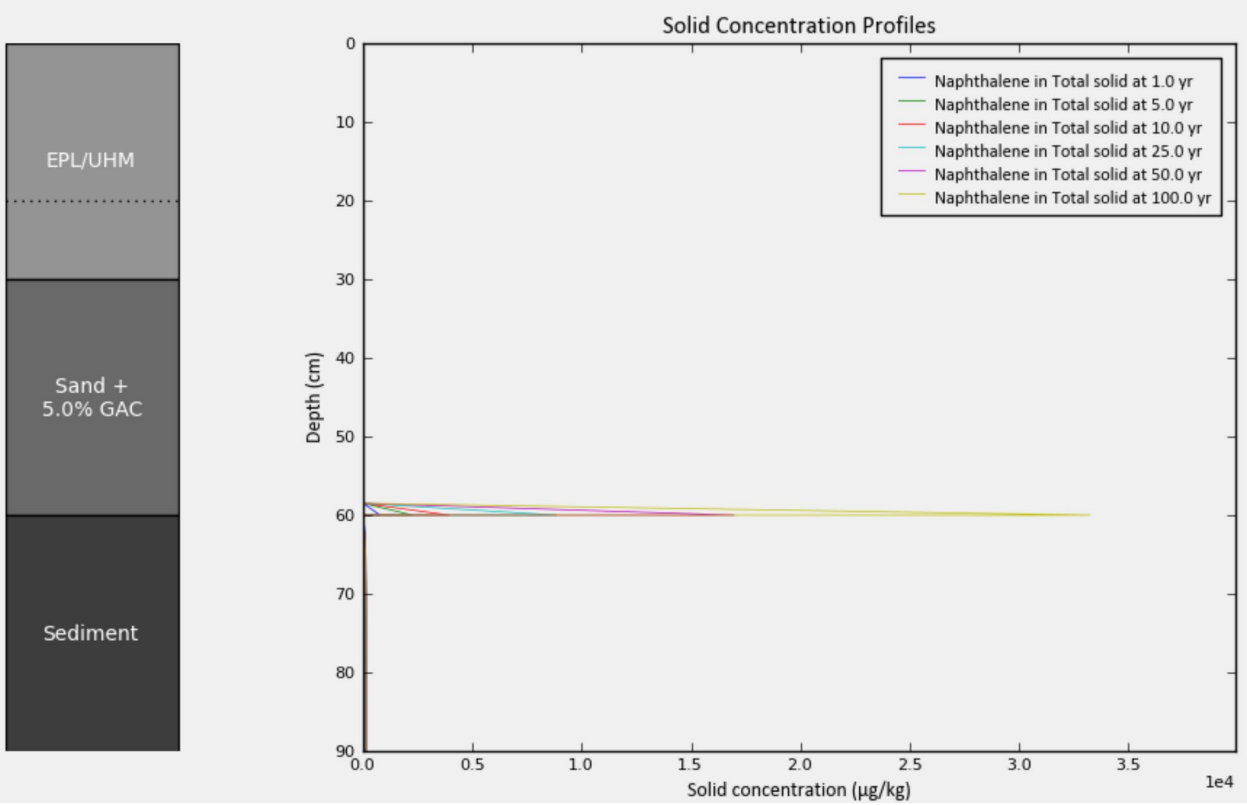

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
Indeno(1,2,3-c,d)pyrene in Total solid at 1.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 5.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 10.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 25.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 50.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
50
100
150
200
250
300
350
Solid concentration (µg/kg)

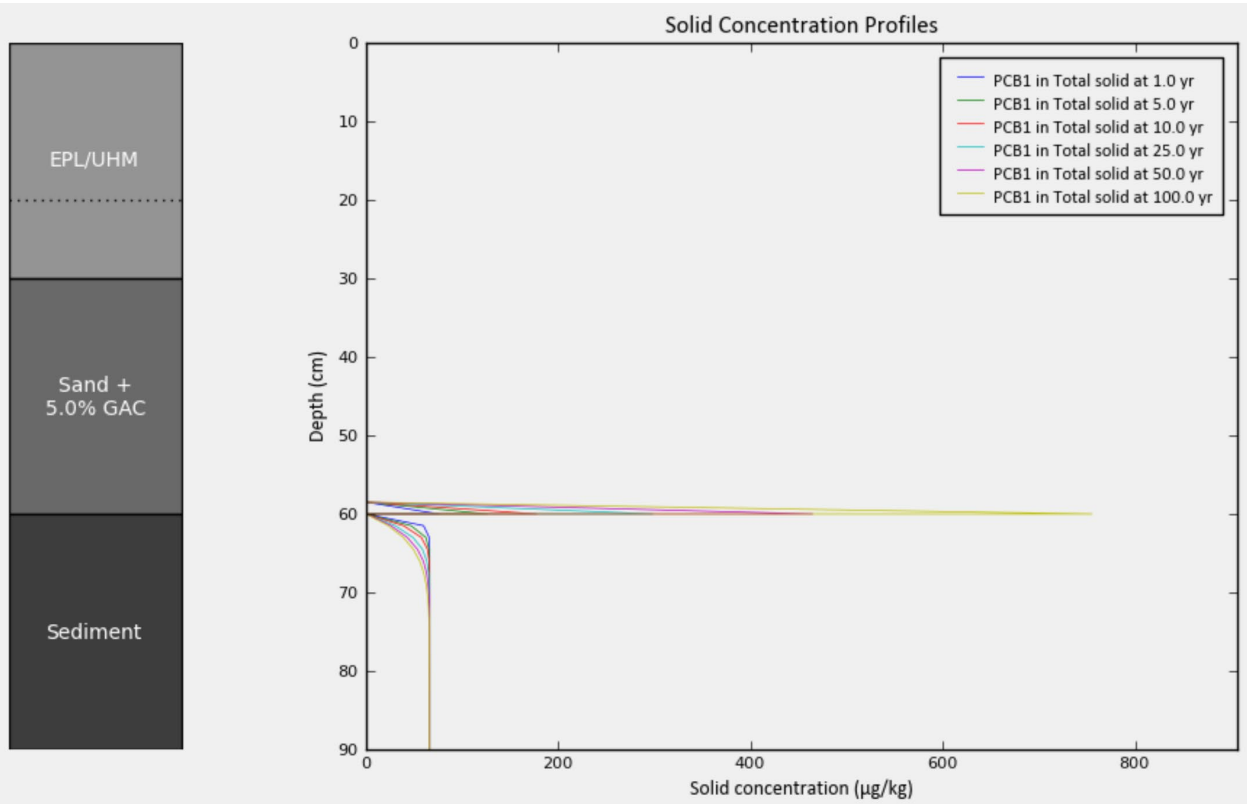

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Lead (inorganic) in Total solid at 1.0 yr
Lead (inorganic) in Total solid at 5.0 yr
Lead (inorganic) in Total solid at 10.0 yr
Lead (inorganic) in Total solid at 25.0 yr
Lead (inorganic) in Total solid at 50.0 yr
Lead (inorganic) in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e5
Solid concentration (µg/kg)

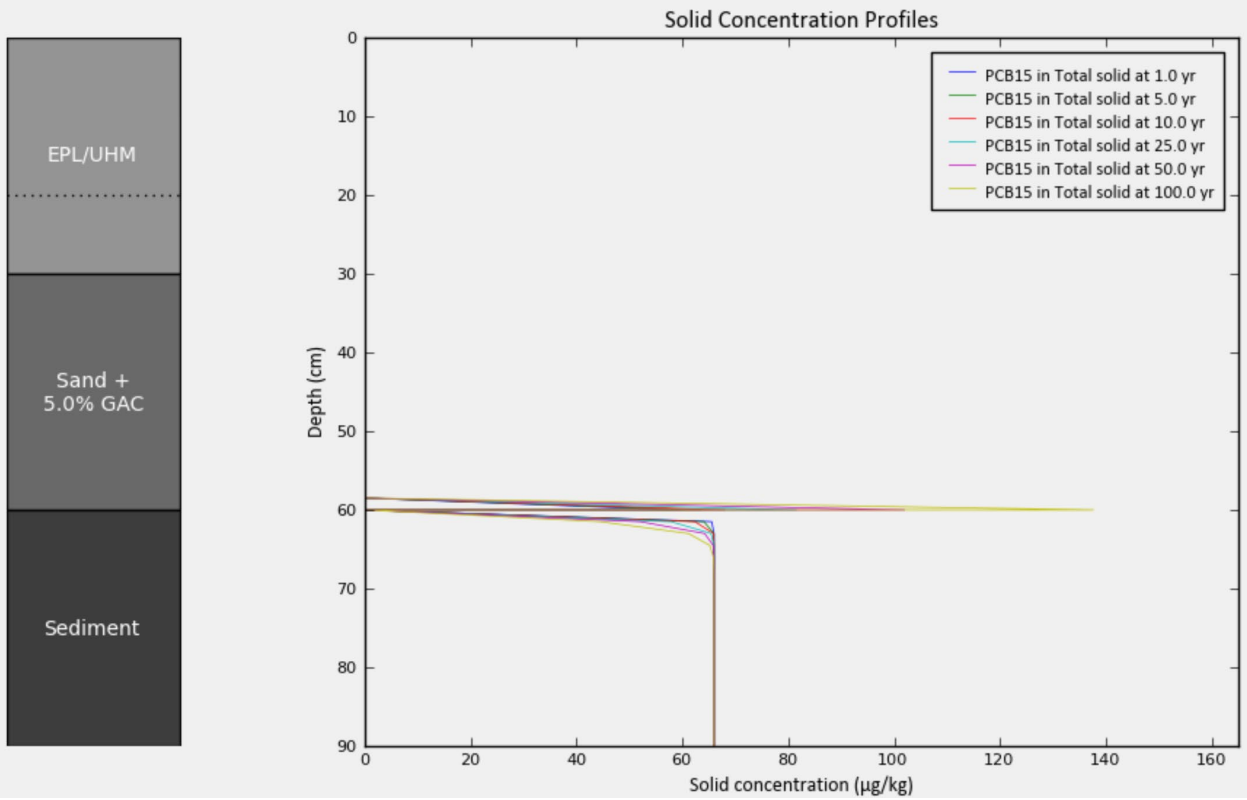

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Lindane in Total solid at 1.0 yr
Lindane in Total solid at 5.0 yr
Lindane in Total solid at 10.0 yr
Lindane in Total solid at 25.0 yr
Lindane in Total solid at 50.0 yr
Lindane in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80
100
120
140
Solid concentration (µg/kg)

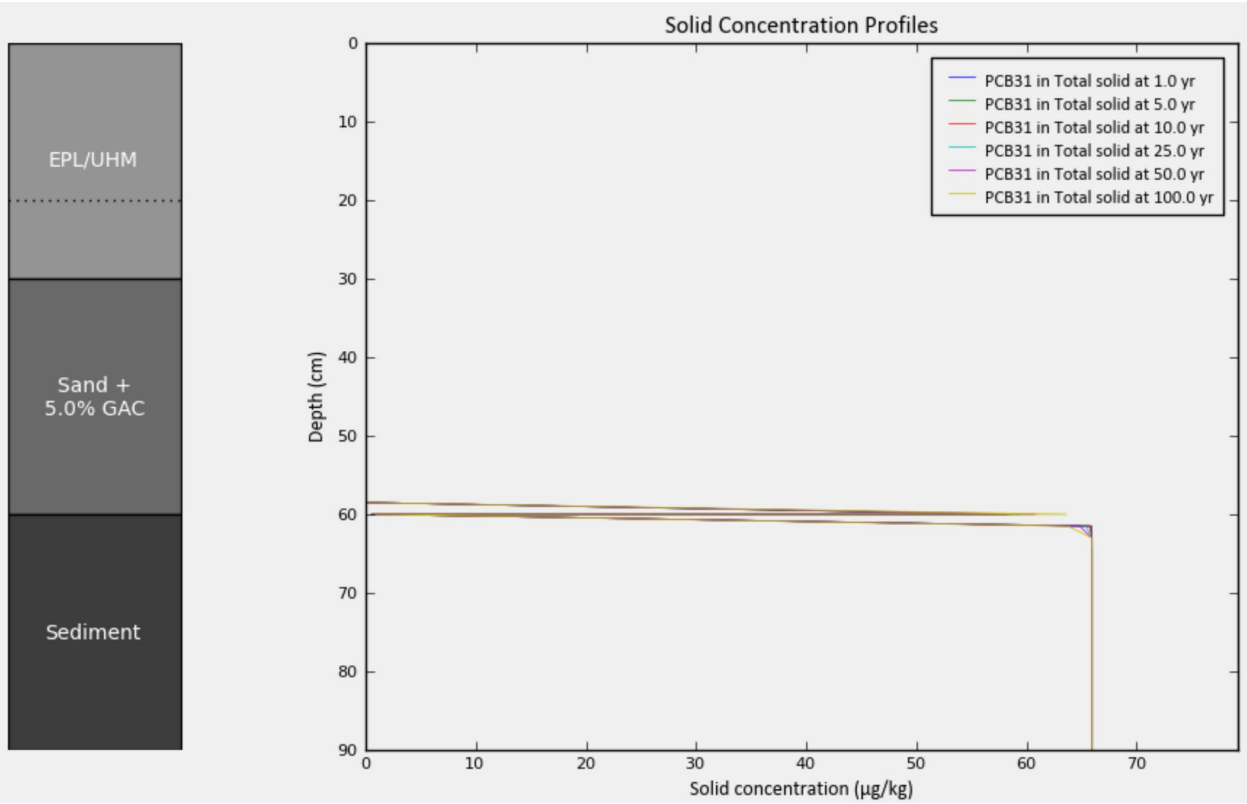

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Manganese in Total solid at 1.0 yr
Manganese in Total solid at 5.0 yr
Manganese in Total solid at 10.0 yr
Manganese in Total solid at 25.0 yr
Manganese in Total solid at 50.0 yr
Manganese in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

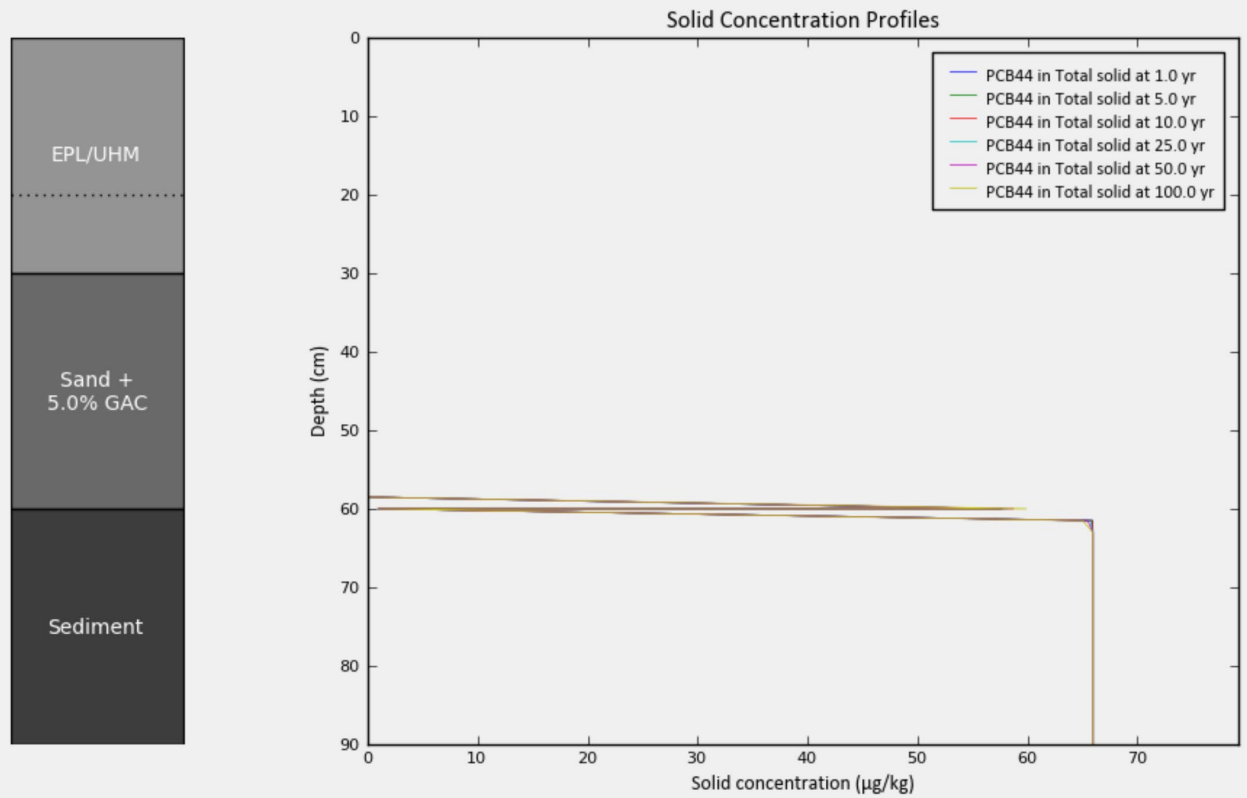

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Mercury in Total solid at 1.0 yr
Mercury in Total solid at 5.0 yr
Mercury in Total solid at 10.0 yr
Mercury in Total solid at 25.0 yr
Mercury in Total solid at 50.0 yr
Mercury in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

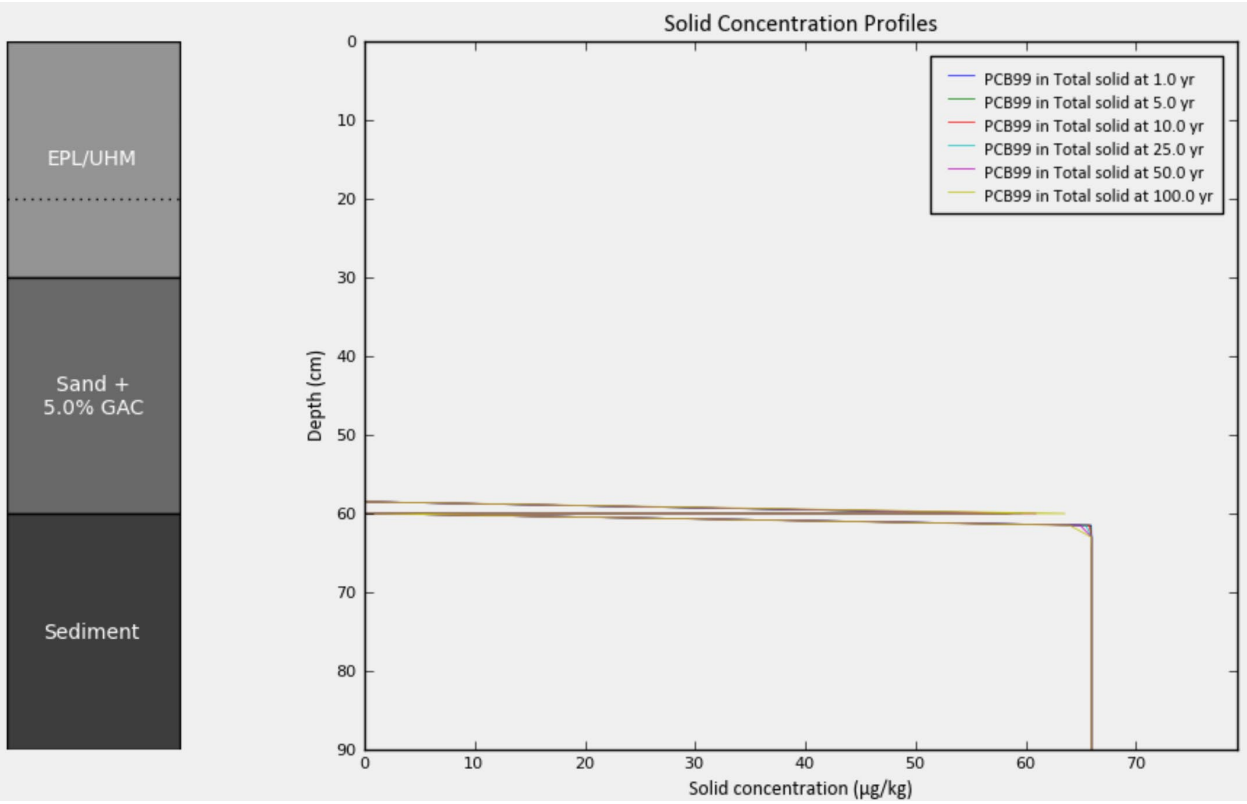

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Naphthalene in Total solid at 1.0 yr
Naphthalene in Total solid at 5.0 yr
Naphthalene in Total solid at 10.0 yr
Naphthalene in Total solid at 25.0 yr
Naphthalene in Total solid at 50.0 yr
Naphthalene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

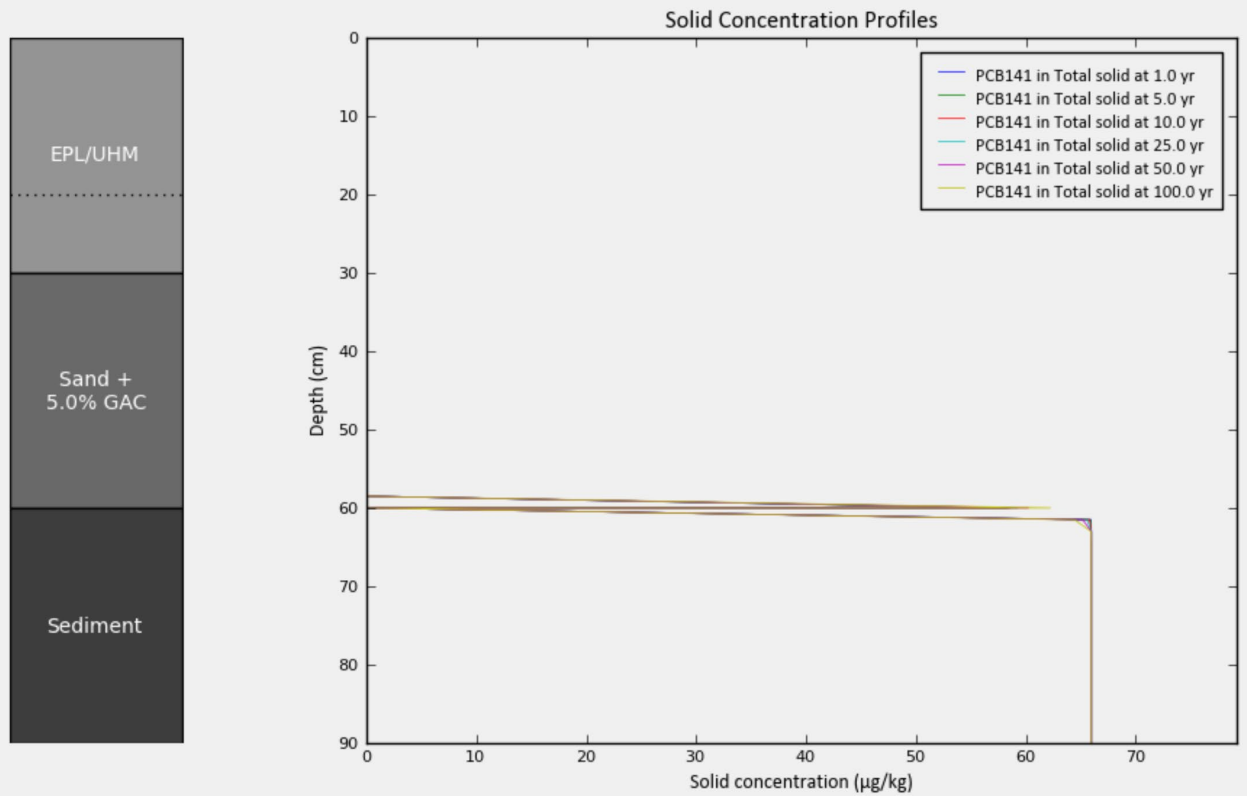

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB1 in Total solid at 1.0 yr
PCB1 in Total solid at 5.0 yr
PCB1 in Total solid at 10.0 yr
PCB1 in Total solid at 25.0 yr
PCB1 in Total solid at 50.0 yr
PCB1 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

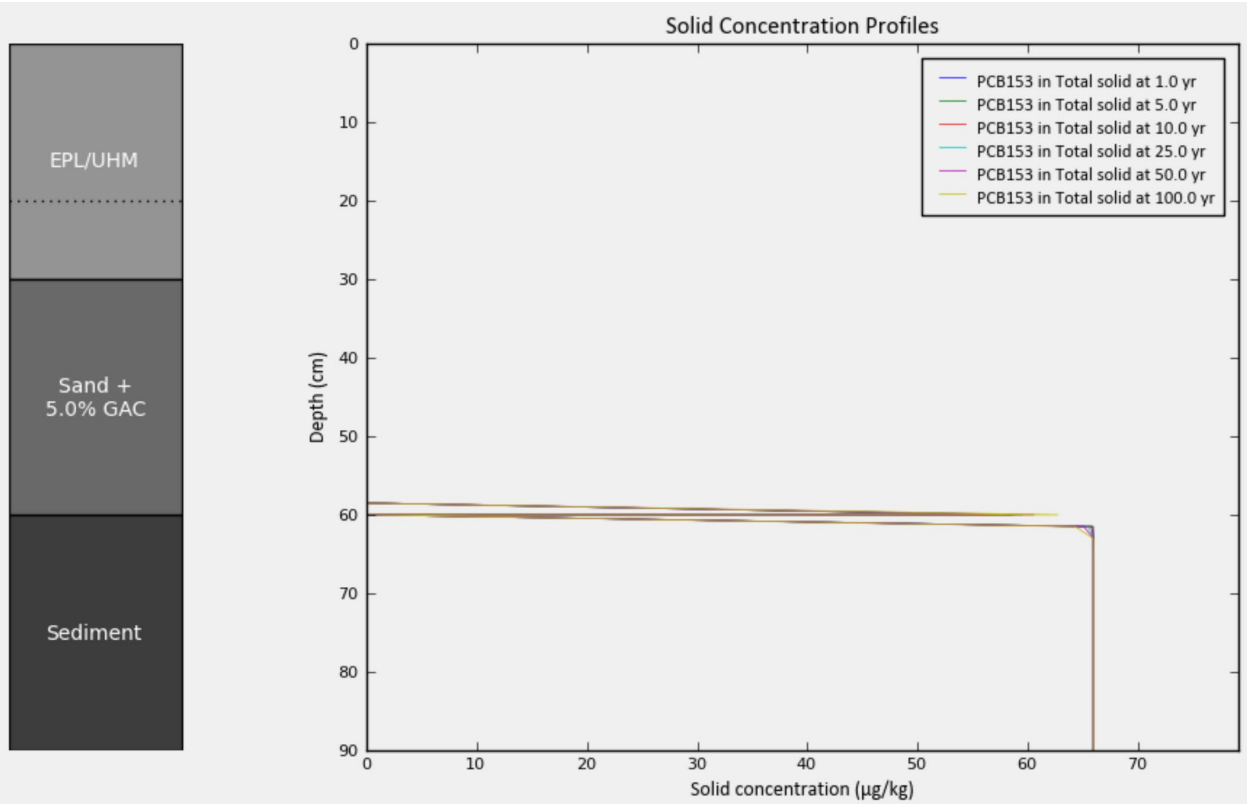

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB15 in Total solid at 1.0 yr
PCB15 in Total solid at 5.0 yr
PCB15 in Total solid at 10.0 yr
PCB15 in Total solid at 25.0 yr
PCB15 in Total solid at 50.0 yr
PCB15 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

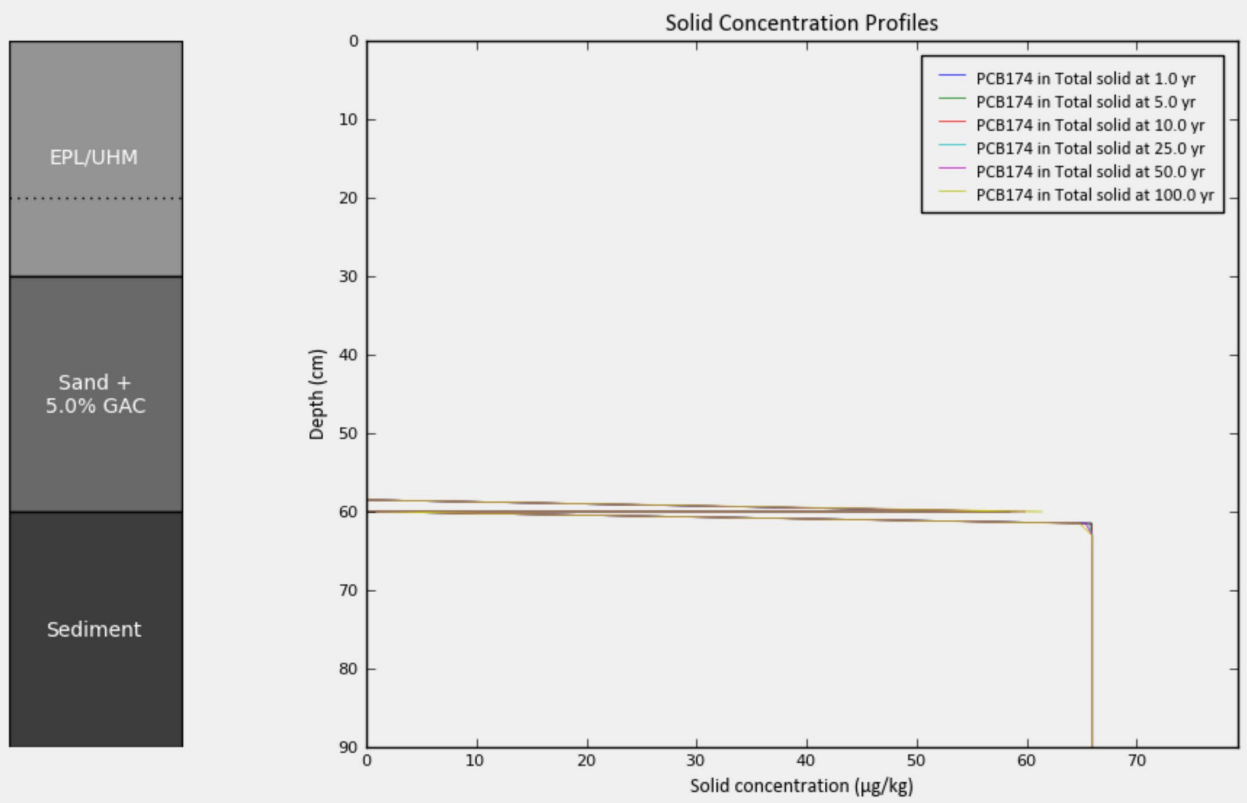

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB31 in Total solid at 1.0 yr
PCB31 in Total solid at 5.0 yr
PCB31 in Total solid at 10.0 yr
PCB31 in Total solid at 25.0 yr
PCB31 in Total solid at 50.0 yr
PCB31 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

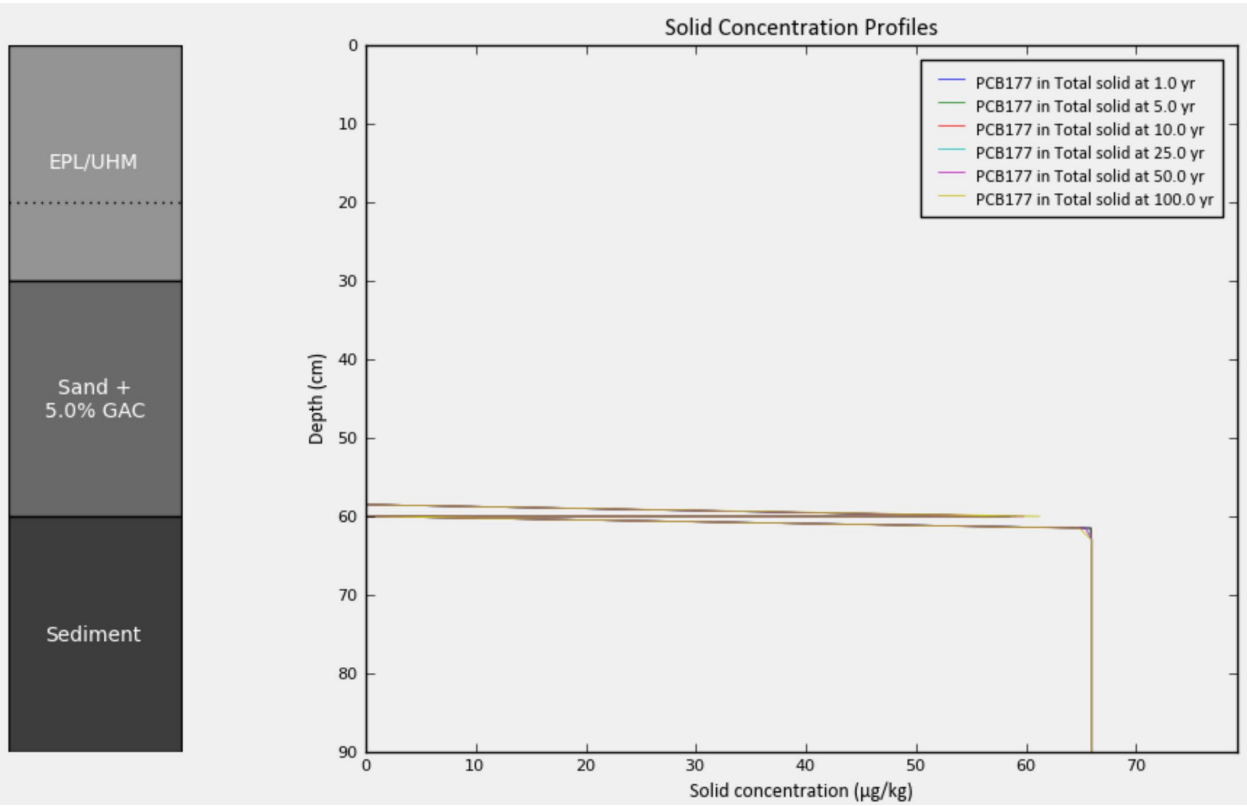

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB44 in Total solid at 1.0 yr
PCB44 in Total solid at 5.0 yr
PCB44 in Total solid at 10.0 yr
PCB44 in Total solid at 25.0 yr
PCB44 in Total solid at 50.0 yr
PCB44 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

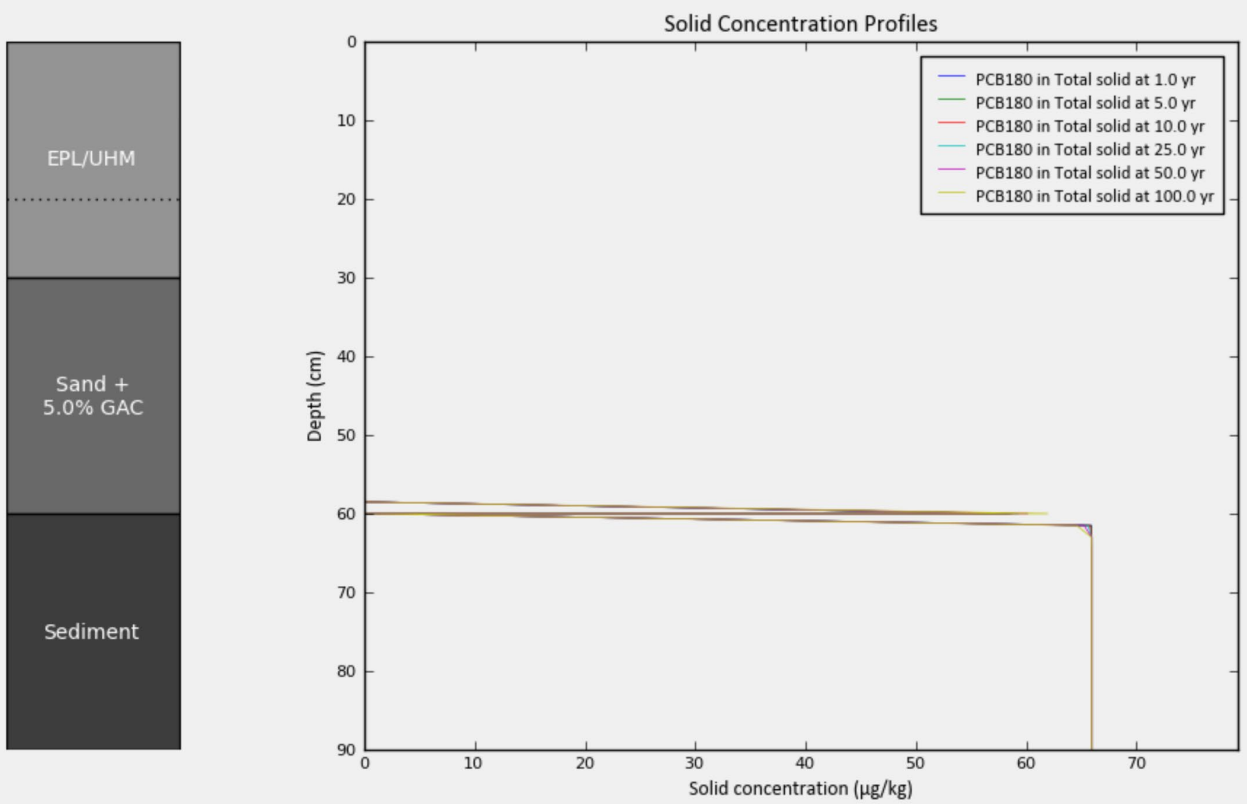

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB99 in Total solid at 1.0 yr
PCB99 in Total solid at 5.0 yr
PCB99 in Total solid at 10.0 yr
PCB99 in Total solid at 25.0 yr
PCB99 in Total solid at 50.0 yr
PCB99 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

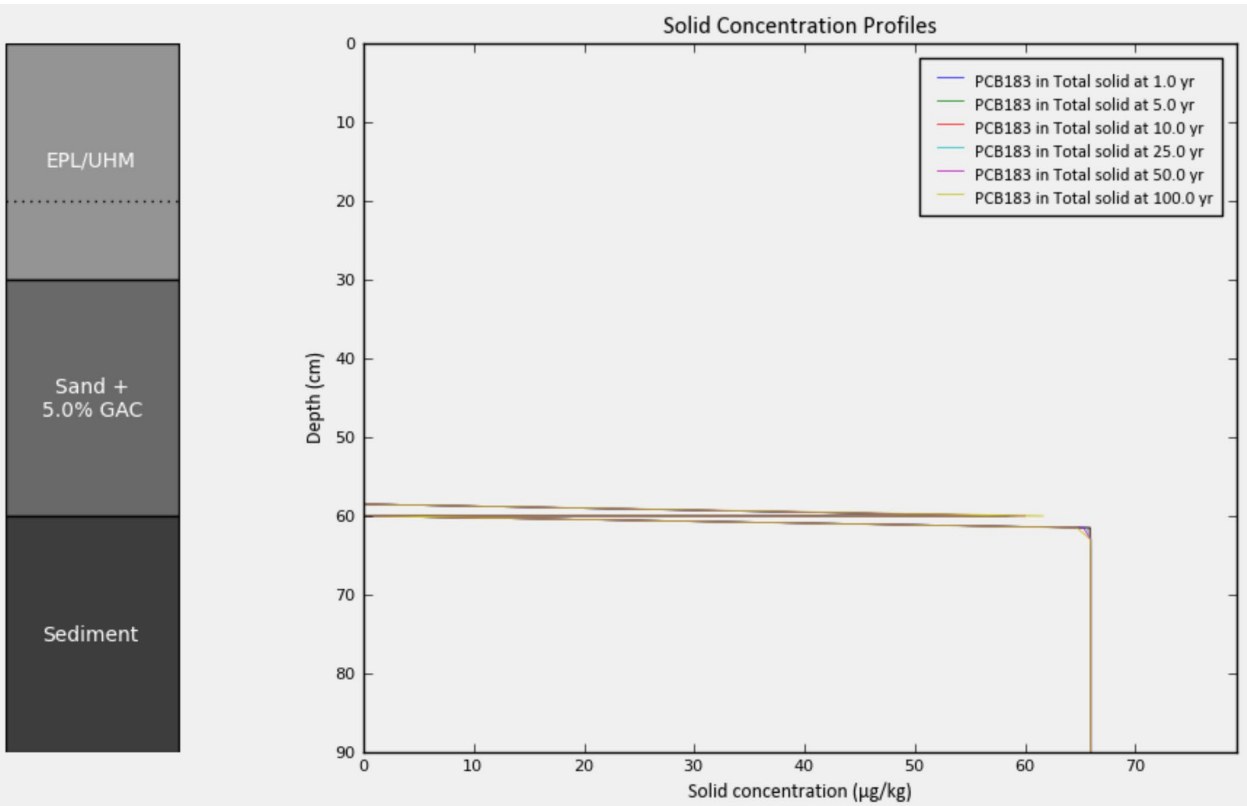

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB141 in Total solid at 1.0 yr
PCB141 in Total solid at 5.0 yr
PCB141 in Total solid at 10.0 yr
PCB141 in Total solid at 25.0 yr
PCB141 in Total solid at 50.0 yr
PCB141 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90

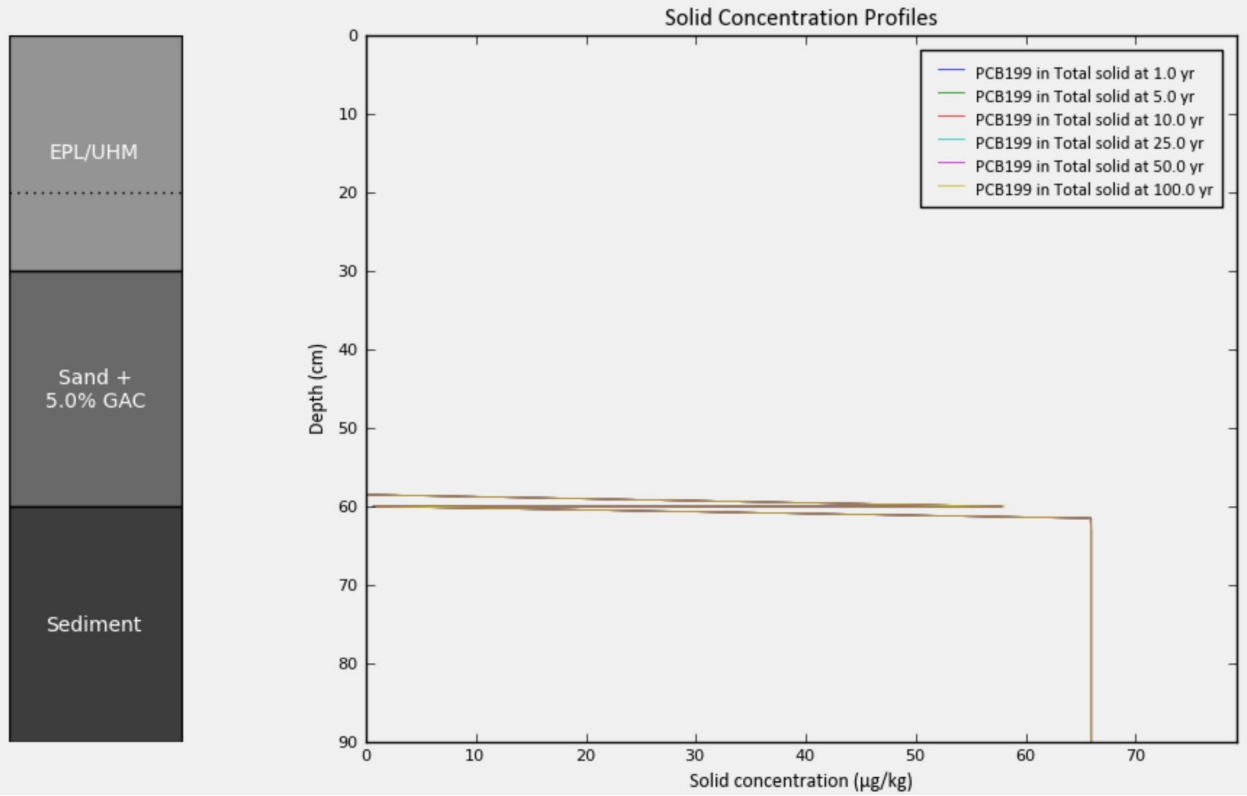

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB153 in Total solid at 1.0 yr
PCB153 in Total solid at 5.0 yr
PCB153 in Total solid at 10.0 yr
PCB153 in Total solid at 25.0 yr
PCB153 in Total solid at 50.0 yr
PCB153 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90

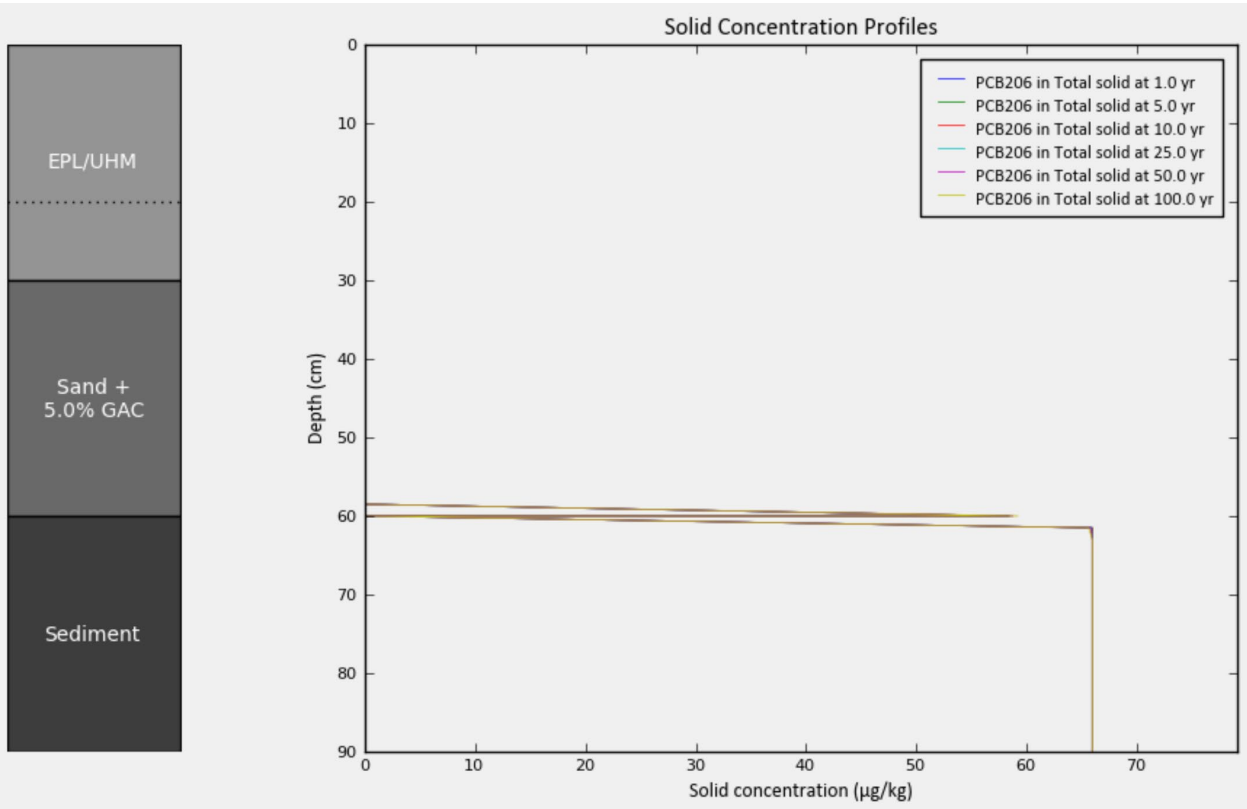

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB174 in Total solid at 1.0 yr
PCB174 in Total solid at 5.0 yr
PCB174 in Total solid at 10.0 yr
PCB174 in Total solid at 25.0 yr
PCB174 in Total solid at 50.0 yr
PCB174 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

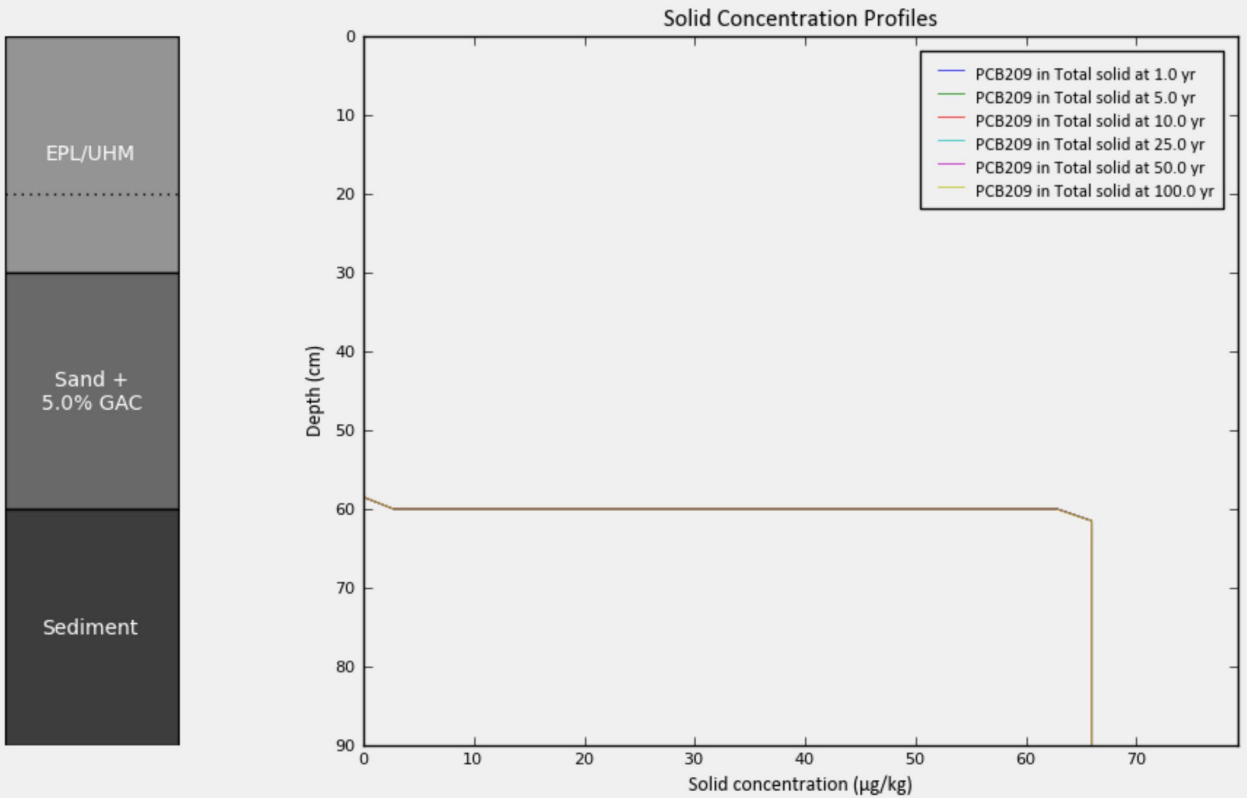

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB177 in Total solid at 1.0 yr
PCB177 in Total solid at 5.0 yr
PCB177 in Total solid at 10.0 yr
PCB177 in Total solid at 25.0 yr
PCB177 in Total solid at 50.0 yr
PCB177 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

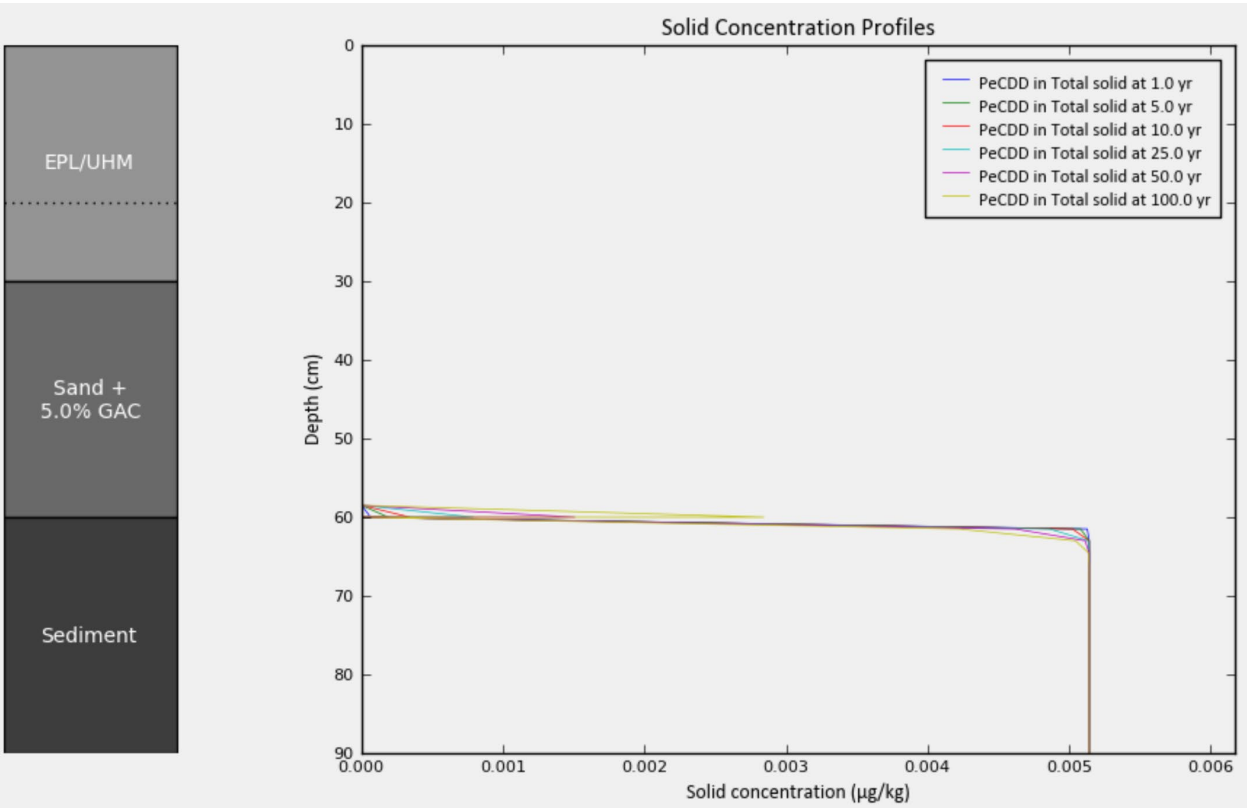

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB180 in Total solid at 1.0 yr
PCB180 in Total solid at 5.0 yr
PCB180 in Total solid at 10.0 yr
PCB180 in Total solid at 25.0 yr
PCB180 in Total solid at 50.0 yr
PCB180 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

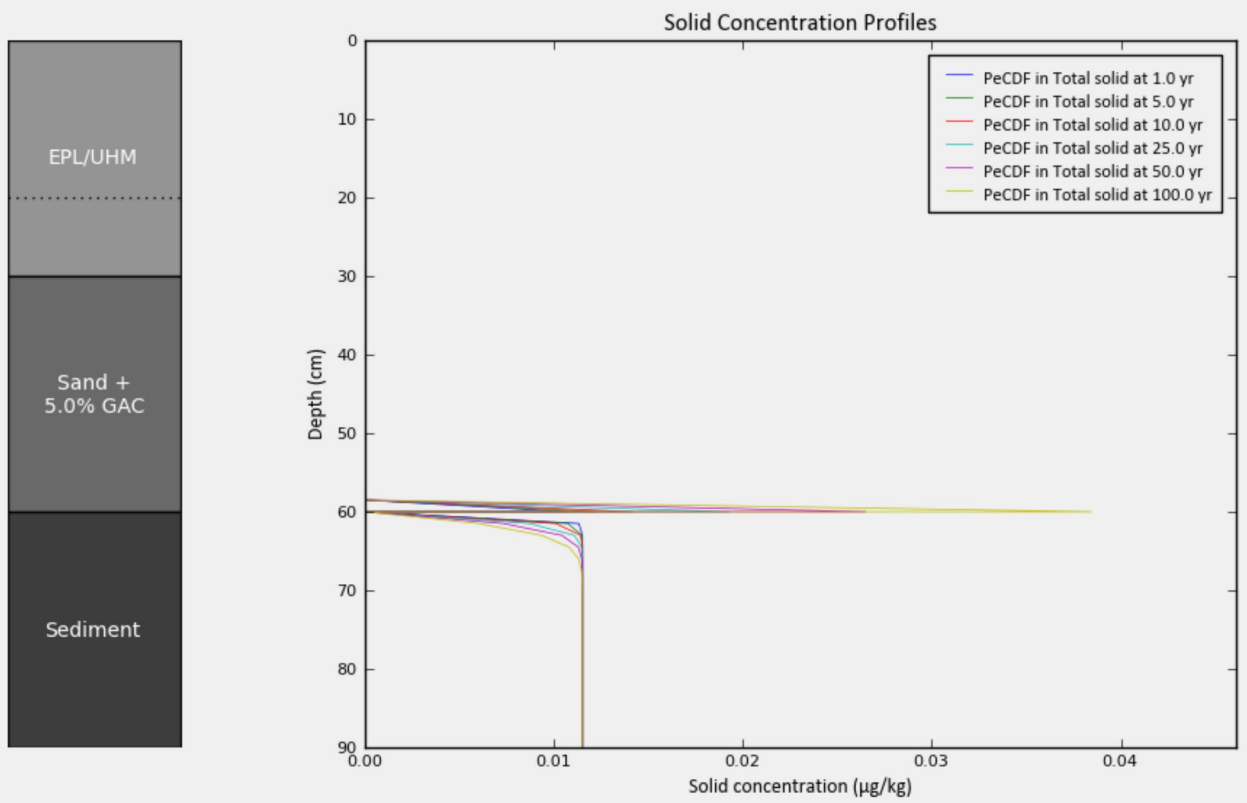

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB183 in Total solid at 1.0 yr
PCB183 in Total solid at 5.0 yr
PCB183 in Total solid at 10.0 yr
PCB183 in Total solid at 25.0 yr
PCB183 in Total solid at 50.0 yr
PCB183 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

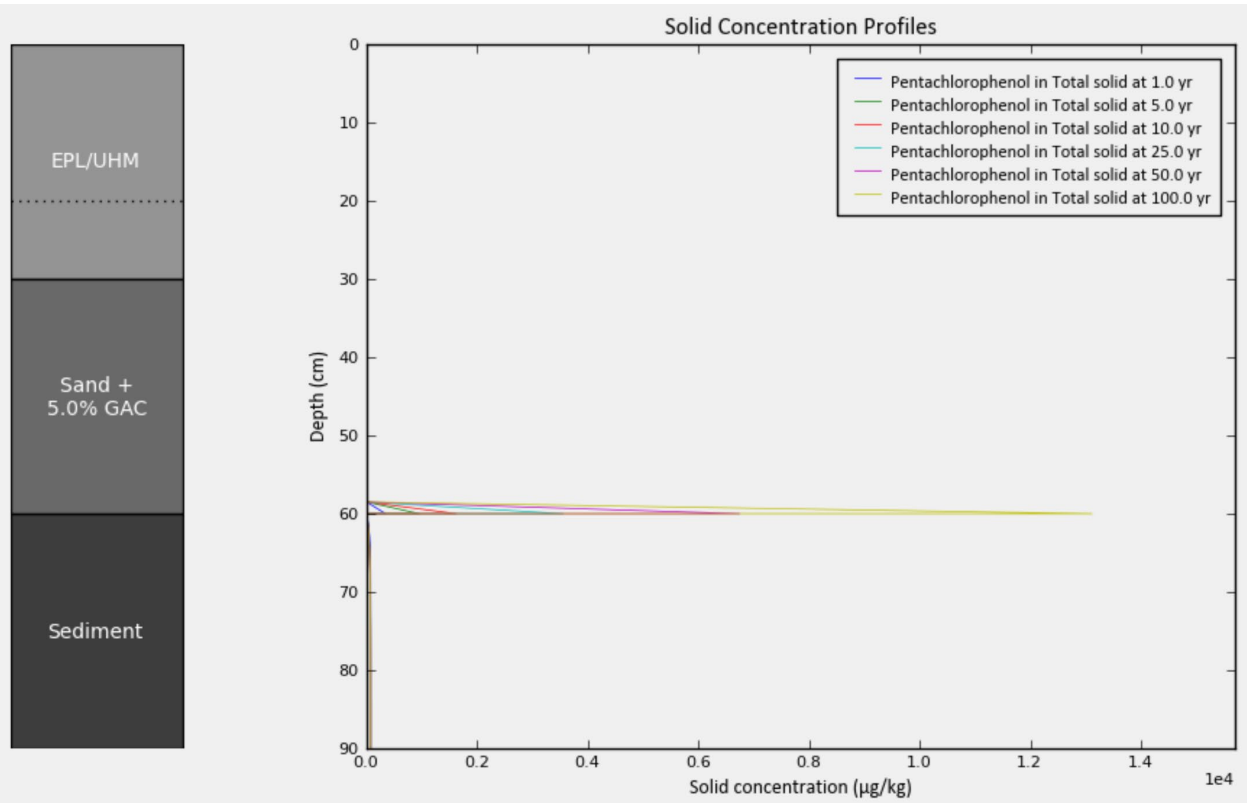

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB199 in Total solid at 1.0 yr
PCB199 in Total solid at 5.0 yr
PCB199 in Total solid at 10.0 yr
PCB199 in Total solid at 25.0 yr
PCB199 in Total solid at 50.0 yr
PCB199 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

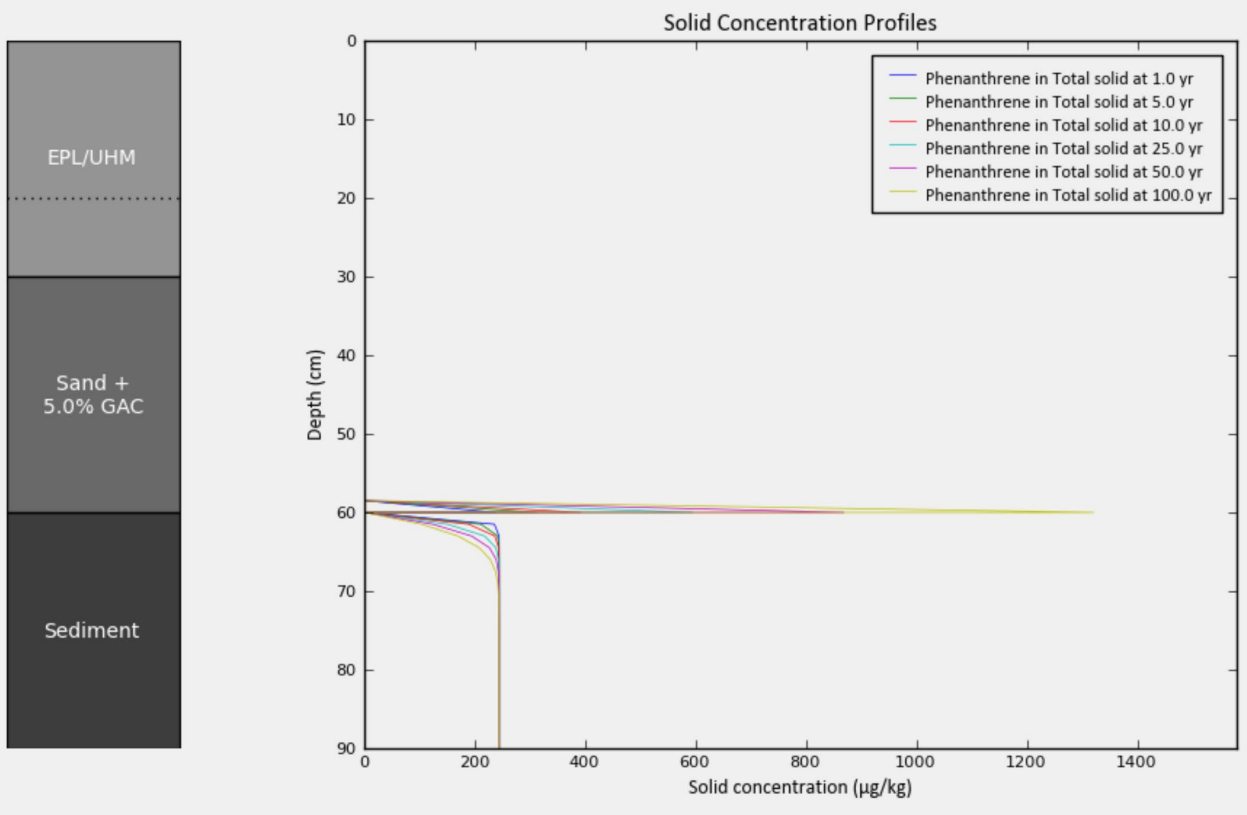

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PCB206 in Total solid at 1.0 yr
PCB206 in Total solid at 5.0 yr
PCB206 in Total solid at 10.0 yr
PCB206 in Total solid at 25.0 yr
PCB206 in Total solid at 50.0 yr
PCB206 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

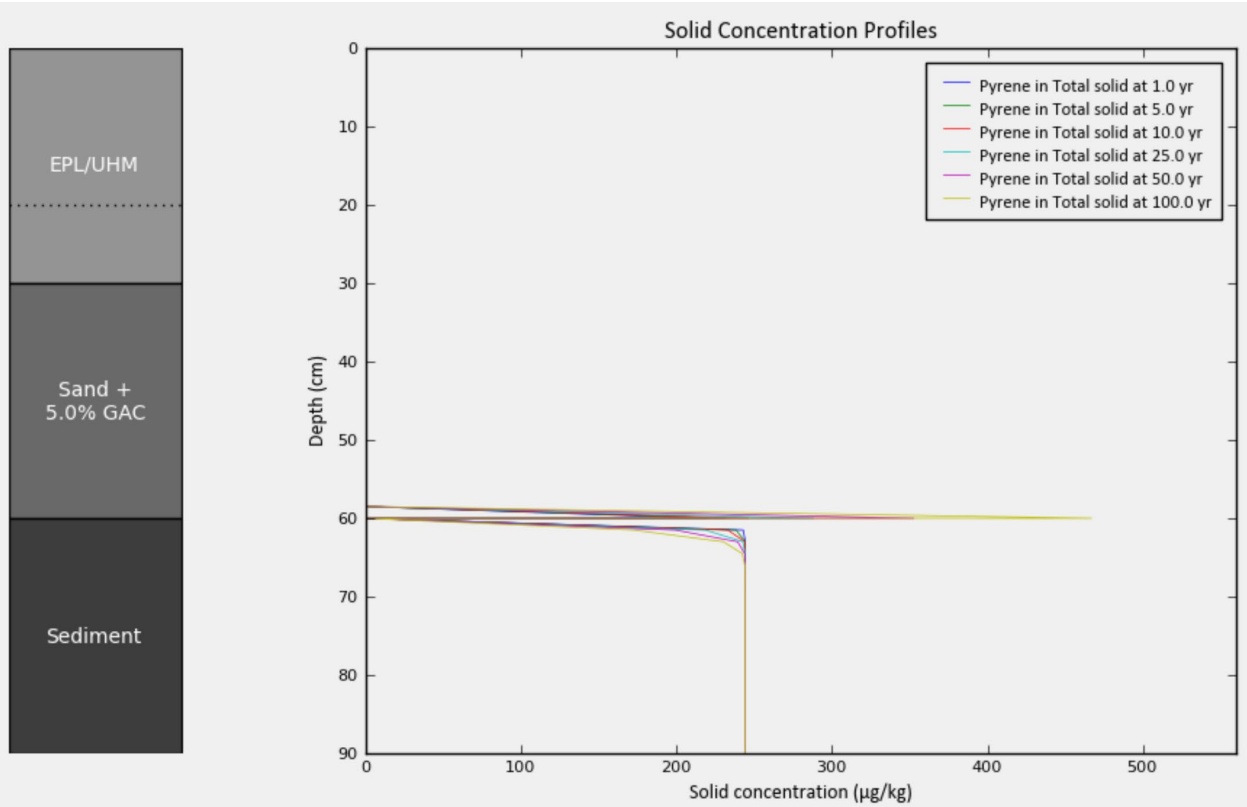

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
PCB209 in Total solid at 1.0 yr
PCB209 in Total solid at 5.0 yr
PCB209 in Total solid at 10.0 yr
PCB209 in Total solid at 25.0 yr
PCB209 in Total solid at 50.0 yr
PCB209 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

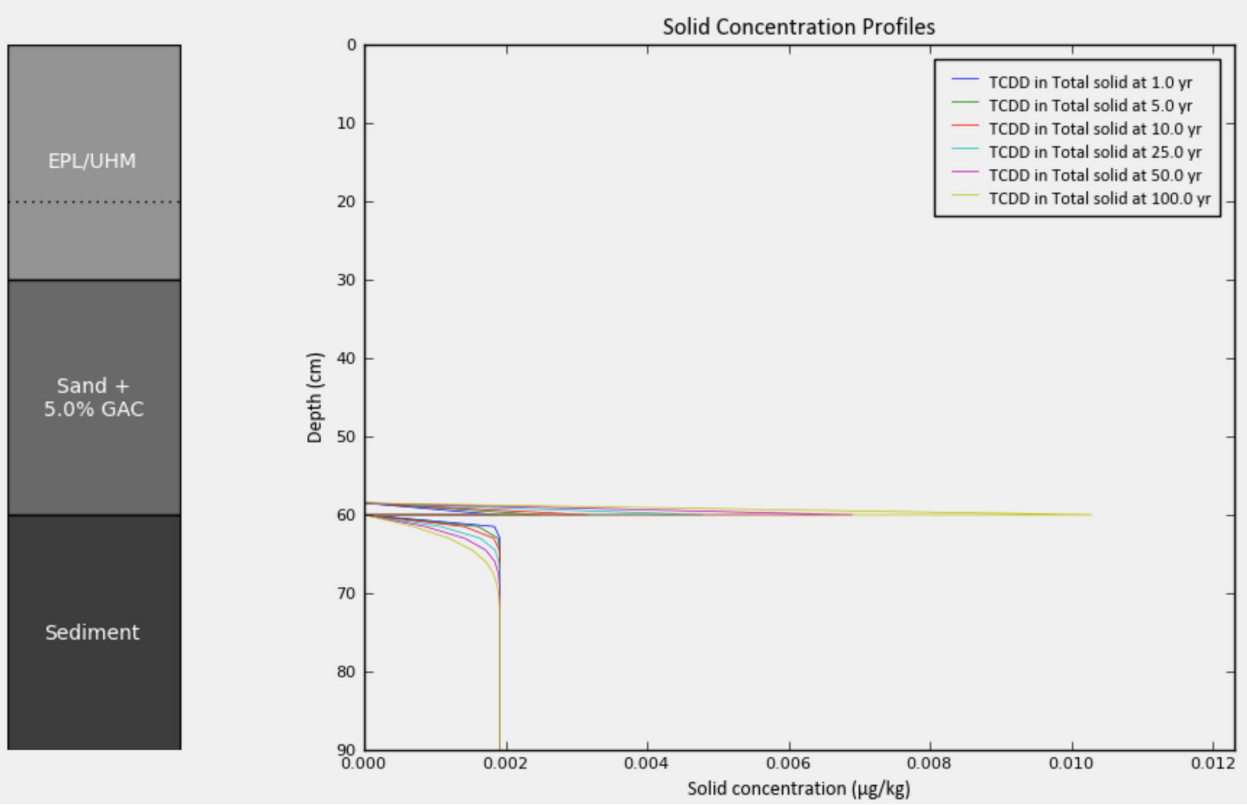

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
PeCDD in Total solid at 1.0 yr
PeCDD in Total solid at 5.0 yr
PeCDD in Total solid at 10.0 yr
PeCDD in Total solid at 25.0 yr
PeCDD in Total solid at 50.0 yr
PeCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

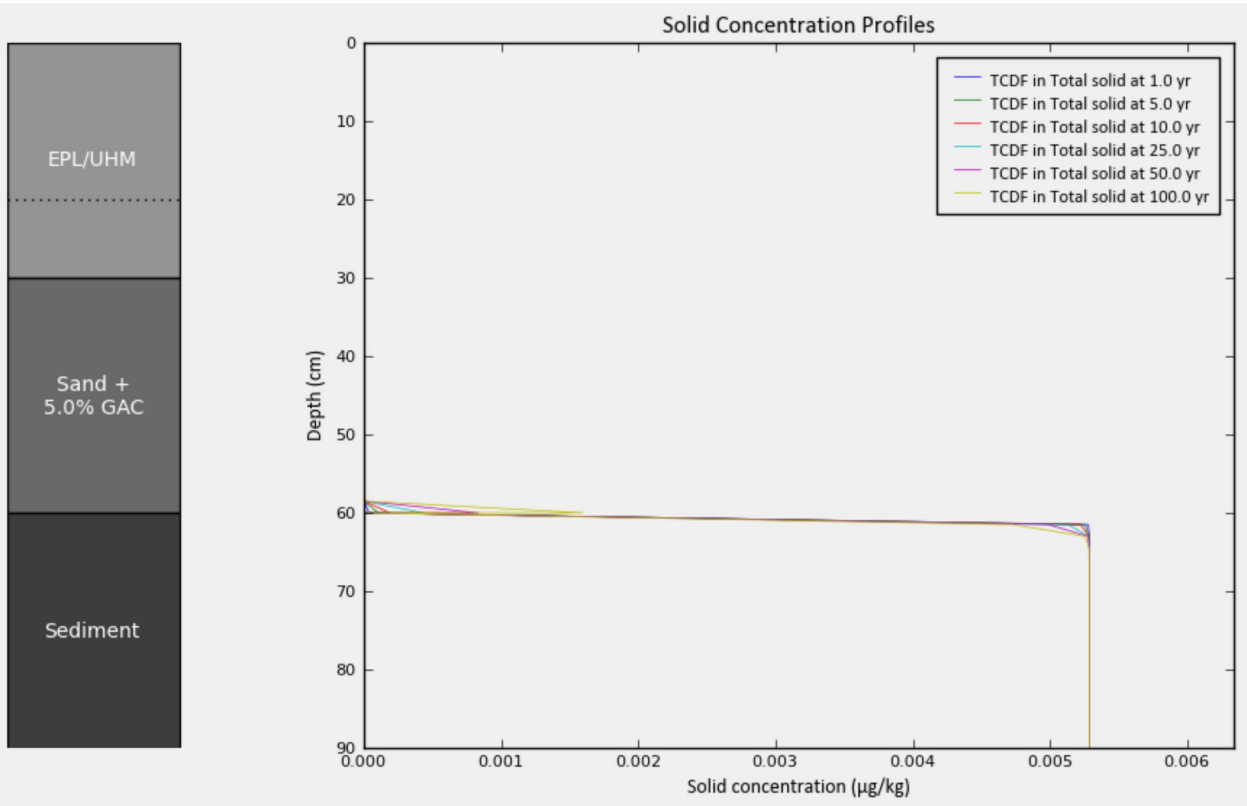

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
PeCDF in Total solid at 1.0 yr
PeCDF in Total solid at 5.0 yr
PeCDF in Total solid at 10.0 yr
PeCDF in Total solid at 25.0 yr
PeCDF in Total solid at 50.0 yr
PeCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.00
0.01
0.02
0.03
0.04
Solid concentration (µg/kg)

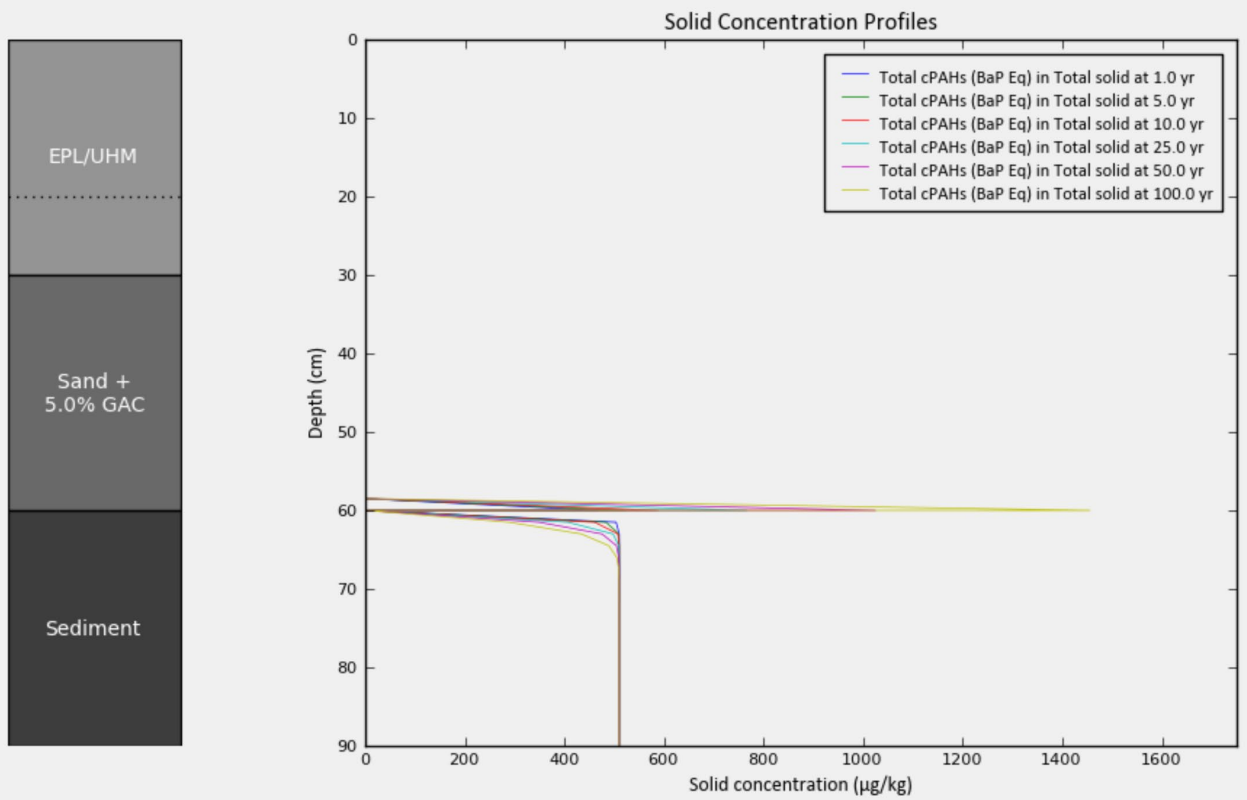

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Pentachlorophenol in Total solid at 1.0 yr
Pentachlorophenol in Total solid at 5.0 yr
Pentachlorophenol in Total solid at 10.0 yr
Pentachlorophenol in Total solid at 25.0 yr
Pentachlorophenol in Total solid at 50.0 yr
Pentachlorophenol in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1e4
Solid concentration (µg/kg)

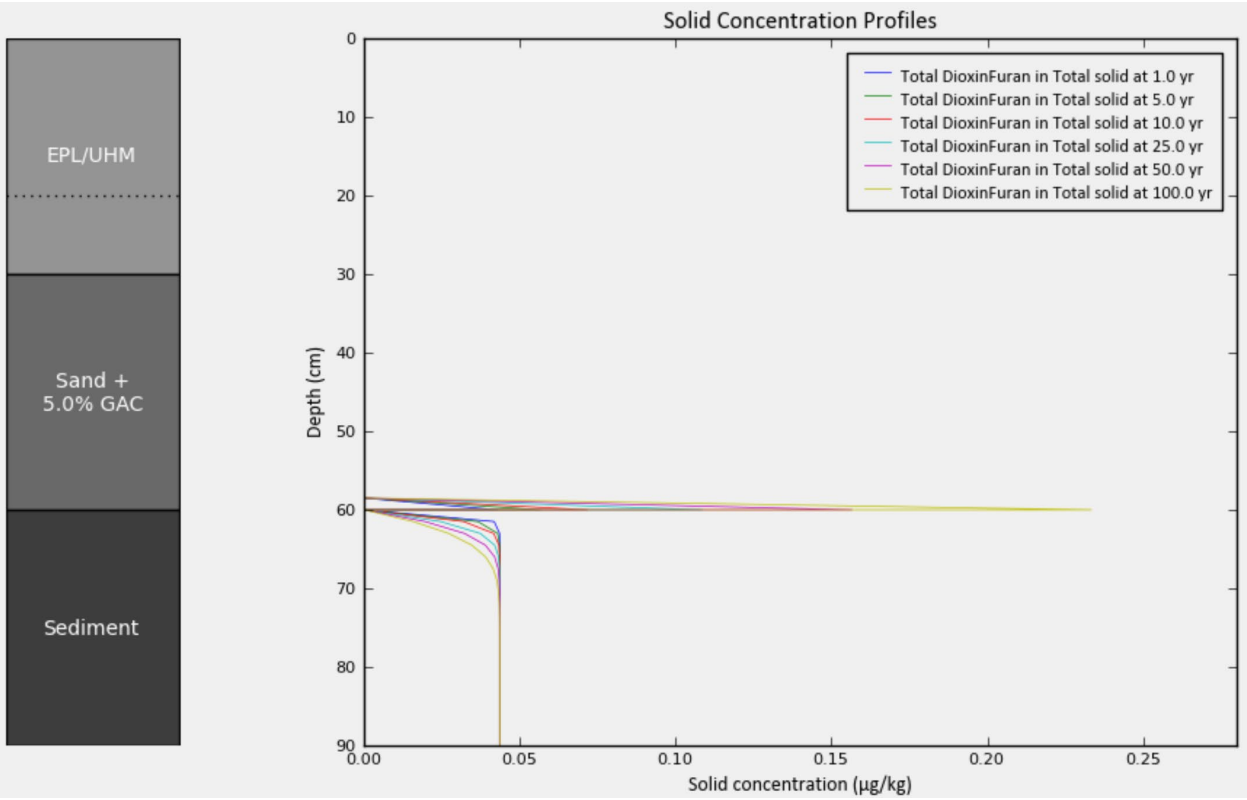

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Phenanthrene in Total solid at 1.0 yr
Phenanthrene in Total solid at 5.0 yr
Phenanthrene in Total solid at 10.0 yr
Phenanthrene in Total solid at 25.0 yr
Phenanthrene in Total solid at 50.0 yr
Phenanthrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
200
400
600
800
1000
1200
1400

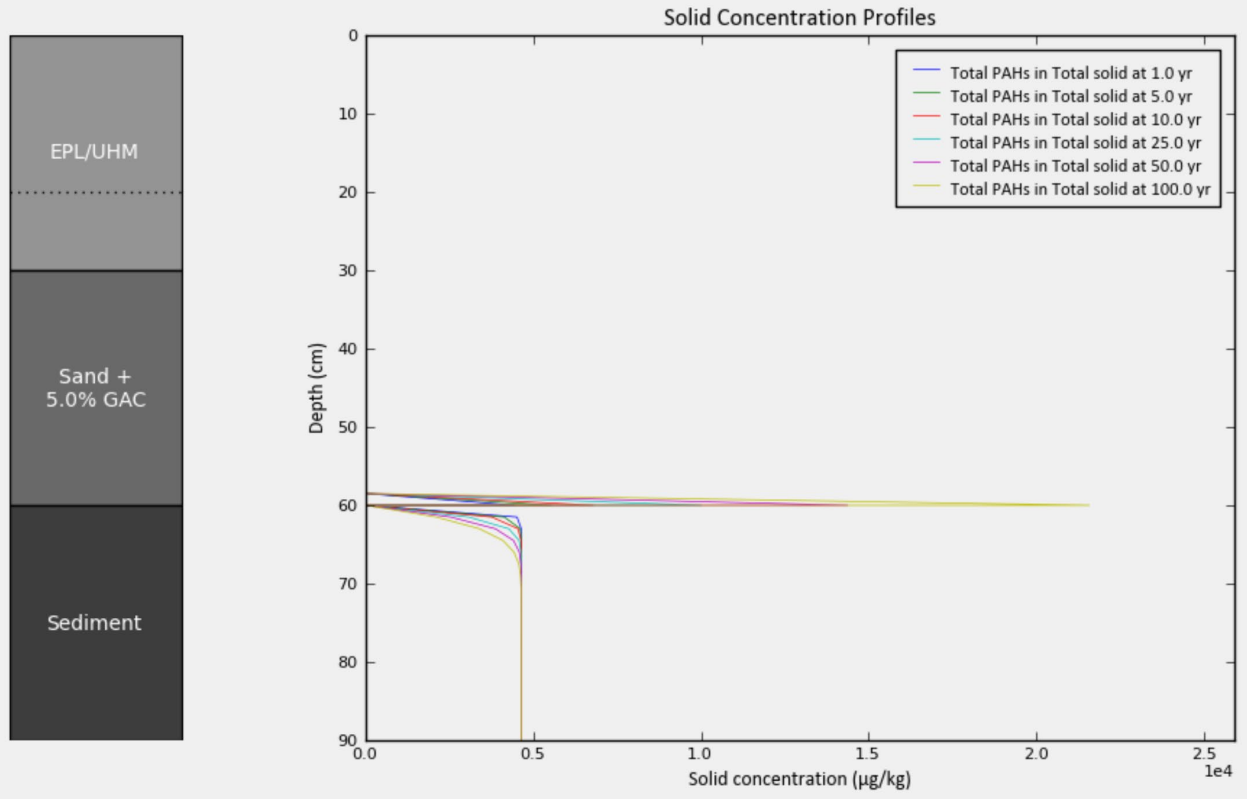

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Pyrene in Total solid at 1.0 yr
Pyrene in Total solid at 5.0 yr
Pyrene in Total solid at 10.0 yr
Pyrene in Total solid at 25.0 yr
Pyrene in Total solid at 50.0 yr
Pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500

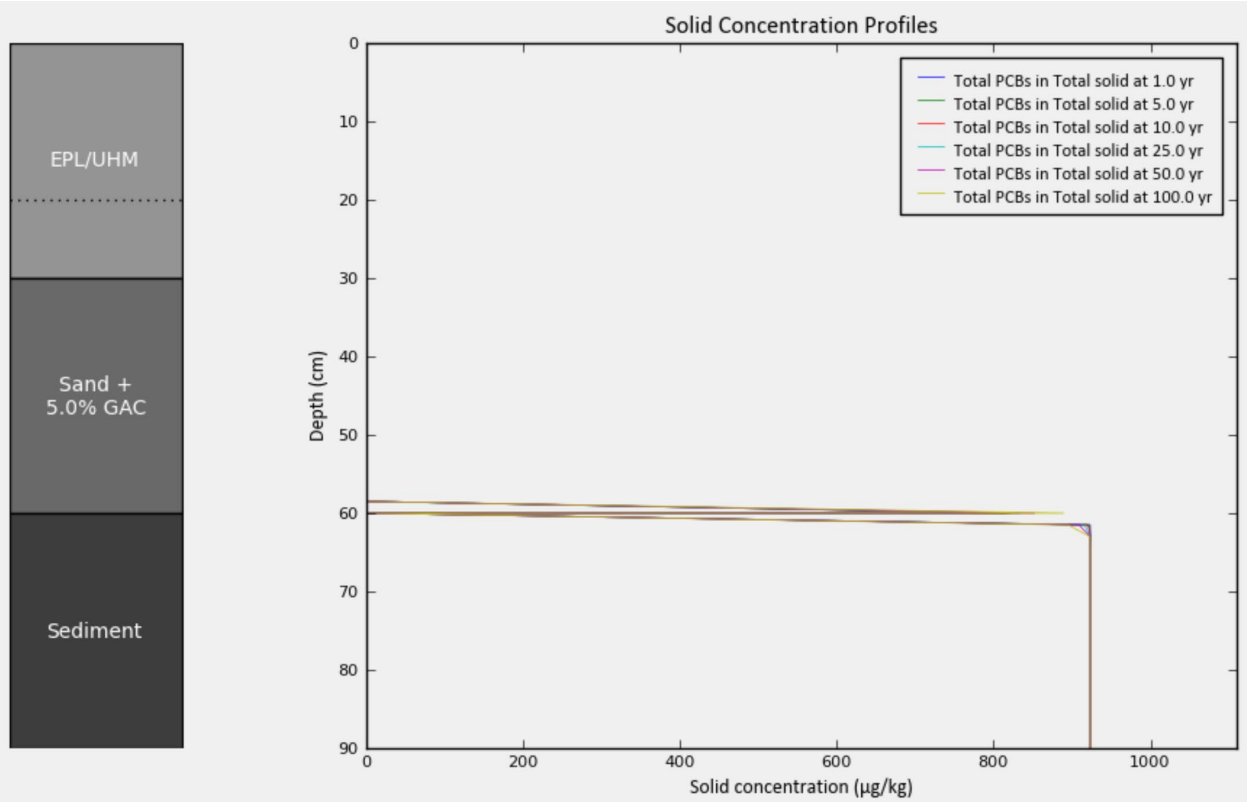

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
TCDD in Total solid at 1.0 yr
TCDD in Total solid at 5.0 yr
TCDD in Total solid at 10.0 yr
TCDD in Total solid at 25.0 yr
TCDD in Total solid at 50.0 yr
TCDD in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
0.012
Solid concentration (µg/kg)

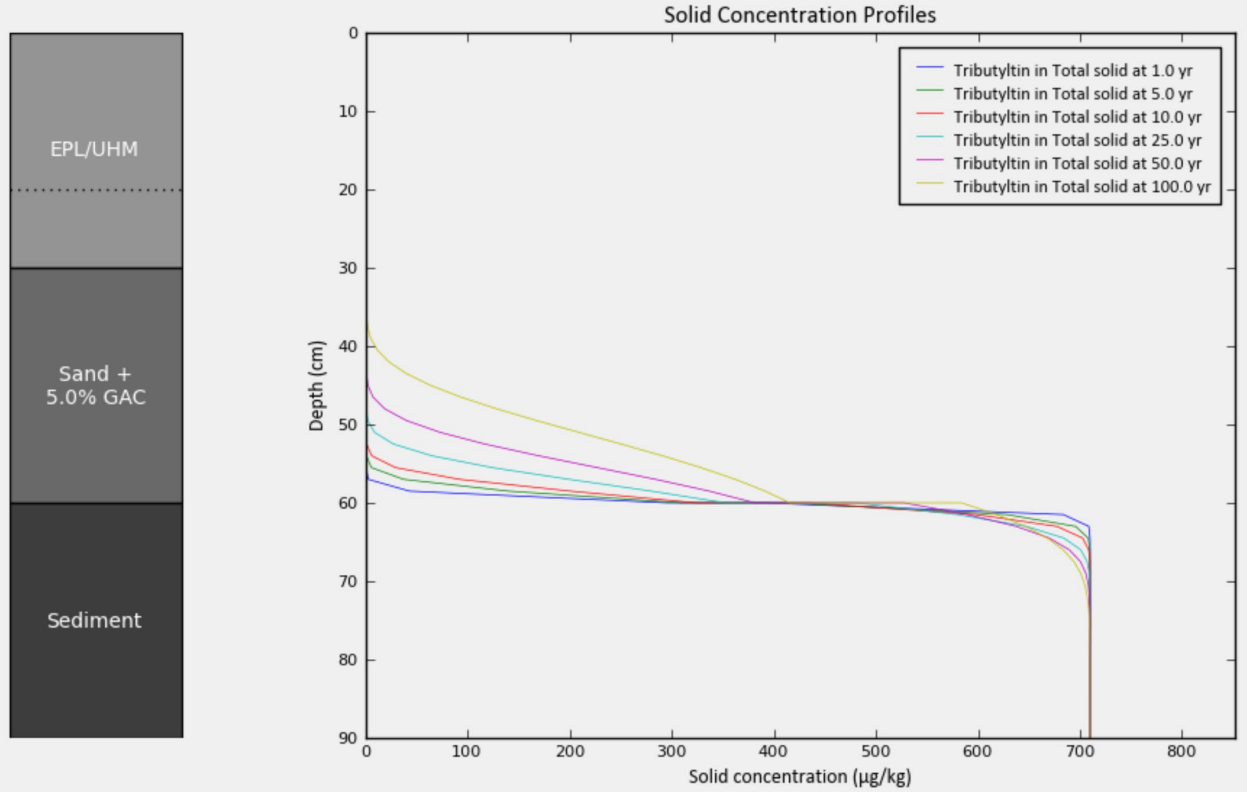

EPL/UHM
Sand + 5.0% GAC
Sediment
Solid Concentration Profiles
TCDF in Total solid at 1.0 yr
TCDF in Total solid at 5.0 yr
TCDF in Total solid at 10.0 yr
TCDF in Total solid at 25.0 yr
TCDF in Total solid at 50.0 yr
TCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Solid concentration (µg/kg)

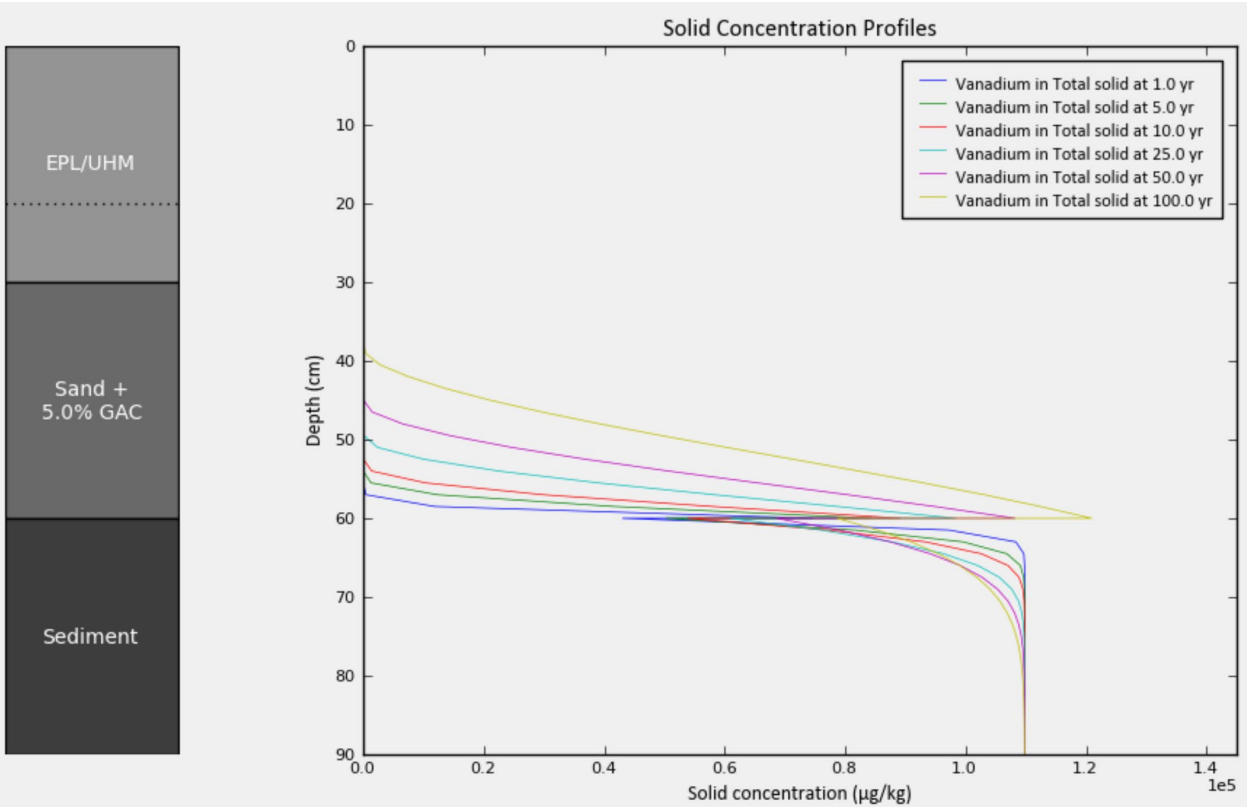

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Total cPAHs (BaP Eq) in Total solid at 1.0 yr
Total cPAHs (BaP Eq) in Total solid at 5.0 yr
Total cPAHs (BaP Eq) in Total solid at 10.0 yr
Total cPAHs (BaP Eq) in Total solid at 25.0 yr
Total cPAHs (BaP Eq) in Total solid at 50.0 yr
Total cPAHs (BaP Eq) in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
200
400
600
800
1000
1200
1400
1600
Solid concentration (µg/kg)

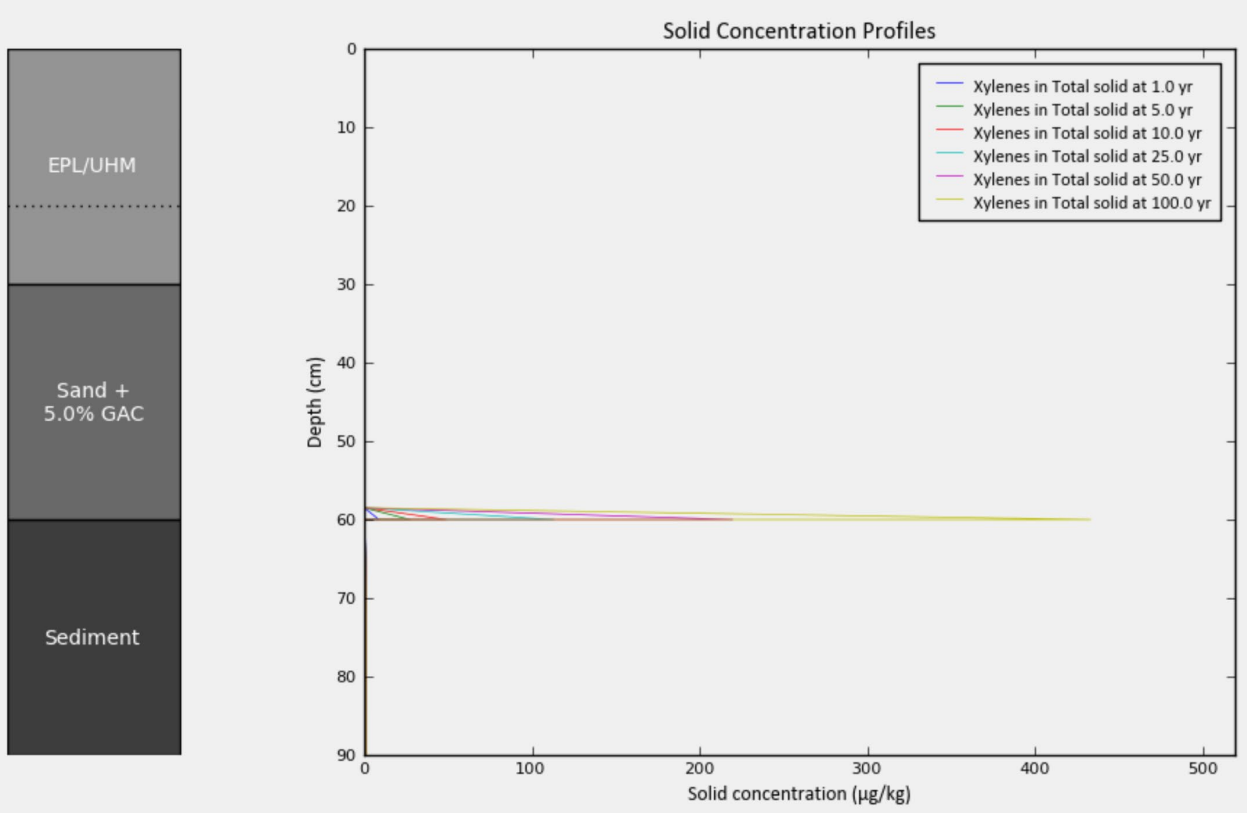

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Total DioxinFuran in Total solid at 1.0 yr
Total DioxinFuran in Total solid at 5.0 yr
Total DioxinFuran in Total solid at 10.0 yr
Total DioxinFuran in Total solid at 25.0 yr
Total DioxinFuran in Total solid at 50.0 yr
Total DioxinFuran in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.00
0.05
0.10
0.15
0.20
0.25
Solid concentration (µg/kg)

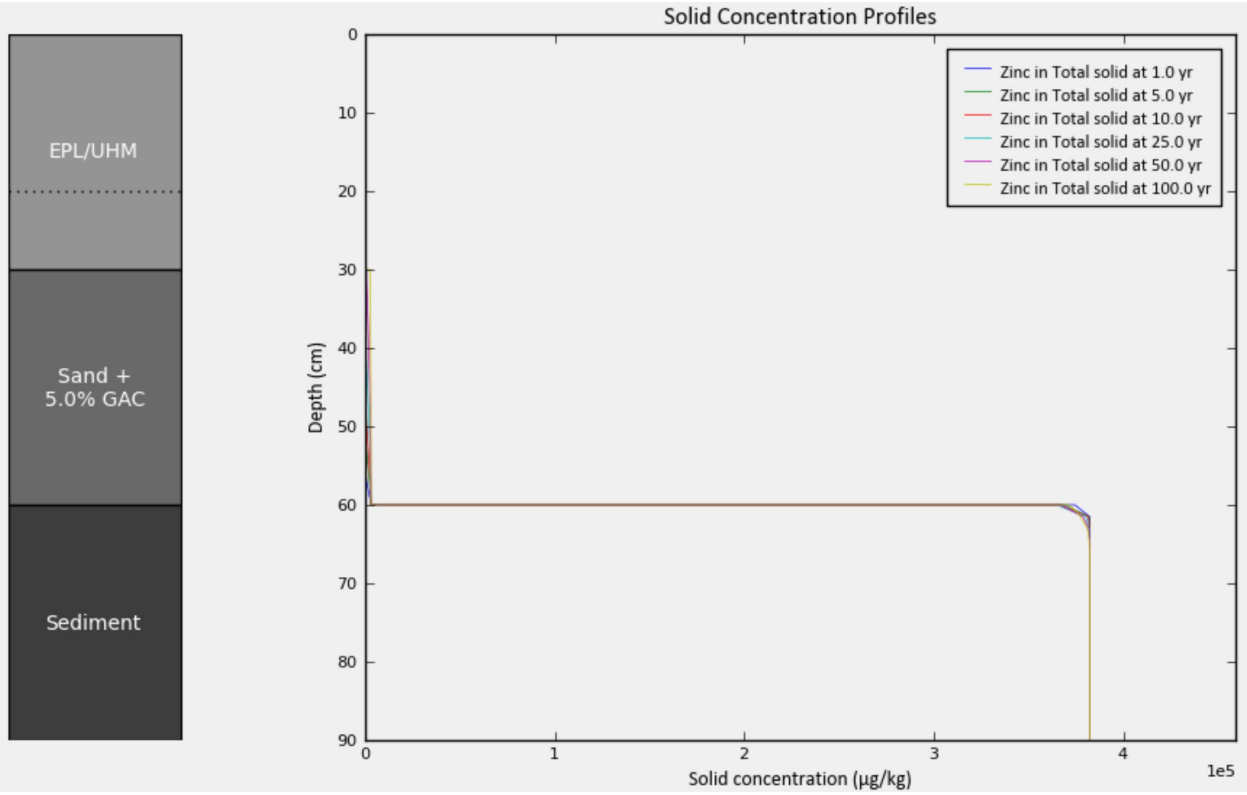

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Total PAHs in Total solid at 1.0 yr
Total PAHs in Total solid at 5.0 yr
Total PAHs in Total solid at 10.0 yr
Total PAHs in Total solid at 25.0 yr
Total PAHs in Total solid at 50.0 yr
Total PAHs in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.5
1.0
1.5
2.0
2.5
1e4
Solid concentration (µg/kg)


EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Total PCBs in Total solid at 1.0 yr
Total PCBs in Total solid at 5.0 yr
Total PCBs in Total solid at 10.0 yr
Total PCBs in Total solid at 25.0 yr
Total PCBs in Total solid at 50.0 yr
Total PCBs in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
200
400
600
800
1000
Solid concentration (µg/kg)


EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Tributyltin in Total solid at 1.0 yr
Tributyltin in Total solid at 5.0 yr
Tributyltin in Total solid at 10.0 yr
Tributyltin in Total solid at 25.0 yr
Tributyltin in Total solid at 50.0 yr
Tributyltin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

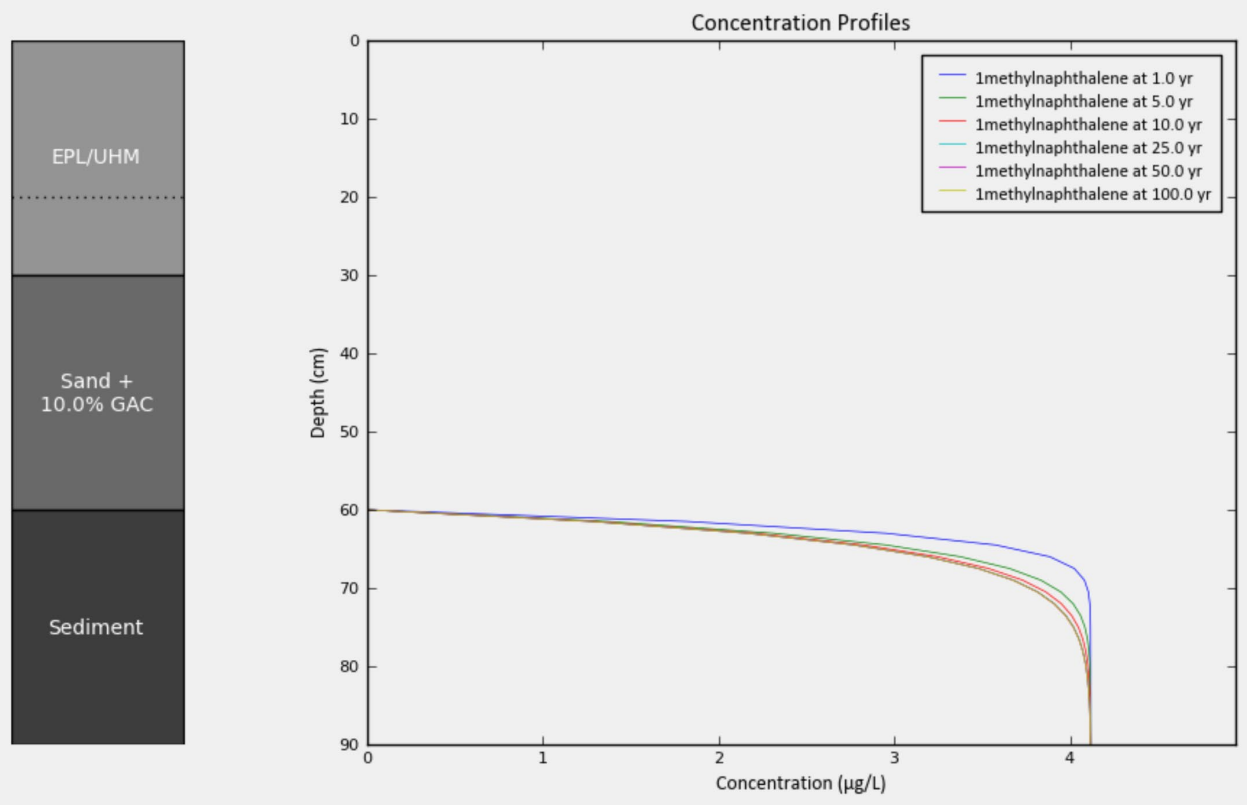

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Vanadium in Total solid at 1.0 yr
Vanadium in Total solid at 5.0 yr
Vanadium in Total solid at 10.0 yr
Vanadium in Total solid at 25.0 yr
Vanadium in Total solid at 50.0 yr
Vanadium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

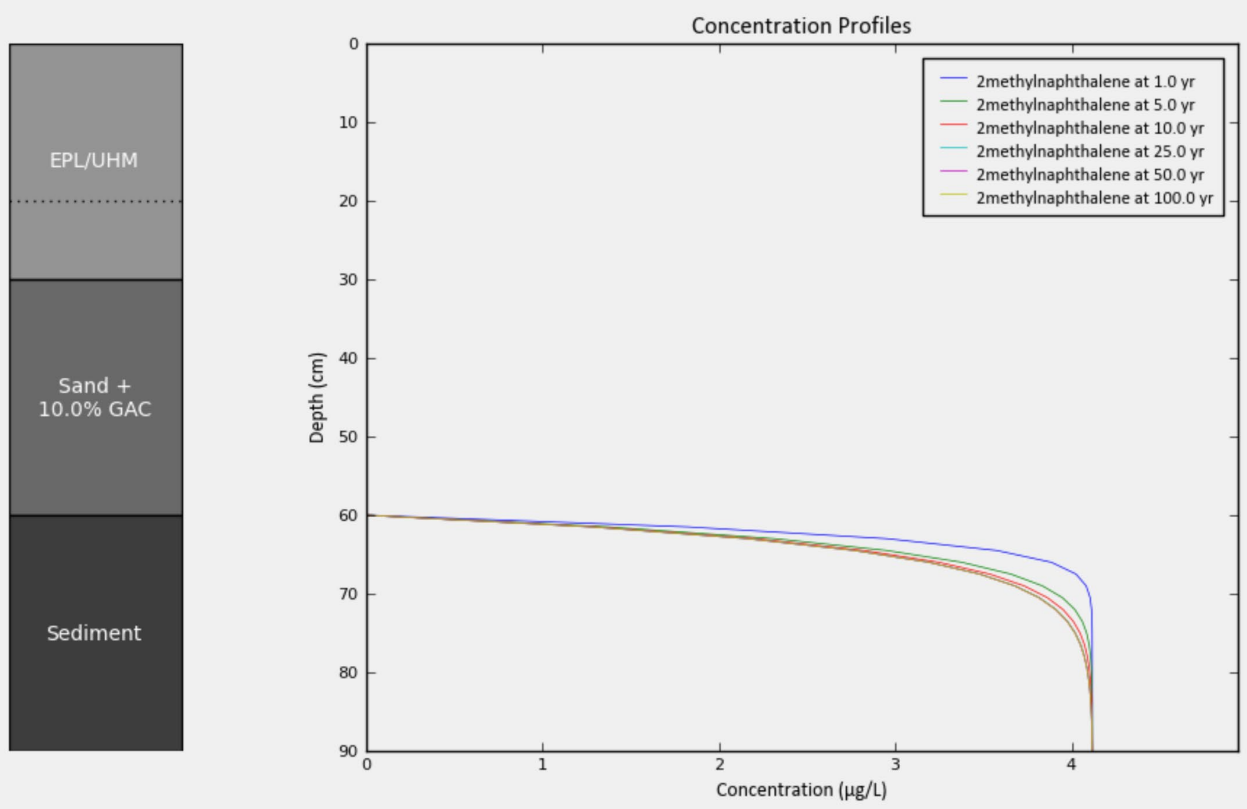

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Xylenes in Total solid at 1.0 yr
Xylenes in Total solid at 5.0 yr
Xylenes in Total solid at 10.0 yr
Xylenes in Total solid at 25.0 yr
Xylenes in Total solid at 50.0 yr
Xylenes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

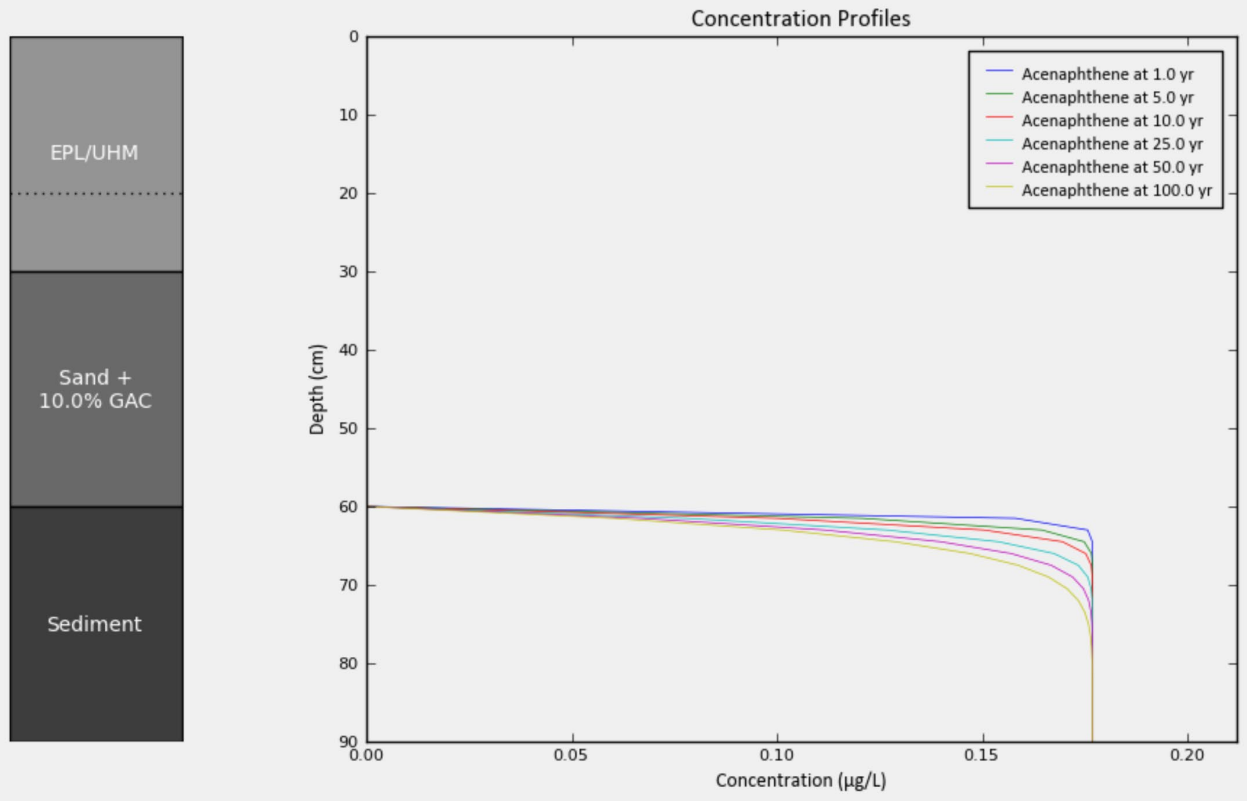

EPL/UHM
Sand +
5.0% GAC
Sediment
Solid Concentration Profiles
Zinc in Total solid at 1.0 yr
Zinc in Total solid at 5.0 yr
Zinc in Total solid at 10.0 yr
Zinc in Total solid at 25.0 yr
Zinc in Total solid at 50.0 yr
Zinc in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

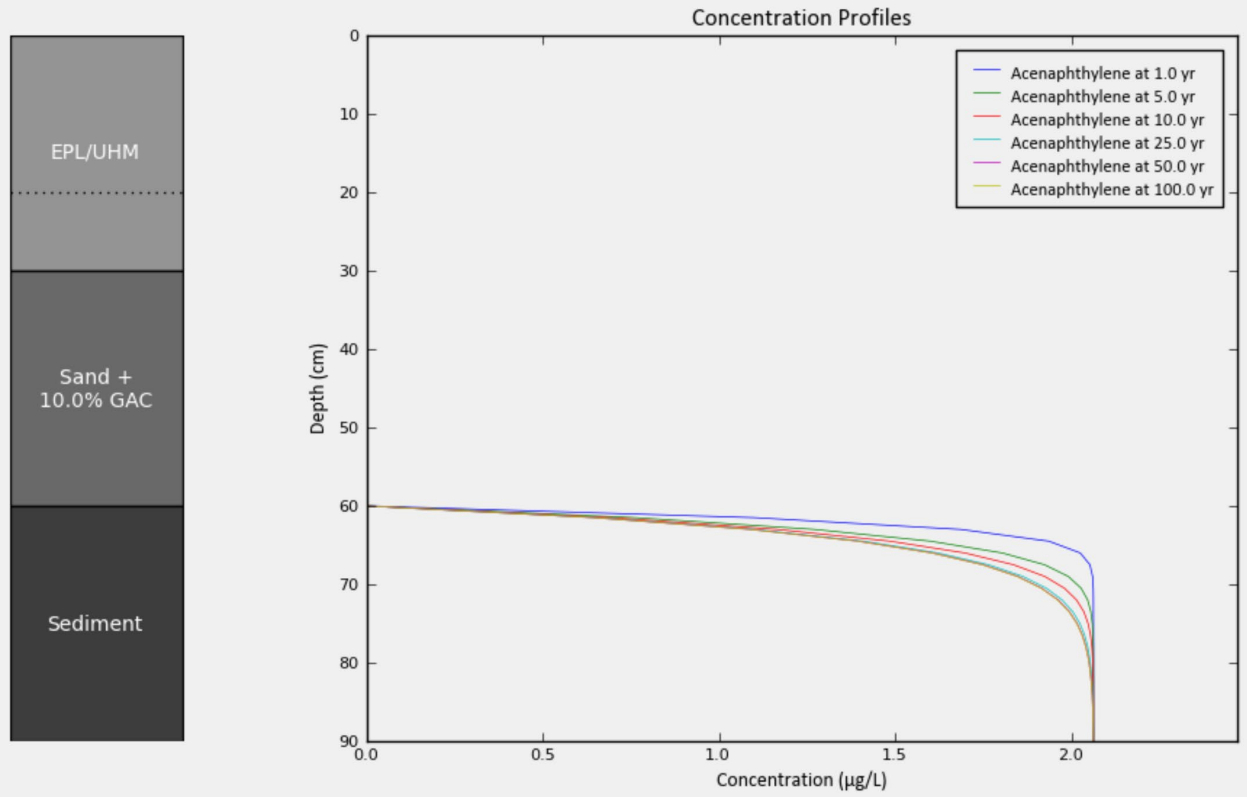
Cap Alternative 4: 30 cm of 10.0% GAC amended sand with 30 cm EPL/UHM

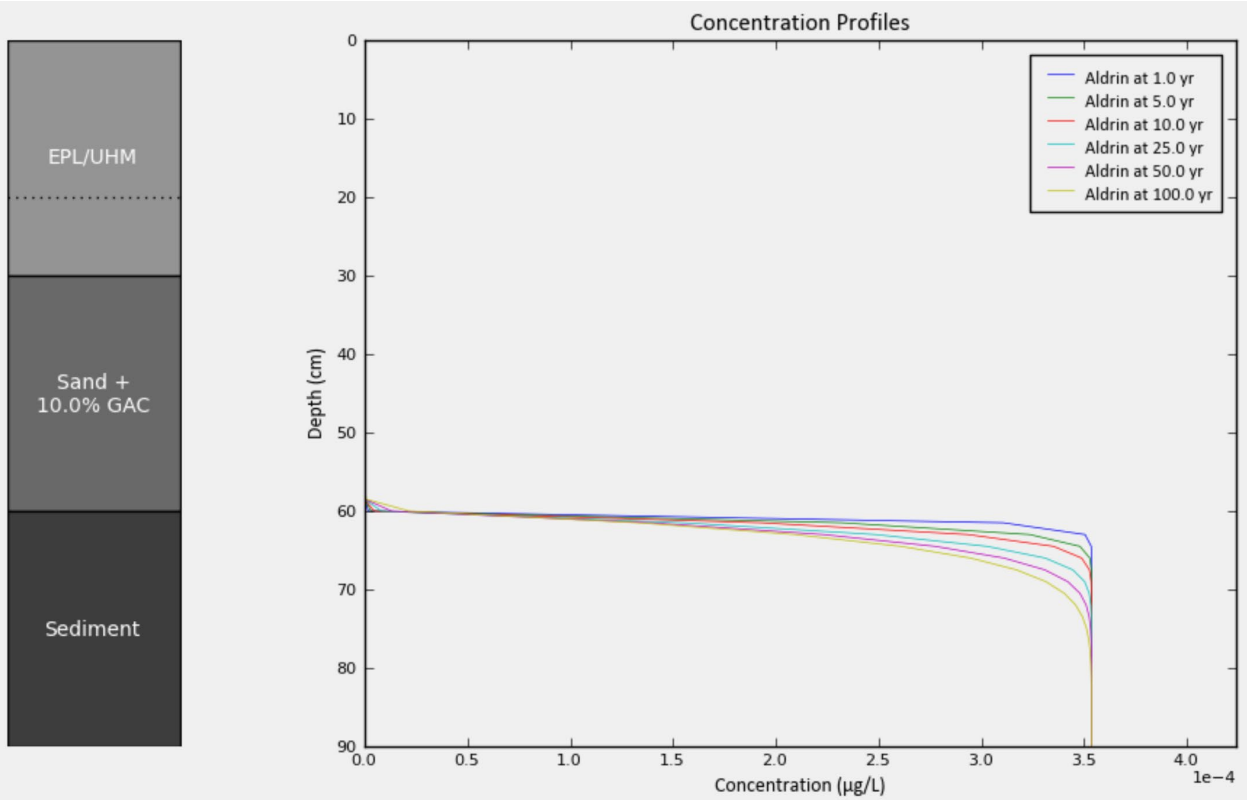
Porewater Concentration - Depth

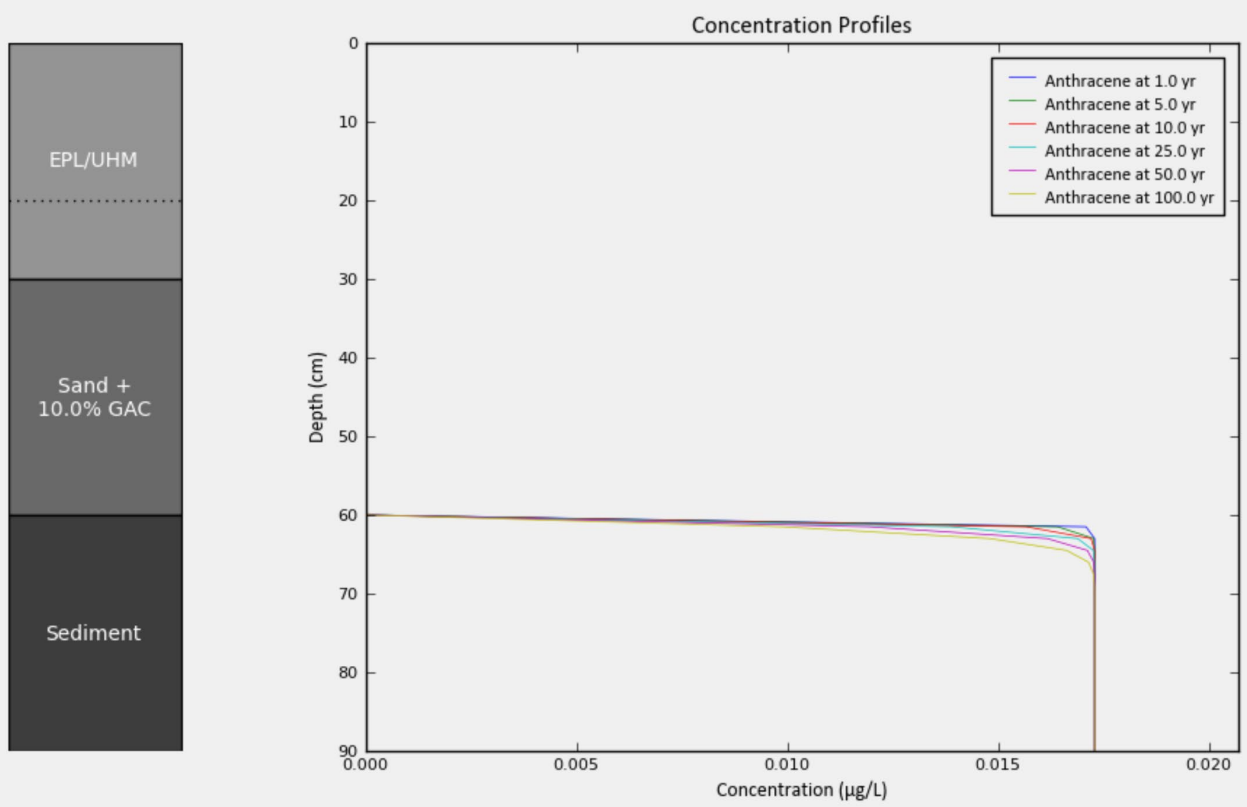


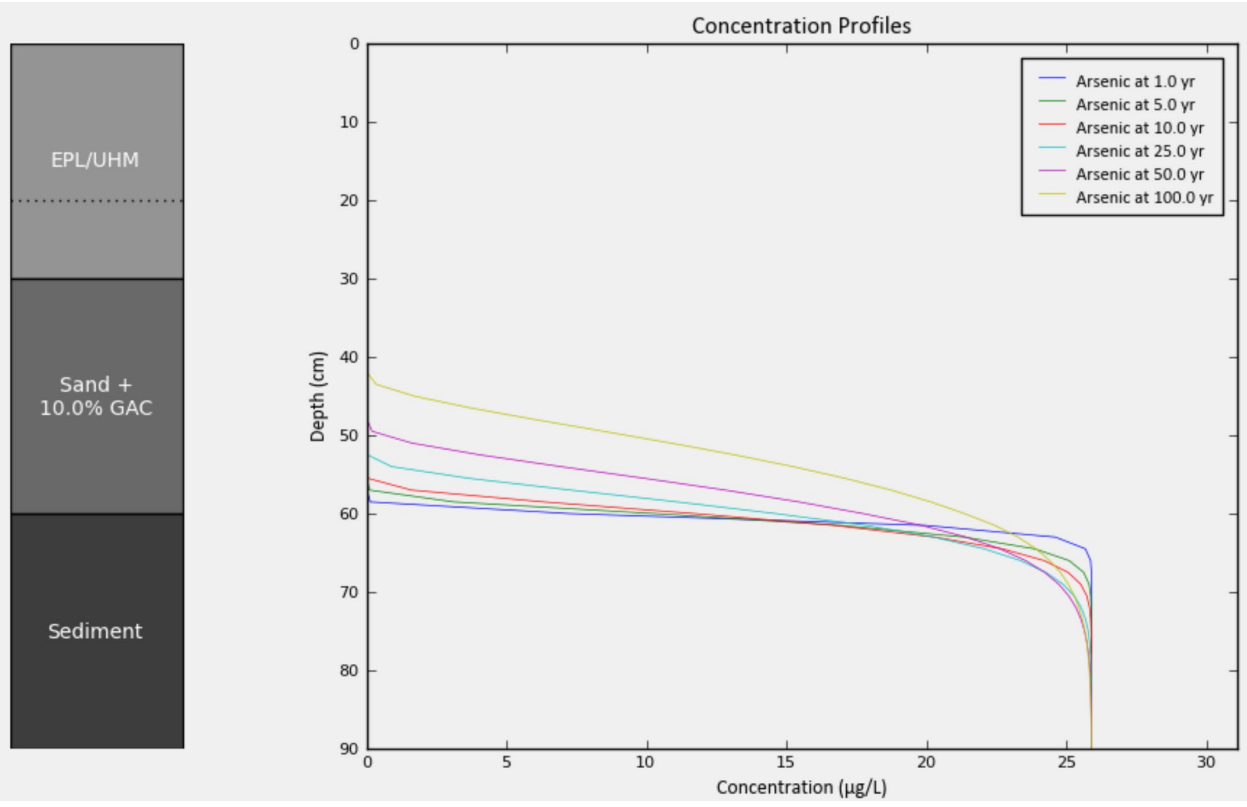

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
2methylnaphthalene at 1.0 yr
2methylnaphthalene at 5.0 yr
2methylnaphthalene at 10.0 yr
2methylnaphthalene at 25.0 yr
2methylnaphthalene at 50.0 yr
2methylnaphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

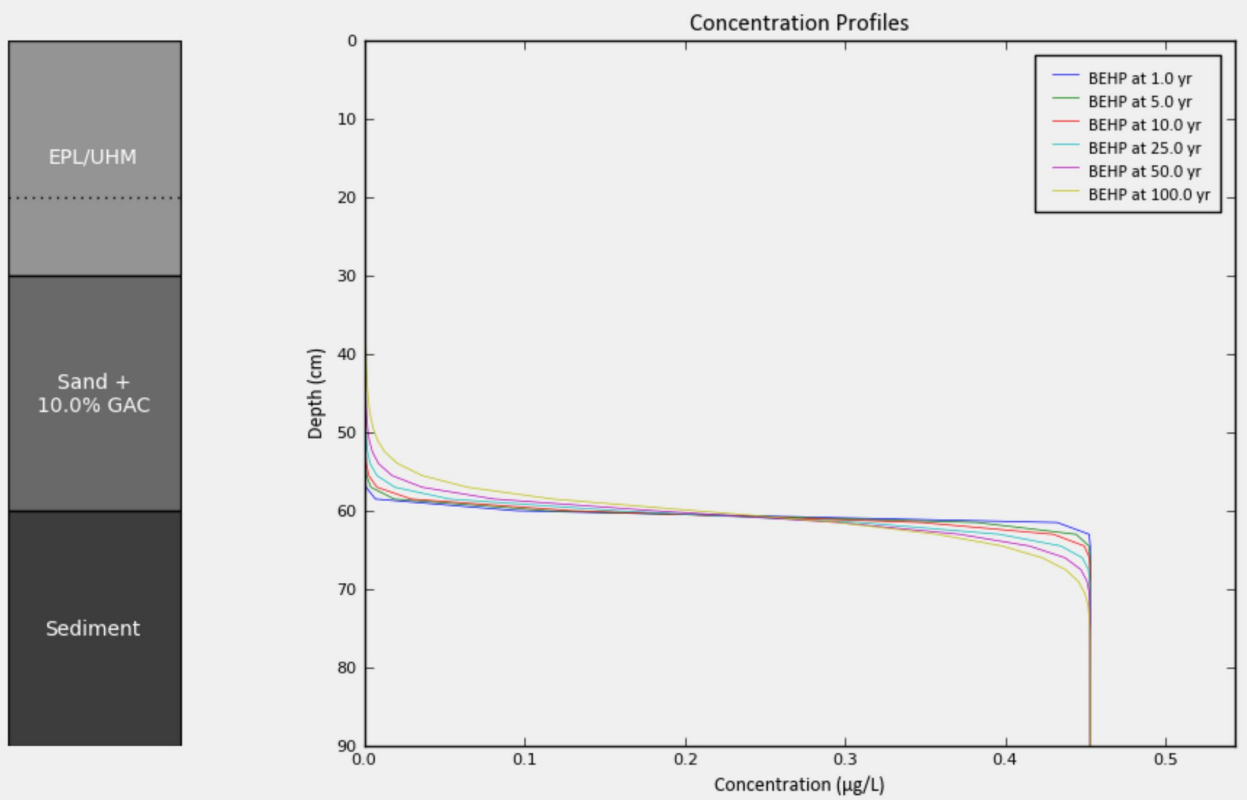

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Acenaphthene at 1.0 yr
Acenaphthene at 5.0 yr
Acenaphthene at 10.0 yr
Acenaphthene at 25.0 yr
Acenaphthene at 50.0 yr
Acenaphthene at 100.0 yr
Depth (cm)
Concentration (µg/L)

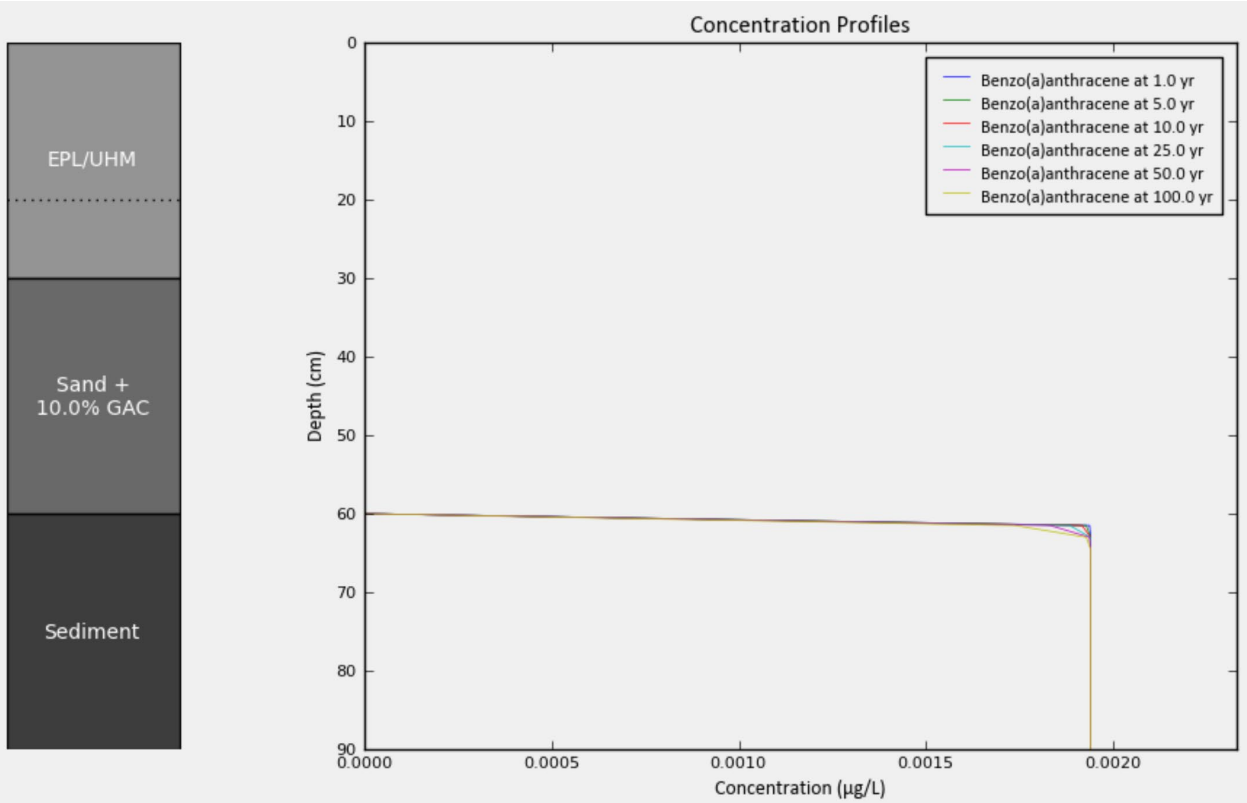

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Acenaphthylene at 1.0 yr
Acenaphthylene at 5.0 yr
Acenaphthylene at 10.0 yr
Acenaphthylene at 25.0 yr
Acenaphthylene at 50.0 yr
Acenaphthylene at 100.0 yr
Depth (cm)
Concentration (µg/L)

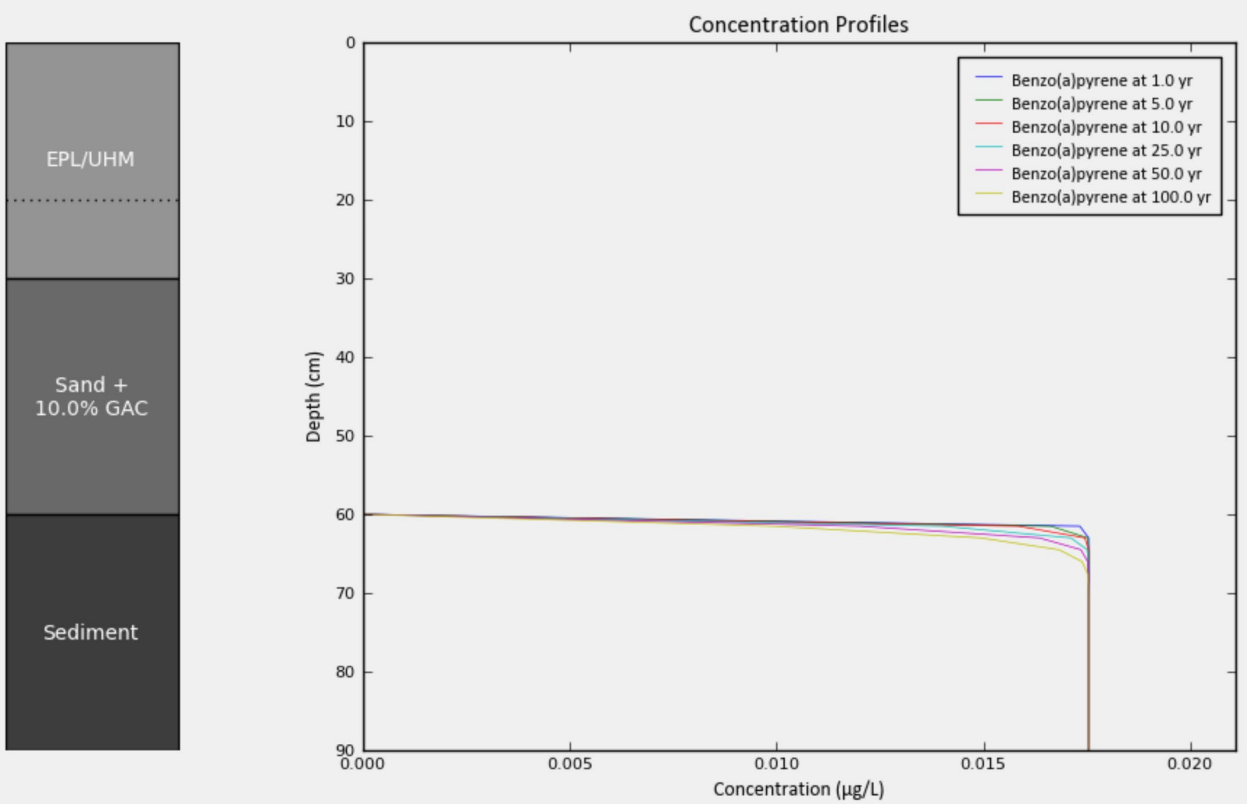

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Aldrin at 1.0 yr
Aldrin at 5.0 yr
Aldrin at 10.0 yr
Aldrin at 25.0 yr
Aldrin at 50.0 yr
Aldrin at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

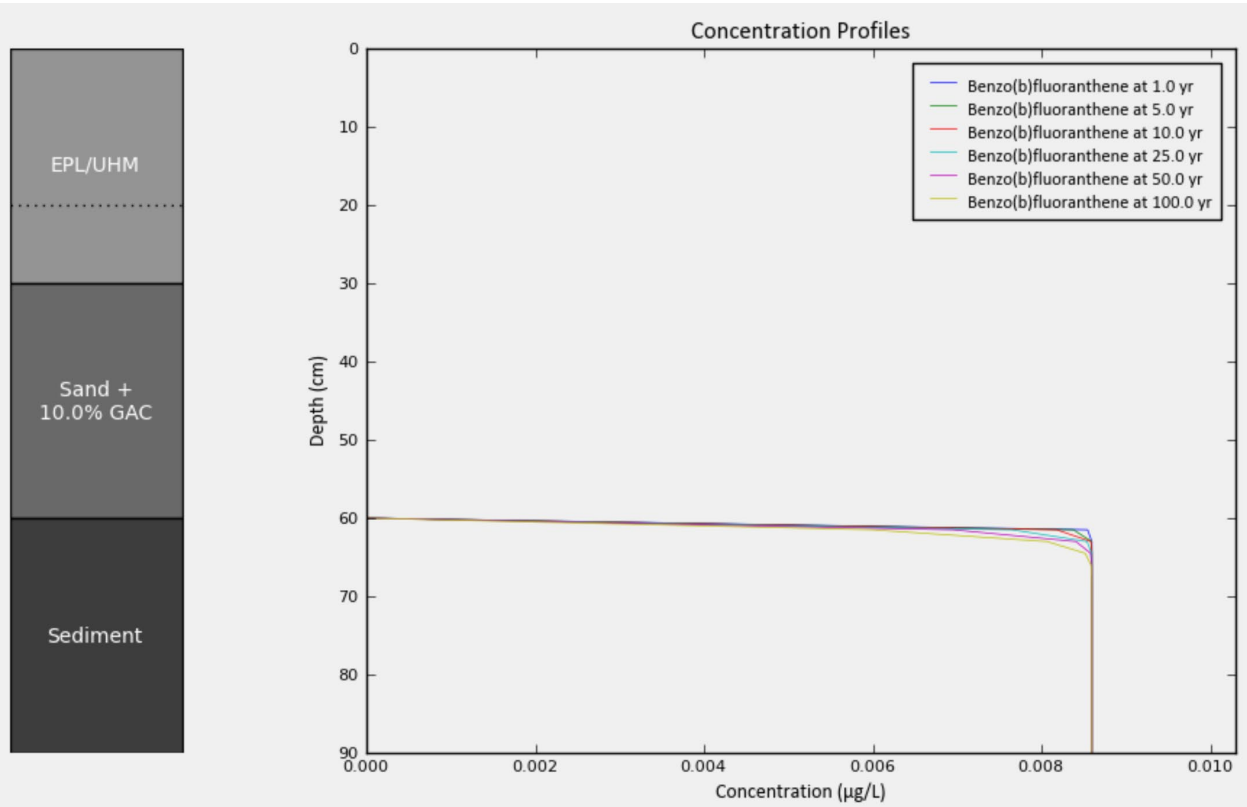

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Anthracene at 1.0 yr
Anthracene at 5.0 yr
Anthracene at 10.0 yr
Anthracene at 25.0 yr
Anthracene at 50.0 yr
Anthracene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

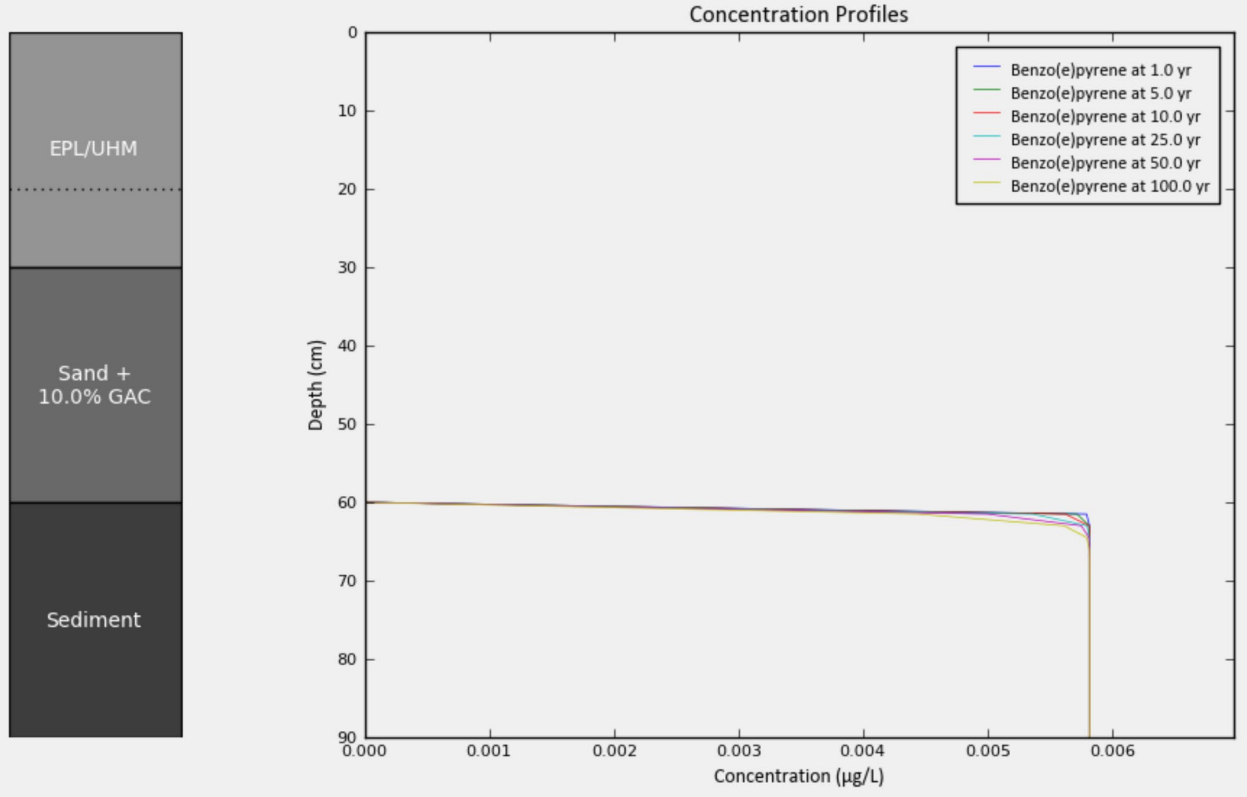

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Arsenic at 1.0 yr
Arsenic at 5.0 yr
Arsenic at 10.0 yr
Arsenic at 25.0 yr
Arsenic at 50.0 yr
Arsenic at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
5
10
15
20
25
30
Concentration (µg/L)

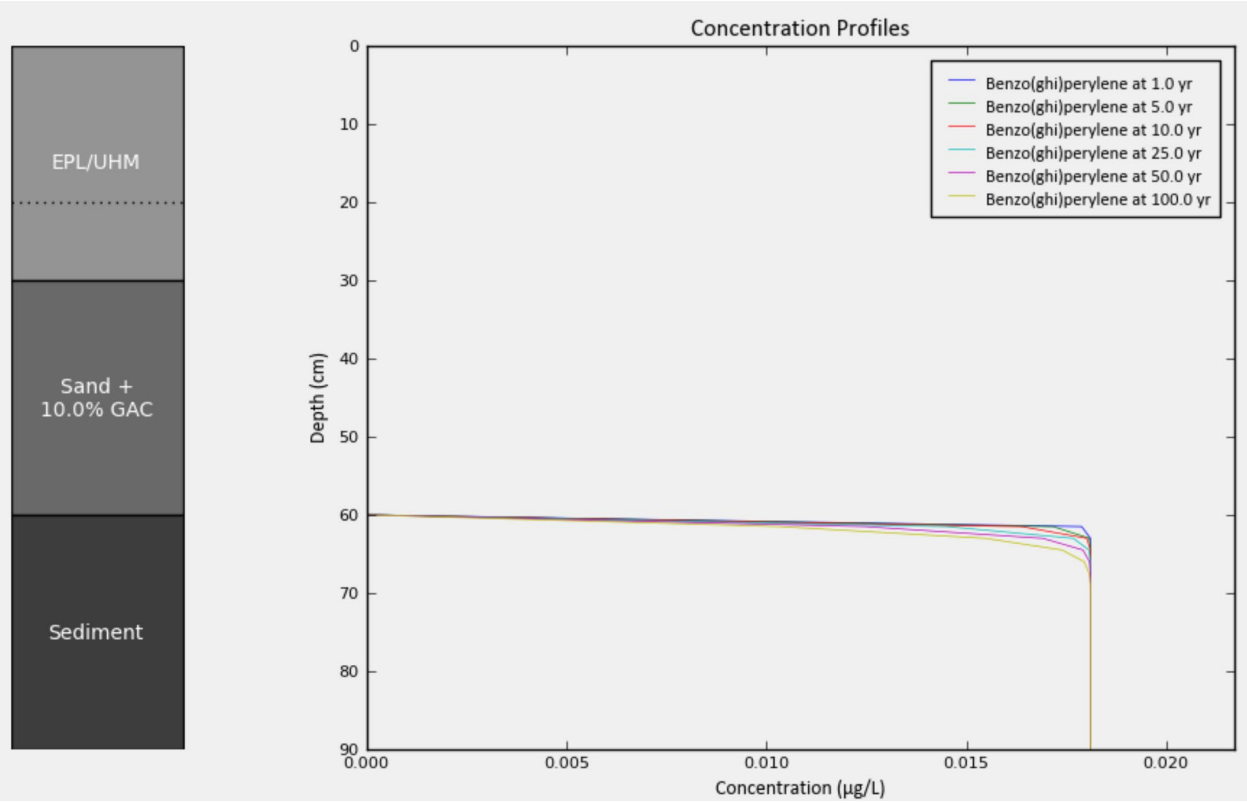

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
BEHP at 1.0 yr
BEHP at 5.0 yr
BEHP at 10.0 yr
BEHP at 25.0 yr
BEHP at 50.0 yr
BEHP at 100.0 yr
Depth (cm)
Concentration (µg/L)

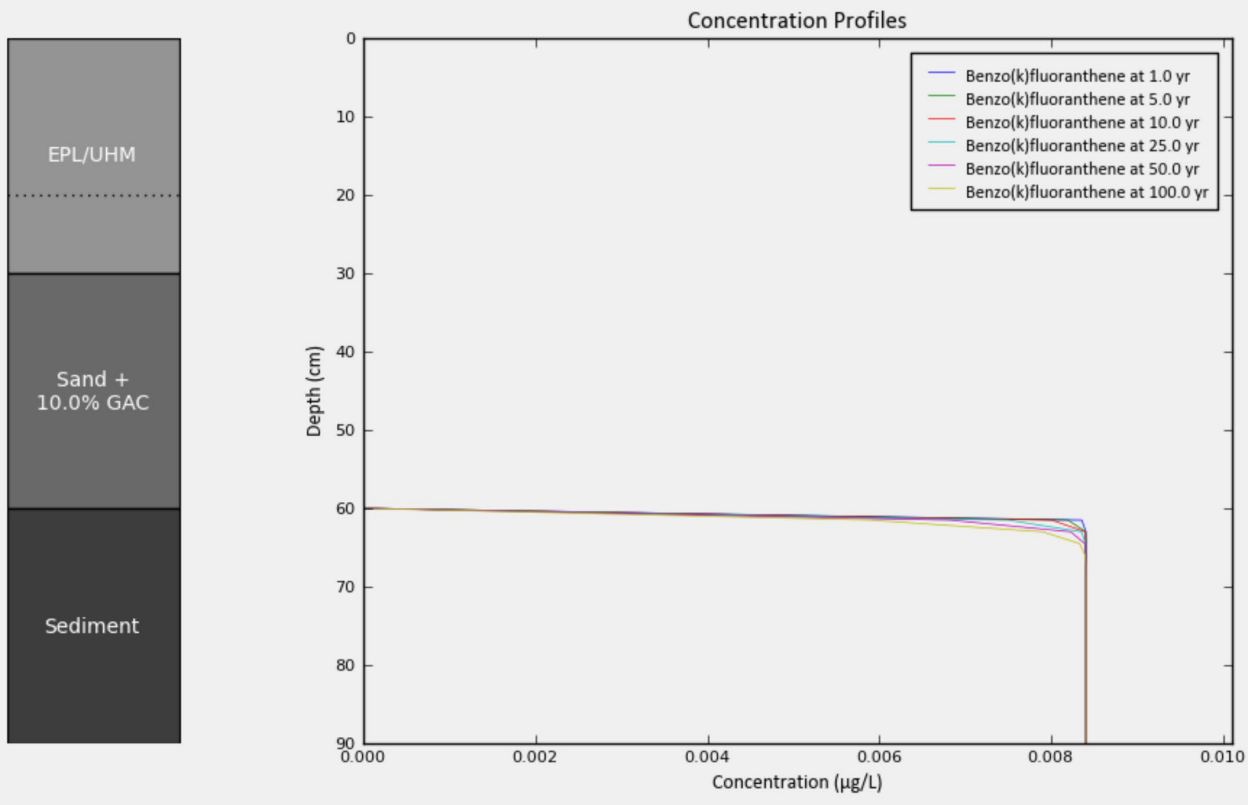

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Benzo(a)anthracene at 1.0 yr
Benzo(a)anthracene at 5.0 yr
Benzo(a)anthracene at 10.0 yr
Benzo(a)anthracene at 25.0 yr
Benzo(a)anthracene at 50.0 yr
Benzo(a)anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)

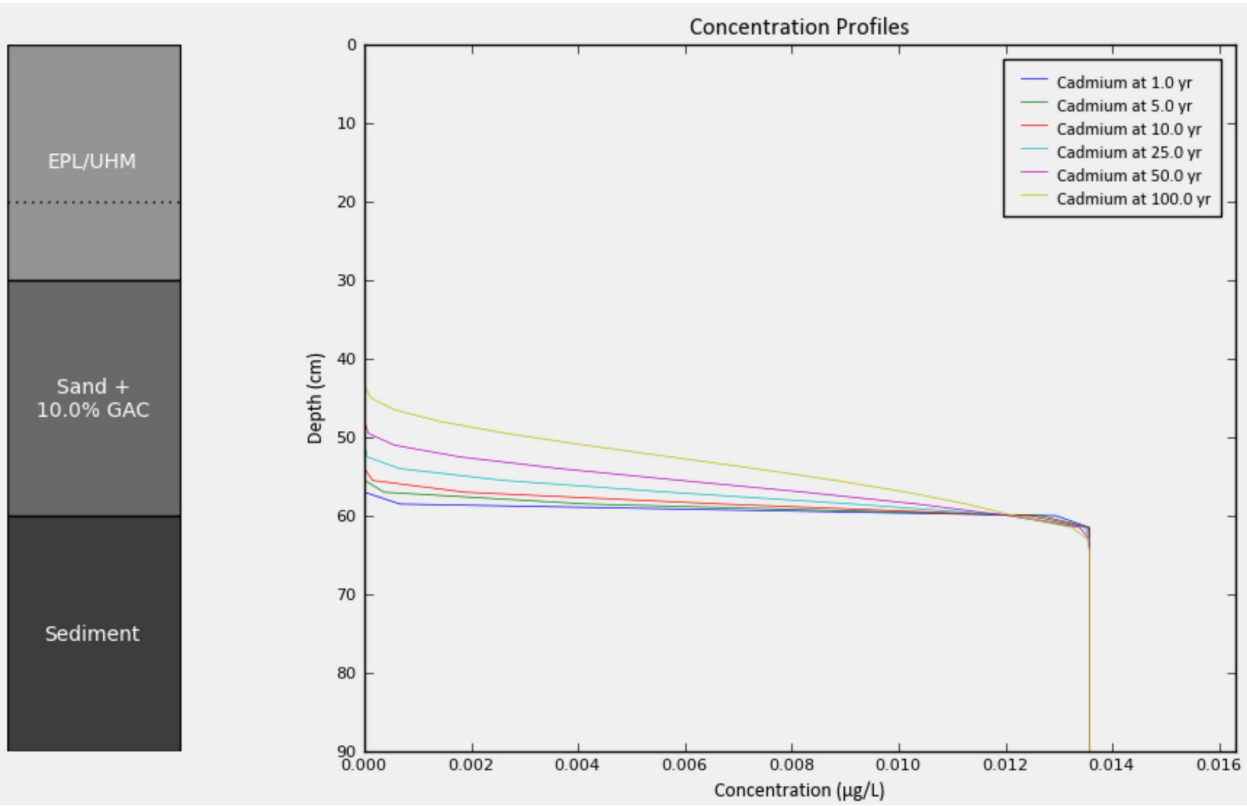

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Benzo(a)pyrene at 1.0 yr
Benzo(a)pyrene at 5.0 yr
Benzo(a)pyrene at 10.0 yr
Benzo(a)pyrene at 25.0 yr
Benzo(a)pyrene at 50.0 yr
Benzo(a)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

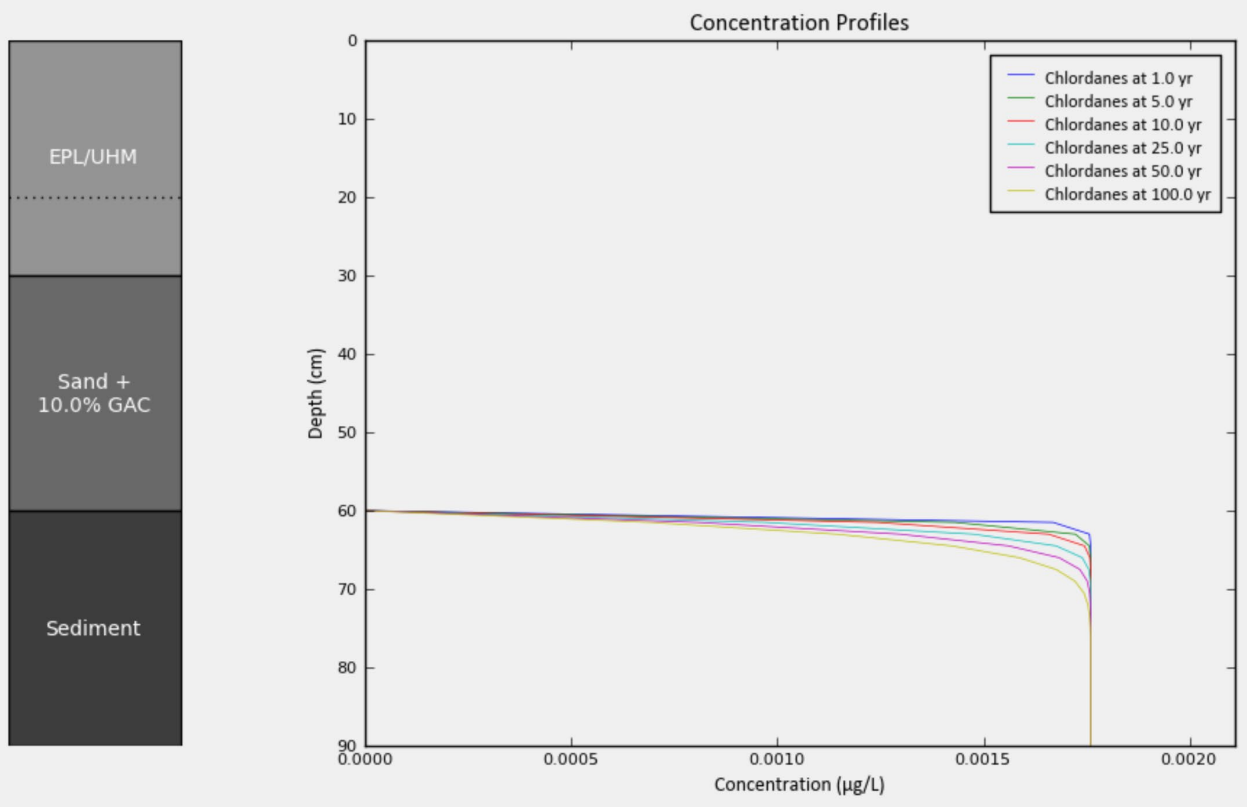

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Benzo(b)fluoranthene at 1.0 yr
Benzo(b)fluoranthene at 5.0 yr
Benzo(b)fluoranthene at 10.0 yr
Benzo(b)fluoranthene at 25.0 yr
Benzo(b)fluoranthene at 50.0 yr
Benzo(b)fluoranthene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
Concentration (µg/L)

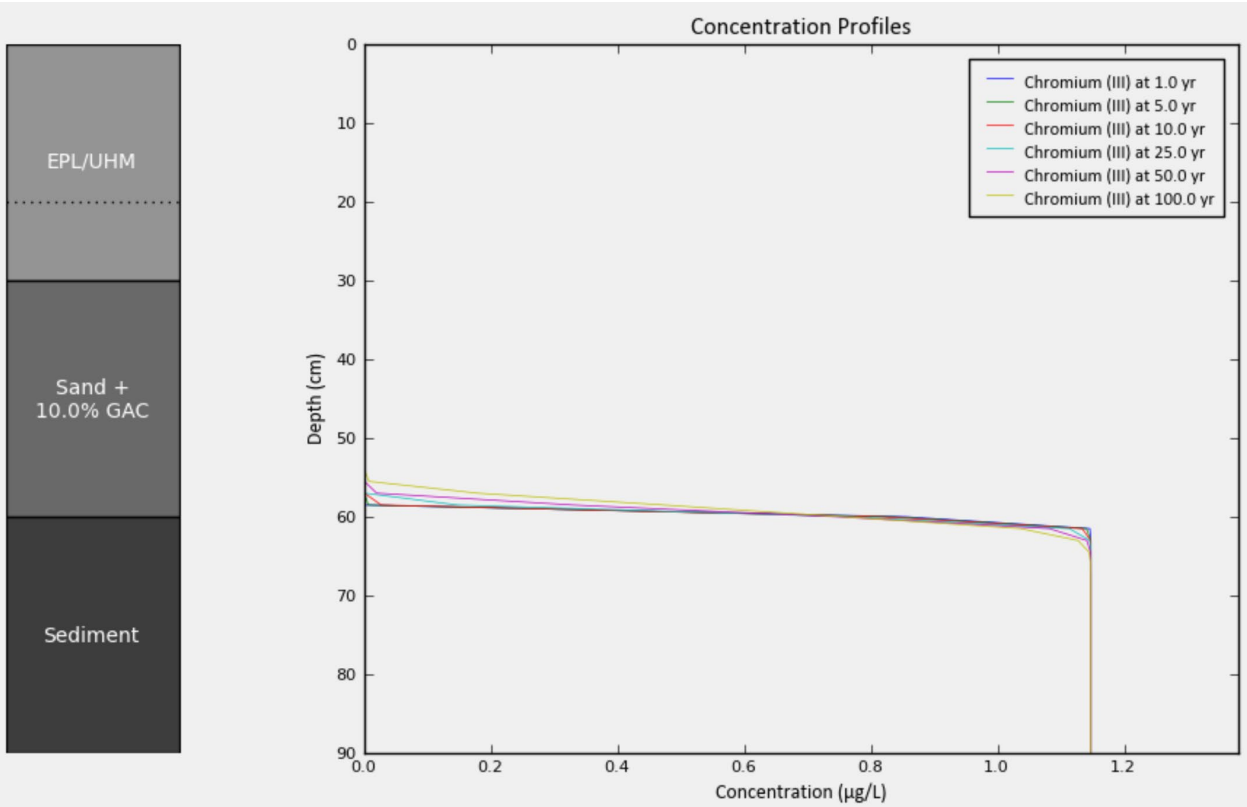

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Benzo(e)pyrene at 1.0 yr
Benzo(e)pyrene at 5.0 yr
Benzo(e)pyrene at 10.0 yr
Benzo(e)pyrene at 25.0 yr
Benzo(e)pyrene at 50.0 yr
Benzo(e)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

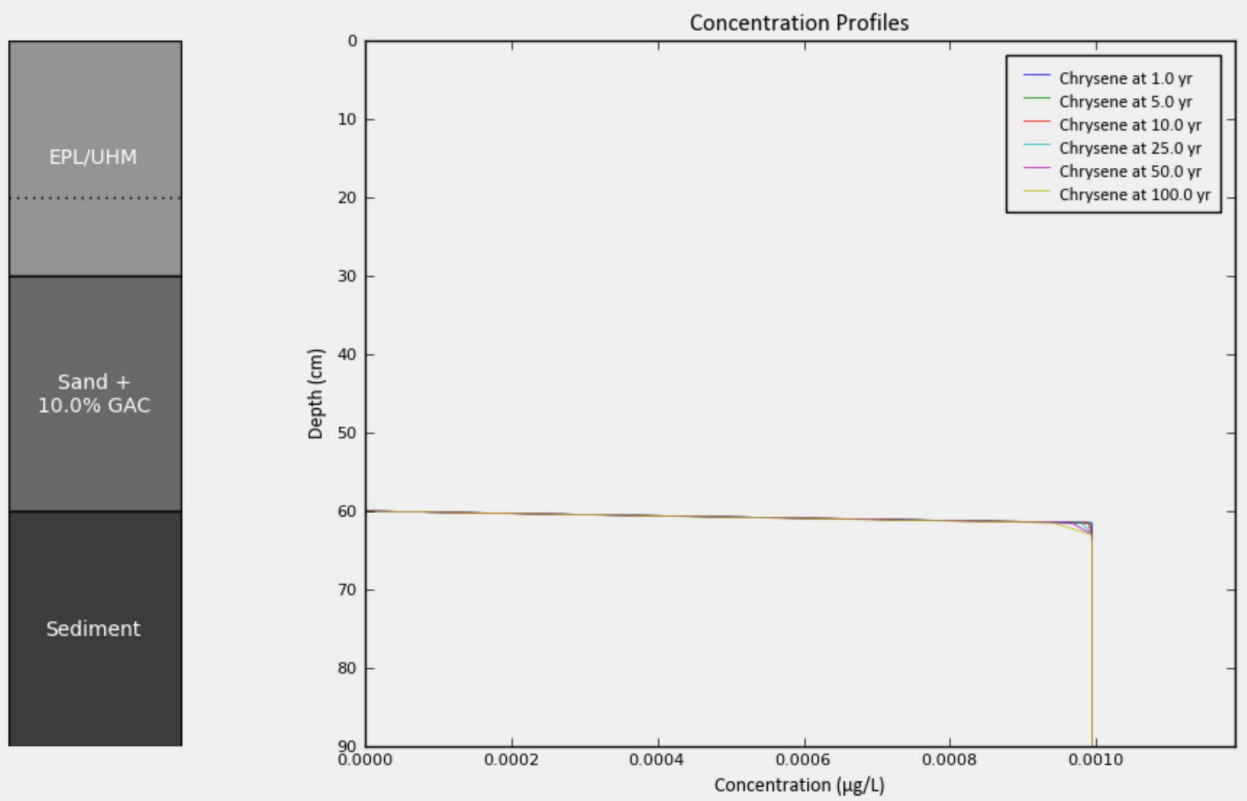

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Benzo(ghi)perylene at 1.0 yr
Benzo(ghi)perylene at 5.0 yr
Benzo(ghi)perylene at 10.0 yr
Benzo(ghi)perylene at 25.0 yr
Benzo(ghi)perylene at 50.0 yr
Benzo(ghi)perylene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

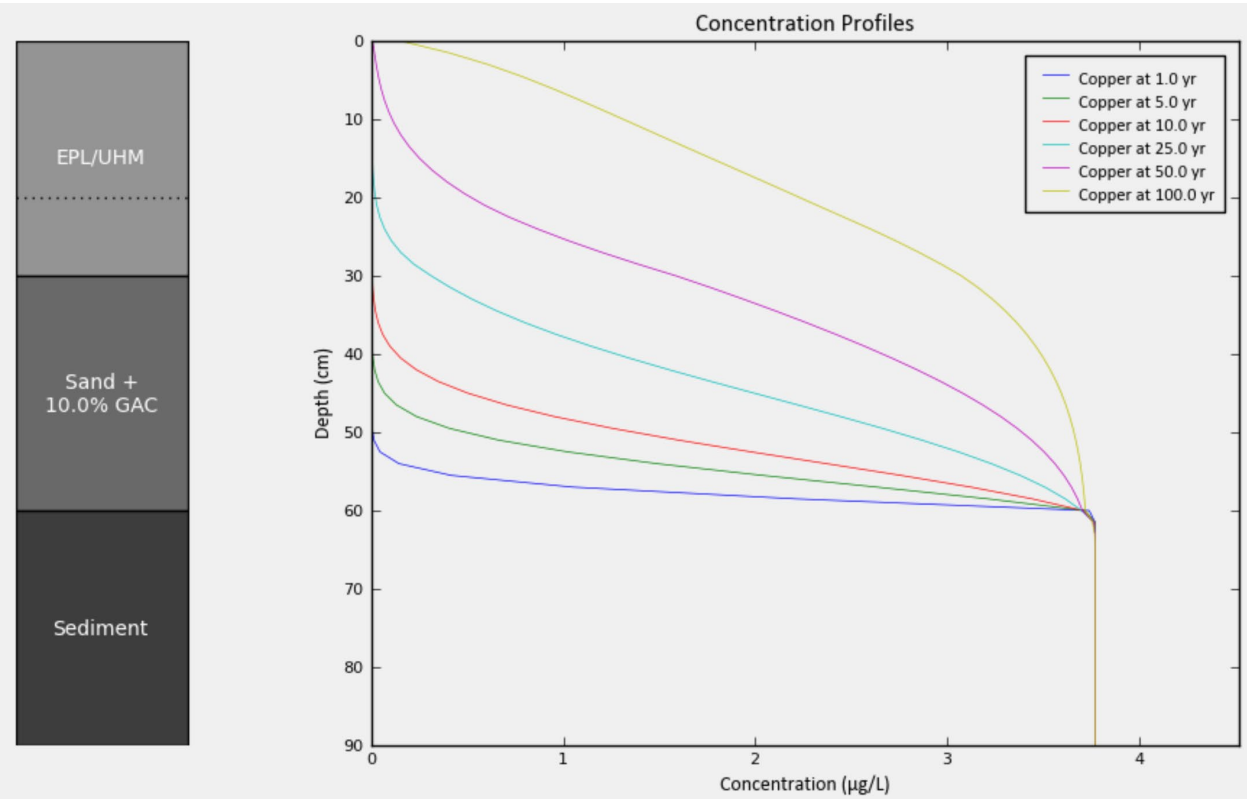

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Benzo(k)fluoranthene at 1.0 yr
Benzo(k)fluoranthene at 5.0 yr
Benzo(k)fluoranthene at 10.0 yr
Benzo(k)fluoranthene at 25.0 yr
Benzo(k)fluoranthene at 50.0 yr
Benzo(k)fluoranthene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
Concentration (µg/L)

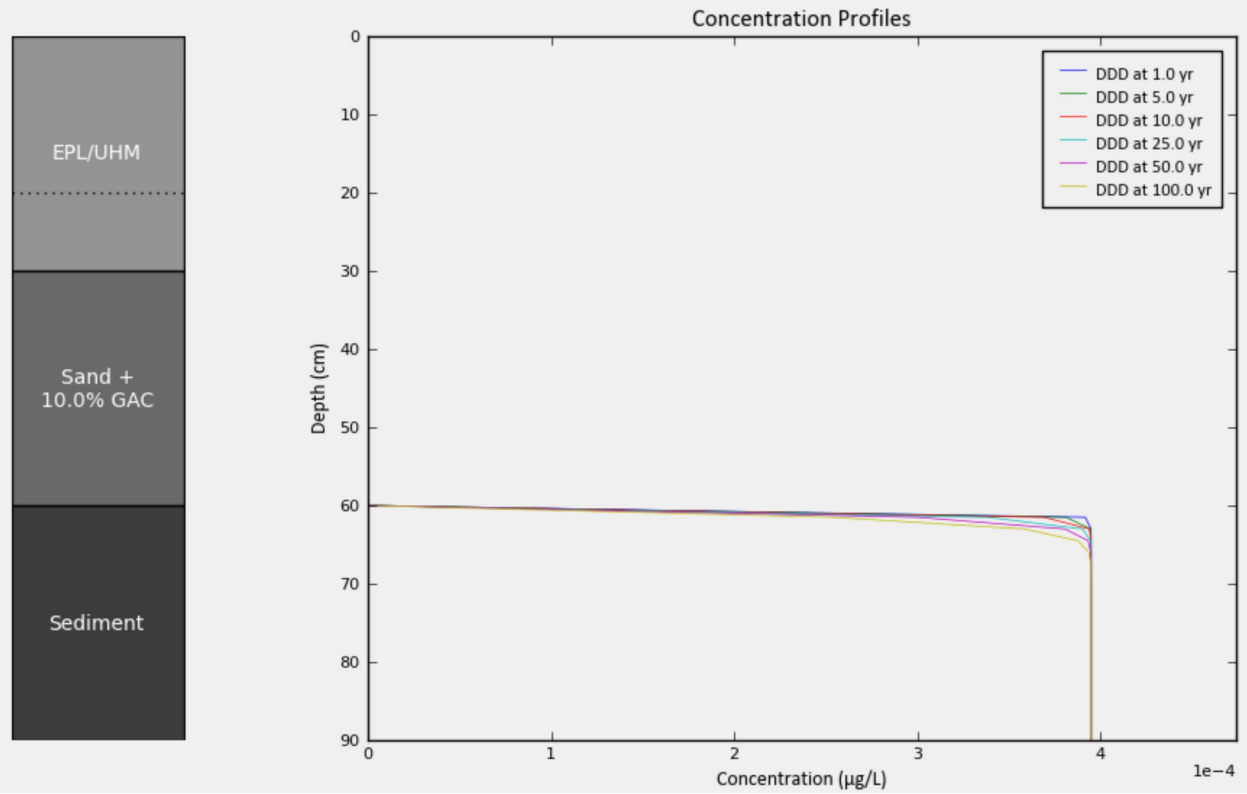

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Cadmium at 1.0 yr
Cadmium at 5.0 yr
Cadmium at 10.0 yr
Cadmium at 25.0 yr
Cadmium at 50.0 yr
Cadmium at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
0.012
0.014
0.016
Concentration (µg/L)

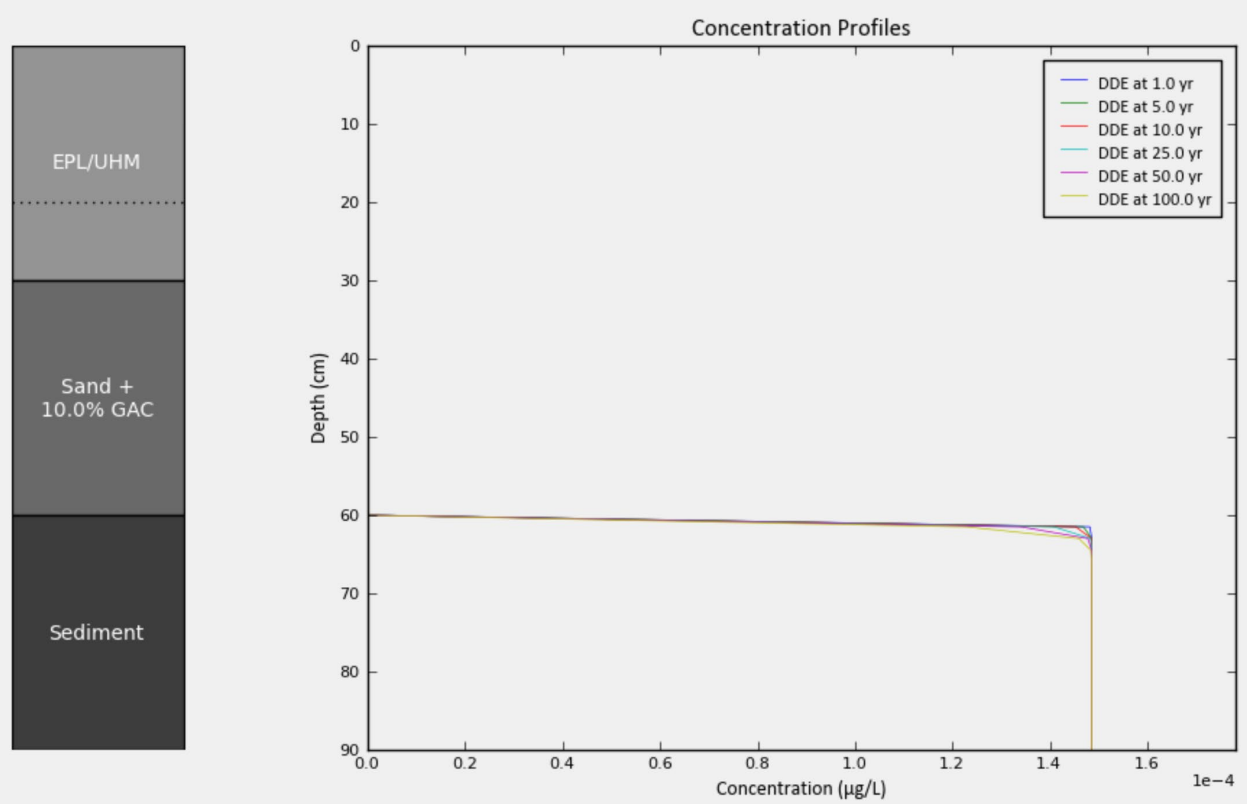

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Chlordanes at 1.0 yr
Chlordanes at 5.0 yr
Chlordanes at 10.0 yr
Chlordanes at 25.0 yr
Chlordanes at 50.0 yr
Chlordanes at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

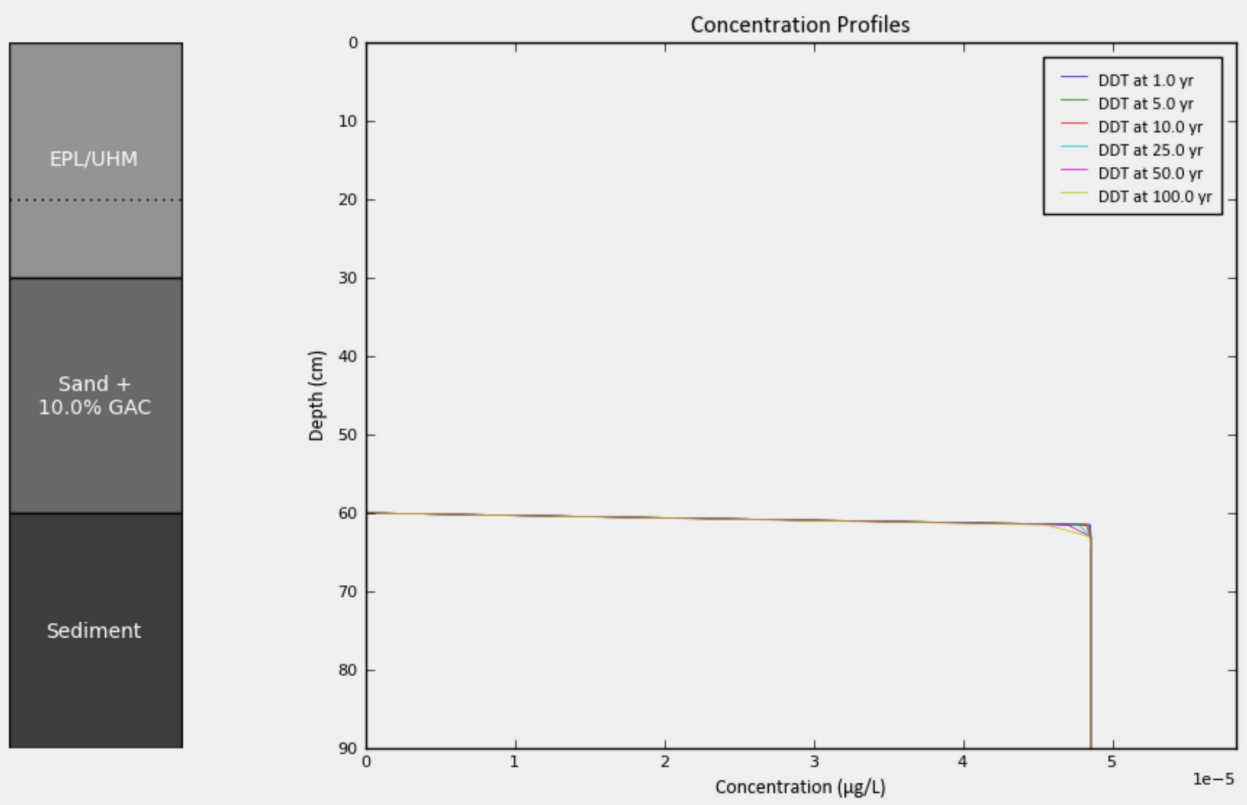

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Chromium (III) at 1.0 yr
Chromium (III) at 5.0 yr
Chromium (III) at 10.0 yr
Chromium (III) at 25.0 yr
Chromium (III) at 50.0 yr
Chromium (III) at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Concentration (µg/L)

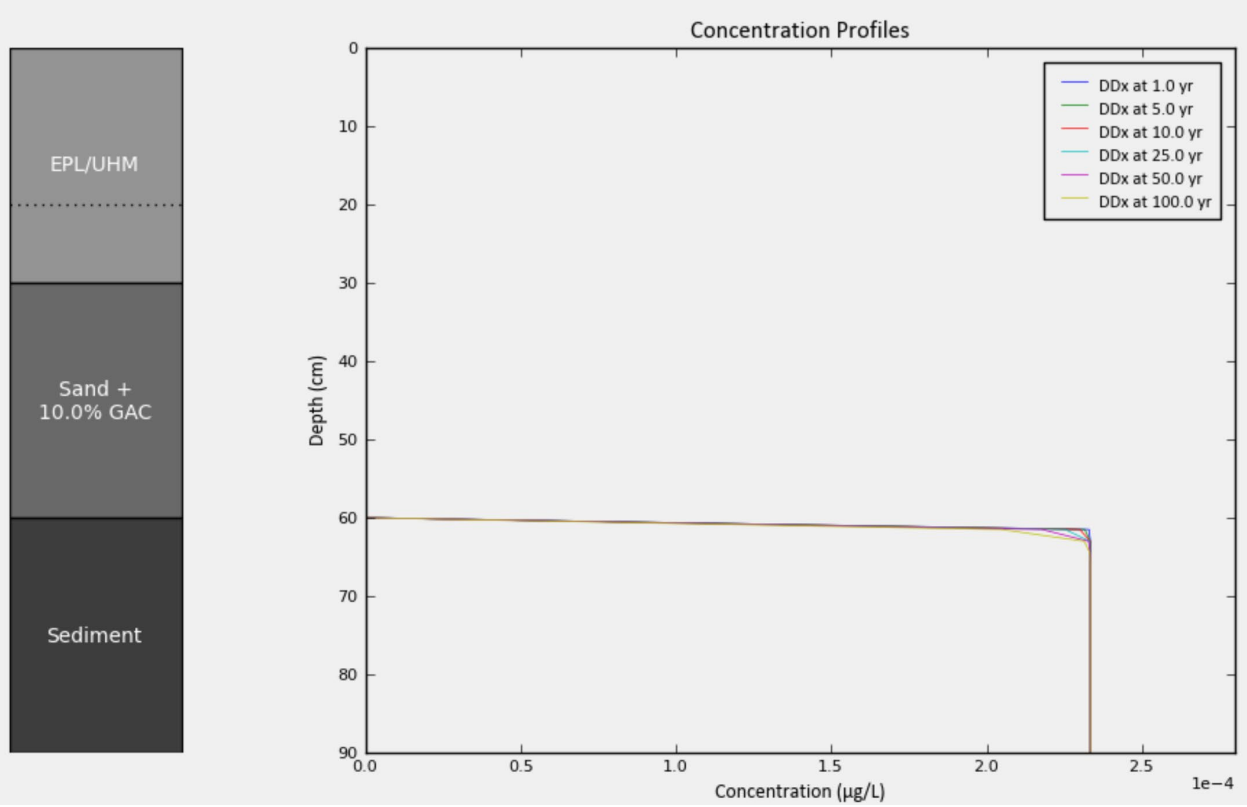

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Chrysene at 1.0 yr
Chrysene at 5.0 yr
Chrysene at 10.0 yr
Chrysene at 25.0 yr
Chrysene at 50.0 yr
Chrysene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010
Concentration (µg/L)

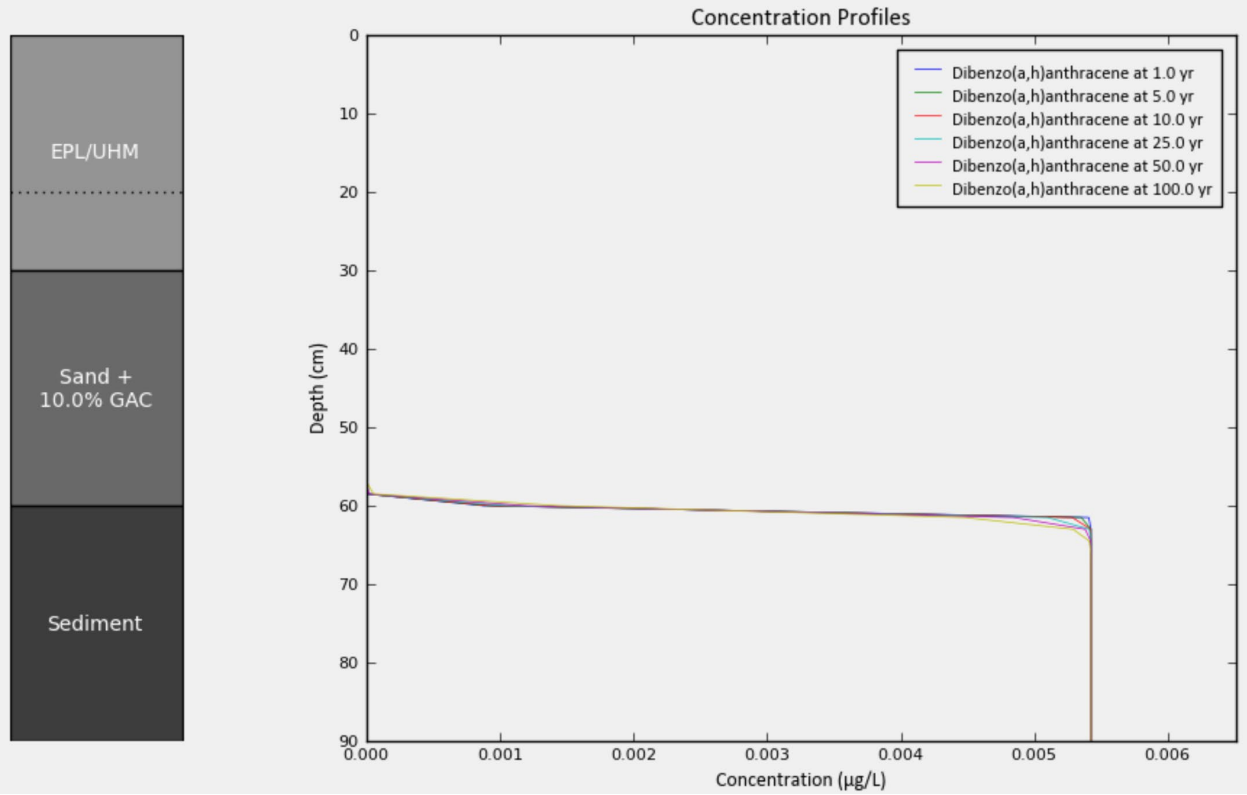

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Copper at 1.0 yr
Copper at 5.0 yr
Copper at 10.0 yr
Copper at 25.0 yr
Copper at 50.0 yr
Copper at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
Concentration (µg/L)

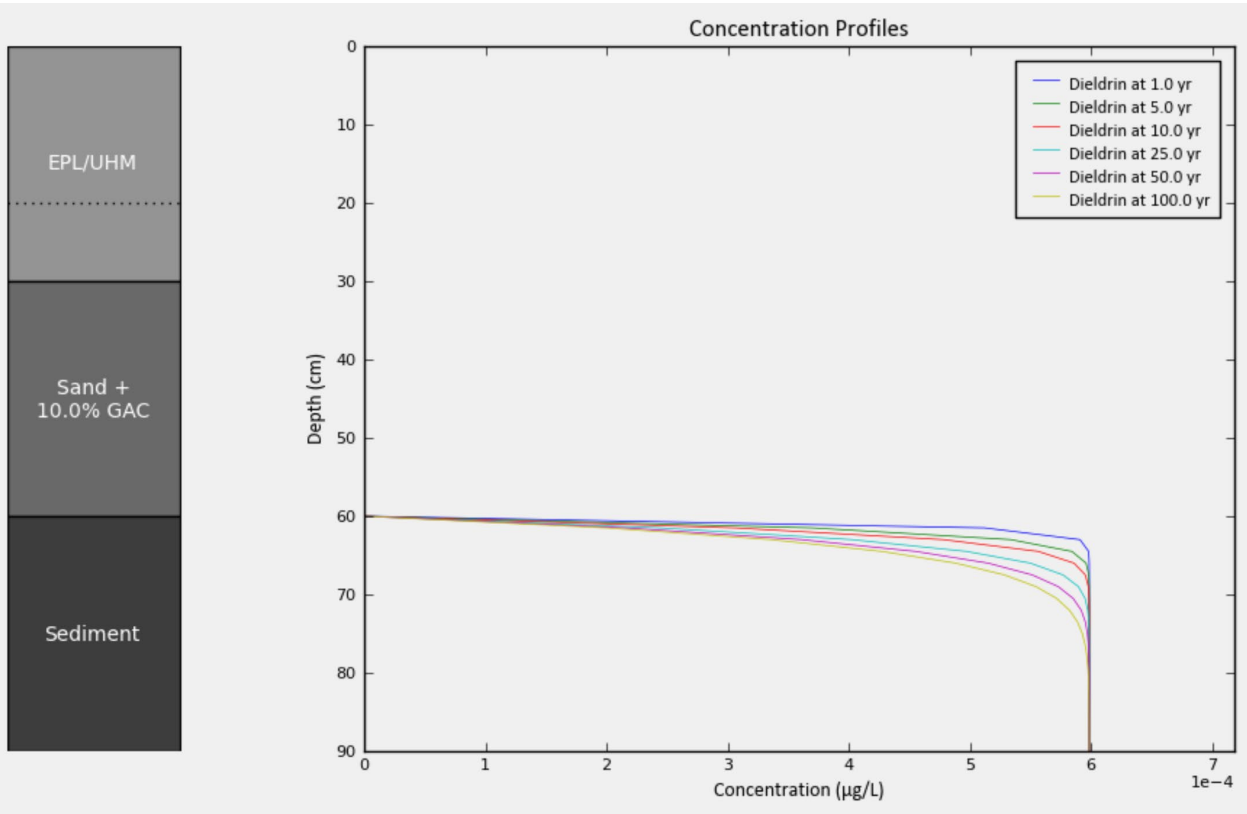

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
DDD at 1.0 yr
DDD at 5.0 yr
DDD at 10.0 yr
DDD at 25.0 yr
DDD at 50.0 yr
DDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

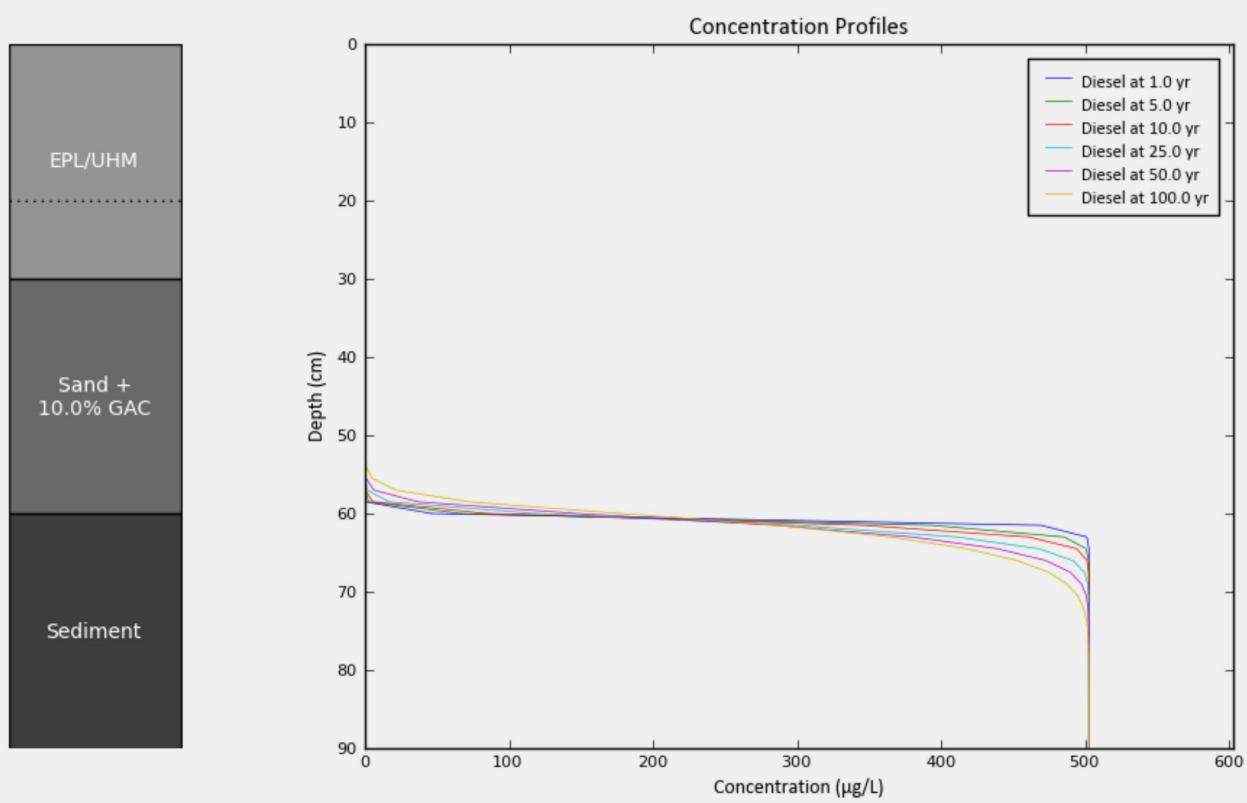

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
DDE at 1.0 yr
DDE at 5.0 yr
DDE at 10.0 yr
DDE at 25.0 yr
DDE at 50.0 yr
DDE at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

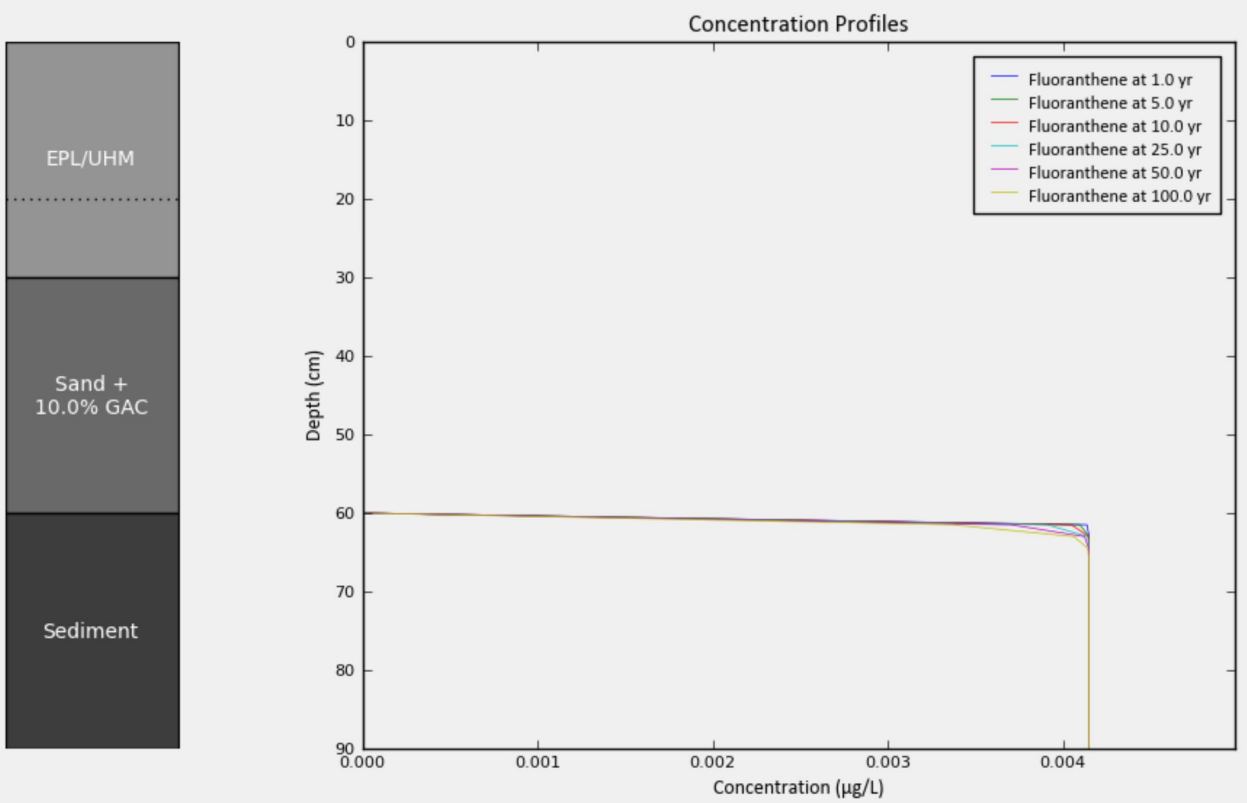

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
DDT at 1.0 yr
DDT at 5.0 yr
DDT at 10.0 yr
DDT at 25.0 yr
DDT at 50.0 yr
DDT at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

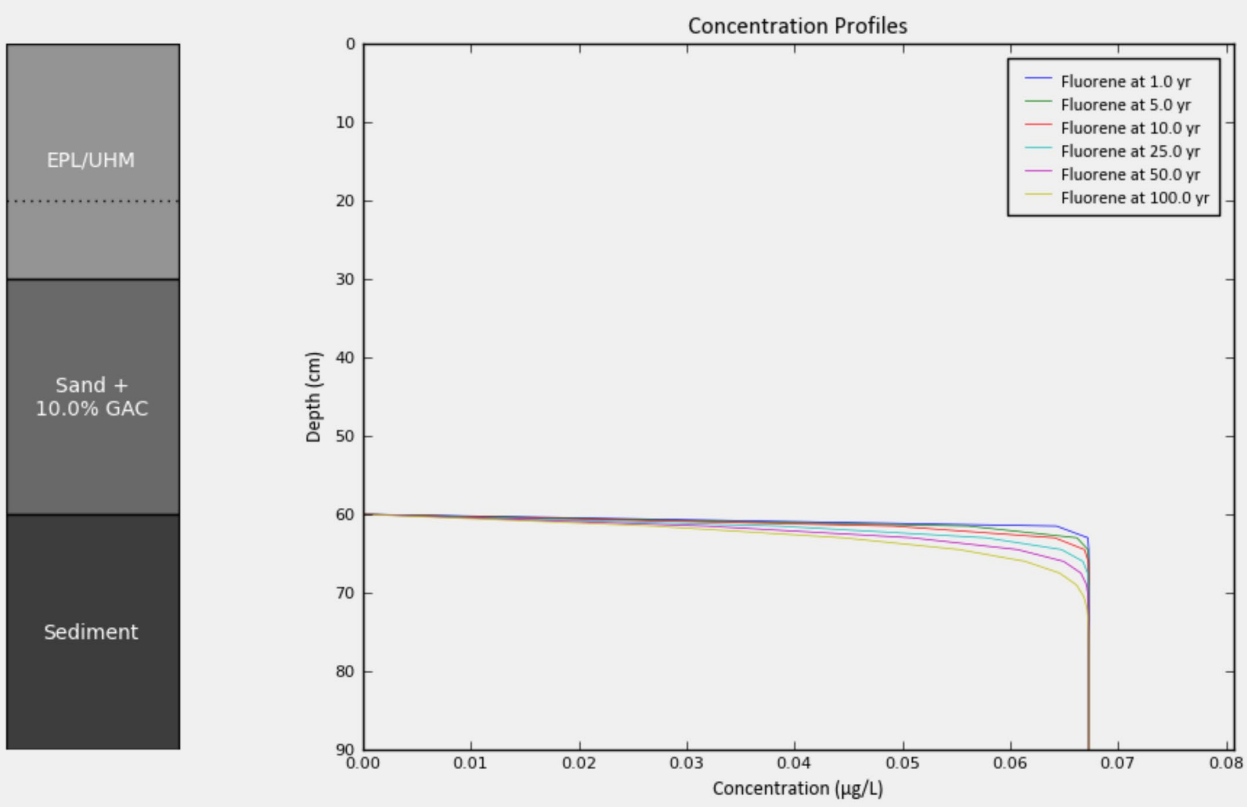

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
DDx at 1.0 yr
DDx at 5.0 yr
DDx at 10.0 yr
DDx at 25.0 yr
DDx at 50.0 yr
DDx at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

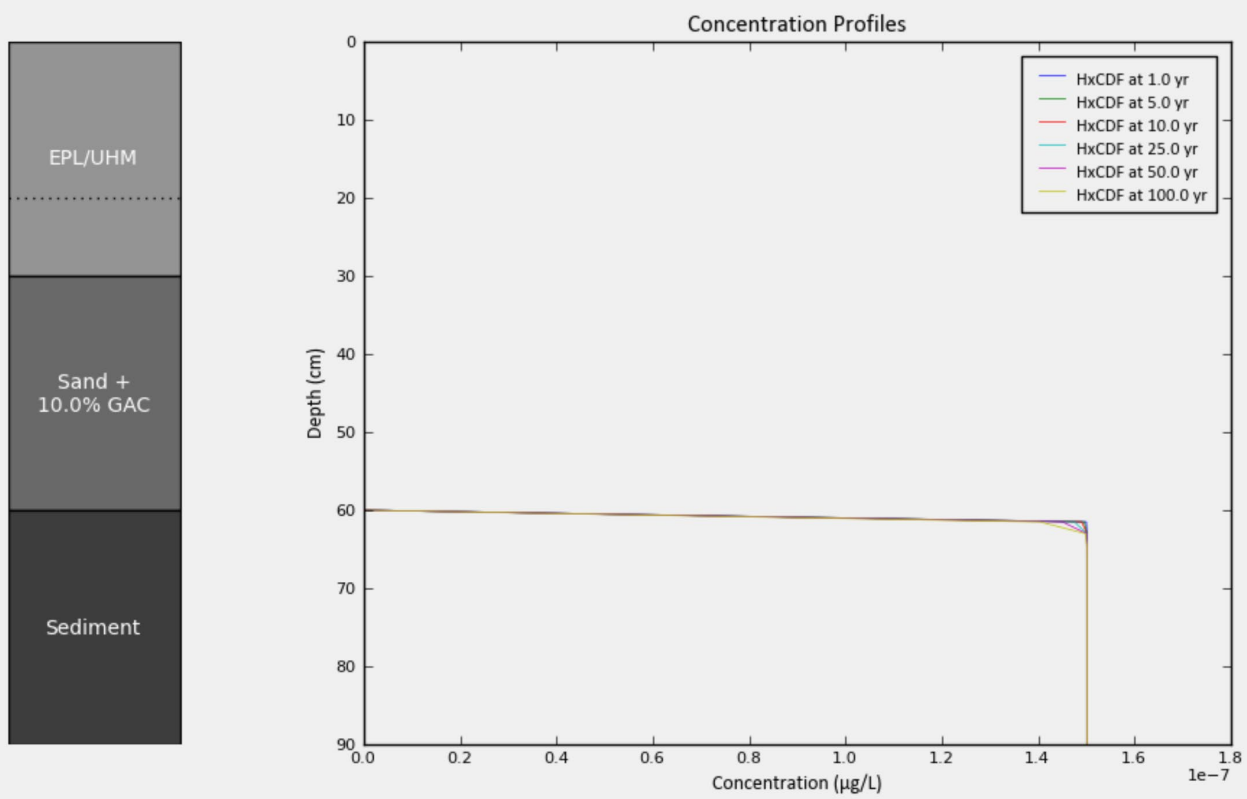

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Dibenzo(a,h)anthracene at 1.0 yr
Dibenzo(a,h)anthracene at 5.0 yr
Dibenzo(a,h)anthracene at 10.0 yr
Dibenzo(a,h)anthracene at 25.0 yr
Dibenzo(a,h)anthracene at 50.0 yr
Dibenzo(a,h)anthracene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

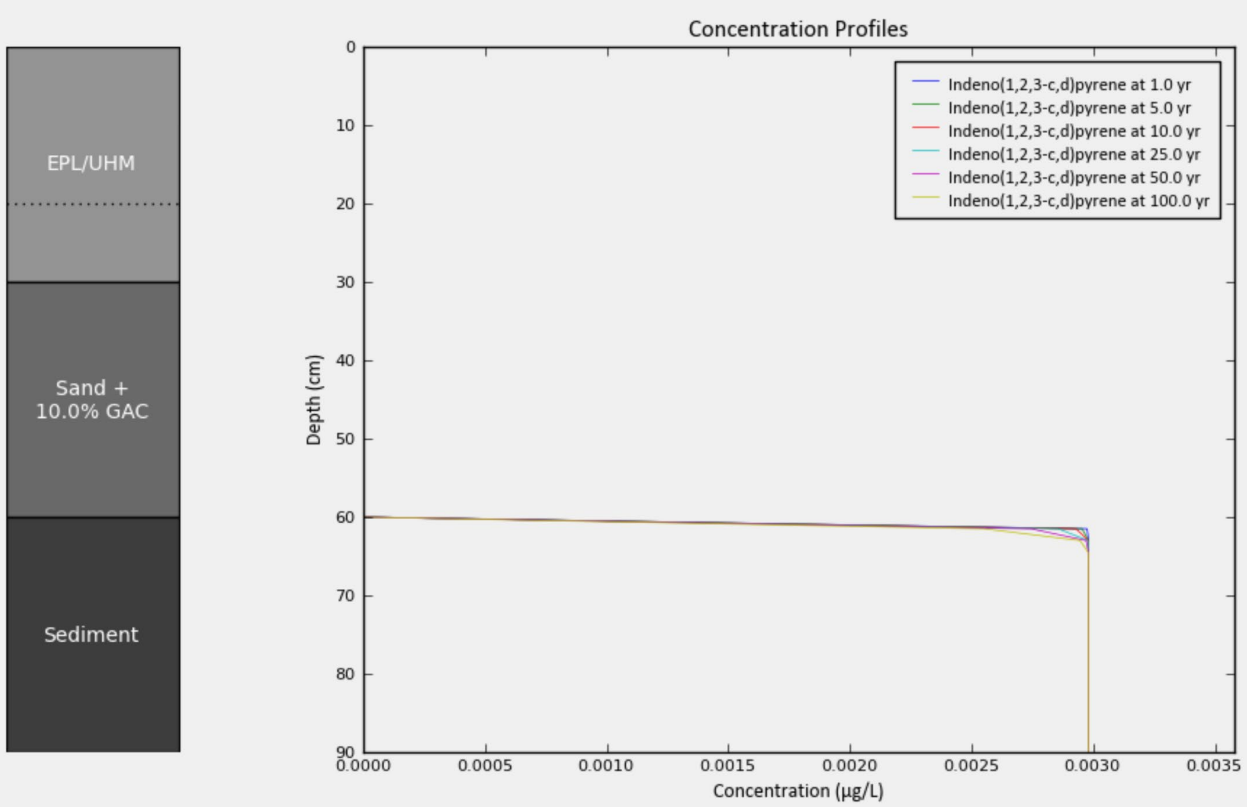

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Dieldrin at 1.0 yr
Dieldrin at 5.0 yr
Dieldrin at 10.0 yr
Dieldrin at 25.0 yr
Dieldrin at 50.0 yr
Dieldrin at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
7
1e−4
Concentration (µg/L)

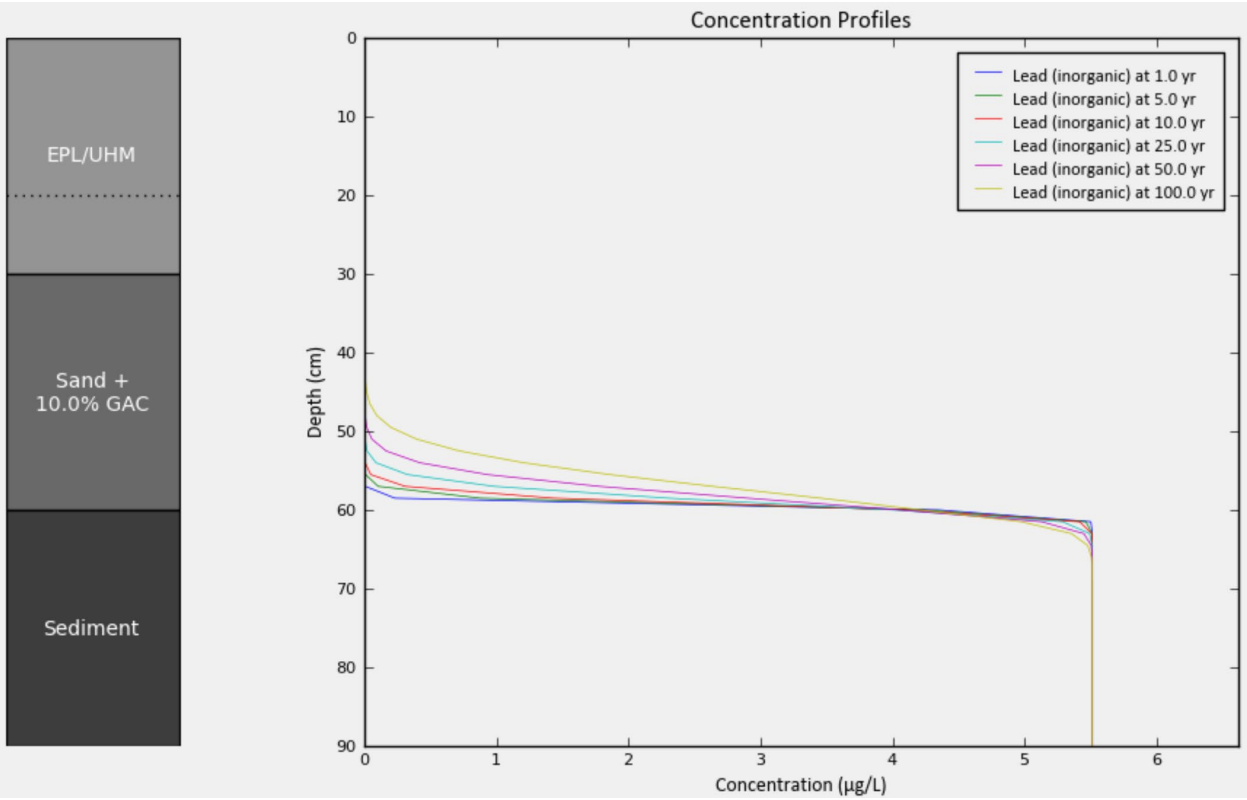

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Diesel at 1.0 yr
Diesel at 5.0 yr
Diesel at 10.0 yr
Diesel at 25.0 yr
Diesel at 50.0 yr
Diesel at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500
600

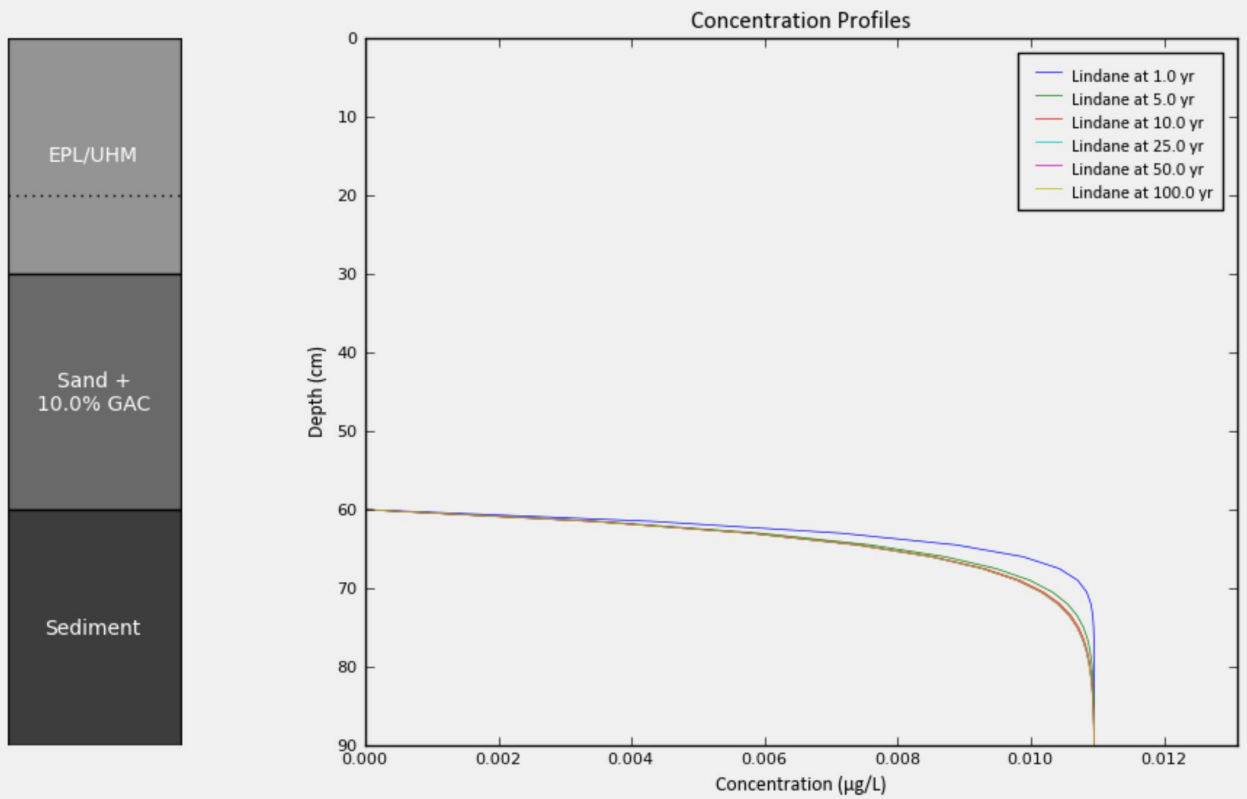

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Fluoranthene at 1.0 yr
Fluoranthene at 5.0 yr
Fluoranthene at 10.0 yr
Fluoranthene at 25.0 yr
Fluoranthene at 50.0 yr
Fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004

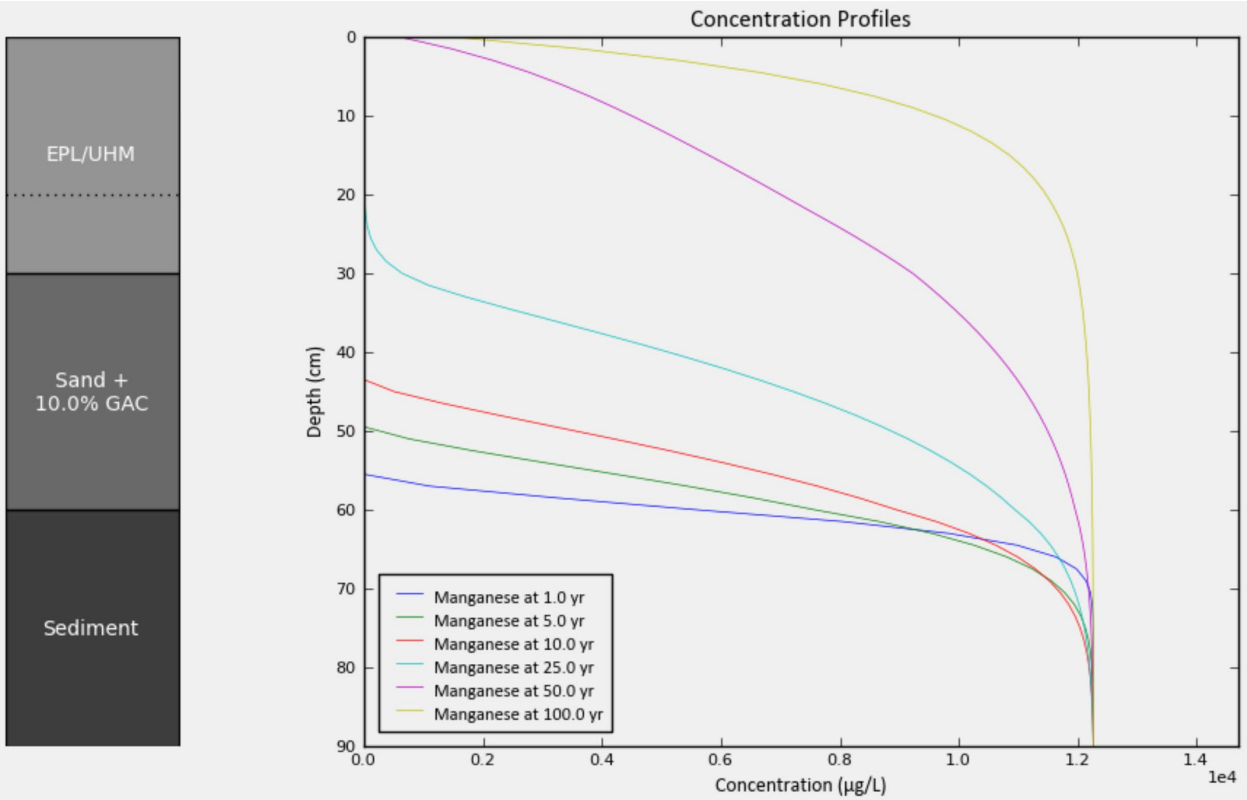

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Fluorene at 1.0 yr
Fluorene at 5.0 yr
Fluorene at 10.0 yr
Fluorene at 25.0 yr
Fluorene at 50.0 yr
Fluorene at 100.0 yr
Depth (cm)
Concentration (µg/L)

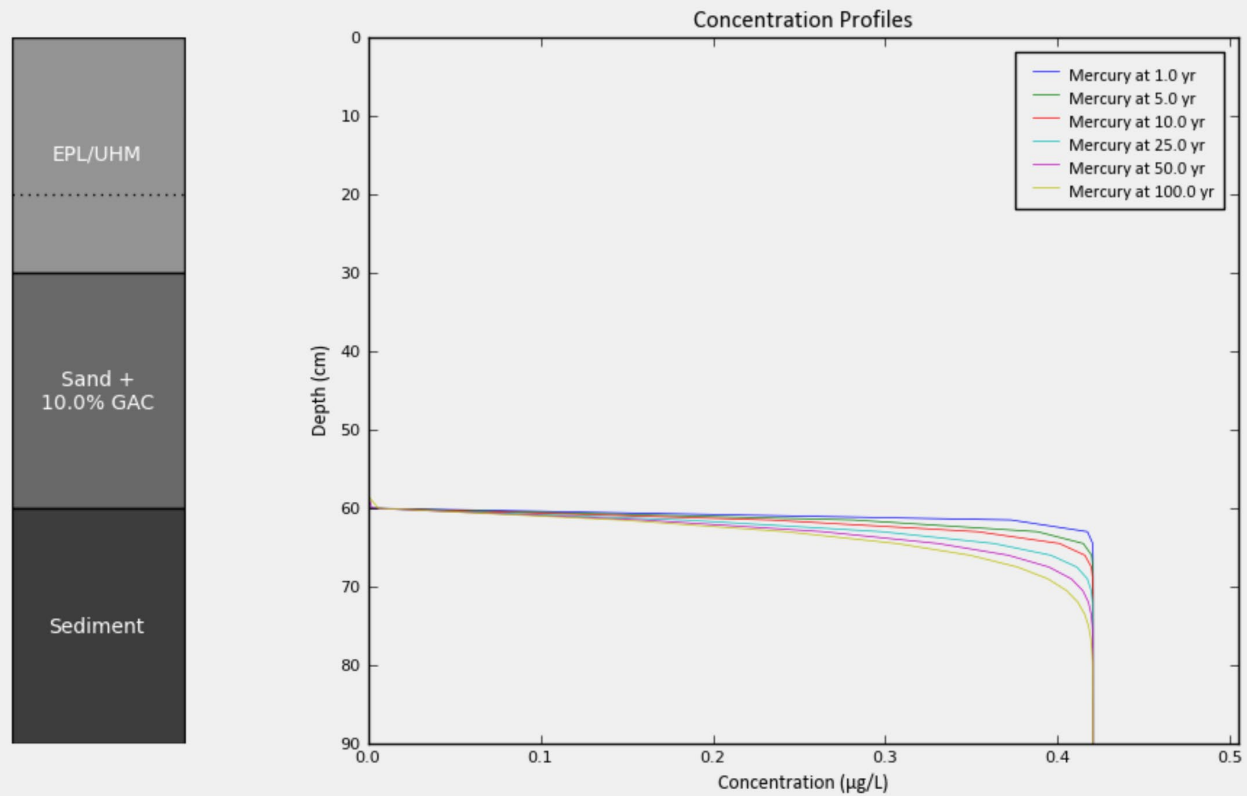

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
HxCDF at 1.0 yr
HxCDF at 5.0 yr
HxCDF at 10.0 yr
HxCDF at 25.0 yr
HxCDF at 50.0 yr
HxCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

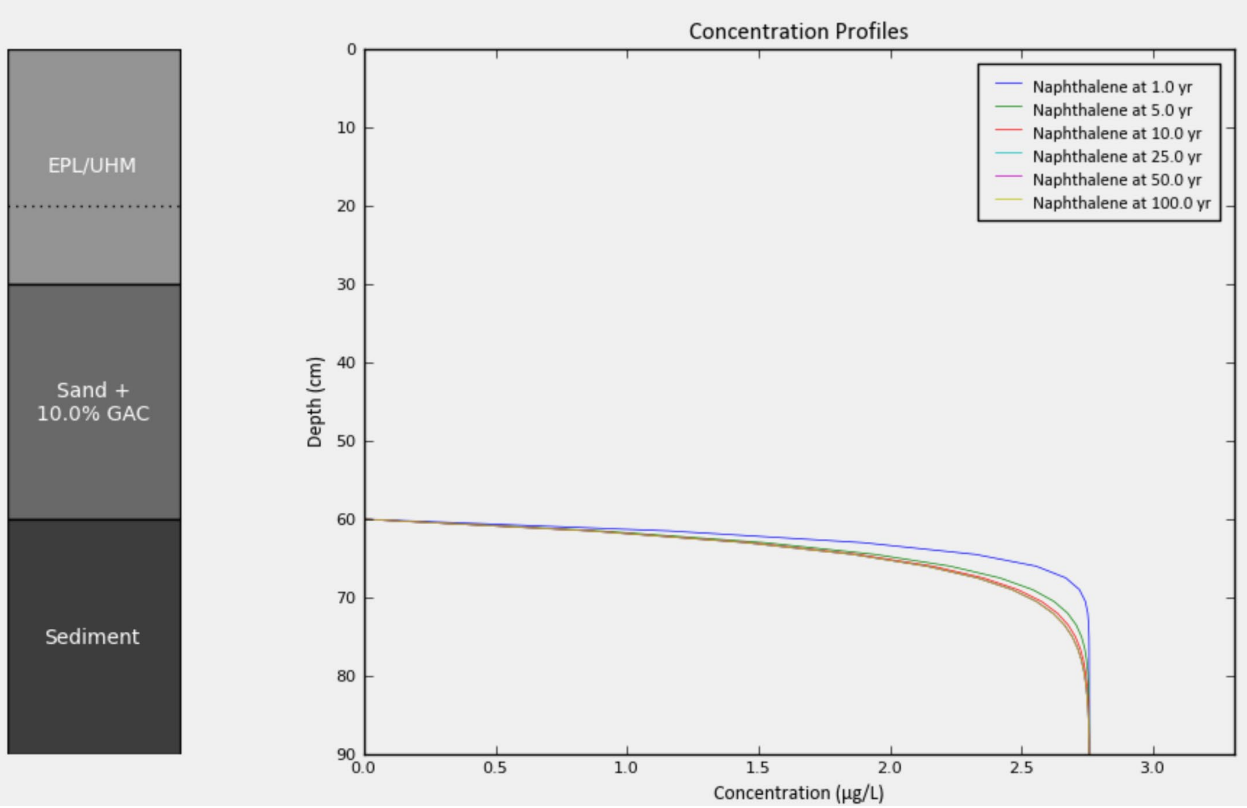

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Indeno(1,2,3-c,d)pyrene at 1.0 yr
Indeno(1,2,3-c,d)pyrene at 5.0 yr
Indeno(1,2,3-c,d)pyrene at 10.0 yr
Indeno(1,2,3-c,d)pyrene at 25.0 yr
Indeno(1,2,3-c,d)pyrene at 50.0 yr
Indeno(1,2,3-c,d)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
0.0035
Concentration (µg/L)

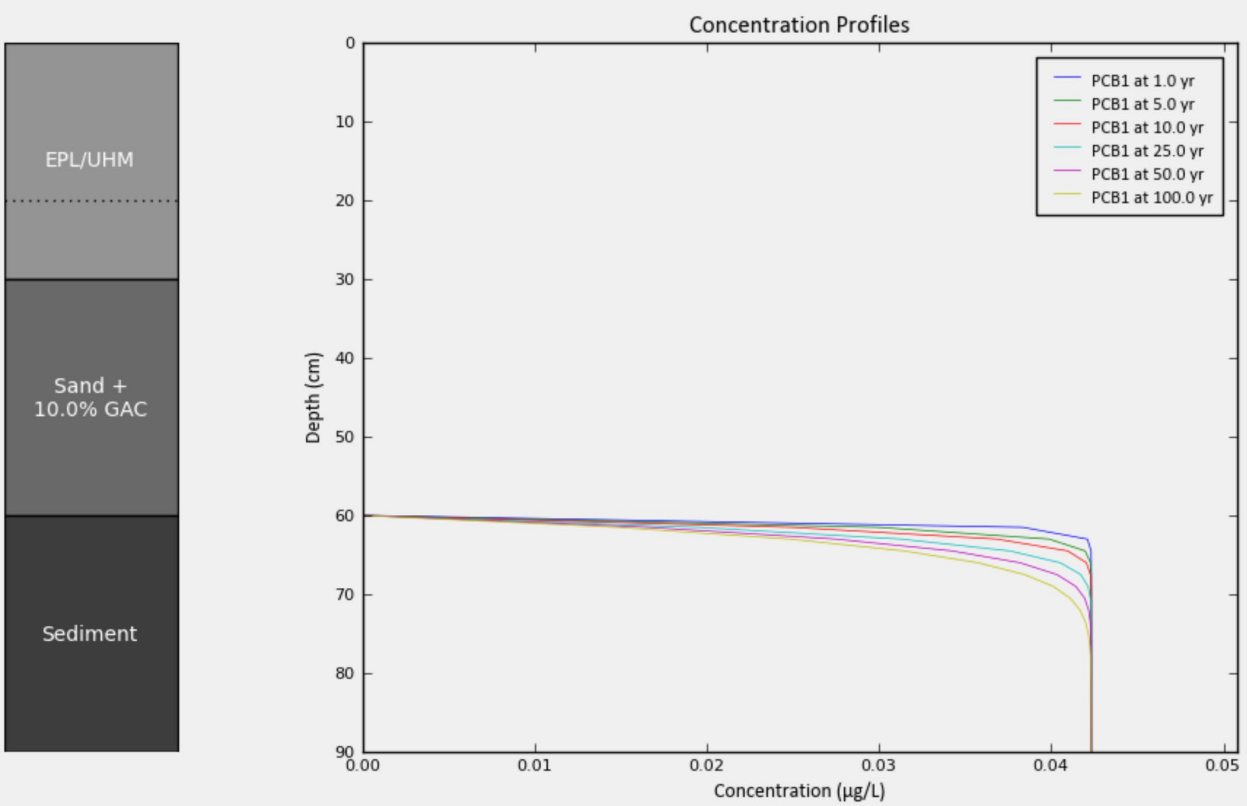

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Lead (inorganic) at 1.0 yr
Lead (inorganic) at 5.0 yr
Lead (inorganic) at 10.0 yr
Lead (inorganic) at 25.0 yr
Lead (inorganic) at 50.0 yr
Lead (inorganic) at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
Concentration (µg/L)

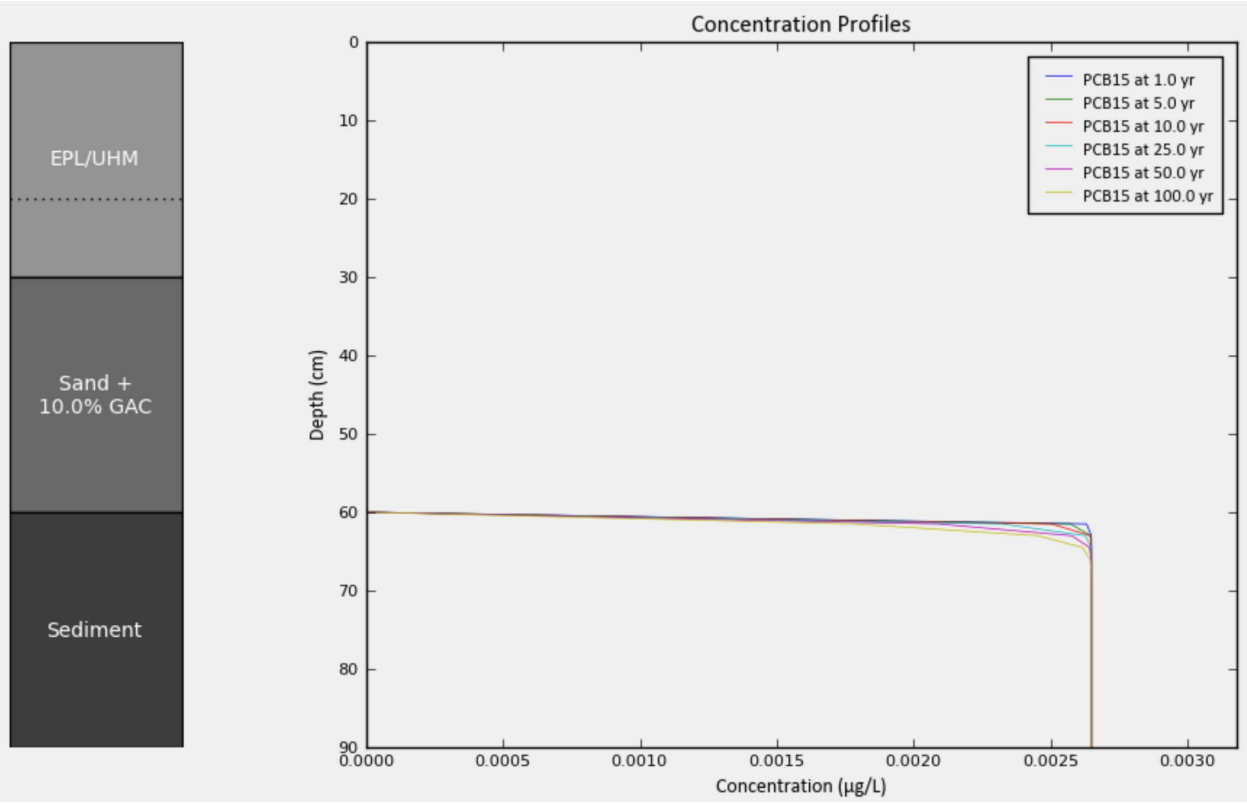

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Lindane at 1.0 yr
Lindane at 5.0 yr
Lindane at 10.0 yr
Lindane at 25.0 yr
Lindane at 50.0 yr
Lindane at 100.0 yr

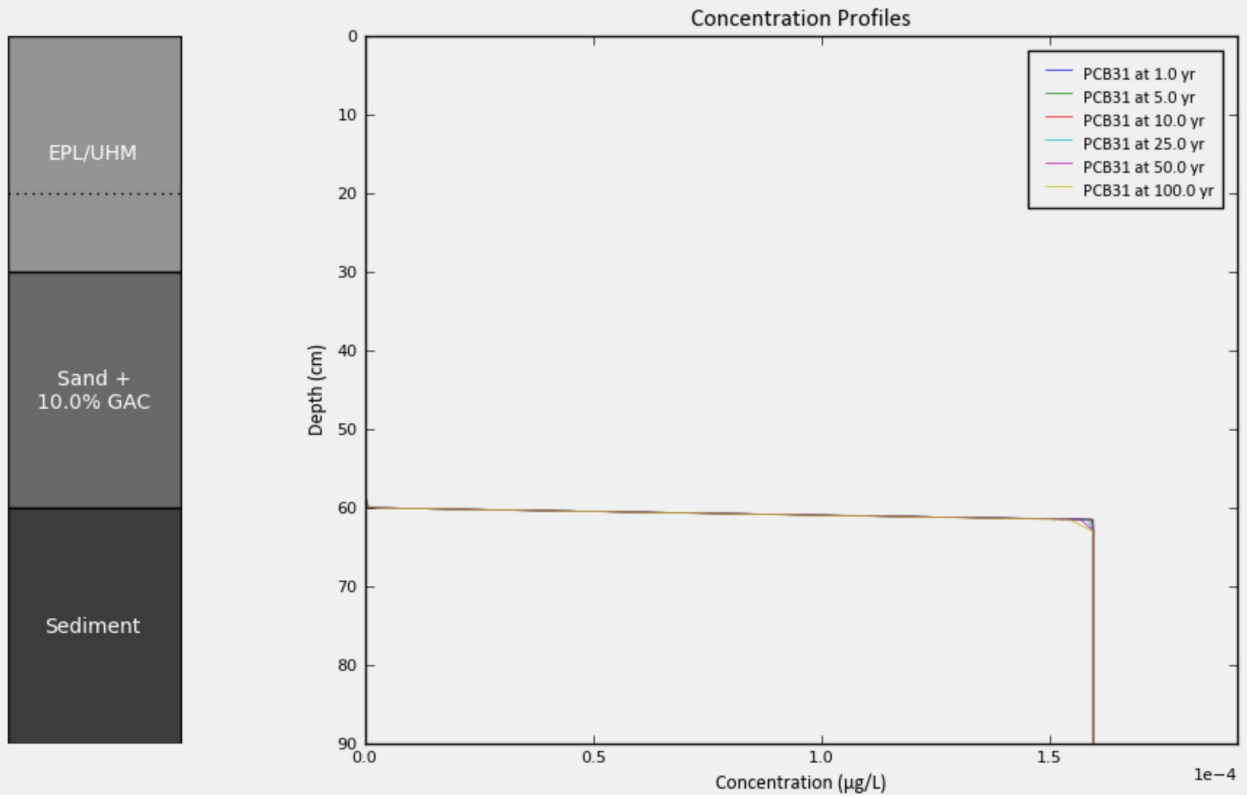

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
1e4
Manganese at 1.0 yr
Manganese at 5.0 yr
Manganese at 10.0 yr
Manganese at 25.0 yr
Manganese at 50.0 yr
Manganese at 100.0 yr

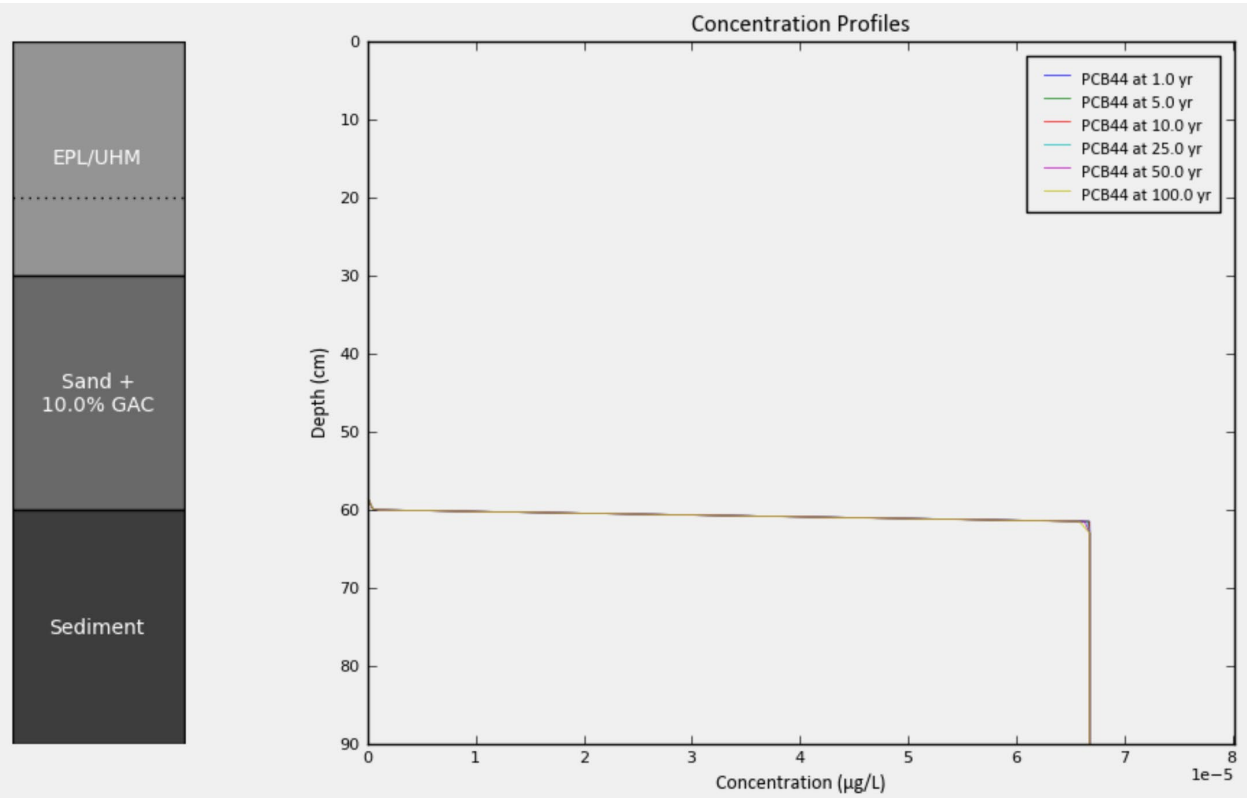

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Mercury at 1.0 yr
Mercury at 5.0 yr
Mercury at 10.0 yr
Mercury at 25.0 yr
Mercury at 50.0 yr
Mercury at 100.0 yr
Depth (cm)
Concentration (µg/L)

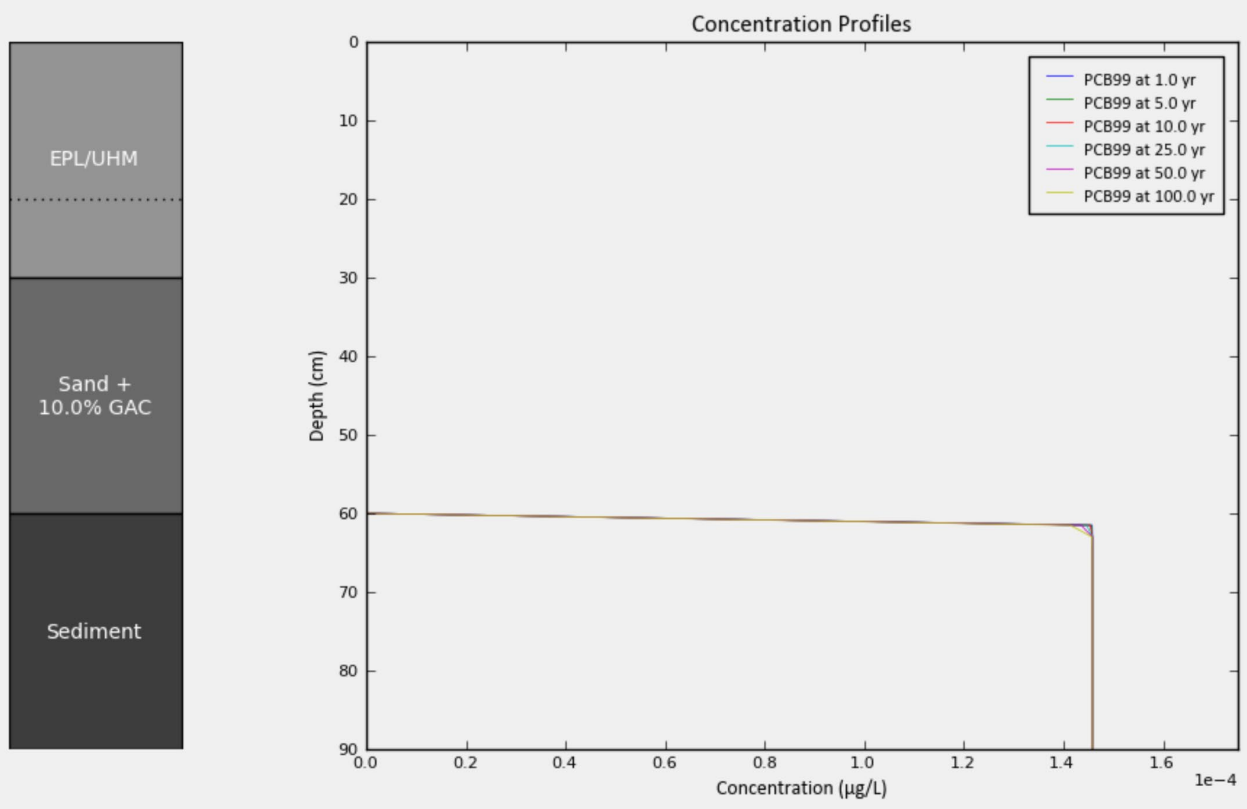

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Naphthalene at 1.0 yr
Naphthalene at 5.0 yr
Naphthalene at 10.0 yr
Naphthalene at 25.0 yr
Naphthalene at 50.0 yr
Naphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

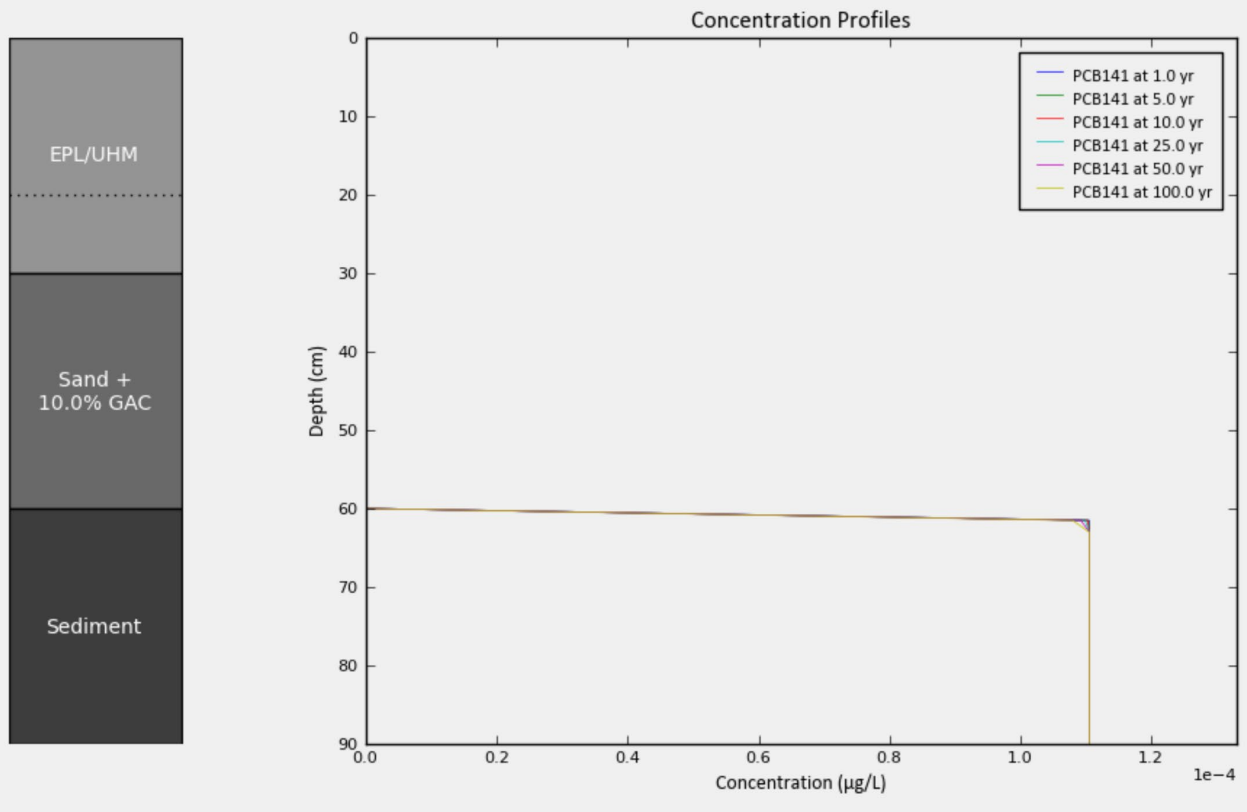

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB1 at 1.0 yr
PCB1 at 5.0 yr
PCB1 at 10.0 yr
PCB1 at 25.0 yr
PCB1 at 50.0 yr
PCB1 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.00
0.01
0.02
0.03
0.04
0.05

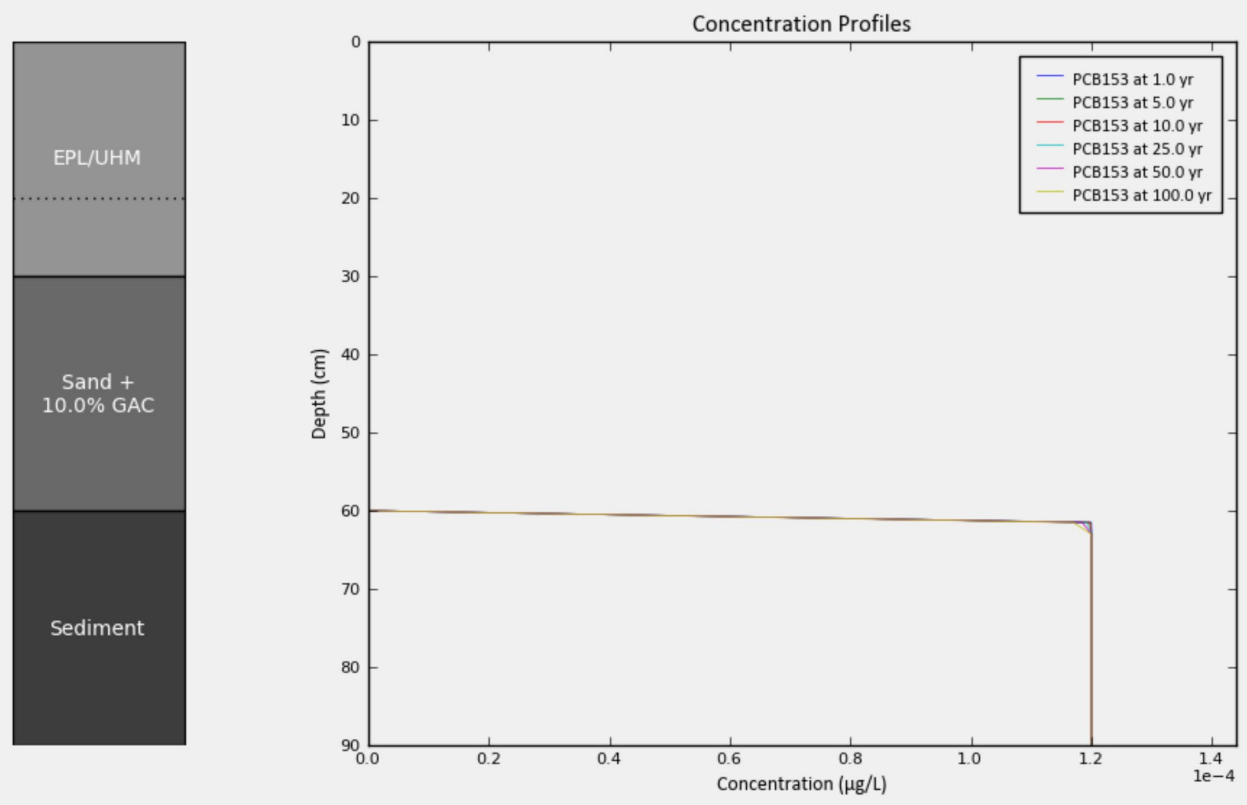

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB15 at 1.0 yr
PCB15 at 5.0 yr
PCB15 at 10.0 yr
PCB15 at 25.0 yr
PCB15 at 50.0 yr
PCB15 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030

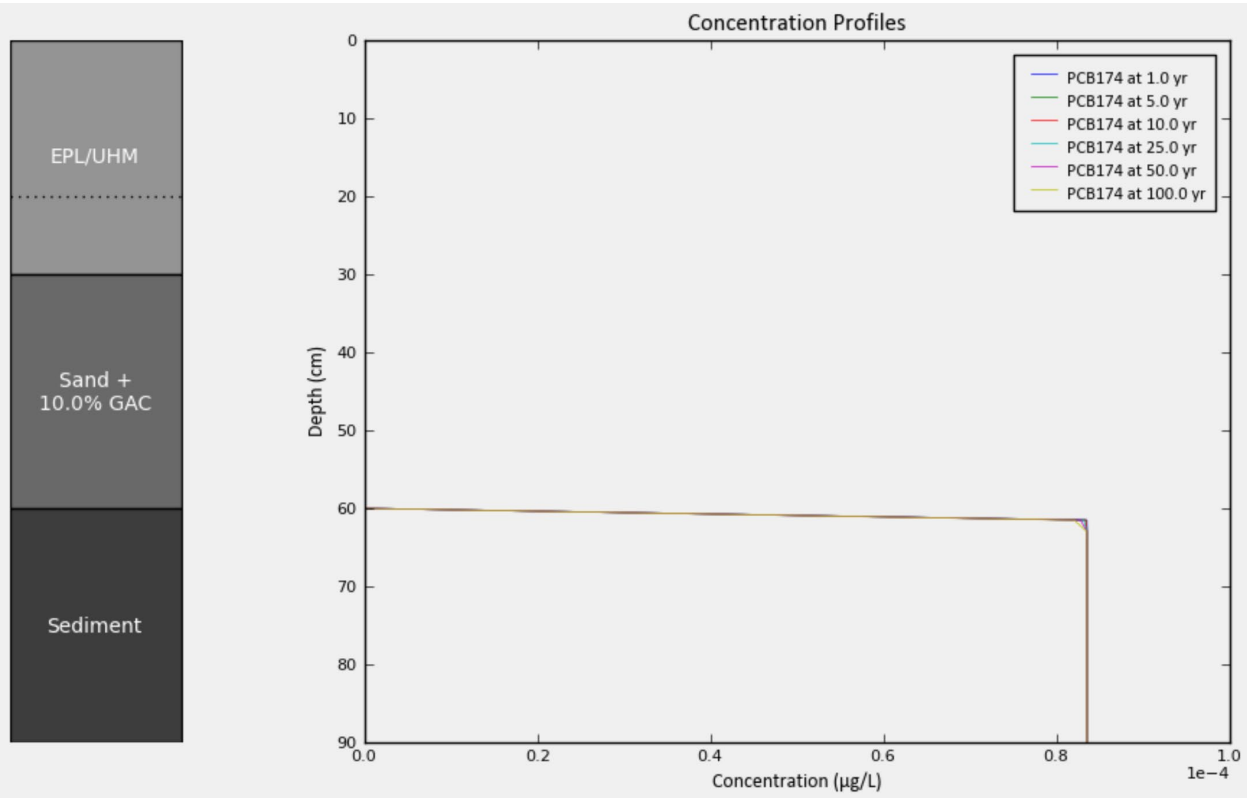

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB31 at 1.0 yr
PCB31 at 5.0 yr
PCB31 at 10.0 yr
PCB31 at 25.0 yr
PCB31 at 50.0 yr
PCB31 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.5
1.0
1.5
Concentration (µg/L)
1e−4

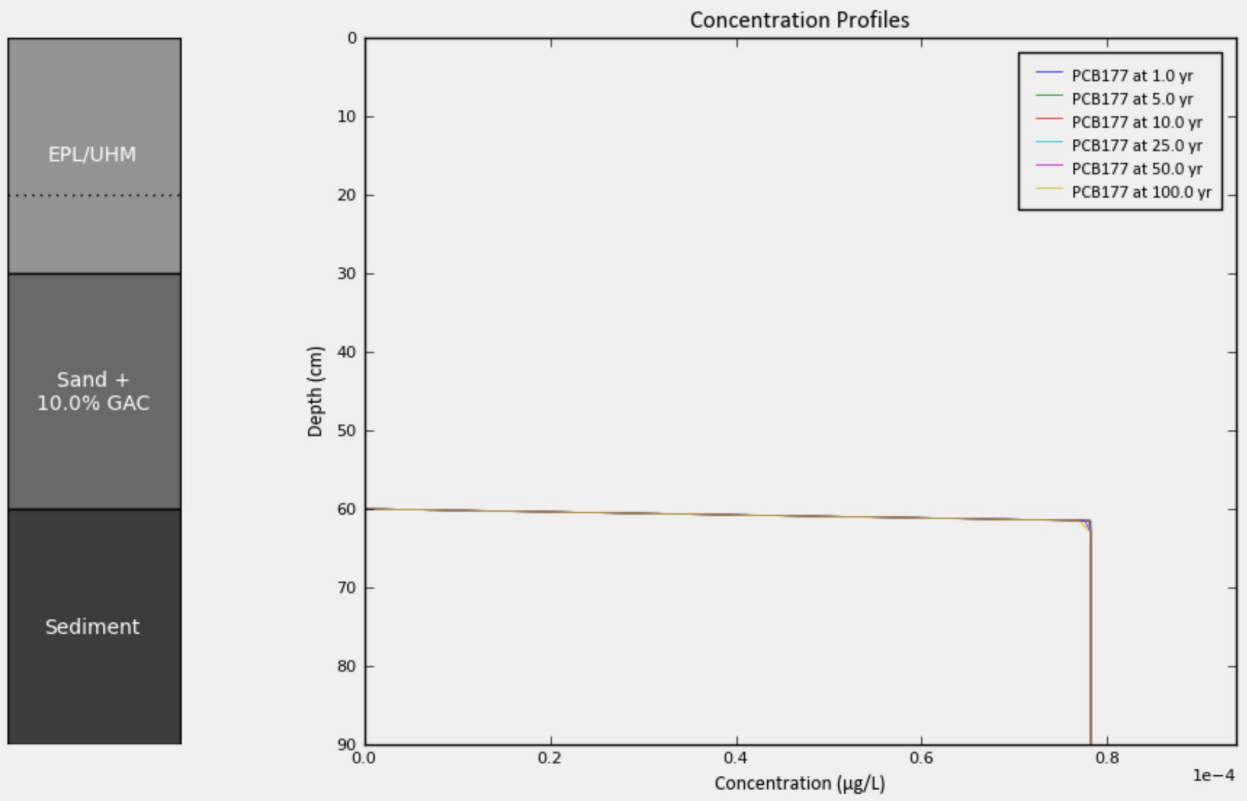

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB44 at 1.0 yr
PCB44 at 5.0 yr
PCB44 at 10.0 yr
PCB44 at 25.0 yr
PCB44 at 50.0 yr
PCB44 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
7
8
Concentration (µg/L)
1e−5

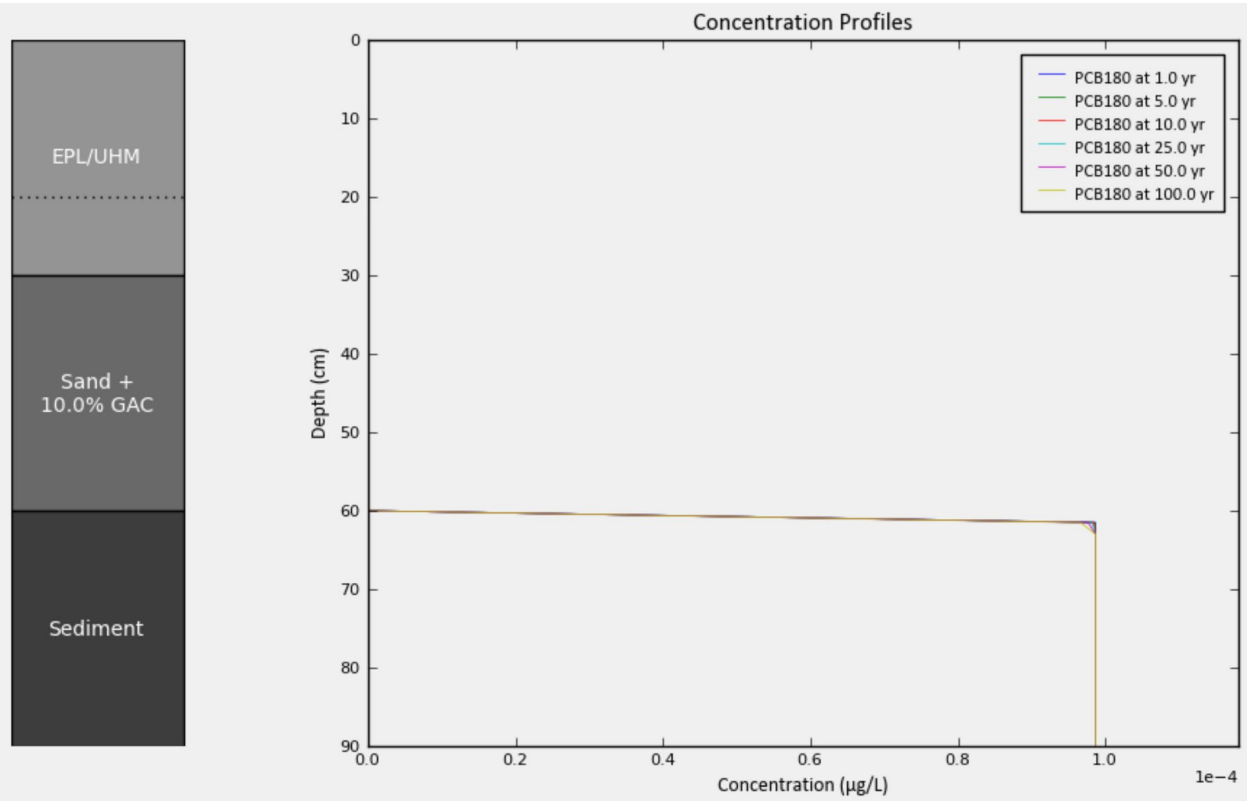

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB99 at 1.0 yr
PCB99 at 5.0 yr
PCB99 at 10.0 yr
PCB99 at 25.0 yr
PCB99 at 50.0 yr
PCB99 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

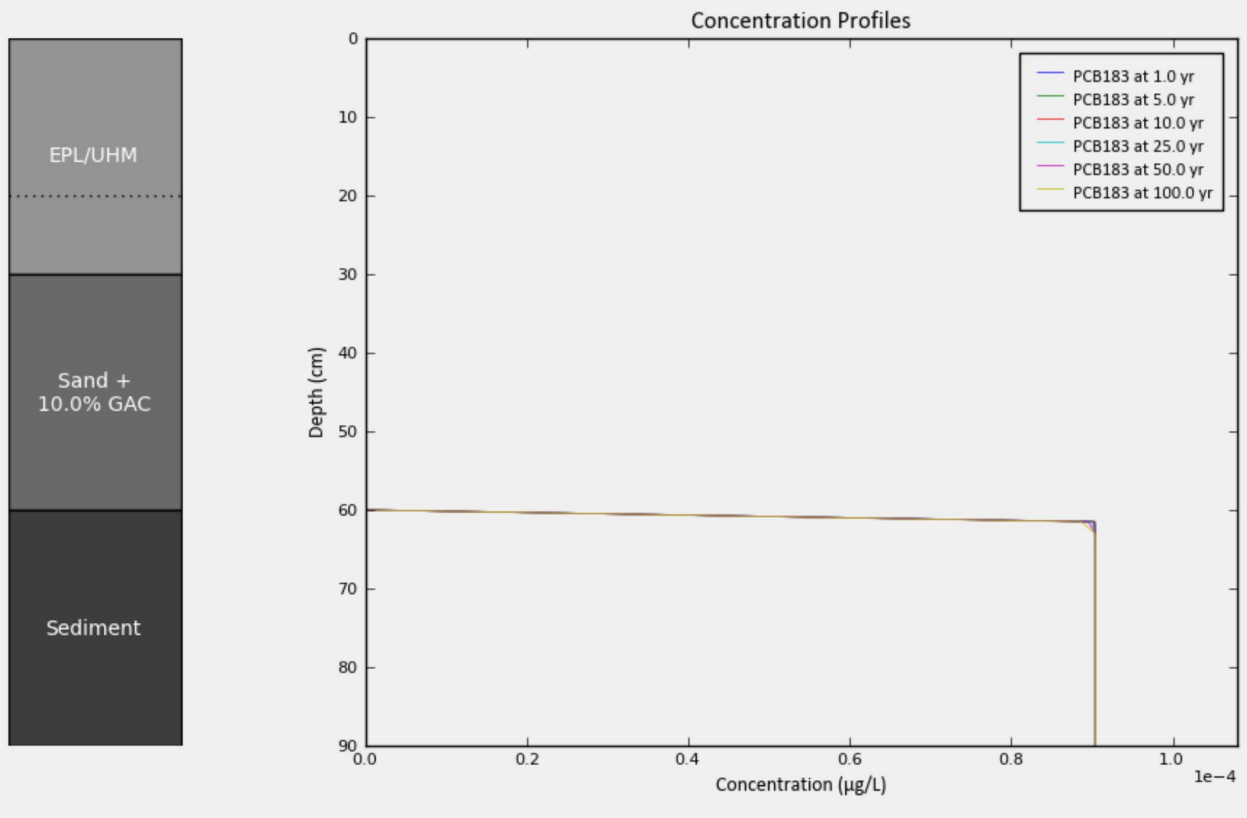

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB141 at 1.0 yr
PCB141 at 5.0 yr
PCB141 at 10.0 yr
PCB141 at 25.0 yr
PCB141 at 50.0 yr
PCB141 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

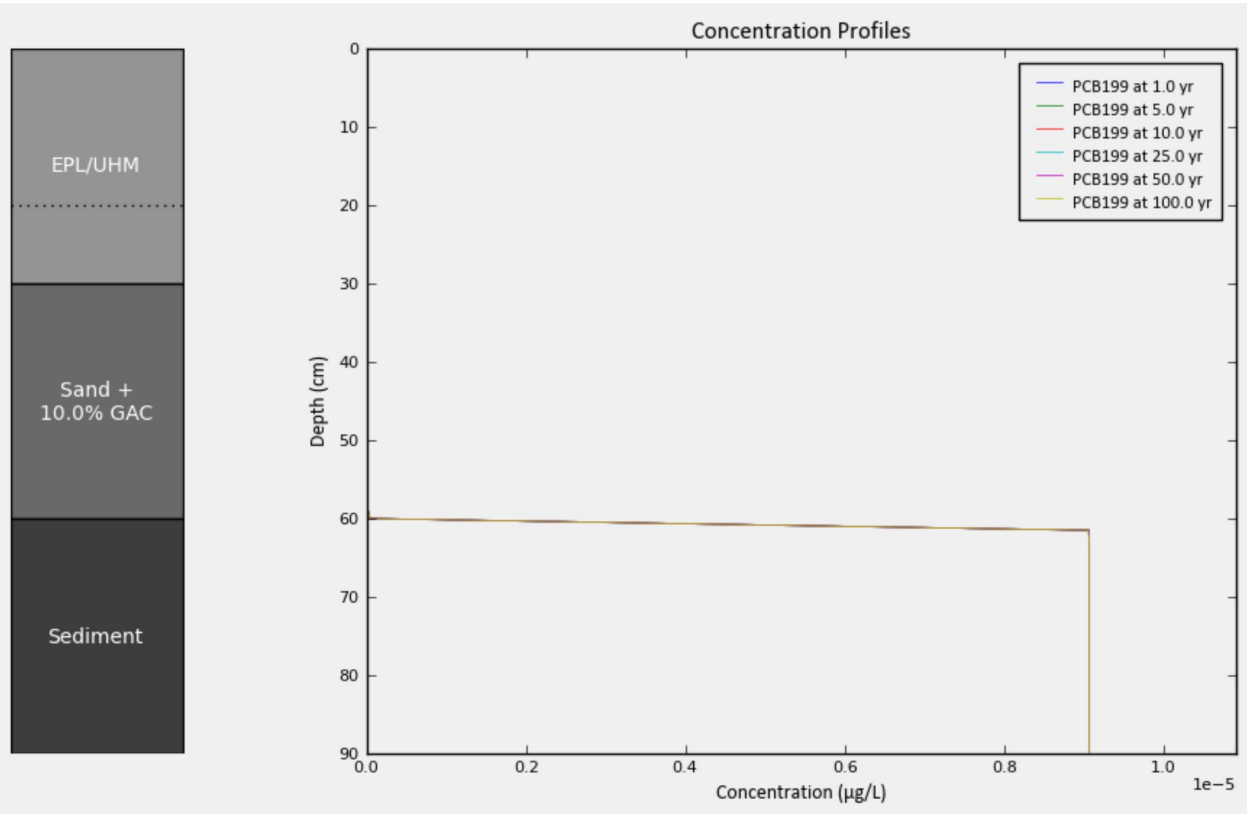

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB153 at 1.0 yr
PCB153 at 5.0 yr
PCB153 at 10.0 yr
PCB153 at 25.0 yr
PCB153 at 50.0 yr
PCB153 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1e−4
Concentration (µg/L)

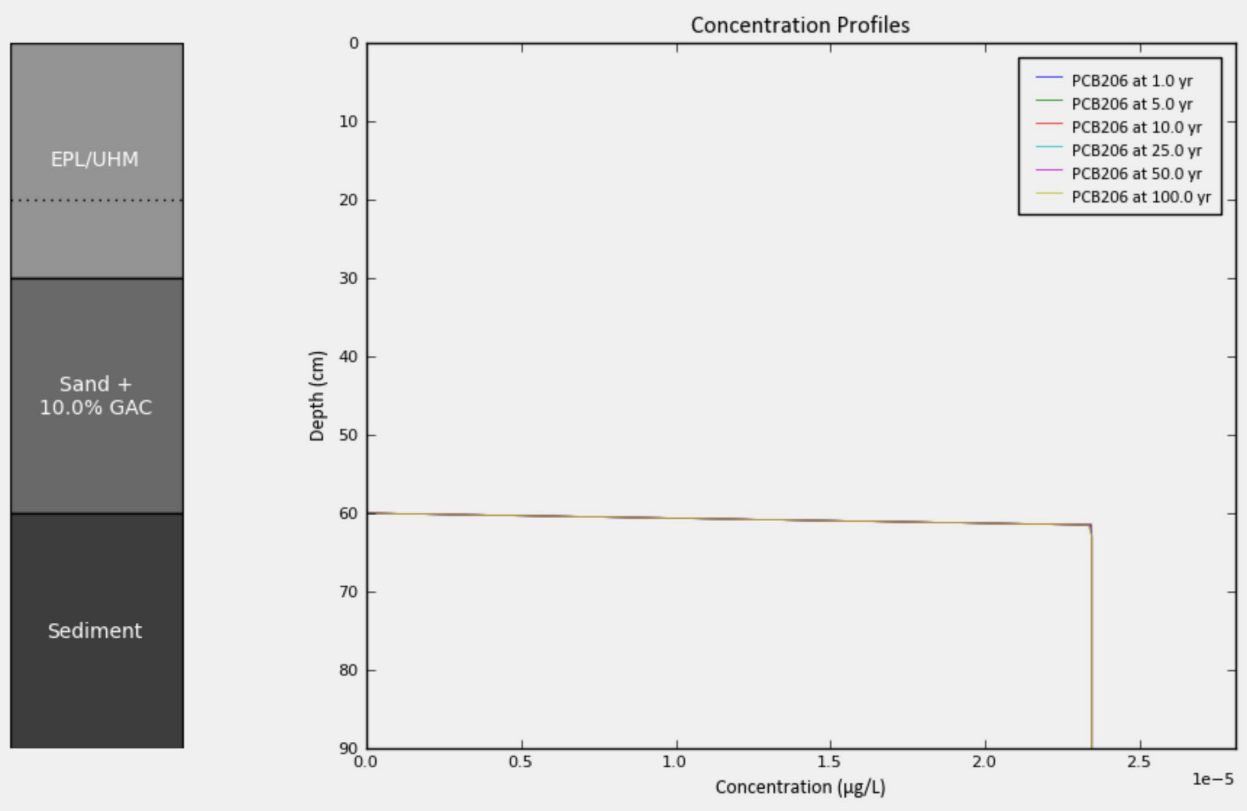

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB174 at 1.0 yr
PCB174 at 5.0 yr
PCB174 at 10.0 yr
PCB174 at 25.0 yr
PCB174 at 50.0 yr
PCB174 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

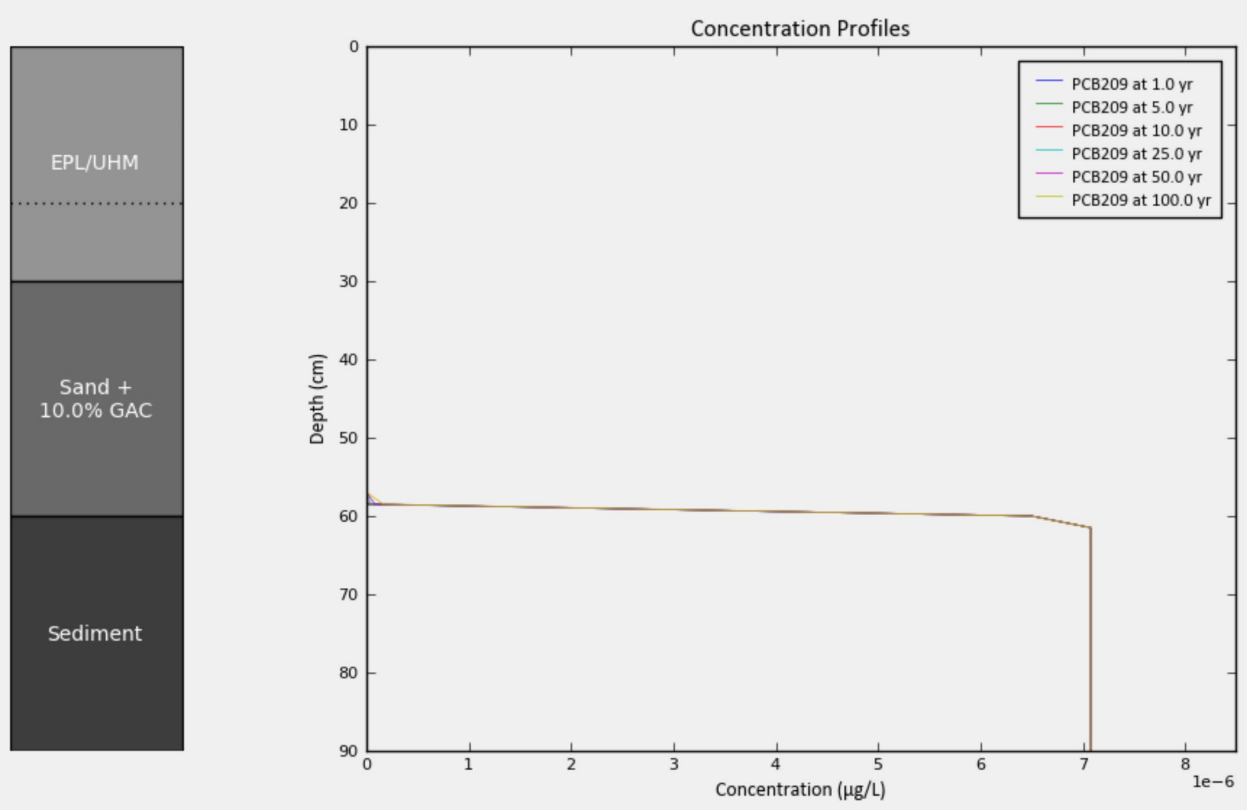

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB177 at 1.0 yr
PCB177 at 5.0 yr
PCB177 at 10.0 yr
PCB177 at 25.0 yr
PCB177 at 50.0 yr
PCB177 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1e−4
Concentration (µg/L)

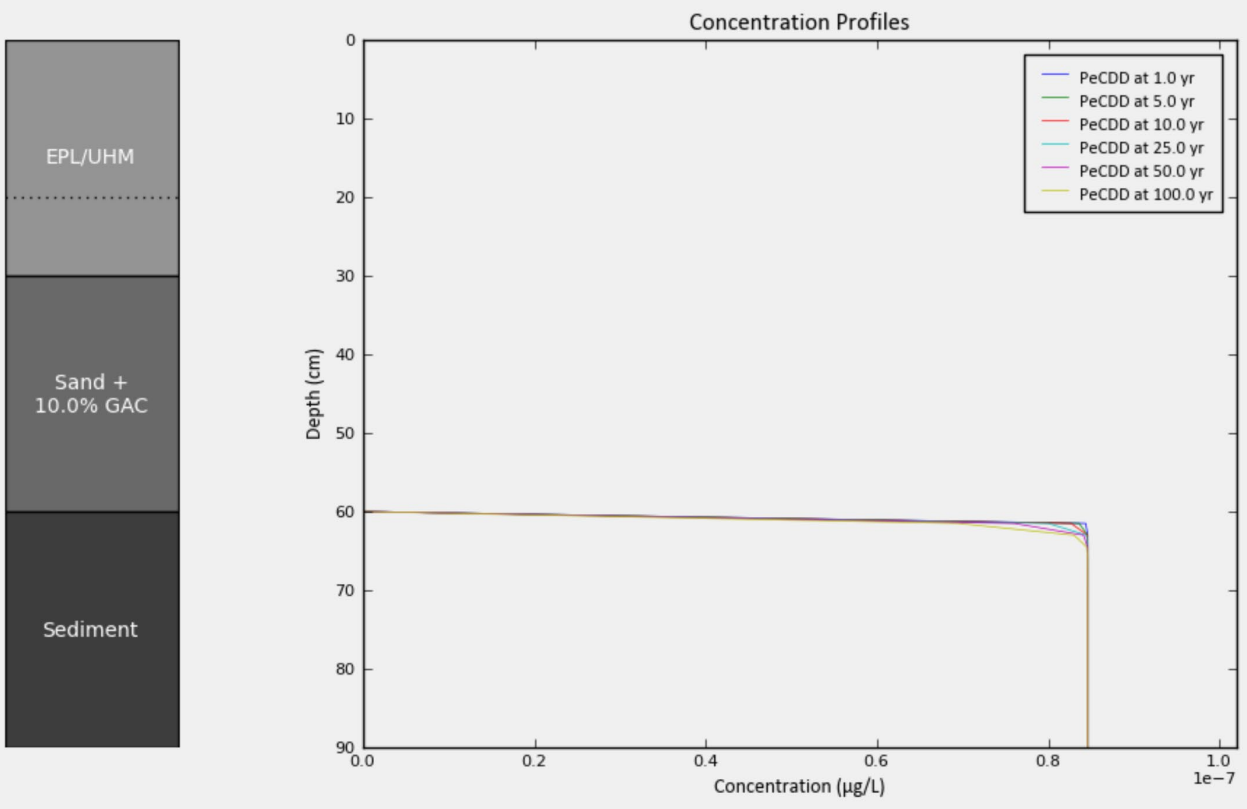

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB180 at 1.0 yr
PCB180 at 5.0 yr
PCB180 at 10.0 yr
PCB180 at 25.0 yr
PCB180 at 50.0 yr
PCB180 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

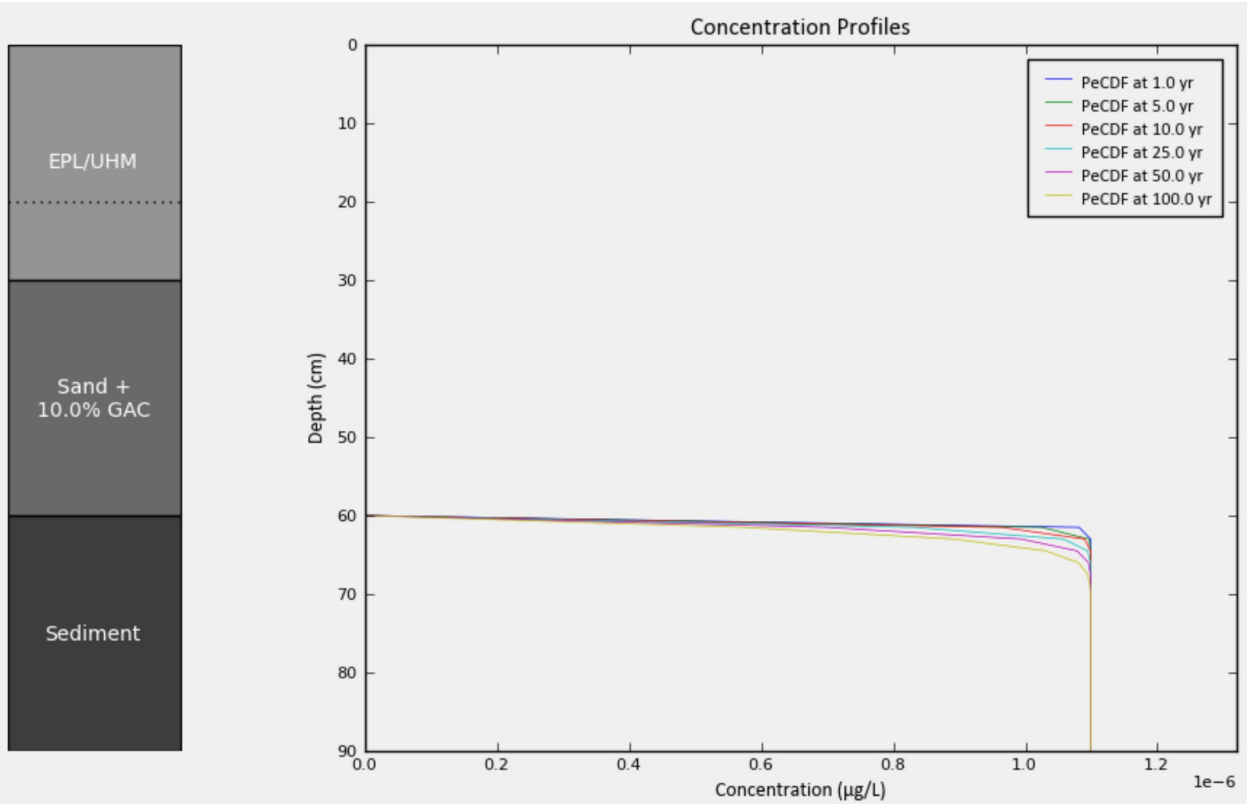

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB183 at 1.0 yr
PCB183 at 5.0 yr
PCB183 at 10.0 yr
PCB183 at 25.0 yr
PCB183 at 50.0 yr
PCB183 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

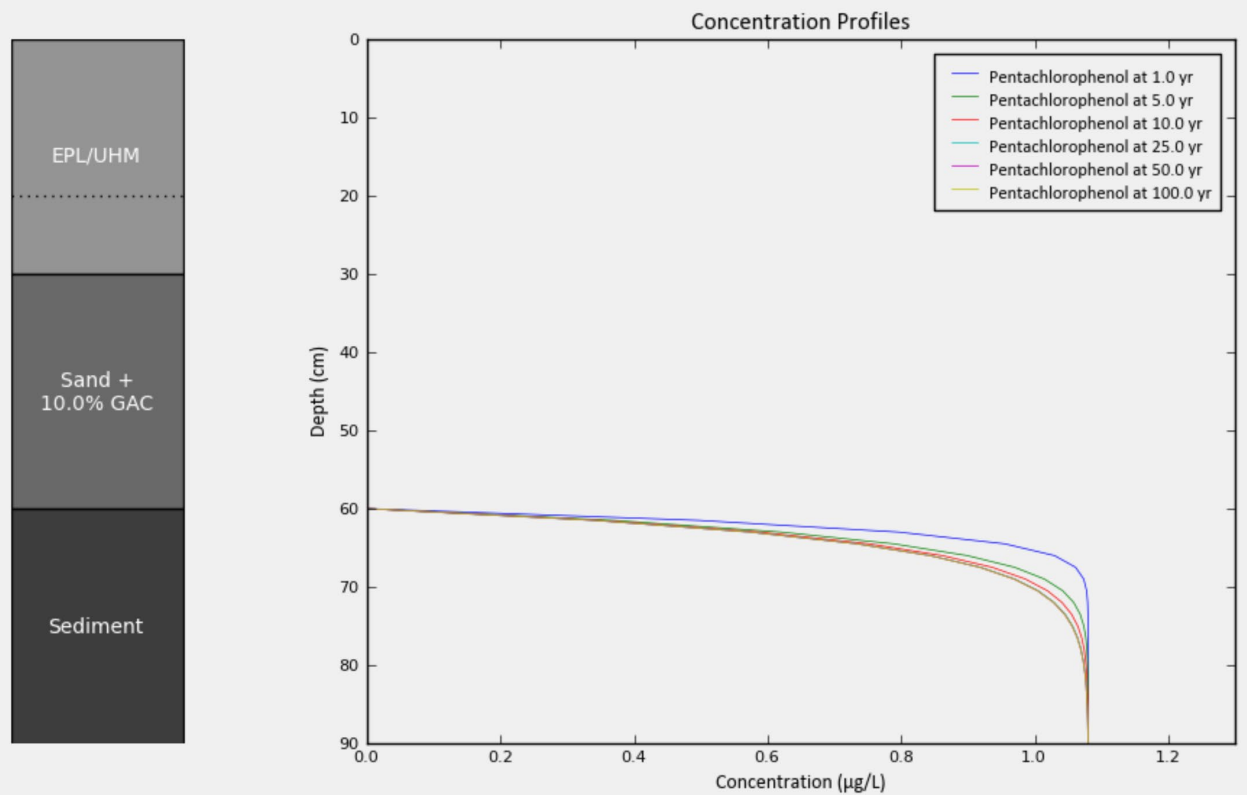

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB199 at 1.0 yr
PCB199 at 5.0 yr
PCB199 at 10.0 yr
PCB199 at 25.0 yr
PCB199 at 50.0 yr
PCB199 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1e−5
Concentration (µg/L)

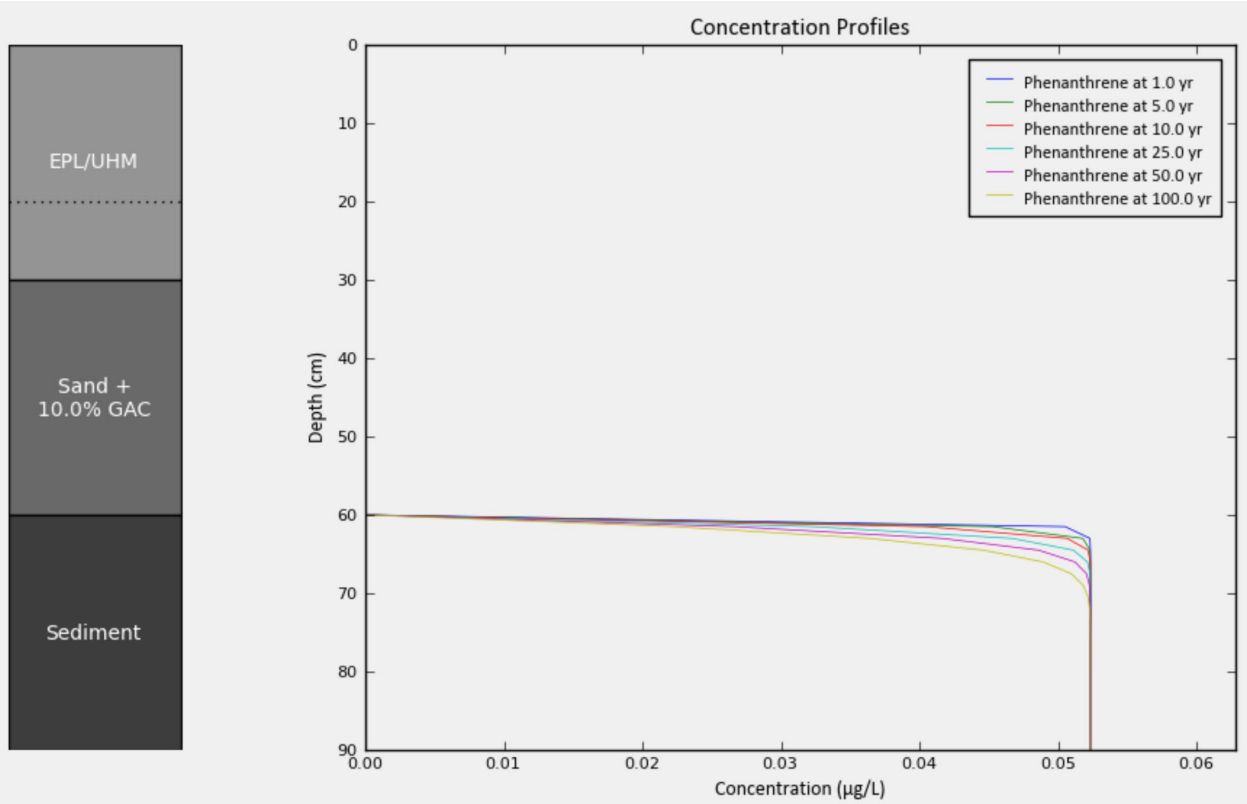

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB206 at 1.0 yr
PCB206 at 5.0 yr
PCB206 at 10.0 yr
PCB206 at 25.0 yr
PCB206 at 50.0 yr
PCB206 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

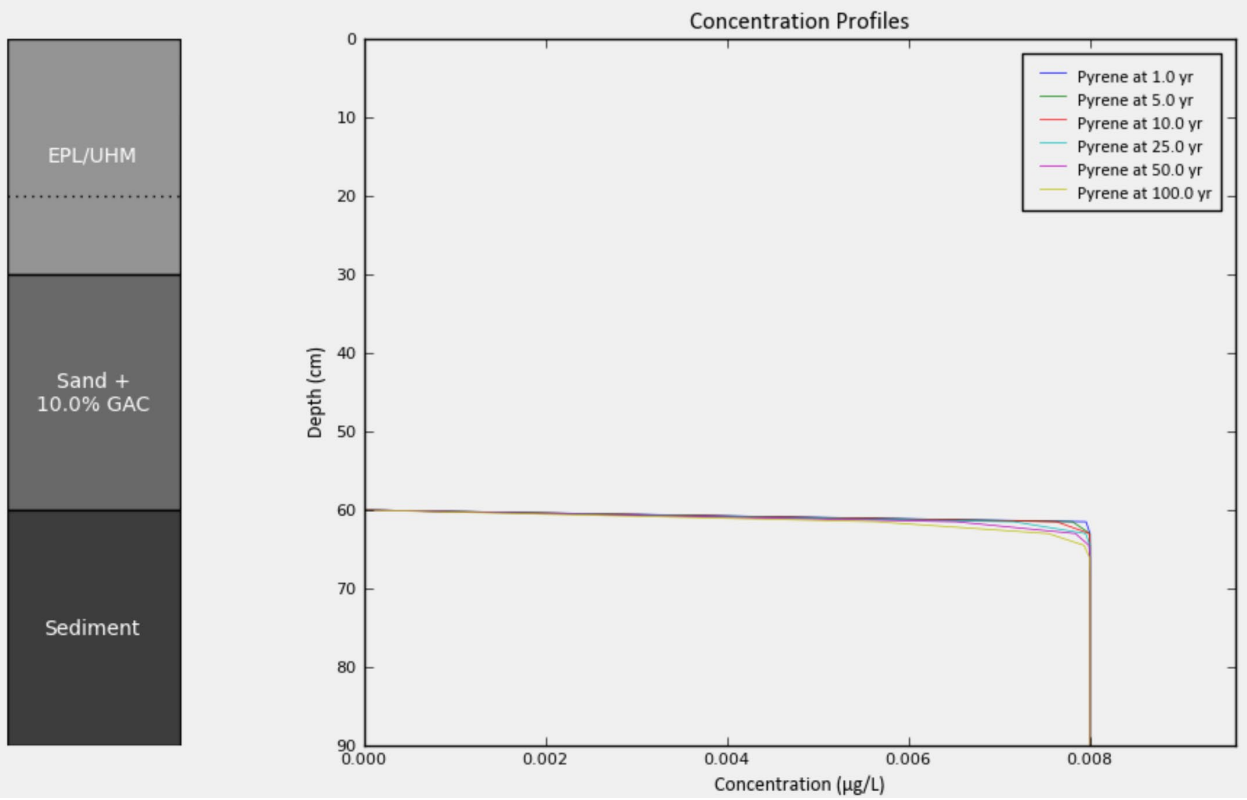

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PCB209 at 1.0 yr
PCB209 at 5.0 yr
PCB209 at 10.0 yr
PCB209 at 25.0 yr
PCB209 at 50.0 yr
PCB209 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

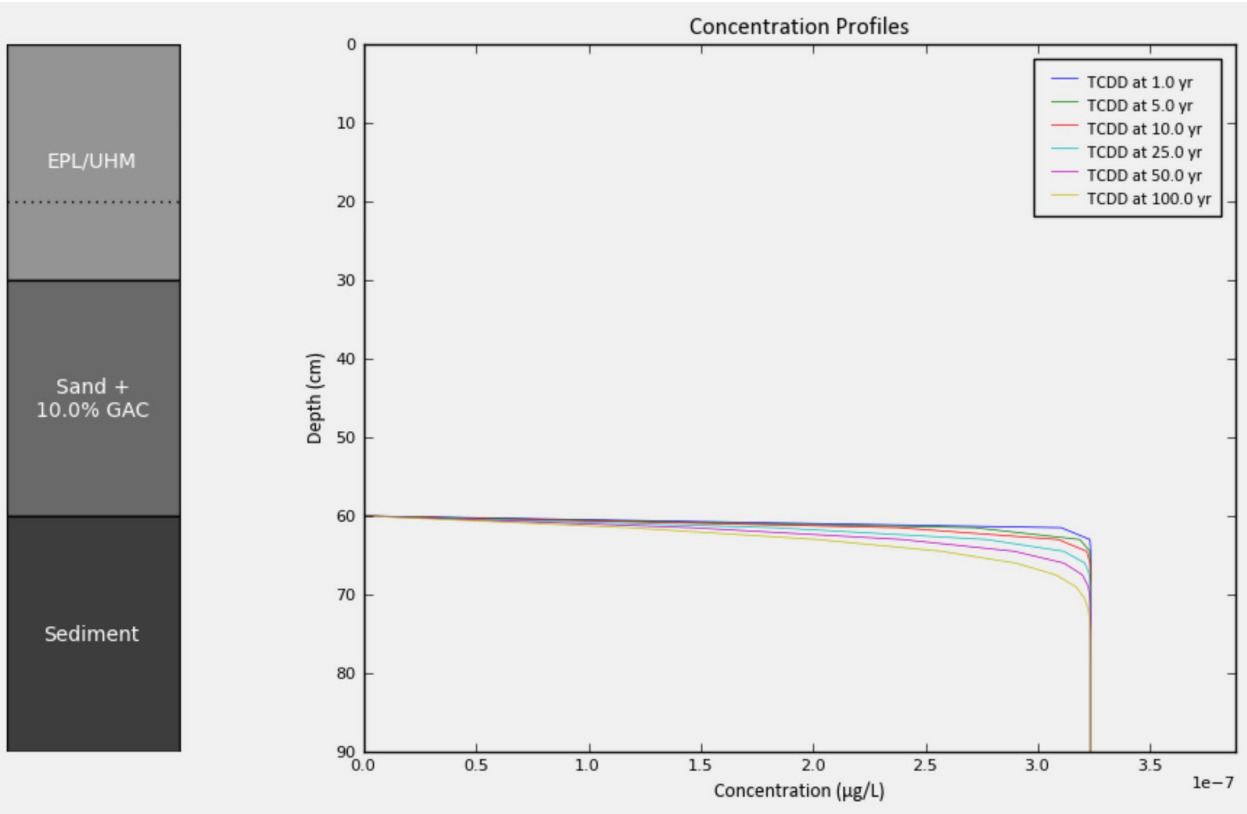

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PeCDD at 1.0 yr
PeCDD at 5.0 yr
PeCDD at 10.0 yr
PeCDD at 25.0 yr
PeCDD at 50.0 yr
PeCDD at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1e−7
Concentration (µg/L)

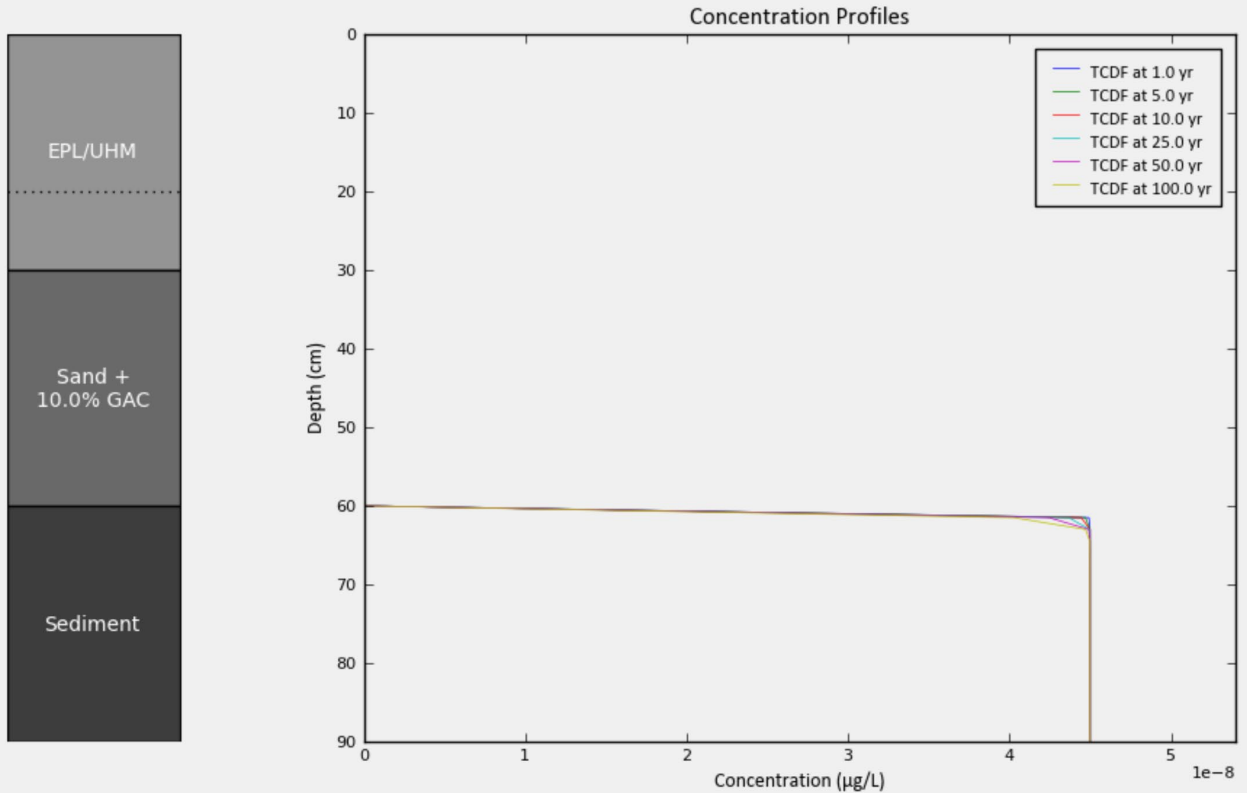

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
PeCDF at 1.0 yr
PeCDF at 5.0 yr
PeCDF at 10.0 yr
PeCDF at 25.0 yr
PeCDF at 50.0 yr
PeCDF at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e−6
Concentration (µg/L)

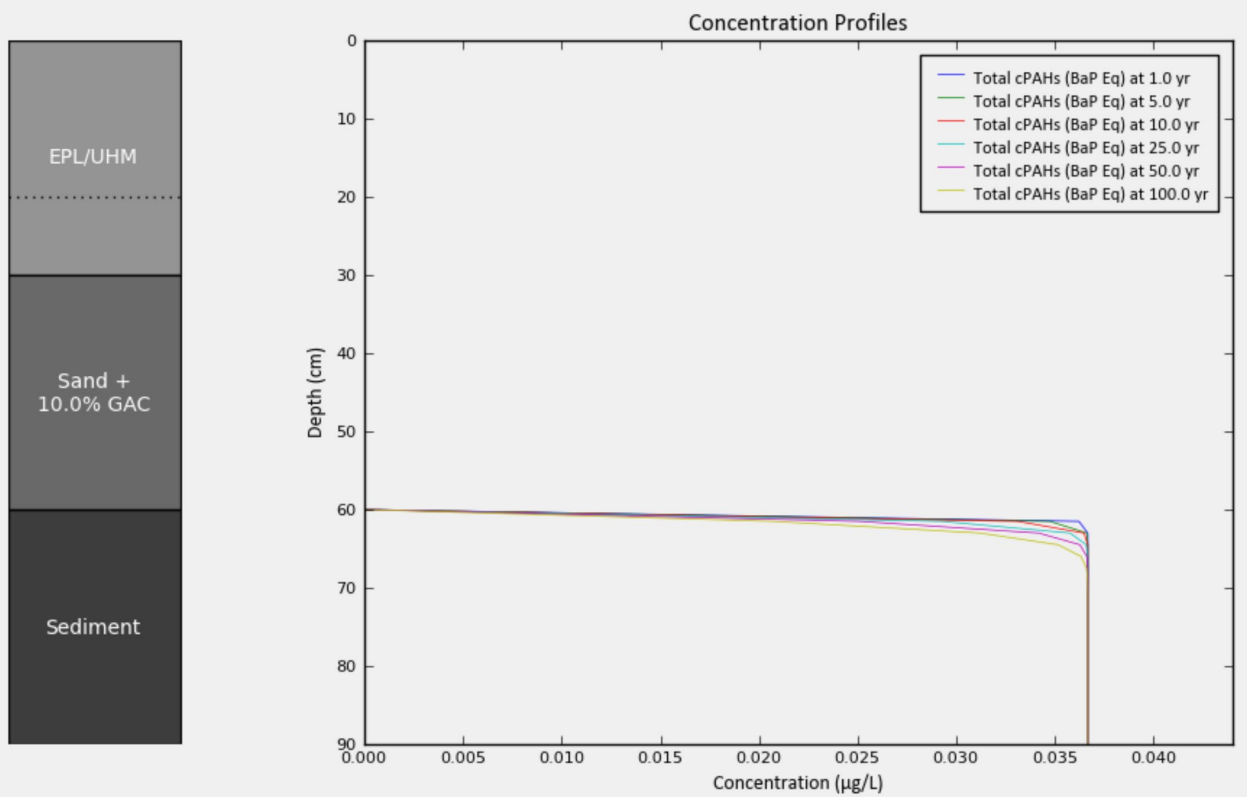

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Pentachlorophenol at 1.0 yr
Pentachlorophenol at 5.0 yr
Pentachlorophenol at 10.0 yr
Pentachlorophenol at 25.0 yr
Pentachlorophenol at 50.0 yr
Pentachlorophenol at 100.0 yr
Depth (cm)
Concentration (µg/L)

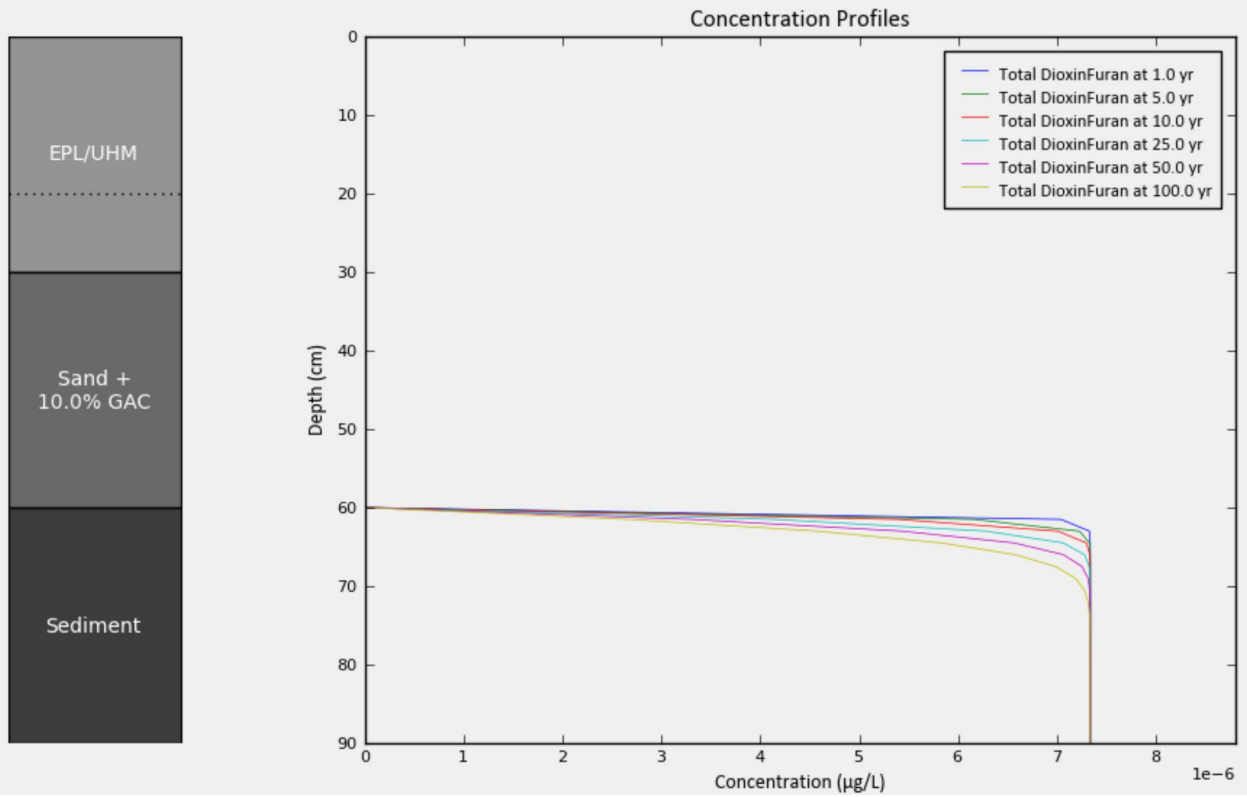

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Phenanthrene at 1.0 yr
Phenanthrene at 5.0 yr
Phenanthrene at 10.0 yr
Phenanthrene at 25.0 yr
Phenanthrene at 50.0 yr
Phenanthrene at 100.0 yr
Depth (cm)
Concentration (µg/L)

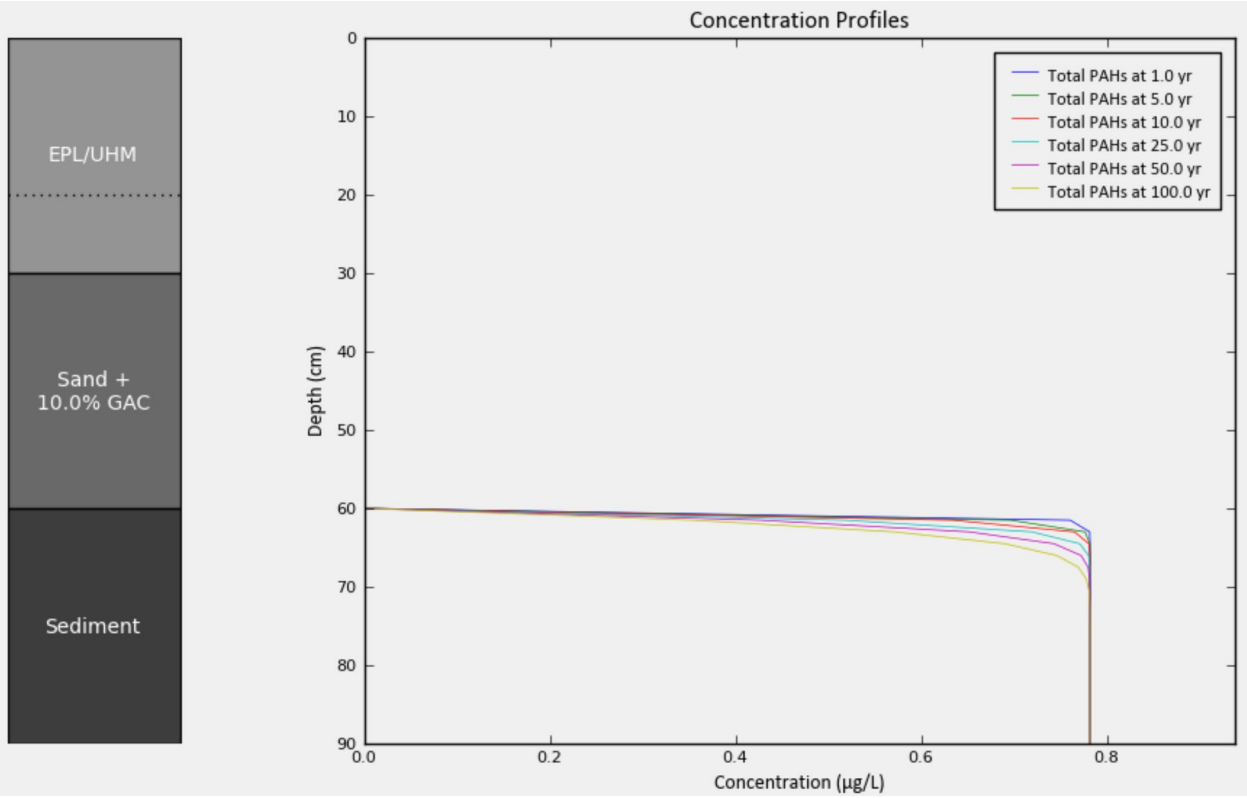

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Pyrene at 1.0 yr
Pyrene at 5.0 yr
Pyrene at 10.0 yr
Pyrene at 25.0 yr
Pyrene at 50.0 yr
Pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
Concentration (µg/L)

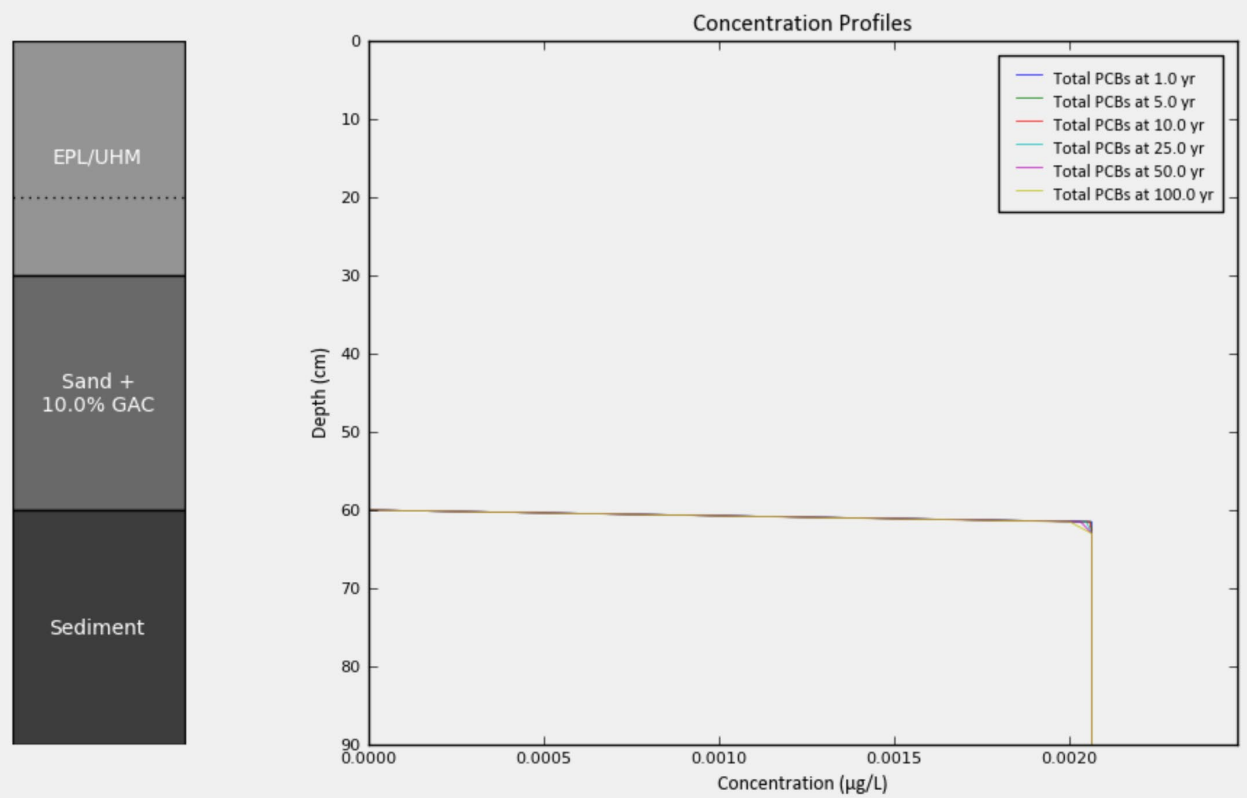

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
TCDD at 1.0 yr
TCDD at 5.0 yr
TCDD at 10.0 yr
TCDD at 25.0 yr
TCDD at 50.0 yr
TCDD at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e−7
Concentration (µg/L)

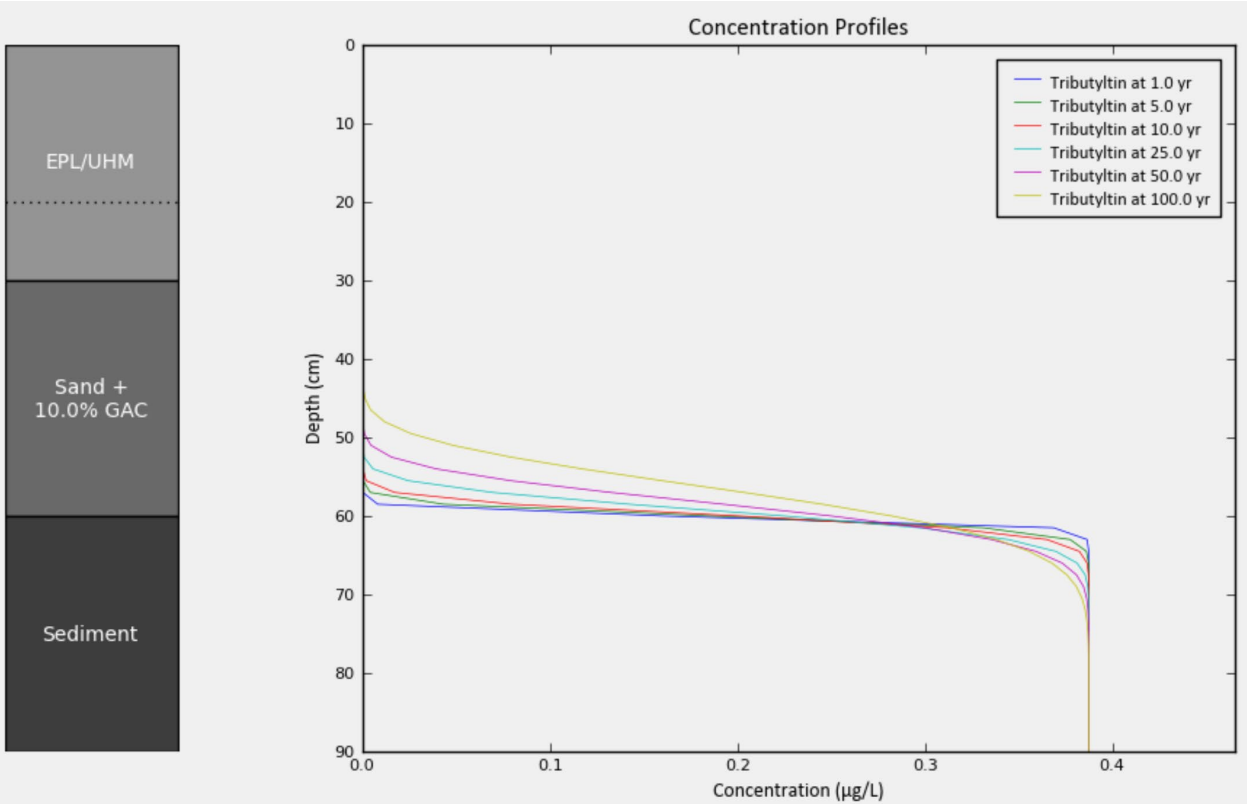

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
TCDF at 1.0 yr
TCDF at 5.0 yr
TCDF at 10.0 yr
TCDF at 25.0 yr
TCDF at 50.0 yr
TCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−8

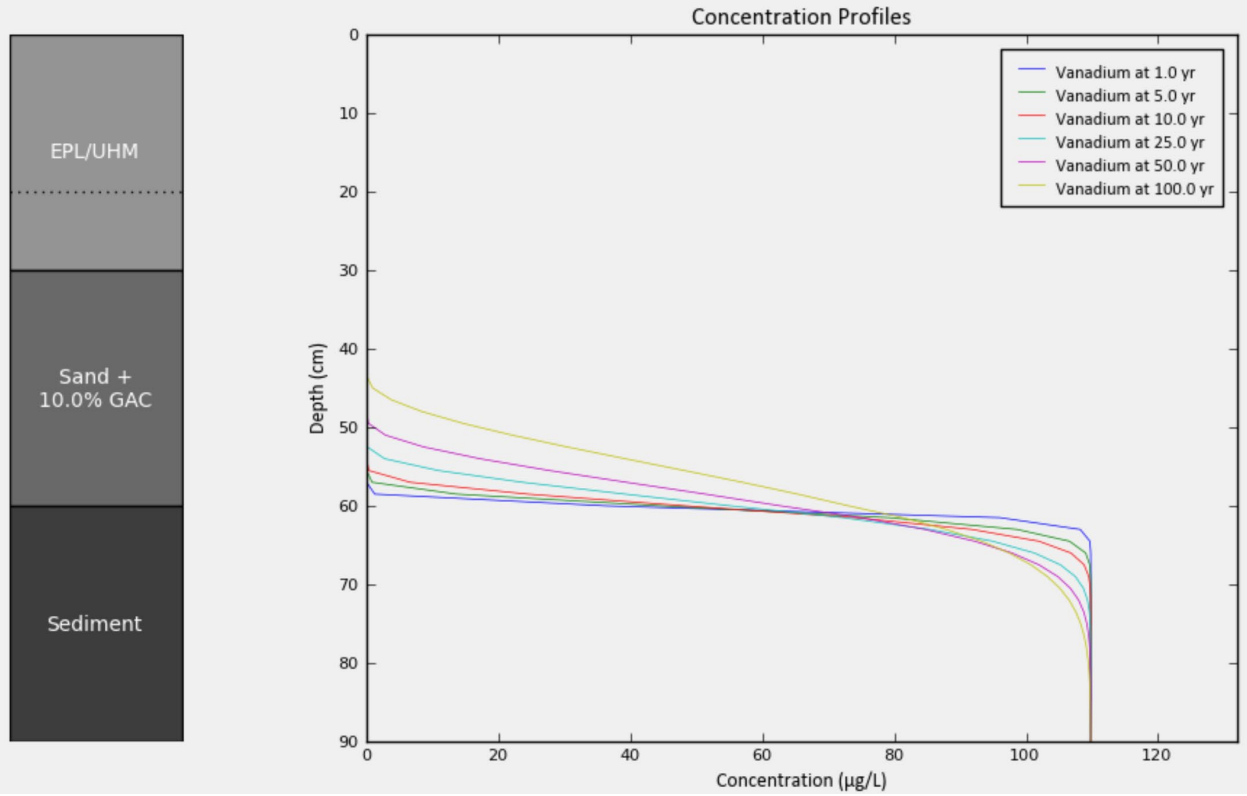

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Total cPAHs (BaP Eq) at 1.0 yr
Total cPAHs (BaP Eq) at 5.0 yr
Total cPAHs (BaP Eq) at 10.0 yr
Total cPAHs (BaP Eq) at 25.0 yr
Total cPAHs (BaP Eq) at 50.0 yr
Total cPAHs (BaP Eq) at 100.0 yr
Depth (cm)
Concentration (µg/L)

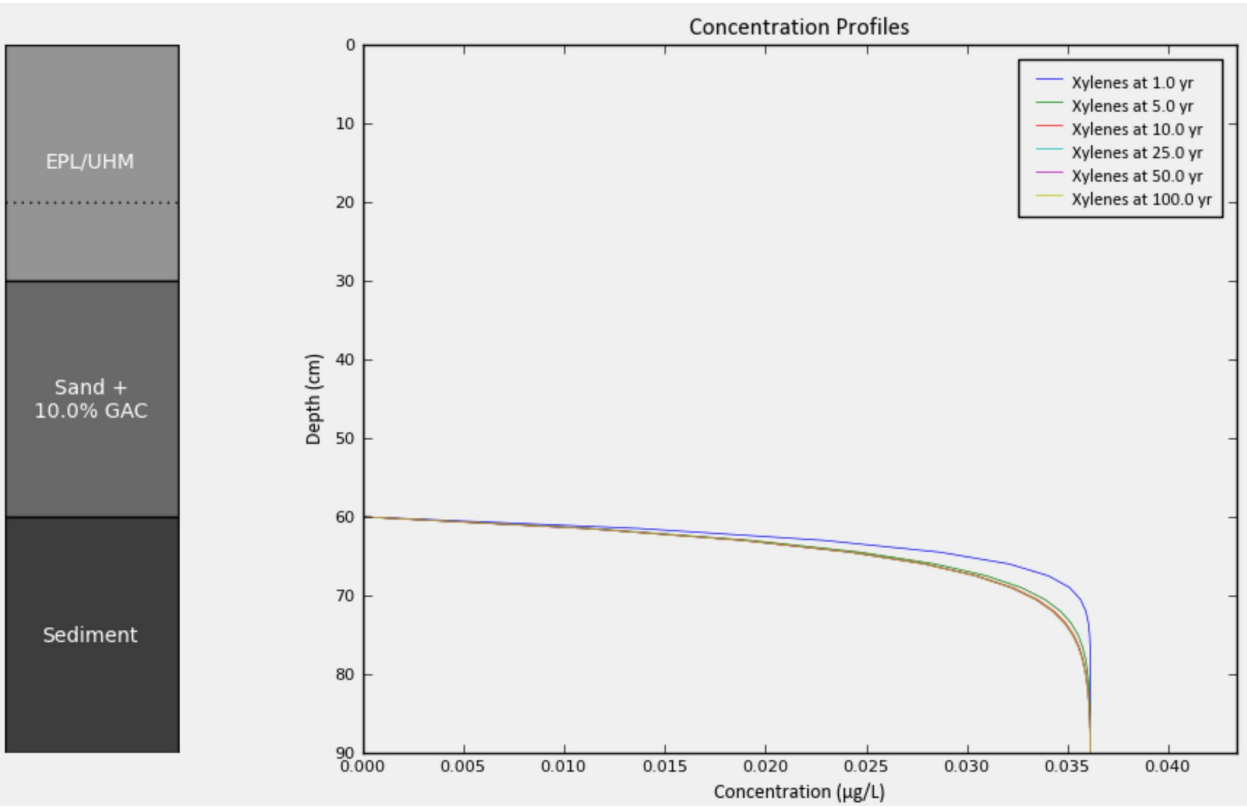

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Total DioxinFuran at 1.0 yr
Total DioxinFuran at 5.0 yr
Total DioxinFuran at 10.0 yr
Total DioxinFuran at 25.0 yr
Total DioxinFuran at 50.0 yr
Total DioxinFuran at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

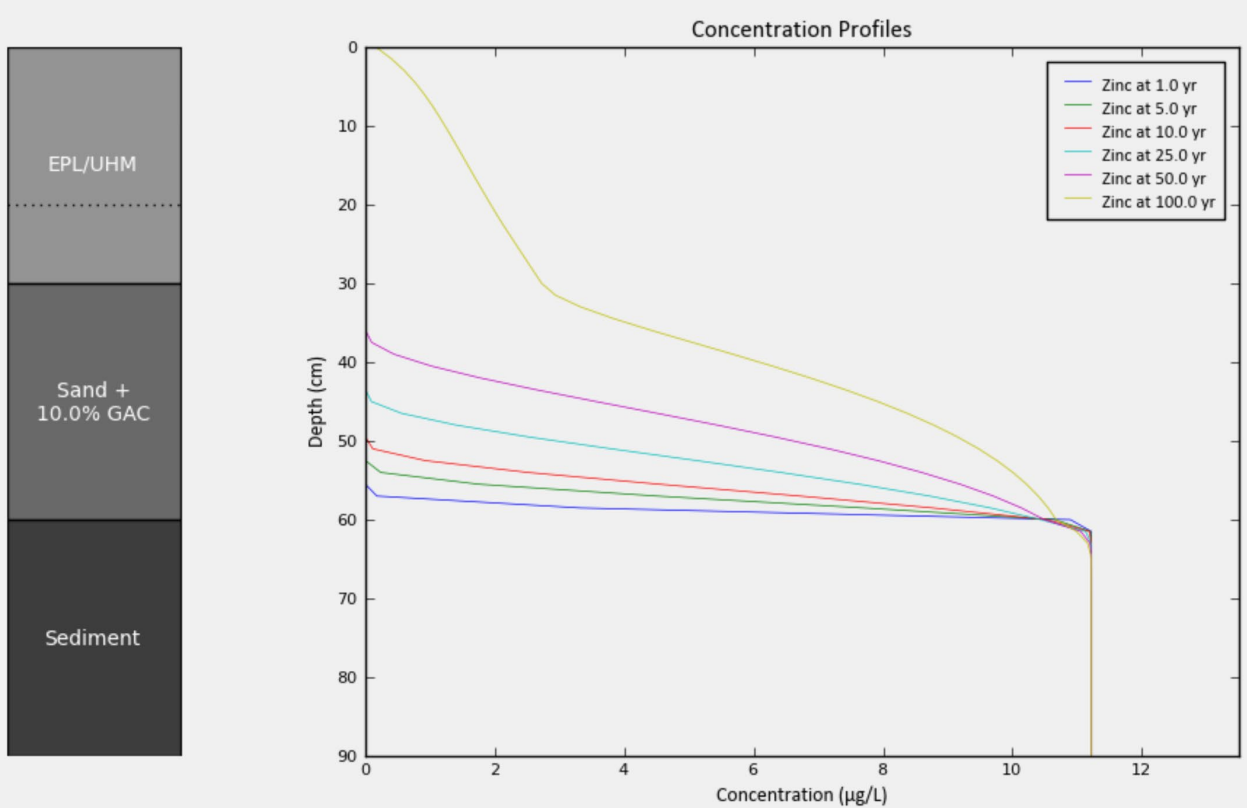

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Total PAHs at 1.0 yr
Total PAHs at 5.0 yr
Total PAHs at 10.0 yr
Total PAHs at 25.0 yr
Total PAHs at 50.0 yr
Total PAHs at 100.0 yr
Depth (cm)
Concentration (µg/L)


EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Total PCBs at 1.0 yr
Total PCBs at 5.0 yr
Total PCBs at 10.0 yr
Total PCBs at 25.0 yr
Total PCBs at 50.0 yr
Total PCBs at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

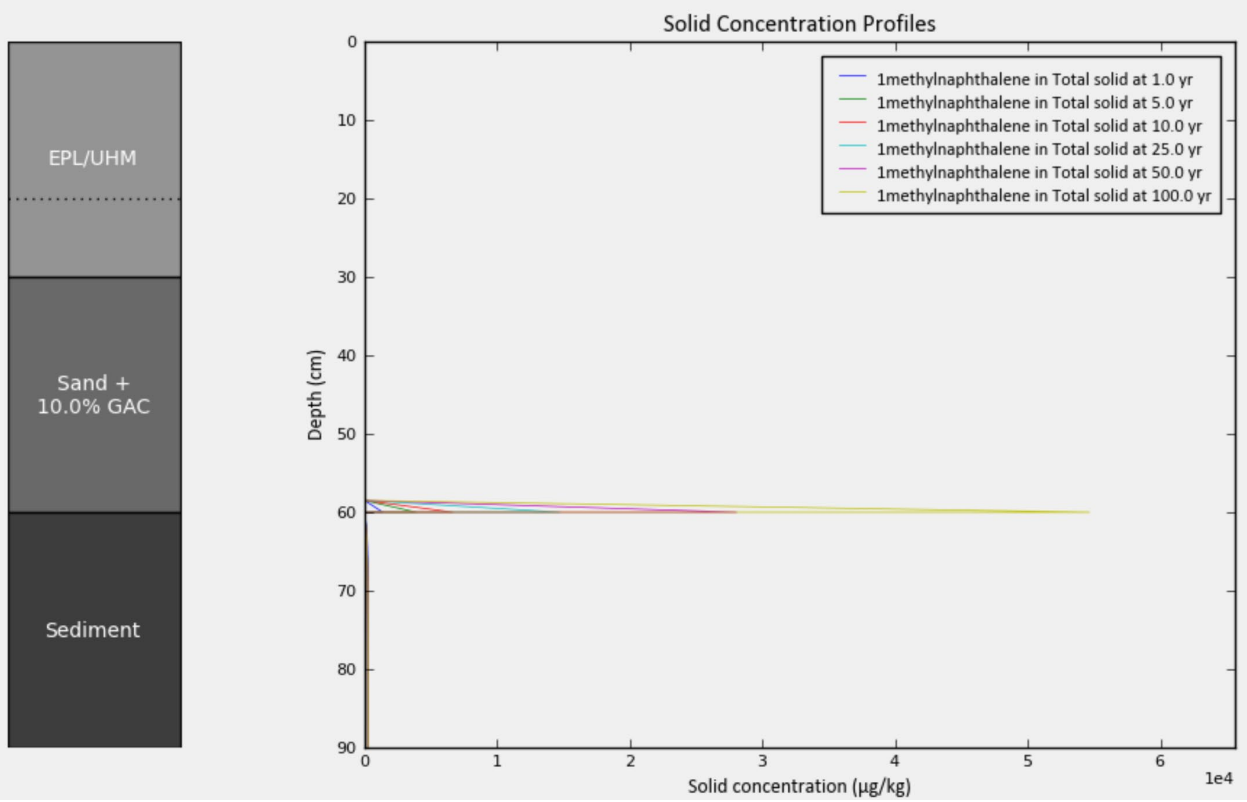

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Tributyltin at 1.0 yr
Tributyltin at 5.0 yr
Tributyltin at 10.0 yr
Tributyltin at 25.0 yr
Tributyltin at 50.0 yr
Tributyltin at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.1
0.2
0.3
0.4
Concentration (µg/L)

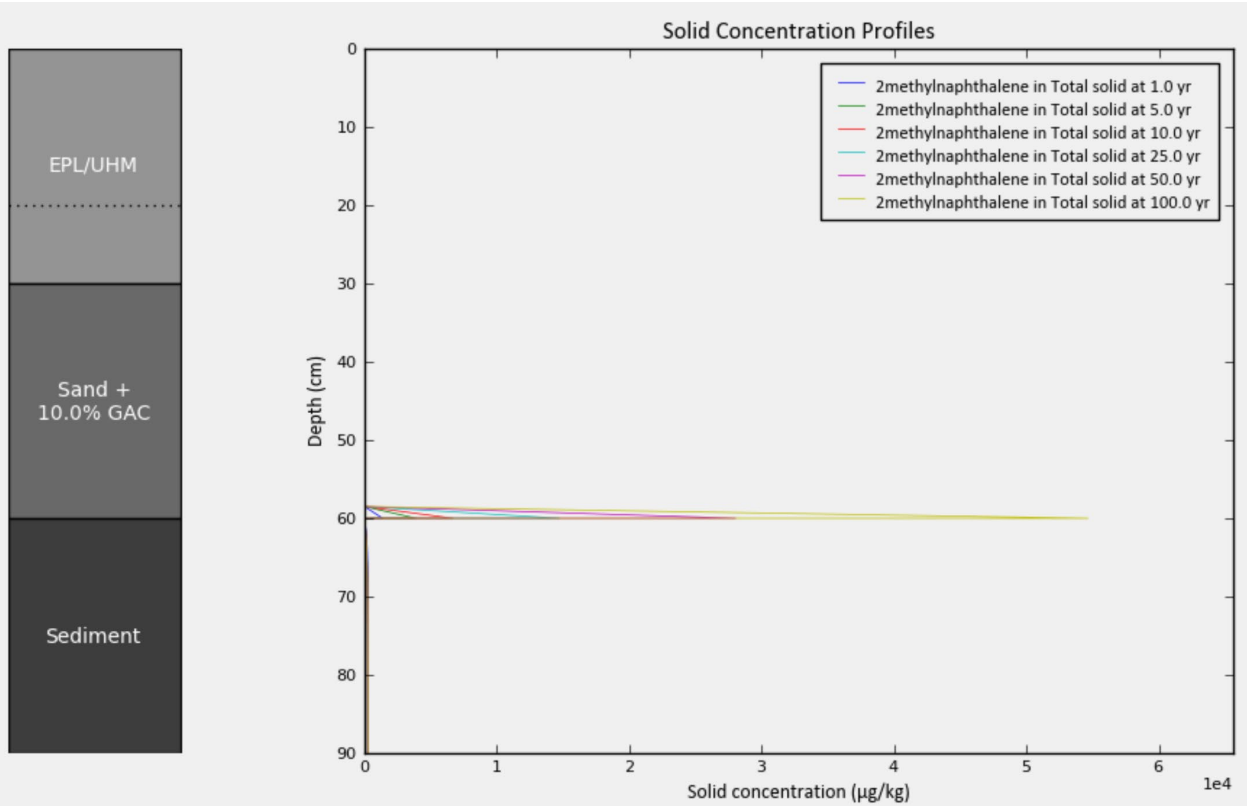

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Vanadium at 1.0 yr
Vanadium at 5.0 yr
Vanadium at 10.0 yr
Vanadium at 25.0 yr
Vanadium at 50.0 yr
Vanadium at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80
100
120

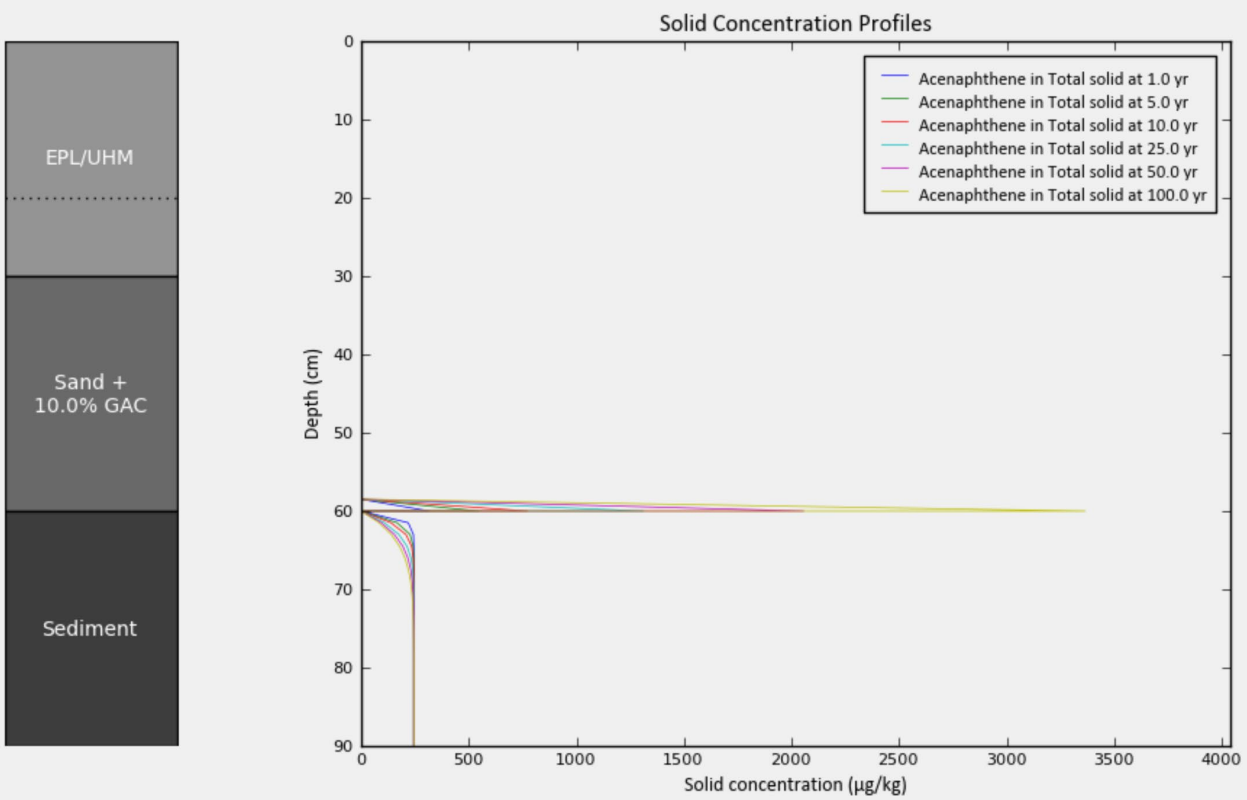

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Xylenes at 1.0 yr
Xylenes at 5.0 yr
Xylenes at 10.0 yr
Xylenes at 25.0 yr
Xylenes at 50.0 yr
Xylenes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040

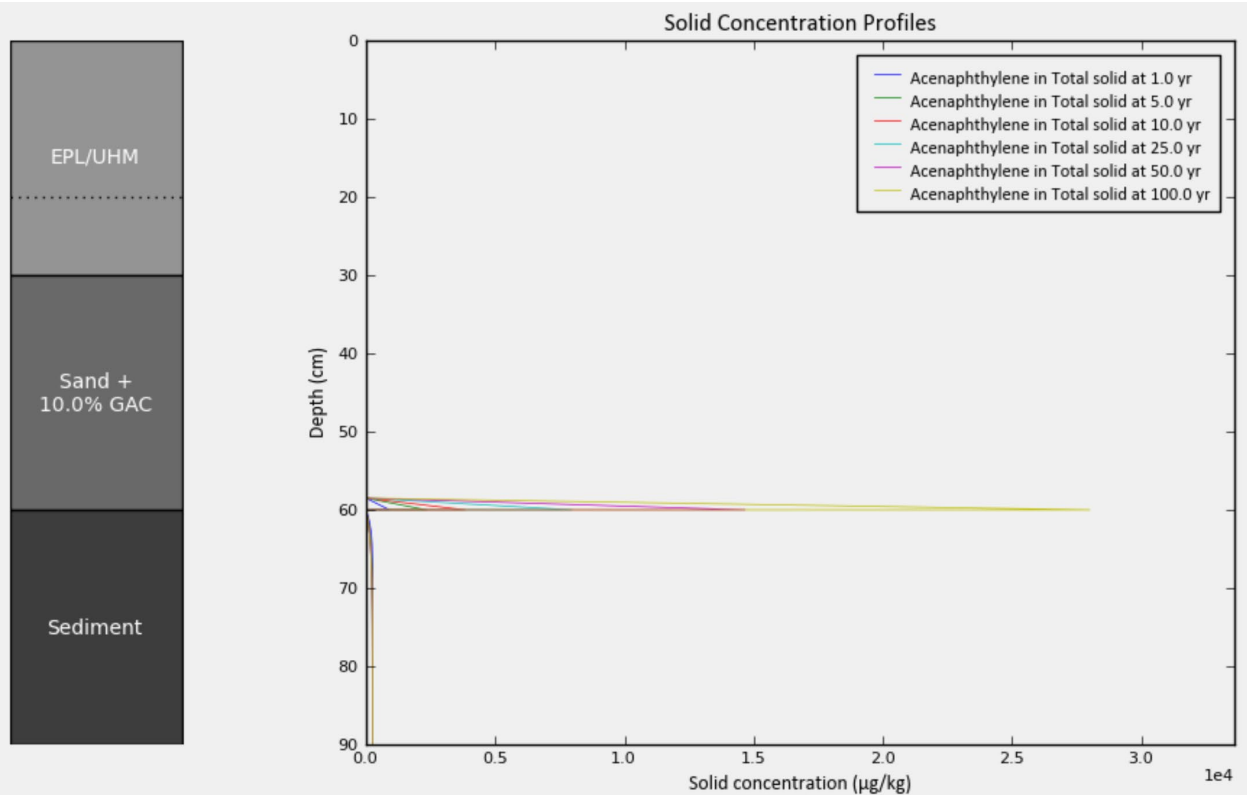

EPL/UHM
Sand +
10.0% GAC
Sediment
Concentration Profiles
Zinc at 1.0 yr
Zinc at 5.0 yr
Zinc at 10.0 yr
Zinc at 25.0 yr
Zinc at 50.0 yr
Zinc at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
2
4
6
8
10
12

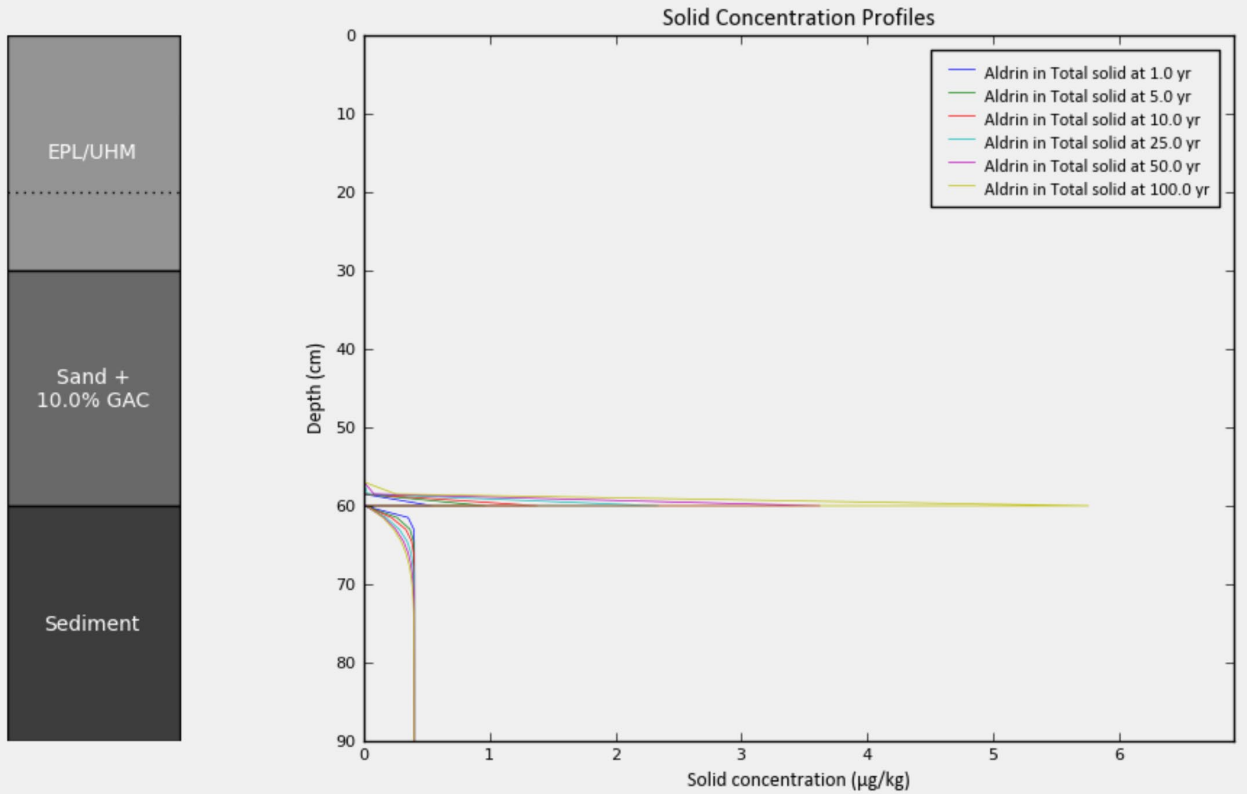
Total Solids Concentration – Depth

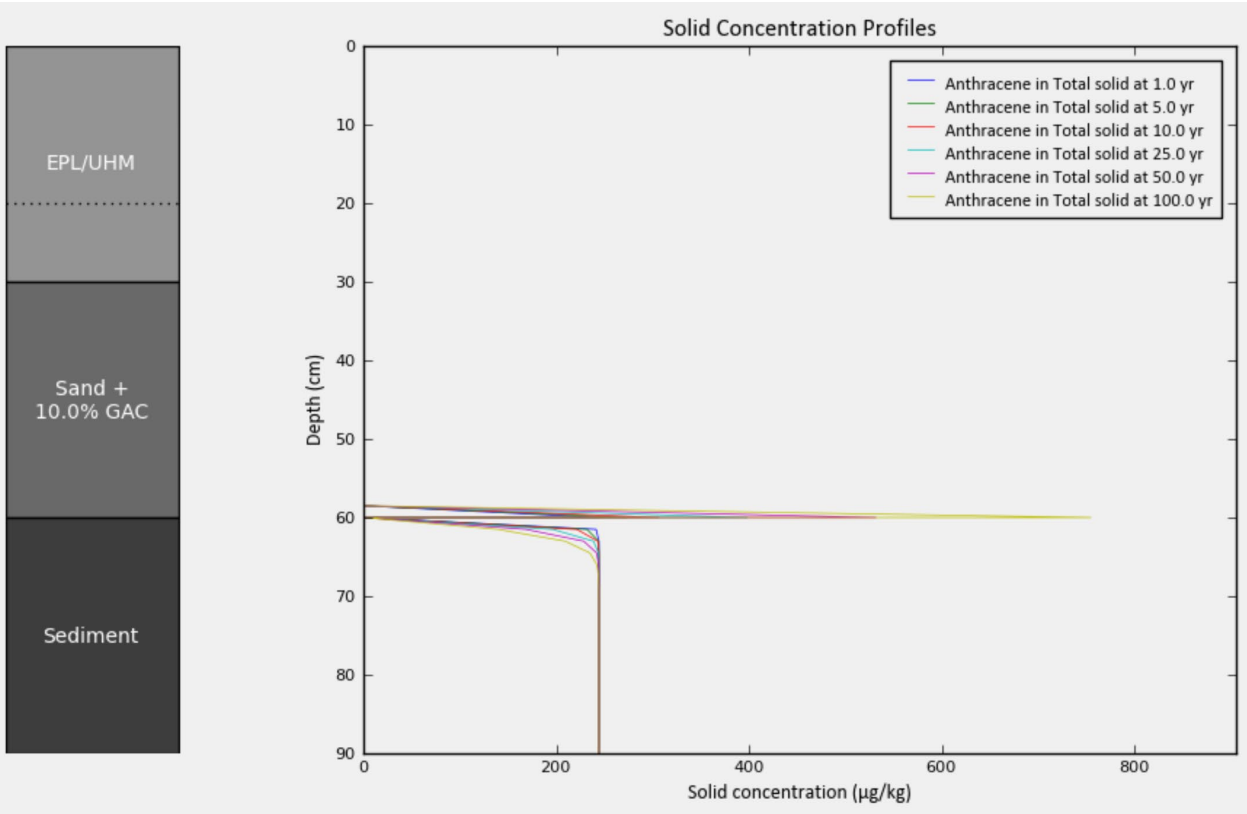


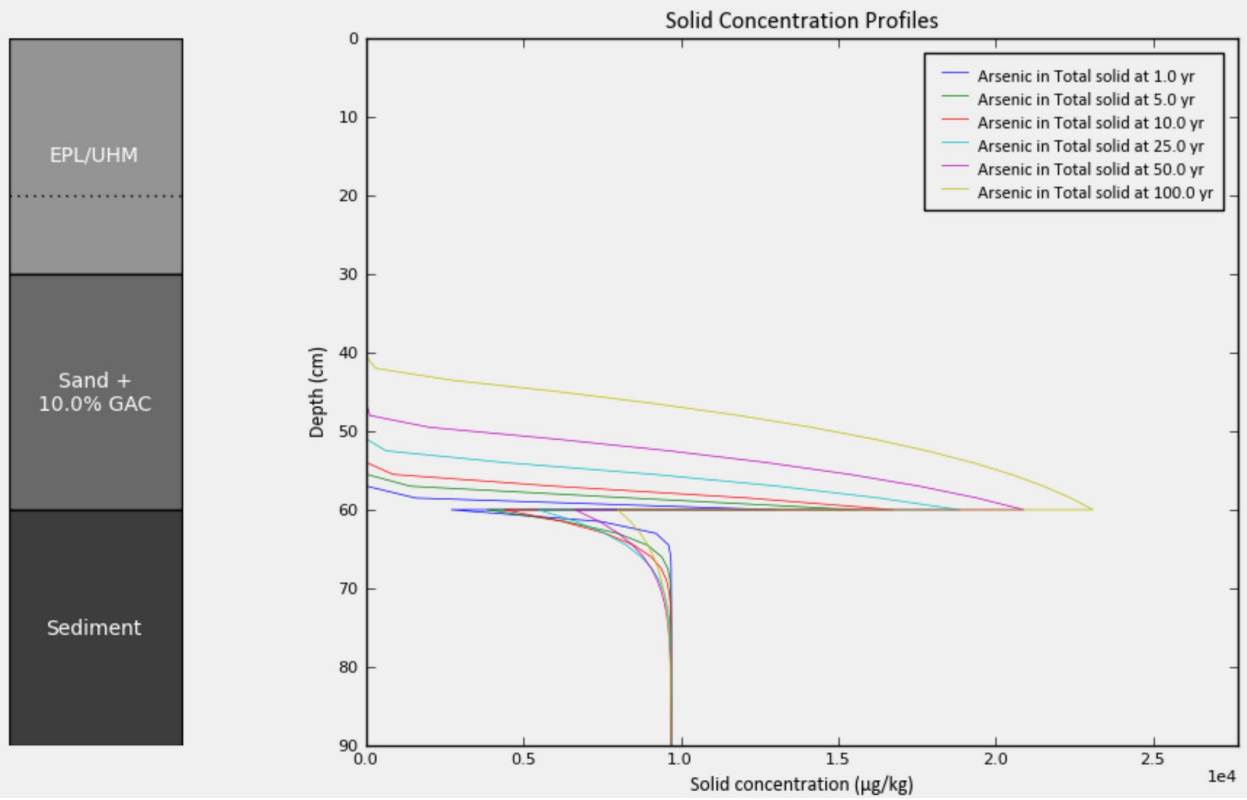


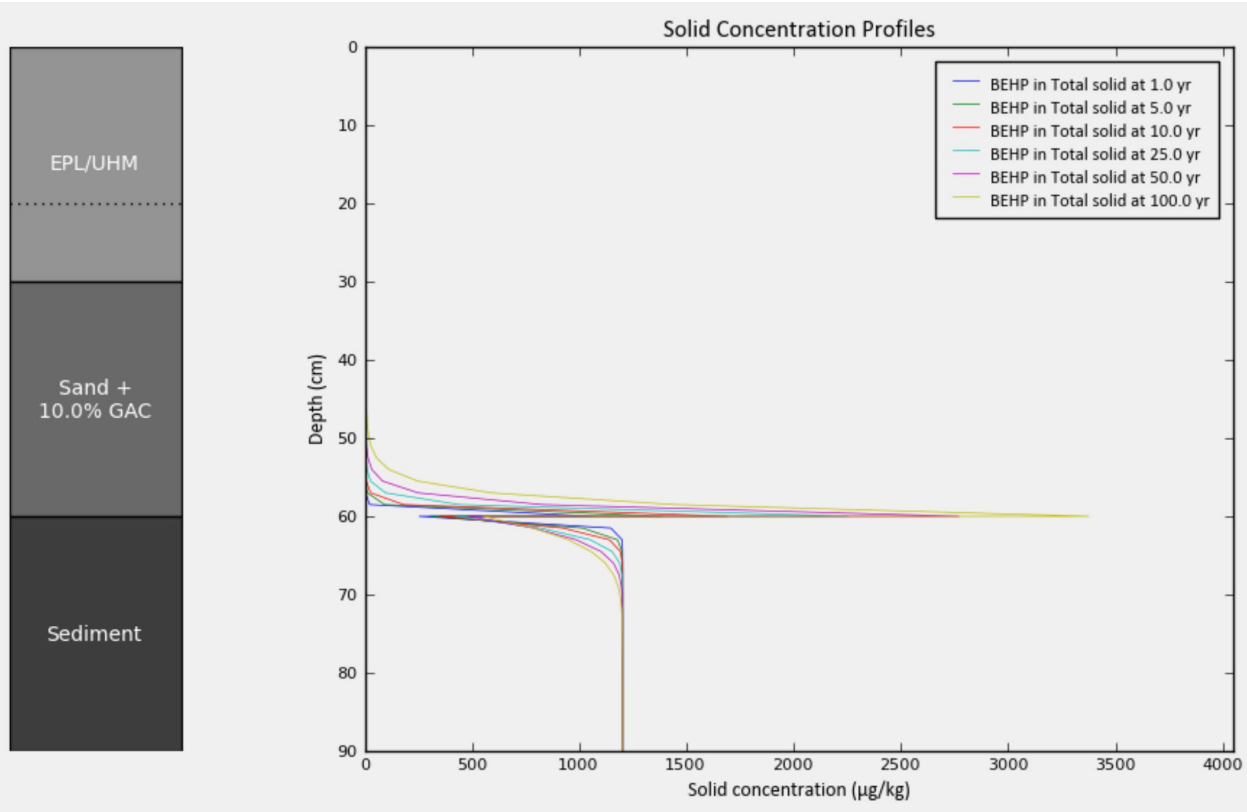

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Acenaphthene in Total solid at 1.0 yr
Acenaphthene in Total solid at 5.0 yr
Acenaphthene in Total solid at 10.0 yr
Acenaphthene in Total solid at 25.0 yr
Acenaphthene in Total solid at 50.0 yr
Acenaphthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

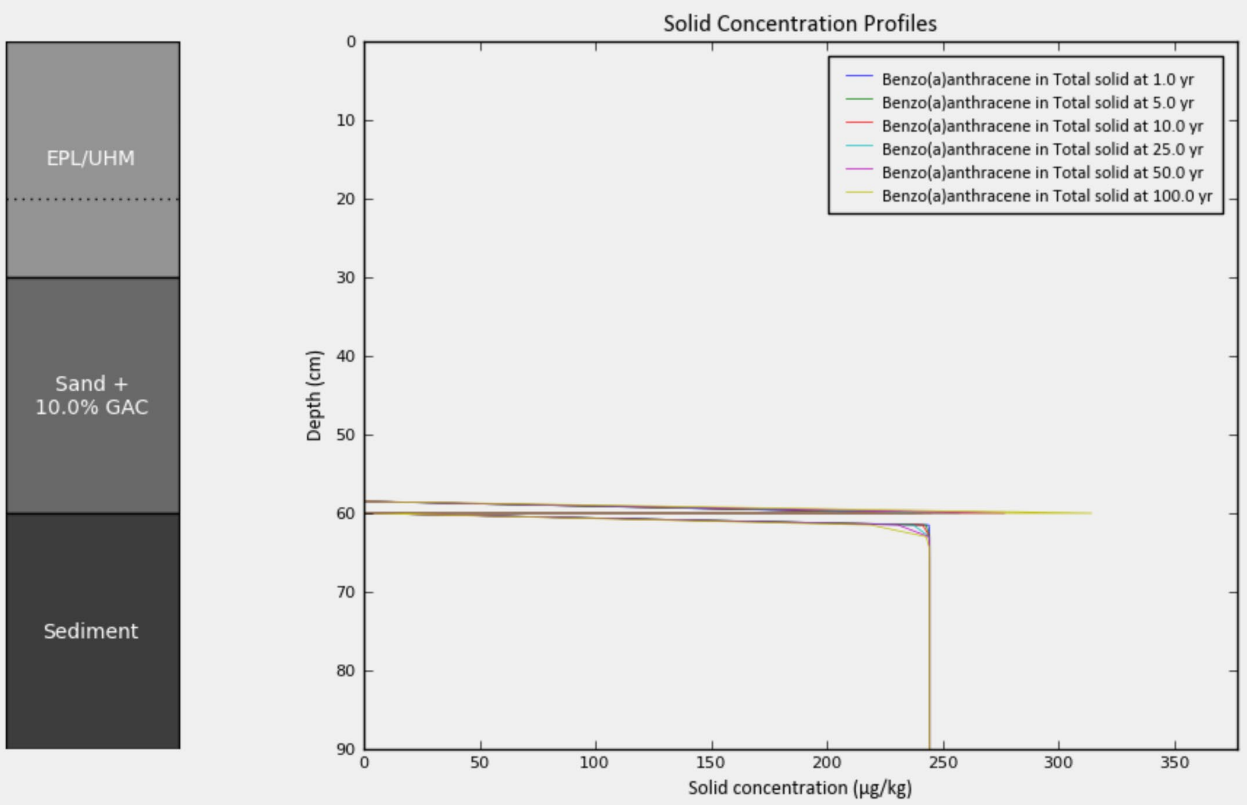

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Acenaphthylene in Total solid at 1.0 yr
Acenaphthylene in Total solid at 5.0 yr
Acenaphthylene in Total solid at 10.0 yr
Acenaphthylene in Total solid at 25.0 yr
Acenaphthylene in Total solid at 50.0 yr
Acenaphthylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

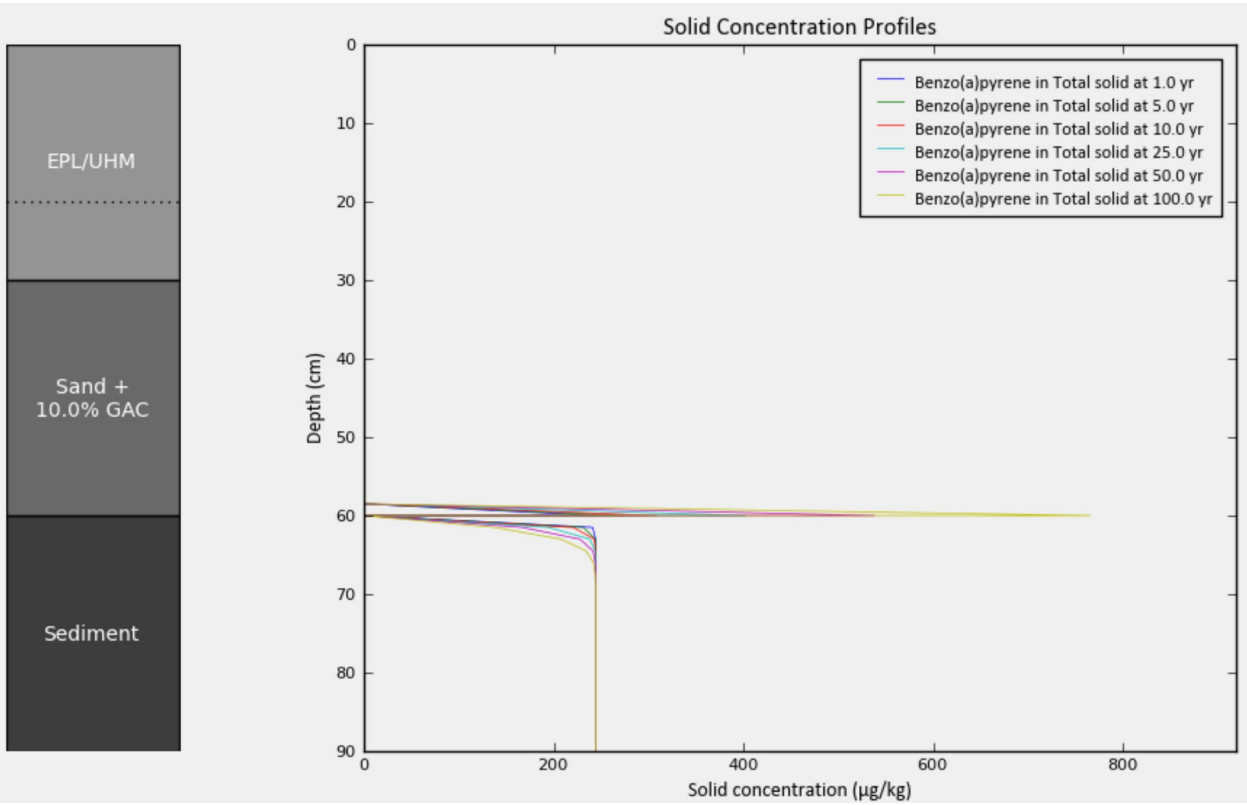

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Aldrin in Total solid at 1.0 yr
Aldrin in Total solid at 5.0 yr
Aldrin in Total solid at 10.0 yr
Aldrin in Total solid at 25.0 yr
Aldrin in Total solid at 50.0 yr
Aldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

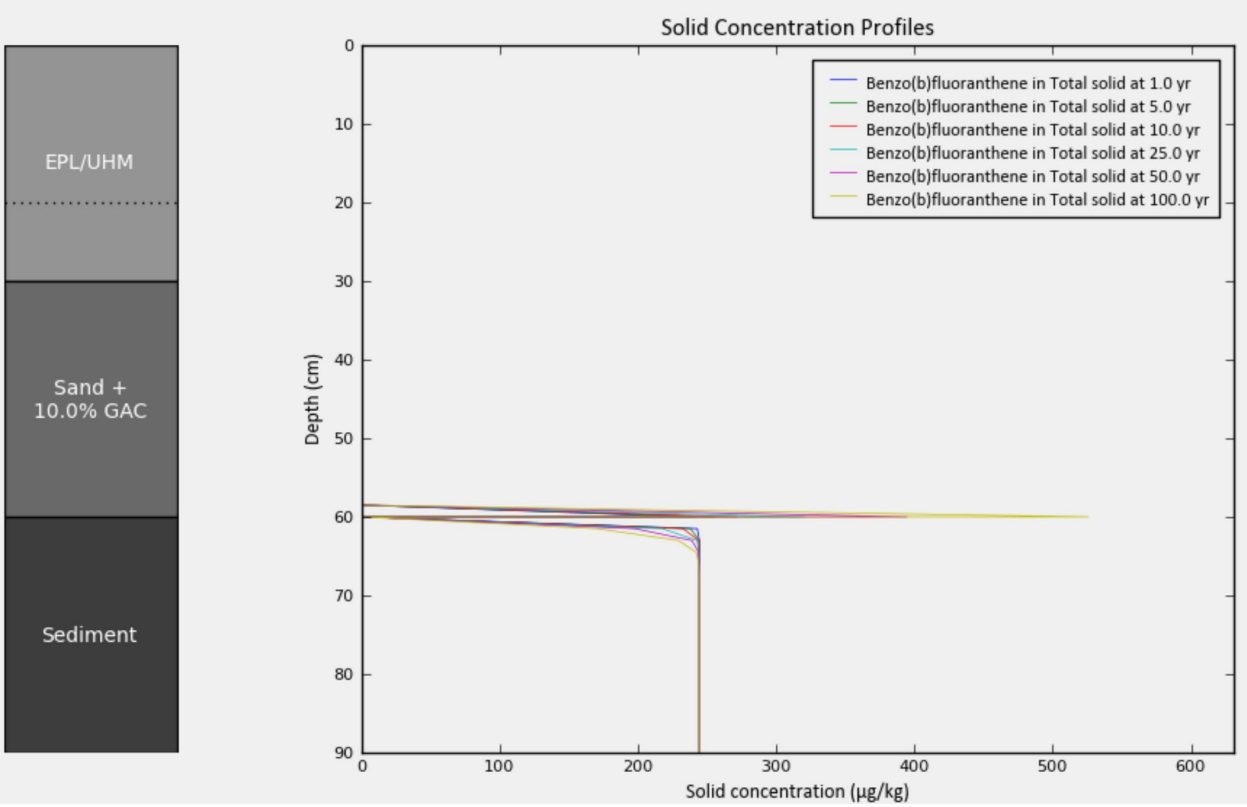

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Anthracene in Total solid at 1.0 yr
Anthracene in Total solid at 5.0 yr
Anthracene in Total solid at 10.0 yr
Anthracene in Total solid at 25.0 yr
Anthracene in Total solid at 50.0 yr
Anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

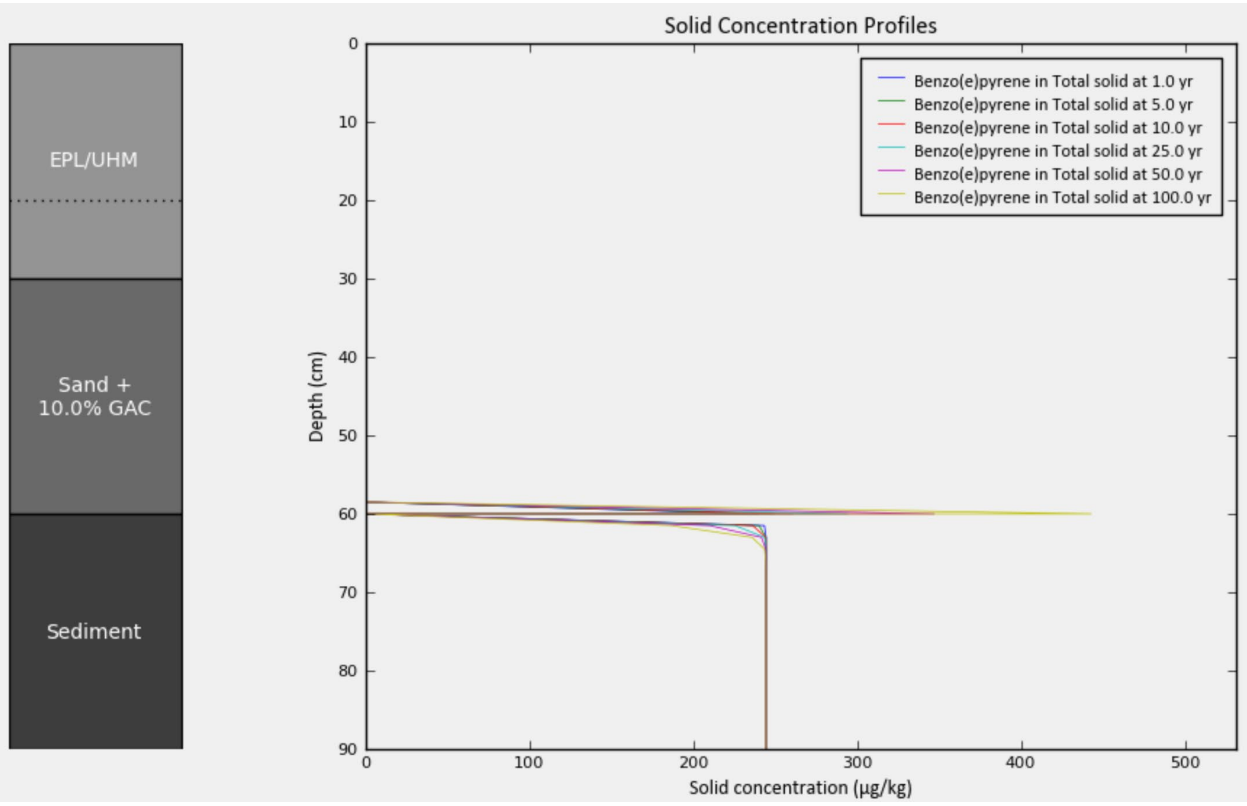

EPL/UHM
Sand + 10.0% GAC
Sediment
Solid Concentration Profiles
Arsenic in Total solid at 1.0 yr
Arsenic in Total solid at 5.0 yr
Arsenic in Total solid at 10.0 yr
Arsenic in Total solid at 25.0 yr
Arsenic in Total solid at 50.0 yr
Arsenic in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

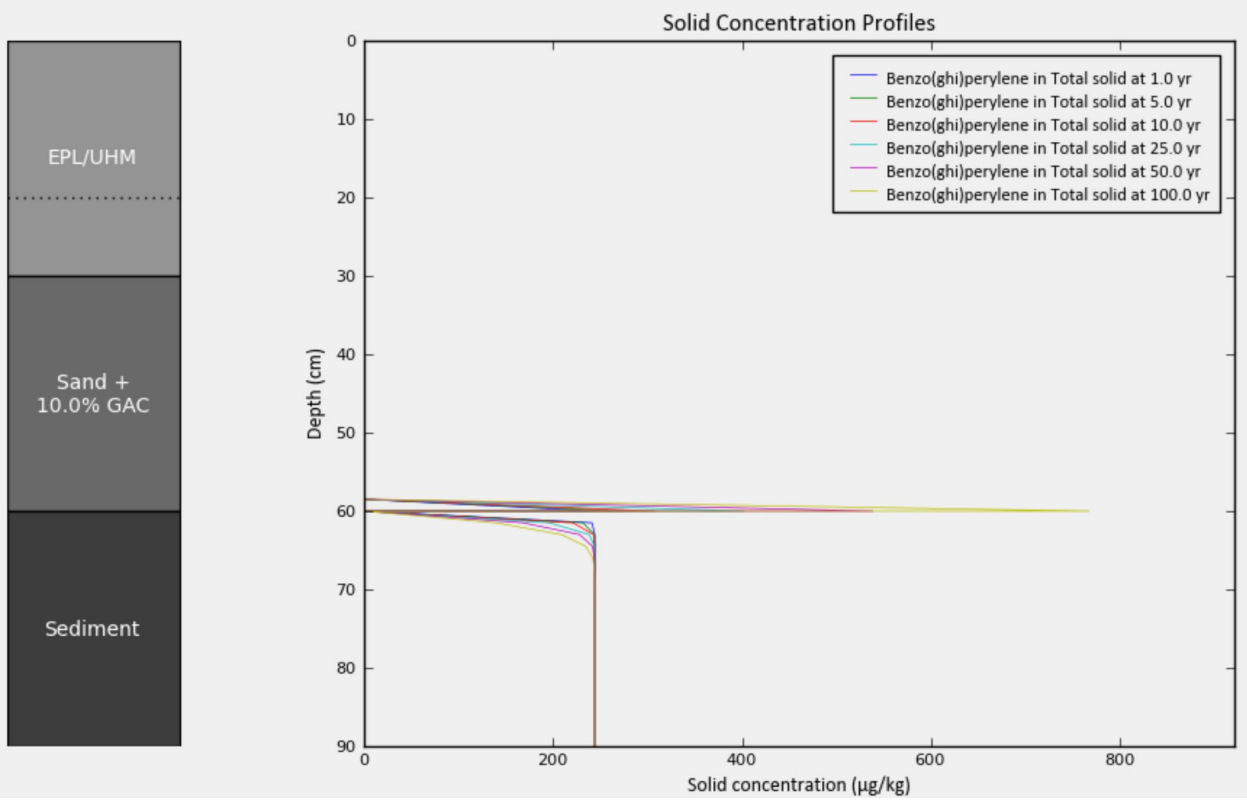

EPL/UHM
Sand + 10.0% GAC
Sediment
Solid Concentration Profiles
BEHP in Total solid at 1.0 yr
BEHP in Total solid at 5.0 yr
BEHP in Total solid at 10.0 yr
BEHP in Total solid at 25.0 yr
BEHP in Total solid at 50.0 yr
BEHP in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

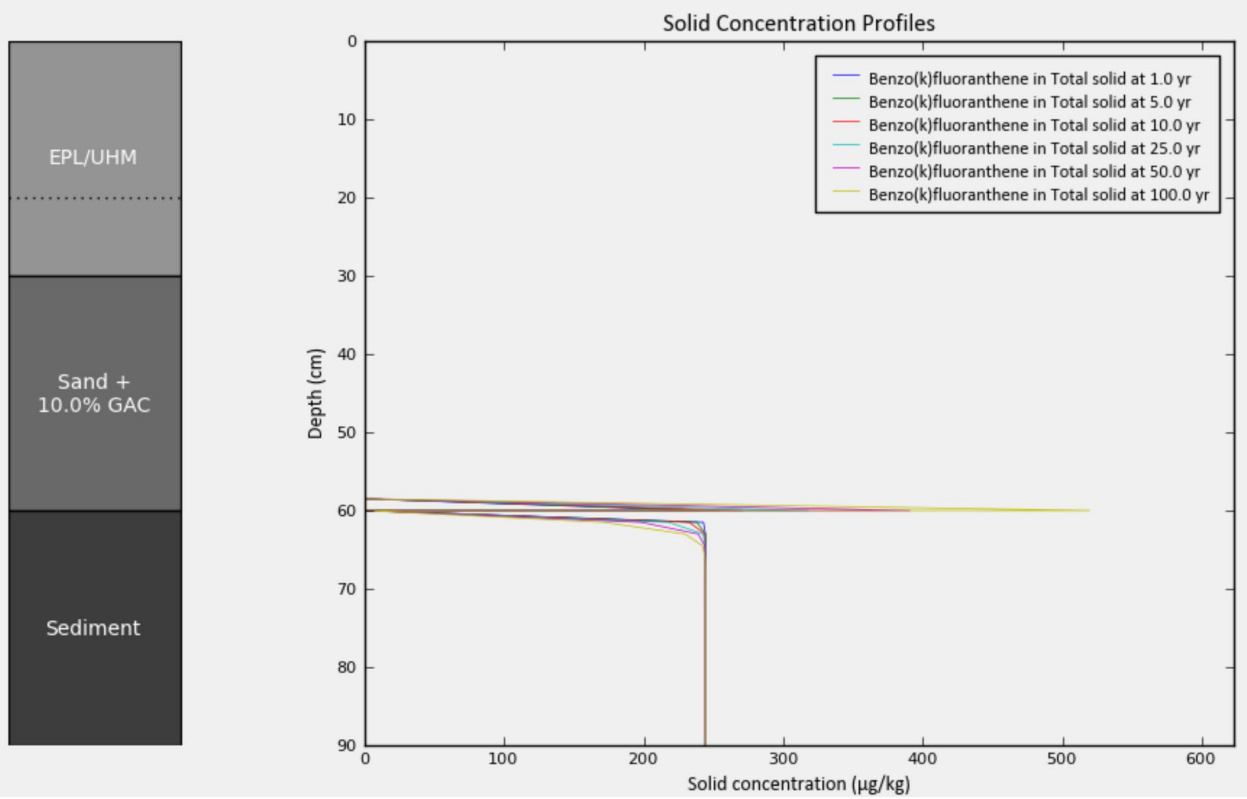

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Benzo(a)anthracene in Total solid at 1.0 yr
Benzo(a)anthracene in Total solid at 5.0 yr
Benzo(a)anthracene in Total solid at 10.0 yr
Benzo(a)anthracene in Total solid at 25.0 yr
Benzo(a)anthracene in Total solid at 50.0 yr
Benzo(a)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
50
100
150
200
250
300
350

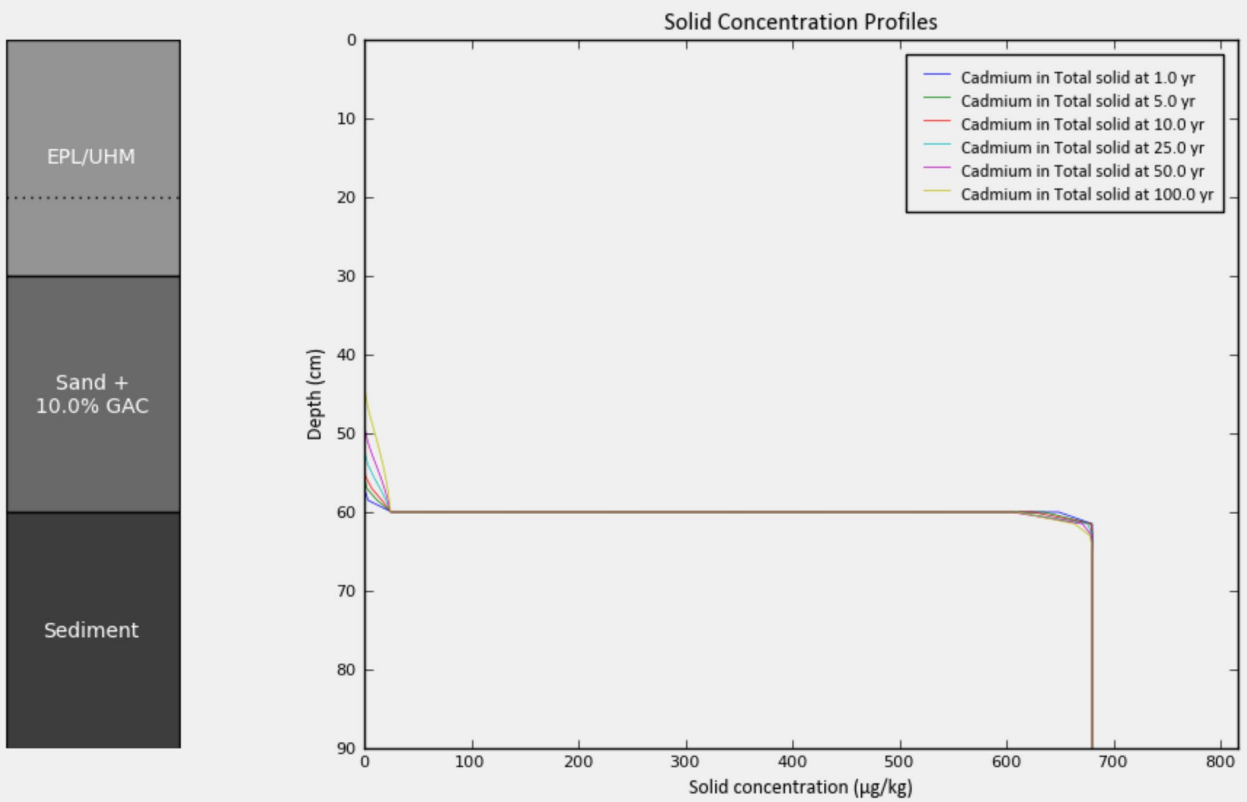

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Benzo(a)pyrene in Total solid at 1.0 yr
Benzo(a)pyrene in Total solid at 5.0 yr
Benzo(a)pyrene in Total solid at 10.0 yr
Benzo(a)pyrene in Total solid at 25.0 yr
Benzo(a)pyrene in Total solid at 50.0 yr
Benzo(a)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
200
400
600
800

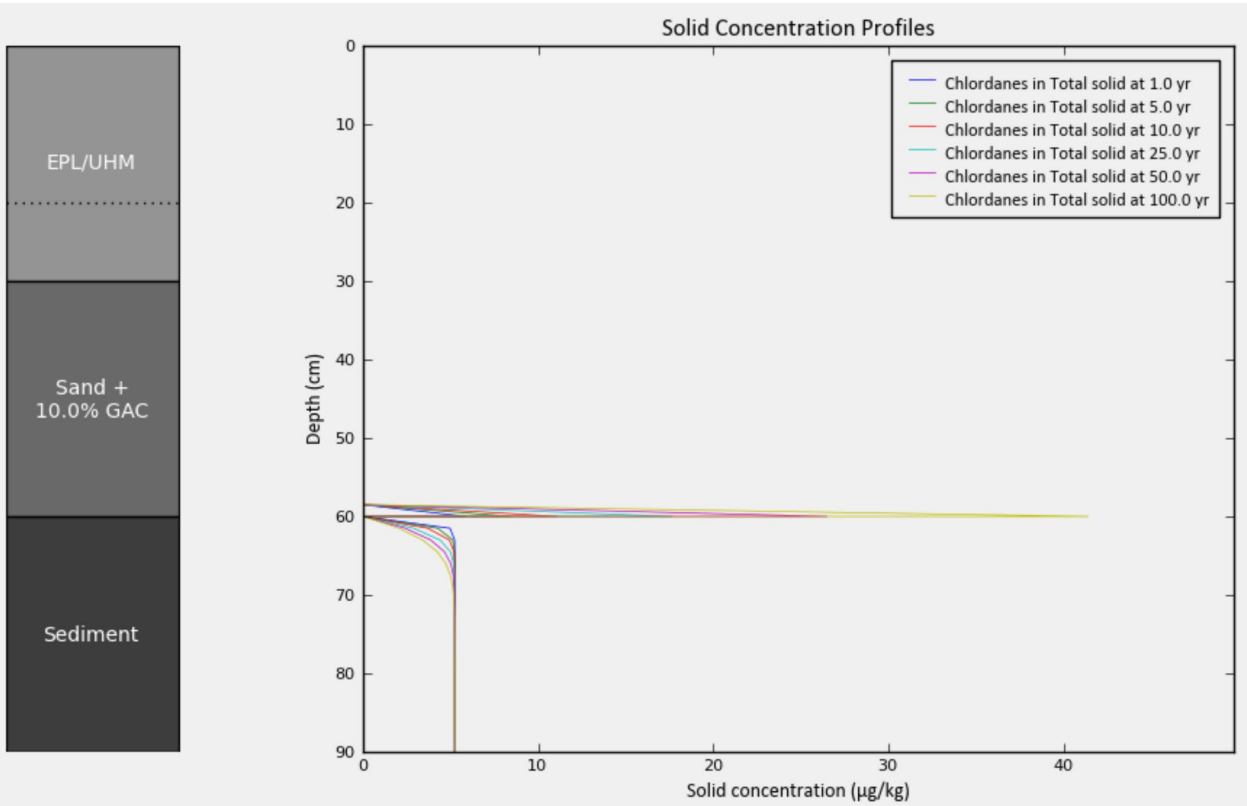

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Benzo(b)fluoranthene in Total solid at 1.0 yr
Benzo(b)fluoranthene in Total solid at 5.0 yr
Benzo(b)fluoranthene in Total solid at 10.0 yr
Benzo(b)fluoranthene in Total solid at 25.0 yr
Benzo(b)fluoranthene in Total solid at 50.0 yr
Benzo(b)fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500
600
Solid concentration (µg/kg)

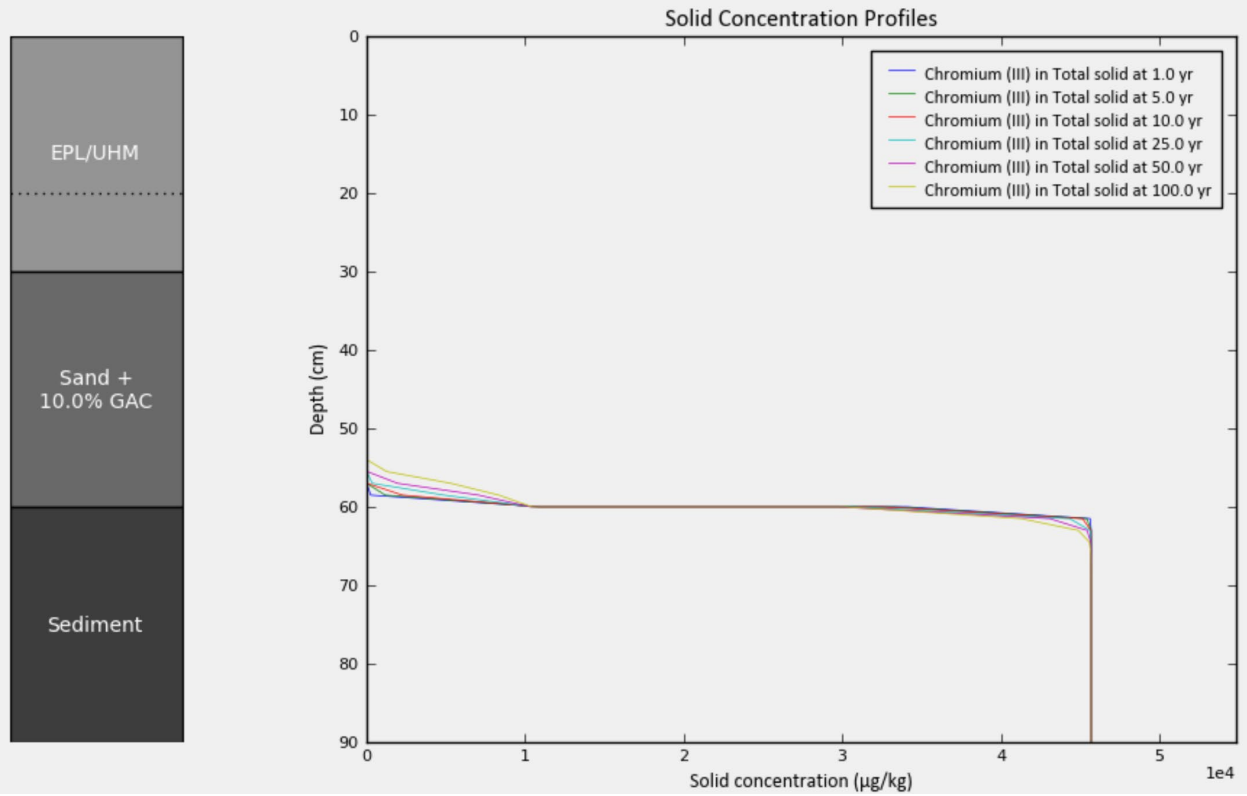

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Benzo(e)pyrene in Total solid at 1.0 yr
Benzo(e)pyrene in Total solid at 5.0 yr
Benzo(e)pyrene in Total solid at 10.0 yr
Benzo(e)pyrene in Total solid at 25.0 yr
Benzo(e)pyrene in Total solid at 50.0 yr
Benzo(e)pyrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500
Solid concentration (µg/kg)

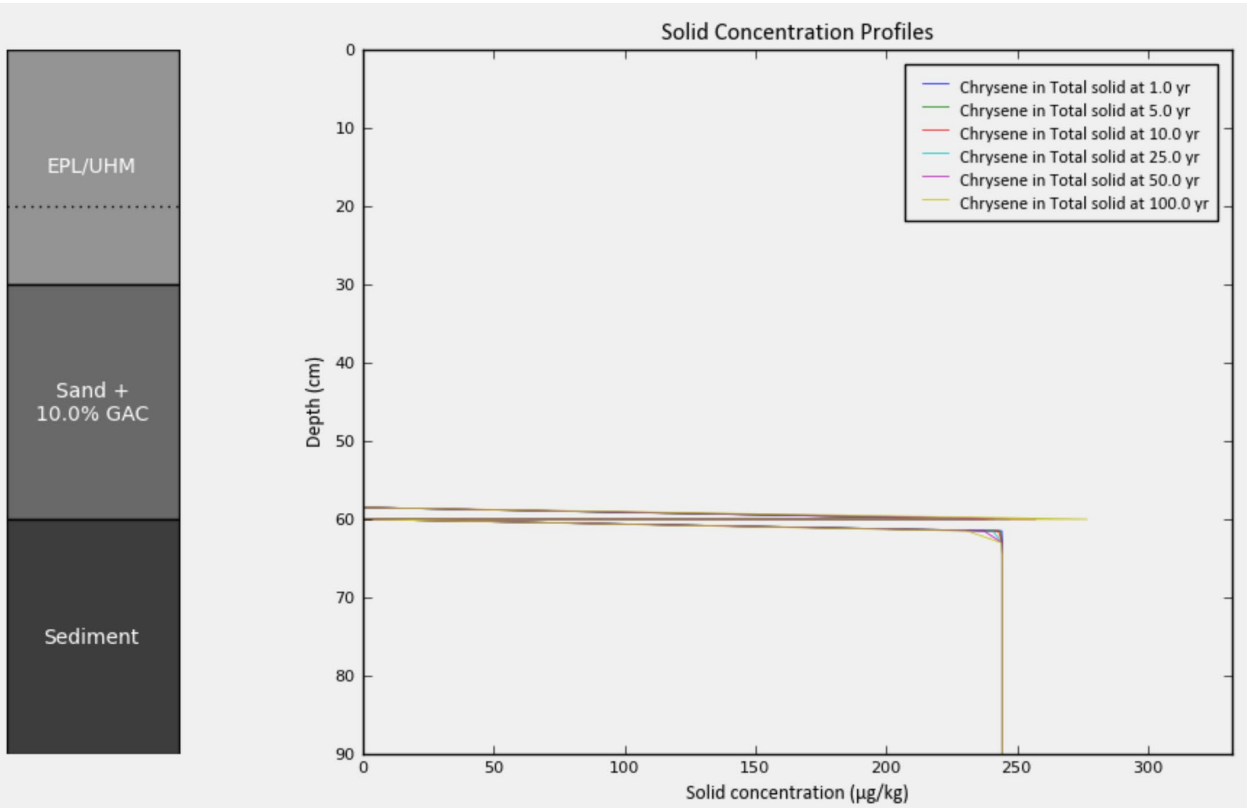

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Benzo(ghi)perylene in Total solid at 1.0 yr
Benzo(ghi)perylene in Total solid at 5.0 yr
Benzo(ghi)perylene in Total solid at 10.0 yr
Benzo(ghi)perylene in Total solid at 25.0 yr
Benzo(ghi)perylene in Total solid at 50.0 yr
Benzo(ghi)perylene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
200
400
600
800
Solid concentration (µg/kg)

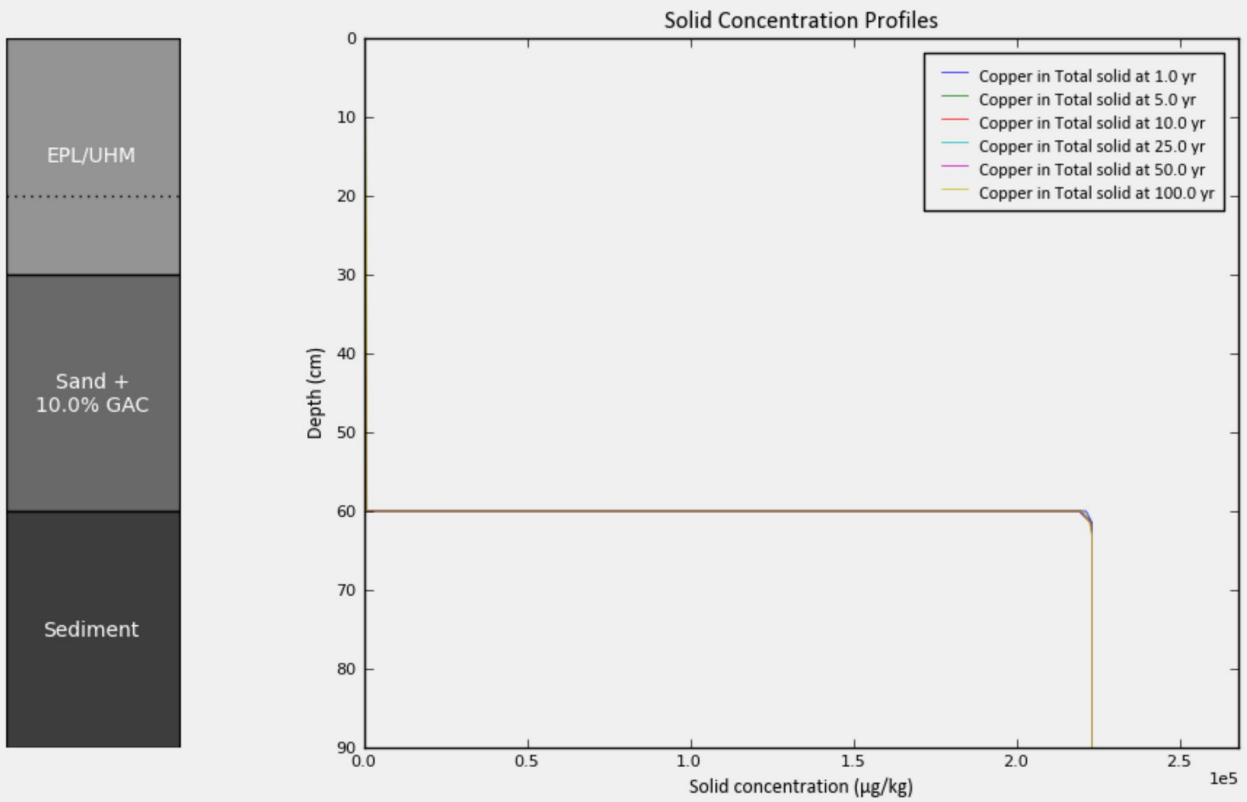

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Benzo(k)fluoranthene in Total solid at 1.0 yr
Benzo(k)fluoranthene in Total solid at 5.0 yr
Benzo(k)fluoranthene in Total solid at 10.0 yr
Benzo(k)fluoranthene in Total solid at 25.0 yr
Benzo(k)fluoranthene in Total solid at 50.0 yr
Benzo(k)fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500
600
Solid concentration (µg/kg)

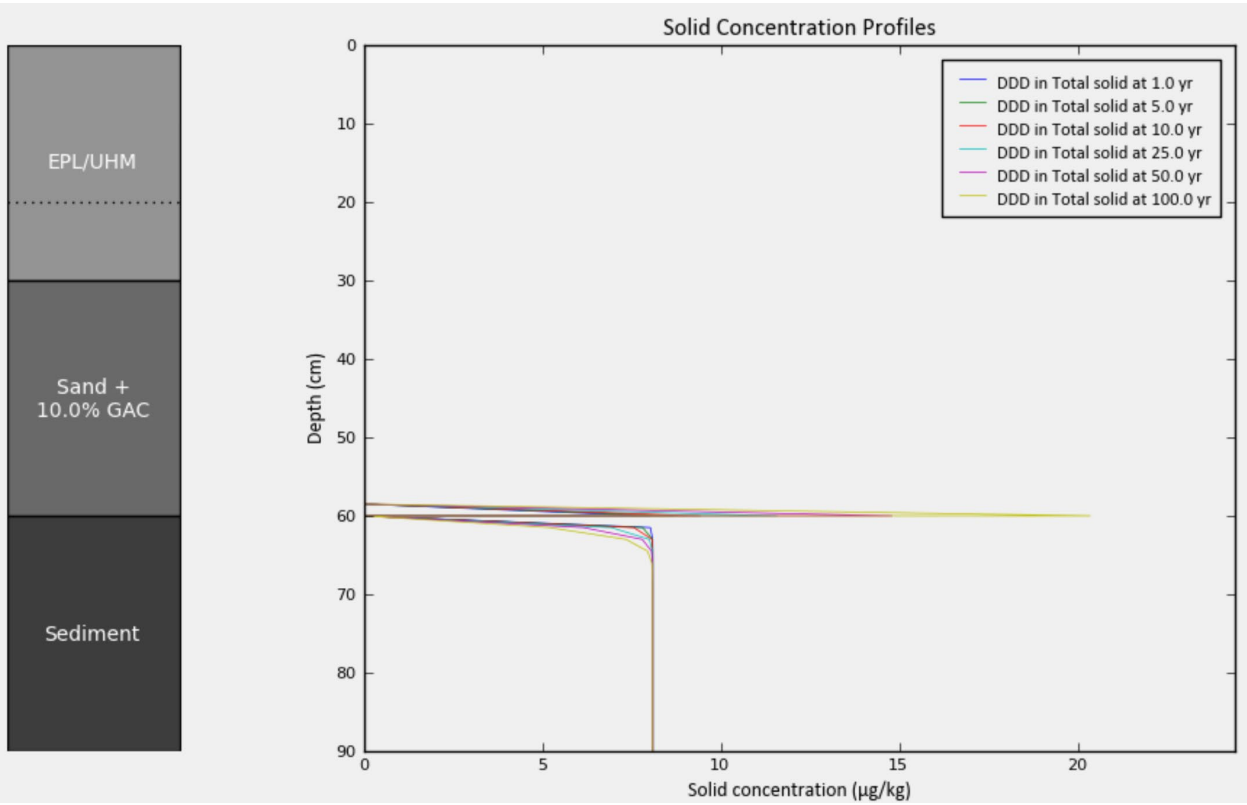

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Cadmium in Total solid at 1.0 yr
Cadmium in Total solid at 5.0 yr
Cadmium in Total solid at 10.0 yr
Cadmium in Total solid at 25.0 yr
Cadmium in Total solid at 50.0 yr
Cadmium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

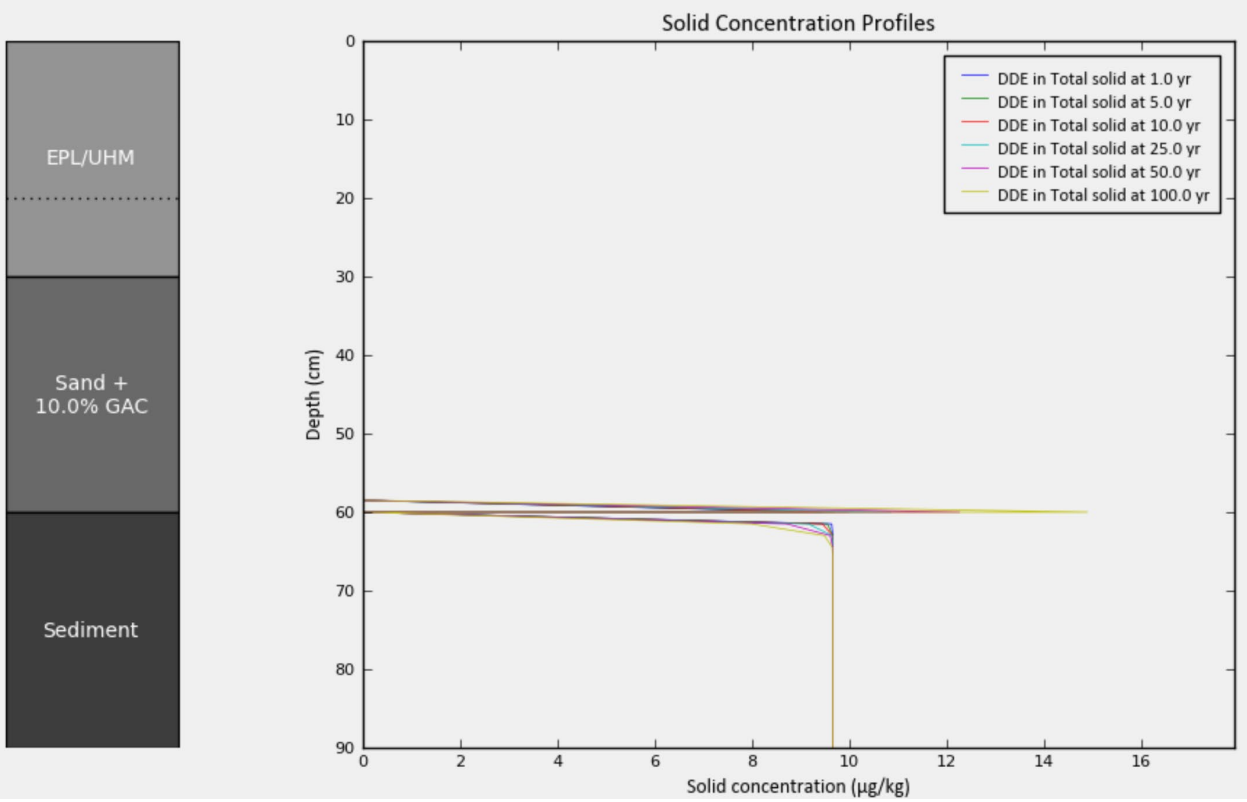

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Chlordanes in Total solid at 1.0 yr
Chlordanes in Total solid at 5.0 yr
Chlordanes in Total solid at 10.0 yr
Chlordanes in Total solid at 25.0 yr
Chlordanes in Total solid at 50.0 yr
Chlordanes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

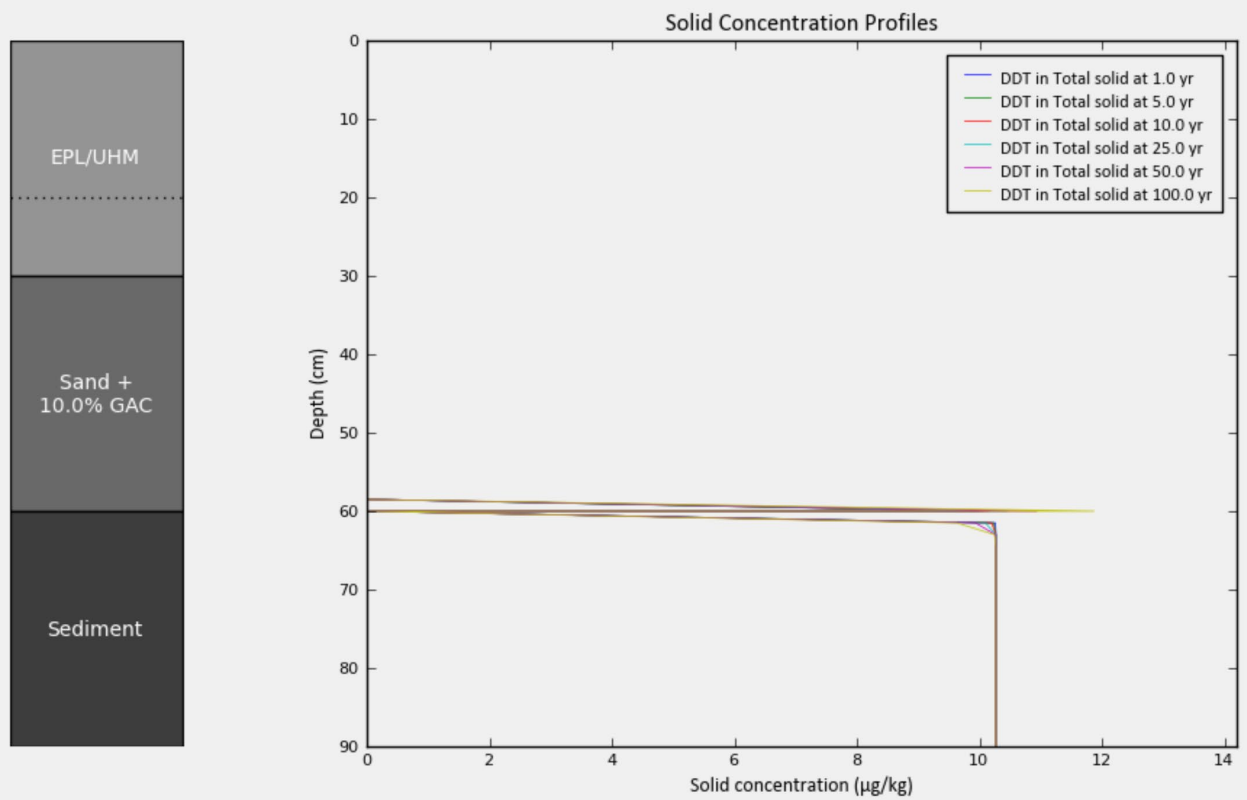

EPL/UHM
Sand + 10.0% GAC
Sediment
Solid Concentration Profiles
Chromium (III) in Total solid at 1.0 yr
Chromium (III) in Total solid at 5.0 yr
Chromium (III) in Total solid at 10.0 yr
Chromium (III) in Total solid at 25.0 yr
Chromium (III) in Total solid at 50.0 yr
Chromium (III) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

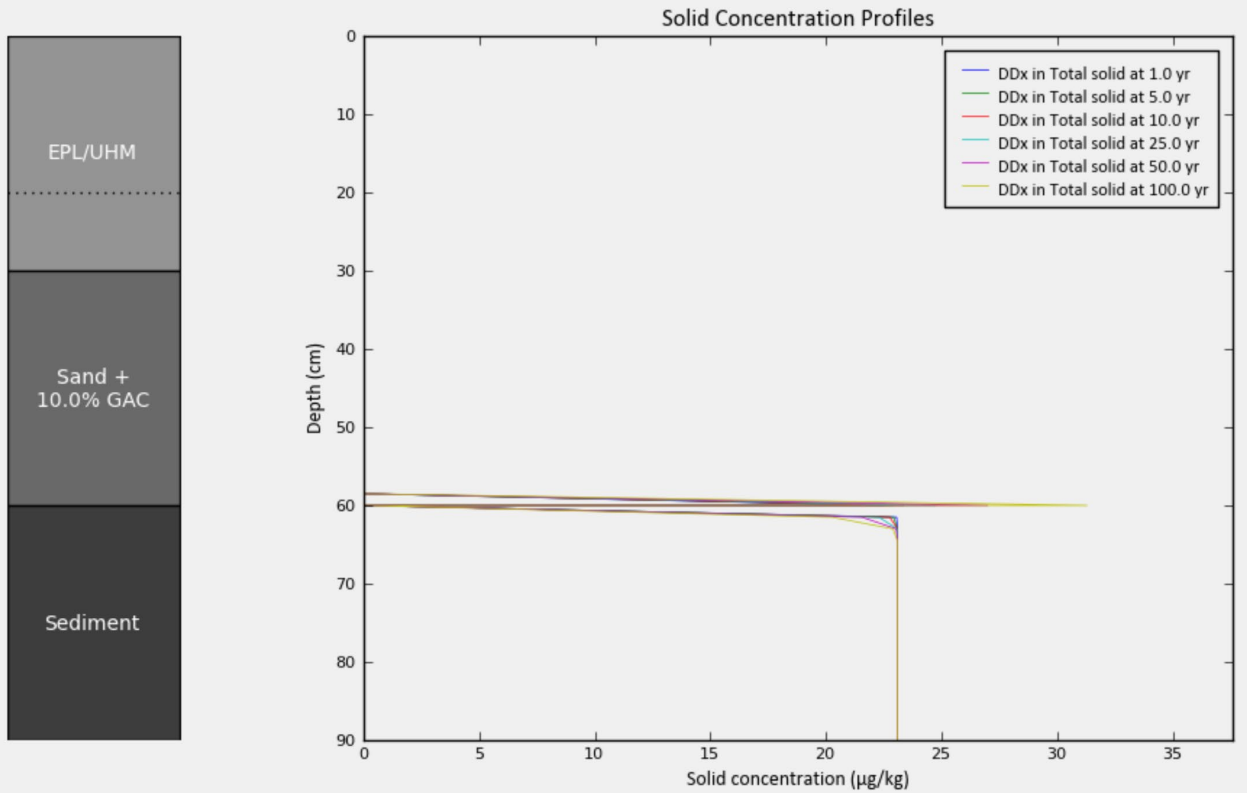

EPL/UHM
Sand + 10.0% GAC
Sediment
Solid Concentration Profiles
Chrysene in Total solid at 1.0 yr
Chrysene in Total solid at 5.0 yr
Chrysene in Total solid at 10.0 yr
Chrysene in Total solid at 25.0 yr
Chrysene in Total solid at 50.0 yr
Chrysene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

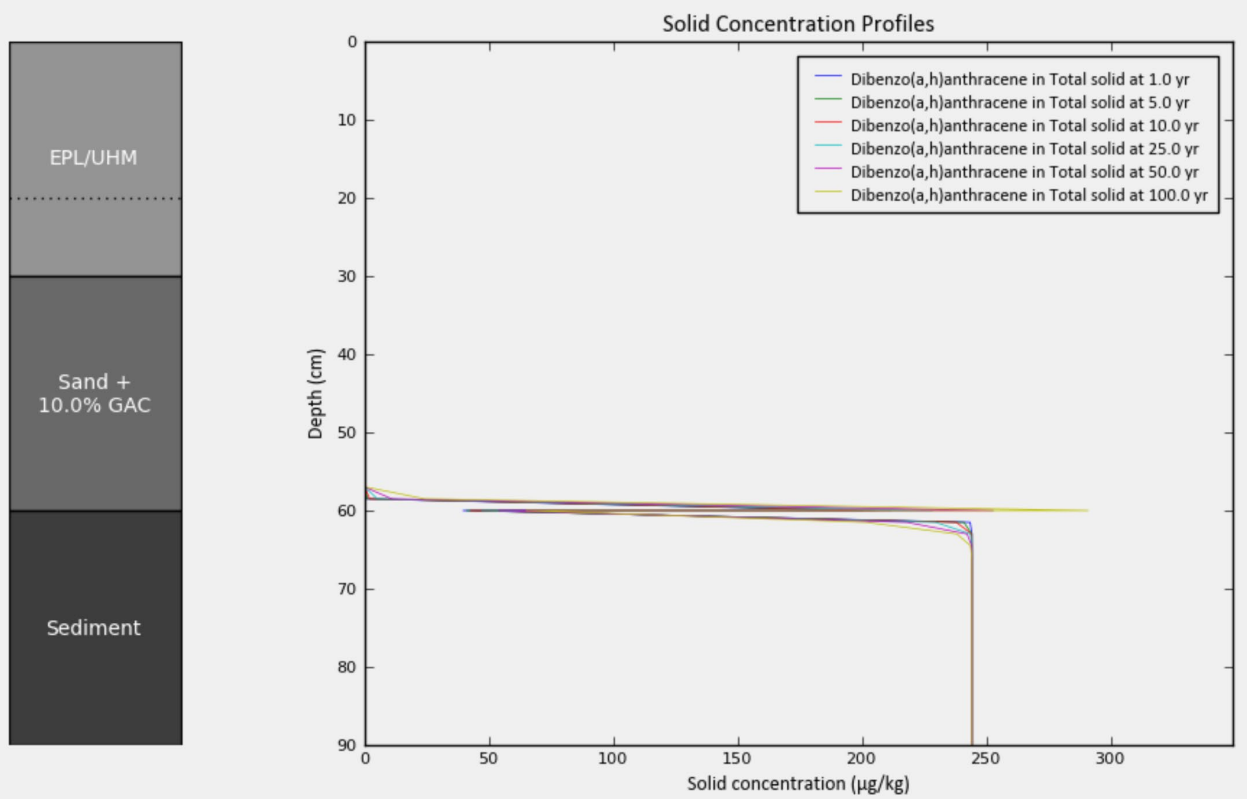

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Copper in Total solid at 1.0 yr
Copper in Total solid at 5.0 yr
Copper in Total solid at 10.0 yr
Copper in Total solid at 25.0 yr
Copper in Total solid at 50.0 yr
Copper in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

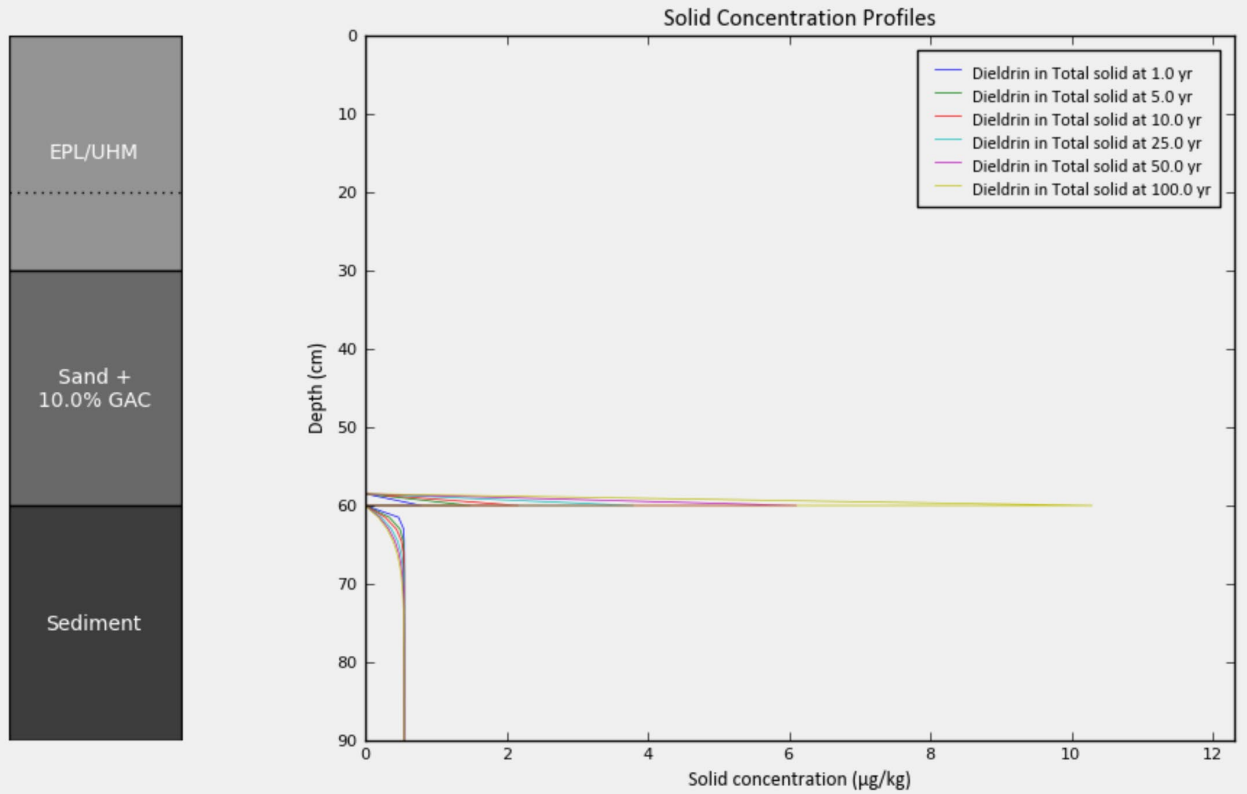

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
DDD in Total solid at 1.0 yr
DDD in Total solid at 5.0 yr
DDD in Total solid at 10.0 yr
DDD in Total solid at 25.0 yr
DDD in Total solid at 50.0 yr
DDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

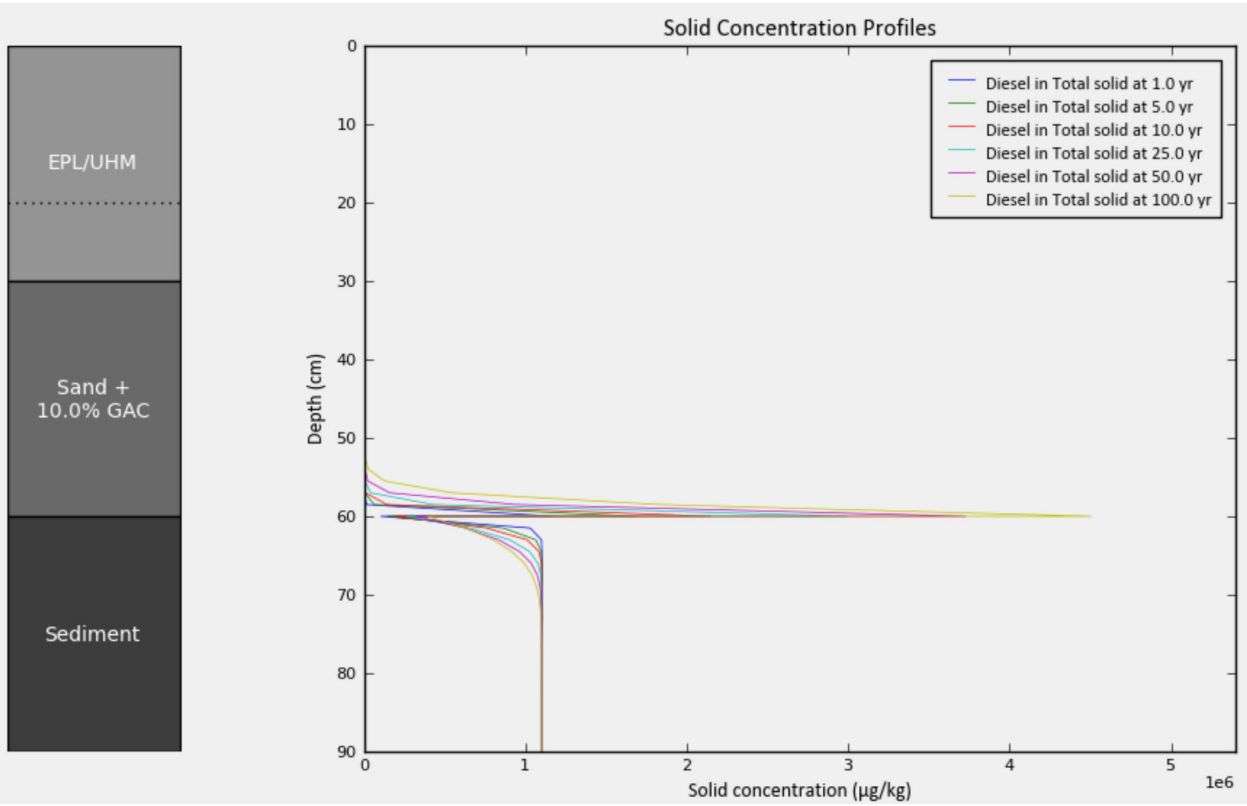

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
DDE in Total solid at 1.0 yr
DDE in Total solid at 5.0 yr
DDE in Total solid at 10.0 yr
DDE in Total solid at 25.0 yr
DDE in Total solid at 50.0 yr
DDE in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

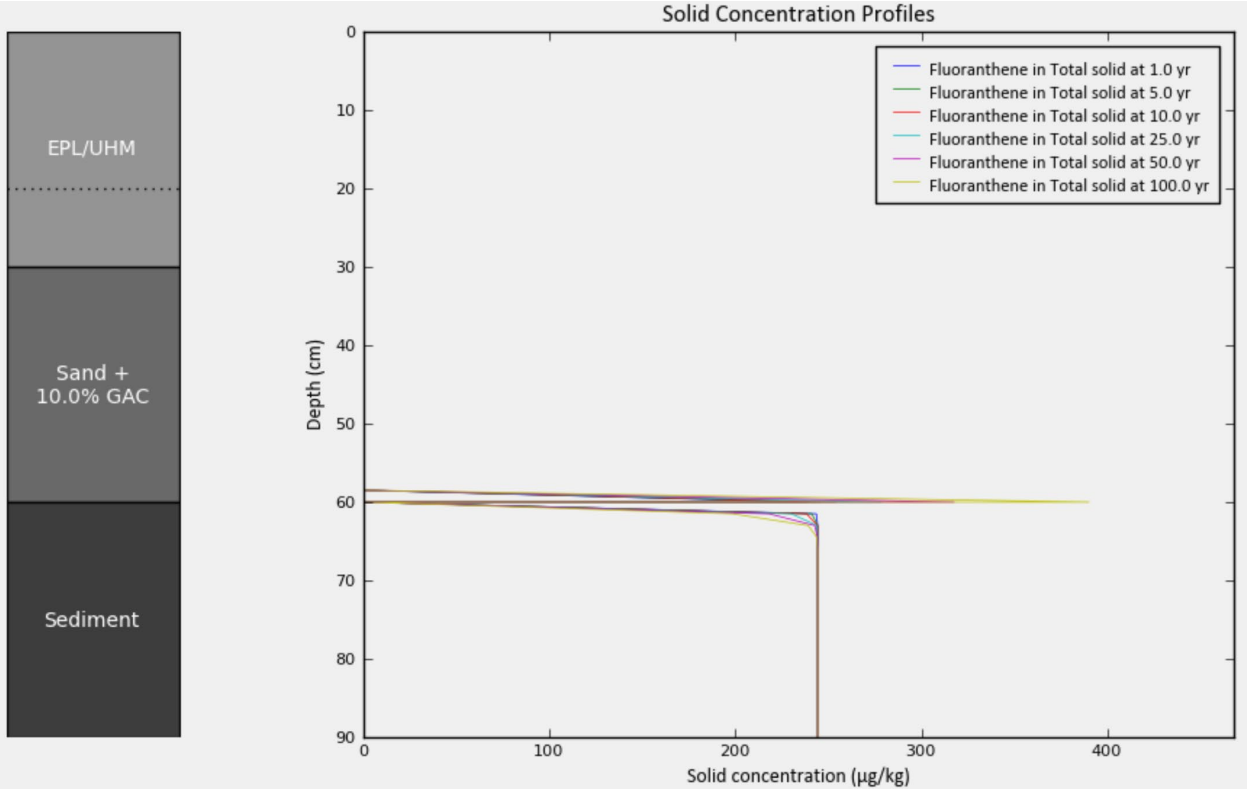

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
DDT in Total solid at 1.0 yr
DDT in Total solid at 5.0 yr
DDT in Total solid at 10.0 yr
DDT in Total solid at 25.0 yr
DDT in Total solid at 50.0 yr
DDT in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

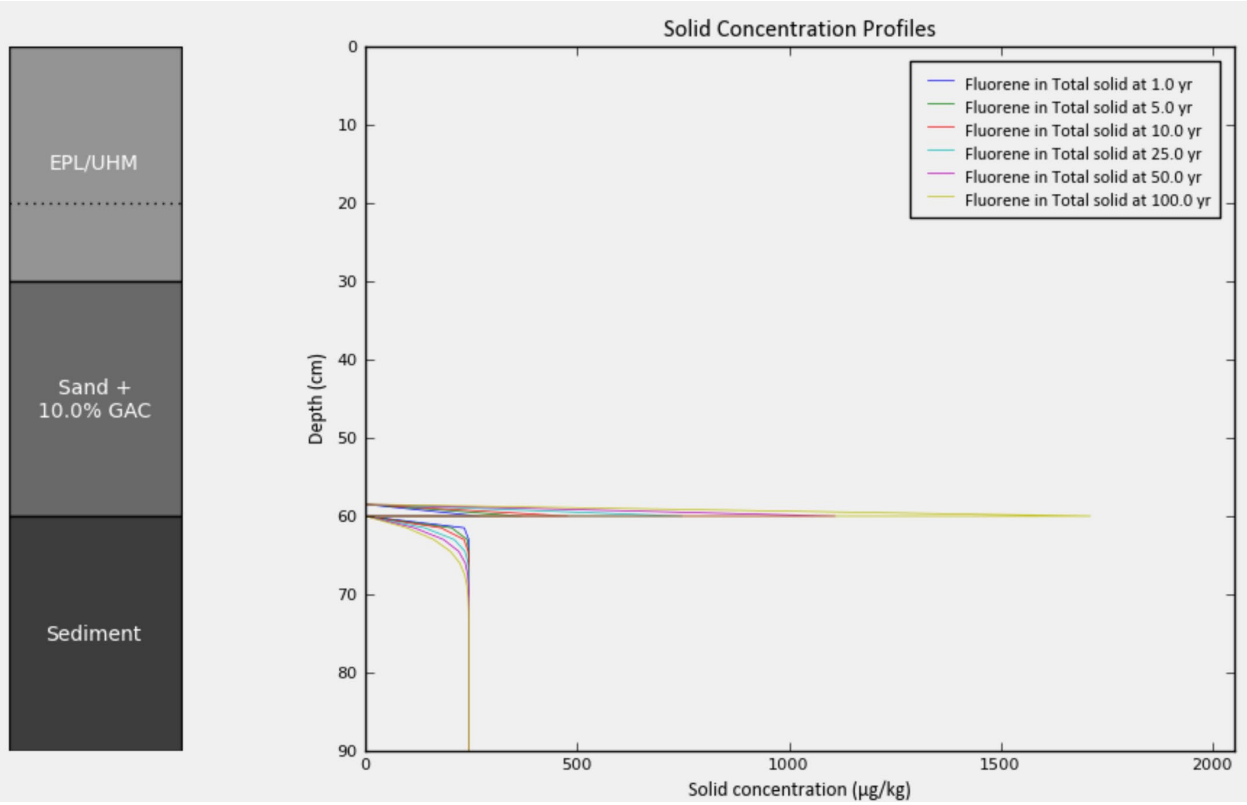

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
DDx in Total solid at 1.0 yr
DDx in Total solid at 5.0 yr
DDx in Total solid at 10.0 yr
DDx in Total solid at 25.0 yr
DDx in Total solid at 50.0 yr
DDx in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

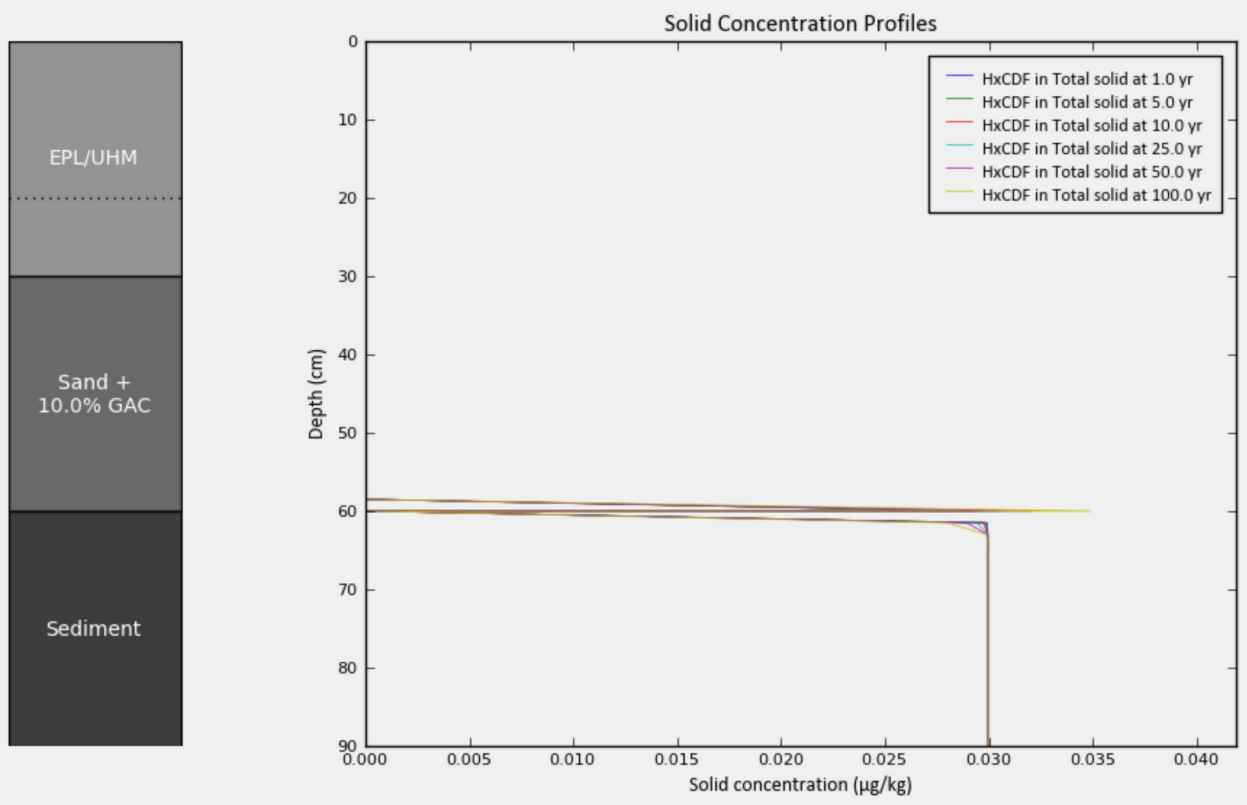

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Dibenzo(a,h)anthracene in Total solid at 1.0 yr
Dibenzo(a,h)anthracene in Total solid at 5.0 yr
Dibenzo(a,h)anthracene in Total solid at 10.0 yr
Dibenzo(a,h)anthracene in Total solid at 25.0 yr
Dibenzo(a,h)anthracene in Total solid at 50.0 yr
Dibenzo(a,h)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

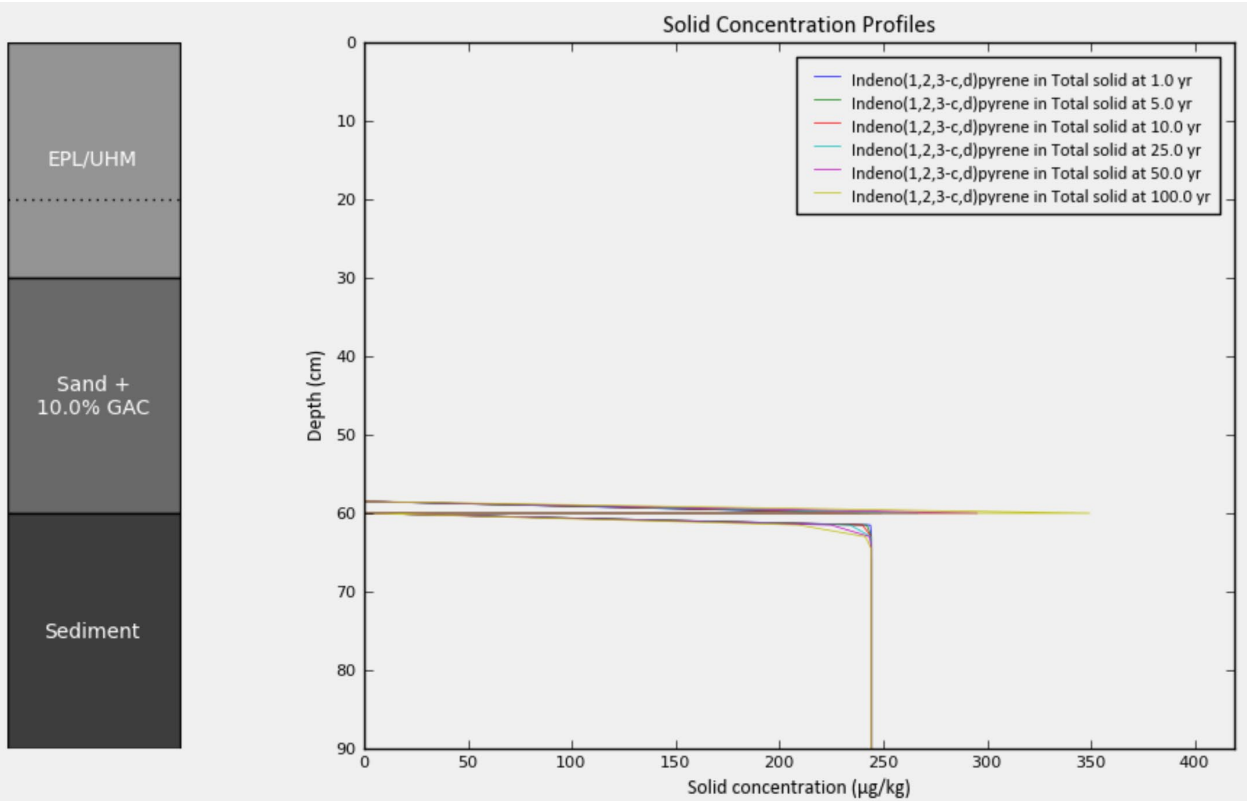

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Dieldrin in Total solid at 1.0 yr
Dieldrin in Total solid at 5.0 yr
Dieldrin in Total solid at 10.0 yr
Dieldrin in Total solid at 25.0 yr
Dieldrin in Total solid at 50.0 yr
Dieldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

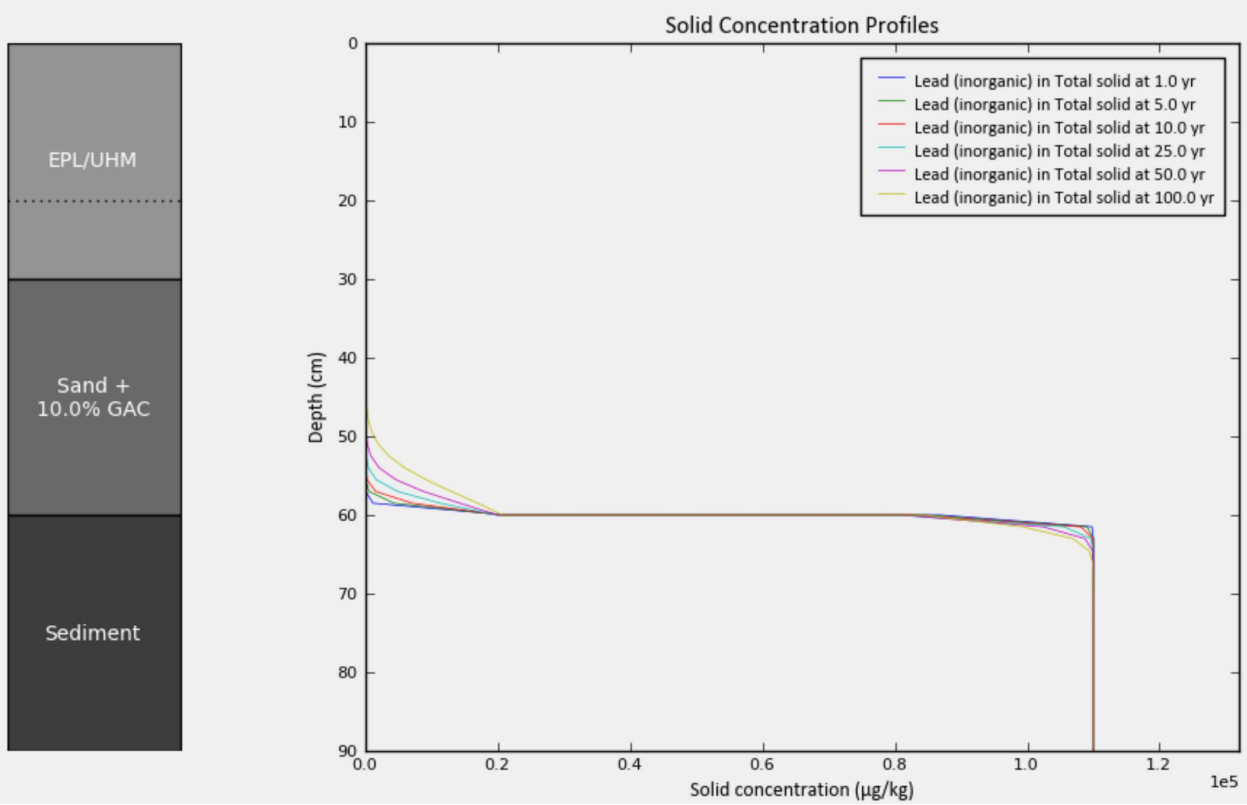

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Diesel in Total solid at 1.0 yr
Diesel in Total solid at 5.0 yr
Diesel in Total solid at 10.0 yr
Diesel in Total solid at 25.0 yr
Diesel in Total solid at 50.0 yr
Diesel in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

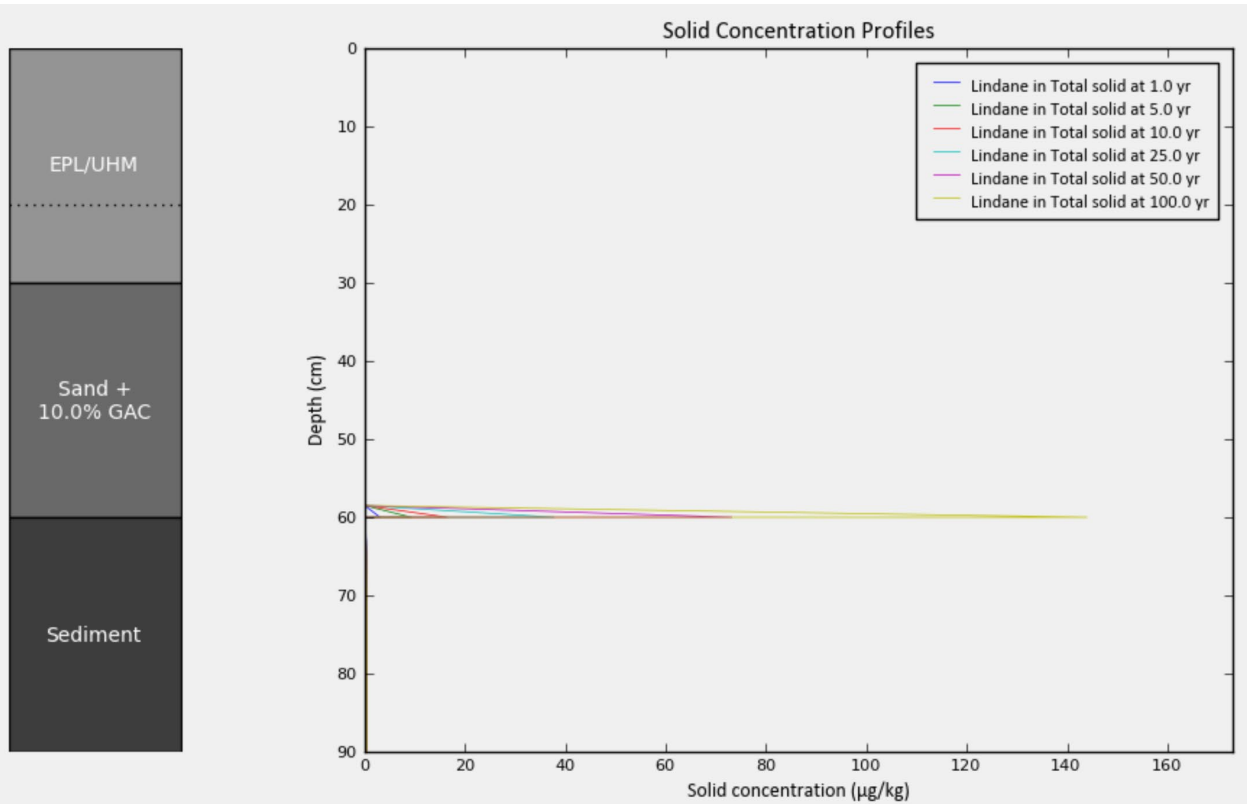

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Fluoranthene in Total solid at 1.0 yr
Fluoranthene in Total solid at 5.0 yr
Fluoranthene in Total solid at 10.0 yr
Fluoranthene in Total solid at 25.0 yr
Fluoranthene in Total solid at 50.0 yr
Fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
Solid concentration (µg/kg)

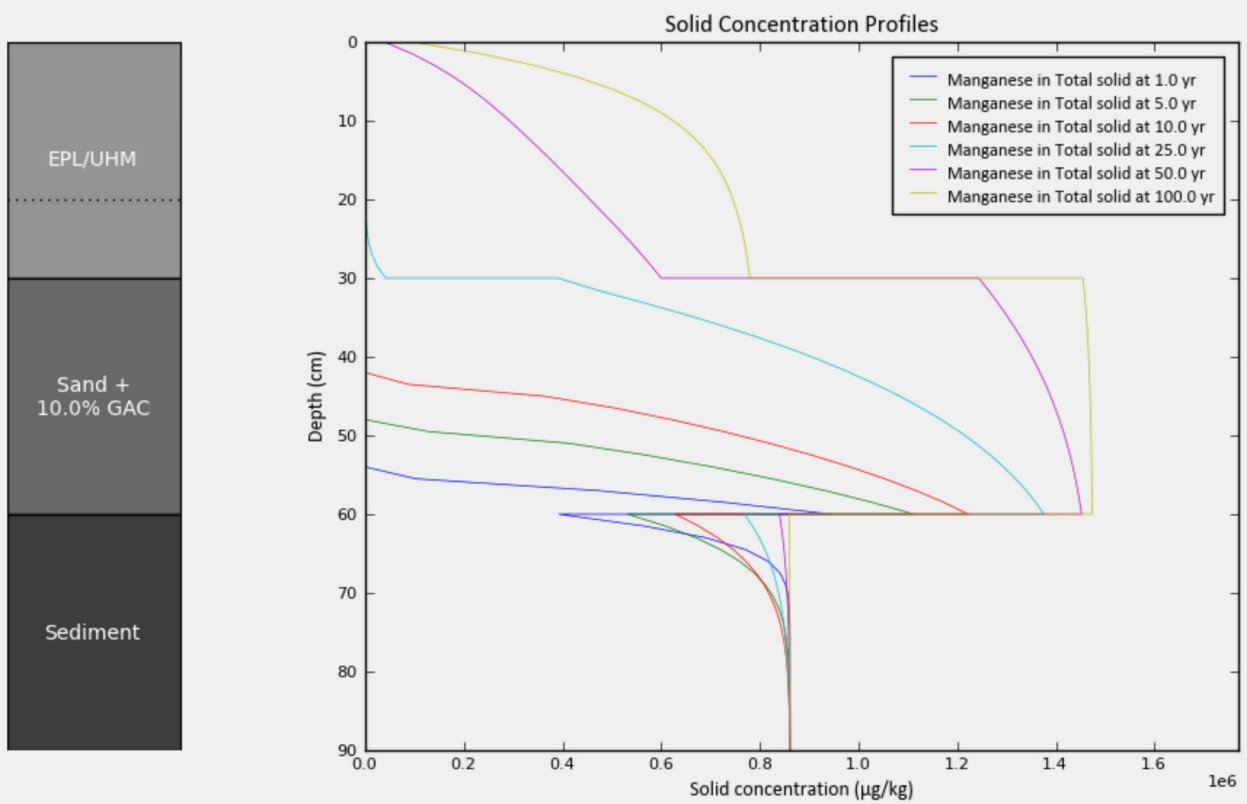

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Fluorene in Total solid at 1.0 yr
Fluorene in Total solid at 5.0 yr
Fluorene in Total solid at 10.0 yr
Fluorene in Total solid at 25.0 yr
Fluorene in Total solid at 50.0 yr
Fluorene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
500
1000
1500
2000
Solid concentration (µg/kg)

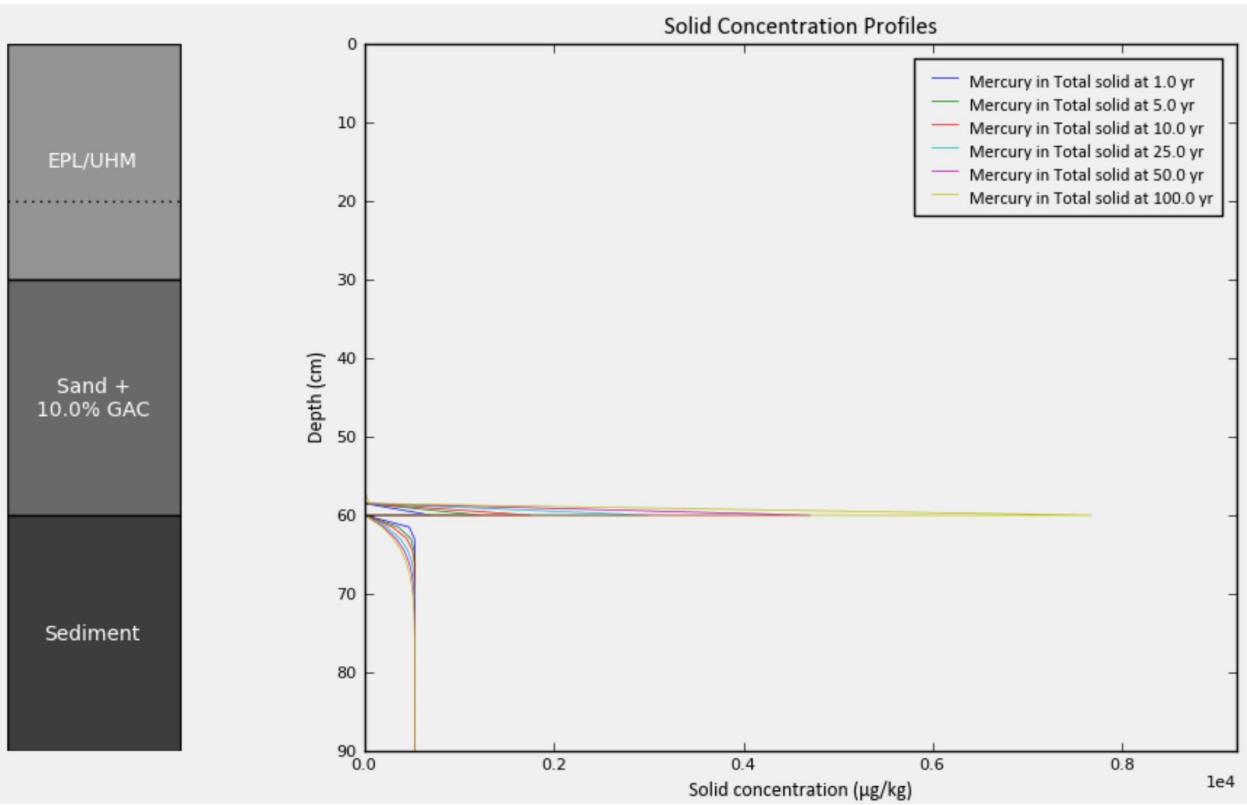

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
HxCDF in Total solid at 1.0 yr
HxCDF in Total solid at 5.0 yr
HxCDF in Total solid at 10.0 yr
HxCDF in Total solid at 25.0 yr
HxCDF in Total solid at 50.0 yr
HxCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040
Solid concentration (µg/kg)

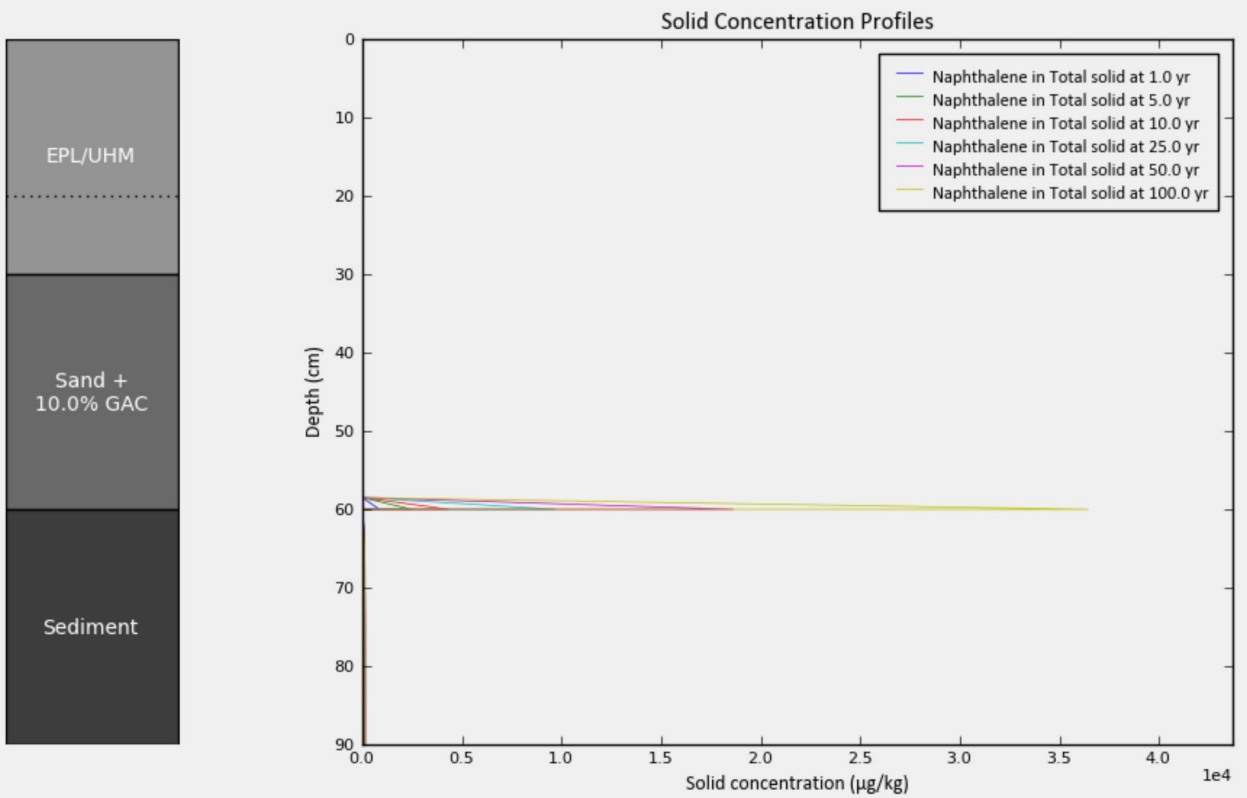

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Indeno(1,2,3-c,d)pyrene in Total solid at 1.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 5.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 10.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 25.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 50.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
50
100
150
200
250
300
350
400
Solid concentration (µg/kg)

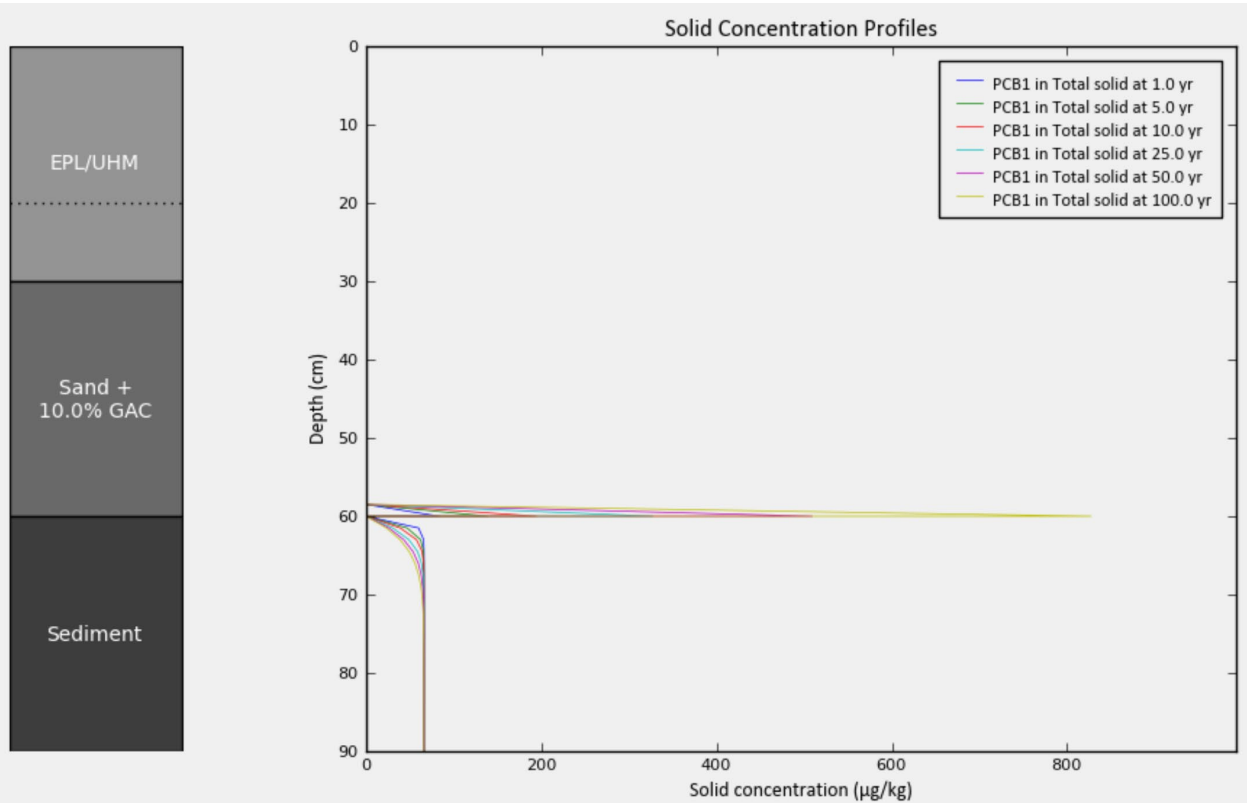

EPL/UHM
Sand + 10.0% GAC
Sediment
Solid Concentration Profiles
Lead (inorganic) in Total solid at 1.0 yr
Lead (inorganic) in Total solid at 5.0 yr
Lead (inorganic) in Total solid at 10.0 yr
Lead (inorganic) in Total solid at 25.0 yr
Lead (inorganic) in Total solid at 50.0 yr
Lead (inorganic) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

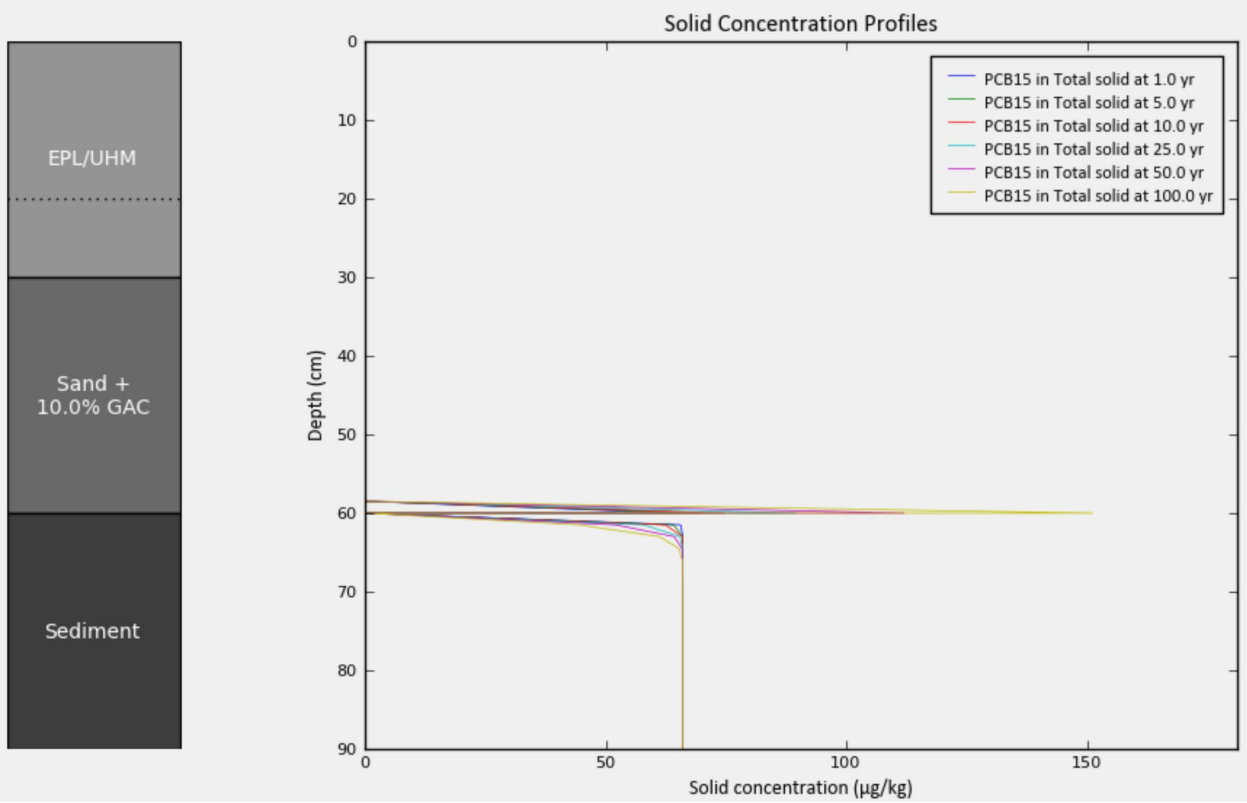

EPL/UHM
Sand + 10.0% GAC
Sediment
Solid Concentration Profiles
Lindane in Total solid at 1.0 yr
Lindane in Total solid at 5.0 yr
Lindane in Total solid at 10.0 yr
Lindane in Total solid at 25.0 yr
Lindane in Total solid at 50.0 yr
Lindane in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

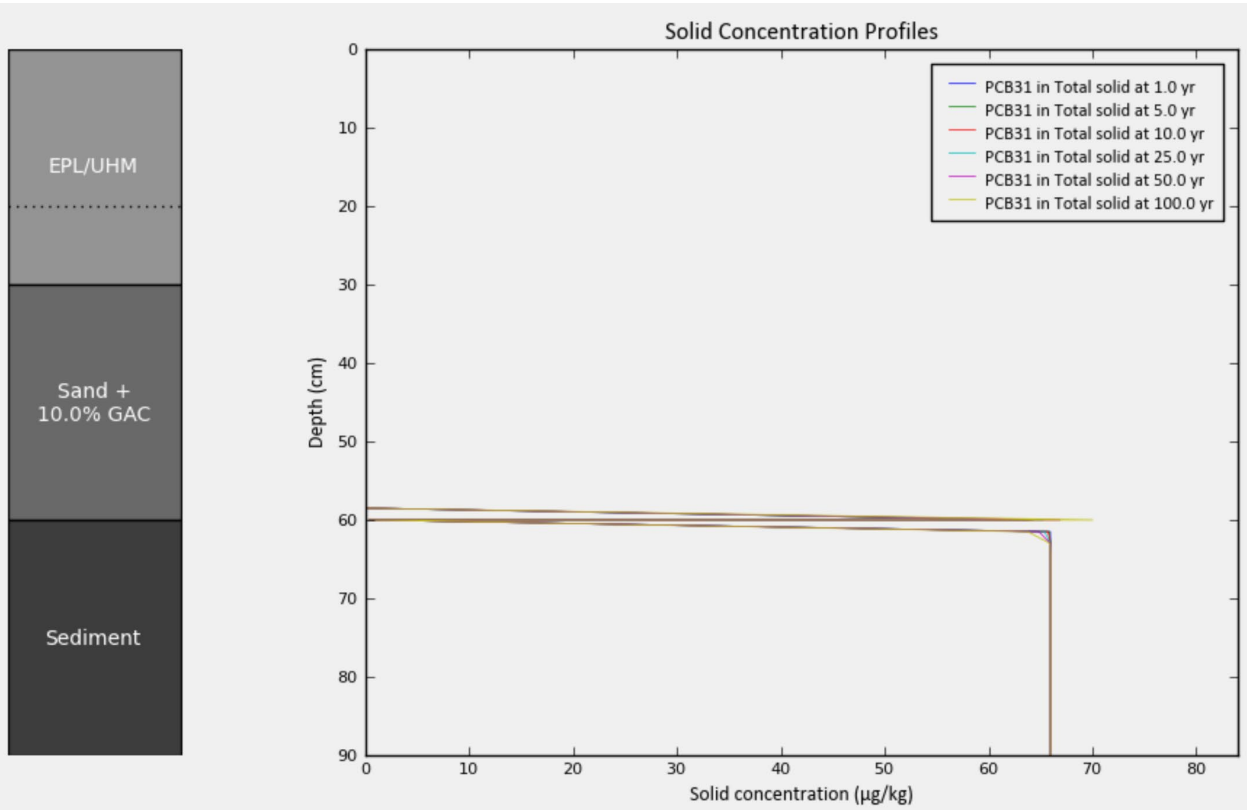

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Manganese in Total solid at 1.0 yr
Manganese in Total solid at 5.0 yr
Manganese in Total solid at 10.0 yr
Manganese in Total solid at 25.0 yr
Manganese in Total solid at 50.0 yr
Manganese in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

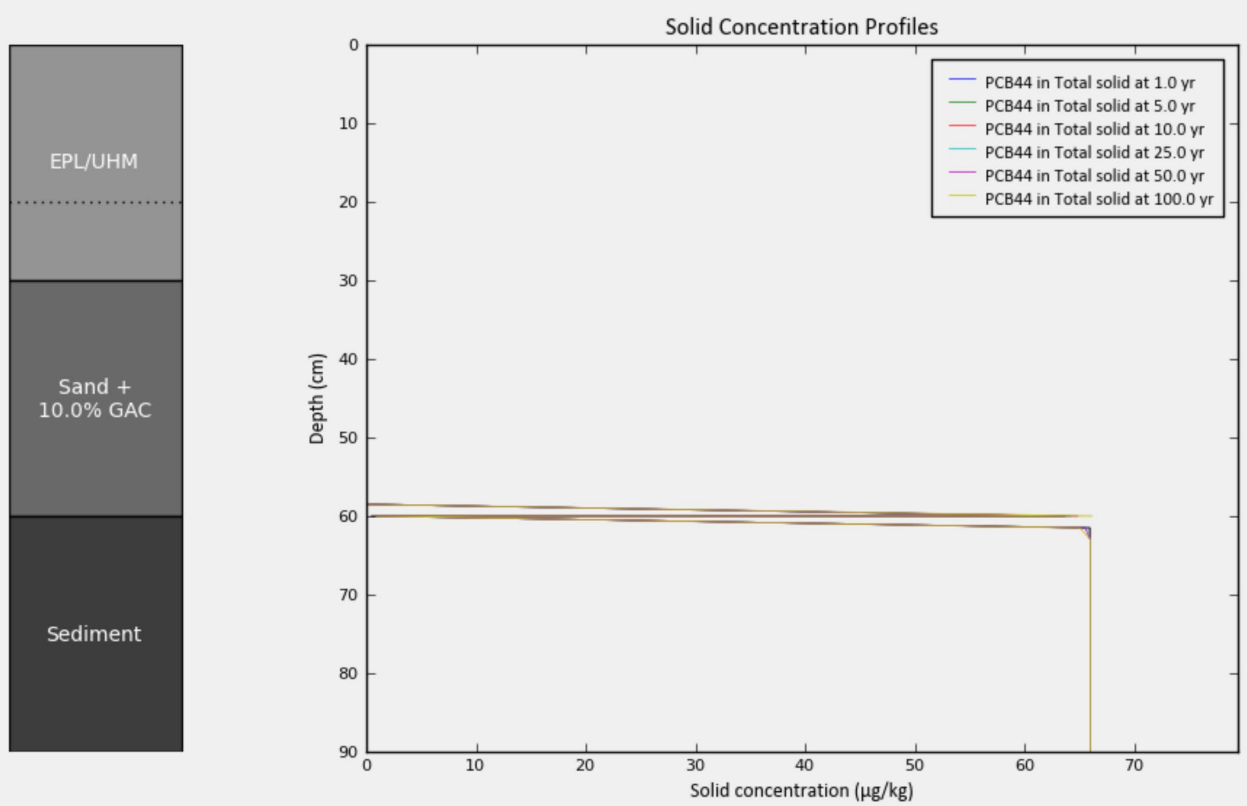

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Mercury in Total solid at 1.0 yr
Mercury in Total solid at 5.0 yr
Mercury in Total solid at 10.0 yr
Mercury in Total solid at 25.0 yr
Mercury in Total solid at 50.0 yr
Mercury in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

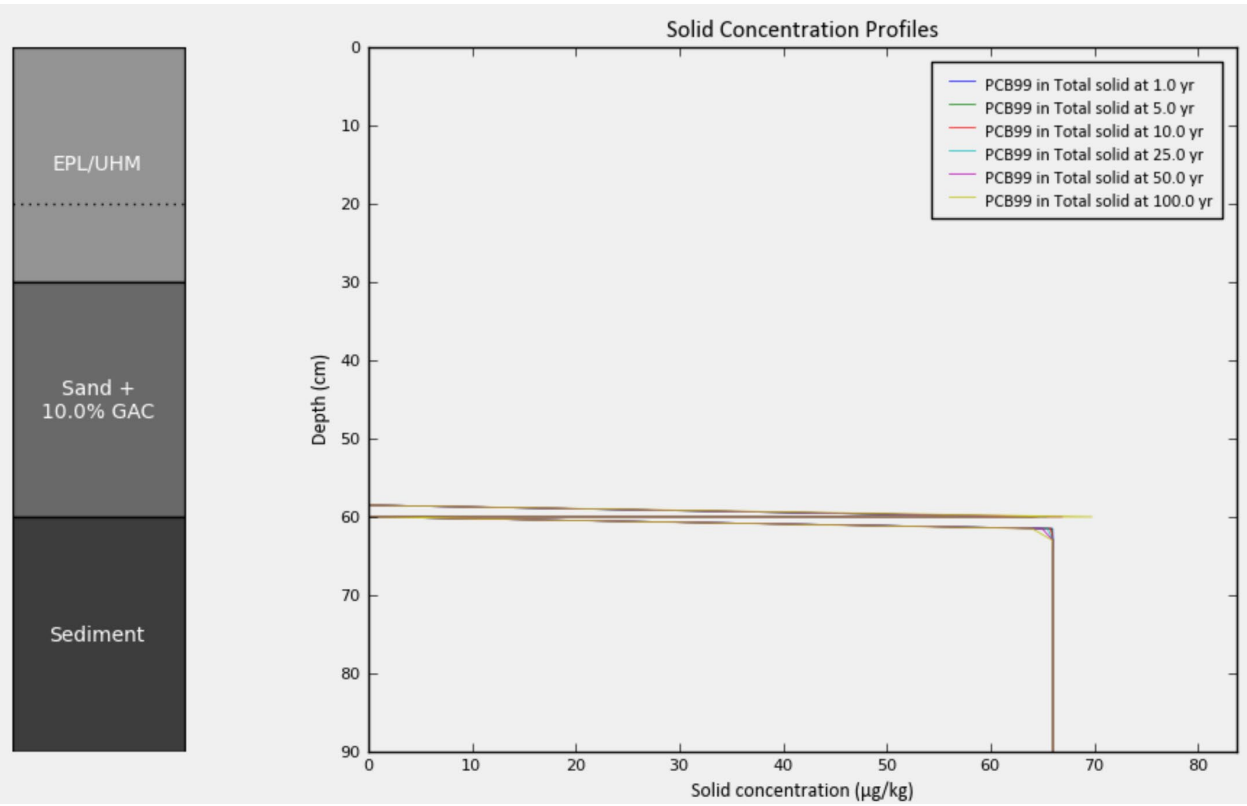

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Naphthalene in Total solid at 1.0 yr
Naphthalene in Total solid at 5.0 yr
Naphthalene in Total solid at 10.0 yr
Naphthalene in Total solid at 25.0 yr
Naphthalene in Total solid at 50.0 yr
Naphthalene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
1e4
Solid concentration (µg/kg)

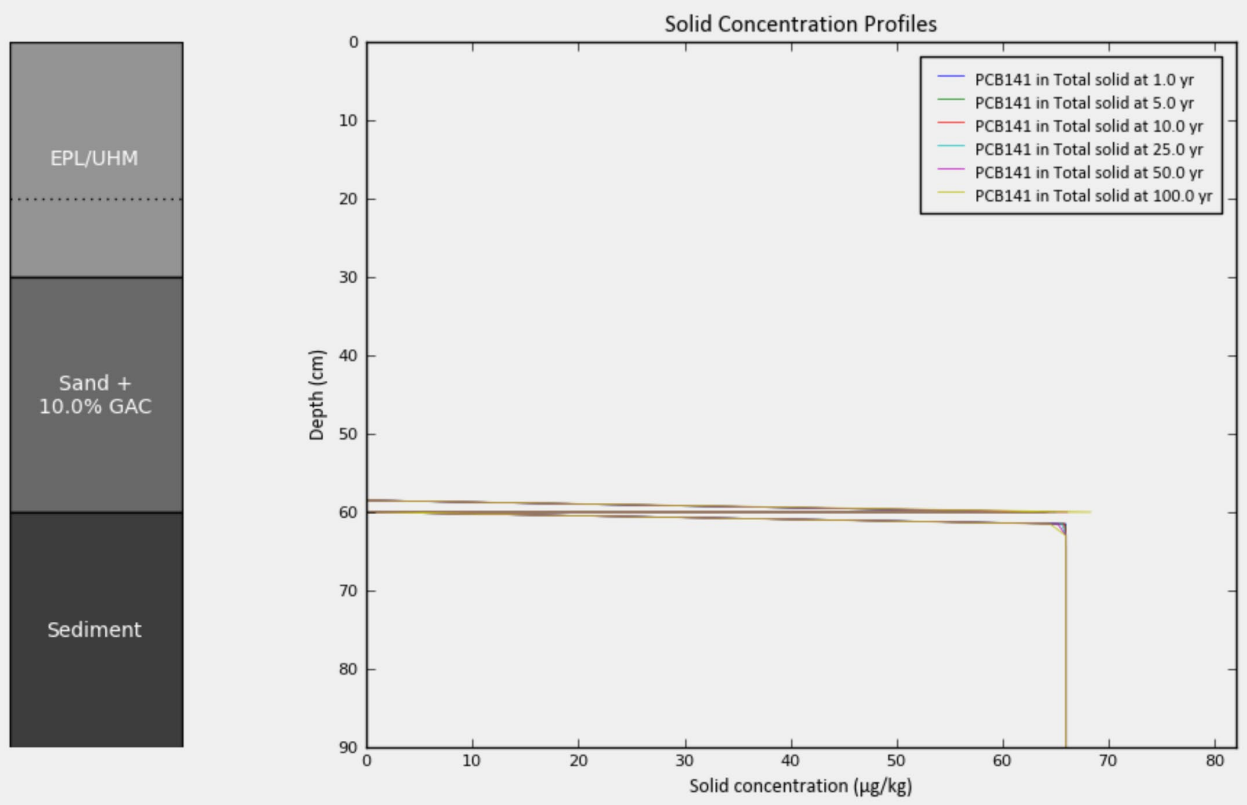

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB1 in Total solid at 1.0 yr
PCB1 in Total solid at 5.0 yr
PCB1 in Total solid at 10.0 yr
PCB1 in Total solid at 25.0 yr
PCB1 in Total solid at 50.0 yr
PCB1 in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
200
400
600
800
Solid concentration (µg/kg)

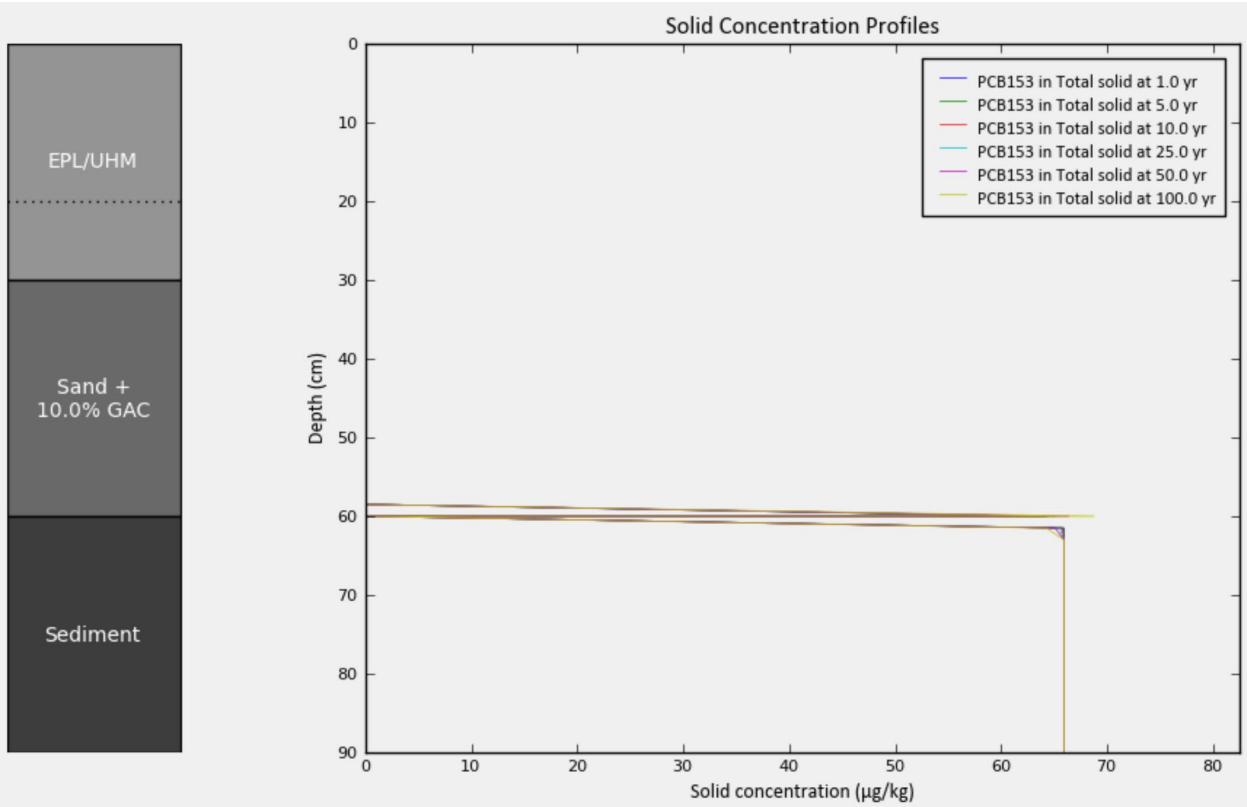

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB15 in Total solid at 1.0 yr
PCB15 in Total solid at 5.0 yr
PCB15 in Total solid at 10.0 yr
PCB15 in Total solid at 25.0 yr
PCB15 in Total solid at 50.0 yr
PCB15 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

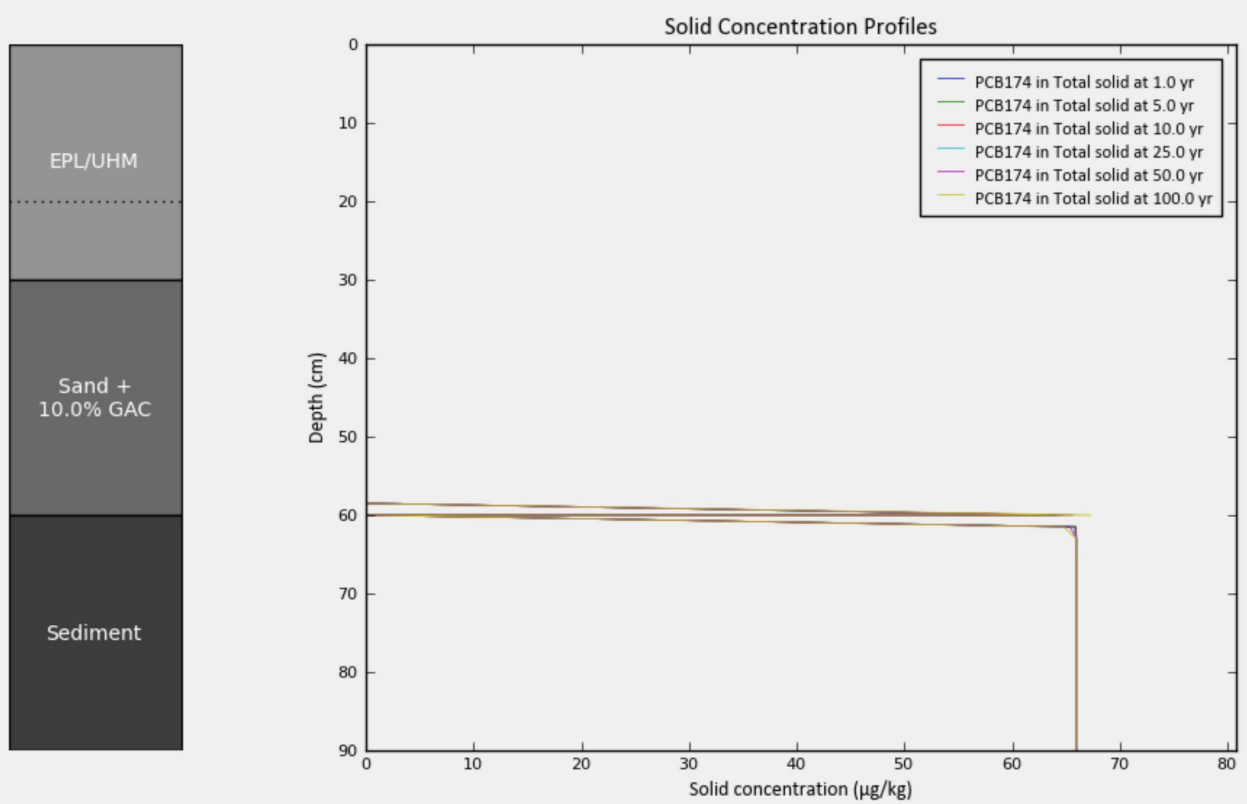

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB31 in Total solid at 1.0 yr
PCB31 in Total solid at 5.0 yr
PCB31 in Total solid at 10.0 yr
PCB31 in Total solid at 25.0 yr
PCB31 in Total solid at 50.0 yr
PCB31 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

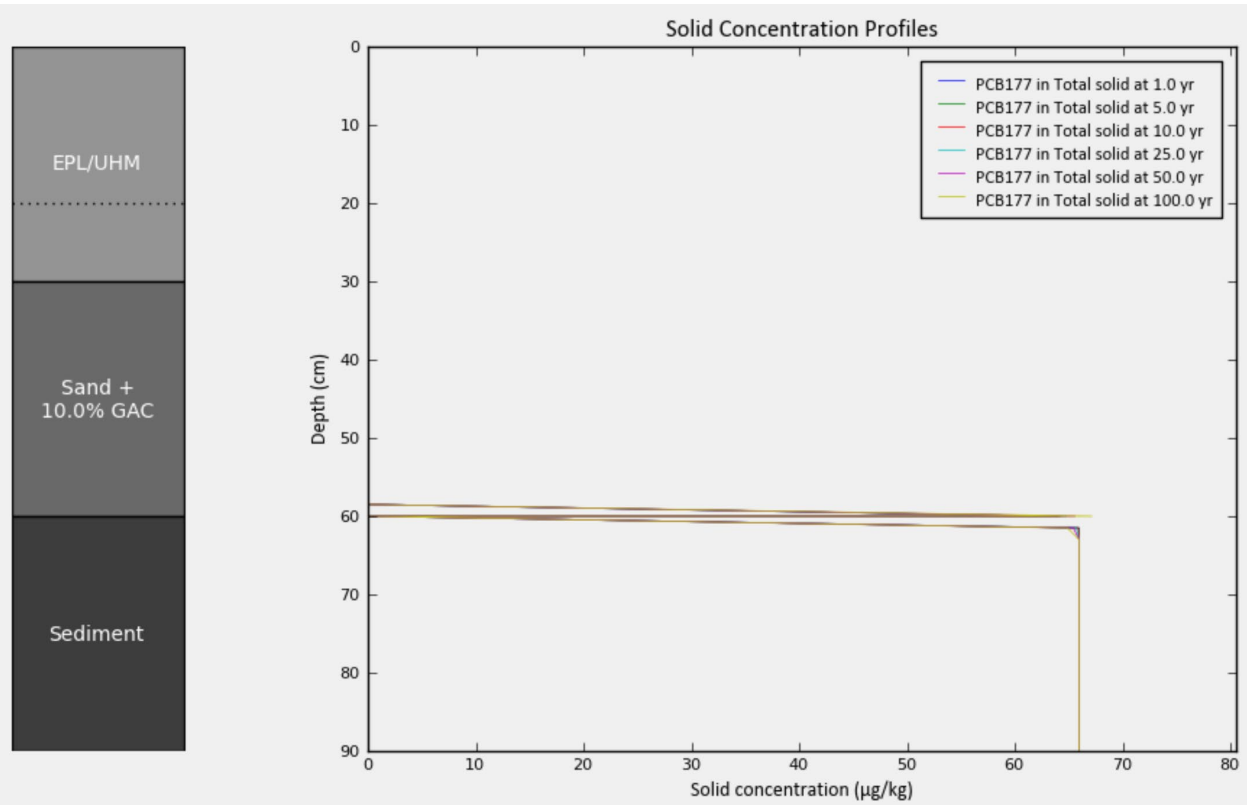

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB44 in Total solid at 1.0 yr
PCB44 in Total solid at 5.0 yr
PCB44 in Total solid at 10.0 yr
PCB44 in Total solid at 25.0 yr
PCB44 in Total solid at 50.0 yr
PCB44 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

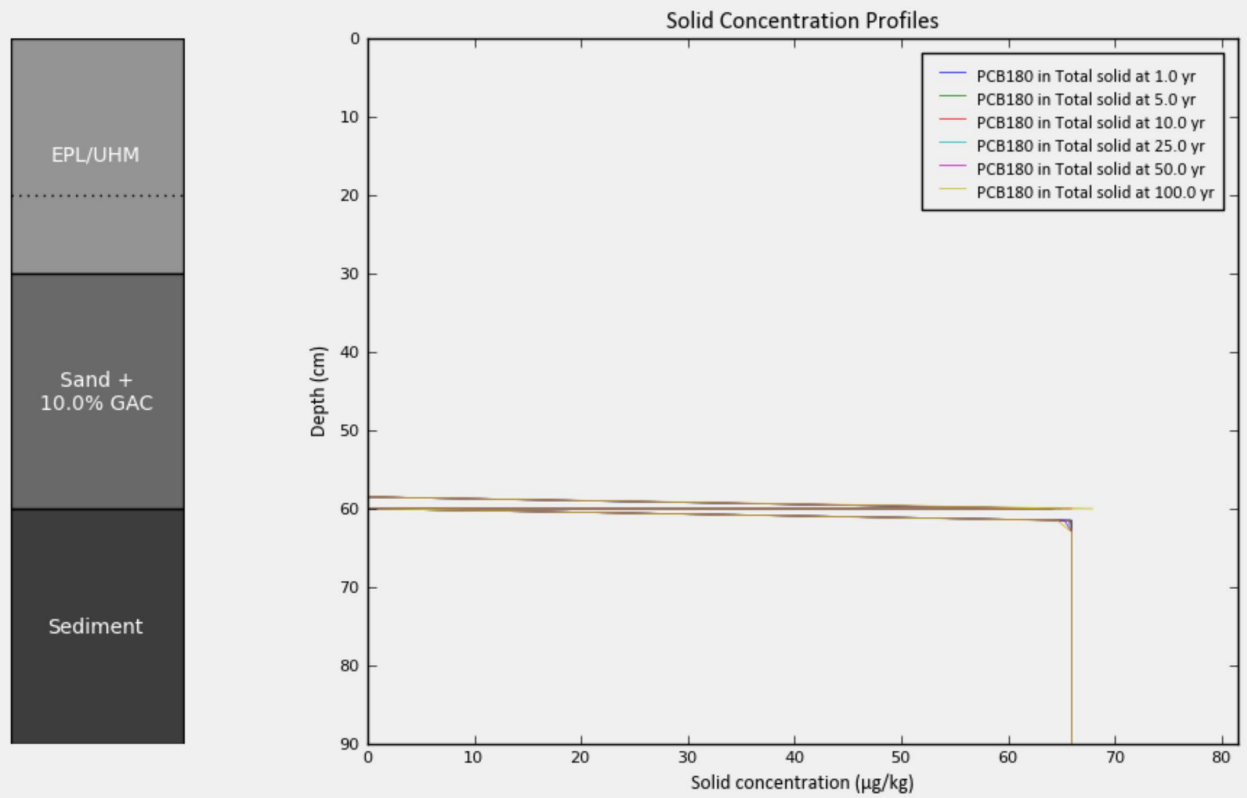

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB99 in Total solid at 1.0 yr
PCB99 in Total solid at 5.0 yr
PCB99 in Total solid at 10.0 yr
PCB99 in Total solid at 25.0 yr
PCB99 in Total solid at 50.0 yr
PCB99 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

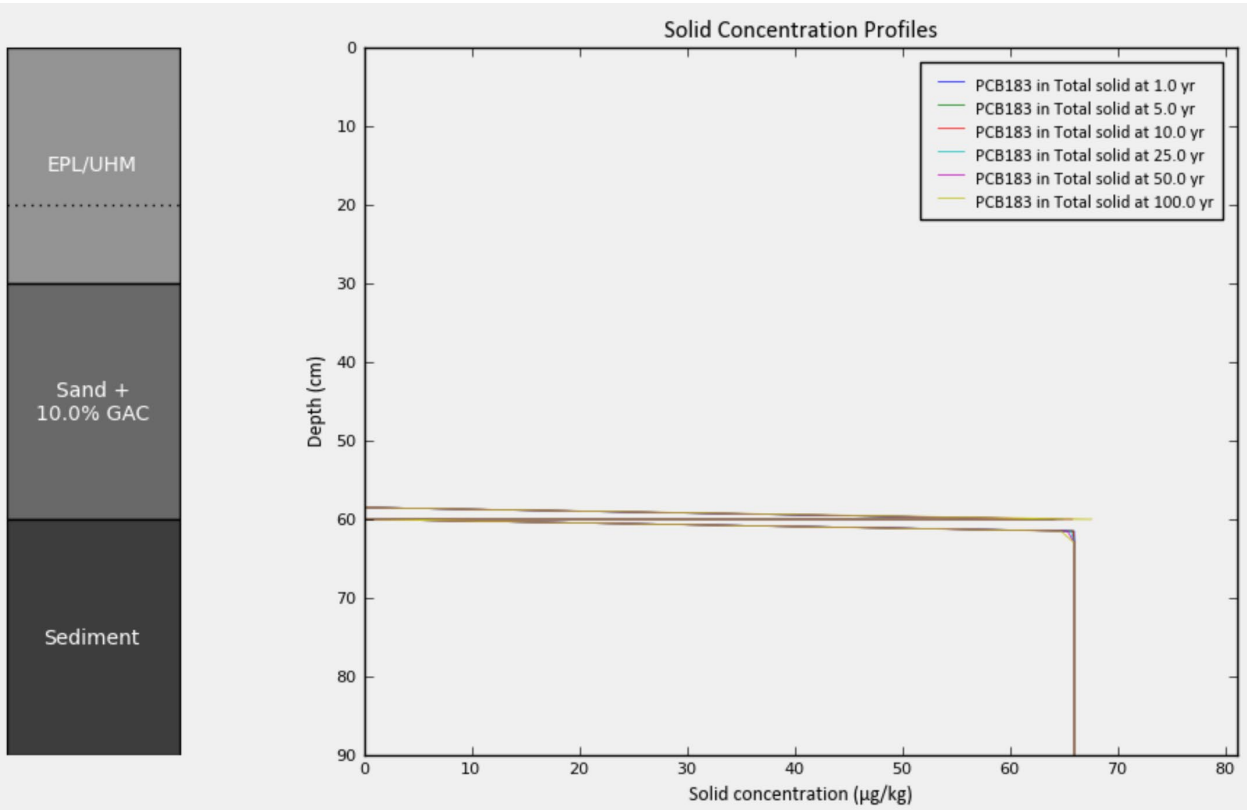

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB141 in Total solid at 1.0 yr
PCB141 in Total solid at 5.0 yr
PCB141 in Total solid at 10.0 yr
PCB141 in Total solid at 25.0 yr
PCB141 in Total solid at 50.0 yr
PCB141 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

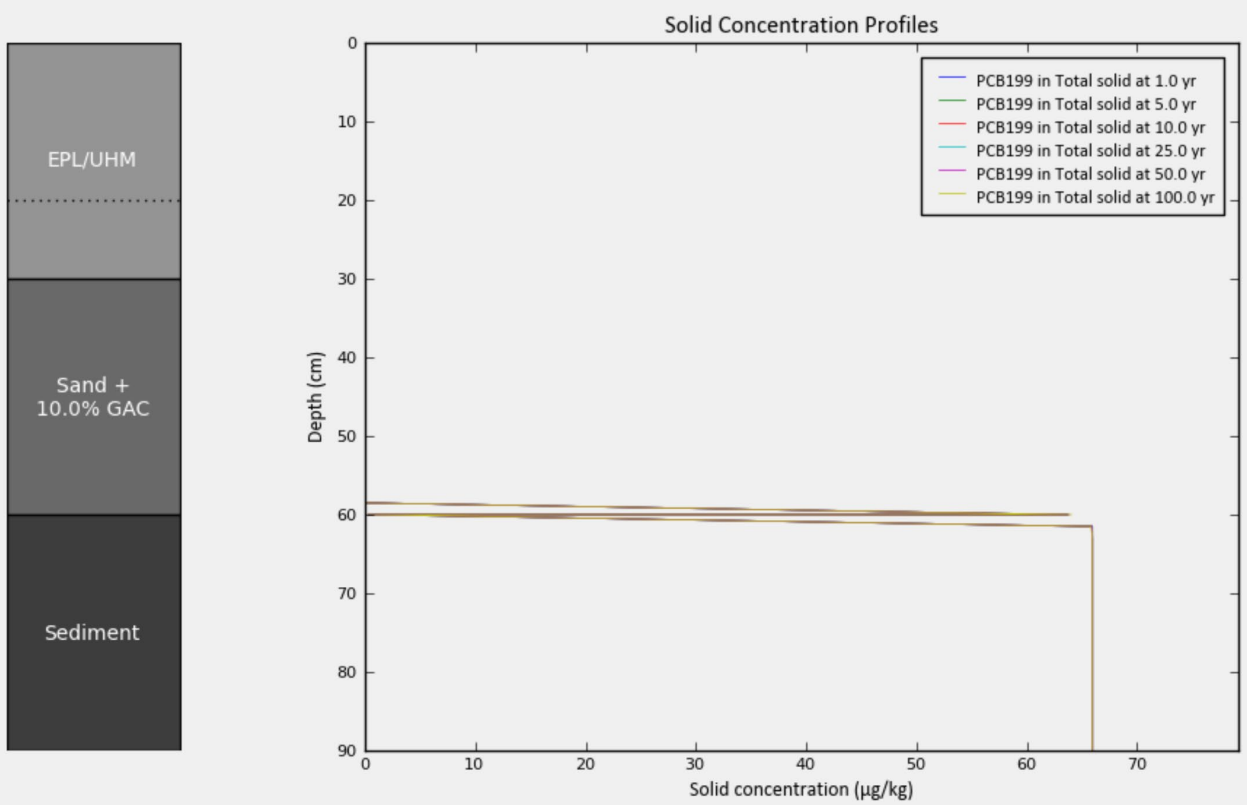

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB153 in Total solid at 1.0 yr
PCB153 in Total solid at 5.0 yr
PCB153 in Total solid at 10.0 yr
PCB153 in Total solid at 25.0 yr
PCB153 in Total solid at 50.0 yr
PCB153 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

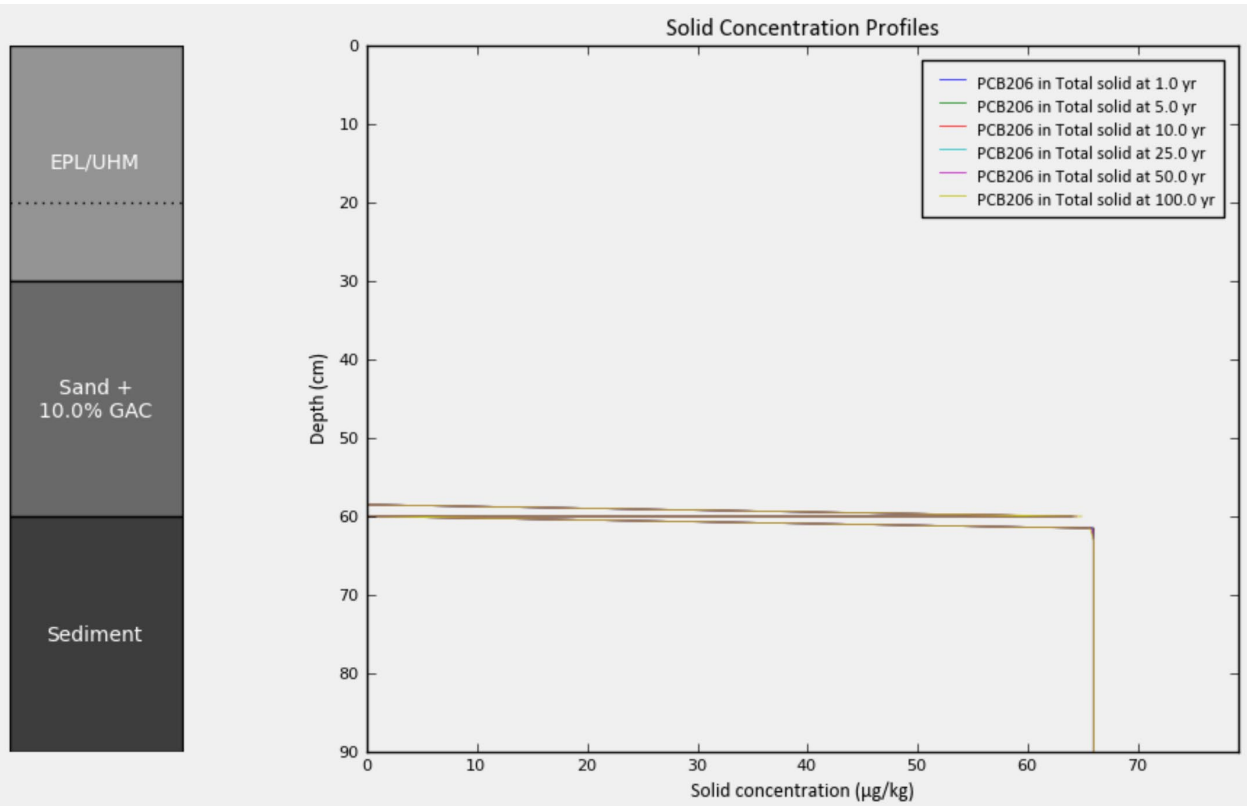

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB174 in Total solid at 1.0 yr
PCB174 in Total solid at 5.0 yr
PCB174 in Total solid at 10.0 yr
PCB174 in Total solid at 25.0 yr
PCB174 in Total solid at 50.0 yr
PCB174 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

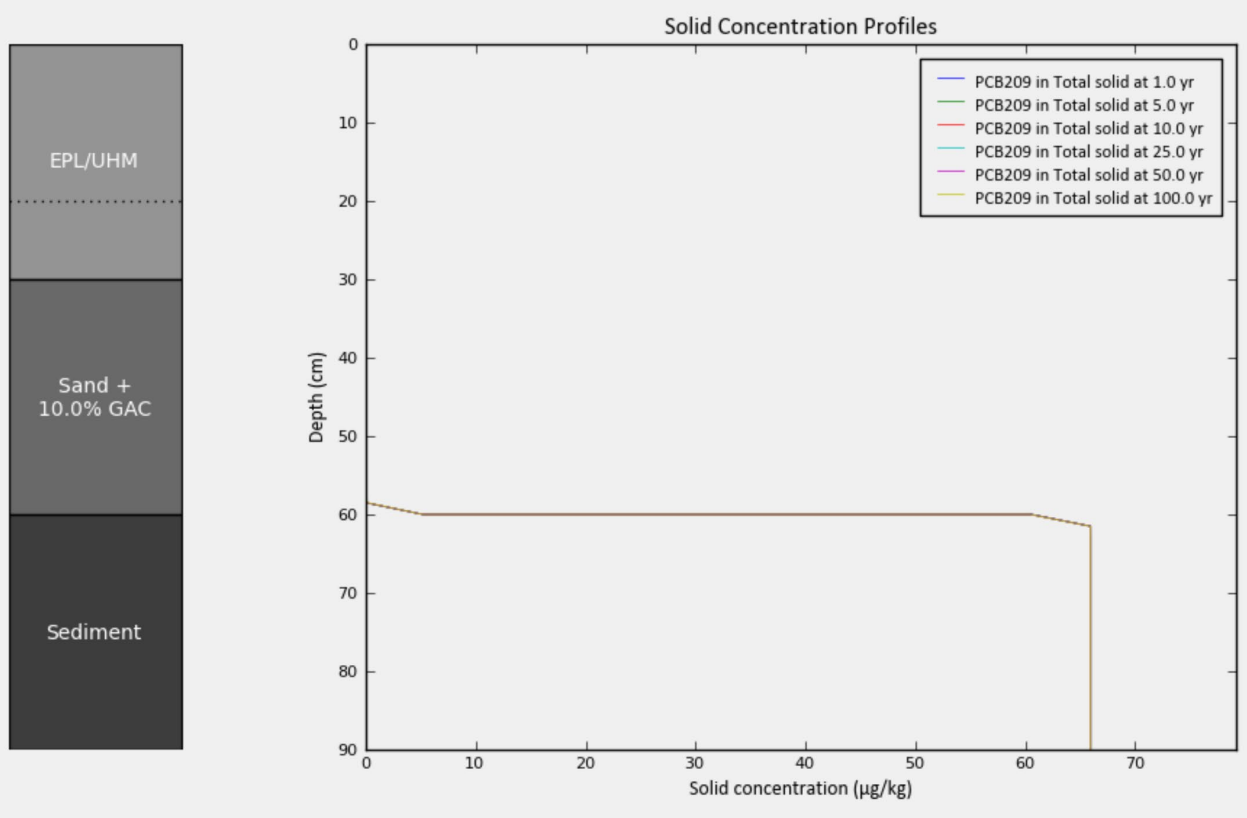

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB177 in Total solid at 1.0 yr
PCB177 in Total solid at 5.0 yr
PCB177 in Total solid at 10.0 yr
PCB177 in Total solid at 25.0 yr
PCB177 in Total solid at 50.0 yr
PCB177 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

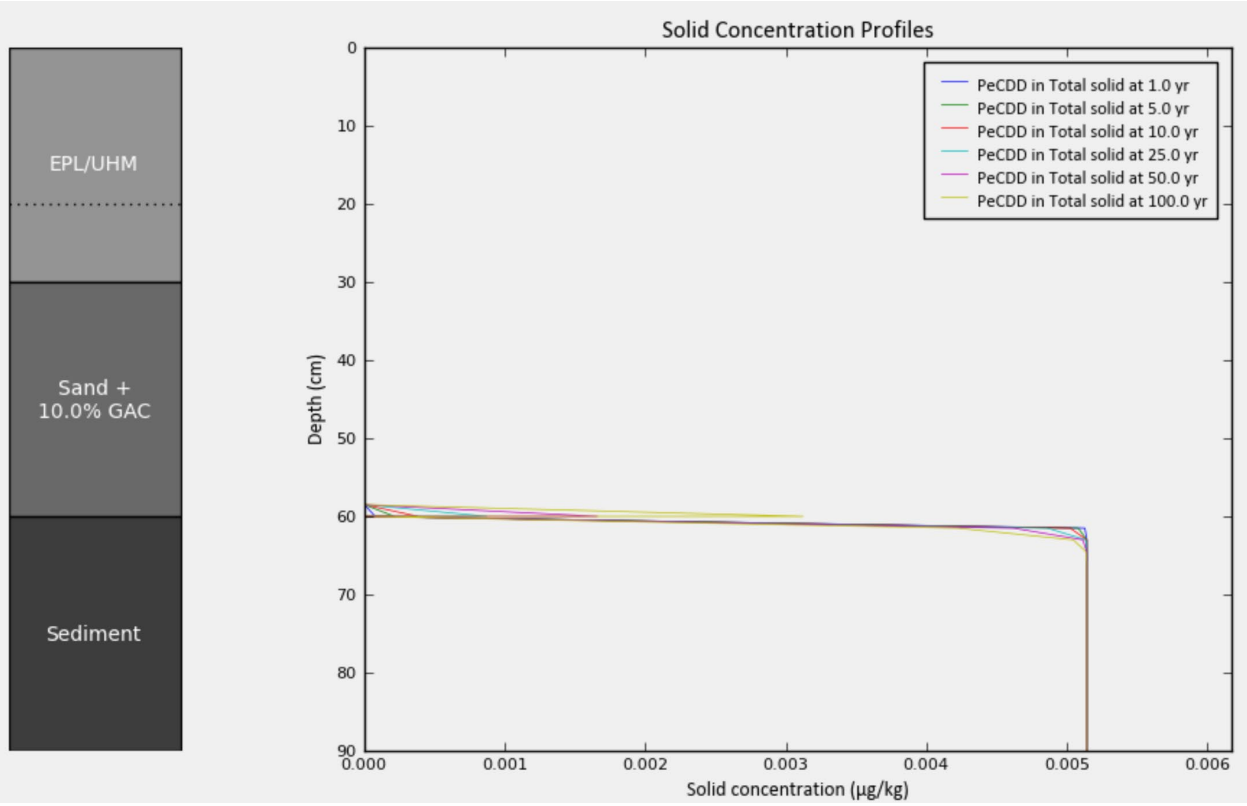

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB180 in Total solid at 1.0 yr
PCB180 in Total solid at 5.0 yr
PCB180 in Total solid at 10.0 yr
PCB180 in Total solid at 25.0 yr
PCB180 in Total solid at 50.0 yr
PCB180 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90

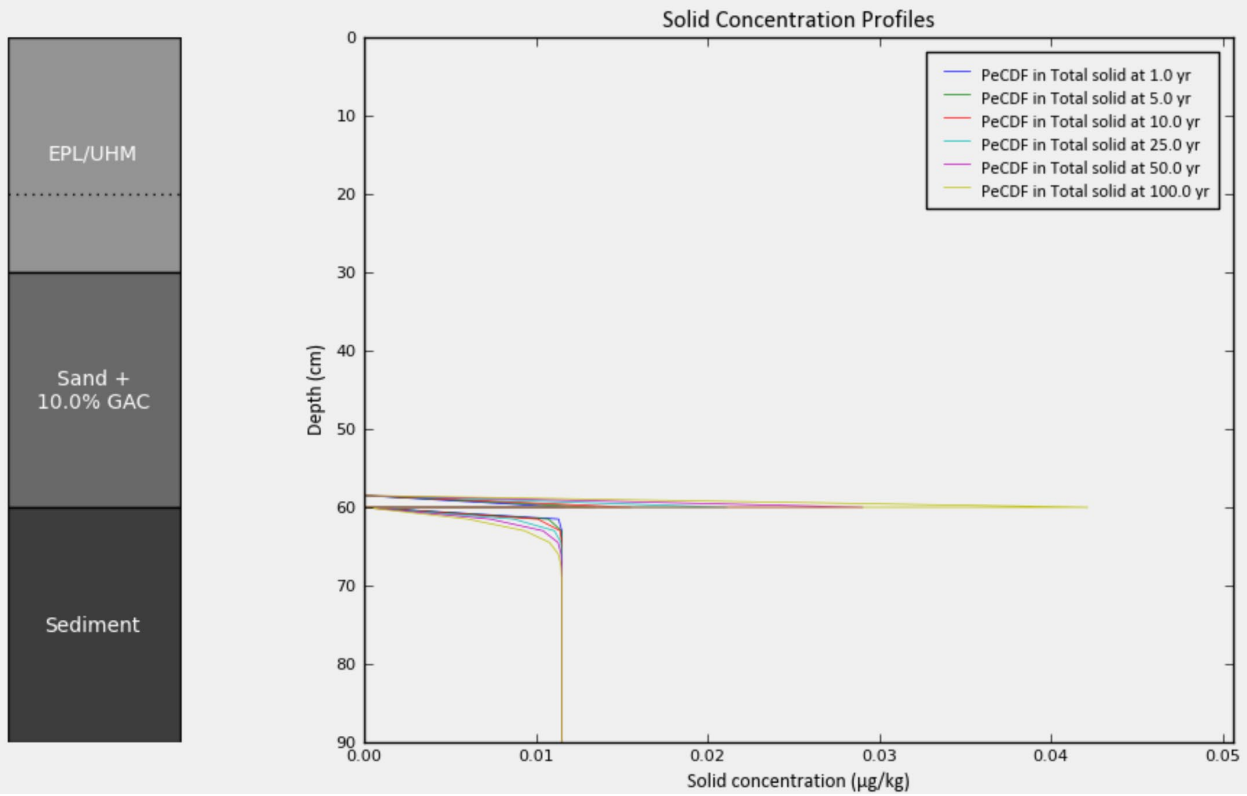

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB183 in Total solid at 1.0 yr
PCB183 in Total solid at 5.0 yr
PCB183 in Total solid at 10.0 yr
PCB183 in Total solid at 25.0 yr
PCB183 in Total solid at 50.0 yr
PCB183 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90

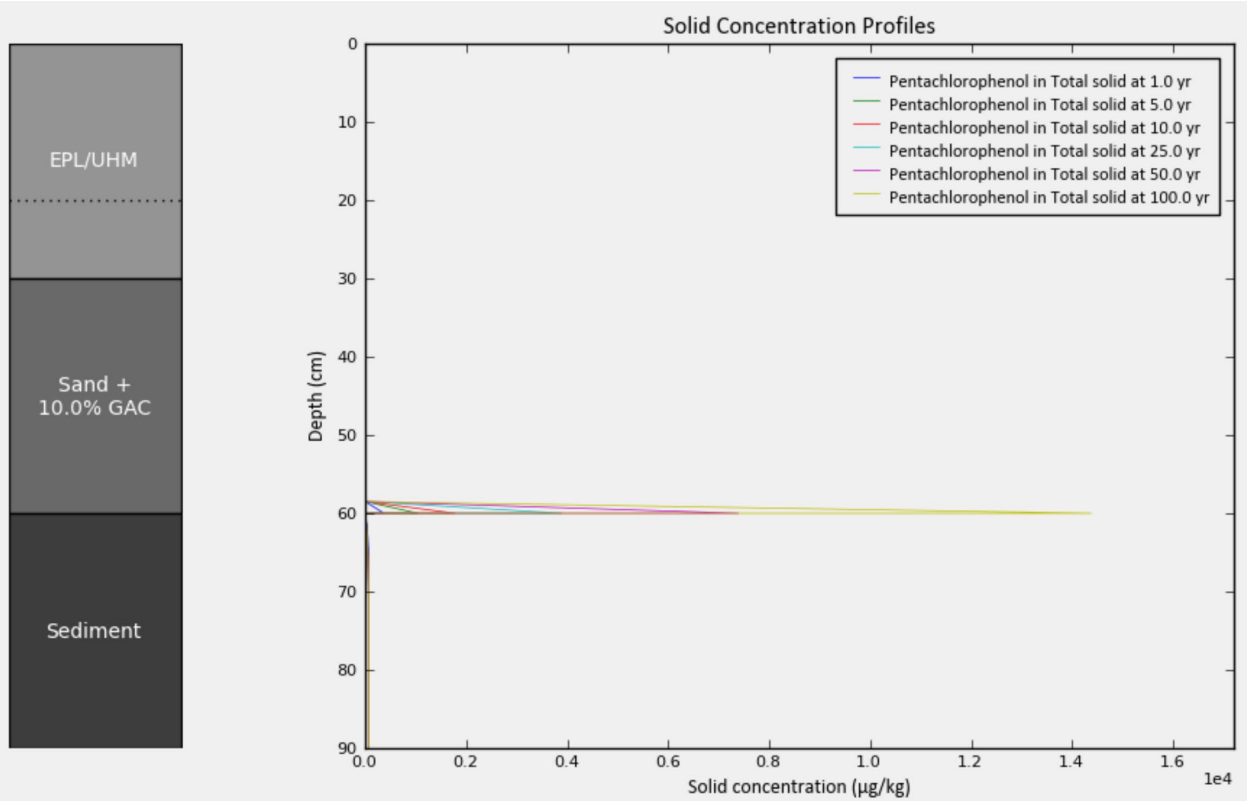

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB199 in Total solid at 1.0 yr
PCB199 in Total solid at 5.0 yr
PCB199 in Total solid at 10.0 yr
PCB199 in Total solid at 25.0 yr
PCB199 in Total solid at 50.0 yr
PCB199 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

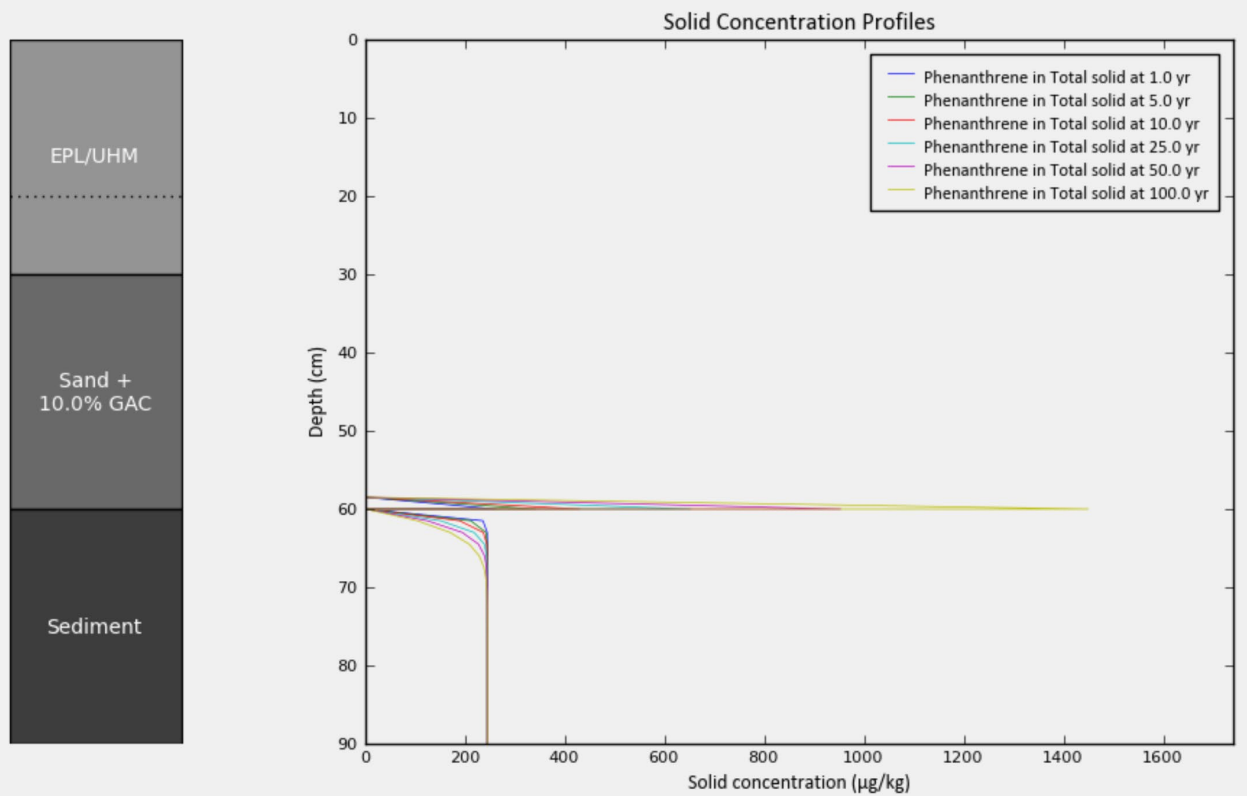

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB206 in Total solid at 1.0 yr
PCB206 in Total solid at 5.0 yr
PCB206 in Total solid at 10.0 yr
PCB206 in Total solid at 25.0 yr
PCB206 in Total solid at 50.0 yr
PCB206 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

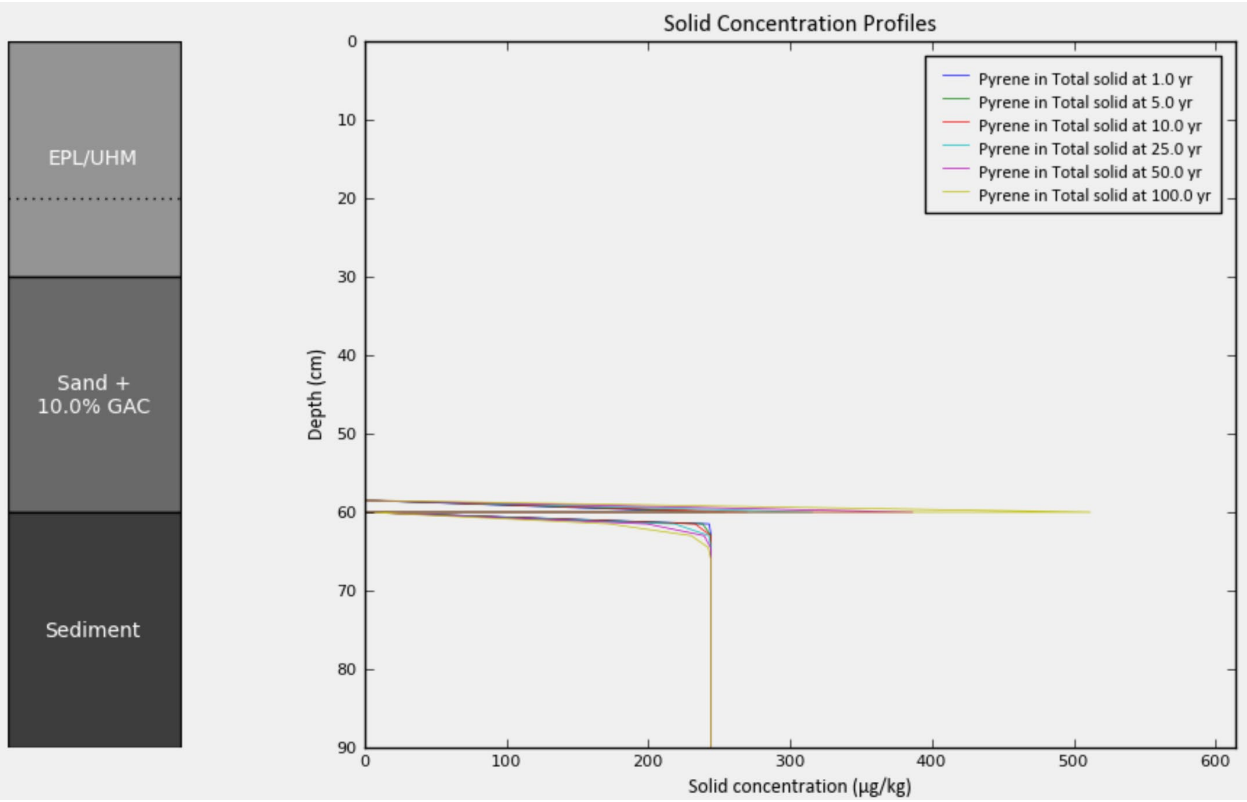

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PCB209 in Total solid at 1.0 yr
PCB209 in Total solid at 5.0 yr
PCB209 in Total solid at 10.0 yr
PCB209 in Total solid at 25.0 yr
PCB209 in Total solid at 50.0 yr
PCB209 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

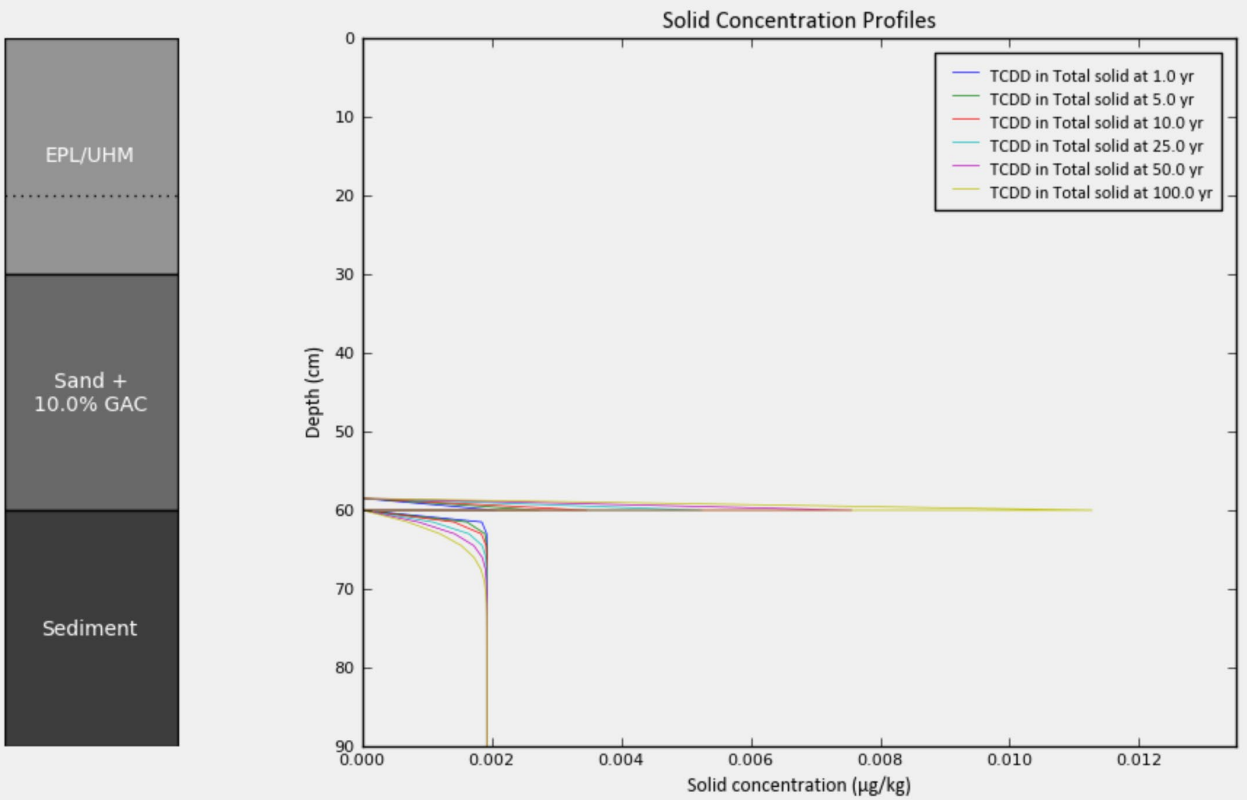

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PeCDD in Total solid at 1.0 yr
PeCDD in Total solid at 5.0 yr
PeCDD in Total solid at 10.0 yr
PeCDD in Total solid at 25.0 yr
PeCDD in Total solid at 50.0 yr
PeCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

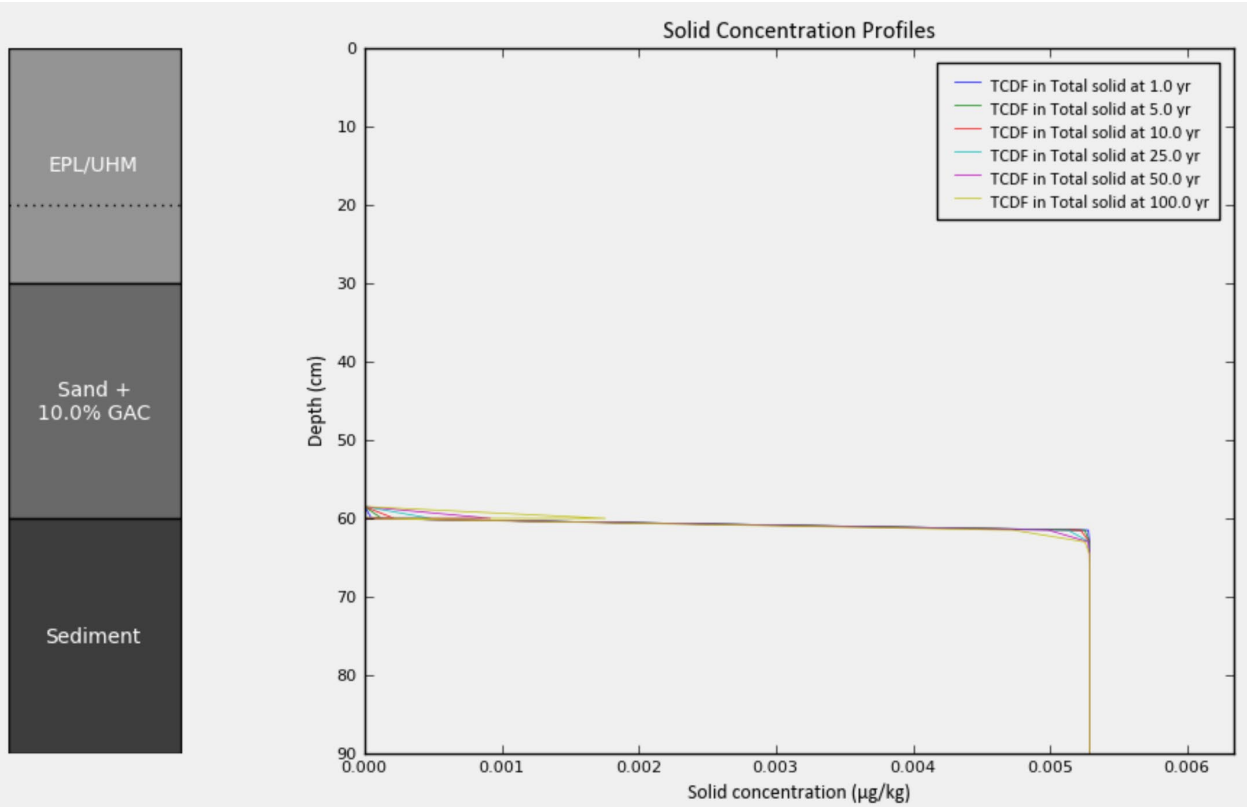

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
PeCDF in Total solid at 1.0 yr
PeCDF in Total solid at 5.0 yr
PeCDF in Total solid at 10.0 yr
PeCDF in Total solid at 25.0 yr
PeCDF in Total solid at 50.0 yr
PeCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.00
0.01
0.02
0.03
0.04
0.05
Solid concentration (µg/kg)

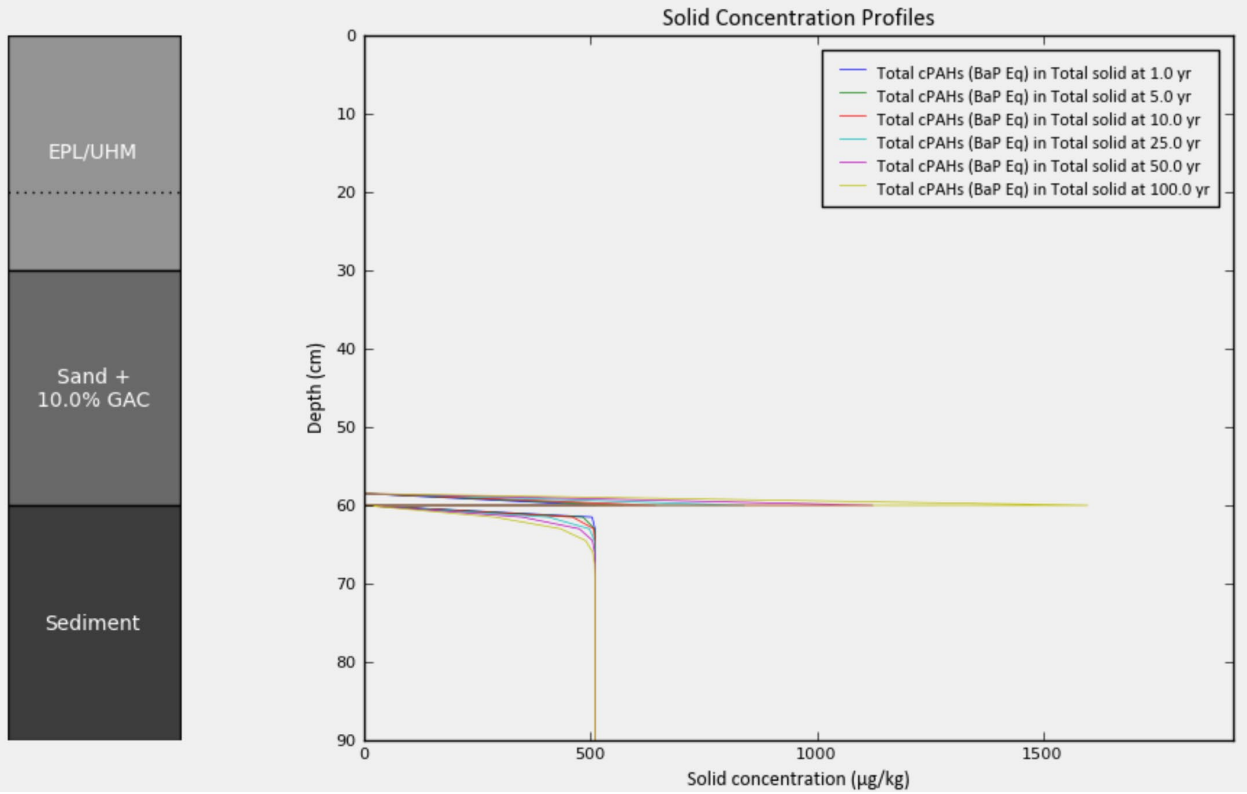

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Pentachlorophenol in Total solid at 1.0 yr
Pentachlorophenol in Total solid at 5.0 yr
Pentachlorophenol in Total solid at 10.0 yr
Pentachlorophenol in Total solid at 25.0 yr
Pentachlorophenol in Total solid at 50.0 yr
Pentachlorophenol in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1e4
Solid concentration (µg/kg)

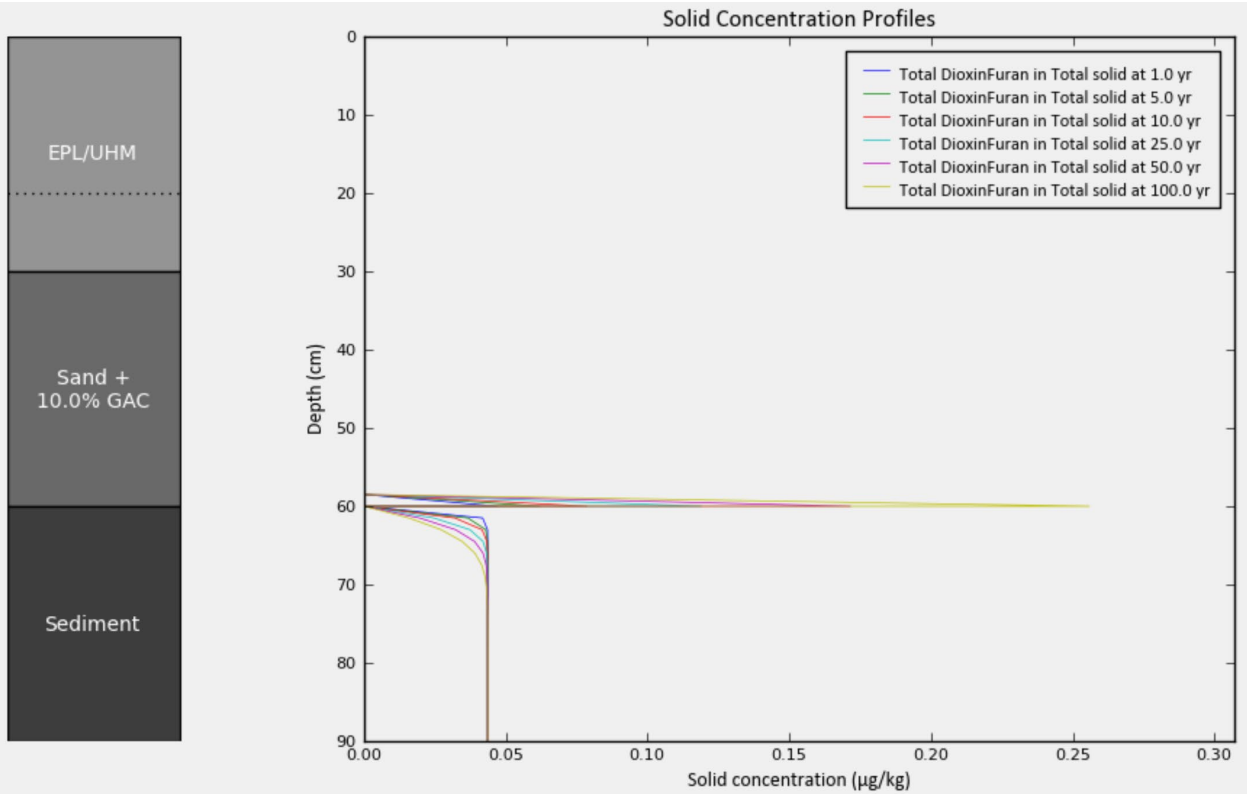

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Phenanthrene in Total solid at 1.0 yr
Phenanthrene in Total solid at 5.0 yr
Phenanthrene in Total solid at 10.0 yr
Phenanthrene in Total solid at 25.0 yr
Phenanthrene in Total solid at 50.0 yr
Phenanthrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
200
400
600
800
1000
1200
1400
1600

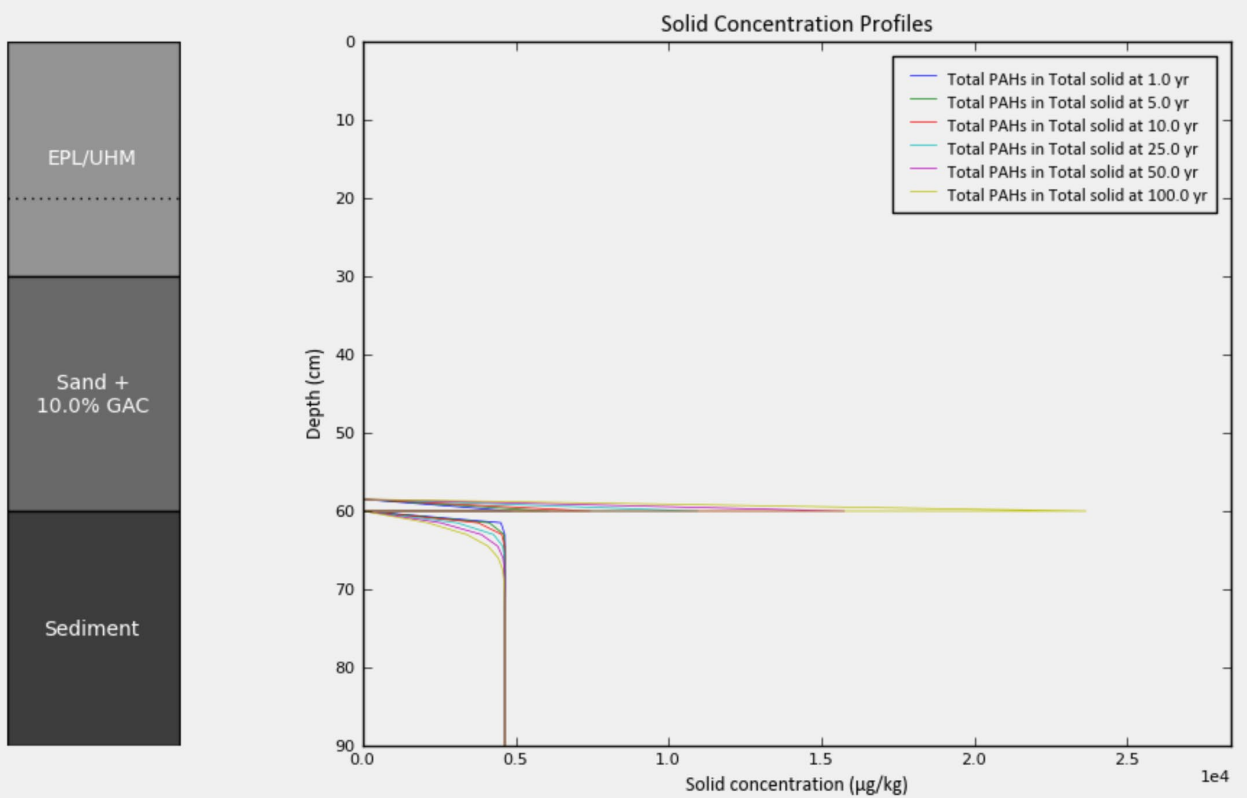

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Pyrene in Total solid at 1.0 yr
Pyrene in Total solid at 5.0 yr
Pyrene in Total solid at 10.0 yr
Pyrene in Total solid at 25.0 yr
Pyrene in Total solid at 50.0 yr
Pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500
600

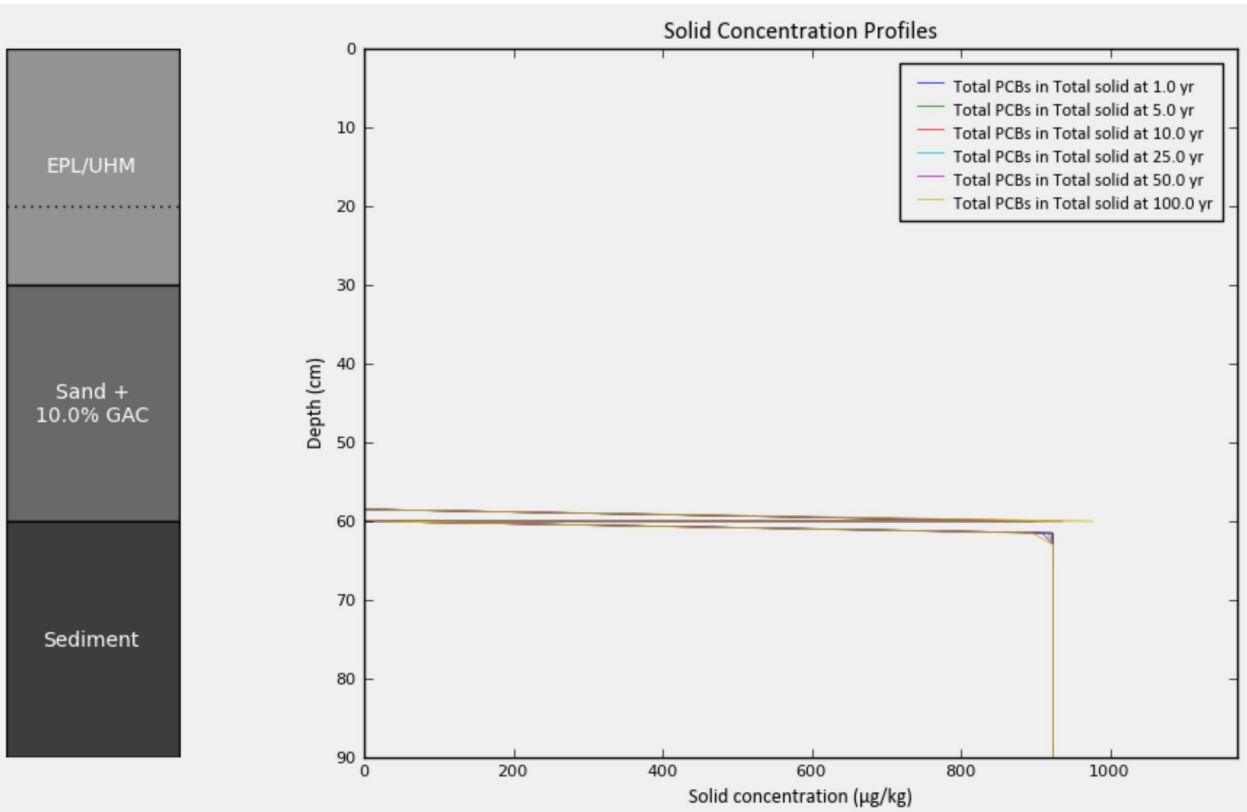

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
TCDD in Total solid at 1.0 yr
TCDD in Total solid at 5.0 yr
TCDD in Total solid at 10.0 yr
TCDD in Total solid at 25.0 yr
TCDD in Total solid at 50.0 yr
TCDD in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
0.012
Solid concentration (µg/kg)

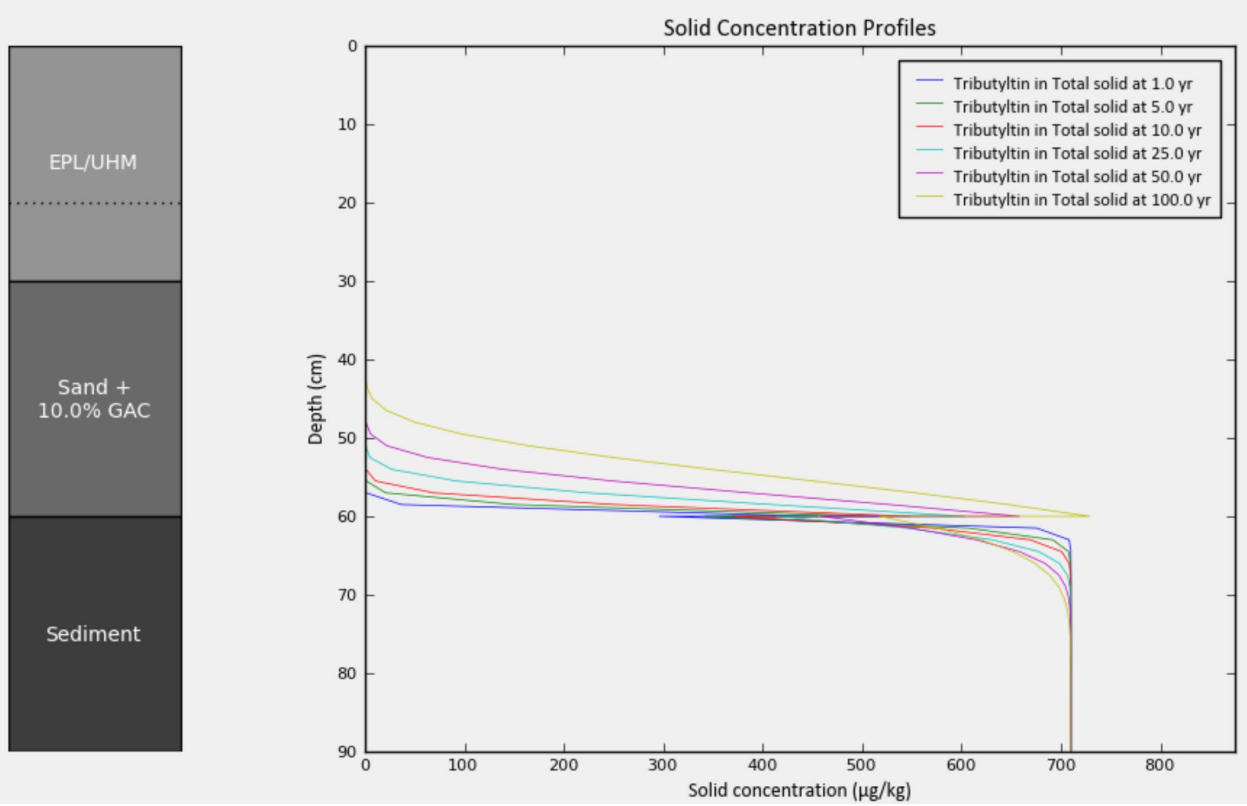

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
TCDF in Total solid at 1.0 yr
TCDF in Total solid at 5.0 yr
TCDF in Total solid at 10.0 yr
TCDF in Total solid at 25.0 yr
TCDF in Total solid at 50.0 yr
TCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Solid concentration (µg/kg)

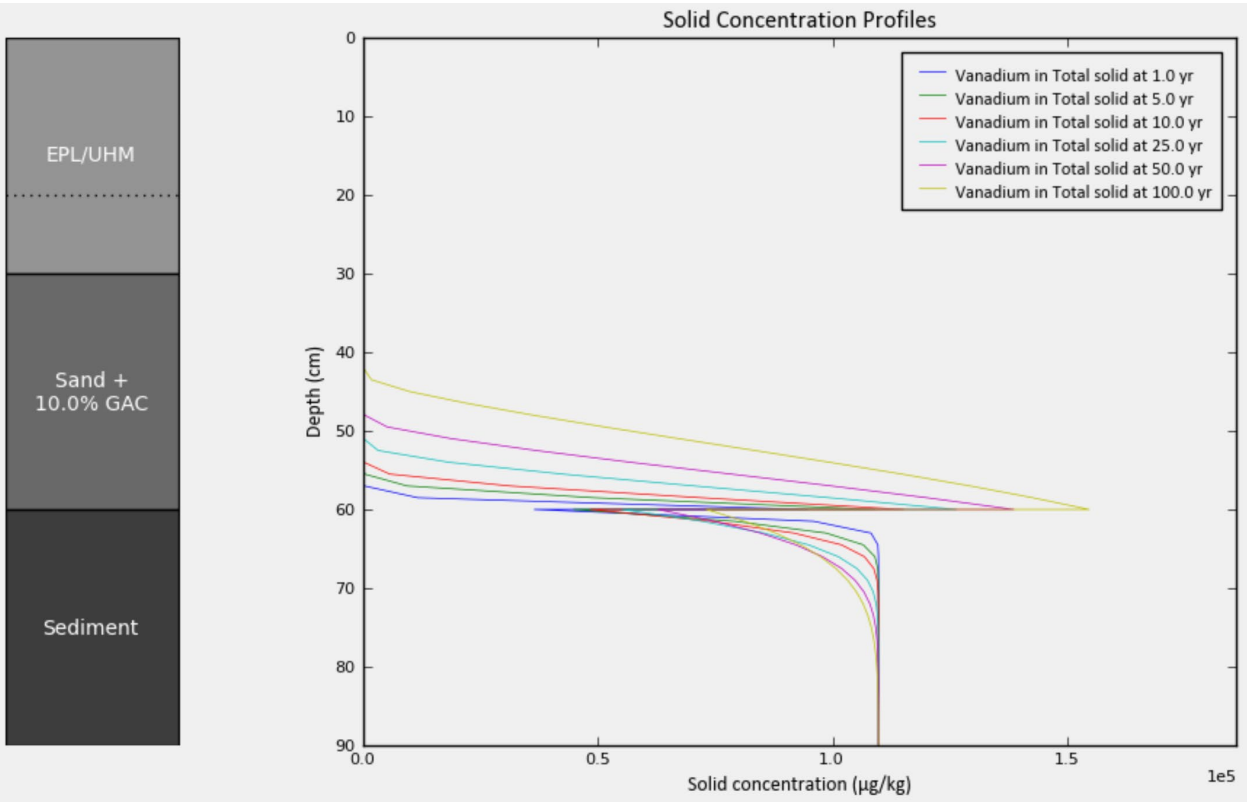

Solid Concentration Profiles
EPL/UHM
Sand +
10.0% GAC
Sediment
Total cPAHs (BaP Eq) in Total solid at 1.0 yr
Total cPAHs (BaP Eq) in Total solid at 5.0 yr
Total cPAHs (BaP Eq) in Total solid at 10.0 yr
Total cPAHs (BaP Eq) in Total solid at 25.0 yr
Total cPAHs (BaP Eq) in Total solid at 50.0 yr
Total cPAHs (BaP Eq) in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
500
1000
1500
Solid concentration (µg/kg)

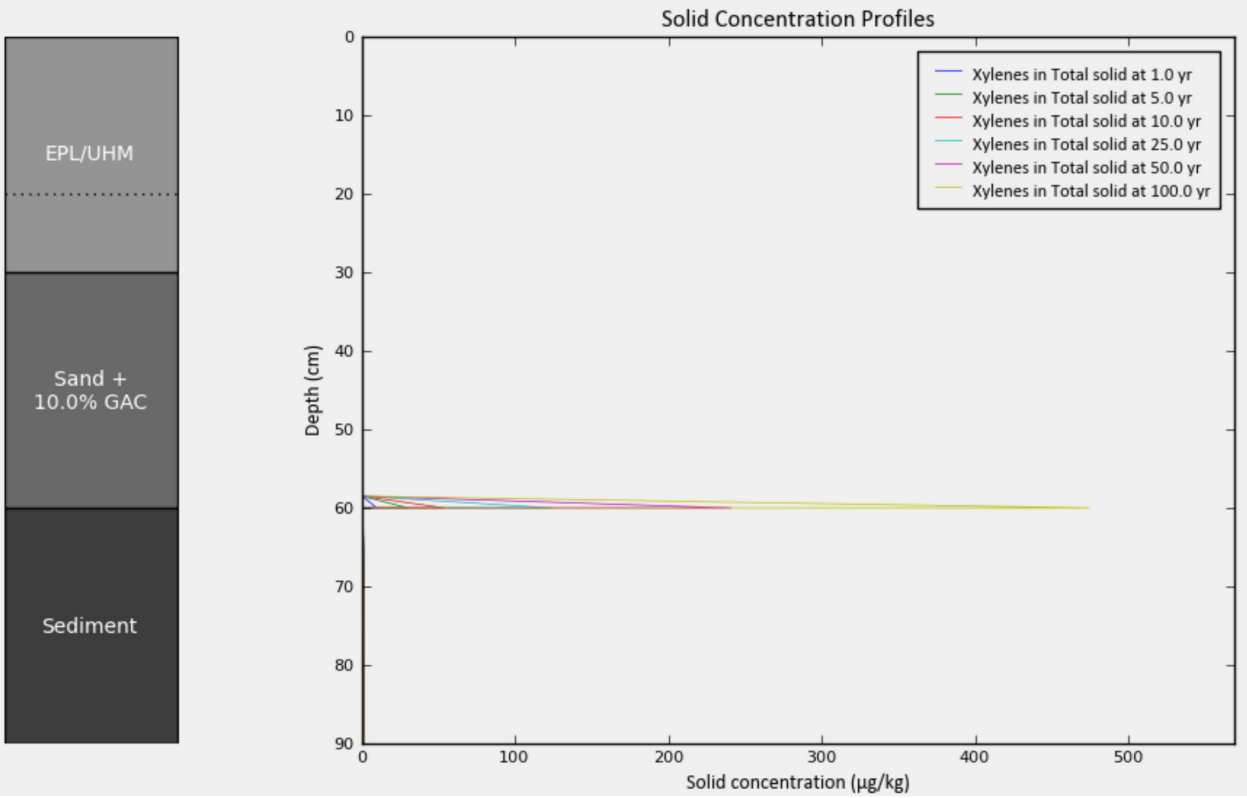

Solid Concentration Profiles
EPL/UHM
Sand +
10.0% GAC
Sediment
Total DioxinFuran in Total solid at 1.0 yr
Total DioxinFuran in Total solid at 5.0 yr
Total DioxinFuran in Total solid at 10.0 yr
Total DioxinFuran in Total solid at 25.0 yr
Total DioxinFuran in Total solid at 50.0 yr
Total DioxinFuran in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.00
0.05
0.10
0.15
0.20
0.25
0.30
Solid concentration (µg/kg)

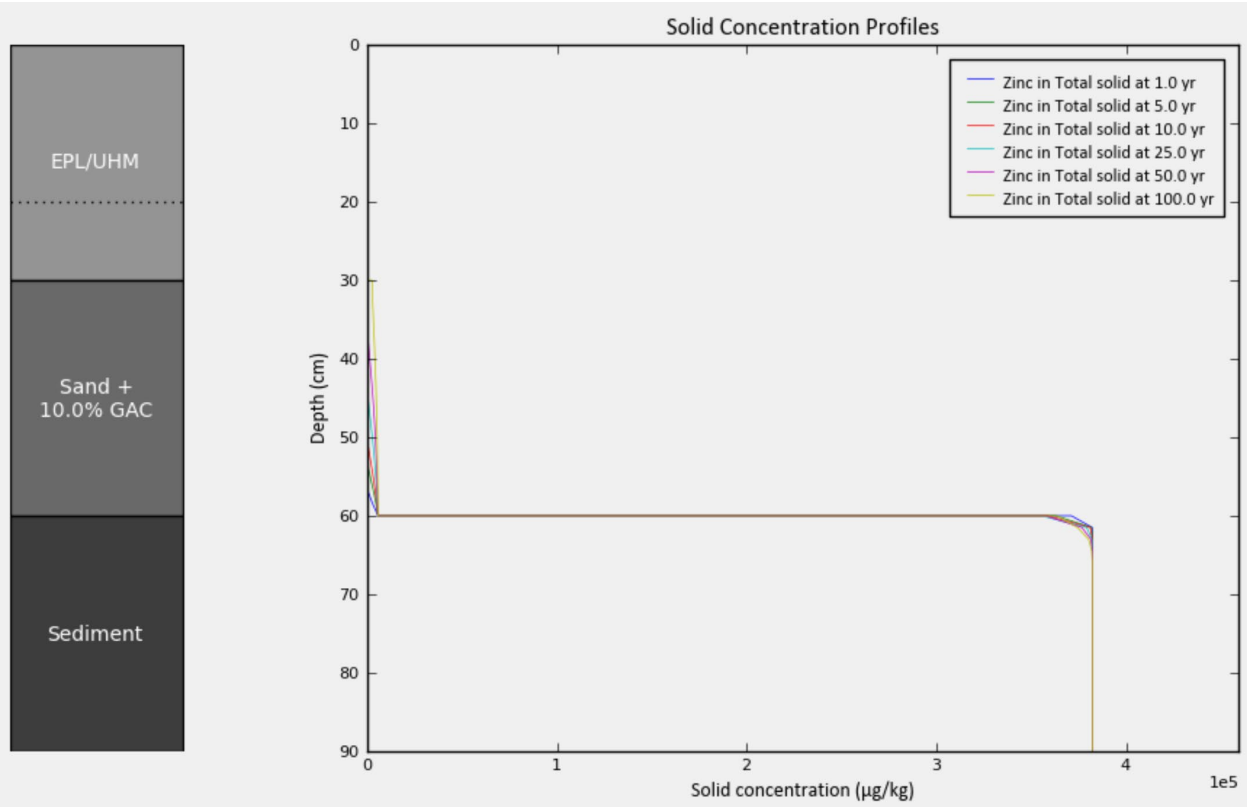

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Total PAHs in Total solid at 1.0 yr
Total PAHs in Total solid at 5.0 yr
Total PAHs in Total solid at 10.0 yr
Total PAHs in Total solid at 25.0 yr
Total PAHs in Total solid at 50.0 yr
Total PAHs in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.5
1.0
1.5
2.0
2.5
1e4
Solid concentration (µg/kg)


EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Total PCBs in Total solid at 1.0 yr
Total PCBs in Total solid at 5.0 yr
Total PCBs in Total solid at 10.0 yr
Total PCBs in Total solid at 25.0 yr
Total PCBs in Total solid at 50.0 yr
Total PCBs in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
200
400
600
800
1000
Solid concentration (µg/kg)


EPL/UHM
Sand + 10.0% GAC
Sediment
Solid Concentration Profiles
Tributyltin in Total solid at 1.0 yr
Tributyltin in Total solid at 5.0 yr
Tributyltin in Total solid at 10.0 yr
Tributyltin in Total solid at 25.0 yr
Tributyltin in Total solid at 50.0 yr
Tributyltin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

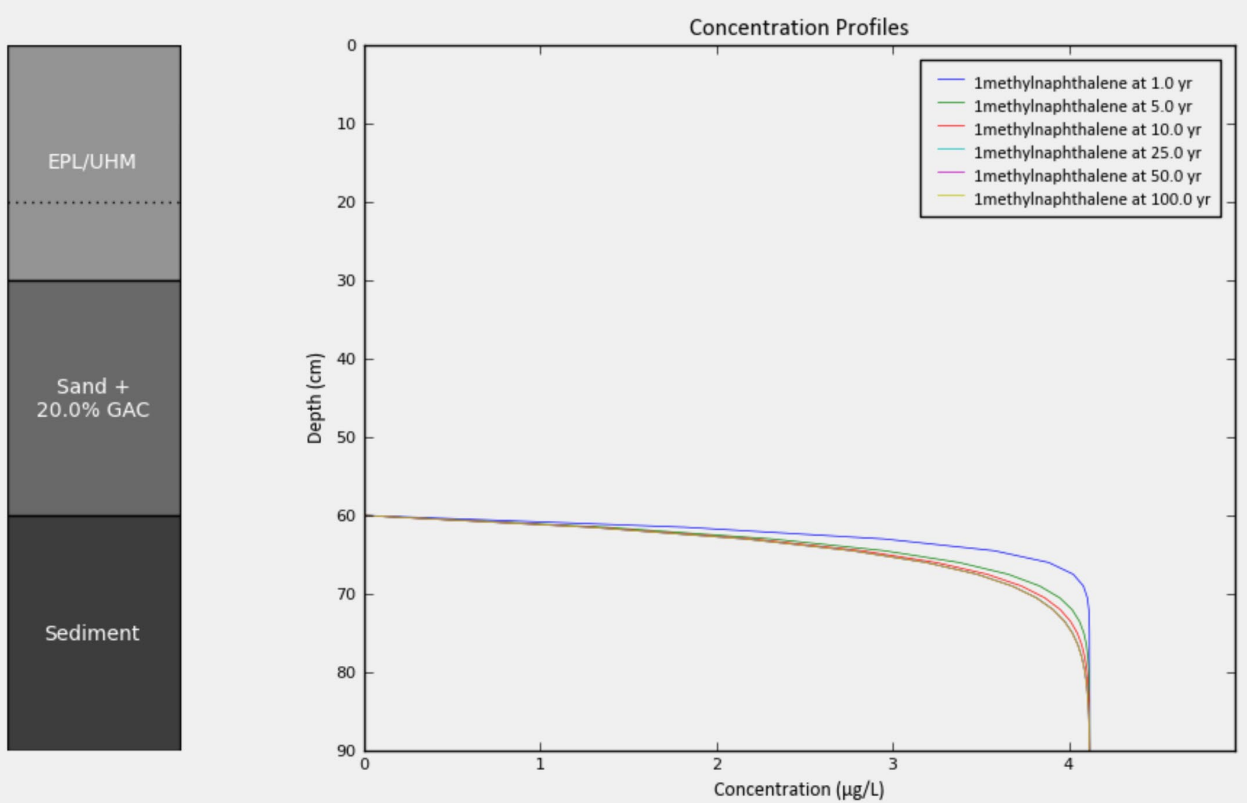

EPL/UHM
Sand + 10.0% GAC
Sediment
Solid Concentration Profiles
Vanadium in Total solid at 1.0 yr
Vanadium in Total solid at 5.0 yr
Vanadium in Total solid at 10.0 yr
Vanadium in Total solid at 25.0 yr
Vanadium in Total solid at 50.0 yr
Vanadium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

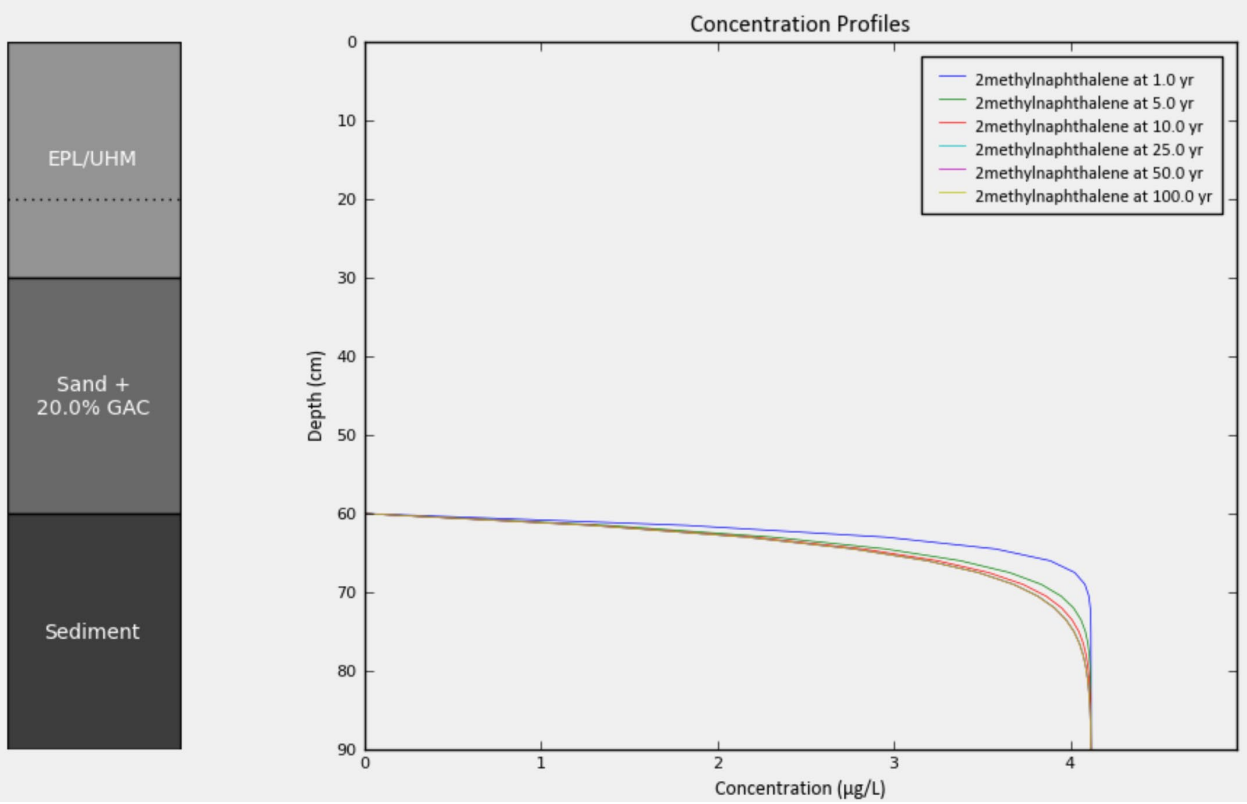

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Xylenes in Total solid at 1.0 yr
Xylenes in Total solid at 5.0 yr
Xylenes in Total solid at 10.0 yr
Xylenes in Total solid at 25.0 yr
Xylenes in Total solid at 50.0 yr
Xylenes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

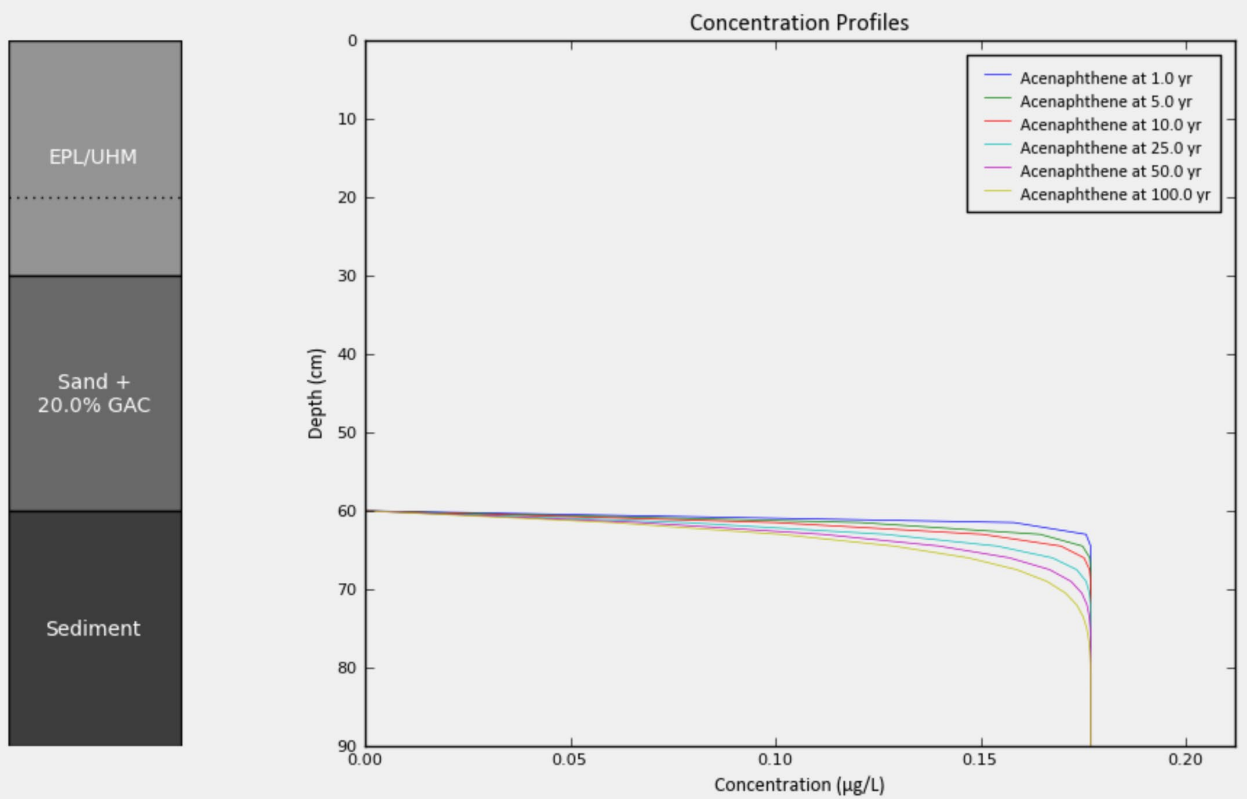

EPL/UHM
Sand +
10.0% GAC
Sediment
Solid Concentration Profiles
Zinc in Total solid at 1.0 yr
Zinc in Total solid at 5.0 yr
Zinc in Total solid at 10.0 yr
Zinc in Total solid at 25.0 yr
Zinc in Total solid at 50.0 yr
Zinc in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

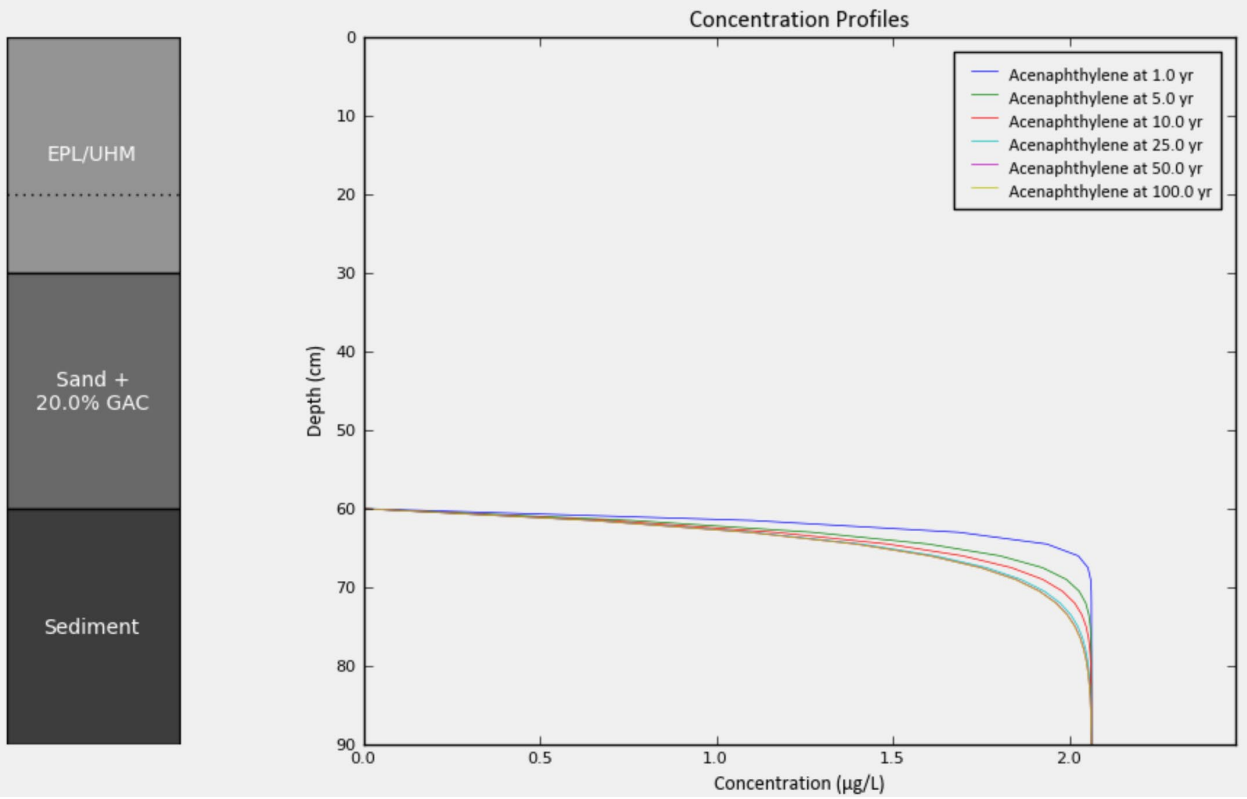
Cap Alternative 5: 30 cm of 20.0% GAC amended sand with 30 cm EPL/UHM

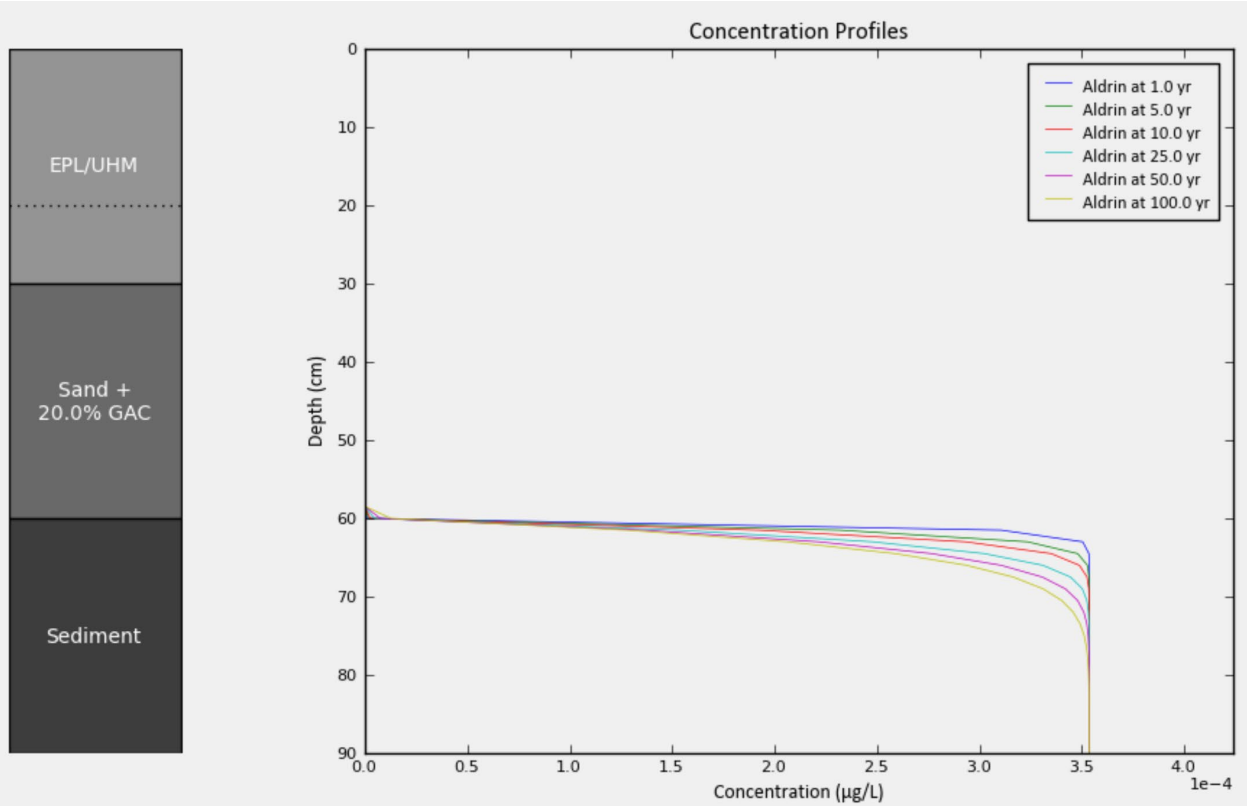
Porewater Concentration - Depth

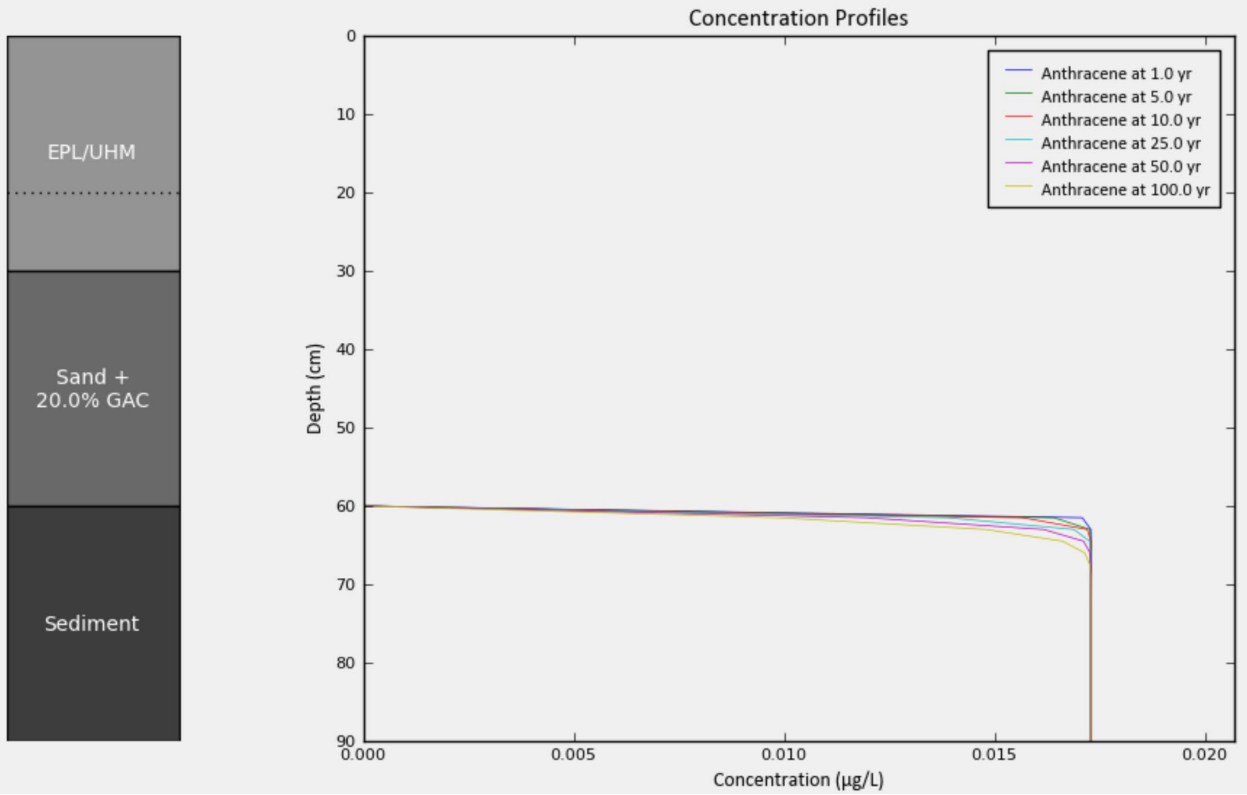


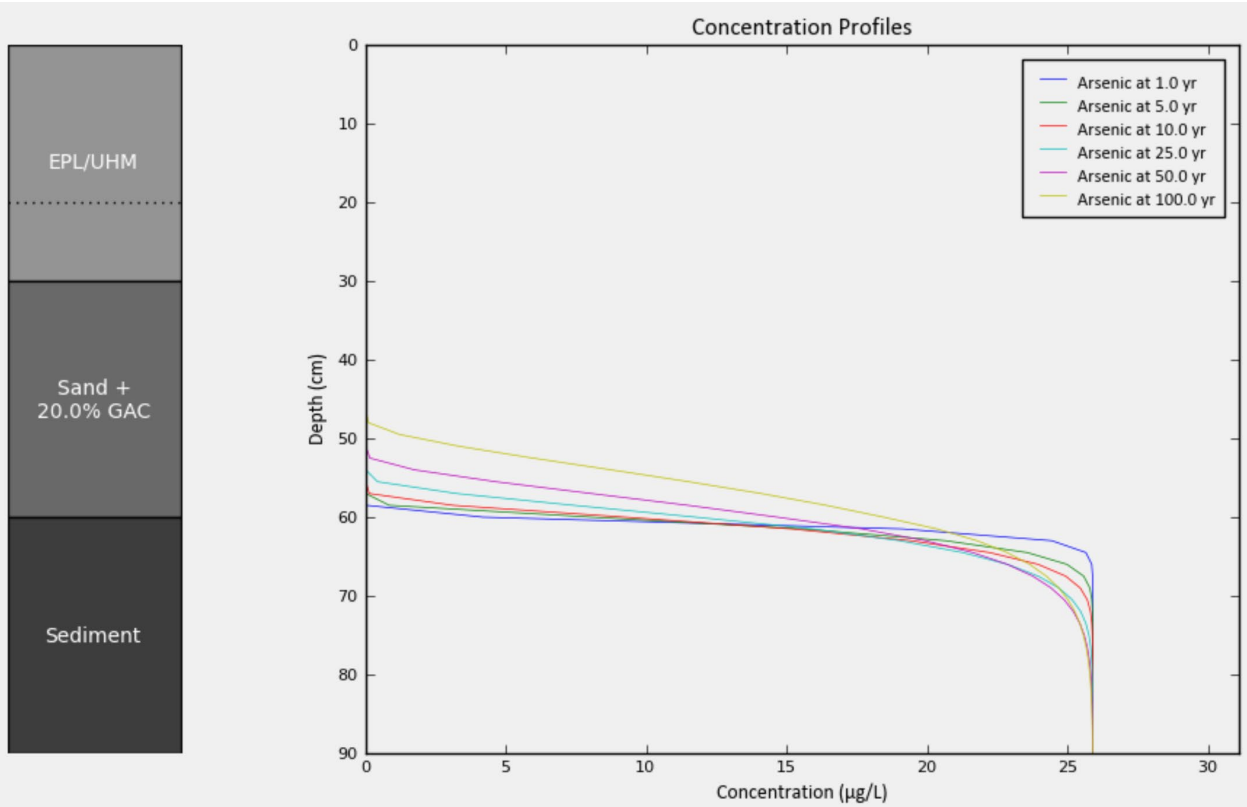

EPL/UHM
Sand + 20.0% GAC
Sediment
Concentration Profiles
2methylnaphthalene at 1.0 yr
2methylnaphthalene at 5.0 yr
2methylnaphthalene at 10.0 yr
2methylnaphthalene at 25.0 yr
2methylnaphthalene at 50.0 yr
2methylnaphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

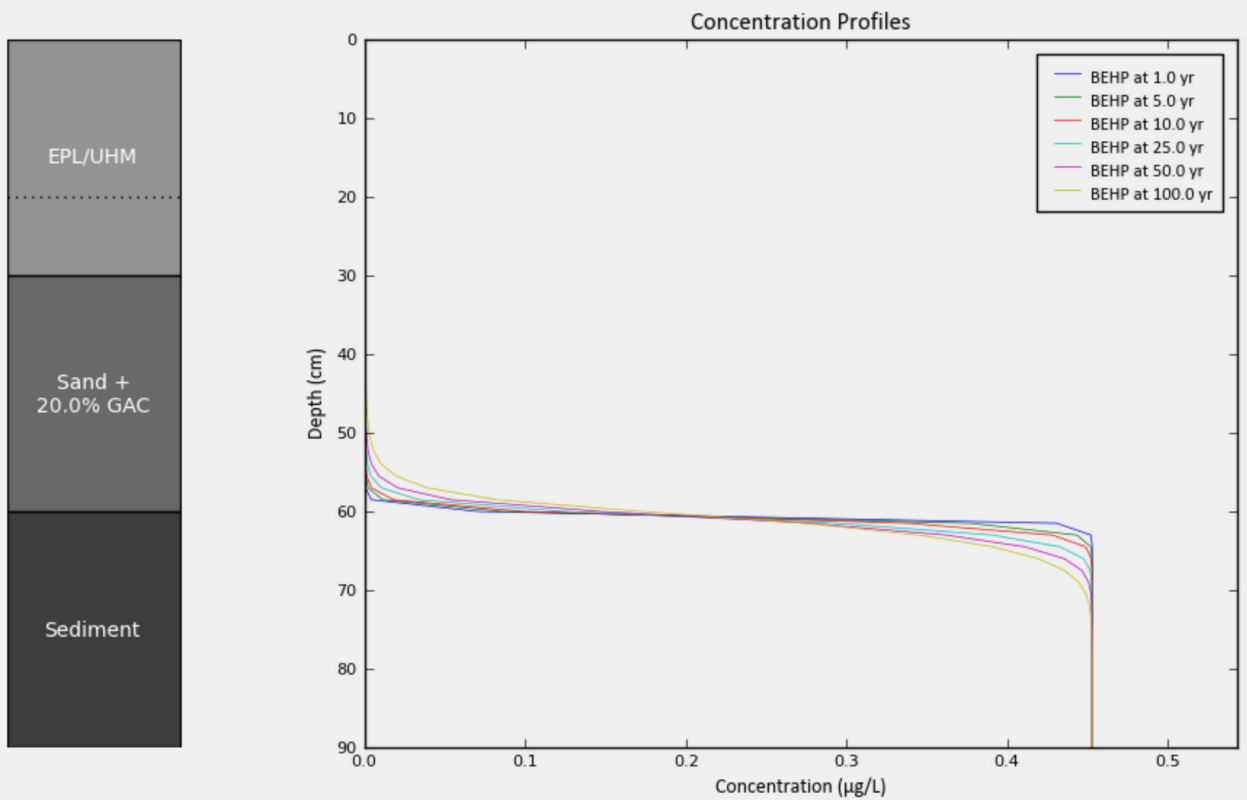

EPL/UHM
Sand + 20.0% GAC
Sediment
Concentration Profiles
Acenaphthene at 1.0 yr
Acenaphthene at 5.0 yr
Acenaphthene at 10.0 yr
Acenaphthene at 25.0 yr
Acenaphthene at 50.0 yr
Acenaphthene at 100.0 yr
Depth (cm)
Concentration (µg/L)

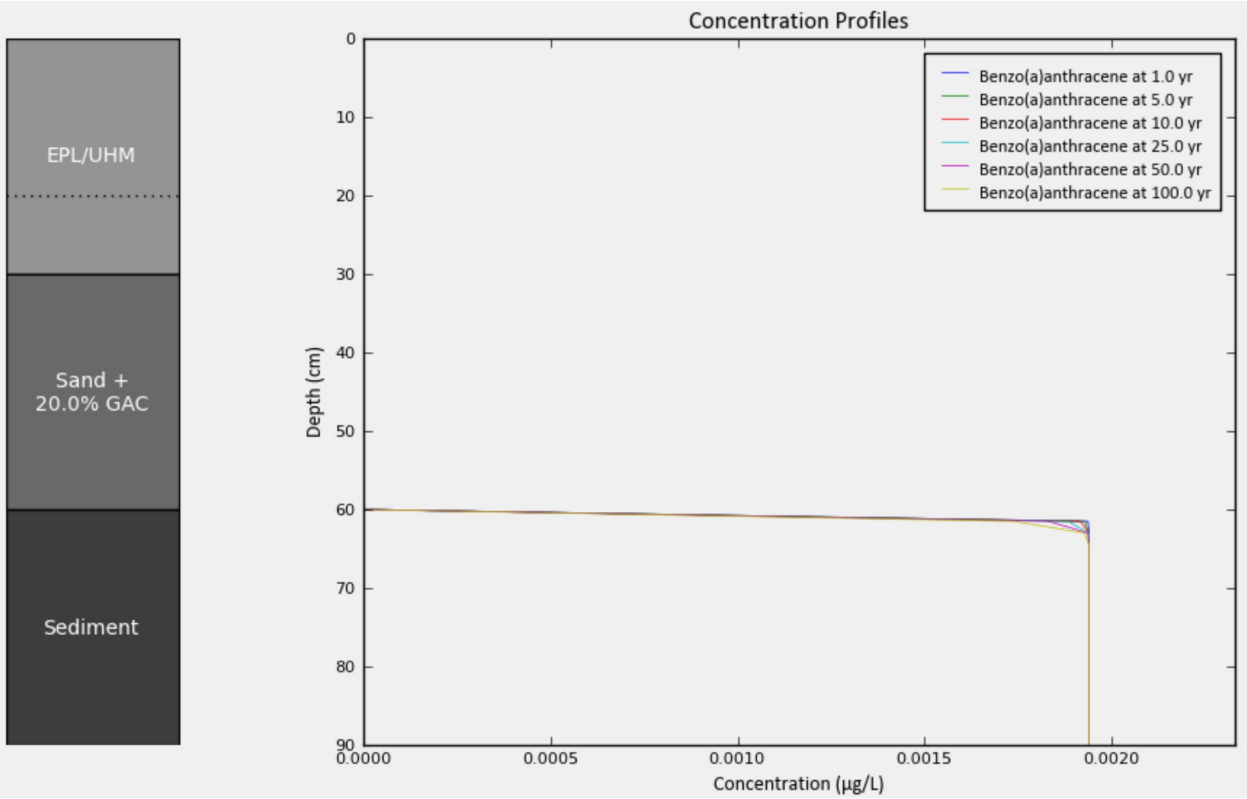

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Acenaphthylene at 1.0 yr
Acenaphthylene at 5.0 yr
Acenaphthylene at 10.0 yr
Acenaphthylene at 25.0 yr
Acenaphthylene at 50.0 yr
Acenaphthylene at 100.0 yr
Depth (cm)
Concentration (µg/L)

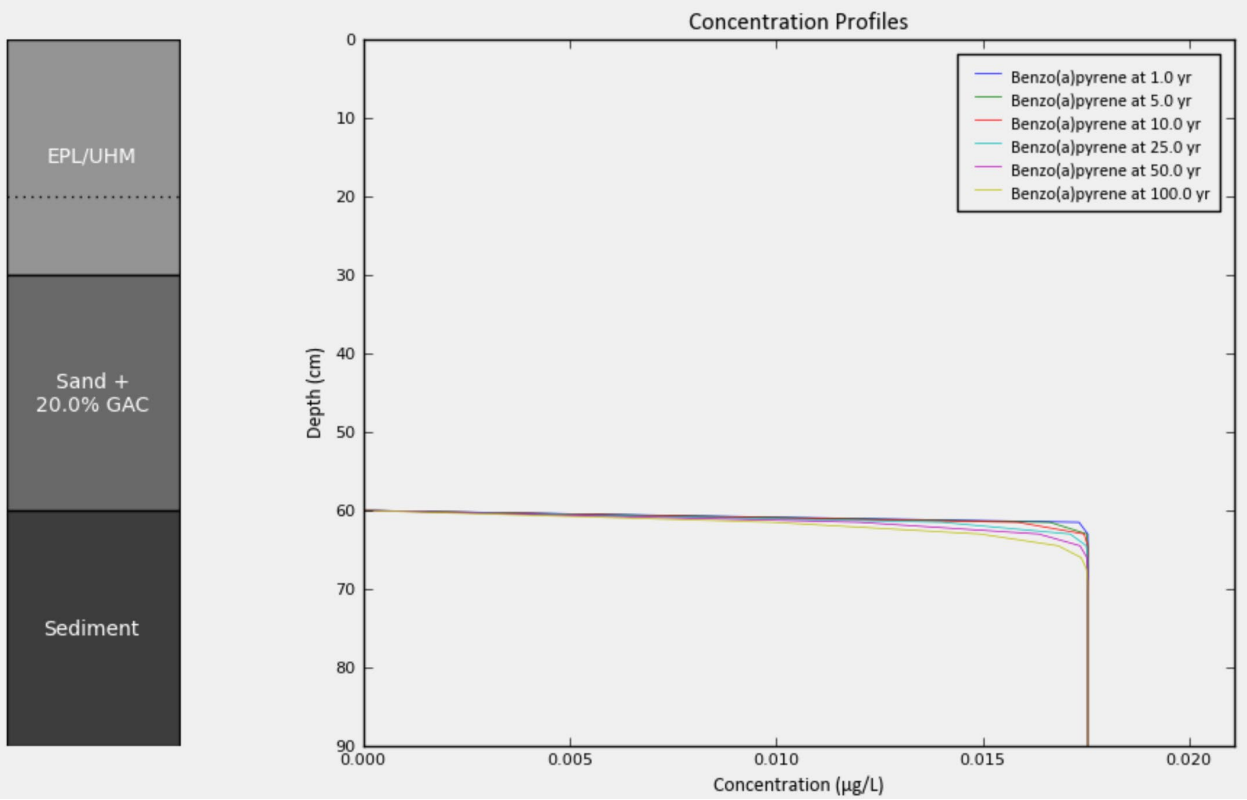

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Aldrin at 1.0 yr
Aldrin at 5.0 yr
Aldrin at 10.0 yr
Aldrin at 25.0 yr
Aldrin at 50.0 yr
Aldrin at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

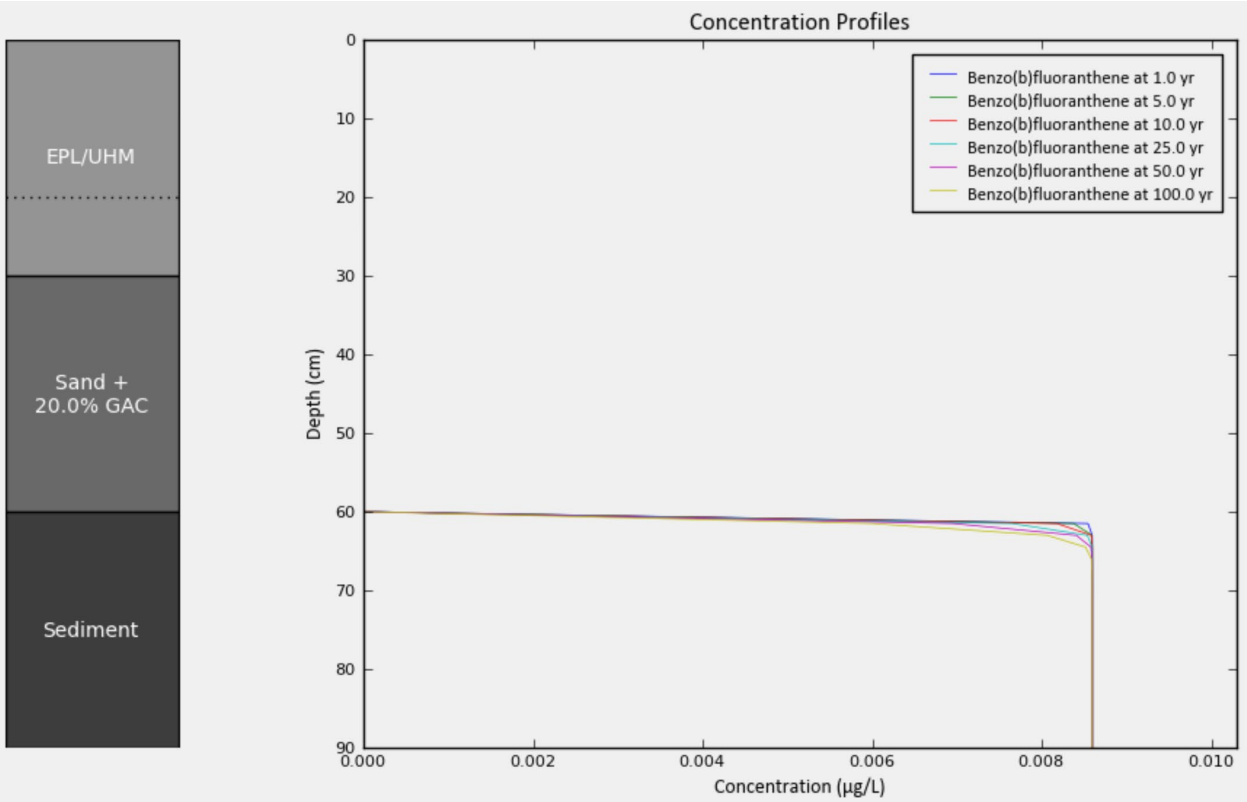

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Anthracene at 1.0 yr
Anthracene at 5.0 yr
Anthracene at 10.0 yr
Anthracene at 25.0 yr
Anthracene at 50.0 yr
Anthracene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

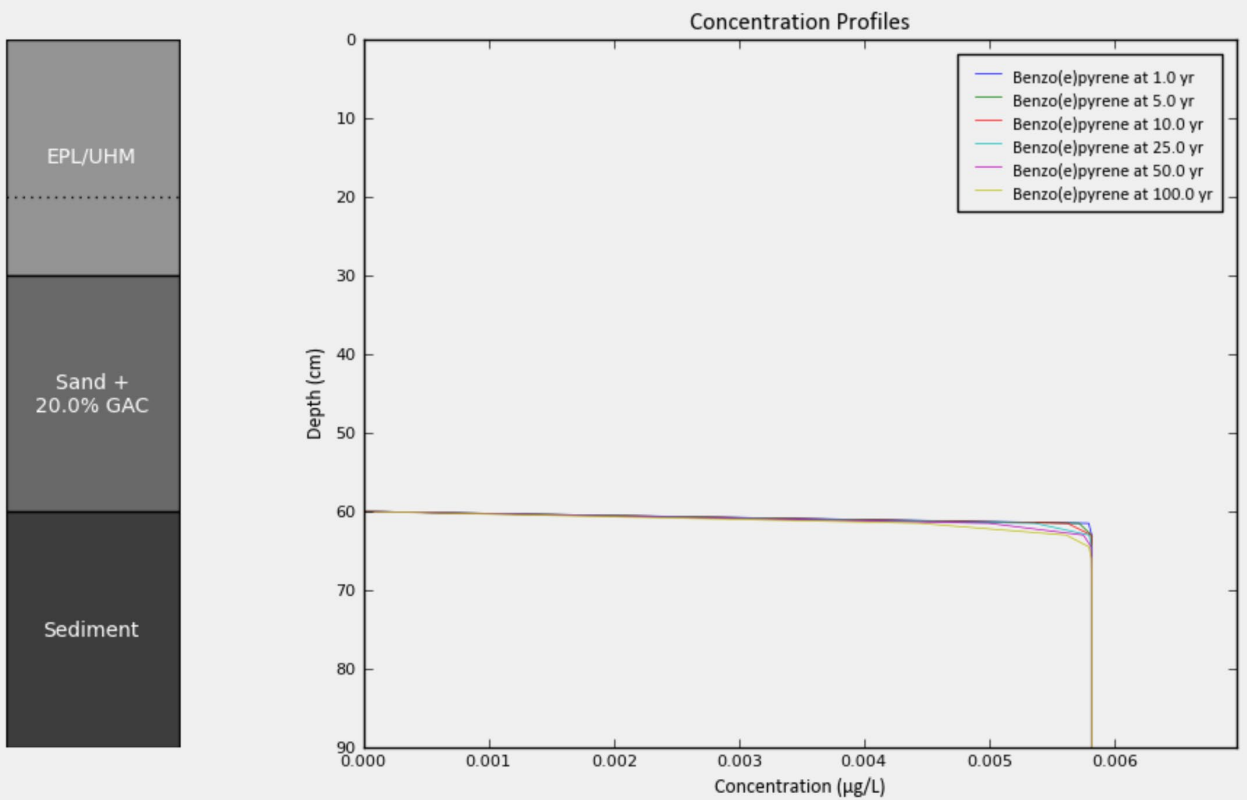

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Arsenic at 1.0 yr
Arsenic at 5.0 yr
Arsenic at 10.0 yr
Arsenic at 25.0 yr
Arsenic at 50.0 yr
Arsenic at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
5
10
15
20
25
30
Concentration (µg/L)

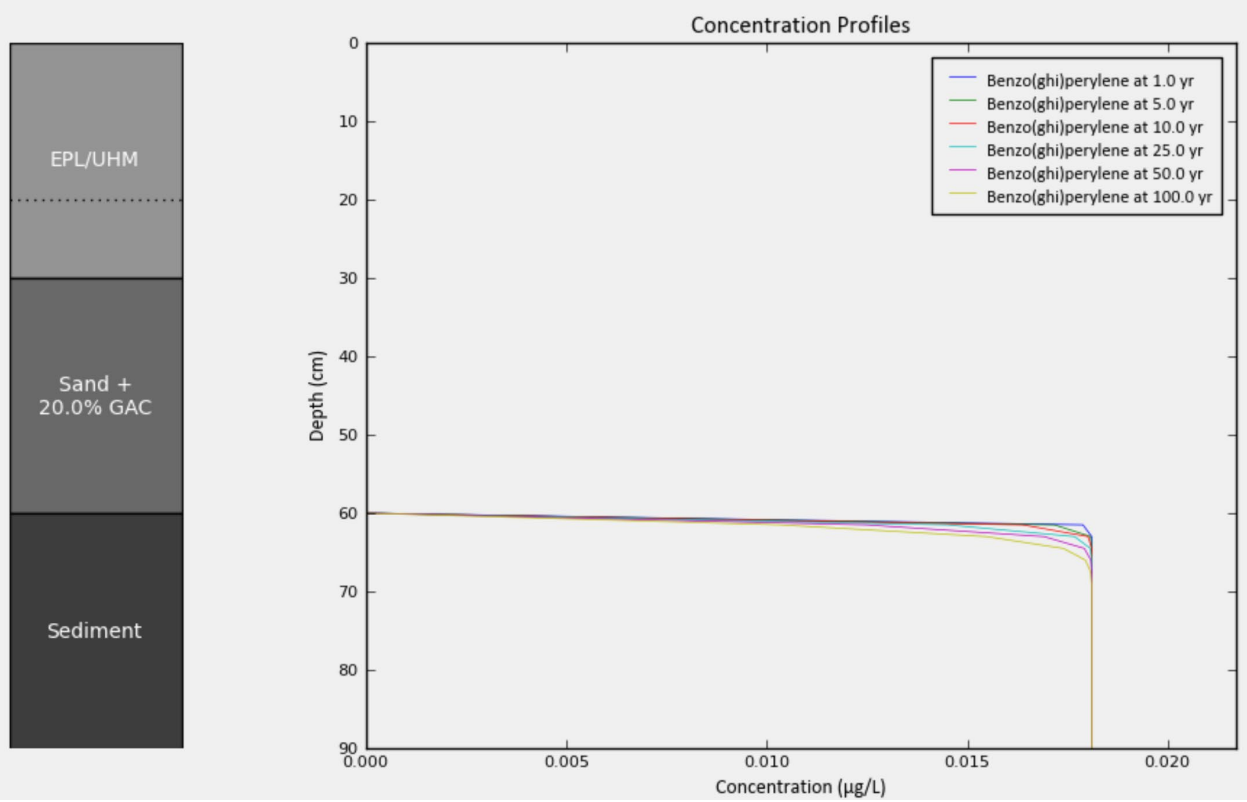

EPL/UHM
Sand + 20.0% GAC
Sediment
Concentration Profiles
BEHP at 1.0 yr
BEHP at 5.0 yr
BEHP at 10.0 yr
BEHP at 25.0 yr
BEHP at 50.0 yr
BEHP at 100.0 yr
Depth (cm)
Concentration (µg/L)

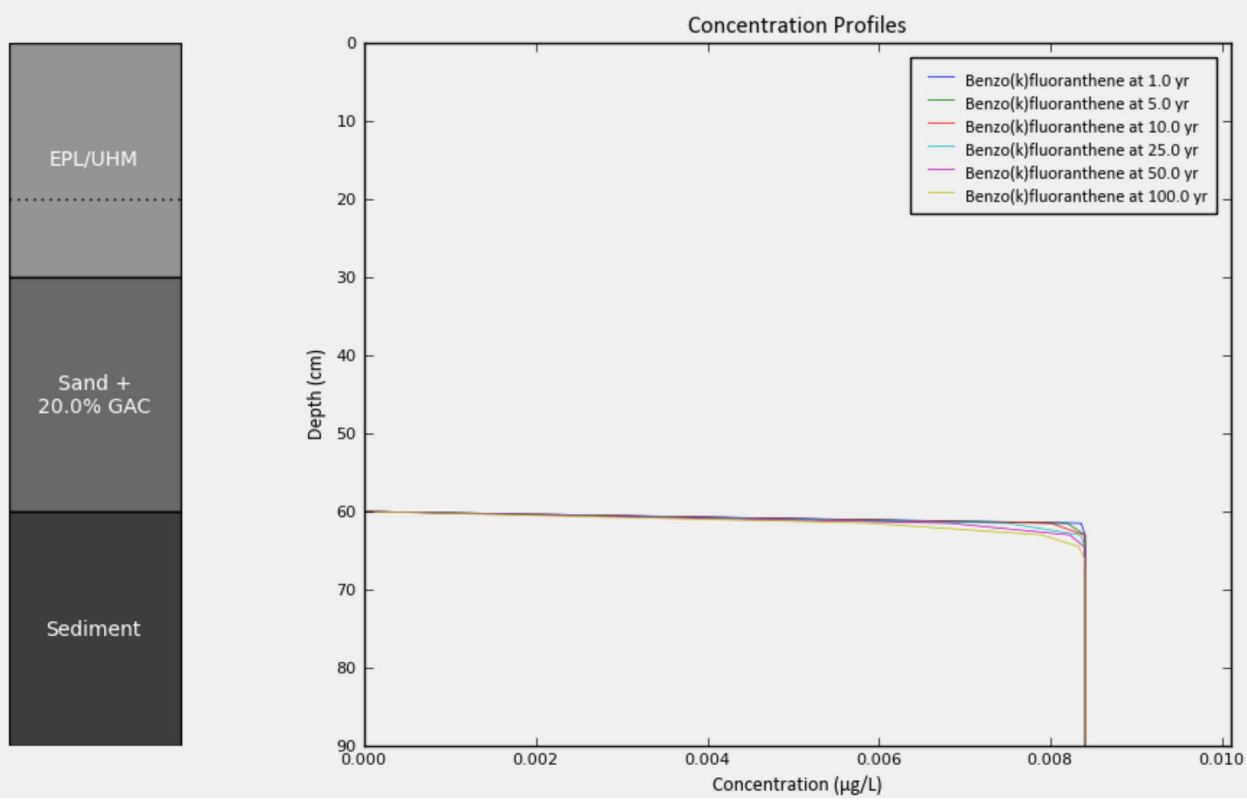

EPL/UHM
Sand + 20.0% GAC
Sediment
Concentration Profiles
Benzo(a)anthracene at 1.0 yr
Benzo(a)anthracene at 5.0 yr
Benzo(a)anthracene at 10.0 yr
Benzo(a)anthracene at 25.0 yr
Benzo(a)anthracene at 50.0 yr
Benzo(a)anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)

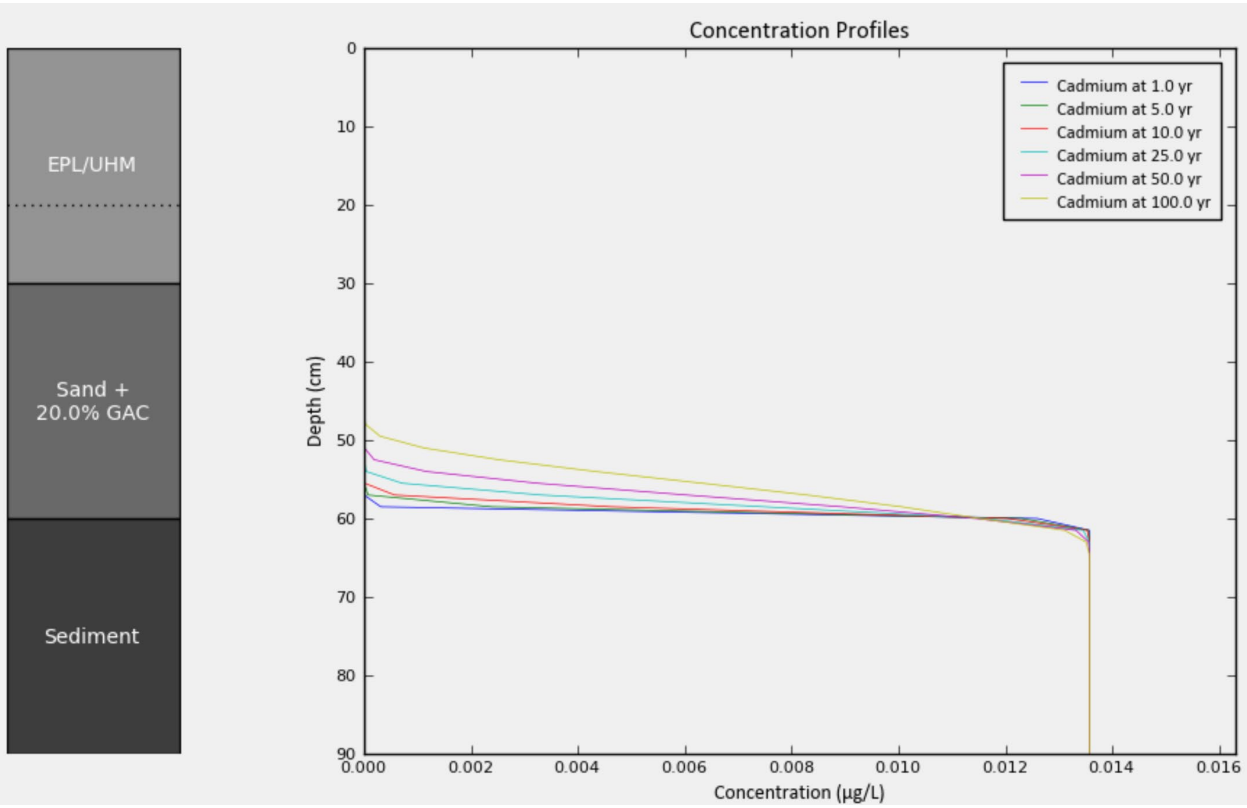

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Benzo(a)pyrene at 1.0 yr
Benzo(a)pyrene at 5.0 yr
Benzo(a)pyrene at 10.0 yr
Benzo(a)pyrene at 25.0 yr
Benzo(a)pyrene at 50.0 yr
Benzo(a)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

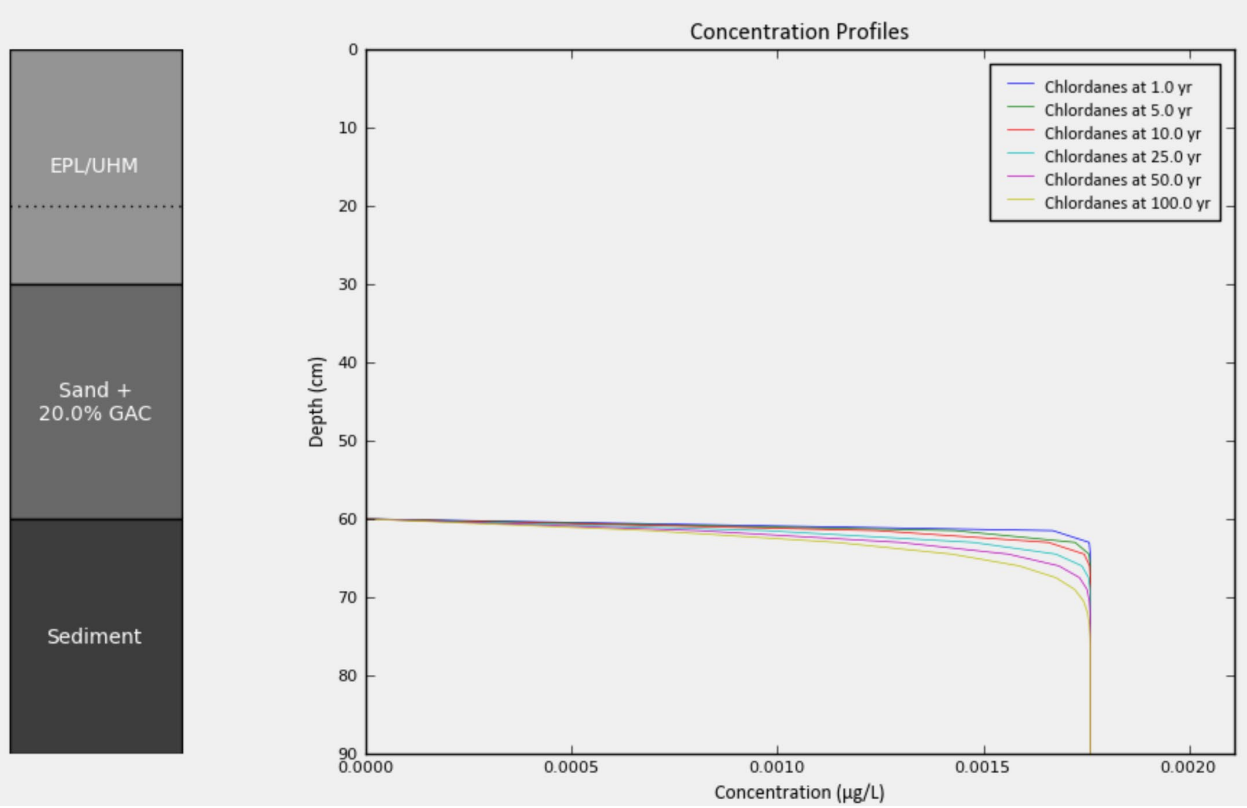

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Benzo(b)fluoranthene at 1.0 yr
Benzo(b)fluoranthene at 5.0 yr
Benzo(b)fluoranthene at 10.0 yr
Benzo(b)fluoranthene at 25.0 yr
Benzo(b)fluoranthene at 50.0 yr
Benzo(b)fluoranthene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
Concentration (µg/L)

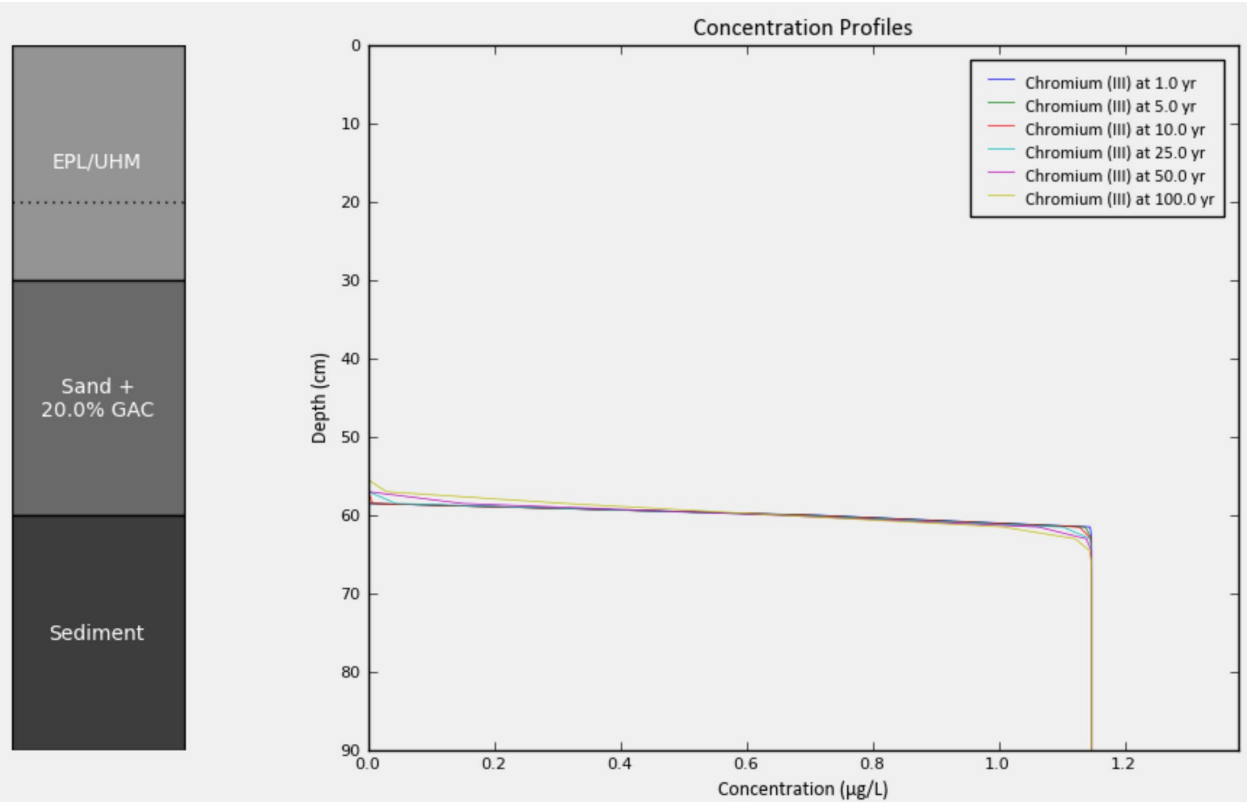

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Benzo(e)pyrene at 1.0 yr
Benzo(e)pyrene at 5.0 yr
Benzo(e)pyrene at 10.0 yr
Benzo(e)pyrene at 25.0 yr
Benzo(e)pyrene at 50.0 yr
Benzo(e)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

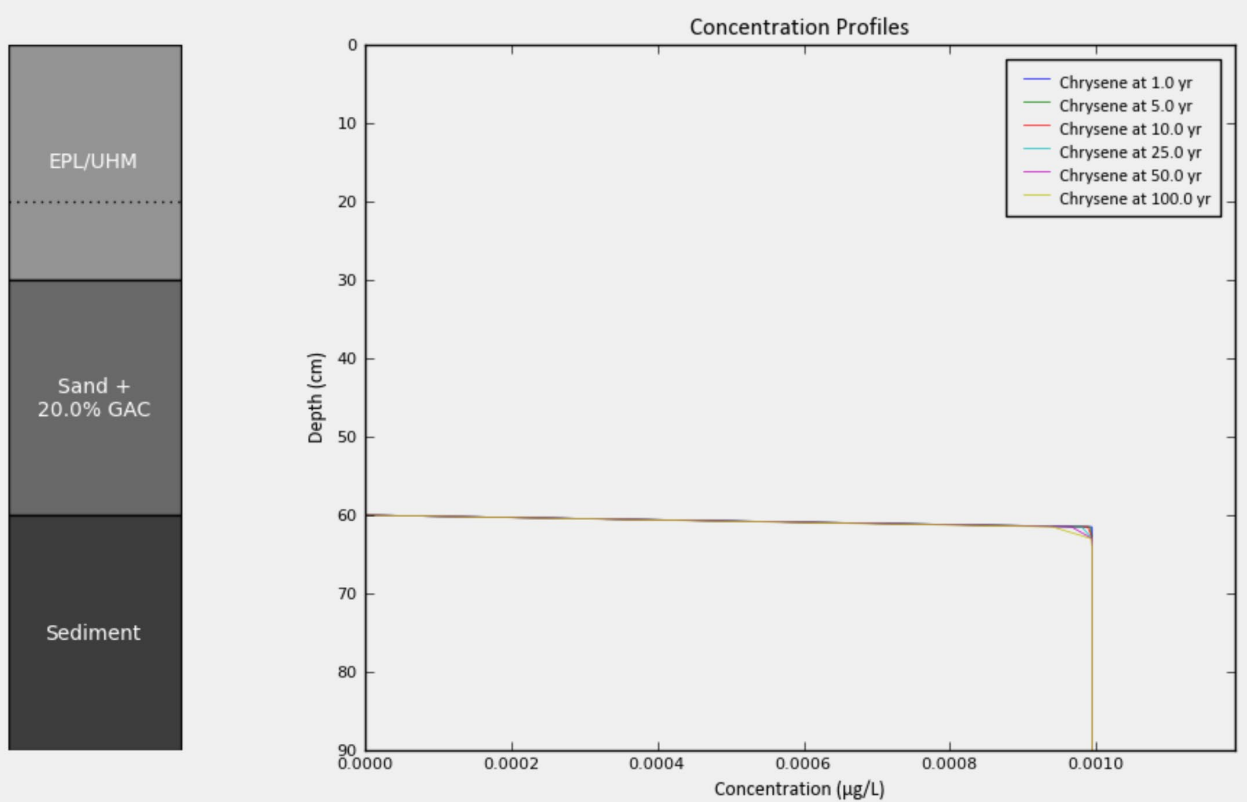

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Benzo(ghi)perylene at 1.0 yr
Benzo(ghi)perylene at 5.0 yr
Benzo(ghi)perylene at 10.0 yr
Benzo(ghi)perylene at 25.0 yr
Benzo(ghi)perylene at 50.0 yr
Benzo(ghi)perylene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

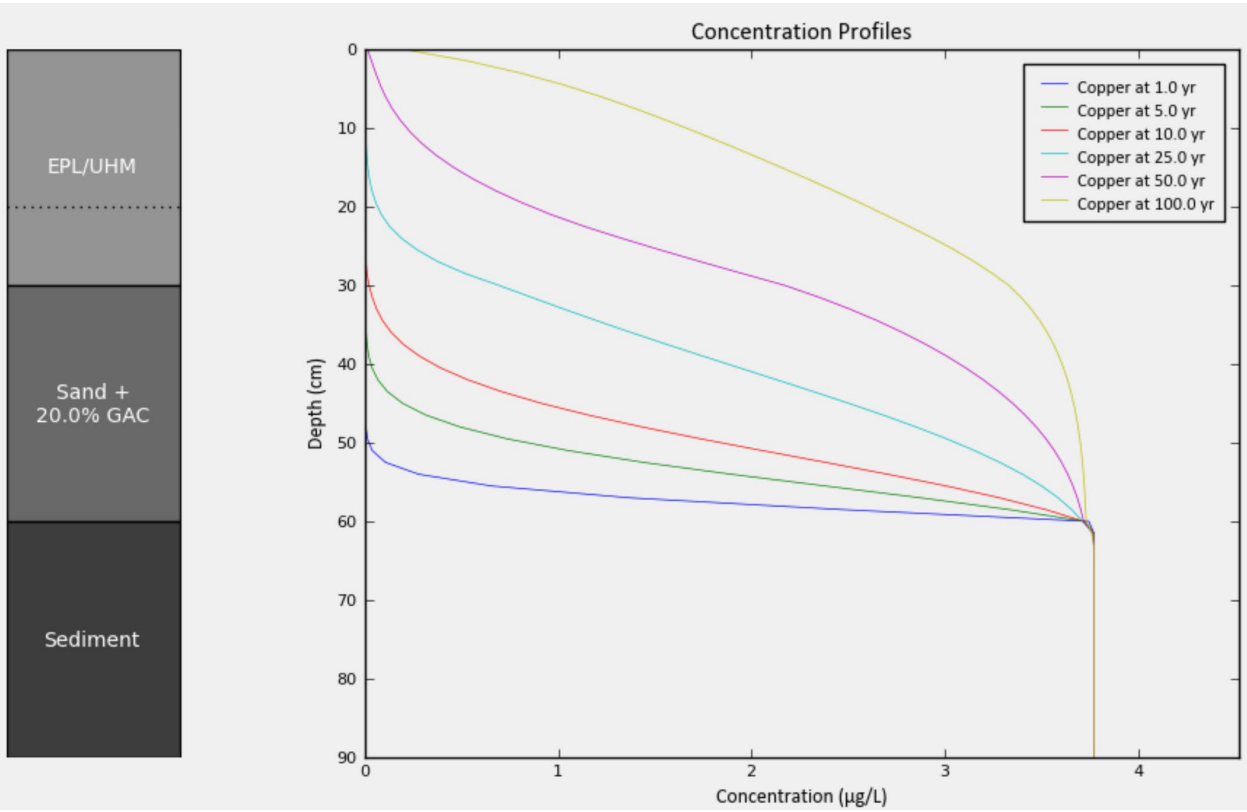

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Benzo(k)fluoranthene at 1.0 yr
Benzo(k)fluoranthene at 5.0 yr
Benzo(k)fluoranthene at 10.0 yr
Benzo(k)fluoranthene at 25.0 yr
Benzo(k)fluoranthene at 50.0 yr
Benzo(k)fluoranthene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
Concentration (µg/L)

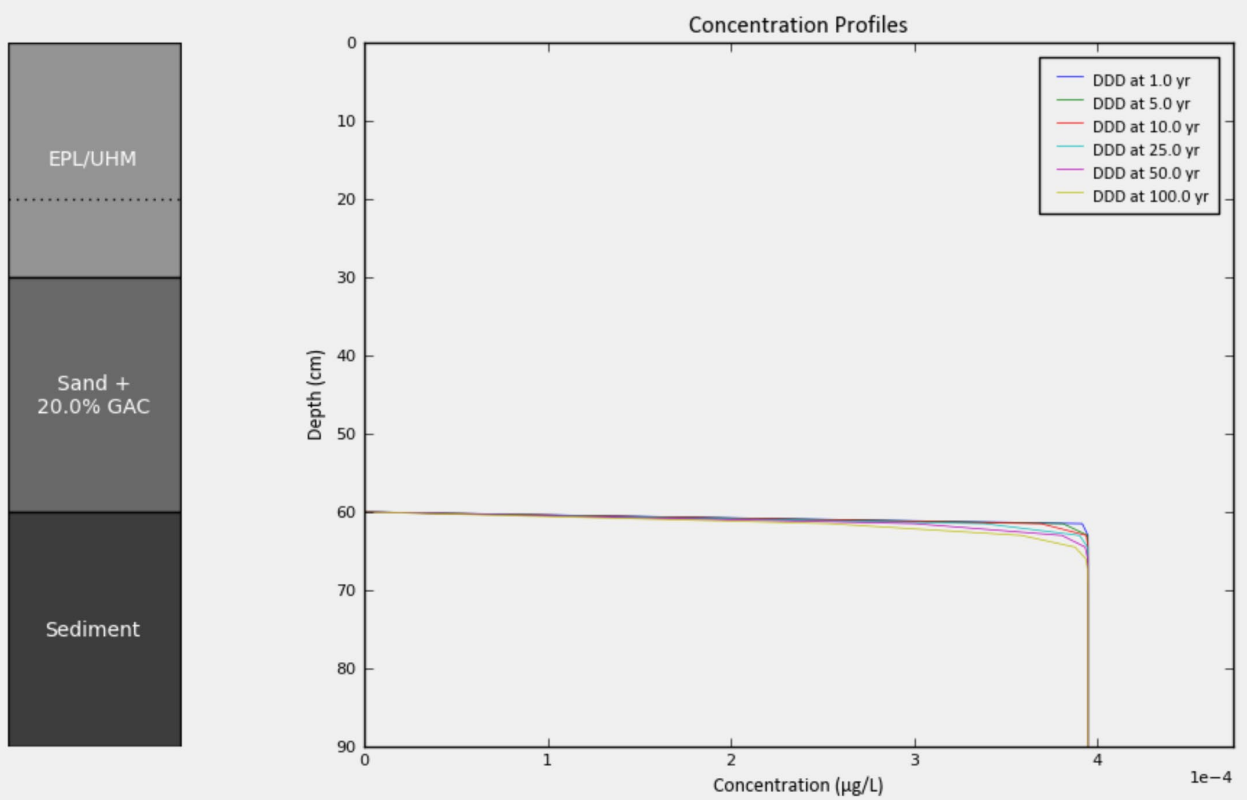

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Cadmium at 1.0 yr
Cadmium at 5.0 yr
Cadmium at 10.0 yr
Cadmium at 25.0 yr
Cadmium at 50.0 yr
Cadmium at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
0.012
0.014
0.016
Concentration (µg/L)

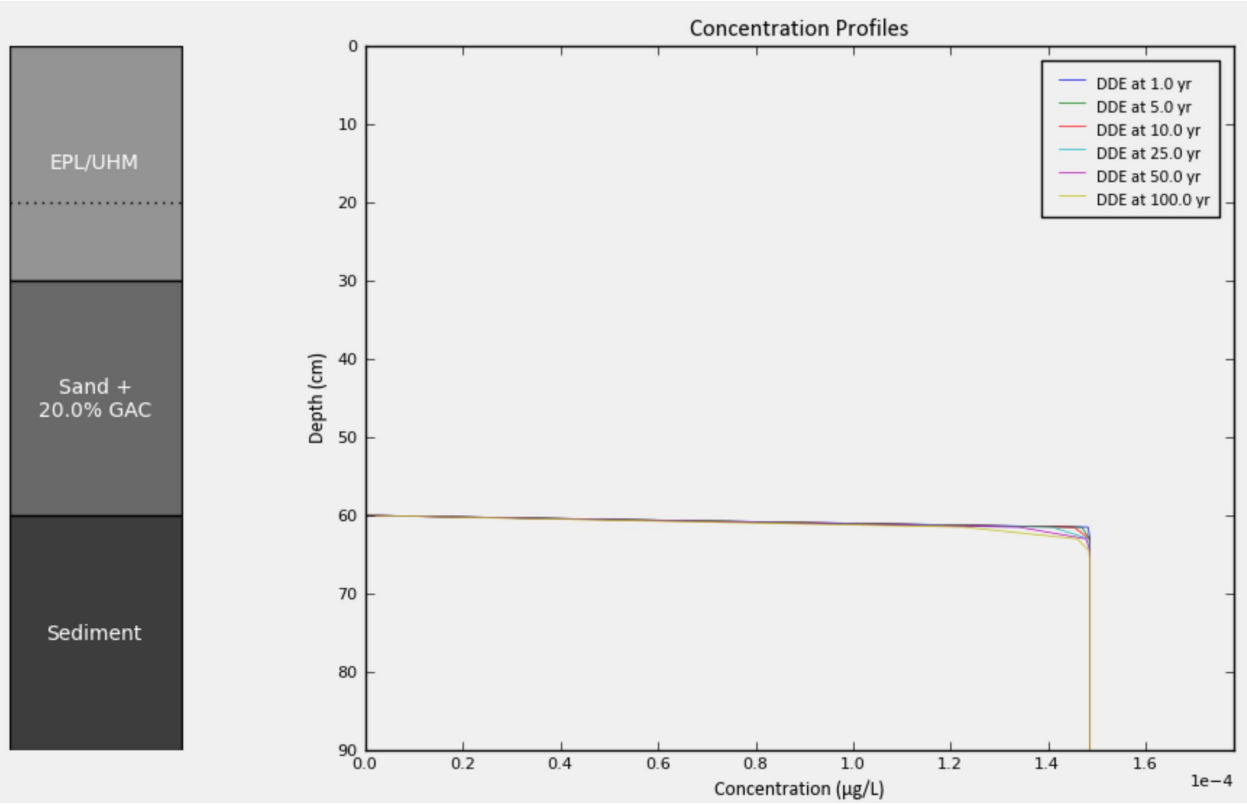

EPL/UHM
Sand + 20.0% GAC
Sediment
Concentration Profiles
Chlordanes at 1.0 yr
Chlordanes at 5.0 yr
Chlordanes at 10.0 yr
Chlordanes at 25.0 yr
Chlordanes at 50.0 yr
Chlordanes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020

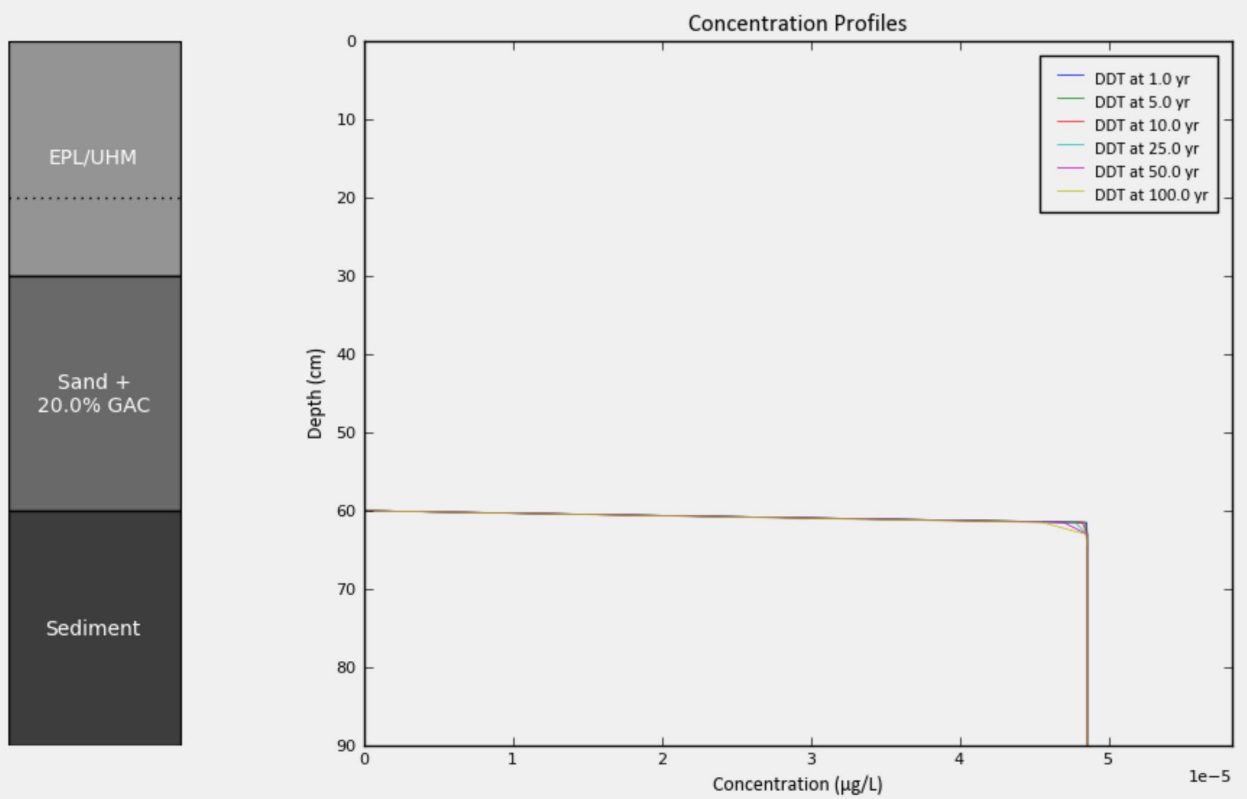

EPL/UHM
Sand + 20.0% GAC
Sediment
Concentration Profiles
Chromium (III) at 1.0 yr
Chromium (III) at 5.0 yr
Chromium (III) at 10.0 yr
Chromium (III) at 25.0 yr
Chromium (III) at 50.0 yr
Chromium (III) at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1.2

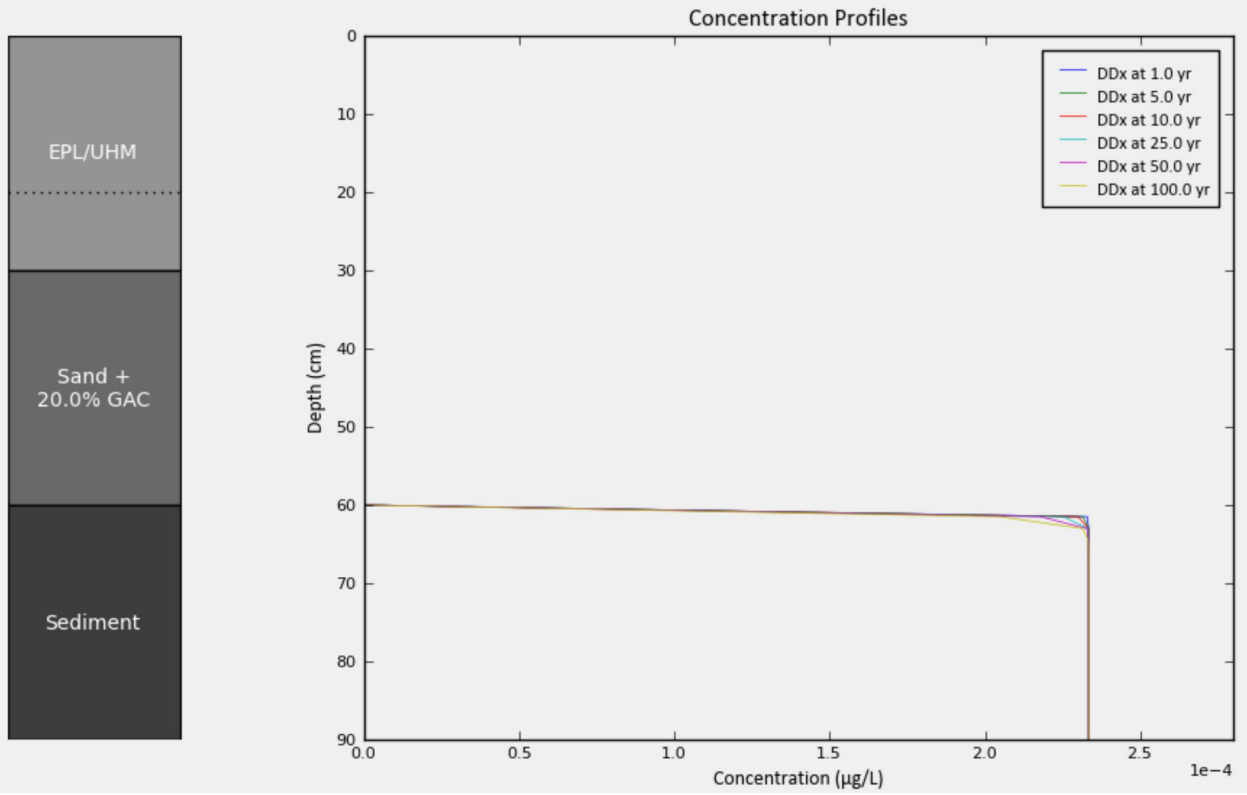

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Chrysene at 1.0 yr
Chrysene at 5.0 yr
Chrysene at 10.0 yr
Chrysene at 25.0 yr
Chrysene at 50.0 yr
Chrysene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010
Concentration (µg/L)

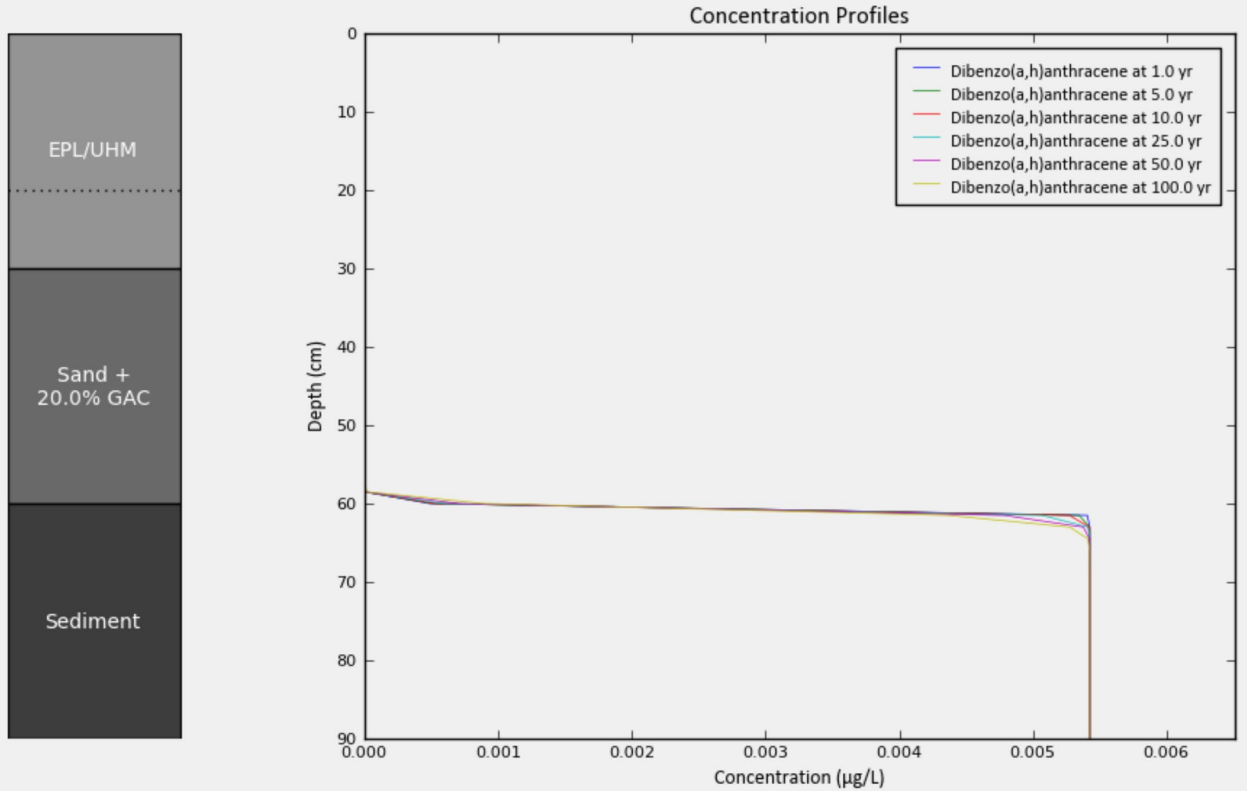

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Copper at 1.0 yr
Copper at 5.0 yr
Copper at 10.0 yr
Copper at 25.0 yr
Copper at 50.0 yr
Copper at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
Concentration (µg/L)

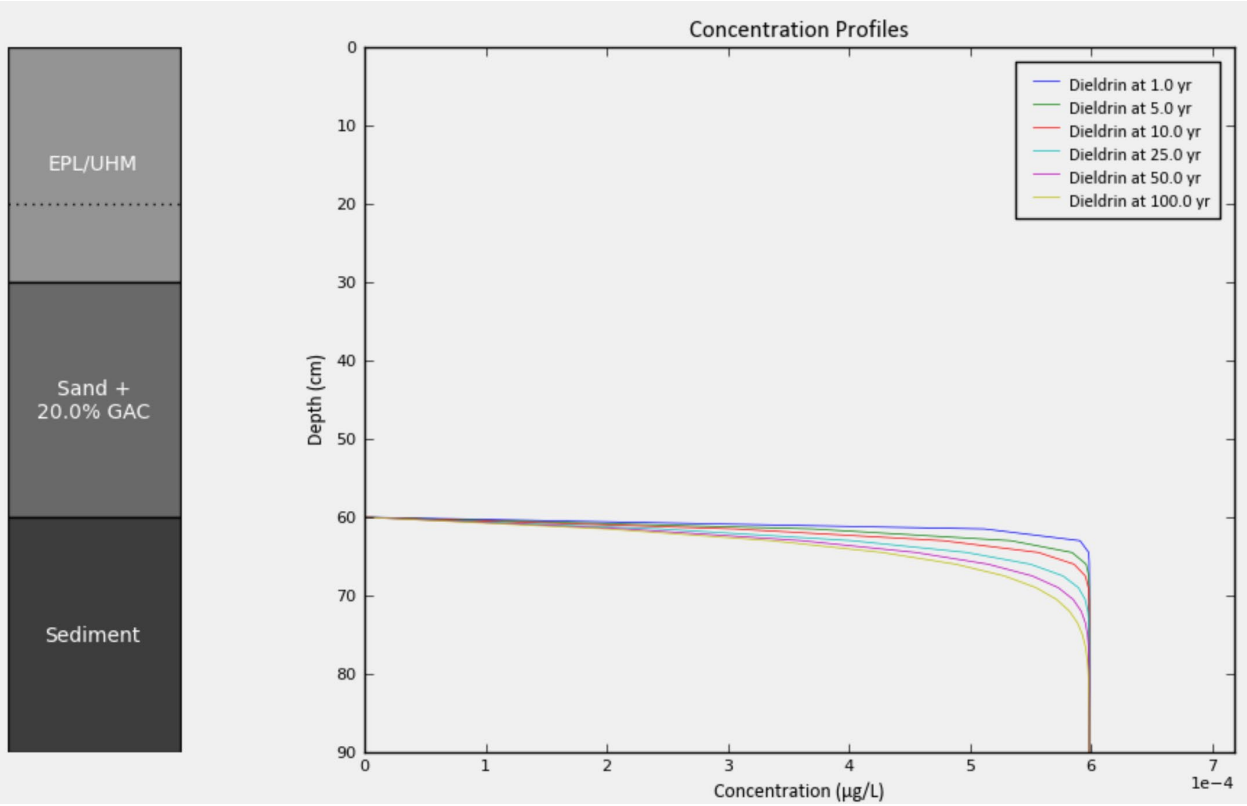

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
DDD at 1.0 yr
DDD at 5.0 yr
DDD at 10.0 yr
DDD at 25.0 yr
DDD at 50.0 yr
DDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

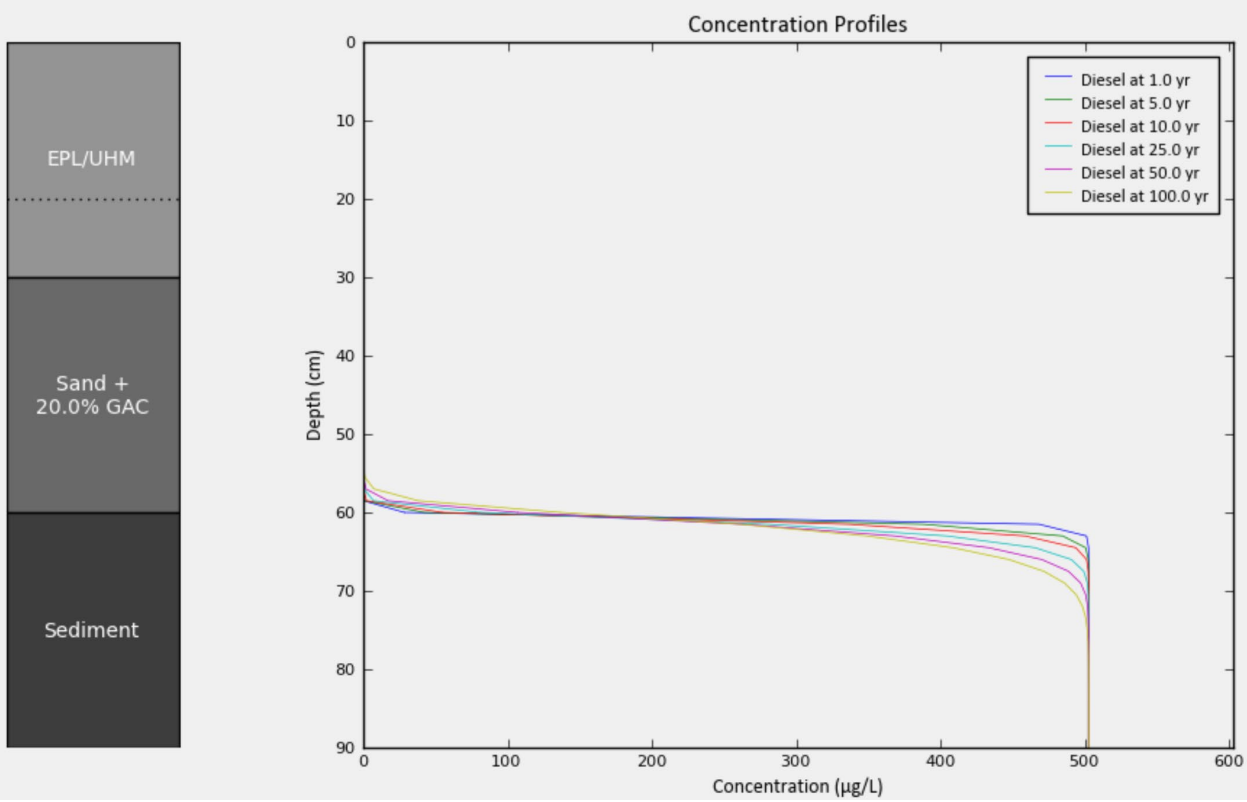

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
DDE at 1.0 yr
DDE at 5.0 yr
DDE at 10.0 yr
DDE at 25.0 yr
DDE at 50.0 yr
DDE at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

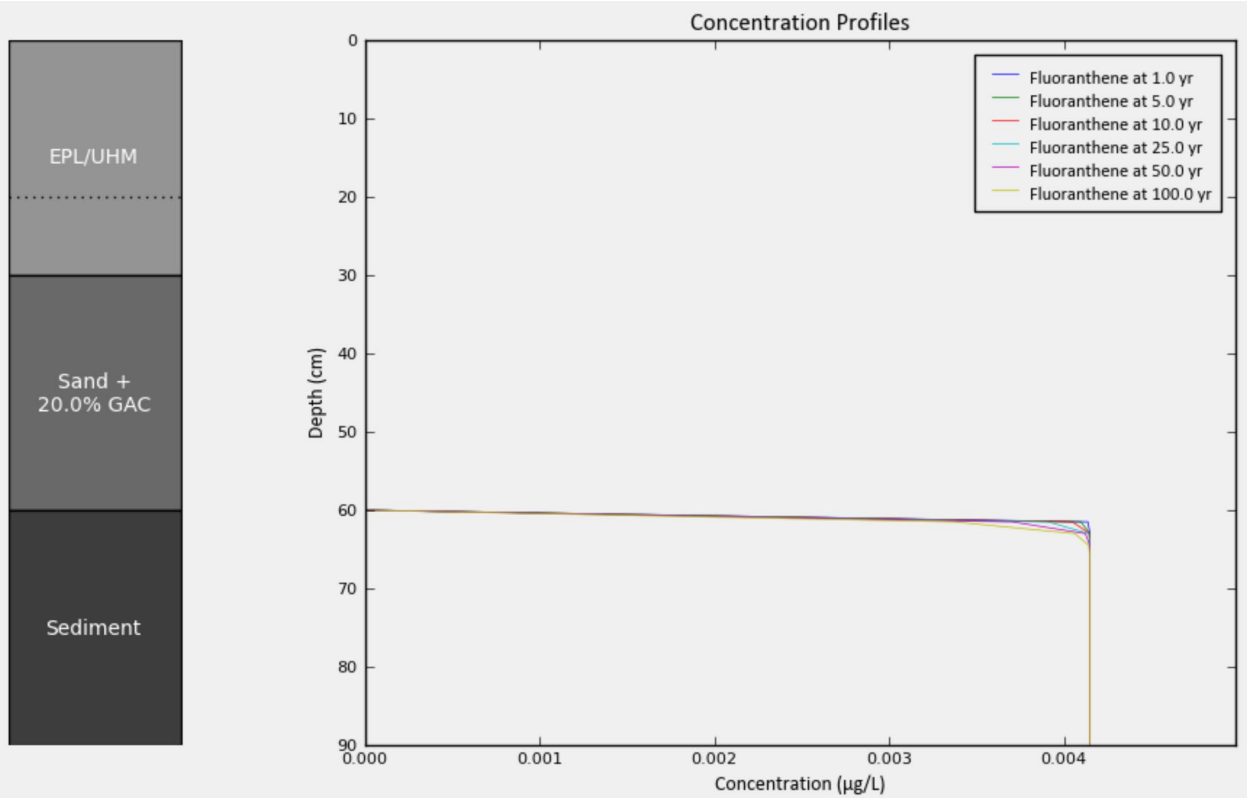

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
DDT at 1.0 yr
DDT at 5.0 yr
DDT at 10.0 yr
DDT at 25.0 yr
DDT at 50.0 yr
DDT at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

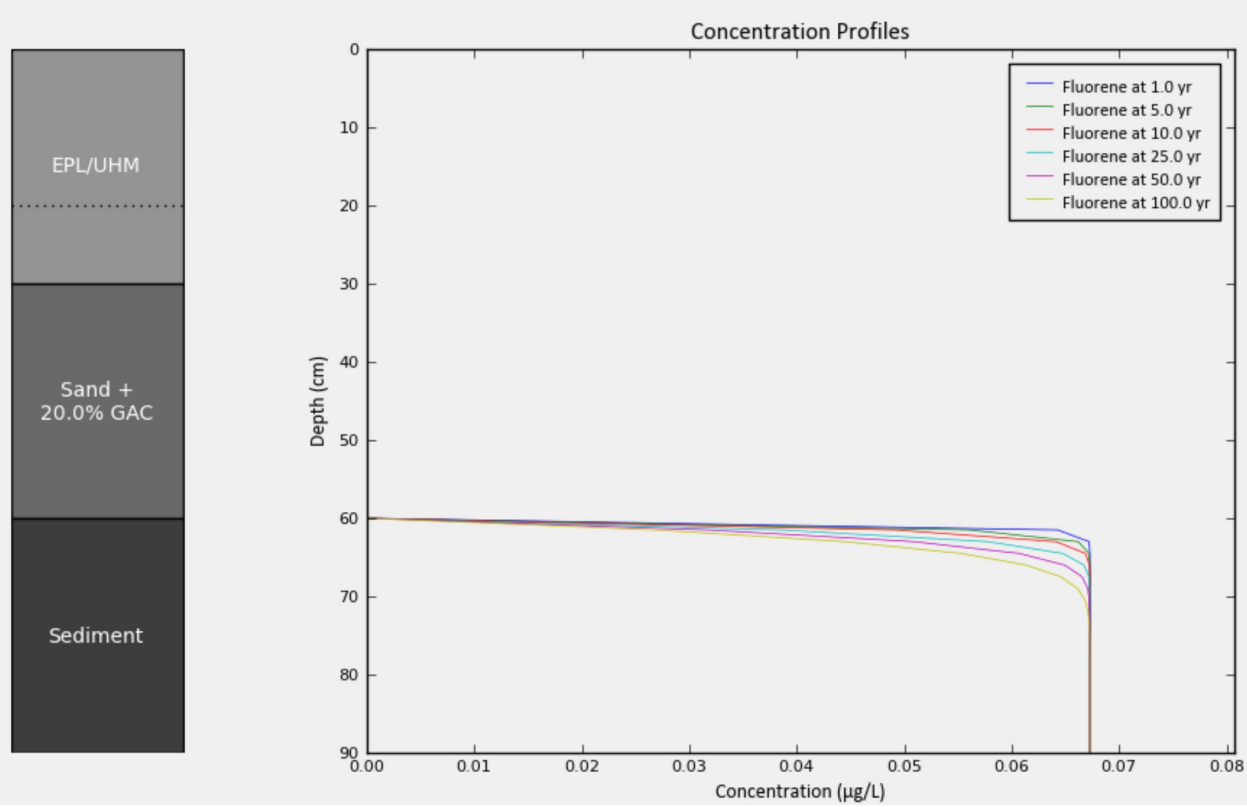

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
DDx at 1.0 yr
DDx at 5.0 yr
DDx at 10.0 yr
DDx at 25.0 yr
DDx at 50.0 yr
DDx at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

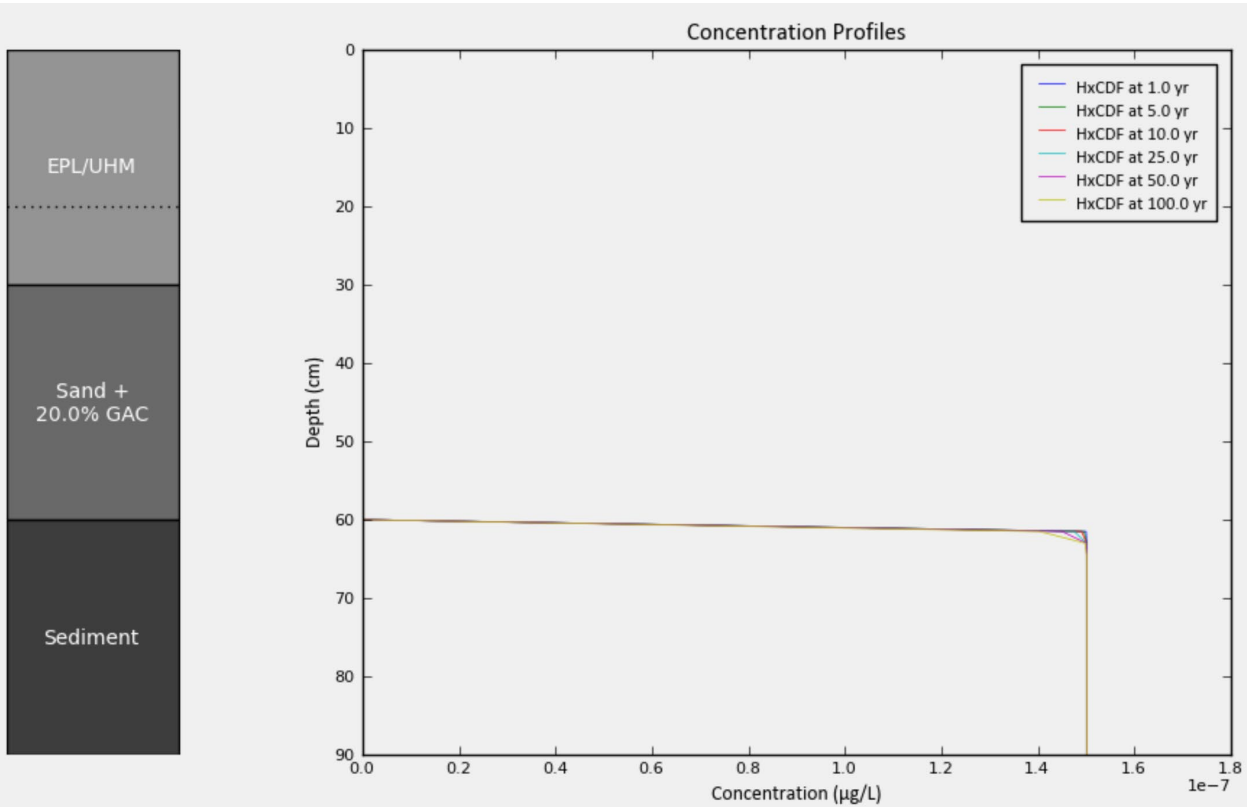

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Dibenzo(a,h)anthracene at 1.0 yr
Dibenzo(a,h)anthracene at 5.0 yr
Dibenzo(a,h)anthracene at 10.0 yr
Dibenzo(a,h)anthracene at 25.0 yr
Dibenzo(a,h)anthracene at 50.0 yr
Dibenzo(a,h)anthracene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

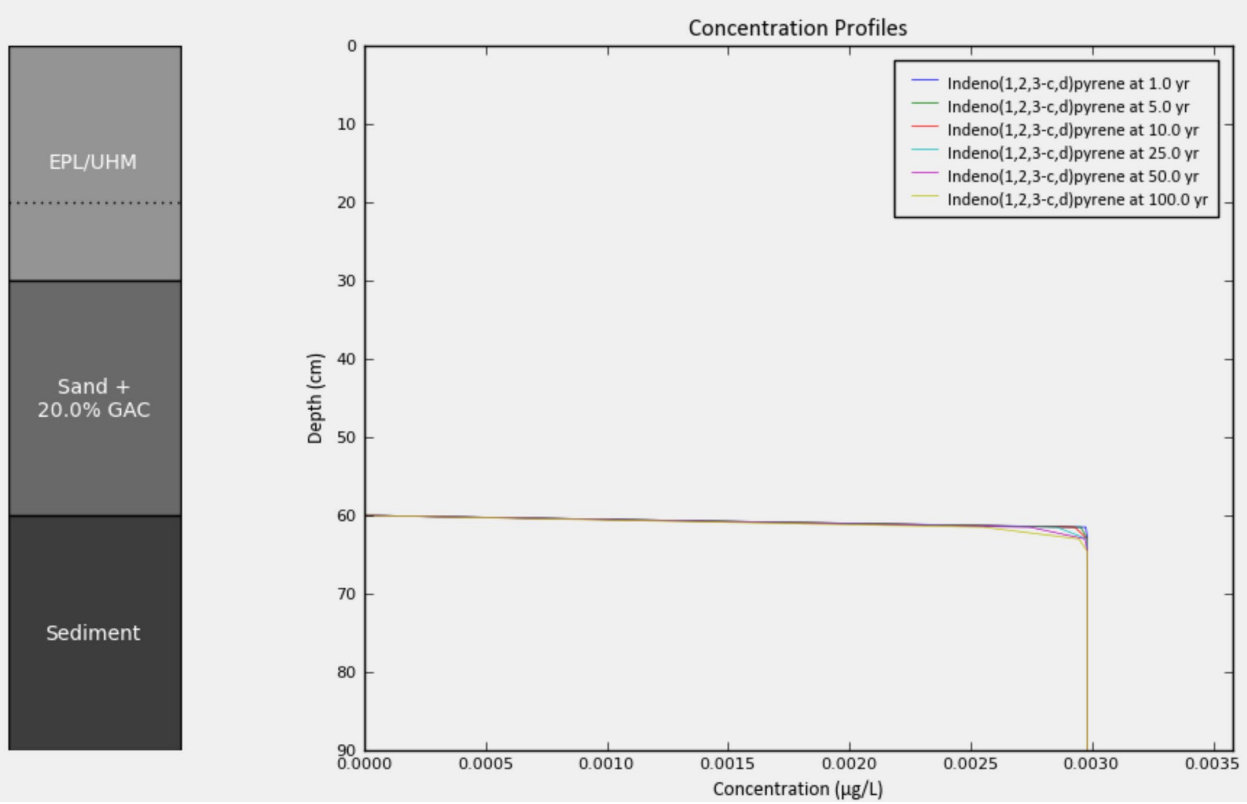

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Dieldrin at 1.0 yr
Dieldrin at 5.0 yr
Dieldrin at 10.0 yr
Dieldrin at 25.0 yr
Dieldrin at 50.0 yr
Dieldrin at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
7
1e−4
Concentration (µg/L)

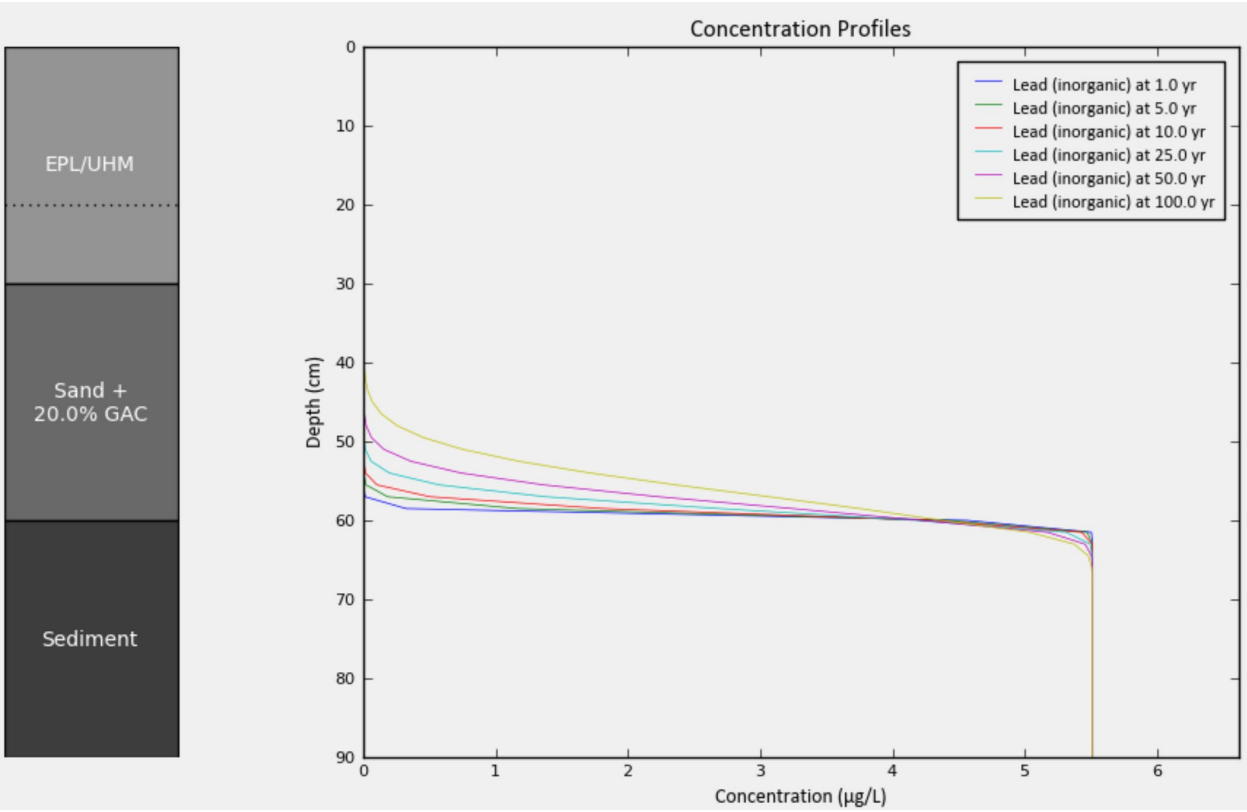

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Diesel at 1.0 yr
Diesel at 5.0 yr
Diesel at 10.0 yr
Diesel at 25.0 yr
Diesel at 50.0 yr
Diesel at 100.0 yr
Depth (cm)
Concentration (µg/L)

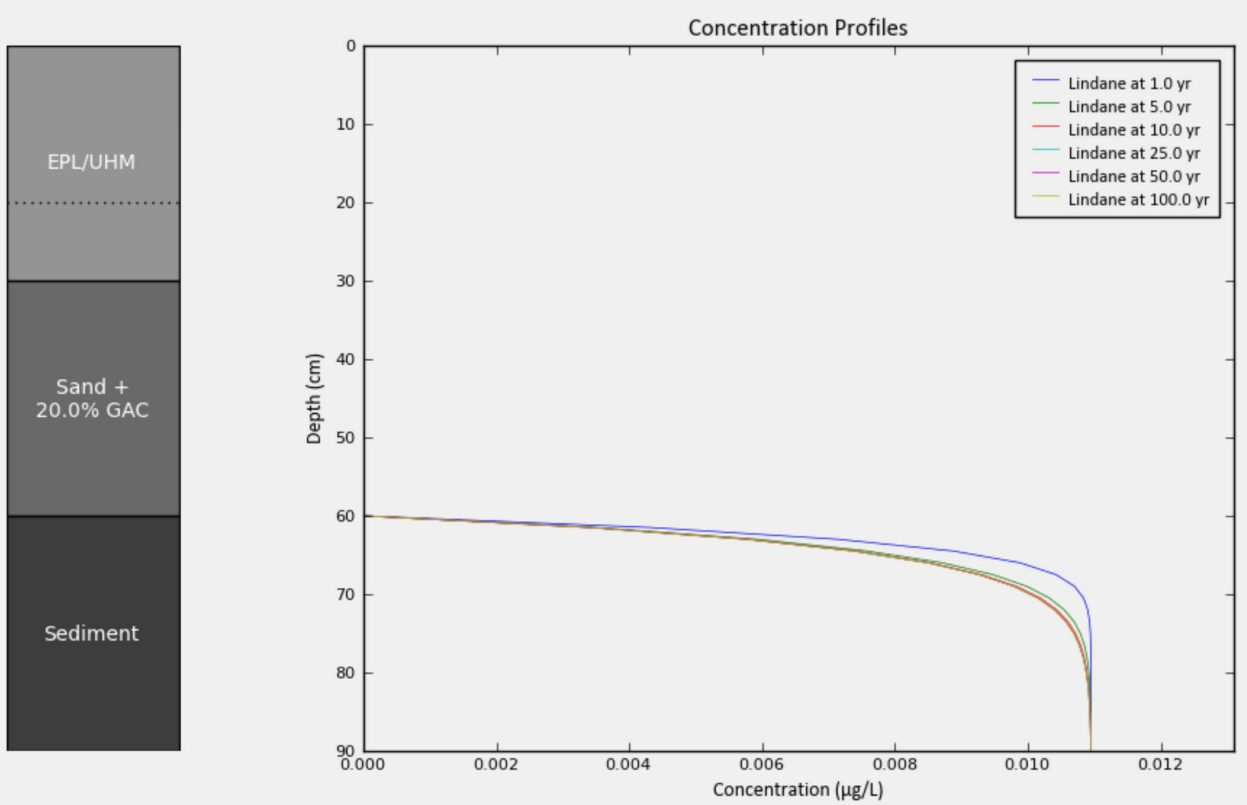

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Fluoranthene at 1.0 yr
Fluoranthene at 5.0 yr
Fluoranthene at 10.0 yr
Fluoranthene at 25.0 yr
Fluoranthene at 50.0 yr
Fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)

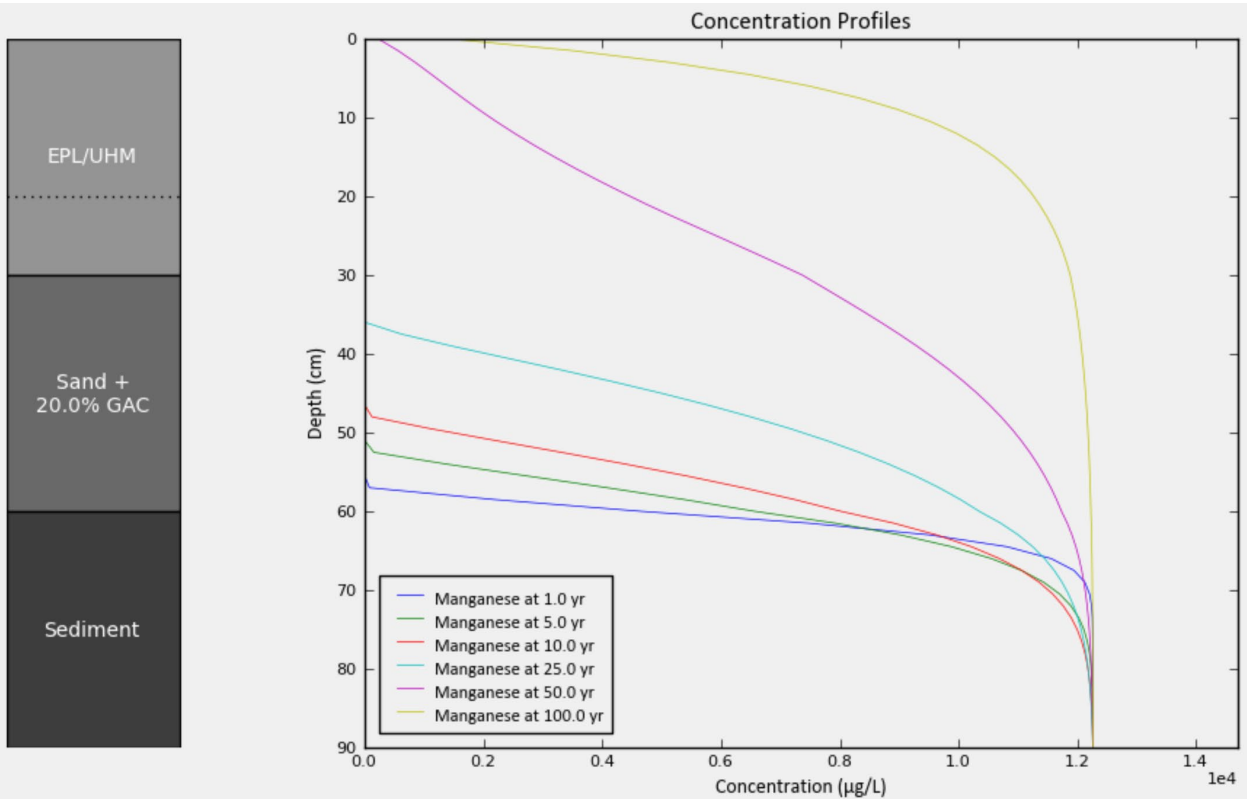

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Fluorene at 1.0 yr
Fluorene at 5.0 yr
Fluorene at 10.0 yr
Fluorene at 25.0 yr
Fluorene at 50.0 yr
Fluorene at 100.0 yr
Depth (cm)
Concentration (µg/L)

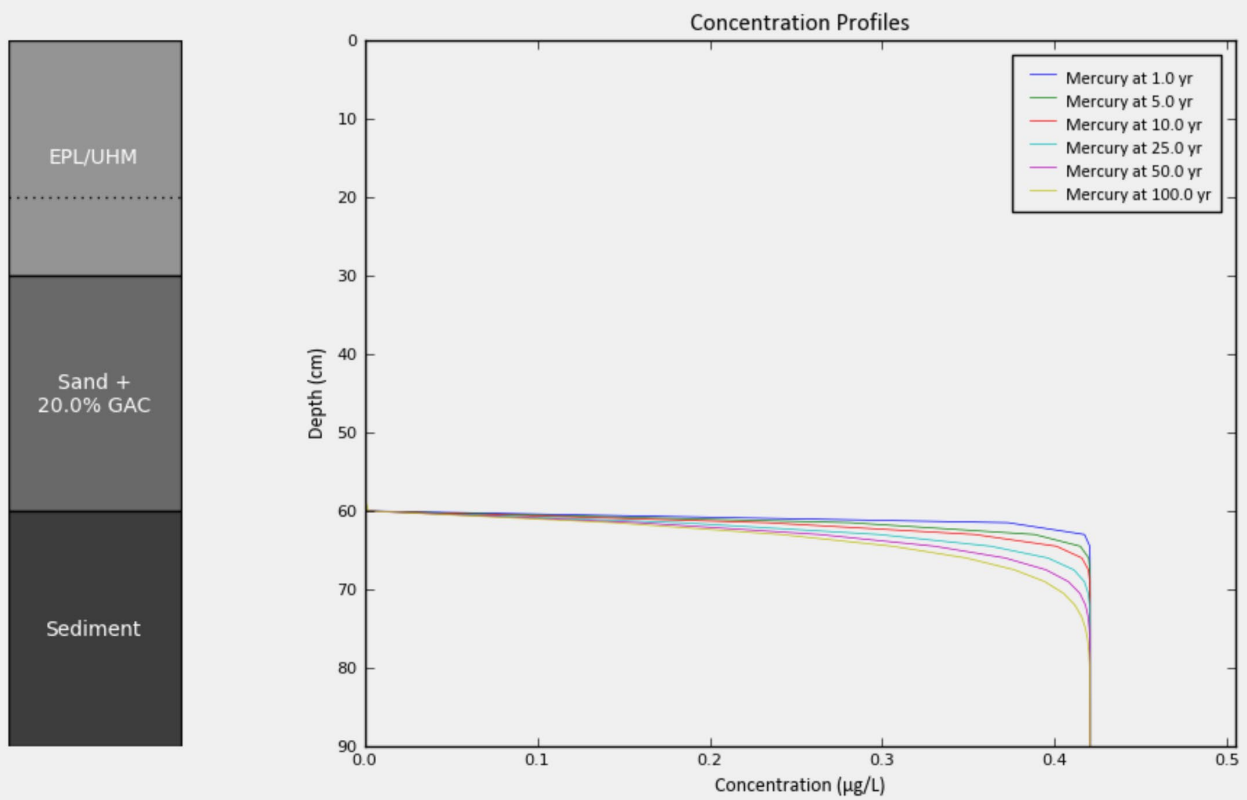

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
HxCDF at 1.0 yr
HxCDF at 5.0 yr
HxCDF at 10.0 yr
HxCDF at 25.0 yr
HxCDF at 50.0 yr
HxCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

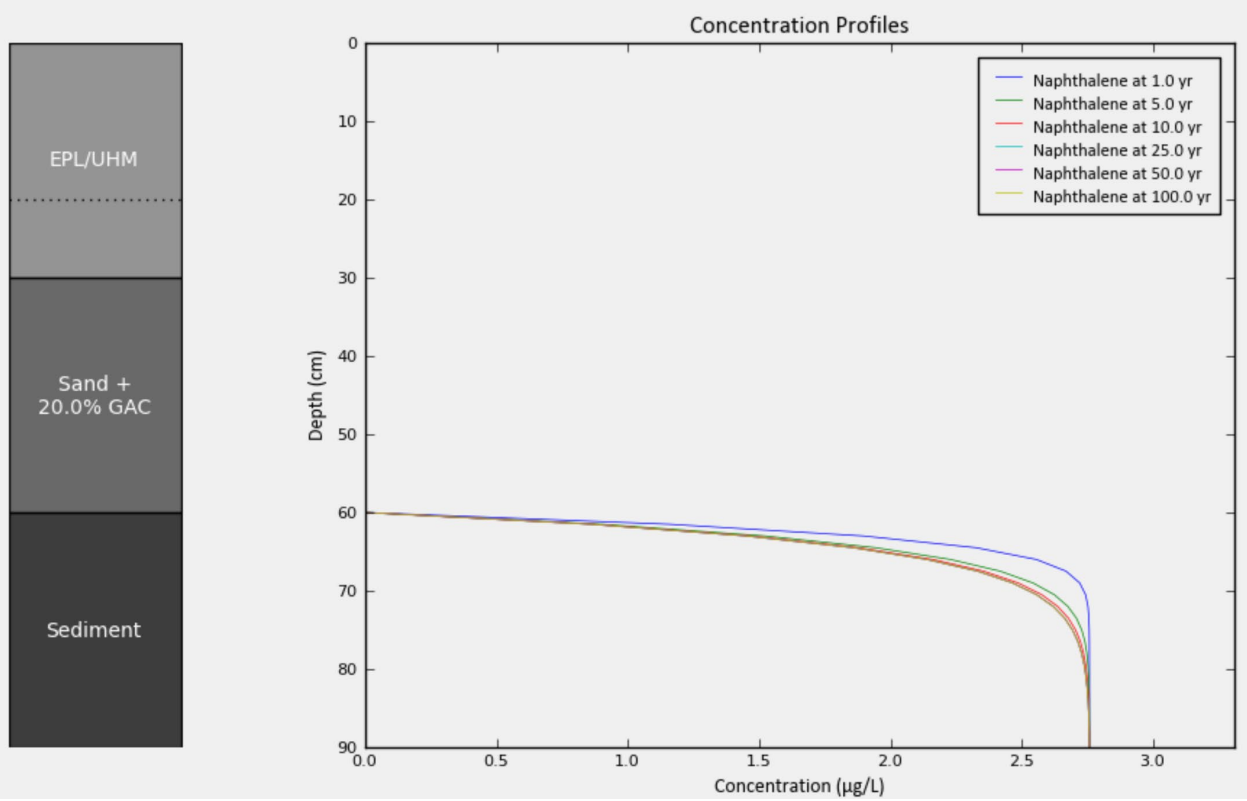

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Indeno(1,2,3-c,d)pyrene at 1.0 yr
Indeno(1,2,3-c,d)pyrene at 5.0 yr
Indeno(1,2,3-c,d)pyrene at 10.0 yr
Indeno(1,2,3-c,d)pyrene at 25.0 yr
Indeno(1,2,3-c,d)pyrene at 50.0 yr
Indeno(1,2,3-c,d)pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
0.0035
Concentration (µg/L)

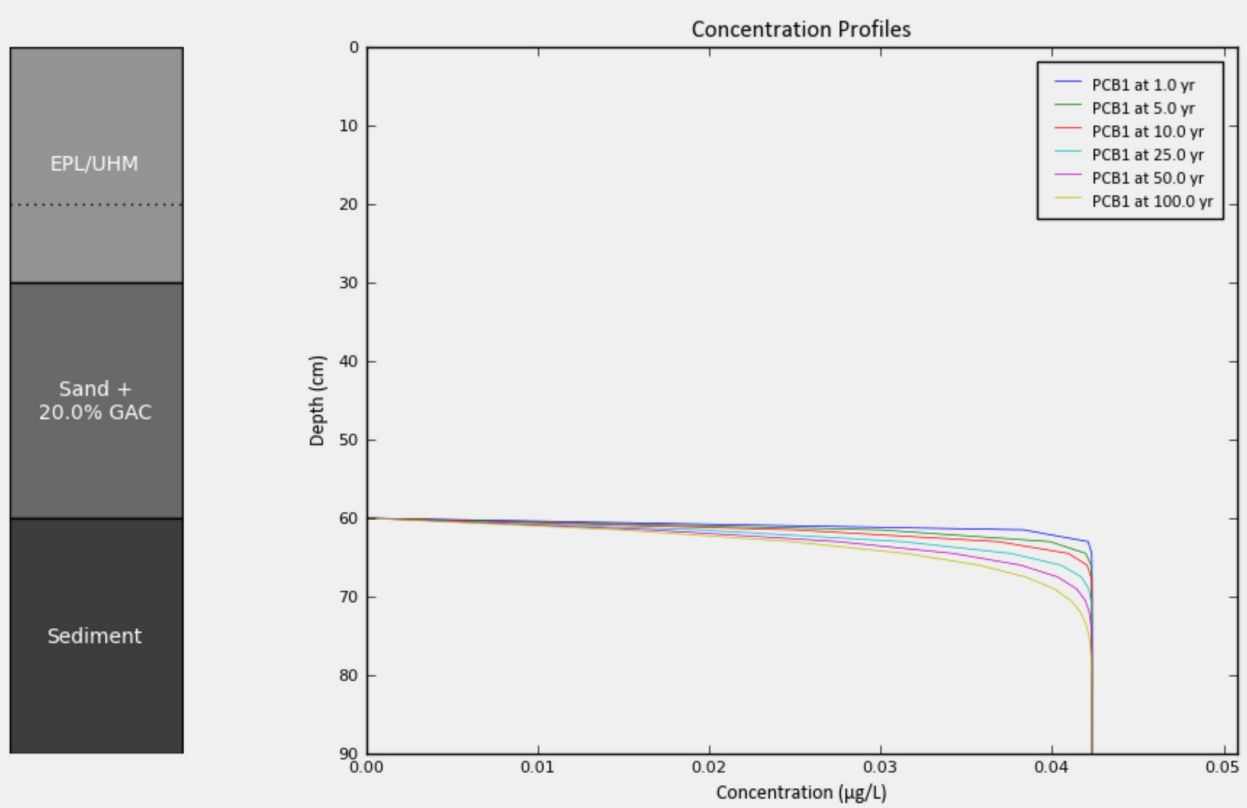

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Lead (inorganic) at 1.0 yr
Lead (inorganic) at 5.0 yr
Lead (inorganic) at 10.0 yr
Lead (inorganic) at 25.0 yr
Lead (inorganic) at 50.0 yr
Lead (inorganic) at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
Concentration (µg/L)

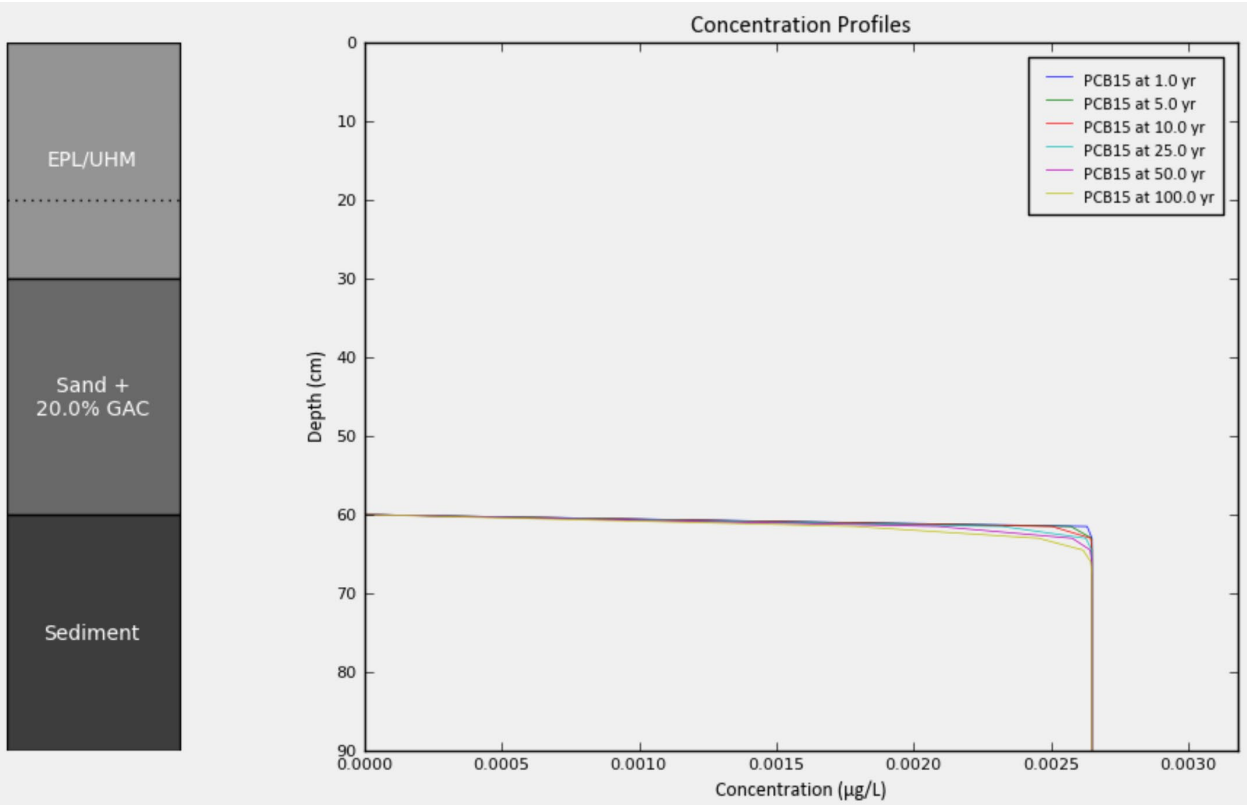

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Lindane at 1.0 yr
Lindane at 5.0 yr
Lindane at 10.0 yr
Lindane at 25.0 yr
Lindane at 50.0 yr
Lindane at 100.0 yr
Depth (cm)
Concentration (µg/L)

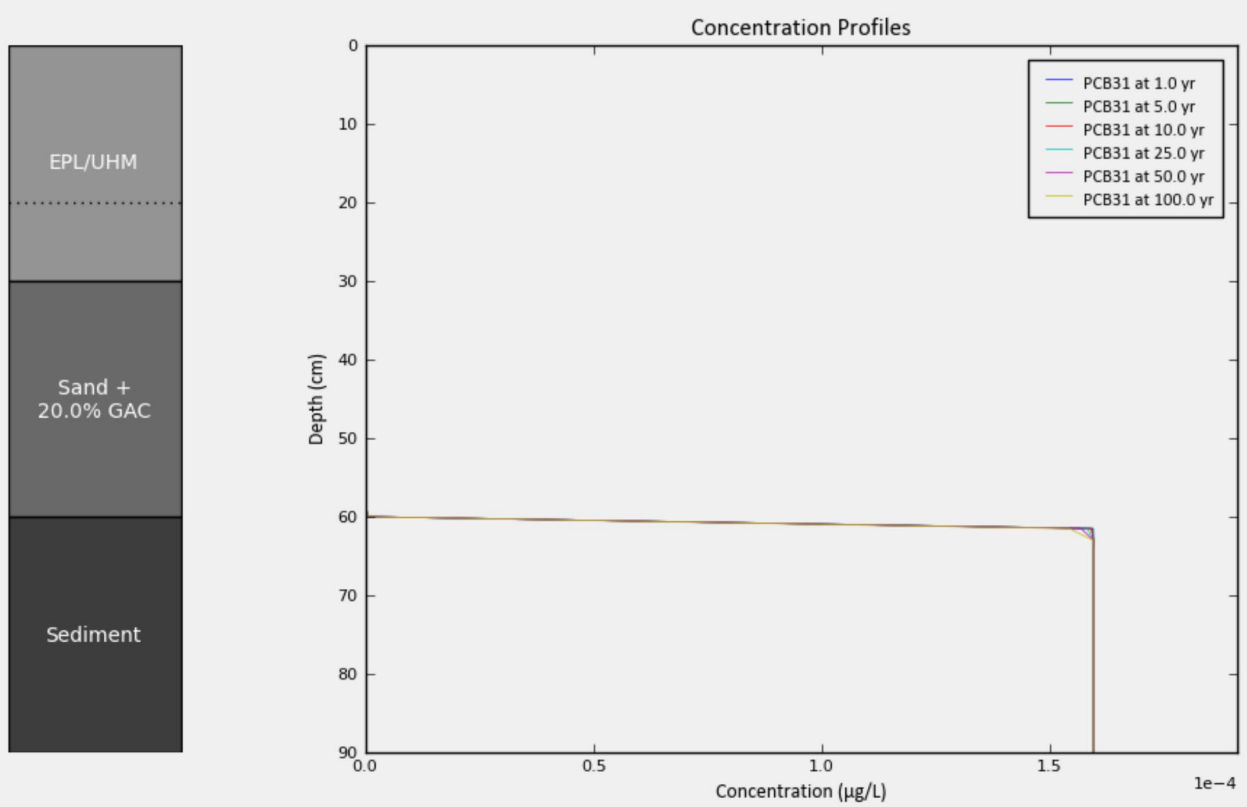

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Manganese at 1.0 yr
Manganese at 5.0 yr
Manganese at 10.0 yr
Manganese at 25.0 yr
Manganese at 50.0 yr
Manganese at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e4

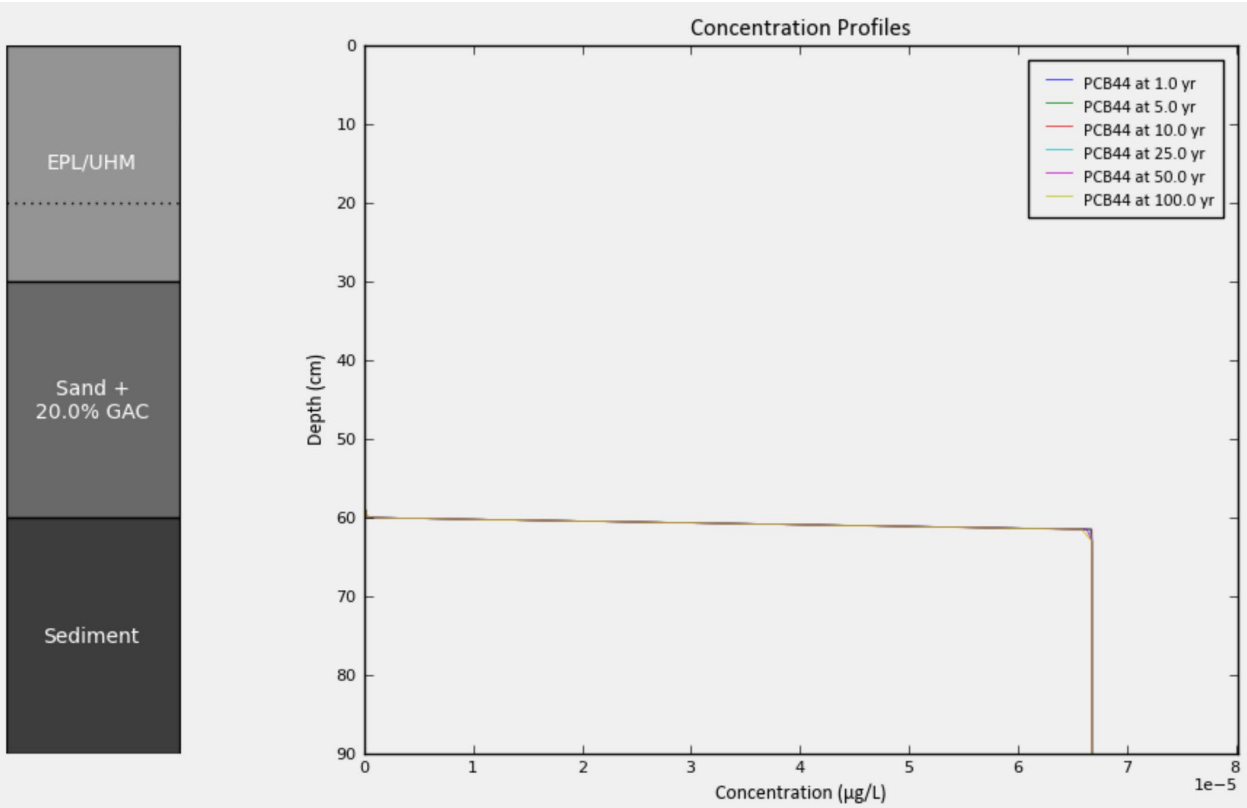

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Mercury at 1.0 yr
Mercury at 5.0 yr
Mercury at 10.0 yr
Mercury at 25.0 yr
Mercury at 50.0 yr
Mercury at 100.0 yr
Depth (cm)
Concentration (µg/L)

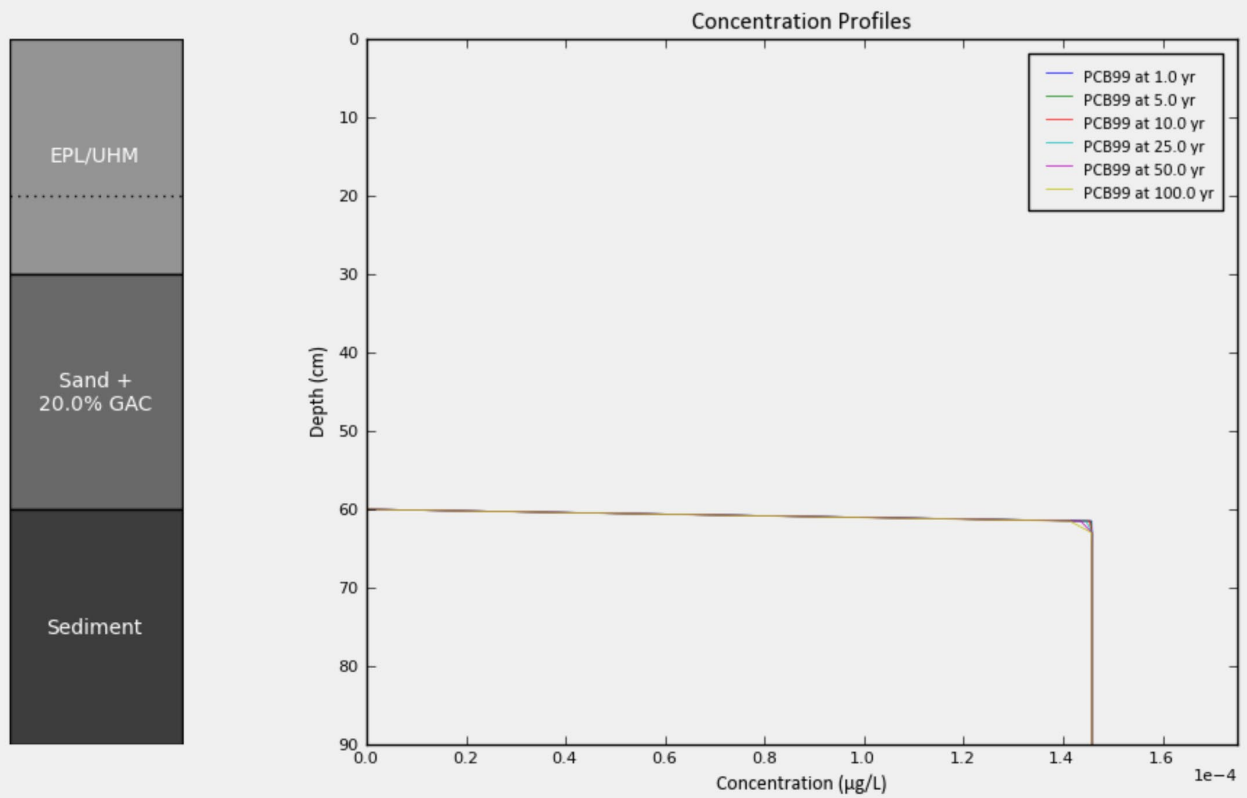

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Naphthalene at 1.0 yr
Naphthalene at 5.0 yr
Naphthalene at 10.0 yr
Naphthalene at 25.0 yr
Naphthalene at 50.0 yr
Naphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

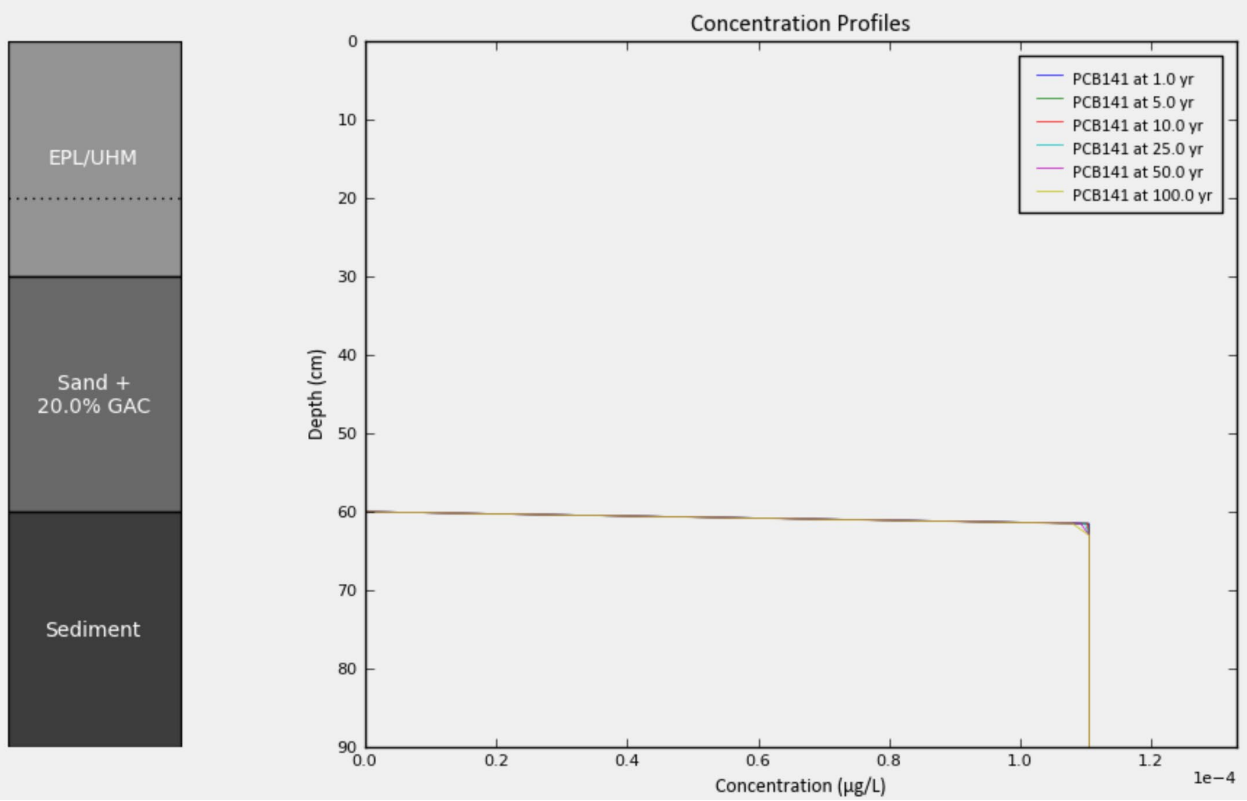

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB1 at 1.0 yr
PCB1 at 5.0 yr
PCB1 at 10.0 yr
PCB1 at 25.0 yr
PCB1 at 50.0 yr
PCB1 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.00
0.01
0.02
0.03
0.04
0.05

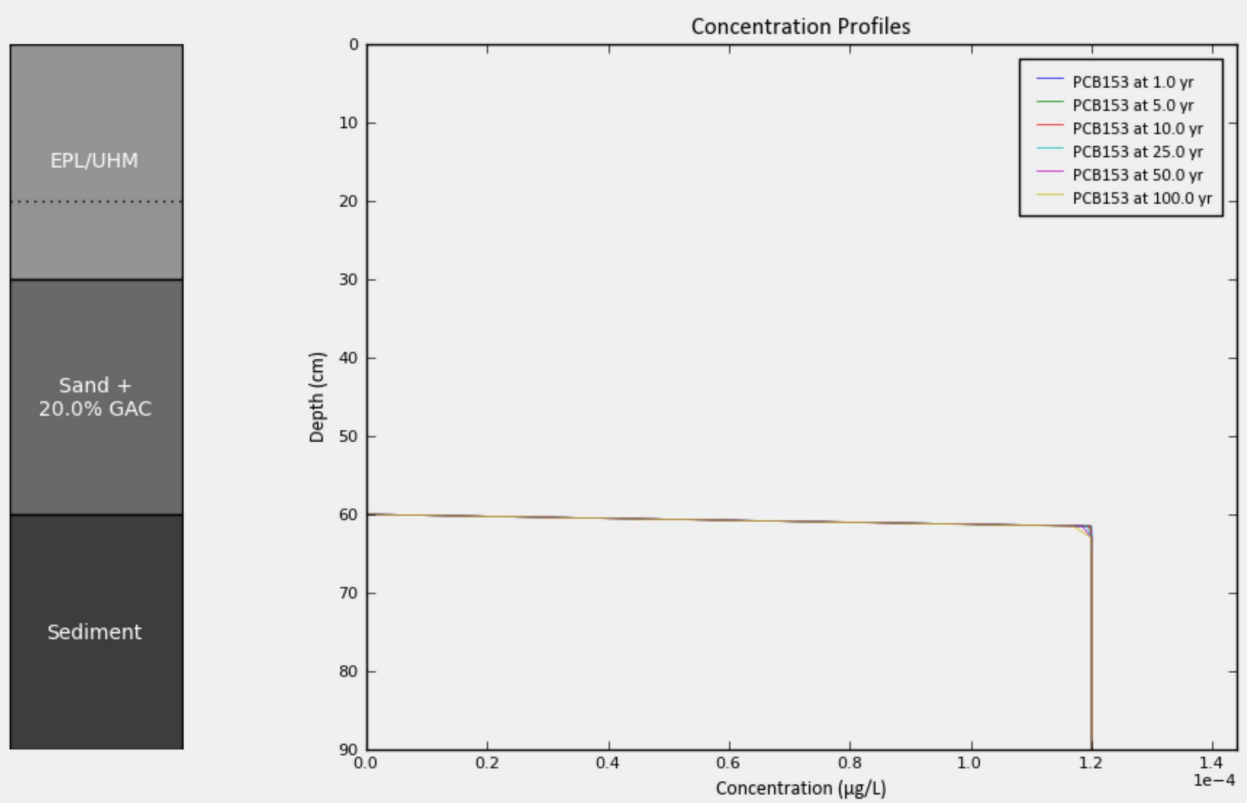

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB15 at 1.0 yr
PCB15 at 5.0 yr
PCB15 at 10.0 yr
PCB15 at 25.0 yr
PCB15 at 50.0 yr
PCB15 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030

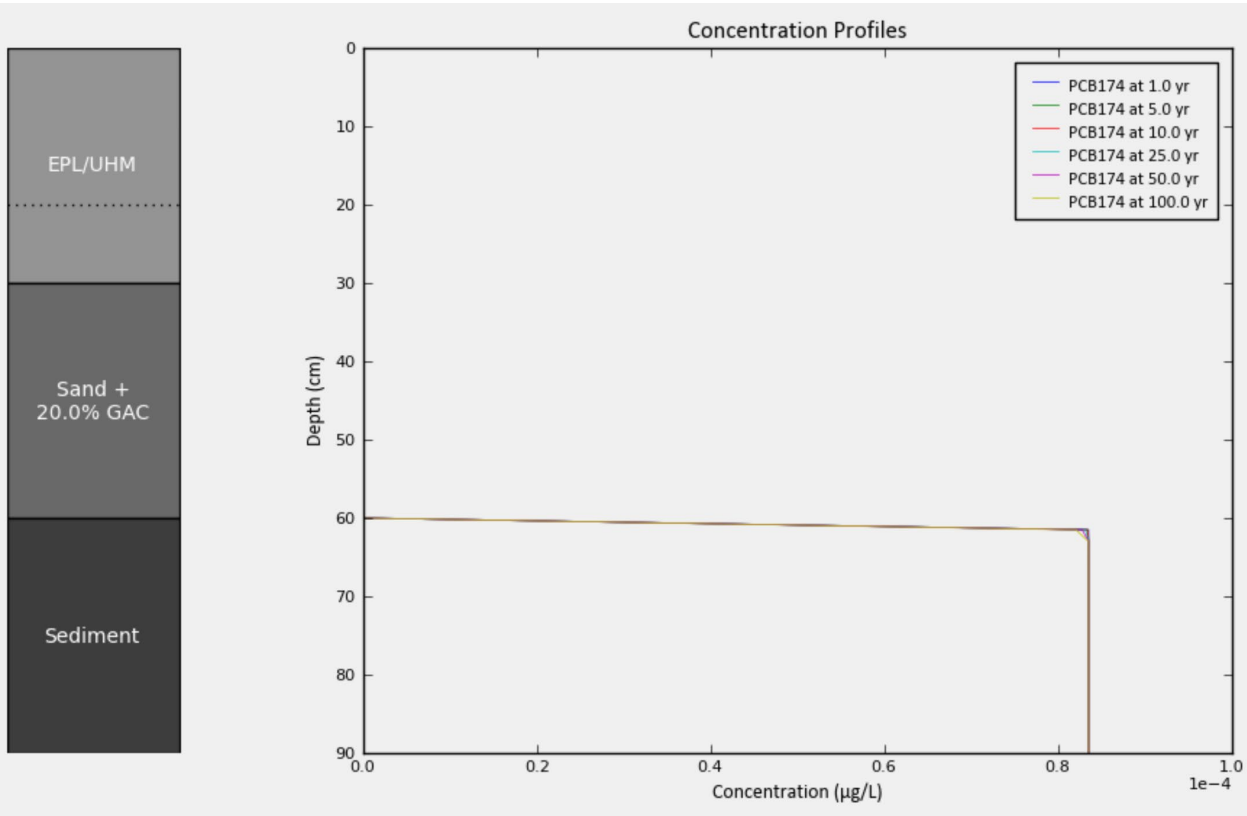

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB31 at 1.0 yr
PCB31 at 5.0 yr
PCB31 at 10.0 yr
PCB31 at 25.0 yr
PCB31 at 50.0 yr
PCB31 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.5
1.0
1.5
Concentration (µg/L)
1e−4

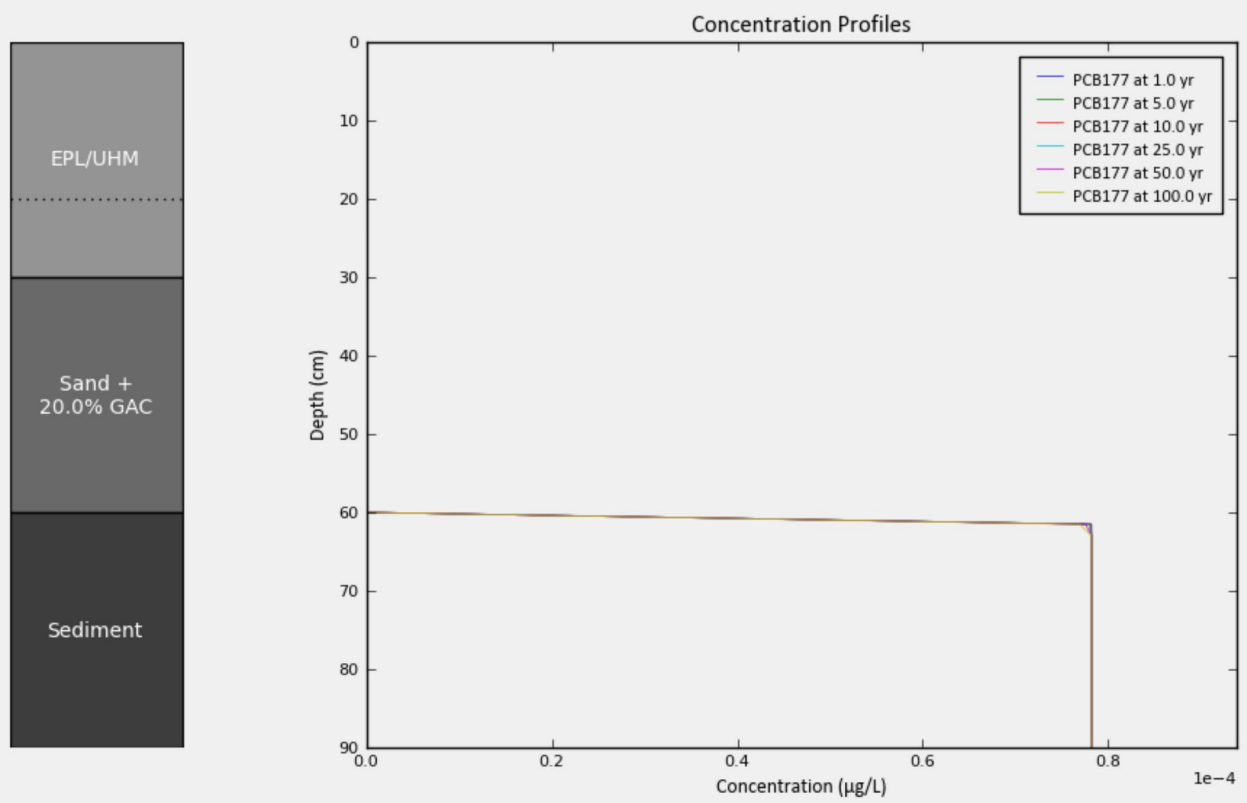

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB44 at 1.0 yr
PCB44 at 5.0 yr
PCB44 at 10.0 yr
PCB44 at 25.0 yr
PCB44 at 50.0 yr
PCB44 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
1
2
3
4
5
6
7
8
Concentration (µg/L)
1e−5

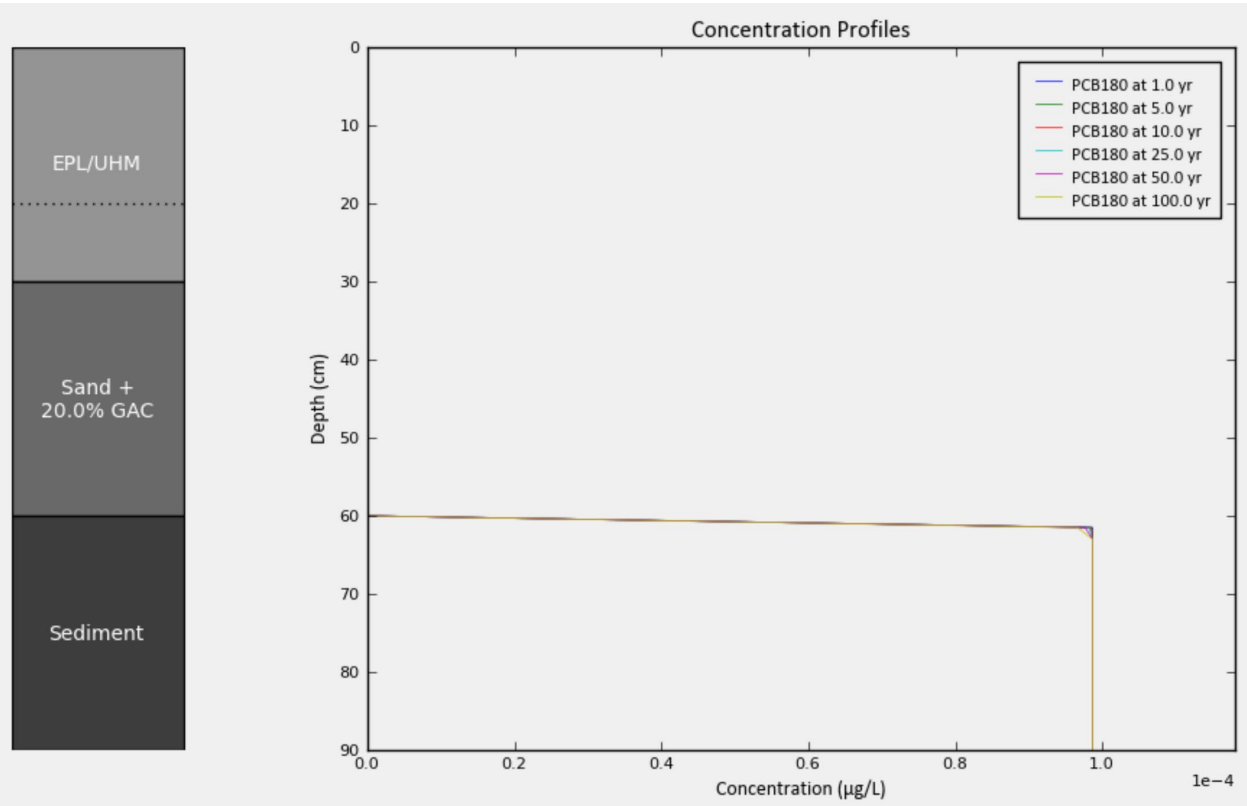

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB99 at 1.0 yr
PCB99 at 5.0 yr
PCB99 at 10.0 yr
PCB99 at 25.0 yr
PCB99 at 50.0 yr
PCB99 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

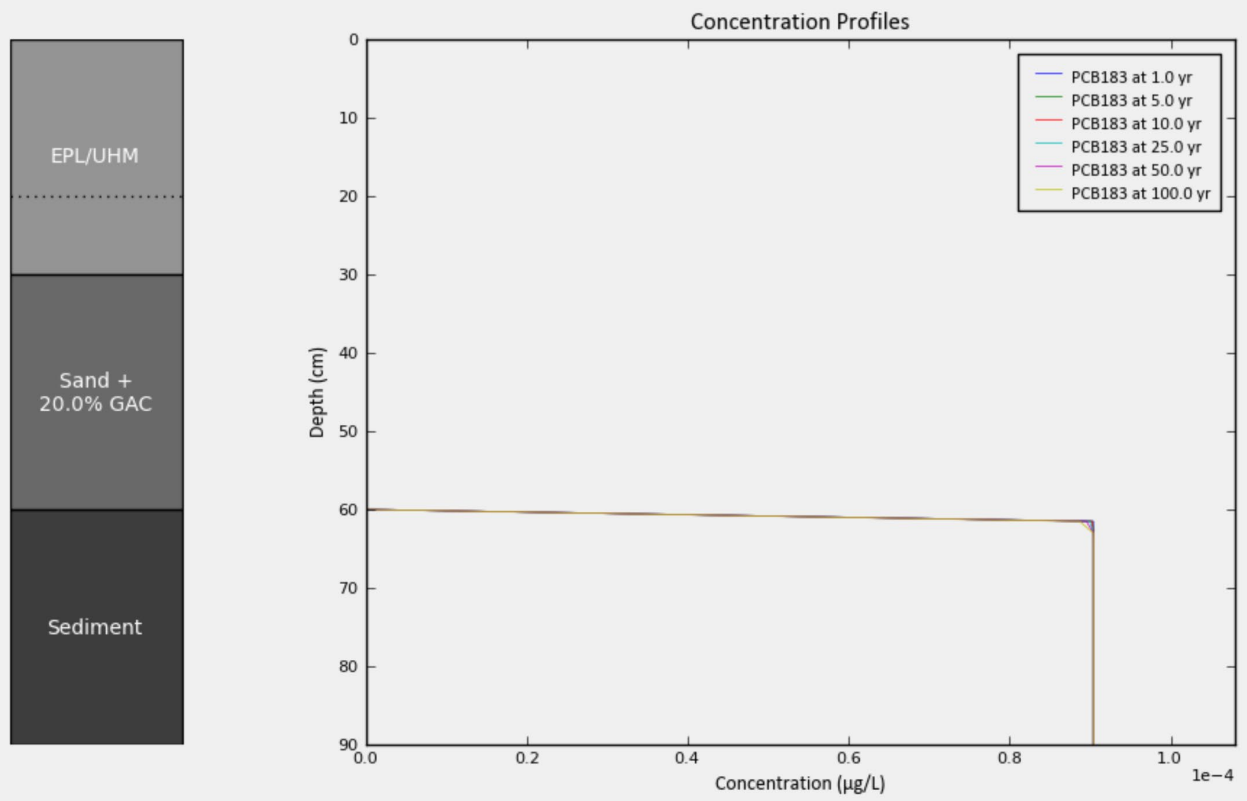

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB141 at 1.0 yr
PCB141 at 5.0 yr
PCB141 at 10.0 yr
PCB141 at 25.0 yr
PCB141 at 50.0 yr
PCB141 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

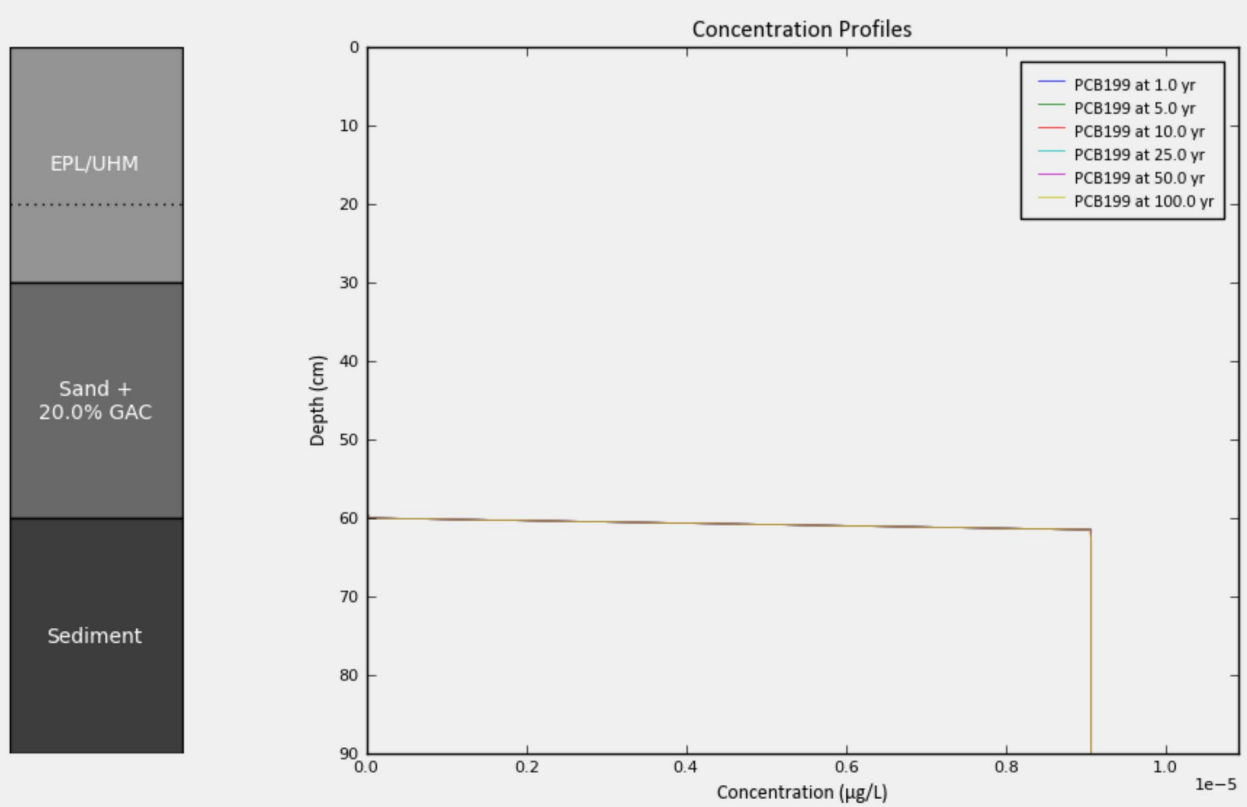

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB153 at 1.0 yr
PCB153 at 5.0 yr
PCB153 at 10.0 yr
PCB153 at 25.0 yr
PCB153 at 50.0 yr
PCB153 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

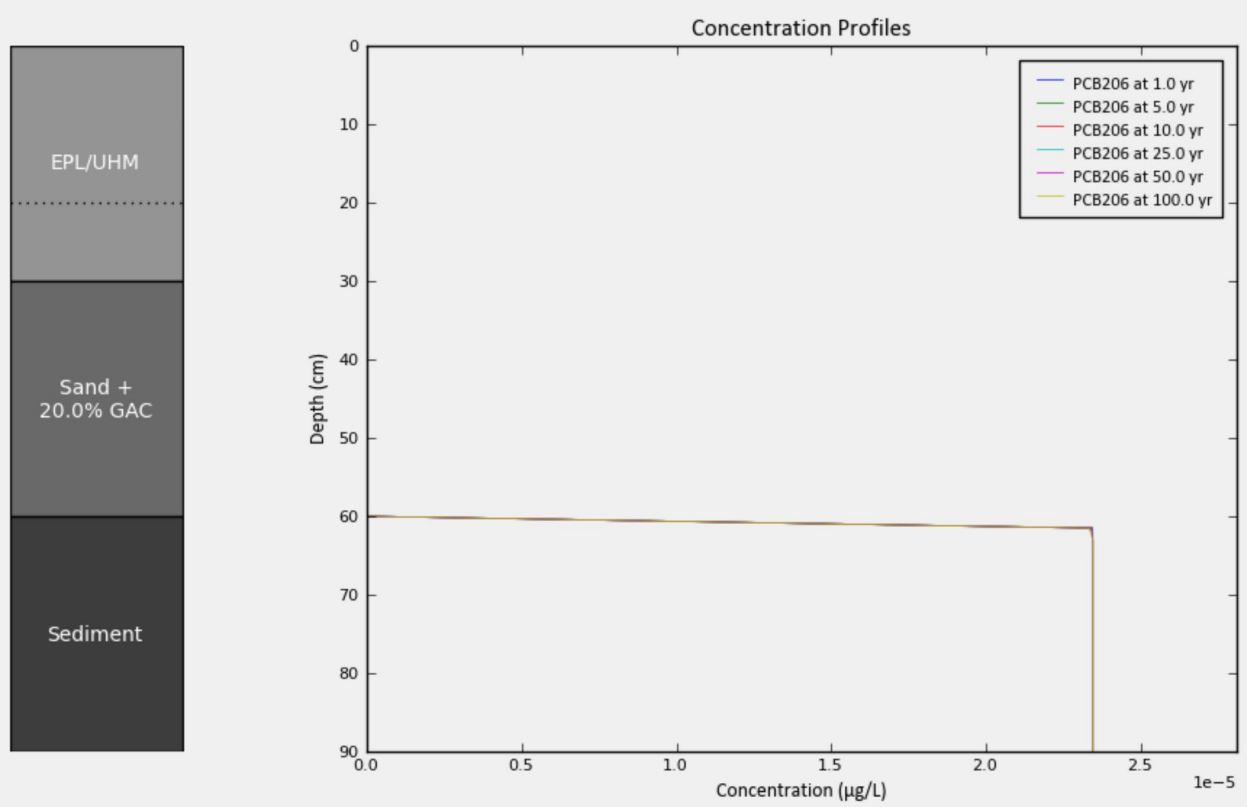

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB174 at 1.0 yr
PCB174 at 5.0 yr
PCB174 at 10.0 yr
PCB174 at 25.0 yr
PCB174 at 50.0 yr
PCB174 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

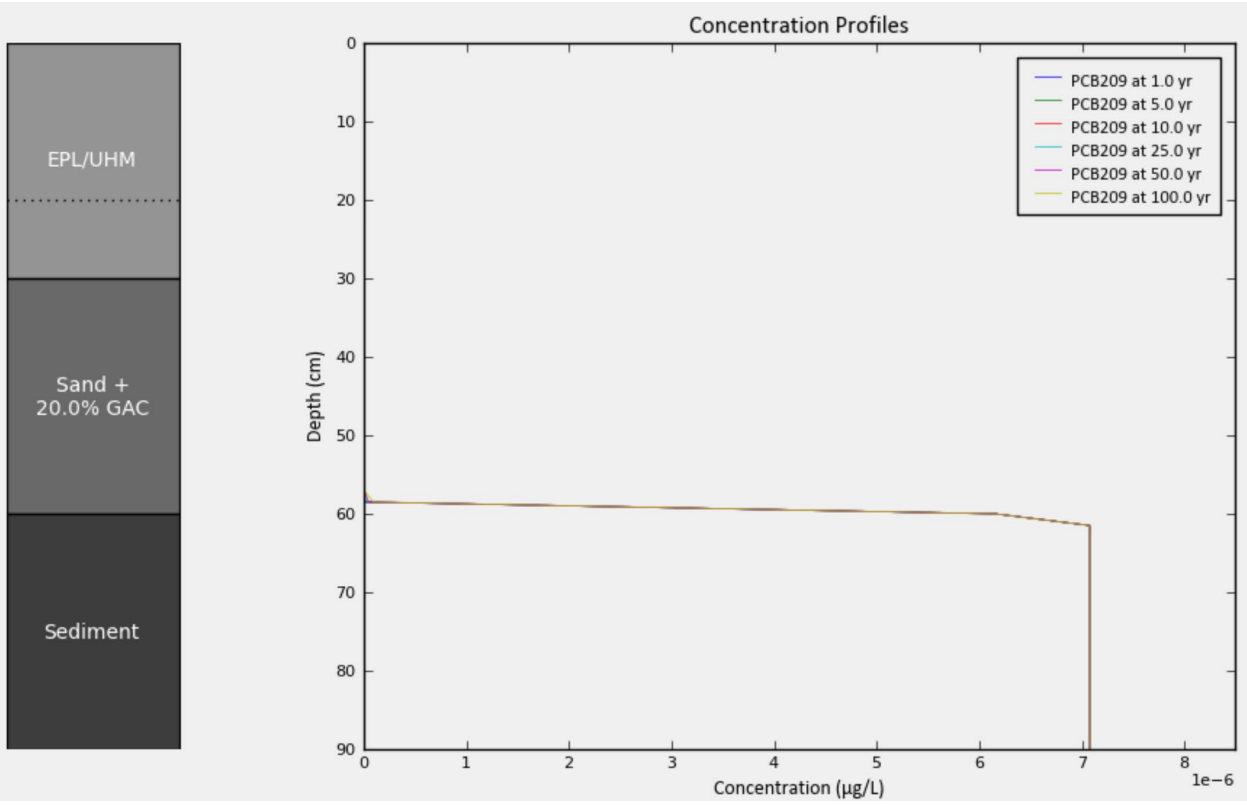

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB177 at 1.0 yr
PCB177 at 5.0 yr
PCB177 at 10.0 yr
PCB177 at 25.0 yr
PCB177 at 50.0 yr
PCB177 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
Concentration (µg/L)
1e−4

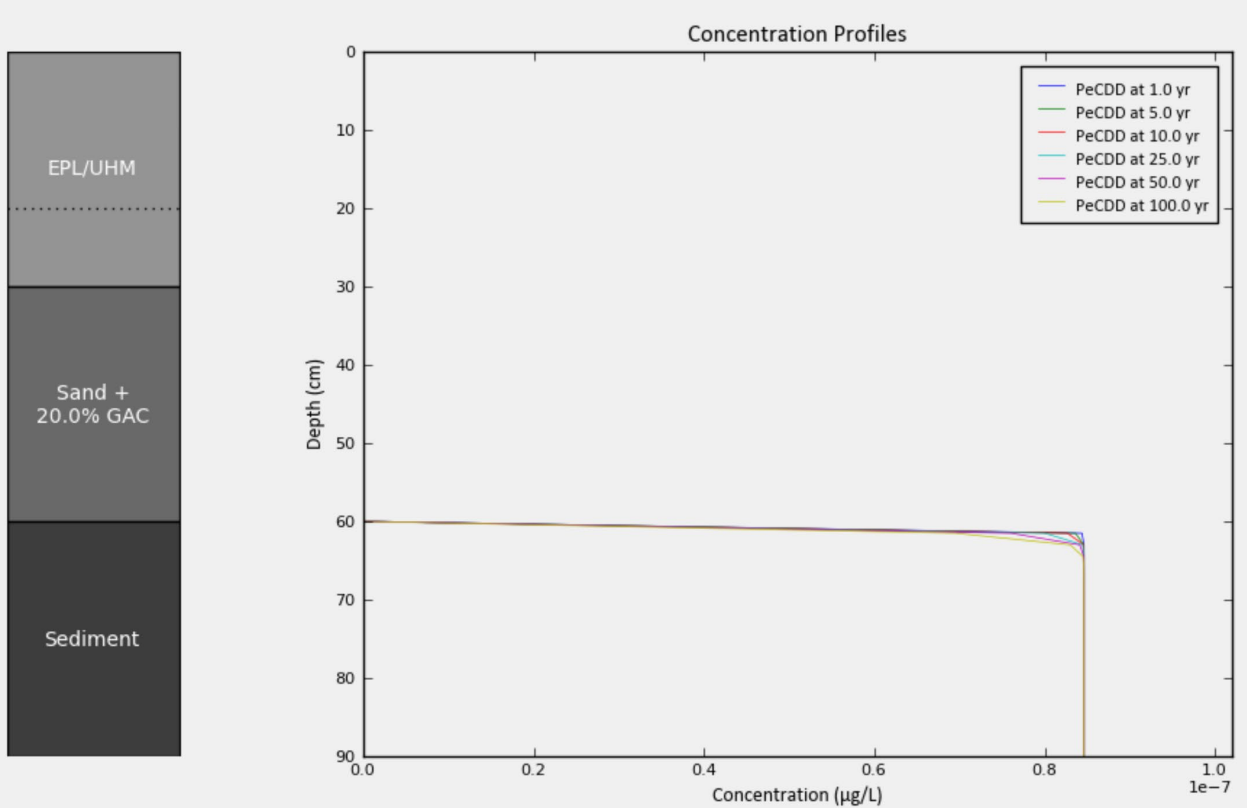

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB180 at 1.0 yr
PCB180 at 5.0 yr
PCB180 at 10.0 yr
PCB180 at 25.0 yr
PCB180 at 50.0 yr
PCB180 at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
Concentration (µg/L)
1e−4

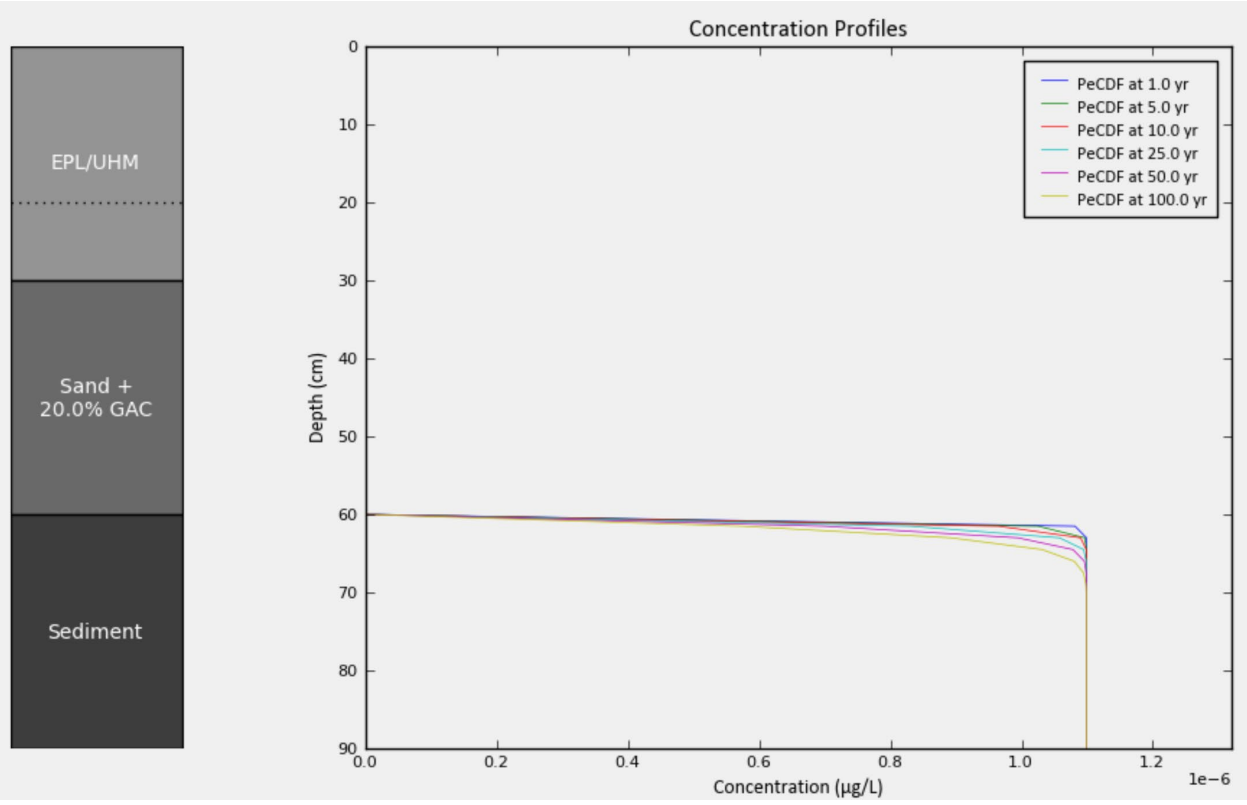

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB183 at 1.0 yr
PCB183 at 5.0 yr
PCB183 at 10.0 yr
PCB183 at 25.0 yr
PCB183 at 50.0 yr
PCB183 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

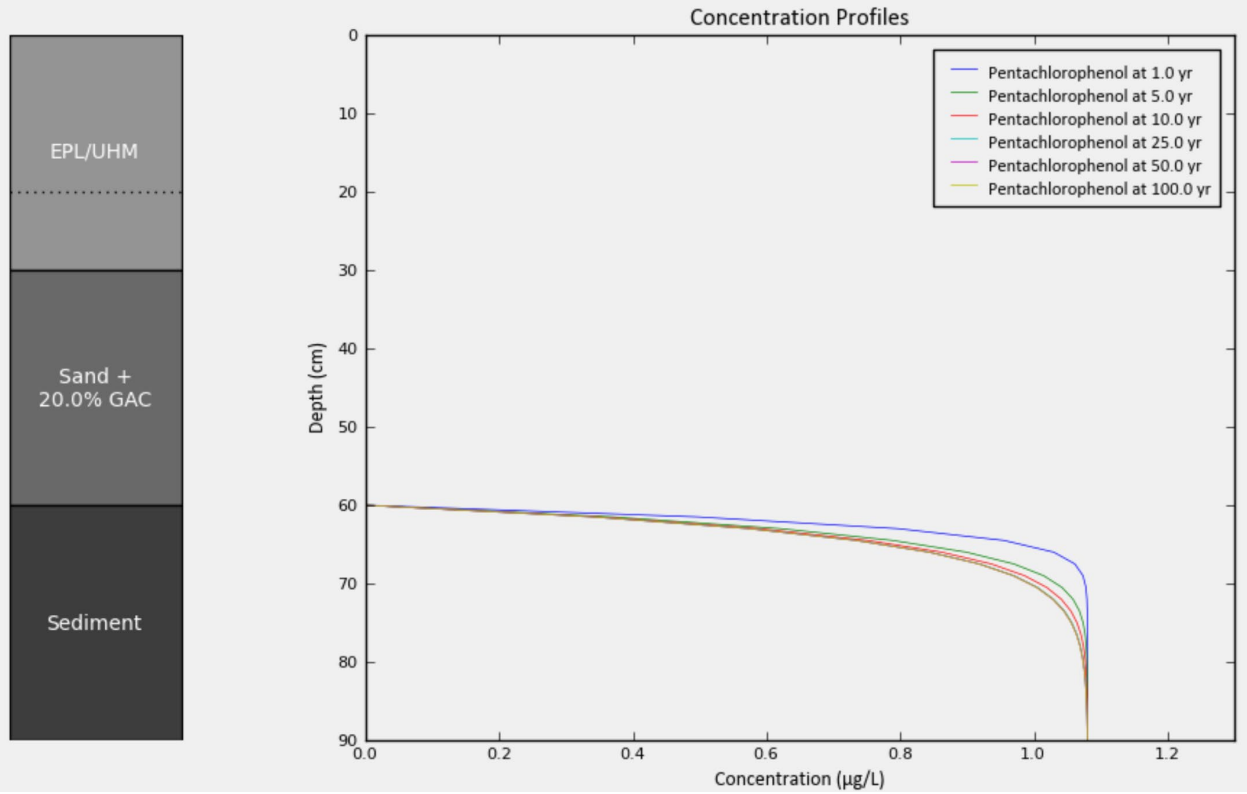

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB199 at 1.0 yr
PCB199 at 5.0 yr
PCB199 at 10.0 yr
PCB199 at 25.0 yr
PCB199 at 50.0 yr
PCB199 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

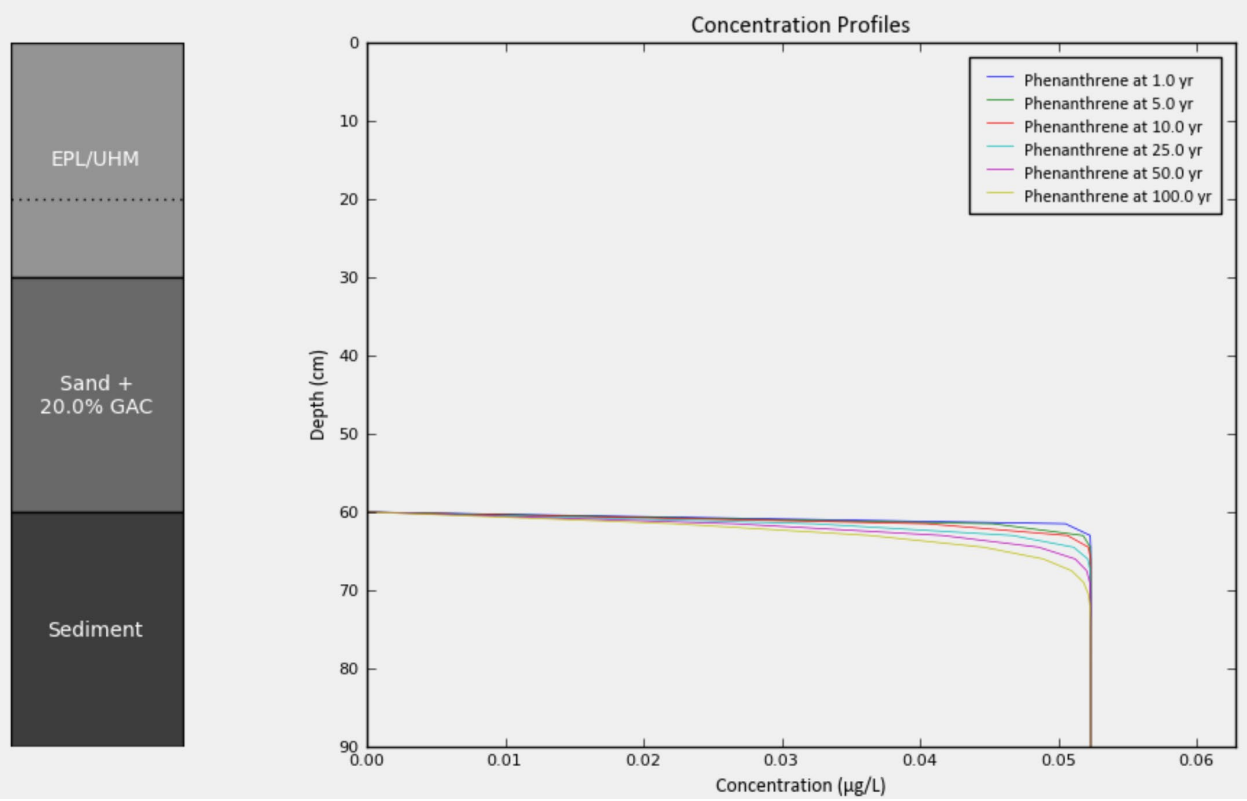

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB206 at 1.0 yr
PCB206 at 5.0 yr
PCB206 at 10.0 yr
PCB206 at 25.0 yr
PCB206 at 50.0 yr
PCB206 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

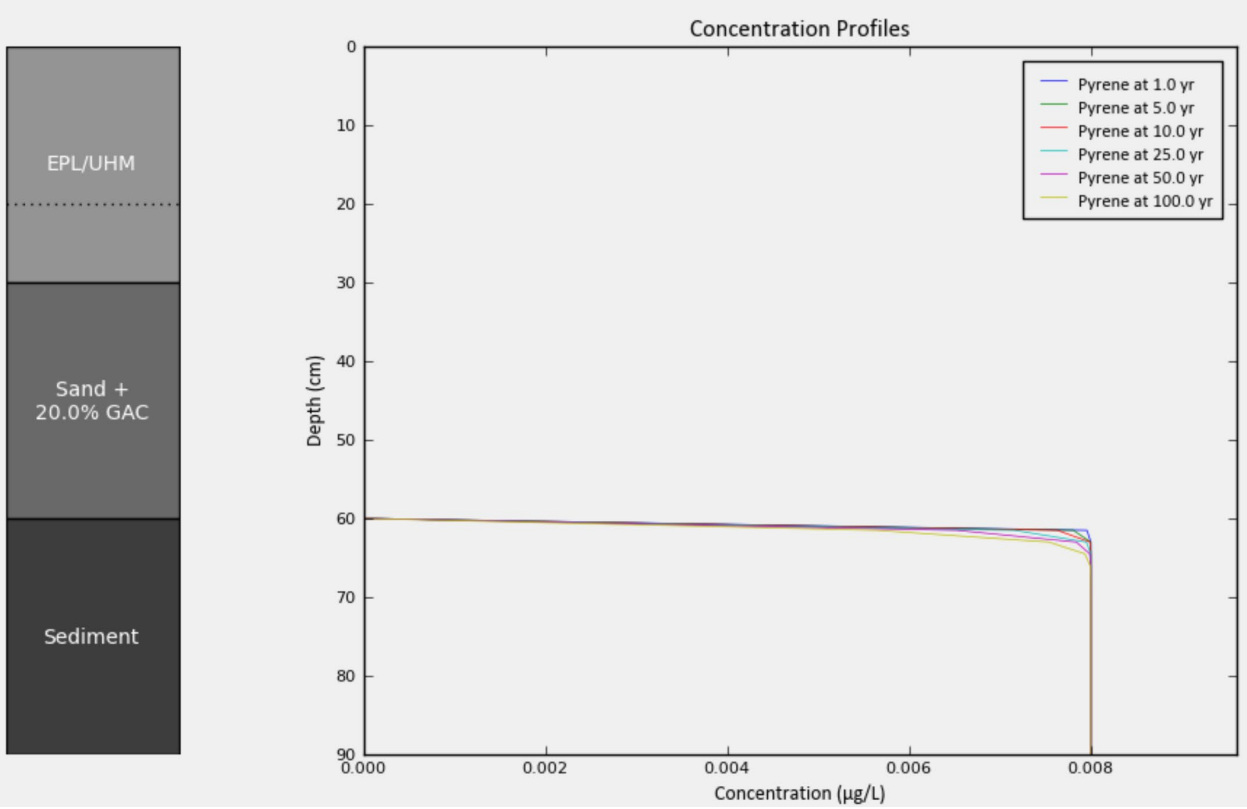

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB209 at 1.0 yr
PCB209 at 5.0 yr
PCB209 at 10.0 yr
PCB209 at 25.0 yr
PCB209 at 50.0 yr
PCB209 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

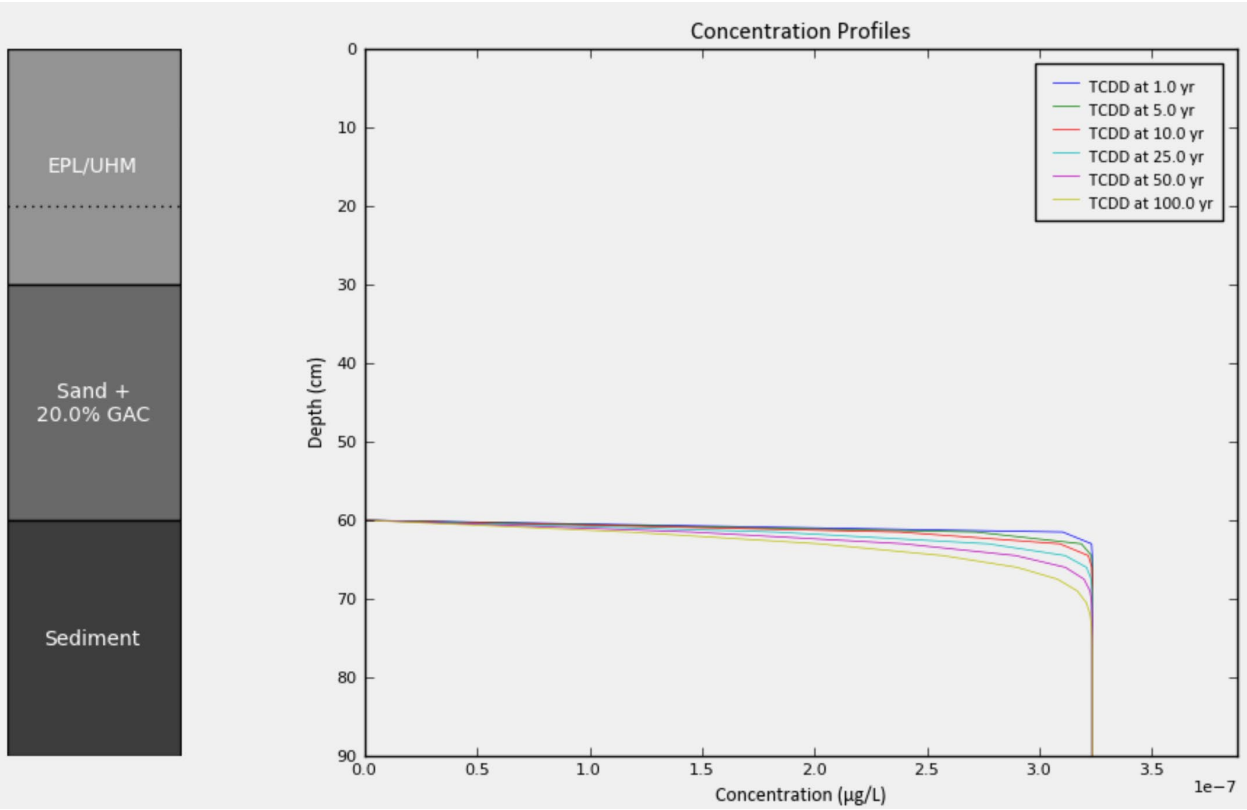

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PeCDD at 1.0 yr
PeCDD at 5.0 yr
PeCDD at 10.0 yr
PeCDD at 25.0 yr
PeCDD at 50.0 yr
PeCDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

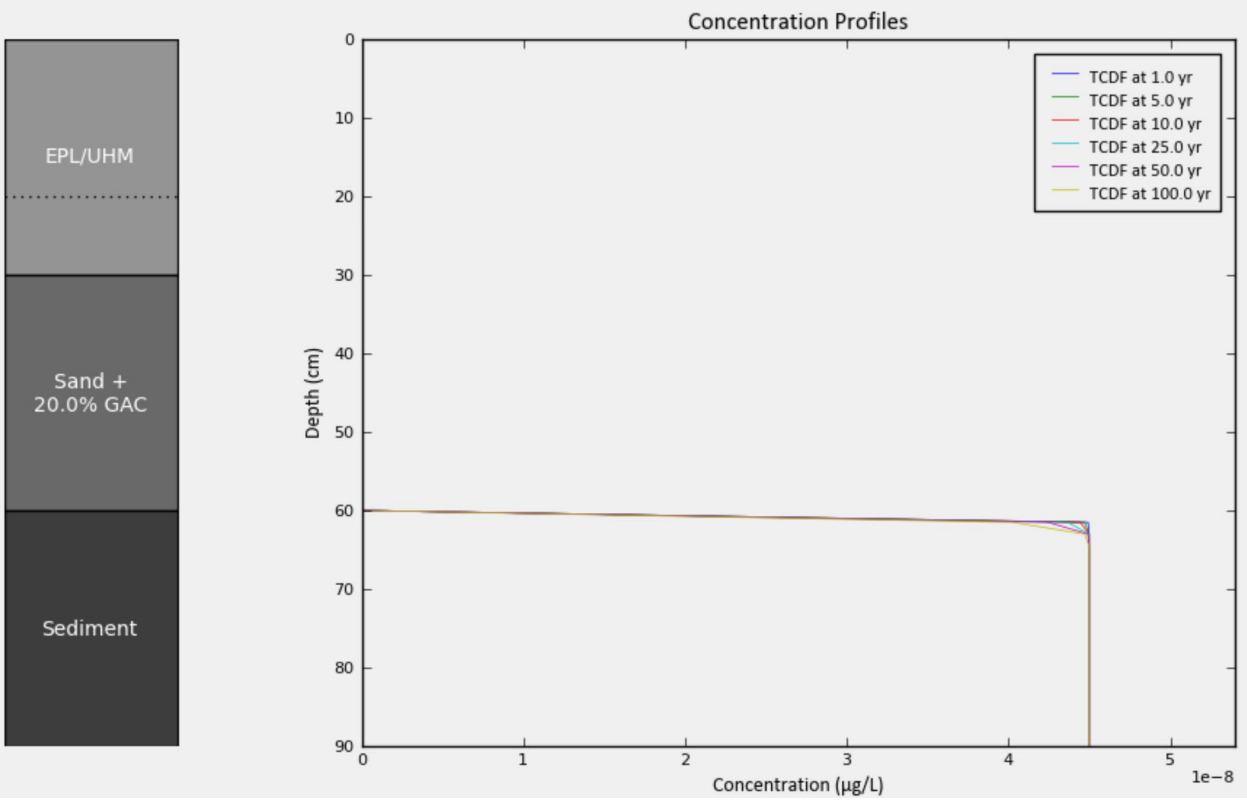

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PeCDF at 1.0 yr
PeCDF at 5.0 yr
PeCDF at 10.0 yr
PeCDF at 25.0 yr
PeCDF at 50.0 yr
PeCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

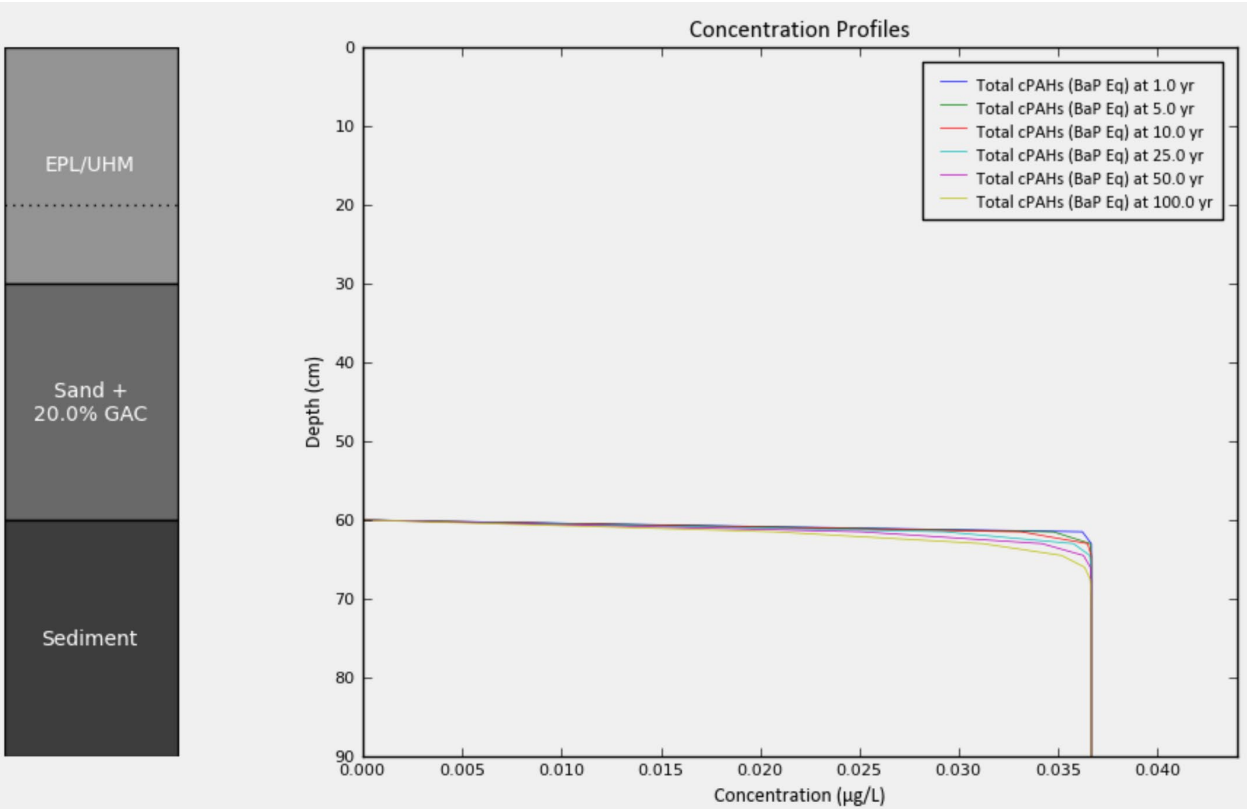

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Pentachlorophenol at 1.0 yr
Pentachlorophenol at 5.0 yr
Pentachlorophenol at 10.0 yr
Pentachlorophenol at 25.0 yr
Pentachlorophenol at 50.0 yr
Pentachlorophenol at 100.0 yr
Depth (cm)
Concentration (µg/L)

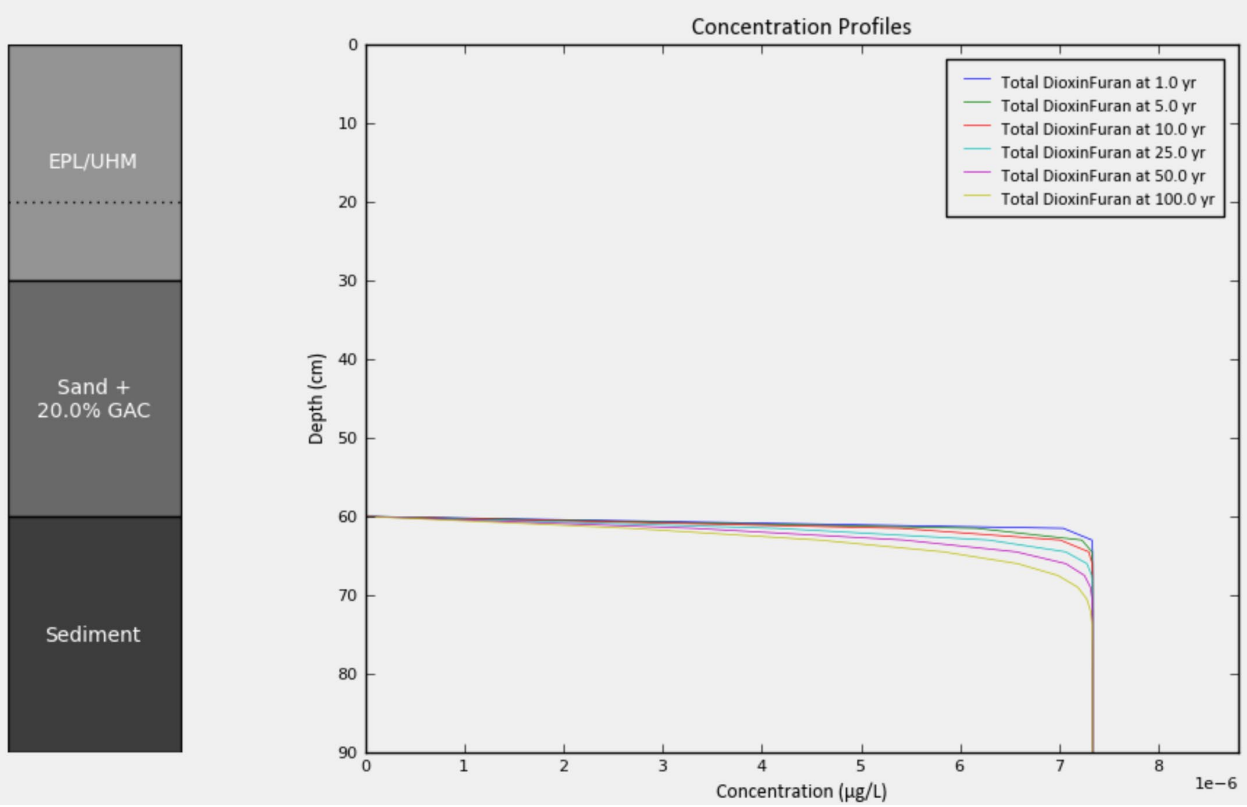

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Phenanthrene at 1.0 yr
Phenanthrene at 5.0 yr
Phenanthrene at 10.0 yr
Phenanthrene at 25.0 yr
Phenanthrene at 50.0 yr
Phenanthrene at 100.0 yr
Depth (cm)
Concentration (µg/L)

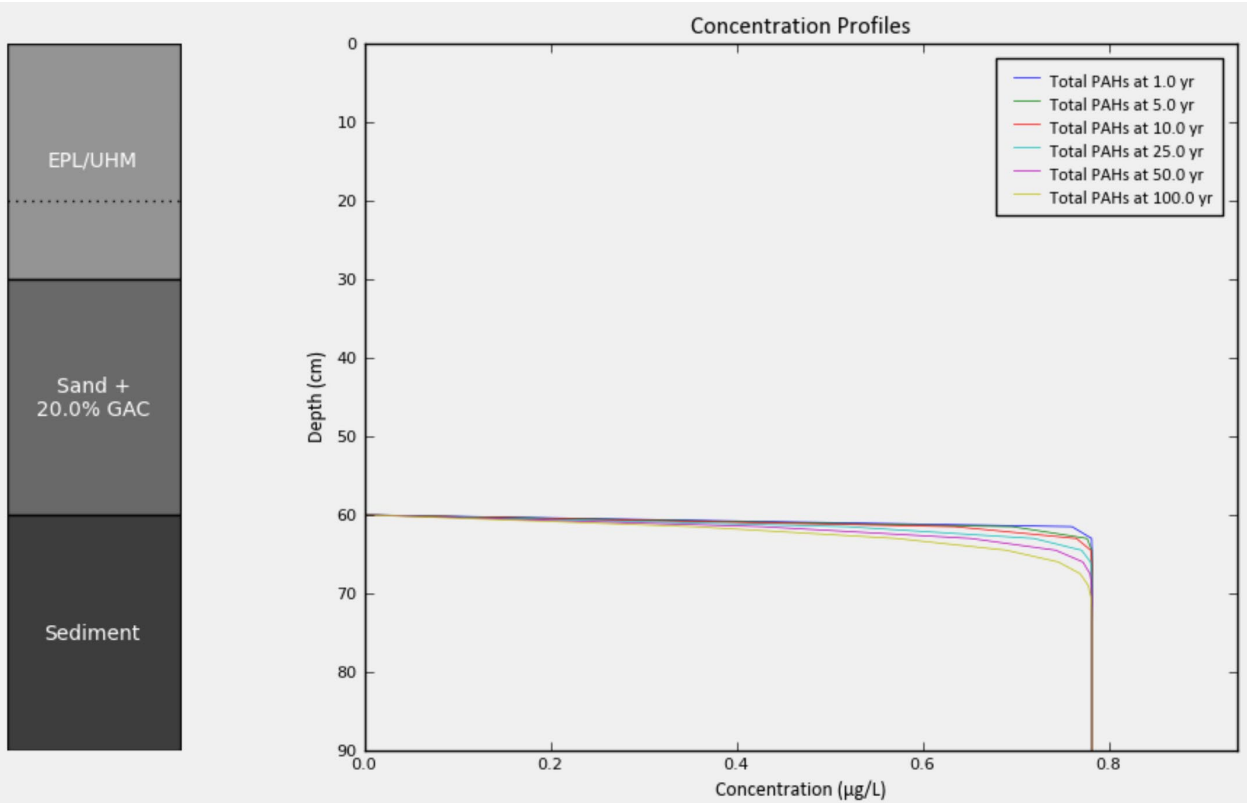

EPL/UHM
Sand + 20.0% GAC
Sediment
Concentration Profiles
Pyrene at 1.0 yr
Pyrene at 5.0 yr
Pyrene at 10.0 yr
Pyrene at 25.0 yr
Pyrene at 50.0 yr
Pyrene at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
Concentration (µg/L)

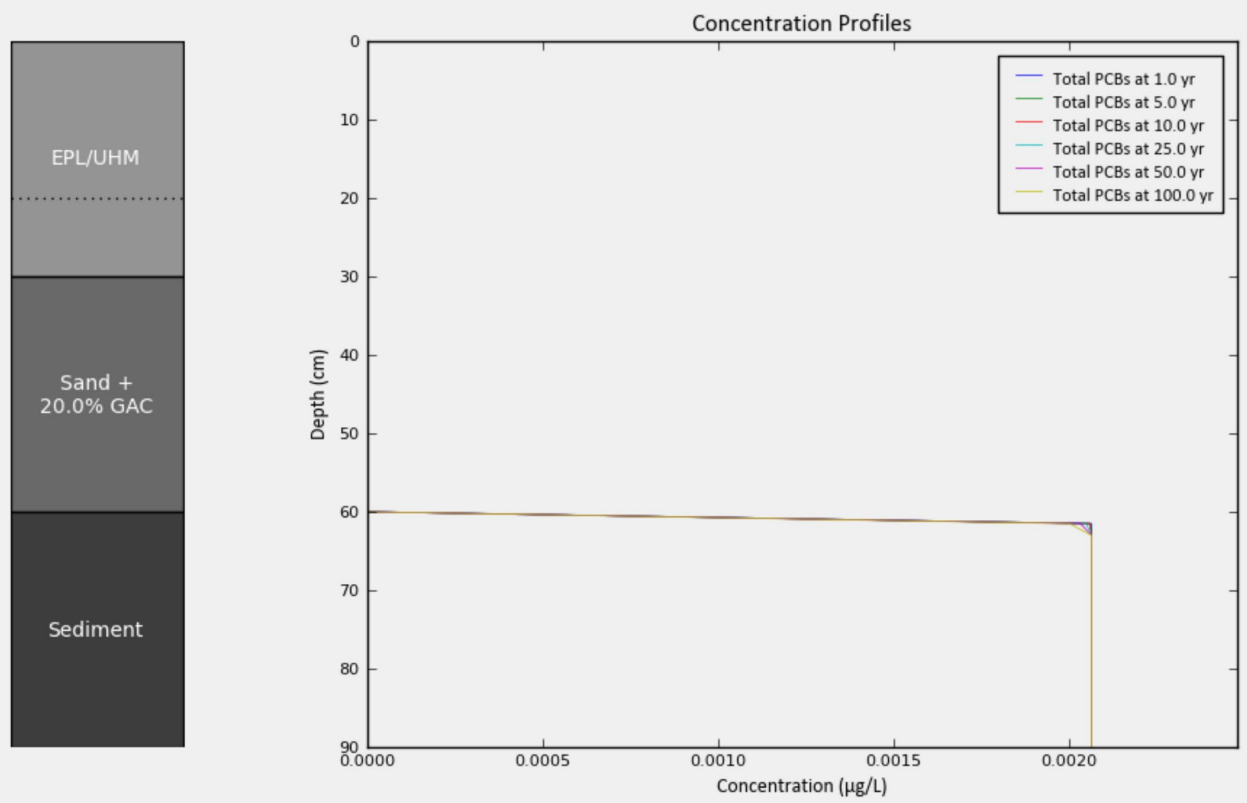

EPL/UHM
Sand + 20.0% GAC
Sediment
Concentration Profiles
TCDD at 1.0 yr
TCDD at 5.0 yr
TCDD at 10.0 yr
TCDD at 25.0 yr
TCDD at 50.0 yr
TCDD at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e−7
Concentration (µg/L)

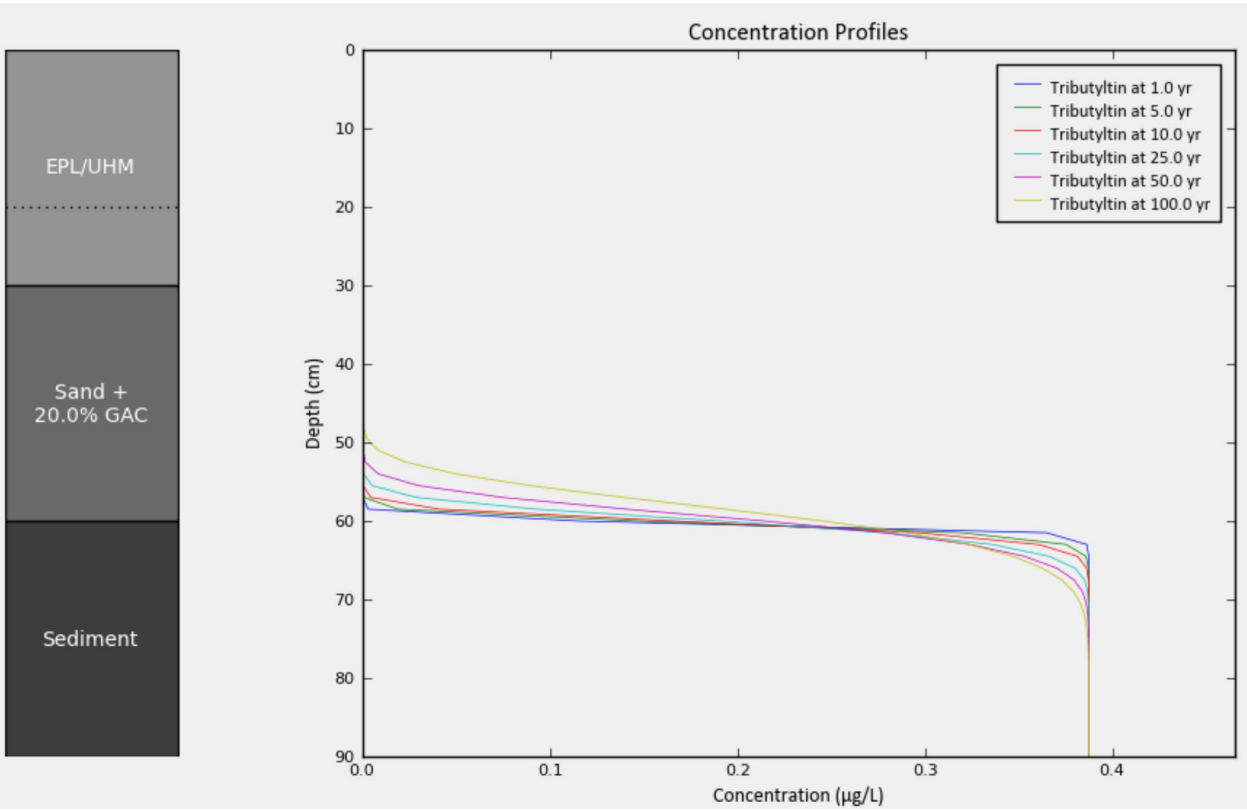

EPL/UHM
Sand + 20.0% GAC
Sediment
Concentration Profiles
TCDF at 1.0 yr
TCDF at 5.0 yr
TCDF at 10.0 yr
TCDF at 25.0 yr
TCDF at 50.0 yr
TCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−8

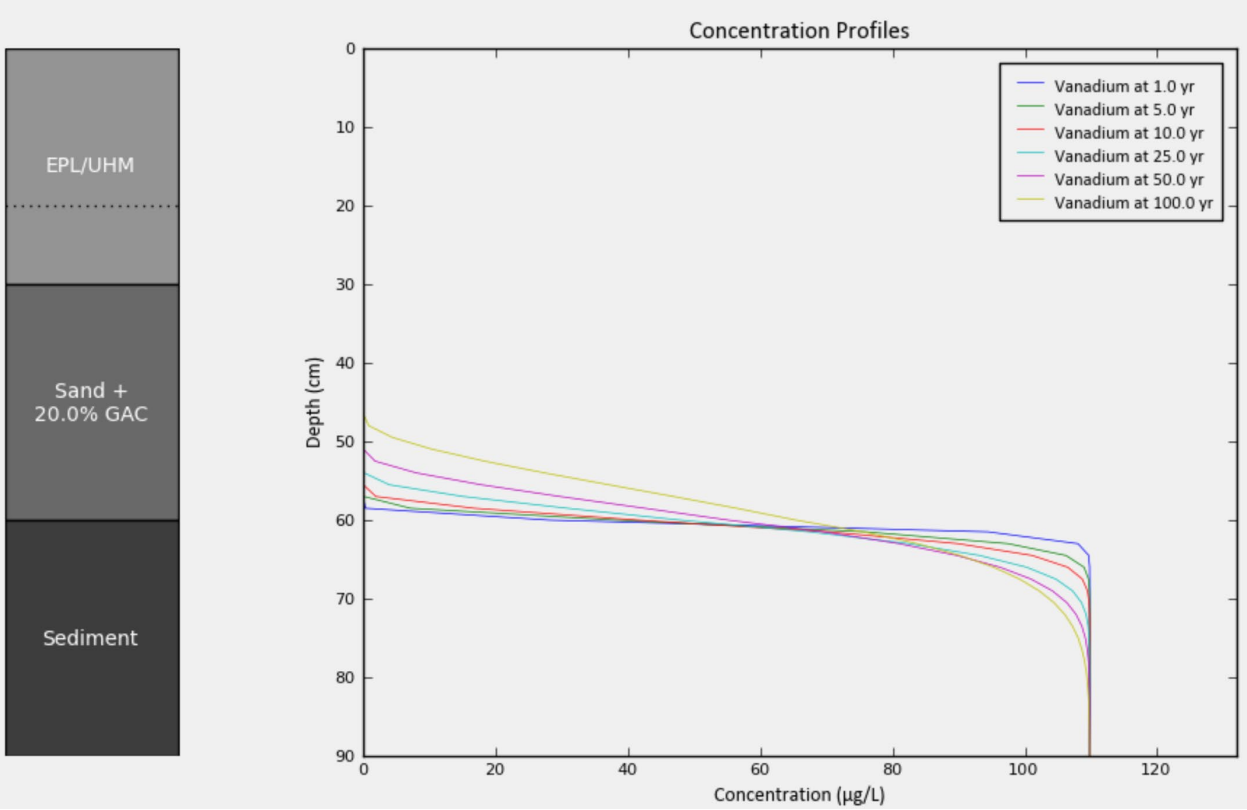

EPL/UHM
Sand + 20.0% GAC
Sediment
Concentration Profiles
Total cPAHs (BaP Eq) at 1.0 yr
Total cPAHs (BaP Eq) at 5.0 yr
Total cPAHs (BaP Eq) at 10.0 yr
Total cPAHs (BaP Eq) at 25.0 yr
Total cPAHs (BaP Eq) at 50.0 yr
Total cPAHs (BaP Eq) at 100.0 yr
Depth (cm)
Concentration (µg/L)

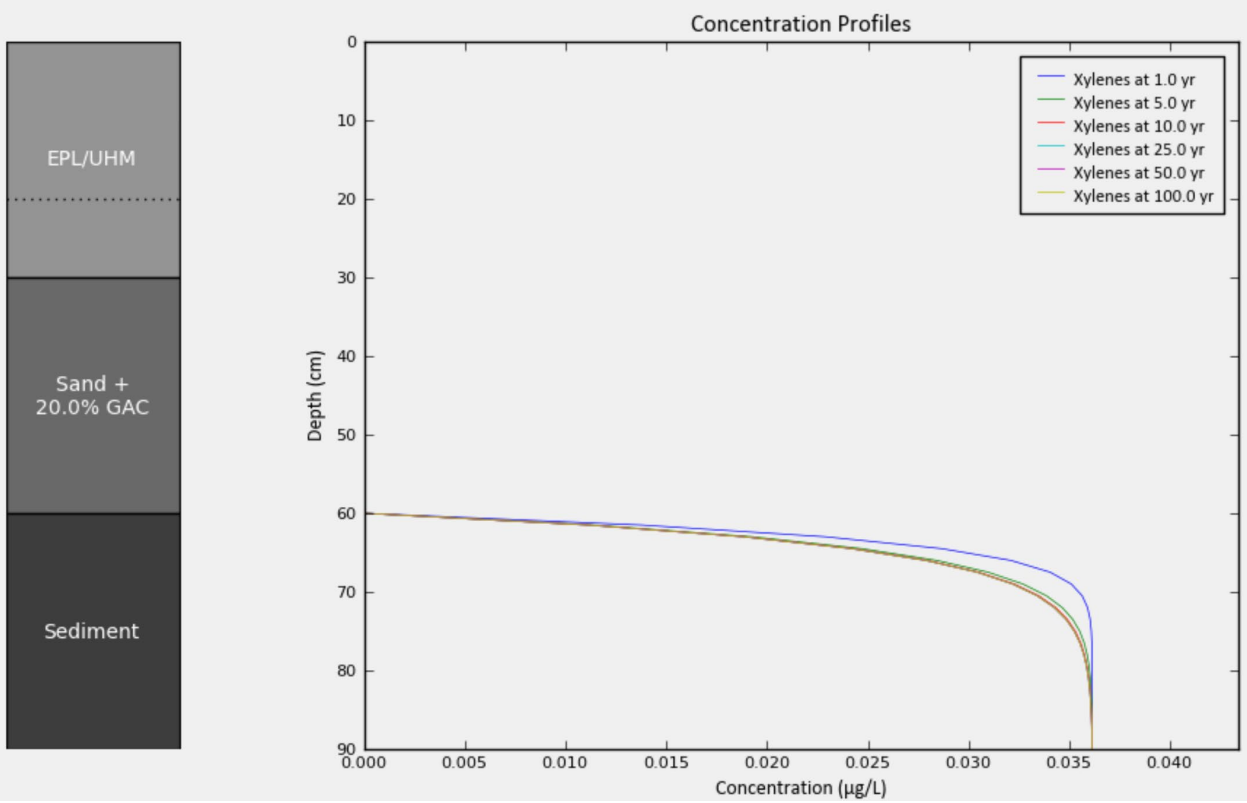

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Total DioxinFuran at 1.0 yr
Total DioxinFuran at 5.0 yr
Total DioxinFuran at 10.0 yr
Total DioxinFuran at 25.0 yr
Total DioxinFuran at 50.0 yr
Total DioxinFuran at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

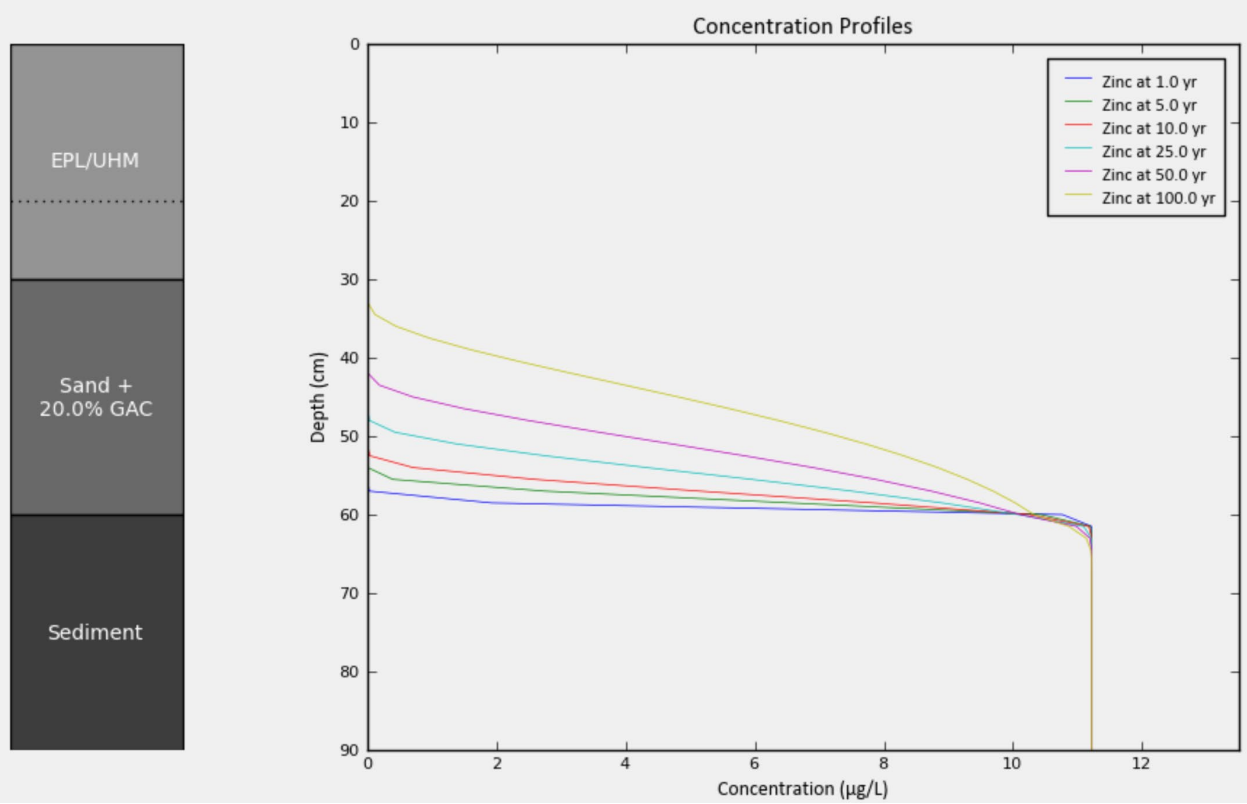

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Total PAHs at 1.0 yr
Total PAHs at 5.0 yr
Total PAHs at 10.0 yr
Total PAHs at 25.0 yr
Total PAHs at 50.0 yr
Total PAHs at 100.0 yr
Depth (cm)
Concentration (µg/L)


EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Total PCBs at 1.0 yr
Total PCBs at 5.0 yr
Total PCBs at 10.0 yr
Total PCBs at 25.0 yr
Total PCBs at 50.0 yr
Total PCBs at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

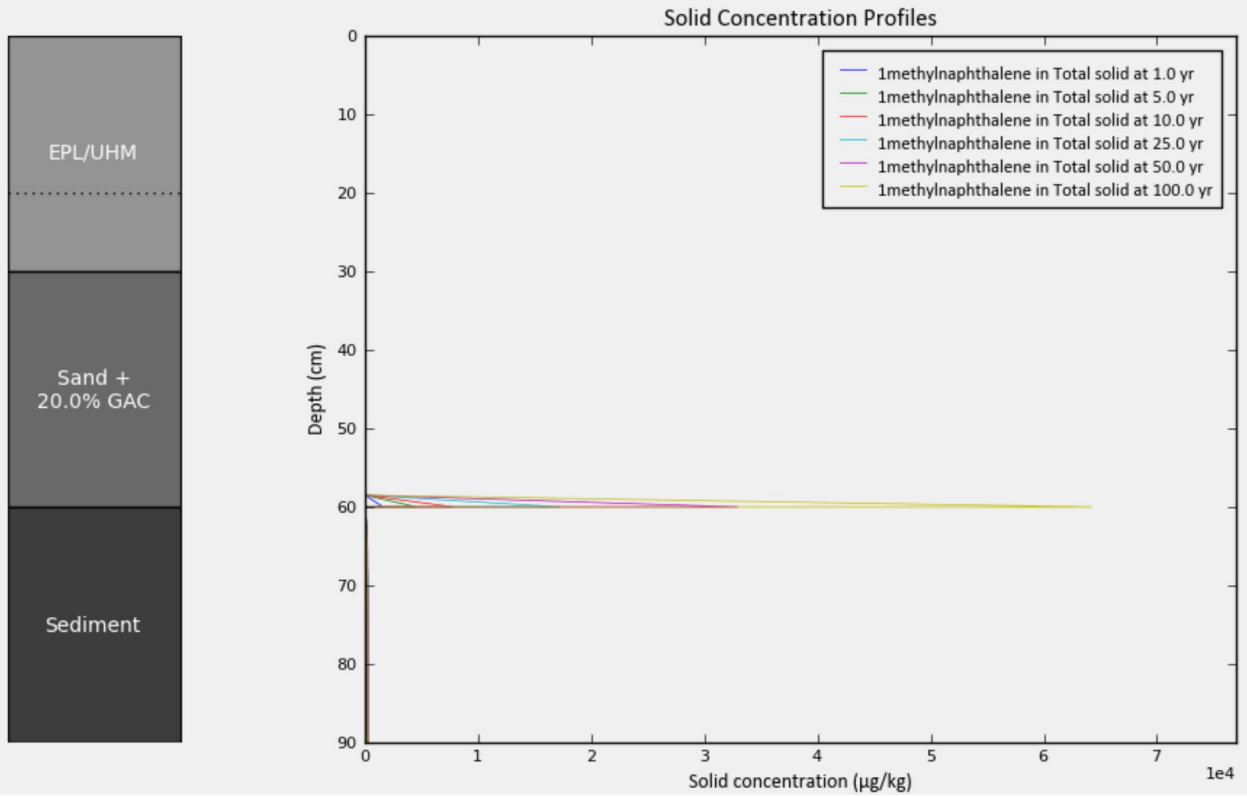

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Tributyltin at 1.0 yr
Tributyltin at 5.0 yr
Tributyltin at 10.0 yr
Tributyltin at 25.0 yr
Tributyltin at 50.0 yr
Tributyltin at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.1
0.2
0.3
0.4
Concentration (µg/L)

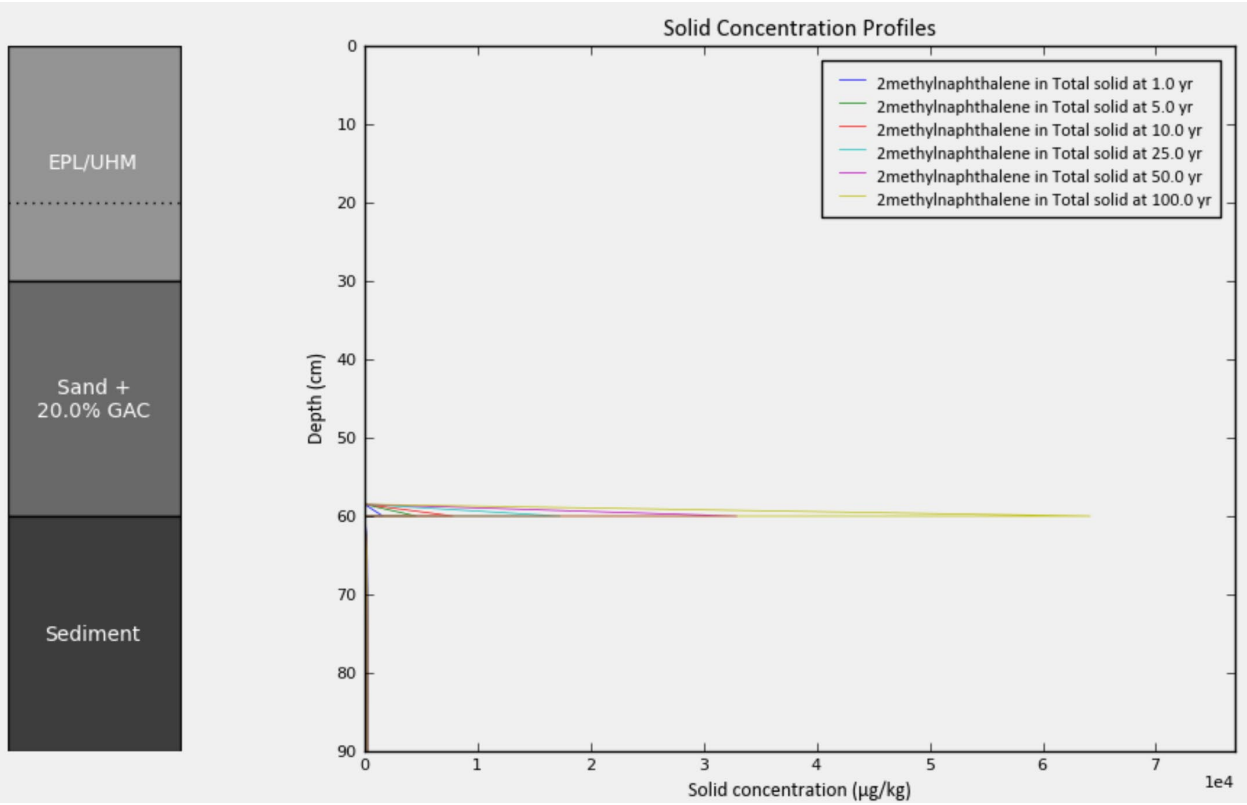

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Vanadium at 1.0 yr
Vanadium at 5.0 yr
Vanadium at 10.0 yr
Vanadium at 25.0 yr
Vanadium at 50.0 yr
Vanadium at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80
100
120

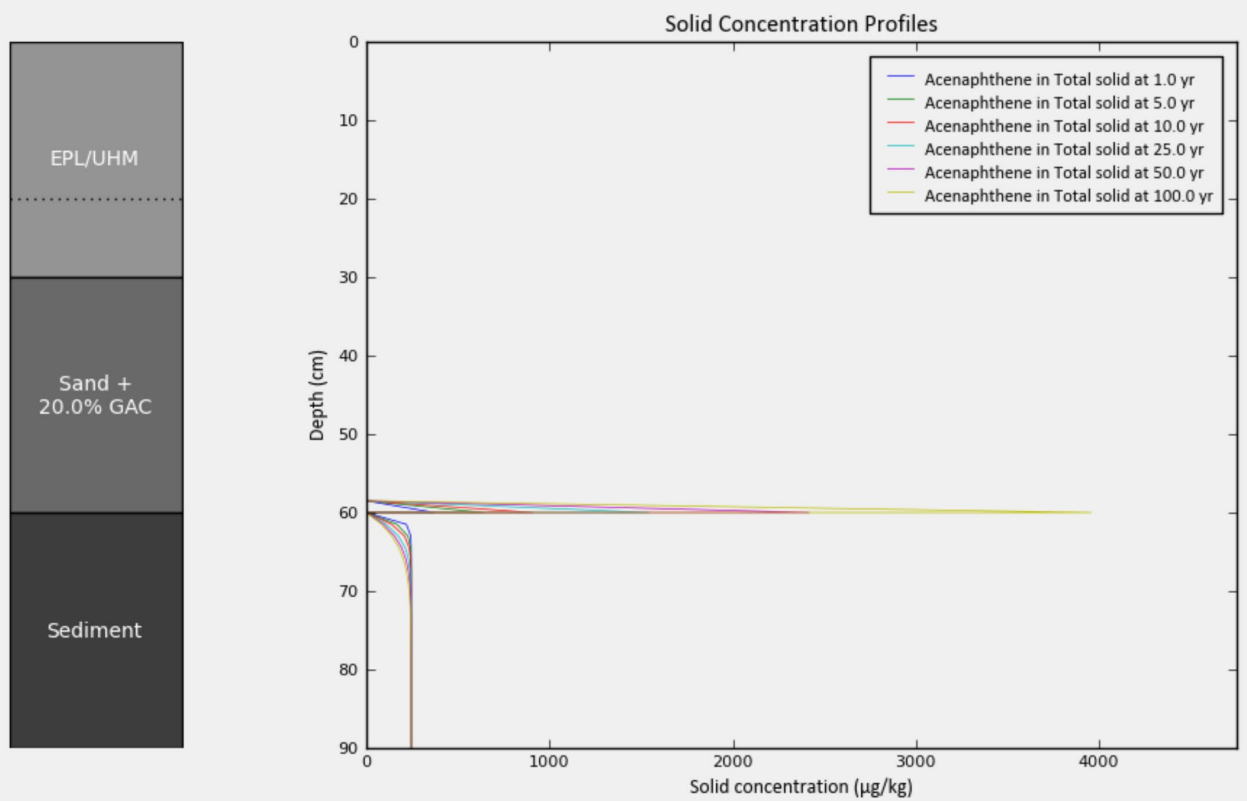

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Xylenes at 1.0 yr
Xylenes at 5.0 yr
Xylenes at 10.0 yr
Xylenes at 25.0 yr
Xylenes at 50.0 yr
Xylenes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040

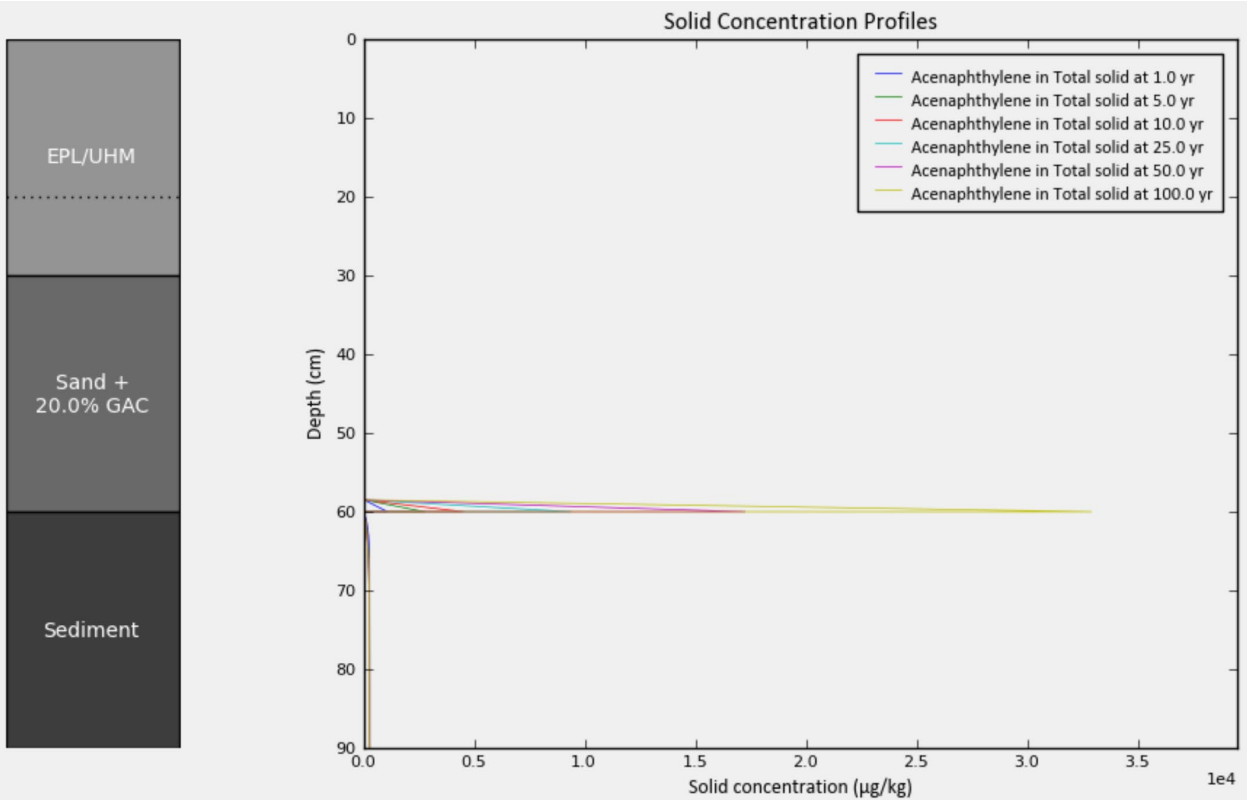

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Zinc at 1.0 yr
Zinc at 5.0 yr
Zinc at 10.0 yr
Zinc at 25.0 yr
Zinc at 50.0 yr
Zinc at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
10
20
30
40
50
60
70
80
90
0
2
4
6
8
10
12

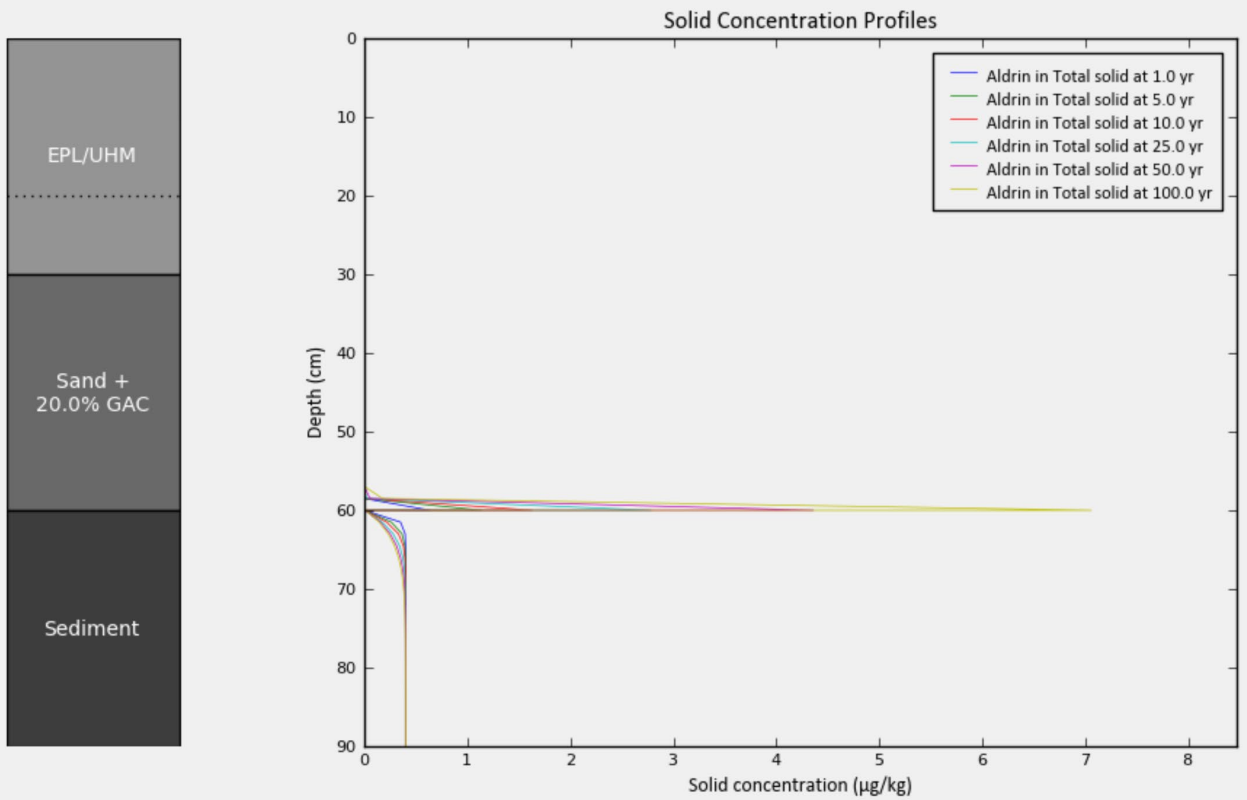
Total Solids Concentration – Depth

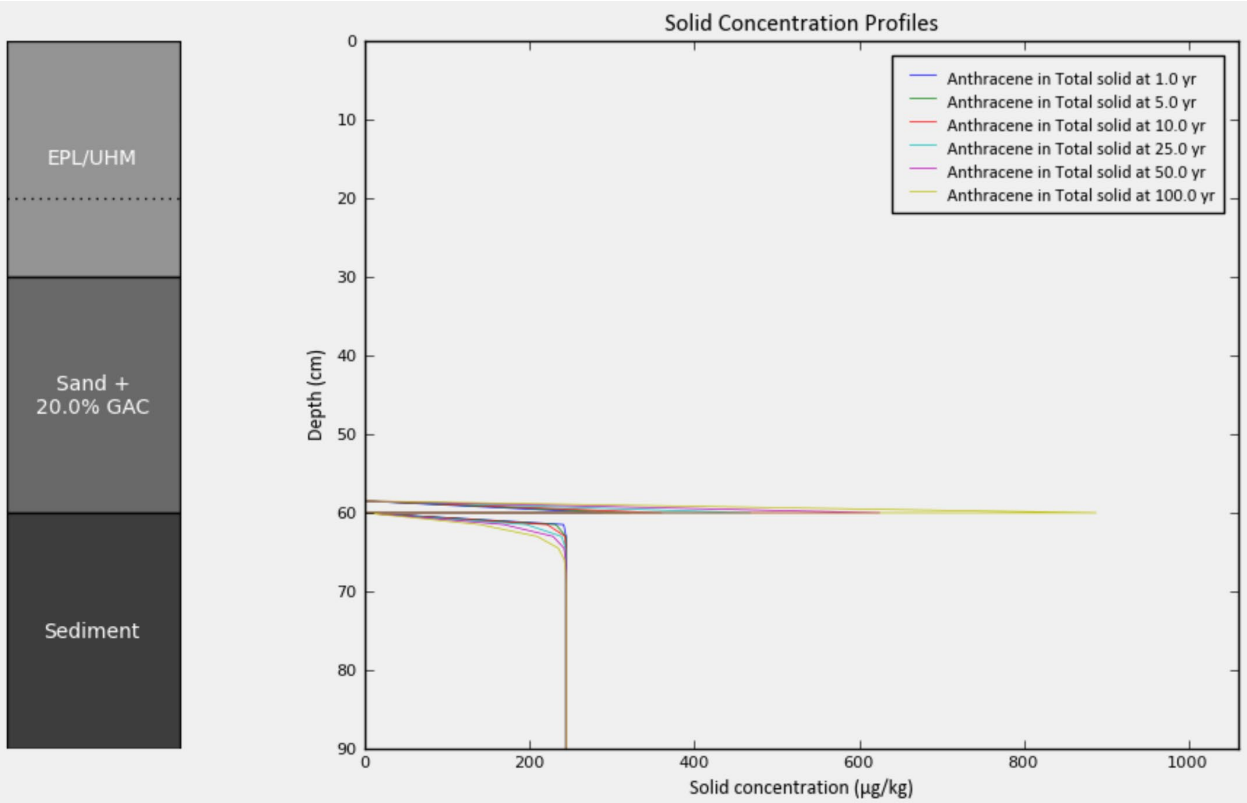


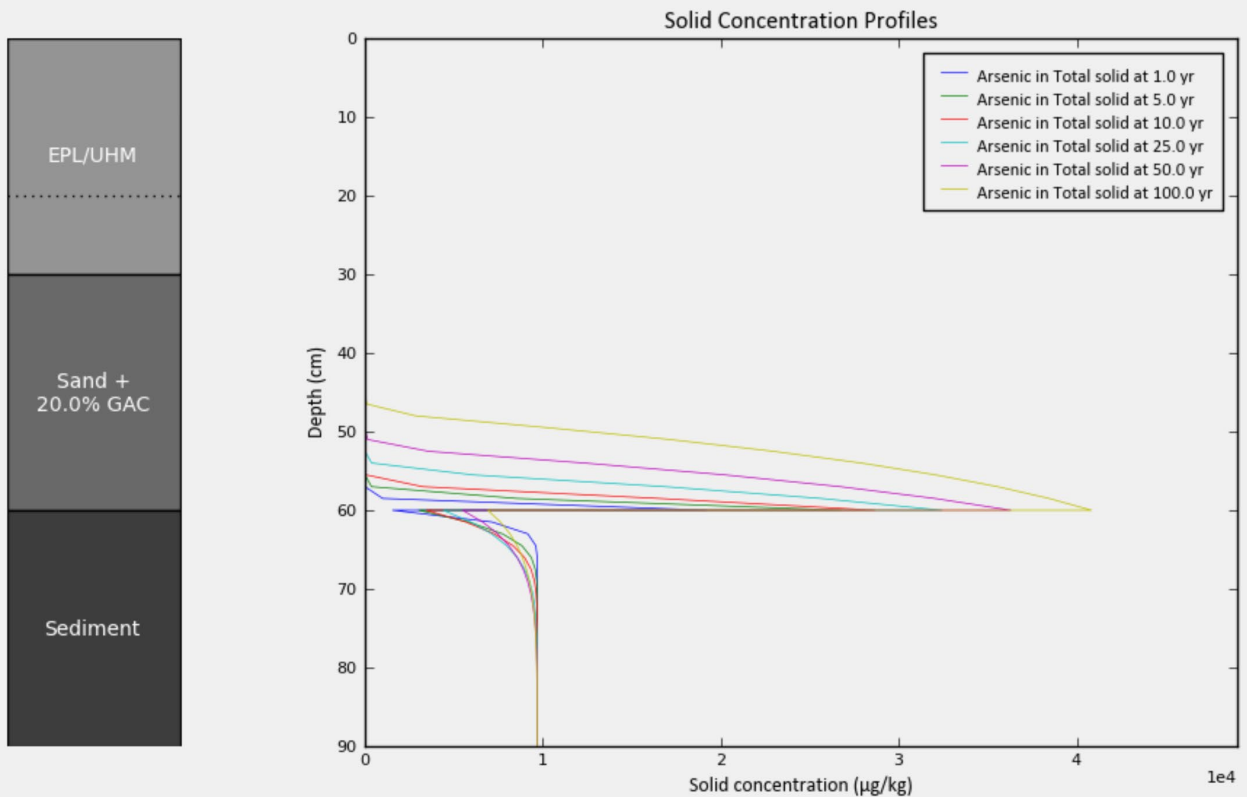


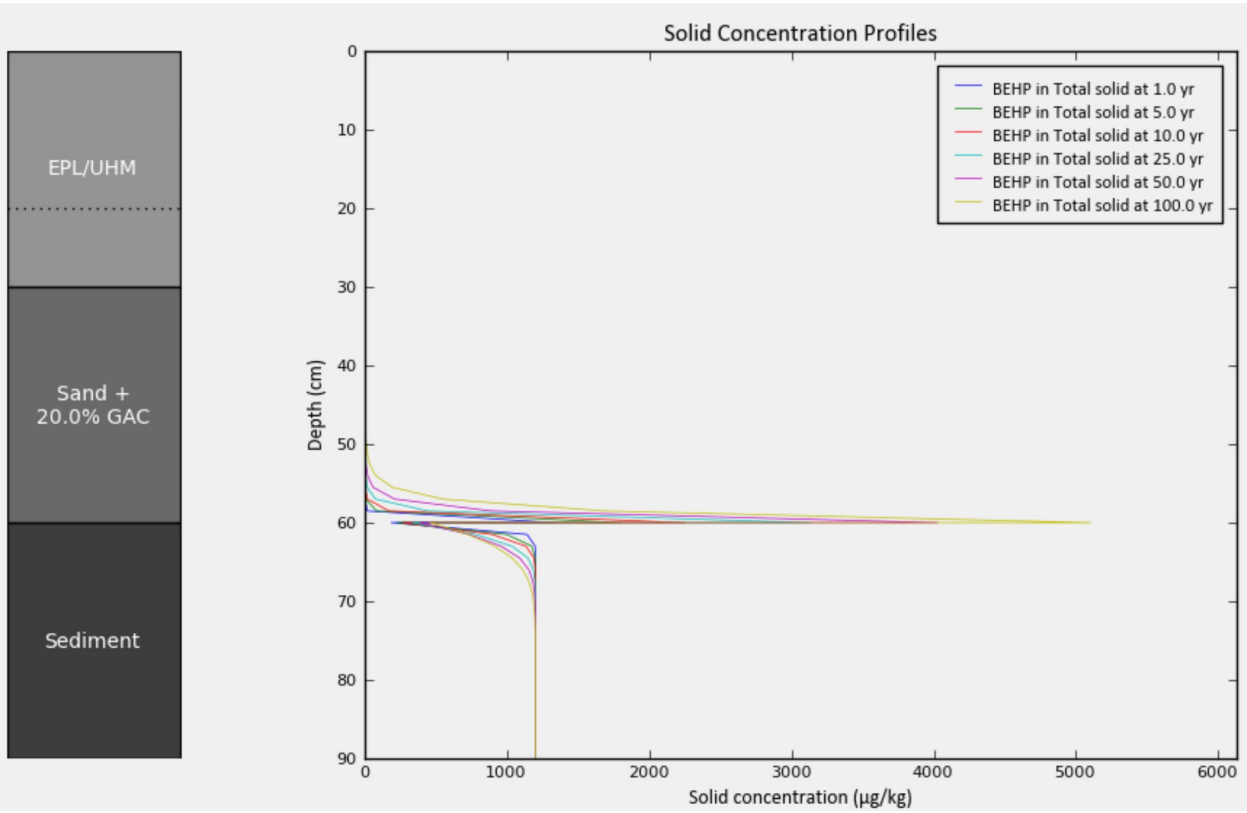

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Acenaphthene in Total solid at 1.0 yr
Acenaphthene in Total solid at 5.0 yr
Acenaphthene in Total solid at 10.0 yr
Acenaphthene in Total solid at 25.0 yr
Acenaphthene in Total solid at 50.0 yr
Acenaphthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

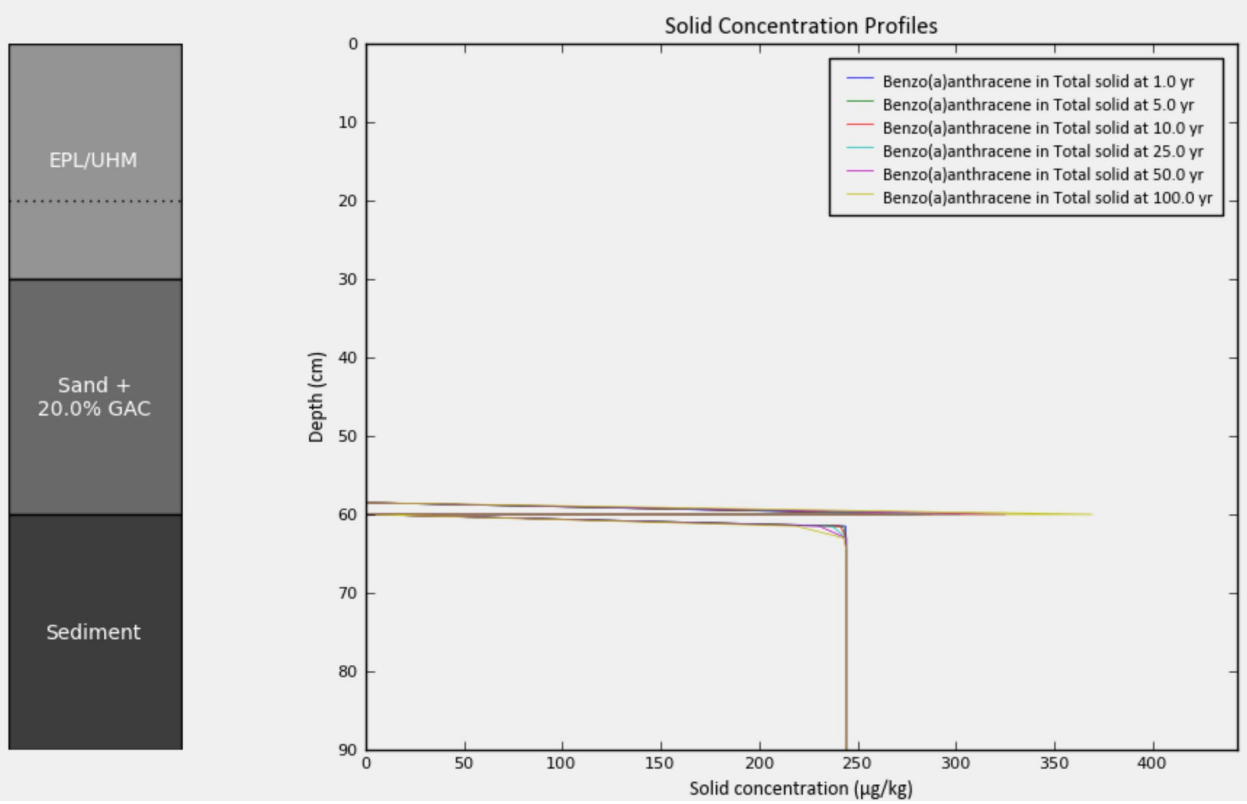

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Acenaphthylene in Total solid at 1.0 yr
Acenaphthylene in Total solid at 5.0 yr
Acenaphthylene in Total solid at 10.0 yr
Acenaphthylene in Total solid at 25.0 yr
Acenaphthylene in Total solid at 50.0 yr
Acenaphthylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

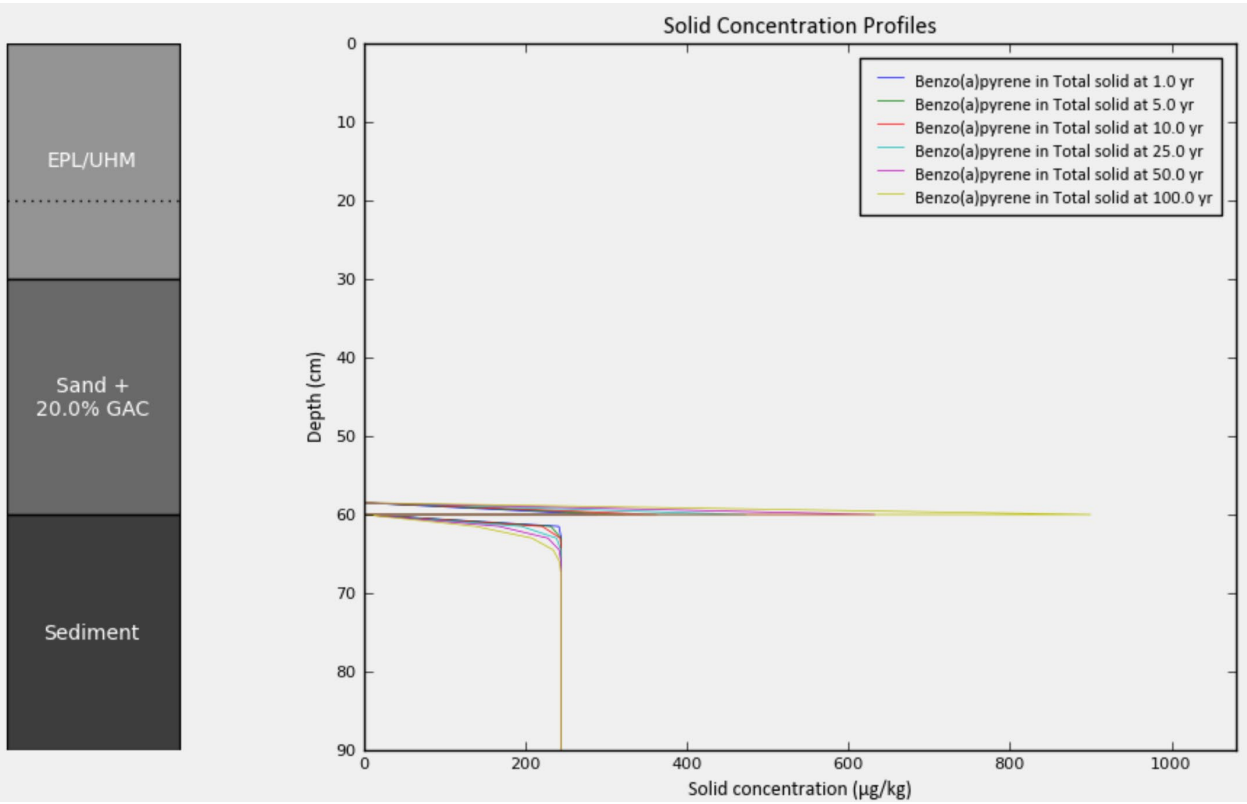

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Aldrin in Total solid at 1.0 yr
Aldrin in Total solid at 5.0 yr
Aldrin in Total solid at 10.0 yr
Aldrin in Total solid at 25.0 yr
Aldrin in Total solid at 50.0 yr
Aldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

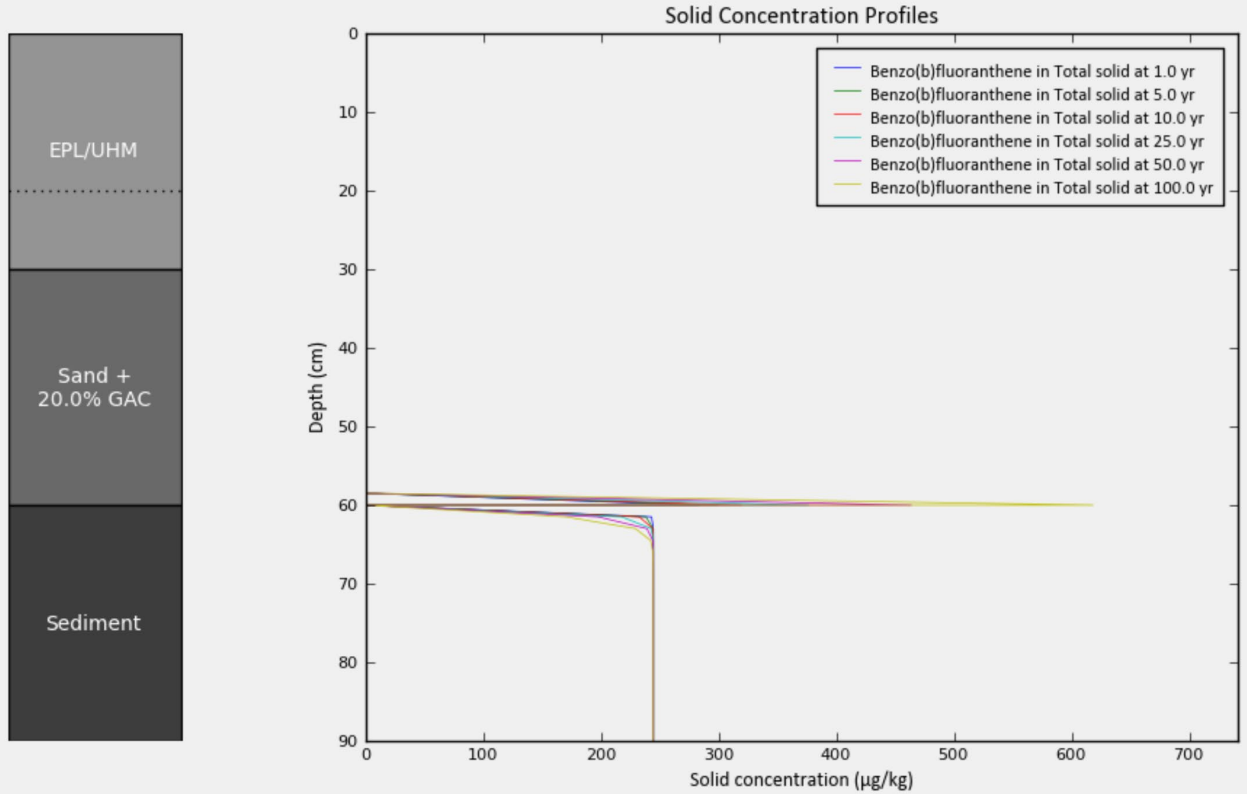

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Anthracene in Total solid at 1.0 yr
Anthracene in Total solid at 5.0 yr
Anthracene in Total solid at 10.0 yr
Anthracene in Total solid at 25.0 yr
Anthracene in Total solid at 50.0 yr
Anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

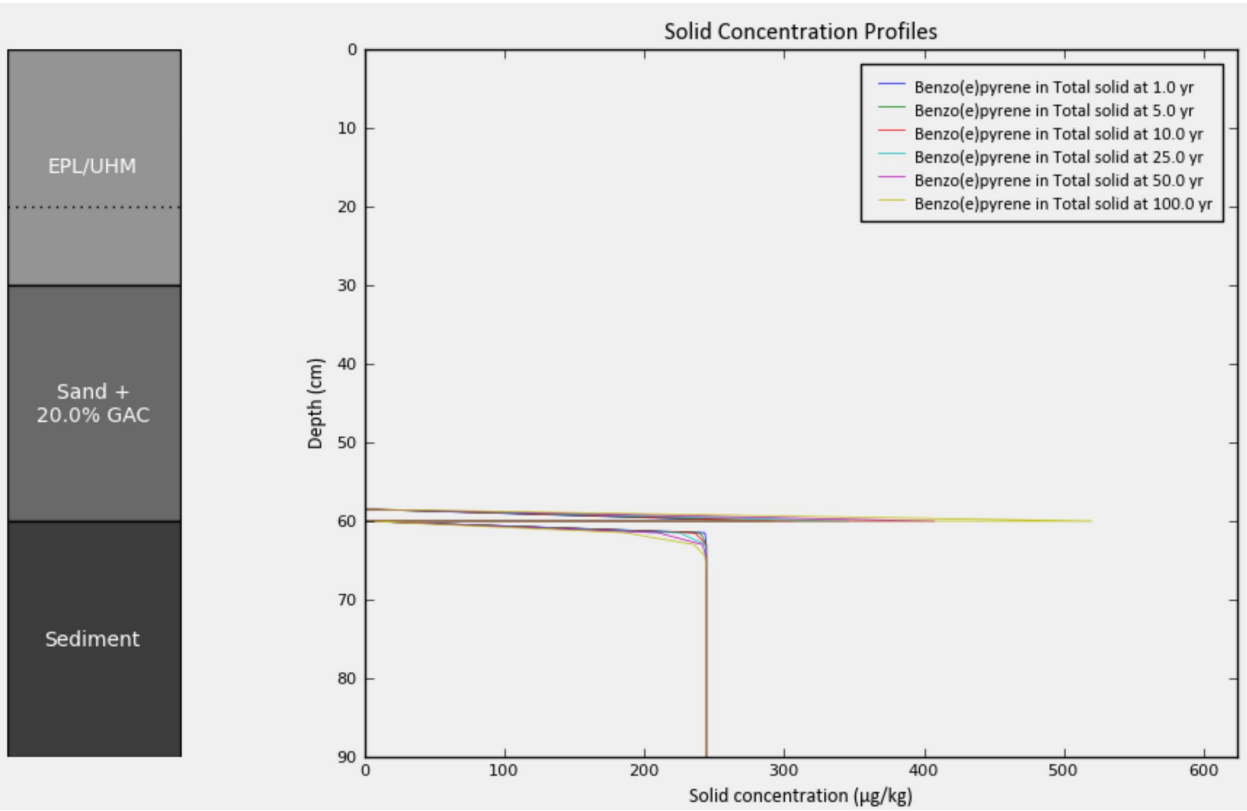

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Arsenic in Total solid at 1.0 yr
Arsenic in Total solid at 5.0 yr
Arsenic in Total solid at 10.0 yr
Arsenic in Total solid at 25.0 yr
Arsenic in Total solid at 50.0 yr
Arsenic in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

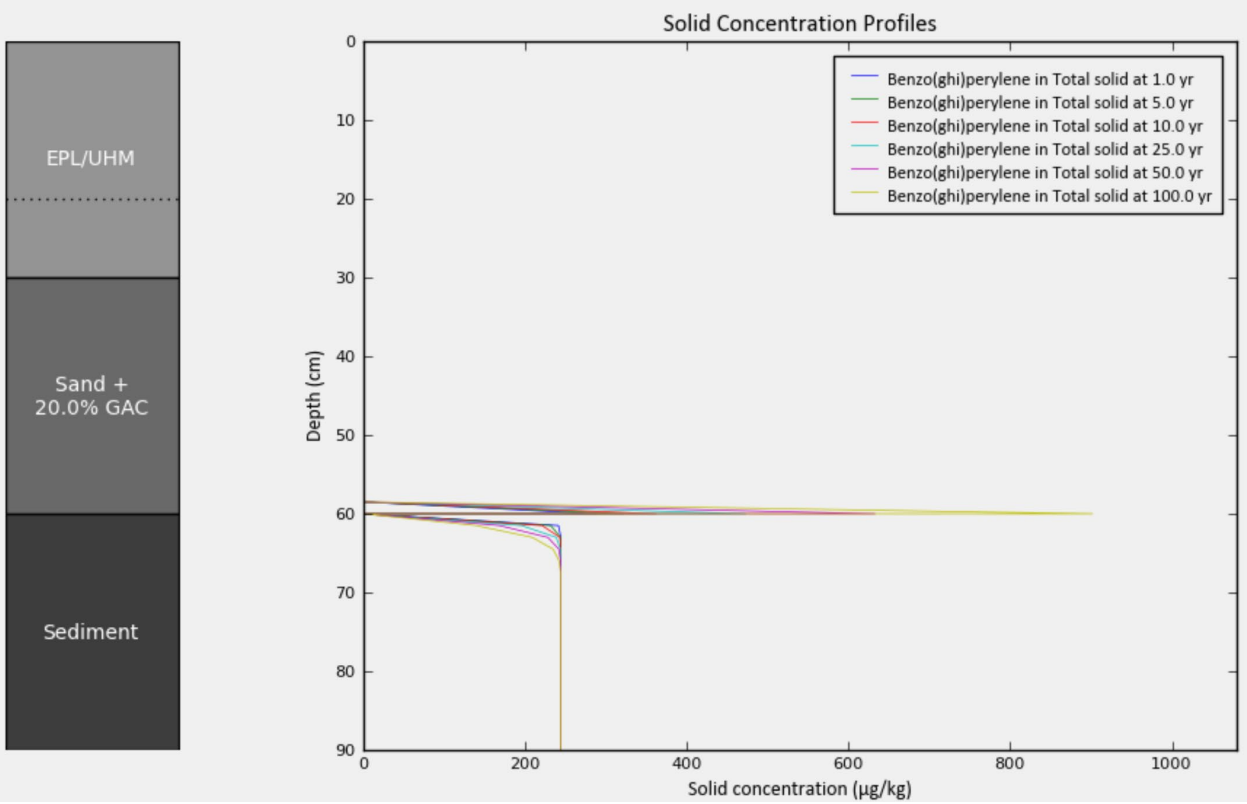

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
BEHP in Total solid at 1.0 yr
BEHP in Total solid at 5.0 yr
BEHP in Total solid at 10.0 yr
BEHP in Total solid at 25.0 yr
BEHP in Total solid at 50.0 yr
BEHP in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

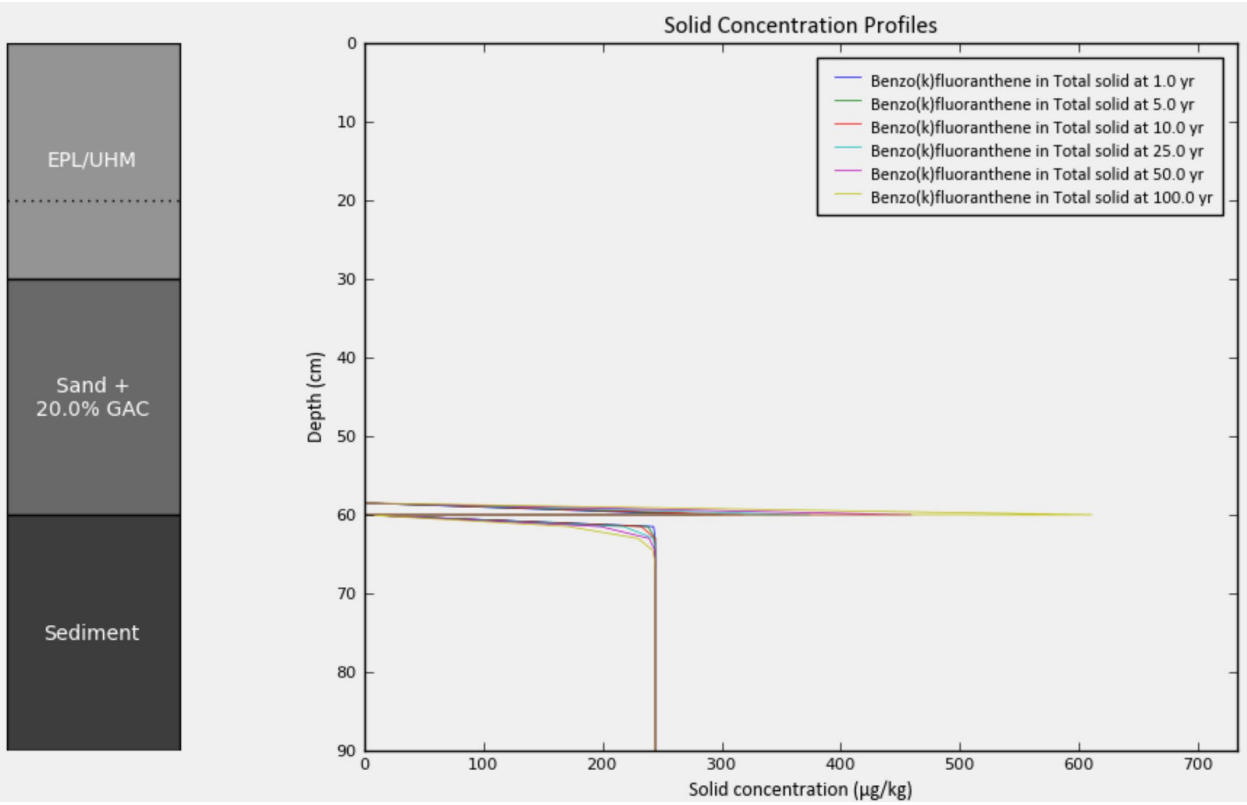

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Benzo(a)anthracene in Total solid at 1.0 yr
Benzo(a)anthracene in Total solid at 5.0 yr
Benzo(a)anthracene in Total solid at 10.0 yr
Benzo(a)anthracene in Total solid at 25.0 yr
Benzo(a)anthracene in Total solid at 50.0 yr
Benzo(a)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

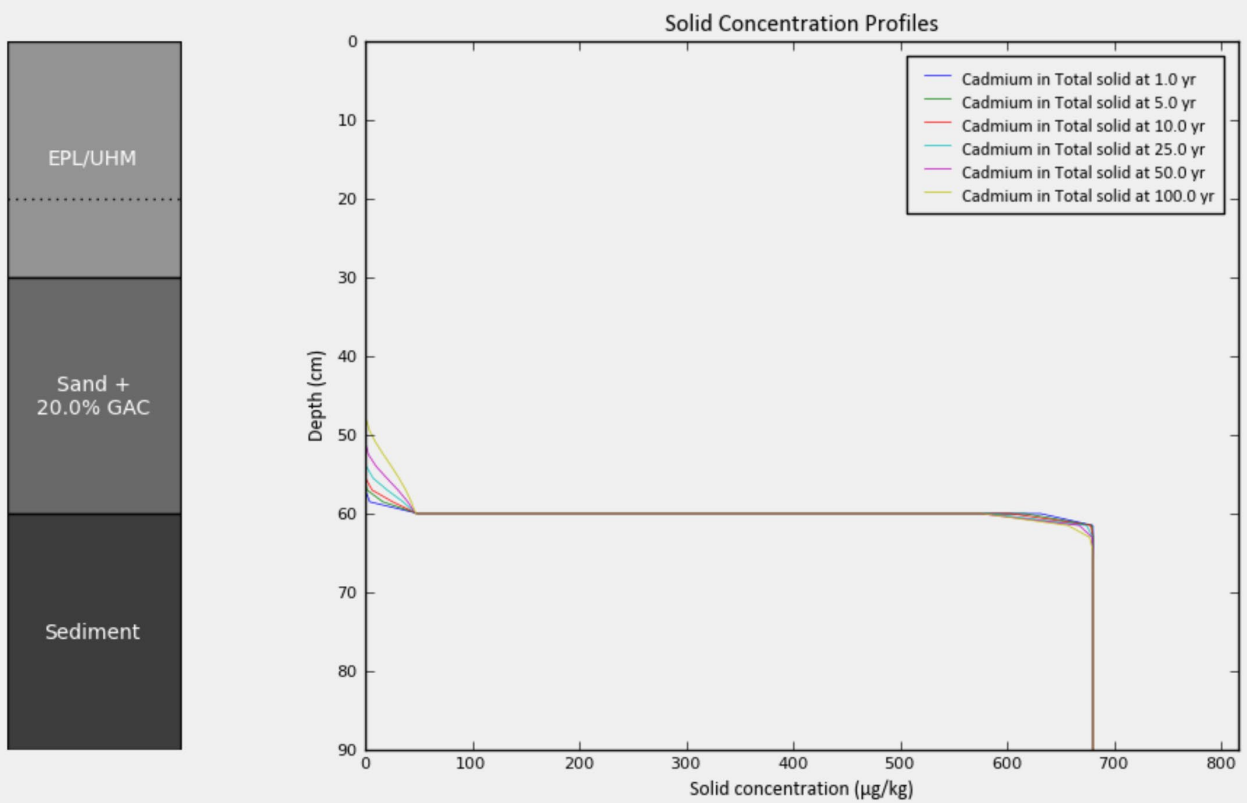

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Benzo(a)pyrene in Total solid at 1.0 yr
Benzo(a)pyrene in Total solid at 5.0 yr
Benzo(a)pyrene in Total solid at 10.0 yr
Benzo(a)pyrene in Total solid at 25.0 yr
Benzo(a)pyrene in Total solid at 50.0 yr
Benzo(a)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

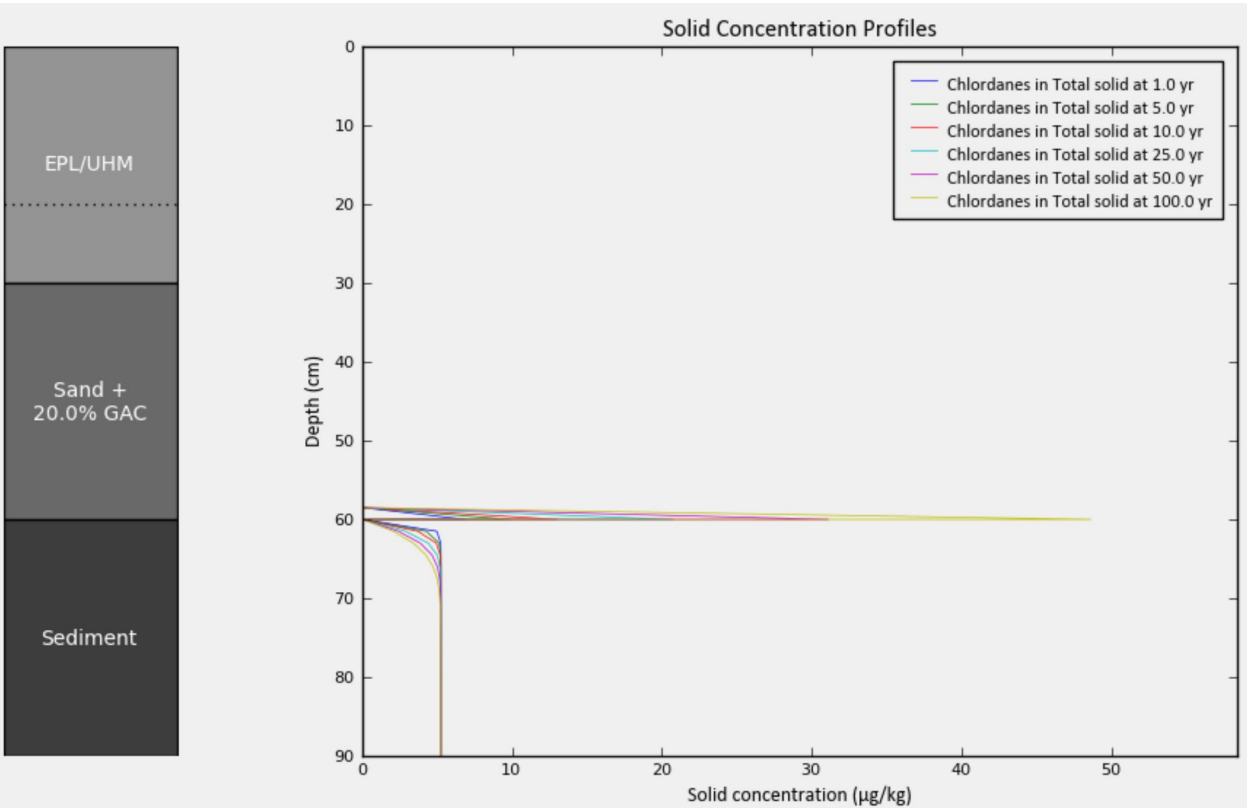

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Benzo(b)fluoranthene in Total solid at 1.0 yr
Benzo(b)fluoranthene in Total solid at 5.0 yr
Benzo(b)fluoranthene in Total solid at 10.0 yr
Benzo(b)fluoranthene in Total solid at 25.0 yr
Benzo(b)fluoranthene in Total solid at 50.0 yr
Benzo(b)fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500
600
700
Solid concentration (µg/kg)

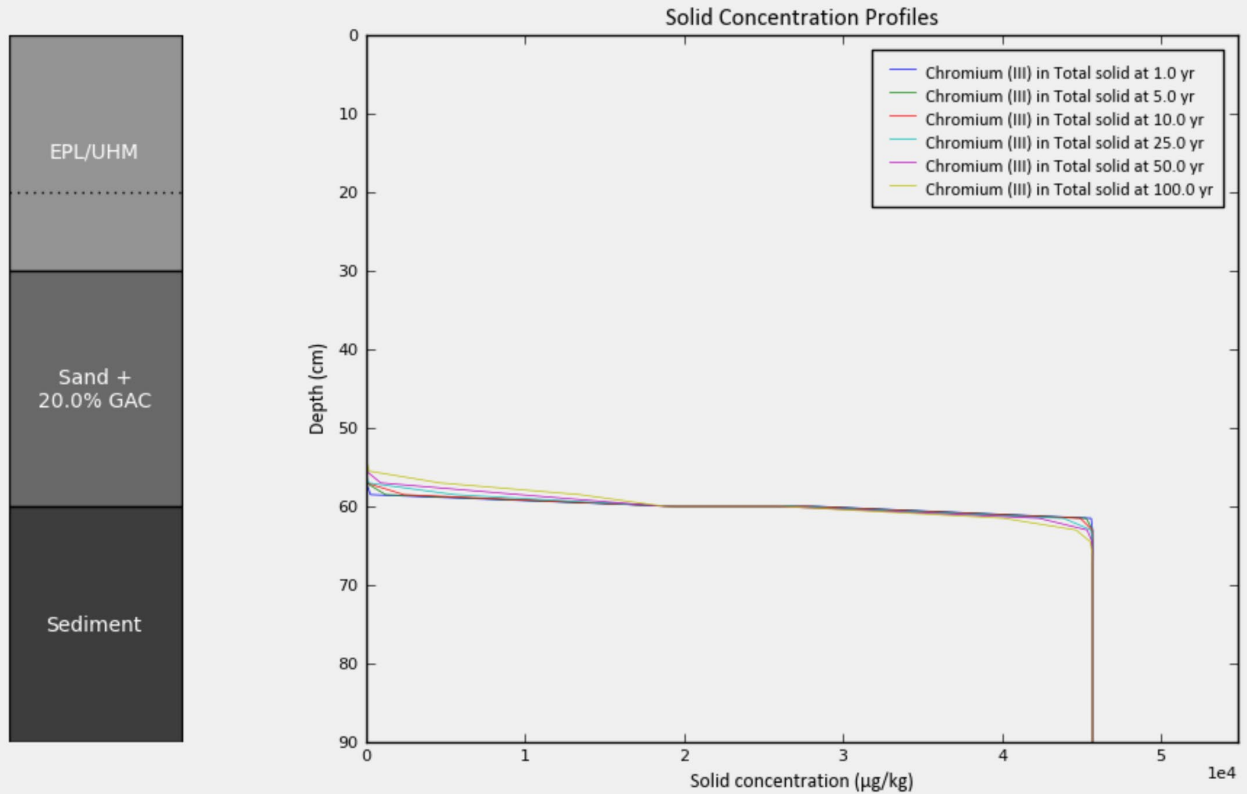

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Benzo(e)pyrene in Total solid at 1.0 yr
Benzo(e)pyrene in Total solid at 5.0 yr
Benzo(e)pyrene in Total solid at 10.0 yr
Benzo(e)pyrene in Total solid at 25.0 yr
Benzo(e)pyrene in Total solid at 50.0 yr
Benzo(e)pyrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500
600
Solid concentration (µg/kg)

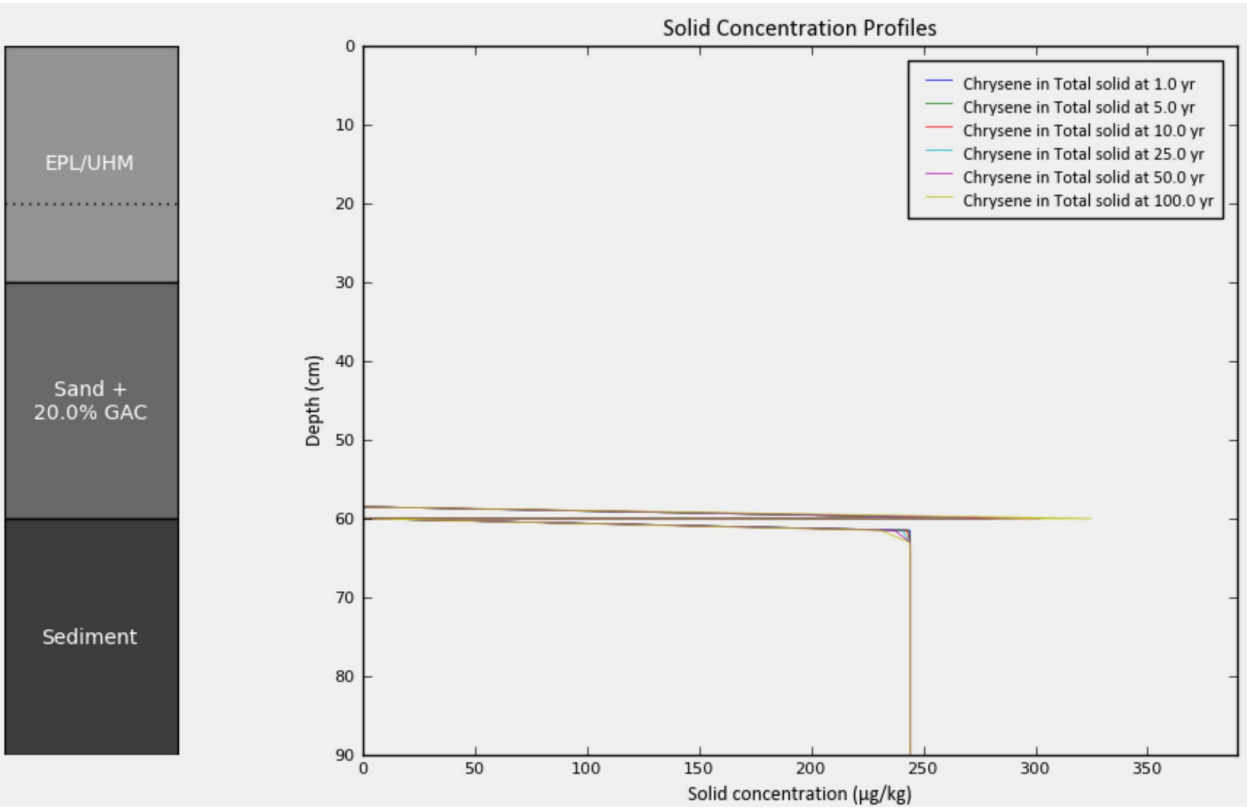

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Benzo(ghi)perylene in Total solid at 1.0 yr
Benzo(ghi)perylene in Total solid at 5.0 yr
Benzo(ghi)perylene in Total solid at 10.0 yr
Benzo(ghi)perylene in Total solid at 25.0 yr
Benzo(ghi)perylene in Total solid at 50.0 yr
Benzo(ghi)perylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

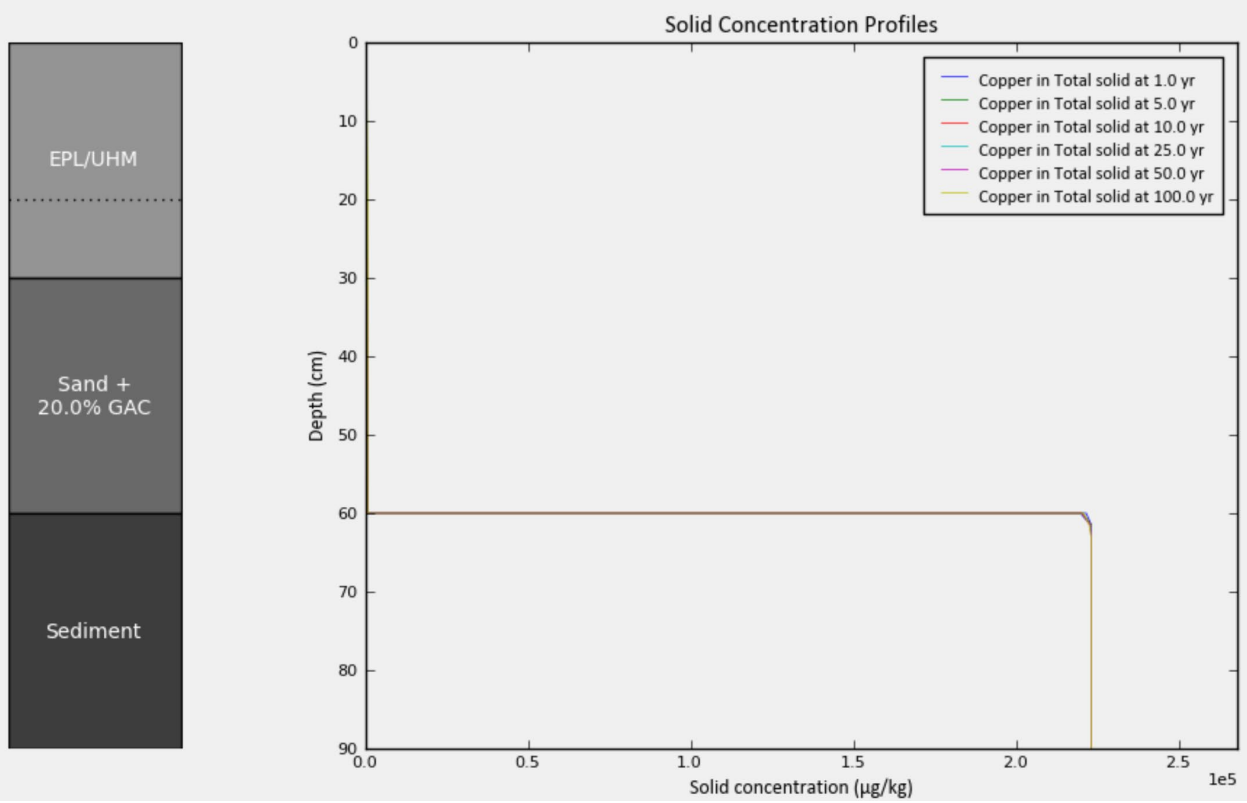

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Benzo(k)fluoranthene in Total solid at 1.0 yr
Benzo(k)fluoranthene in Total solid at 5.0 yr
Benzo(k)fluoranthene in Total solid at 10.0 yr
Benzo(k)fluoranthene in Total solid at 25.0 yr
Benzo(k)fluoranthene in Total solid at 50.0 yr
Benzo(k)fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

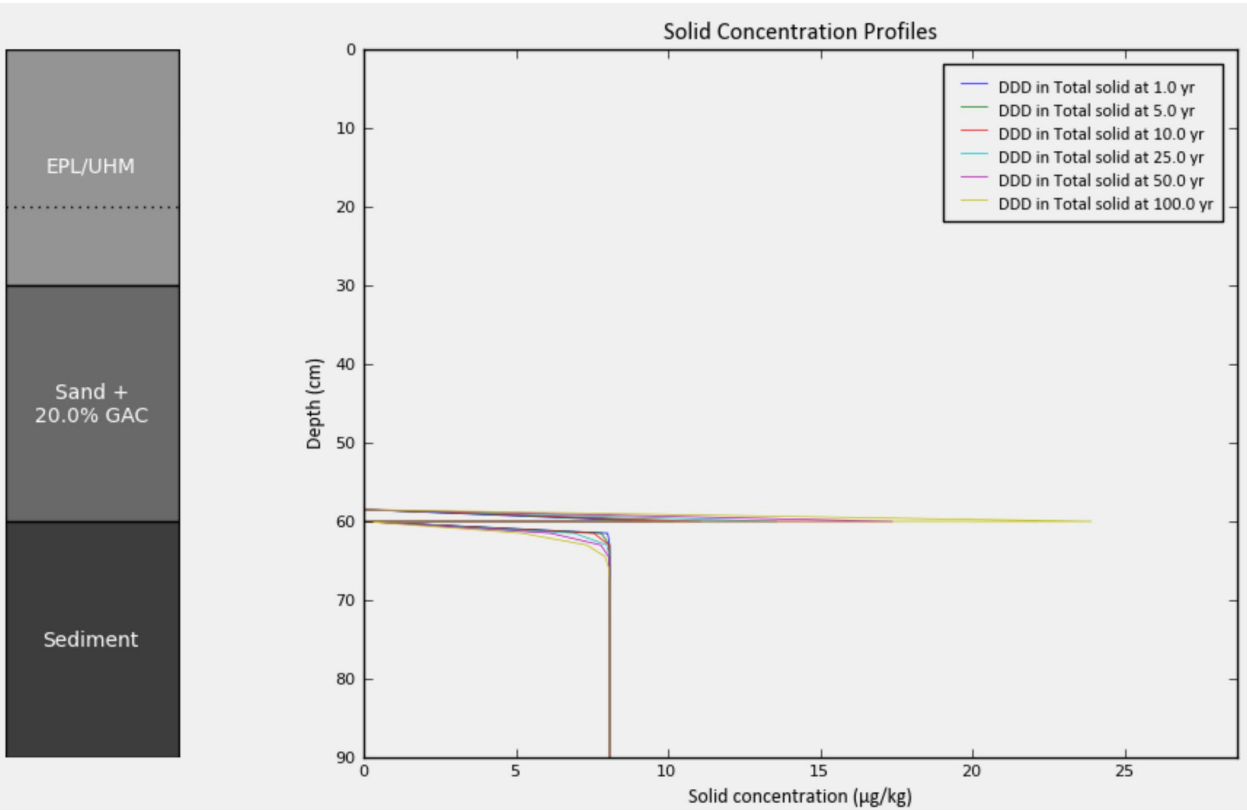

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Cadmium in Total solid at 1.0 yr
Cadmium in Total solid at 5.0 yr
Cadmium in Total solid at 10.0 yr
Cadmium in Total solid at 25.0 yr
Cadmium in Total solid at 50.0 yr
Cadmium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

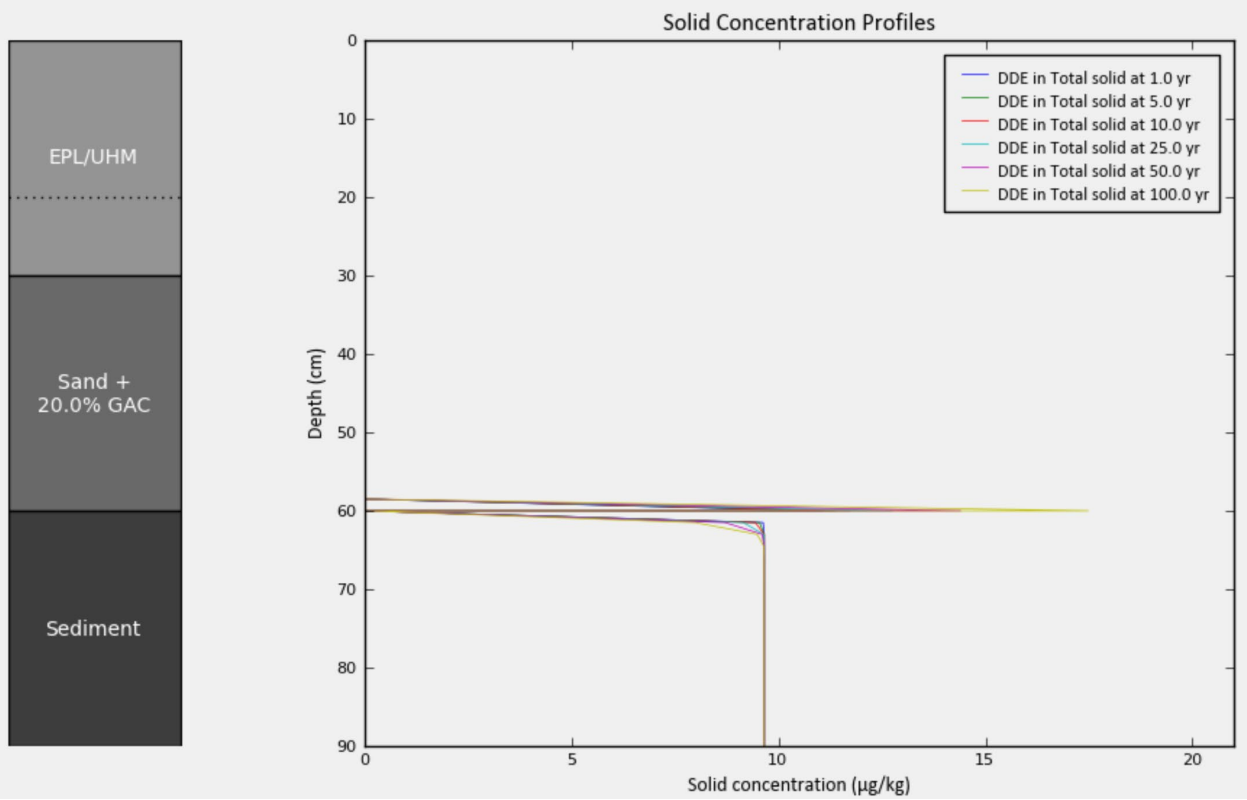

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Chlordanes in Total solid at 1.0 yr
Chlordanes in Total solid at 5.0 yr
Chlordanes in Total solid at 10.0 yr
Chlordanes in Total solid at 25.0 yr
Chlordanes in Total solid at 50.0 yr
Chlordanes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

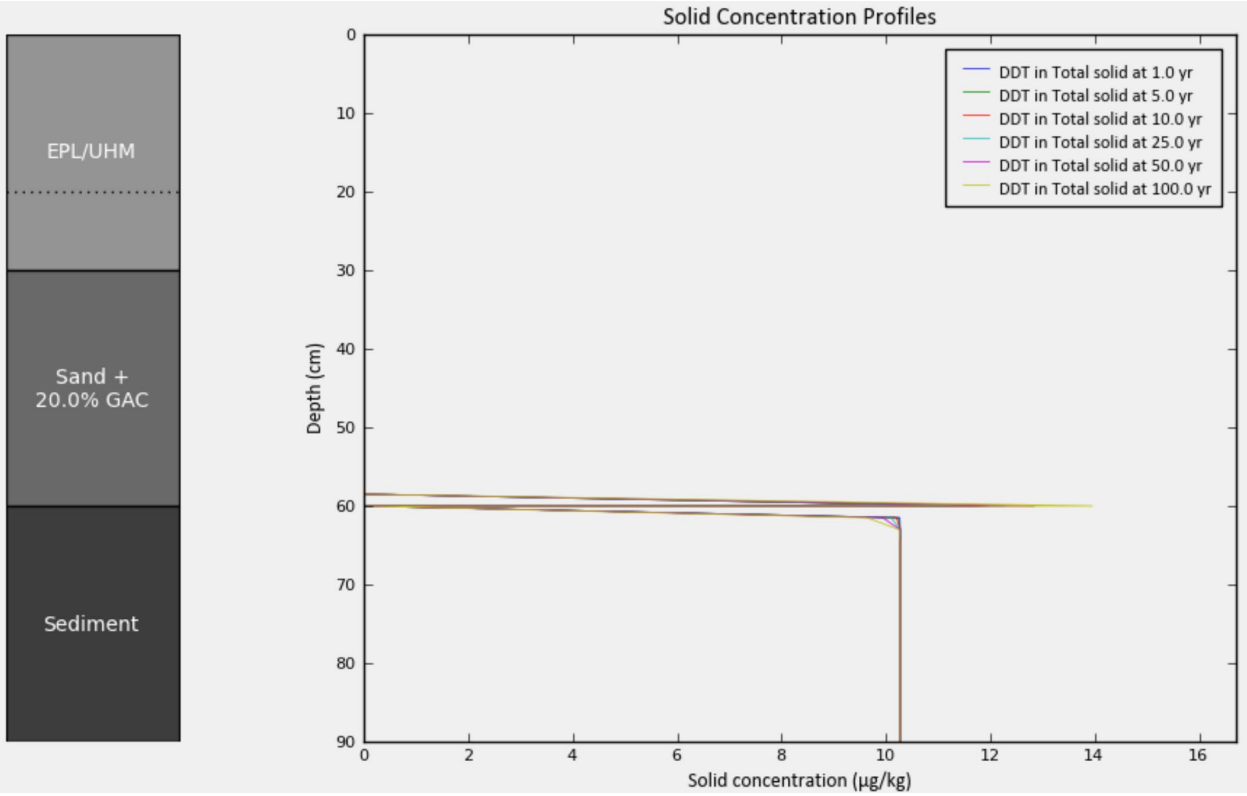

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Chromium (III) in Total solid at 1.0 yr
Chromium (III) in Total solid at 5.0 yr
Chromium (III) in Total solid at 10.0 yr
Chromium (III) in Total solid at 25.0 yr
Chromium (III) in Total solid at 50.0 yr
Chromium (III) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

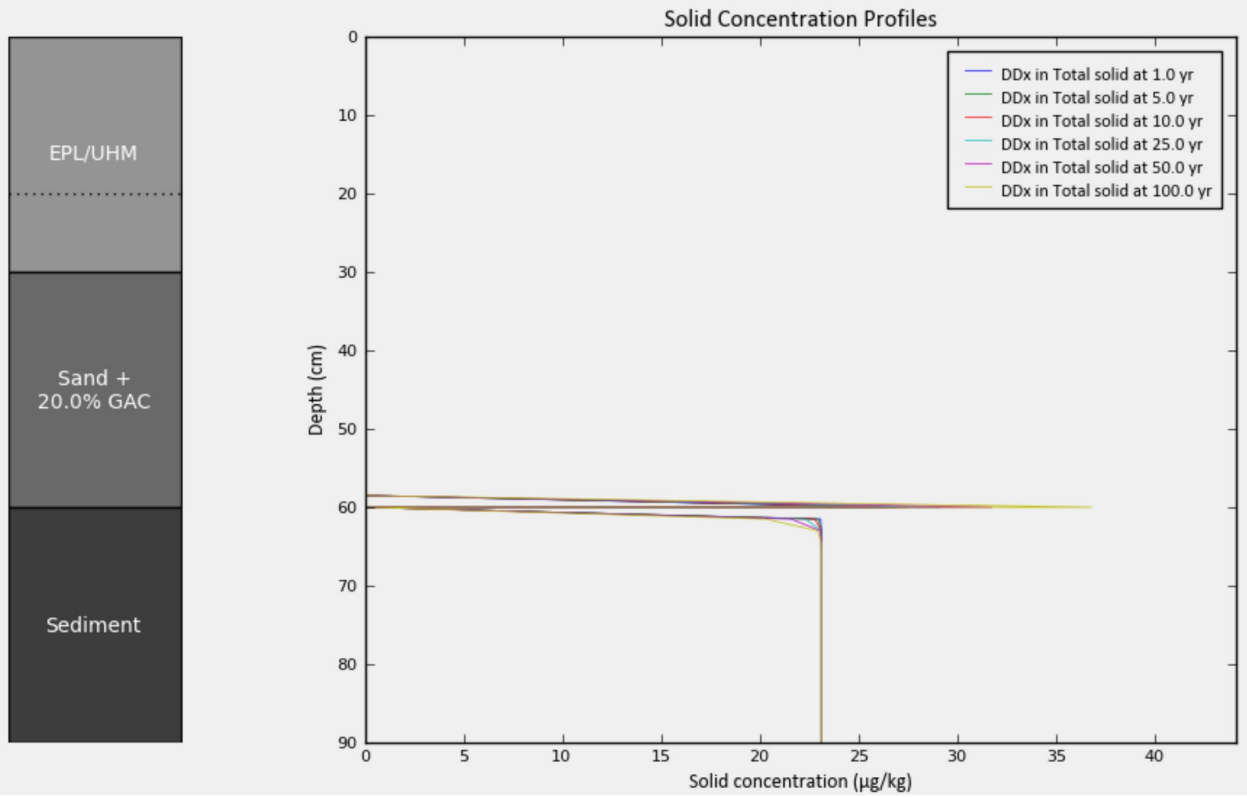

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Chrysene in Total solid at 1.0 yr
Chrysene in Total solid at 5.0 yr
Chrysene in Total solid at 10.0 yr
Chrysene in Total solid at 25.0 yr
Chrysene in Total solid at 50.0 yr
Chrysene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

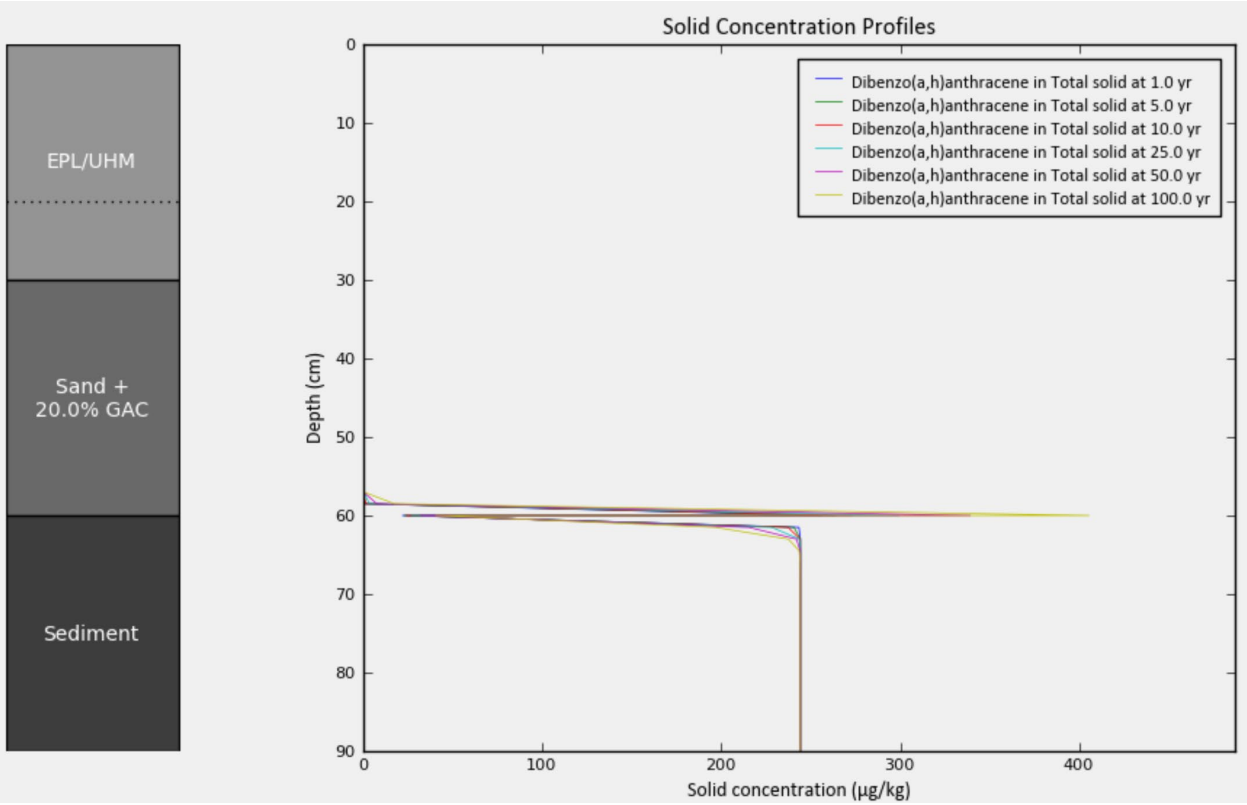

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Copper in Total solid at 1.0 yr
Copper in Total solid at 5.0 yr
Copper in Total solid at 10.0 yr
Copper in Total solid at 25.0 yr
Copper in Total solid at 50.0 yr
Copper in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

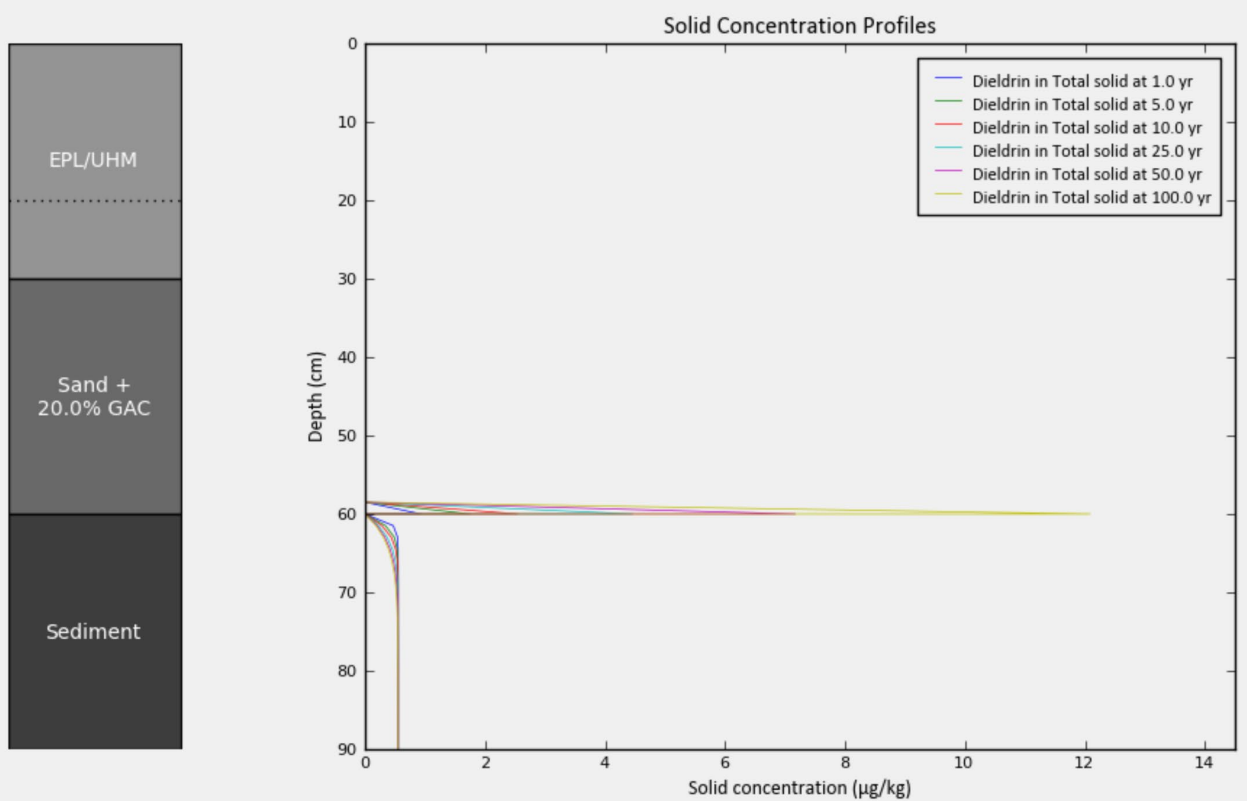

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
DDD in Total solid at 1.0 yr
DDD in Total solid at 5.0 yr
DDD in Total solid at 10.0 yr
DDD in Total solid at 25.0 yr
DDD in Total solid at 50.0 yr
DDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

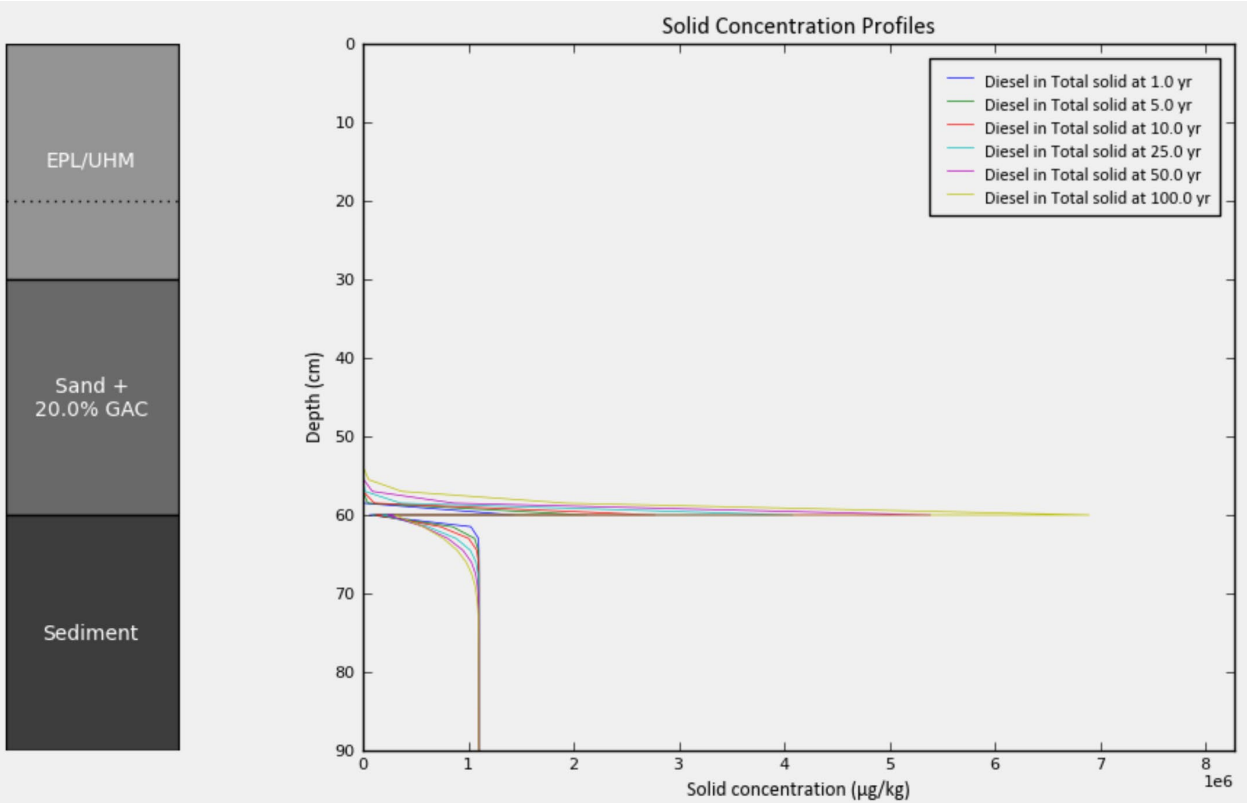

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
DDE in Total solid at 1.0 yr
DDE in Total solid at 5.0 yr
DDE in Total solid at 10.0 yr
DDE in Total solid at 25.0 yr
DDE in Total solid at 50.0 yr
DDE in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

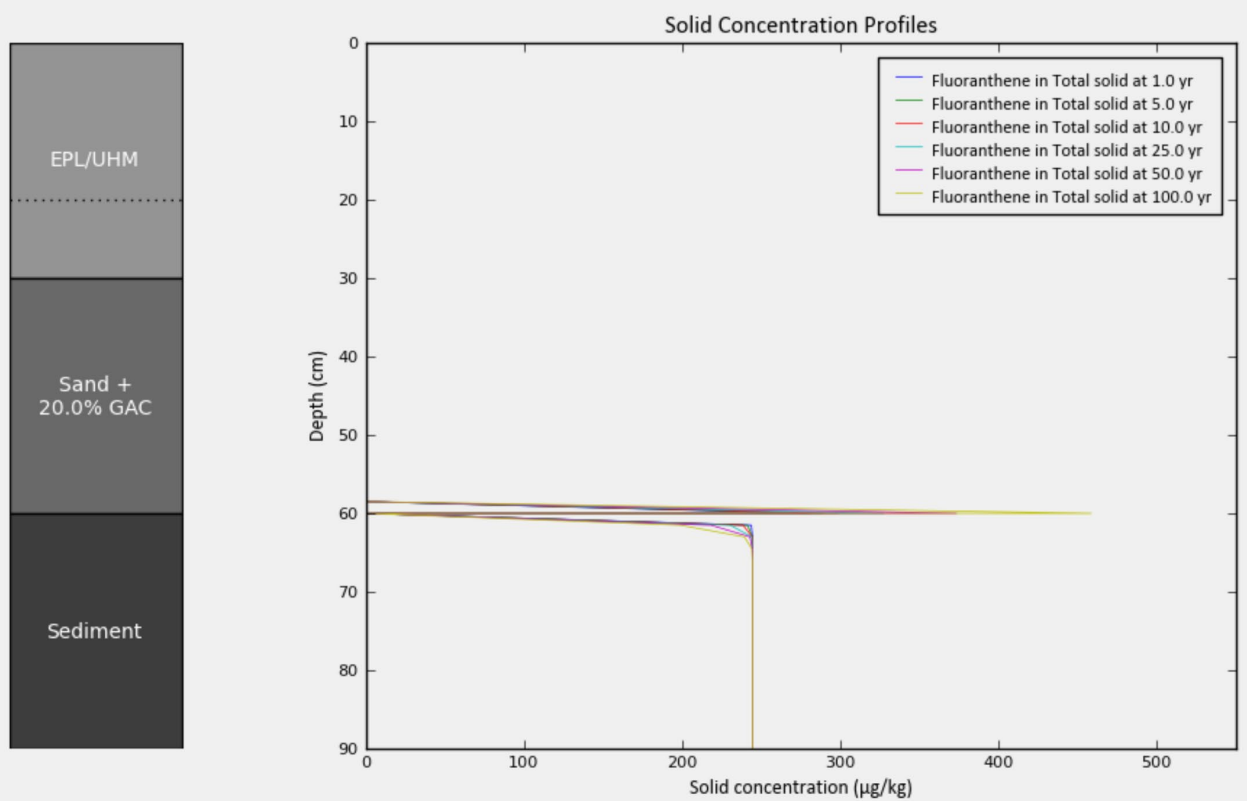

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
DDT in Total solid at 1.0 yr
DDT in Total solid at 5.0 yr
DDT in Total solid at 10.0 yr
DDT in Total solid at 25.0 yr
DDT in Total solid at 50.0 yr
DDT in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

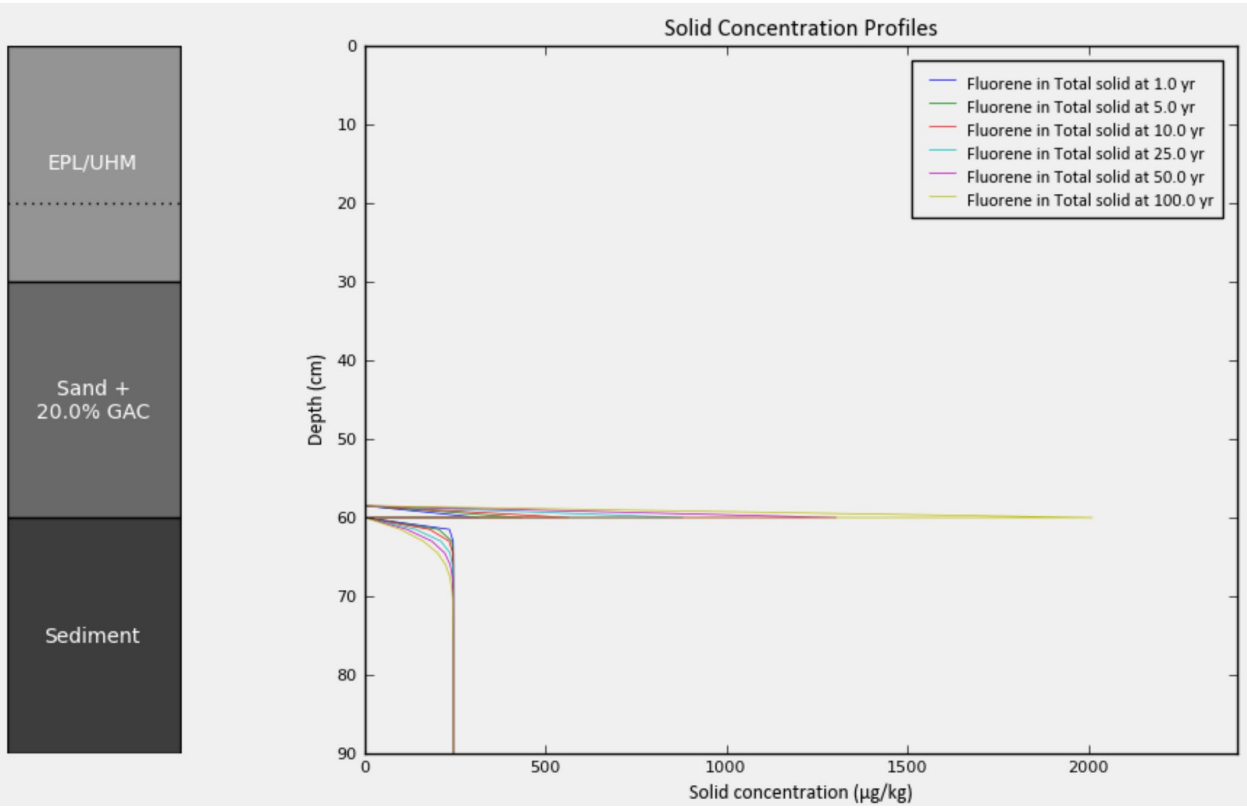

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
DDx in Total solid at 1.0 yr
DDx in Total solid at 5.0 yr
DDx in Total solid at 10.0 yr
DDx in Total solid at 25.0 yr
DDx in Total solid at 50.0 yr
DDx in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

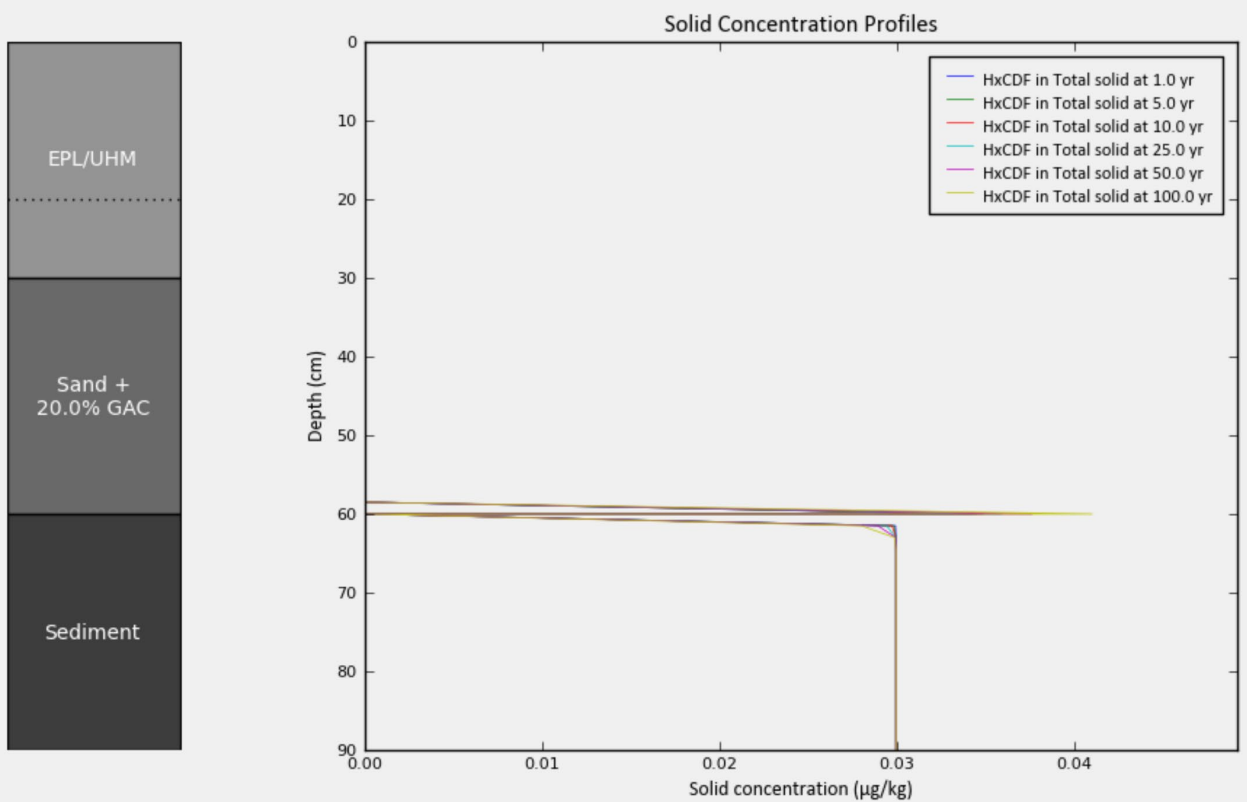

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Dibenzo(a,h)anthracene in Total solid at 1.0 yr
Dibenzo(a,h)anthracene in Total solid at 5.0 yr
Dibenzo(a,h)anthracene in Total solid at 10.0 yr
Dibenzo(a,h)anthracene in Total solid at 25.0 yr
Dibenzo(a,h)anthracene in Total solid at 50.0 yr
Dibenzo(a,h)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

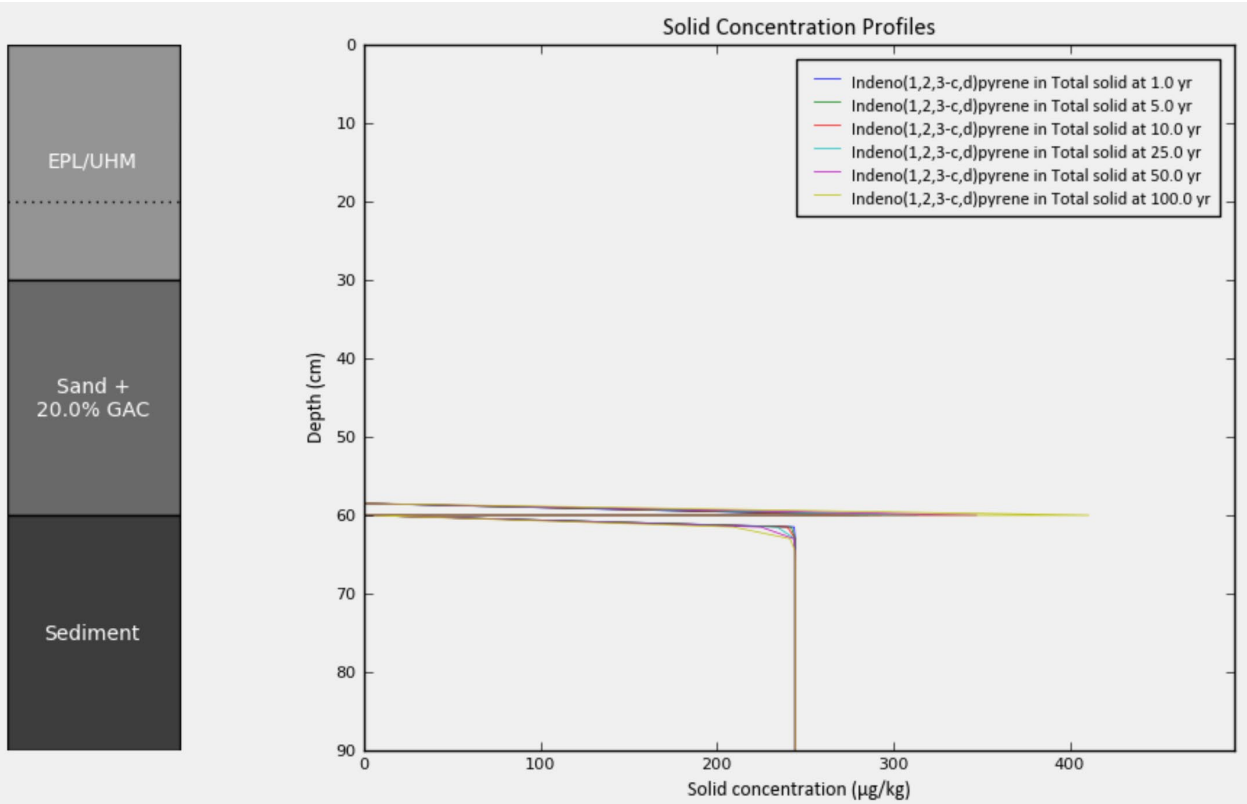

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Dieldrin in Total solid at 1.0 yr
Dieldrin in Total solid at 5.0 yr
Dieldrin in Total solid at 10.0 yr
Dieldrin in Total solid at 25.0 yr
Dieldrin in Total solid at 50.0 yr
Dieldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

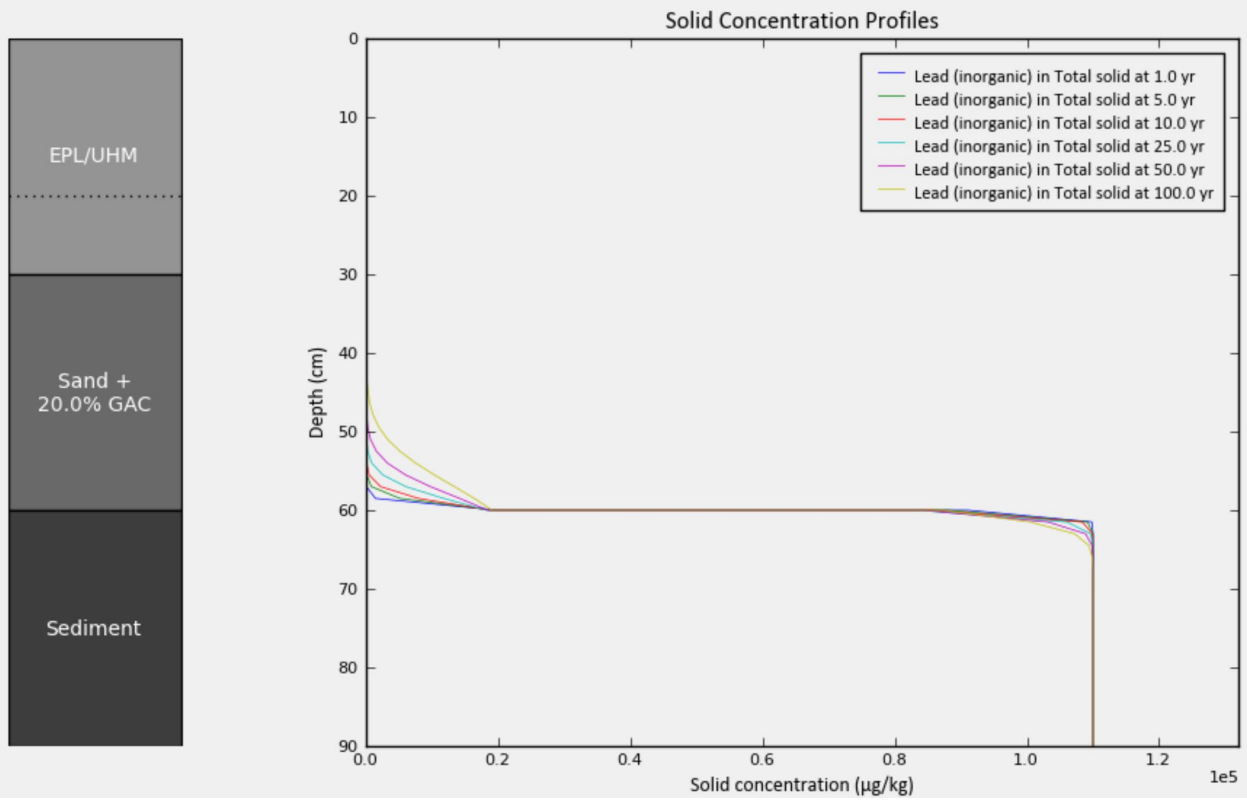

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Diesel in Total solid at 1.0 yr
Diesel in Total solid at 5.0 yr
Diesel in Total solid at 10.0 yr
Diesel in Total solid at 25.0 yr
Diesel in Total solid at 50.0 yr
Diesel in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

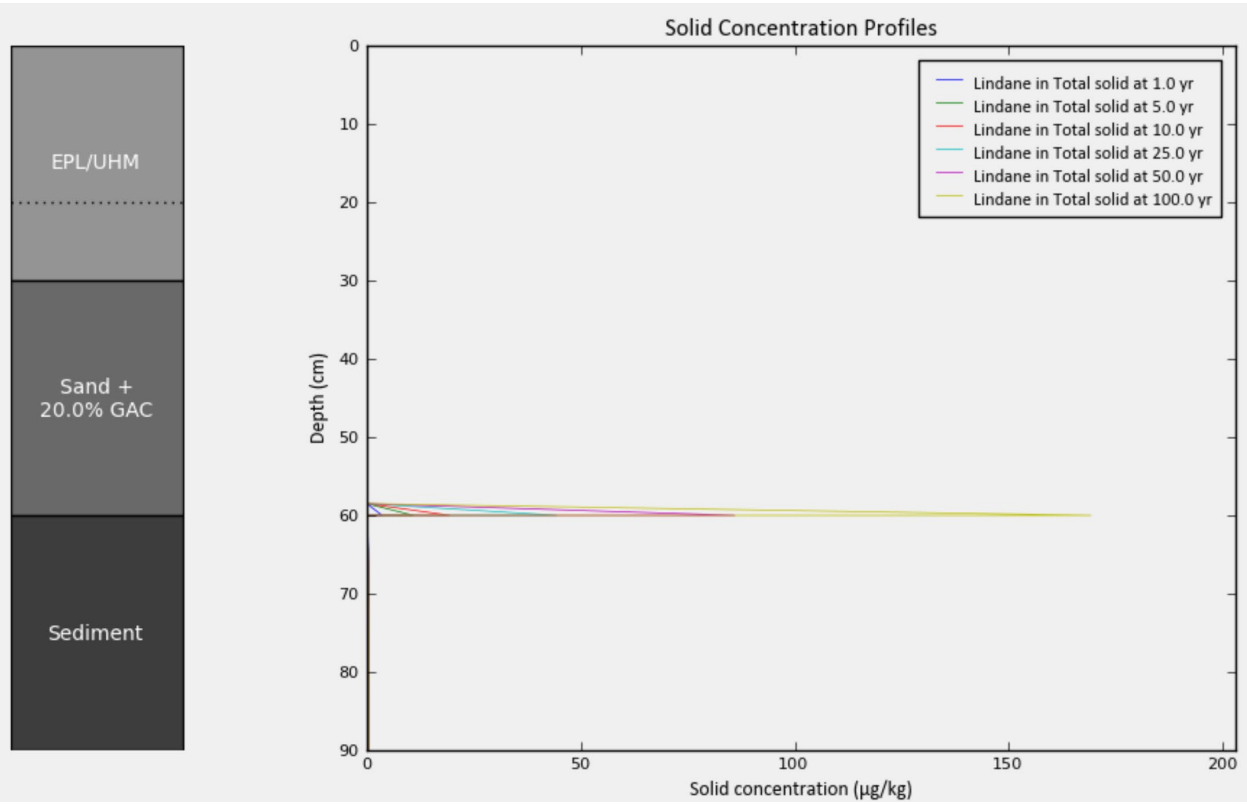

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Fluoranthene in Total solid at 1.0 yr
Fluoranthene in Total solid at 5.0 yr
Fluoranthene in Total solid at 10.0 yr
Fluoranthene in Total solid at 25.0 yr
Fluoranthene in Total solid at 50.0 yr
Fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

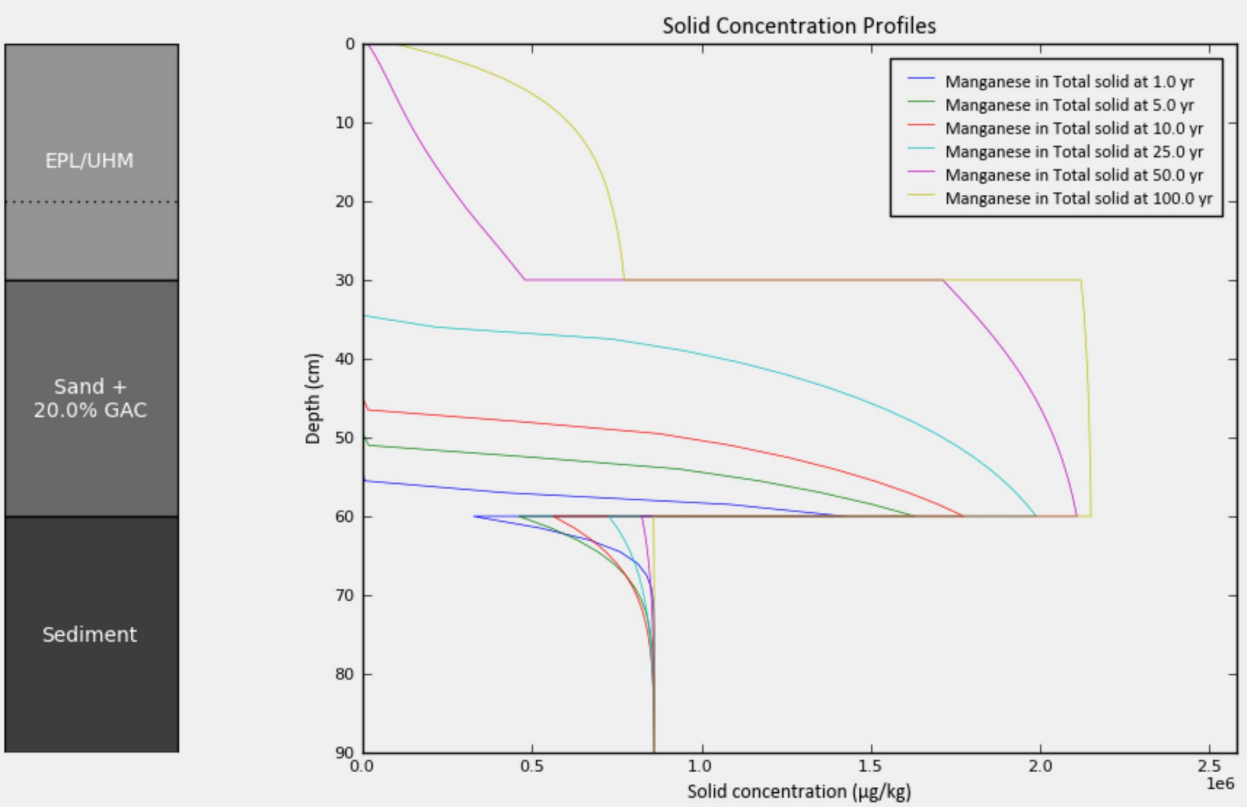

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Fluorene in Total solid at 1.0 yr
Fluorene in Total solid at 5.0 yr
Fluorene in Total solid at 10.0 yr
Fluorene in Total solid at 25.0 yr
Fluorene in Total solid at 50.0 yr
Fluorene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

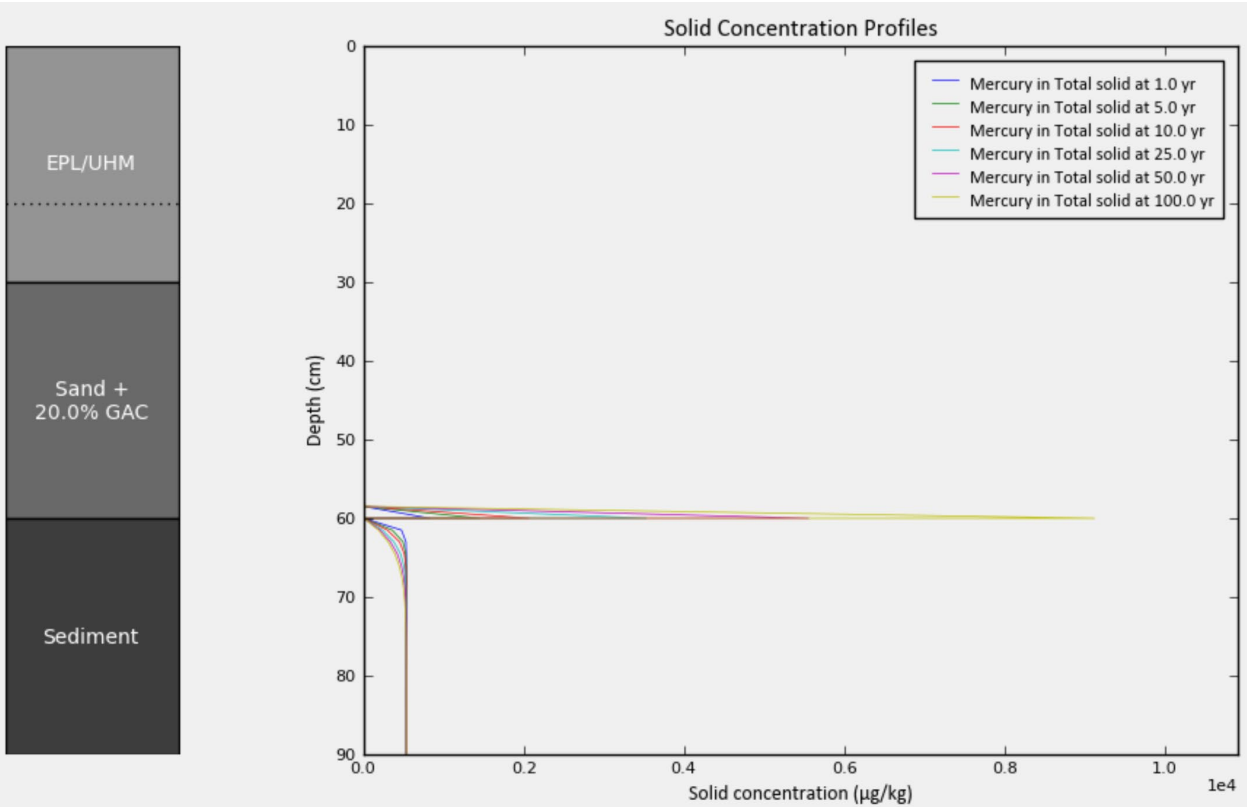

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
HxCDF in Total solid at 1.0 yr
HxCDF in Total solid at 5.0 yr
HxCDF in Total solid at 10.0 yr
HxCDF in Total solid at 25.0 yr
HxCDF in Total solid at 50.0 yr
HxCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.00
0.01
0.02
0.03
0.04
Solid concentration (µg/kg)

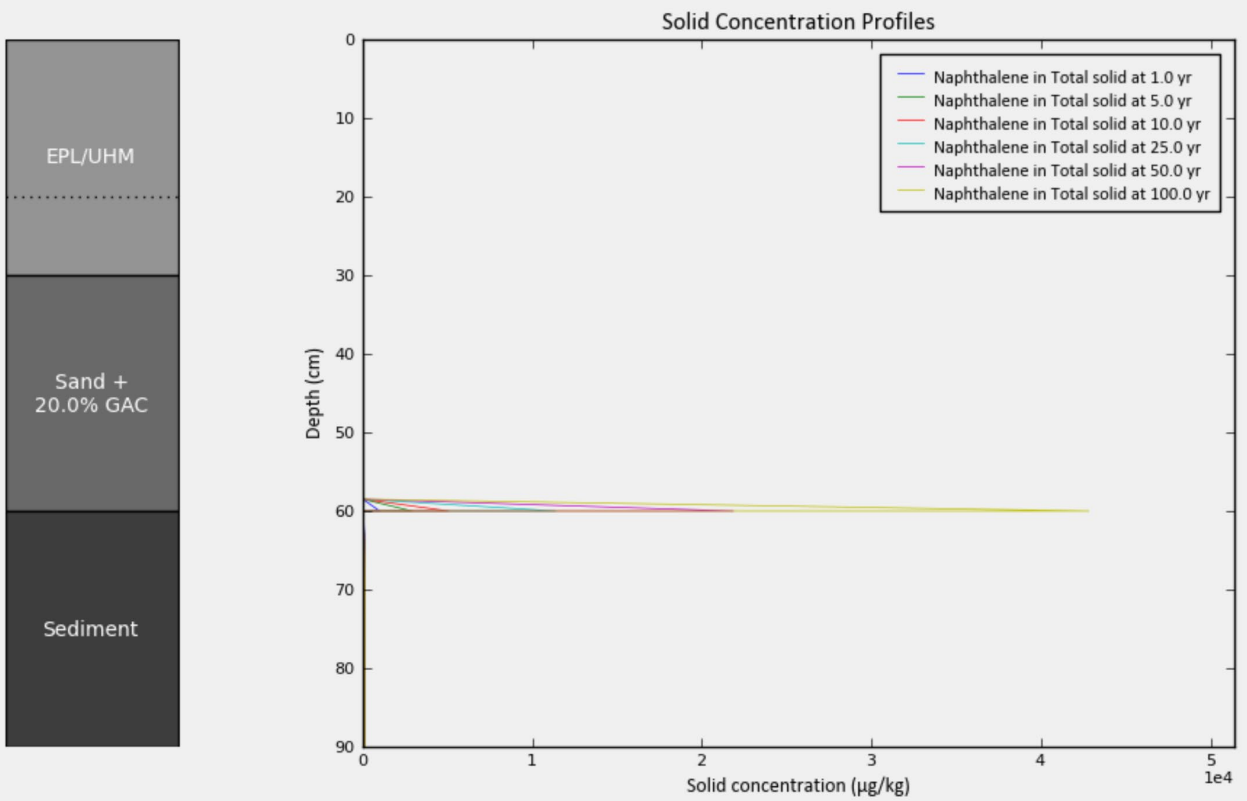

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Indeno(1,2,3-c,d)pyrene in Total solid at 1.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 5.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 10.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 25.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 50.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
Solid concentration (µg/kg)

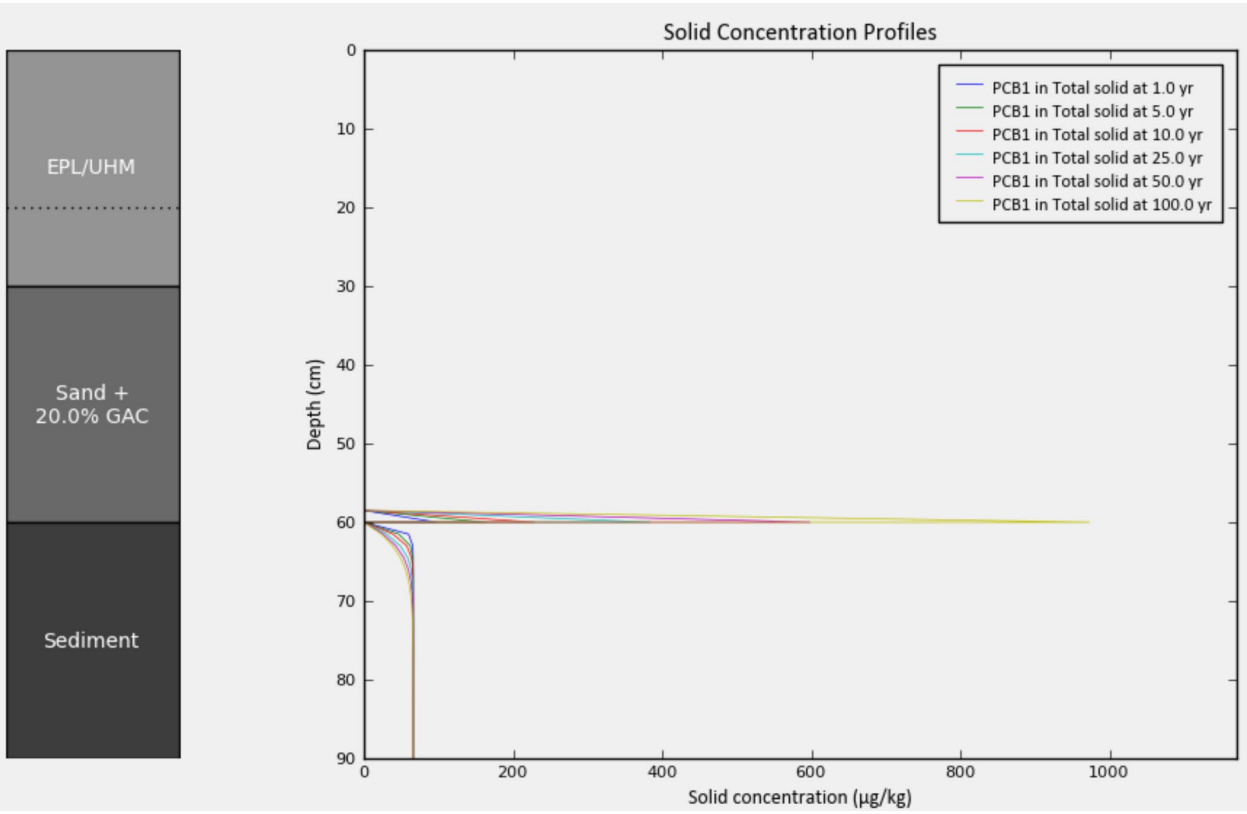

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Lead (inorganic) in Total solid at 1.0 yr
Lead (inorganic) in Total solid at 5.0 yr
Lead (inorganic) in Total solid at 10.0 yr
Lead (inorganic) in Total solid at 25.0 yr
Lead (inorganic) in Total solid at 50.0 yr
Lead (inorganic) in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e5
Solid concentration (µg/kg)

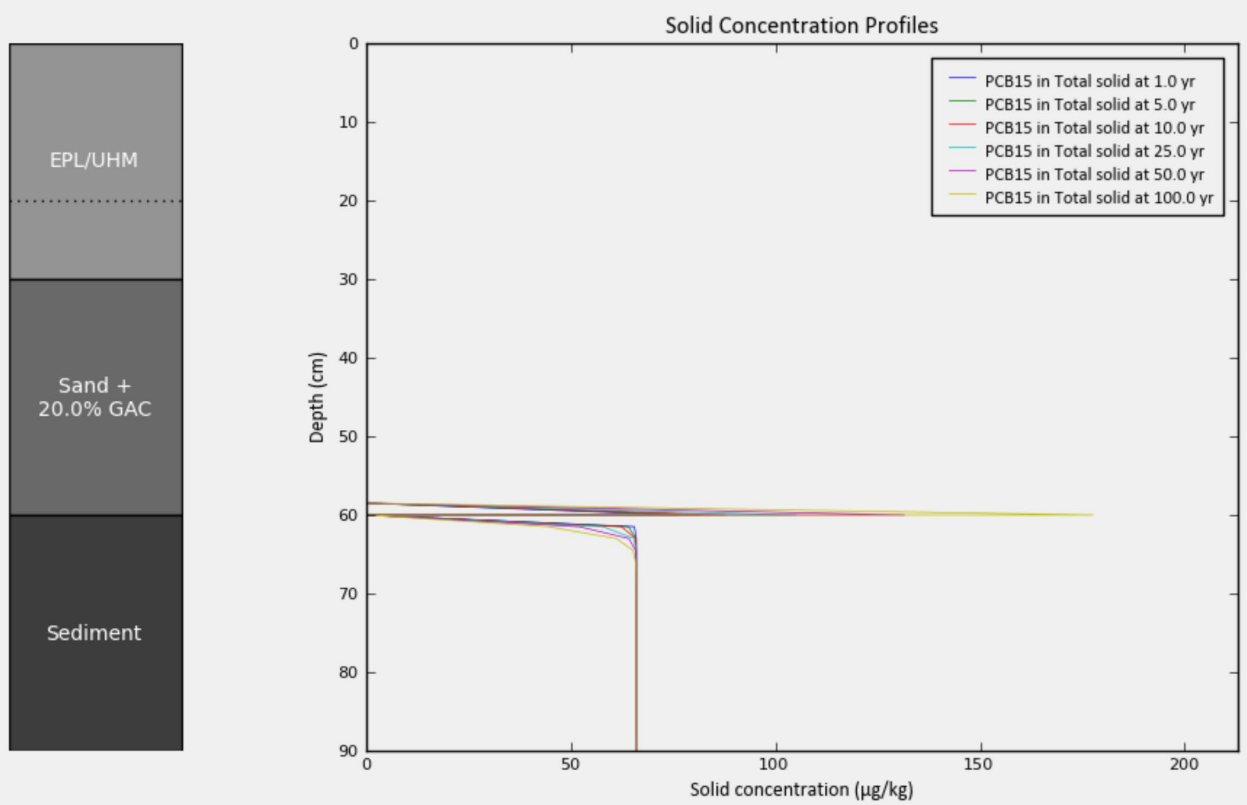

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Lindane in Total solid at 1.0 yr
Lindane in Total solid at 5.0 yr
Lindane in Total solid at 10.0 yr
Lindane in Total solid at 25.0 yr
Lindane in Total solid at 50.0 yr
Lindane in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
50
100
150
200
Solid concentration (µg/kg)

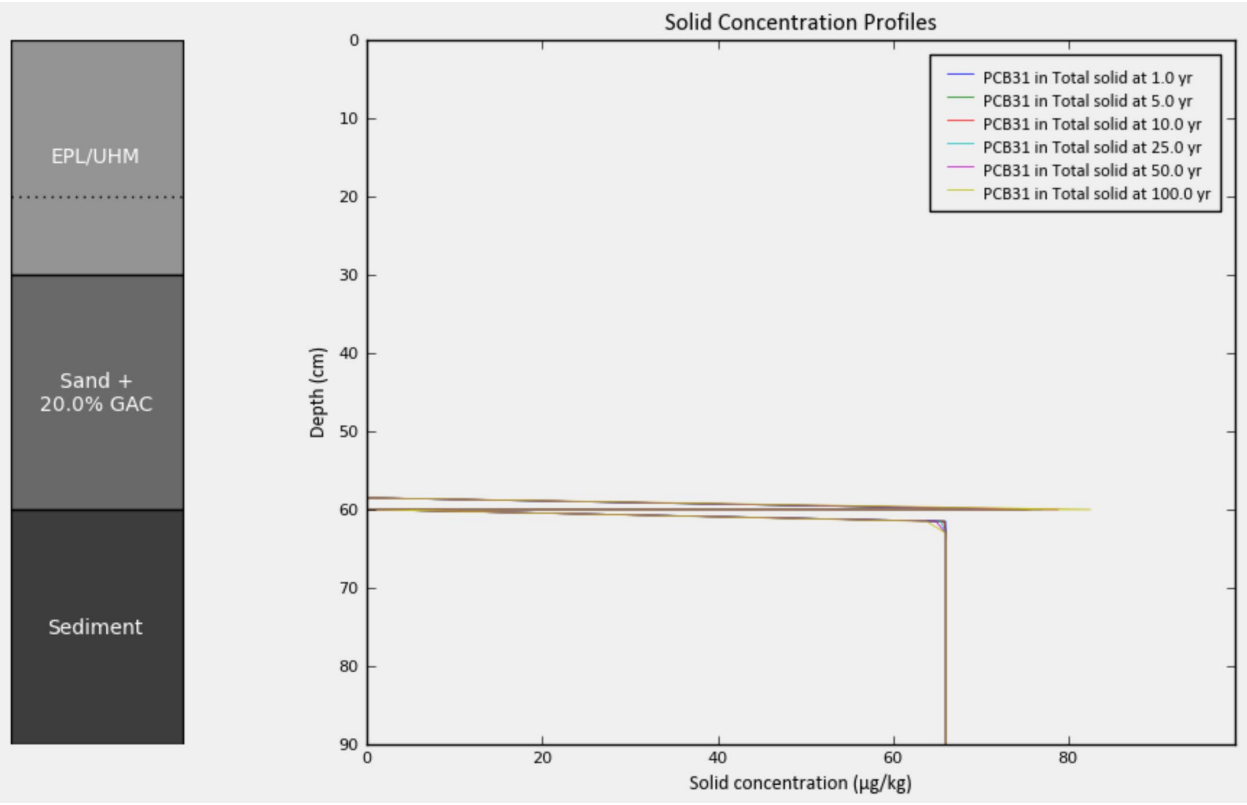

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Manganese in Total solid at 1.0 yr
Manganese in Total solid at 5.0 yr
Manganese in Total solid at 10.0 yr
Manganese in Total solid at 25.0 yr
Manganese in Total solid at 50.0 yr
Manganese in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

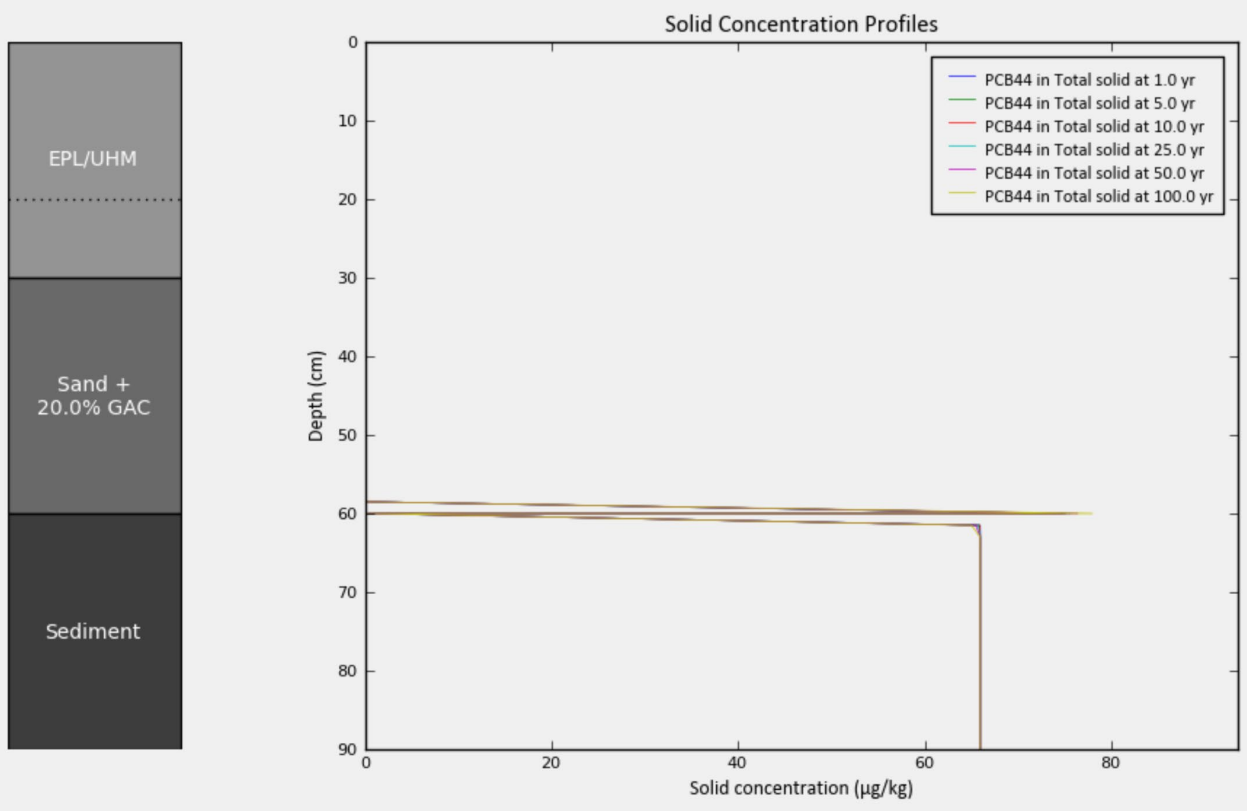

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Mercury in Total solid at 1.0 yr
Mercury in Total solid at 5.0 yr
Mercury in Total solid at 10.0 yr
Mercury in Total solid at 25.0 yr
Mercury in Total solid at 50.0 yr
Mercury in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

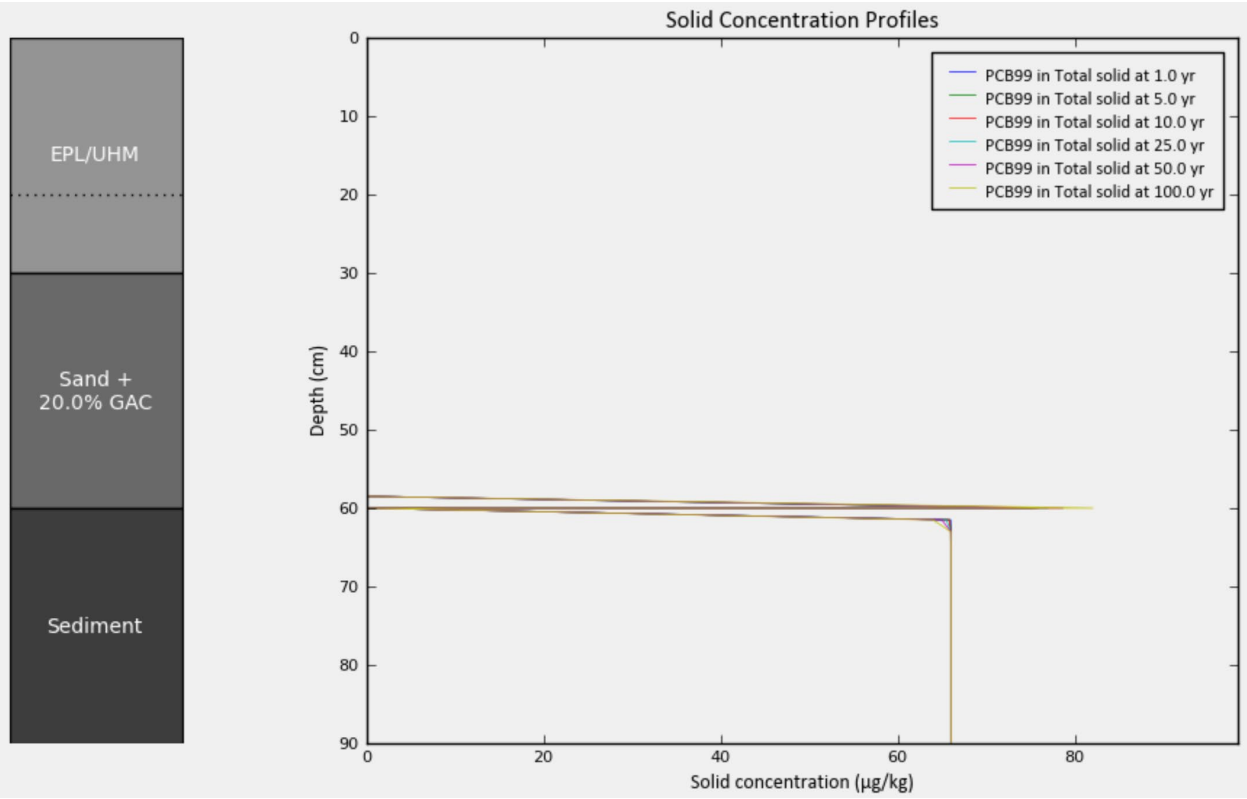

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Naphthalene in Total solid at 1.0 yr
Naphthalene in Total solid at 5.0 yr
Naphthalene in Total solid at 10.0 yr
Naphthalene in Total solid at 25.0 yr
Naphthalene in Total solid at 50.0 yr
Naphthalene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

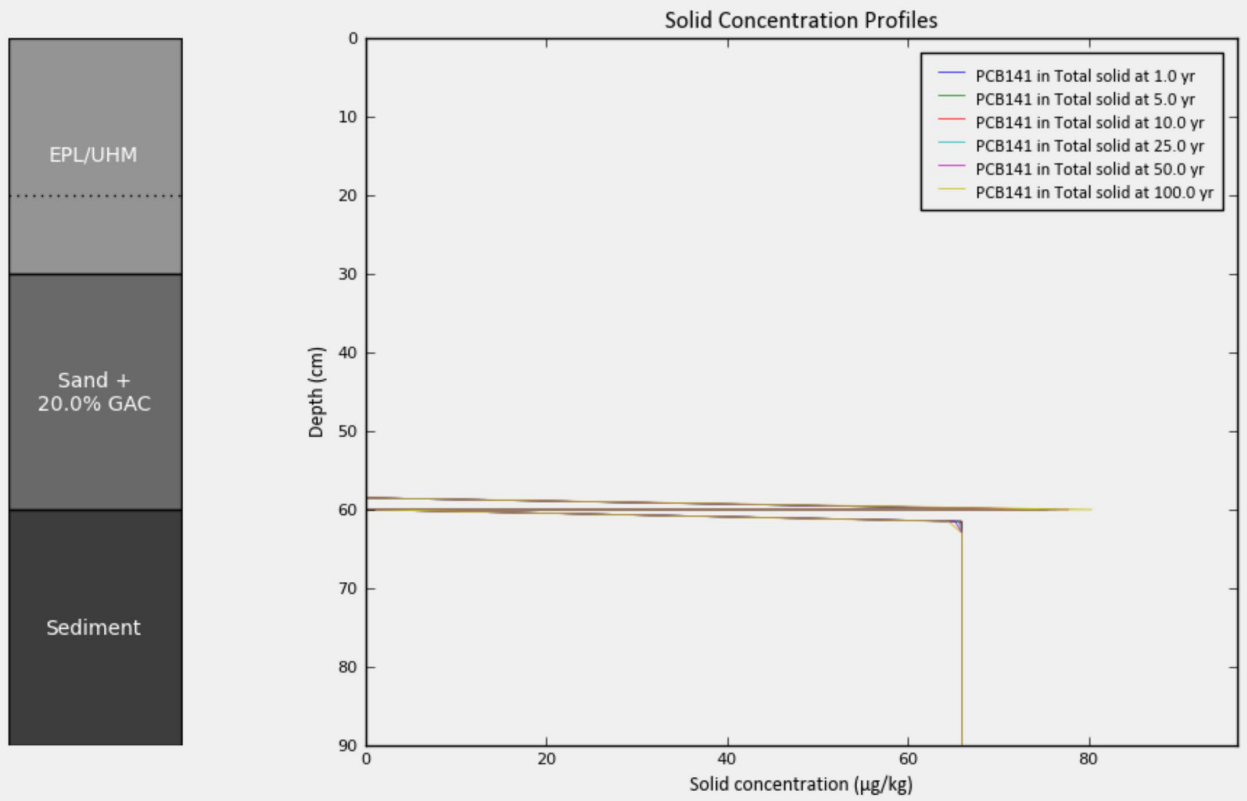

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB1 in Total solid at 1.0 yr
PCB1 in Total solid at 5.0 yr
PCB1 in Total solid at 10.0 yr
PCB1 in Total solid at 25.0 yr
PCB1 in Total solid at 50.0 yr
PCB1 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

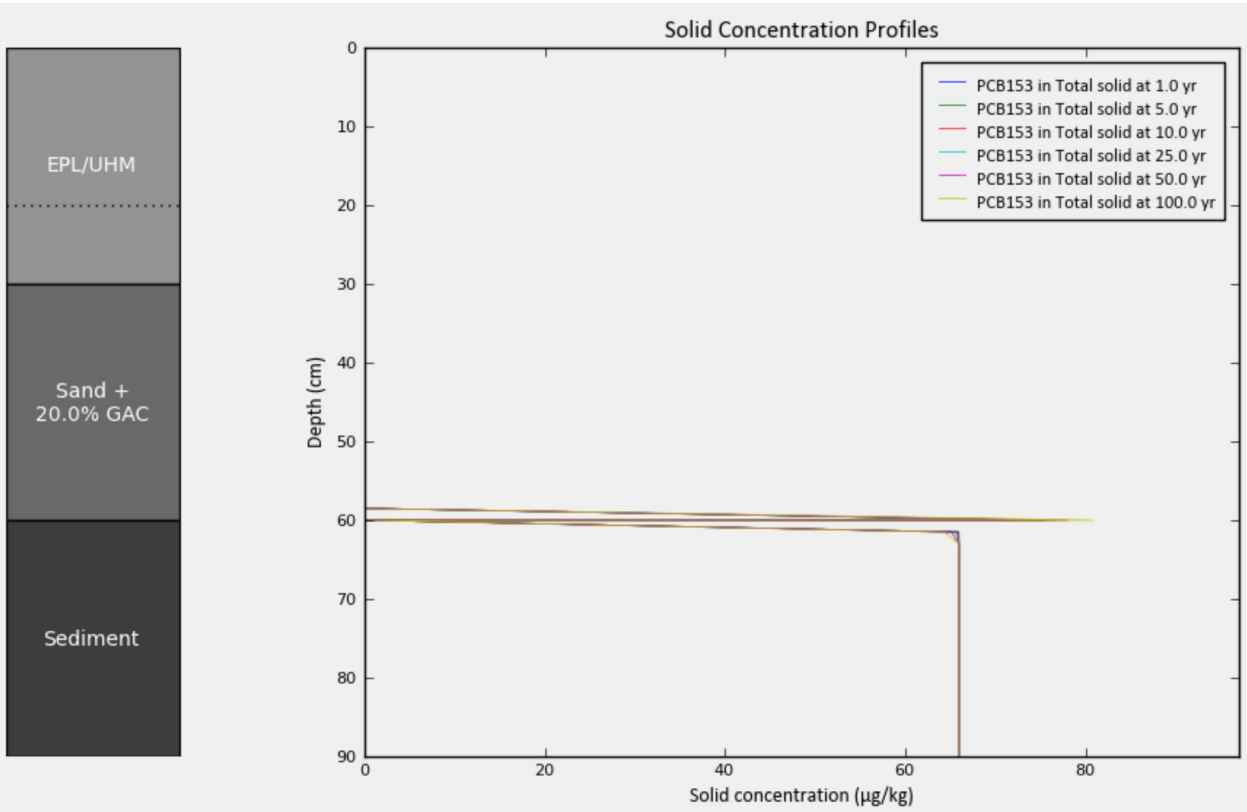

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB15 in Total solid at 1.0 yr
PCB15 in Total solid at 5.0 yr
PCB15 in Total solid at 10.0 yr
PCB15 in Total solid at 25.0 yr
PCB15 in Total solid at 50.0 yr
PCB15 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
50
100
150
200

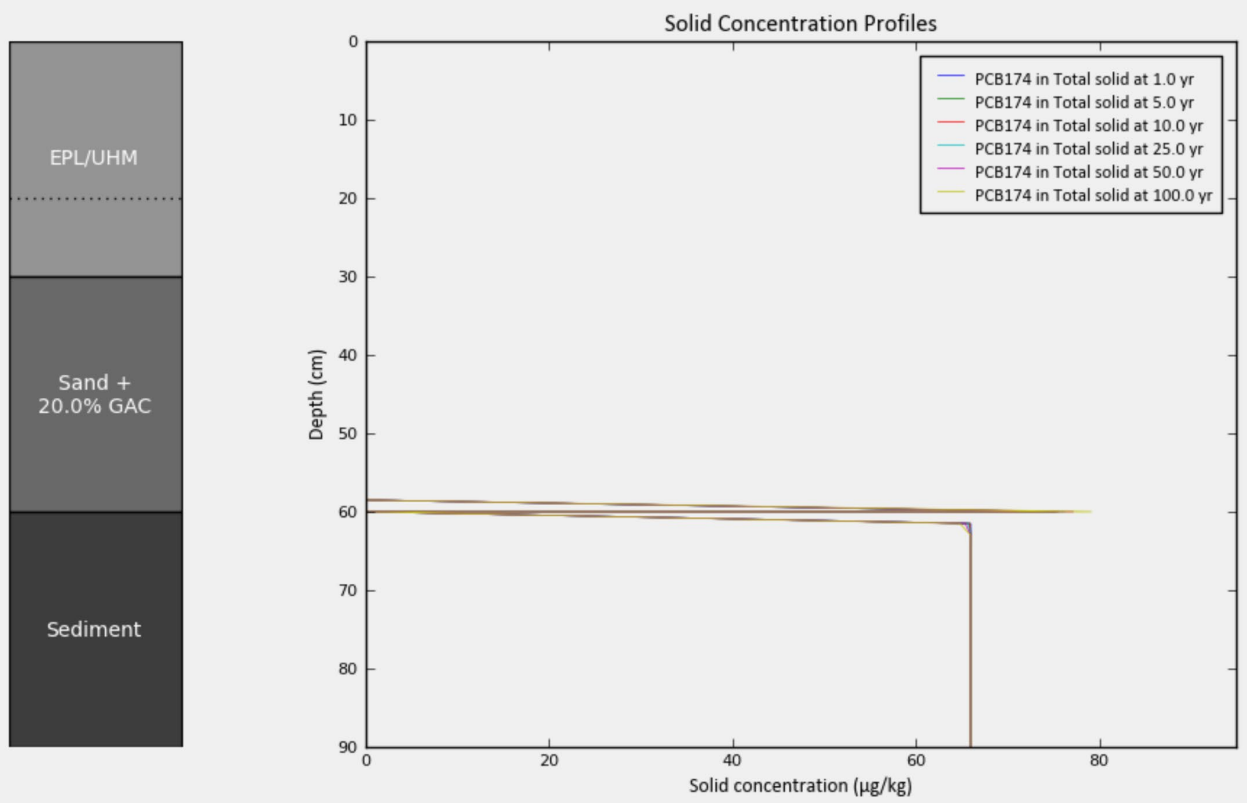

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB31 in Total solid at 1.0 yr
PCB31 in Total solid at 5.0 yr
PCB31 in Total solid at 10.0 yr
PCB31 in Total solid at 25.0 yr
PCB31 in Total solid at 50.0 yr
PCB31 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80

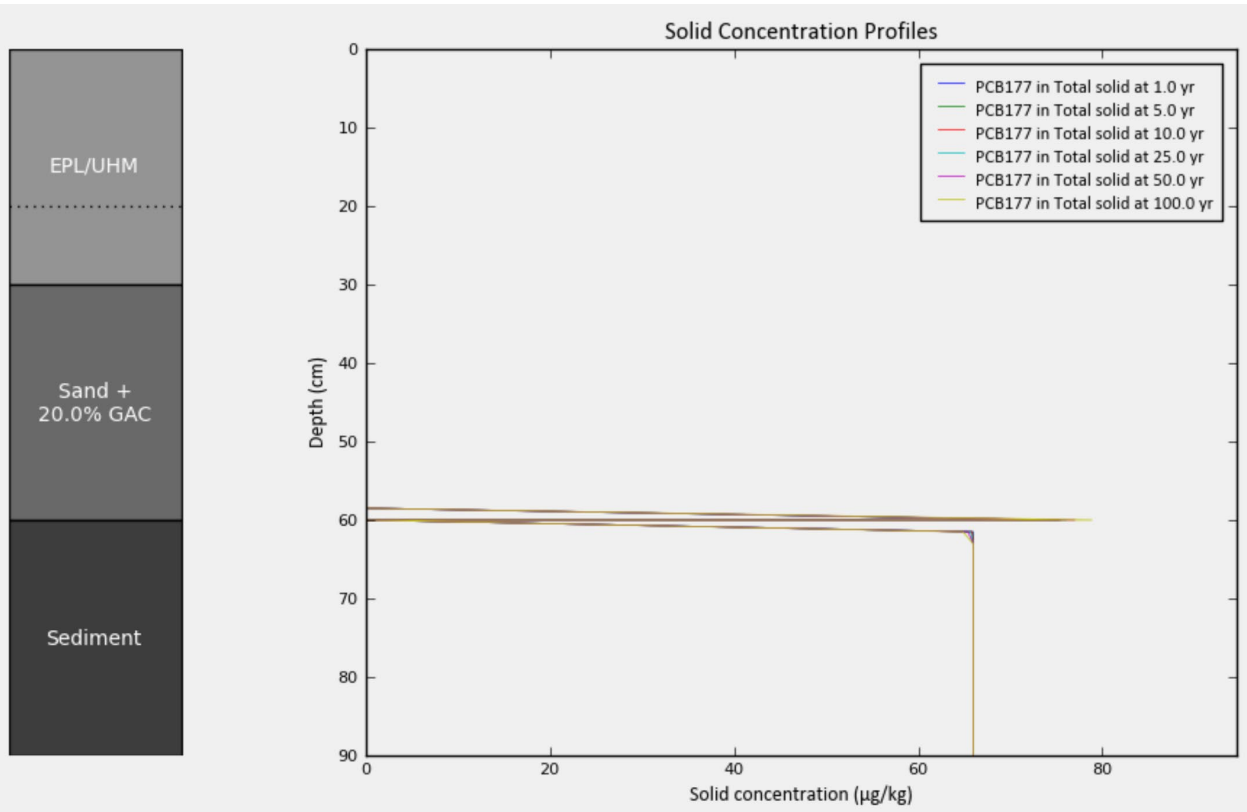

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB44 in Total solid at 1.0 yr
PCB44 in Total solid at 5.0 yr
PCB44 in Total solid at 10.0 yr
PCB44 in Total solid at 25.0 yr
PCB44 in Total solid at 50.0 yr
PCB44 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

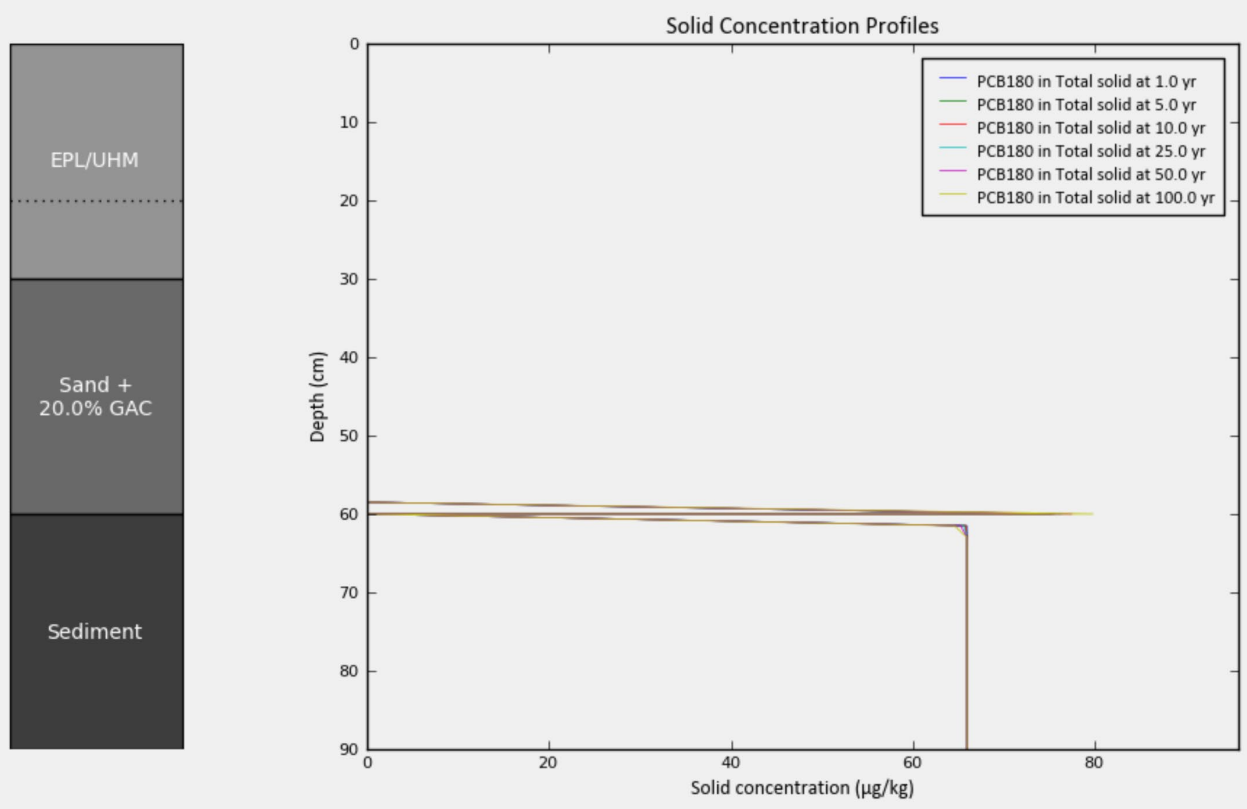

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB99 in Total solid at 1.0 yr
PCB99 in Total solid at 5.0 yr
PCB99 in Total solid at 10.0 yr
PCB99 in Total solid at 25.0 yr
PCB99 in Total solid at 50.0 yr
PCB99 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

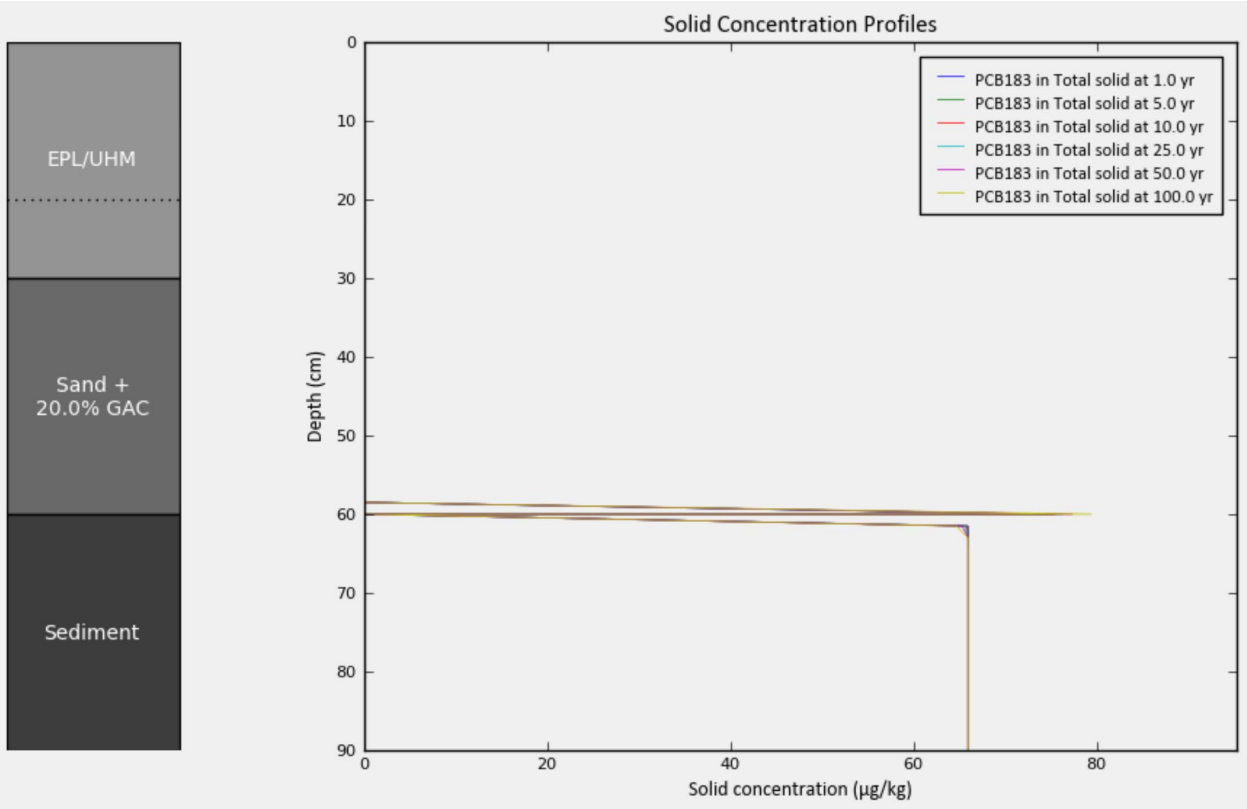

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB141 in Total solid at 1.0 yr
PCB141 in Total solid at 5.0 yr
PCB141 in Total solid at 10.0 yr
PCB141 in Total solid at 25.0 yr
PCB141 in Total solid at 50.0 yr
PCB141 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80

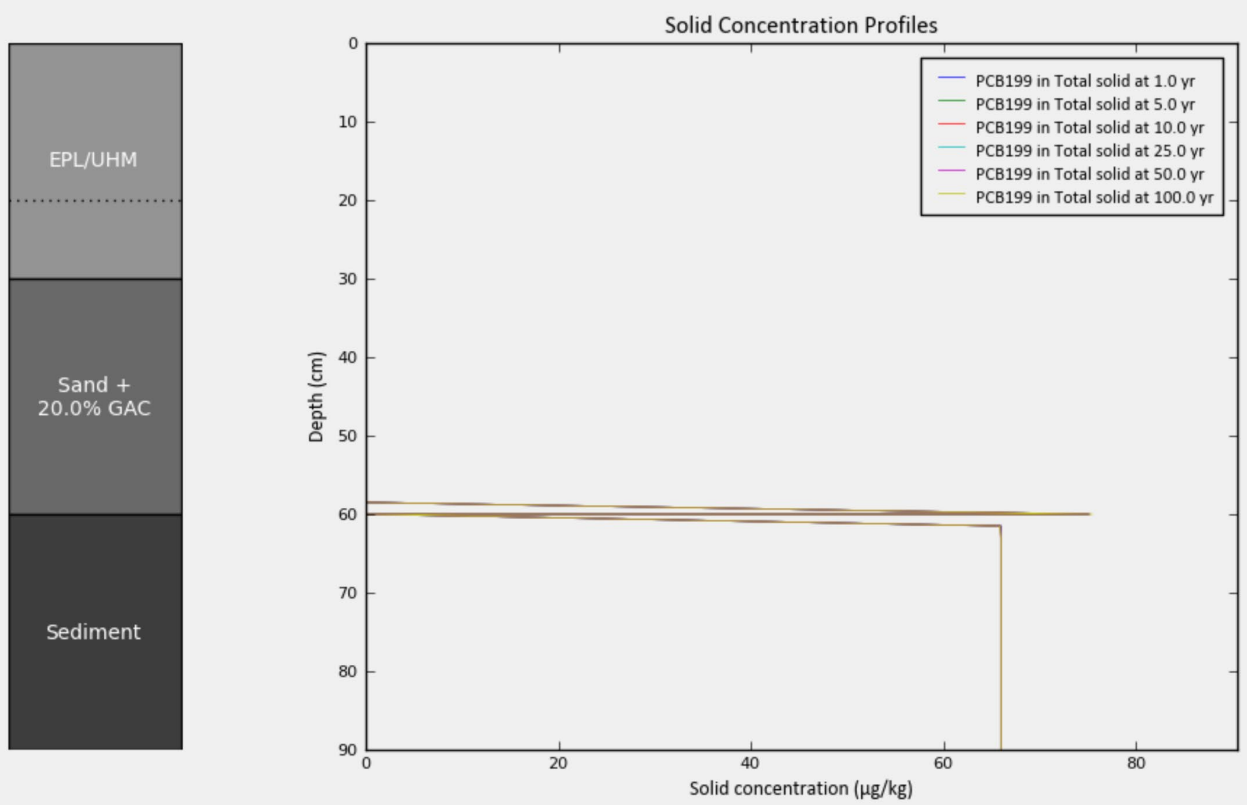

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB153 in Total solid at 1.0 yr
PCB153 in Total solid at 5.0 yr
PCB153 in Total solid at 10.0 yr
PCB153 in Total solid at 25.0 yr
PCB153 in Total solid at 50.0 yr
PCB153 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80

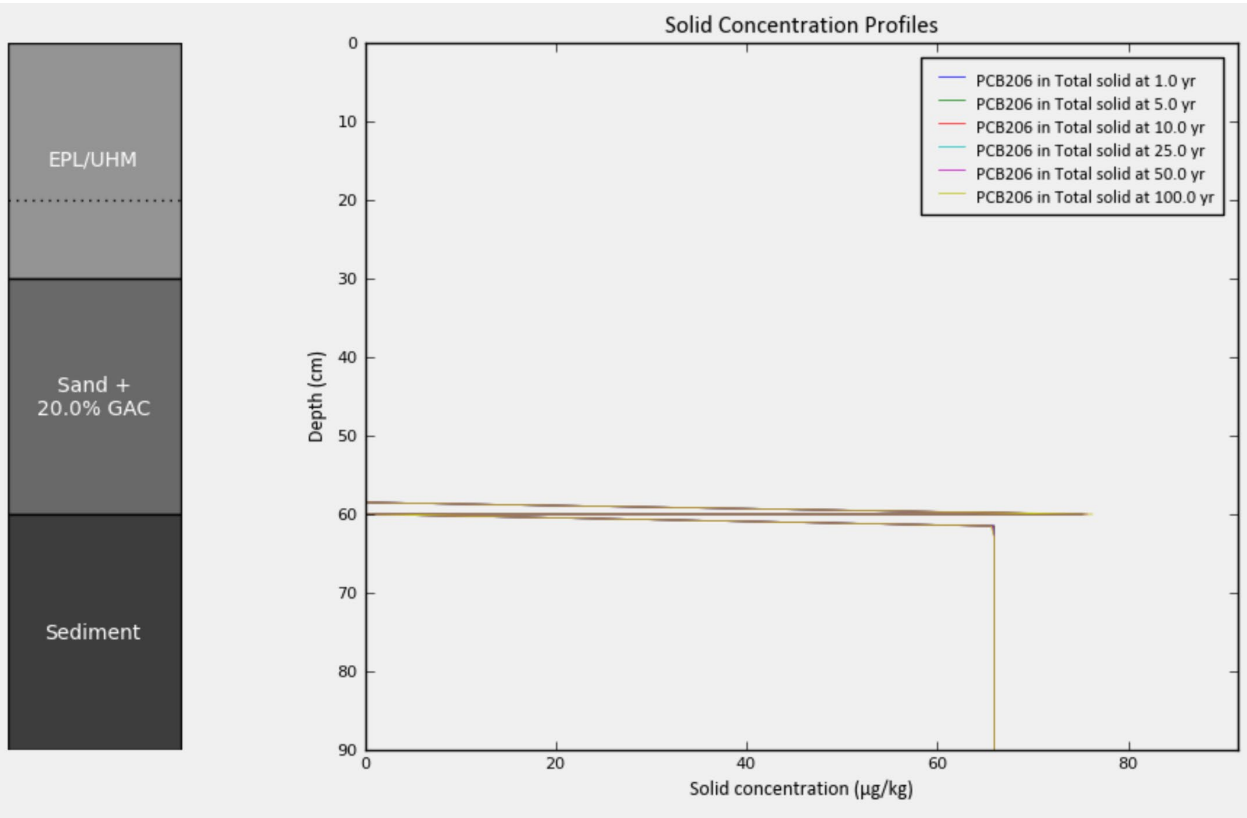

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB174 in Total solid at 1.0 yr
PCB174 in Total solid at 5.0 yr
PCB174 in Total solid at 10.0 yr
PCB174 in Total solid at 25.0 yr
PCB174 in Total solid at 50.0 yr
PCB174 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80

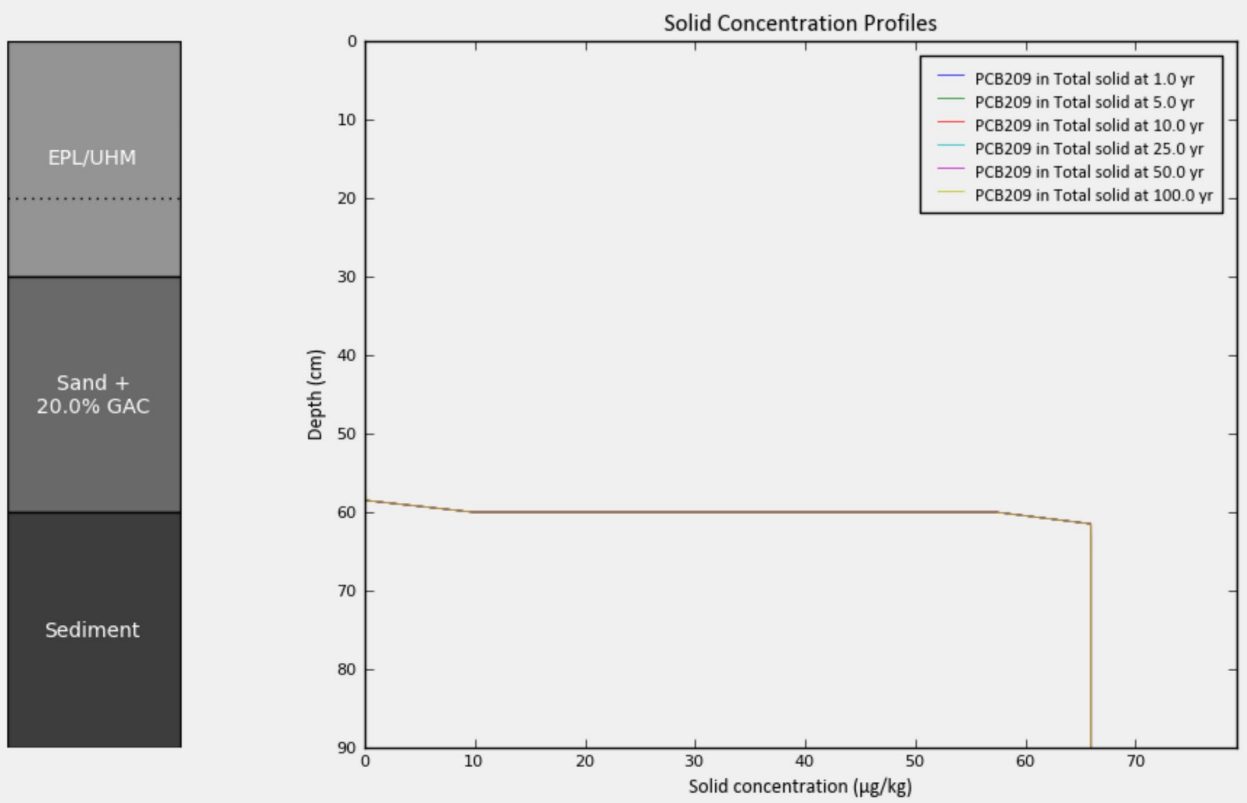

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB177 in Total solid at 1.0 yr
PCB177 in Total solid at 5.0 yr
PCB177 in Total solid at 10.0 yr
PCB177 in Total solid at 25.0 yr
PCB177 in Total solid at 50.0 yr
PCB177 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80

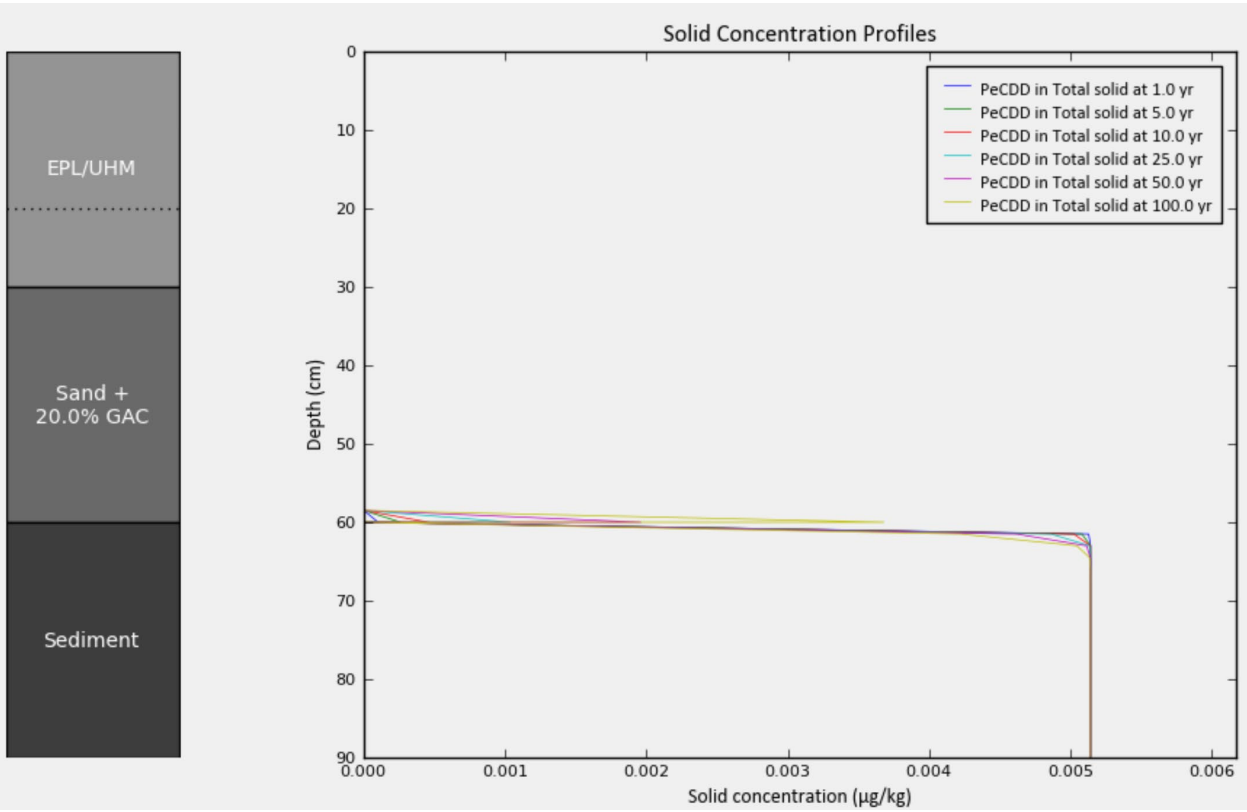

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
PCB180 in Total solid at 1.0 yr
PCB180 in Total solid at 5.0 yr
PCB180 in Total solid at 10.0 yr
PCB180 in Total solid at 25.0 yr
PCB180 in Total solid at 50.0 yr
PCB180 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

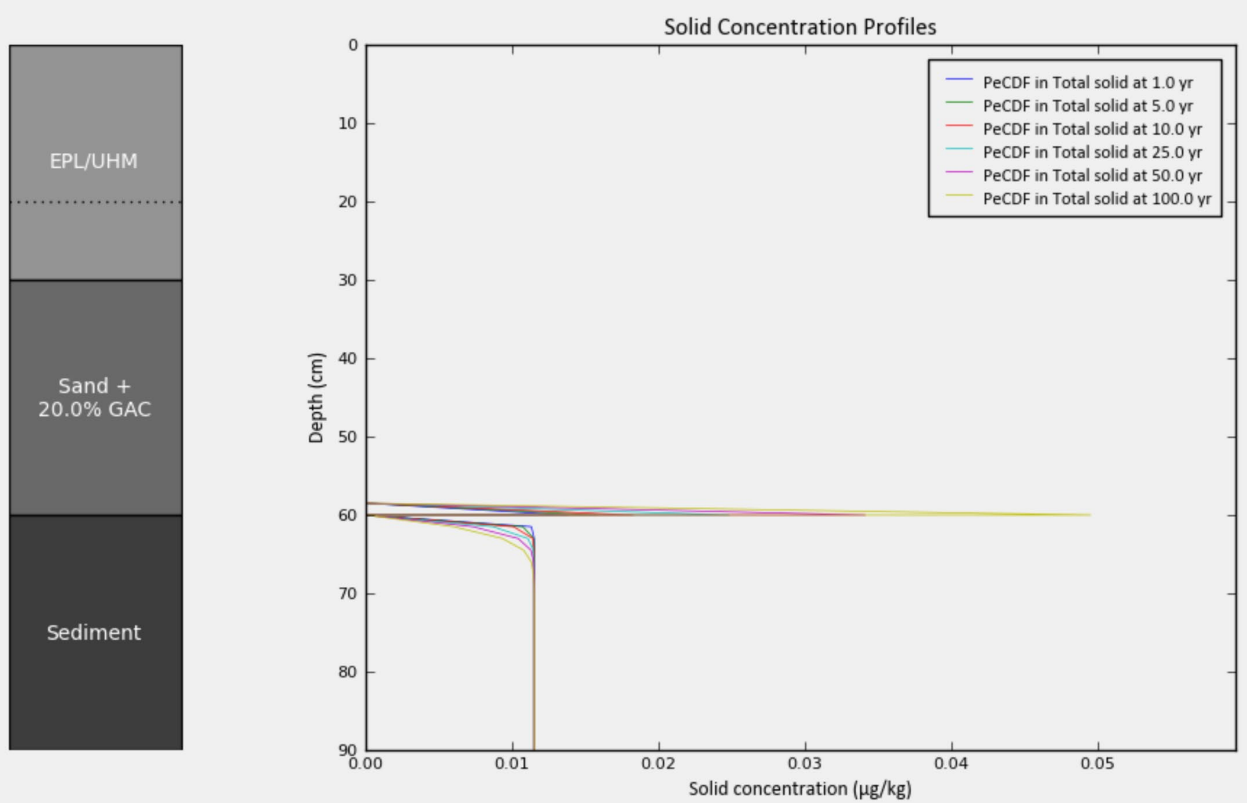

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
PCB183 in Total solid at 1.0 yr
PCB183 in Total solid at 5.0 yr
PCB183 in Total solid at 10.0 yr
PCB183 in Total solid at 25.0 yr
PCB183 in Total solid at 50.0 yr
PCB183 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

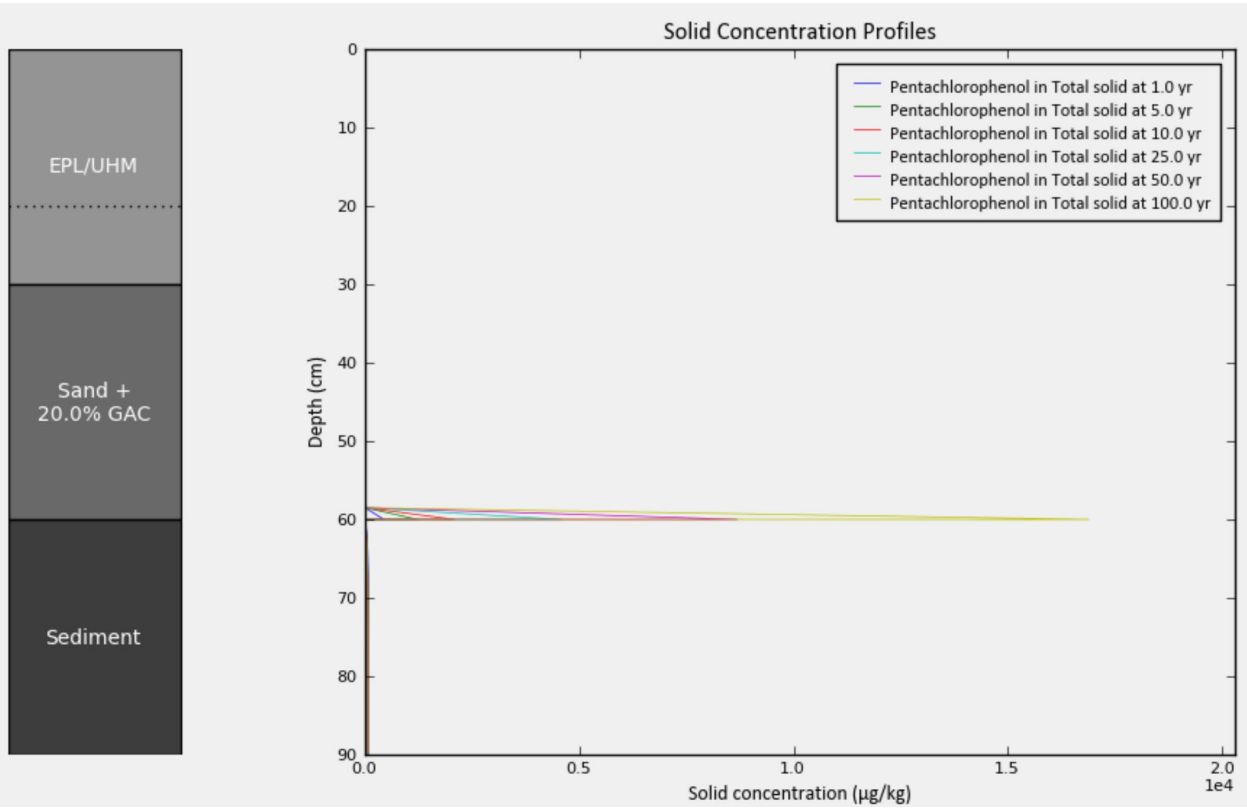

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB199 in Total solid at 1.0 yr
PCB199 in Total solid at 5.0 yr
PCB199 in Total solid at 10.0 yr
PCB199 in Total solid at 25.0 yr
PCB199 in Total solid at 50.0 yr
PCB199 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80

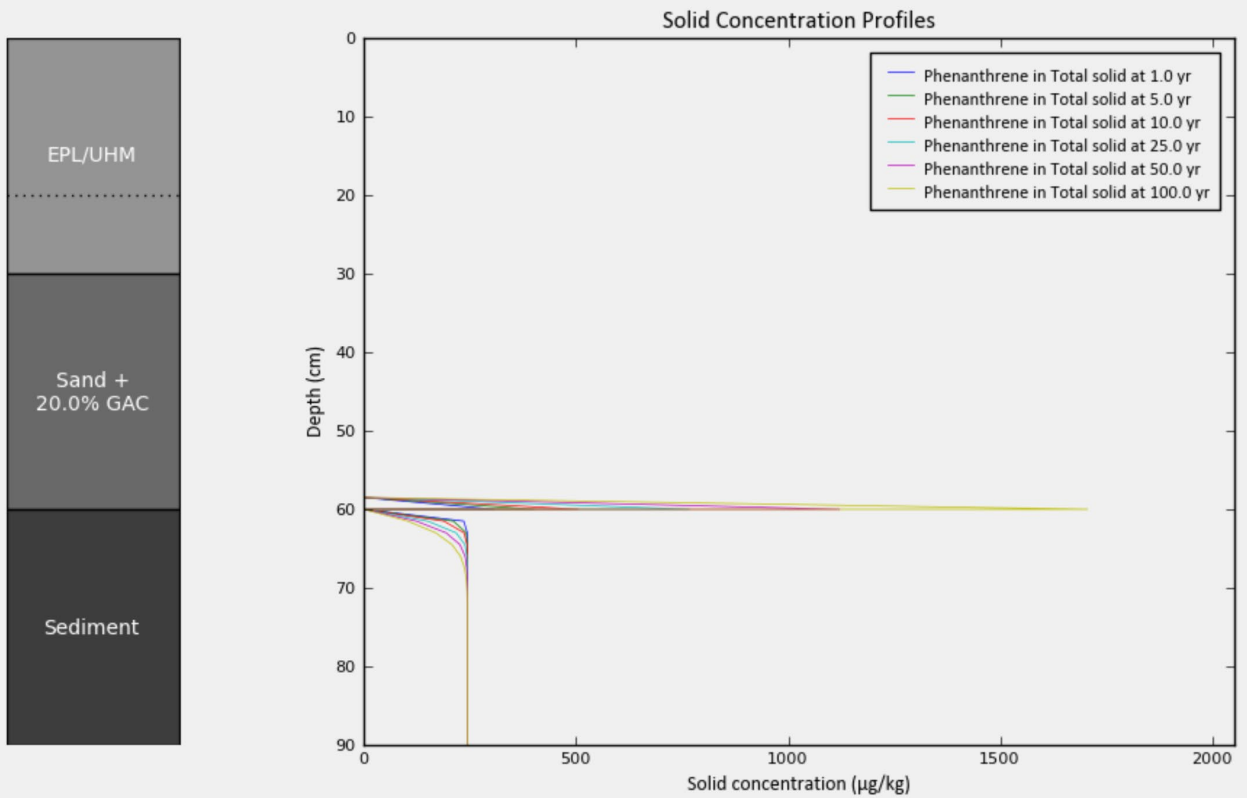

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB206 in Total solid at 1.0 yr
PCB206 in Total solid at 5.0 yr
PCB206 in Total solid at 10.0 yr
PCB206 in Total solid at 25.0 yr
PCB206 in Total solid at 50.0 yr
PCB206 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
10
20
30
40
50
60
70
80
90
0
20
40
60
80

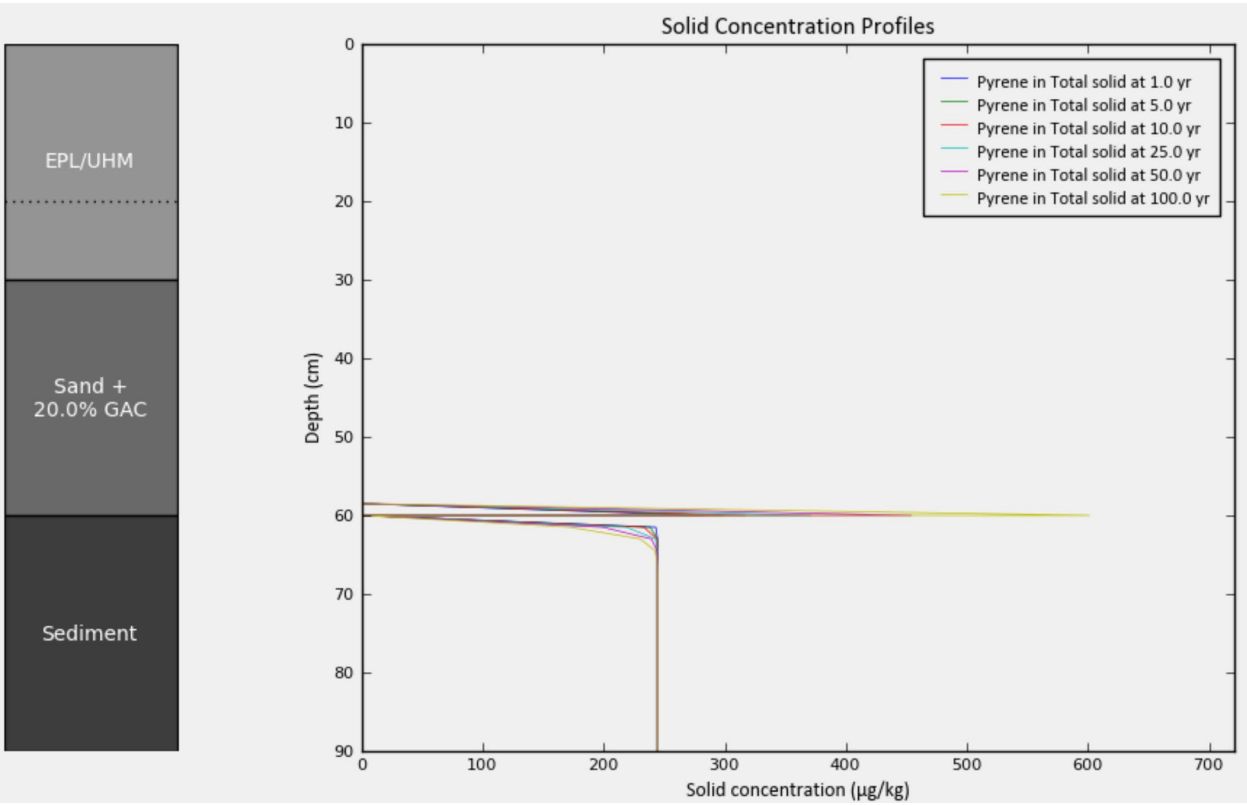

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
PCB209 in Total solid at 1.0 yr
PCB209 in Total solid at 5.0 yr
PCB209 in Total solid at 10.0 yr
PCB209 in Total solid at 25.0 yr
PCB209 in Total solid at 50.0 yr
PCB209 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

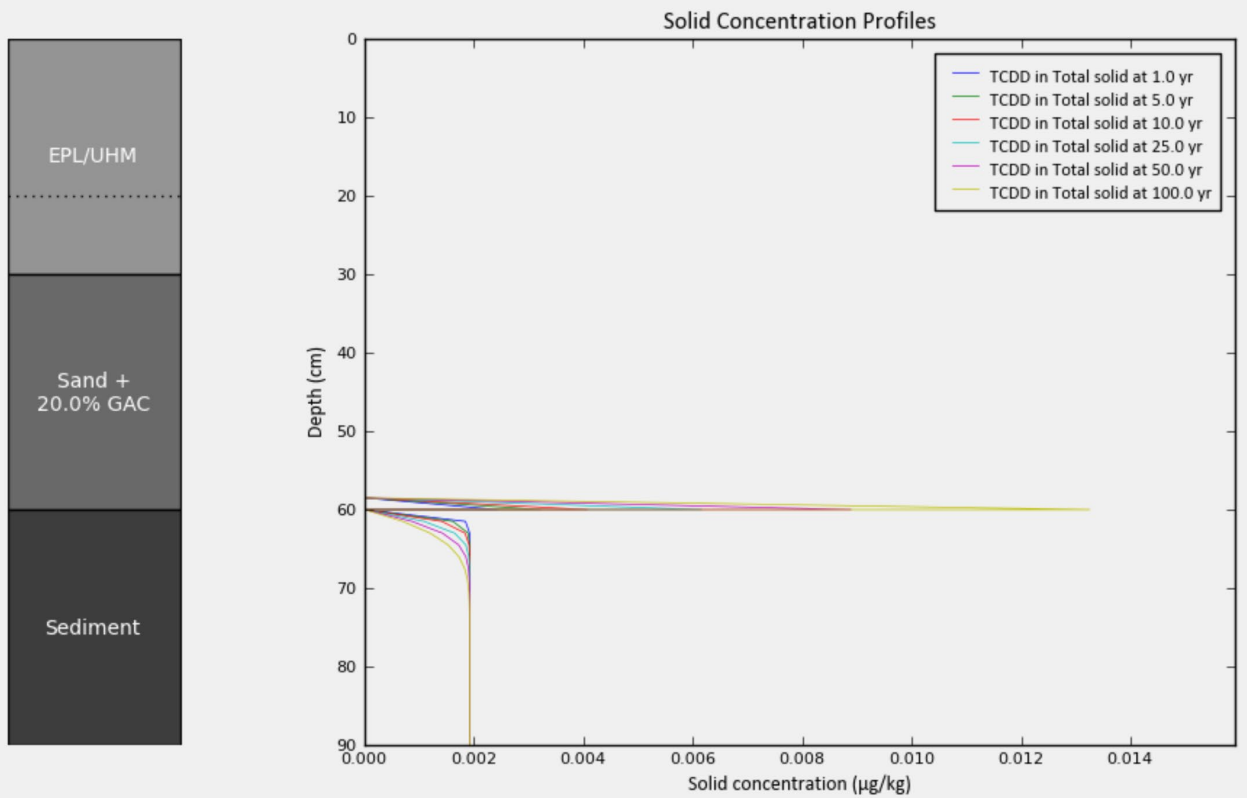

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
PeCDD in Total solid at 1.0 yr
PeCDD in Total solid at 5.0 yr
PeCDD in Total solid at 10.0 yr
PeCDD in Total solid at 25.0 yr
PeCDD in Total solid at 50.0 yr
PeCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

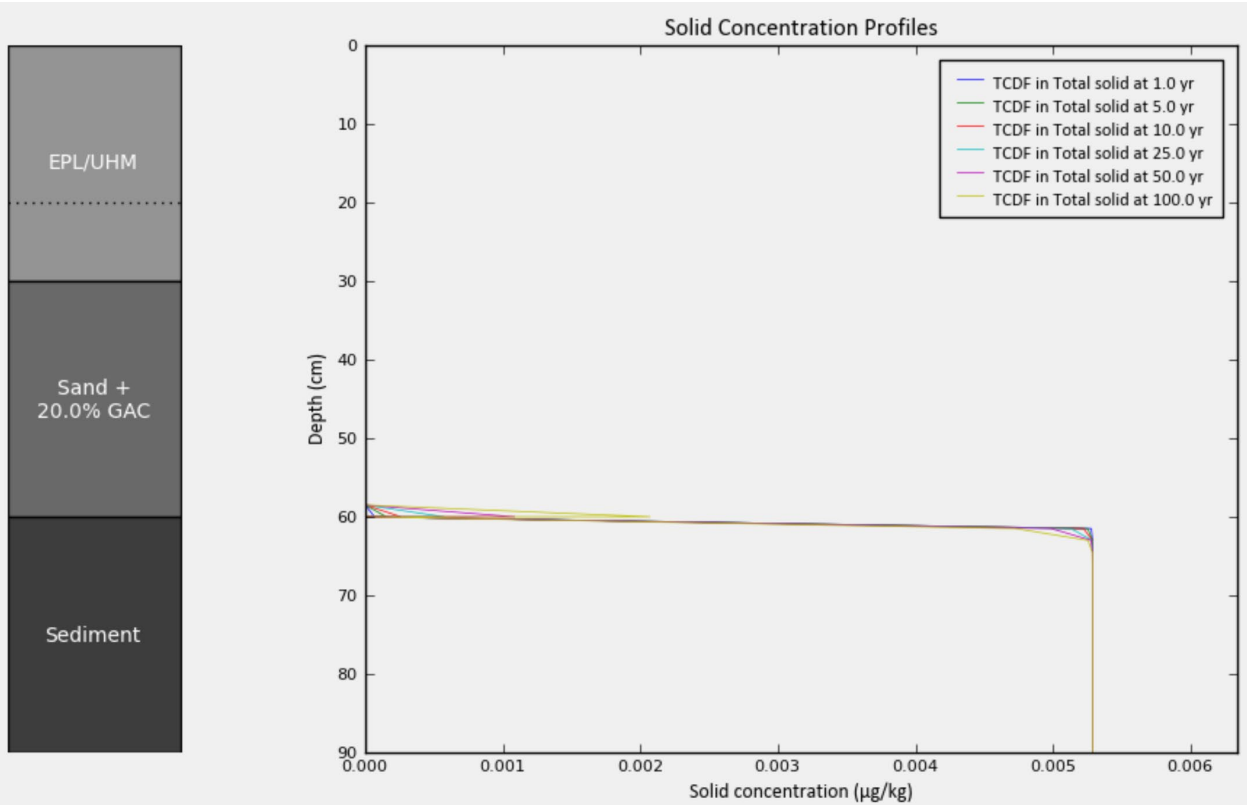

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PeCDF in Total solid at 1.0 yr
PeCDF in Total solid at 5.0 yr
PeCDF in Total solid at 10.0 yr
PeCDF in Total solid at 25.0 yr
PeCDF in Total solid at 50.0 yr
PeCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.00
0.01
0.02
0.03
0.04
0.05
Solid concentration (µg/kg)

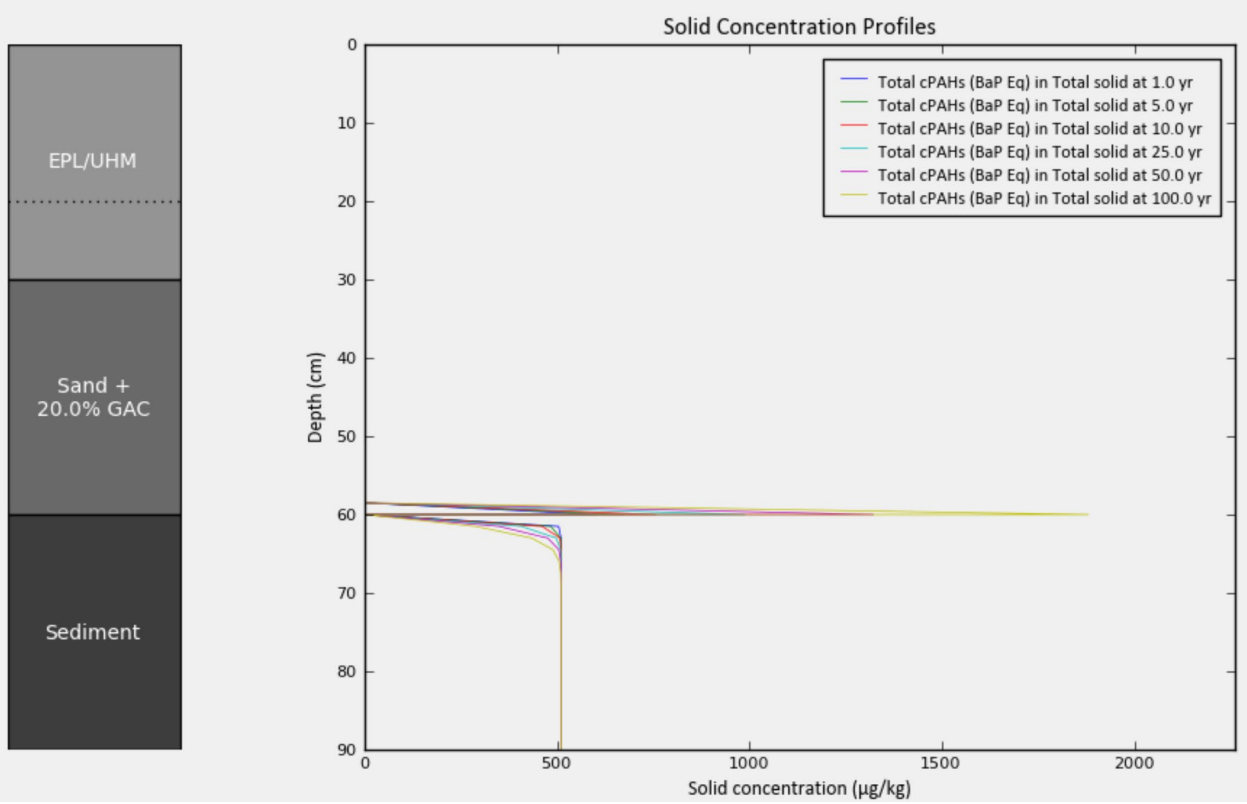

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Pentachlorophenol in Total solid at 1.0 yr
Pentachlorophenol in Total solid at 5.0 yr
Pentachlorophenol in Total solid at 10.0 yr
Pentachlorophenol in Total solid at 25.0 yr
Pentachlorophenol in Total solid at 50.0 yr
Pentachlorophenol in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.5
1.0
1.5
2.0
1e4
Solid concentration (µg/kg)

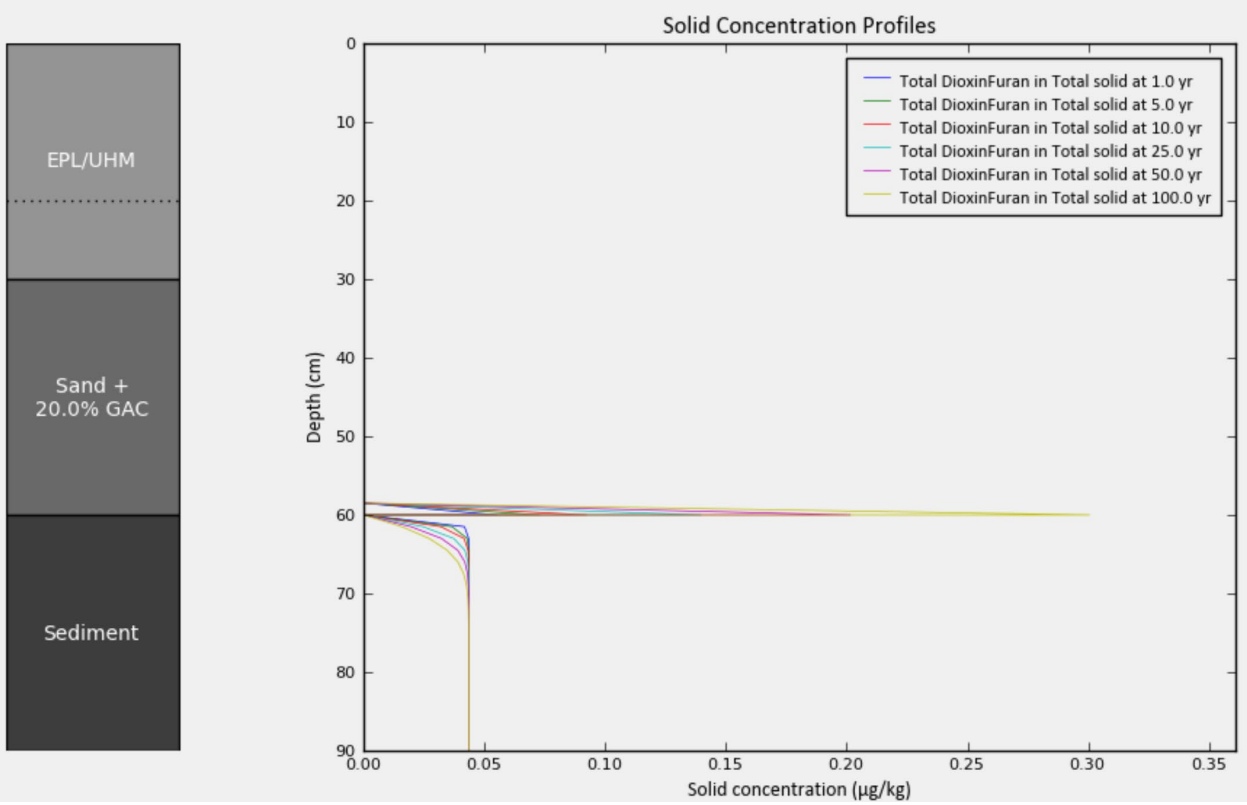

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Phenanthrene in Total solid at 1.0 yr
Phenanthrene in Total solid at 5.0 yr
Phenanthrene in Total solid at 10.0 yr
Phenanthrene in Total solid at 25.0 yr
Phenanthrene in Total solid at 50.0 yr
Phenanthrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
500
1000
1500
2000
Solid concentration (µg/kg)

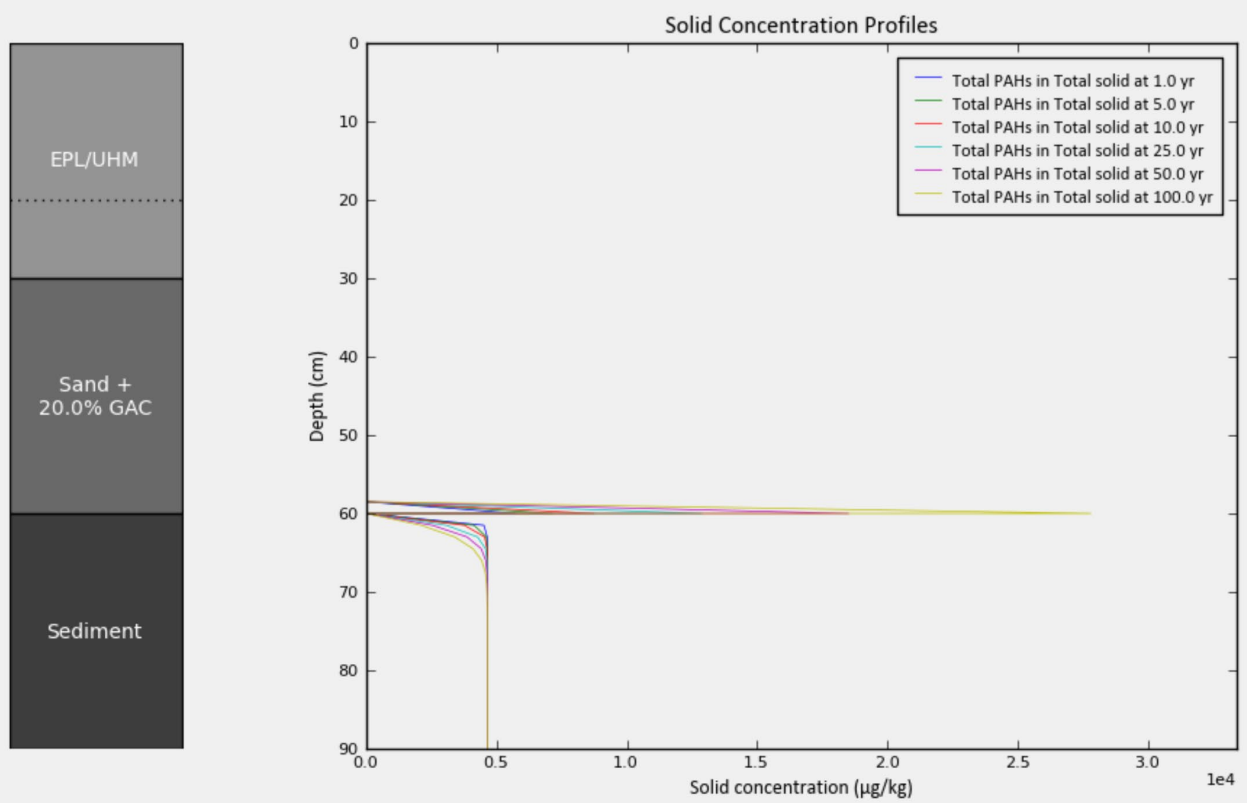

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Pyrene in Total solid at 1.0 yr
Pyrene in Total solid at 5.0 yr
Pyrene in Total solid at 10.0 yr
Pyrene in Total solid at 25.0 yr
Pyrene in Total solid at 50.0 yr
Pyrene in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
100
200
300
400
500
600
700
Solid concentration (µg/kg)

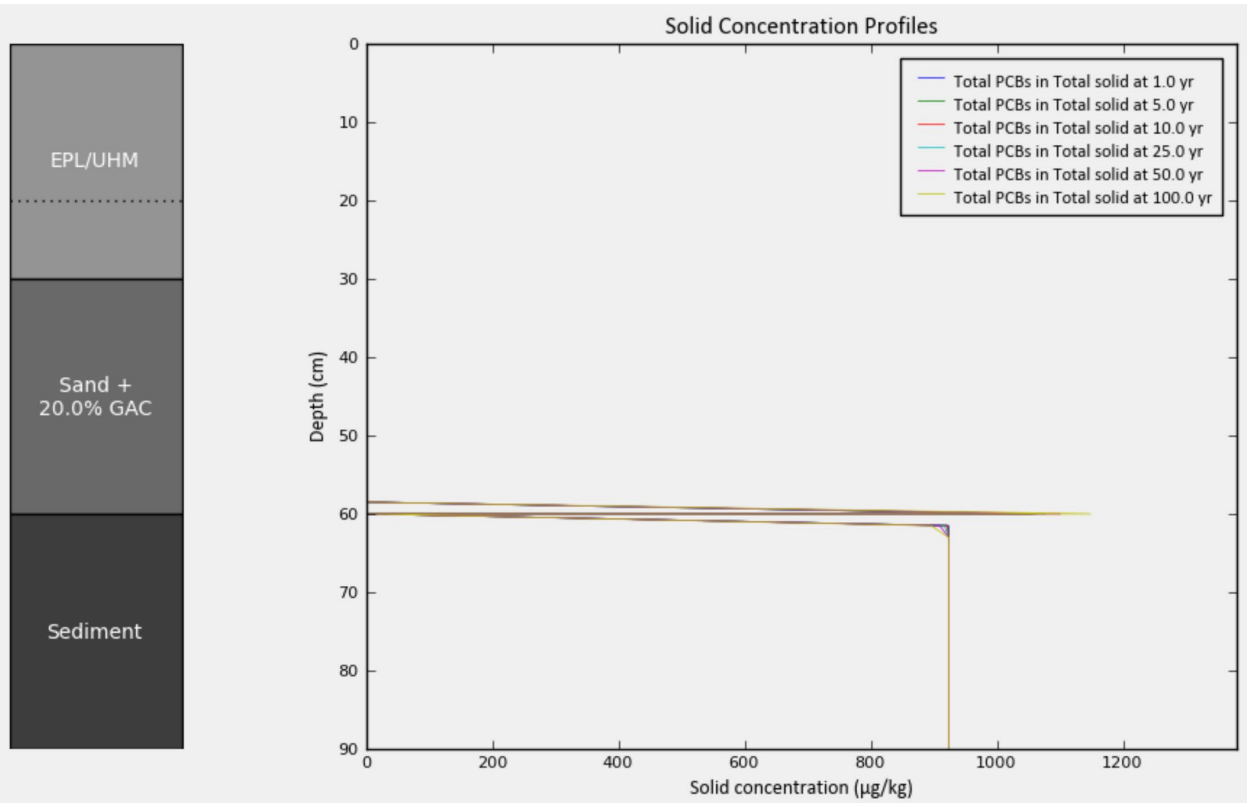

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
TCDD in Total solid at 1.0 yr
TCDD in Total solid at 5.0 yr
TCDD in Total solid at 10.0 yr
TCDD in Total solid at 25.0 yr
TCDD in Total solid at 50.0 yr
TCDD in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.002
0.004
0.006
0.008
0.010
0.012
0.014
Solid concentration (µg/kg)

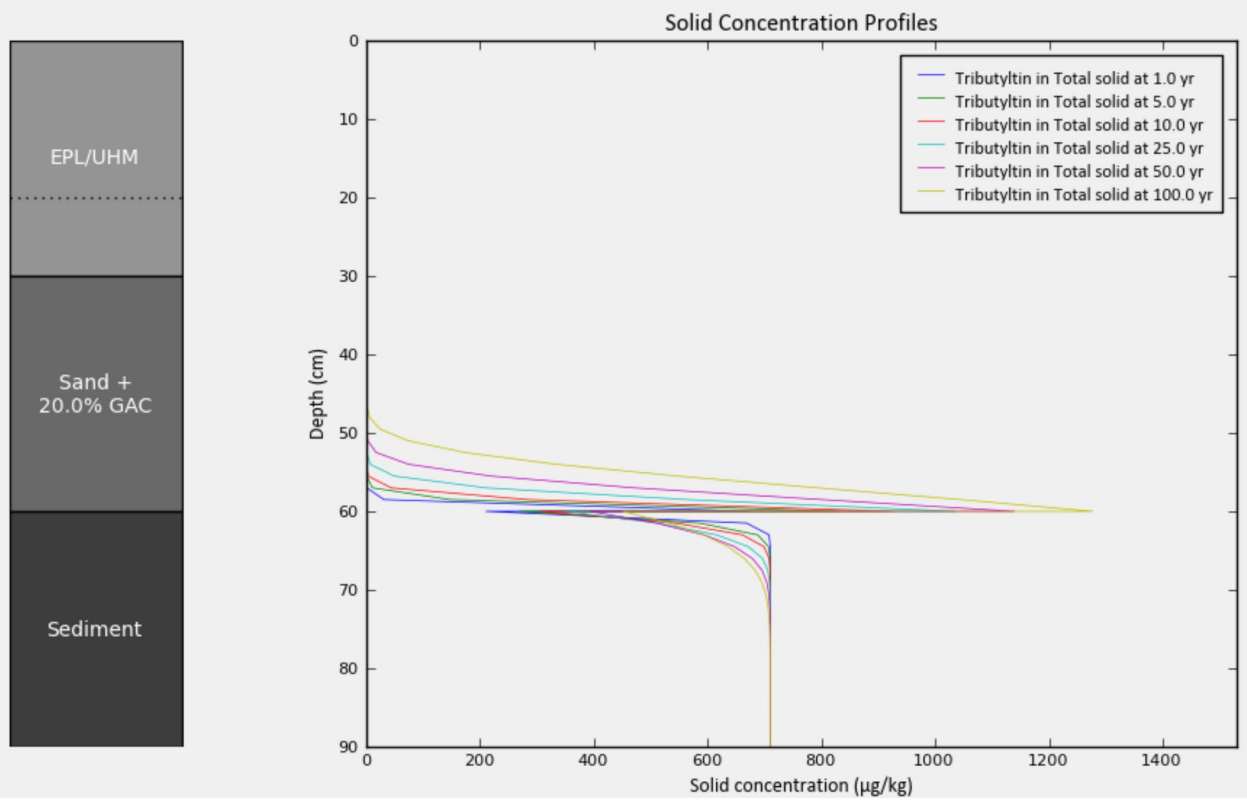

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
TCDF in Total solid at 1.0 yr
TCDF in Total solid at 5.0 yr
TCDF in Total solid at 10.0 yr
TCDF in Total solid at 25.0 yr
TCDF in Total solid at 50.0 yr
TCDF in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Solid concentration (µg/kg)

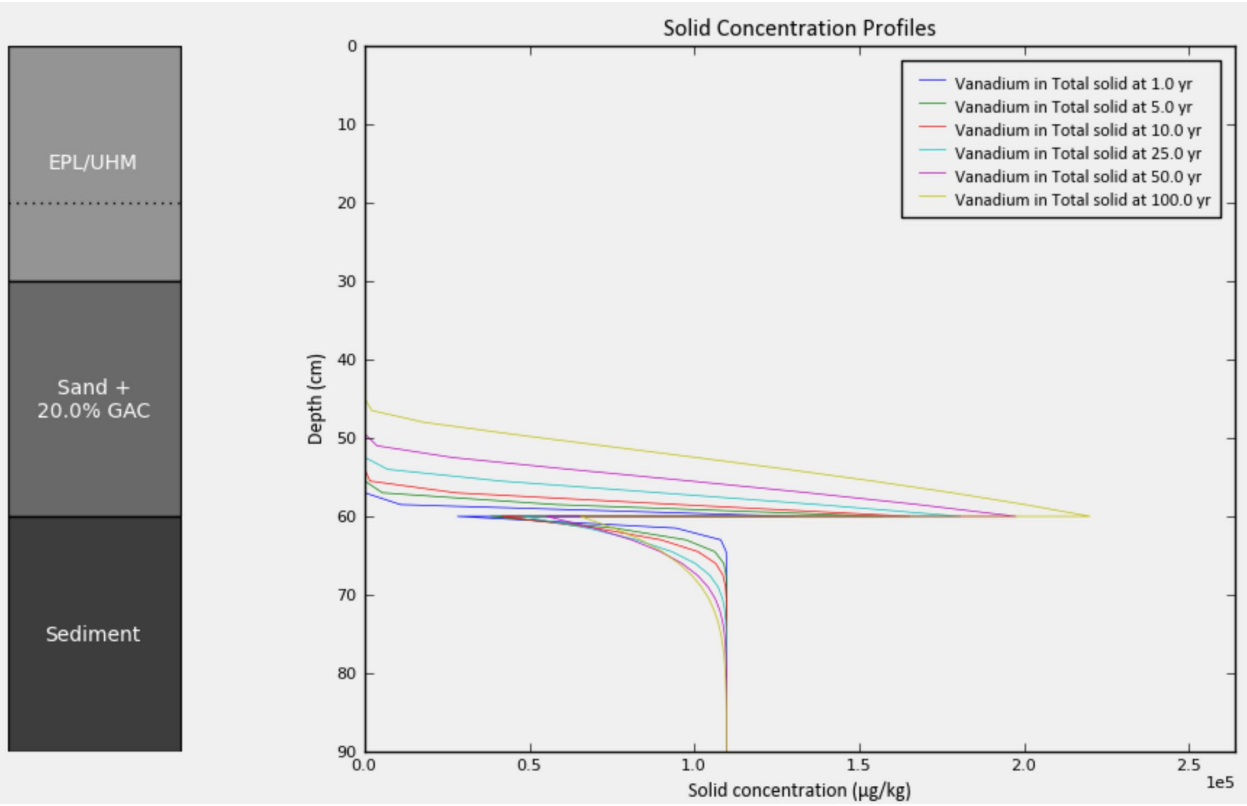

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Total cPAHs (BaP Eq) in Total solid at 1.0 yr
Total cPAHs (BaP Eq) in Total solid at 5.0 yr
Total cPAHs (BaP Eq) in Total solid at 10.0 yr
Total cPAHs (BaP Eq) in Total solid at 25.0 yr
Total cPAHs (BaP Eq) in Total solid at 50.0 yr
Total cPAHs (BaP Eq) in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
500
1000
1500
2000
Solid concentration (µg/kg)

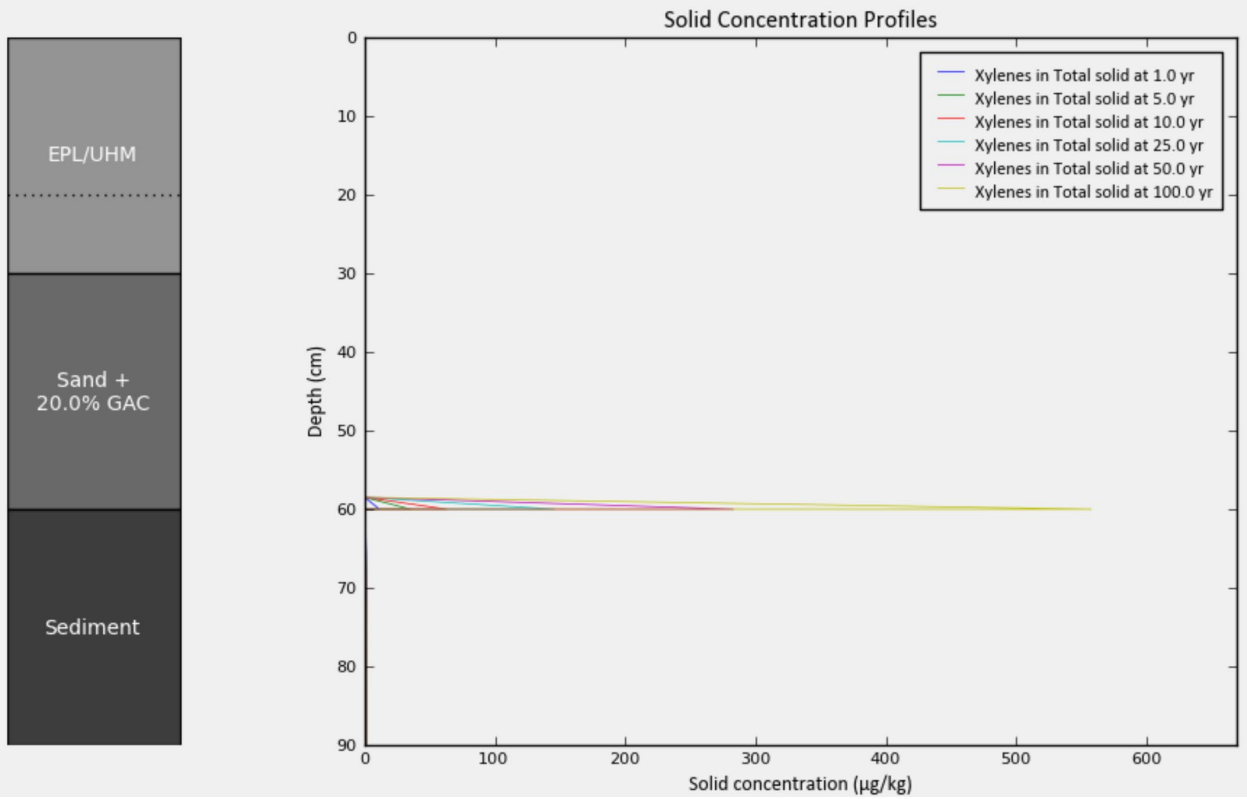

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Total DioxinFuran in Total solid at 1.0 yr
Total DioxinFuran in Total solid at 5.0 yr
Total DioxinFuran in Total solid at 10.0 yr
Total DioxinFuran in Total solid at 25.0 yr
Total DioxinFuran in Total solid at 50.0 yr
Total DioxinFuran in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
Solid concentration (µg/kg)

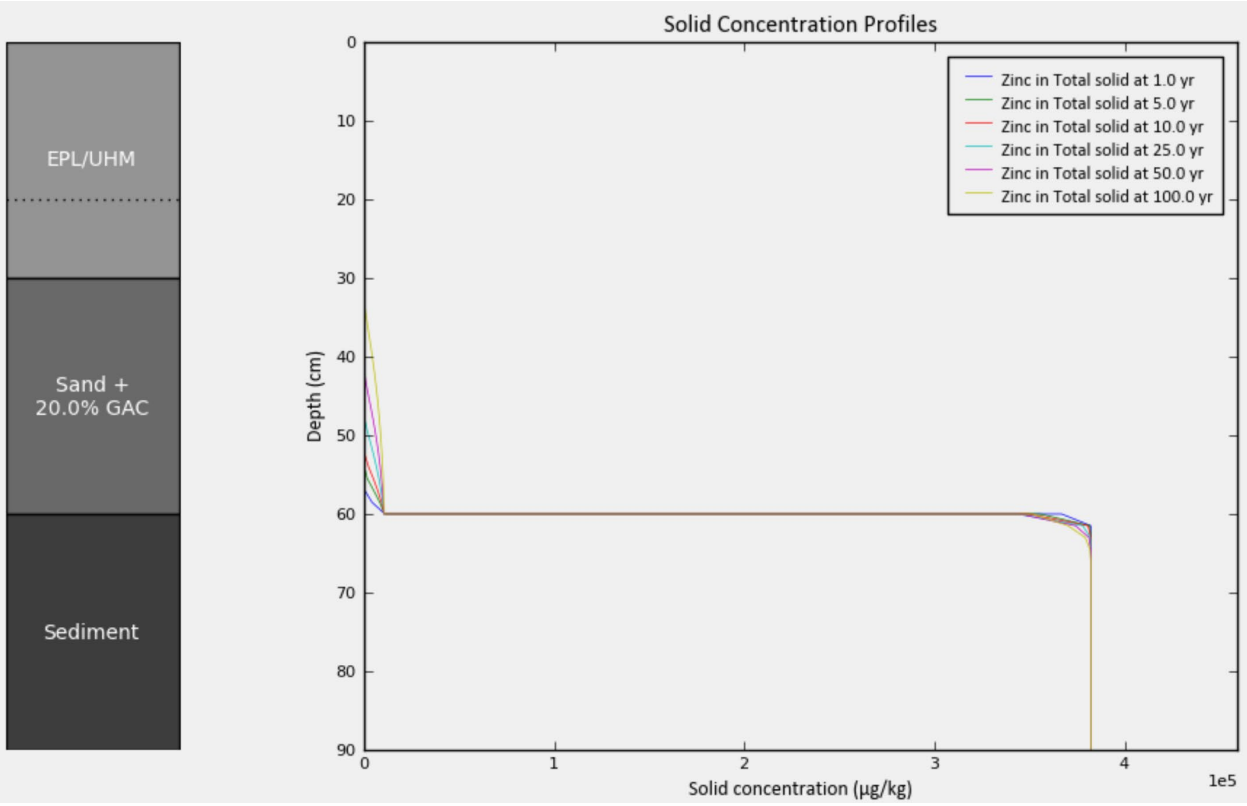

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Total PAHs in Total solid at 1.0 yr
Total PAHs in Total solid at 5.0 yr
Total PAHs in Total solid at 10.0 yr
Total PAHs in Total solid at 25.0 yr
Total PAHs in Total solid at 50.0 yr
Total PAHs in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1e4
Solid concentration (µg/kg)


EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Total PCBs in Total solid at 1.0 yr
Total PCBs in Total solid at 5.0 yr
Total PCBs in Total solid at 10.0 yr
Total PCBs in Total solid at 25.0 yr
Total PCBs in Total solid at 50.0 yr
Total PCBs in Total solid at 100.0 yr
Depth (cm)
0
10
20
30
40
50
60
70
80
90
0
200
400
600
800
1000
1200
Solid concentration (µg/kg)


EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Tributyltin in Total solid at 1.0 yr
Tributyltin in Total solid at 5.0 yr
Tributyltin in Total solid at 10.0 yr
Tributyltin in Total solid at 25.0 yr
Tributyltin in Total solid at 50.0 yr
Tributyltin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

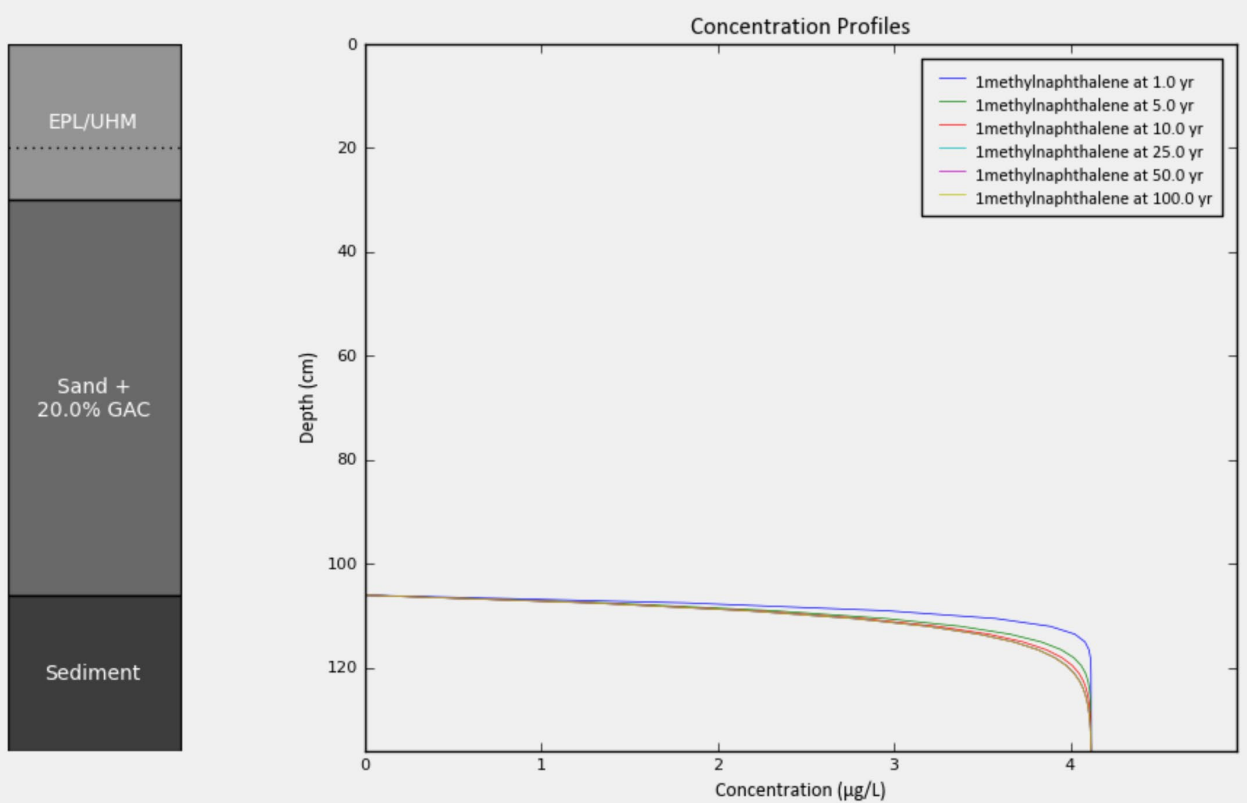

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Vanadium in Total solid at 1.0 yr
Vanadium in Total solid at 5.0 yr
Vanadium in Total solid at 10.0 yr
Vanadium in Total solid at 25.0 yr
Vanadium in Total solid at 50.0 yr
Vanadium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

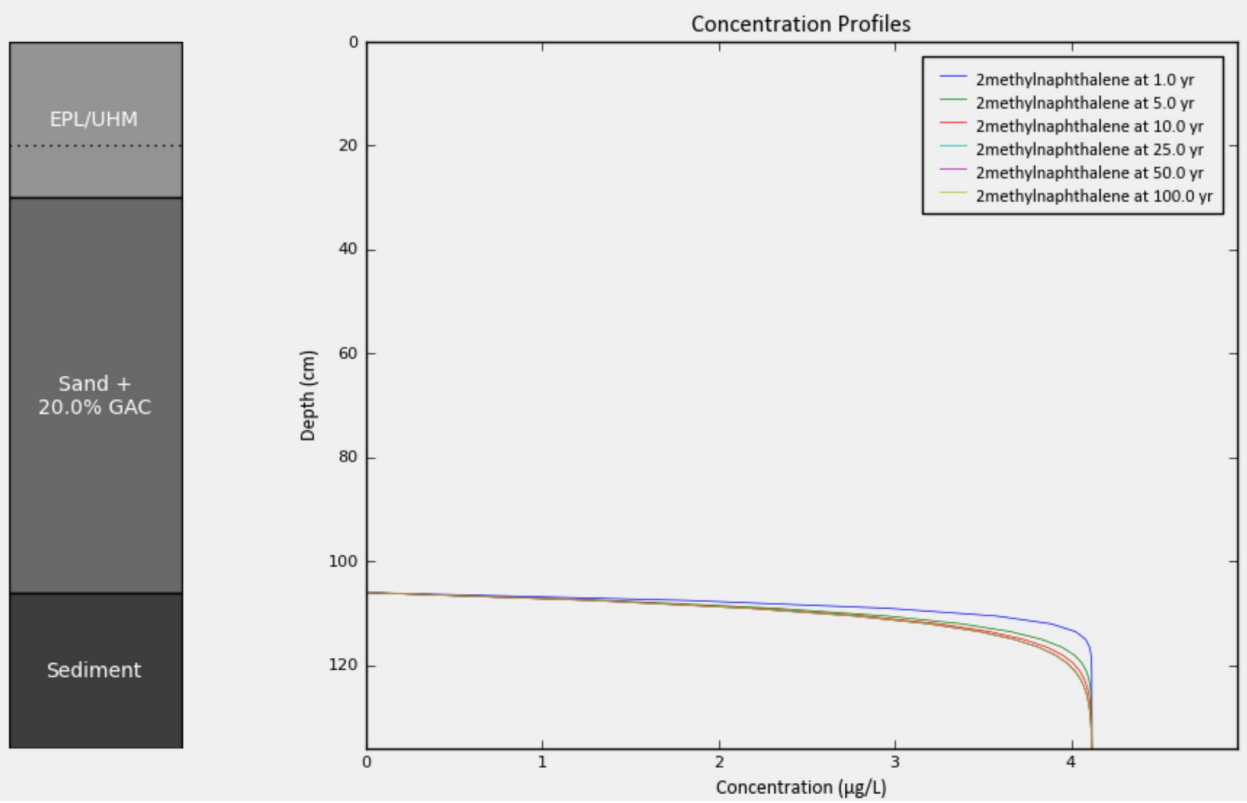

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Xylenes in Total solid at 1.0 yr
Xylenes in Total solid at 5.0 yr
Xylenes in Total solid at 10.0 yr
Xylenes in Total solid at 25.0 yr
Xylenes in Total solid at 50.0 yr
Xylenes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

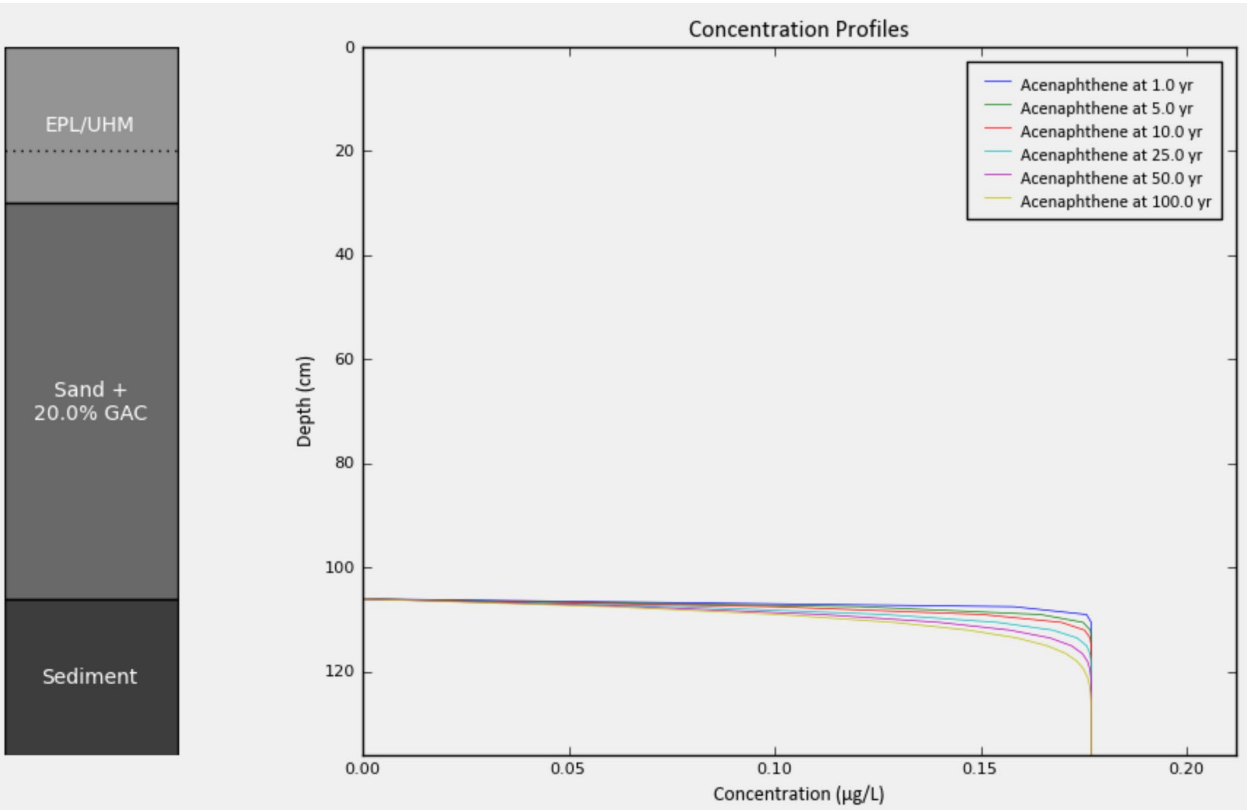

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Zinc in Total solid at 1.0 yr
Zinc in Total solid at 5.0 yr
Zinc in Total solid at 10.0 yr
Zinc in Total solid at 25.0 yr
Zinc in Total solid at 50.0 yr
Zinc in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

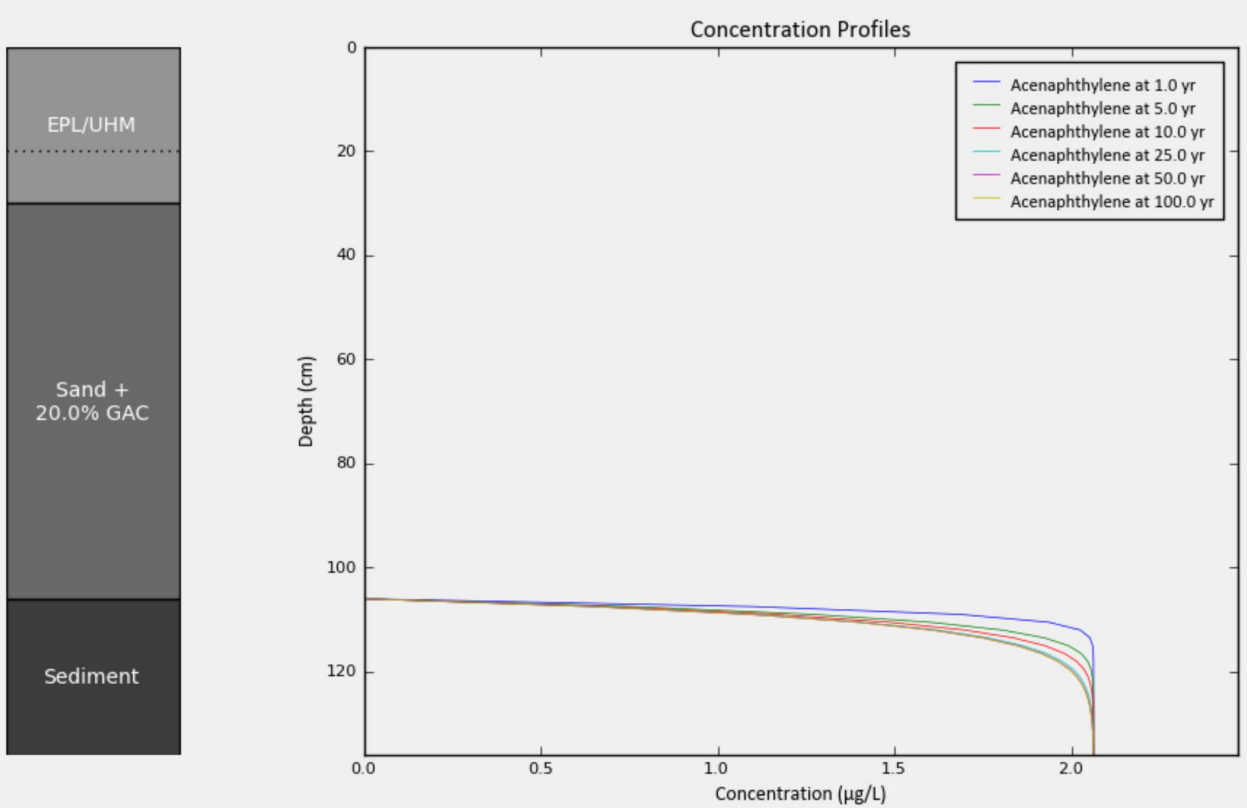
Cap Alternative 6: 76 cm of 20.0% GAC amended sand with 30 cm EPL/UHM

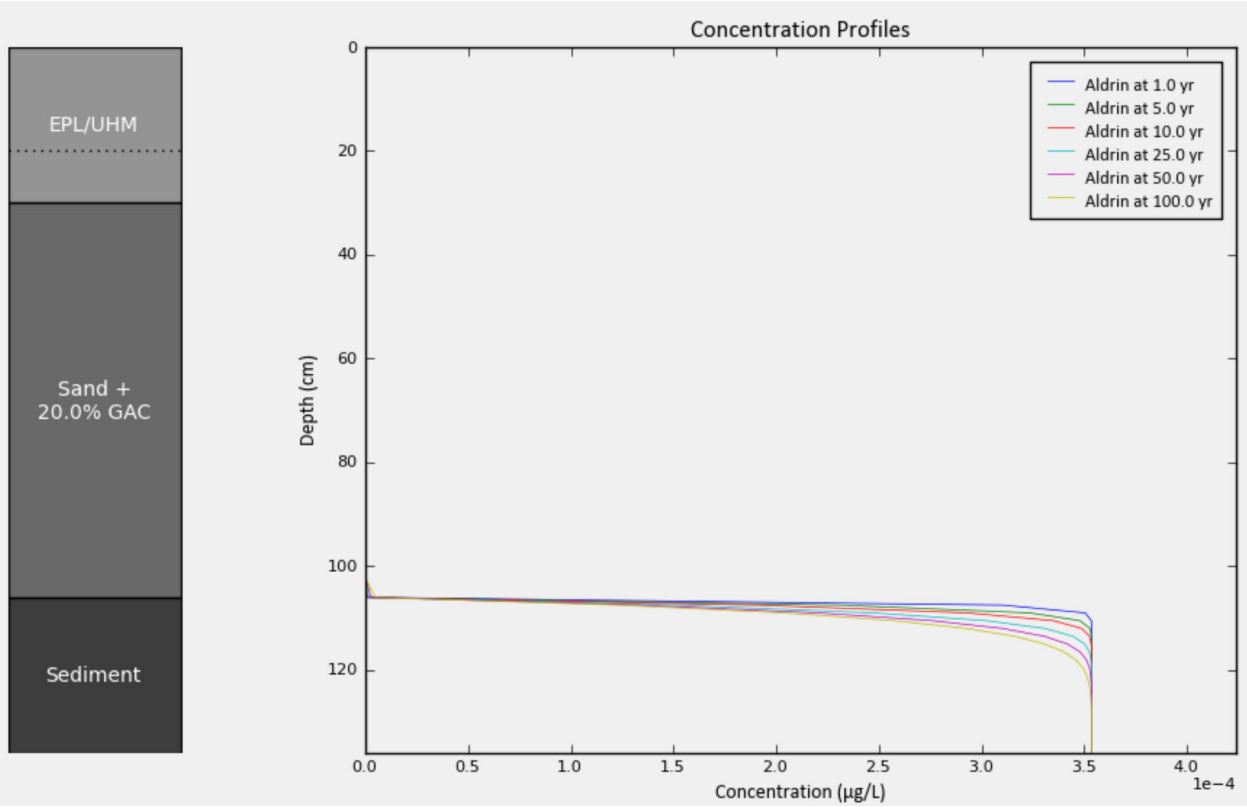
Porewater Concentration - Depth

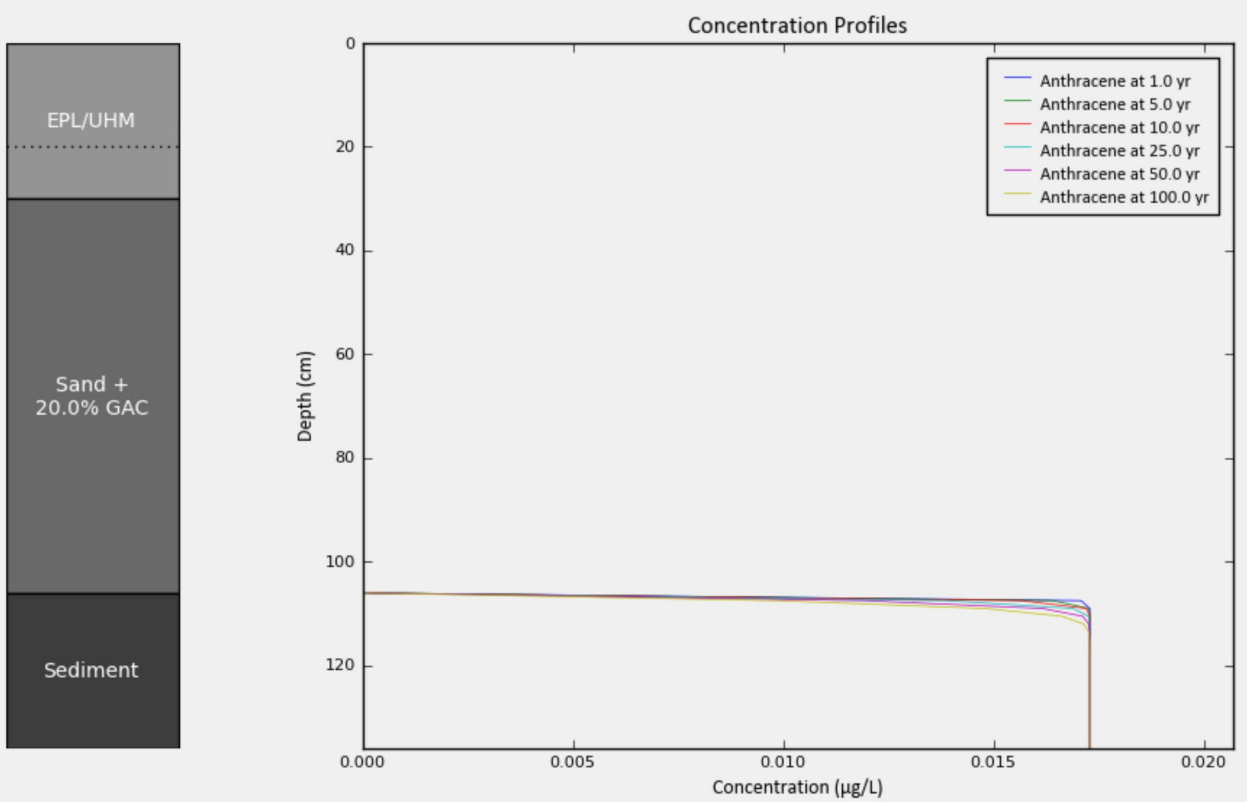


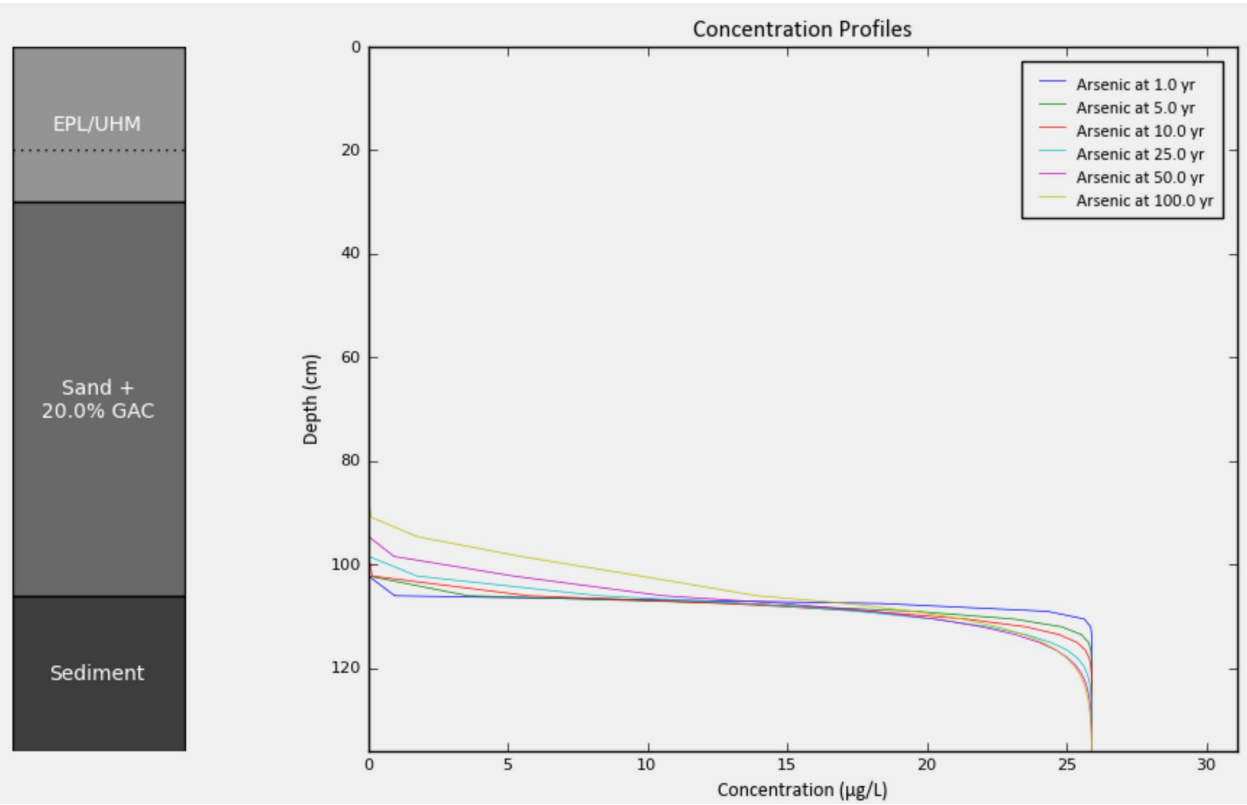

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
2methylnaphthalene at 1.0 yr
2methylnaphthalene at 5.0 yr
2methylnaphthalene at 10.0 yr
2methylnaphthalene at 25.0 yr
2methylnaphthalene at 50.0 yr
2methylnaphthalene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
Concentration (µg/L)

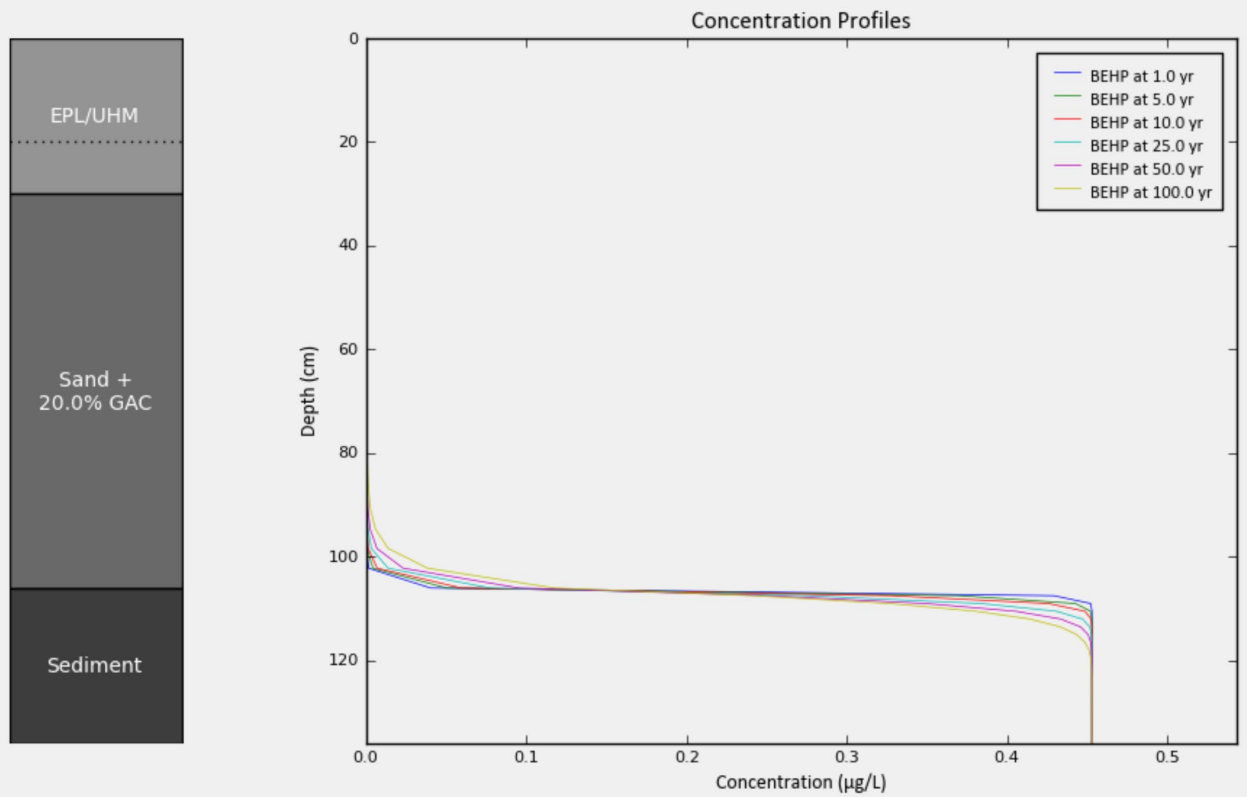

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Acenaphthene at 1.0 yr
Acenaphthene at 5.0 yr
Acenaphthene at 10.0 yr
Acenaphthene at 25.0 yr
Acenaphthene at 50.0 yr
Acenaphthene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.00
0.05
0.10
0.15
0.20
Concentration (µg/L)

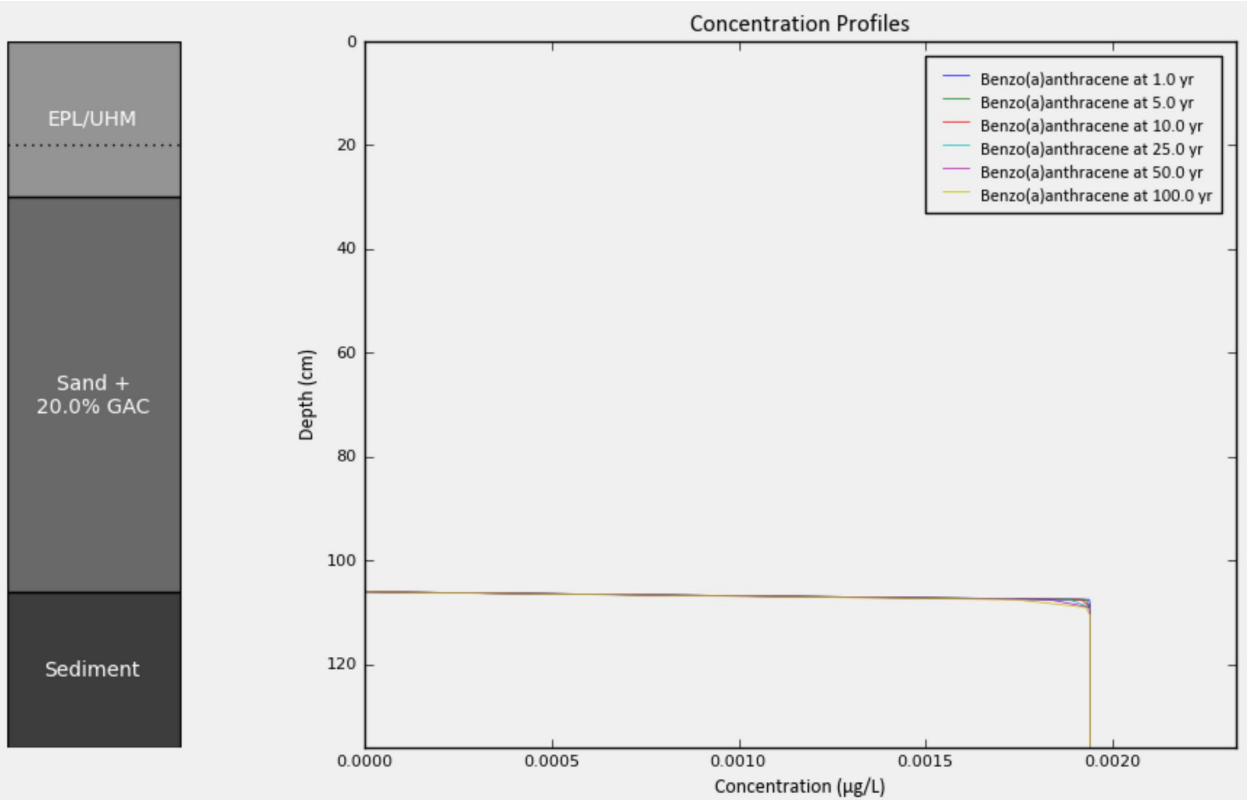

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Acenaphthylene at 1.0 yr
Acenaphthylene at 5.0 yr
Acenaphthylene at 10.0 yr
Acenaphthylene at 25.0 yr
Acenaphthylene at 50.0 yr
Acenaphthylene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
Concentration (µg/L)

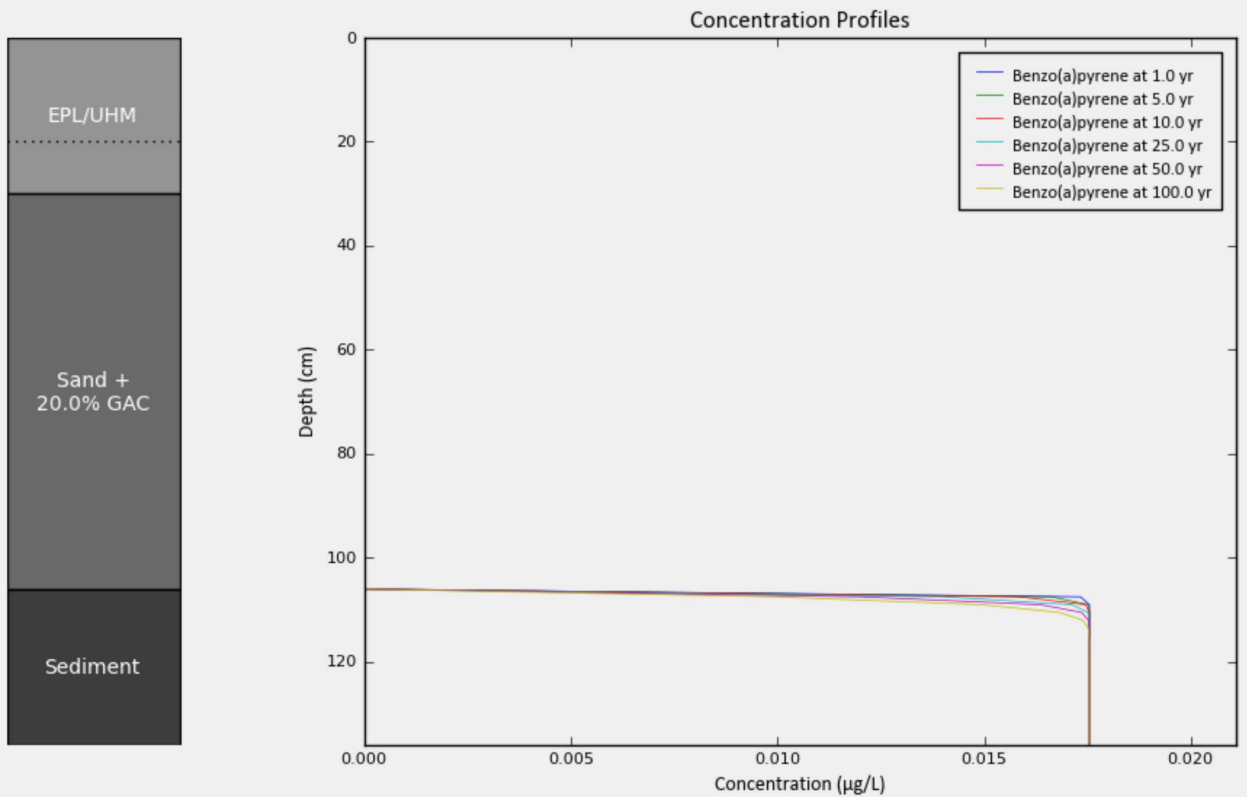

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Aldrin at 1.0 yr
Aldrin at 5.0 yr
Aldrin at 10.0 yr
Aldrin at 25.0 yr
Aldrin at 50.0 yr
Aldrin at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
1e−4
Concentration (µg/L)

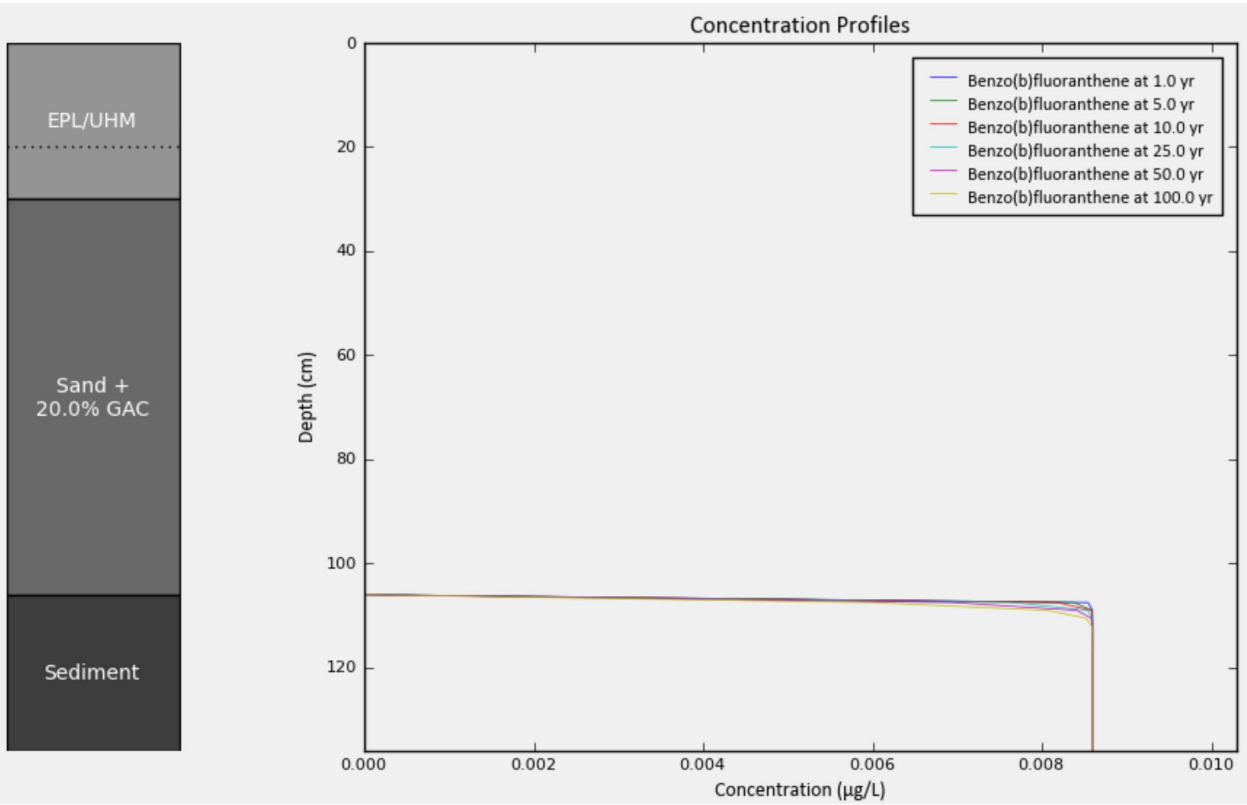

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Anthracene at 1.0 yr
Anthracene at 5.0 yr
Anthracene at 10.0 yr
Anthracene at 25.0 yr
Anthracene at 50.0 yr
Anthracene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

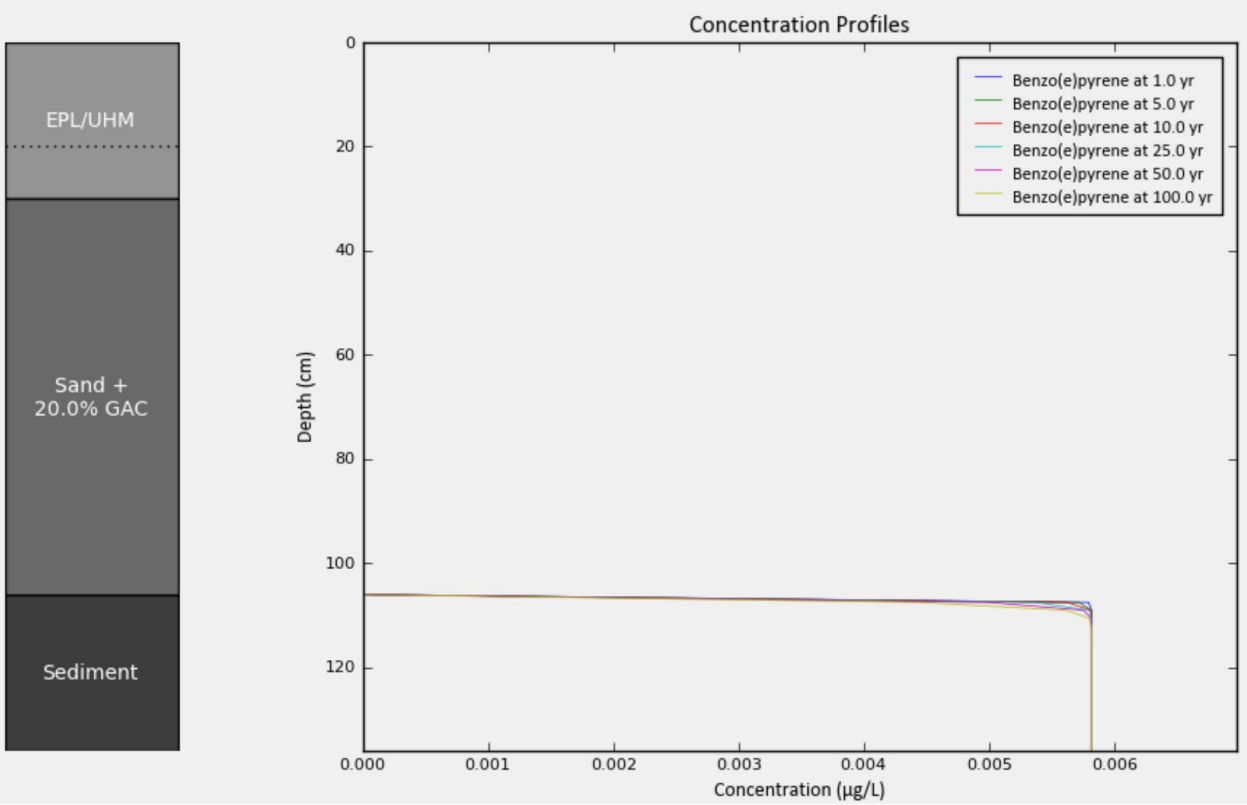

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Arsenic at 1.0 yr
Arsenic at 5.0 yr
Arsenic at 10.0 yr
Arsenic at 25.0 yr
Arsenic at 50.0 yr
Arsenic at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
5
10
15
20
25
30
Concentration (µg/L)

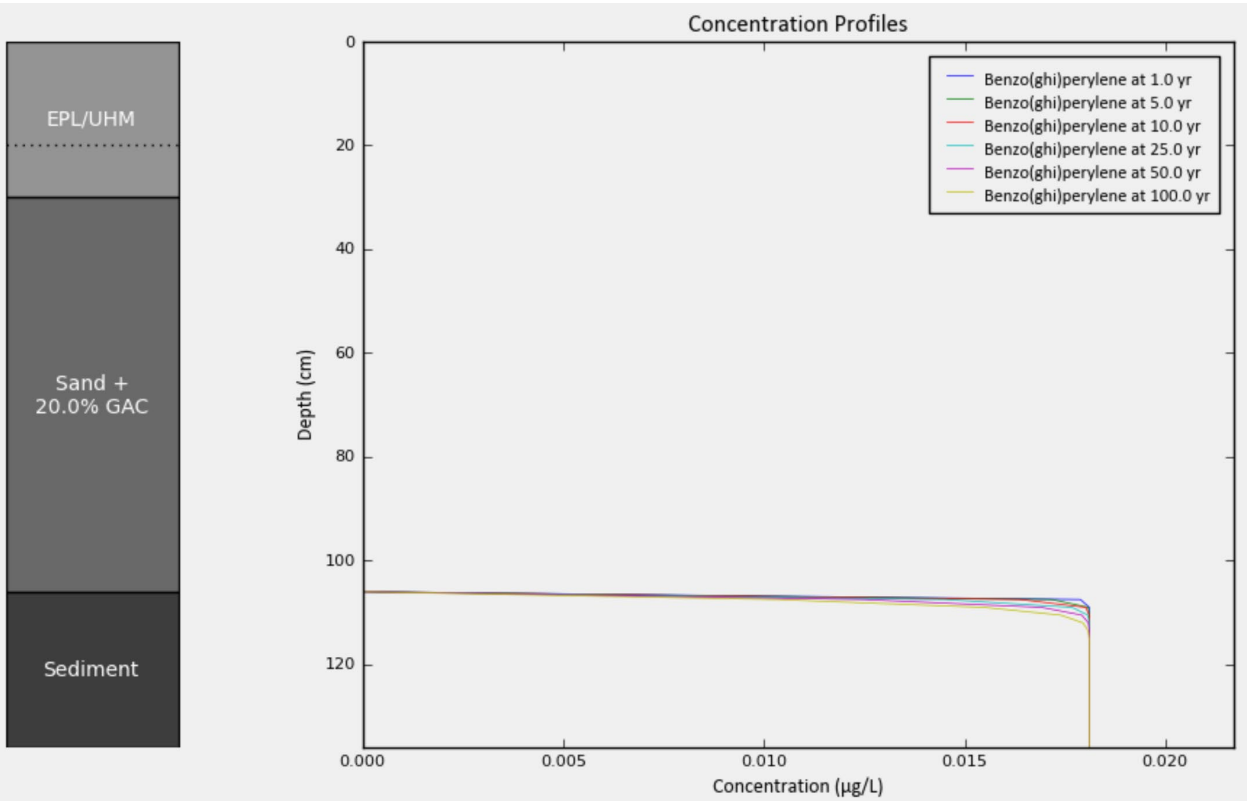

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
BEHP at 1.0 yr
BEHP at 5.0 yr
BEHP at 10.0 yr
BEHP at 25.0 yr
BEHP at 50.0 yr
BEHP at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.1
0.2
0.3
0.4
0.5
Concentration (µg/L)

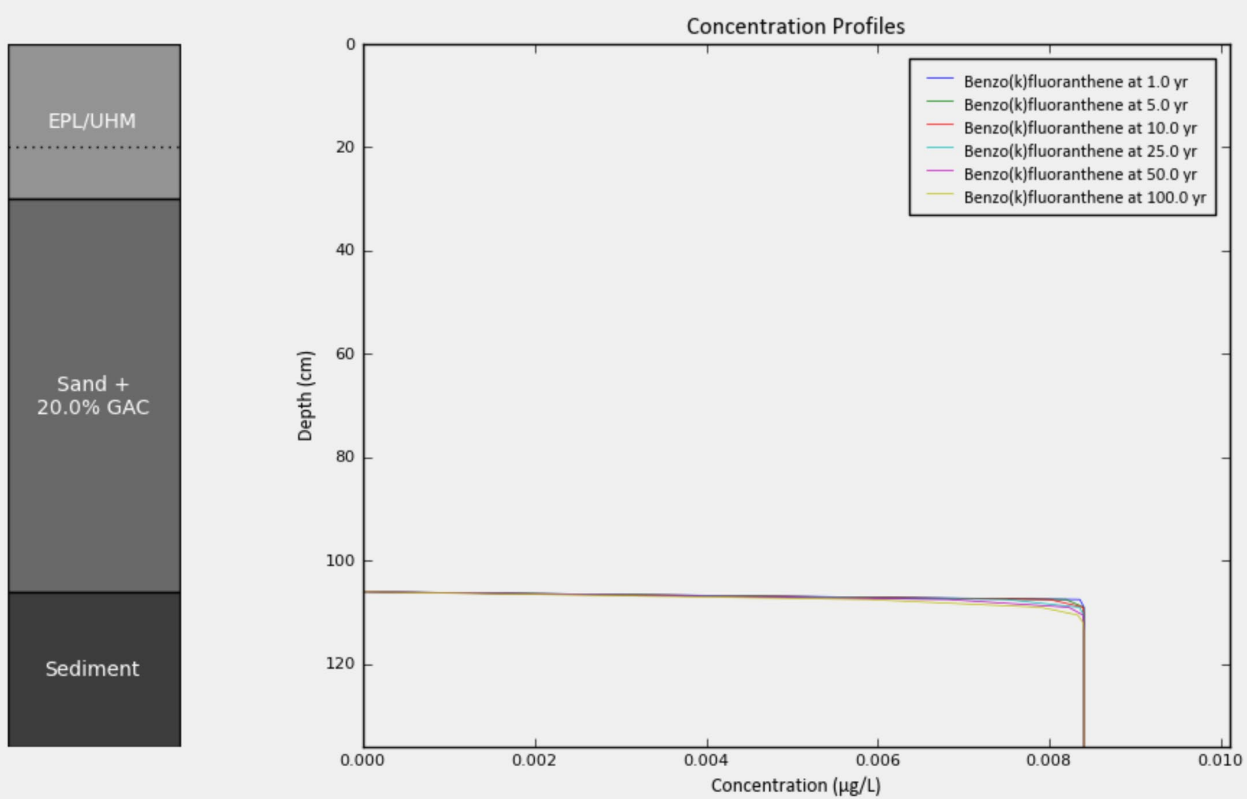

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Benzo(a)anthracene at 1.0 yr
Benzo(a)anthracene at 5.0 yr
Benzo(a)anthracene at 10.0 yr
Benzo(a)anthracene at 25.0 yr
Benzo(a)anthracene at 50.0 yr
Benzo(a)anthracene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

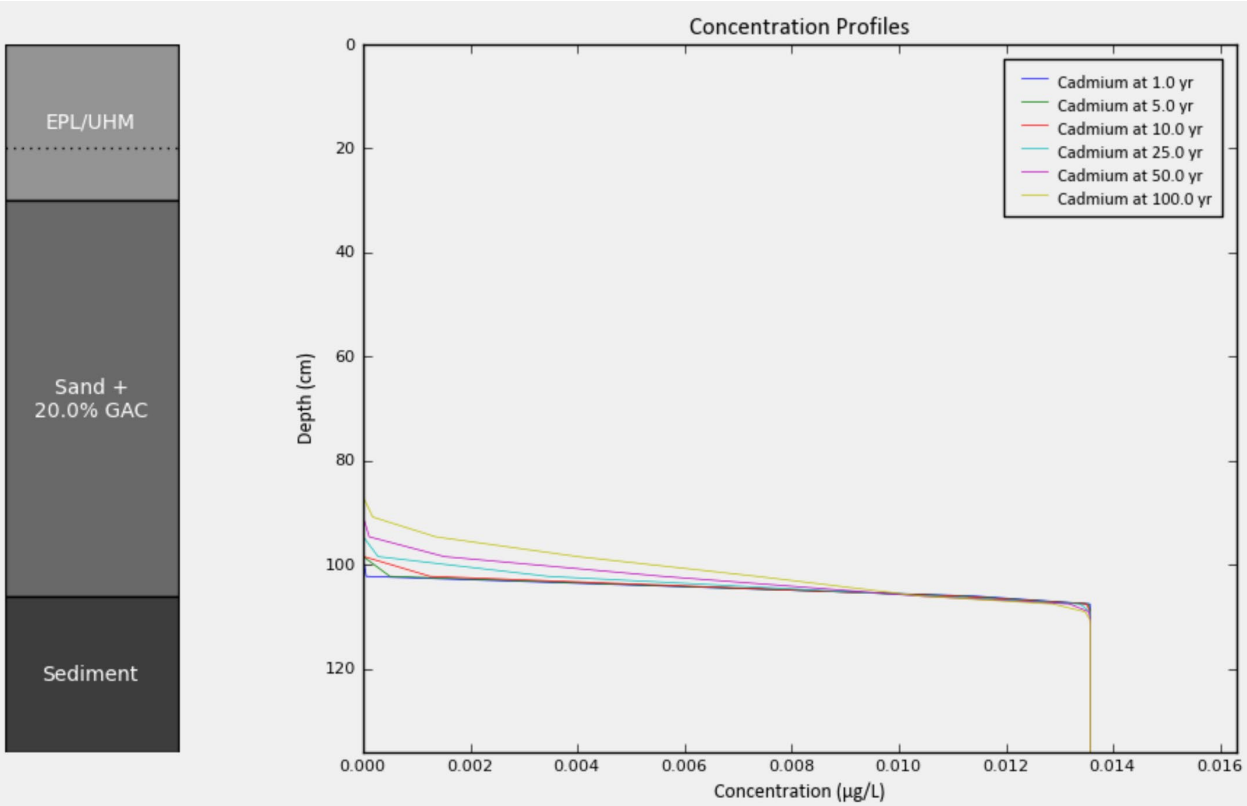

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Benzo(a)pyrene at 1.0 yr
Benzo(a)pyrene at 5.0 yr
Benzo(a)pyrene at 10.0 yr
Benzo(a)pyrene at 25.0 yr
Benzo(a)pyrene at 50.0 yr
Benzo(a)pyrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

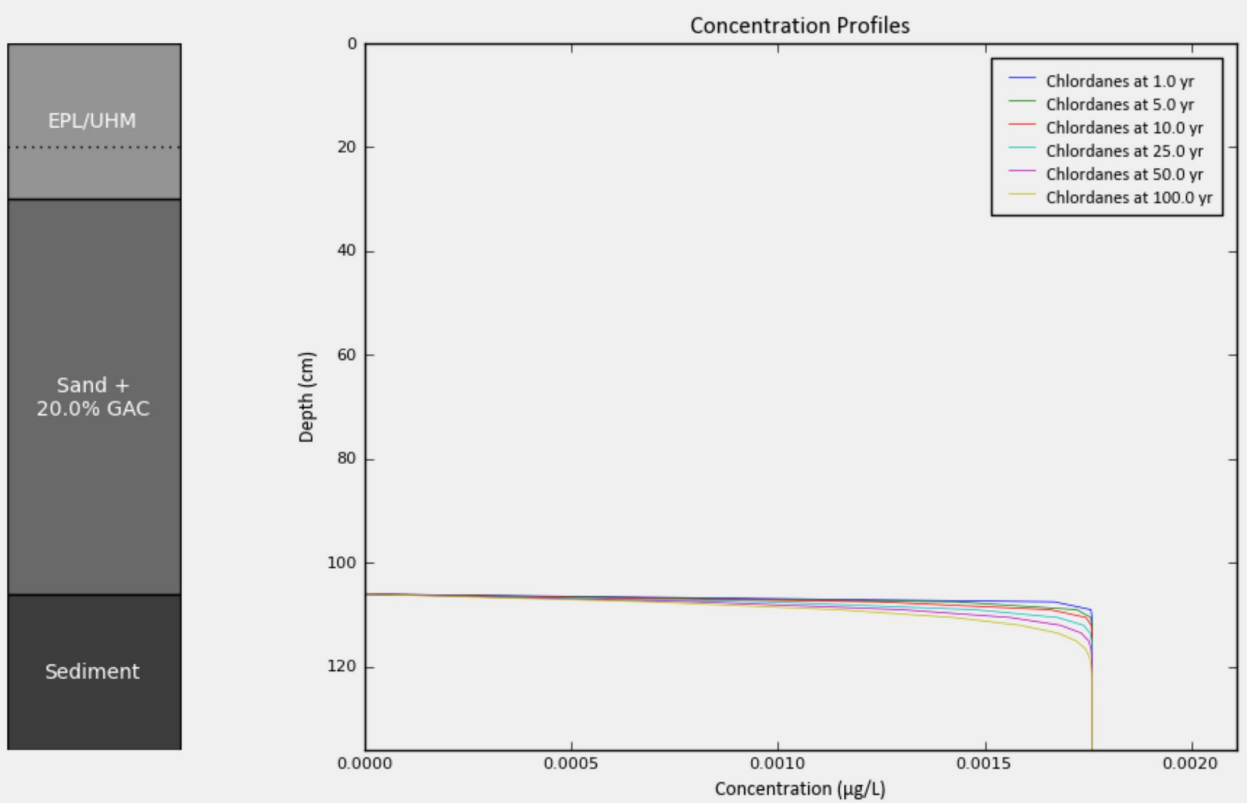

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Benzo(b)fluoranthene at 1.0 yr
Benzo(b)fluoranthene at 5.0 yr
Benzo(b)fluoranthene at 10.0 yr
Benzo(b)fluoranthene at 25.0 yr
Benzo(b)fluoranthene at 50.0 yr
Benzo(b)fluoranthene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
0.010
Concentration (µg/L)

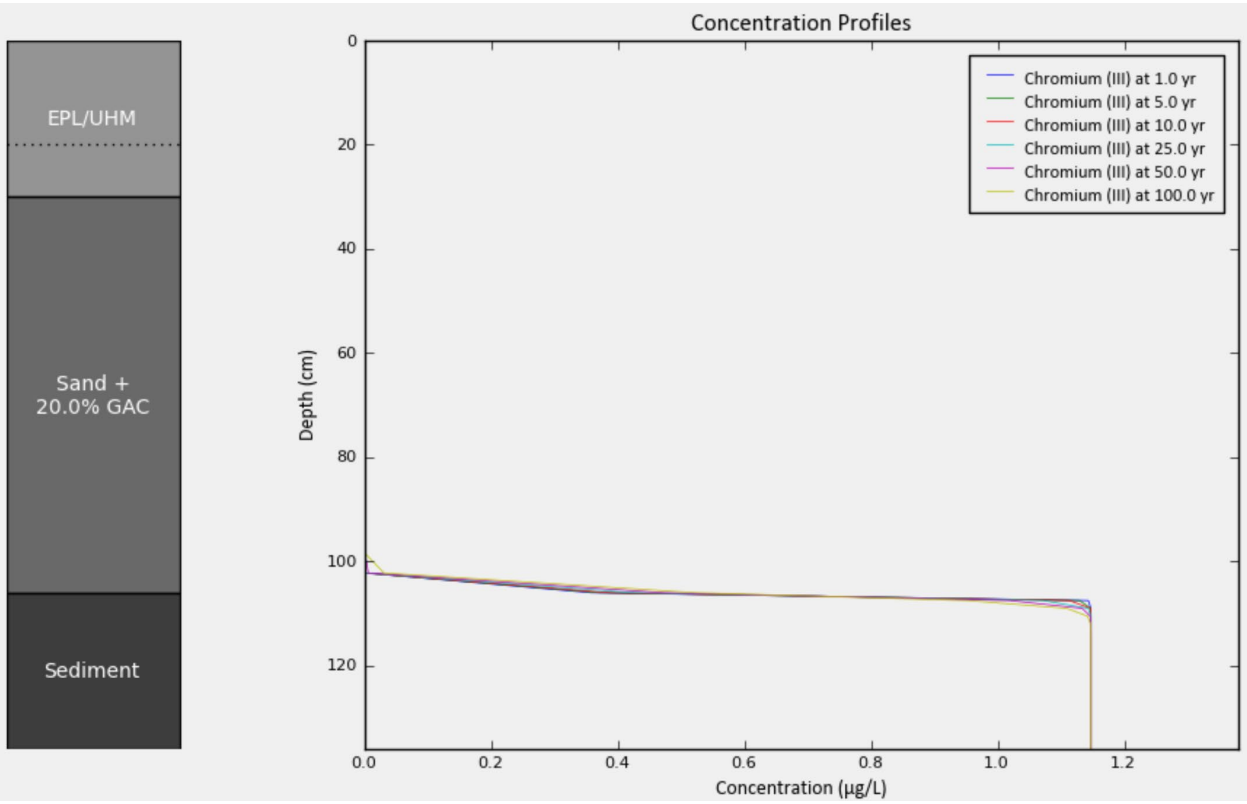

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Benzo(e)pyrene at 1.0 yr
Benzo(e)pyrene at 5.0 yr
Benzo(e)pyrene at 10.0 yr
Benzo(e)pyrene at 25.0 yr
Benzo(e)pyrene at 50.0 yr
Benzo(e)pyrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

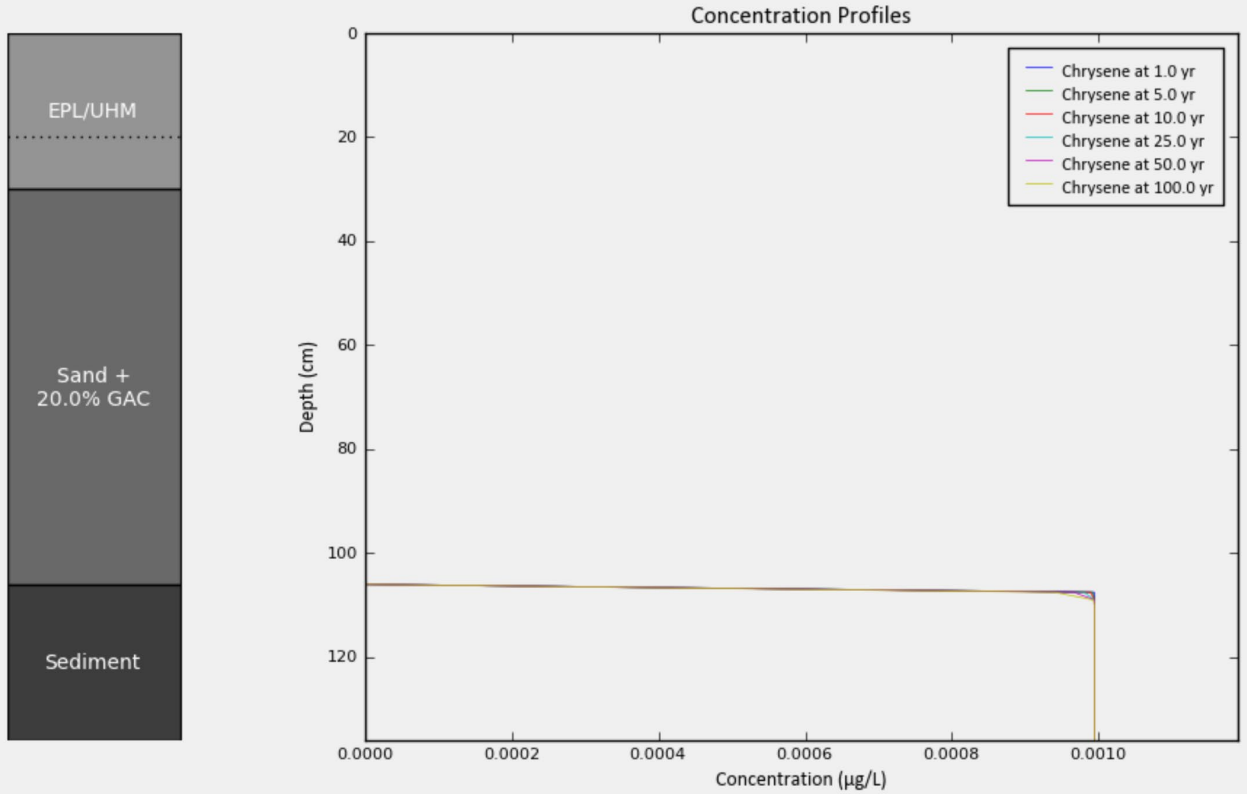

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Benzo(ghi)perylene at 1.0 yr
Benzo(ghi)perylene at 5.0 yr
Benzo(ghi)perylene at 10.0 yr
Benzo(ghi)perylene at 25.0 yr
Benzo(ghi)perylene at 50.0 yr
Benzo(ghi)perylene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

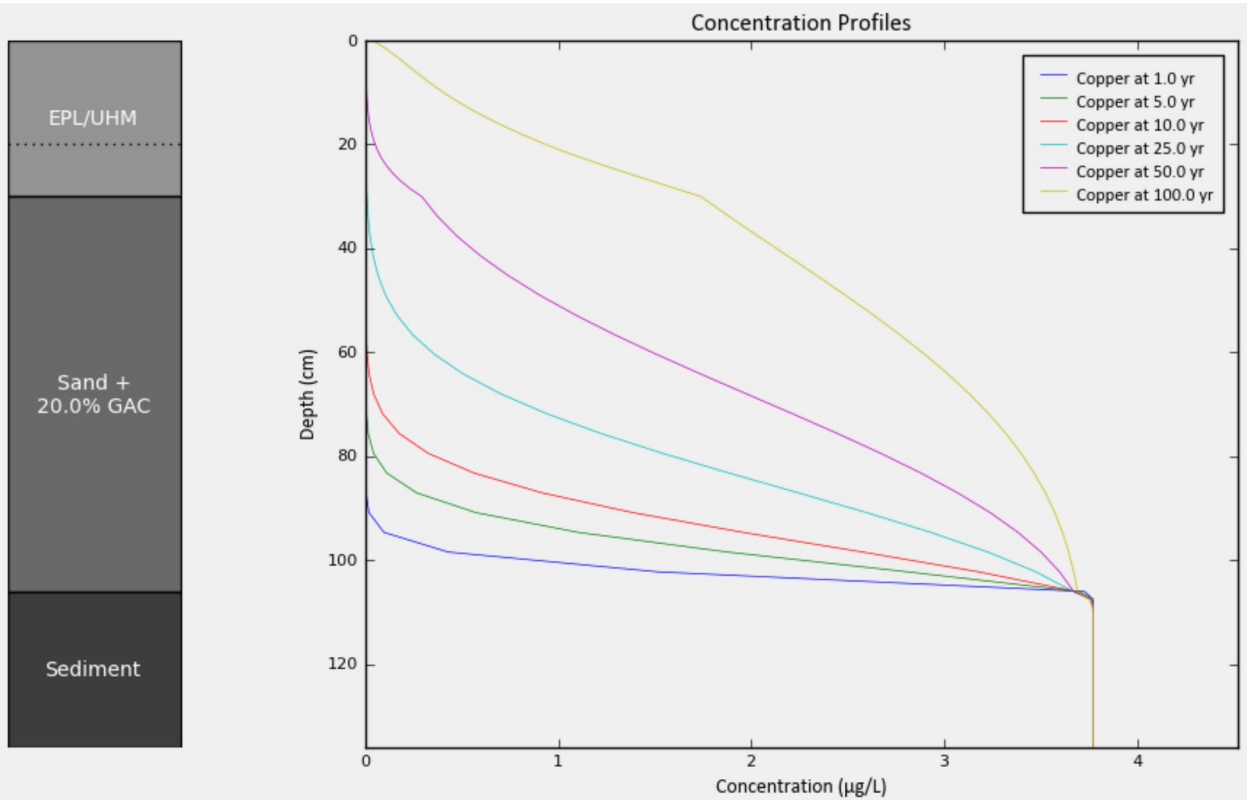

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Benzo(k)fluoranthene at 1.0 yr
Benzo(k)fluoranthene at 5.0 yr
Benzo(k)fluoranthene at 10.0 yr
Benzo(k)fluoranthene at 25.0 yr
Benzo(k)fluoranthene at 50.0 yr
Benzo(k)fluoranthene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
0.010
Concentration (µg/L)

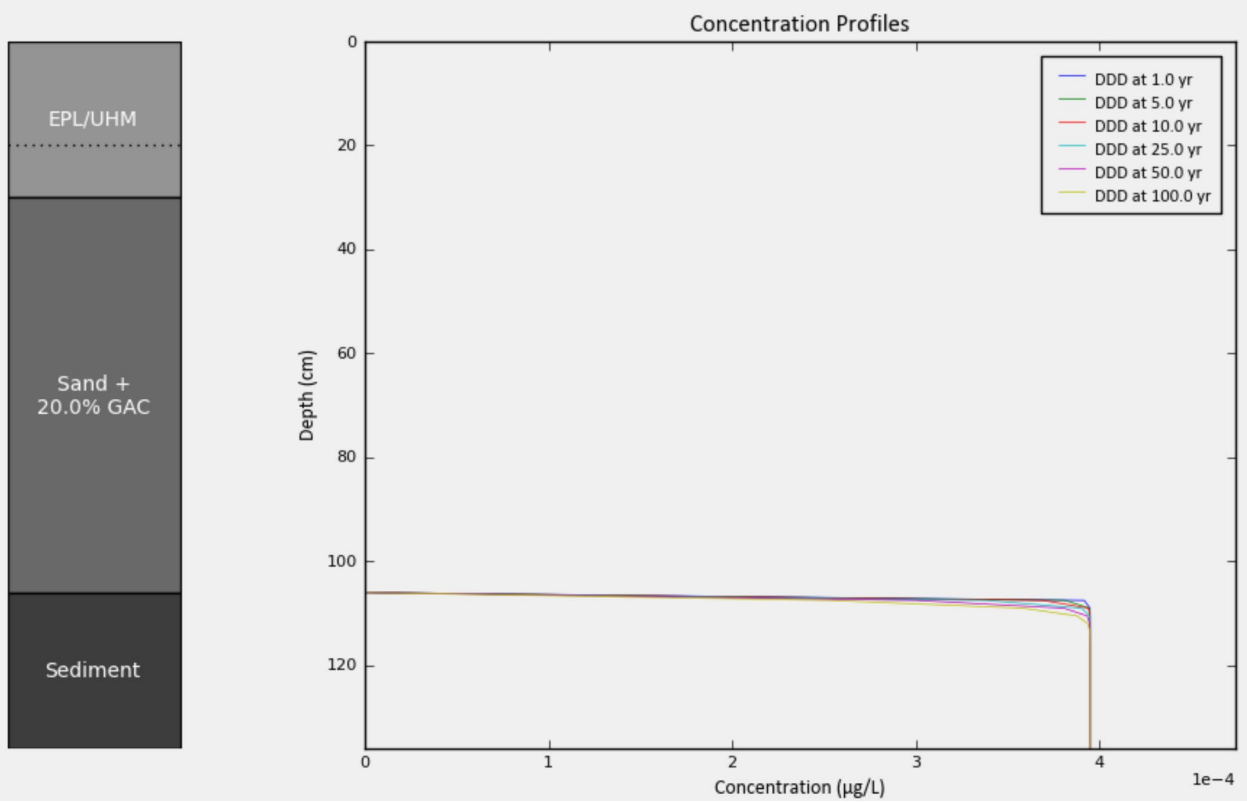

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Cadmium at 1.0 yr
Cadmium at 5.0 yr
Cadmium at 10.0 yr
Cadmium at 25.0 yr
Cadmium at 50.0 yr
Cadmium at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
0.010
0.012
0.014
0.016
Concentration (µg/L)

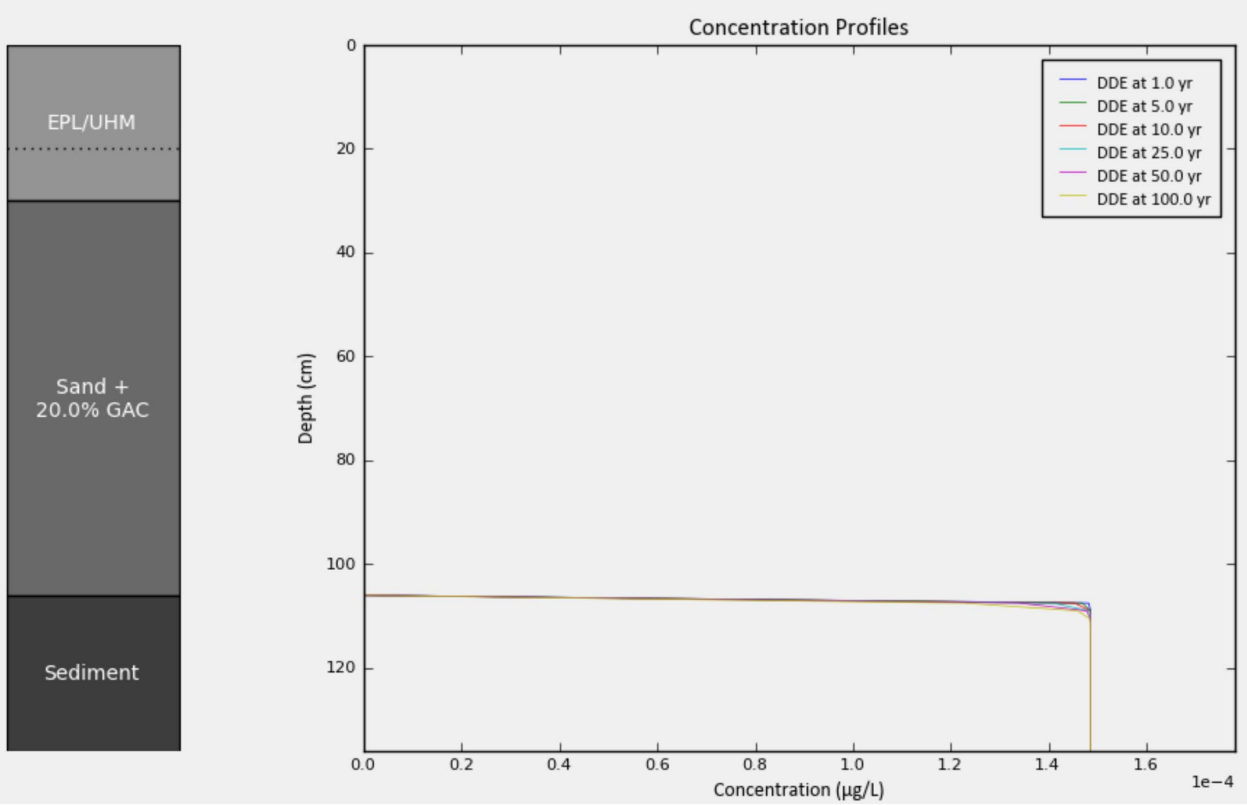

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Chlordanes at 1.0 yr
Chlordanes at 5.0 yr
Chlordanes at 10.0 yr
Chlordanes at 25.0 yr
Chlordanes at 50.0 yr
Chlordanes at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

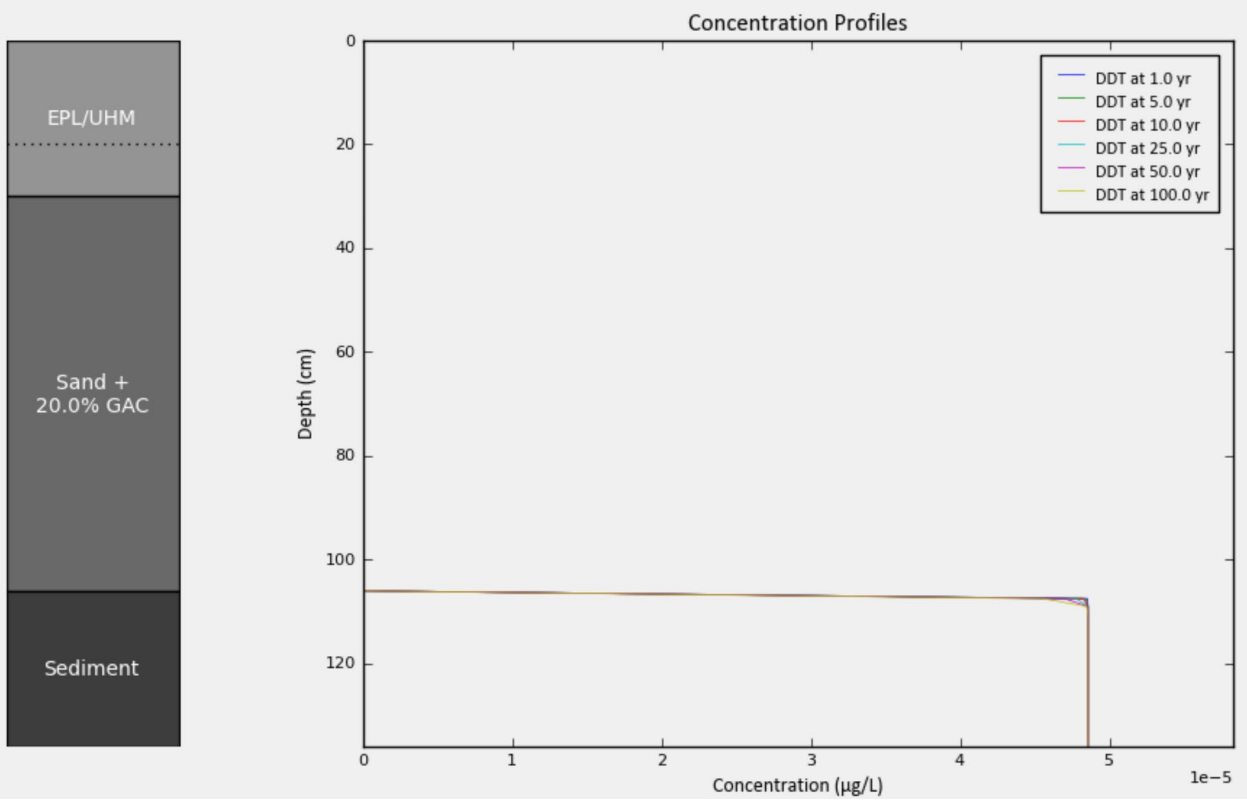

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Chromium (III) at 1.0 yr
Chromium (III) at 5.0 yr
Chromium (III) at 10.0 yr
Chromium (III) at 25.0 yr
Chromium (III) at 50.0 yr
Chromium (III) at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Concentration (µg/L)

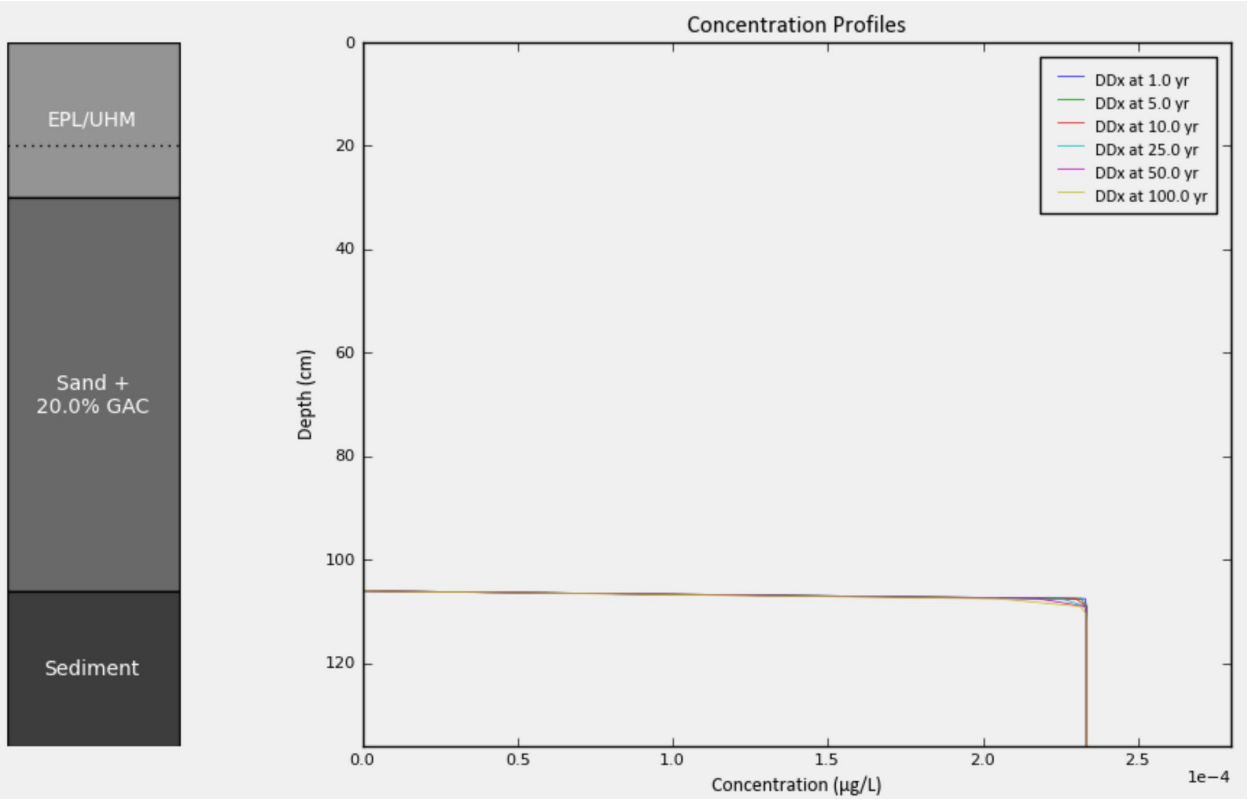

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Chrysene at 1.0 yr
Chrysene at 5.0 yr
Chrysene at 10.0 yr
Chrysene at 25.0 yr
Chrysene at 50.0 yr
Chrysene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010
Concentration (µg/L)

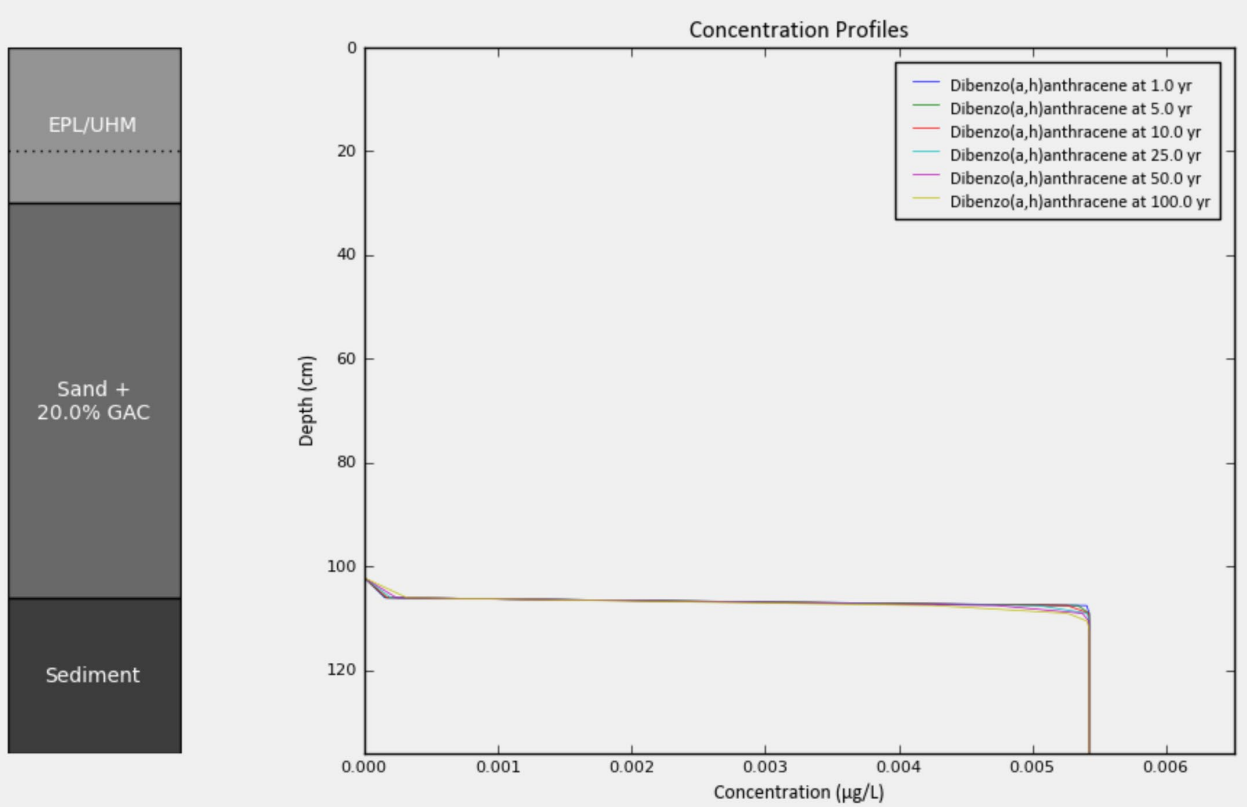

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Copper at 1.0 yr
Copper at 5.0 yr
Copper at 10.0 yr
Copper at 25.0 yr
Copper at 50.0 yr
Copper at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
Concentration (µg/L)

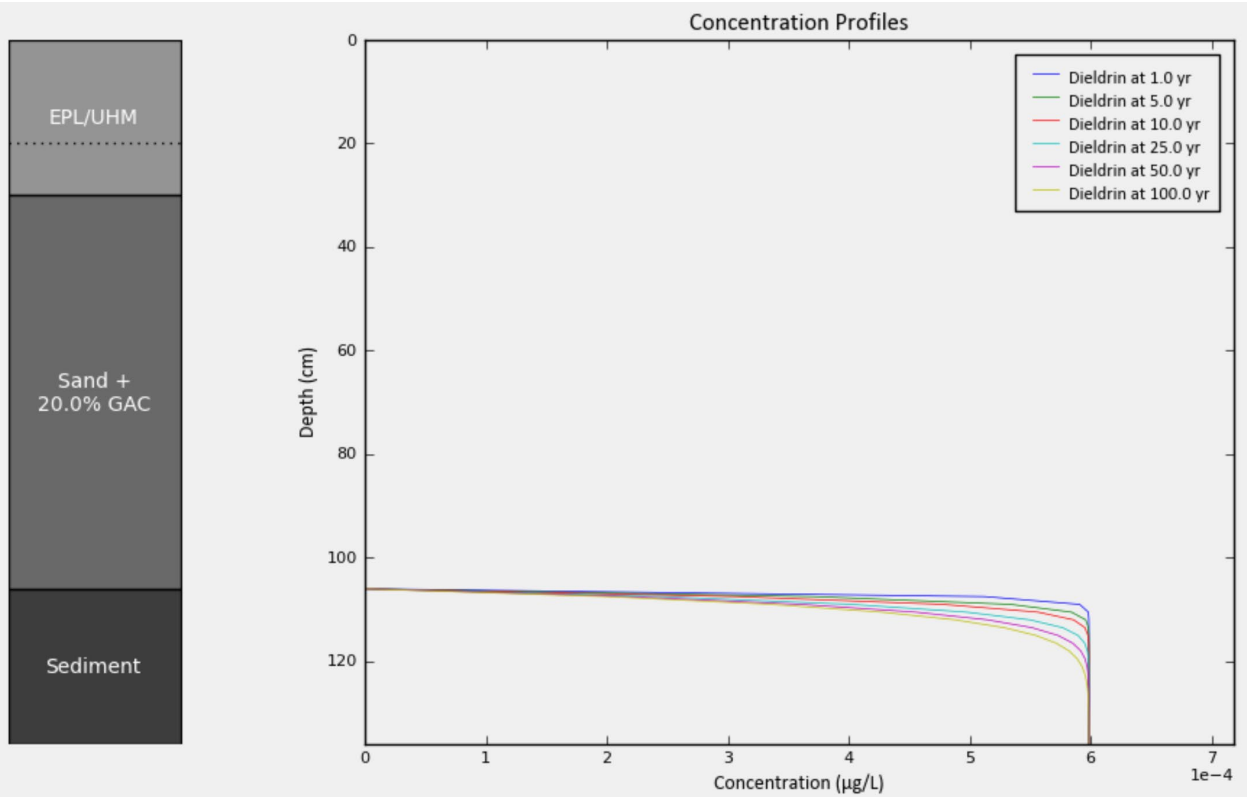

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
DDD at 1.0 yr
DDD at 5.0 yr
DDD at 10.0 yr
DDD at 25.0 yr
DDD at 50.0 yr
DDD at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
1e−4
Concentration (µg/L)

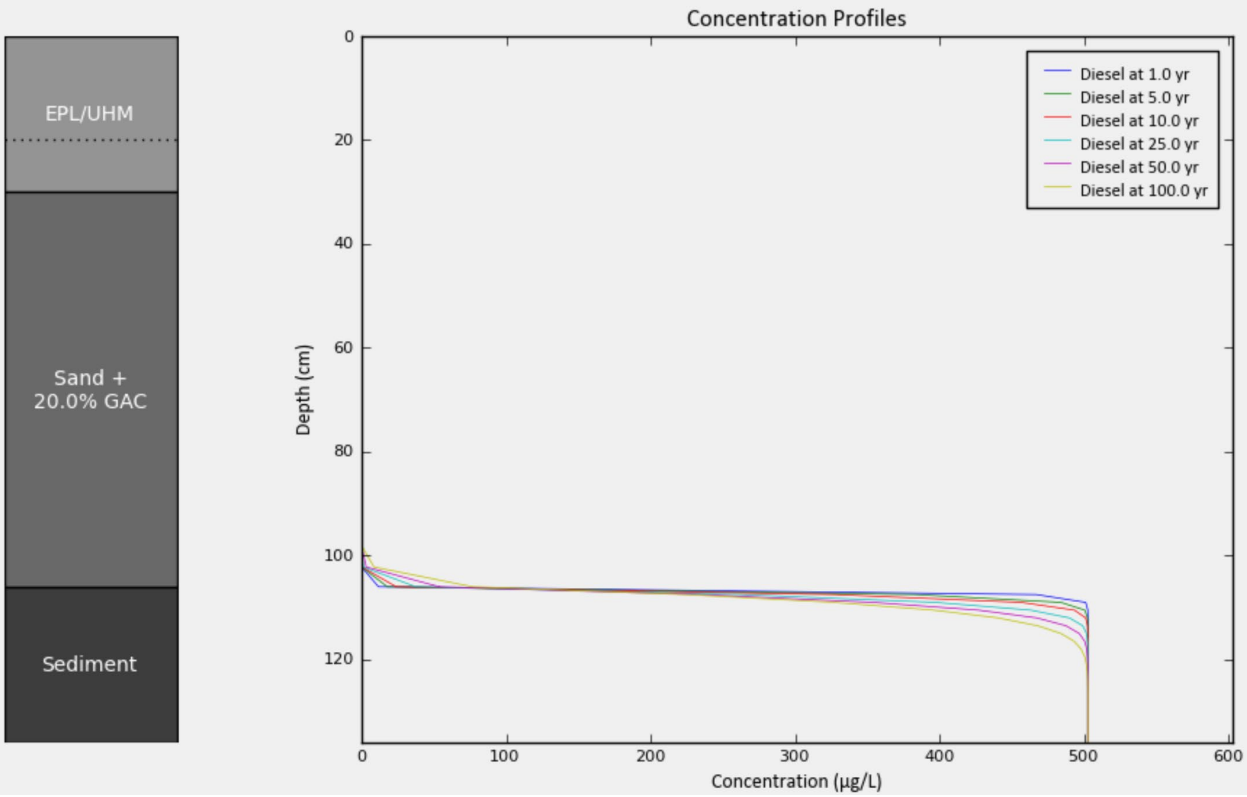

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
DDE at 1.0 yr
DDE at 5.0 yr
DDE at 10.0 yr
DDE at 25.0 yr
DDE at 50.0 yr
DDE at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1e−4
Concentration (µg/L)

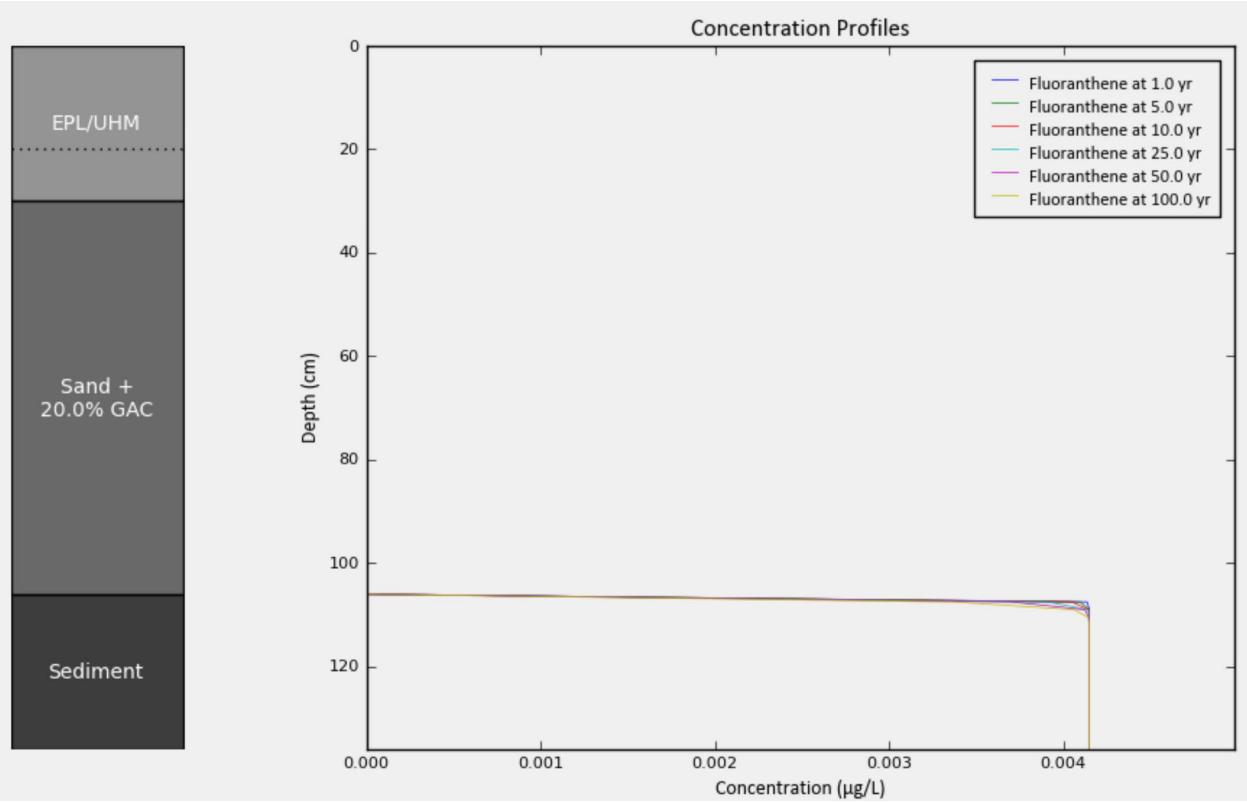

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
DDT at 1.0 yr
DDT at 5.0 yr
DDT at 10.0 yr
DDT at 25.0 yr
DDT at 50.0 yr
DDT at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
1e−5
Concentration (µg/L)

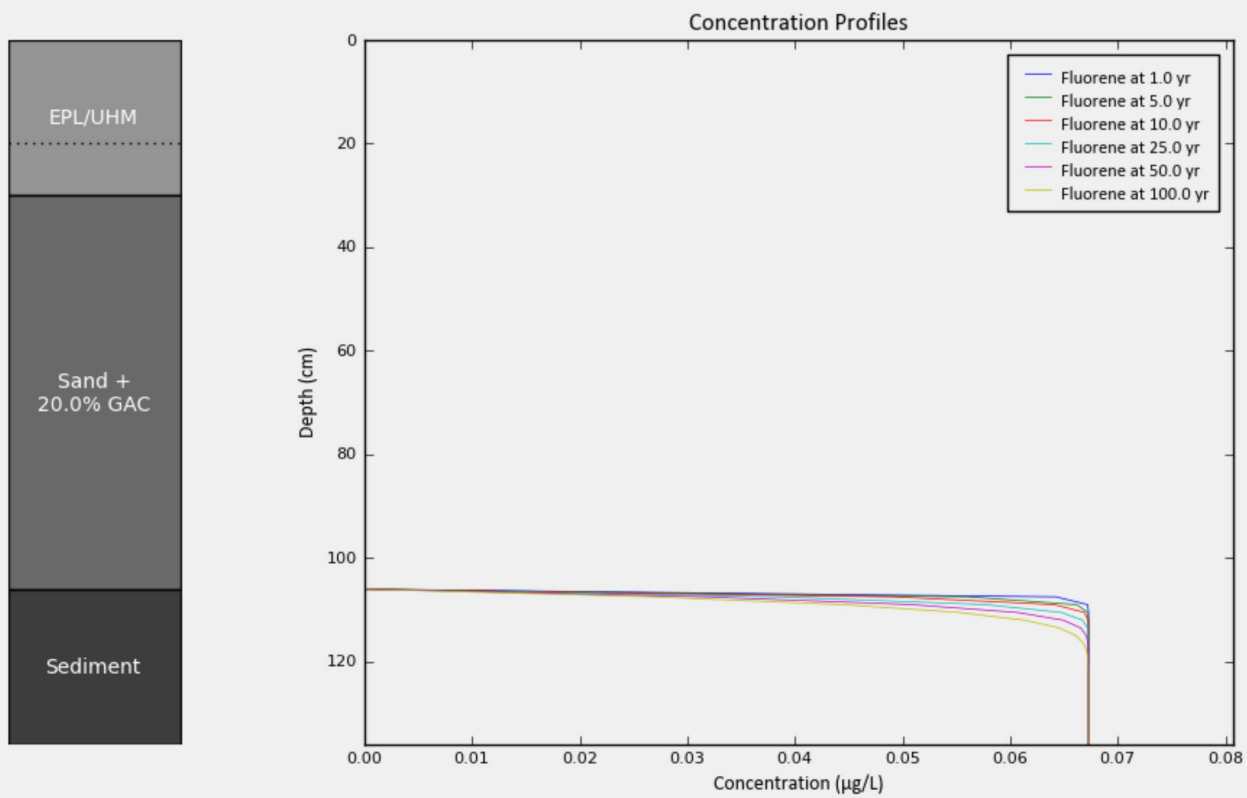

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
DDx at 1.0 yr
DDx at 5.0 yr
DDx at 10.0 yr
DDx at 25.0 yr
DDx at 50.0 yr
DDx at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
1e−4
Concentration (µg/L)

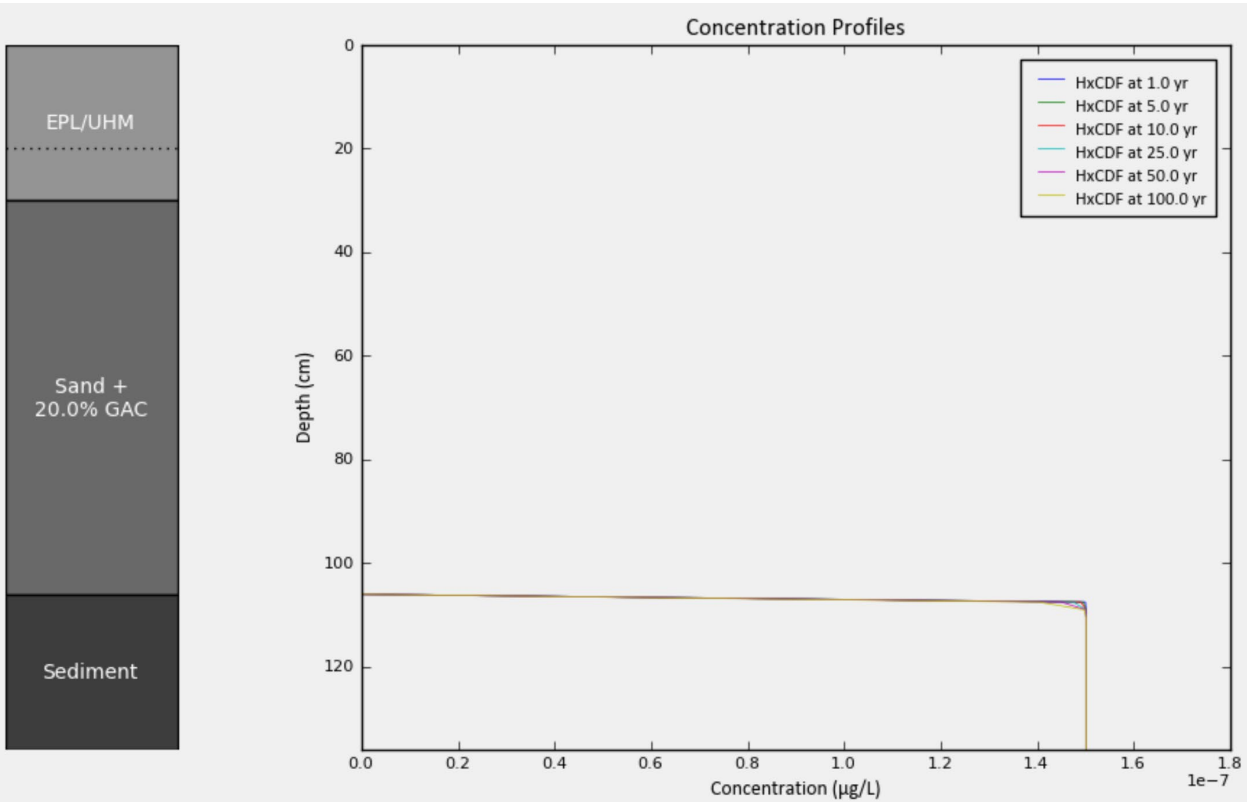

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Dibenzo(a,h)anthracene at 1.0 yr
Dibenzo(a,h)anthracene at 5.0 yr
Dibenzo(a,h)anthracene at 10.0 yr
Dibenzo(a,h)anthracene at 25.0 yr
Dibenzo(a,h)anthracene at 50.0 yr
Dibenzo(a,h)anthracene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

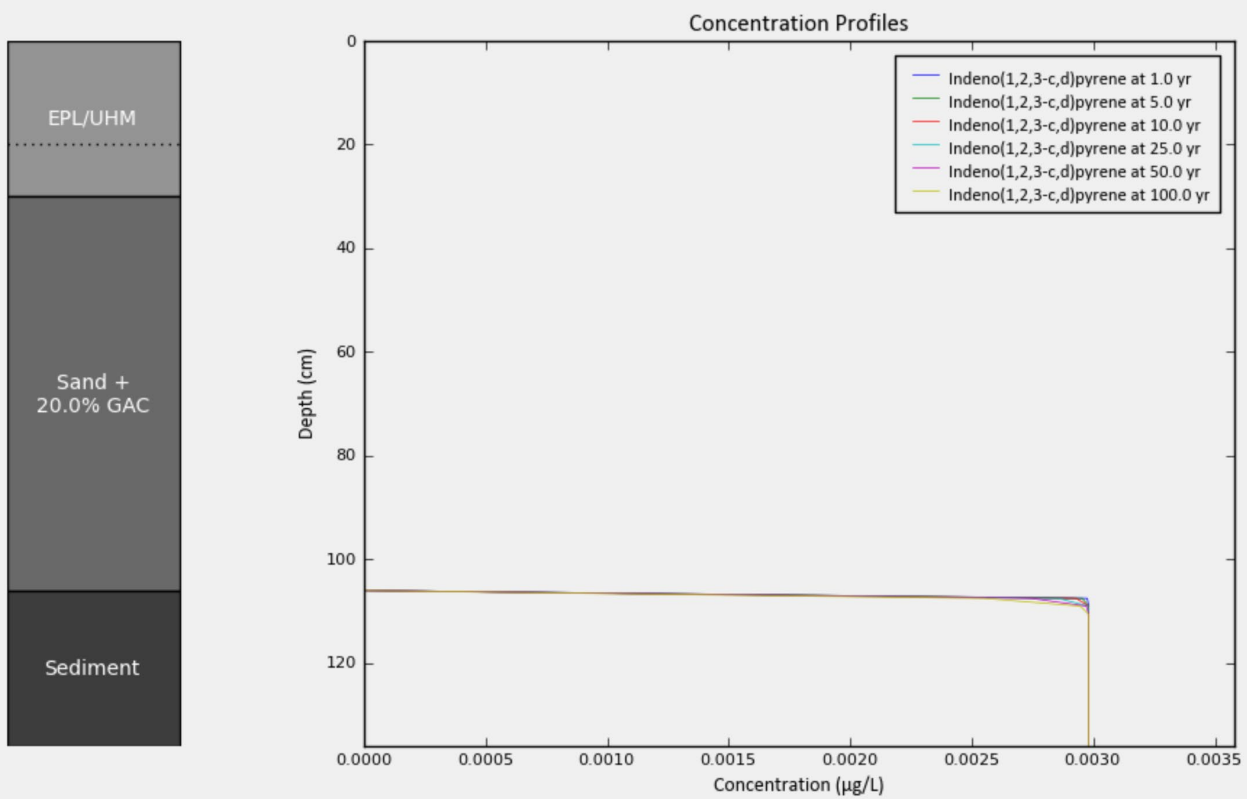

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Dieldrin at 1.0 yr
Dieldrin at 5.0 yr
Dieldrin at 10.0 yr
Dieldrin at 25.0 yr
Dieldrin at 50.0 yr
Dieldrin at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
7
1e−4
Concentration (µg/L)

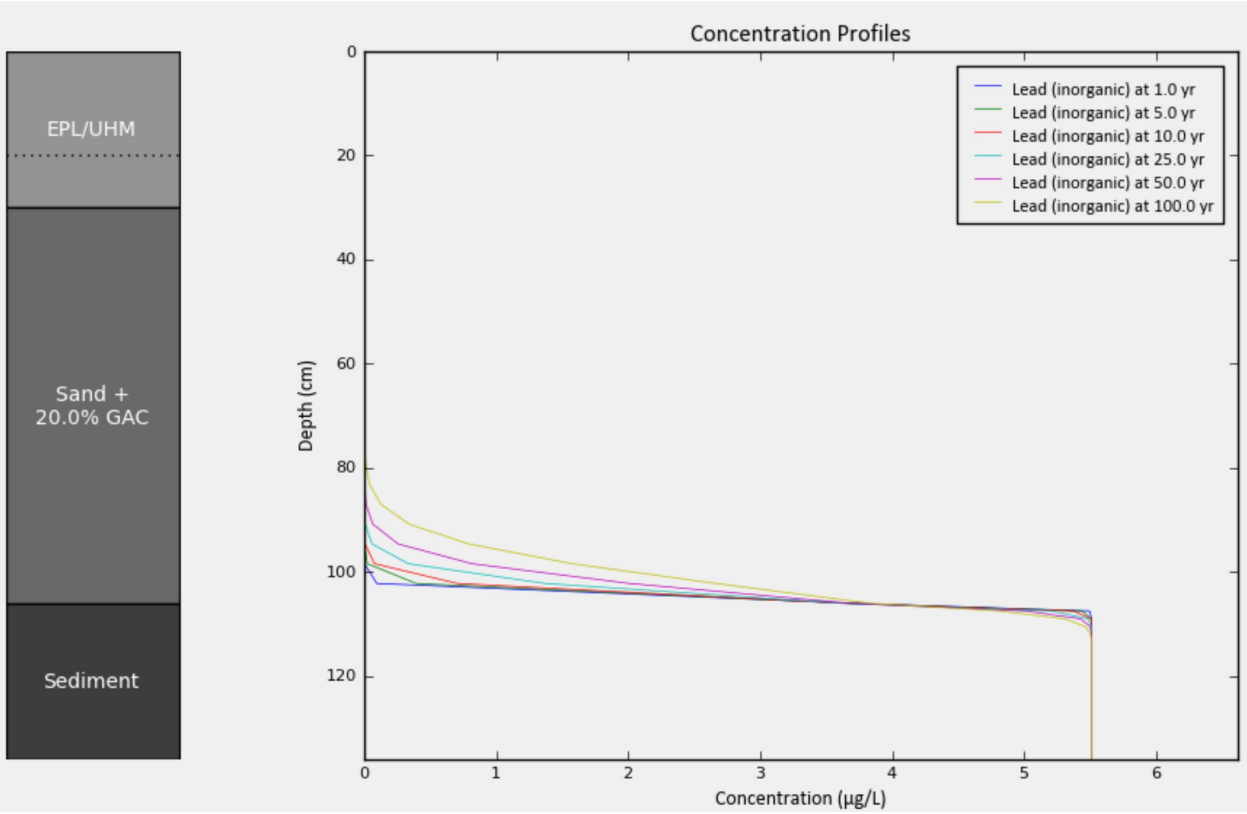

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Diesel at 1.0 yr
Diesel at 5.0 yr
Diesel at 10.0 yr
Diesel at 25.0 yr
Diesel at 50.0 yr
Diesel at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
100
200
300
400
500
600

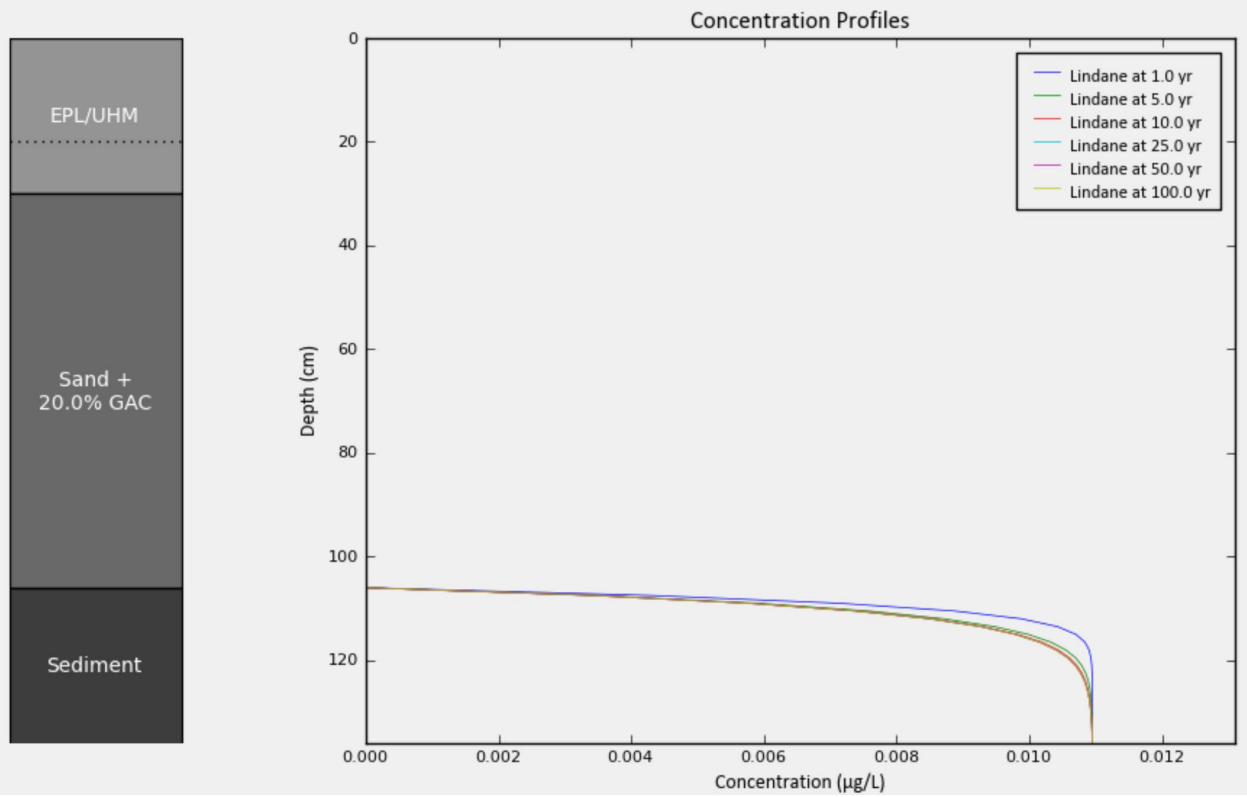

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Fluoranthene at 1.0 yr
Fluoranthene at 5.0 yr
Fluoranthene at 10.0 yr
Fluoranthene at 25.0 yr
Fluoranthene at 50.0 yr
Fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004

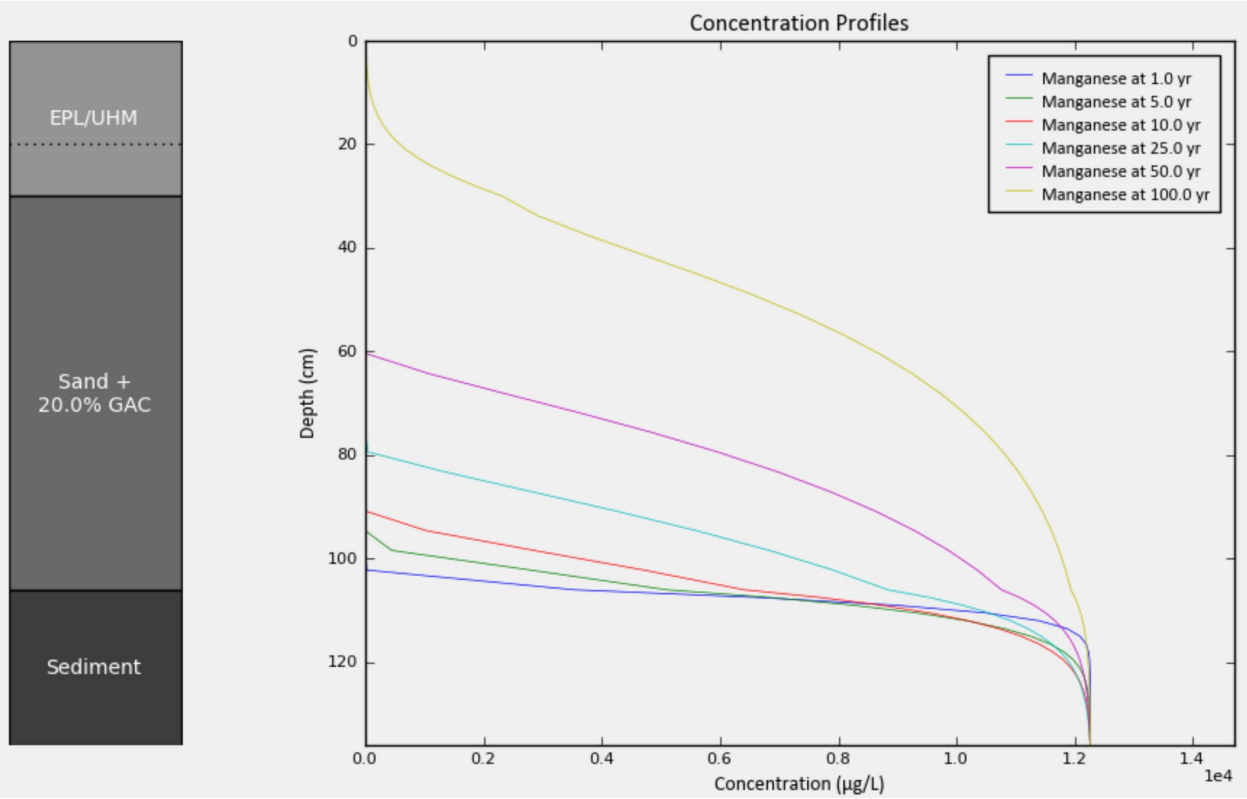

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Fluorene at 1.0 yr
Fluorene at 5.0 yr
Fluorene at 10.0 yr
Fluorene at 25.0 yr
Fluorene at 50.0 yr
Fluorene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
Concentration (µg/L)

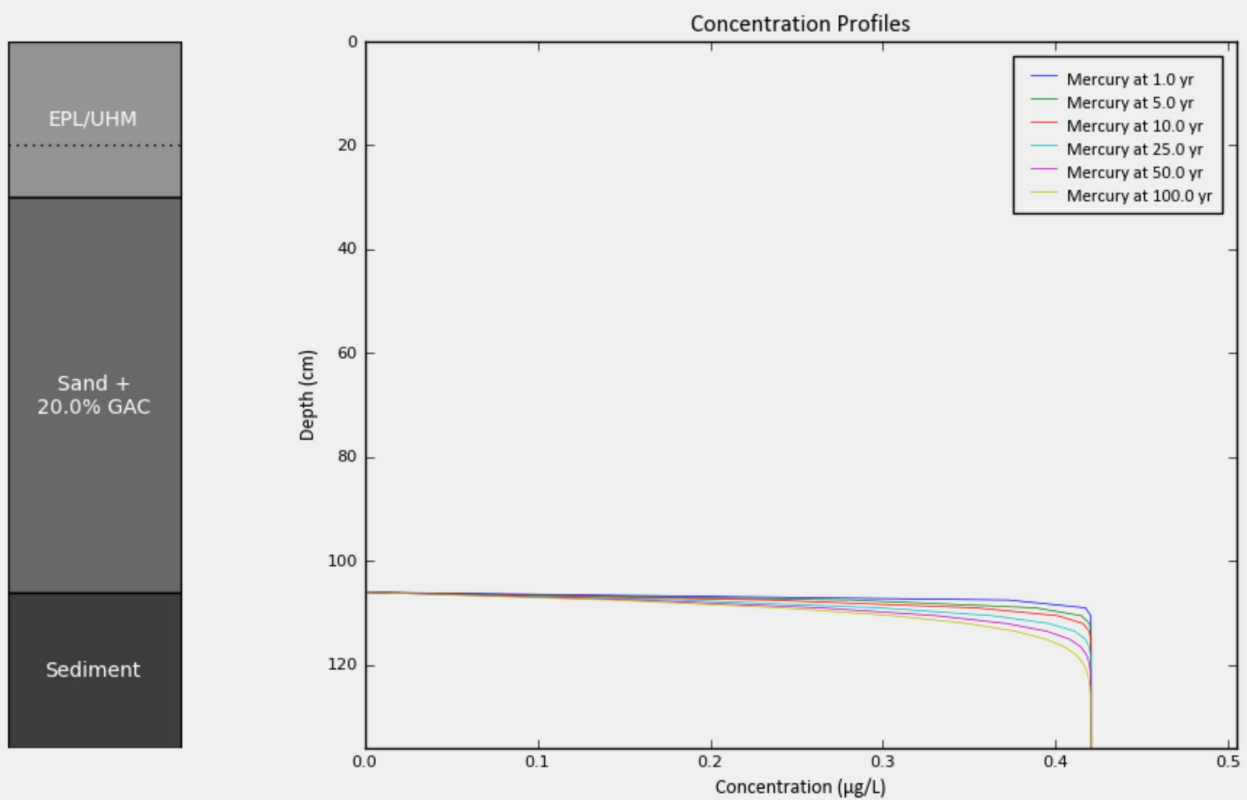

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
HxCDF at 1.0 yr
HxCDF at 5.0 yr
HxCDF at 10.0 yr
HxCDF at 25.0 yr
HxCDF at 50.0 yr
HxCDF at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
1e−7
Concentration (µg/L)

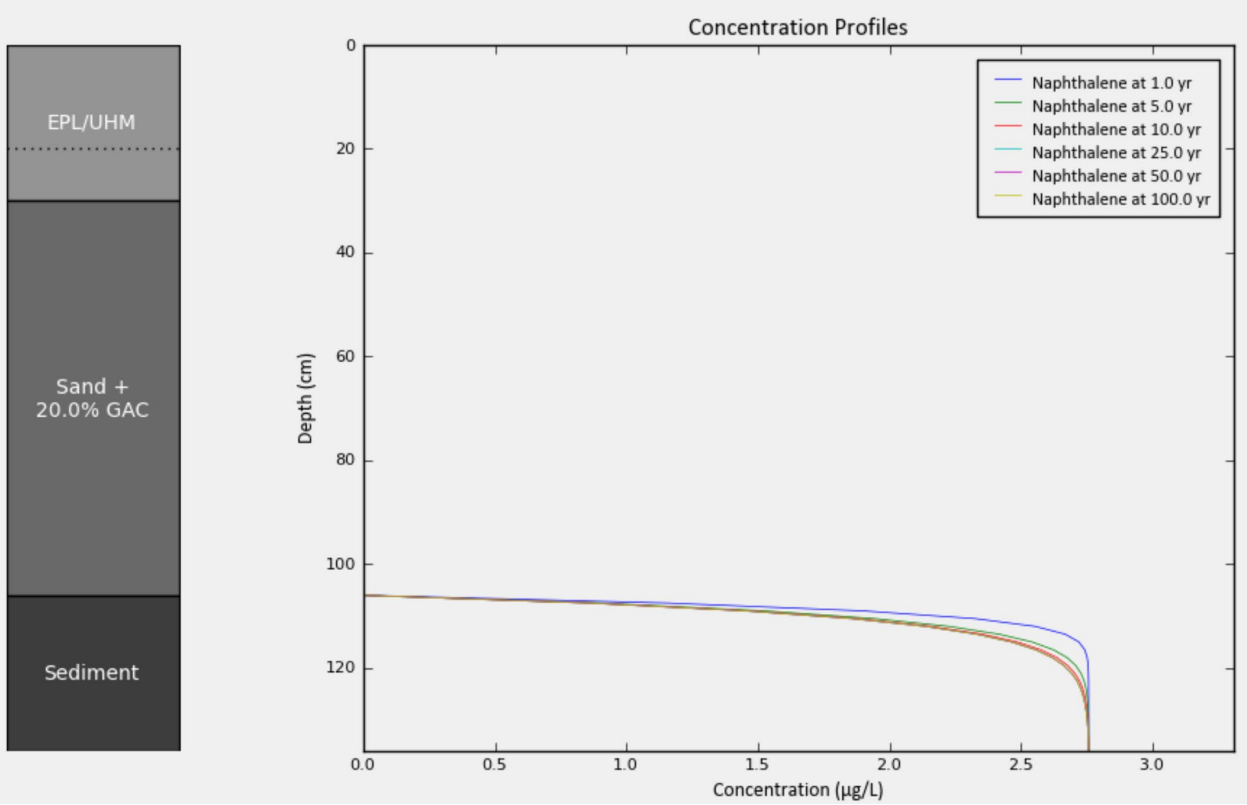

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Indeno(1,2,3-c,d)pyrene at 1.0 yr
Indeno(1,2,3-c,d)pyrene at 5.0 yr
Indeno(1,2,3-c,d)pyrene at 10.0 yr
Indeno(1,2,3-c,d)pyrene at 25.0 yr
Indeno(1,2,3-c,d)pyrene at 50.0 yr
Indeno(1,2,3-c,d)pyrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
0.0035
Concentration (µg/L)

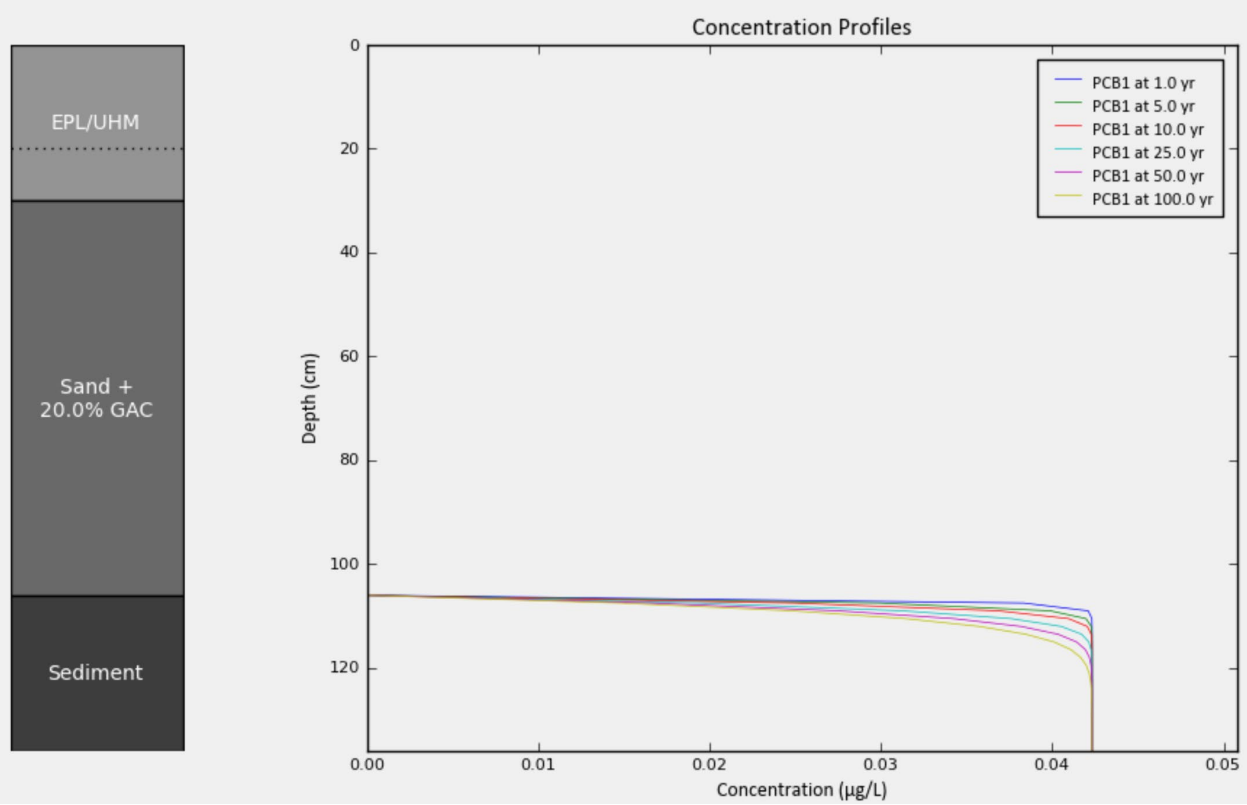

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Lead (inorganic) at 1.0 yr
Lead (inorganic) at 5.0 yr
Lead (inorganic) at 10.0 yr
Lead (inorganic) at 25.0 yr
Lead (inorganic) at 50.0 yr
Lead (inorganic) at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
Concentration (µg/L)

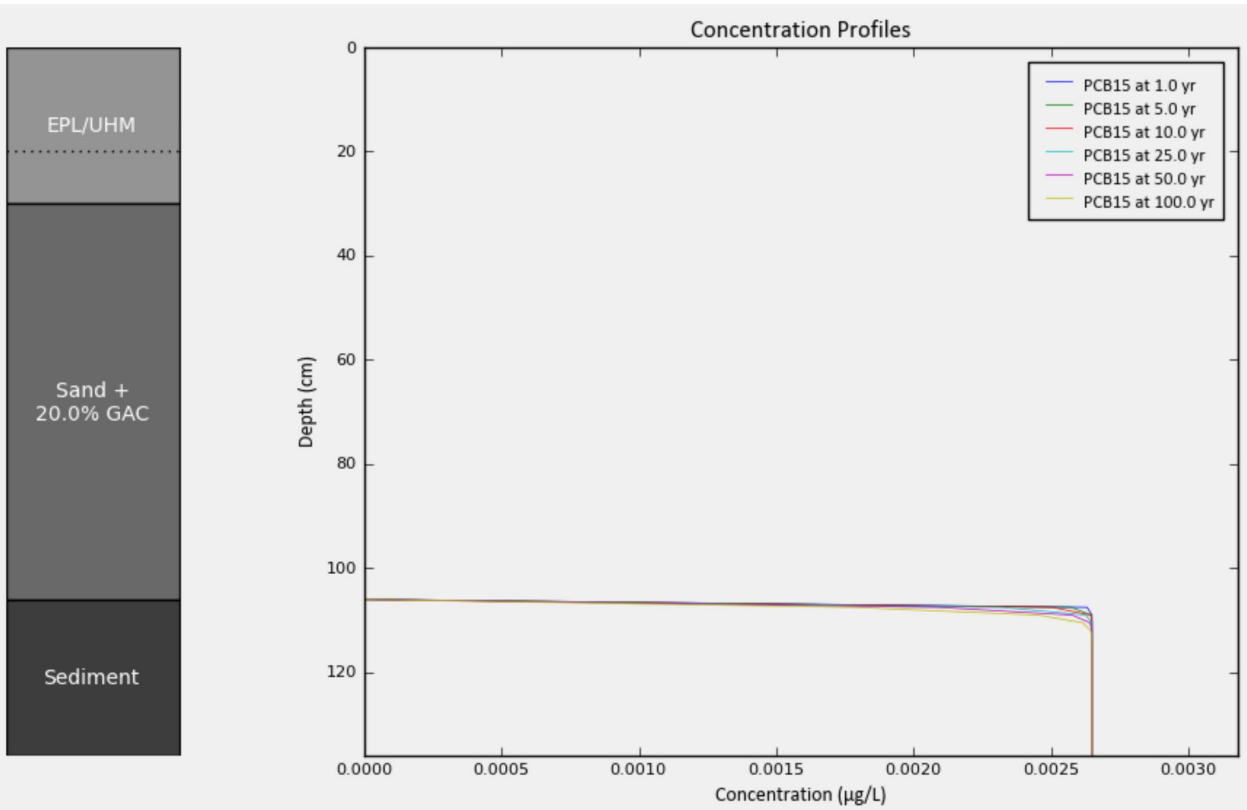

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Lindane at 1.0 yr
Lindane at 5.0 yr
Lindane at 10.0 yr
Lindane at 25.0 yr
Lindane at 50.0 yr
Lindane at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
0.010
0.012
Concentration (µg/L)

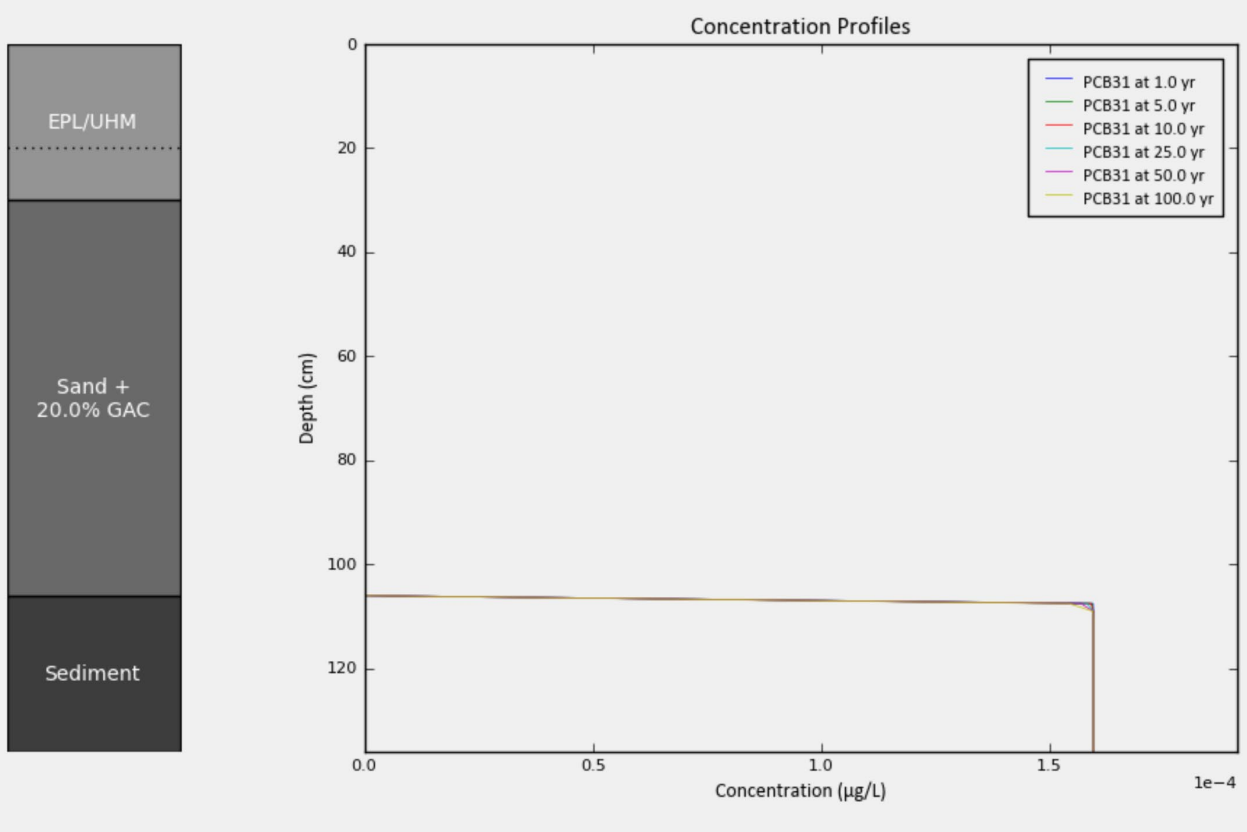

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Manganese at 1.0 yr
Manganese at 5.0 yr
Manganese at 10.0 yr
Manganese at 25.0 yr
Manganese at 50.0 yr
Manganese at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1e4
Concentration (µg/L)

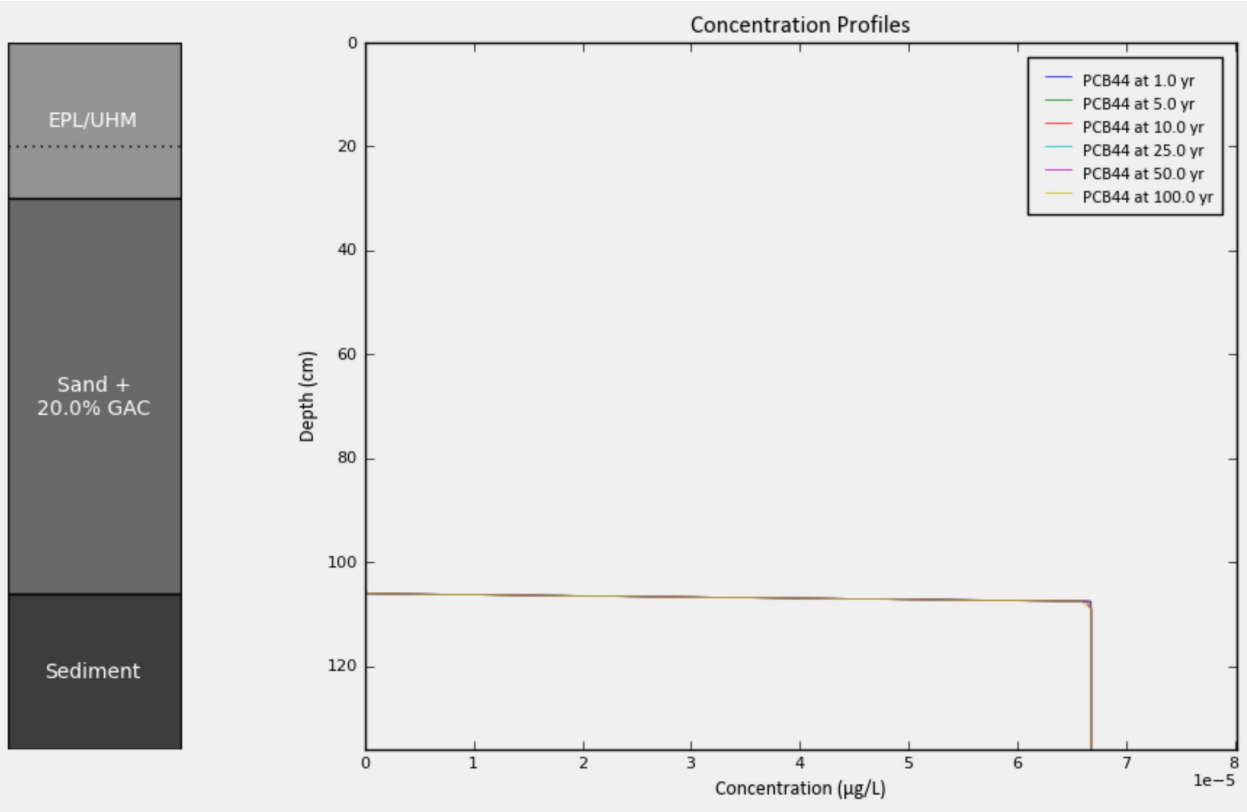

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Mercury at 1.0 yr
Mercury at 5.0 yr
Mercury at 10.0 yr
Mercury at 25.0 yr
Mercury at 50.0 yr
Mercury at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.1
0.2
0.3
0.4
0.5
Concentration (µg/L)

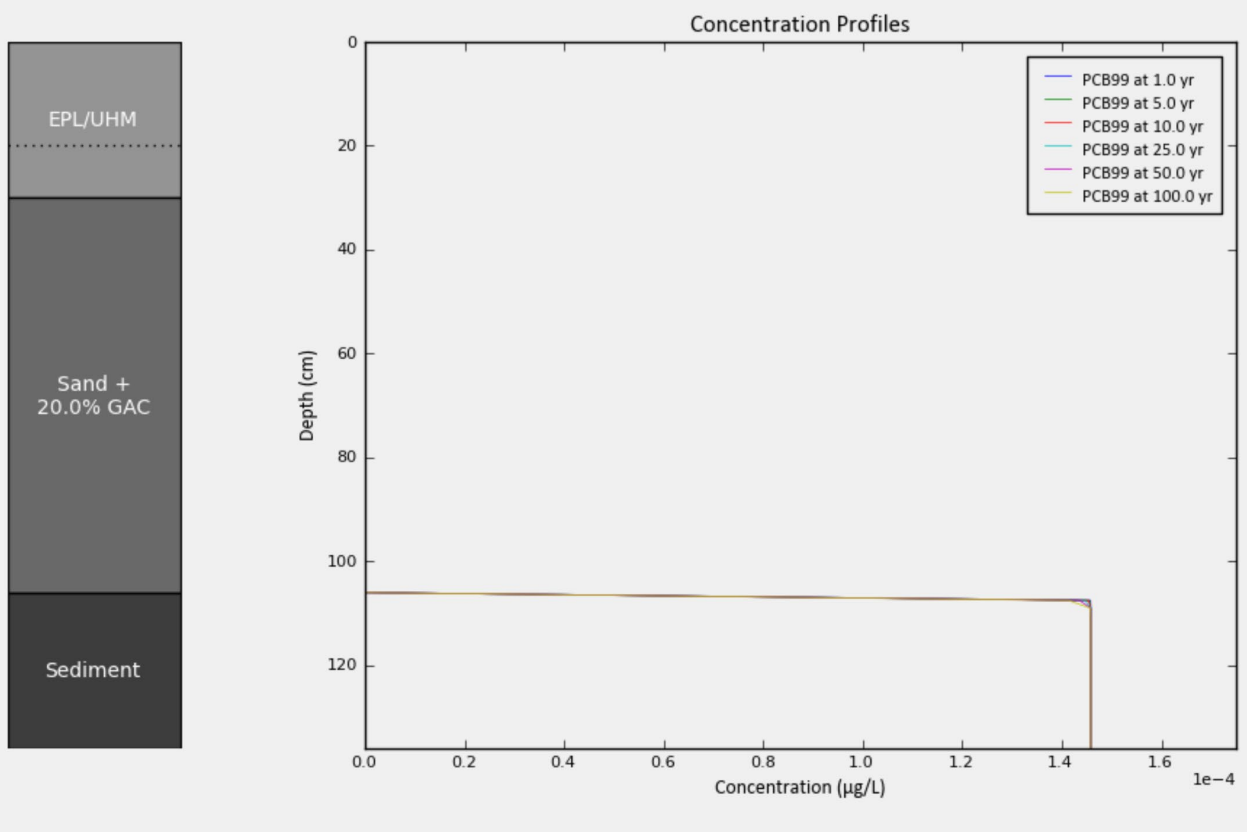

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Naphthalene at 1.0 yr
Naphthalene at 5.0 yr
Naphthalene at 10.0 yr
Naphthalene at 25.0 yr
Naphthalene at 50.0 yr
Naphthalene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Concentration (µg/L)

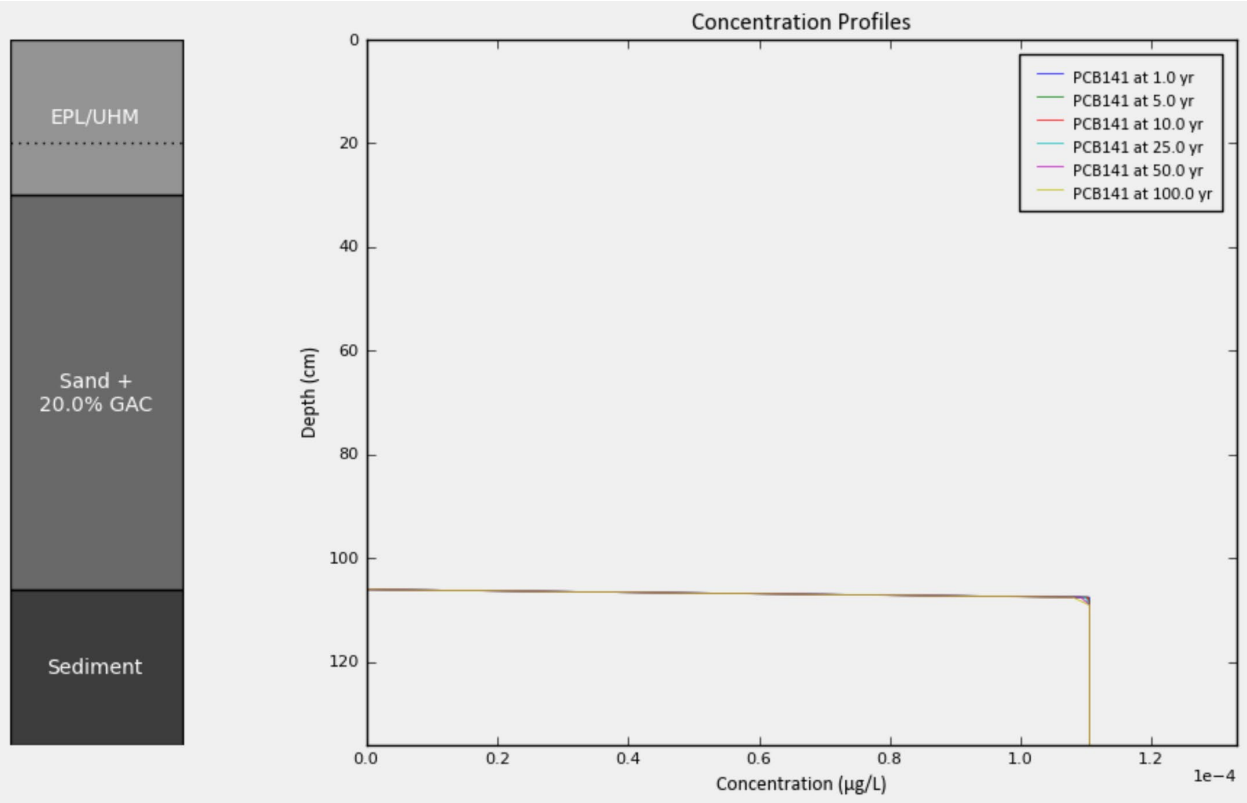

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB1 at 1.0 yr
PCB1 at 5.0 yr
PCB1 at 10.0 yr
PCB1 at 25.0 yr
PCB1 at 50.0 yr
PCB1 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.00
0.01
0.02
0.03
0.04
0.05
Concentration (µg/L)

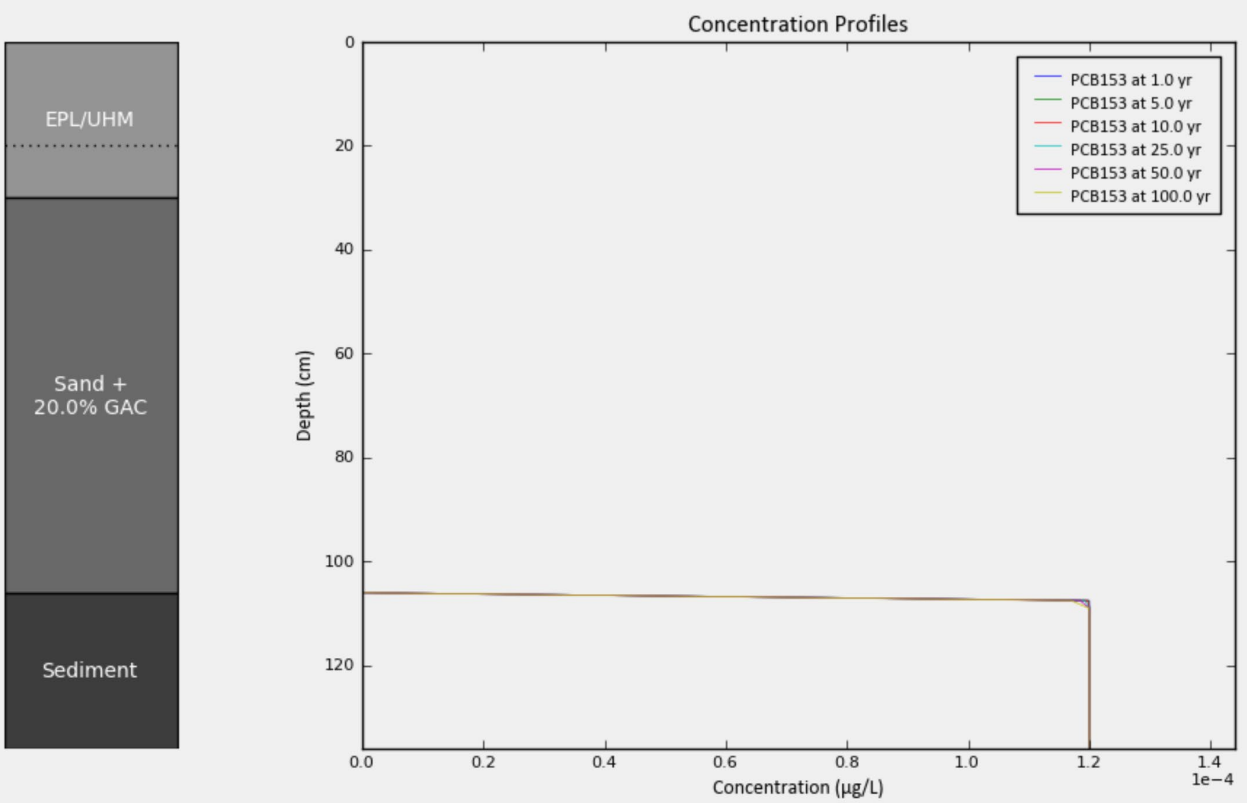

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB15 at 1.0 yr
PCB15 at 5.0 yr
PCB15 at 10.0 yr
PCB15 at 25.0 yr
PCB15 at 50.0 yr
PCB15 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
Concentration (µg/L)

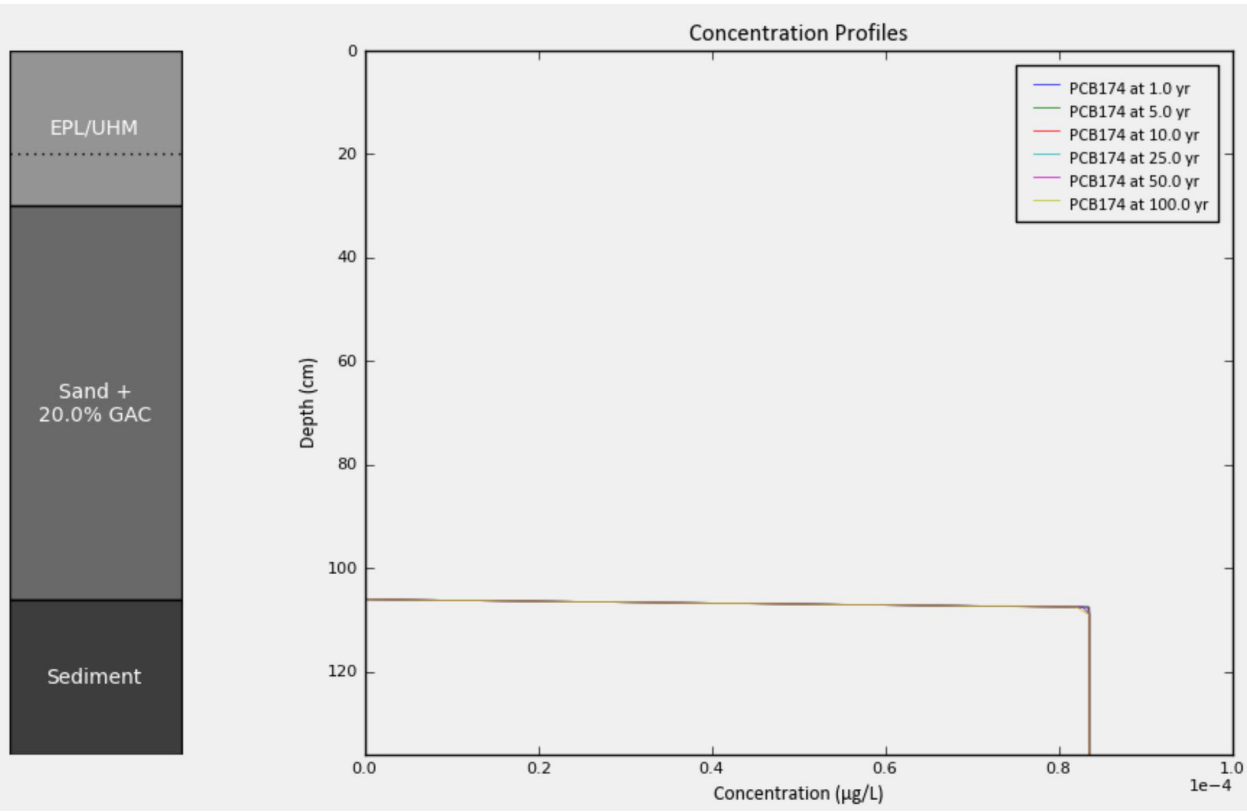

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB31 at 1.0 yr
PCB31 at 5.0 yr
PCB31 at 10.0 yr
PCB31 at 25.0 yr
PCB31 at 50.0 yr
PCB31 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
Concentration (µg/L)
1e−4

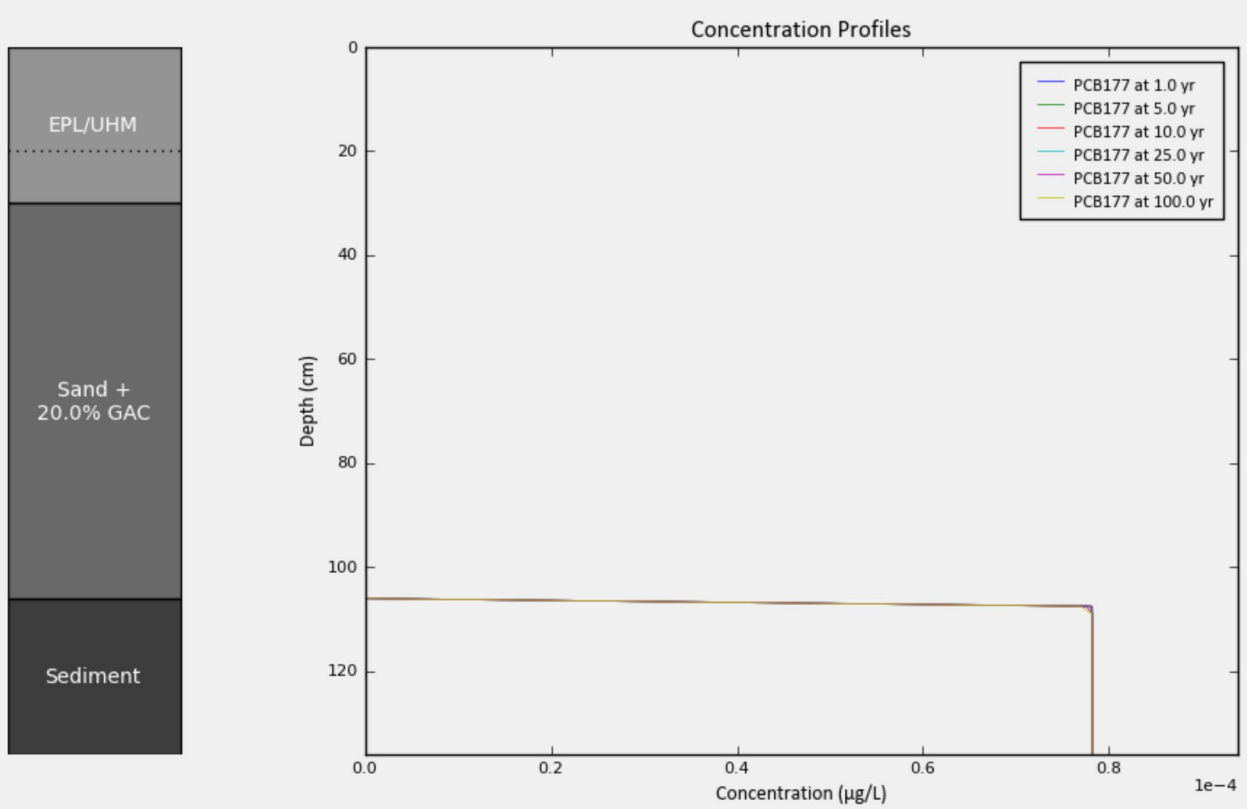

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB44 at 1.0 yr
PCB44 at 5.0 yr
PCB44 at 10.0 yr
PCB44 at 25.0 yr
PCB44 at 50.0 yr
PCB44 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
7
8
Concentration (µg/L)
1e−5

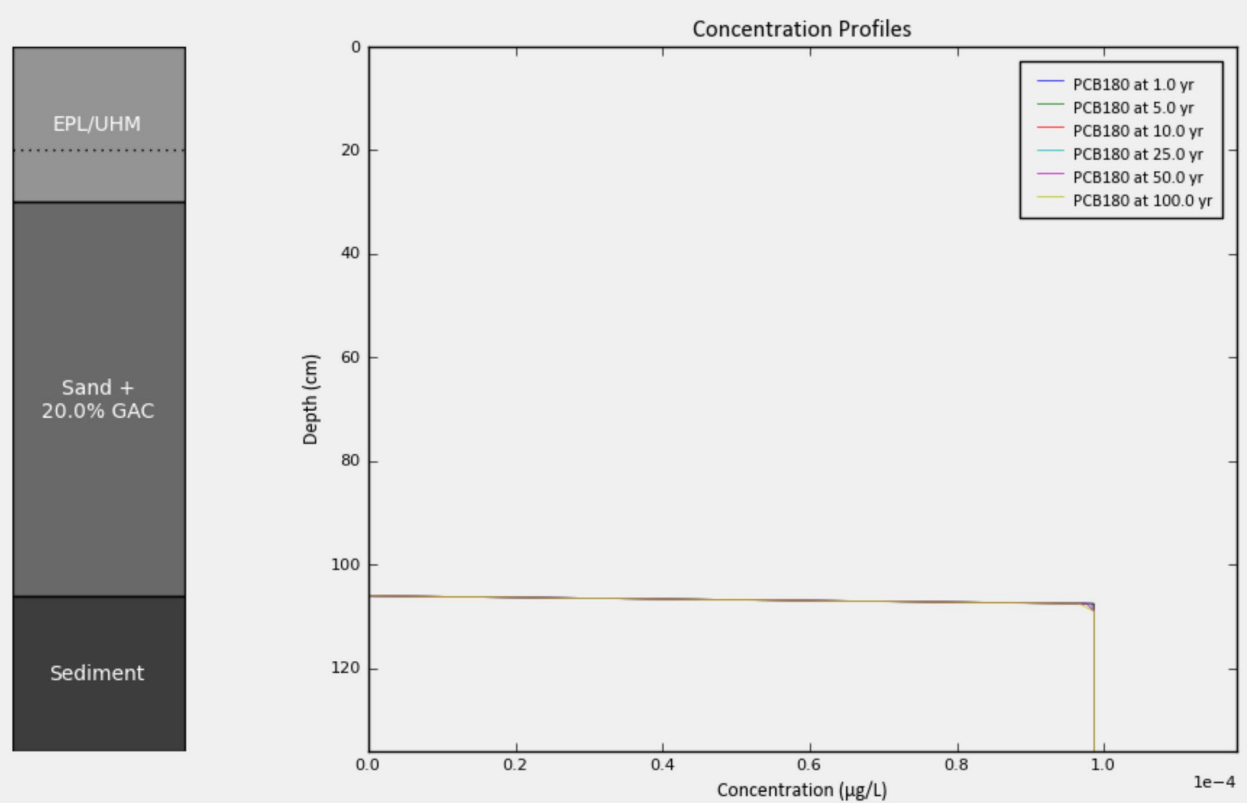

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB99 at 1.0 yr
PCB99 at 5.0 yr
PCB99 at 10.0 yr
PCB99 at 25.0 yr
PCB99 at 50.0 yr
PCB99 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1e−4
Concentration (µg/L)

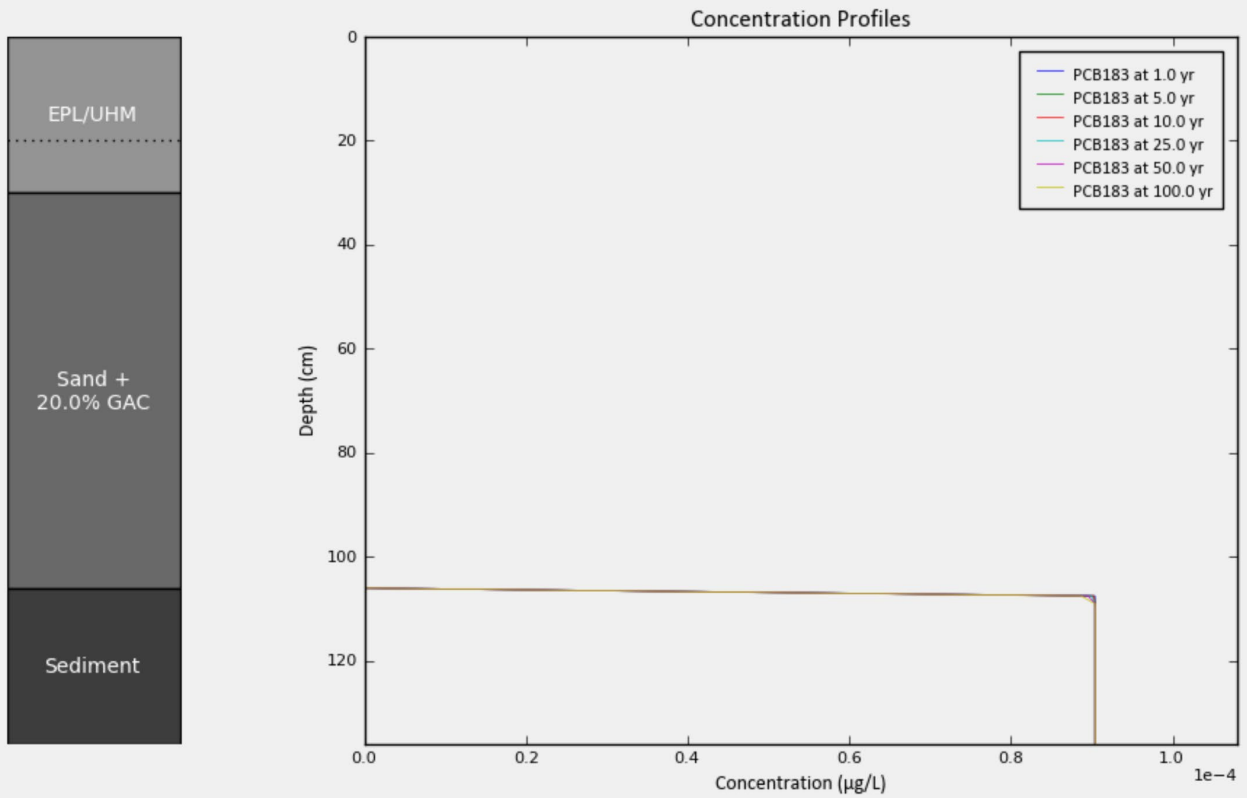

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB141 at 1.0 yr
PCB141 at 5.0 yr
PCB141 at 10.0 yr
PCB141 at 25.0 yr
PCB141 at 50.0 yr
PCB141 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e−4
Concentration (µg/L)

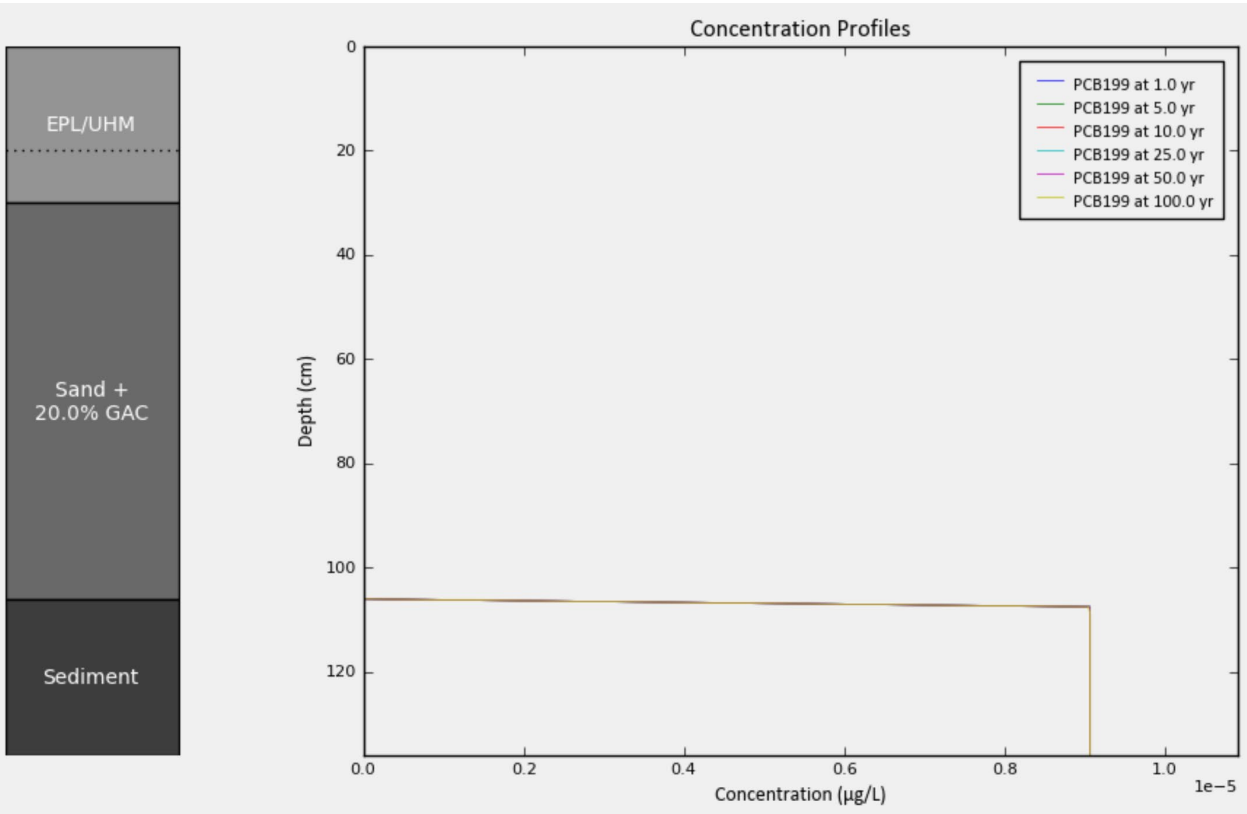

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB153 at 1.0 yr
PCB153 at 5.0 yr
PCB153 at 10.0 yr
PCB153 at 25.0 yr
PCB153 at 50.0 yr
PCB153 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1e−4
Concentration (µg/L)

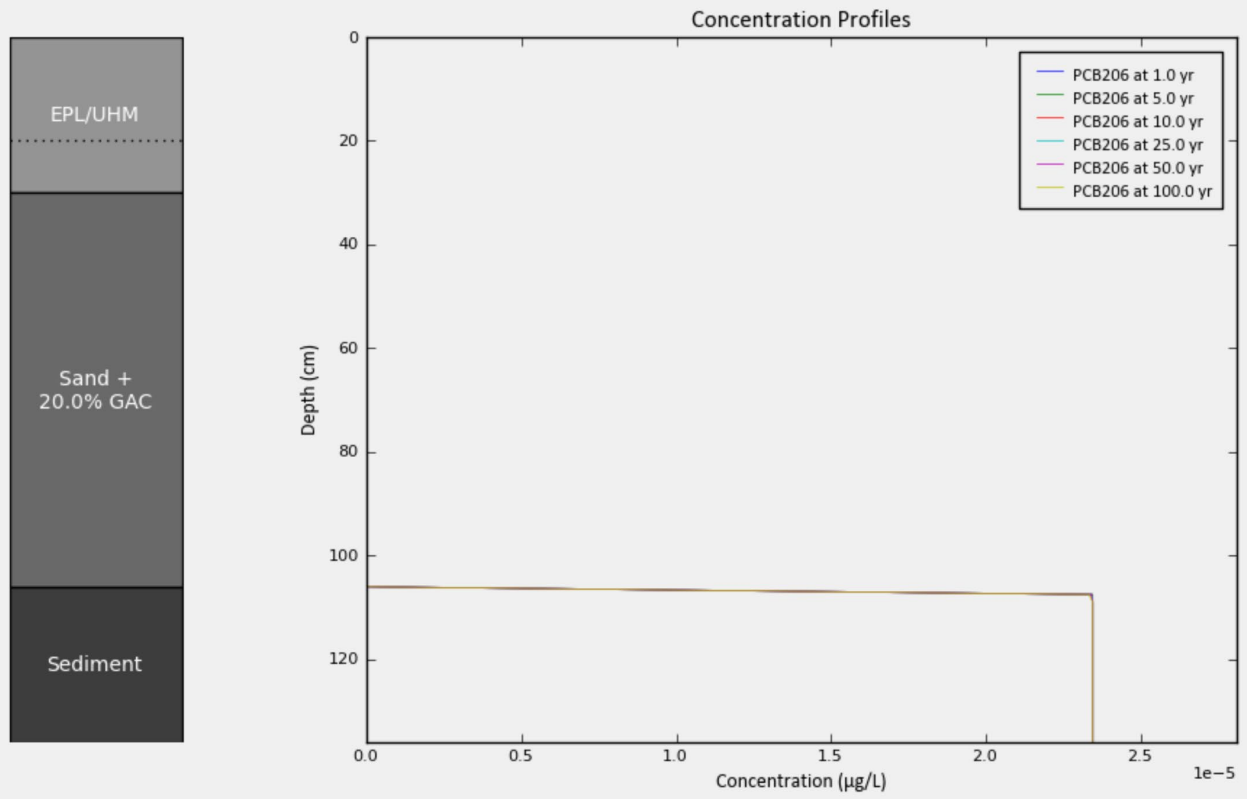

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB174 at 1.0 yr
PCB174 at 5.0 yr
PCB174 at 10.0 yr
PCB174 at 25.0 yr
PCB174 at 50.0 yr
PCB174 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

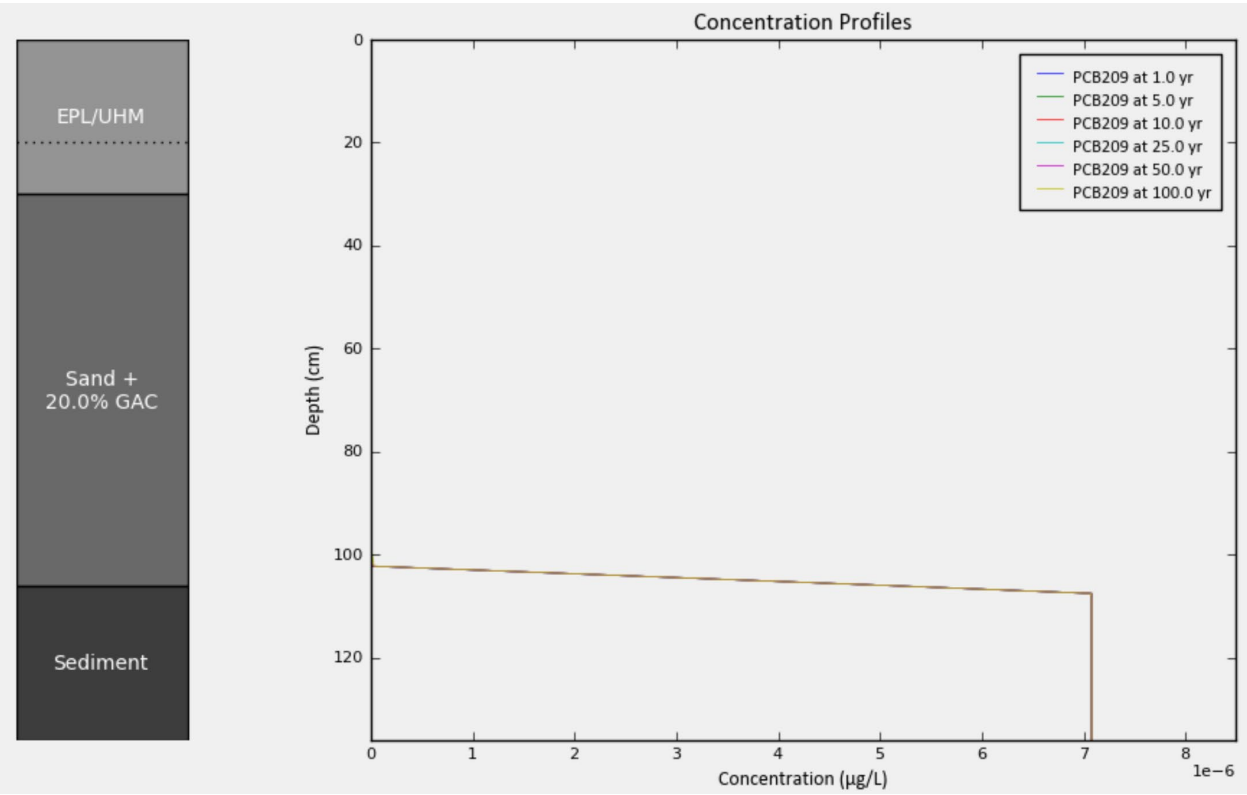

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB177 at 1.0 yr
PCB177 at 5.0 yr
PCB177 at 10.0 yr
PCB177 at 25.0 yr
PCB177 at 50.0 yr
PCB177 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1e−4
Concentration (µg/L)

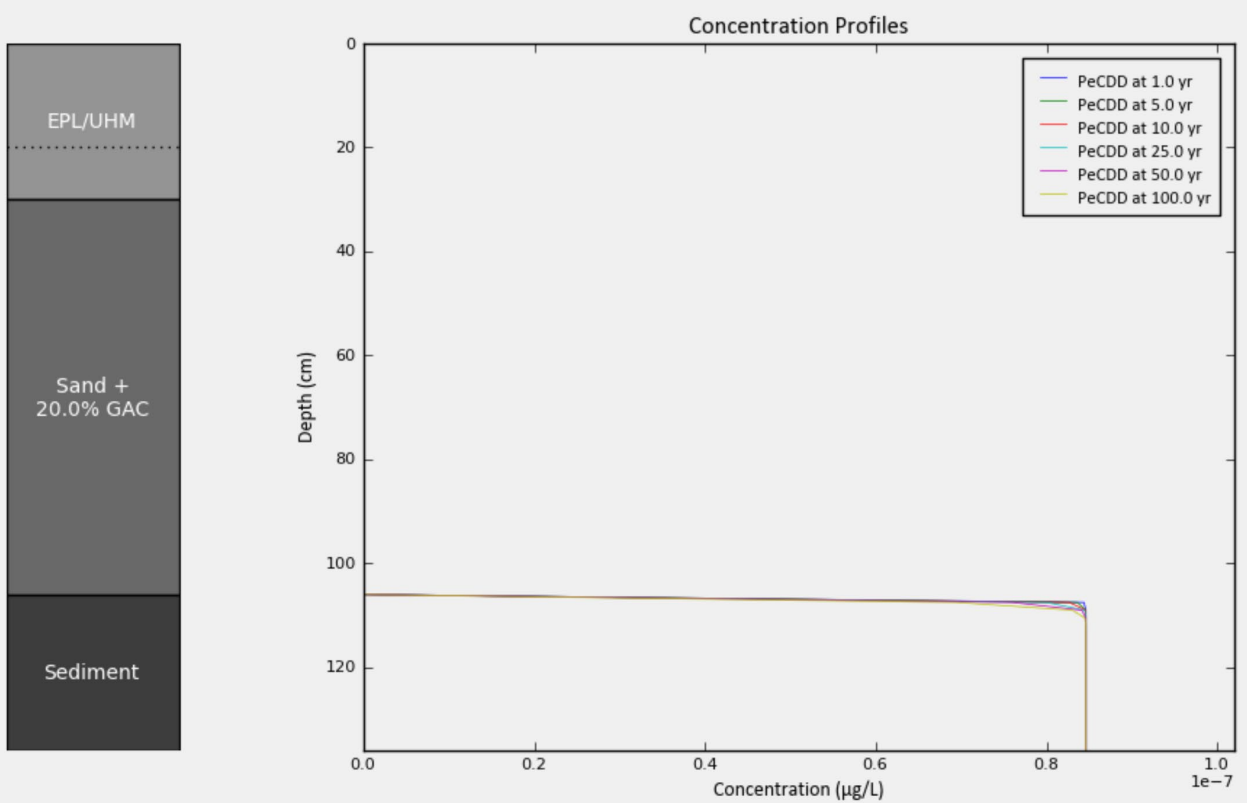

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB180 at 1.0 yr
PCB180 at 5.0 yr
PCB180 at 10.0 yr
PCB180 at 25.0 yr
PCB180 at 50.0 yr
PCB180 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

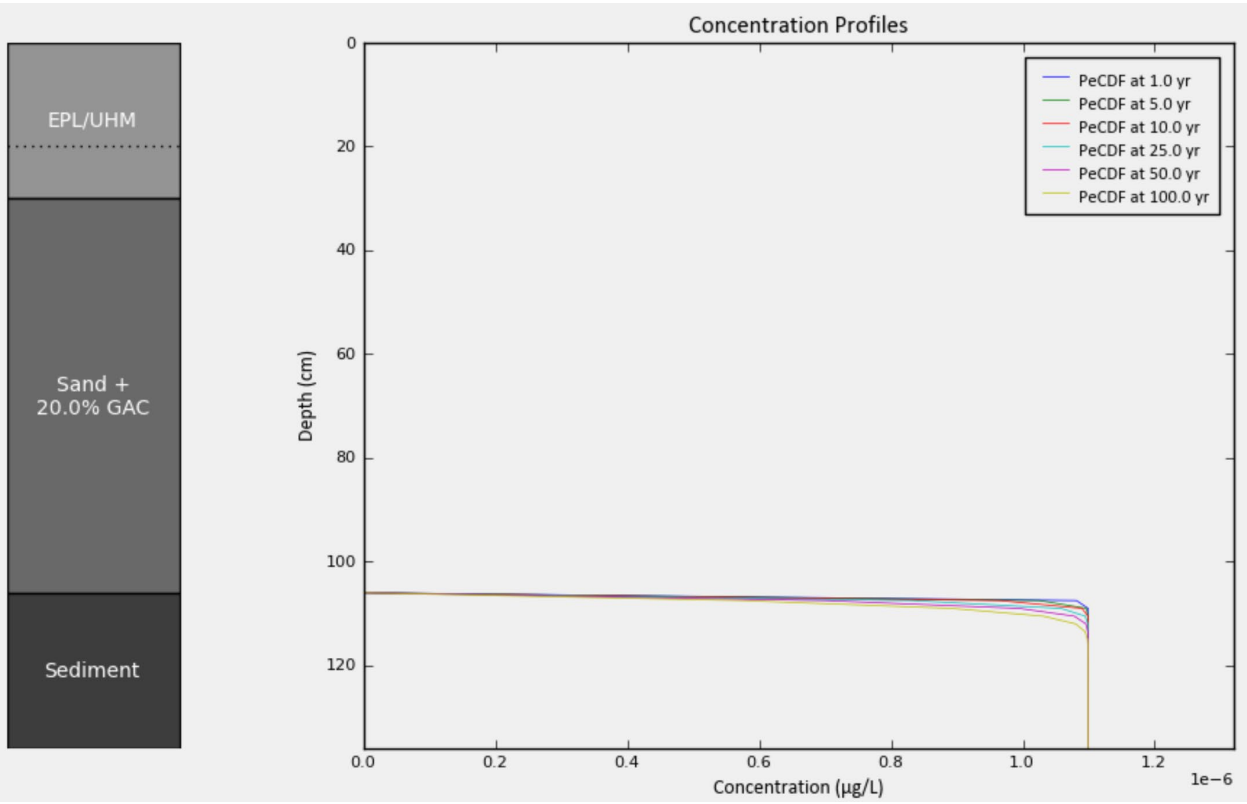

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB183 at 1.0 yr
PCB183 at 5.0 yr
PCB183 at 10.0 yr
PCB183 at 25.0 yr
PCB183 at 50.0 yr
PCB183 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

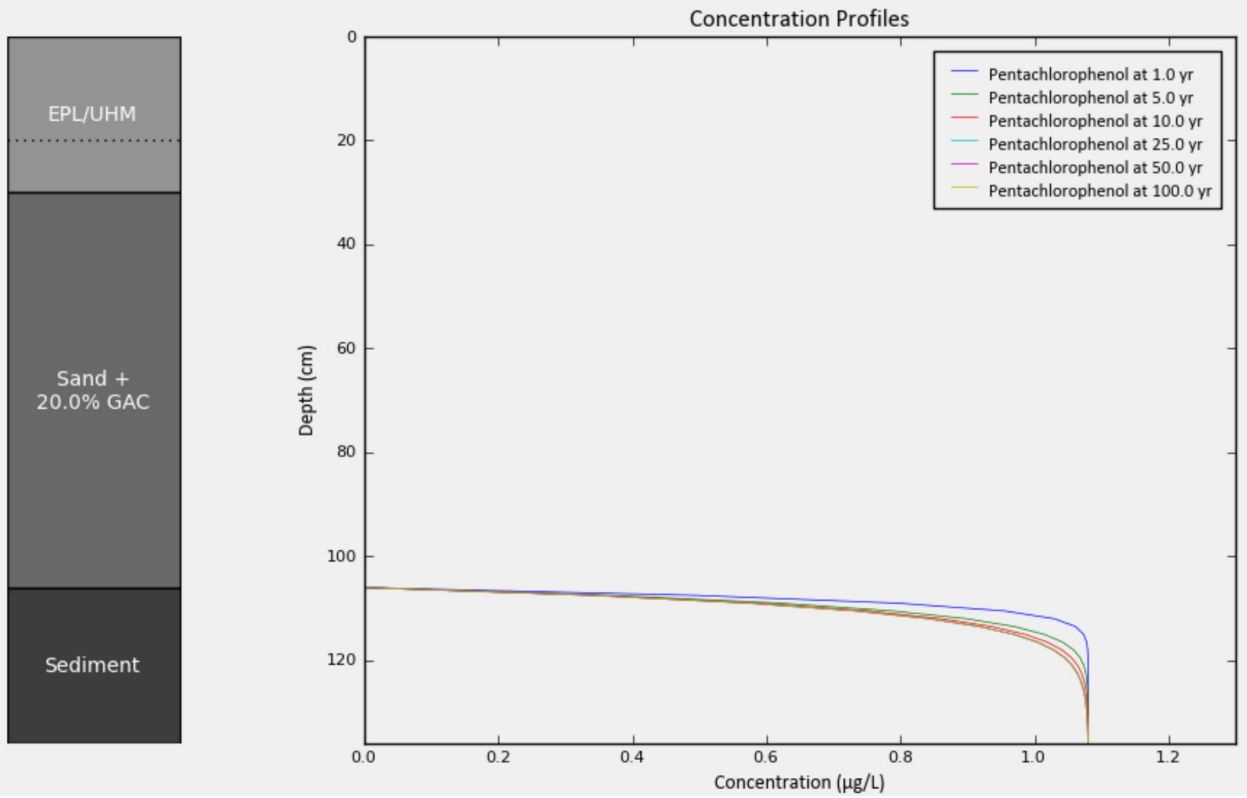

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB199 at 1.0 yr
PCB199 at 5.0 yr
PCB199 at 10.0 yr
PCB199 at 25.0 yr
PCB199 at 50.0 yr
PCB199 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−5
Concentration (µg/L)

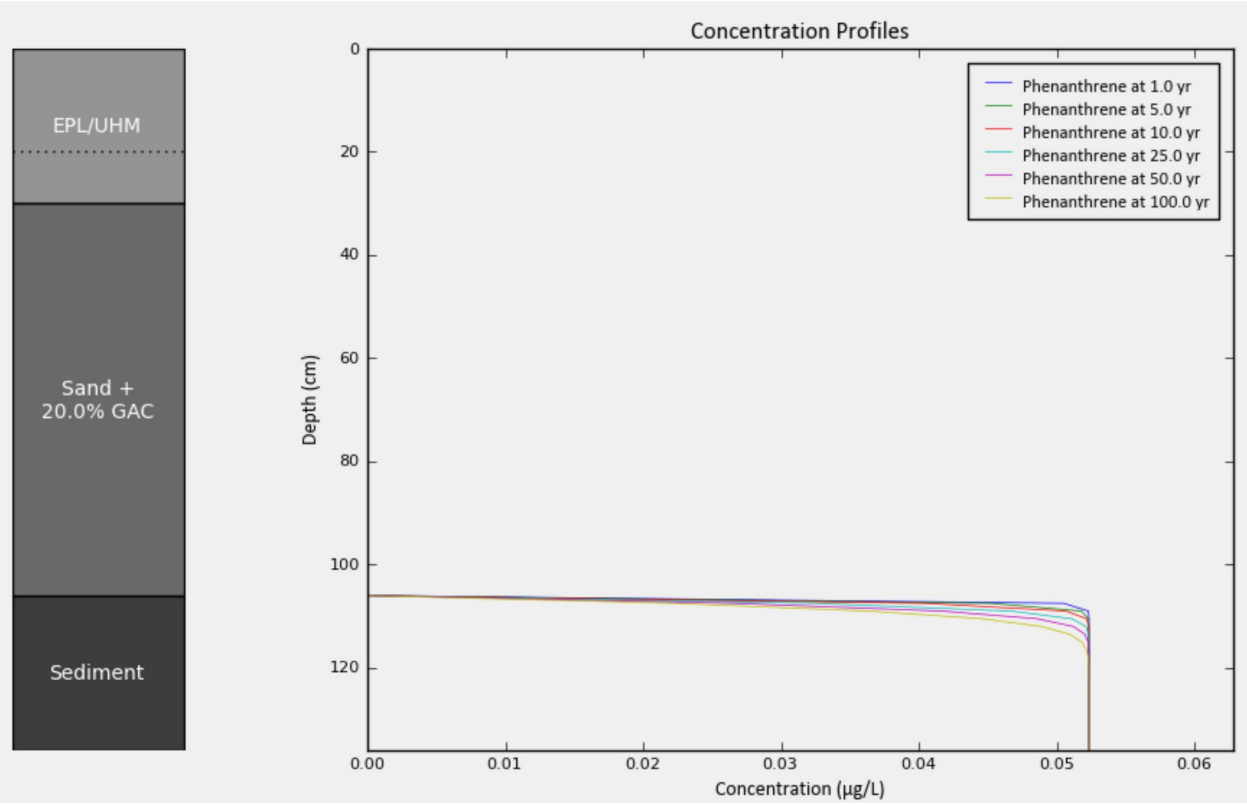

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB206 at 1.0 yr
PCB206 at 5.0 yr
PCB206 at 10.0 yr
PCB206 at 25.0 yr
PCB206 at 50.0 yr
PCB206 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
Concentration (µg/L)
1e−5

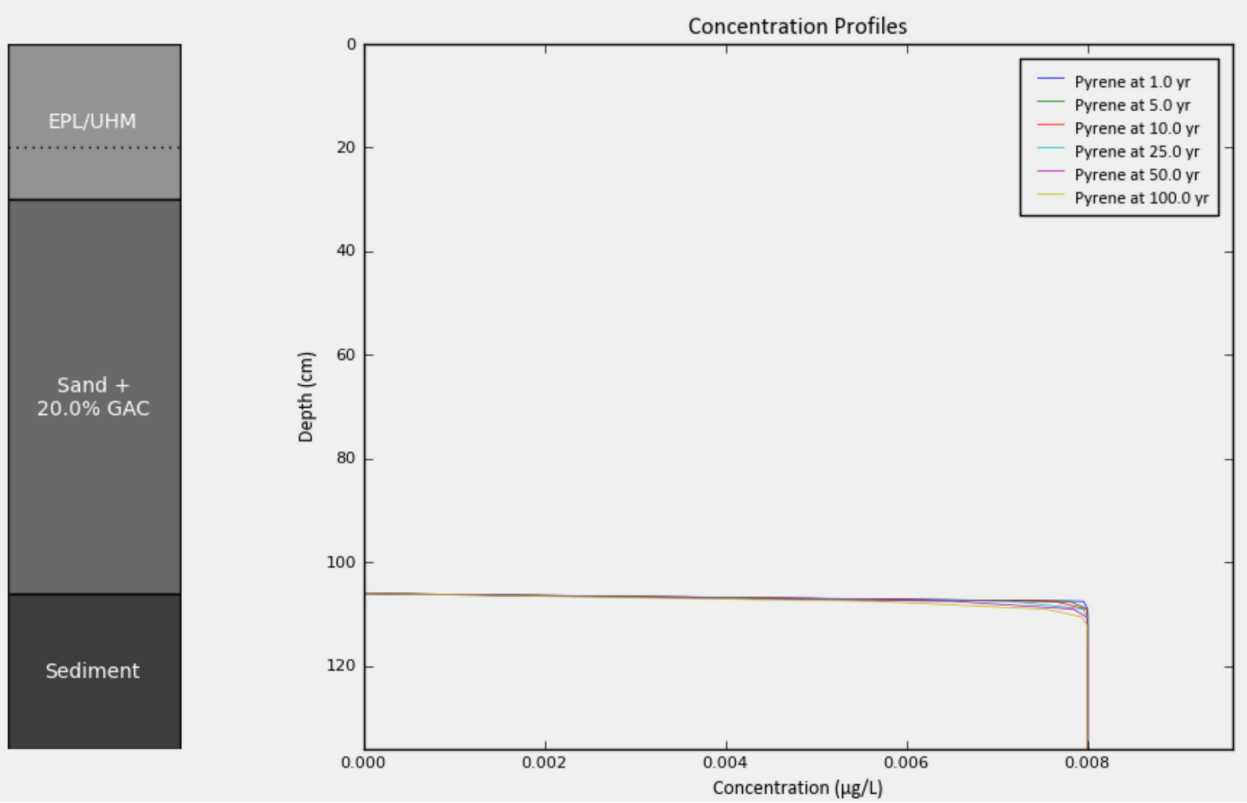

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PCB209 at 1.0 yr
PCB209 at 5.0 yr
PCB209 at 10.0 yr
PCB209 at 25.0 yr
PCB209 at 50.0 yr
PCB209 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
7
8
Concentration (µg/L)
1e−6

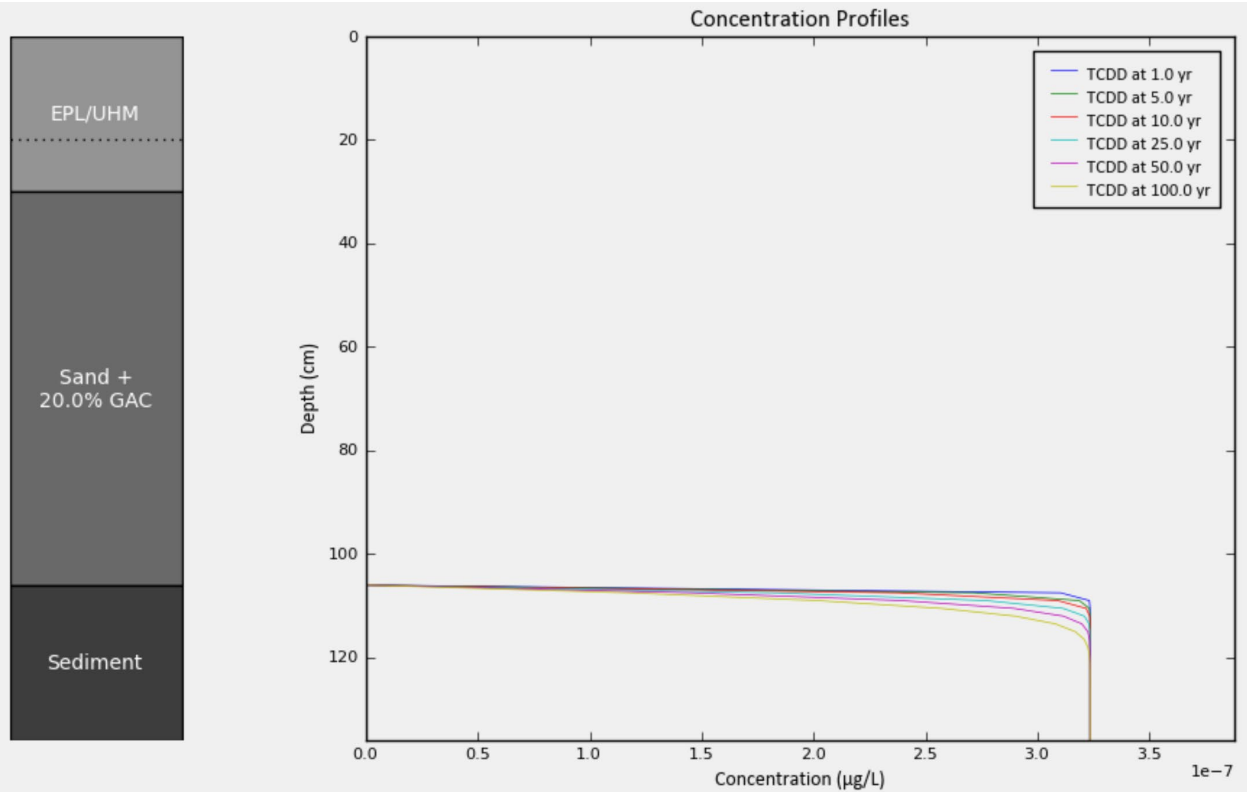

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PeCDD at 1.0 yr
PeCDD at 5.0 yr
PeCDD at 10.0 yr
PeCDD at 25.0 yr
PeCDD at 50.0 yr
PeCDD at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−7
Concentration (µg/L)

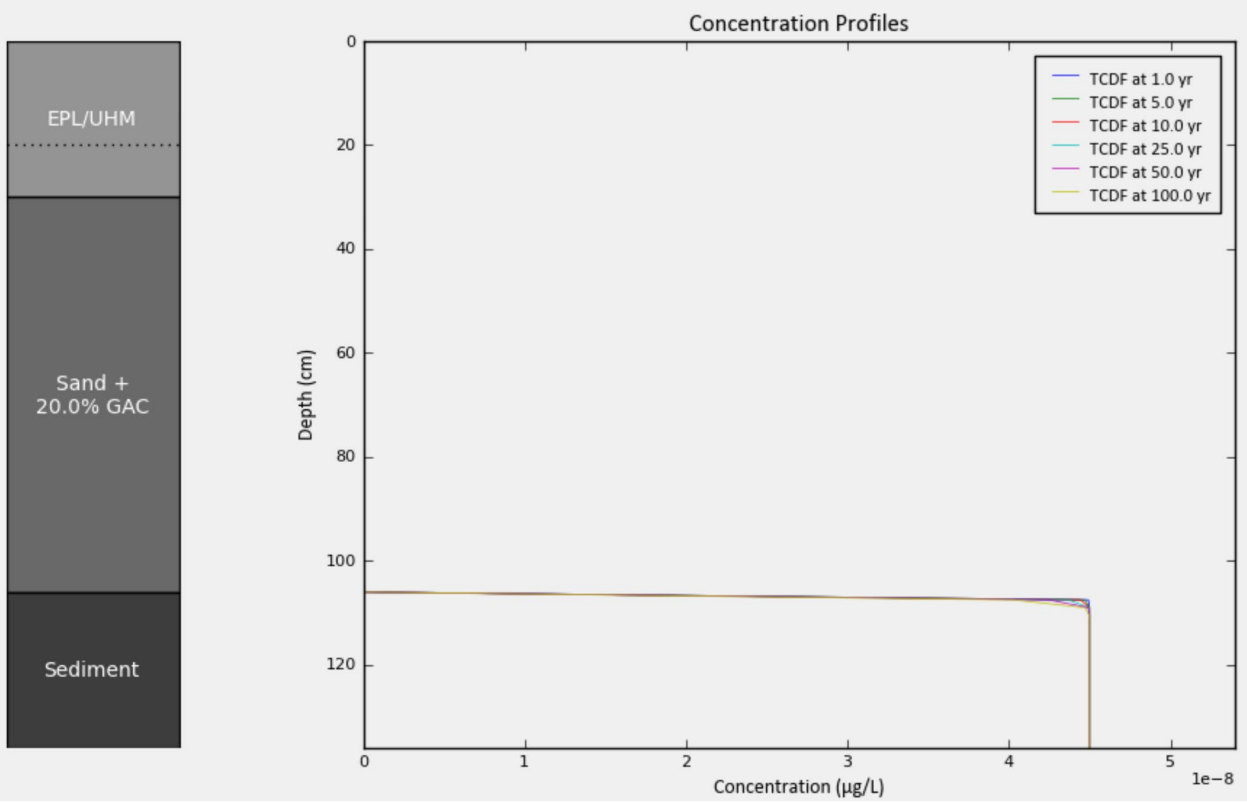

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
PeCDF at 1.0 yr
PeCDF at 5.0 yr
PeCDF at 10.0 yr
PeCDF at 25.0 yr
PeCDF at 50.0 yr
PeCDF at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e−6
Concentration (µg/L)

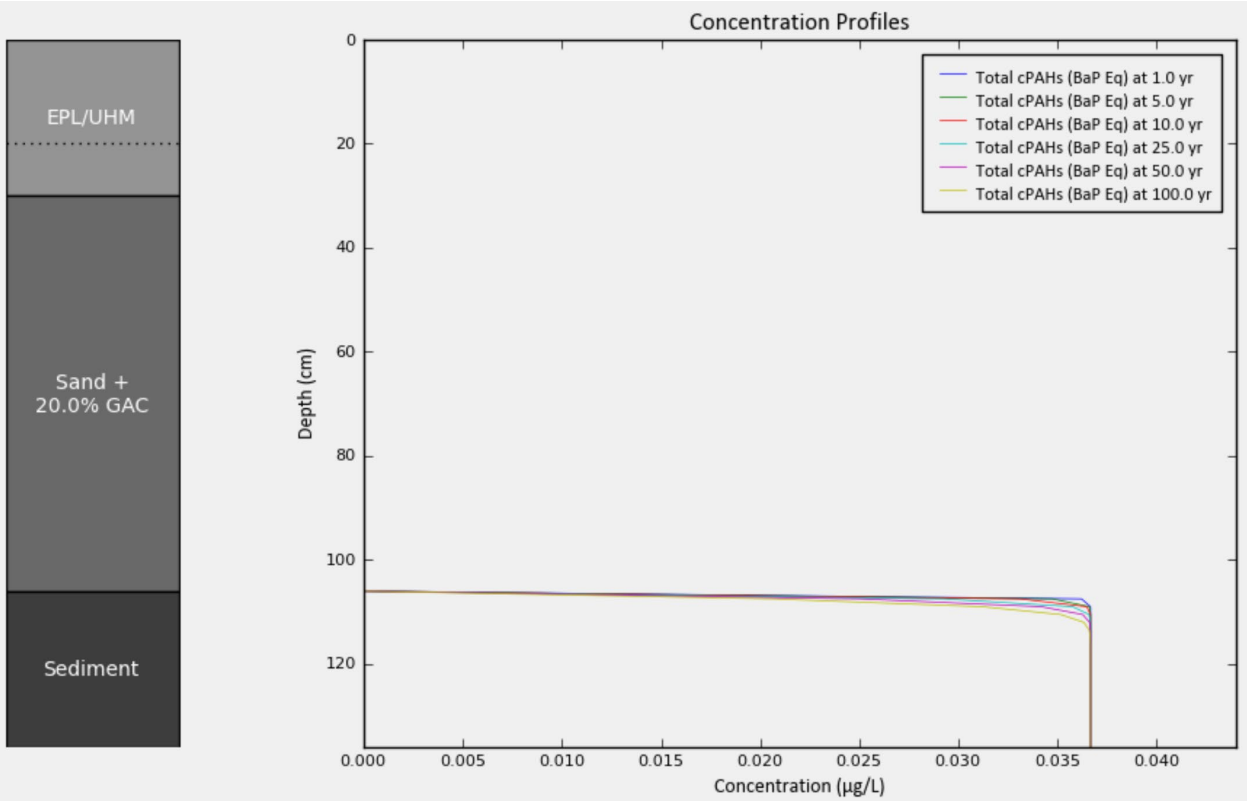

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Pentachlorophenol at 1.0 yr
Pentachlorophenol at 5.0 yr
Pentachlorophenol at 10.0 yr
Pentachlorophenol at 25.0 yr
Pentachlorophenol at 50.0 yr
Pentachlorophenol at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Concentration (µg/L)

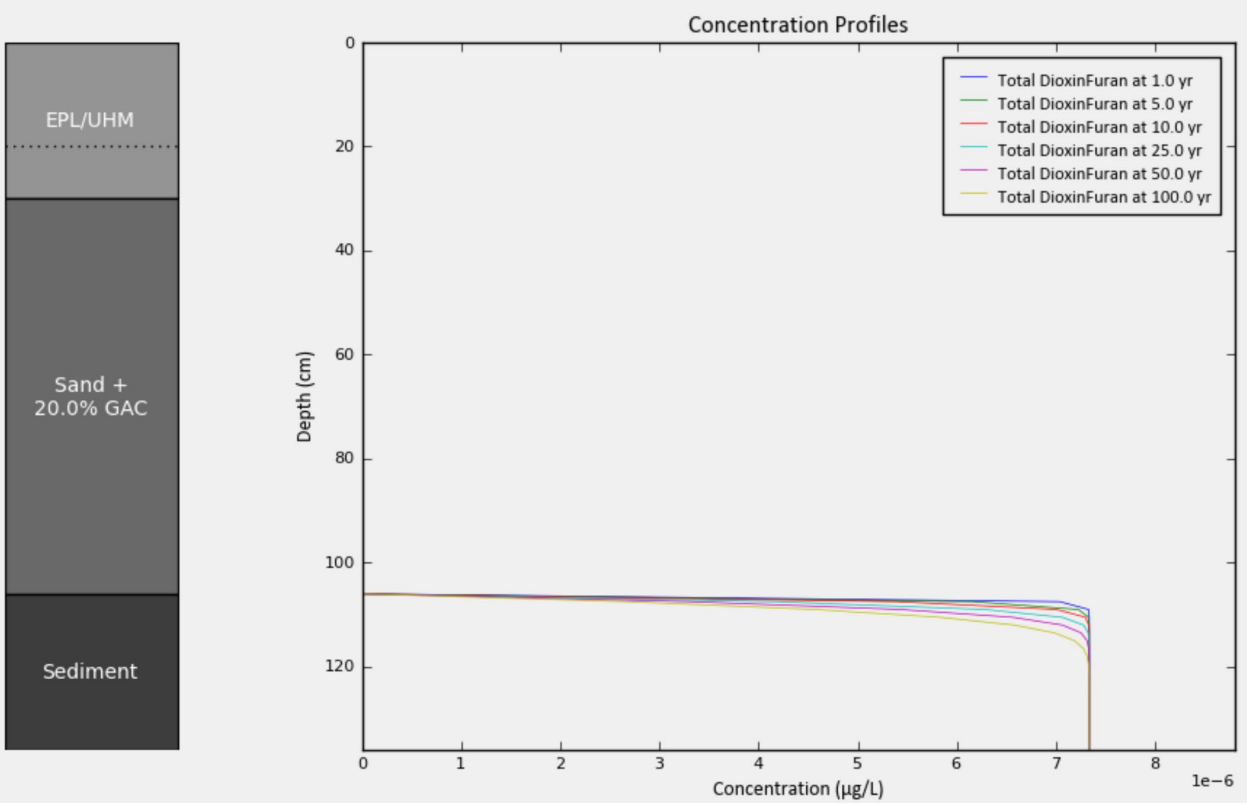

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Phenanthrene at 1.0 yr
Phenanthrene at 5.0 yr
Phenanthrene at 10.0 yr
Phenanthrene at 25.0 yr
Phenanthrene at 50.0 yr
Phenanthrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.00
0.01
0.02
0.03
0.04
0.05
0.06
Concentration (µg/L)

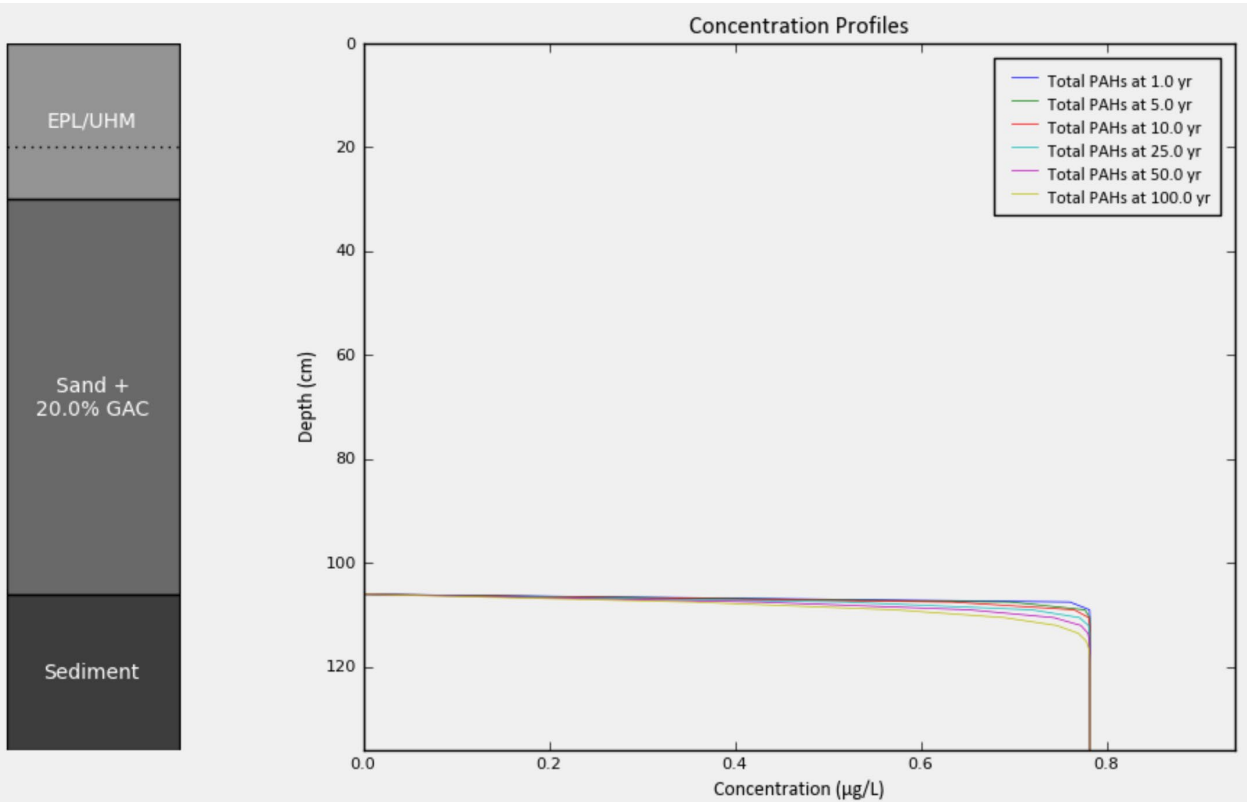

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Pyrene at 1.0 yr
Pyrene at 5.0 yr
Pyrene at 10.0 yr
Pyrene at 25.0 yr
Pyrene at 50.0 yr
Pyrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
Concentration (µg/L)

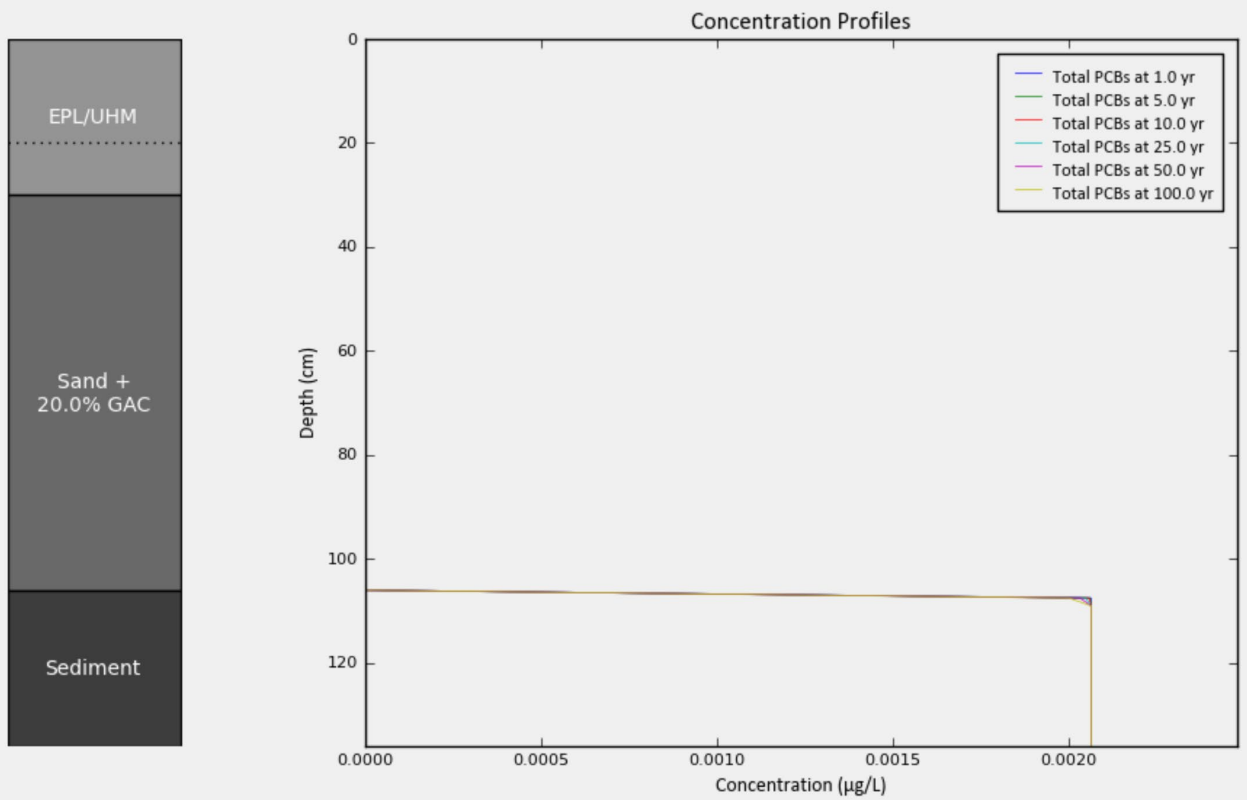

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
TCDD at 1.0 yr
TCDD at 5.0 yr
TCDD at 10.0 yr
TCDD at 25.0 yr
TCDD at 50.0 yr
TCDD at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e−7
Concentration (µg/L)

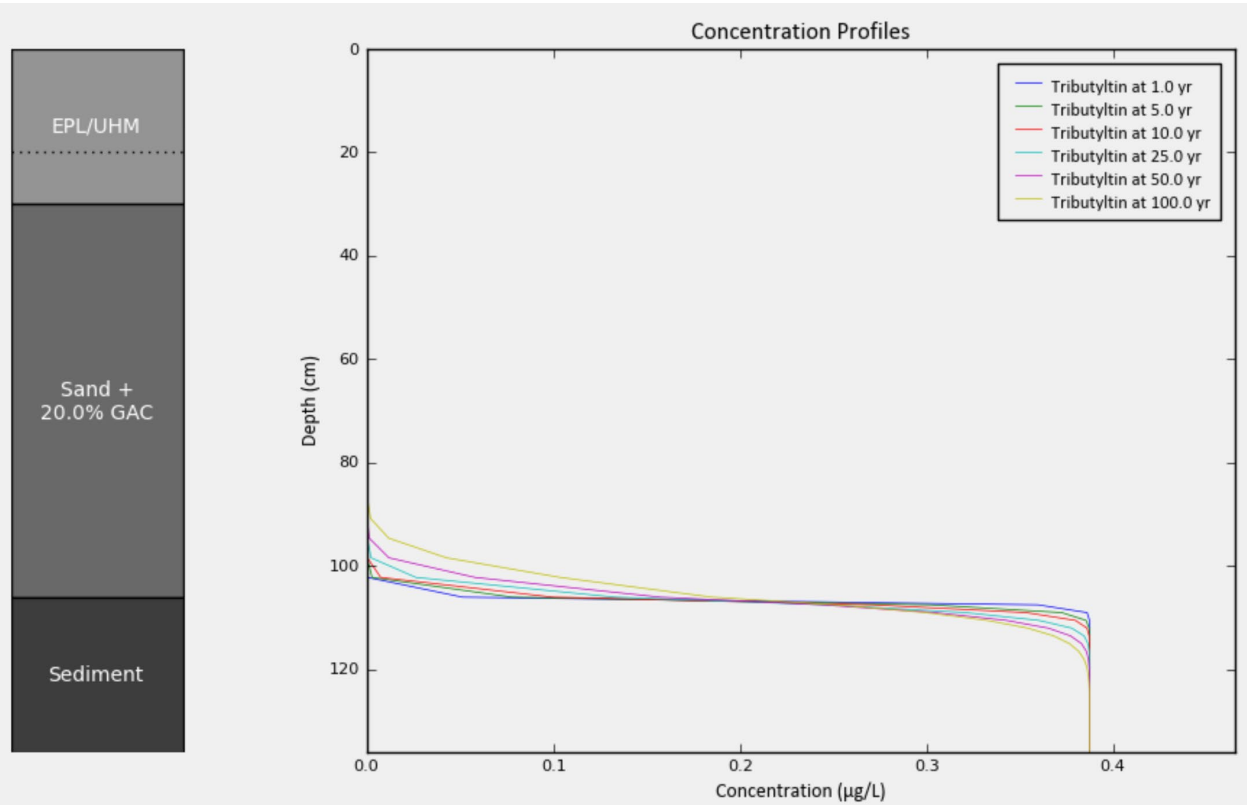

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
TCDF at 1.0 yr
TCDF at 5.0 yr
TCDF at 10.0 yr
TCDF at 25.0 yr
TCDF at 50.0 yr
TCDF at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
1e−8
Concentration (µg/L)

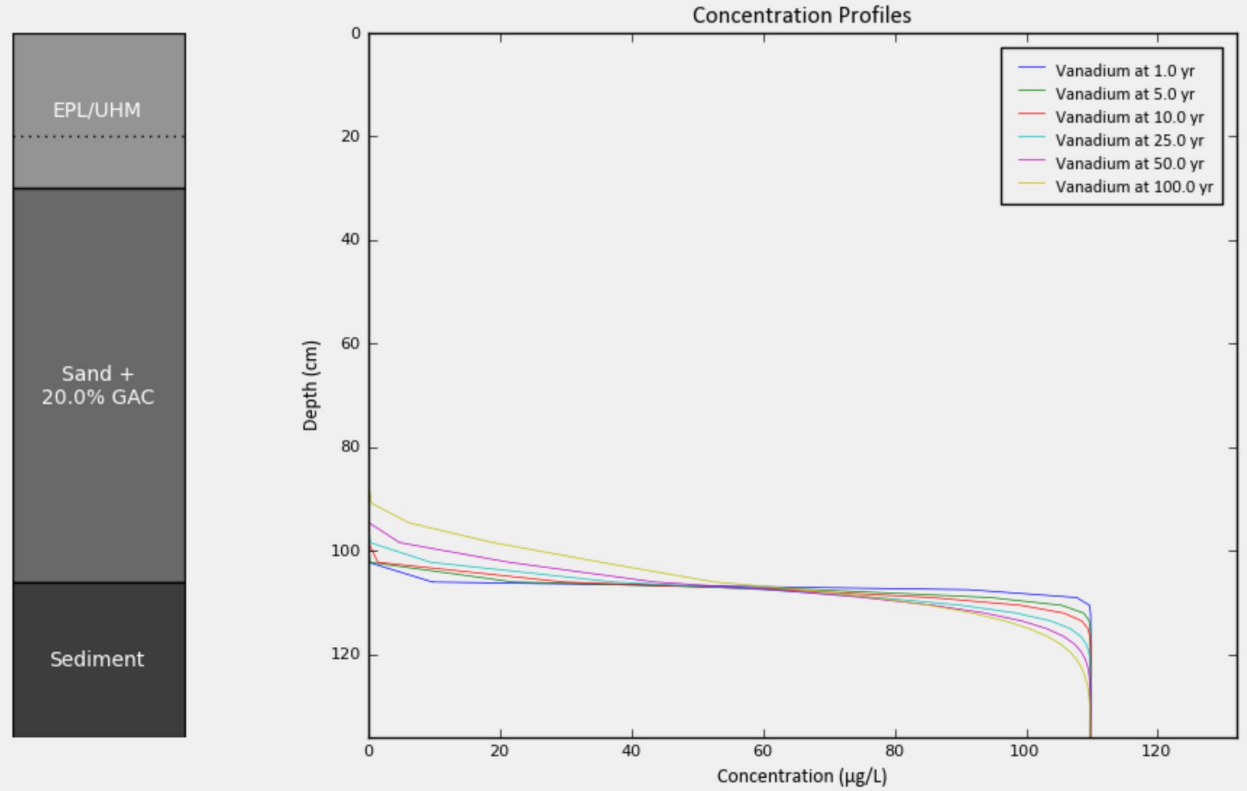

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Total cPAHs (BaP Eq) at 1.0 yr
Total cPAHs (BaP Eq) at 5.0 yr
Total cPAHs (BaP Eq) at 10.0 yr
Total cPAHs (BaP Eq) at 25.0 yr
Total cPAHs (BaP Eq) at 50.0 yr
Total cPAHs (BaP Eq) at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040
Concentration (µg/L)

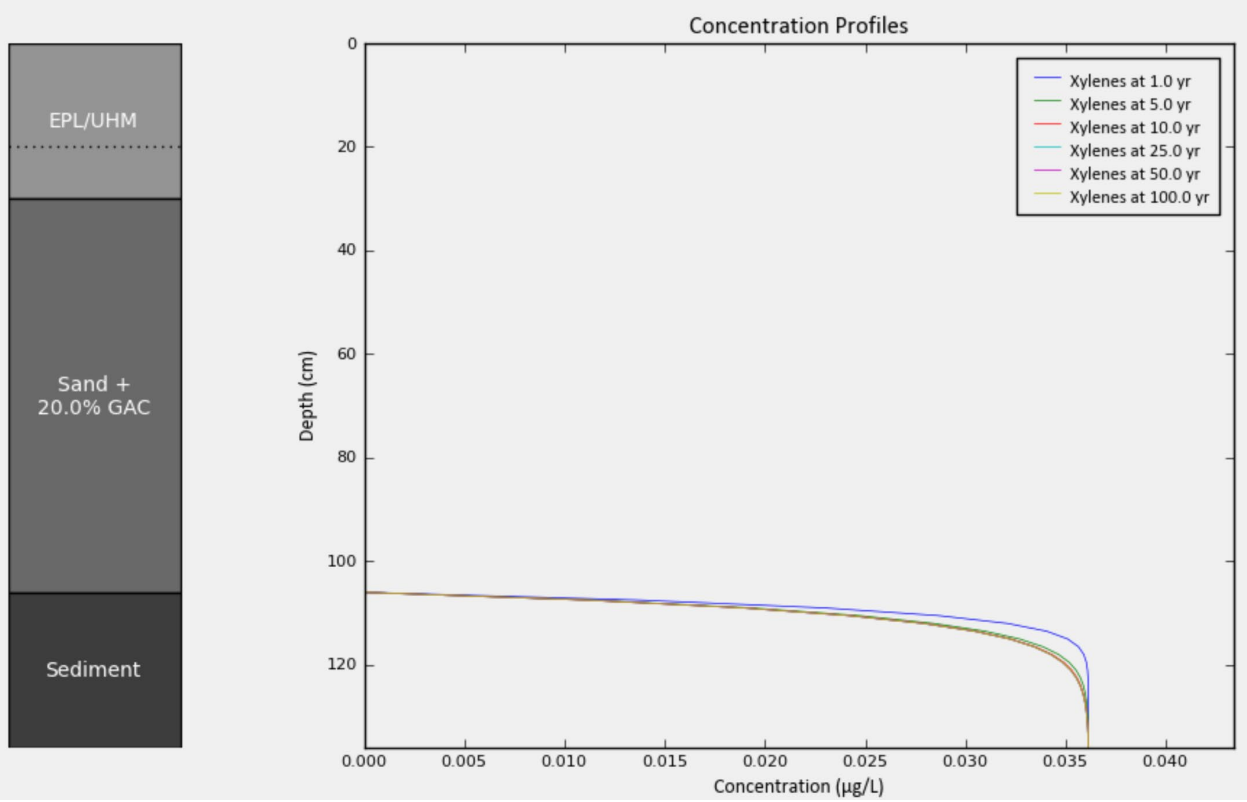

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Total DioxinFuran at 1.0 yr
Total DioxinFuran at 5.0 yr
Total DioxinFuran at 10.0 yr
Total DioxinFuran at 25.0 yr
Total DioxinFuran at 50.0 yr
Total DioxinFuran at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
7
8
1e−6
Concentration (µg/L)

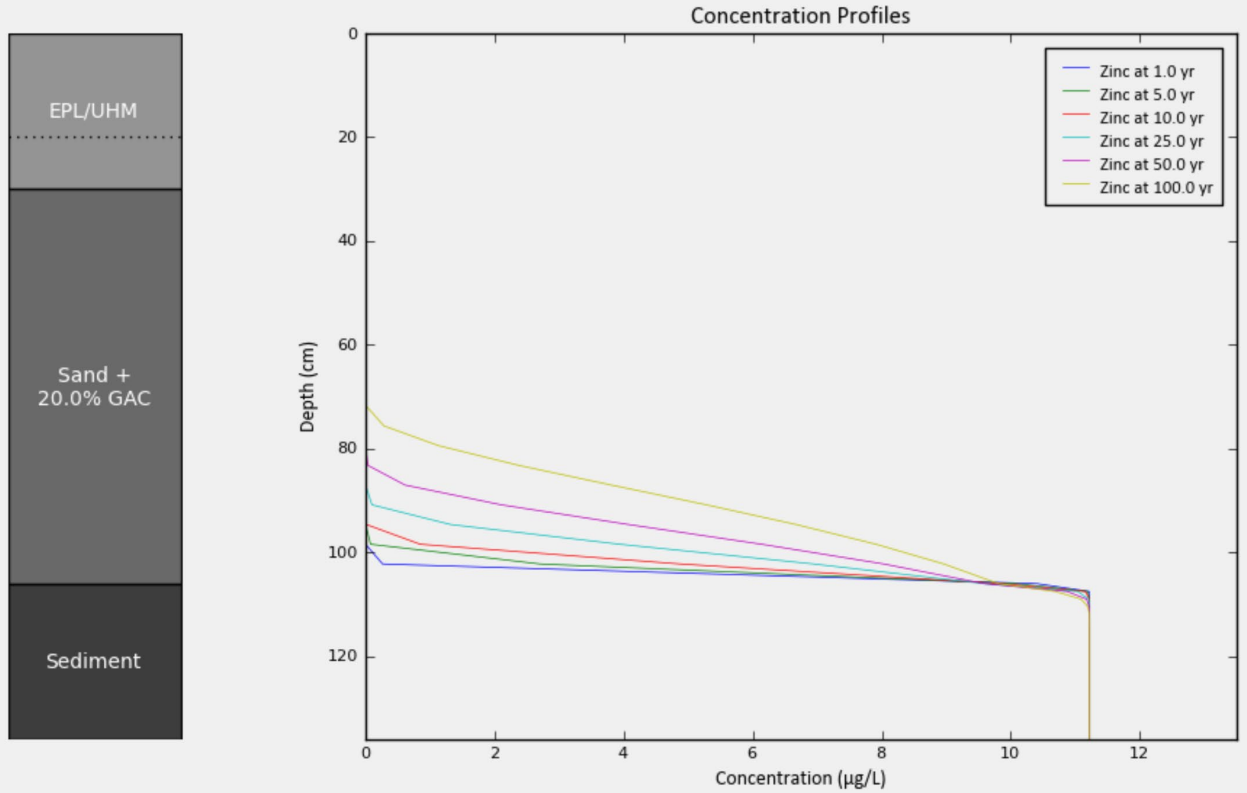

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Total PAHs at 1.0 yr
Total PAHs at 5.0 yr
Total PAHs at 10.0 yr
Total PAHs at 25.0 yr
Total PAHs at 50.0 yr
Total PAHs at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
Concentration (µg/L)


EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Total PCBs at 1.0 yr
Total PCBs at 5.0 yr
Total PCBs at 10.0 yr
Total PCBs at 25.0 yr
Total PCBs at 50.0 yr
Total PCBs at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

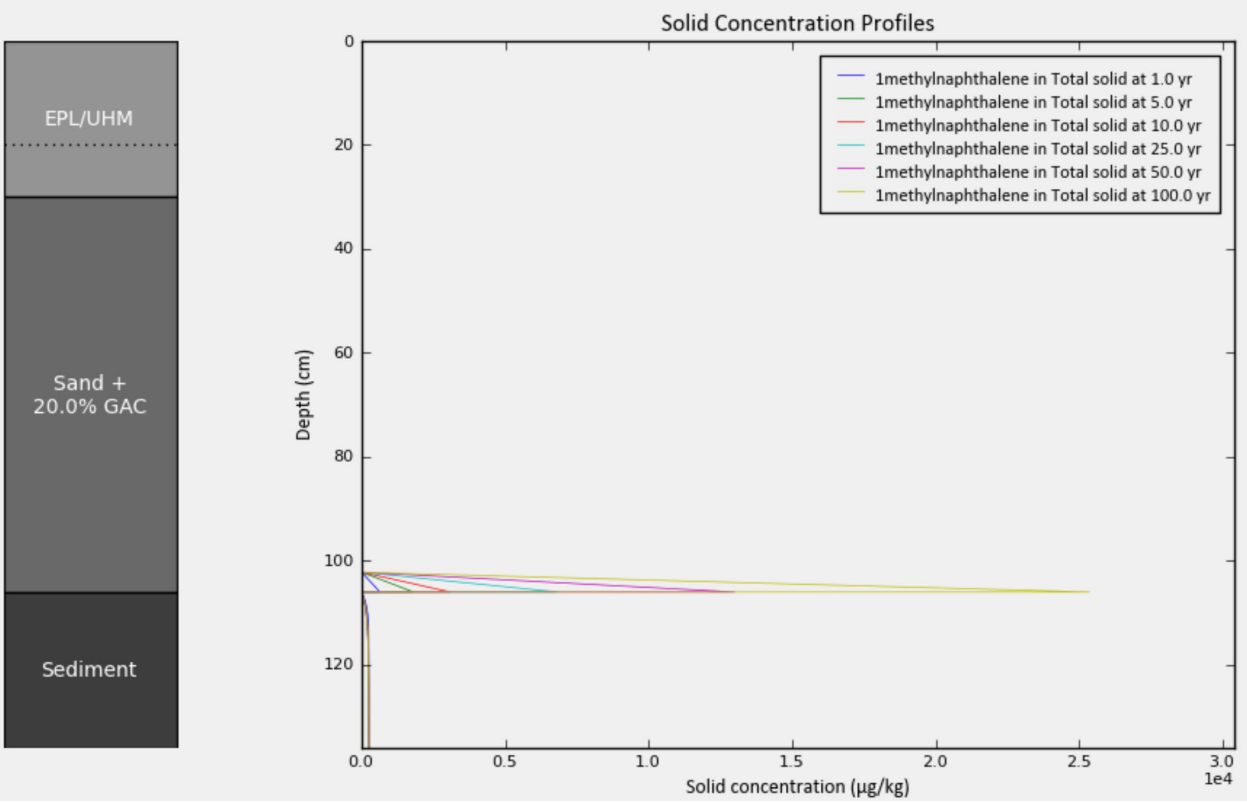

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Tributyltin at 1.0 yr
Tributyltin at 5.0 yr
Tributyltin at 10.0 yr
Tributyltin at 25.0 yr
Tributyltin at 50.0 yr
Tributyltin at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.1
0.2
0.3
0.4
Concentration (µg/L)

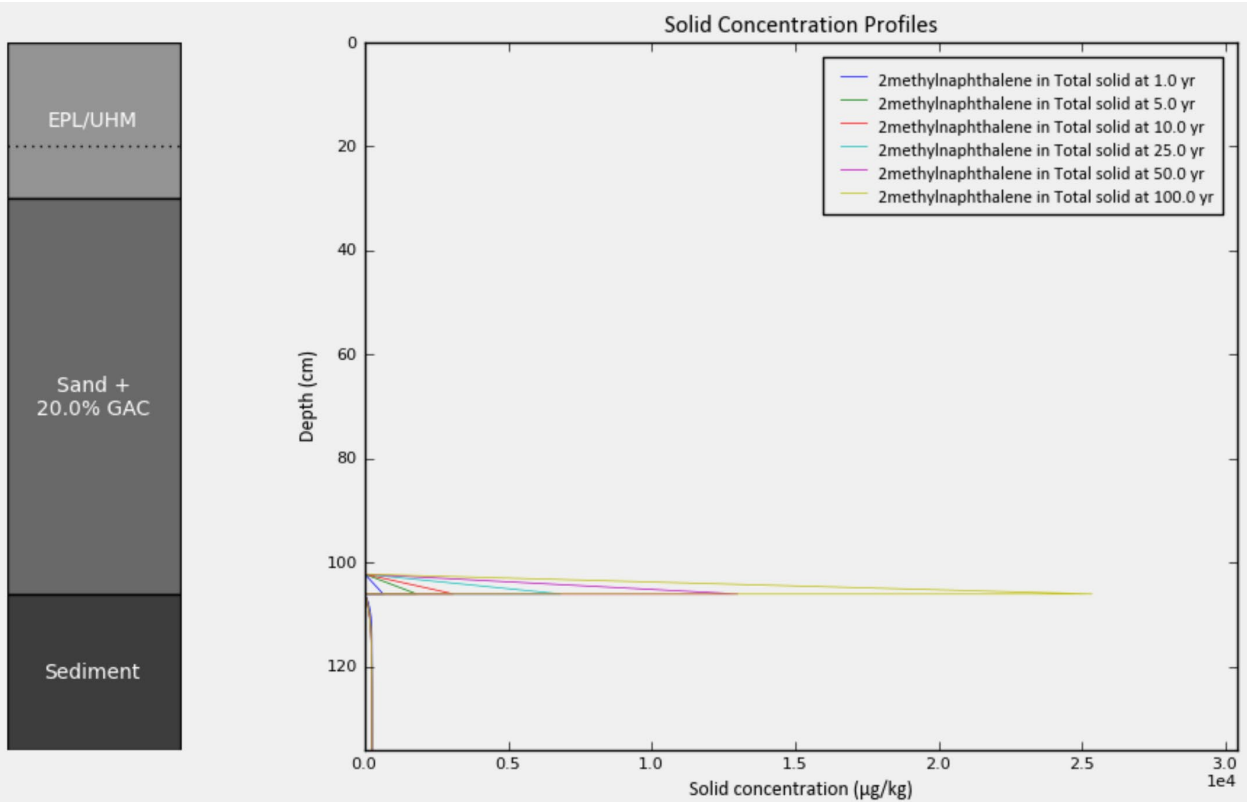

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Vanadium at 1.0 yr
Vanadium at 5.0 yr
Vanadium at 10.0 yr
Vanadium at 25.0 yr
Vanadium at 50.0 yr
Vanadium at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120

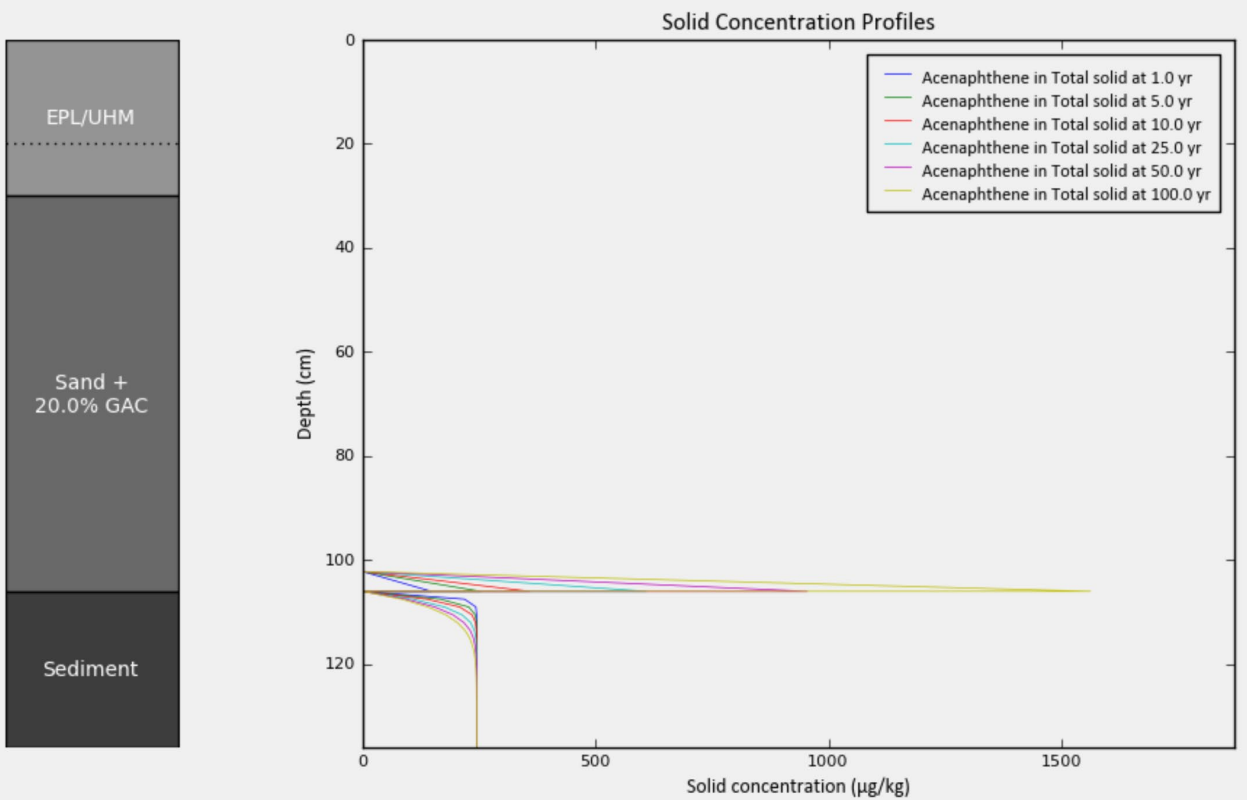

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Xylenes at 1.0 yr
Xylenes at 5.0 yr
Xylenes at 10.0 yr
Xylenes at 25.0 yr
Xylenes at 50.0 yr
Xylenes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040

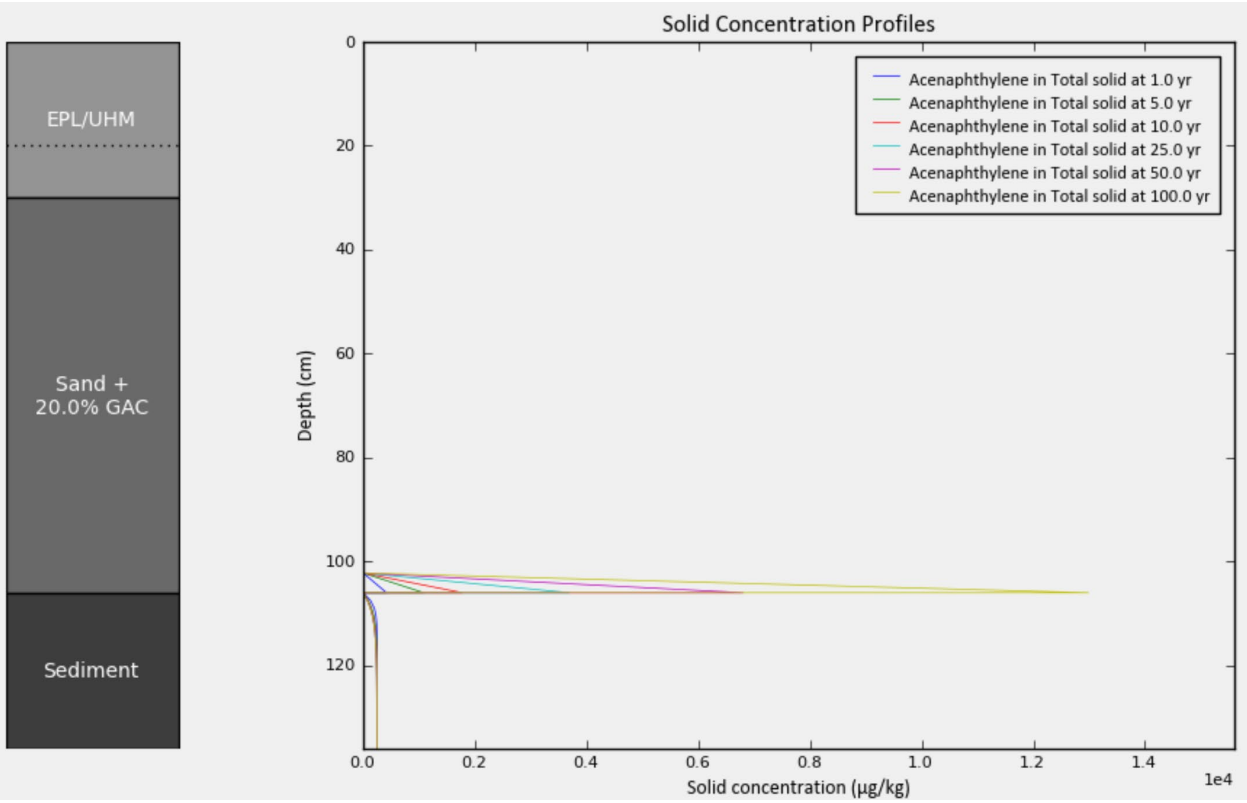

EPL/UHM
Sand +
20.0% GAC
Sediment
Concentration Profiles
Zinc at 1.0 yr
Zinc at 5.0 yr
Zinc at 10.0 yr
Zinc at 25.0 yr
Zinc at 50.0 yr
Zinc at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
2
4
6
8
10
12
Concentration (µg/L)

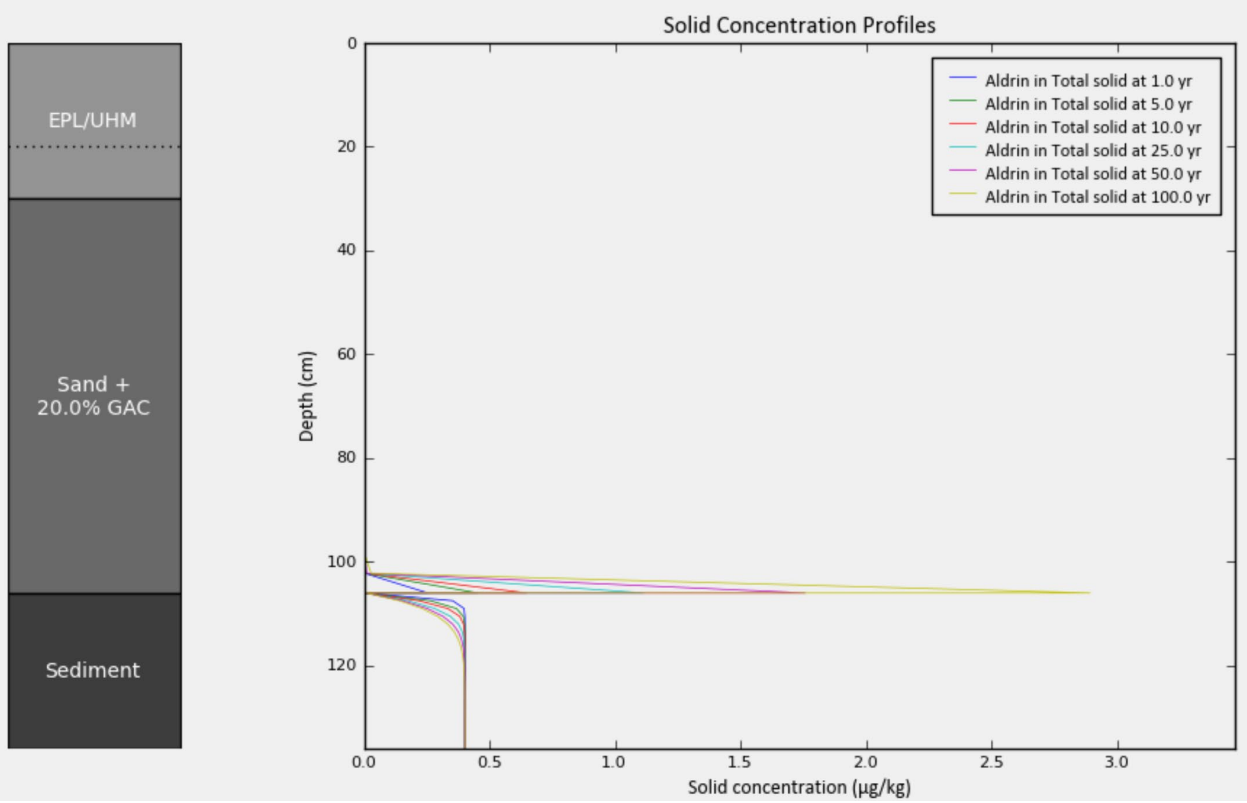
Total Solids Concentration – Depth

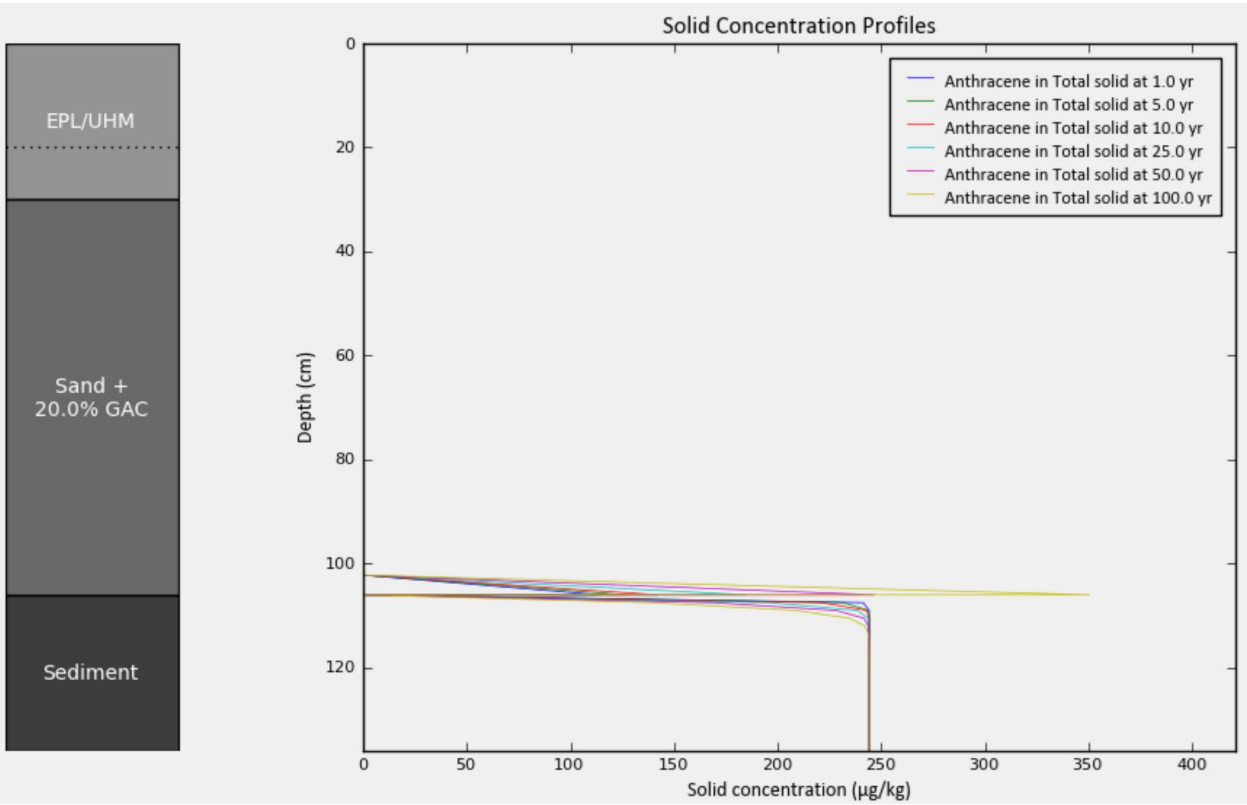


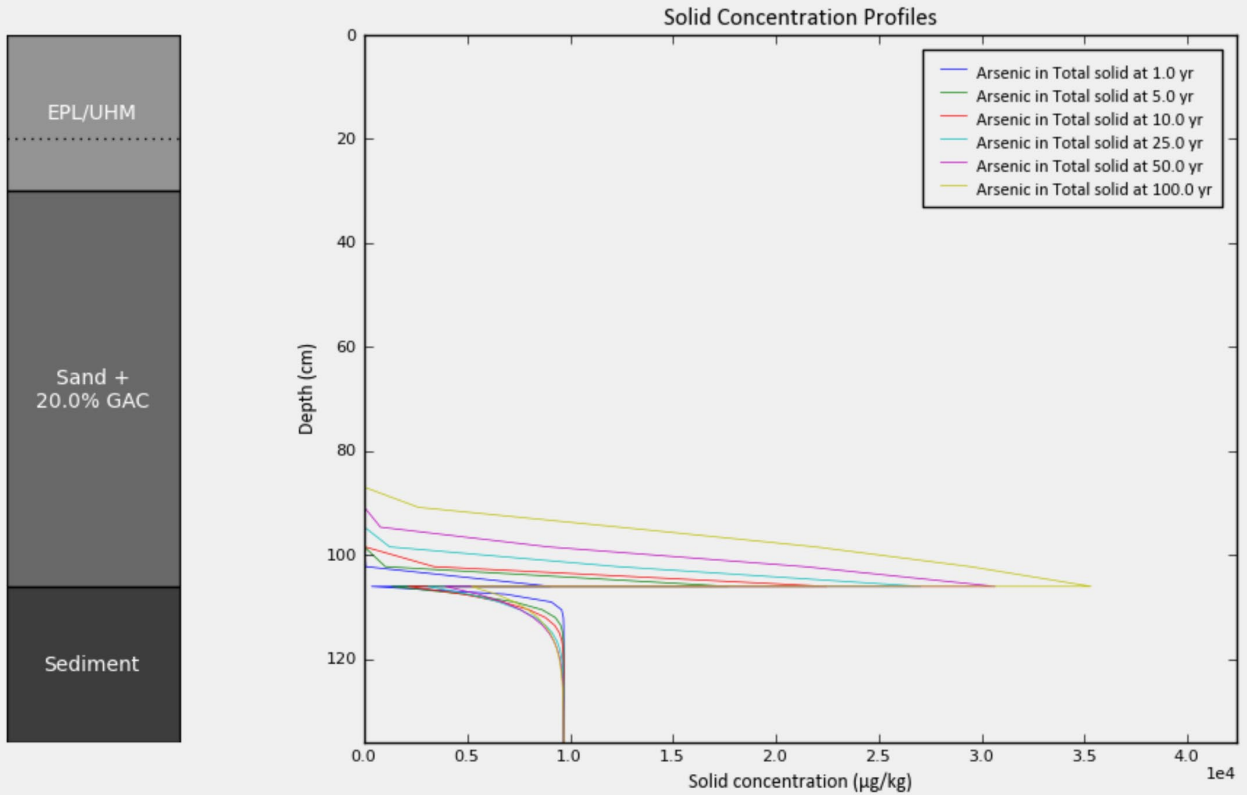


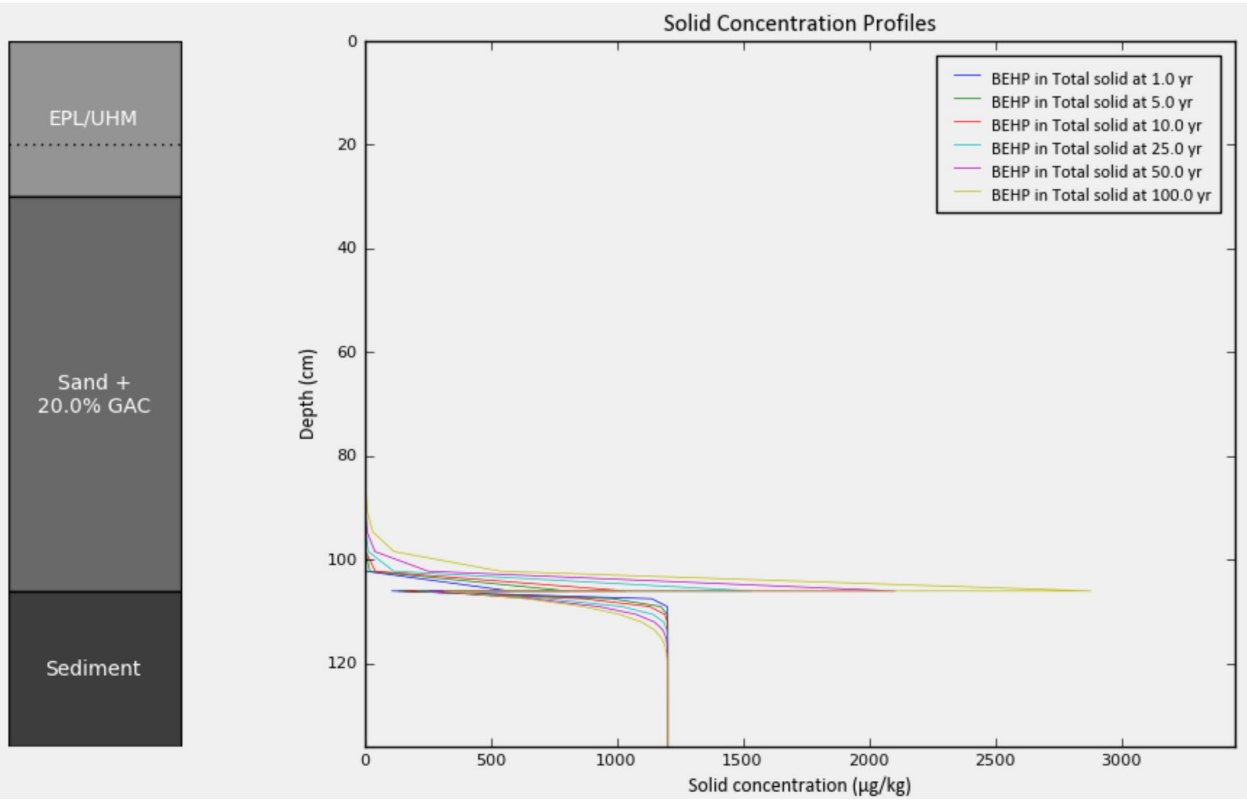

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Acenaphthene in Total solid at 1.0 yr
Acenaphthene in Total solid at 5.0 yr
Acenaphthene in Total solid at 10.0 yr
Acenaphthene in Total solid at 25.0 yr
Acenaphthene in Total solid at 50.0 yr
Acenaphthene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
500
1000
1500
Solid concentration (µg/kg)

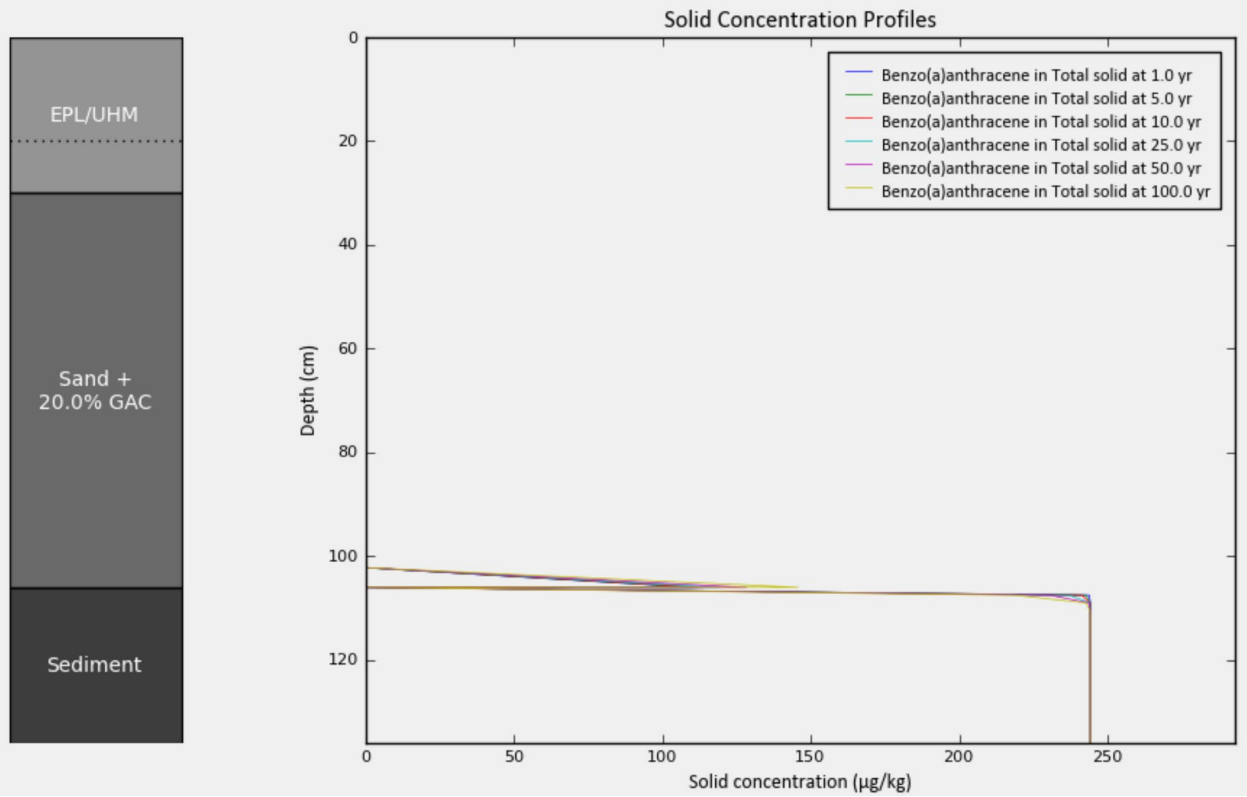

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Acenaphthylene in Total solid at 1.0 yr
Acenaphthylene in Total solid at 5.0 yr
Acenaphthylene in Total solid at 10.0 yr
Acenaphthylene in Total solid at 25.0 yr
Acenaphthylene in Total solid at 50.0 yr
Acenaphthylene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1e4
Solid concentration (µg/kg)

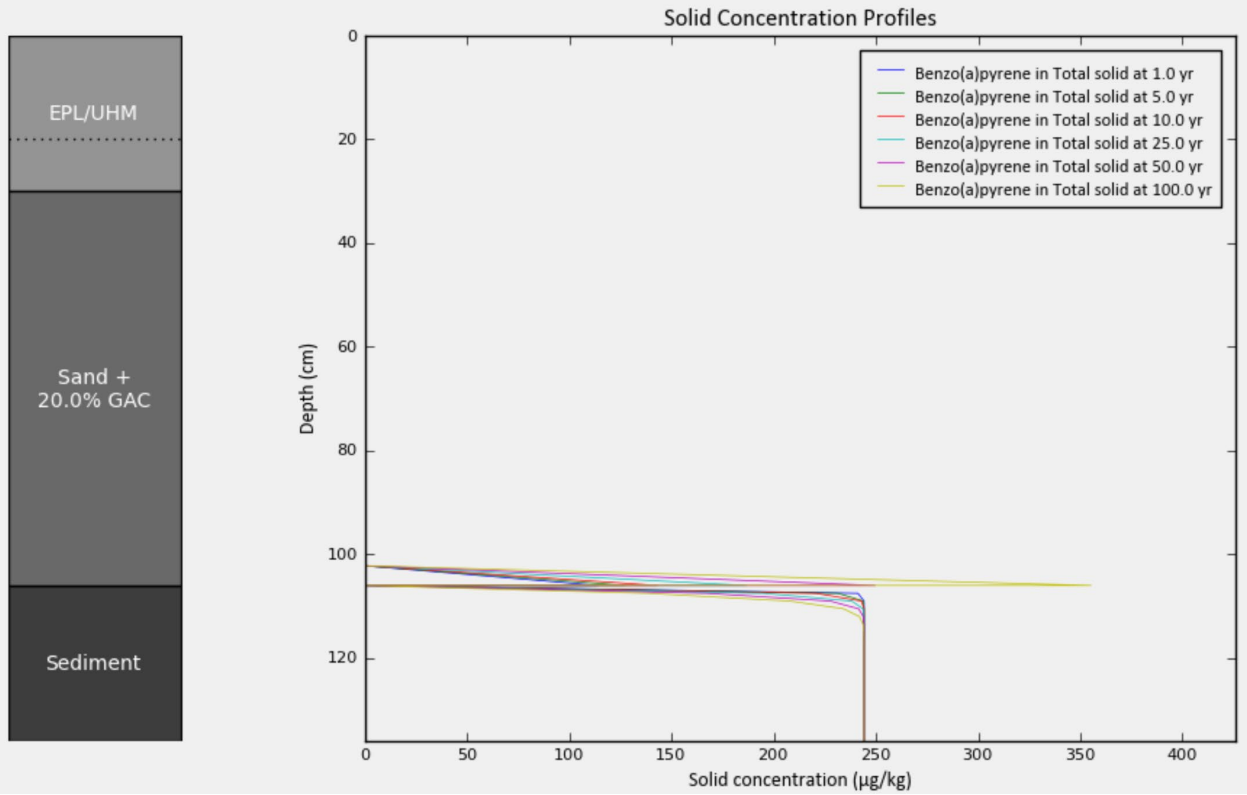

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Aldrin in Total solid at 1.0 yr
Aldrin in Total solid at 5.0 yr
Aldrin in Total solid at 10.0 yr
Aldrin in Total solid at 25.0 yr
Aldrin in Total solid at 50.0 yr
Aldrin in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Solid concentration (µg/kg)

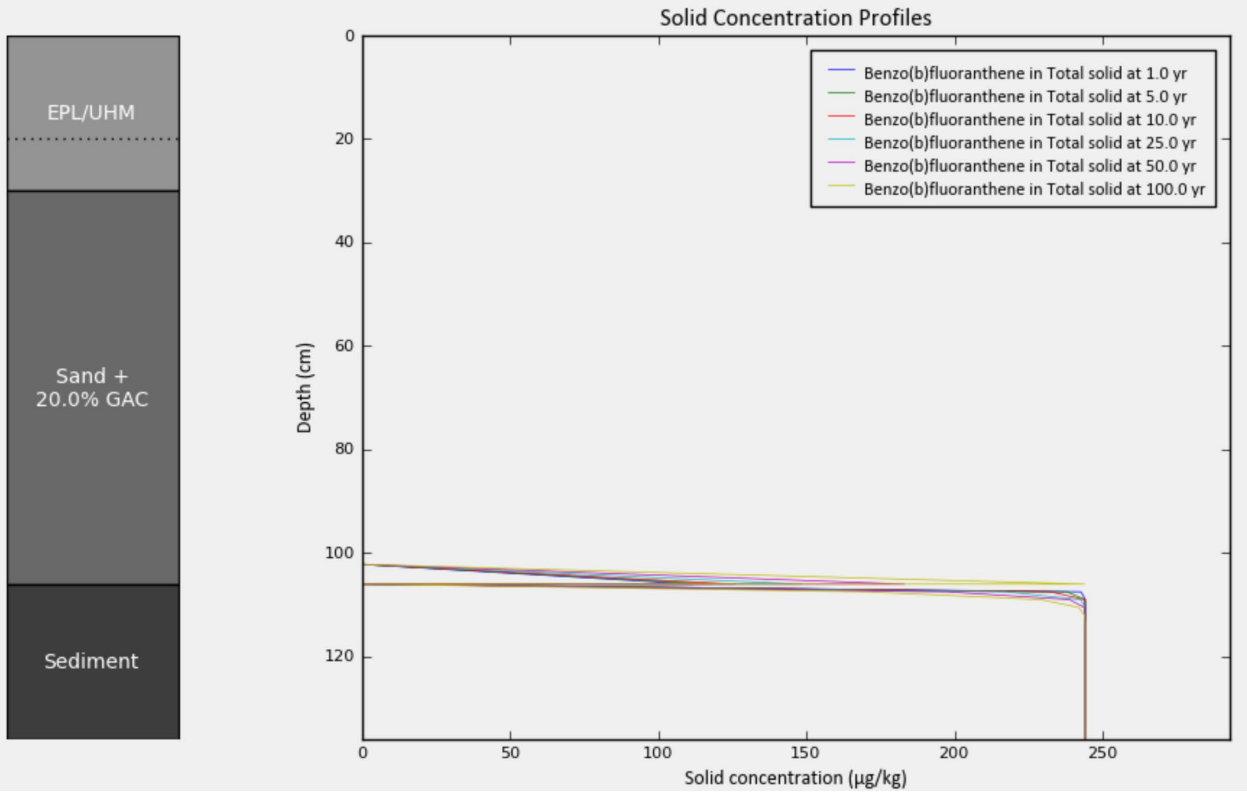

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Anthracene in Total solid at 1.0 yr
Anthracene in Total solid at 5.0 yr
Anthracene in Total solid at 10.0 yr
Anthracene in Total solid at 25.0 yr
Anthracene in Total solid at 50.0 yr
Anthracene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
300
350
400
Solid concentration (µg/kg)

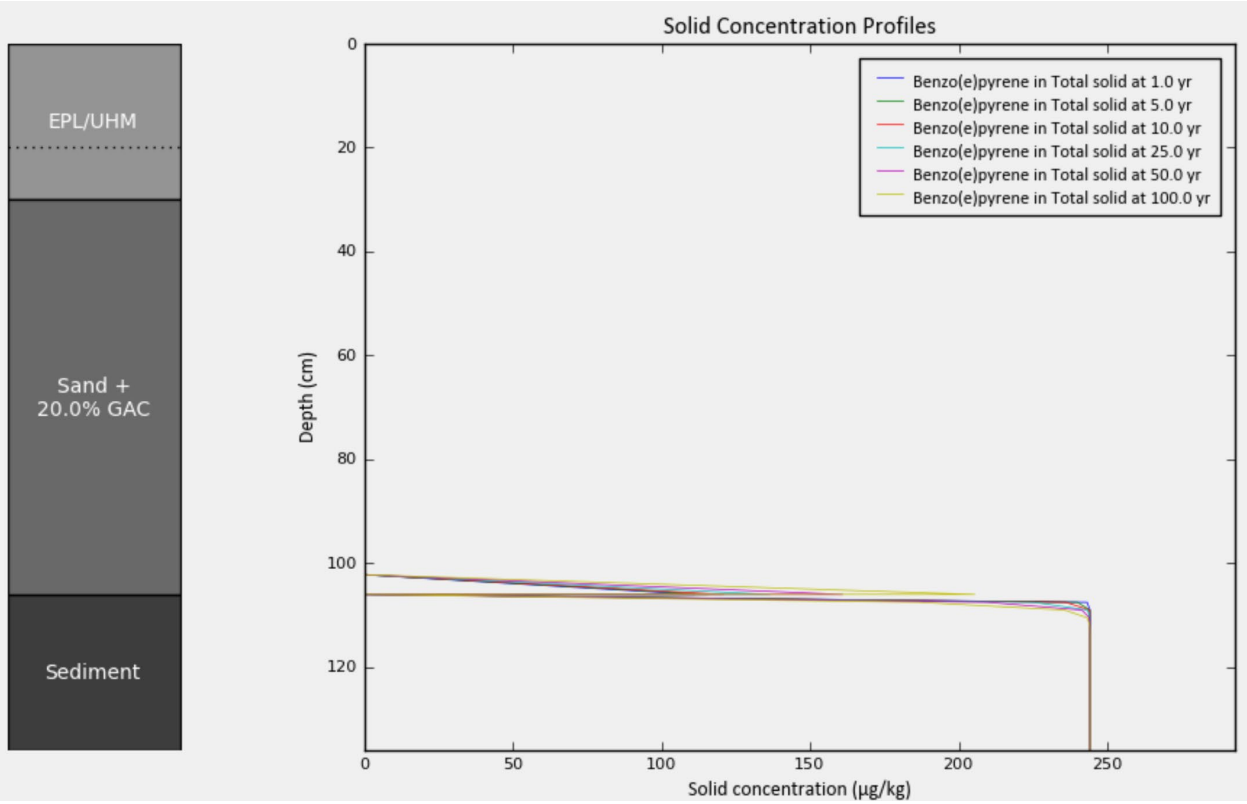

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Arsenic in Total solid at 1.0 yr
Arsenic in Total solid at 5.0 yr
Arsenic in Total solid at 10.0 yr
Arsenic in Total solid at 25.0 yr
Arsenic in Total solid at 50.0 yr
Arsenic in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
1e4
Solid concentration (µg/kg)

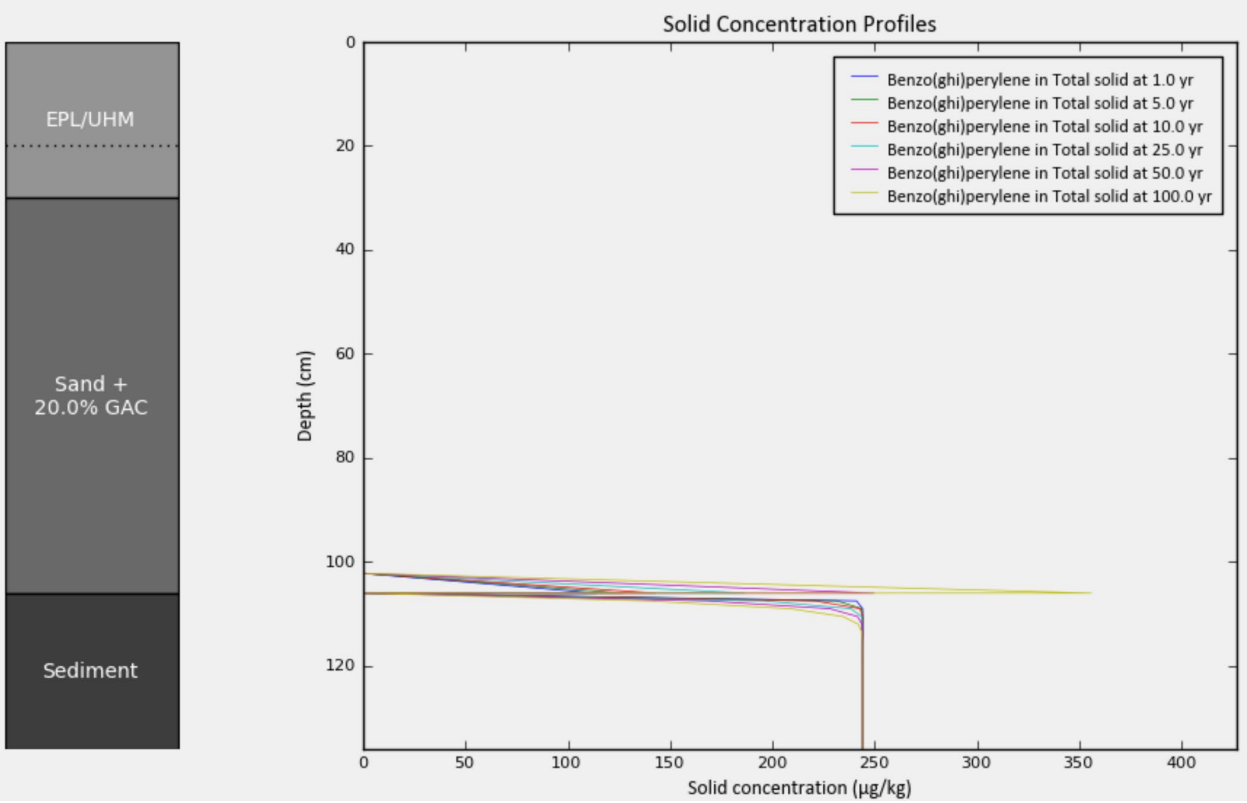

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
BEHP in Total solid at 1.0 yr
BEHP in Total solid at 5.0 yr
BEHP in Total solid at 10.0 yr
BEHP in Total solid at 25.0 yr
BEHP in Total solid at 50.0 yr
BEHP in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
500
1000
1500
2000
2500
3000
Solid concentration (µg/kg)

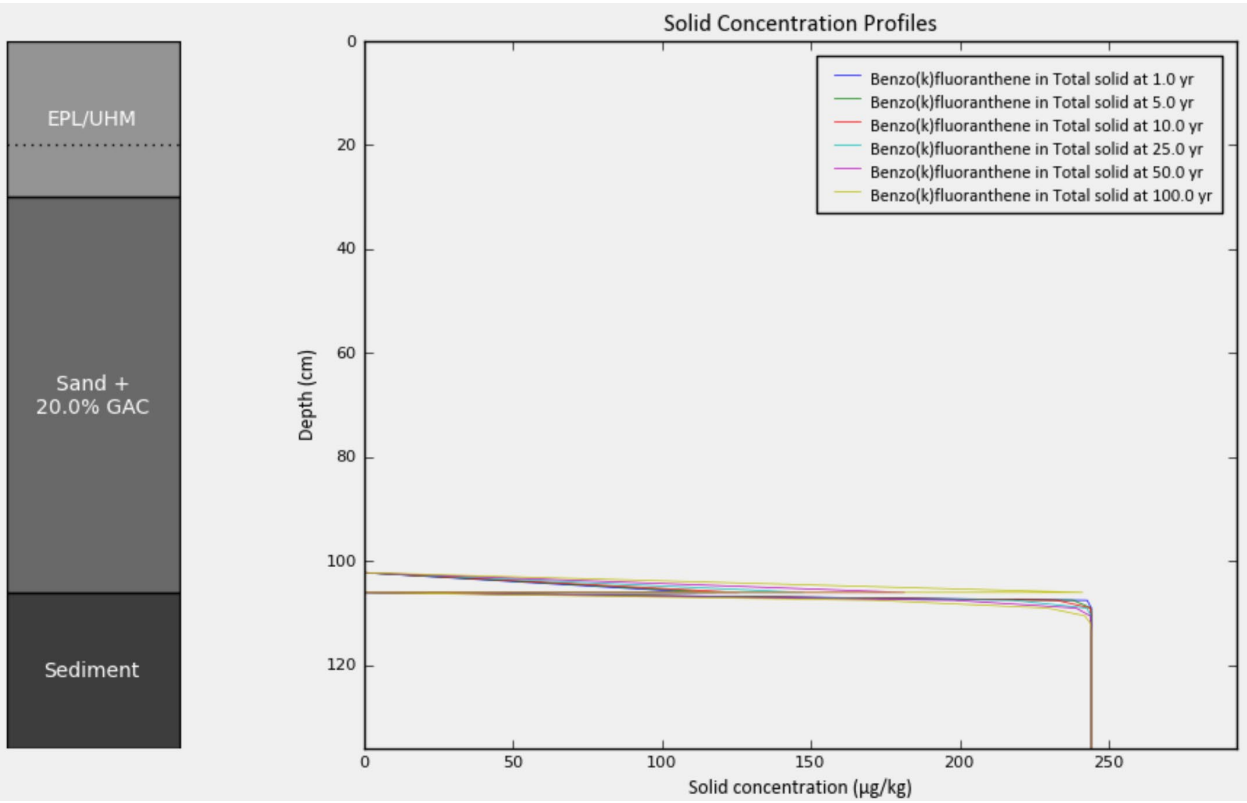

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Benzo(a)anthracene in Total solid at 1.0 yr
Benzo(a)anthracene in Total solid at 5.0 yr
Benzo(a)anthracene in Total solid at 10.0 yr
Benzo(a)anthracene in Total solid at 25.0 yr
Benzo(a)anthracene in Total solid at 50.0 yr
Benzo(a)anthracene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
Solid concentration (µg/kg)

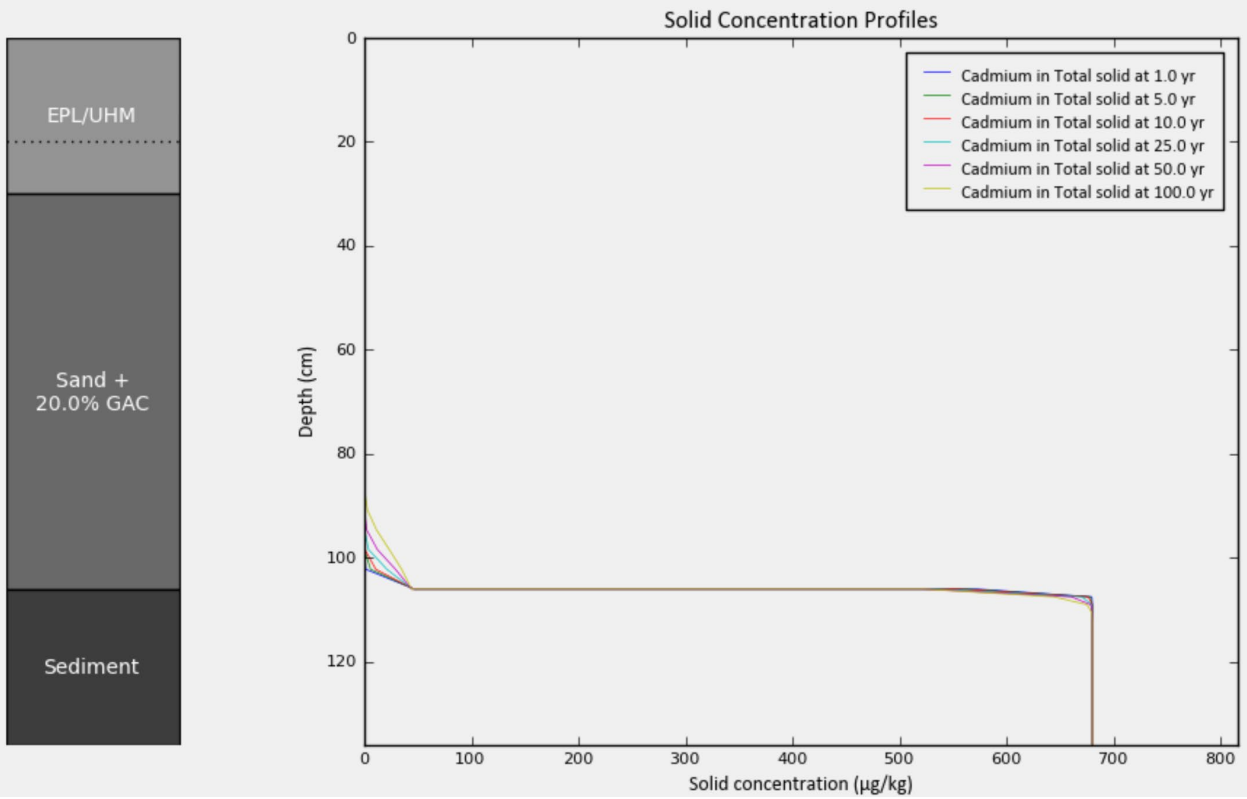

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Benzo(a)pyrene in Total solid at 1.0 yr
Benzo(a)pyrene in Total solid at 5.0 yr
Benzo(a)pyrene in Total solid at 10.0 yr
Benzo(a)pyrene in Total solid at 25.0 yr
Benzo(a)pyrene in Total solid at 50.0 yr
Benzo(a)pyrene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
300
350
400
Solid concentration (µg/kg)

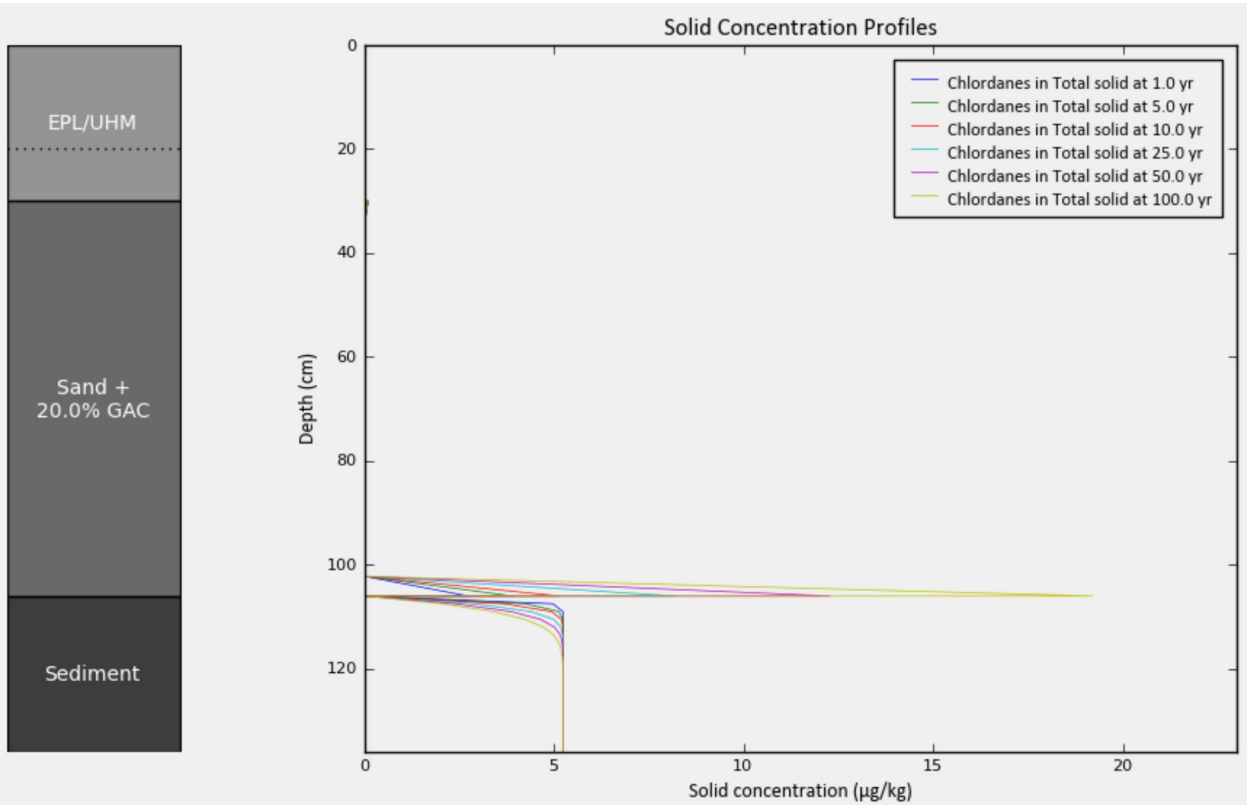

Solid Concentration Profiles
EPL/UHM
Sand +
20.0% GAC
Sediment
Benzo(b)fluoranthene in Total solid at 1.0 yr
Benzo(b)fluoranthene in Total solid at 5.0 yr
Benzo(b)fluoranthene in Total solid at 10.0 yr
Benzo(b)fluoranthene in Total solid at 25.0 yr
Benzo(b)fluoranthene in Total solid at 50.0 yr
Benzo(b)fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
Solid concentration (µg/kg)

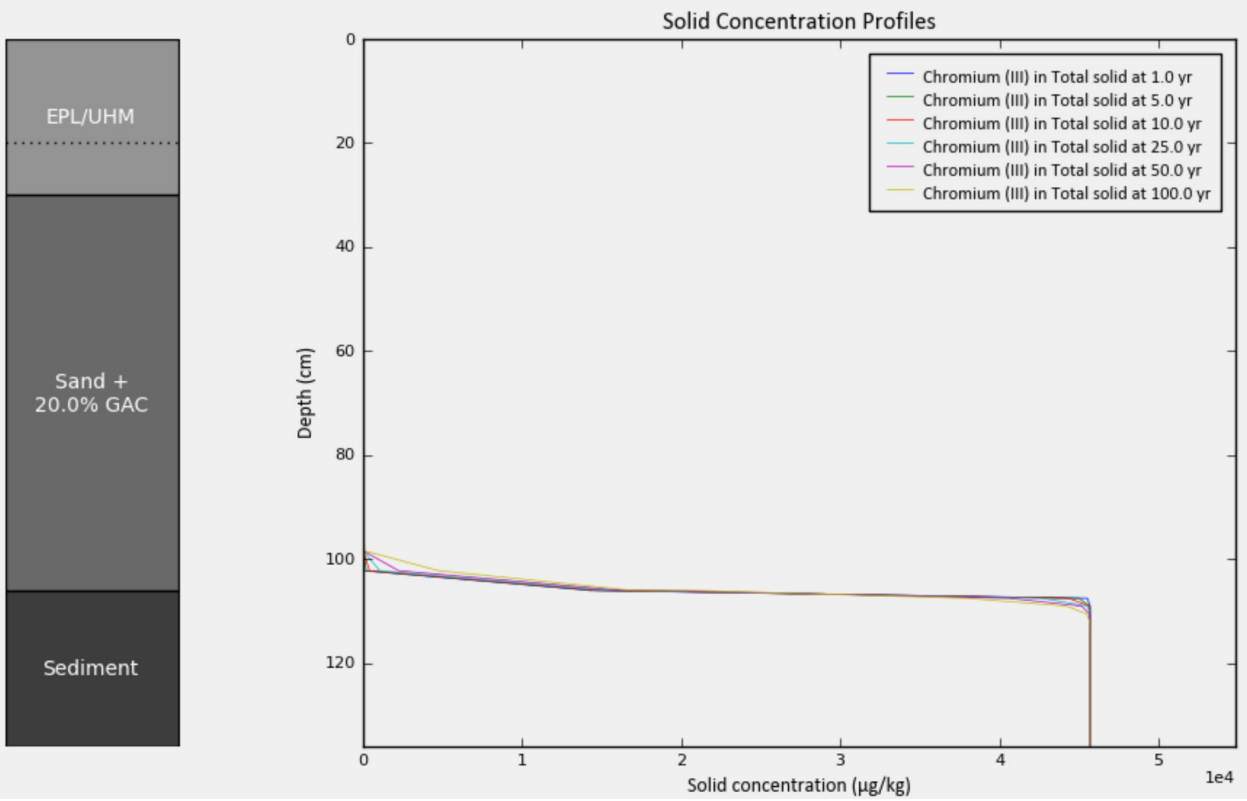

Solid Concentration Profiles
EPL/UHM
Sand +
20.0% GAC
Sediment
Benzo(e)pyrene in Total solid at 1.0 yr
Benzo(e)pyrene in Total solid at 5.0 yr
Benzo(e)pyrene in Total solid at 10.0 yr
Benzo(e)pyrene in Total solid at 25.0 yr
Benzo(e)pyrene in Total solid at 50.0 yr
Benzo(e)pyrene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
Solid concentration (µg/kg)

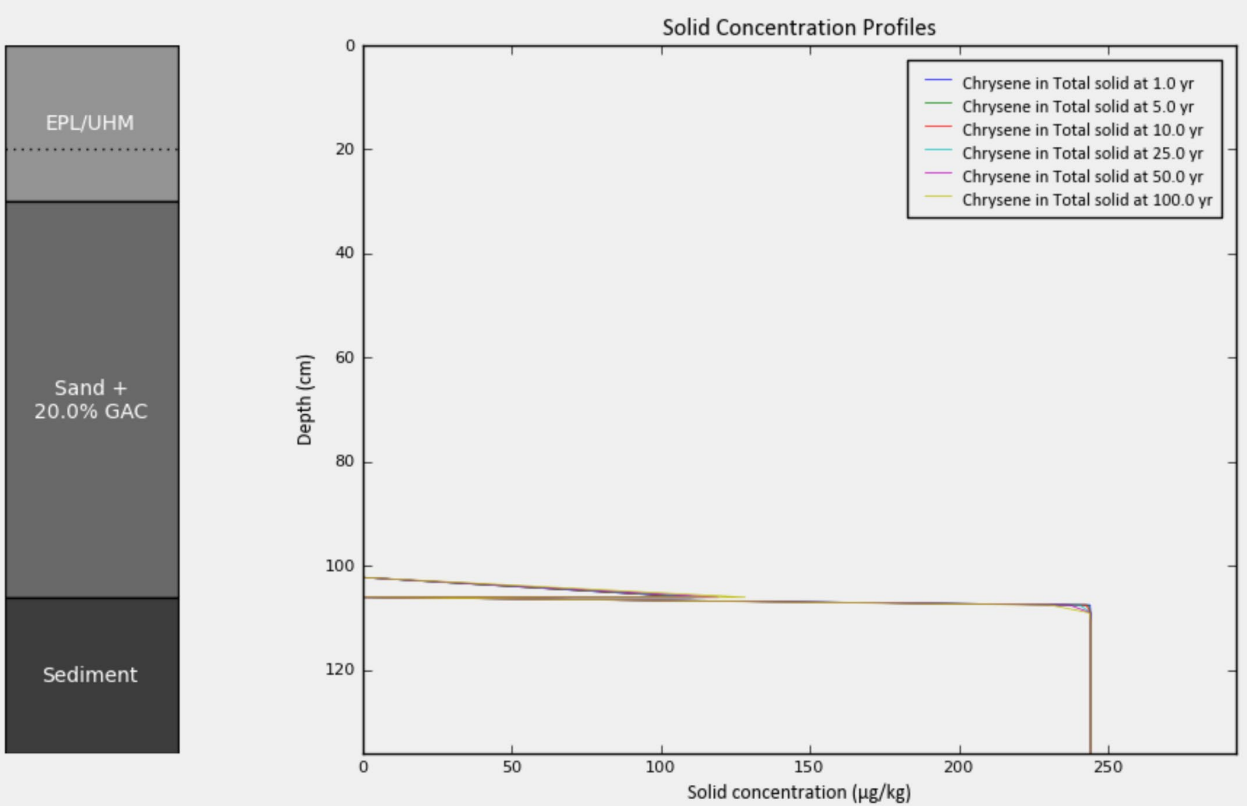

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Benzo(ghi)perylene in Total solid at 1.0 yr
Benzo(ghi)perylene in Total solid at 5.0 yr
Benzo(ghi)perylene in Total solid at 10.0 yr
Benzo(ghi)perylene in Total solid at 25.0 yr
Benzo(ghi)perylene in Total solid at 50.0 yr
Benzo(ghi)perylene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
300
350
400
Solid concentration (µg/kg)

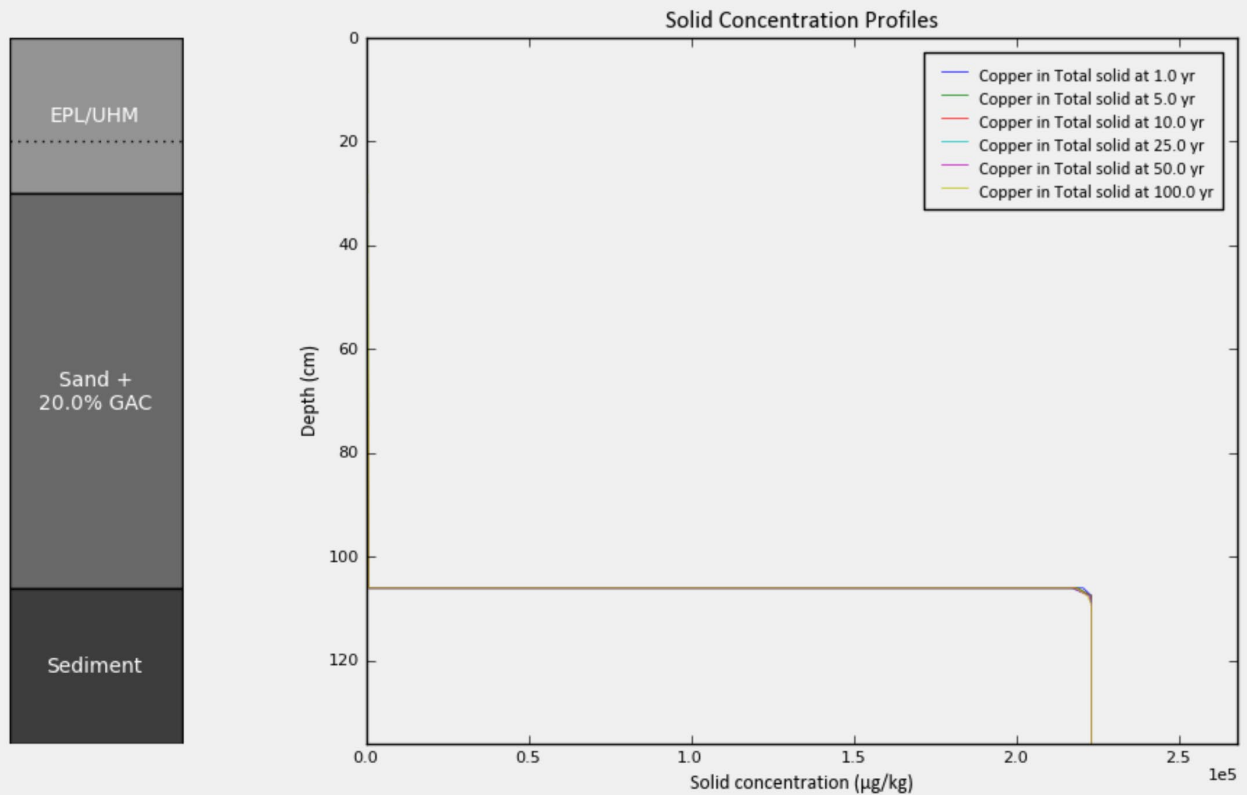

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Benzo(k)fluoranthene in Total solid at 1.0 yr
Benzo(k)fluoranthene in Total solid at 5.0 yr
Benzo(k)fluoranthene in Total solid at 10.0 yr
Benzo(k)fluoranthene in Total solid at 25.0 yr
Benzo(k)fluoranthene in Total solid at 50.0 yr
Benzo(k)fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
Solid concentration (µg/kg)

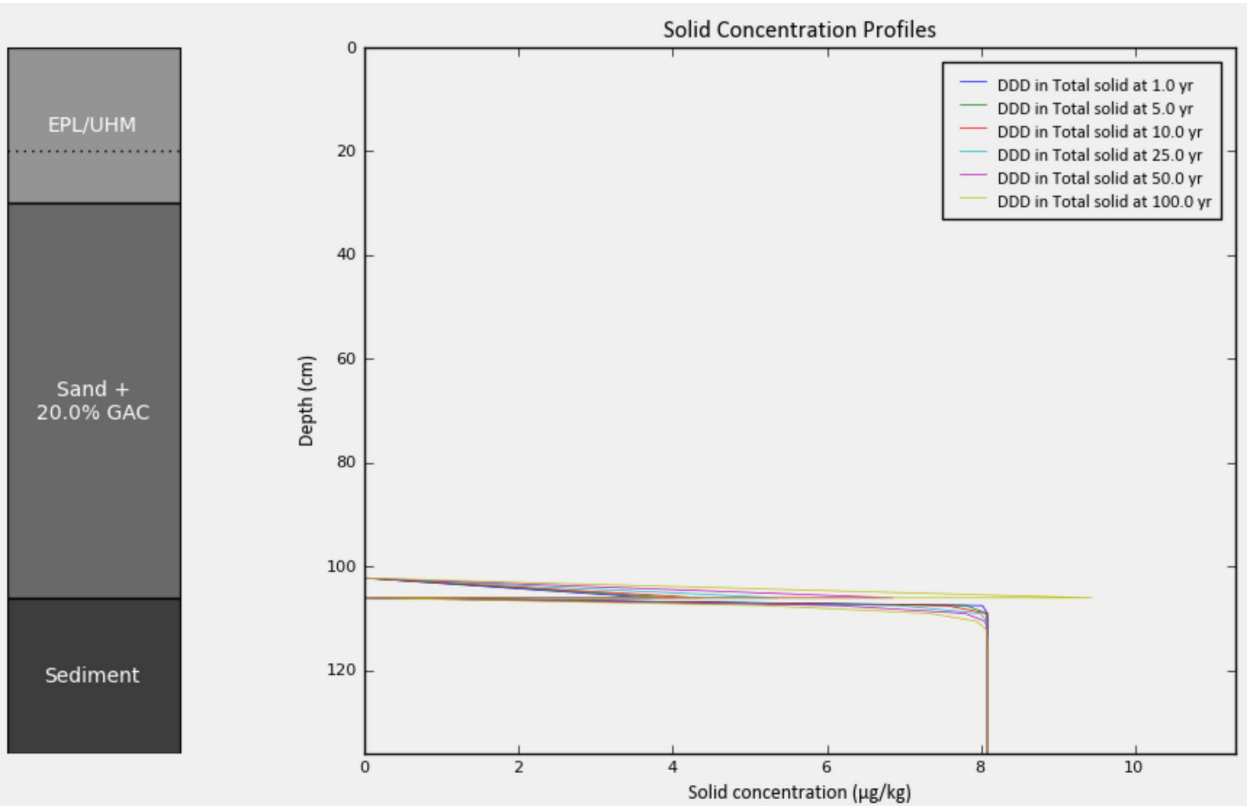

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Cadmium in Total solid at 1.0 yr
Cadmium in Total solid at 5.0 yr
Cadmium in Total solid at 10.0 yr
Cadmium in Total solid at 25.0 yr
Cadmium in Total solid at 50.0 yr
Cadmium in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
100
200
300
400
500
600
700
800
Solid concentration (µg/kg)

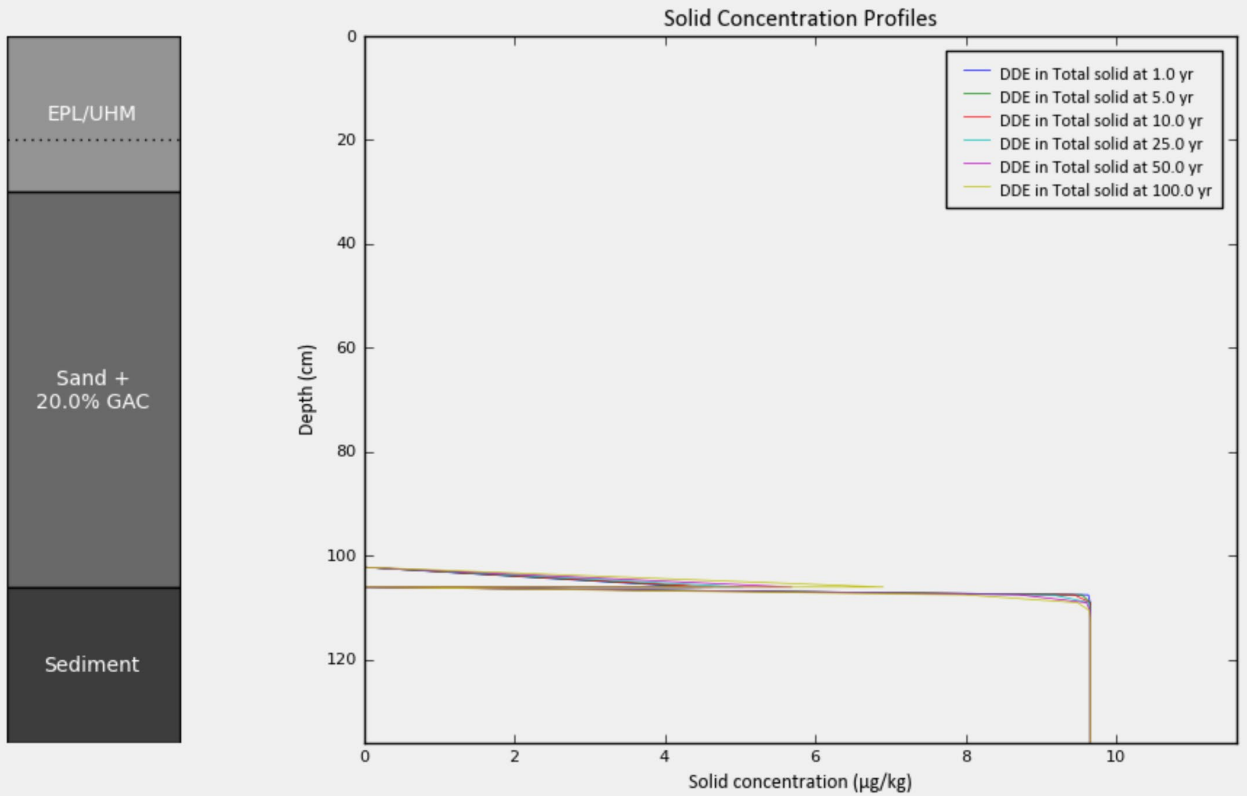

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Chlordanes in Total solid at 1.0 yr
Chlordanes in Total solid at 5.0 yr
Chlordanes in Total solid at 10.0 yr
Chlordanes in Total solid at 25.0 yr
Chlordanes in Total solid at 50.0 yr
Chlordanes in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
5
10
15
20
Solid concentration (µg/kg)

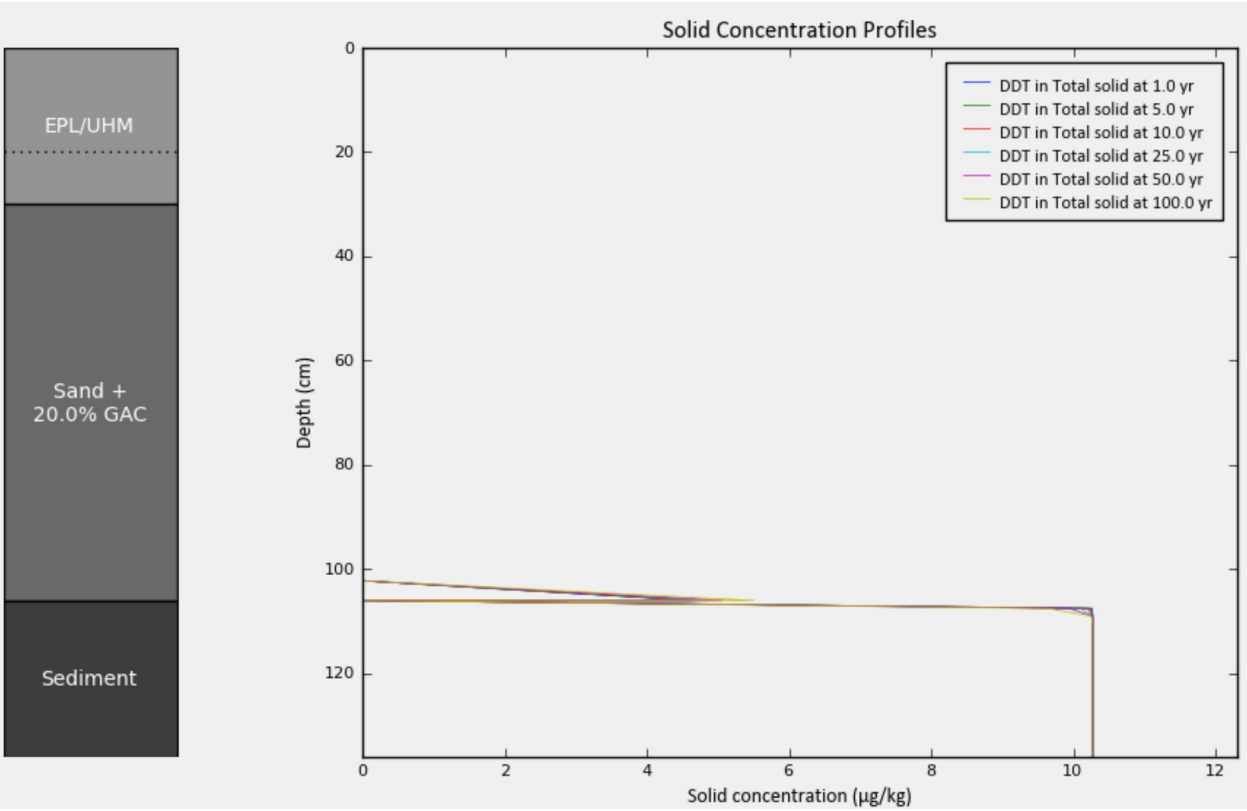

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Chromium (III) in Total solid at 1.0 yr
Chromium (III) in Total solid at 5.0 yr
Chromium (III) in Total solid at 10.0 yr
Chromium (III) in Total solid at 25.0 yr
Chromium (III) in Total solid at 50.0 yr
Chromium (III) in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
1e4
Solid concentration (µg/kg)

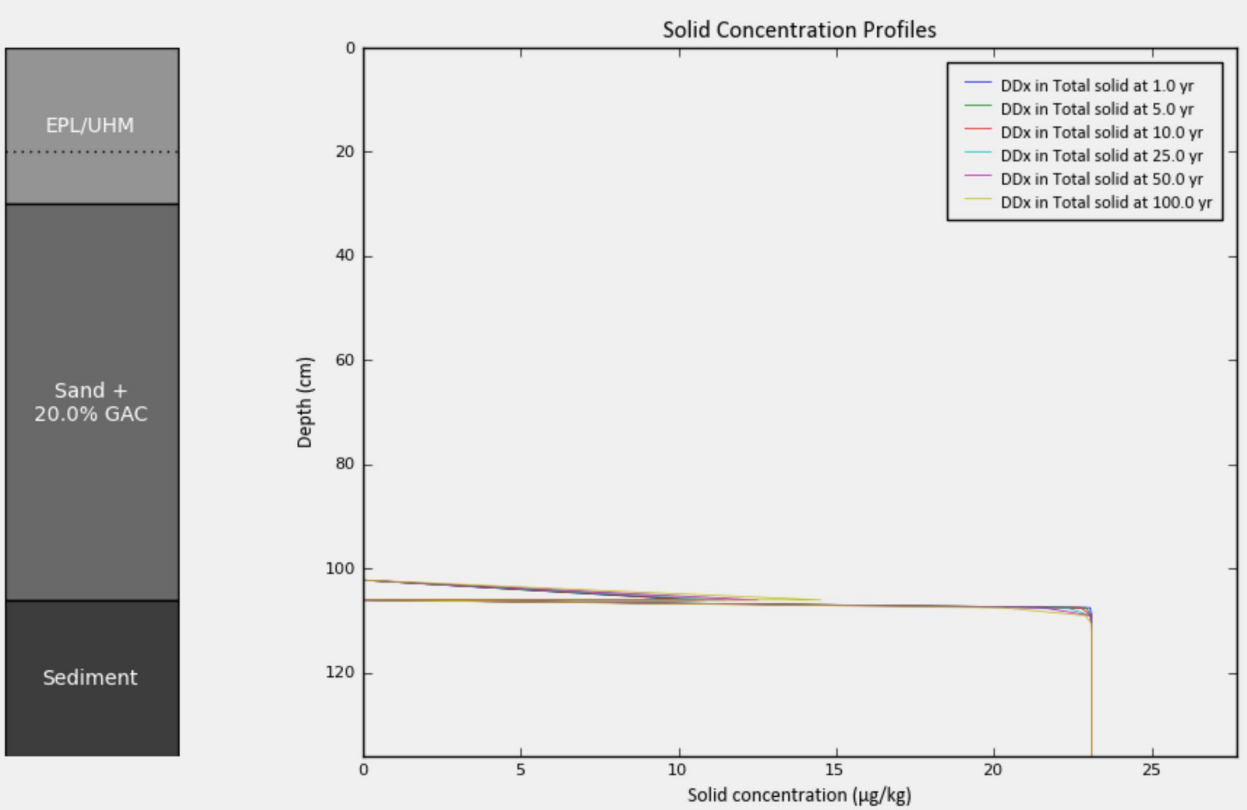

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Chrysene in Total solid at 1.0 yr
Chrysene in Total solid at 5.0 yr
Chrysene in Total solid at 10.0 yr
Chrysene in Total solid at 25.0 yr
Chrysene in Total solid at 50.0 yr
Chrysene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
Solid concentration (µg/kg)

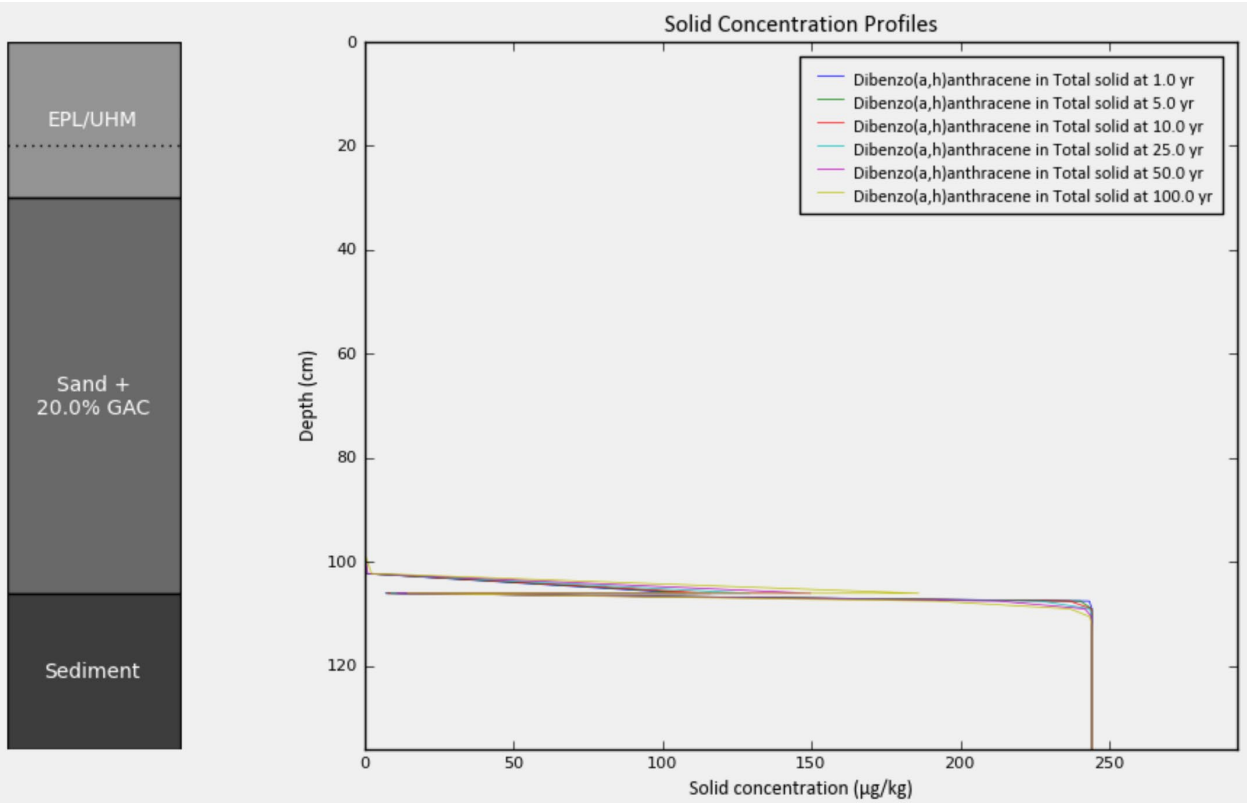

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Copper in Total solid at 1.0 yr
Copper in Total solid at 5.0 yr
Copper in Total solid at 10.0 yr
Copper in Total solid at 25.0 yr
Copper in Total solid at 50.0 yr
Copper in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
1e5
Solid concentration (µg/kg)

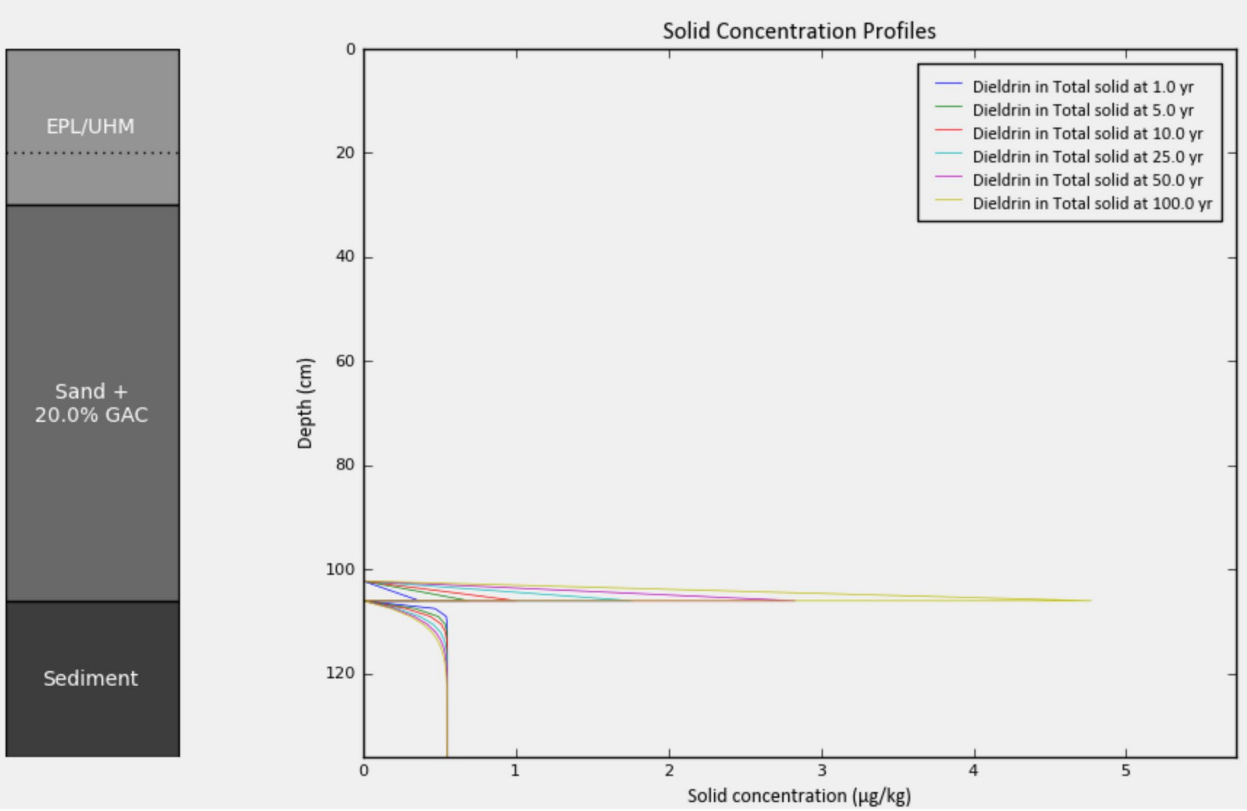

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
DDD in Total solid at 1.0 yr
DDD in Total solid at 5.0 yr
DDD in Total solid at 10.0 yr
DDD in Total solid at 25.0 yr
DDD in Total solid at 50.0 yr
DDD in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
2
4
6
8
10
Solid concentration (µg/kg)

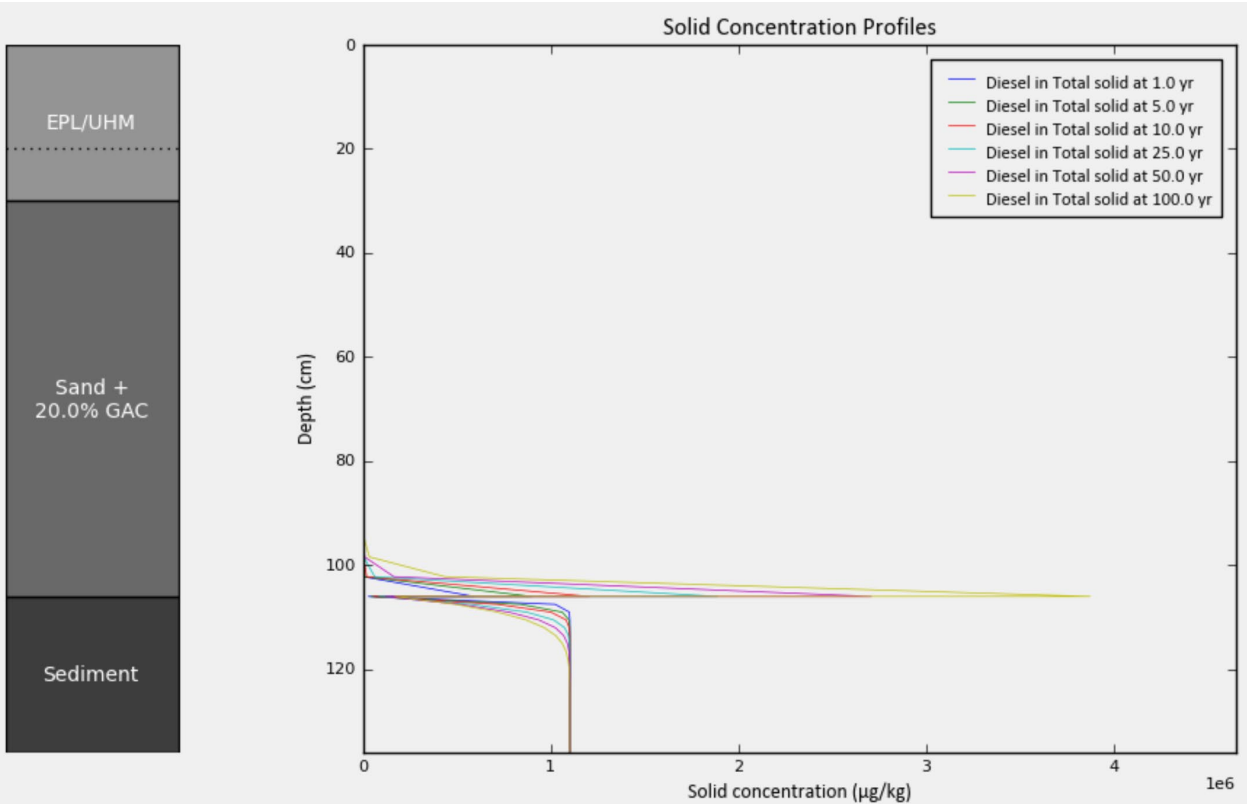

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
DDE in Total solid at 1.0 yr
DDE in Total solid at 5.0 yr
DDE in Total solid at 10.0 yr
DDE in Total solid at 25.0 yr
DDE in Total solid at 50.0 yr
DDE in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
2
4
6
8
10
Solid concentration (µg/kg)

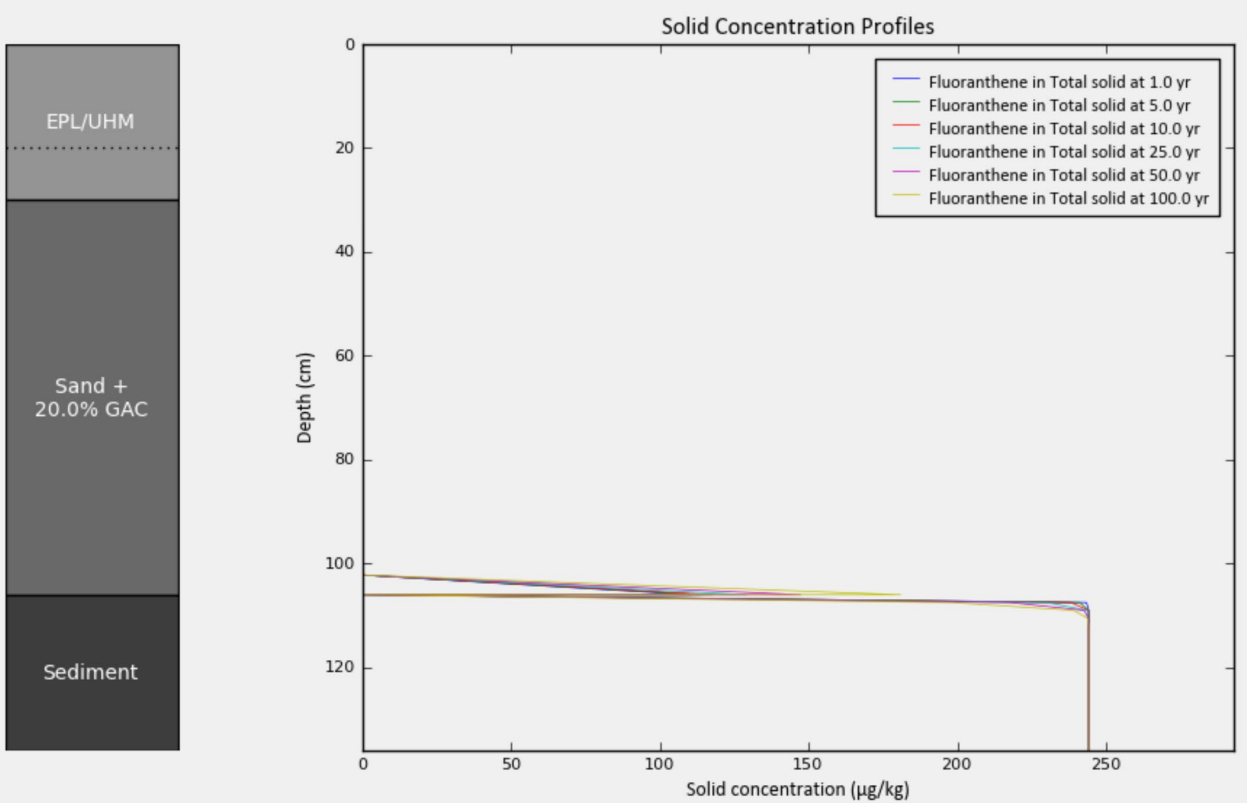

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
DDT in Total solid at 1.0 yr
DDT in Total solid at 5.0 yr
DDT in Total solid at 10.0 yr
DDT in Total solid at 25.0 yr
DDT in Total solid at 50.0 yr
DDT in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
2
4
6
8
10
12
Solid concentration (µg/kg)

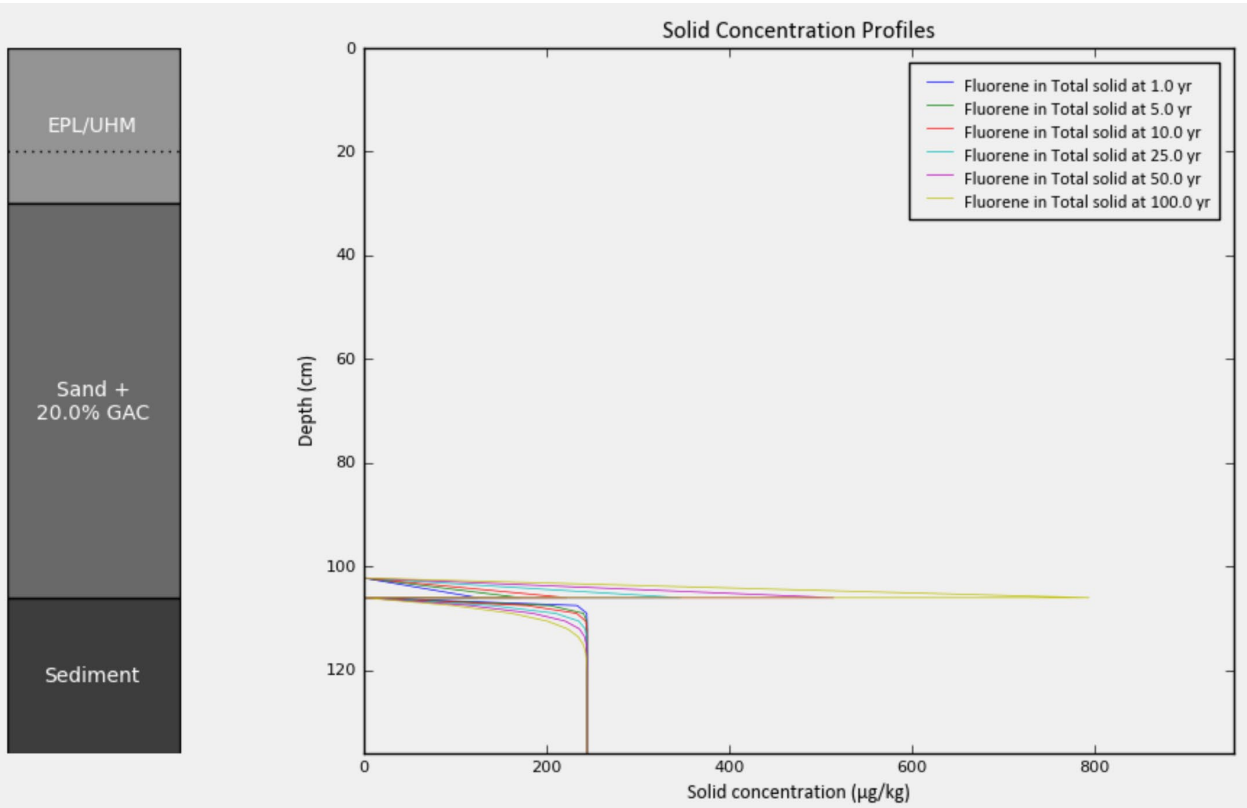

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
DDx in Total solid at 1.0 yr
DDx in Total solid at 5.0 yr
DDx in Total solid at 10.0 yr
DDx in Total solid at 25.0 yr
DDx in Total solid at 50.0 yr
DDx in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
5
10
15
20
25
Solid concentration (µg/kg)

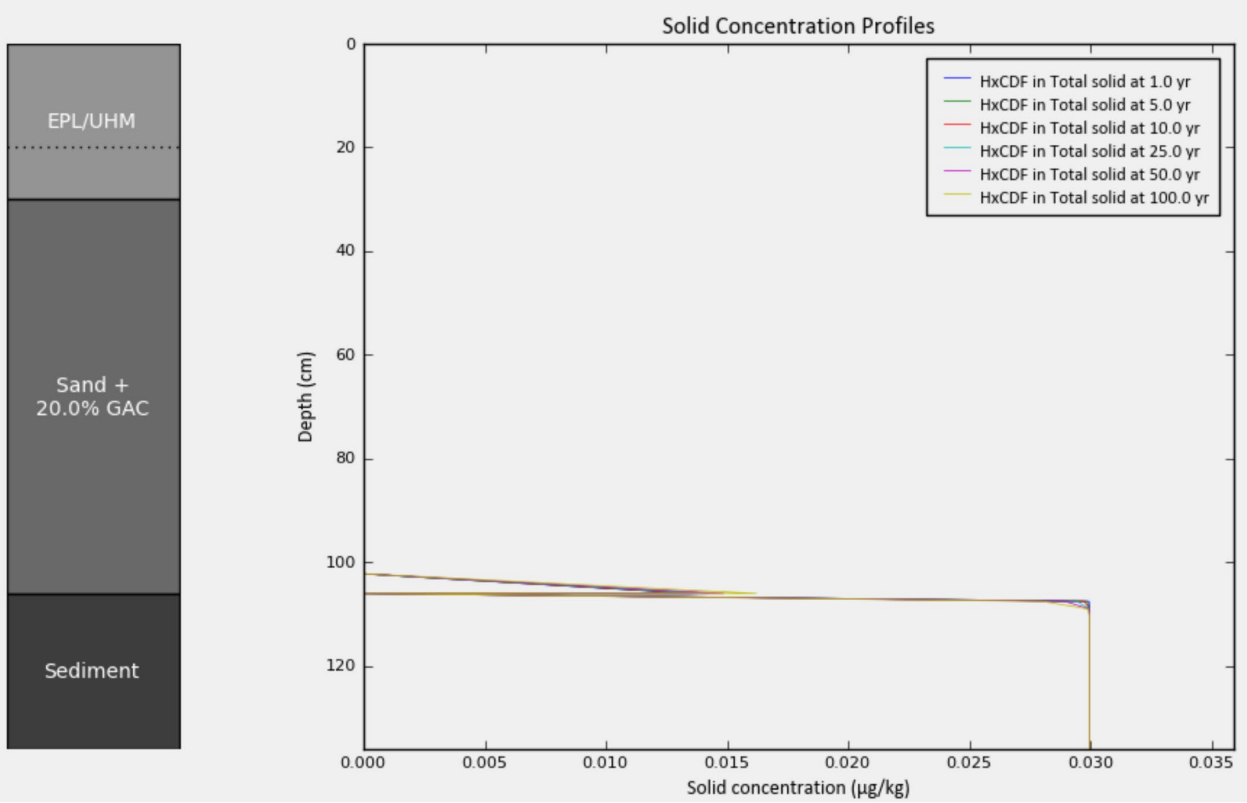

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Dibenzo(a,h)anthracene in Total solid at 1.0 yr
Dibenzo(a,h)anthracene in Total solid at 5.0 yr
Dibenzo(a,h)anthracene in Total solid at 10.0 yr
Dibenzo(a,h)anthracene in Total solid at 25.0 yr
Dibenzo(a,h)anthracene in Total solid at 50.0 yr
Dibenzo(a,h)anthracene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
Solid concentration (µg/kg)

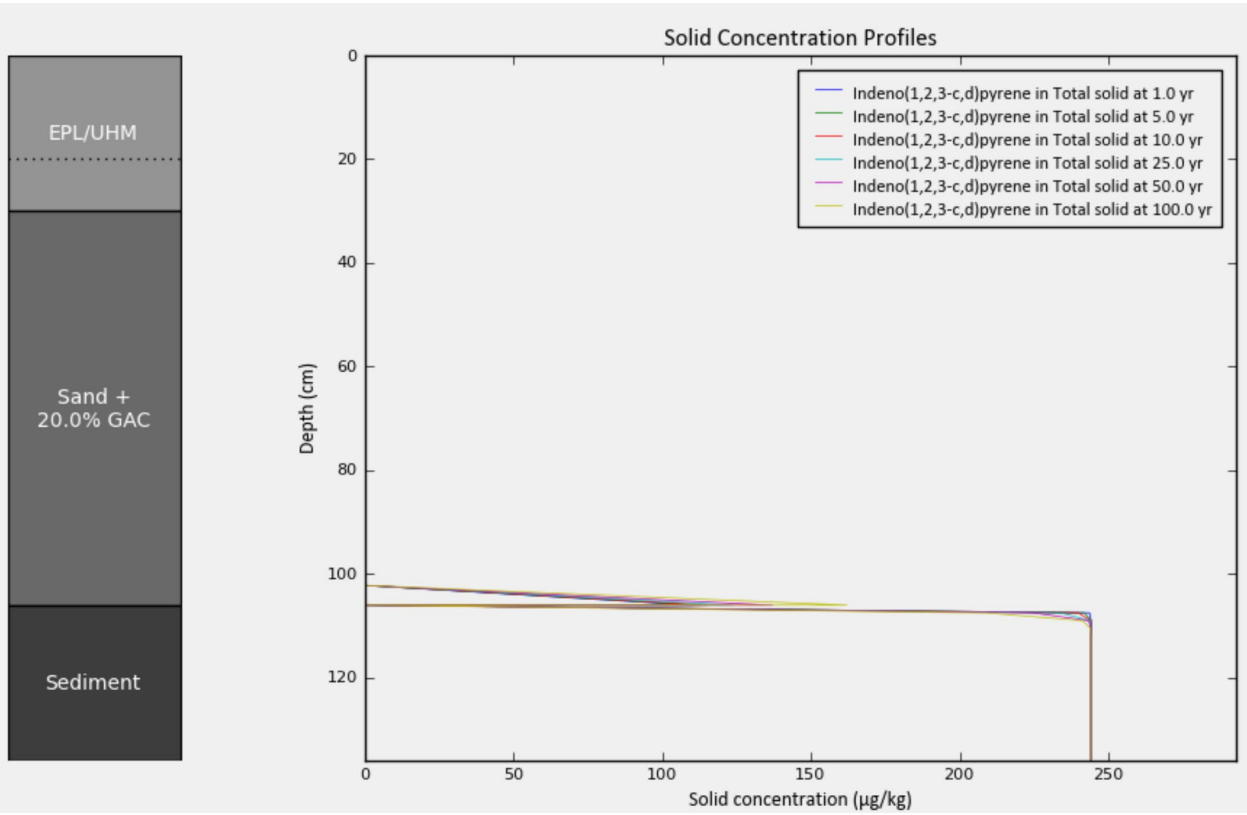

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Dieldrin in Total solid at 1.0 yr
Dieldrin in Total solid at 5.0 yr
Dieldrin in Total solid at 10.0 yr
Dieldrin in Total solid at 25.0 yr
Dieldrin in Total solid at 50.0 yr
Dieldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

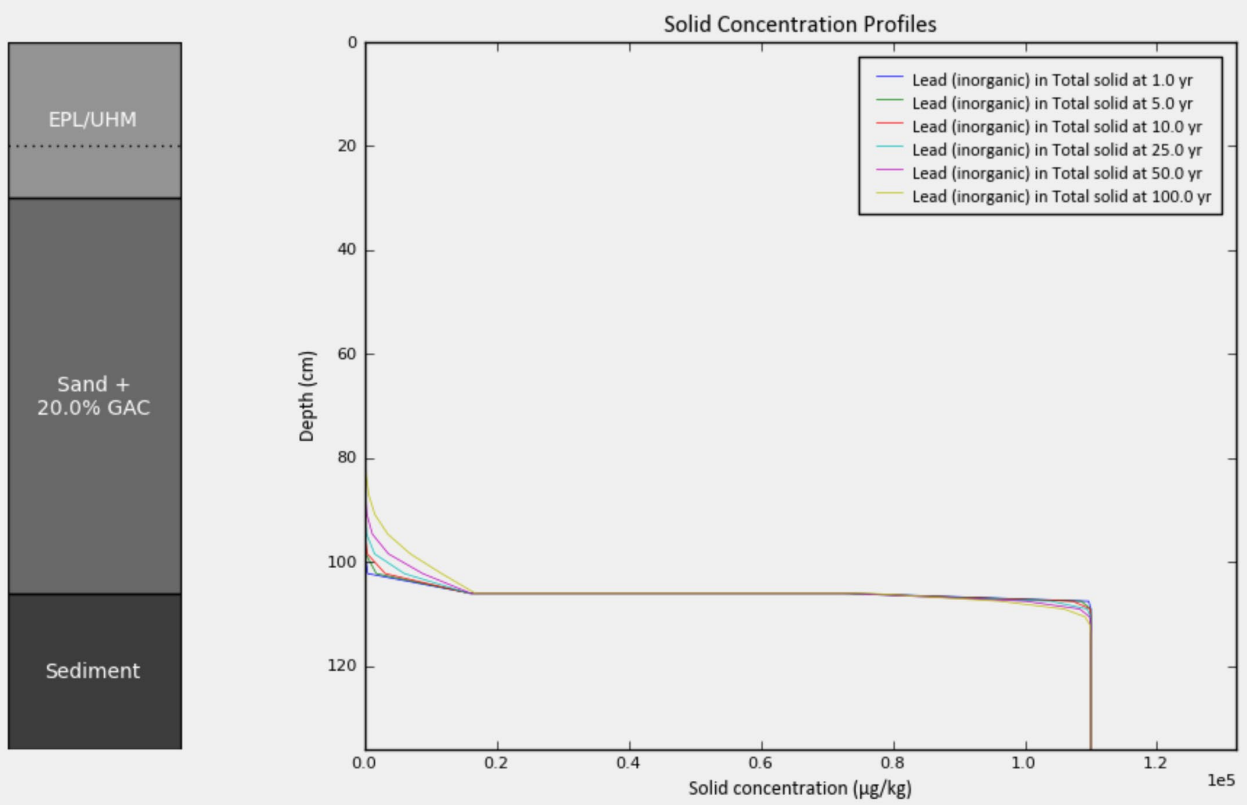

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Diesel in Total solid at 1.0 yr
Diesel in Total solid at 5.0 yr
Diesel in Total solid at 10.0 yr
Diesel in Total solid at 25.0 yr
Diesel in Total solid at 50.0 yr
Diesel in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

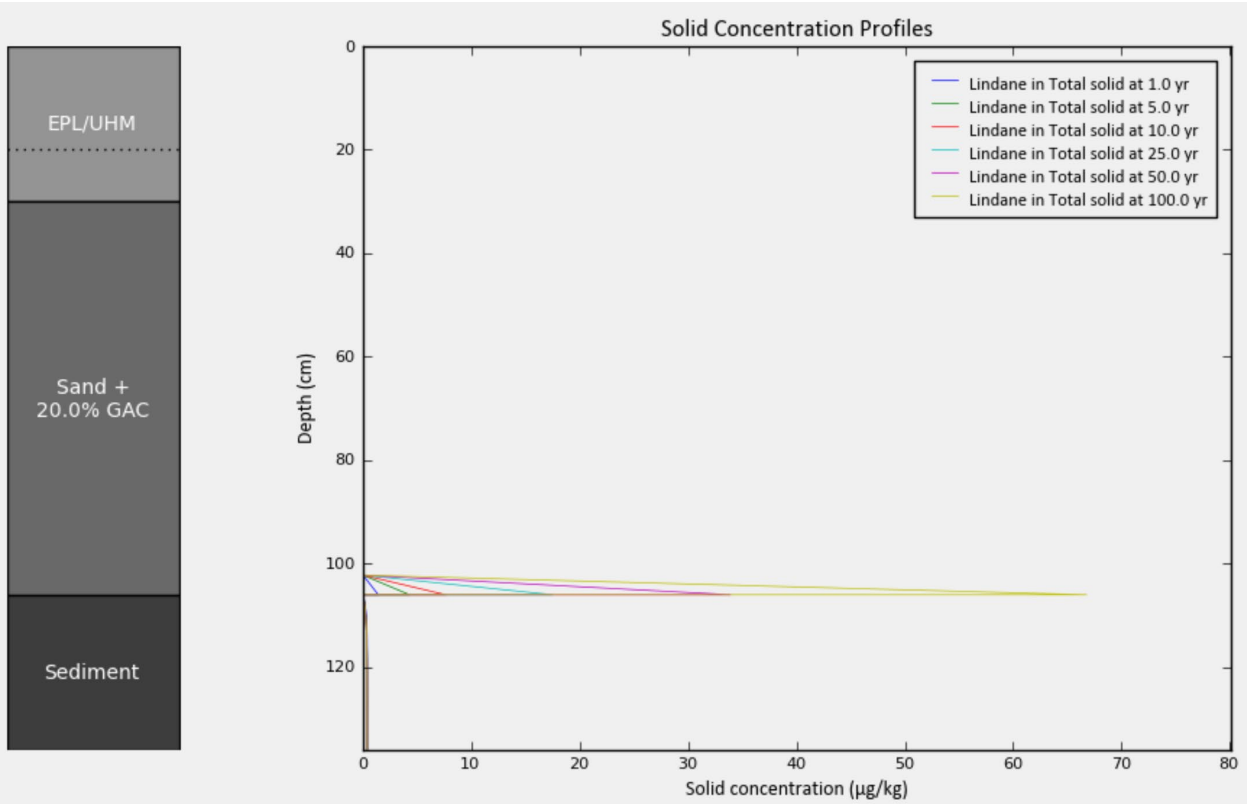

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Fluoranthene in Total solid at 1.0 yr
Fluoranthene in Total solid at 5.0 yr
Fluoranthene in Total solid at 10.0 yr
Fluoranthene in Total solid at 25.0 yr
Fluoranthene in Total solid at 50.0 yr
Fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
Solid concentration (µg/kg)

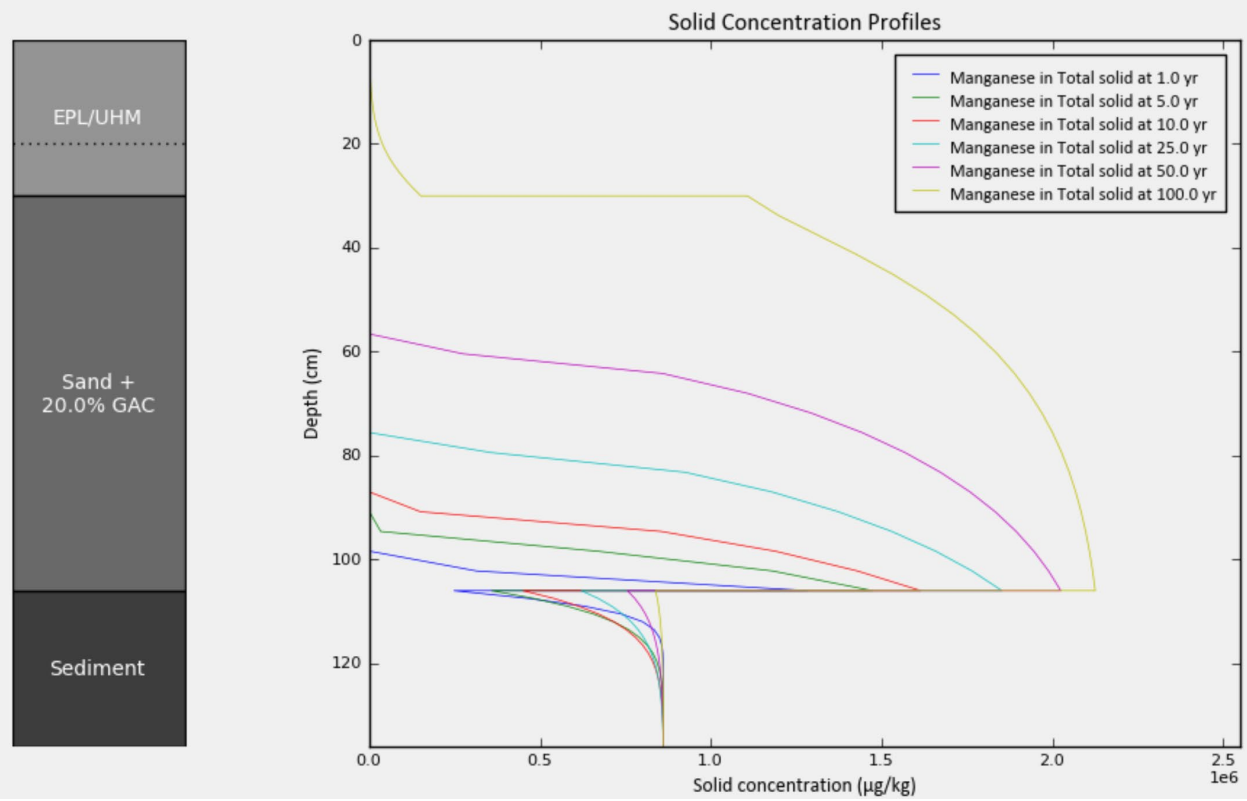

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Fluorene in Total solid at 1.0 yr
Fluorene in Total solid at 5.0 yr
Fluorene in Total solid at 10.0 yr
Fluorene in Total solid at 25.0 yr
Fluorene in Total solid at 50.0 yr
Fluorene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
200
400
600
800
Solid concentration (µg/kg)

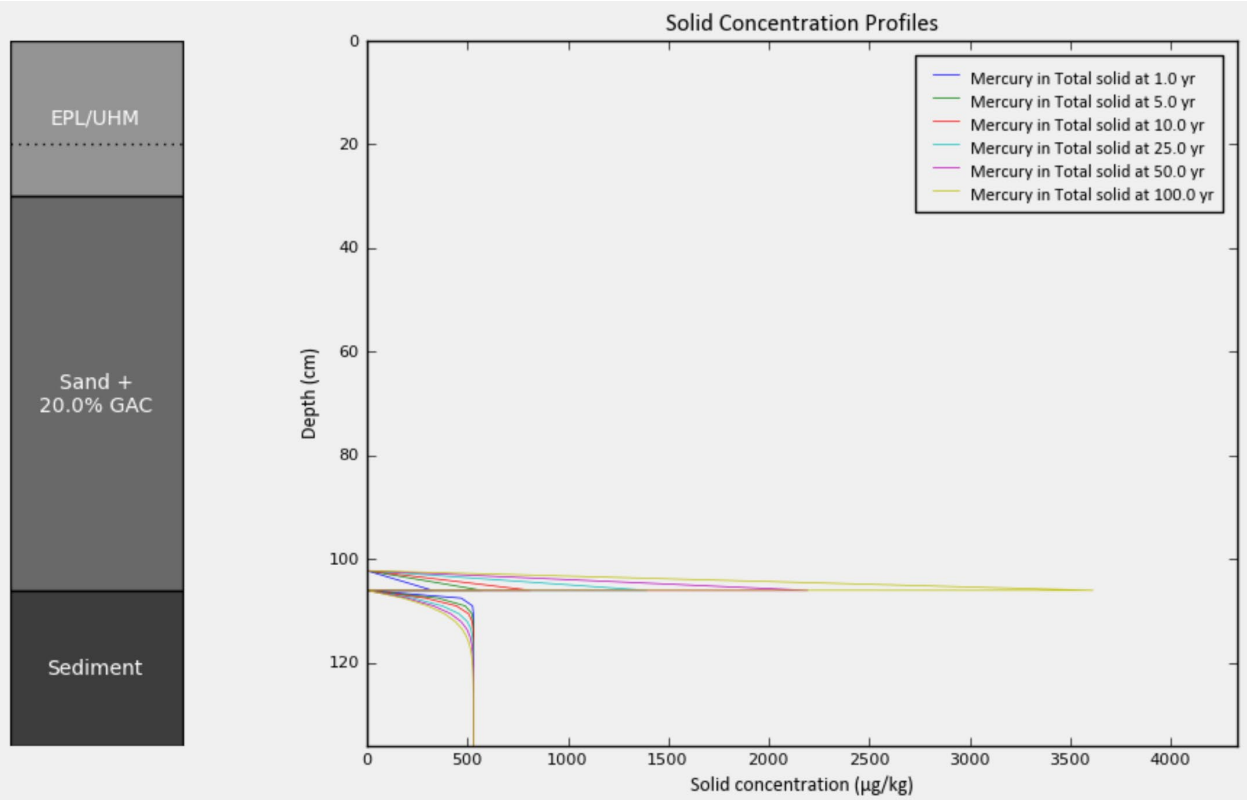

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
HxCDF in Total solid at 1.0 yr
HxCDF in Total solid at 5.0 yr
HxCDF in Total solid at 10.0 yr
HxCDF in Total solid at 25.0 yr
HxCDF in Total solid at 50.0 yr
HxCDF in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
Solid concentration (µg/kg)

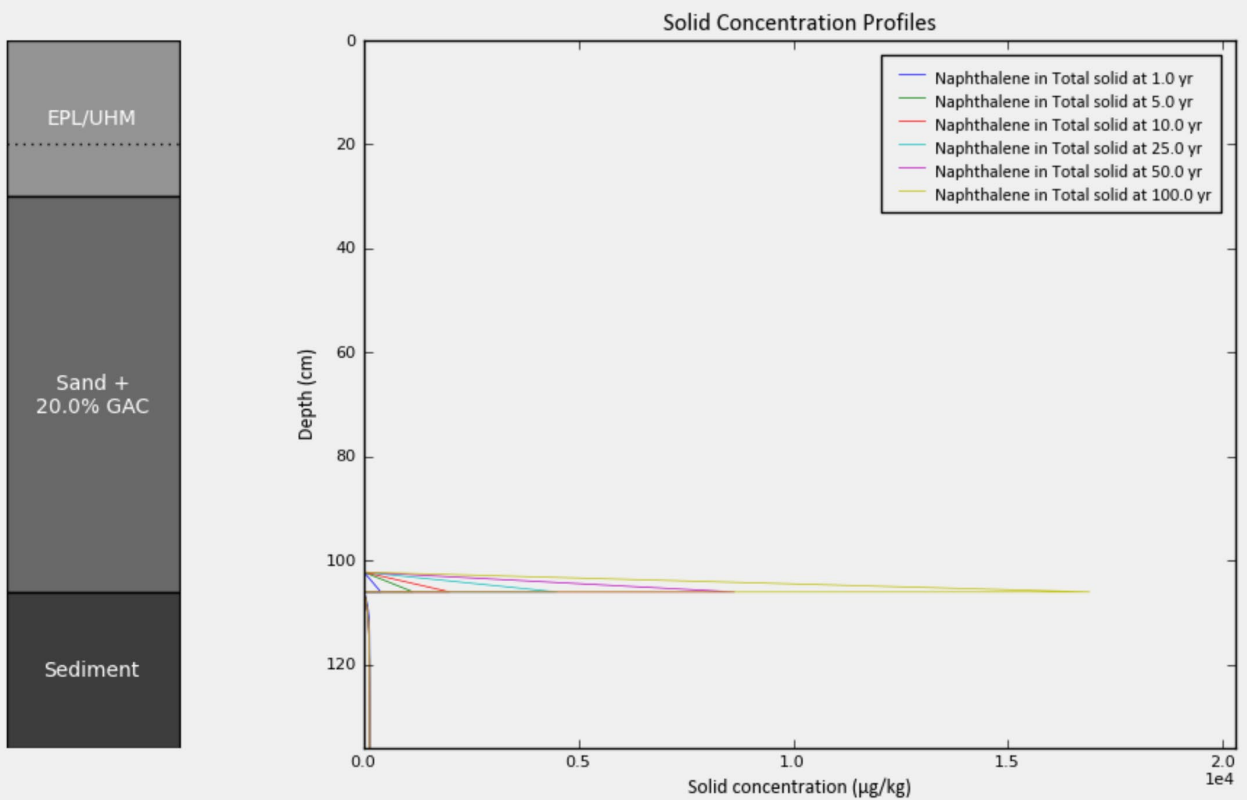

EPL/UHM
Sand + 20.0% GAC
Sediment
Solid Concentration Profiles
Indeno(1,2,3-c,d)pyrene in Total solid at 1.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 5.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 10.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 25.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 50.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
Solid concentration (µg/kg)

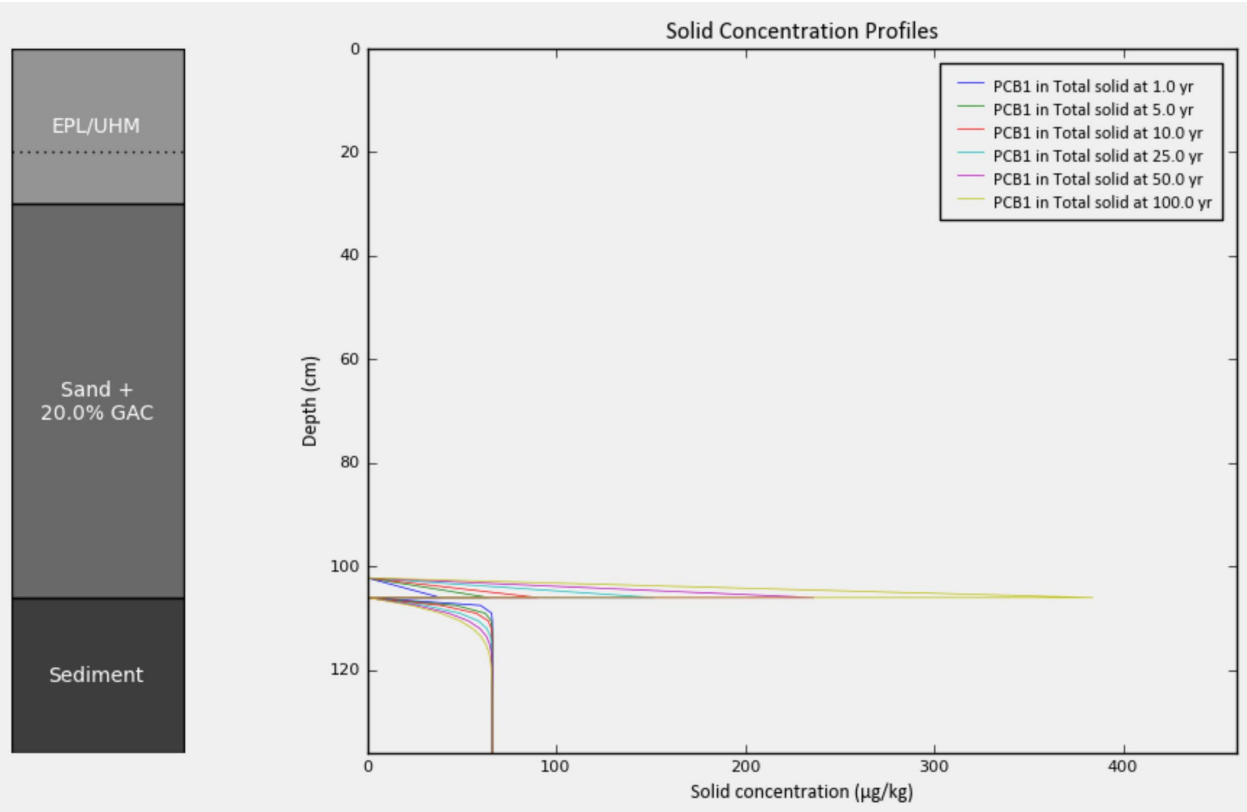

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Lead (inorganic) in Total solid at 1.0 yr
Lead (inorganic) in Total solid at 5.0 yr
Lead (inorganic) in Total solid at 10.0 yr
Lead (inorganic) in Total solid at 25.0 yr
Lead (inorganic) in Total solid at 50.0 yr
Lead (inorganic) in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e5
Solid concentration (µg/kg)

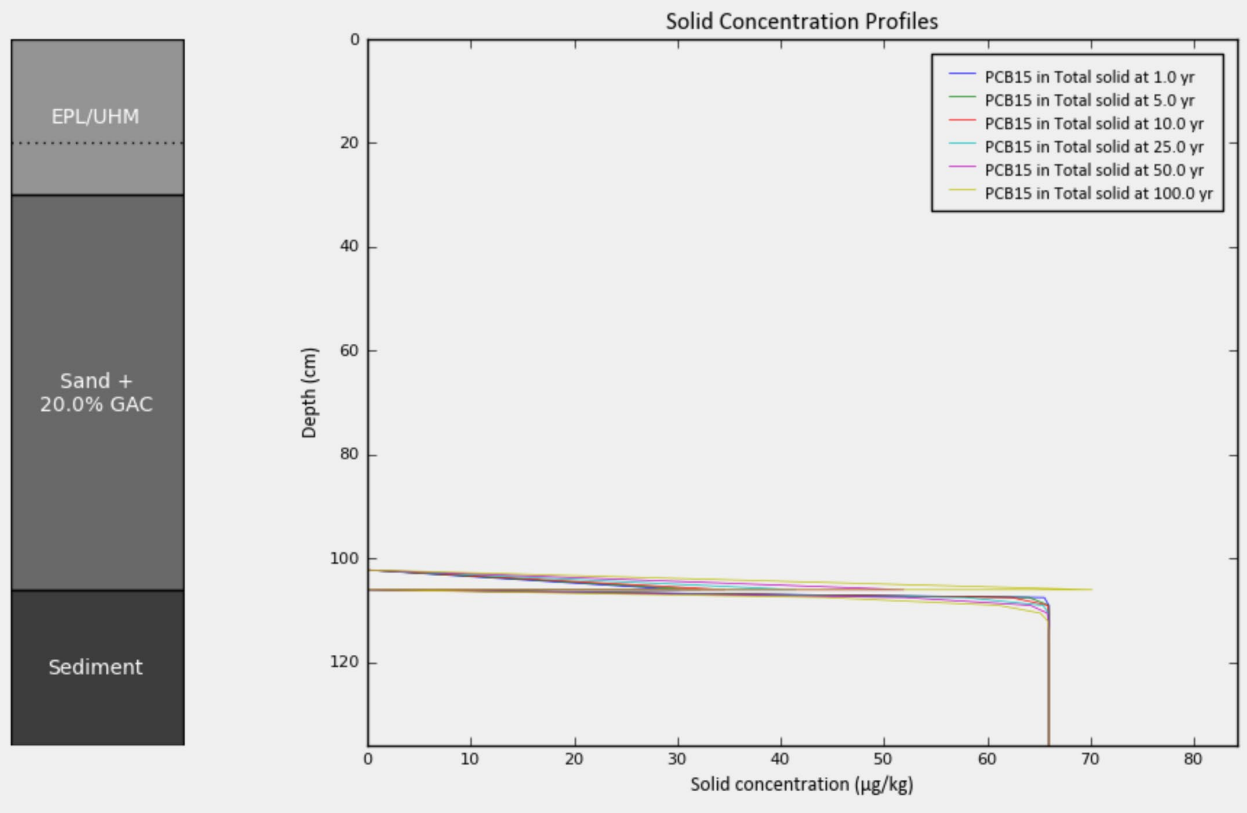

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Lindane in Total solid at 1.0 yr
Lindane in Total solid at 5.0 yr
Lindane in Total solid at 10.0 yr
Lindane in Total solid at 25.0 yr
Lindane in Total solid at 50.0 yr
Lindane in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
10
20
30
40
50
60
70
80
Solid concentration (µg/kg)

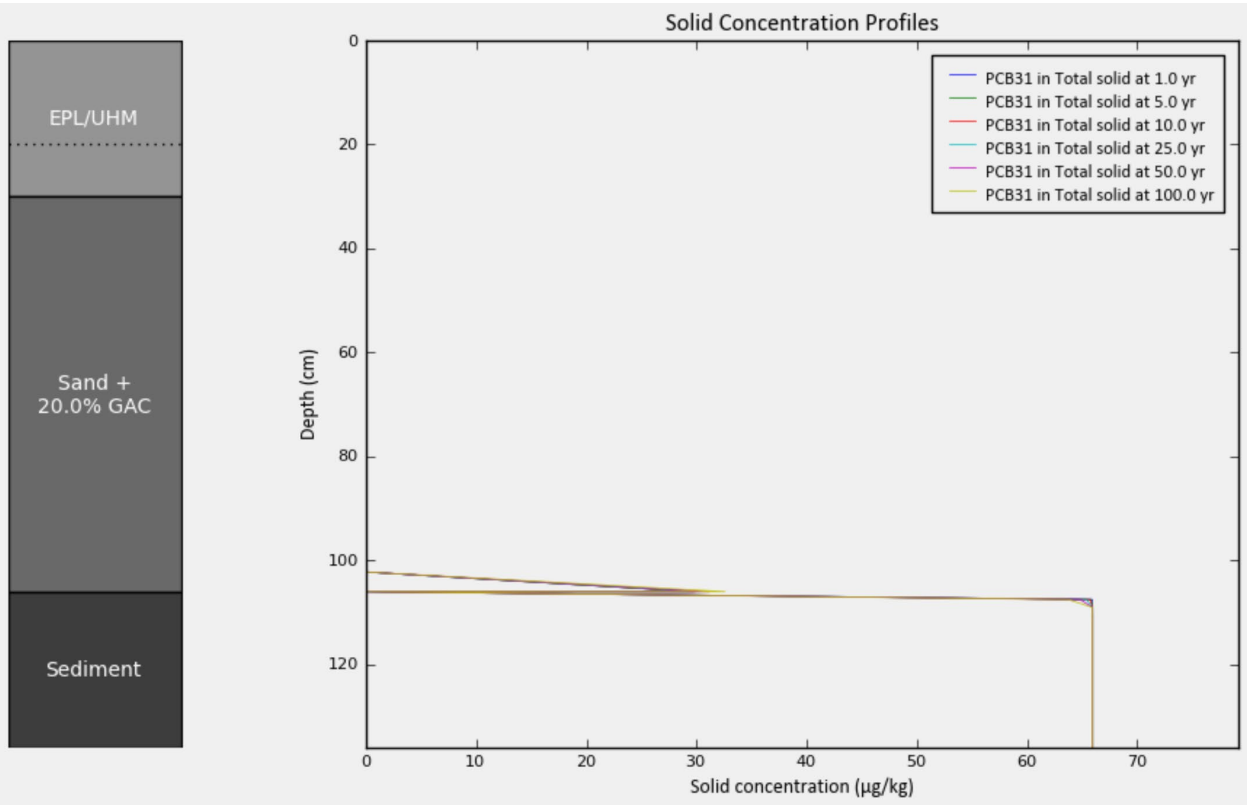

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Manganese in Total solid at 1.0 yr
Manganese in Total solid at 5.0 yr
Manganese in Total solid at 10.0 yr
Manganese in Total solid at 25.0 yr
Manganese in Total solid at 50.0 yr
Manganese in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
1e6
Solid concentration (µg/kg)

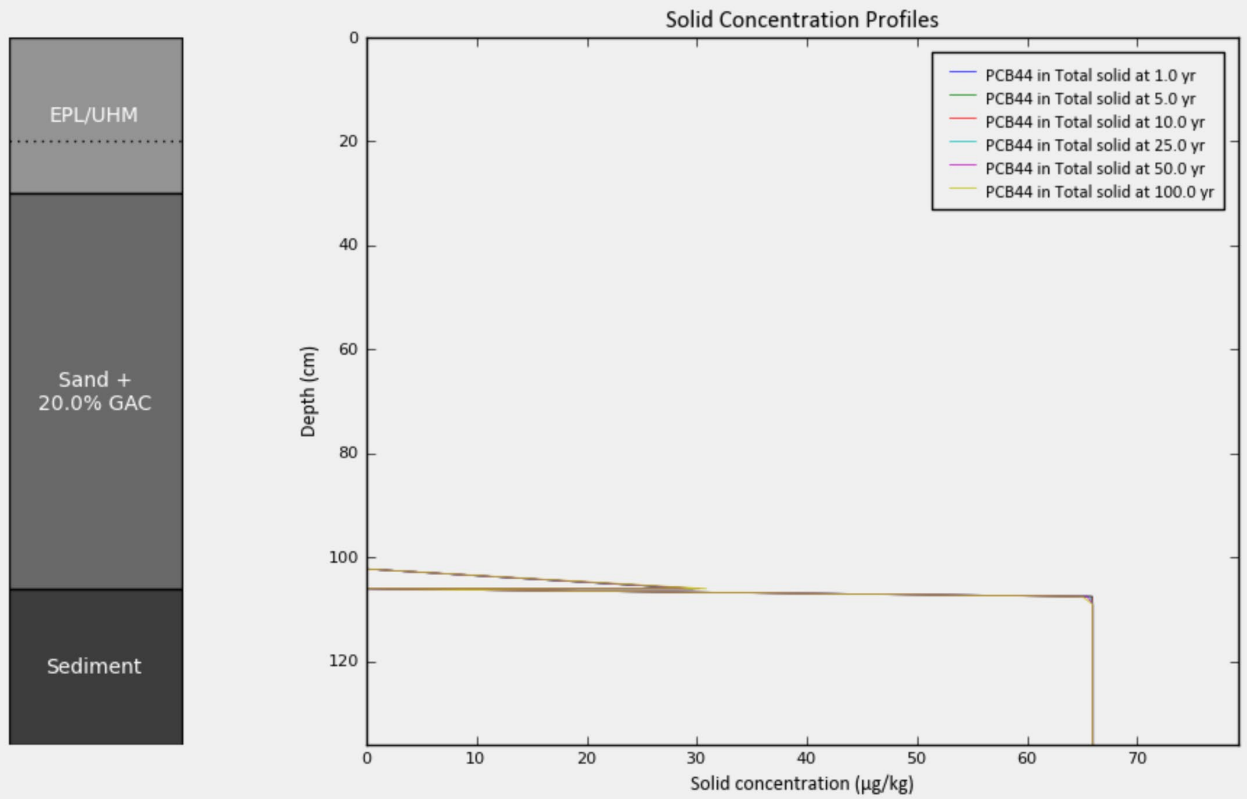

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Mercury in Total solid at 1.0 yr
Mercury in Total solid at 5.0 yr
Mercury in Total solid at 10.0 yr
Mercury in Total solid at 25.0 yr
Mercury in Total solid at 50.0 yr
Mercury in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
500
1000
1500
2000
2500
3000
3500
4000
Solid concentration (µg/kg)

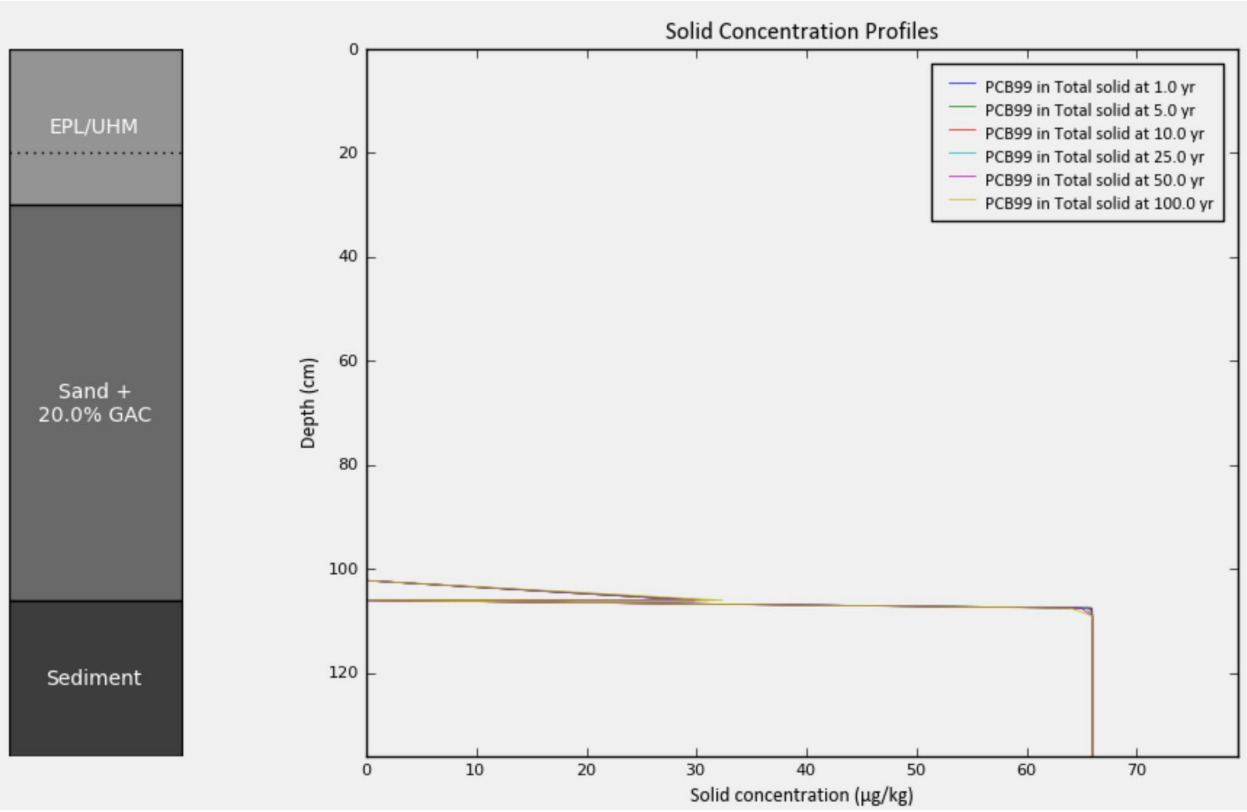

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Naphthalene in Total solid at 1.0 yr
Naphthalene in Total solid at 5.0 yr
Naphthalene in Total solid at 10.0 yr
Naphthalene in Total solid at 25.0 yr
Naphthalene in Total solid at 50.0 yr
Naphthalene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
1e4
Solid concentration (µg/kg)

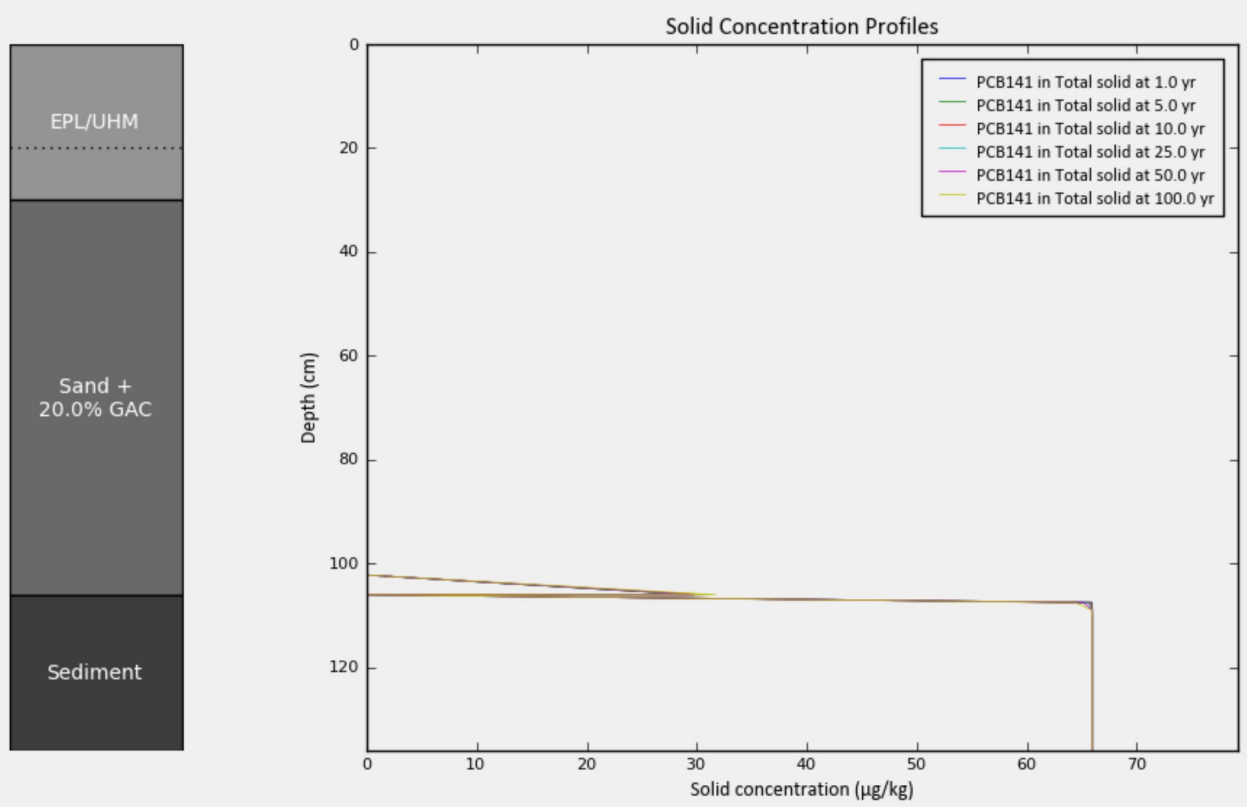

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB1 in Total solid at 1.0 yr
PCB1 in Total solid at 5.0 yr
PCB1 in Total solid at 10.0 yr
PCB1 in Total solid at 25.0 yr
PCB1 in Total solid at 50.0 yr
PCB1 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
100
200
300
400
Solid concentration (µg/kg)

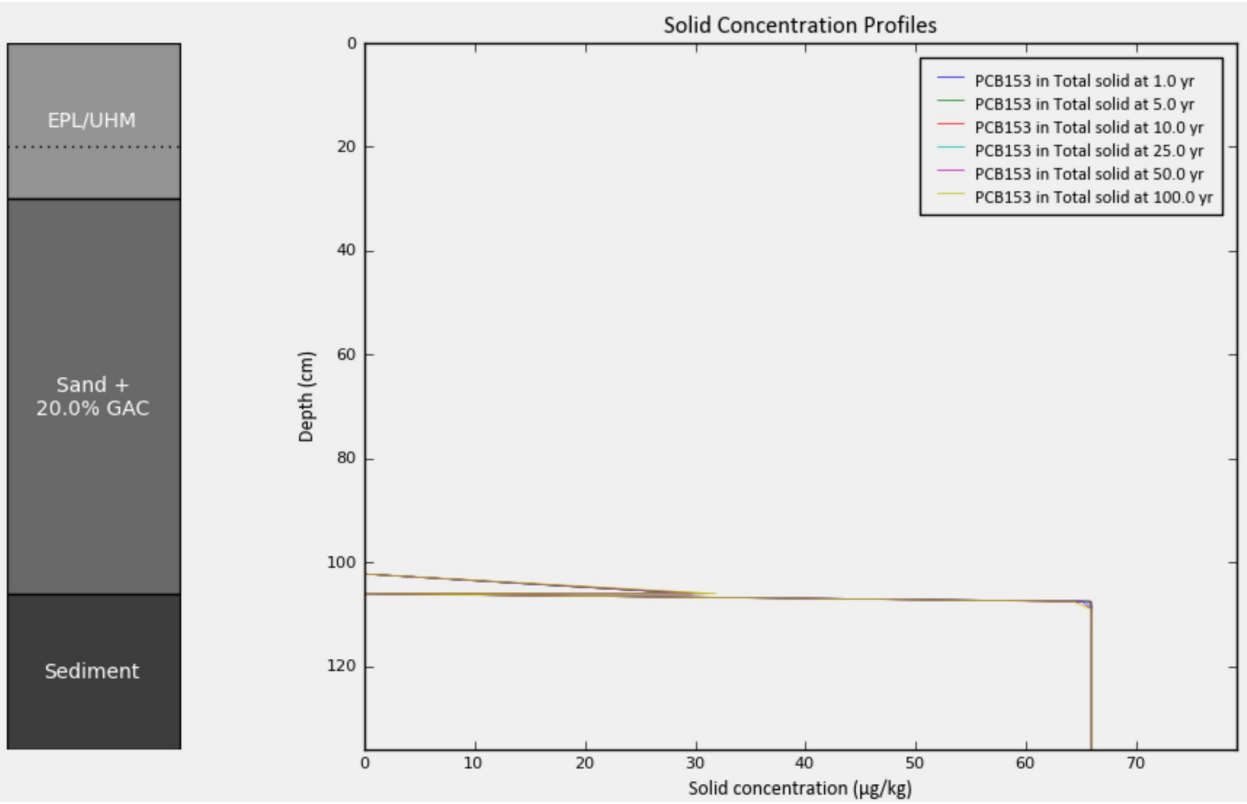

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB15 in Total solid at 1.0 yr
PCB15 in Total solid at 5.0 yr
PCB15 in Total solid at 10.0 yr
PCB15 in Total solid at 25.0 yr
PCB15 in Total solid at 50.0 yr
PCB15 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

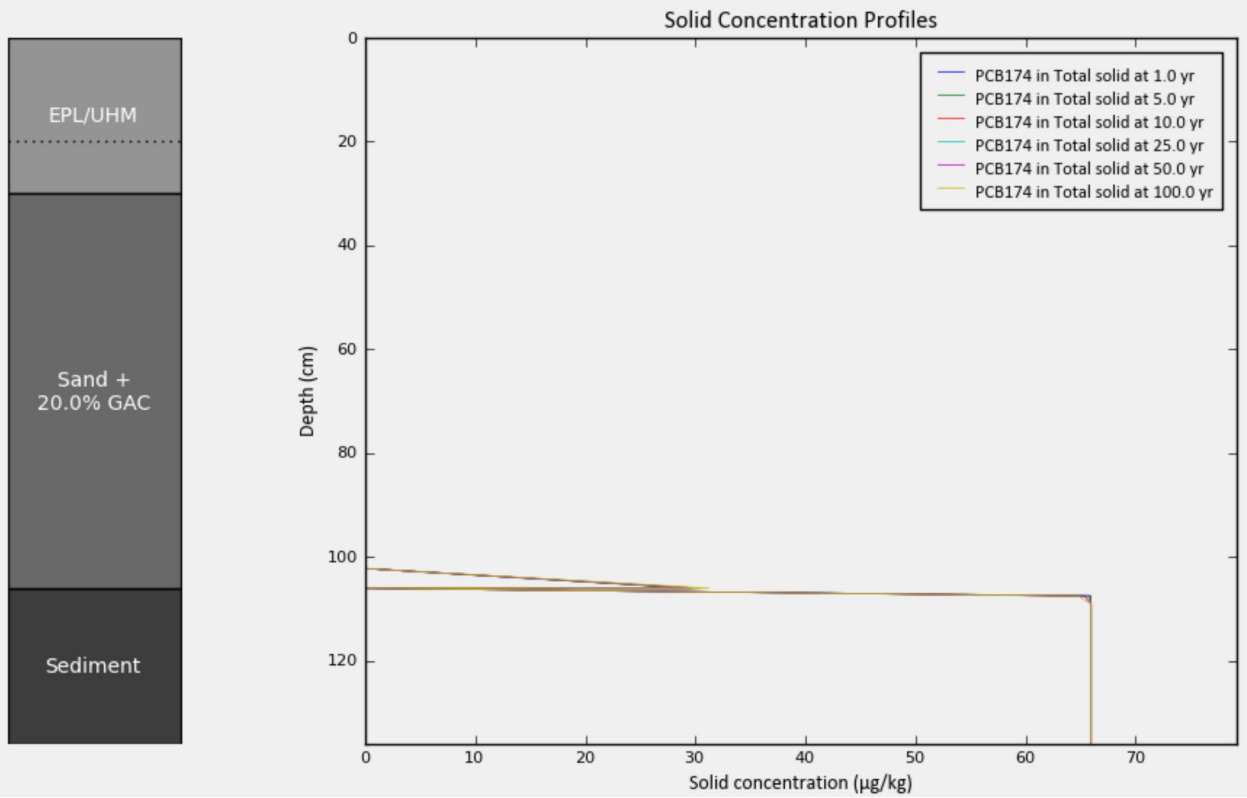

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB31 in Total solid at 1.0 yr
PCB31 in Total solid at 5.0 yr
PCB31 in Total solid at 10.0 yr
PCB31 in Total solid at 25.0 yr
PCB31 in Total solid at 50.0 yr
PCB31 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

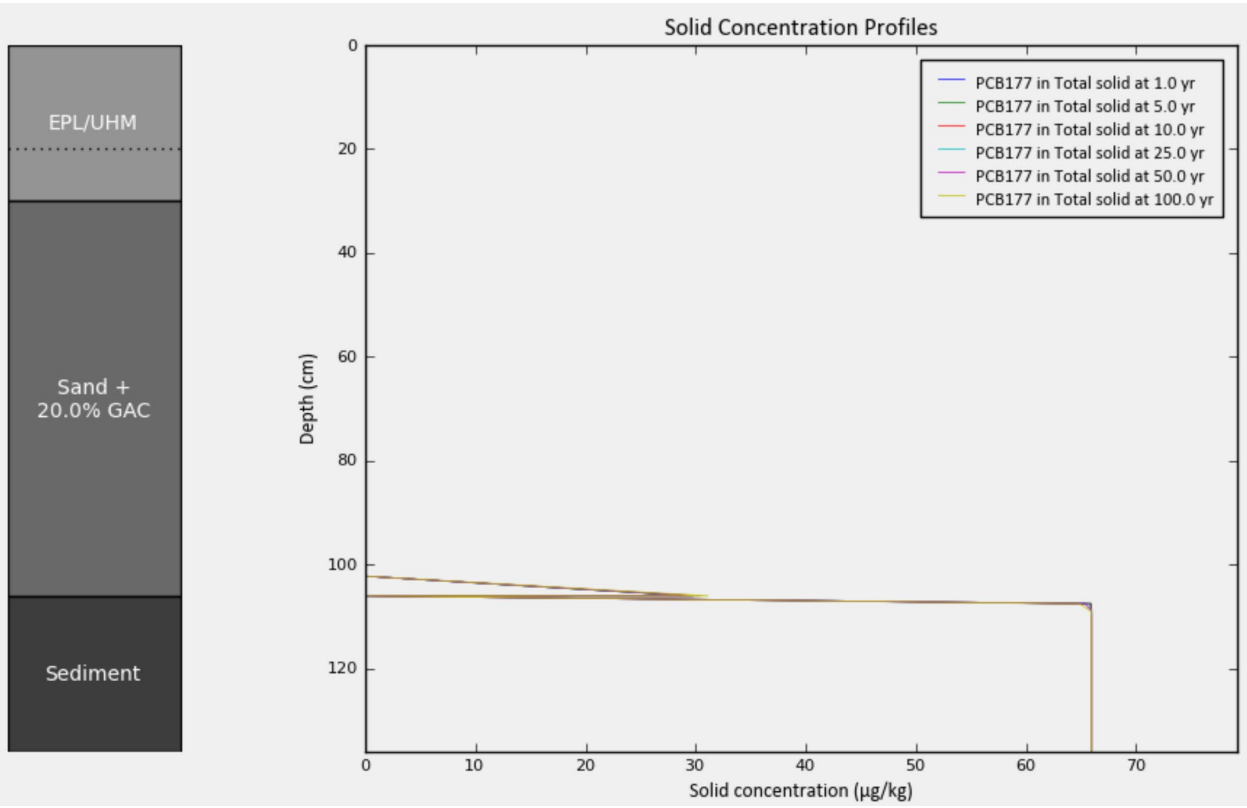

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB44 in Total solid at 1.0 yr
PCB44 in Total solid at 5.0 yr
PCB44 in Total solid at 10.0 yr
PCB44 in Total solid at 25.0 yr
PCB44 in Total solid at 50.0 yr
PCB44 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

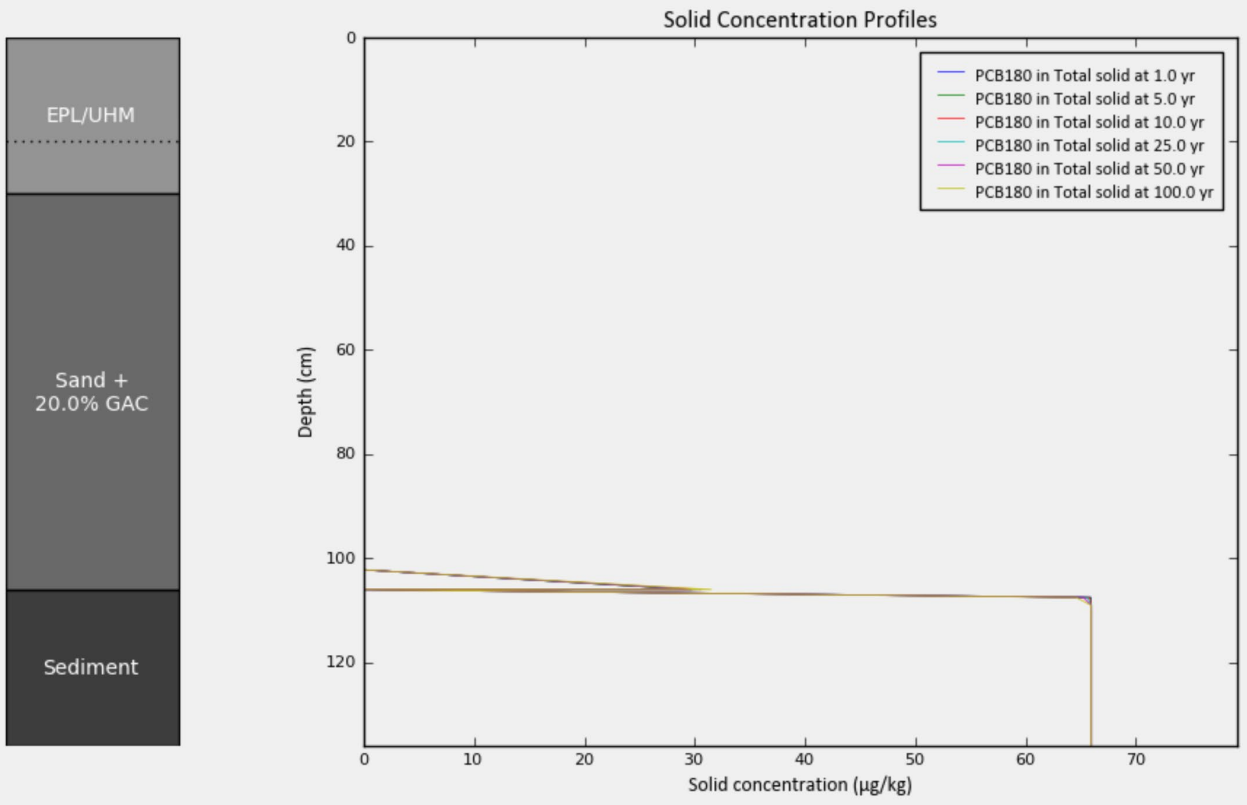

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB99 in Total solid at 1.0 yr
PCB99 in Total solid at 5.0 yr
PCB99 in Total solid at 10.0 yr
PCB99 in Total solid at 25.0 yr
PCB99 in Total solid at 50.0 yr
PCB99 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

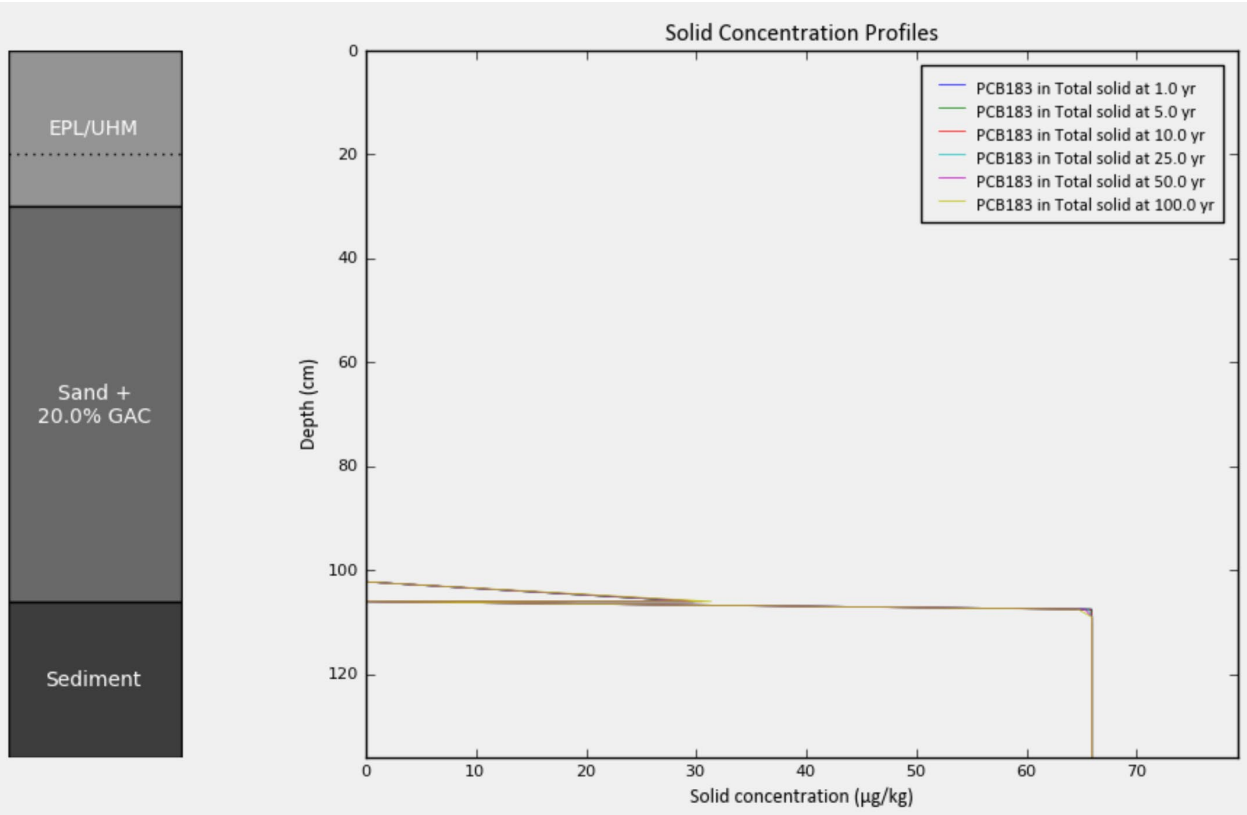

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB141 in Total solid at 1.0 yr
PCB141 in Total solid at 5.0 yr
PCB141 in Total solid at 10.0 yr
PCB141 in Total solid at 25.0 yr
PCB141 in Total solid at 50.0 yr
PCB141 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

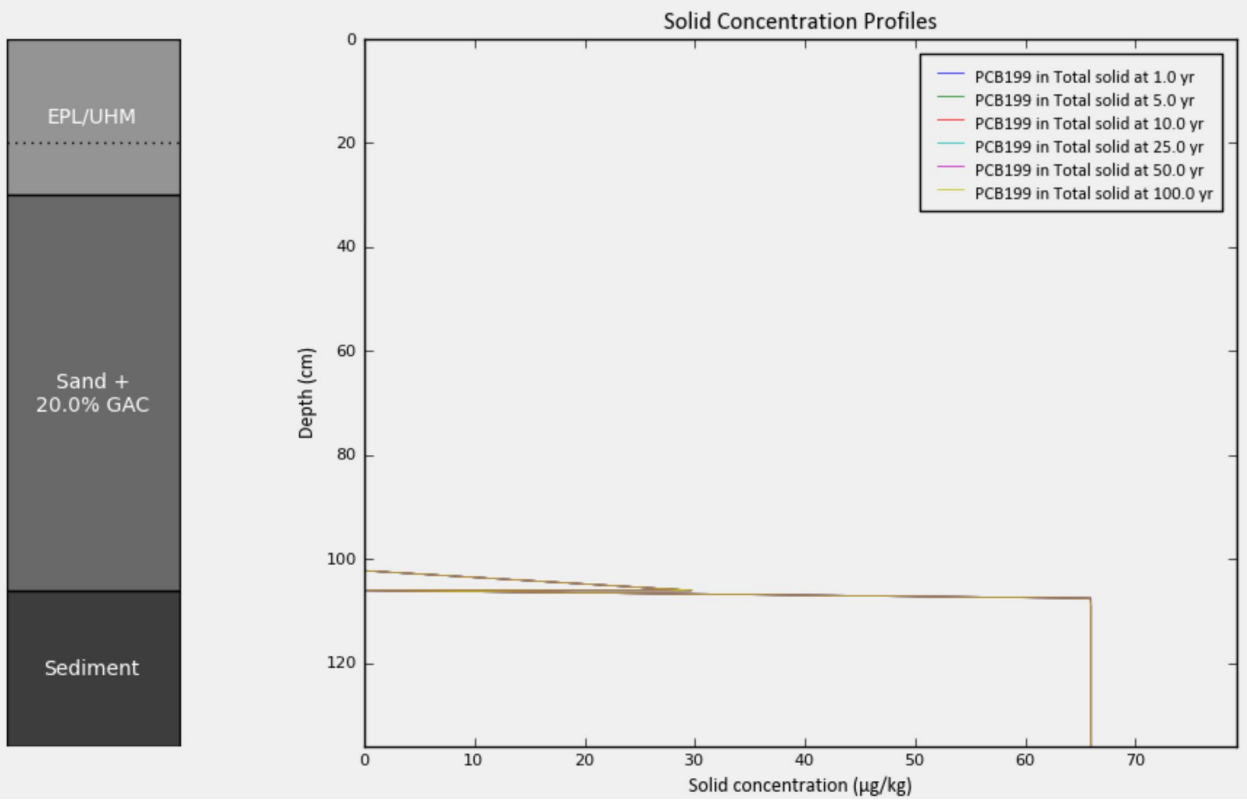

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB153 in Total solid at 1.0 yr
PCB153 in Total solid at 5.0 yr
PCB153 in Total solid at 10.0 yr
PCB153 in Total solid at 25.0 yr
PCB153 in Total solid at 50.0 yr
PCB153 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

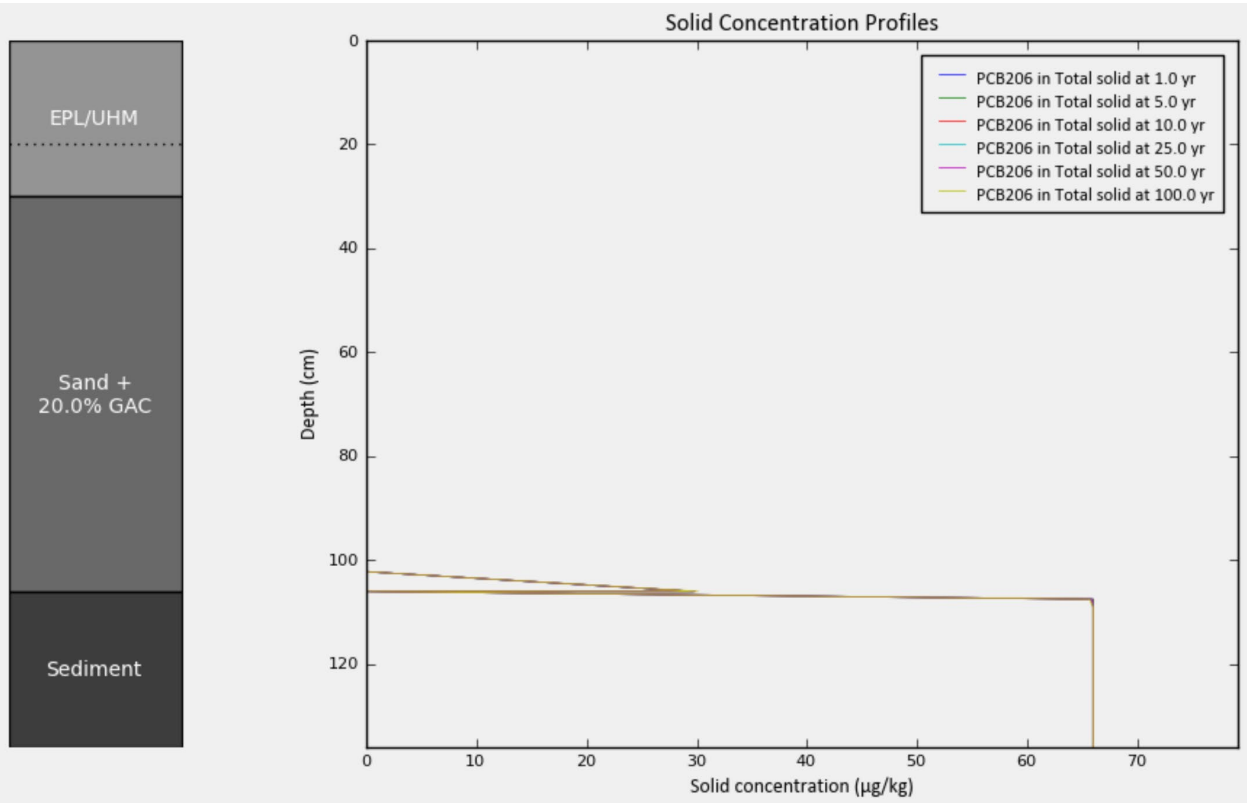

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB174 in Total solid at 1.0 yr
PCB174 in Total solid at 5.0 yr
PCB174 in Total solid at 10.0 yr
PCB174 in Total solid at 25.0 yr
PCB174 in Total solid at 50.0 yr
PCB174 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
10
20
30
40
50
60
70
Solid concentration (µg/kg)

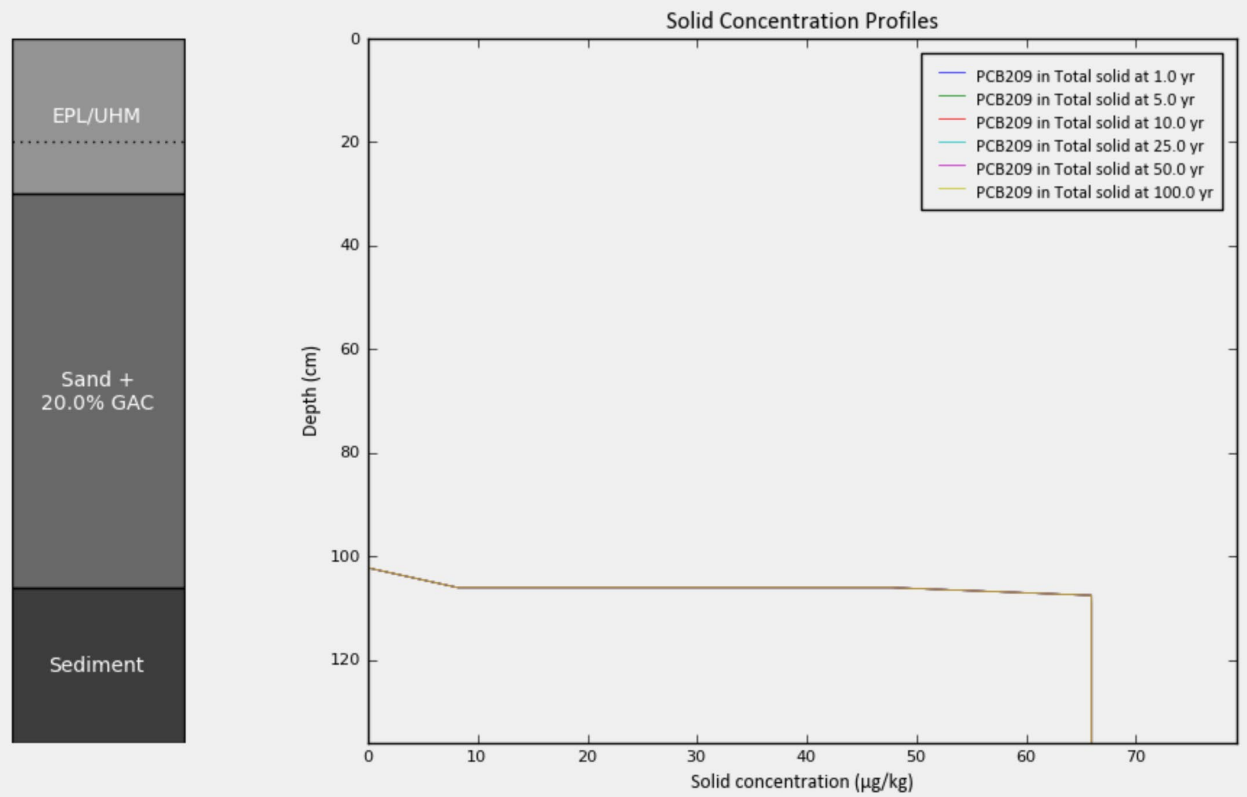

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB177 in Total solid at 1.0 yr
PCB177 in Total solid at 5.0 yr
PCB177 in Total solid at 10.0 yr
PCB177 in Total solid at 25.0 yr
PCB177 in Total solid at 50.0 yr
PCB177 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
10
20
30
40
50
60
70
Solid concentration (µg/kg)

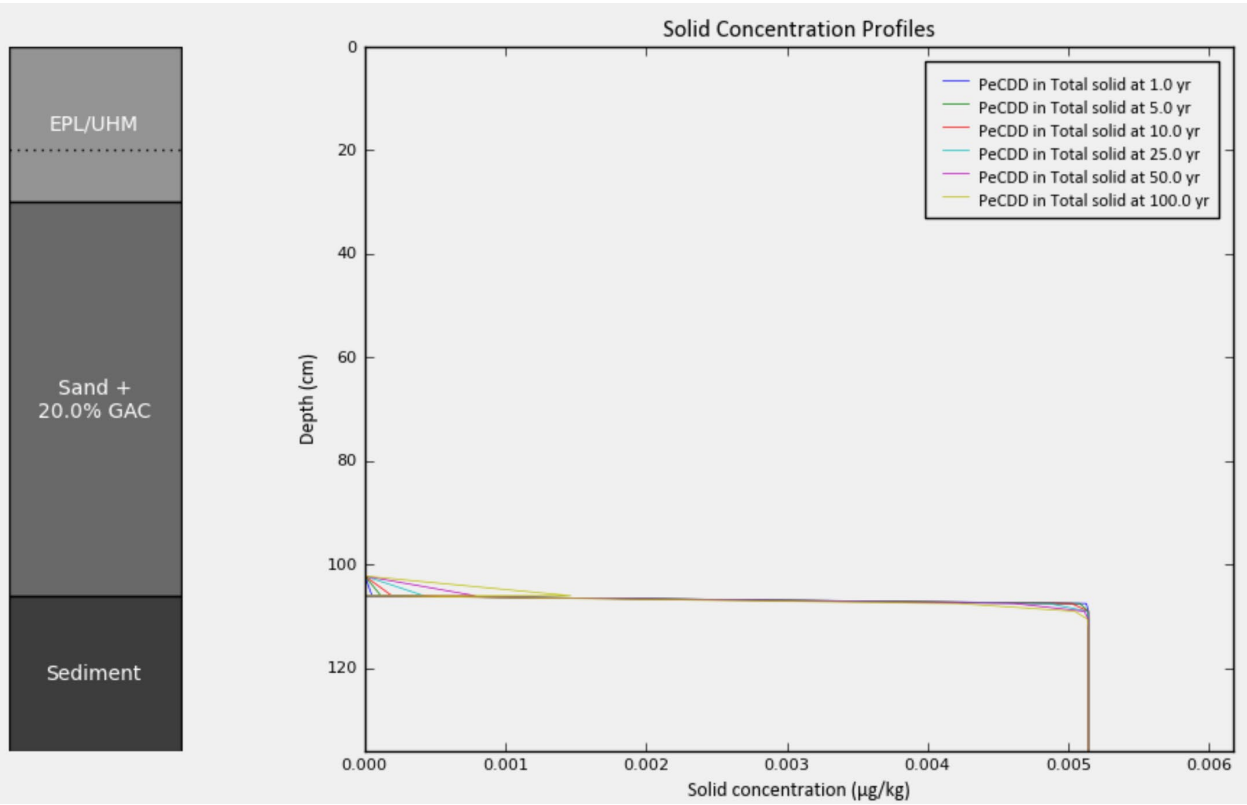

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB180 in Total solid at 1.0 yr
PCB180 in Total solid at 5.0 yr
PCB180 in Total solid at 10.0 yr
PCB180 in Total solid at 25.0 yr
PCB180 in Total solid at 50.0 yr
PCB180 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
10
20
30
40
50
60
70
Solid concentration (µg/kg)

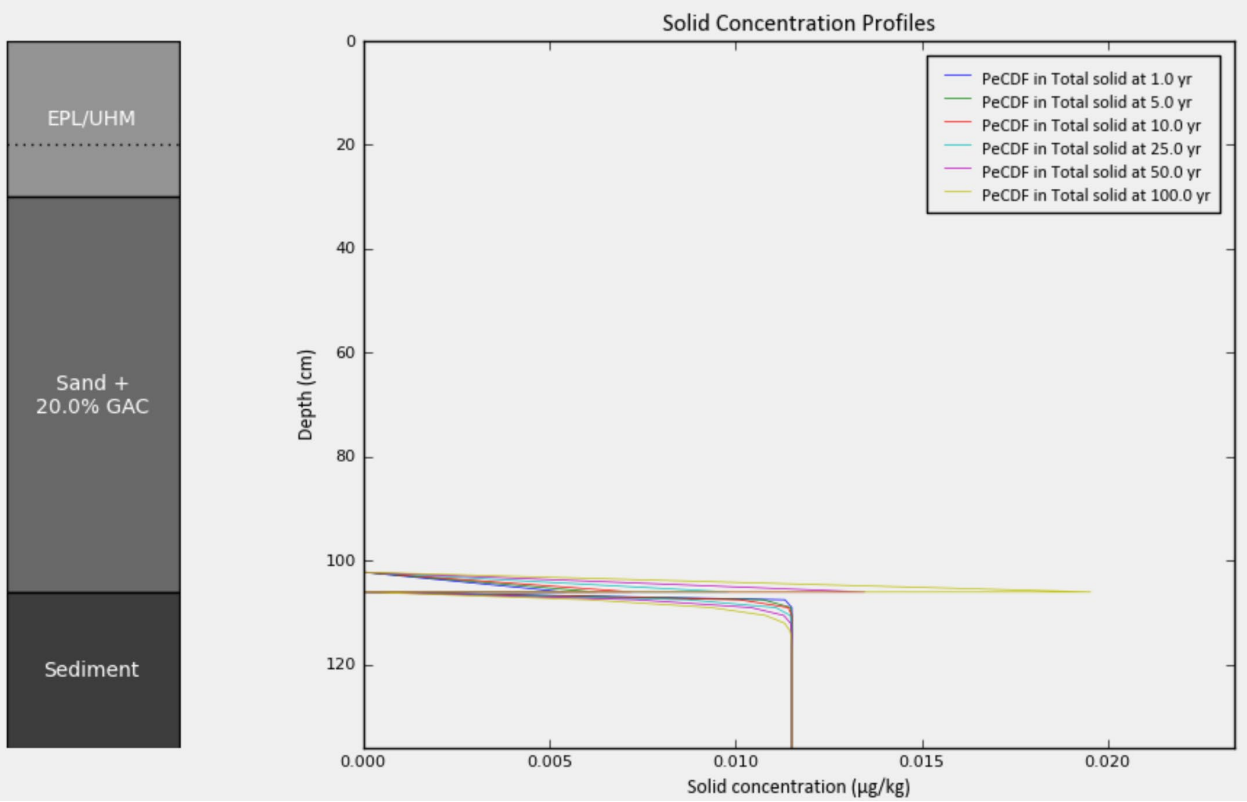

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB183 in Total solid at 1.0 yr
PCB183 in Total solid at 5.0 yr
PCB183 in Total solid at 10.0 yr
PCB183 in Total solid at 25.0 yr
PCB183 in Total solid at 50.0 yr
PCB183 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
10
20
30
40
50
60
70
Solid concentration (µg/kg)

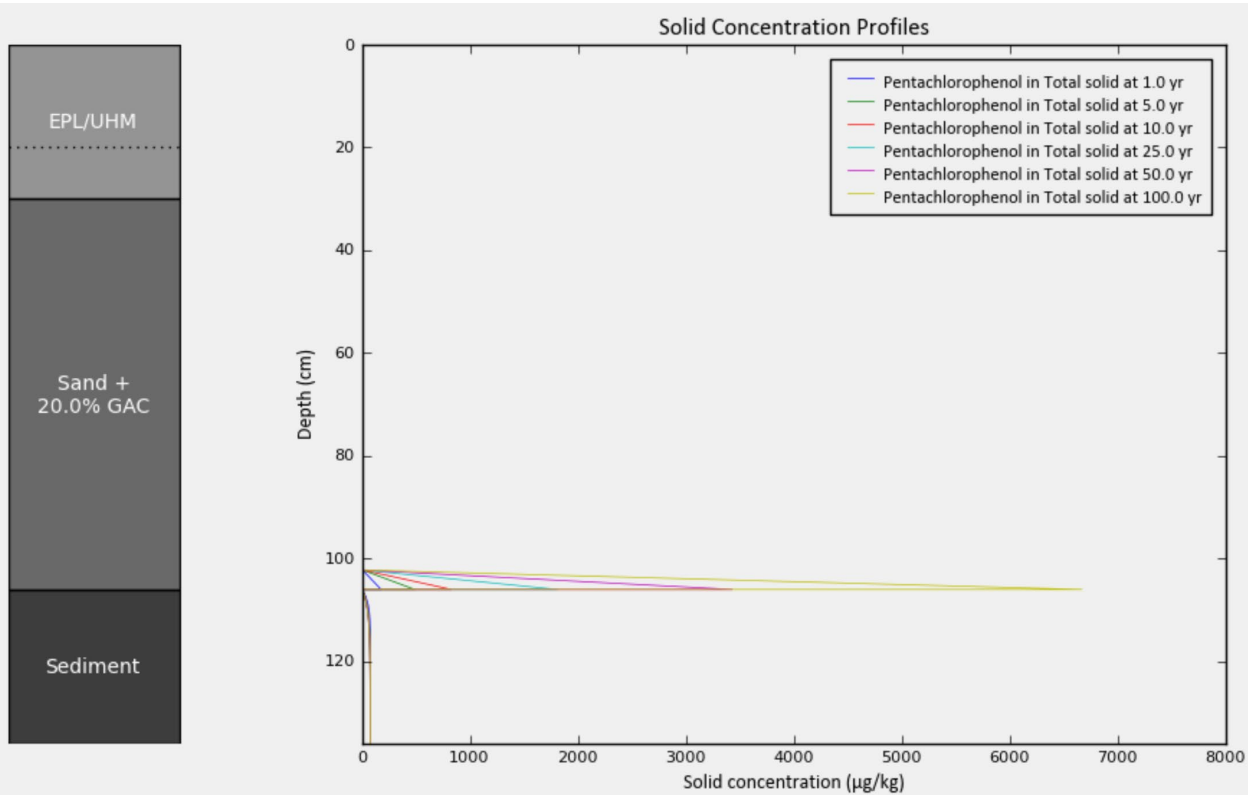

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB199 in Total solid at 1.0 yr
PCB199 in Total solid at 5.0 yr
PCB199 in Total solid at 10.0 yr
PCB199 in Total solid at 25.0 yr
PCB199 in Total solid at 50.0 yr
PCB199 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

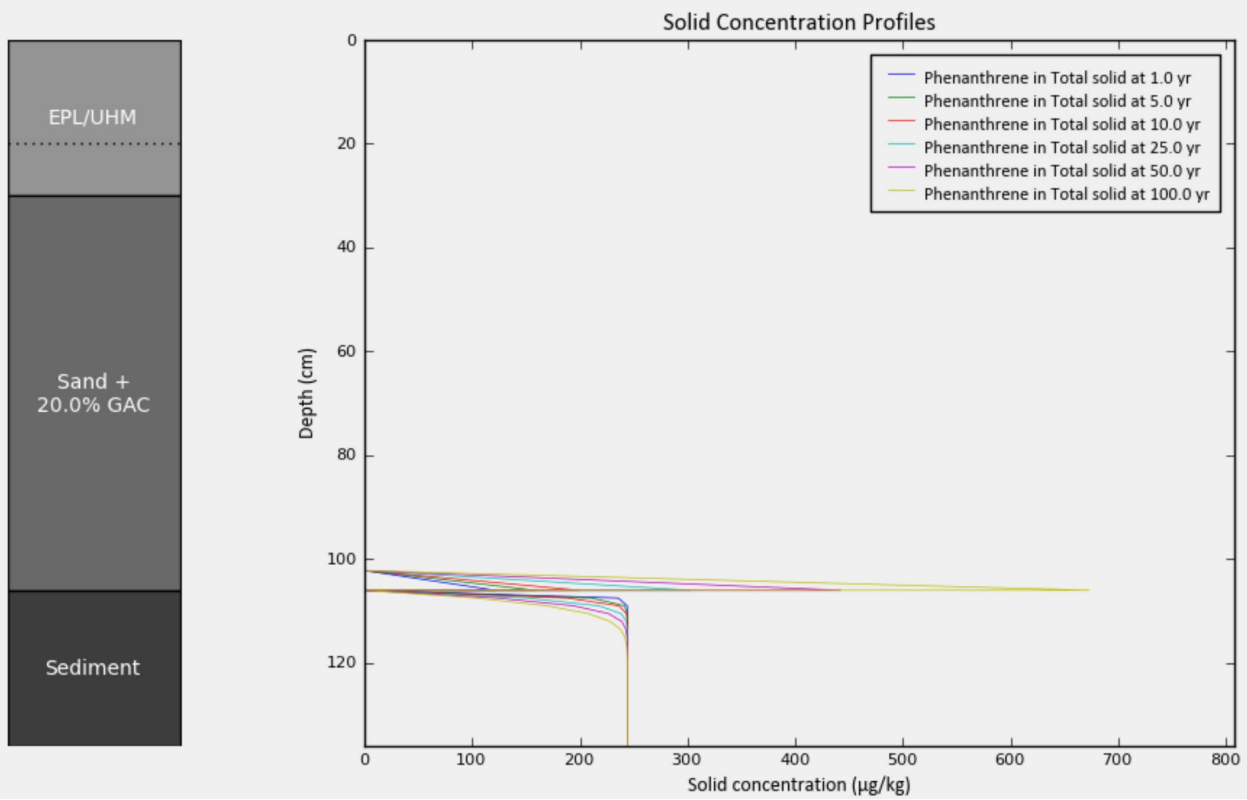

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB206 in Total solid at 1.0 yr
PCB206 in Total solid at 5.0 yr
PCB206 in Total solid at 10.0 yr
PCB206 in Total solid at 25.0 yr
PCB206 in Total solid at 50.0 yr
PCB206 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

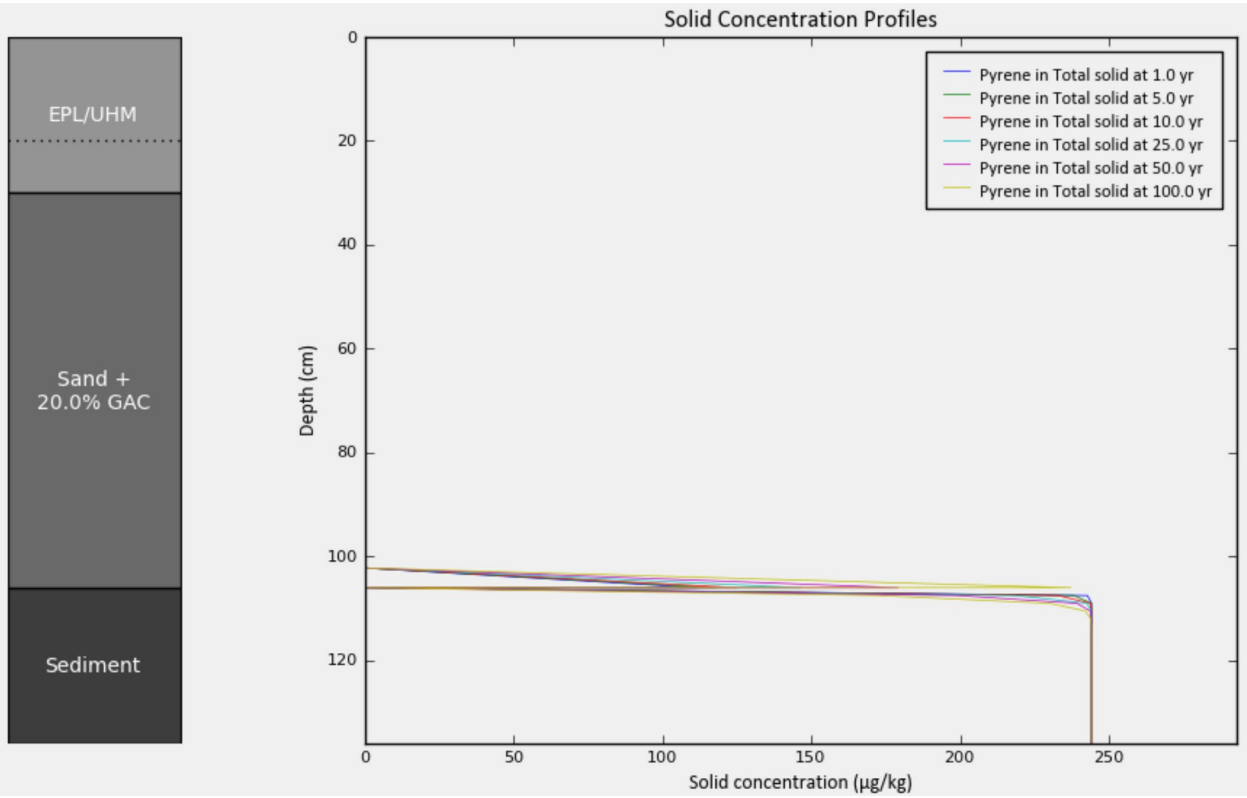

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PCB209 in Total solid at 1.0 yr
PCB209 in Total solid at 5.0 yr
PCB209 in Total solid at 10.0 yr
PCB209 in Total solid at 25.0 yr
PCB209 in Total solid at 50.0 yr
PCB209 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
10
20
30
40
50
60
70
Solid concentration (µg/kg)

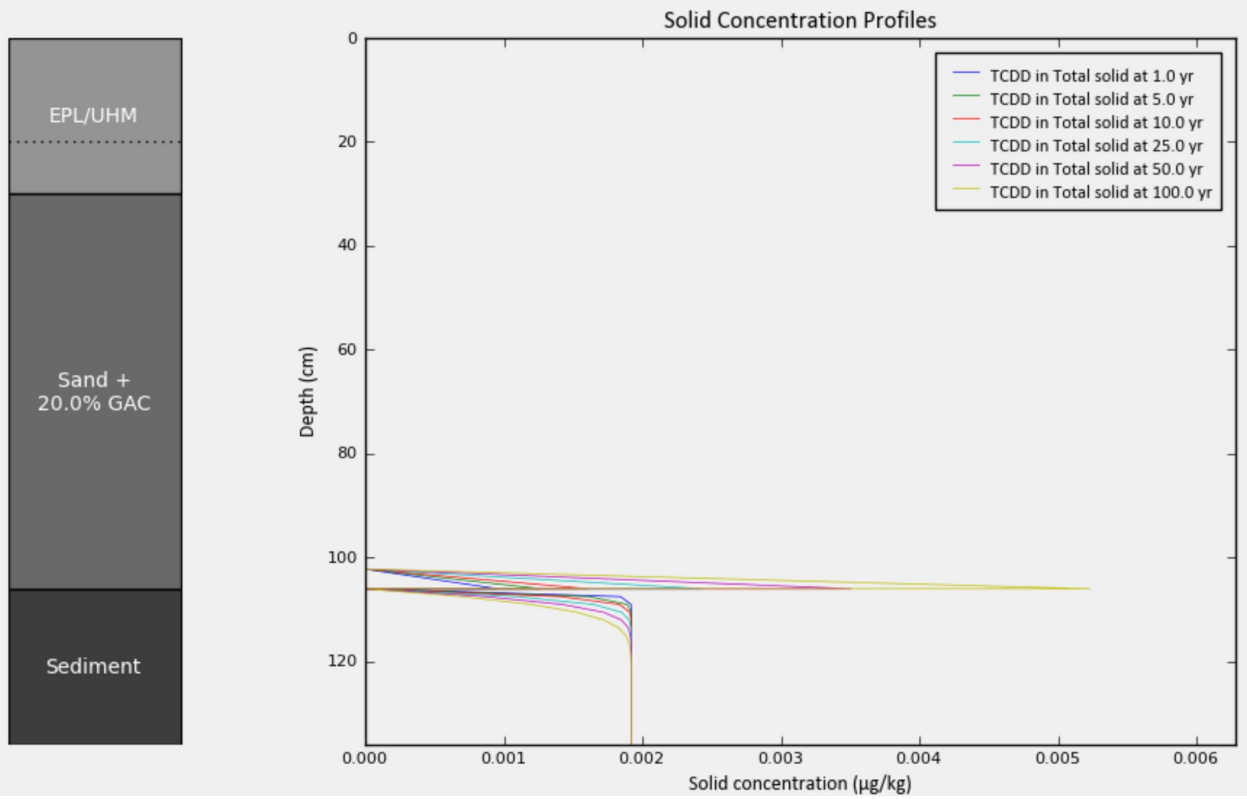

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PeCDD in Total solid at 1.0 yr
PeCDD in Total solid at 5.0 yr
PeCDD in Total solid at 10.0 yr
PeCDD in Total solid at 25.0 yr
PeCDD in Total solid at 50.0 yr
PeCDD in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Solid concentration (µg/kg)

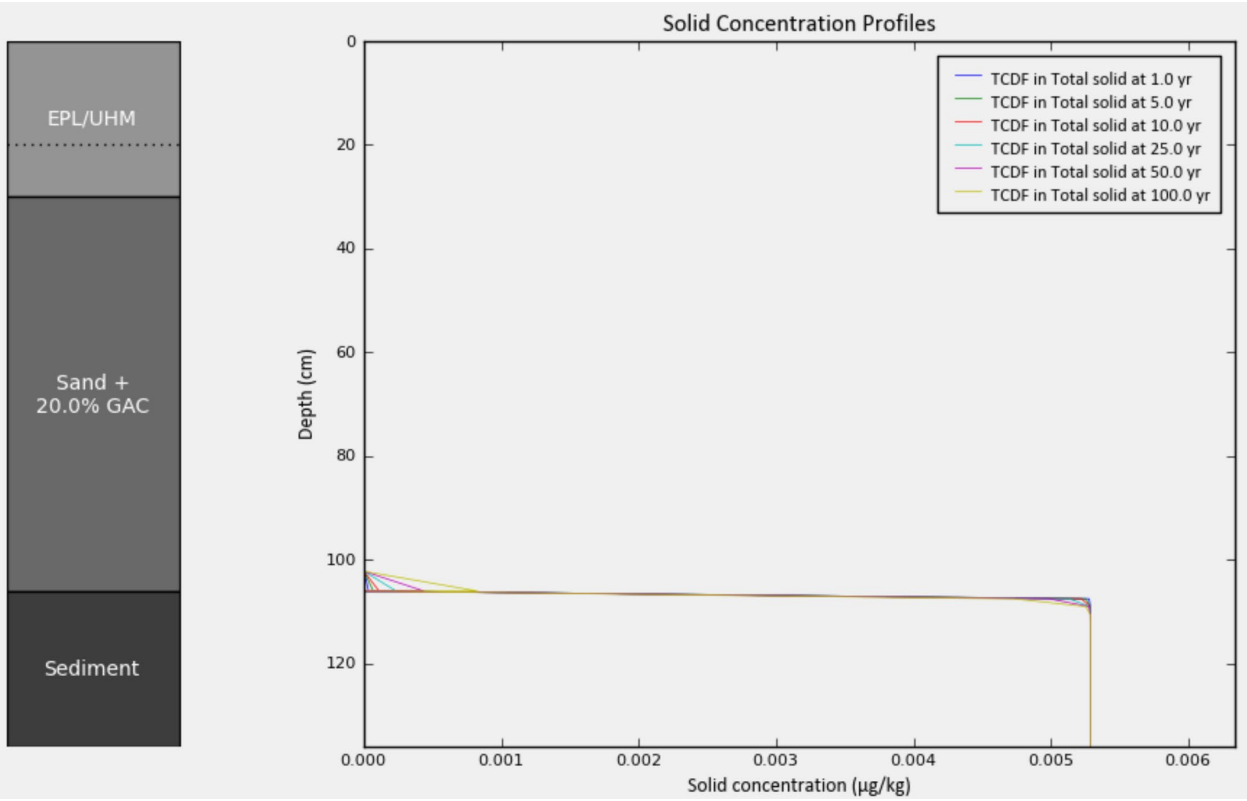

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
PeCDF in Total solid at 1.0 yr
PeCDF in Total solid at 5.0 yr
PeCDF in Total solid at 10.0 yr
PeCDF in Total solid at 25.0 yr
PeCDF in Total solid at 50.0 yr
PeCDF in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
Solid concentration (µg/kg)

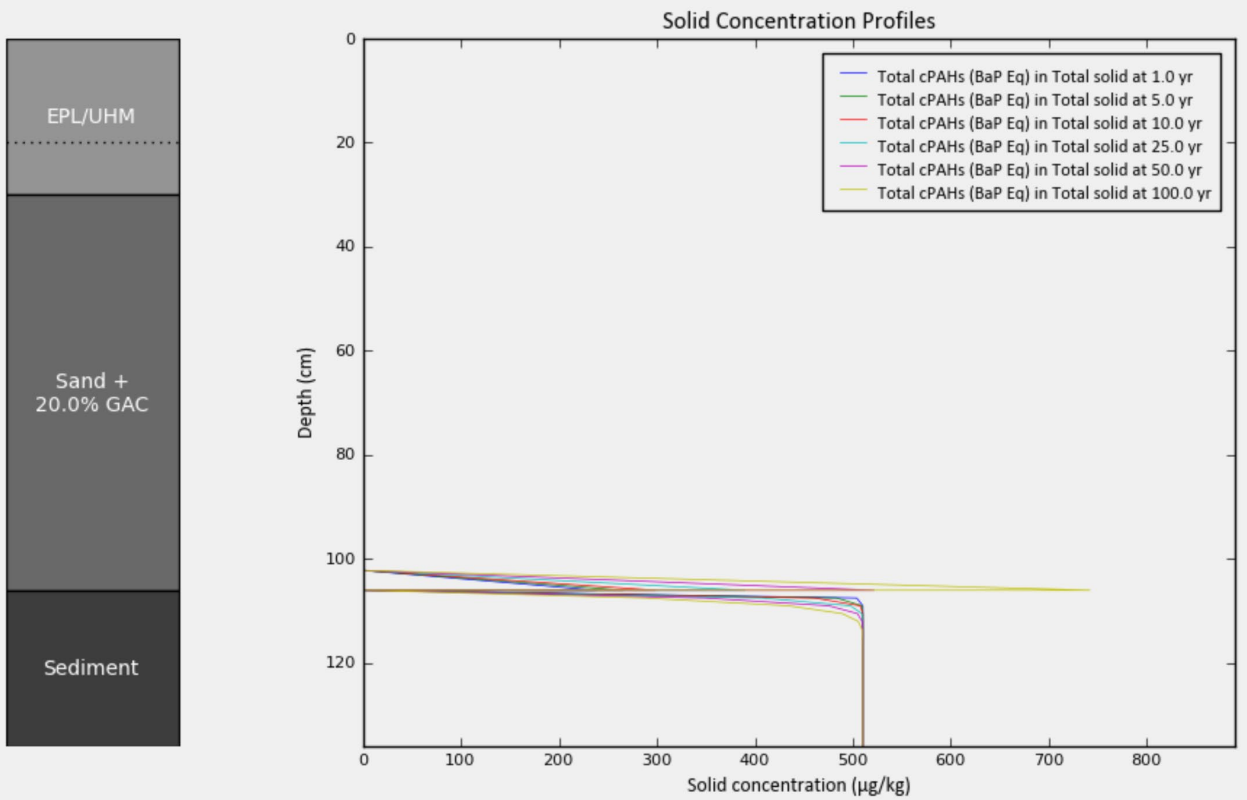

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Pentachlorophenol in Total solid at 1.0 yr
Pentachlorophenol in Total solid at 5.0 yr
Pentachlorophenol in Total solid at 10.0 yr
Pentachlorophenol in Total solid at 25.0 yr
Pentachlorophenol in Total solid at 50.0 yr
Pentachlorophenol in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1000
2000
3000
4000
5000
6000
7000
8000
Solid concentration (µg/kg)

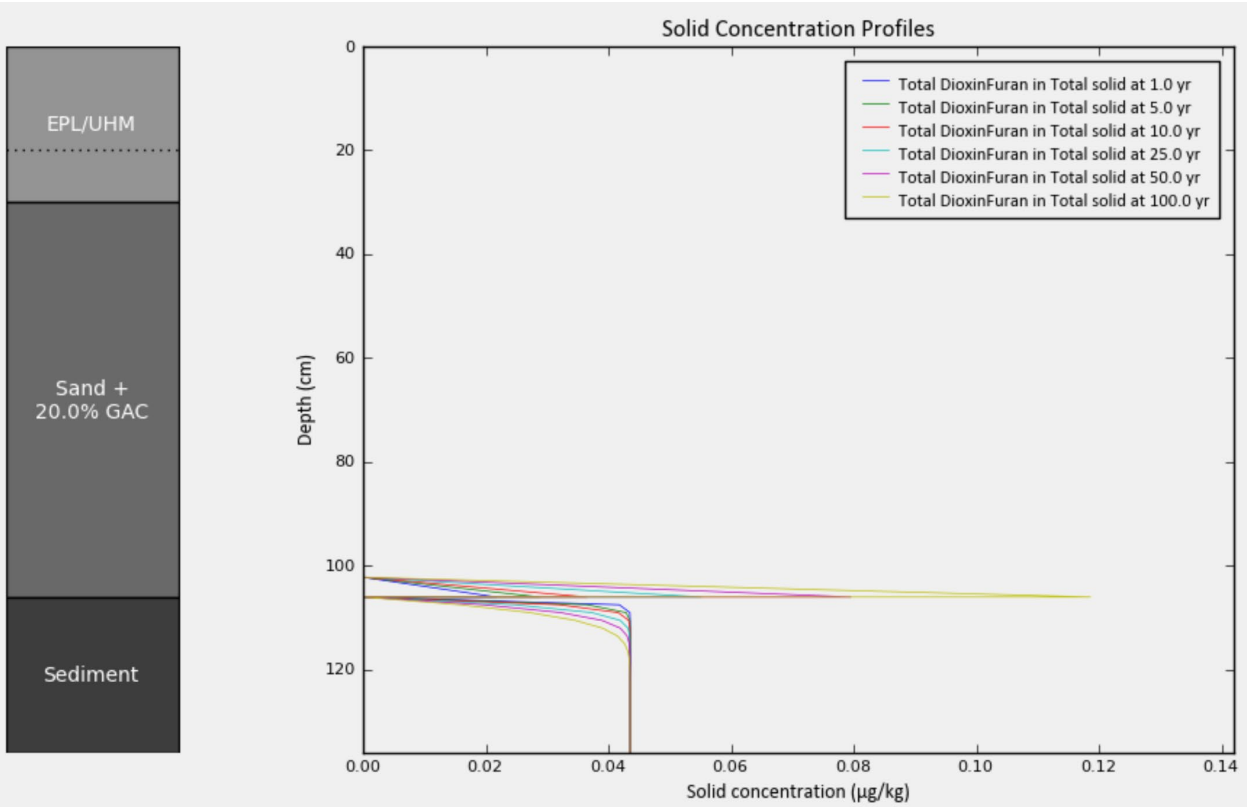

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Phenanthrene in Total solid at 1.0 yr
Phenanthrene in Total solid at 5.0 yr
Phenanthrene in Total solid at 10.0 yr
Phenanthrene in Total solid at 25.0 yr
Phenanthrene in Total solid at 50.0 yr
Phenanthrene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
100
200
300
400
500
600
700
800
Solid concentration (µg/kg)

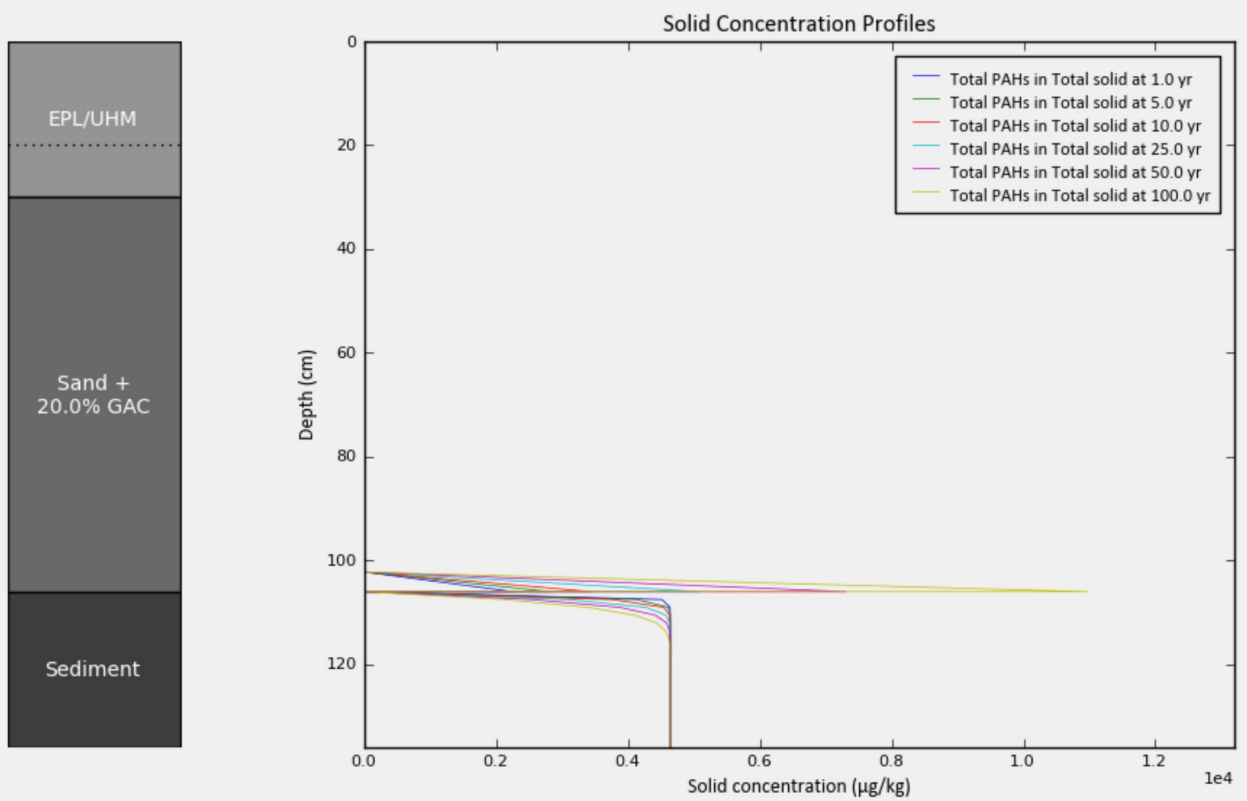

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Pyrene in Total solid at 1.0 yr
Pyrene in Total solid at 5.0 yr
Pyrene in Total solid at 10.0 yr
Pyrene in Total solid at 25.0 yr
Pyrene in Total solid at 50.0 yr
Pyrene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
Solid concentration (µg/kg)

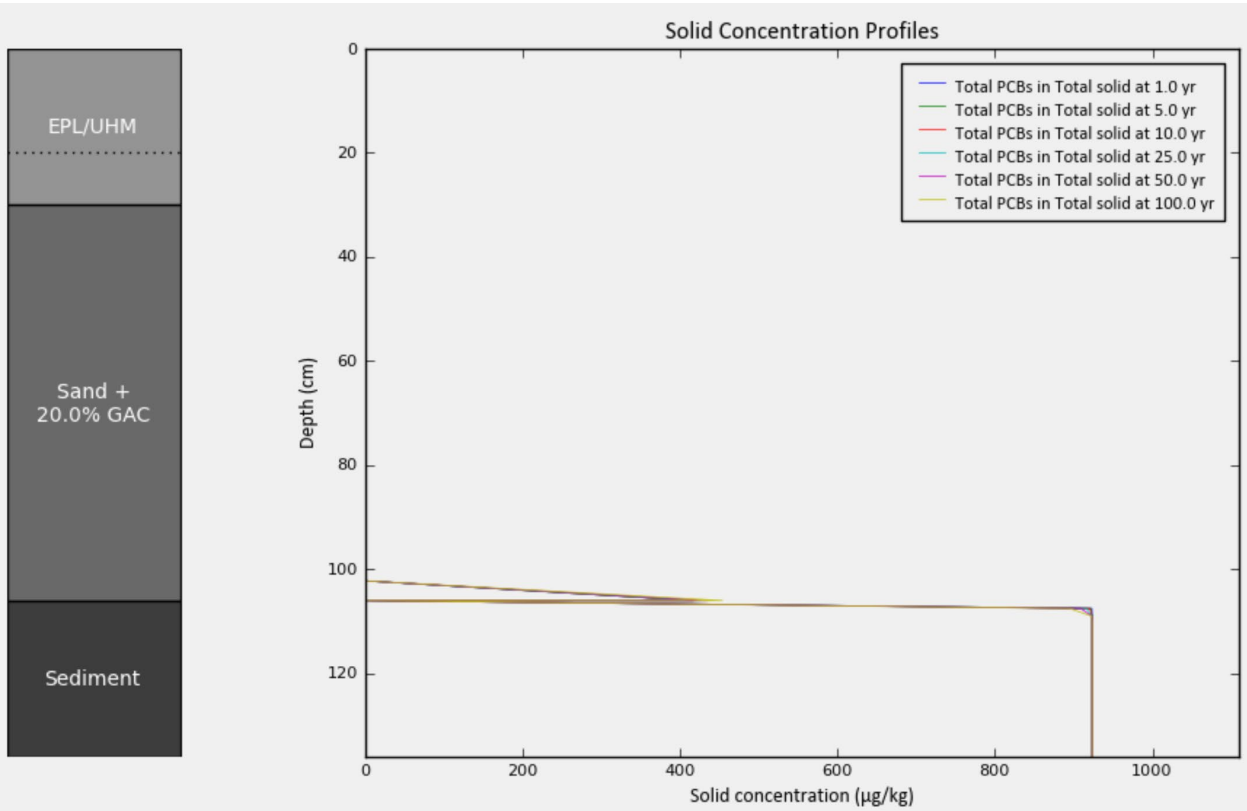

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
TCDD in Total solid at 1.0 yr
TCDD in Total solid at 5.0 yr
TCDD in Total solid at 10.0 yr
TCDD in Total solid at 25.0 yr
TCDD in Total solid at 50.0 yr
TCDD in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Solid concentration (µg/kg)

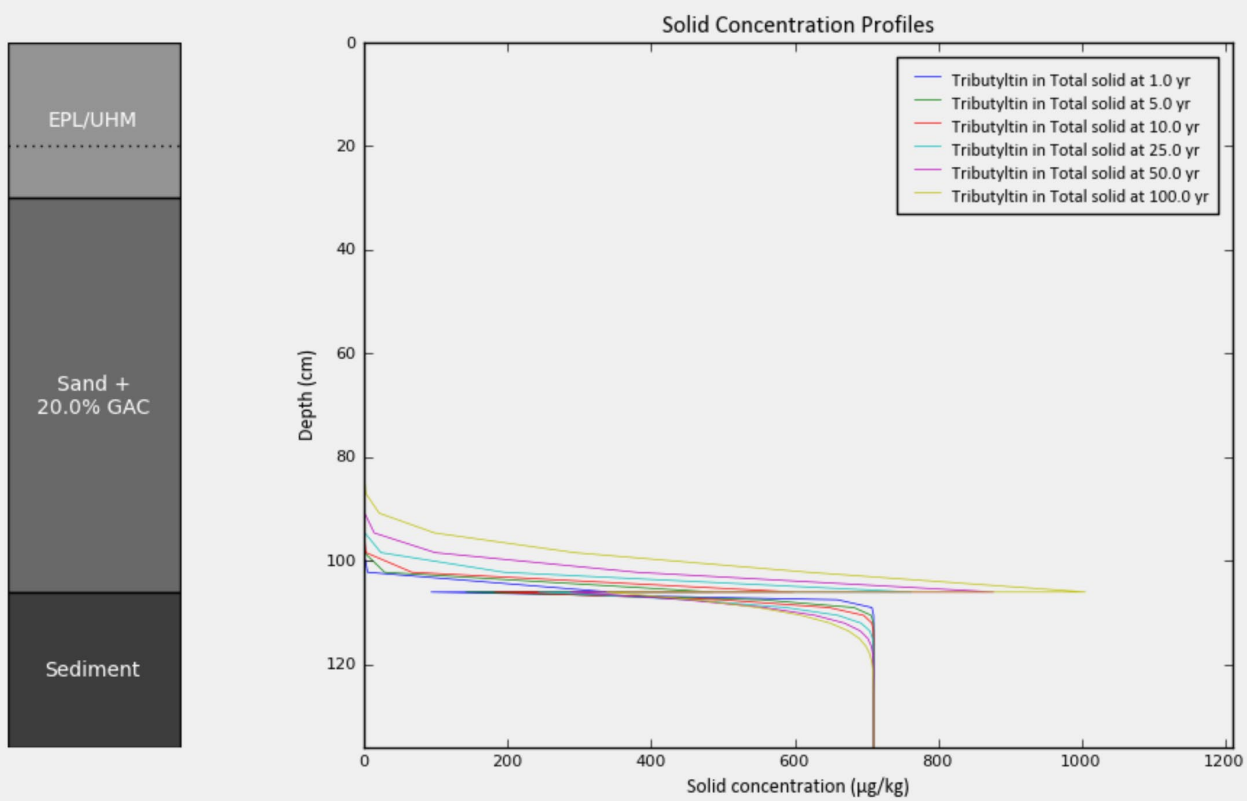

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
TCDF in Total solid at 1.0 yr
TCDF in Total solid at 5.0 yr
TCDF in Total solid at 10.0 yr
TCDF in Total solid at 25.0 yr
TCDF in Total solid at 50.0 yr
TCDF in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Solid concentration (µg/kg)

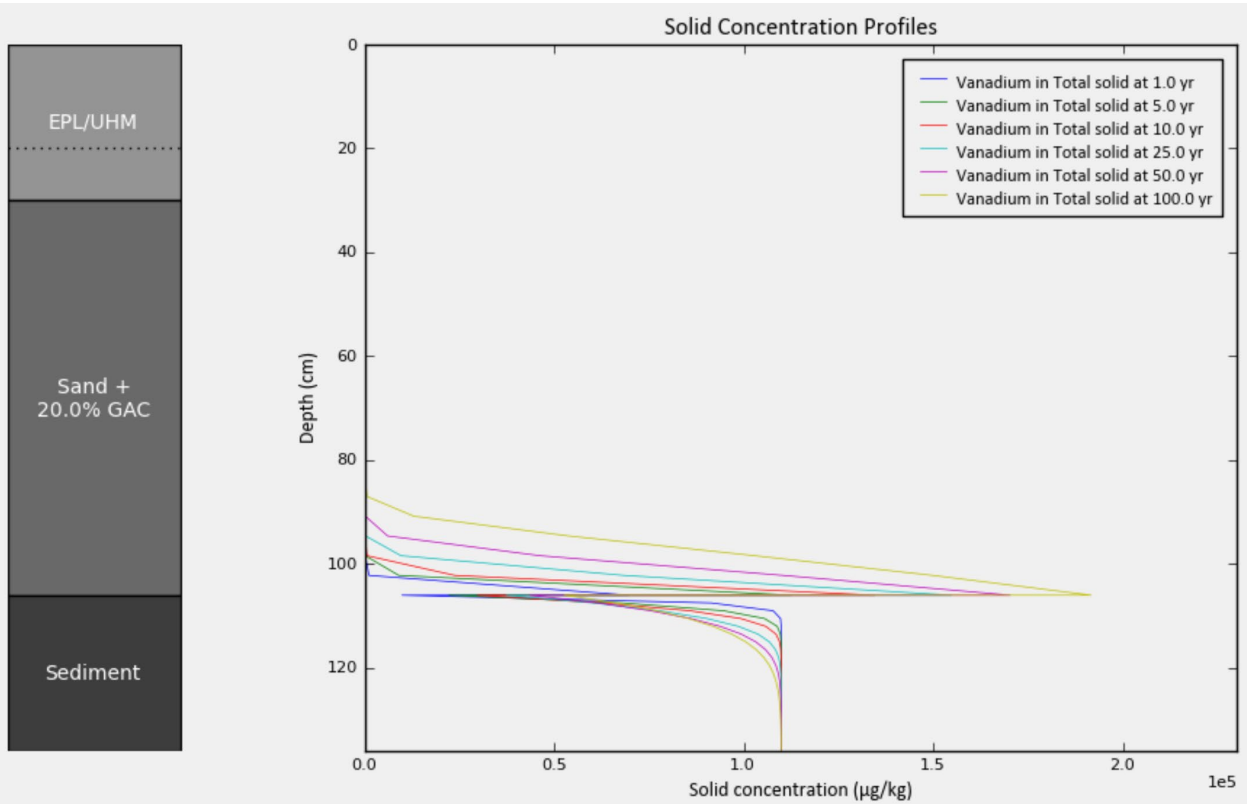

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Total cPAHs (BaP Eq) in Total solid at 1.0 yr
Total cPAHs (BaP Eq) in Total solid at 5.0 yr
Total cPAHs (BaP Eq) in Total solid at 10.0 yr
Total cPAHs (BaP Eq) in Total solid at 25.0 yr
Total cPAHs (BaP Eq) in Total solid at 50.0 yr
Total cPAHs (BaP Eq) in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
100
200
300
400
500
600
700
800
Solid concentration (µg/kg)

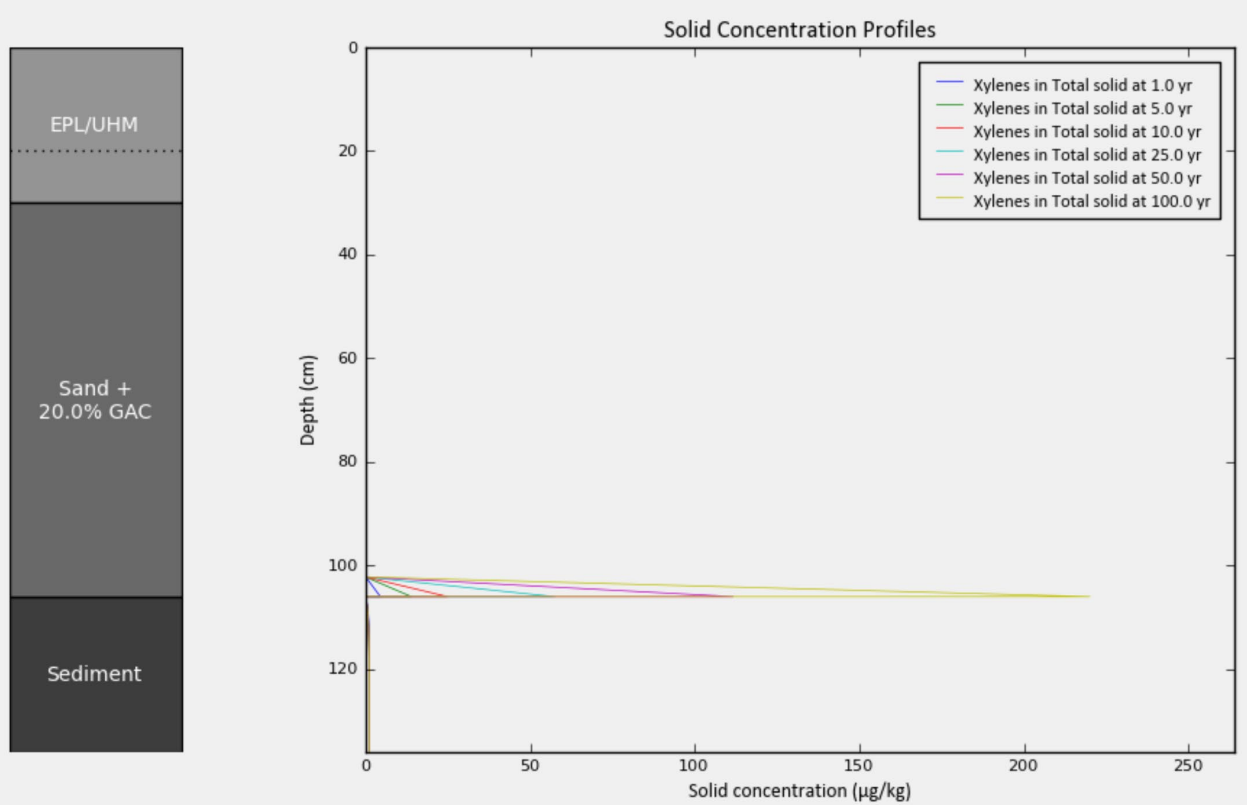

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Total DioxinFuran in Total solid at 1.0 yr
Total DioxinFuran in Total solid at 5.0 yr
Total DioxinFuran in Total solid at 10.0 yr
Total DioxinFuran in Total solid at 25.0 yr
Total DioxinFuran in Total solid at 50.0 yr
Total DioxinFuran in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
Solid concentration (µg/kg)

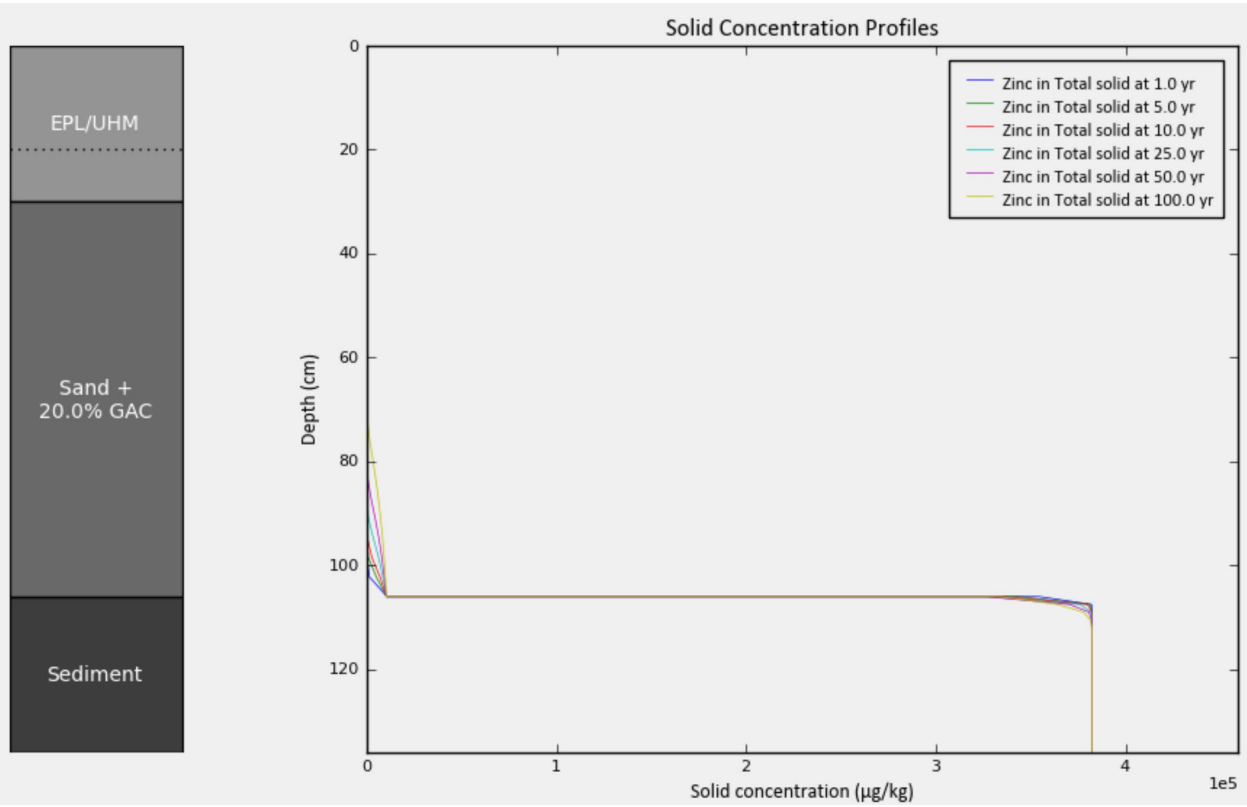

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Total PAHs in Total solid at 1.0 yr
Total PAHs in Total solid at 5.0 yr
Total PAHs in Total solid at 10.0 yr
Total PAHs in Total solid at 25.0 yr
Total PAHs in Total solid at 50.0 yr
Total PAHs in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e4
Solid concentration (µg/kg)


EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Total PCBs in Total solid at 1.0 yr
Total PCBs in Total solid at 5.0 yr
Total PCBs in Total solid at 10.0 yr
Total PCBs in Total solid at 25.0 yr
Total PCBs in Total solid at 50.0 yr
Total PCBs in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
200
400
600
800
1000
Solid concentration (µg/kg)


EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Tributyltin in Total solid at 1.0 yr
Tributyltin in Total solid at 5.0 yr
Tributyltin in Total solid at 10.0 yr
Tributyltin in Total solid at 25.0 yr
Tributyltin in Total solid at 50.0 yr
Tributyltin in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
200
400
600
800
1000
1200
Solid concentration (µg/kg)

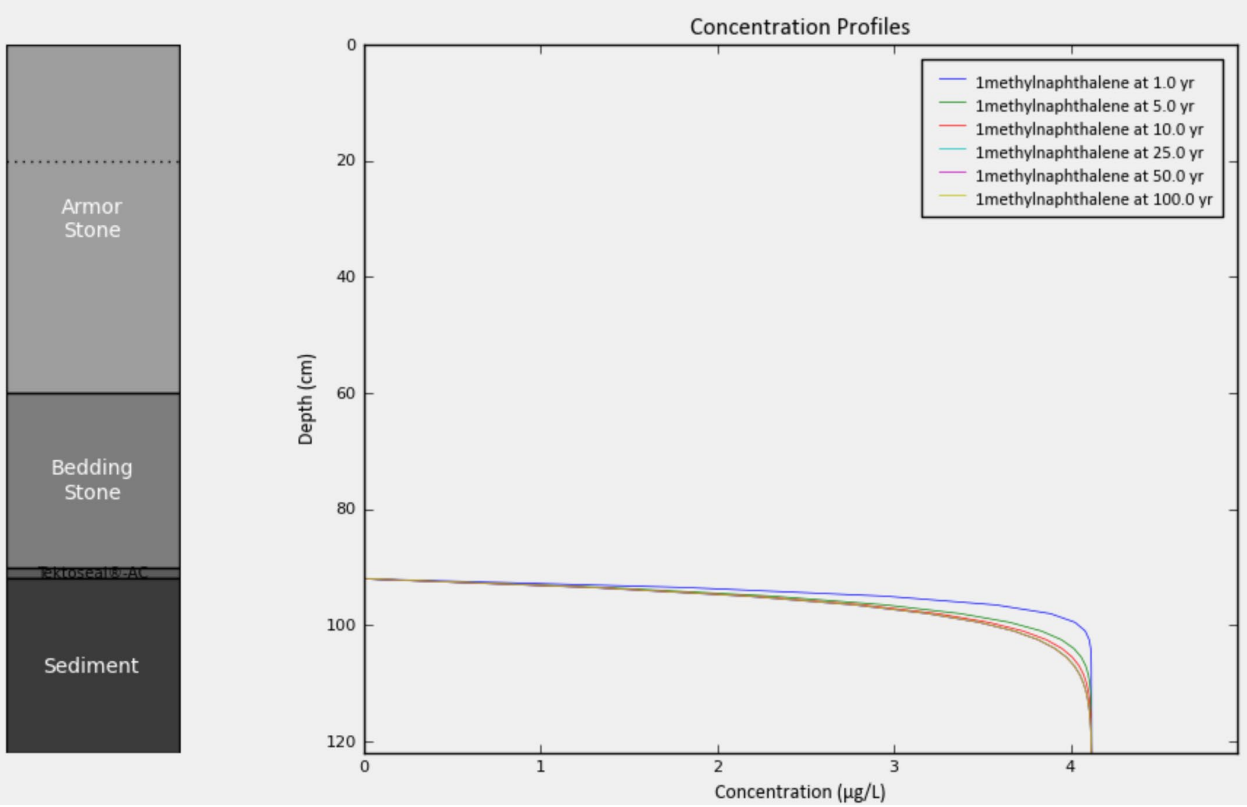

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Vanadium in Total solid at 1.0 yr
Vanadium in Total solid at 5.0 yr
Vanadium in Total solid at 10.0 yr
Vanadium in Total solid at 25.0 yr
Vanadium in Total solid at 50.0 yr
Vanadium in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
1e5
Solid concentration (µg/kg)

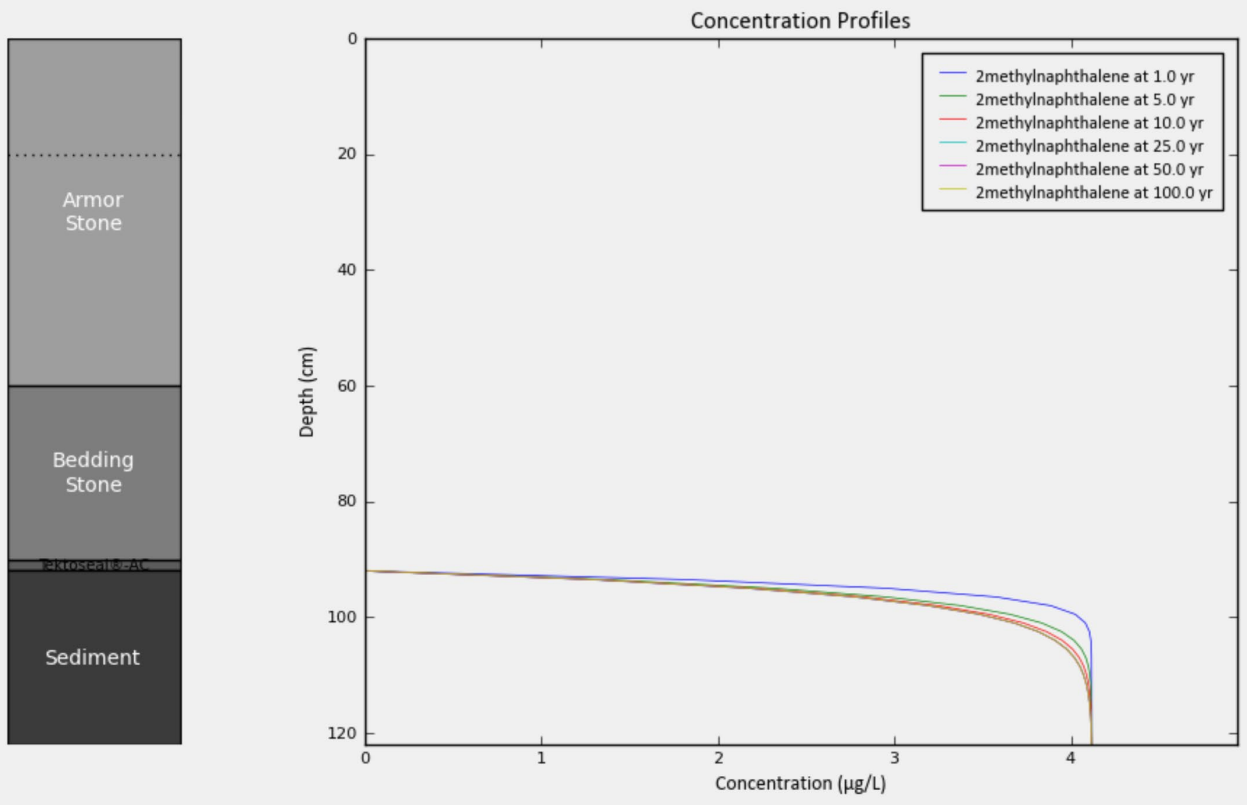

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Xylenes in Total solid at 1.0 yr
Xylenes in Total solid at 5.0 yr
Xylenes in Total solid at 10.0 yr
Xylenes in Total solid at 25.0 yr
Xylenes in Total solid at 50.0 yr
Xylenes in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
50
100
150
200
250
Solid concentration (µg/kg)

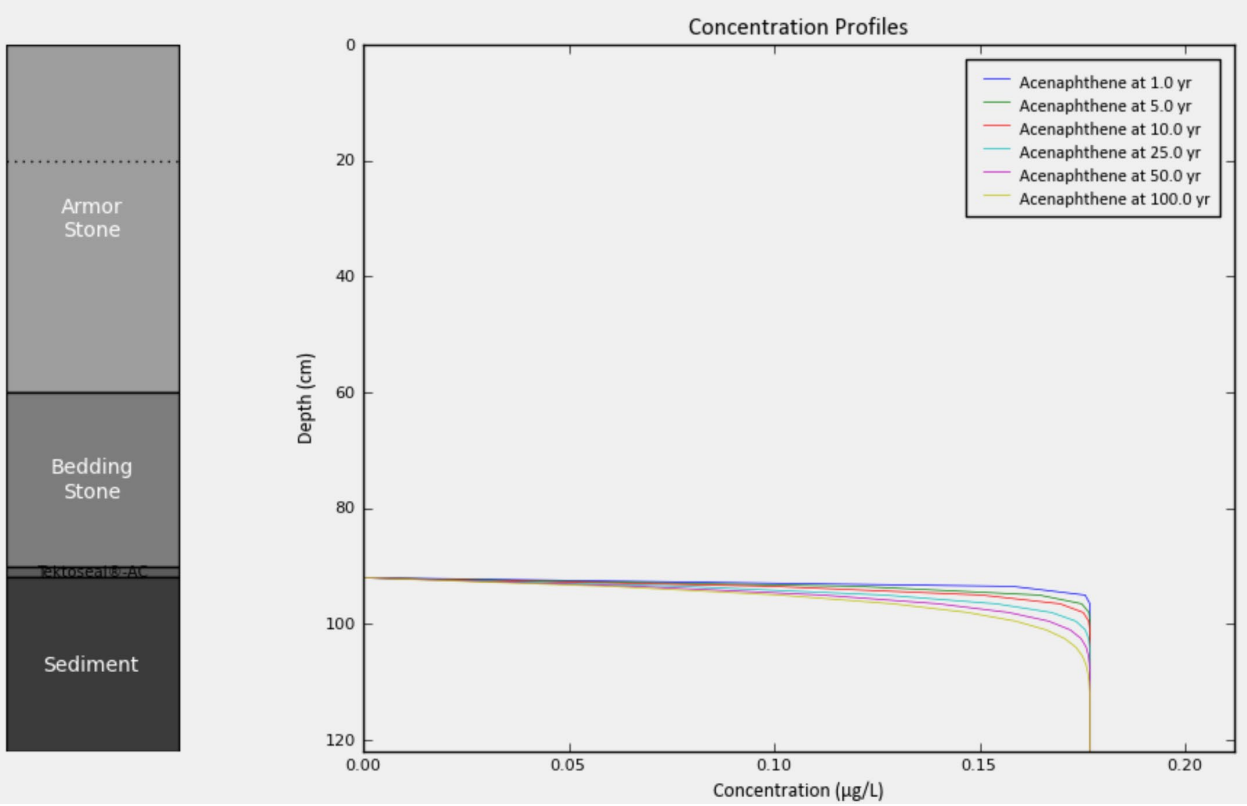

EPL/UHM
Sand +
20.0% GAC
Sediment
Solid Concentration Profiles
Zinc in Total solid at 1.0 yr
Zinc in Total solid at 5.0 yr
Zinc in Total solid at 10.0 yr
Zinc in Total solid at 25.0 yr
Zinc in Total solid at 50.0 yr
Zinc in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
1e5
Solid concentration (µg/kg)

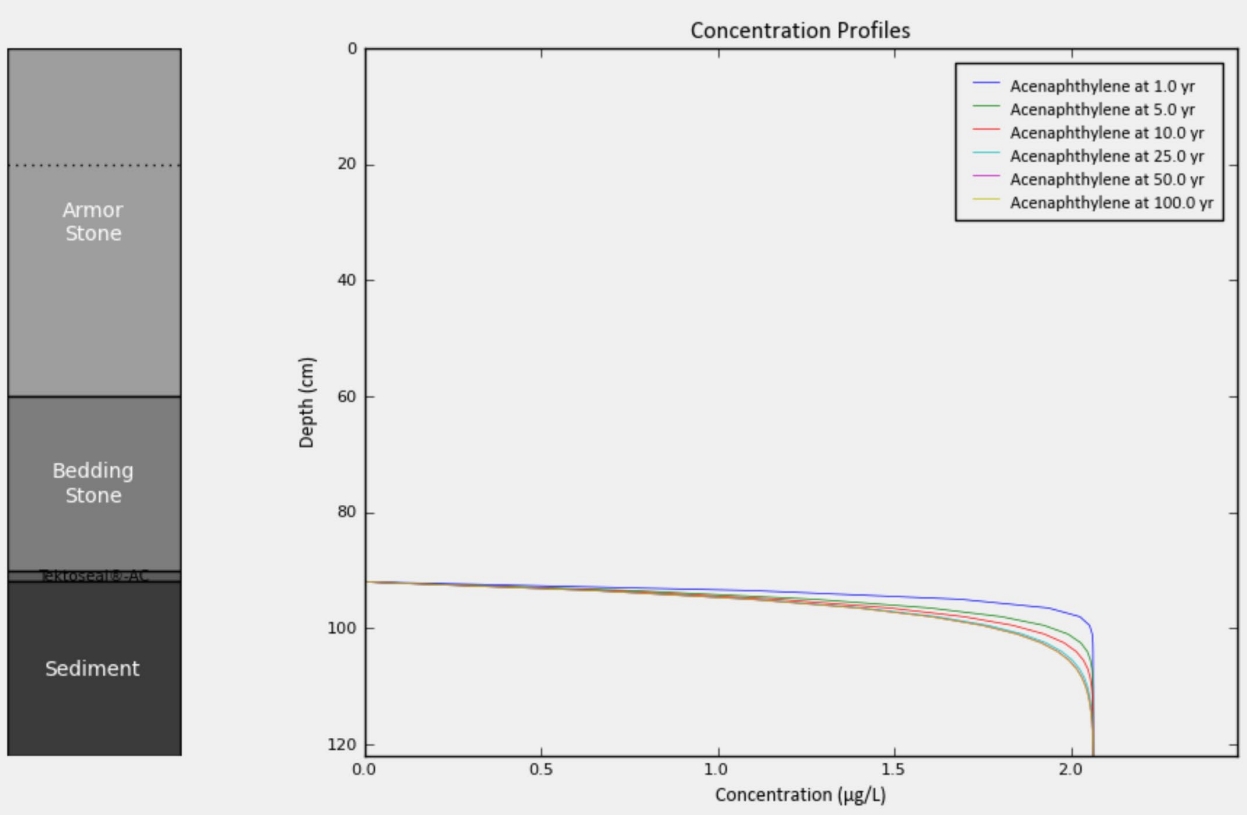
Cap Alternative 7: 2 cm Tektoseal-AC with 30 cm of 2.5-inch bedding stone and 60 cm of 10-inch armor stone

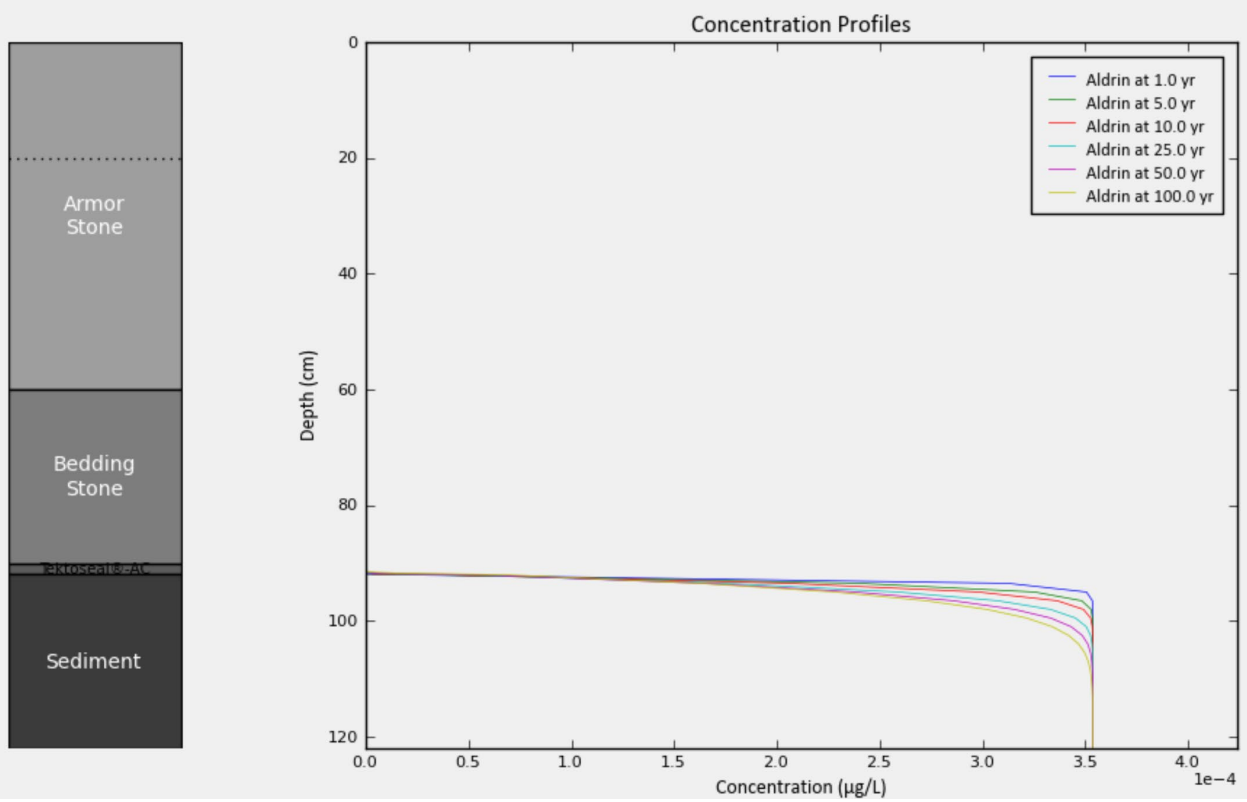
Porewater Concentration - Depth

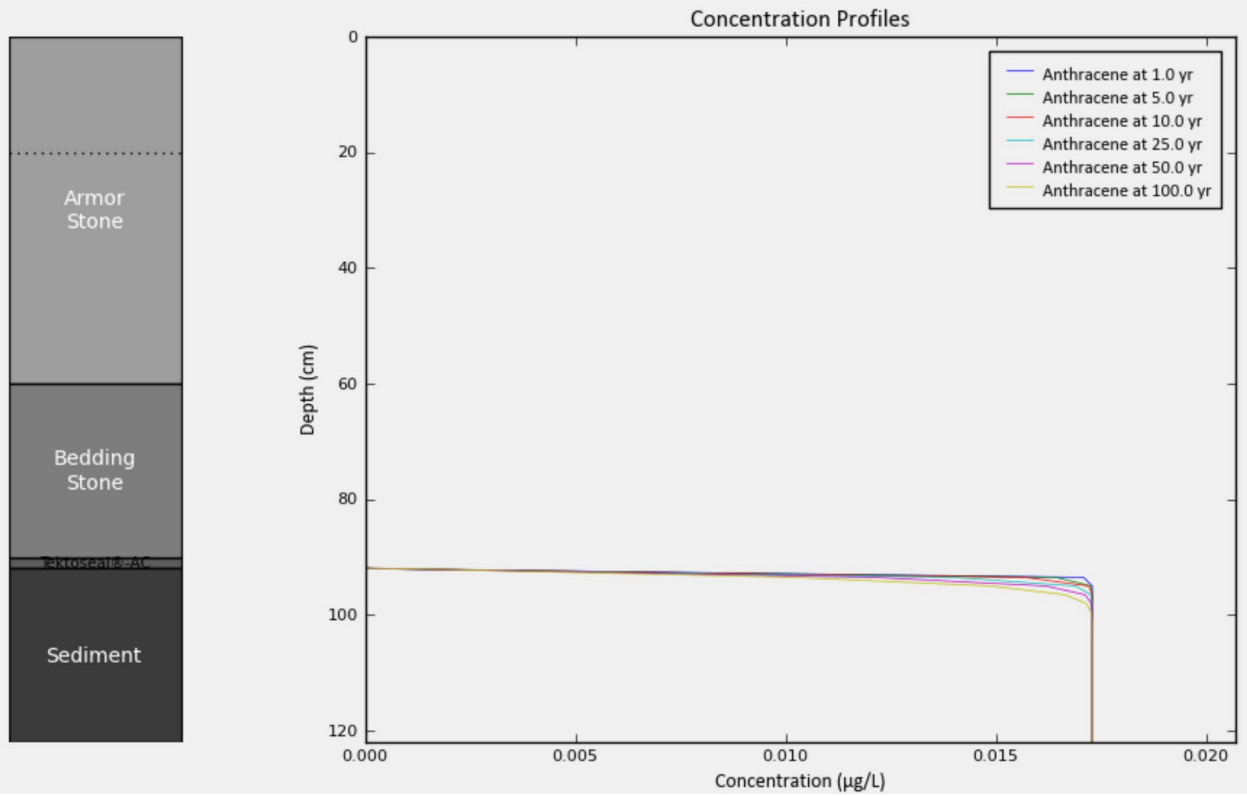


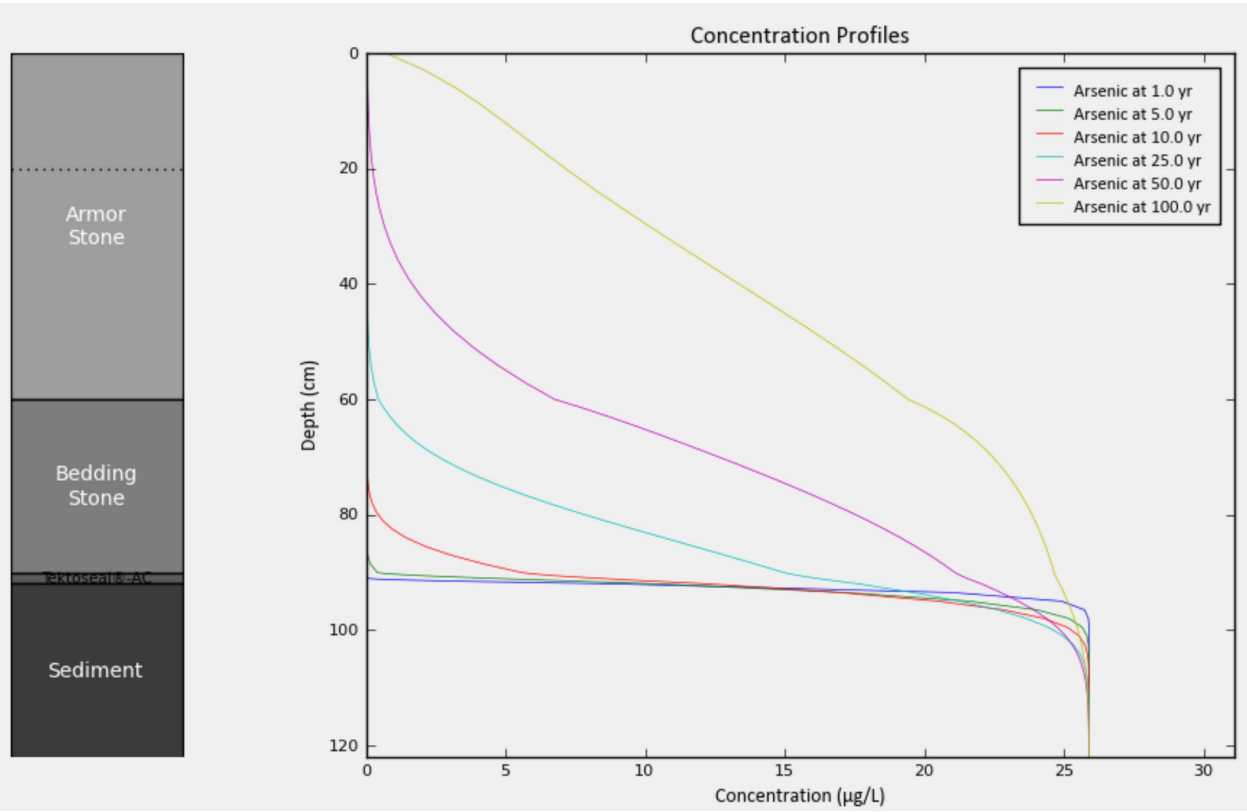

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
2methylnaphthalene at 1.0 yr
2methylnaphthalene at 5.0 yr
2methylnaphthalene at 10.0 yr
2methylnaphthalene at 25.0 yr
2methylnaphthalene at 50.0 yr
2methylnaphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

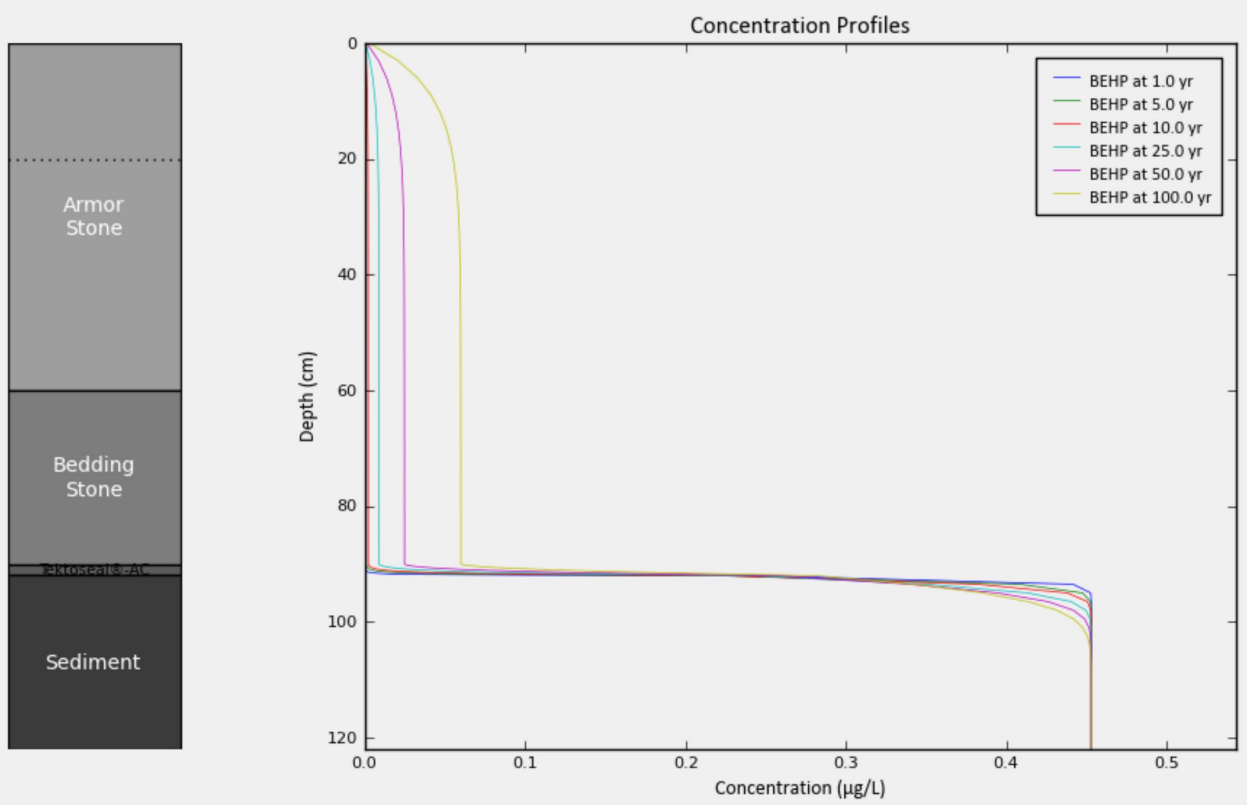

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Acenaphthene at 1.0 yr
Acenaphthene at 5.0 yr
Acenaphthene at 10.0 yr
Acenaphthene at 25.0 yr
Acenaphthene at 50.0 yr
Acenaphthene at 100.0 yr
Depth (cm)
Concentration (µg/L)

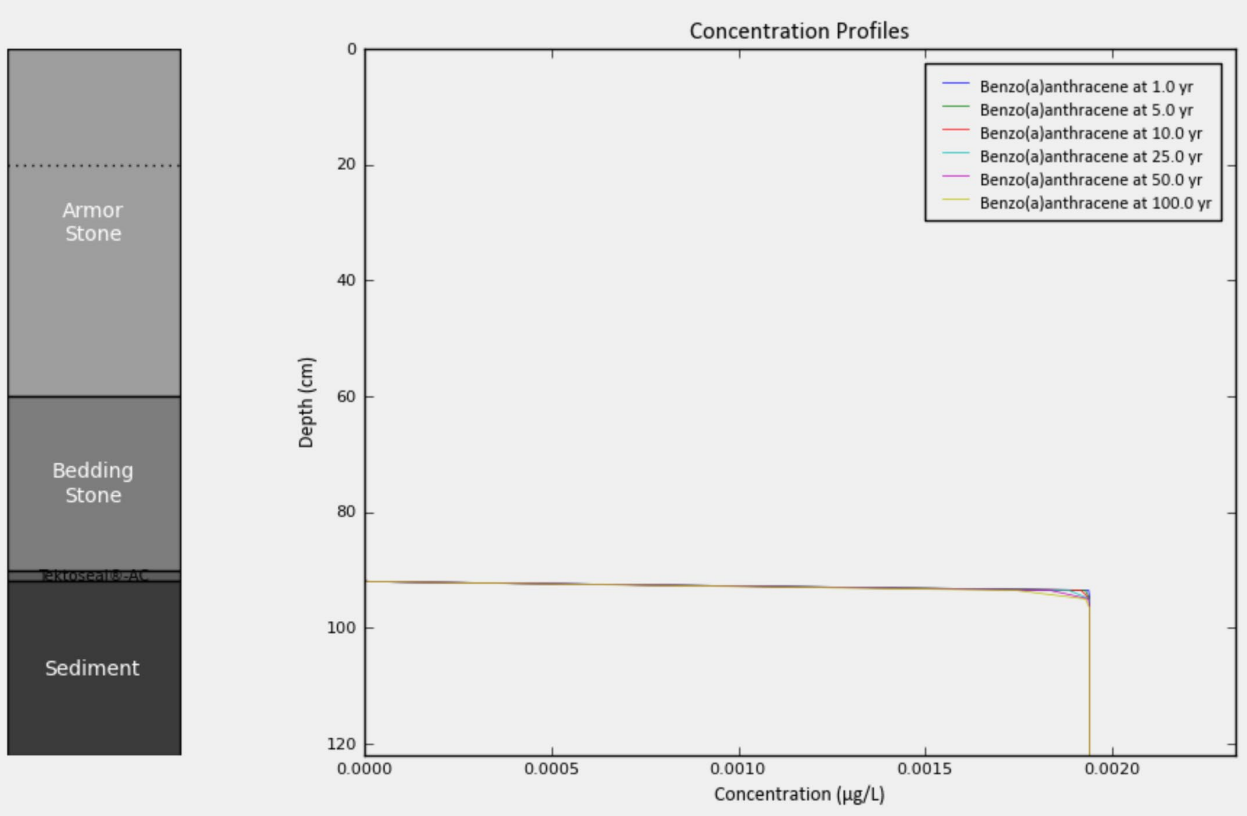

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Acenaphthylene at 1.0 yr
Acenaphthylene at 5.0 yr
Acenaphthylene at 10.0 yr
Acenaphthylene at 25.0 yr
Acenaphthylene at 50.0 yr
Acenaphthylene at 100.0 yr
Depth (cm)
Concentration (µg/L)

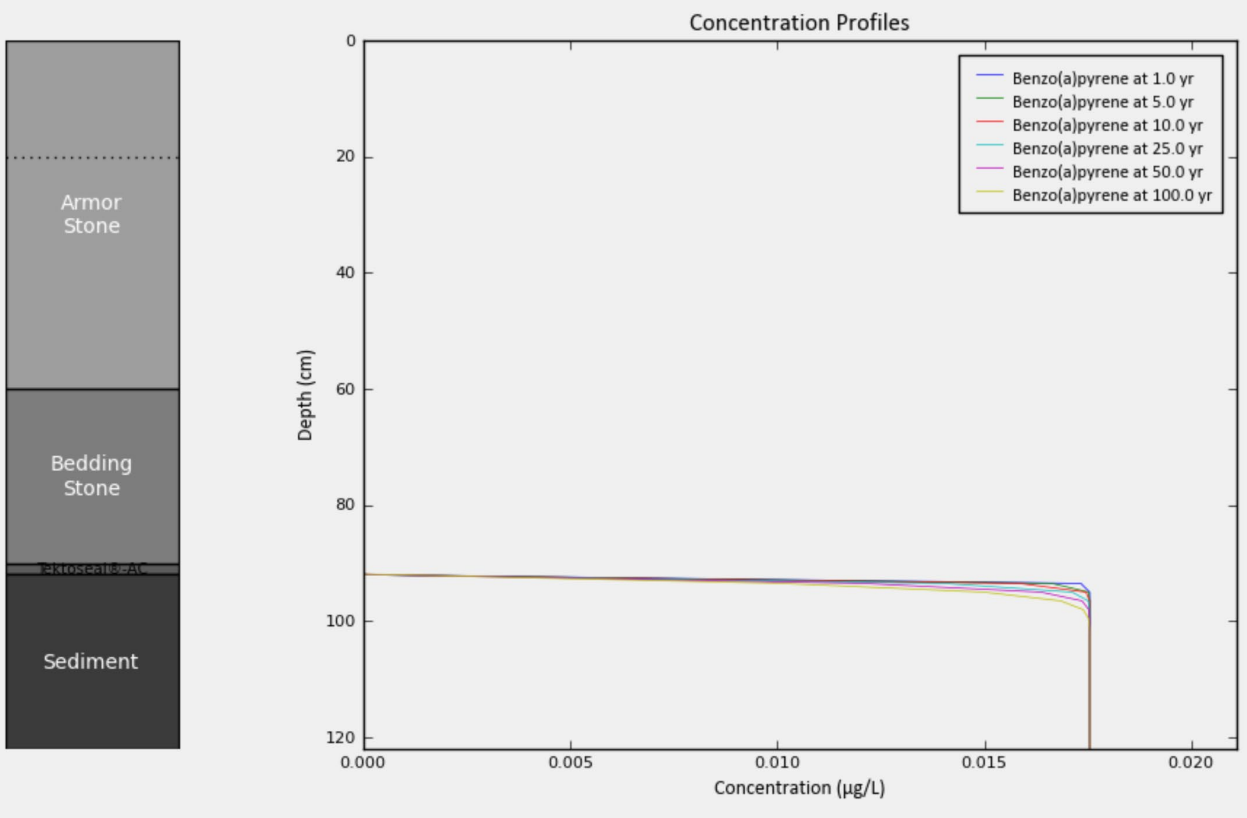

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Aldrin at 1.0 yr
Aldrin at 5.0 yr
Aldrin at 10.0 yr
Aldrin at 25.0 yr
Aldrin at 50.0 yr
Aldrin at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

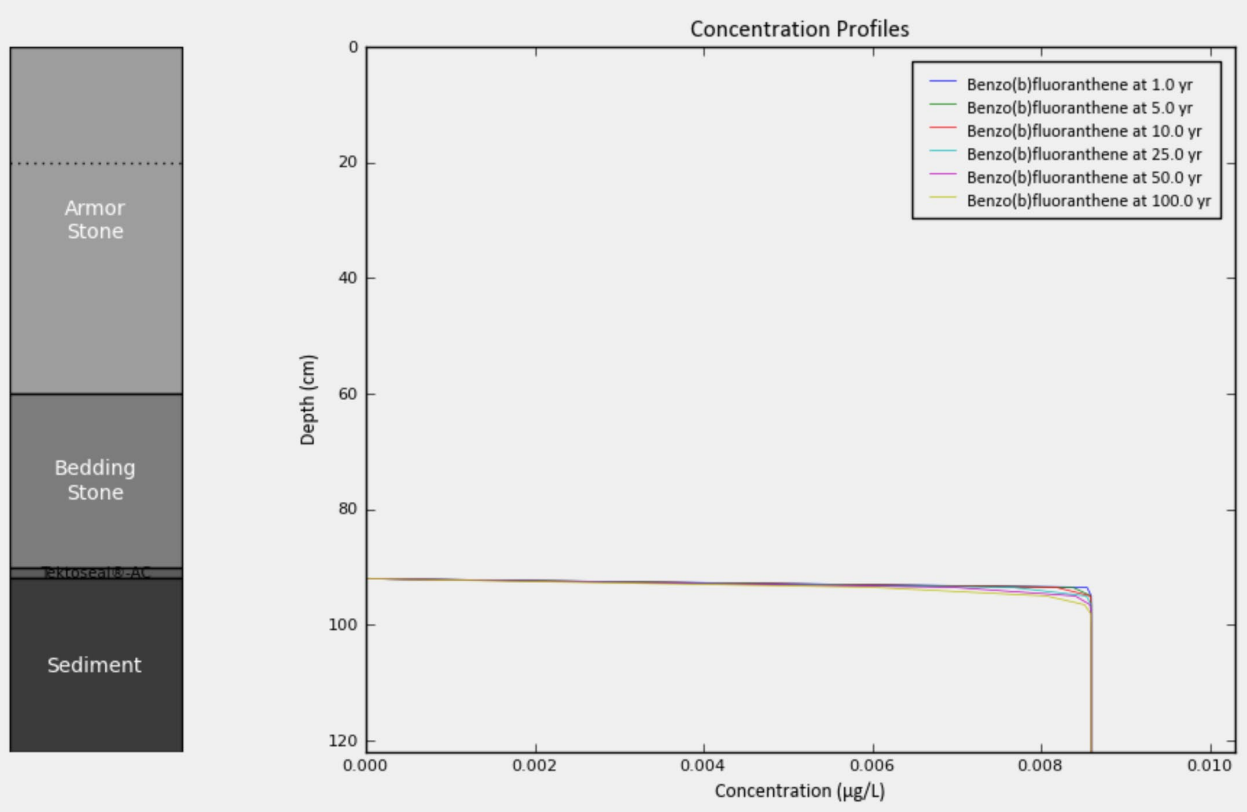

Armor Stone
Bedding Stone
Tetrosorb-AC
Sediment
Concentration Profiles
Anthracene at 1.0 yr
Anthracene at 5.0 yr
Anthracene at 10.0 yr
Anthracene at 25.0 yr
Anthracene at 50.0 yr
Anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020

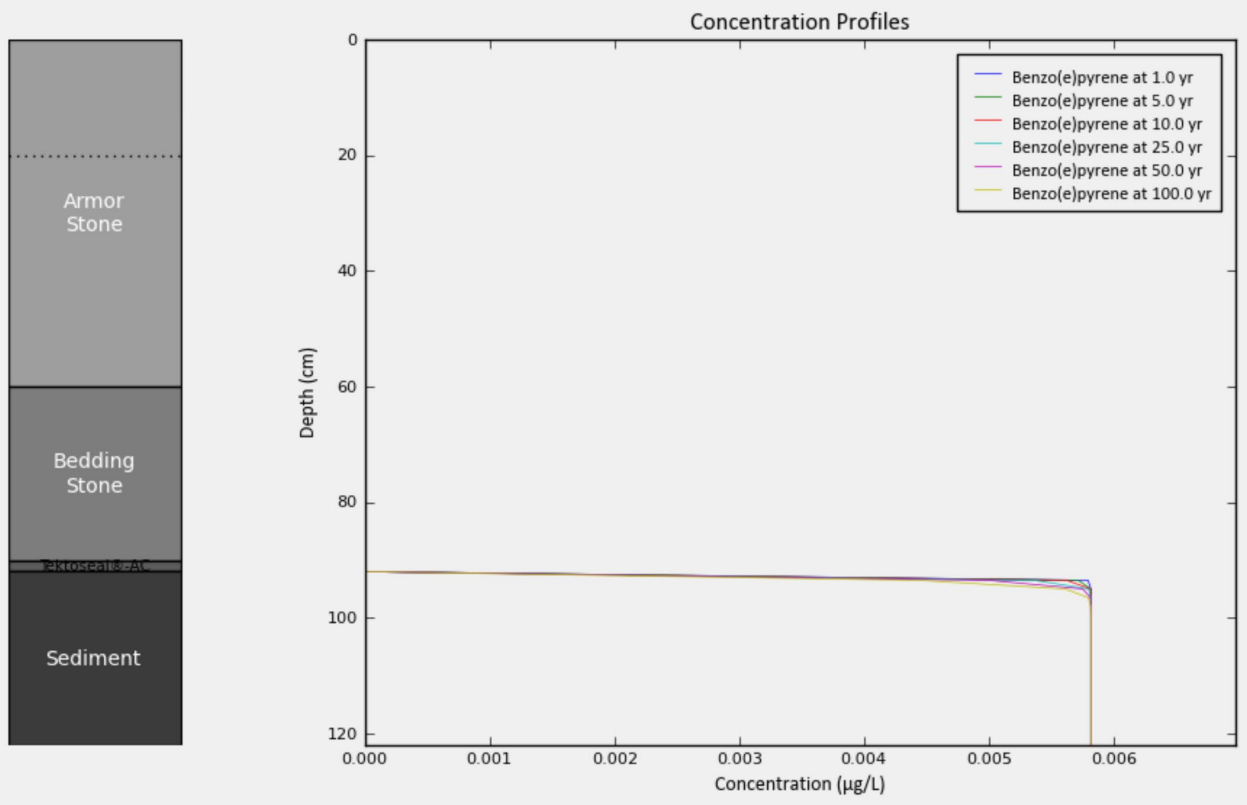

Armor Stone
Bedding Stone
Tetrosorb-AC
Sediment
Concentration Profiles
Arsenic at 1.0 yr
Arsenic at 5.0 yr
Arsenic at 10.0 yr
Arsenic at 25.0 yr
Arsenic at 50.0 yr
Arsenic at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
5
10
15
20
25
30

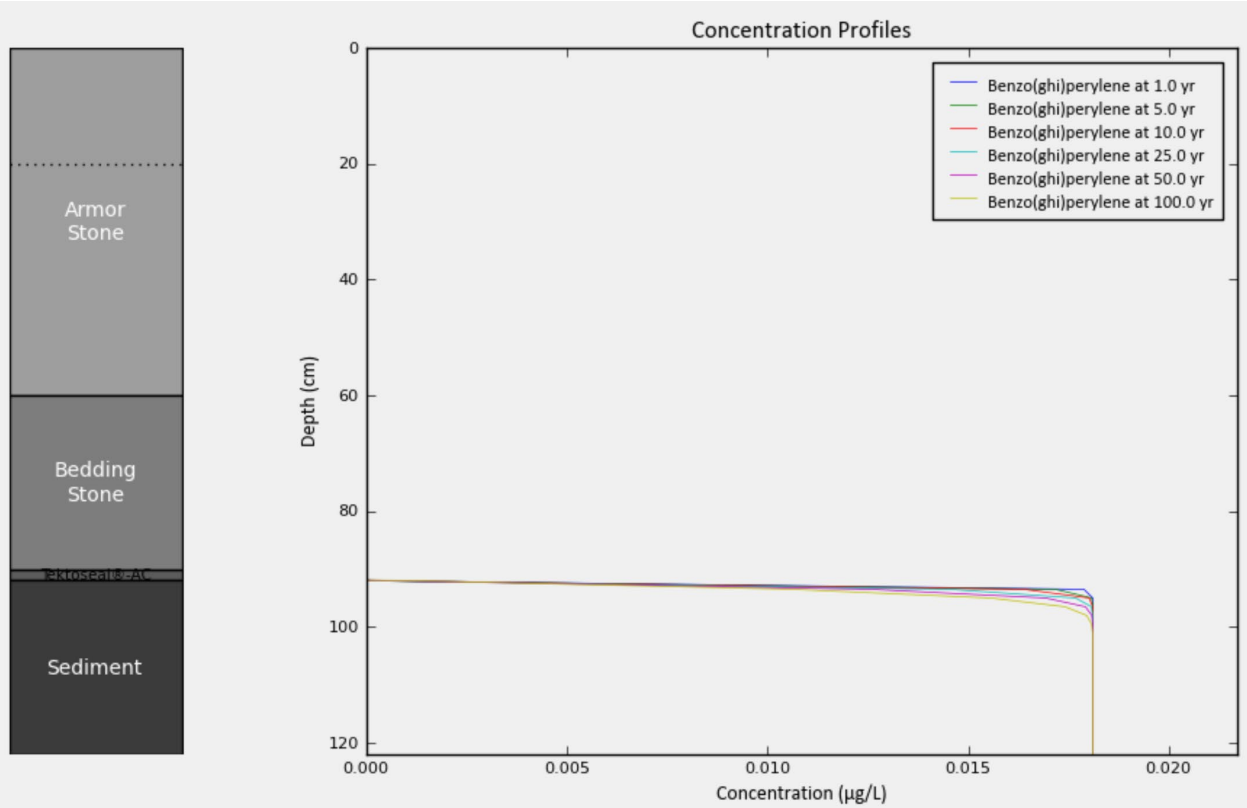

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
BEHP at 1.0 yr
BEHP at 5.0 yr
BEHP at 10.0 yr
BEHP at 25.0 yr
BEHP at 50.0 yr
BEHP at 100.0 yr
Depth (cm)
Concentration (µg/L)

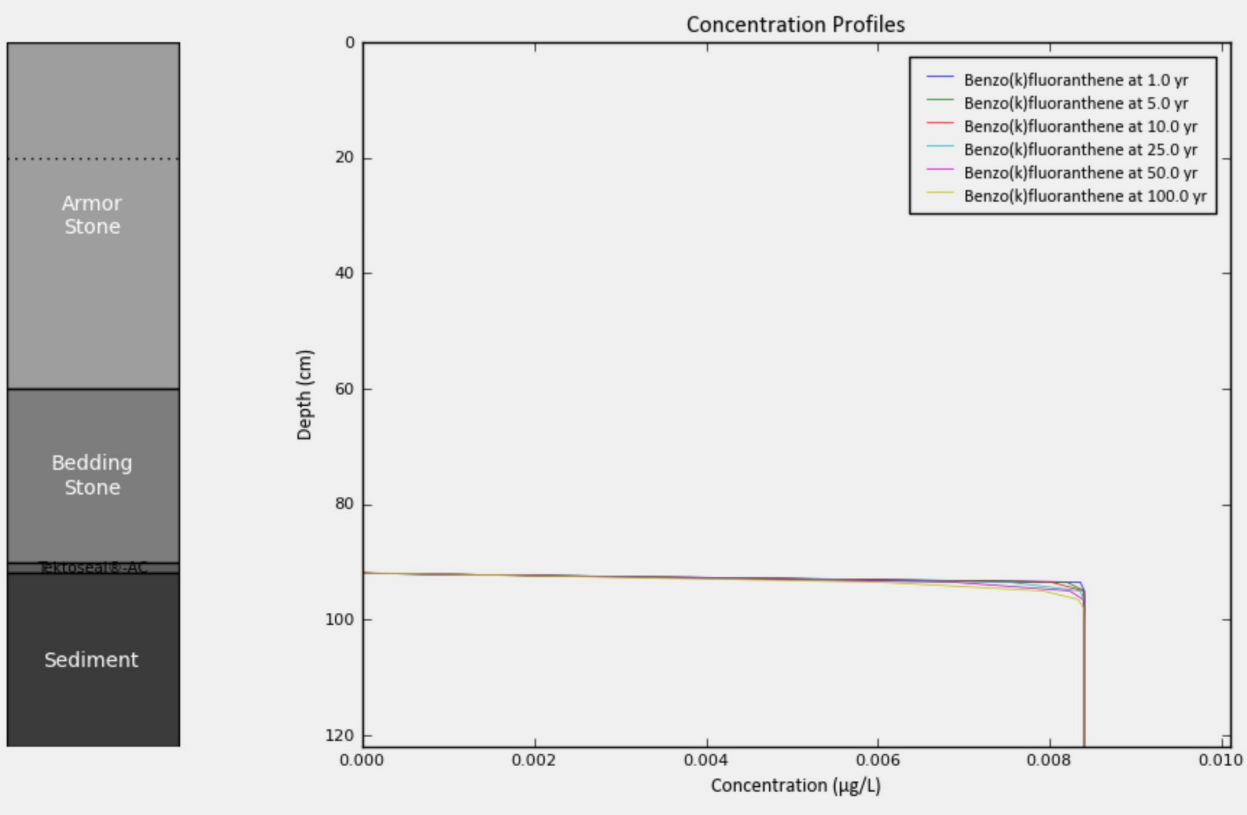

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Benzo(a)anthracene at 1.0 yr
Benzo(a)anthracene at 5.0 yr
Benzo(a)anthracene at 10.0 yr
Benzo(a)anthracene at 25.0 yr
Benzo(a)anthracene at 50.0 yr
Benzo(a)anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)

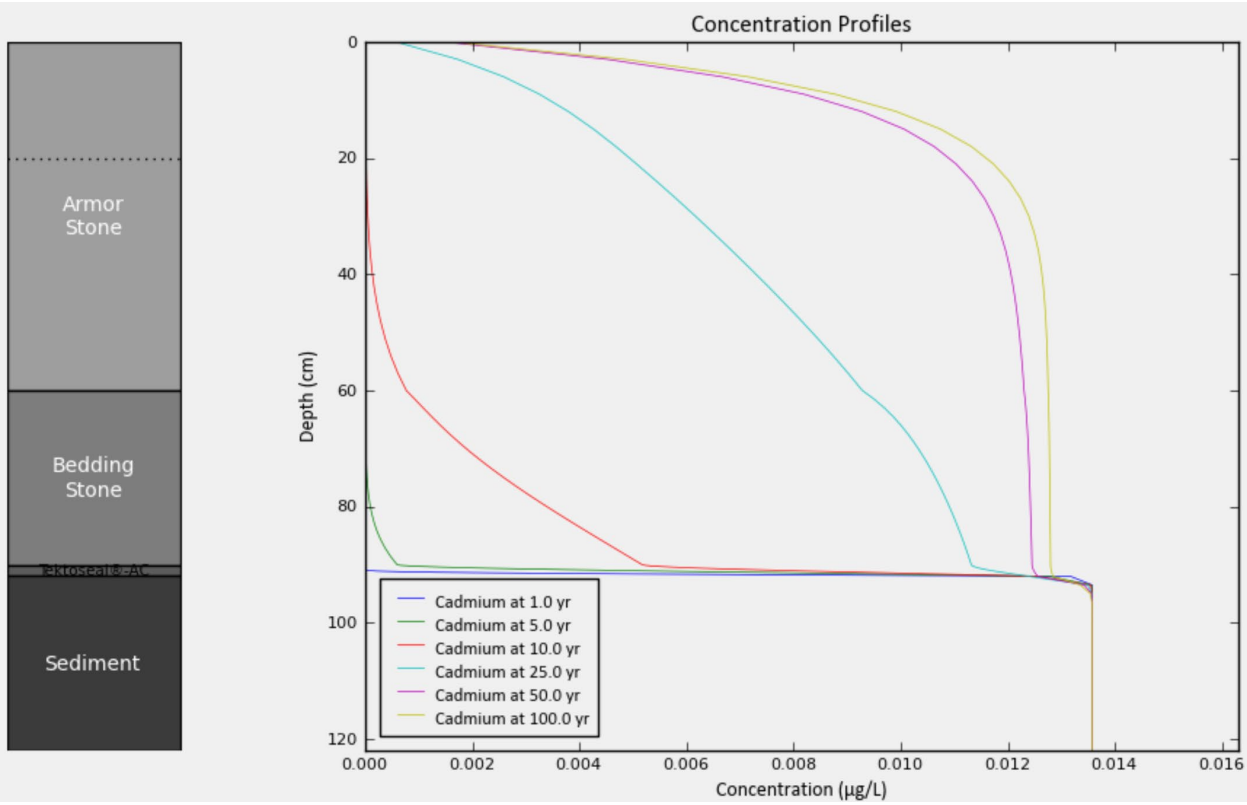

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Benzo(a)pyrene at 1.0 yr
Benzo(a)pyrene at 5.0 yr
Benzo(a)pyrene at 10.0 yr
Benzo(a)pyrene at 25.0 yr
Benzo(a)pyrene at 50.0 yr
Benzo(a)pyrene at 100.0 yr
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020

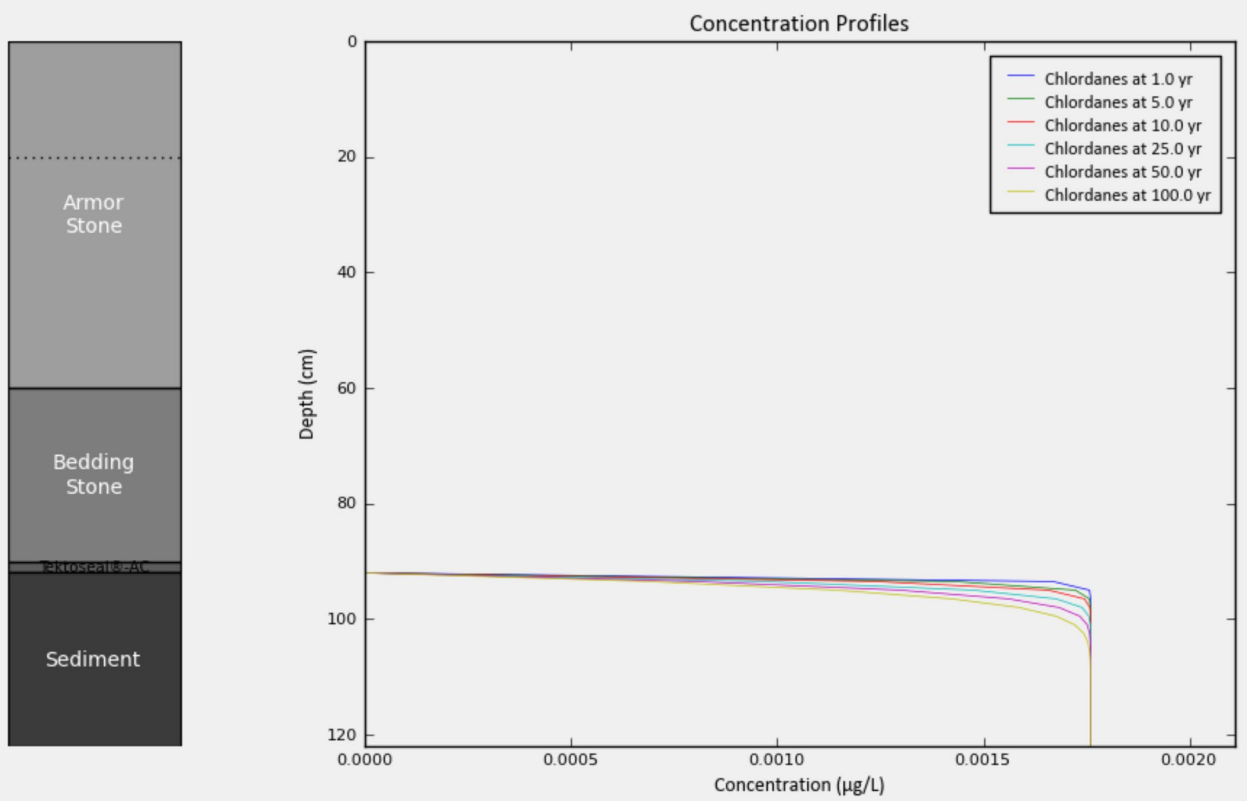

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Benzo(b)fluoranthene at 1.0 yr
Benzo(b)fluoranthene at 5.0 yr
Benzo(b)fluoranthene at 10.0 yr
Benzo(b)fluoranthene at 25.0 yr
Benzo(b)fluoranthene at 50.0 yr
Benzo(b)fluoranthene at 100.0 yr
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
0.010

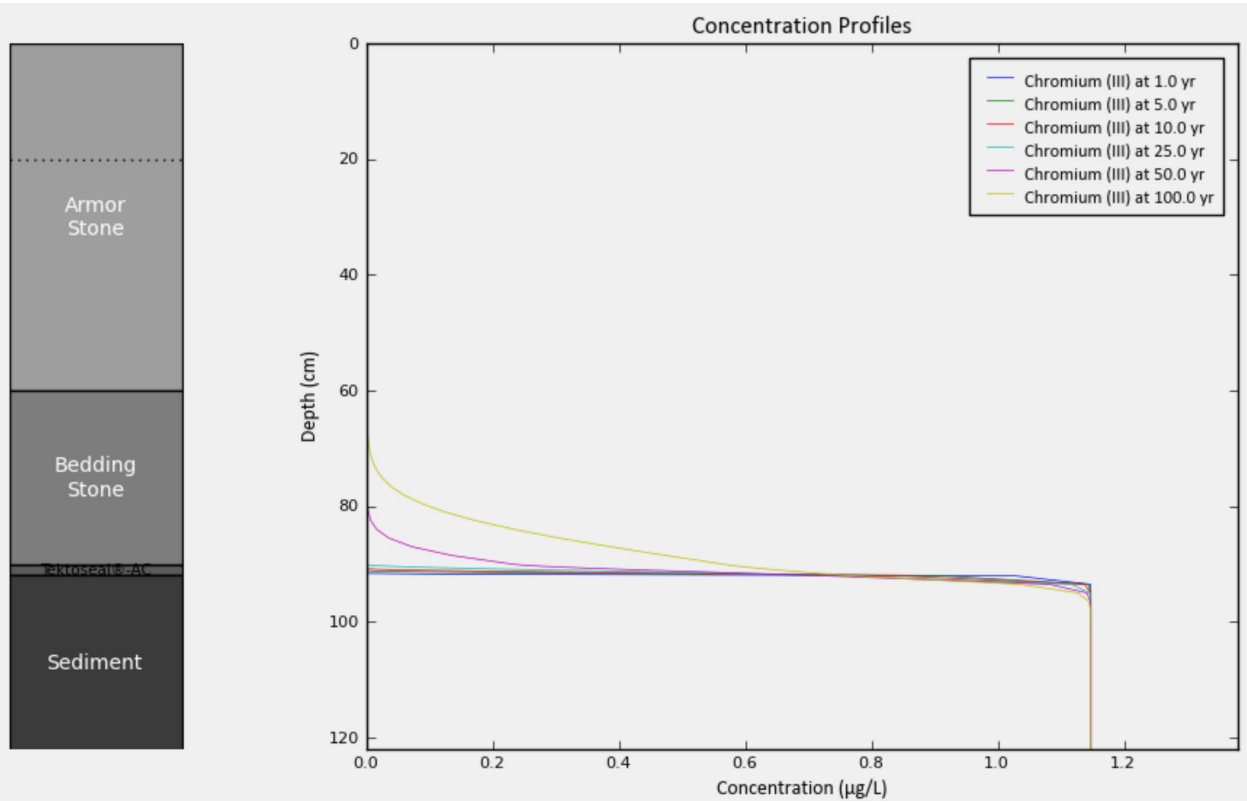

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Benzo(e)pyrene at 1.0 yr
Benzo(e)pyrene at 5.0 yr
Benzo(e)pyrene at 10.0 yr
Benzo(e)pyrene at 25.0 yr
Benzo(e)pyrene at 50.0 yr
Benzo(e)pyrene at 100.0 yr
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004
0.005
0.006

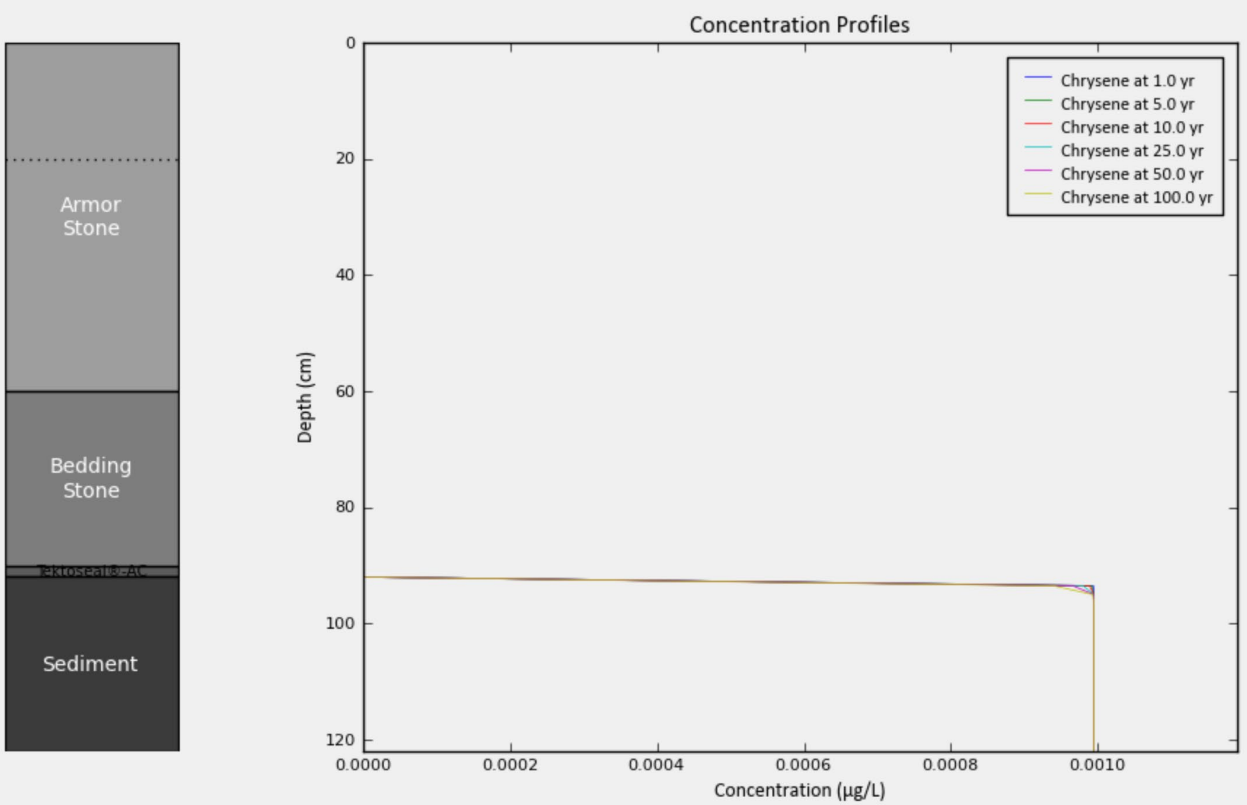

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Benzo(ghi)perylene at 1.0 yr
Benzo(ghi)perylene at 5.0 yr
Benzo(ghi)perylene at 10.0 yr
Benzo(ghi)perylene at 25.0 yr
Benzo(ghi)perylene at 50.0 yr
Benzo(ghi)perylene at 100.0 yr
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020

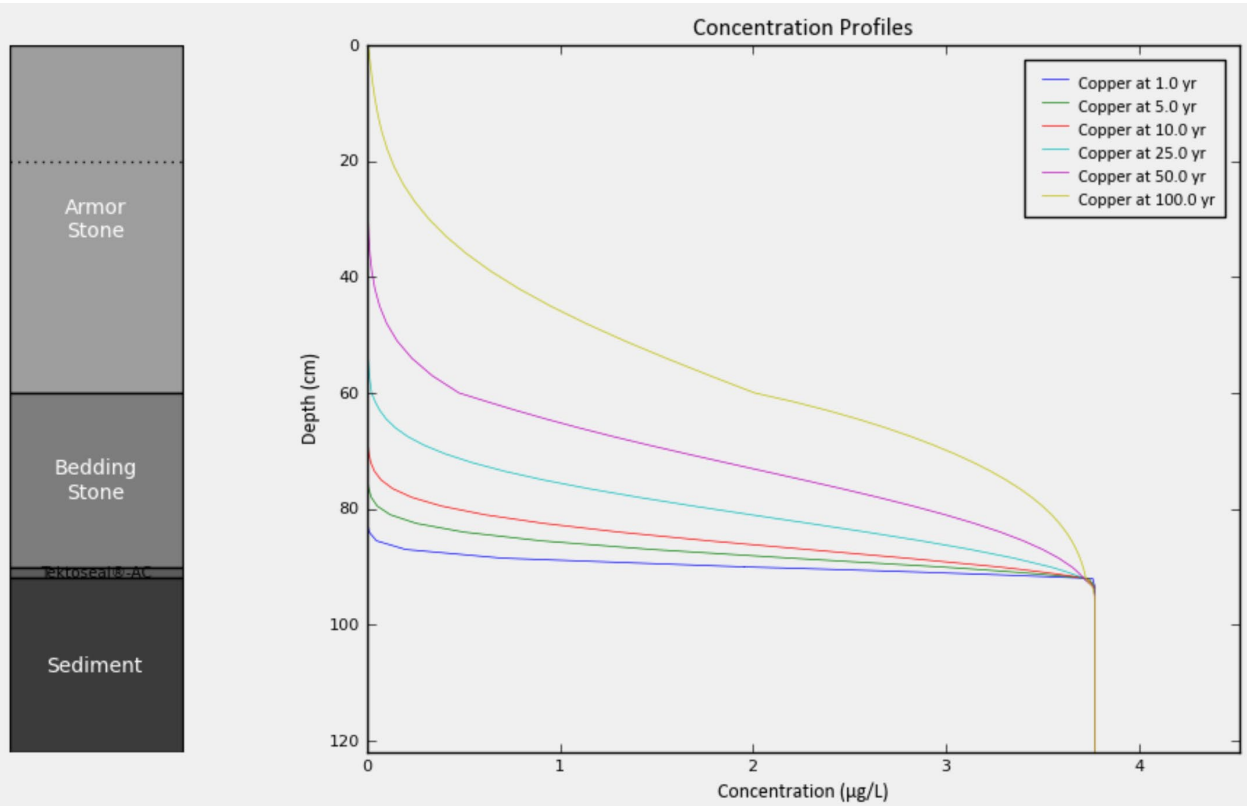

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Benzo(k)fluoranthene at 1.0 yr
Benzo(k)fluoranthene at 5.0 yr
Benzo(k)fluoranthene at 10.0 yr
Benzo(k)fluoranthene at 25.0 yr
Benzo(k)fluoranthene at 50.0 yr
Benzo(k)fluoranthene at 100.0 yr

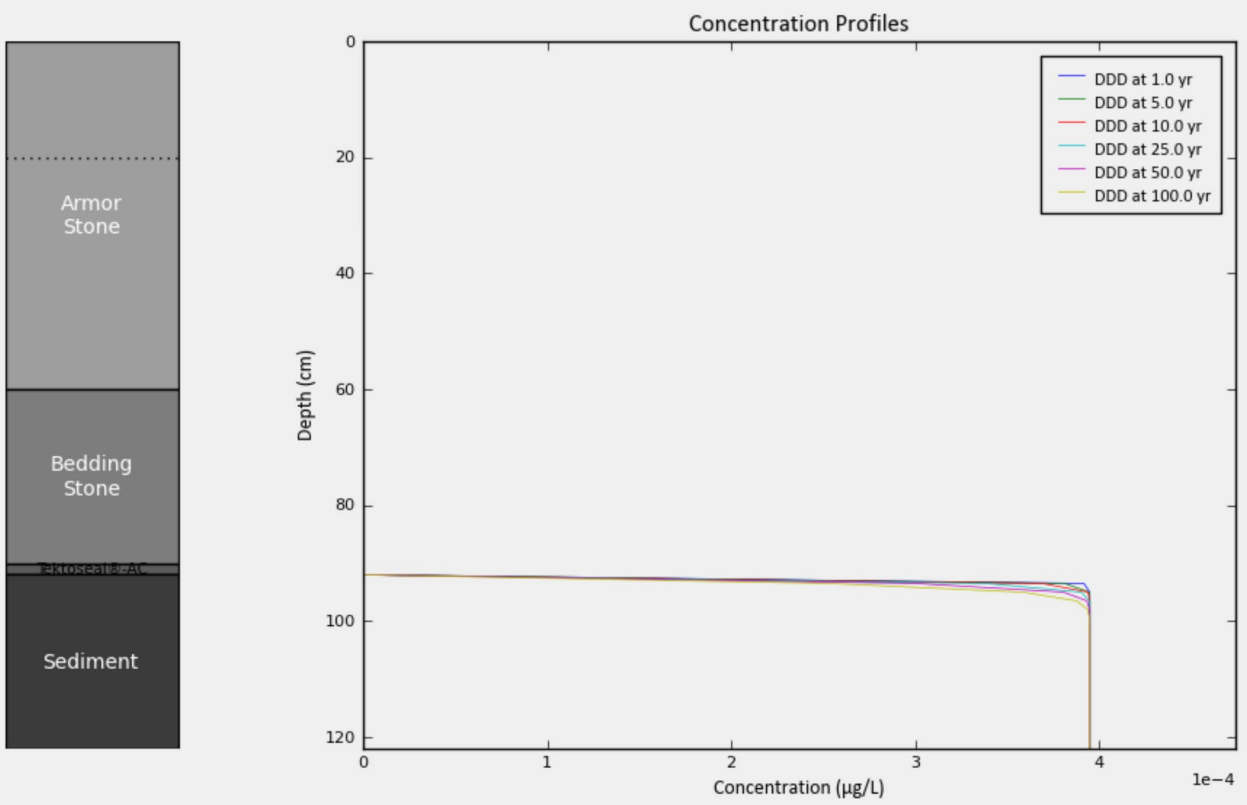

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Cadmium at 1.0 yr
Cadmium at 5.0 yr
Cadmium at 10.0 yr
Cadmium at 25.0 yr
Cadmium at 50.0 yr
Cadmium at 100.0 yr

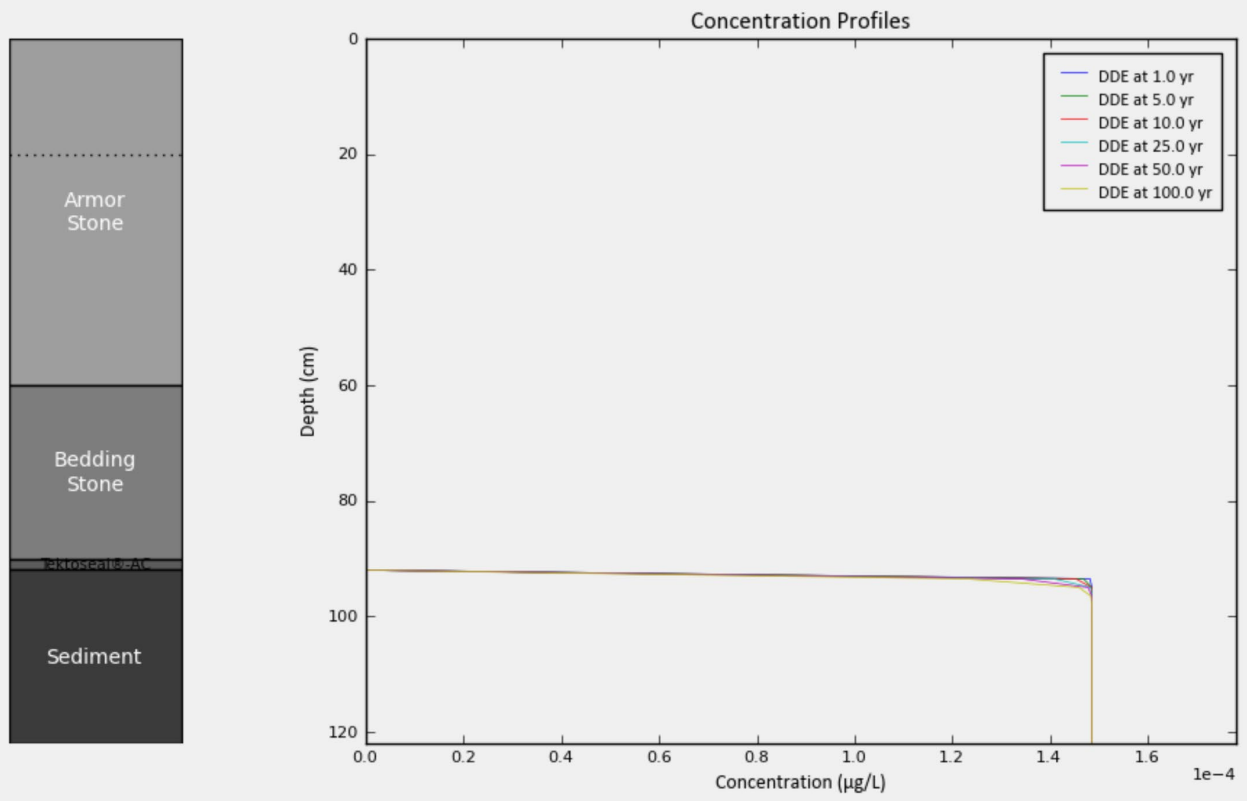

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Chlordanes at 1.0 yr
Chlordanes at 5.0 yr
Chlordanes at 10.0 yr
Chlordanes at 25.0 yr
Chlordanes at 50.0 yr
Chlordanes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020

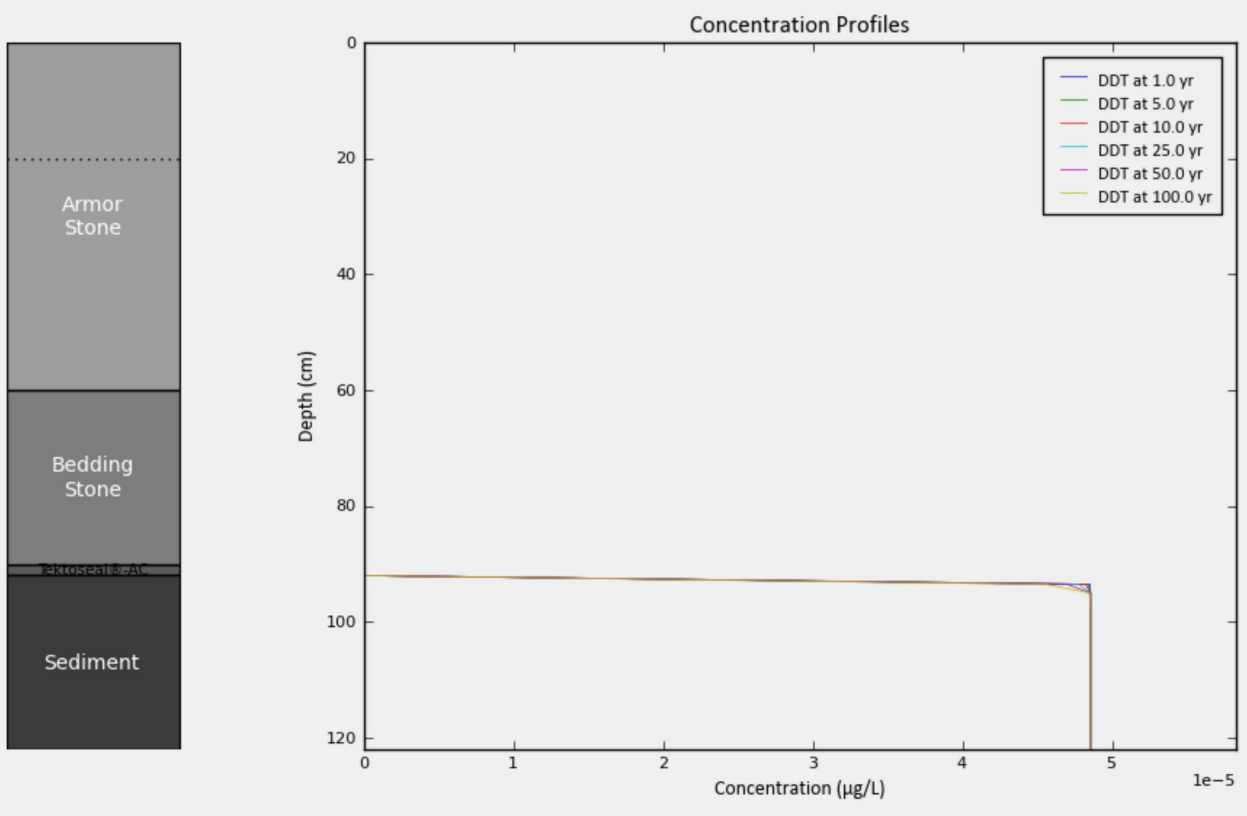

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Chromium (III) at 1.0 yr
Chromium (III) at 5.0 yr
Chromium (III) at 10.0 yr
Chromium (III) at 25.0 yr
Chromium (III) at 50.0 yr
Chromium (III) at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2

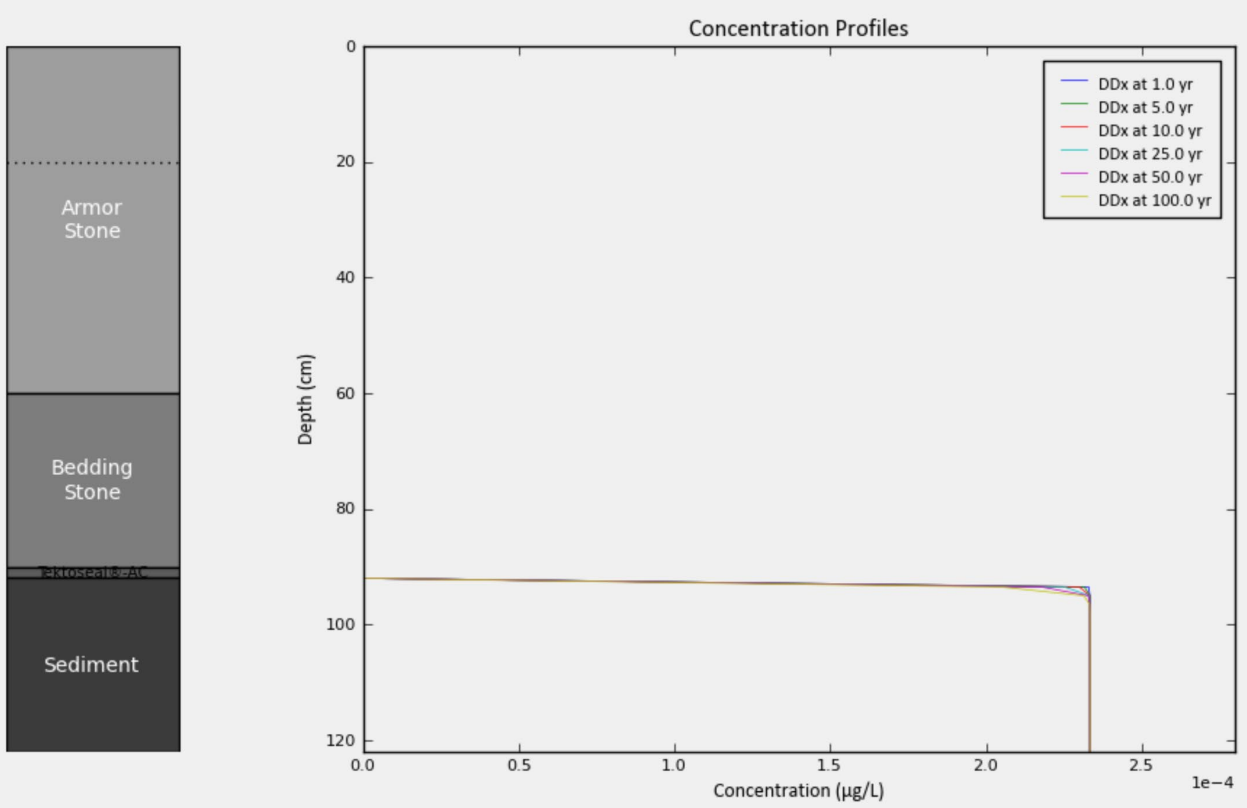

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Chrysene at 1.0 yr
Chrysene at 5.0 yr
Chrysene at 10.0 yr
Chrysene at 25.0 yr
Chrysene at 50.0 yr
Chrysene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010

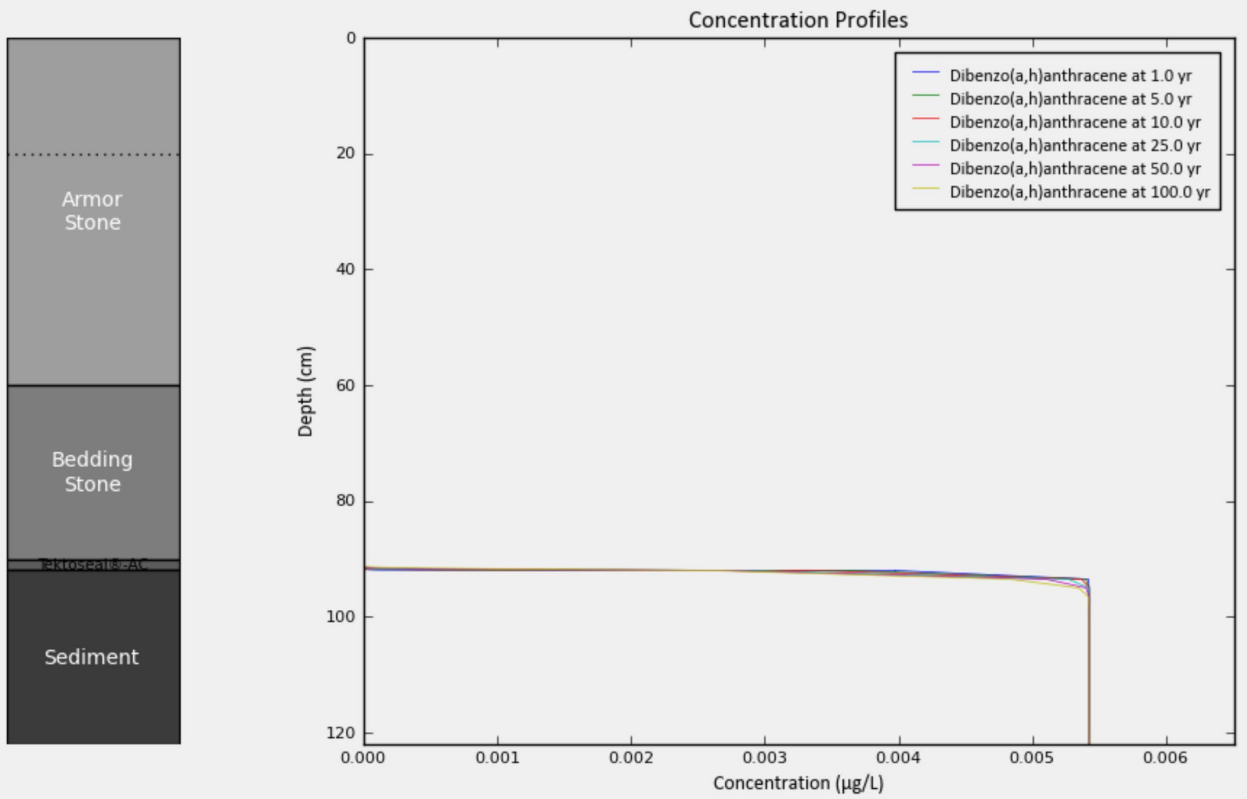

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Copper at 1.0 yr
Copper at 5.0 yr
Copper at 10.0 yr
Copper at 25.0 yr
Copper at 50.0 yr
Copper at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
1
2
3
4

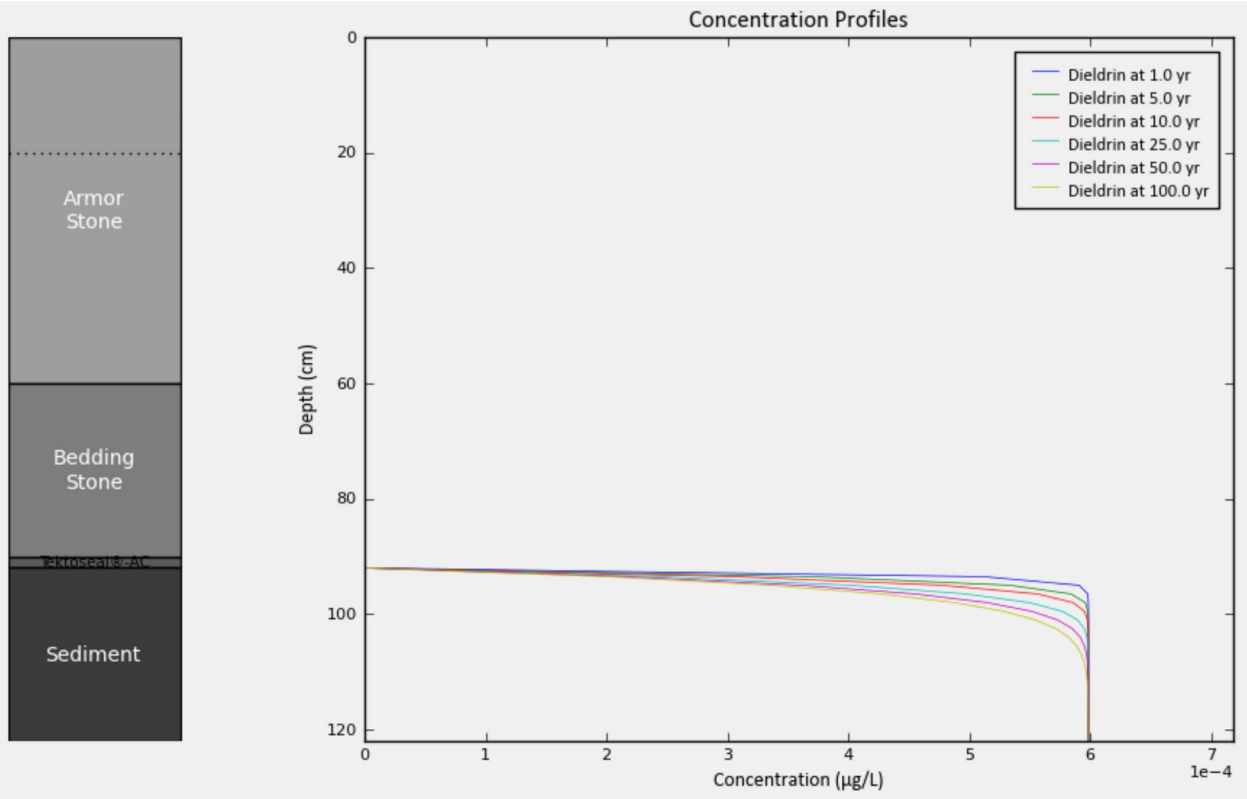

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDD at 1.0 yr
DDD at 5.0 yr
DDD at 10.0 yr
DDD at 25.0 yr
DDD at 50.0 yr
DDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

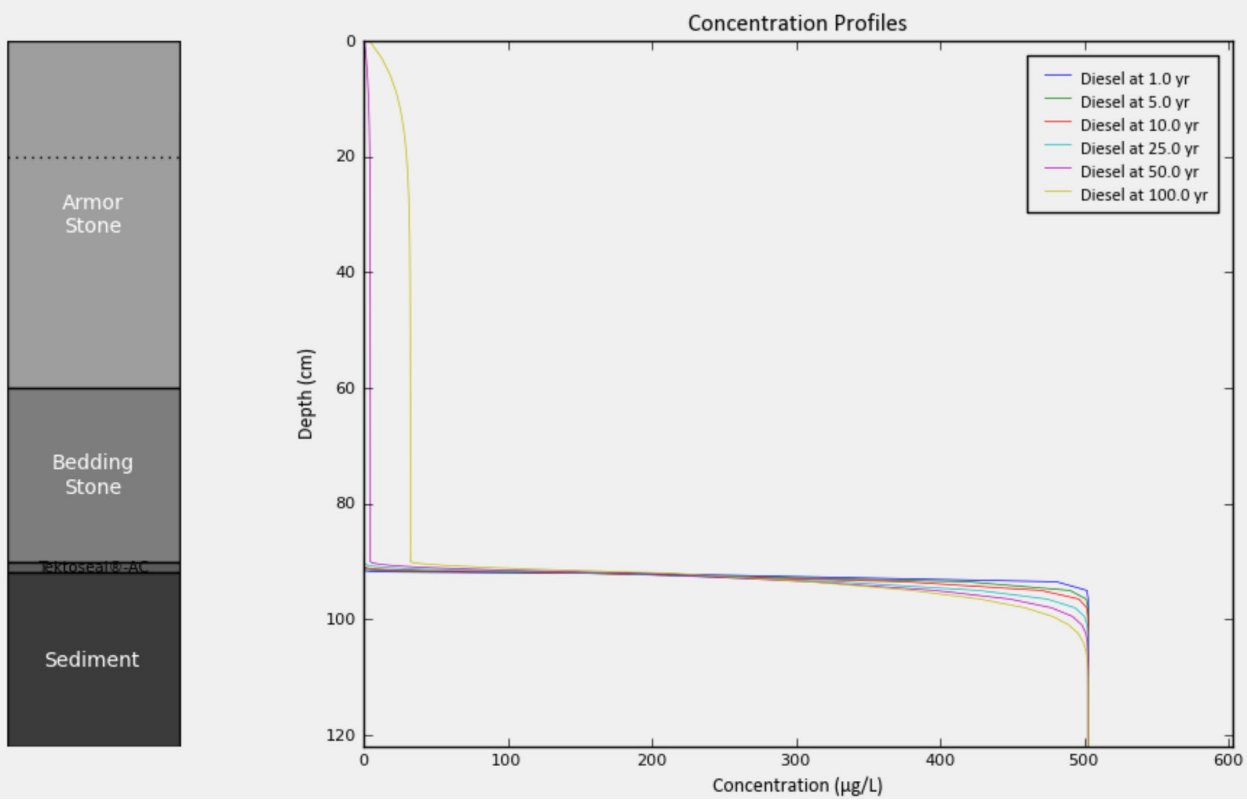

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDE at 1.0 yr
DDE at 5.0 yr
DDE at 10.0 yr
DDE at 25.0 yr
DDE at 50.0 yr
DDE at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

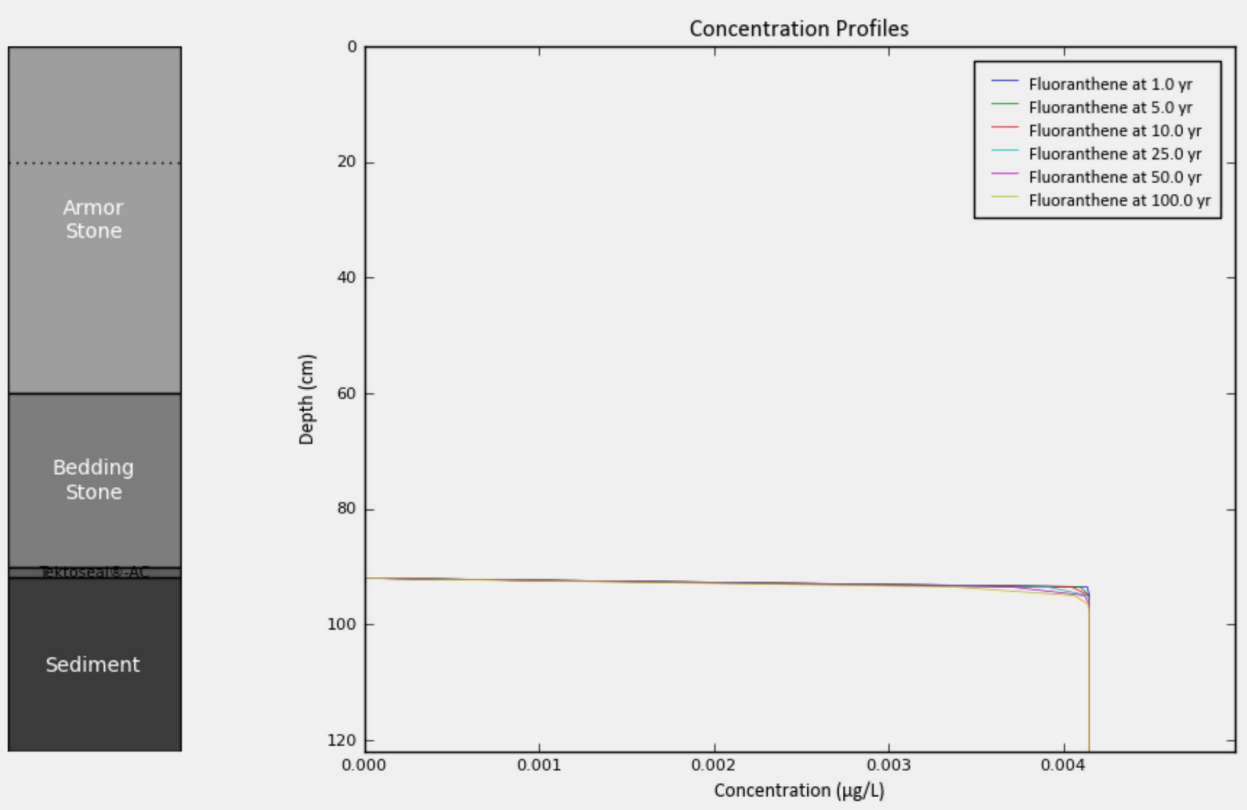

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDT at 1.0 yr
DDT at 5.0 yr
DDT at 10.0 yr
DDT at 25.0 yr
DDT at 50.0 yr
DDT at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

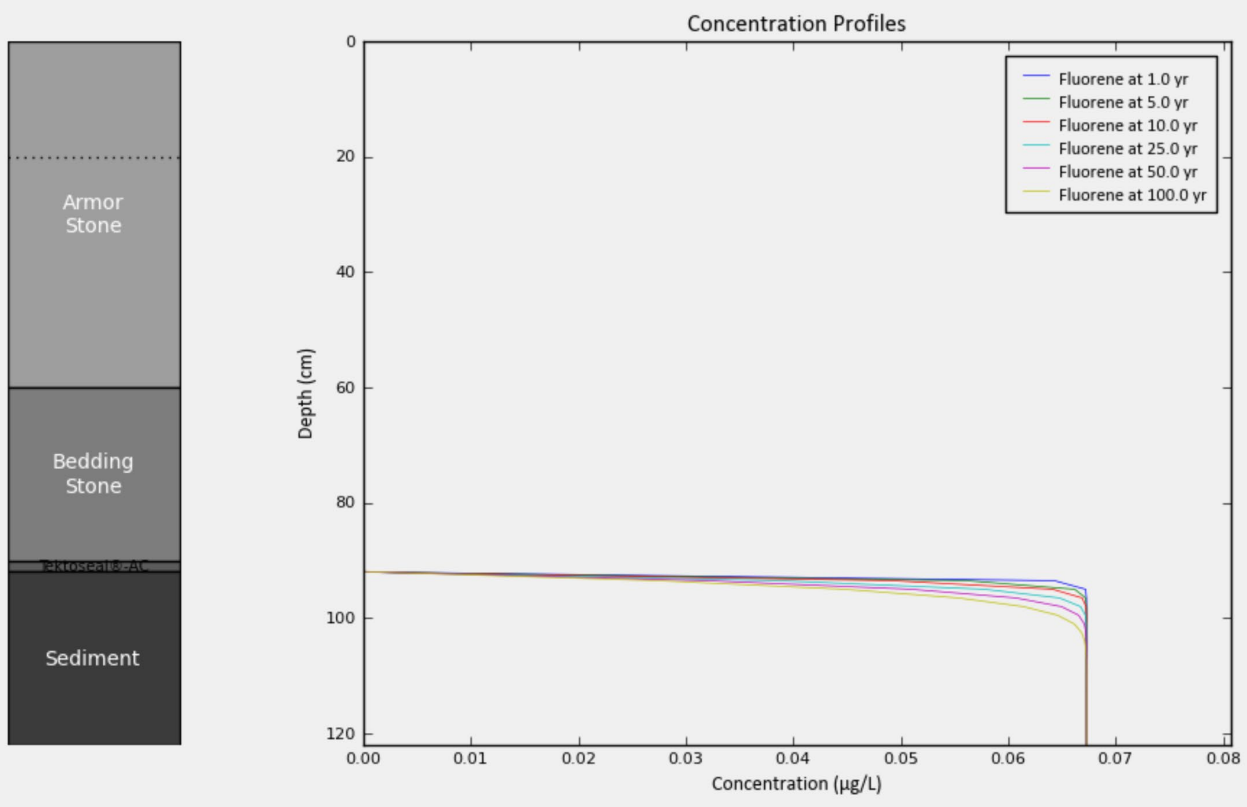

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDx at 1.0 yr
DDx at 5.0 yr
DDx at 10.0 yr
DDx at 25.0 yr
DDx at 50.0 yr
DDx at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

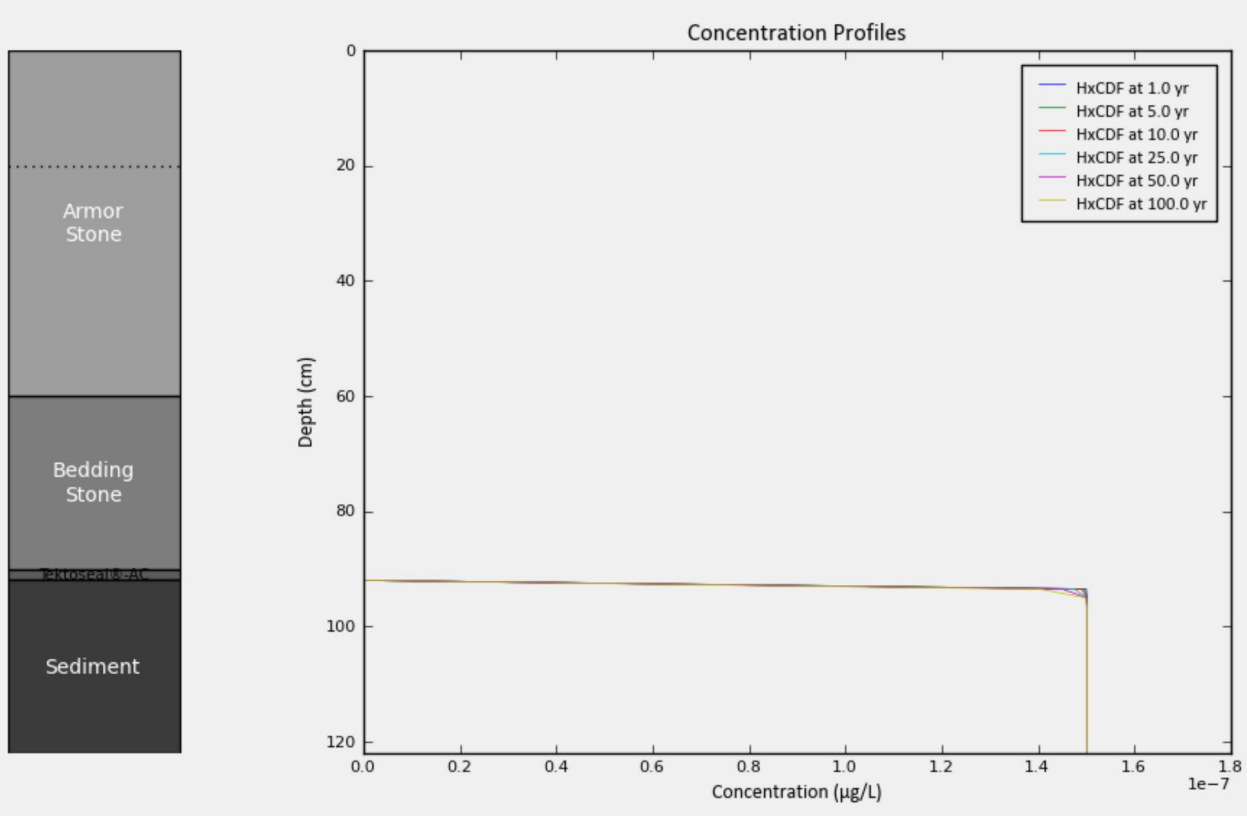

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Dibenzo(a,h)anthracene at 1.0 yr
Dibenzo(a,h)anthracene at 5.0 yr
Dibenzo(a,h)anthracene at 10.0 yr
Dibenzo(a,h)anthracene at 25.0 yr
Dibenzo(a,h)anthracene at 50.0 yr
Dibenzo(a,h)anthracene at 100.0 yr

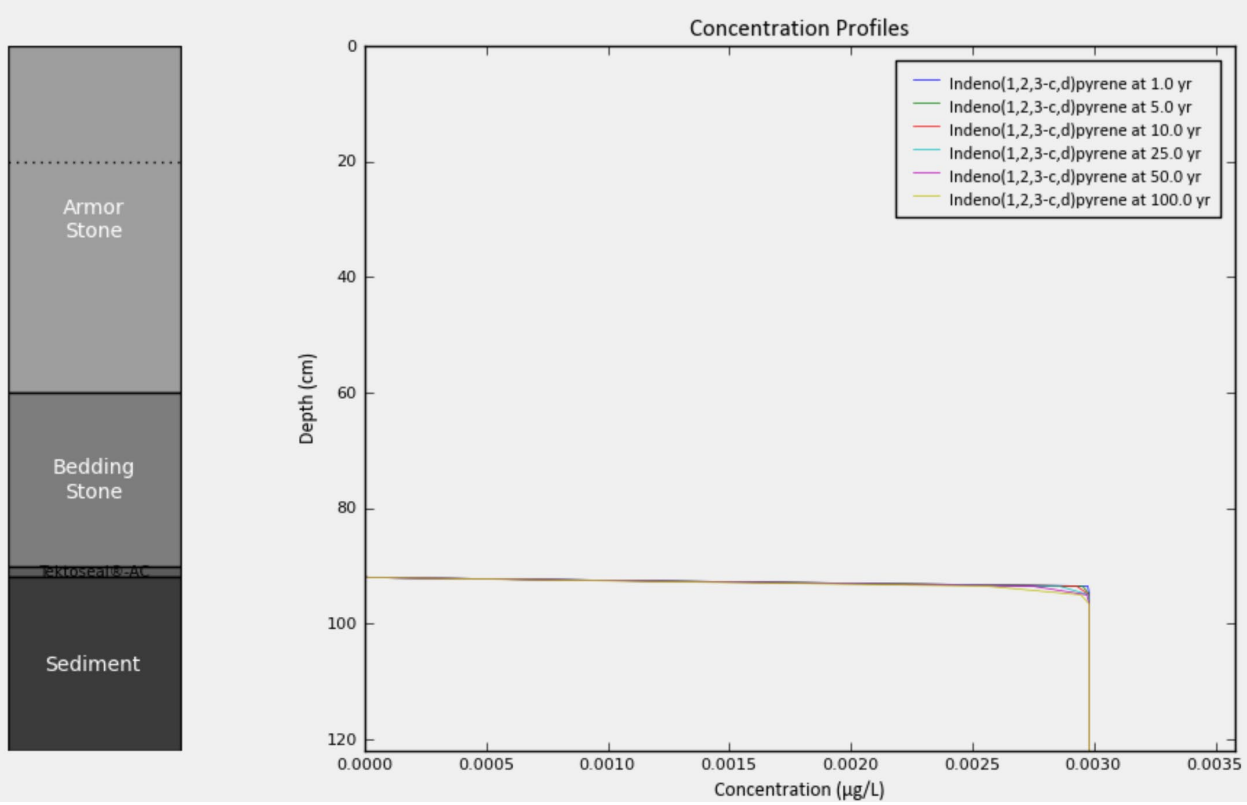

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
1e−4
Dieldrin at 1.0 yr
Dieldrin at 5.0 yr
Dieldrin at 10.0 yr
Dieldrin at 25.0 yr
Dieldrin at 50.0 yr
Dieldrin at 100.0 yr

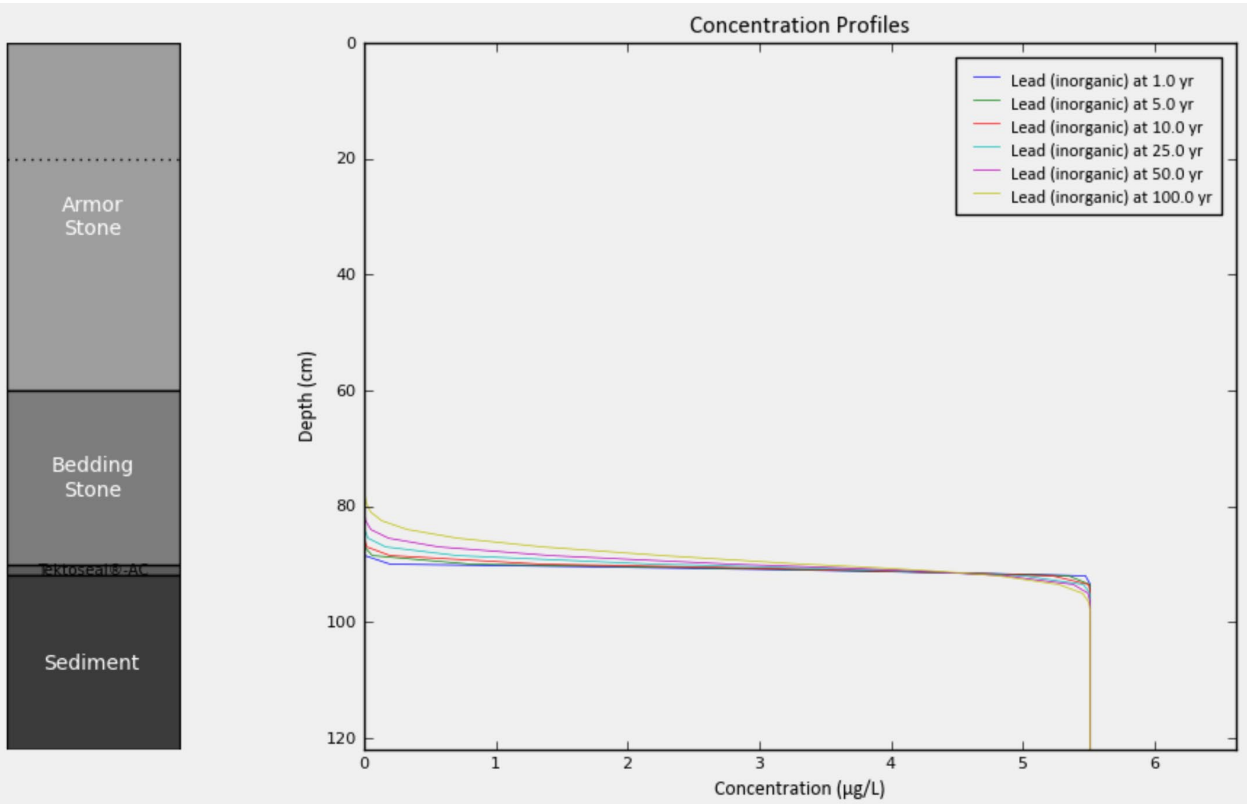

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Diesel at 1.0 yr
Diesel at 5.0 yr
Diesel at 10.0 yr
Diesel at 25.0 yr
Diesel at 50.0 yr
Diesel at 100.0 yr
Depth (cm)
Concentration (µg/L)

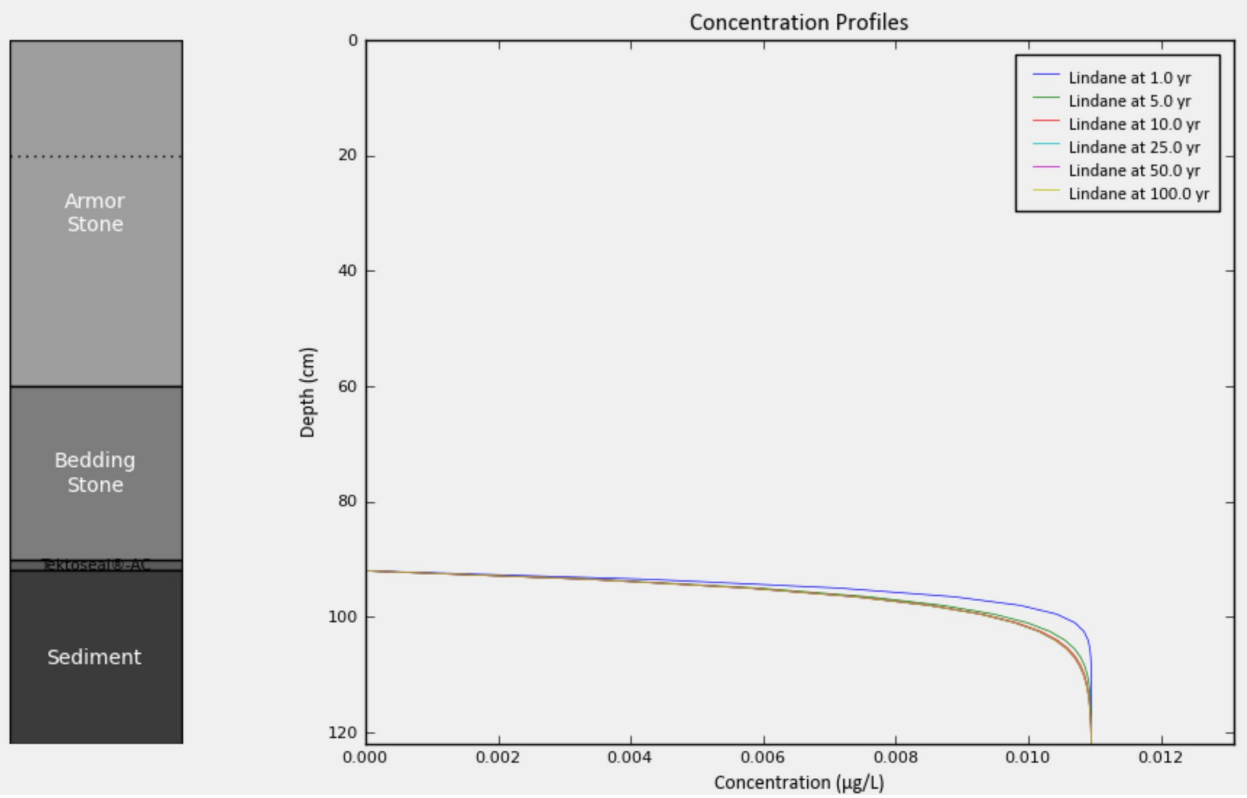

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Fluoranthene at 1.0 yr
Fluoranthene at 5.0 yr
Fluoranthene at 10.0 yr
Fluoranthene at 25.0 yr
Fluoranthene at 50.0 yr
Fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)

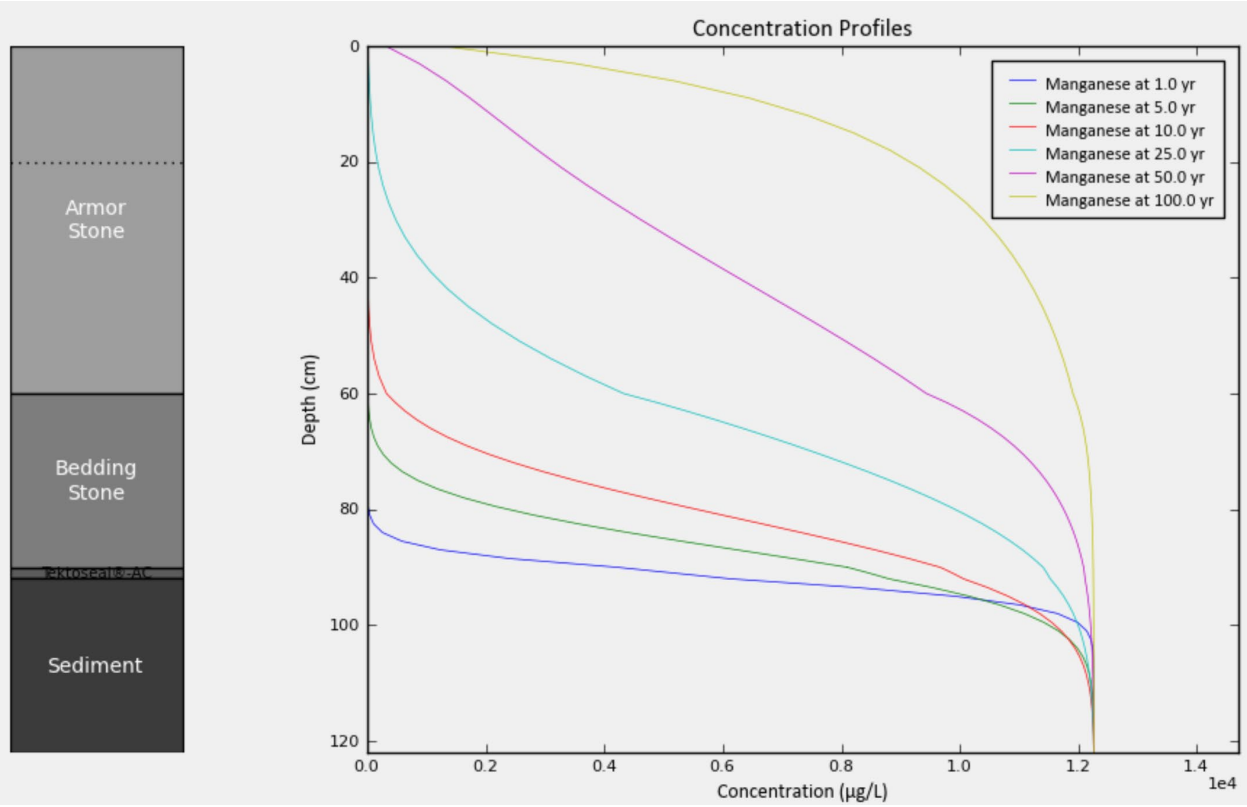

Concentration Profiles
Armor Stone
Bedding Stone
Tetroseal® AC
Sediment
Fluorene at 1.0 yr
Fluorene at 5.0 yr
Fluorene at 10.0 yr
Fluorene at 25.0 yr
Fluorene at 50.0 yr
Fluorene at 100.0 yr
Depth (cm)
Concentration (µg/L)

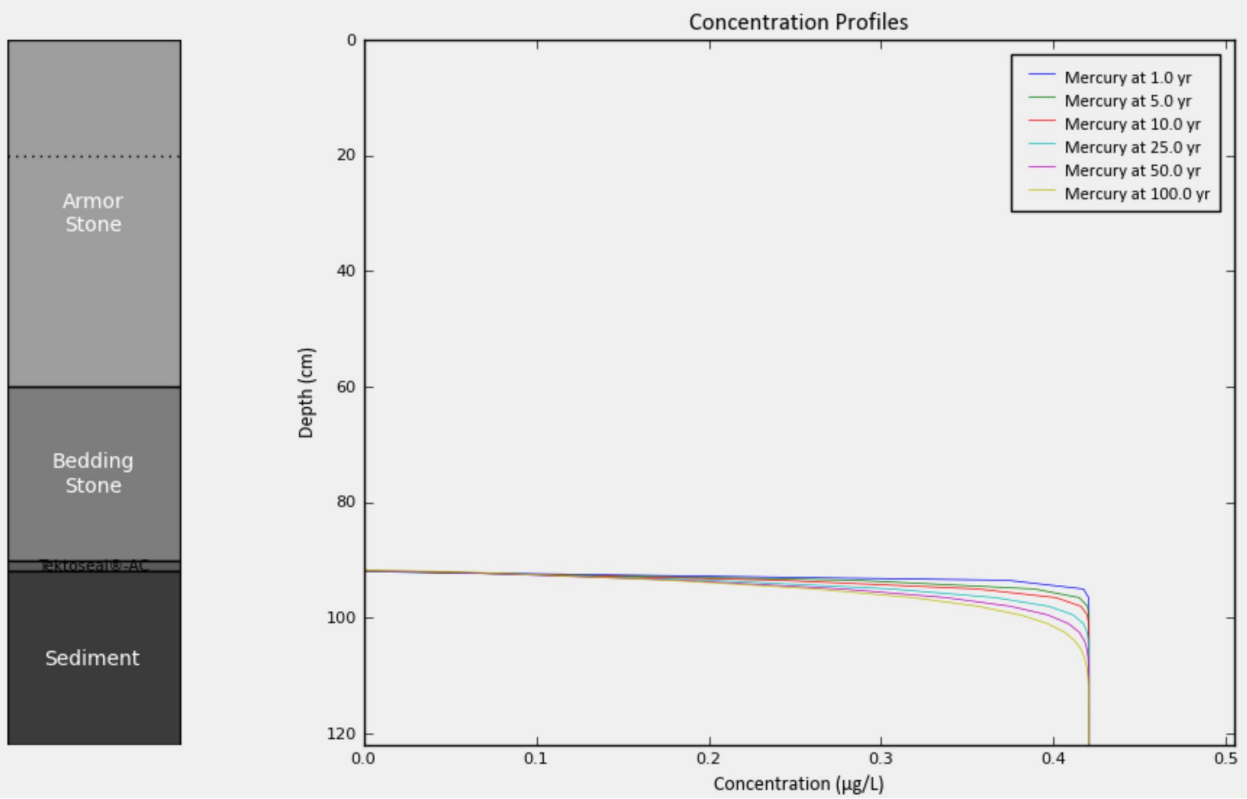

Concentration Profiles
Armor Stone
Bedding Stone
Tetroseal® AC
Sediment
HxCDF at 1.0 yr
HxCDF at 5.0 yr
HxCDF at 10.0 yr
HxCDF at 25.0 yr
HxCDF at 50.0 yr
HxCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

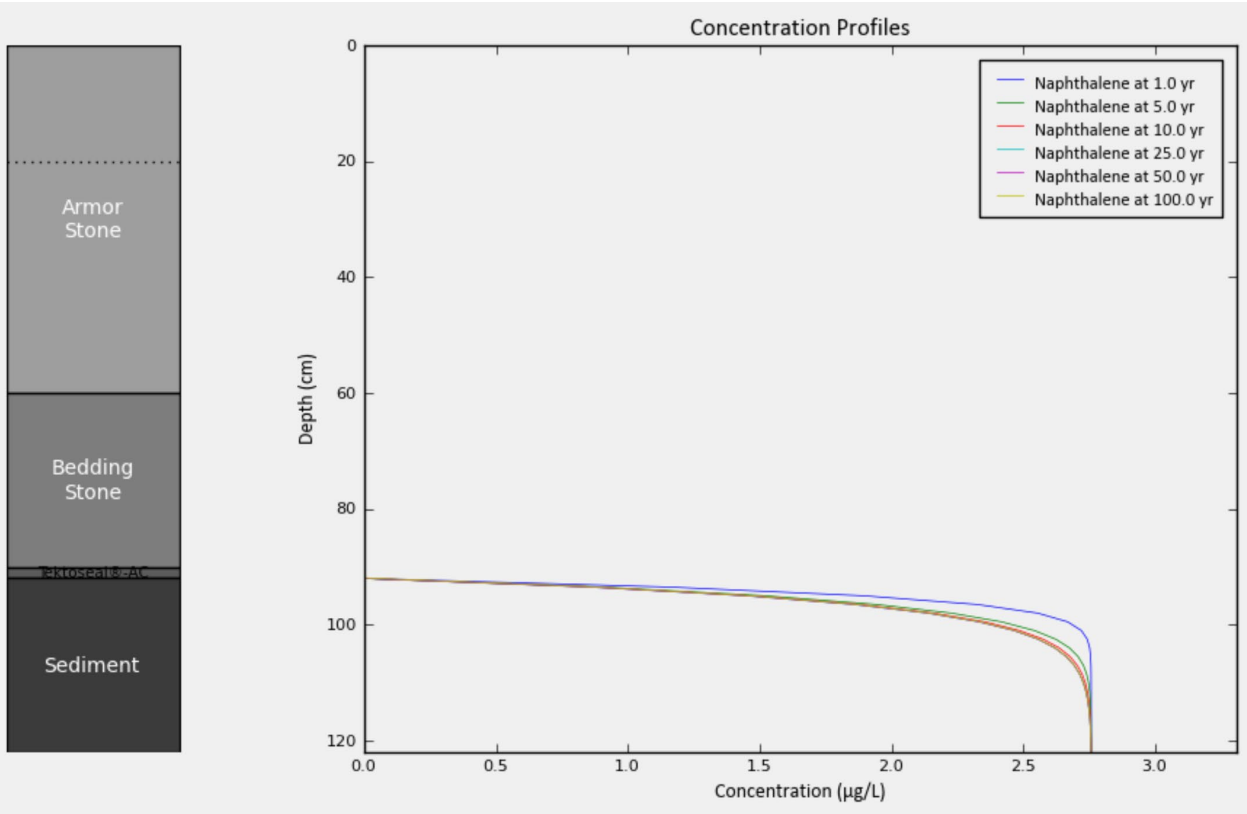

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Indeno(1,2,3-c,d)pyrene at 1.0 yr
Indeno(1,2,3-c,d)pyrene at 5.0 yr
Indeno(1,2,3-c,d)pyrene at 10.0 yr
Indeno(1,2,3-c,d)pyrene at 25.0 yr
Indeno(1,2,3-c,d)pyrene at 50.0 yr
Indeno(1,2,3-c,d)pyrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
0.0035
Concentration (µg/L)

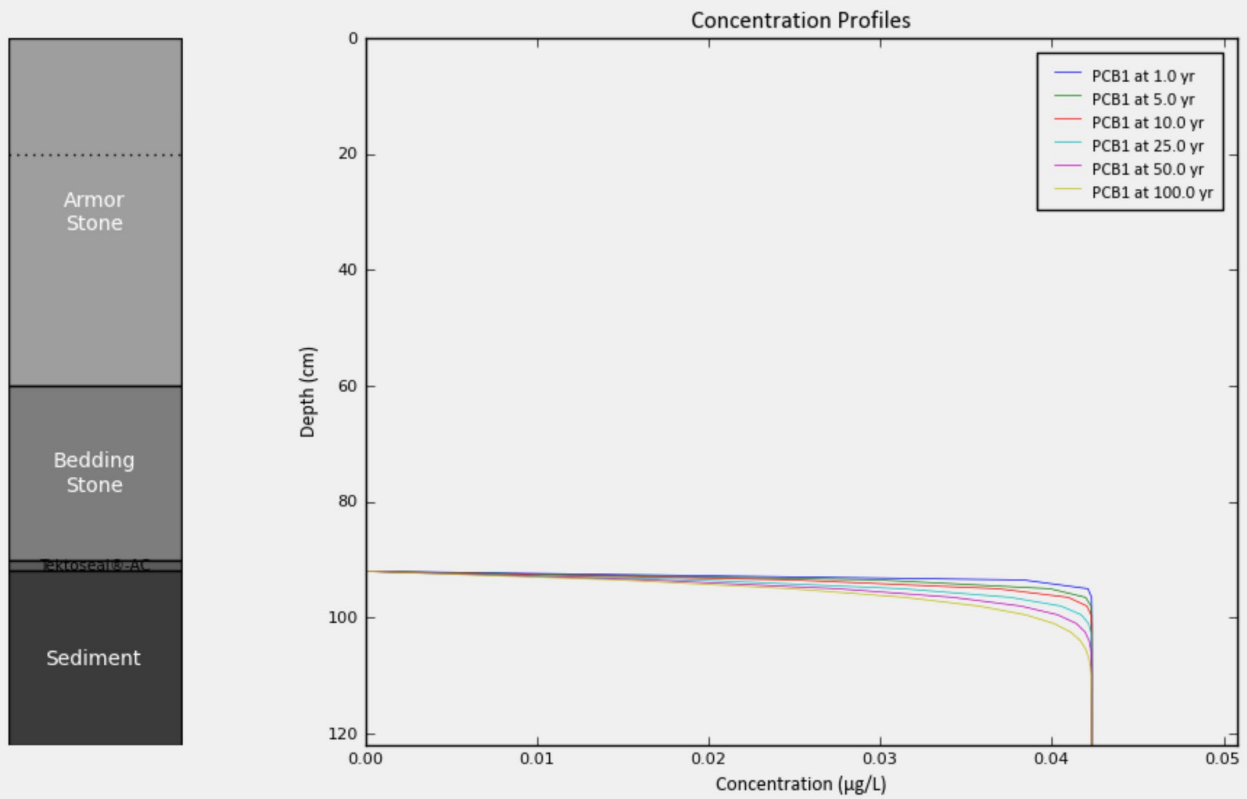

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Lead (inorganic) at 1.0 yr
Lead (inorganic) at 5.0 yr
Lead (inorganic) at 10.0 yr
Lead (inorganic) at 25.0 yr
Lead (inorganic) at 50.0 yr
Lead (inorganic) at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
Concentration (µg/L)

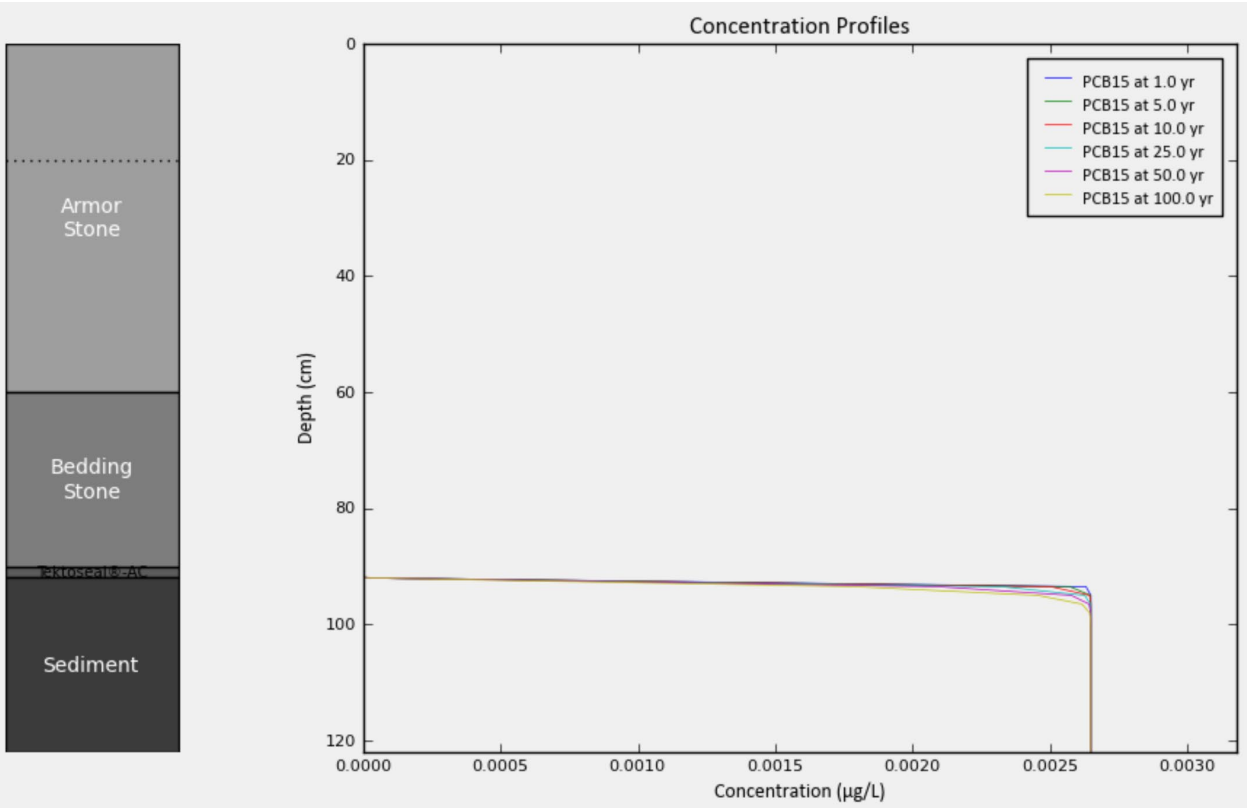

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Lindane at 1.0 yr
Lindane at 5.0 yr
Lindane at 10.0 yr
Lindane at 25.0 yr
Lindane at 50.0 yr
Lindane at 100.0 yr
Depth (cm)
Concentration (µg/L)

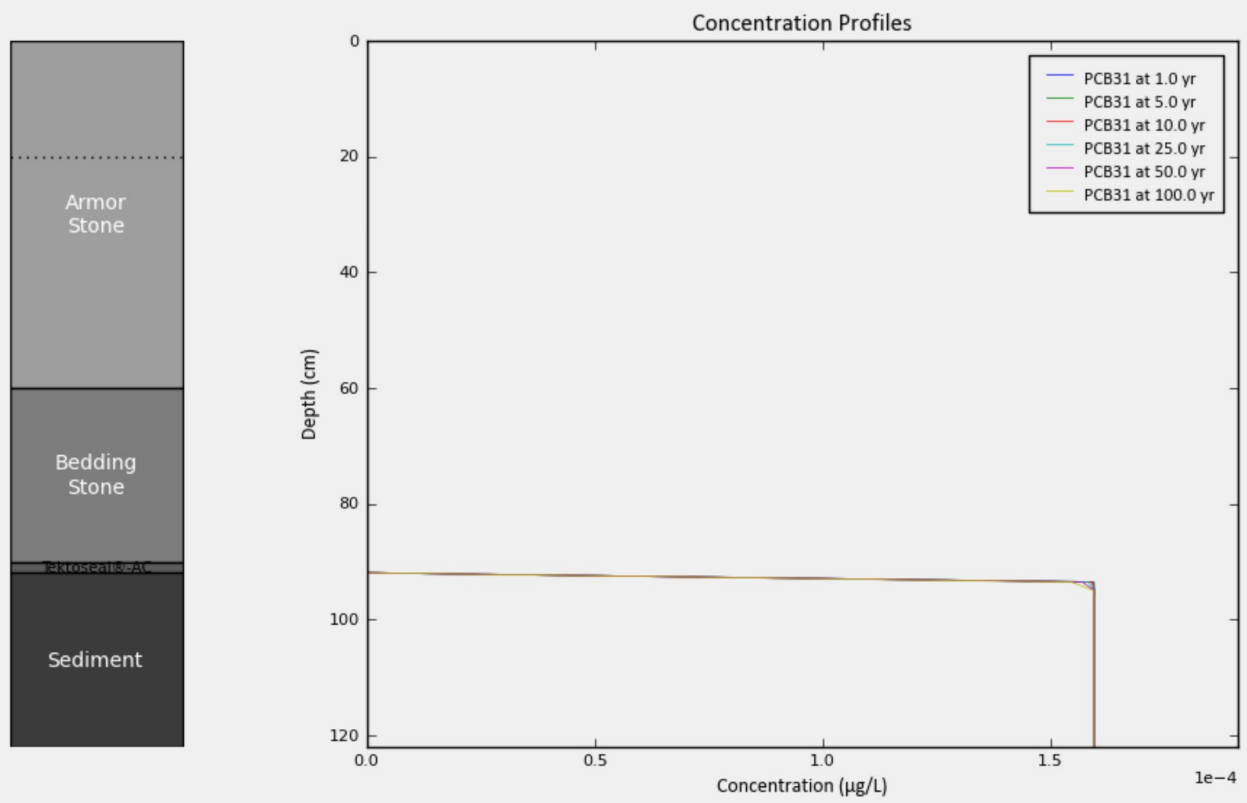

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Manganese at 1.0 yr
Manganese at 5.0 yr
Manganese at 10.0 yr
Manganese at 25.0 yr
Manganese at 50.0 yr
Manganese at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e4

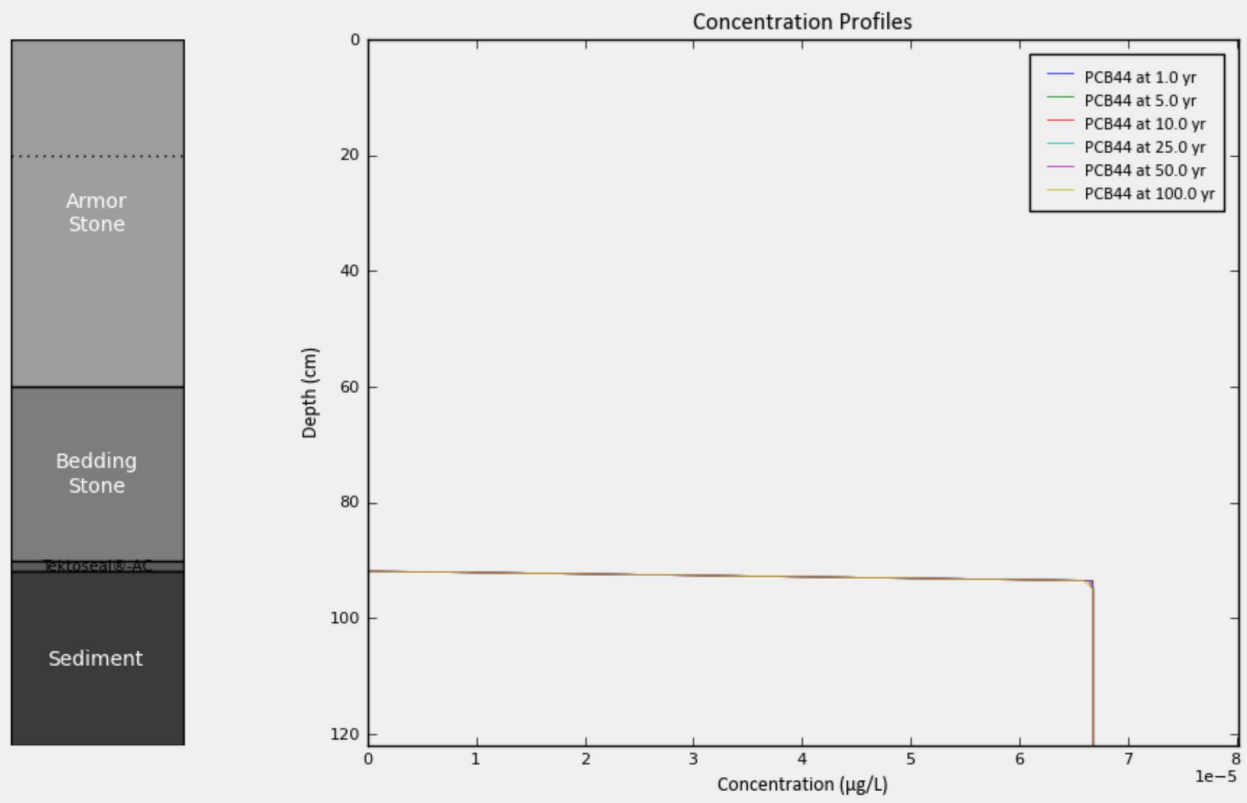

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Mercury at 1.0 yr
Mercury at 5.0 yr
Mercury at 10.0 yr
Mercury at 25.0 yr
Mercury at 50.0 yr
Mercury at 100.0 yr
Depth (cm)
Concentration (µg/L)

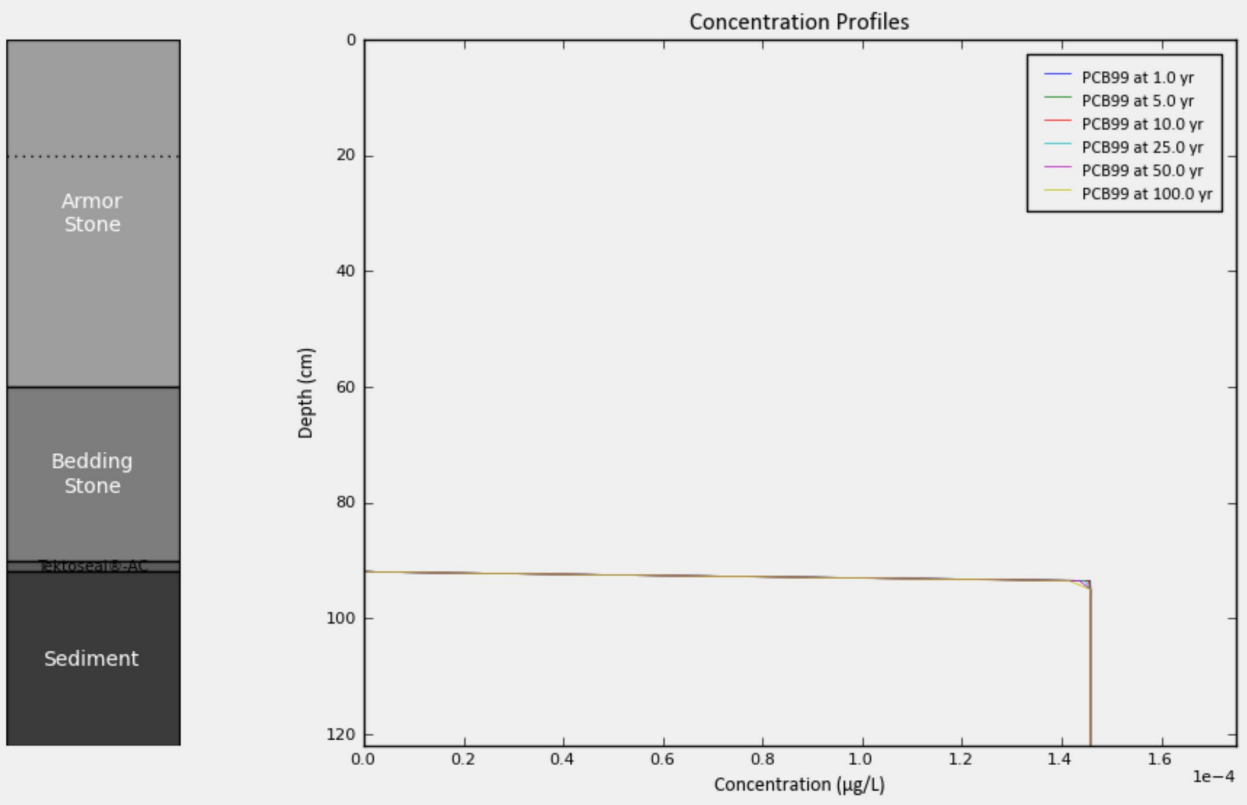

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Naphthalene at 1.0 yr
Naphthalene at 5.0 yr
Naphthalene at 10.0 yr
Naphthalene at 25.0 yr
Naphthalene at 50.0 yr
Naphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

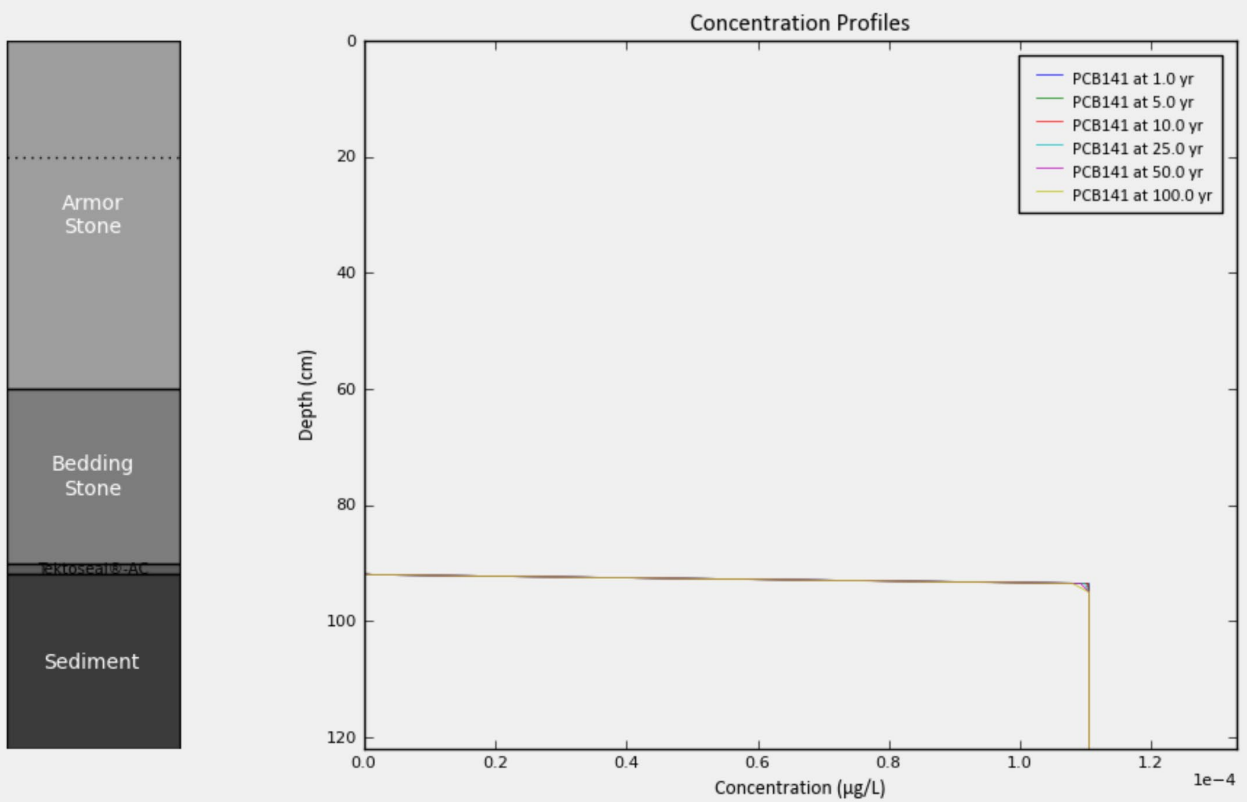

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB1 at 1.0 yr
PCB1 at 5.0 yr
PCB1 at 10.0 yr
PCB1 at 25.0 yr
PCB1 at 50.0 yr
PCB1 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.00
0.01
0.02
0.03
0.04
0.05

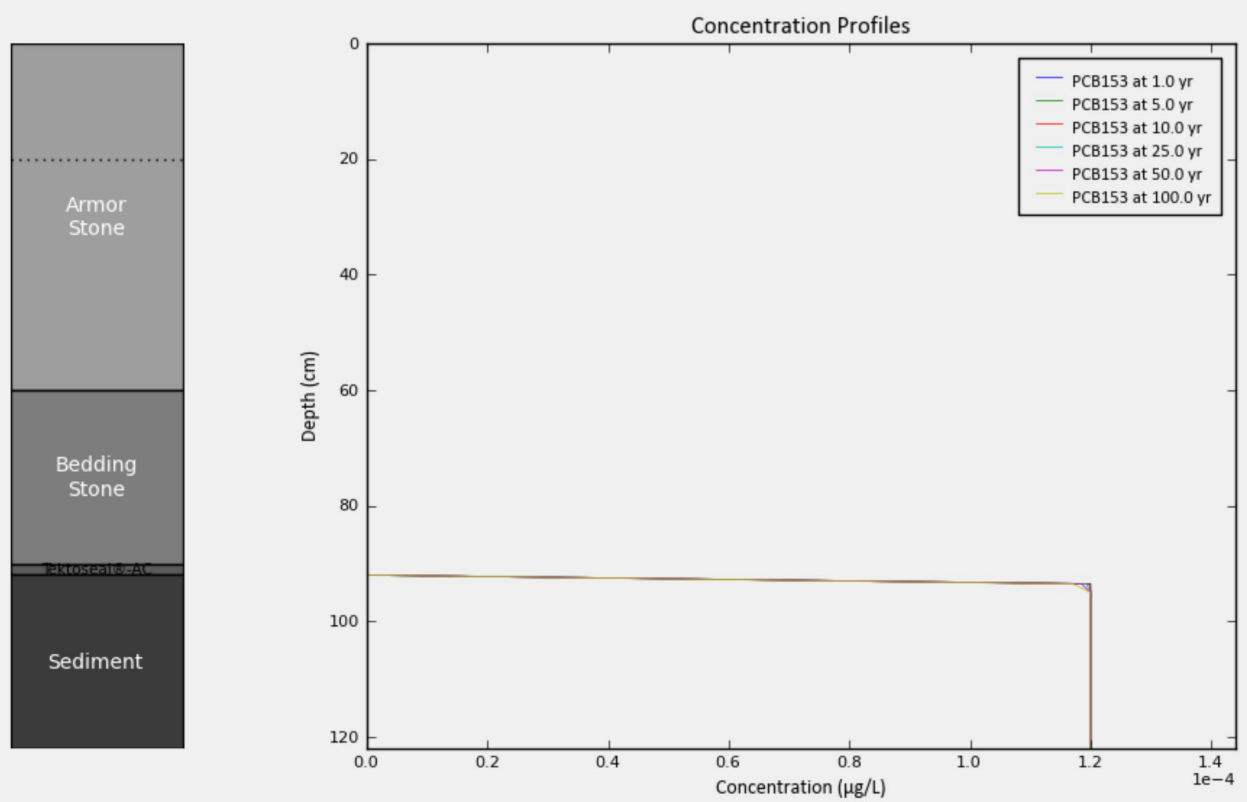

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB15 at 1.0 yr
PCB15 at 5.0 yr
PCB15 at 10.0 yr
PCB15 at 25.0 yr
PCB15 at 50.0 yr
PCB15 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030

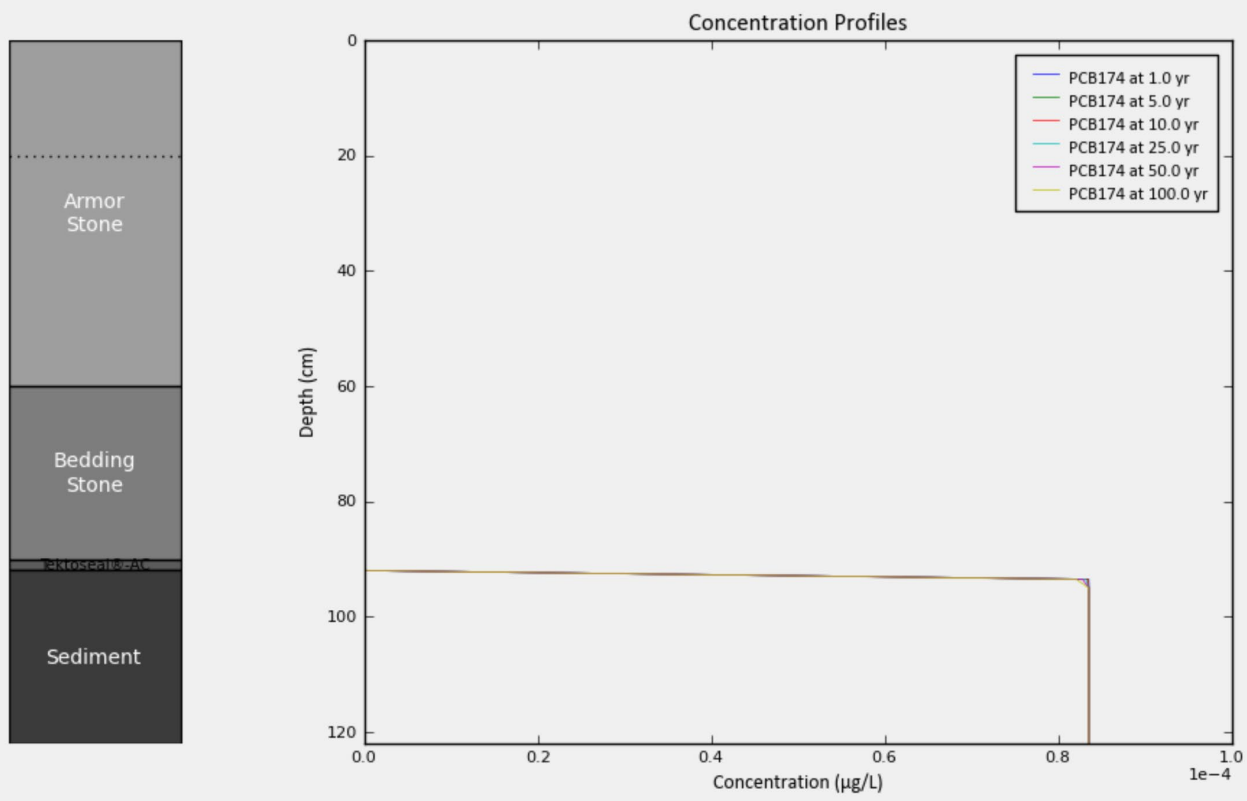

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB31 at 1.0 yr
PCB31 at 5.0 yr
PCB31 at 10.0 yr
PCB31 at 25.0 yr
PCB31 at 50.0 yr
PCB31 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

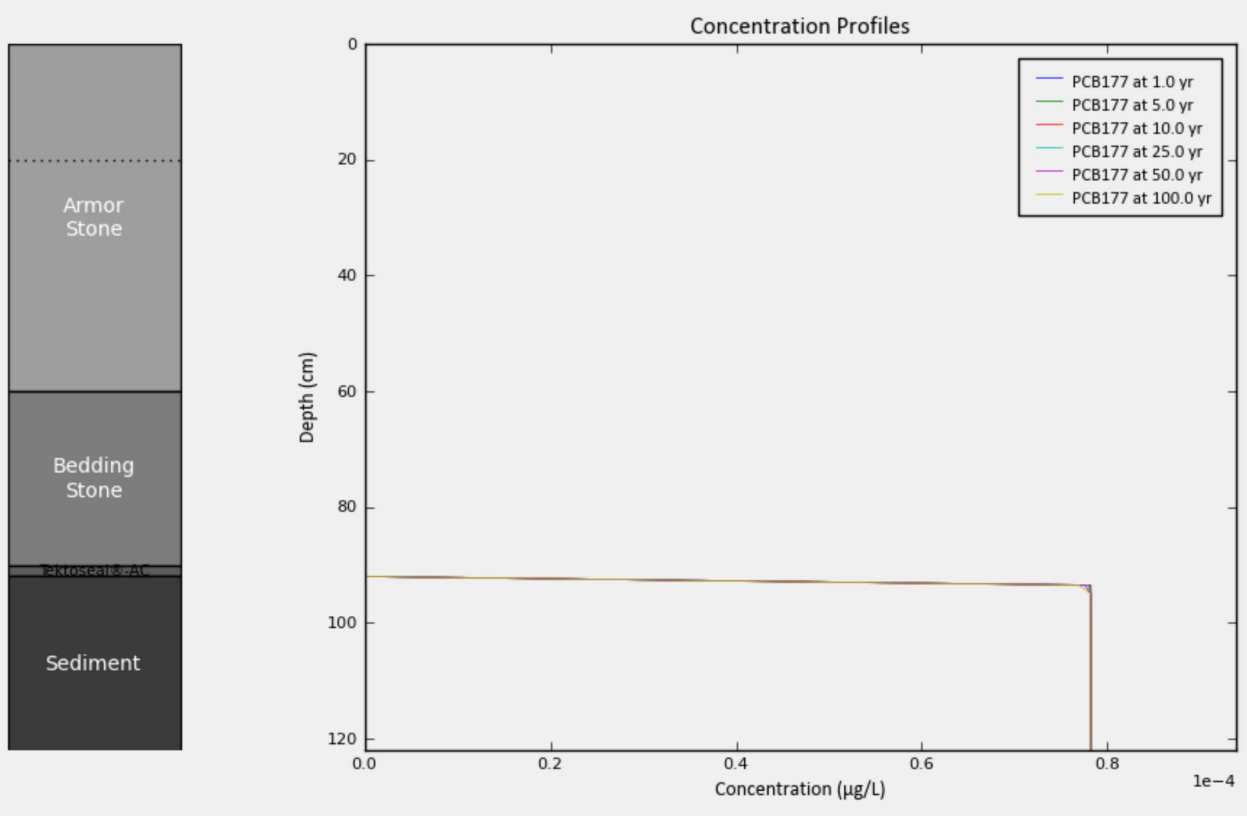

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB44 at 1.0 yr
PCB44 at 5.0 yr
PCB44 at 10.0 yr
PCB44 at 25.0 yr
PCB44 at 50.0 yr
PCB44 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

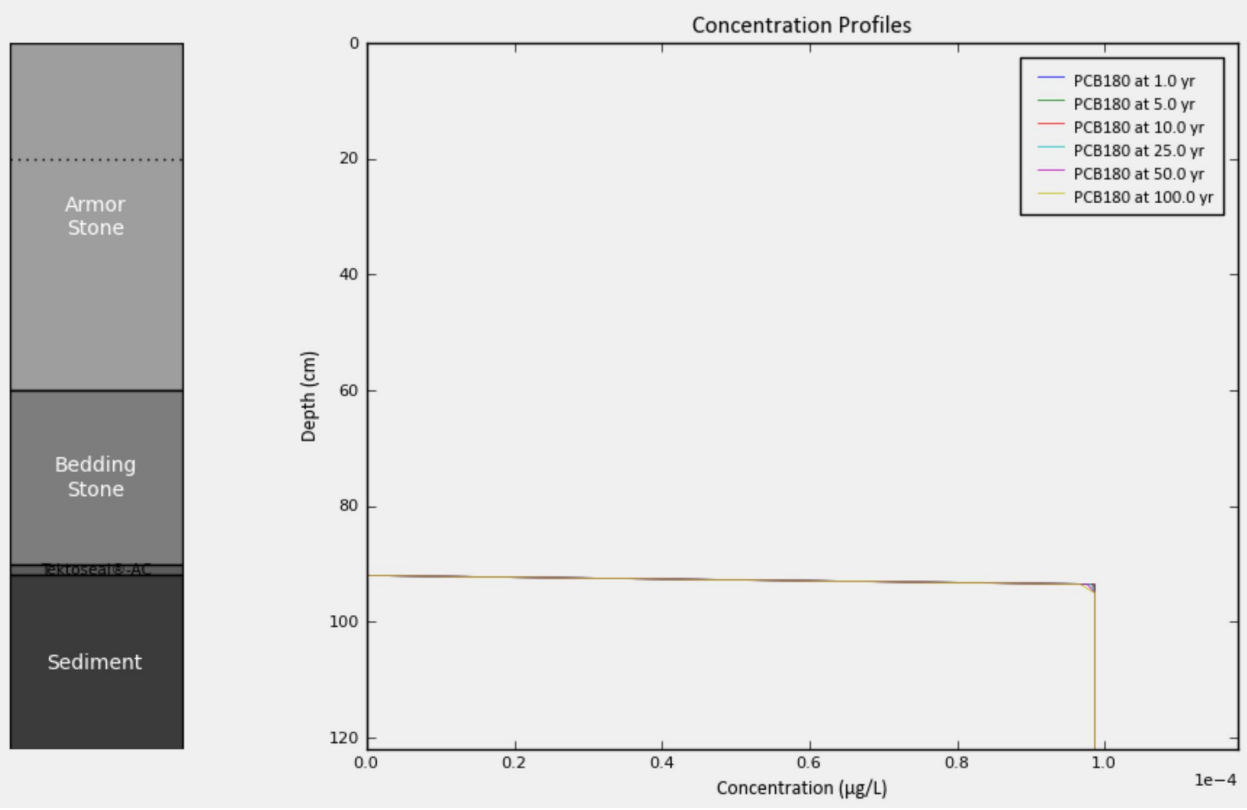

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB99 at 1.0 yr
PCB99 at 5.0 yr
PCB99 at 10.0 yr
PCB99 at 25.0 yr
PCB99 at 50.0 yr
PCB99 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

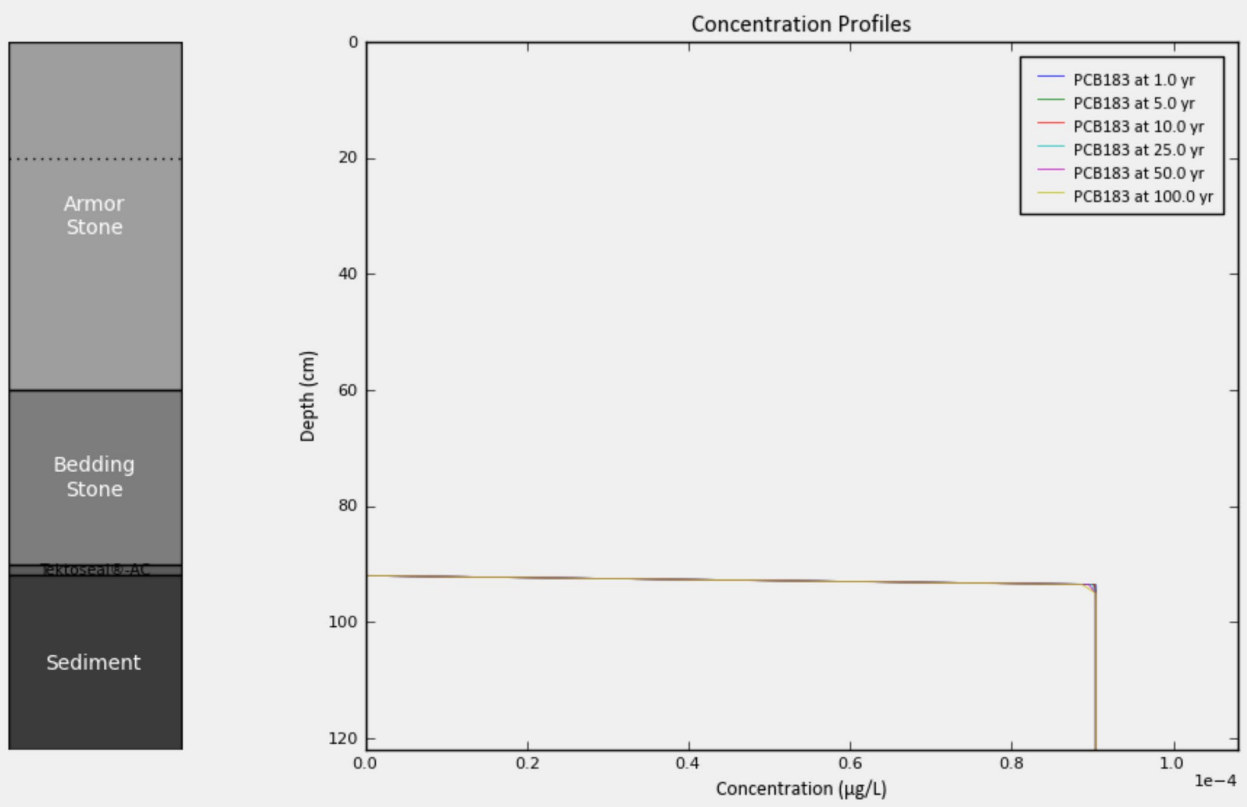

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB141 at 1.0 yr
PCB141 at 5.0 yr
PCB141 at 10.0 yr
PCB141 at 25.0 yr
PCB141 at 50.0 yr
PCB141 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

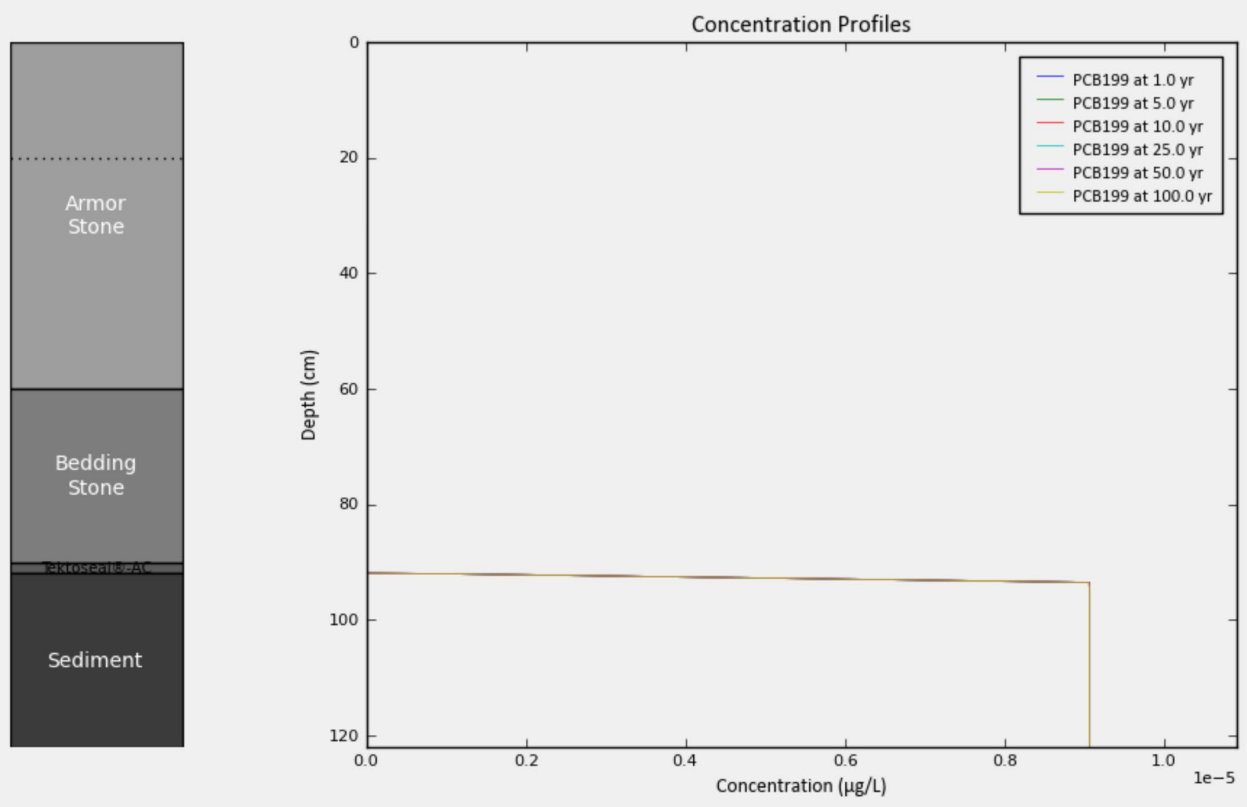

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB153 at 1.0 yr
PCB153 at 5.0 yr
PCB153 at 10.0 yr
PCB153 at 25.0 yr
PCB153 at 50.0 yr
PCB153 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

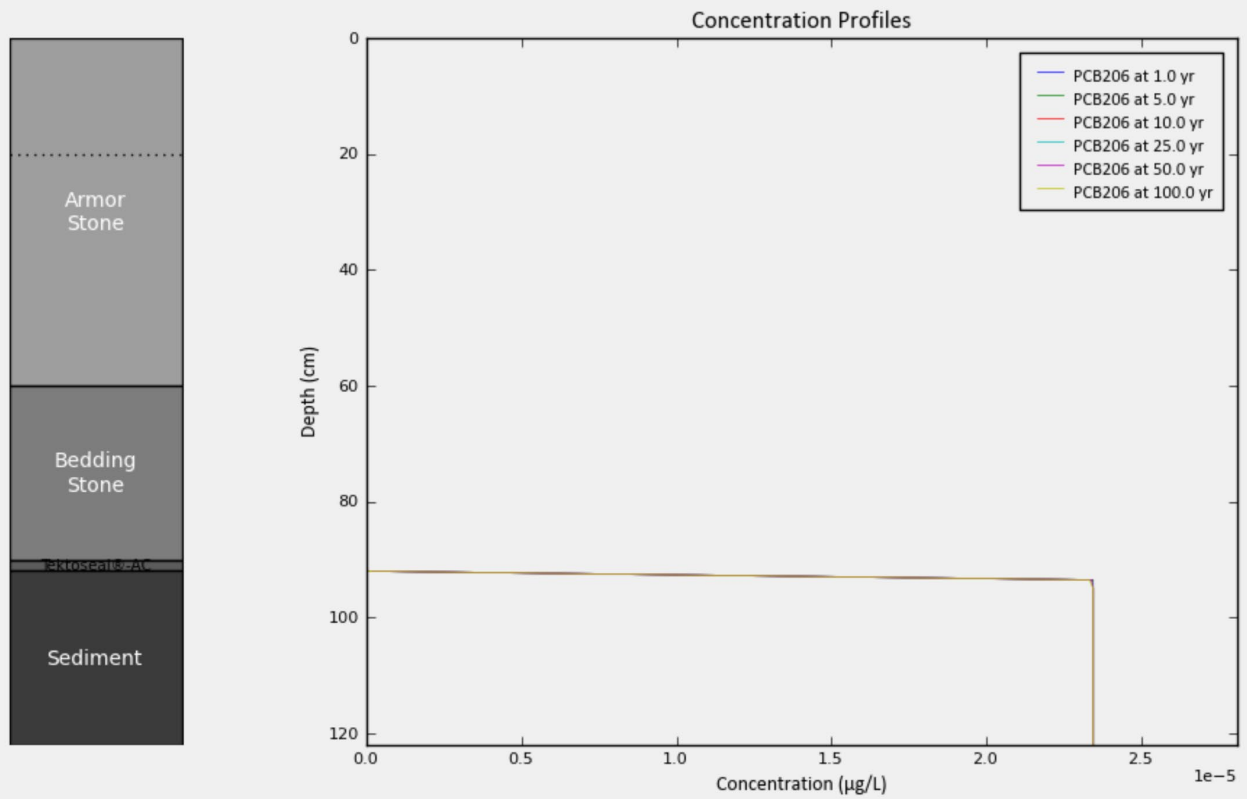

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB174 at 1.0 yr
PCB174 at 5.0 yr
PCB174 at 10.0 yr
PCB174 at 25.0 yr
PCB174 at 50.0 yr
PCB174 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

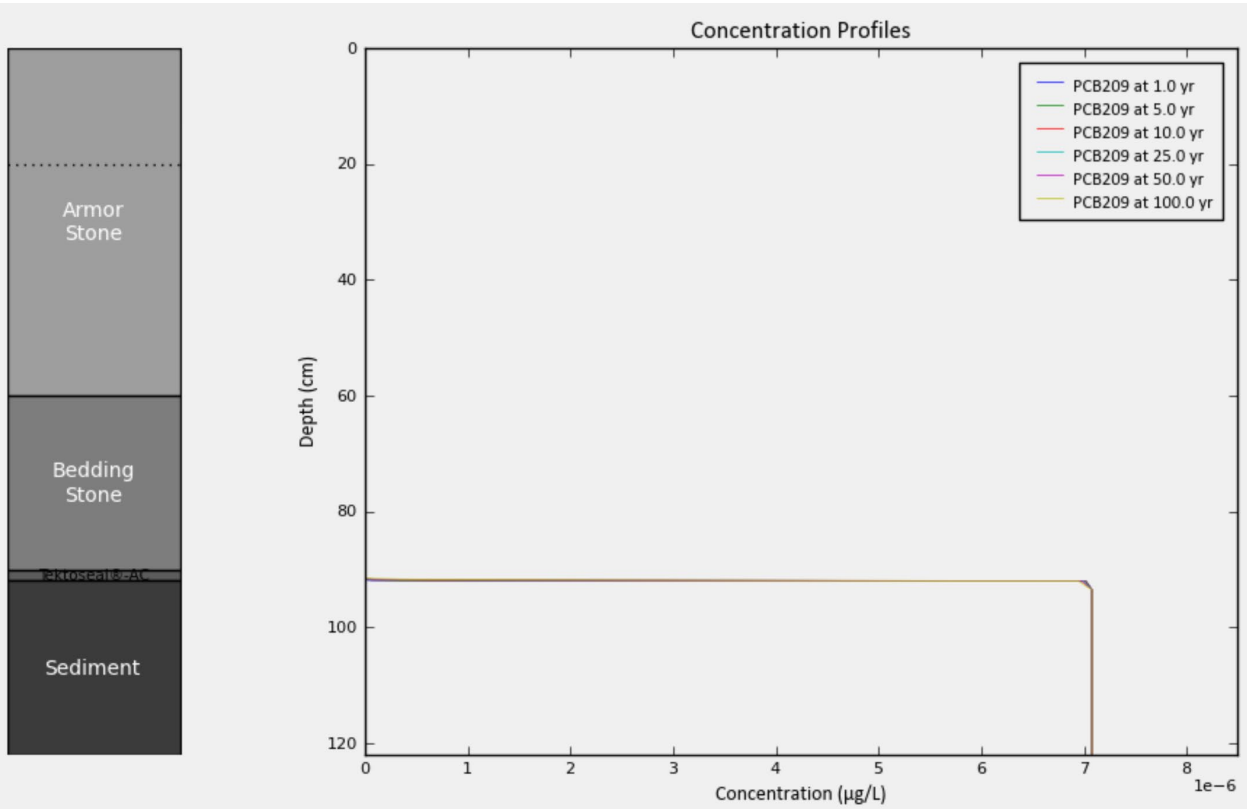

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB177 at 1.0 yr
PCB177 at 5.0 yr
PCB177 at 10.0 yr
PCB177 at 25.0 yr
PCB177 at 50.0 yr
PCB177 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

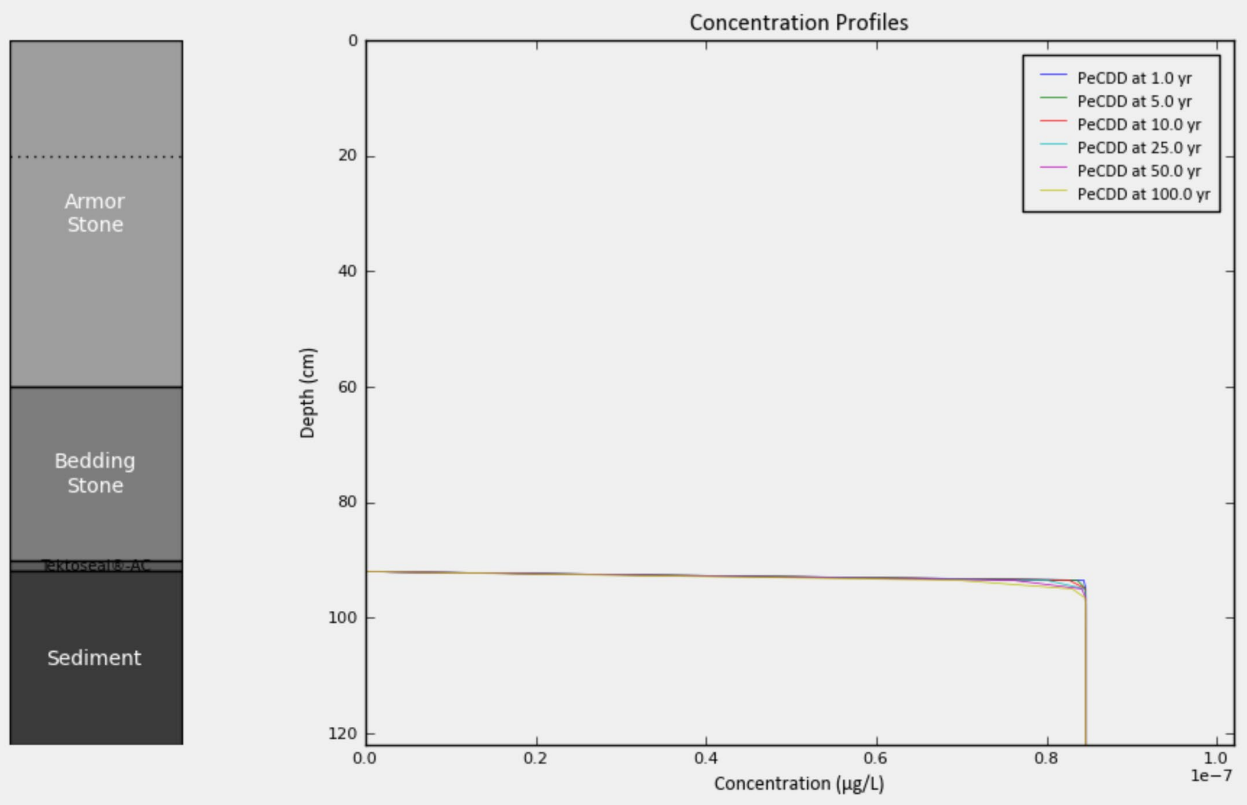

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB180 at 1.0 yr
PCB180 at 5.0 yr
PCB180 at 10.0 yr
PCB180 at 25.0 yr
PCB180 at 50.0 yr
PCB180 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

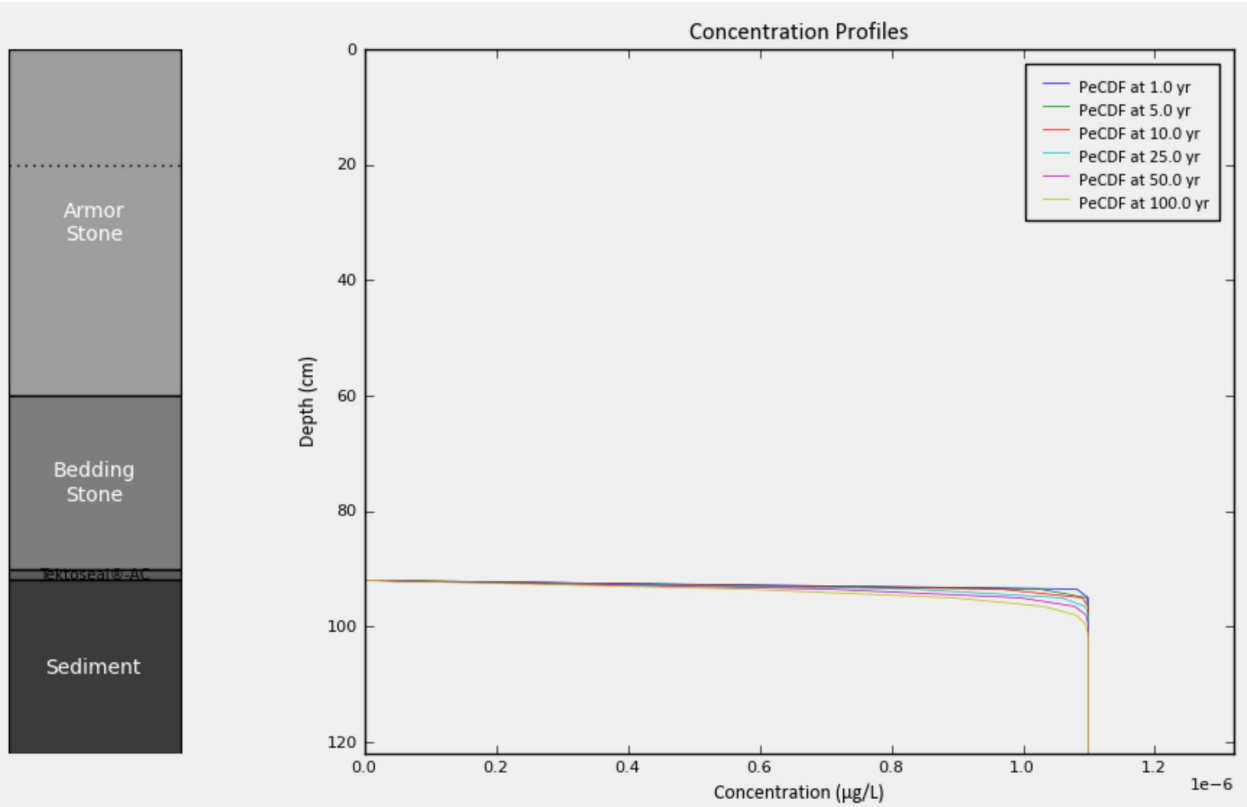

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB183 at 1.0 yr
PCB183 at 5.0 yr
PCB183 at 10.0 yr
PCB183 at 25.0 yr
PCB183 at 50.0 yr
PCB183 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

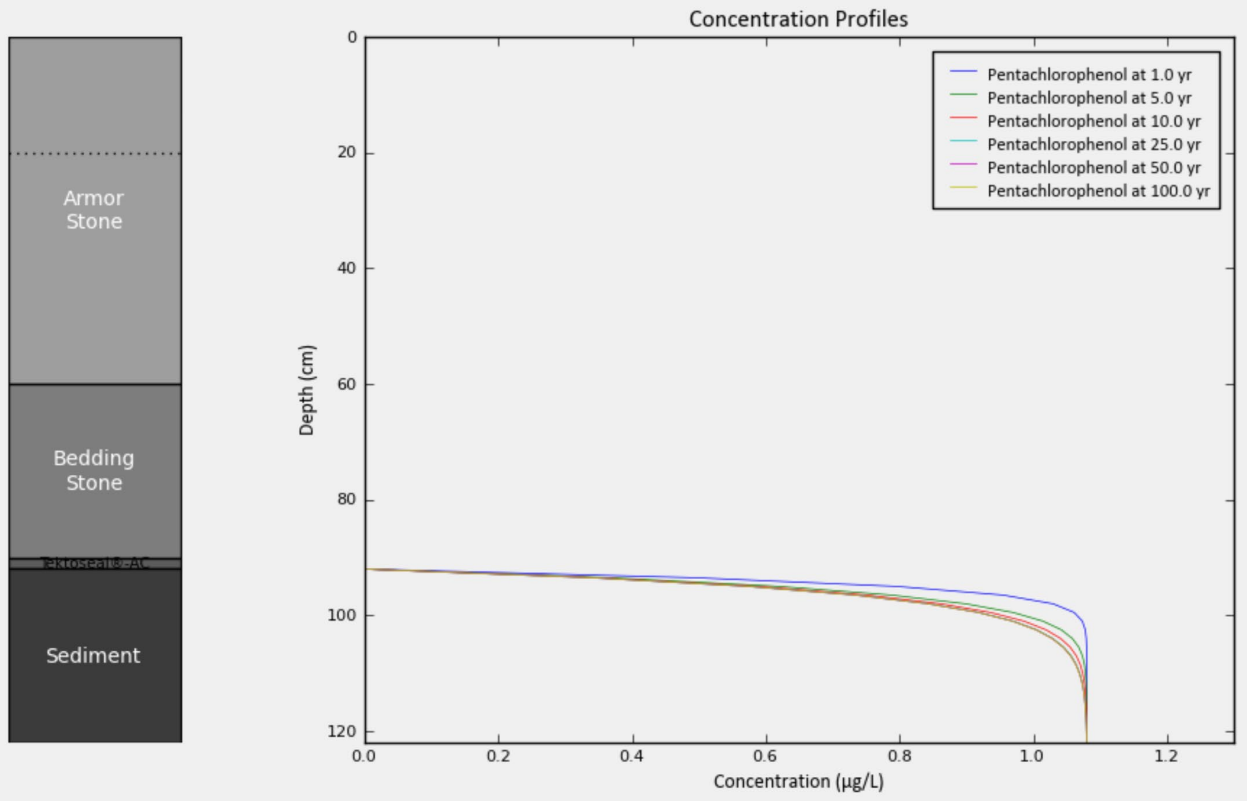

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB199 at 1.0 yr
PCB199 at 5.0 yr
PCB199 at 10.0 yr
PCB199 at 25.0 yr
PCB199 at 50.0 yr
PCB199 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

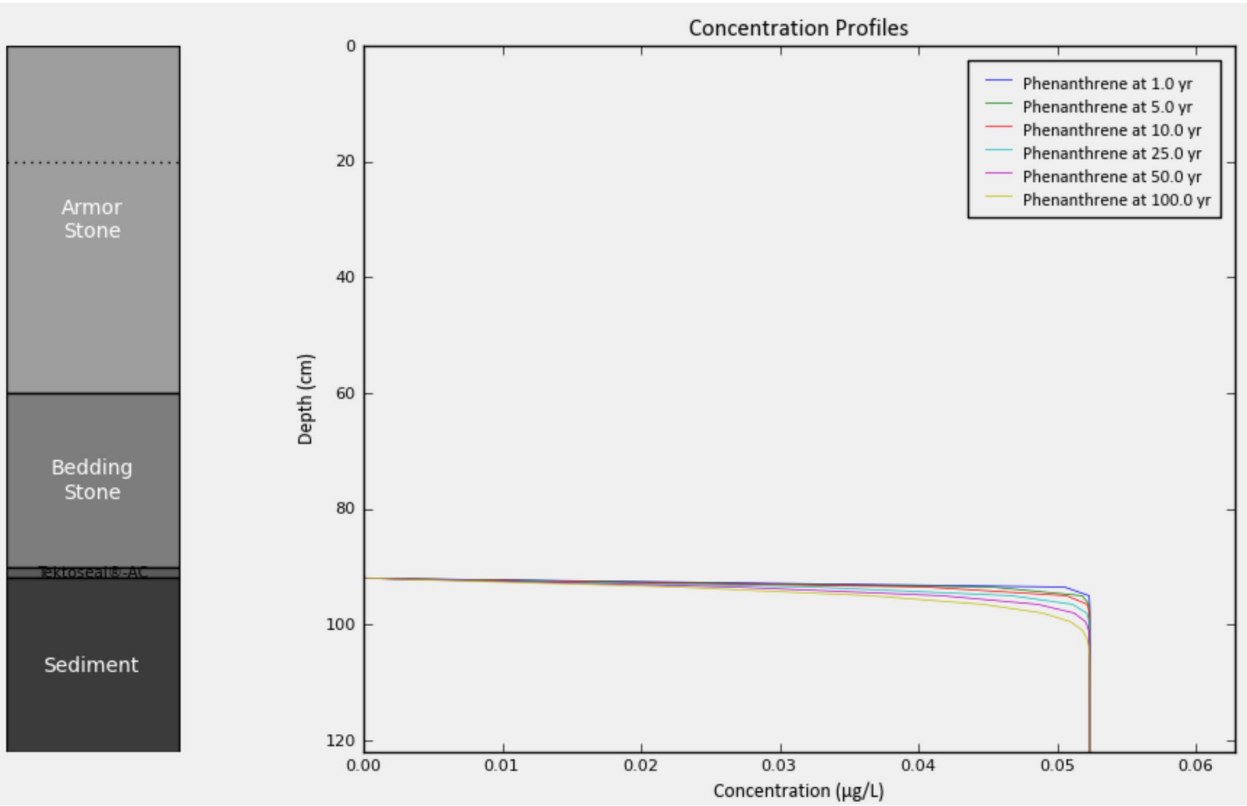

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB206 at 1.0 yr
PCB206 at 5.0 yr
PCB206 at 10.0 yr
PCB206 at 25.0 yr
PCB206 at 50.0 yr
PCB206 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

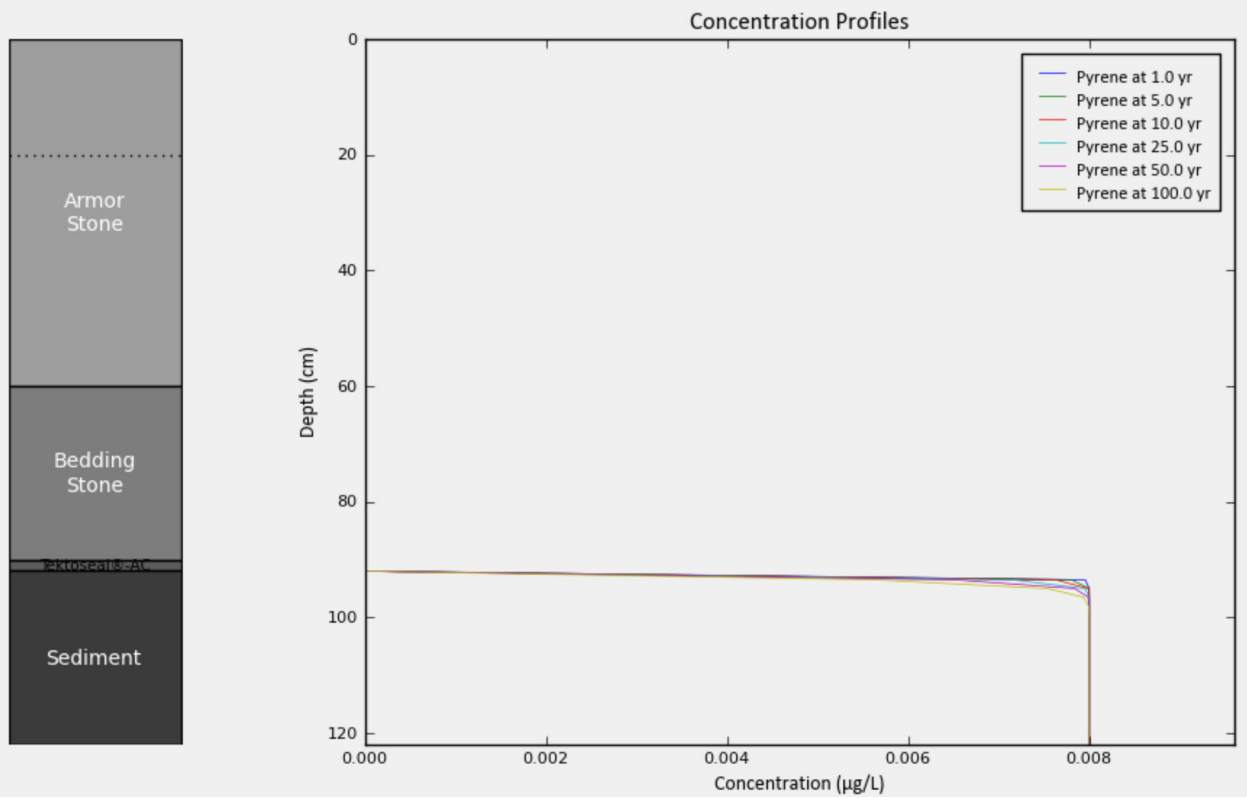

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB209 at 1.0 yr
PCB209 at 5.0 yr
PCB209 at 10.0 yr
PCB209 at 25.0 yr
PCB209 at 50.0 yr
PCB209 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

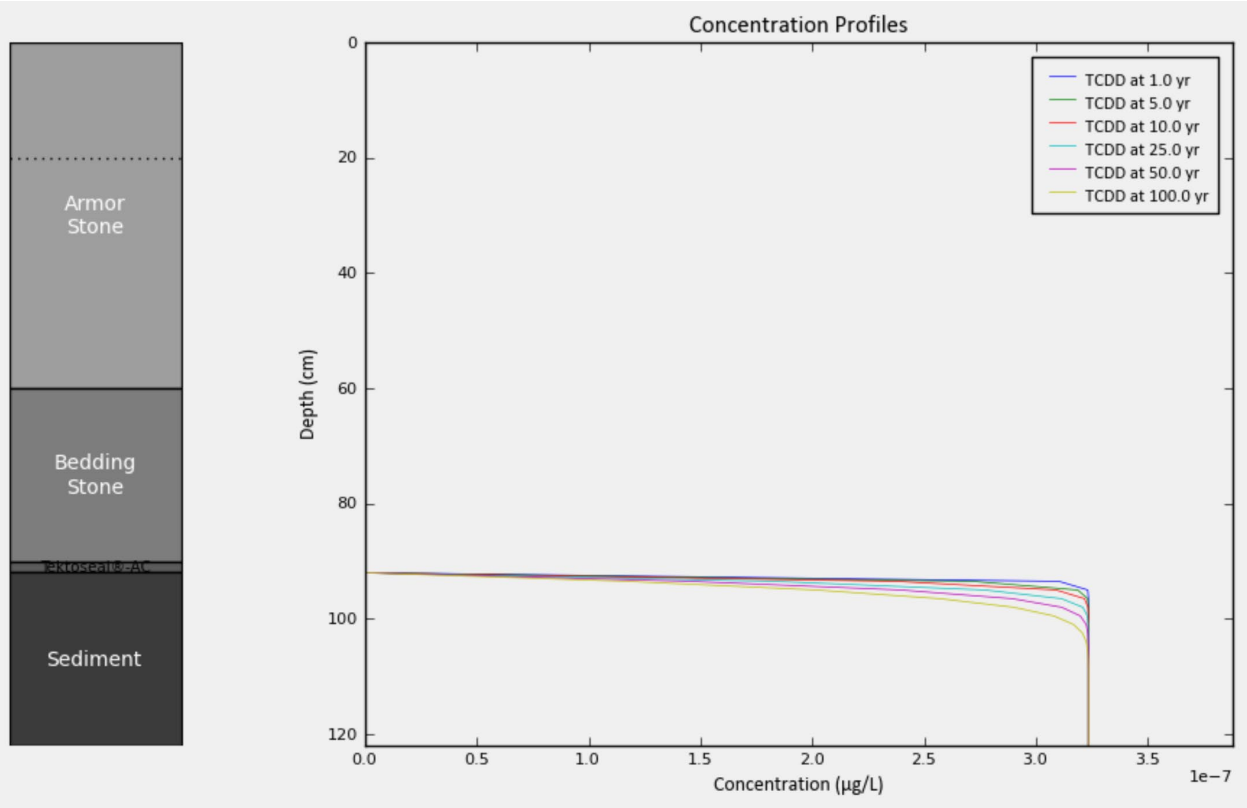

Armor Stone
Bedding Stone
Tetroseal® AC
Sediment
Concentration Profiles
PeCDD at 1.0 yr
PeCDD at 5.0 yr
PeCDD at 10.0 yr
PeCDD at 25.0 yr
PeCDD at 50.0 yr
PeCDD at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−7
Concentration (µg/L)

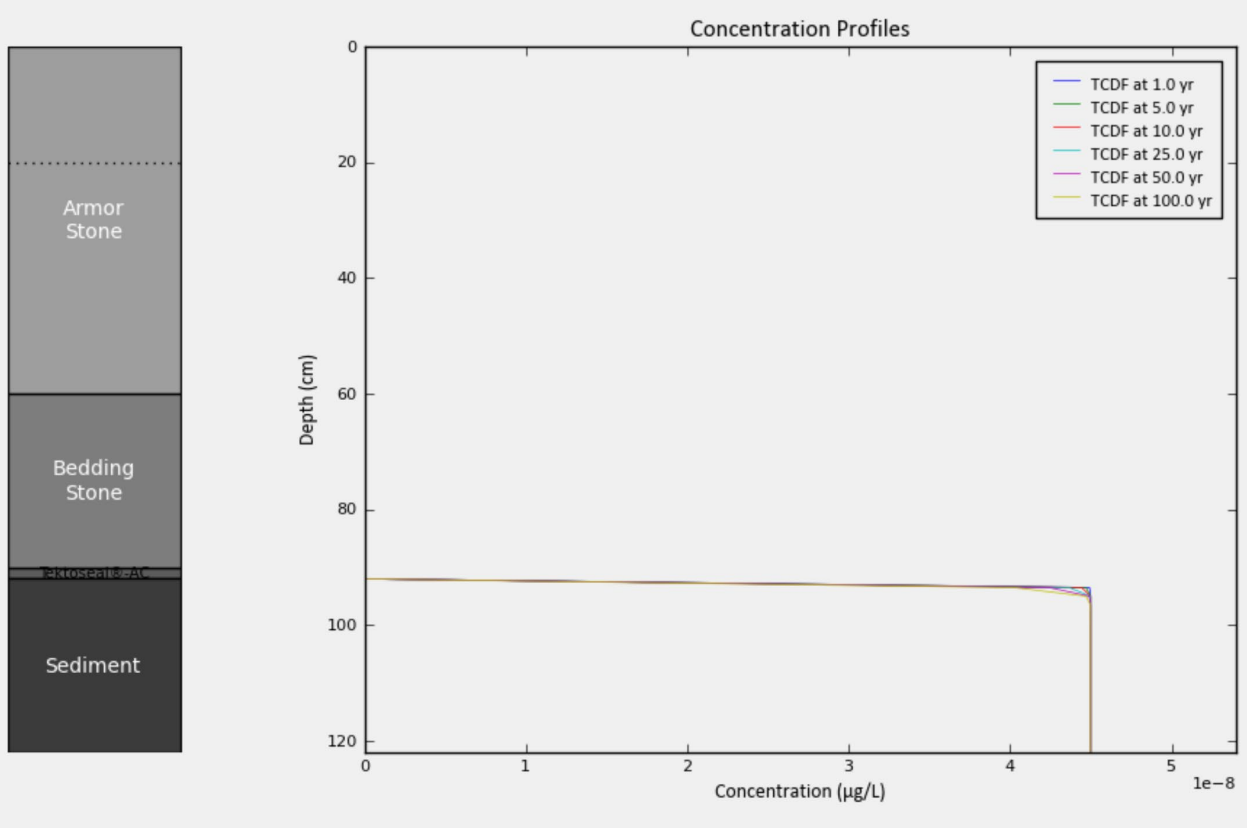

Armor Stone
Bedding Stone
Tetroseal® AC
Sediment
Concentration Profiles
PeCDF at 1.0 yr
PeCDF at 5.0 yr
PeCDF at 10.0 yr
PeCDF at 25.0 yr
PeCDF at 50.0 yr
PeCDF at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e−6
Concentration (µg/L)

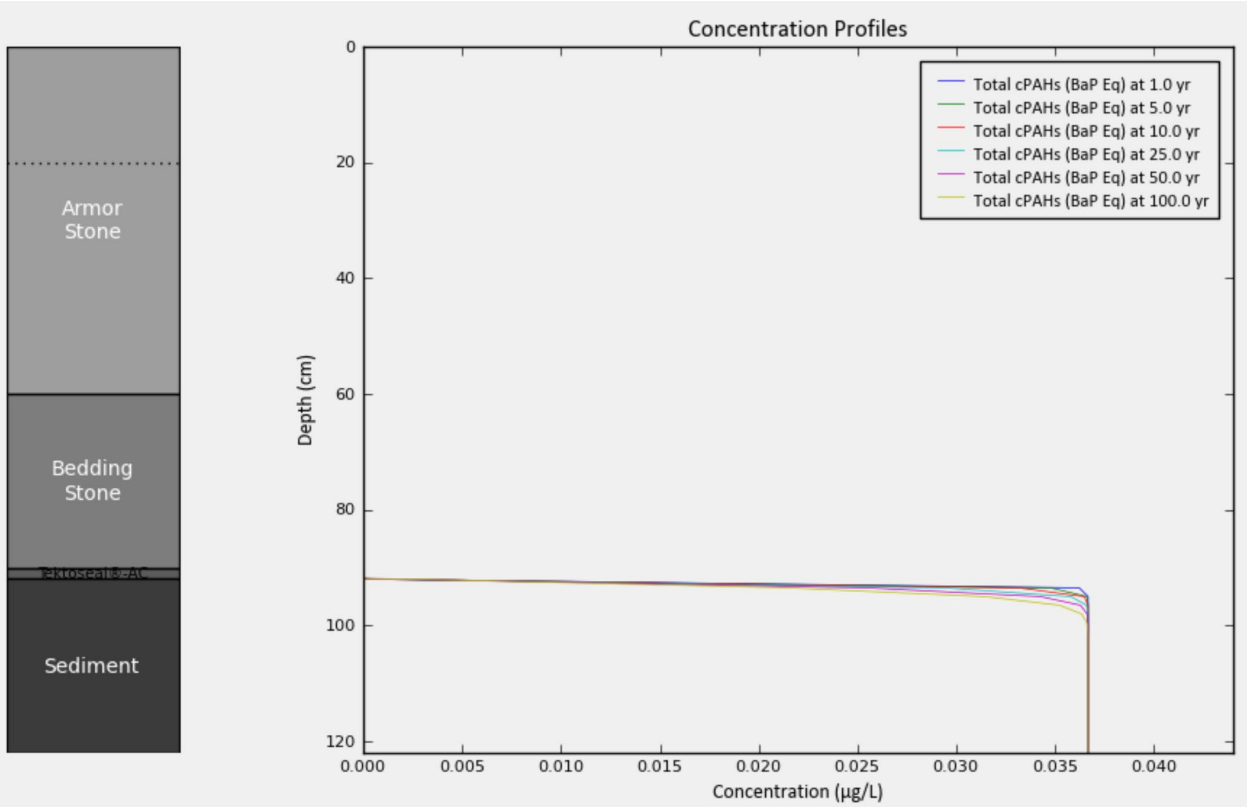

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Pentachlorophenol at 1.0 yr
Pentachlorophenol at 5.0 yr
Pentachlorophenol at 10.0 yr
Pentachlorophenol at 25.0 yr
Pentachlorophenol at 50.0 yr
Pentachlorophenol at 100.0 yr
Depth (cm)
Concentration (µg/L)

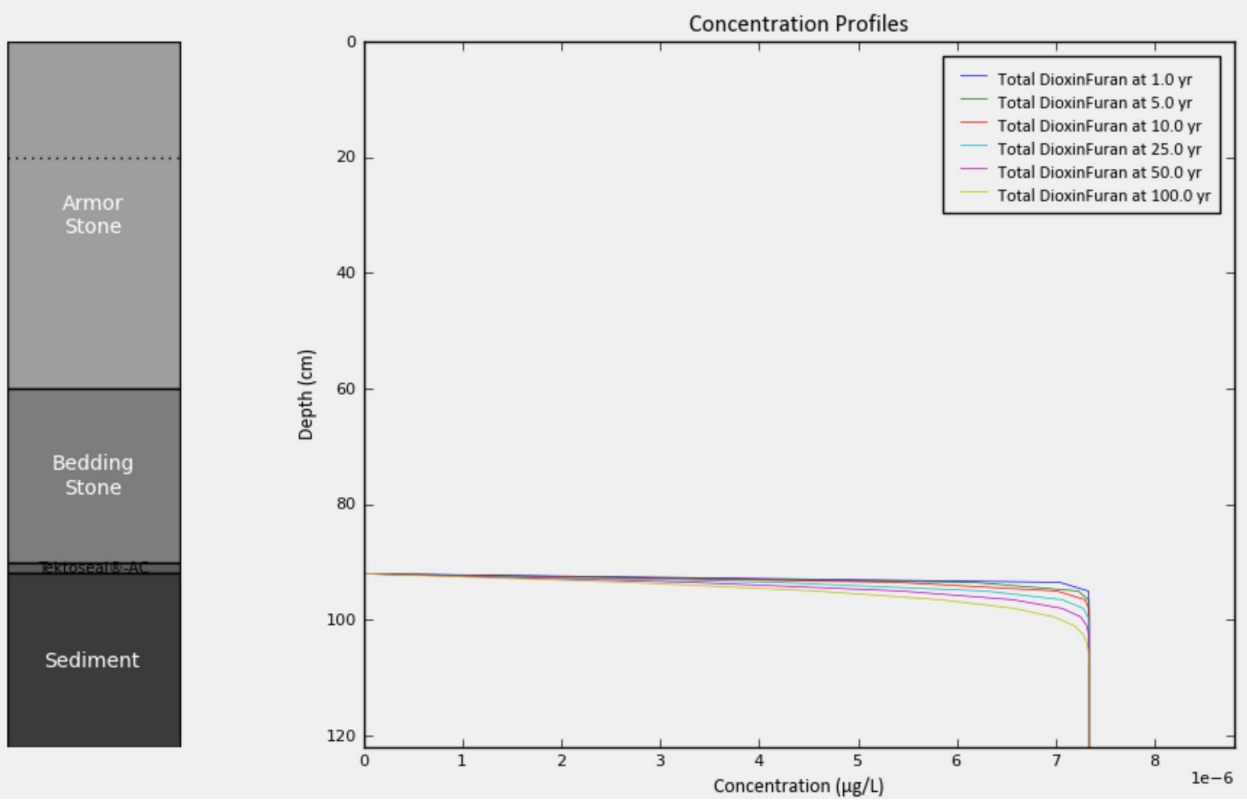

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Phenanthrene at 1.0 yr
Phenanthrene at 5.0 yr
Phenanthrene at 10.0 yr
Phenanthrene at 25.0 yr
Phenanthrene at 50.0 yr
Phenanthrene at 100.0 yr
Depth (cm)
Concentration (µg/L)

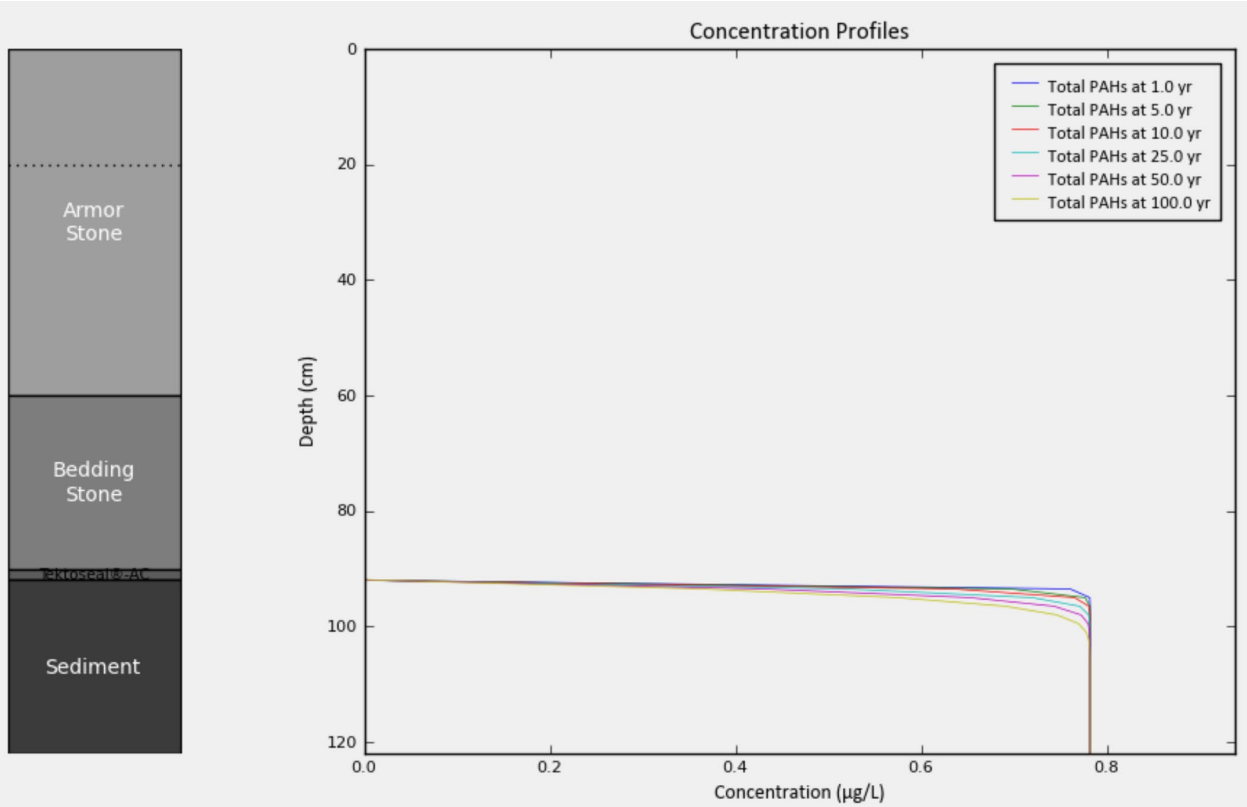

Armor Stone
Bedding Stone
Tetroseal® AC
Sediment
Concentration Profiles
Pyrene at 1.0 yr
Pyrene at 5.0 yr
Pyrene at 10.0 yr
Pyrene at 25.0 yr
Pyrene at 50.0 yr
Pyrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
Concentration (µg/L)

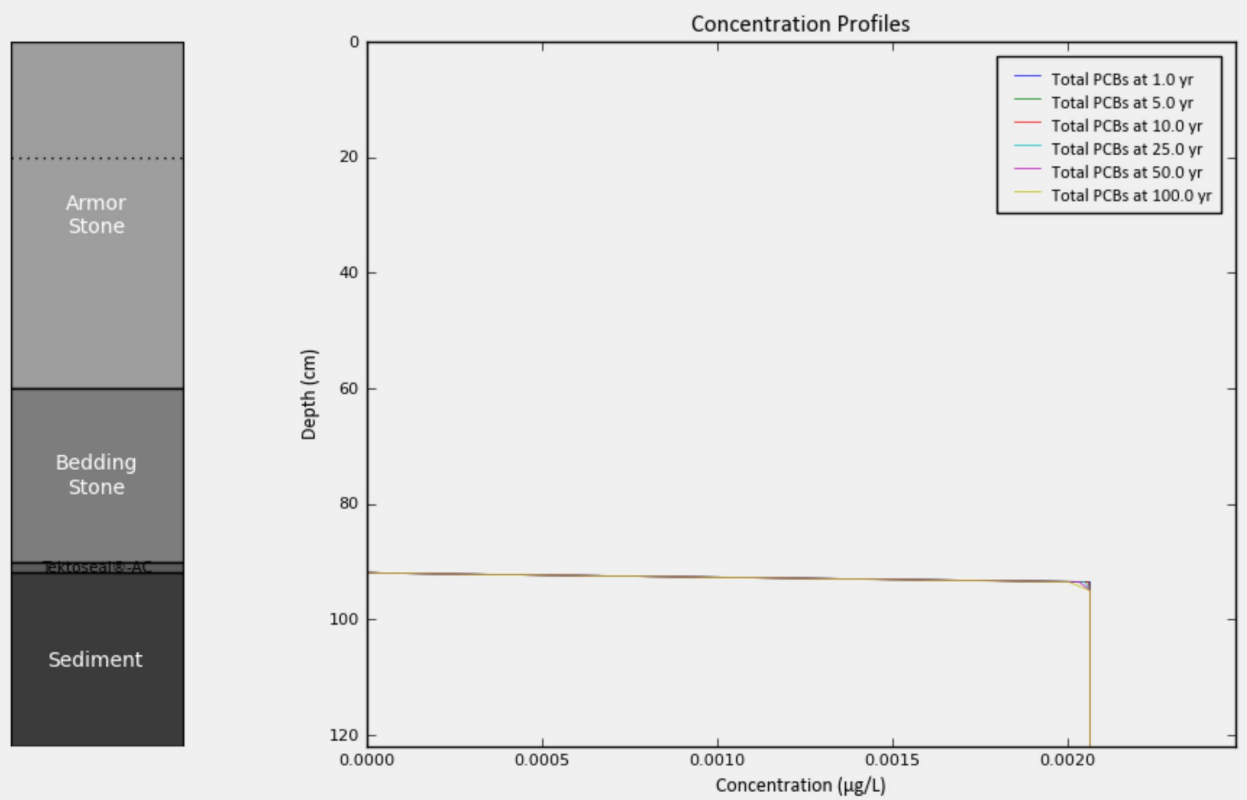

Armor Stone
Bedding Stone
Tetroseal® AC
Sediment
Concentration Profiles
TCDD at 1.0 yr
TCDD at 5.0 yr
TCDD at 10.0 yr
TCDD at 25.0 yr
TCDD at 50.0 yr
TCDD at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e−7
Concentration (µg/L)

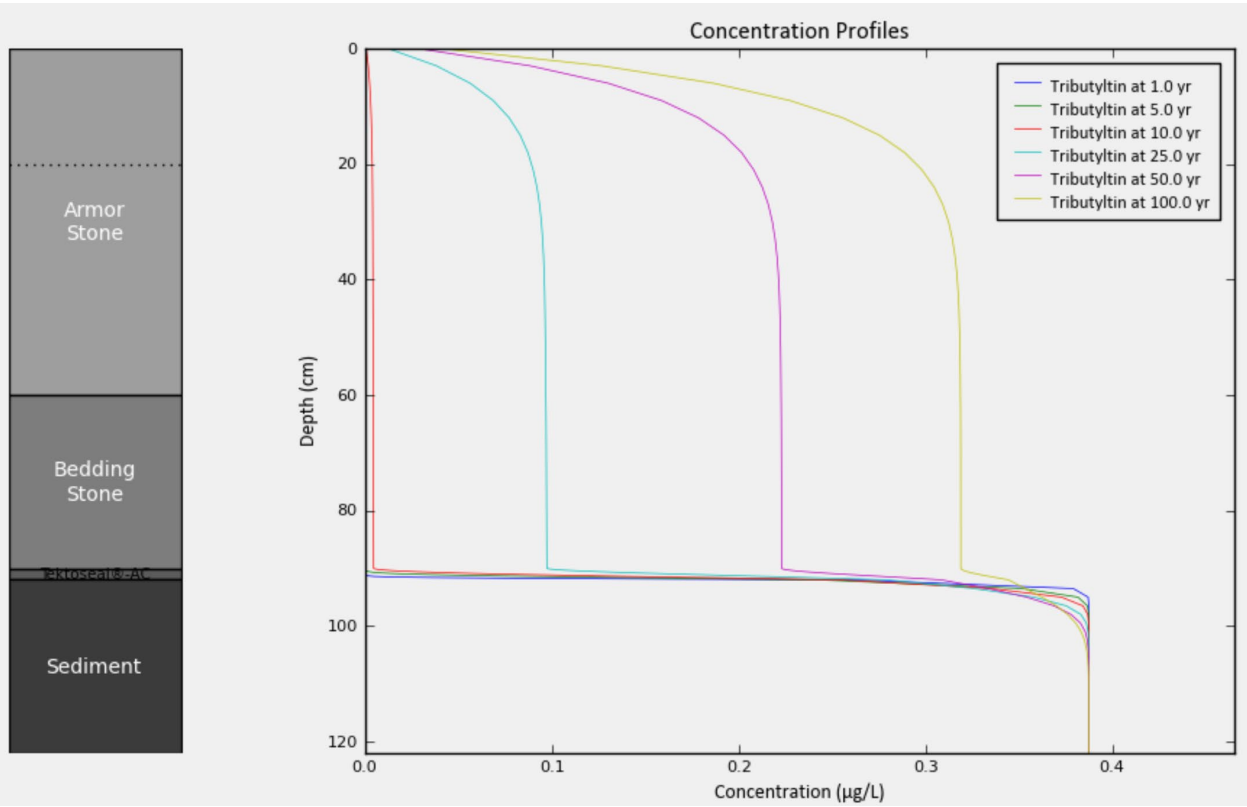

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
TCDF at 1.0 yr
TCDF at 5.0 yr
TCDF at 10.0 yr
TCDF at 25.0 yr
TCDF at 50.0 yr
TCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−8

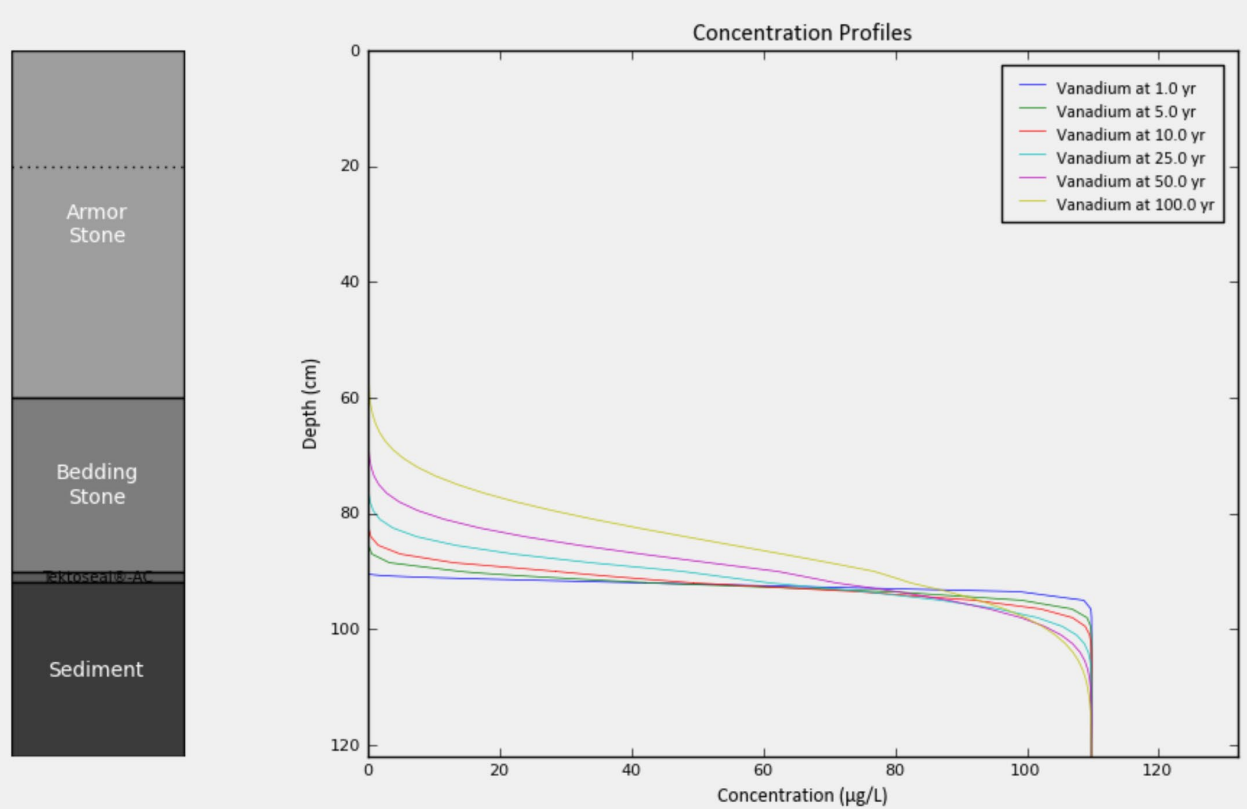

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Total cPAHs (BaP Eq) at 1.0 yr
Total cPAHs (BaP Eq) at 5.0 yr
Total cPAHs (BaP Eq) at 10.0 yr
Total cPAHs (BaP Eq) at 25.0 yr
Total cPAHs (BaP Eq) at 50.0 yr
Total cPAHs (BaP Eq) at 100.0 yr
Depth (cm)
Concentration (µg/L)

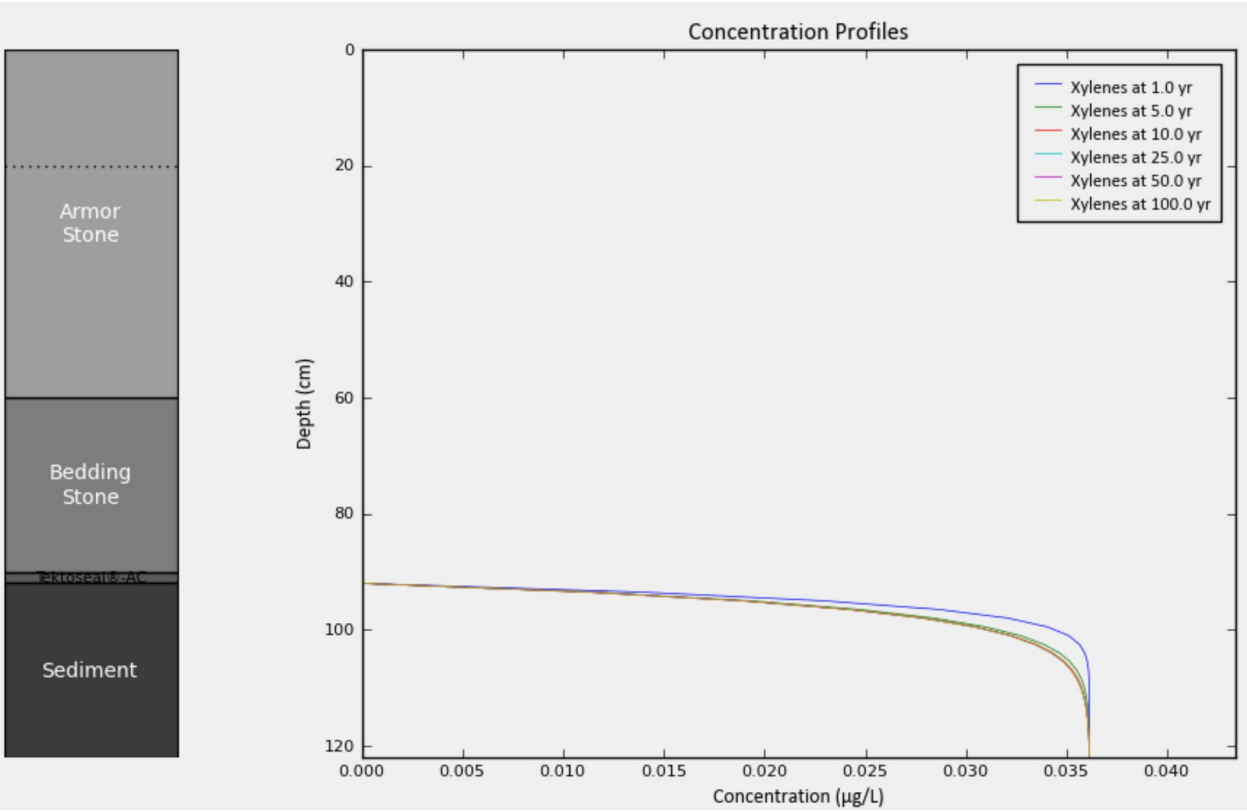

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Total DioxinFuran at 1.0 yr
Total DioxinFuran at 5.0 yr
Total DioxinFuran at 10.0 yr
Total DioxinFuran at 25.0 yr
Total DioxinFuran at 50.0 yr
Total DioxinFuran at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

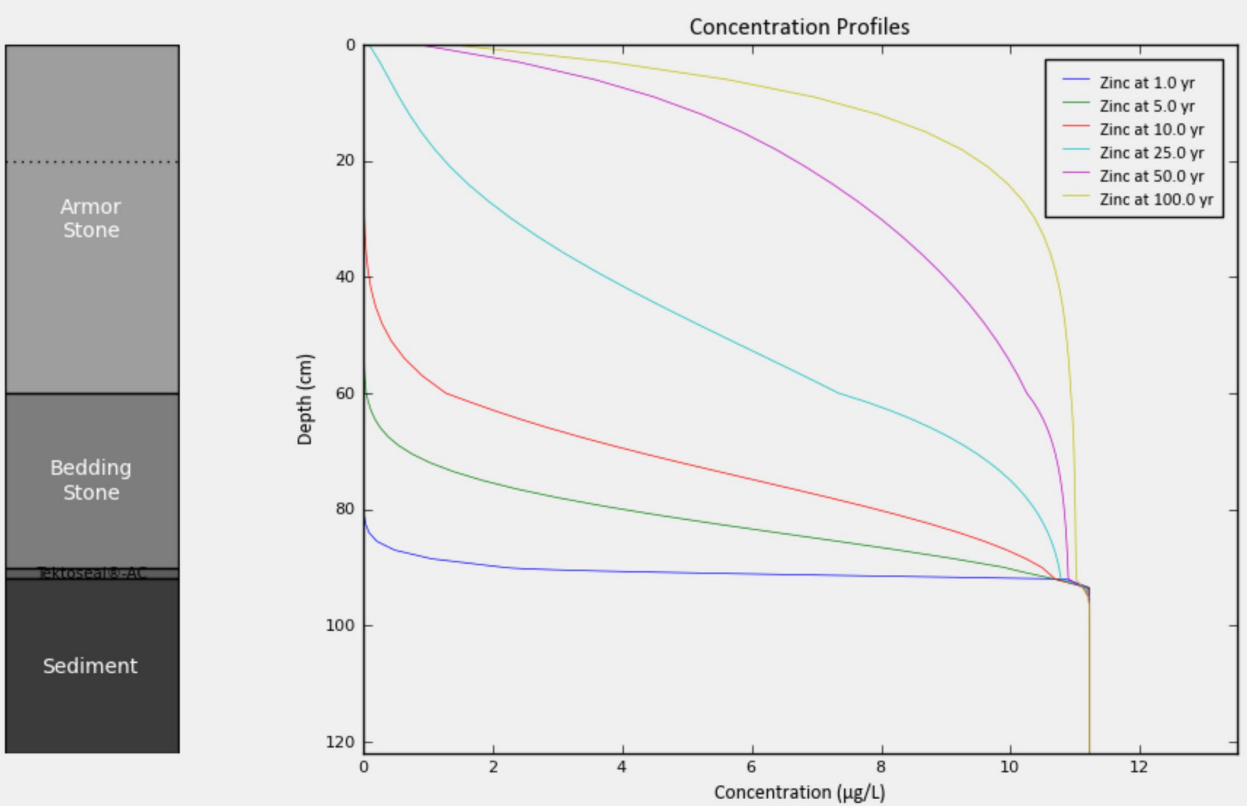

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Total PAHs at 1.0 yr
Total PAHs at 5.0 yr
Total PAHs at 10.0 yr
Total PAHs at 25.0 yr
Total PAHs at 50.0 yr
Total PAHs at 100.0 yr
Depth (cm)
Concentration (µg/L)


Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Total PCBs at 1.0 yr
Total PCBs at 5.0 yr
Total PCBs at 10.0 yr
Total PCBs at 25.0 yr
Total PCBs at 50.0 yr
Total PCBs at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

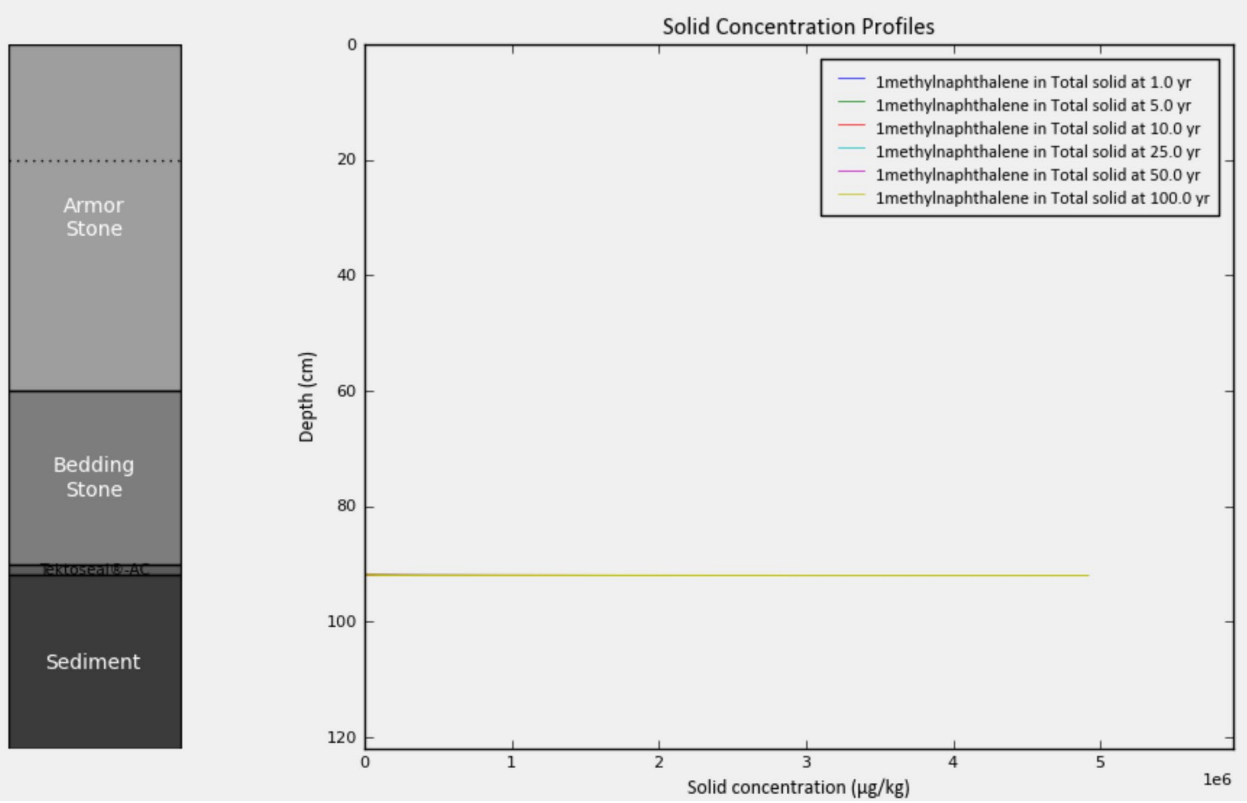

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Tributyltin at 1.0 yr
Tributyltin at 5.0 yr
Tributyltin at 10.0 yr
Tributyltin at 25.0 yr
Tributyltin at 50.0 yr
Tributyltin at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.1
0.2
0.3
0.4
Concentration (µg/L)

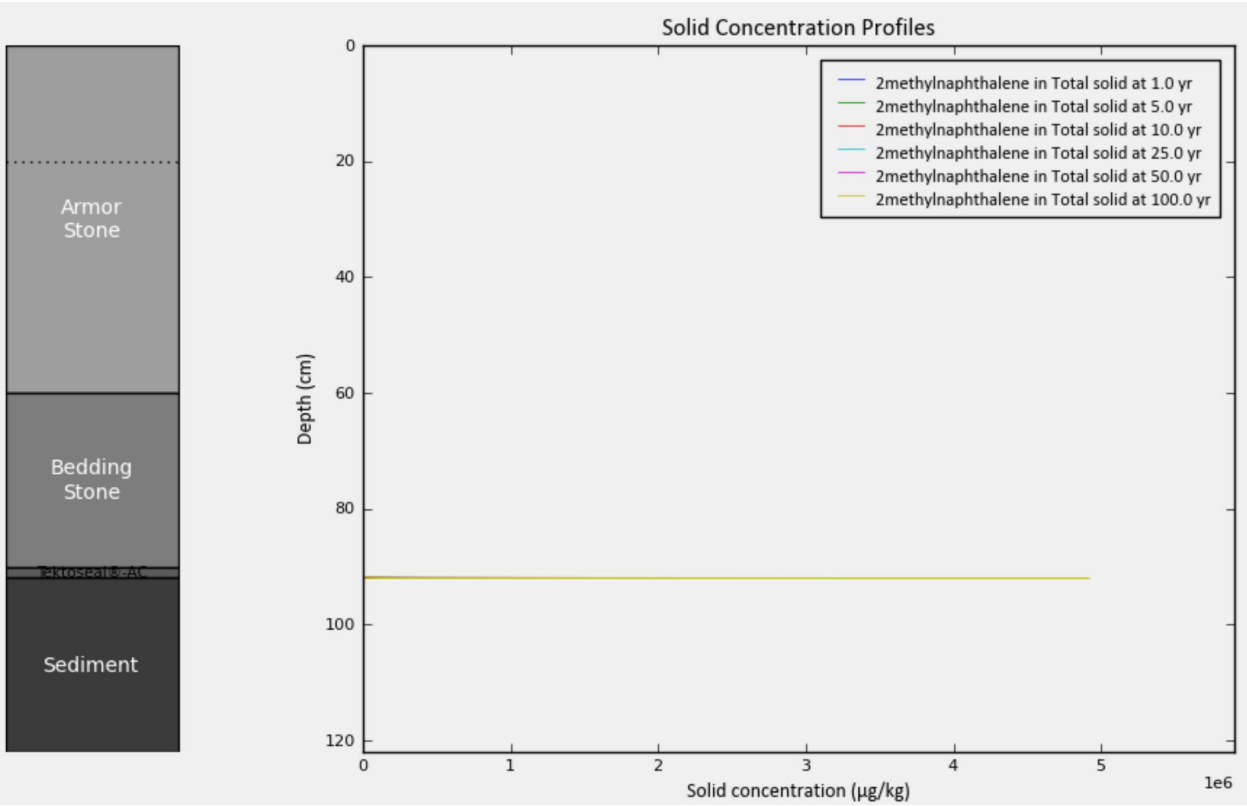

Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® AC
Sediment
Vanadium at 1.0 yr
Vanadium at 5.0 yr
Vanadium at 10.0 yr
Vanadium at 25.0 yr
Vanadium at 50.0 yr
Vanadium at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120

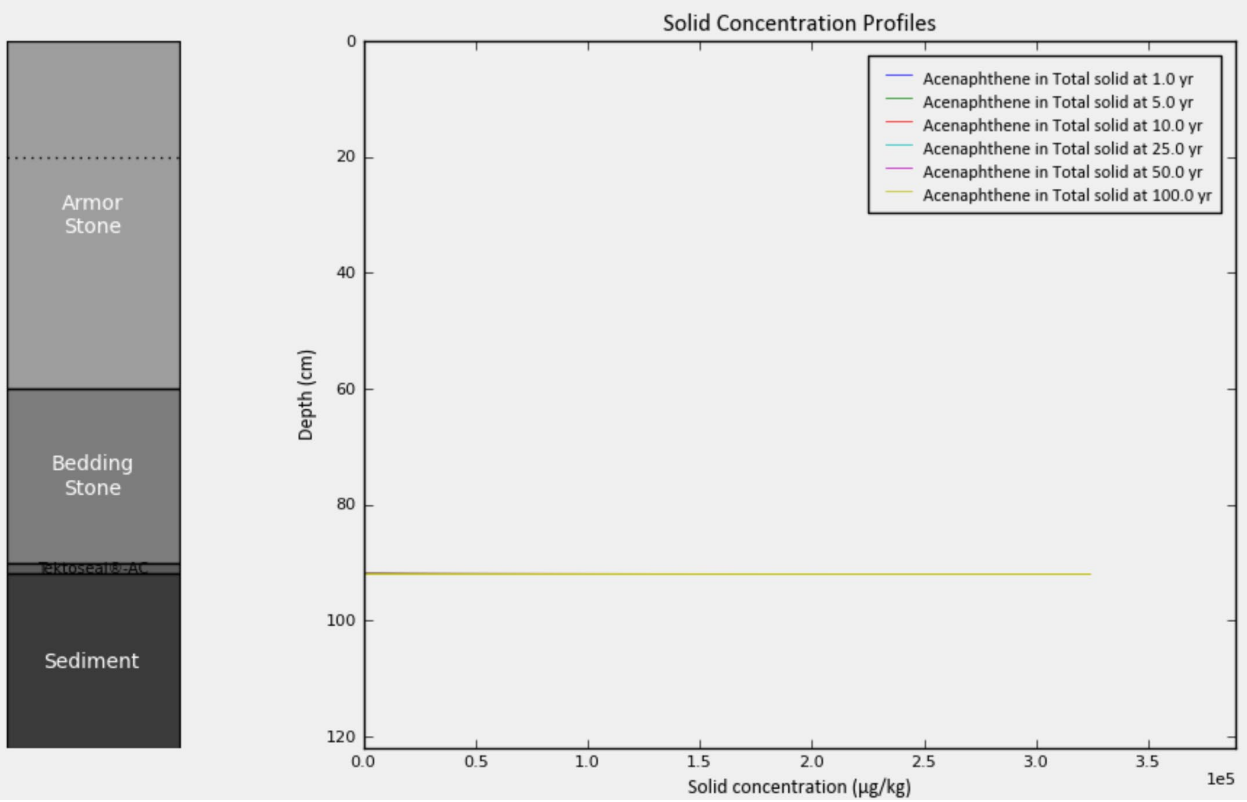

Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® AC
Sediment
Xylenes at 1.0 yr
Xylenes at 5.0 yr
Xylenes at 10.0 yr
Xylenes at 25.0 yr
Xylenes at 50.0 yr
Xylenes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040

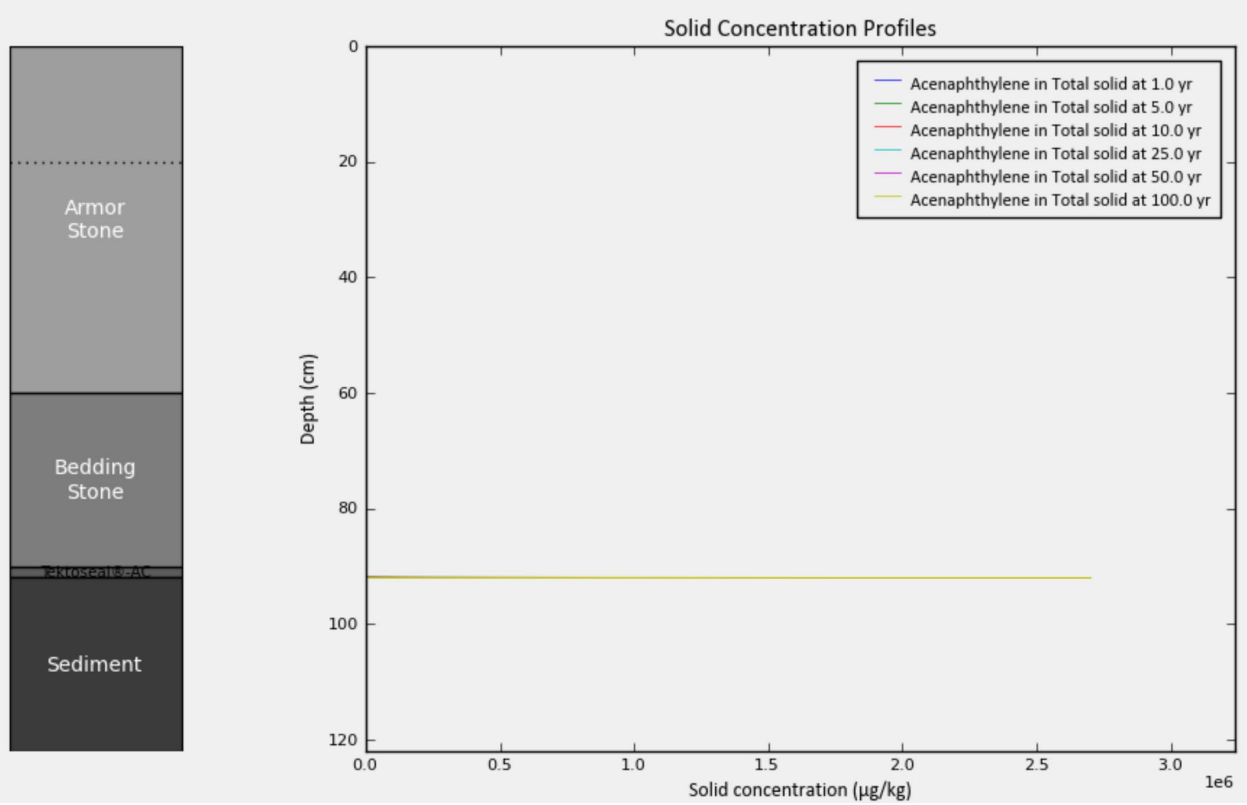

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Zinc at 1.0 yr
Zinc at 5.0 yr
Zinc at 10.0 yr
Zinc at 25.0 yr
Zinc at 50.0 yr
Zinc at 100.0 yr
0
20
40
60
80
100
120
0
2
4
6
8
10
12

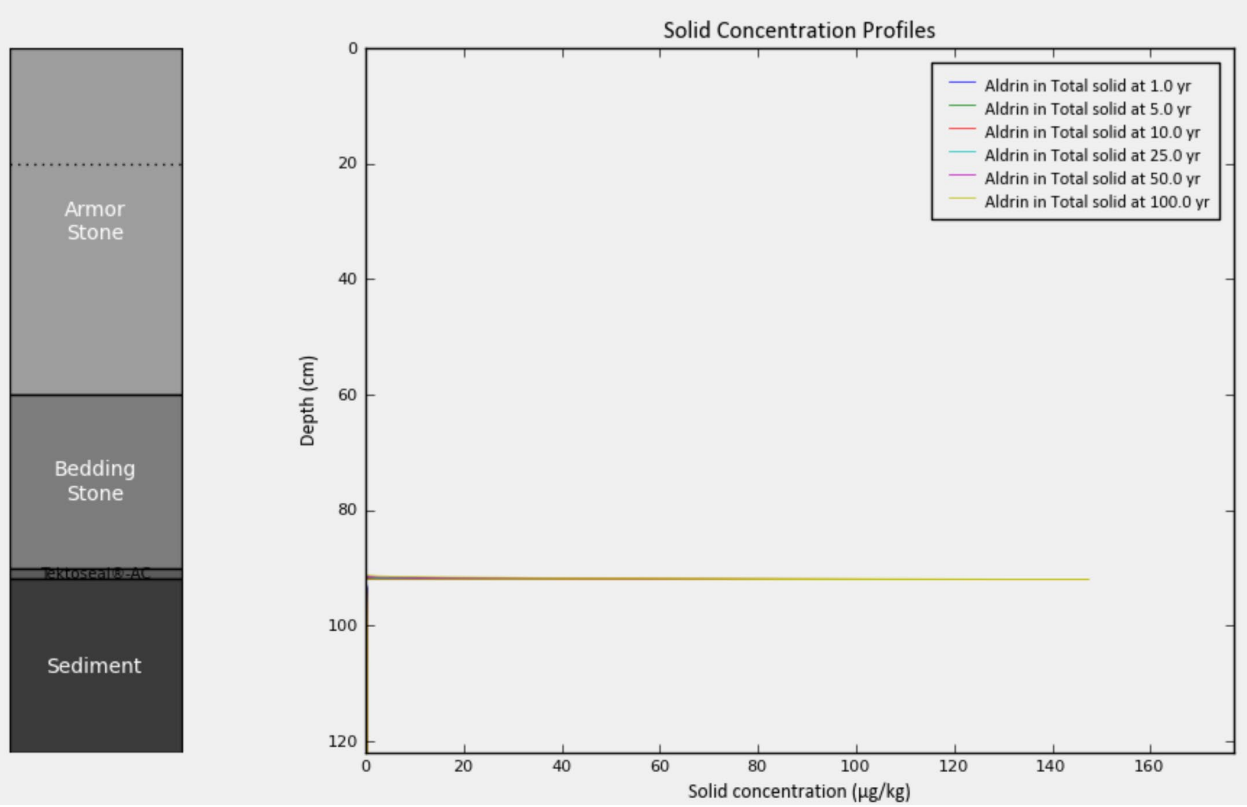
Total Solids Concentration – Depth

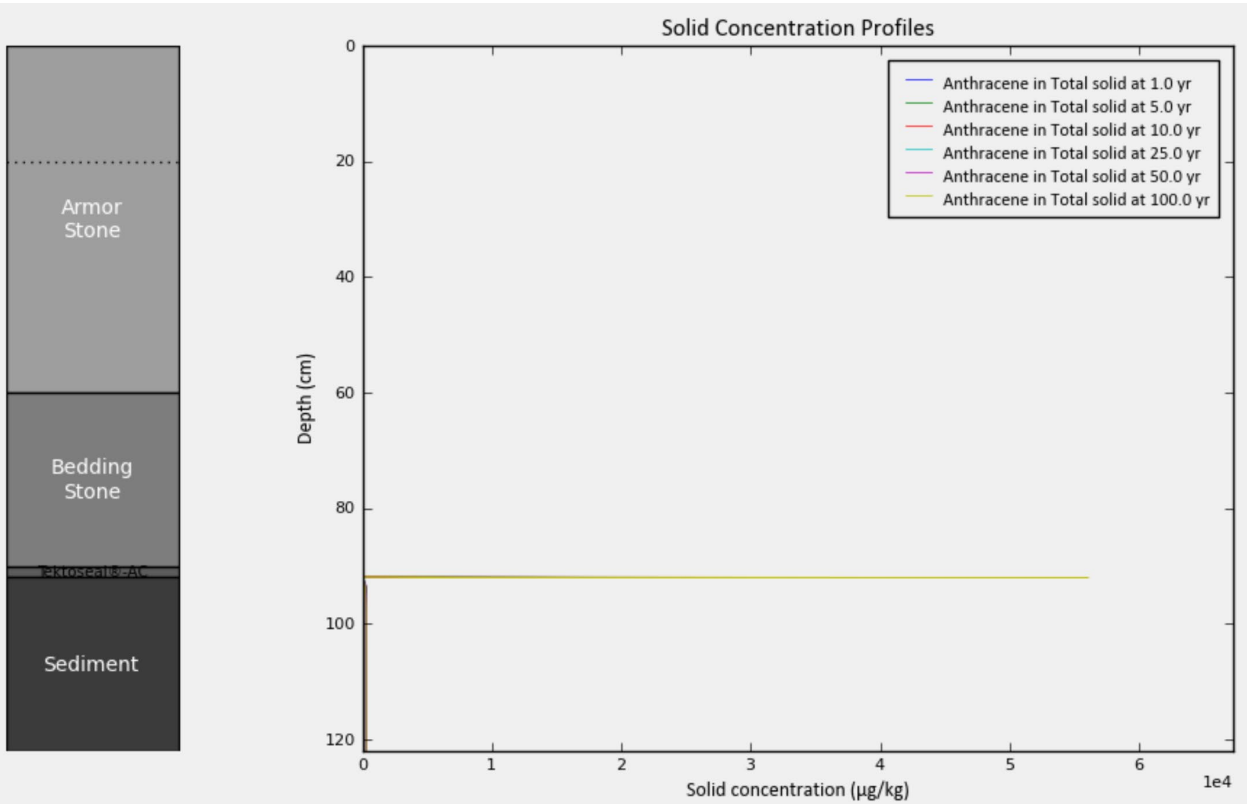


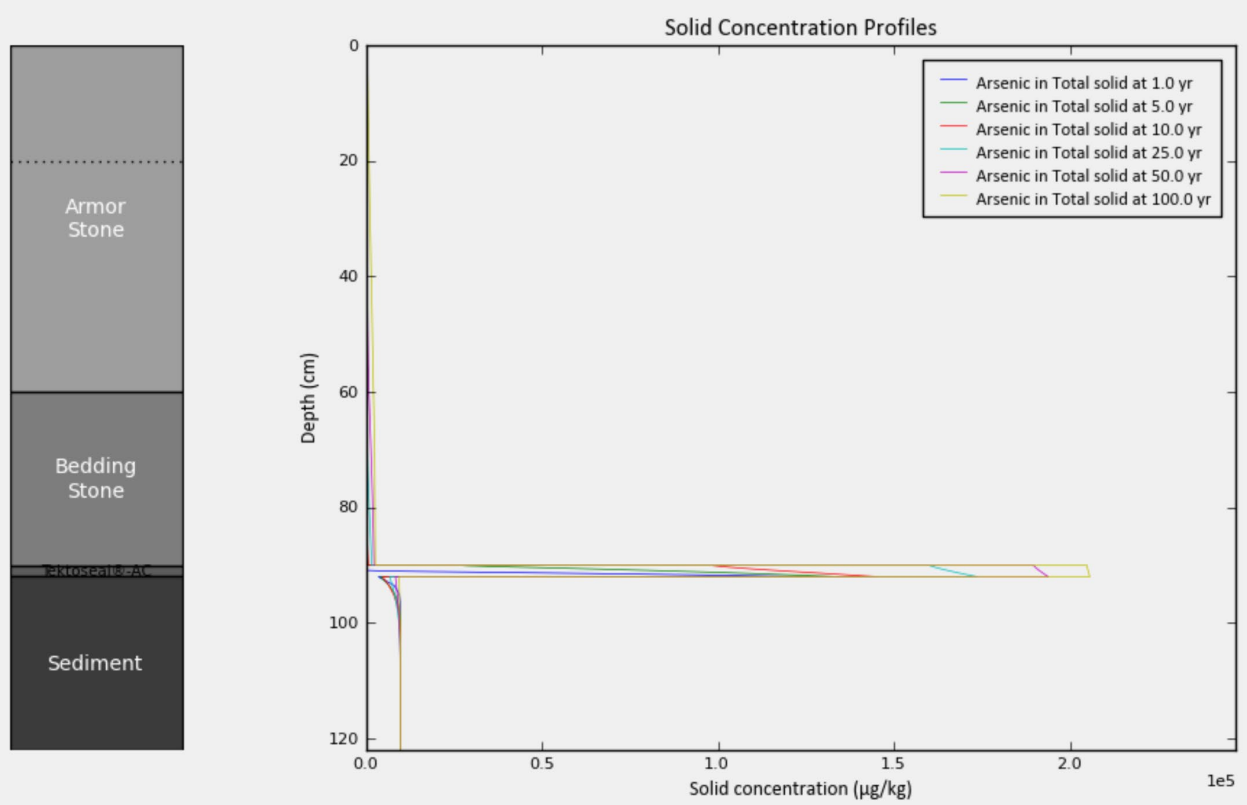


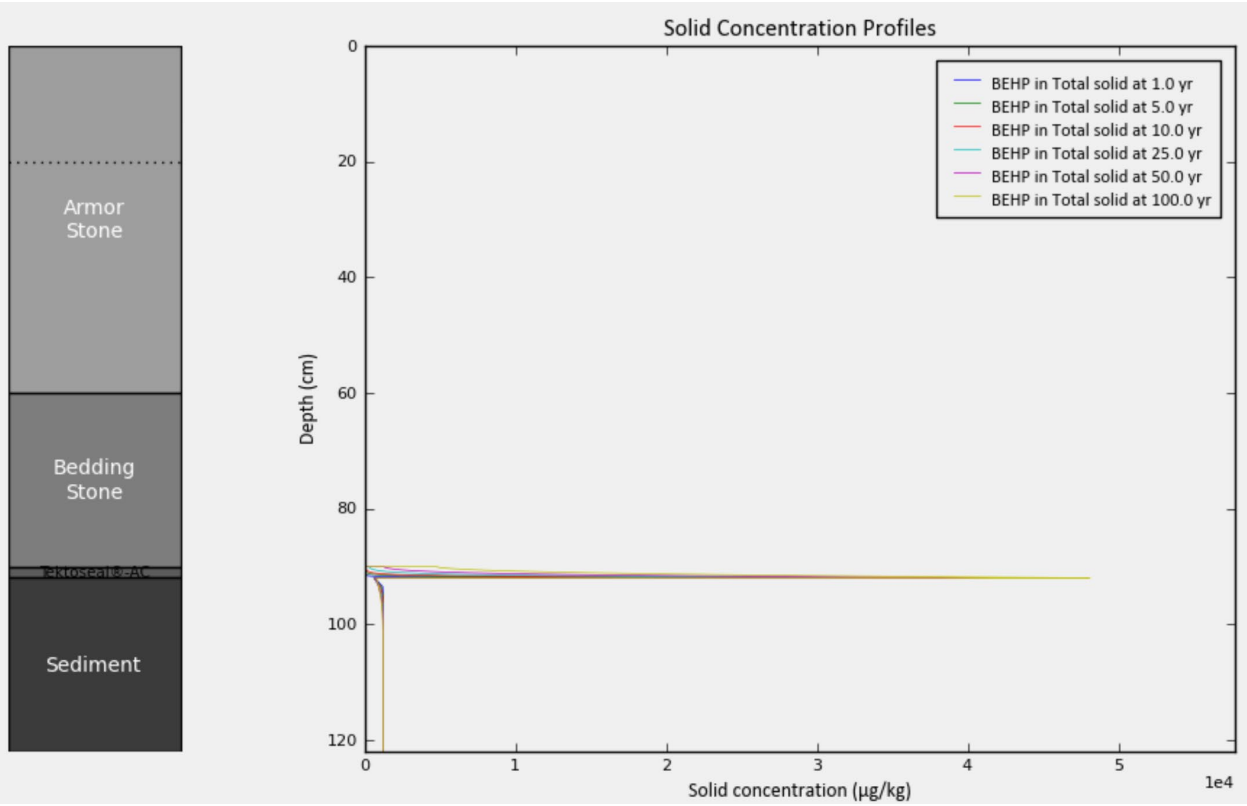

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Acenaphthene in Total solid at 1.0 yr
Acenaphthene in Total solid at 5.0 yr
Acenaphthene in Total solid at 10.0 yr
Acenaphthene in Total solid at 25.0 yr
Acenaphthene in Total solid at 50.0 yr
Acenaphthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

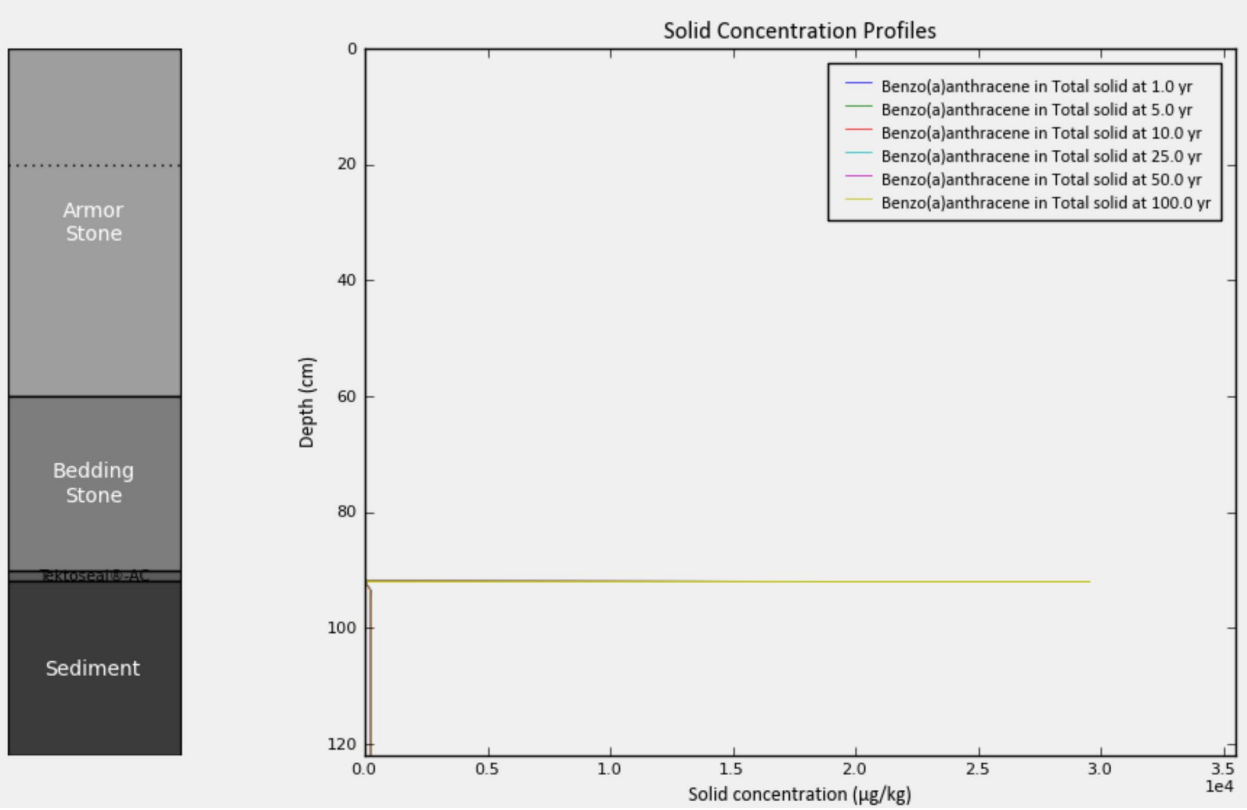

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Acenaphthylene in Total solid at 1.0 yr
Acenaphthylene in Total solid at 5.0 yr
Acenaphthylene in Total solid at 10.0 yr
Acenaphthylene in Total solid at 25.0 yr
Acenaphthylene in Total solid at 50.0 yr
Acenaphthylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

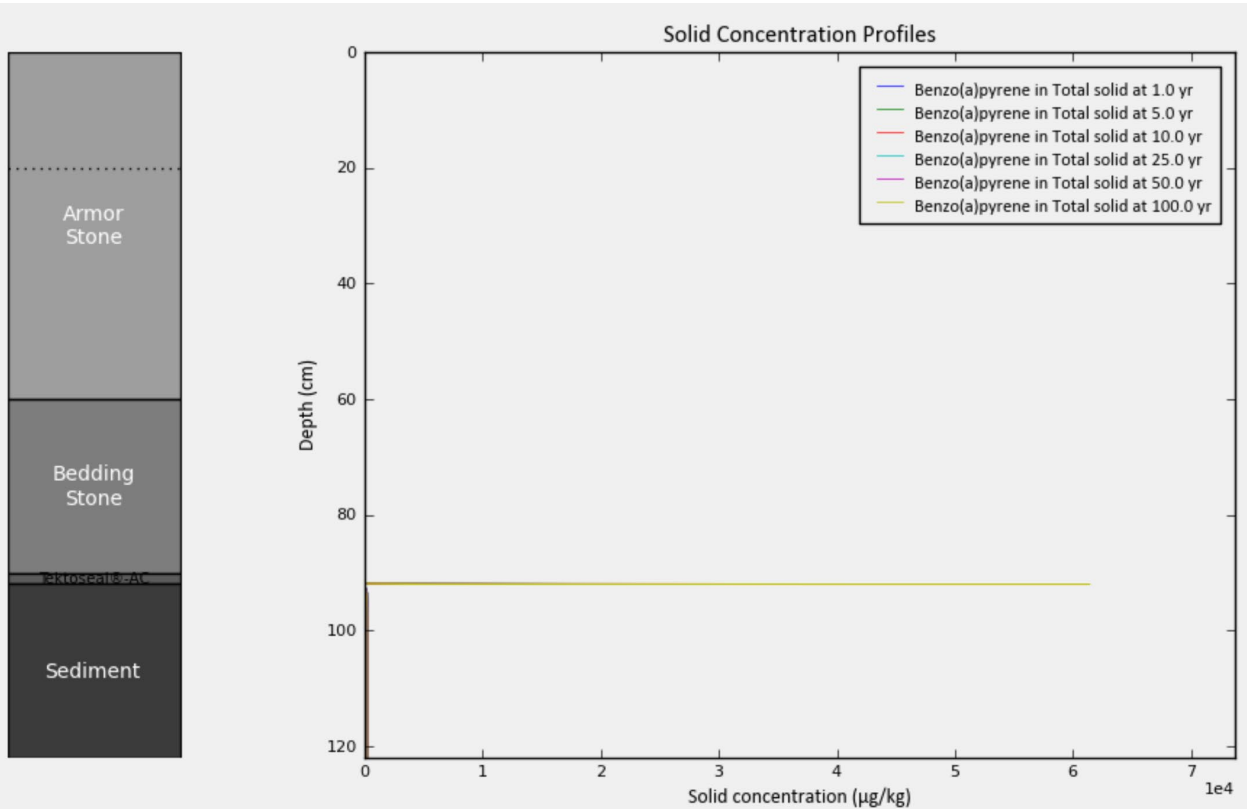

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Aldrin in Total solid at 1.0 yr
Aldrin in Total solid at 5.0 yr
Aldrin in Total solid at 10.0 yr
Aldrin in Total solid at 25.0 yr
Aldrin in Total solid at 50.0 yr
Aldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

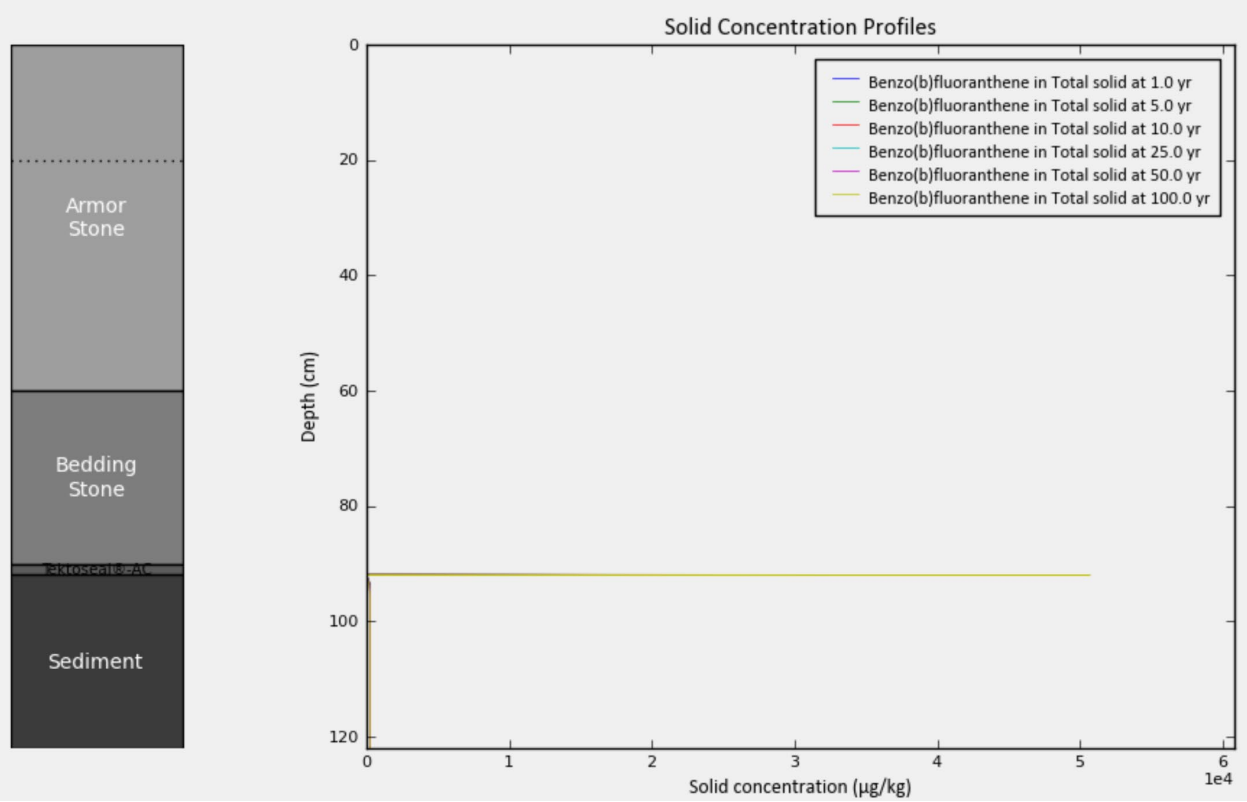

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Anthracene in Total solid at 1.0 yr
Anthracene in Total solid at 5.0 yr
Anthracene in Total solid at 10.0 yr
Anthracene in Total solid at 25.0 yr
Anthracene in Total solid at 50.0 yr
Anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

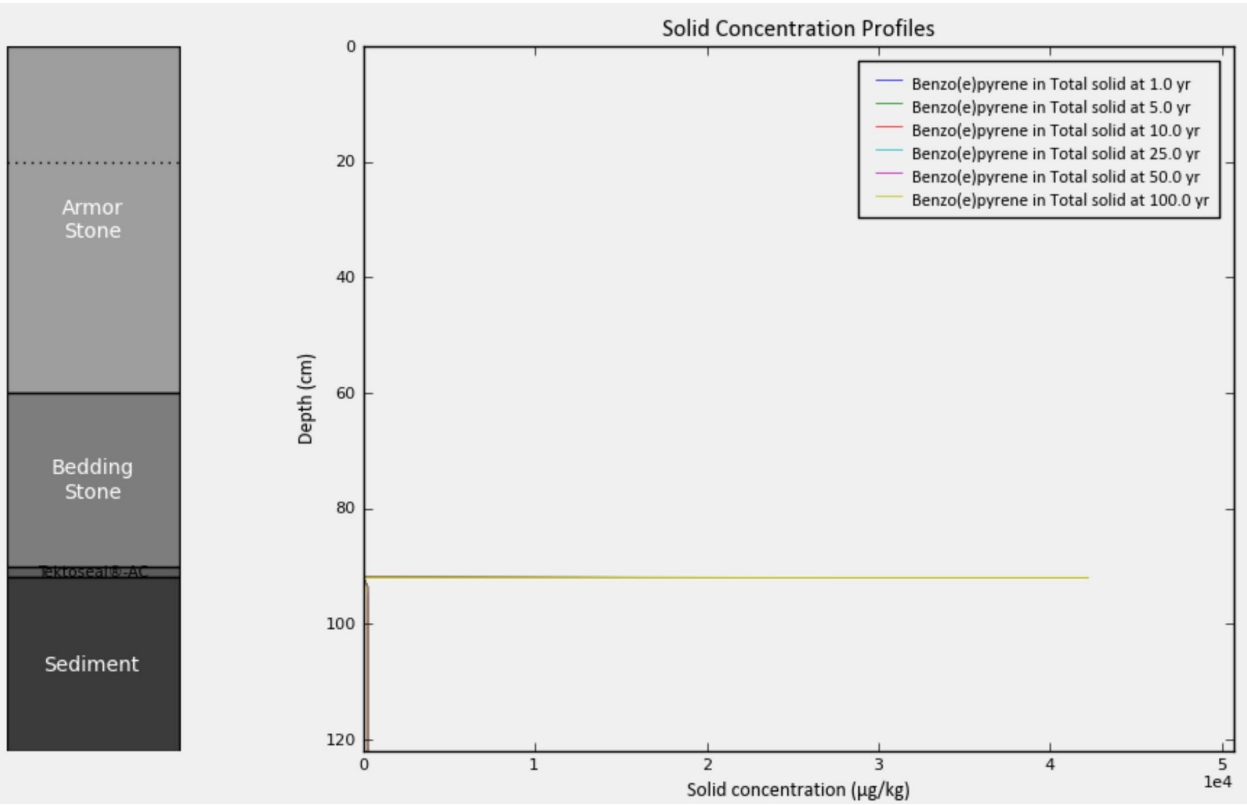

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Arsenic in Total solid at 1.0 yr
Arsenic in Total solid at 5.0 yr
Arsenic in Total solid at 10.0 yr
Arsenic in Total solid at 25.0 yr
Arsenic in Total solid at 50.0 yr
Arsenic in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

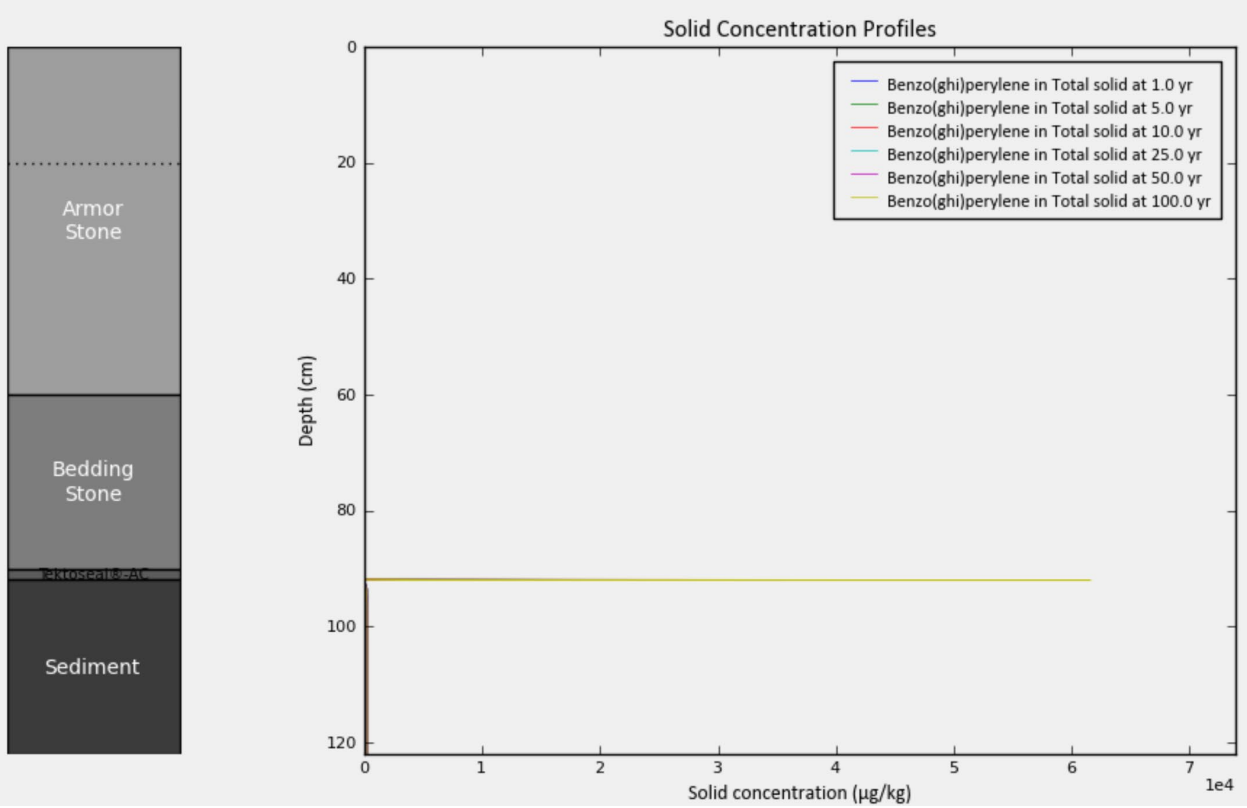

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
BEHP in Total solid at 1.0 yr
BEHP in Total solid at 5.0 yr
BEHP in Total solid at 10.0 yr
BEHP in Total solid at 25.0 yr
BEHP in Total solid at 50.0 yr
BEHP in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

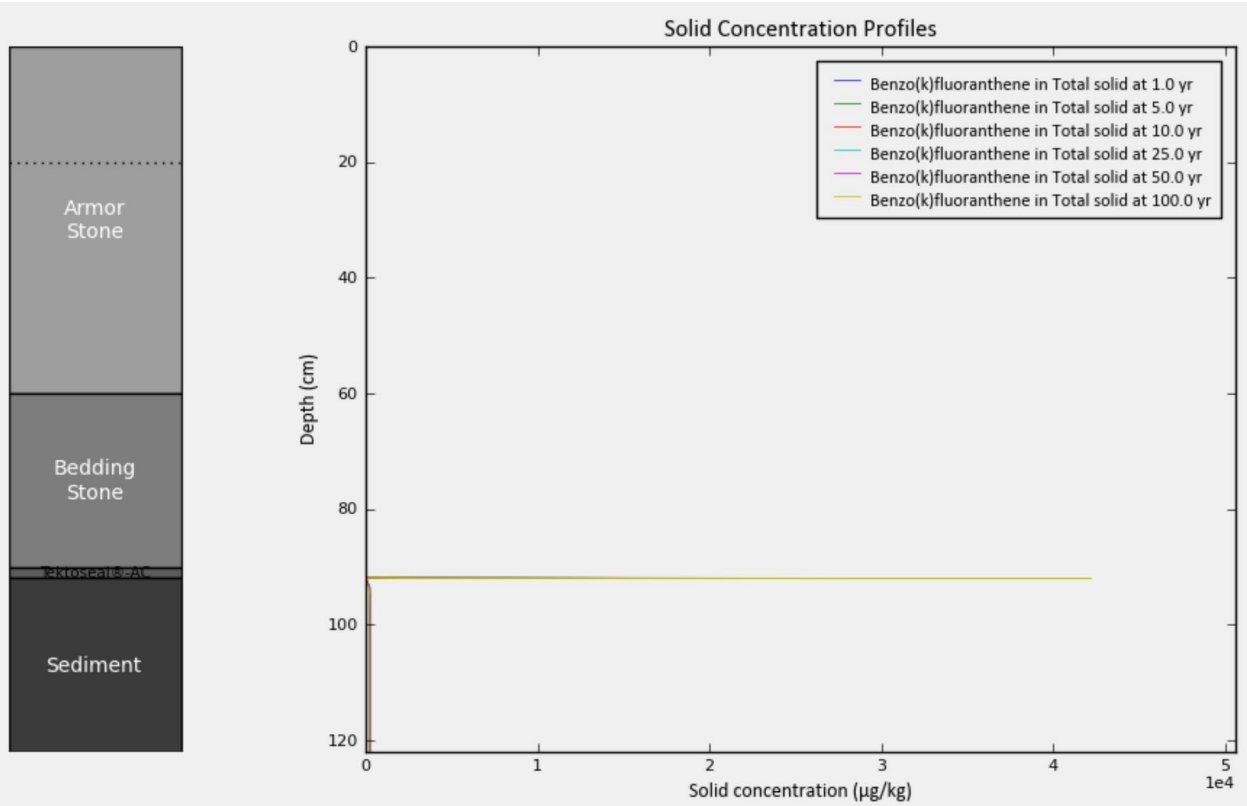

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(a)anthracene in Total solid at 1.0 yr
Benzo(a)anthracene in Total solid at 5.0 yr
Benzo(a)anthracene in Total solid at 10.0 yr
Benzo(a)anthracene in Total solid at 25.0 yr
Benzo(a)anthracene in Total solid at 50.0 yr
Benzo(a)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

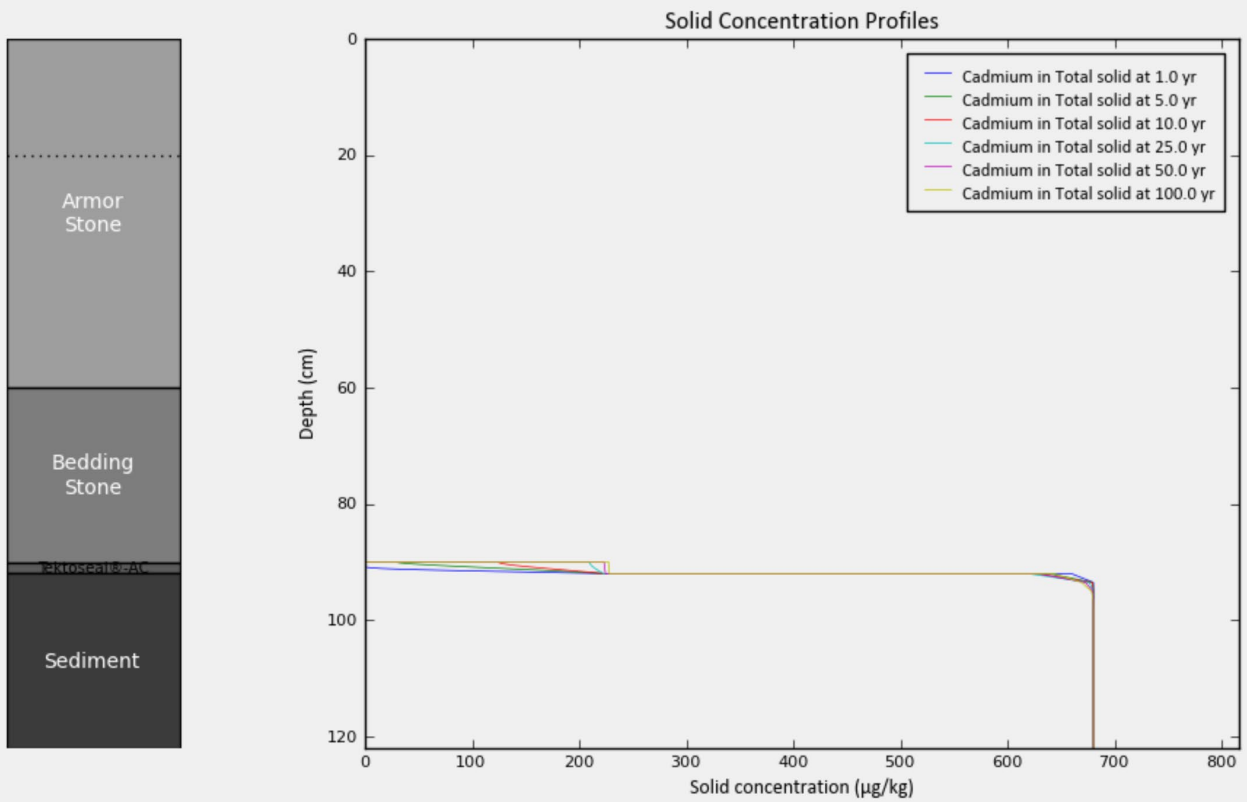

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(a)pyrene in Total solid at 1.0 yr
Benzo(a)pyrene in Total solid at 5.0 yr
Benzo(a)pyrene in Total solid at 10.0 yr
Benzo(a)pyrene in Total solid at 25.0 yr
Benzo(a)pyrene in Total solid at 50.0 yr
Benzo(a)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

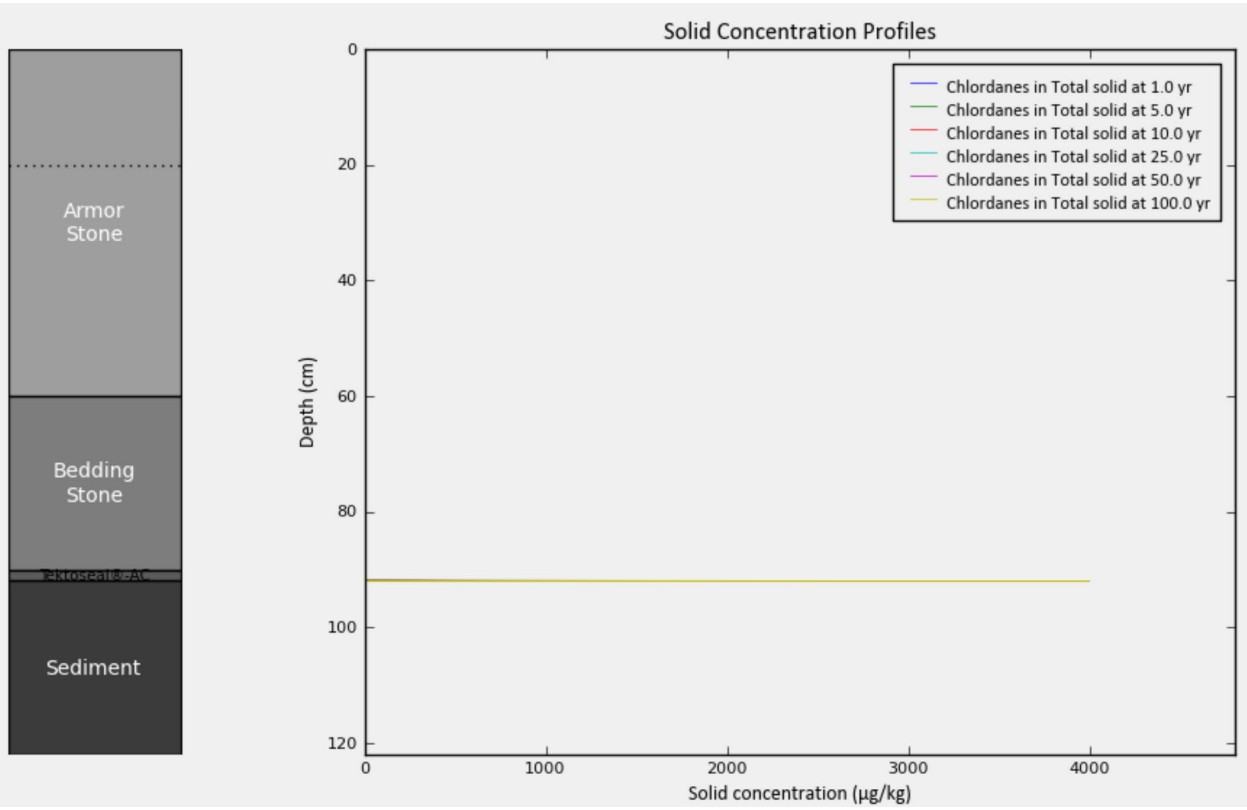

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(b)fluoranthene in Total solid at 1.0 yr
Benzo(b)fluoranthene in Total solid at 5.0 yr
Benzo(b)fluoranthene in Total solid at 10.0 yr
Benzo(b)fluoranthene in Total solid at 25.0 yr
Benzo(b)fluoranthene in Total solid at 50.0 yr
Benzo(b)fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

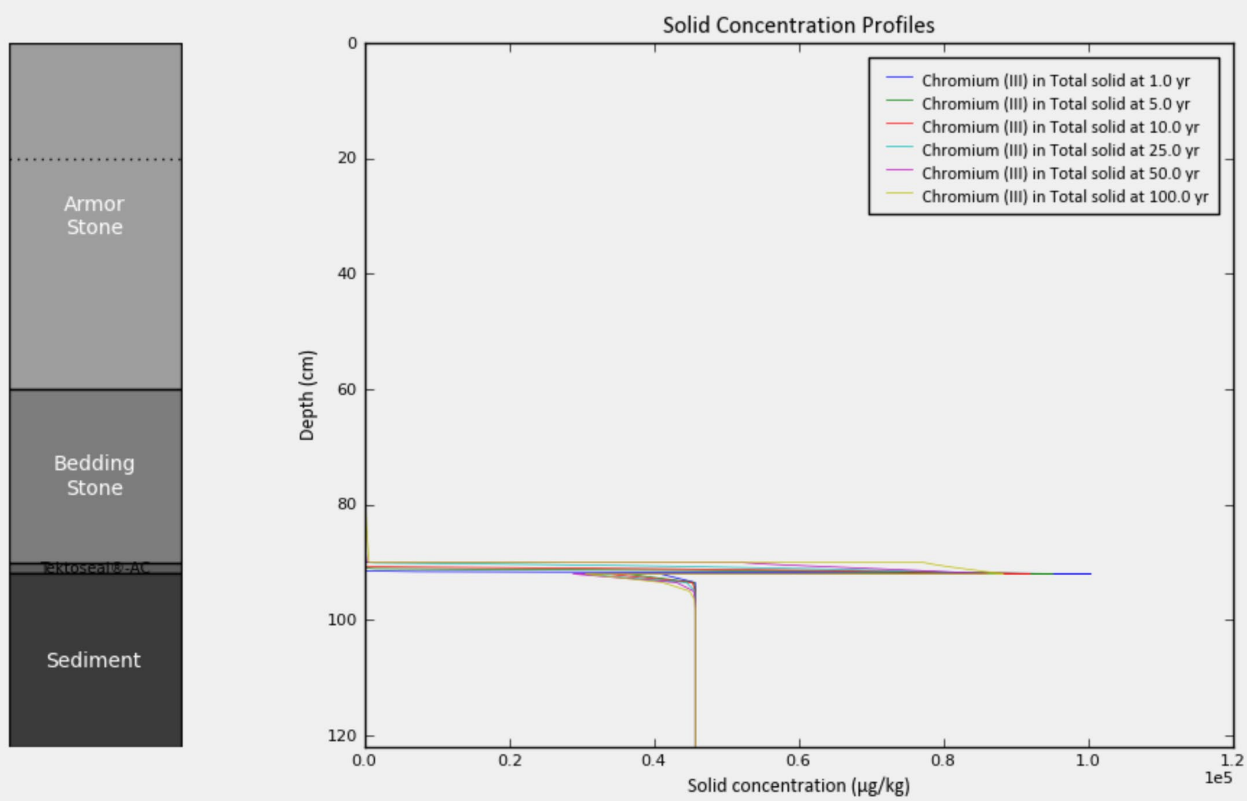

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(e)pyrene in Total solid at 1.0 yr
Benzo(e)pyrene in Total solid at 5.0 yr
Benzo(e)pyrene in Total solid at 10.0 yr
Benzo(e)pyrene in Total solid at 25.0 yr
Benzo(e)pyrene in Total solid at 50.0 yr
Benzo(e)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

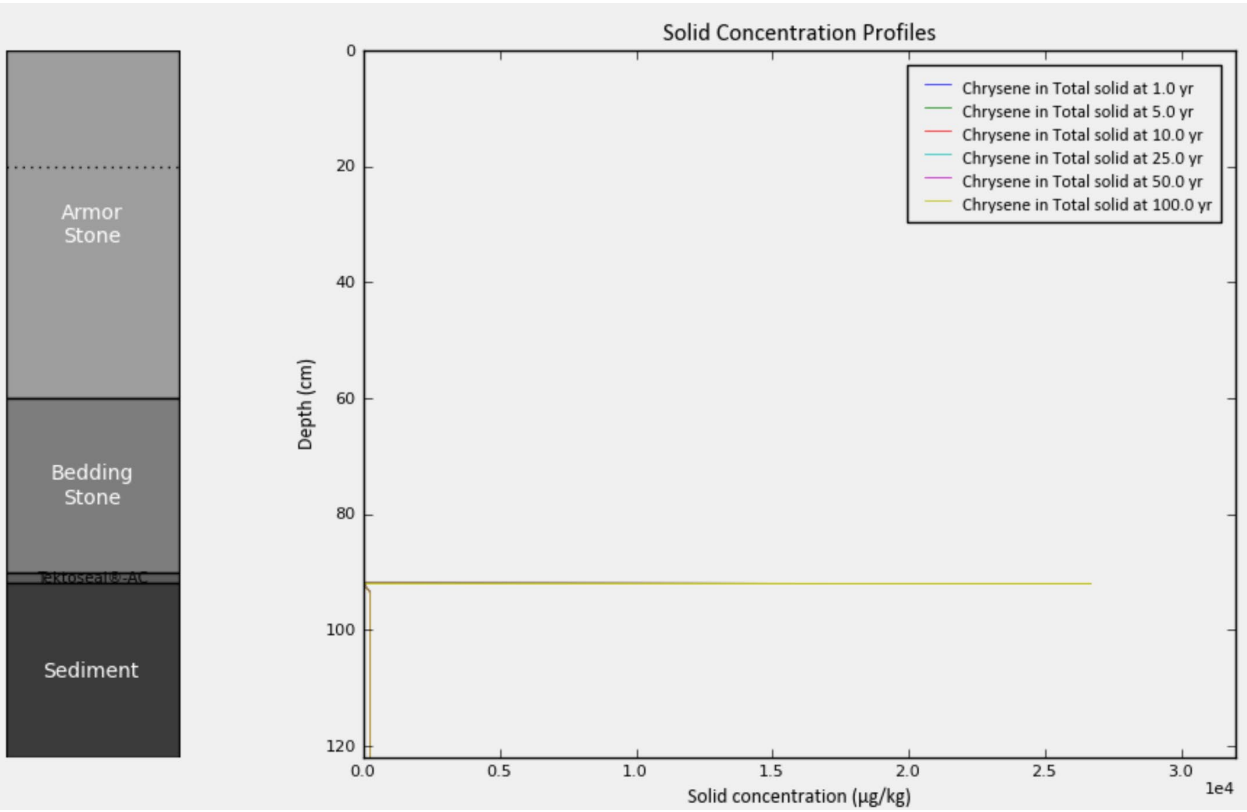

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(ghi)perylene in Total solid at 1.0 yr
Benzo(ghi)perylene in Total solid at 5.0 yr
Benzo(ghi)perylene in Total solid at 10.0 yr
Benzo(ghi)perylene in Total solid at 25.0 yr
Benzo(ghi)perylene in Total solid at 50.0 yr
Benzo(ghi)perylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

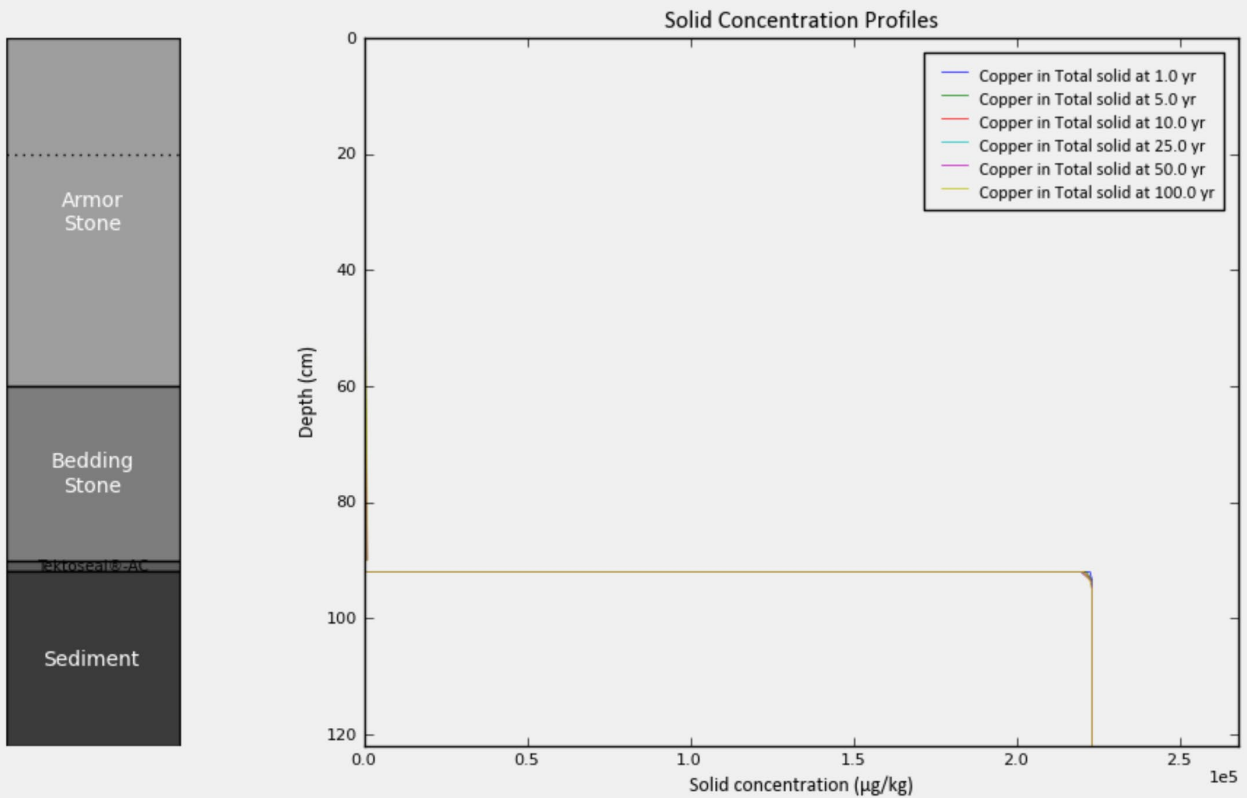

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(k)fluoranthene in Total solid at 1.0 yr
Benzo(k)fluoranthene in Total solid at 5.0 yr
Benzo(k)fluoranthene in Total solid at 10.0 yr
Benzo(k)fluoranthene in Total solid at 25.0 yr
Benzo(k)fluoranthene in Total solid at 50.0 yr
Benzo(k)fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

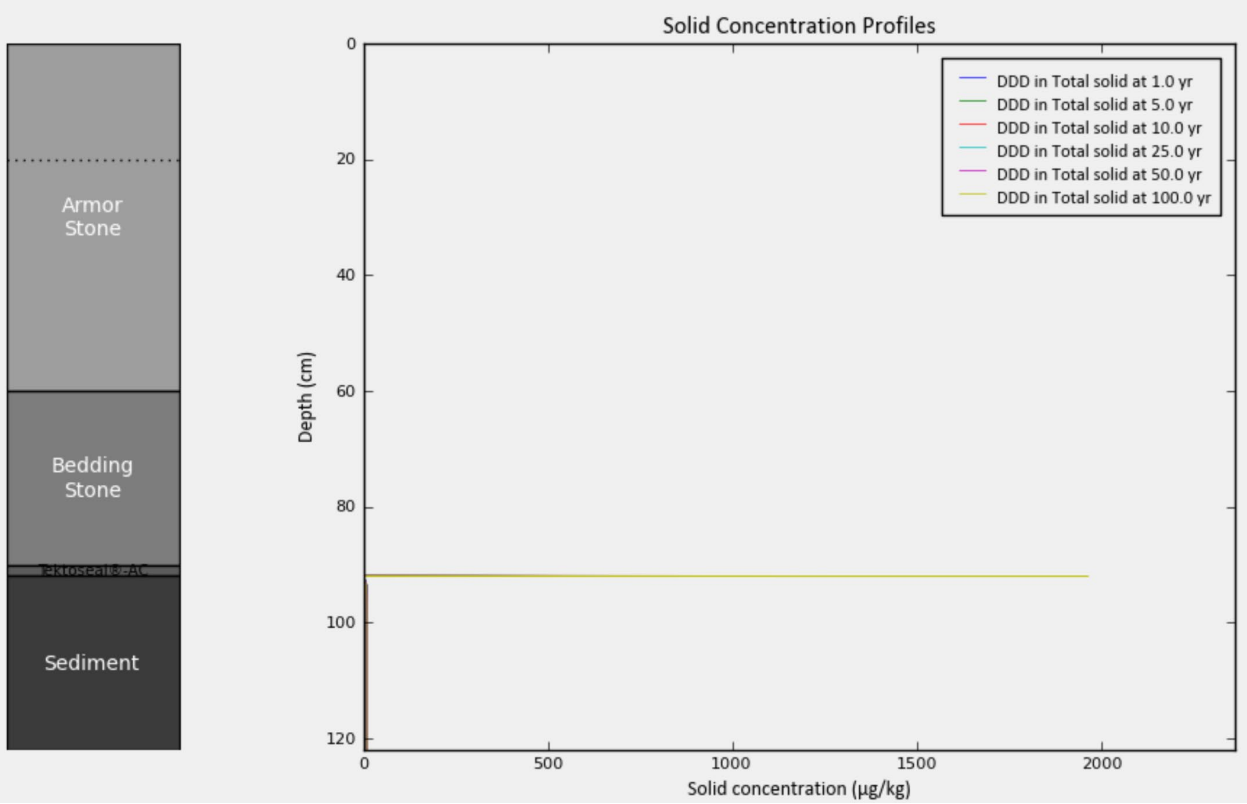

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Cadmium in Total solid at 1.0 yr
Cadmium in Total solid at 5.0 yr
Cadmium in Total solid at 10.0 yr
Cadmium in Total solid at 25.0 yr
Cadmium in Total solid at 50.0 yr
Cadmium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

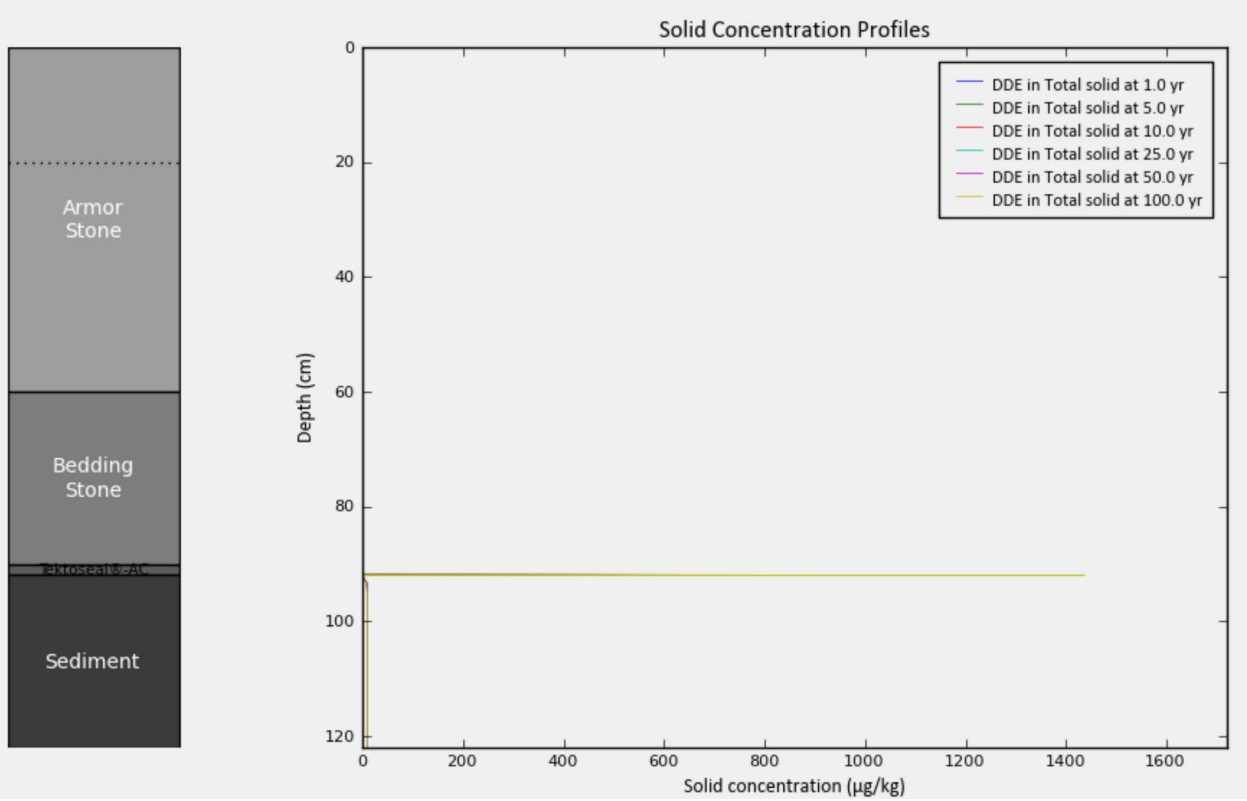

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Chlordanes in Total solid at 1.0 yr
Chlordanes in Total solid at 5.0 yr
Chlordanes in Total solid at 10.0 yr
Chlordanes in Total solid at 25.0 yr
Chlordanes in Total solid at 50.0 yr
Chlordanes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

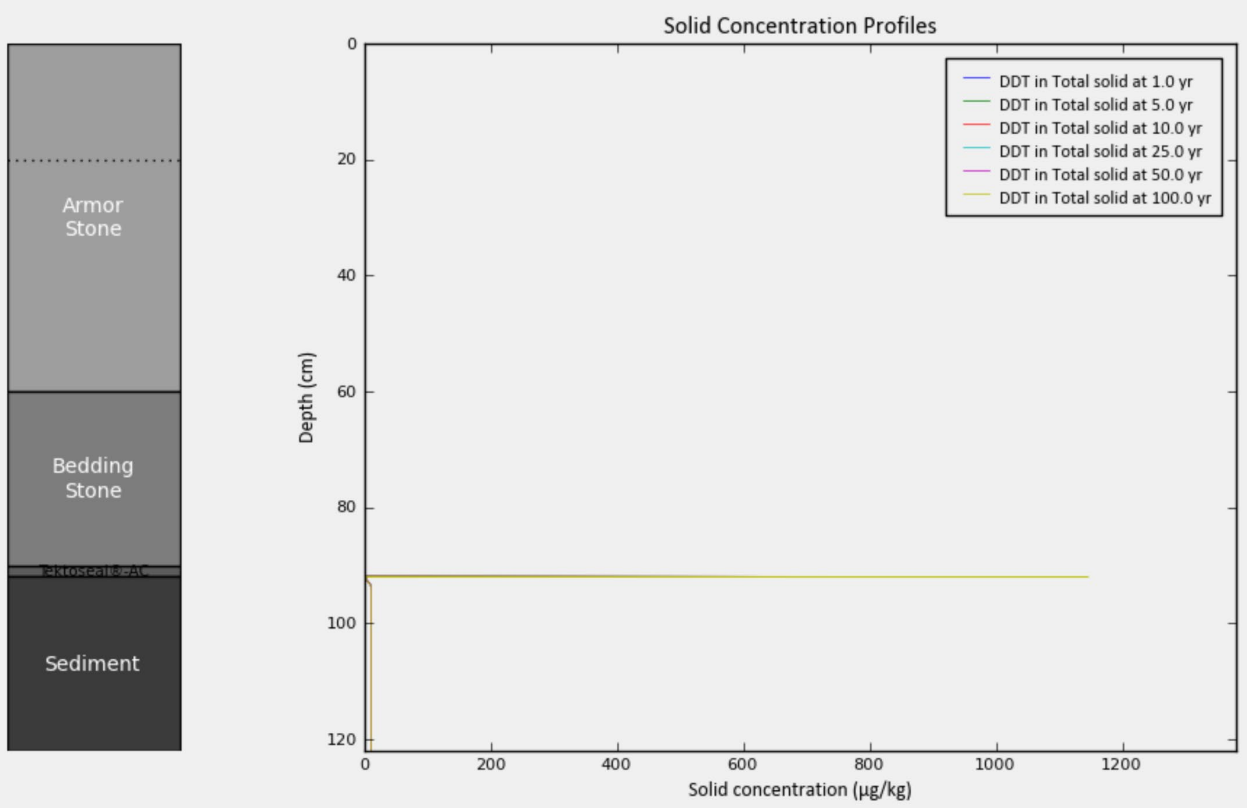

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Chromium (III) in Total solid at 1.0 yr
Chromium (III) in Total solid at 5.0 yr
Chromium (III) in Total solid at 10.0 yr
Chromium (III) in Total solid at 25.0 yr
Chromium (III) in Total solid at 50.0 yr
Chromium (III) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

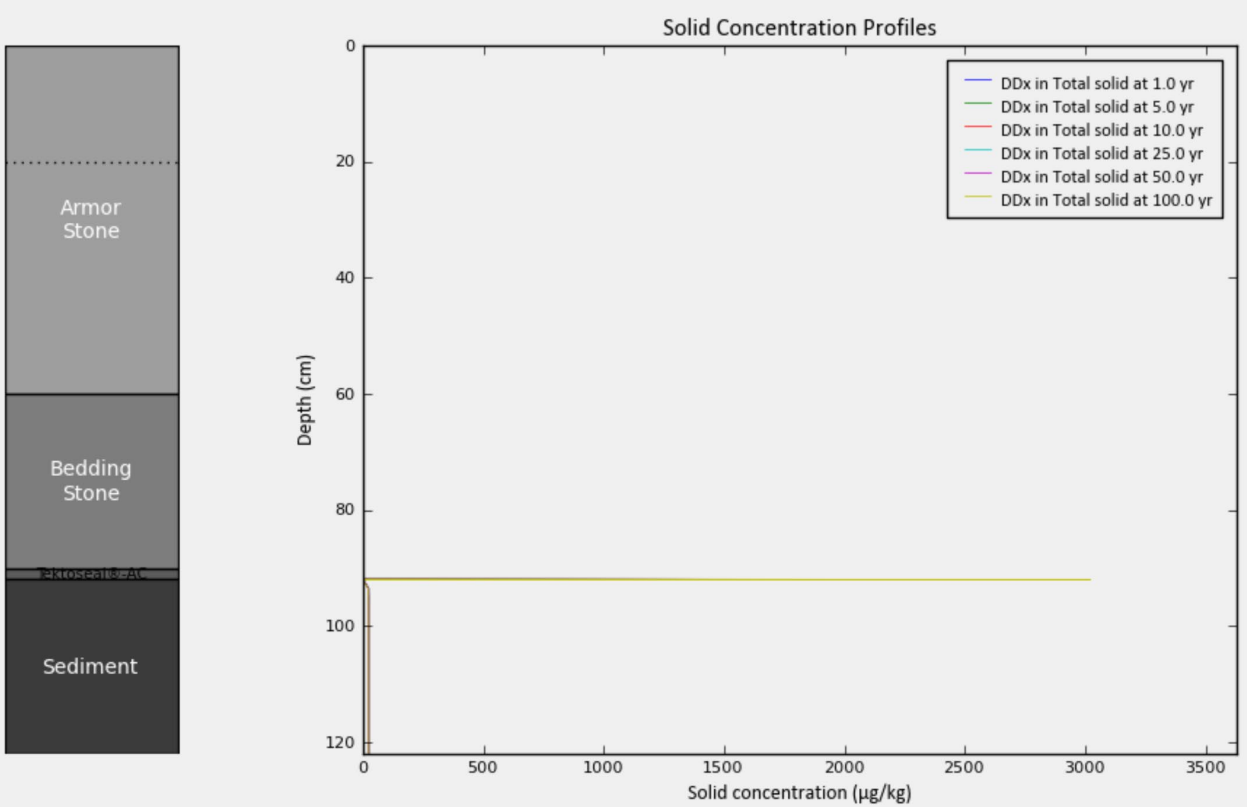

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Chrysene in Total solid at 1.0 yr
Chrysene in Total solid at 5.0 yr
Chrysene in Total solid at 10.0 yr
Chrysene in Total solid at 25.0 yr
Chrysene in Total solid at 50.0 yr
Chrysene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

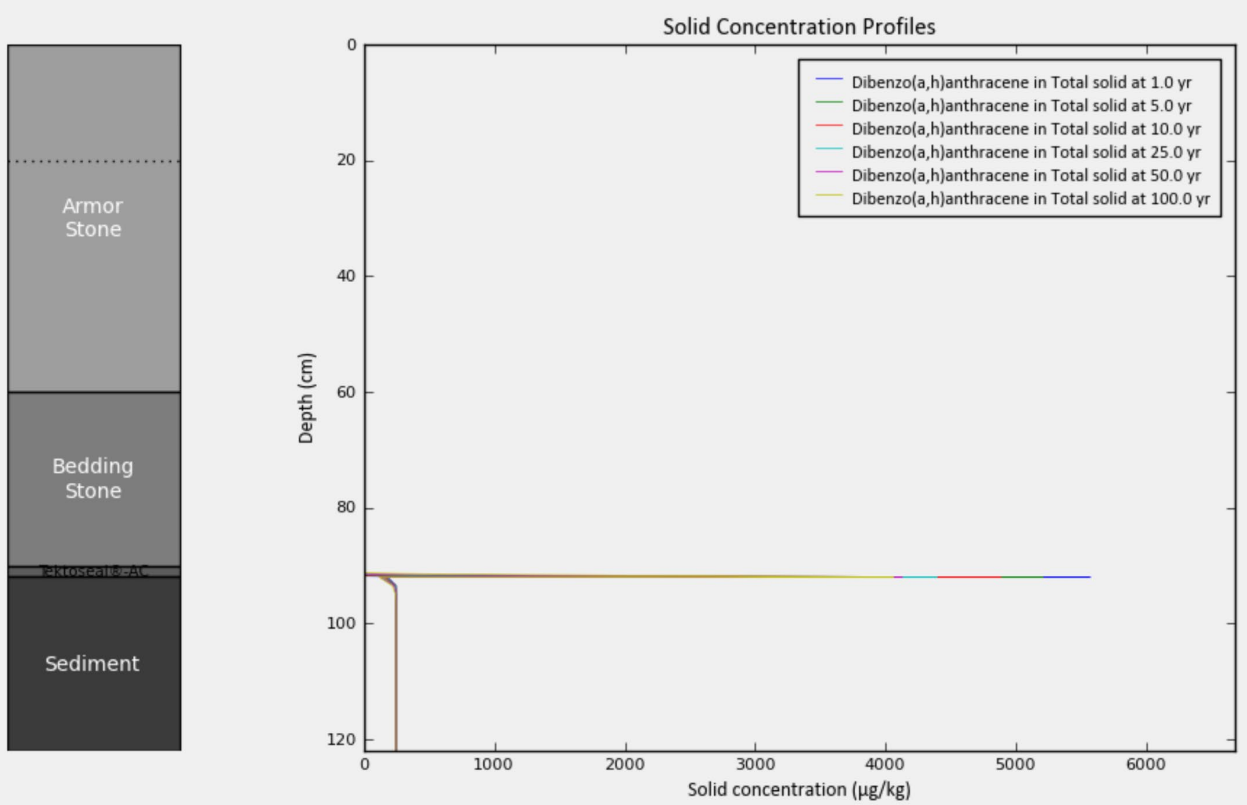

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Copper in Total solid at 1.0 yr
Copper in Total solid at 5.0 yr
Copper in Total solid at 10.0 yr
Copper in Total solid at 25.0 yr
Copper in Total solid at 50.0 yr
Copper in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

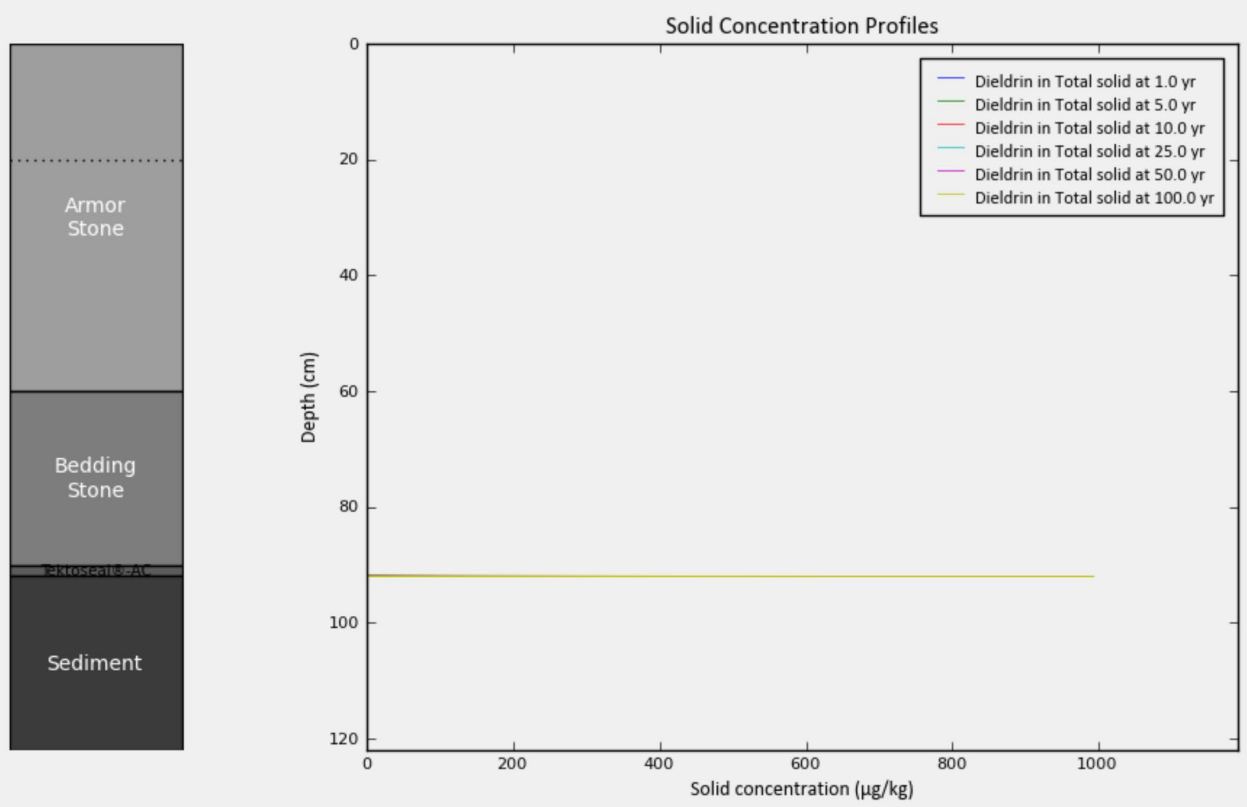

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDD in Total solid at 1.0 yr
DDD in Total solid at 5.0 yr
DDD in Total solid at 10.0 yr
DDD in Total solid at 25.0 yr
DDD in Total solid at 50.0 yr
DDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

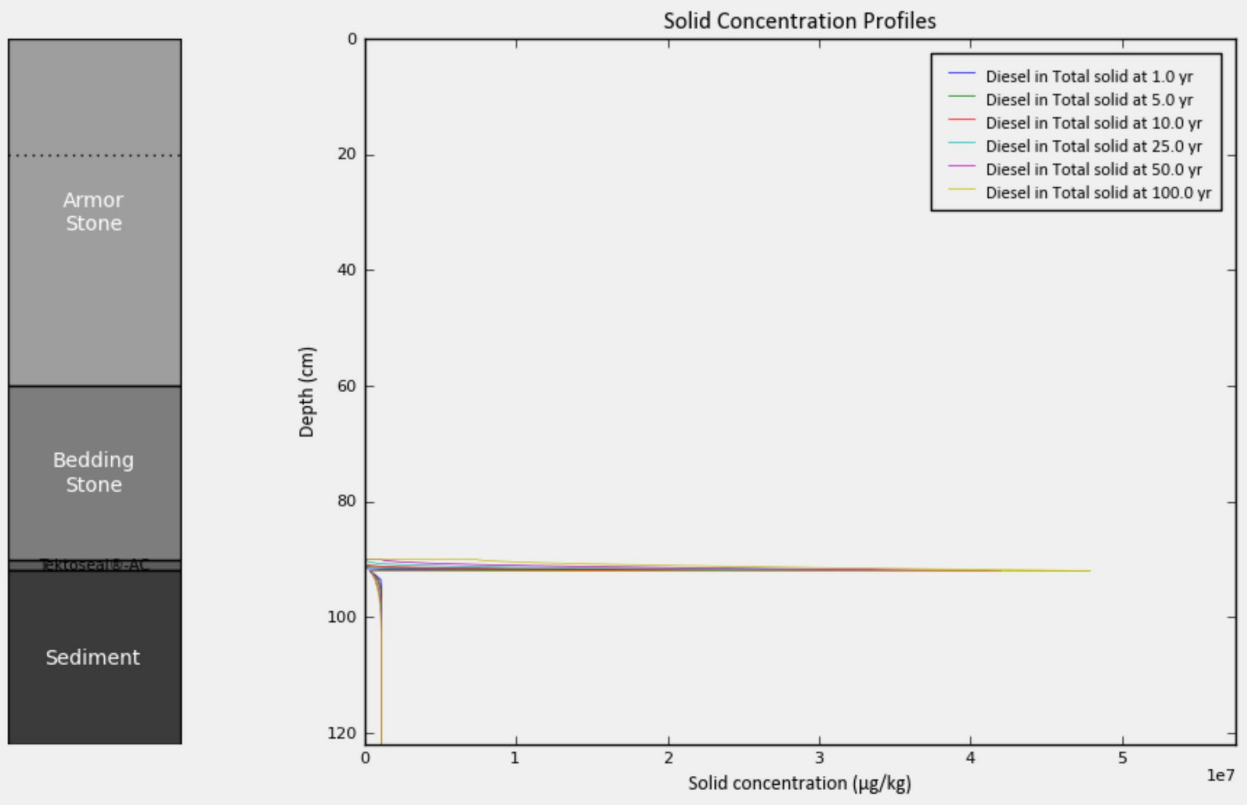

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDE in Total solid at 1.0 yr
DDE in Total solid at 5.0 yr
DDE in Total solid at 10.0 yr
DDE in Total solid at 25.0 yr
DDE in Total solid at 50.0 yr
DDE in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

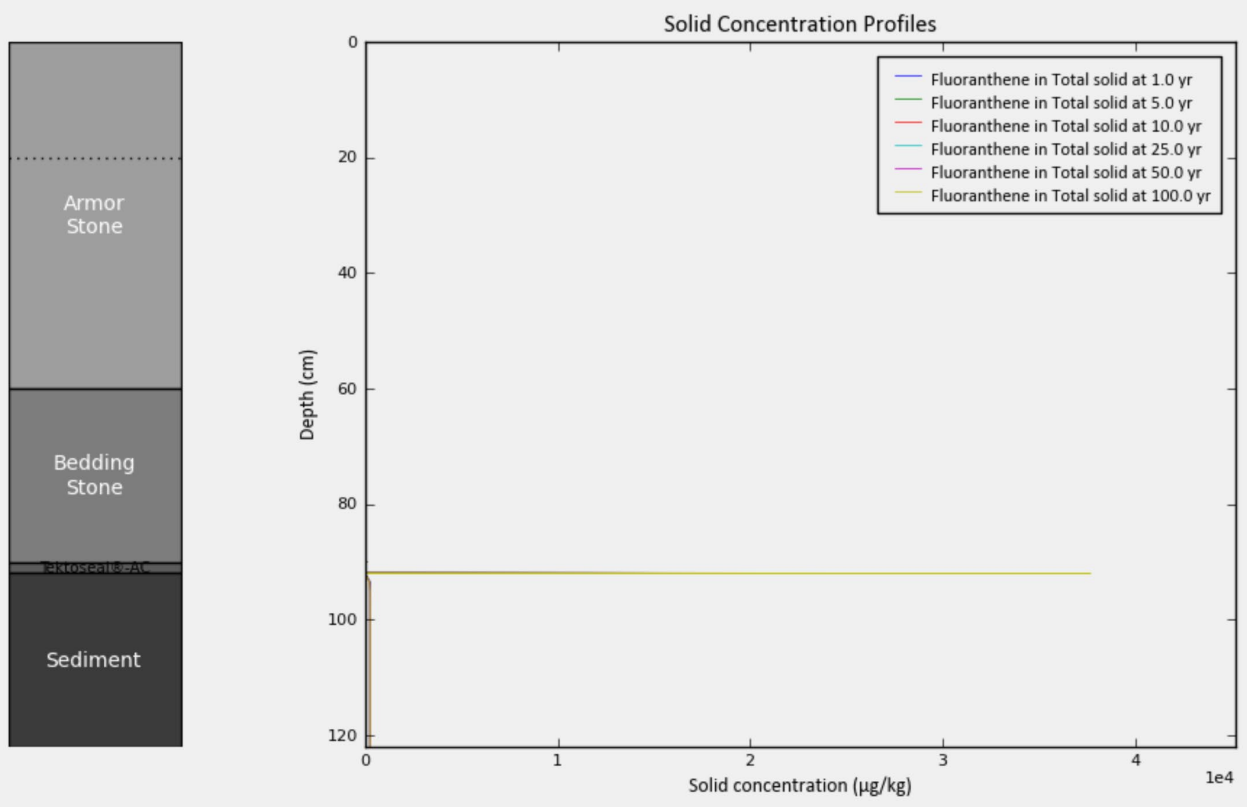

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDT in Total solid at 1.0 yr
DDT in Total solid at 5.0 yr
DDT in Total solid at 10.0 yr
DDT in Total solid at 25.0 yr
DDT in Total solid at 50.0 yr
DDT in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

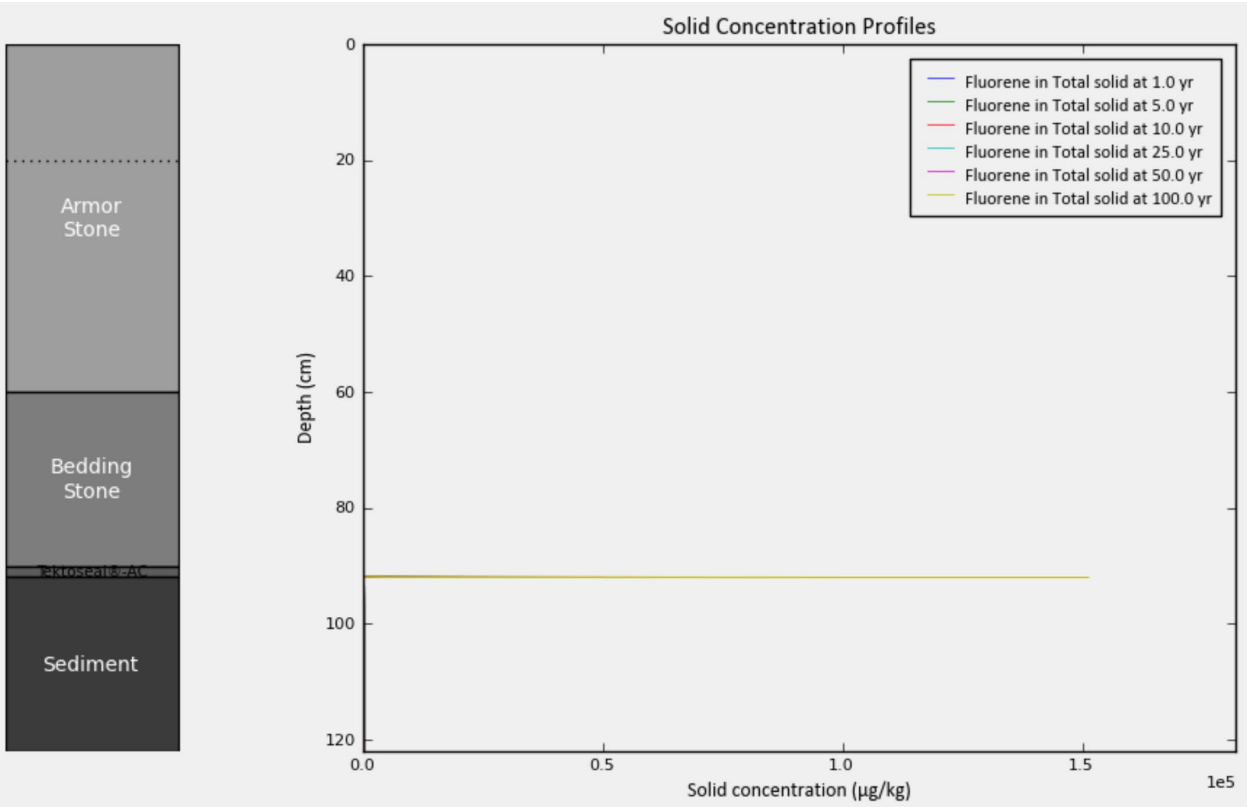

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDx in Total solid at 1.0 yr
DDx in Total solid at 5.0 yr
DDx in Total solid at 10.0 yr
DDx in Total solid at 25.0 yr
DDx in Total solid at 50.0 yr
DDx in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

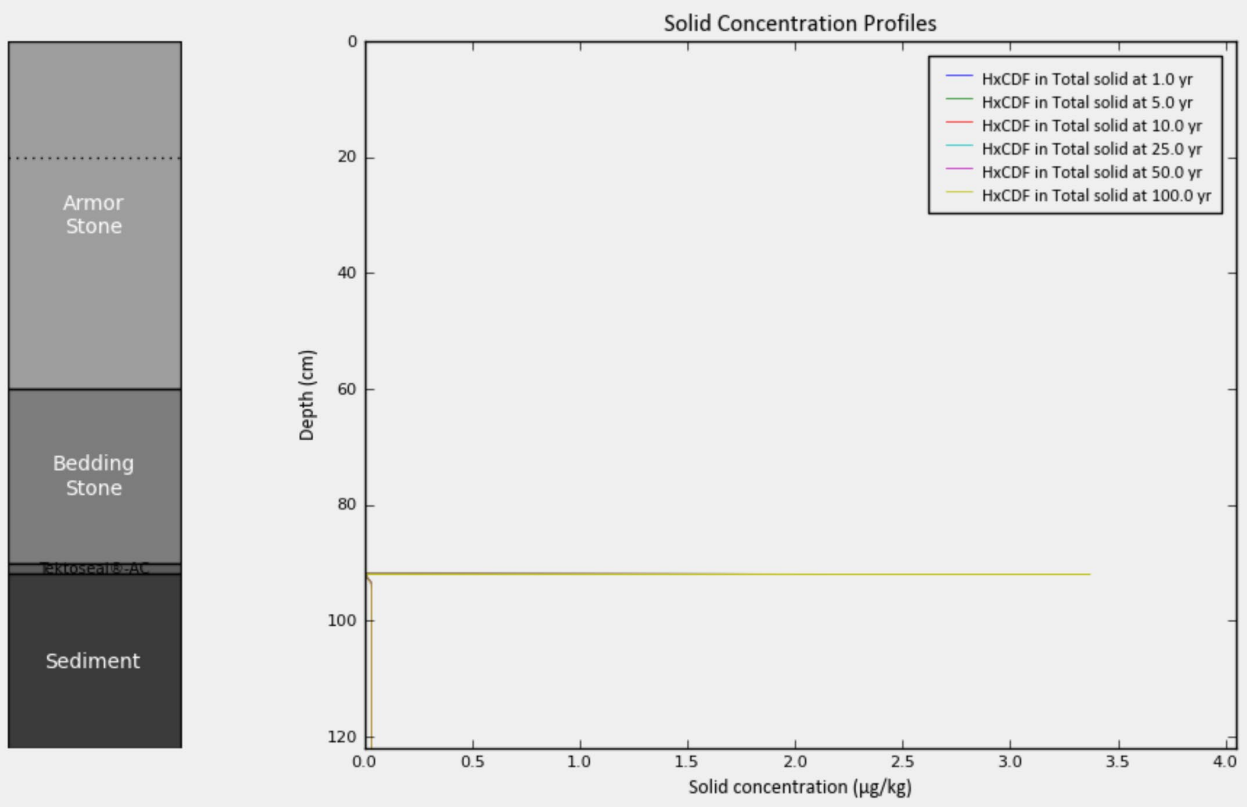

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Dibenzo(a,h)anthracene in Total solid at 1.0 yr
Dibenzo(a,h)anthracene in Total solid at 5.0 yr
Dibenzo(a,h)anthracene in Total solid at 10.0 yr
Dibenzo(a,h)anthracene in Total solid at 25.0 yr
Dibenzo(a,h)anthracene in Total solid at 50.0 yr
Dibenzo(a,h)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

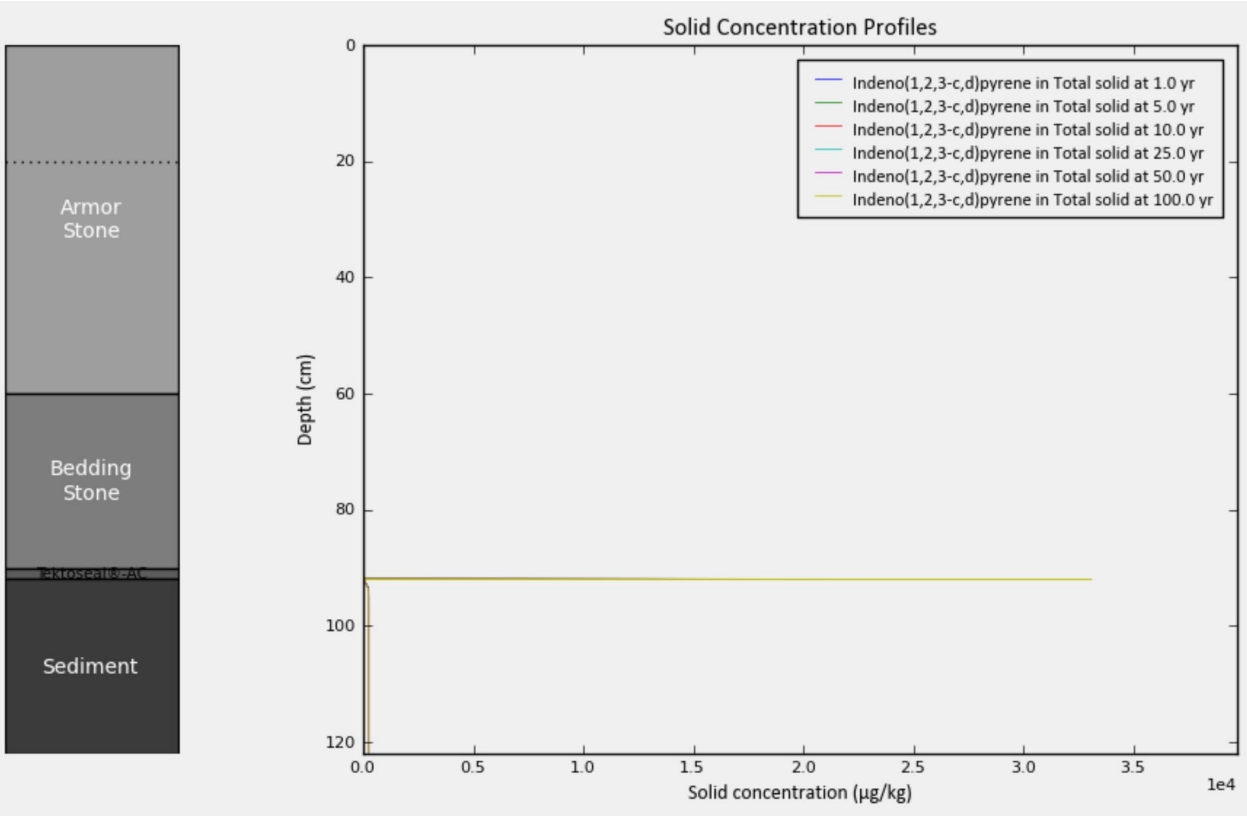

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Dieldrin in Total solid at 1.0 yr
Dieldrin in Total solid at 5.0 yr
Dieldrin in Total solid at 10.0 yr
Dieldrin in Total solid at 25.0 yr
Dieldrin in Total solid at 50.0 yr
Dieldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

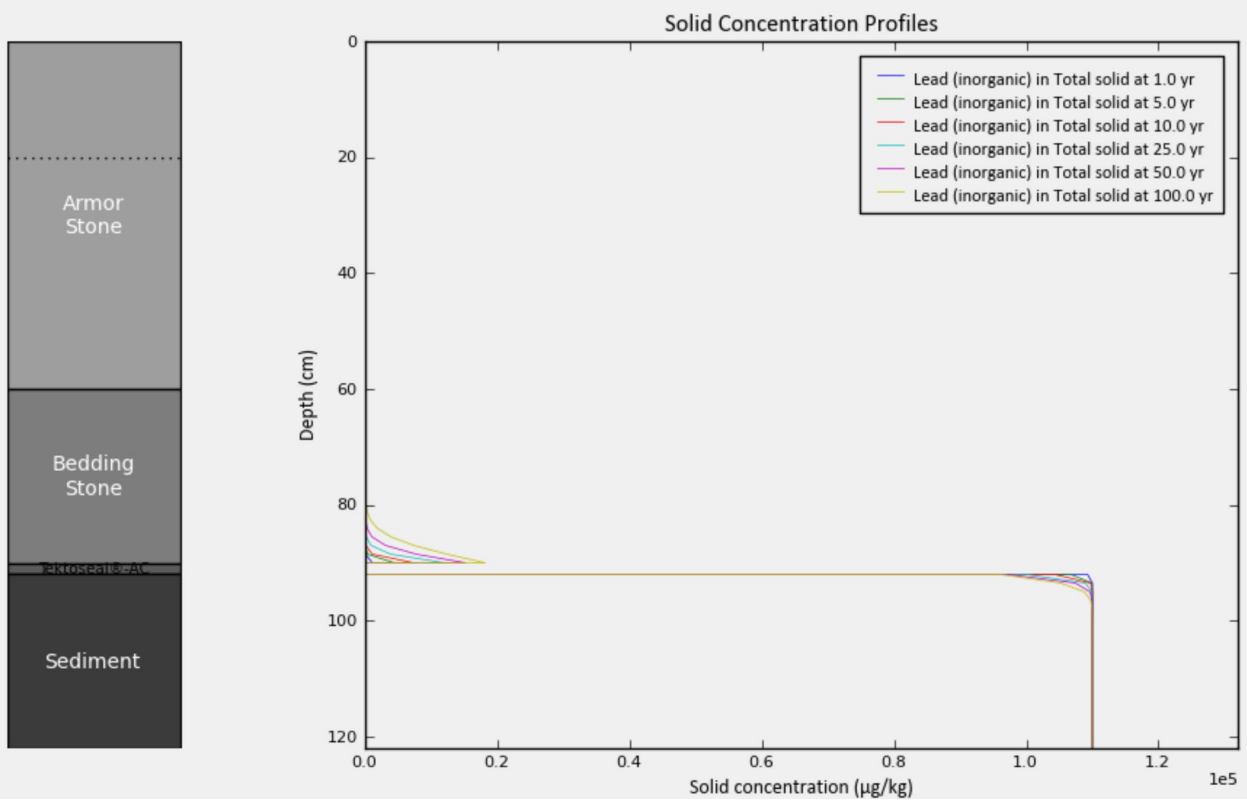

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Diesel in Total solid at 1.0 yr
Diesel in Total solid at 5.0 yr
Diesel in Total solid at 10.0 yr
Diesel in Total solid at 25.0 yr
Diesel in Total solid at 50.0 yr
Diesel in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e7

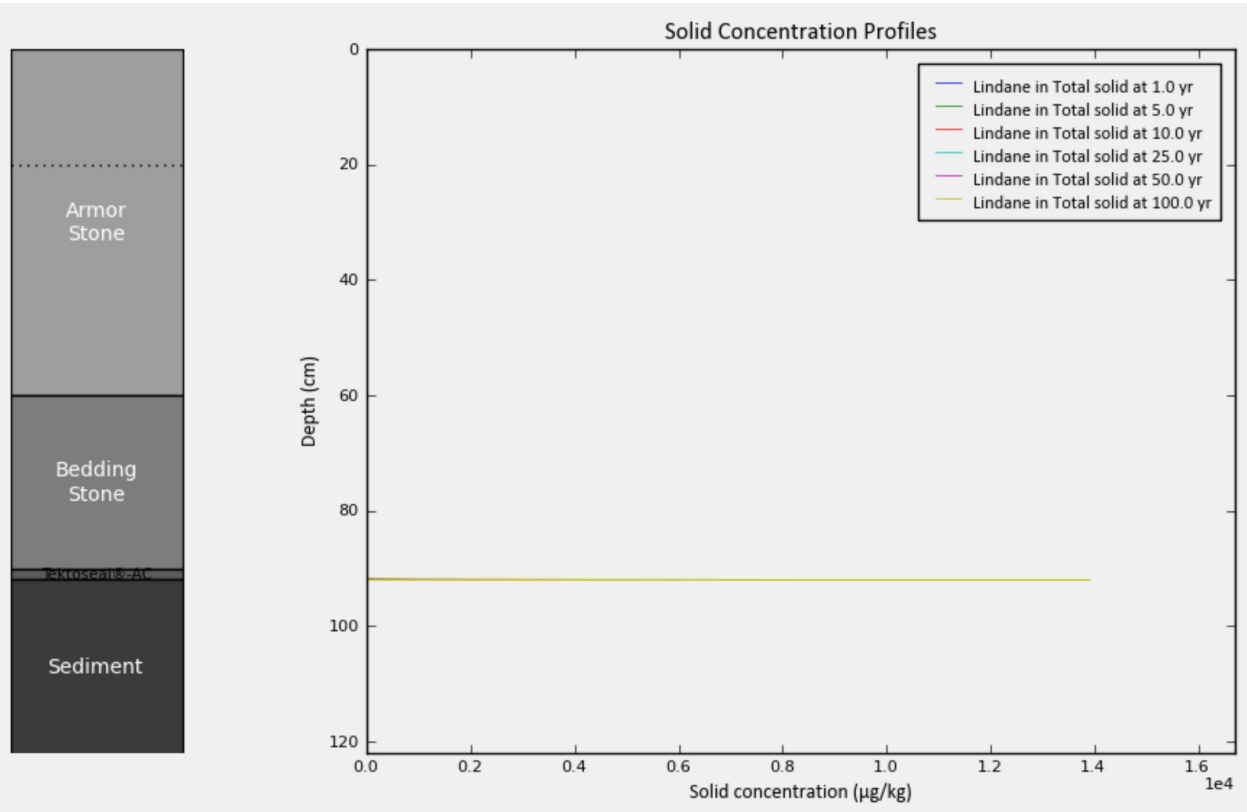

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Fluoranthene in Total solid at 1.0 yr
Fluoranthene in Total solid at 5.0 yr
Fluoranthene in Total solid at 10.0 yr
Fluoranthene in Total solid at 25.0 yr
Fluoranthene in Total solid at 50.0 yr
Fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

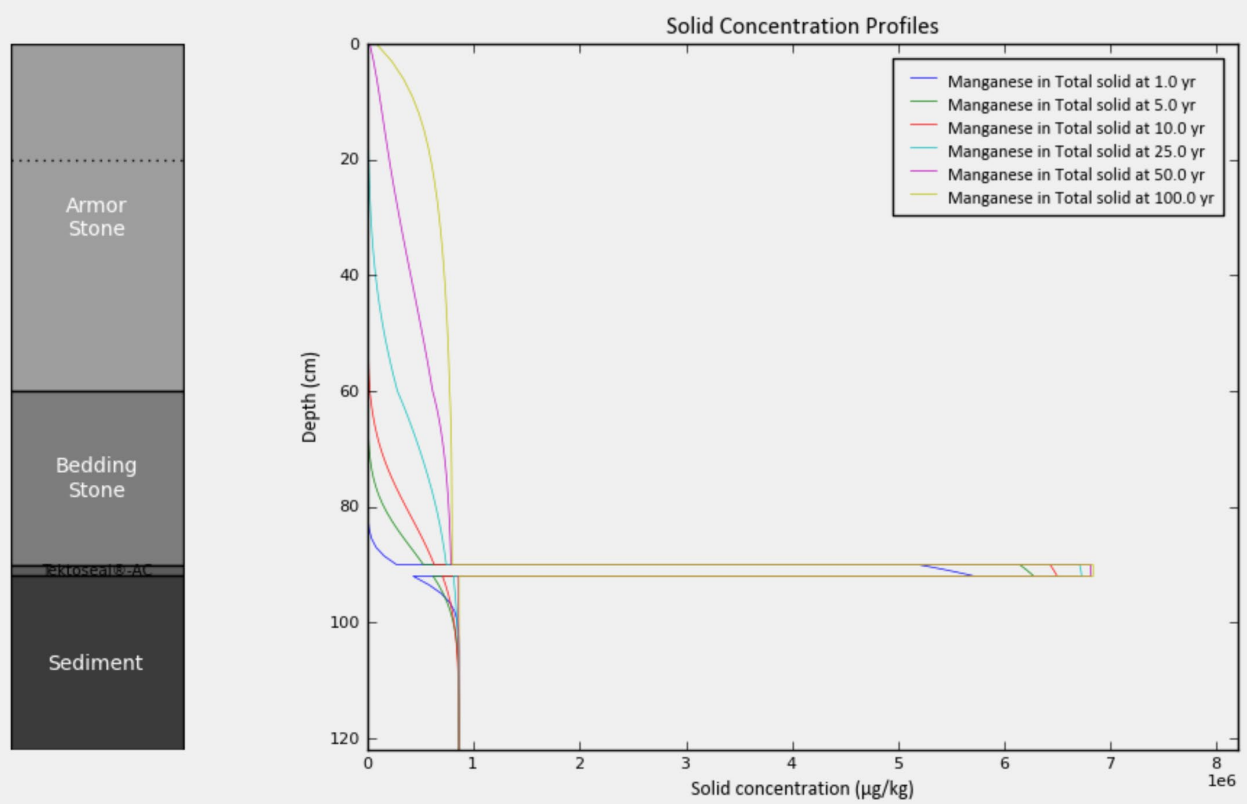

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Fluorene in Total solid at 1.0 yr
Fluorene in Total solid at 5.0 yr
Fluorene in Total solid at 10.0 yr
Fluorene in Total solid at 25.0 yr
Fluorene in Total solid at 50.0 yr
Fluorene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

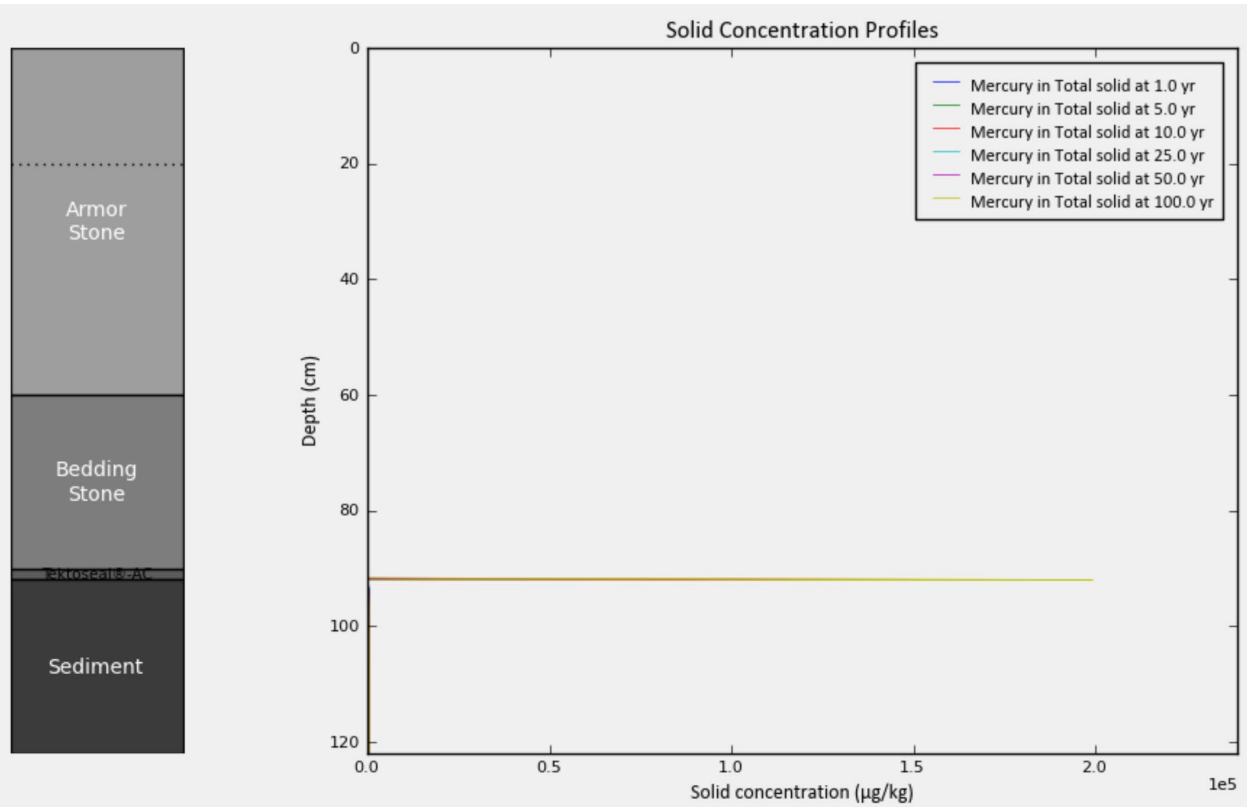

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
HxCDF in Total solid at 1.0 yr
HxCDF in Total solid at 5.0 yr
HxCDF in Total solid at 10.0 yr
HxCDF in Total solid at 25.0 yr
HxCDF in Total solid at 50.0 yr
HxCDF in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

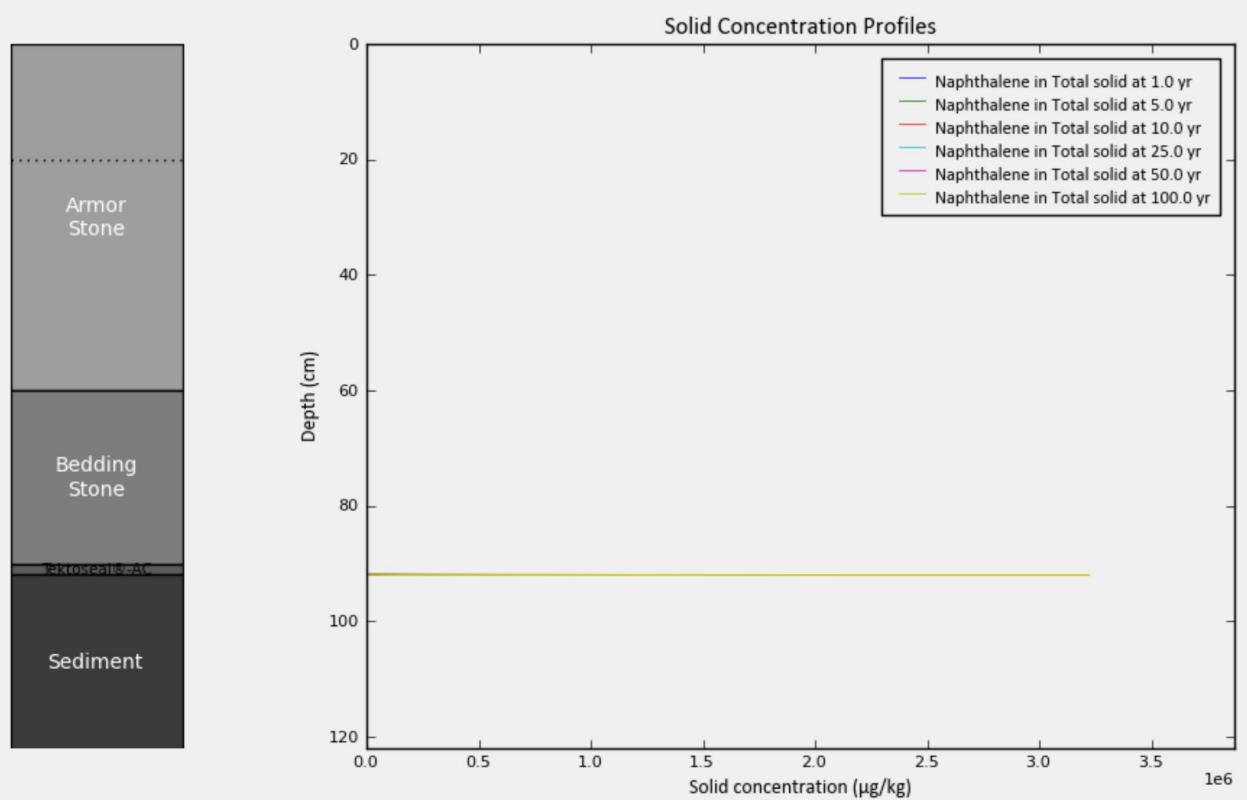

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Indeno(1,2,3-c,d)pyrene in Total solid at 1.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 5.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 10.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 25.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 50.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

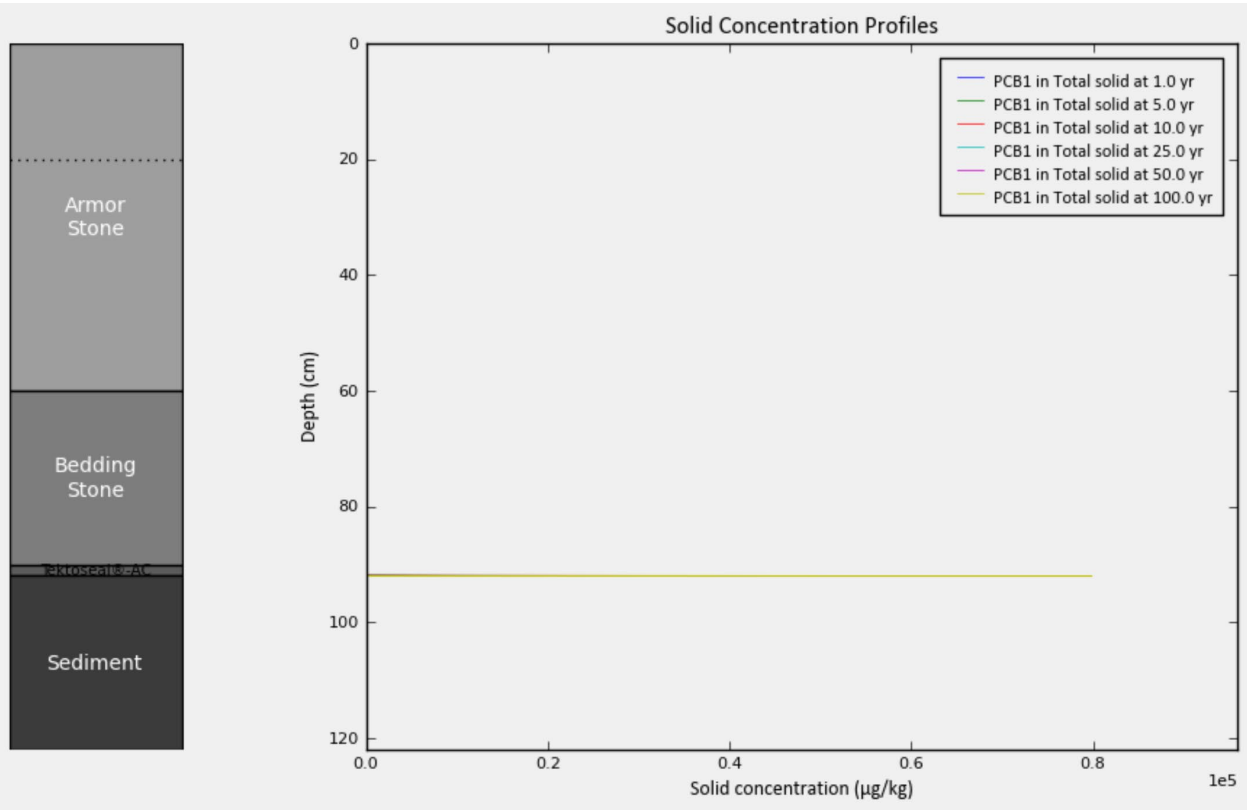

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Lead (inorganic) in Total solid at 1.0 yr
Lead (inorganic) in Total solid at 5.0 yr
Lead (inorganic) in Total solid at 10.0 yr
Lead (inorganic) in Total solid at 25.0 yr
Lead (inorganic) in Total solid at 50.0 yr
Lead (inorganic) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

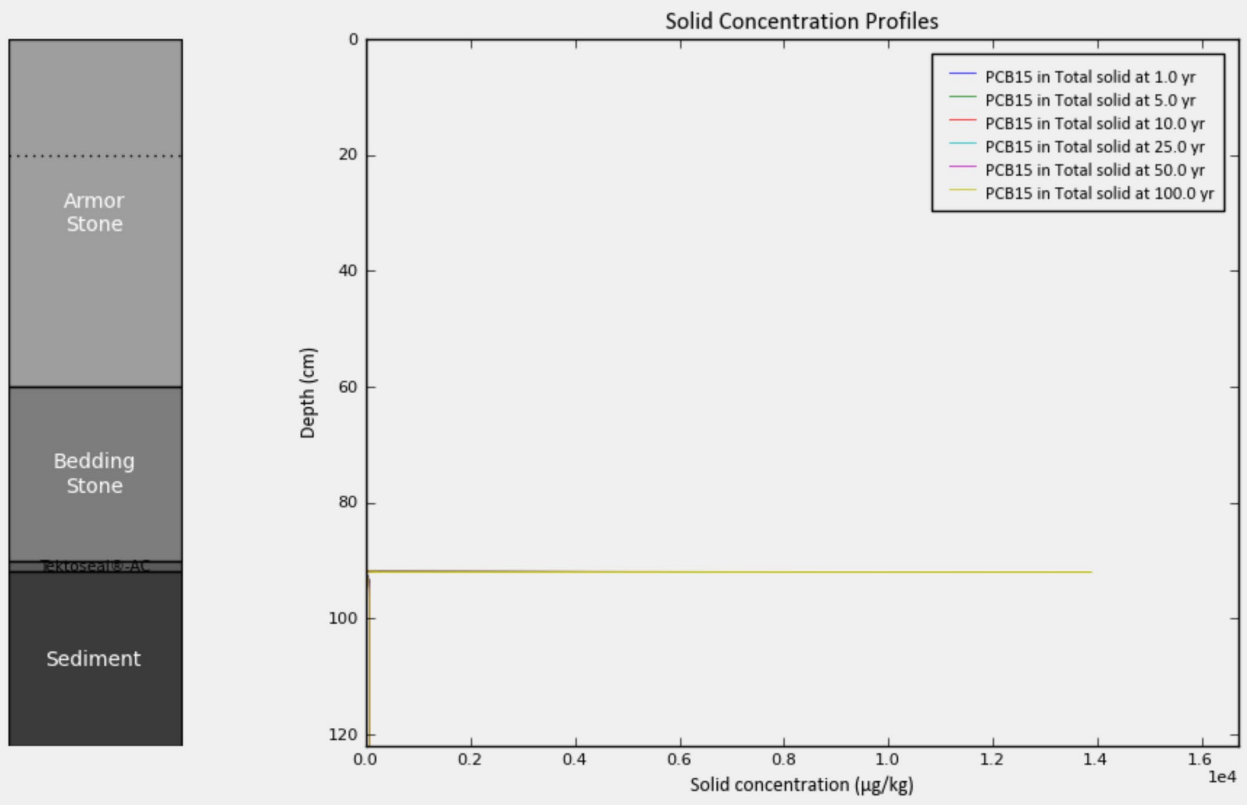

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Lindane in Total solid at 1.0 yr
Lindane in Total solid at 5.0 yr
Lindane in Total solid at 10.0 yr
Lindane in Total solid at 25.0 yr
Lindane in Total solid at 50.0 yr
Lindane in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

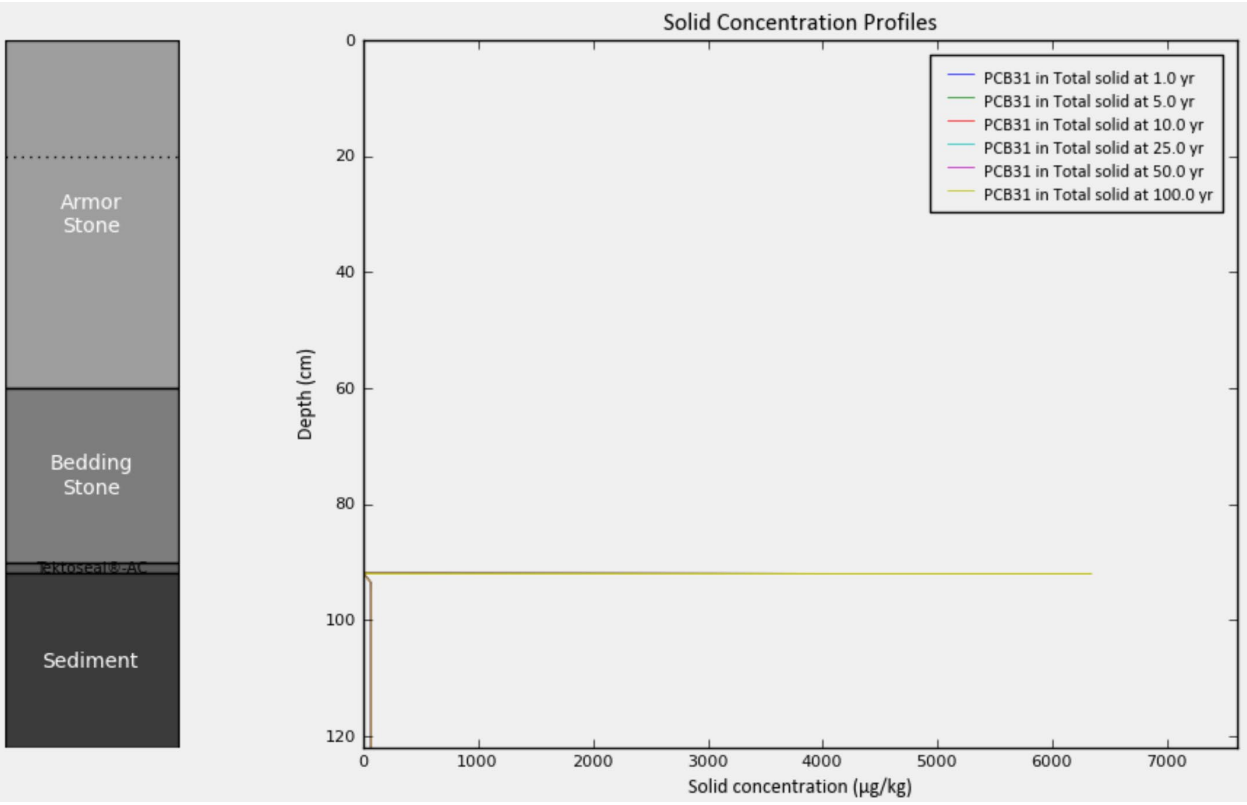

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Manganese in Total solid at 1.0 yr
Manganese in Total solid at 5.0 yr
Manganese in Total solid at 10.0 yr
Manganese in Total solid at 25.0 yr
Manganese in Total solid at 50.0 yr
Manganese in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

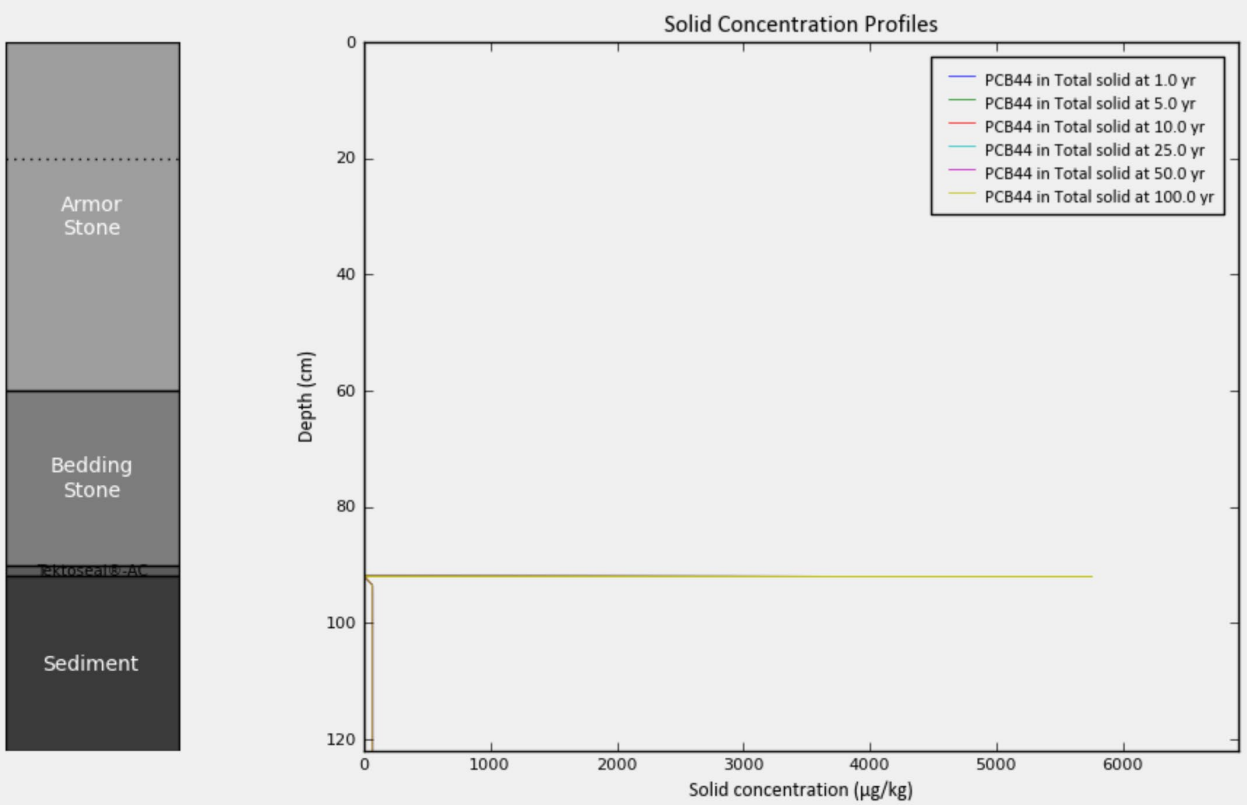

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Mercury in Total solid at 1.0 yr
Mercury in Total solid at 5.0 yr
Mercury in Total solid at 10.0 yr
Mercury in Total solid at 25.0 yr
Mercury in Total solid at 50.0 yr
Mercury in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

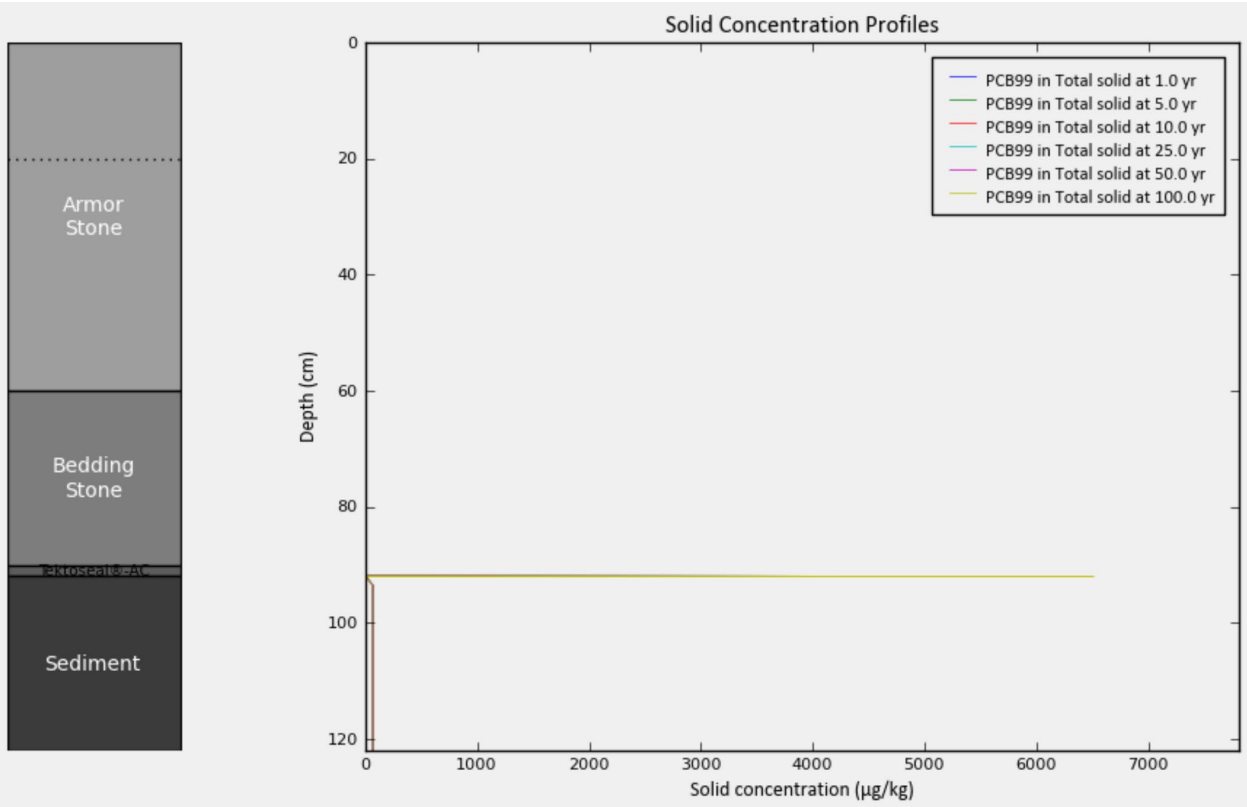

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Naphthalene in Total solid at 1.0 yr
Naphthalene in Total solid at 5.0 yr
Naphthalene in Total solid at 10.0 yr
Naphthalene in Total solid at 25.0 yr
Naphthalene in Total solid at 50.0 yr
Naphthalene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

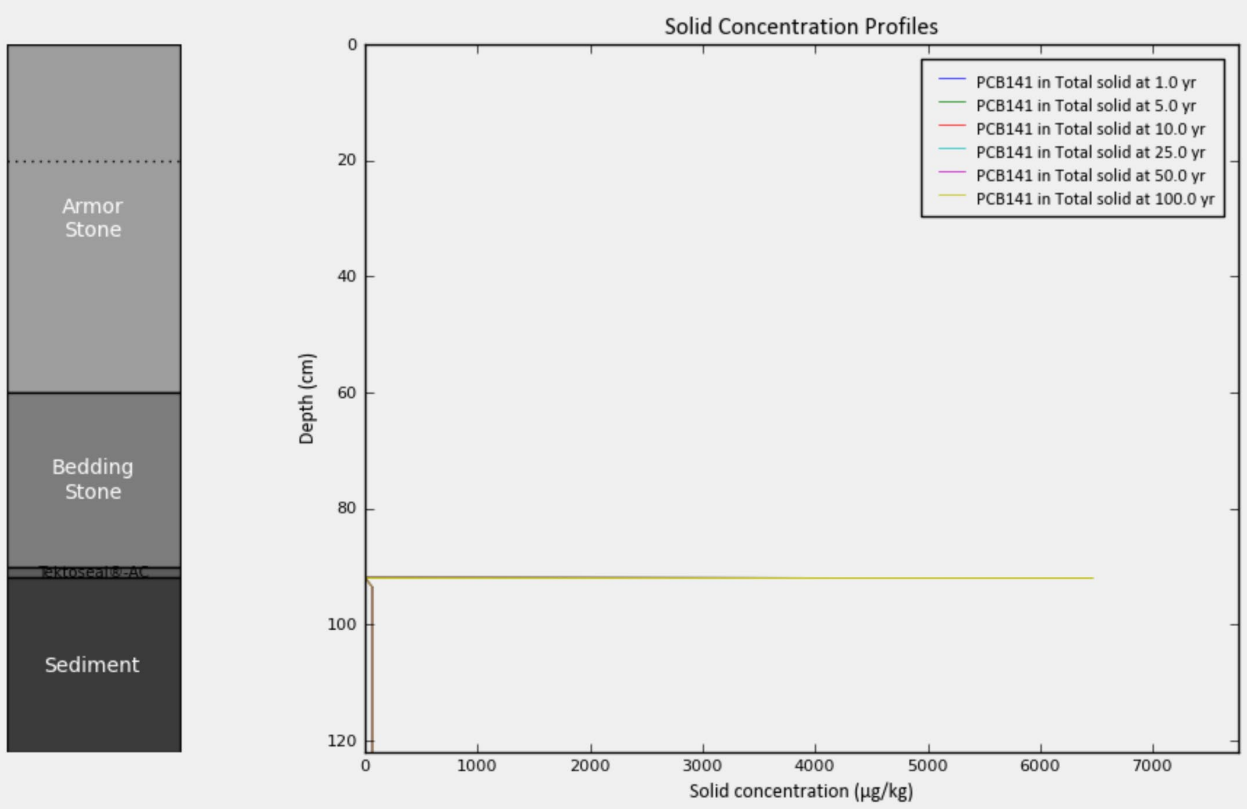

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB1 in Total solid at 1.0 yr
PCB1 in Total solid at 5.0 yr
PCB1 in Total solid at 10.0 yr
PCB1 in Total solid at 25.0 yr
PCB1 in Total solid at 50.0 yr
PCB1 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

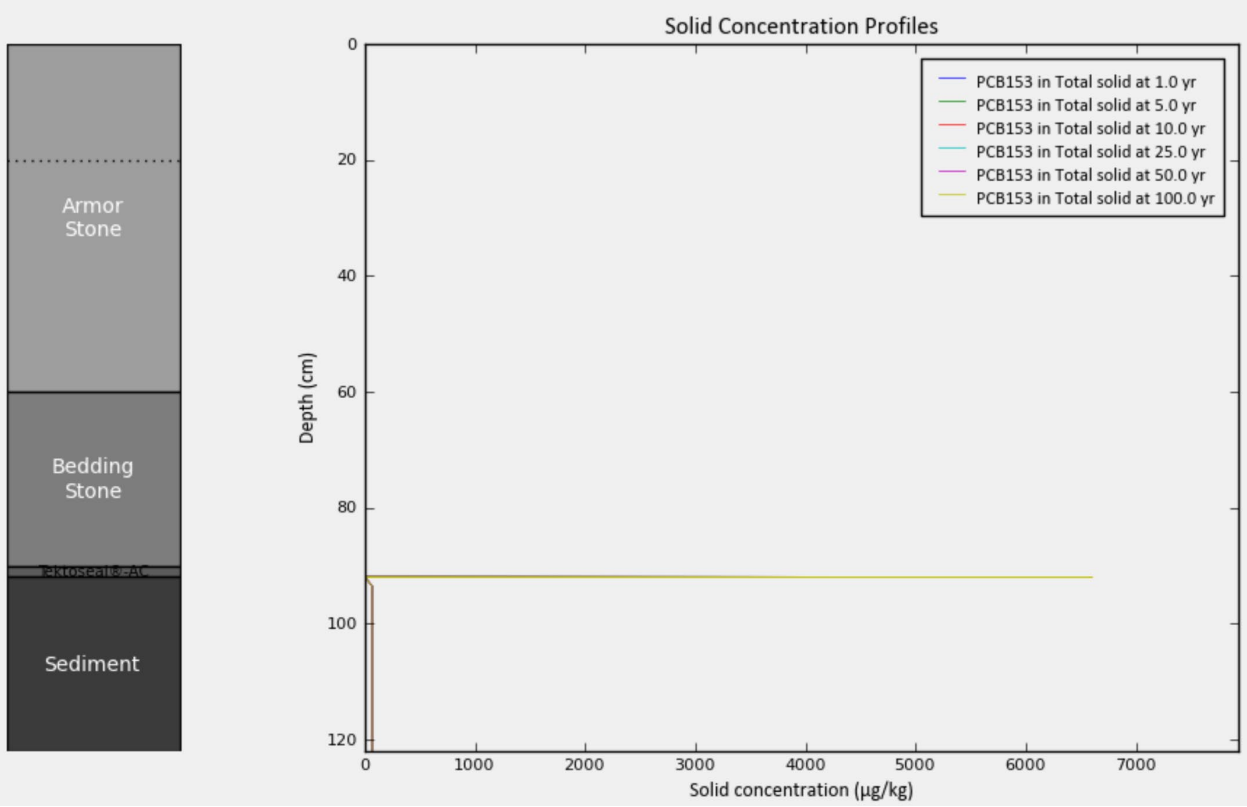

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB15 in Total solid at 1.0 yr
PCB15 in Total solid at 5.0 yr
PCB15 in Total solid at 10.0 yr
PCB15 in Total solid at 25.0 yr
PCB15 in Total solid at 50.0 yr
PCB15 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

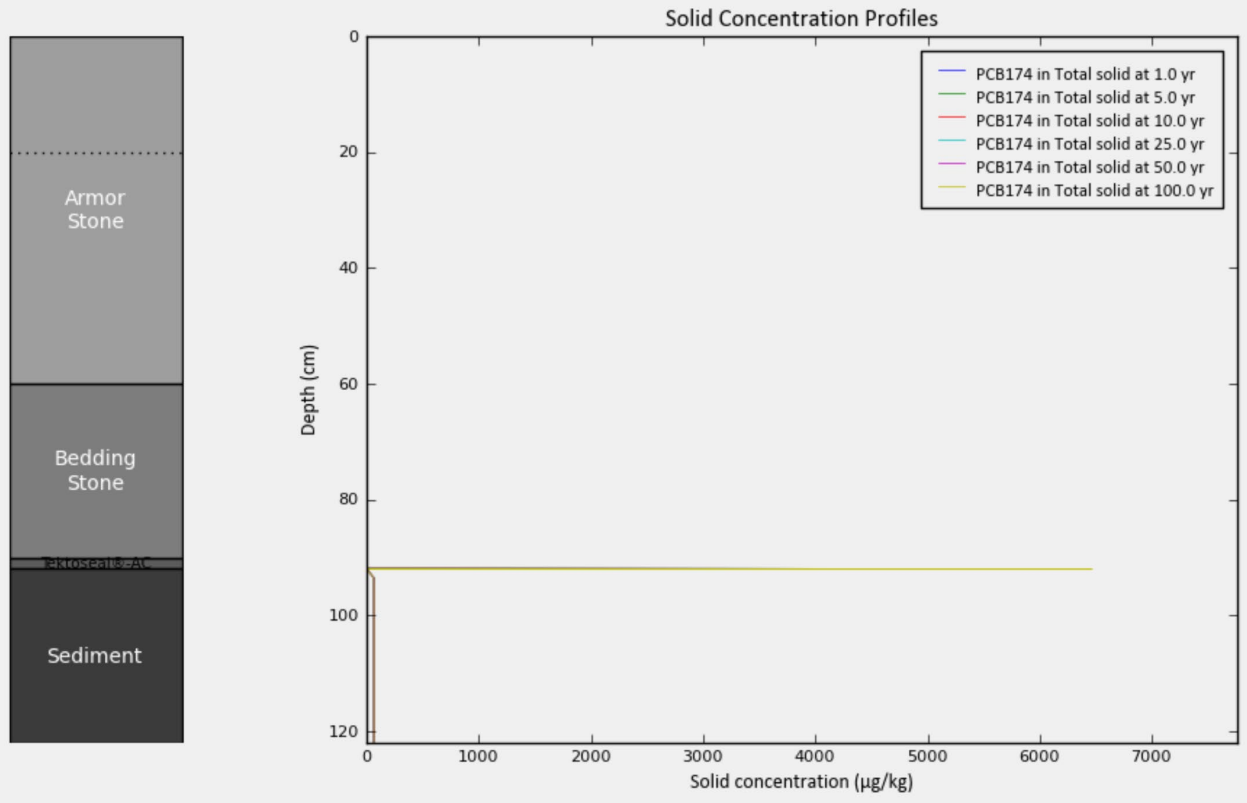

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB31 in Total solid at 1.0 yr
PCB31 in Total solid at 5.0 yr
PCB31 in Total solid at 10.0 yr
PCB31 in Total solid at 25.0 yr
PCB31 in Total solid at 50.0 yr
PCB31 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

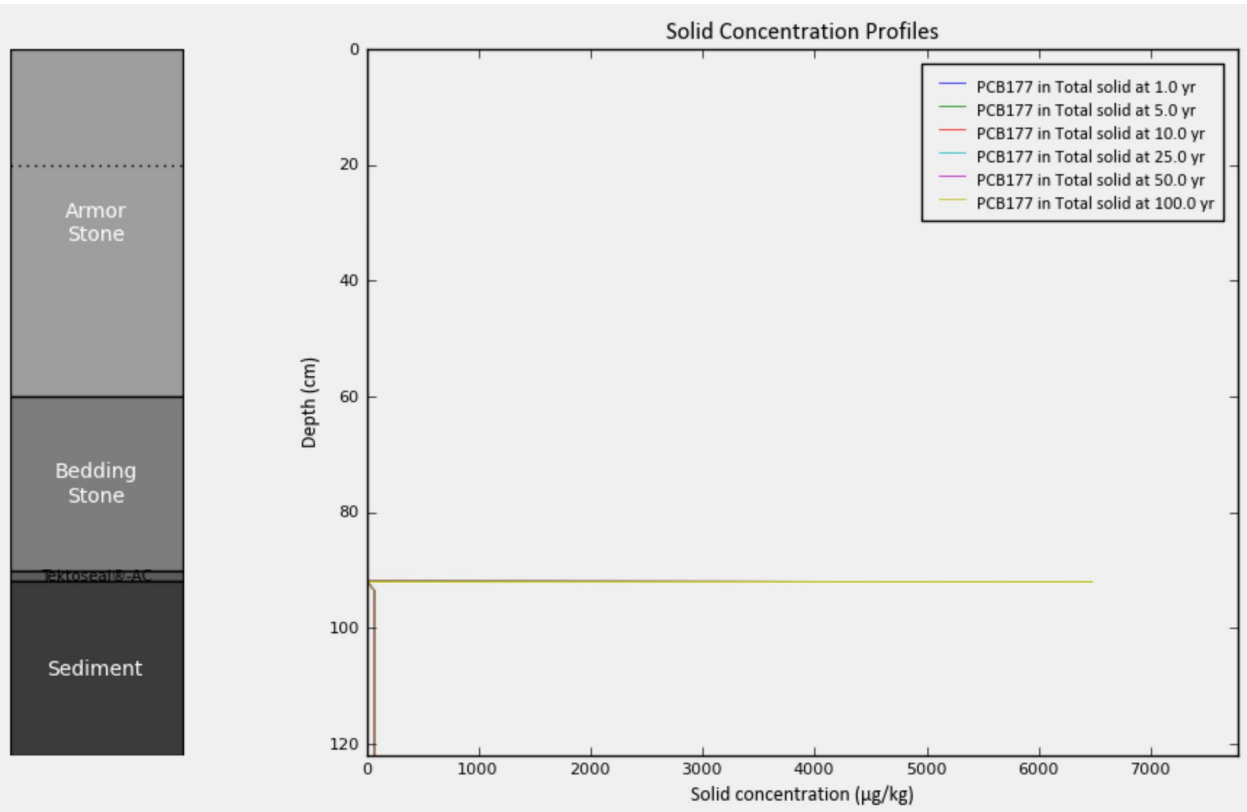

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB44 in Total solid at 1.0 yr
PCB44 in Total solid at 5.0 yr
PCB44 in Total solid at 10.0 yr
PCB44 in Total solid at 25.0 yr
PCB44 in Total solid at 50.0 yr
PCB44 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

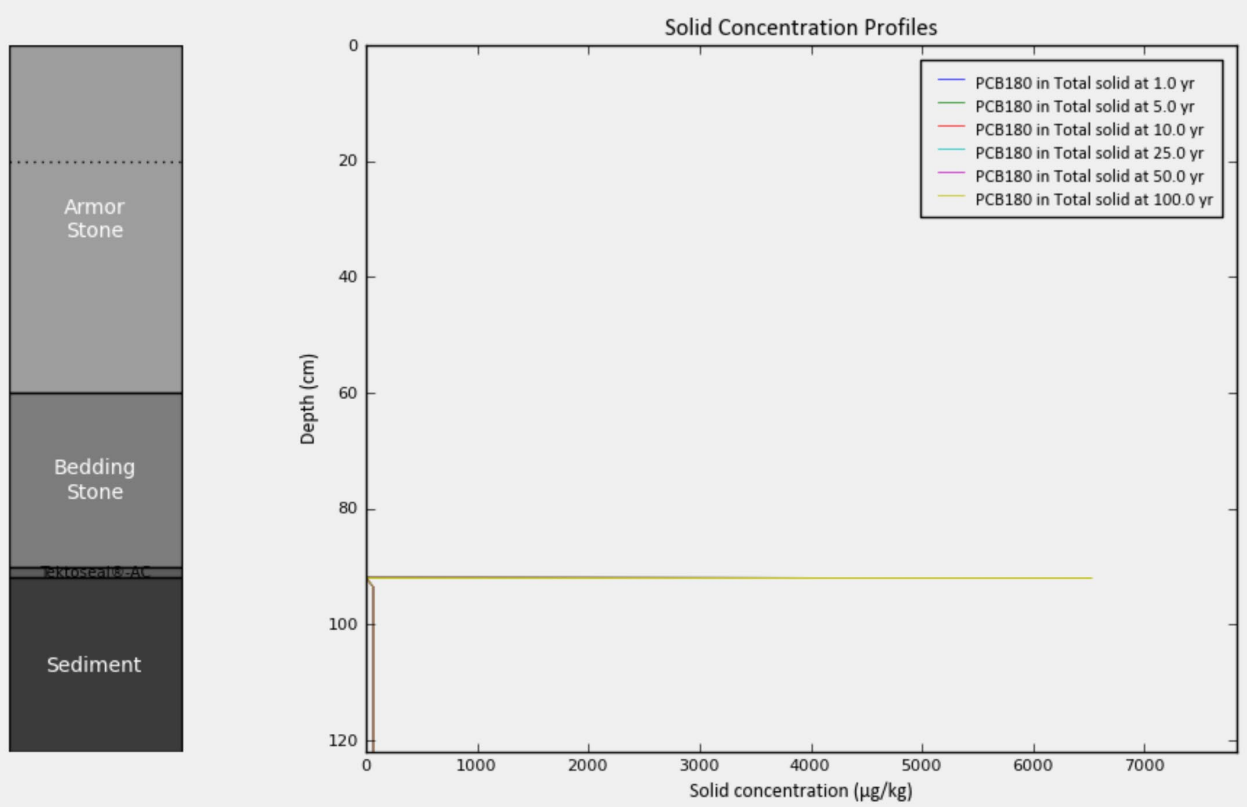

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB99 in Total solid at 1.0 yr
PCB99 in Total solid at 5.0 yr
PCB99 in Total solid at 10.0 yr
PCB99 in Total solid at 25.0 yr
PCB99 in Total solid at 50.0 yr
PCB99 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

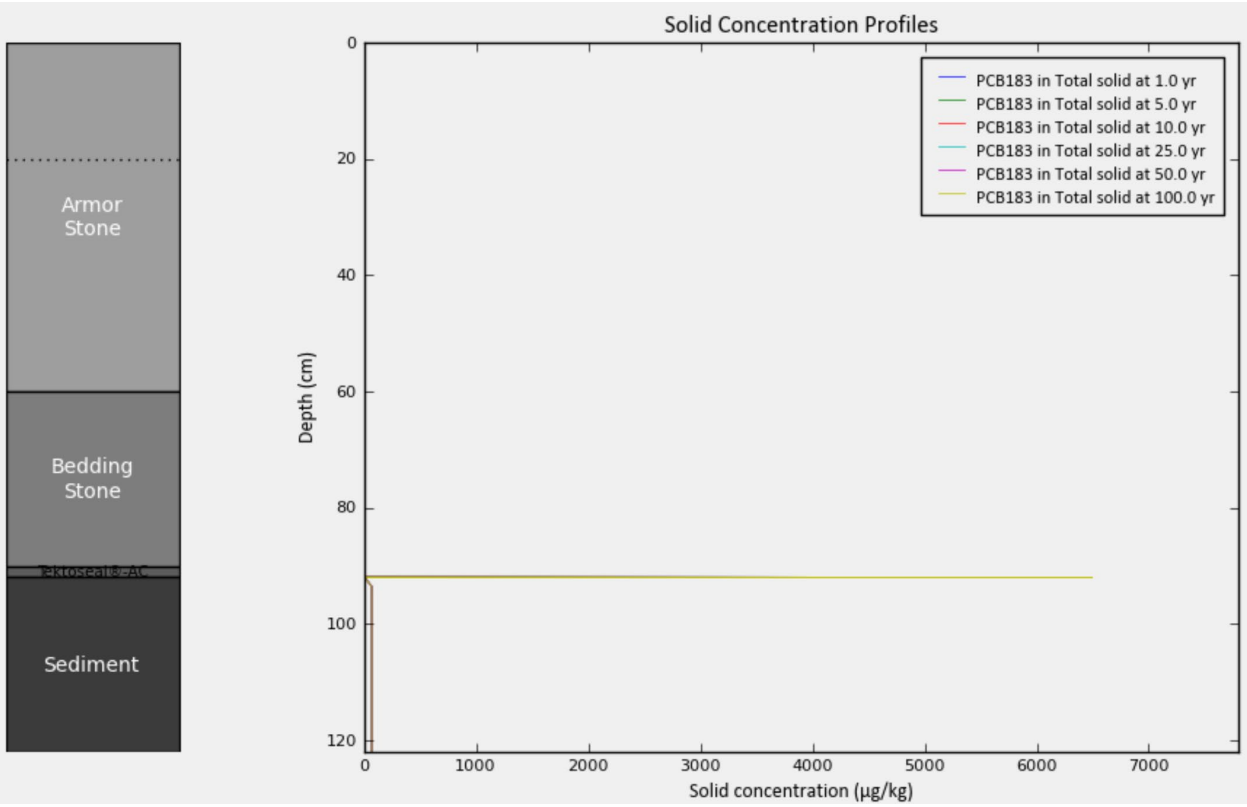

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB141 in Total solid at 1.0 yr
PCB141 in Total solid at 5.0 yr
PCB141 in Total solid at 10.0 yr
PCB141 in Total solid at 25.0 yr
PCB141 in Total solid at 50.0 yr
PCB141 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

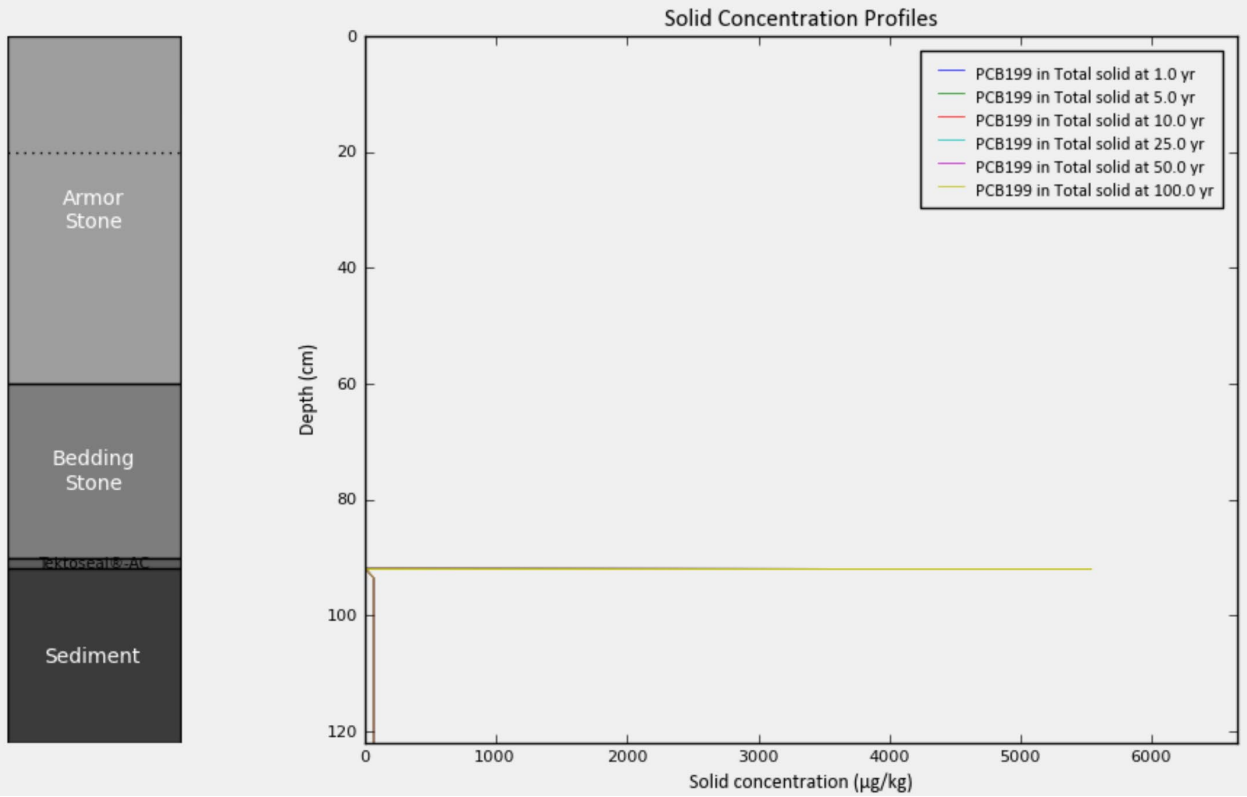

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB153 in Total solid at 1.0 yr
PCB153 in Total solid at 5.0 yr
PCB153 in Total solid at 10.0 yr
PCB153 in Total solid at 25.0 yr
PCB153 in Total solid at 50.0 yr
PCB153 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

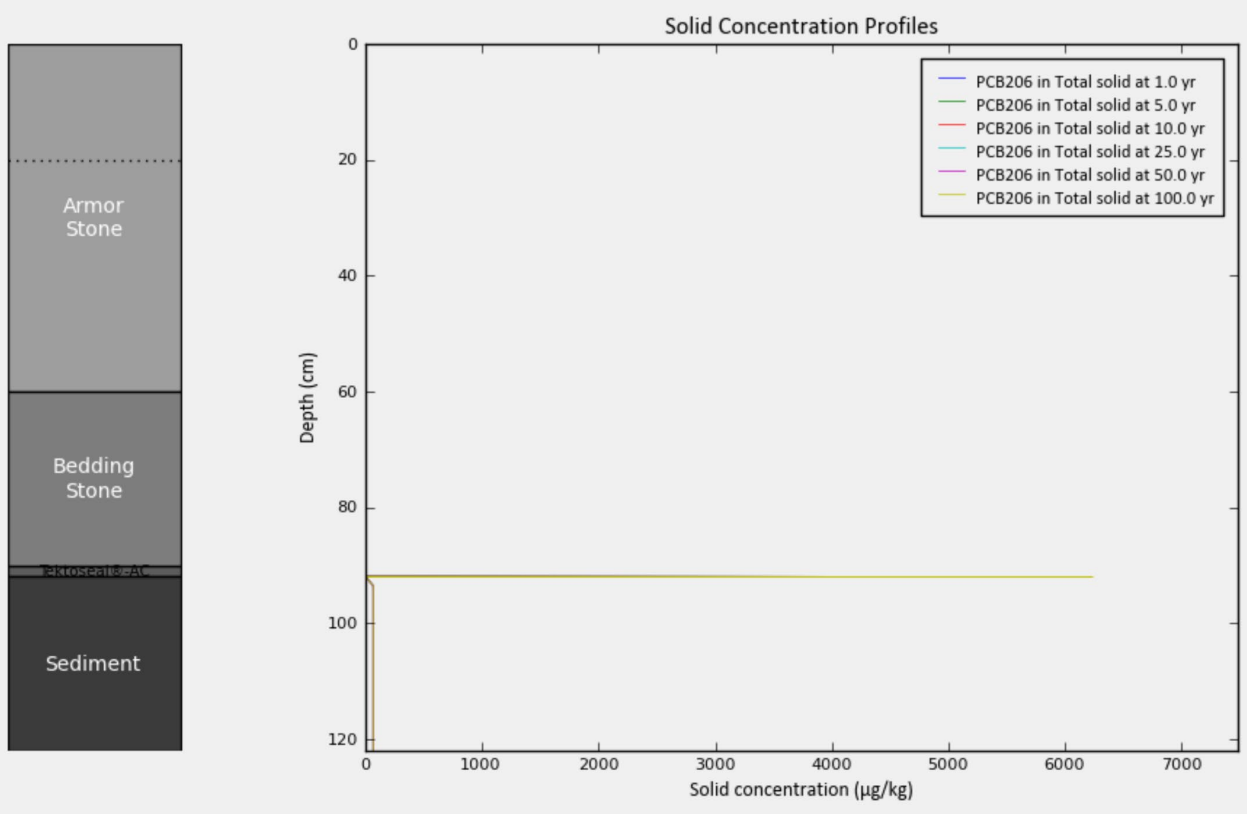

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB174 in Total solid at 1.0 yr
PCB174 in Total solid at 5.0 yr
PCB174 in Total solid at 10.0 yr
PCB174 in Total solid at 25.0 yr
PCB174 in Total solid at 50.0 yr
PCB174 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

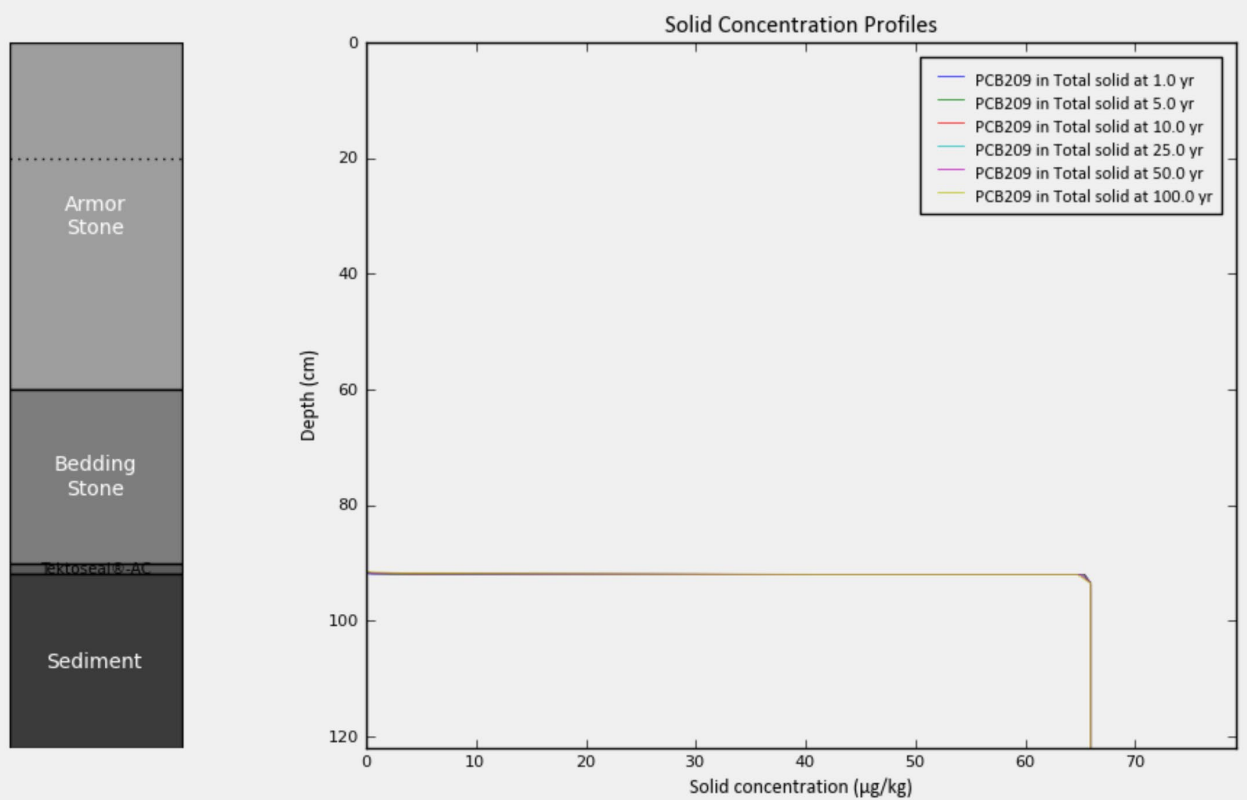

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB177 in Total solid at 1.0 yr
PCB177 in Total solid at 5.0 yr
PCB177 in Total solid at 10.0 yr
PCB177 in Total solid at 25.0 yr
PCB177 in Total solid at 50.0 yr
PCB177 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

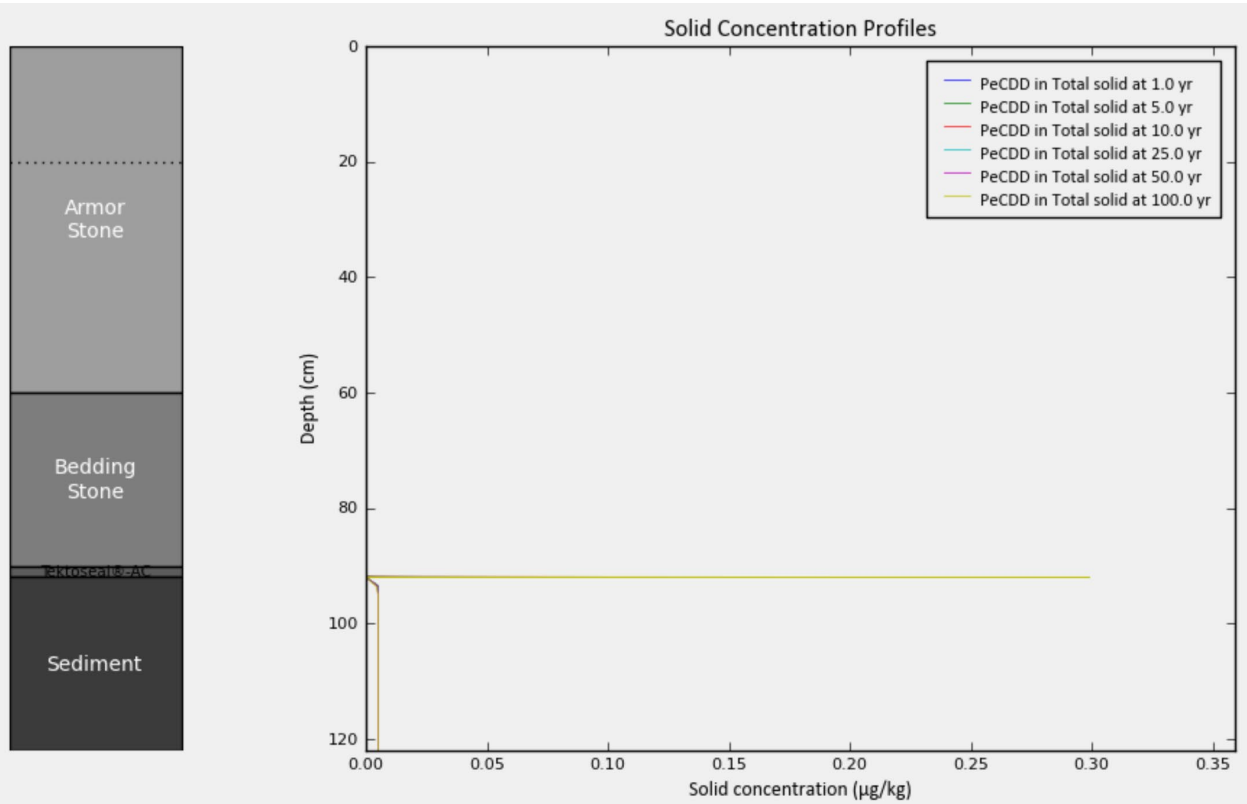

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB180 in Total solid at 1.0 yr
PCB180 in Total solid at 5.0 yr
PCB180 in Total solid at 10.0 yr
PCB180 in Total solid at 25.0 yr
PCB180 in Total solid at 50.0 yr
PCB180 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

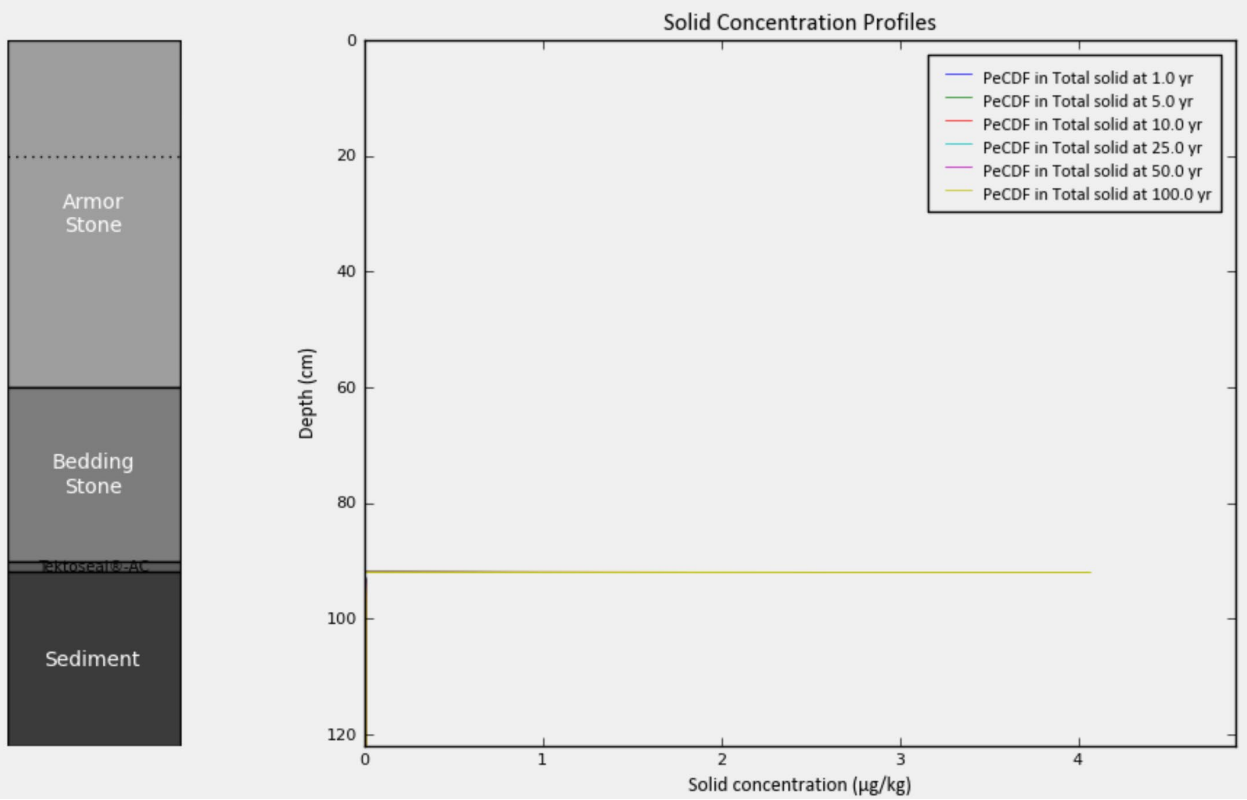

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB183 in Total solid at 1.0 yr
PCB183 in Total solid at 5.0 yr
PCB183 in Total solid at 10.0 yr
PCB183 in Total solid at 25.0 yr
PCB183 in Total solid at 50.0 yr
PCB183 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

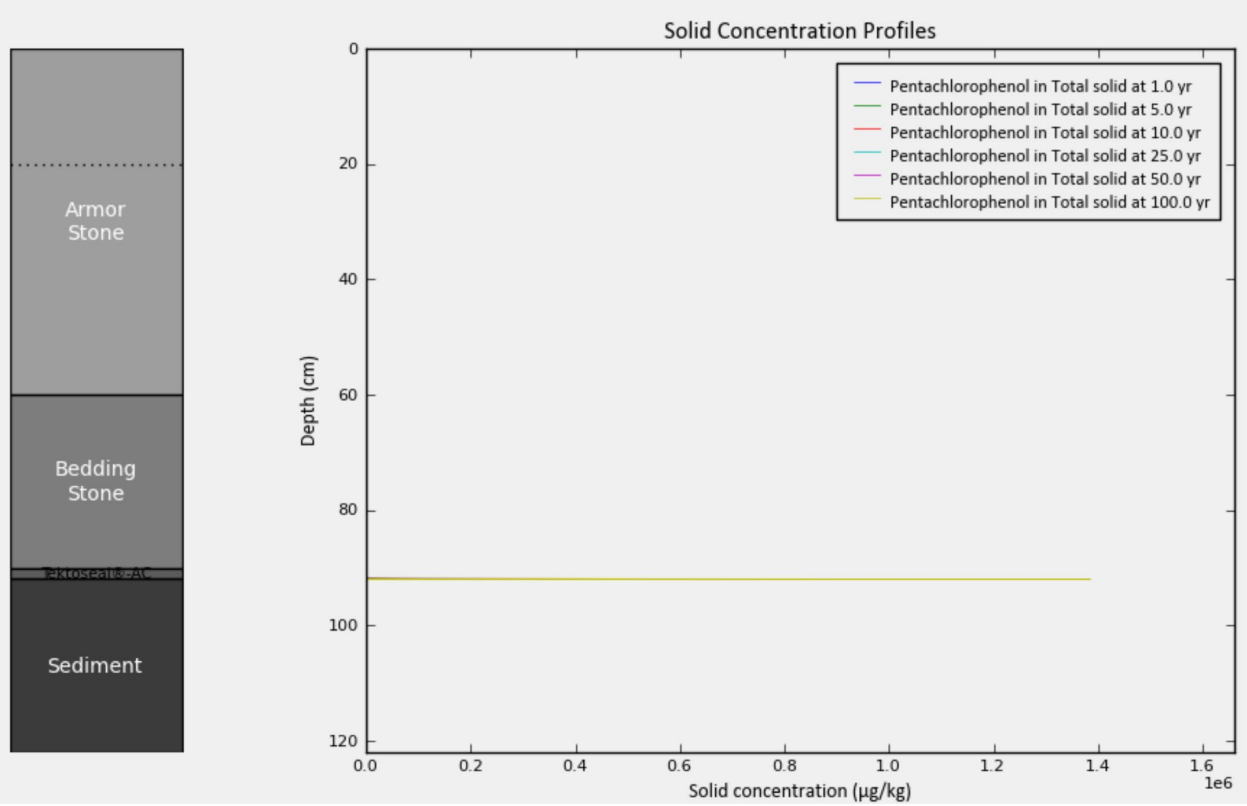

Armor Stone
Bedding Stone
Tetroseal® AC
Sediment
Solid Concentration Profiles
PCB199 in Total solid at 1.0 yr
PCB199 in Total solid at 5.0 yr
PCB199 in Total solid at 10.0 yr
PCB199 in Total solid at 25.0 yr
PCB199 in Total solid at 50.0 yr
PCB199 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1000
2000
3000
4000
5000
6000
Solid concentration (µg/kg)

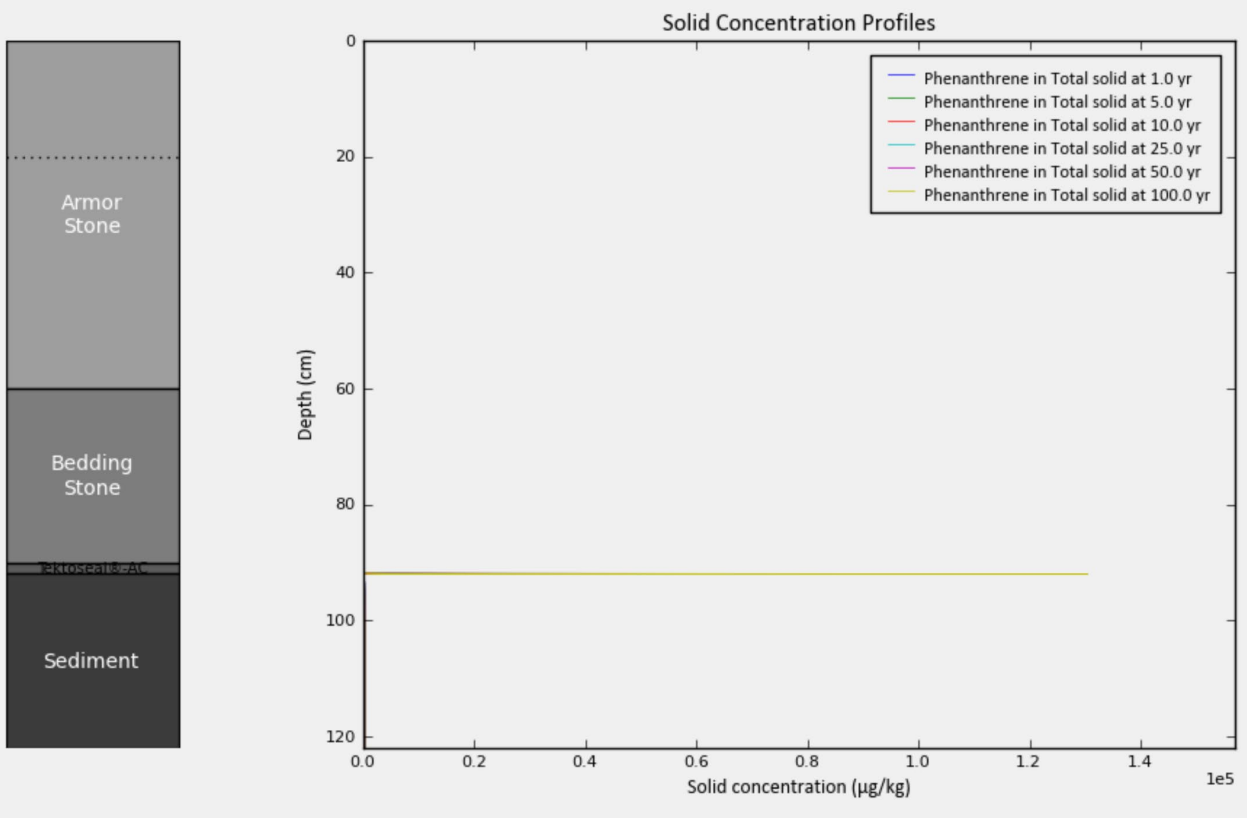

Armor Stone
Bedding Stone
Tetroseal® AC
Sediment
Solid Concentration Profiles
PCB206 in Total solid at 1.0 yr
PCB206 in Total solid at 5.0 yr
PCB206 in Total solid at 10.0 yr
PCB206 in Total solid at 25.0 yr
PCB206 in Total solid at 50.0 yr
PCB206 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1000
2000
3000
4000
5000
6000
7000
Solid concentration (µg/kg)

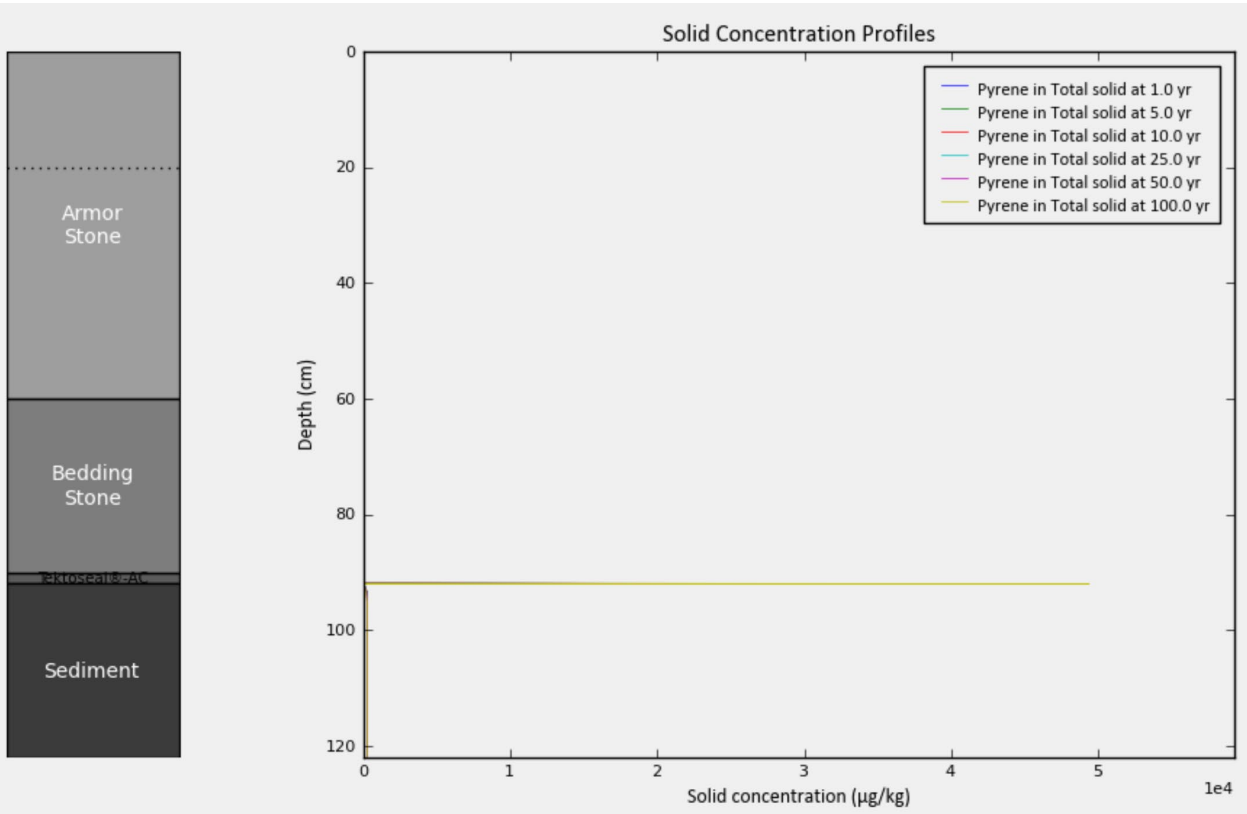

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB209 in Total solid at 1.0 yr
PCB209 in Total solid at 5.0 yr
PCB209 in Total solid at 10.0 yr
PCB209 in Total solid at 25.0 yr
PCB209 in Total solid at 50.0 yr
PCB209 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

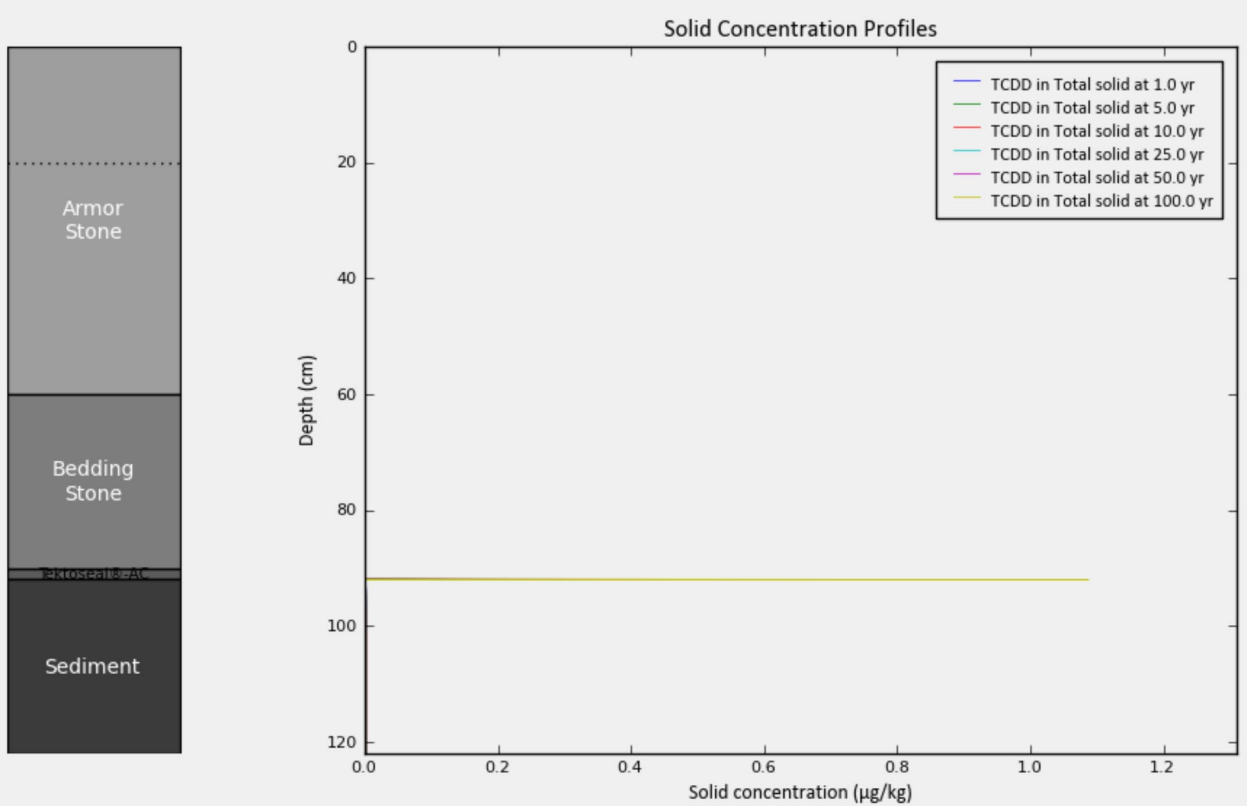

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PeCDD in Total solid at 1.0 yr
PeCDD in Total solid at 5.0 yr
PeCDD in Total solid at 10.0 yr
PeCDD in Total solid at 25.0 yr
PeCDD in Total solid at 50.0 yr
PeCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

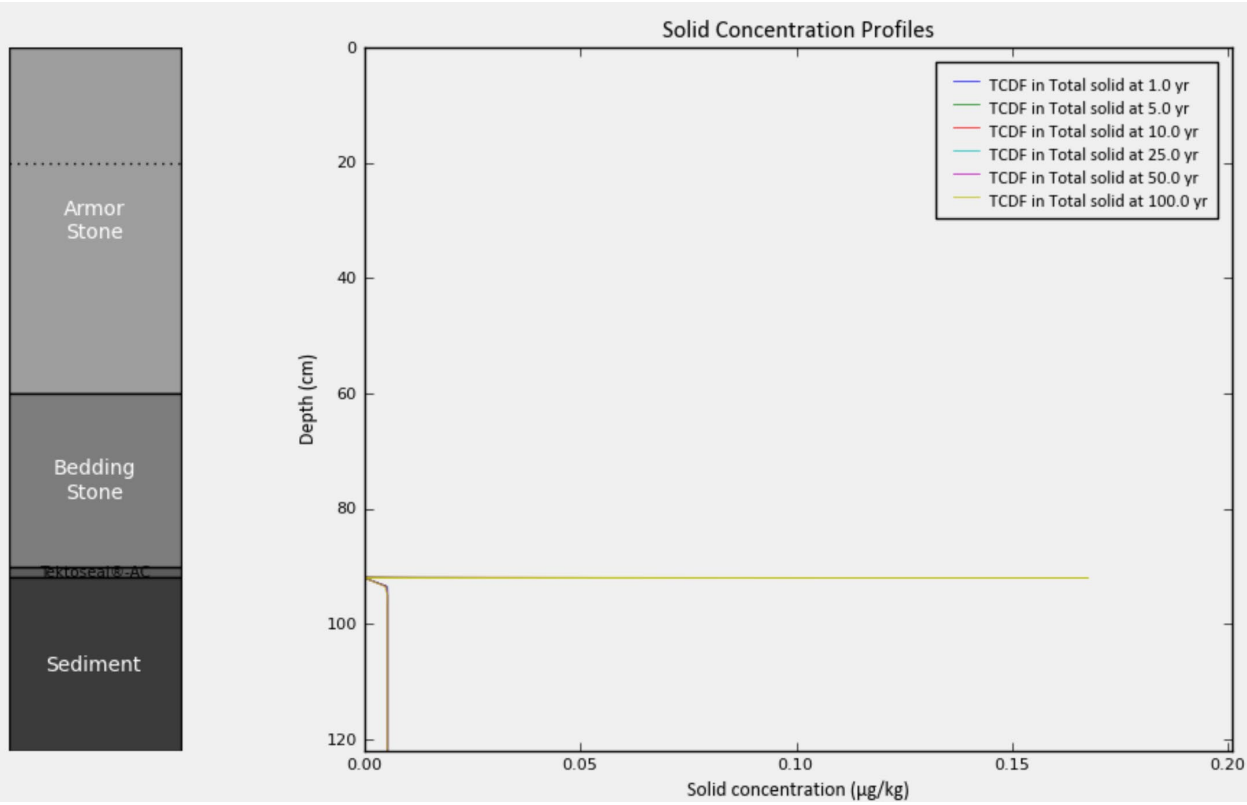

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PeCDF in Total solid at 1.0 yr
PeCDF in Total solid at 5.0 yr
PeCDF in Total solid at 10.0 yr
PeCDF in Total solid at 25.0 yr
PeCDF in Total solid at 50.0 yr
PeCDF in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

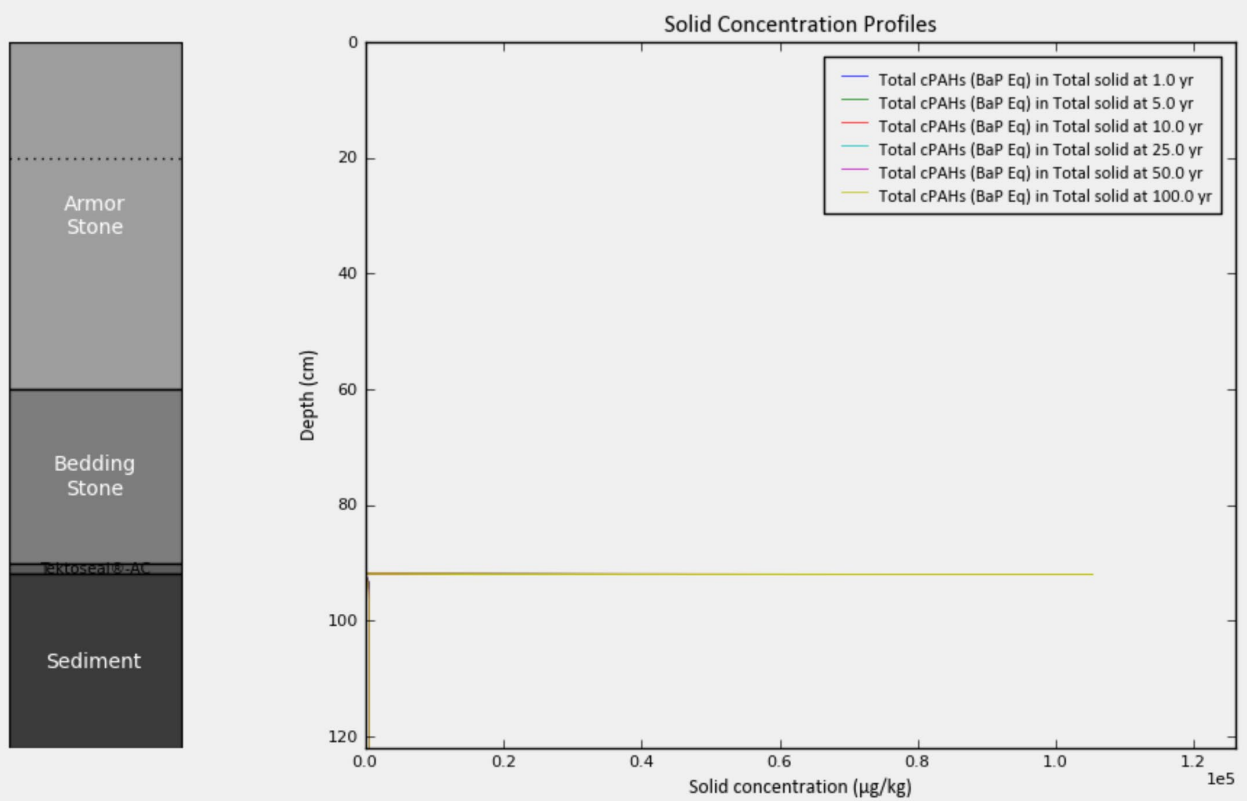

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Pentachlorophenol in Total solid at 1.0 yr
Pentachlorophenol in Total solid at 5.0 yr
Pentachlorophenol in Total solid at 10.0 yr
Pentachlorophenol in Total solid at 25.0 yr
Pentachlorophenol in Total solid at 50.0 yr
Pentachlorophenol in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

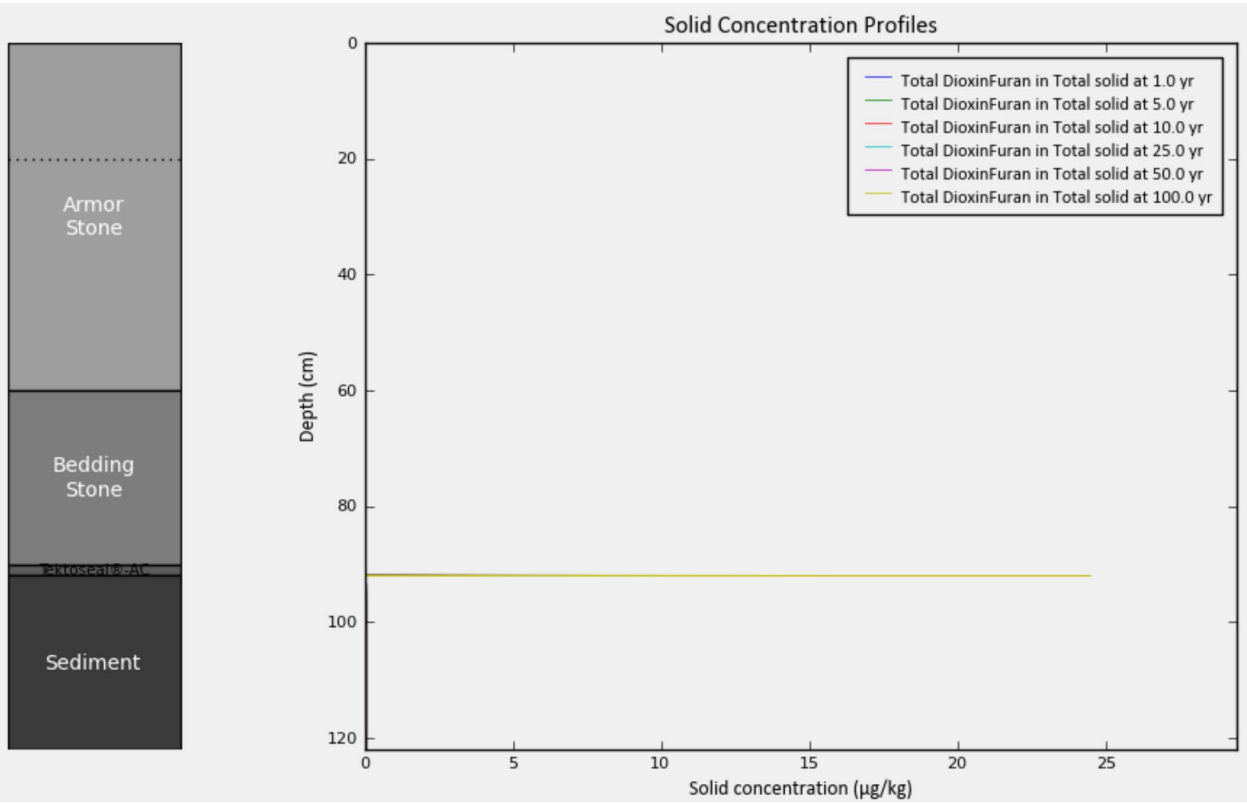

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Phenanthrene in Total solid at 1.0 yr
Phenanthrene in Total solid at 5.0 yr
Phenanthrene in Total solid at 10.0 yr
Phenanthrene in Total solid at 25.0 yr
Phenanthrene in Total solid at 50.0 yr
Phenanthrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

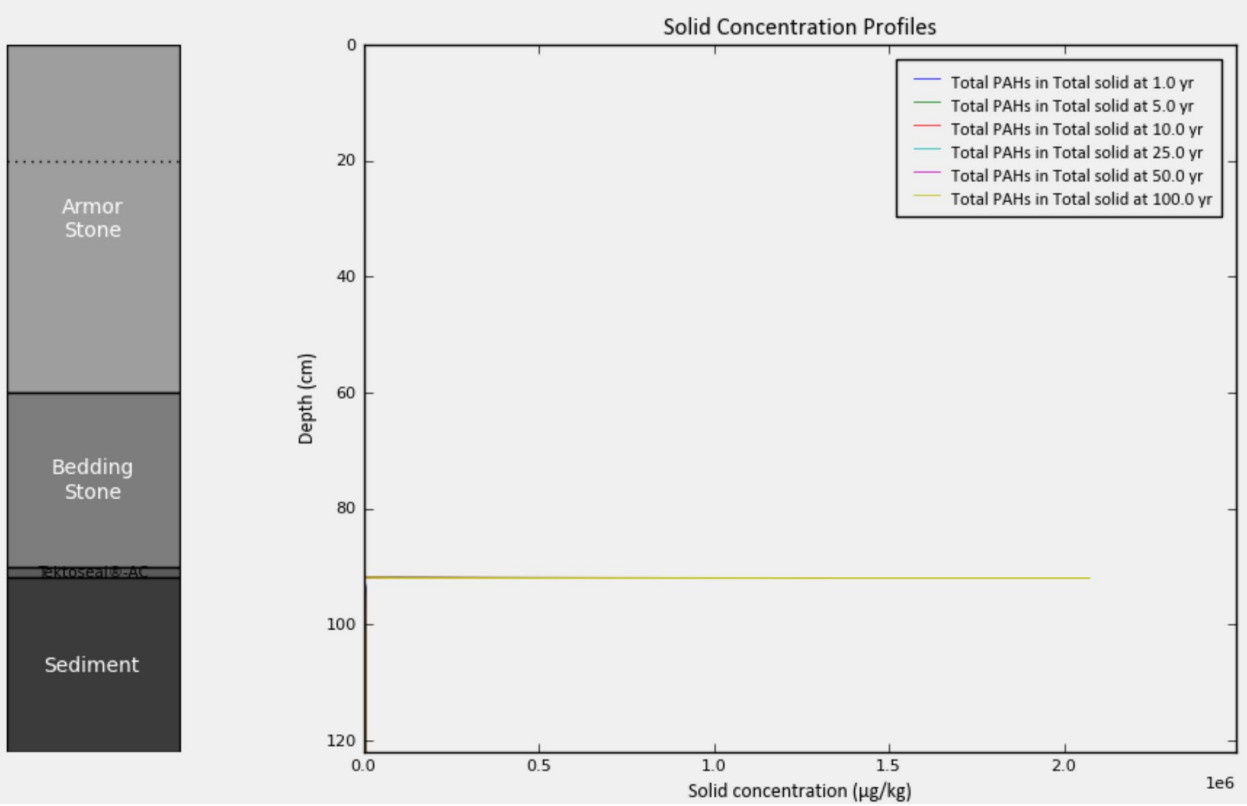

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Pyrene in Total solid at 1.0 yr
Pyrene in Total solid at 5.0 yr
Pyrene in Total solid at 10.0 yr
Pyrene in Total solid at 25.0 yr
Pyrene in Total solid at 50.0 yr
Pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

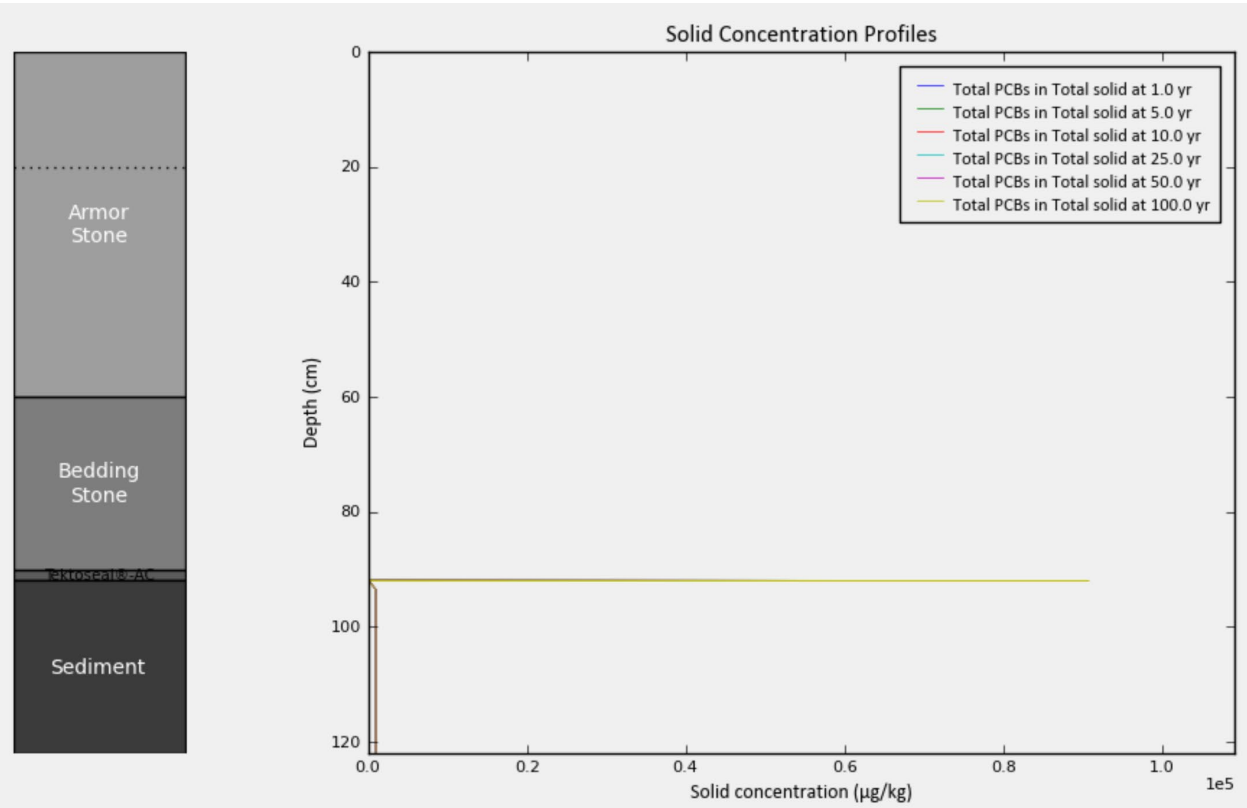

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
TCDD in Total solid at 1.0 yr
TCDD in Total solid at 5.0 yr
TCDD in Total solid at 10.0 yr
TCDD in Total solid at 25.0 yr
TCDD in Total solid at 50.0 yr
TCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

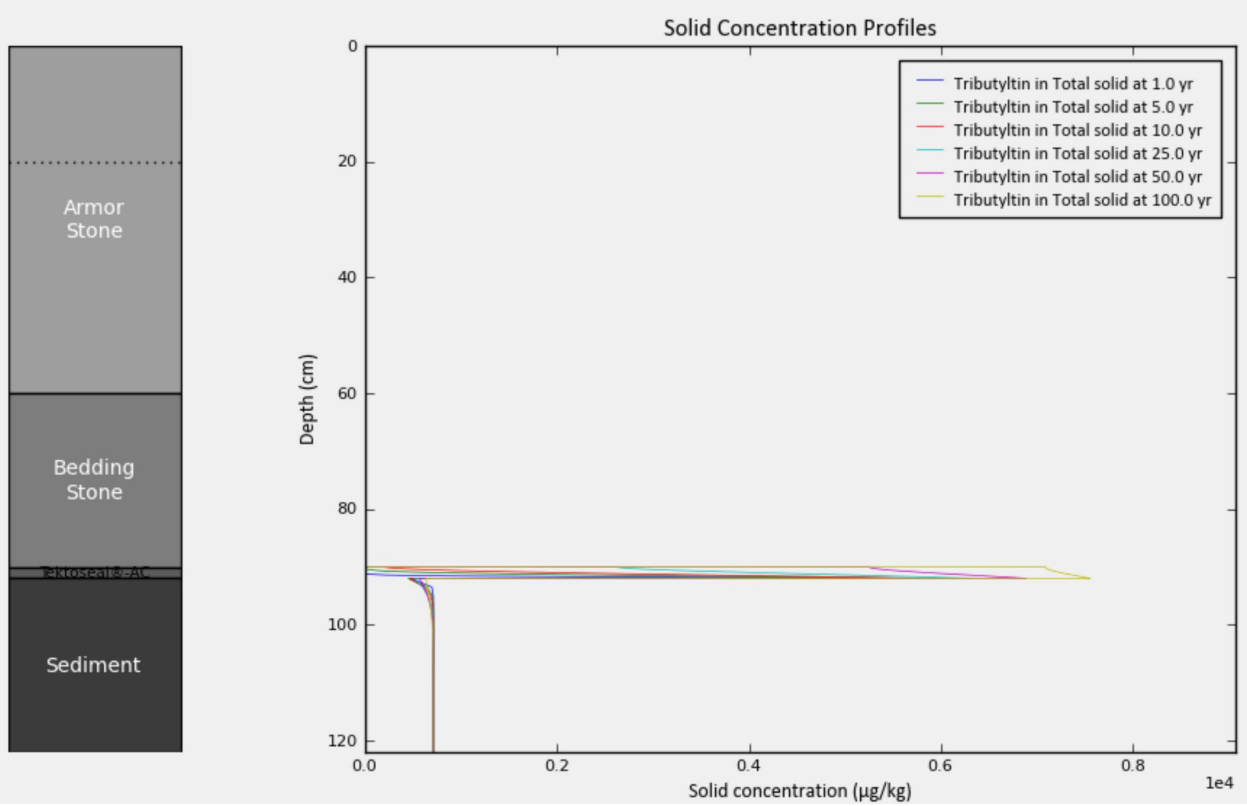

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
TCDF in Total solid at 1.0 yr
TCDF in Total solid at 5.0 yr
TCDF in Total solid at 10.0 yr
TCDF in Total solid at 25.0 yr
TCDF in Total solid at 50.0 yr
TCDF in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

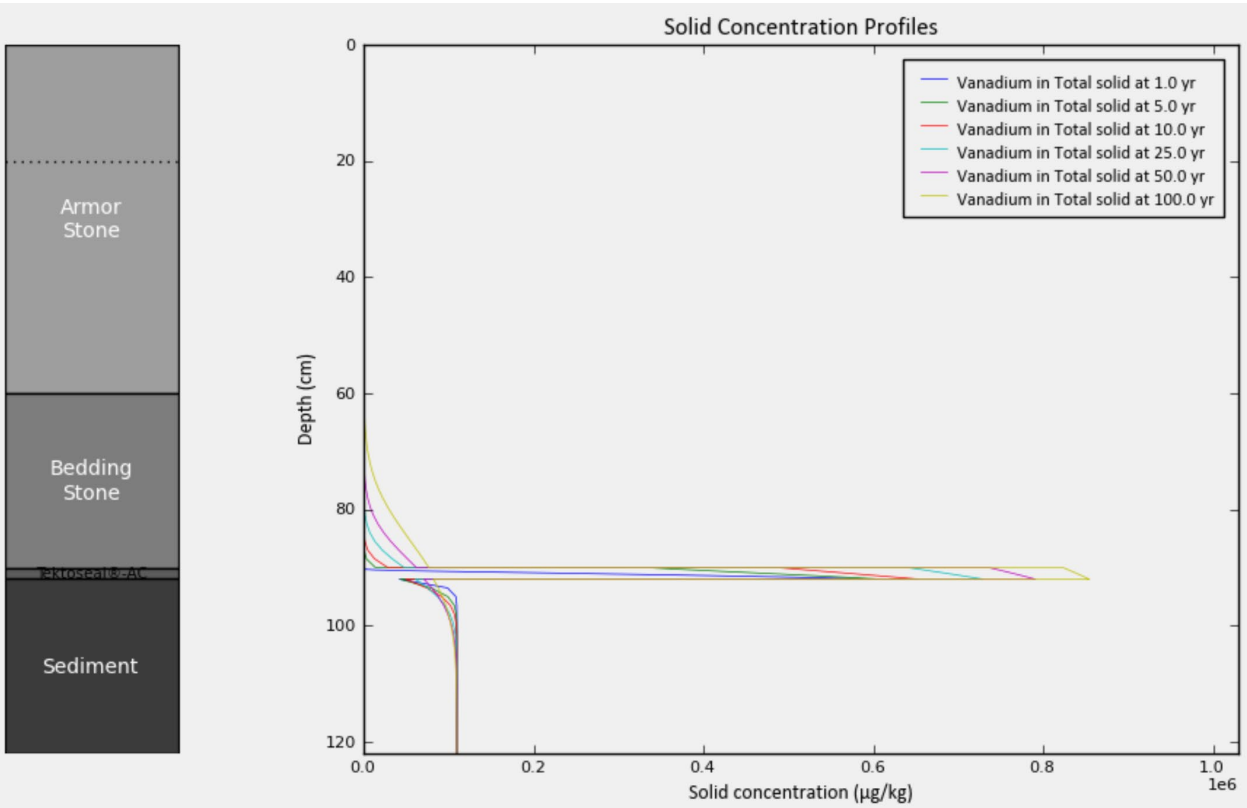

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Total cPAHs (BaP Eq) in Total solid at 1.0 yr
Total cPAHs (BaP Eq) in Total solid at 5.0 yr
Total cPAHs (BaP Eq) in Total solid at 10.0 yr
Total cPAHs (BaP Eq) in Total solid at 25.0 yr
Total cPAHs (BaP Eq) in Total solid at 50.0 yr
Total cPAHs (BaP Eq) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

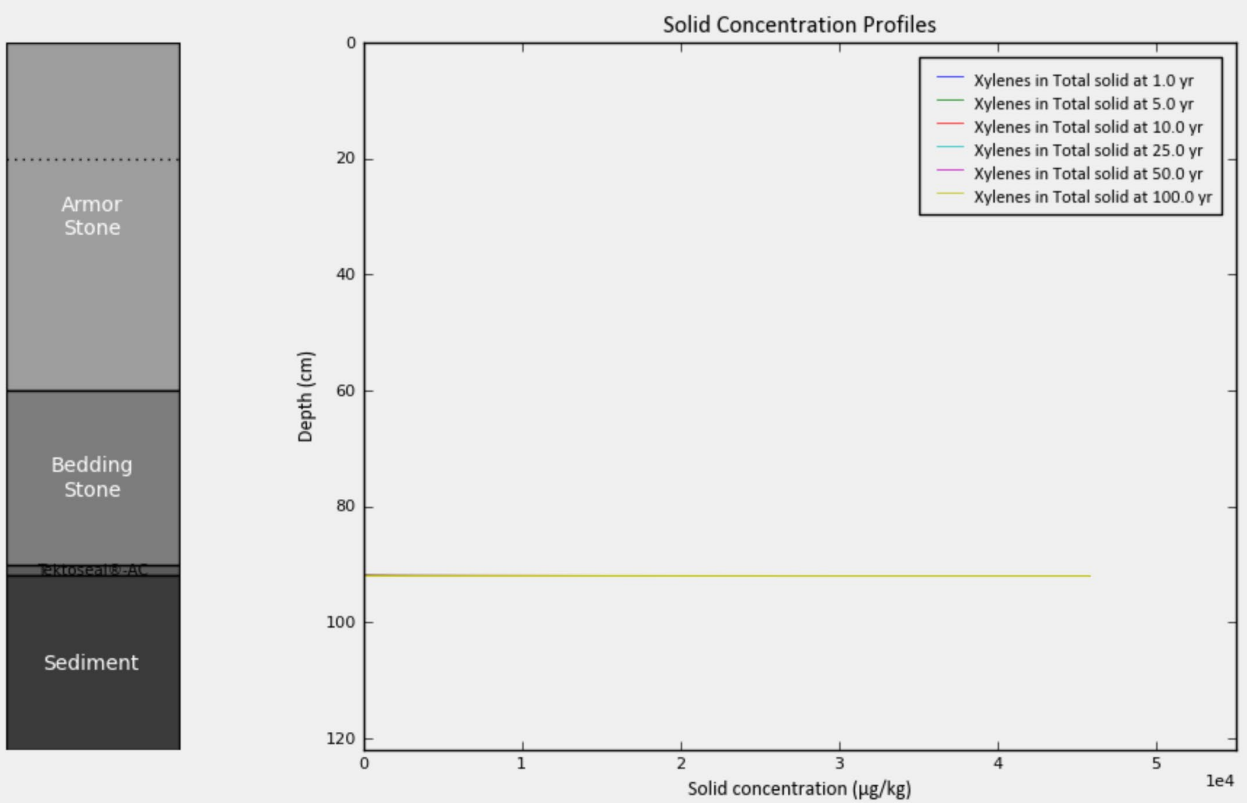

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Total DioxinFuran in Total solid at 1.0 yr
Total DioxinFuran in Total solid at 5.0 yr
Total DioxinFuran in Total solid at 10.0 yr
Total DioxinFuran in Total solid at 25.0 yr
Total DioxinFuran in Total solid at 50.0 yr
Total DioxinFuran in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

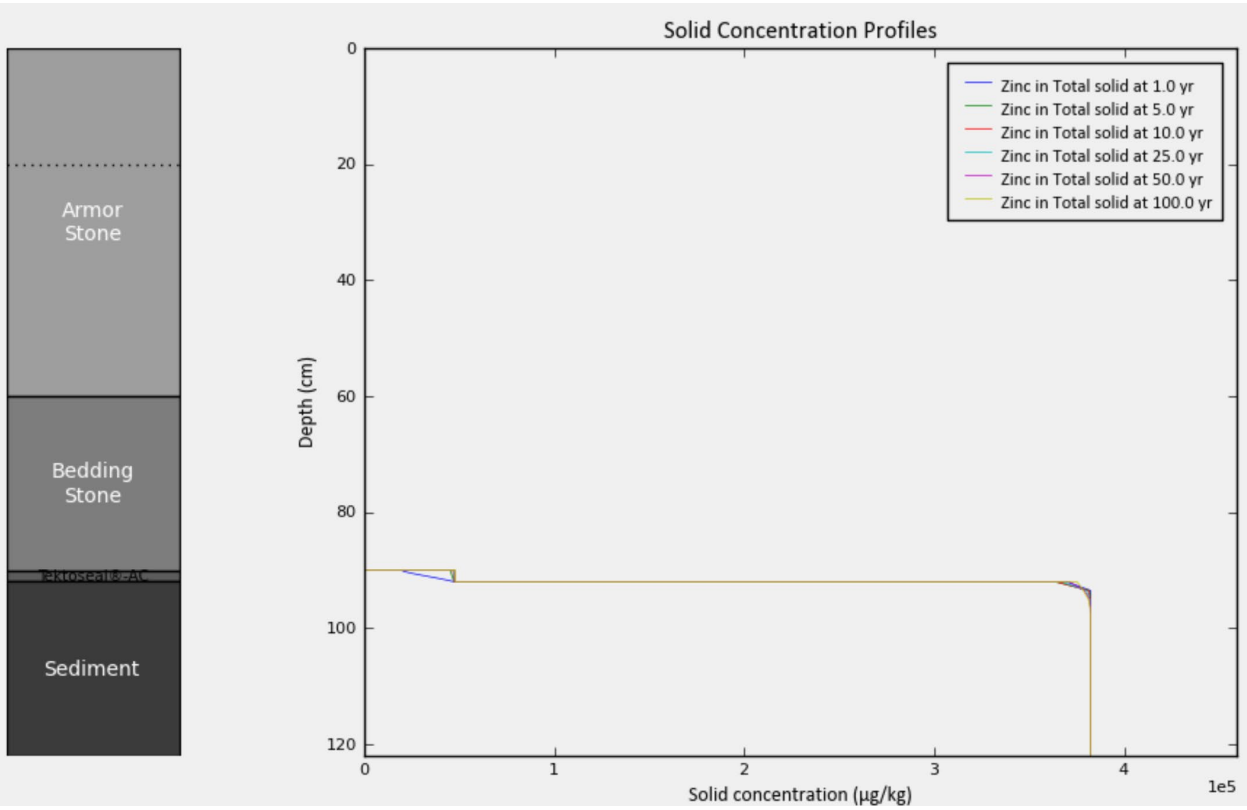

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Total PAHs in Total solid at 1.0 yr
Total PAHs in Total solid at 5.0 yr
Total PAHs in Total solid at 10.0 yr
Total PAHs in Total solid at 25.0 yr
Total PAHs in Total solid at 50.0 yr
Total PAHs in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6


Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Total PCBs in Total solid at 1.0 yr
Total PCBs in Total solid at 5.0 yr
Total PCBs in Total solid at 10.0 yr
Total PCBs in Total solid at 25.0 yr
Total PCBs in Total solid at 50.0 yr
Total PCBs in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5


Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Tributyltin in Total solid at 1.0 yr
Tributyltin in Total solid at 5.0 yr
Tributyltin in Total solid at 10.0 yr
Tributyltin in Total solid at 25.0 yr
Tributyltin in Total solid at 50.0 yr
Tributyltin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

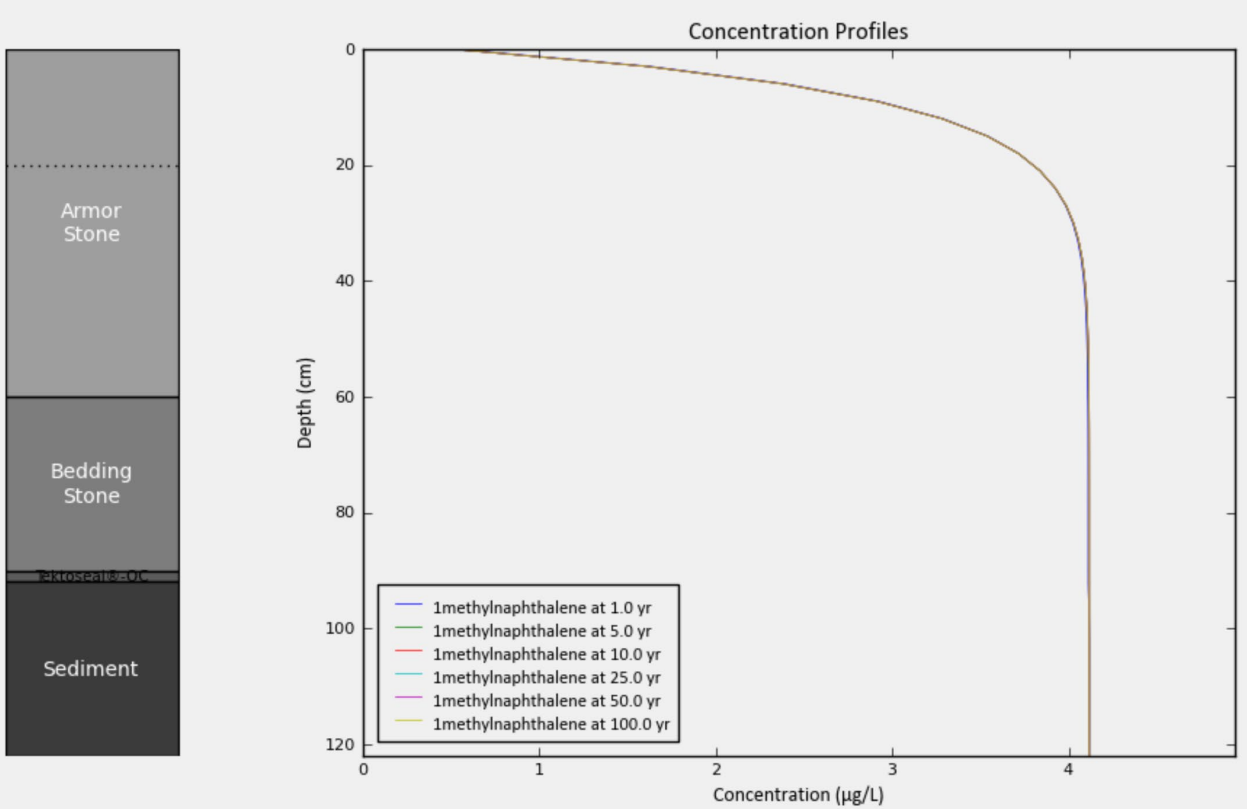

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Vanadium in Total solid at 1.0 yr
Vanadium in Total solid at 5.0 yr
Vanadium in Total solid at 10.0 yr
Vanadium in Total solid at 25.0 yr
Vanadium in Total solid at 50.0 yr
Vanadium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

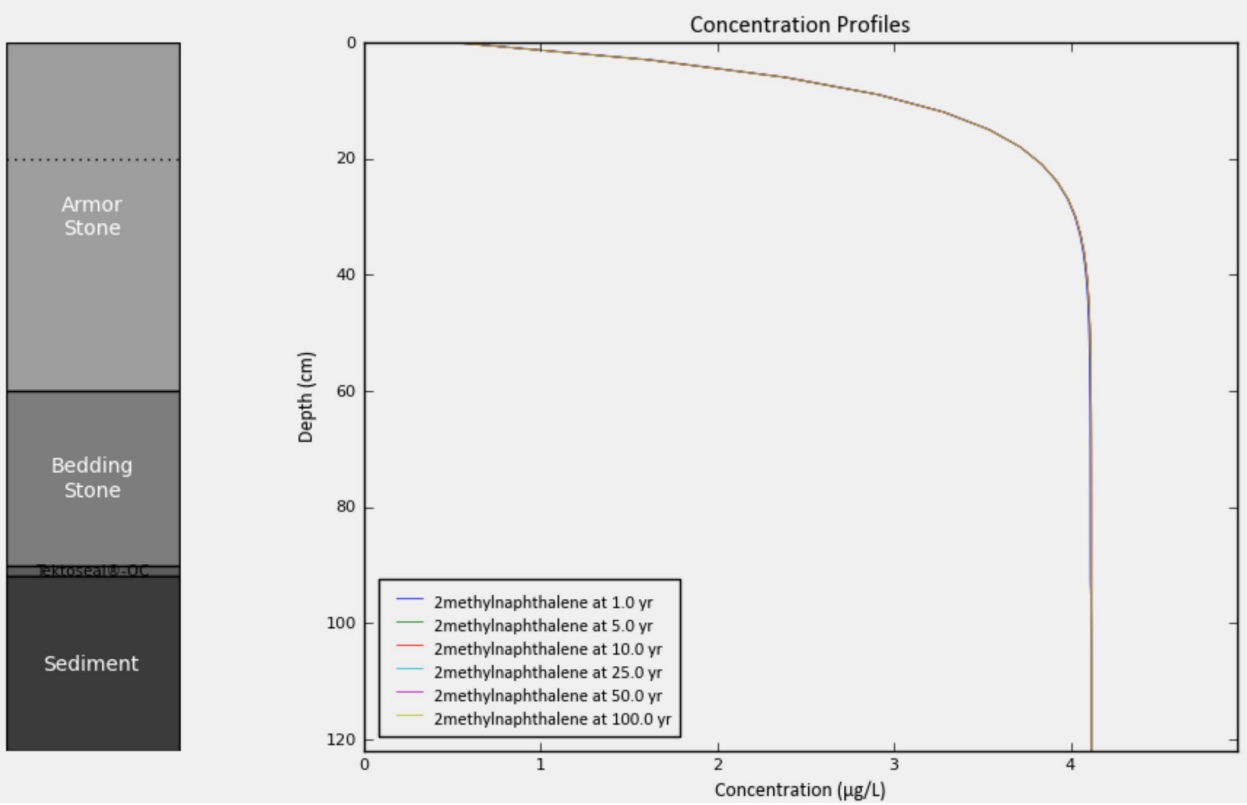

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Xylenes in Total solid at 1.0 yr
Xylenes in Total solid at 5.0 yr
Xylenes in Total solid at 10.0 yr
Xylenes in Total solid at 25.0 yr
Xylenes in Total solid at 50.0 yr
Xylenes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

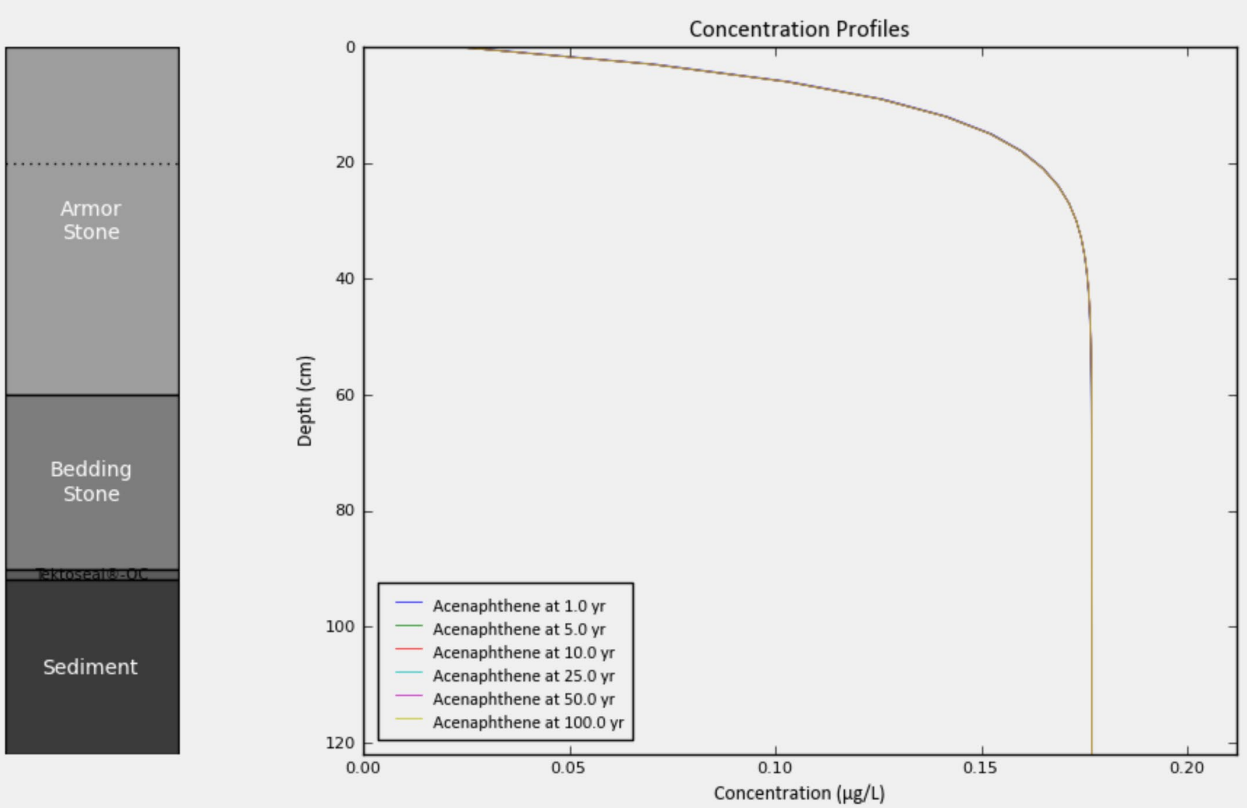

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Zinc in Total solid at 1.0 yr
Zinc in Total solid at 5.0 yr
Zinc in Total solid at 10.0 yr
Zinc in Total solid at 25.0 yr
Zinc in Total solid at 50.0 yr
Zinc in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

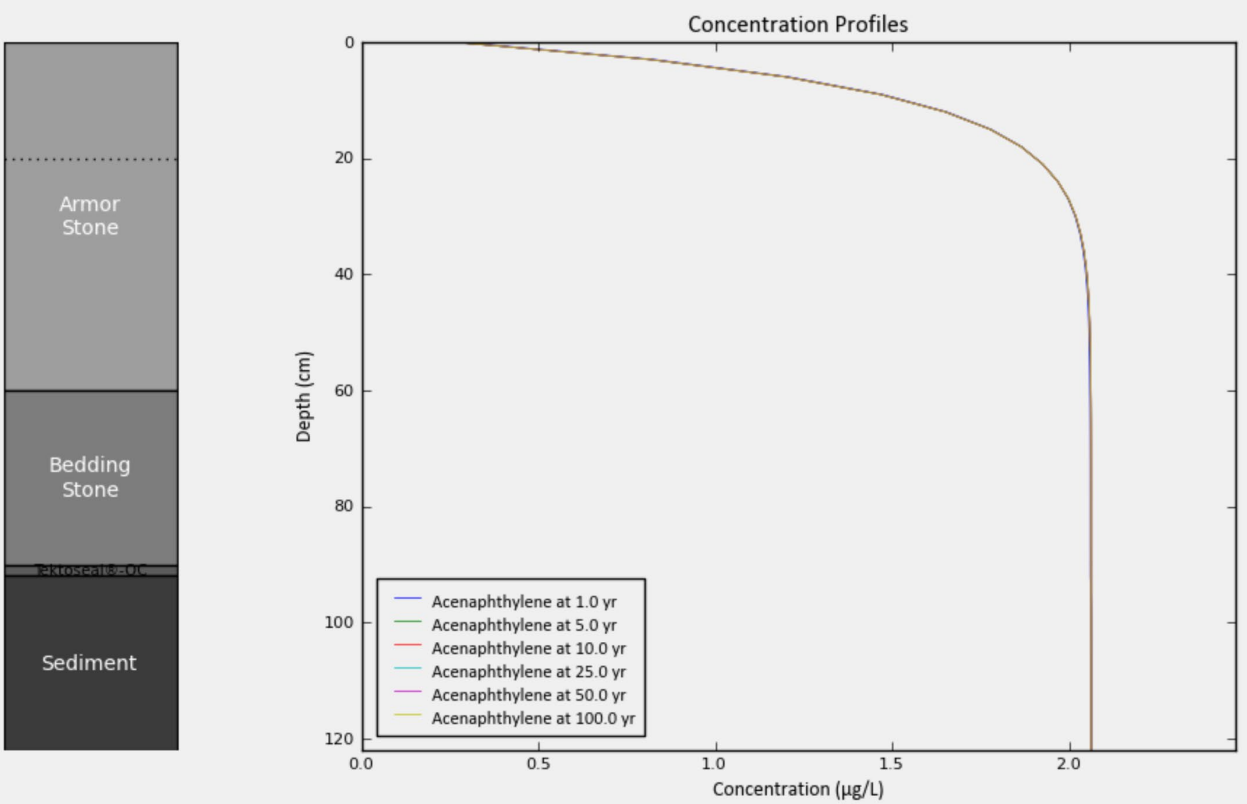
Cap Alternative 8: 2 cm Tektoseal-HM with 30 cm of 2.5-inch bedding stone and 60 cm of 10-inch armor stone

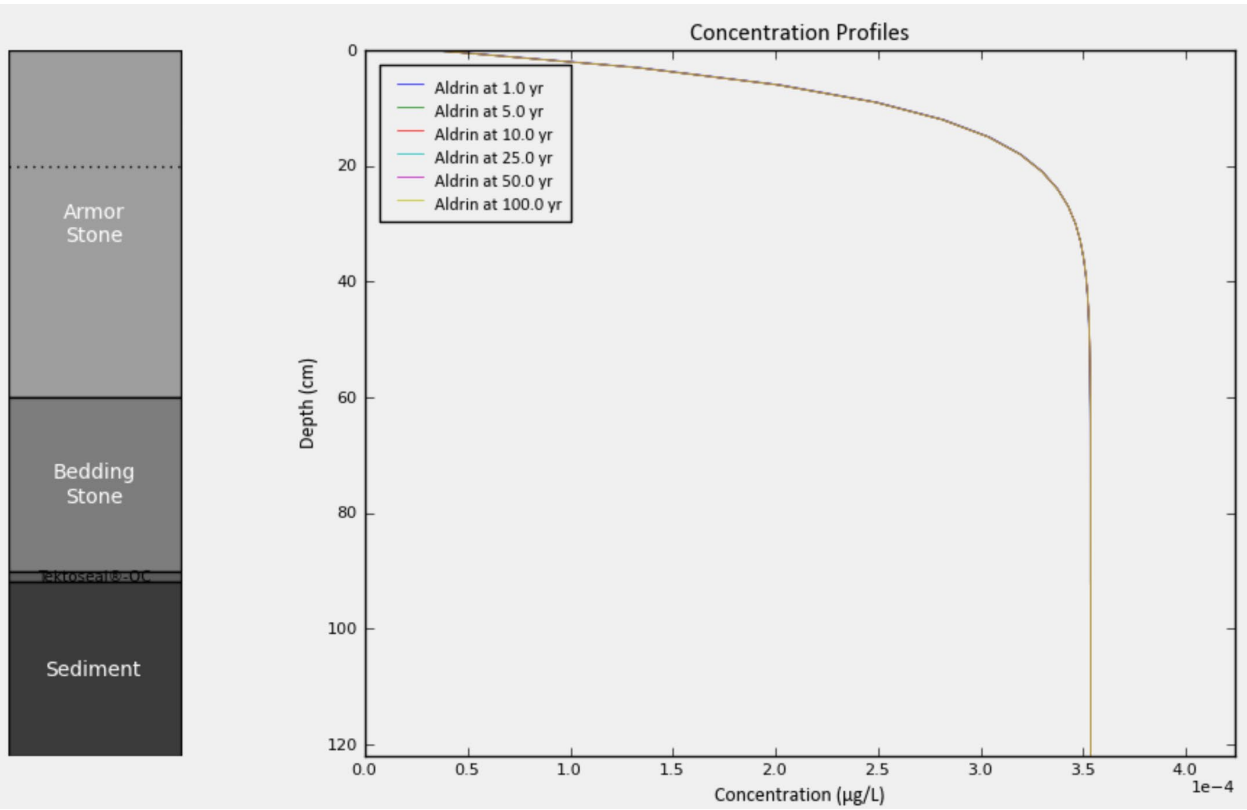
Porewater Concentration - Depth

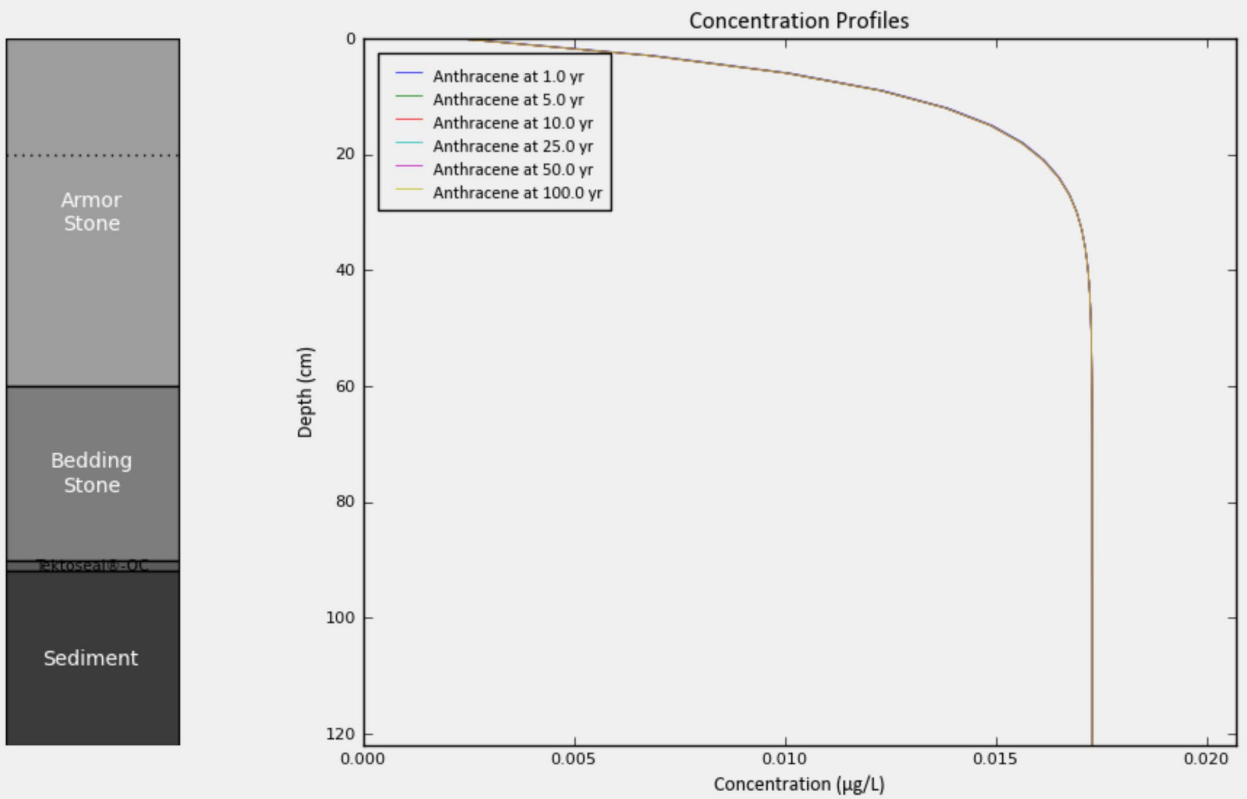


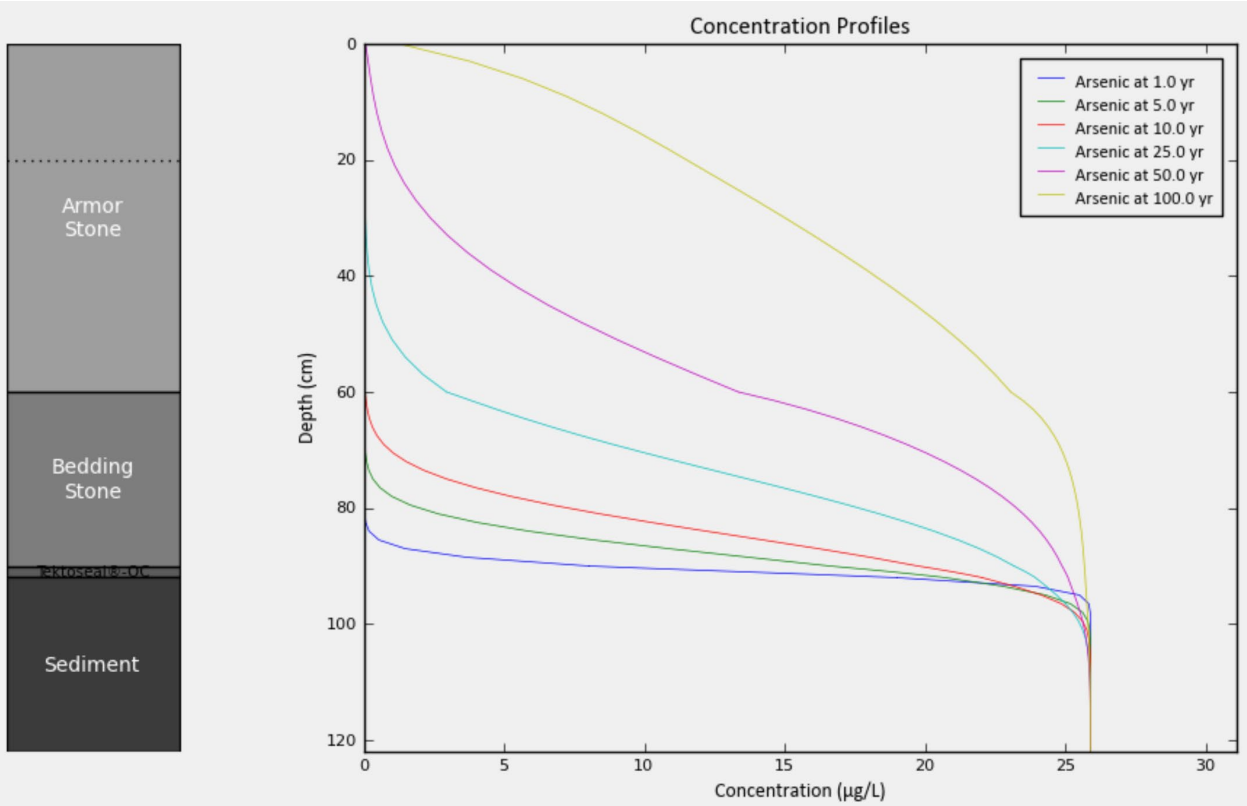

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
2methylnaphthalene at 1.0 yr
2methylnaphthalene at 5.0 yr
2methylnaphthalene at 10.0 yr
2methylnaphthalene at 25.0 yr
2methylnaphthalene at 50.0 yr
2methylnaphthalene at 100.0 yr

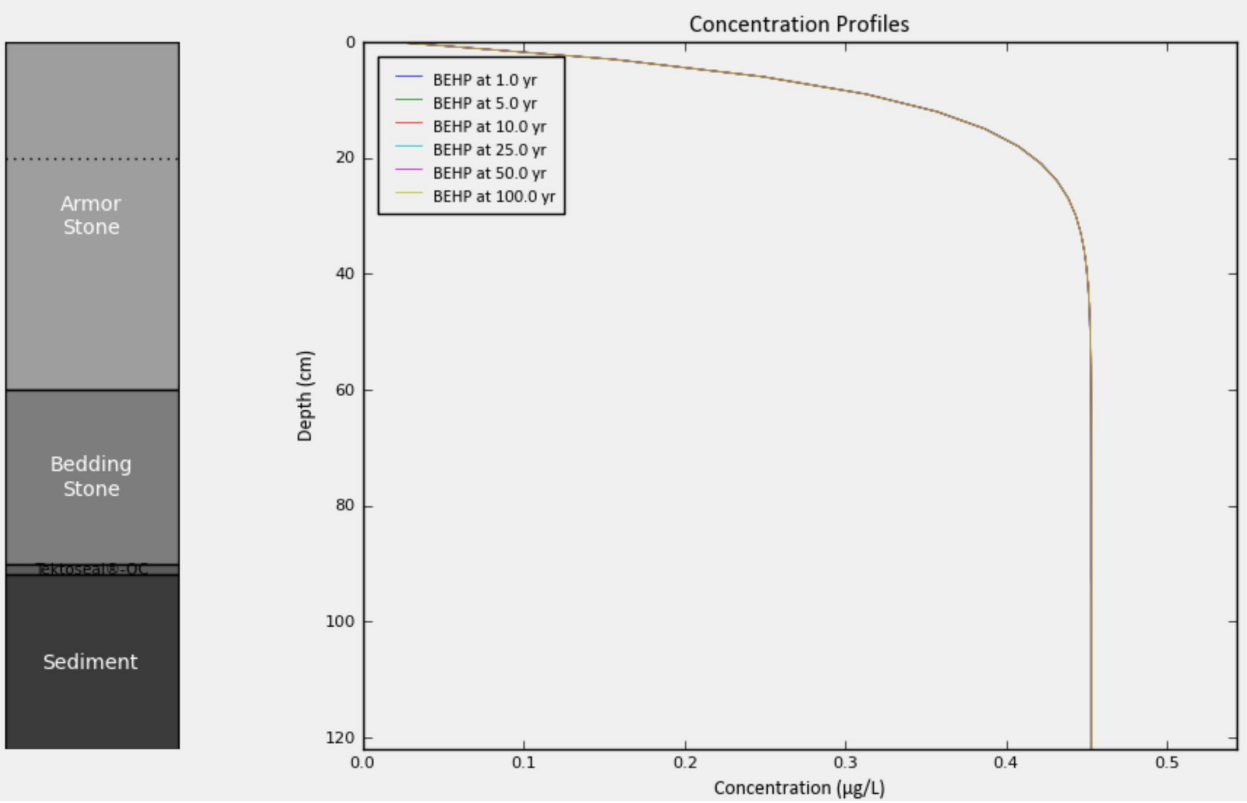

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Acenaphthene at 1.0 yr
Acenaphthene at 5.0 yr
Acenaphthene at 10.0 yr
Acenaphthene at 25.0 yr
Acenaphthene at 50.0 yr
Acenaphthene at 100.0 yr

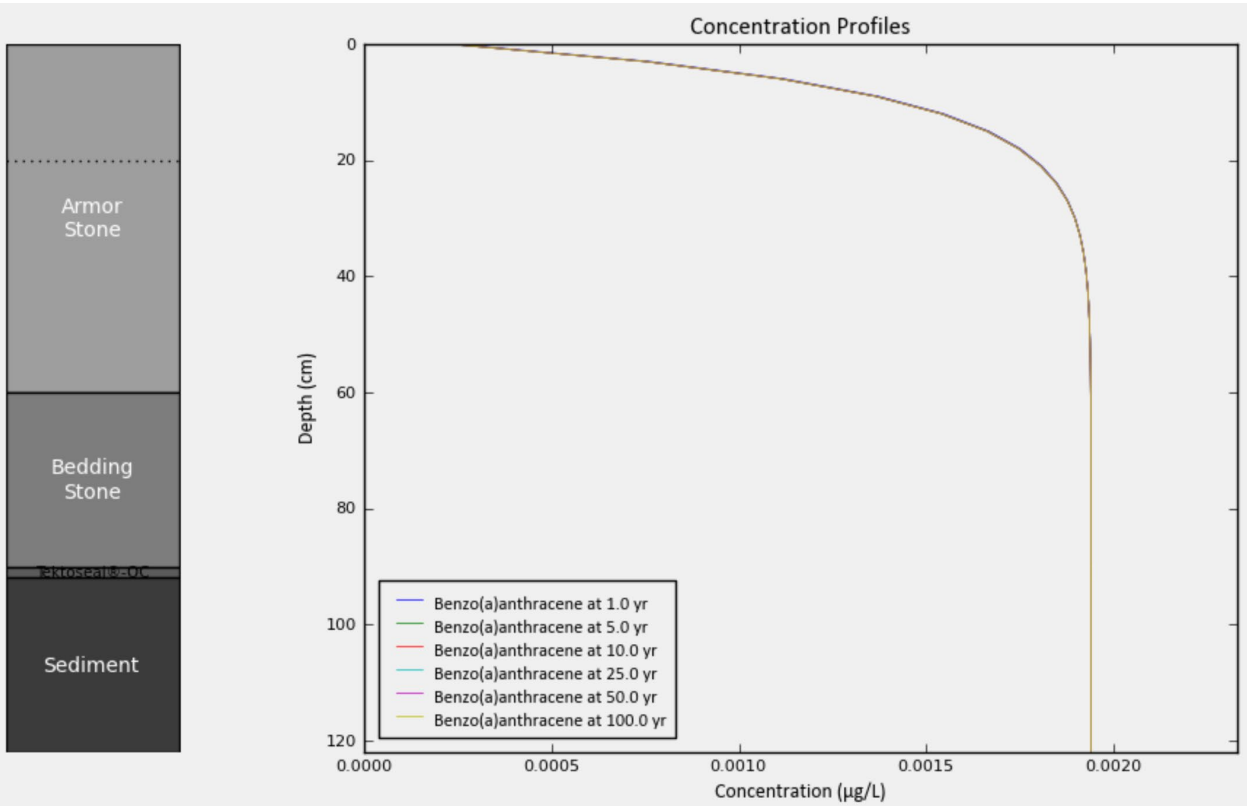

Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal®-OC
Sediment
Depth (cm)
Concentration (µg/L)
Acenaphthylene at 1.0 yr
Acenaphthylene at 5.0 yr
Acenaphthylene at 10.0 yr
Acenaphthylene at 25.0 yr
Acenaphthylene at 50.0 yr
Acenaphthylene at 100.0 yr

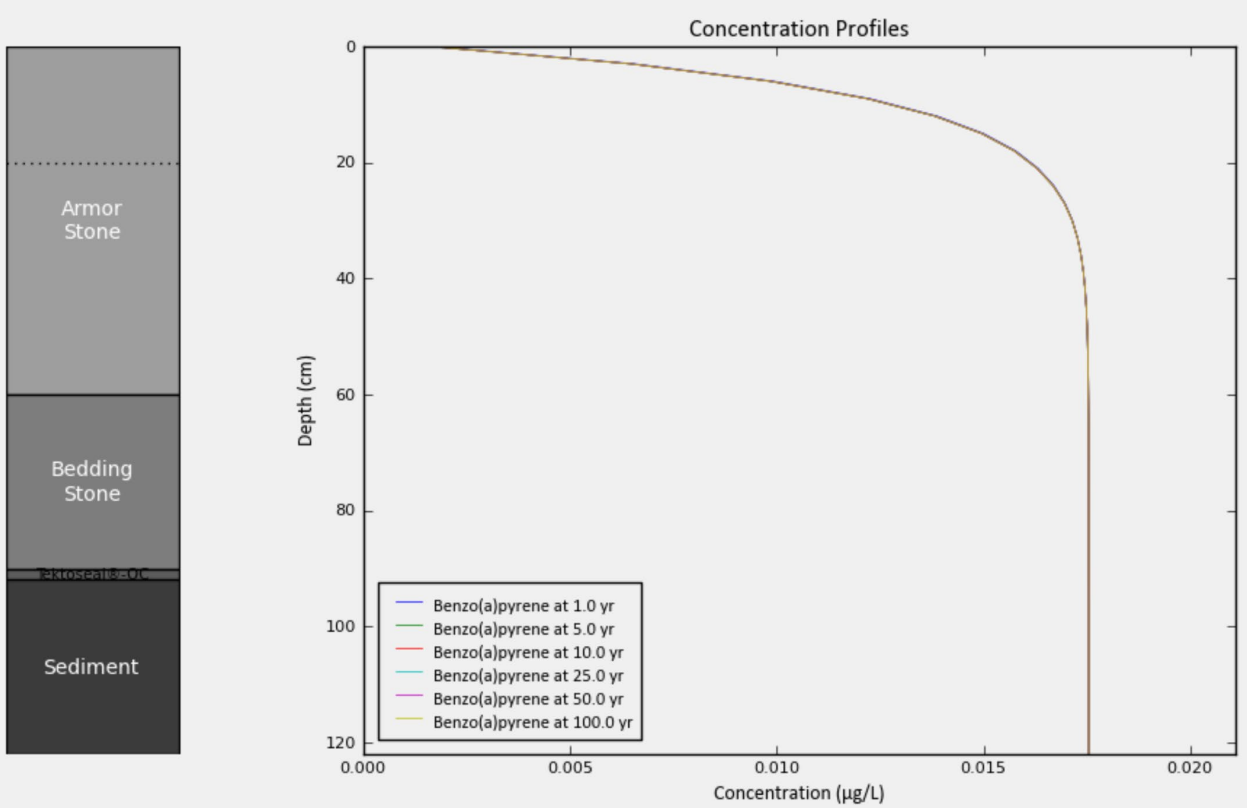

Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal®-OC
Sediment
Depth (cm)
Concentration (µg/L)
1e−4
Aldrin at 1.0 yr
Aldrin at 5.0 yr
Aldrin at 10.0 yr
Aldrin at 25.0 yr
Aldrin at 50.0 yr
Aldrin at 100.0 yr

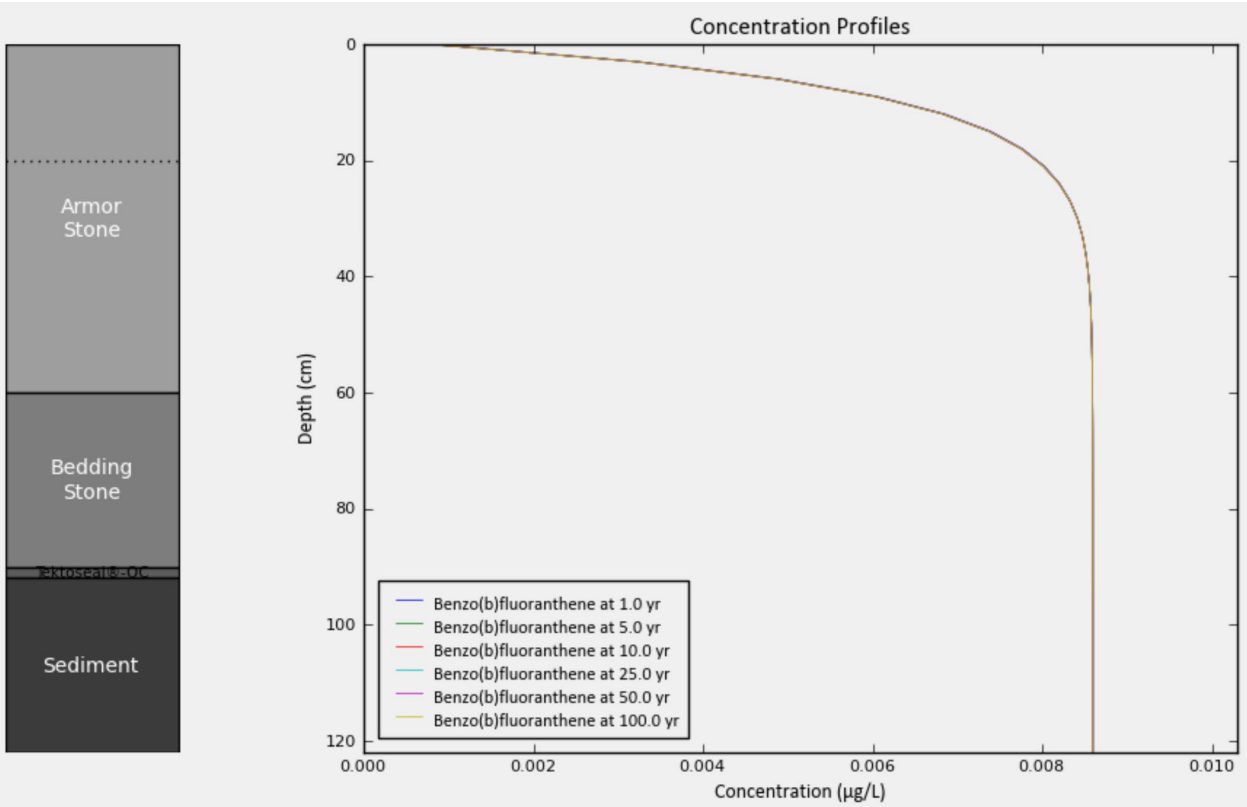

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Anthracene at 1.0 yr
Anthracene at 5.0 yr
Anthracene at 10.0 yr
Anthracene at 25.0 yr
Anthracene at 50.0 yr
Anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020

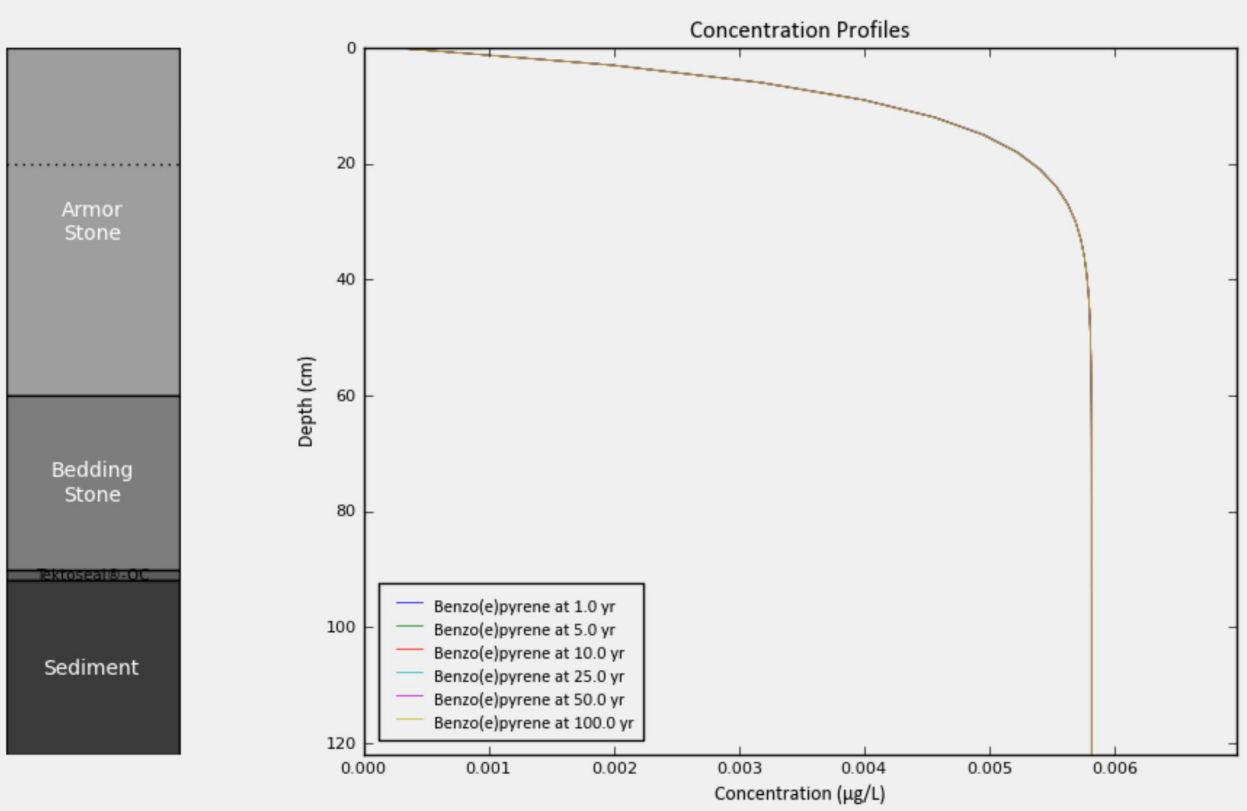

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Arsenic at 1.0 yr
Arsenic at 5.0 yr
Arsenic at 10.0 yr
Arsenic at 25.0 yr
Arsenic at 50.0 yr
Arsenic at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
5
10
15
20
25
30

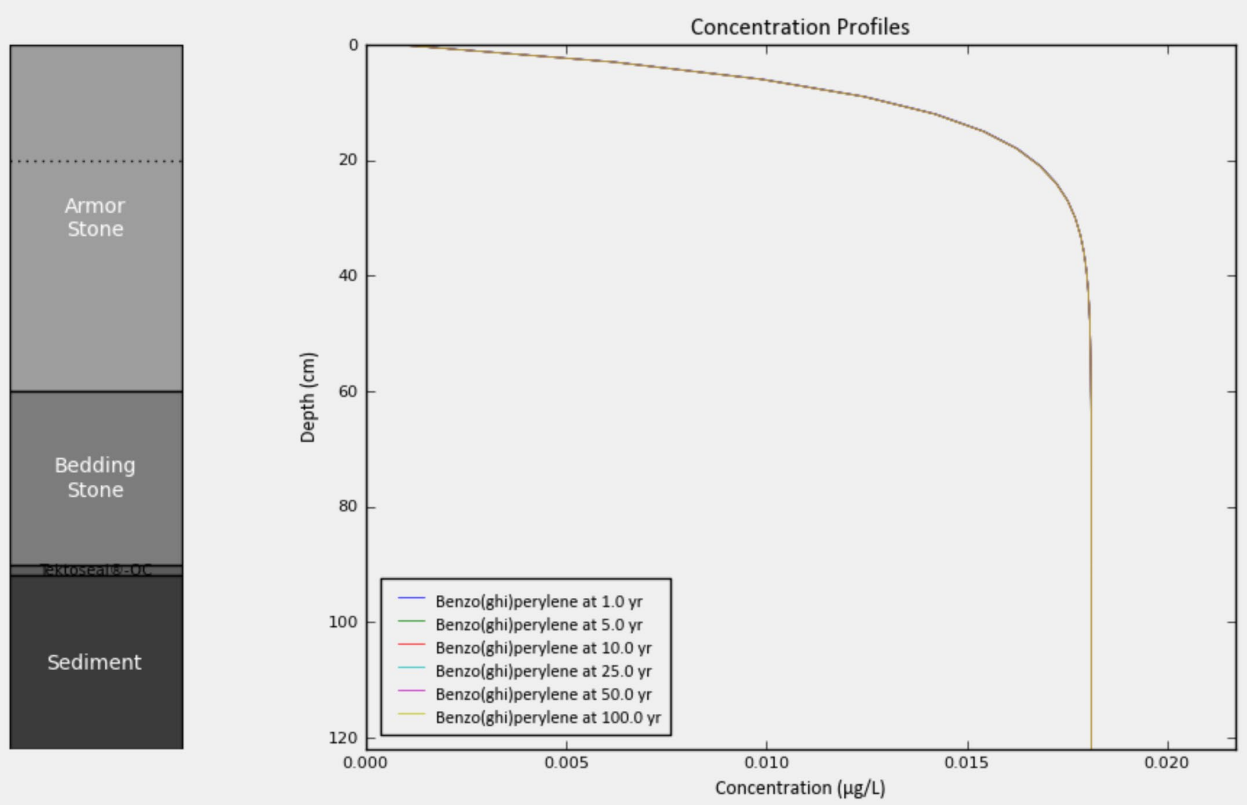

Armor Stone
Bedding Stone
Ekoseal® EC
Sediment
Concentration Profiles
BEHP at 1.0 yr
BEHP at 5.0 yr
BEHP at 10.0 yr
BEHP at 25.0 yr
BEHP at 50.0 yr
BEHP at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0
0.1
0.2
0.3
0.4
0.5

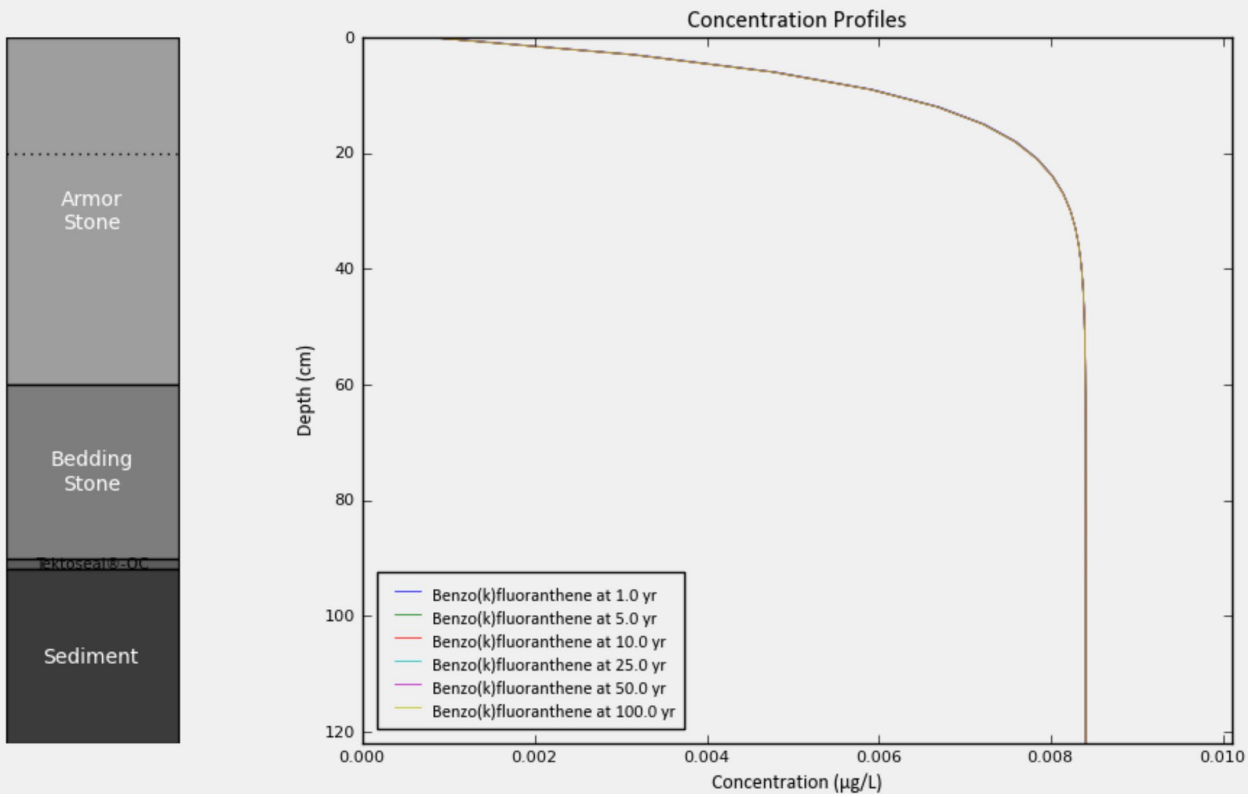

Armor Stone
Bedding Stone
Ekoseal® EC
Sediment
Concentration Profiles
Benzo(a)anthracene at 1.0 yr
Benzo(a)anthracene at 5.0 yr
Benzo(a)anthracene at 10.0 yr
Benzo(a)anthracene at 25.0 yr
Benzo(a)anthracene at 50.0 yr
Benzo(a)anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020

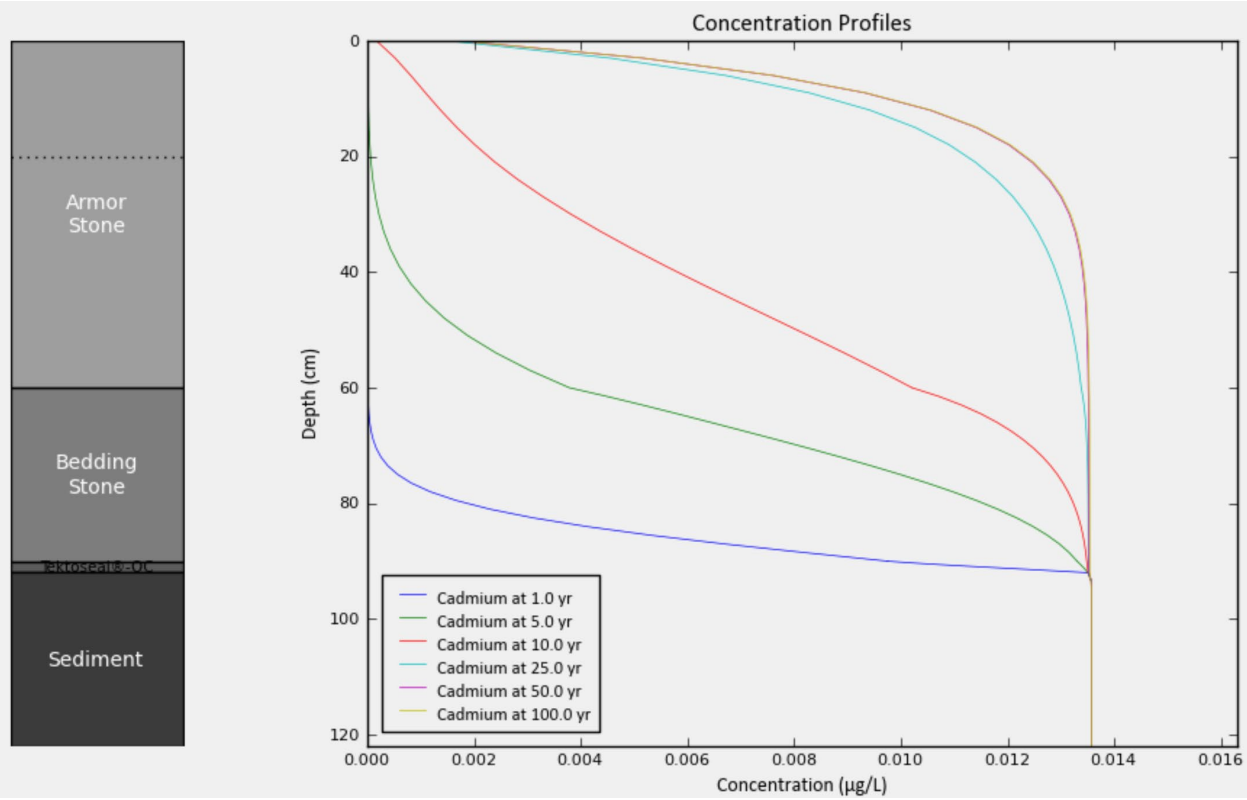

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
Benzo(a)pyrene at 1.0 yr
Benzo(a)pyrene at 5.0 yr
Benzo(a)pyrene at 10.0 yr
Benzo(a)pyrene at 25.0 yr
Benzo(a)pyrene at 50.0 yr
Benzo(a)pyrene at 100.0 yr

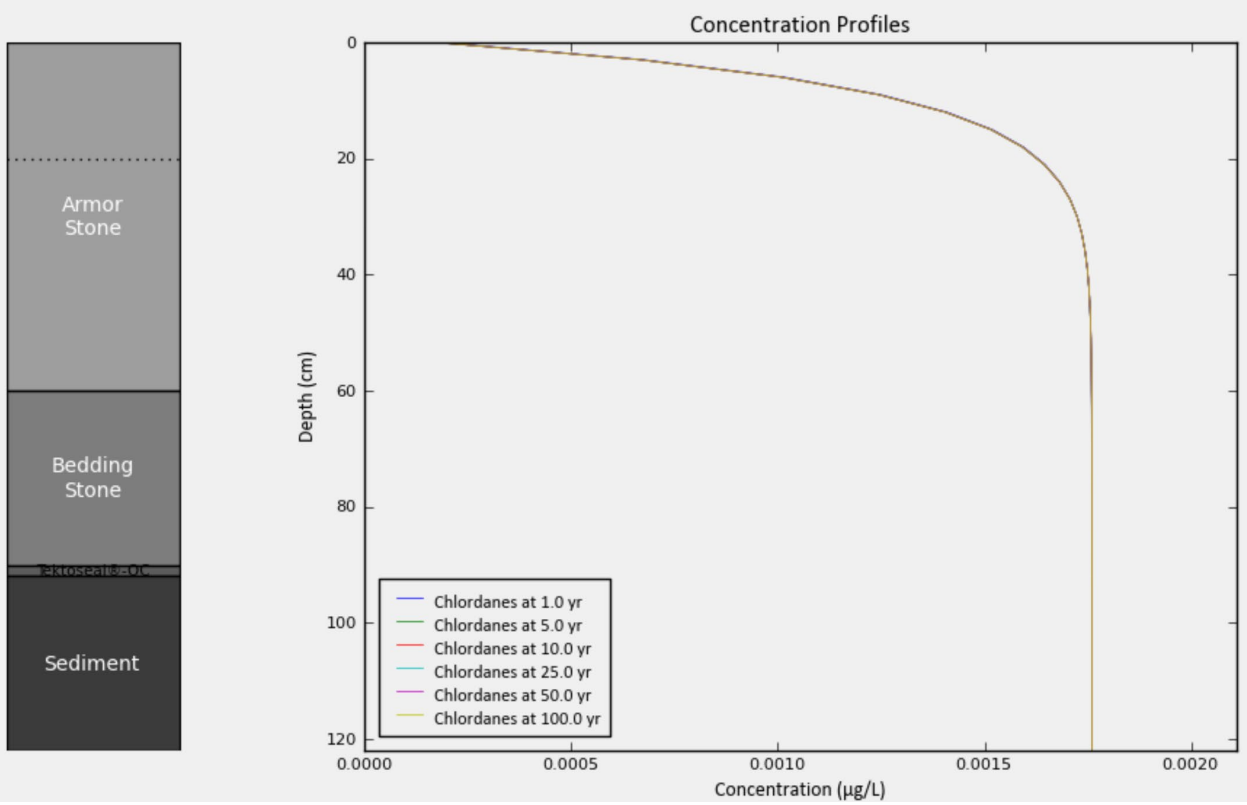

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
0.010
Benzo(b)fluoranthene at 1.0 yr
Benzo(b)fluoranthene at 5.0 yr
Benzo(b)fluoranthene at 10.0 yr
Benzo(b)fluoranthene at 25.0 yr
Benzo(b)fluoranthene at 50.0 yr
Benzo(b)fluoranthene at 100.0 yr

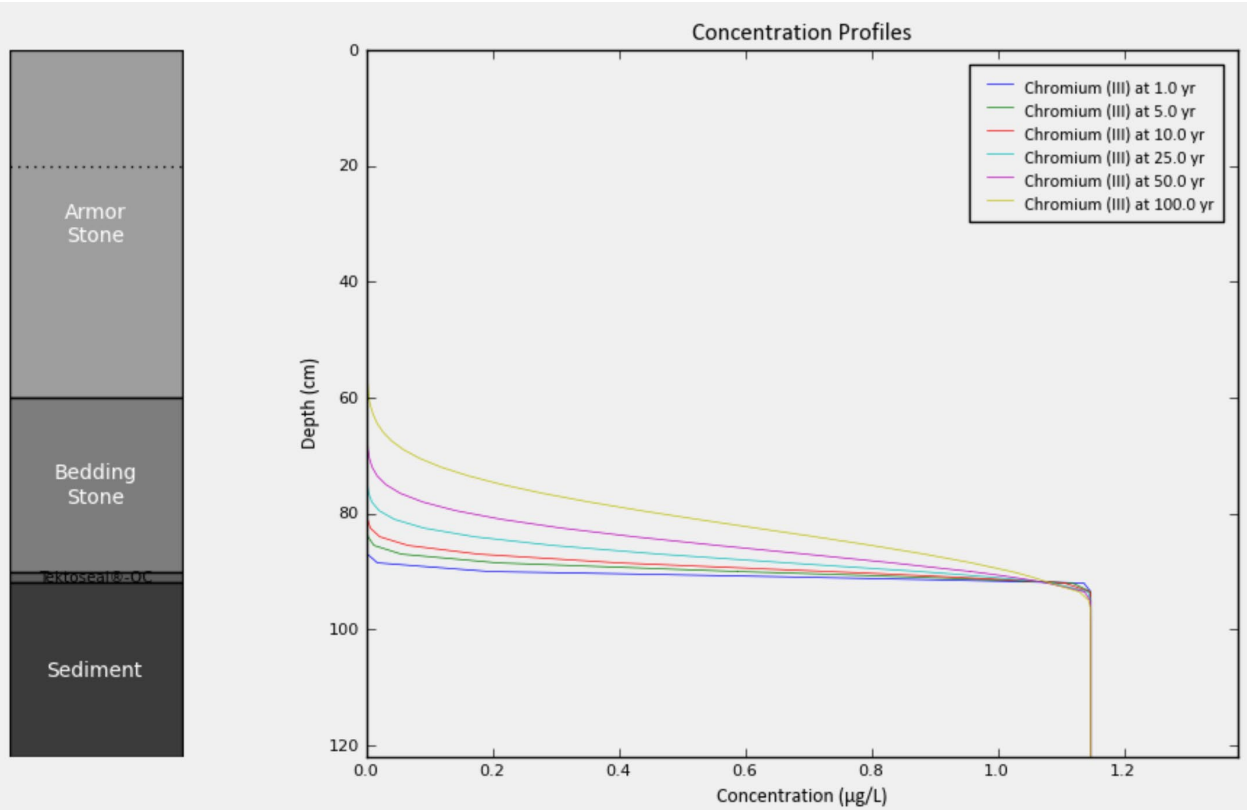

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Benzo(e)pyrene at 1.0 yr
Benzo(e)pyrene at 5.0 yr
Benzo(e)pyrene at 10.0 yr
Benzo(e)pyrene at 25.0 yr
Benzo(e)pyrene at 50.0 yr
Benzo(e)pyrene at 100.0 yr

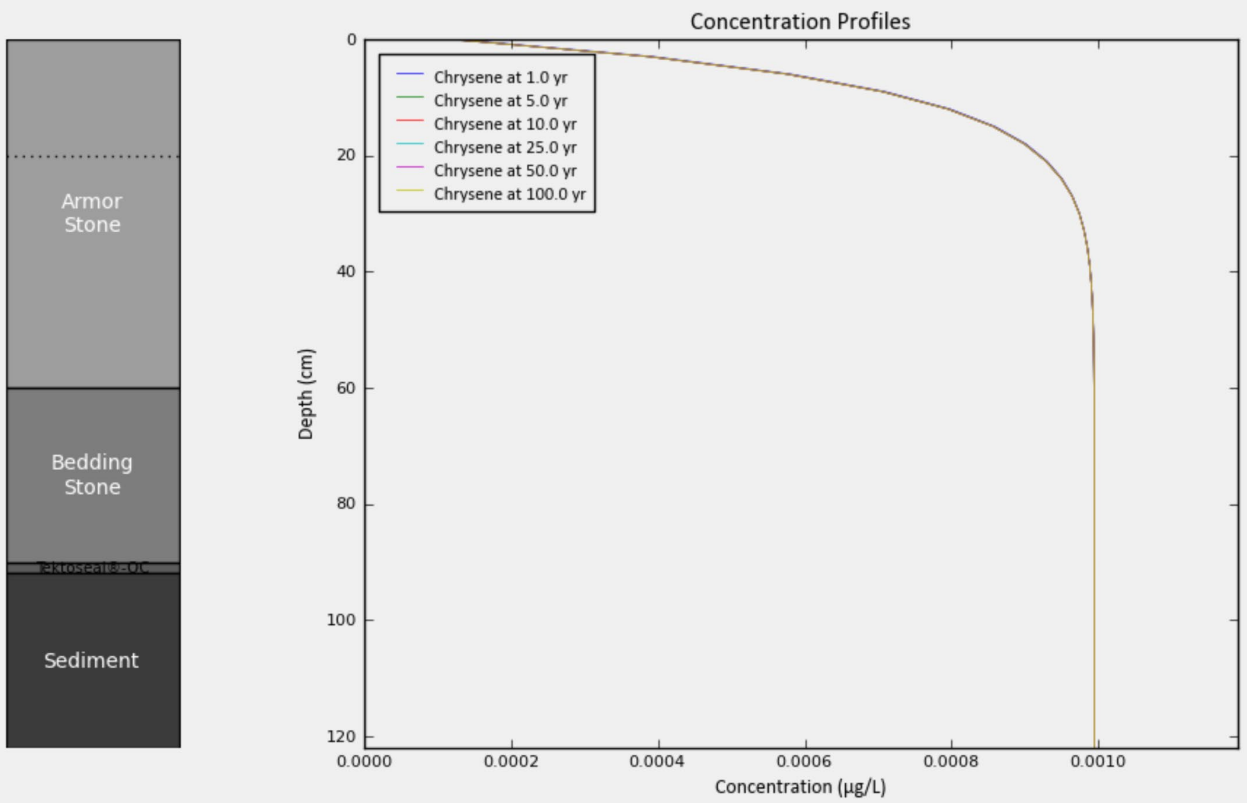

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Benzo(ghi)perylene at 1.0 yr
Benzo(ghi)perylene at 5.0 yr
Benzo(ghi)perylene at 10.0 yr
Benzo(ghi)perylene at 25.0 yr
Benzo(ghi)perylene at 50.0 yr
Benzo(ghi)perylene at 100.0 yr

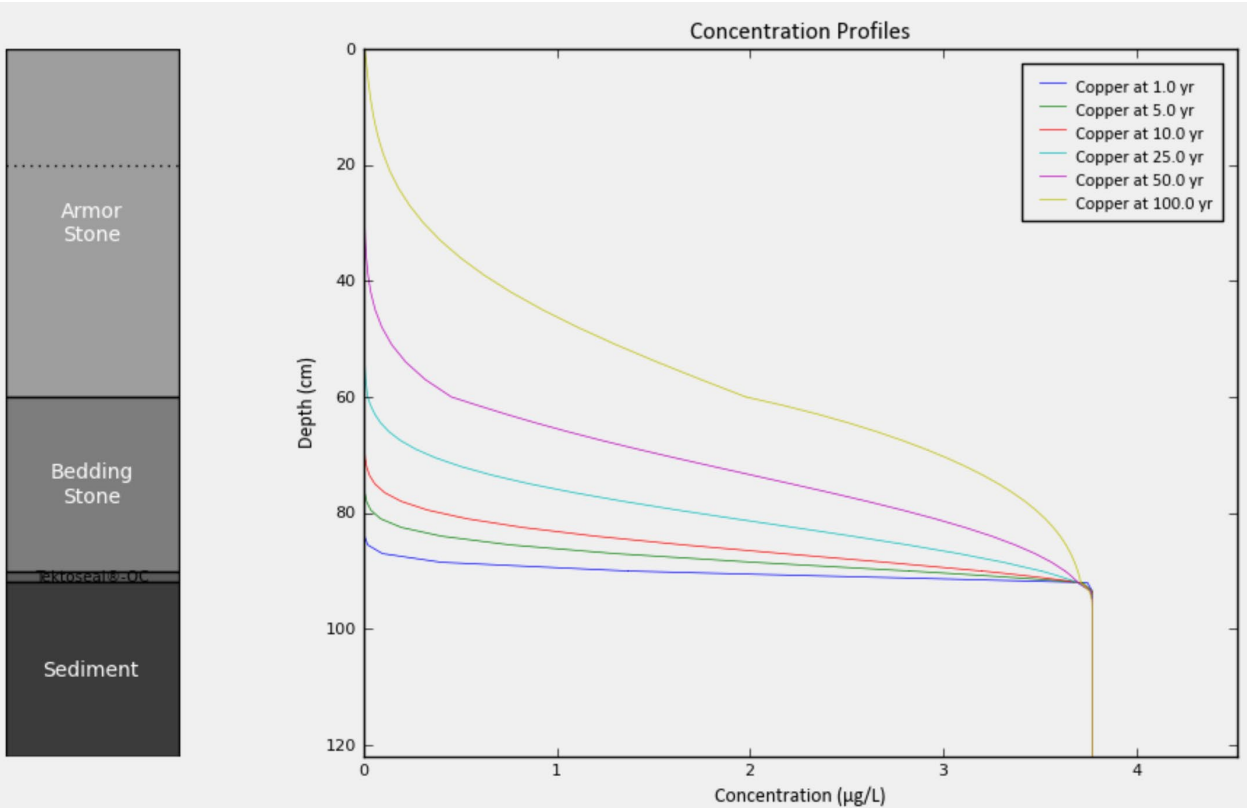

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Benzo(k)fluoranthene at 1.0 yr
Benzo(k)fluoranthene at 5.0 yr
Benzo(k)fluoranthene at 10.0 yr
Benzo(k)fluoranthene at 25.0 yr
Benzo(k)fluoranthene at 50.0 yr
Benzo(k)fluoranthene at 100.0 yr

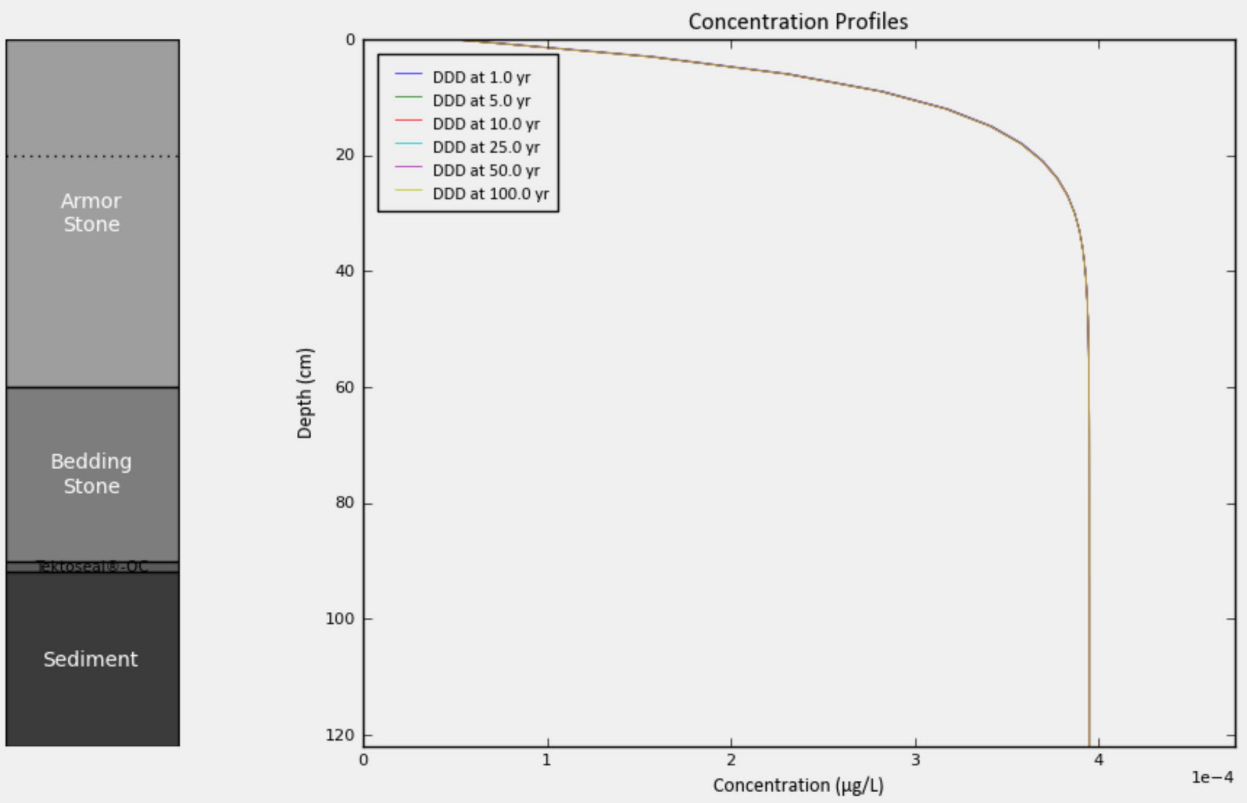

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Cadmium at 1.0 yr
Cadmium at 5.0 yr
Cadmium at 10.0 yr
Cadmium at 25.0 yr
Cadmium at 50.0 yr
Cadmium at 100.0 yr

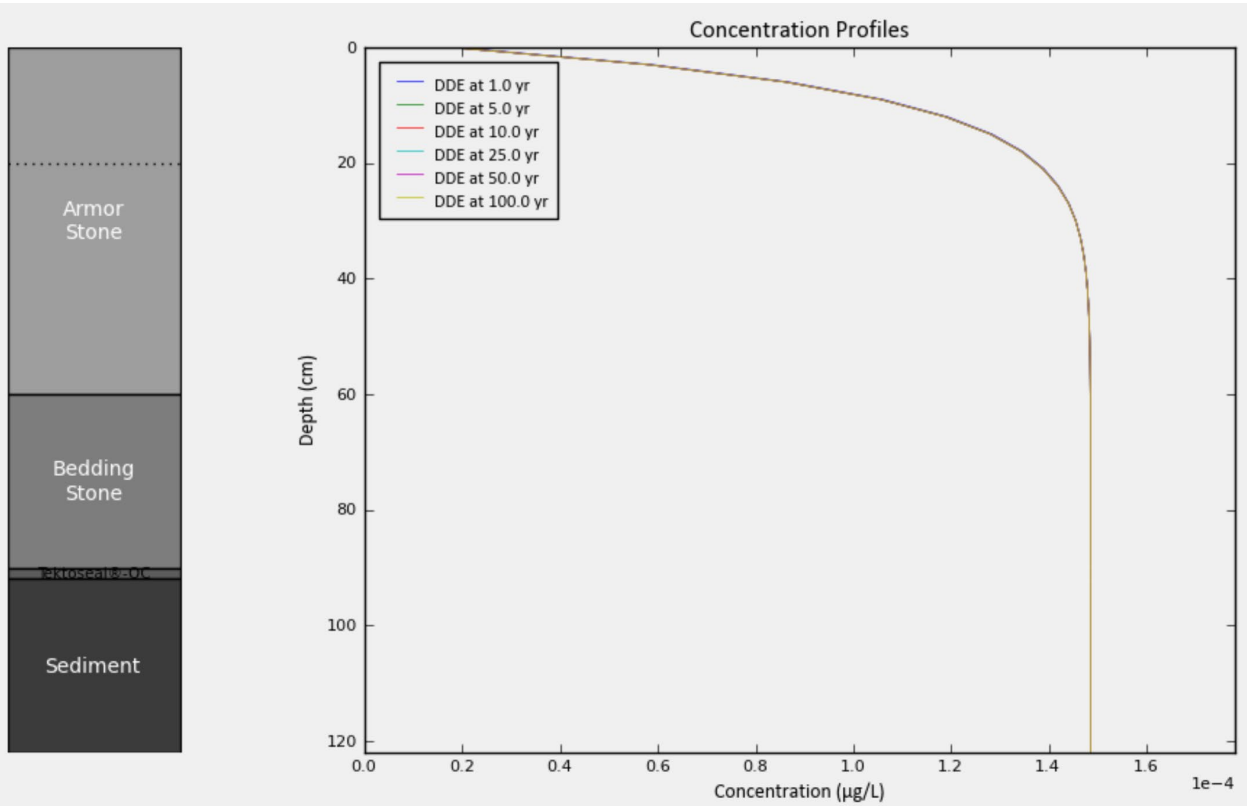

Armor Stone
Bedding Stone
Ektoseal 3.0C
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
Chlordanes at 1.0 yr
Chlordanes at 5.0 yr
Chlordanes at 10.0 yr
Chlordanes at 25.0 yr
Chlordanes at 50.0 yr
Chlordanes at 100.0 yr

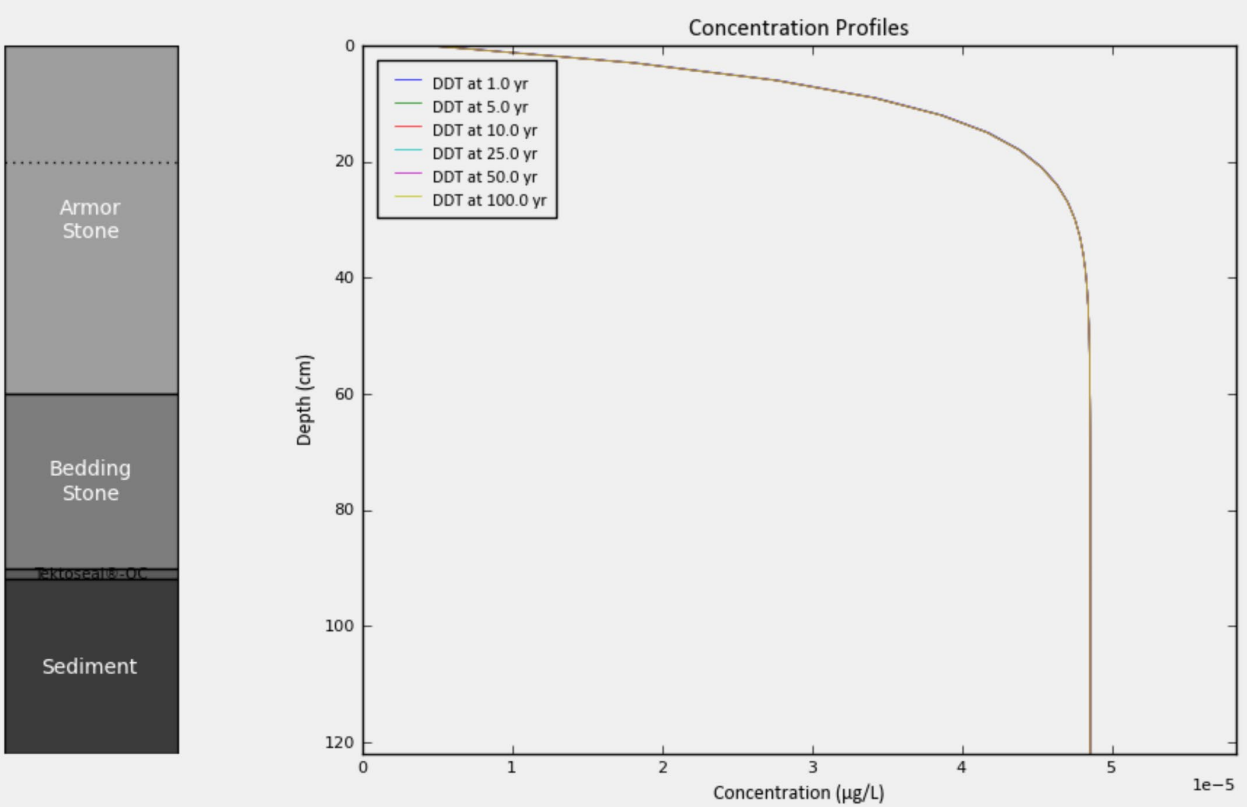

Armor Stone
Bedding Stone
Ektoseal 3.0C
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Chromium (III) at 1.0 yr
Chromium (III) at 5.0 yr
Chromium (III) at 10.0 yr
Chromium (III) at 25.0 yr
Chromium (III) at 50.0 yr
Chromium (III) at 100.0 yr

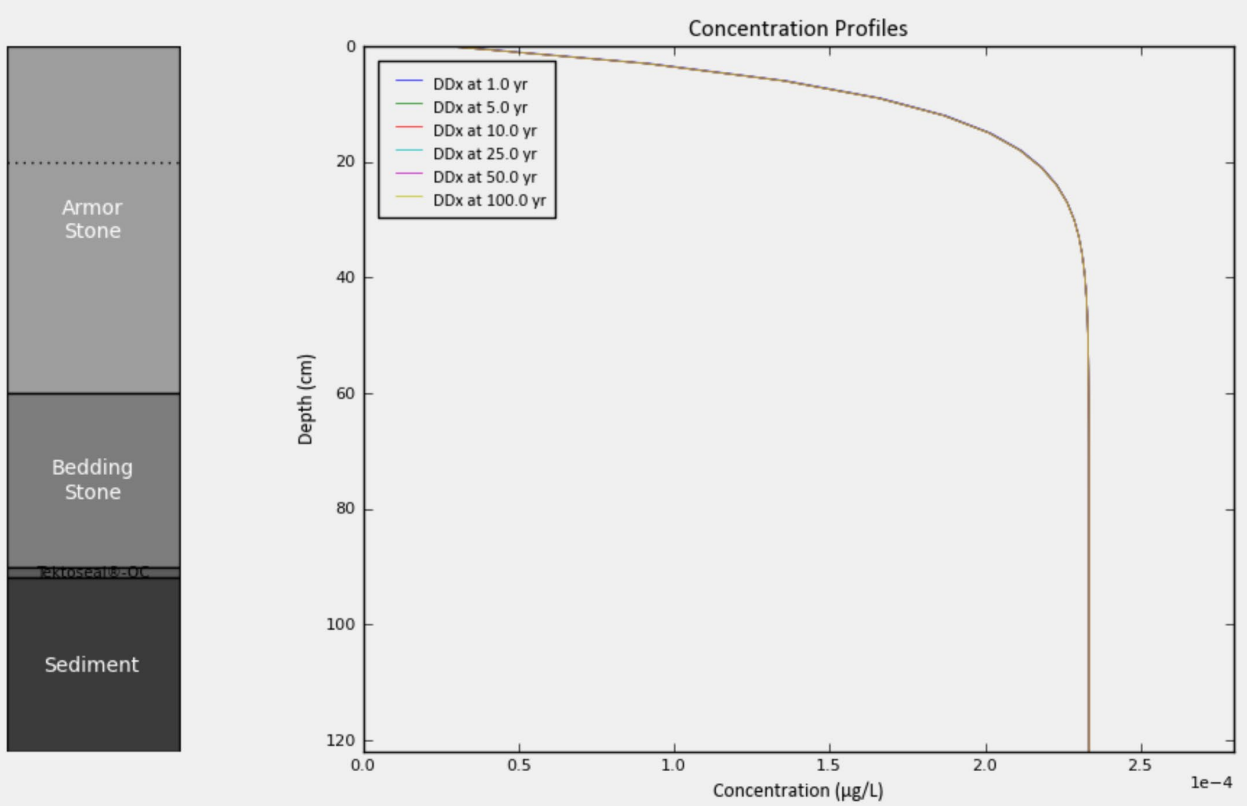

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Chrysene at 1.0 yr
Chrysene at 5.0 yr
Chrysene at 10.0 yr
Chrysene at 25.0 yr
Chrysene at 50.0 yr
Chrysene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010

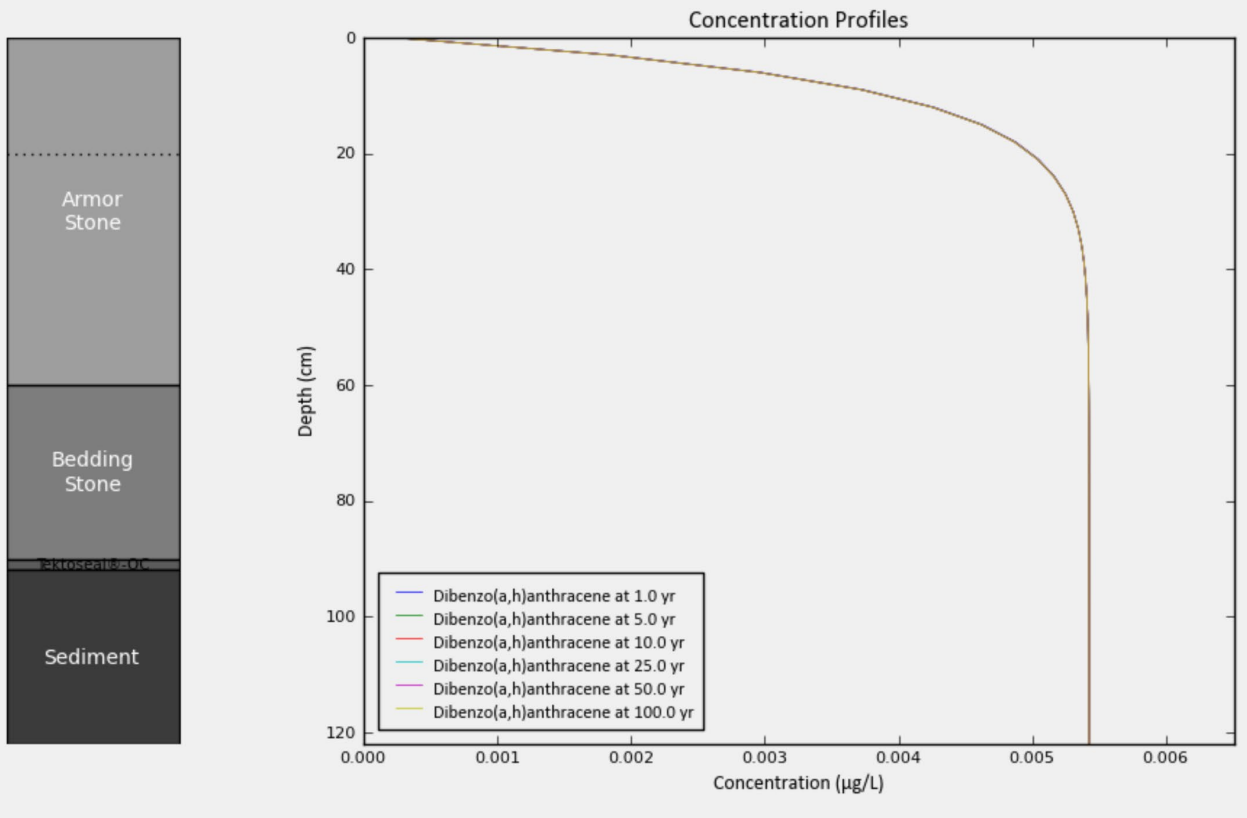

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Copper at 1.0 yr
Copper at 5.0 yr
Copper at 10.0 yr
Copper at 25.0 yr
Copper at 50.0 yr
Copper at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
1
2
3
4

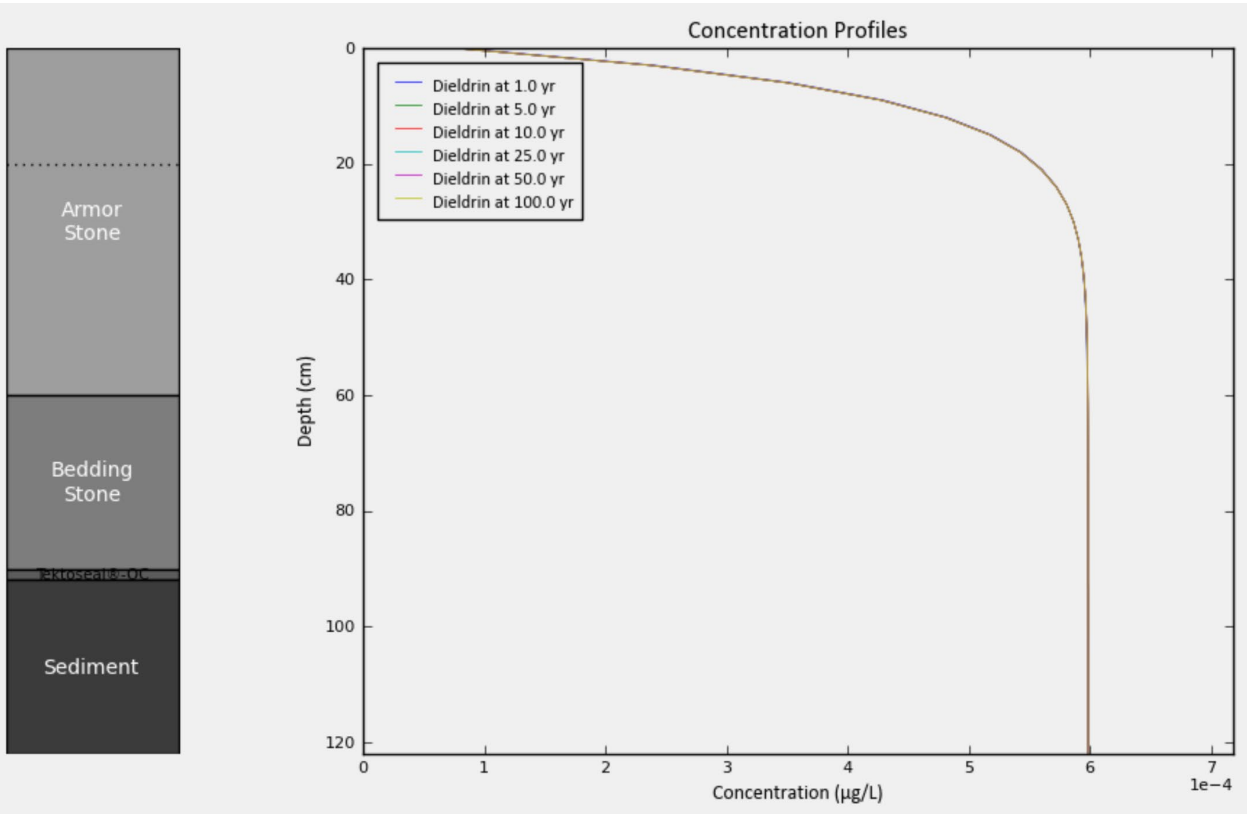

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDD at 1.0 yr
DDD at 5.0 yr
DDD at 10.0 yr
DDD at 25.0 yr
DDD at 50.0 yr
DDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

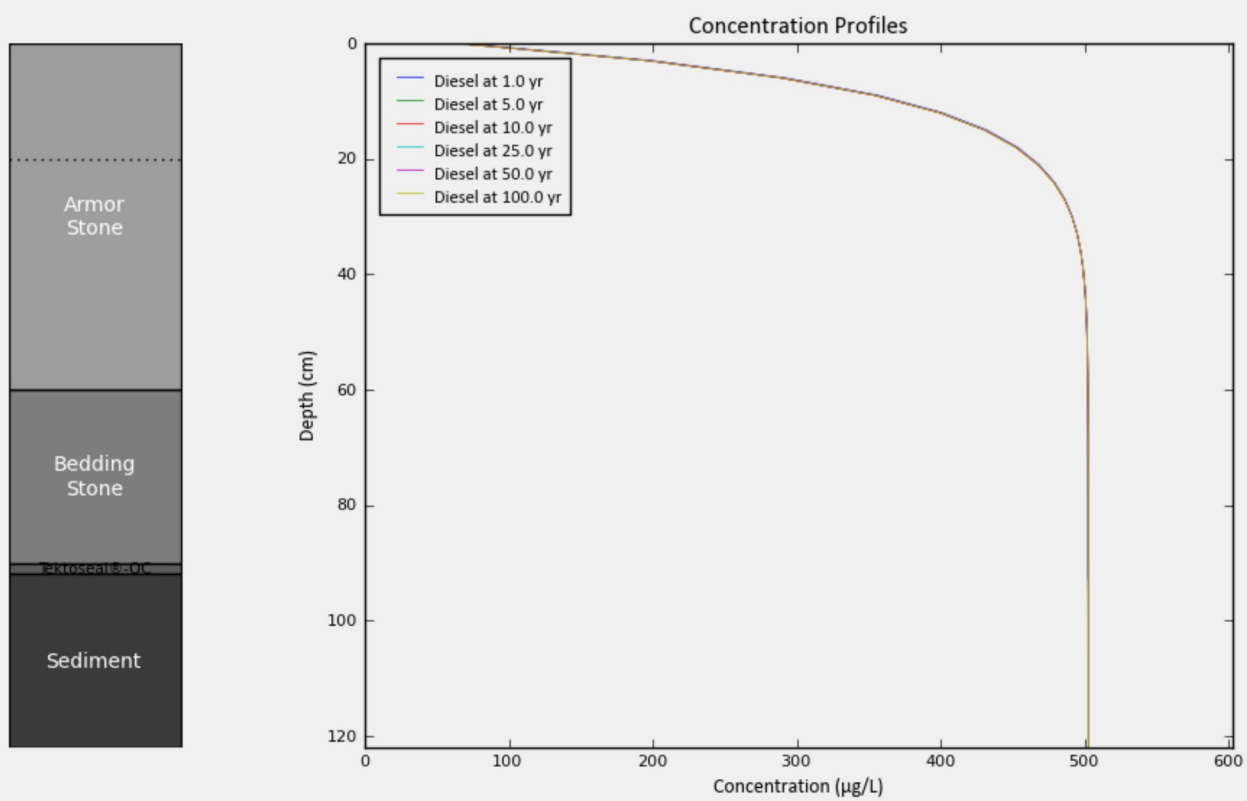

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDE at 1.0 yr
DDE at 5.0 yr
DDE at 10.0 yr
DDE at 25.0 yr
DDE at 50.0 yr
DDE at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

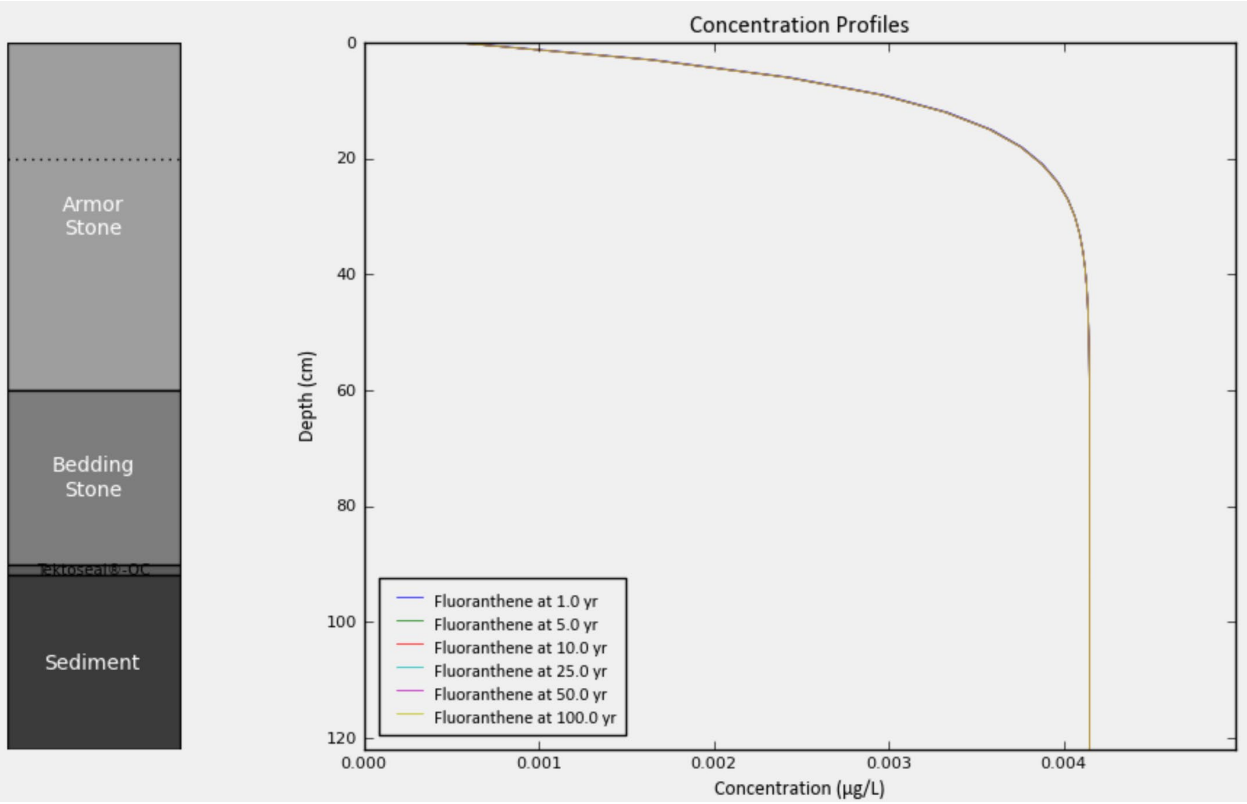

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDT at 1.0 yr
DDT at 5.0 yr
DDT at 10.0 yr
DDT at 25.0 yr
DDT at 50.0 yr
DDT at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

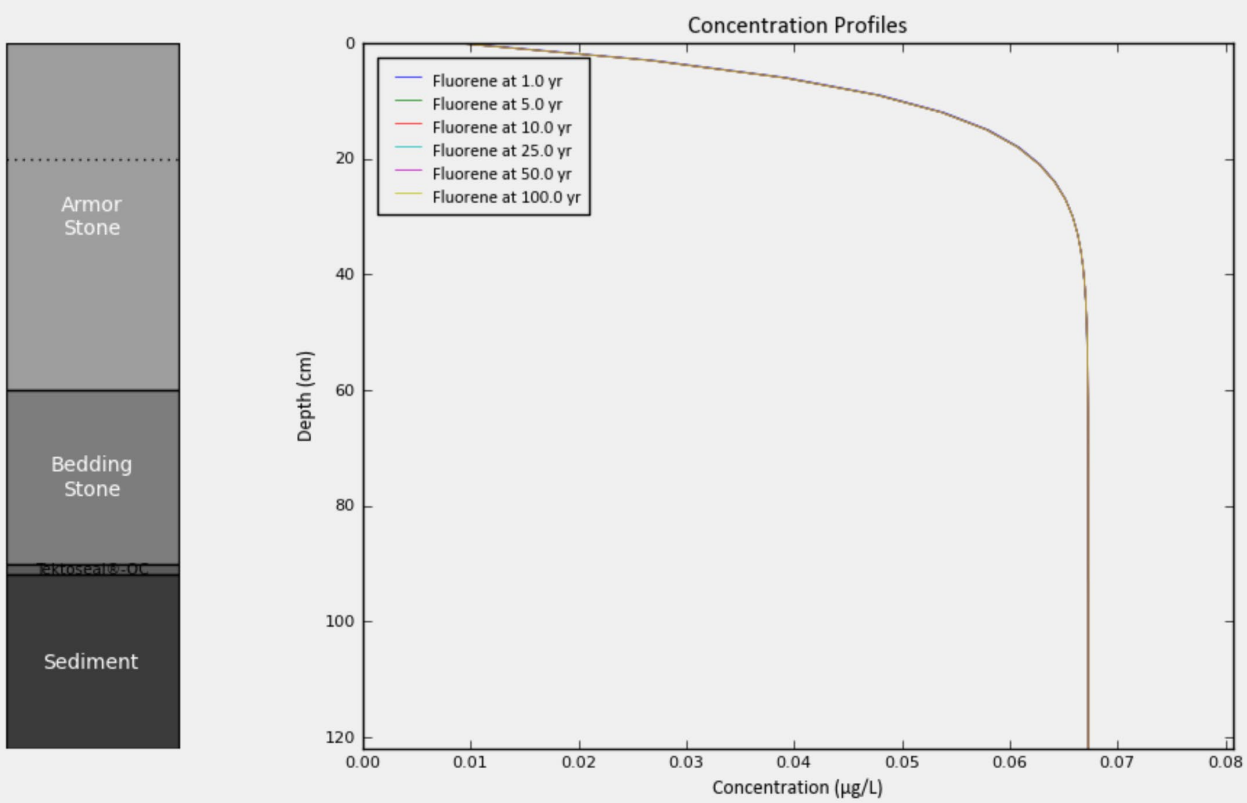

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDx at 1.0 yr
DDx at 5.0 yr
DDx at 10.0 yr
DDx at 25.0 yr
DDx at 50.0 yr
DDx at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

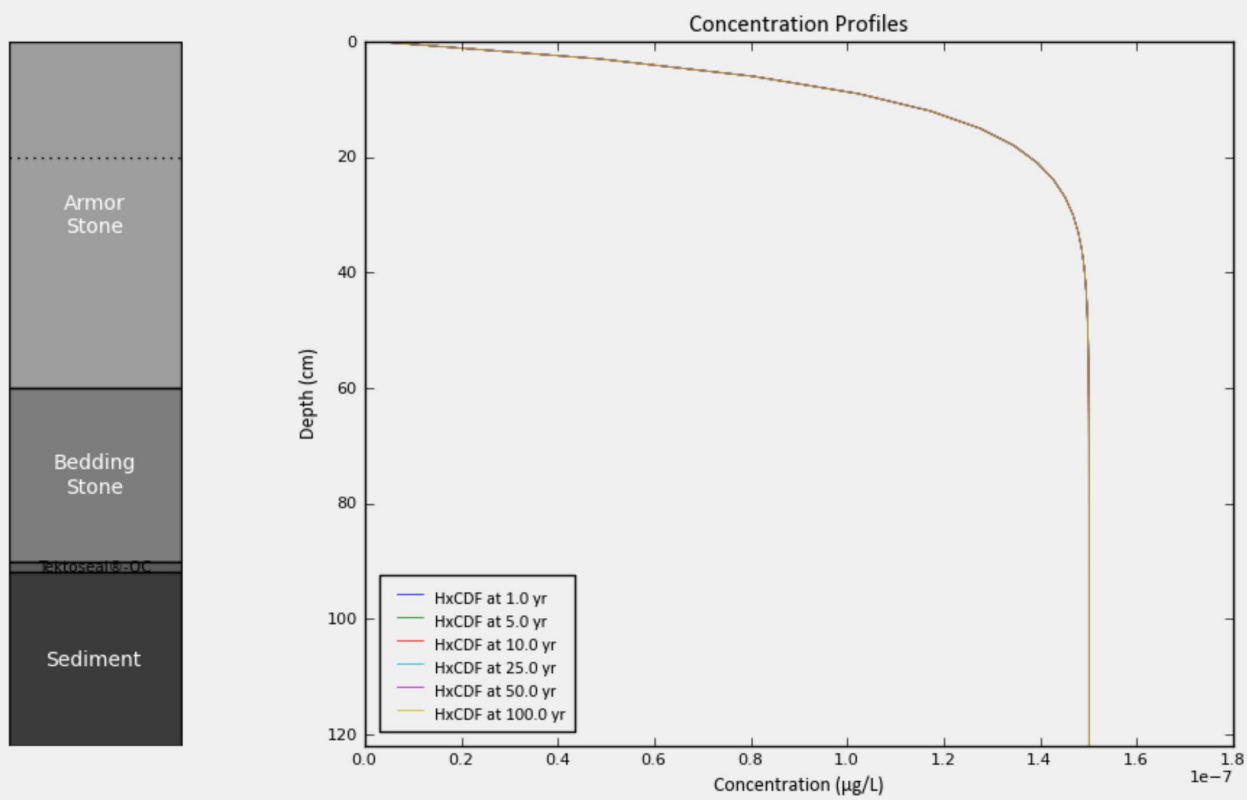

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Dibenzo(a,h)anthracene at 1.0 yr
Dibenzo(a,h)anthracene at 5.0 yr
Dibenzo(a,h)anthracene at 10.0 yr
Dibenzo(a,h)anthracene at 25.0 yr
Dibenzo(a,h)anthracene at 50.0 yr
Dibenzo(a,h)anthracene at 100.0 yr

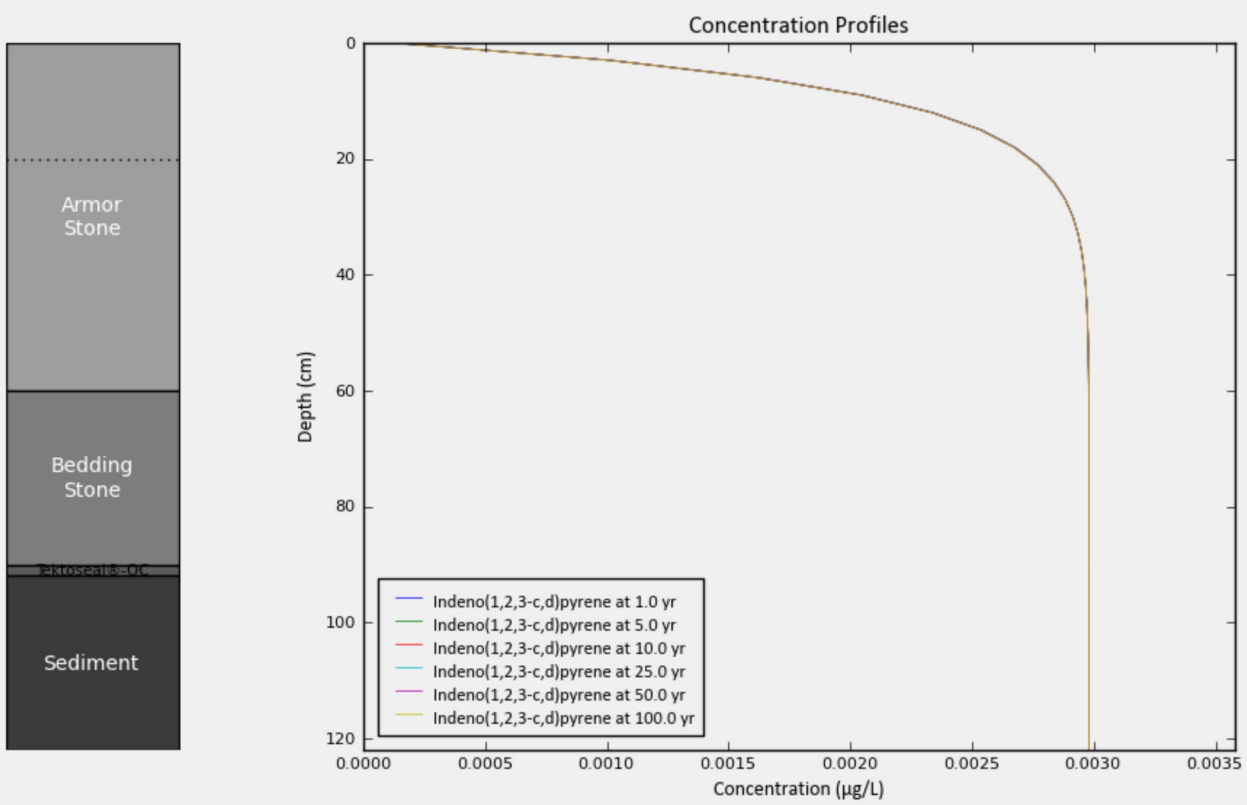

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
1e−4
Dieldrin at 1.0 yr
Dieldrin at 5.0 yr
Dieldrin at 10.0 yr
Dieldrin at 25.0 yr
Dieldrin at 50.0 yr
Dieldrin at 100.0 yr

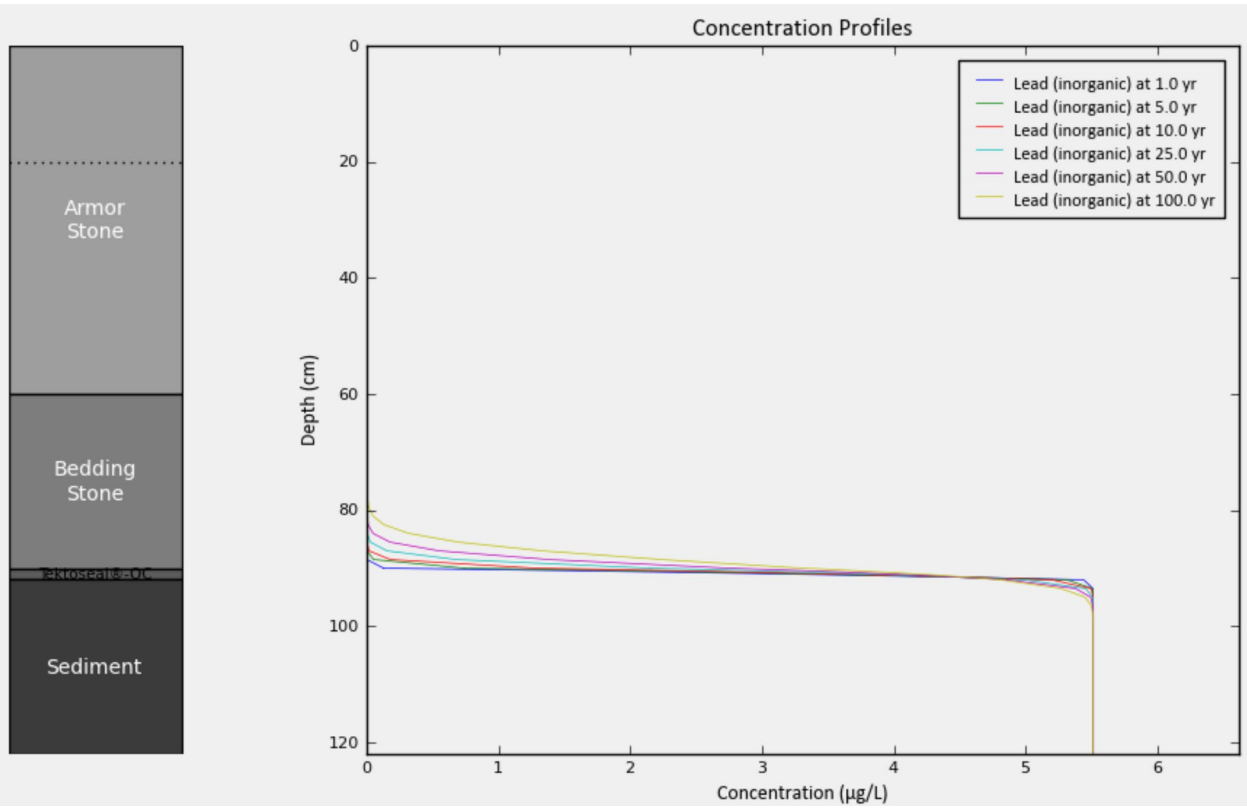

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Diesel at 1.0 yr
Diesel at 5.0 yr
Diesel at 10.0 yr
Diesel at 25.0 yr
Diesel at 50.0 yr
Diesel at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
100
200
300
400
500
600

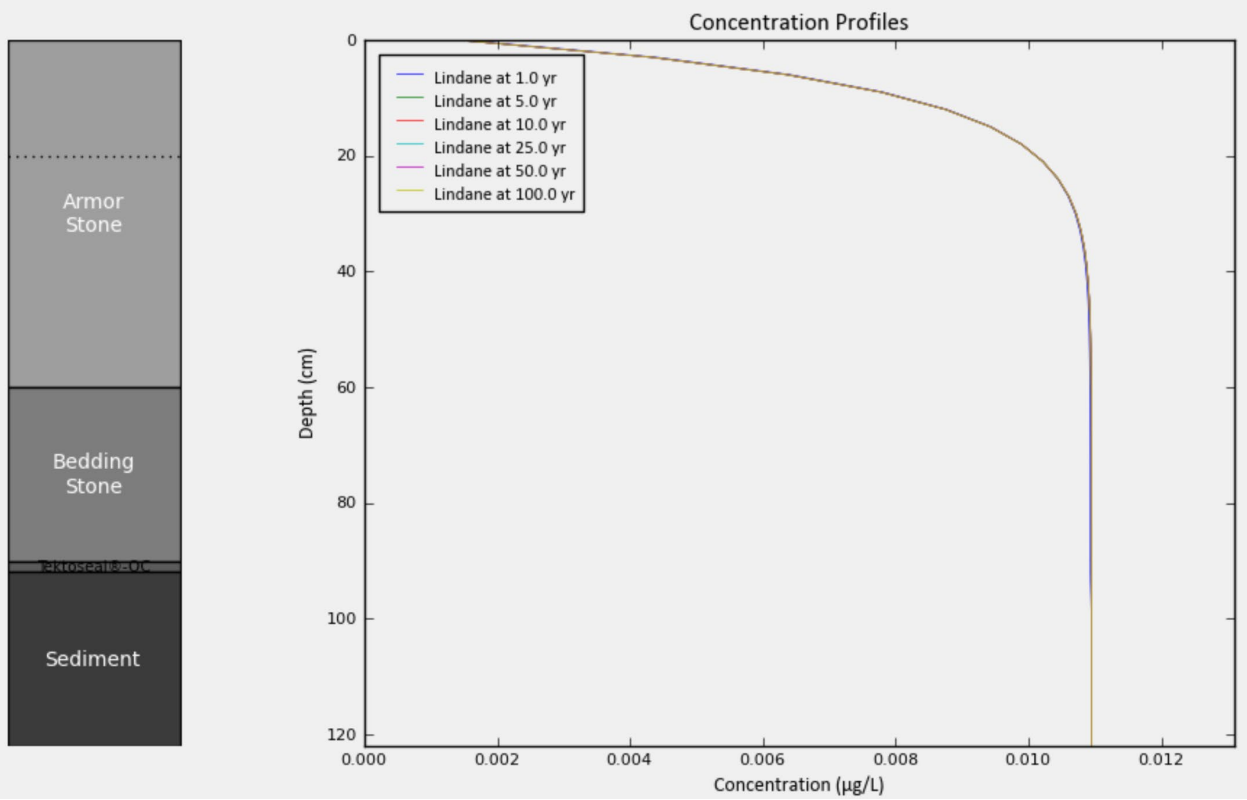

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Fluoranthene at 1.0 yr
Fluoranthene at 5.0 yr
Fluoranthene at 10.0 yr
Fluoranthene at 25.0 yr
Fluoranthene at 50.0 yr
Fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004

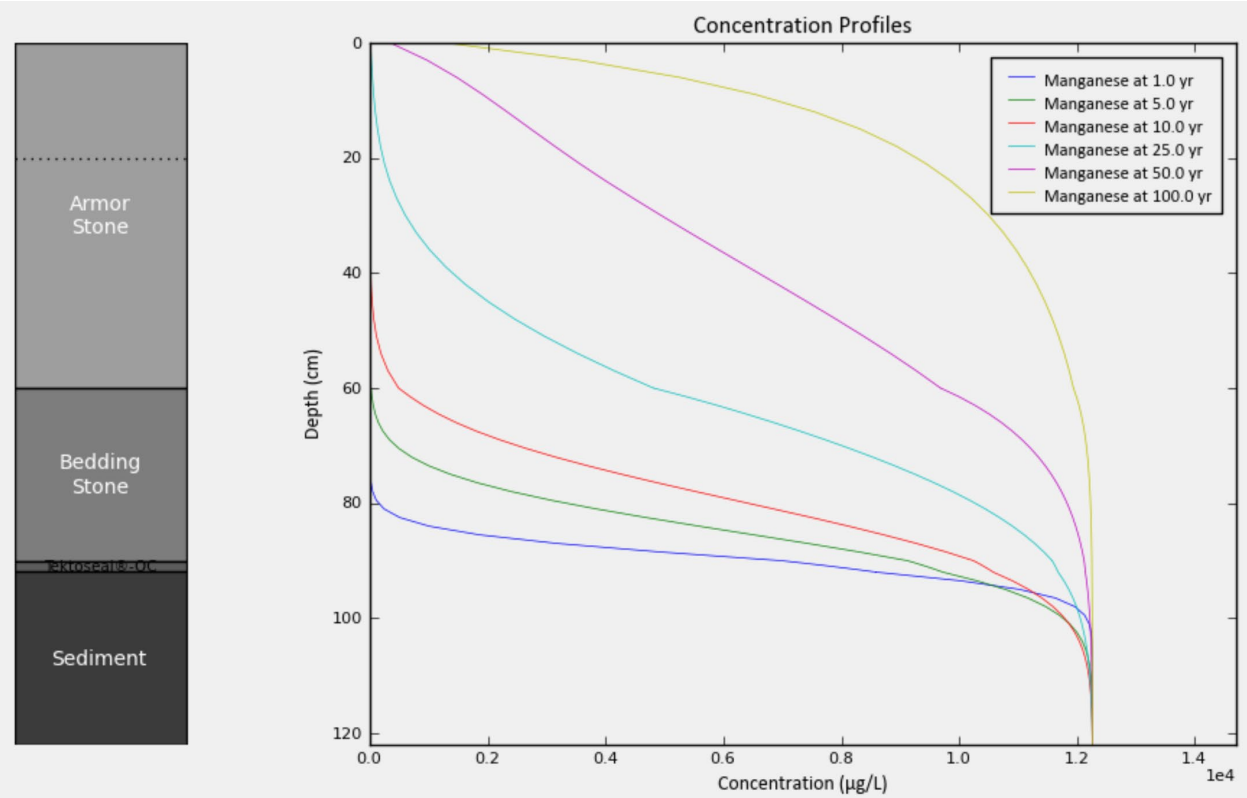

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Fluorene at 1.0 yr
Fluorene at 5.0 yr
Fluorene at 10.0 yr
Fluorene at 25.0 yr
Fluorene at 50.0 yr
Fluorene at 100.0 yr
Depth (cm)
Concentration (µg/L)

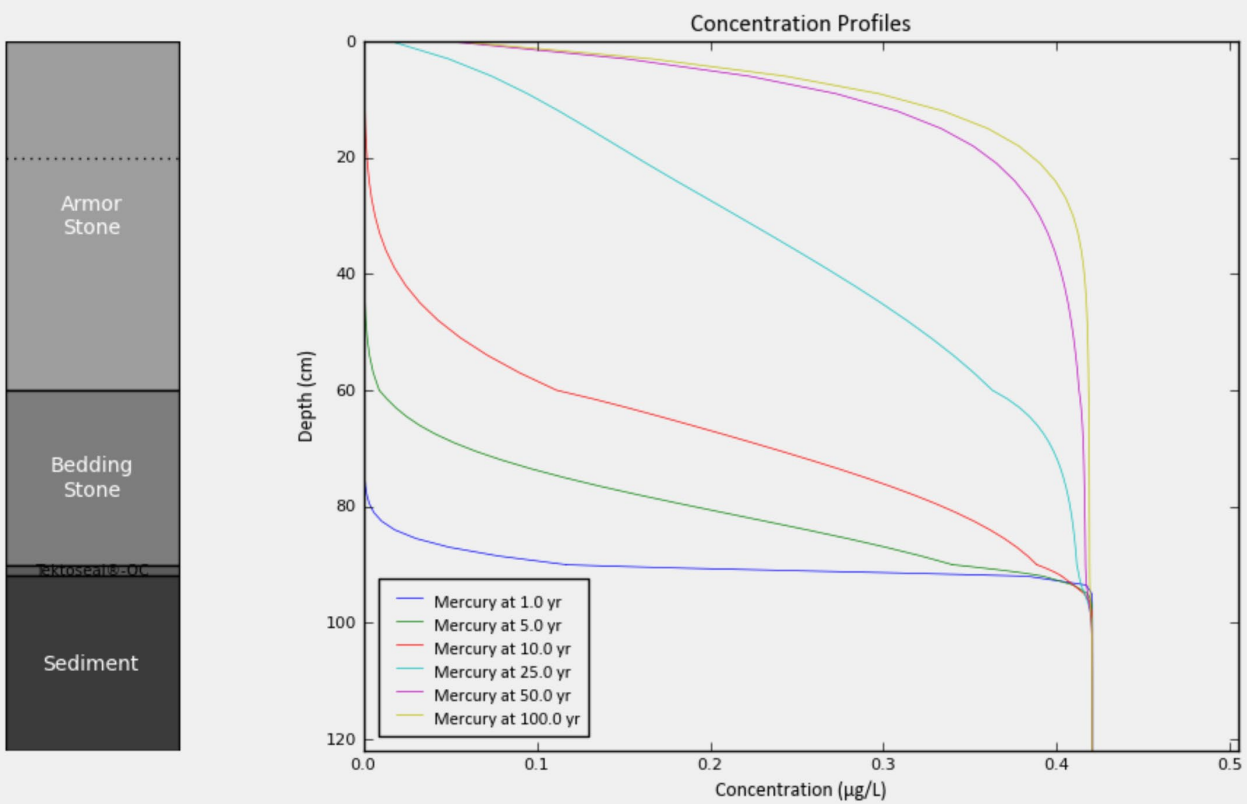

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
HxCDF at 1.0 yr
HxCDF at 5.0 yr
HxCDF at 10.0 yr
HxCDF at 25.0 yr
HxCDF at 50.0 yr
HxCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

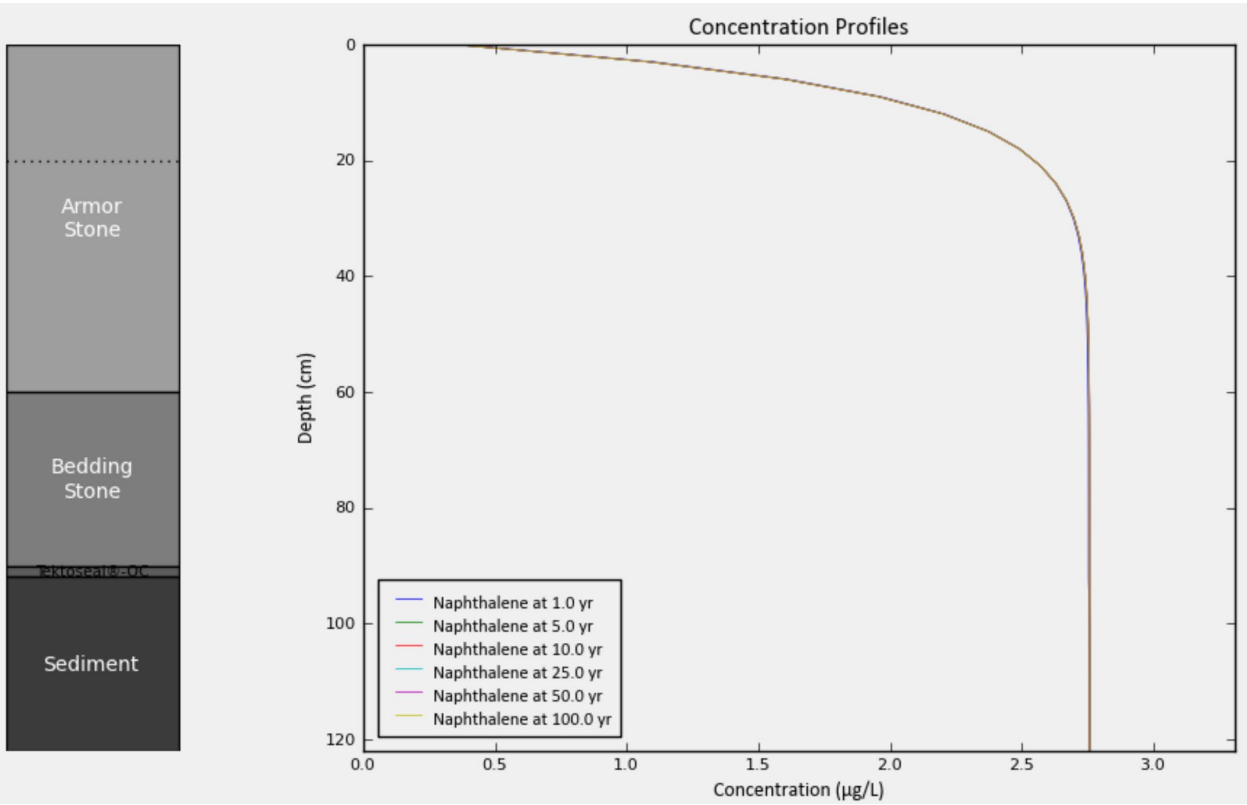

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Indeno(1,2,3-c,d)pyrene at 1.0 yr
Indeno(1,2,3-c,d)pyrene at 5.0 yr
Indeno(1,2,3-c,d)pyrene at 10.0 yr
Indeno(1,2,3-c,d)pyrene at 25.0 yr
Indeno(1,2,3-c,d)pyrene at 50.0 yr
Indeno(1,2,3-c,d)pyrene at 100.0 yr

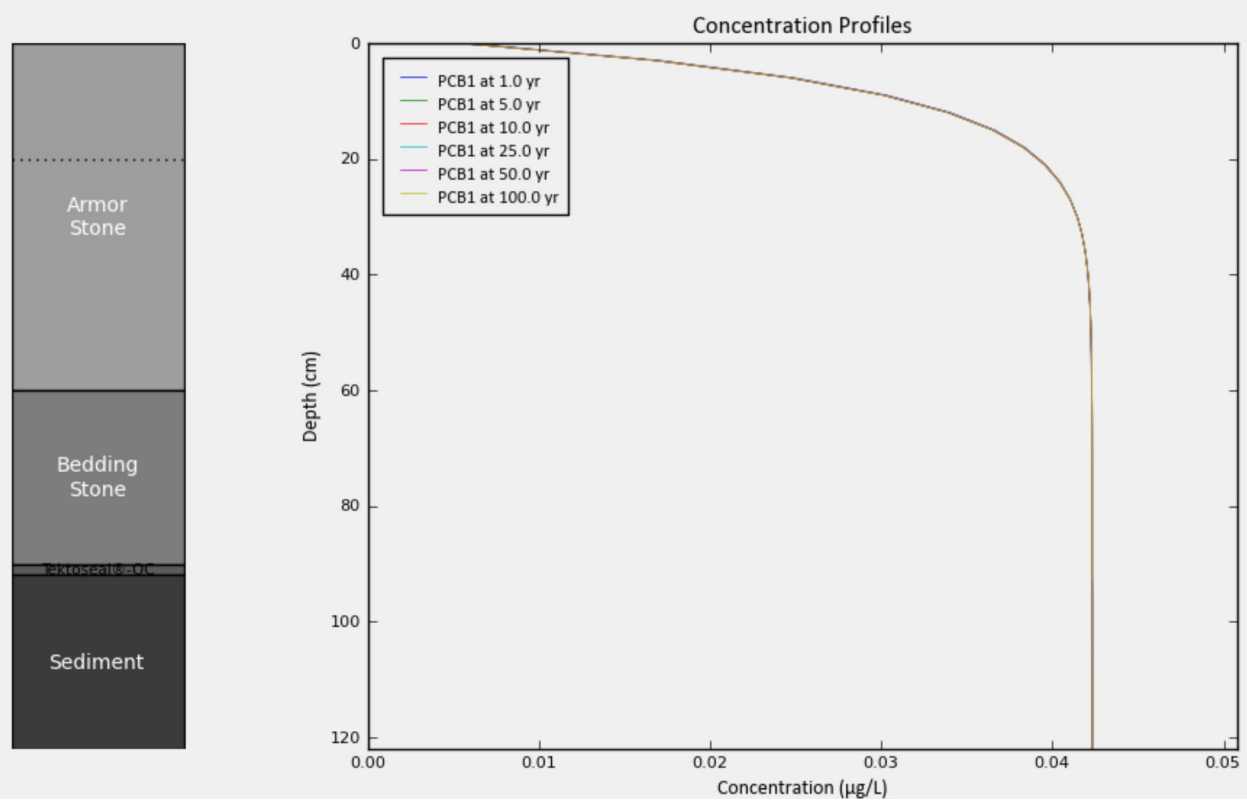

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Lead (inorganic) at 1.0 yr
Lead (inorganic) at 5.0 yr
Lead (inorganic) at 10.0 yr
Lead (inorganic) at 25.0 yr
Lead (inorganic) at 50.0 yr
Lead (inorganic) at 100.0 yr

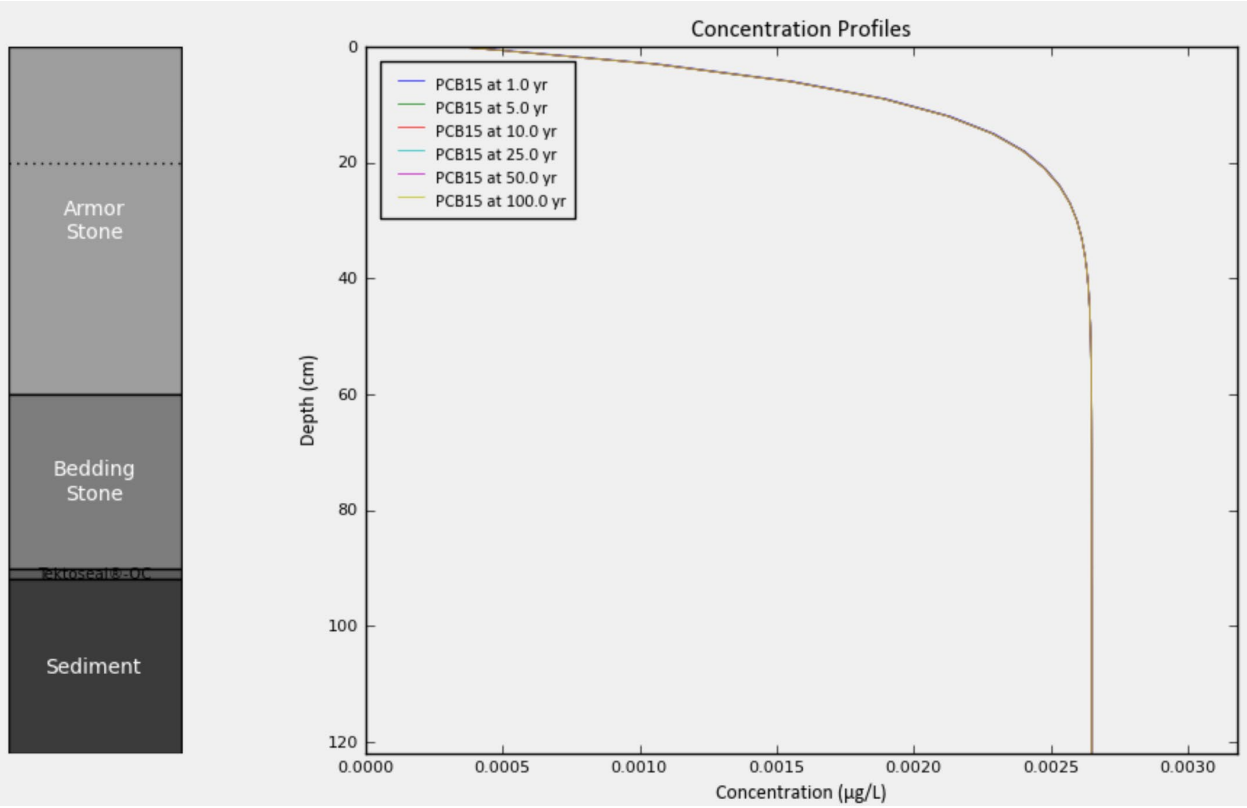

Armor Stone
Bedding Stone
Tekoseal® OC
Sediment
Concentration Profiles
Lindane at 1.0 yr
Lindane at 5.0 yr
Lindane at 10.0 yr
Lindane at 25.0 yr
Lindane at 50.0 yr
Lindane at 100.0 yr
Depth (cm)
Concentration (µg/L)

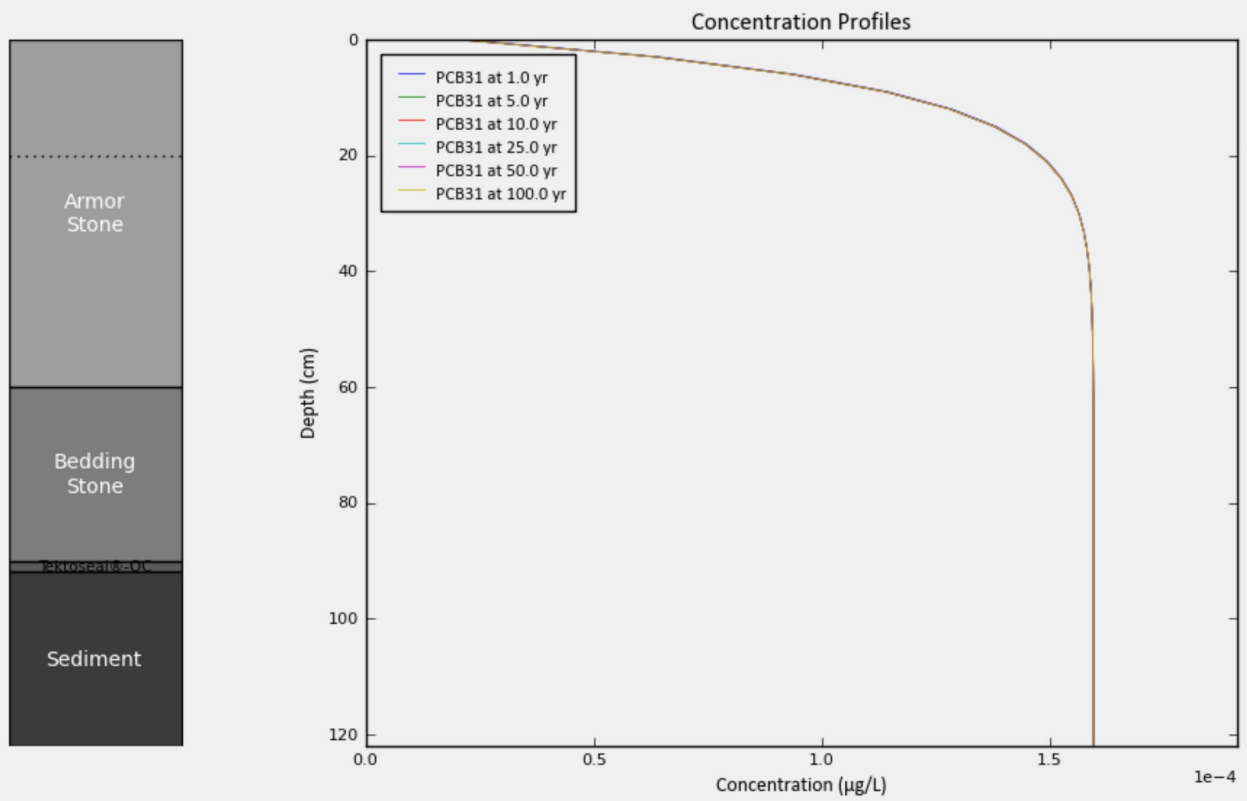

Armor Stone
Bedding Stone
Tekoseal® OC
Sediment
Concentration Profiles
Manganese at 1.0 yr
Manganese at 5.0 yr
Manganese at 10.0 yr
Manganese at 25.0 yr
Manganese at 50.0 yr
Manganese at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e4

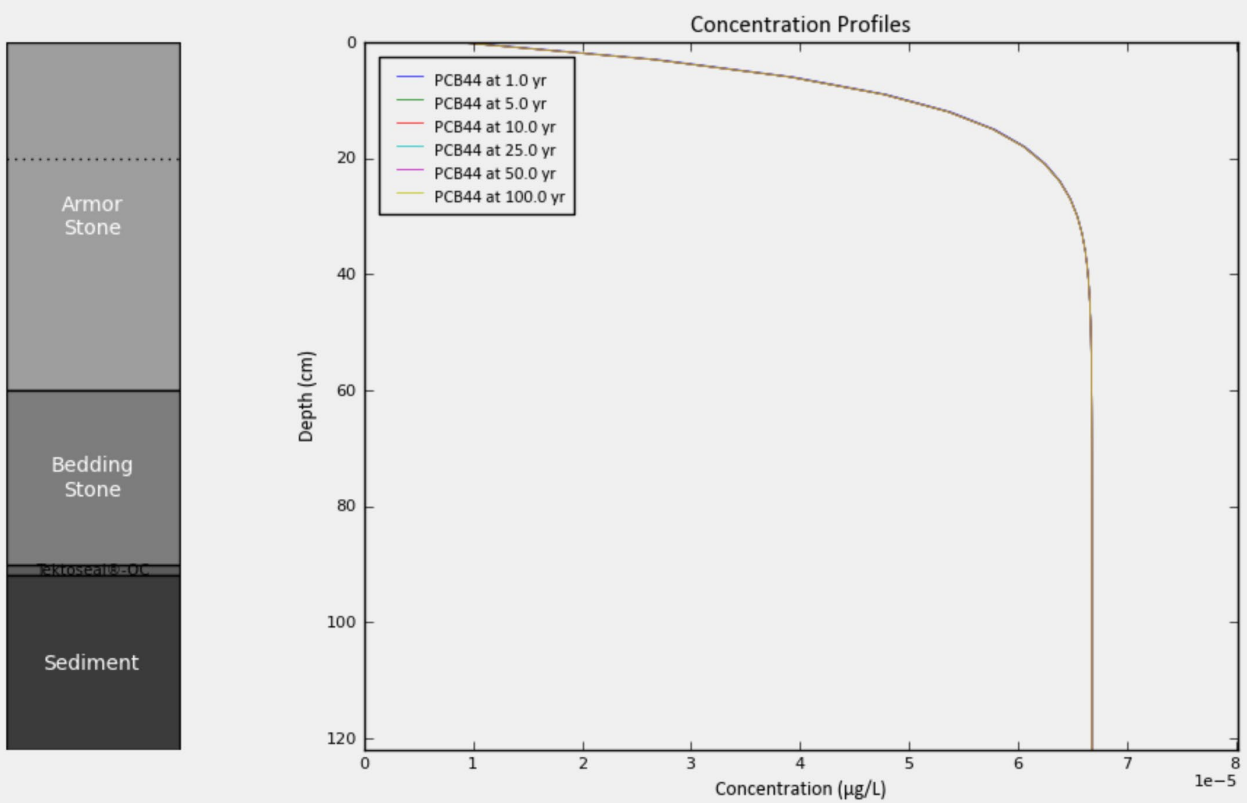

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Mercury at 1.0 yr
Mercury at 5.0 yr
Mercury at 10.0 yr
Mercury at 25.0 yr
Mercury at 50.0 yr
Mercury at 100.0 yr

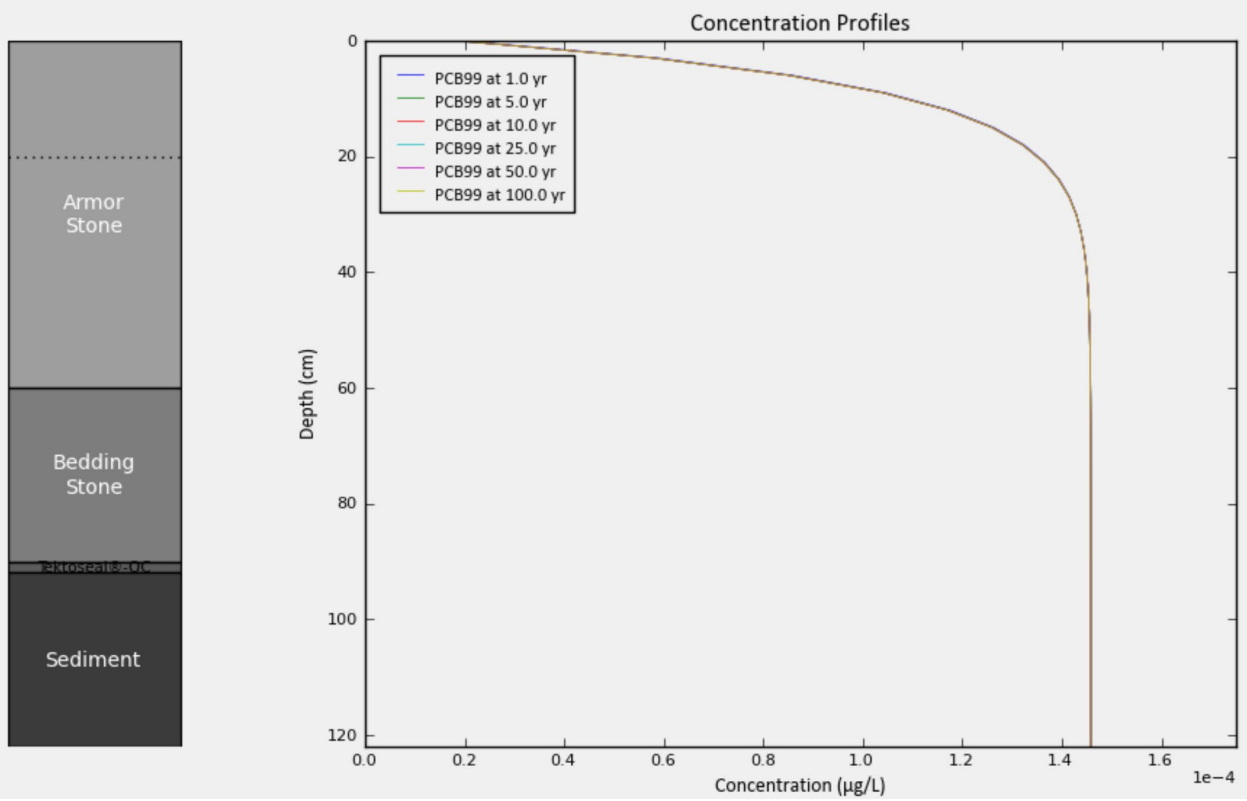

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Naphthalene at 1.0 yr
Naphthalene at 5.0 yr
Naphthalene at 10.0 yr
Naphthalene at 25.0 yr
Naphthalene at 50.0 yr
Naphthalene at 100.0 yr

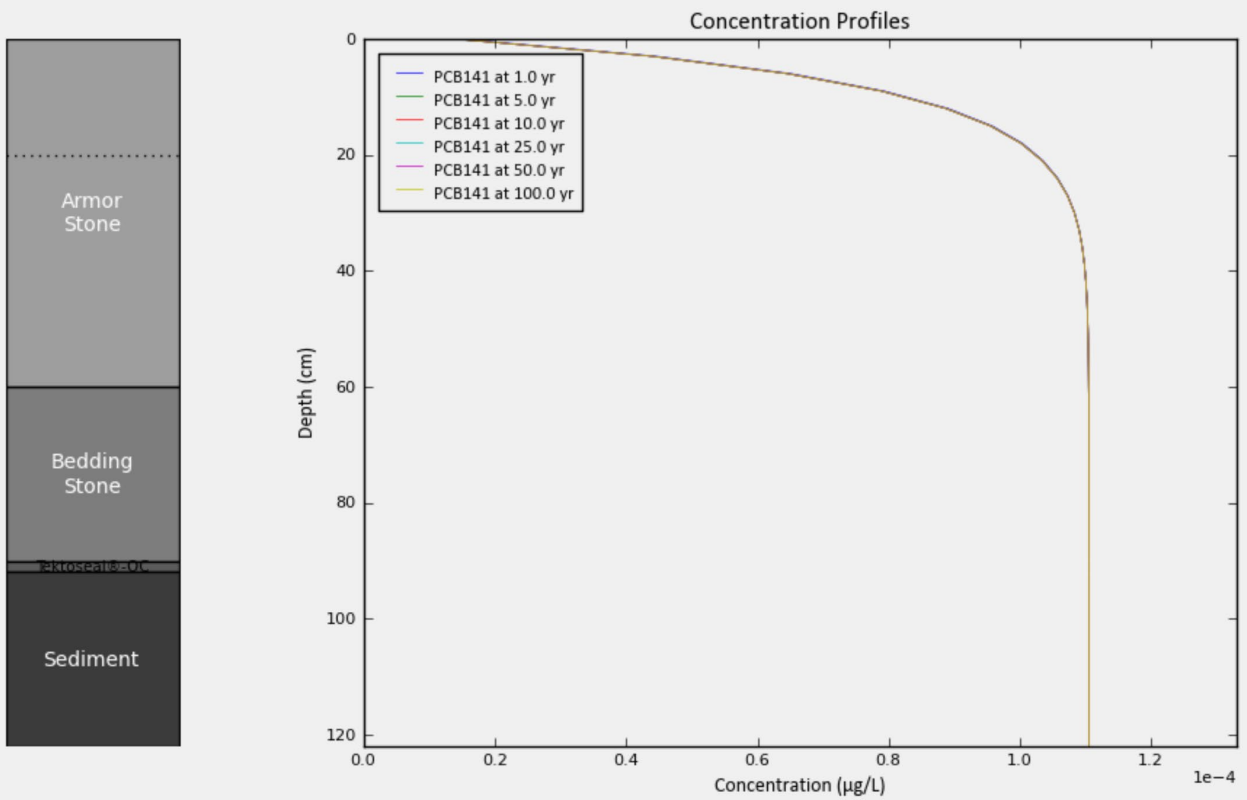

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB1 at 1.0 yr
PCB1 at 5.0 yr
PCB1 at 10.0 yr
PCB1 at 25.0 yr
PCB1 at 50.0 yr
PCB1 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.00
0.01
0.02
0.03
0.04
0.05

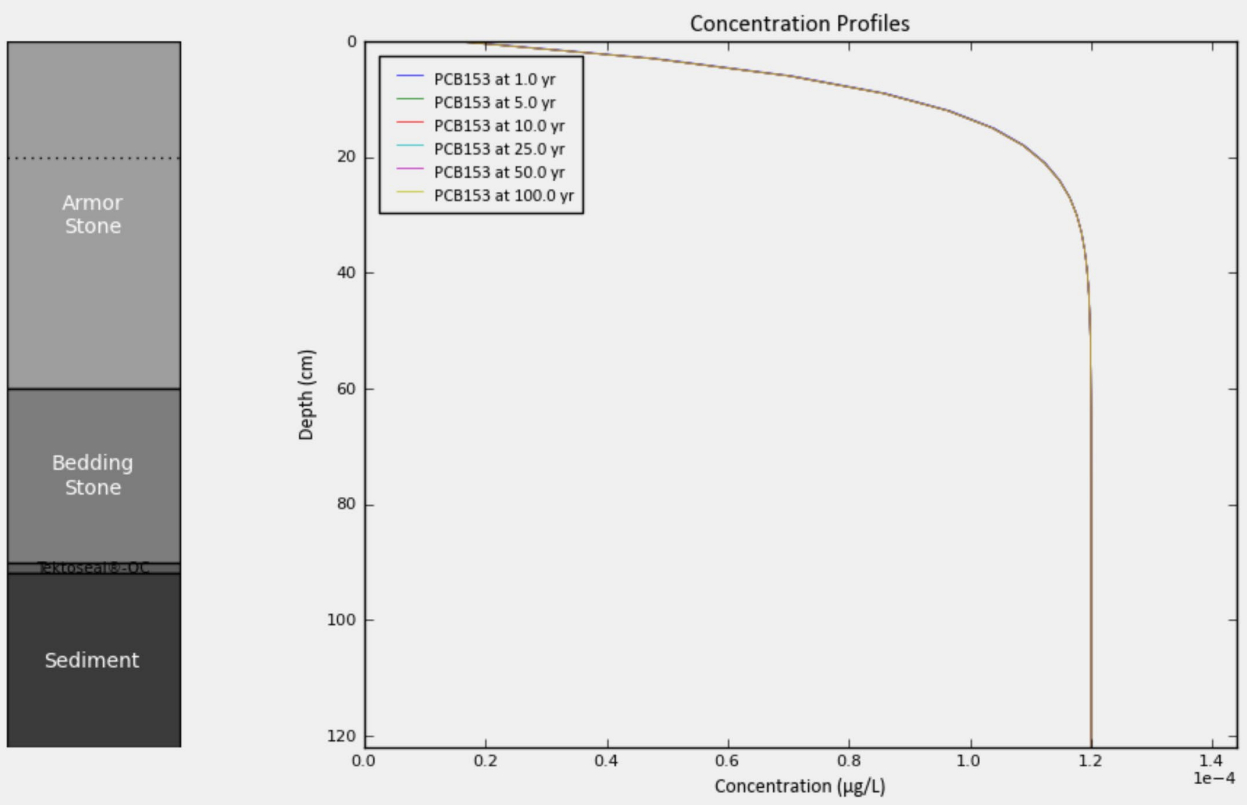

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB15 at 1.0 yr
PCB15 at 5.0 yr
PCB15 at 10.0 yr
PCB15 at 25.0 yr
PCB15 at 50.0 yr
PCB15 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030

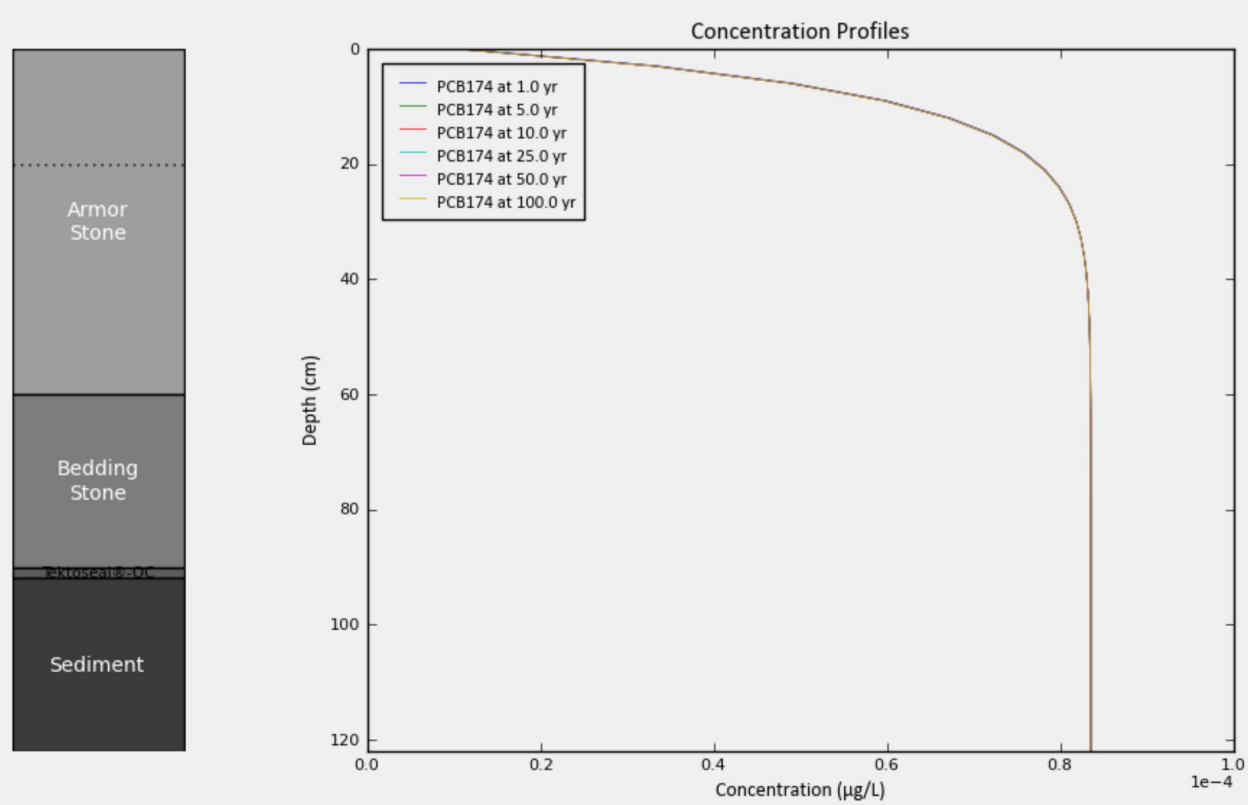

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB31 at 1.0 yr
PCB31 at 5.0 yr
PCB31 at 10.0 yr
PCB31 at 25.0 yr
PCB31 at 50.0 yr
PCB31 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

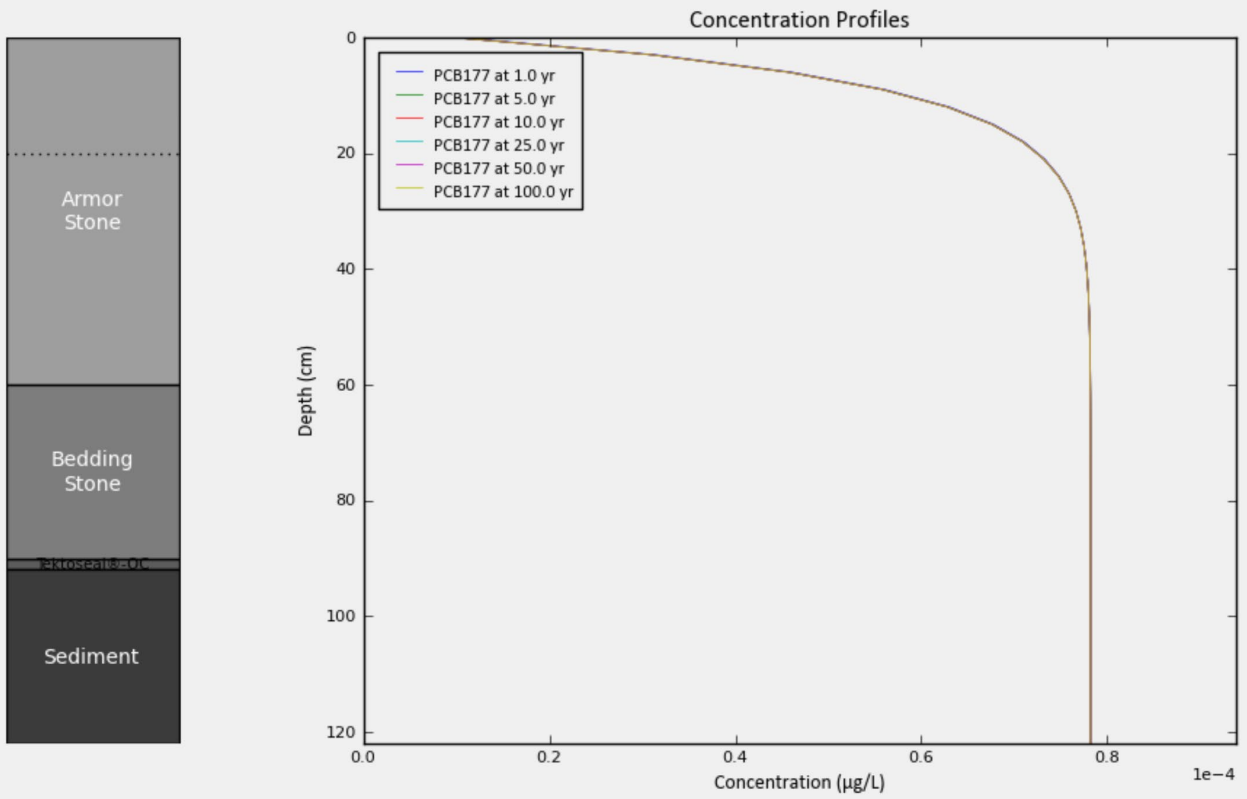

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB44 at 1.0 yr
PCB44 at 5.0 yr
PCB44 at 10.0 yr
PCB44 at 25.0 yr
PCB44 at 50.0 yr
PCB44 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

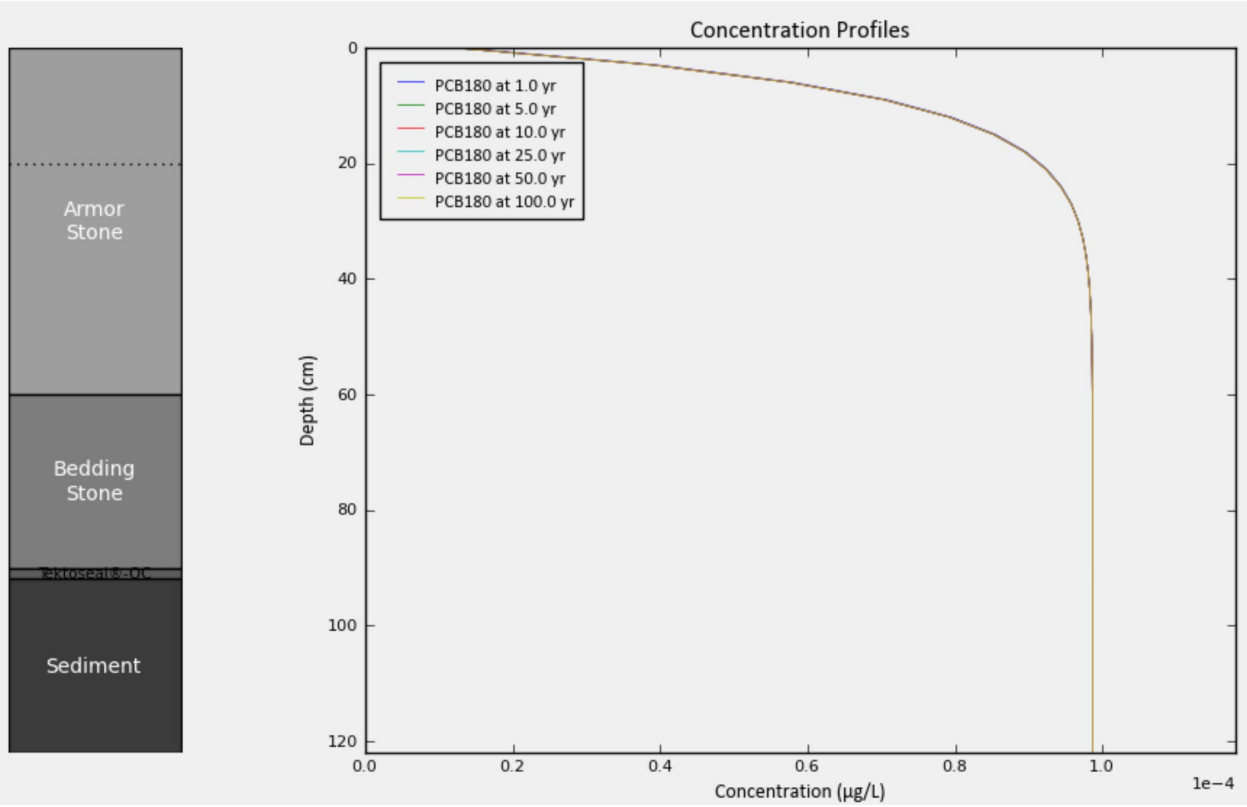

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB99 at 1.0 yr
PCB99 at 5.0 yr
PCB99 at 10.0 yr
PCB99 at 25.0 yr
PCB99 at 50.0 yr
PCB99 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

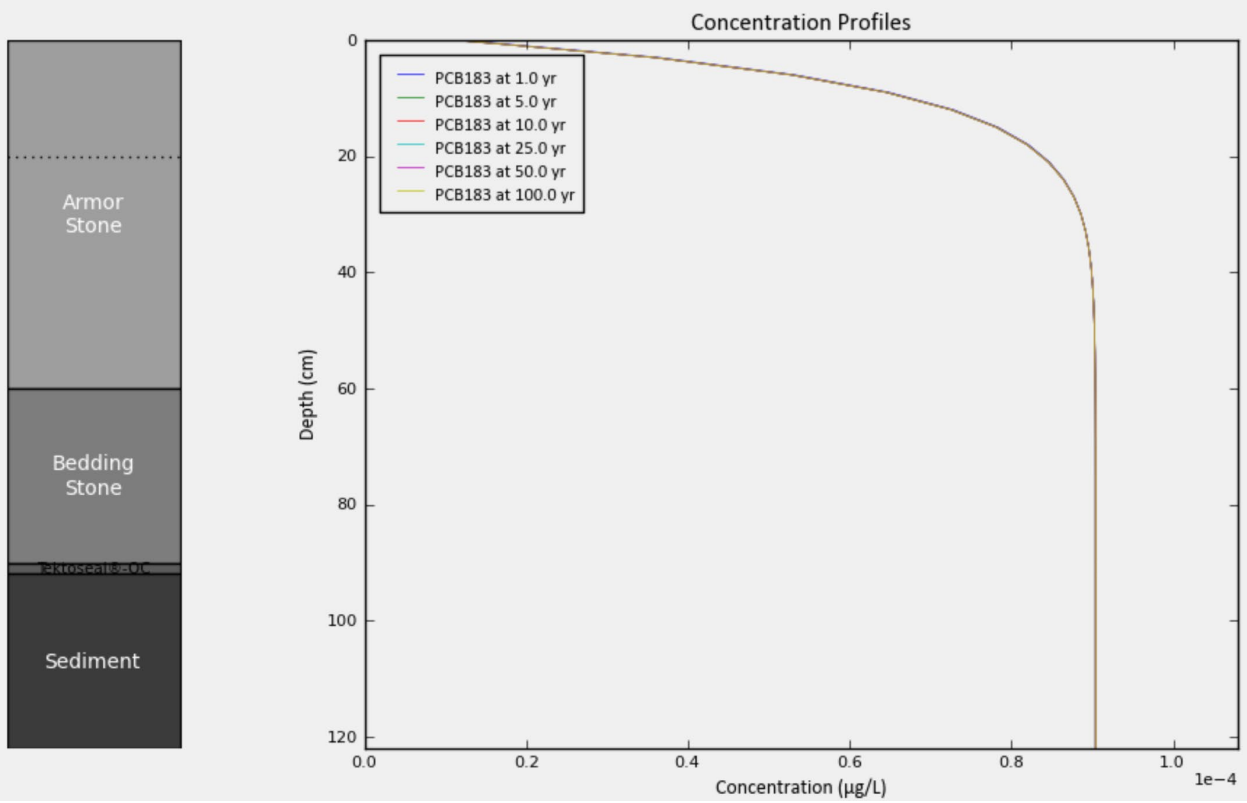

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB141 at 1.0 yr
PCB141 at 5.0 yr
PCB141 at 10.0 yr
PCB141 at 25.0 yr
PCB141 at 50.0 yr
PCB141 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

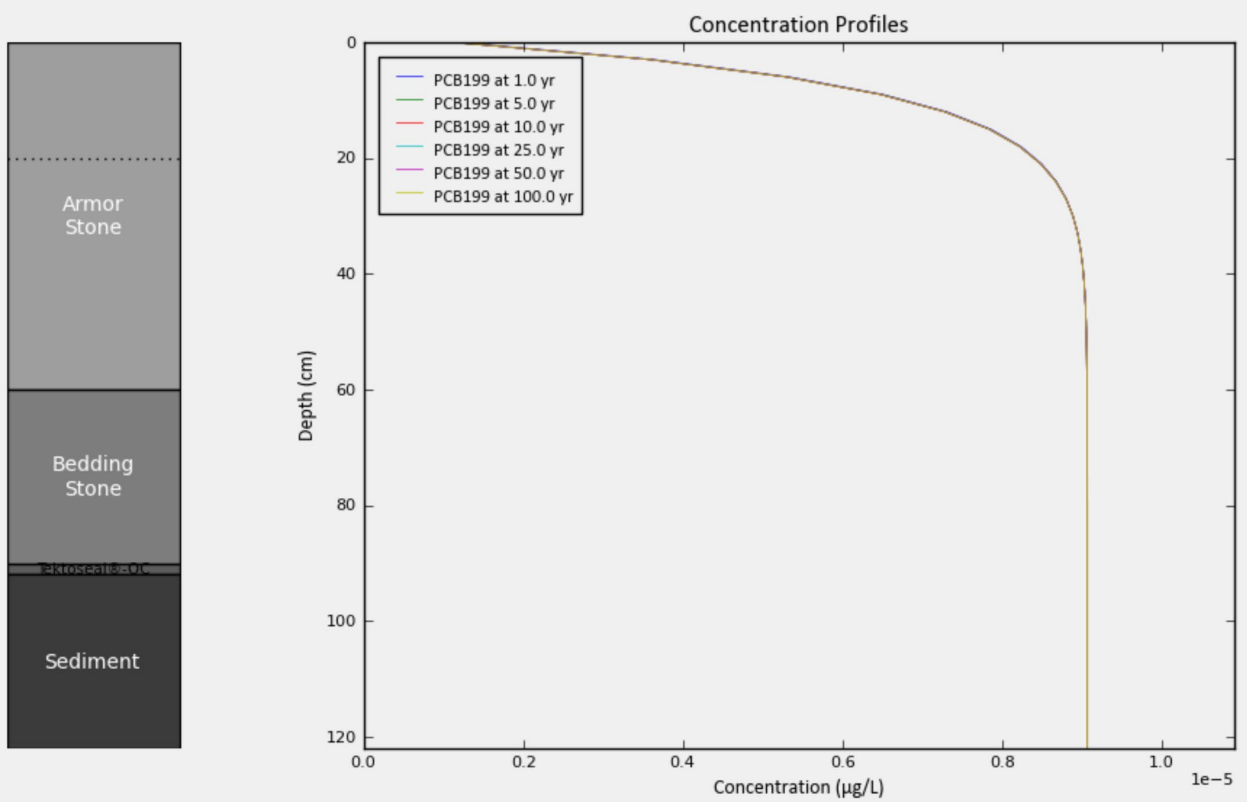

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB153 at 1.0 yr
PCB153 at 5.0 yr
PCB153 at 10.0 yr
PCB153 at 25.0 yr
PCB153 at 50.0 yr
PCB153 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

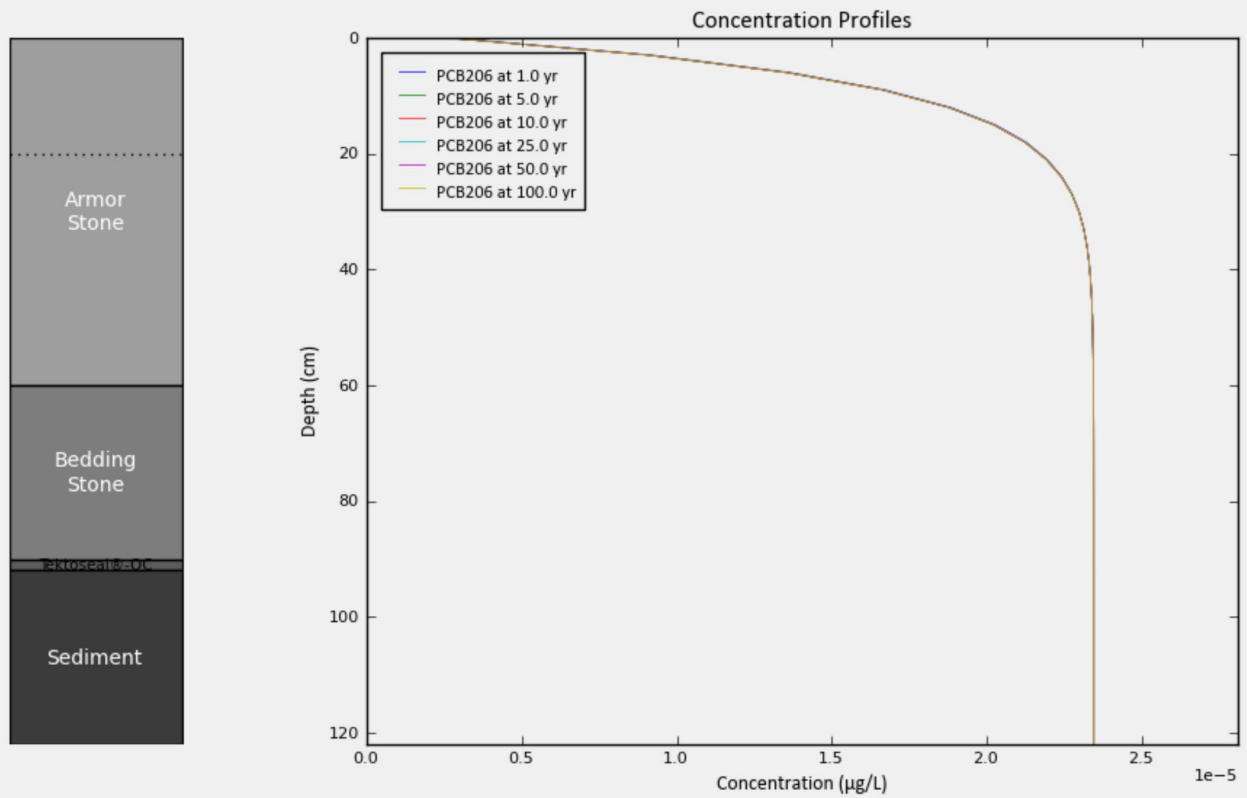

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB174 at 1.0 yr
PCB174 at 5.0 yr
PCB174 at 10.0 yr
PCB174 at 25.0 yr
PCB174 at 50.0 yr
PCB174 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

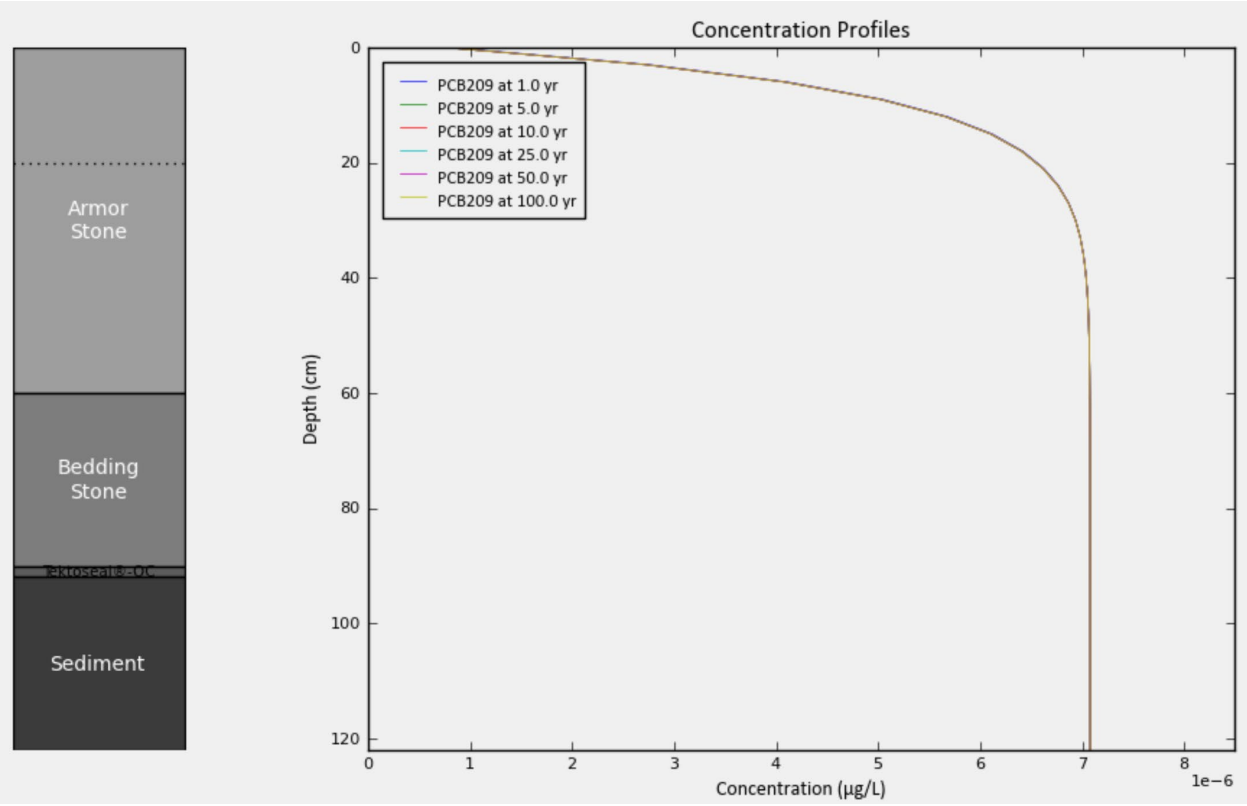

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB177 at 1.0 yr
PCB177 at 5.0 yr
PCB177 at 10.0 yr
PCB177 at 25.0 yr
PCB177 at 50.0 yr
PCB177 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

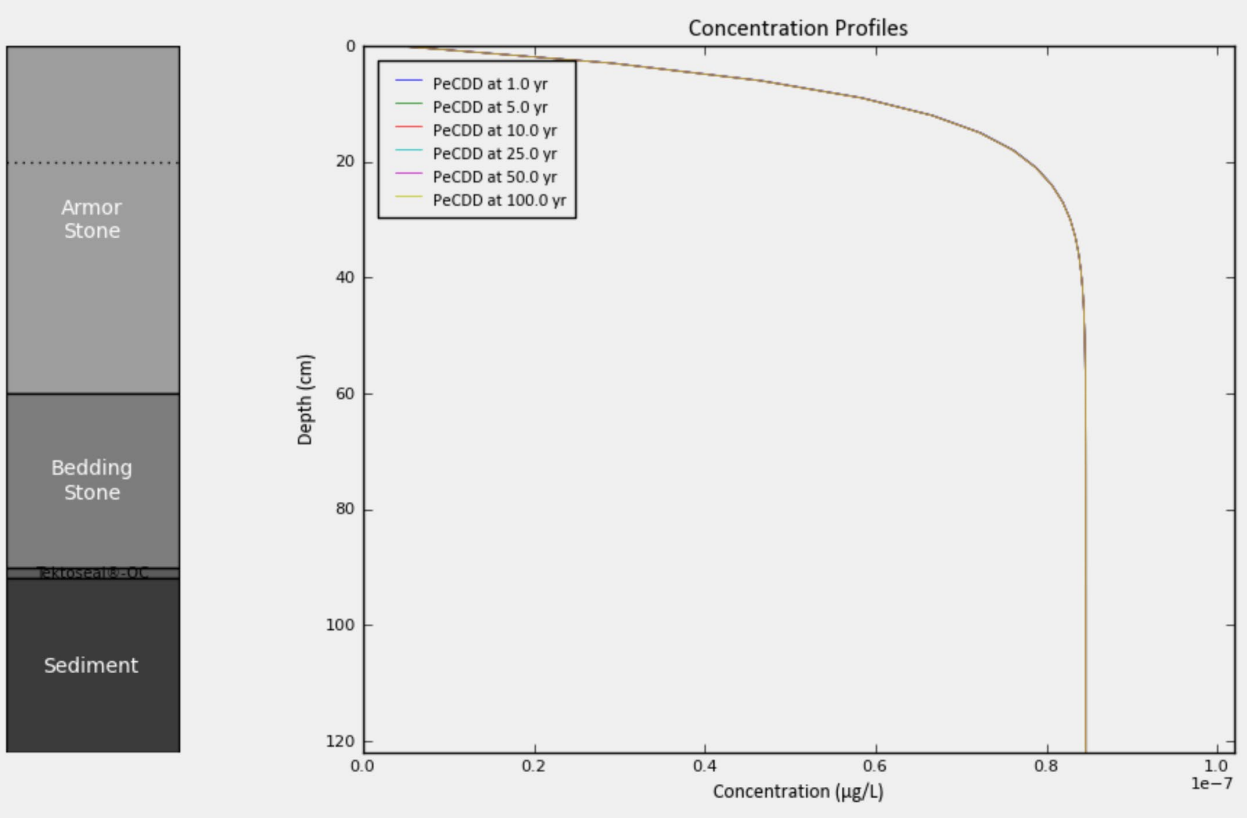

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB180 at 1.0 yr
PCB180 at 5.0 yr
PCB180 at 10.0 yr
PCB180 at 25.0 yr
PCB180 at 50.0 yr
PCB180 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

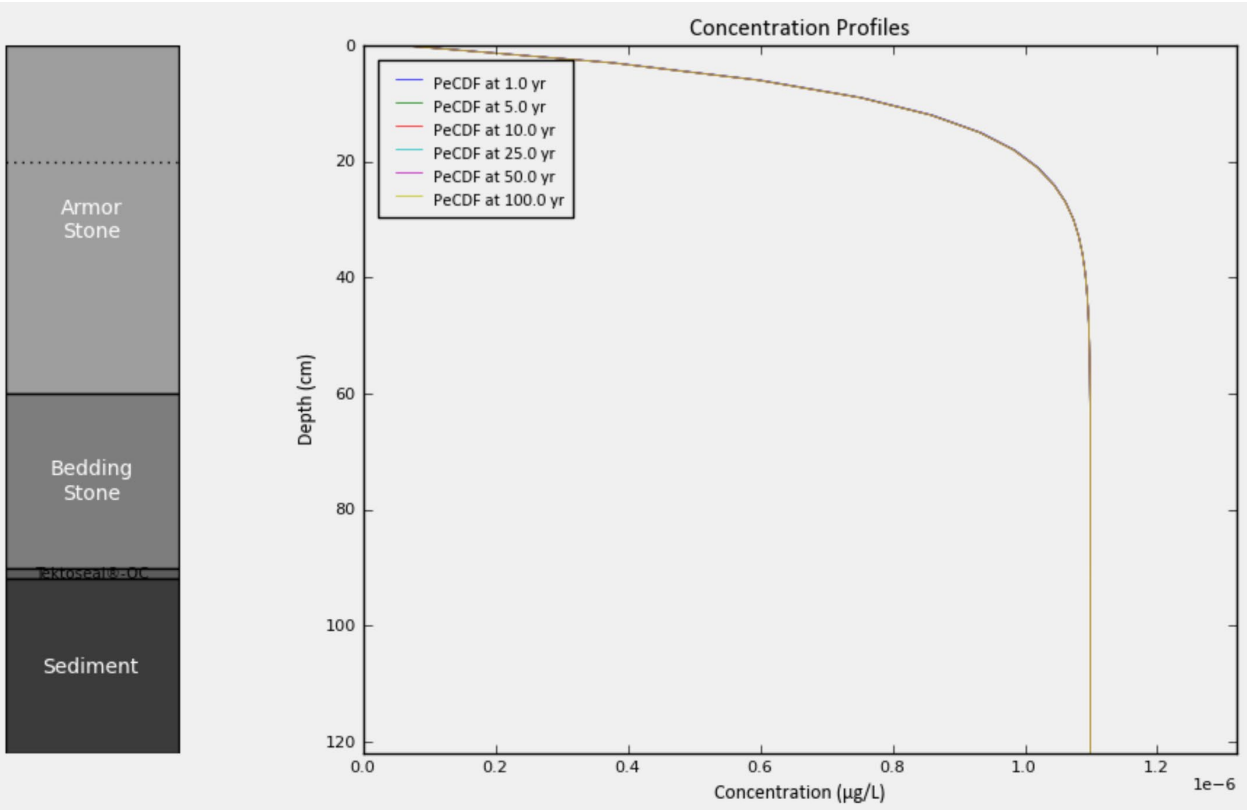

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB183 at 1.0 yr
PCB183 at 5.0 yr
PCB183 at 10.0 yr
PCB183 at 25.0 yr
PCB183 at 50.0 yr
PCB183 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

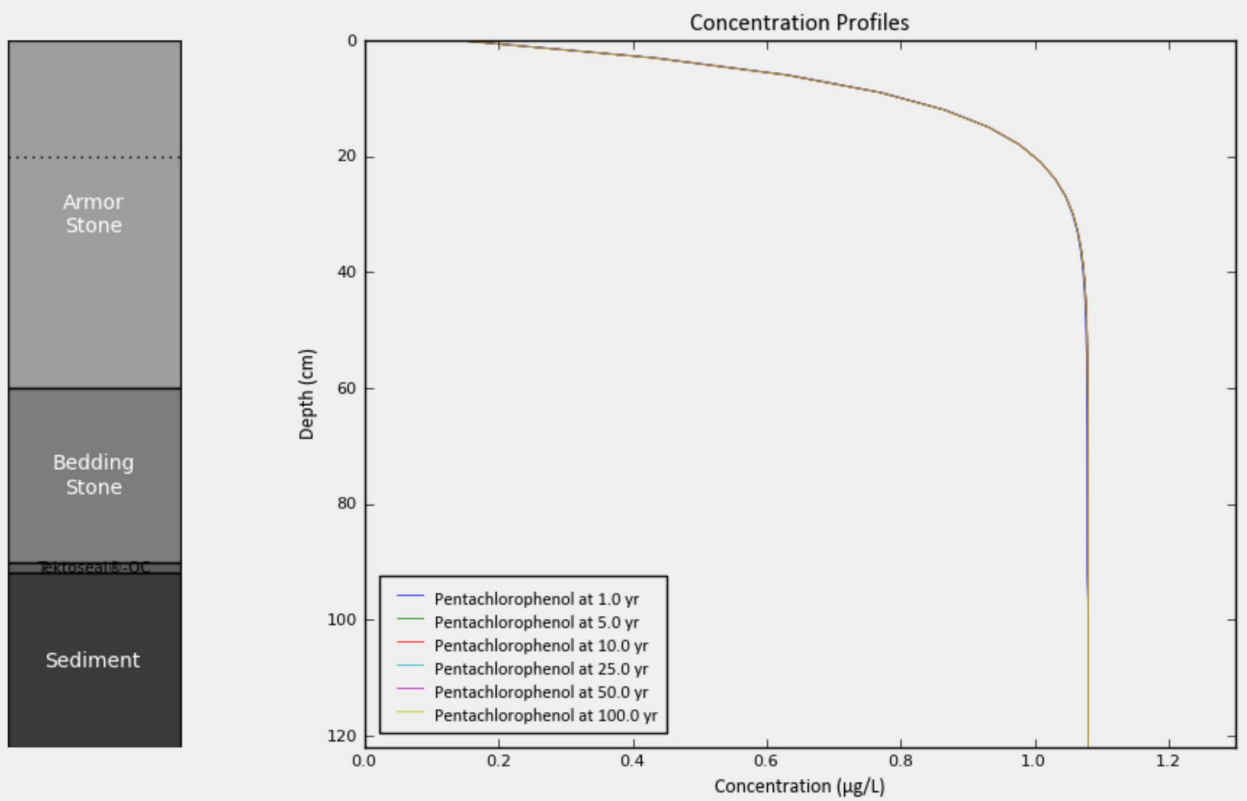

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB199 at 1.0 yr
PCB199 at 5.0 yr
PCB199 at 10.0 yr
PCB199 at 25.0 yr
PCB199 at 50.0 yr
PCB199 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

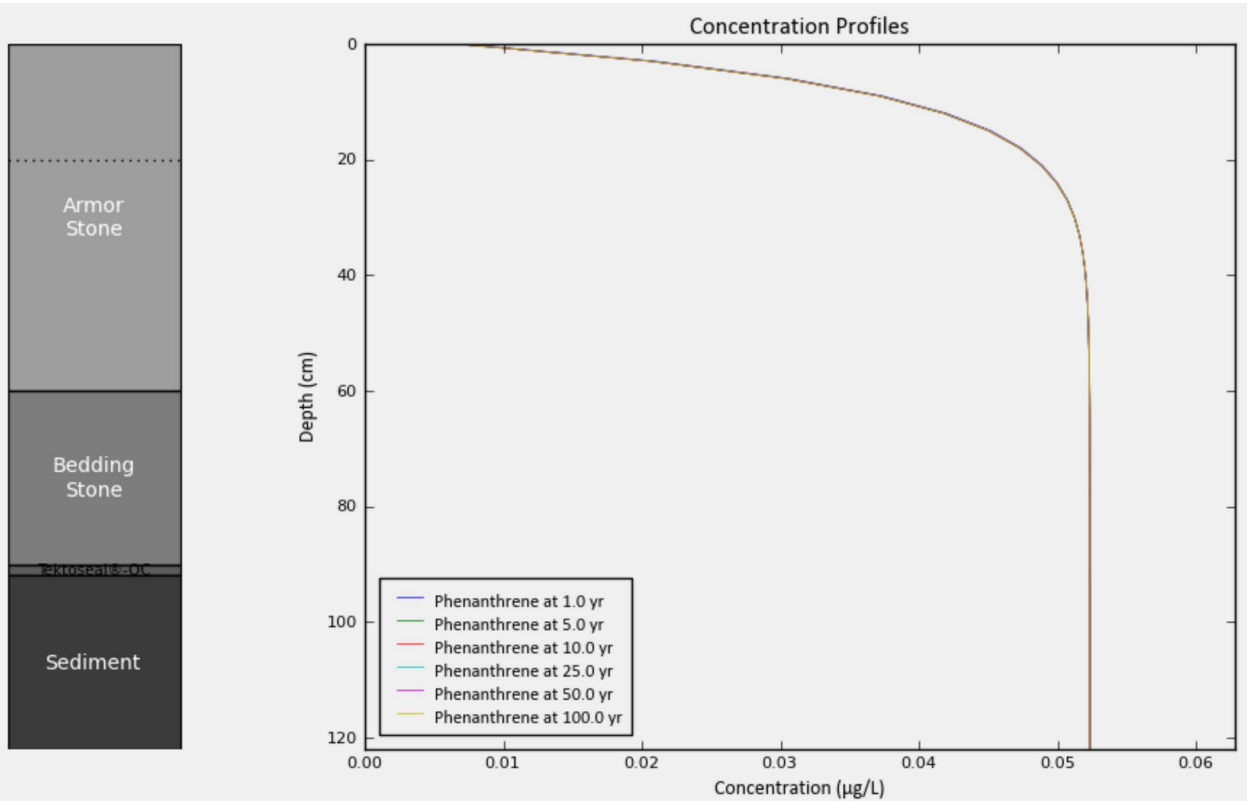

Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal®-OC
Sediment
PCB206 at 1.0 yr
PCB206 at 5.0 yr
PCB206 at 10.0 yr
PCB206 at 25.0 yr
PCB206 at 50.0 yr
PCB206 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

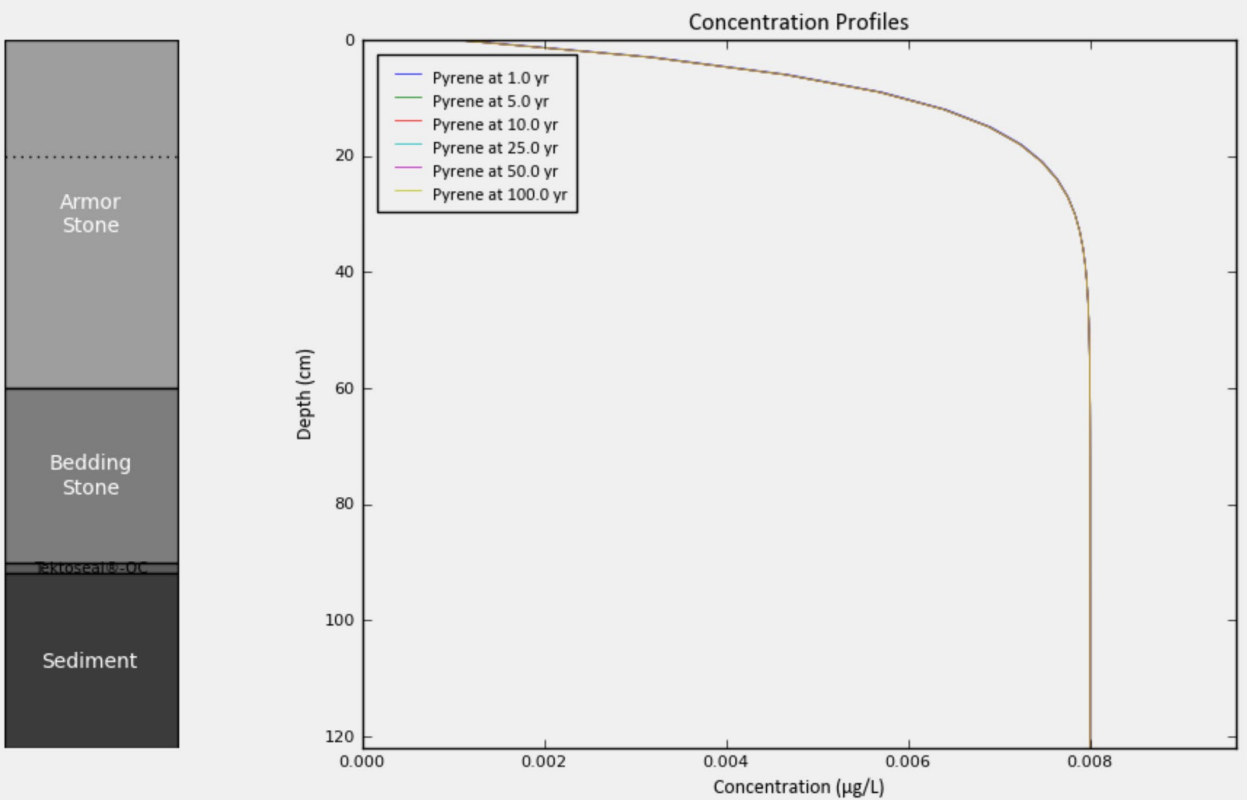

Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal®-OC
Sediment
PCB209 at 1.0 yr
PCB209 at 5.0 yr
PCB209 at 10.0 yr
PCB209 at 25.0 yr
PCB209 at 50.0 yr
PCB209 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

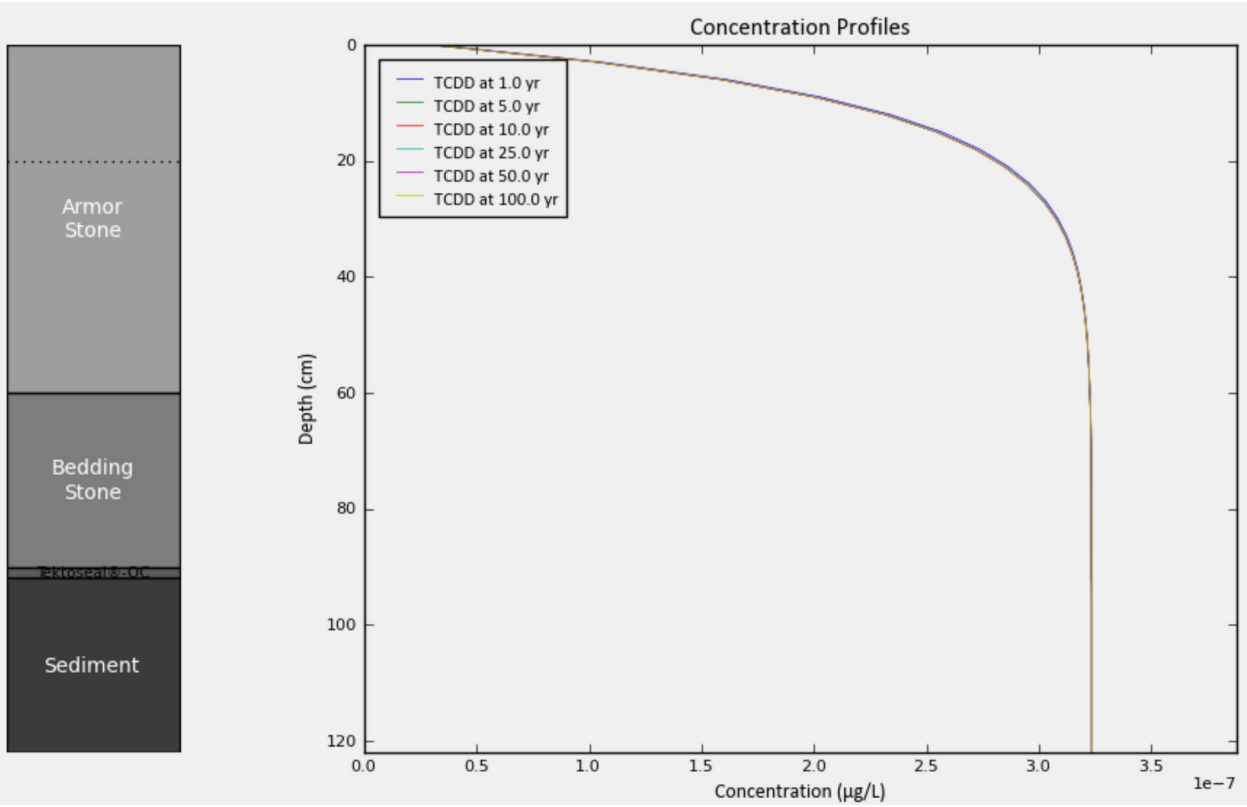

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PeCDD at 1.0 yr
PeCDD at 5.0 yr
PeCDD at 10.0 yr
PeCDD at 25.0 yr
PeCDD at 50.0 yr
PeCDD at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−7
Concentration (µg/L)

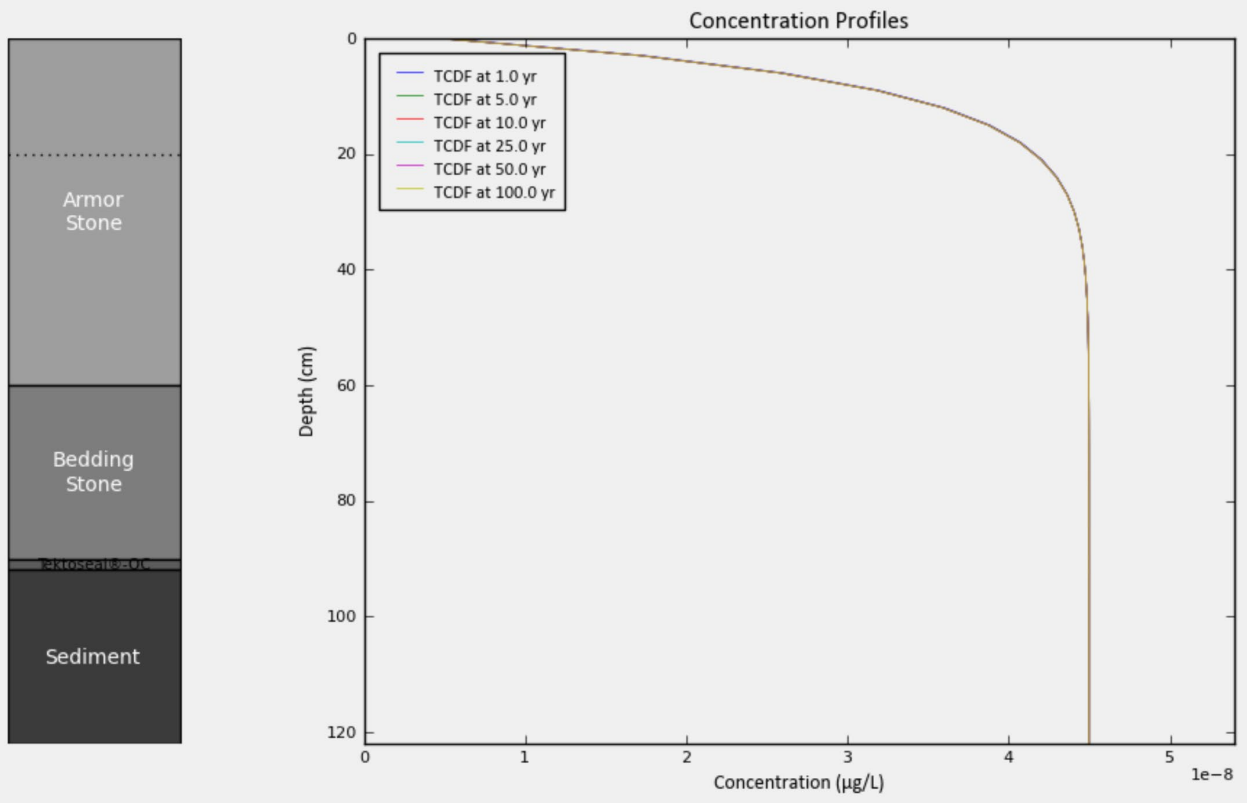

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PeCDF at 1.0 yr
PeCDF at 5.0 yr
PeCDF at 10.0 yr
PeCDF at 25.0 yr
PeCDF at 50.0 yr
PeCDF at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e−6
Concentration (µg/L)

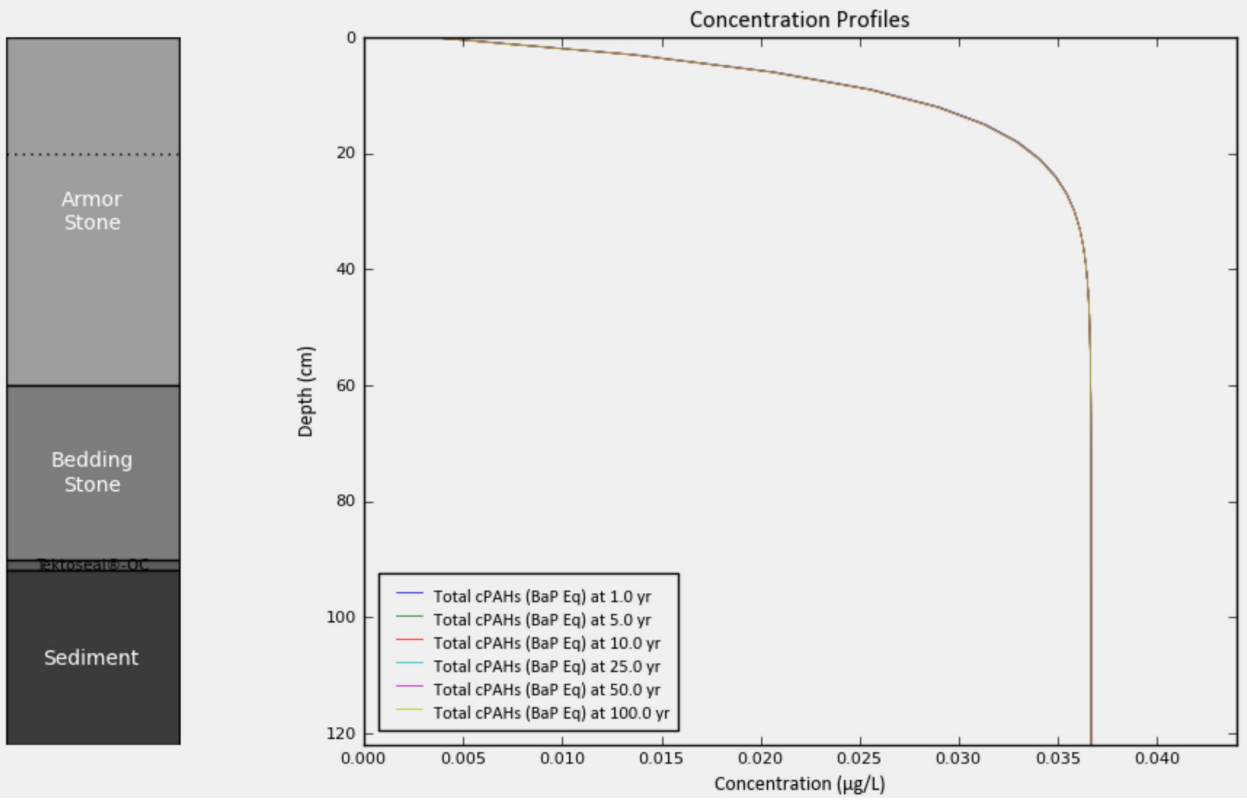

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Pentachlorophenol at 1.0 yr
Pentachlorophenol at 5.0 yr
Pentachlorophenol at 10.0 yr
Pentachlorophenol at 25.0 yr
Pentachlorophenol at 50.0 yr
Pentachlorophenol at 100.0 yr

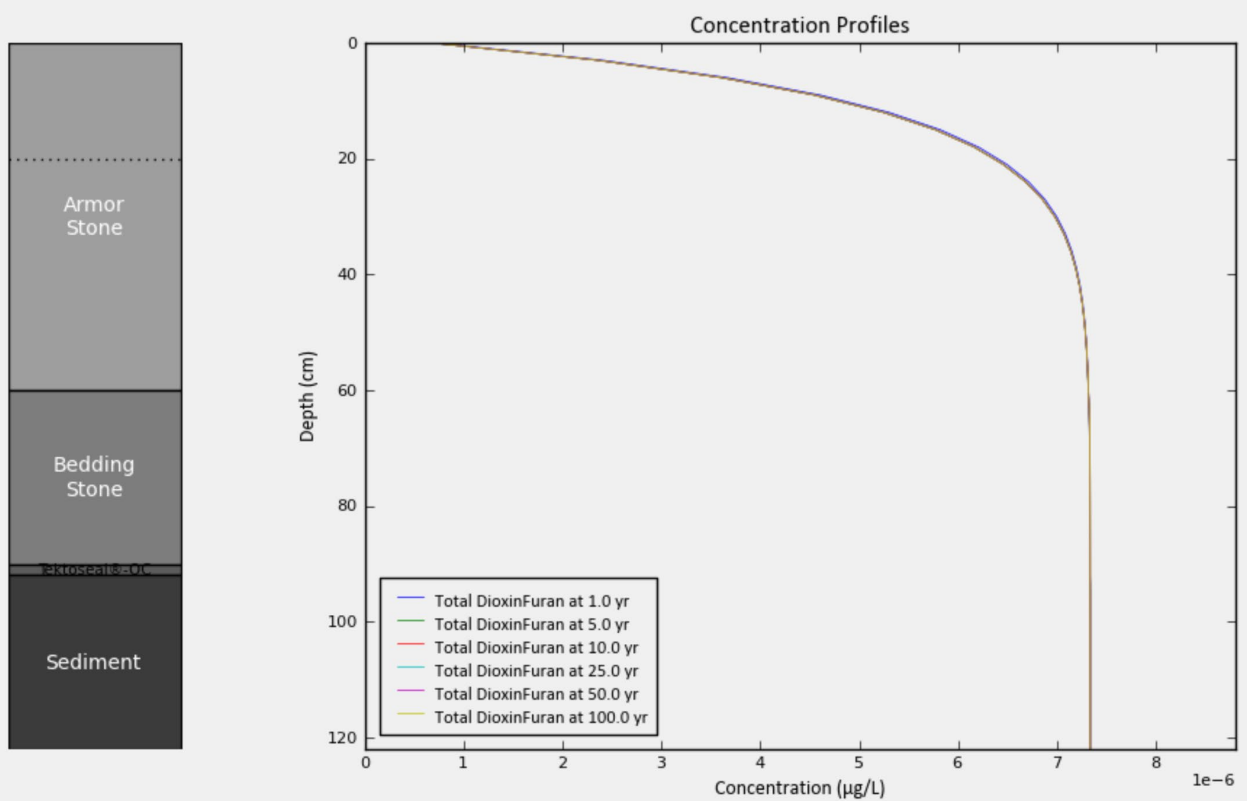

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Phenanthrene at 1.0 yr
Phenanthrene at 5.0 yr
Phenanthrene at 10.0 yr
Phenanthrene at 25.0 yr
Phenanthrene at 50.0 yr
Phenanthrene at 100.0 yr

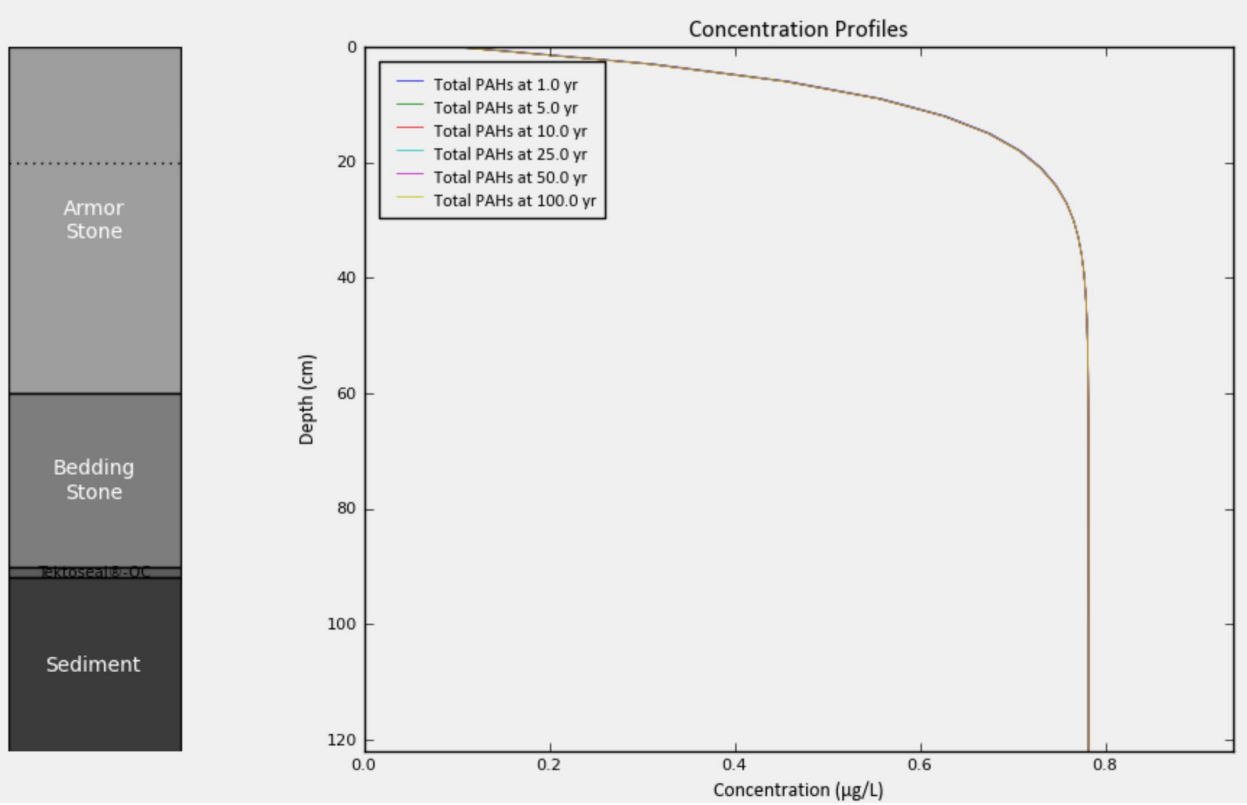

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Pyrene at 1.0 yr
Pyrene at 5.0 yr
Pyrene at 10.0 yr
Pyrene at 25.0 yr
Pyrene at 50.0 yr
Pyrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
Concentration (µg/L)

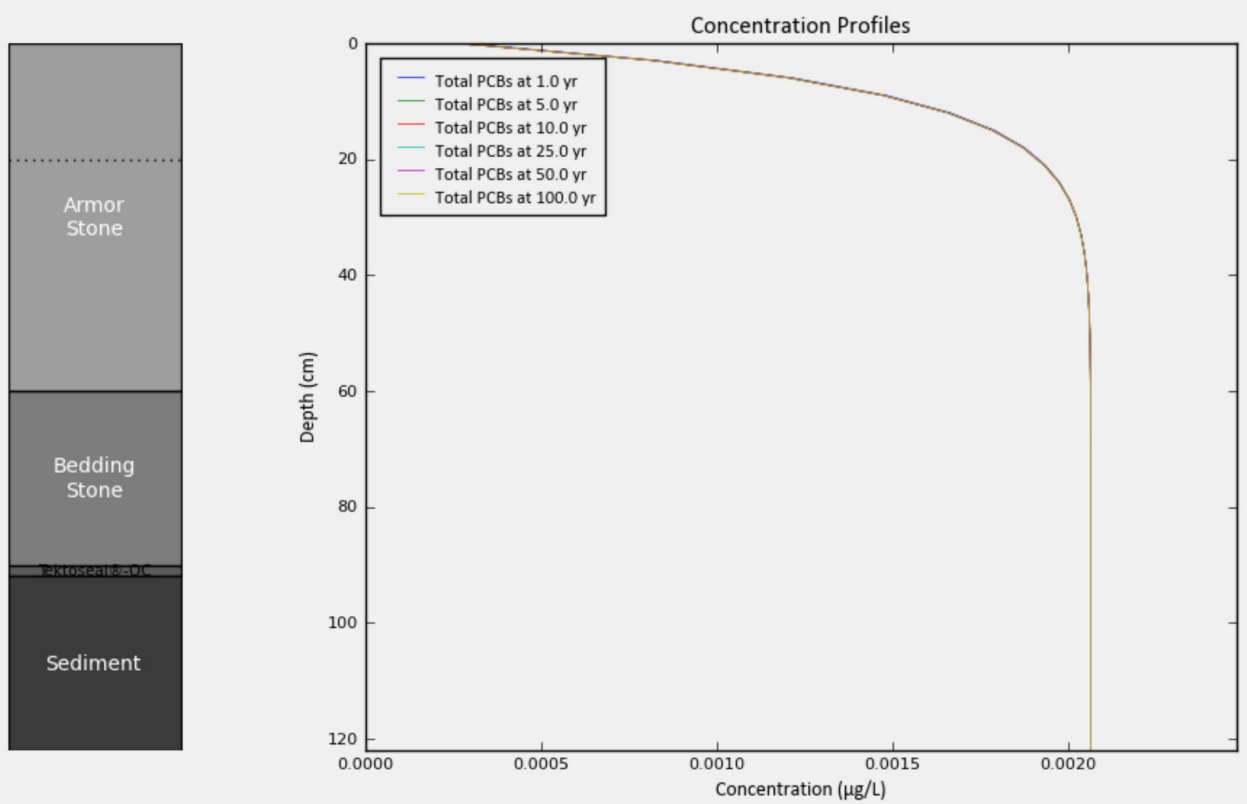

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
TCDD at 1.0 yr
TCDD at 5.0 yr
TCDD at 10.0 yr
TCDD at 25.0 yr
TCDD at 50.0 yr
TCDD at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e−7
Concentration (µg/L)

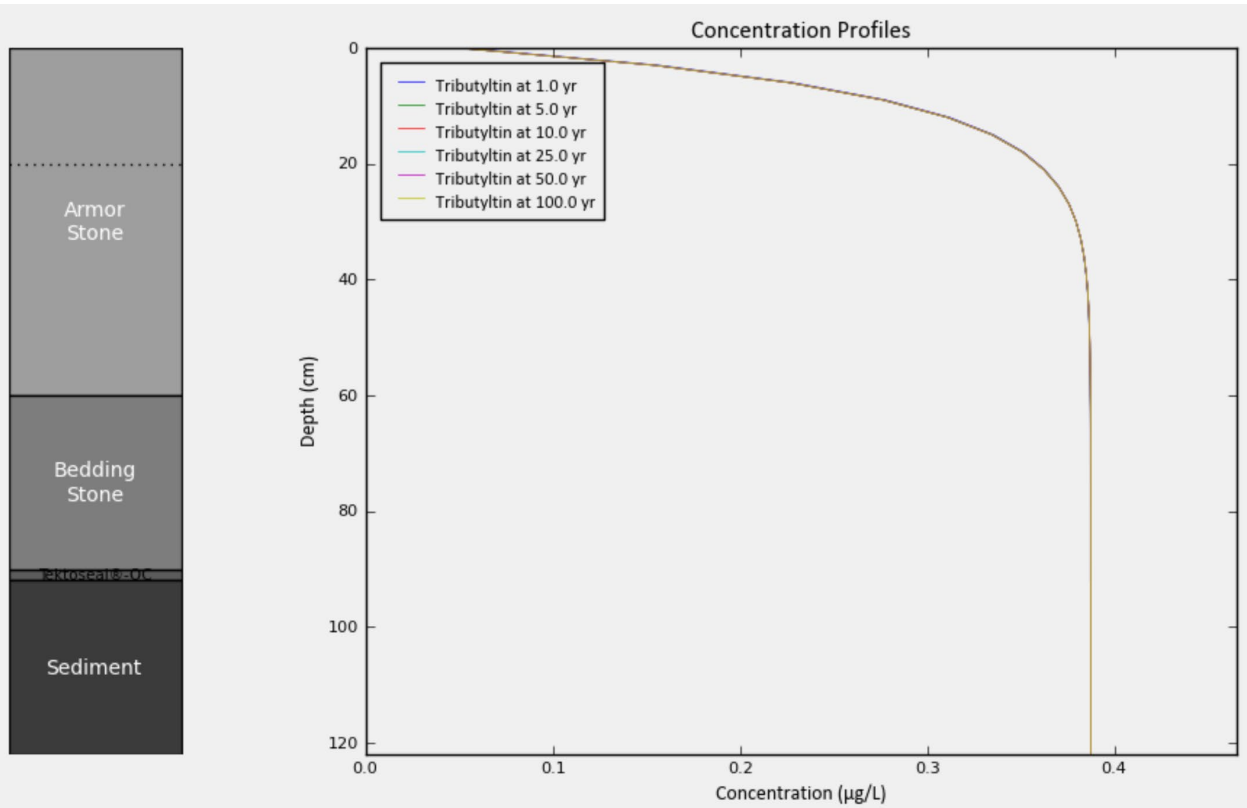

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
TCDF at 1.0 yr
TCDF at 5.0 yr
TCDF at 10.0 yr
TCDF at 25.0 yr
TCDF at 50.0 yr
TCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−8

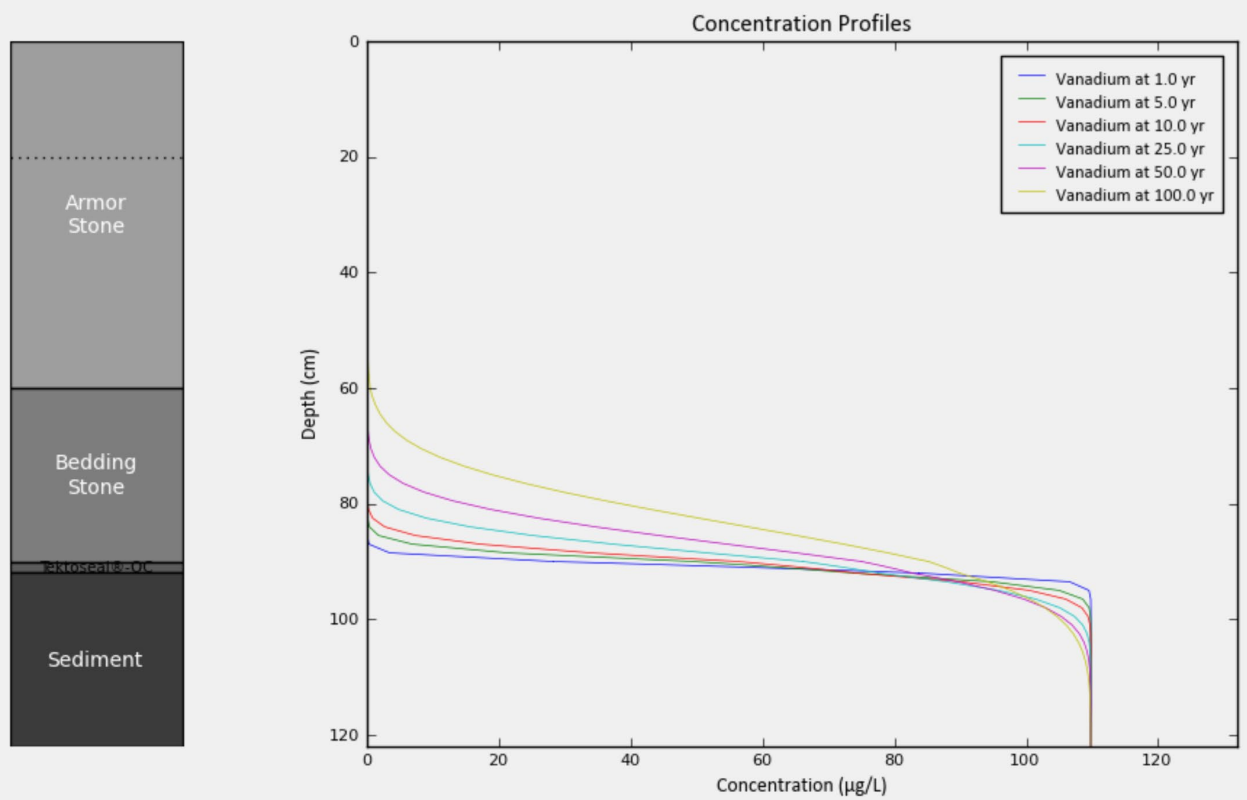

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Total cPAHs (BaP Eq) at 1.0 yr
Total cPAHs (BaP Eq) at 5.0 yr
Total cPAHs (BaP Eq) at 10.0 yr
Total cPAHs (BaP Eq) at 25.0 yr
Total cPAHs (BaP Eq) at 50.0 yr
Total cPAHs (BaP Eq) at 100.0 yr
Depth (cm)
Concentration (µg/L)

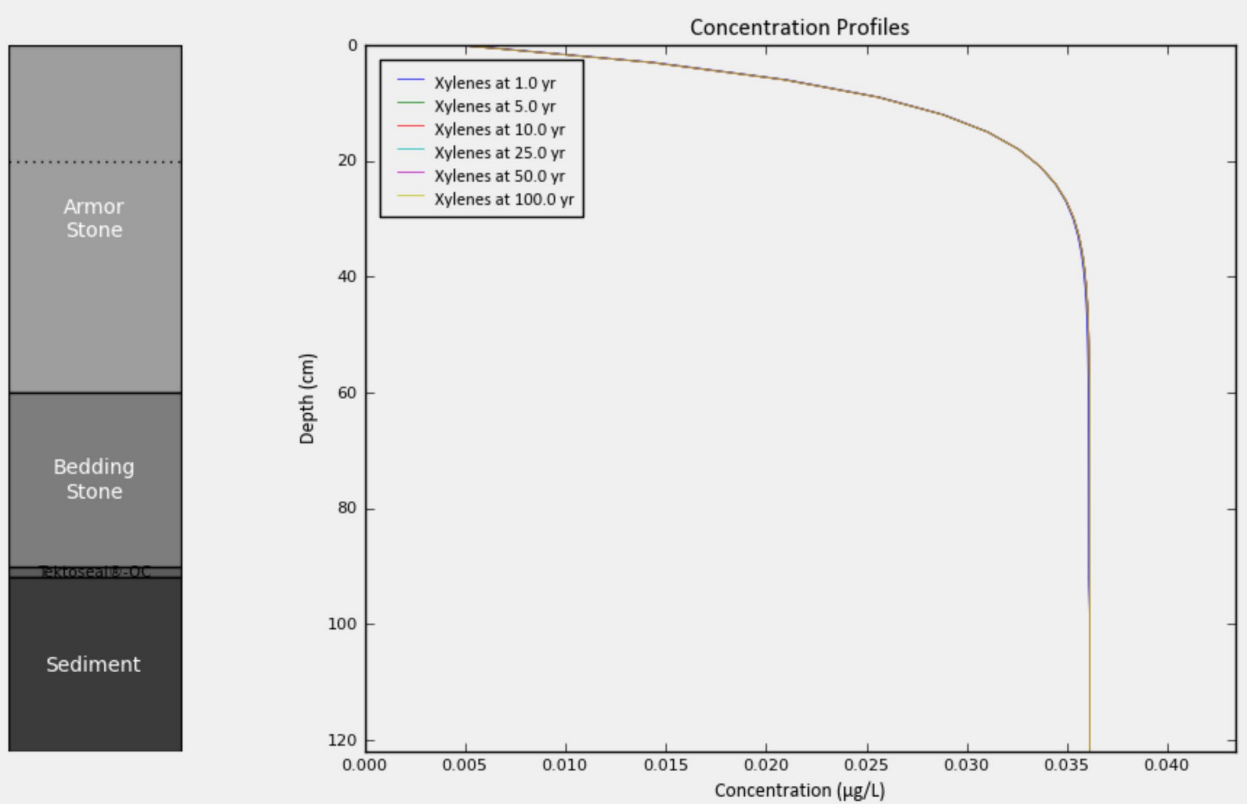

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
1e−6
Total DioxinFuran at 1.0 yr
Total DioxinFuran at 5.0 yr
Total DioxinFuran at 10.0 yr
Total DioxinFuran at 25.0 yr
Total DioxinFuran at 50.0 yr
Total DioxinFuran at 100.0 yr

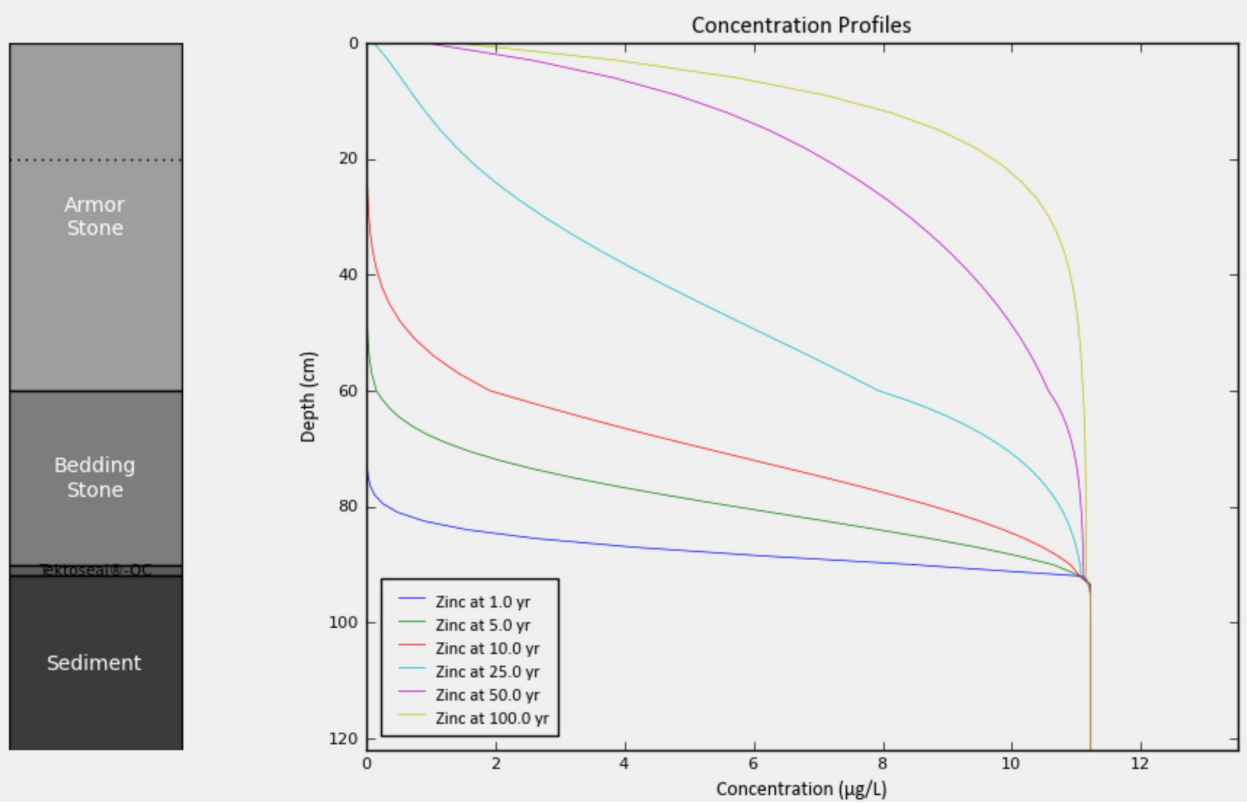

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Total PAHs at 1.0 yr
Total PAHs at 5.0 yr
Total PAHs at 10.0 yr
Total PAHs at 25.0 yr
Total PAHs at 50.0 yr
Total PAHs at 100.0 yr


Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Total PCBs at 1.0 yr
Total PCBs at 5.0 yr
Total PCBs at 10.0 yr
Total PCBs at 25.0 yr
Total PCBs at 50.0 yr
Total PCBs at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

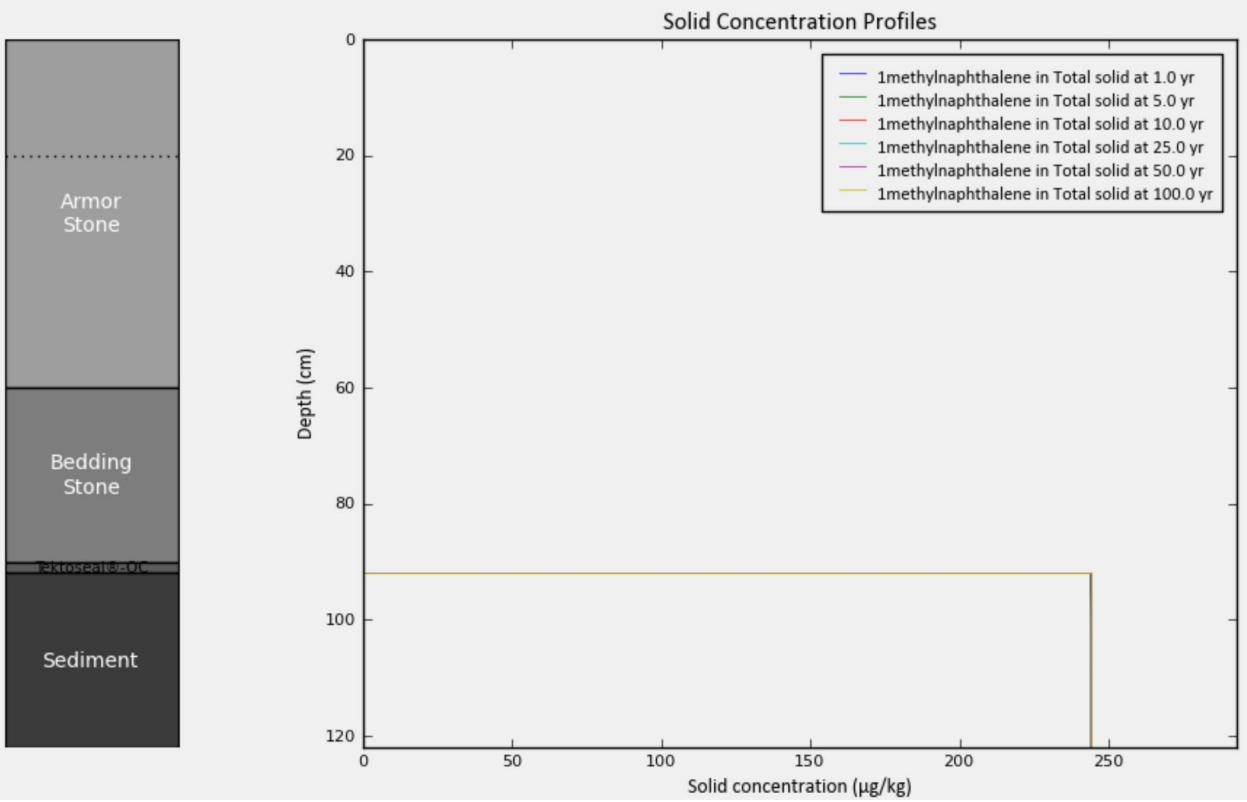

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Tributyltin at 1.0 yr
Tributyltin at 5.0 yr
Tributyltin at 10.0 yr
Tributyltin at 25.0 yr
Tributyltin at 50.0 yr
Tributyltin at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.1
0.2
0.3
0.4
Concentration (µg/L)

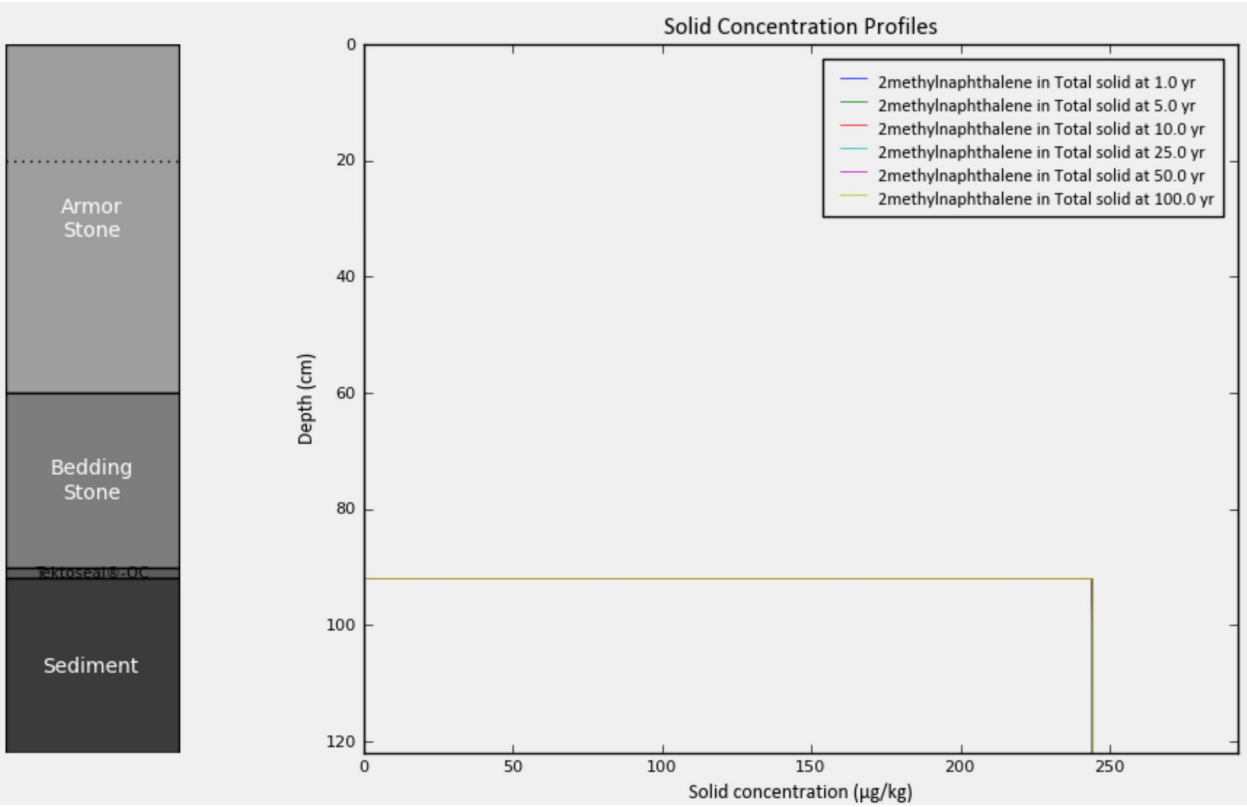

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Vanadium at 1.0 yr
Vanadium at 5.0 yr
Vanadium at 10.0 yr
Vanadium at 25.0 yr
Vanadium at 50.0 yr
Vanadium at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120

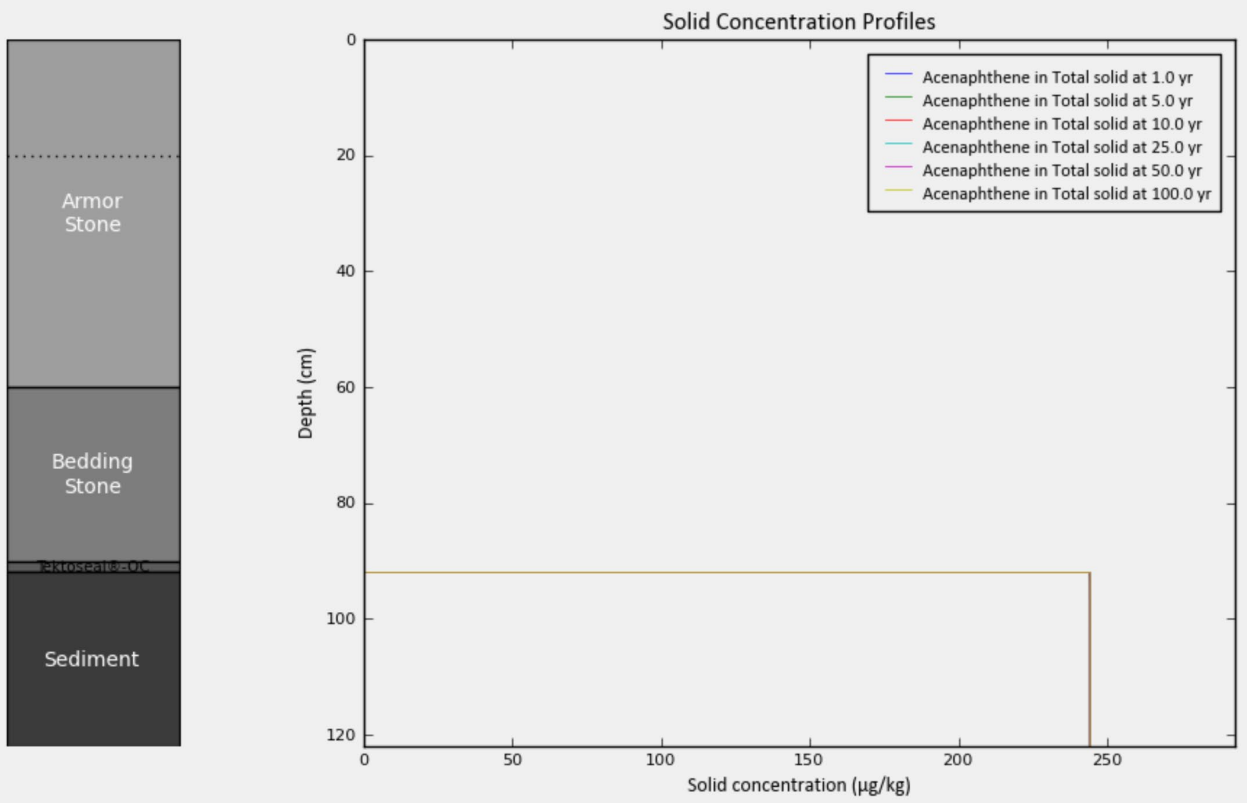

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Xylenes at 1.0 yr
Xylenes at 5.0 yr
Xylenes at 10.0 yr
Xylenes at 25.0 yr
Xylenes at 50.0 yr
Xylenes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040

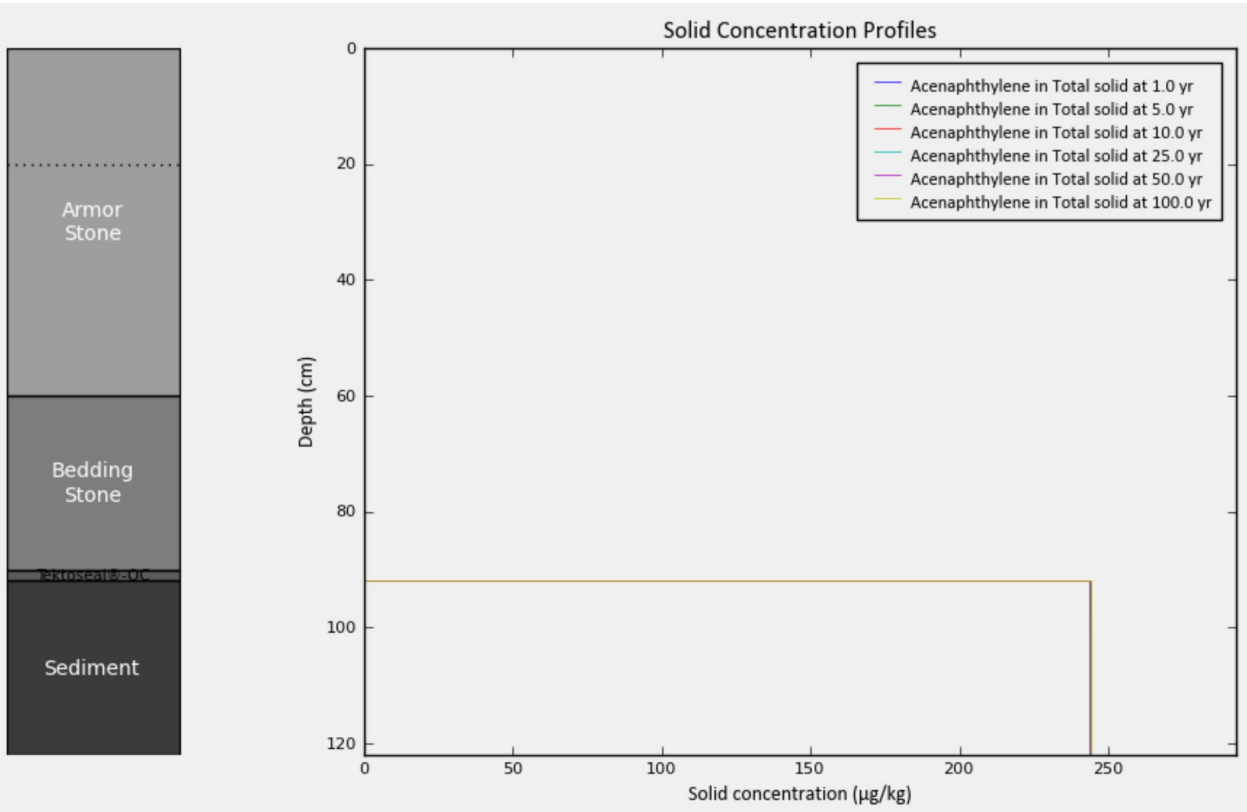

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
2
4
6
8
10
12
Zinc at 1.0 yr
Zinc at 5.0 yr
Zinc at 10.0 yr
Zinc at 25.0 yr
Zinc at 50.0 yr
Zinc at 100.0 yr

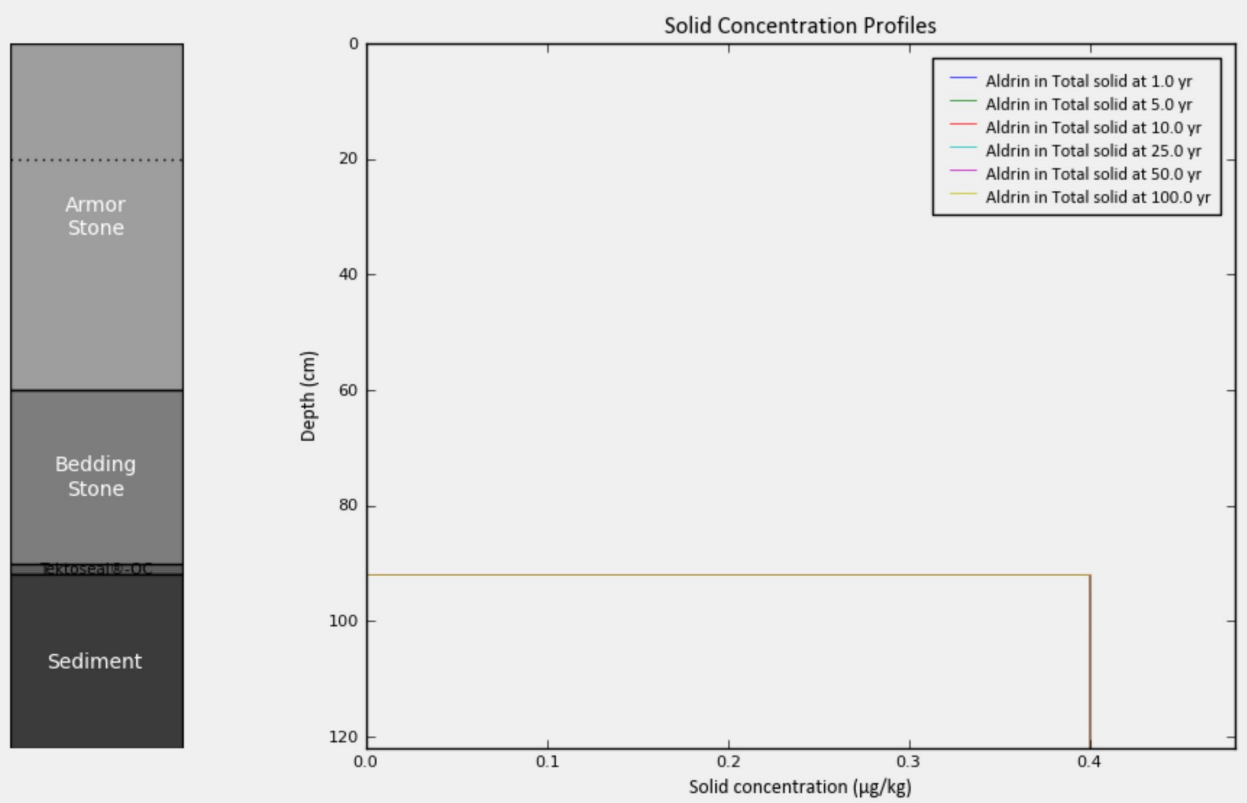
Total Solids Concentration – Depth

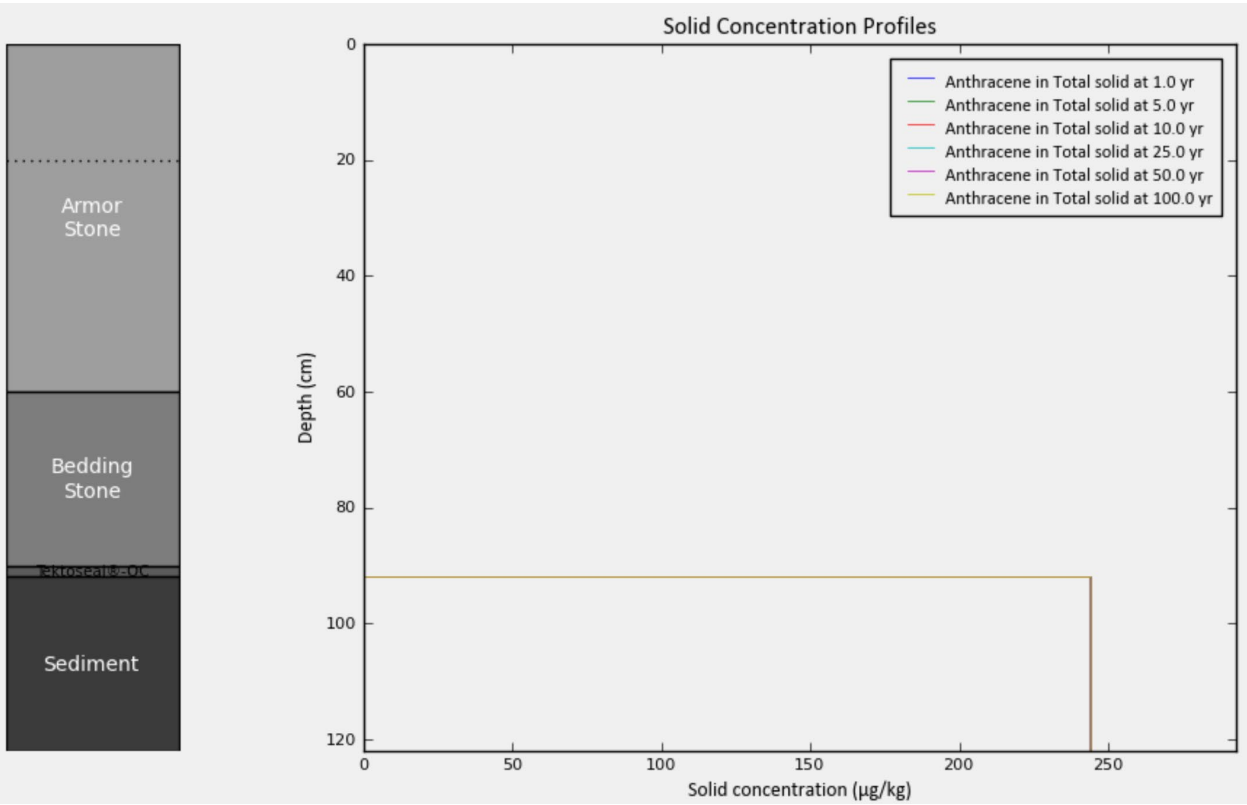


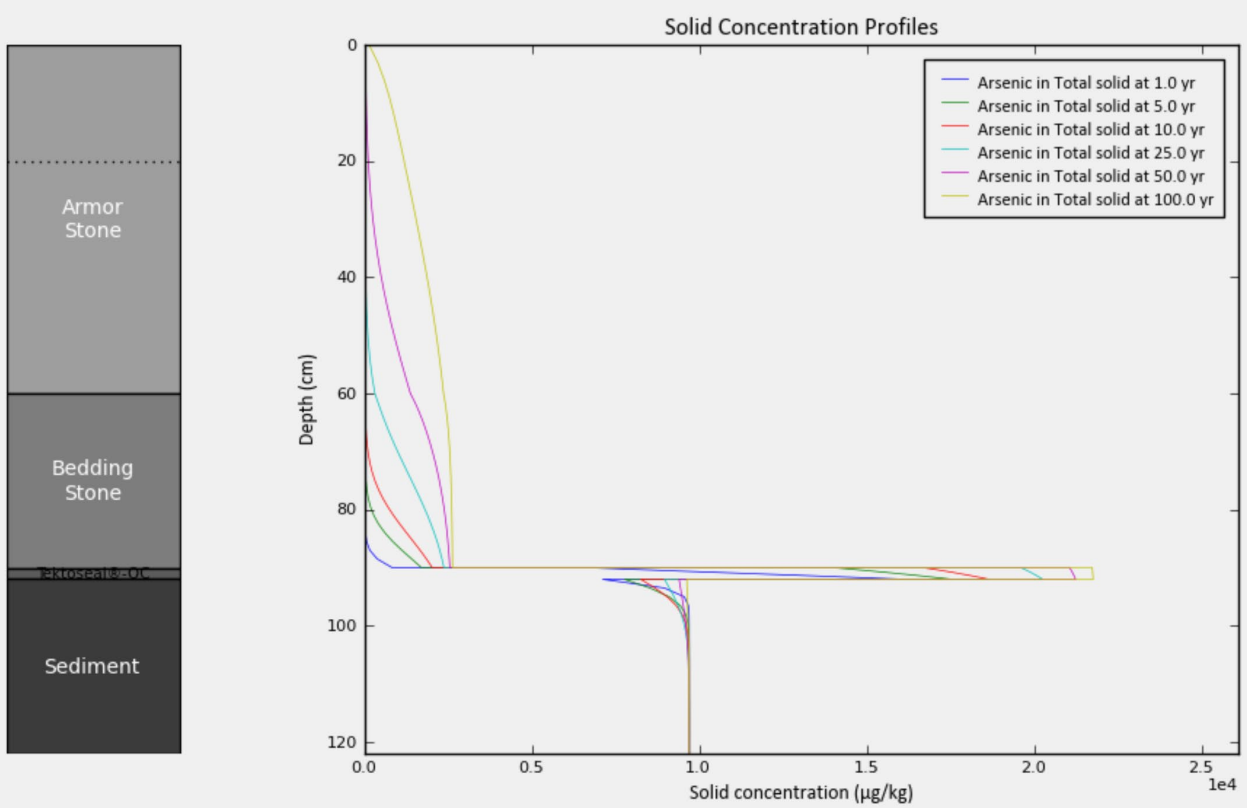


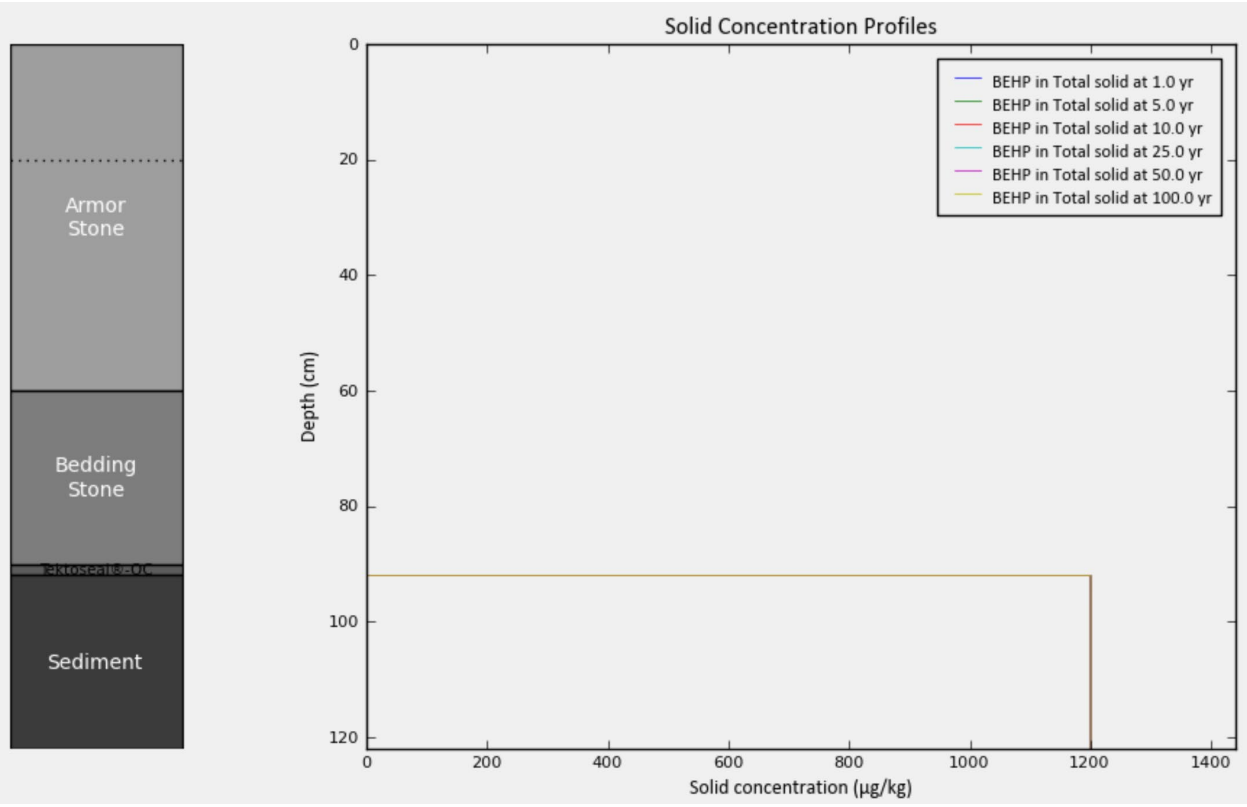

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Acenaphthene in Total solid at 1.0 yr
Acenaphthene in Total solid at 5.0 yr
Acenaphthene in Total solid at 10.0 yr
Acenaphthene in Total solid at 25.0 yr
Acenaphthene in Total solid at 50.0 yr
Acenaphthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

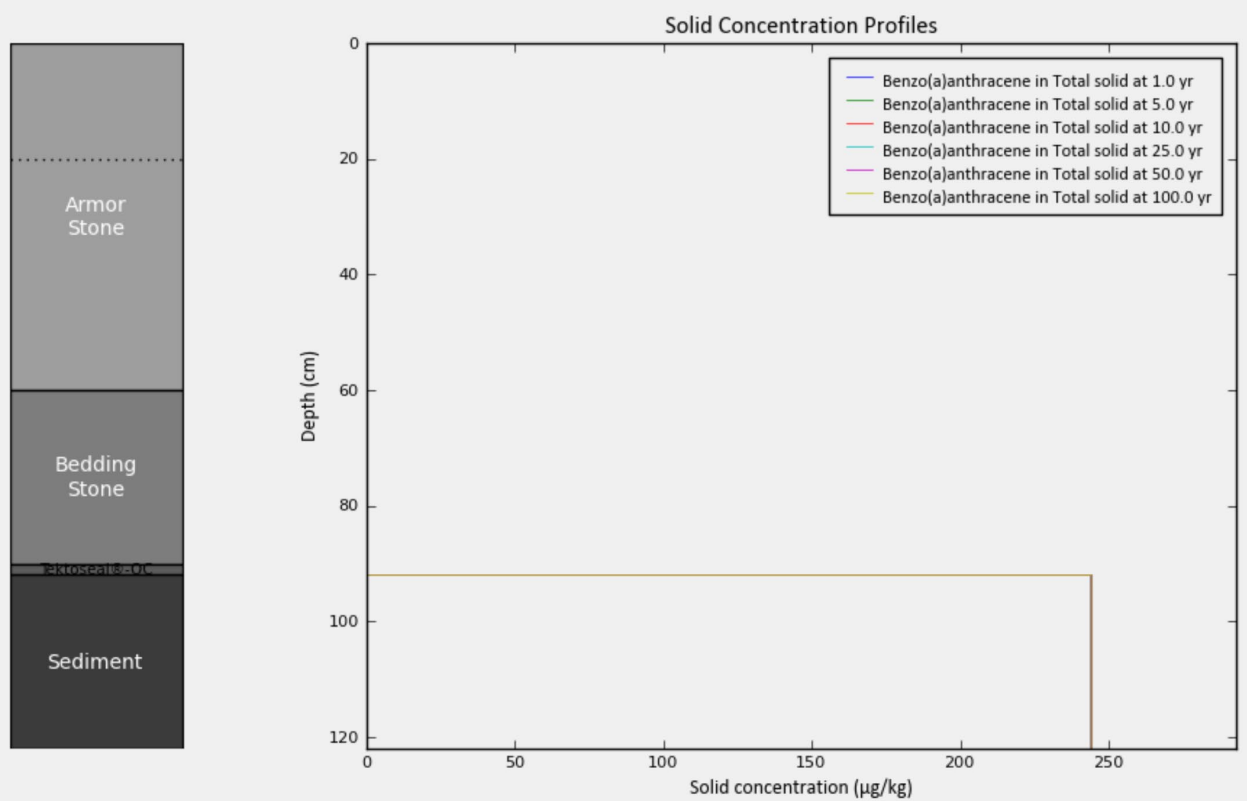

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Acenaphthylene in Total solid at 1.0 yr
Acenaphthylene in Total solid at 5.0 yr
Acenaphthylene in Total solid at 10.0 yr
Acenaphthylene in Total solid at 25.0 yr
Acenaphthylene in Total solid at 50.0 yr
Acenaphthylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

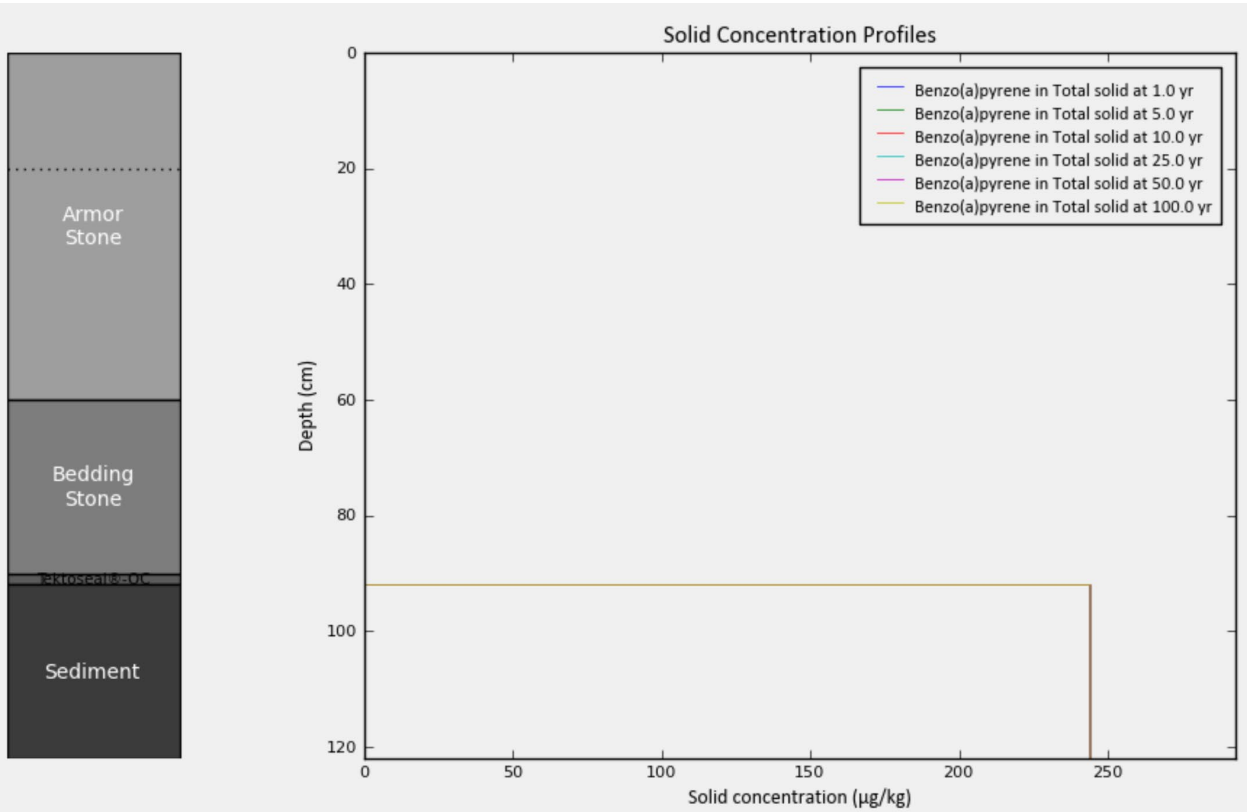

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Aldrin in Total solid at 1.0 yr
Aldrin in Total solid at 5.0 yr
Aldrin in Total solid at 10.0 yr
Aldrin in Total solid at 25.0 yr
Aldrin in Total solid at 50.0 yr
Aldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

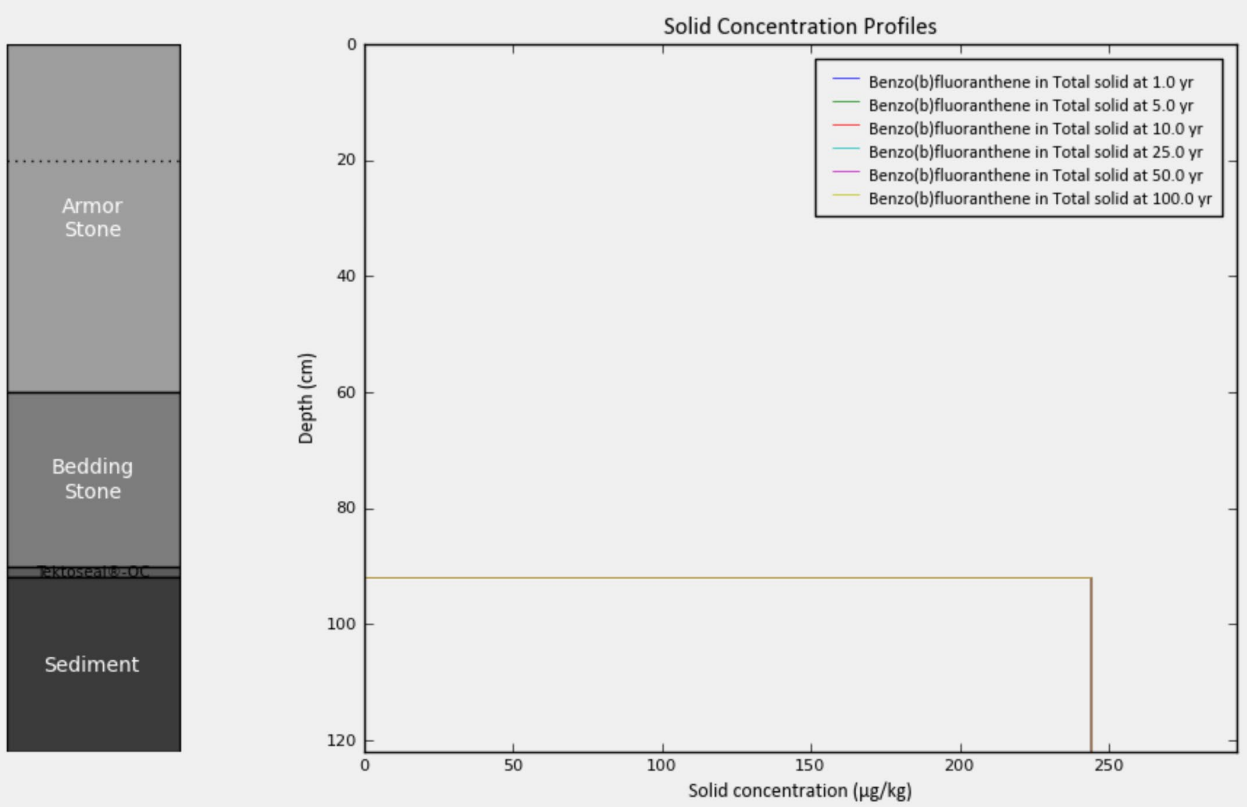

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Anthracene in Total solid at 1.0 yr
Anthracene in Total solid at 5.0 yr
Anthracene in Total solid at 10.0 yr
Anthracene in Total solid at 25.0 yr
Anthracene in Total solid at 50.0 yr
Anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

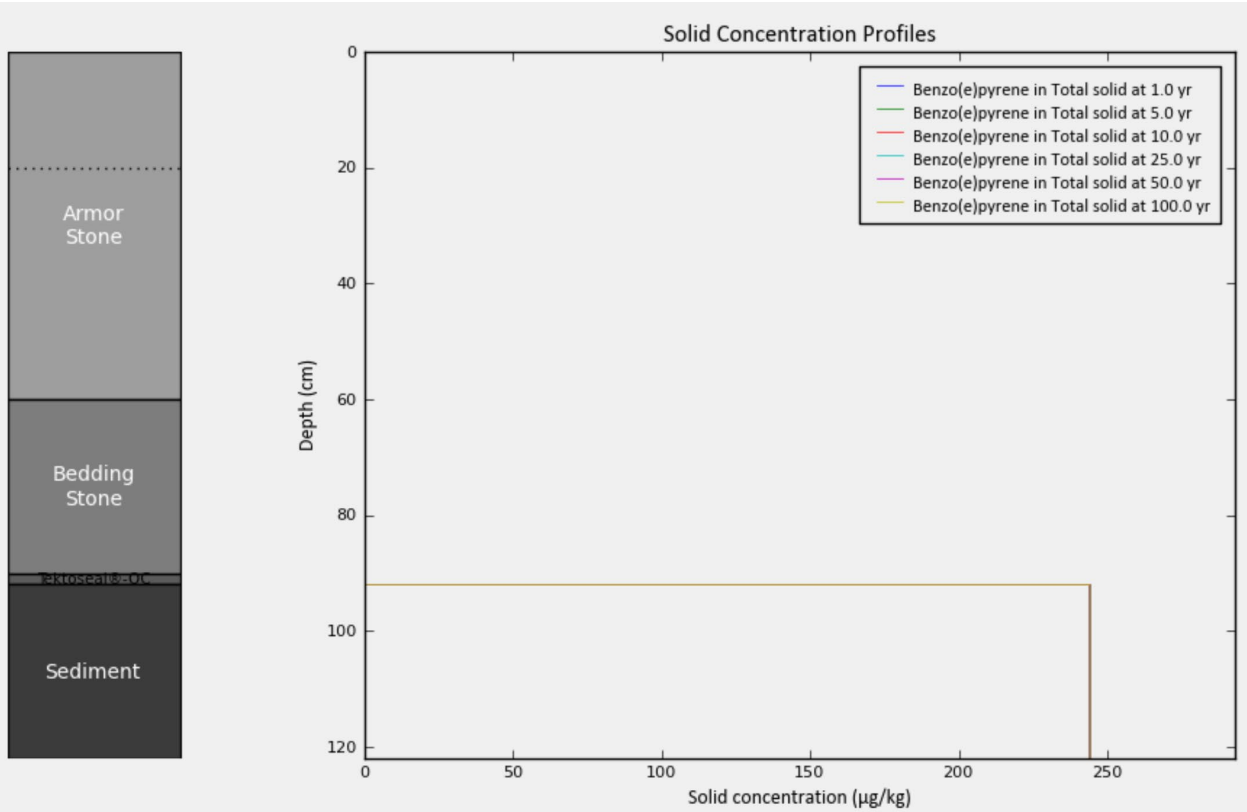

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Arsenic in Total solid at 1.0 yr
Arsenic in Total solid at 5.0 yr
Arsenic in Total solid at 10.0 yr
Arsenic in Total solid at 25.0 yr
Arsenic in Total solid at 50.0 yr
Arsenic in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

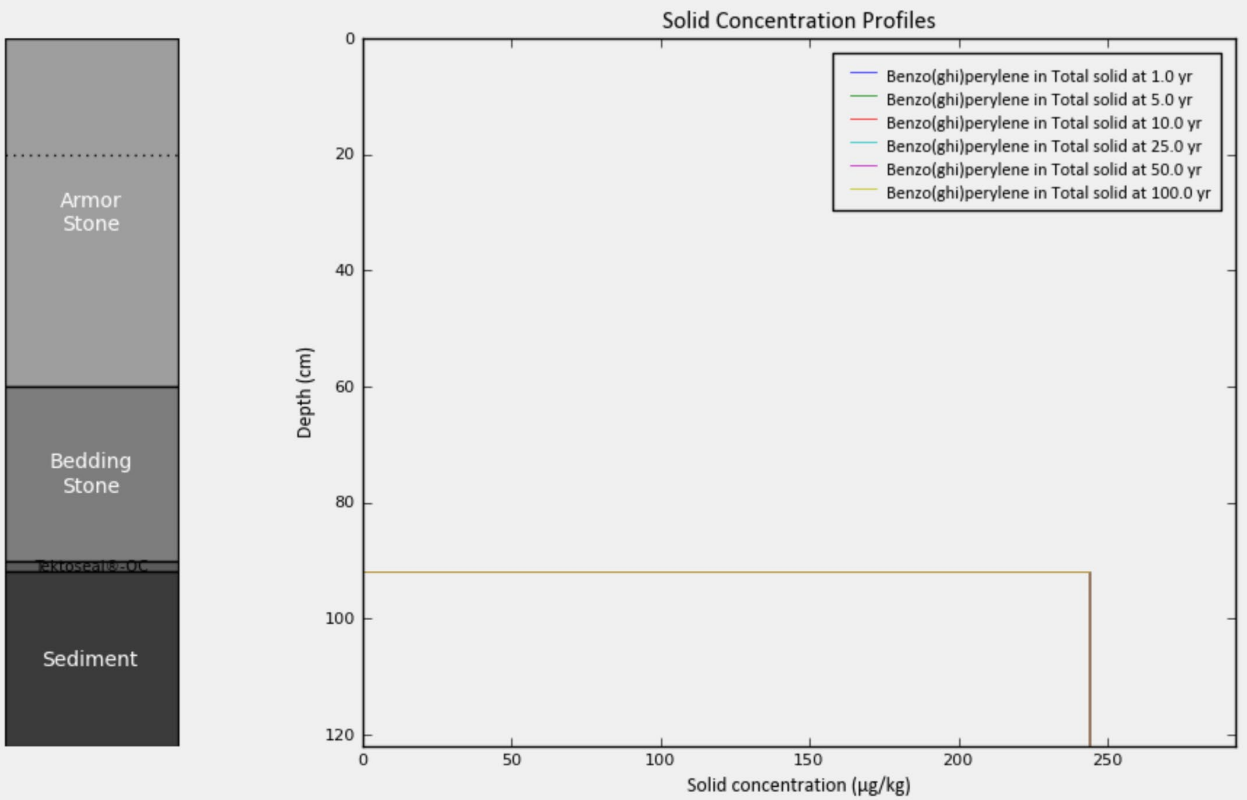

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
BEHP in Total solid at 1.0 yr
BEHP in Total solid at 5.0 yr
BEHP in Total solid at 10.0 yr
BEHP in Total solid at 25.0 yr
BEHP in Total solid at 50.0 yr
BEHP in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

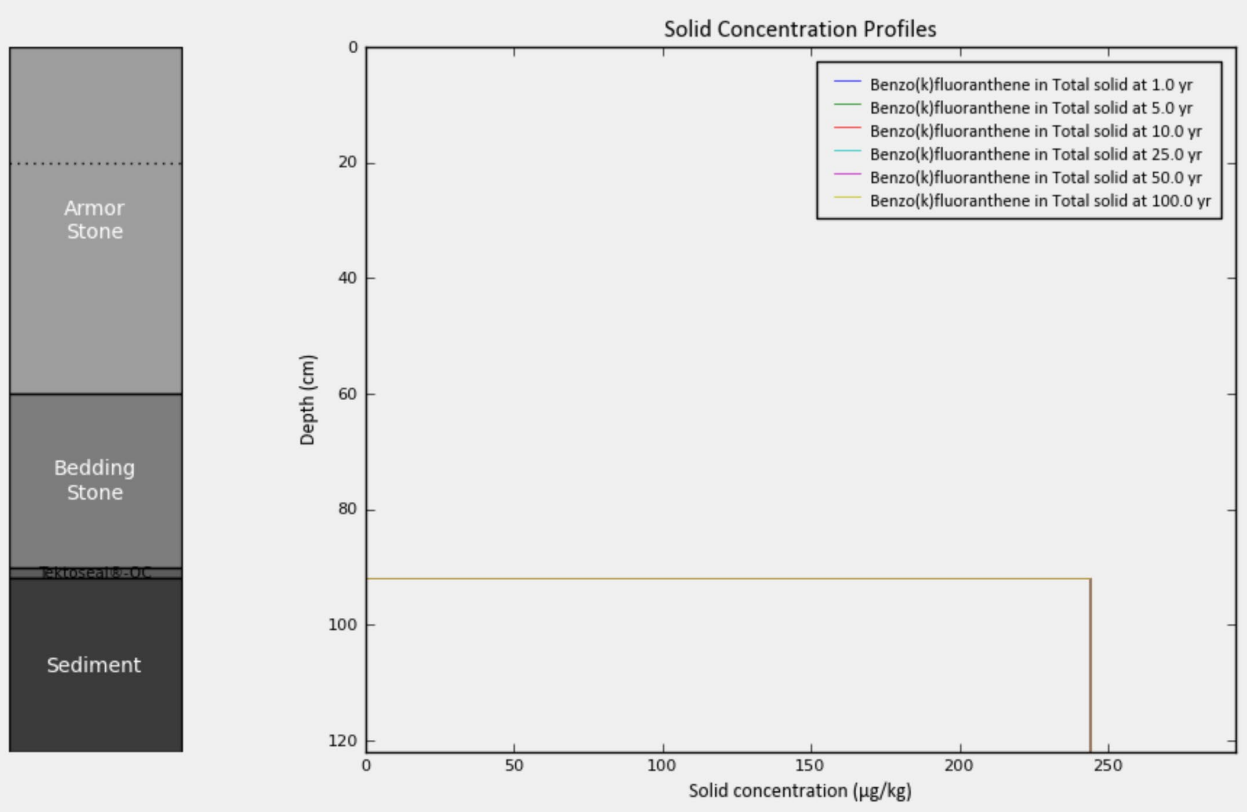

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(a)anthracene in Total solid at 1.0 yr
Benzo(a)anthracene in Total solid at 5.0 yr
Benzo(a)anthracene in Total solid at 10.0 yr
Benzo(a)anthracene in Total solid at 25.0 yr
Benzo(a)anthracene in Total solid at 50.0 yr
Benzo(a)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

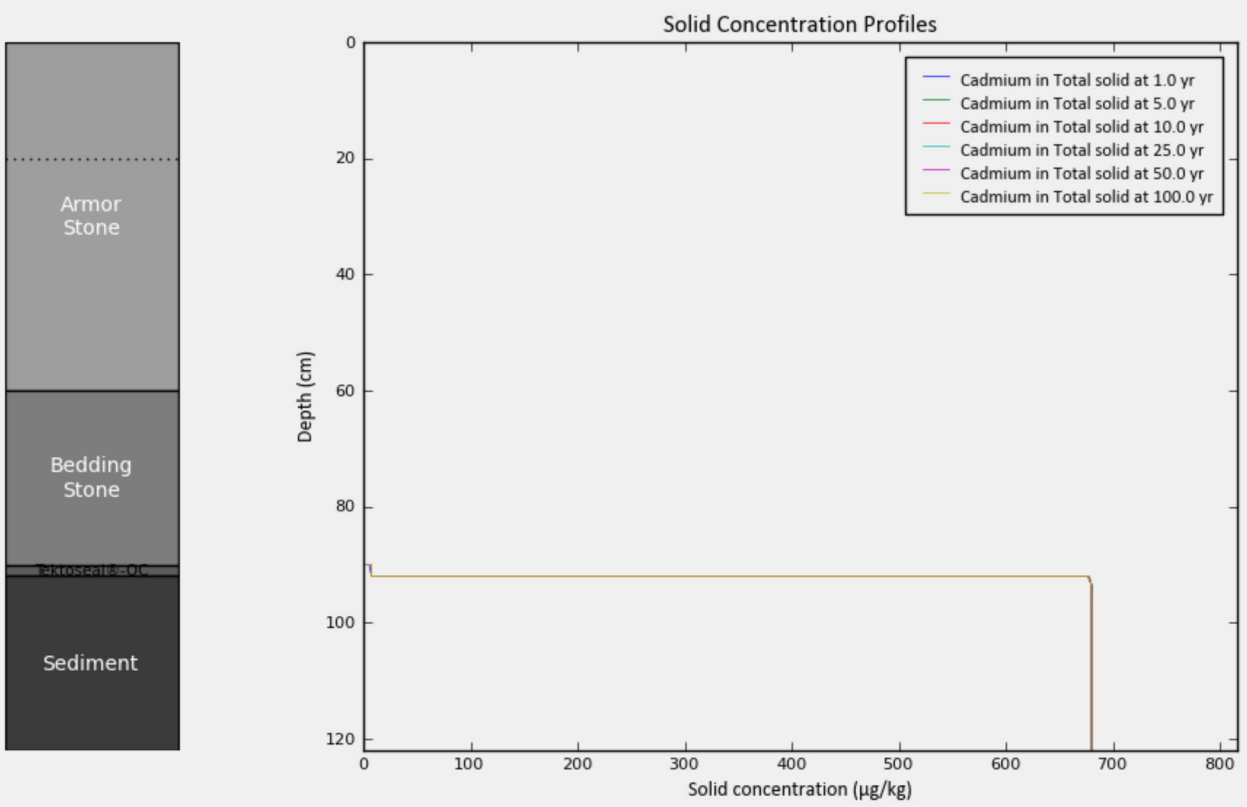

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(a)pyrene in Total solid at 1.0 yr
Benzo(a)pyrene in Total solid at 5.0 yr
Benzo(a)pyrene in Total solid at 10.0 yr
Benzo(a)pyrene in Total solid at 25.0 yr
Benzo(a)pyrene in Total solid at 50.0 yr
Benzo(a)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

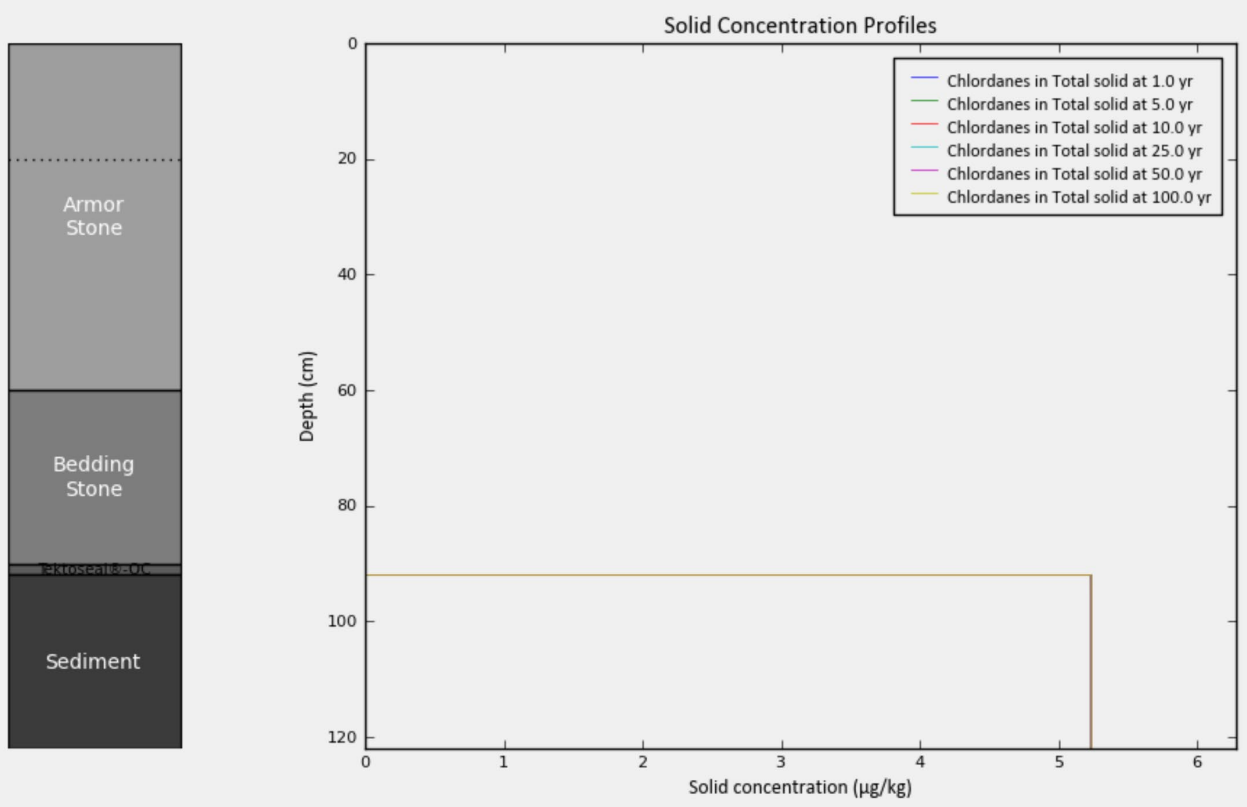

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(b)fluoranthene in Total solid at 1.0 yr
Benzo(b)fluoranthene in Total solid at 5.0 yr
Benzo(b)fluoranthene in Total solid at 10.0 yr
Benzo(b)fluoranthene in Total solid at 25.0 yr
Benzo(b)fluoranthene in Total solid at 50.0 yr
Benzo(b)fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
20
40
60
80
100
120
0
50
100
150
200
250

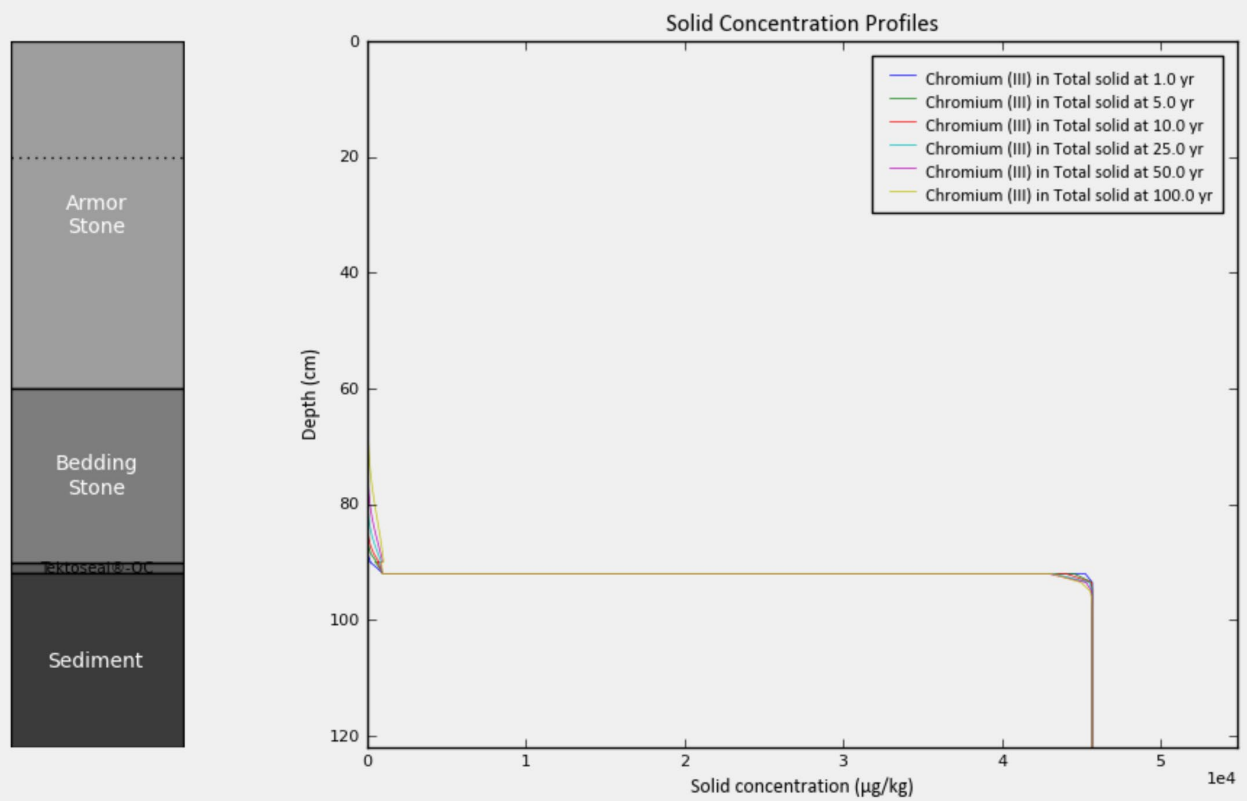

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(e)pyrene in Total solid at 1.0 yr
Benzo(e)pyrene in Total solid at 5.0 yr
Benzo(e)pyrene in Total solid at 10.0 yr
Benzo(e)pyrene in Total solid at 25.0 yr
Benzo(e)pyrene in Total solid at 50.0 yr
Benzo(e)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
20
40
60
80
100
120
0
50
100
150
200
250

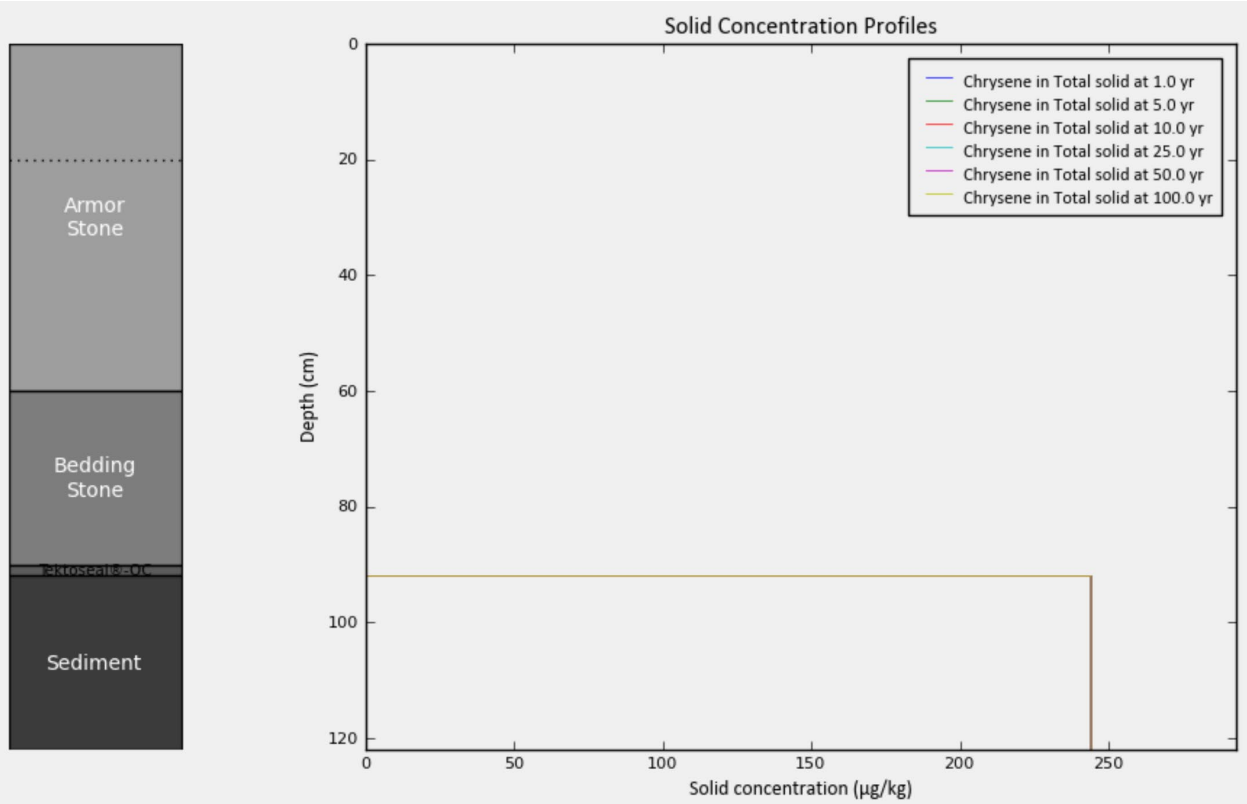

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(ghi)perylene in Total solid at 1.0 yr
Benzo(ghi)perylene in Total solid at 5.0 yr
Benzo(ghi)perylene in Total solid at 10.0 yr
Benzo(ghi)perylene in Total solid at 25.0 yr
Benzo(ghi)perylene in Total solid at 50.0 yr
Benzo(ghi)perylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

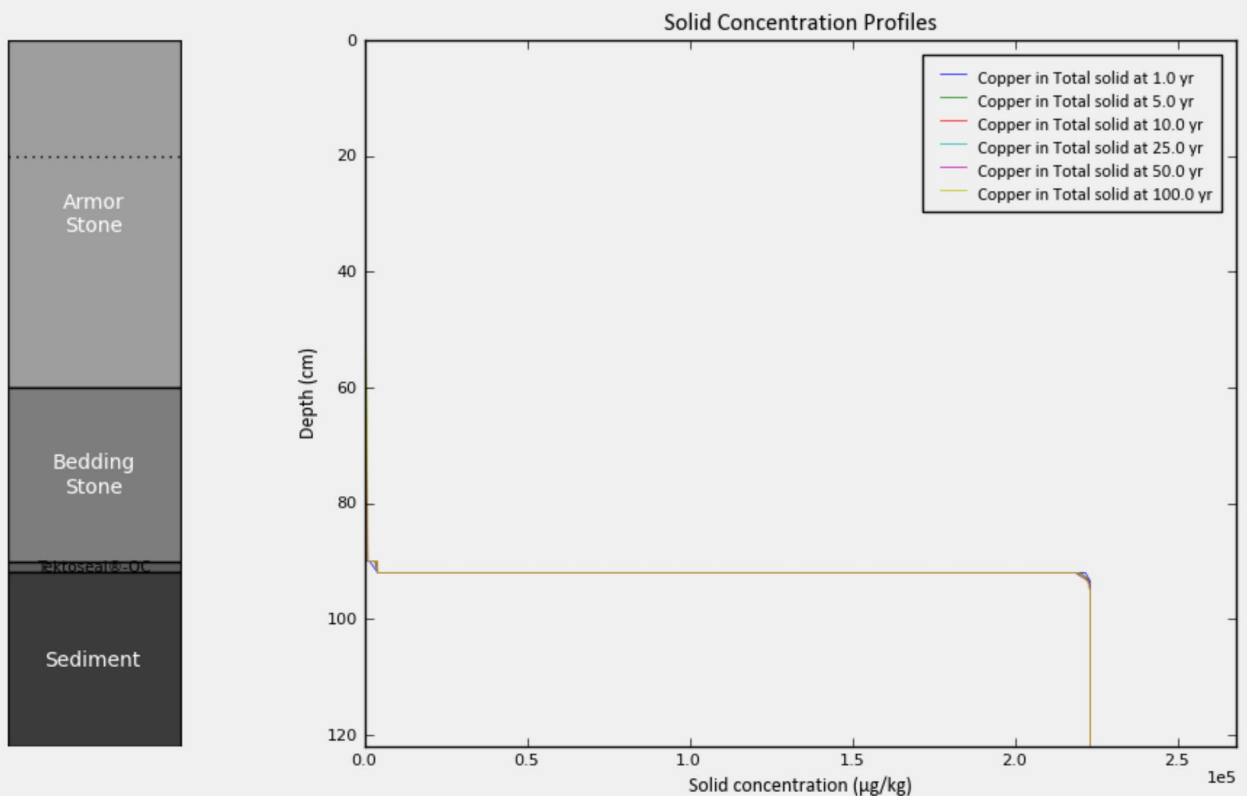

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(k)fluoranthene in Total solid at 1.0 yr
Benzo(k)fluoranthene in Total solid at 5.0 yr
Benzo(k)fluoranthene in Total solid at 10.0 yr
Benzo(k)fluoranthene in Total solid at 25.0 yr
Benzo(k)fluoranthene in Total solid at 50.0 yr
Benzo(k)fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

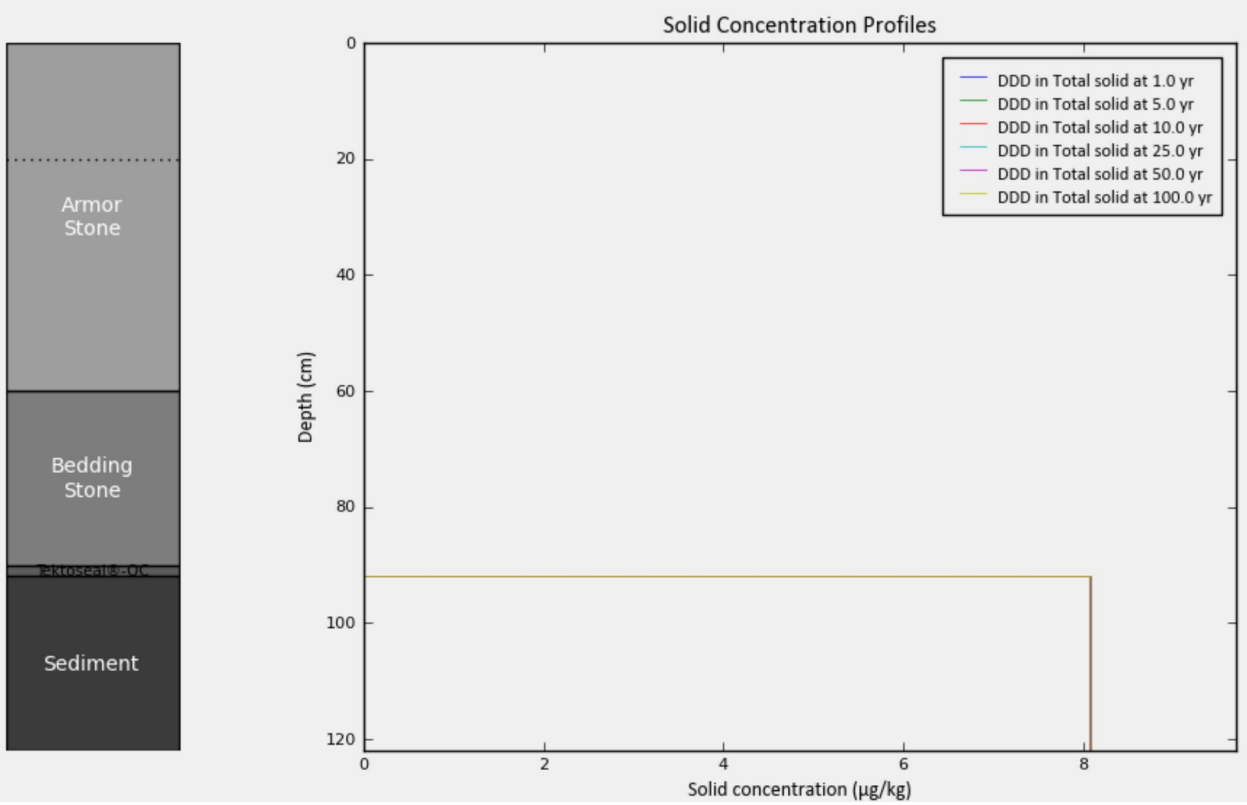

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Cadmium in Total solid at 1.0 yr
Cadmium in Total solid at 5.0 yr
Cadmium in Total solid at 10.0 yr
Cadmium in Total solid at 25.0 yr
Cadmium in Total solid at 50.0 yr
Cadmium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

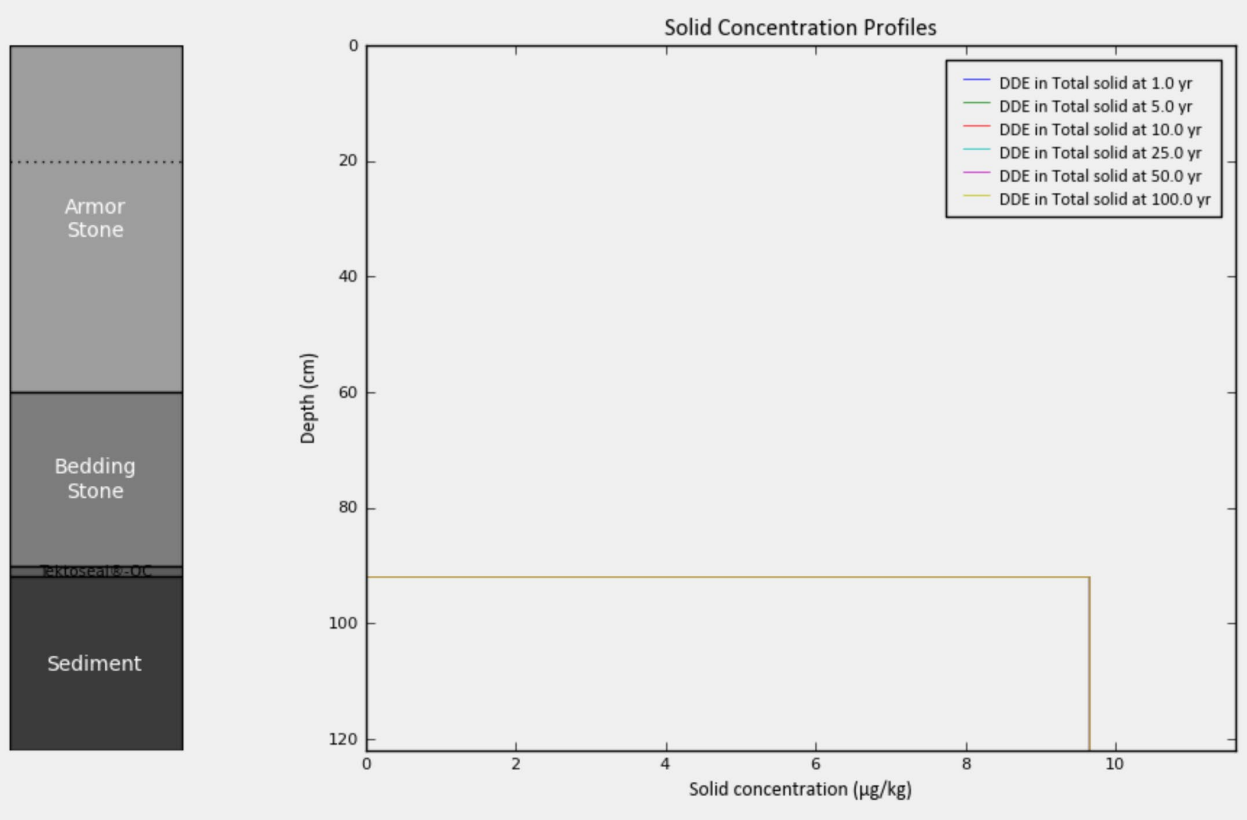

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Chlordanes in Total solid at 1.0 yr
Chlordanes in Total solid at 5.0 yr
Chlordanes in Total solid at 10.0 yr
Chlordanes in Total solid at 25.0 yr
Chlordanes in Total solid at 50.0 yr
Chlordanes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

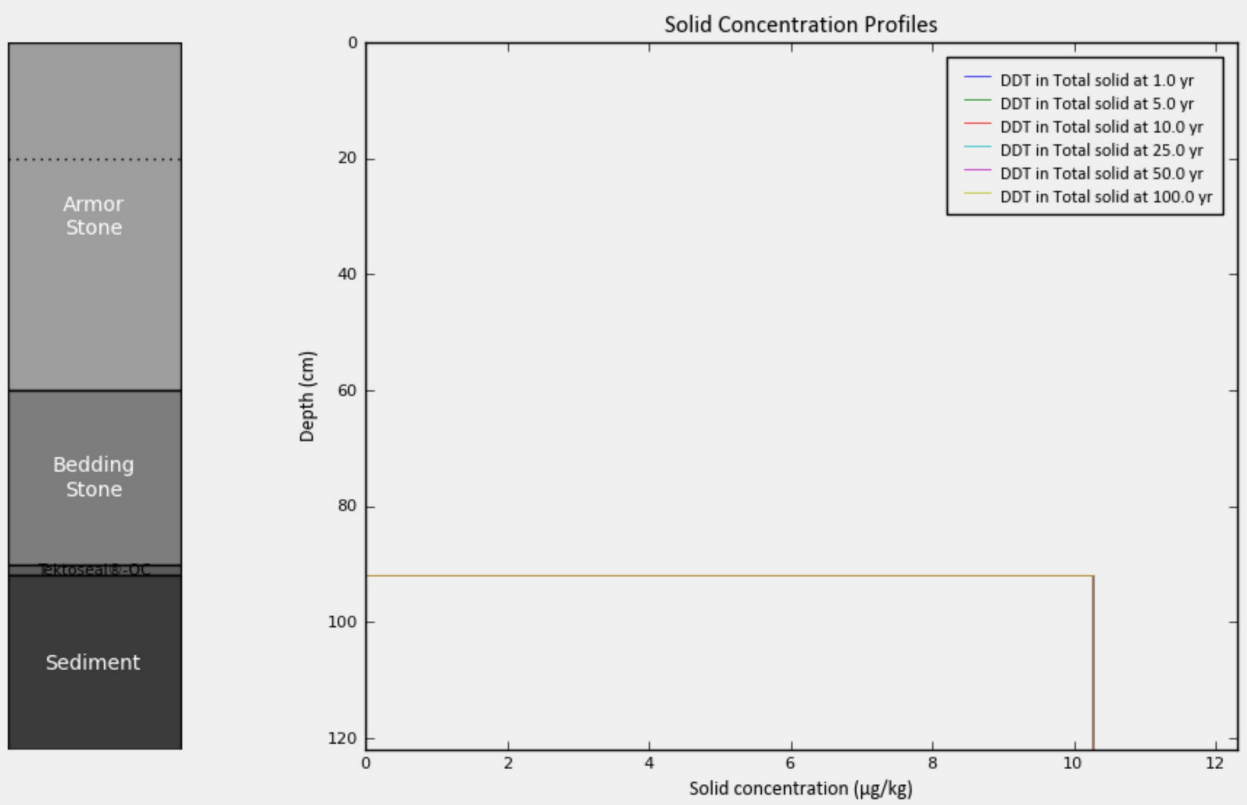

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Chromium (III) in Total solid at 1.0 yr
Chromium (III) in Total solid at 5.0 yr
Chromium (III) in Total solid at 10.0 yr
Chromium (III) in Total solid at 25.0 yr
Chromium (III) in Total solid at 50.0 yr
Chromium (III) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

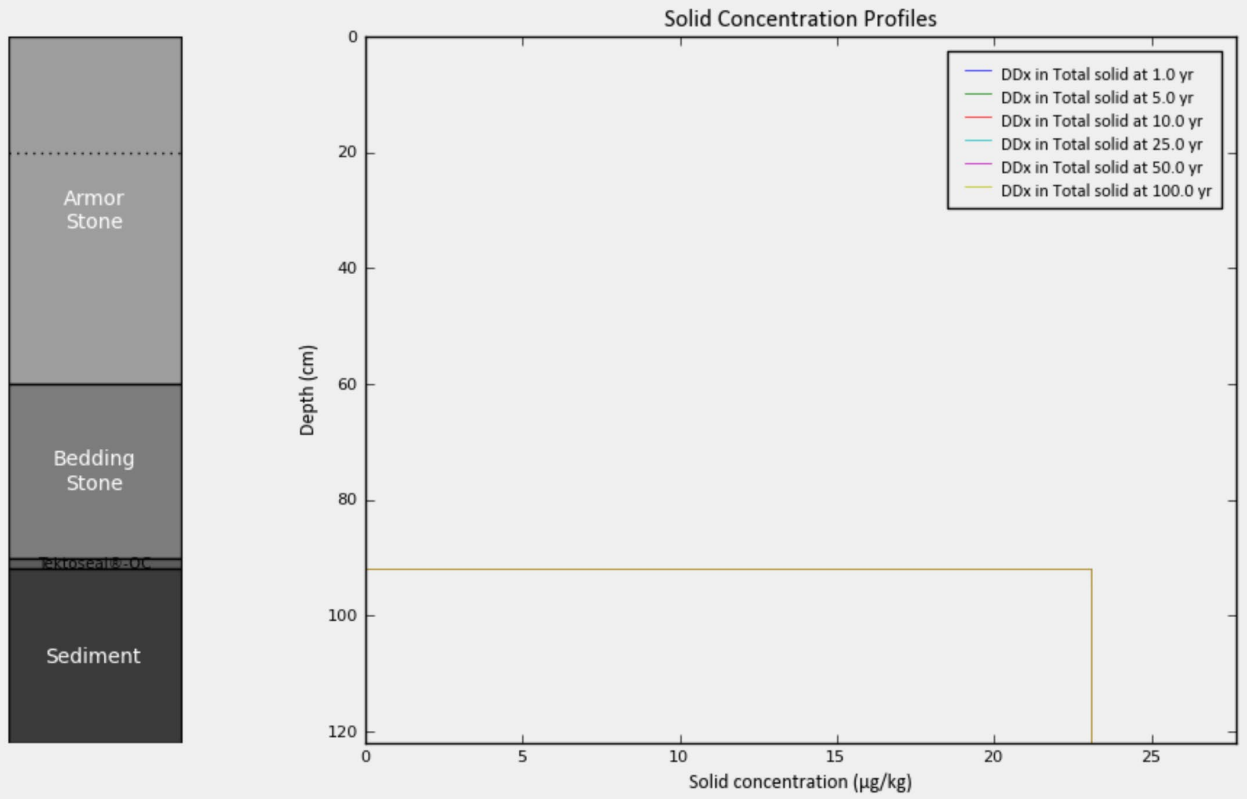

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Chrysene in Total solid at 1.0 yr
Chrysene in Total solid at 5.0 yr
Chrysene in Total solid at 10.0 yr
Chrysene in Total solid at 25.0 yr
Chrysene in Total solid at 50.0 yr
Chrysene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

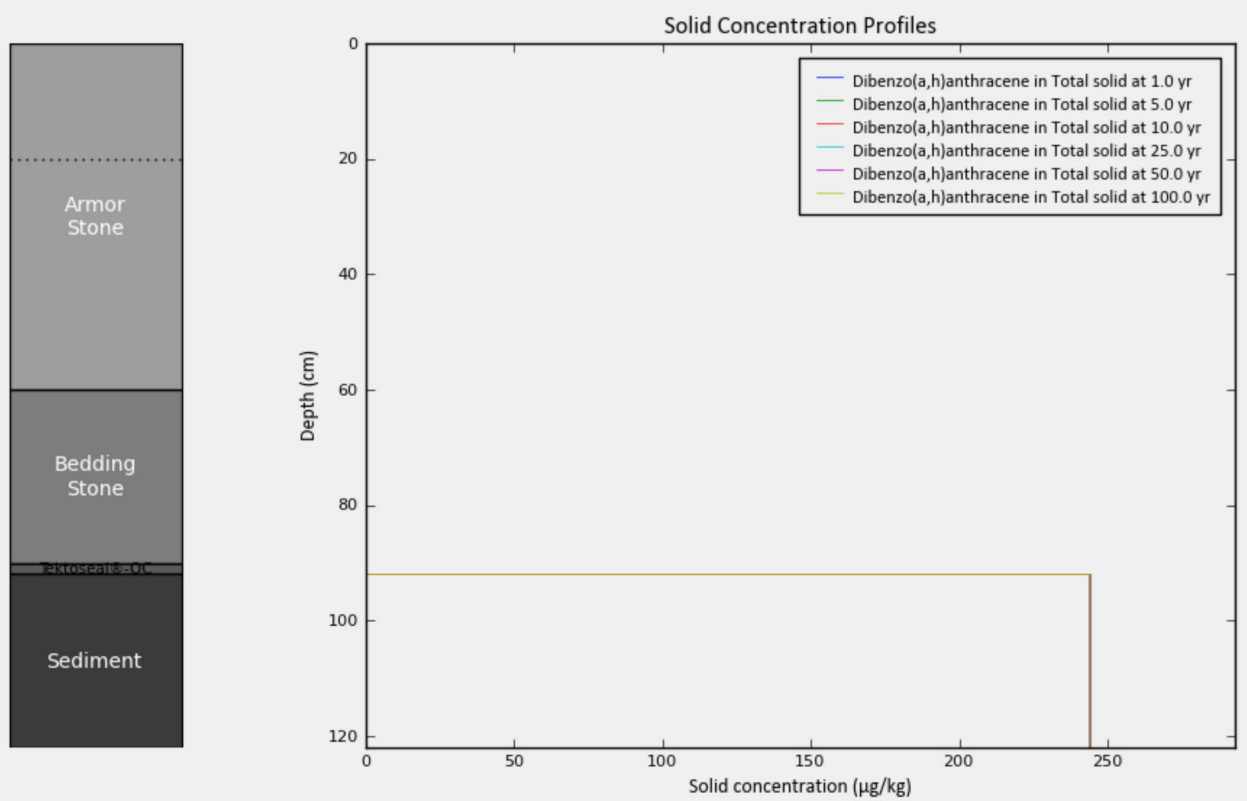

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Copper in Total solid at 1.0 yr
Copper in Total solid at 5.0 yr
Copper in Total solid at 10.0 yr
Copper in Total solid at 25.0 yr
Copper in Total solid at 50.0 yr
Copper in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

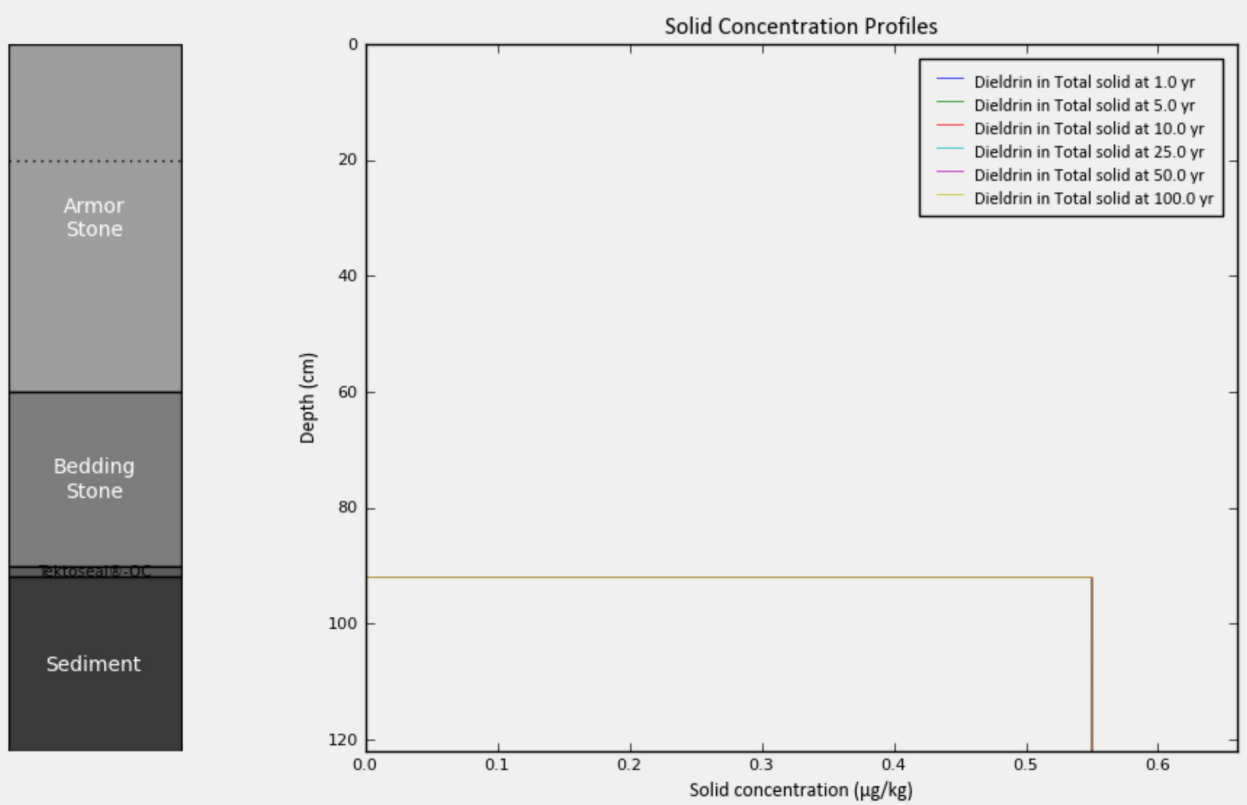

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDD in Total solid at 1.0 yr
DDD in Total solid at 5.0 yr
DDD in Total solid at 10.0 yr
DDD in Total solid at 25.0 yr
DDD in Total solid at 50.0 yr
DDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

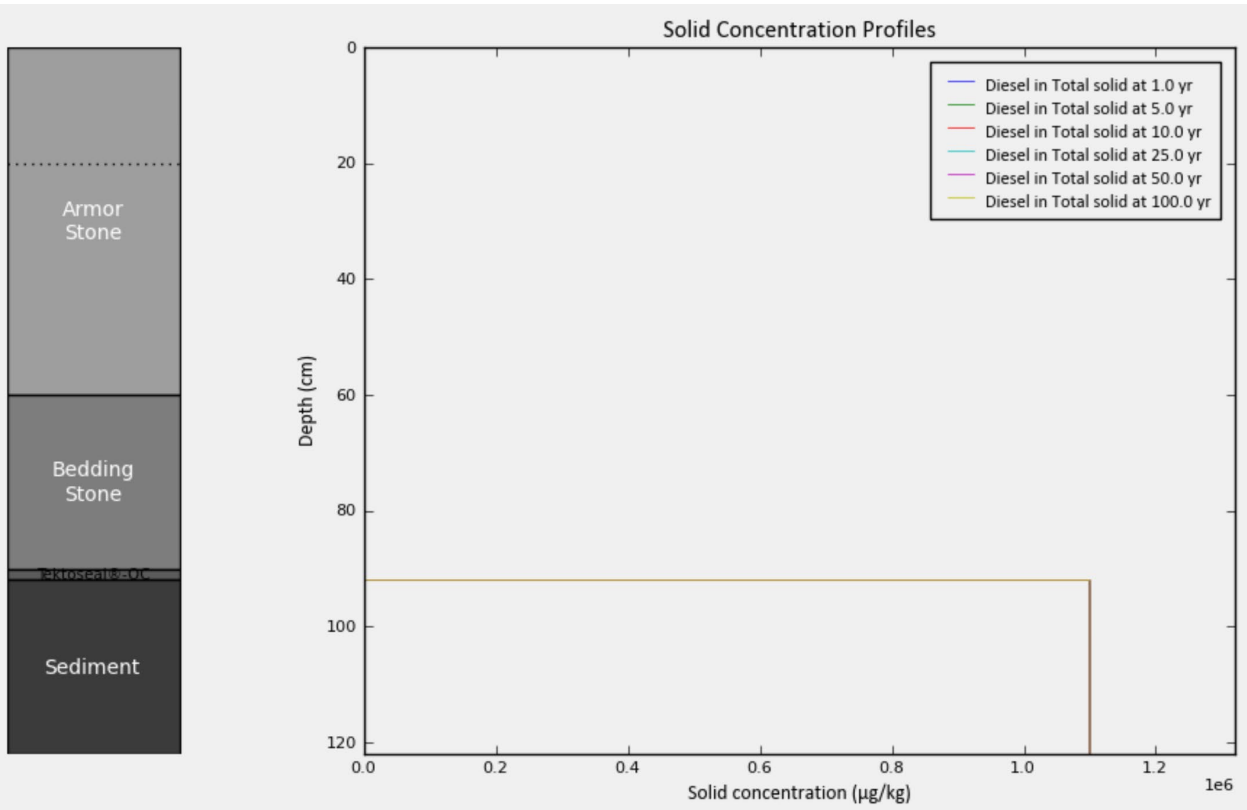

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDE in Total solid at 1.0 yr
DDE in Total solid at 5.0 yr
DDE in Total solid at 10.0 yr
DDE in Total solid at 25.0 yr
DDE in Total solid at 50.0 yr
DDE in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

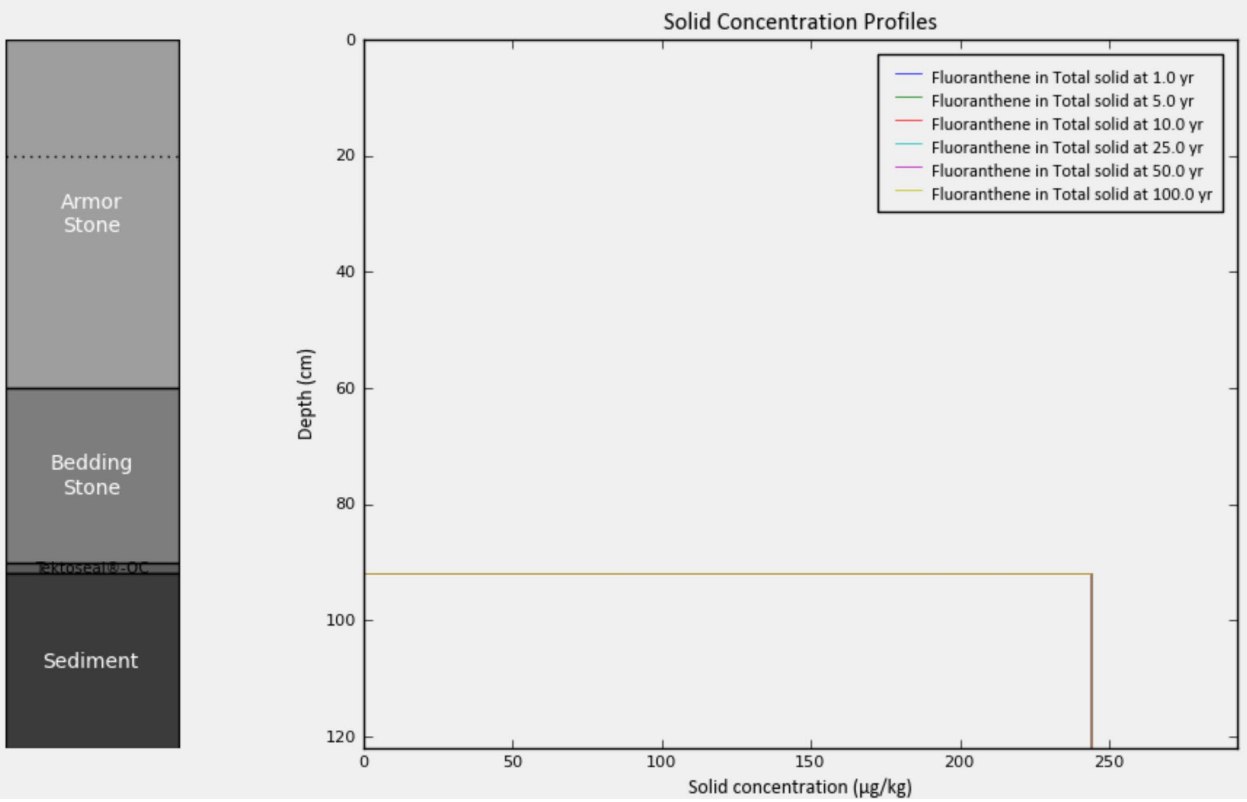

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDT in Total solid at 1.0 yr
DDT in Total solid at 5.0 yr
DDT in Total solid at 10.0 yr
DDT in Total solid at 25.0 yr
DDT in Total solid at 50.0 yr
DDT in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

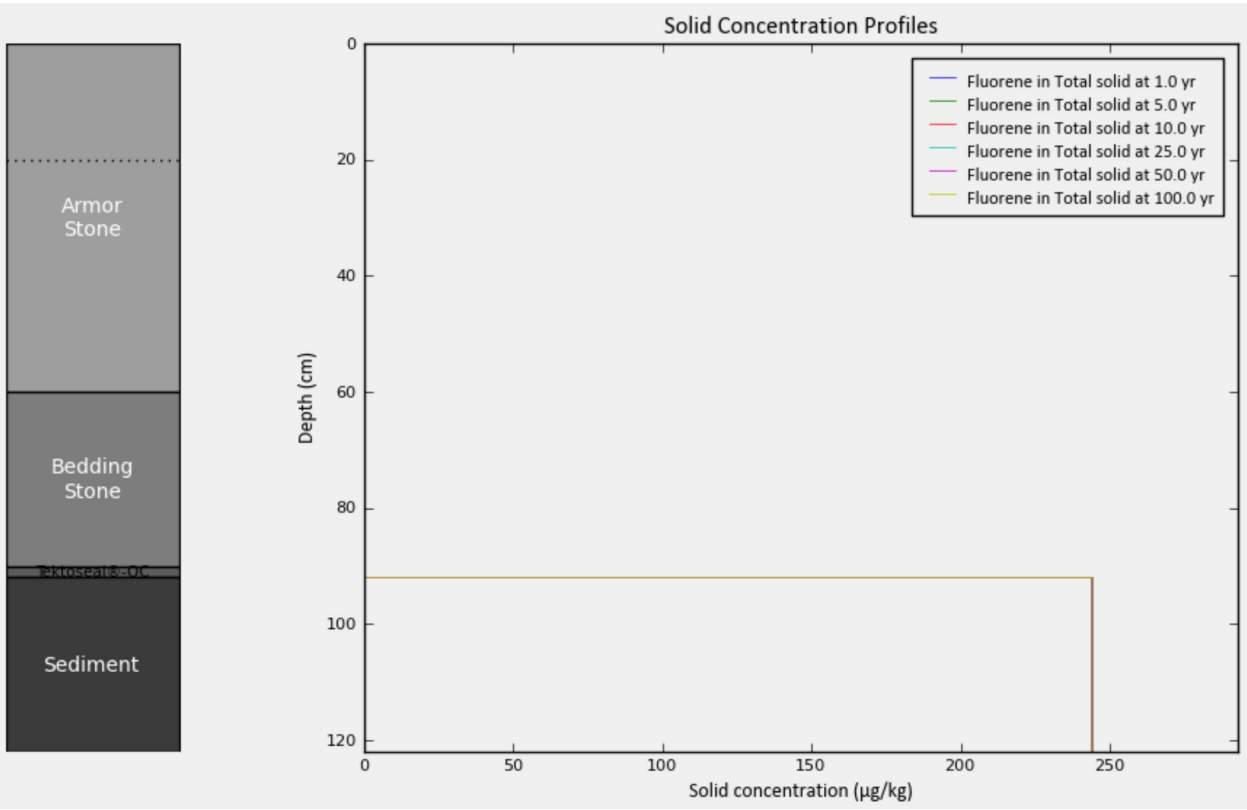

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDx in Total solid at 1.0 yr
DDx in Total solid at 5.0 yr
DDx in Total solid at 10.0 yr
DDx in Total solid at 25.0 yr
DDx in Total solid at 50.0 yr
DDx in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

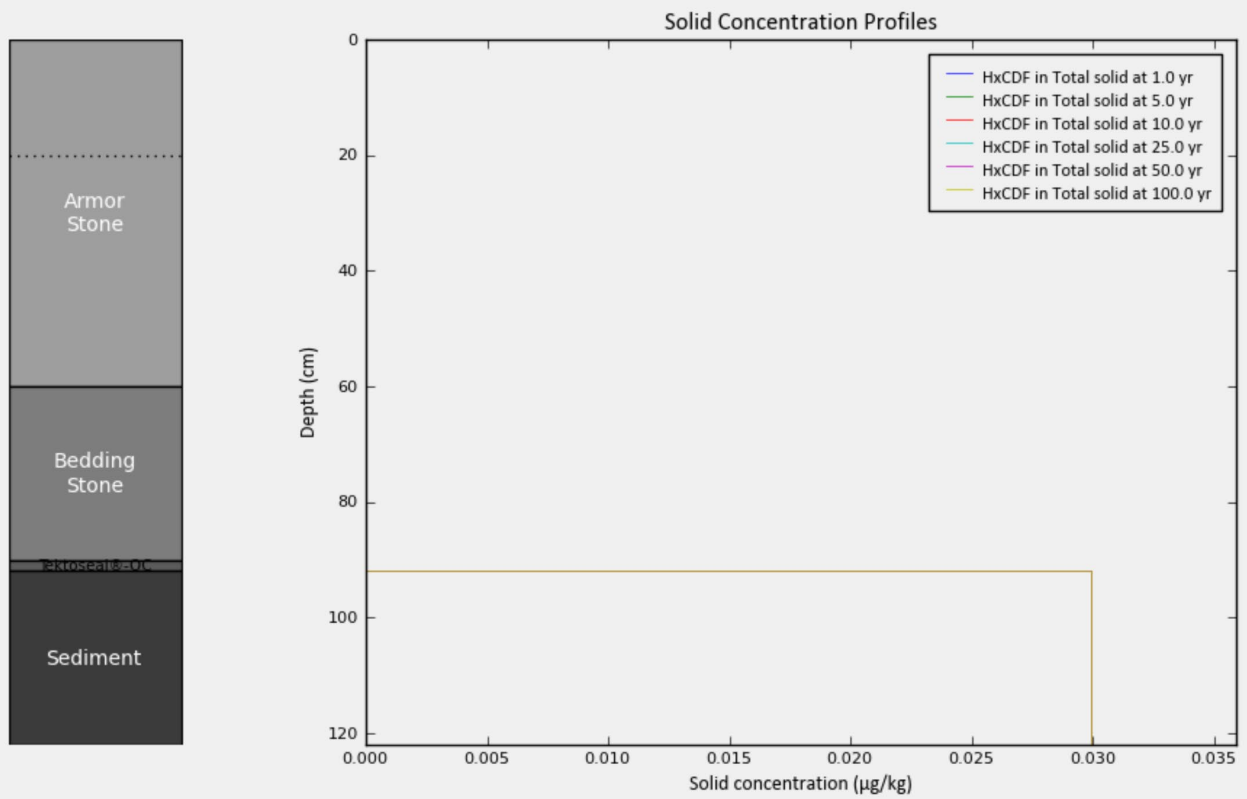

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Dibenzo(a,h)anthracene in Total solid at 1.0 yr
Dibenzo(a,h)anthracene in Total solid at 5.0 yr
Dibenzo(a,h)anthracene in Total solid at 10.0 yr
Dibenzo(a,h)anthracene in Total solid at 25.0 yr
Dibenzo(a,h)anthracene in Total solid at 50.0 yr
Dibenzo(a,h)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

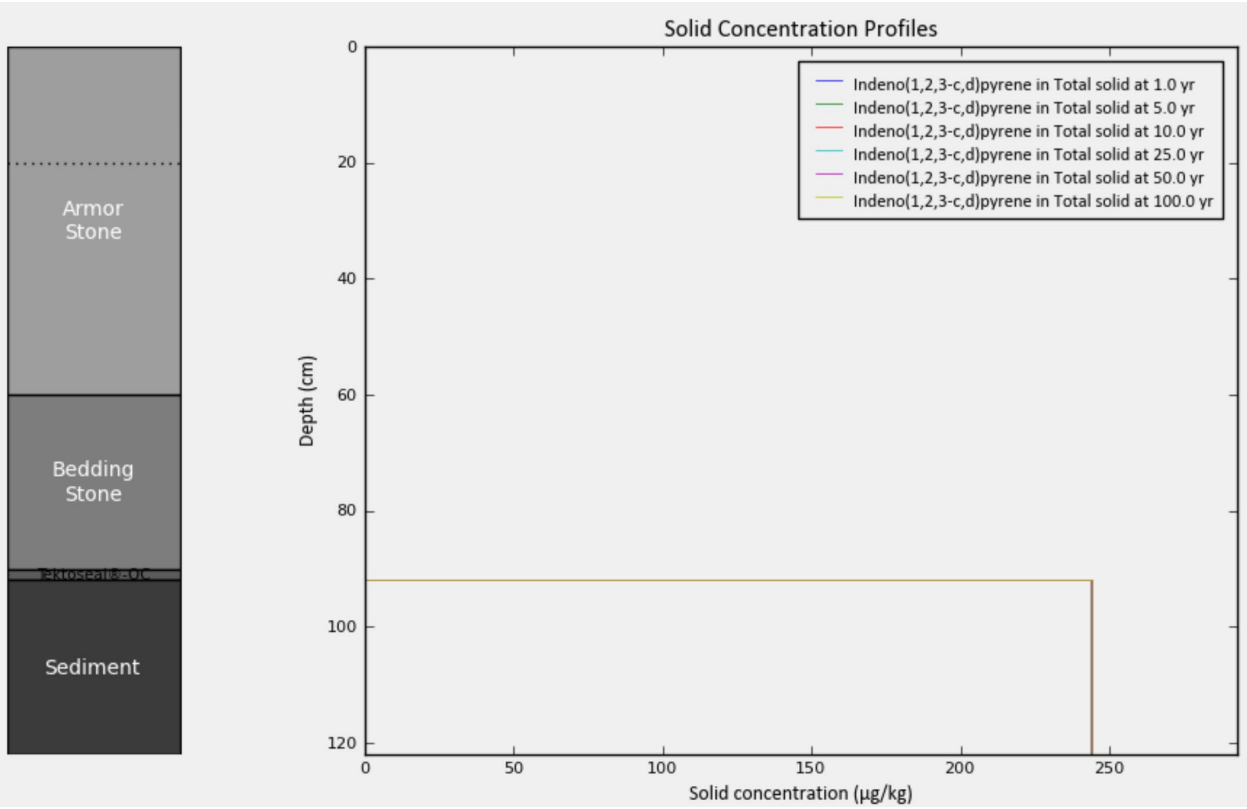

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Dieldrin in Total solid at 1.0 yr
Dieldrin in Total solid at 5.0 yr
Dieldrin in Total solid at 10.0 yr
Dieldrin in Total solid at 25.0 yr
Dieldrin in Total solid at 50.0 yr
Dieldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

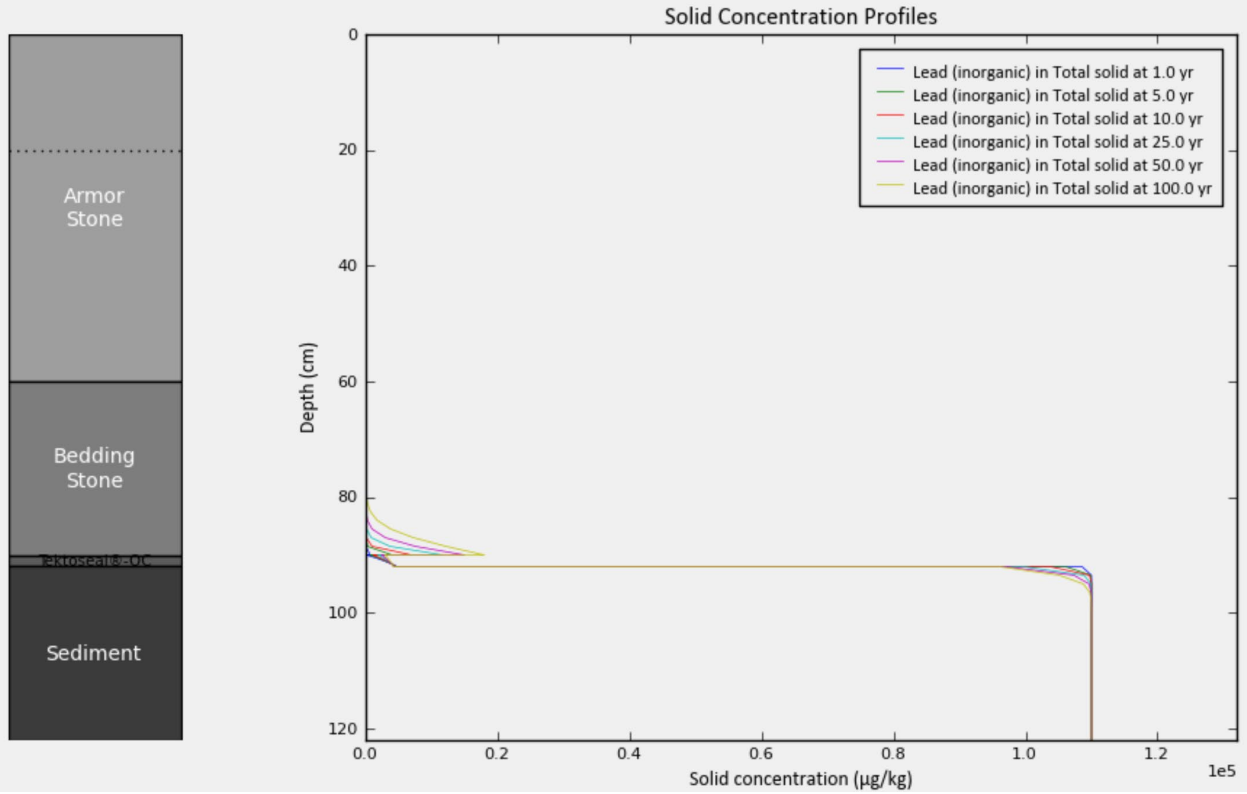

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Diesel in Total solid at 1.0 yr
Diesel in Total solid at 5.0 yr
Diesel in Total solid at 10.0 yr
Diesel in Total solid at 25.0 yr
Diesel in Total solid at 50.0 yr
Diesel in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

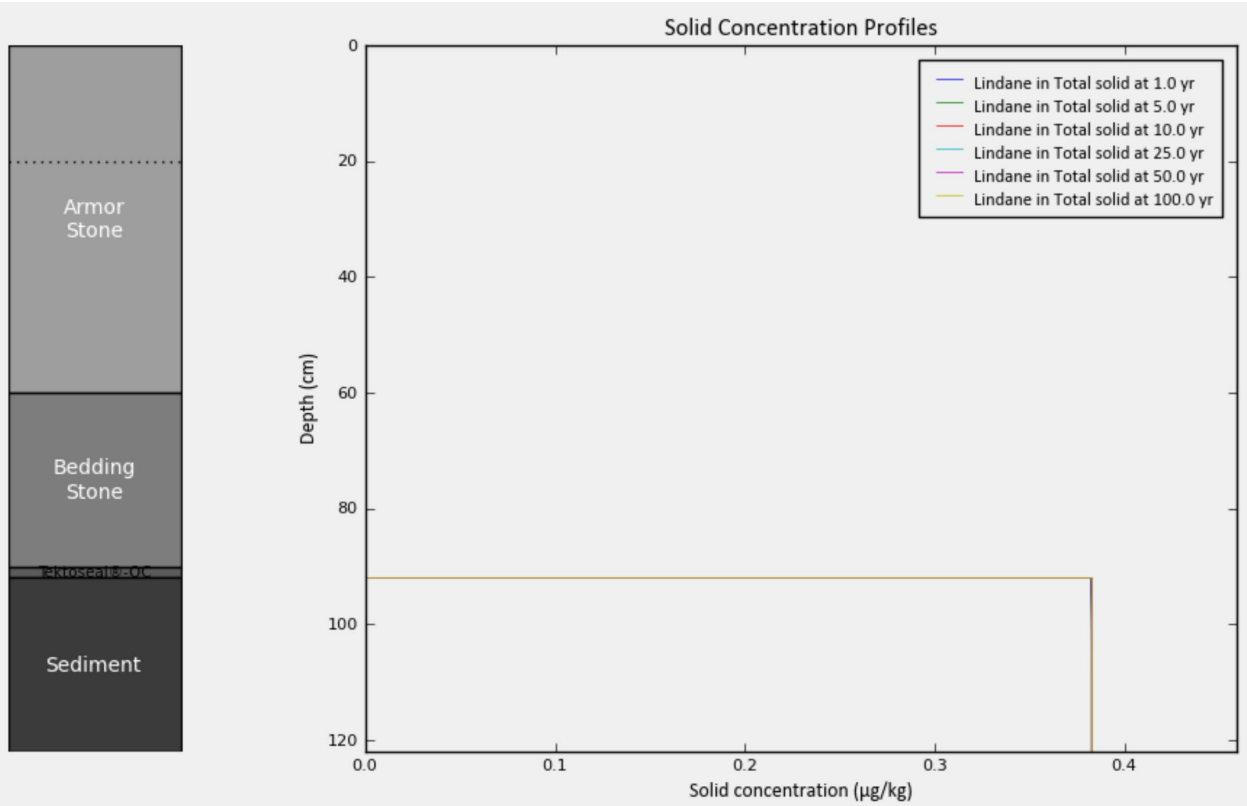

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Fluoranthene in Total solid at 1.0 yr
Fluoranthene in Total solid at 5.0 yr
Fluoranthene in Total solid at 10.0 yr
Fluoranthene in Total solid at 25.0 yr
Fluoranthene in Total solid at 50.0 yr
Fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

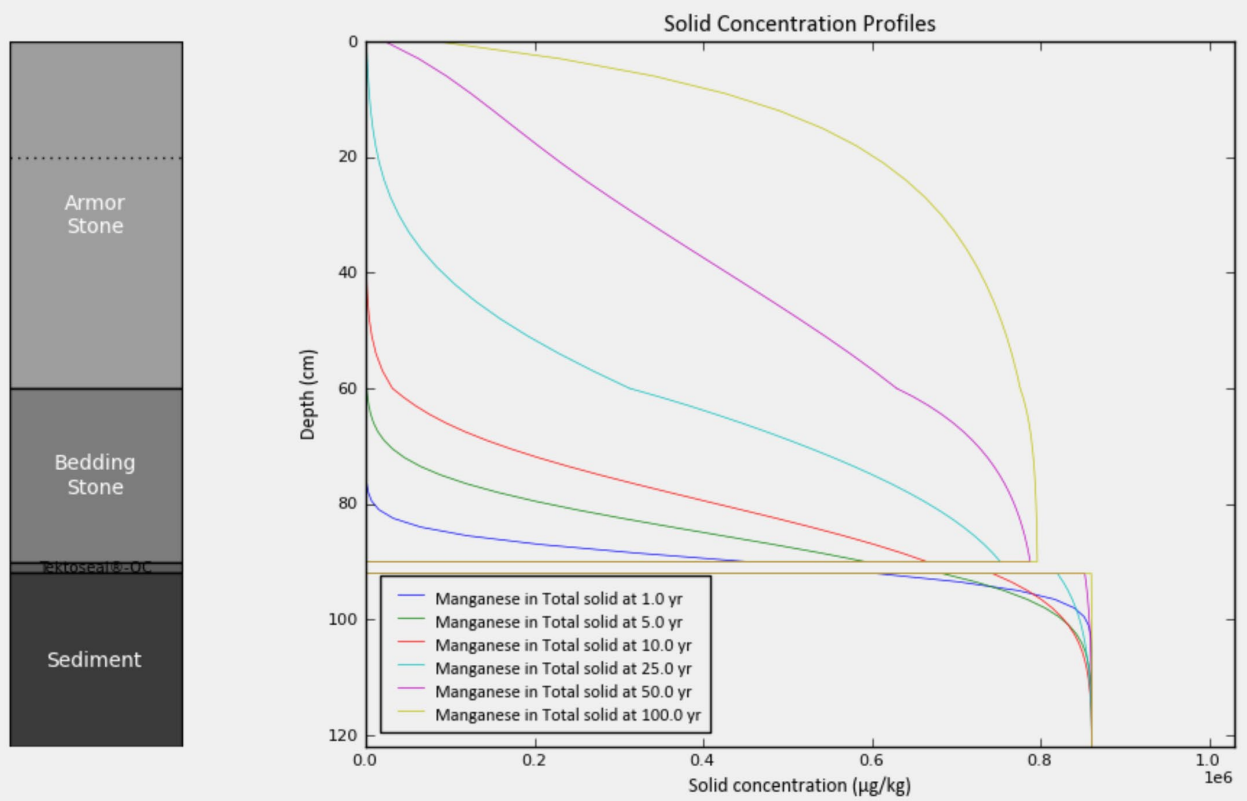

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Fluorene in Total solid at 1.0 yr
Fluorene in Total solid at 5.0 yr
Fluorene in Total solid at 10.0 yr
Fluorene in Total solid at 25.0 yr
Fluorene in Total solid at 50.0 yr
Fluorene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

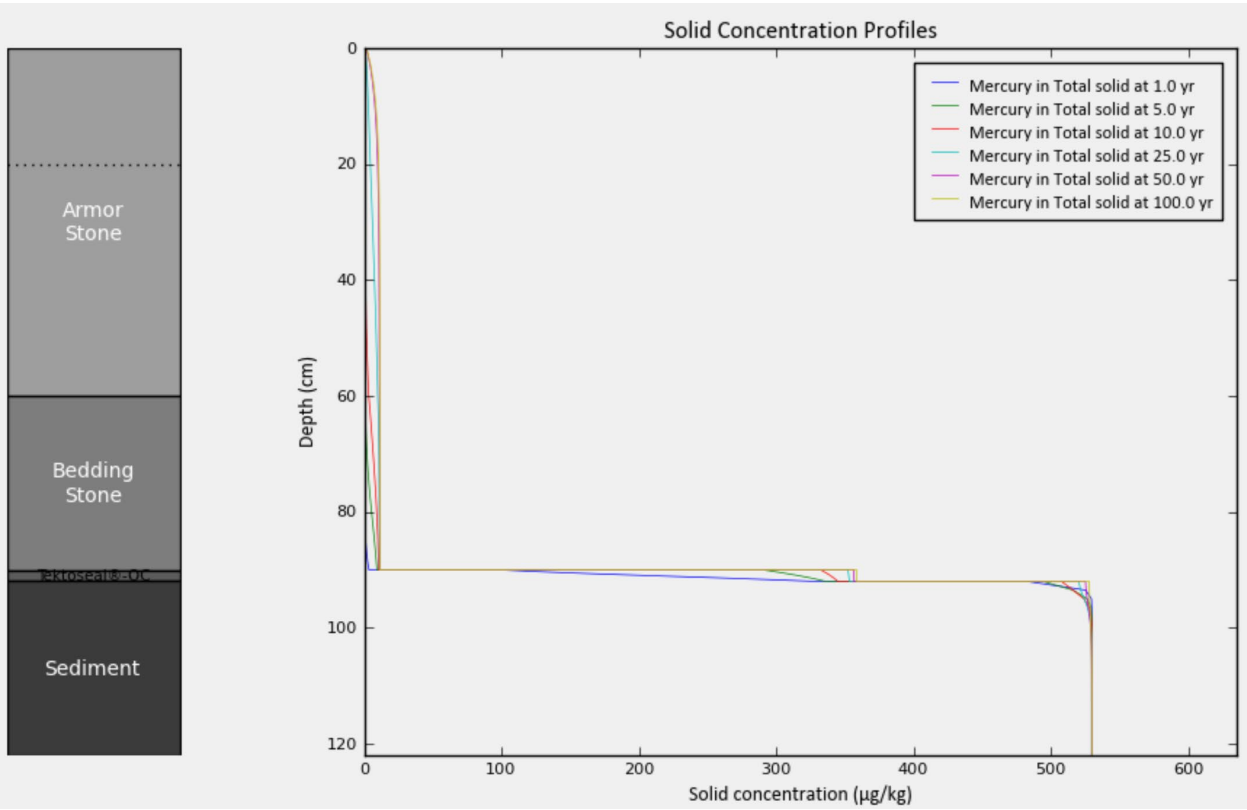

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
HxCDF in Total solid at 1.0 yr
HxCDF in Total solid at 5.0 yr
HxCDF in Total solid at 10.0 yr
HxCDF in Total solid at 25.0 yr
HxCDF in Total solid at 50.0 yr
HxCDF in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035

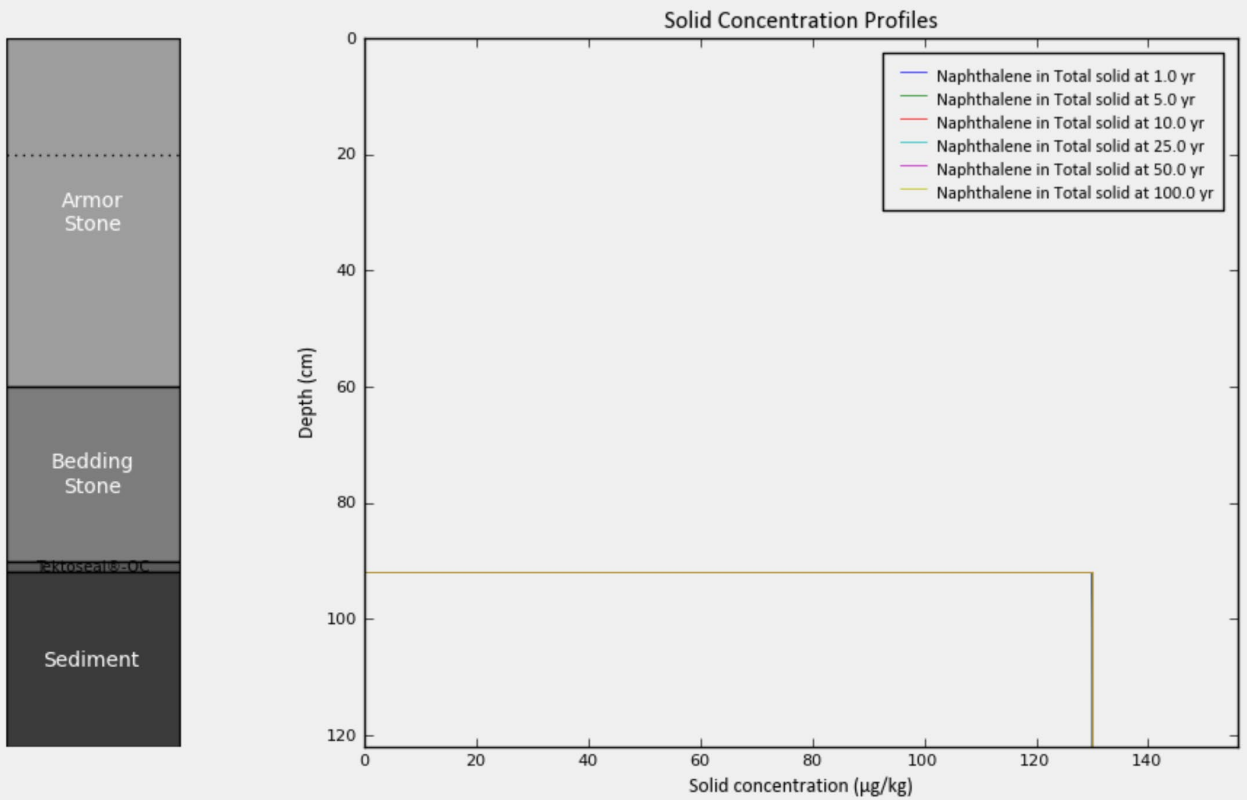

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Indeno(1,2,3-c,d)pyrene in Total solid at 1.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 5.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 10.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 25.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 50.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
0
20
40
60
80
100
120
0
50
100
150
200
250

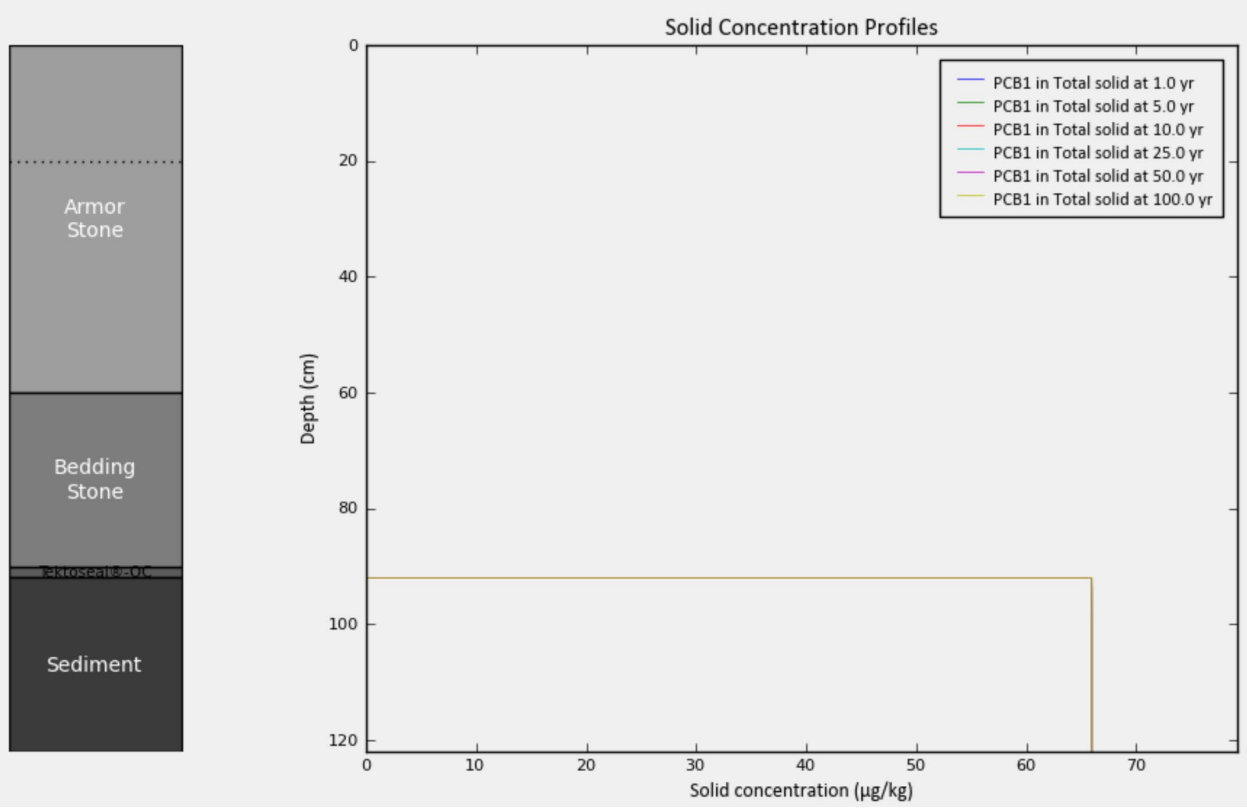

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Lead (inorganic) in Total solid at 1.0 yr
Lead (inorganic) in Total solid at 5.0 yr
Lead (inorganic) in Total solid at 10.0 yr
Lead (inorganic) in Total solid at 25.0 yr
Lead (inorganic) in Total solid at 50.0 yr
Lead (inorganic) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

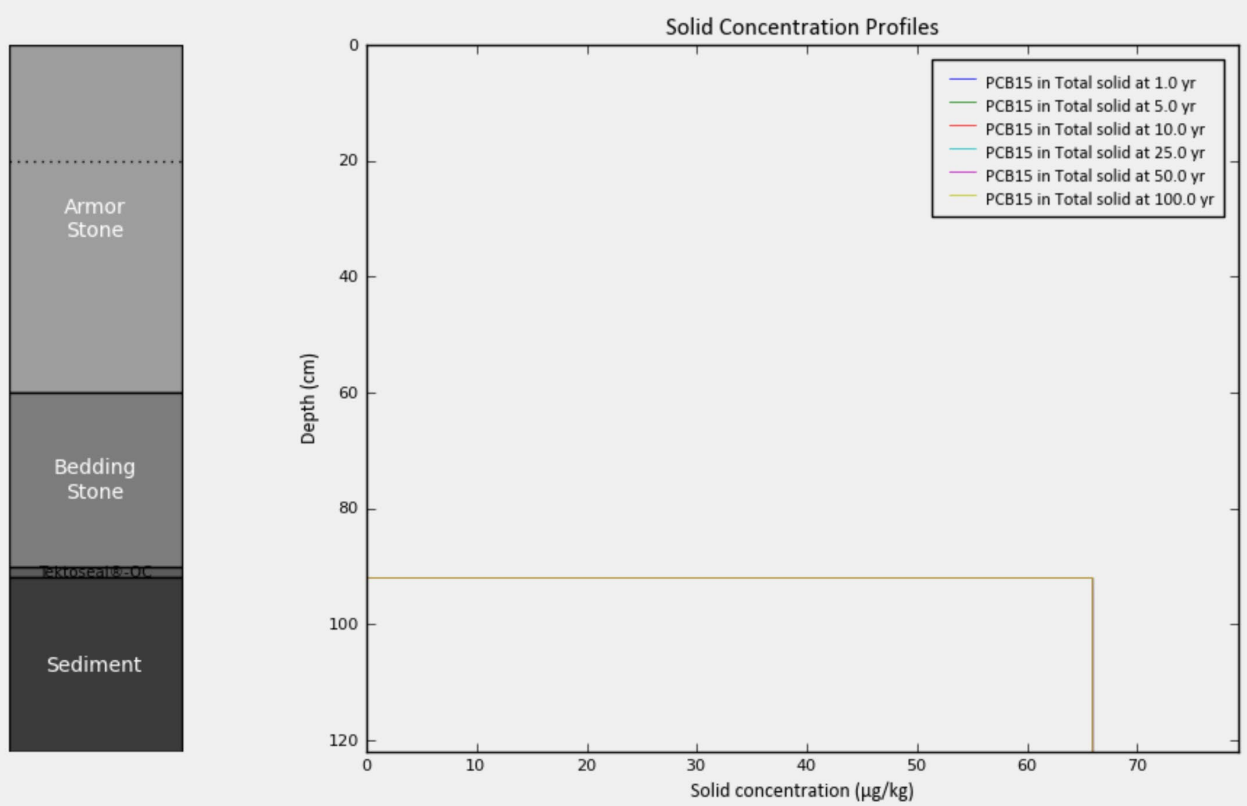

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Lindane in Total solid at 1.0 yr
Lindane in Total solid at 5.0 yr
Lindane in Total solid at 10.0 yr
Lindane in Total solid at 25.0 yr
Lindane in Total solid at 50.0 yr
Lindane in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

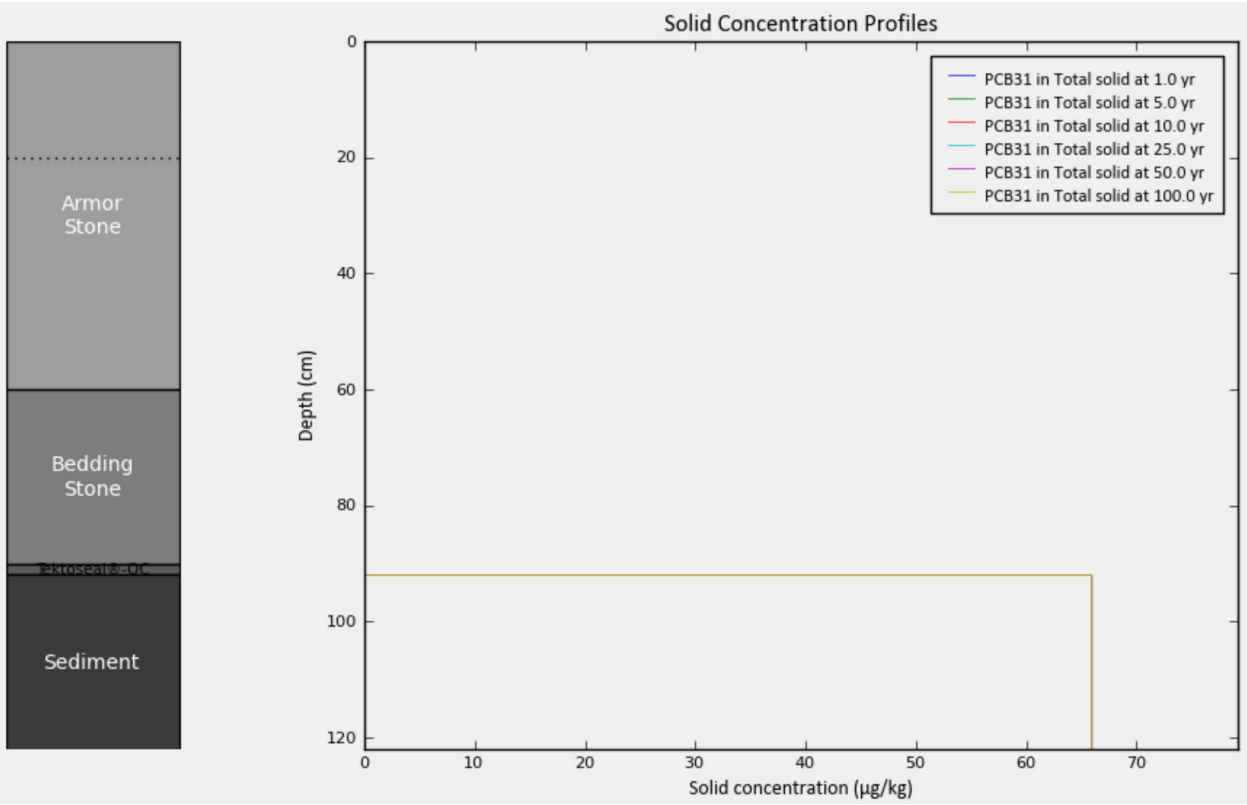

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Depth (cm)
Solid concentration (µg/kg)
1e6
Manganese in Total solid at 1.0 yr
Manganese in Total solid at 5.0 yr
Manganese in Total solid at 10.0 yr
Manganese in Total solid at 25.0 yr
Manganese in Total solid at 50.0 yr
Manganese in Total solid at 100.0 yr

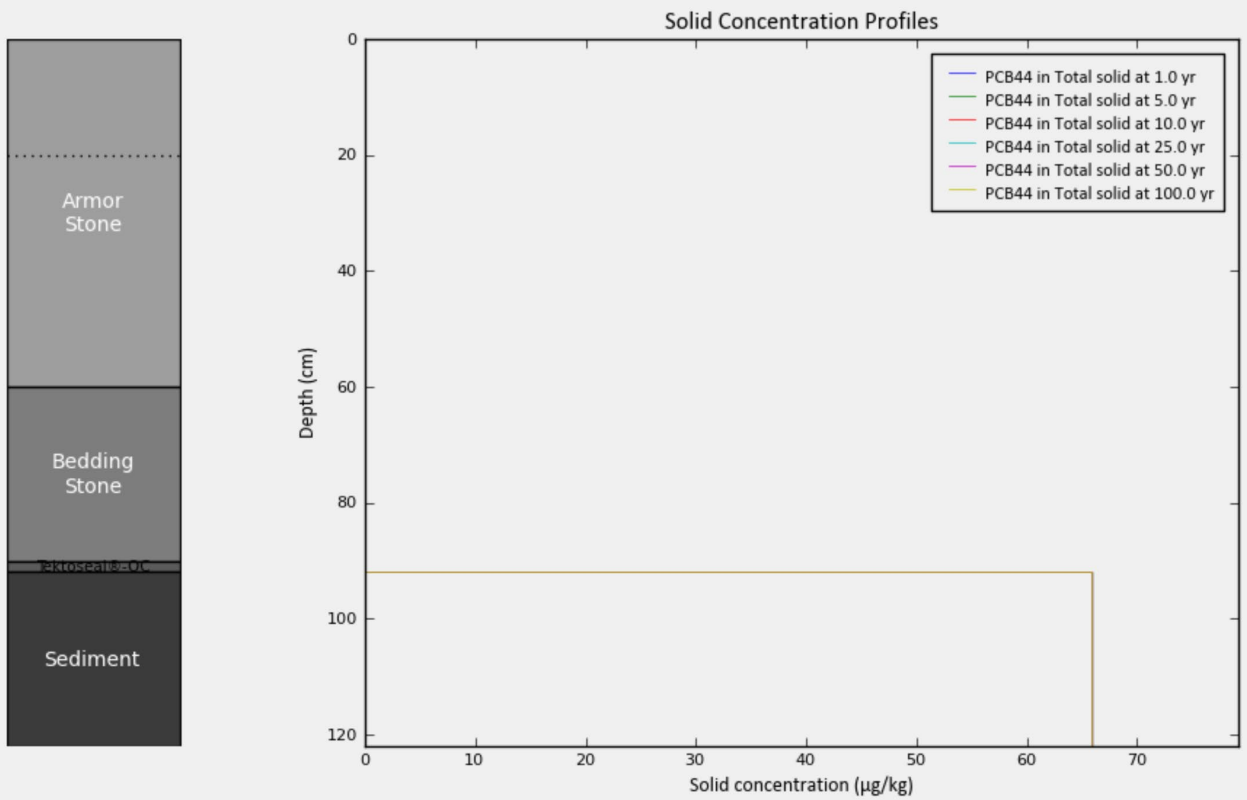

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Depth (cm)
Solid concentration (µg/kg)
Mercury in Total solid at 1.0 yr
Mercury in Total solid at 5.0 yr
Mercury in Total solid at 10.0 yr
Mercury in Total solid at 25.0 yr
Mercury in Total solid at 50.0 yr
Mercury in Total solid at 100.0 yr

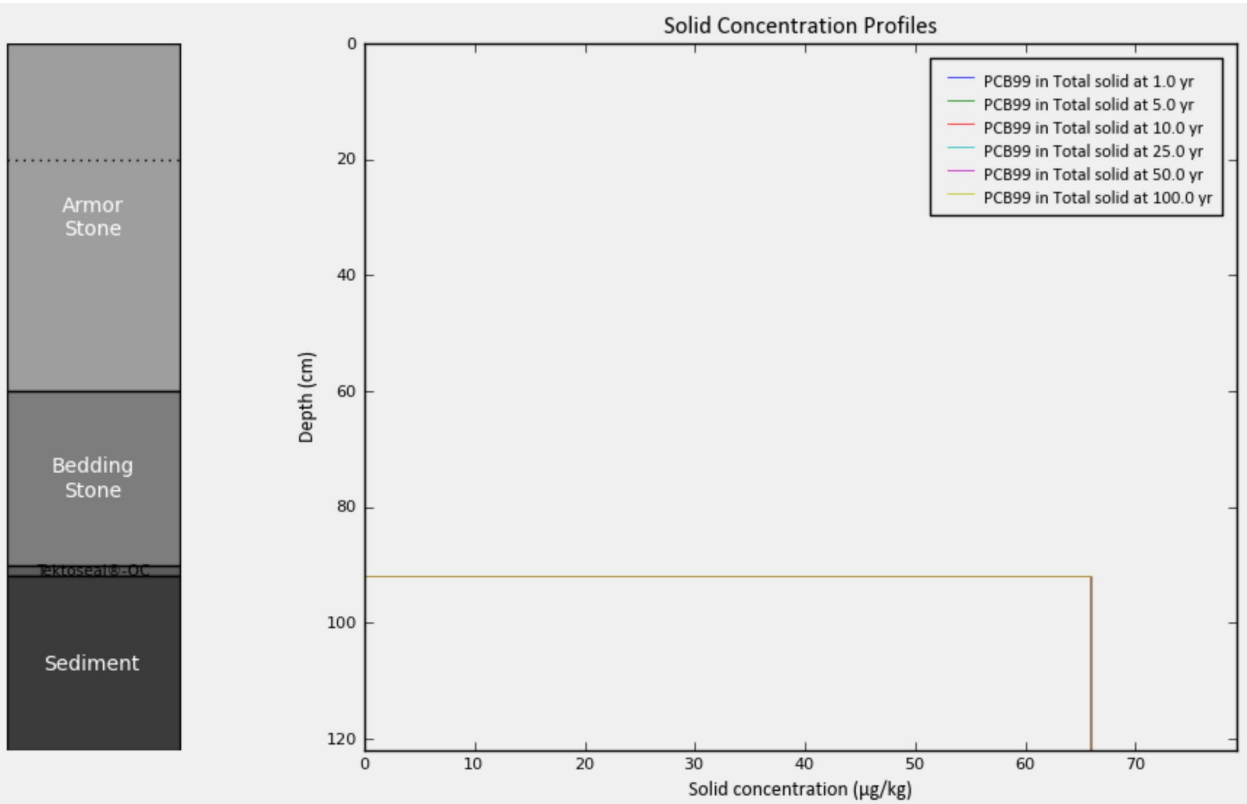

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Naphthalene in Total solid at 1.0 yr
Naphthalene in Total solid at 5.0 yr
Naphthalene in Total solid at 10.0 yr
Naphthalene in Total solid at 25.0 yr
Naphthalene in Total solid at 50.0 yr
Naphthalene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

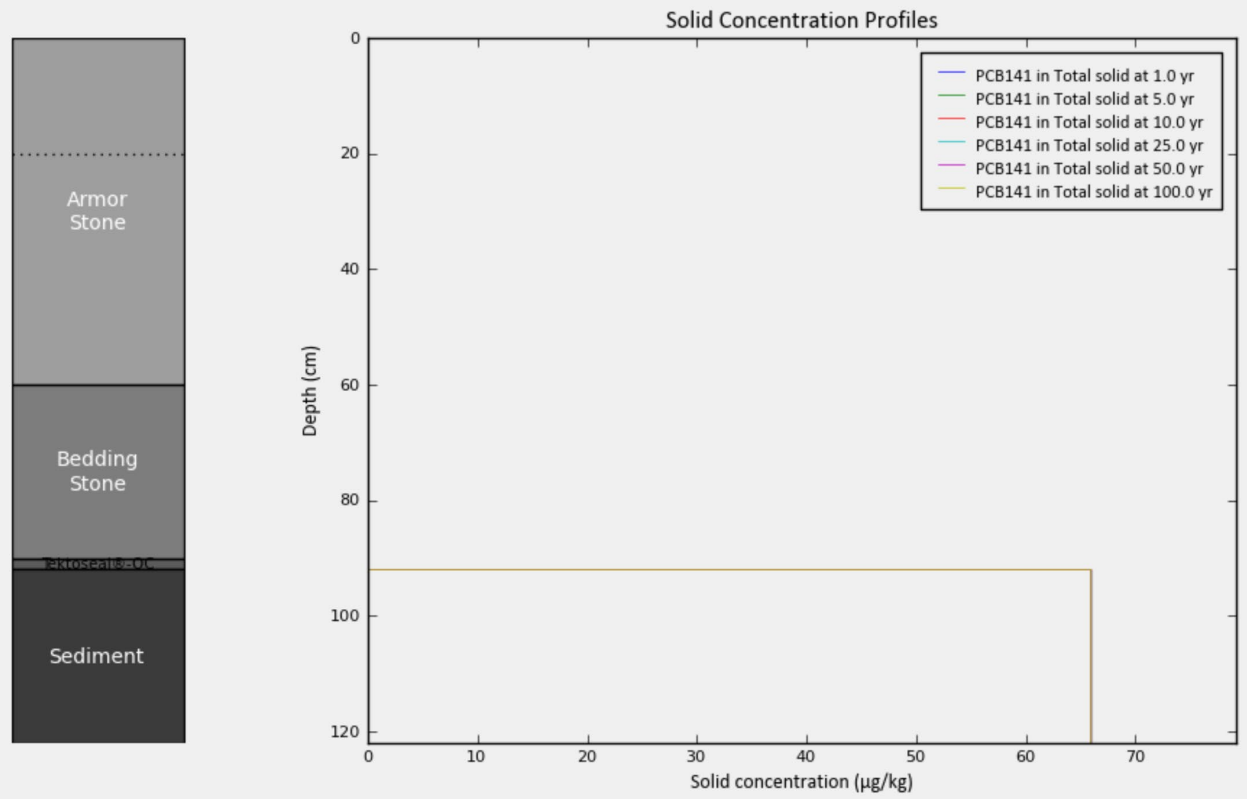

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB1 in Total solid at 1.0 yr
PCB1 in Total solid at 5.0 yr
PCB1 in Total solid at 10.0 yr
PCB1 in Total solid at 25.0 yr
PCB1 in Total solid at 50.0 yr
PCB1 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

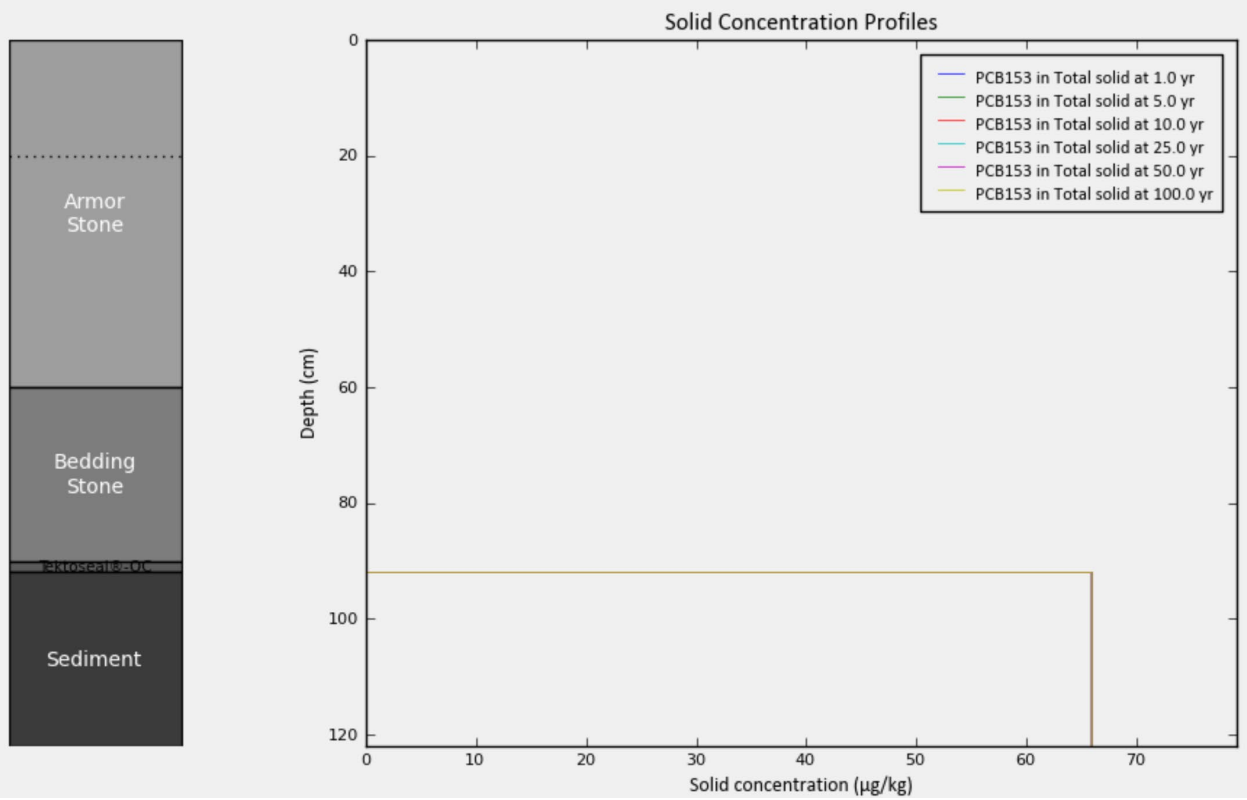

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB15 in Total solid at 1.0 yr
PCB15 in Total solid at 5.0 yr
PCB15 in Total solid at 10.0 yr
PCB15 in Total solid at 25.0 yr
PCB15 in Total solid at 50.0 yr
PCB15 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

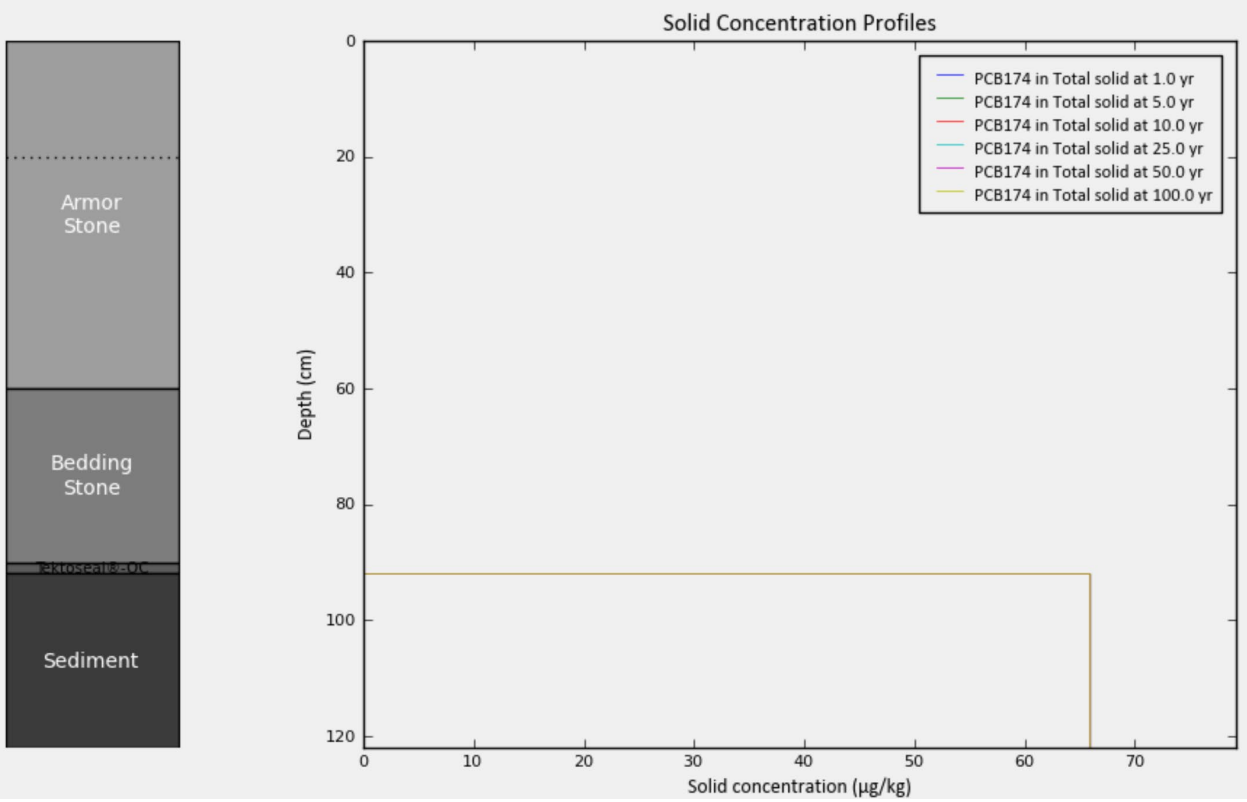

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB31 in Total solid at 1.0 yr
PCB31 in Total solid at 5.0 yr
PCB31 in Total solid at 10.0 yr
PCB31 in Total solid at 25.0 yr
PCB31 in Total solid at 50.0 yr
PCB31 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

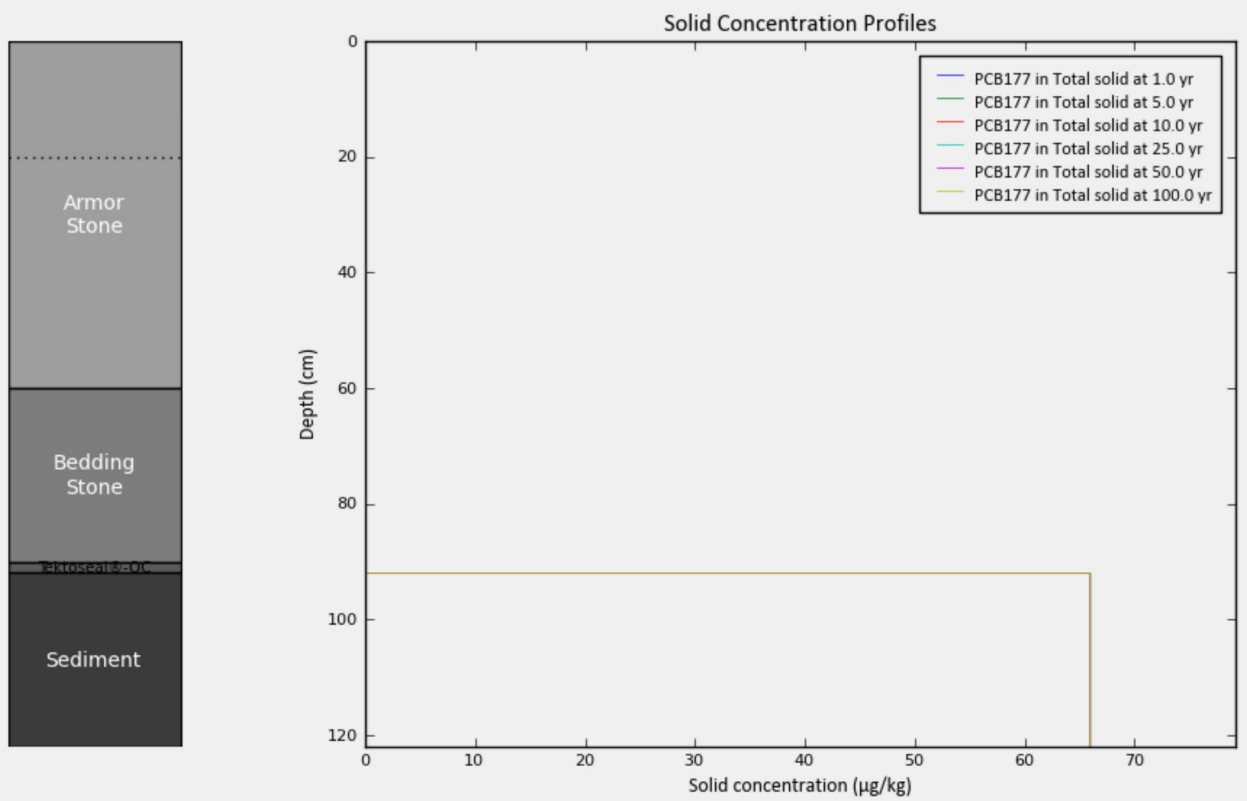

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB44 in Total solid at 1.0 yr
PCB44 in Total solid at 5.0 yr
PCB44 in Total solid at 10.0 yr
PCB44 in Total solid at 25.0 yr
PCB44 in Total solid at 50.0 yr
PCB44 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

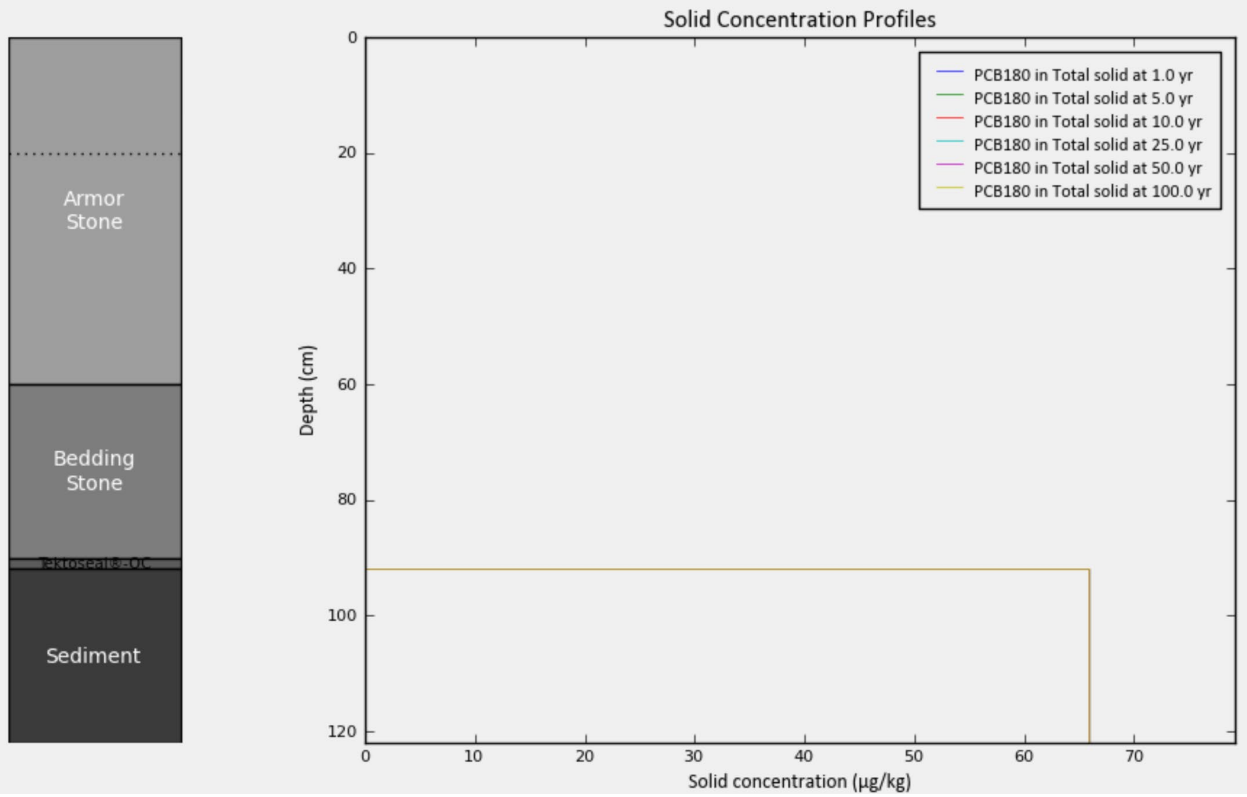

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB99 in Total solid at 1.0 yr
PCB99 in Total solid at 5.0 yr
PCB99 in Total solid at 10.0 yr
PCB99 in Total solid at 25.0 yr
PCB99 in Total solid at 50.0 yr
PCB99 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

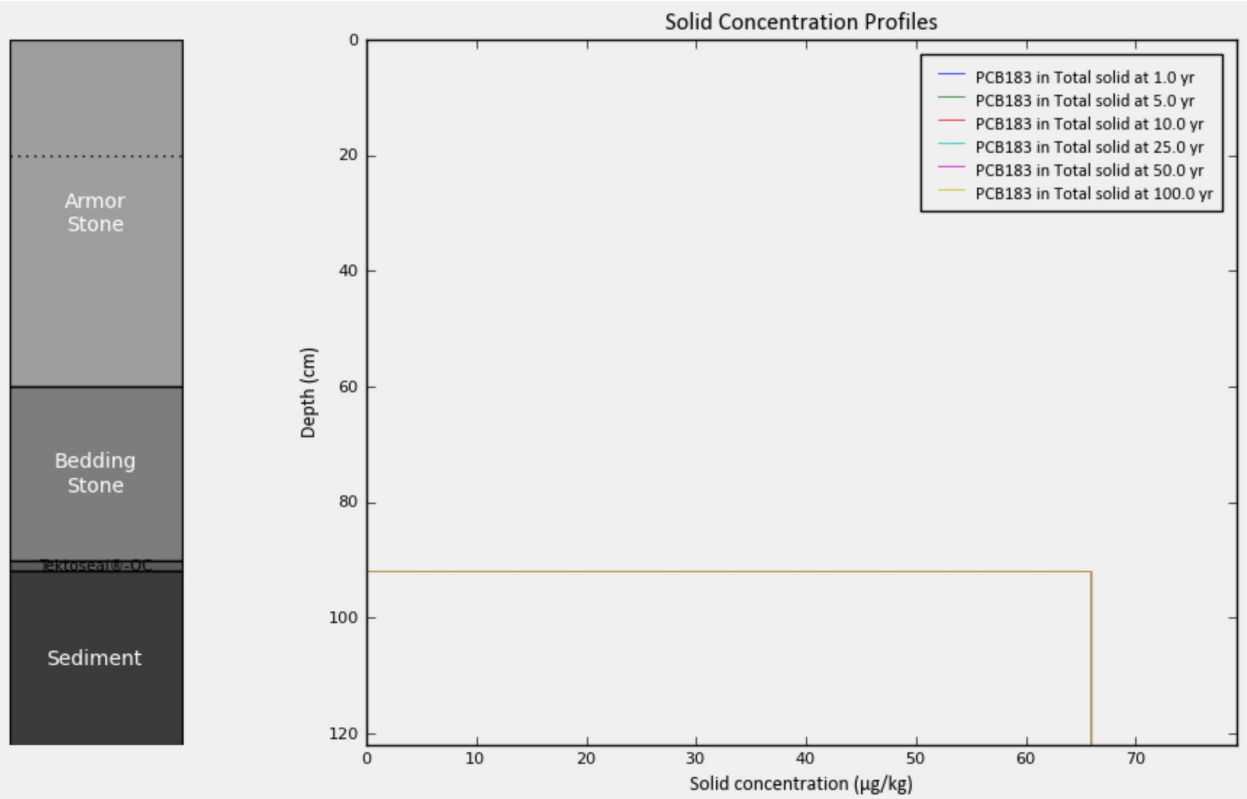

Armor Stone
Bedding Stone
Tetroseal® OC
Sediment
Solid Concentration Profiles
PCB141 in Total solid at 1.0 yr
PCB141 in Total solid at 5.0 yr
PCB141 in Total solid at 10.0 yr
PCB141 in Total solid at 25.0 yr
PCB141 in Total solid at 50.0 yr
PCB141 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

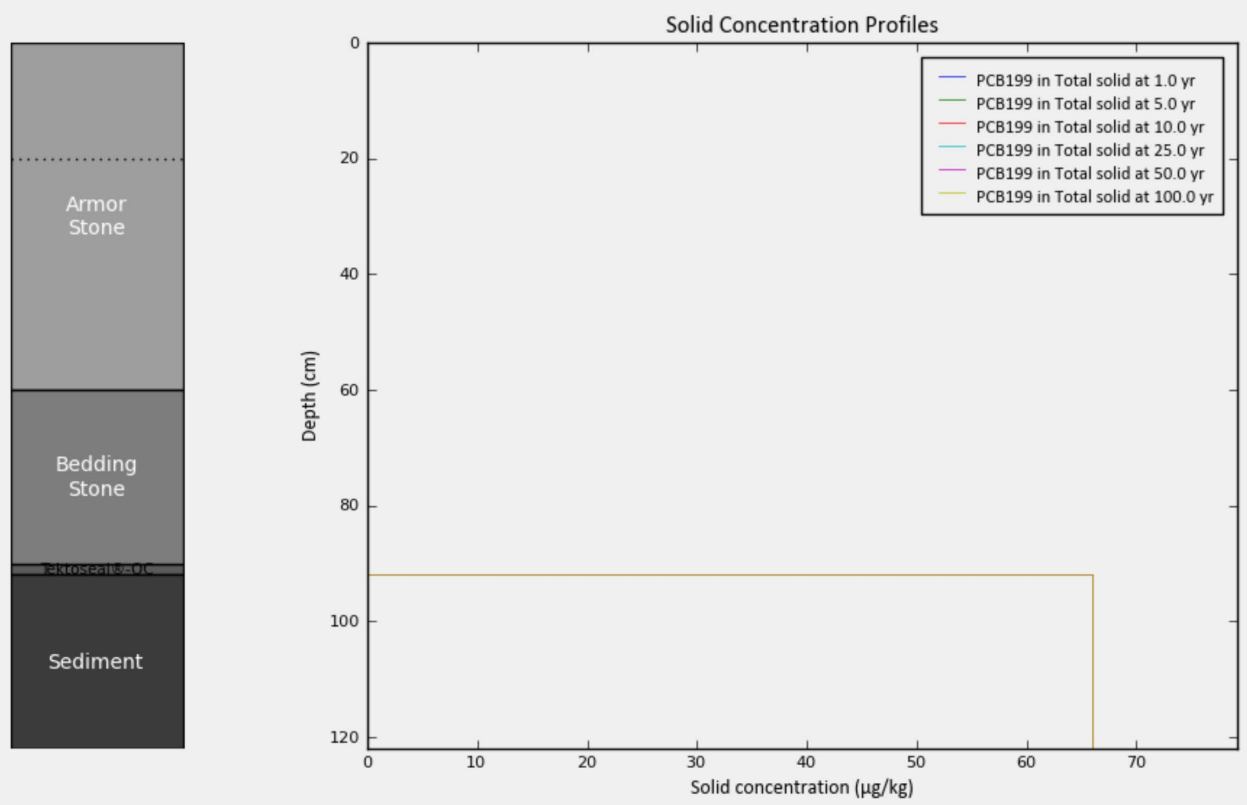

Armor Stone
Bedding Stone
Tetroseal® OC
Sediment
Solid Concentration Profiles
PCB153 in Total solid at 1.0 yr
PCB153 in Total solid at 5.0 yr
PCB153 in Total solid at 10.0 yr
PCB153 in Total solid at 25.0 yr
PCB153 in Total solid at 50.0 yr
PCB153 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

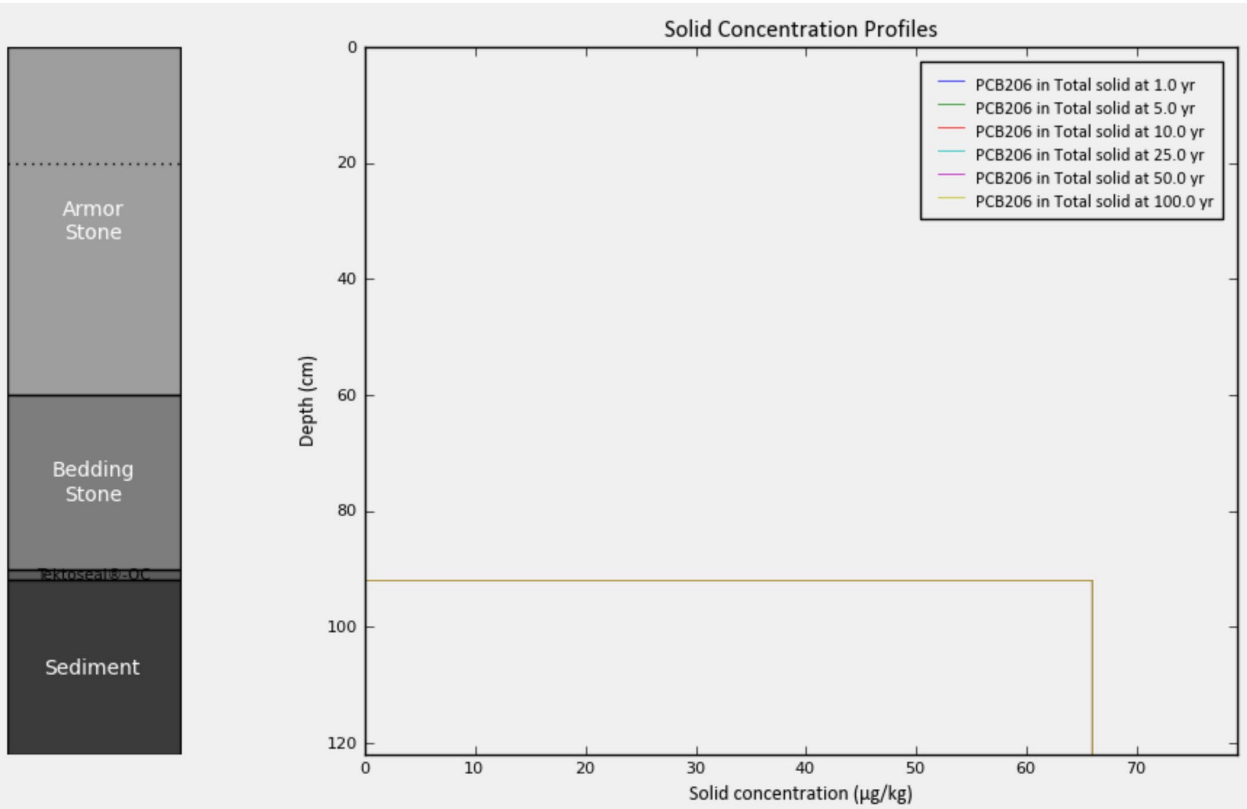

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB174 in Total solid at 1.0 yr
PCB174 in Total solid at 5.0 yr
PCB174 in Total solid at 10.0 yr
PCB174 in Total solid at 25.0 yr
PCB174 in Total solid at 50.0 yr
PCB174 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

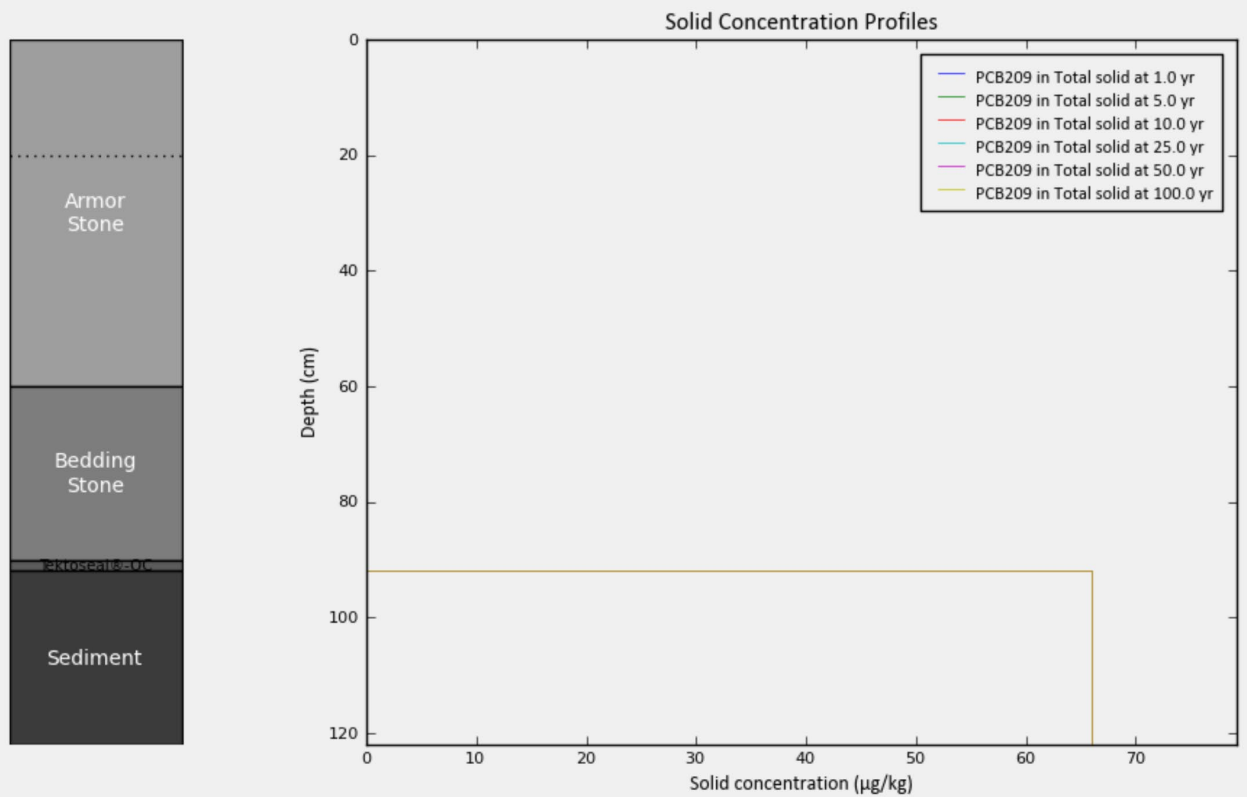

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB177 in Total solid at 1.0 yr
PCB177 in Total solid at 5.0 yr
PCB177 in Total solid at 10.0 yr
PCB177 in Total solid at 25.0 yr
PCB177 in Total solid at 50.0 yr
PCB177 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

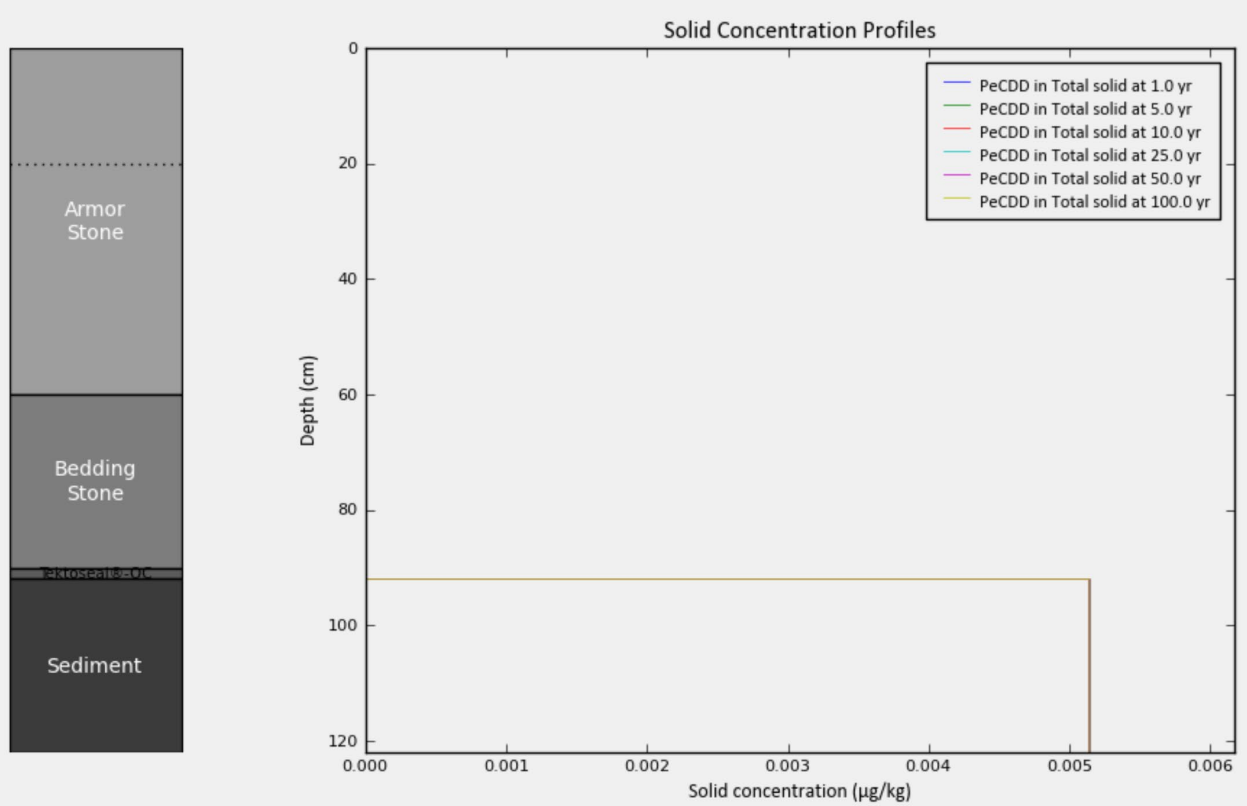

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB180 in Total solid at 1.0 yr
PCB180 in Total solid at 5.0 yr
PCB180 in Total solid at 10.0 yr
PCB180 in Total solid at 25.0 yr
PCB180 in Total solid at 50.0 yr
PCB180 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

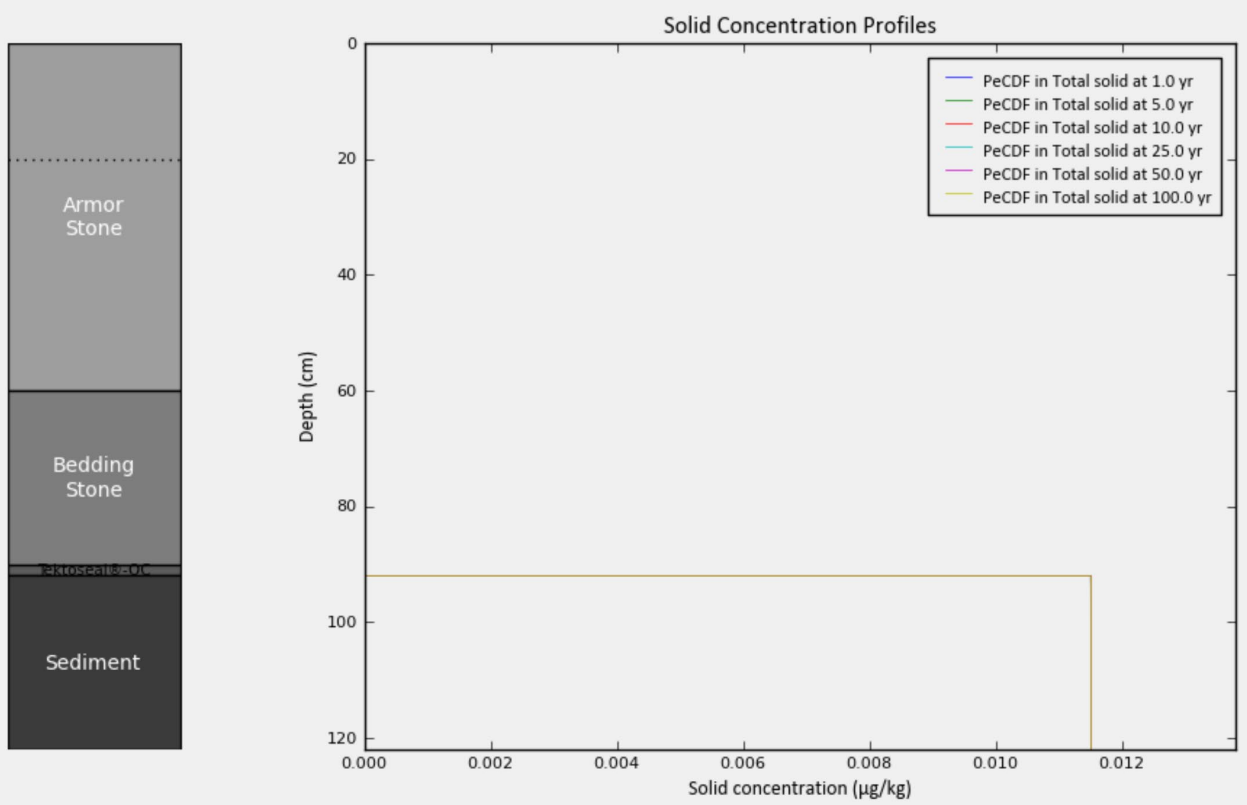

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB183 in Total solid at 1.0 yr
PCB183 in Total solid at 5.0 yr
PCB183 in Total solid at 10.0 yr
PCB183 in Total solid at 25.0 yr
PCB183 in Total solid at 50.0 yr
PCB183 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

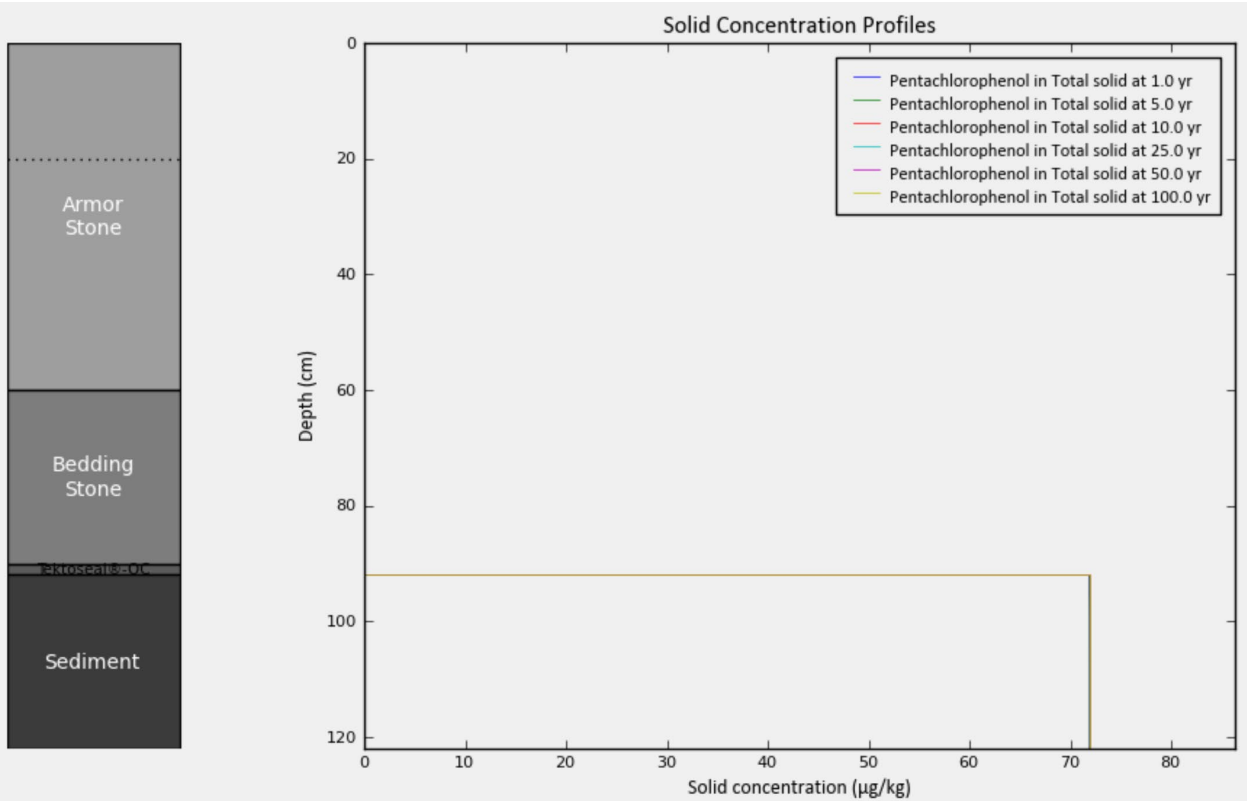

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB199 in Total solid at 1.0 yr
PCB199 in Total solid at 5.0 yr
PCB199 in Total solid at 10.0 yr
PCB199 in Total solid at 25.0 yr
PCB199 in Total solid at 50.0 yr
PCB199 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

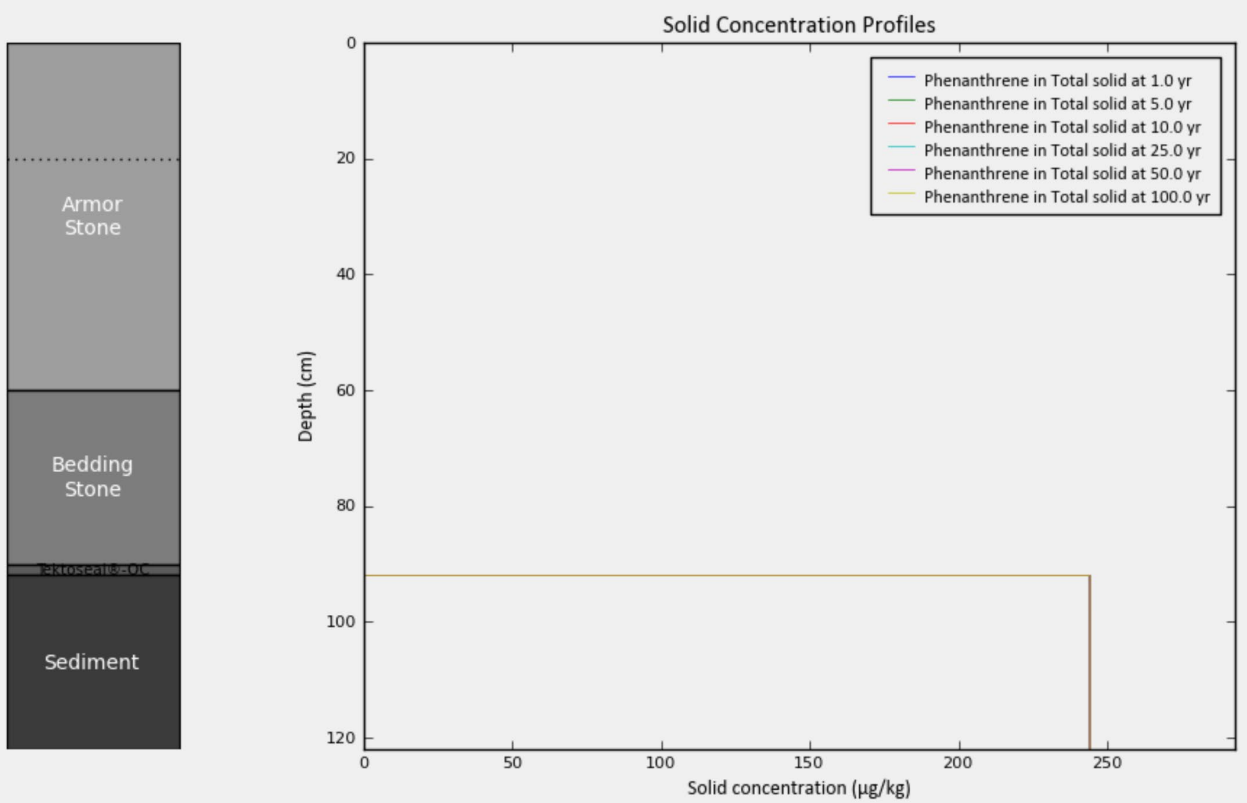

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB206 in Total solid at 1.0 yr
PCB206 in Total solid at 5.0 yr
PCB206 in Total solid at 10.0 yr
PCB206 in Total solid at 25.0 yr
PCB206 in Total solid at 50.0 yr
PCB206 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

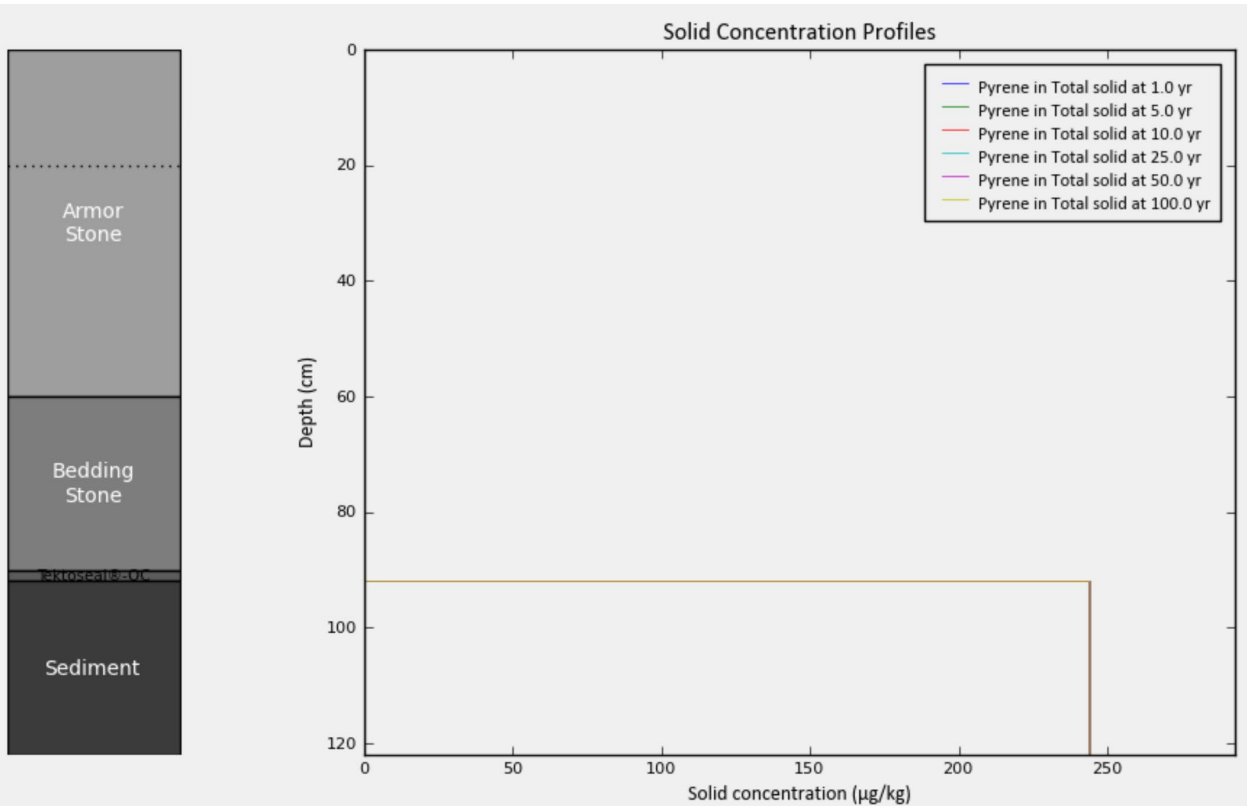

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB209 in Total solid at 1.0 yr
PCB209 in Total solid at 5.0 yr
PCB209 in Total solid at 10.0 yr
PCB209 in Total solid at 25.0 yr
PCB209 in Total solid at 50.0 yr
PCB209 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

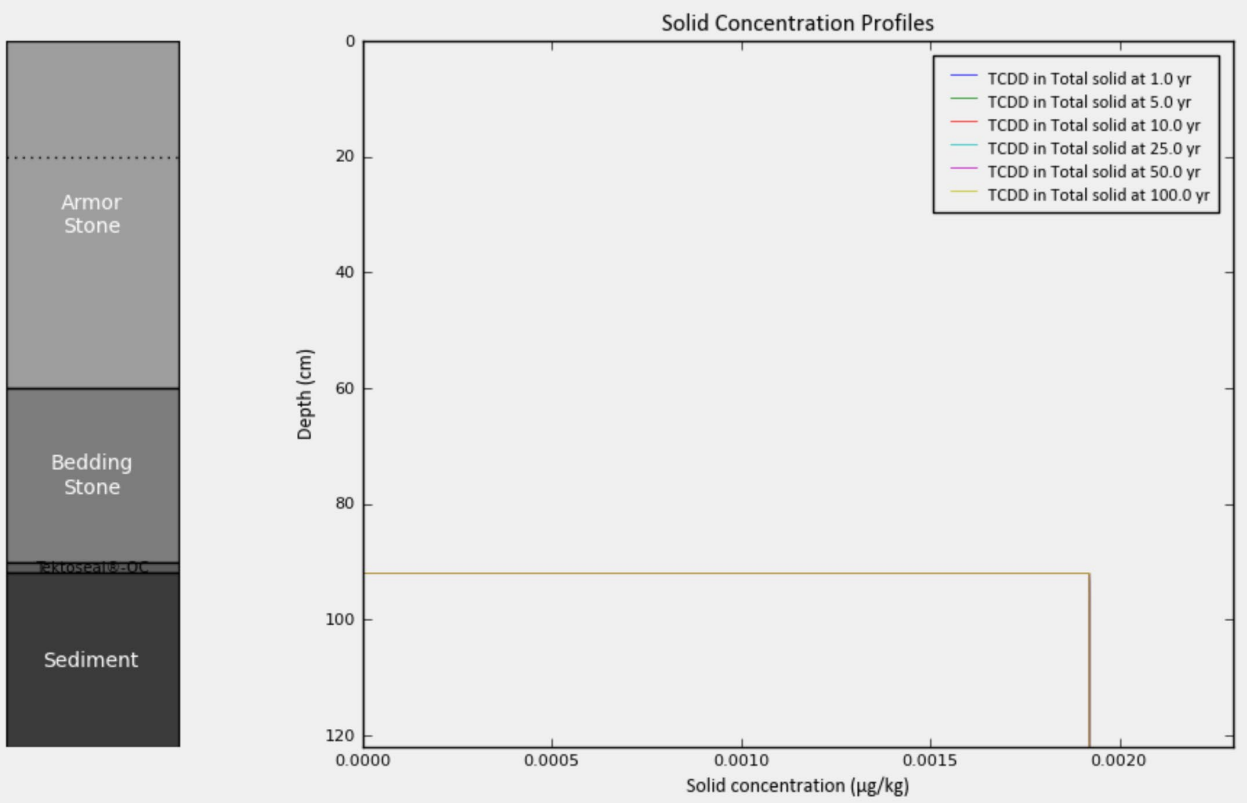

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PeCDD in Total solid at 1.0 yr
PeCDD in Total solid at 5.0 yr
PeCDD in Total solid at 10.0 yr
PeCDD in Total solid at 25.0 yr
PeCDD in Total solid at 50.0 yr
PeCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

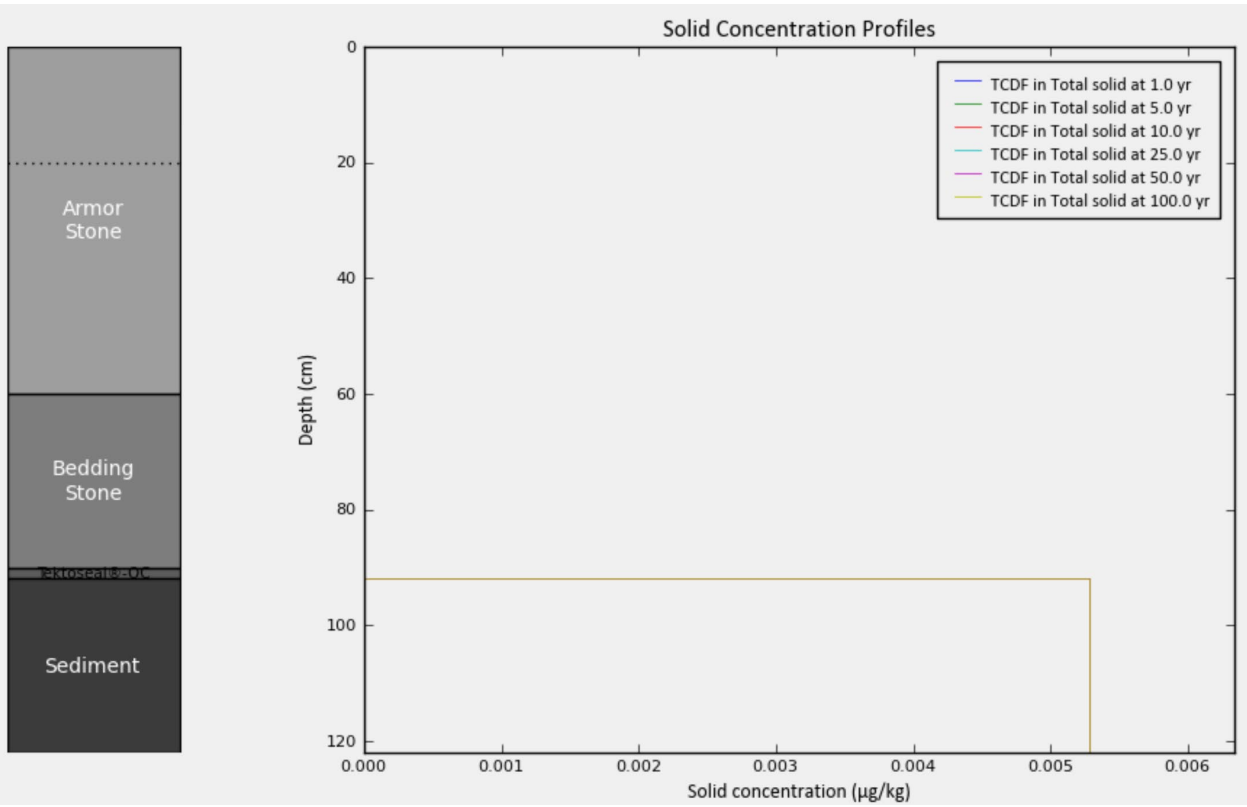

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PeCDF in Total solid at 1.0 yr
PeCDF in Total solid at 5.0 yr
PeCDF in Total solid at 10.0 yr
PeCDF in Total solid at 25.0 yr
PeCDF in Total solid at 50.0 yr
PeCDF in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

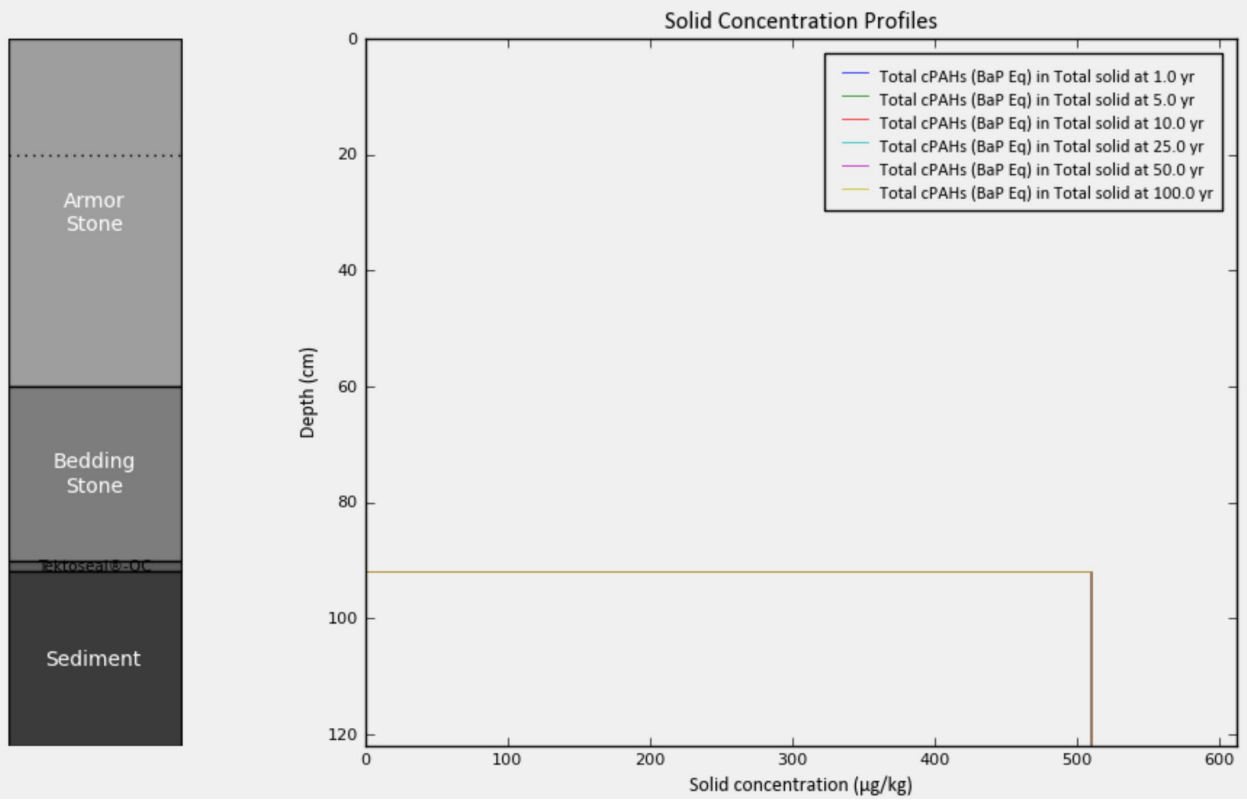

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Pentachlorophenol in Total solid at 1.0 yr
Pentachlorophenol in Total solid at 5.0 yr
Pentachlorophenol in Total solid at 10.0 yr
Pentachlorophenol in Total solid at 25.0 yr
Pentachlorophenol in Total solid at 50.0 yr
Pentachlorophenol in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

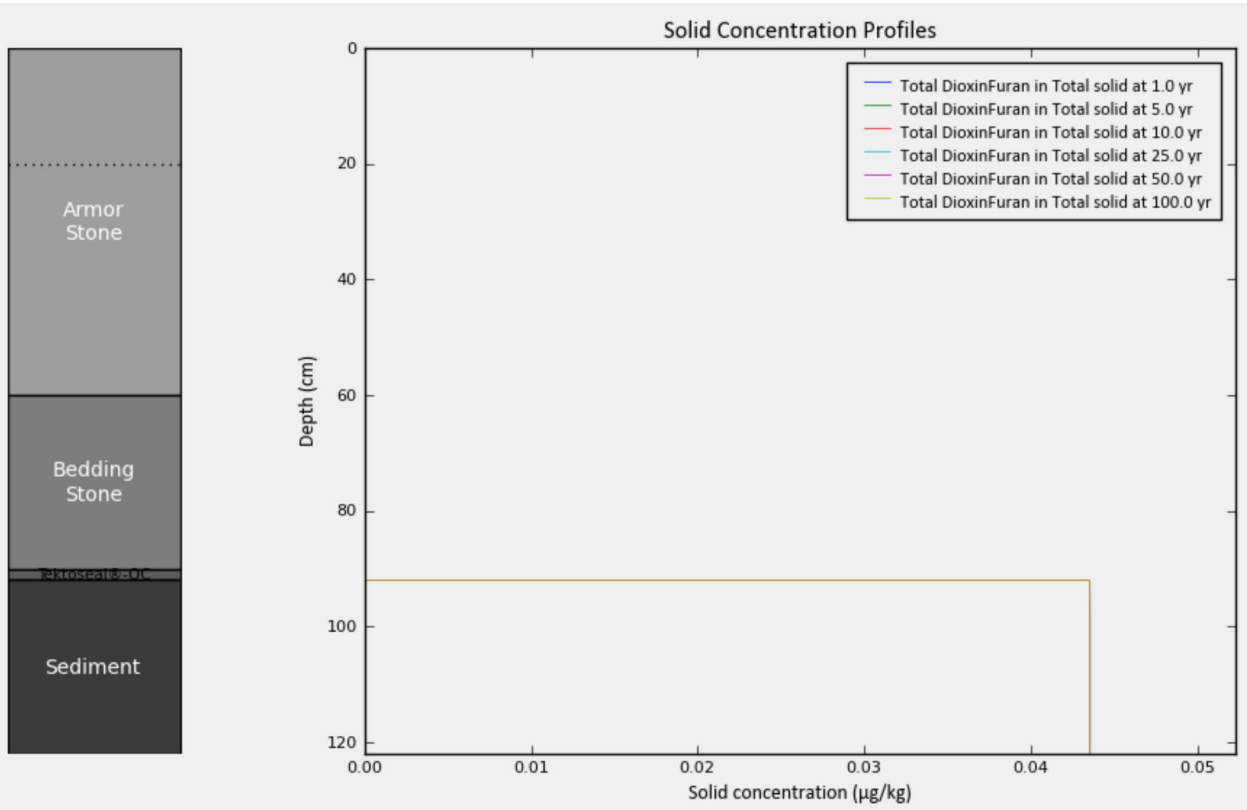

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Phenanthrene in Total solid at 1.0 yr
Phenanthrene in Total solid at 5.0 yr
Phenanthrene in Total solid at 10.0 yr
Phenanthrene in Total solid at 25.0 yr
Phenanthrene in Total solid at 50.0 yr
Phenanthrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

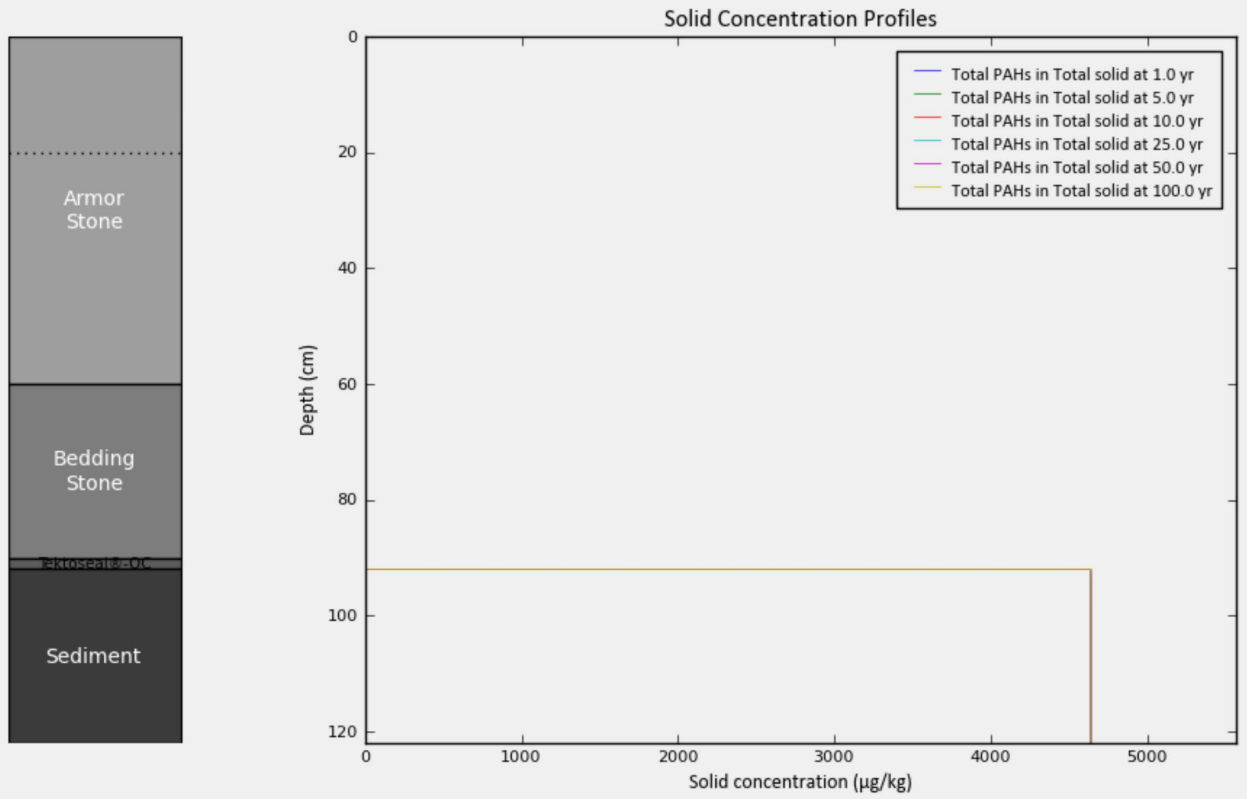

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Pyrene in Total solid at 1.0 yr
Pyrene in Total solid at 5.0 yr
Pyrene in Total solid at 10.0 yr
Pyrene in Total solid at 25.0 yr
Pyrene in Total solid at 50.0 yr
Pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

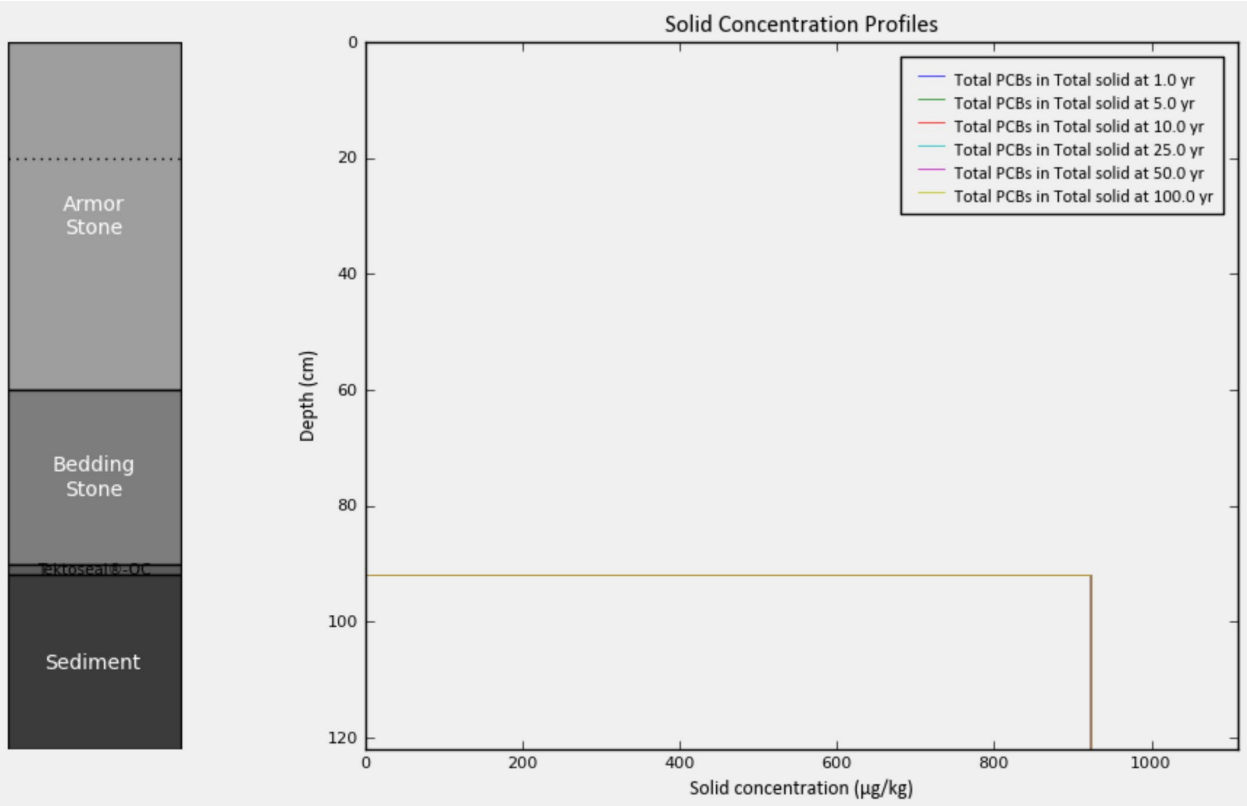

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
TCDD in Total solid at 1.0 yr
TCDD in Total solid at 5.0 yr
TCDD in Total solid at 10.0 yr
TCDD in Total solid at 25.0 yr
TCDD in Total solid at 50.0 yr
TCDD in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
Solid concentration (µg/kg)

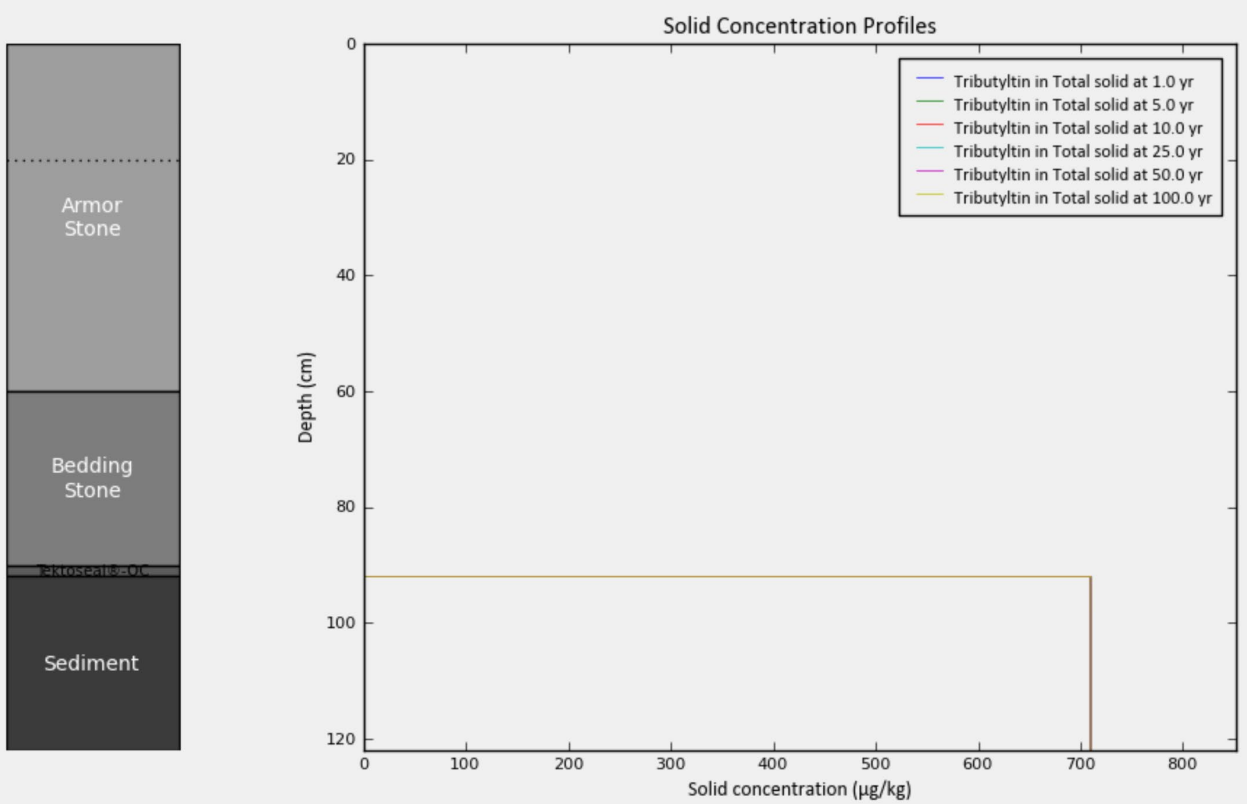

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
TCDF in Total solid at 1.0 yr
TCDF in Total solid at 5.0 yr
TCDF in Total solid at 10.0 yr
TCDF in Total solid at 25.0 yr
TCDF in Total solid at 50.0 yr
TCDF in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Solid concentration (µg/kg)

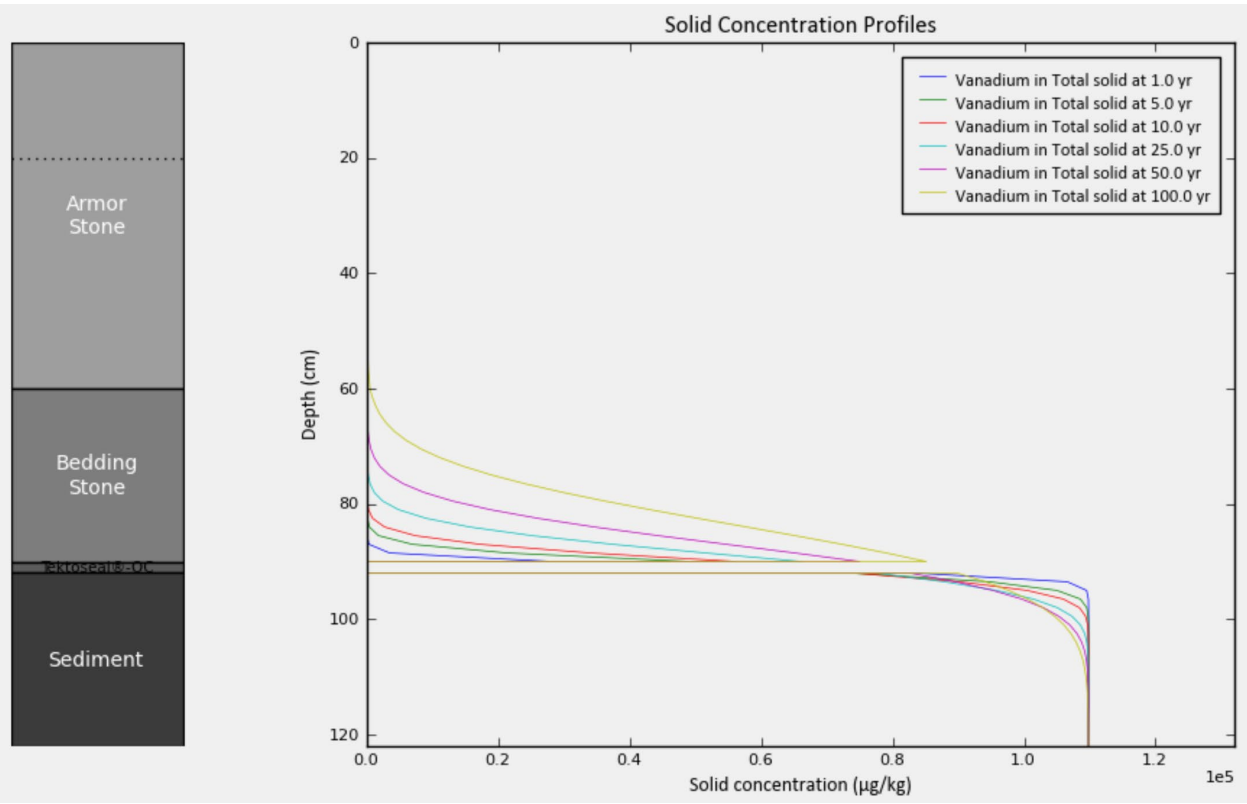

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Total cPAHs (BaP Eq) in Total solid at 1.0 yr
Total cPAHs (BaP Eq) in Total solid at 5.0 yr
Total cPAHs (BaP Eq) in Total solid at 10.0 yr
Total cPAHs (BaP Eq) in Total solid at 25.0 yr
Total cPAHs (BaP Eq) in Total solid at 50.0 yr
Total cPAHs (BaP Eq) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

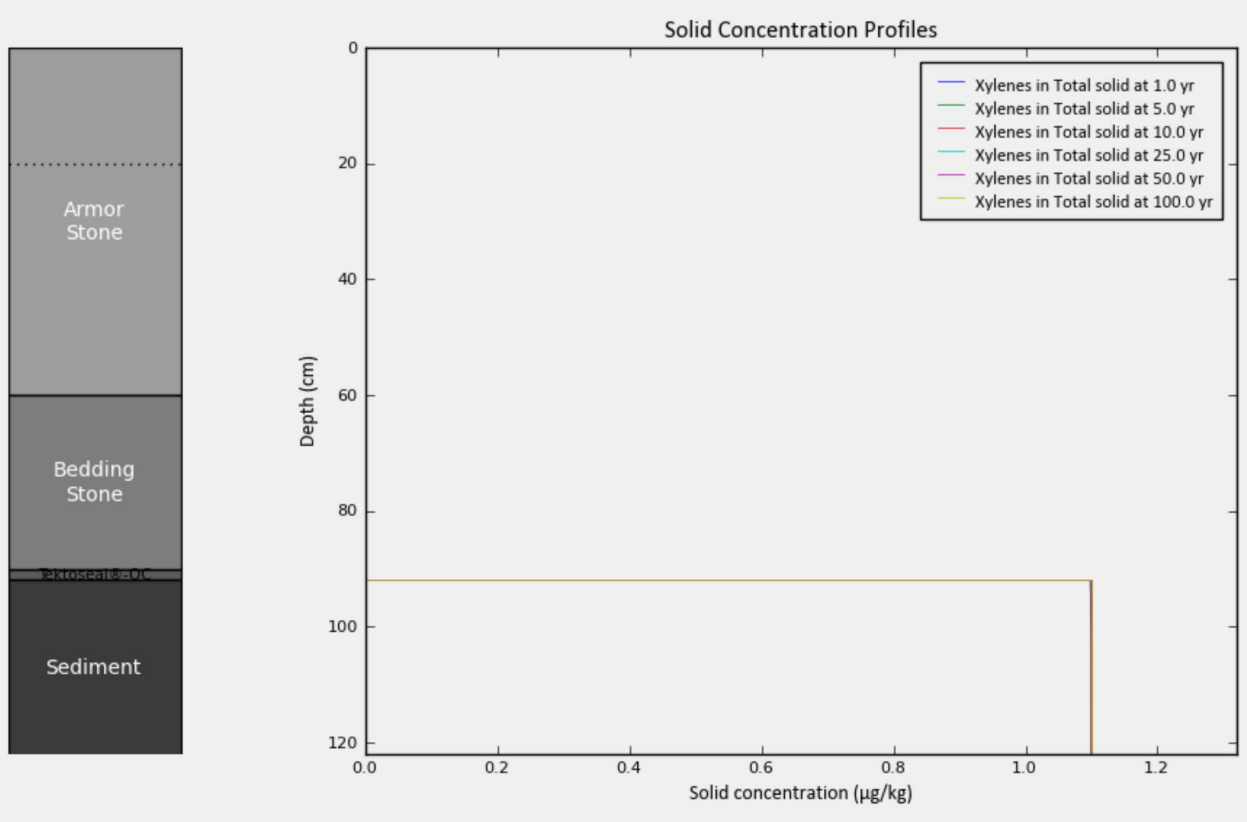

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Total DioxinFuran in Total solid at 1.0 yr
Total DioxinFuran in Total solid at 5.0 yr
Total DioxinFuran in Total solid at 10.0 yr
Total DioxinFuran in Total solid at 25.0 yr
Total DioxinFuran in Total solid at 50.0 yr
Total DioxinFuran in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

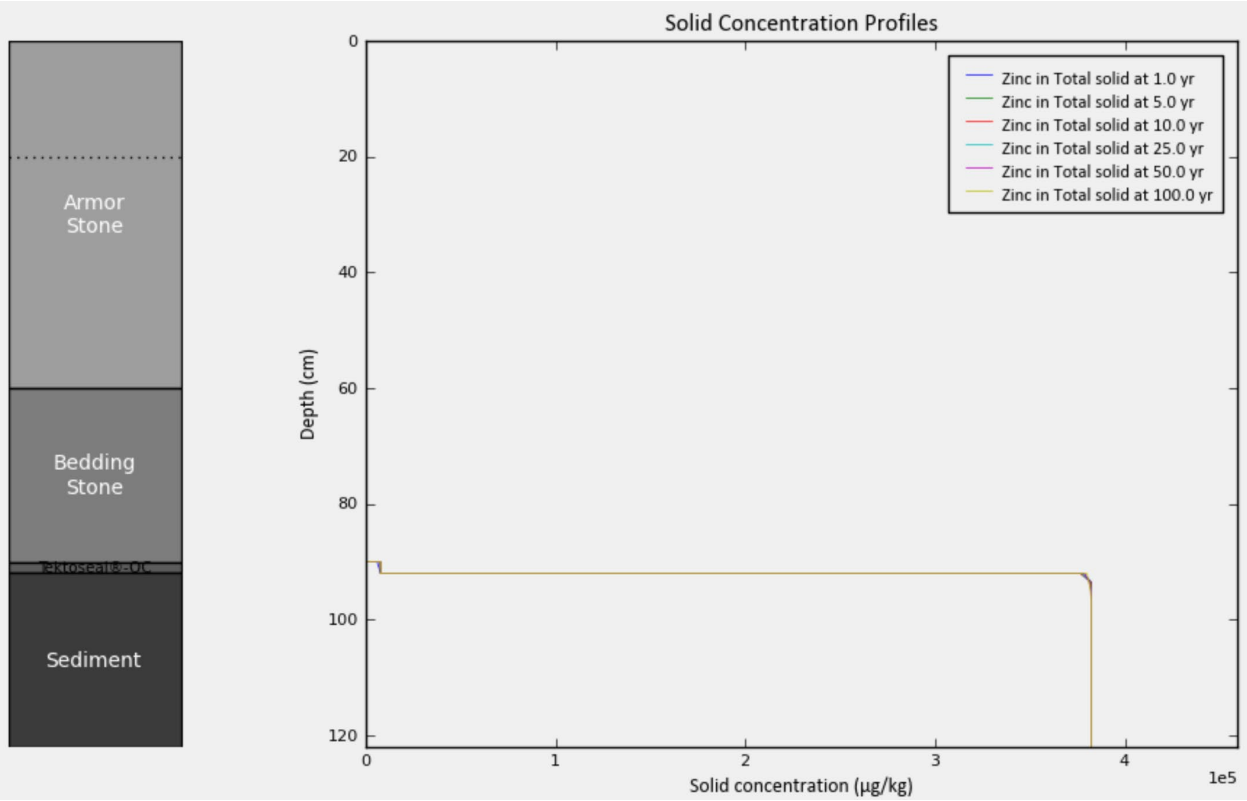

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Total PAHs in Total solid at 1.0 yr
Total PAHs in Total solid at 5.0 yr
Total PAHs in Total solid at 10.0 yr
Total PAHs in Total solid at 25.0 yr
Total PAHs in Total solid at 50.0 yr
Total PAHs in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)


Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Total PCBs in Total solid at 1.0 yr
Total PCBs in Total solid at 5.0 yr
Total PCBs in Total solid at 10.0 yr
Total PCBs in Total solid at 25.0 yr
Total PCBs in Total solid at 50.0 yr
Total PCBs in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)


Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Tributyltin in Total solid at 1.0 yr
Tributyltin in Total solid at 5.0 yr
Tributyltin in Total solid at 10.0 yr
Tributyltin in Total solid at 25.0 yr
Tributyltin in Total solid at 50.0 yr
Tributyltin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

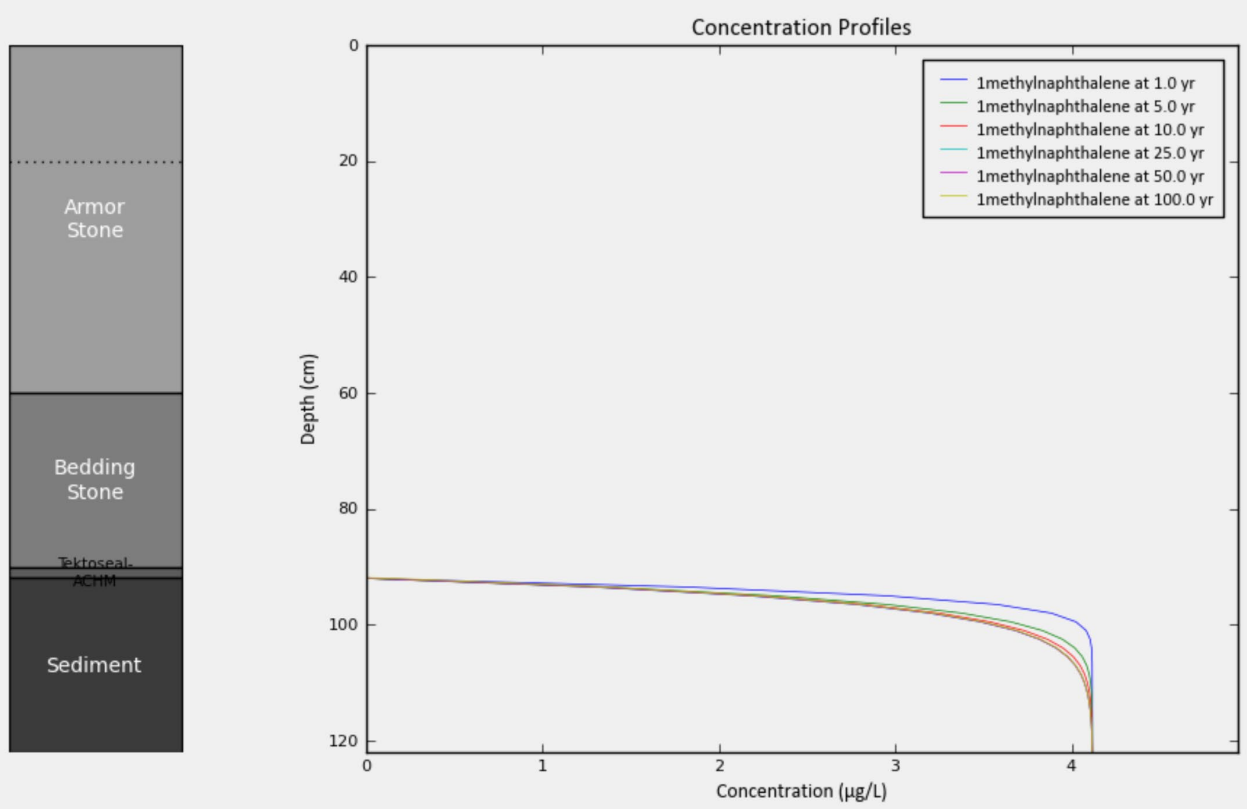

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Vanadium in Total solid at 1.0 yr
Vanadium in Total solid at 5.0 yr
Vanadium in Total solid at 10.0 yr
Vanadium in Total solid at 25.0 yr
Vanadium in Total solid at 50.0 yr
Vanadium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

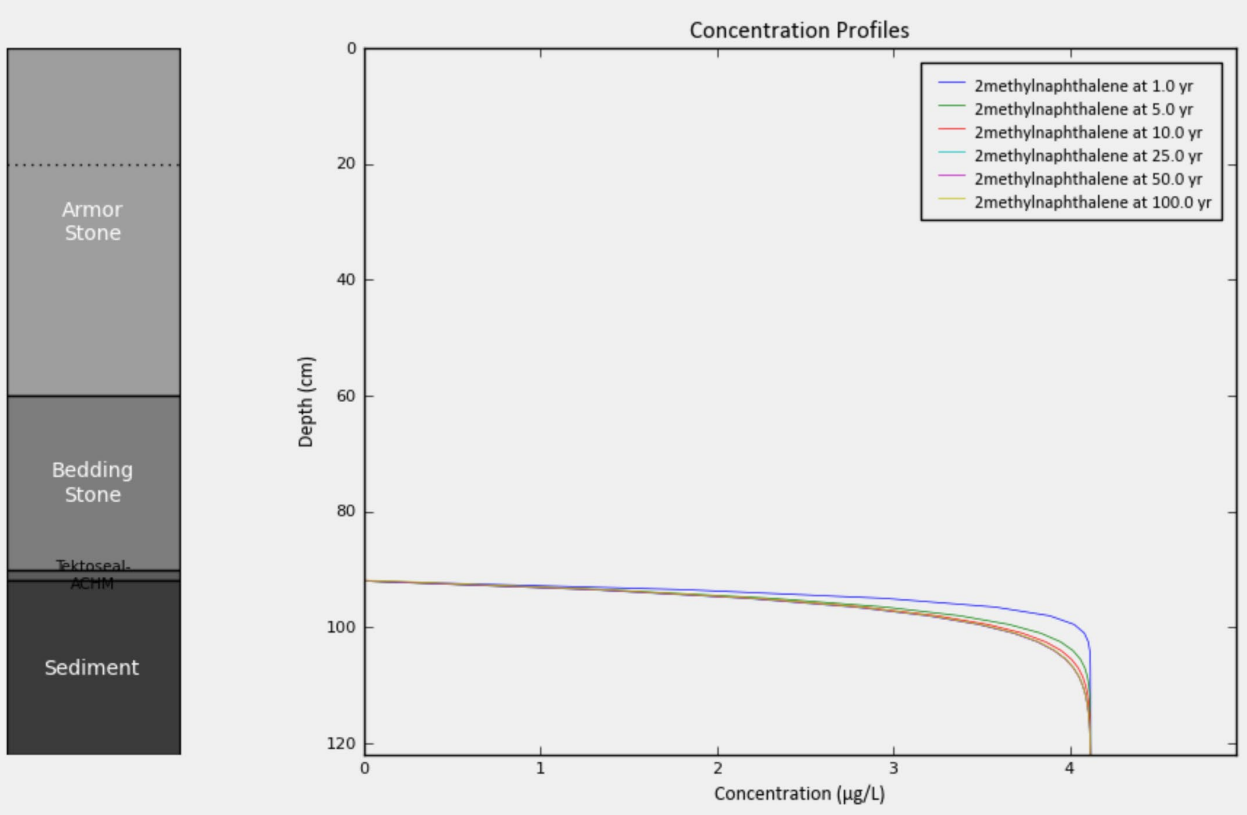

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Xylenes in Total solid at 1.0 yr
Xylenes in Total solid at 5.0 yr
Xylenes in Total solid at 10.0 yr
Xylenes in Total solid at 25.0 yr
Xylenes in Total solid at 50.0 yr
Xylenes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

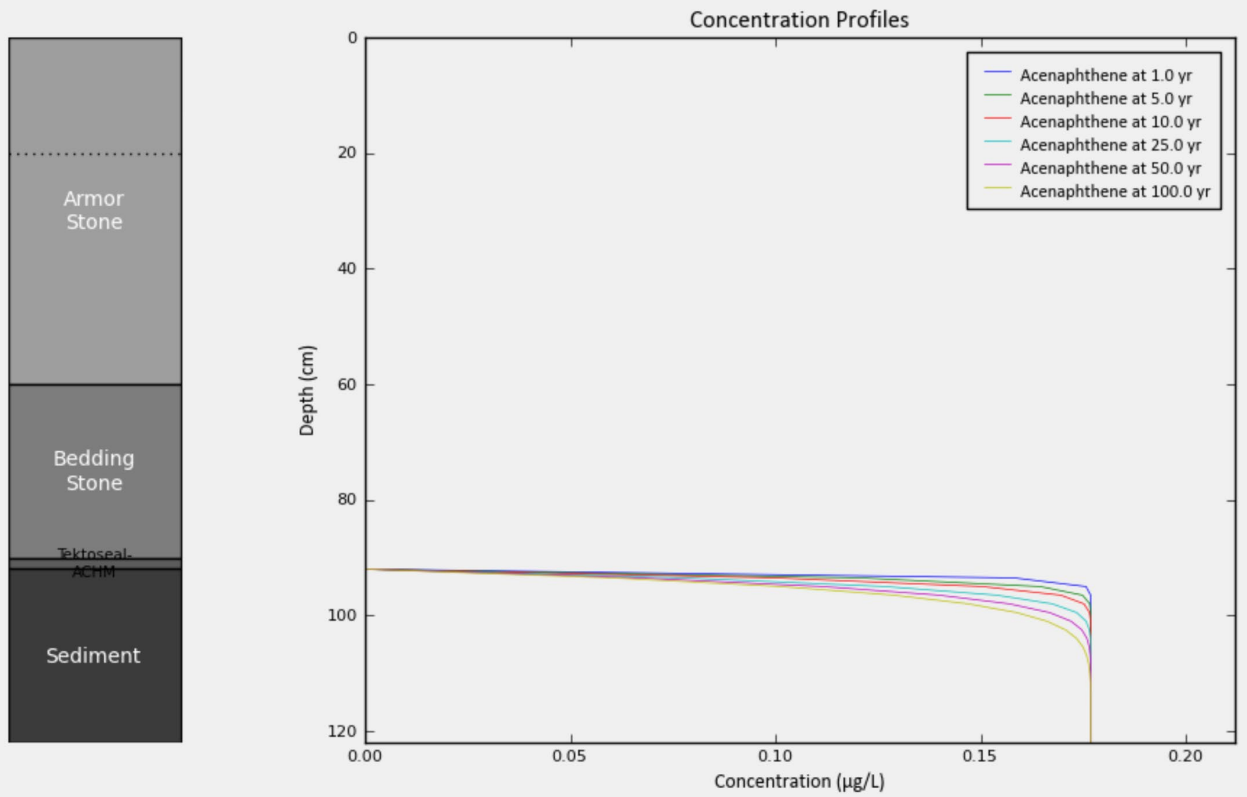

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Zinc in Total solid at 1.0 yr
Zinc in Total solid at 5.0 yr
Zinc in Total solid at 10.0 yr
Zinc in Total solid at 25.0 yr
Zinc in Total solid at 50.0 yr
Zinc in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

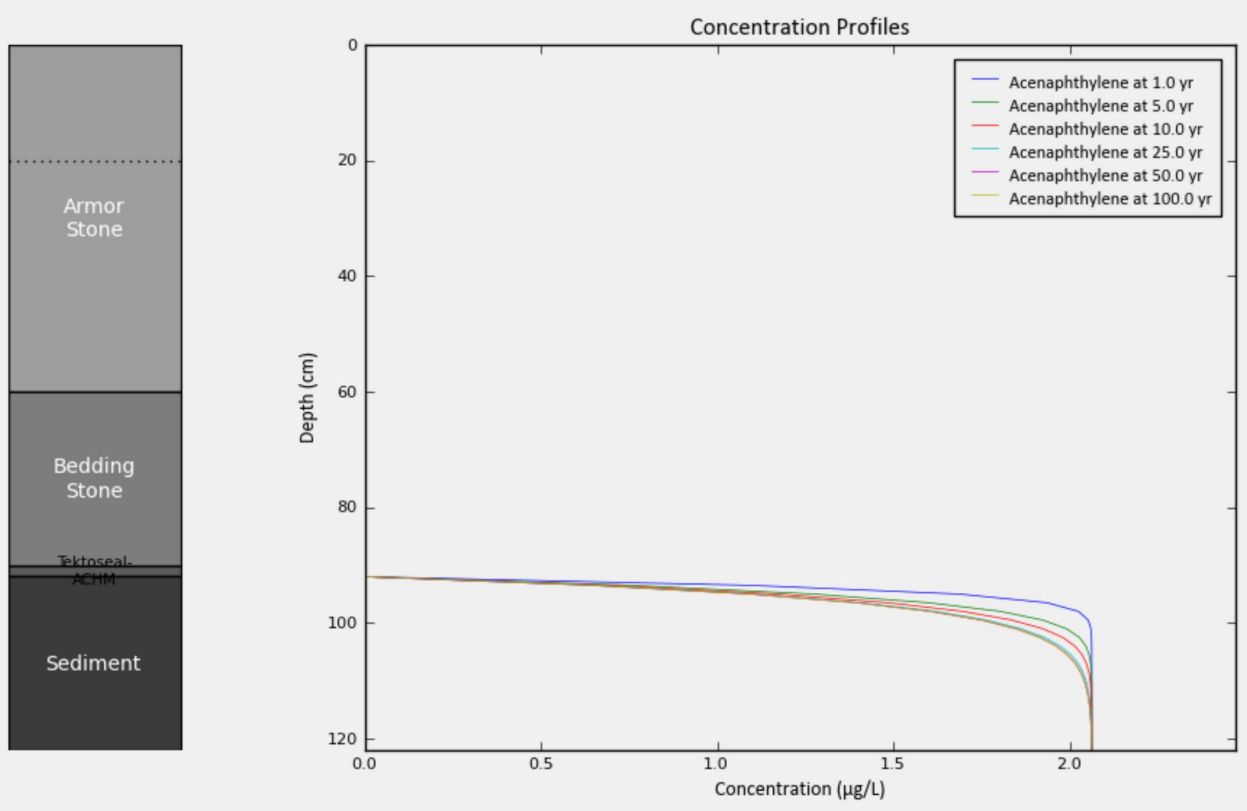
Cap Alternative 9: 2 cm hybrid of Tektoseal-AC and Tektoseal-HM with 30 cm of 2.5-inch bedding stone and 60 cm of 10-inch armor stone

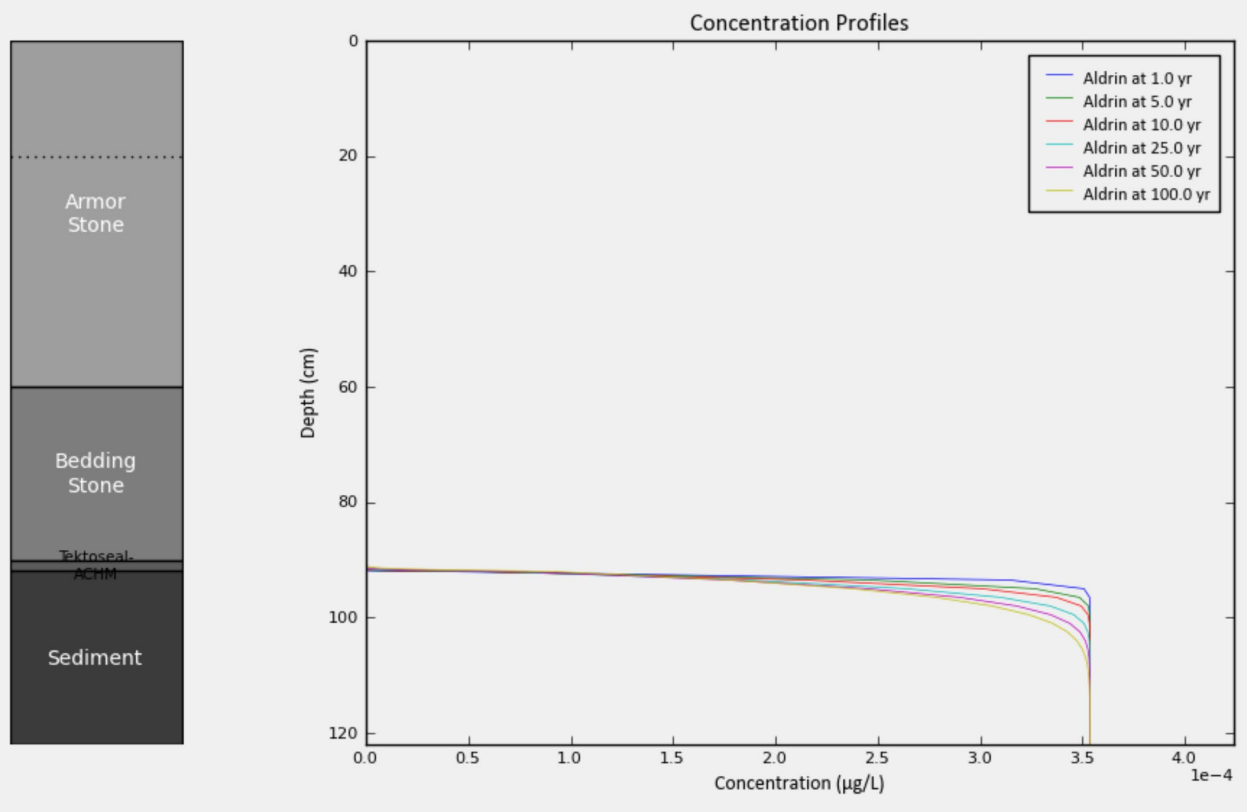
Porewater Concentration - Depth

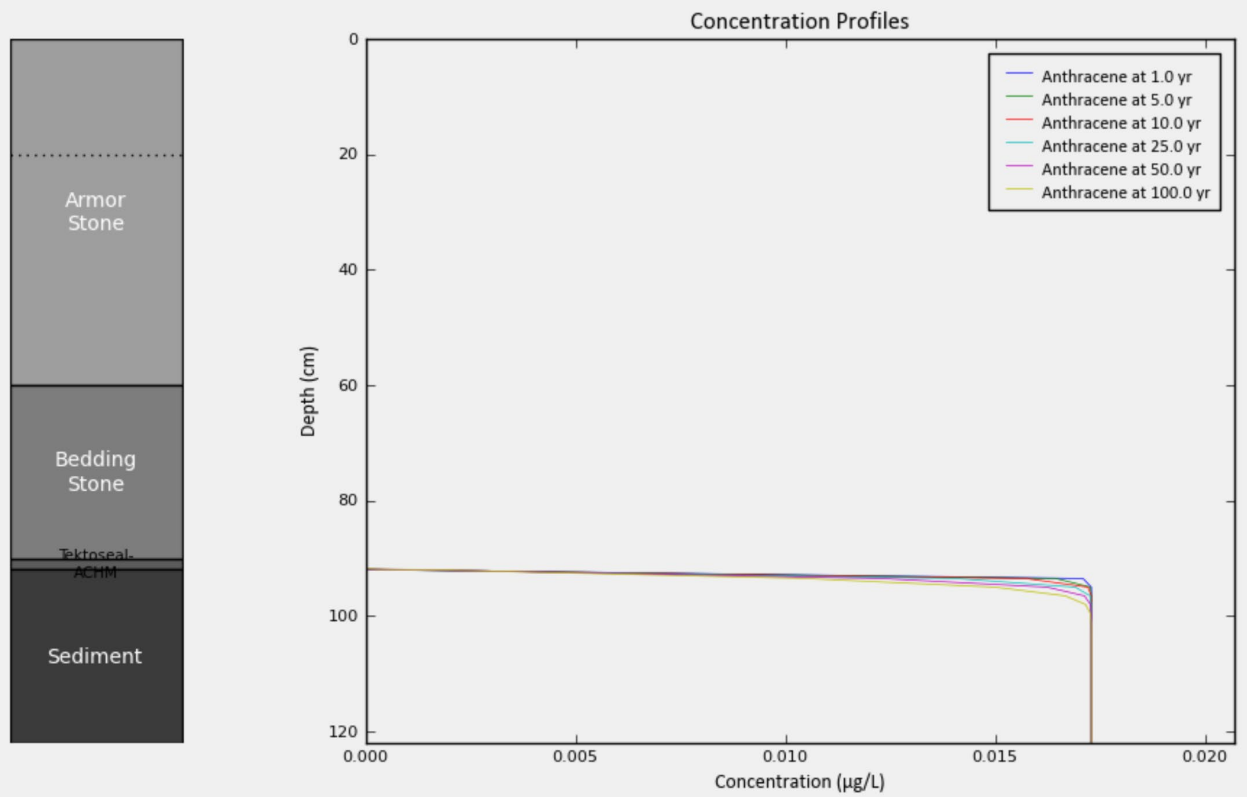


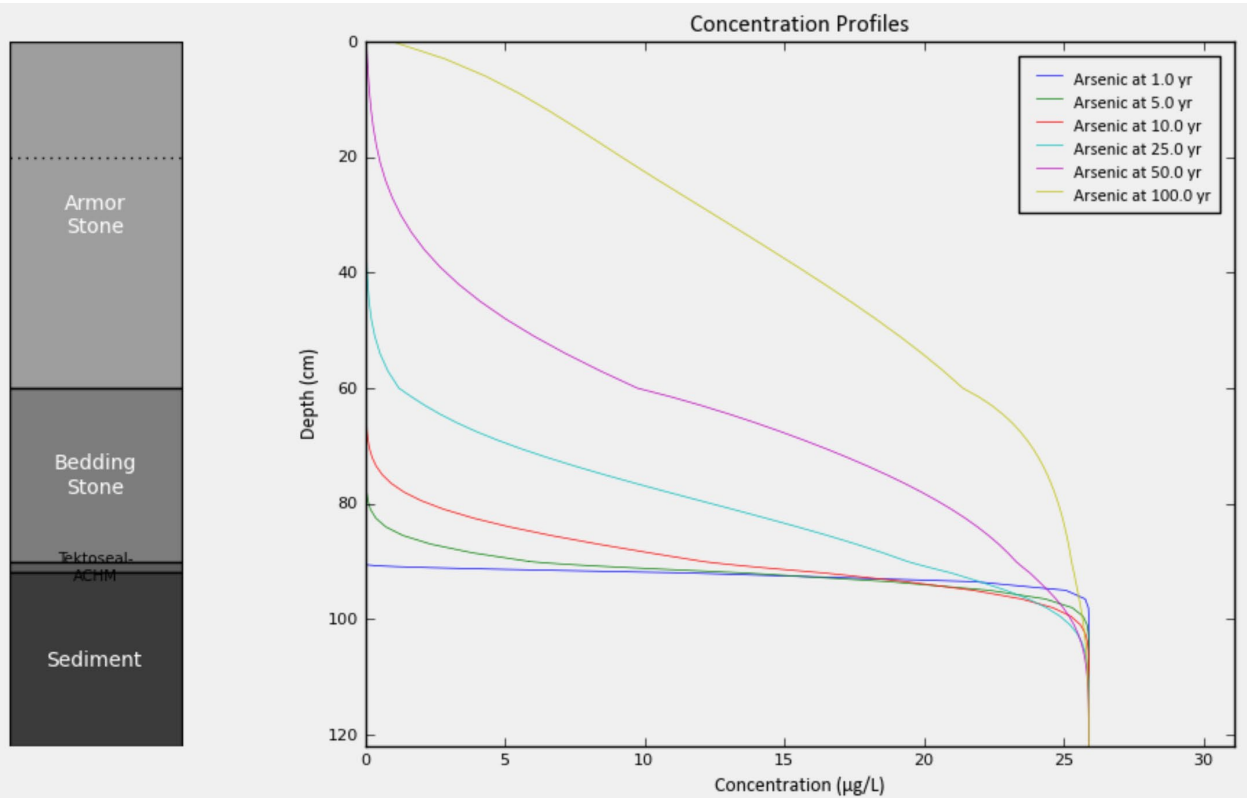

Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
2methylnaphthalene at 1.0 yr
2methylnaphthalene at 5.0 yr
2methylnaphthalene at 10.0 yr
2methylnaphthalene at 25.0 yr
2methylnaphthalene at 50.0 yr
2methylnaphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

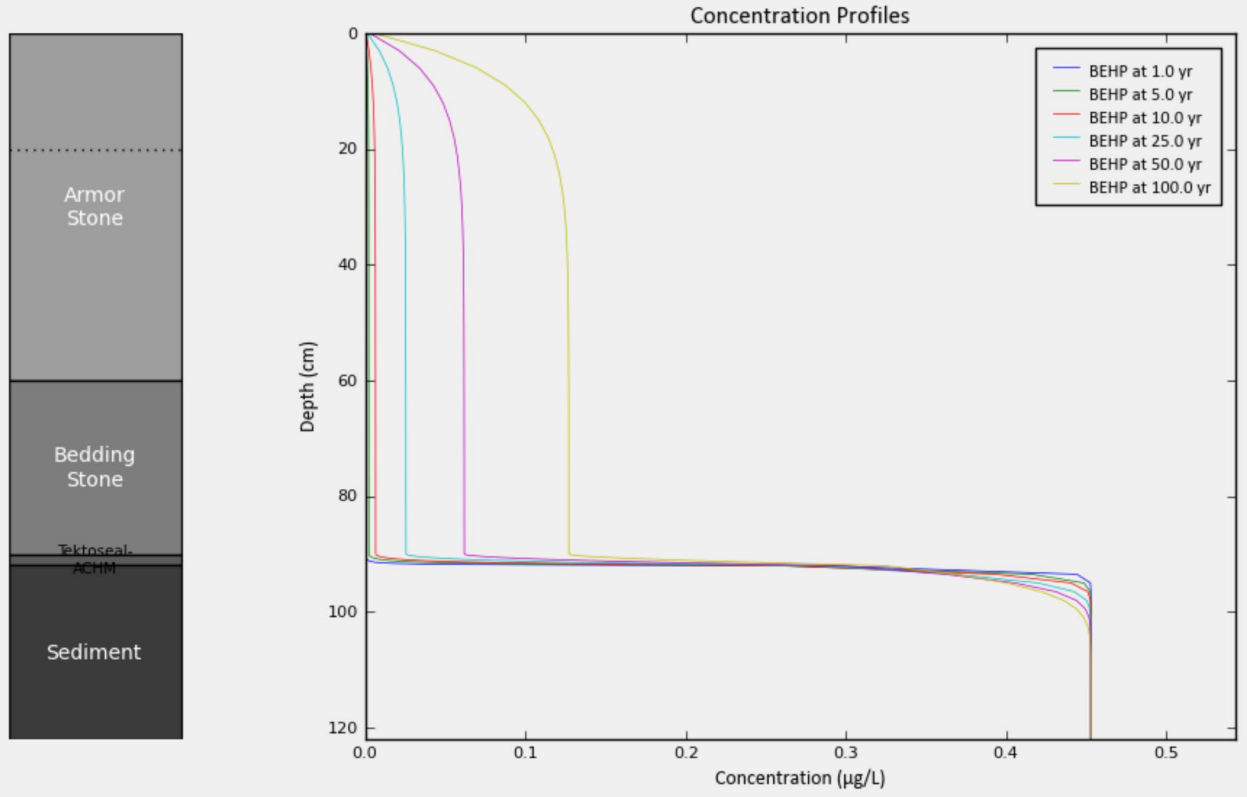

Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Acenaphthene at 1.0 yr
Acenaphthene at 5.0 yr
Acenaphthene at 10.0 yr
Acenaphthene at 25.0 yr
Acenaphthene at 50.0 yr
Acenaphthene at 100.0 yr
Depth (cm)
Concentration (µg/L)

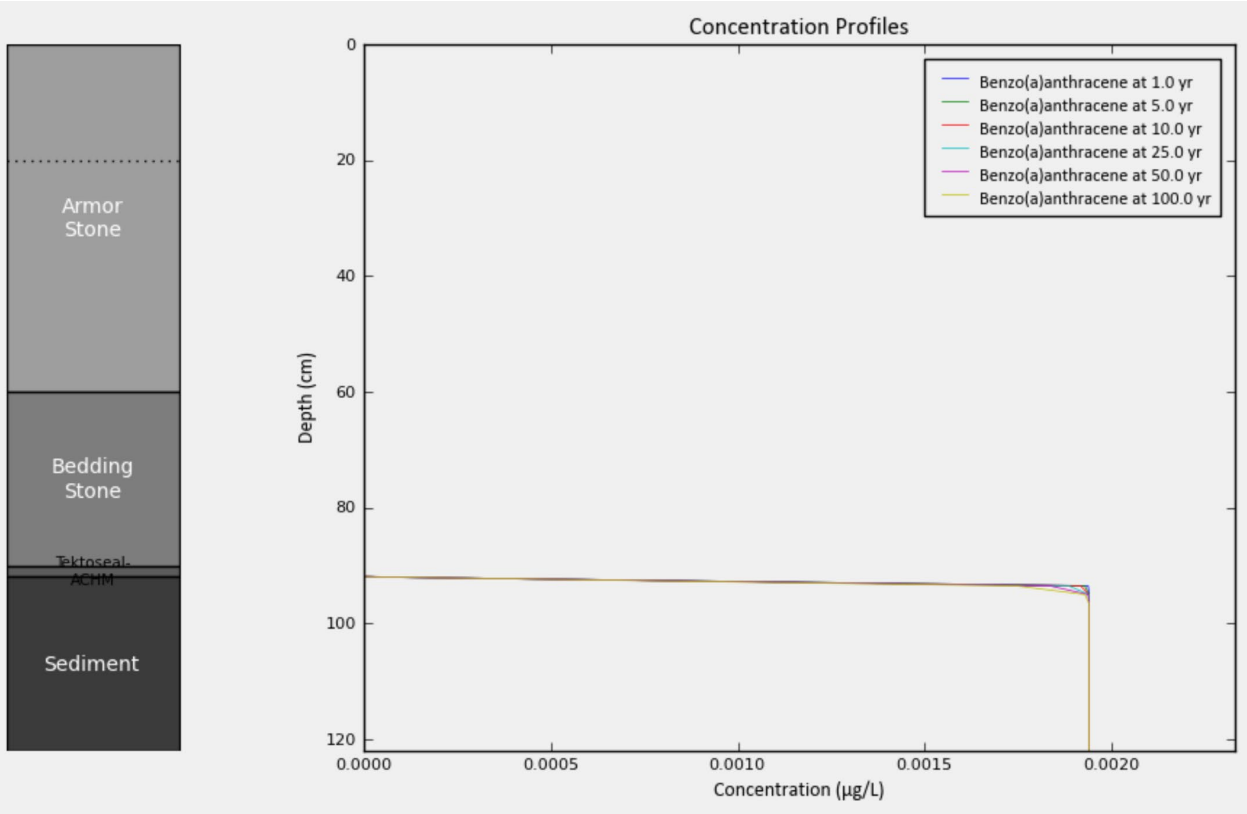

Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Depth (cm)
Concentration (µg/L)
Acenaphthylene at 1.0 yr
Acenaphthylene at 5.0 yr
Acenaphthylene at 10.0 yr
Acenaphthylene at 25.0 yr
Acenaphthylene at 50.0 yr
Acenaphthylene at 100.0 yr

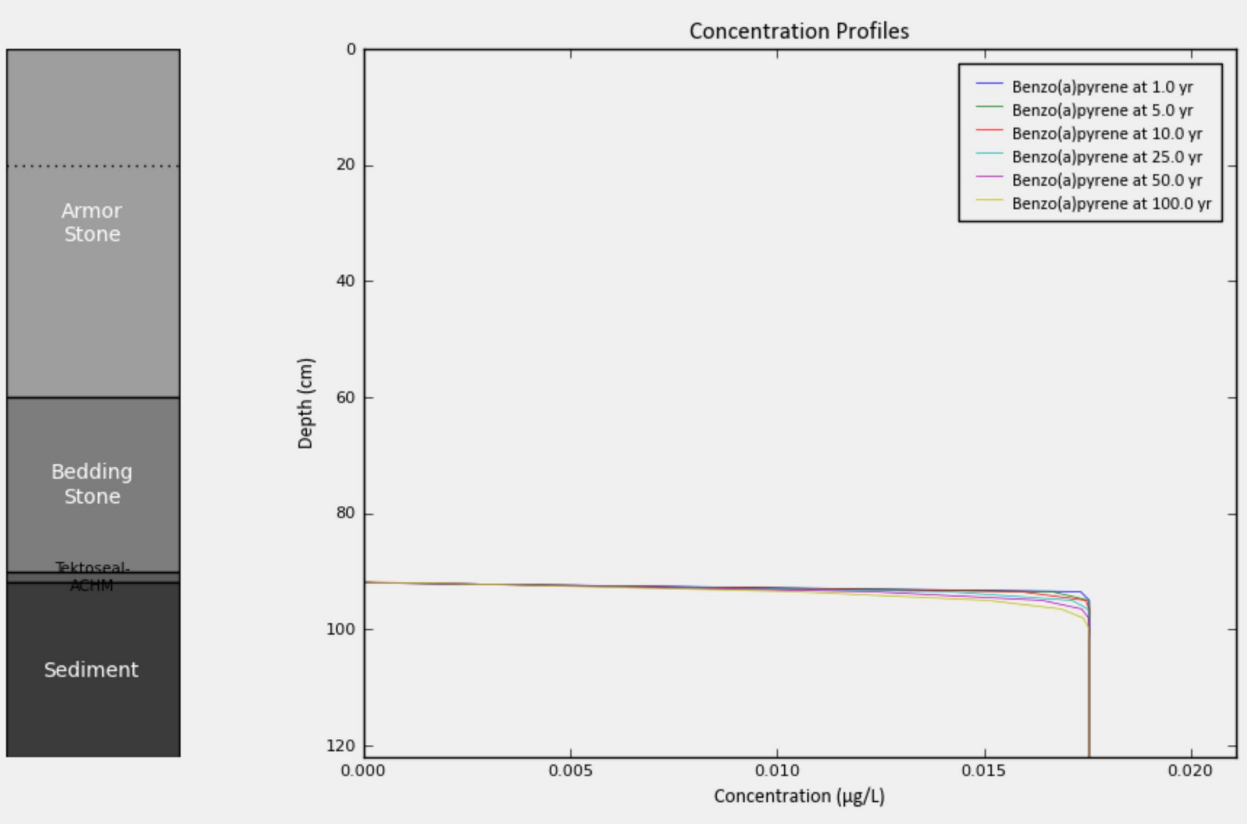

Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Depth (cm)
Concentration (µg/L)
1e−4
Aldrin at 1.0 yr
Aldrin at 5.0 yr
Aldrin at 10.0 yr
Aldrin at 25.0 yr
Aldrin at 50.0 yr
Aldrin at 100.0 yr

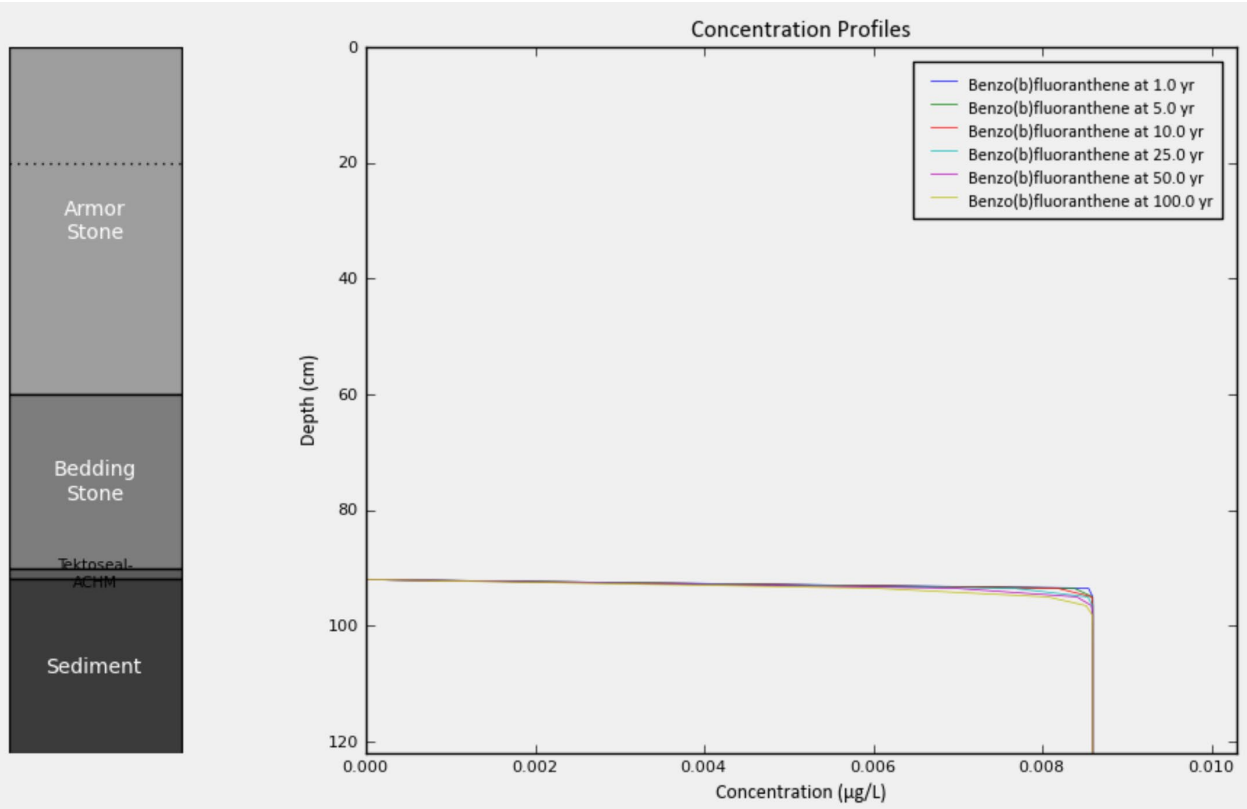

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Anthracene at 1.0 yr
Anthracene at 5.0 yr
Anthracene at 10.0 yr
Anthracene at 25.0 yr
Anthracene at 50.0 yr
Anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020

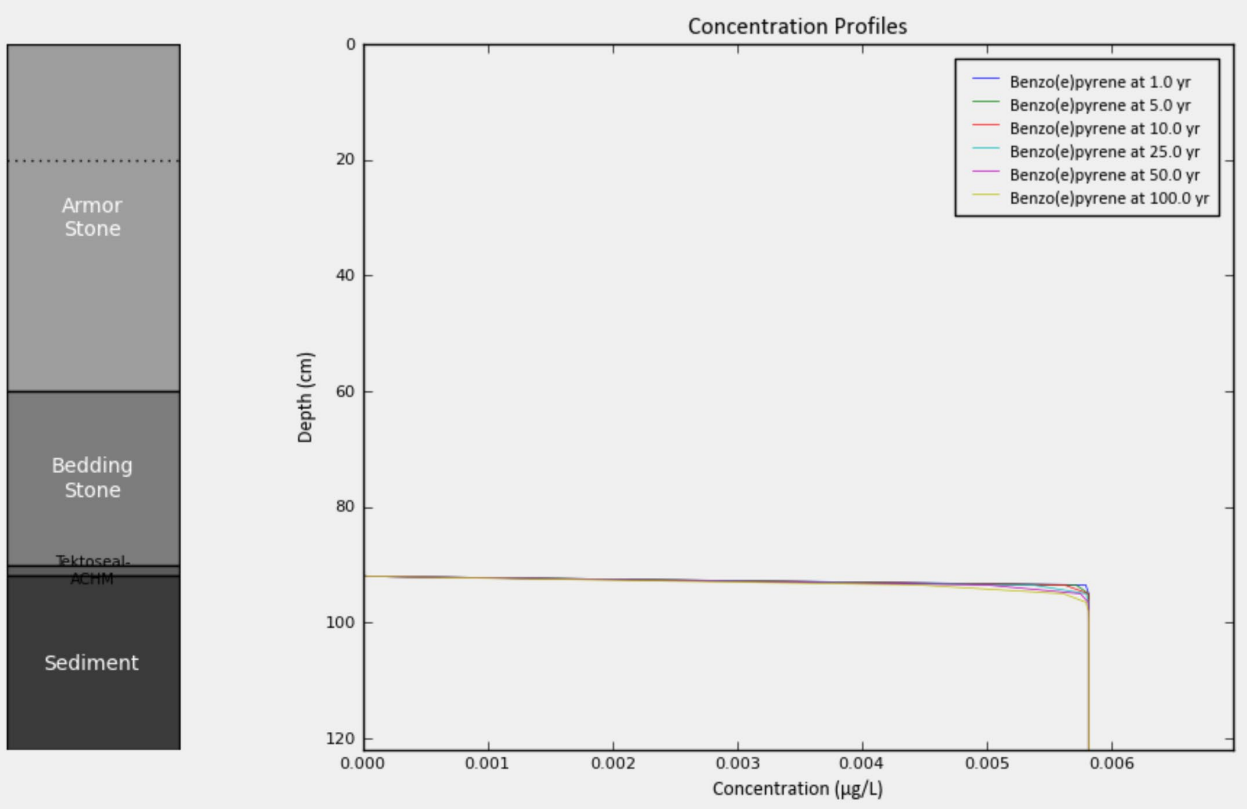

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Arsenic at 1.0 yr
Arsenic at 5.0 yr
Arsenic at 10.0 yr
Arsenic at 25.0 yr
Arsenic at 50.0 yr
Arsenic at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
5
10
15
20
25
30

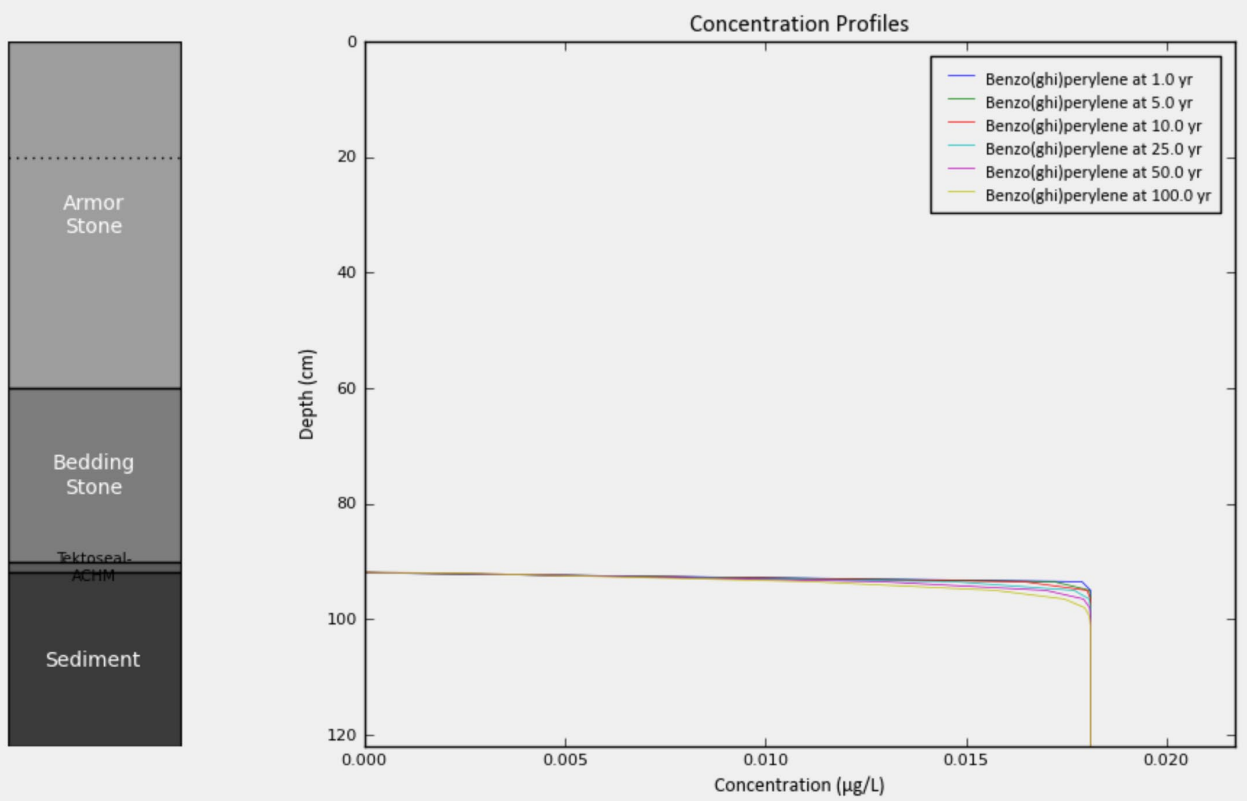

Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
BEHP at 1.0 yr
BEHP at 5.0 yr
BEHP at 10.0 yr
BEHP at 25.0 yr
BEHP at 50.0 yr
BEHP at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0
0.1
0.2
0.3
0.4
0.5

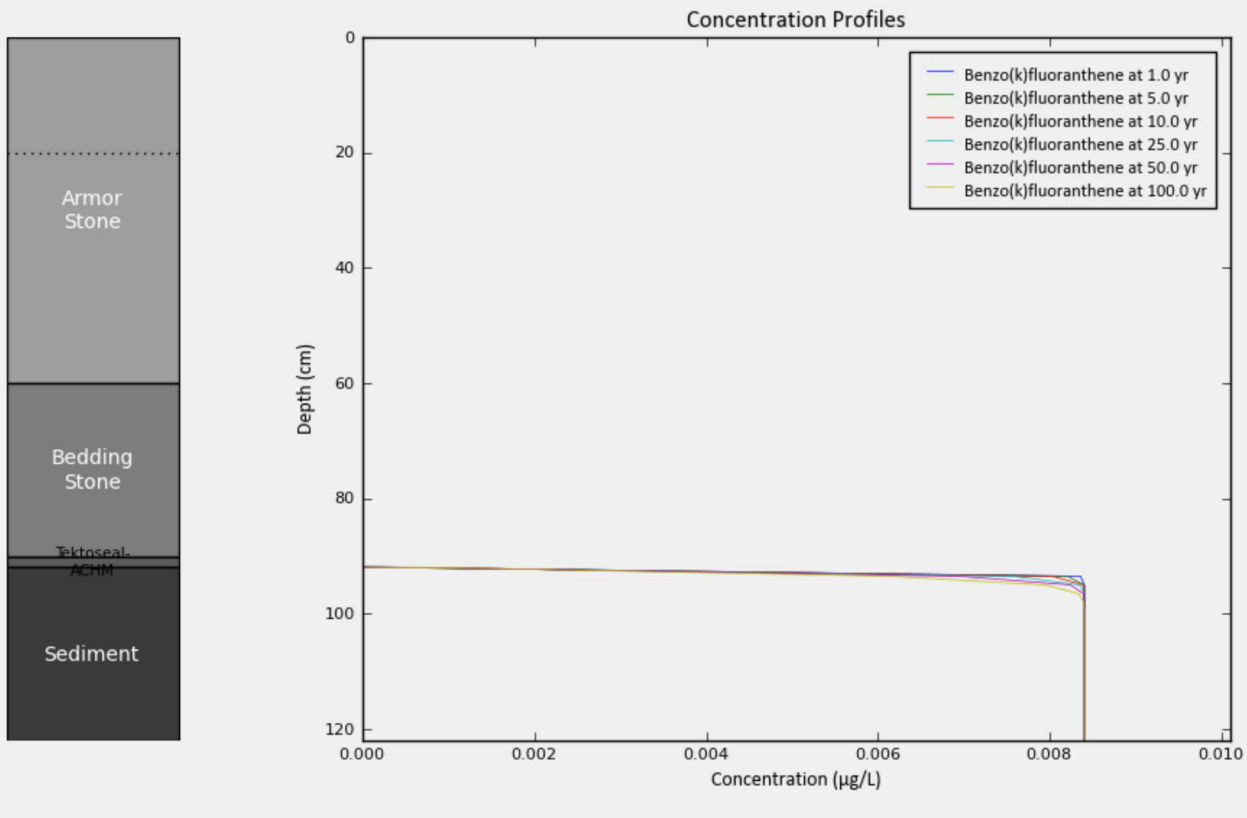

Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Benzo(a)anthracene at 1.0 yr
Benzo(a)anthracene at 5.0 yr
Benzo(a)anthracene at 10.0 yr
Benzo(a)anthracene at 25.0 yr
Benzo(a)anthracene at 50.0 yr
Benzo(a)anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020

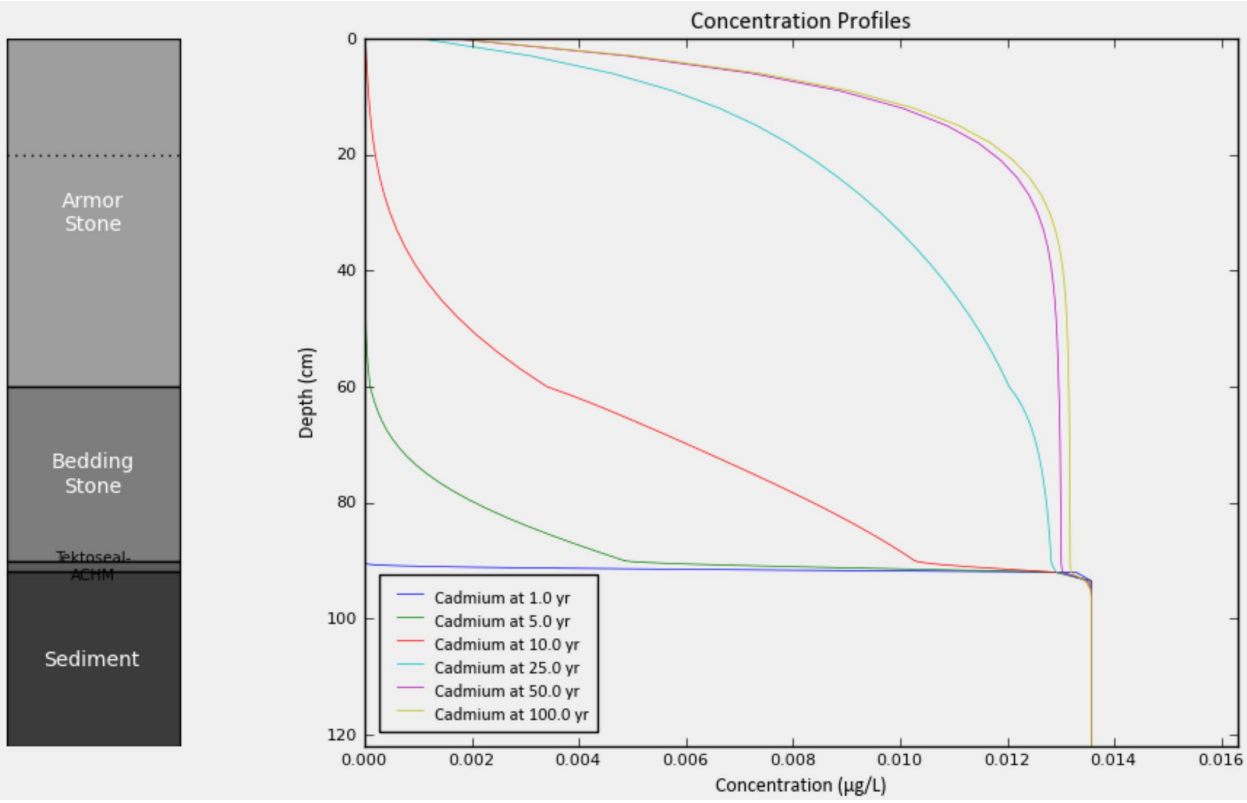

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Benzo(a)pyrene at 1.0 yr
Benzo(a)pyrene at 5.0 yr
Benzo(a)pyrene at 10.0 yr
Benzo(a)pyrene at 25.0 yr
Benzo(a)pyrene at 50.0 yr
Benzo(a)pyrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

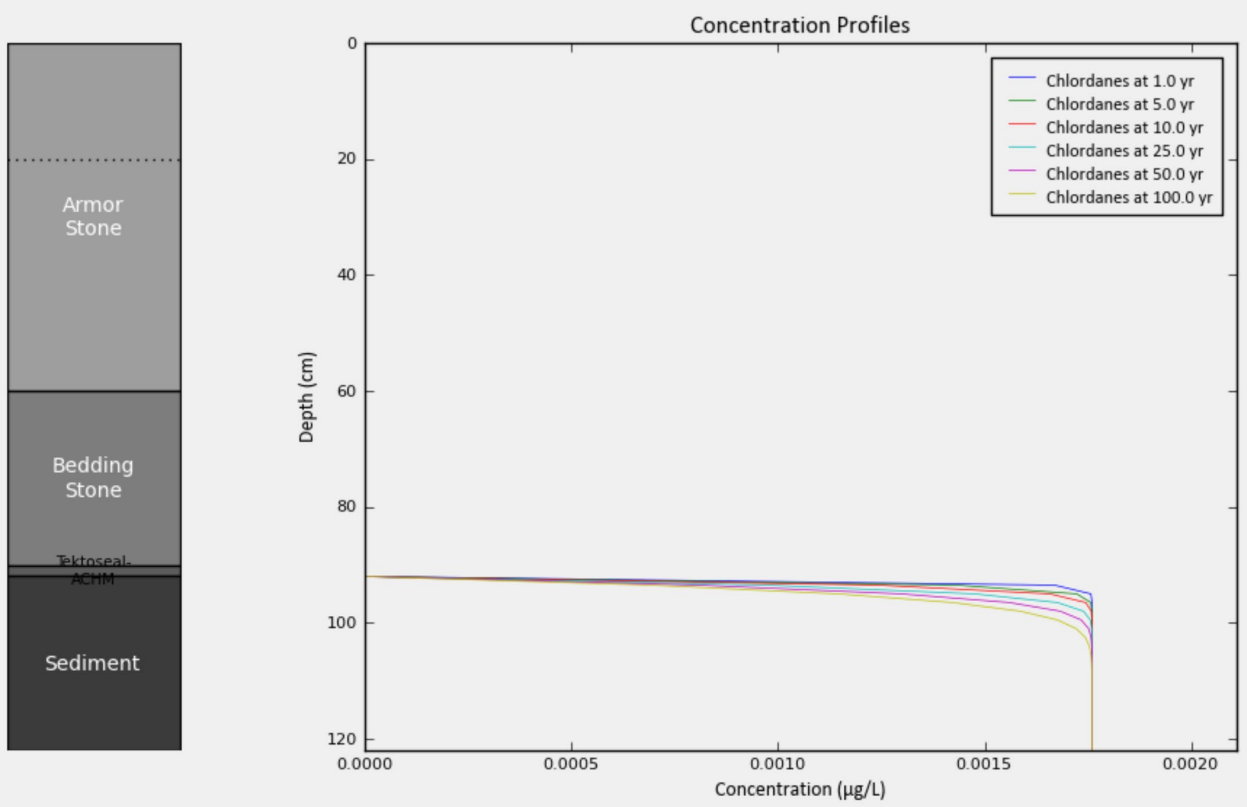

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Benzo(b)fluoranthene at 1.0 yr
Benzo(b)fluoranthene at 5.0 yr
Benzo(b)fluoranthene at 10.0 yr
Benzo(b)fluoranthene at 25.0 yr
Benzo(b)fluoranthene at 50.0 yr
Benzo(b)fluoranthene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
0.010
Concentration (µg/L)

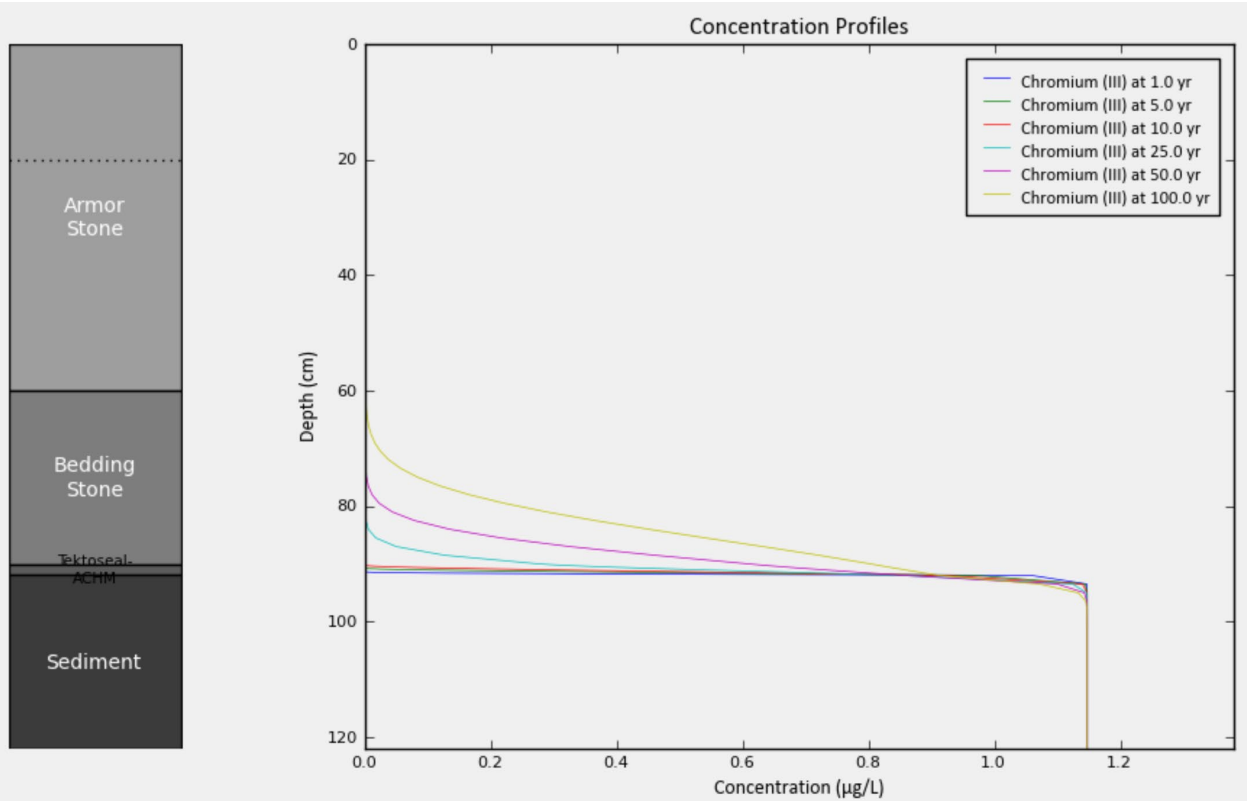

Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Benzo(e)pyrene at 1.0 yr
Benzo(e)pyrene at 5.0 yr
Benzo(e)pyrene at 10.0 yr
Benzo(e)pyrene at 25.0 yr
Benzo(e)pyrene at 50.0 yr
Benzo(e)pyrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

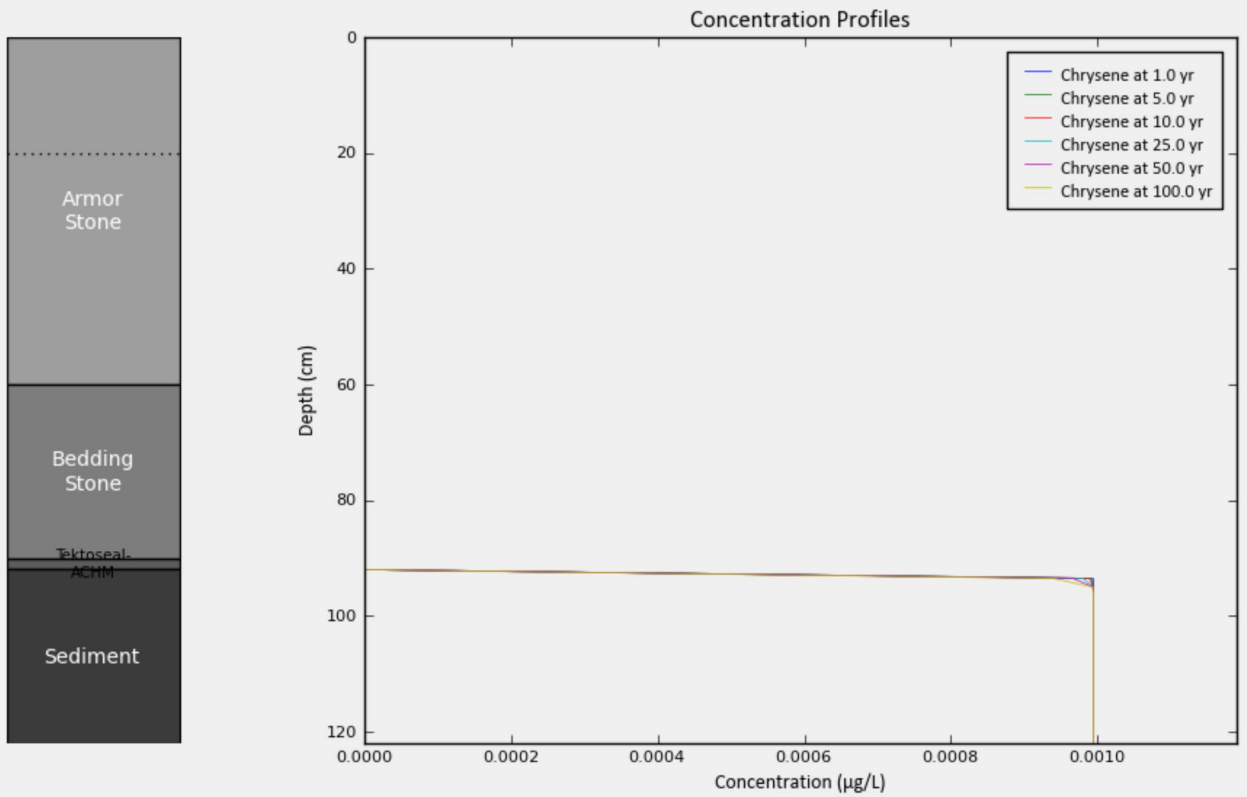

Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Benzo(ghi)perylene at 1.0 yr
Benzo(ghi)perylene at 5.0 yr
Benzo(ghi)perylene at 10.0 yr
Benzo(ghi)perylene at 25.0 yr
Benzo(ghi)perylene at 50.0 yr
Benzo(ghi)perylene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

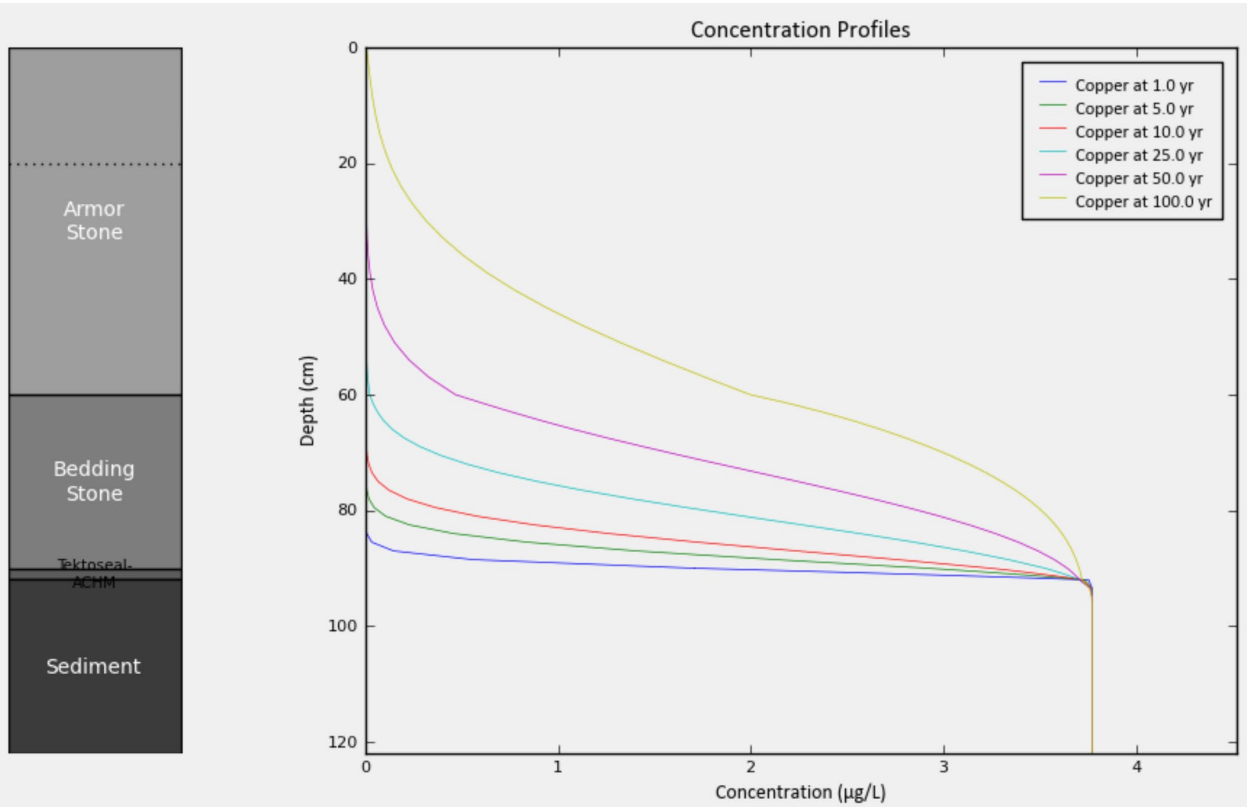

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Benzo(k)fluoranthene at 1.0 yr
Benzo(k)fluoranthene at 5.0 yr
Benzo(k)fluoranthene at 10.0 yr
Benzo(k)fluoranthene at 25.0 yr
Benzo(k)fluoranthene at 50.0 yr
Benzo(k)fluoranthene at 100.0 yr

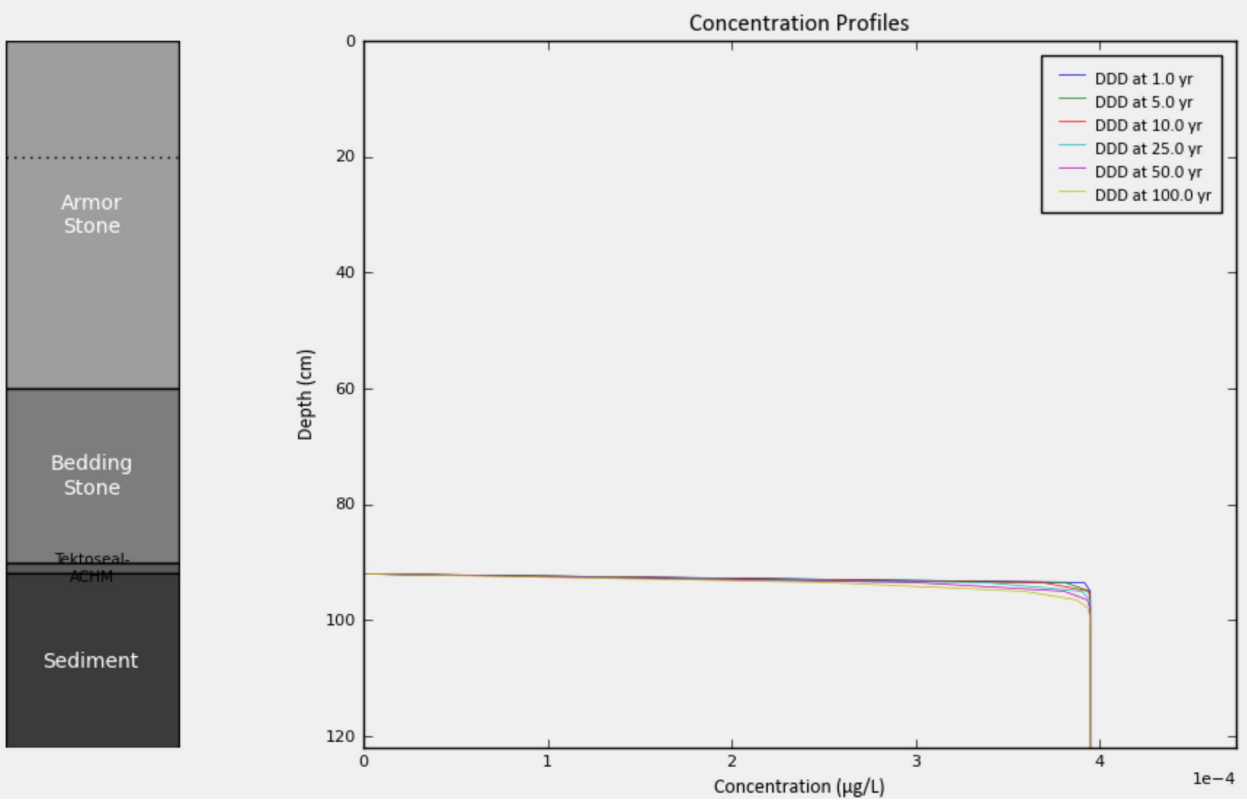

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Cadmium at 1.0 yr
Cadmium at 5.0 yr
Cadmium at 10.0 yr
Cadmium at 25.0 yr
Cadmium at 50.0 yr
Cadmium at 100.0 yr

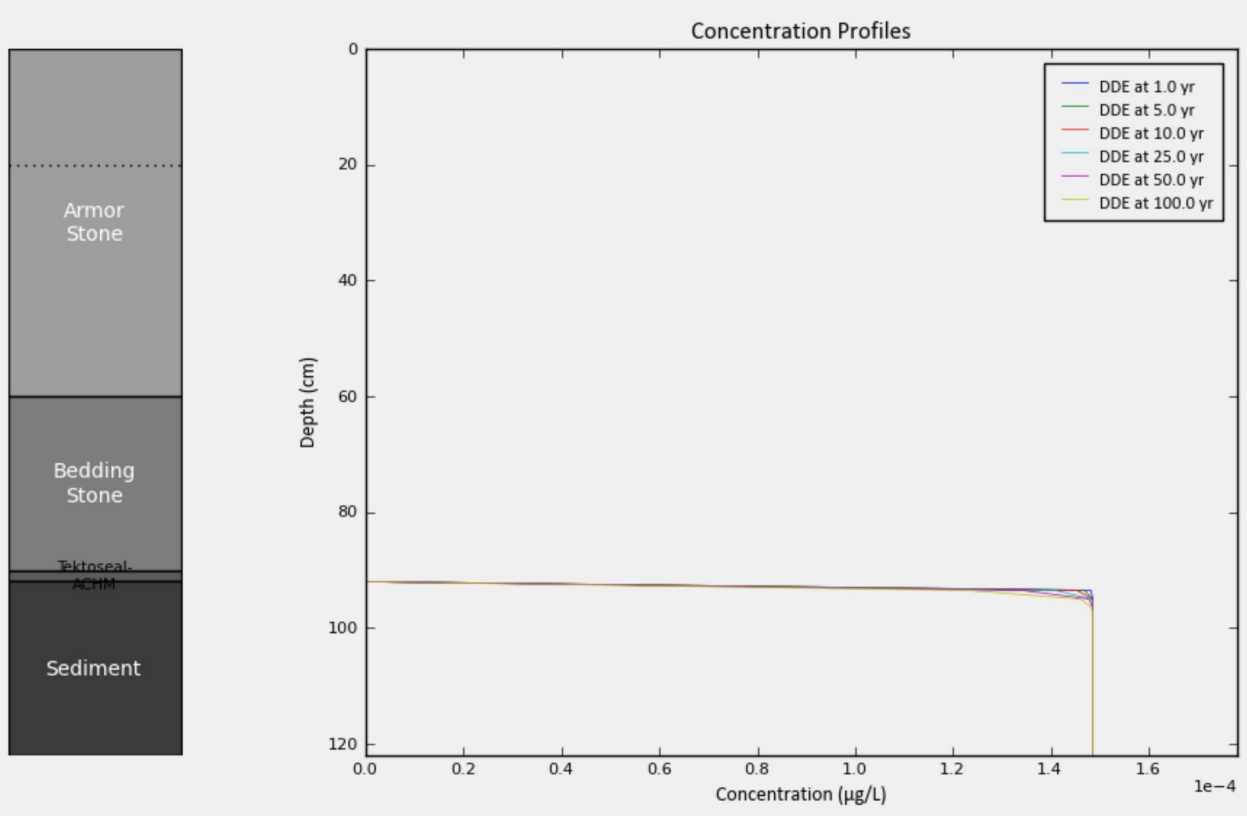

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Chlordanes at 1.0 yr
Chlordanes at 5.0 yr
Chlordanes at 10.0 yr
Chlordanes at 25.0 yr
Chlordanes at 50.0 yr
Chlordanes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020

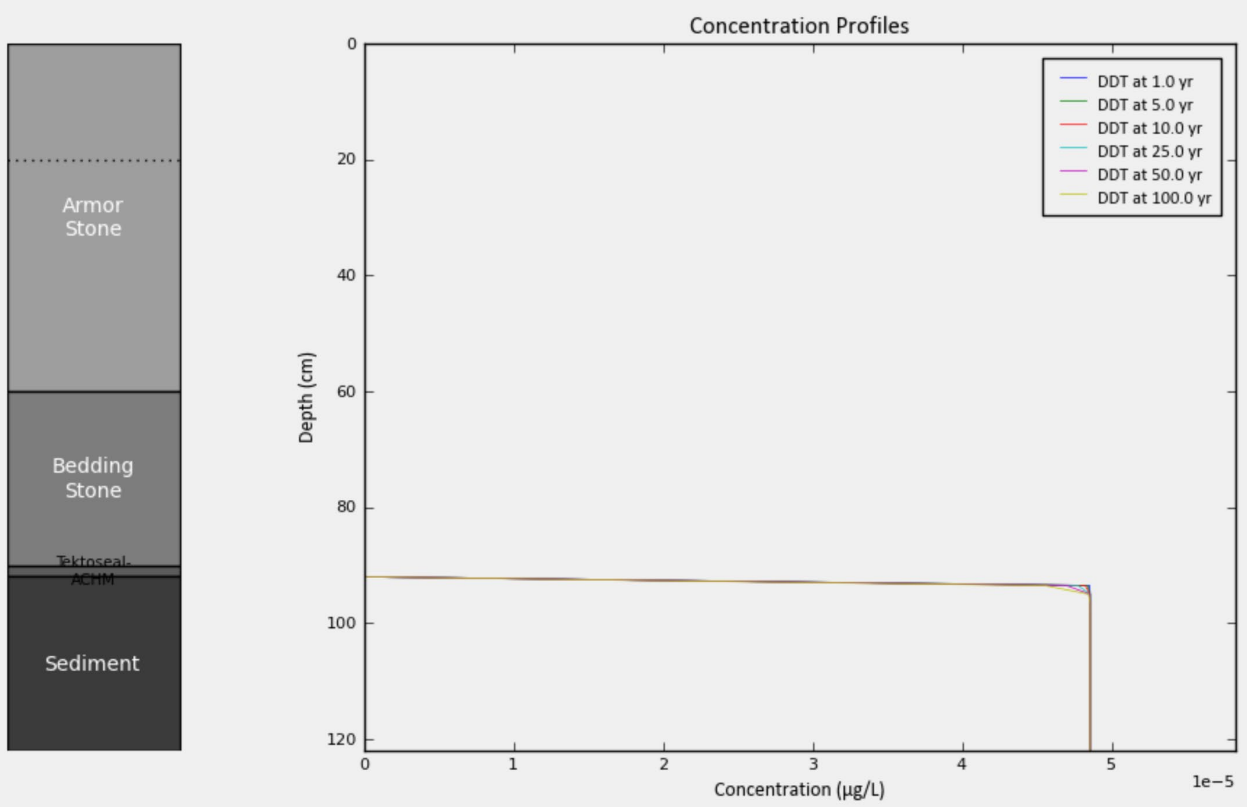

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Chromium (III) at 1.0 yr
Chromium (III) at 5.0 yr
Chromium (III) at 10.0 yr
Chromium (III) at 25.0 yr
Chromium (III) at 50.0 yr
Chromium (III) at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2

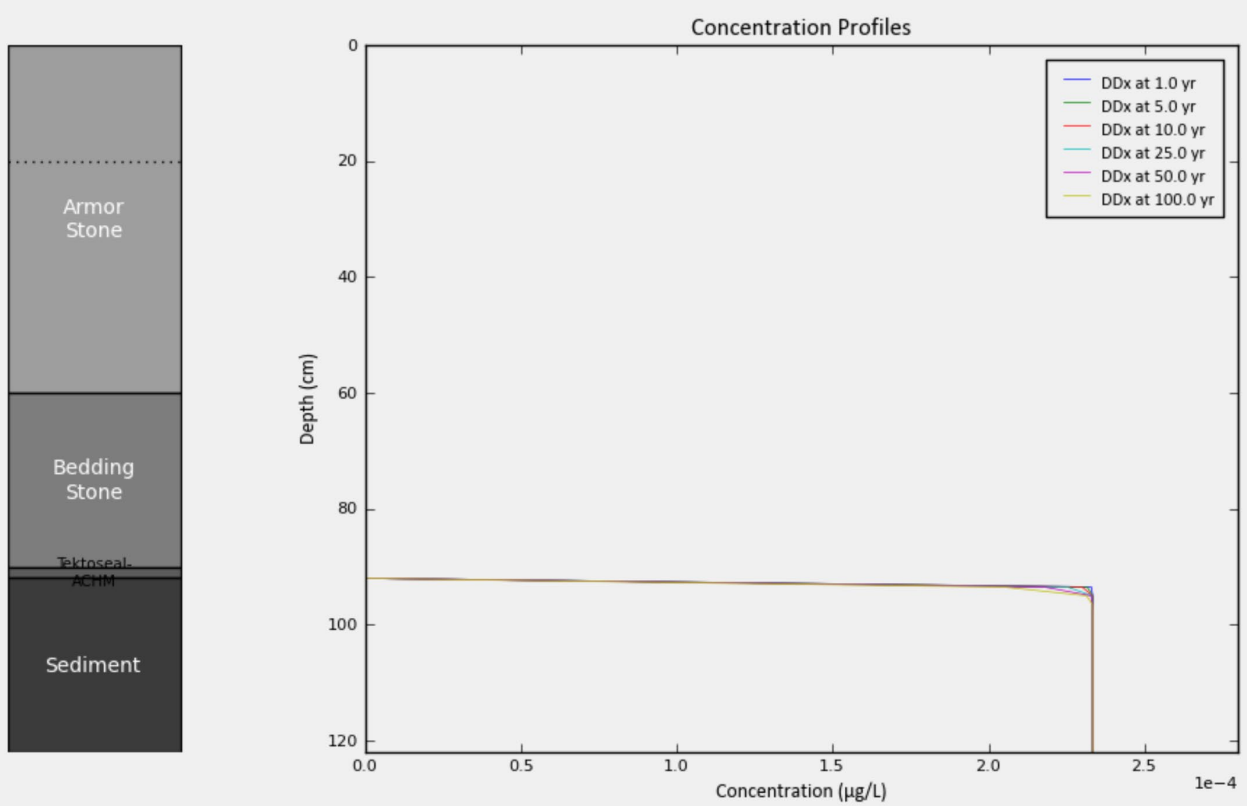

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Chrysene at 1.0 yr
Chrysene at 5.0 yr
Chrysene at 10.0 yr
Chrysene at 25.0 yr
Chrysene at 50.0 yr
Chrysene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010
Concentration (µg/L)

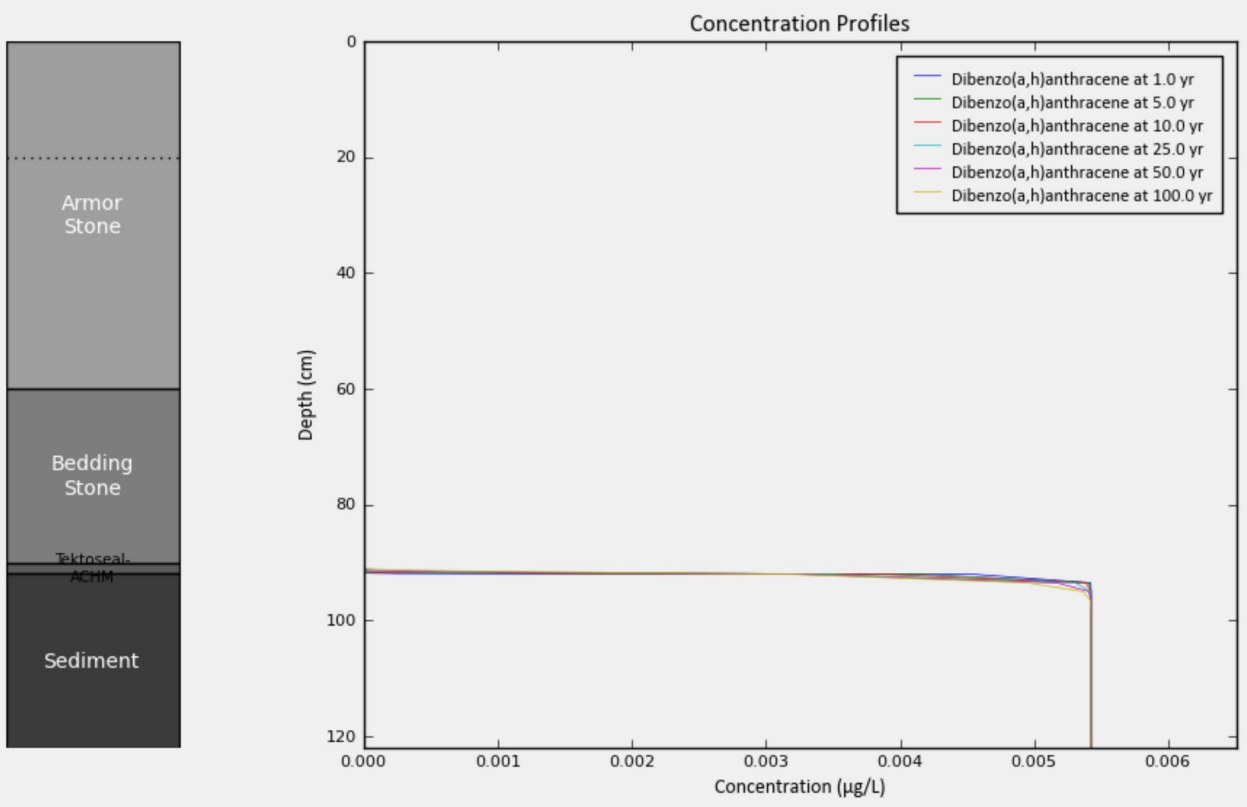

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Copper at 1.0 yr
Copper at 5.0 yr
Copper at 10.0 yr
Copper at 25.0 yr
Copper at 50.0 yr
Copper at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
Concentration (µg/L)

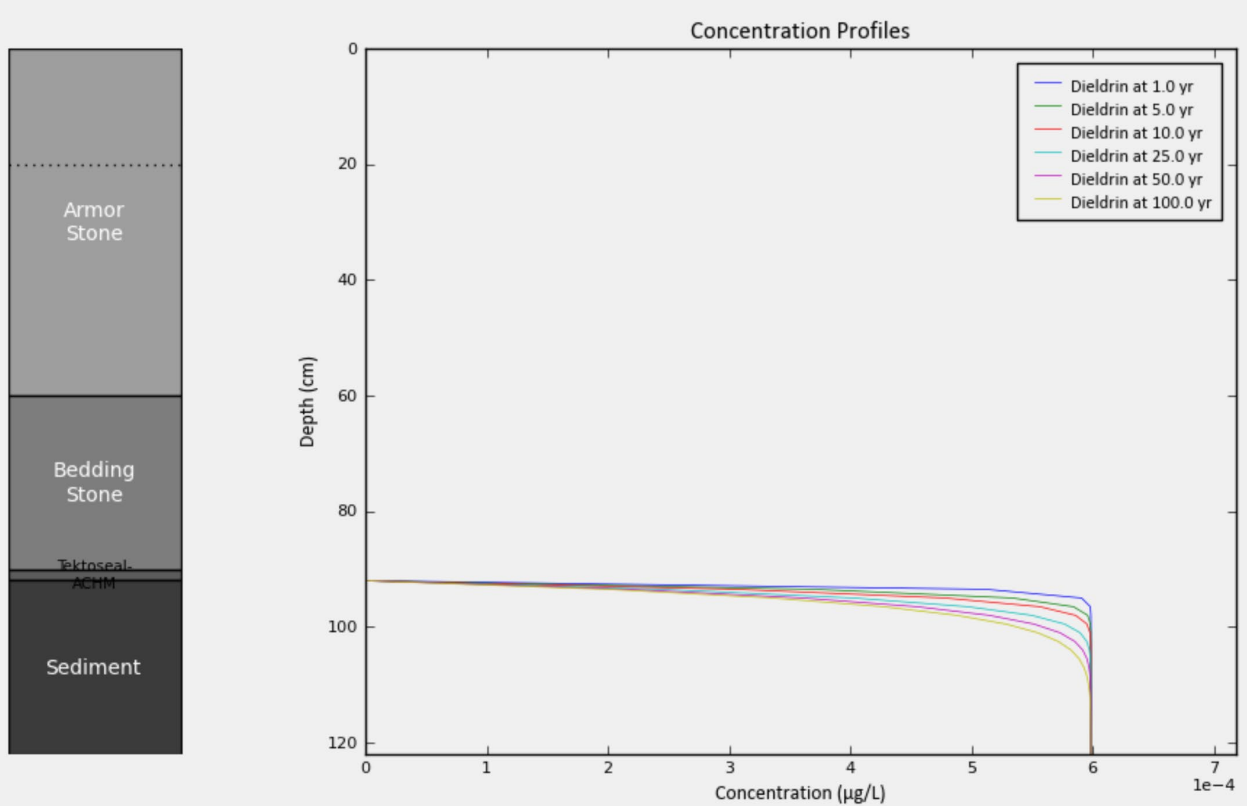

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
DDD at 1.0 yr
DDD at 5.0 yr
DDD at 10.0 yr
DDD at 25.0 yr
DDD at 50.0 yr
DDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

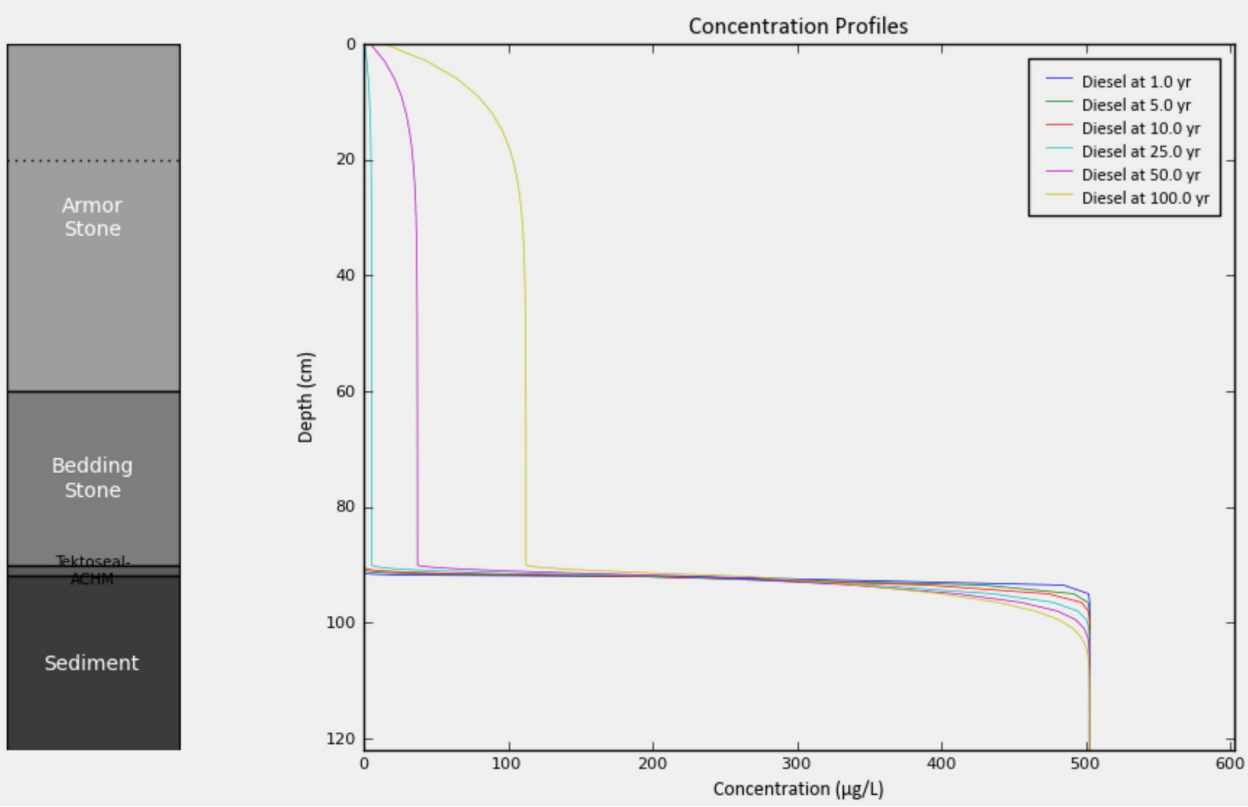

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
DDE at 1.0 yr
DDE at 5.0 yr
DDE at 10.0 yr
DDE at 25.0 yr
DDE at 50.0 yr
DDE at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

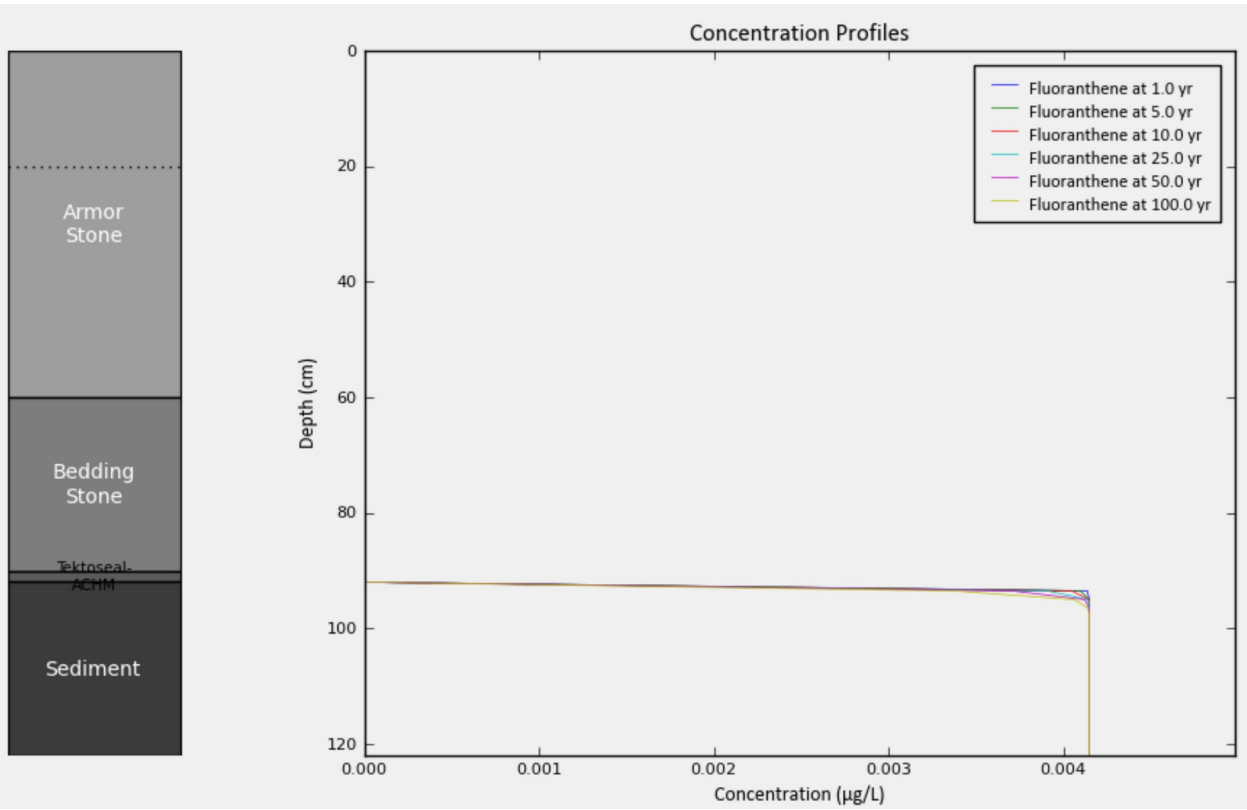

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
DDT at 1.0 yr
DDT at 5.0 yr
DDT at 10.0 yr
DDT at 25.0 yr
DDT at 50.0 yr
DDT at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
1e−5
Concentration (µg/L)

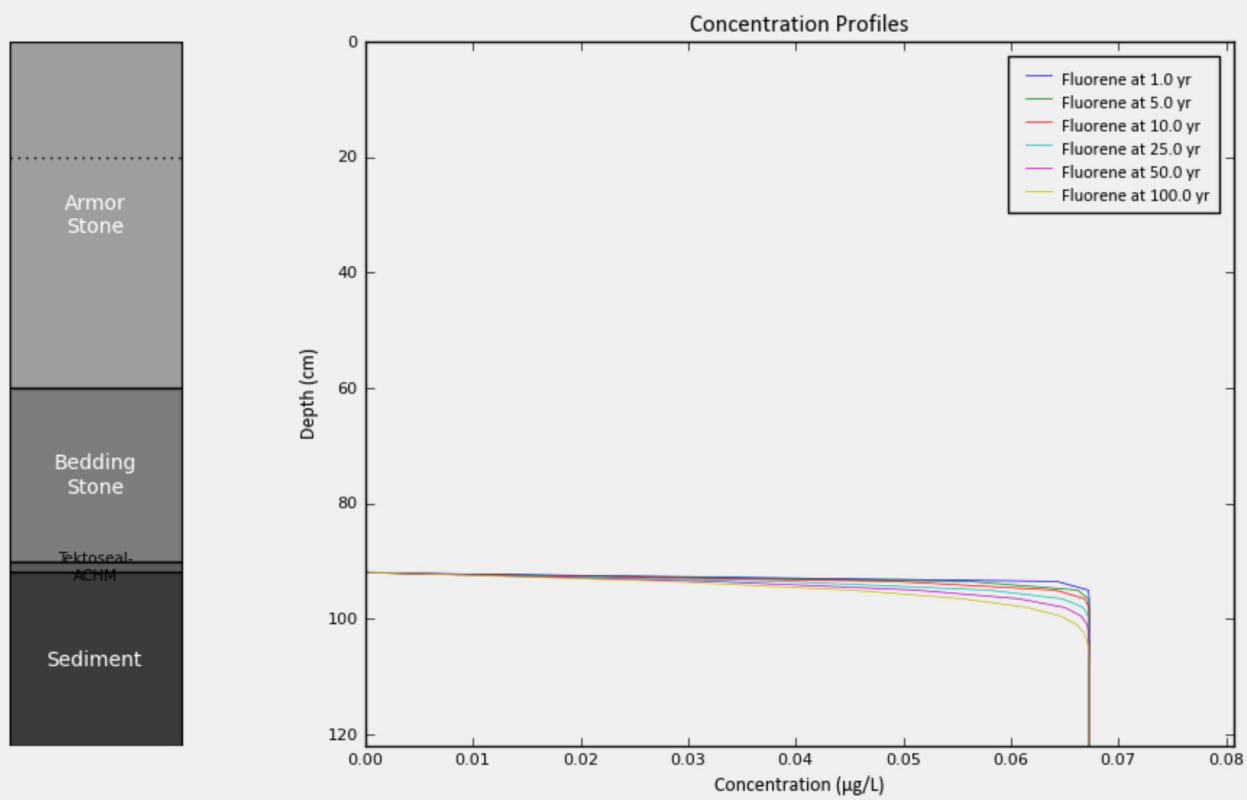

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
DDx at 1.0 yr
DDx at 5.0 yr
DDx at 10.0 yr
DDx at 25.0 yr
DDx at 50.0 yr
DDx at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
1e−4
Concentration (µg/L)

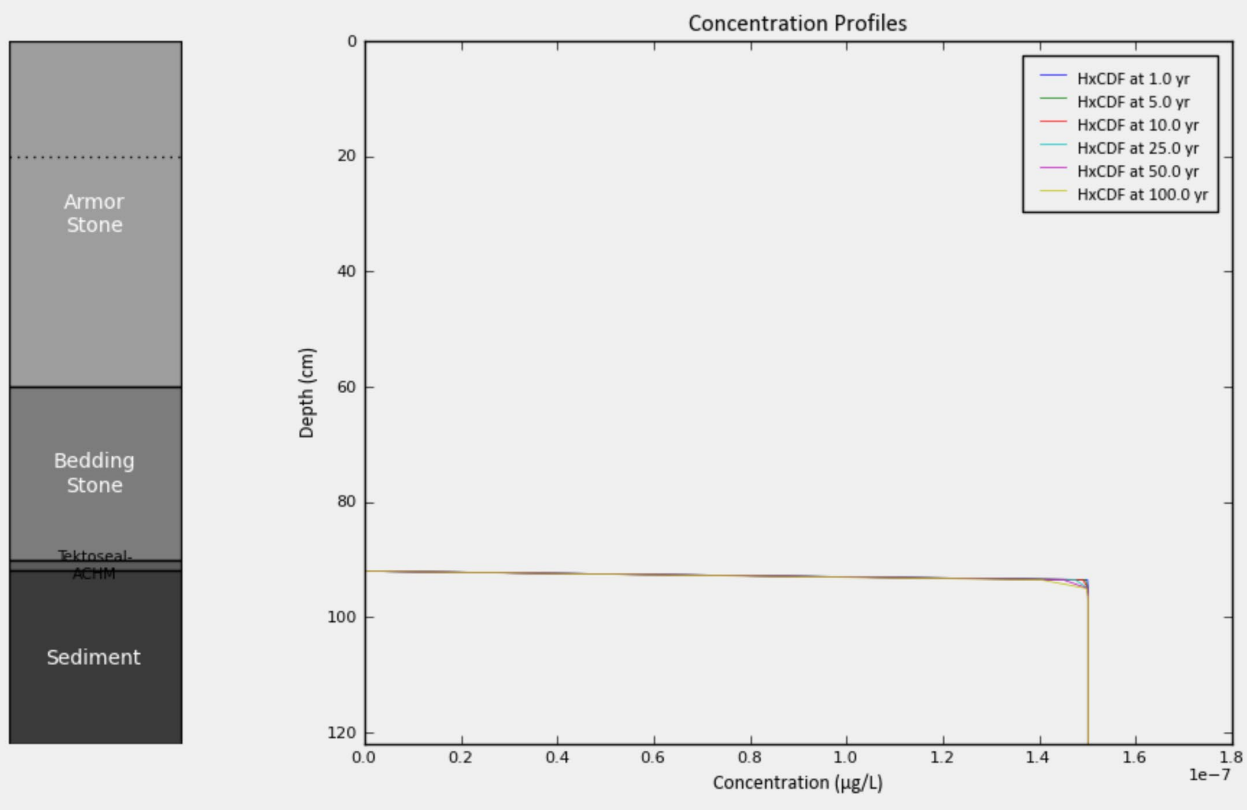

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Dibenzo(a,h)anthracene at 1.0 yr
Dibenzo(a,h)anthracene at 5.0 yr
Dibenzo(a,h)anthracene at 10.0 yr
Dibenzo(a,h)anthracene at 25.0 yr
Dibenzo(a,h)anthracene at 50.0 yr
Dibenzo(a,h)anthracene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

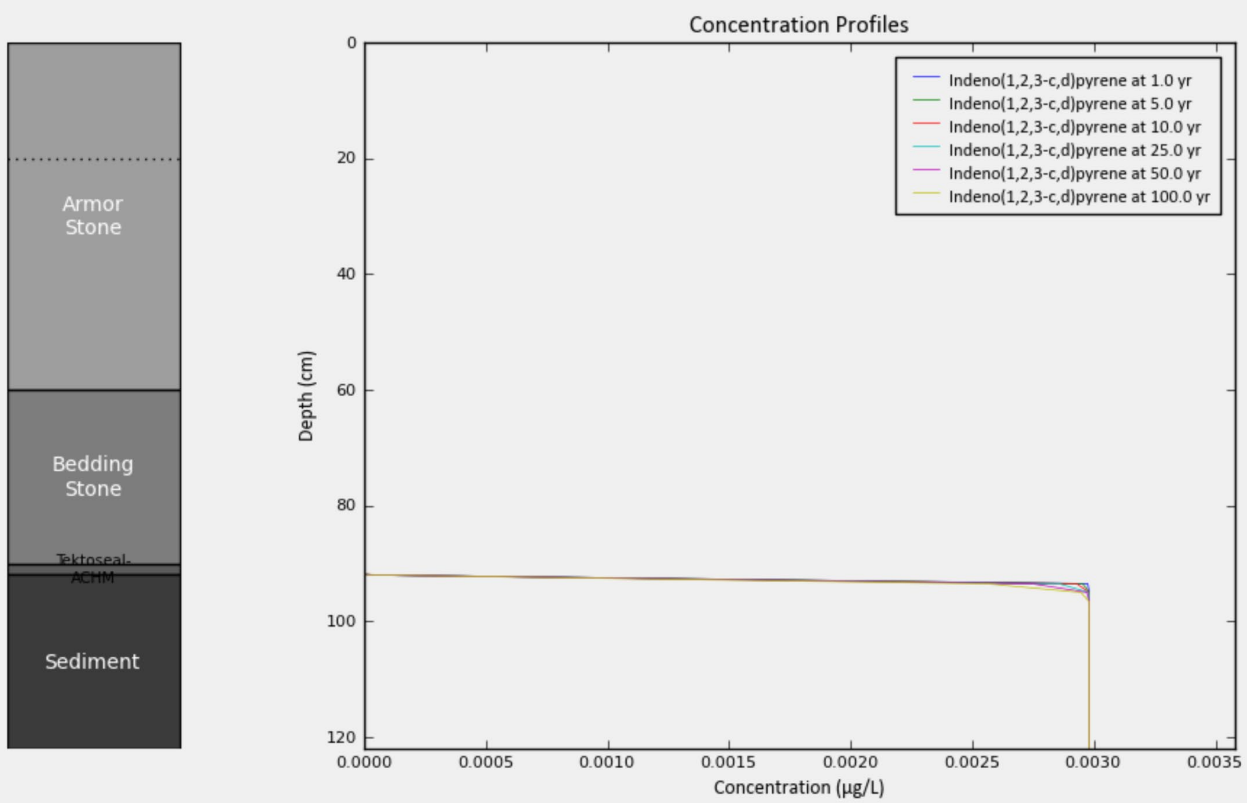

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Dieldrin at 1.0 yr
Dieldrin at 5.0 yr
Dieldrin at 10.0 yr
Dieldrin at 25.0 yr
Dieldrin at 50.0 yr
Dieldrin at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
7
1e−4
Concentration (µg/L)

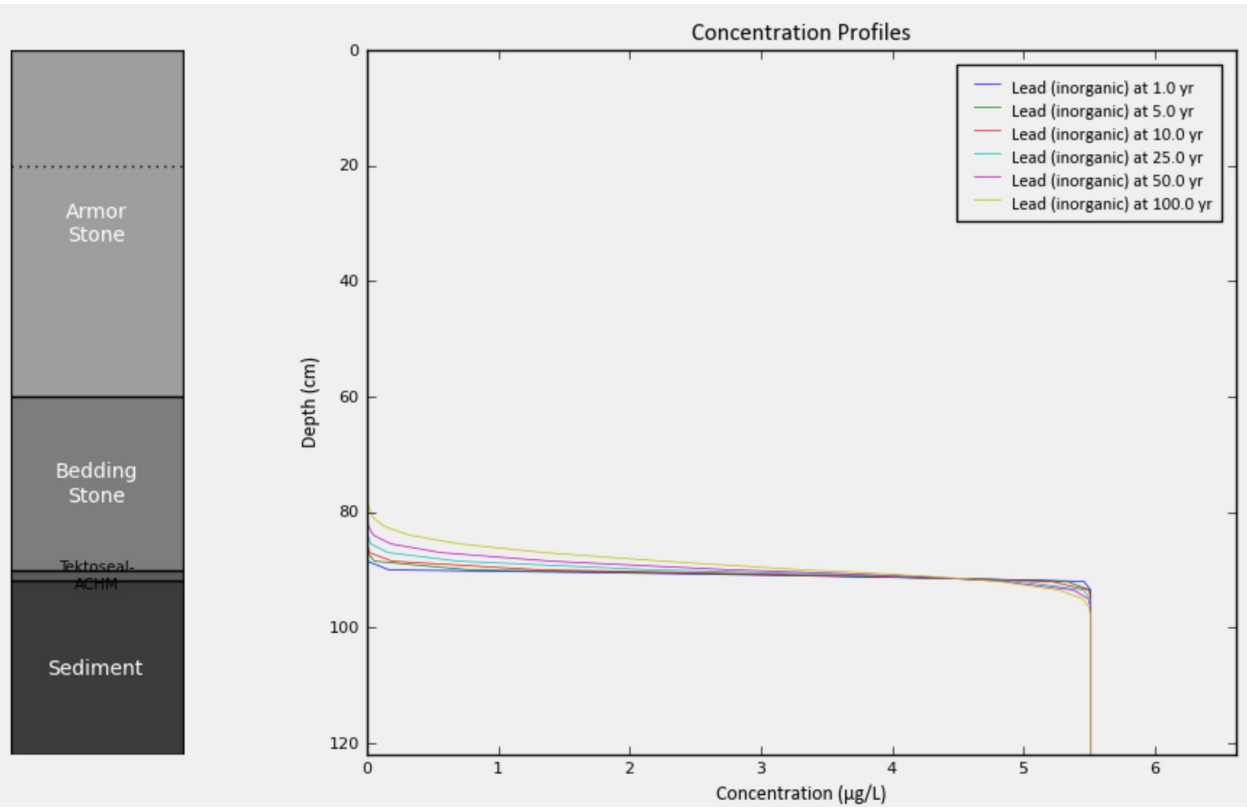

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Diesel at 1.0 yr
Diesel at 5.0 yr
Diesel at 10.0 yr
Diesel at 25.0 yr
Diesel at 50.0 yr
Diesel at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
100
200
300
400
500
600

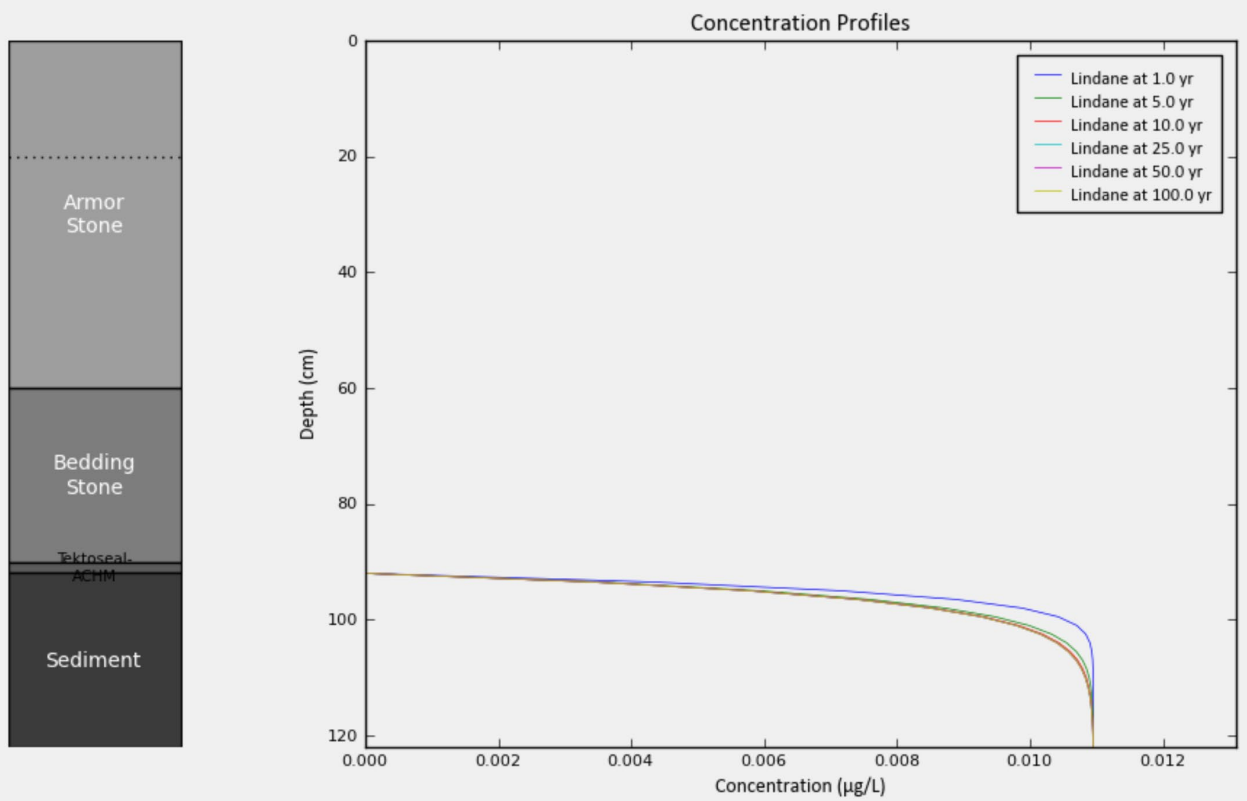

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Fluoranthene at 1.0 yr
Fluoranthene at 5.0 yr
Fluoranthene at 10.0 yr
Fluoranthene at 25.0 yr
Fluoranthene at 50.0 yr
Fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004

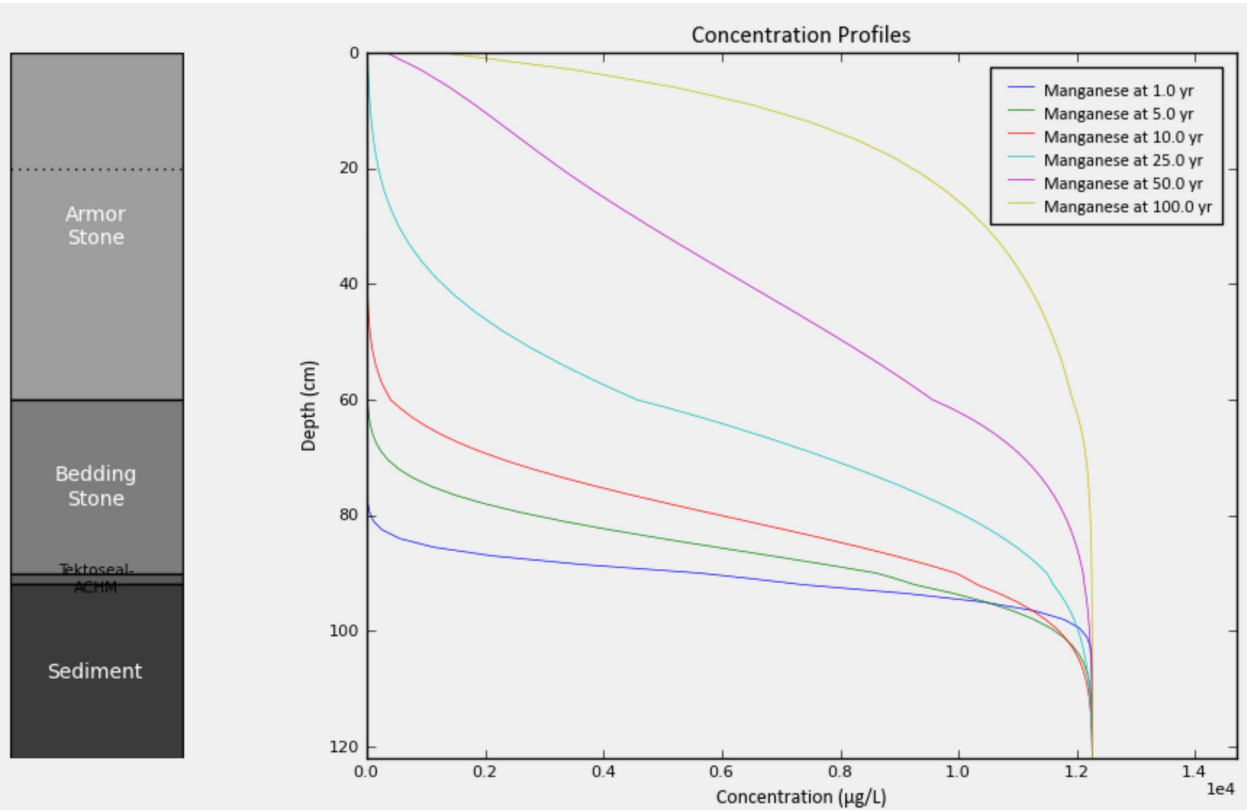

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Fluorene at 1.0 yr
Fluorene at 5.0 yr
Fluorene at 10.0 yr
Fluorene at 25.0 yr
Fluorene at 50.0 yr
Fluorene at 100.0 yr
Depth (cm)
Concentration (µg/L)

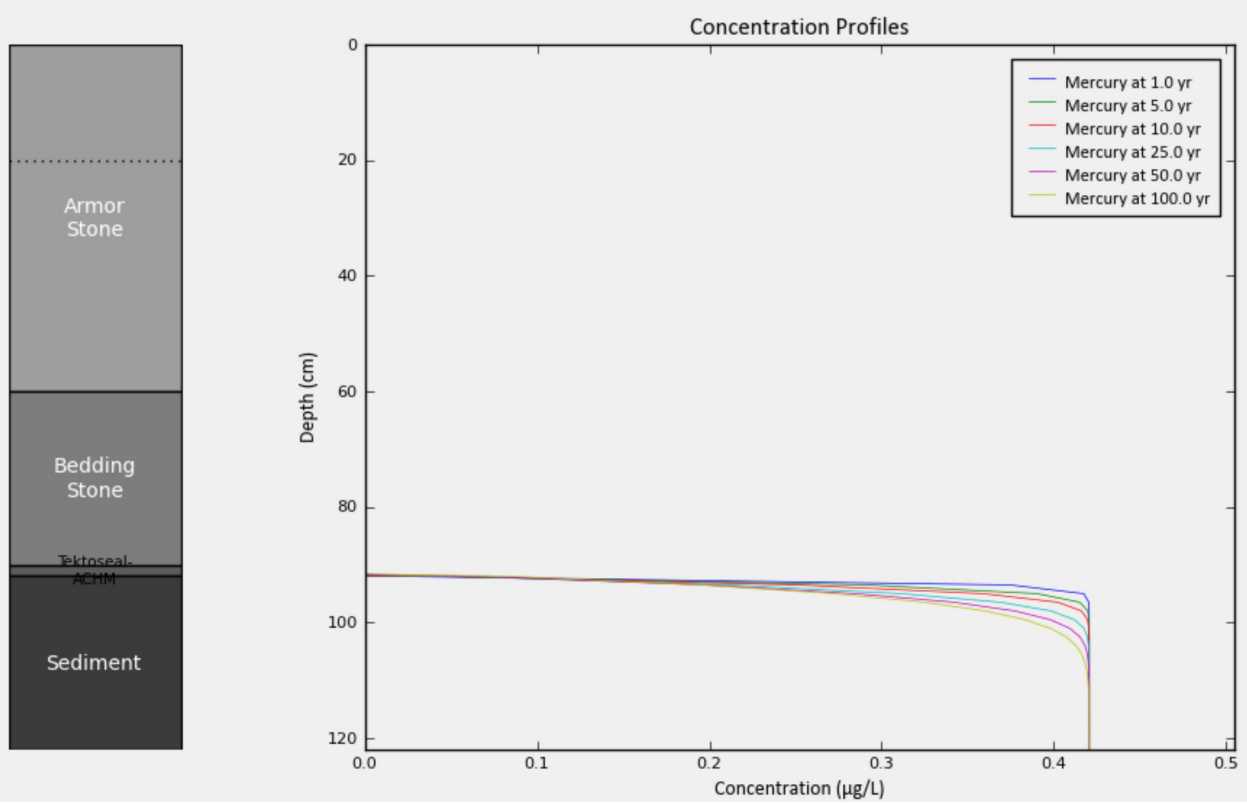

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
HxCDF at 1.0 yr
HxCDF at 5.0 yr
HxCDF at 10.0 yr
HxCDF at 25.0 yr
HxCDF at 50.0 yr
HxCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

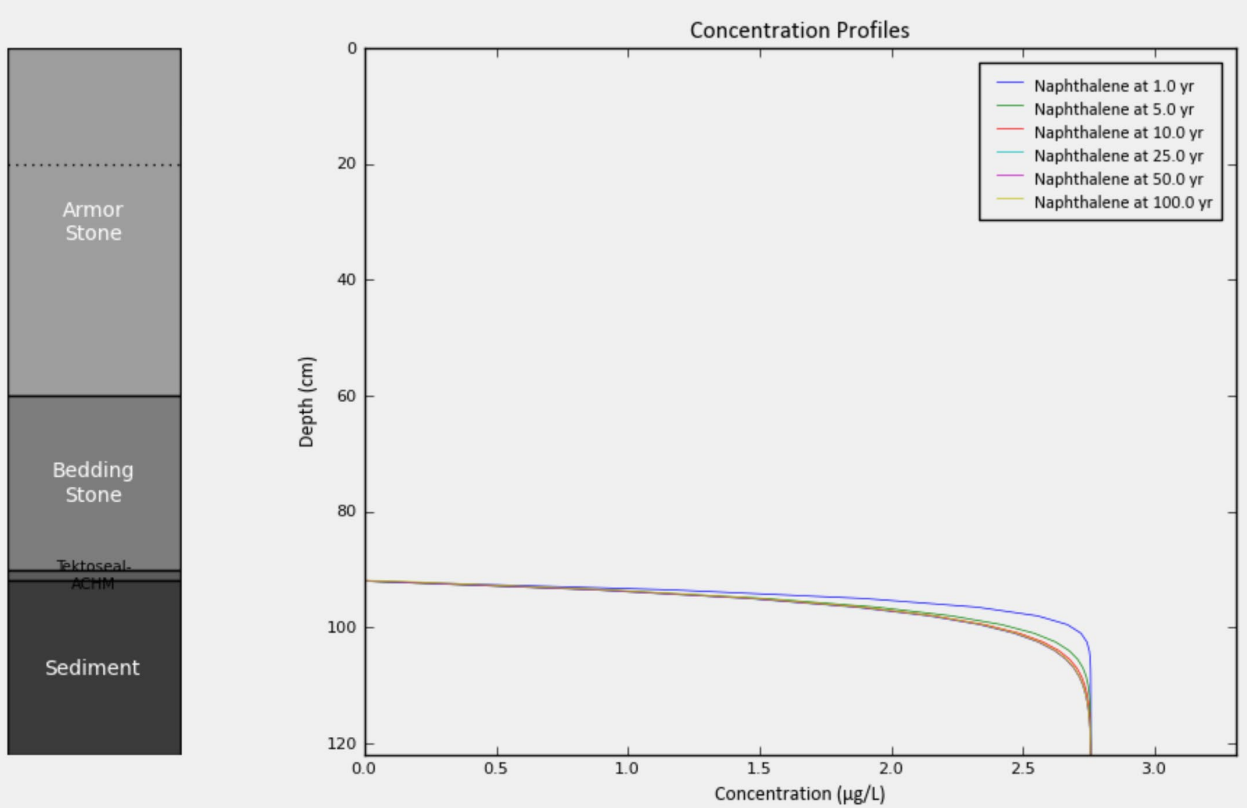

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Indeno(1,2,3-c,d)pyrene at 1.0 yr
Indeno(1,2,3-c,d)pyrene at 5.0 yr
Indeno(1,2,3-c,d)pyrene at 10.0 yr
Indeno(1,2,3-c,d)pyrene at 25.0 yr
Indeno(1,2,3-c,d)pyrene at 50.0 yr
Indeno(1,2,3-c,d)pyrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
0.0035
Concentration (µg/L)

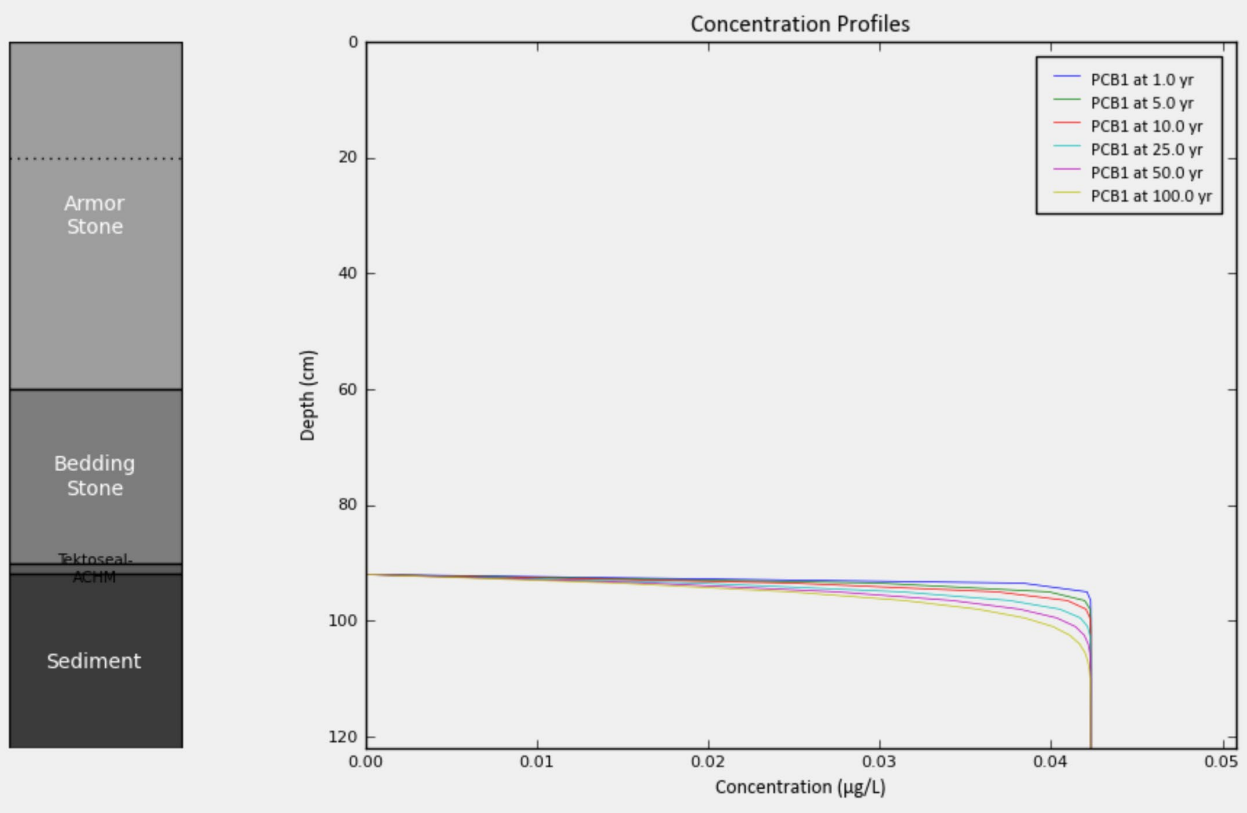

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Lead (inorganic) at 1.0 yr
Lead (inorganic) at 5.0 yr
Lead (inorganic) at 10.0 yr
Lead (inorganic) at 25.0 yr
Lead (inorganic) at 50.0 yr
Lead (inorganic) at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
Concentration (µg/L)

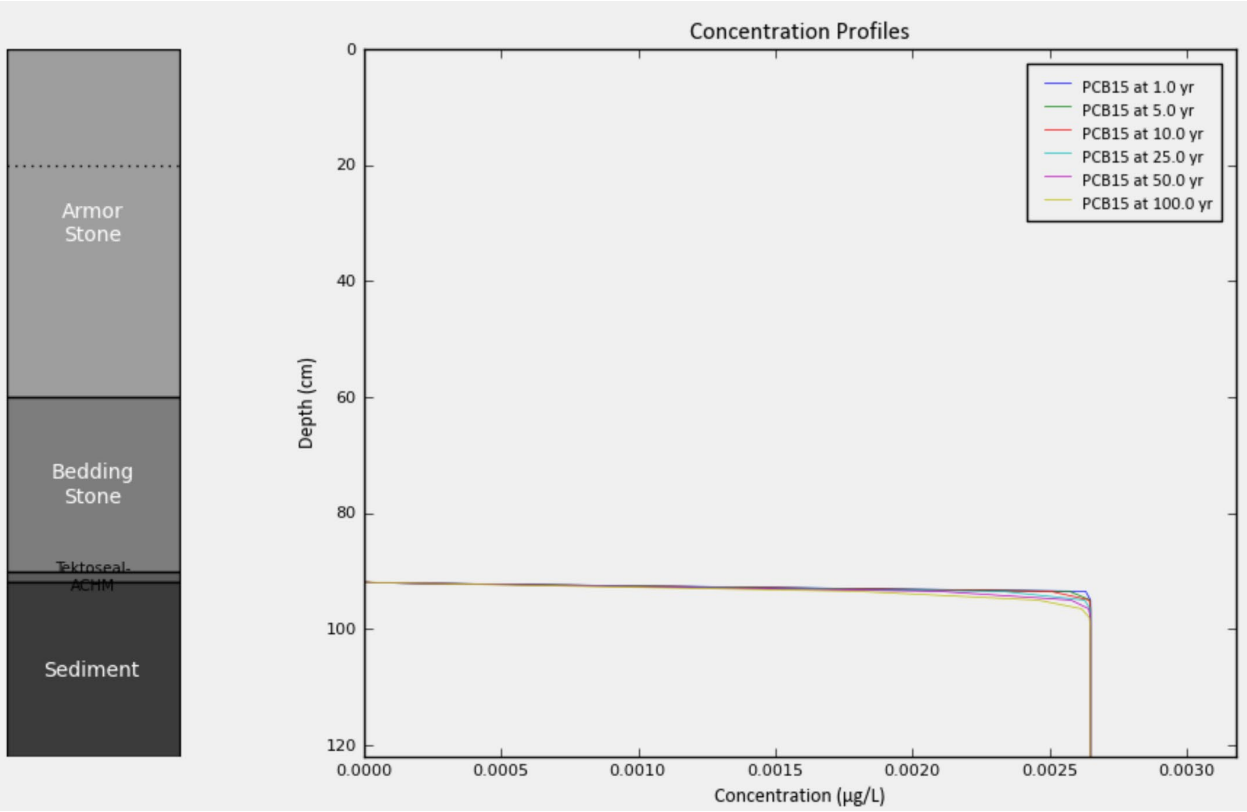

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Lindane at 1.0 yr
Lindane at 5.0 yr
Lindane at 10.0 yr
Lindane at 25.0 yr
Lindane at 50.0 yr
Lindane at 100.0 yr
Depth (cm)
Concentration (µg/L)

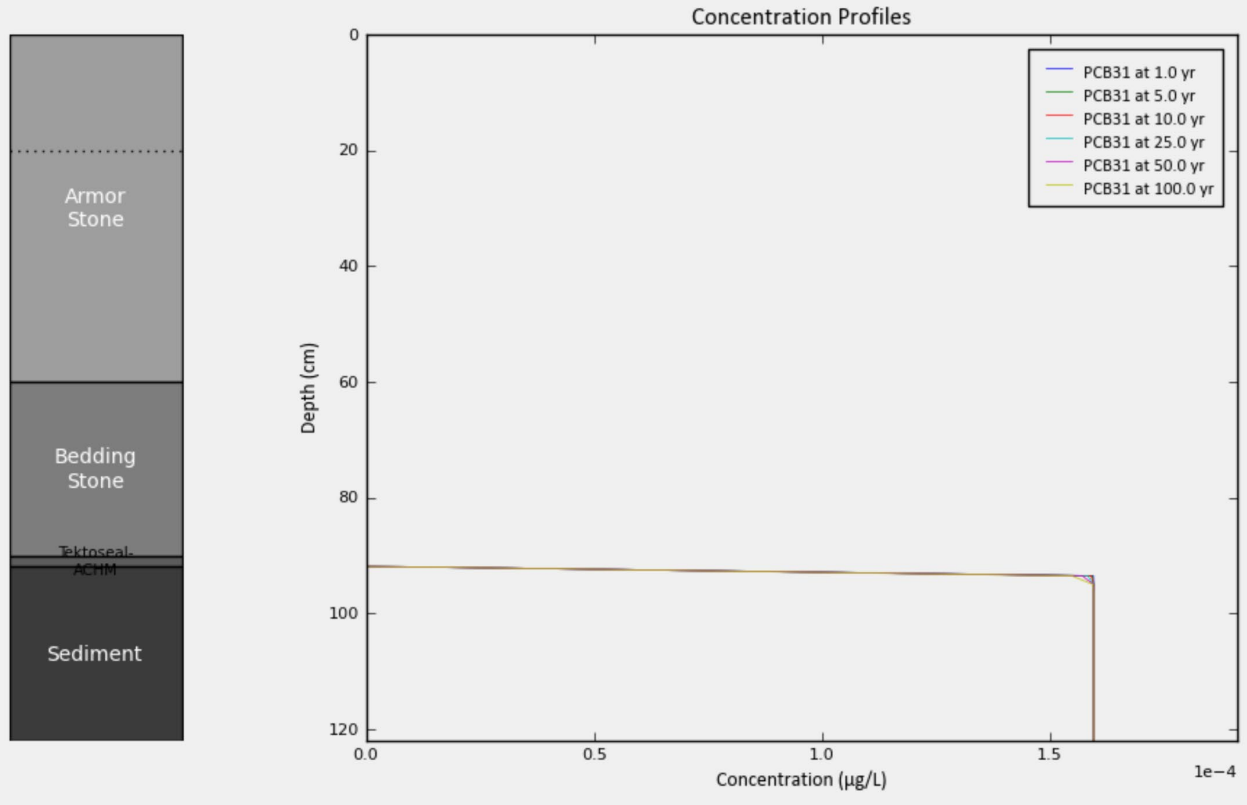

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Manganese at 1.0 yr
Manganese at 5.0 yr
Manganese at 10.0 yr
Manganese at 25.0 yr
Manganese at 50.0 yr
Manganese at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e4

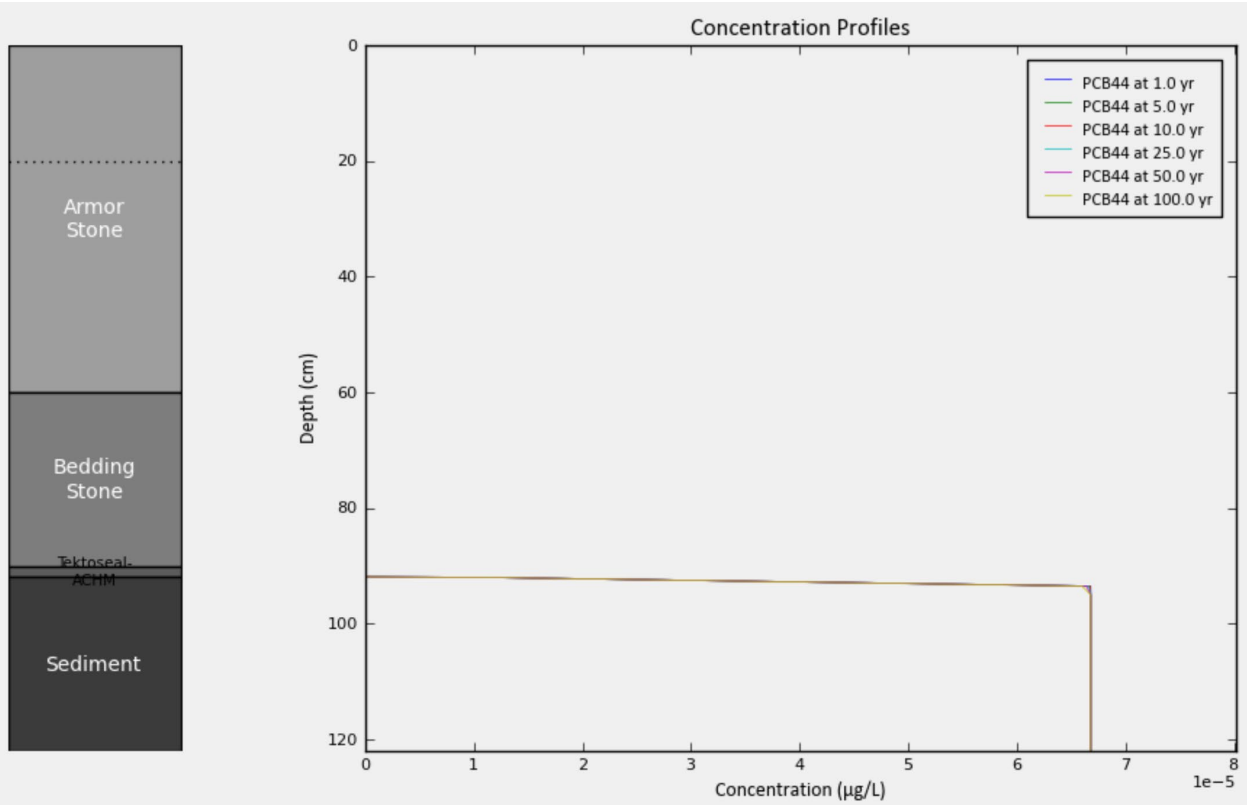

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Mercury at 1.0 yr
Mercury at 5.0 yr
Mercury at 10.0 yr
Mercury at 25.0 yr
Mercury at 50.0 yr
Mercury at 100.0 yr
Depth (cm)
Concentration (µg/L)

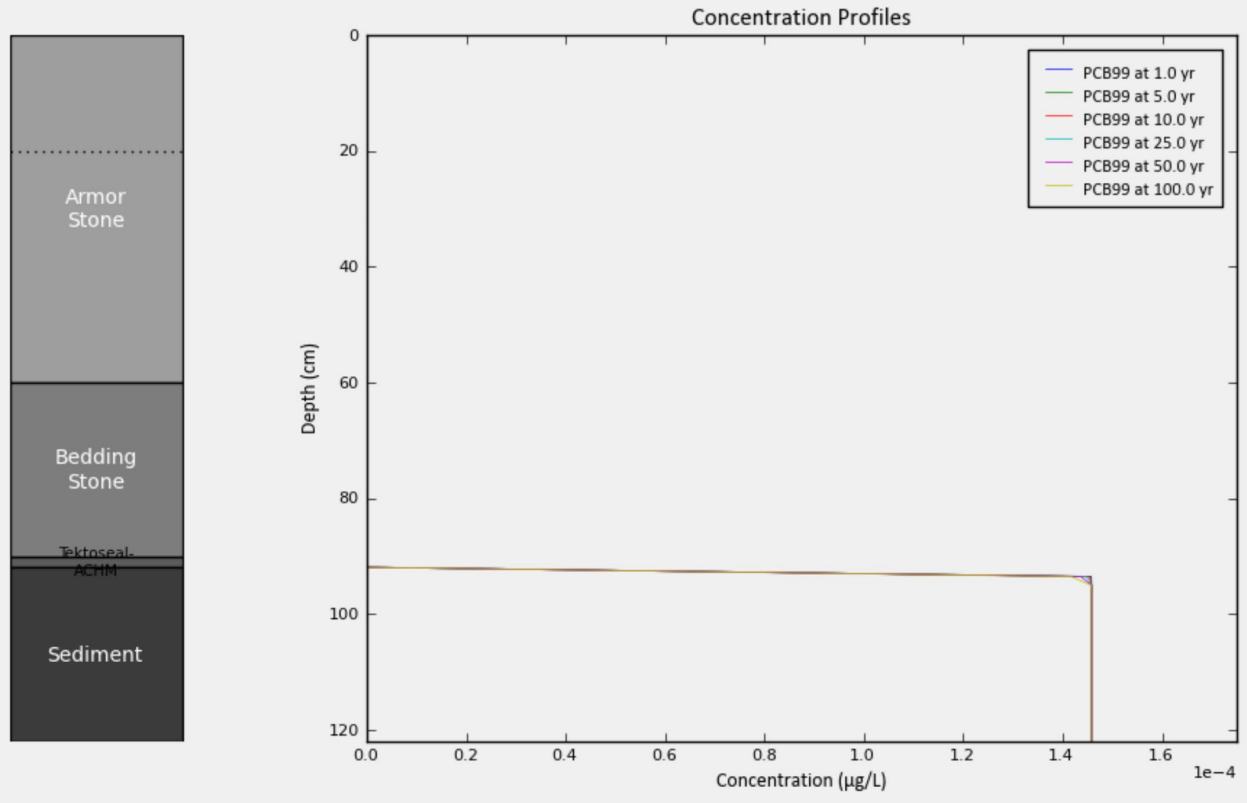

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Naphthalene at 1.0 yr
Naphthalene at 5.0 yr
Naphthalene at 10.0 yr
Naphthalene at 25.0 yr
Naphthalene at 50.0 yr
Naphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

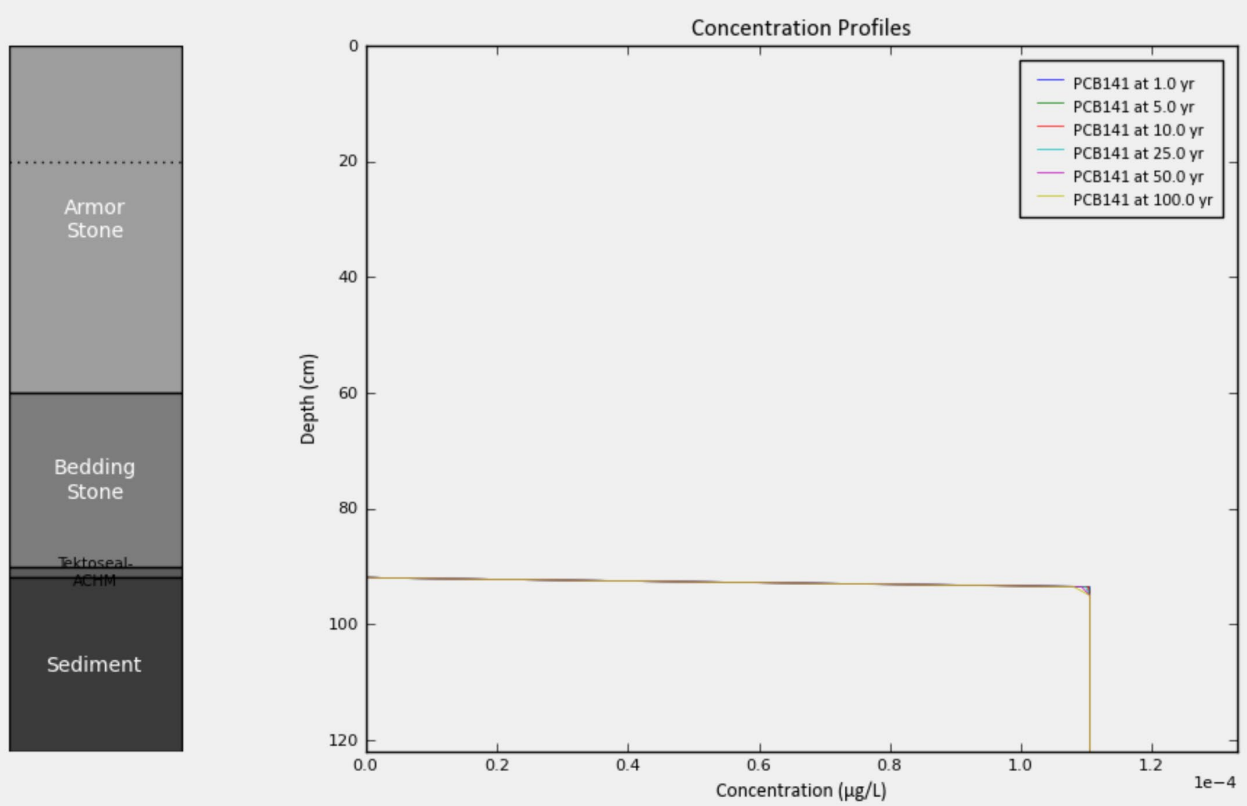

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB1 at 1.0 yr
PCB1 at 5.0 yr
PCB1 at 10.0 yr
PCB1 at 25.0 yr
PCB1 at 50.0 yr
PCB1 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.00
0.01
0.02
0.03
0.04
0.05
Concentration (µg/L)

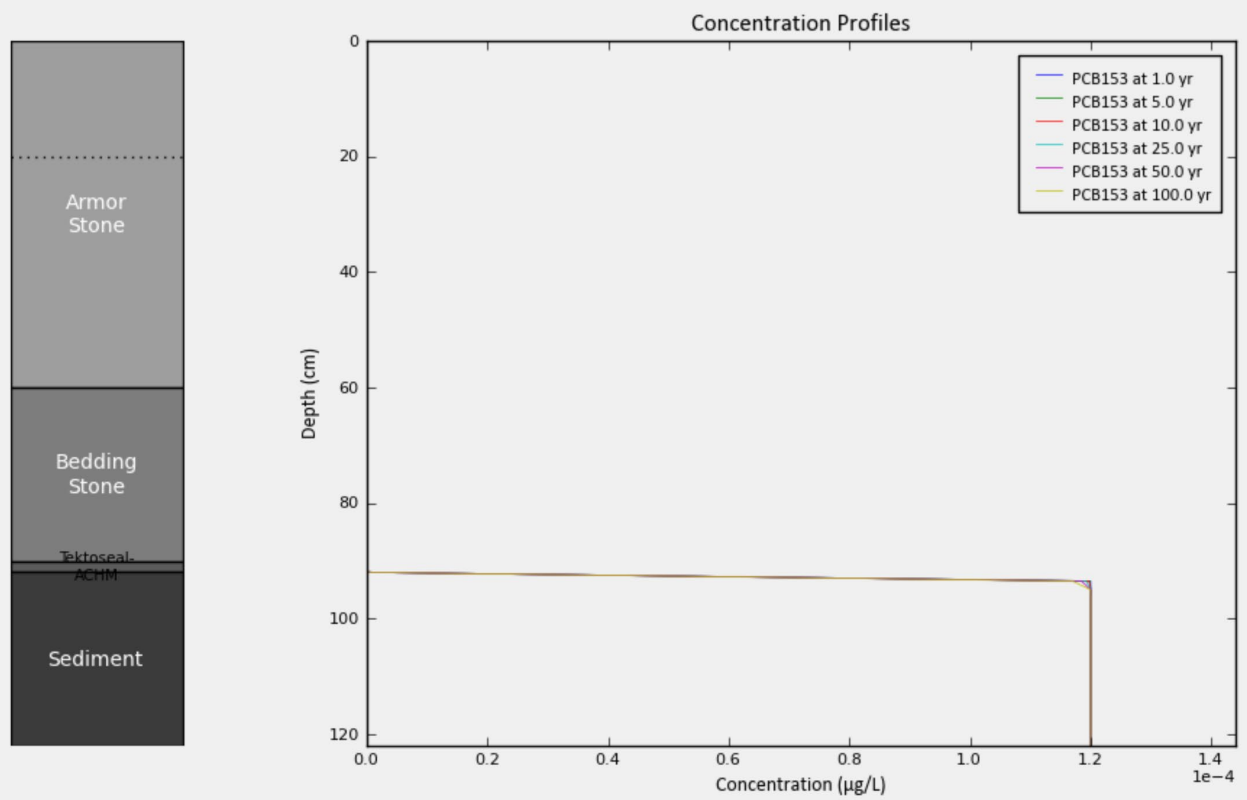

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB15 at 1.0 yr
PCB15 at 5.0 yr
PCB15 at 10.0 yr
PCB15 at 25.0 yr
PCB15 at 50.0 yr
PCB15 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
Concentration (µg/L)

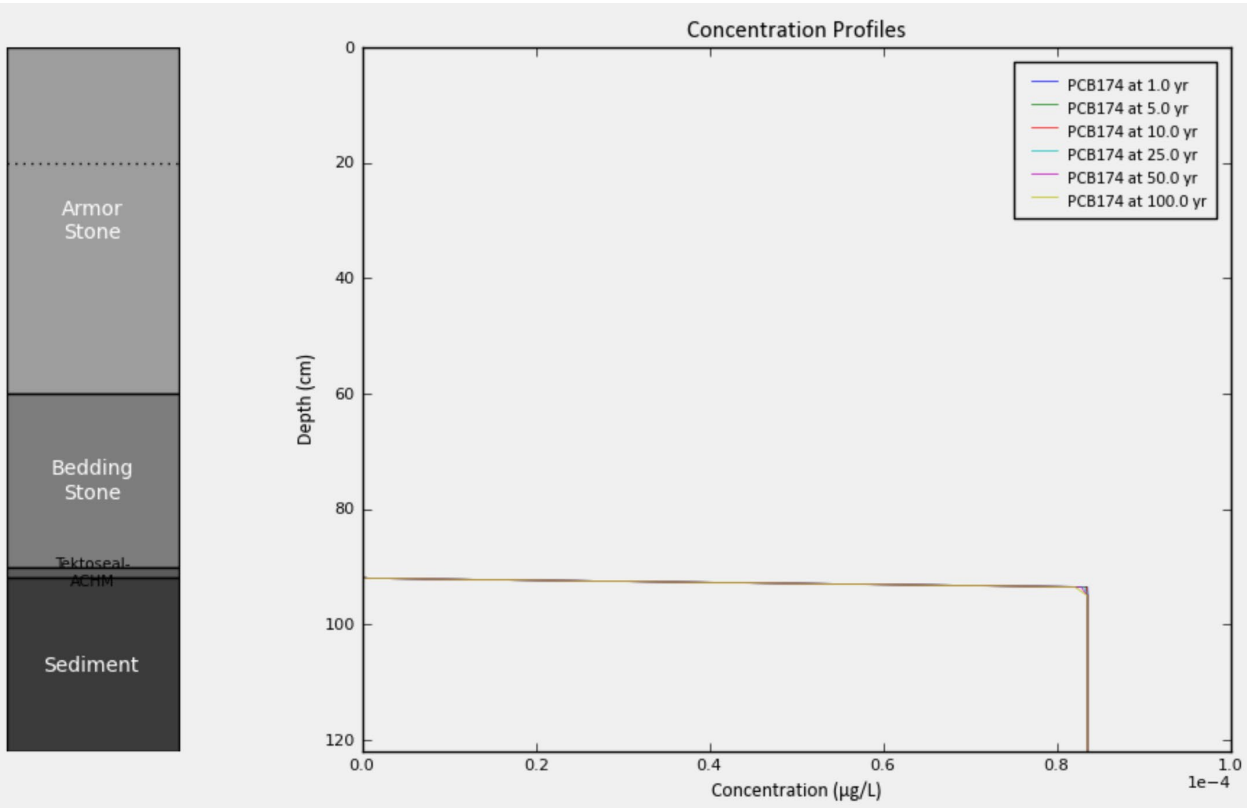

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB31 at 1.0 yr
PCB31 at 5.0 yr
PCB31 at 10.0 yr
PCB31 at 25.0 yr
PCB31 at 50.0 yr
PCB31 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
Concentration (µg/L)
1e−4

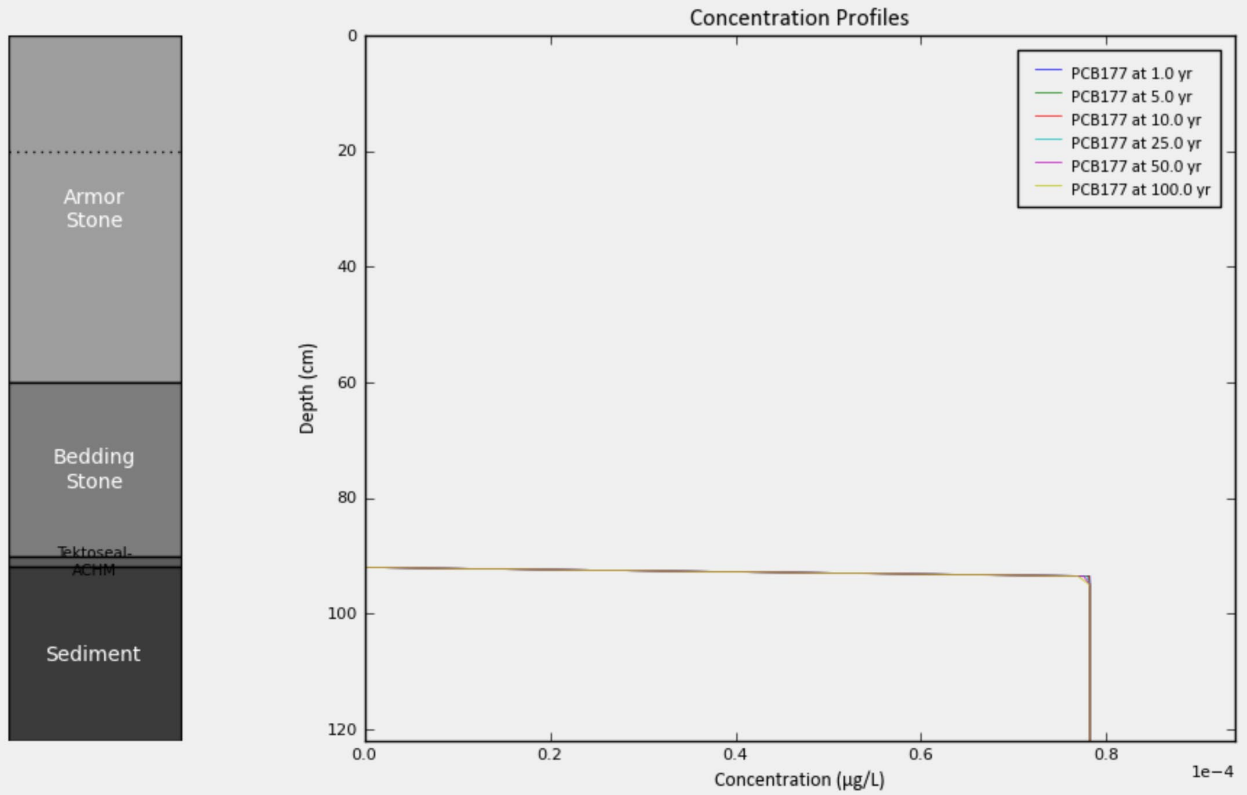

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB44 at 1.0 yr
PCB44 at 5.0 yr
PCB44 at 10.0 yr
PCB44 at 25.0 yr
PCB44 at 50.0 yr
PCB44 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
7
8
Concentration (µg/L)
1e−5

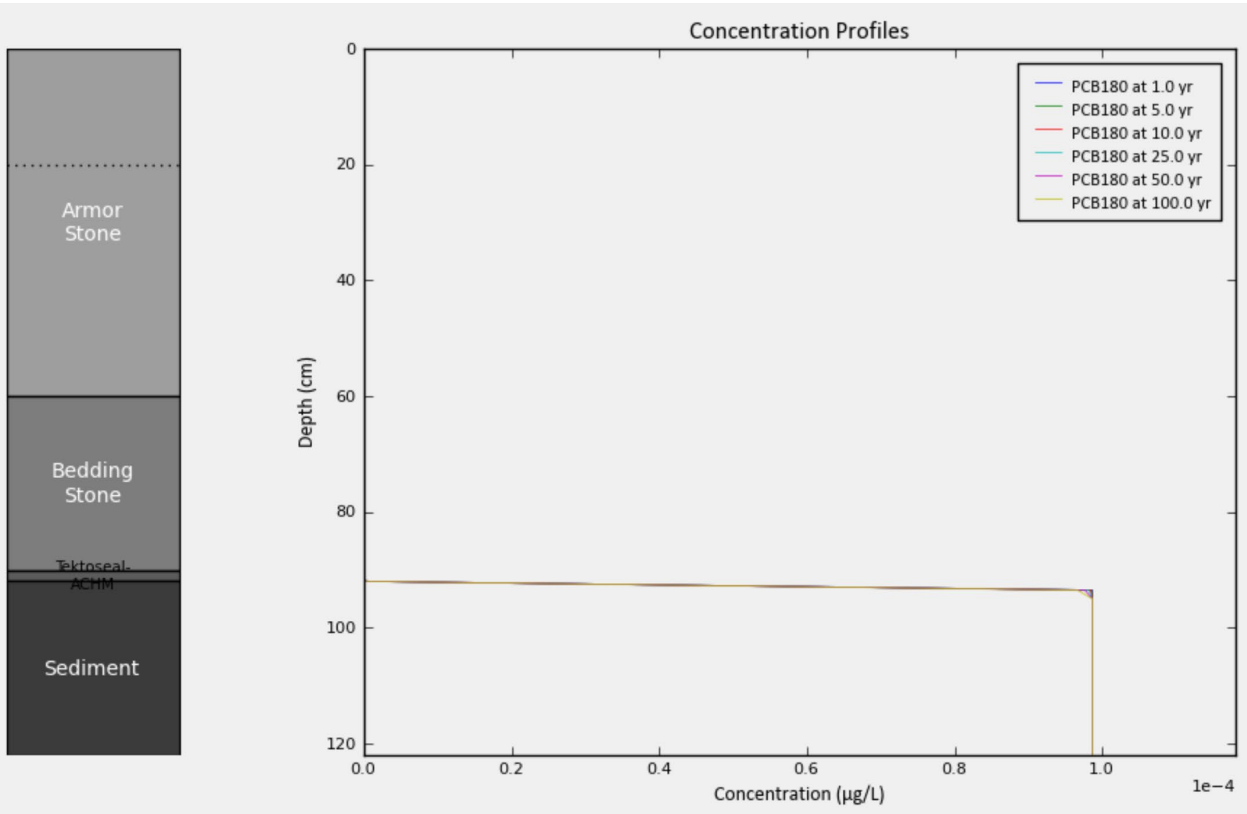

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB99 at 1.0 yr
PCB99 at 5.0 yr
PCB99 at 10.0 yr
PCB99 at 25.0 yr
PCB99 at 50.0 yr
PCB99 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

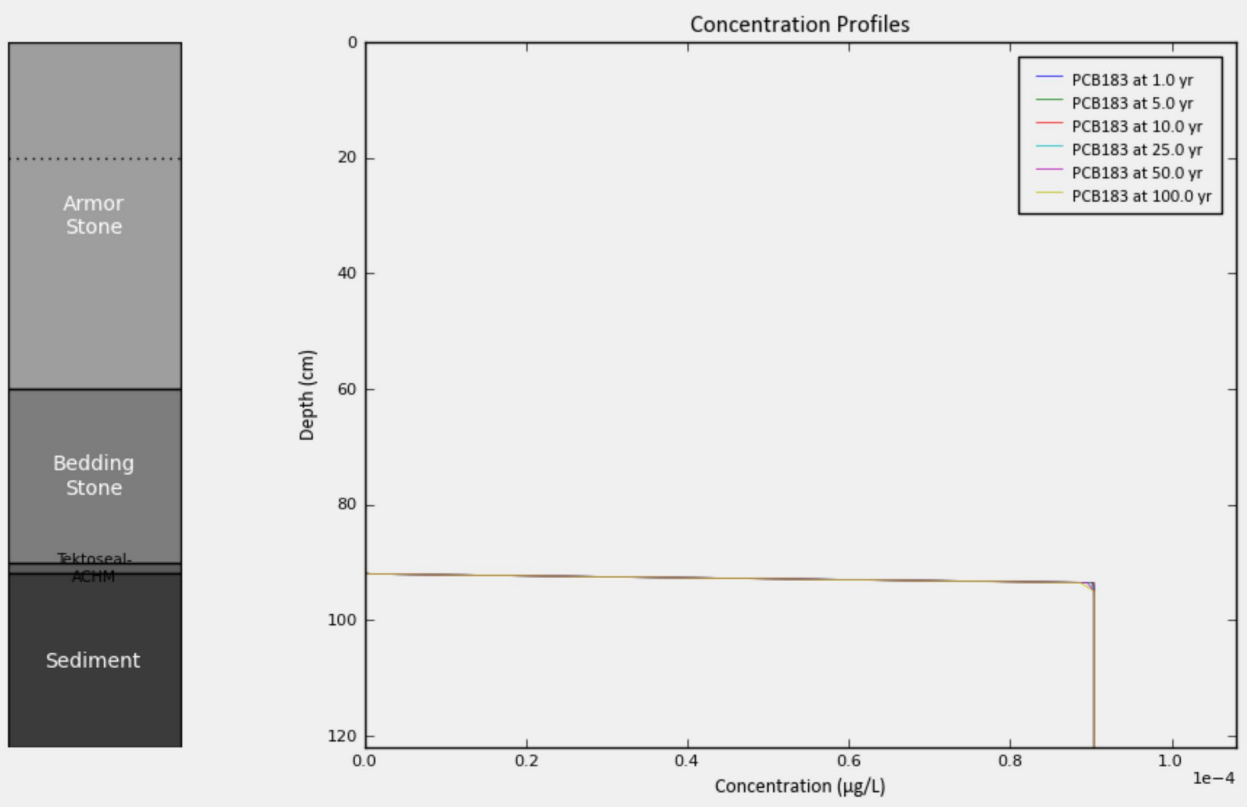

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB141 at 1.0 yr
PCB141 at 5.0 yr
PCB141 at 10.0 yr
PCB141 at 25.0 yr
PCB141 at 50.0 yr
PCB141 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

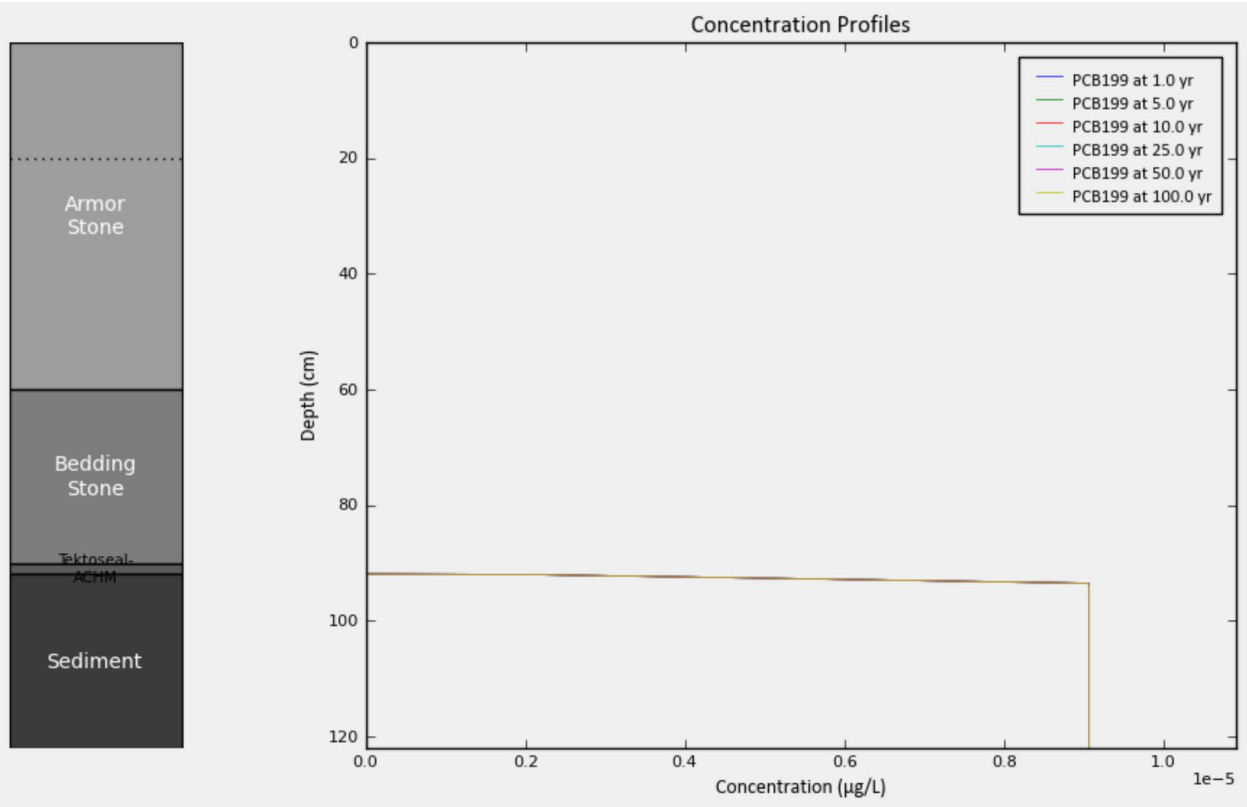

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB153 at 1.0 yr
PCB153 at 5.0 yr
PCB153 at 10.0 yr
PCB153 at 25.0 yr
PCB153 at 50.0 yr
PCB153 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1e−4
Concentration (µg/L)

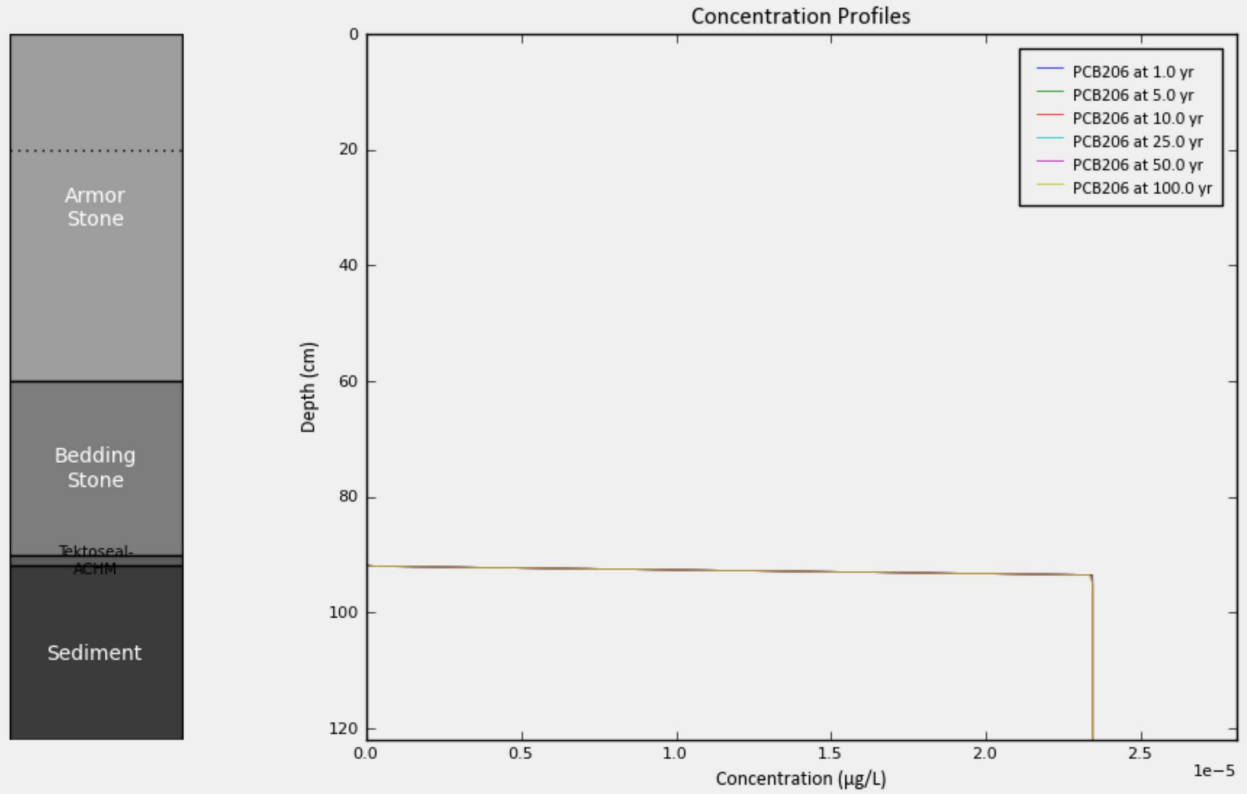

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB174 at 1.0 yr
PCB174 at 5.0 yr
PCB174 at 10.0 yr
PCB174 at 25.0 yr
PCB174 at 50.0 yr
PCB174 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

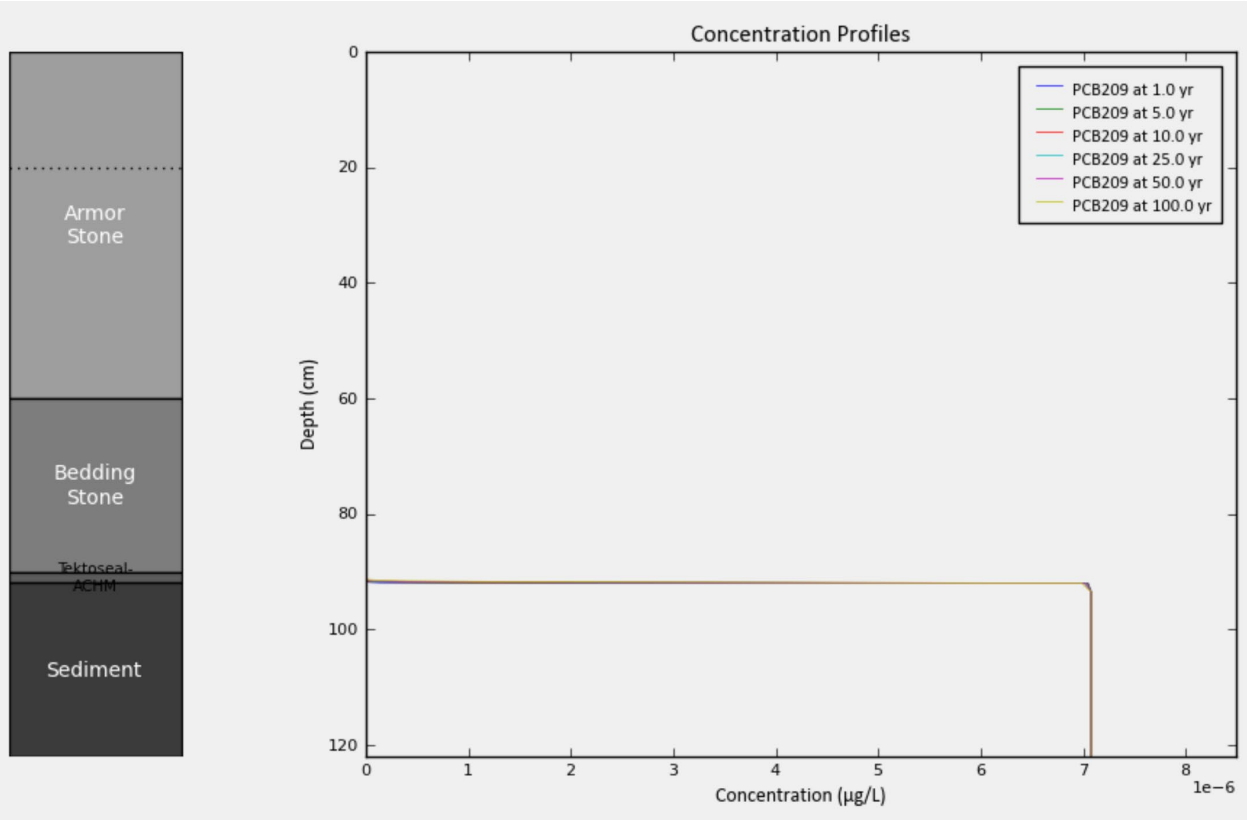

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB177 at 1.0 yr
PCB177 at 5.0 yr
PCB177 at 10.0 yr
PCB177 at 25.0 yr
PCB177 at 50.0 yr
PCB177 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1e−4
Concentration (µg/L)

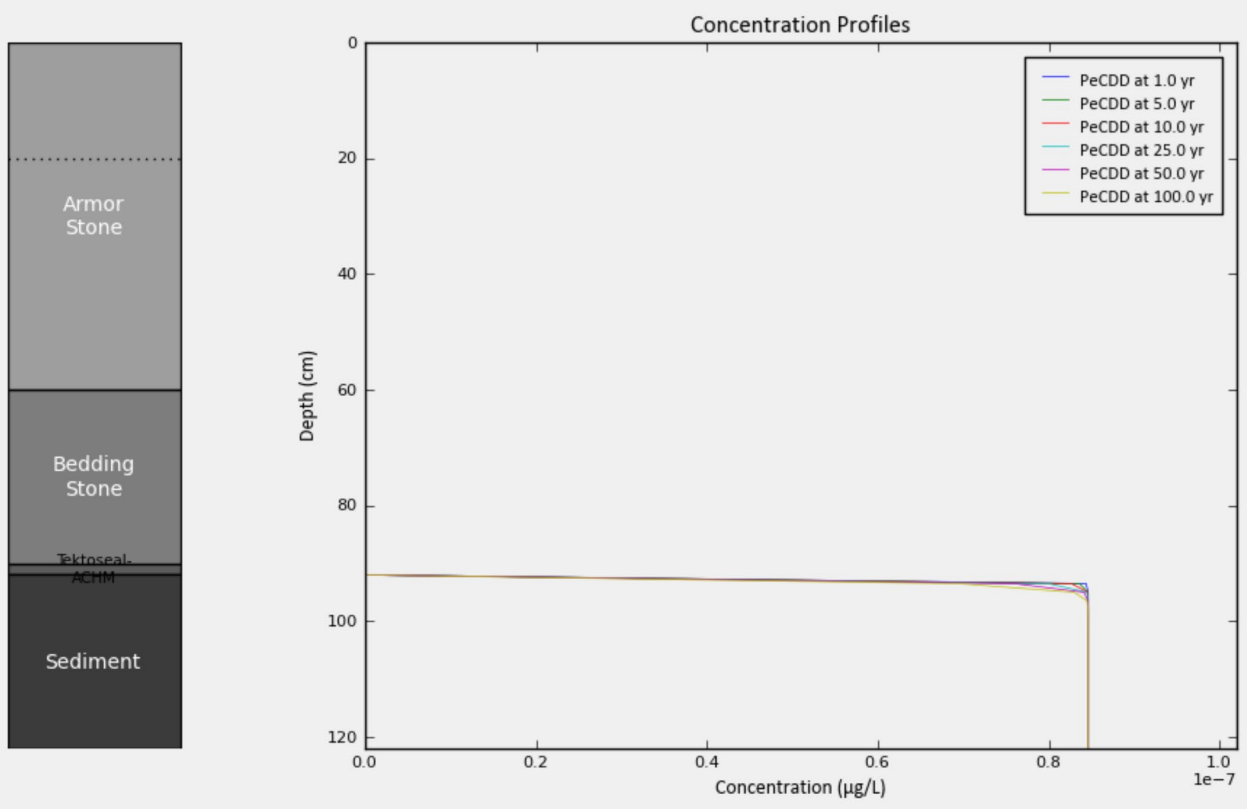

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB180 at 1.0 yr
PCB180 at 5.0 yr
PCB180 at 10.0 yr
PCB180 at 25.0 yr
PCB180 at 50.0 yr
PCB180 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

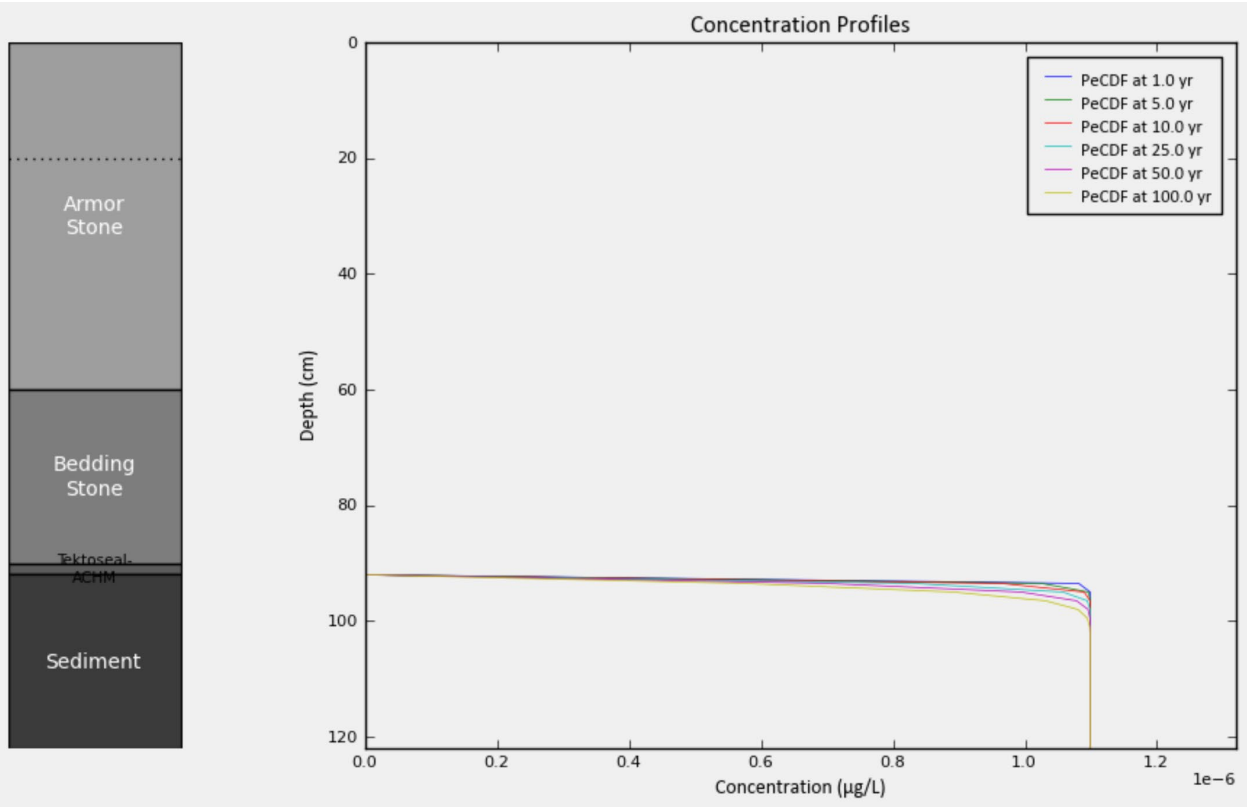

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB183 at 1.0 yr
PCB183 at 5.0 yr
PCB183 at 10.0 yr
PCB183 at 25.0 yr
PCB183 at 50.0 yr
PCB183 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

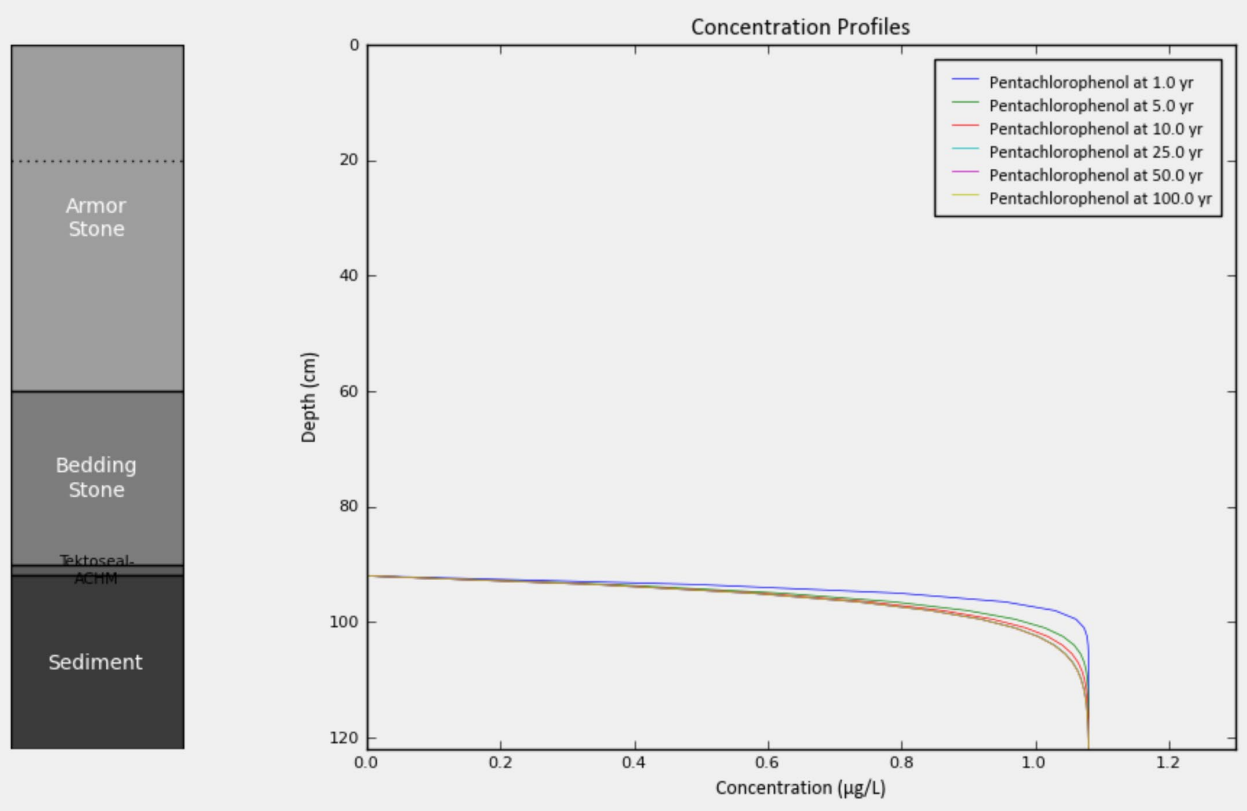

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB199 at 1.0 yr
PCB199 at 5.0 yr
PCB199 at 10.0 yr
PCB199 at 25.0 yr
PCB199 at 50.0 yr
PCB199 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−5
Concentration (µg/L)

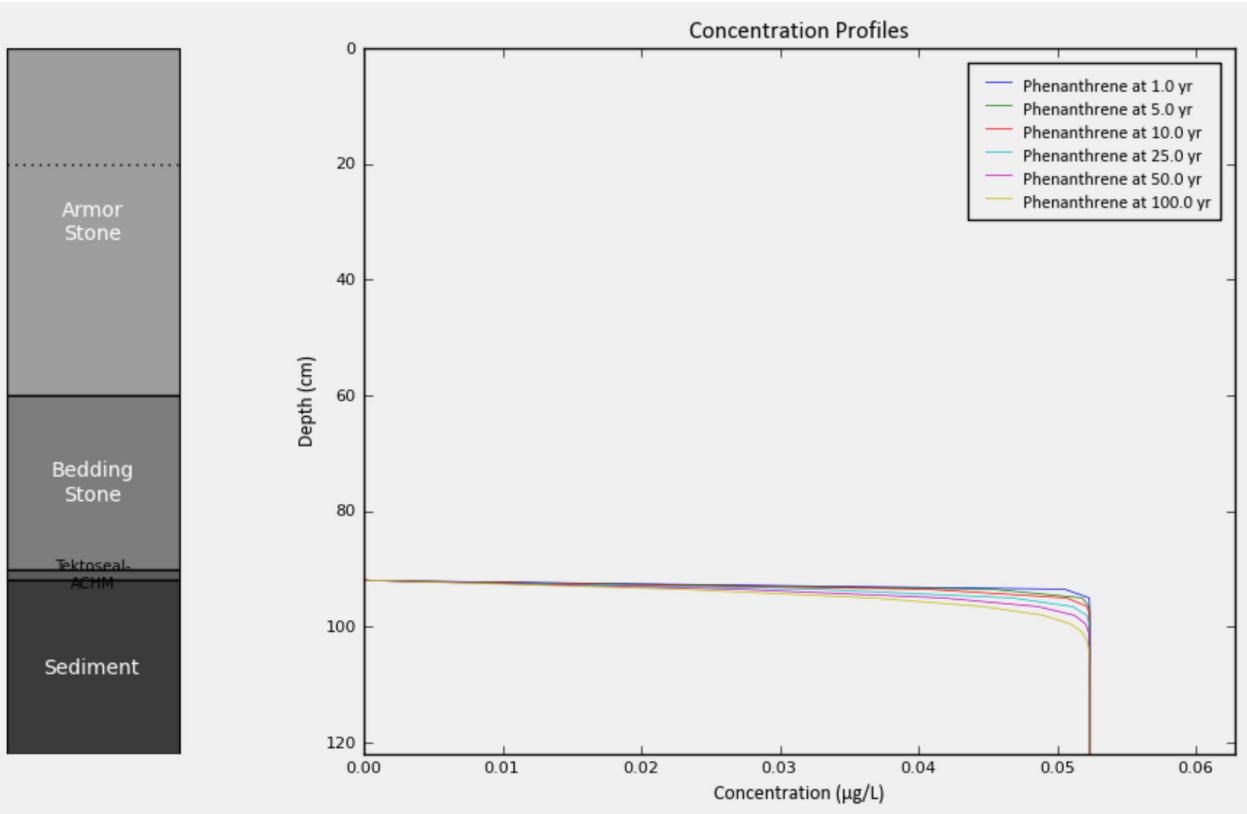

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB206 at 1.0 yr
PCB206 at 5.0 yr
PCB206 at 10.0 yr
PCB206 at 25.0 yr
PCB206 at 50.0 yr
PCB206 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

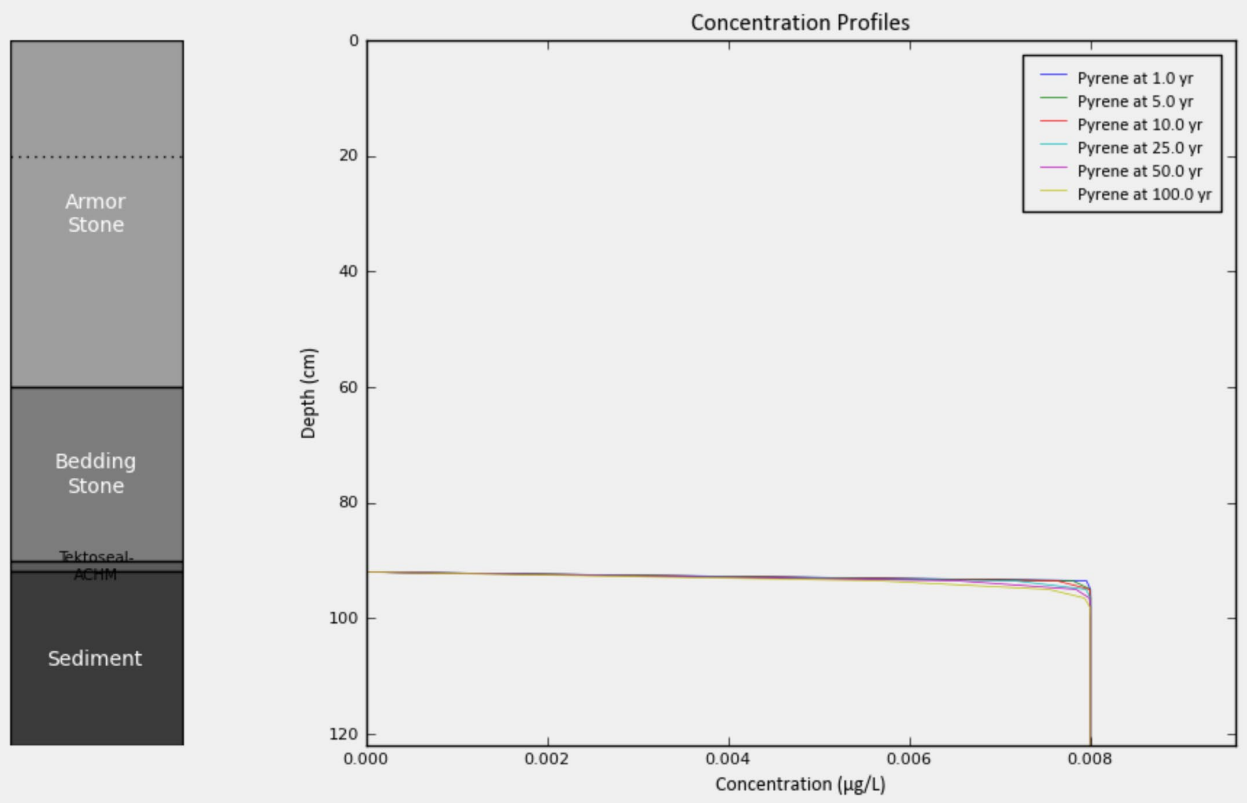

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PCB209 at 1.0 yr
PCB209 at 5.0 yr
PCB209 at 10.0 yr
PCB209 at 25.0 yr
PCB209 at 50.0 yr
PCB209 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

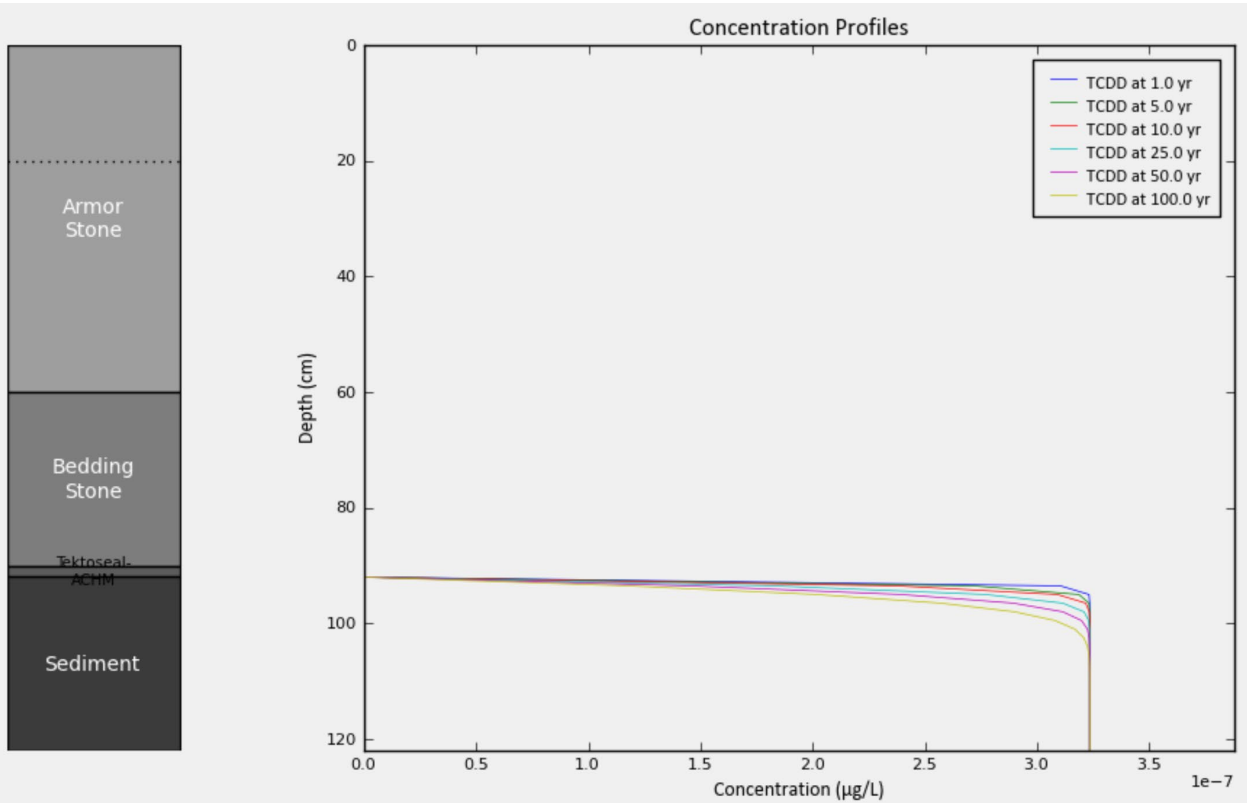

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PeCDD at 1.0 yr
PeCDD at 5.0 yr
PeCDD at 10.0 yr
PeCDD at 25.0 yr
PeCDD at 50.0 yr
PeCDD at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−7
Concentration (µg/L)

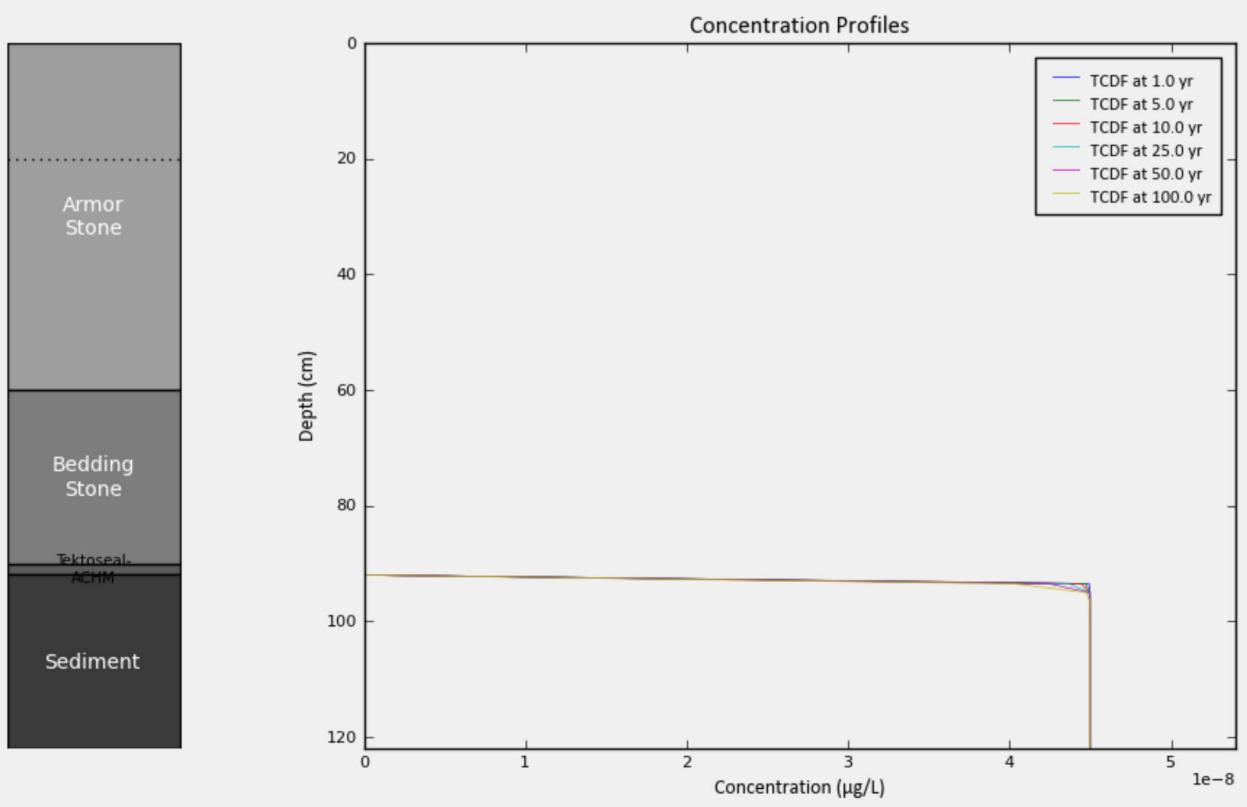

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
PeCDF at 1.0 yr
PeCDF at 5.0 yr
PeCDF at 10.0 yr
PeCDF at 25.0 yr
PeCDF at 50.0 yr
PeCDF at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e−6
Concentration (µg/L)

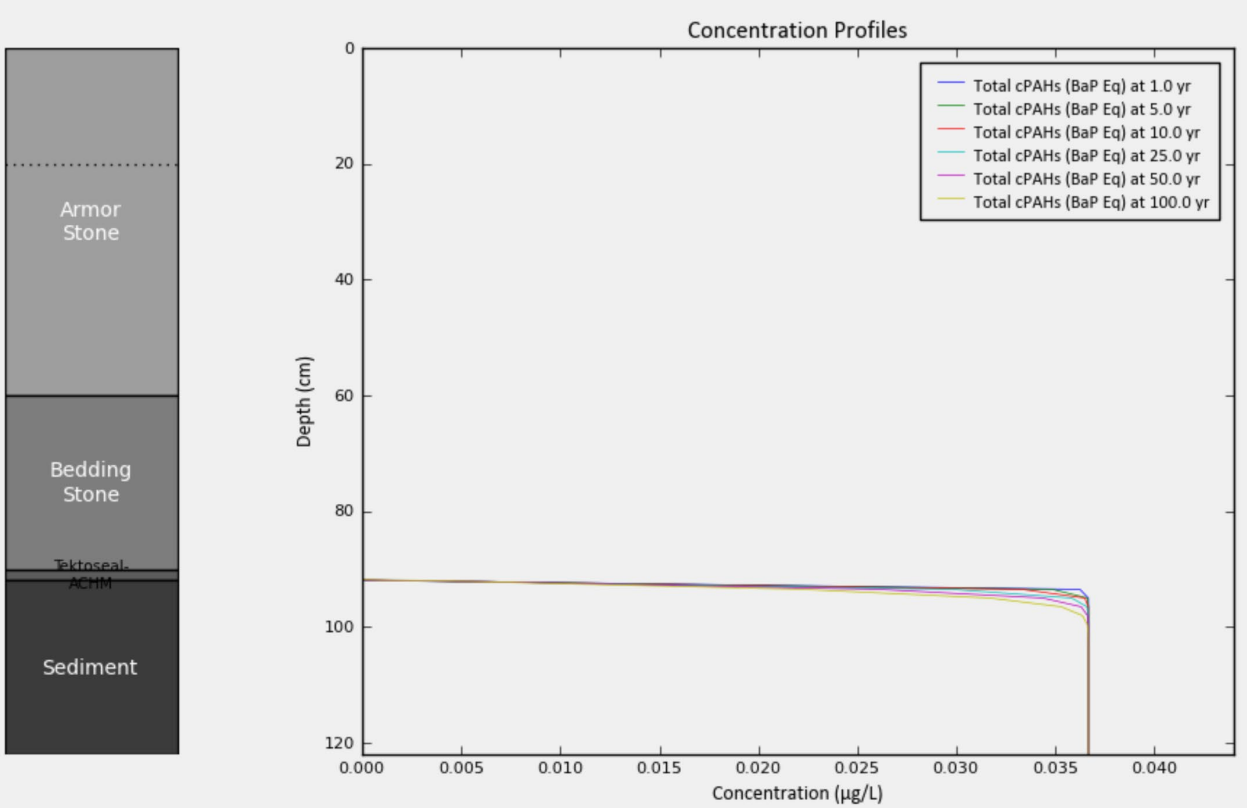

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Pentachlorophenol at 1.0 yr
Pentachlorophenol at 5.0 yr
Pentachlorophenol at 10.0 yr
Pentachlorophenol at 25.0 yr
Pentachlorophenol at 50.0 yr
Pentachlorophenol at 100.0 yr
Depth (cm)
Concentration (µg/L)

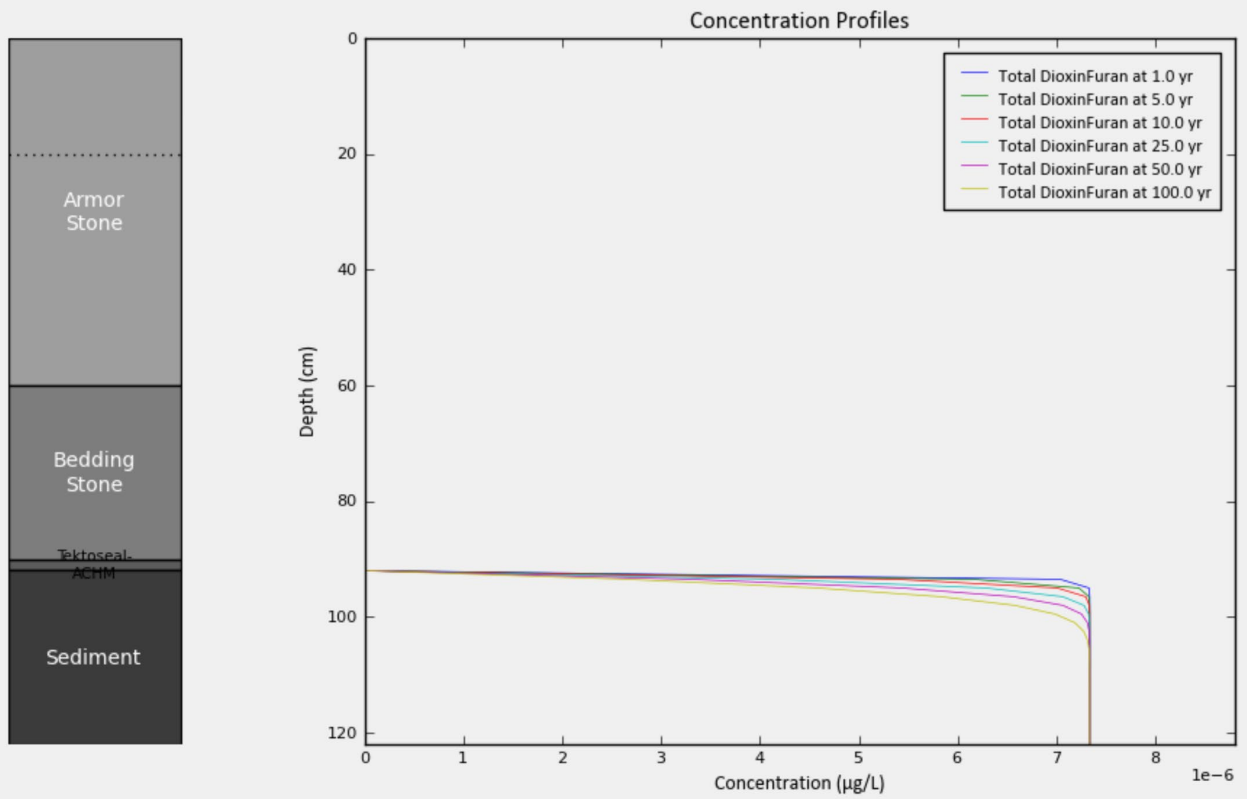

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Phenanthrene at 1.0 yr
Phenanthrene at 5.0 yr
Phenanthrene at 10.0 yr
Phenanthrene at 25.0 yr
Phenanthrene at 50.0 yr
Phenanthrene at 100.0 yr
Depth (cm)
Concentration (µg/L)

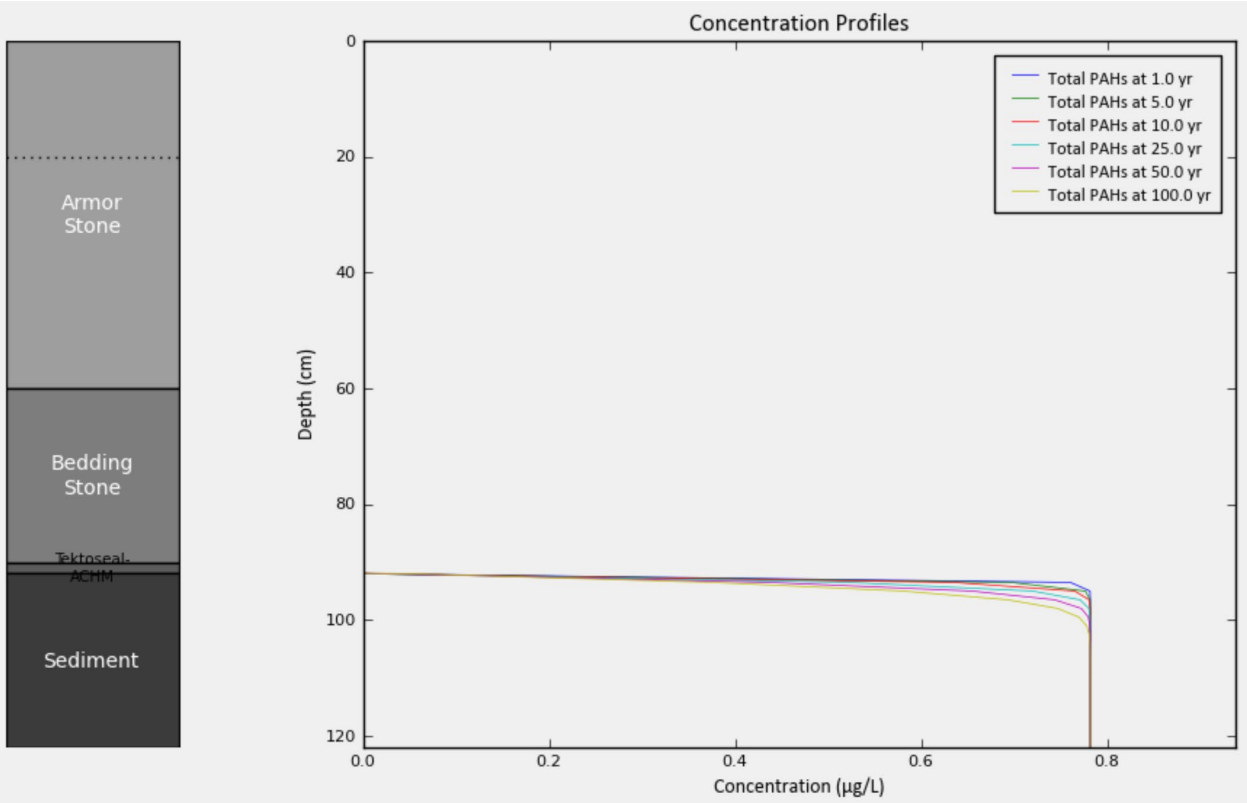

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Pyrene at 1.0 yr
Pyrene at 5.0 yr
Pyrene at 10.0 yr
Pyrene at 25.0 yr
Pyrene at 50.0 yr
Pyrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
Concentration (µg/L)

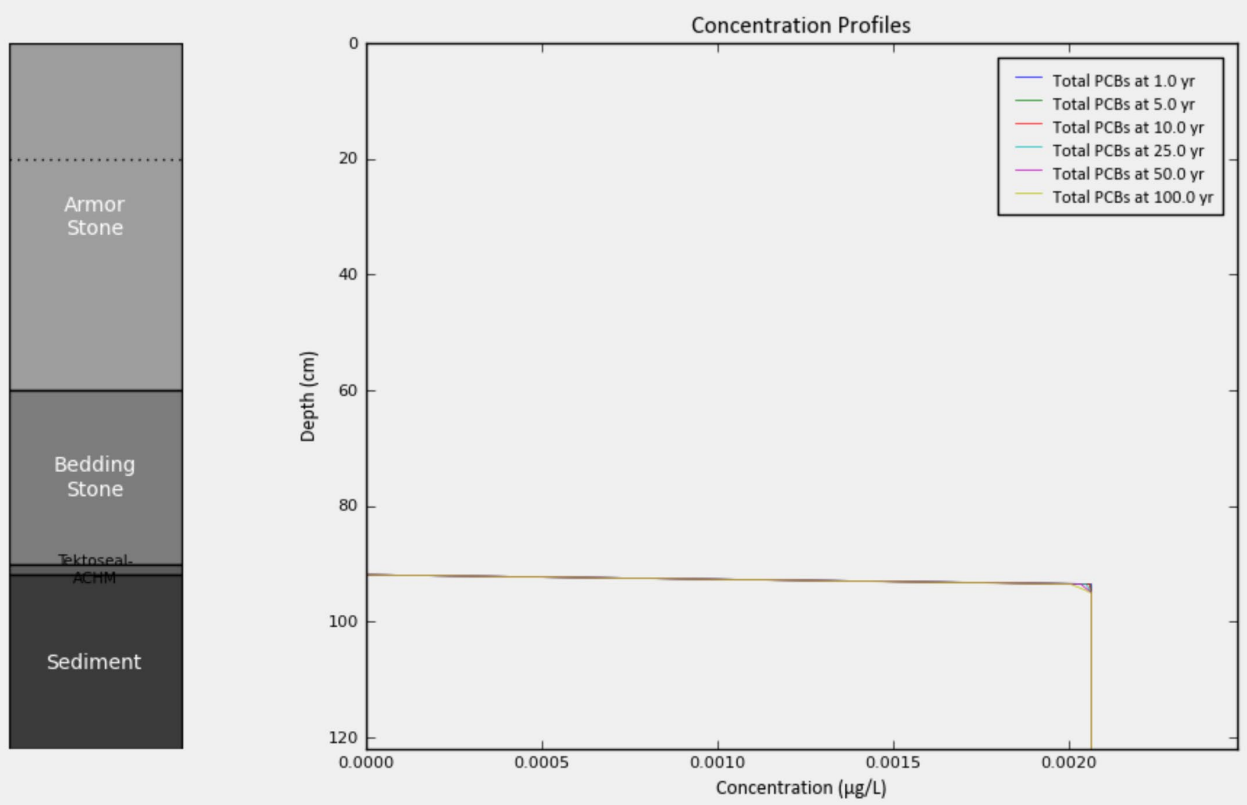

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
TCDD at 1.0 yr
TCDD at 5.0 yr
TCDD at 10.0 yr
TCDD at 25.0 yr
TCDD at 50.0 yr
TCDD at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e−7
Concentration (µg/L)

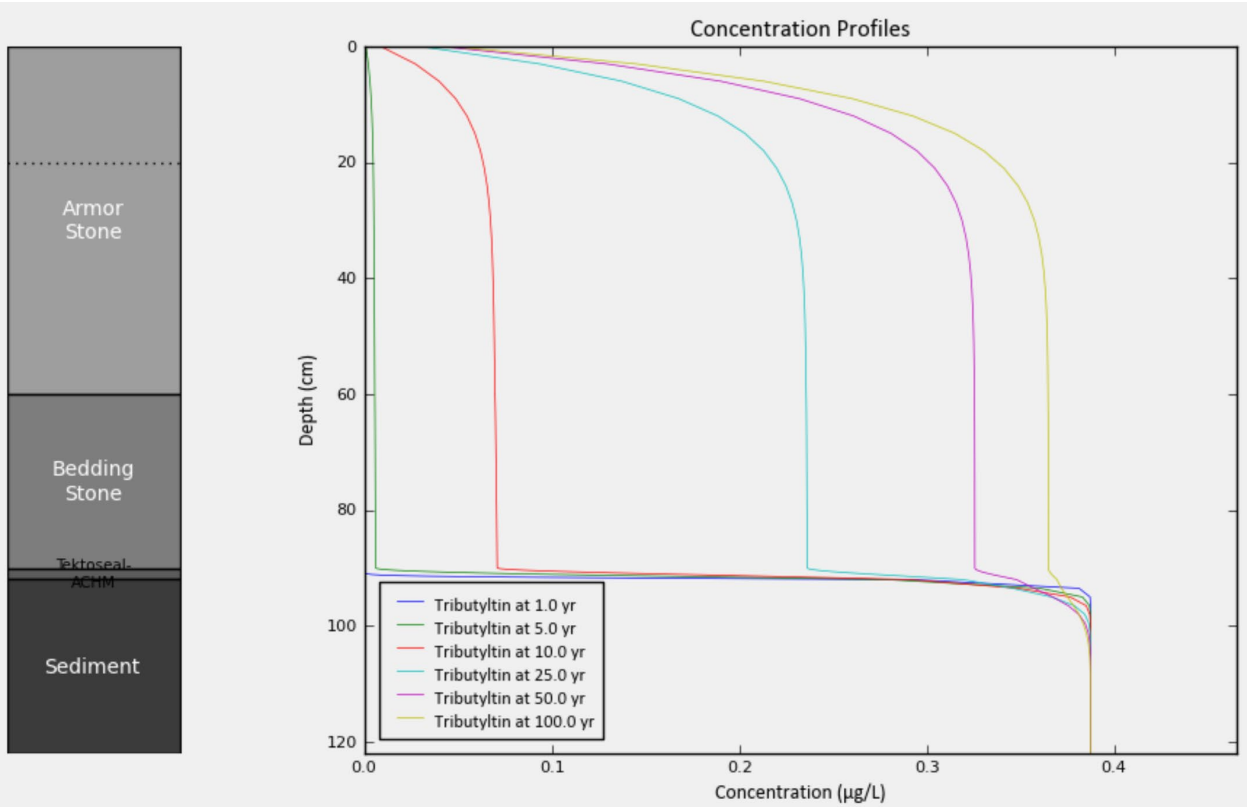

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
TCDF at 1.0 yr
TCDF at 5.0 yr
TCDF at 10.0 yr
TCDF at 25.0 yr
TCDF at 50.0 yr
TCDF at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
1e−8
Concentration (µg/L)

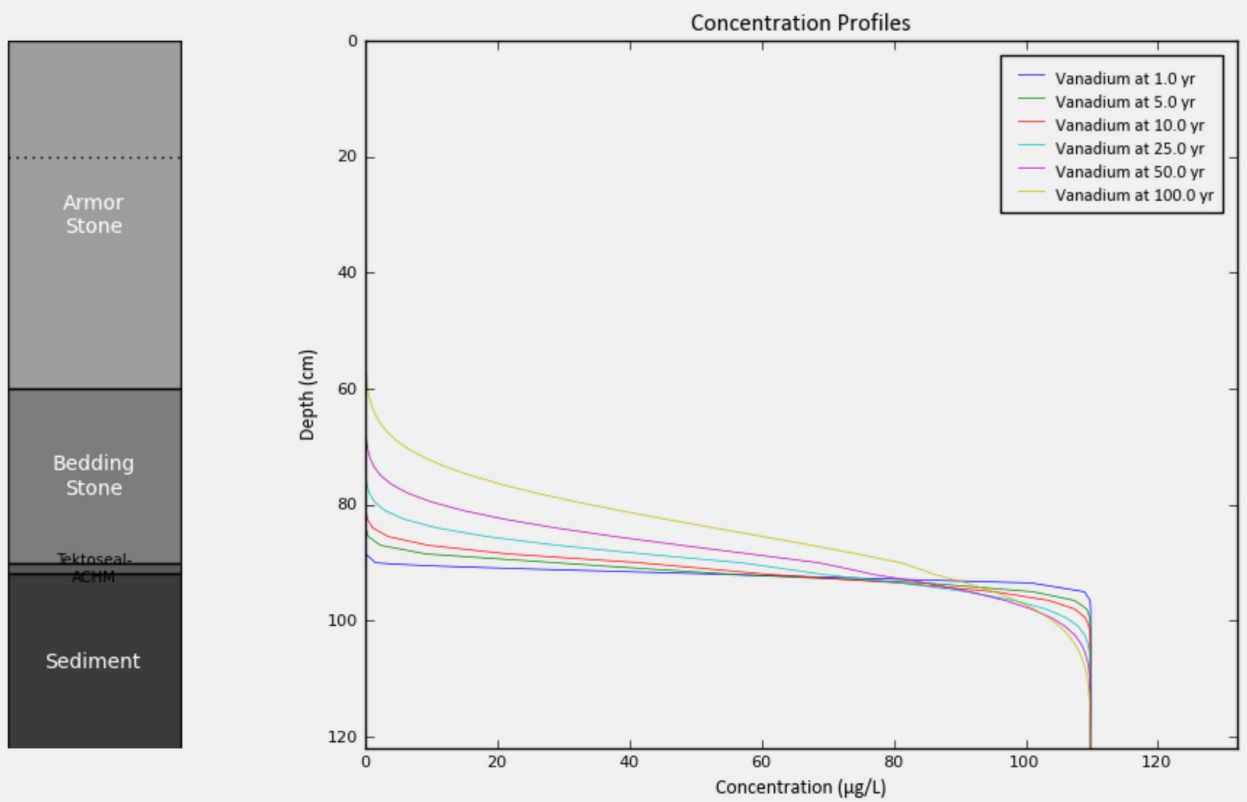

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Total cPAHs (BaP Eq) at 1.0 yr
Total cPAHs (BaP Eq) at 5.0 yr
Total cPAHs (BaP Eq) at 10.0 yr
Total cPAHs (BaP Eq) at 25.0 yr
Total cPAHs (BaP Eq) at 50.0 yr
Total cPAHs (BaP Eq) at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040
Concentration (µg/L)

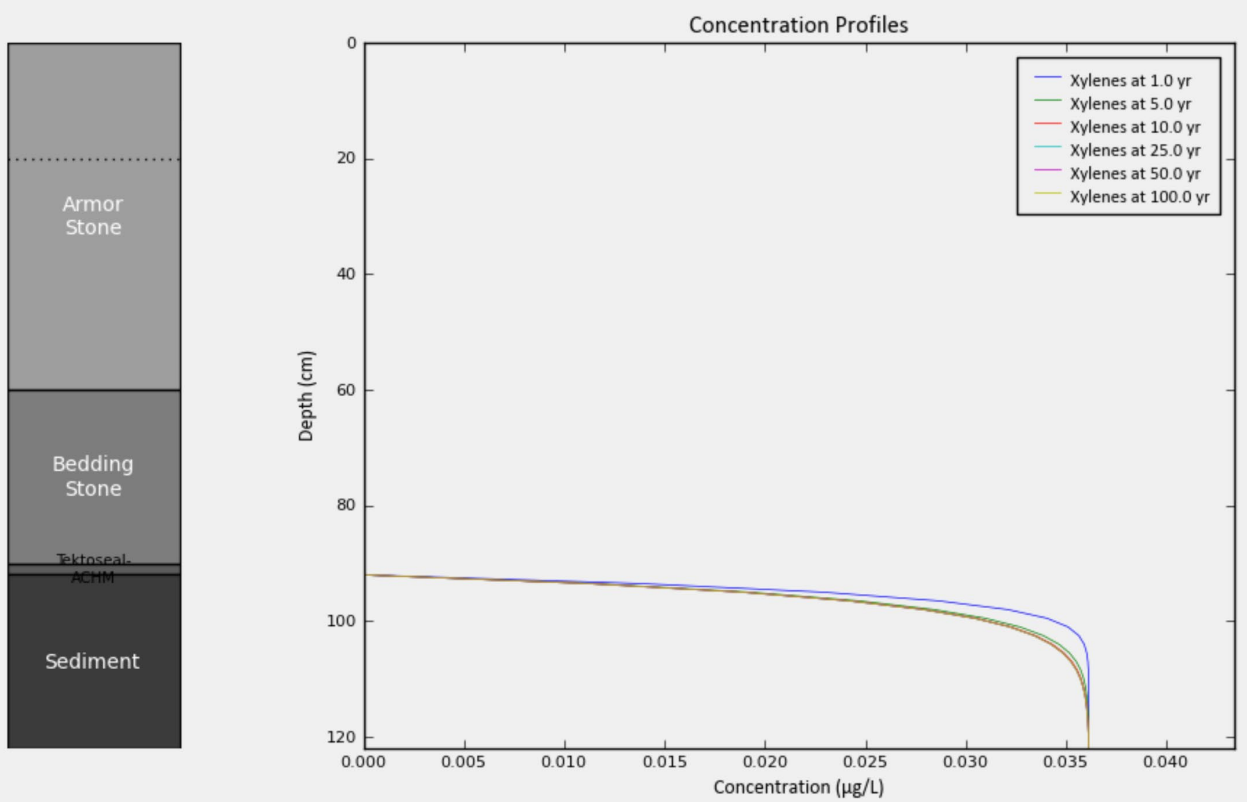

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Total DioxinFuran at 1.0 yr
Total DioxinFuran at 5.0 yr
Total DioxinFuran at 10.0 yr
Total DioxinFuran at 25.0 yr
Total DioxinFuran at 50.0 yr
Total DioxinFuran at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

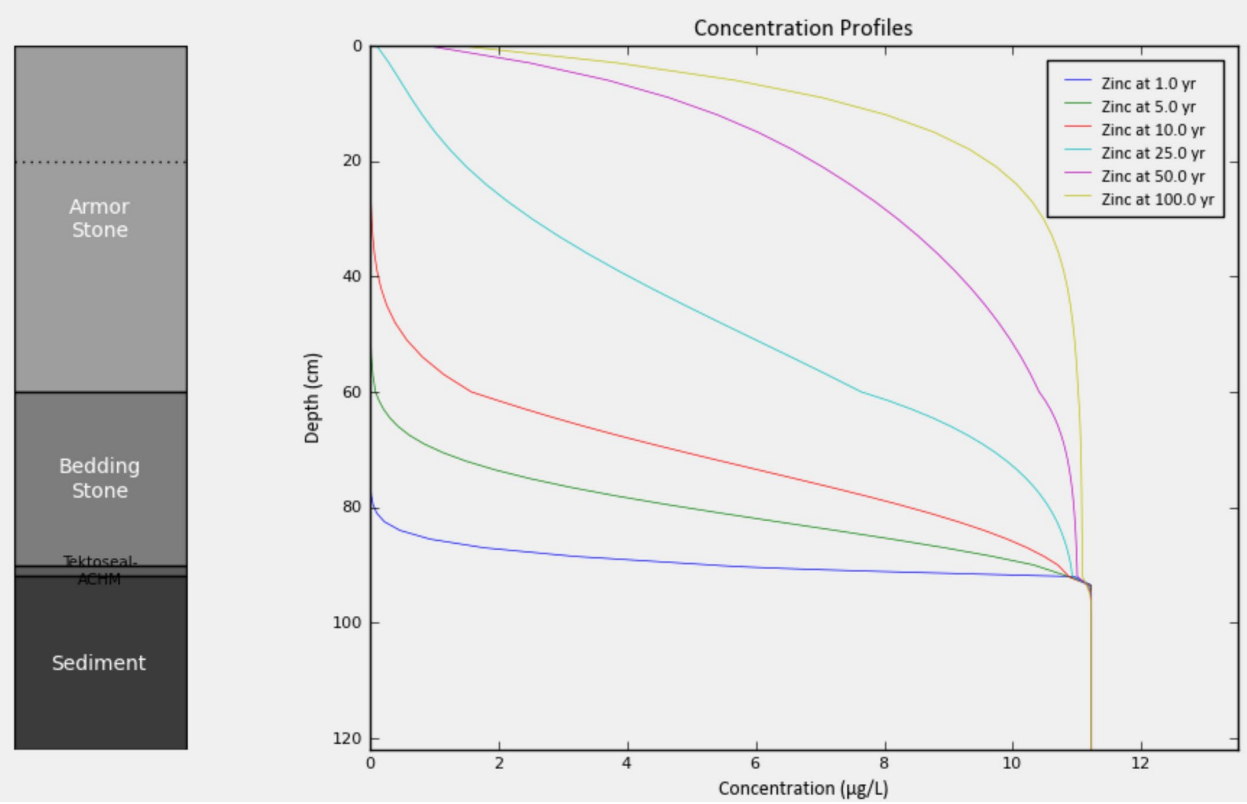

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Total PAHs at 1.0 yr
Total PAHs at 5.0 yr
Total PAHs at 10.0 yr
Total PAHs at 25.0 yr
Total PAHs at 50.0 yr
Total PAHs at 100.0 yr
Depth (cm)
Concentration (µg/L)


Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Total PCBs at 1.0 yr
Total PCBs at 5.0 yr
Total PCBs at 10.0 yr
Total PCBs at 25.0 yr
Total PCBs at 50.0 yr
Total PCBs at 100.0 yr

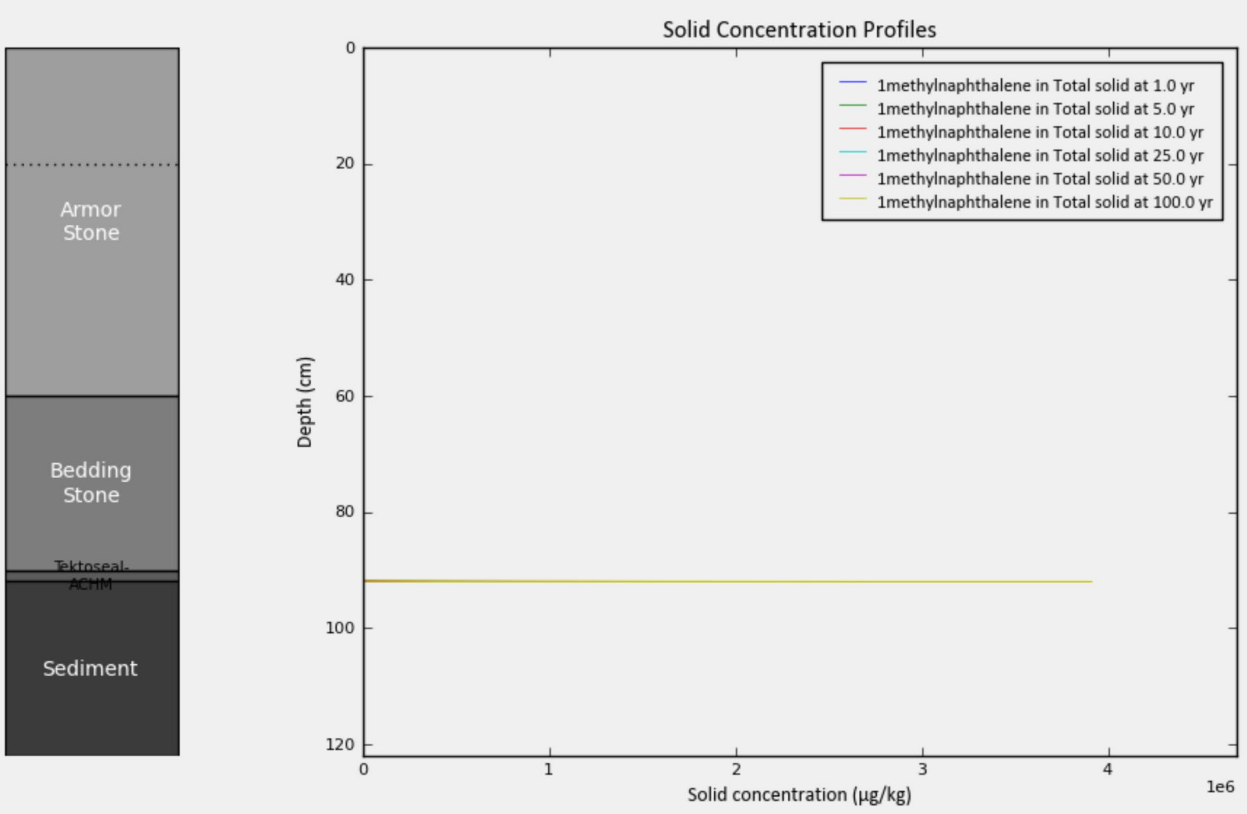

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Tributyltin at 1.0 yr
Tributyltin at 5.0 yr
Tributyltin at 10.0 yr
Tributyltin at 25.0 yr
Tributyltin at 50.0 yr
Tributyltin at 100.0 yr

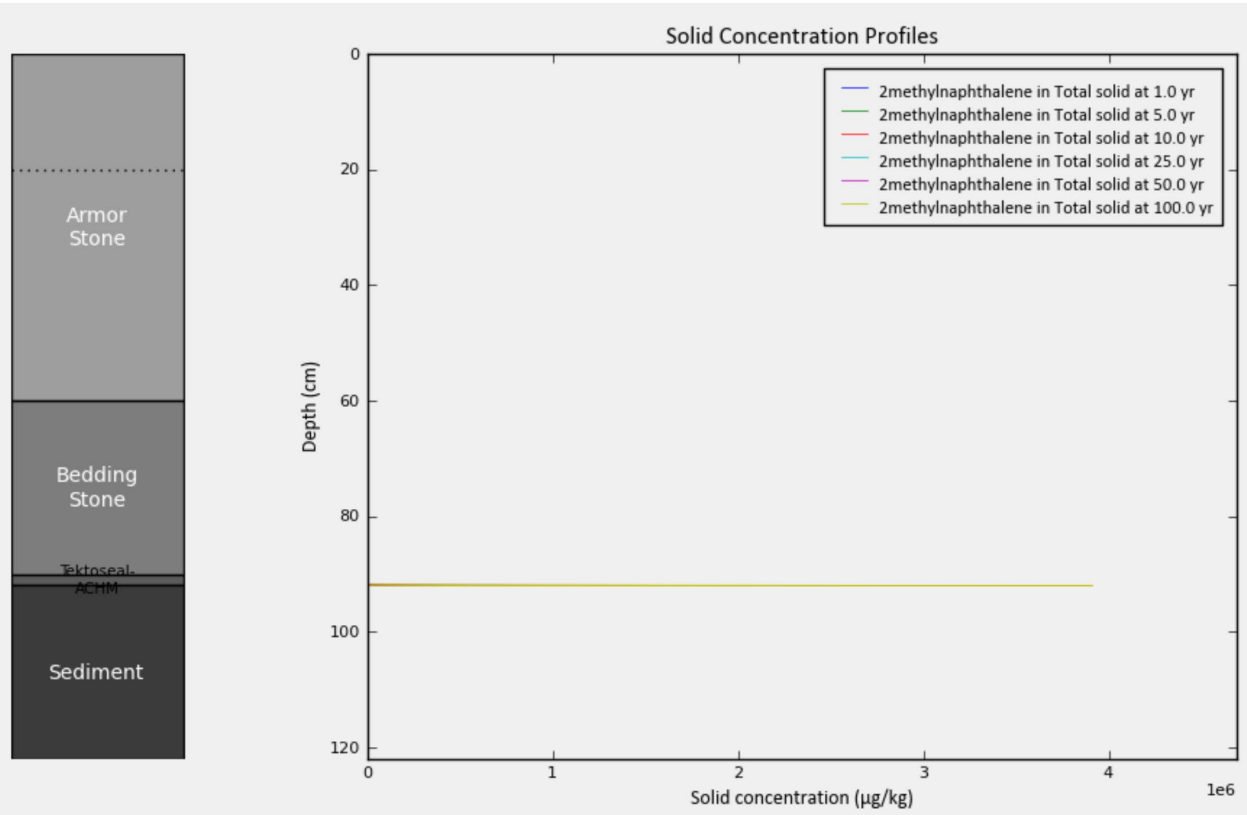

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Vanadium at 1.0 yr
Vanadium at 5.0 yr
Vanadium at 10.0 yr
Vanadium at 25.0 yr
Vanadium at 50.0 yr
Vanadium at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120

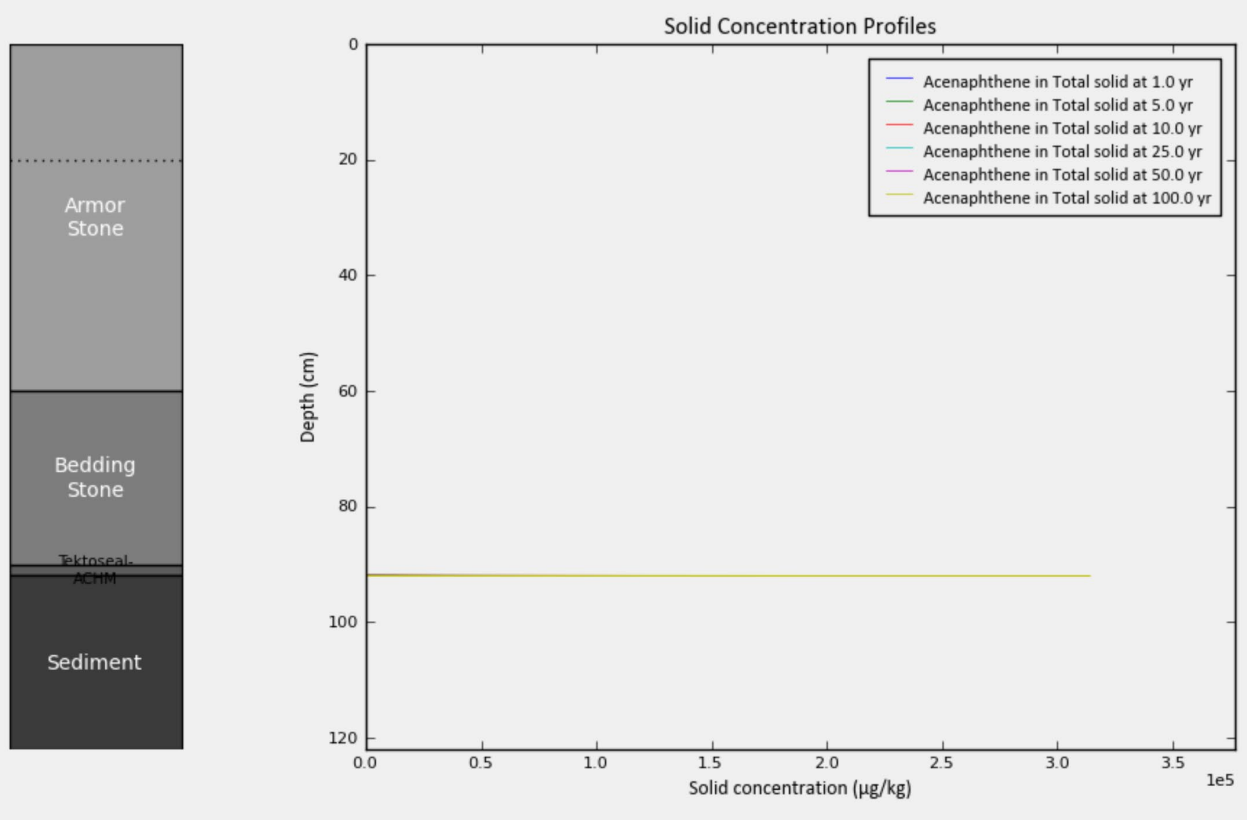

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Xylenes at 1.0 yr
Xylenes at 5.0 yr
Xylenes at 10.0 yr
Xylenes at 25.0 yr
Xylenes at 50.0 yr
Xylenes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040

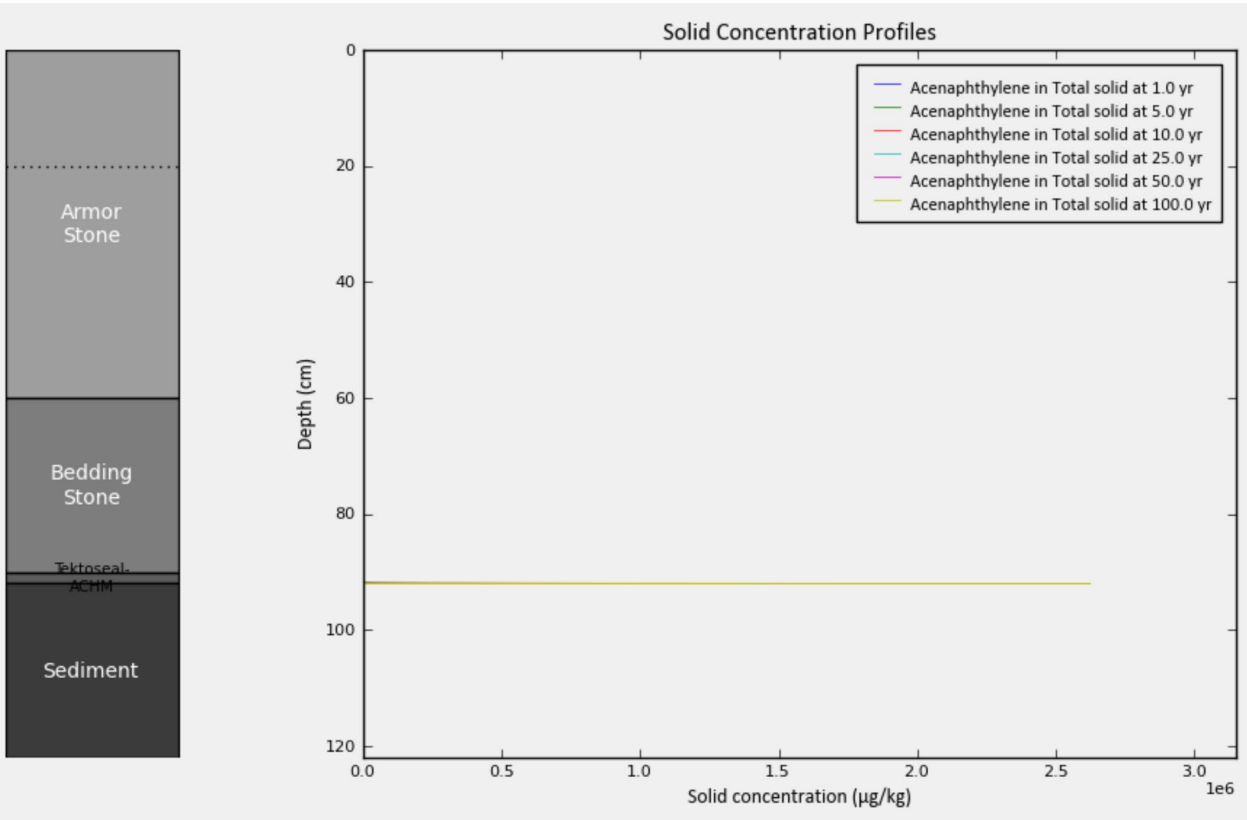

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Zinc at 1.0 yr
Zinc at 5.0 yr
Zinc at 10.0 yr
Zinc at 25.0 yr
Zinc at 50.0 yr
Zinc at 100.0 yr
0
20
40
60
80
100
120
0
2
4
6
8
10
12

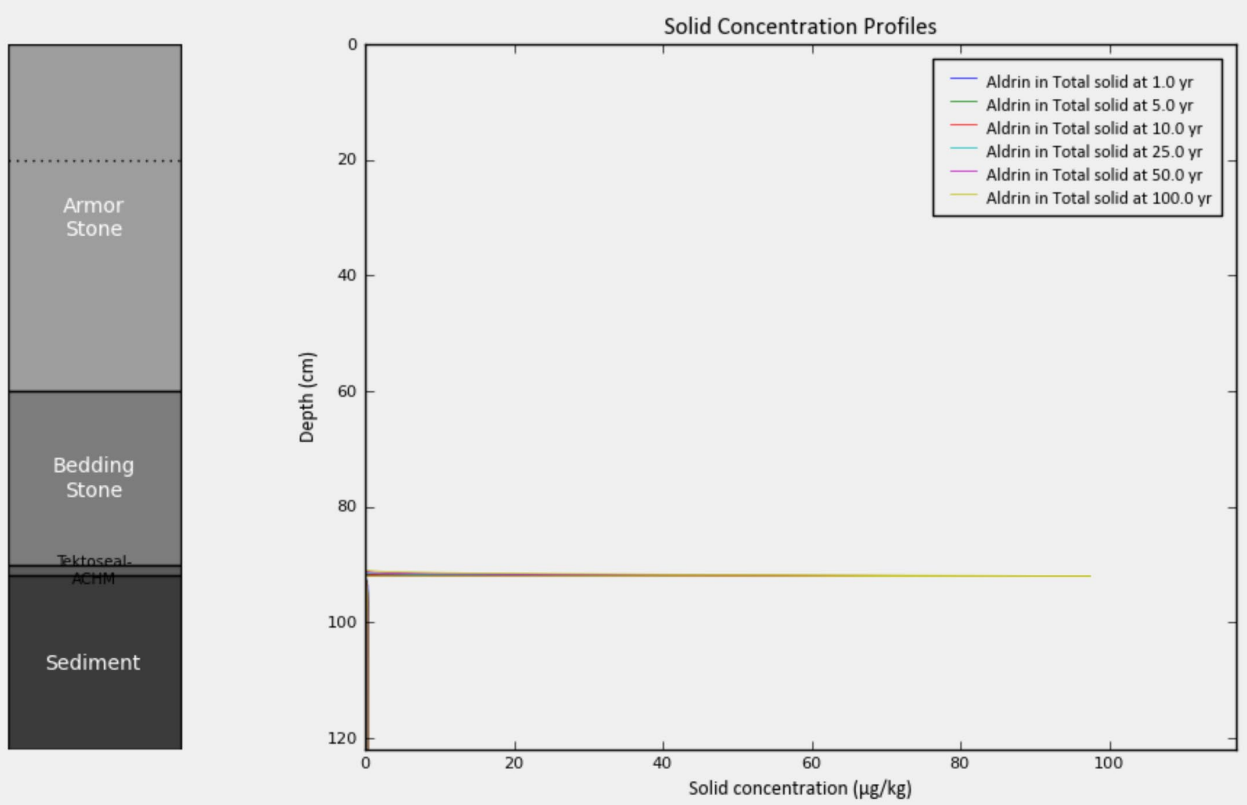
Total Solids Concentration – Depth

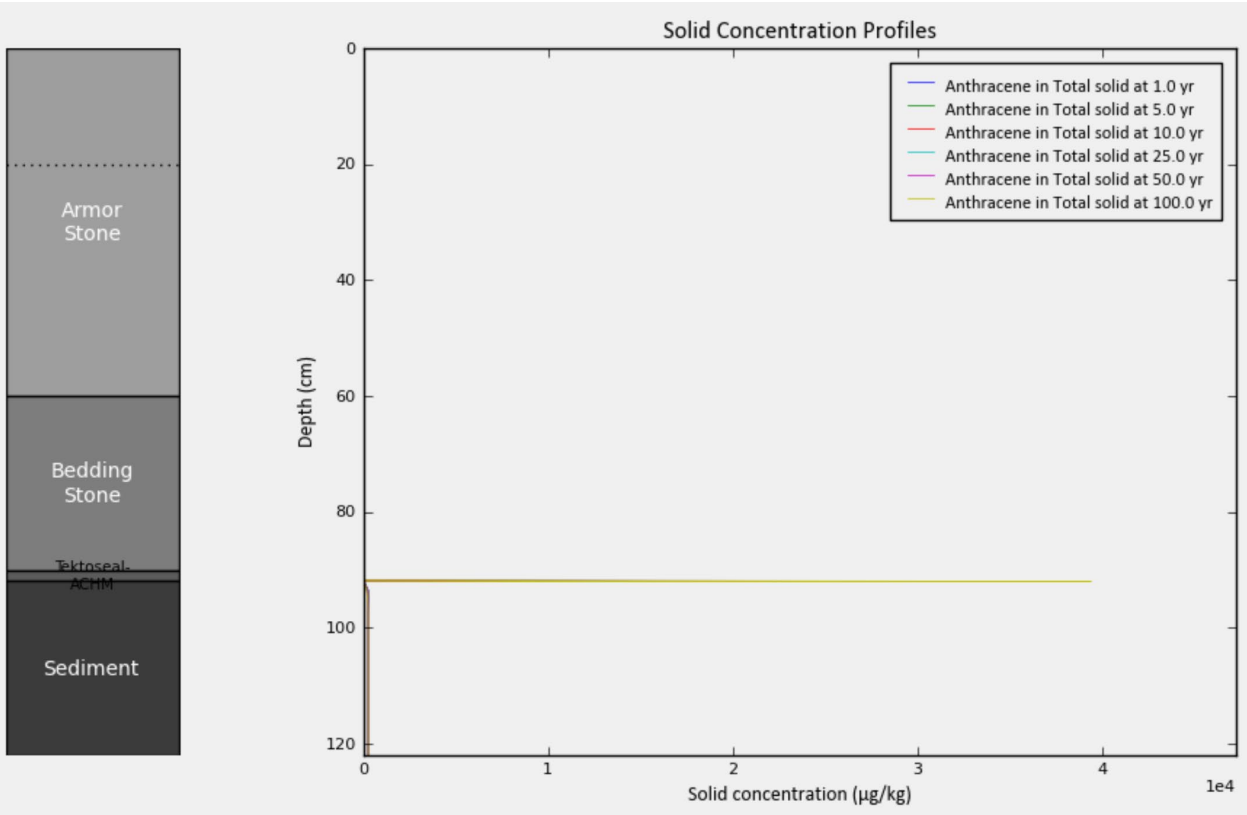


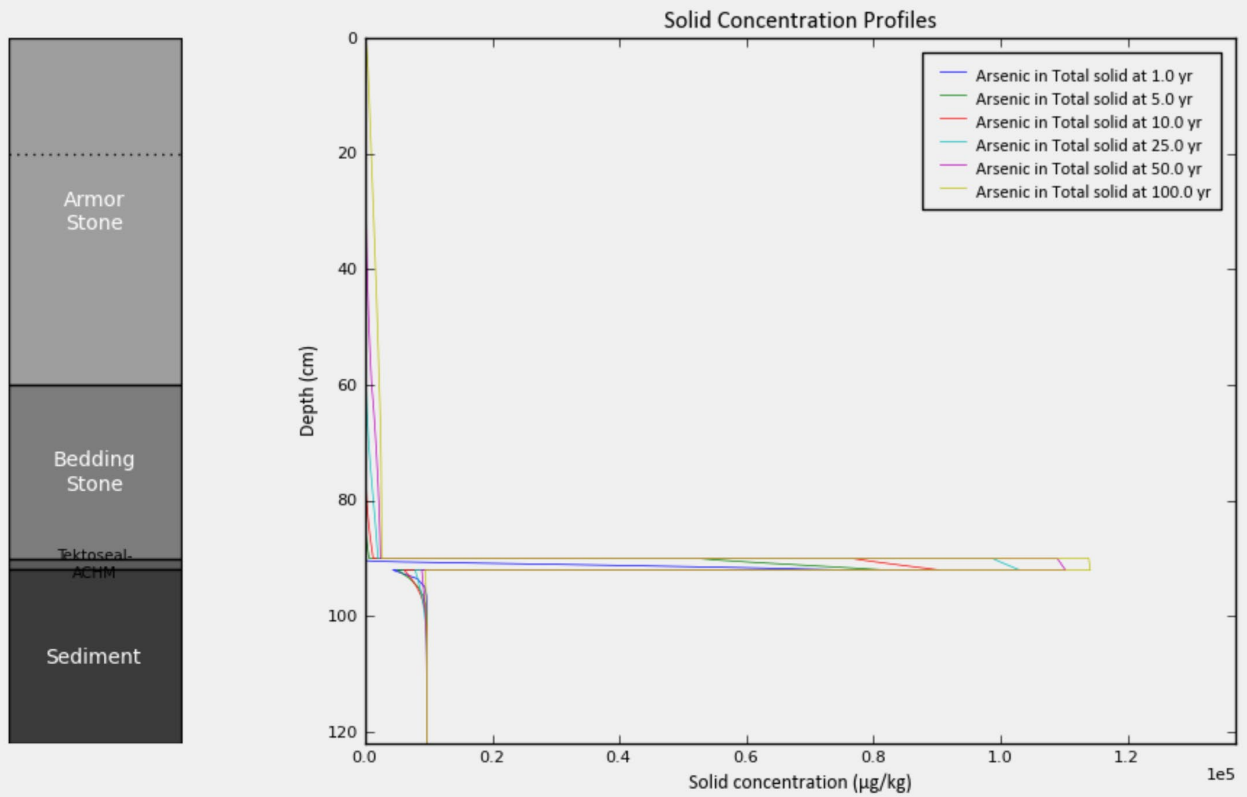


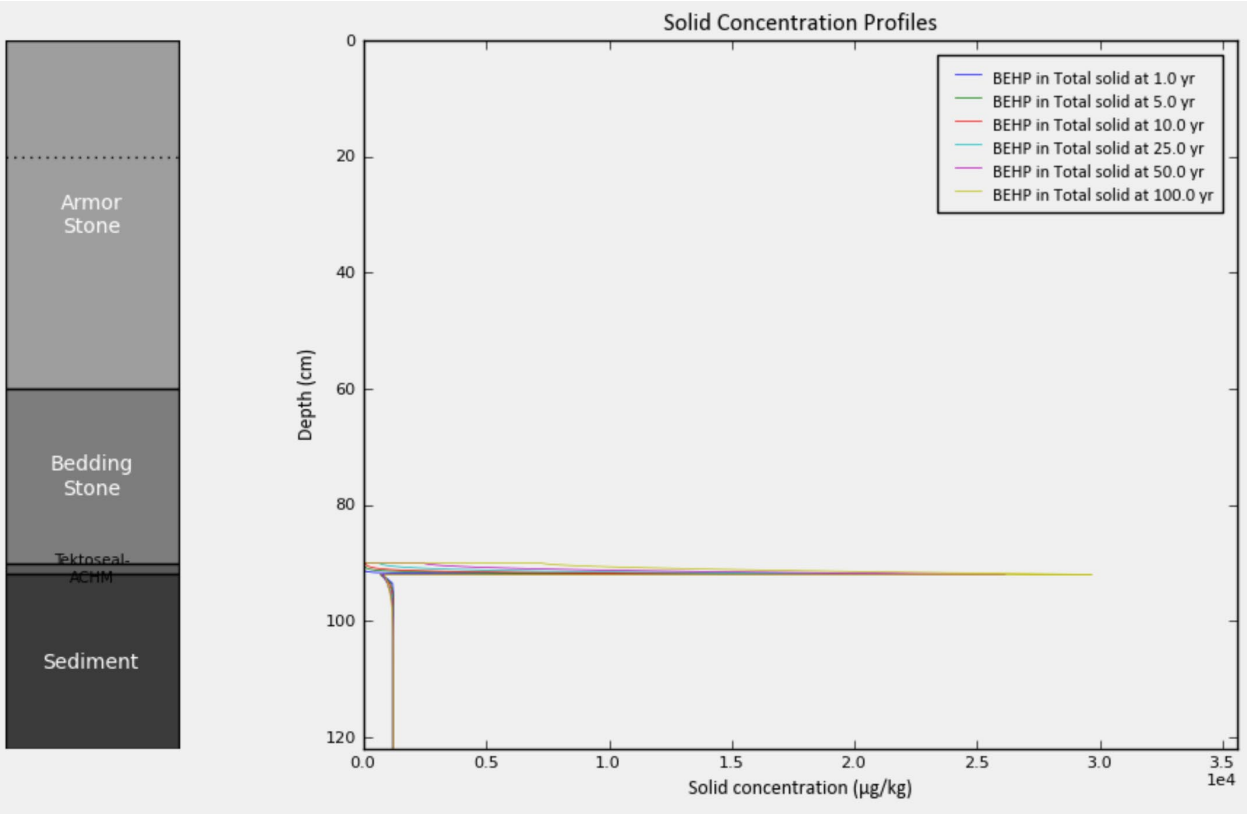

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Acenaphthene in Total solid at 1.0 yr
Acenaphthene in Total solid at 5.0 yr
Acenaphthene in Total solid at 10.0 yr
Acenaphthene in Total solid at 25.0 yr
Acenaphthene in Total solid at 50.0 yr
Acenaphthene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e5
Solid concentration (µg/kg)

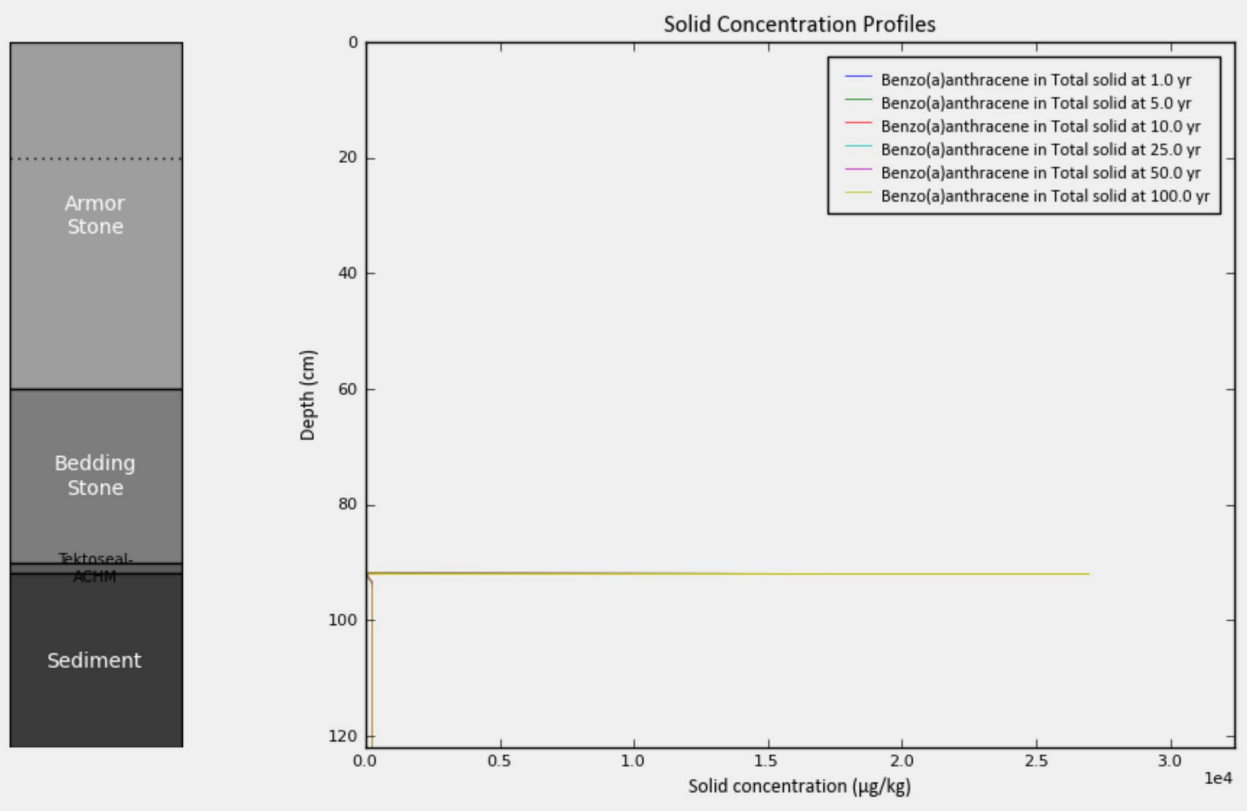

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Acenaphthylene in Total solid at 1.0 yr
Acenaphthylene in Total solid at 5.0 yr
Acenaphthylene in Total solid at 10.0 yr
Acenaphthylene in Total solid at 25.0 yr
Acenaphthylene in Total solid at 50.0 yr
Acenaphthylene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1e6
Solid concentration (µg/kg)

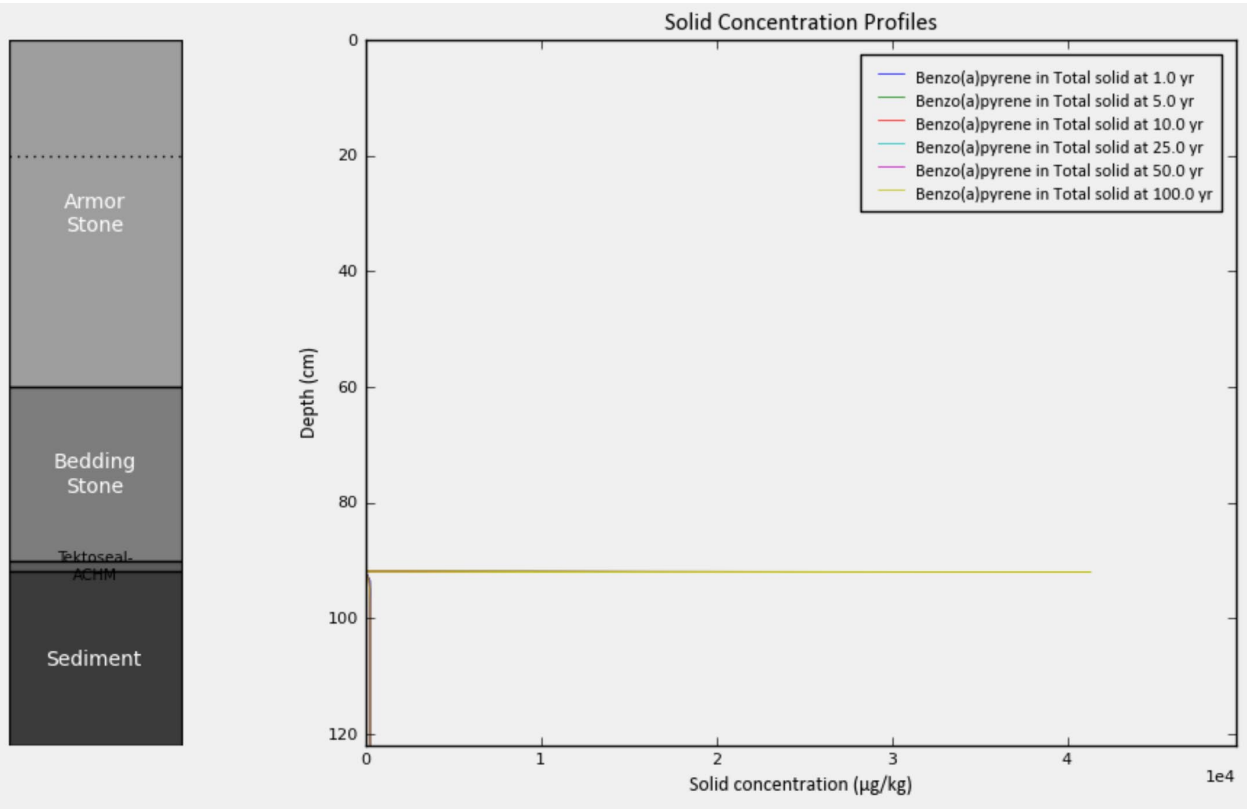

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Aldrin in Total solid at 1.0 yr
Aldrin in Total solid at 5.0 yr
Aldrin in Total solid at 10.0 yr
Aldrin in Total solid at 25.0 yr
Aldrin in Total solid at 50.0 yr
Aldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

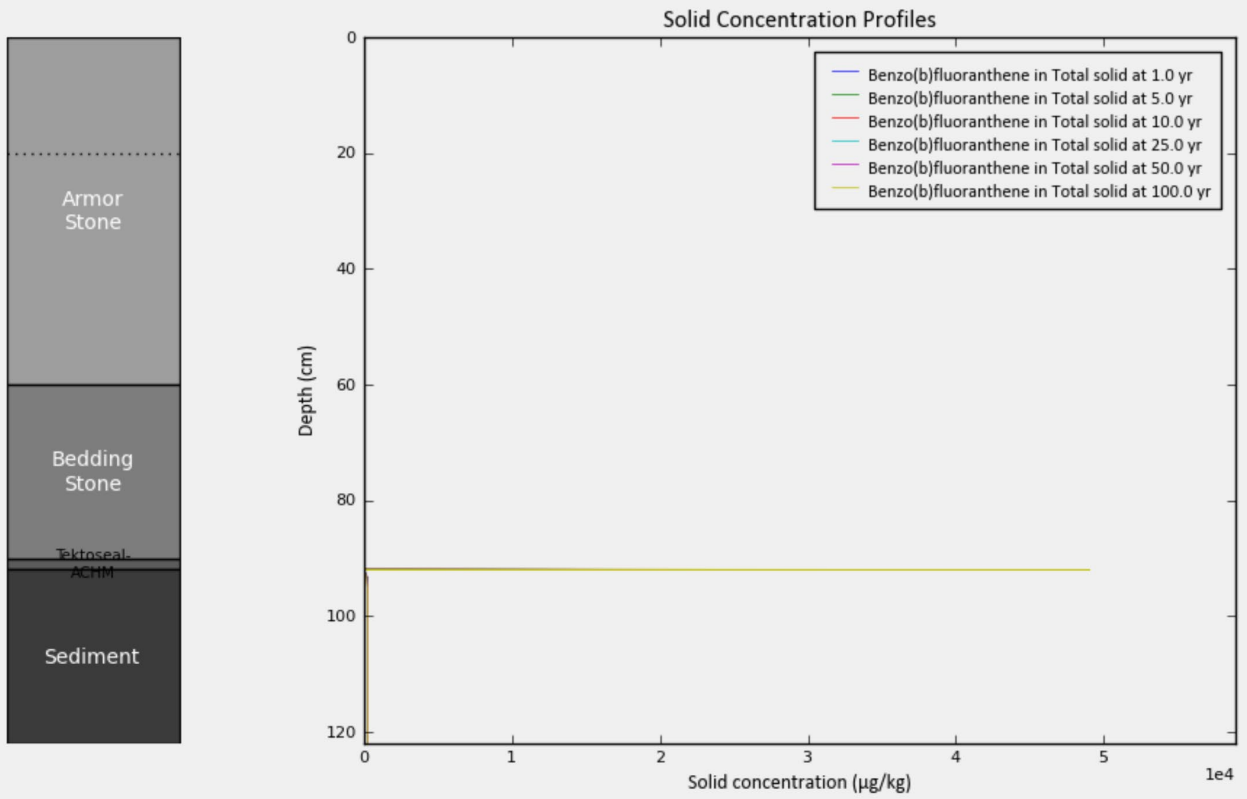

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Anthracene in Total solid at 1.0 yr
Anthracene in Total solid at 5.0 yr
Anthracene in Total solid at 10.0 yr
Anthracene in Total solid at 25.0 yr
Anthracene in Total solid at 50.0 yr
Anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

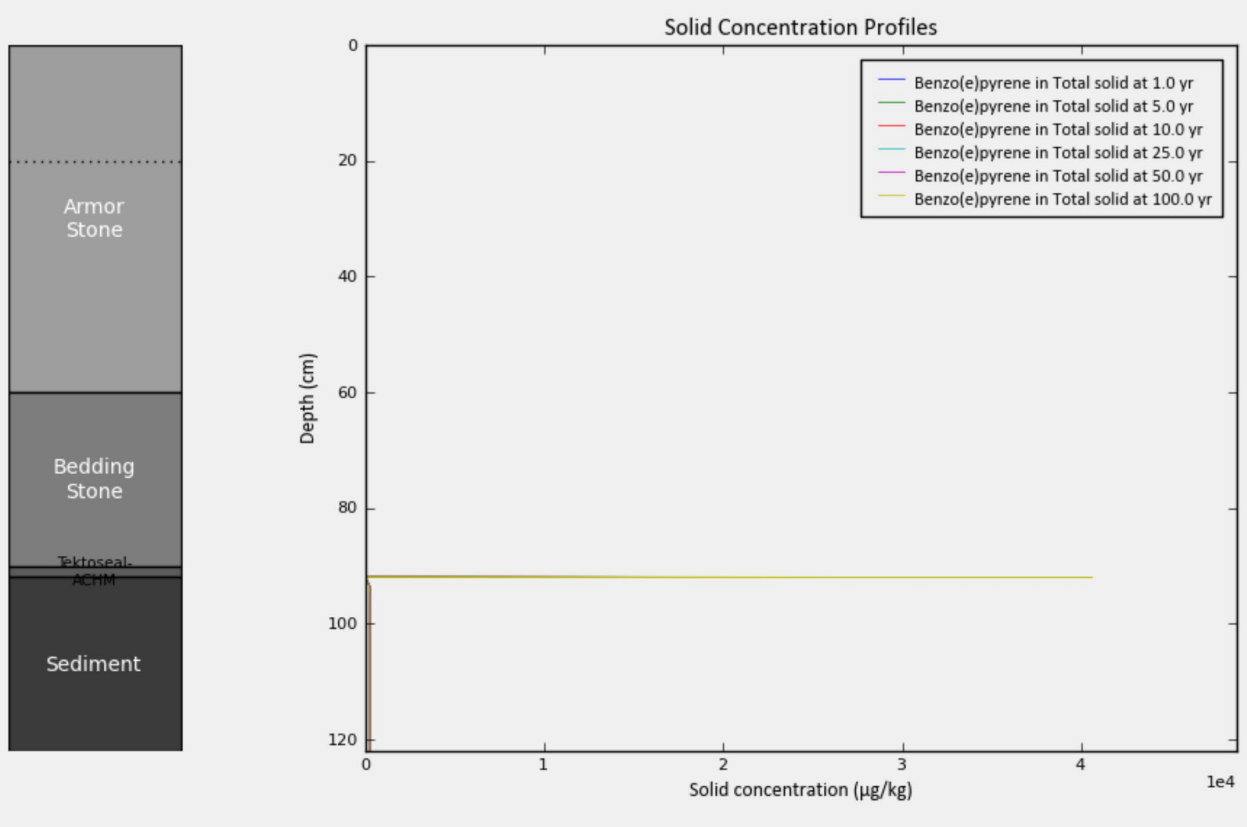

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Arsenic in Total solid at 1.0 yr
Arsenic in Total solid at 5.0 yr
Arsenic in Total solid at 10.0 yr
Arsenic in Total solid at 25.0 yr
Arsenic in Total solid at 50.0 yr
Arsenic in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

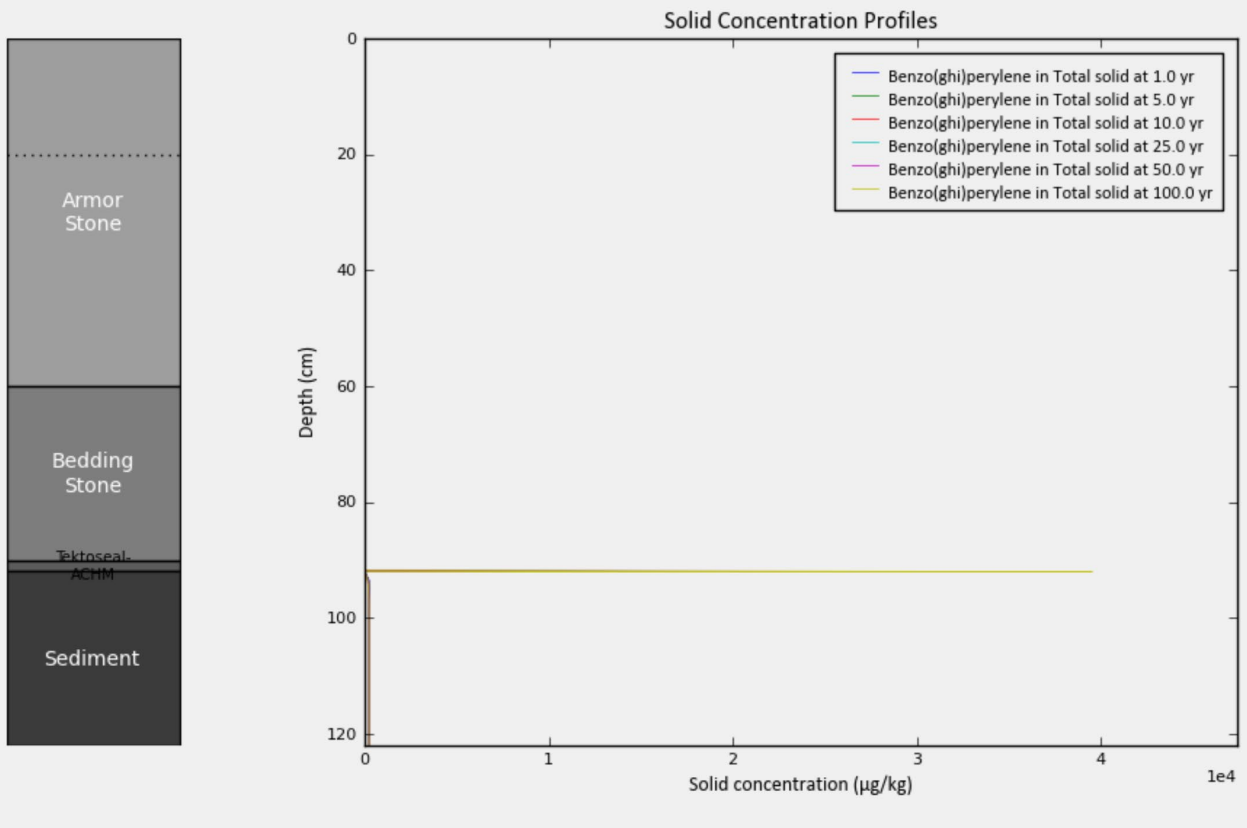

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
BEHP in Total solid at 1.0 yr
BEHP in Total solid at 5.0 yr
BEHP in Total solid at 10.0 yr
BEHP in Total solid at 25.0 yr
BEHP in Total solid at 50.0 yr
BEHP in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

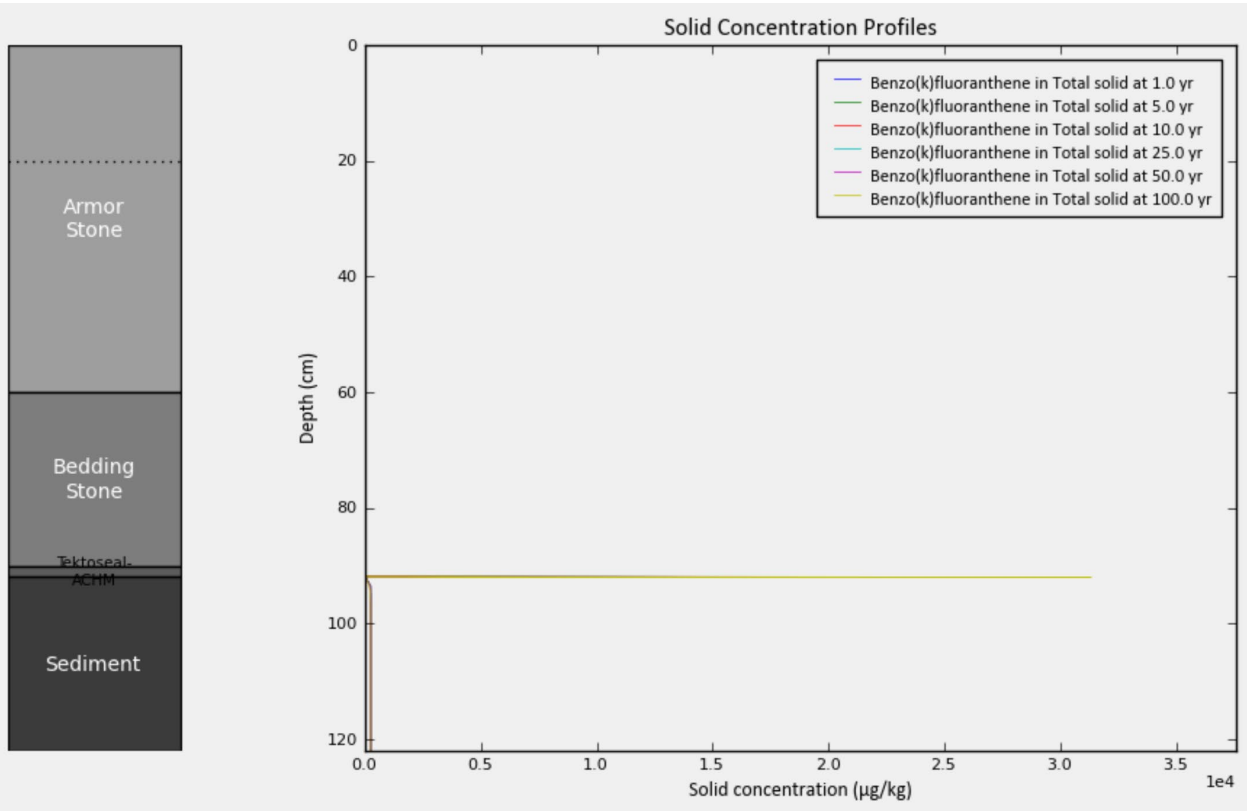

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Benzo(a)anthracene in Total solid at 1.0 yr
Benzo(a)anthracene in Total solid at 5.0 yr
Benzo(a)anthracene in Total solid at 10.0 yr
Benzo(a)anthracene in Total solid at 25.0 yr
Benzo(a)anthracene in Total solid at 50.0 yr
Benzo(a)anthracene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1e4
Solid concentration (µg/kg)

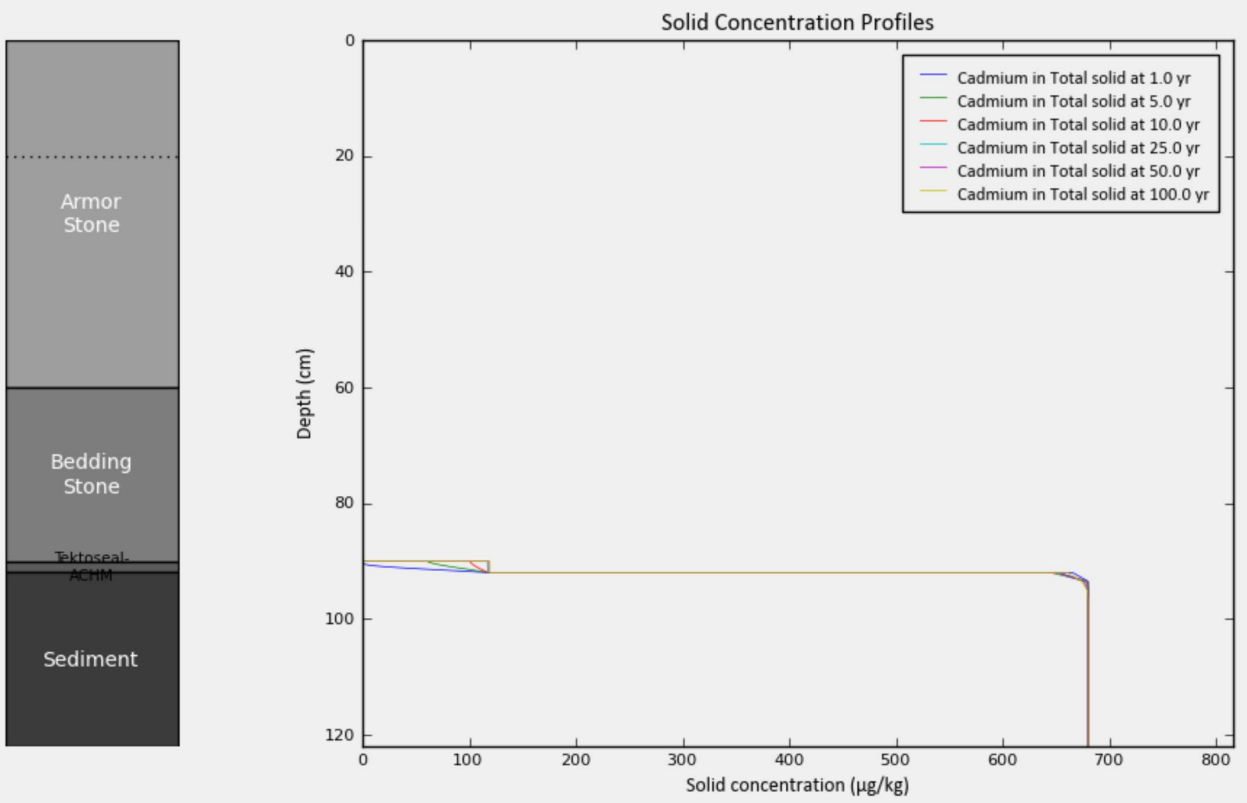

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Benzo(a)pyrene in Total solid at 1.0 yr
Benzo(a)pyrene in Total solid at 5.0 yr
Benzo(a)pyrene in Total solid at 10.0 yr
Benzo(a)pyrene in Total solid at 25.0 yr
Benzo(a)pyrene in Total solid at 50.0 yr
Benzo(a)pyrene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
1e4
Solid concentration (µg/kg)

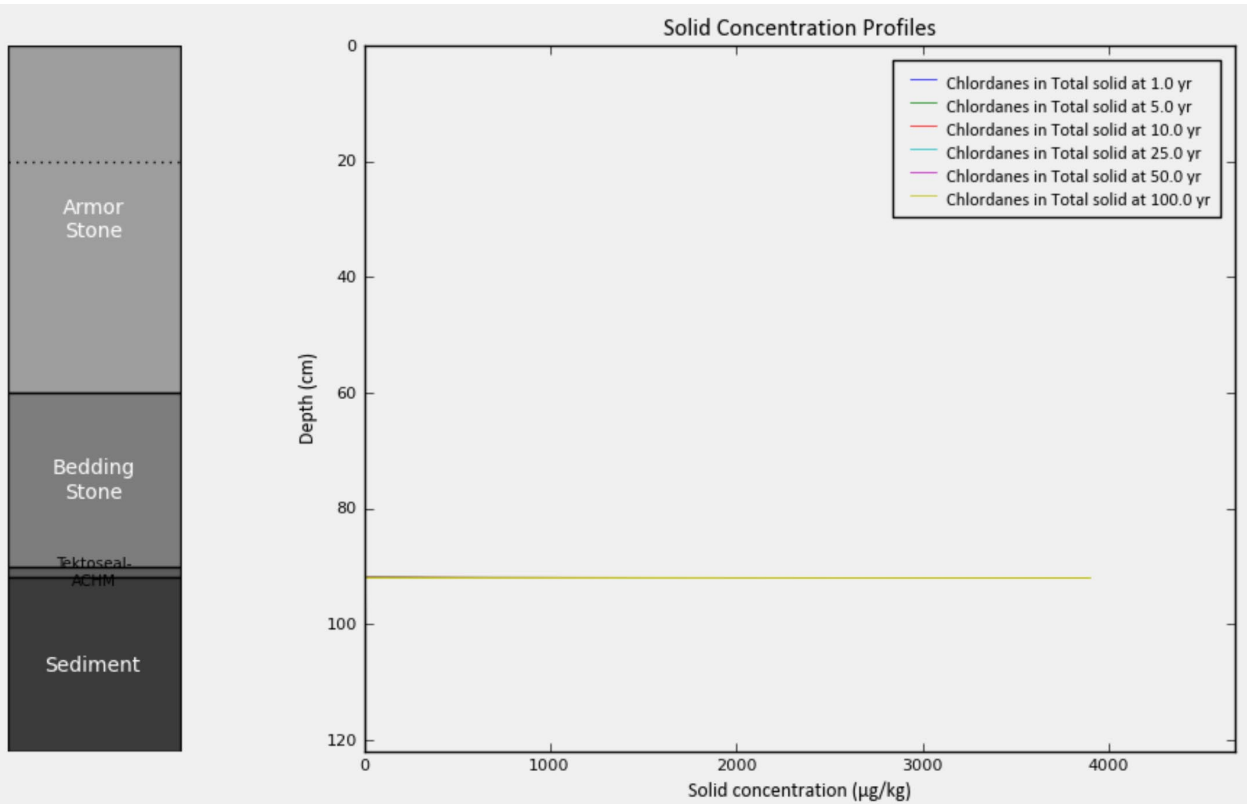

Solid Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Benzo(b)fluoranthene in Total solid at 1.0 yr
Benzo(b)fluoranthene in Total solid at 5.0 yr
Benzo(b)fluoranthene in Total solid at 10.0 yr
Benzo(b)fluoranthene in Total solid at 25.0 yr
Benzo(b)fluoranthene in Total solid at 50.0 yr
Benzo(b)fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
1e4
Solid concentration (µg/kg)

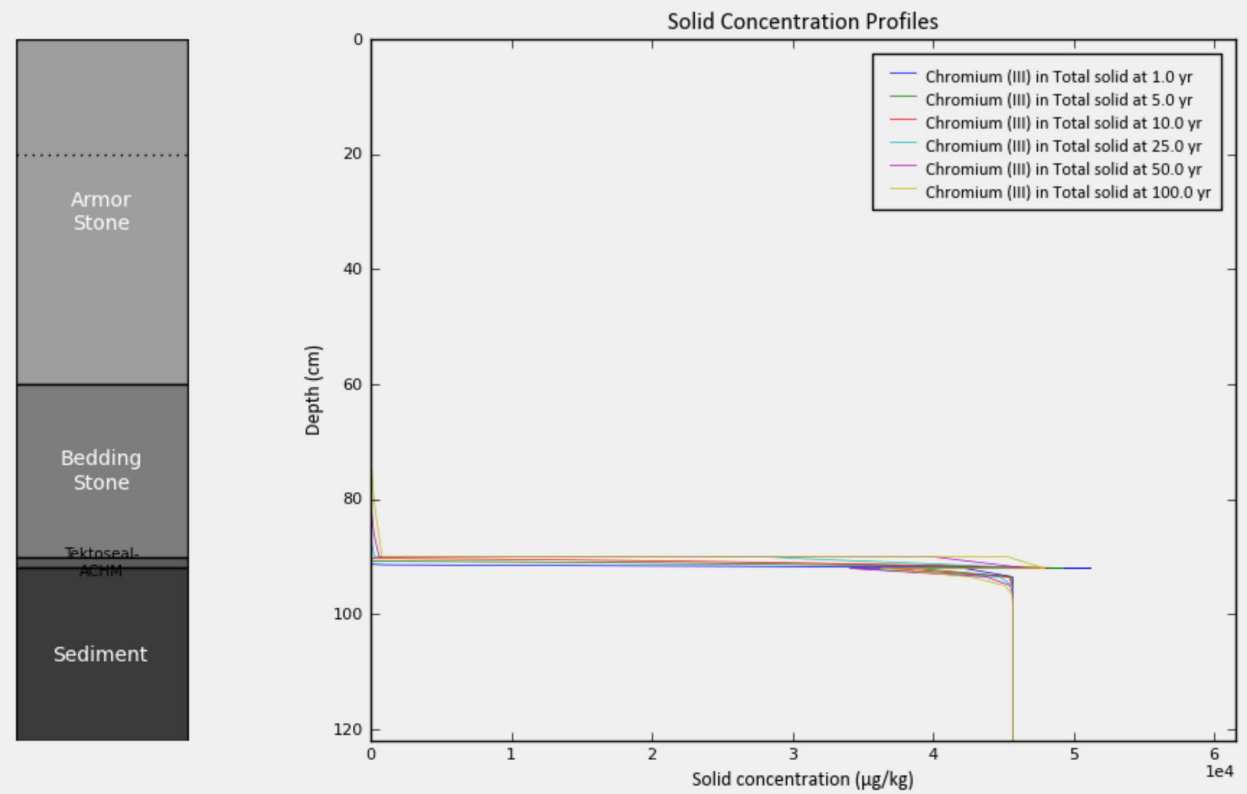

Solid Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Benzo(e)pyrene in Total solid at 1.0 yr
Benzo(e)pyrene in Total solid at 5.0 yr
Benzo(e)pyrene in Total solid at 10.0 yr
Benzo(e)pyrene in Total solid at 25.0 yr
Benzo(e)pyrene in Total solid at 50.0 yr
Benzo(e)pyrene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
1e4
Solid concentration (µg/kg)

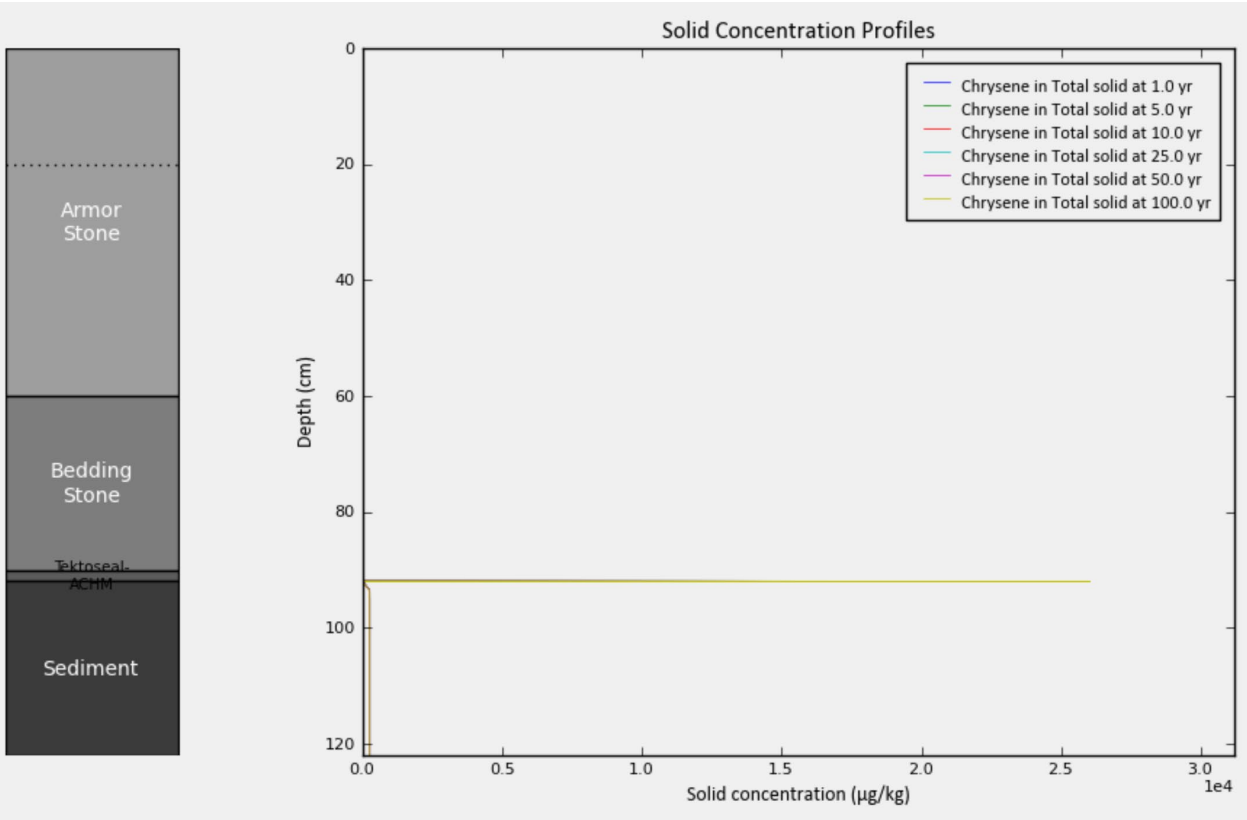

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Benzo(ghi)perylene in Total solid at 1.0 yr
Benzo(ghi)perylene in Total solid at 5.0 yr
Benzo(ghi)perylene in Total solid at 10.0 yr
Benzo(ghi)perylene in Total solid at 25.0 yr
Benzo(ghi)perylene in Total solid at 50.0 yr
Benzo(ghi)perylene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
1e4
Solid concentration (µg/kg)

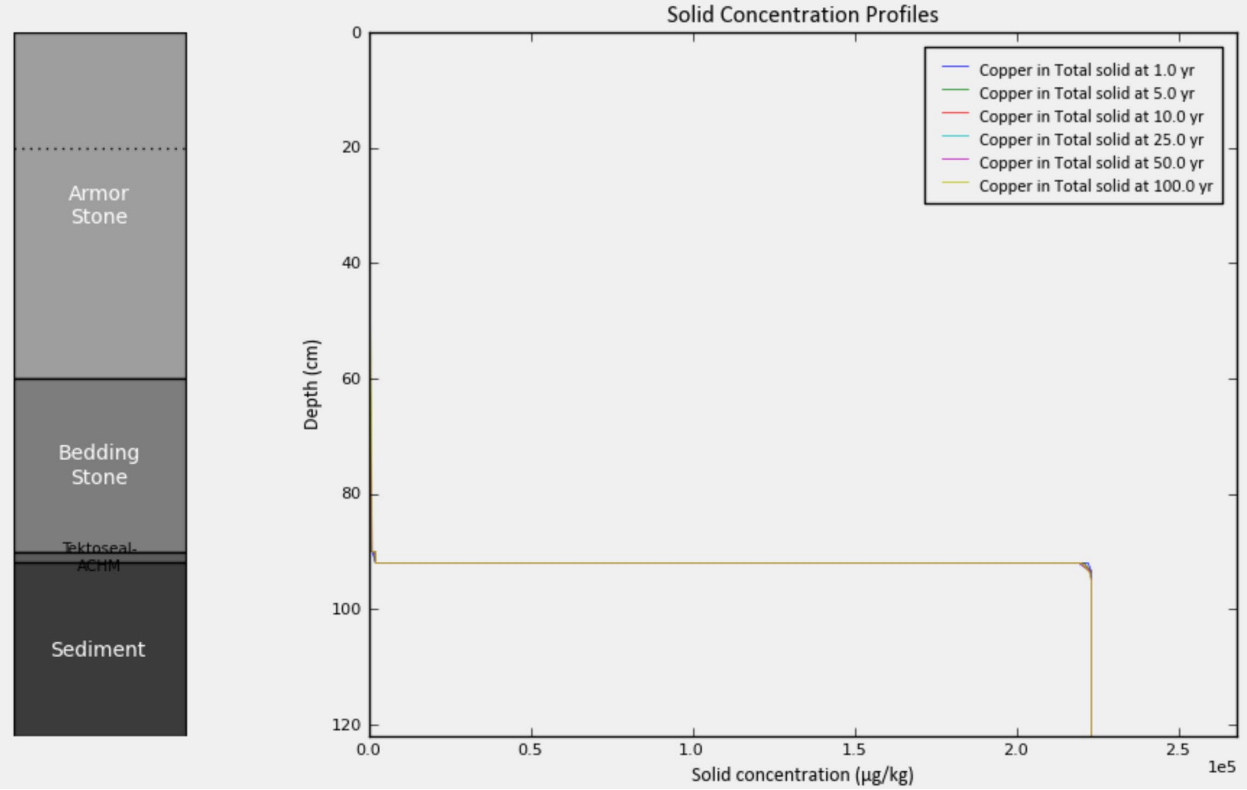

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Benzo(k)fluoranthene in Total solid at 1.0 yr
Benzo(k)fluoranthene in Total solid at 5.0 yr
Benzo(k)fluoranthene in Total solid at 10.0 yr
Benzo(k)fluoranthene in Total solid at 25.0 yr
Benzo(k)fluoranthene in Total solid at 50.0 yr
Benzo(k)fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e4
Solid concentration (µg/kg)

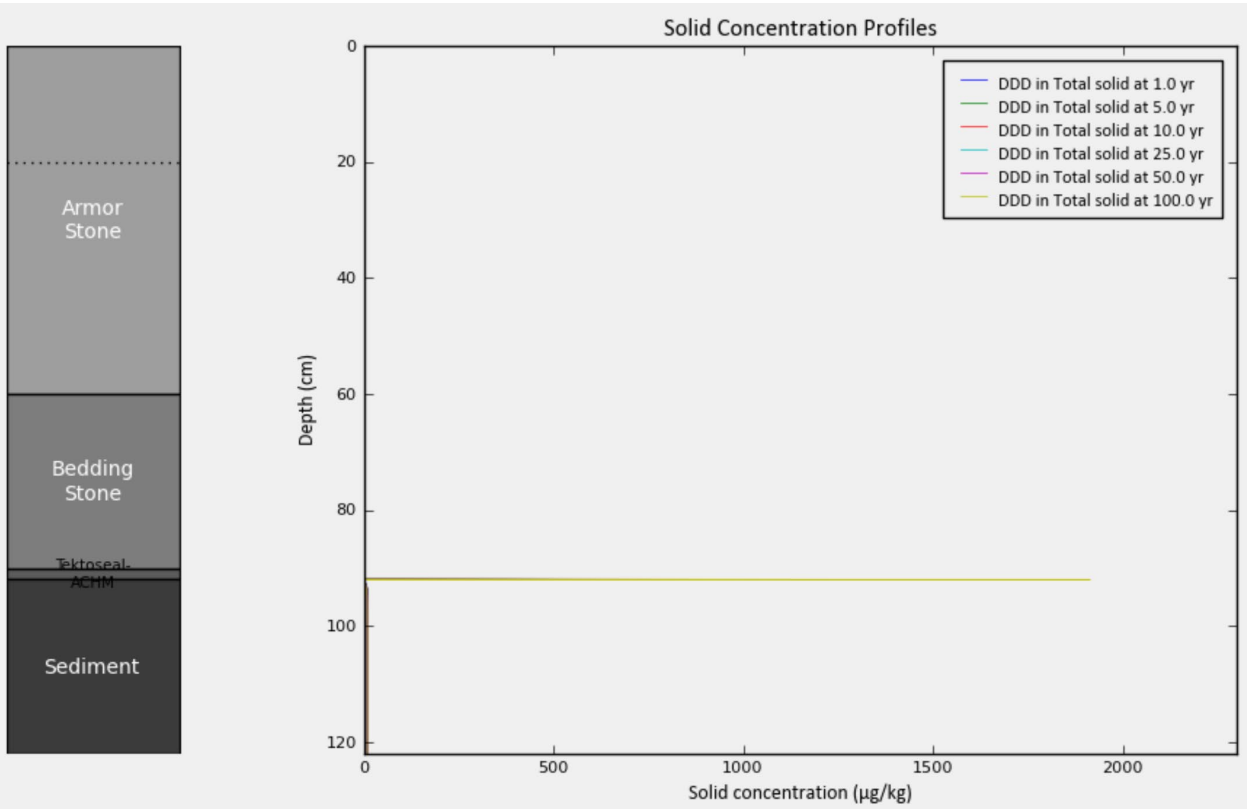

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Cadmium in Total solid at 1.0 yr
Cadmium in Total solid at 5.0 yr
Cadmium in Total solid at 10.0 yr
Cadmium in Total solid at 25.0 yr
Cadmium in Total solid at 50.0 yr
Cadmium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

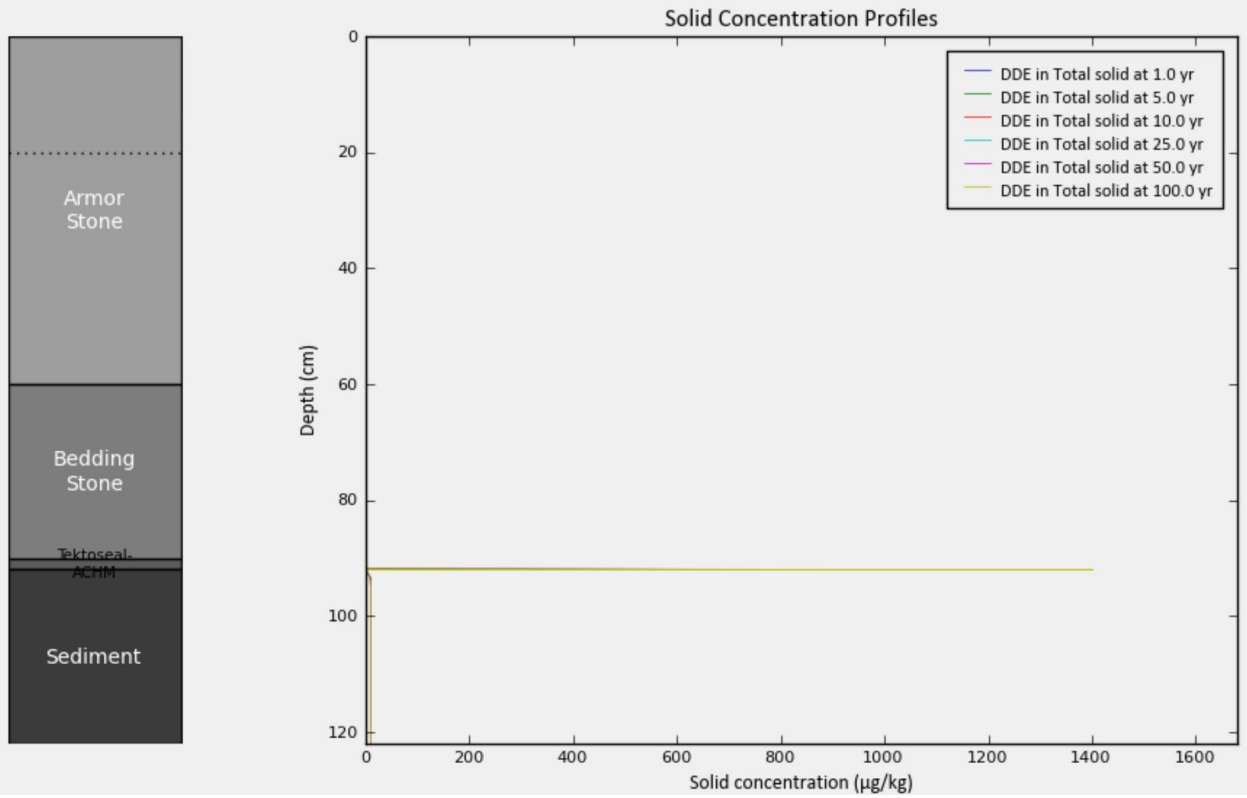

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Chlordanes in Total solid at 1.0 yr
Chlordanes in Total solid at 5.0 yr
Chlordanes in Total solid at 10.0 yr
Chlordanes in Total solid at 25.0 yr
Chlordanes in Total solid at 50.0 yr
Chlordanes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

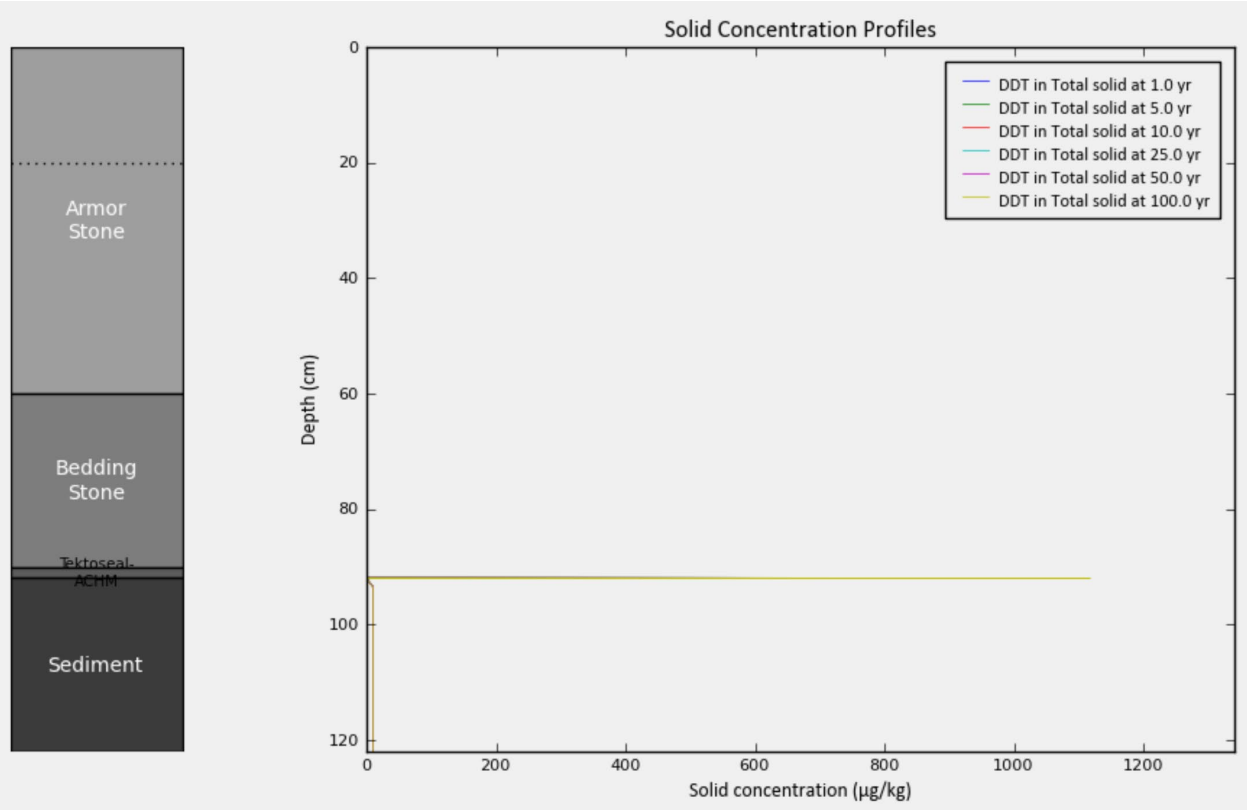

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Chromium (III) in Total solid at 1.0 yr
Chromium (III) in Total solid at 5.0 yr
Chromium (III) in Total solid at 10.0 yr
Chromium (III) in Total solid at 25.0 yr
Chromium (III) in Total solid at 50.0 yr
Chromium (III) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

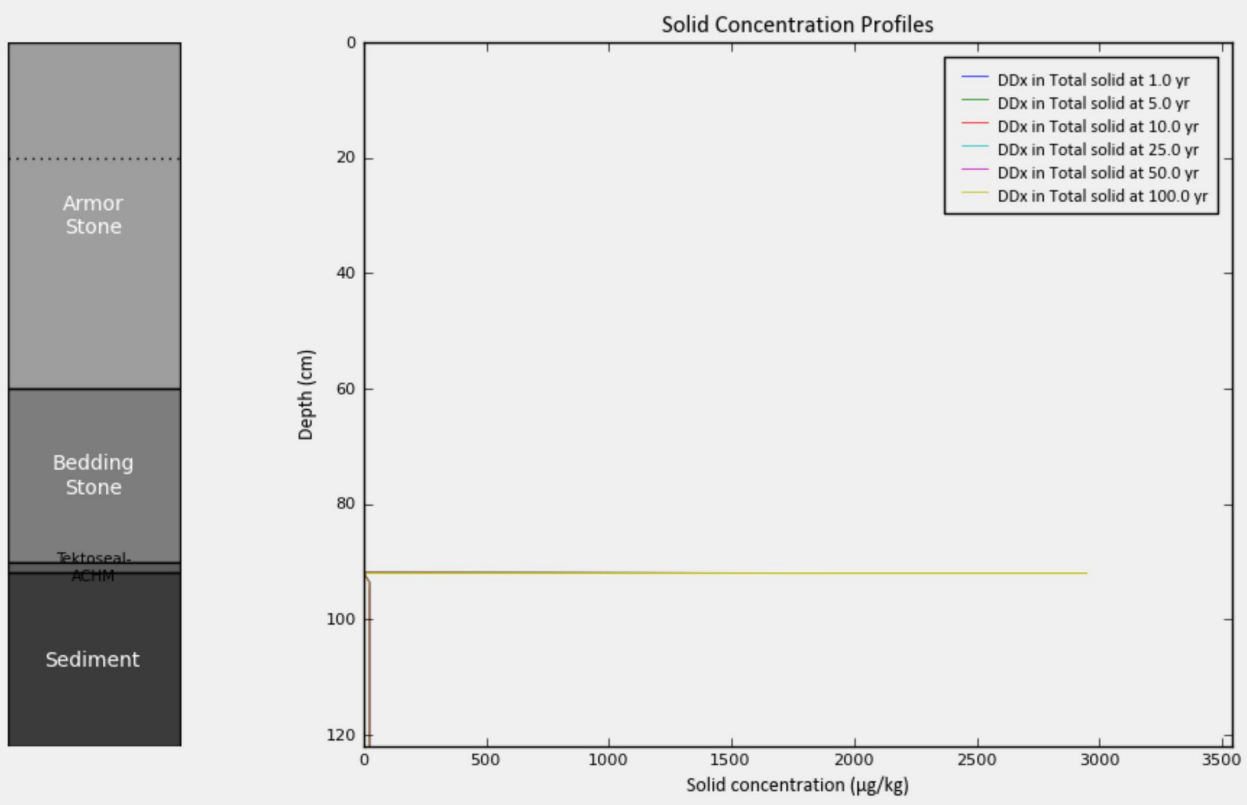

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Chrysene in Total solid at 1.0 yr
Chrysene in Total solid at 5.0 yr
Chrysene in Total solid at 10.0 yr
Chrysene in Total solid at 25.0 yr
Chrysene in Total solid at 50.0 yr
Chrysene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

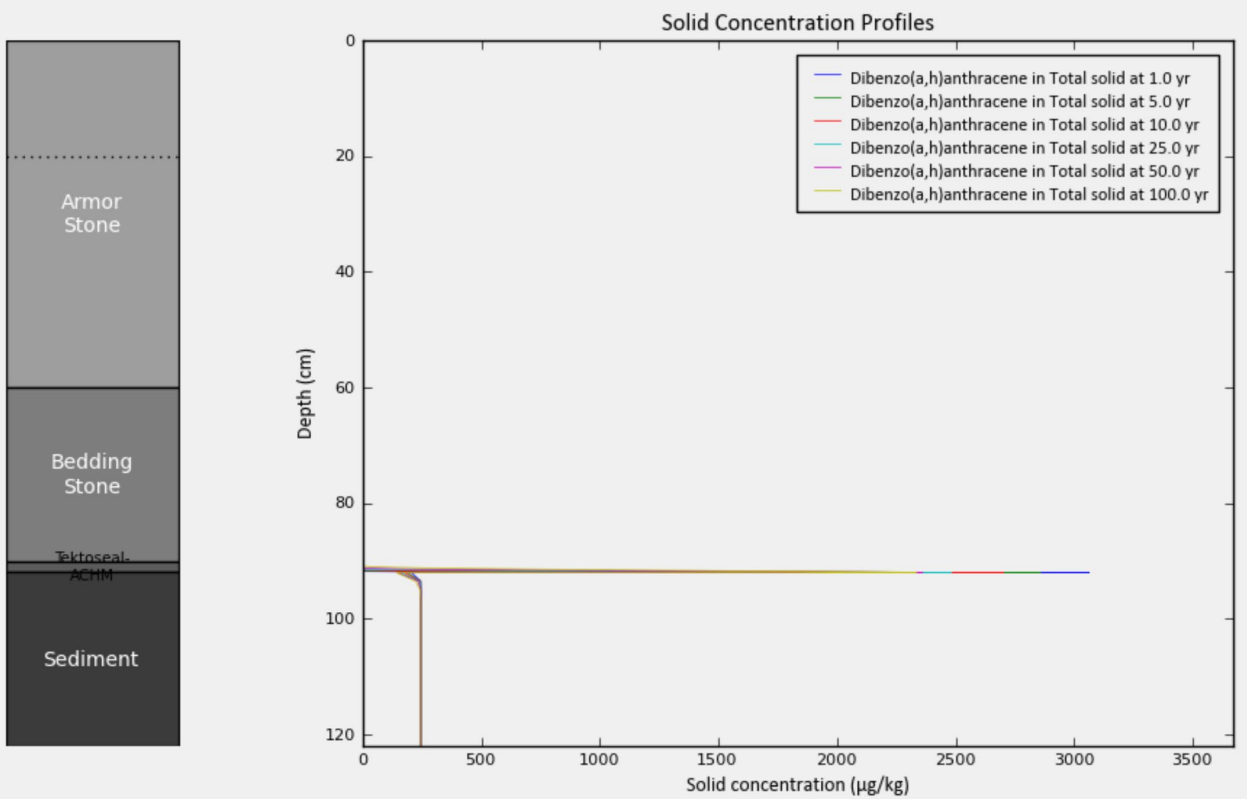

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Copper in Total solid at 1.0 yr
Copper in Total solid at 5.0 yr
Copper in Total solid at 10.0 yr
Copper in Total solid at 25.0 yr
Copper in Total solid at 50.0 yr
Copper in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

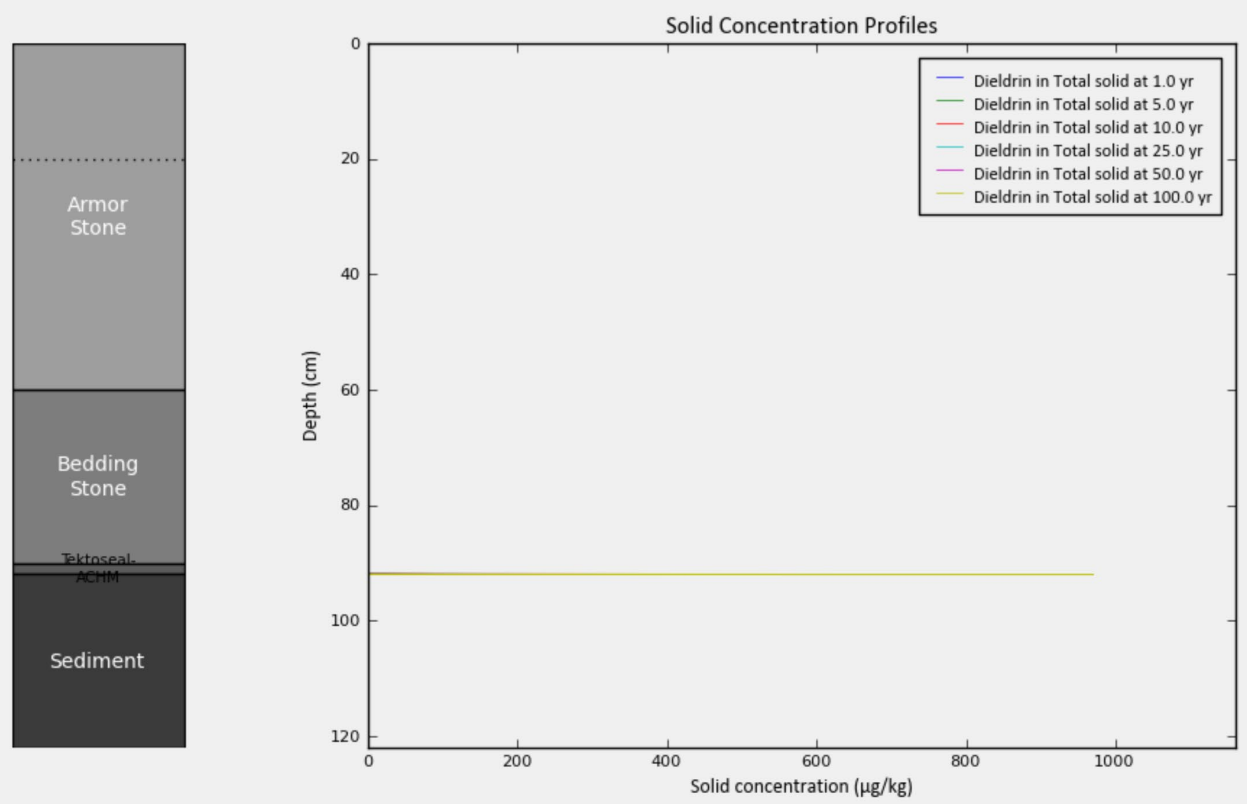

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
DDD in Total solid at 1.0 yr
DDD in Total solid at 5.0 yr
DDD in Total solid at 10.0 yr
DDD in Total solid at 25.0 yr
DDD in Total solid at 50.0 yr
DDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

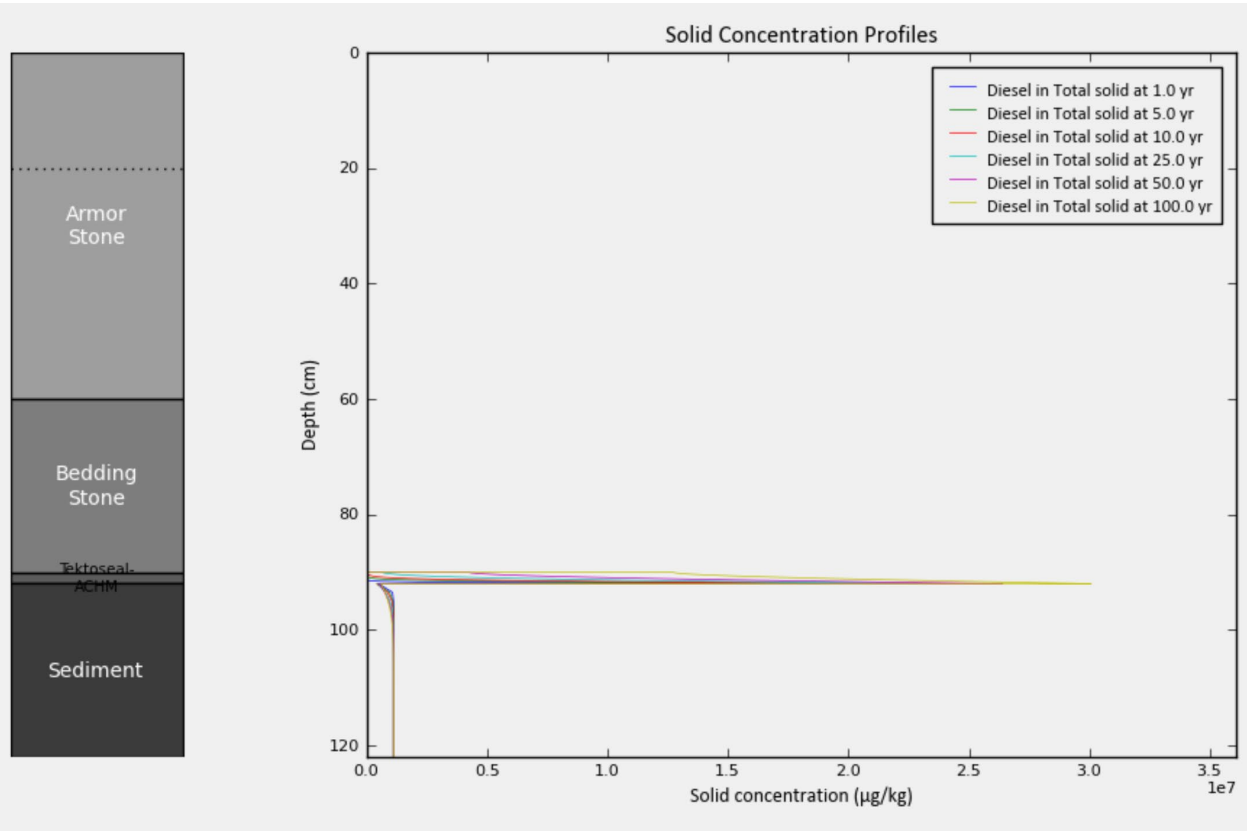

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
DDE in Total solid at 1.0 yr
DDE in Total solid at 5.0 yr
DDE in Total solid at 10.0 yr
DDE in Total solid at 25.0 yr
DDE in Total solid at 50.0 yr
DDE in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

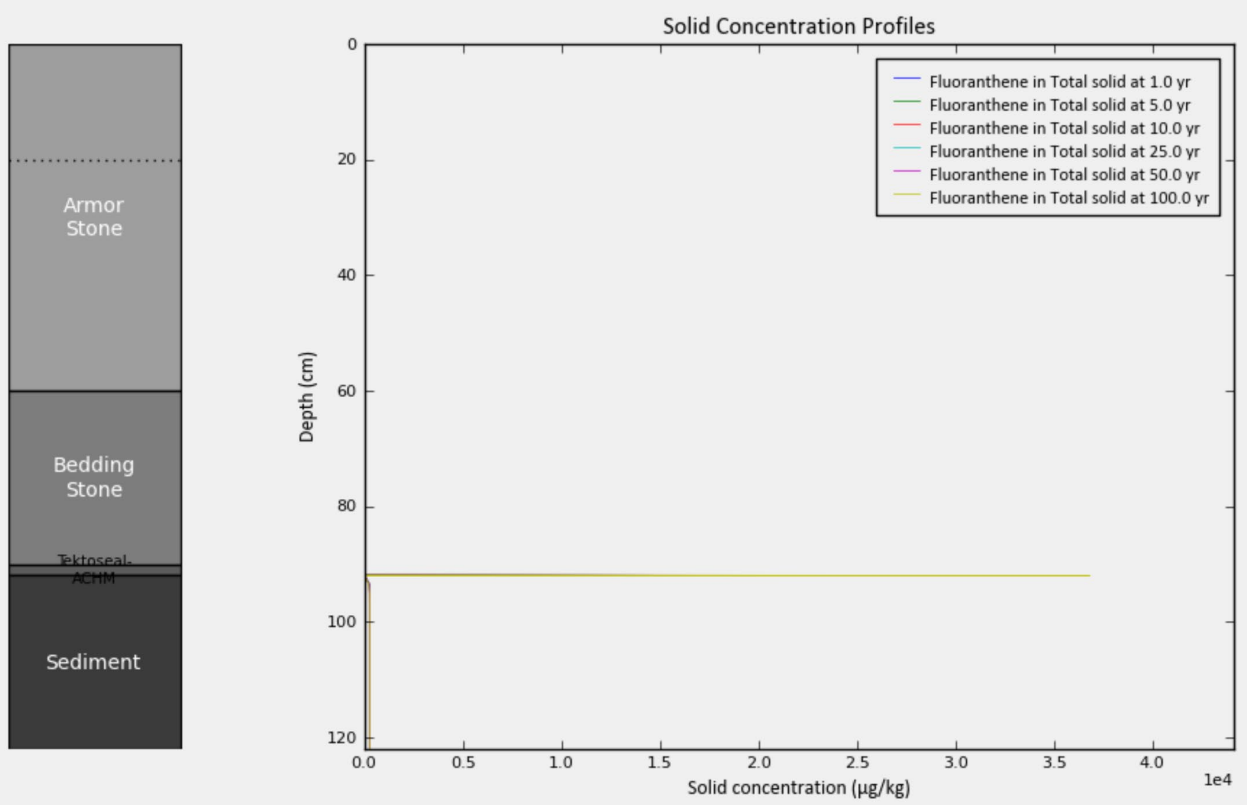

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
DDT in Total solid at 1.0 yr
DDT in Total solid at 5.0 yr
DDT in Total solid at 10.0 yr
DDT in Total solid at 25.0 yr
DDT in Total solid at 50.0 yr
DDT in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

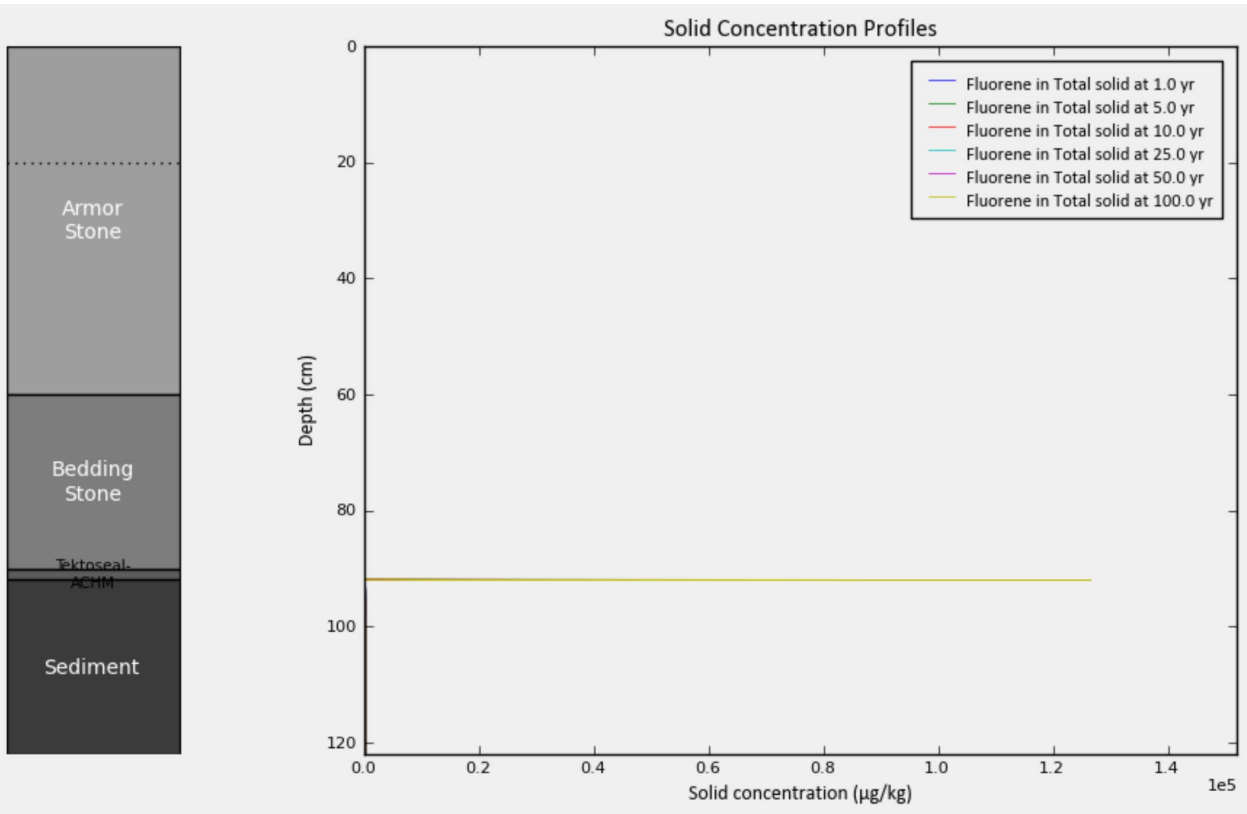

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
DDx in Total solid at 1.0 yr
DDx in Total solid at 5.0 yr
DDx in Total solid at 10.0 yr
DDx in Total solid at 25.0 yr
DDx in Total solid at 50.0 yr
DDx in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

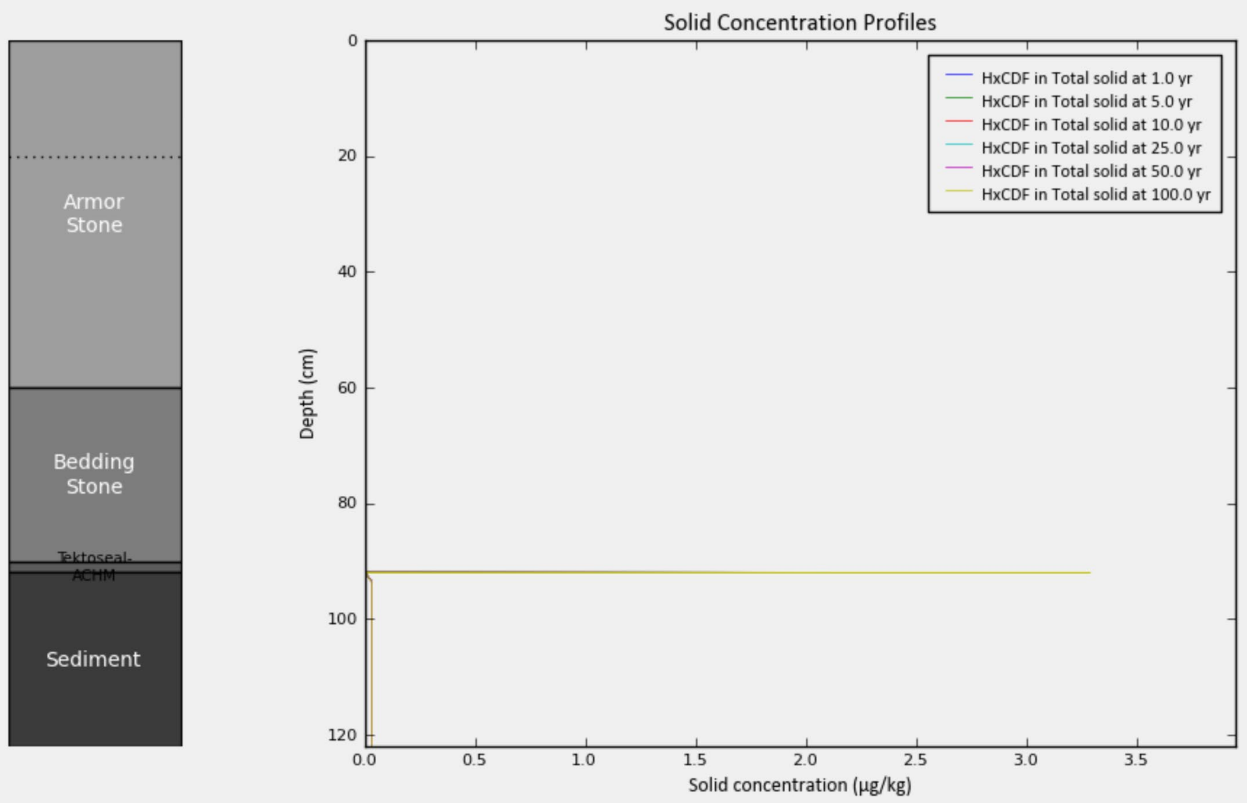

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Dibenzo(a,h)anthracene in Total solid at 1.0 yr
Dibenzo(a,h)anthracene in Total solid at 5.0 yr
Dibenzo(a,h)anthracene in Total solid at 10.0 yr
Dibenzo(a,h)anthracene in Total solid at 25.0 yr
Dibenzo(a,h)anthracene in Total solid at 50.0 yr
Dibenzo(a,h)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

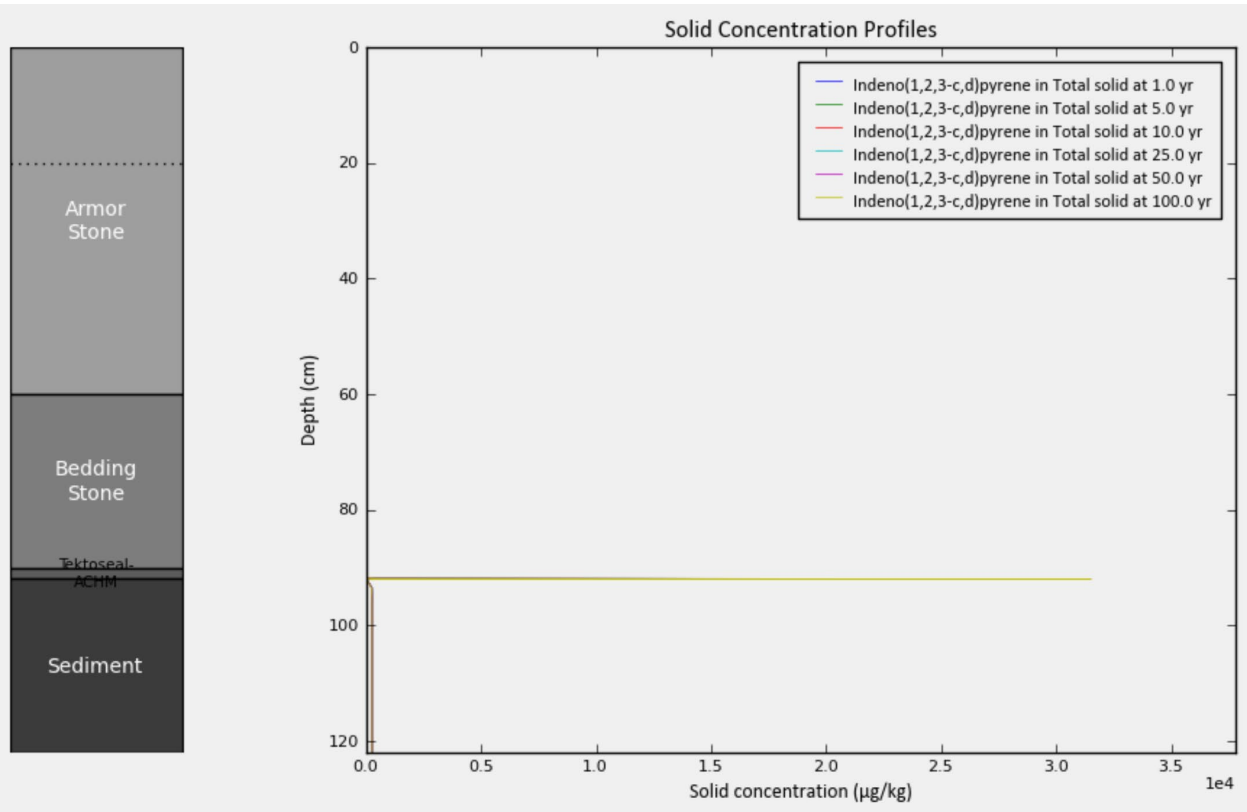

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Dieldrin in Total solid at 1.0 yr
Dieldrin in Total solid at 5.0 yr
Dieldrin in Total solid at 10.0 yr
Dieldrin in Total solid at 25.0 yr
Dieldrin in Total solid at 50.0 yr
Dieldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

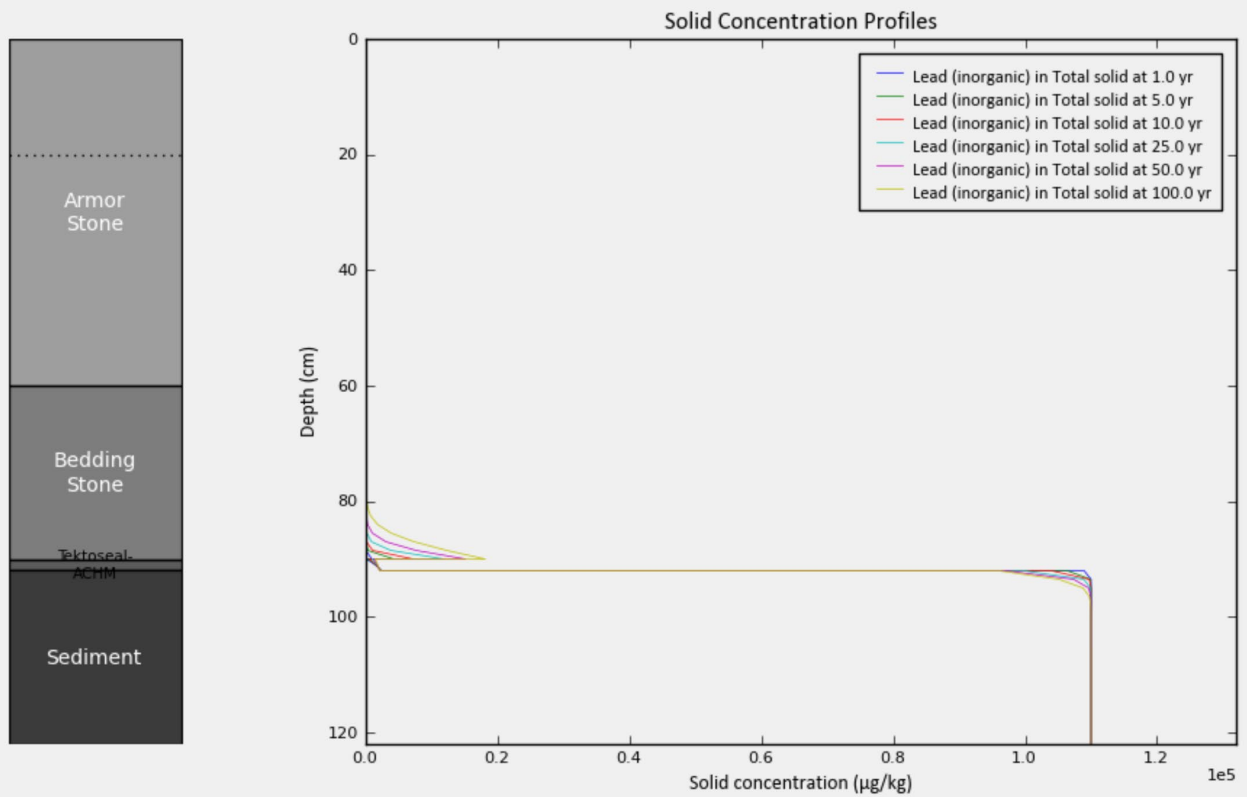

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Diesel in Total solid at 1.0 yr
Diesel in Total solid at 5.0 yr
Diesel in Total solid at 10.0 yr
Diesel in Total solid at 25.0 yr
Diesel in Total solid at 50.0 yr
Diesel in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e7

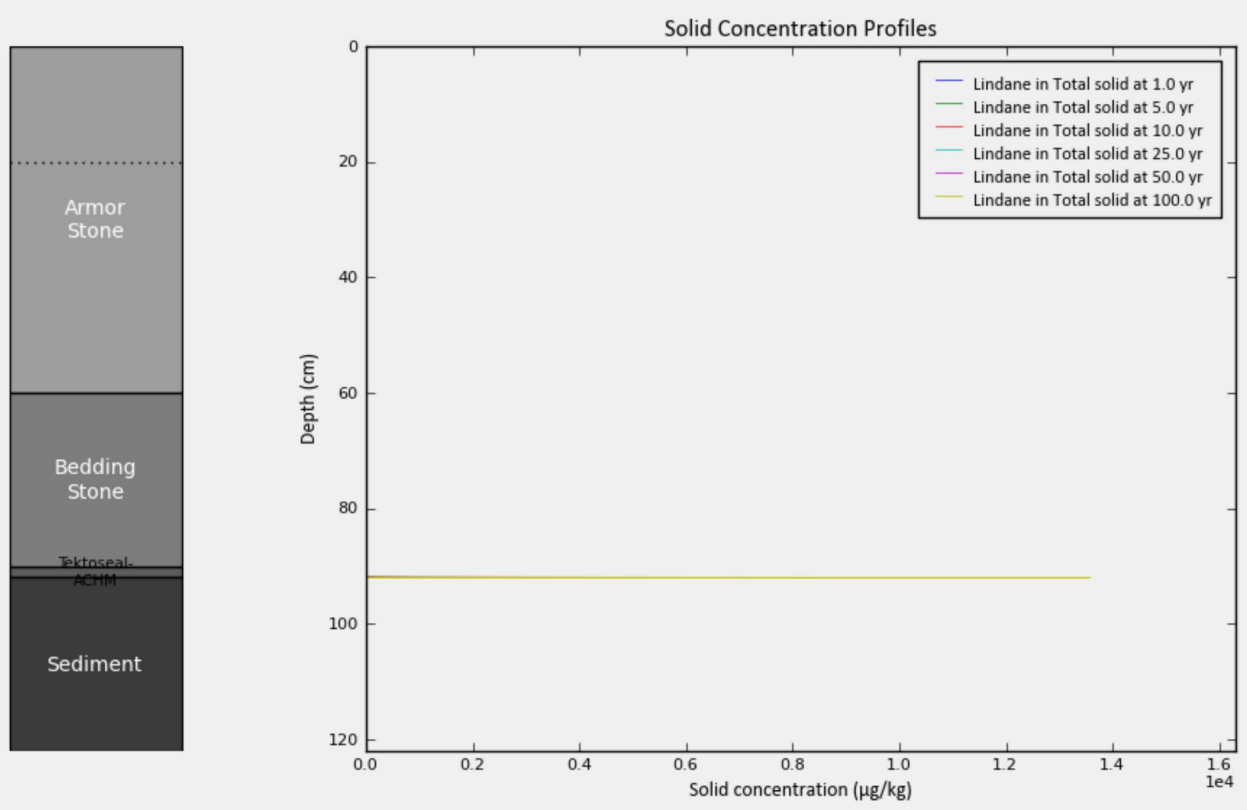

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Fluoranthene in Total solid at 1.0 yr
Fluoranthene in Total solid at 5.0 yr
Fluoranthene in Total solid at 10.0 yr
Fluoranthene in Total solid at 25.0 yr
Fluoranthene in Total solid at 50.0 yr
Fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

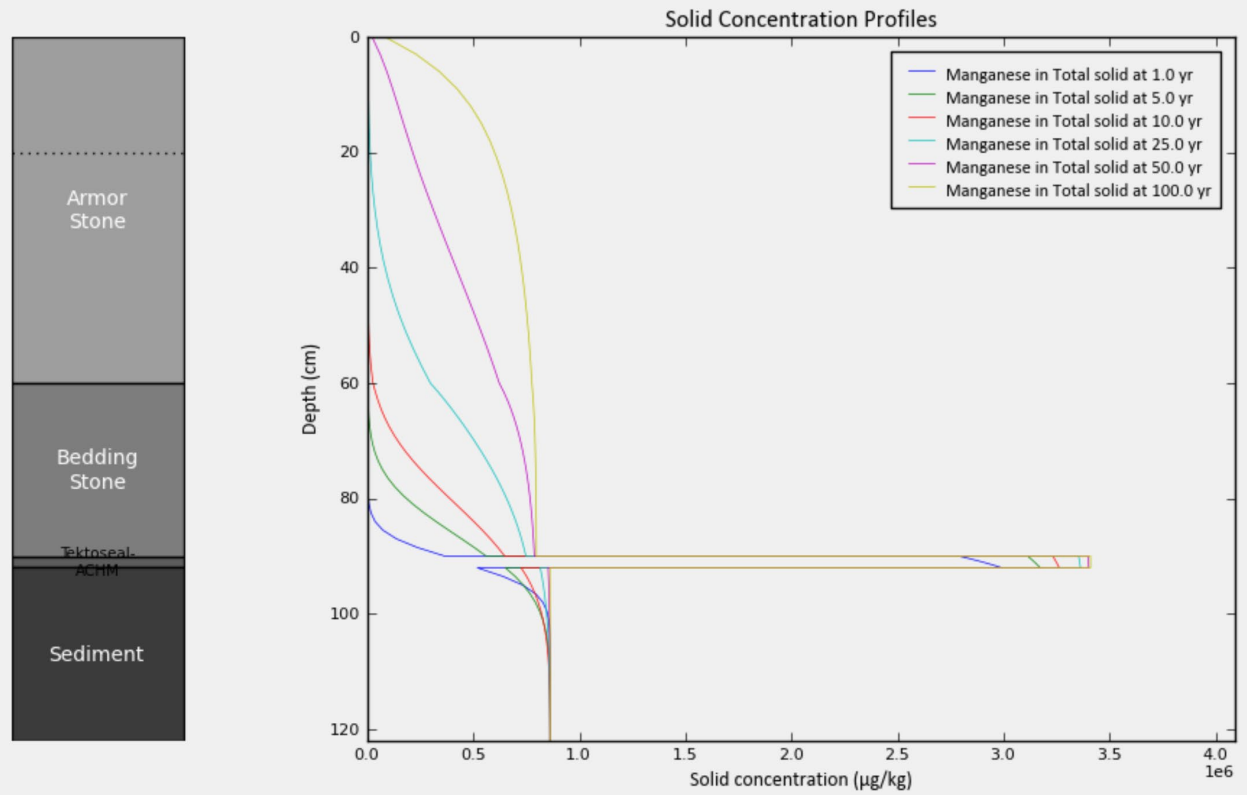

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Fluorene in Total solid at 1.0 yr
Fluorene in Total solid at 5.0 yr
Fluorene in Total solid at 10.0 yr
Fluorene in Total solid at 25.0 yr
Fluorene in Total solid at 50.0 yr
Fluorene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

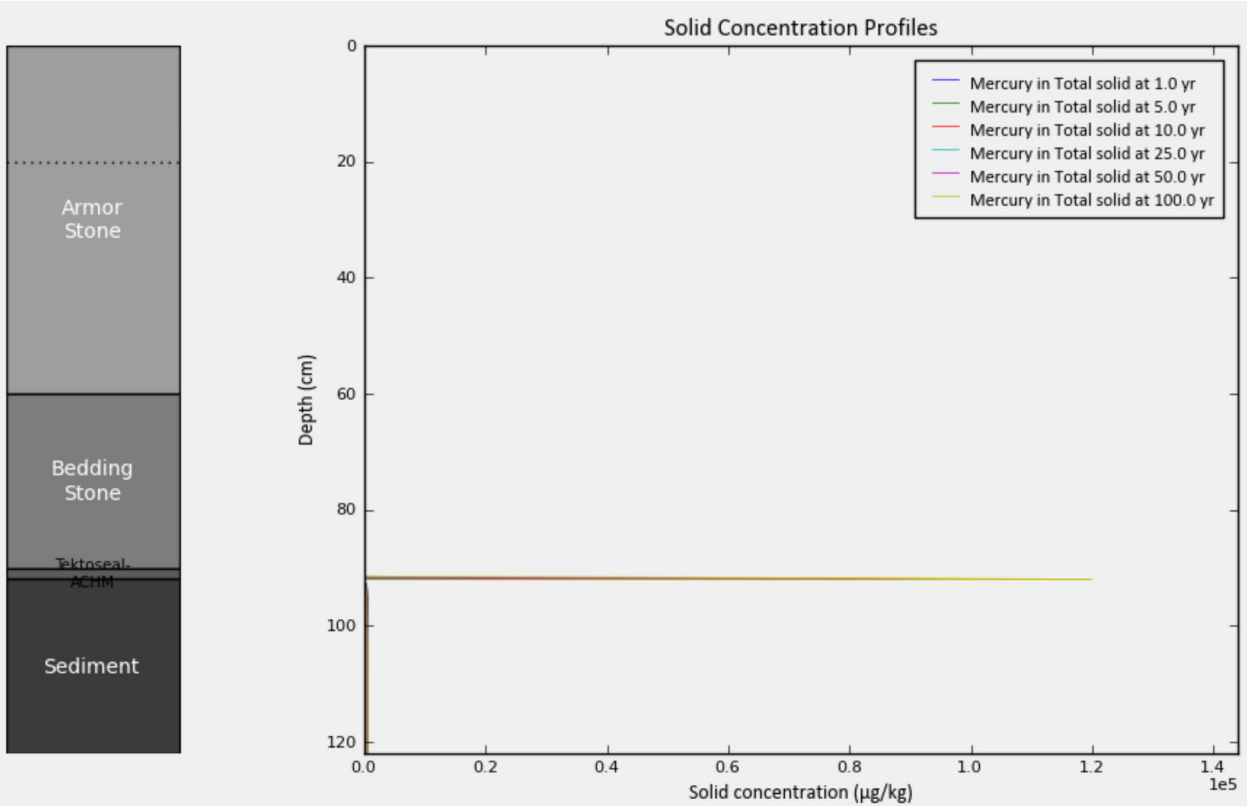

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
HxCDF in Total solid at 1.0 yr
HxCDF in Total solid at 5.0 yr
HxCDF in Total solid at 10.0 yr
HxCDF in Total solid at 25.0 yr
HxCDF in Total solid at 50.0 yr
HxCDF in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

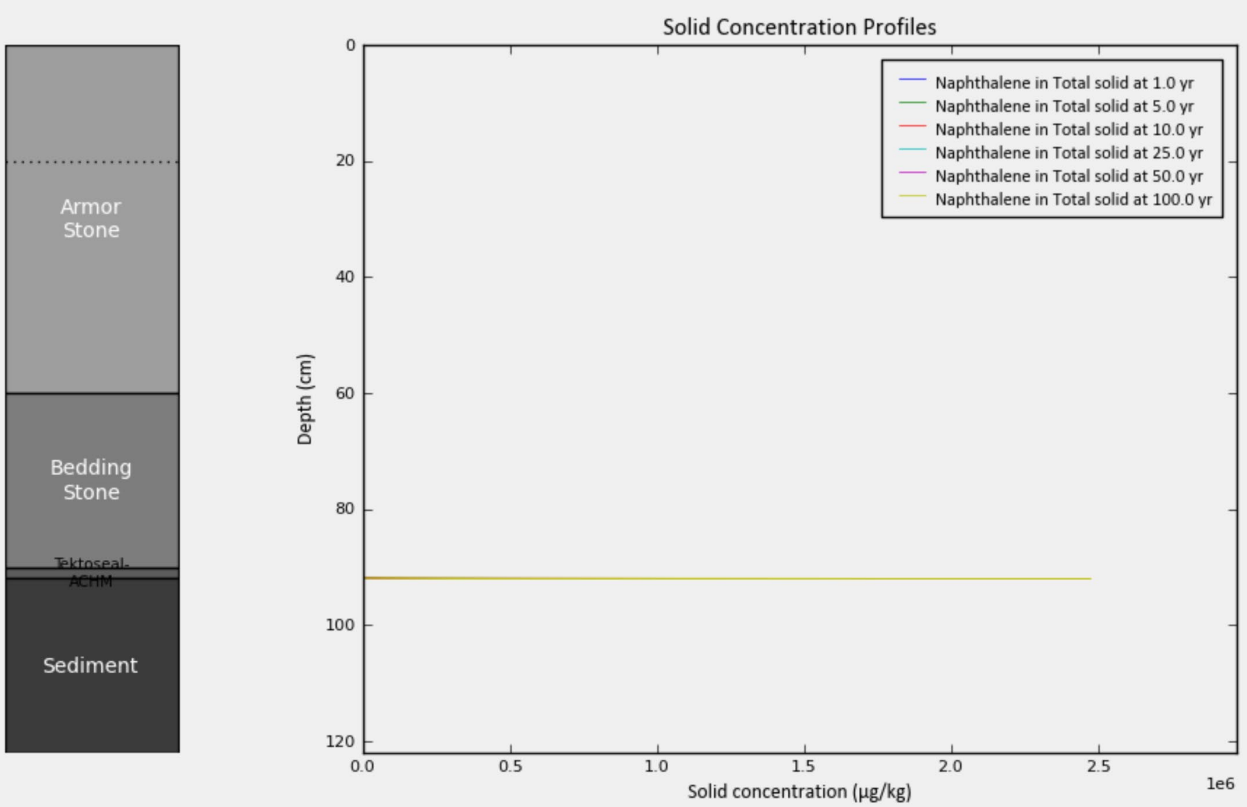

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Indeno(1,2,3-c,d)pyrene in Total solid at 1.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 5.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 10.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 25.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 50.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

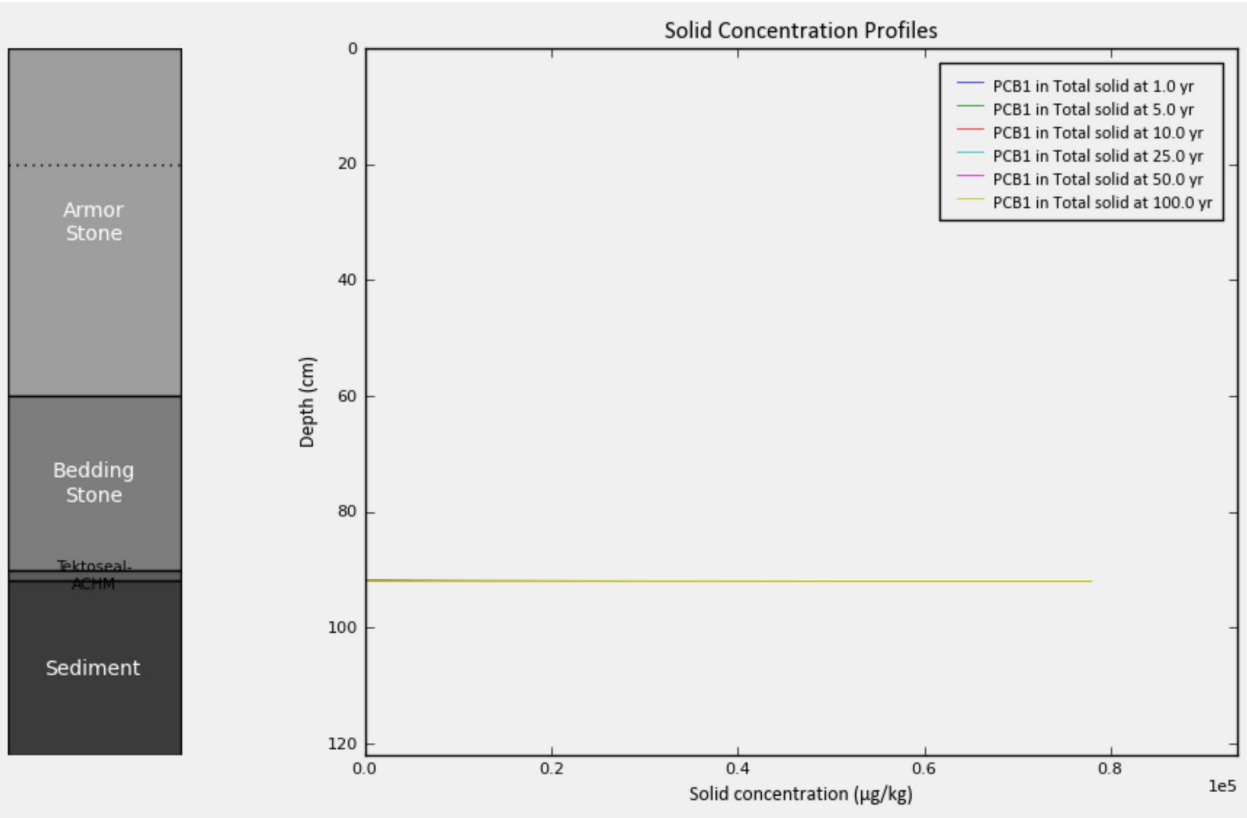

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Lead (inorganic) in Total solid at 1.0 yr
Lead (inorganic) in Total solid at 5.0 yr
Lead (inorganic) in Total solid at 10.0 yr
Lead (inorganic) in Total solid at 25.0 yr
Lead (inorganic) in Total solid at 50.0 yr
Lead (inorganic) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

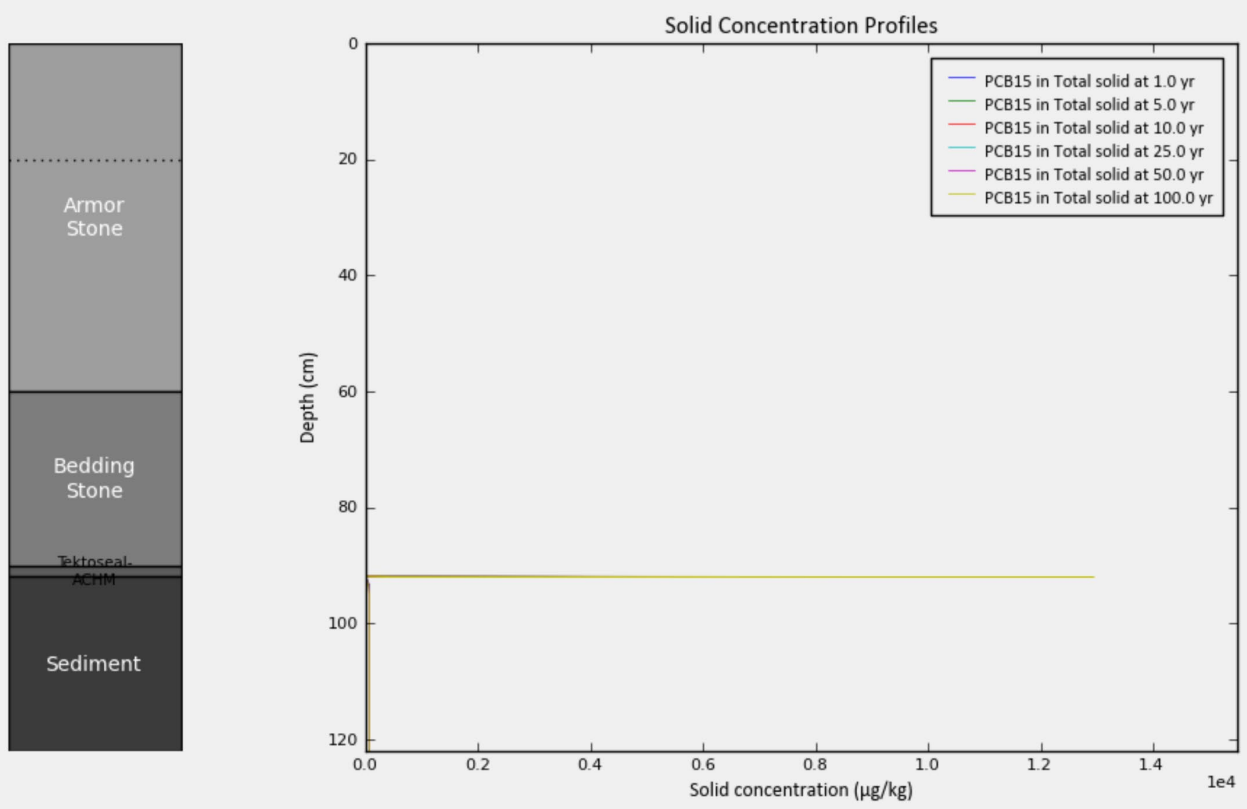

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Lindane in Total solid at 1.0 yr
Lindane in Total solid at 5.0 yr
Lindane in Total solid at 10.0 yr
Lindane in Total solid at 25.0 yr
Lindane in Total solid at 50.0 yr
Lindane in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

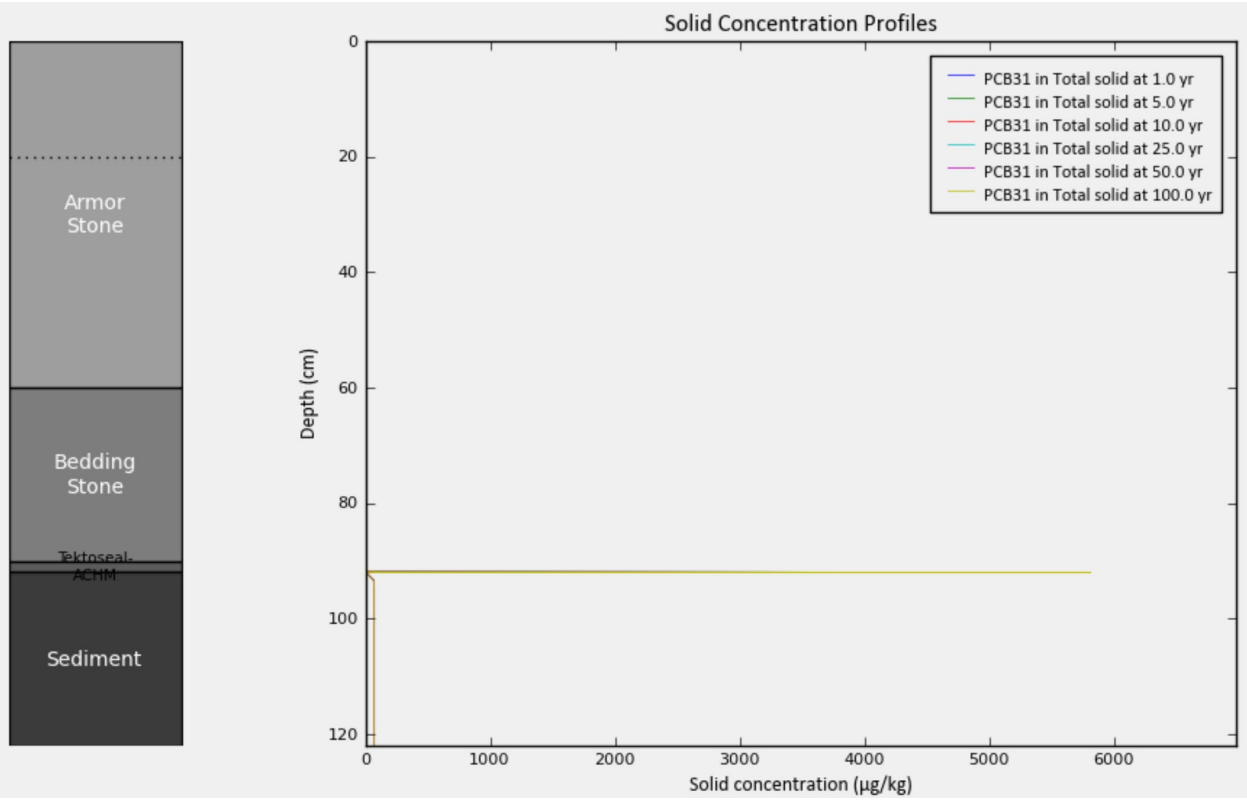

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Manganese in Total solid at 1.0 yr
Manganese in Total solid at 5.0 yr
Manganese in Total solid at 10.0 yr
Manganese in Total solid at 25.0 yr
Manganese in Total solid at 50.0 yr
Manganese in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

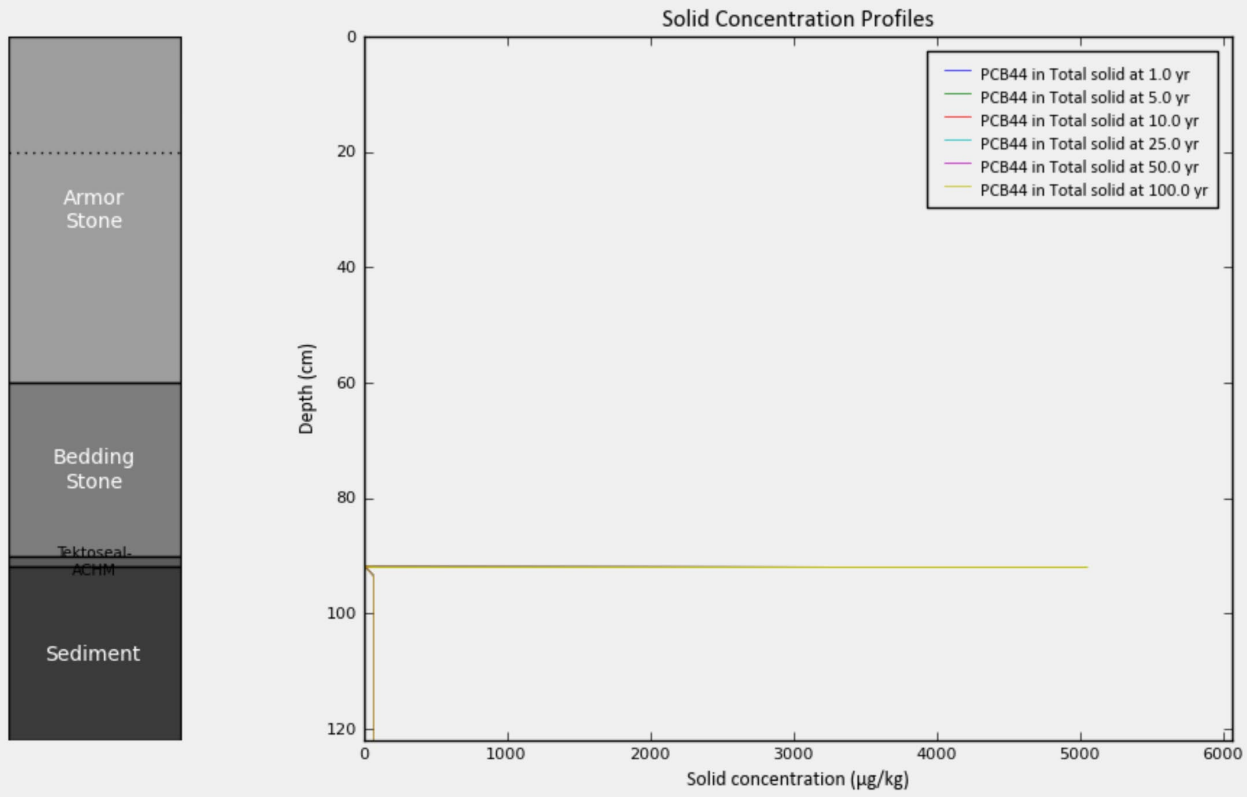

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Mercury in Total solid at 1.0 yr
Mercury in Total solid at 5.0 yr
Mercury in Total solid at 10.0 yr
Mercury in Total solid at 25.0 yr
Mercury in Total solid at 50.0 yr
Mercury in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

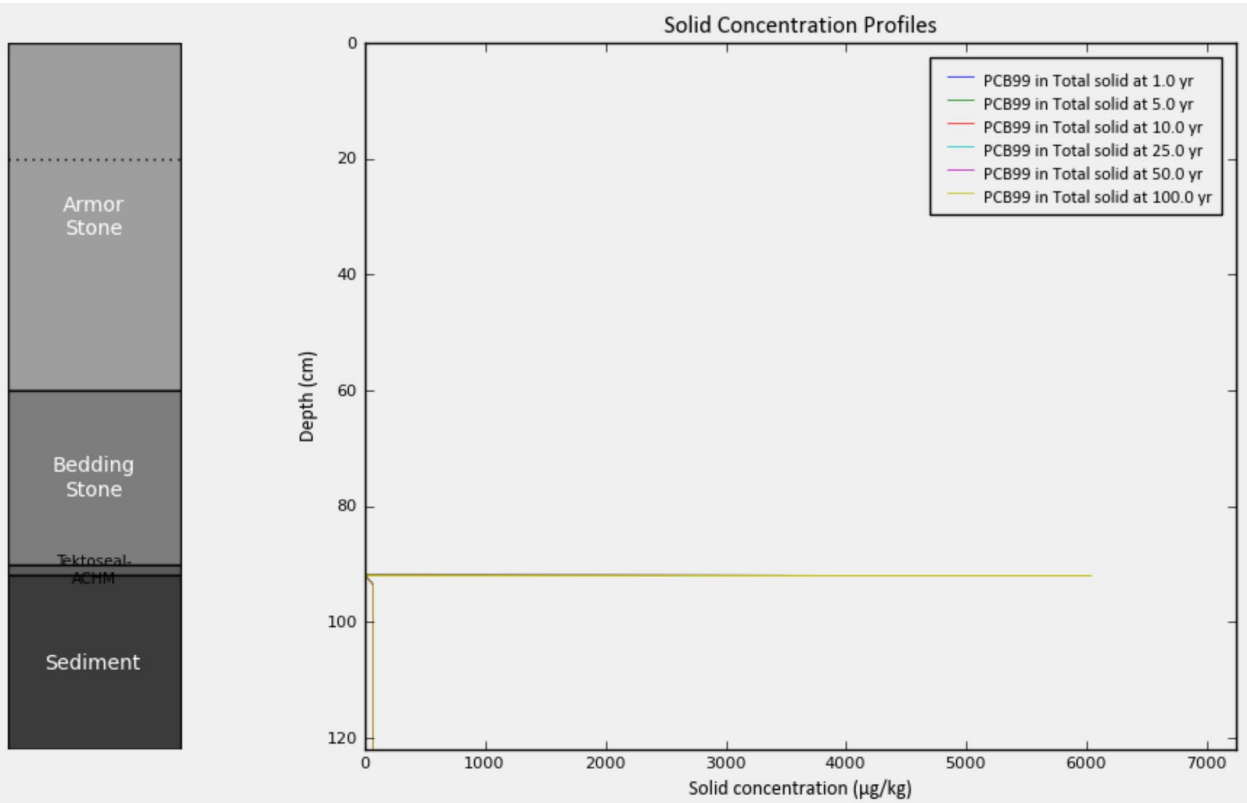

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Naphthalene in Total solid at 1.0 yr
Naphthalene in Total solid at 5.0 yr
Naphthalene in Total solid at 10.0 yr
Naphthalene in Total solid at 25.0 yr
Naphthalene in Total solid at 50.0 yr
Naphthalene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
1e6
Solid concentration (µg/kg)

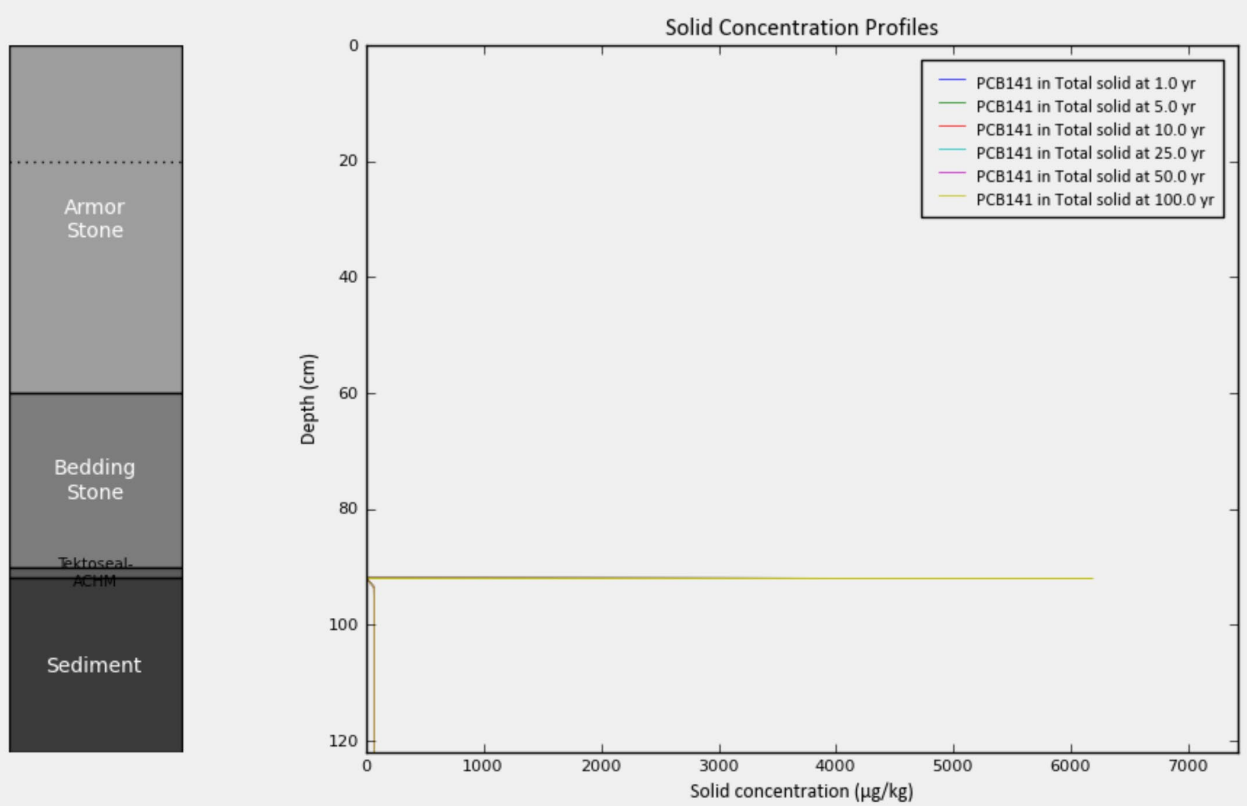

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB1 in Total solid at 1.0 yr
PCB1 in Total solid at 5.0 yr
PCB1 in Total solid at 10.0 yr
PCB1 in Total solid at 25.0 yr
PCB1 in Total solid at 50.0 yr
PCB1 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1e5
Solid concentration (µg/kg)

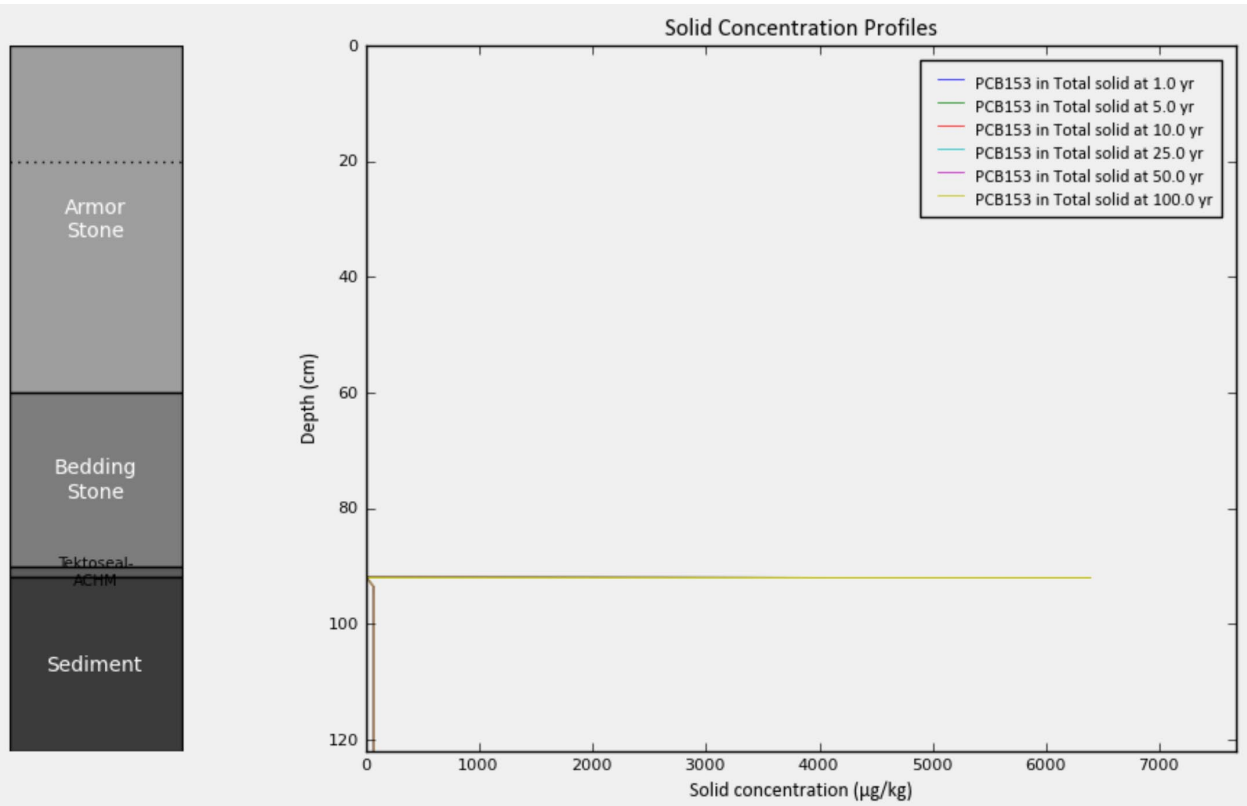

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB15 in Total solid at 1.0 yr
PCB15 in Total solid at 5.0 yr
PCB15 in Total solid at 10.0 yr
PCB15 in Total solid at 25.0 yr
PCB15 in Total solid at 50.0 yr
PCB15 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

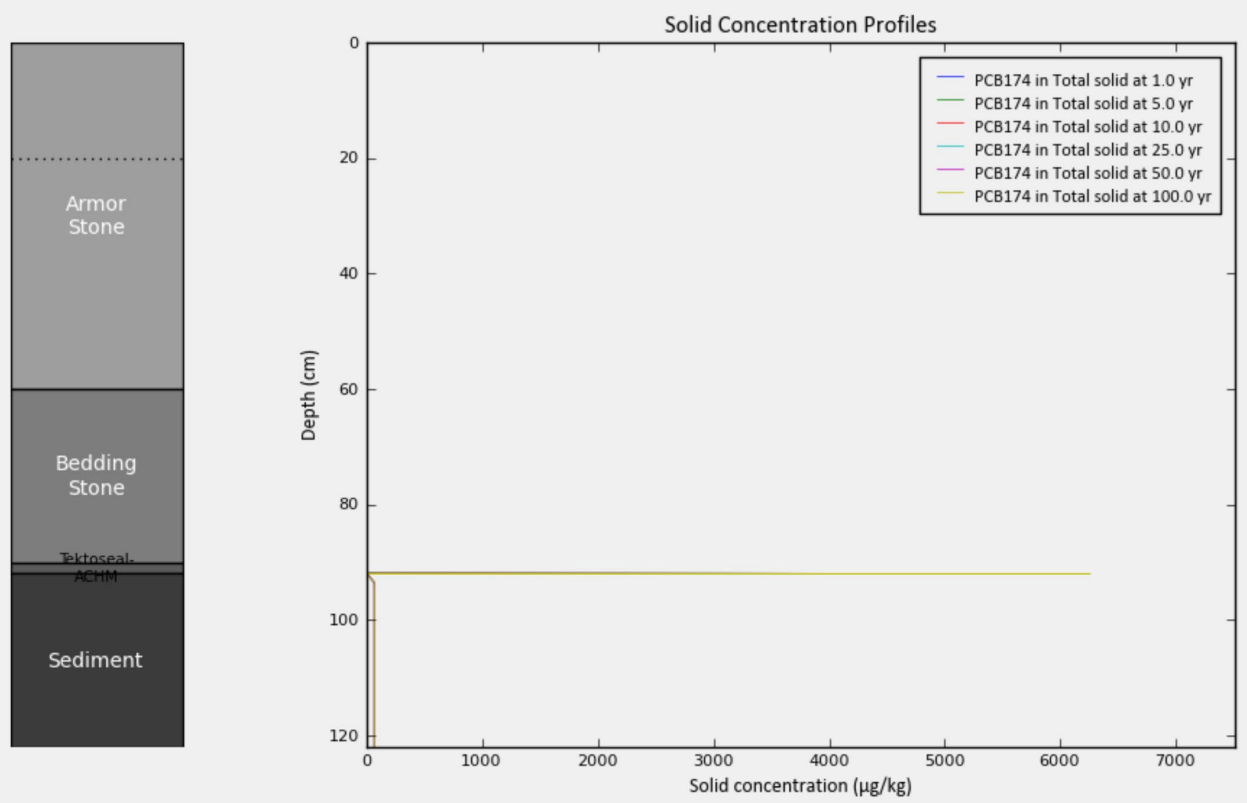

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB31 in Total solid at 1.0 yr
PCB31 in Total solid at 5.0 yr
PCB31 in Total solid at 10.0 yr
PCB31 in Total solid at 25.0 yr
PCB31 in Total solid at 50.0 yr
PCB31 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

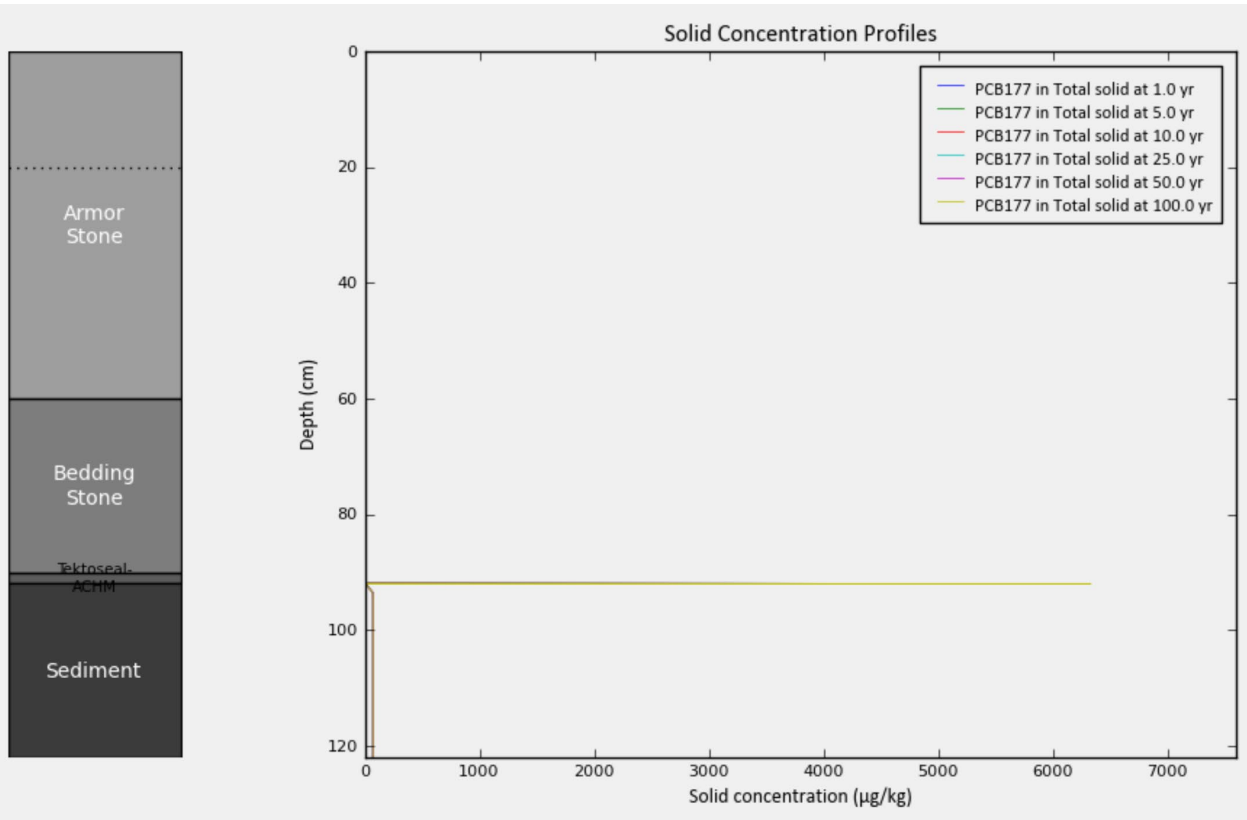

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB44 in Total solid at 1.0 yr
PCB44 in Total solid at 5.0 yr
PCB44 in Total solid at 10.0 yr
PCB44 in Total solid at 25.0 yr
PCB44 in Total solid at 50.0 yr
PCB44 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

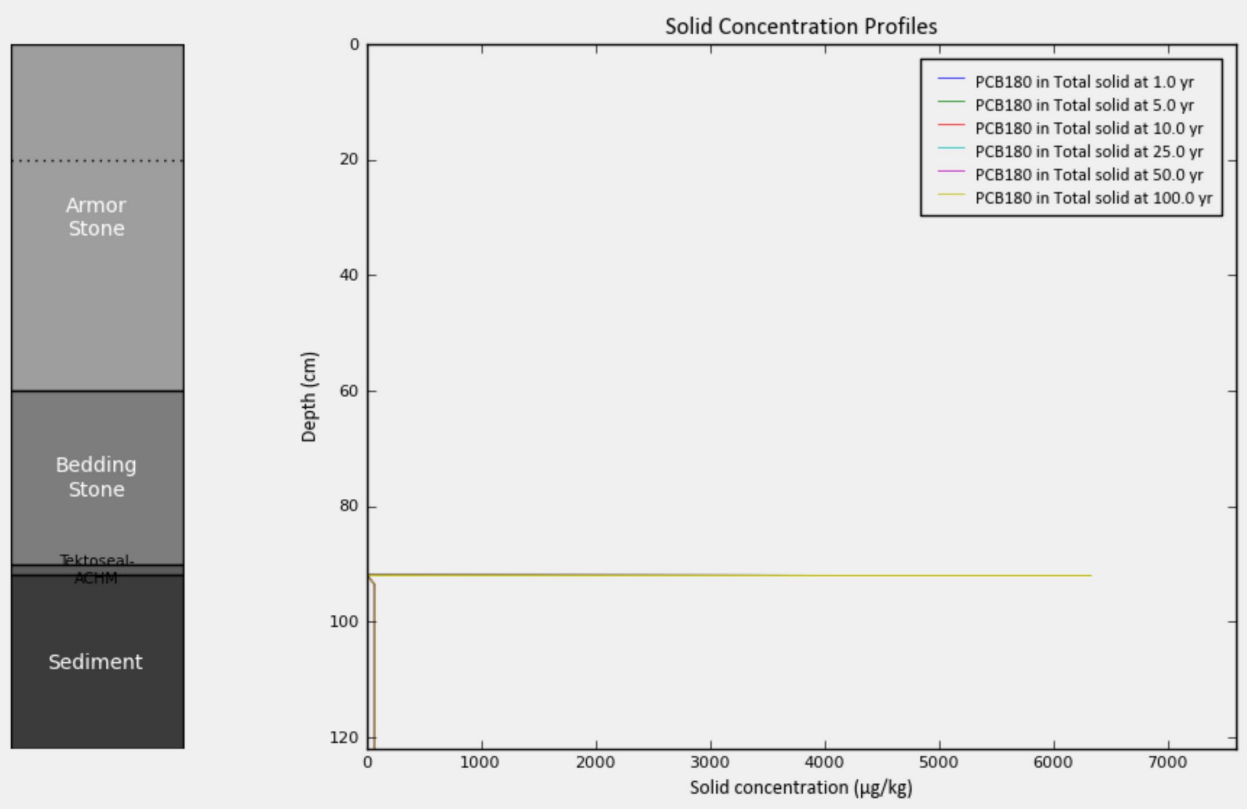

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB99 in Total solid at 1.0 yr
PCB99 in Total solid at 5.0 yr
PCB99 in Total solid at 10.0 yr
PCB99 in Total solid at 25.0 yr
PCB99 in Total solid at 50.0 yr
PCB99 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

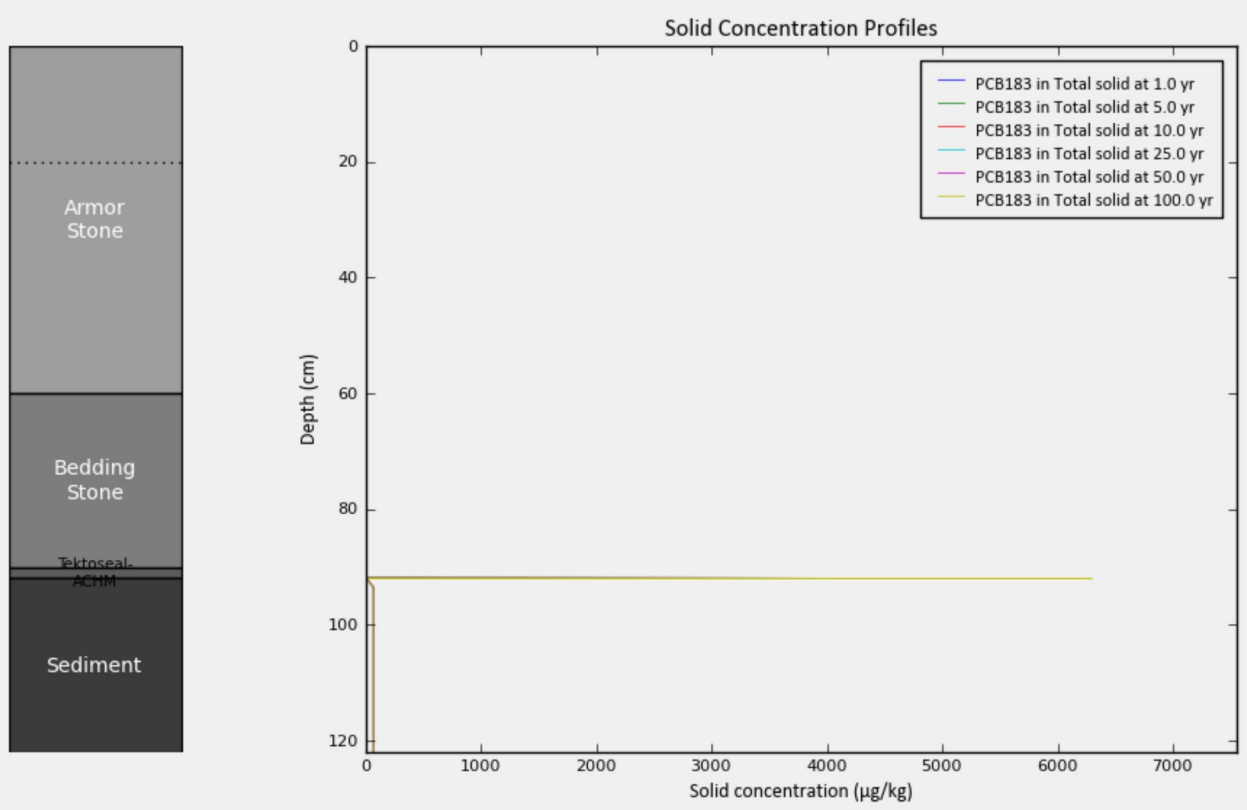

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB141 in Total solid at 1.0 yr
PCB141 in Total solid at 5.0 yr
PCB141 in Total solid at 10.0 yr
PCB141 in Total solid at 25.0 yr
PCB141 in Total solid at 50.0 yr
PCB141 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

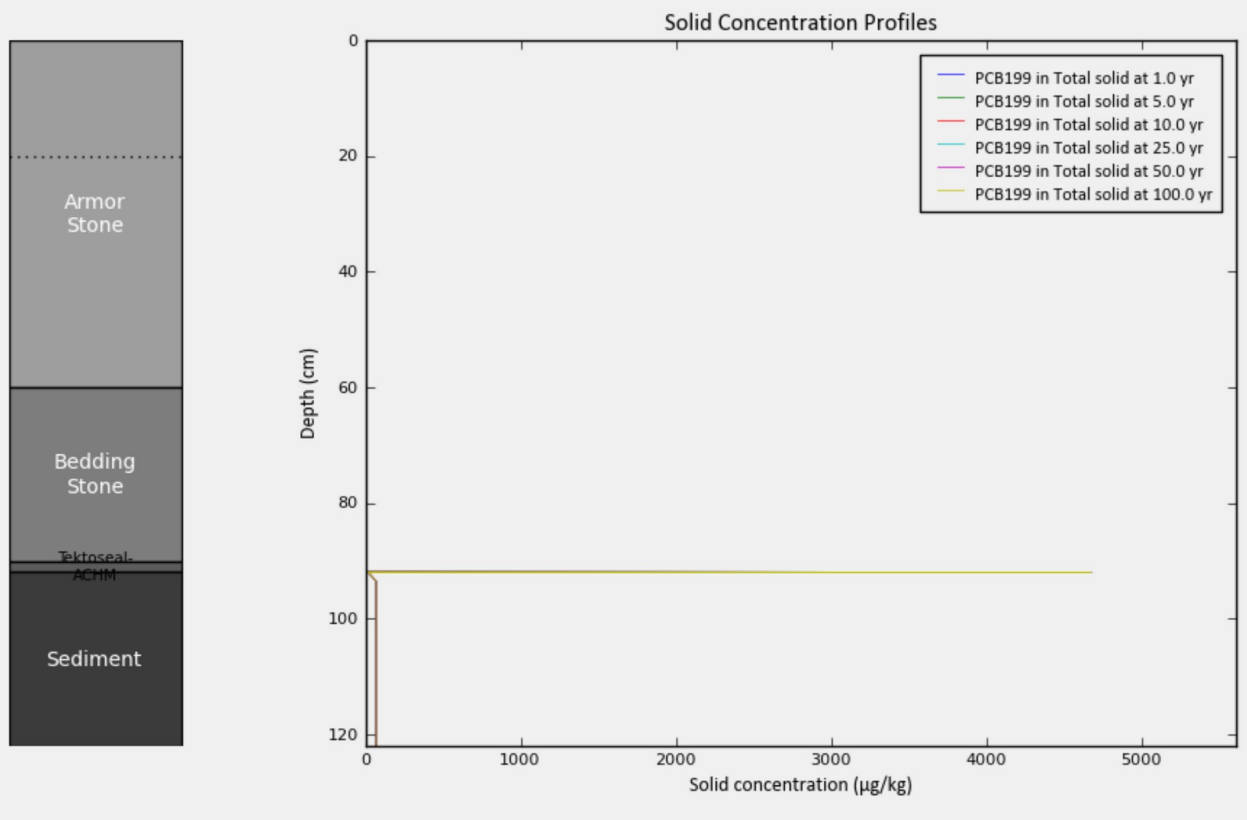

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB153 in Total solid at 1.0 yr
PCB153 in Total solid at 5.0 yr
PCB153 in Total solid at 10.0 yr
PCB153 in Total solid at 25.0 yr
PCB153 in Total solid at 50.0 yr
PCB153 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

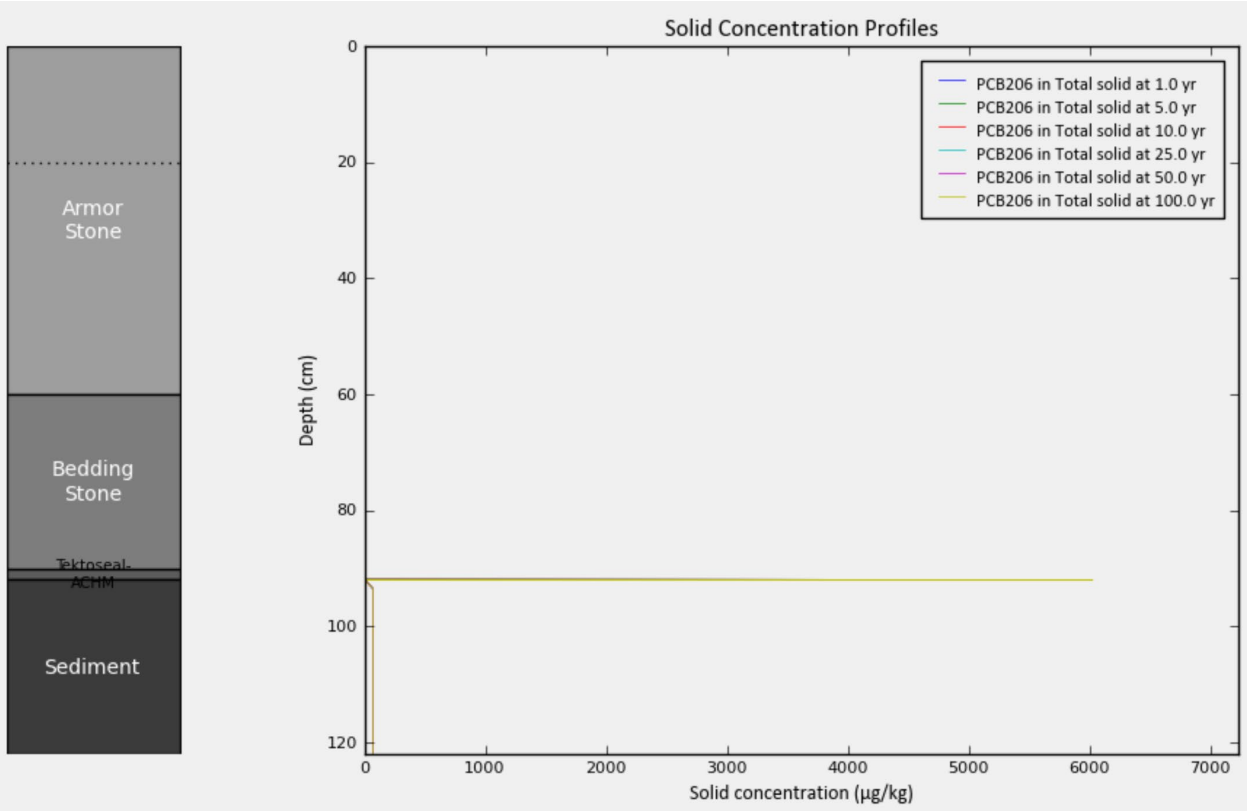

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB174 in Total solid at 1.0 yr
PCB174 in Total solid at 5.0 yr
PCB174 in Total solid at 10.0 yr
PCB174 in Total solid at 25.0 yr
PCB174 in Total solid at 50.0 yr
PCB174 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

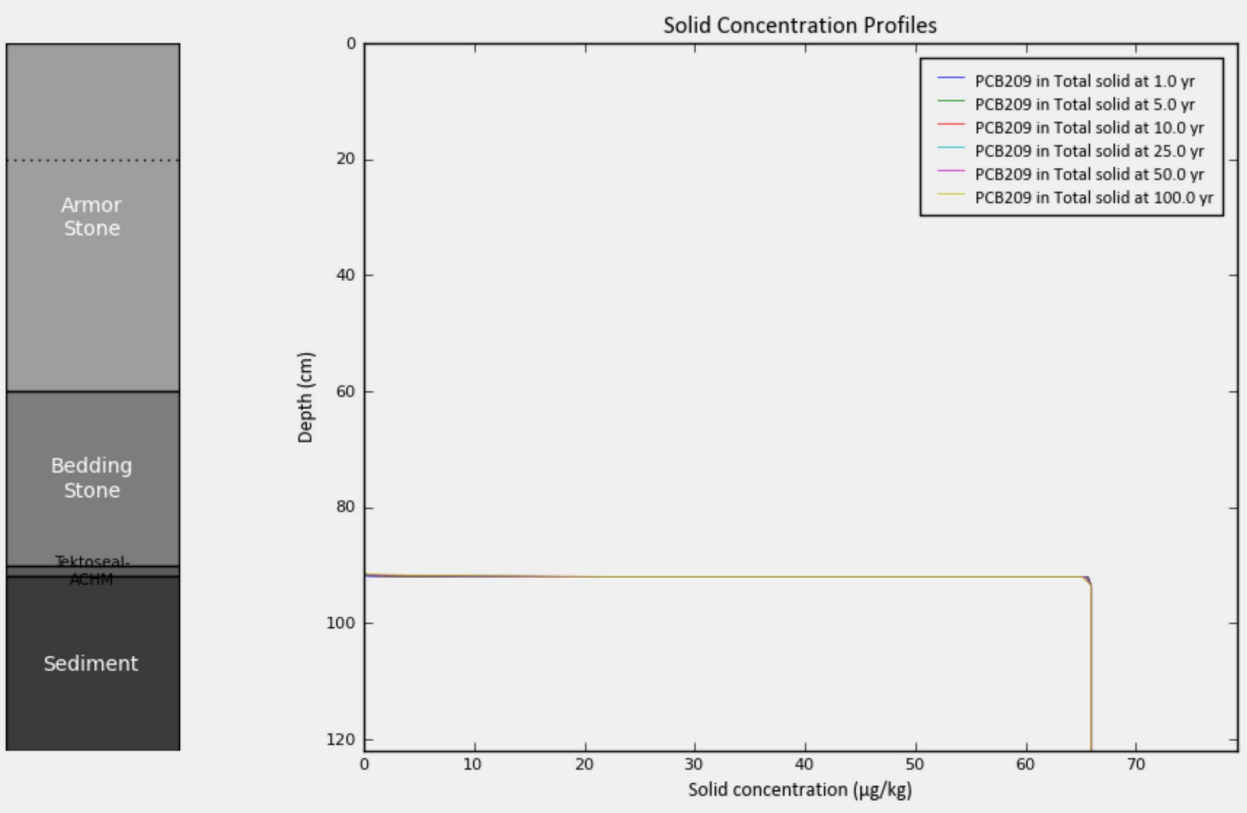

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB177 in Total solid at 1.0 yr
PCB177 in Total solid at 5.0 yr
PCB177 in Total solid at 10.0 yr
PCB177 in Total solid at 25.0 yr
PCB177 in Total solid at 50.0 yr
PCB177 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

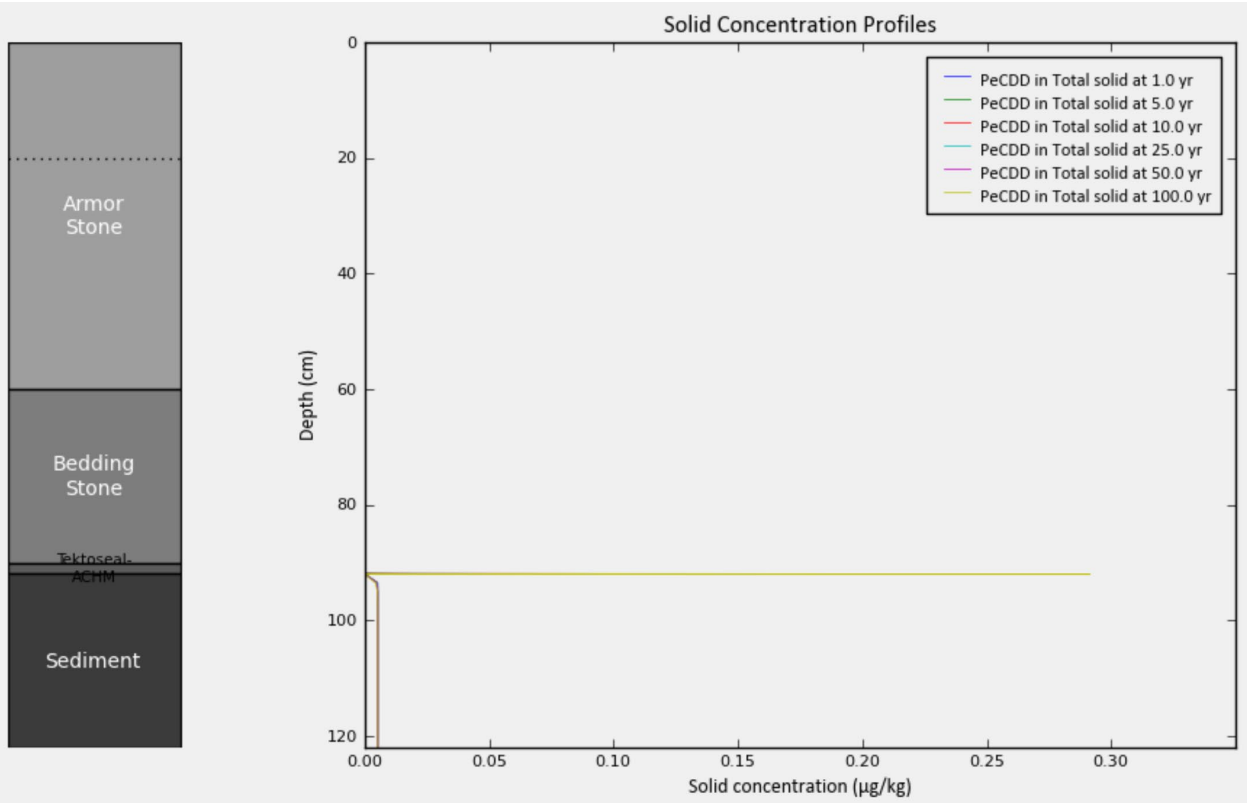

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB180 in Total solid at 1.0 yr
PCB180 in Total solid at 5.0 yr
PCB180 in Total solid at 10.0 yr
PCB180 in Total solid at 25.0 yr
PCB180 in Total solid at 50.0 yr
PCB180 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

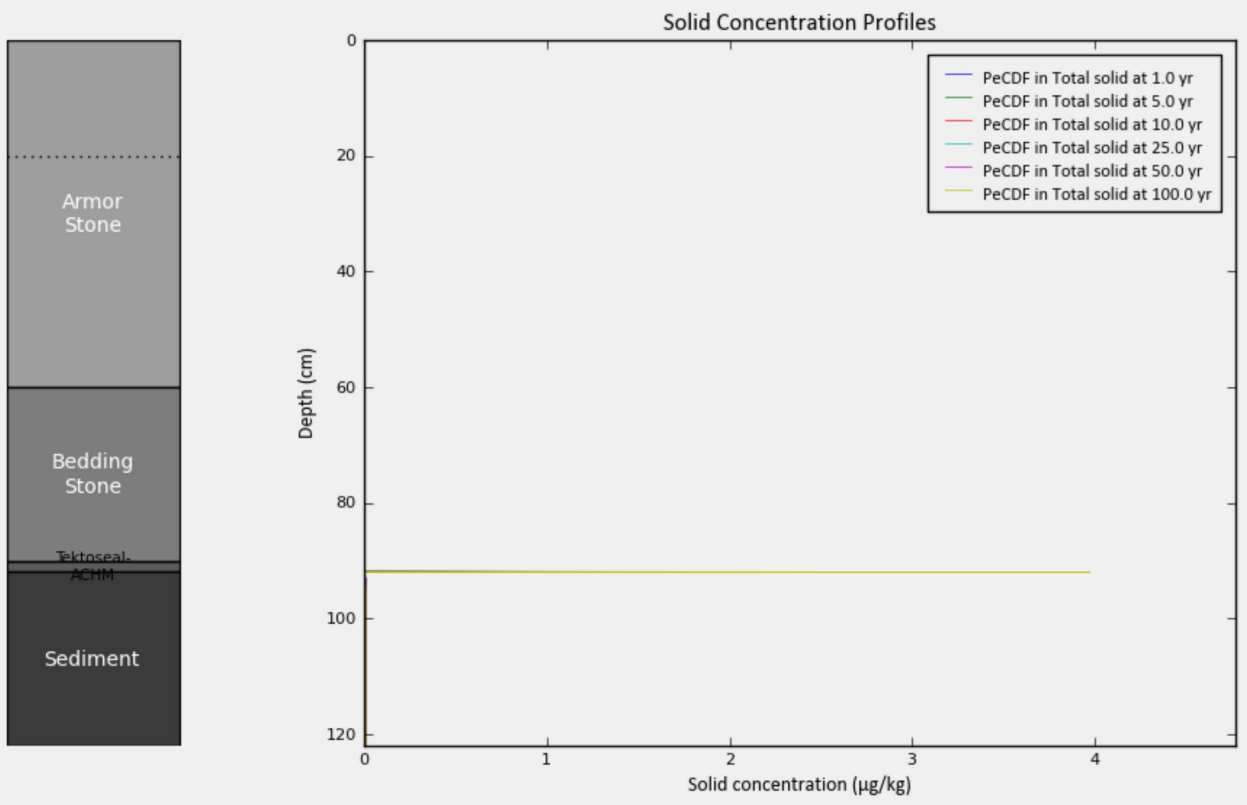

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB183 in Total solid at 1.0 yr
PCB183 in Total solid at 5.0 yr
PCB183 in Total solid at 10.0 yr
PCB183 in Total solid at 25.0 yr
PCB183 in Total solid at 50.0 yr
PCB183 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

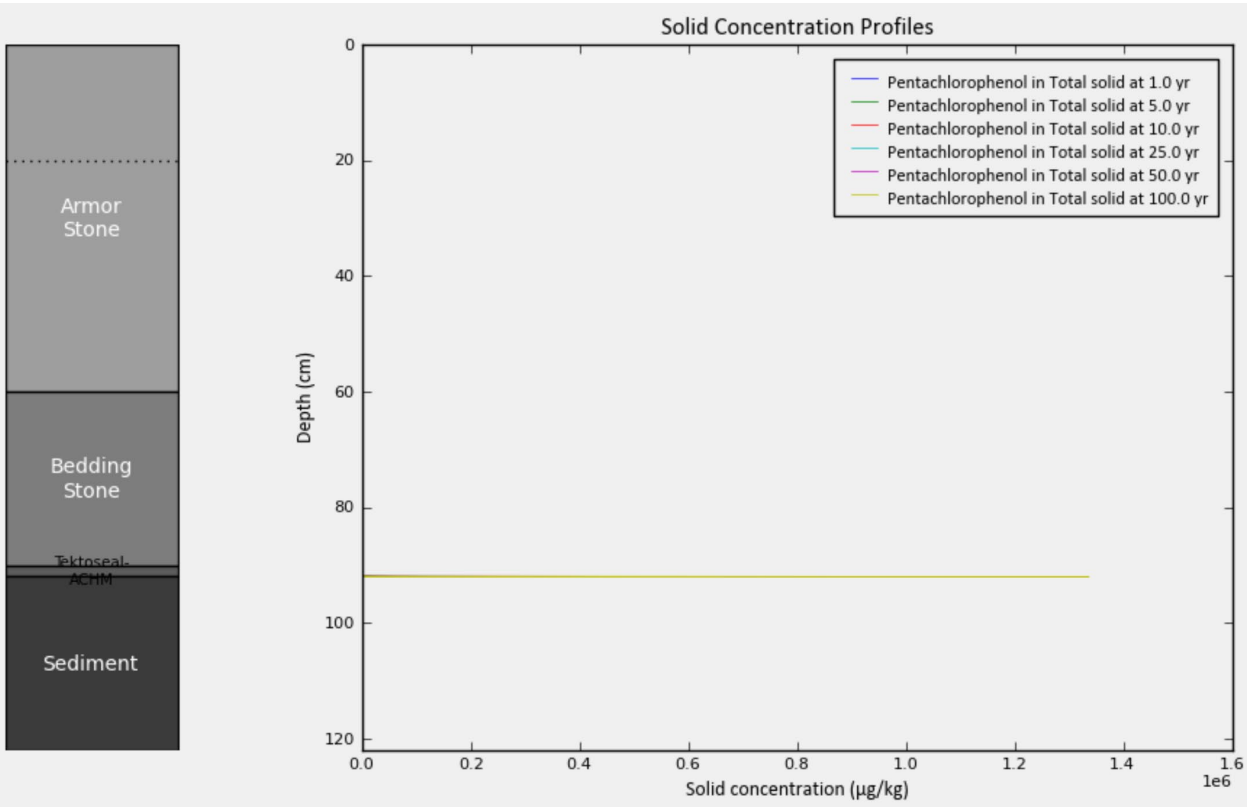

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB199 in Total solid at 1.0 yr
PCB199 in Total solid at 5.0 yr
PCB199 in Total solid at 10.0 yr
PCB199 in Total solid at 25.0 yr
PCB199 in Total solid at 50.0 yr
PCB199 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

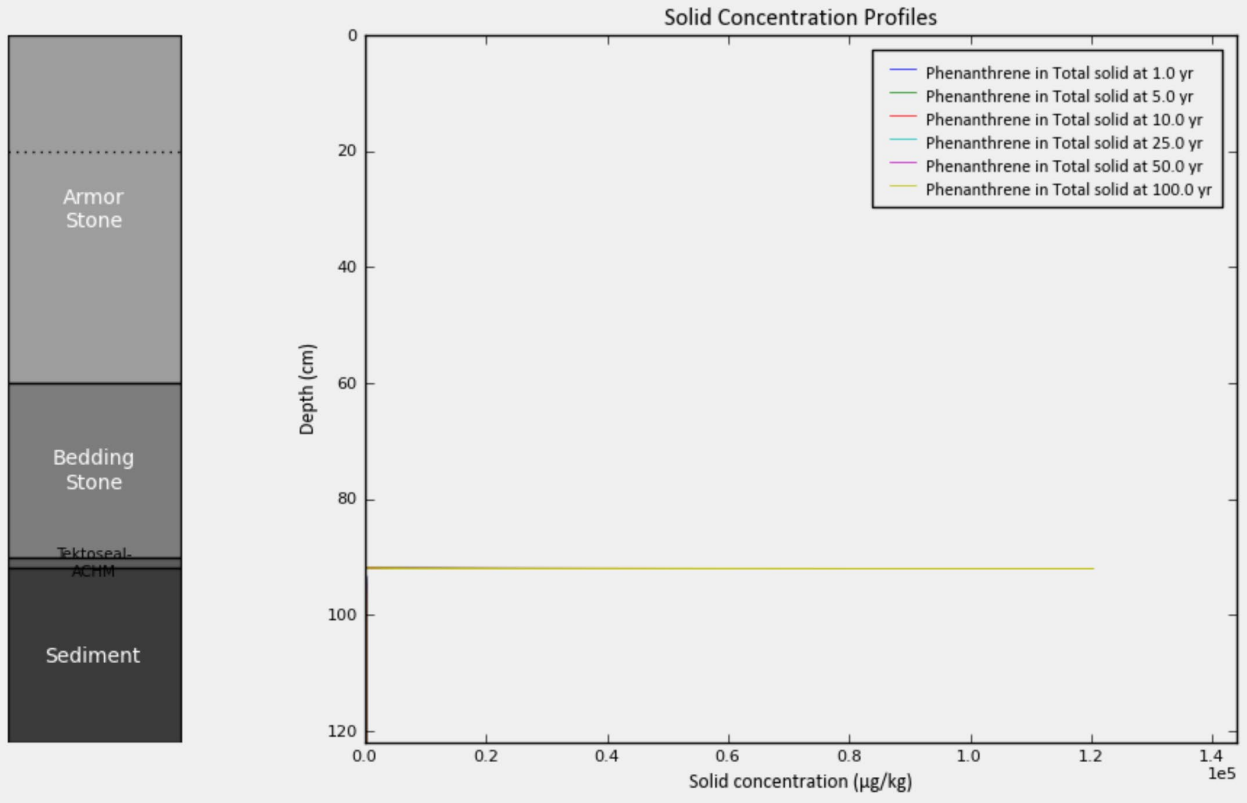

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB206 in Total solid at 1.0 yr
PCB206 in Total solid at 5.0 yr
PCB206 in Total solid at 10.0 yr
PCB206 in Total solid at 25.0 yr
PCB206 in Total solid at 50.0 yr
PCB206 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

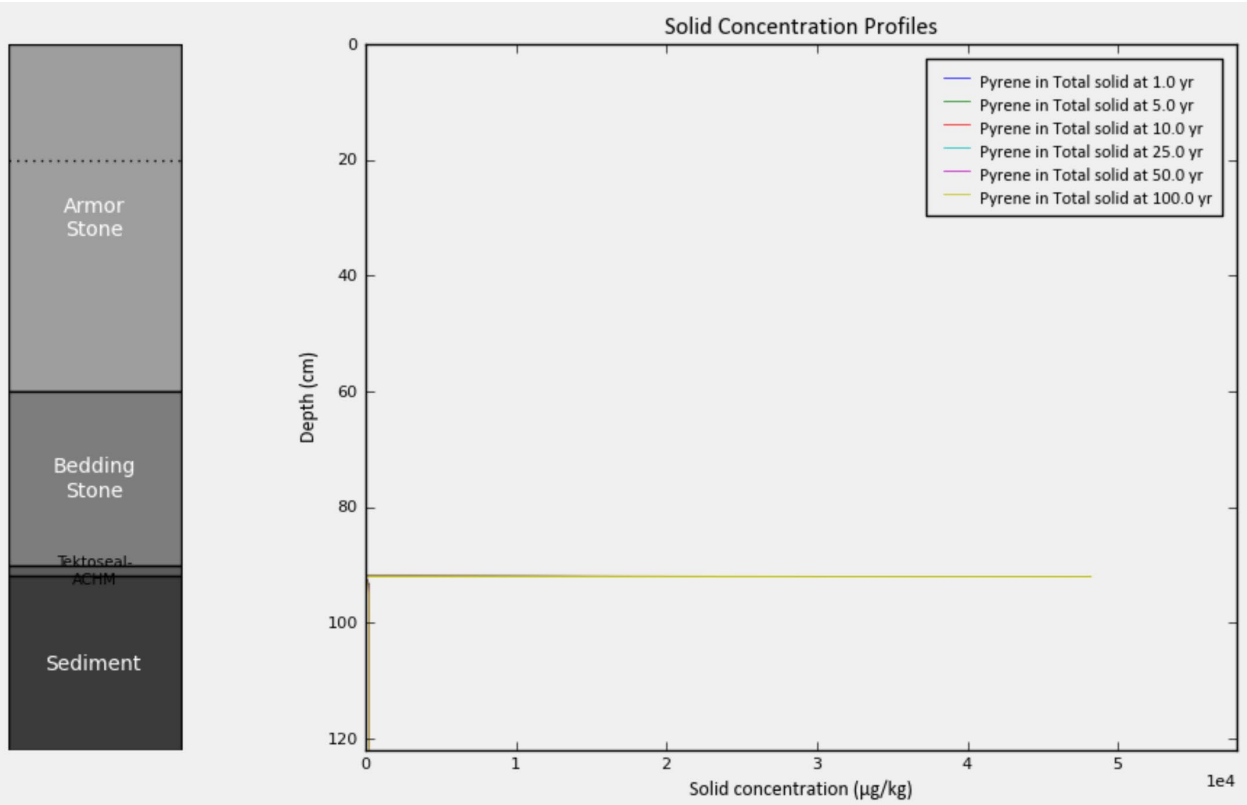

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PCB209 in Total solid at 1.0 yr
PCB209 in Total solid at 5.0 yr
PCB209 in Total solid at 10.0 yr
PCB209 in Total solid at 25.0 yr
PCB209 in Total solid at 50.0 yr
PCB209 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

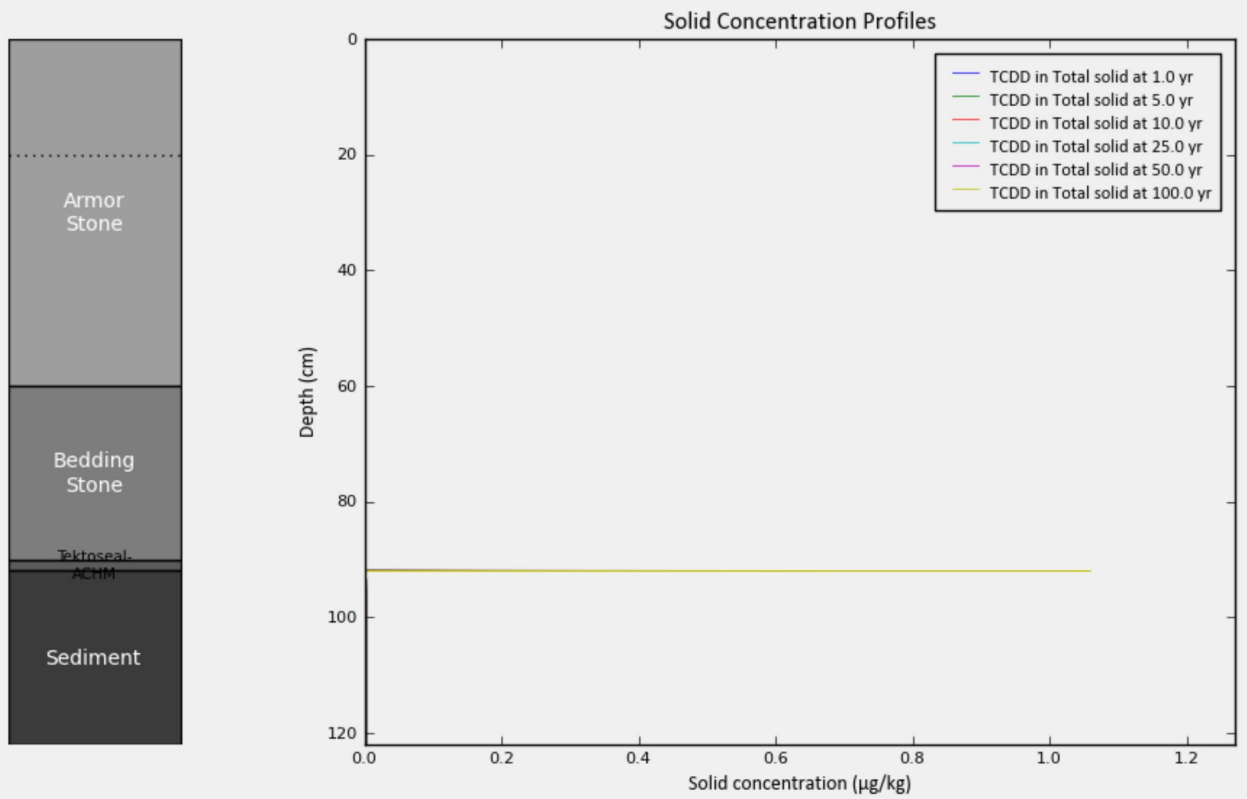

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PeCDD in Total solid at 1.0 yr
PeCDD in Total solid at 5.0 yr
PeCDD in Total solid at 10.0 yr
PeCDD in Total solid at 25.0 yr
PeCDD in Total solid at 50.0 yr
PeCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

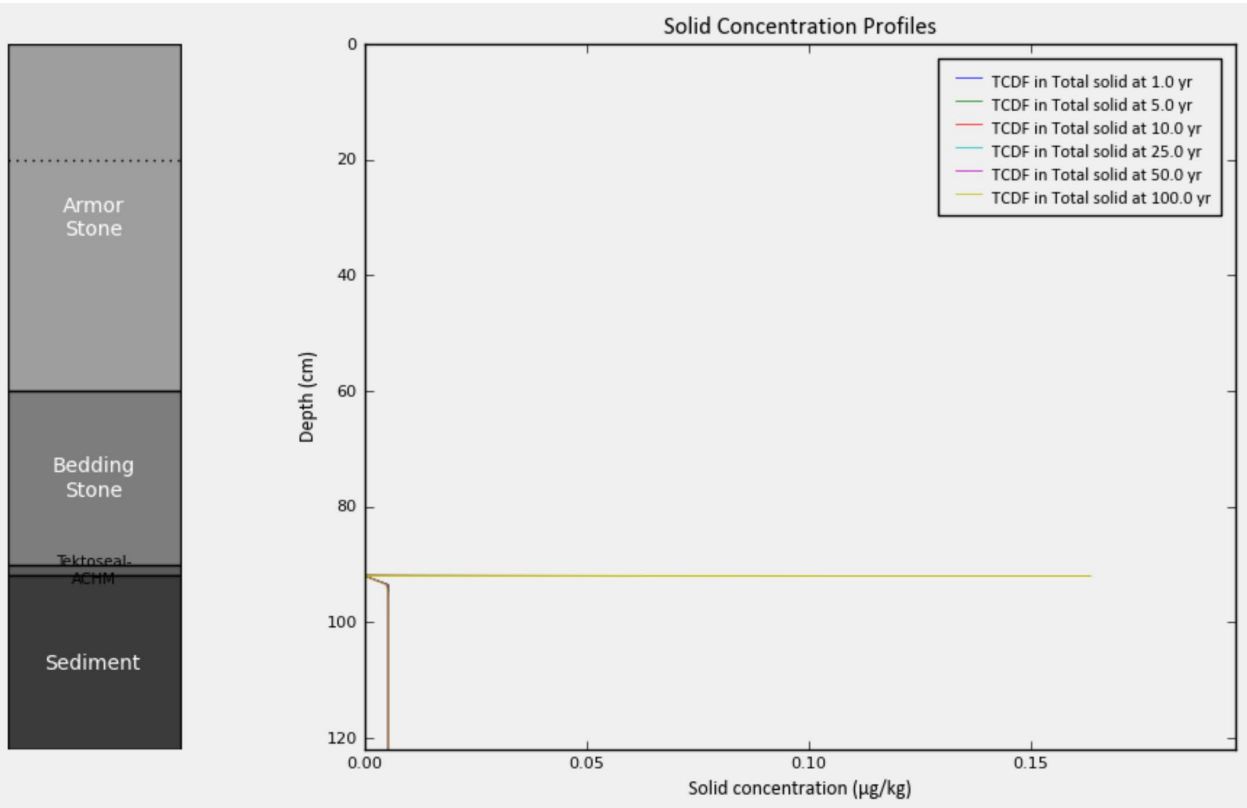

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
PeCDF in Total solid at 1.0 yr
PeCDF in Total solid at 5.0 yr
PeCDF in Total solid at 10.0 yr
PeCDF in Total solid at 25.0 yr
PeCDF in Total solid at 50.0 yr
PeCDF in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

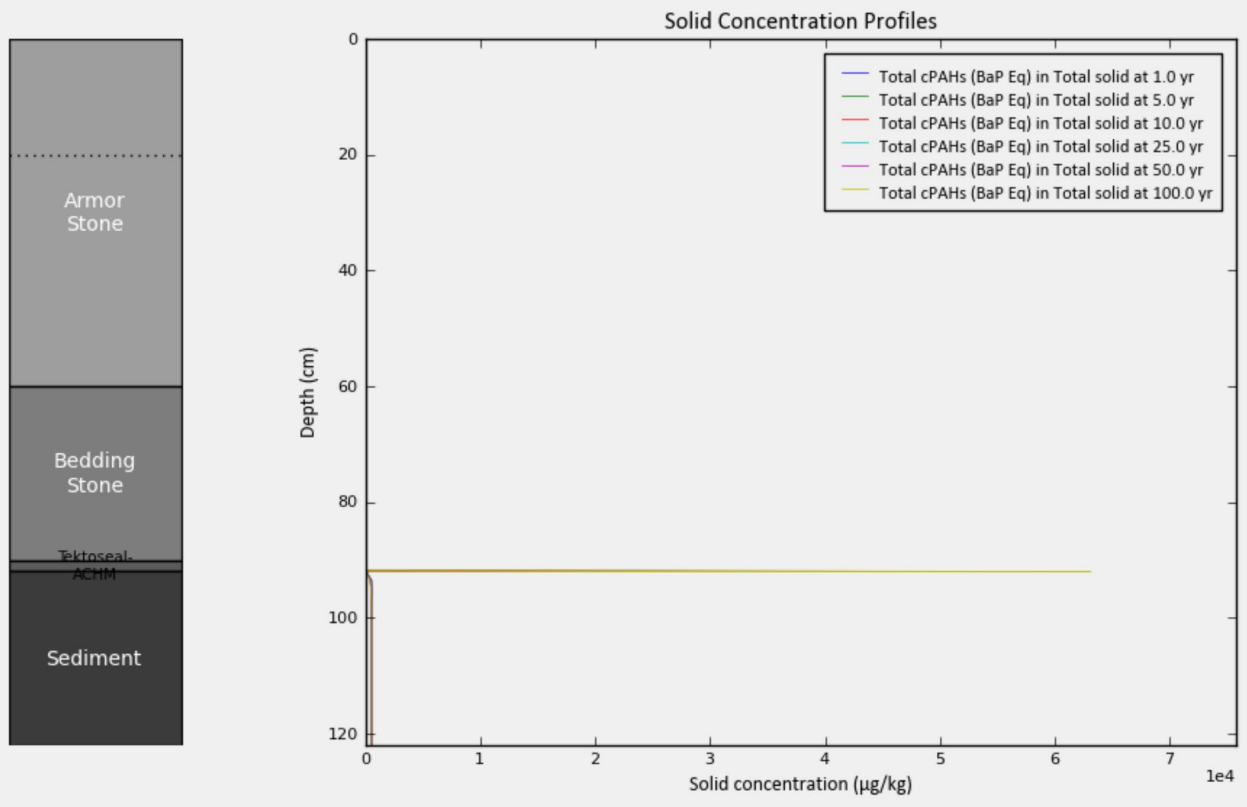

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Pentachlorophenol in Total solid at 1.0 yr
Pentachlorophenol in Total solid at 5.0 yr
Pentachlorophenol in Total solid at 10.0 yr
Pentachlorophenol in Total solid at 25.0 yr
Pentachlorophenol in Total solid at 50.0 yr
Pentachlorophenol in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

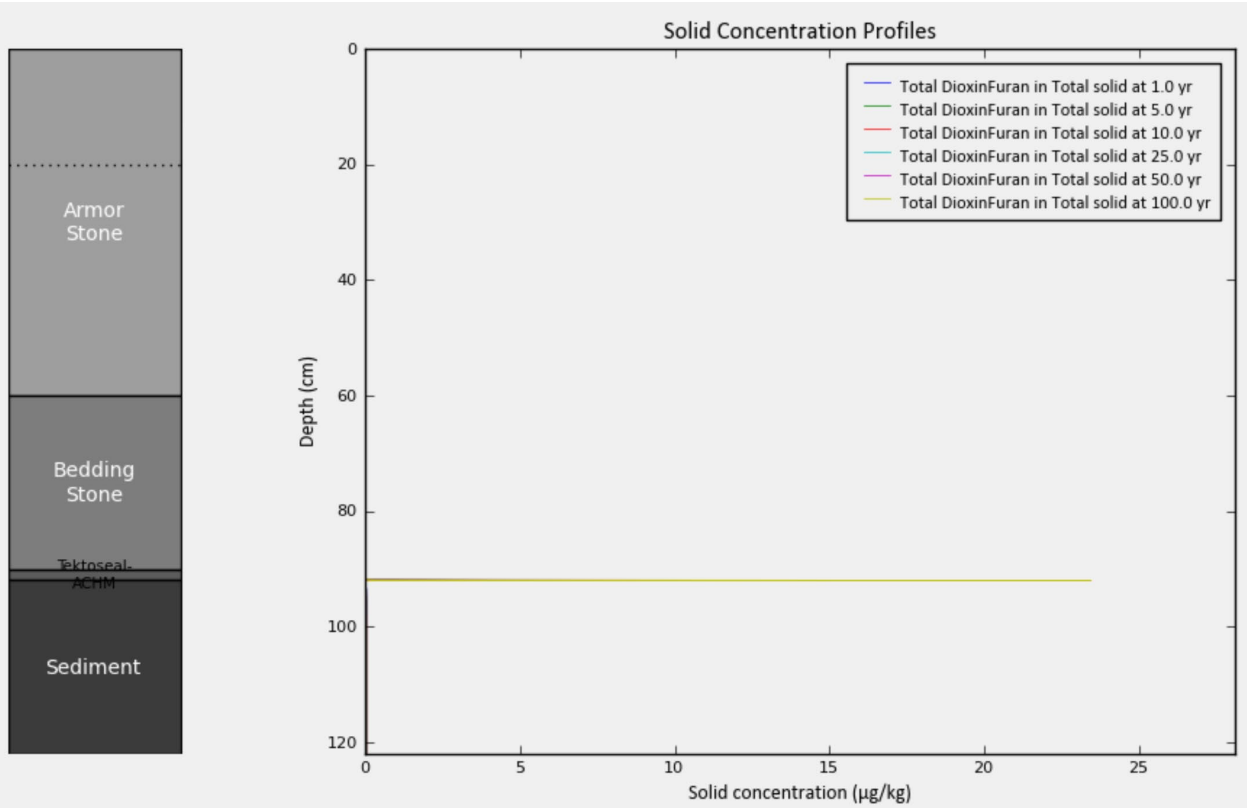

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Phenanthrene in Total solid at 1.0 yr
Phenanthrene in Total solid at 5.0 yr
Phenanthrene in Total solid at 10.0 yr
Phenanthrene in Total solid at 25.0 yr
Phenanthrene in Total solid at 50.0 yr
Phenanthrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

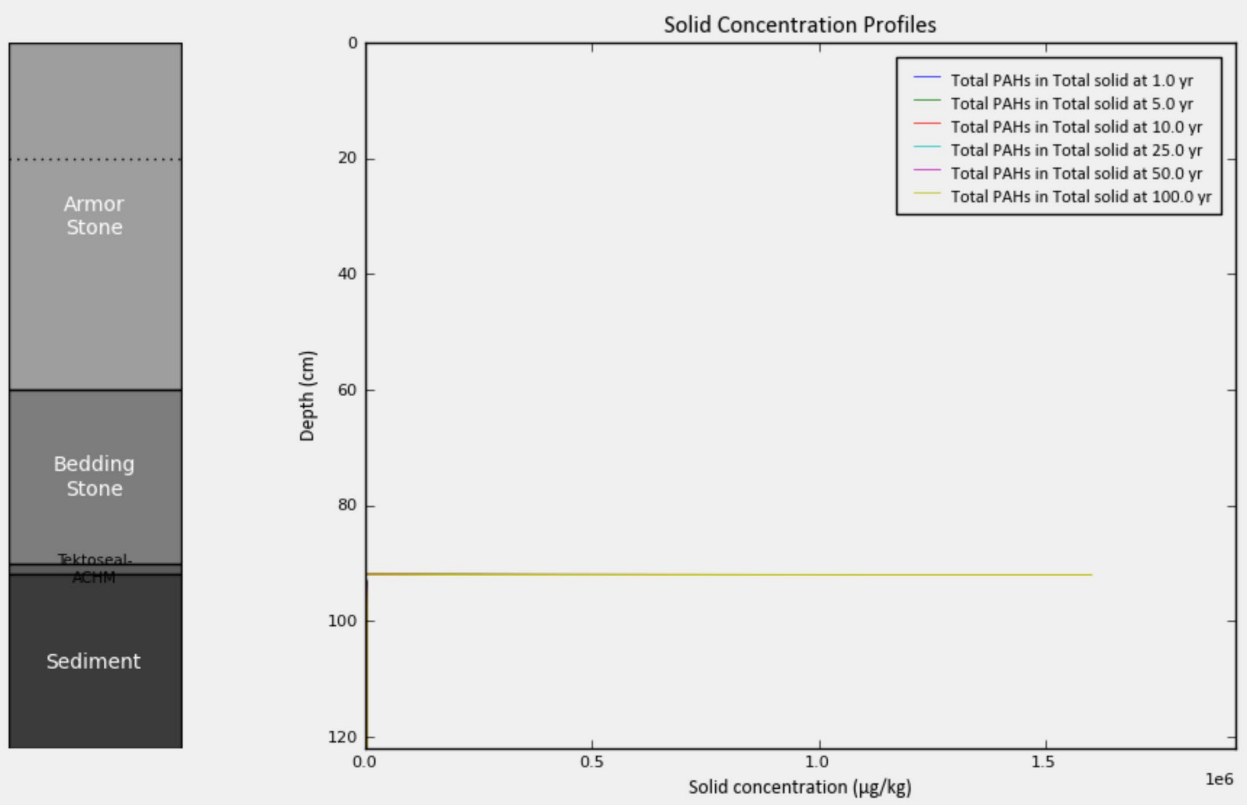

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Pyrene in Total solid at 1.0 yr
Pyrene in Total solid at 5.0 yr
Pyrene in Total solid at 10.0 yr
Pyrene in Total solid at 25.0 yr
Pyrene in Total solid at 50.0 yr
Pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

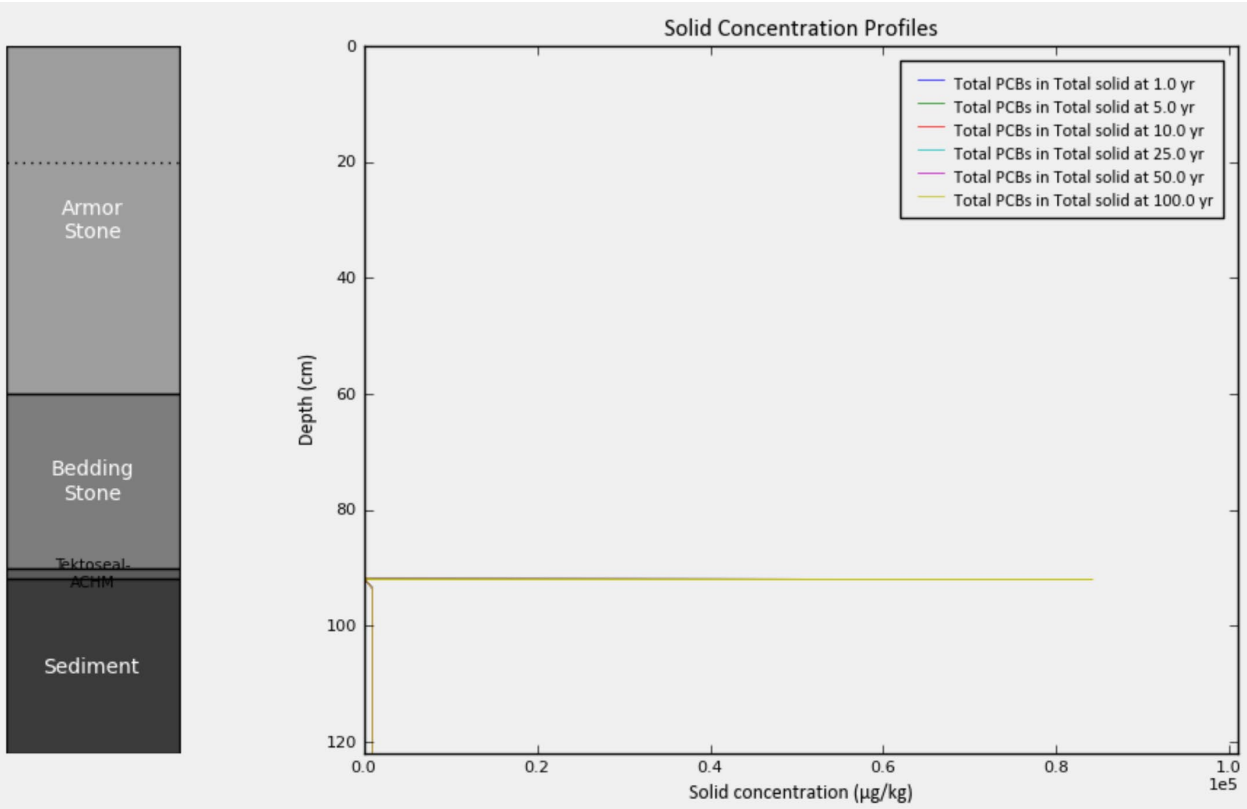

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
TCDD in Total solid at 1.0 yr
TCDD in Total solid at 5.0 yr
TCDD in Total solid at 10.0 yr
TCDD in Total solid at 25.0 yr
TCDD in Total solid at 50.0 yr
TCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

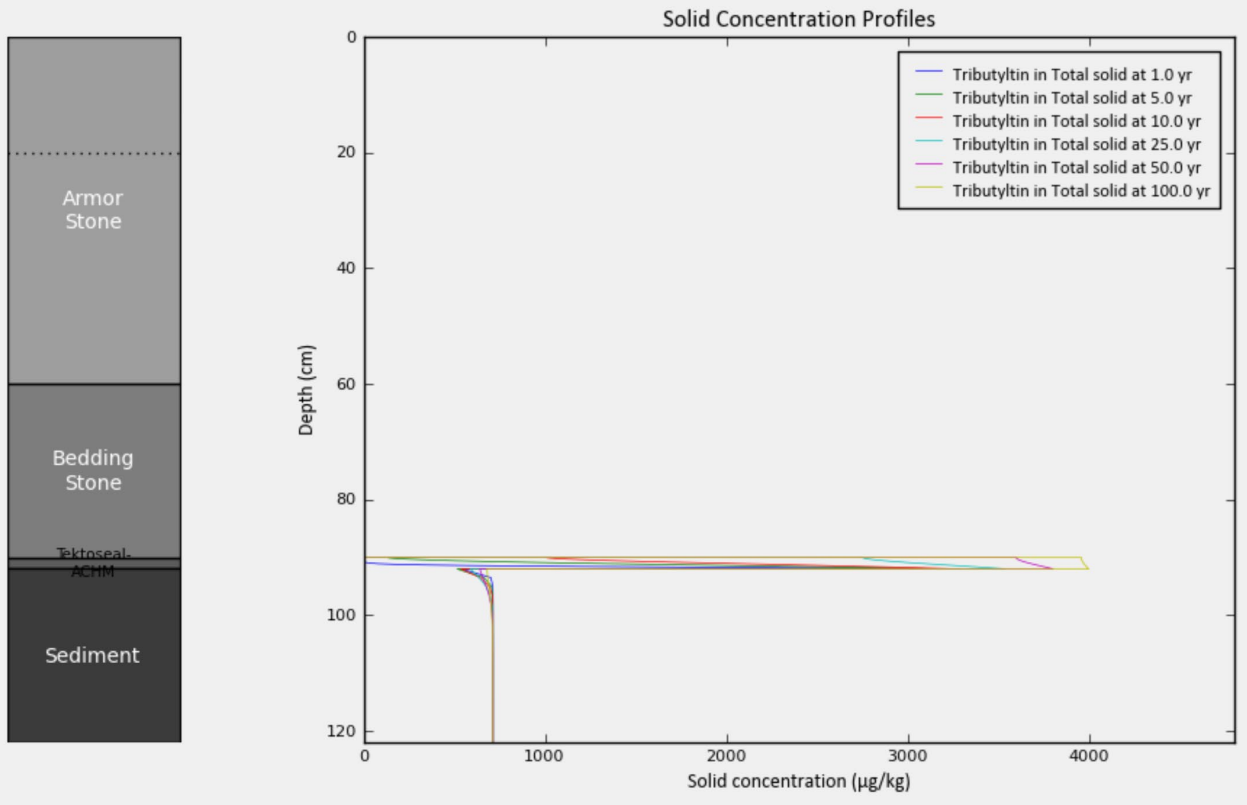

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
TCDF in Total solid at 1.0 yr
TCDF in Total solid at 5.0 yr
TCDF in Total solid at 10.0 yr
TCDF in Total solid at 25.0 yr
TCDF in Total solid at 50.0 yr
TCDF in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

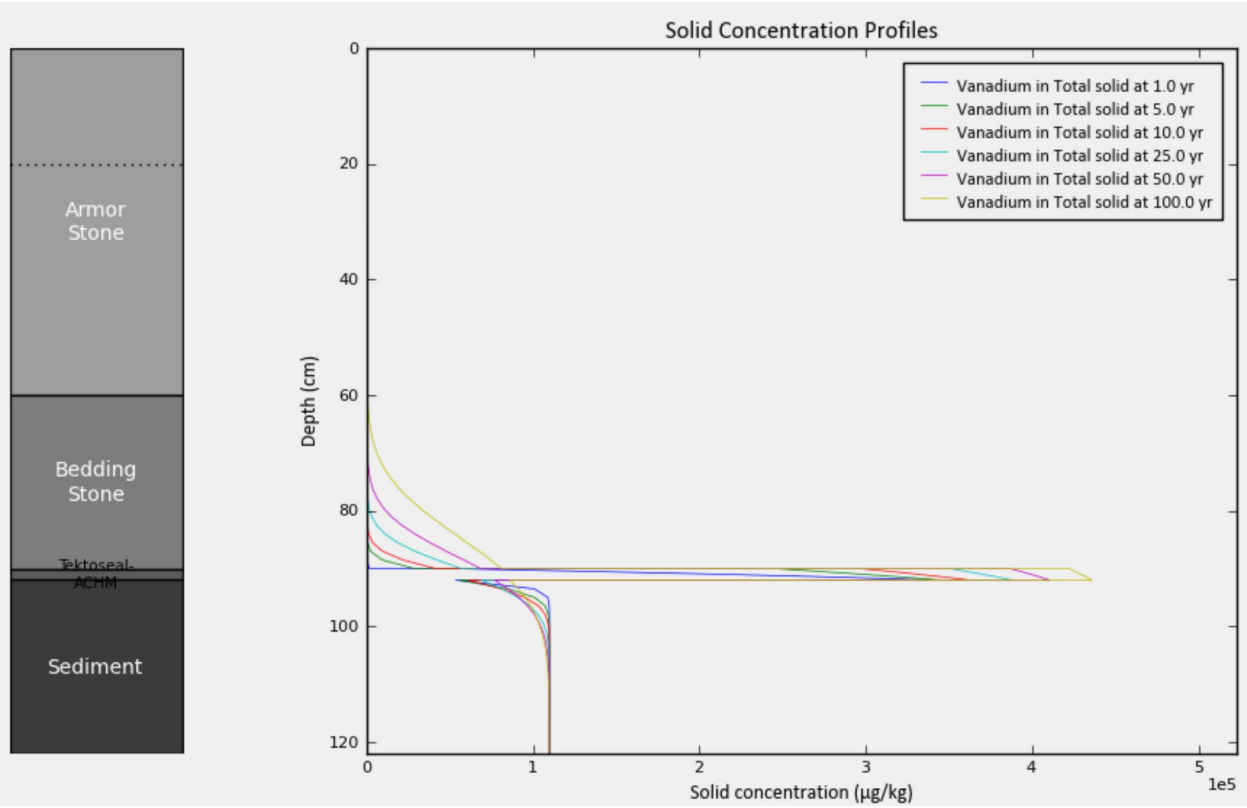

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Total cPAHs (BaP Eq) in Total solid at 1.0 yr
Total cPAHs (BaP Eq) in Total solid at 5.0 yr
Total cPAHs (BaP Eq) in Total solid at 10.0 yr
Total cPAHs (BaP Eq) in Total solid at 25.0 yr
Total cPAHs (BaP Eq) in Total solid at 50.0 yr
Total cPAHs (BaP Eq) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

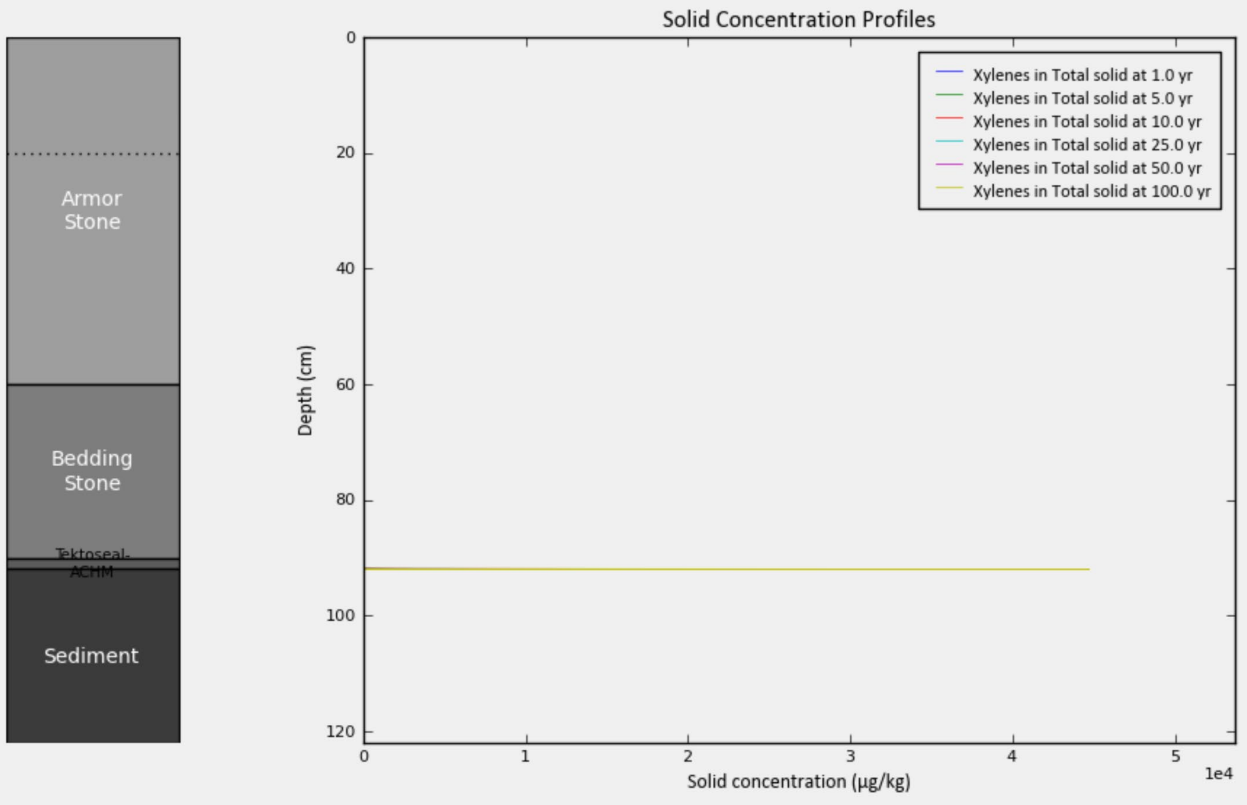

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Total DioxinFuran in Total solid at 1.0 yr
Total DioxinFuran in Total solid at 5.0 yr
Total DioxinFuran in Total solid at 10.0 yr
Total DioxinFuran in Total solid at 25.0 yr
Total DioxinFuran in Total solid at 50.0 yr
Total DioxinFuran in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

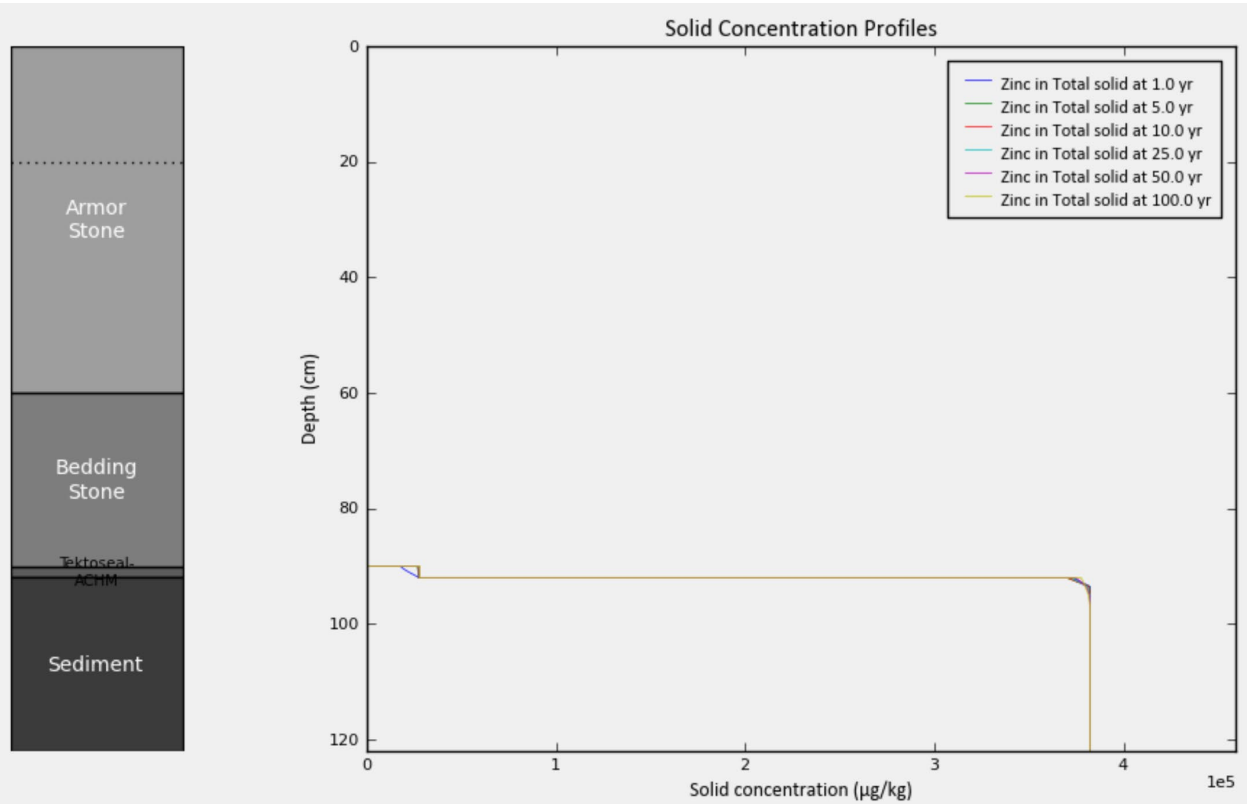

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Total PAHs in Total solid at 1.0 yr
Total PAHs in Total solid at 5.0 yr
Total PAHs in Total solid at 10.0 yr
Total PAHs in Total solid at 25.0 yr
Total PAHs in Total solid at 50.0 yr
Total PAHs in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
1e6
Solid concentration (µg/kg)


Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Total PCBs in Total solid at 1.0 yr
Total PCBs in Total solid at 5.0 yr
Total PCBs in Total solid at 10.0 yr
Total PCBs in Total solid at 25.0 yr
Total PCBs in Total solid at 50.0 yr
Total PCBs in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e5
Solid concentration (µg/kg)


Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Tributyltin in Total solid at 1.0 yr
Tributyltin in Total solid at 5.0 yr
Tributyltin in Total solid at 10.0 yr
Tributyltin in Total solid at 25.0 yr
Tributyltin in Total solid at 50.0 yr
Tributyltin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

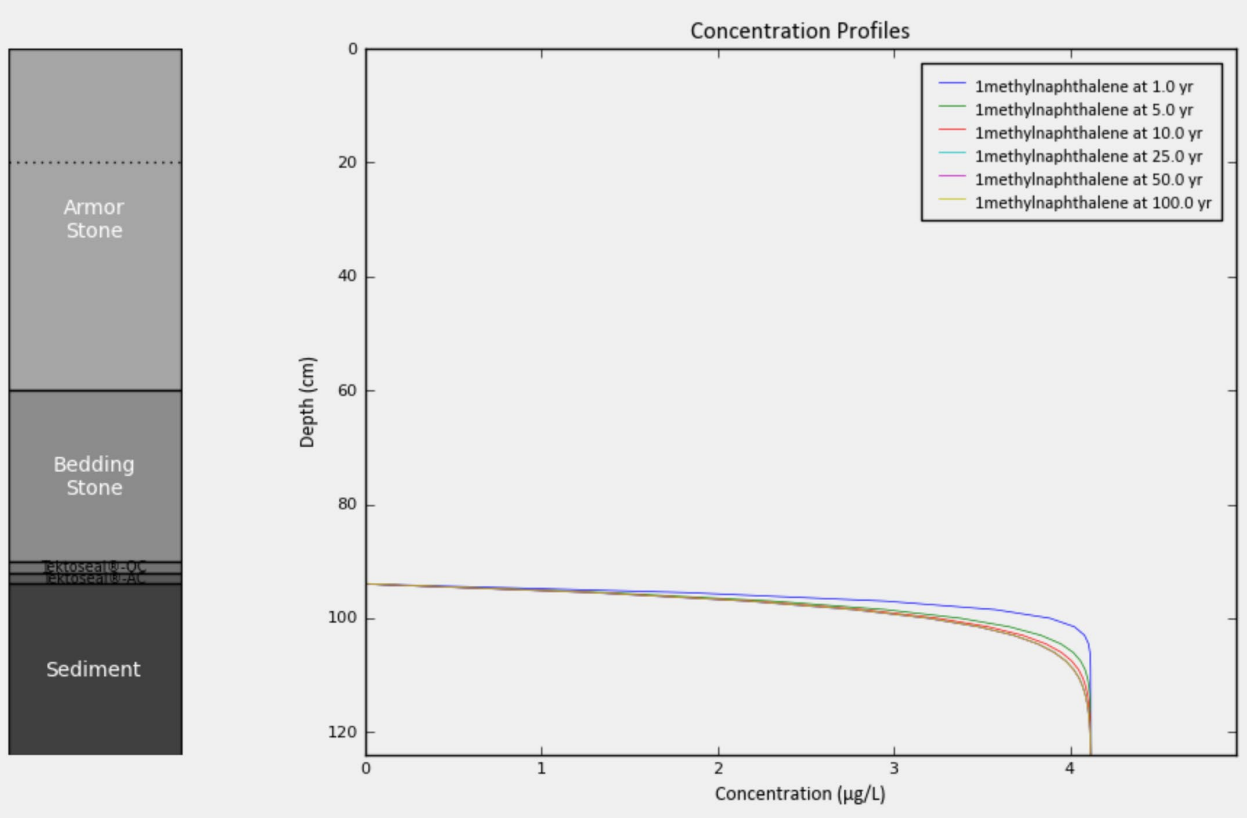

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Vanadium in Total solid at 1.0 yr
Vanadium in Total solid at 5.0 yr
Vanadium in Total solid at 10.0 yr
Vanadium in Total solid at 25.0 yr
Vanadium in Total solid at 50.0 yr
Vanadium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

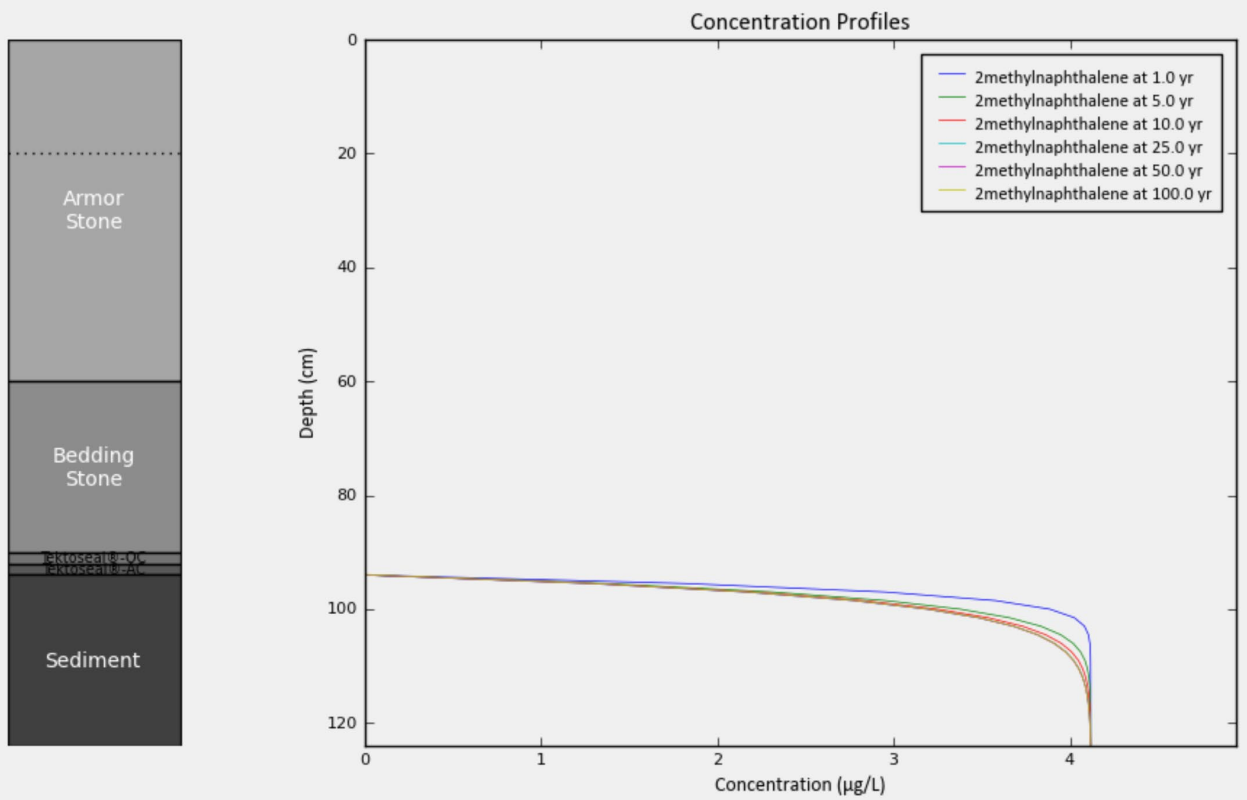

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Xylenes in Total solid at 1.0 yr
Xylenes in Total solid at 5.0 yr
Xylenes in Total solid at 10.0 yr
Xylenes in Total solid at 25.0 yr
Xylenes in Total solid at 50.0 yr
Xylenes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

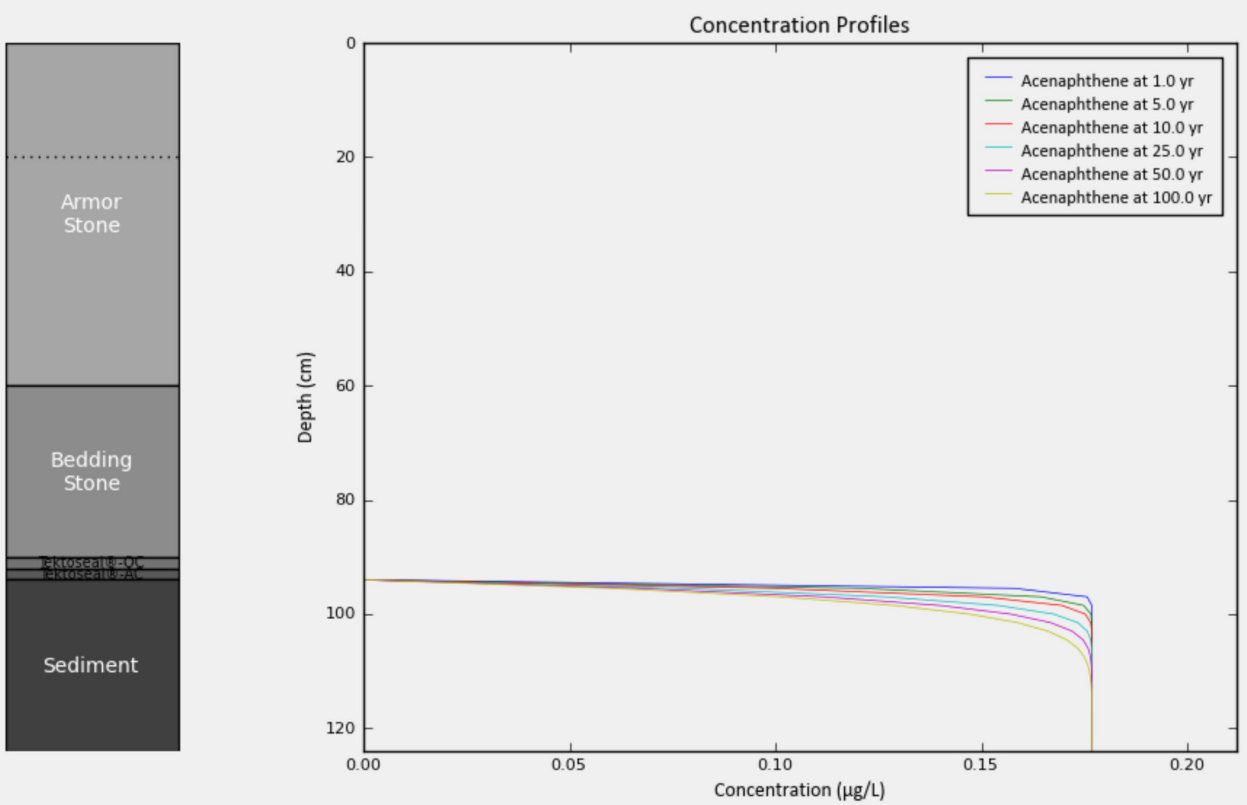

Armor Stone
Bedding Stone
Tektoseal-ACHM
Sediment
Solid Concentration Profiles
Zinc in Total solid at 1.0 yr
Zinc in Total solid at 5.0 yr
Zinc in Total solid at 10.0 yr
Zinc in Total solid at 25.0 yr
Zinc in Total solid at 50.0 yr
Zinc in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

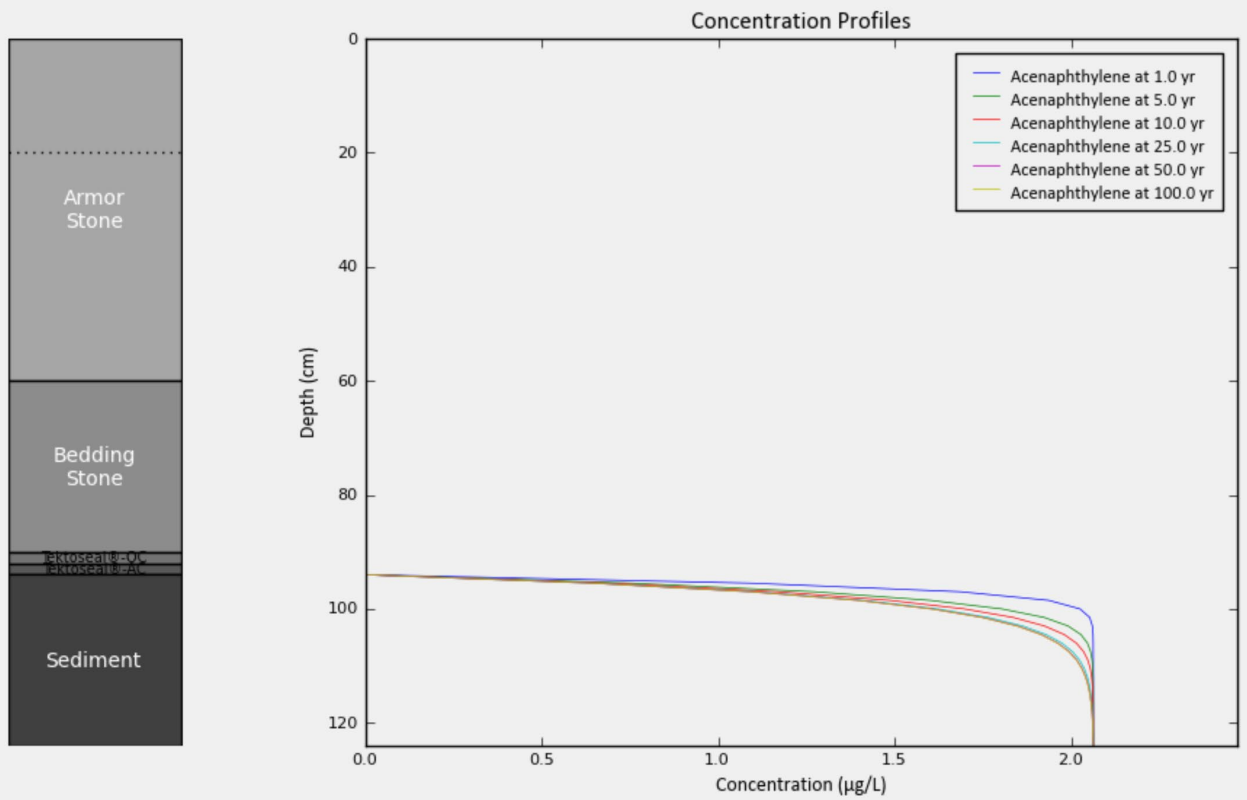
Cap Alternative 10: 2 cm Tektoseal-AC and 2 cm Tektoseal-HM with 30 cm of 2.5-inch bedding stone and 60 cm of 10-inch armor stone

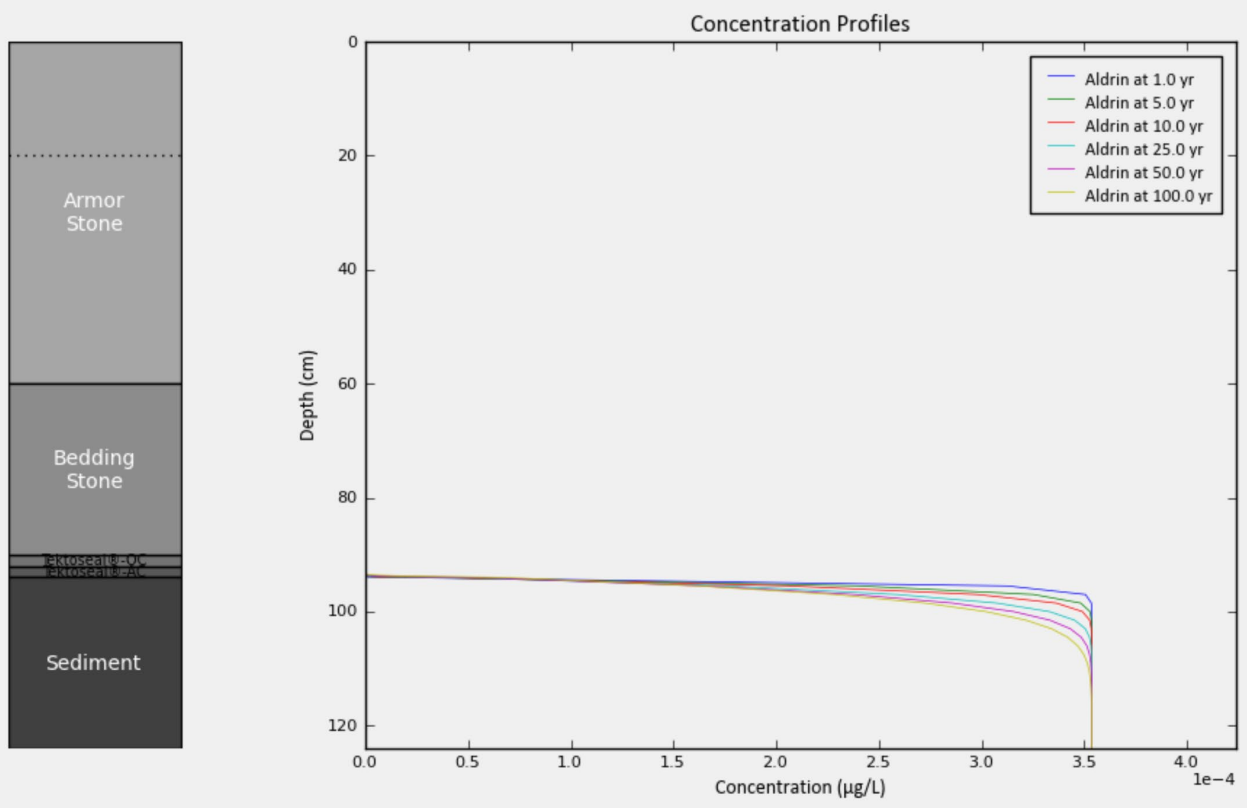
Porewater Concentration - Depth

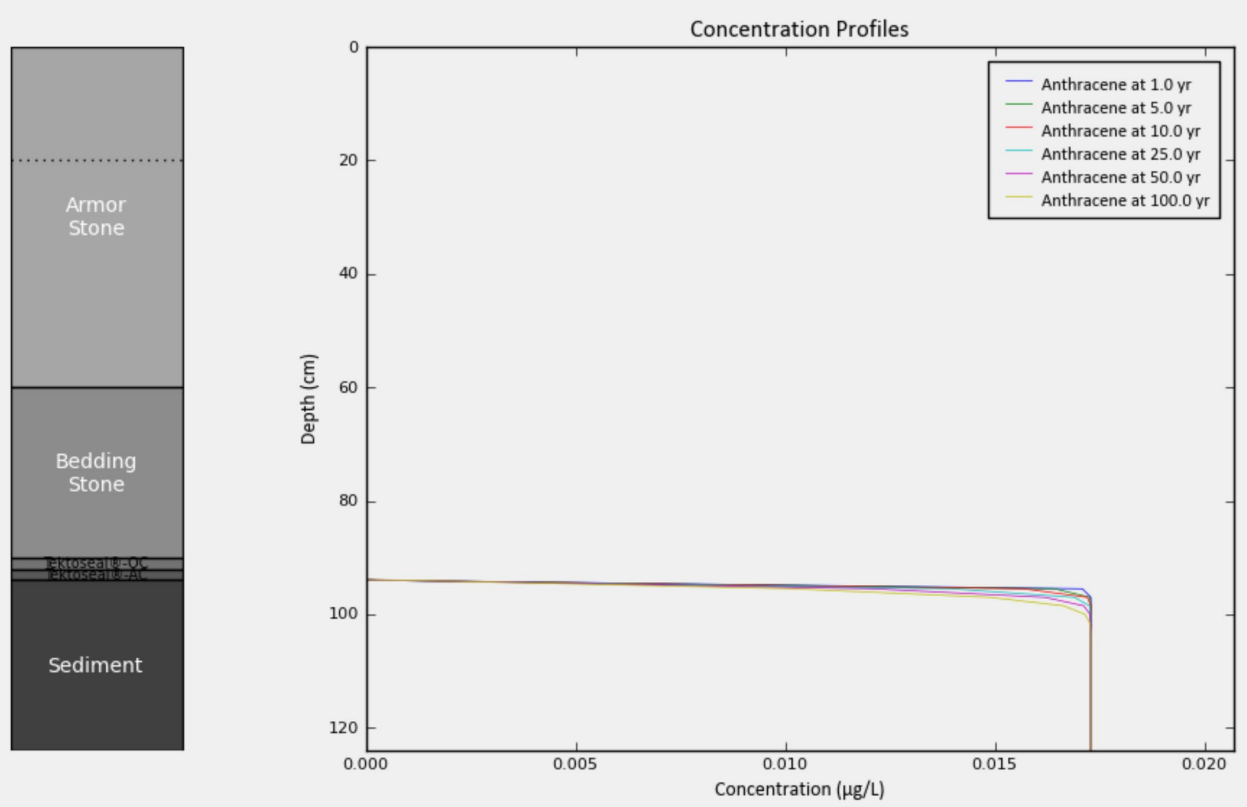


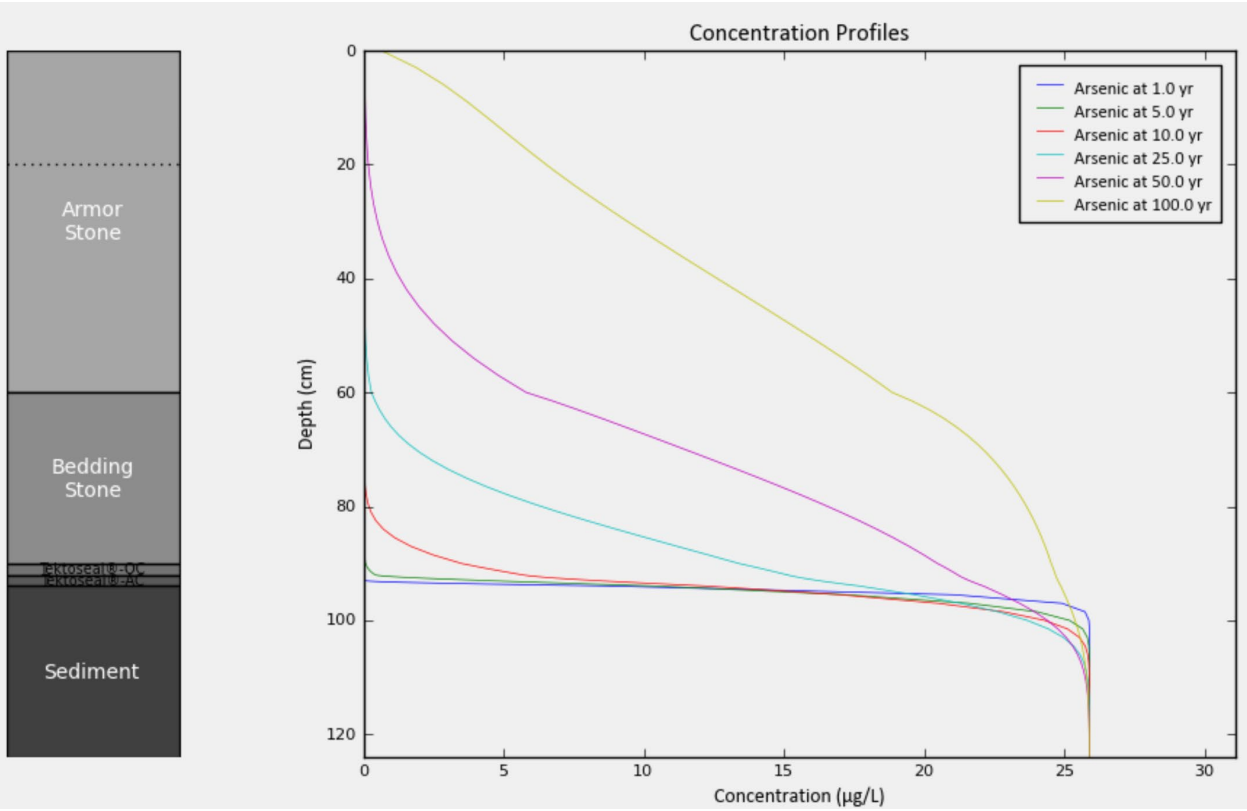

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
2methylnaphthalene at 1.0 yr
2methylnaphthalene at 5.0 yr
2methylnaphthalene at 10.0 yr
2methylnaphthalene at 25.0 yr
2methylnaphthalene at 50.0 yr
2methylnaphthalene at 100.0 yr

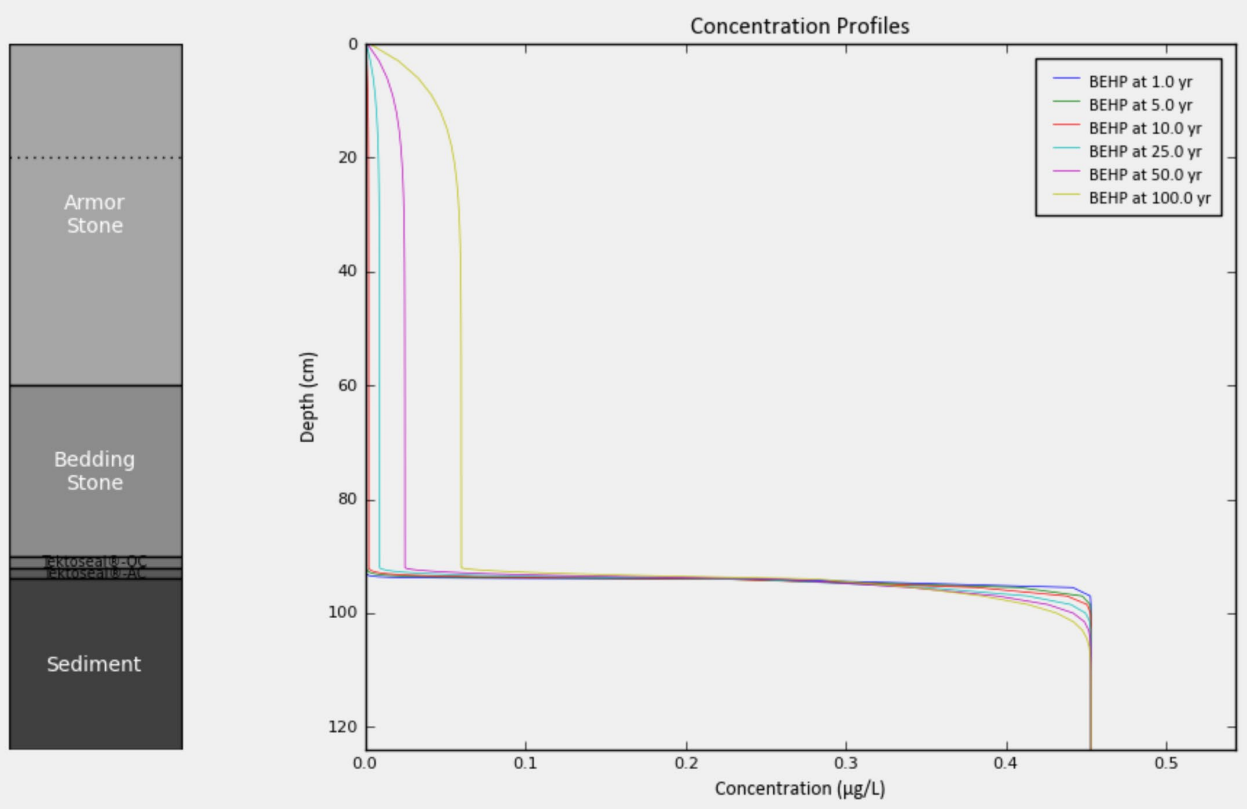

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Acenaphthene at 1.0 yr
Acenaphthene at 5.0 yr
Acenaphthene at 10.0 yr
Acenaphthene at 25.0 yr
Acenaphthene at 50.0 yr
Acenaphthene at 100.0 yr

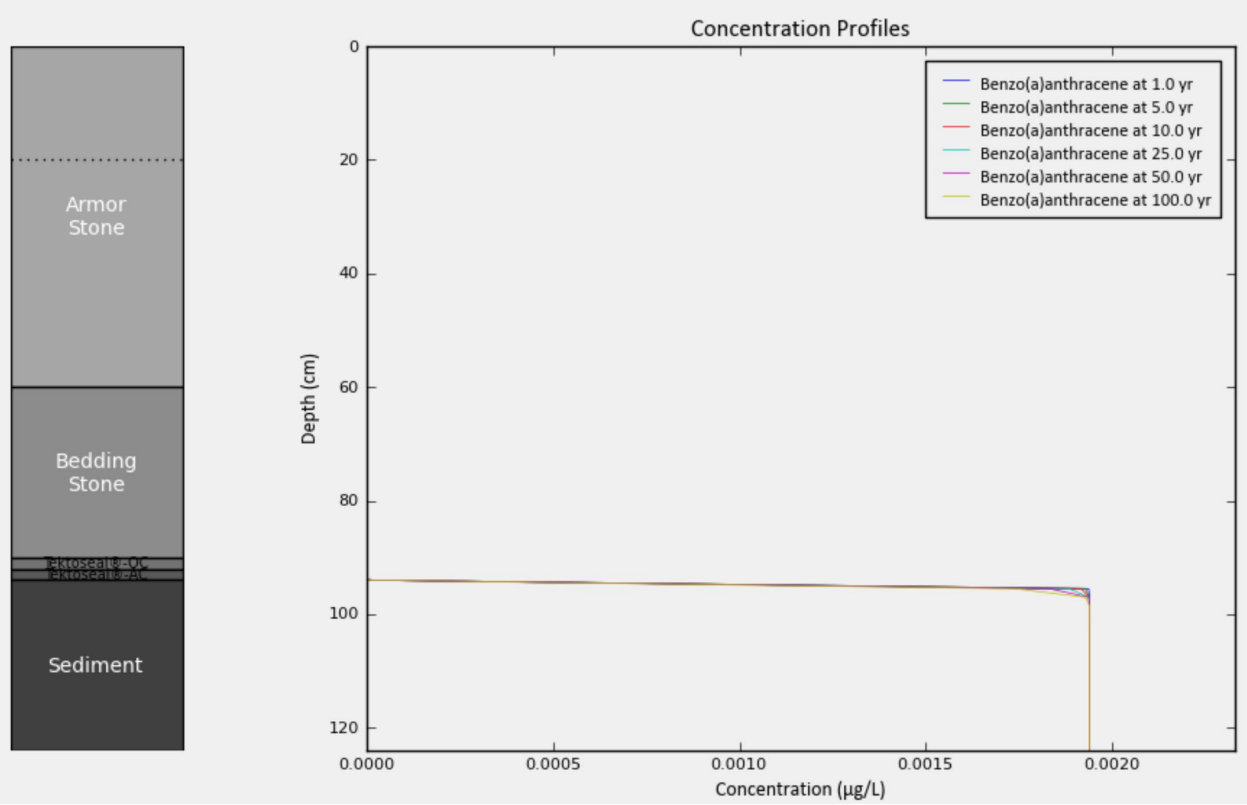

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Acenaphthylene at 1.0 yr
Acenaphthylene at 5.0 yr
Acenaphthylene at 10.0 yr
Acenaphthylene at 25.0 yr
Acenaphthylene at 50.0 yr
Acenaphthylene at 100.0 yr
Depth (cm)
Concentration (µg/L)

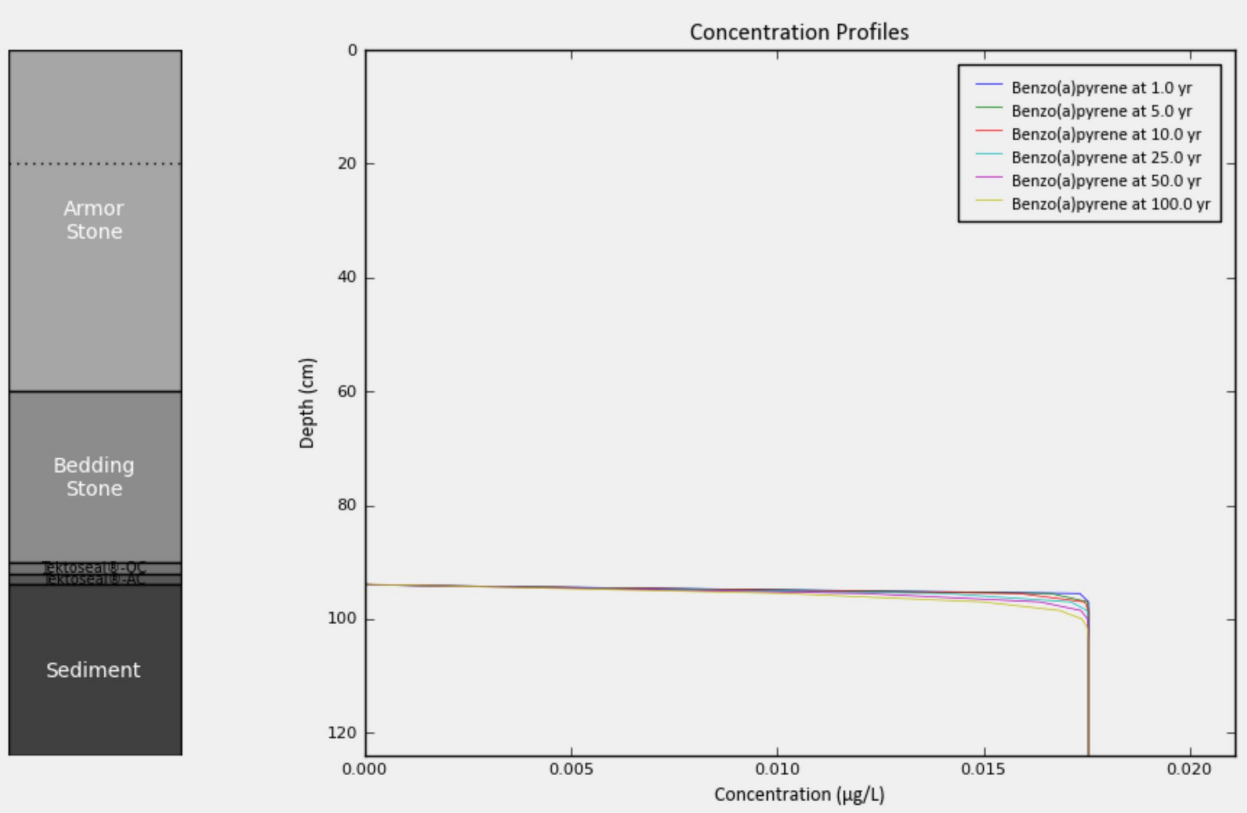

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Aldrin at 1.0 yr
Aldrin at 5.0 yr
Aldrin at 10.0 yr
Aldrin at 25.0 yr
Aldrin at 50.0 yr
Aldrin at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

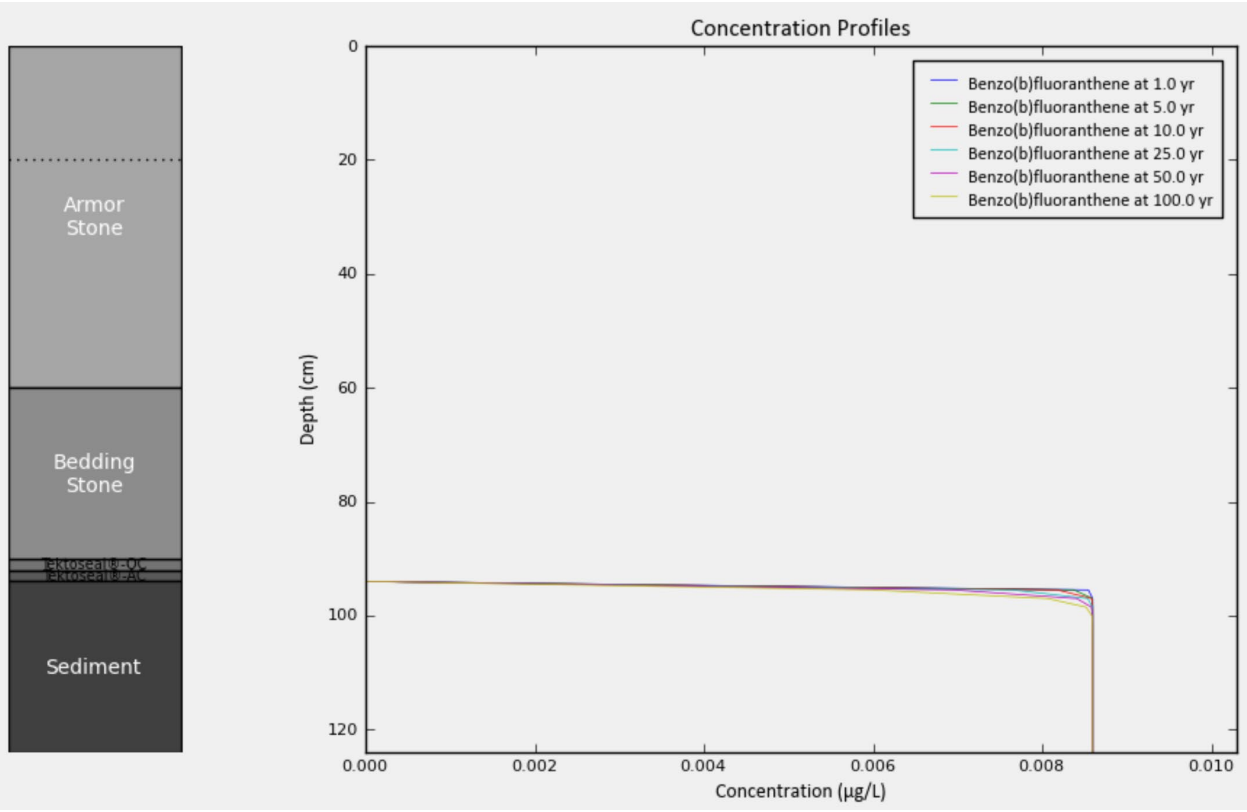

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Anthracene at 1.0 yr
Anthracene at 5.0 yr
Anthracene at 10.0 yr
Anthracene at 25.0 yr
Anthracene at 50.0 yr
Anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020

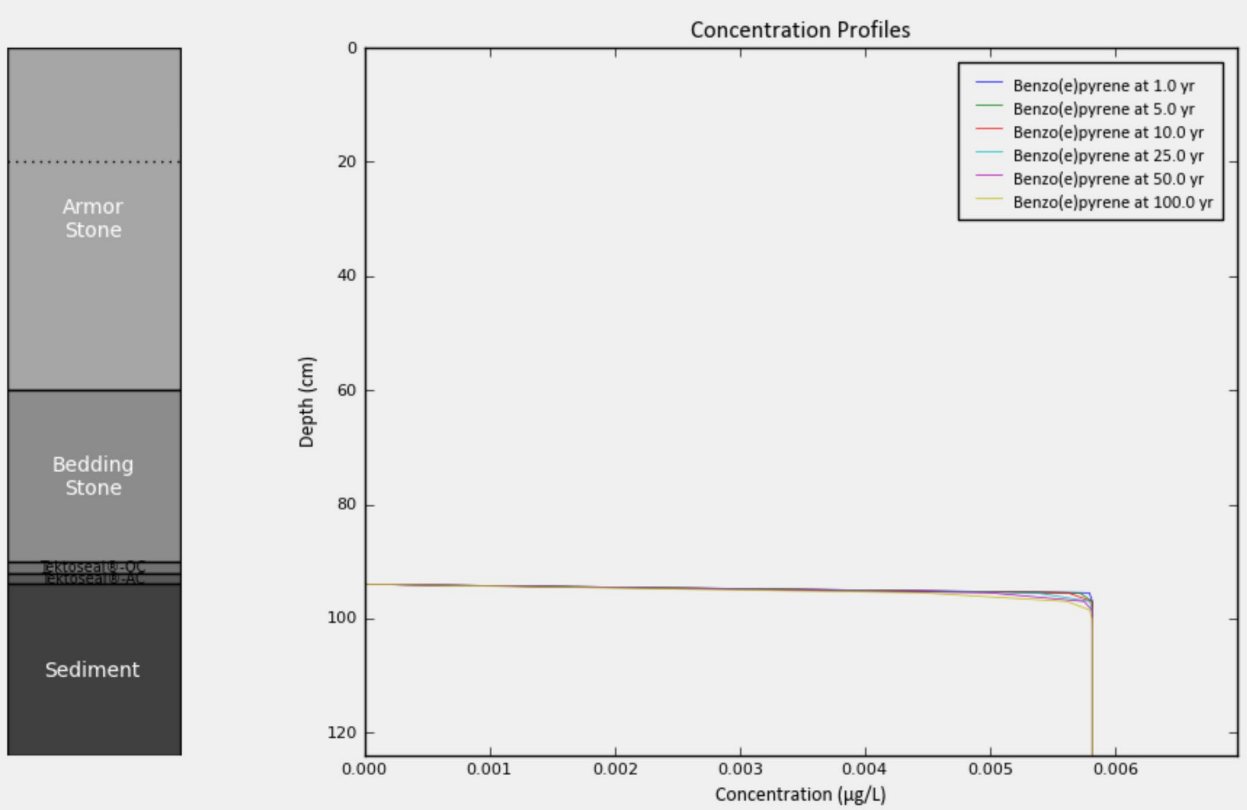

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Arsenic at 1.0 yr
Arsenic at 5.0 yr
Arsenic at 10.0 yr
Arsenic at 25.0 yr
Arsenic at 50.0 yr
Arsenic at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
5
10
15
20
25
30

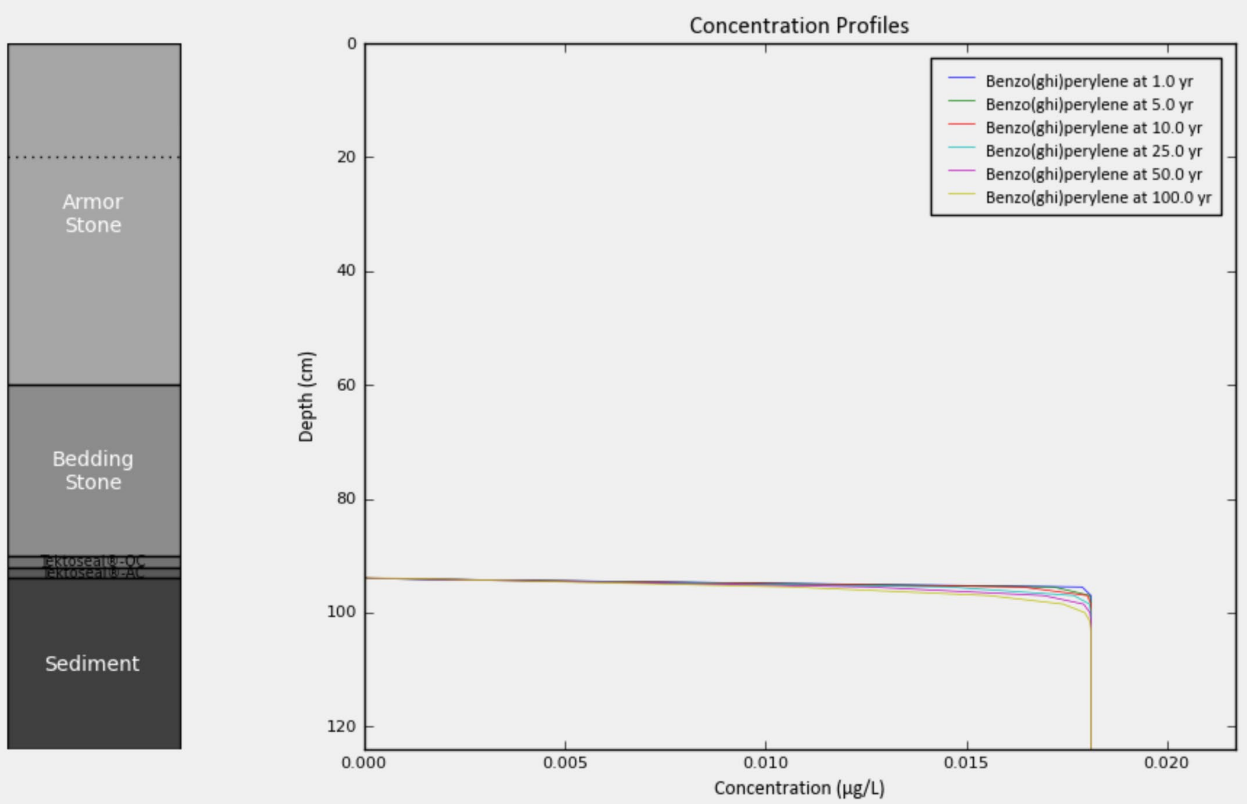

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
BEHP at 1.0 yr
BEHP at 5.0 yr
BEHP at 10.0 yr
BEHP at 25.0 yr
BEHP at 50.0 yr
BEHP at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0
0.1
0.2
0.3
0.4
0.5

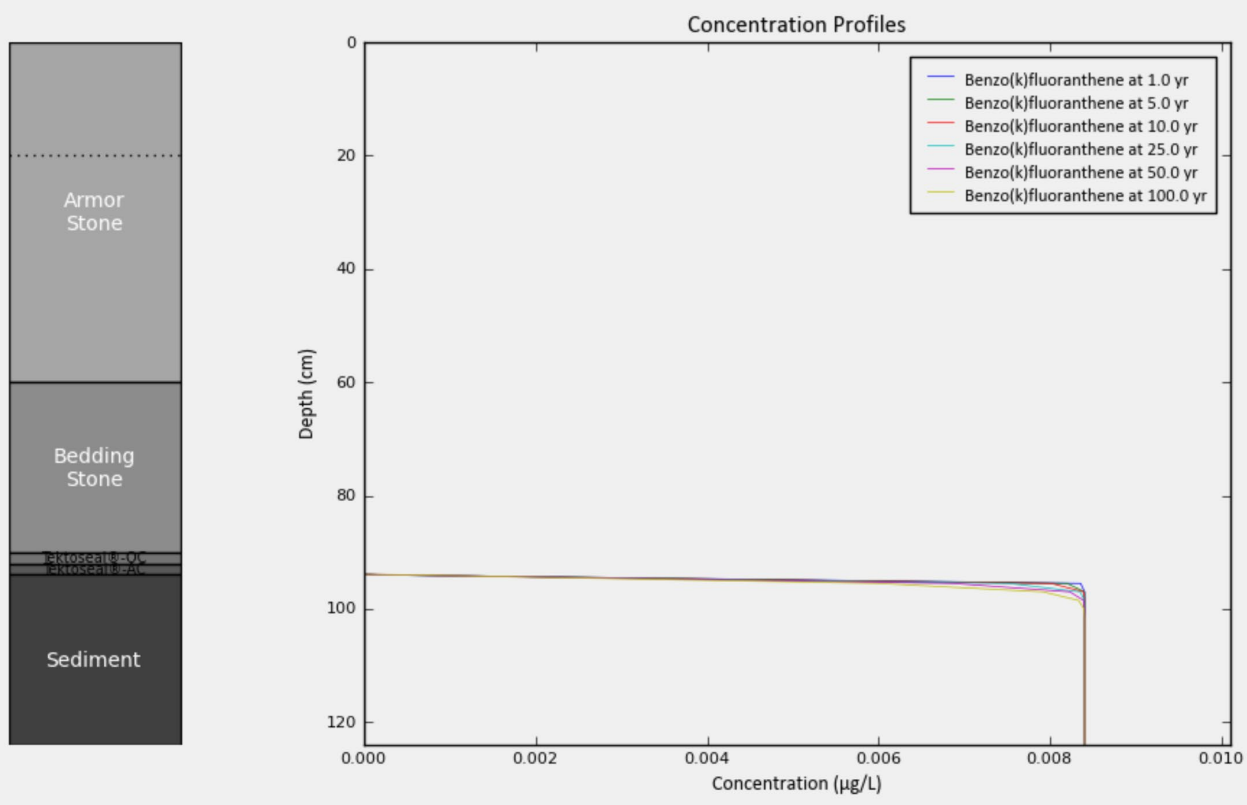

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Benzo(a)anthracene at 1.0 yr
Benzo(a)anthracene at 5.0 yr
Benzo(a)anthracene at 10.0 yr
Benzo(a)anthracene at 25.0 yr
Benzo(a)anthracene at 50.0 yr
Benzo(a)anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020

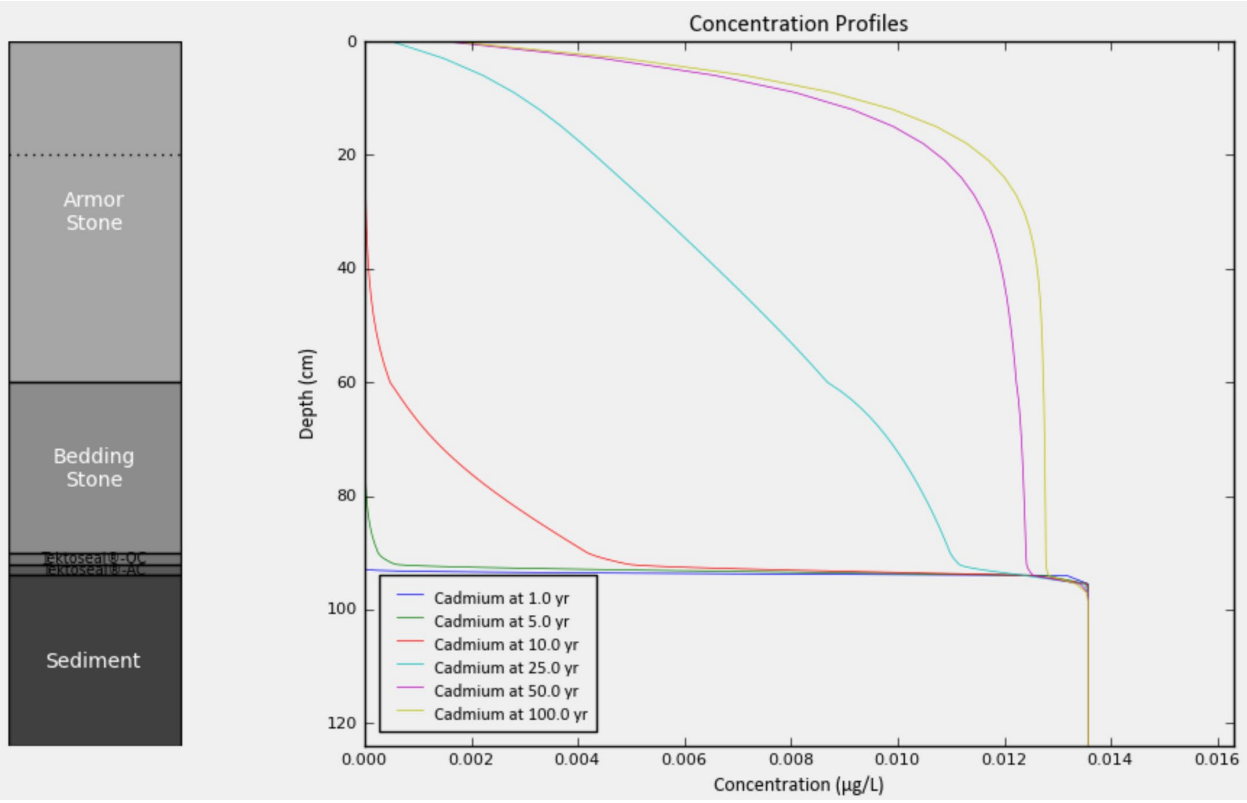

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Benzo(a)pyrene at 1.0 yr
Benzo(a)pyrene at 5.0 yr
Benzo(a)pyrene at 10.0 yr
Benzo(a)pyrene at 25.0 yr
Benzo(a)pyrene at 50.0 yr
Benzo(a)pyrene at 100.0 yr

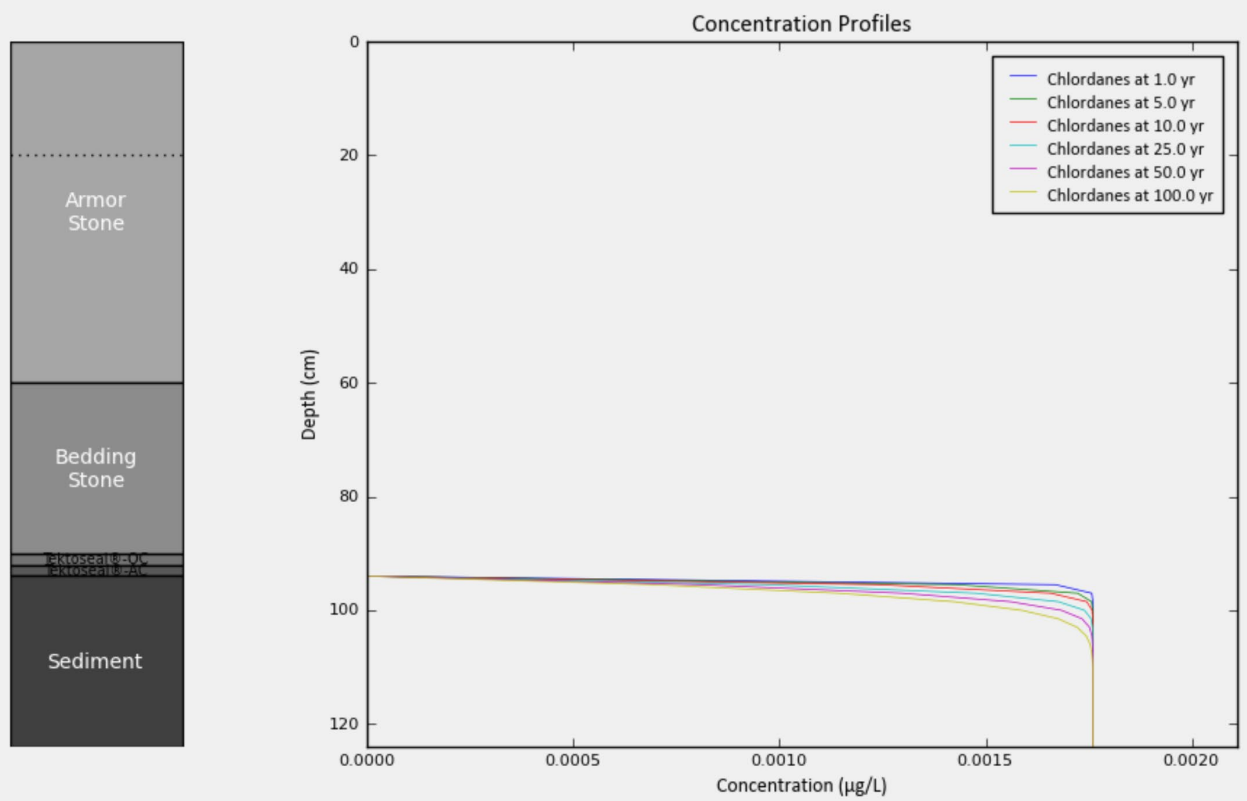

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Benzo(b)fluoranthene at 1.0 yr
Benzo(b)fluoranthene at 5.0 yr
Benzo(b)fluoranthene at 10.0 yr
Benzo(b)fluoranthene at 25.0 yr
Benzo(b)fluoranthene at 50.0 yr
Benzo(b)fluoranthene at 100.0 yr

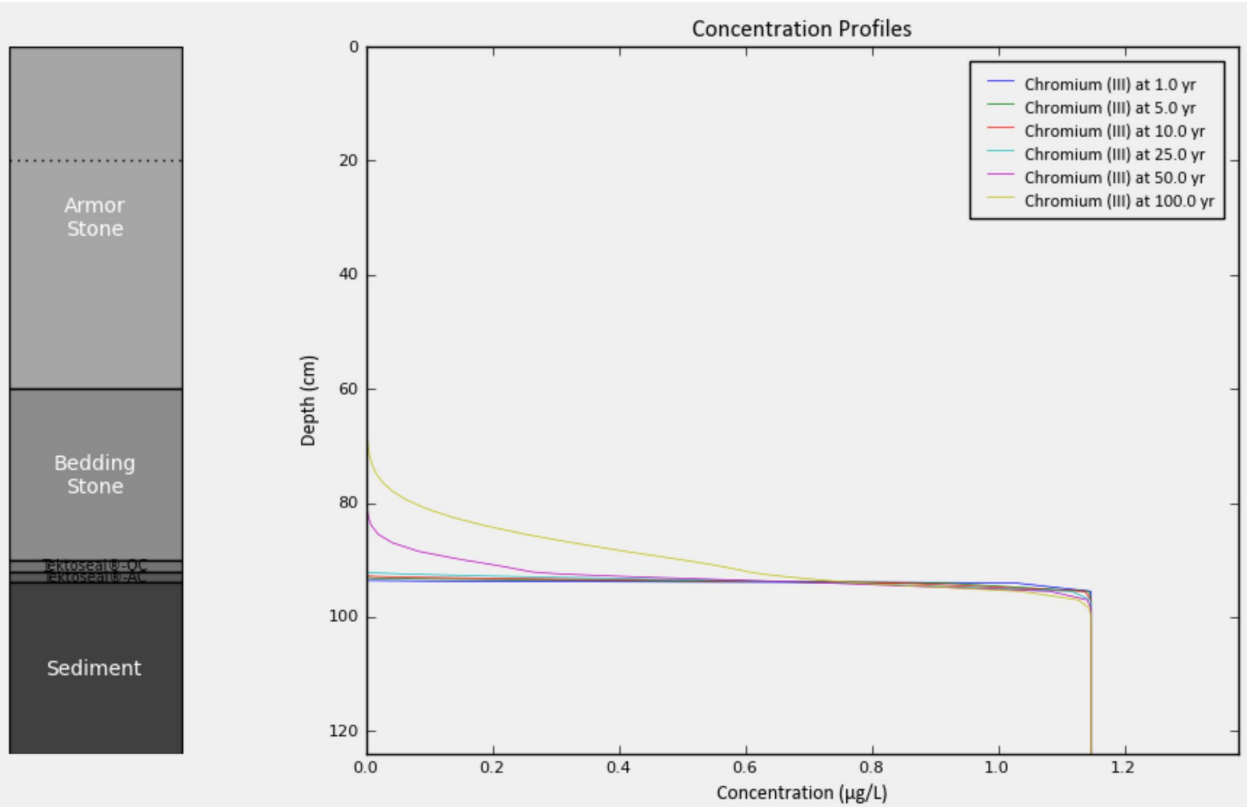

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Benzo(e)pyrene at 1.0 yr
Benzo(e)pyrene at 5.0 yr
Benzo(e)pyrene at 10.0 yr
Benzo(e)pyrene at 25.0 yr
Benzo(e)pyrene at 50.0 yr
Benzo(e)pyrene at 100.0 yr

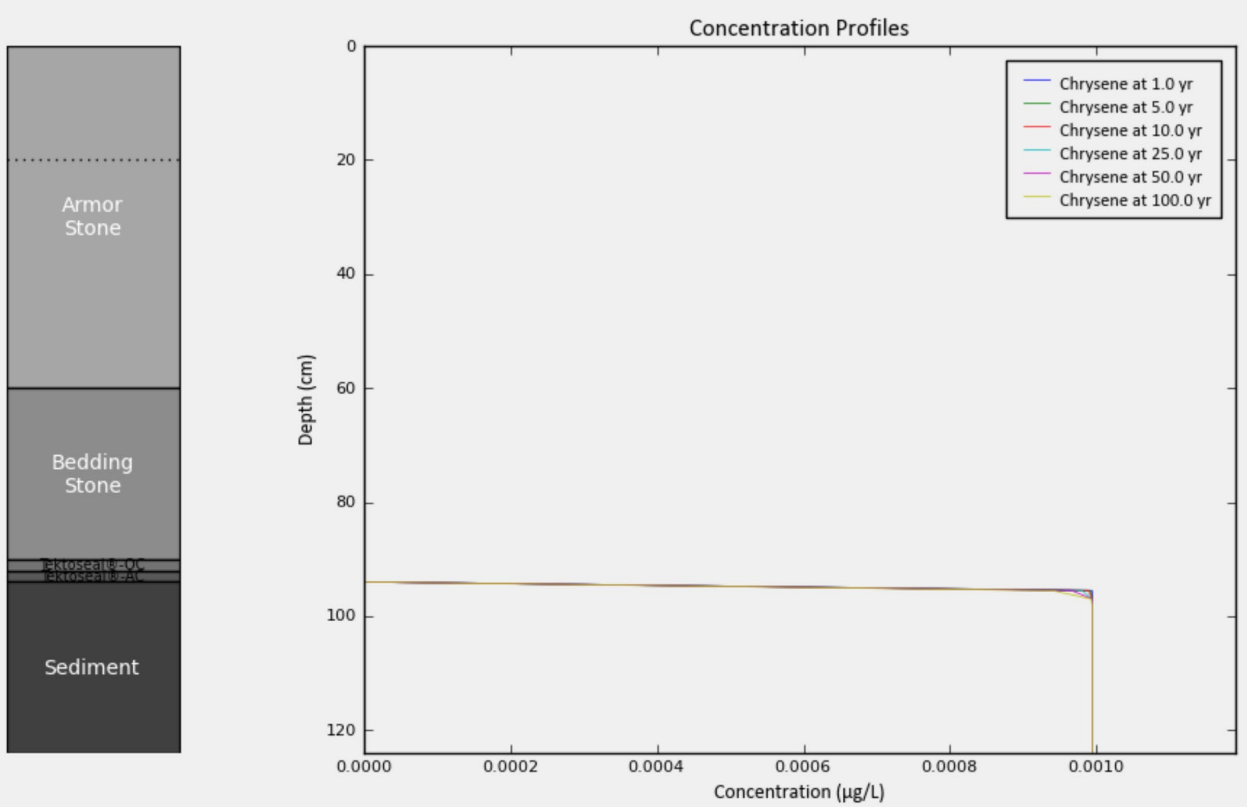

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Benzo(ghi)perylene at 1.0 yr
Benzo(ghi)perylene at 5.0 yr
Benzo(ghi)perylene at 10.0 yr
Benzo(ghi)perylene at 25.0 yr
Benzo(ghi)perylene at 50.0 yr
Benzo(ghi)perylene at 100.0 yr

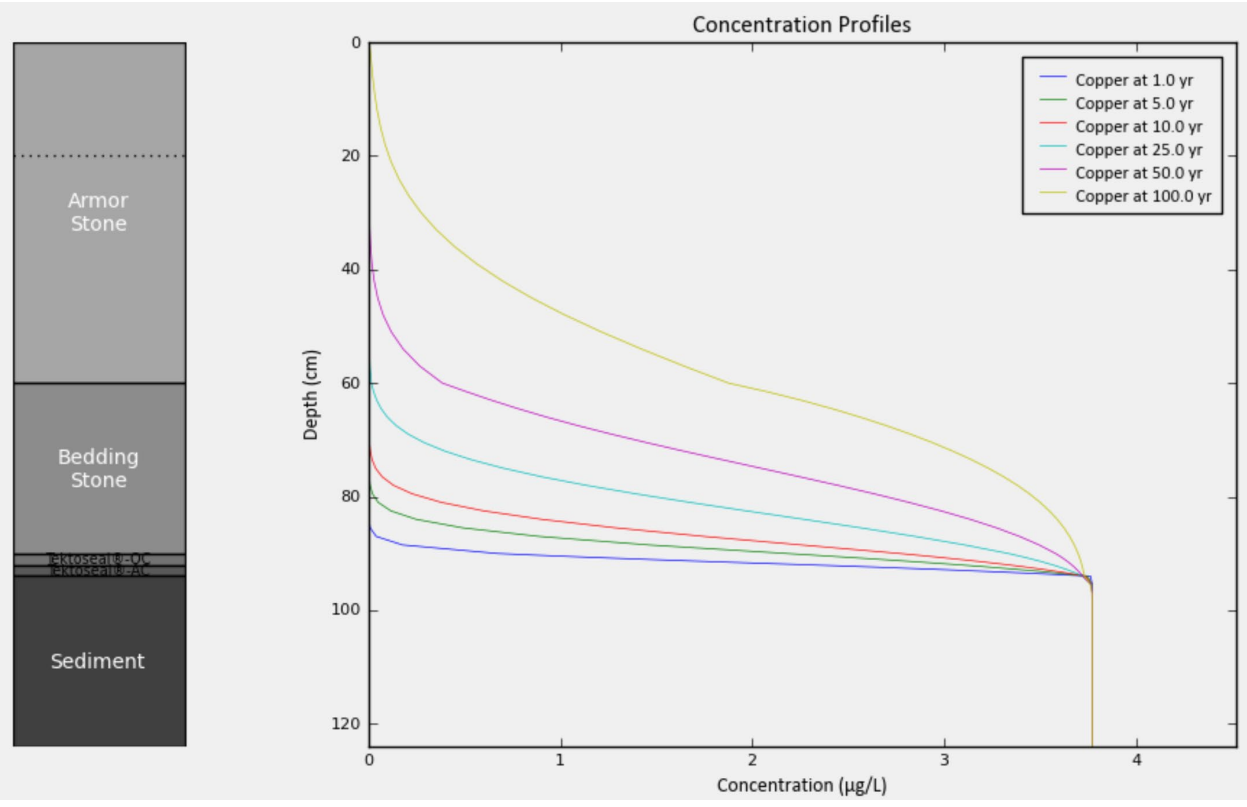

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Benzo(k)fluoranthene at 1.0 yr
Benzo(k)fluoranthene at 5.0 yr
Benzo(k)fluoranthene at 10.0 yr
Benzo(k)fluoranthene at 25.0 yr
Benzo(k)fluoranthene at 50.0 yr
Benzo(k)fluoranthene at 100.0 yr

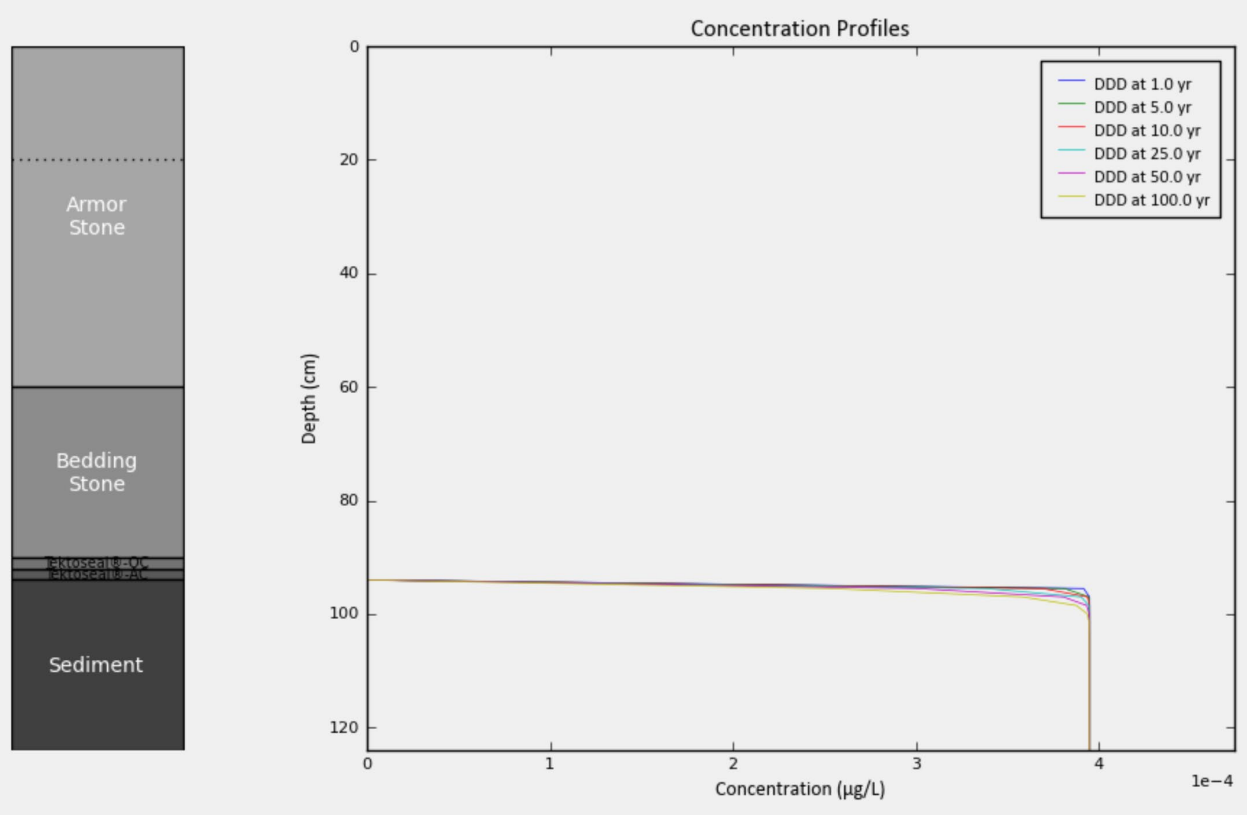

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Cadmium at 1.0 yr
Cadmium at 5.0 yr
Cadmium at 10.0 yr
Cadmium at 25.0 yr
Cadmium at 50.0 yr
Cadmium at 100.0 yr

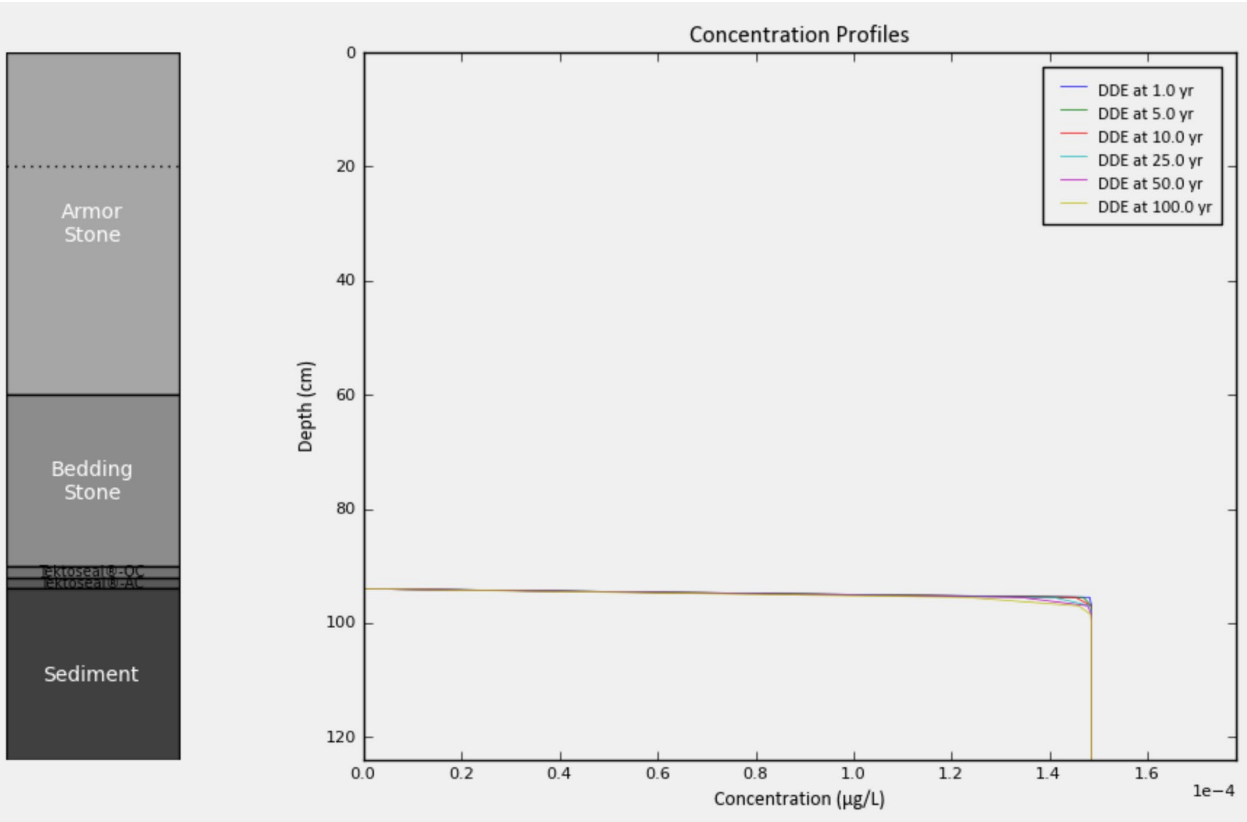

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Chlordanes at 1.0 yr
Chlordanes at 5.0 yr
Chlordanes at 10.0 yr
Chlordanes at 25.0 yr
Chlordanes at 50.0 yr
Chlordanes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020

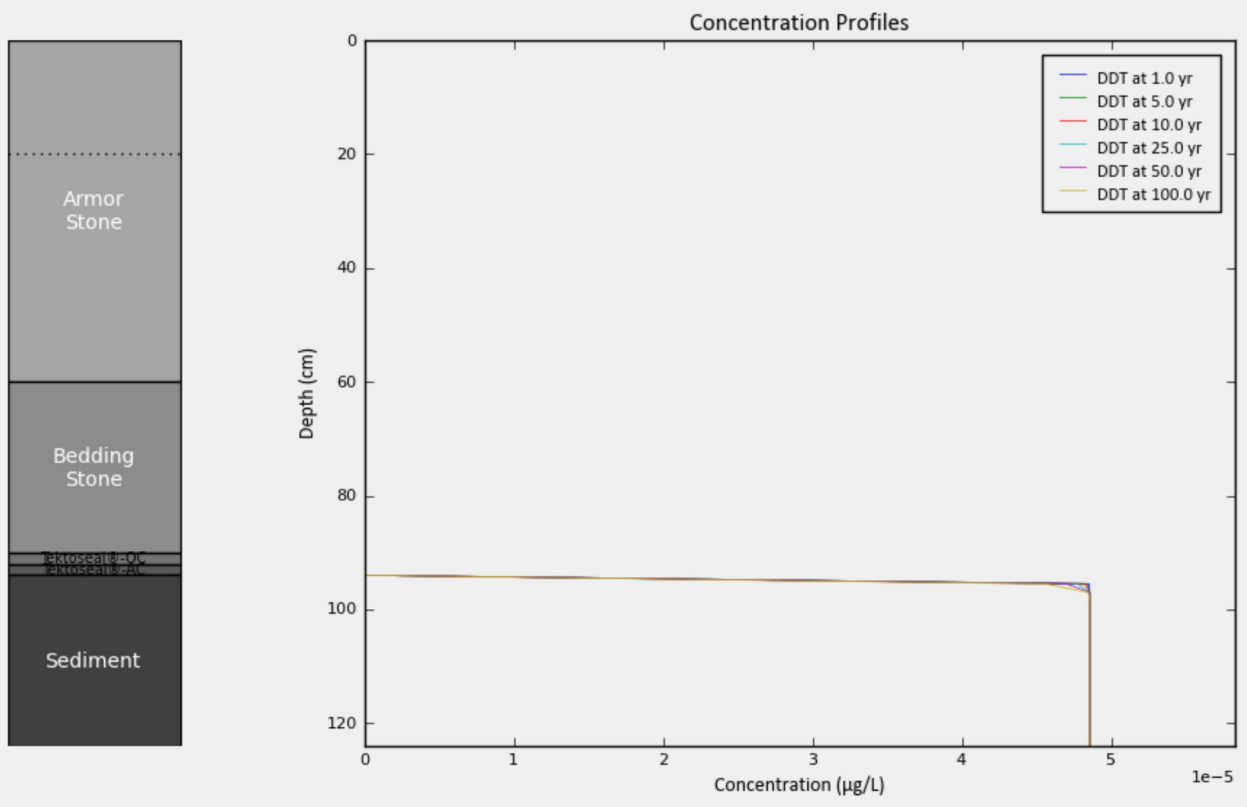

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Chromium (III) at 1.0 yr
Chromium (III) at 5.0 yr
Chromium (III) at 10.0 yr
Chromium (III) at 25.0 yr
Chromium (III) at 50.0 yr
Chromium (III) at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2

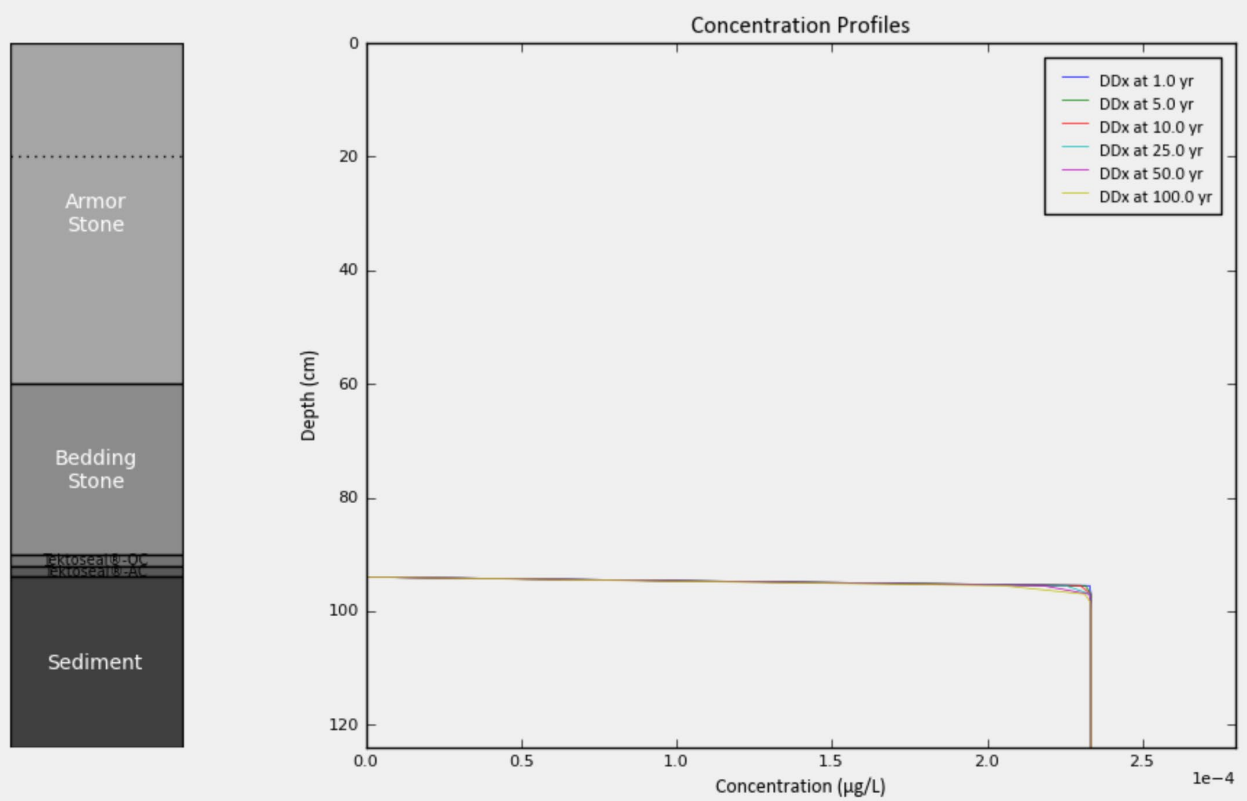

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Chrysene at 1.0 yr
Chrysene at 5.0 yr
Chrysene at 10.0 yr
Chrysene at 25.0 yr
Chrysene at 50.0 yr
Chrysene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010

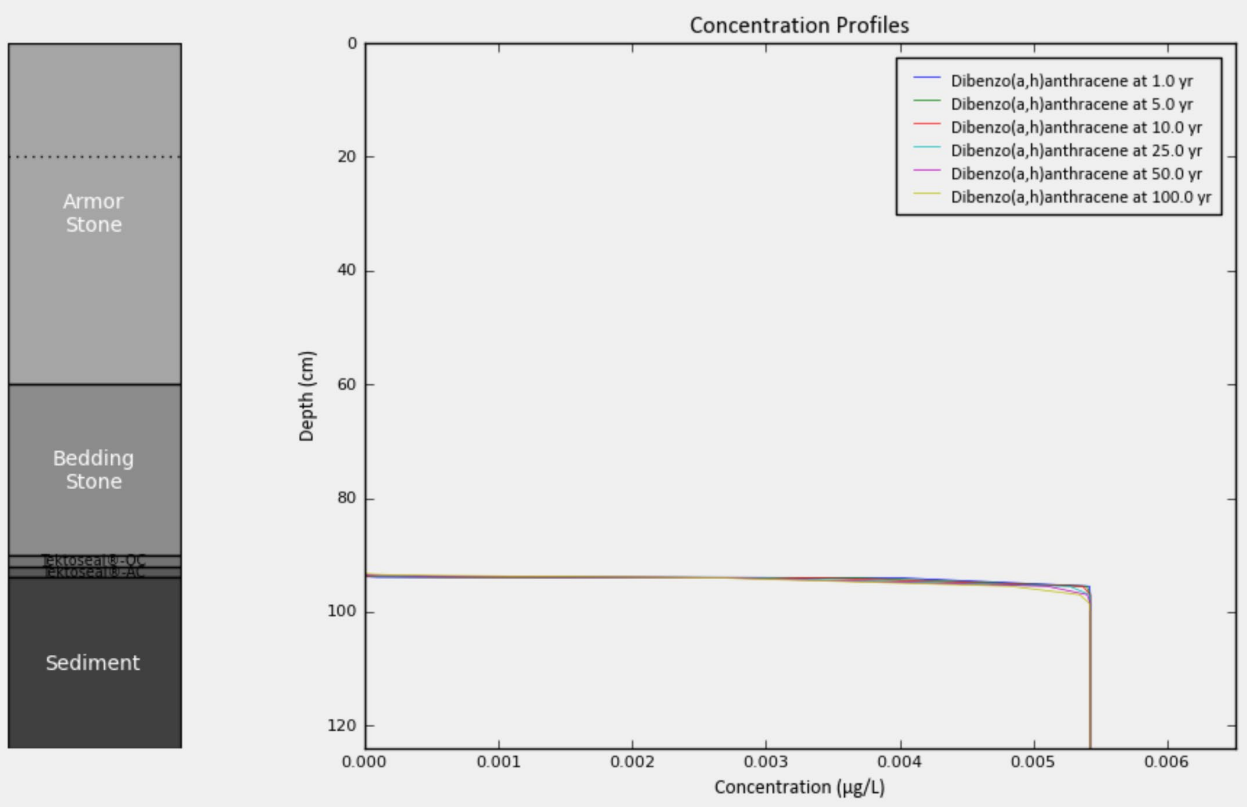

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Copper at 1.0 yr
Copper at 5.0 yr
Copper at 10.0 yr
Copper at 25.0 yr
Copper at 50.0 yr
Copper at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
1
2
3
4

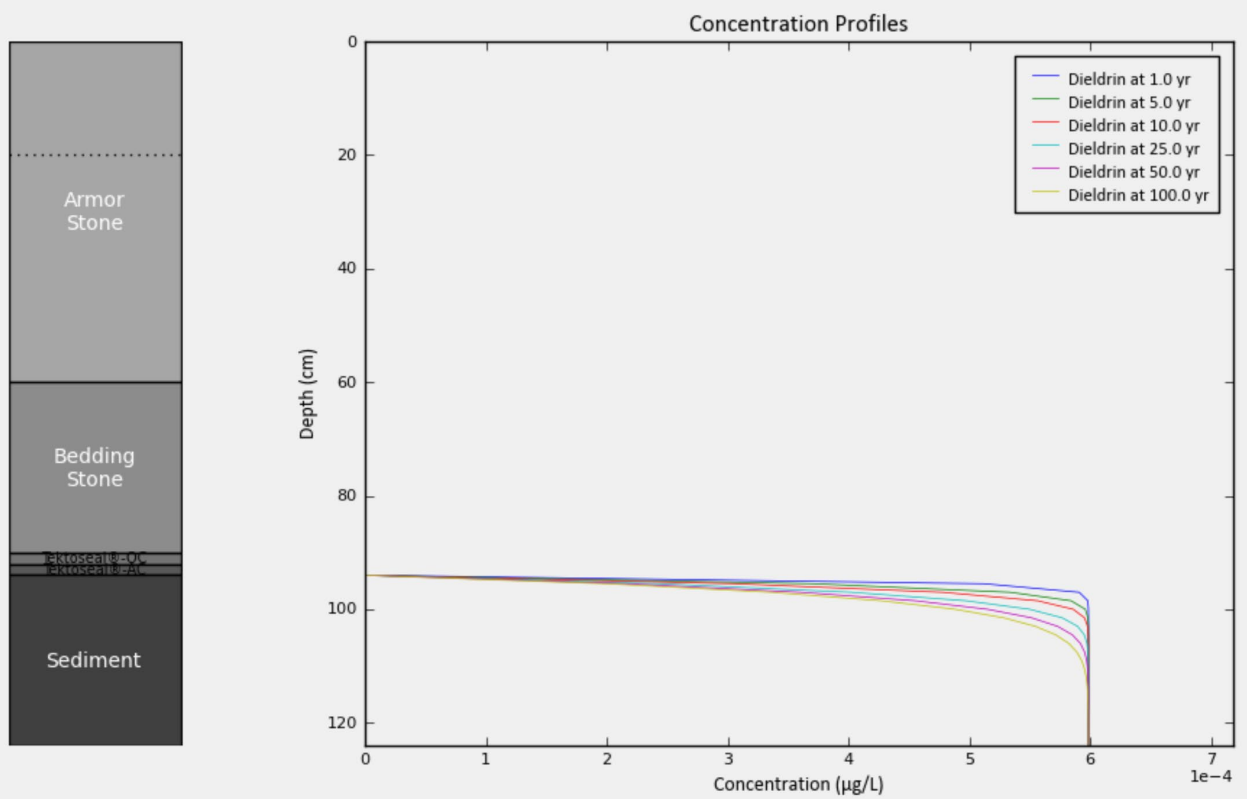

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDD at 1.0 yr
DDD at 5.0 yr
DDD at 10.0 yr
DDD at 25.0 yr
DDD at 50.0 yr
DDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

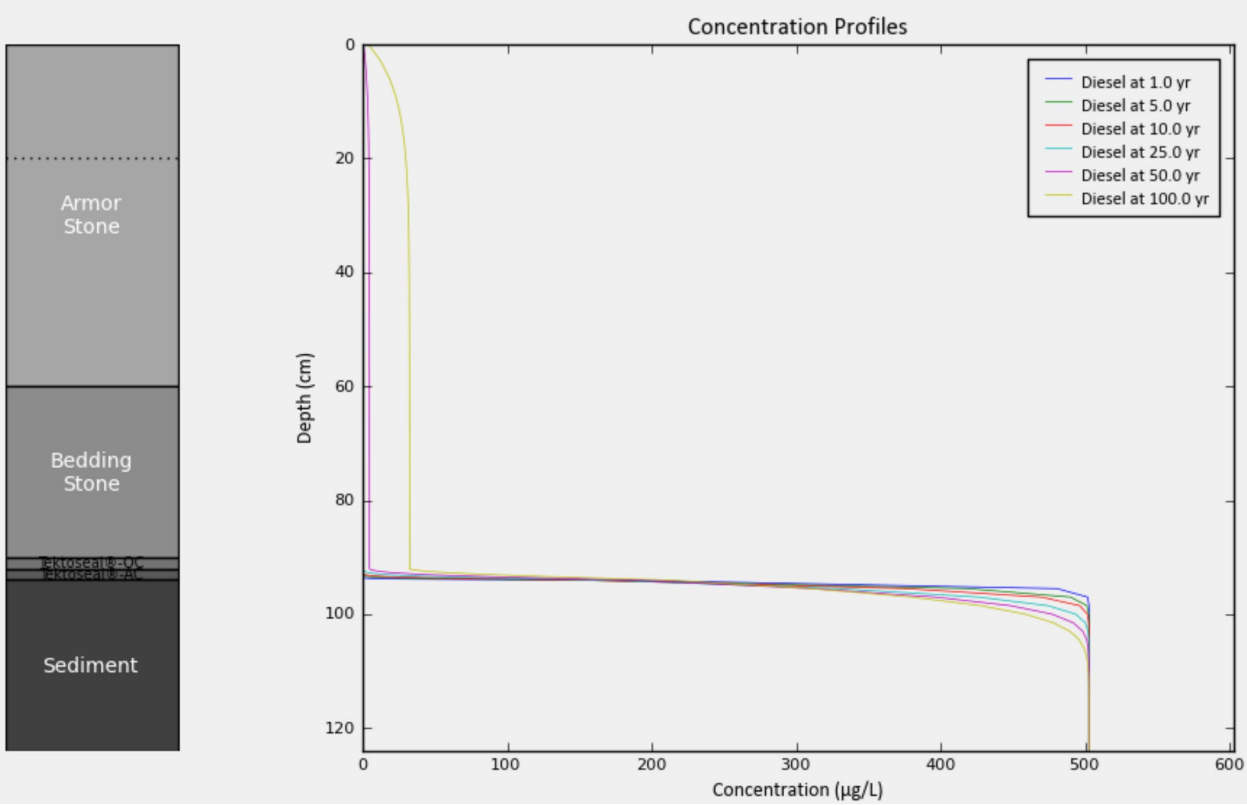

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDE at 1.0 yr
DDE at 5.0 yr
DDE at 10.0 yr
DDE at 25.0 yr
DDE at 50.0 yr
DDE at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

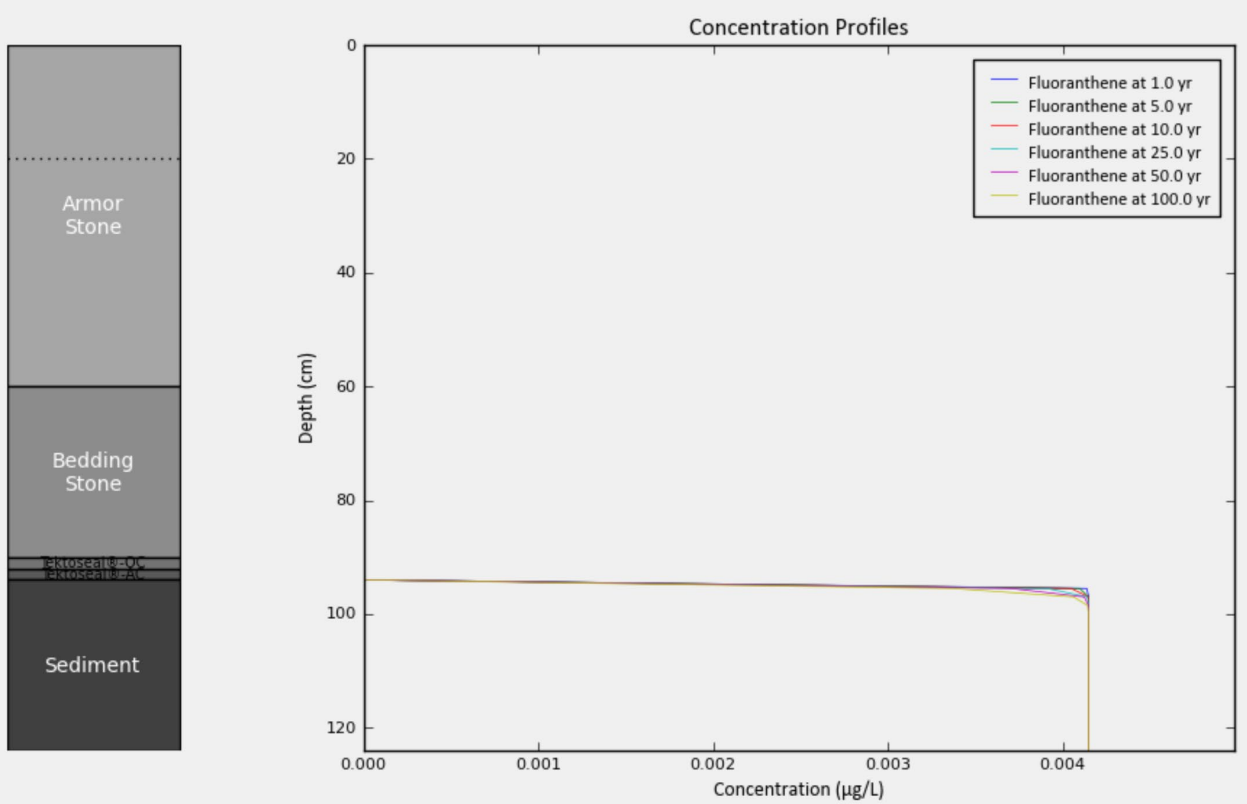

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDT at 1.0 yr
DDT at 5.0 yr
DDT at 10.0 yr
DDT at 25.0 yr
DDT at 50.0 yr
DDT at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

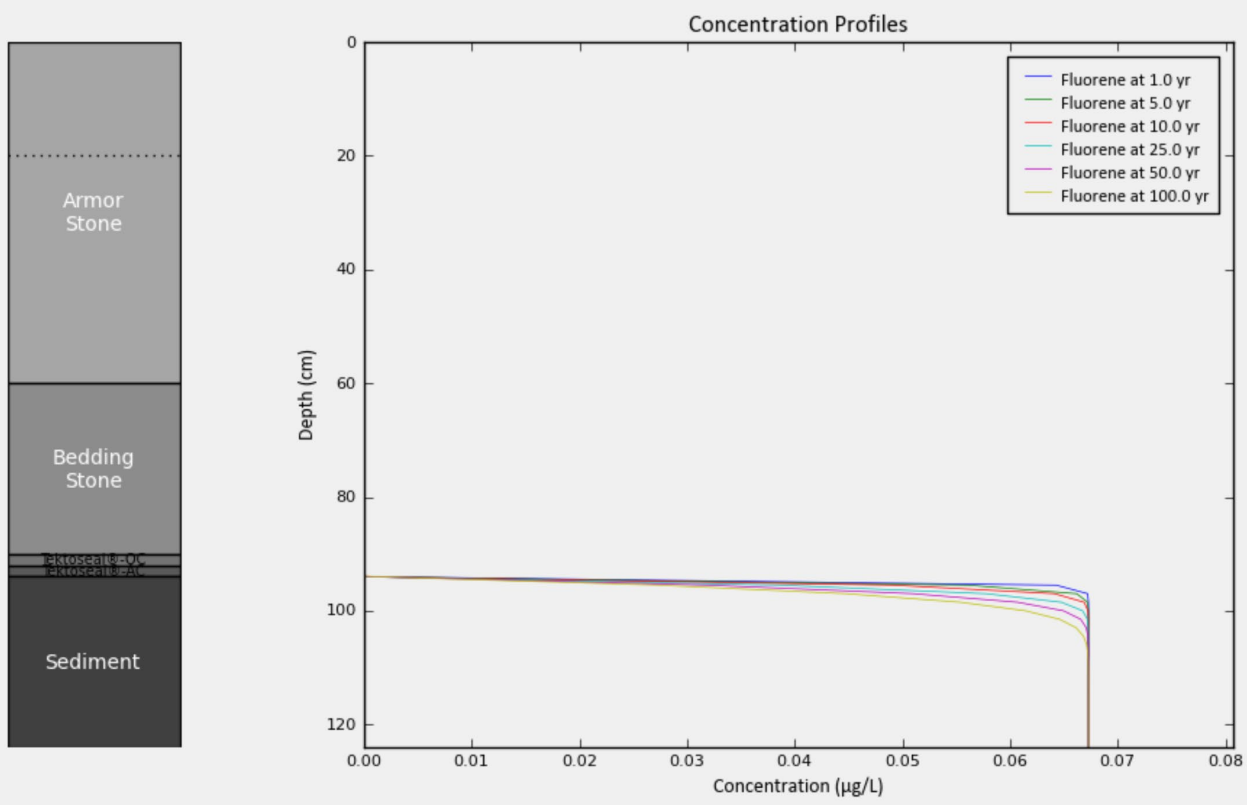

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDx at 1.0 yr
DDx at 5.0 yr
DDx at 10.0 yr
DDx at 25.0 yr
DDx at 50.0 yr
DDx at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

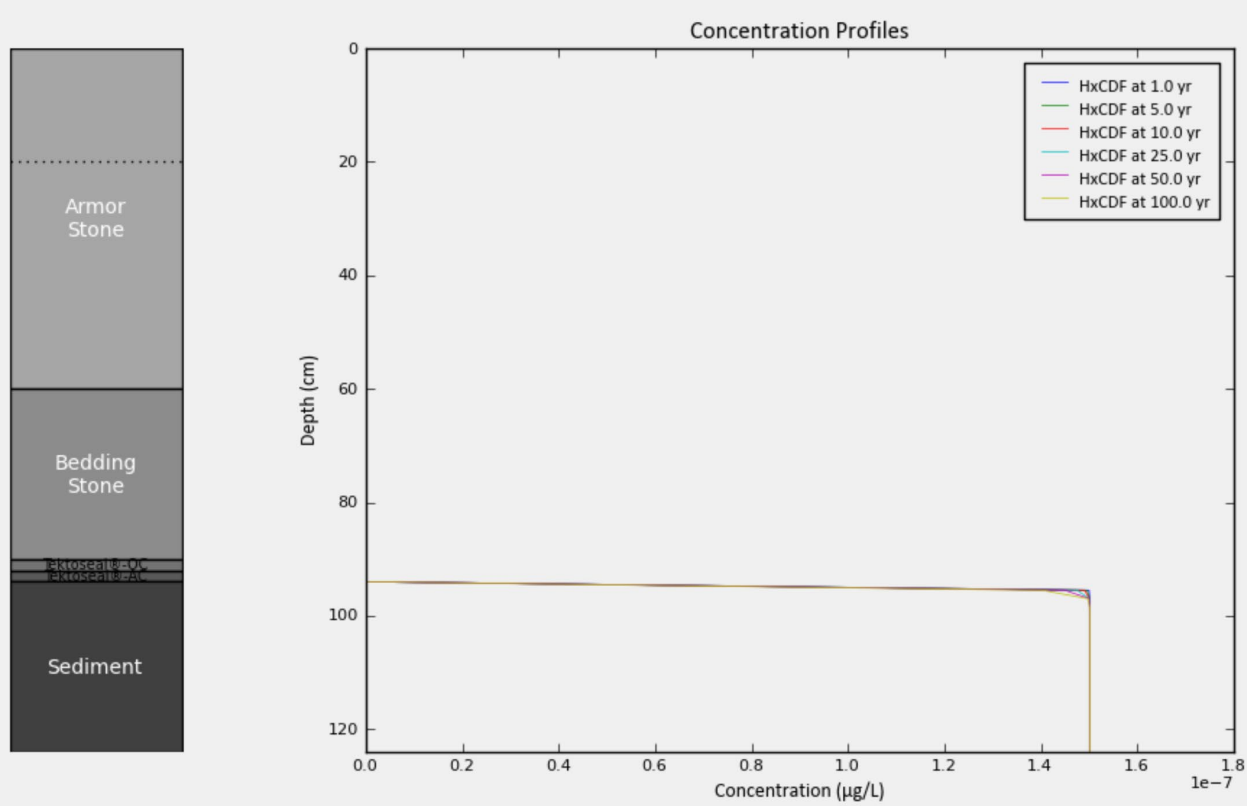

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Dibenzo(a,h)anthracene at 1.0 yr
Dibenzo(a,h)anthracene at 5.0 yr
Dibenzo(a,h)anthracene at 10.0 yr
Dibenzo(a,h)anthracene at 25.0 yr
Dibenzo(a,h)anthracene at 50.0 yr
Dibenzo(a,h)anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)

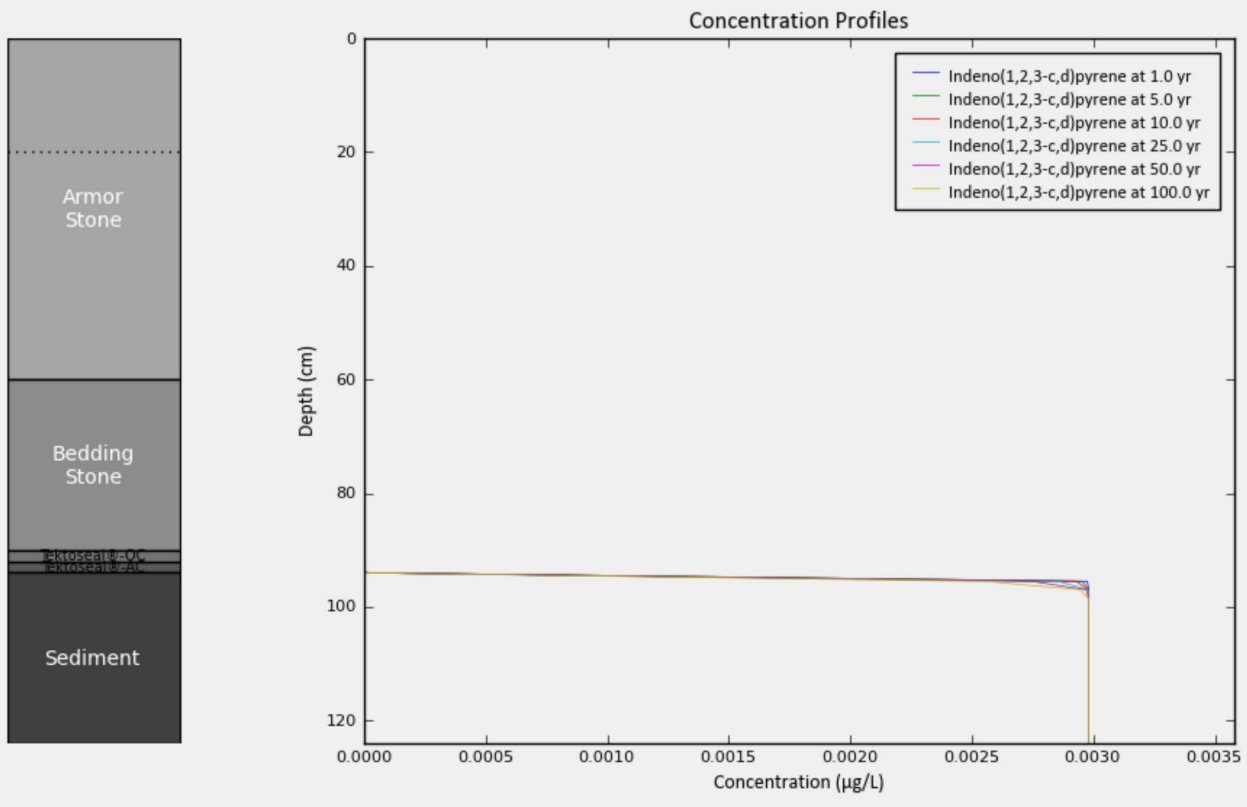

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Dieldrin at 1.0 yr
Dieldrin at 5.0 yr
Dieldrin at 10.0 yr
Dieldrin at 25.0 yr
Dieldrin at 50.0 yr
Dieldrin at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

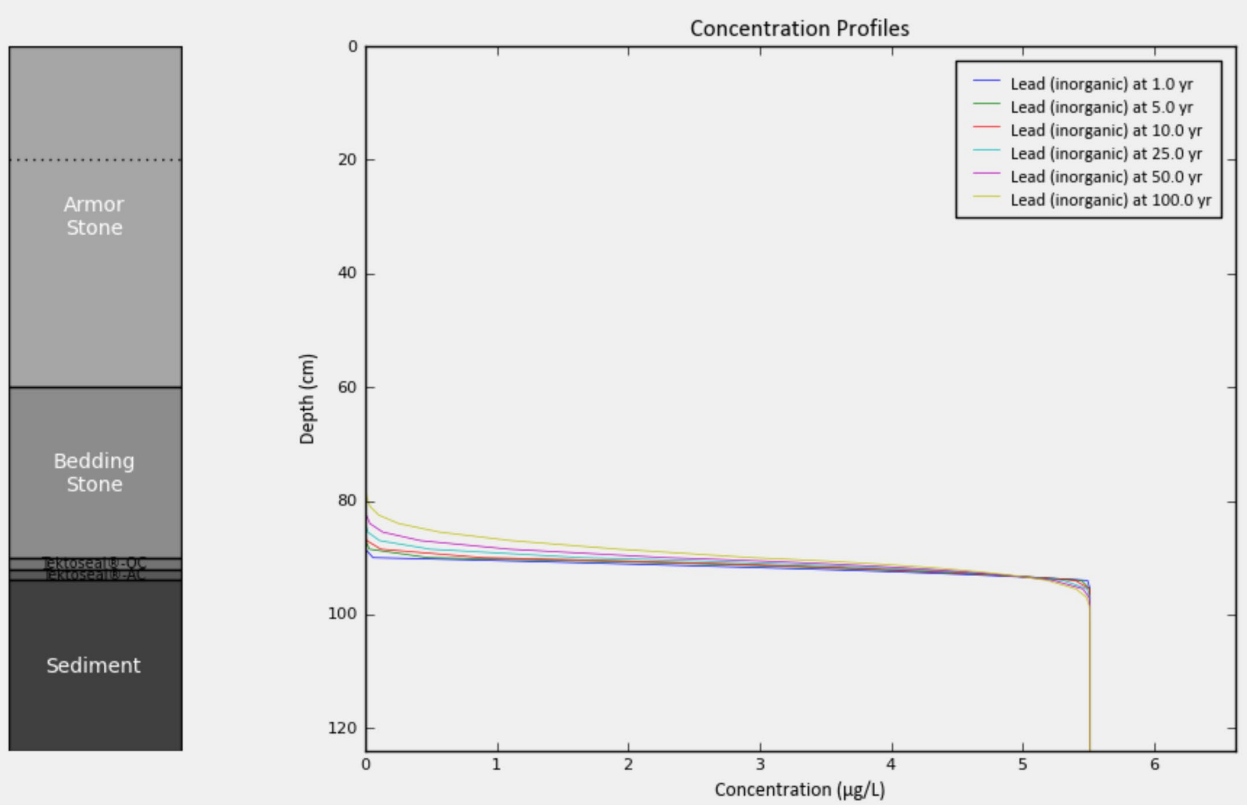

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Diesel at 1.0 yr
Diesel at 5.0 yr
Diesel at 10.0 yr
Diesel at 25.0 yr
Diesel at 50.0 yr
Diesel at 100.0 yr
Depth (cm)
Concentration (µg/L)

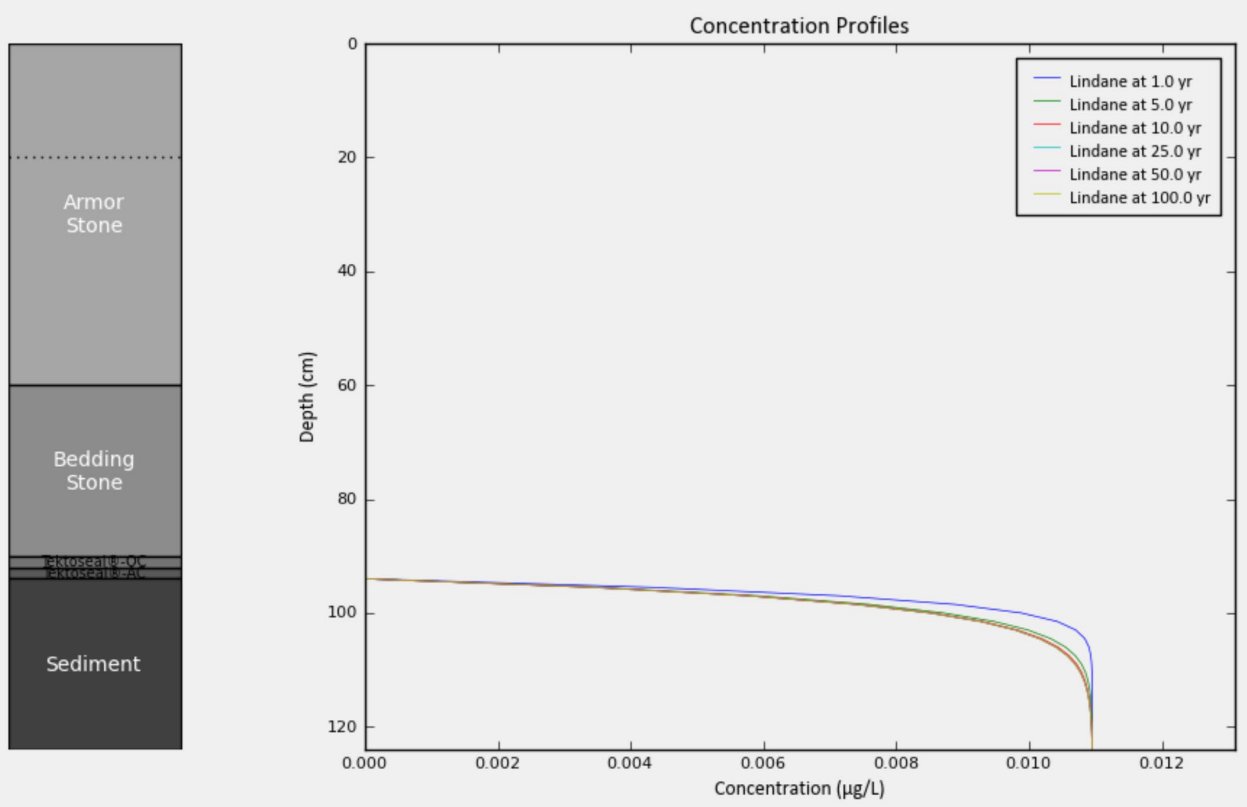

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Fluoranthene at 1.0 yr
Fluoranthene at 5.0 yr
Fluoranthene at 10.0 yr
Fluoranthene at 25.0 yr
Fluoranthene at 50.0 yr
Fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)

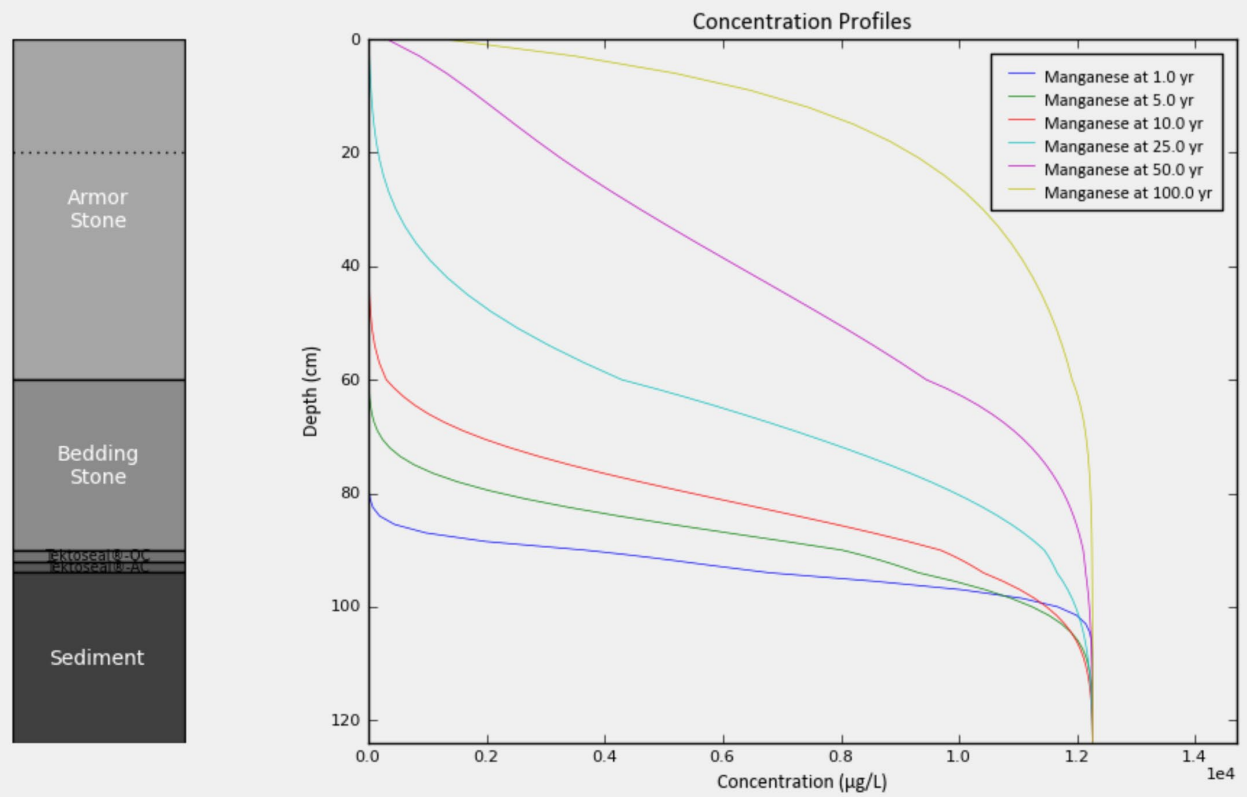

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Fluorene at 1.0 yr
Fluorene at 5.0 yr
Fluorene at 10.0 yr
Fluorene at 25.0 yr
Fluorene at 50.0 yr
Fluorene at 100.0 yr

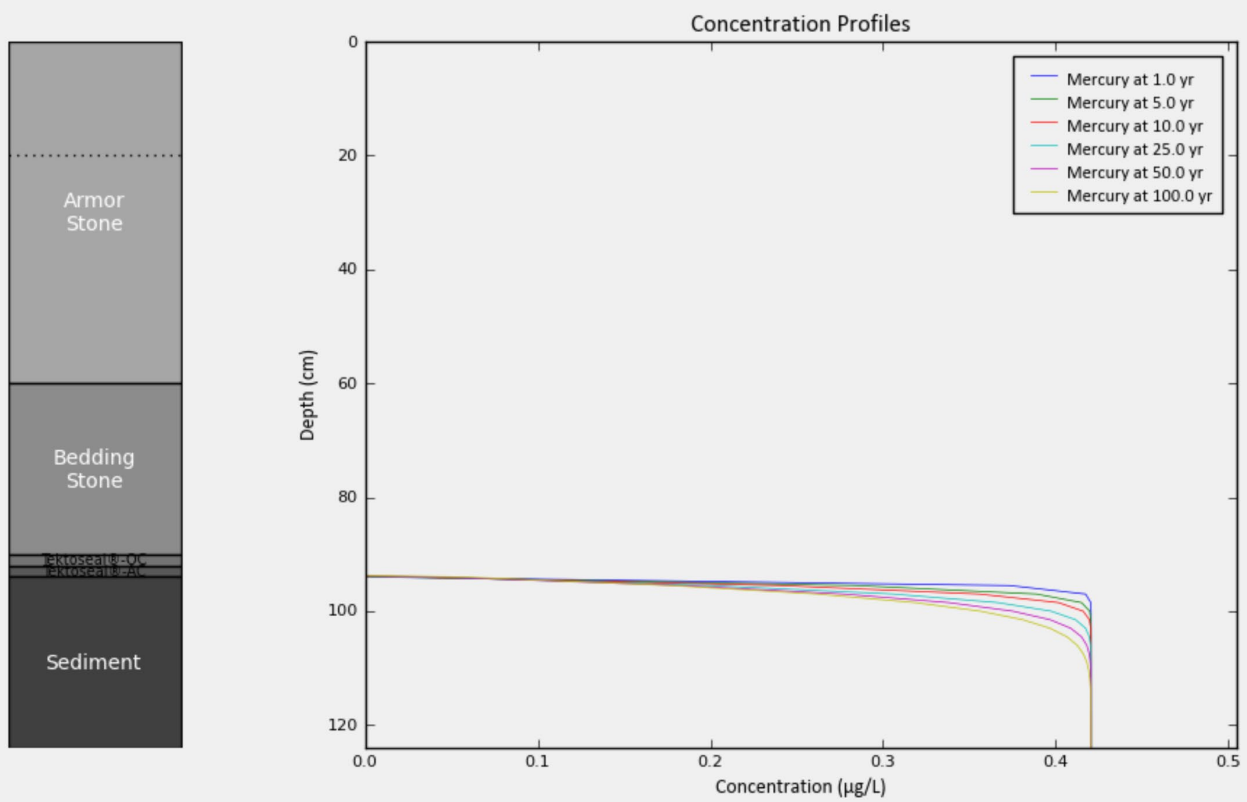

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
1e−7
HxCDF at 1.0 yr
HxCDF at 5.0 yr
HxCDF at 10.0 yr
HxCDF at 25.0 yr
HxCDF at 50.0 yr
HxCDF at 100.0 yr

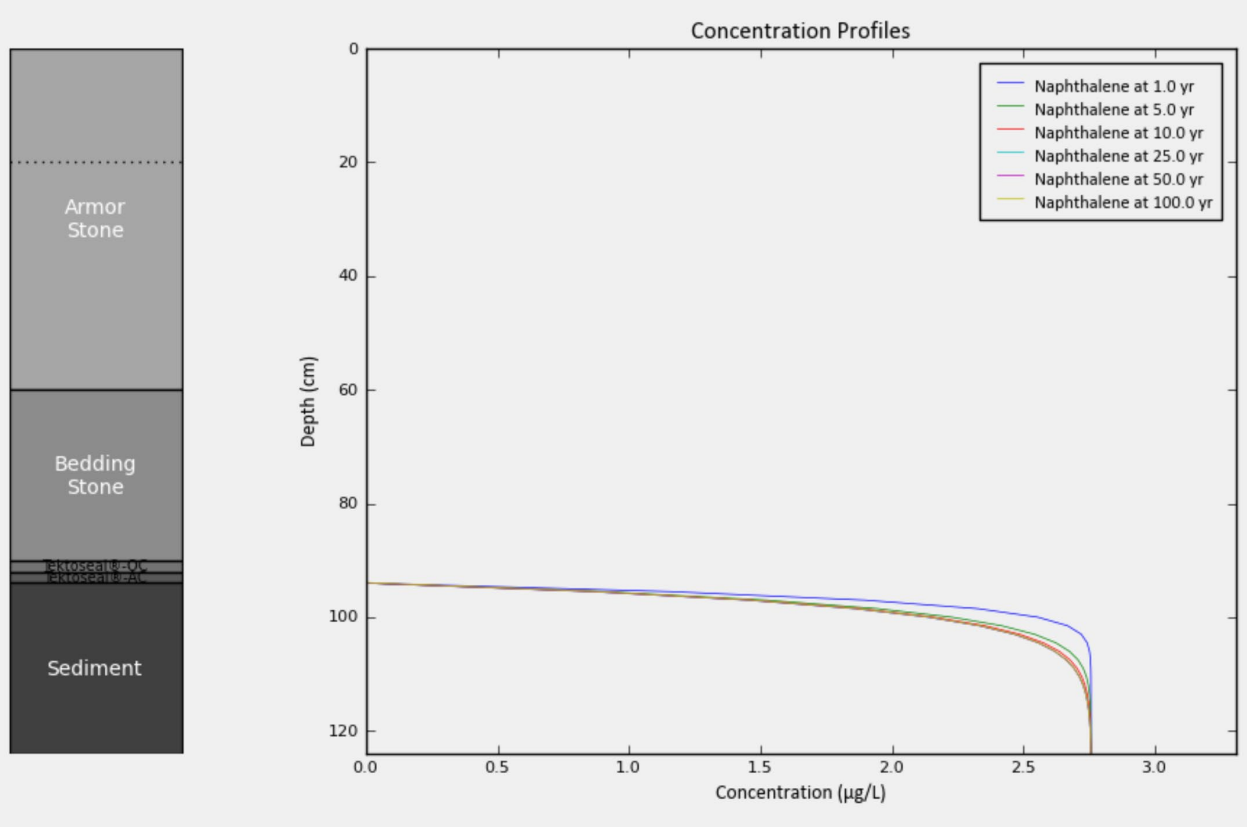

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Indeno(1,2,3-c,d)pyrene at 1.0 yr
Indeno(1,2,3-c,d)pyrene at 5.0 yr
Indeno(1,2,3-c,d)pyrene at 10.0 yr
Indeno(1,2,3-c,d)pyrene at 25.0 yr
Indeno(1,2,3-c,d)pyrene at 50.0 yr
Indeno(1,2,3-c,d)pyrene at 100.0 yr

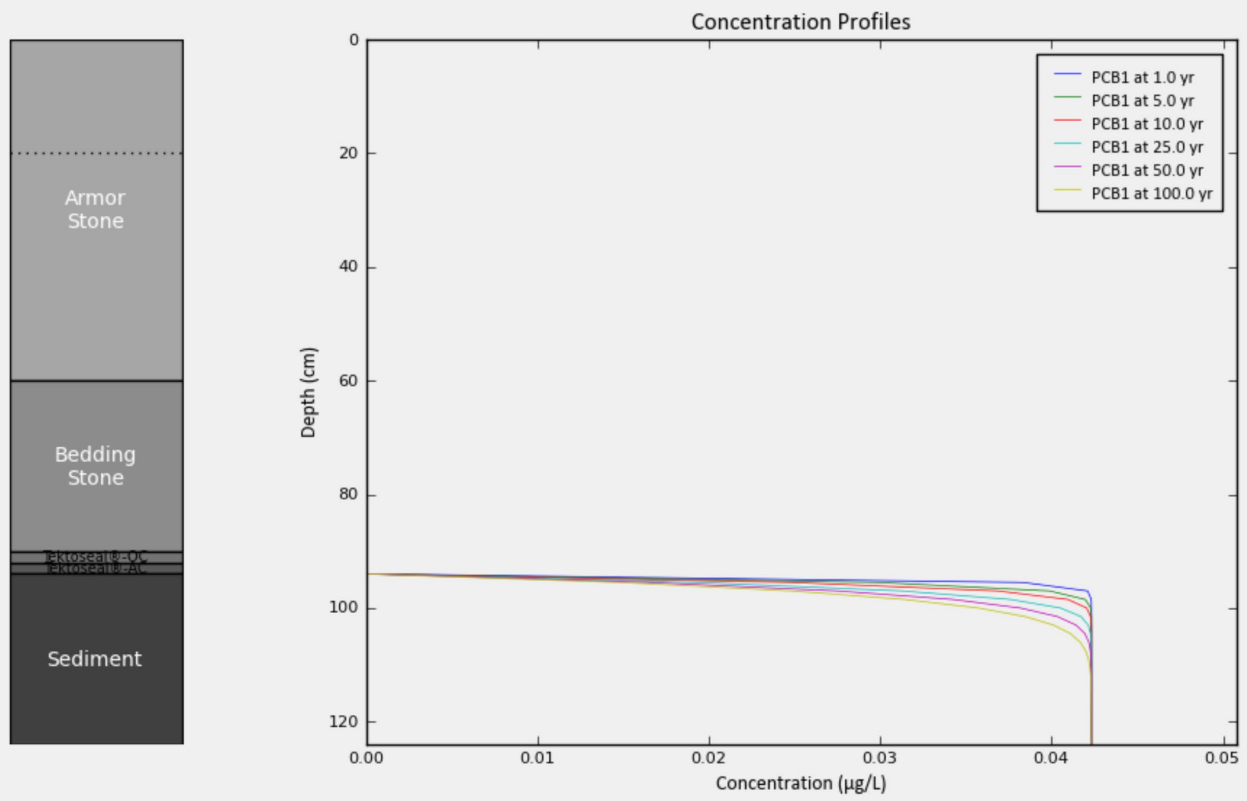

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Lead (inorganic) at 1.0 yr
Lead (inorganic) at 5.0 yr
Lead (inorganic) at 10.0 yr
Lead (inorganic) at 25.0 yr
Lead (inorganic) at 50.0 yr
Lead (inorganic) at 100.0 yr

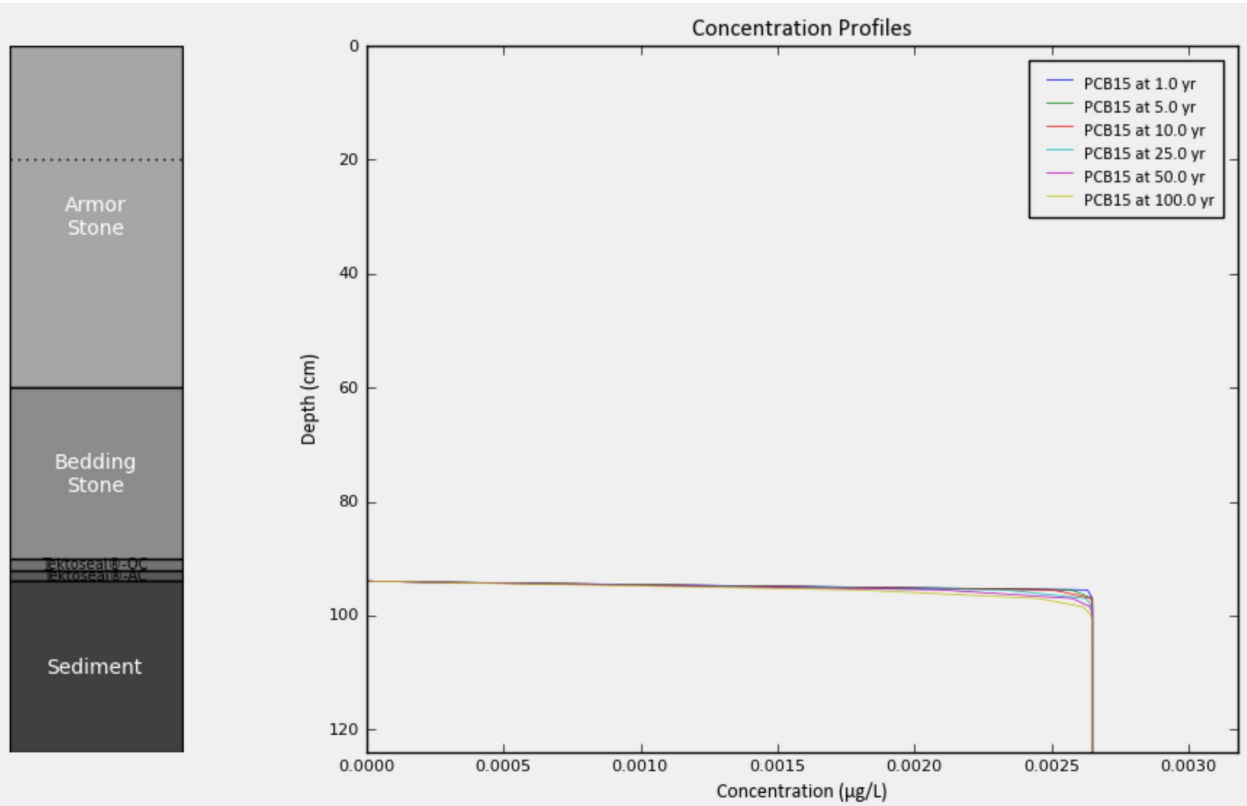

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Lindane at 1.0 yr
Lindane at 5.0 yr
Lindane at 10.0 yr
Lindane at 25.0 yr
Lindane at 50.0 yr
Lindane at 100.0 yr
Depth (cm)
Concentration (µg/L)

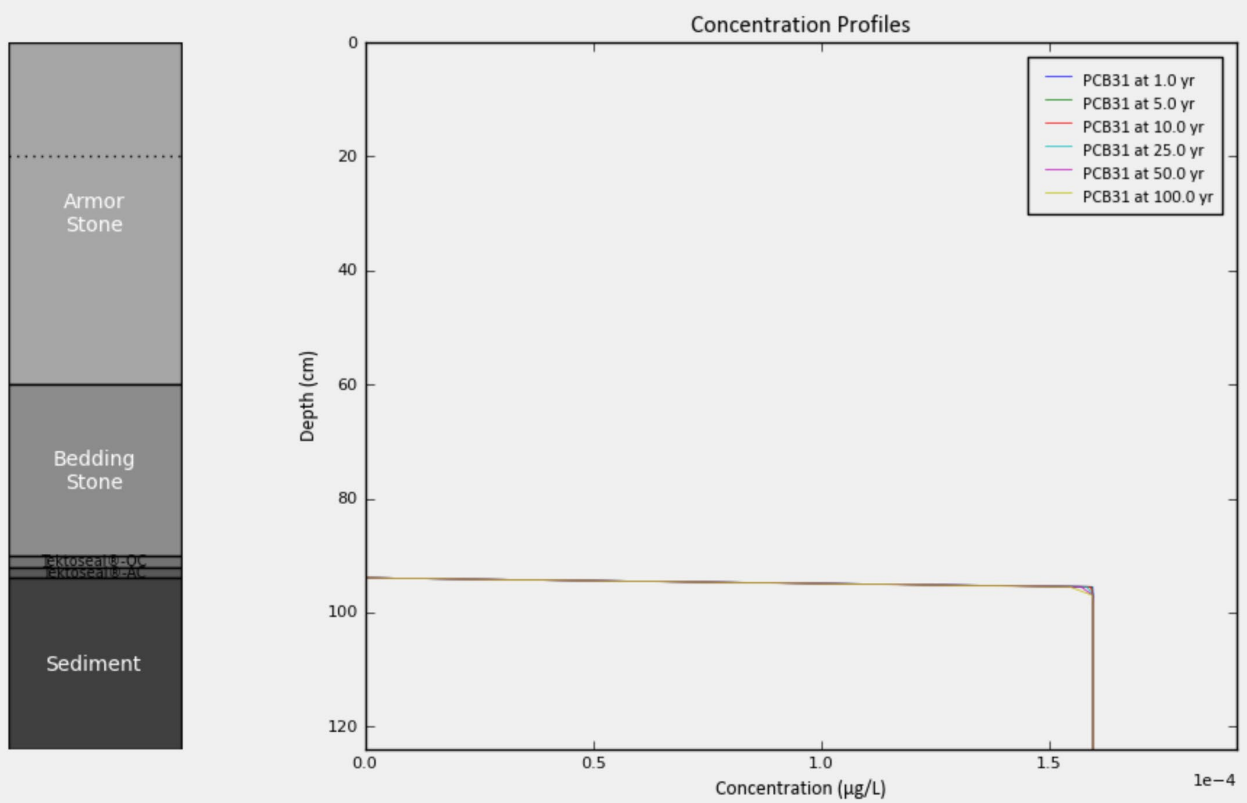

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Manganese at 1.0 yr
Manganese at 5.0 yr
Manganese at 10.0 yr
Manganese at 25.0 yr
Manganese at 50.0 yr
Manganese at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e4

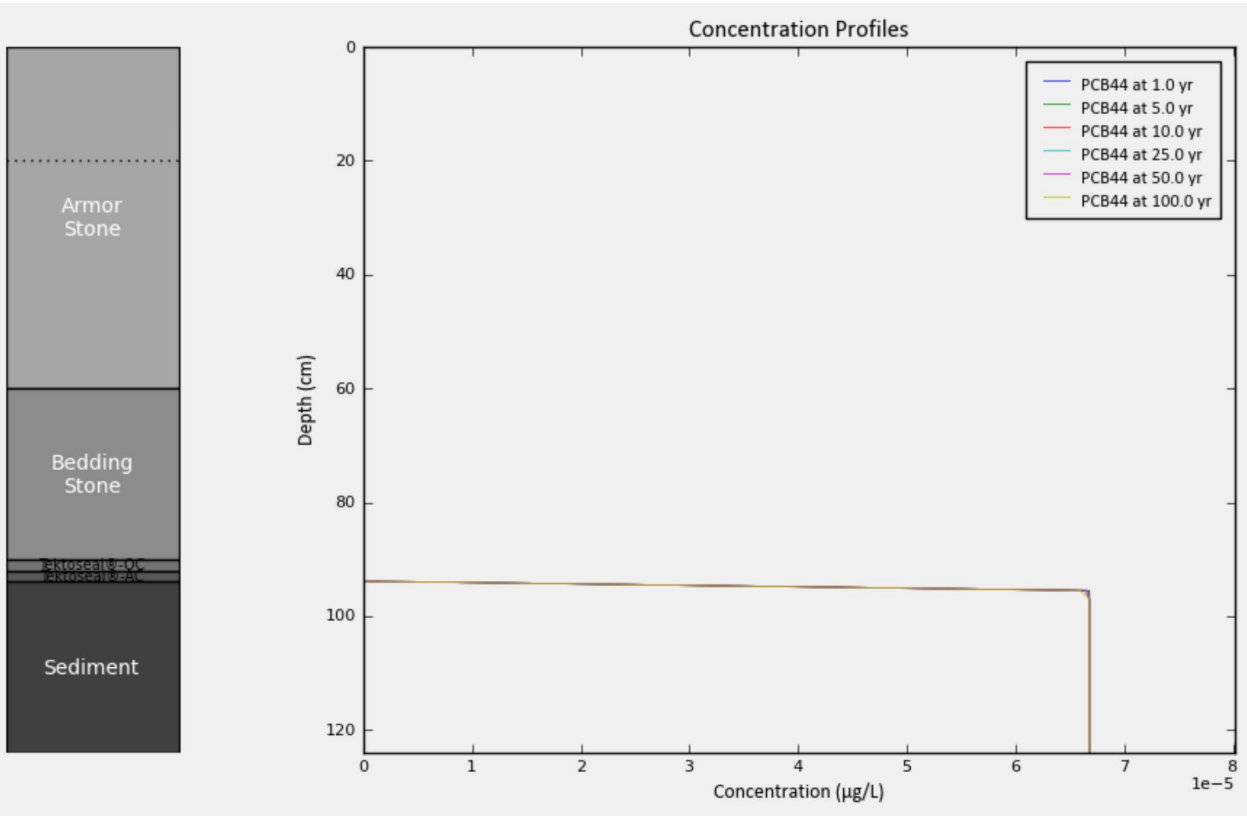

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Mercury at 1.0 yr
Mercury at 5.0 yr
Mercury at 10.0 yr
Mercury at 25.0 yr
Mercury at 50.0 yr
Mercury at 100.0 yr
Depth (cm)
Concentration (µg/L)

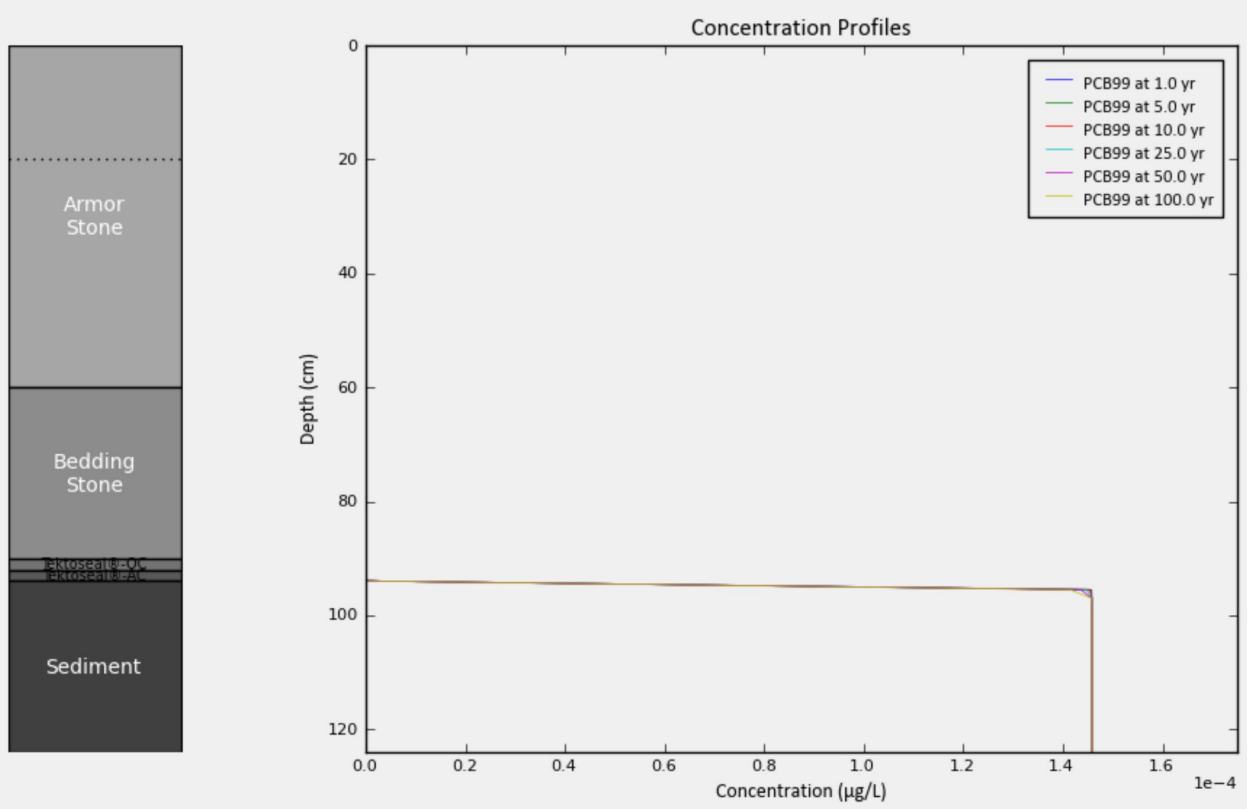

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Naphthalene at 1.0 yr
Naphthalene at 5.0 yr
Naphthalene at 10.0 yr
Naphthalene at 25.0 yr
Naphthalene at 50.0 yr
Naphthalene at 100.0 yr
Depth (cm)
Concentration (µg/L)

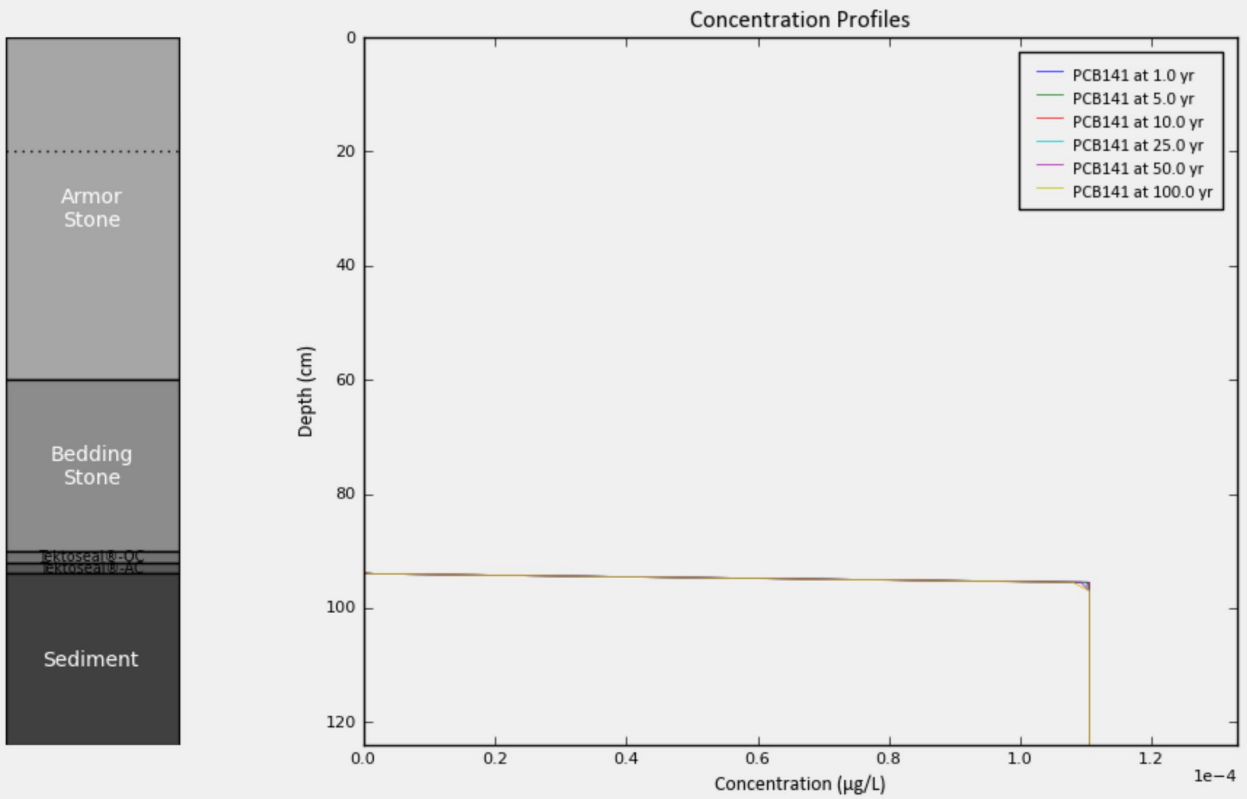

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB1 at 1.0 yr
PCB1 at 5.0 yr
PCB1 at 10.0 yr
PCB1 at 25.0 yr
PCB1 at 50.0 yr
PCB1 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.00
0.01
0.02
0.03
0.04
0.05

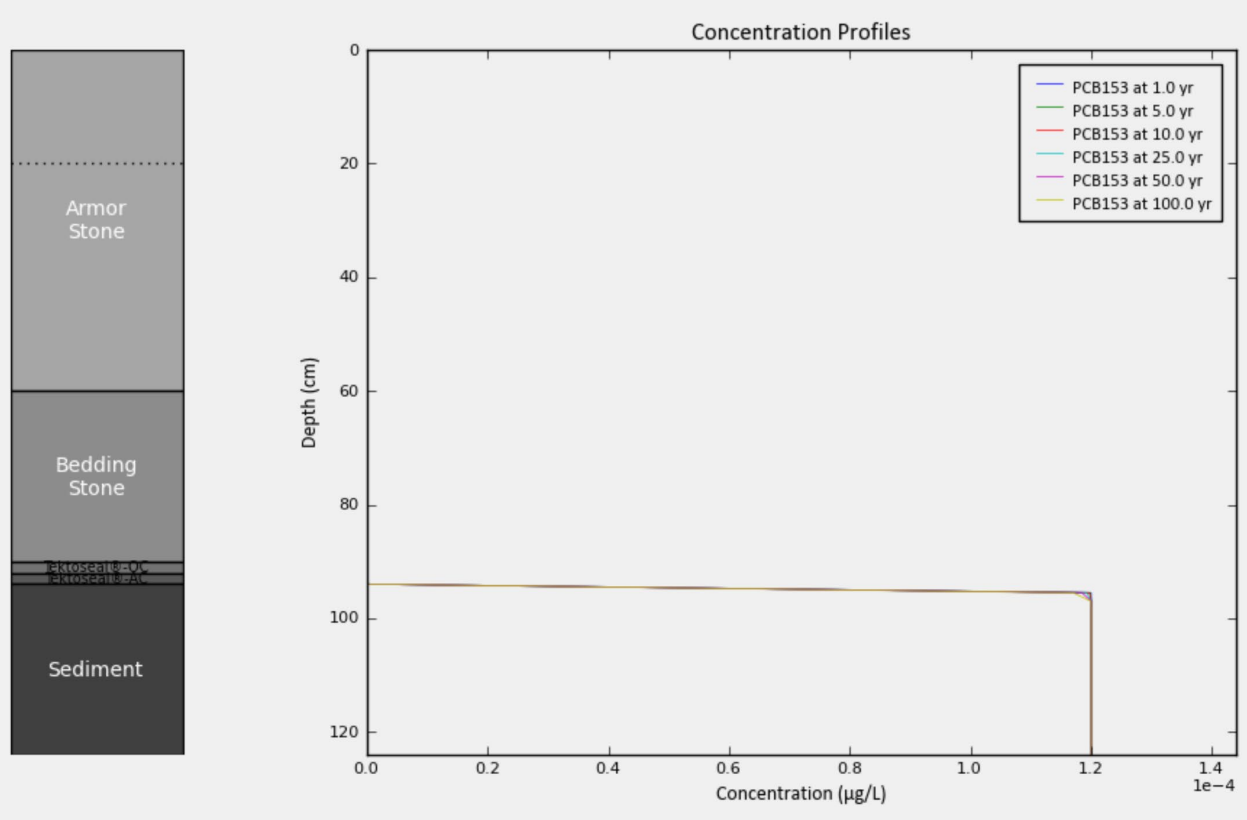

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB15 at 1.0 yr
PCB15 at 5.0 yr
PCB15 at 10.0 yr
PCB15 at 25.0 yr
PCB15 at 50.0 yr
PCB15 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030

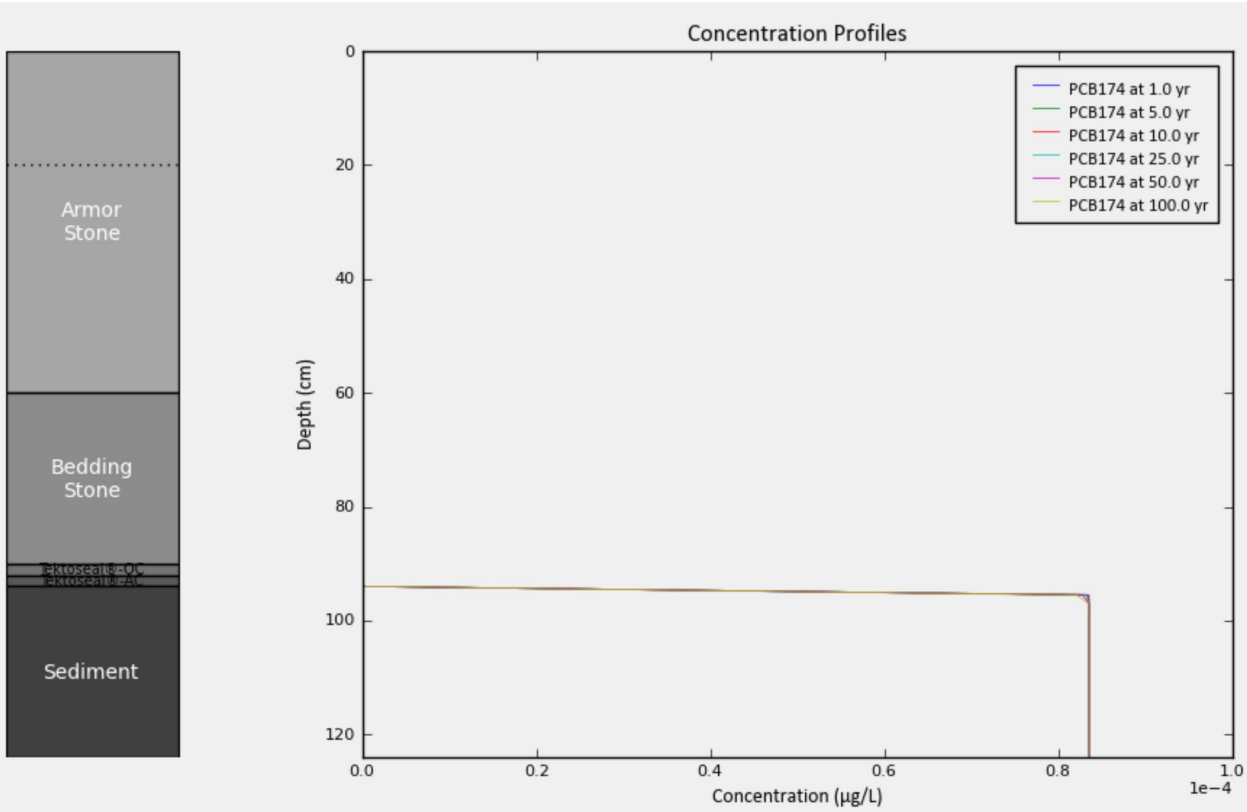

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB31 at 1.0 yr
PCB31 at 5.0 yr
PCB31 at 10.0 yr
PCB31 at 25.0 yr
PCB31 at 50.0 yr
PCB31 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
Concentration (µg/L)
1e−4

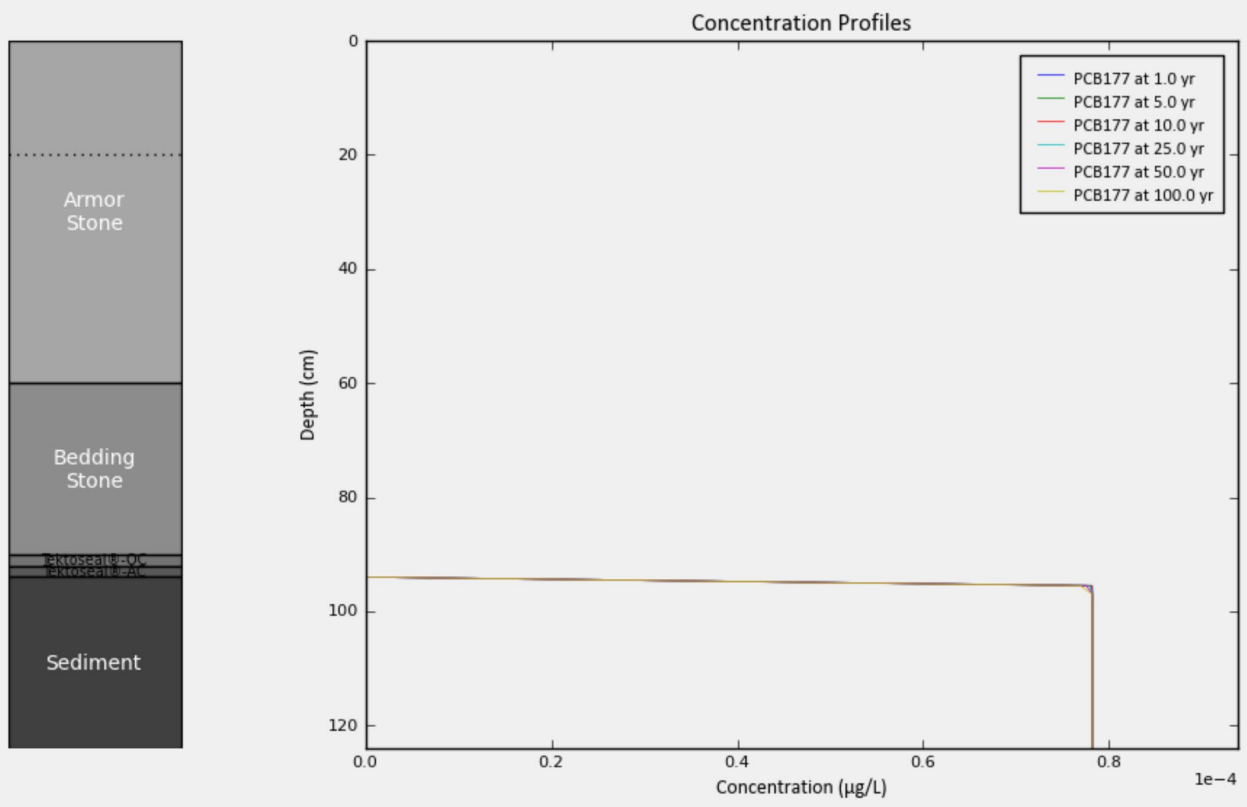

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB44 at 1.0 yr
PCB44 at 5.0 yr
PCB44 at 10.0 yr
PCB44 at 25.0 yr
PCB44 at 50.0 yr
PCB44 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
7
8
Concentration (µg/L)
1e−5

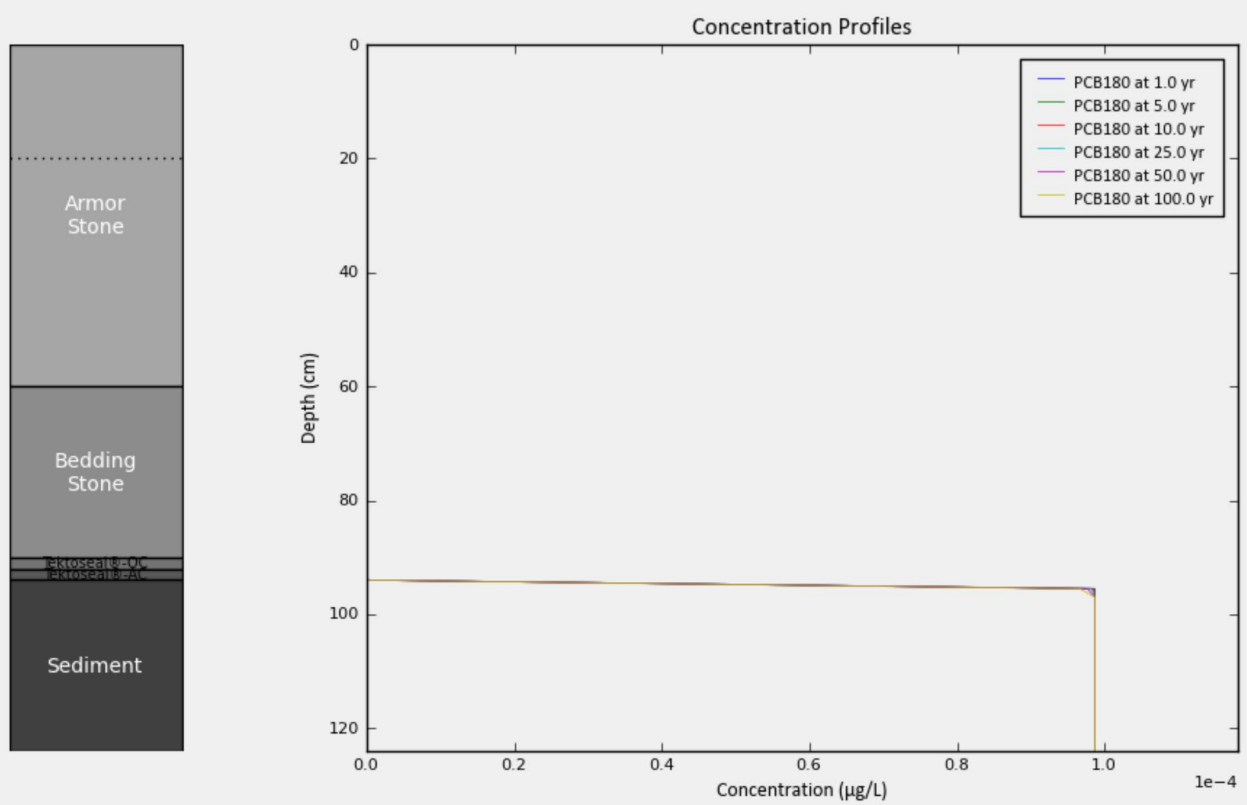

Armor Stone
Bedding Stone
Tekoseal® OC
Tekoseal® AC
Sediment
Concentration Profiles
PCB99 at 1.0 yr
PCB99 at 5.0 yr
PCB99 at 10.0 yr
PCB99 at 25.0 yr
PCB99 at 50.0 yr
PCB99 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

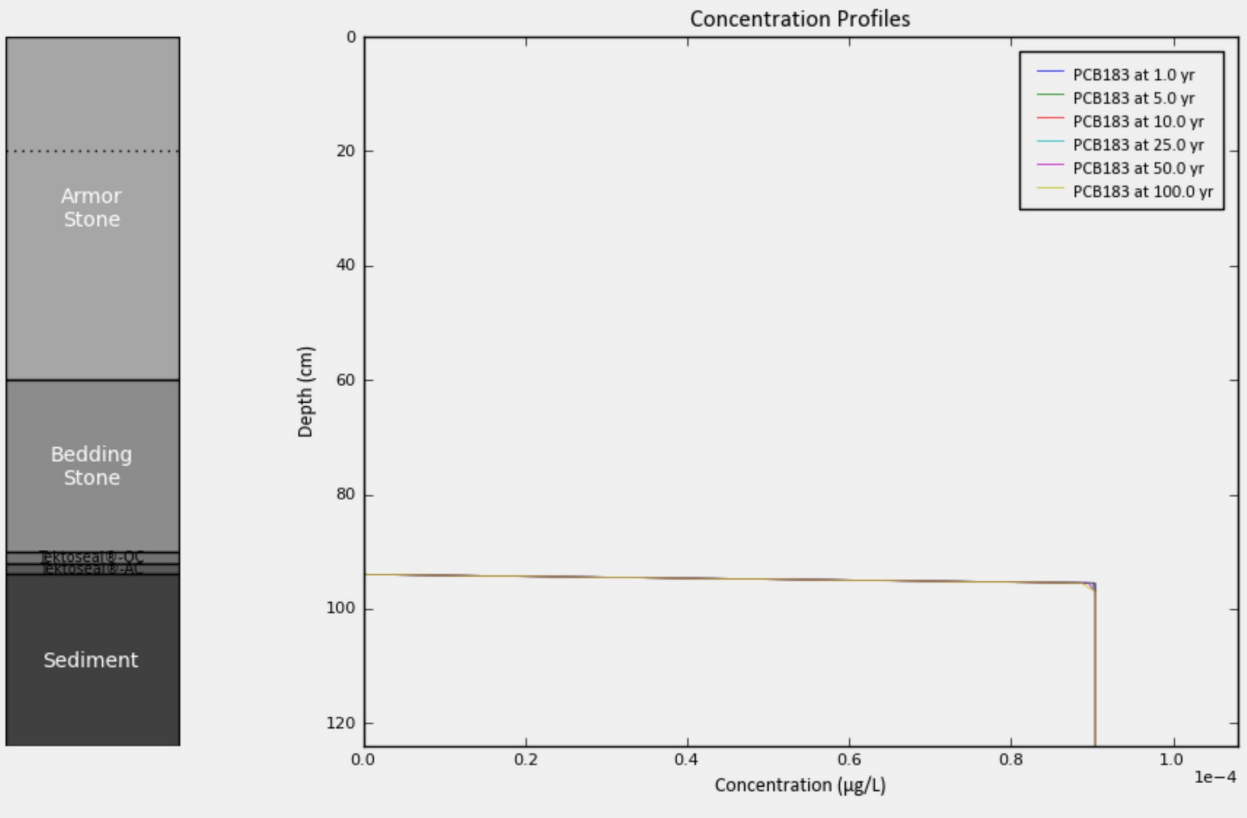

Armor Stone
Bedding Stone
Tekoseal® OC
Tekoseal® AC
Sediment
Concentration Profiles
PCB141 at 1.0 yr
PCB141 at 5.0 yr
PCB141 at 10.0 yr
PCB141 at 25.0 yr
PCB141 at 50.0 yr
PCB141 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

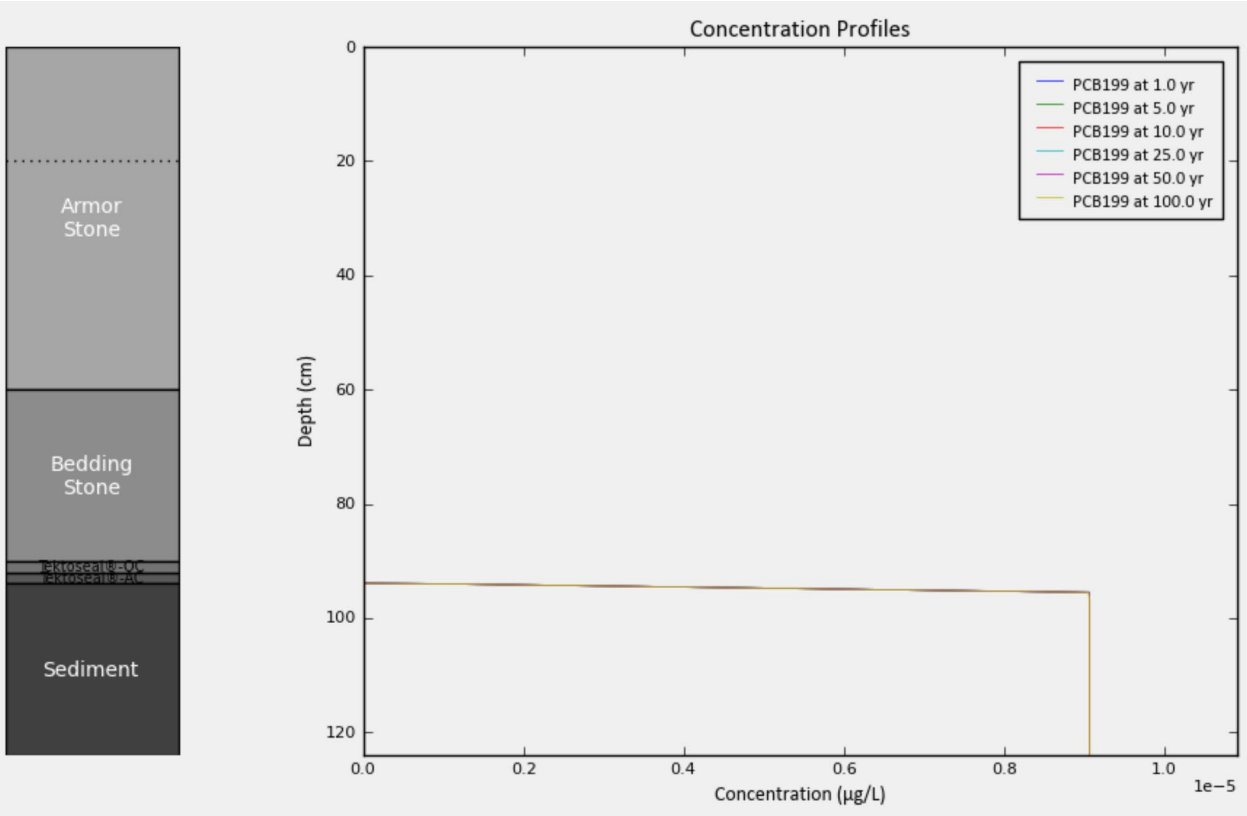

Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® OC
Tekoseal® AC
Sediment
PCB153 at 1.0 yr
PCB153 at 5.0 yr
PCB153 at 10.0 yr
PCB153 at 25.0 yr
PCB153 at 50.0 yr
PCB153 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1e−4
Concentration (µg/L)

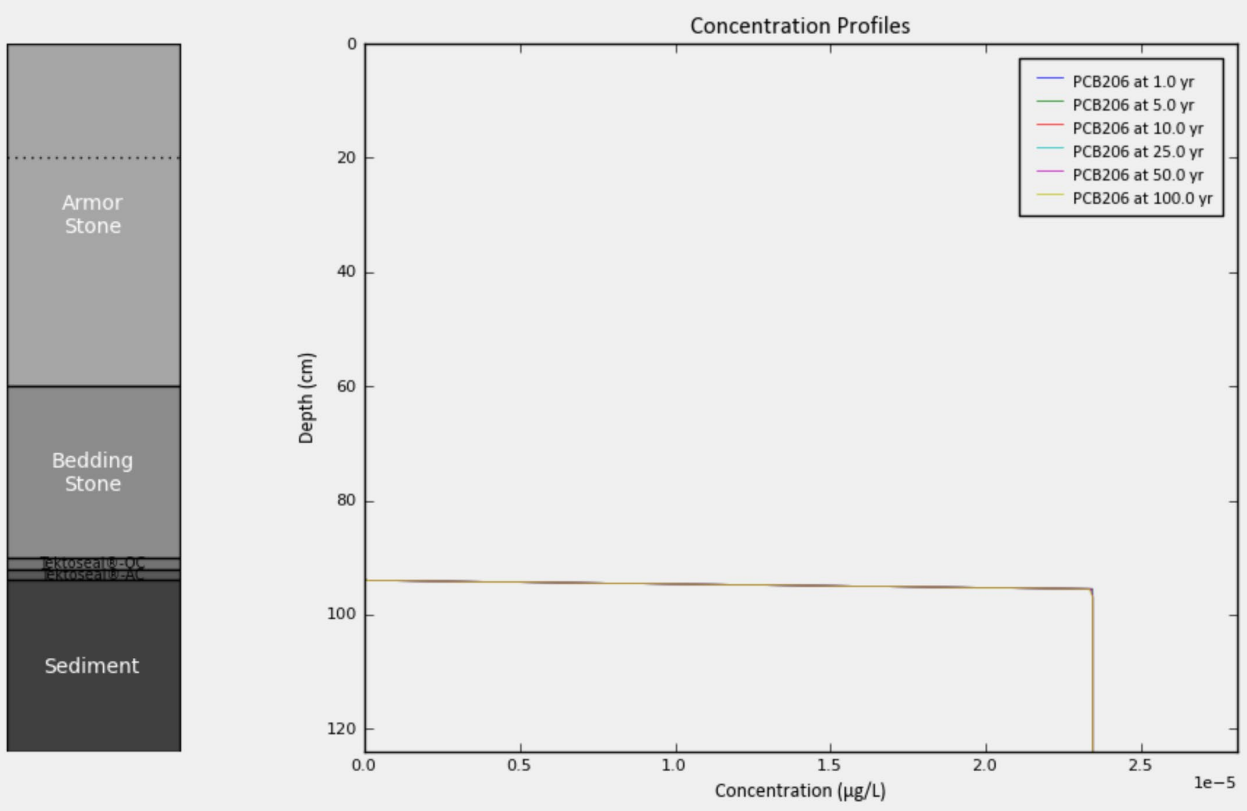

Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® OC
Tekoseal® AC
Sediment
PCB174 at 1.0 yr
PCB174 at 5.0 yr
PCB174 at 10.0 yr
PCB174 at 25.0 yr
PCB174 at 50.0 yr
PCB174 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

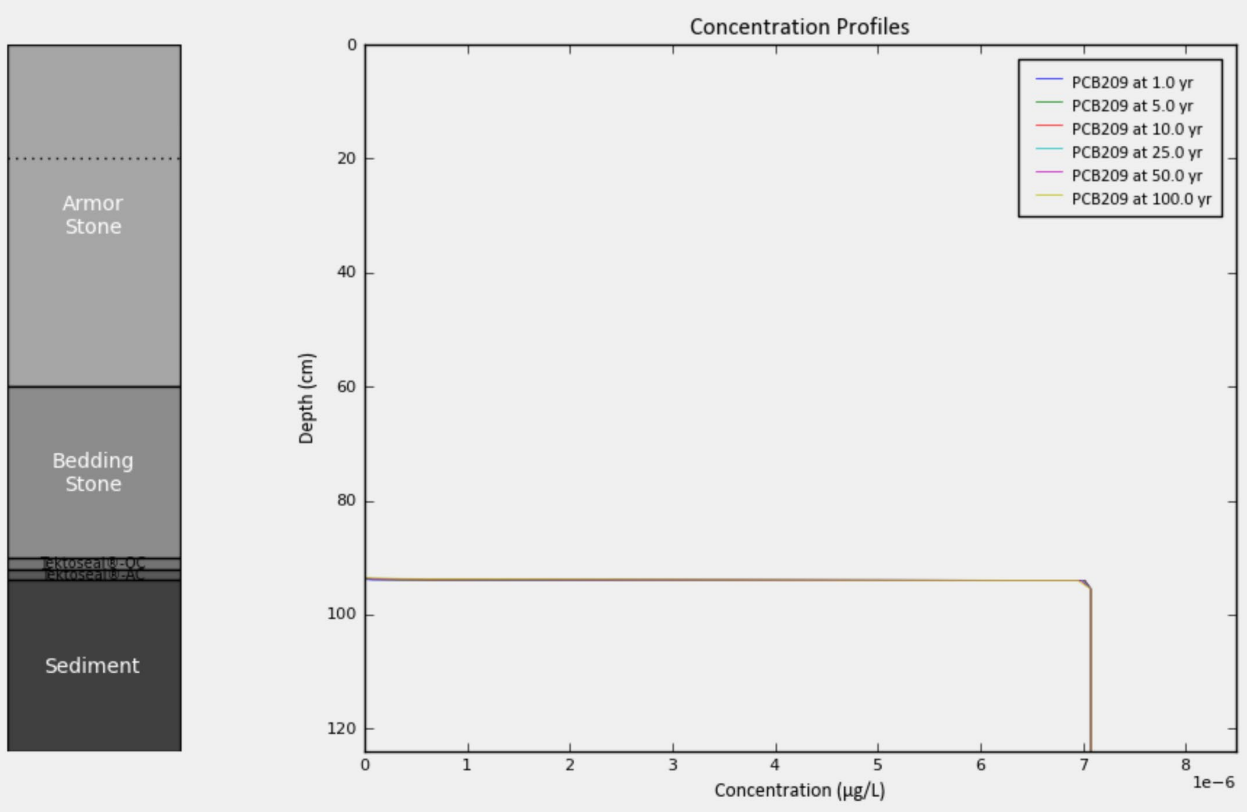

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB177 at 1.0 yr
PCB177 at 5.0 yr
PCB177 at 10.0 yr
PCB177 at 25.0 yr
PCB177 at 50.0 yr
PCB177 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

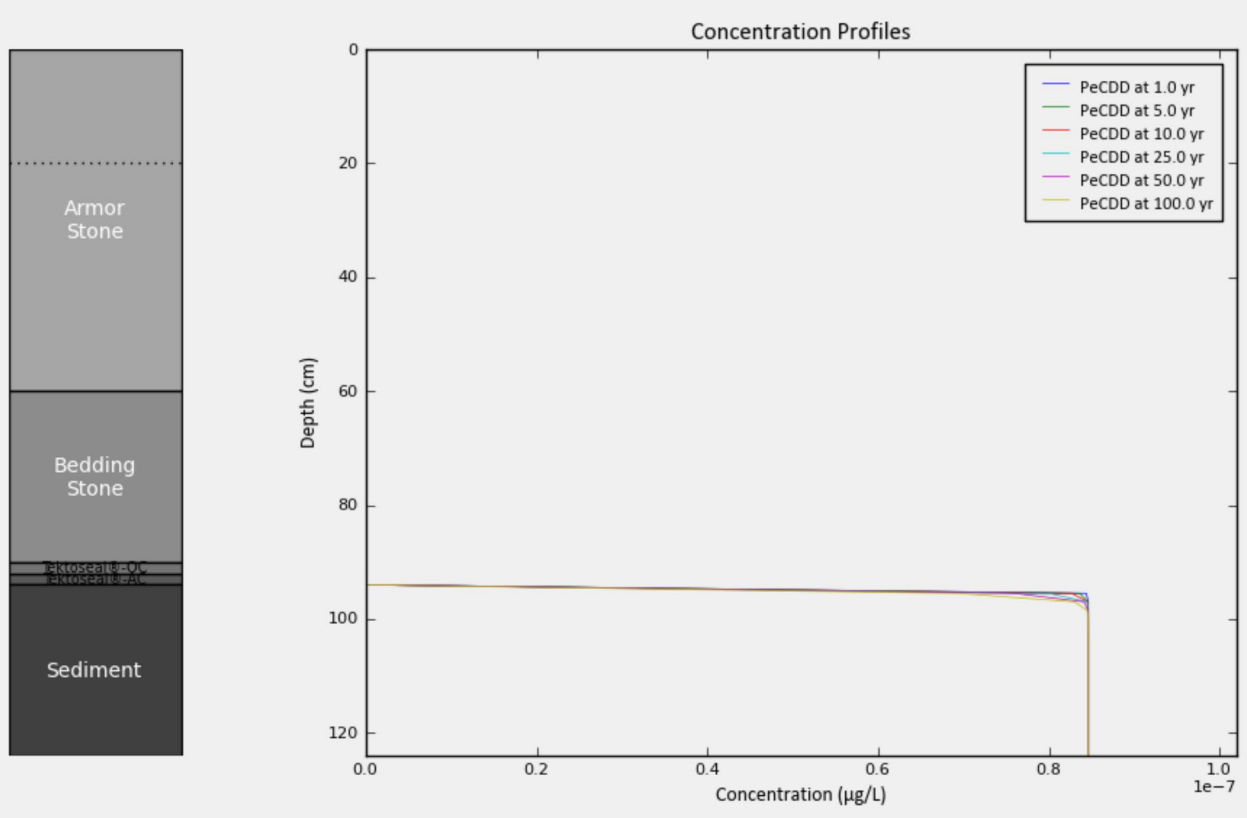

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB180 at 1.0 yr
PCB180 at 5.0 yr
PCB180 at 10.0 yr
PCB180 at 25.0 yr
PCB180 at 50.0 yr
PCB180 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

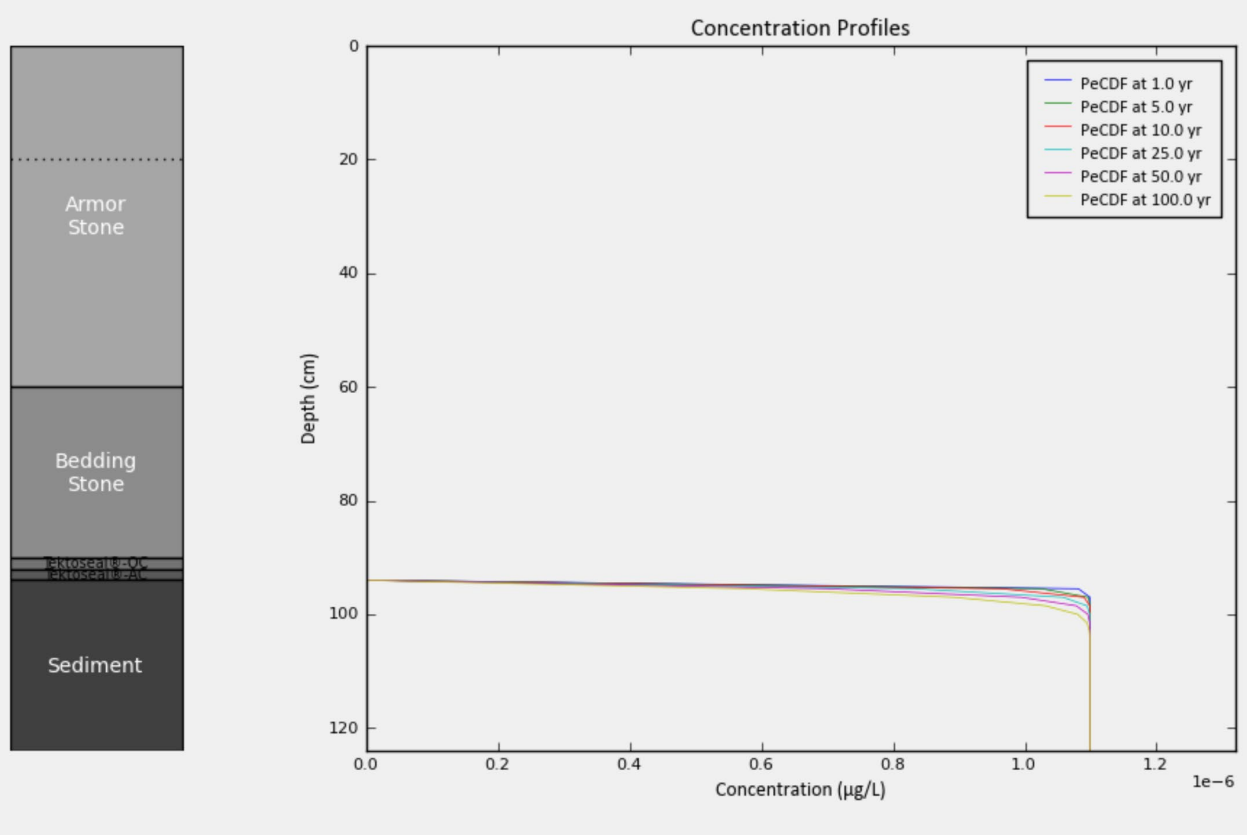

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB183 at 1.0 yr
PCB183 at 5.0 yr
PCB183 at 10.0 yr
PCB183 at 25.0 yr
PCB183 at 50.0 yr
PCB183 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

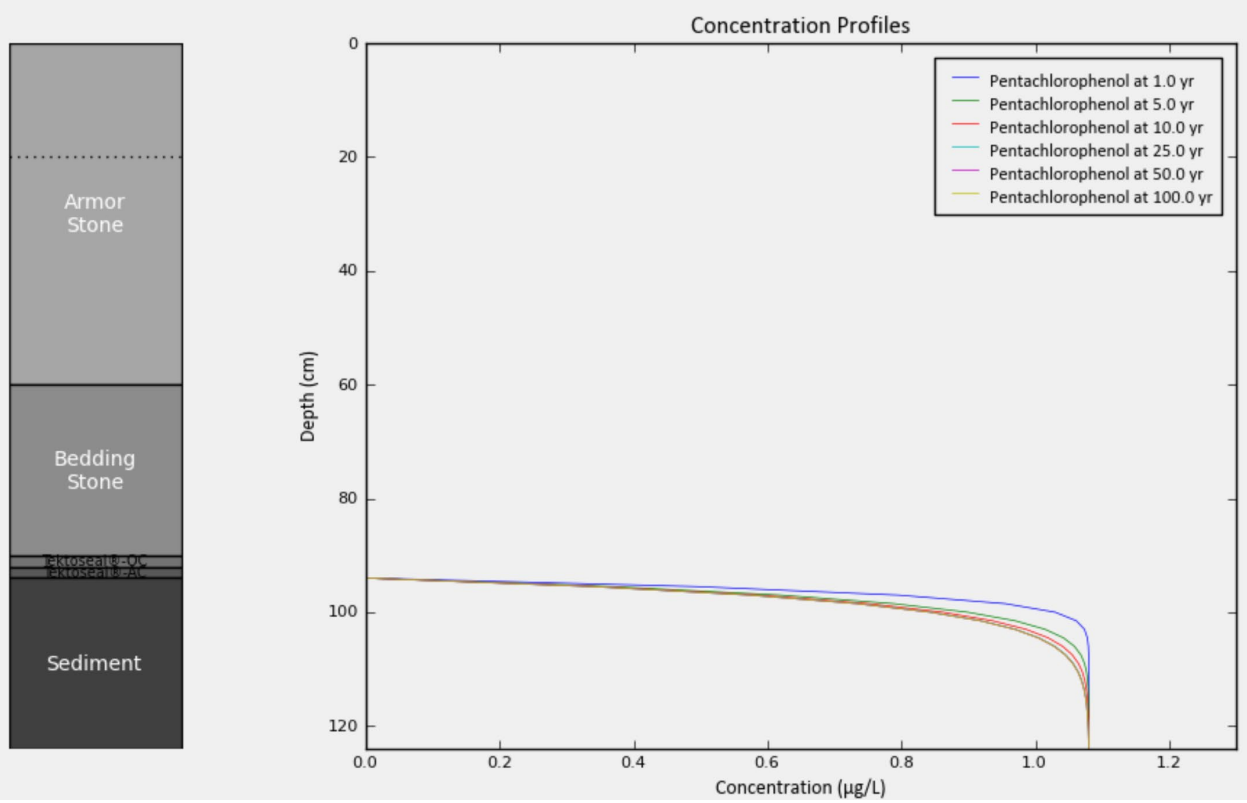

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB199 at 1.0 yr
PCB199 at 5.0 yr
PCB199 at 10.0 yr
PCB199 at 25.0 yr
PCB199 at 50.0 yr
PCB199 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

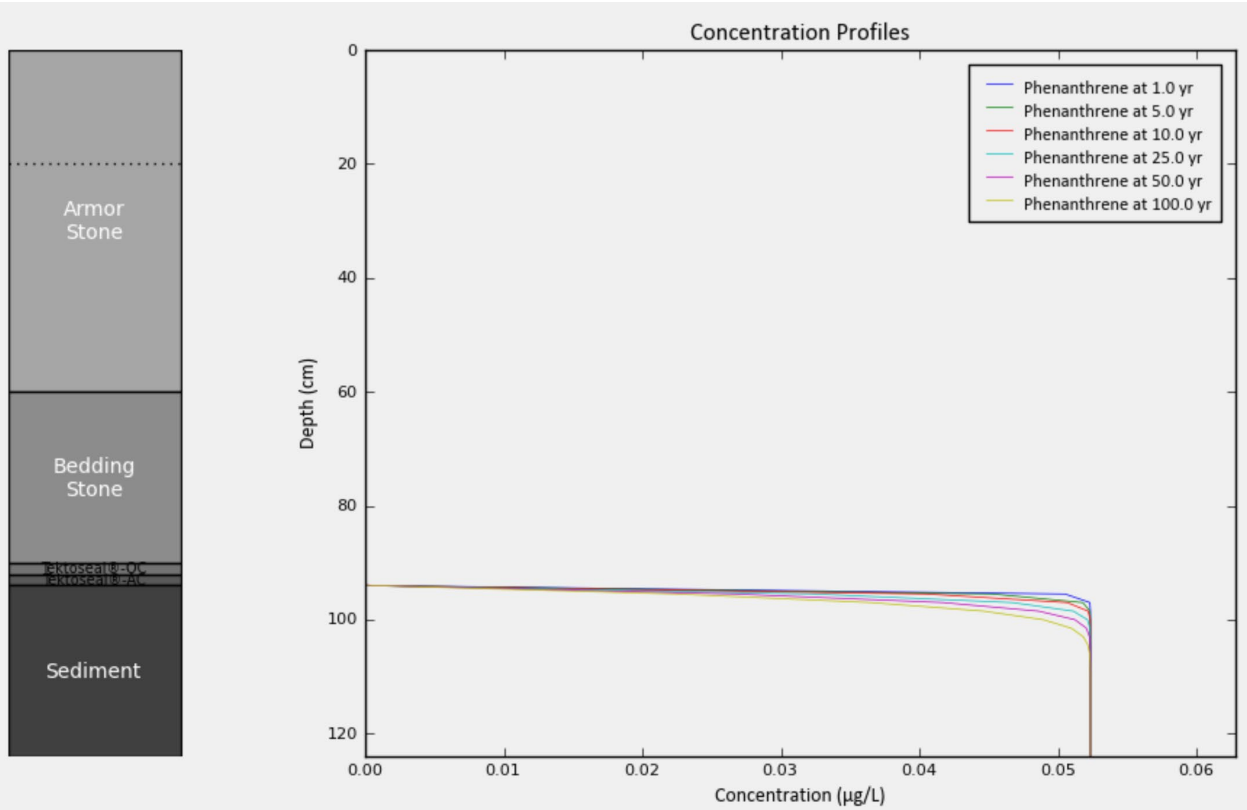

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB206 at 1.0 yr
PCB206 at 5.0 yr
PCB206 at 10.0 yr
PCB206 at 25.0 yr
PCB206 at 50.0 yr
PCB206 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

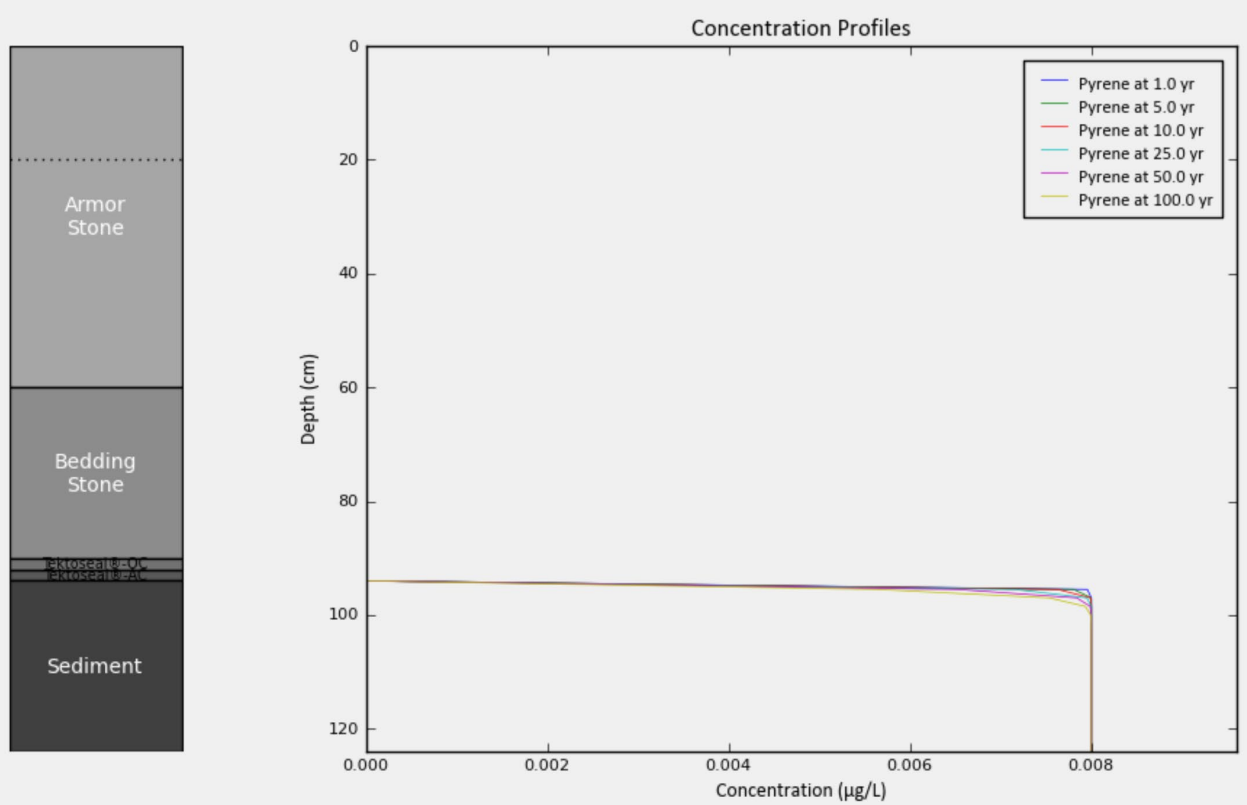

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB209 at 1.0 yr
PCB209 at 5.0 yr
PCB209 at 10.0 yr
PCB209 at 25.0 yr
PCB209 at 50.0 yr
PCB209 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

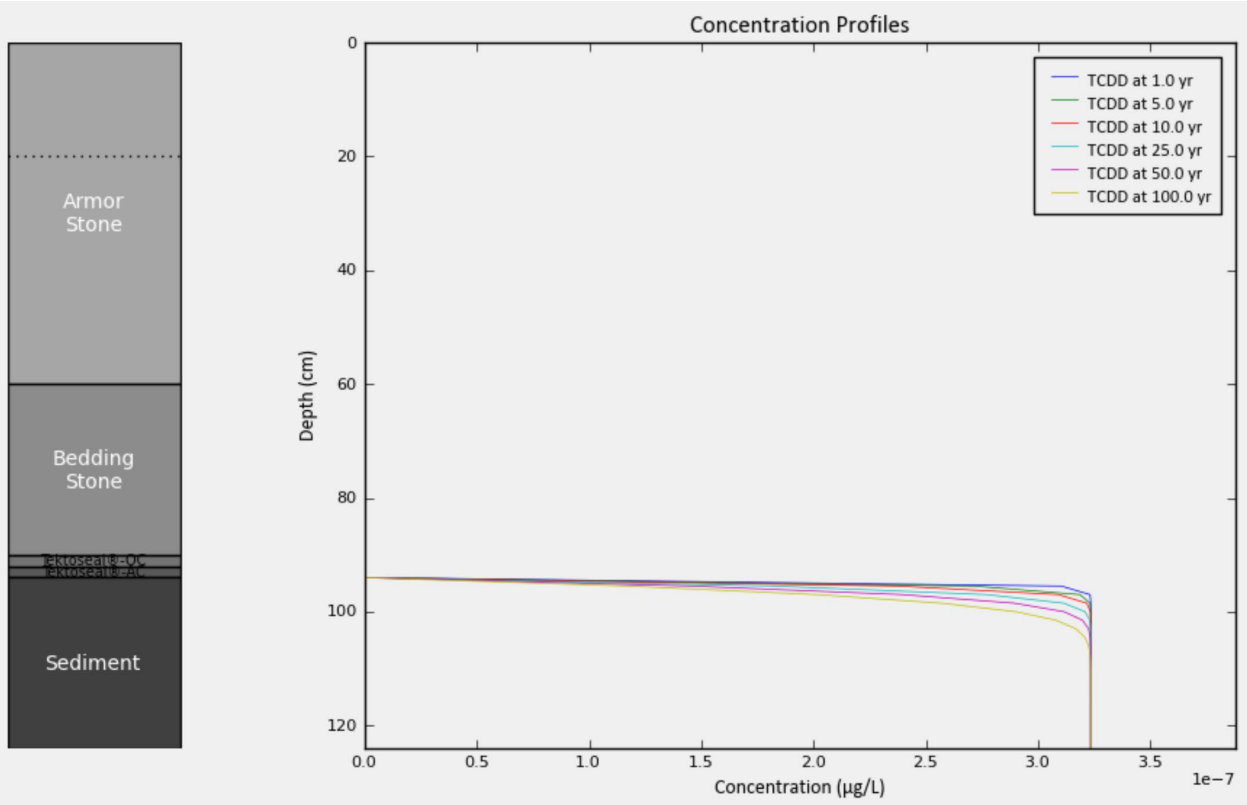

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PeCDD at 1.0 yr
PeCDD at 5.0 yr
PeCDD at 10.0 yr
PeCDD at 25.0 yr
PeCDD at 50.0 yr
PeCDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

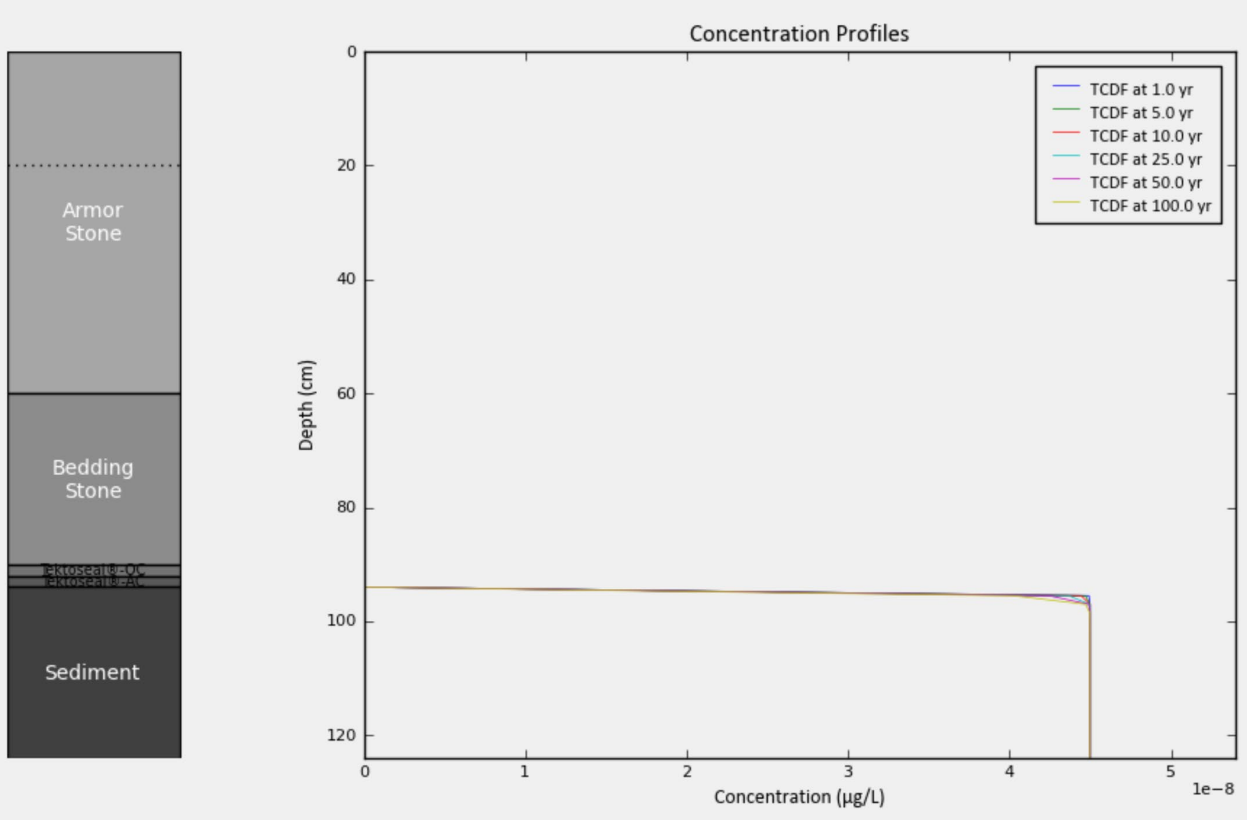

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PeCDF at 1.0 yr
PeCDF at 5.0 yr
PeCDF at 10.0 yr
PeCDF at 25.0 yr
PeCDF at 50.0 yr
PeCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

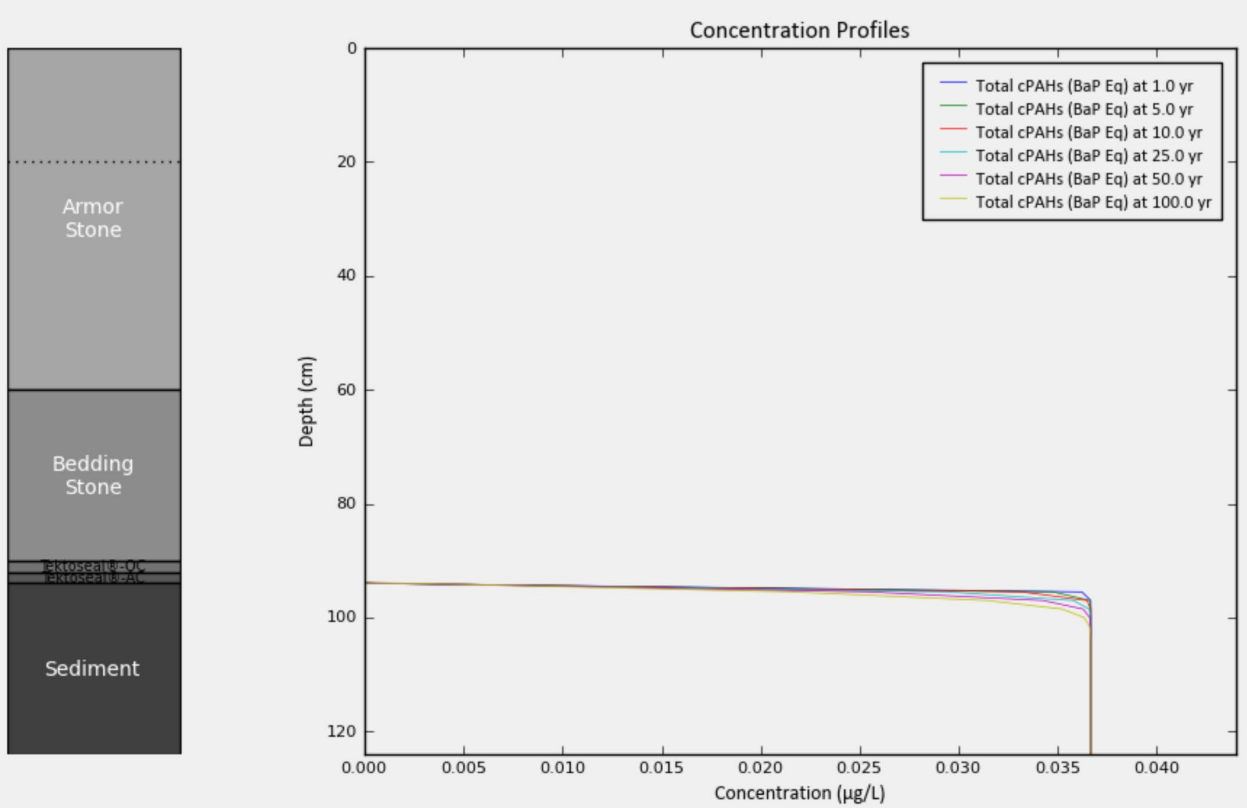

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Pentachlorophenol at 1.0 yr
Pentachlorophenol at 5.0 yr
Pentachlorophenol at 10.0 yr
Pentachlorophenol at 25.0 yr
Pentachlorophenol at 50.0 yr
Pentachlorophenol at 100.0 yr
Depth (cm)
Concentration (µg/L)

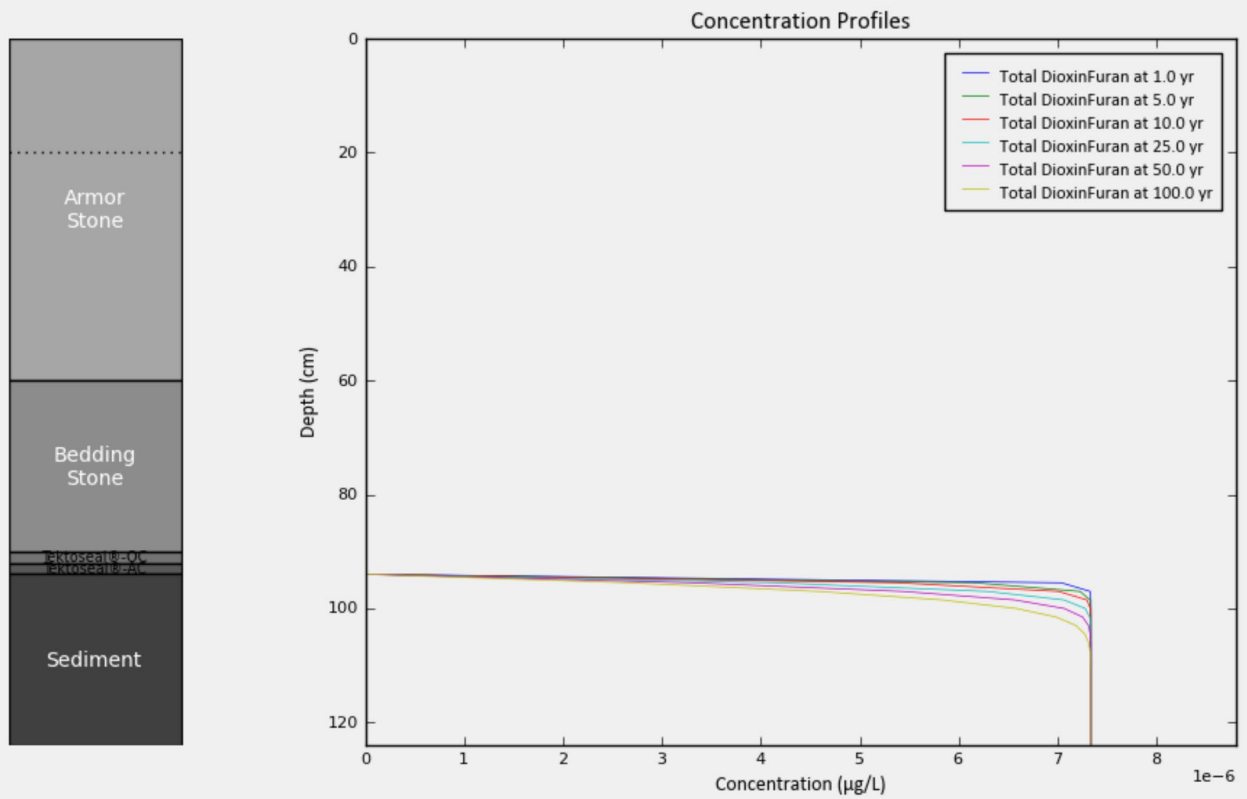

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Phenanthrene at 1.0 yr
Phenanthrene at 5.0 yr
Phenanthrene at 10.0 yr
Phenanthrene at 25.0 yr
Phenanthrene at 50.0 yr
Phenanthrene at 100.0 yr
Depth (cm)
Concentration (µg/L)

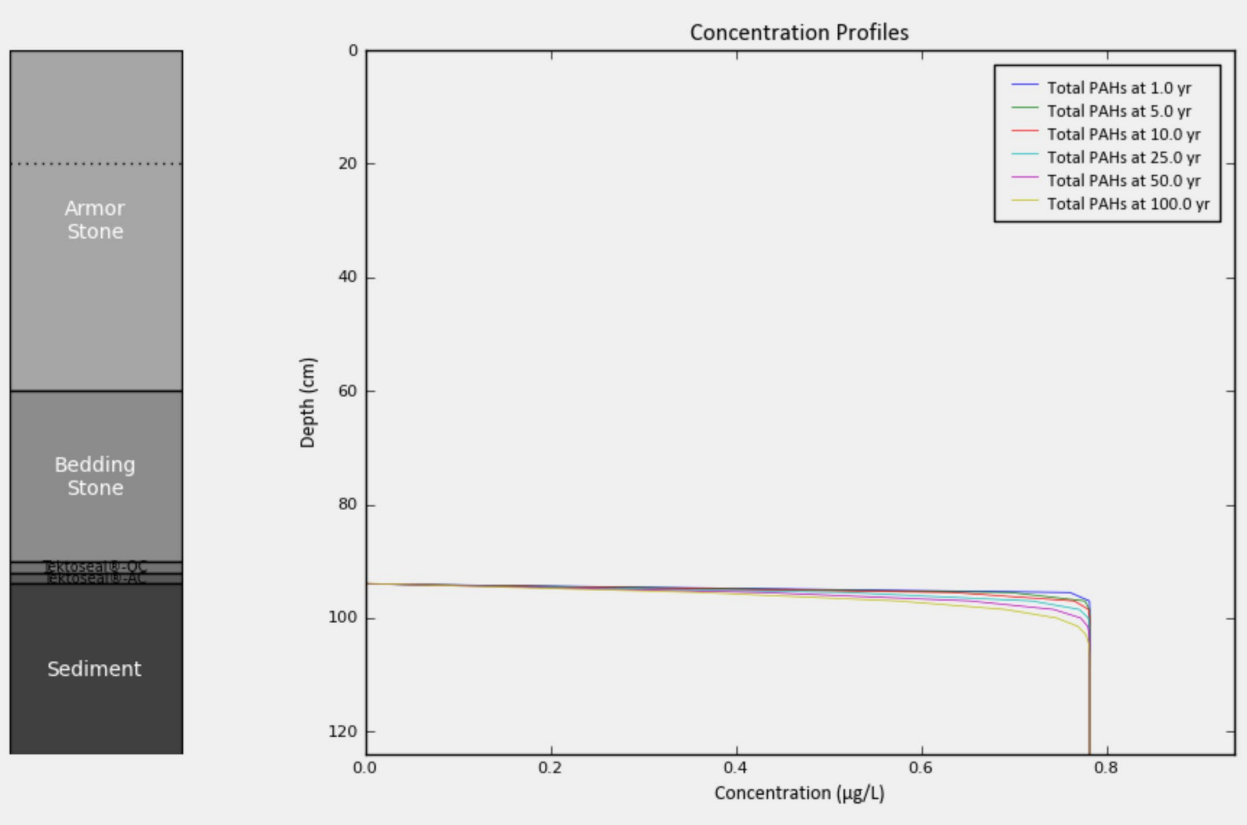

Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® EC
Tekoseal® AC
Sediment
Pyrene at 1.0 yr
Pyrene at 5.0 yr
Pyrene at 10.0 yr
Pyrene at 25.0 yr
Pyrene at 50.0 yr
Pyrene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008

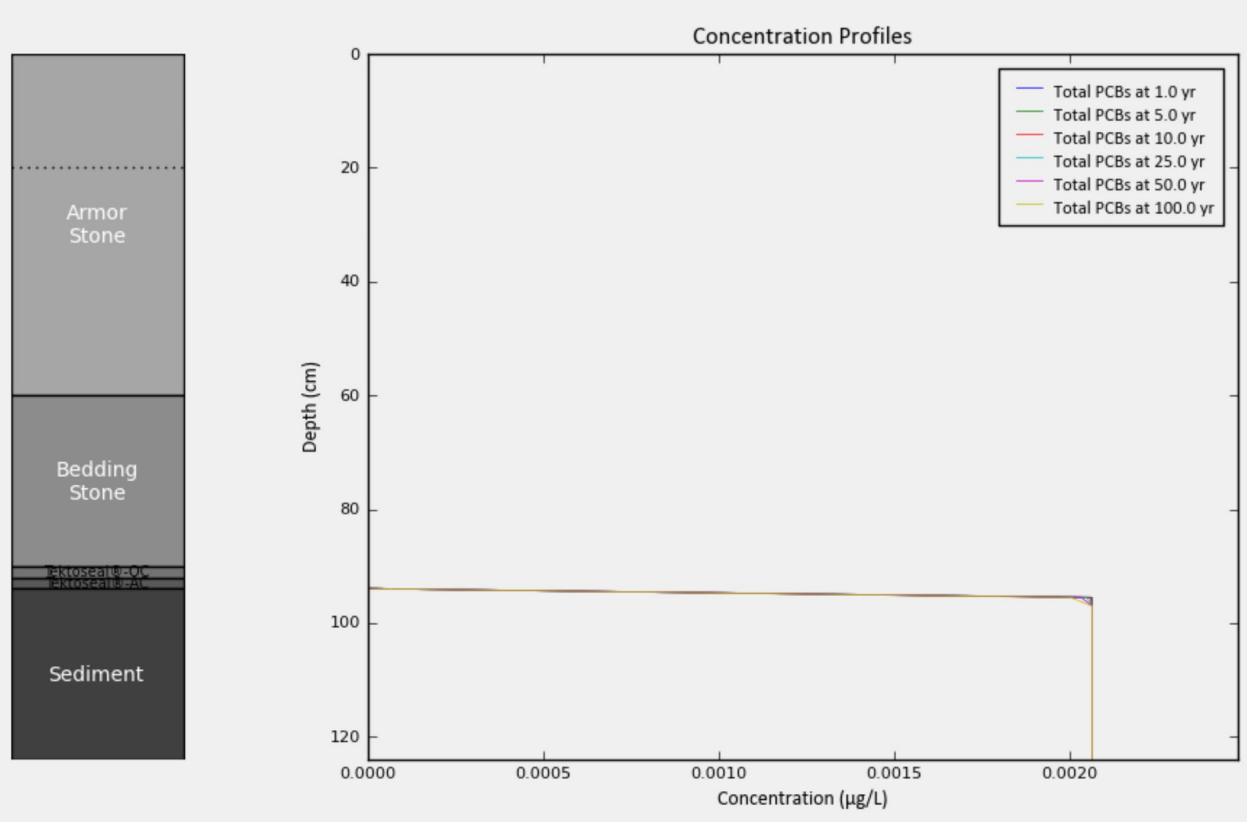

Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® EC
Tekoseal® AC
Sediment
TCDD at 1.0 yr
TCDD at 5.0 yr
TCDD at 10.0 yr
TCDD at 25.0 yr
TCDD at 50.0 yr
TCDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5

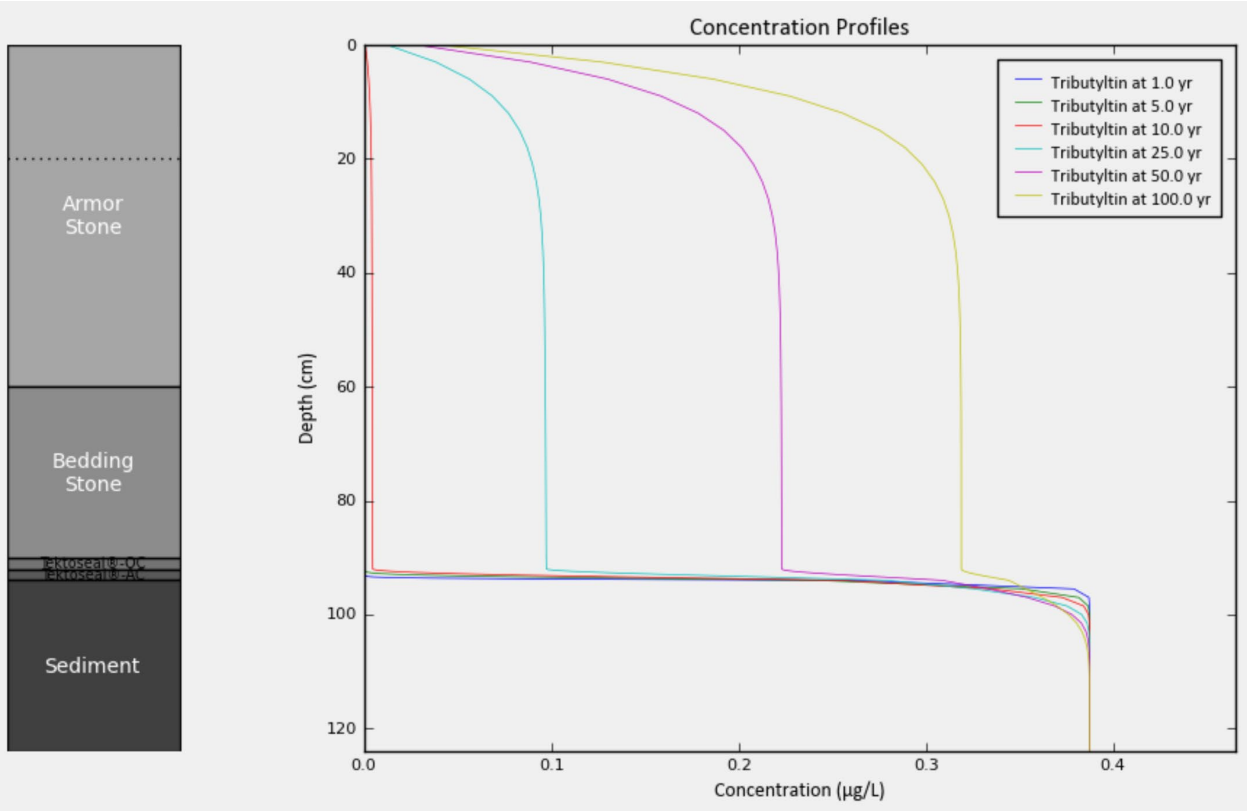

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
TCDF at 1.0 yr
TCDF at 5.0 yr
TCDF at 10.0 yr
TCDF at 25.0 yr
TCDF at 50.0 yr
TCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−8

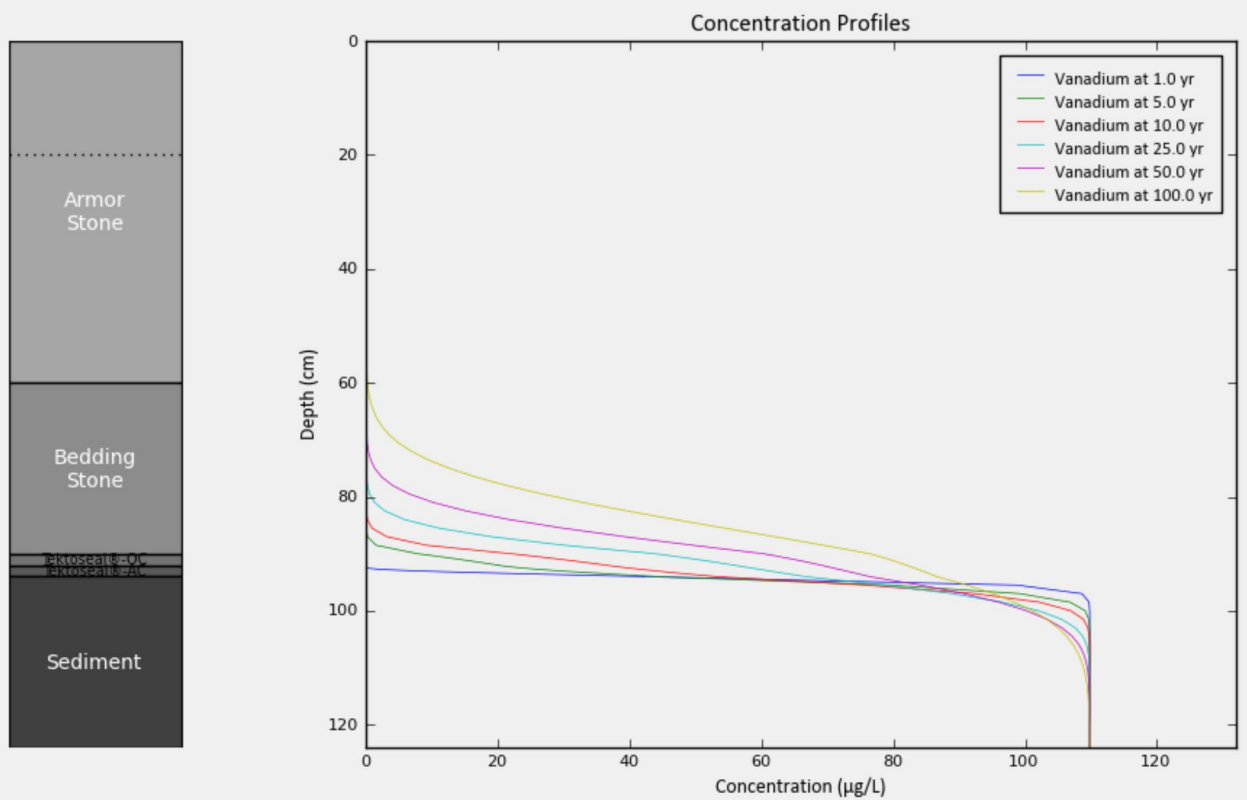

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Total cPAHs (BaP Eq) at 1.0 yr
Total cPAHs (BaP Eq) at 5.0 yr
Total cPAHs (BaP Eq) at 10.0 yr
Total cPAHs (BaP Eq) at 25.0 yr
Total cPAHs (BaP Eq) at 50.0 yr
Total cPAHs (BaP Eq) at 100.0 yr
Depth (cm)
Concentration (µg/L)

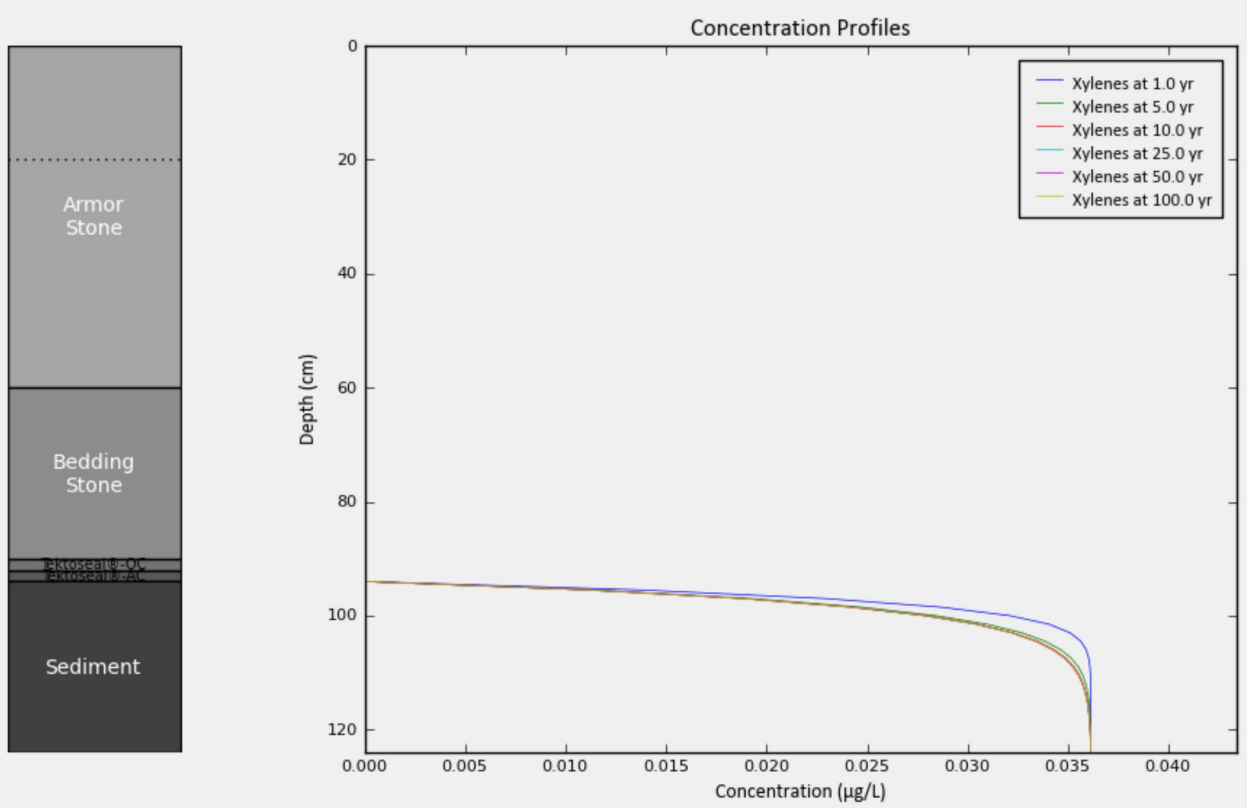

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Total DioxinFuran at 1.0 yr
Total DioxinFuran at 5.0 yr
Total DioxinFuran at 10.0 yr
Total DioxinFuran at 25.0 yr
Total DioxinFuran at 50.0 yr
Total DioxinFuran at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

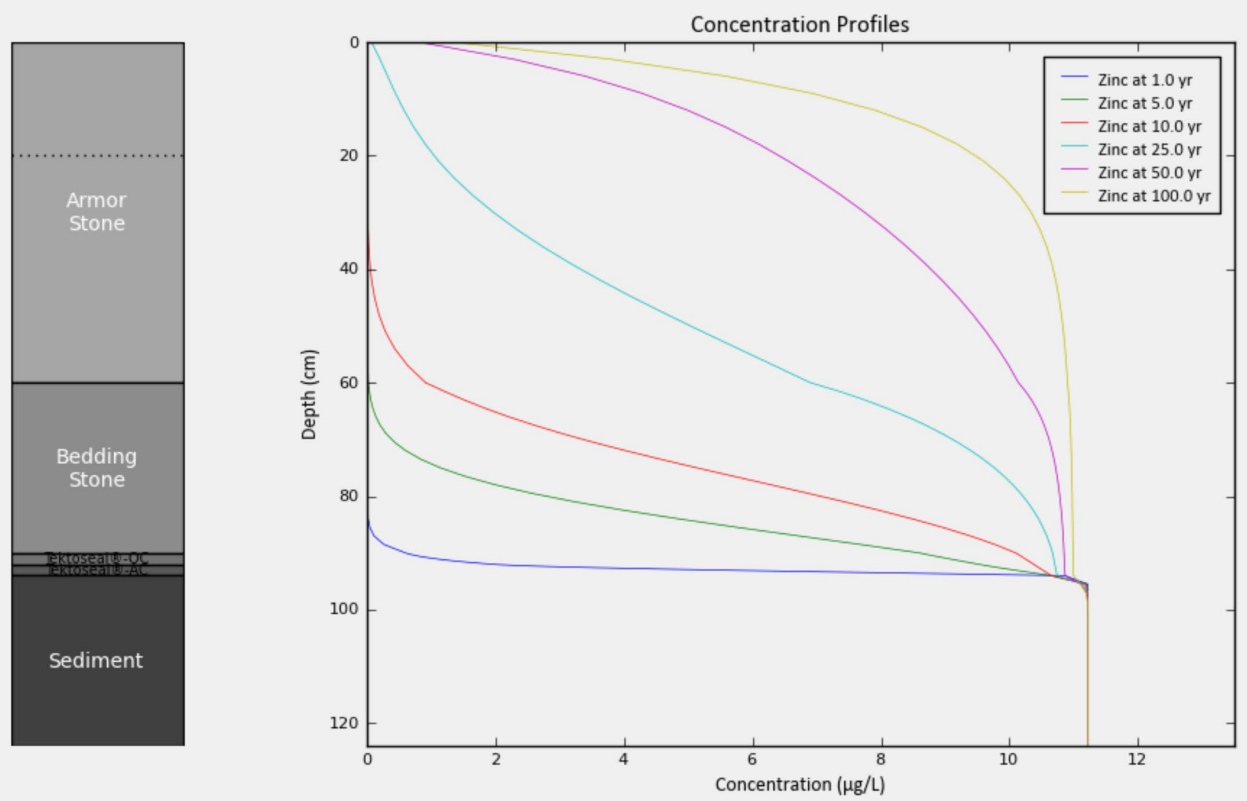

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Total PAHs at 1.0 yr
Total PAHs at 5.0 yr
Total PAHs at 10.0 yr
Total PAHs at 25.0 yr
Total PAHs at 50.0 yr
Total PAHs at 100.0 yr
Depth (cm)
Concentration (µg/L)


Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Total PCBs at 1.0 yr
Total PCBs at 5.0 yr
Total PCBs at 10.0 yr
Total PCBs at 25.0 yr
Total PCBs at 50.0 yr
Total PCBs at 100.0 yr

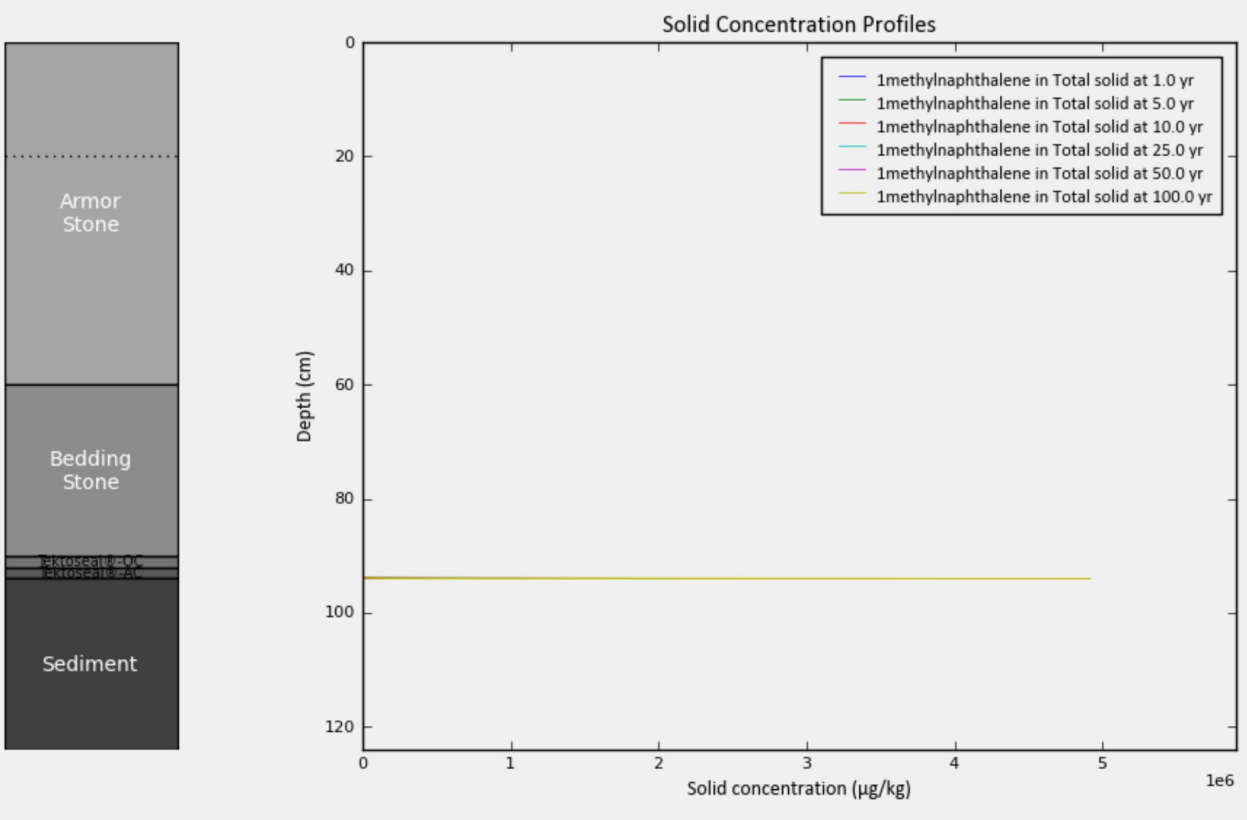

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Concentration (µg/L)
Tributyltin at 1.0 yr
Tributyltin at 5.0 yr
Tributyltin at 10.0 yr
Tributyltin at 25.0 yr
Tributyltin at 50.0 yr
Tributyltin at 100.0 yr

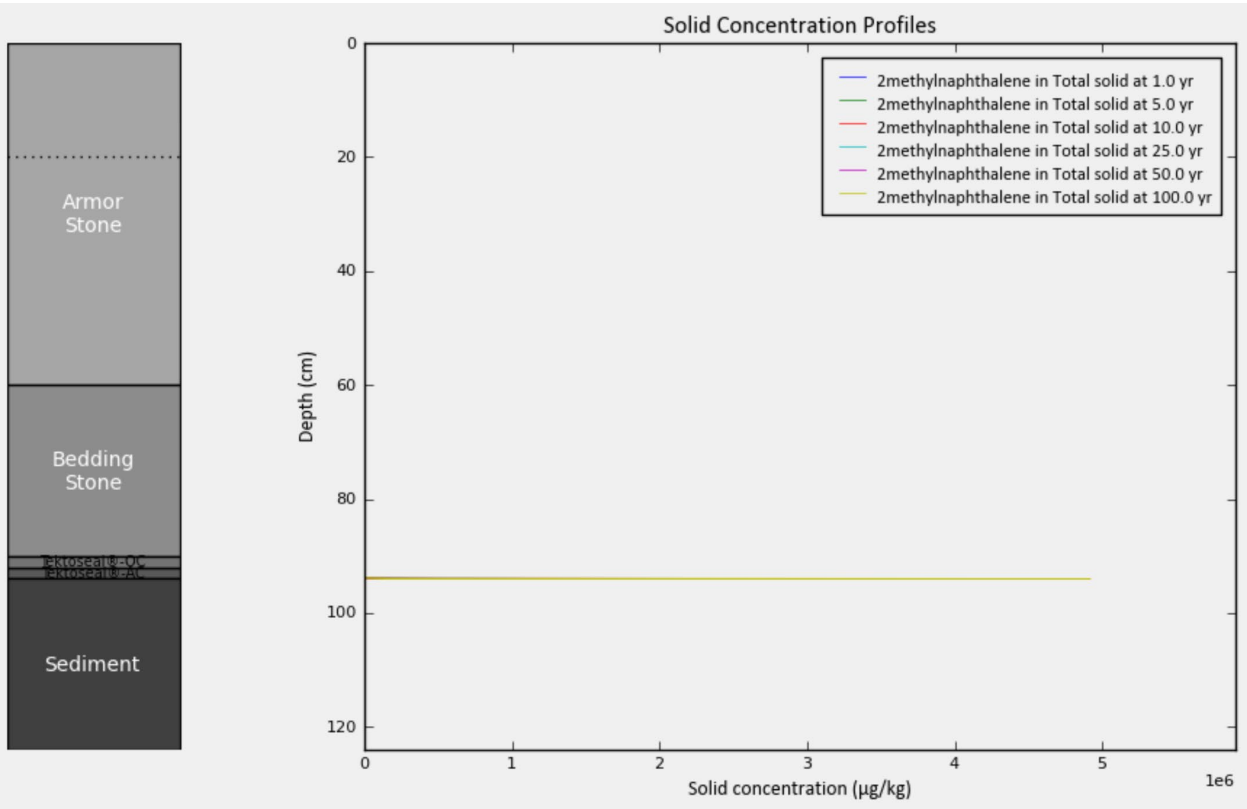

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Vanadium at 1.0 yr
Vanadium at 5.0 yr
Vanadium at 10.0 yr
Vanadium at 25.0 yr
Vanadium at 50.0 yr
Vanadium at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120

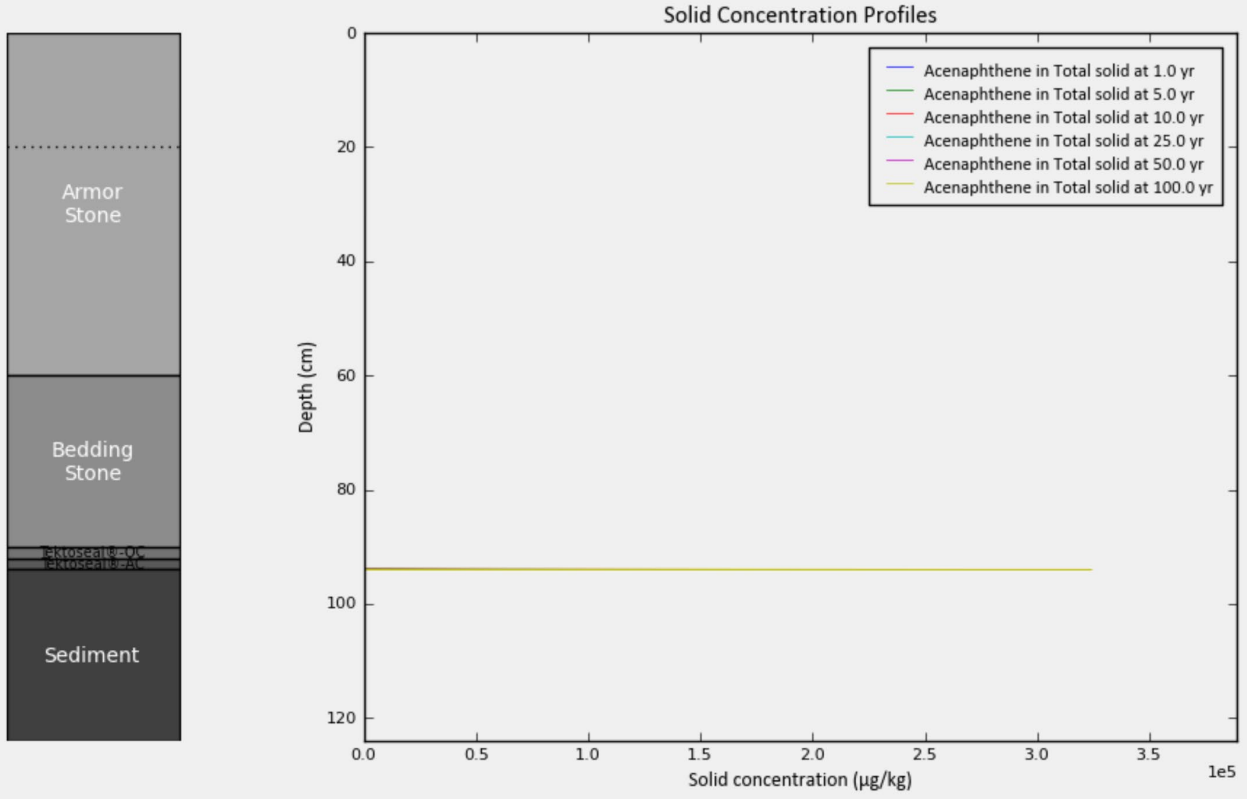

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Xylenes at 1.0 yr
Xylenes at 5.0 yr
Xylenes at 10.0 yr
Xylenes at 25.0 yr
Xylenes at 50.0 yr
Xylenes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040

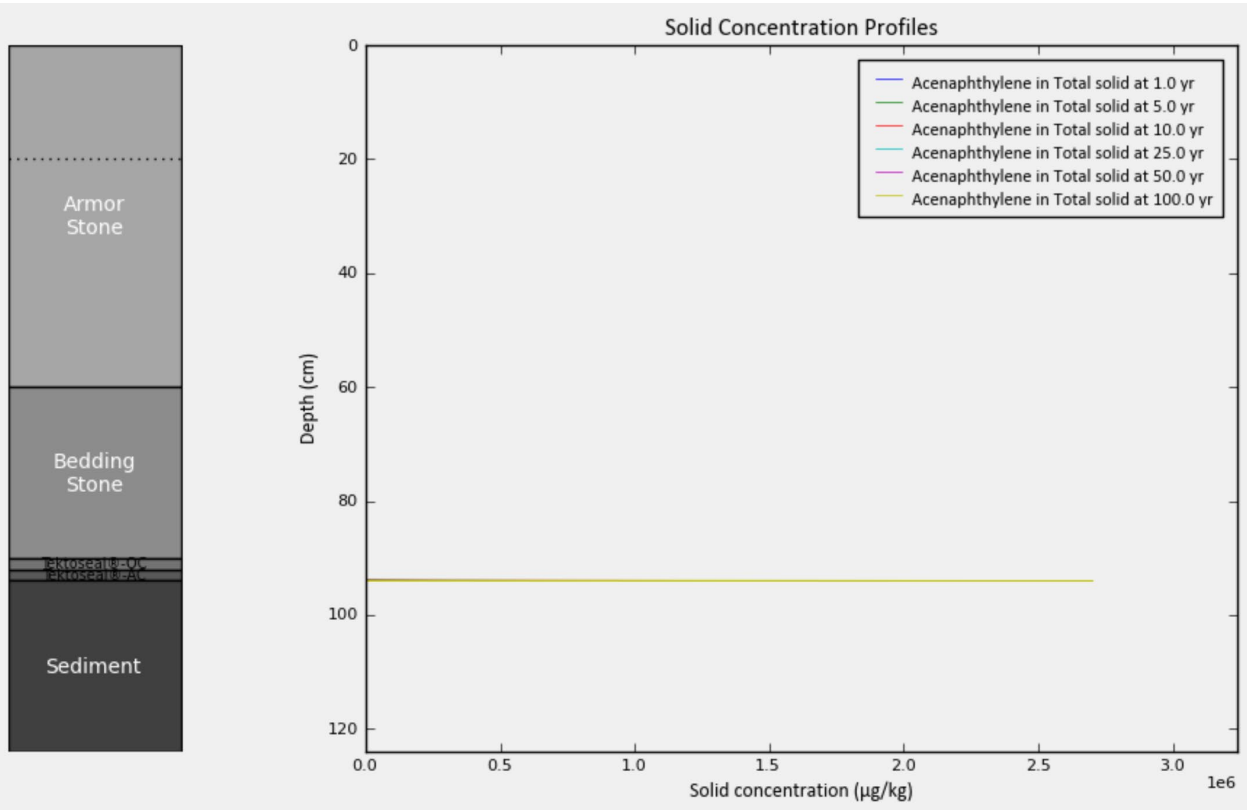

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Zinc at 1.0 yr
Zinc at 5.0 yr
Zinc at 10.0 yr
Zinc at 25.0 yr
Zinc at 50.0 yr
Zinc at 100.0 yr
0
20
40
60
80
100
120
0
2
4
6
8
10
12

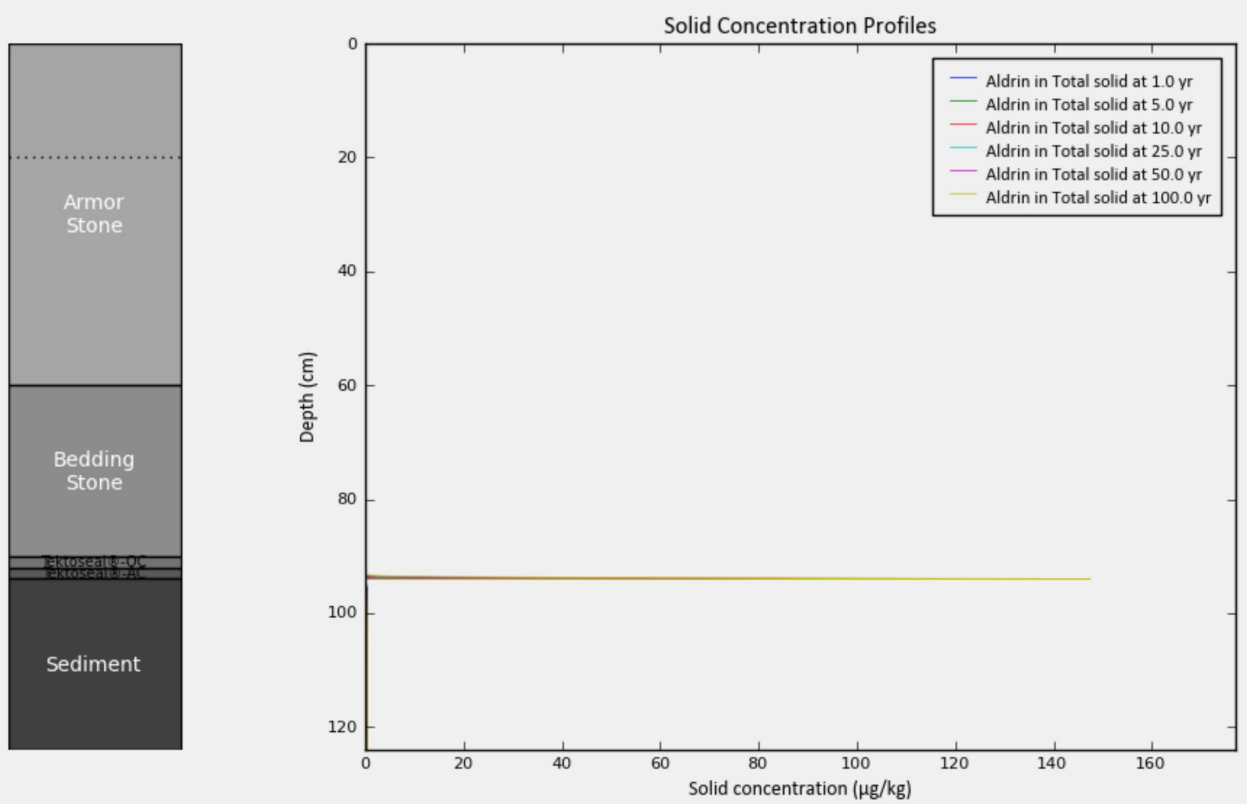
Total Solids Concentration – Depth

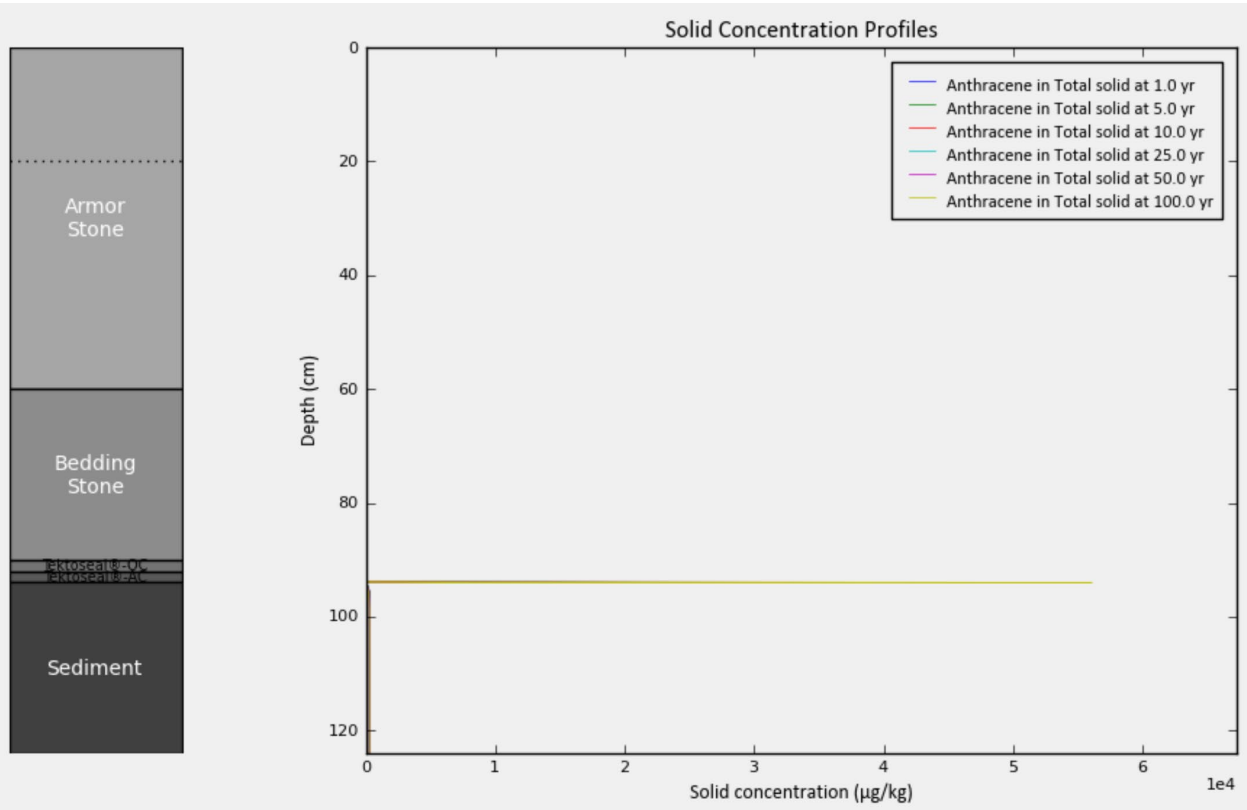


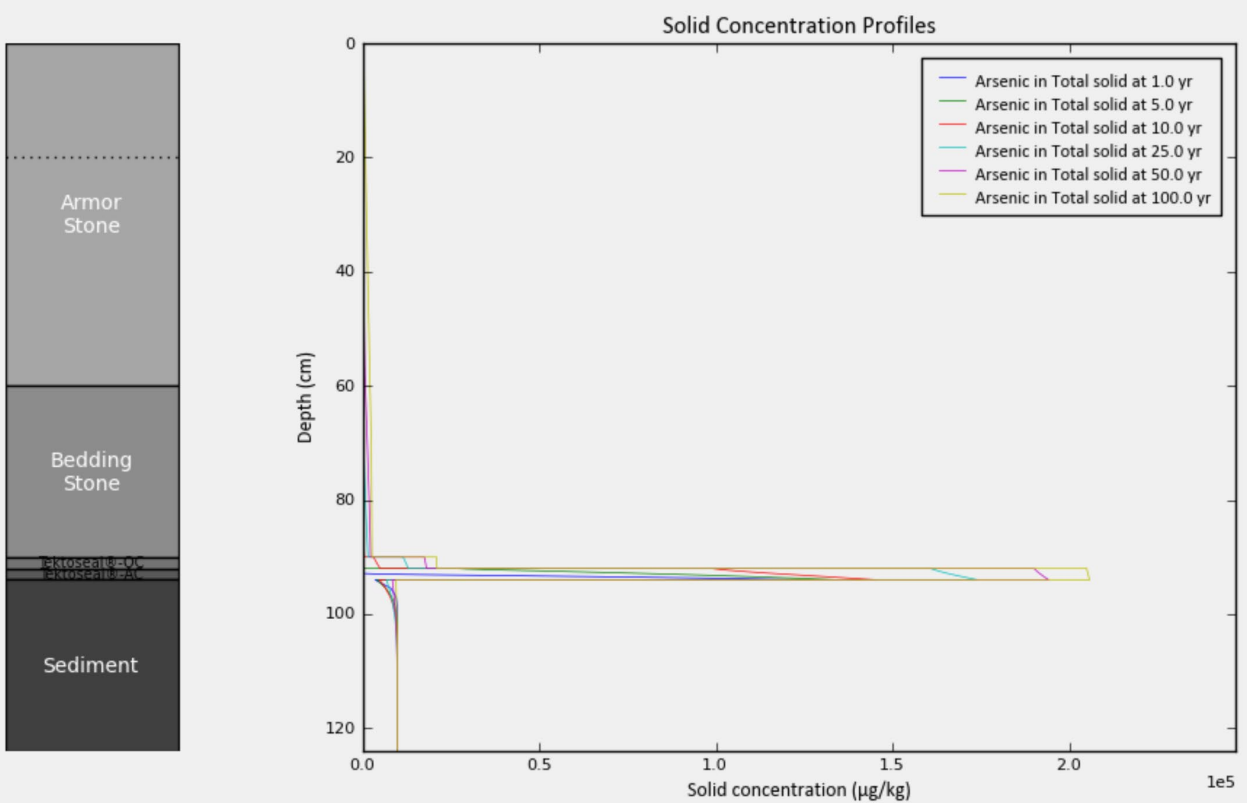


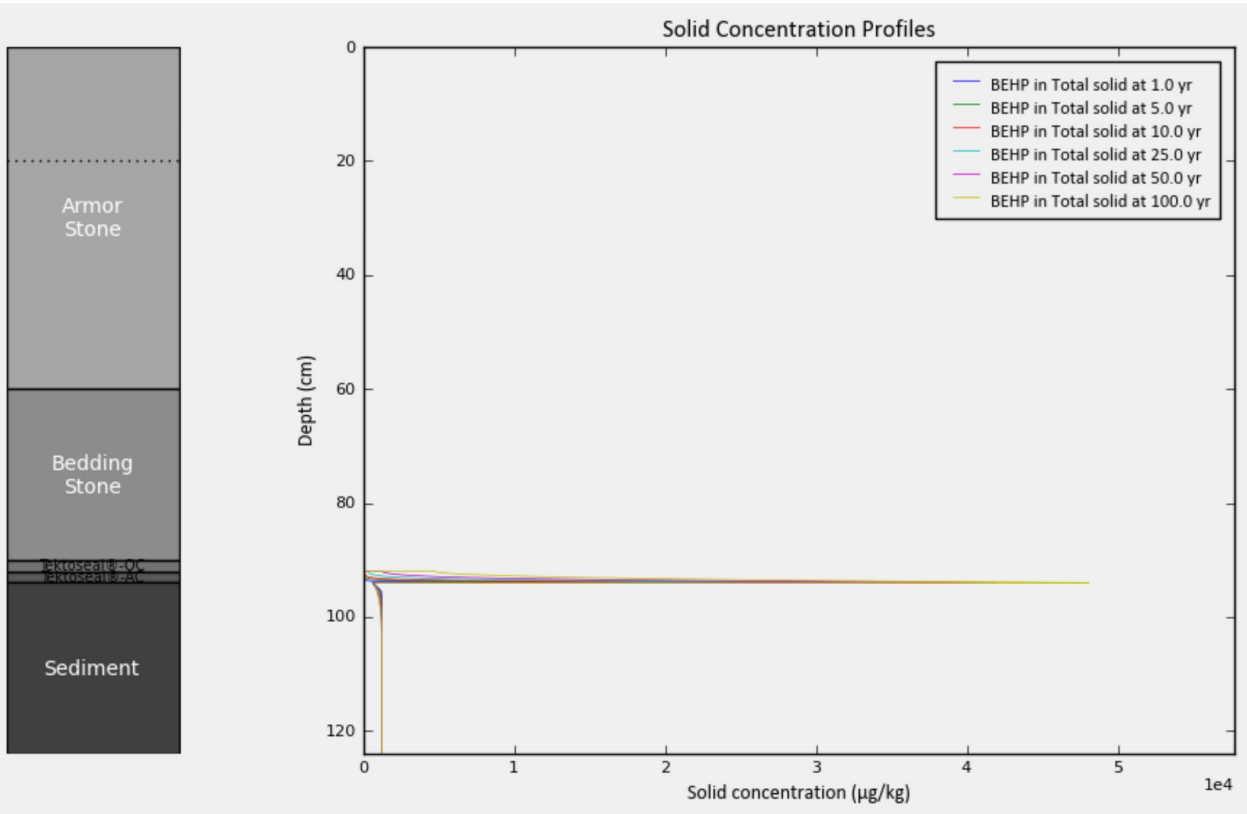

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Acenaphthene in Total solid at 1.0 yr
Acenaphthene in Total solid at 5.0 yr
Acenaphthene in Total solid at 10.0 yr
Acenaphthene in Total solid at 25.0 yr
Acenaphthene in Total solid at 50.0 yr
Acenaphthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

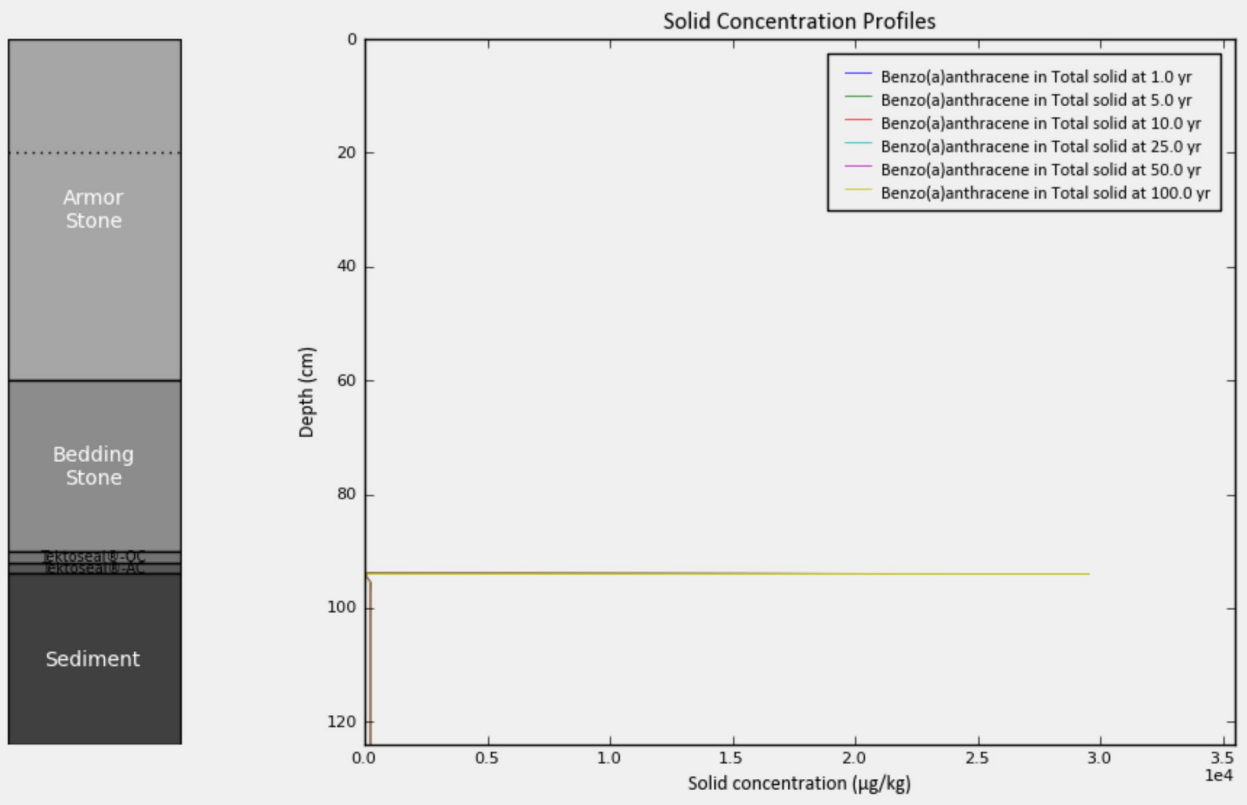

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Acenaphthylene in Total solid at 1.0 yr
Acenaphthylene in Total solid at 5.0 yr
Acenaphthylene in Total solid at 10.0 yr
Acenaphthylene in Total solid at 25.0 yr
Acenaphthylene in Total solid at 50.0 yr
Acenaphthylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

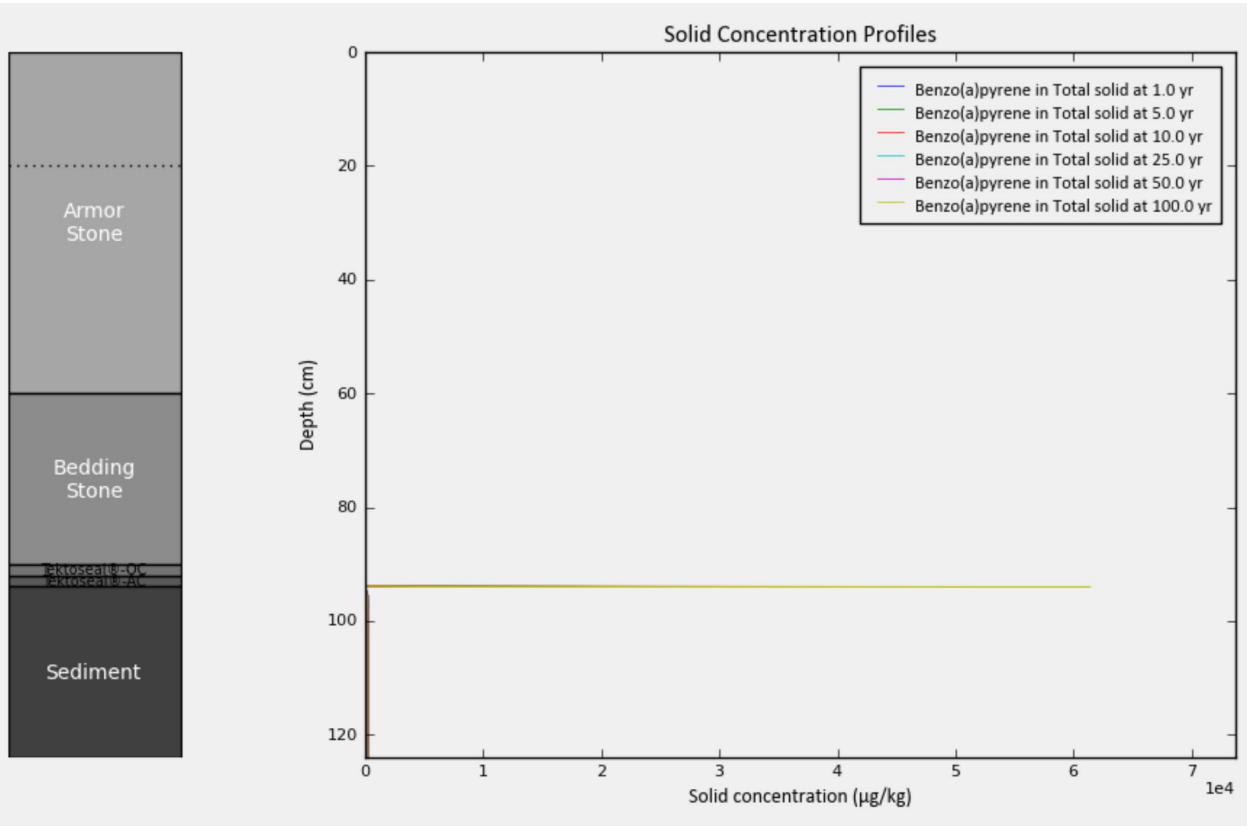

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Aldrin in Total solid at 1.0 yr
Aldrin in Total solid at 5.0 yr
Aldrin in Total solid at 10.0 yr
Aldrin in Total solid at 25.0 yr
Aldrin in Total solid at 50.0 yr
Aldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

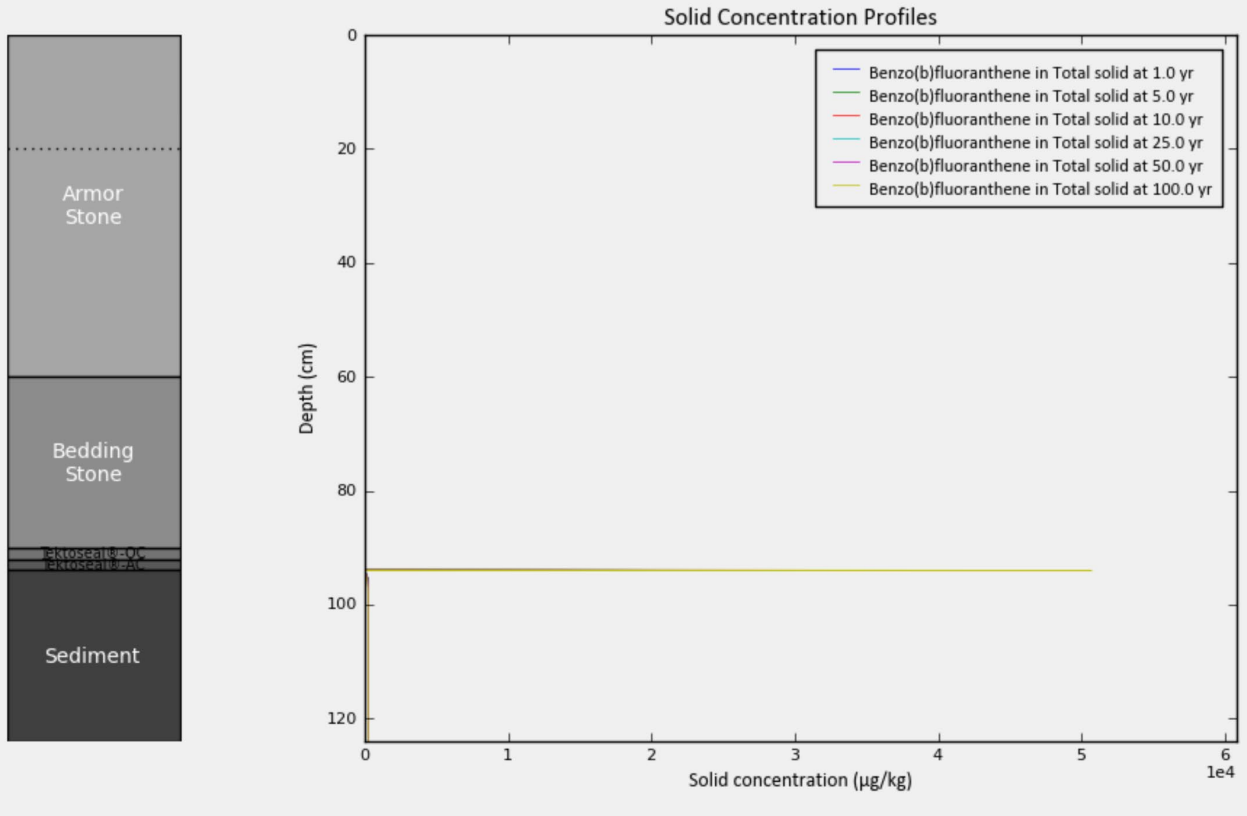

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Anthracene in Total solid at 1.0 yr
Anthracene in Total solid at 5.0 yr
Anthracene in Total solid at 10.0 yr
Anthracene in Total solid at 25.0 yr
Anthracene in Total solid at 50.0 yr
Anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

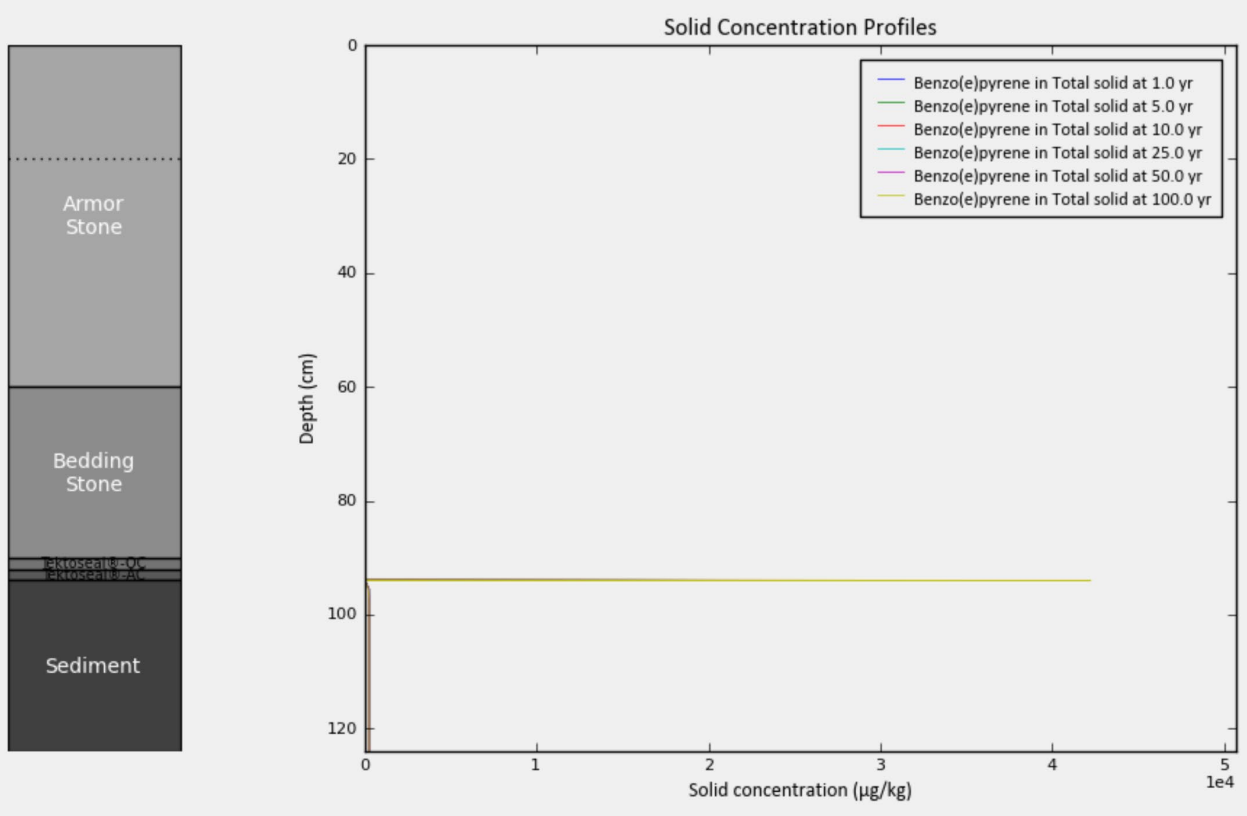

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Arsenic in Total solid at 1.0 yr
Arsenic in Total solid at 5.0 yr
Arsenic in Total solid at 10.0 yr
Arsenic in Total solid at 25.0 yr
Arsenic in Total solid at 50.0 yr
Arsenic in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

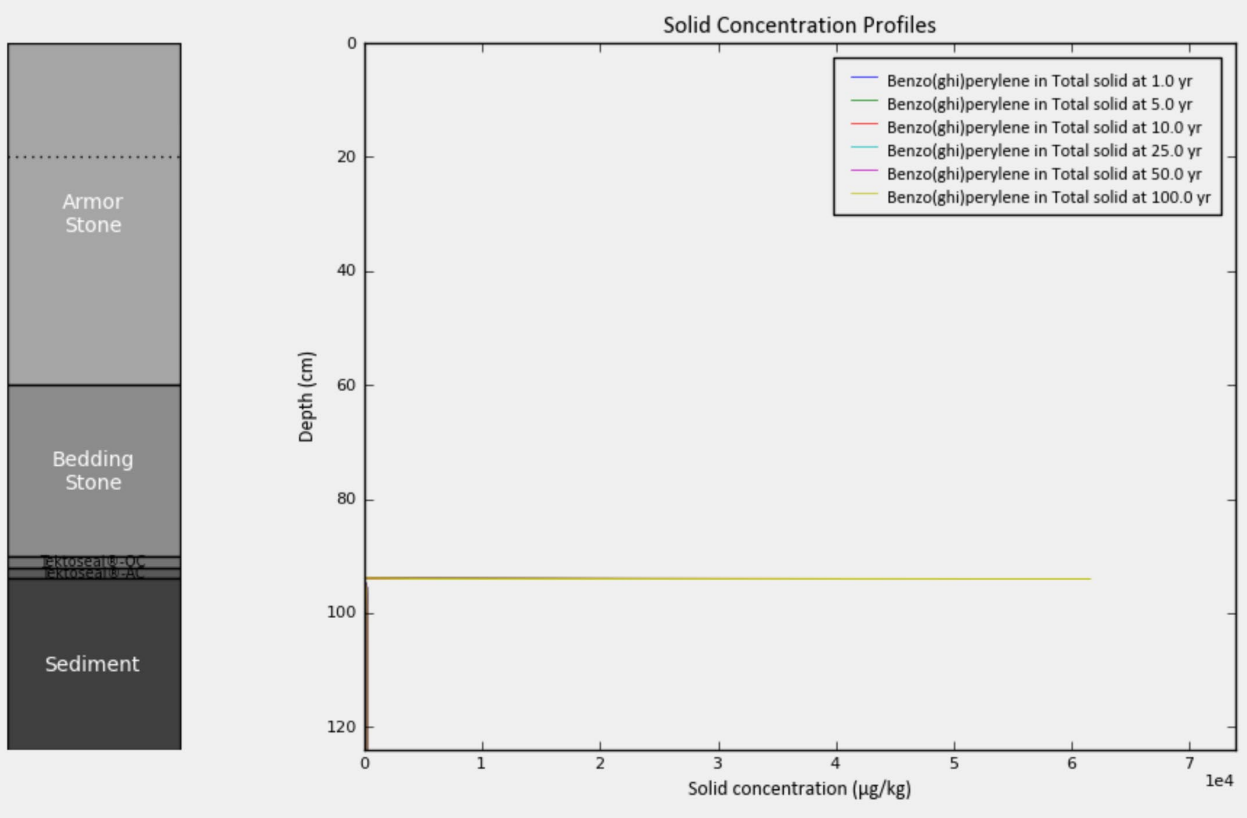

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
BEHP in Total solid at 1.0 yr
BEHP in Total solid at 5.0 yr
BEHP in Total solid at 10.0 yr
BEHP in Total solid at 25.0 yr
BEHP in Total solid at 50.0 yr
BEHP in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

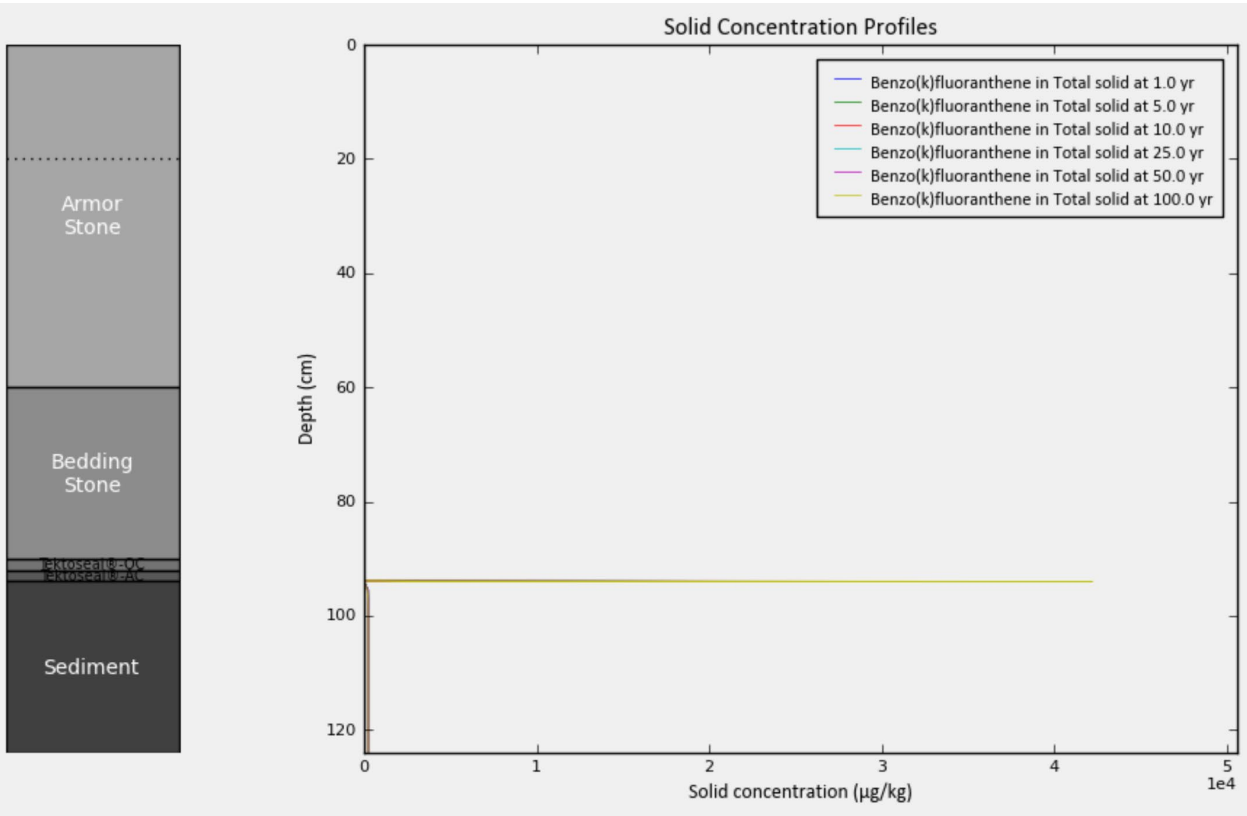

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(a)anthracene in Total solid at 1.0 yr
Benzo(a)anthracene in Total solid at 5.0 yr
Benzo(a)anthracene in Total solid at 10.0 yr
Benzo(a)anthracene in Total solid at 25.0 yr
Benzo(a)anthracene in Total solid at 50.0 yr
Benzo(a)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

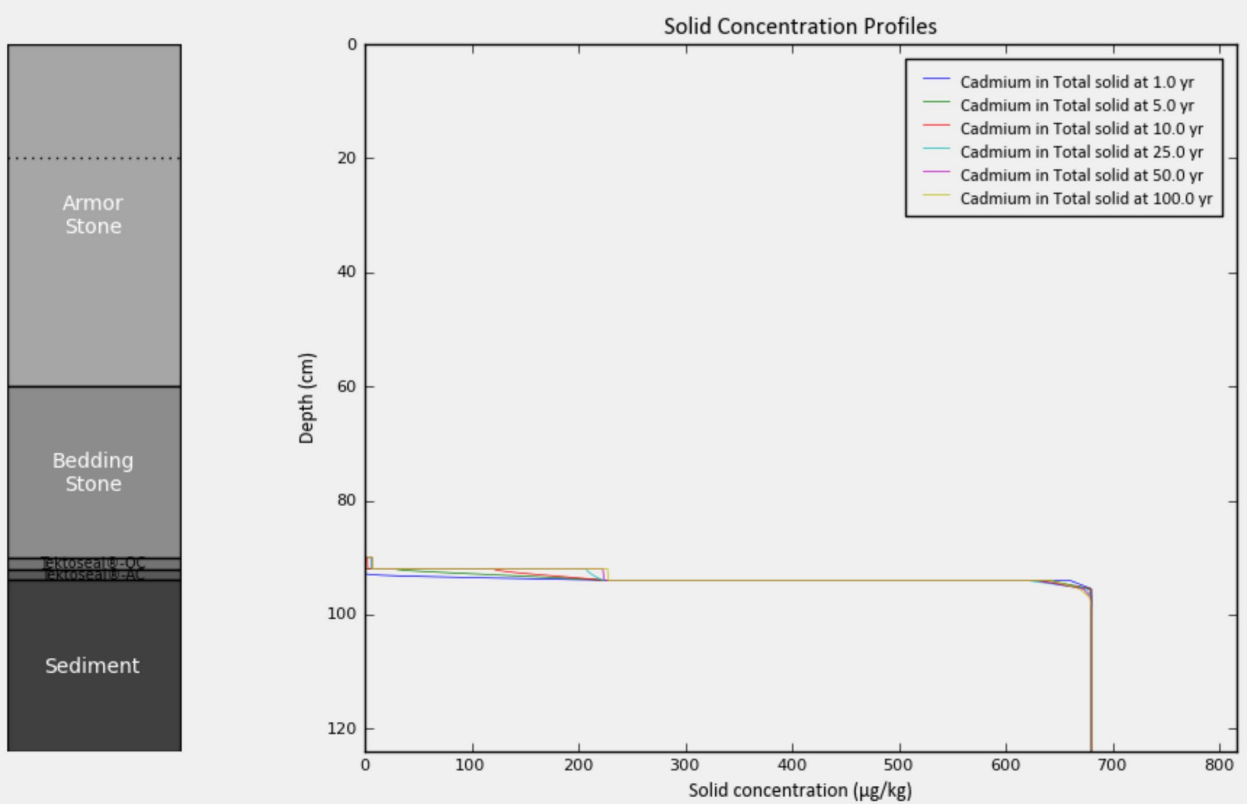

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(a)pyrene in Total solid at 1.0 yr
Benzo(a)pyrene in Total solid at 5.0 yr
Benzo(a)pyrene in Total solid at 10.0 yr
Benzo(a)pyrene in Total solid at 25.0 yr
Benzo(a)pyrene in Total solid at 50.0 yr
Benzo(a)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

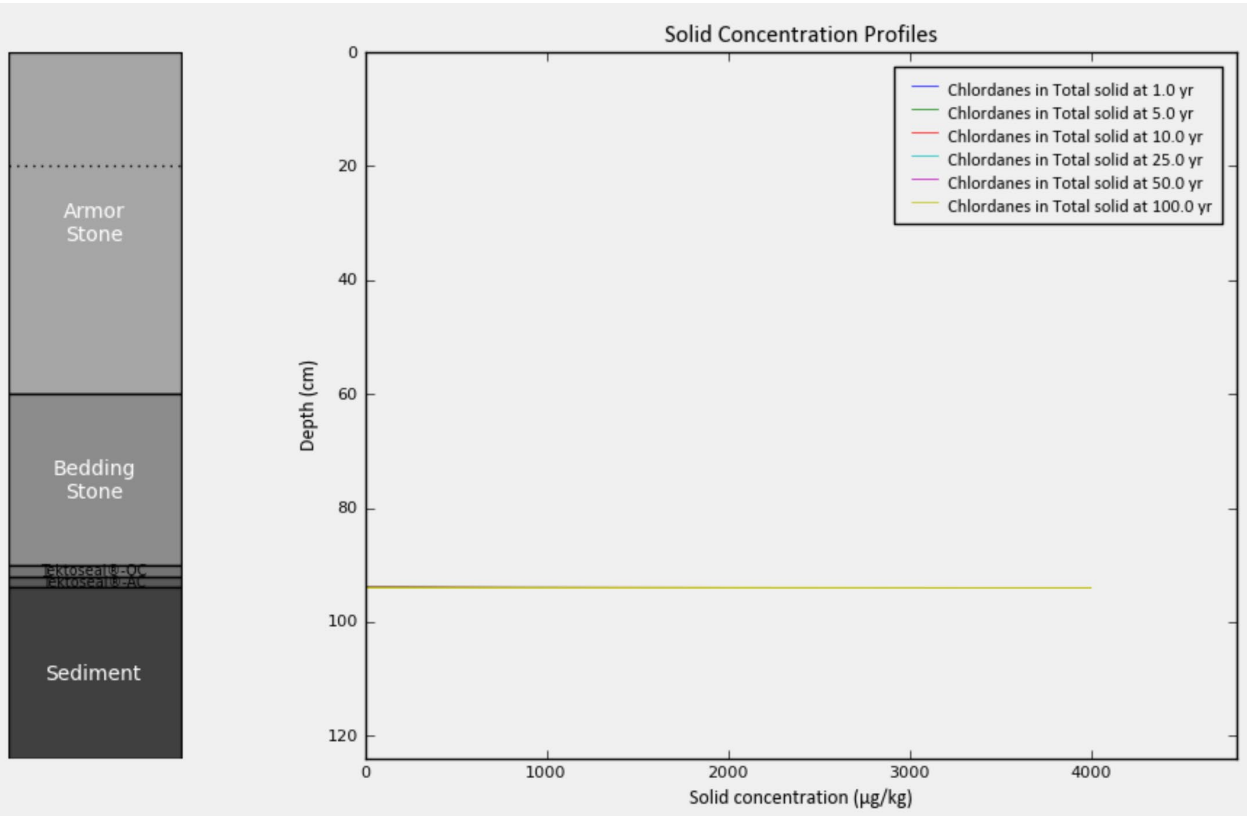

Solid Concentration Profiles
Armor Stone
Bedding Stone
Ertoseal® EC
Ertoseal® AC
Sediment
Benzo(b)fluoranthene in Total solid at 1.0 yr
Benzo(b)fluoranthene in Total solid at 5.0 yr
Benzo(b)fluoranthene in Total solid at 10.0 yr
Benzo(b)fluoranthene in Total solid at 25.0 yr
Benzo(b)fluoranthene in Total solid at 50.0 yr
Benzo(b)fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
1e4
Solid concentration (µg/kg)

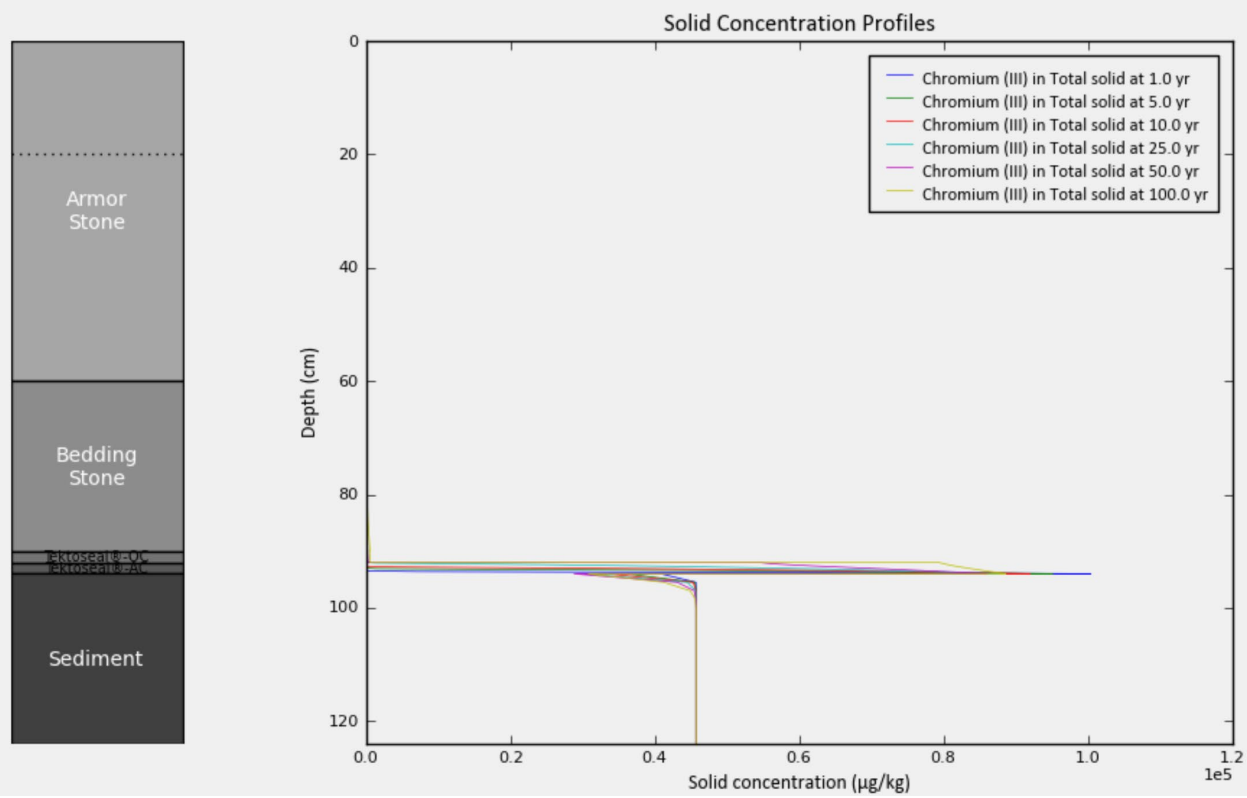

Solid Concentration Profiles
Armor Stone
Bedding Stone
Ertoseal® EC
Ertoseal® AC
Sediment
Benzo(e)pyrene in Total solid at 1.0 yr
Benzo(e)pyrene in Total solid at 5.0 yr
Benzo(e)pyrene in Total solid at 10.0 yr
Benzo(e)pyrene in Total solid at 25.0 yr
Benzo(e)pyrene in Total solid at 50.0 yr
Benzo(e)pyrene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
1e4
Solid concentration (µg/kg)

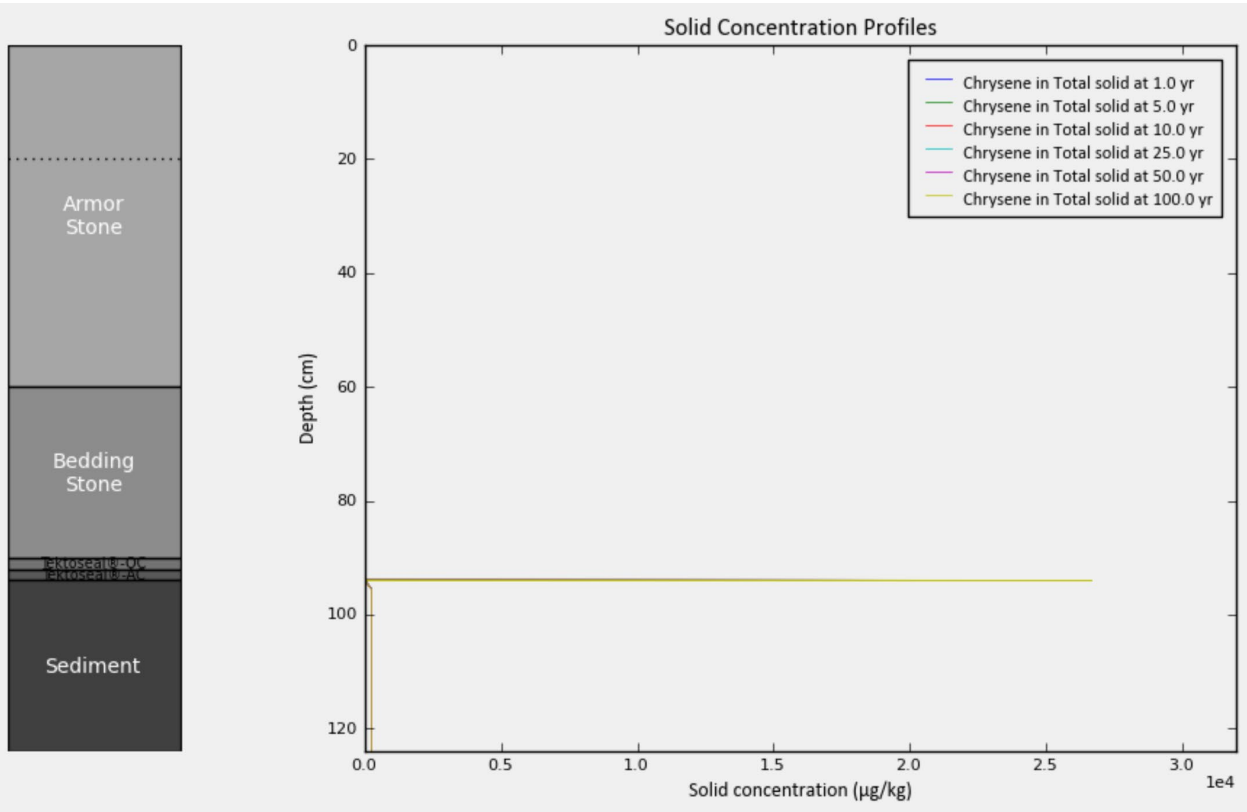

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(ghi)perylene in Total solid at 1.0 yr
Benzo(ghi)perylene in Total solid at 5.0 yr
Benzo(ghi)perylene in Total solid at 10.0 yr
Benzo(ghi)perylene in Total solid at 25.0 yr
Benzo(ghi)perylene in Total solid at 50.0 yr
Benzo(ghi)perylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

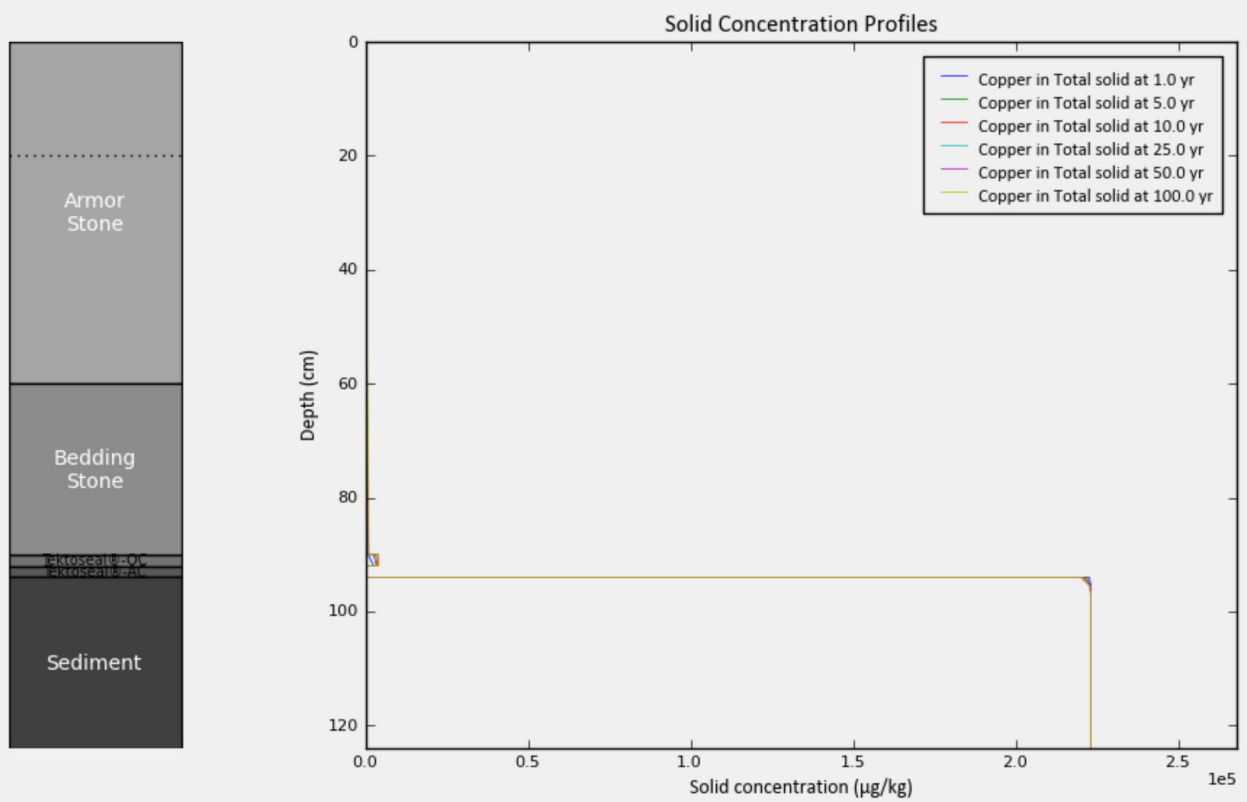

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(k)fluoranthene in Total solid at 1.0 yr
Benzo(k)fluoranthene in Total solid at 5.0 yr
Benzo(k)fluoranthene in Total solid at 10.0 yr
Benzo(k)fluoranthene in Total solid at 25.0 yr
Benzo(k)fluoranthene in Total solid at 50.0 yr
Benzo(k)fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

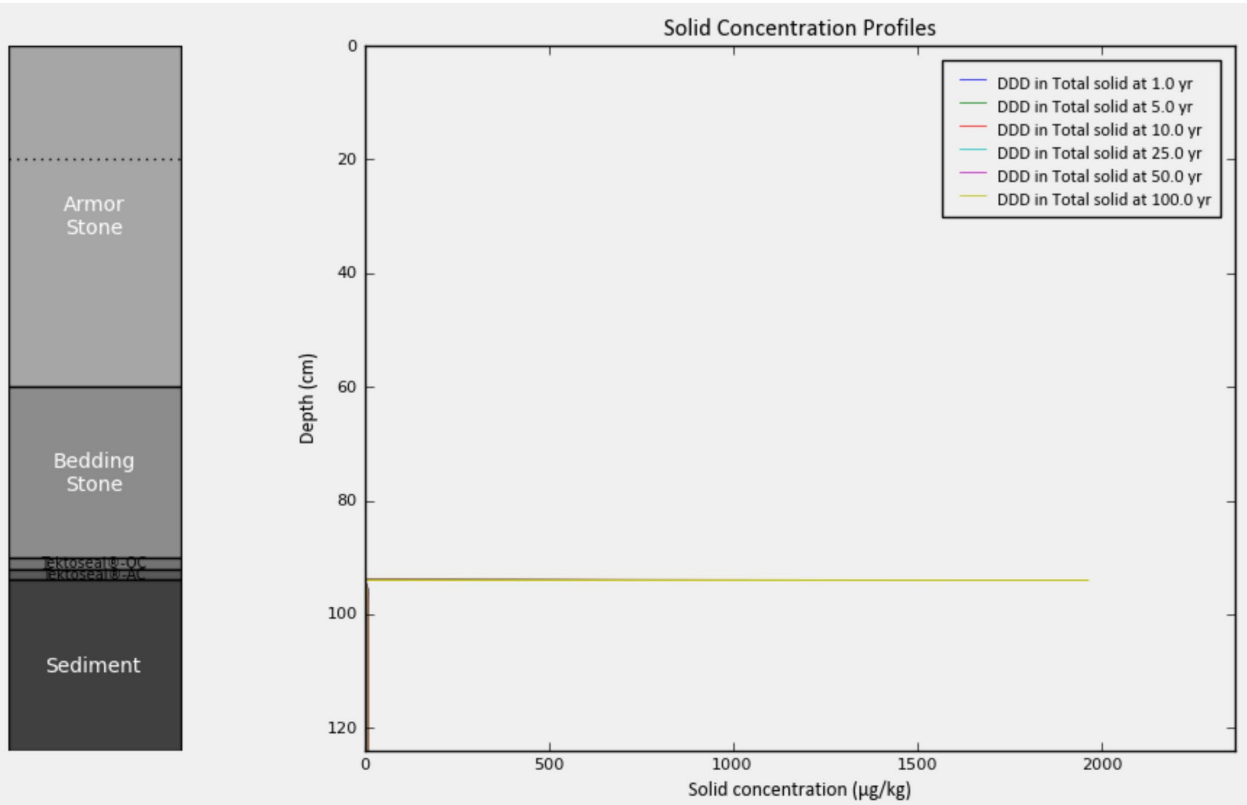

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Cadmium in Total solid at 1.0 yr
Cadmium in Total solid at 5.0 yr
Cadmium in Total solid at 10.0 yr
Cadmium in Total solid at 25.0 yr
Cadmium in Total solid at 50.0 yr
Cadmium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

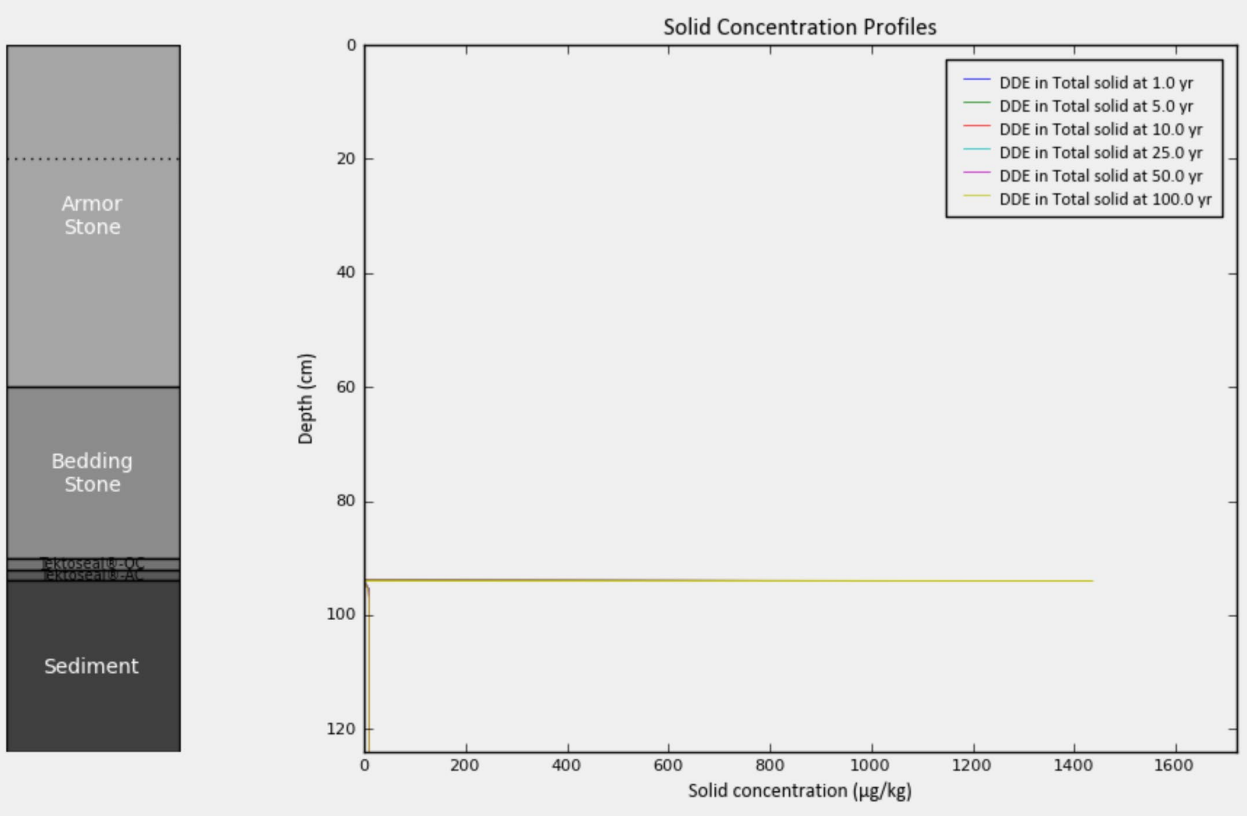

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Chlordanes in Total solid at 1.0 yr
Chlordanes in Total solid at 5.0 yr
Chlordanes in Total solid at 10.0 yr
Chlordanes in Total solid at 25.0 yr
Chlordanes in Total solid at 50.0 yr
Chlordanes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

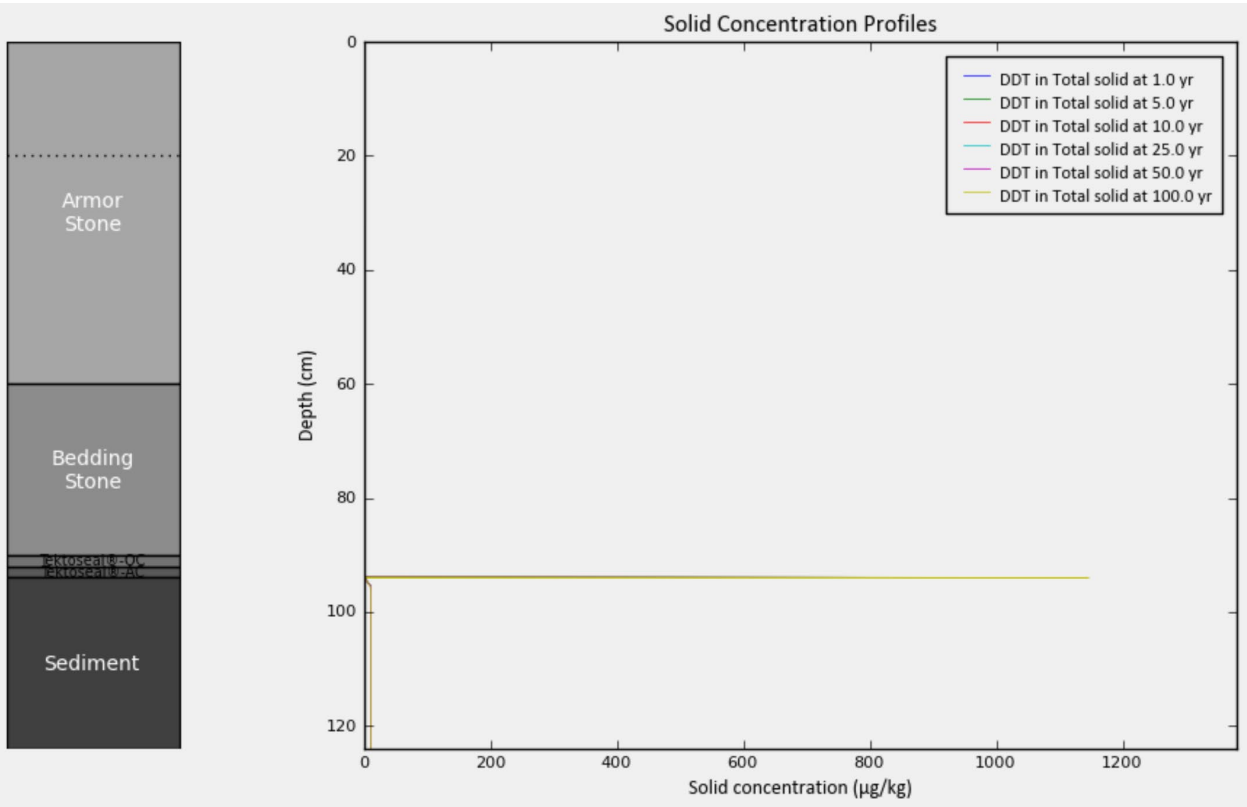

Solid Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Solid concentration (µg/kg)
1e5
Chromium (III) in Total solid at 1.0 yr
Chromium (III) in Total solid at 5.0 yr
Chromium (III) in Total solid at 10.0 yr
Chromium (III) in Total solid at 25.0 yr
Chromium (III) in Total solid at 50.0 yr
Chromium (III) in Total solid at 100.0 yr

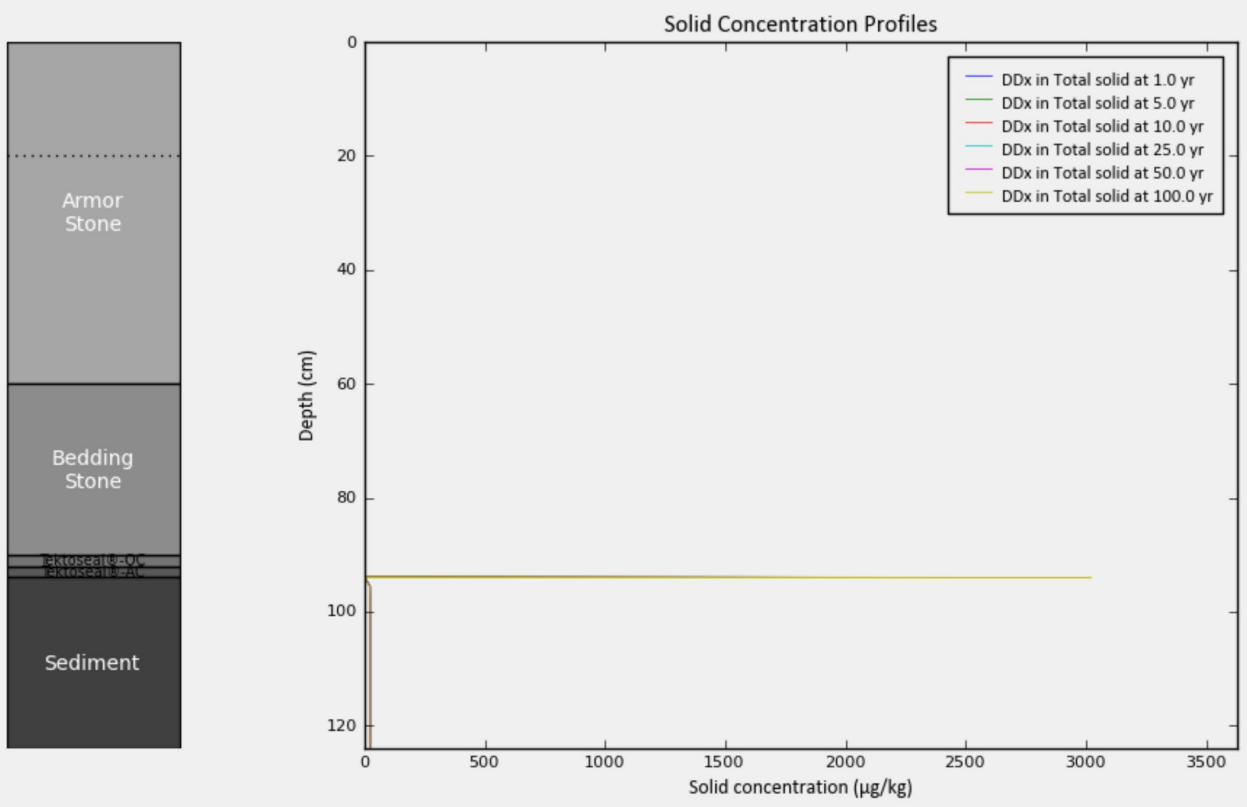

Solid Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Solid concentration (µg/kg)
1e4
Chrysene in Total solid at 1.0 yr
Chrysene in Total solid at 5.0 yr
Chrysene in Total solid at 10.0 yr
Chrysene in Total solid at 25.0 yr
Chrysene in Total solid at 50.0 yr
Chrysene in Total solid at 100.0 yr

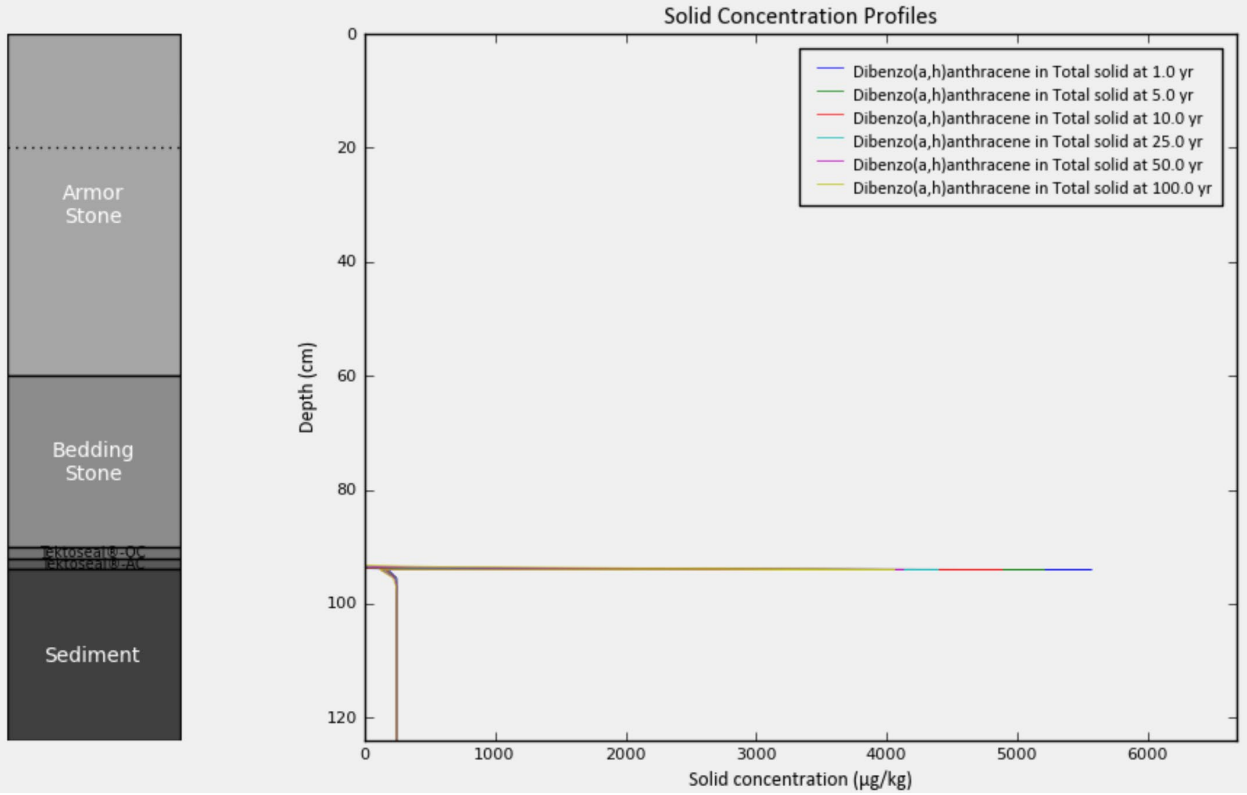

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Copper in Total solid at 1.0 yr
Copper in Total solid at 5.0 yr
Copper in Total solid at 10.0 yr
Copper in Total solid at 25.0 yr
Copper in Total solid at 50.0 yr
Copper in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

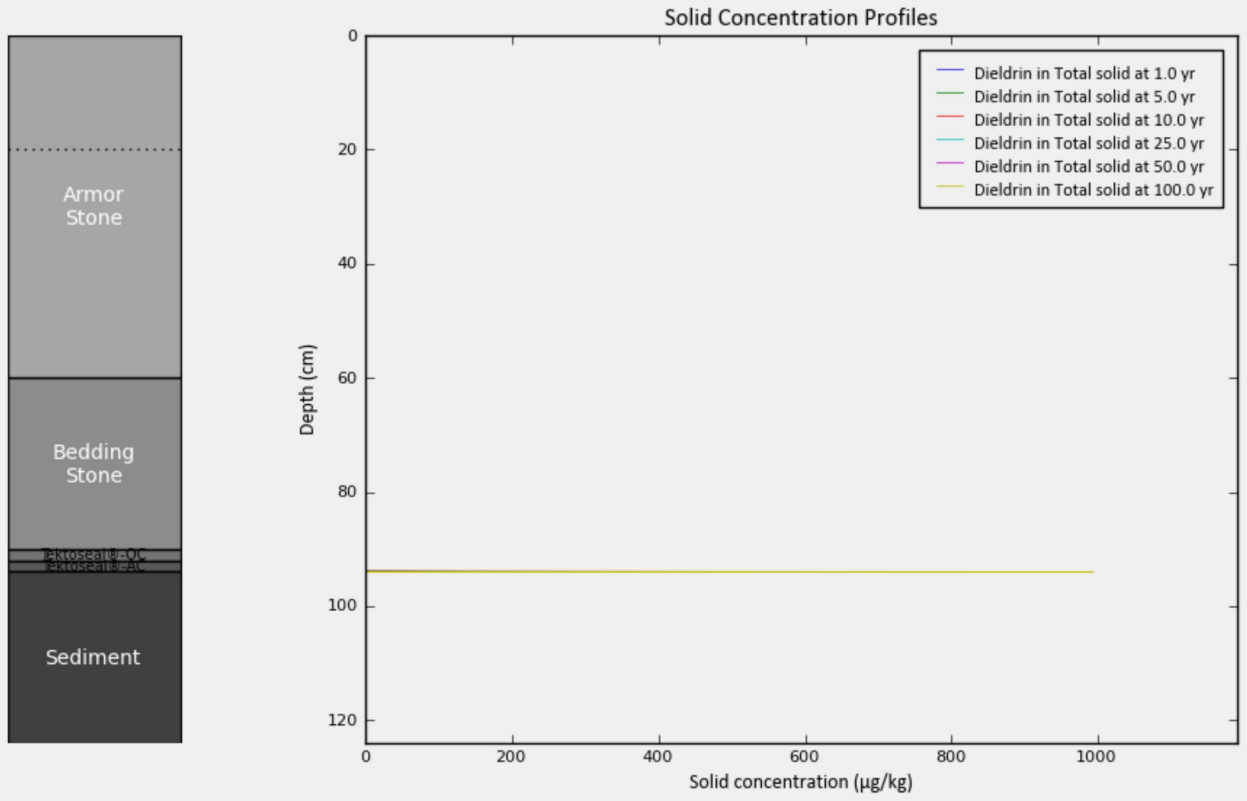

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDD in Total solid at 1.0 yr
DDD in Total solid at 5.0 yr
DDD in Total solid at 10.0 yr
DDD in Total solid at 25.0 yr
DDD in Total solid at 50.0 yr
DDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

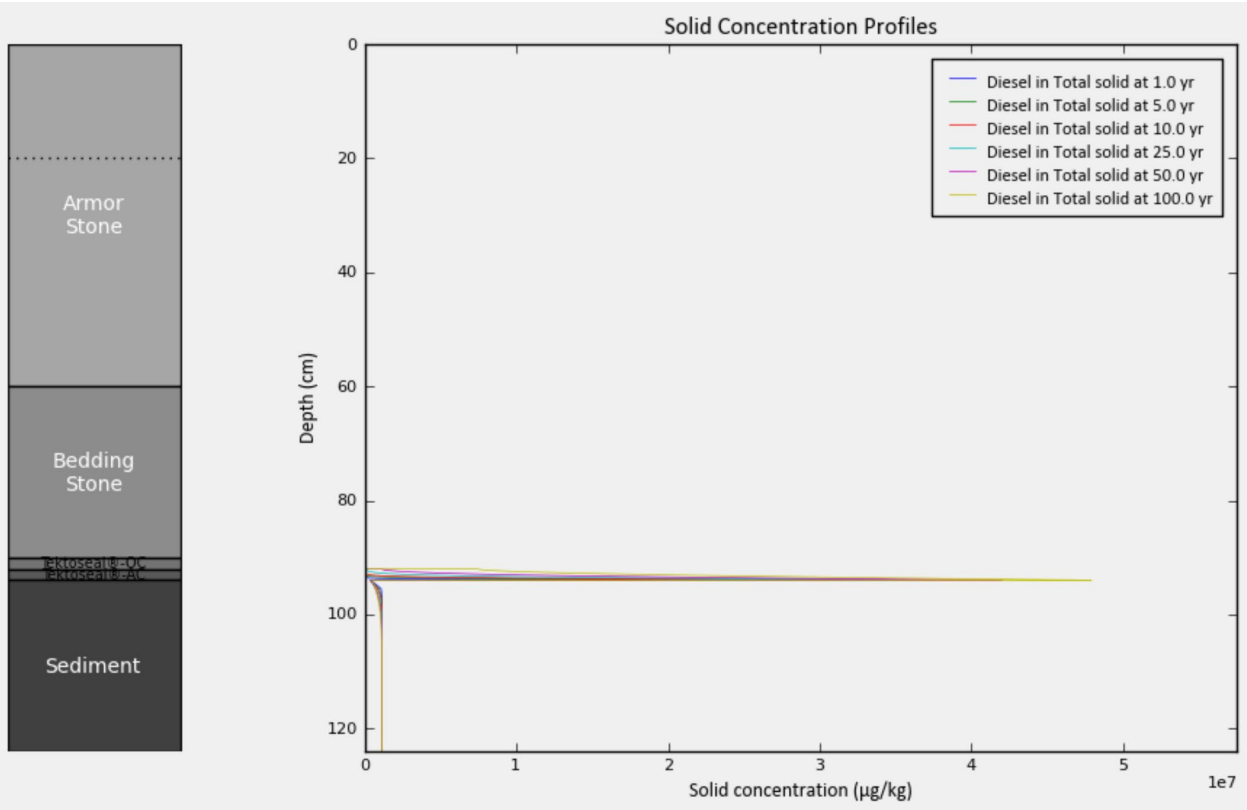

Armor Stone
Bedding Stone
Tetroseal® OC
Tetroseal® AC
Sediment
Solid Concentration Profiles
DDE in Total solid at 1.0 yr
DDE in Total solid at 5.0 yr
DDE in Total solid at 10.0 yr
DDE in Total solid at 25.0 yr
DDE in Total solid at 50.0 yr
DDE in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

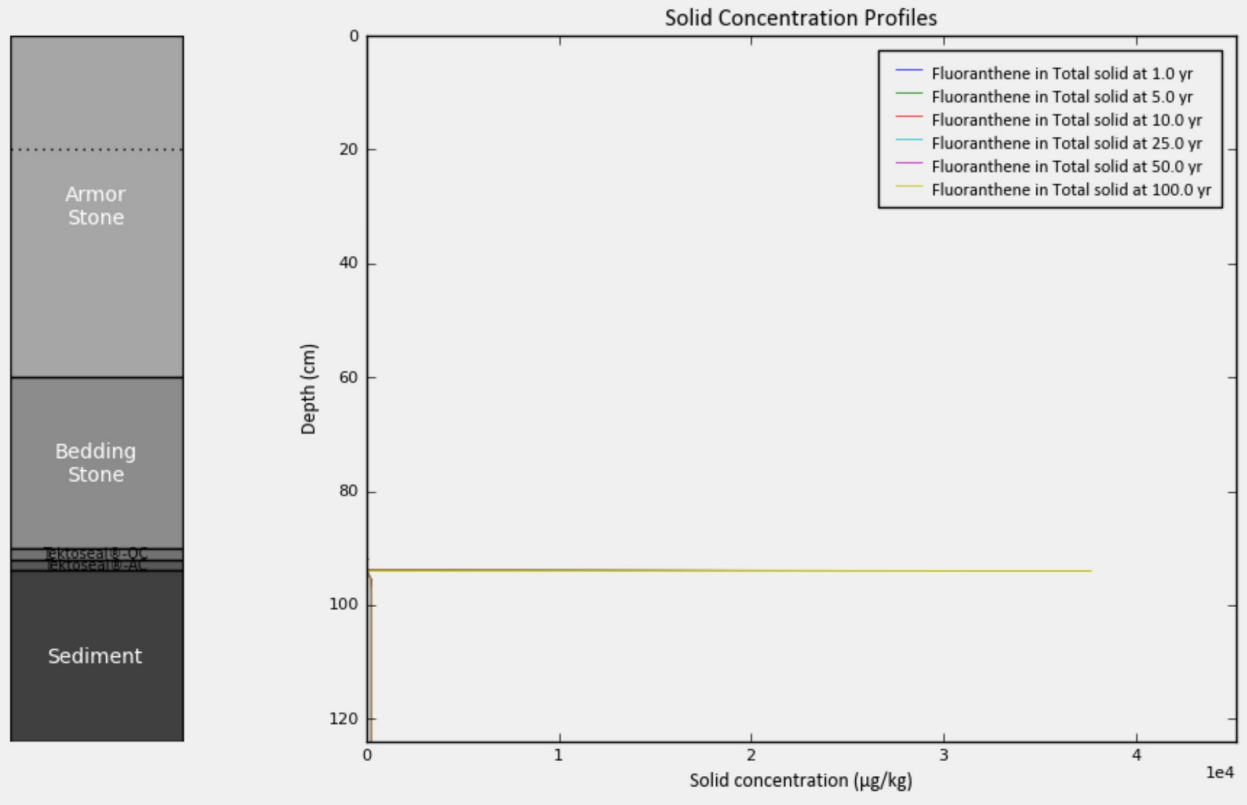

Armor Stone
Bedding Stone
Tetroseal® OC
Tetroseal® AC
Sediment
Solid Concentration Profiles
DDT in Total solid at 1.0 yr
DDT in Total solid at 5.0 yr
DDT in Total solid at 10.0 yr
DDT in Total solid at 25.0 yr
DDT in Total solid at 50.0 yr
DDT in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

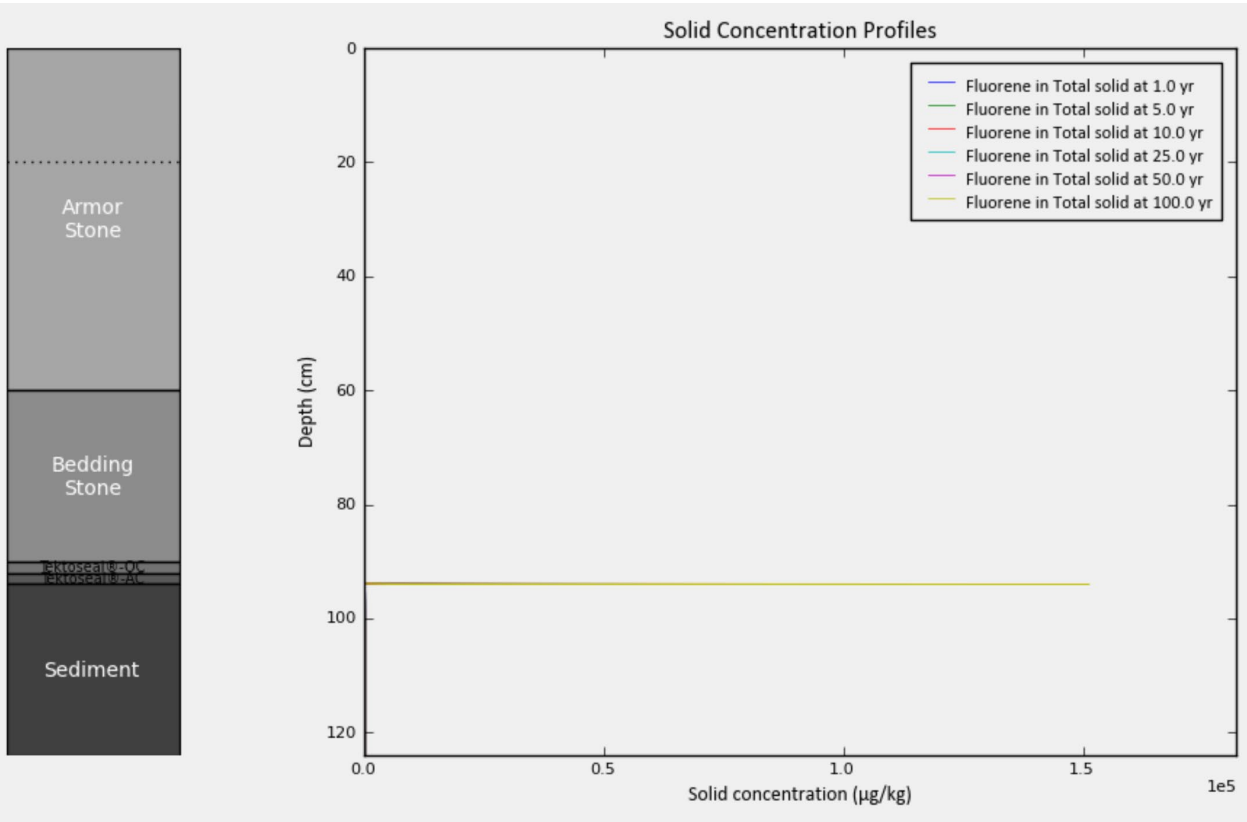

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDx in Total solid at 1.0 yr
DDx in Total solid at 5.0 yr
DDx in Total solid at 10.0 yr
DDx in Total solid at 25.0 yr
DDx in Total solid at 50.0 yr
DDx in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

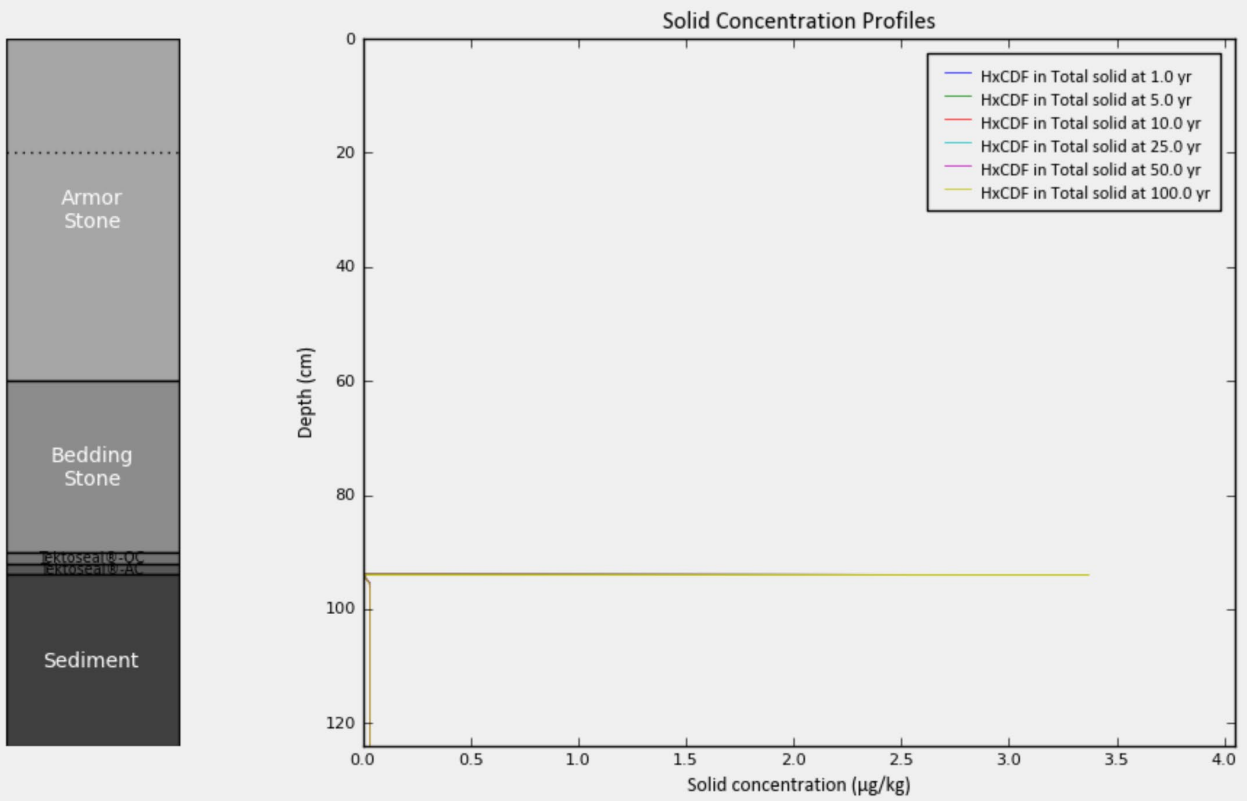

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Dibenzo(a,h)anthracene in Total solid at 1.0 yr
Dibenzo(a,h)anthracene in Total solid at 5.0 yr
Dibenzo(a,h)anthracene in Total solid at 10.0 yr
Dibenzo(a,h)anthracene in Total solid at 25.0 yr
Dibenzo(a,h)anthracene in Total solid at 50.0 yr
Dibenzo(a,h)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

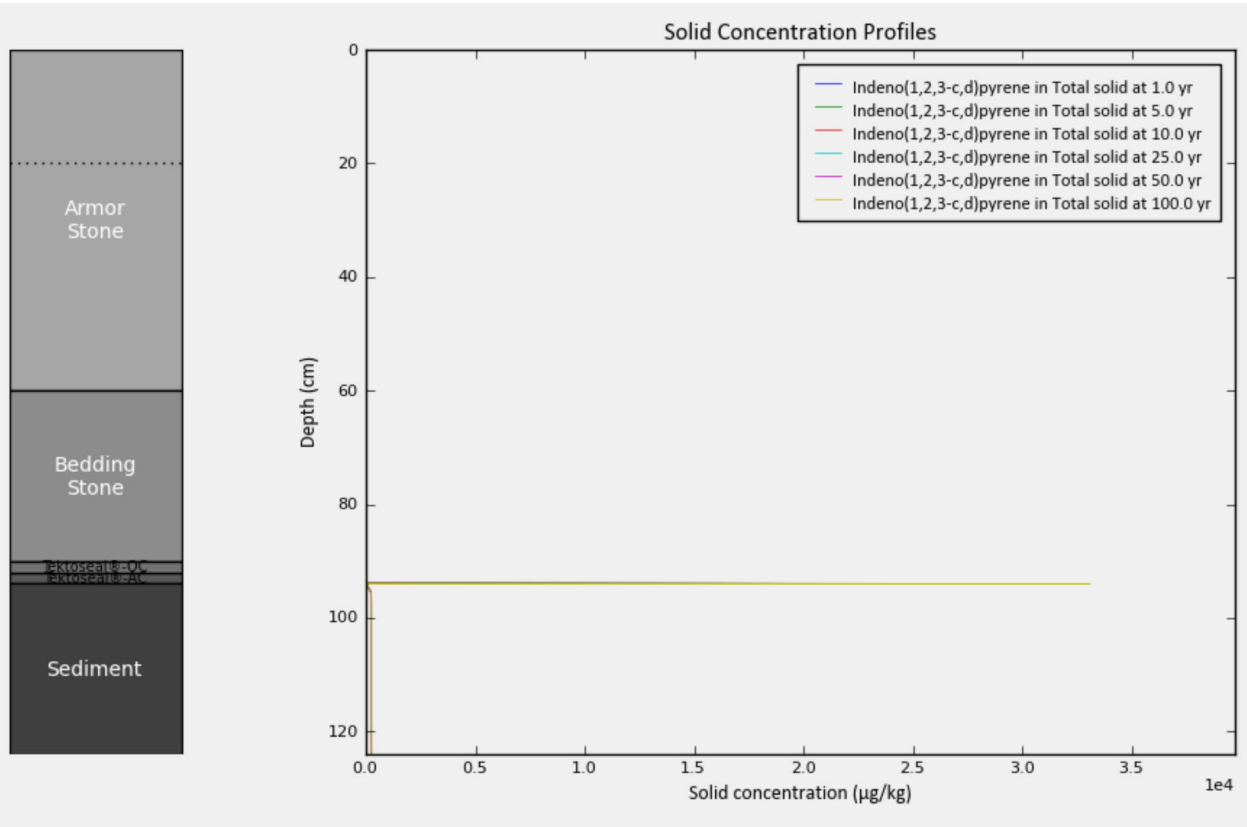

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Dieldrin in Total solid at 1.0 yr
Dieldrin in Total solid at 5.0 yr
Dieldrin in Total solid at 10.0 yr
Dieldrin in Total solid at 25.0 yr
Dieldrin in Total solid at 50.0 yr
Dieldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

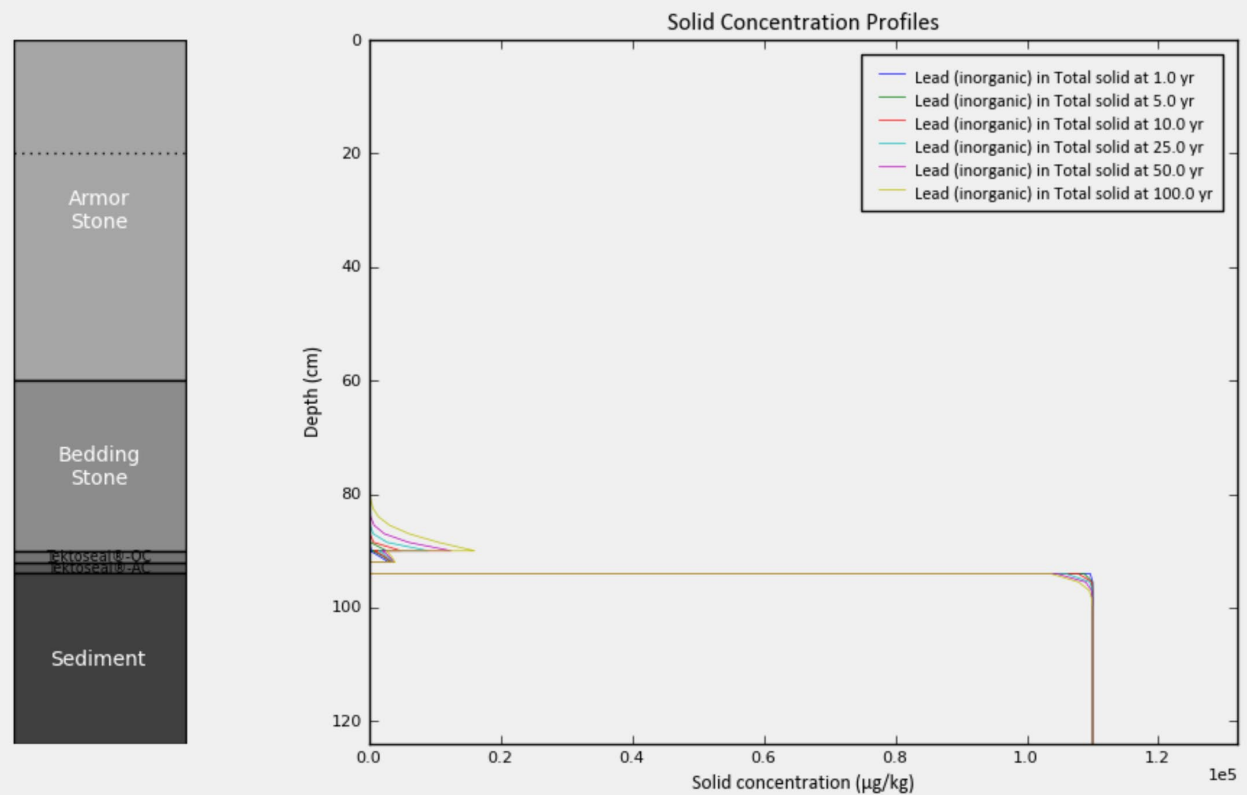

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Diesel in Total solid at 1.0 yr
Diesel in Total solid at 5.0 yr
Diesel in Total solid at 10.0 yr
Diesel in Total solid at 25.0 yr
Diesel in Total solid at 50.0 yr
Diesel in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e7

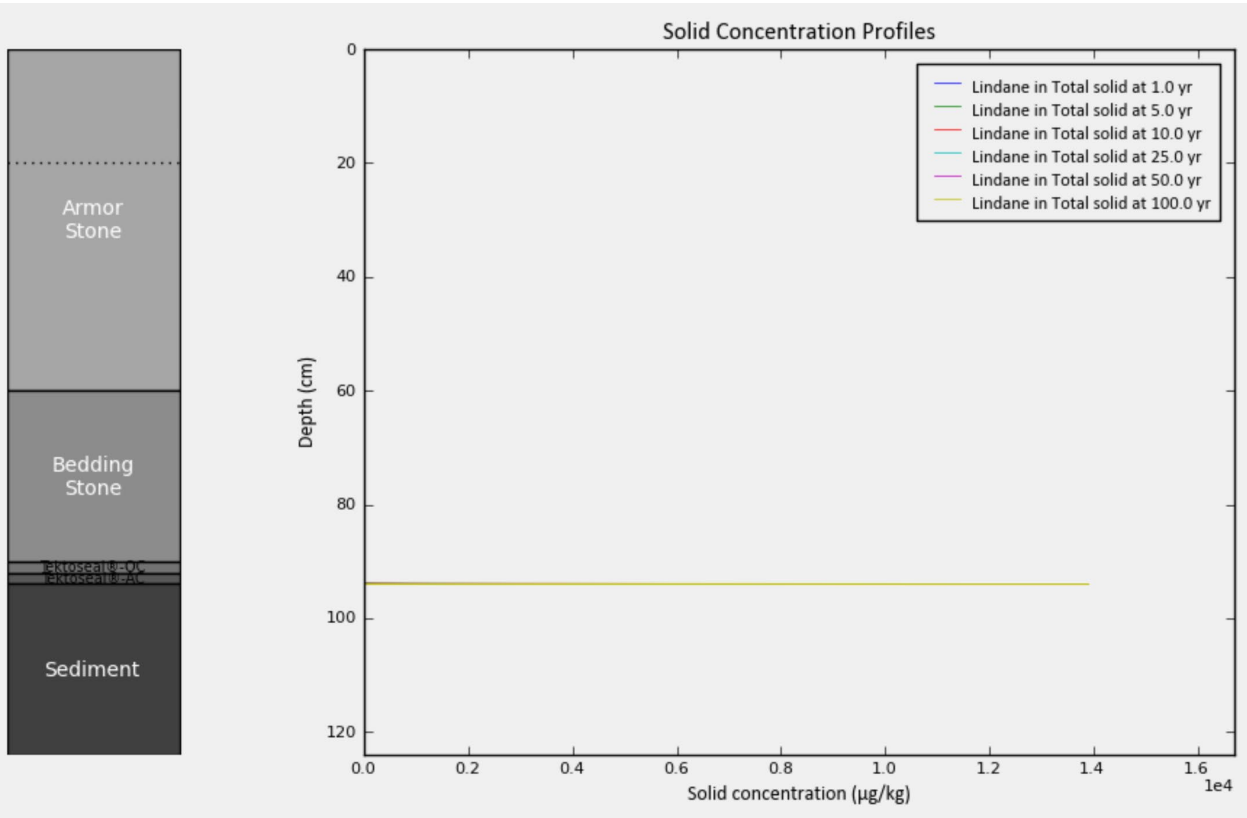

Solid Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Solid concentration (µg/kg)
1e4
Fluoranthene in Total solid at 1.0 yr
Fluoranthene in Total solid at 5.0 yr
Fluoranthene in Total solid at 10.0 yr
Fluoranthene in Total solid at 25.0 yr
Fluoranthene in Total solid at 50.0 yr
Fluoranthene in Total solid at 100.0 yr

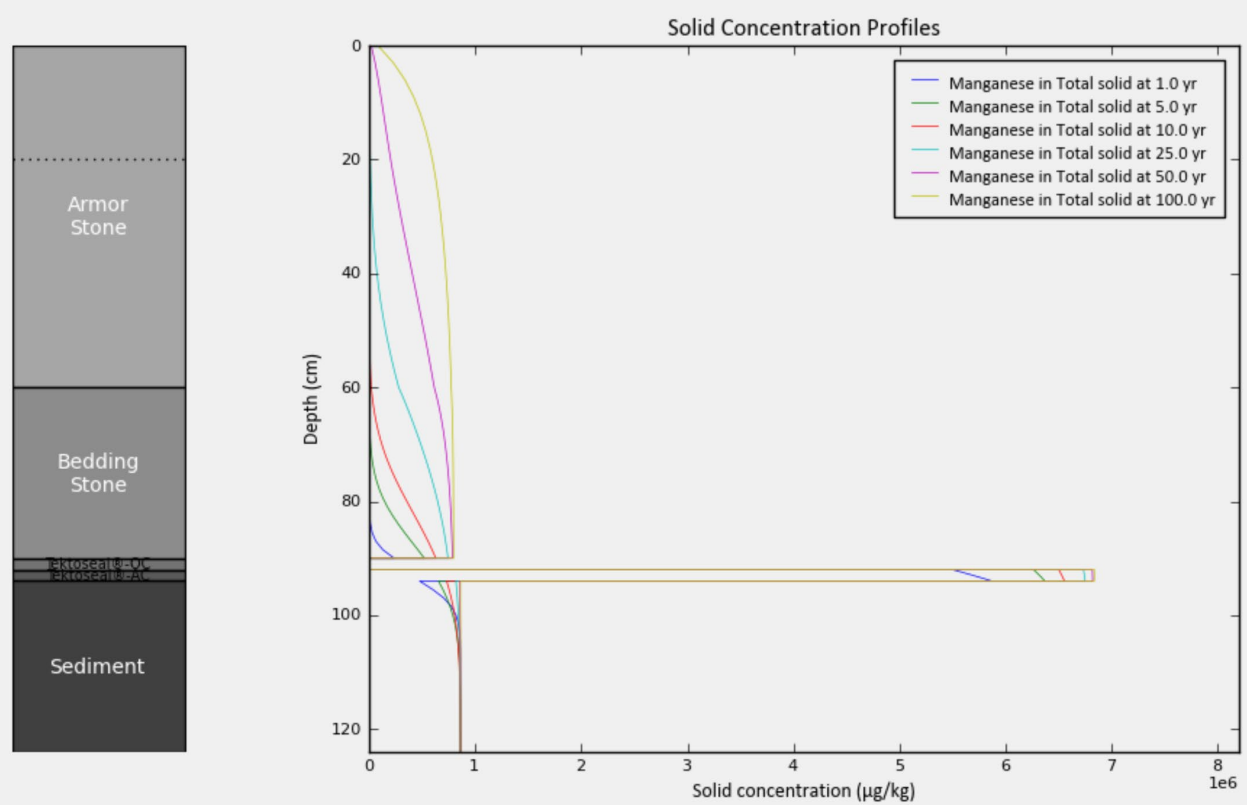

Solid Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Depth (cm)
Solid concentration (µg/kg)
1e5
Fluorene in Total solid at 1.0 yr
Fluorene in Total solid at 5.0 yr
Fluorene in Total solid at 10.0 yr
Fluorene in Total solid at 25.0 yr
Fluorene in Total solid at 50.0 yr
Fluorene in Total solid at 100.0 yr

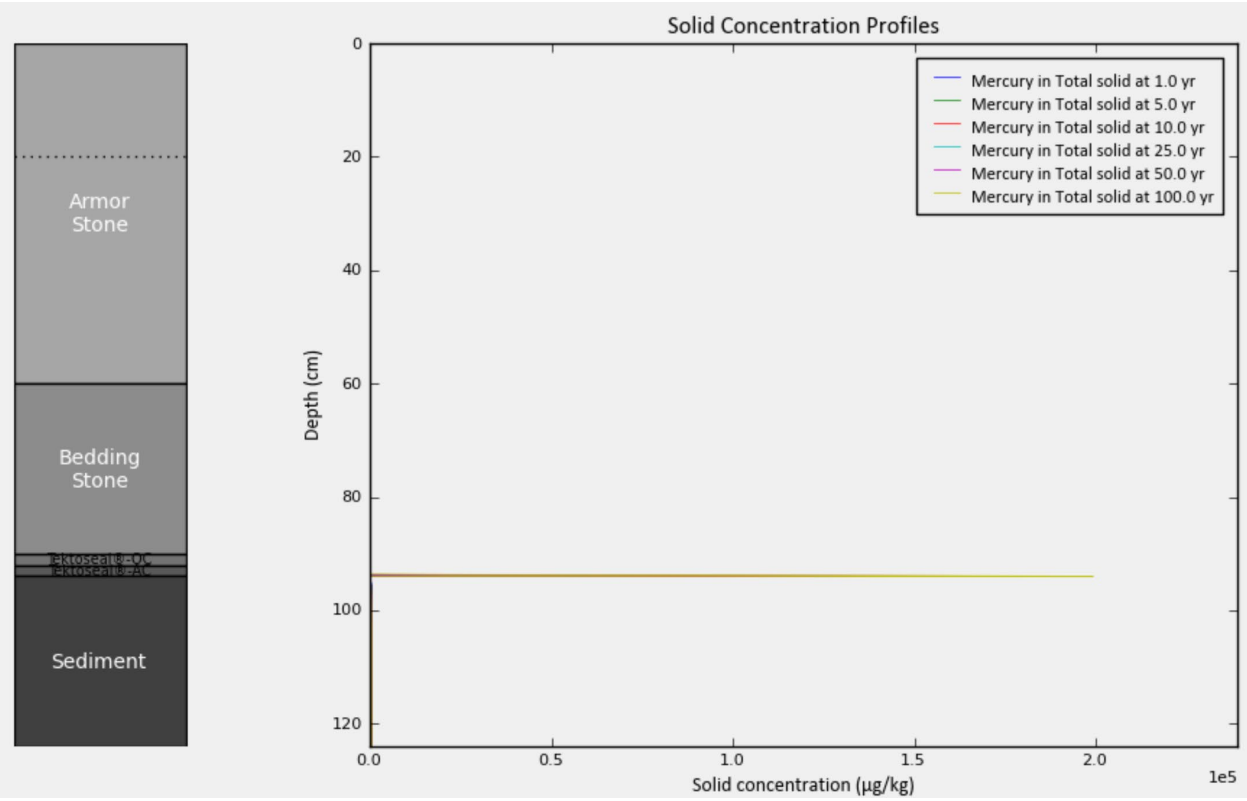

Solid Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® OC
Tekoseal® AC
Sediment
HxCDF in Total solid at 1.0 yr
HxCDF in Total solid at 5.0 yr
HxCDF in Total solid at 10.0 yr
HxCDF in Total solid at 25.0 yr
HxCDF in Total solid at 50.0 yr
HxCDF in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

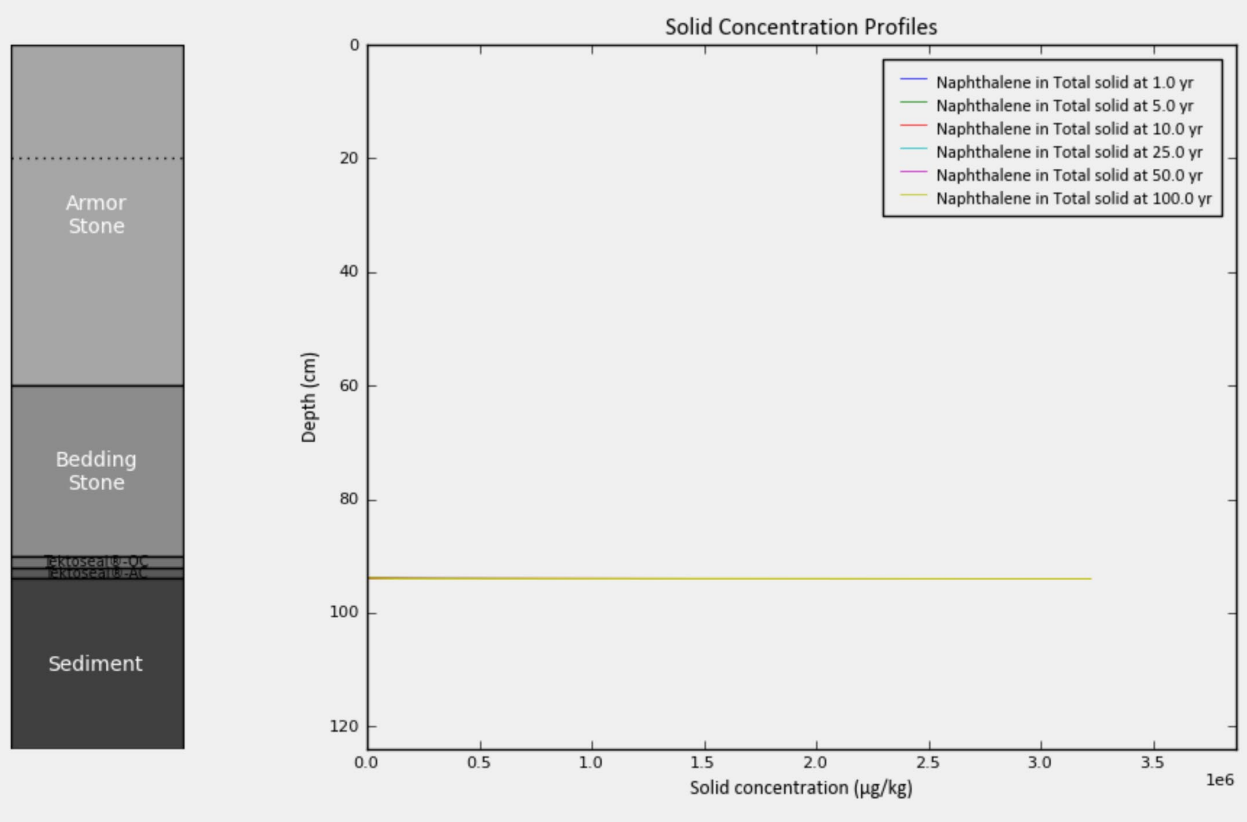

Solid Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® OC
Tekoseal® AC
Sediment
Indeno(1,2,3-c,d)pyrene in Total solid at 1.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 5.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 10.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 25.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 50.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

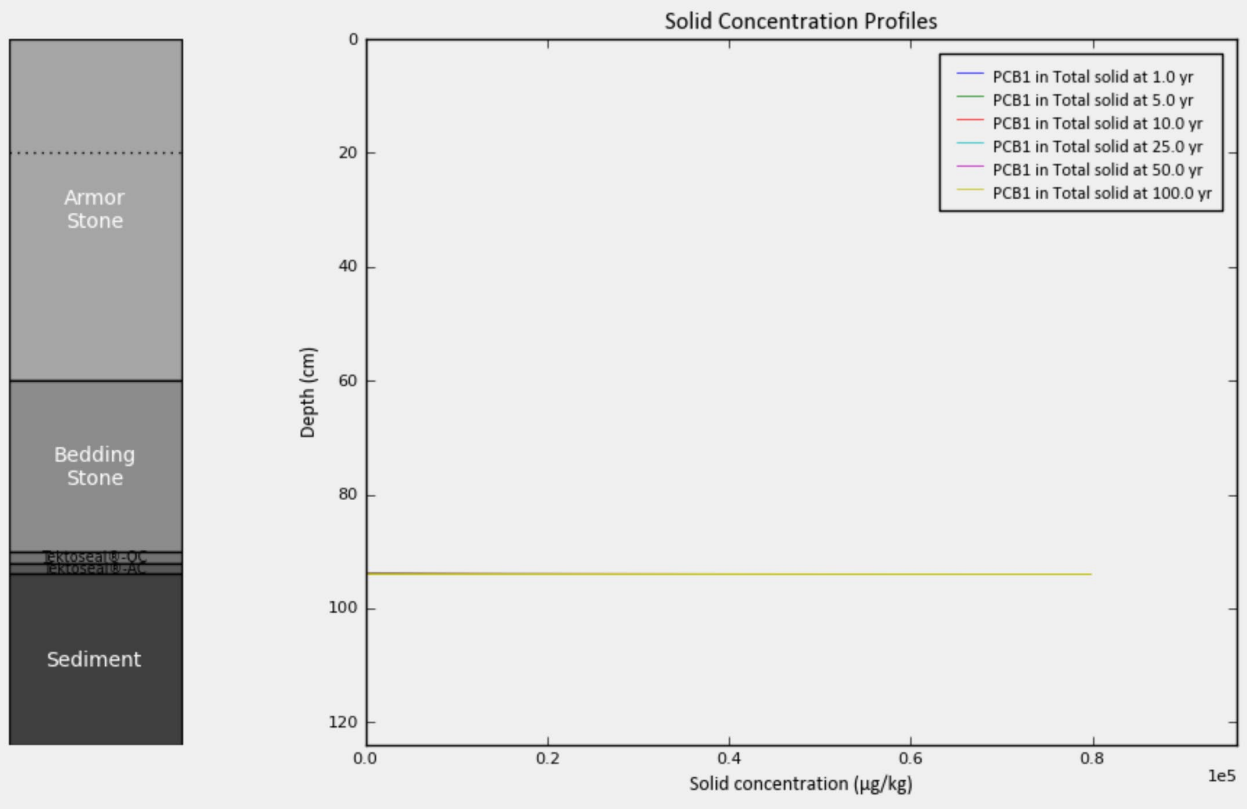

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Lead (inorganic) in Total solid at 1.0 yr
Lead (inorganic) in Total solid at 5.0 yr
Lead (inorganic) in Total solid at 10.0 yr
Lead (inorganic) in Total solid at 25.0 yr
Lead (inorganic) in Total solid at 50.0 yr
Lead (inorganic) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

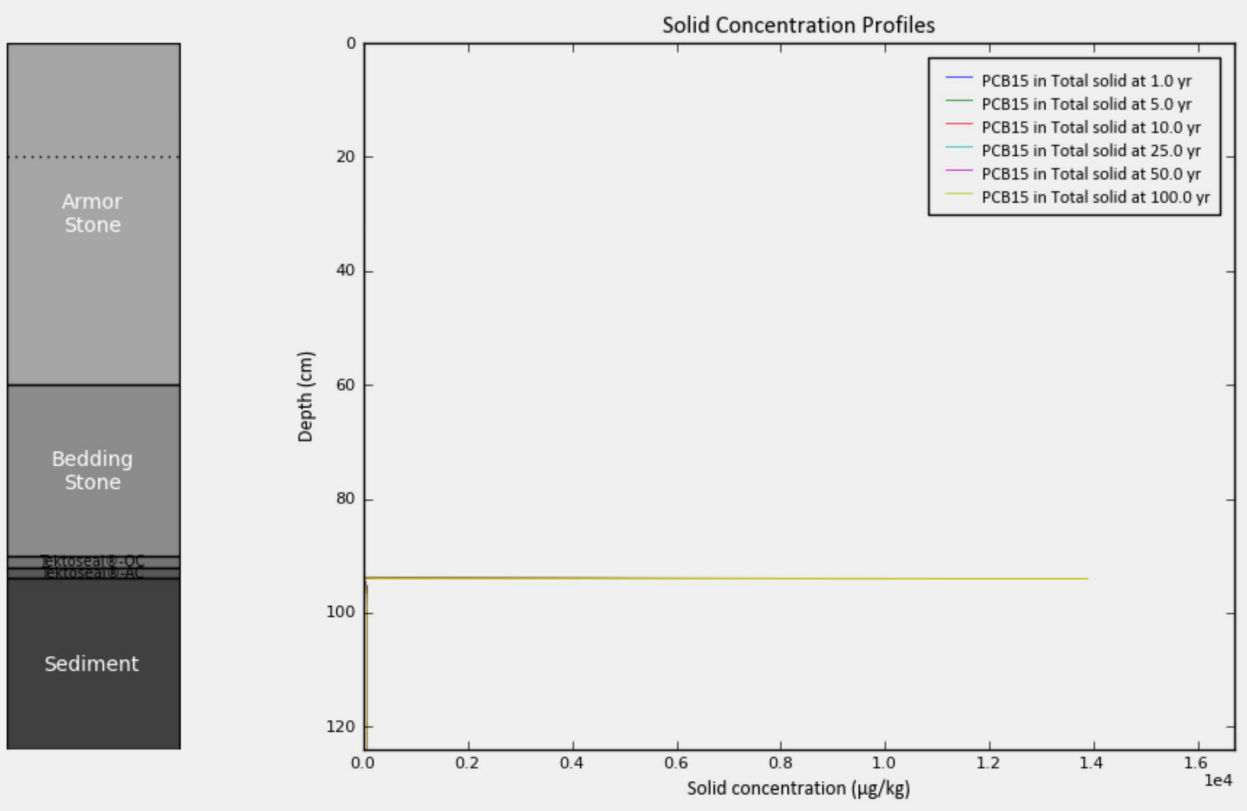

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Lindane in Total solid at 1.0 yr
Lindane in Total solid at 5.0 yr
Lindane in Total solid at 10.0 yr
Lindane in Total solid at 25.0 yr
Lindane in Total solid at 50.0 yr
Lindane in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

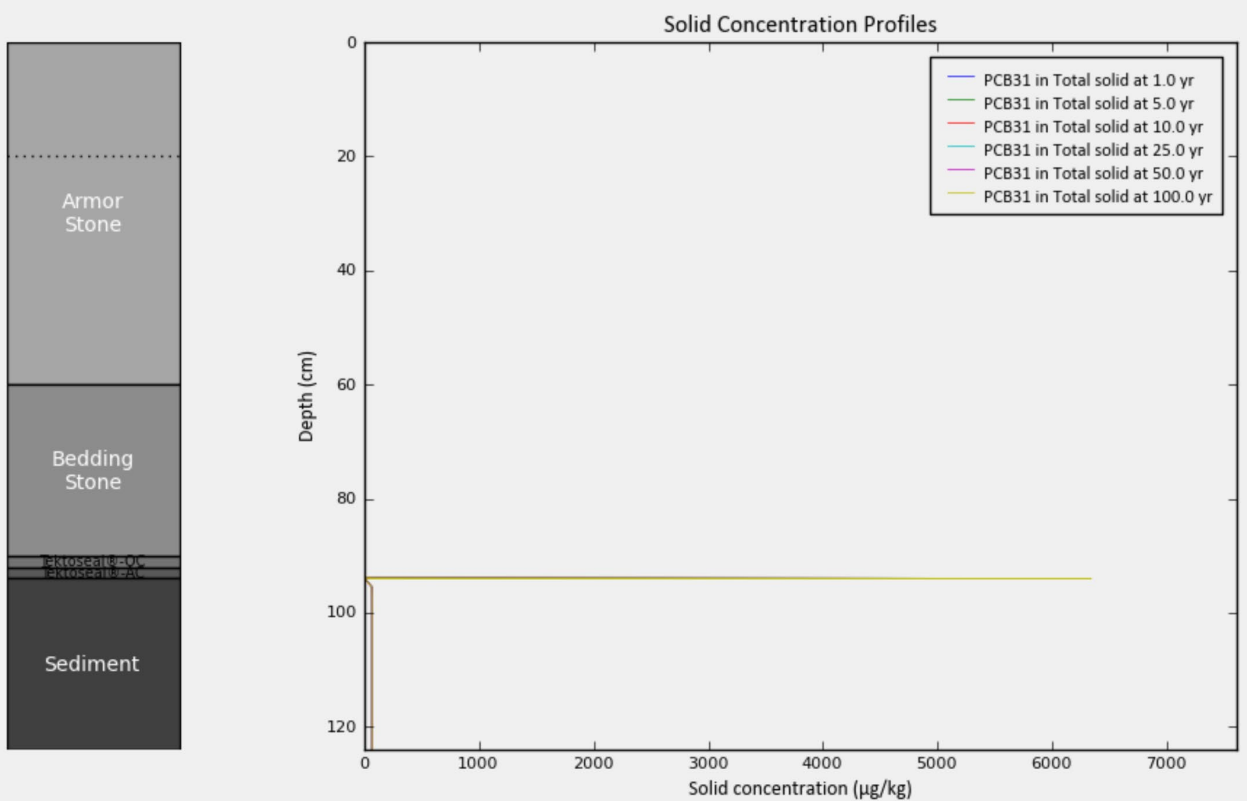

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Manganese in Total solid at 1.0 yr
Manganese in Total solid at 5.0 yr
Manganese in Total solid at 10.0 yr
Manganese in Total solid at 25.0 yr
Manganese in Total solid at 50.0 yr
Manganese in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

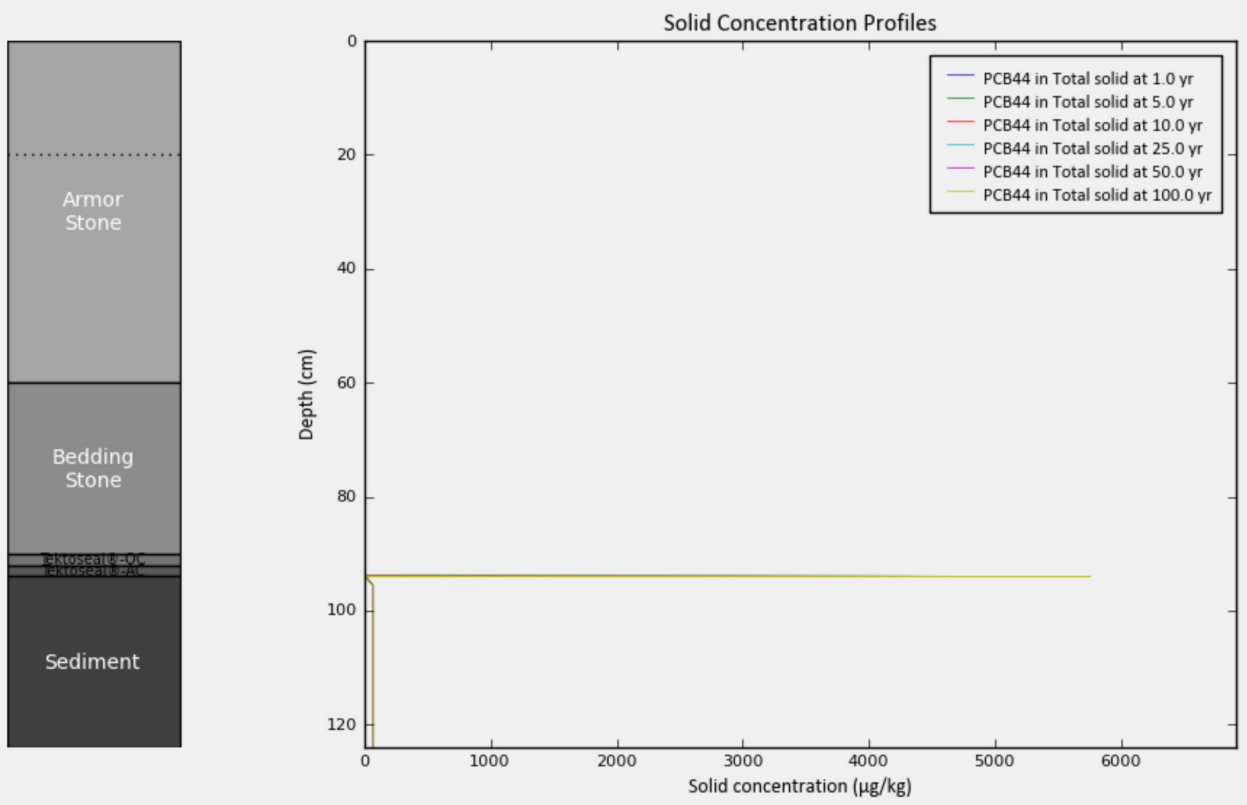

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Mercury in Total solid at 1.0 yr
Mercury in Total solid at 5.0 yr
Mercury in Total solid at 10.0 yr
Mercury in Total solid at 25.0 yr
Mercury in Total solid at 50.0 yr
Mercury in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

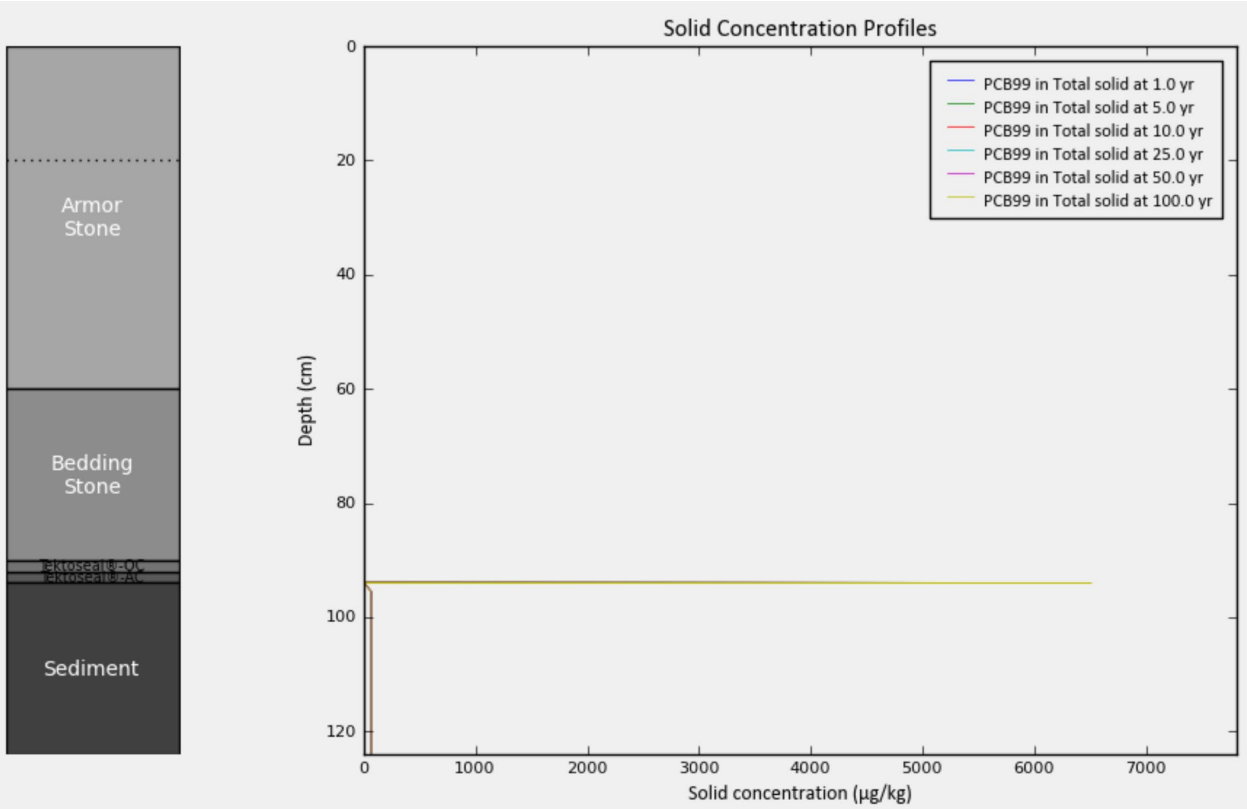

Solid Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® EOC
Tekoseal® EAC
Sediment
Naphthalene in Total solid at 1.0 yr
Naphthalene in Total solid at 5.0 yr
Naphthalene in Total solid at 10.0 yr
Naphthalene in Total solid at 25.0 yr
Naphthalene in Total solid at 50.0 yr
Naphthalene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e6
Solid concentration (µg/kg)

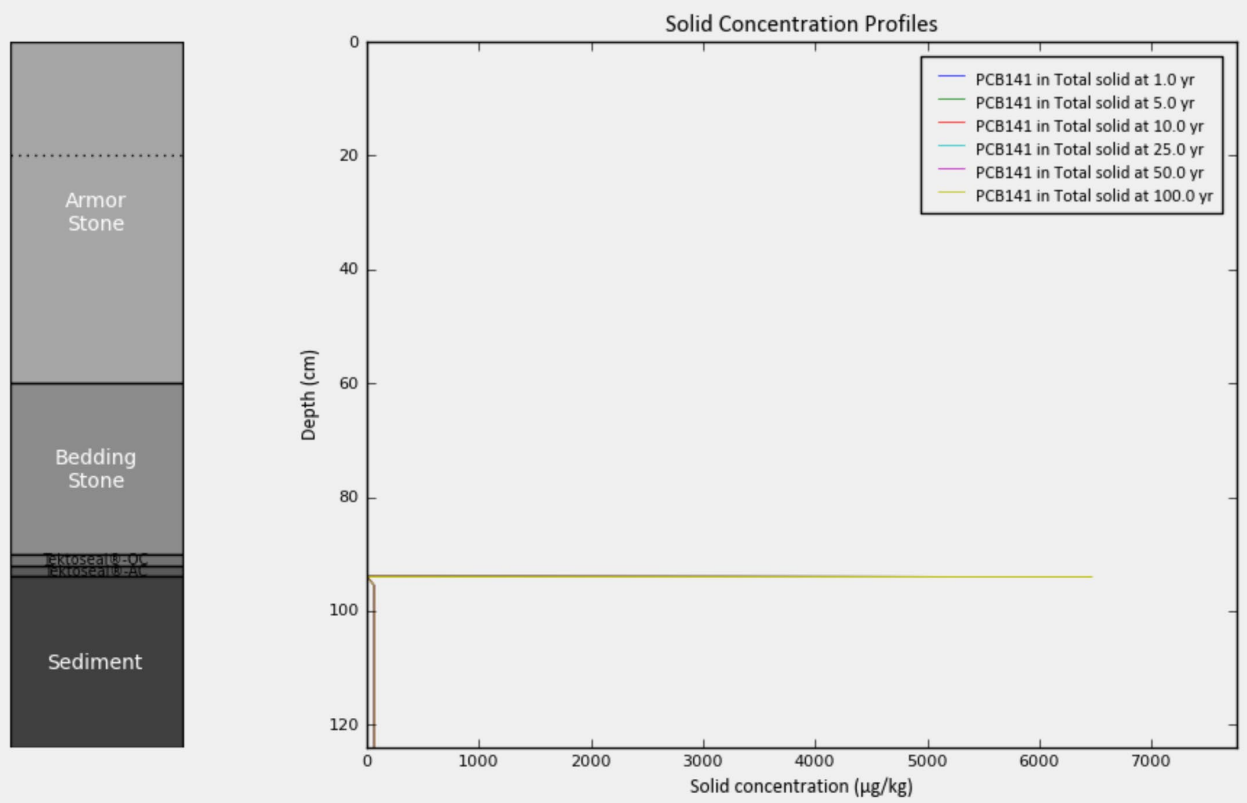

Solid Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® EOC
Tekoseal® EAC
Sediment
PCB1 in Total solid at 1.0 yr
PCB1 in Total solid at 5.0 yr
PCB1 in Total solid at 10.0 yr
PCB1 in Total solid at 25.0 yr
PCB1 in Total solid at 50.0 yr
PCB1 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1e5
Solid concentration (µg/kg)

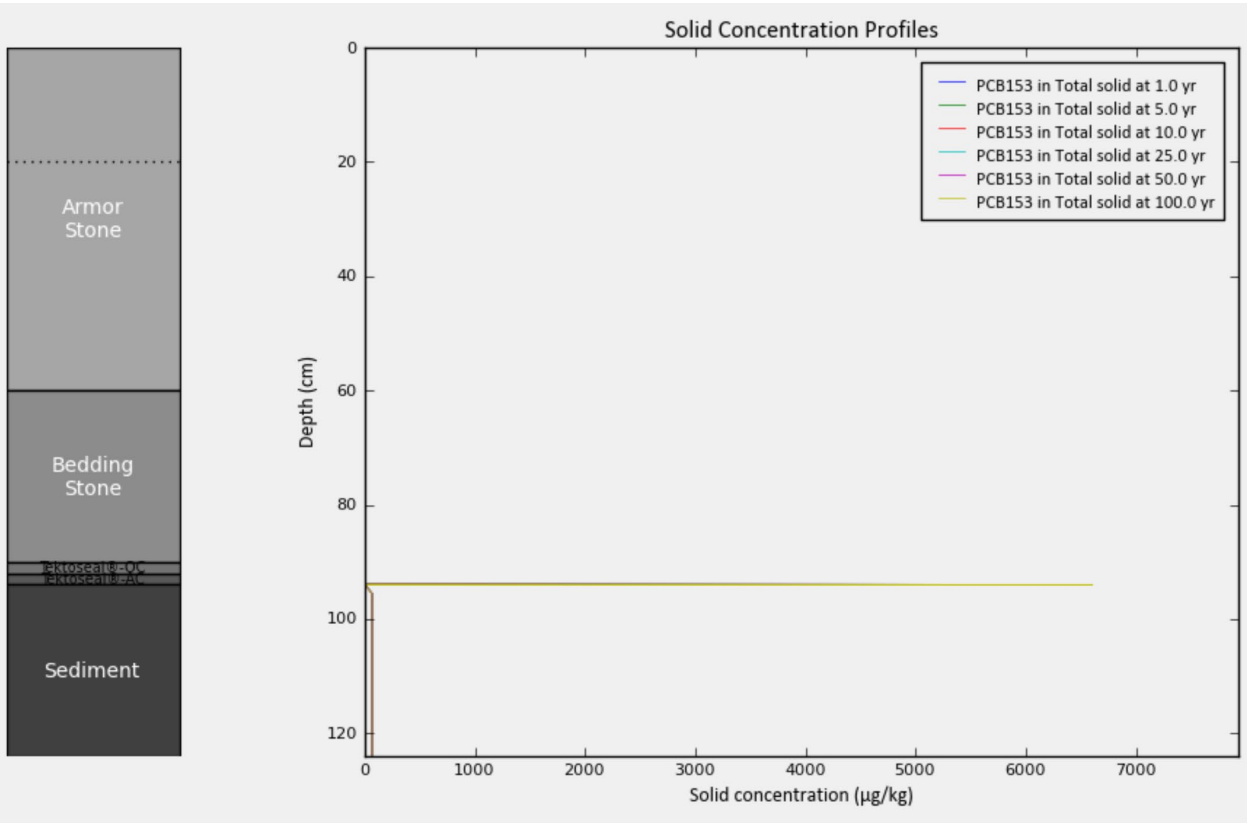

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB15 in Total solid at 1.0 yr
PCB15 in Total solid at 5.0 yr
PCB15 in Total solid at 10.0 yr
PCB15 in Total solid at 25.0 yr
PCB15 in Total solid at 50.0 yr
PCB15 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

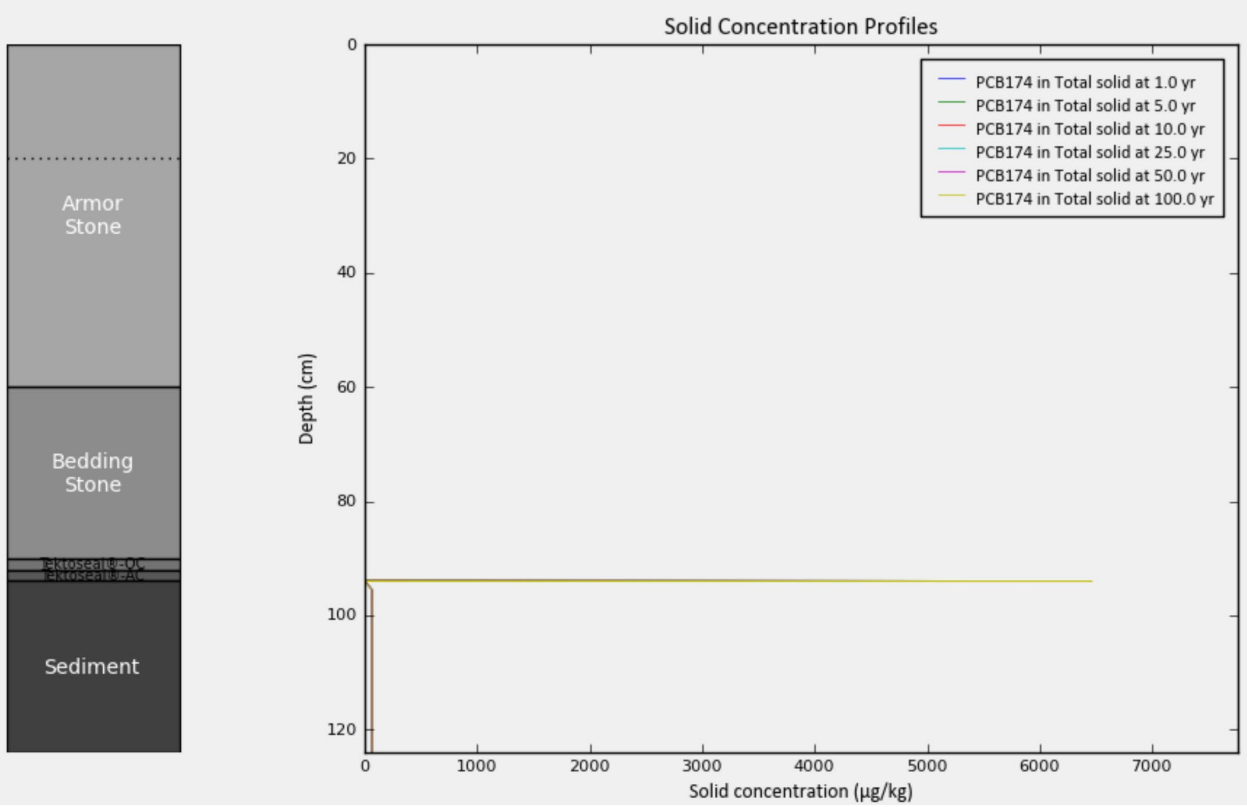

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB31 in Total solid at 1.0 yr
PCB31 in Total solid at 5.0 yr
PCB31 in Total solid at 10.0 yr
PCB31 in Total solid at 25.0 yr
PCB31 in Total solid at 50.0 yr
PCB31 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

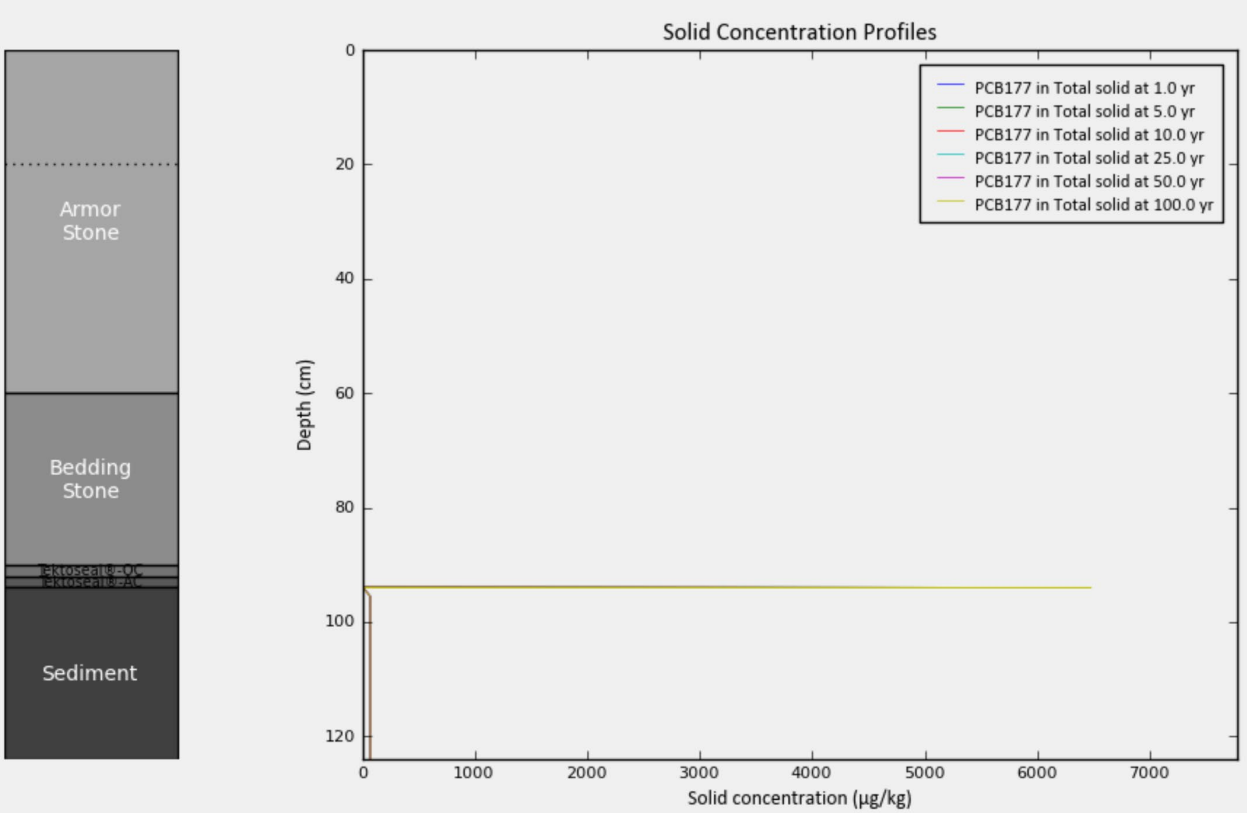

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB44 in Total solid at 1.0 yr
PCB44 in Total solid at 5.0 yr
PCB44 in Total solid at 10.0 yr
PCB44 in Total solid at 25.0 yr
PCB44 in Total solid at 50.0 yr
PCB44 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

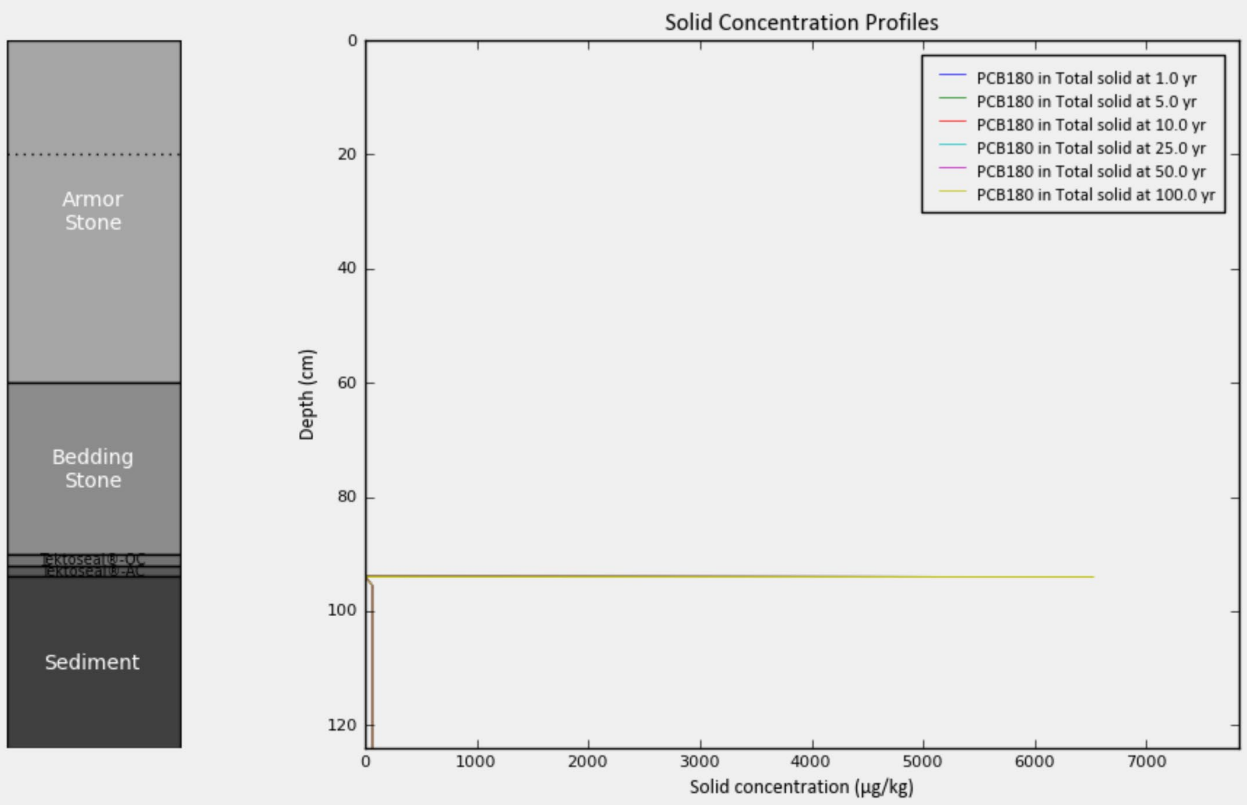

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB99 in Total solid at 1.0 yr
PCB99 in Total solid at 5.0 yr
PCB99 in Total solid at 10.0 yr
PCB99 in Total solid at 25.0 yr
PCB99 in Total solid at 50.0 yr
PCB99 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

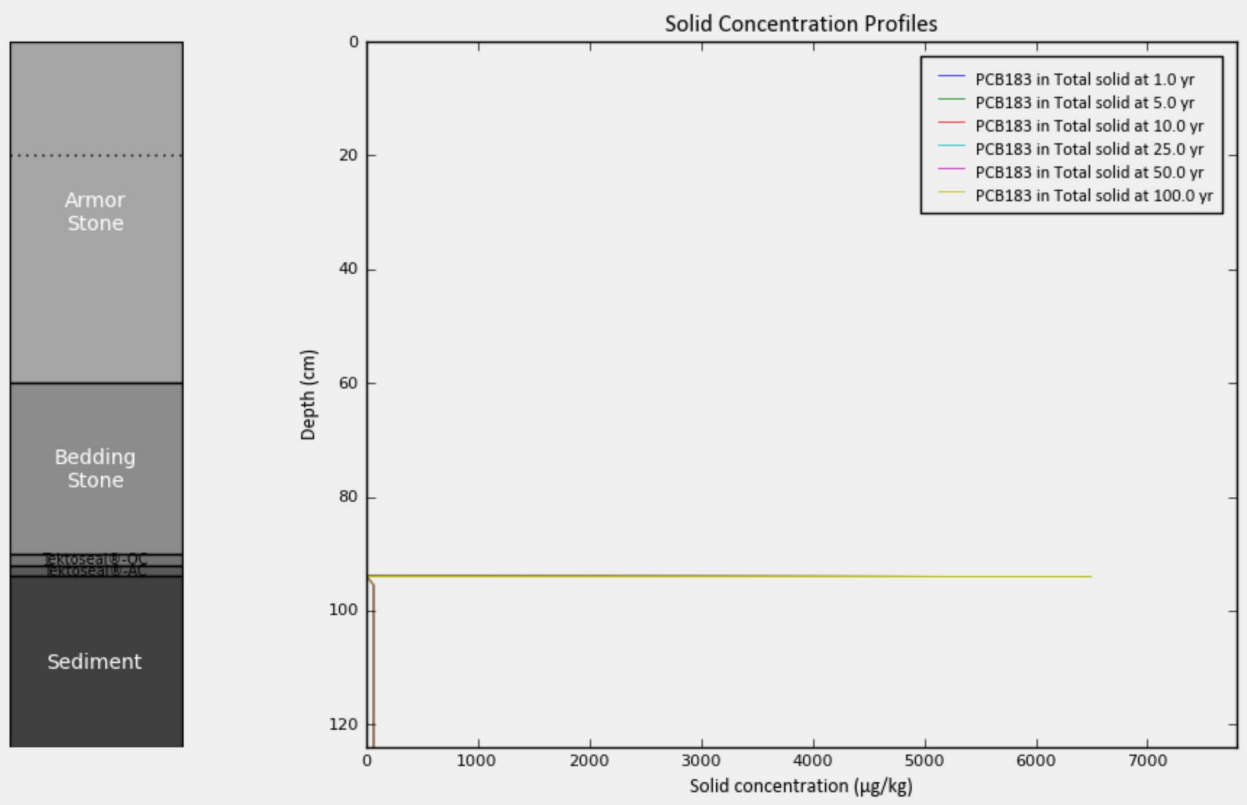

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB141 in Total solid at 1.0 yr
PCB141 in Total solid at 5.0 yr
PCB141 in Total solid at 10.0 yr
PCB141 in Total solid at 25.0 yr
PCB141 in Total solid at 50.0 yr
PCB141 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

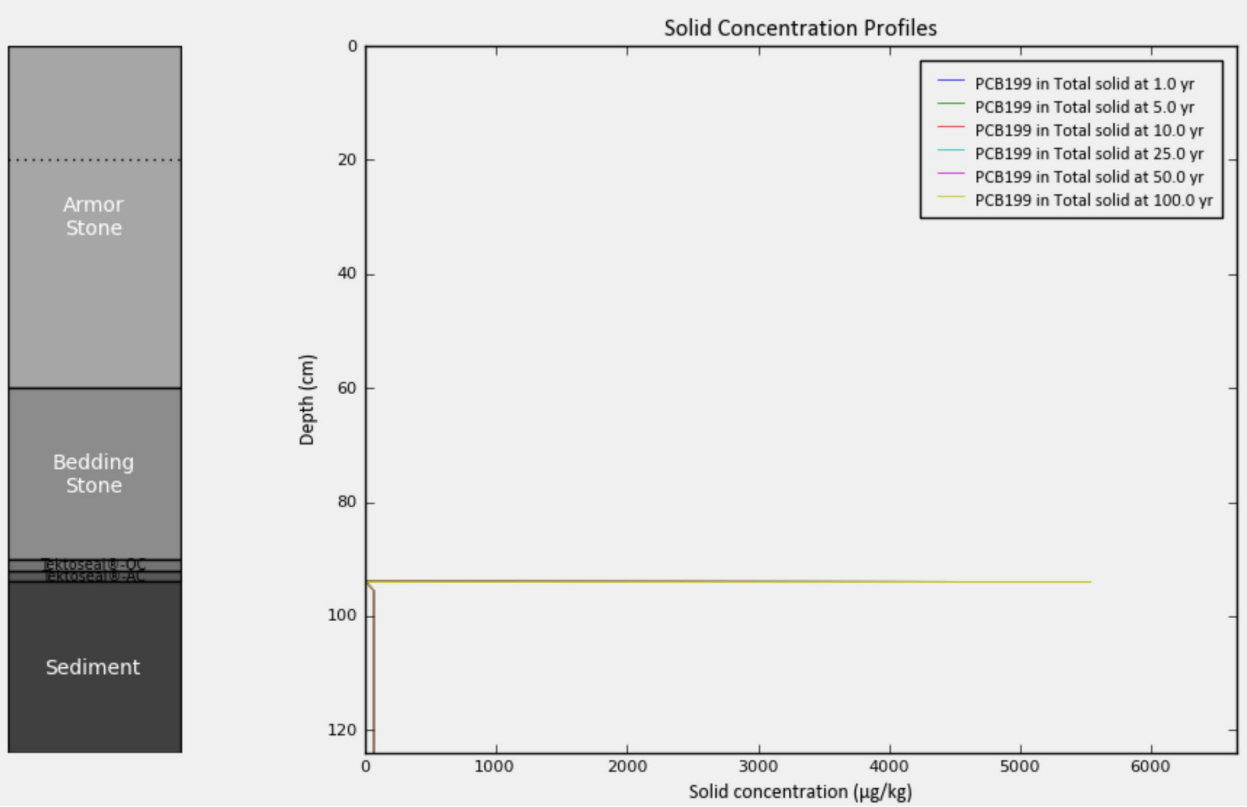

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB153 in Total solid at 1.0 yr
PCB153 in Total solid at 5.0 yr
PCB153 in Total solid at 10.0 yr
PCB153 in Total solid at 25.0 yr
PCB153 in Total solid at 50.0 yr
PCB153 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

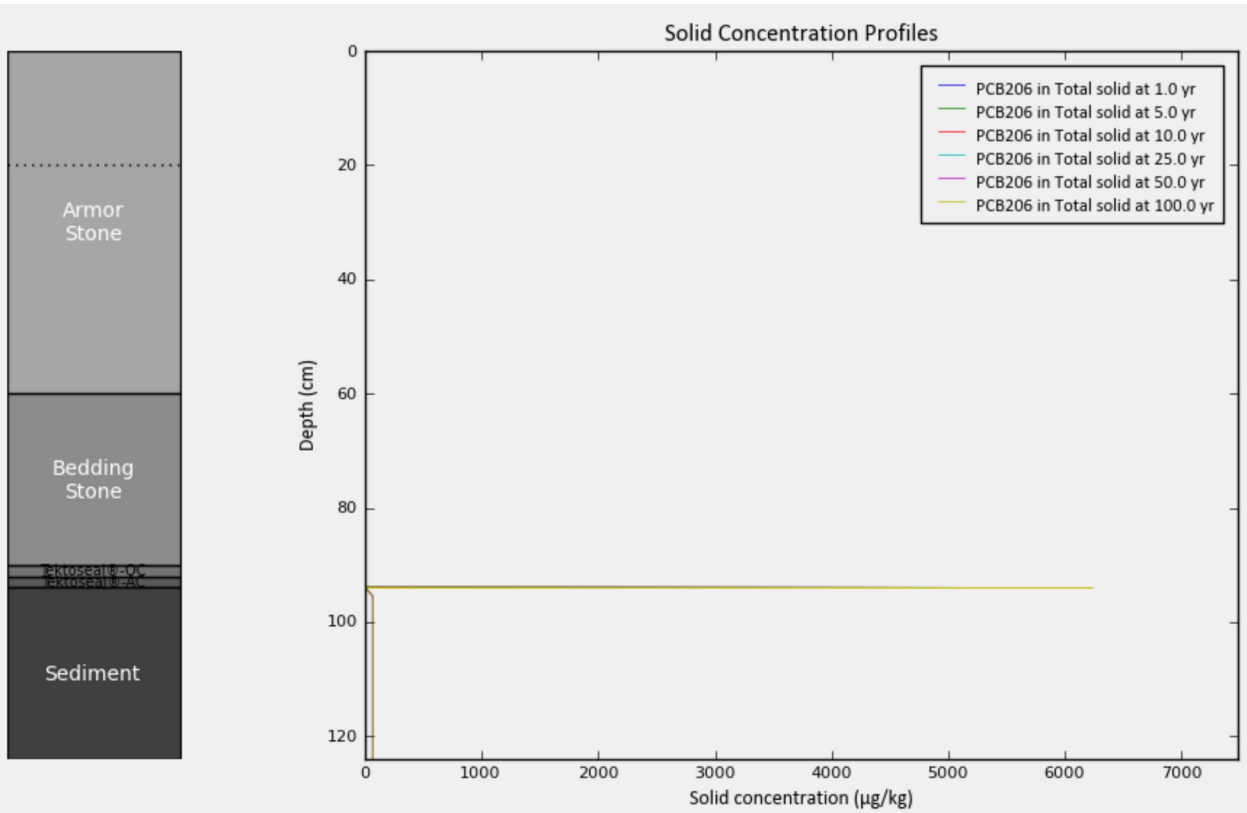

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB174 in Total solid at 1.0 yr
PCB174 in Total solid at 5.0 yr
PCB174 in Total solid at 10.0 yr
PCB174 in Total solid at 25.0 yr
PCB174 in Total solid at 50.0 yr
PCB174 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

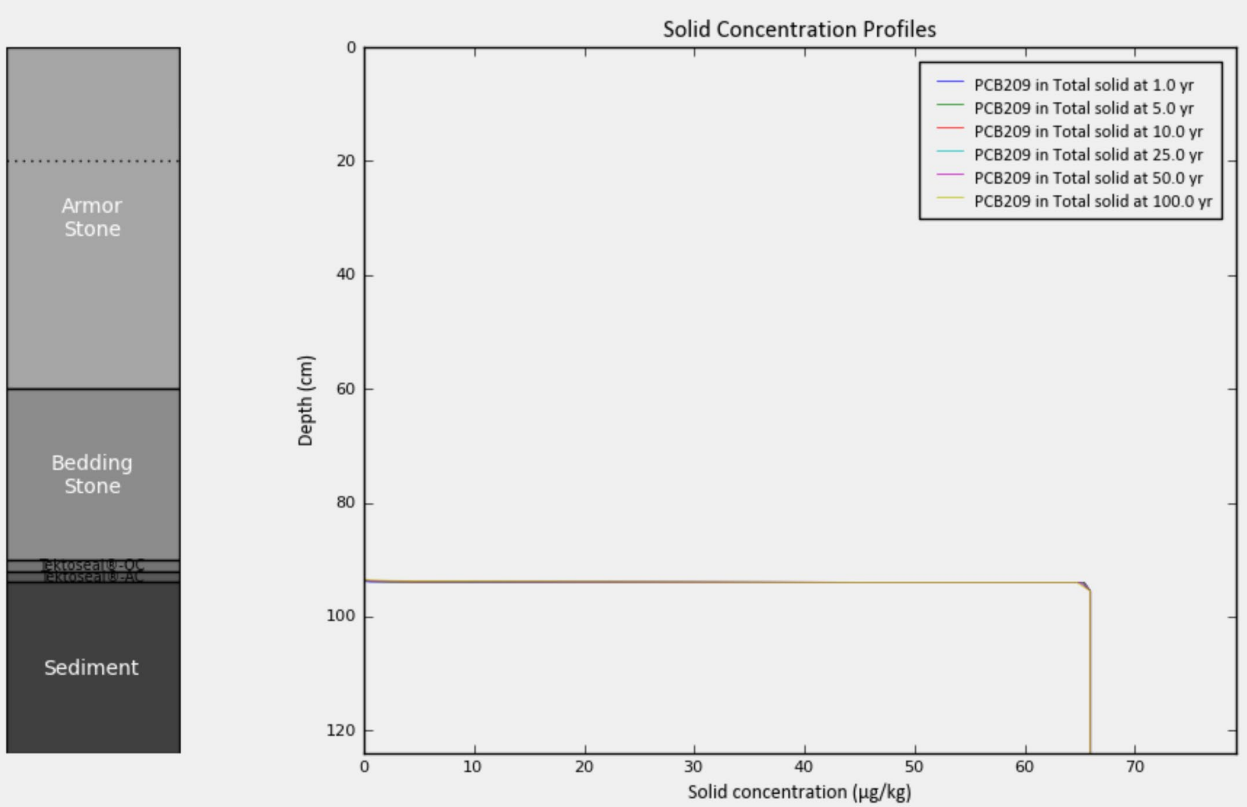

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB177 in Total solid at 1.0 yr
PCB177 in Total solid at 5.0 yr
PCB177 in Total solid at 10.0 yr
PCB177 in Total solid at 25.0 yr
PCB177 in Total solid at 50.0 yr
PCB177 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

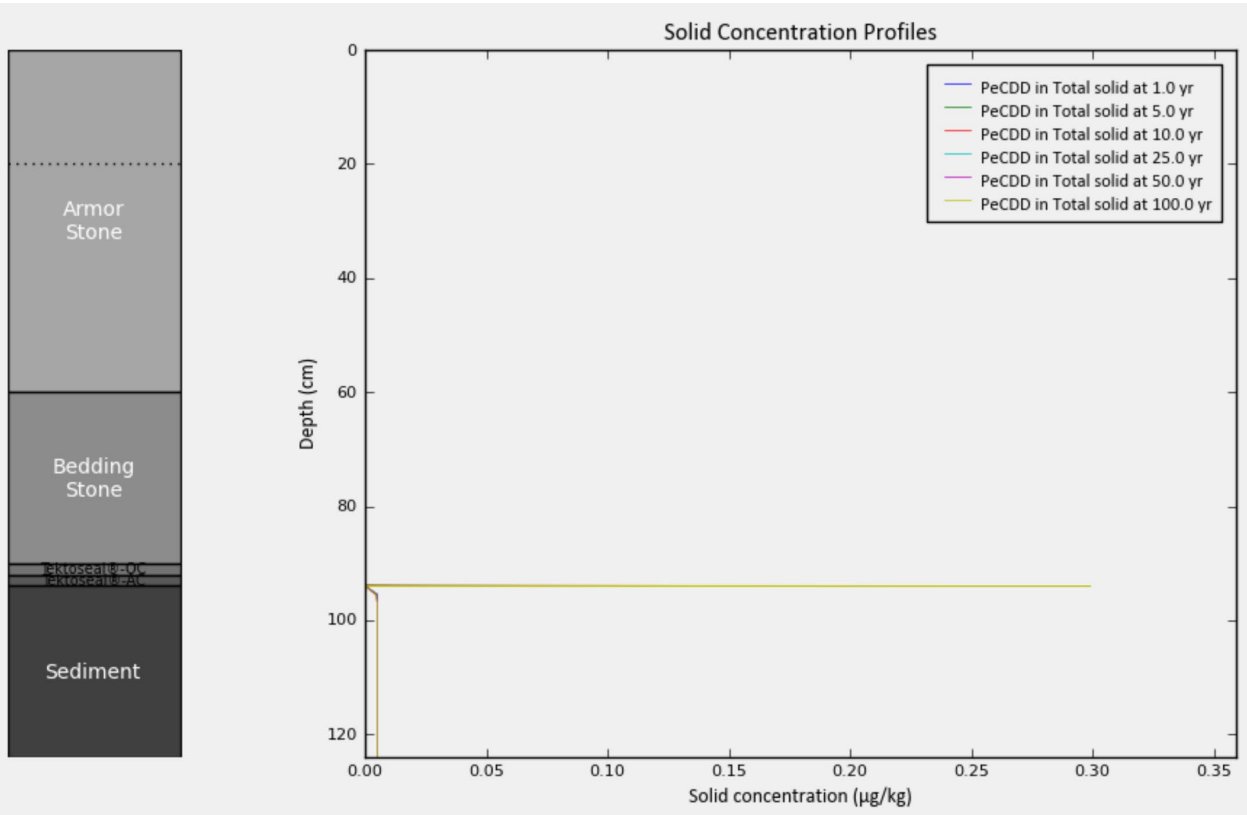

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB180 in Total solid at 1.0 yr
PCB180 in Total solid at 5.0 yr
PCB180 in Total solid at 10.0 yr
PCB180 in Total solid at 25.0 yr
PCB180 in Total solid at 50.0 yr
PCB180 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

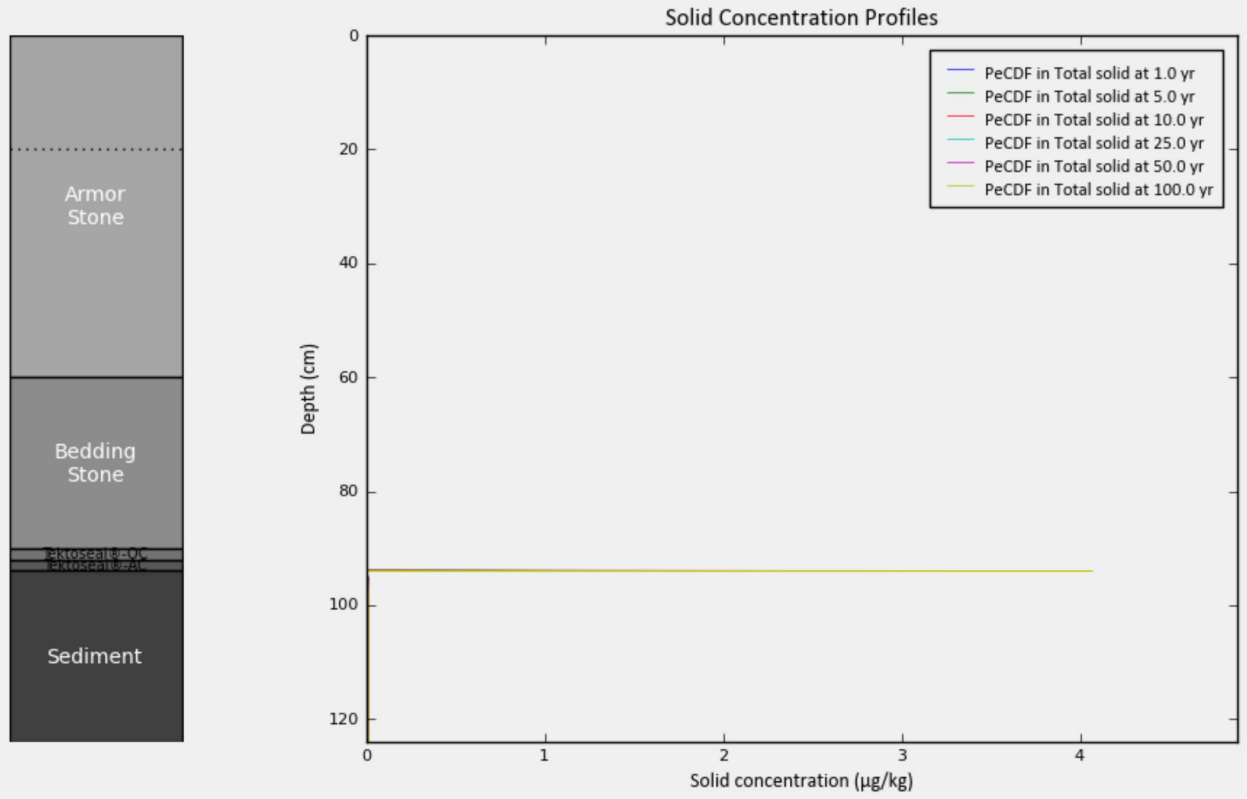

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB183 in Total solid at 1.0 yr
PCB183 in Total solid at 5.0 yr
PCB183 in Total solid at 10.0 yr
PCB183 in Total solid at 25.0 yr
PCB183 in Total solid at 50.0 yr
PCB183 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

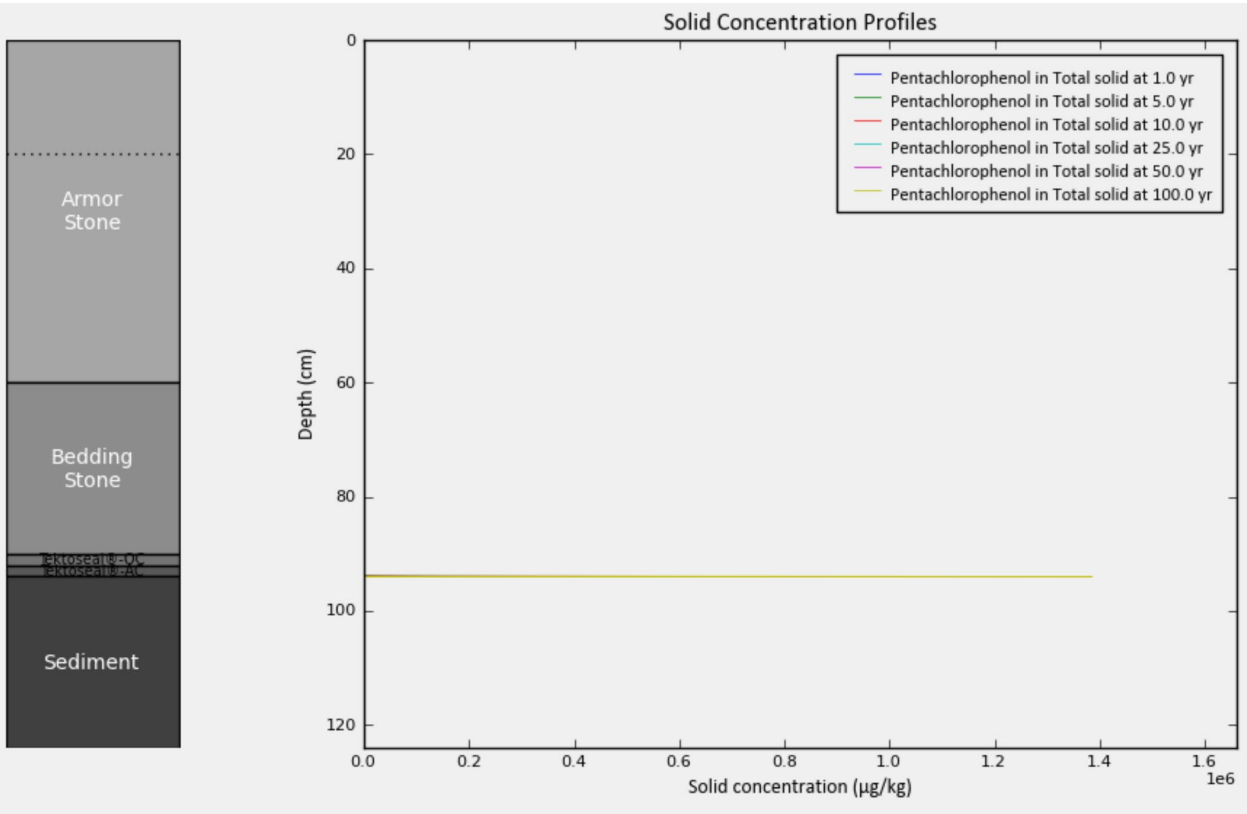

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB199 in Total solid at 1.0 yr
PCB199 in Total solid at 5.0 yr
PCB199 in Total solid at 10.0 yr
PCB199 in Total solid at 25.0 yr
PCB199 in Total solid at 50.0 yr
PCB199 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

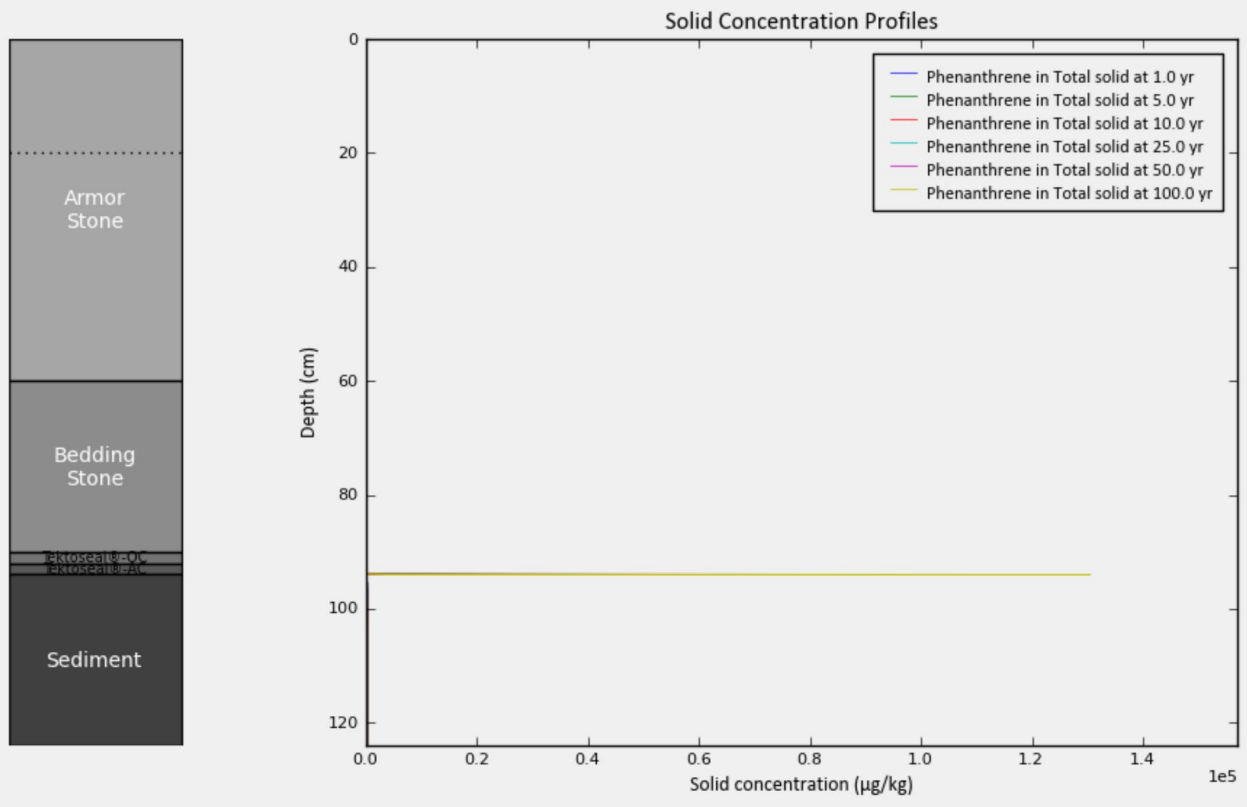

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB206 in Total solid at 1.0 yr
PCB206 in Total solid at 5.0 yr
PCB206 in Total solid at 10.0 yr
PCB206 in Total solid at 25.0 yr
PCB206 in Total solid at 50.0 yr
PCB206 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

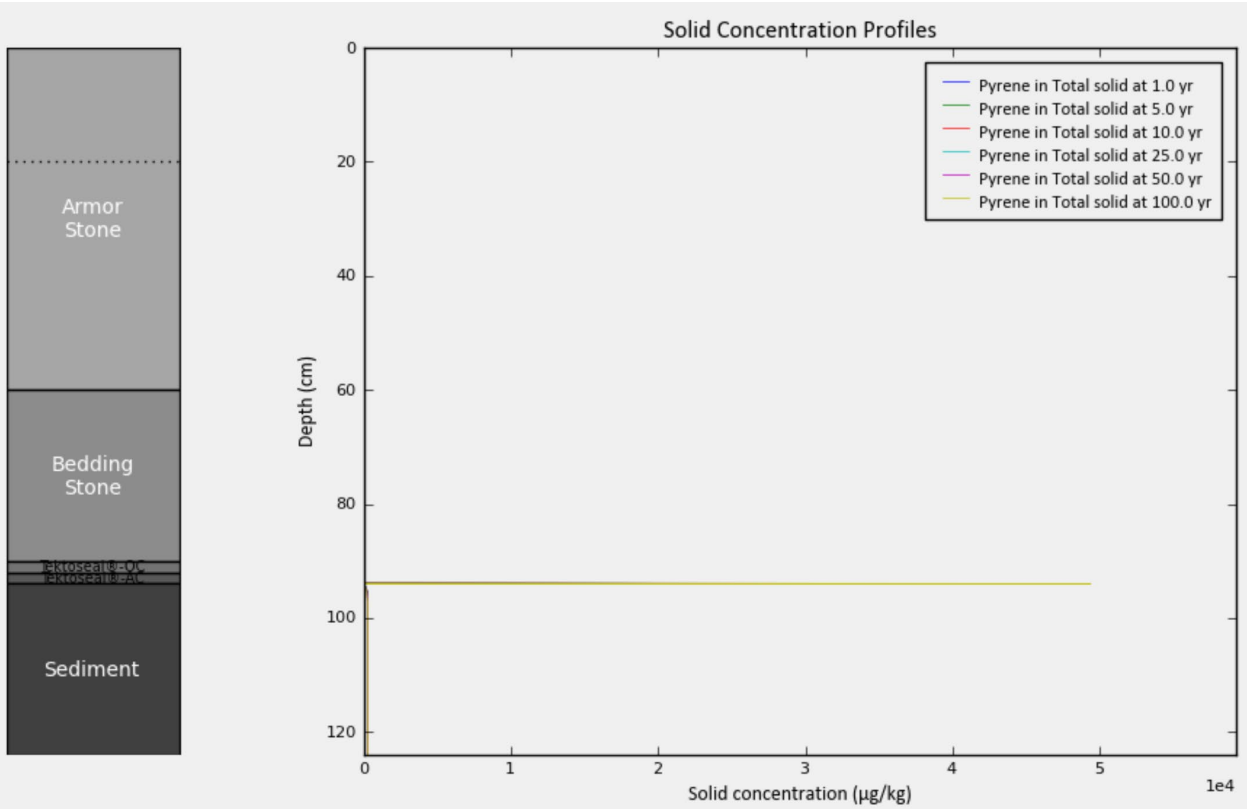

Armor Stone
Bedding Stone
Tekoseal® EC
Tekoseal® AC
Sediment
Solid Concentration Profiles
PCB209 in Total solid at 1.0 yr
PCB209 in Total solid at 5.0 yr
PCB209 in Total solid at 10.0 yr
PCB209 in Total solid at 25.0 yr
PCB209 in Total solid at 50.0 yr
PCB209 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

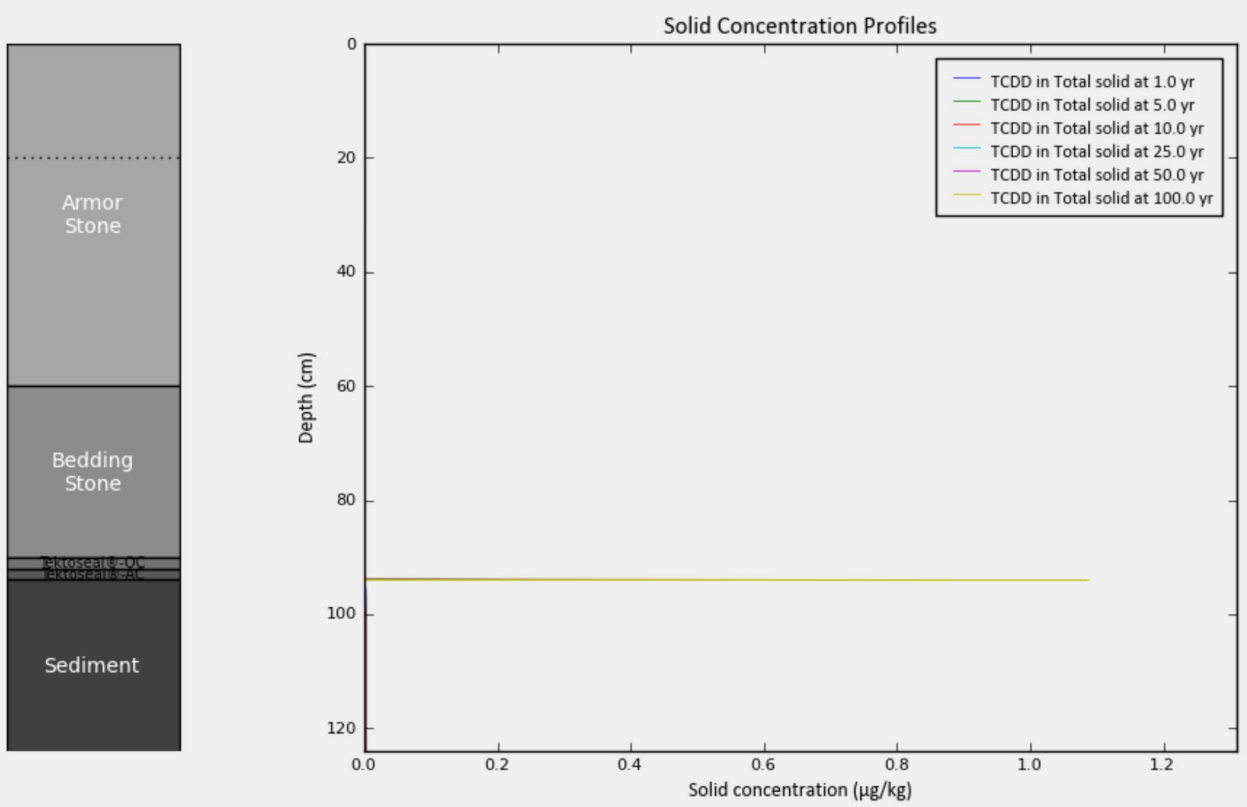

Armor Stone
Bedding Stone
Tekoseal® EC
Tekoseal® AC
Sediment
Solid Concentration Profiles
PeCDD in Total solid at 1.0 yr
PeCDD in Total solid at 5.0 yr
PeCDD in Total solid at 10.0 yr
PeCDD in Total solid at 25.0 yr
PeCDD in Total solid at 50.0 yr
PeCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

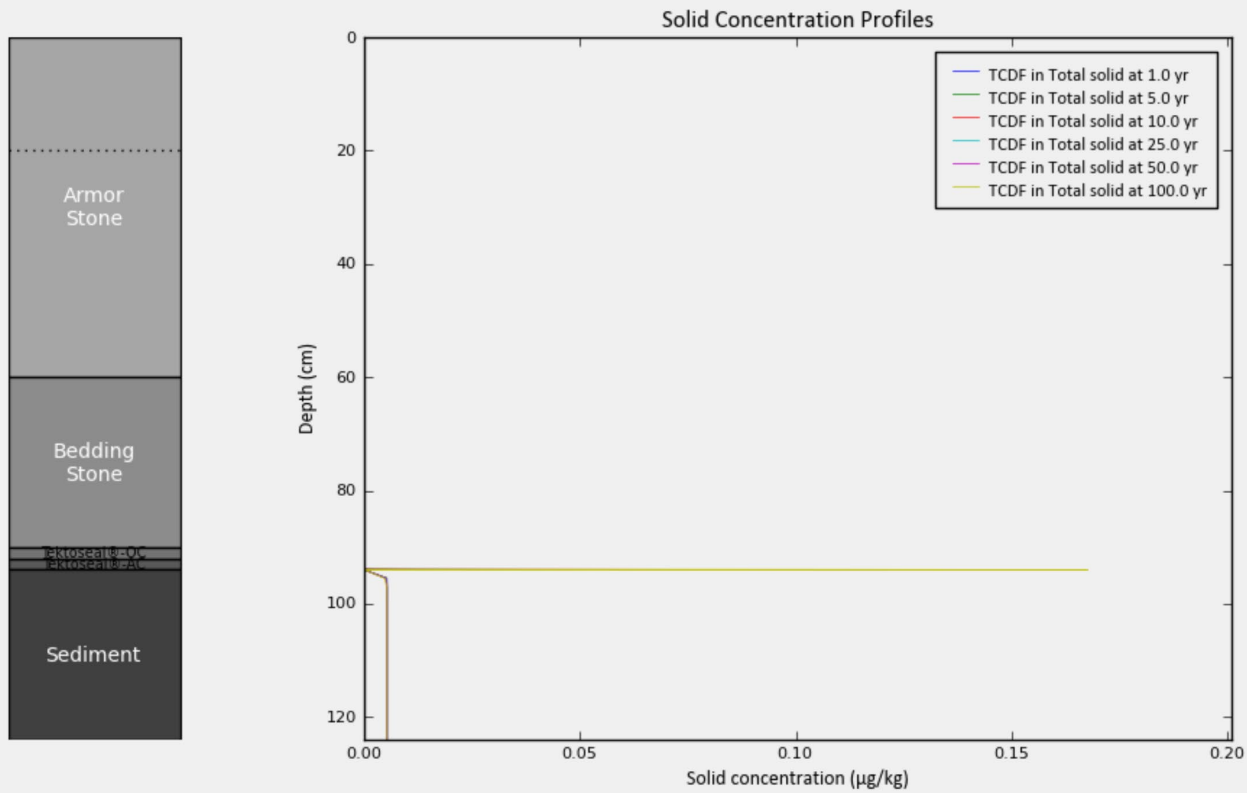

Solid Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal®-OC
Tektoseal®-AC
Sediment
Depth (cm)
Solid concentration (µg/kg)
PeCDF in Total solid at 1.0 yr
PeCDF in Total solid at 5.0 yr
PeCDF in Total solid at 10.0 yr
PeCDF in Total solid at 25.0 yr
PeCDF in Total solid at 50.0 yr
PeCDF in Total solid at 100.0 yr

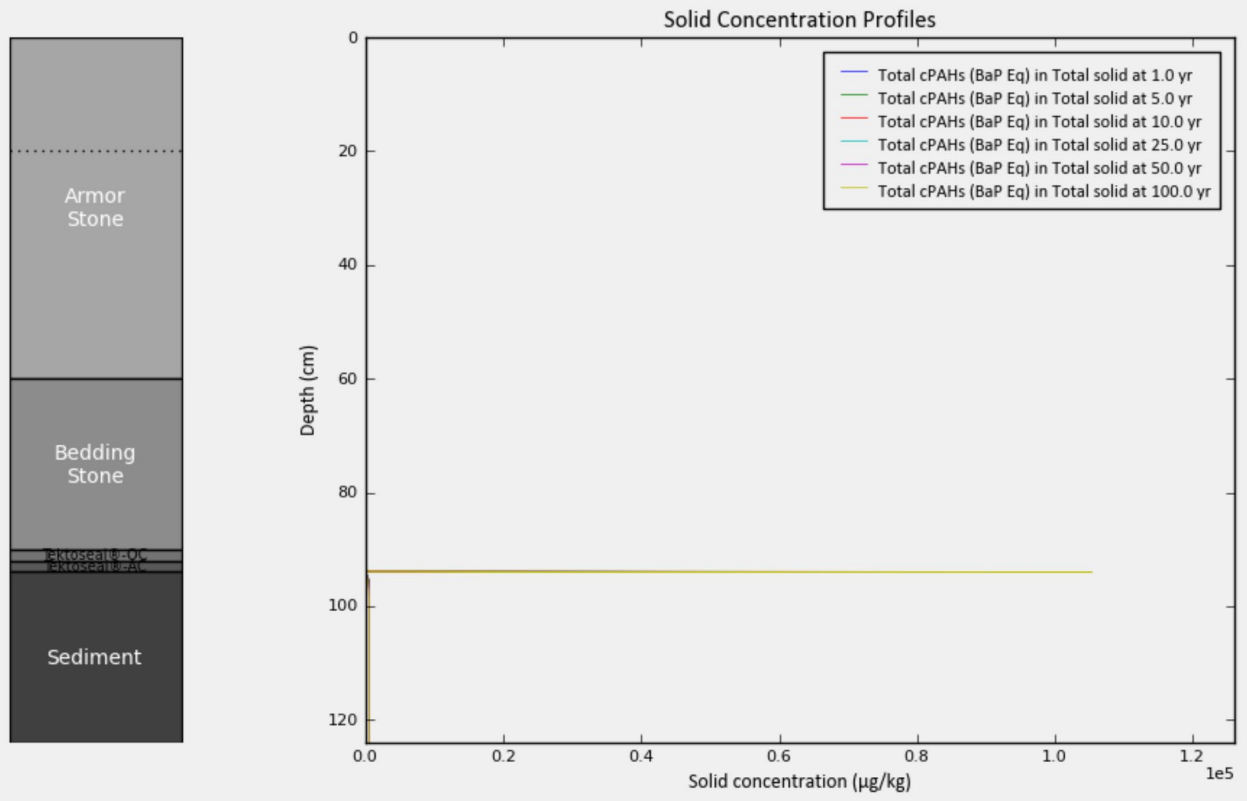

Solid Concentration Profiles
Armor Stone
Bedding Stone
Tektoseal®-OC
Tektoseal®-AC
Sediment
Depth (cm)
Solid concentration (µg/kg)
1e6
Pentachlorophenol in Total solid at 1.0 yr
Pentachlorophenol in Total solid at 5.0 yr
Pentachlorophenol in Total solid at 10.0 yr
Pentachlorophenol in Total solid at 25.0 yr
Pentachlorophenol in Total solid at 50.0 yr
Pentachlorophenol in Total solid at 100.0 yr

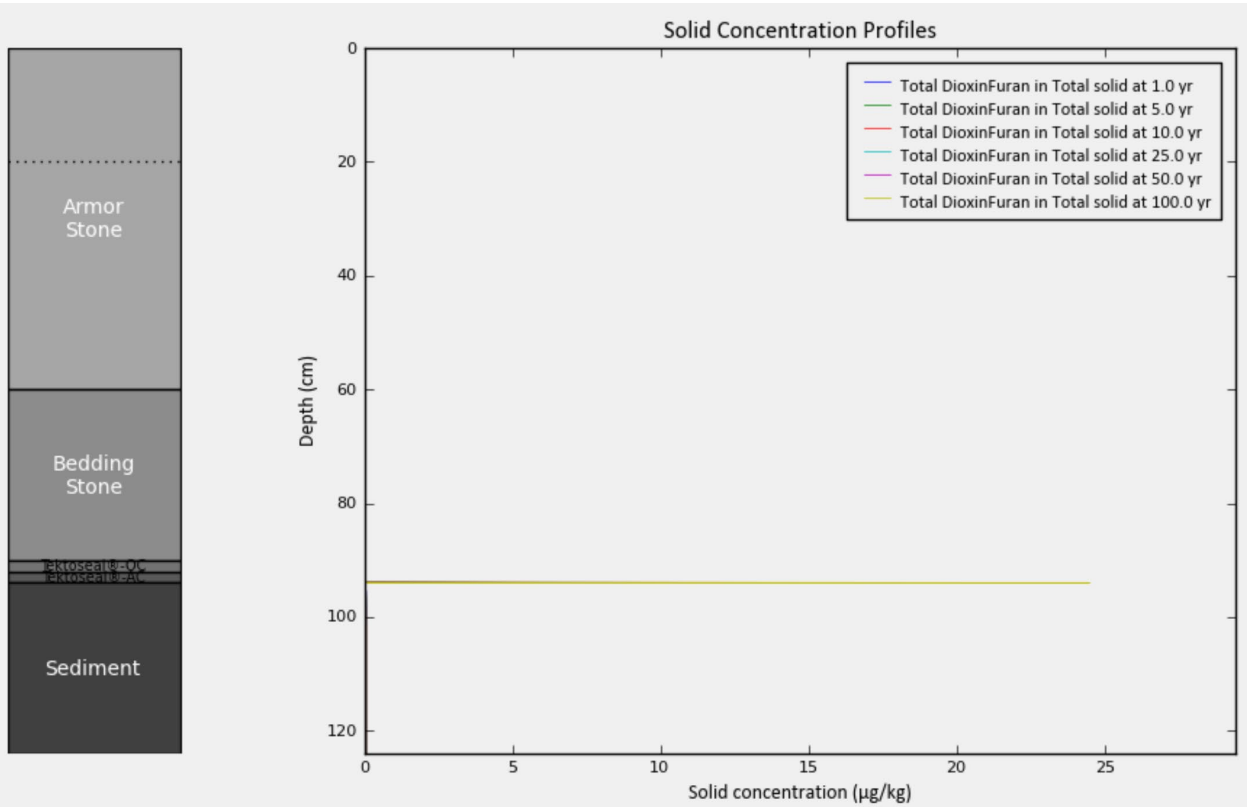

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Phenanthrene in Total solid at 1.0 yr
Phenanthrene in Total solid at 5.0 yr
Phenanthrene in Total solid at 10.0 yr
Phenanthrene in Total solid at 25.0 yr
Phenanthrene in Total solid at 50.0 yr
Phenanthrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

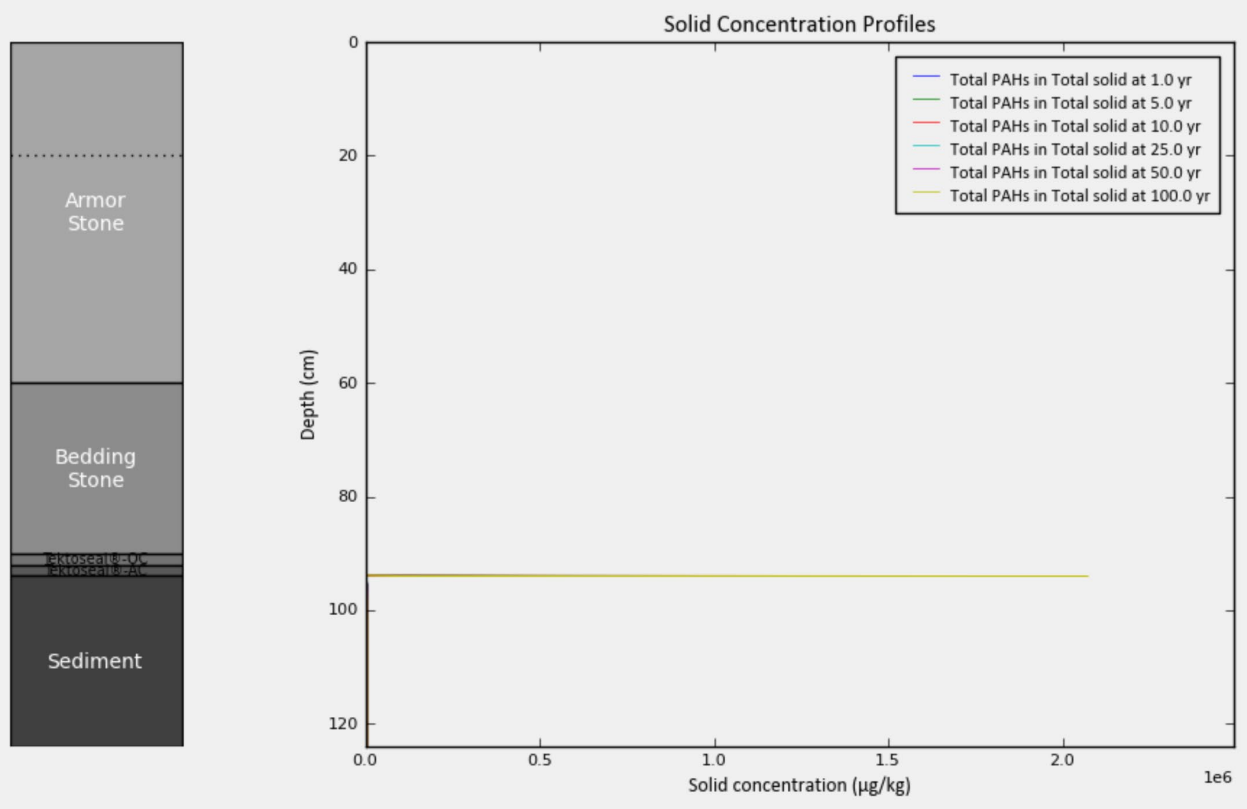

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Pyrene in Total solid at 1.0 yr
Pyrene in Total solid at 5.0 yr
Pyrene in Total solid at 10.0 yr
Pyrene in Total solid at 25.0 yr
Pyrene in Total solid at 50.0 yr
Pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

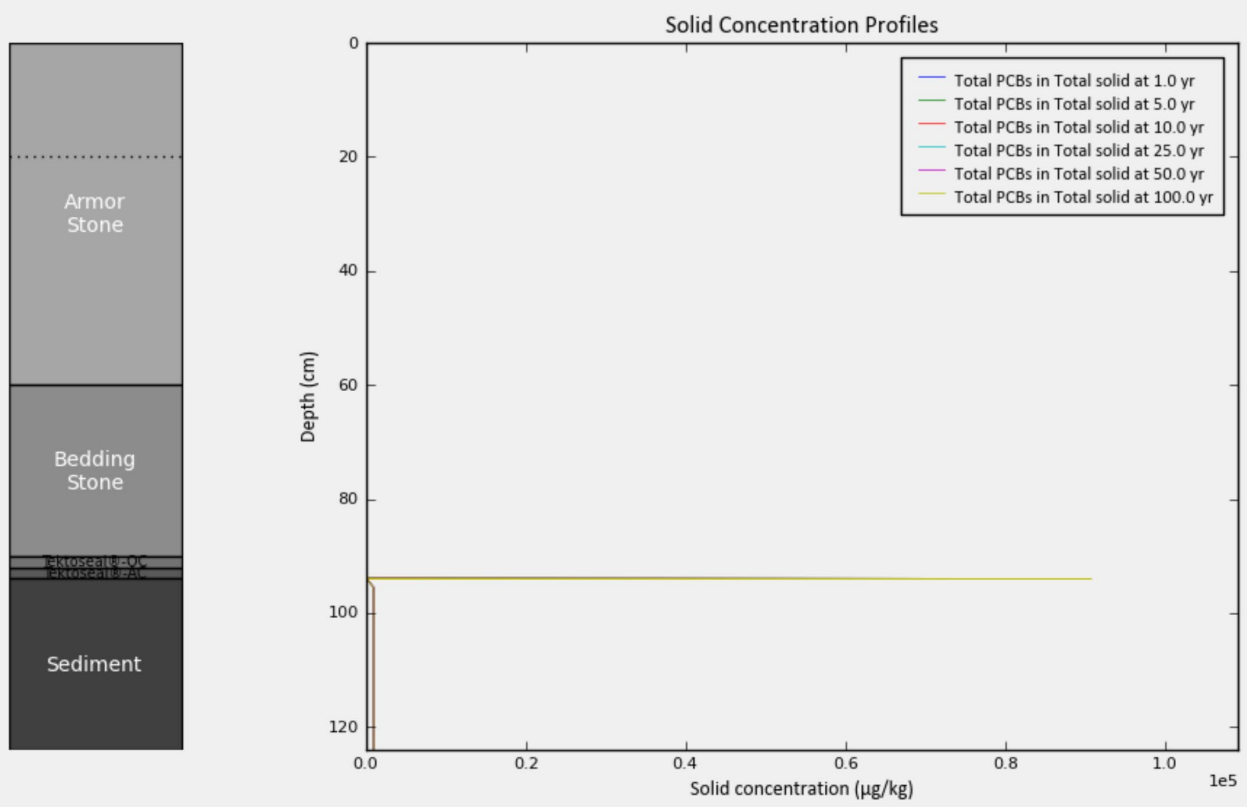

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
TCDD in Total solid at 1.0 yr
TCDD in Total solid at 5.0 yr
TCDD in Total solid at 10.0 yr
TCDD in Total solid at 25.0 yr
TCDD in Total solid at 50.0 yr
TCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

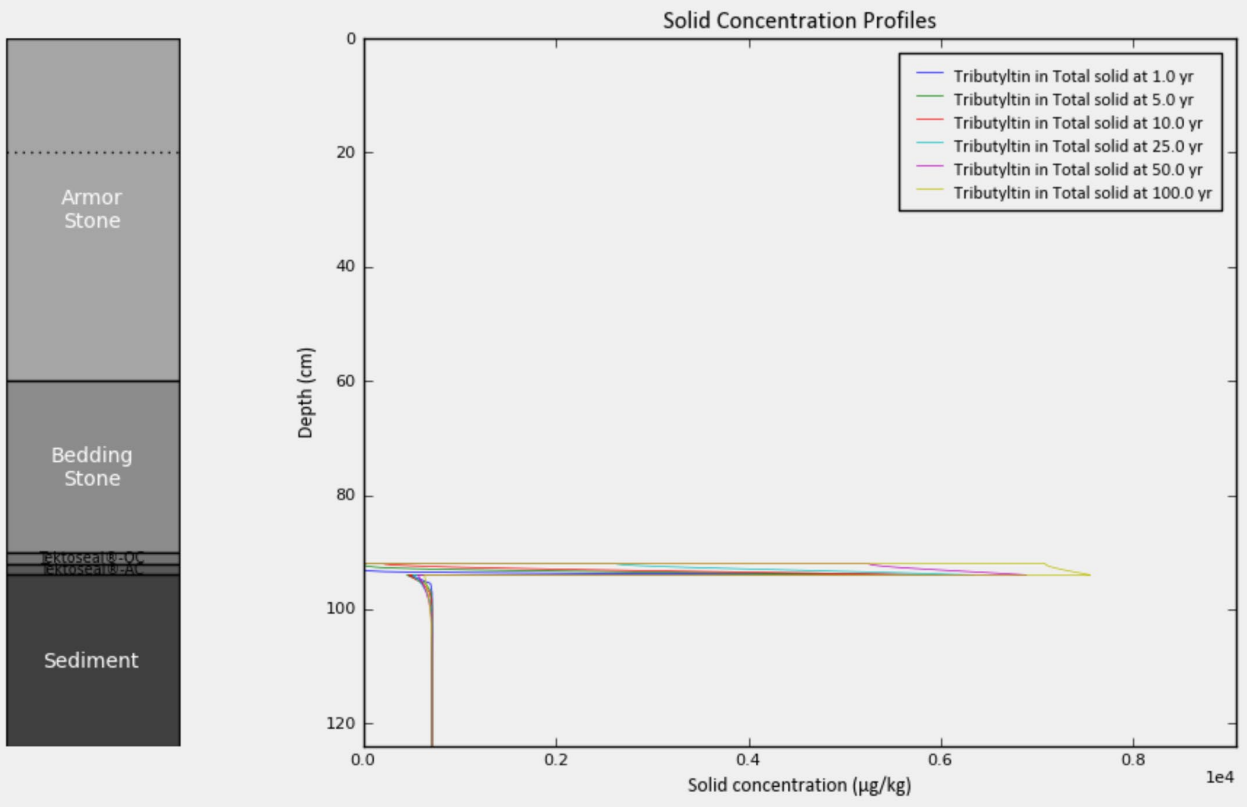

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
TCDF in Total solid at 1.0 yr
TCDF in Total solid at 5.0 yr
TCDF in Total solid at 10.0 yr
TCDF in Total solid at 25.0 yr
TCDF in Total solid at 50.0 yr
TCDF in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

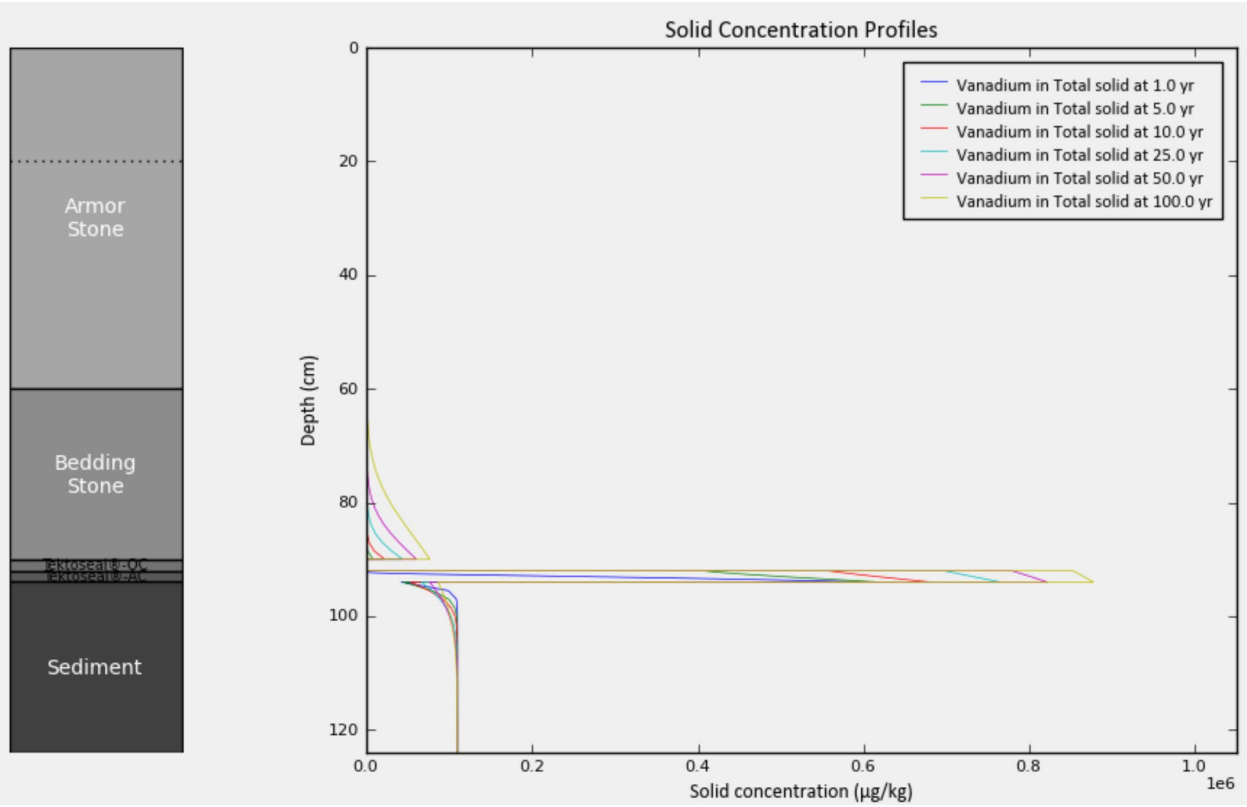

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Total cPAHs (BaP Eq) in Total solid at 1.0 yr
Total cPAHs (BaP Eq) in Total solid at 5.0 yr
Total cPAHs (BaP Eq) in Total solid at 10.0 yr
Total cPAHs (BaP Eq) in Total solid at 25.0 yr
Total cPAHs (BaP Eq) in Total solid at 50.0 yr
Total cPAHs (BaP Eq) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

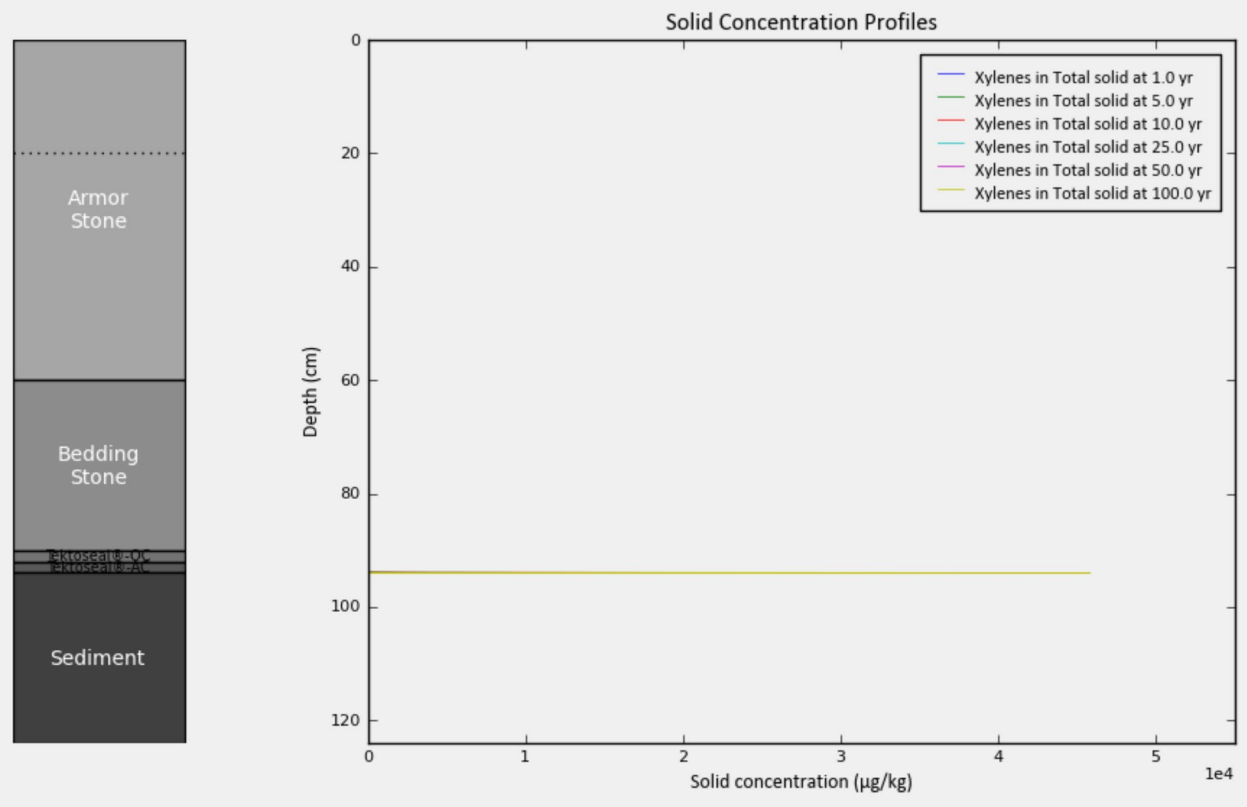

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Total DioxinFuran in Total solid at 1.0 yr
Total DioxinFuran in Total solid at 5.0 yr
Total DioxinFuran in Total solid at 10.0 yr
Total DioxinFuran in Total solid at 25.0 yr
Total DioxinFuran in Total solid at 50.0 yr
Total DioxinFuran in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

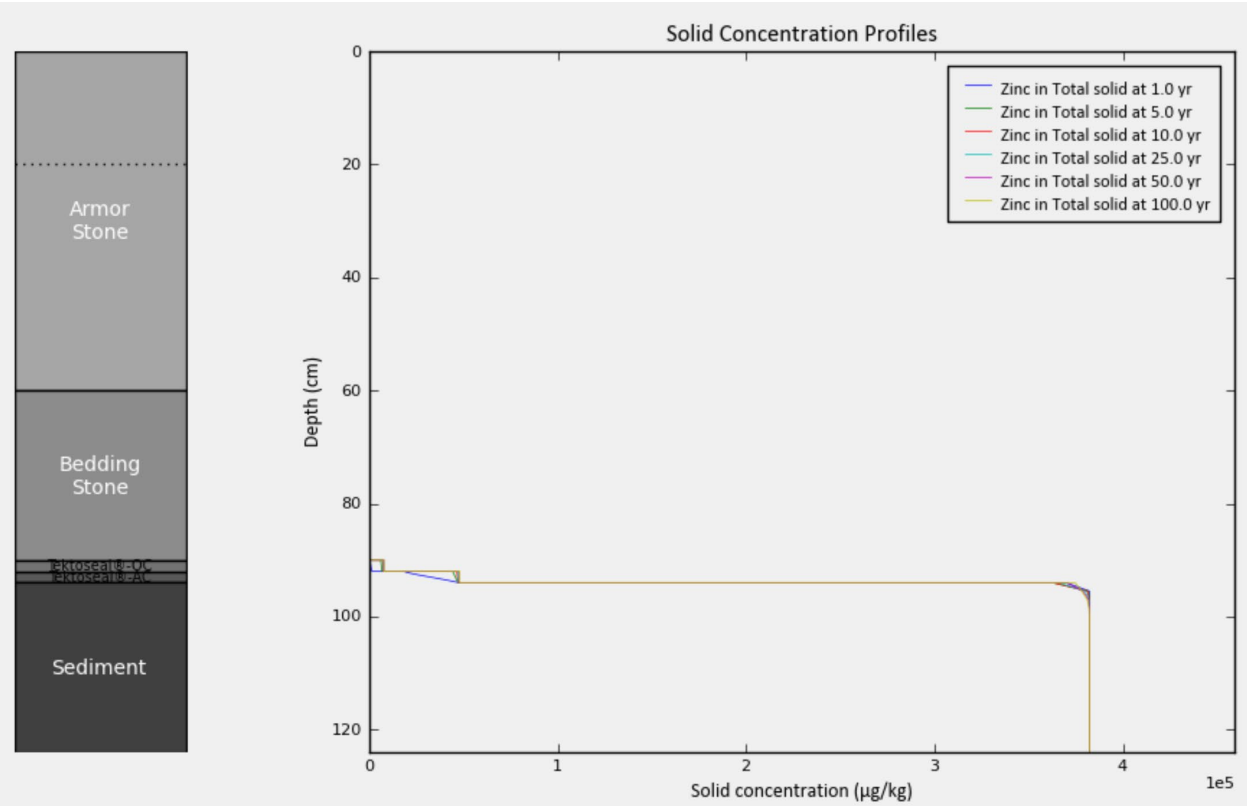

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Total PAHs in Total solid at 1.0 yr
Total PAHs in Total solid at 5.0 yr
Total PAHs in Total solid at 10.0 yr
Total PAHs in Total solid at 25.0 yr
Total PAHs in Total solid at 50.0 yr
Total PAHs in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6


Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Total PCBs in Total solid at 1.0 yr
Total PCBs in Total solid at 5.0 yr
Total PCBs in Total solid at 10.0 yr
Total PCBs in Total solid at 25.0 yr
Total PCBs in Total solid at 50.0 yr
Total PCBs in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5


Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Tributyltin in Total solid at 1.0 yr
Tributyltin in Total solid at 5.0 yr
Tributyltin in Total solid at 10.0 yr
Tributyltin in Total solid at 25.0 yr
Tributyltin in Total solid at 50.0 yr
Tributyltin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

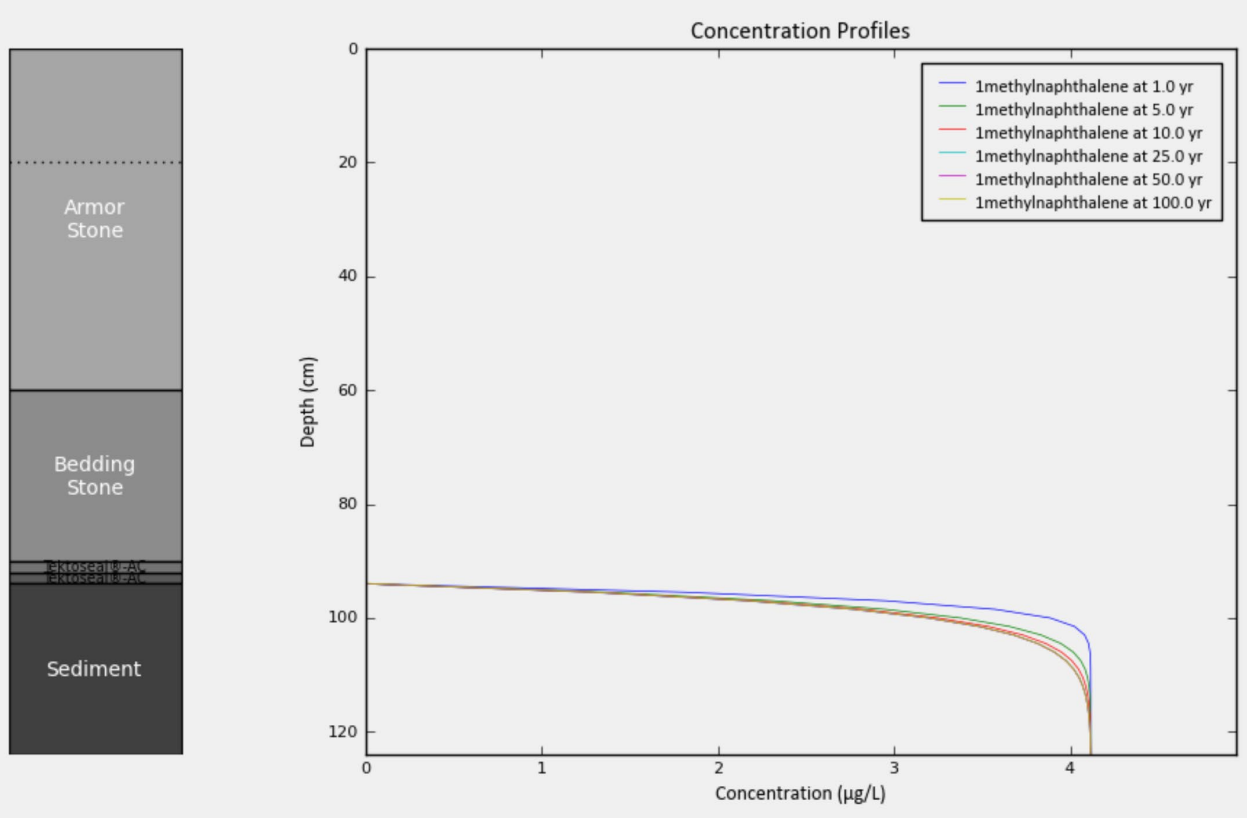

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Vanadium in Total solid at 1.0 yr
Vanadium in Total solid at 5.0 yr
Vanadium in Total solid at 10.0 yr
Vanadium in Total solid at 25.0 yr
Vanadium in Total solid at 50.0 yr
Vanadium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

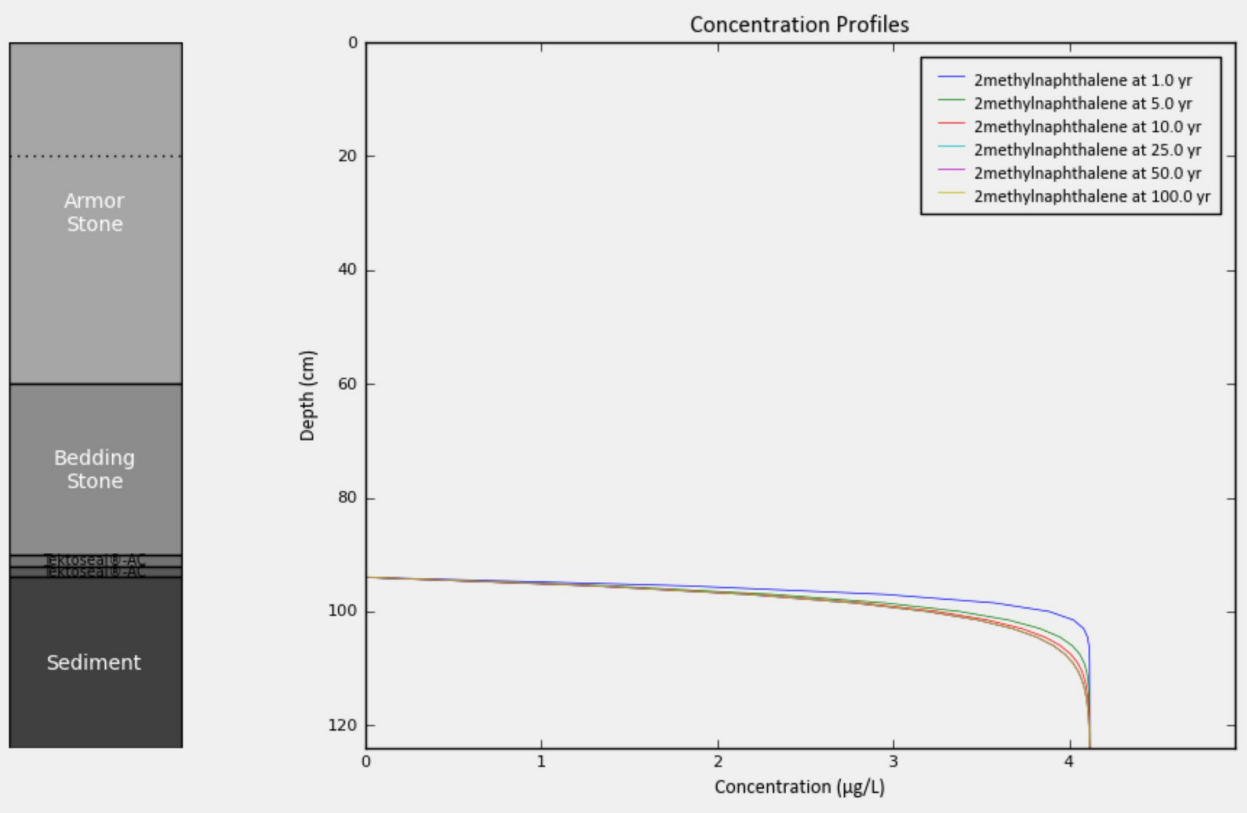

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Xylenes in Total solid at 1.0 yr
Xylenes in Total solid at 5.0 yr
Xylenes in Total solid at 10.0 yr
Xylenes in Total solid at 25.0 yr
Xylenes in Total solid at 50.0 yr
Xylenes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

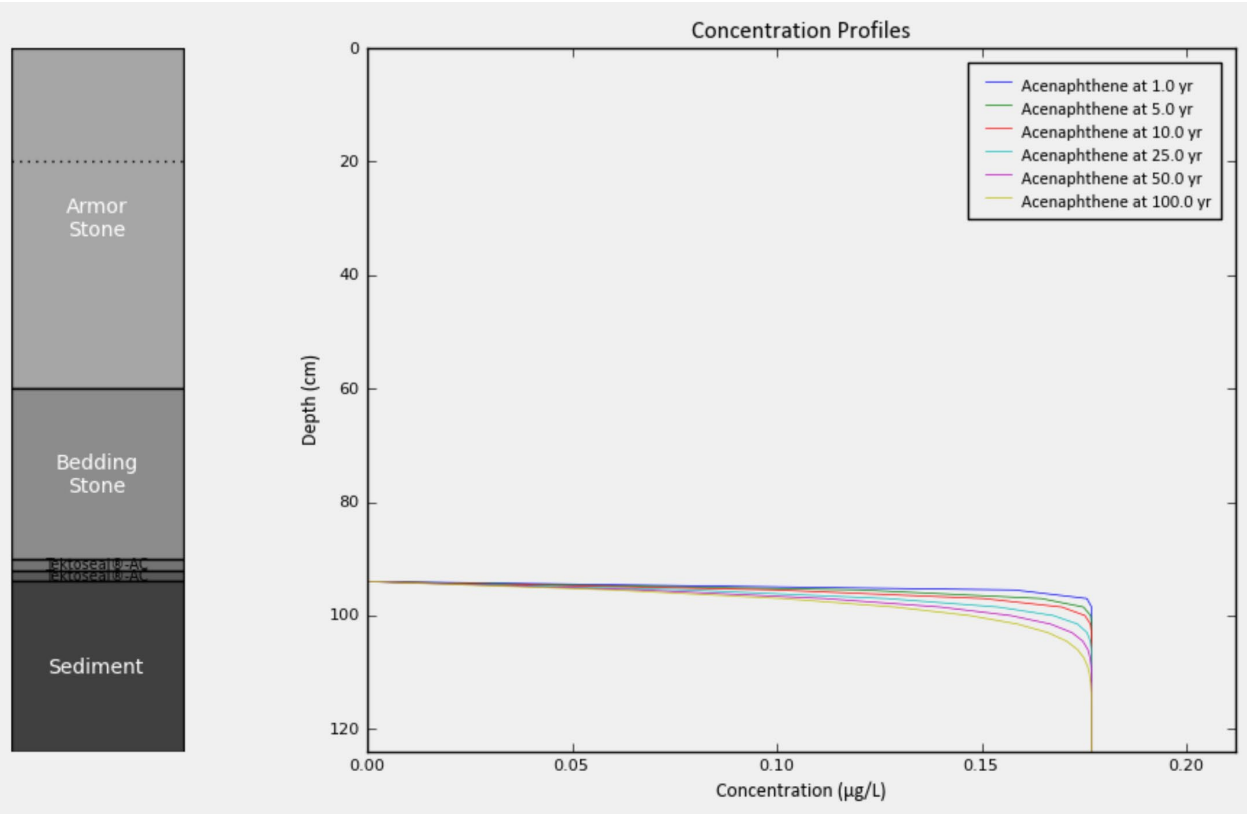

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Zinc in Total solid at 1.0 yr
Zinc in Total solid at 5.0 yr
Zinc in Total solid at 10.0 yr
Zinc in Total solid at 25.0 yr
Zinc in Total solid at 50.0 yr
Zinc in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

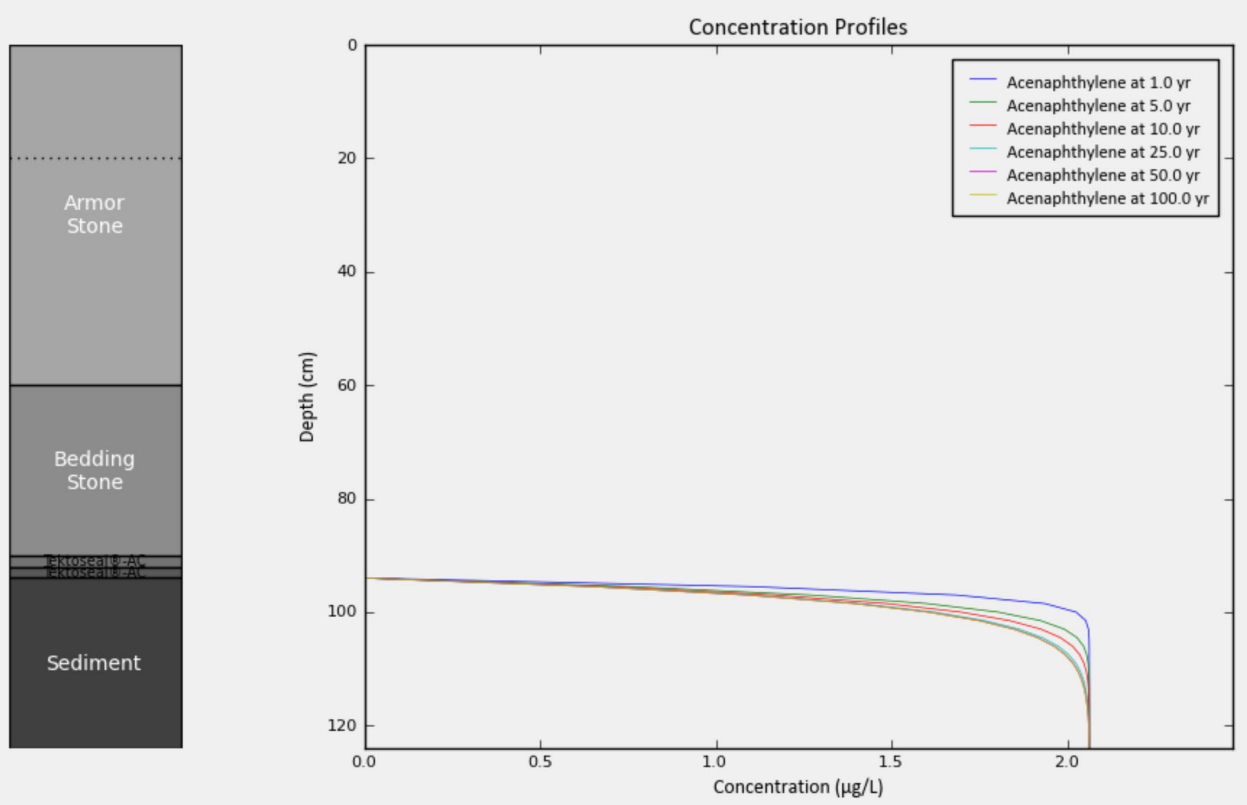
Cap Alternative 11: 4 cm Tektoseal-AC with 30 cm of 2.5-inch bedding stone and 60 cm of 10-inch armor stone

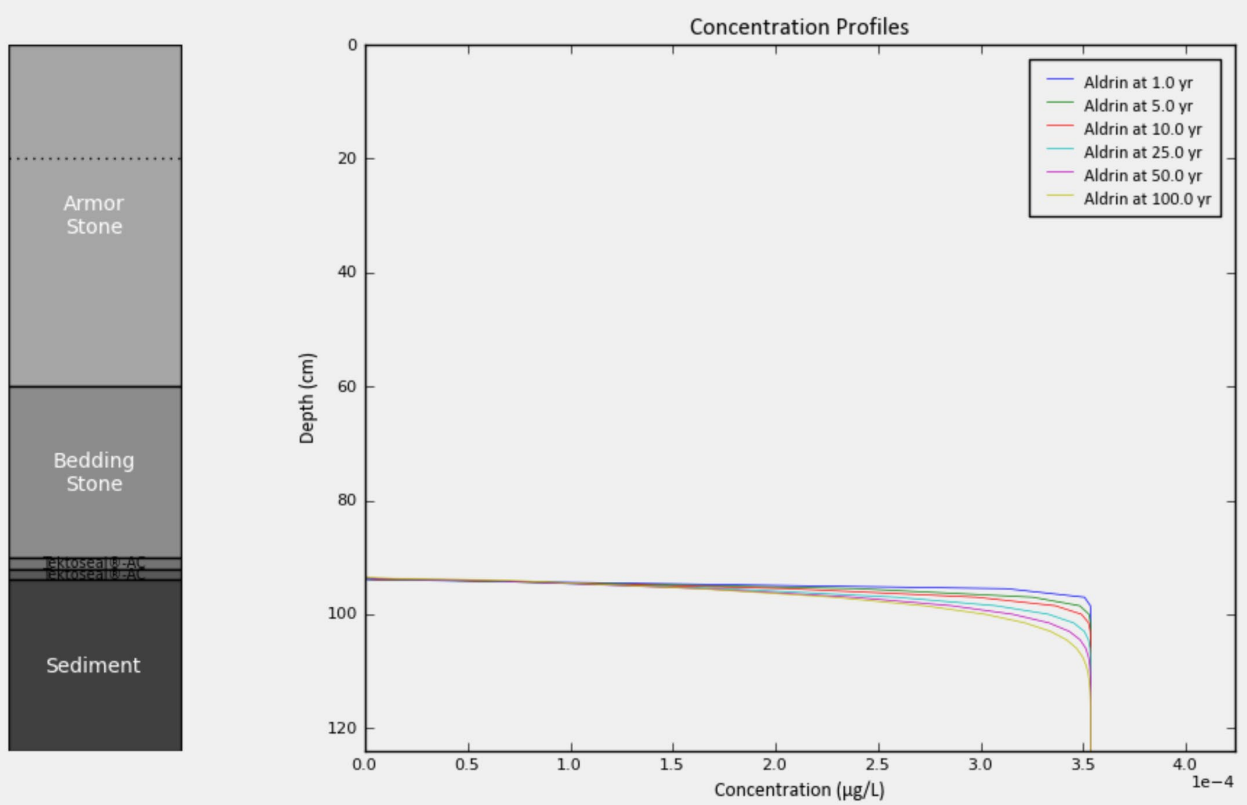
Porewater Concentration - Depth

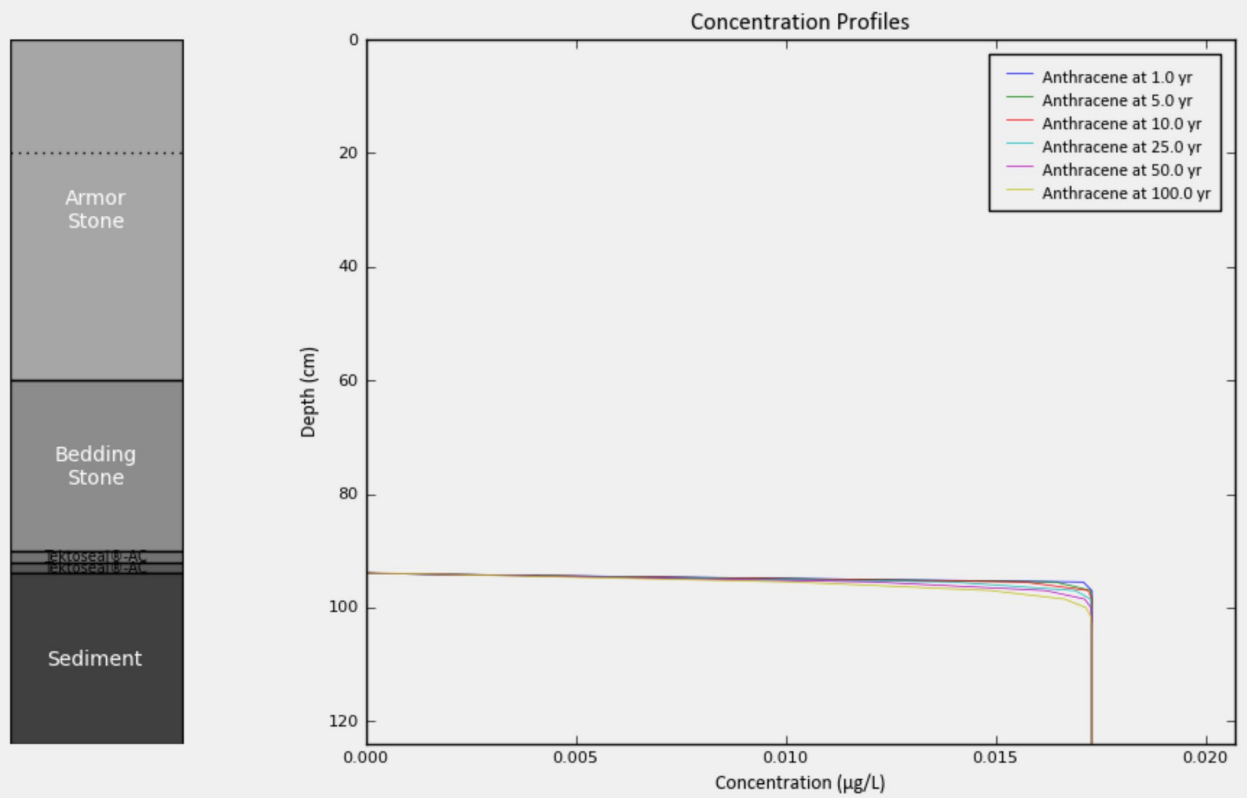


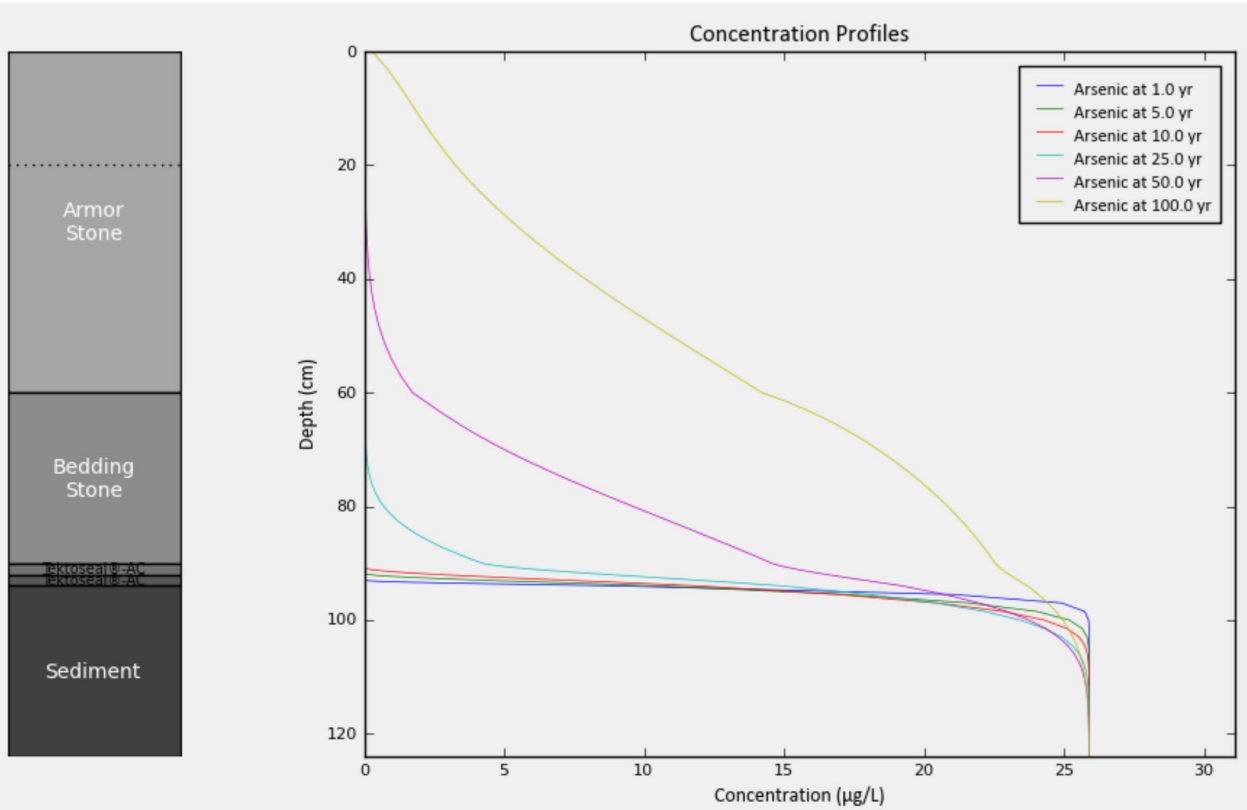

Armor Stone
Bedding Stone
Ekoseal PAC
Ekoseal PAC
Sediment
Concentration Profiles
2methylnaphthalene at 1.0 yr
2methylnaphthalene at 5.0 yr
2methylnaphthalene at 10.0 yr
2methylnaphthalene at 25.0 yr
2methylnaphthalene at 50.0 yr
2methylnaphthalene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
Concentration (µg/L)

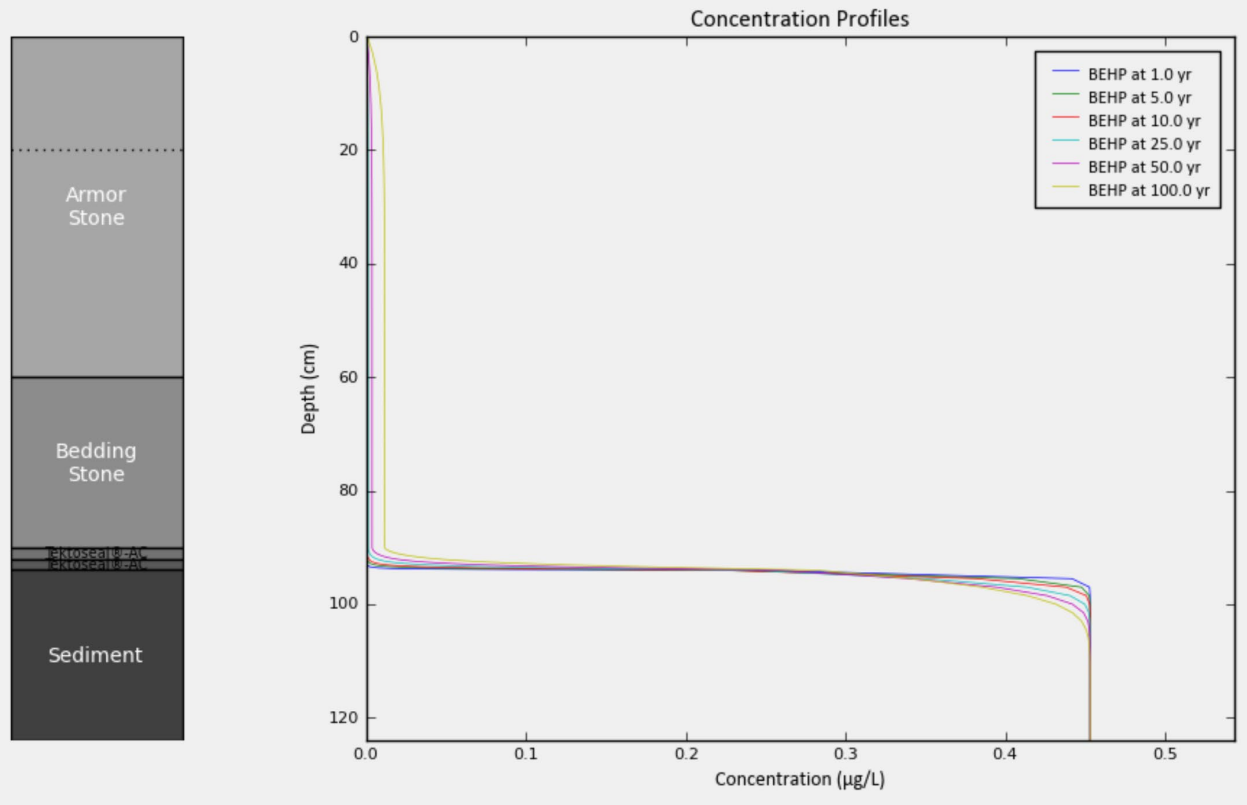

Armor Stone
Bedding Stone
Ekoseal PAC
Ekoseal PAC
Sediment
Concentration Profiles
Acenaphthene at 1.0 yr
Acenaphthene at 5.0 yr
Acenaphthene at 10.0 yr
Acenaphthene at 25.0 yr
Acenaphthene at 50.0 yr
Acenaphthene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.00
0.05
0.10
0.15
0.20
Concentration (µg/L)

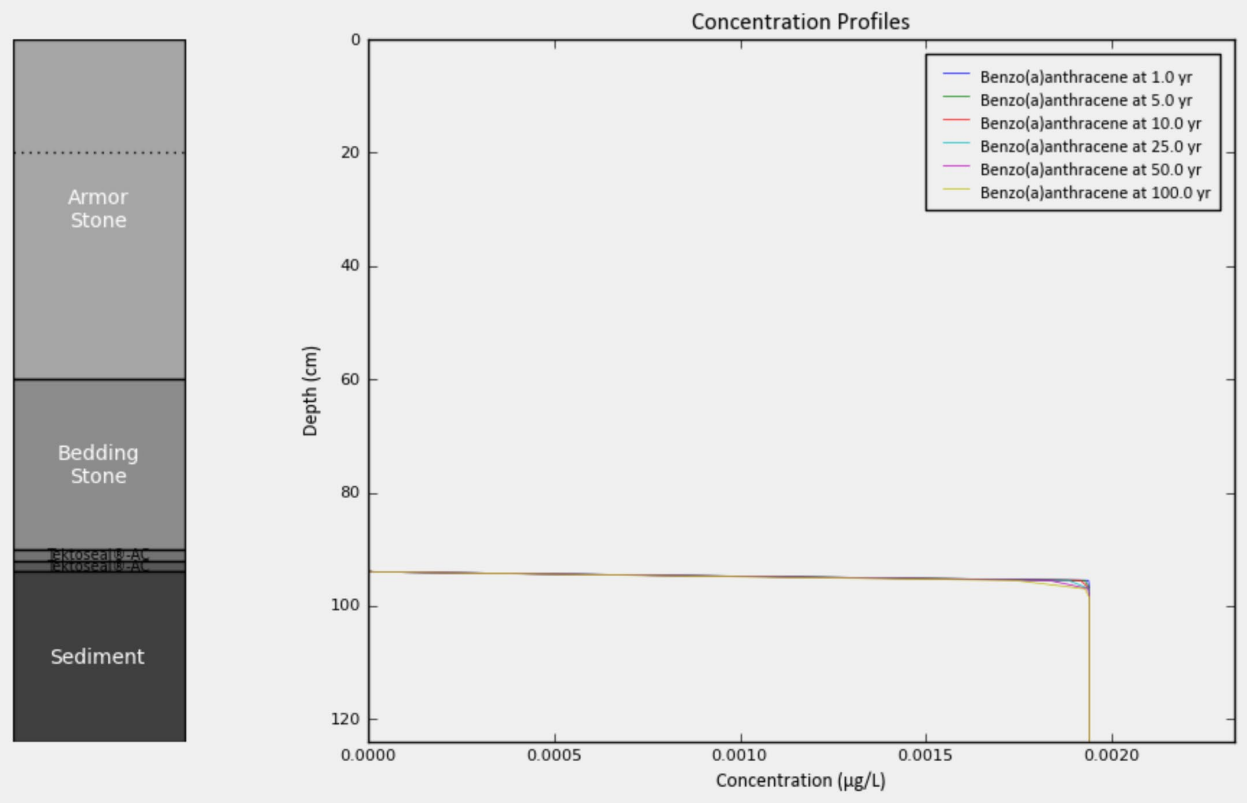

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Acenaphthylene at 1.0 yr
Acenaphthylene at 5.0 yr
Acenaphthylene at 10.0 yr
Acenaphthylene at 25.0 yr
Acenaphthylene at 50.0 yr
Acenaphthylene at 100.0 yr
Depth (cm)
Concentration (µg/L)

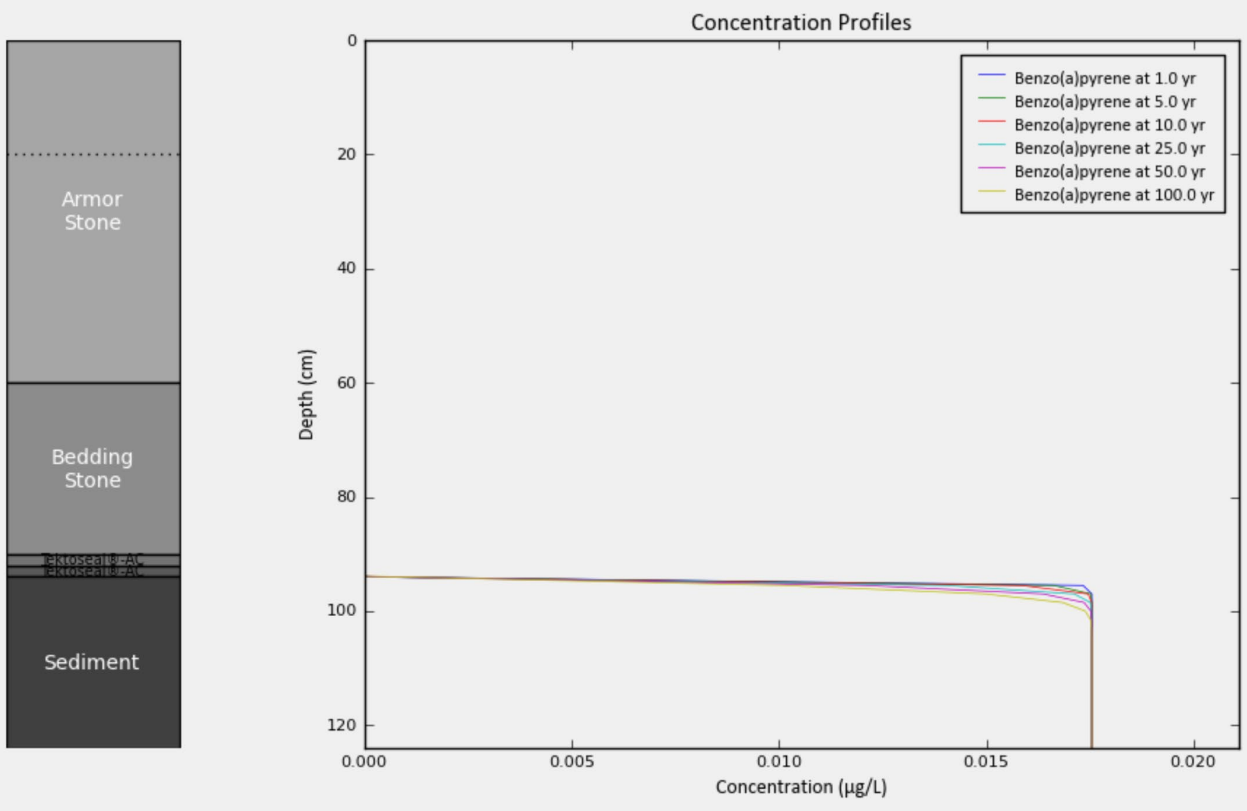

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Aldrin at 1.0 yr
Aldrin at 5.0 yr
Aldrin at 10.0 yr
Aldrin at 25.0 yr
Aldrin at 50.0 yr
Aldrin at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

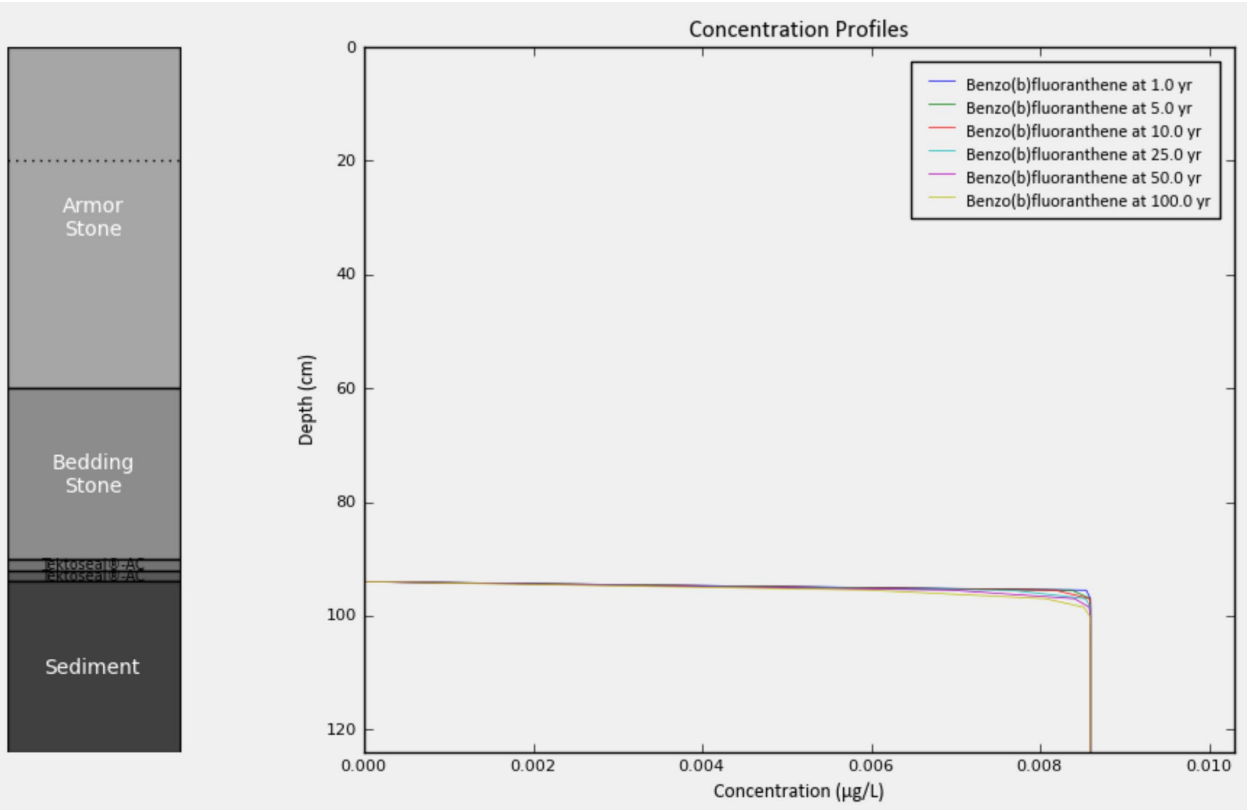

Armor Stone
Bedding Stone
Ekoseal PAC
Ekoseal PAC
Sediment
Concentration Profiles
Anthracene at 1.0 yr
Anthracene at 5.0 yr
Anthracene at 10.0 yr
Anthracene at 25.0 yr
Anthracene at 50.0 yr
Anthracene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
Concentration (µg/L)

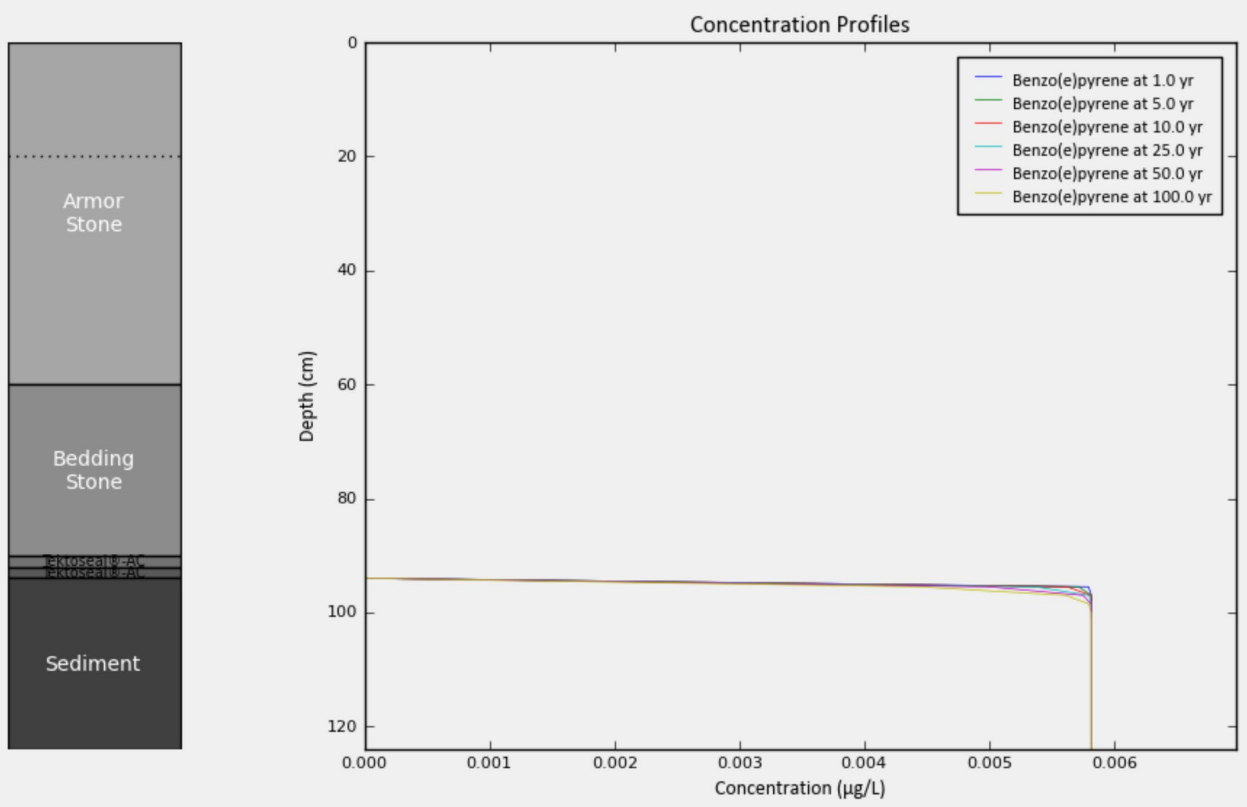

Armor Stone
Bedding Stone
Ekoseal PAC
Ekoseal PAC
Sediment
Concentration Profiles
Arsenic at 1.0 yr
Arsenic at 5.0 yr
Arsenic at 10.0 yr
Arsenic at 25.0 yr
Arsenic at 50.0 yr
Arsenic at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
5
10
15
20
25
30
Concentration (µg/L)

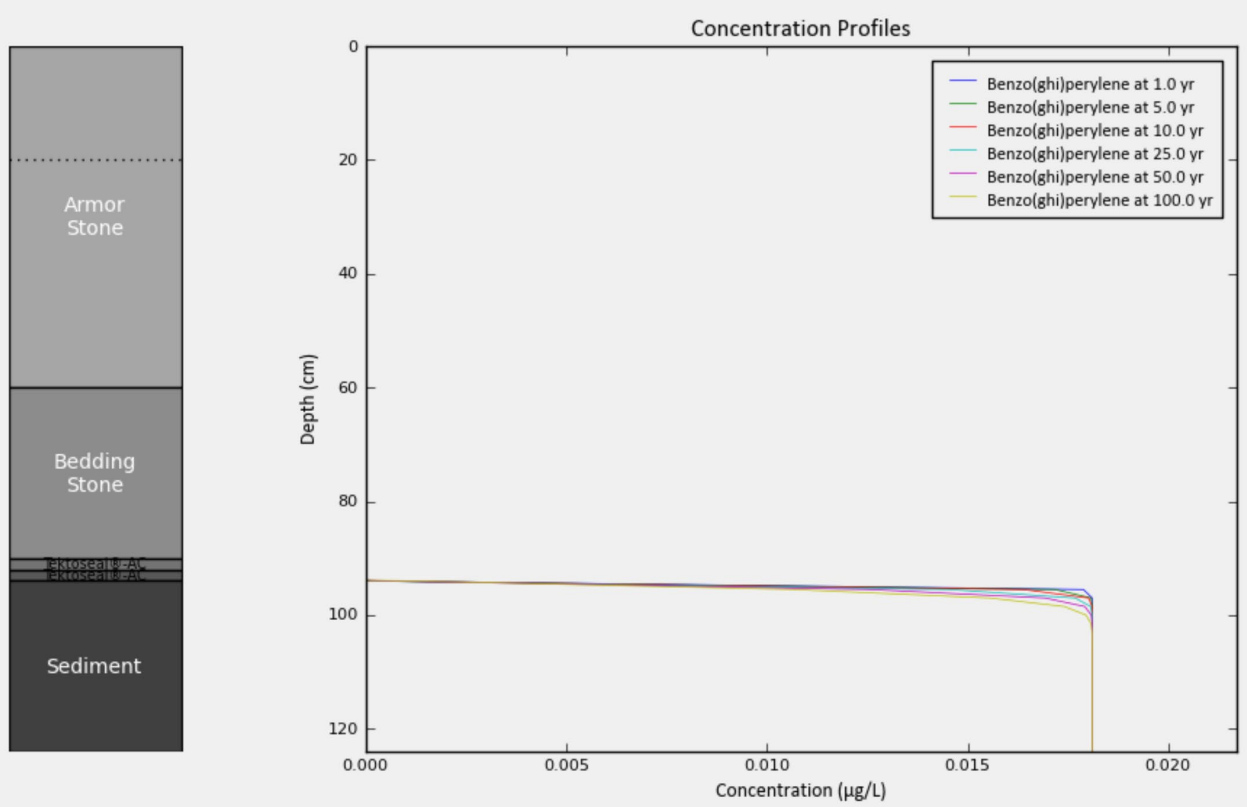

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
BEHP at 1.0 yr
BEHP at 5.0 yr
BEHP at 10.0 yr
BEHP at 25.0 yr
BEHP at 50.0 yr
BEHP at 100.0 yr
Depth (cm)
Concentration (µg/L)

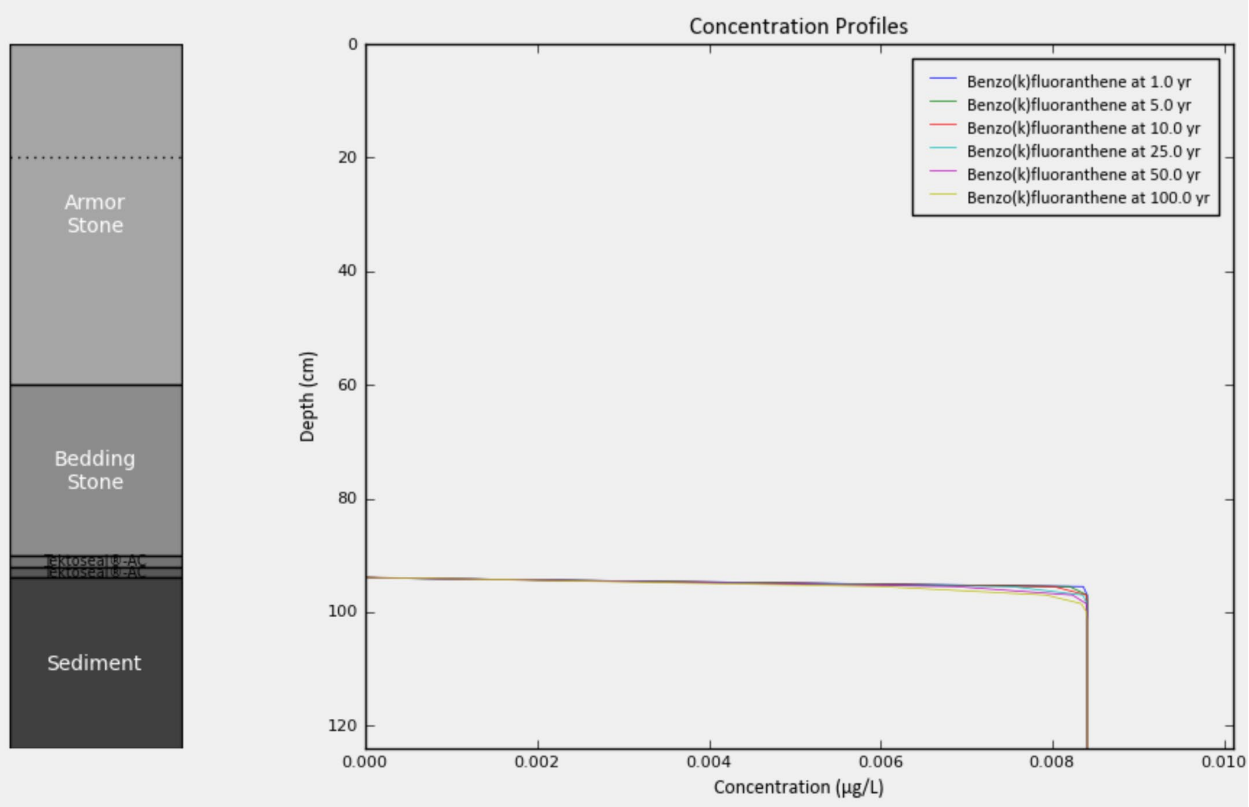

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Benzo(a)anthracene at 1.0 yr
Benzo(a)anthracene at 5.0 yr
Benzo(a)anthracene at 10.0 yr
Benzo(a)anthracene at 25.0 yr
Benzo(a)anthracene at 50.0 yr
Benzo(a)anthracene at 100.0 yr
Depth (cm)
Concentration (µg/L)

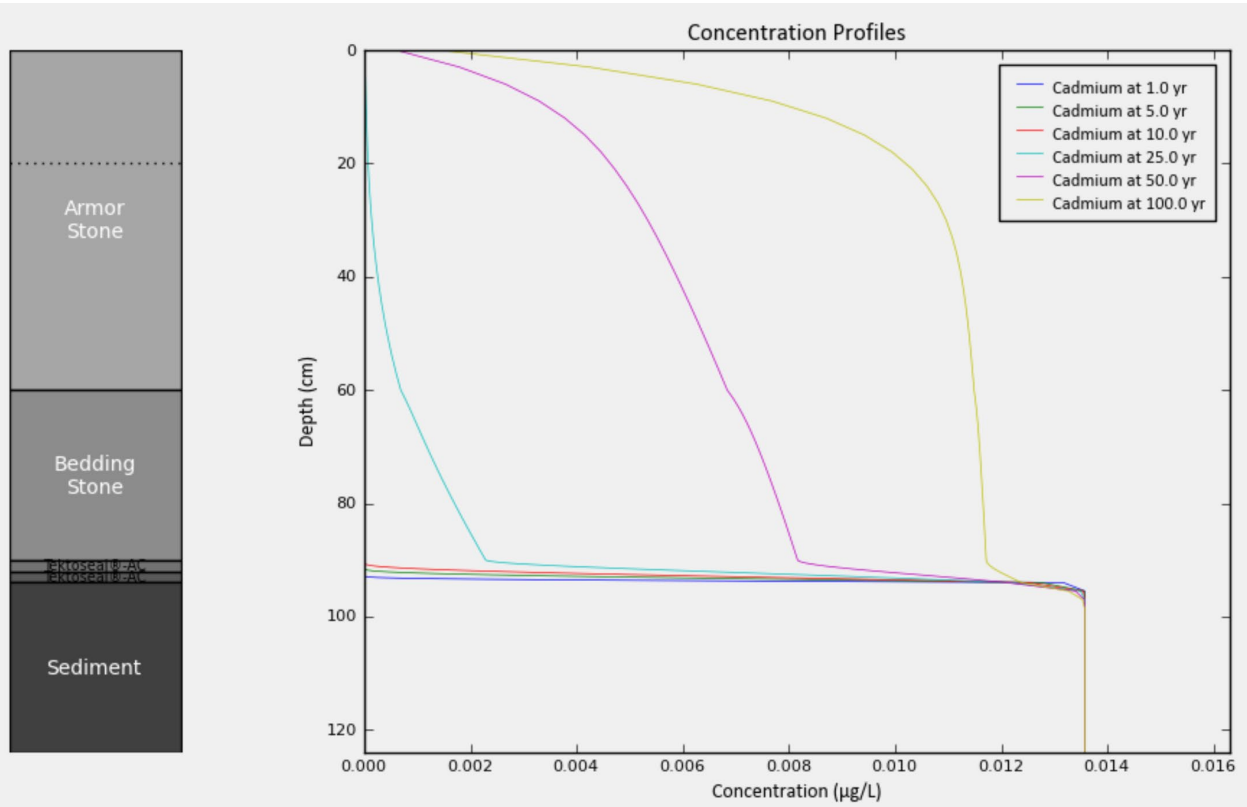

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Benzo(a)pyrene at 1.0 yr
Benzo(a)pyrene at 5.0 yr
Benzo(a)pyrene at 10.0 yr
Benzo(a)pyrene at 25.0 yr
Benzo(a)pyrene at 50.0 yr
Benzo(a)pyrene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020

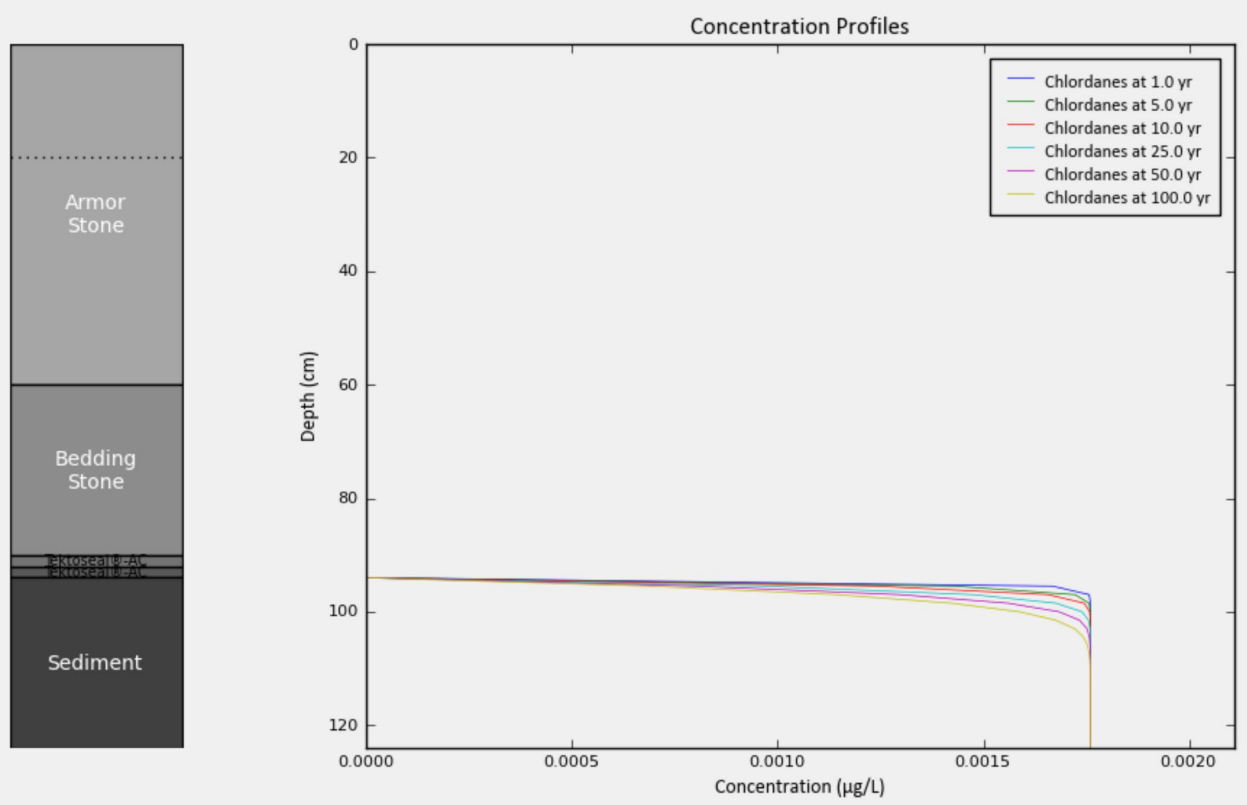

Concentration Profiles
Armor Stone
Bedding Stone
Sediment
Benzo(b)fluoranthene at 1.0 yr
Benzo(b)fluoranthene at 5.0 yr
Benzo(b)fluoranthene at 10.0 yr
Benzo(b)fluoranthene at 25.0 yr
Benzo(b)fluoranthene at 50.0 yr
Benzo(b)fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
0.010

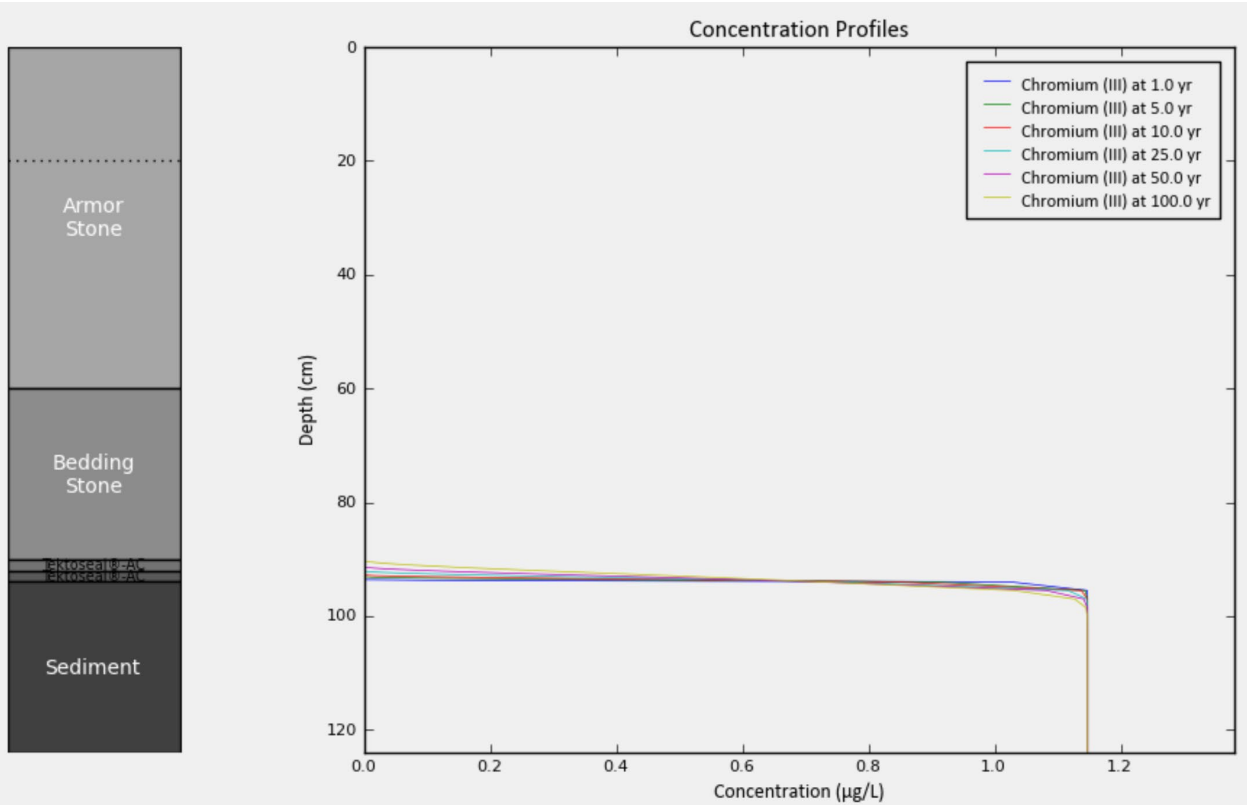

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Benzo(e)pyrene at 1.0 yr
Benzo(e)pyrene at 5.0 yr
Benzo(e)pyrene at 10.0 yr
Benzo(e)pyrene at 25.0 yr
Benzo(e)pyrene at 50.0 yr
Benzo(e)pyrene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004
0.005
0.006

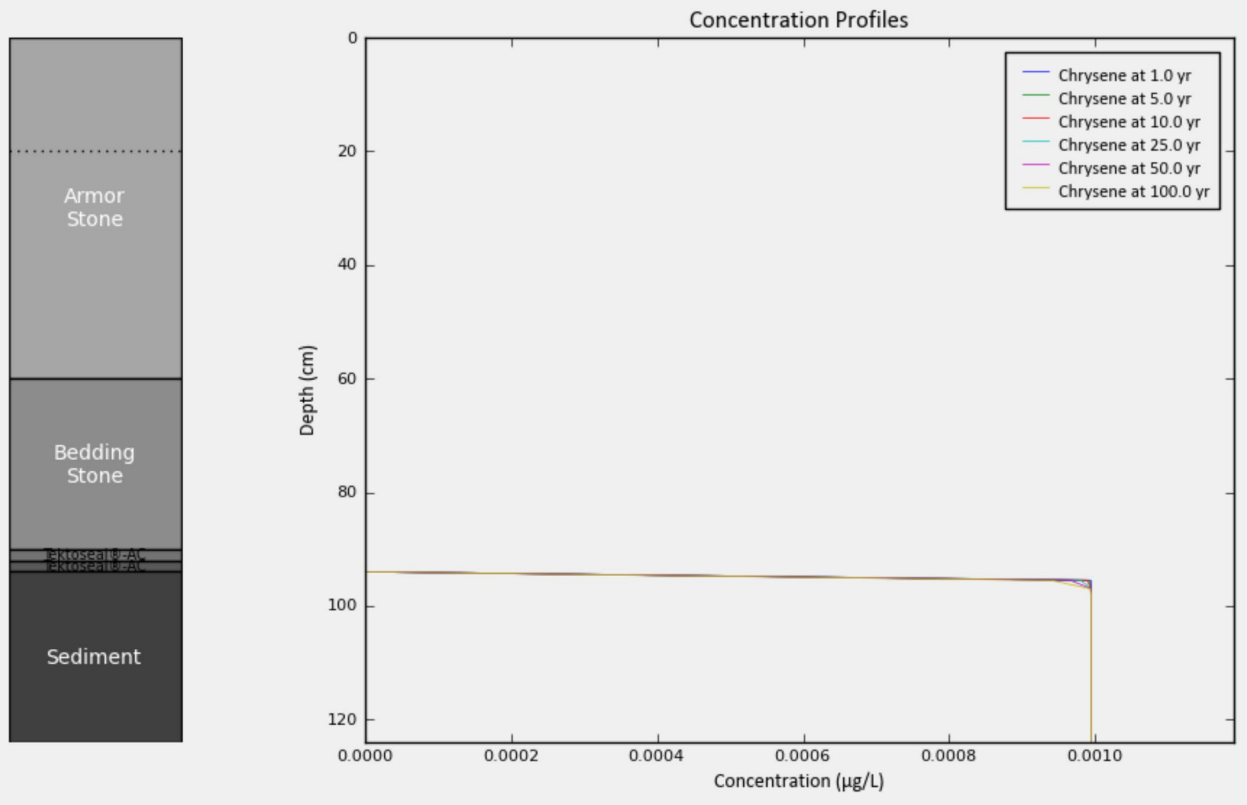

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Benzo(ghi)perylene at 1.0 yr
Benzo(ghi)perylene at 5.0 yr
Benzo(ghi)perylene at 10.0 yr
Benzo(ghi)perylene at 25.0 yr
Benzo(ghi)perylene at 50.0 yr
Benzo(ghi)perylene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020

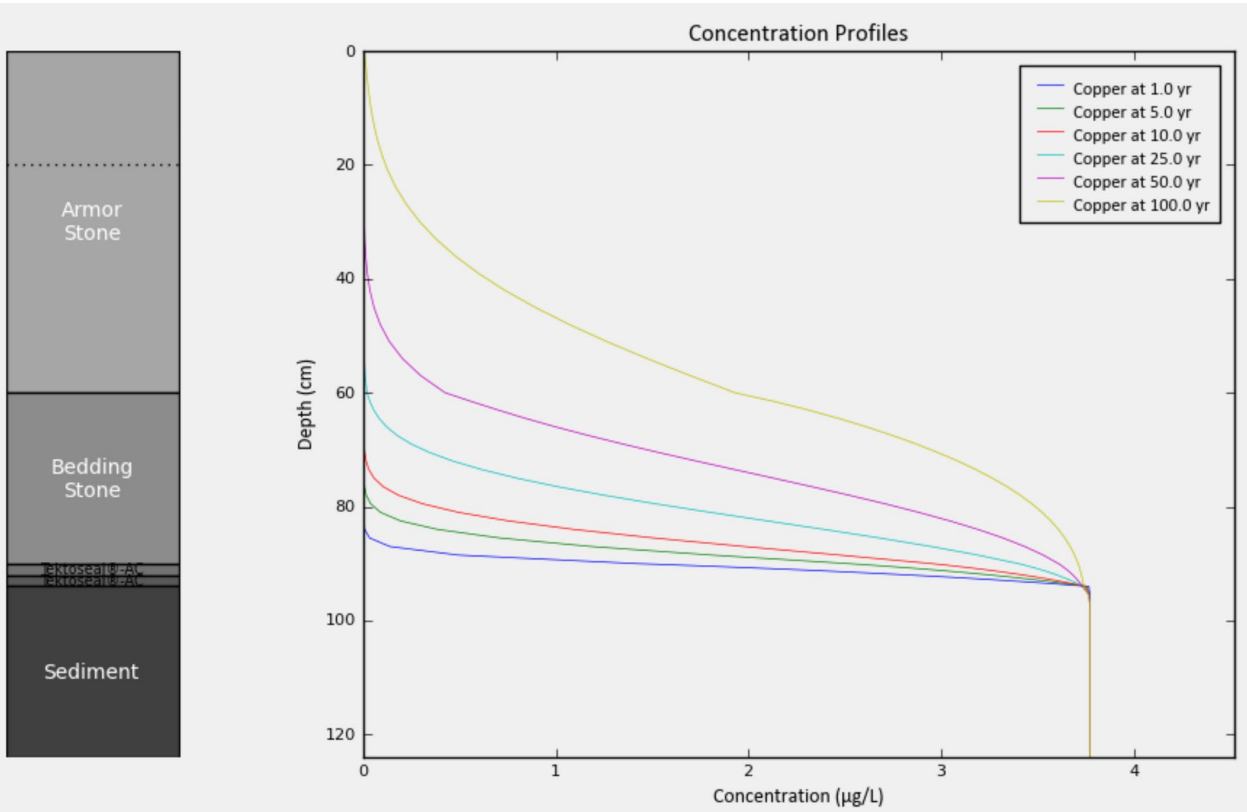

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Benzo(k)fluoranthene at 1.0 yr
Benzo(k)fluoranthene at 5.0 yr
Benzo(k)fluoranthene at 10.0 yr
Benzo(k)fluoranthene at 25.0 yr
Benzo(k)fluoranthene at 50.0 yr
Benzo(k)fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
0.010

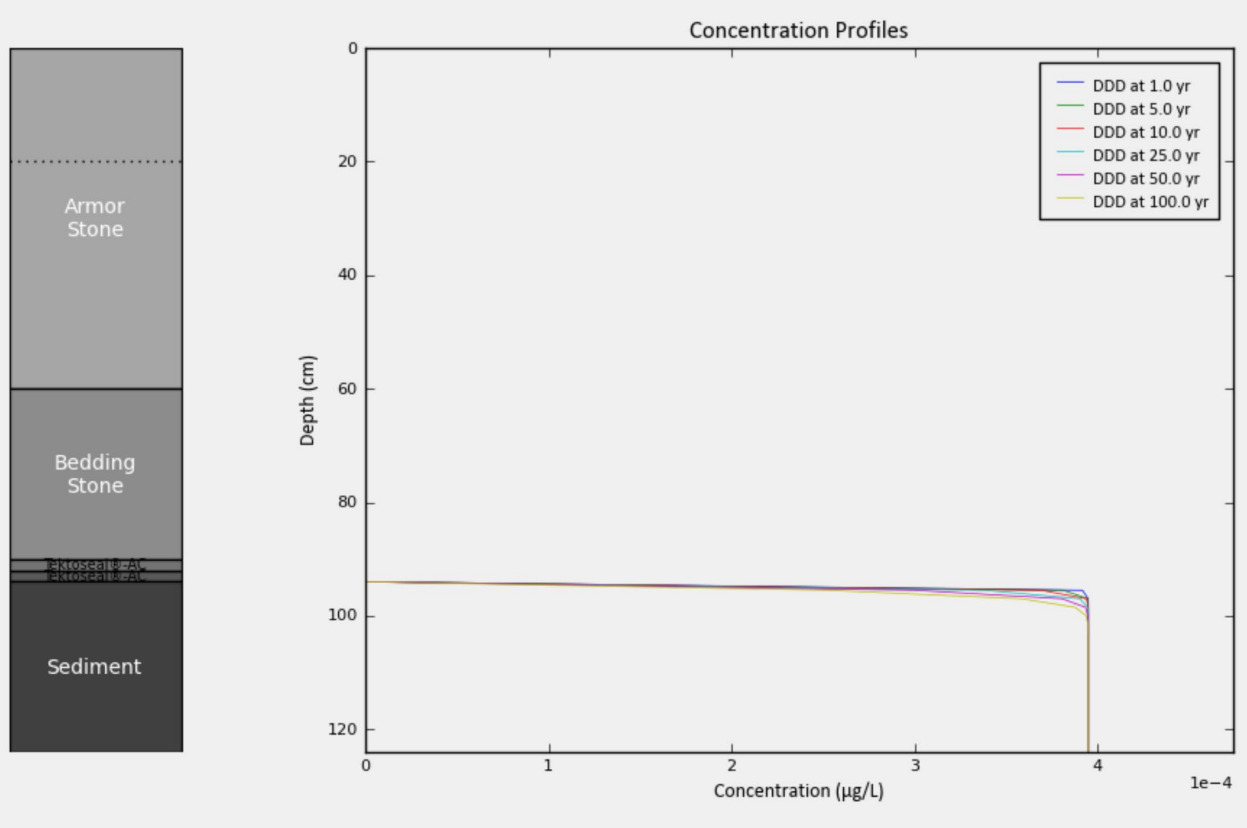

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Cadmium at 1.0 yr
Cadmium at 5.0 yr
Cadmium at 10.0 yr
Cadmium at 25.0 yr
Cadmium at 50.0 yr
Cadmium at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
0.010
0.012
0.014
0.016

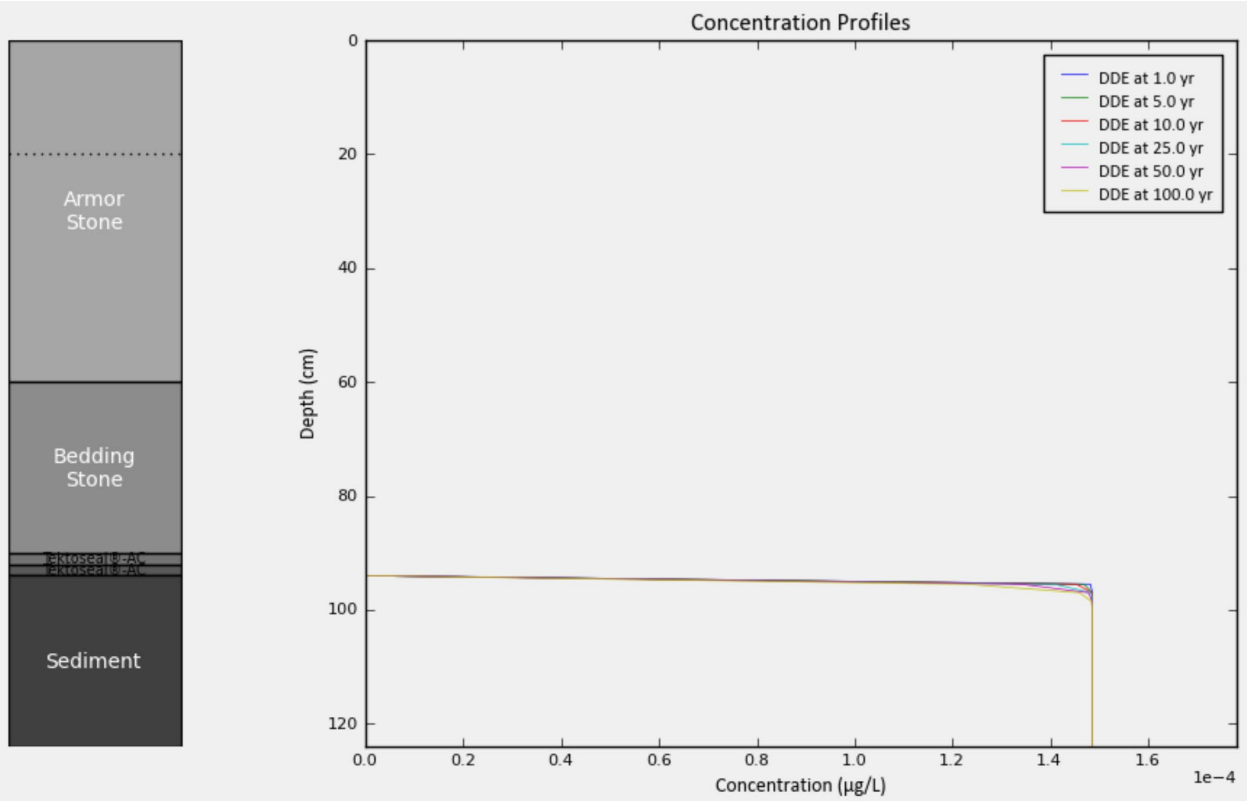

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Chlordanes at 1.0 yr
Chlordanes at 5.0 yr
Chlordanes at 10.0 yr
Chlordanes at 25.0 yr
Chlordanes at 50.0 yr
Chlordanes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020

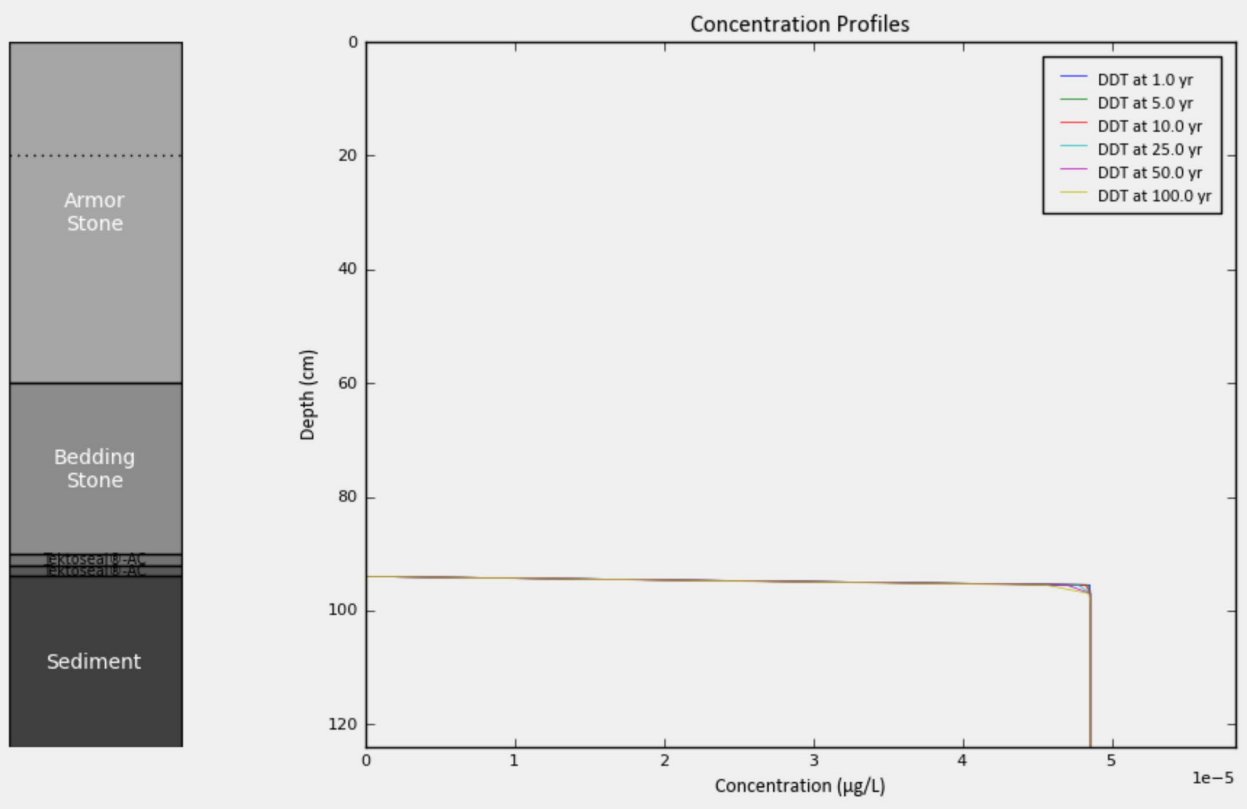

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Chromium (III) at 1.0 yr
Chromium (III) at 5.0 yr
Chromium (III) at 10.0 yr
Chromium (III) at 25.0 yr
Chromium (III) at 50.0 yr
Chromium (III) at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2

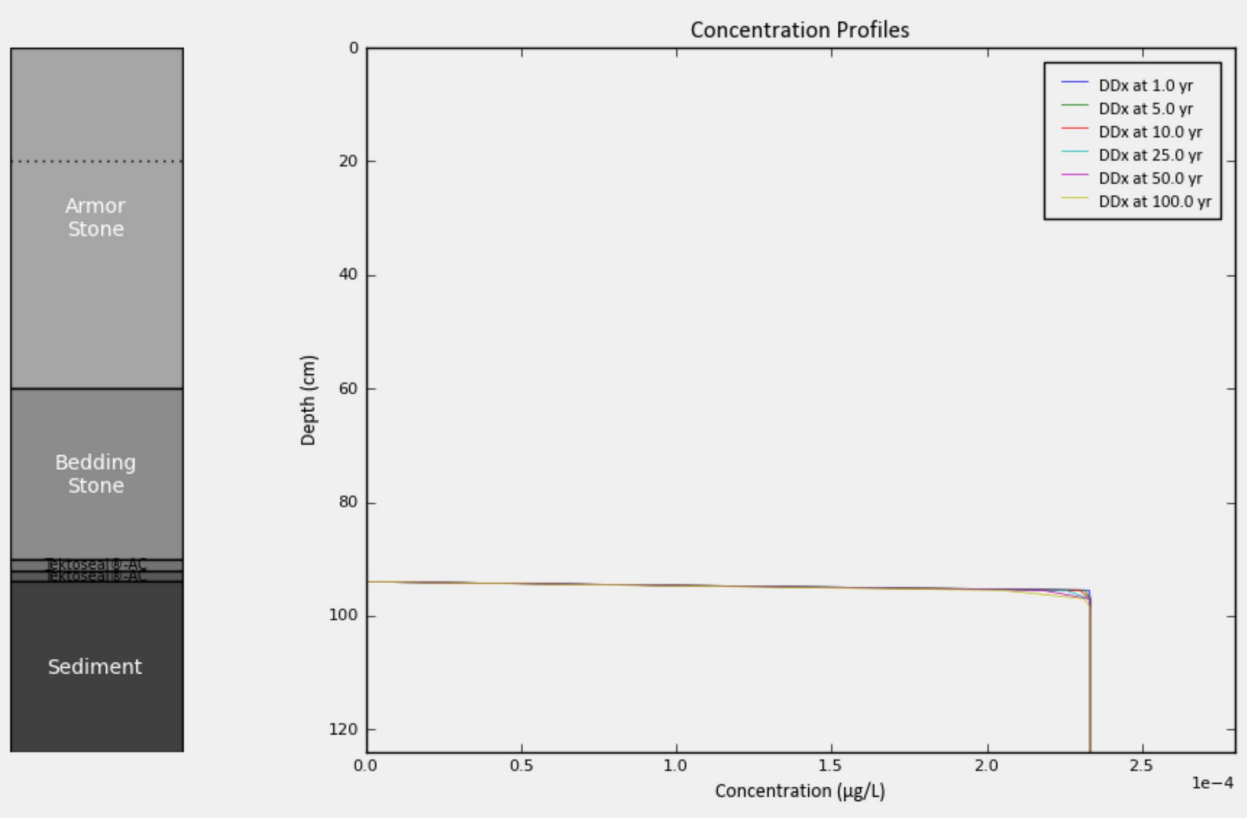

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Chrysene at 1.0 yr
Chrysene at 5.0 yr
Chrysene at 10.0 yr
Chrysene at 25.0 yr
Chrysene at 50.0 yr
Chrysene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010

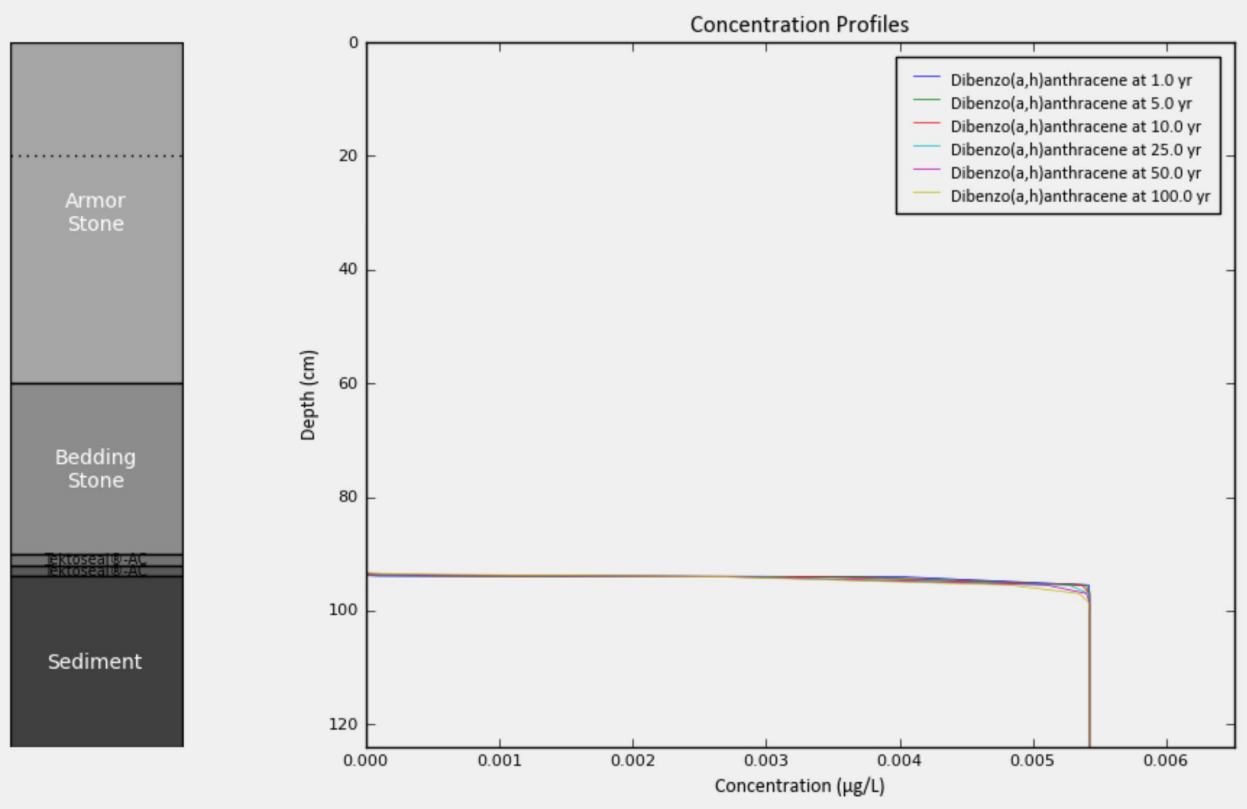

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Copper at 1.0 yr
Copper at 5.0 yr
Copper at 10.0 yr
Copper at 25.0 yr
Copper at 50.0 yr
Copper at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
1
2
3
4

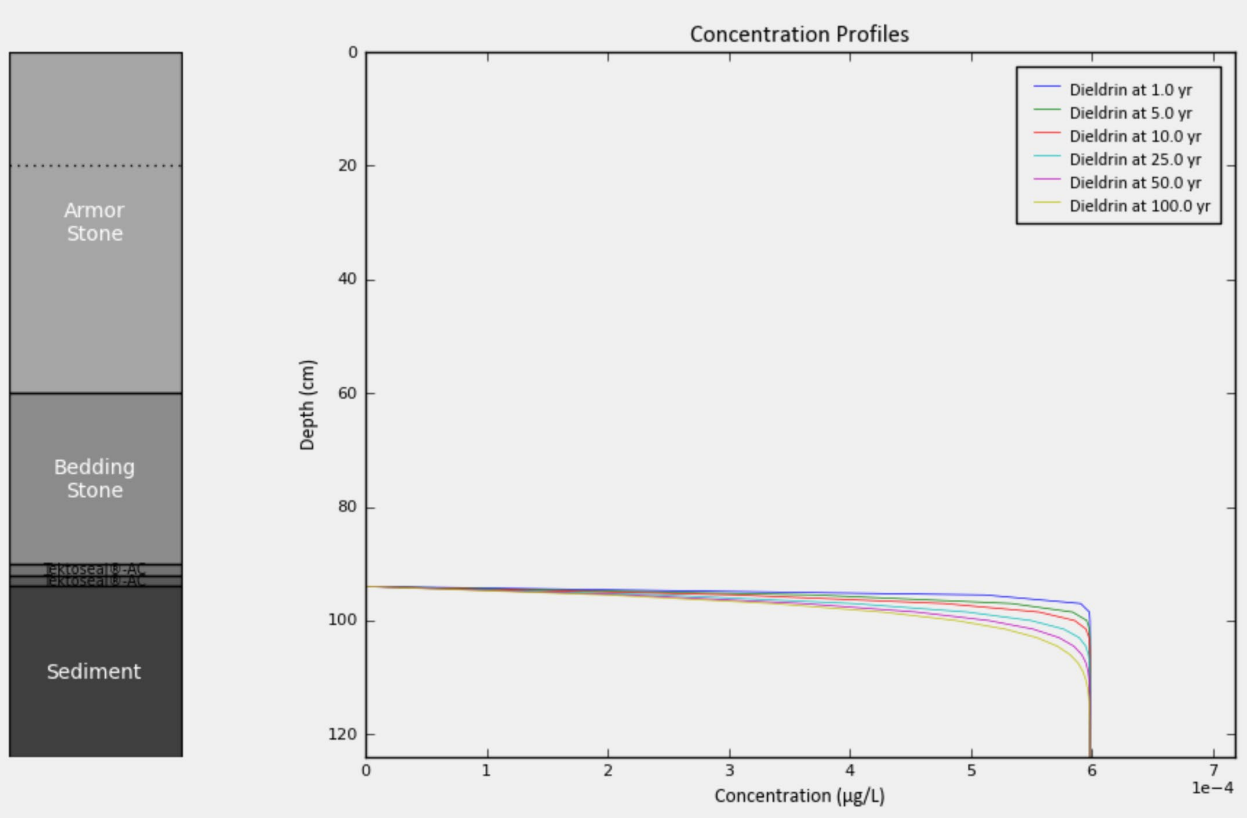

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDD at 1.0 yr
DDD at 5.0 yr
DDD at 10.0 yr
DDD at 25.0 yr
DDD at 50.0 yr
DDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

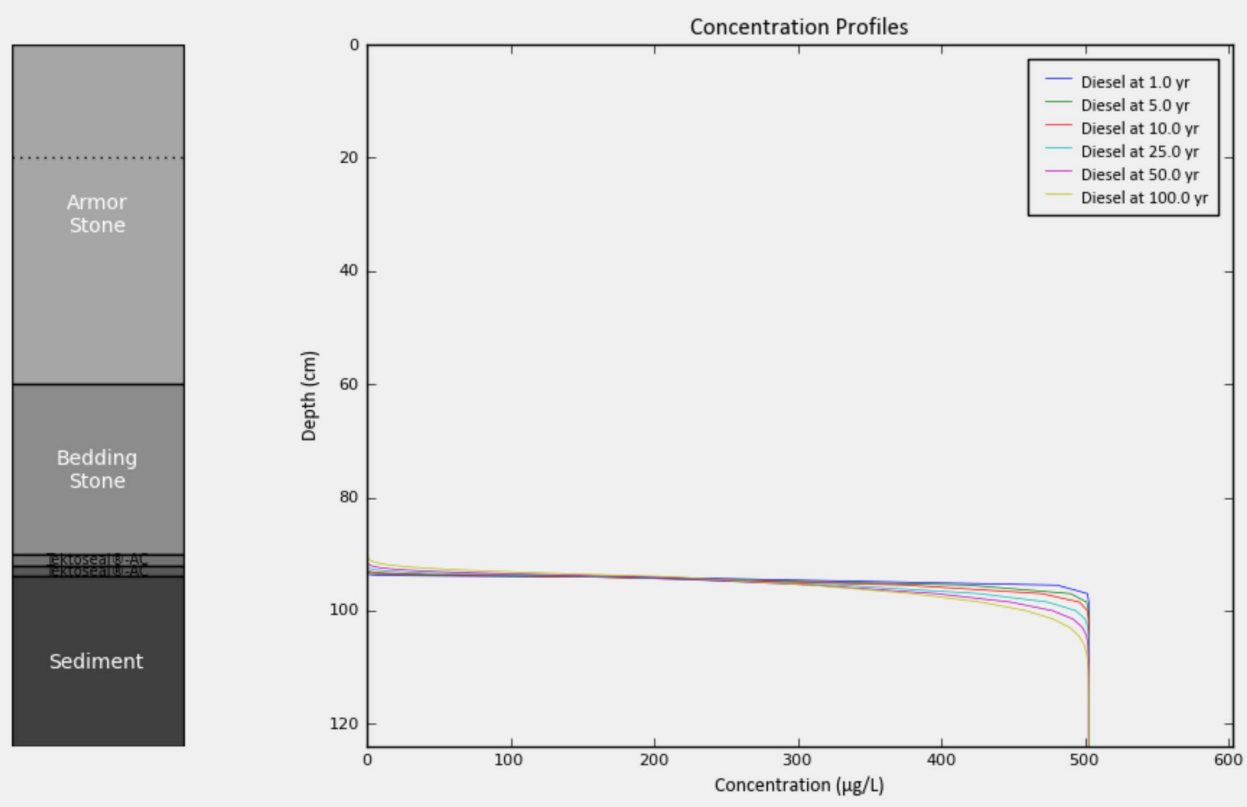

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDE at 1.0 yr
DDE at 5.0 yr
DDE at 10.0 yr
DDE at 25.0 yr
DDE at 50.0 yr
DDE at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

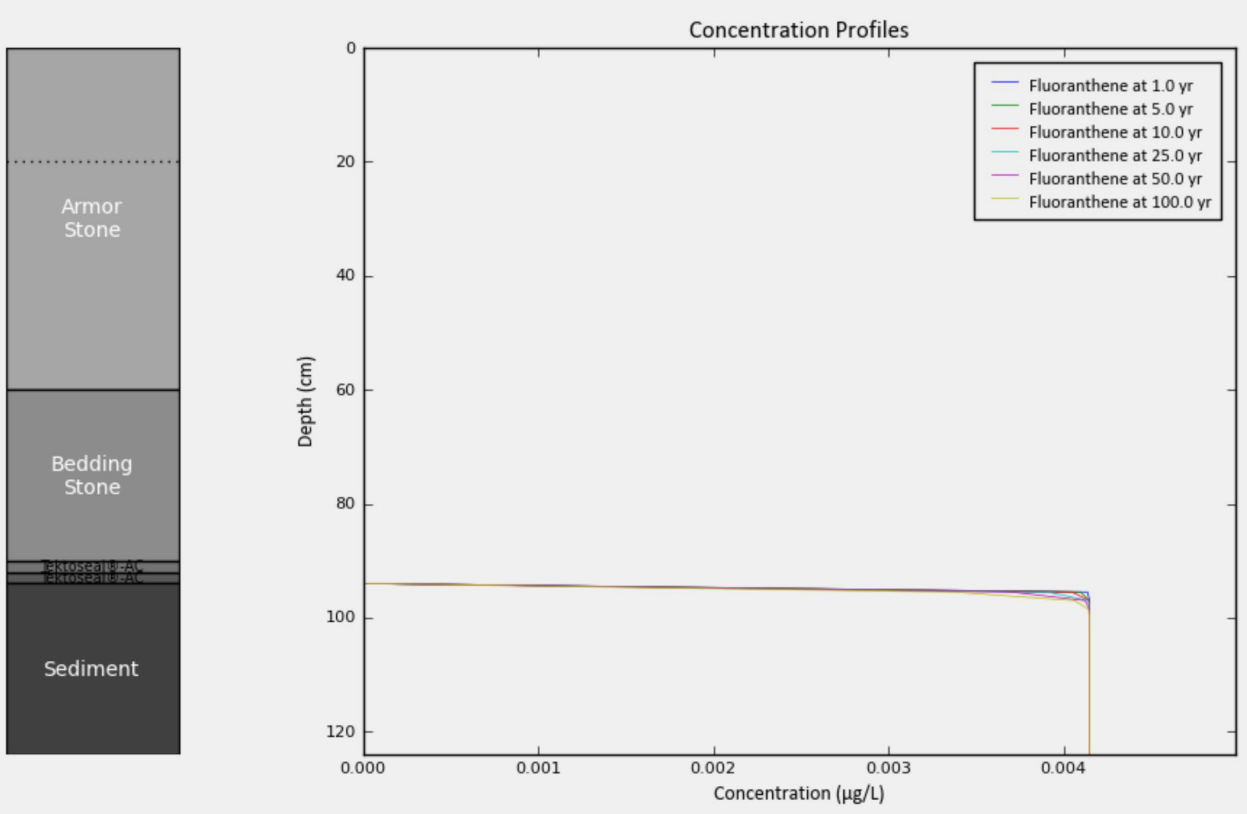

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDT at 1.0 yr
DDT at 5.0 yr
DDT at 10.0 yr
DDT at 25.0 yr
DDT at 50.0 yr
DDT at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

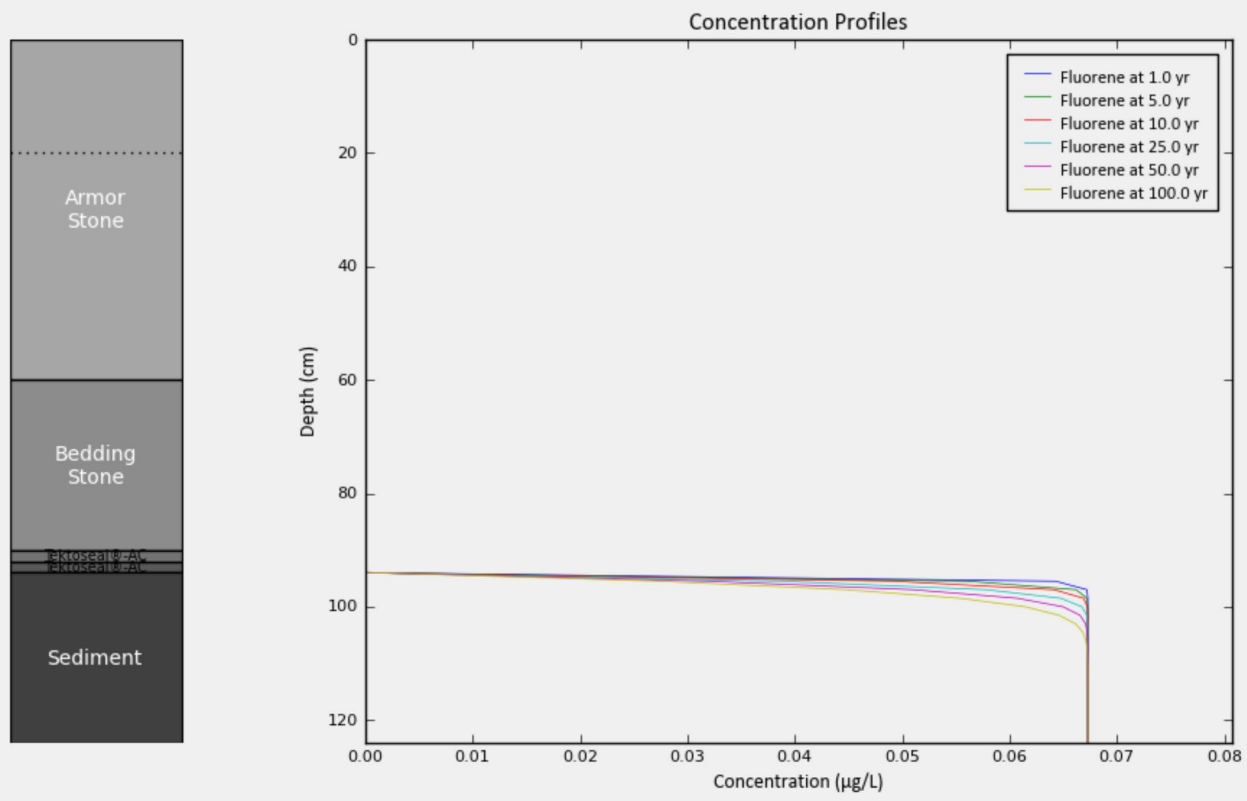

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
DDx at 1.0 yr
DDx at 5.0 yr
DDx at 10.0 yr
DDx at 25.0 yr
DDx at 50.0 yr
DDx at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

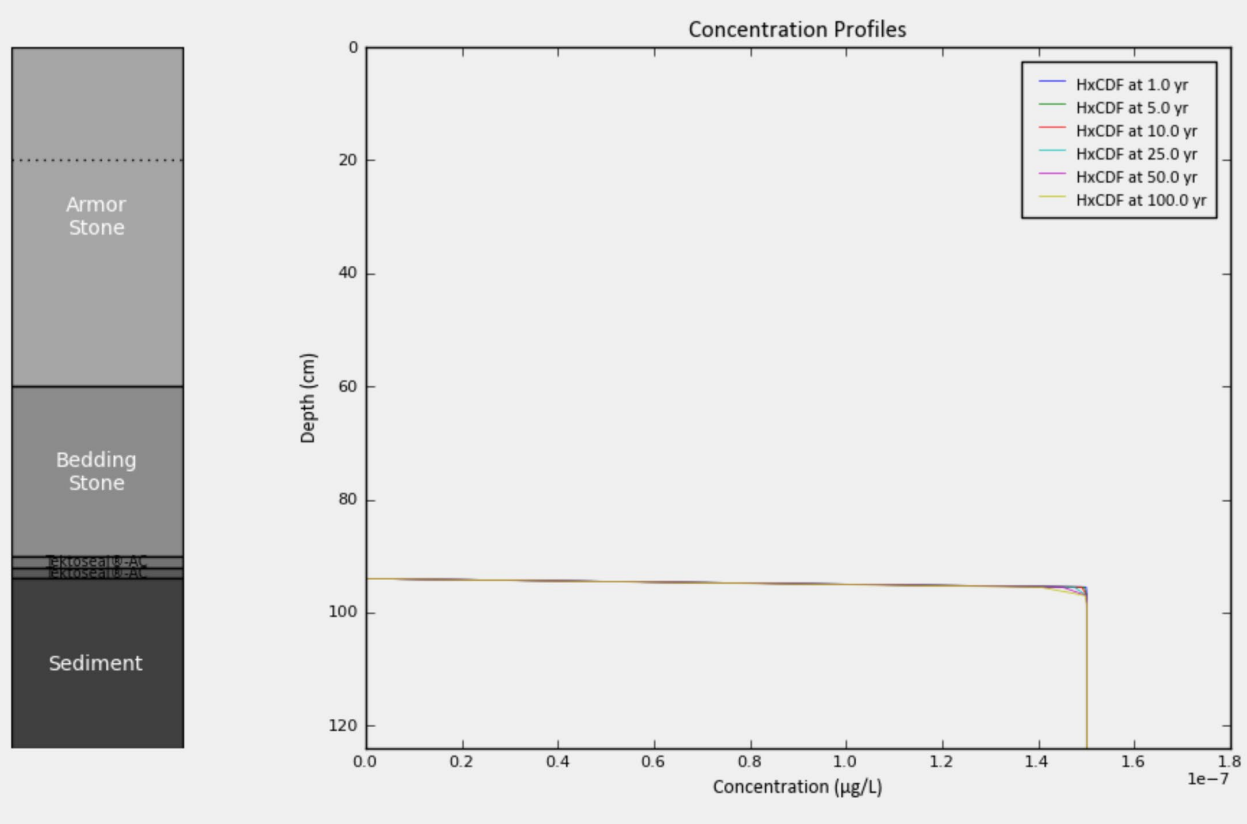

Armor Stone
Bedding Stone
Tekoseal PAC
Tekoseal PAC
Sediment
Concentration Profiles
Dibenzo(a,h)anthracene at 1.0 yr
Dibenzo(a,h)anthracene at 5.0 yr
Dibenzo(a,h)anthracene at 10.0 yr
Dibenzo(a,h)anthracene at 25.0 yr
Dibenzo(a,h)anthracene at 50.0 yr
Dibenzo(a,h)anthracene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.001
0.002
0.003
0.004
0.005
0.006
Concentration (µg/L)

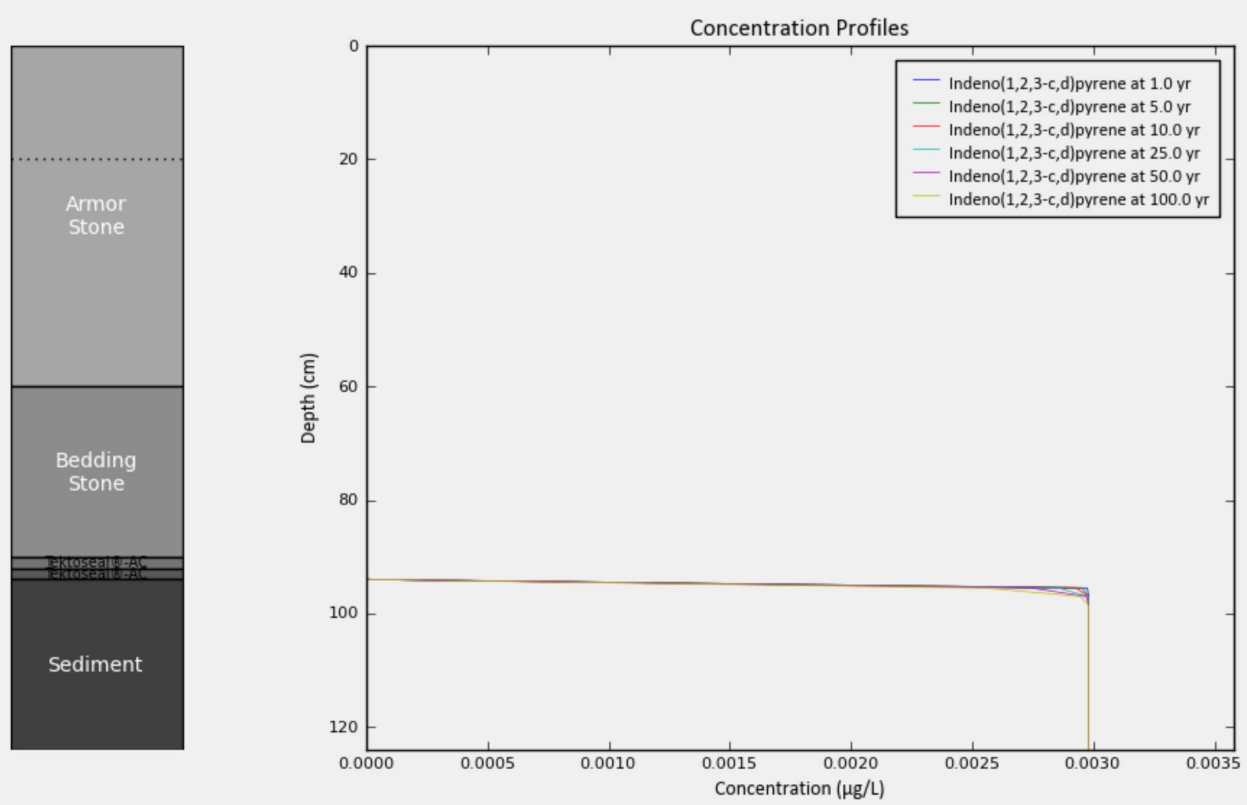

Armor Stone
Bedding Stone
Tekoseal PAC
Tekoseal PAC
Sediment
Concentration Profiles
Dieldrin at 1.0 yr
Dieldrin at 5.0 yr
Dieldrin at 10.0 yr
Dieldrin at 25.0 yr
Dieldrin at 50.0 yr
Dieldrin at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
7
1e−4
Concentration (µg/L)

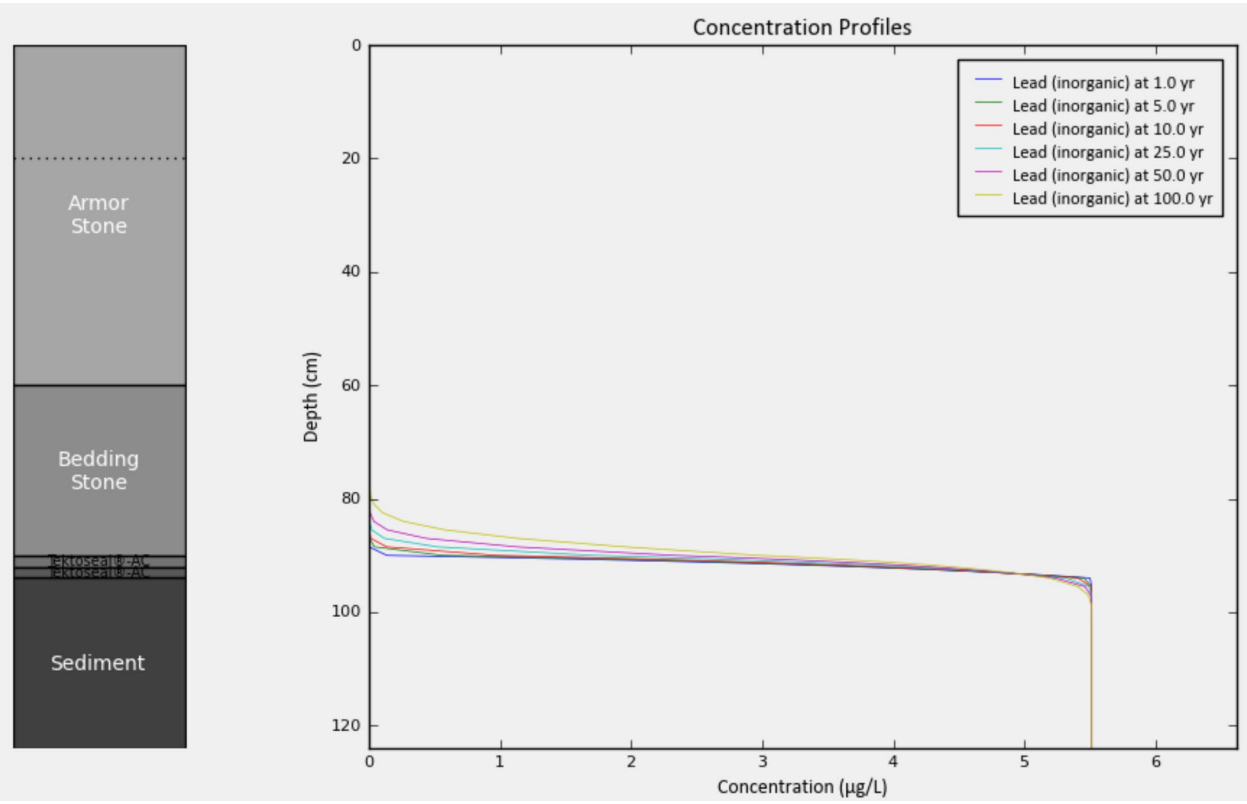

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Diesel at 1.0 yr
Diesel at 5.0 yr
Diesel at 10.0 yr
Diesel at 25.0 yr
Diesel at 50.0 yr
Diesel at 100.0 yr
Depth (cm)
Concentration (µg/L)

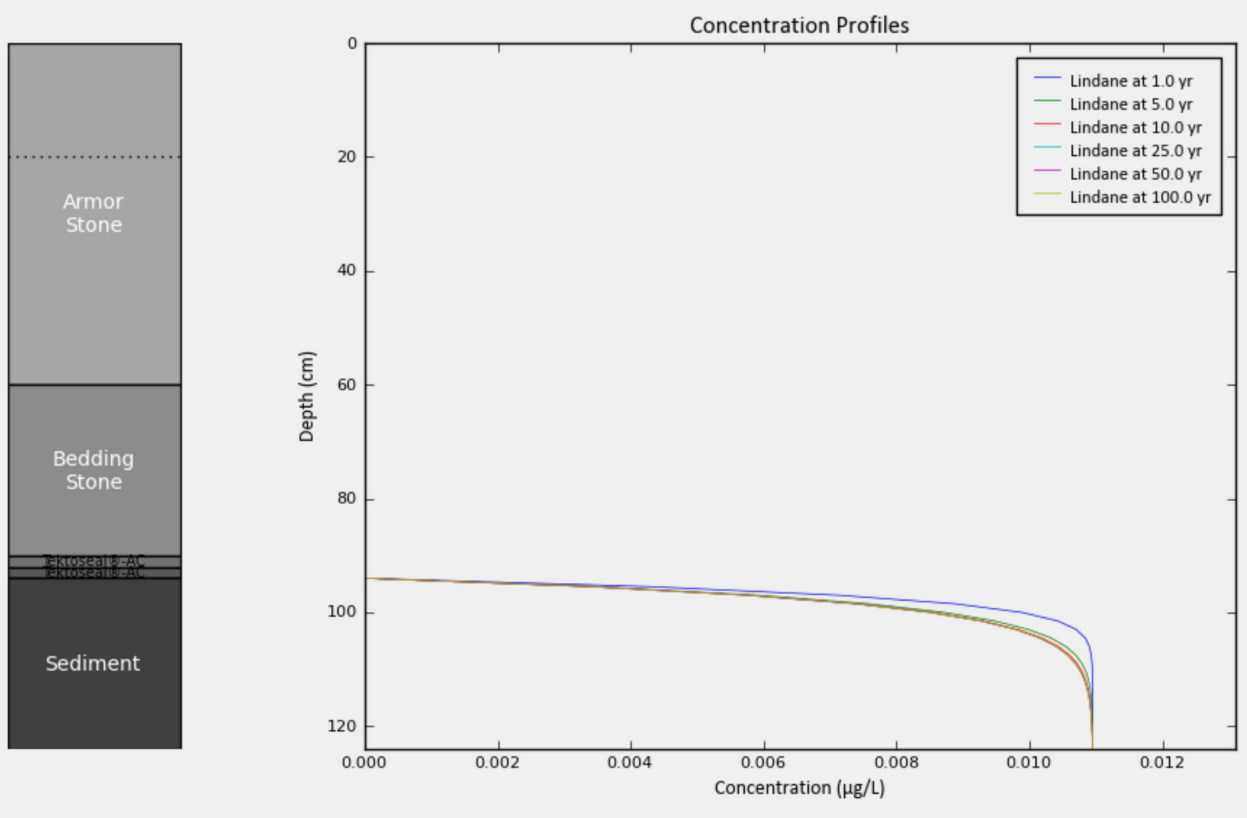

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Fluoranthene at 1.0 yr
Fluoranthene at 5.0 yr
Fluoranthene at 10.0 yr
Fluoranthene at 25.0 yr
Fluoranthene at 50.0 yr
Fluoranthene at 100.0 yr
Depth (cm)
Concentration (µg/L)

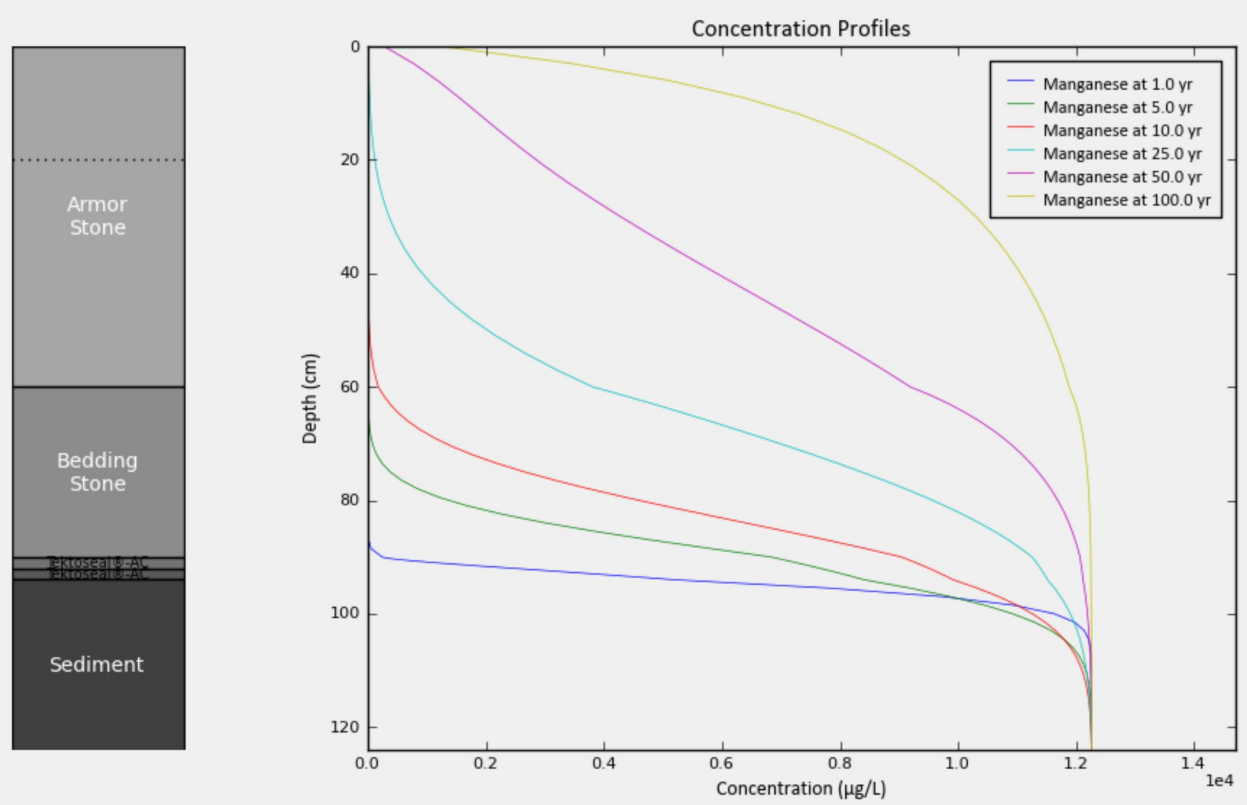

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Fluorene at 1.0 yr
Fluorene at 5.0 yr
Fluorene at 10.0 yr
Fluorene at 25.0 yr
Fluorene at 50.0 yr
Fluorene at 100.0 yr
Depth (cm)
Concentration (µg/L)

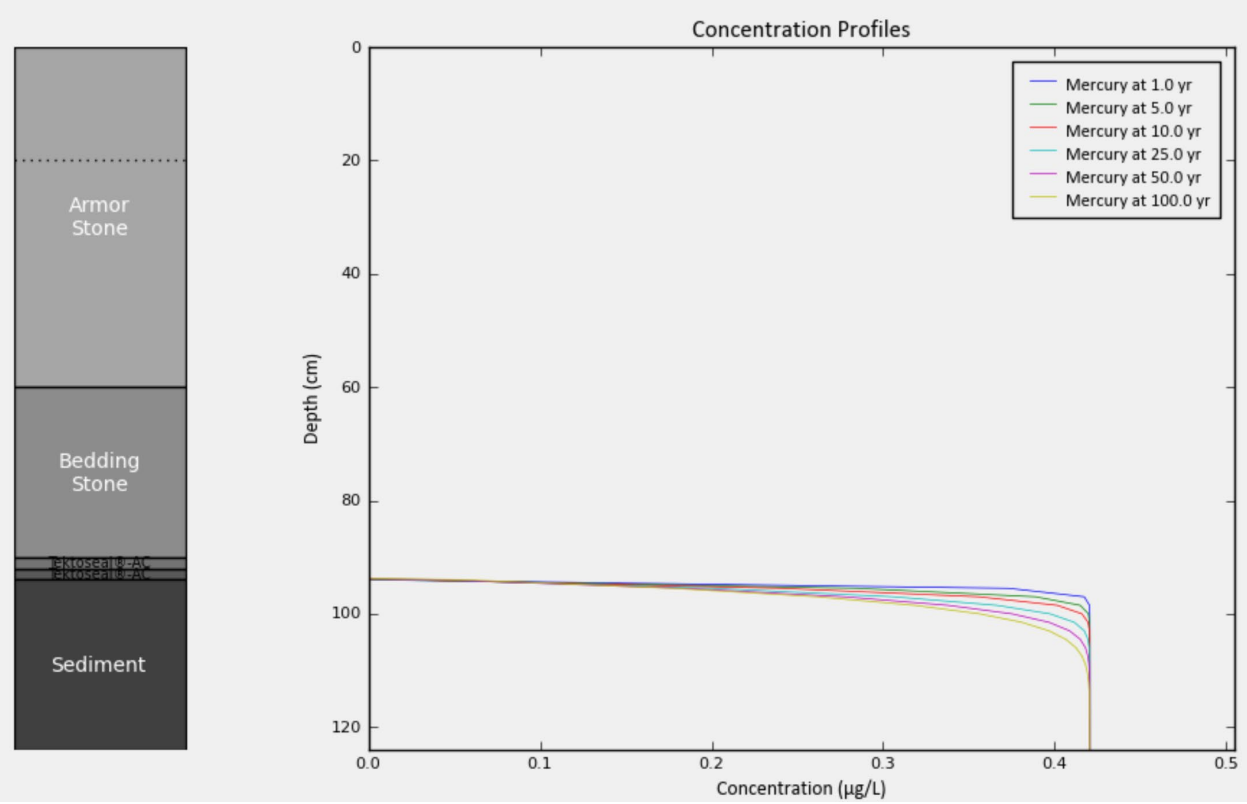

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
HxCDF at 1.0 yr
HxCDF at 5.0 yr
HxCDF at 10.0 yr
HxCDF at 25.0 yr
HxCDF at 50.0 yr
HxCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

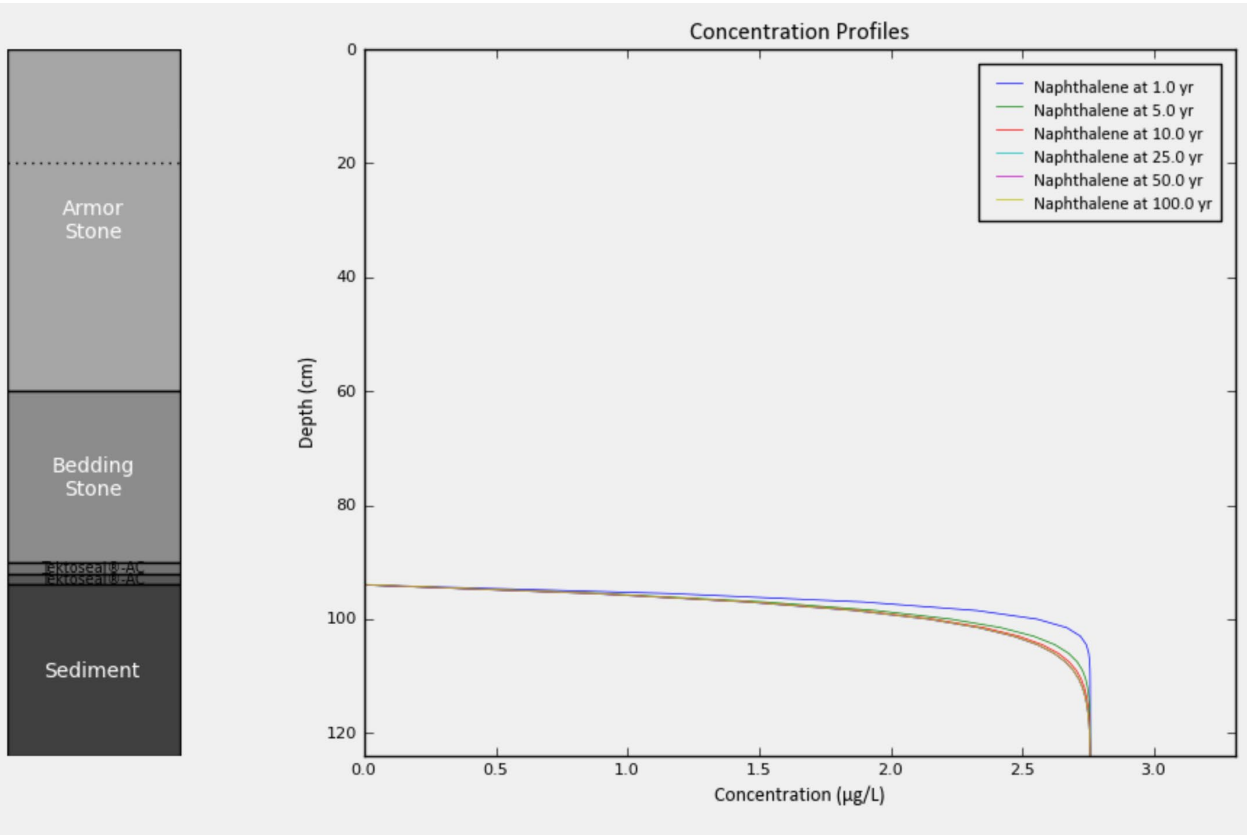

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Indeno(1,2,3-c,d)pyrene at 1.0 yr
Indeno(1,2,3-c,d)pyrene at 5.0 yr
Indeno(1,2,3-c,d)pyrene at 10.0 yr
Indeno(1,2,3-c,d)pyrene at 25.0 yr
Indeno(1,2,3-c,d)pyrene at 50.0 yr
Indeno(1,2,3-c,d)pyrene at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030
0.0035

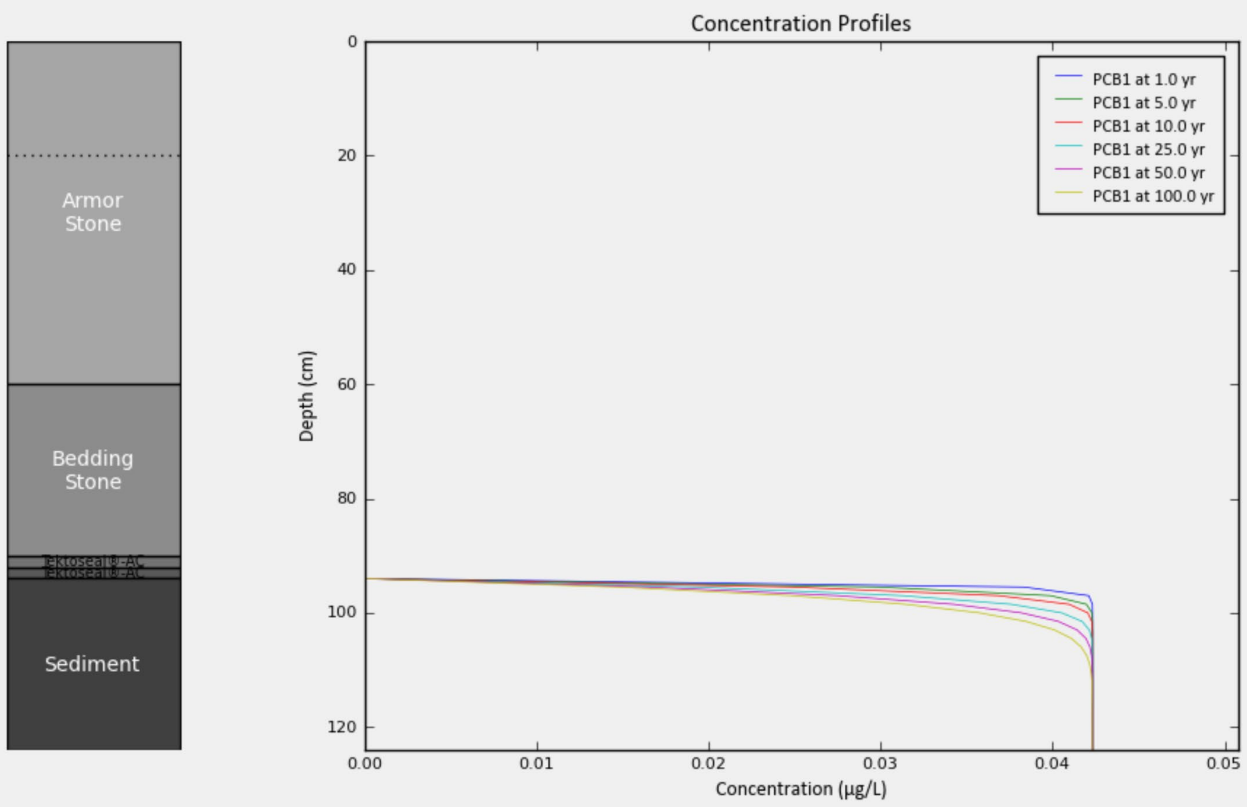

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Lead (inorganic) at 1.0 yr
Lead (inorganic) at 5.0 yr
Lead (inorganic) at 10.0 yr
Lead (inorganic) at 25.0 yr
Lead (inorganic) at 50.0 yr
Lead (inorganic) at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0
1
2
3
4
5
6

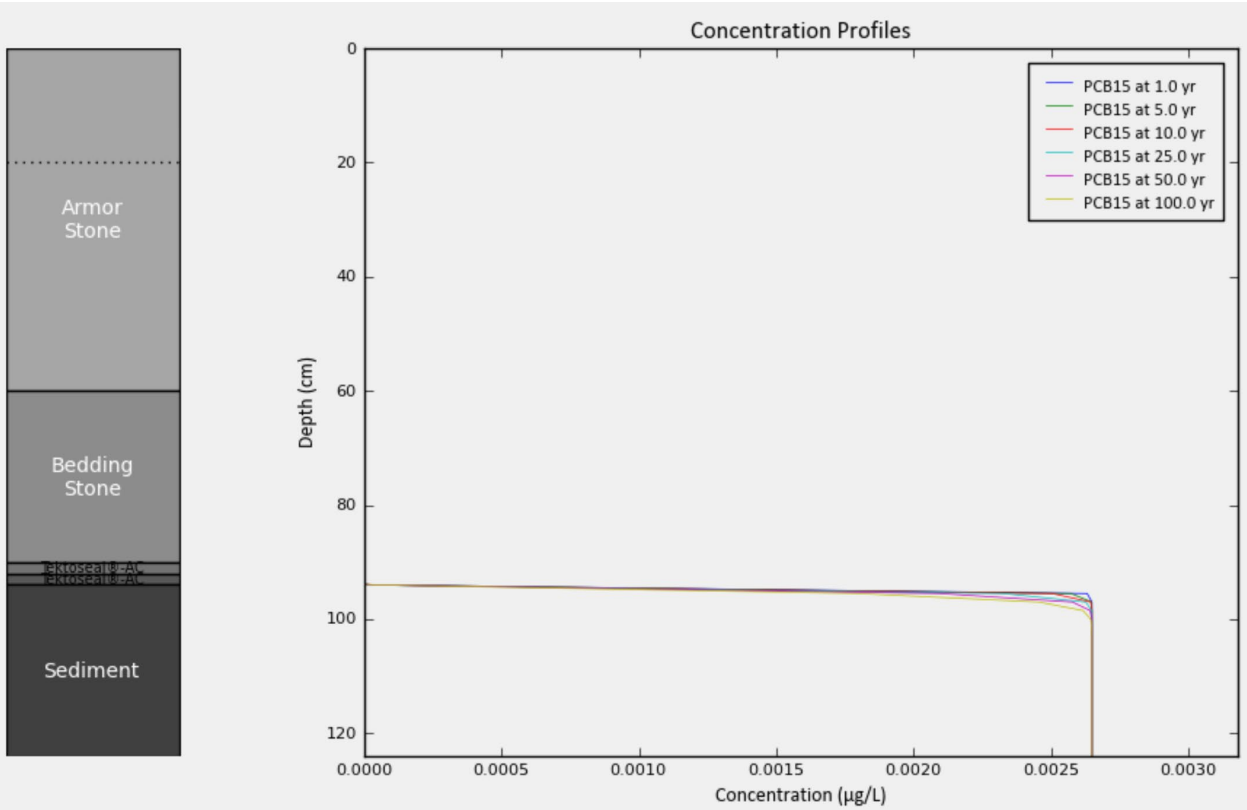

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Lindane at 1.0 yr
Lindane at 5.0 yr
Lindane at 10.0 yr
Lindane at 25.0 yr
Lindane at 50.0 yr
Lindane at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
0.010
0.012

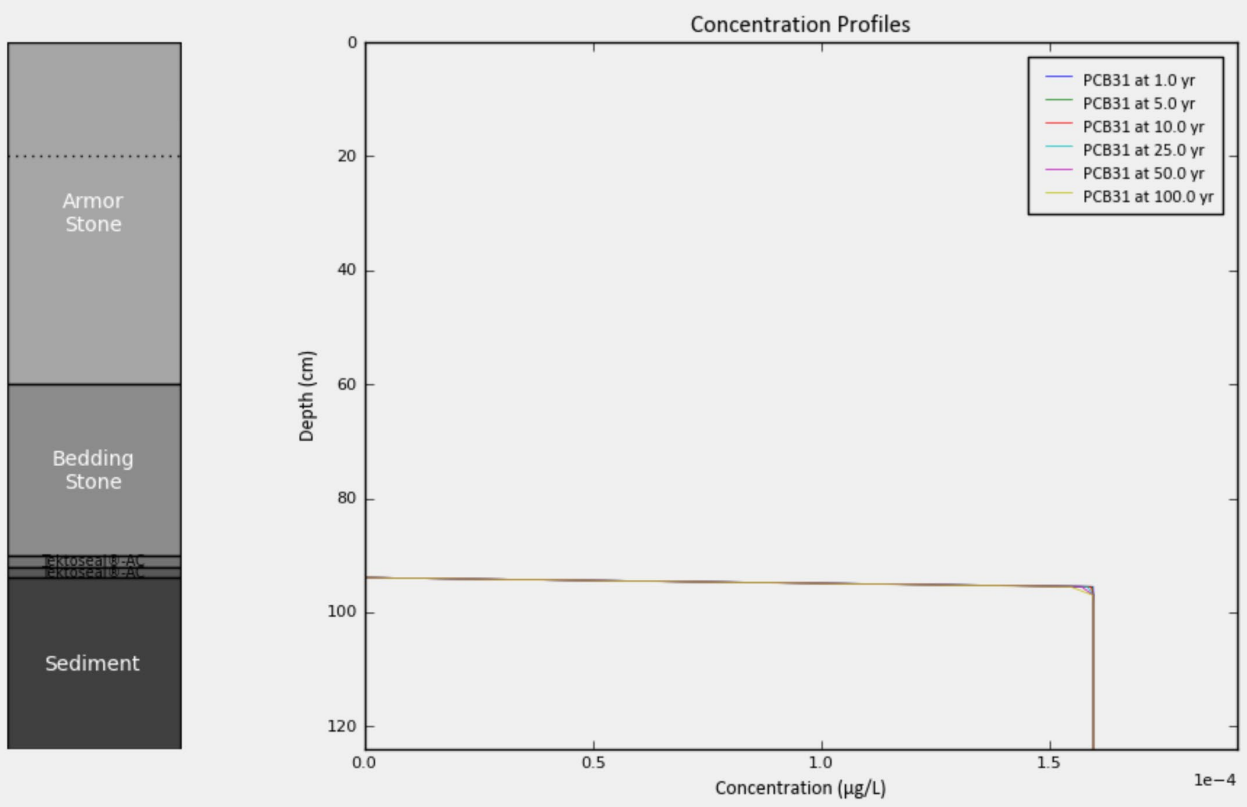

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Manganese at 1.0 yr
Manganese at 5.0 yr
Manganese at 10.0 yr
Manganese at 25.0 yr
Manganese at 50.0 yr
Manganese at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e4
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4

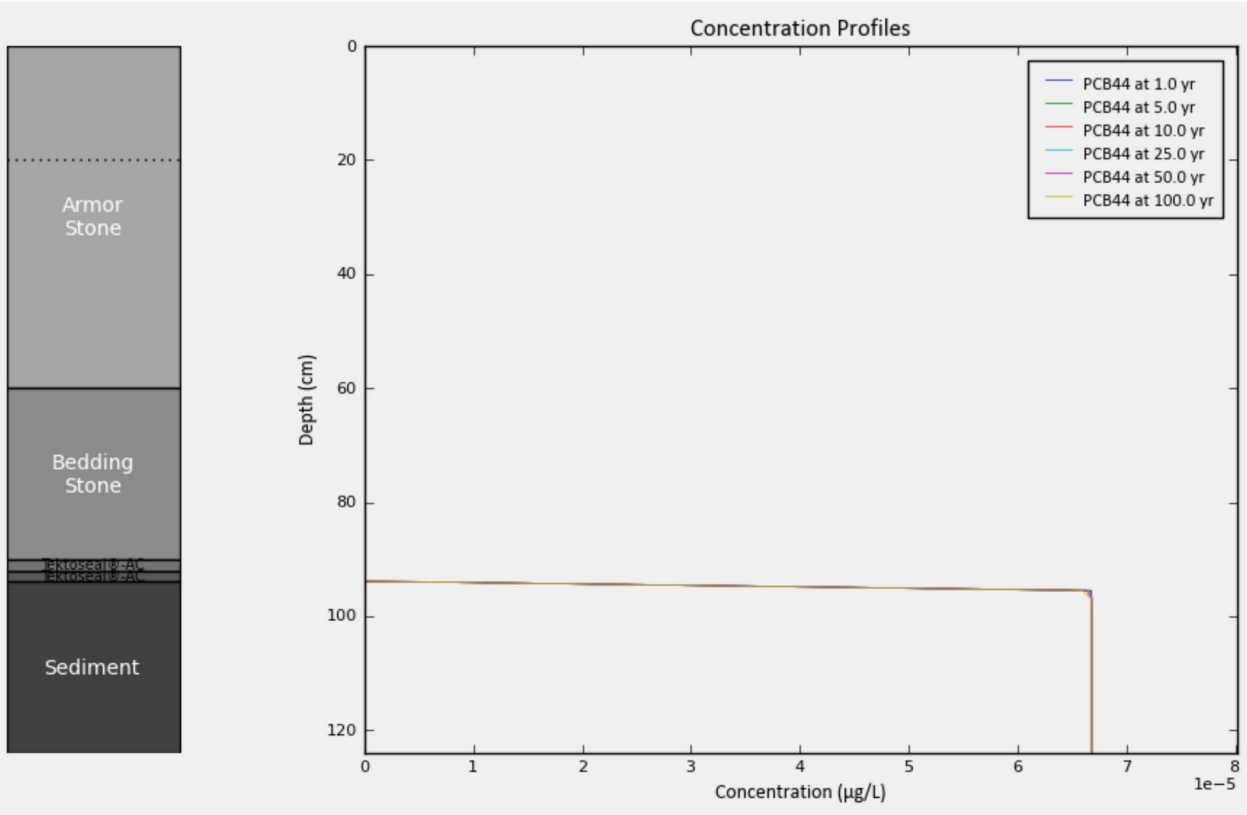

Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® AC
Tekoseal® AC
Sediment
Depth (cm)
Concentration (µg/L)
Mercury at 1.0 yr
Mercury at 5.0 yr
Mercury at 10.0 yr
Mercury at 25.0 yr
Mercury at 50.0 yr
Mercury at 100.0 yr
0
20
40
60
80
100
120
0.0
0.1
0.2
0.3
0.4
0.5

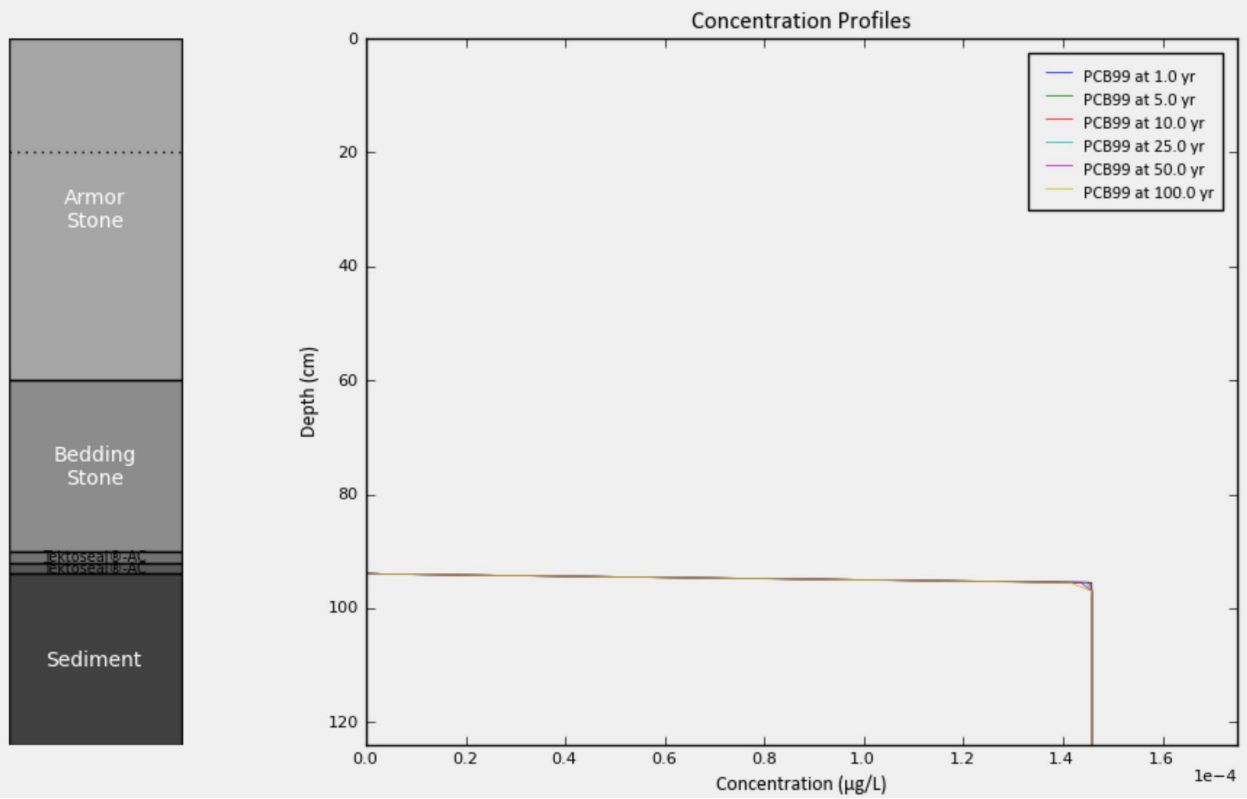

Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® AC
Tekoseal® AC
Sediment
Depth (cm)
Concentration (µg/L)
Naphthalene at 1.0 yr
Naphthalene at 5.0 yr
Naphthalene at 10.0 yr
Naphthalene at 25.0 yr
Naphthalene at 50.0 yr
Naphthalene at 100.0 yr
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0

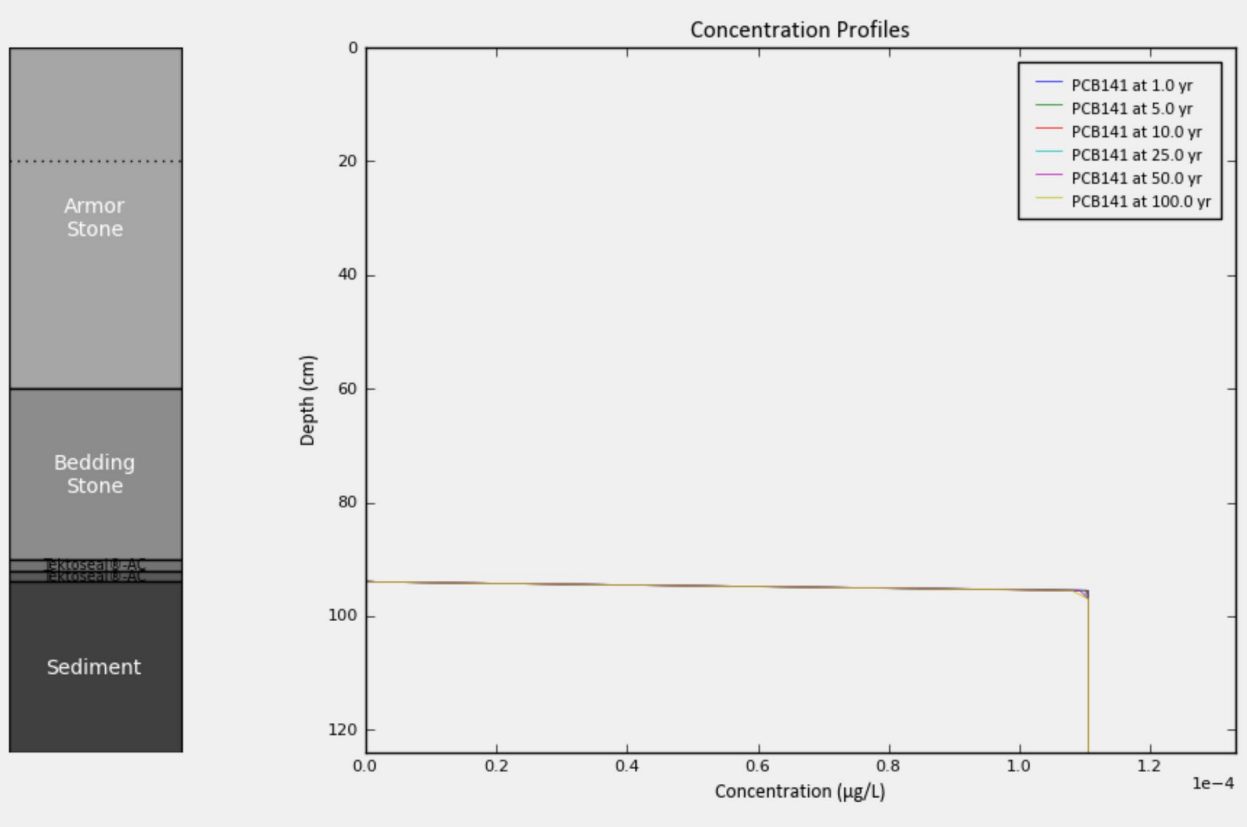

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB1 at 1.0 yr
PCB1 at 5.0 yr
PCB1 at 10.0 yr
PCB1 at 25.0 yr
PCB1 at 50.0 yr
PCB1 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.00
0.01
0.02
0.03
0.04
0.05

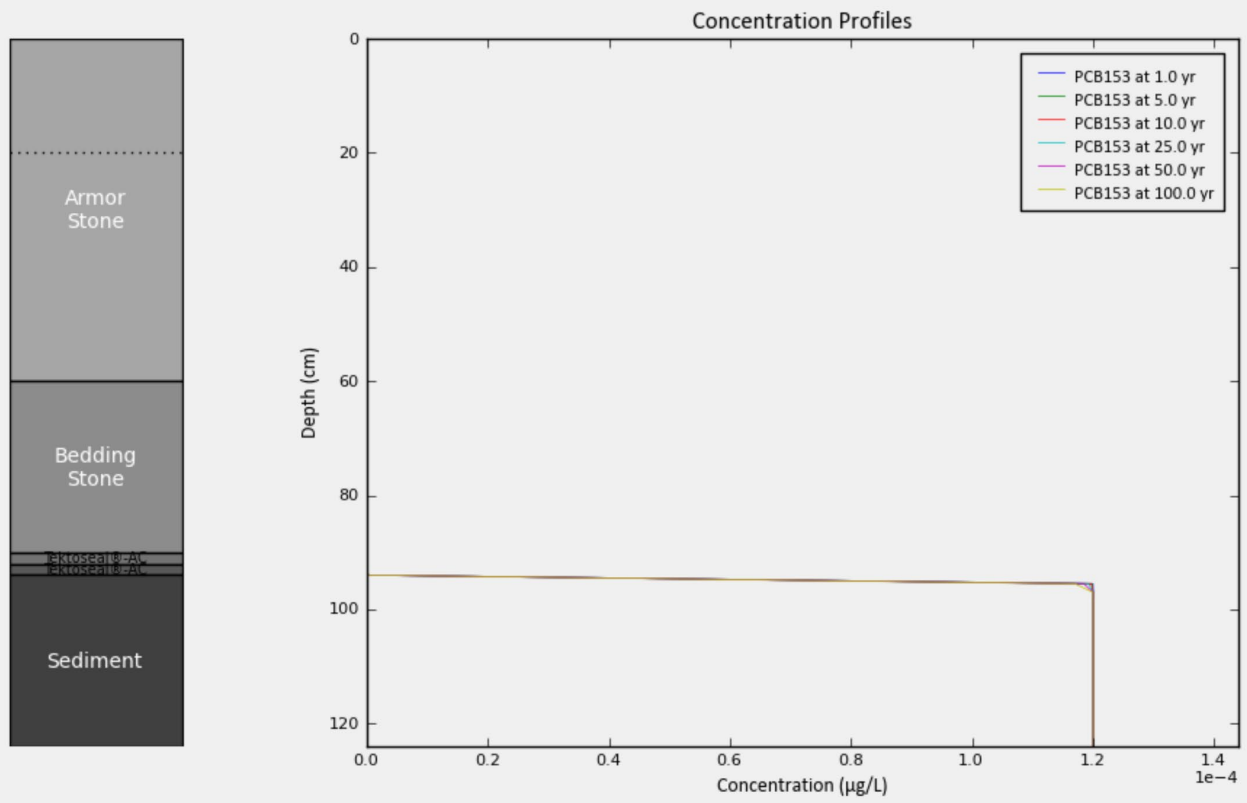

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB15 at 1.0 yr
PCB15 at 5.0 yr
PCB15 at 10.0 yr
PCB15 at 25.0 yr
PCB15 at 50.0 yr
PCB15 at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
0.0025
0.0030

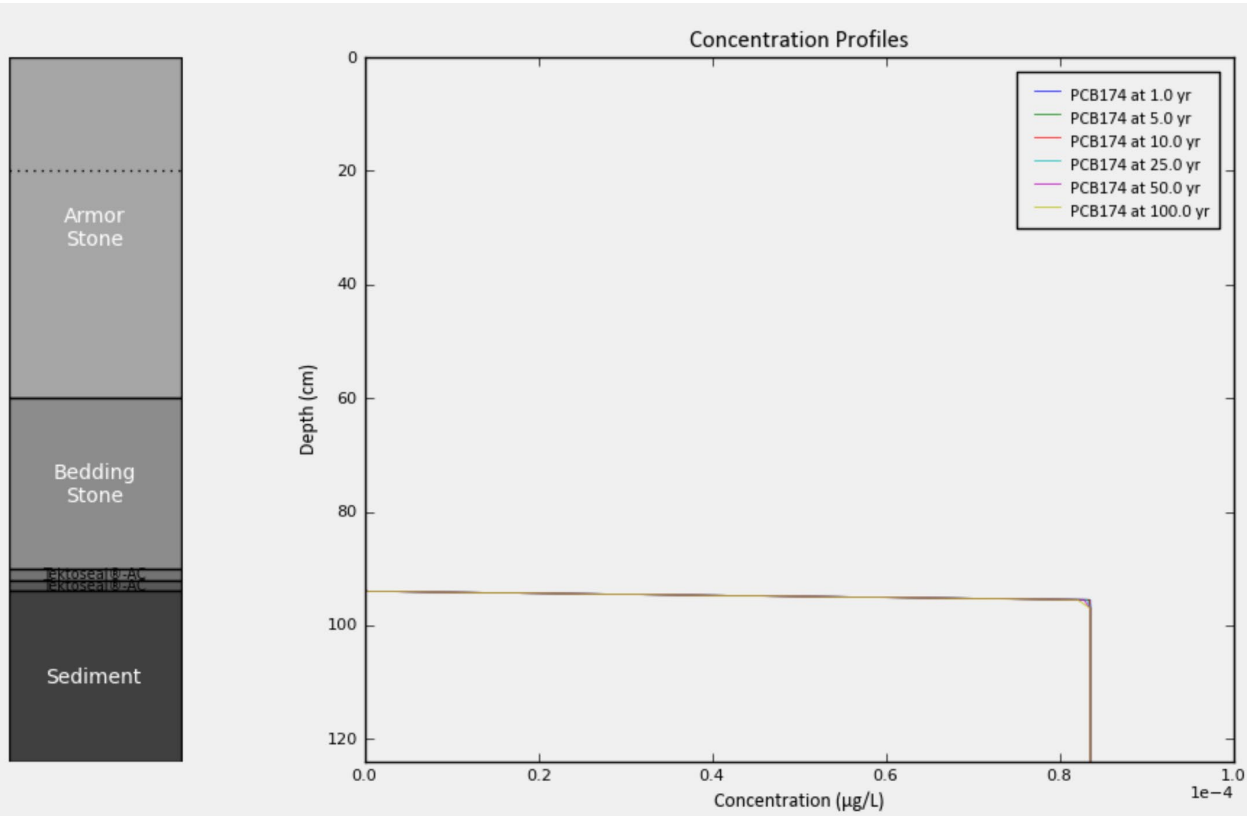

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB31 at 1.0 yr
PCB31 at 5.0 yr
PCB31 at 10.0 yr
PCB31 at 25.0 yr
PCB31 at 50.0 yr
PCB31 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

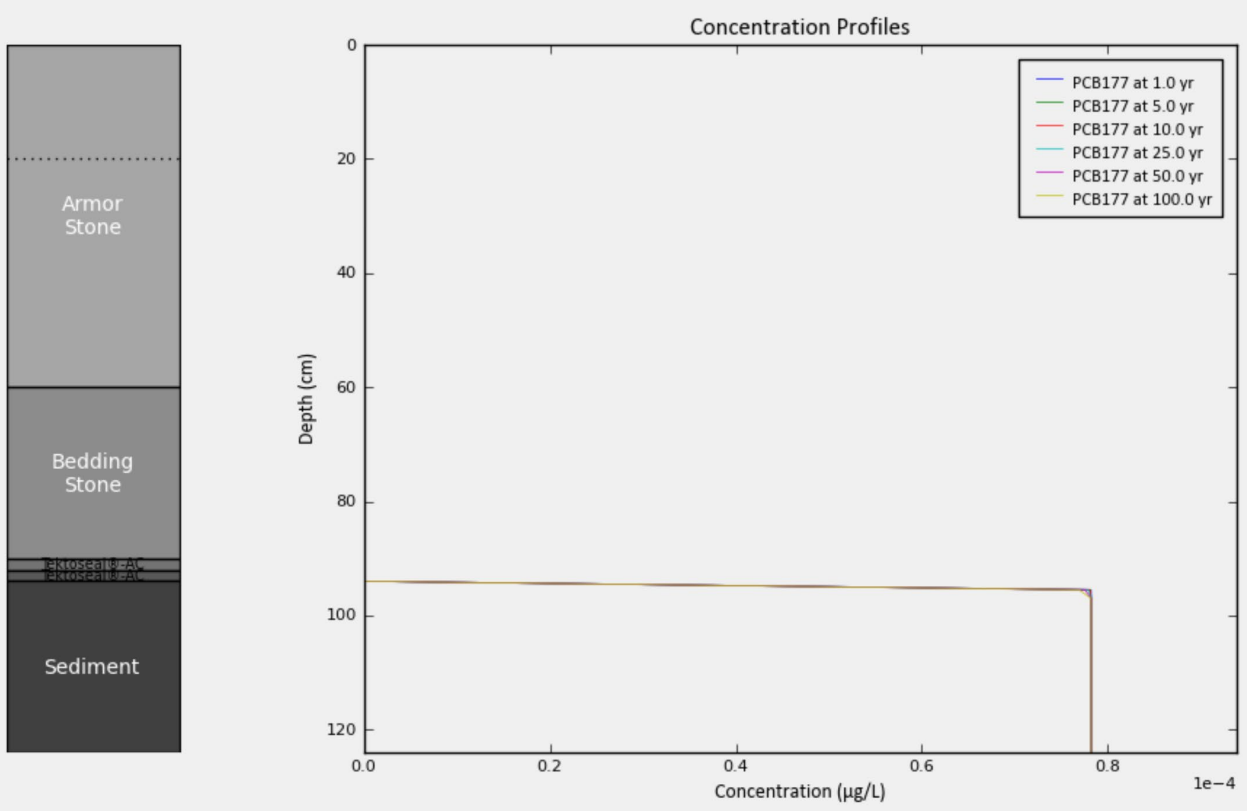

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB44 at 1.0 yr
PCB44 at 5.0 yr
PCB44 at 10.0 yr
PCB44 at 25.0 yr
PCB44 at 50.0 yr
PCB44 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

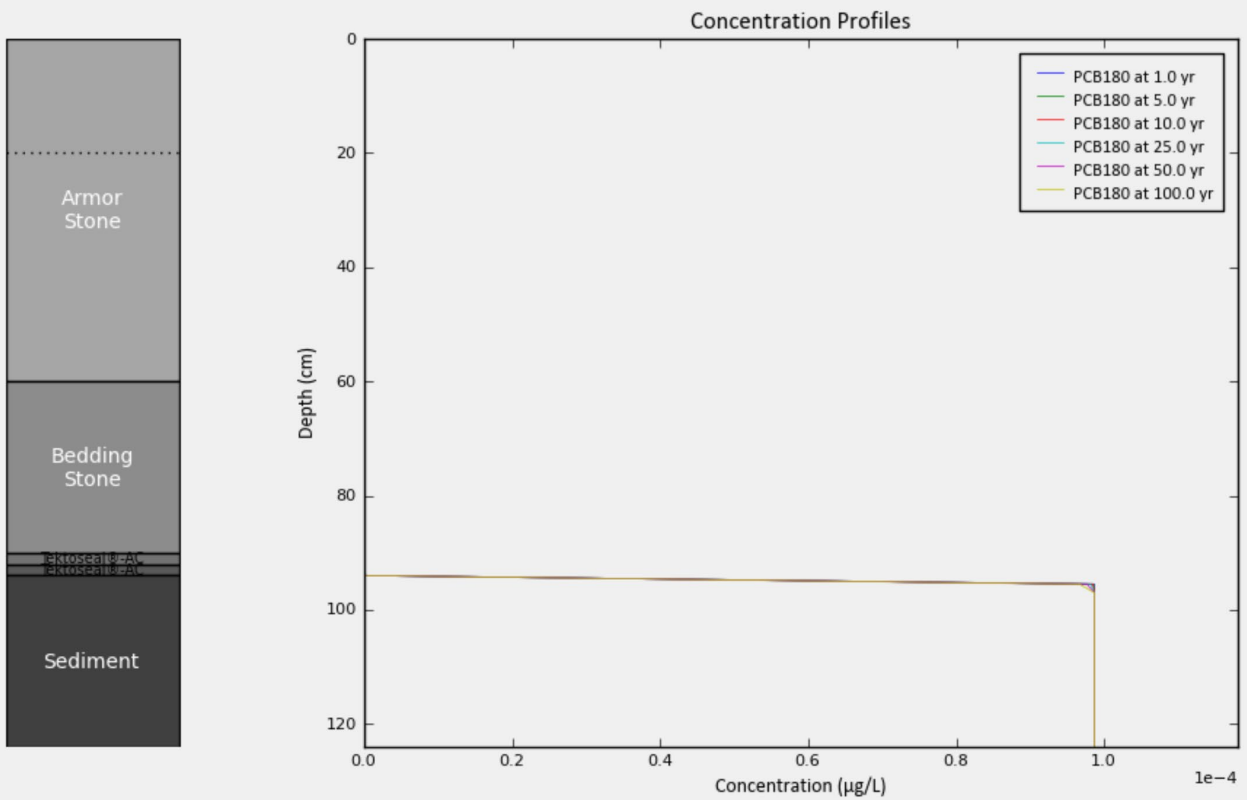

Armor Stone
Bedding Stone
Ecoseal II AC
Ecoseal II AC
Sediment
Concentration Profiles
PCB99 at 1.0 yr
PCB99 at 5.0 yr
PCB99 at 10.0 yr
PCB99 at 25.0 yr
PCB99 at 50.0 yr
PCB99 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

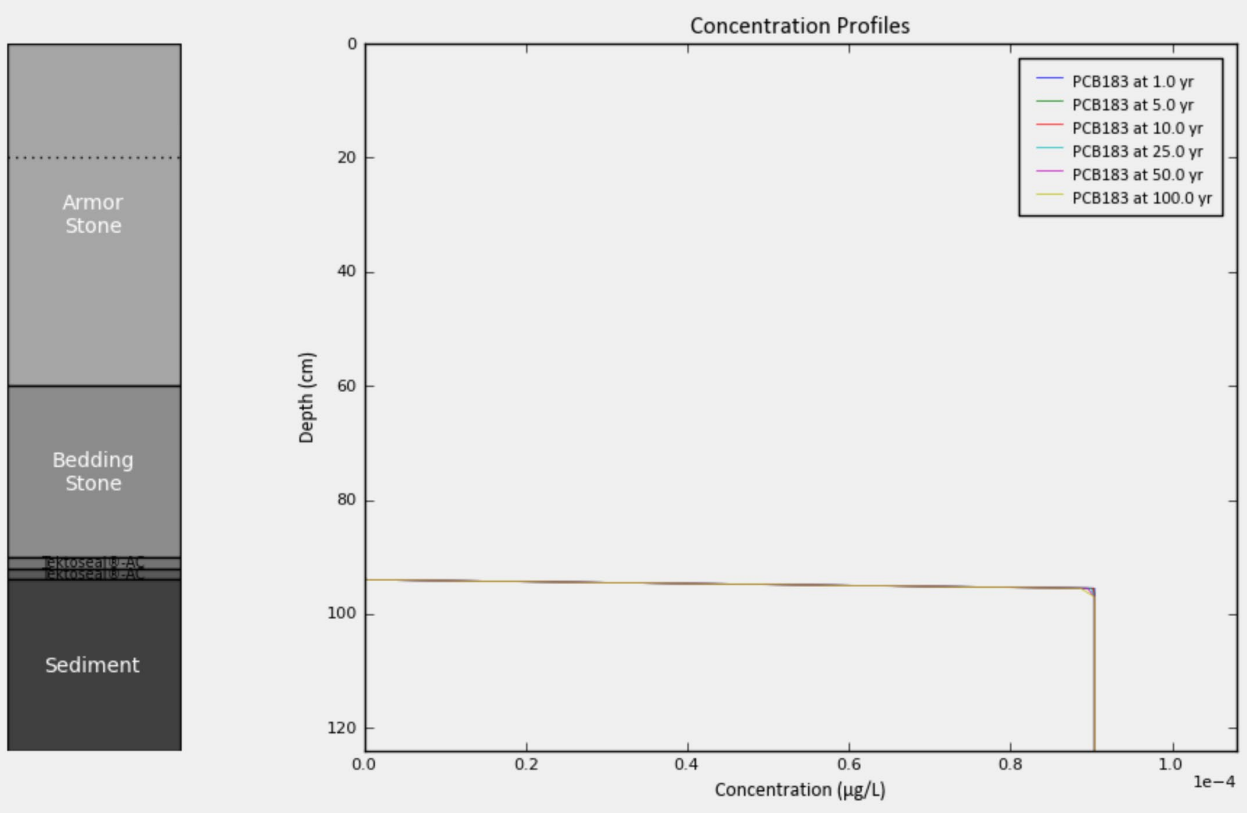

Armor Stone
Bedding Stone
Ecoseal II AC
Ecoseal II AC
Sediment
Concentration Profiles
PCB141 at 1.0 yr
PCB141 at 5.0 yr
PCB141 at 10.0 yr
PCB141 at 25.0 yr
PCB141 at 50.0 yr
PCB141 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

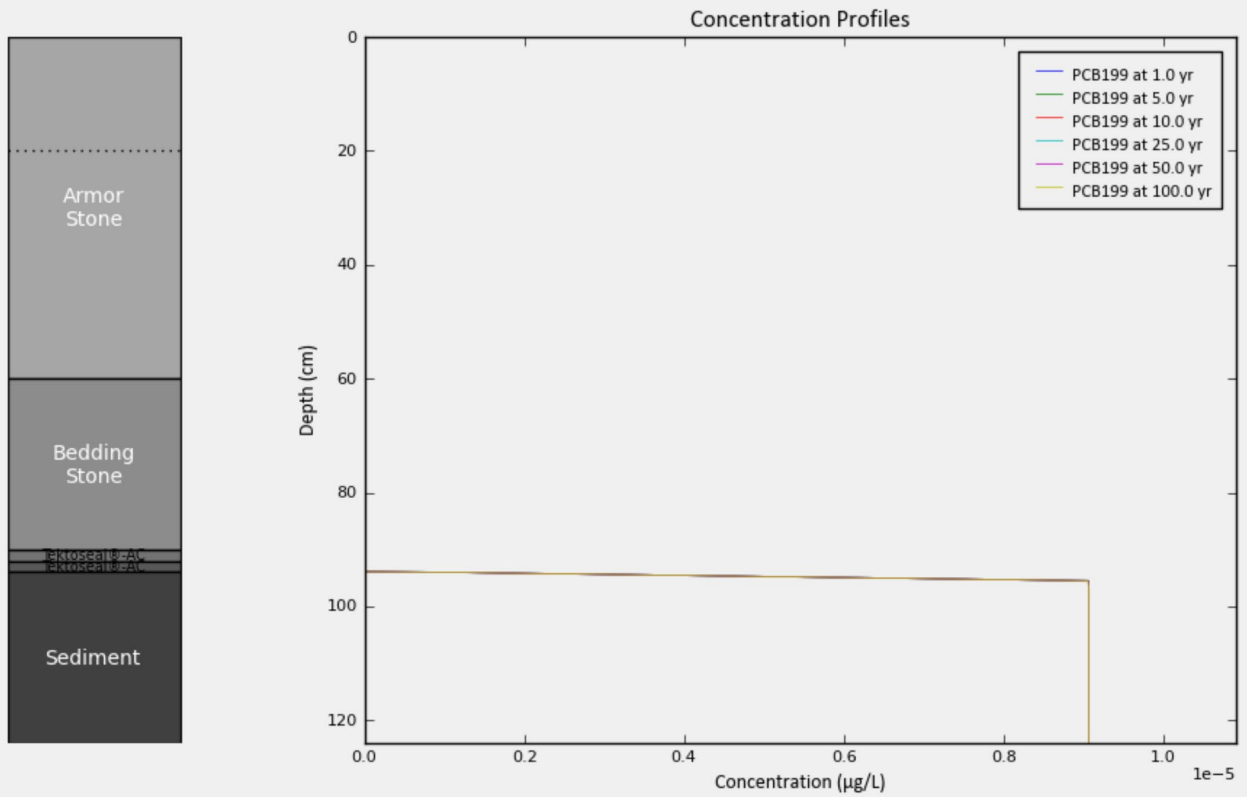

Armor Stone
Bedding Stone
Ecoseal PAC
Ecoseal PAC
Sediment
Concentration Profiles
PCB153 at 1.0 yr
PCB153 at 5.0 yr
PCB153 at 10.0 yr
PCB153 at 25.0 yr
PCB153 at 50.0 yr
PCB153 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1e−4
Concentration (µg/L)

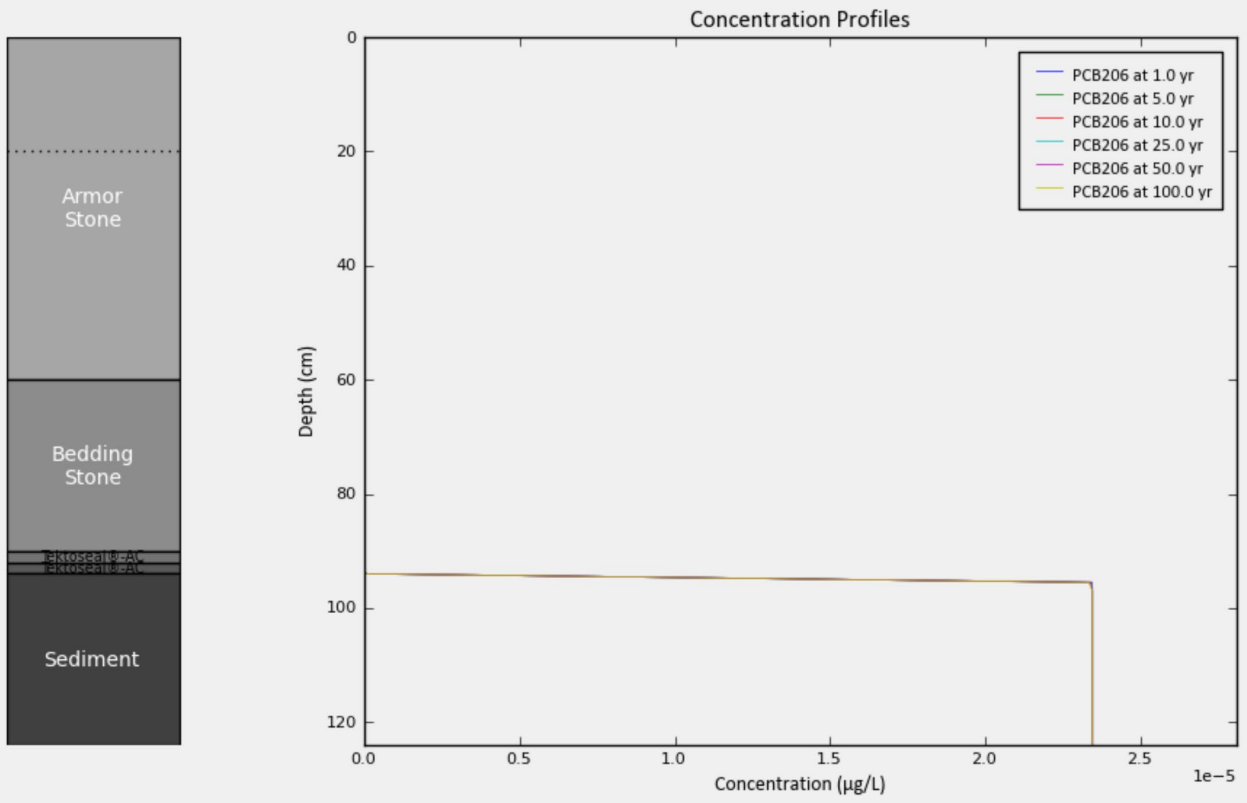

Armor Stone
Bedding Stone
Ecoseal PAC
Ecoseal PAC
Sediment
Concentration Profiles
PCB174 at 1.0 yr
PCB174 at 5.0 yr
PCB174 at 10.0 yr
PCB174 at 25.0 yr
PCB174 at 50.0 yr
PCB174 at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e−4
Concentration (µg/L)

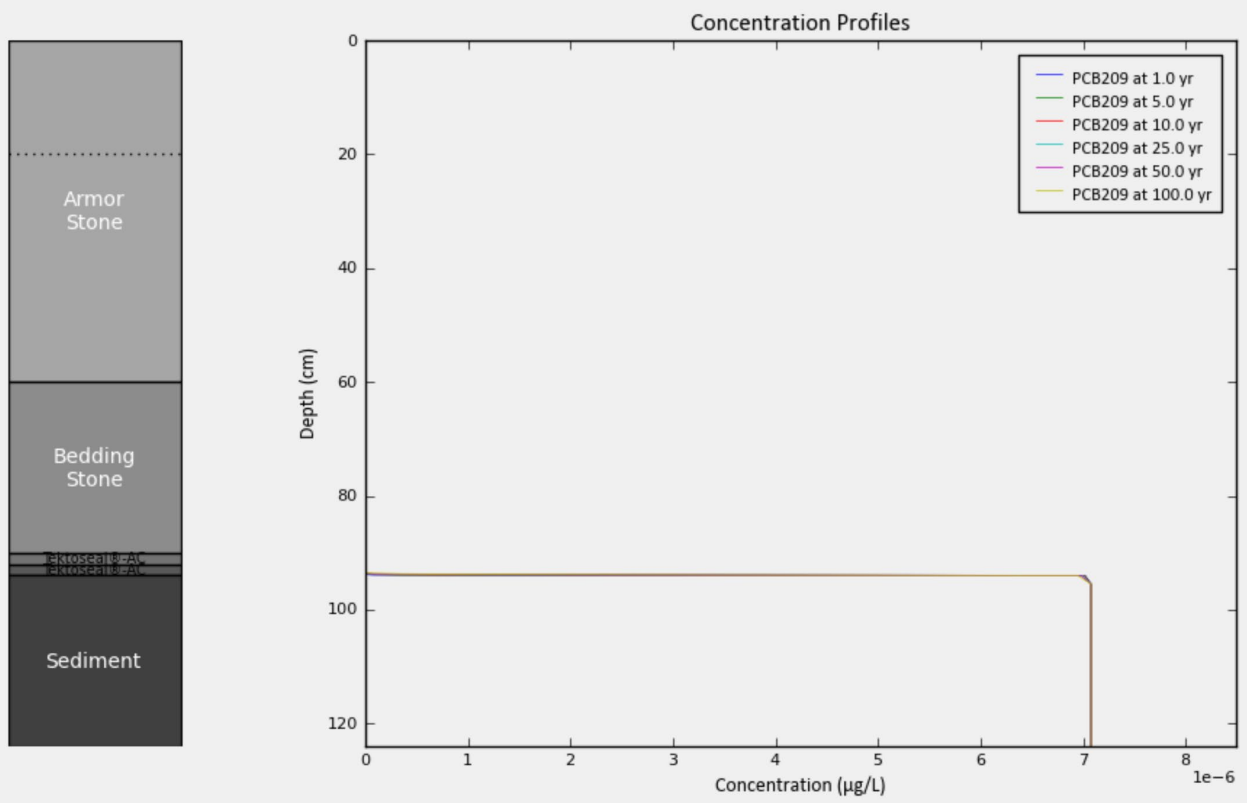

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB177 at 1.0 yr
PCB177 at 5.0 yr
PCB177 at 10.0 yr
PCB177 at 25.0 yr
PCB177 at 50.0 yr
PCB177 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

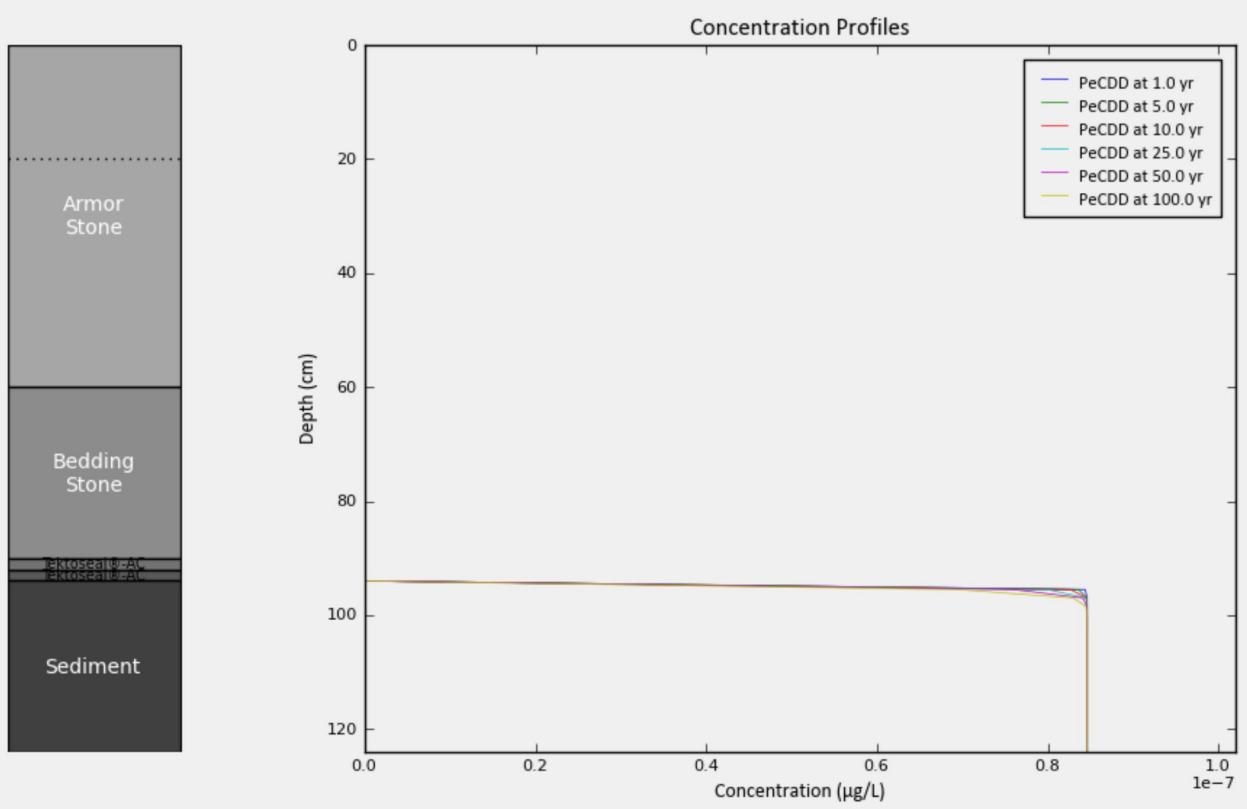

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB180 at 1.0 yr
PCB180 at 5.0 yr
PCB180 at 10.0 yr
PCB180 at 25.0 yr
PCB180 at 50.0 yr
PCB180 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

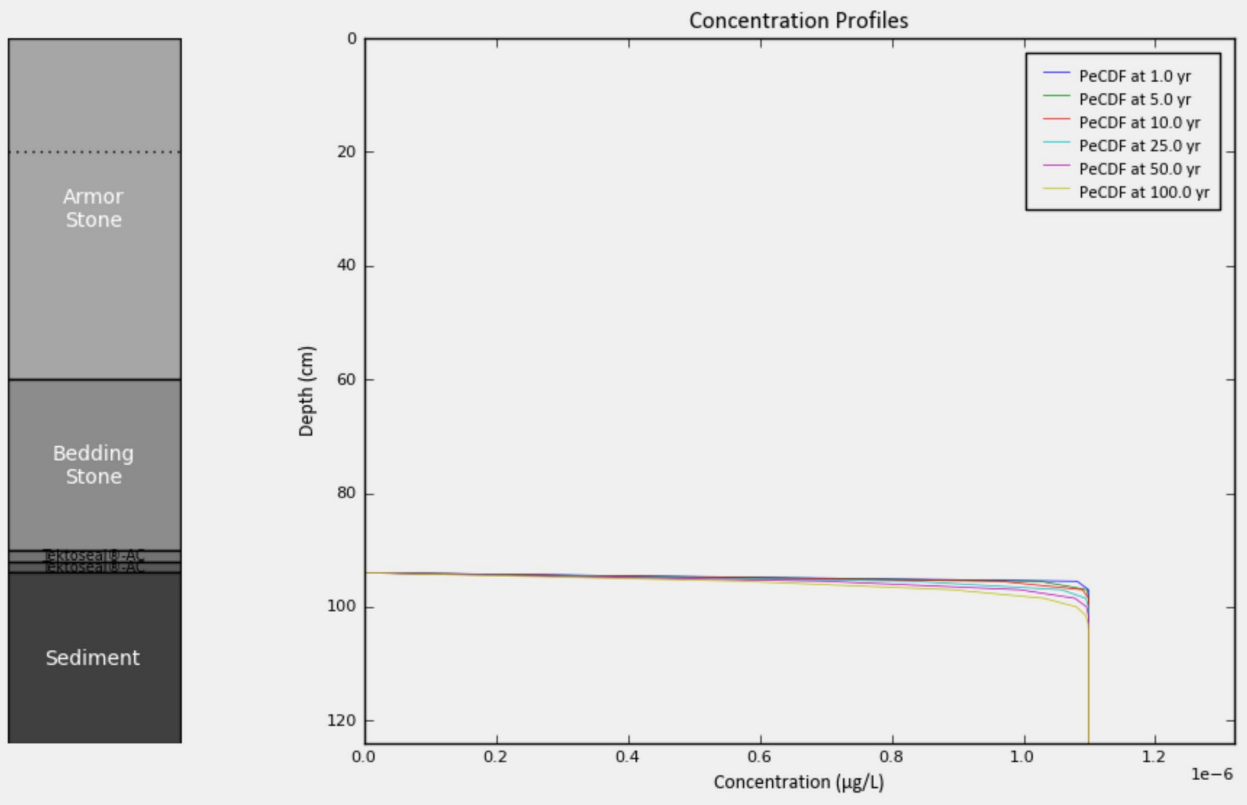

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB183 at 1.0 yr
PCB183 at 5.0 yr
PCB183 at 10.0 yr
PCB183 at 25.0 yr
PCB183 at 50.0 yr
PCB183 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−4

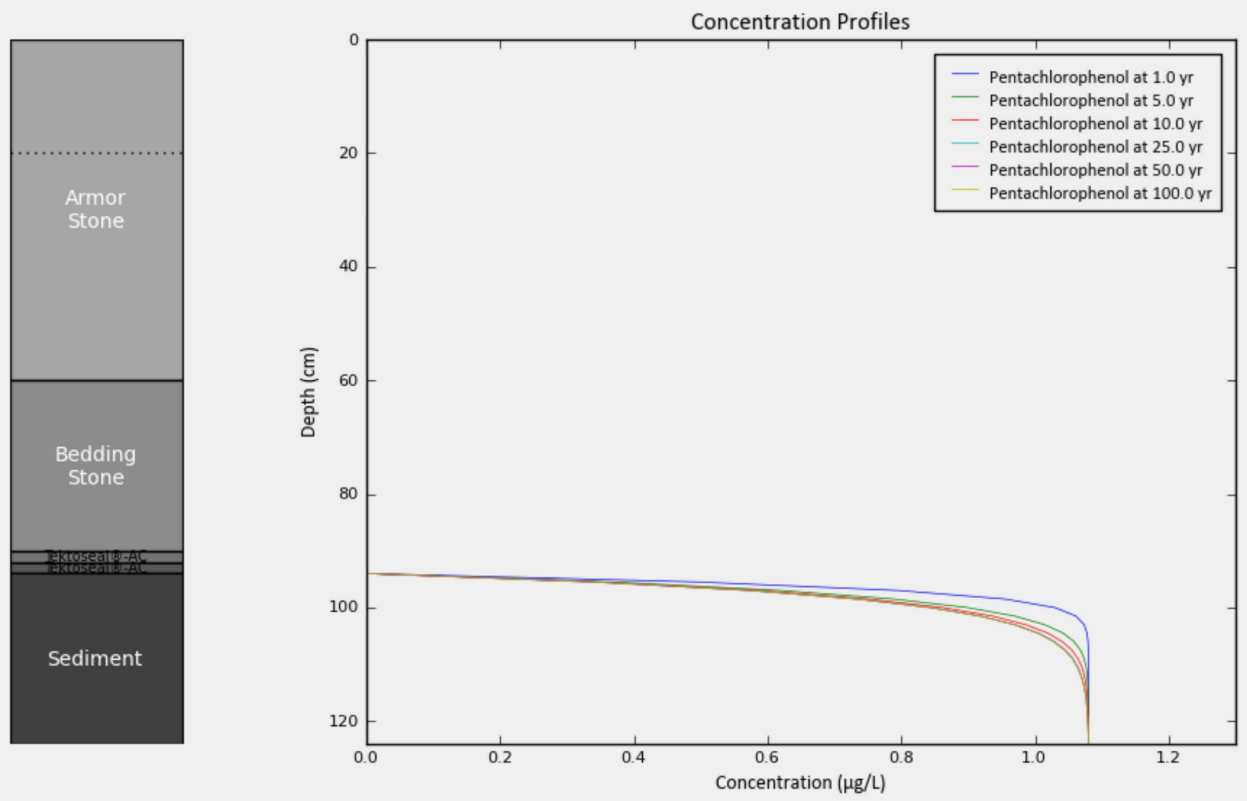

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB199 at 1.0 yr
PCB199 at 5.0 yr
PCB199 at 10.0 yr
PCB199 at 25.0 yr
PCB199 at 50.0 yr
PCB199 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

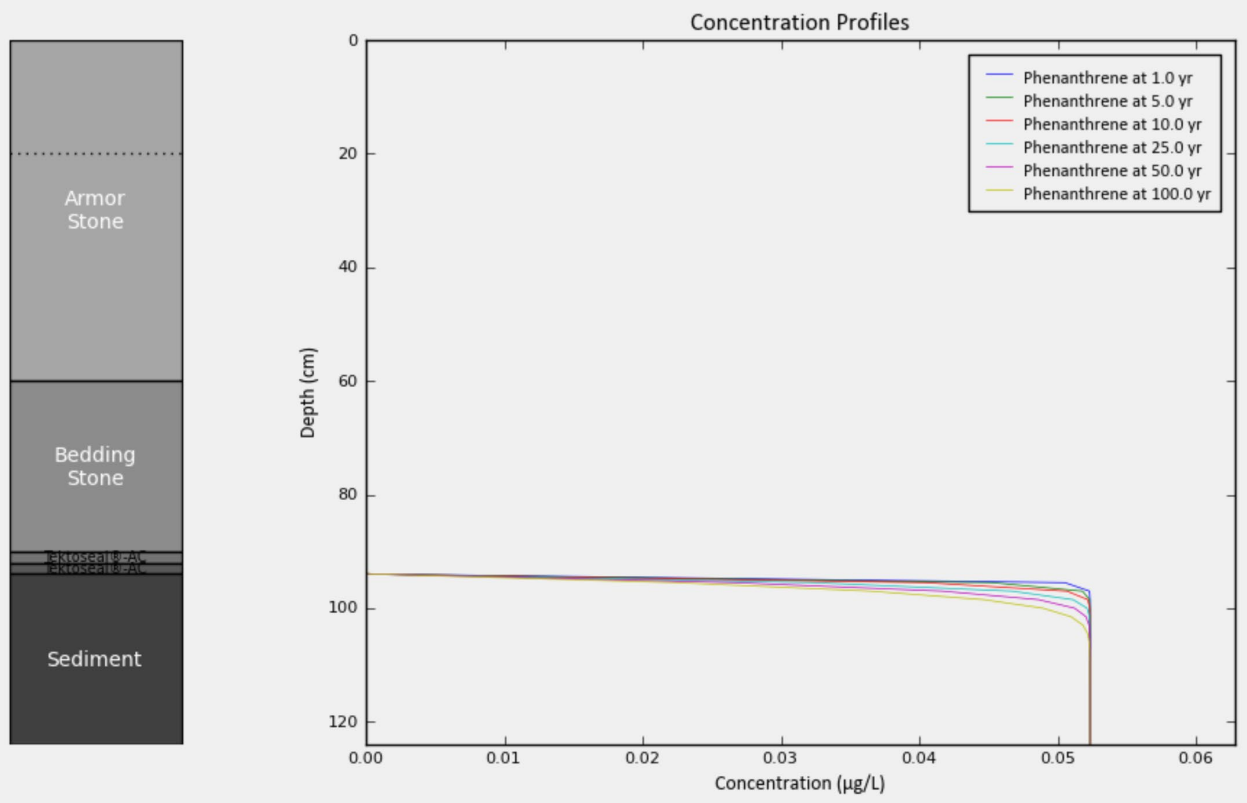

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB206 at 1.0 yr
PCB206 at 5.0 yr
PCB206 at 10.0 yr
PCB206 at 25.0 yr
PCB206 at 50.0 yr
PCB206 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−5

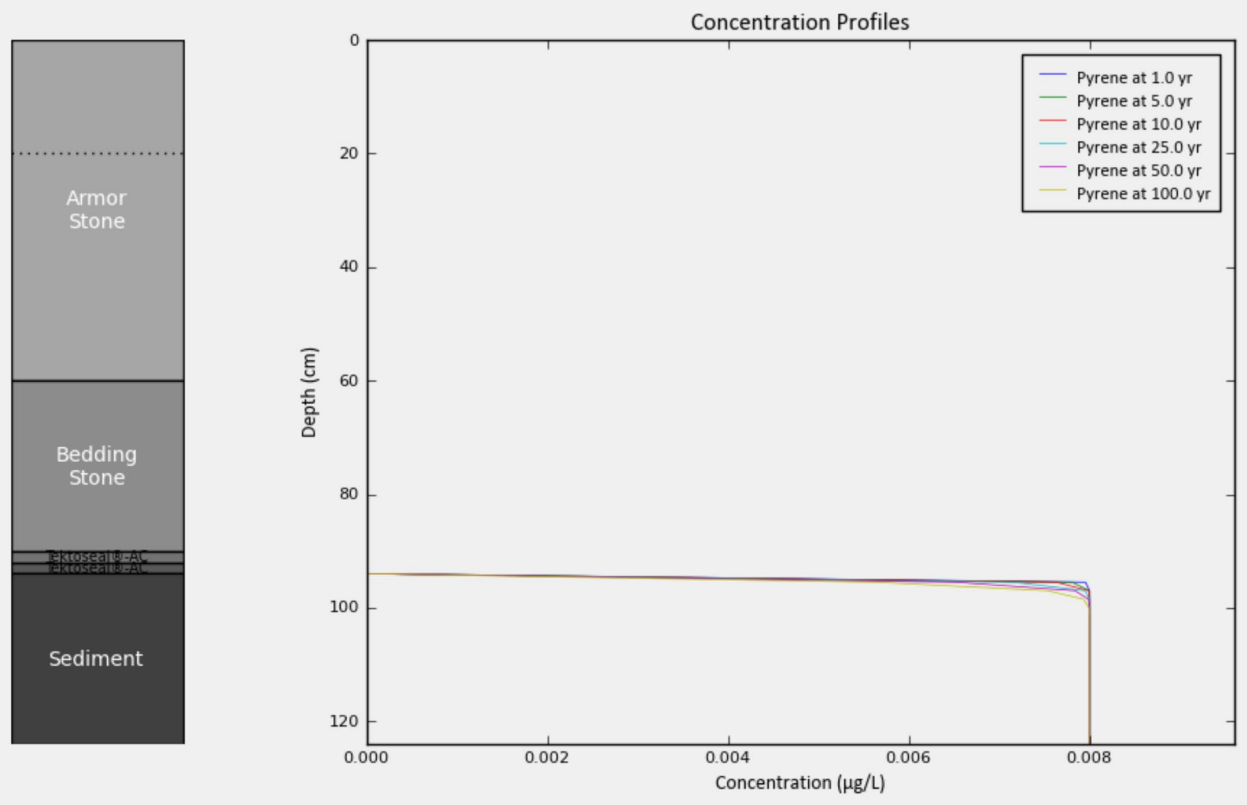

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PCB209 at 1.0 yr
PCB209 at 5.0 yr
PCB209 at 10.0 yr
PCB209 at 25.0 yr
PCB209 at 50.0 yr
PCB209 at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

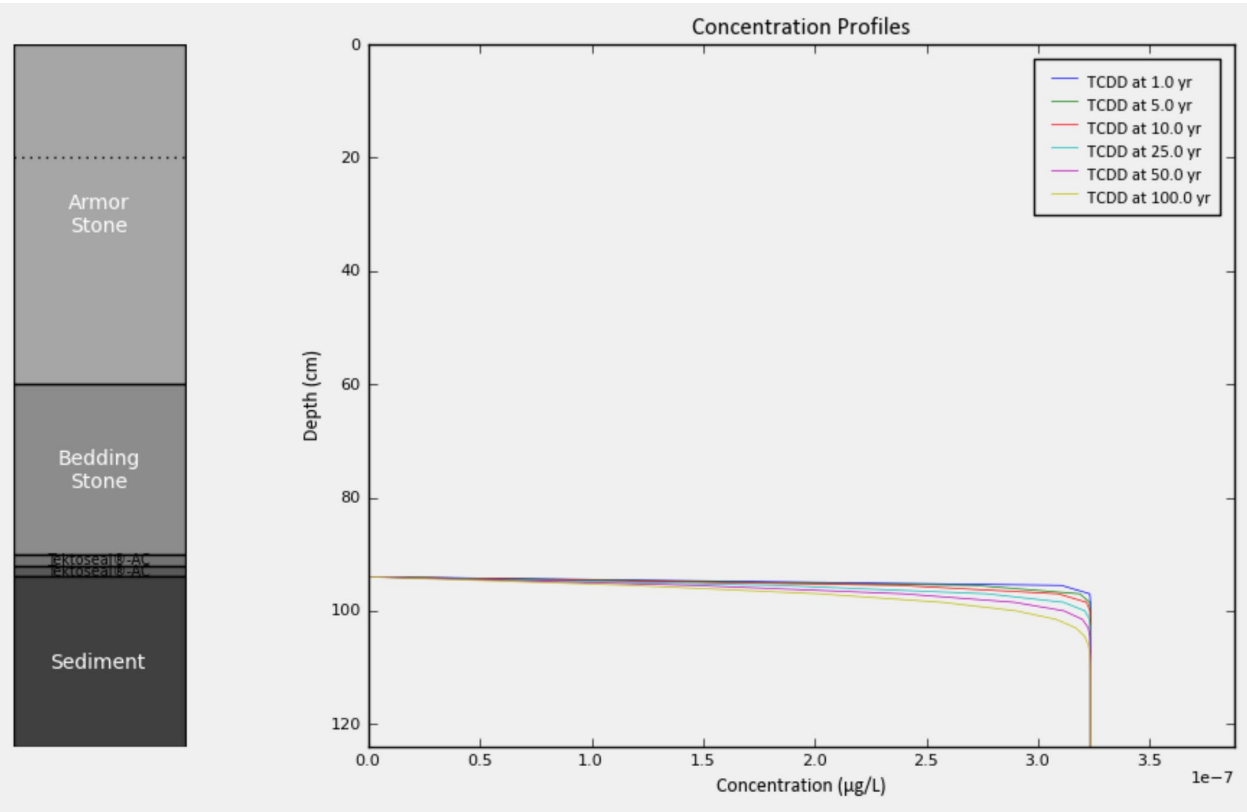

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PeCDD at 1.0 yr
PeCDD at 5.0 yr
PeCDD at 10.0 yr
PeCDD at 25.0 yr
PeCDD at 50.0 yr
PeCDD at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−7

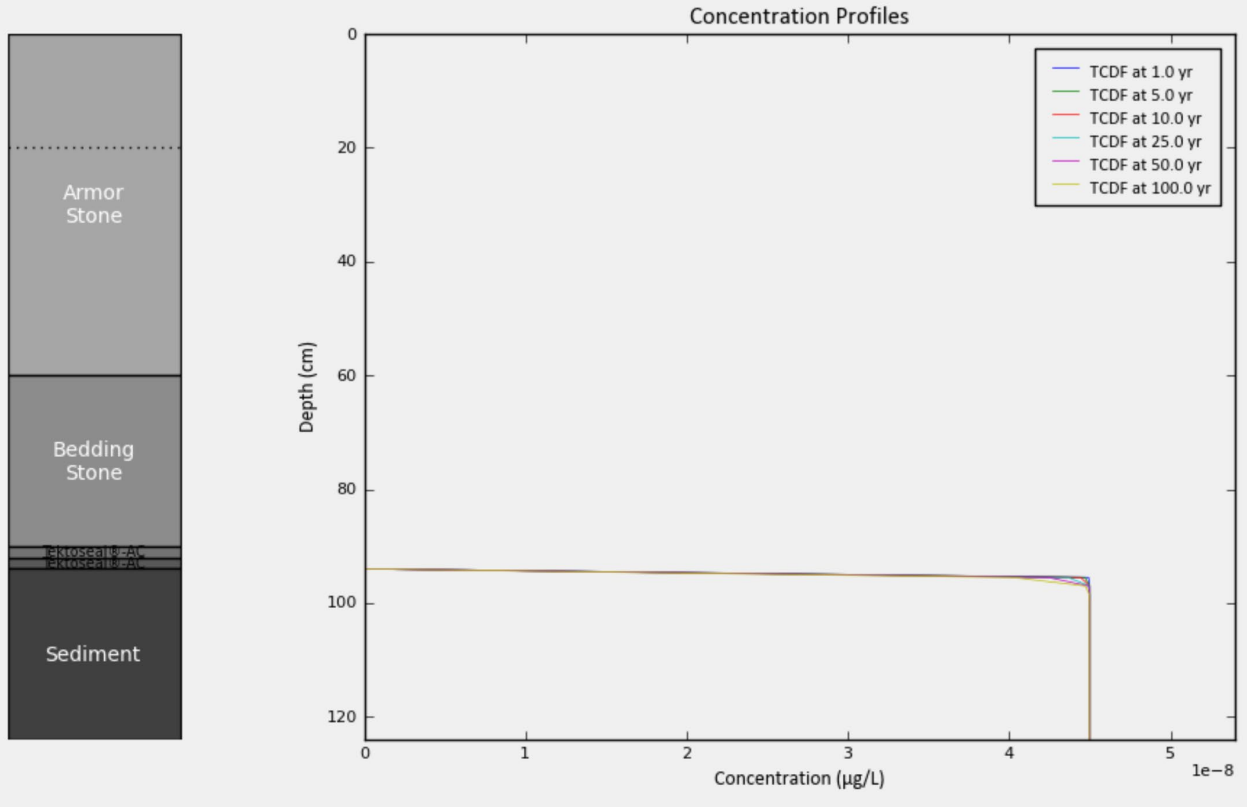

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
PeCDF at 1.0 yr
PeCDF at 5.0 yr
PeCDF at 10.0 yr
PeCDF at 25.0 yr
PeCDF at 50.0 yr
PeCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−6

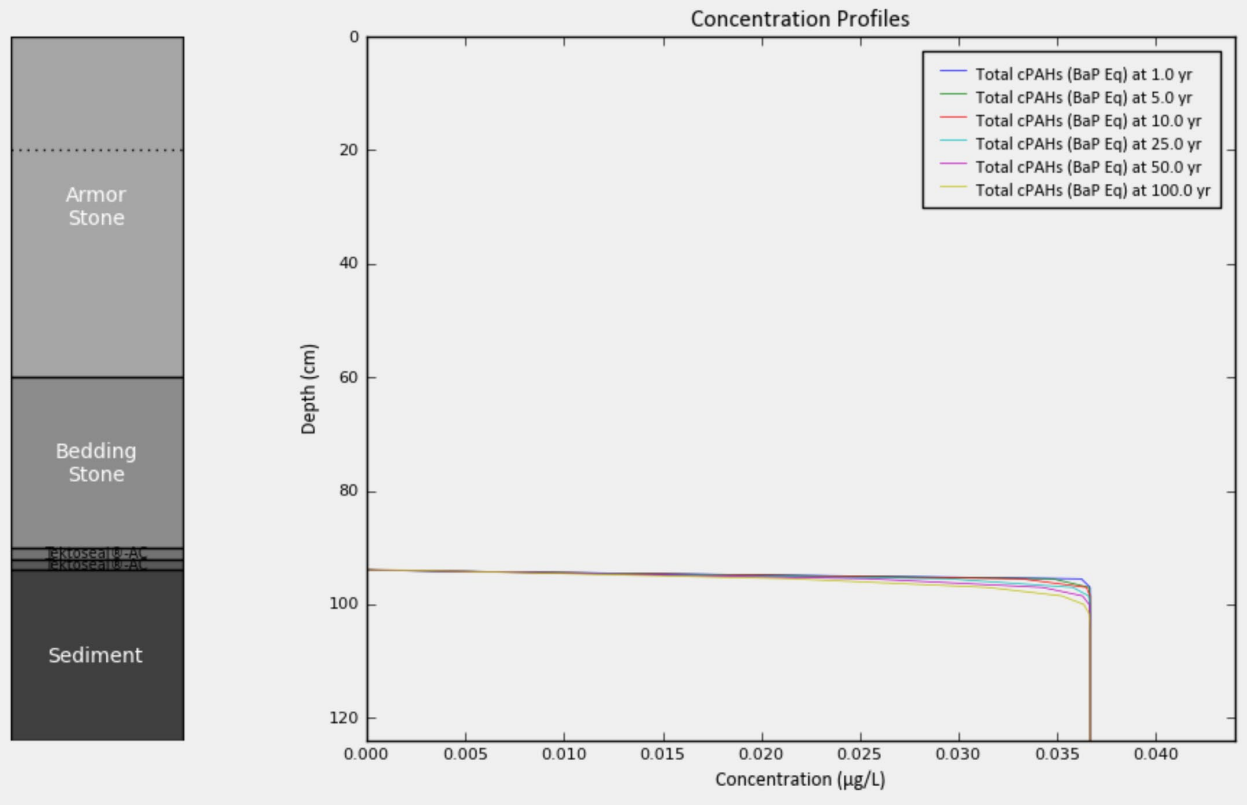

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Pentachlorophenol at 1.0 yr
Pentachlorophenol at 5.0 yr
Pentachlorophenol at 10.0 yr
Pentachlorophenol at 25.0 yr
Pentachlorophenol at 50.0 yr
Pentachlorophenol at 100.0 yr
Depth (cm)
Concentration (µg/L)

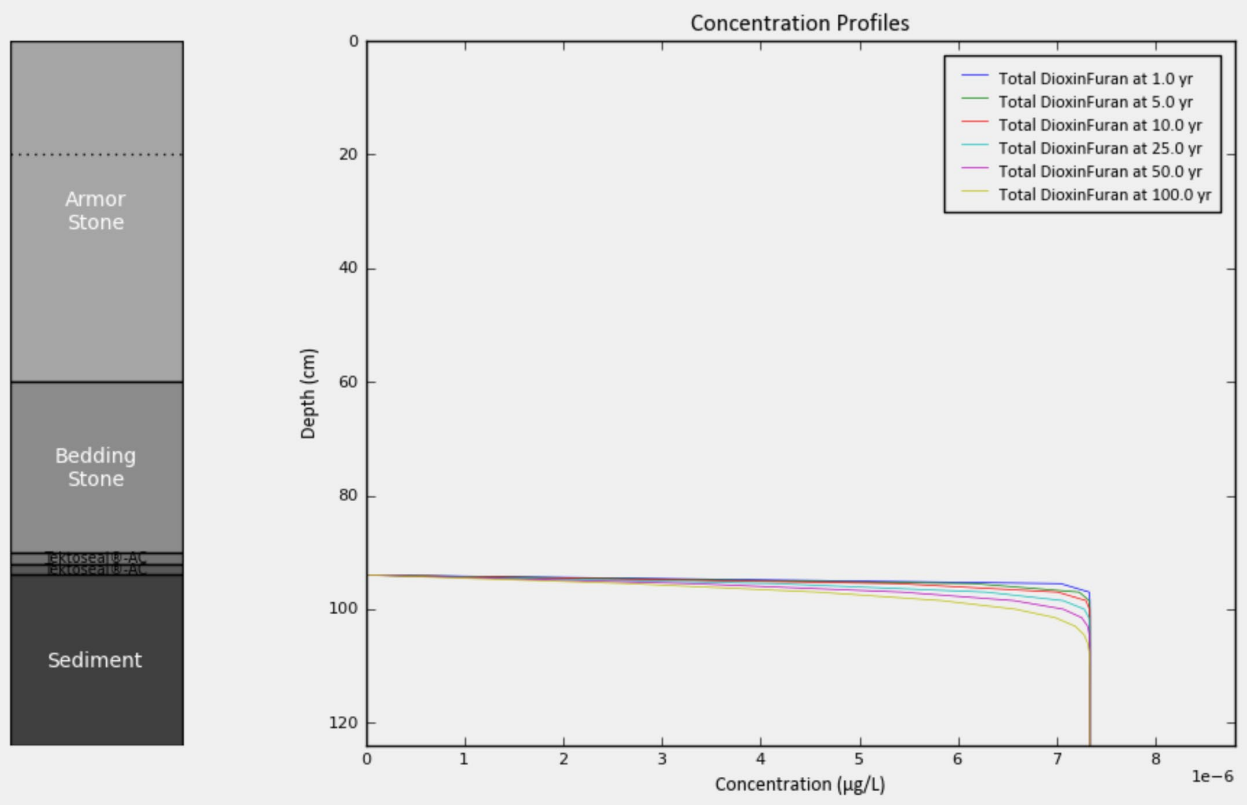

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Phenanthrene at 1.0 yr
Phenanthrene at 5.0 yr
Phenanthrene at 10.0 yr
Phenanthrene at 25.0 yr
Phenanthrene at 50.0 yr
Phenanthrene at 100.0 yr
Depth (cm)
Concentration (µg/L)

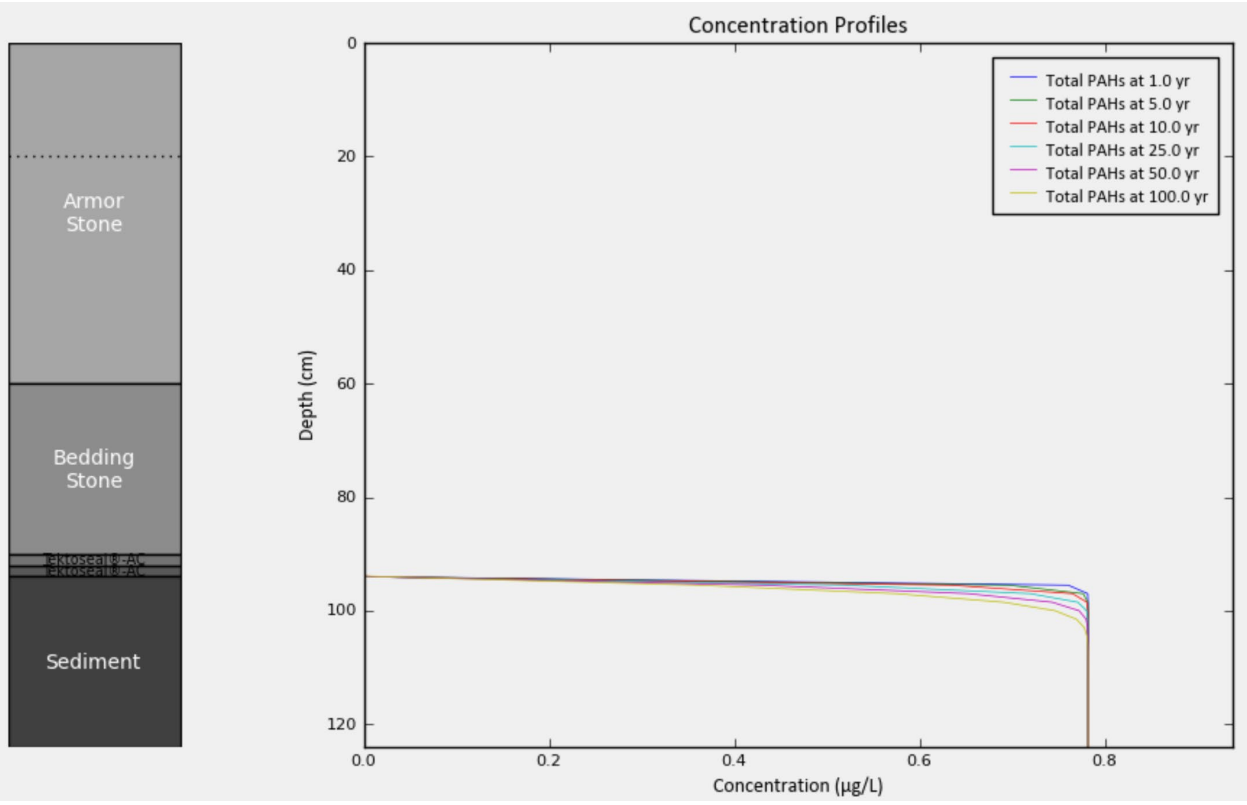

Armor Stone
Bedding Stone
Ekoseal® AC
Ekoseal® AC
Sediment
Concentration Profiles
Pyrene at 1.0 yr
Pyrene at 5.0 yr
Pyrene at 10.0 yr
Pyrene at 25.0 yr
Pyrene at 50.0 yr
Pyrene at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.000
0.002
0.004
0.006
0.008
Concentration (µg/L)

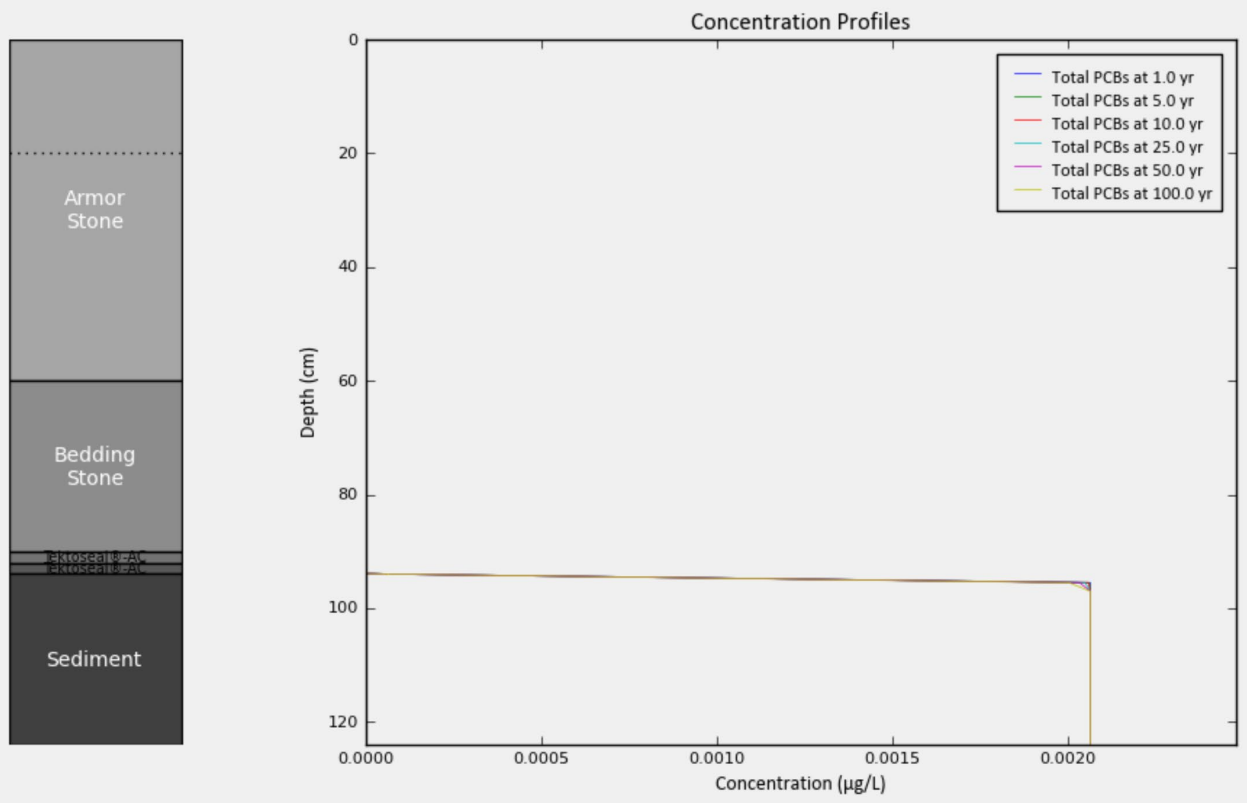

Armor Stone
Bedding Stone
Ekoseal® AC
Ekoseal® AC
Sediment
Concentration Profiles
TCDD at 1.0 yr
TCDD at 5.0 yr
TCDD at 10.0 yr
TCDD at 25.0 yr
TCDD at 50.0 yr
TCDD at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e−7
Concentration (µg/L)

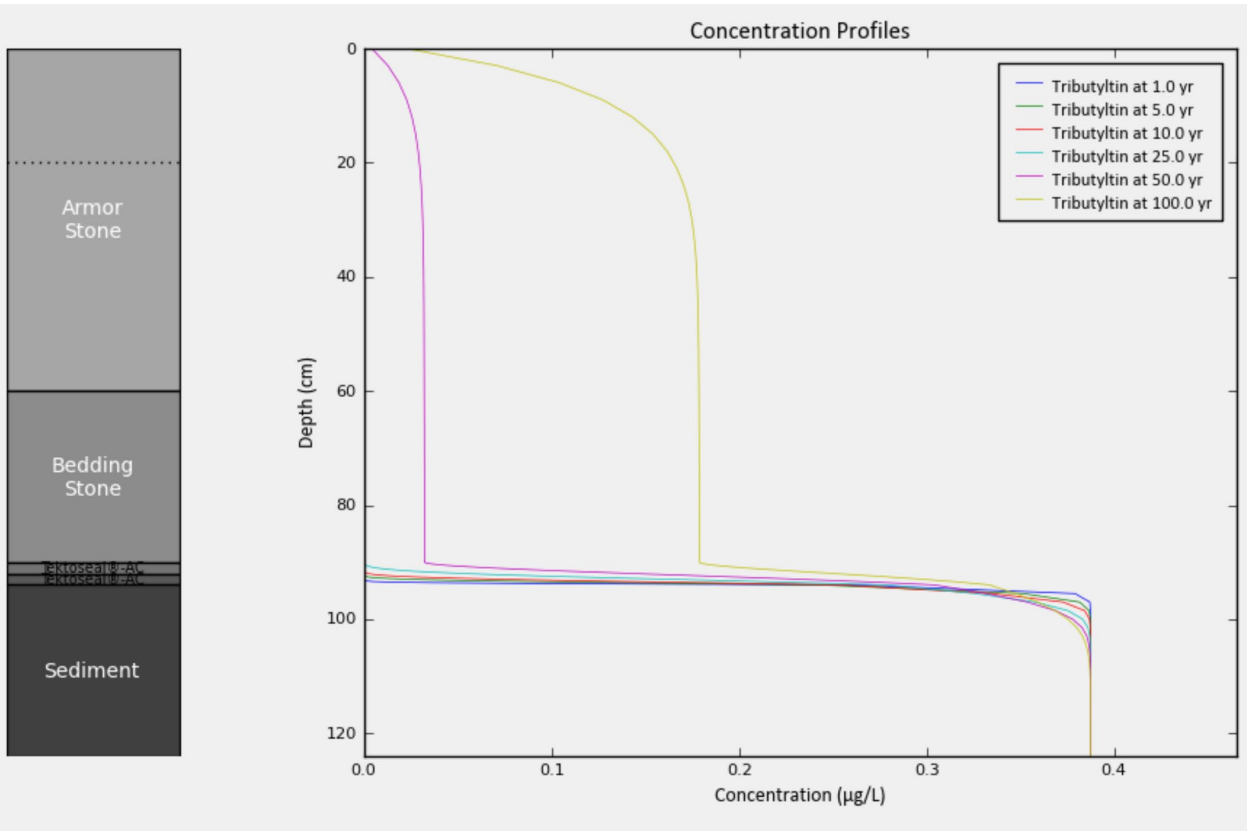

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
TCDF at 1.0 yr
TCDF at 5.0 yr
TCDF at 10.0 yr
TCDF at 25.0 yr
TCDF at 50.0 yr
TCDF at 100.0 yr
Depth (cm)
Concentration (µg/L)
1e−8

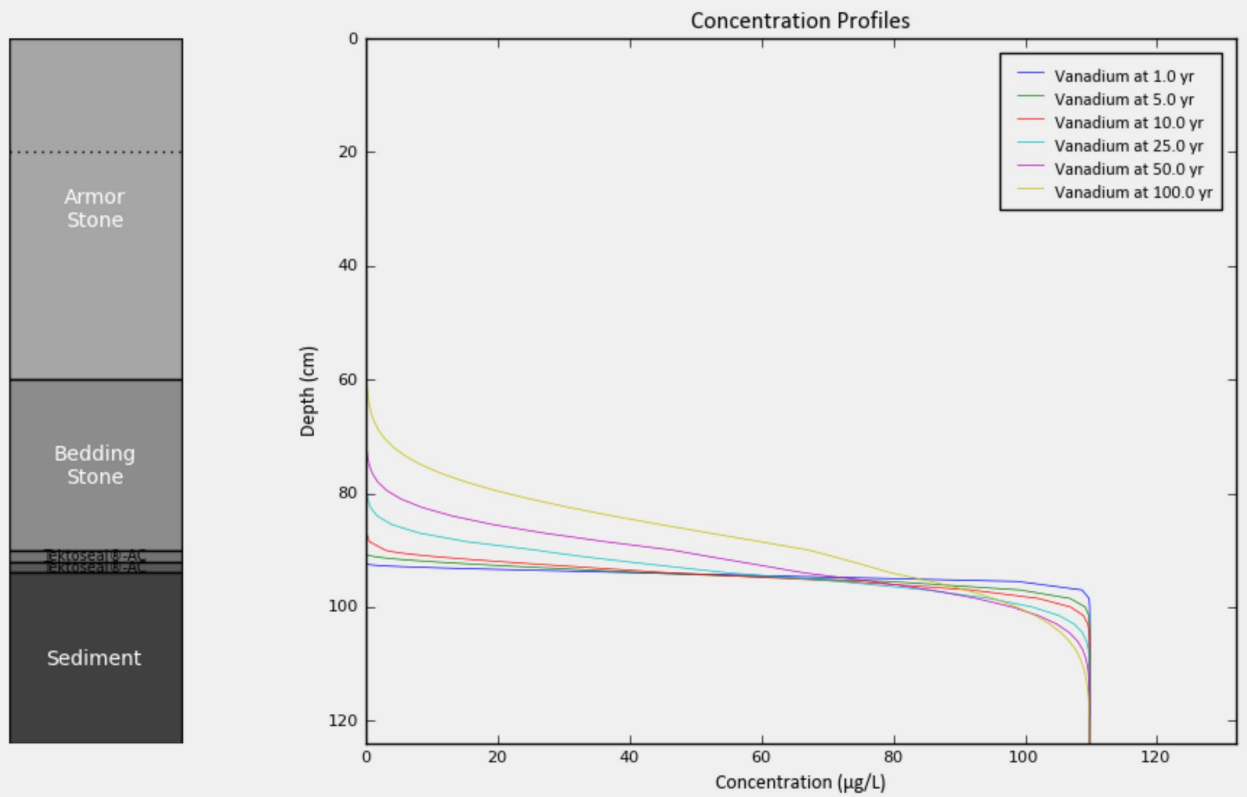

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Total cPAHs (BaP Eq) at 1.0 yr
Total cPAHs (BaP Eq) at 5.0 yr
Total cPAHs (BaP Eq) at 10.0 yr
Total cPAHs (BaP Eq) at 25.0 yr
Total cPAHs (BaP Eq) at 50.0 yr
Total cPAHs (BaP Eq) at 100.0 yr
Depth (cm)
Concentration (µg/L)

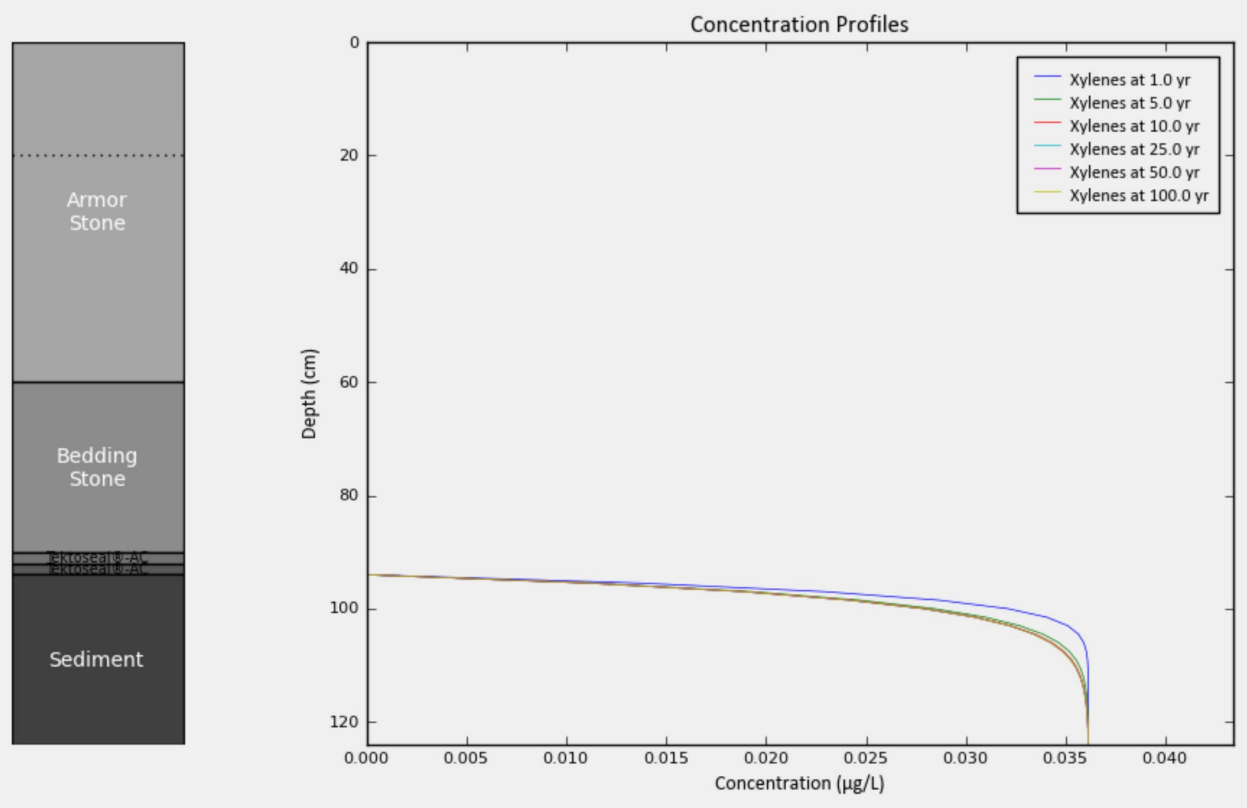

Armor Stone
Bedding Stone
Ekoseal PAC
Ekoseal PAC
Sediment
Concentration Profiles
Total DioxinFuran at 1.0 yr
Total DioxinFuran at 5.0 yr
Total DioxinFuran at 10.0 yr
Total DioxinFuran at 25.0 yr
Total DioxinFuran at 50.0 yr
Total DioxinFuran at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
7
8
1e−6
Concentration (µg/L)

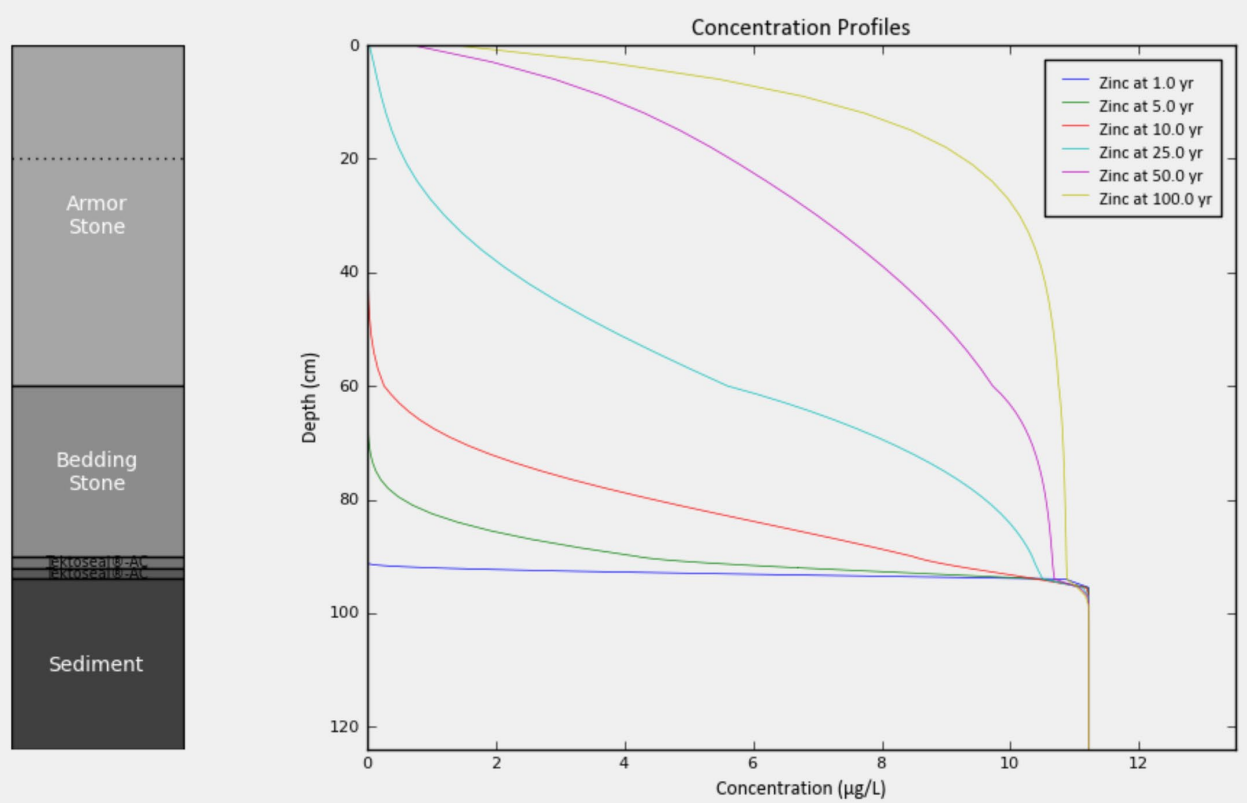

Armor Stone
Bedding Stone
Ekoseal PAC
Ekoseal PAC
Sediment
Concentration Profiles
Total PAHs at 1.0 yr
Total PAHs at 5.0 yr
Total PAHs at 10.0 yr
Total PAHs at 25.0 yr
Total PAHs at 50.0 yr
Total PAHs at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
Concentration (µg/L)


Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal PAC
Tekoseal PAC
Sediment
Total PCBs at 1.0 yr
Total PCBs at 5.0 yr
Total PCBs at 10.0 yr
Total PCBs at 25.0 yr
Total PCBs at 50.0 yr
Total PCBs at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0000
0.0005
0.0010
0.0015
0.0020
Concentration (µg/L)

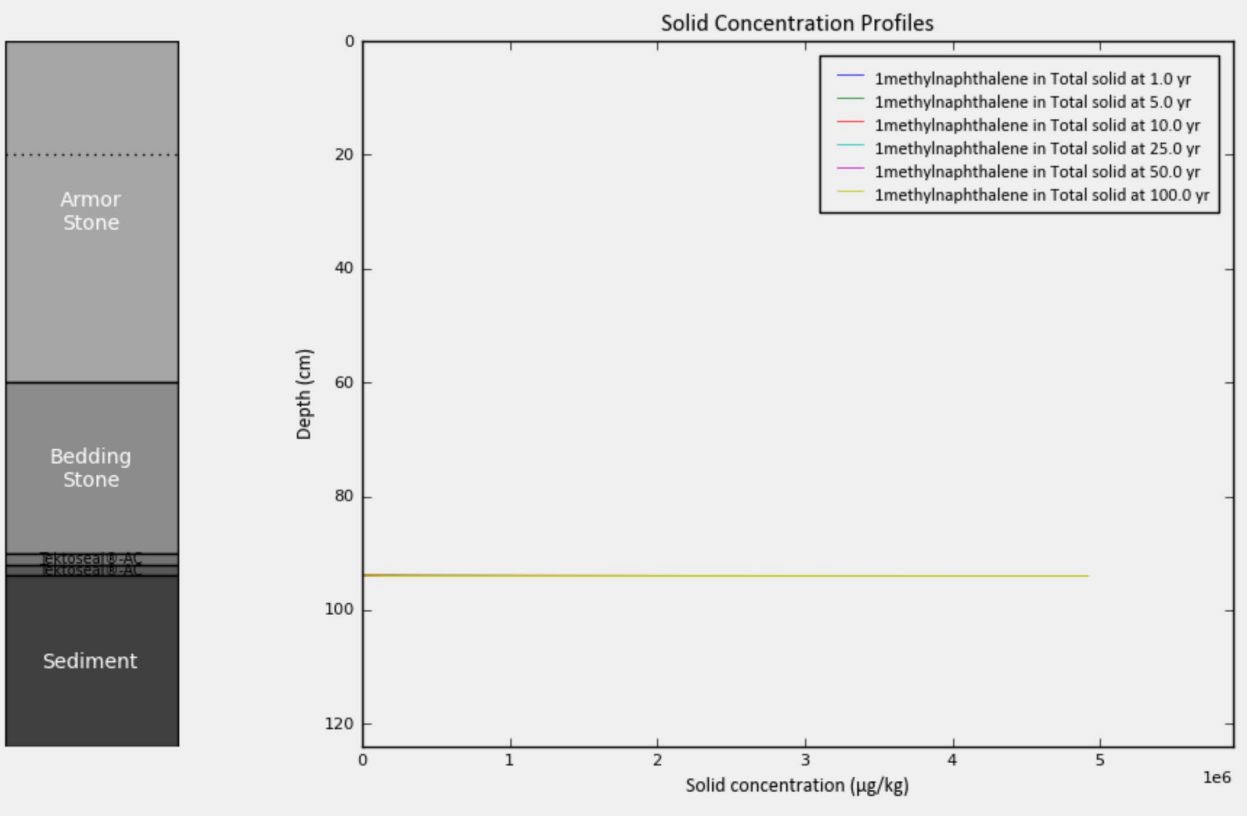

Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal PAC
Tekoseal PAC
Sediment
Tributyltin at 1.0 yr
Tributyltin at 5.0 yr
Tributyltin at 10.0 yr
Tributyltin at 25.0 yr
Tributyltin at 50.0 yr
Tributyltin at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.1
0.2
0.3
0.4
Concentration (µg/L)

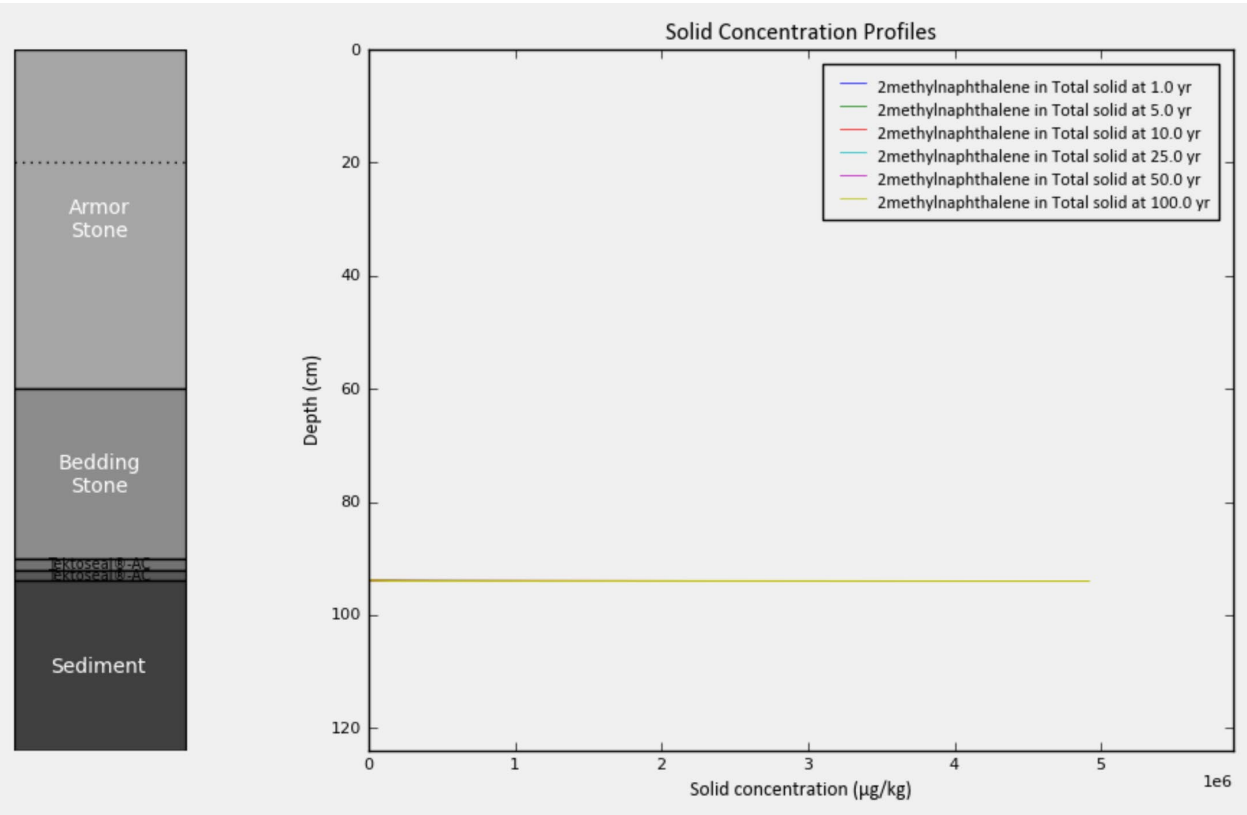

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Vanadium at 1.0 yr
Vanadium at 5.0 yr
Vanadium at 10.0 yr
Vanadium at 25.0 yr
Vanadium at 50.0 yr
Vanadium at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120

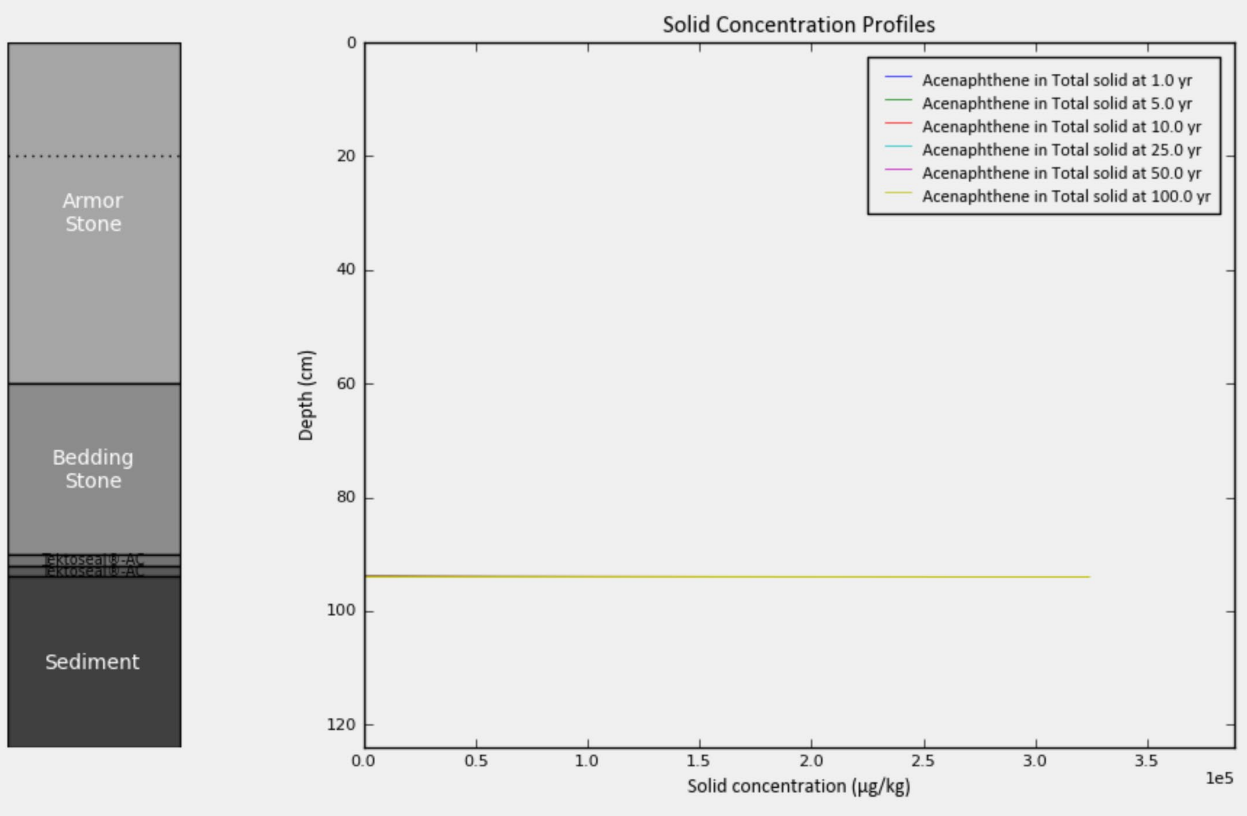

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Xylenes at 1.0 yr
Xylenes at 5.0 yr
Xylenes at 10.0 yr
Xylenes at 25.0 yr
Xylenes at 50.0 yr
Xylenes at 100.0 yr
Depth (cm)
Concentration (µg/L)
0
20
40
60
80
100
120
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040

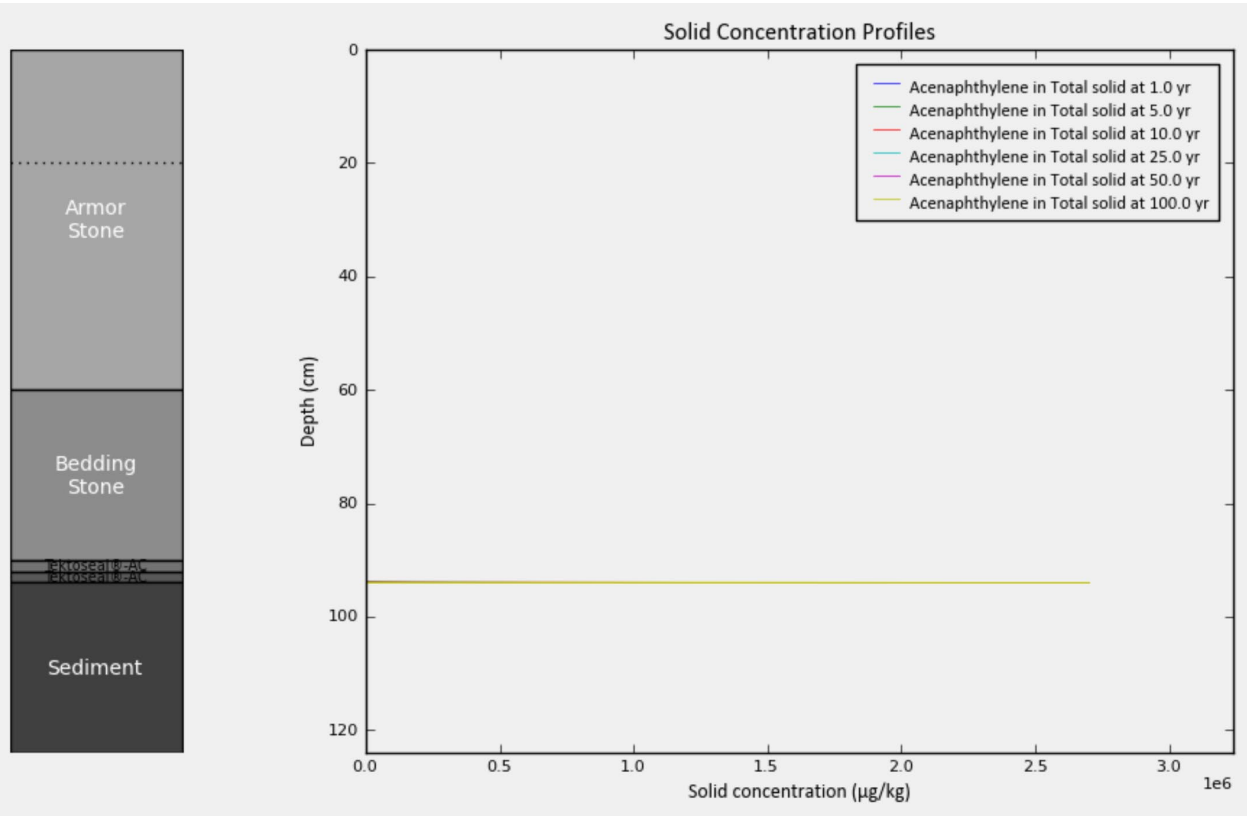

Armor Stone
Bedding Stone
Sediment
Concentration Profiles
Depth (cm)
Concentration (µg/L)
Zinc at 1.0 yr
Zinc at 5.0 yr
Zinc at 10.0 yr
Zinc at 25.0 yr
Zinc at 50.0 yr
Zinc at 100.0 yr
0
20
40
60
80
100
120
0
2
4
6
8
10
12

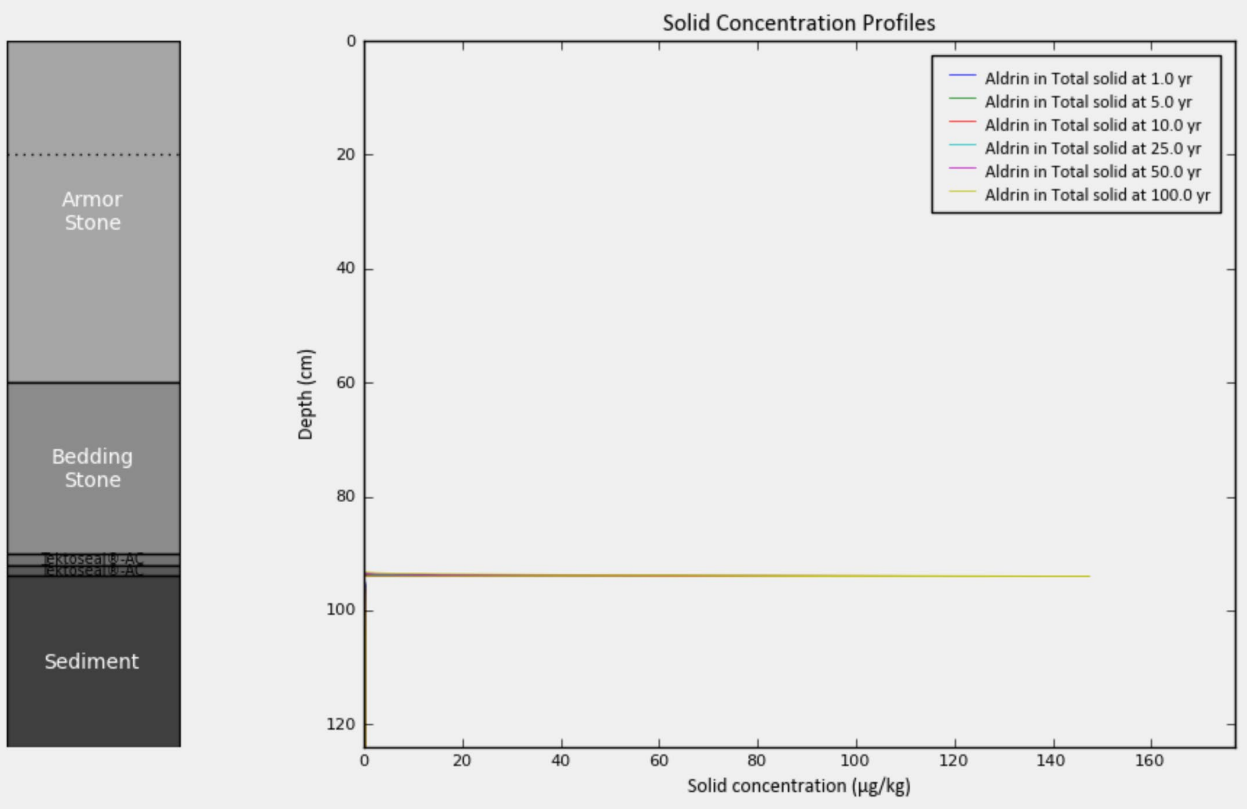
Total Solids Concentration – Depth

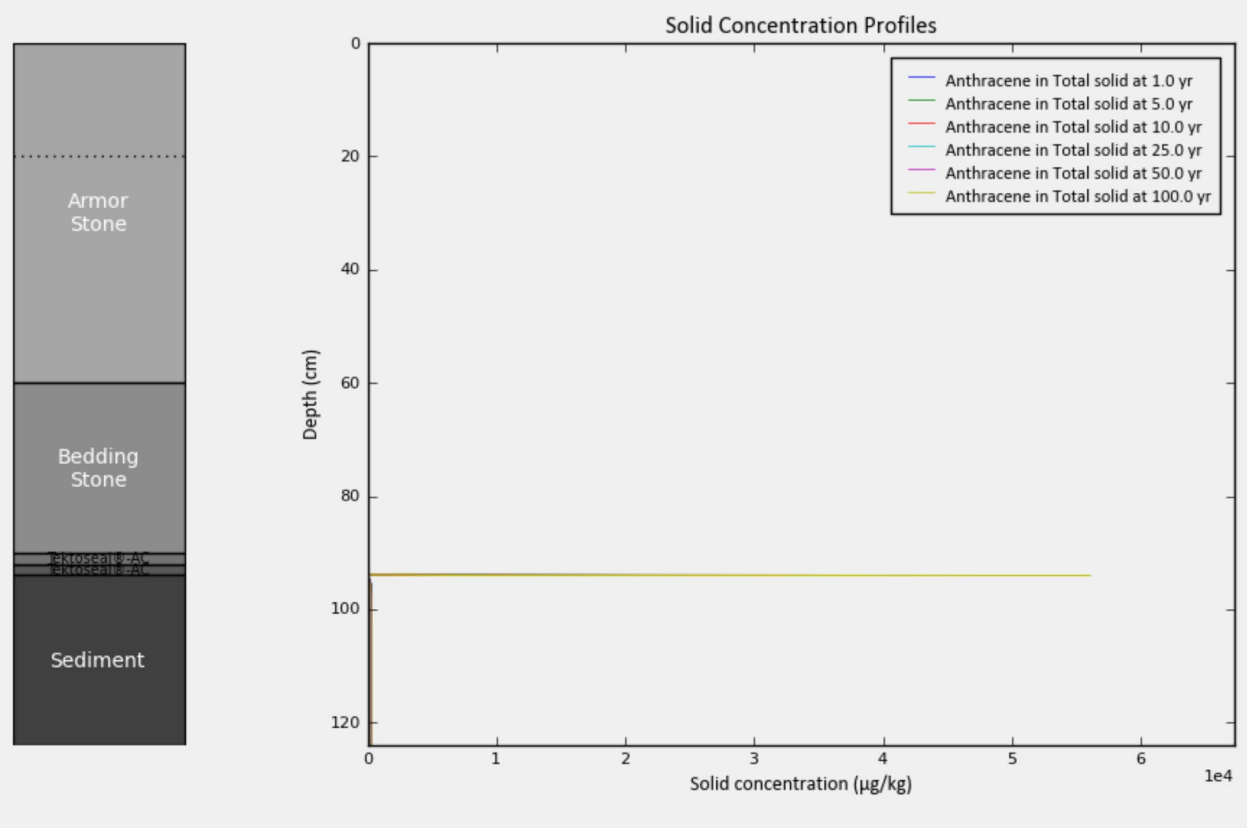


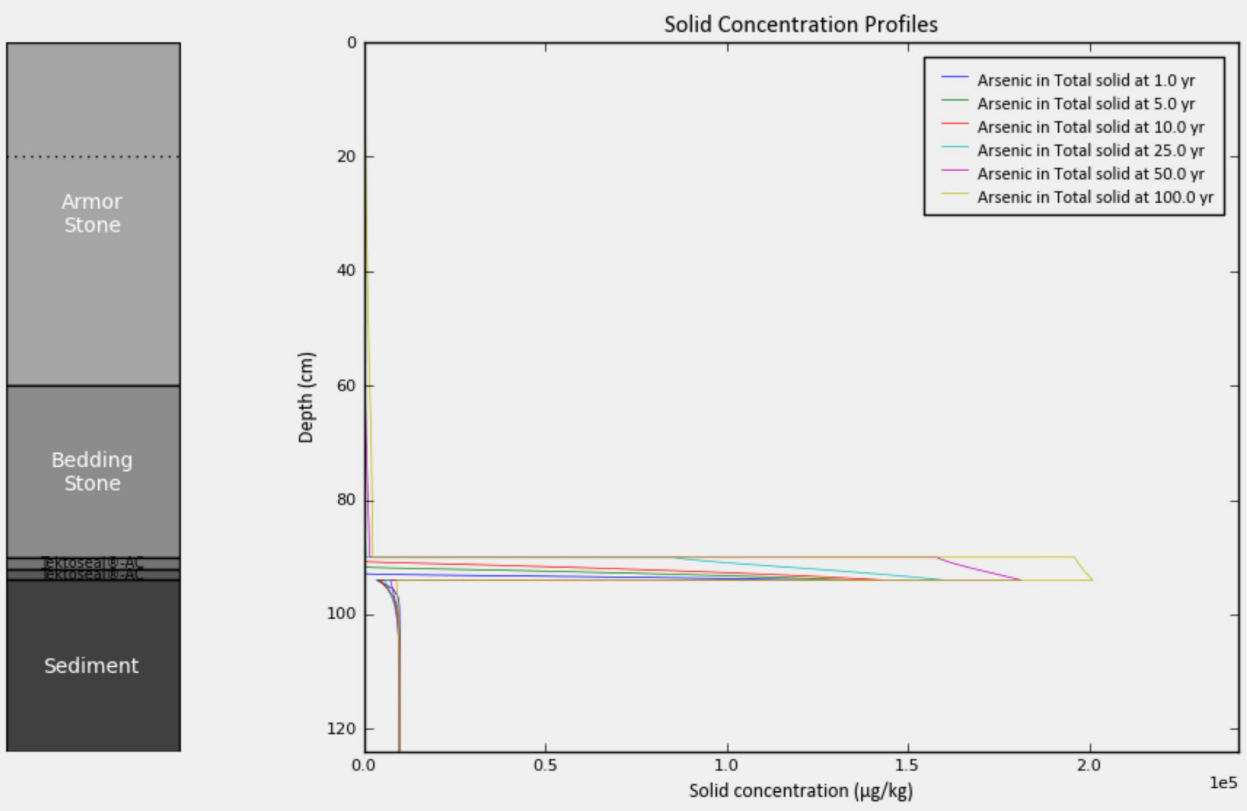


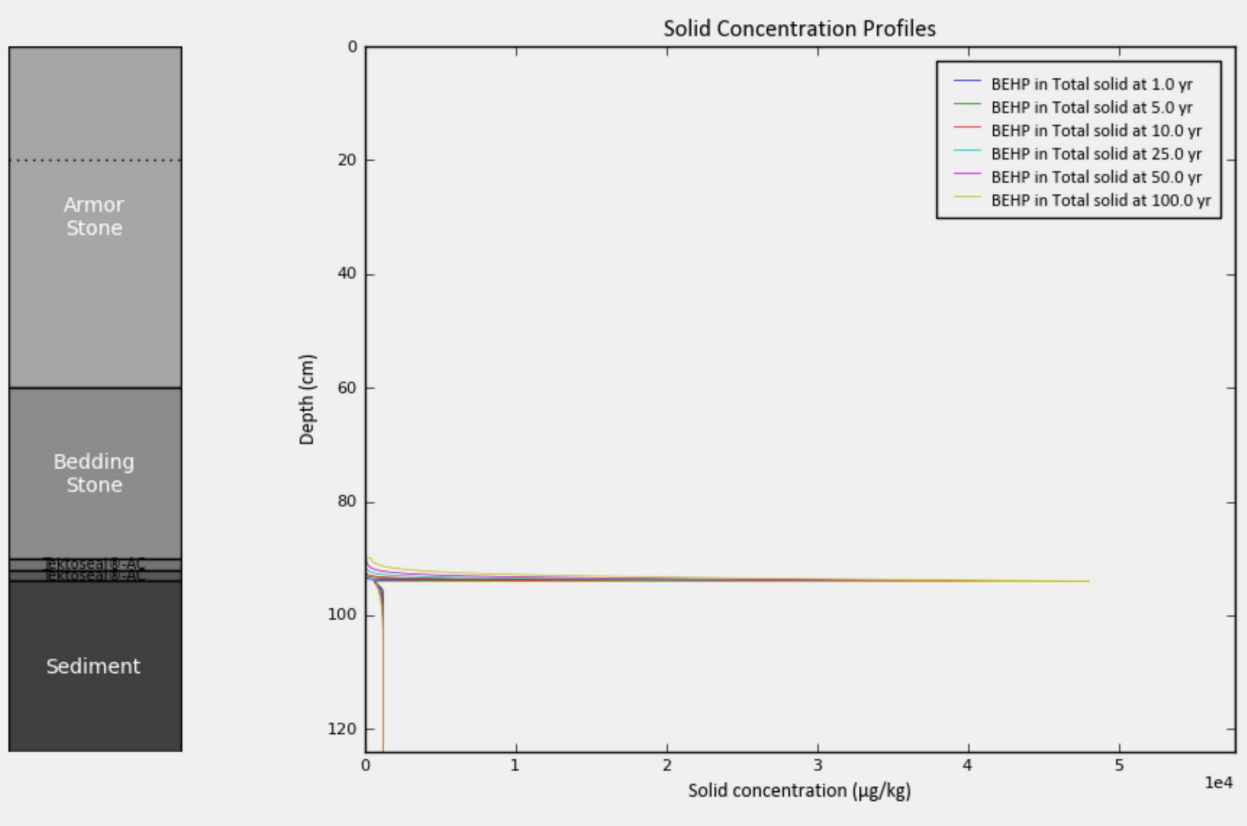

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Acenaphthene in Total solid at 1.0 yr
Acenaphthene in Total solid at 5.0 yr
Acenaphthene in Total solid at 10.0 yr
Acenaphthene in Total solid at 25.0 yr
Acenaphthene in Total solid at 50.0 yr
Acenaphthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

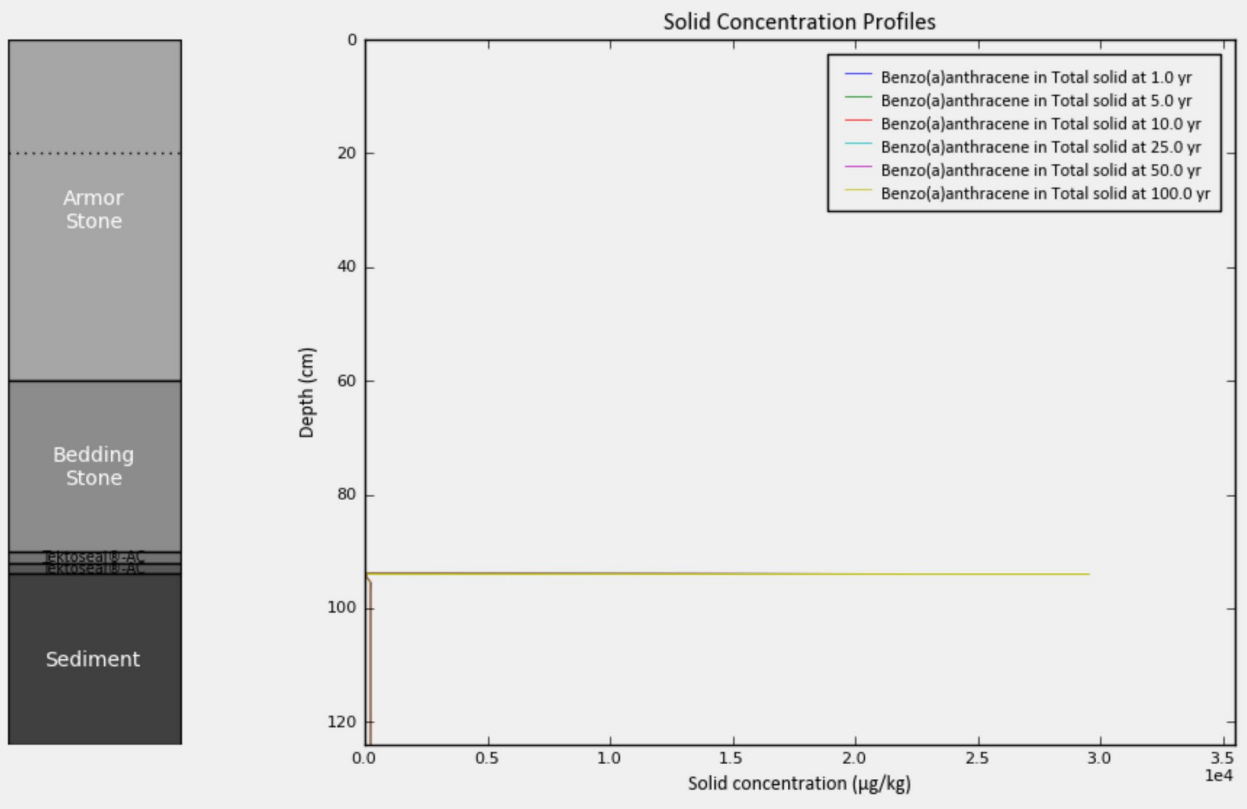

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Acenaphthylene in Total solid at 1.0 yr
Acenaphthylene in Total solid at 5.0 yr
Acenaphthylene in Total solid at 10.0 yr
Acenaphthylene in Total solid at 25.0 yr
Acenaphthylene in Total solid at 50.0 yr
Acenaphthylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

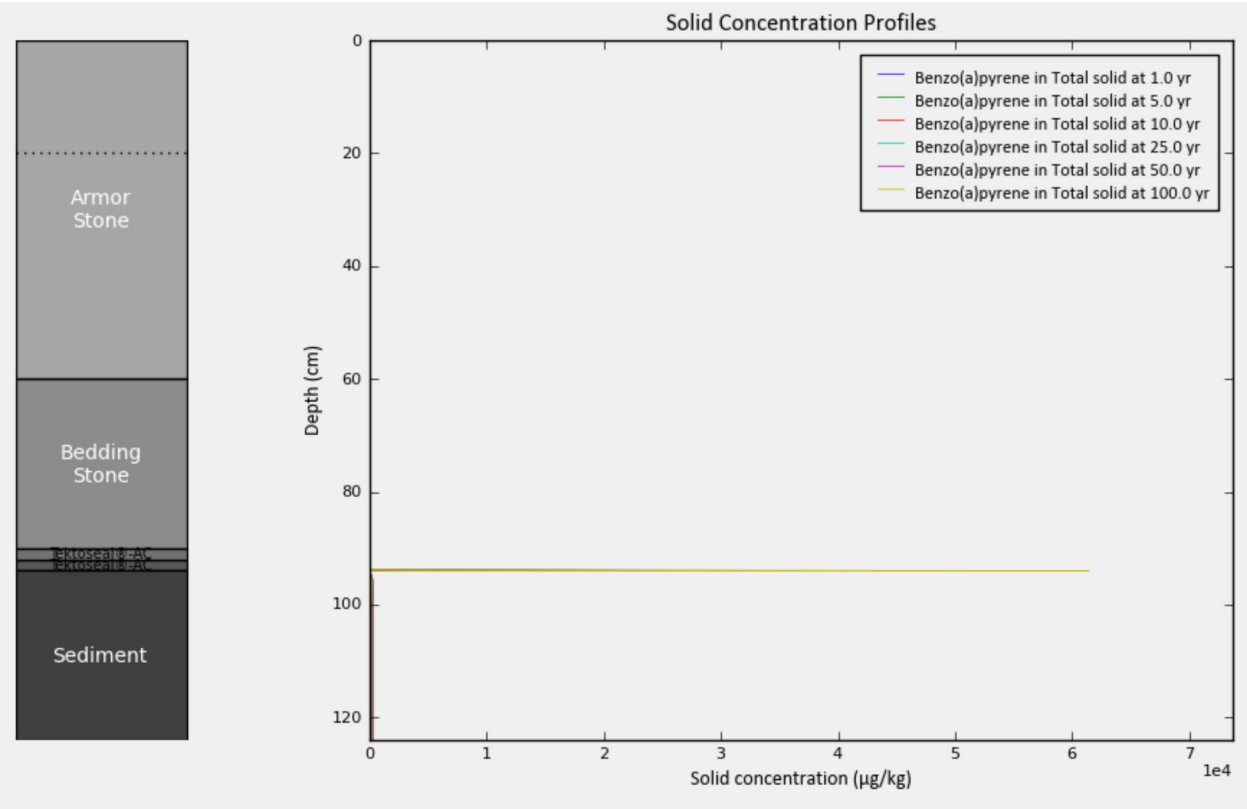

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Aldrin in Total solid at 1.0 yr
Aldrin in Total solid at 5.0 yr
Aldrin in Total solid at 10.0 yr
Aldrin in Total solid at 25.0 yr
Aldrin in Total solid at 50.0 yr
Aldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

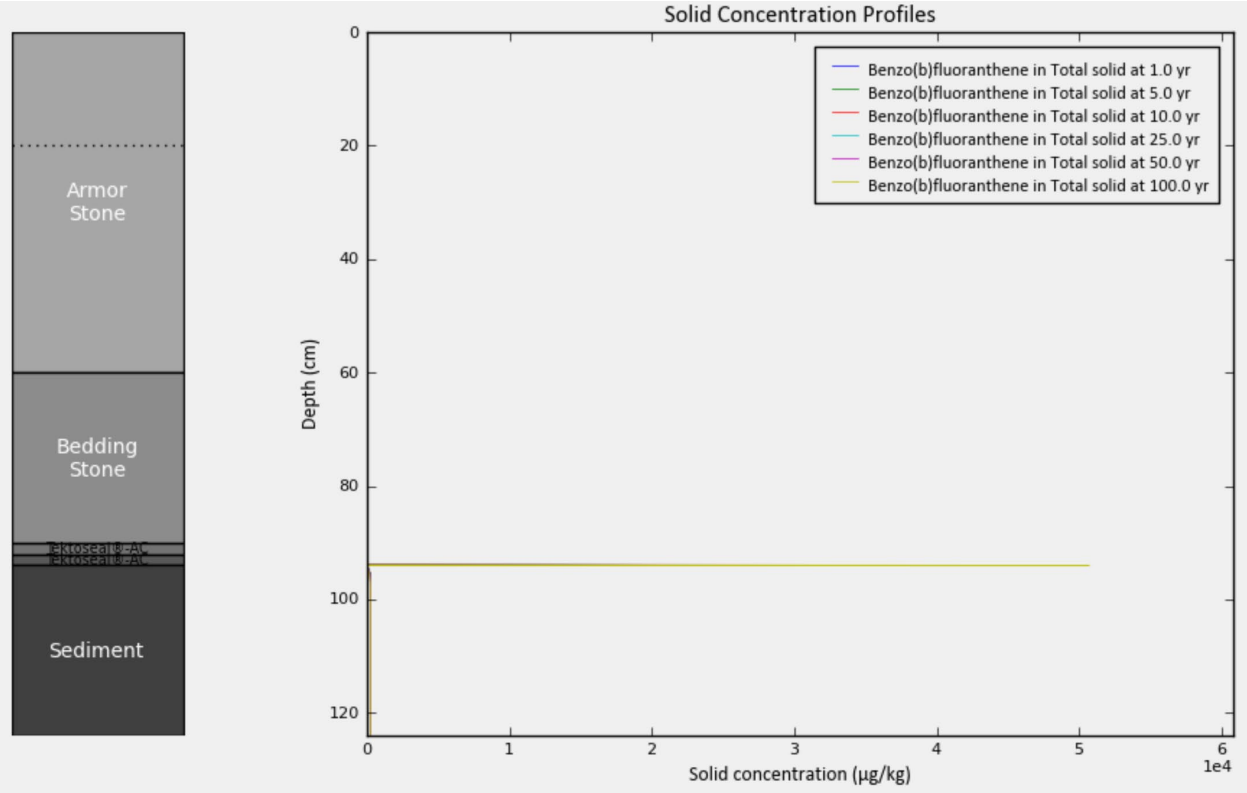

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Anthracene in Total solid at 1.0 yr
Anthracene in Total solid at 5.0 yr
Anthracene in Total solid at 10.0 yr
Anthracene in Total solid at 25.0 yr
Anthracene in Total solid at 50.0 yr
Anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

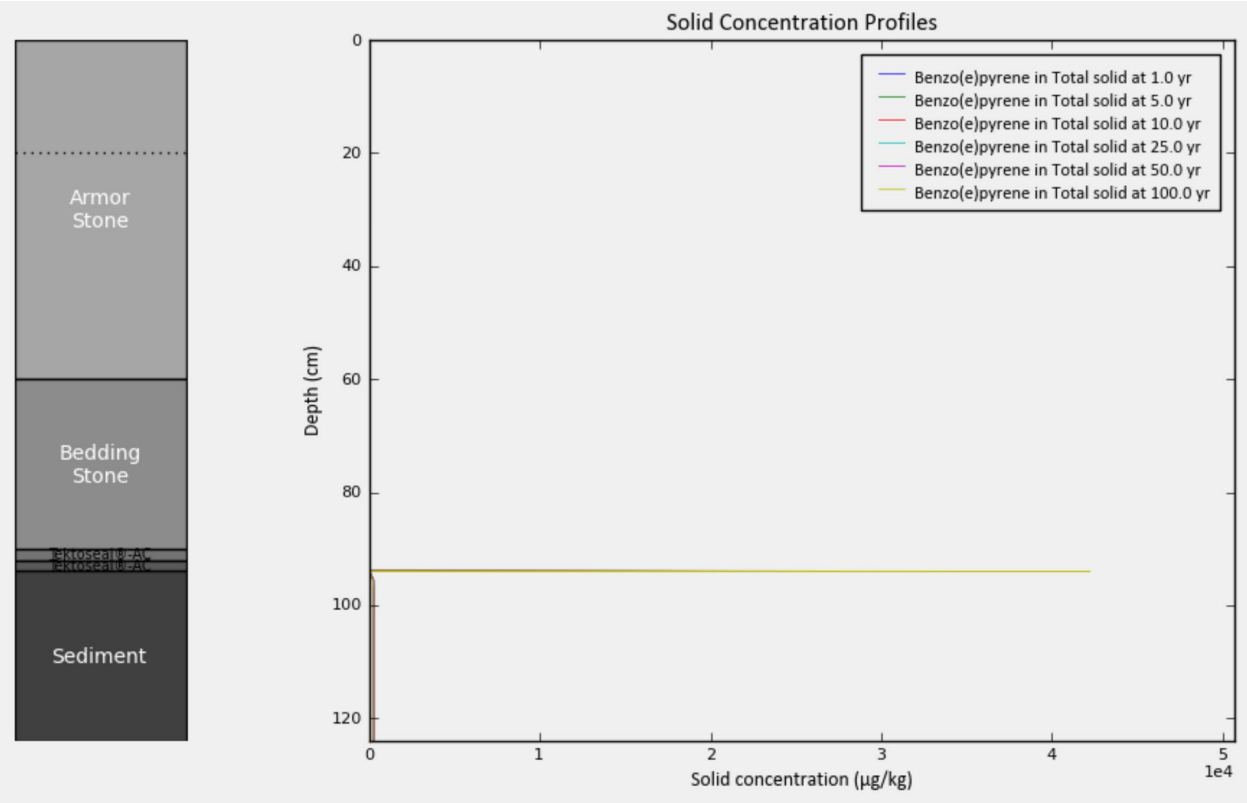

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Arsenic in Total solid at 1.0 yr
Arsenic in Total solid at 5.0 yr
Arsenic in Total solid at 10.0 yr
Arsenic in Total solid at 25.0 yr
Arsenic in Total solid at 50.0 yr
Arsenic in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

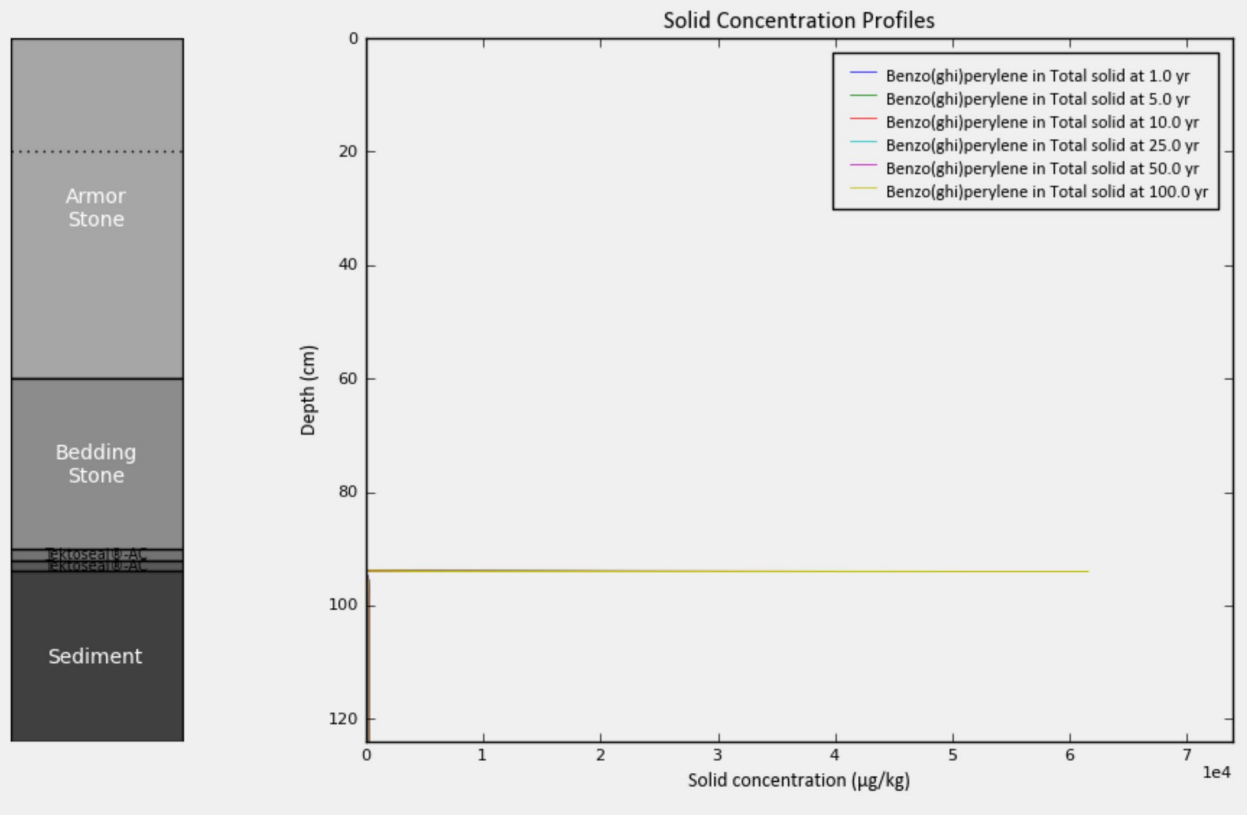

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
BEHP in Total solid at 1.0 yr
BEHP in Total solid at 5.0 yr
BEHP in Total solid at 10.0 yr
BEHP in Total solid at 25.0 yr
BEHP in Total solid at 50.0 yr
BEHP in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

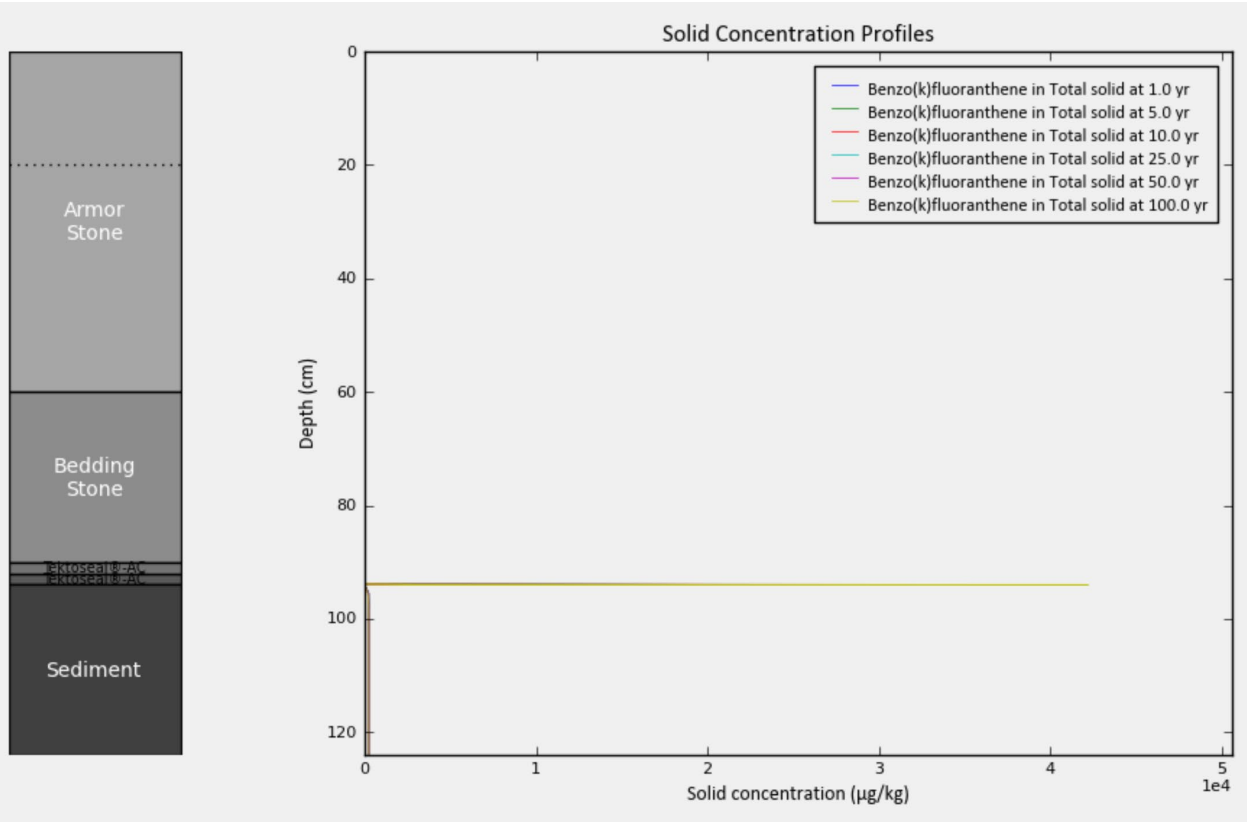

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(a)anthracene in Total solid at 1.0 yr
Benzo(a)anthracene in Total solid at 5.0 yr
Benzo(a)anthracene in Total solid at 10.0 yr
Benzo(a)anthracene in Total solid at 25.0 yr
Benzo(a)anthracene in Total solid at 50.0 yr
Benzo(a)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

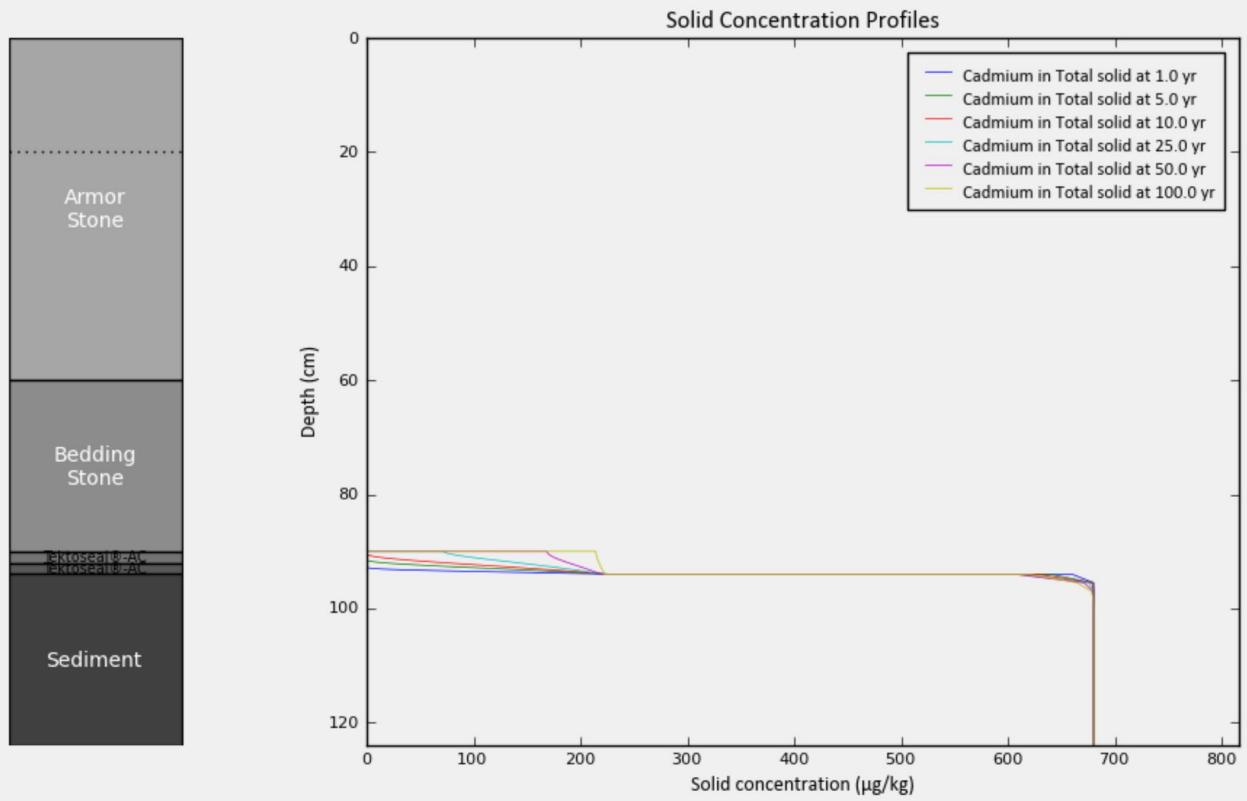

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(a)pyrene in Total solid at 1.0 yr
Benzo(a)pyrene in Total solid at 5.0 yr
Benzo(a)pyrene in Total solid at 10.0 yr
Benzo(a)pyrene in Total solid at 25.0 yr
Benzo(a)pyrene in Total solid at 50.0 yr
Benzo(a)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

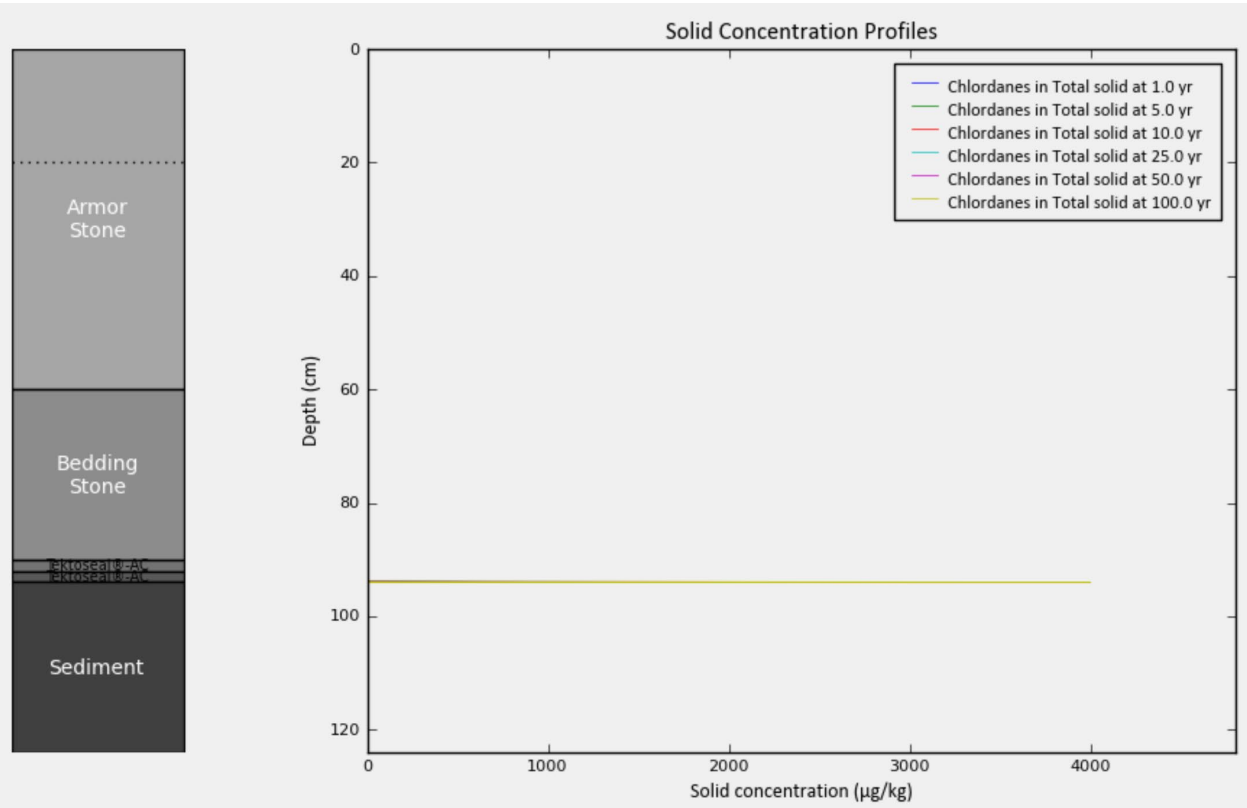

Solid Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® AC
Tekoseal® AC
Sediment
Benzo(b)fluoranthene in Total solid at 1.0 yr
Benzo(b)fluoranthene in Total solid at 5.0 yr
Benzo(b)fluoranthene in Total solid at 10.0 yr
Benzo(b)fluoranthene in Total solid at 25.0 yr
Benzo(b)fluoranthene in Total solid at 50.0 yr
Benzo(b)fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
6
1e4
Solid concentration (µg/kg)

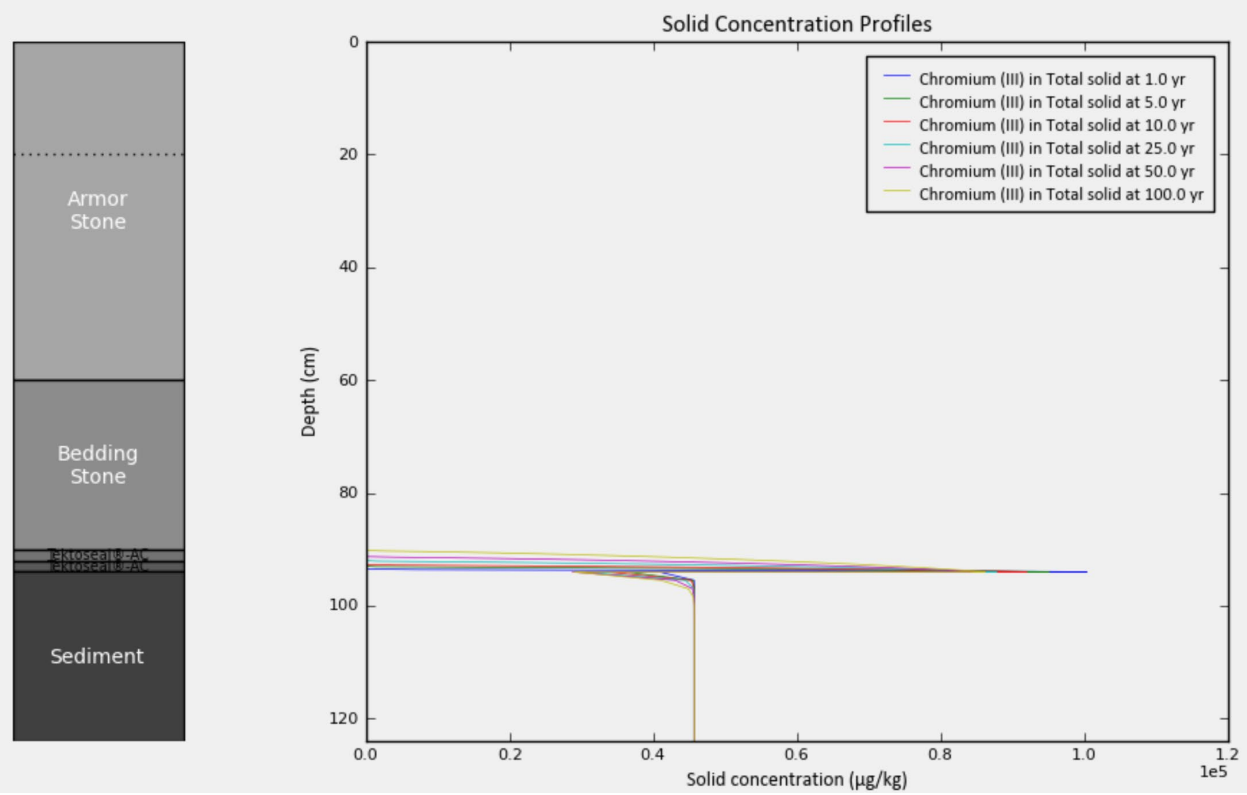

Solid Concentration Profiles
Armor Stone
Bedding Stone
Tekoseal® AC
Tekoseal® AC
Sediment
Benzo(e)pyrene in Total solid at 1.0 yr
Benzo(e)pyrene in Total solid at 5.0 yr
Benzo(e)pyrene in Total solid at 10.0 yr
Benzo(e)pyrene in Total solid at 25.0 yr
Benzo(e)pyrene in Total solid at 50.0 yr
Benzo(e)pyrene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
5
1e4
Solid concentration (µg/kg)

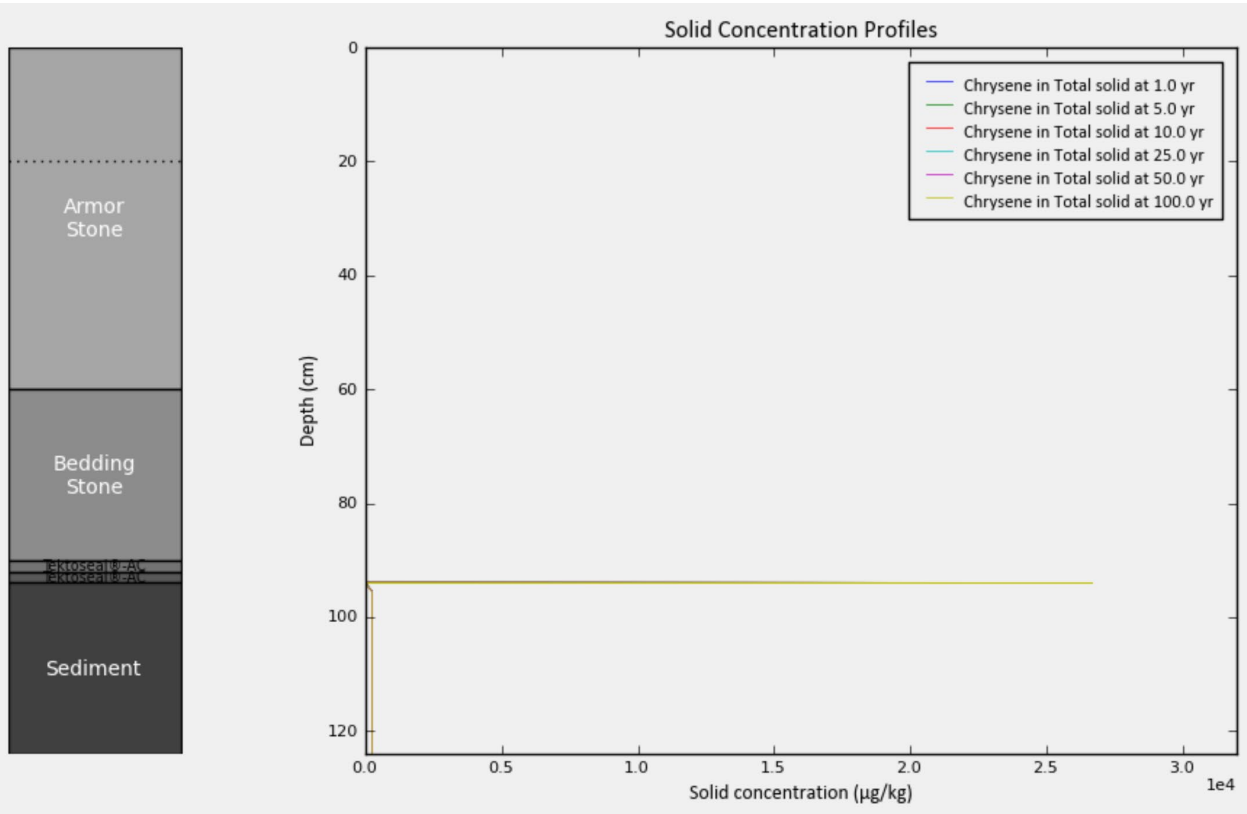

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(ghi)perylene in Total solid at 1.0 yr
Benzo(ghi)perylene in Total solid at 5.0 yr
Benzo(ghi)perylene in Total solid at 10.0 yr
Benzo(ghi)perylene in Total solid at 25.0 yr
Benzo(ghi)perylene in Total solid at 50.0 yr
Benzo(ghi)perylene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

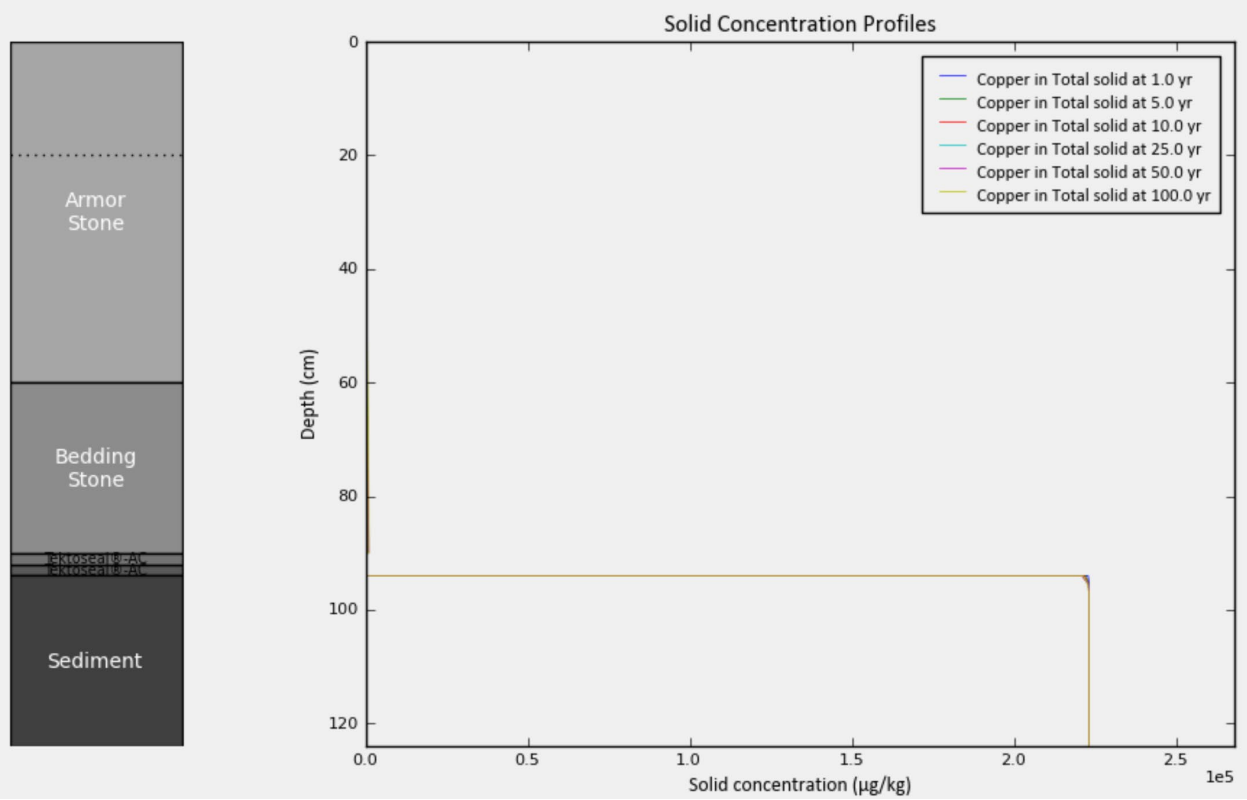

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Benzo(k)fluoranthene in Total solid at 1.0 yr
Benzo(k)fluoranthene in Total solid at 5.0 yr
Benzo(k)fluoranthene in Total solid at 10.0 yr
Benzo(k)fluoranthene in Total solid at 25.0 yr
Benzo(k)fluoranthene in Total solid at 50.0 yr
Benzo(k)fluoranthene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

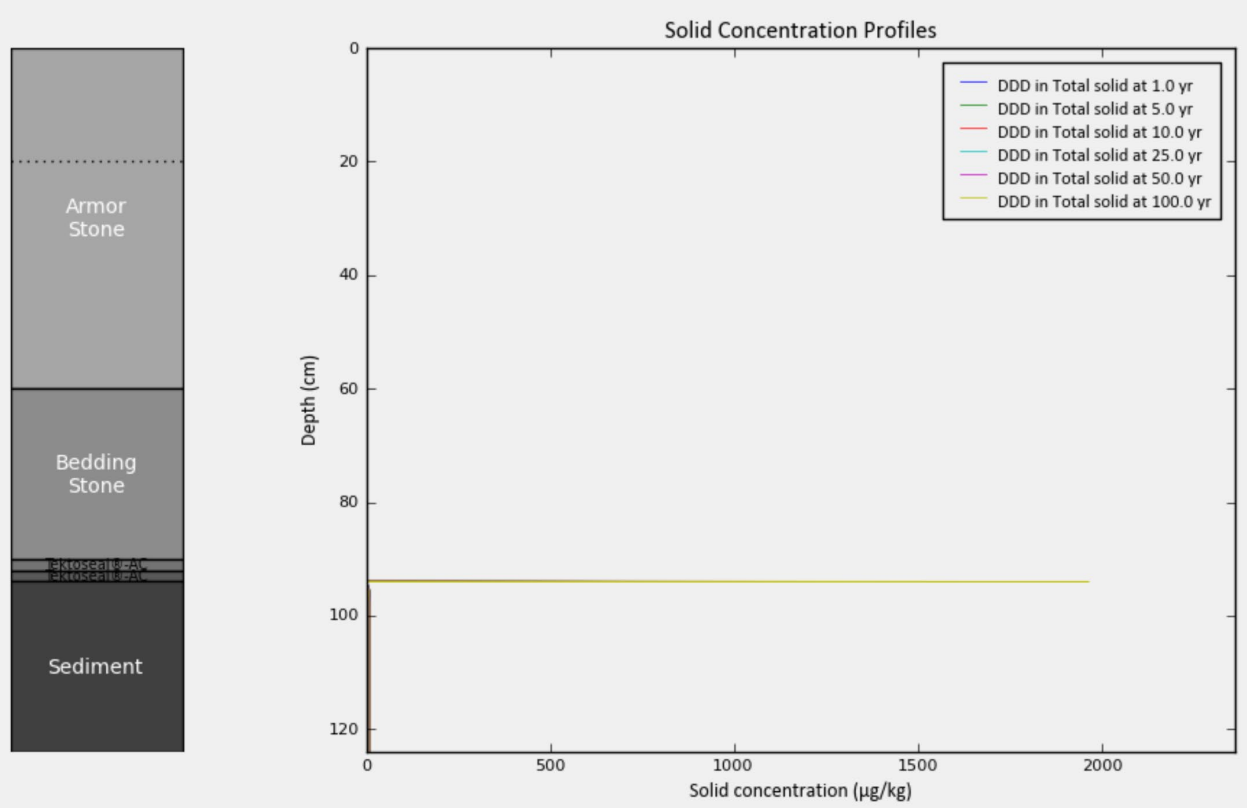

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Cadmium in Total solid at 1.0 yr
Cadmium in Total solid at 5.0 yr
Cadmium in Total solid at 10.0 yr
Cadmium in Total solid at 25.0 yr
Cadmium in Total solid at 50.0 yr
Cadmium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

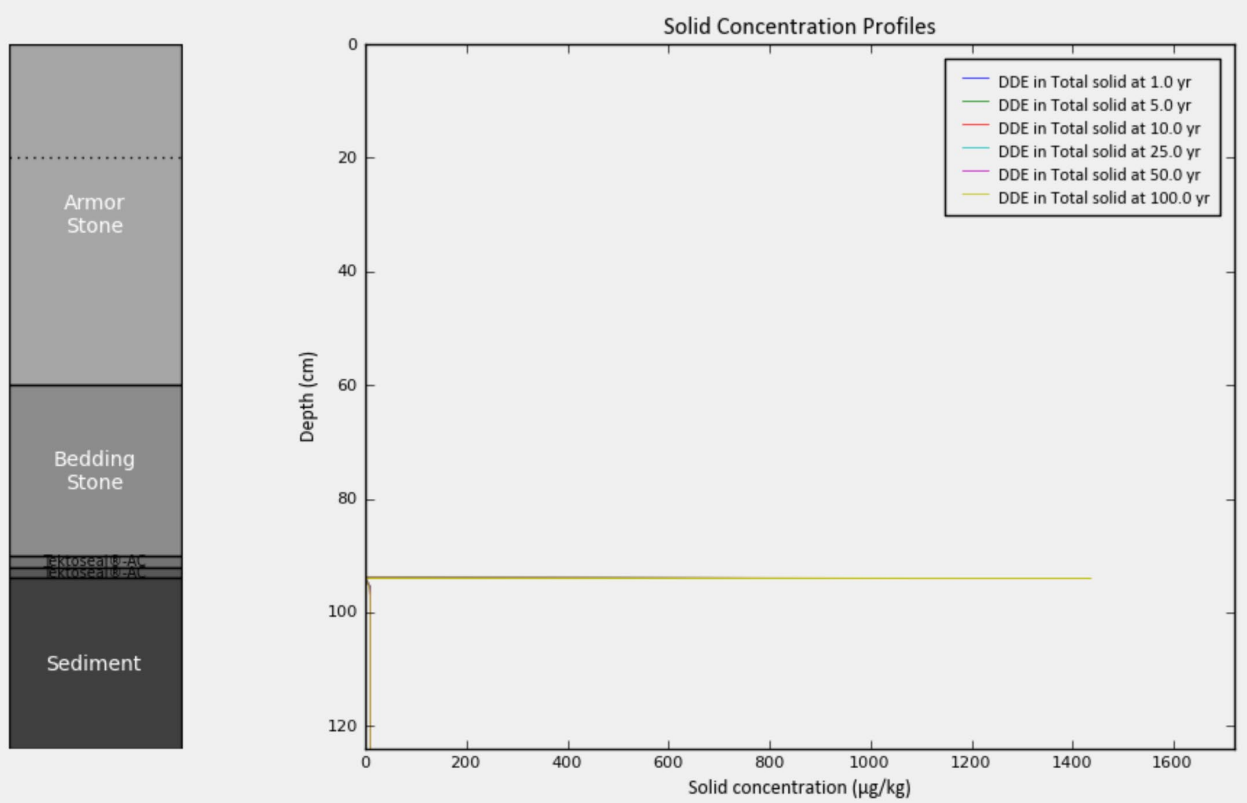

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Chlordanes in Total solid at 1.0 yr
Chlordanes in Total solid at 5.0 yr
Chlordanes in Total solid at 10.0 yr
Chlordanes in Total solid at 25.0 yr
Chlordanes in Total solid at 50.0 yr
Chlordanes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

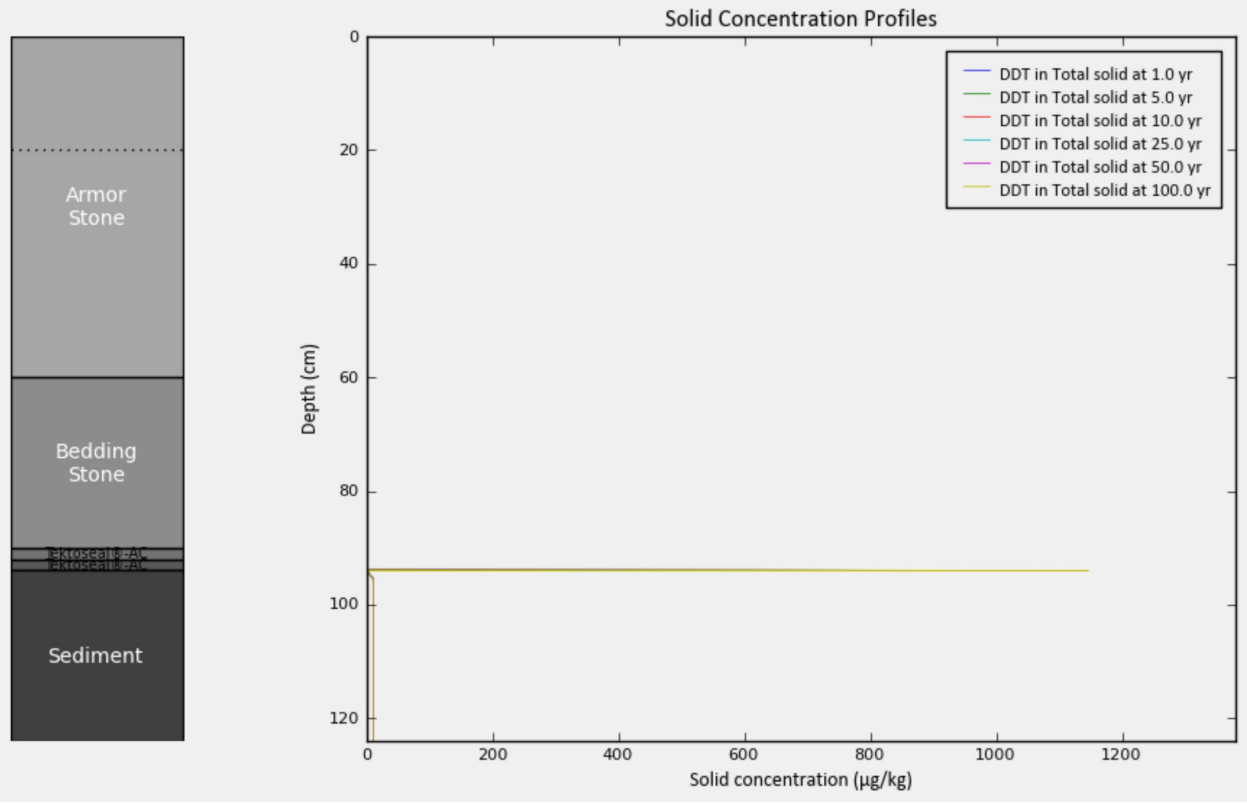

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Chromium (III) in Total solid at 1.0 yr
Chromium (III) in Total solid at 5.0 yr
Chromium (III) in Total solid at 10.0 yr
Chromium (III) in Total solid at 25.0 yr
Chromium (III) in Total solid at 50.0 yr
Chromium (III) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

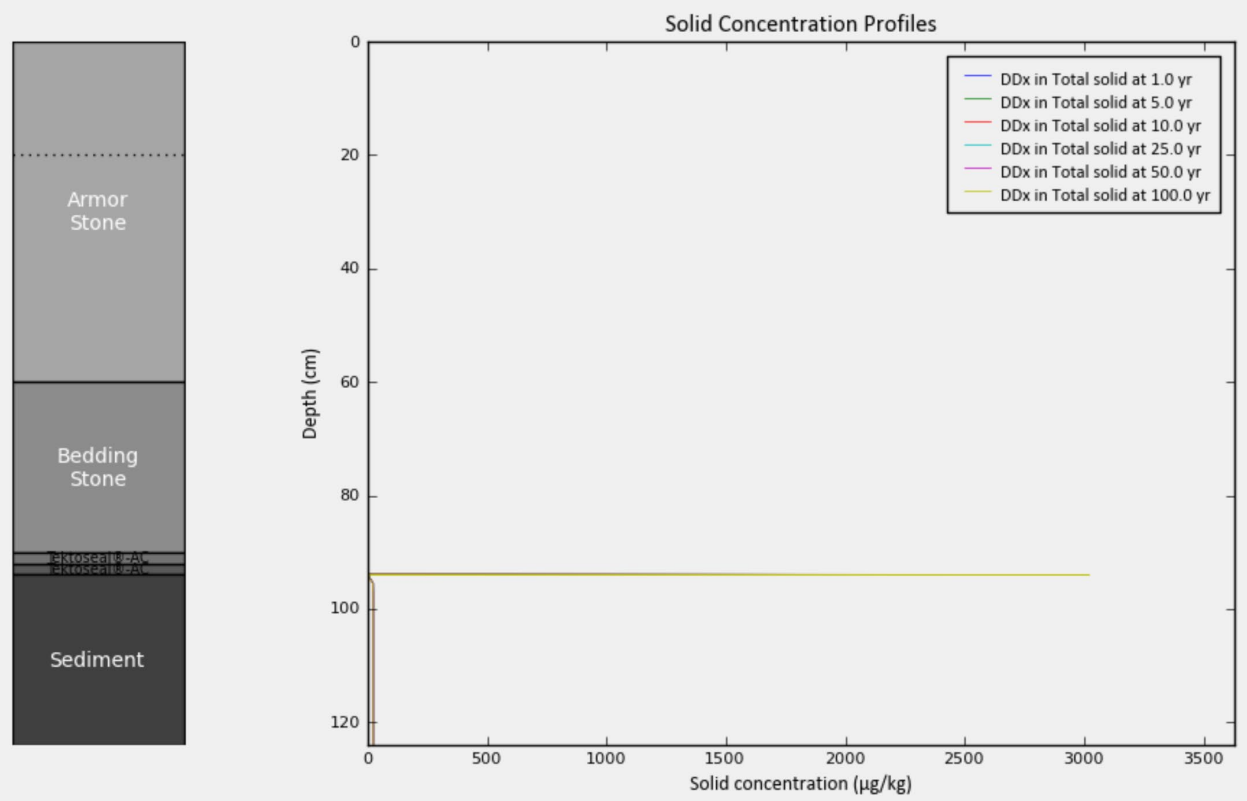

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Chrysene in Total solid at 1.0 yr
Chrysene in Total solid at 5.0 yr
Chrysene in Total solid at 10.0 yr
Chrysene in Total solid at 25.0 yr
Chrysene in Total solid at 50.0 yr
Chrysene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

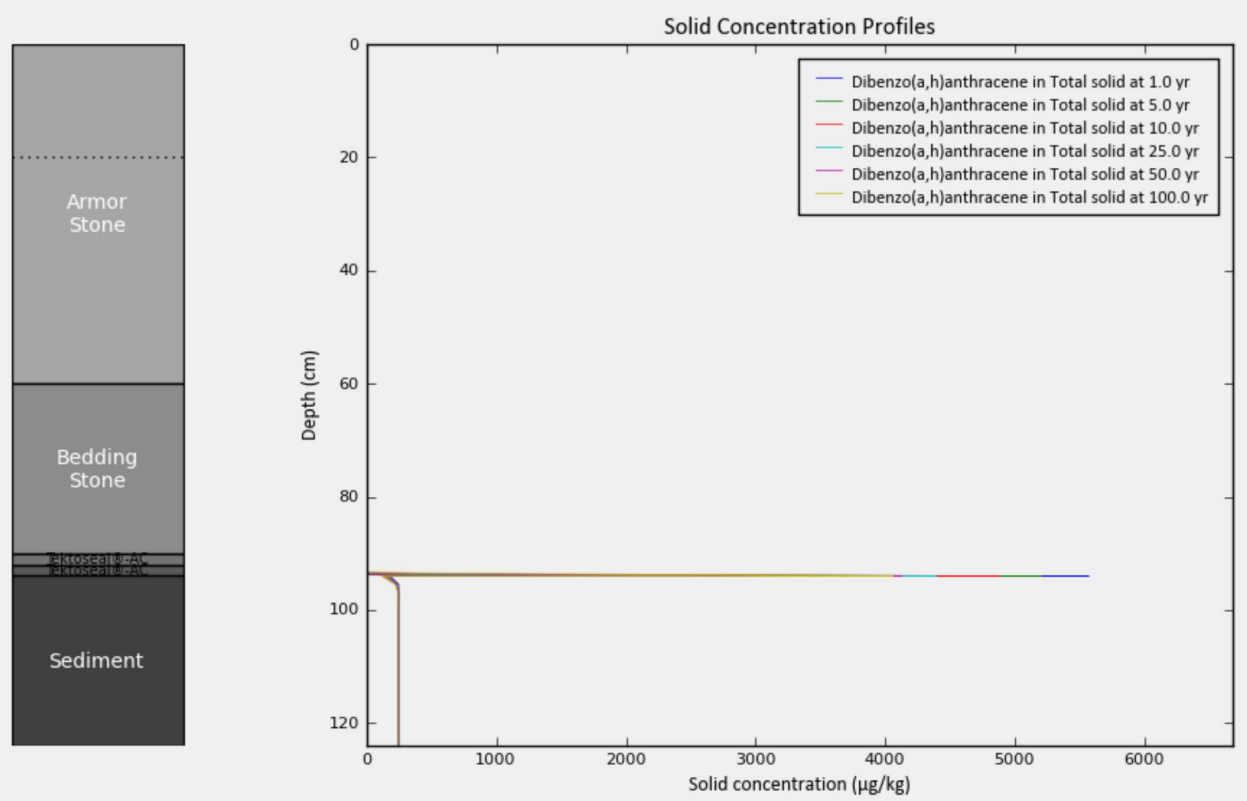

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Copper in Total solid at 1.0 yr
Copper in Total solid at 5.0 yr
Copper in Total solid at 10.0 yr
Copper in Total solid at 25.0 yr
Copper in Total solid at 50.0 yr
Copper in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

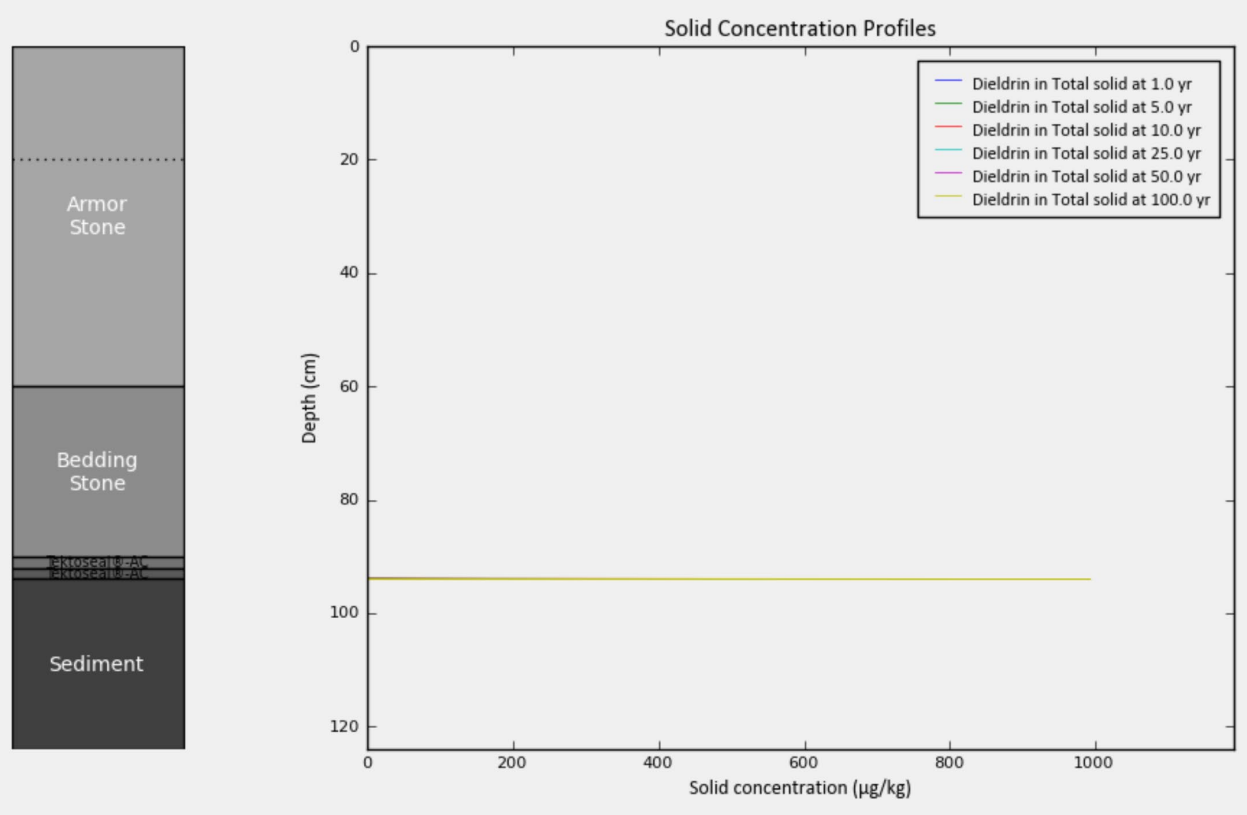

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDD in Total solid at 1.0 yr
DDD in Total solid at 5.0 yr
DDD in Total solid at 10.0 yr
DDD in Total solid at 25.0 yr
DDD in Total solid at 50.0 yr
DDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

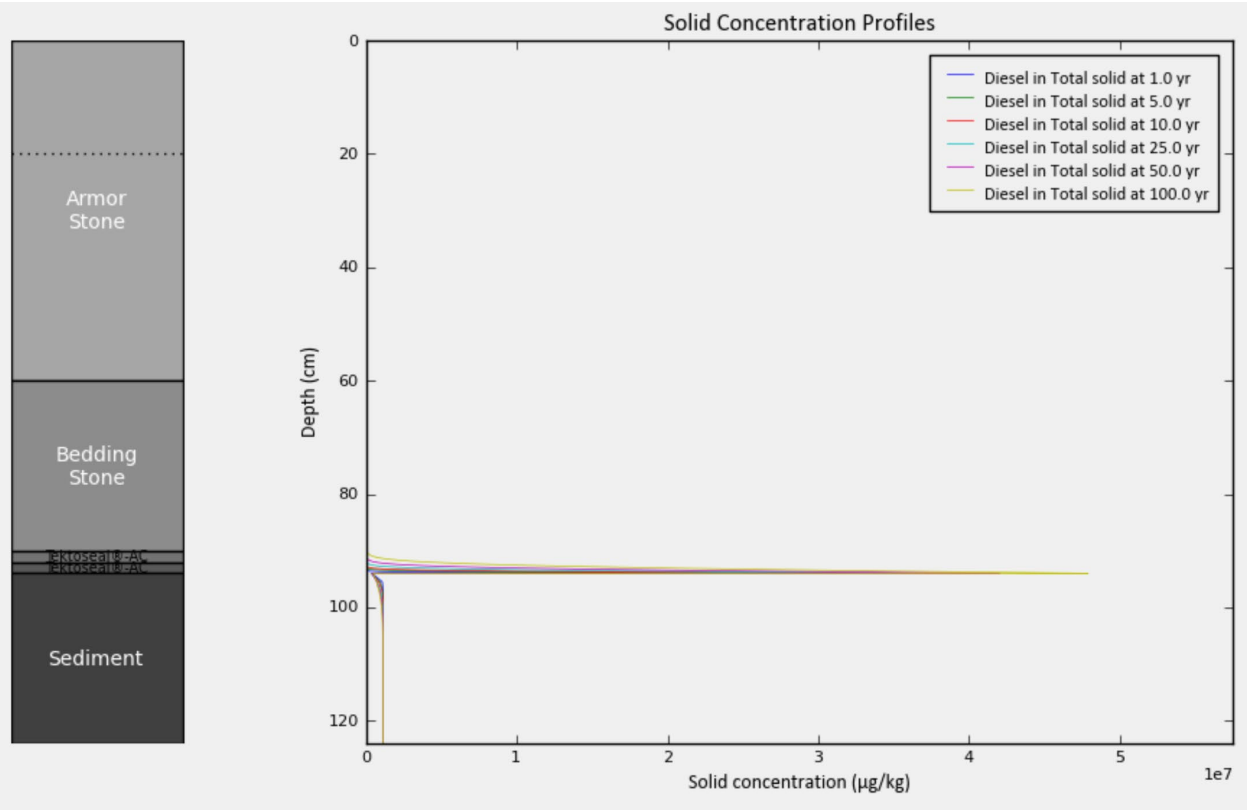

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDE in Total solid at 1.0 yr
DDE in Total solid at 5.0 yr
DDE in Total solid at 10.0 yr
DDE in Total solid at 25.0 yr
DDE in Total solid at 50.0 yr
DDE in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

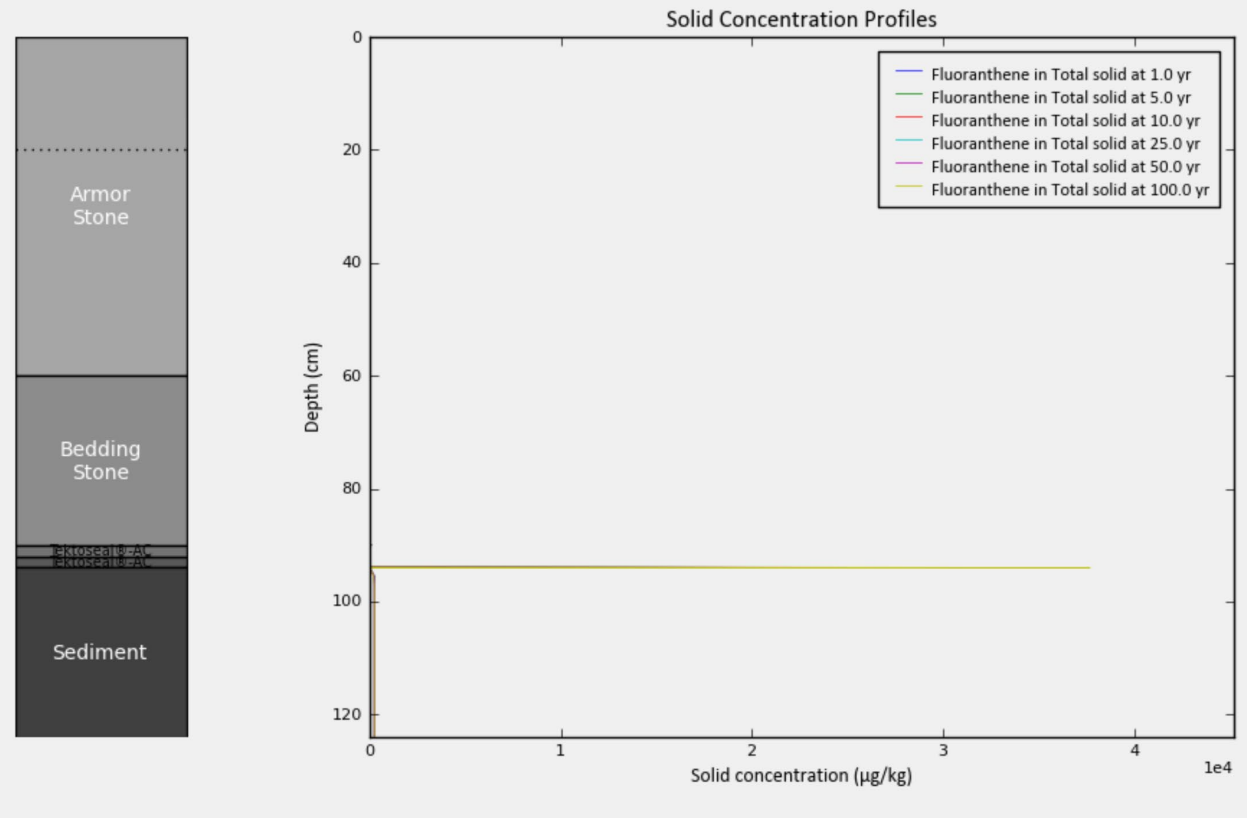

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDT in Total solid at 1.0 yr
DDT in Total solid at 5.0 yr
DDT in Total solid at 10.0 yr
DDT in Total solid at 25.0 yr
DDT in Total solid at 50.0 yr
DDT in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

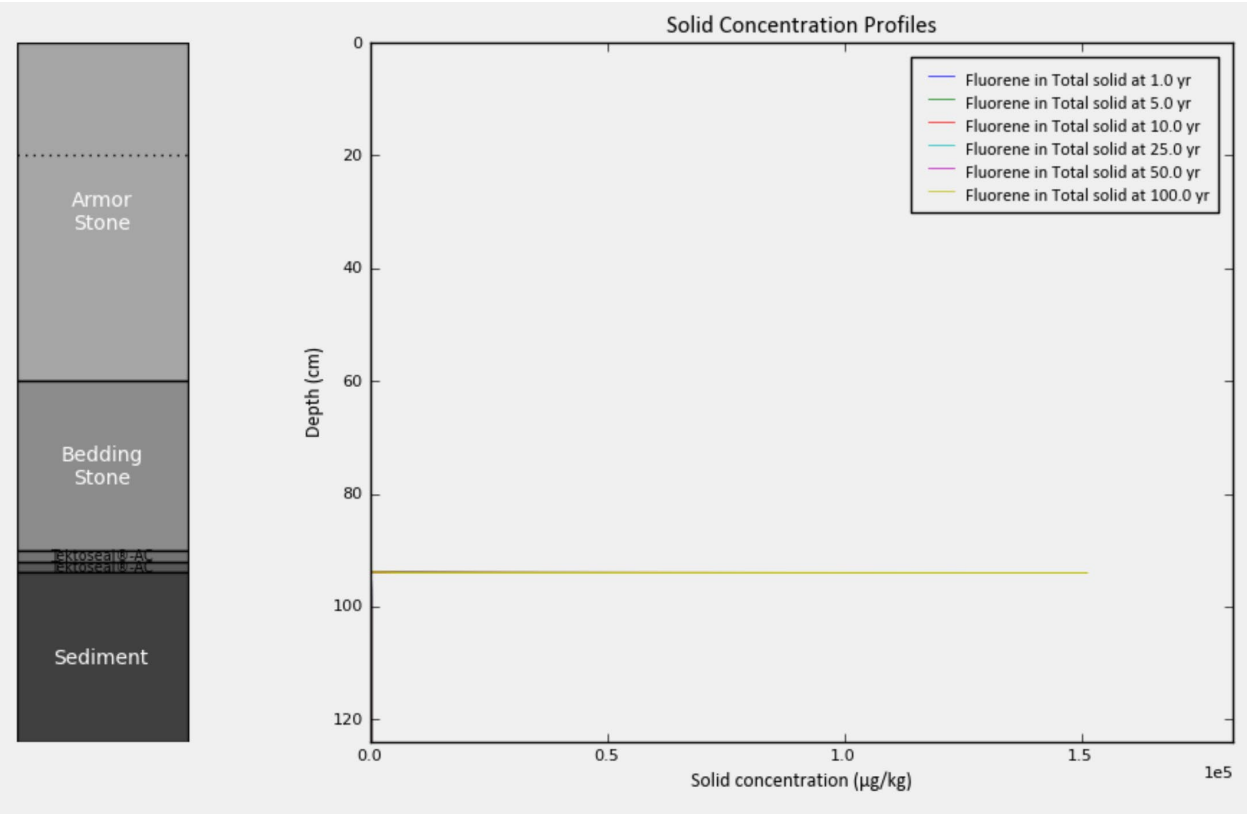

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
DDx in Total solid at 1.0 yr
DDx in Total solid at 5.0 yr
DDx in Total solid at 10.0 yr
DDx in Total solid at 25.0 yr
DDx in Total solid at 50.0 yr
DDx in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

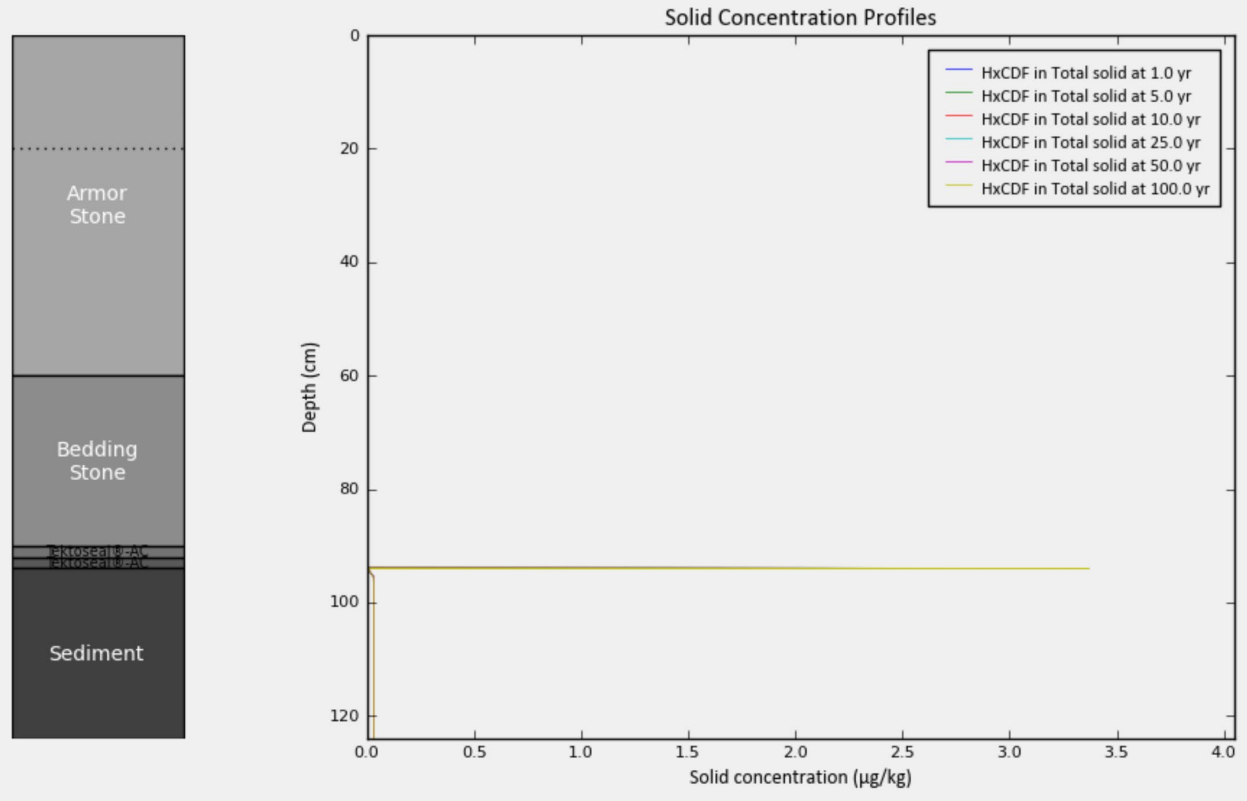

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Dibenzo(a,h)anthracene in Total solid at 1.0 yr
Dibenzo(a,h)anthracene in Total solid at 5.0 yr
Dibenzo(a,h)anthracene in Total solid at 10.0 yr
Dibenzo(a,h)anthracene in Total solid at 25.0 yr
Dibenzo(a,h)anthracene in Total solid at 50.0 yr
Dibenzo(a,h)anthracene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

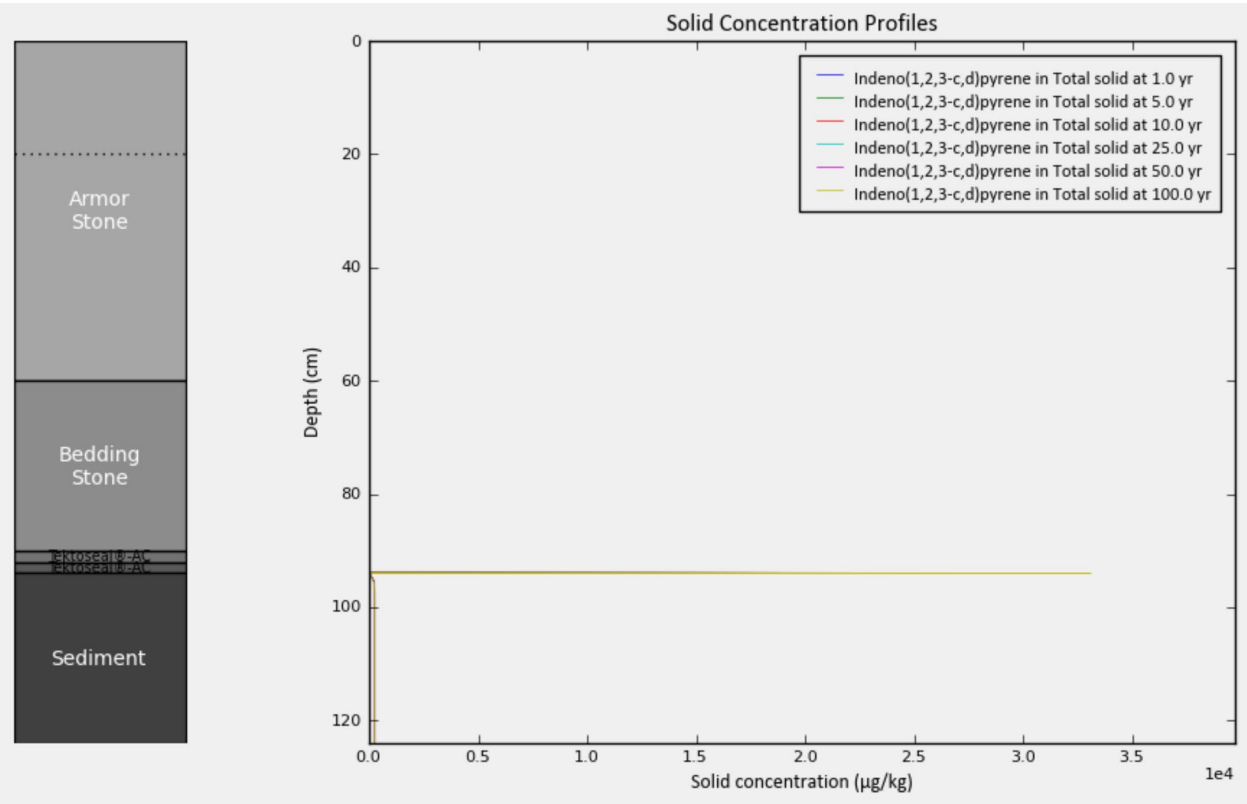

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Dieldrin in Total solid at 1.0 yr
Dieldrin in Total solid at 5.0 yr
Dieldrin in Total solid at 10.0 yr
Dieldrin in Total solid at 25.0 yr
Dieldrin in Total solid at 50.0 yr
Dieldrin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

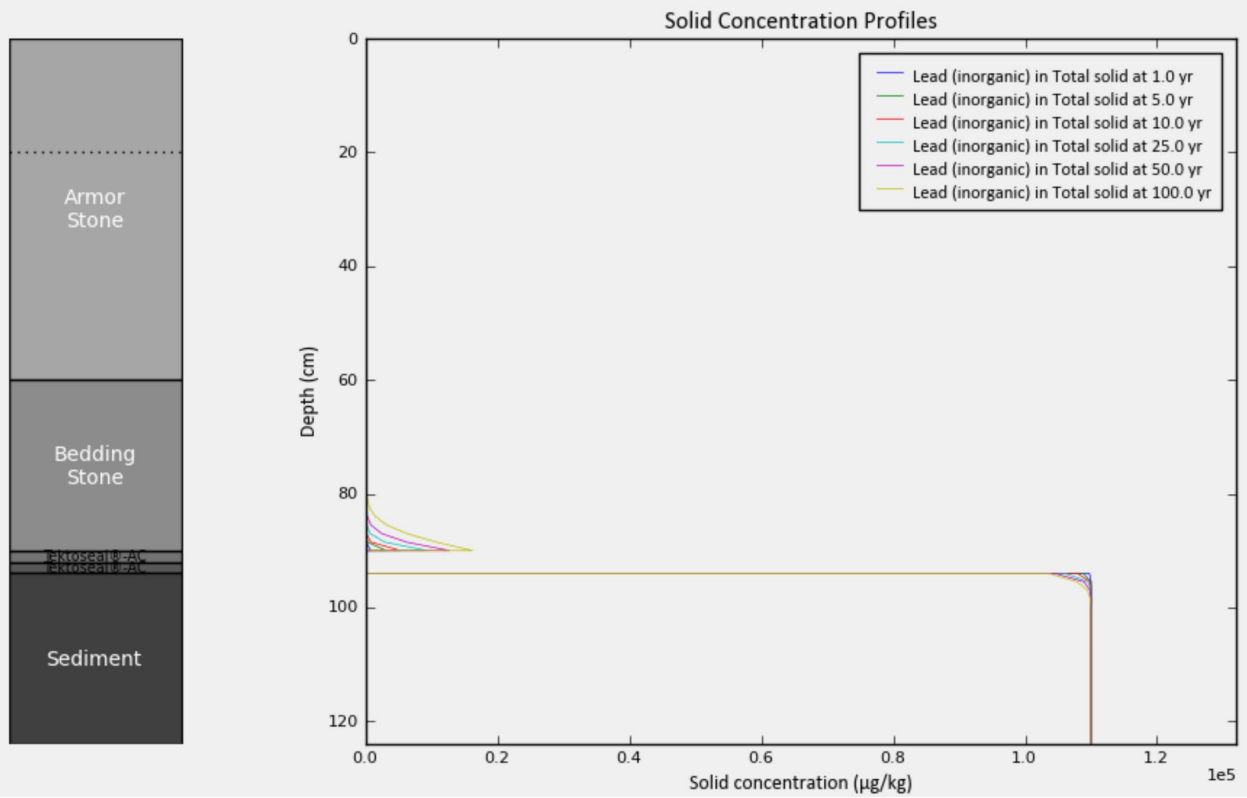

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Diesel in Total solid at 1.0 yr
Diesel in Total solid at 5.0 yr
Diesel in Total solid at 10.0 yr
Diesel in Total solid at 25.0 yr
Diesel in Total solid at 50.0 yr
Diesel in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e7

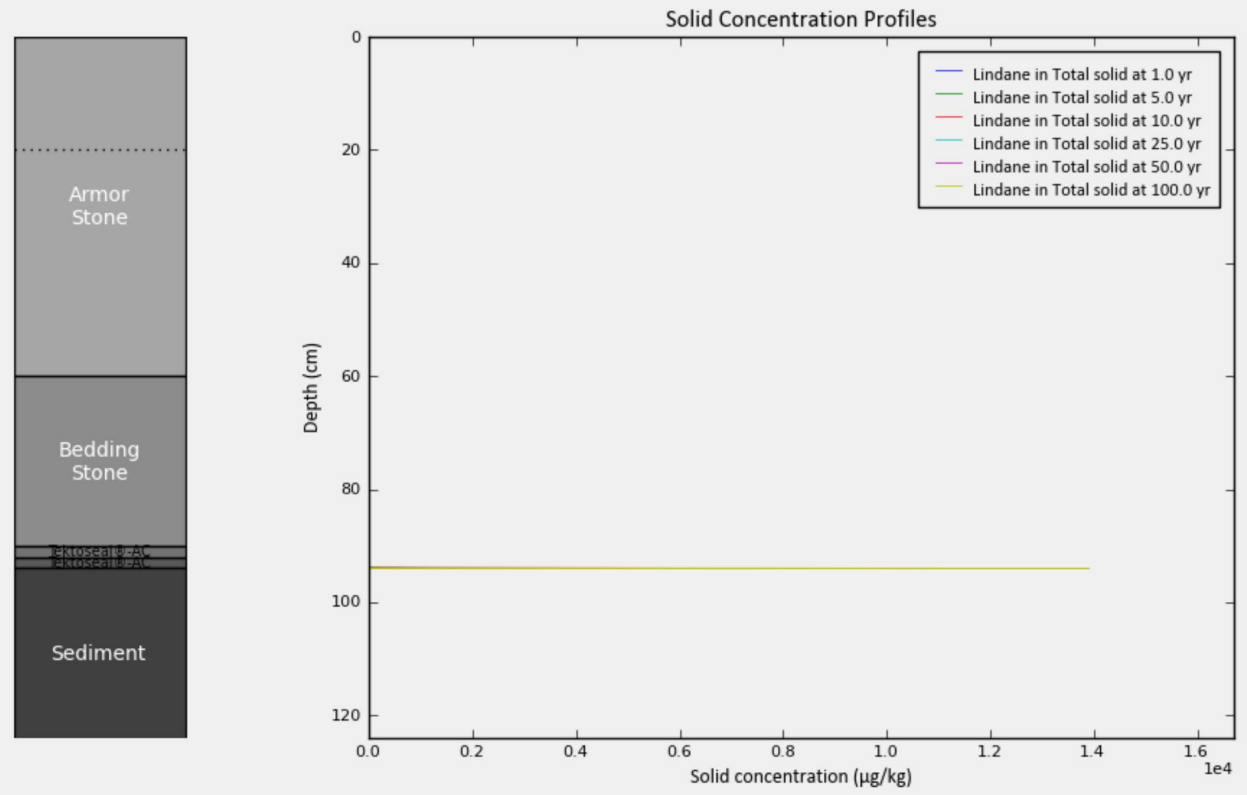

Armor Stone
Bedding Stone
Tekoseal® AC
Tekoseal® AC
Sediment
Solid Concentration Profiles
Fluoranthene in Total solid at 1.0 yr
Fluoranthene in Total solid at 5.0 yr
Fluoranthene in Total solid at 10.0 yr
Fluoranthene in Total solid at 25.0 yr
Fluoranthene in Total solid at 50.0 yr
Fluoranthene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
1e4
Solid concentration (µg/kg)

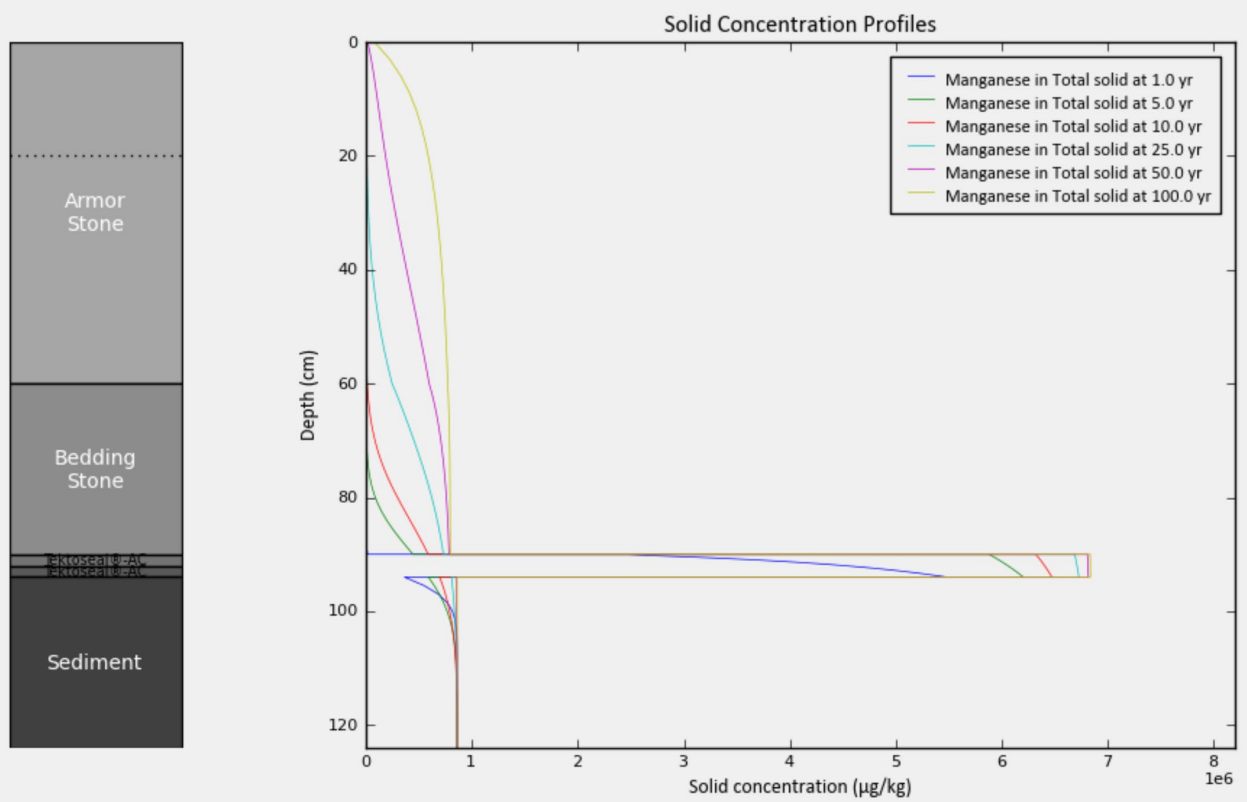

Armor Stone
Bedding Stone
Tekoseal® AC
Tekoseal® AC
Sediment
Solid Concentration Profiles
Fluorene in Total solid at 1.0 yr
Fluorene in Total solid at 5.0 yr
Fluorene in Total solid at 10.0 yr
Fluorene in Total solid at 25.0 yr
Fluorene in Total solid at 50.0 yr
Fluorene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
1e5
Solid concentration (µg/kg)

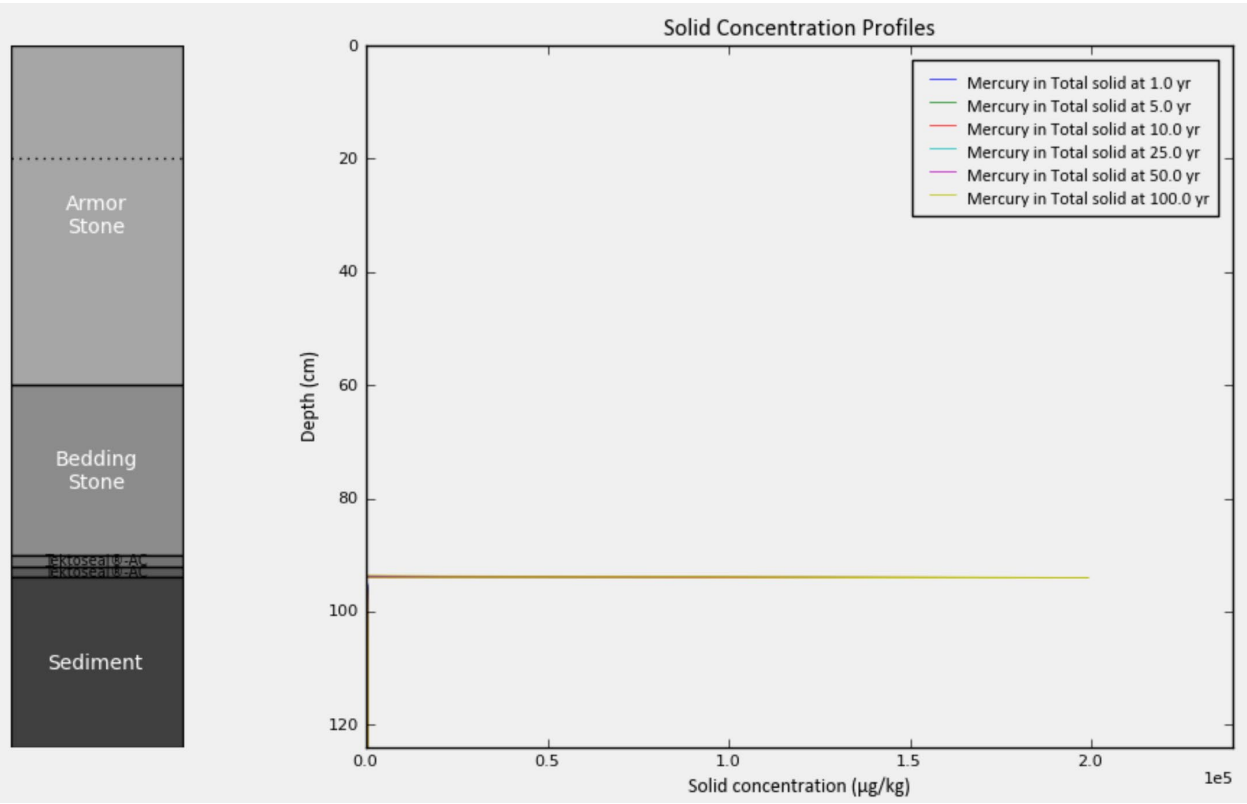

Armor Stone
Bedding Stone
Ekoseal® AC
Ekoseal® AC
Sediment
Solid Concentration Profiles
HxCDF in Total solid at 1.0 yr
HxCDF in Total solid at 5.0 yr
HxCDF in Total solid at 10.0 yr
HxCDF in Total solid at 25.0 yr
HxCDF in Total solid at 50.0 yr
HxCDF in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

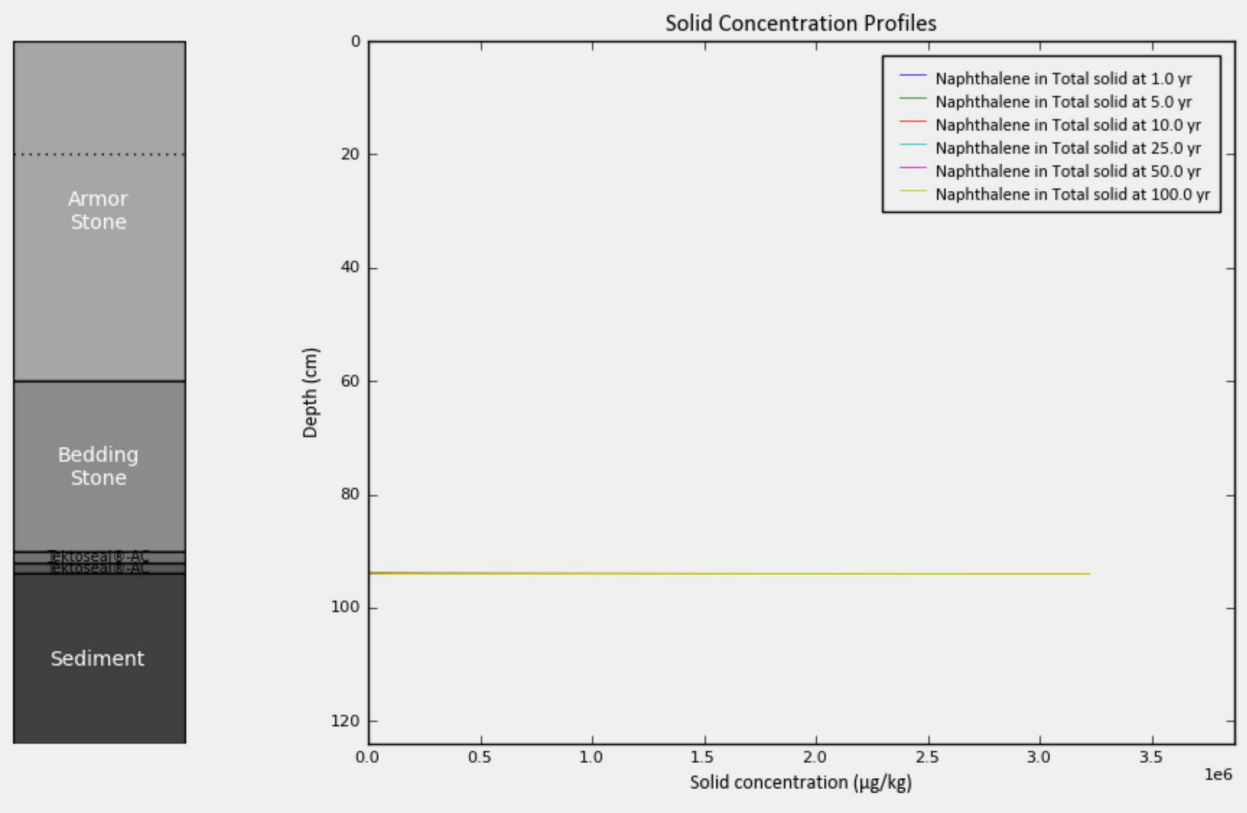

Armor Stone
Bedding Stone
Ekoseal® AC
Ekoseal® AC
Sediment
Solid Concentration Profiles
Indeno(1,2,3-c,d)pyrene in Total solid at 1.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 5.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 10.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 25.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 50.0 yr
Indeno(1,2,3-c,d)pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

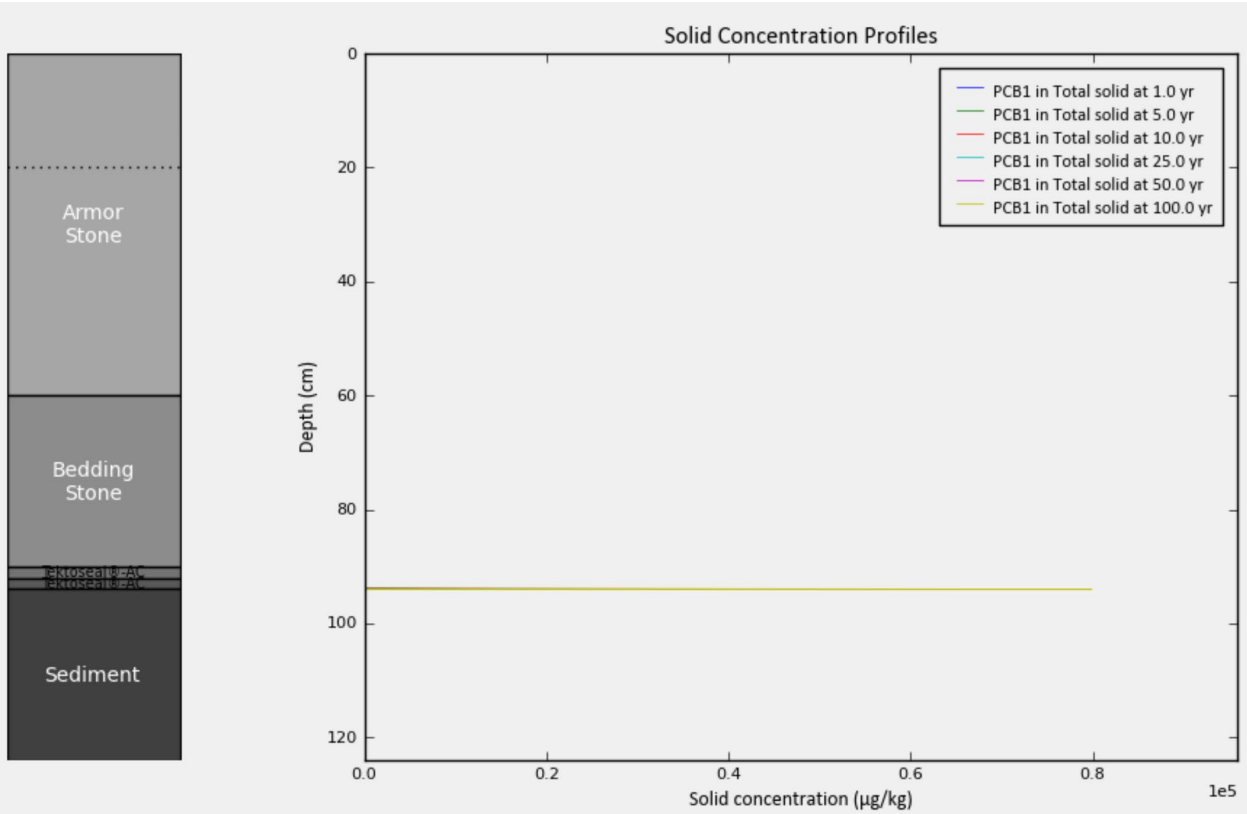

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Lead (inorganic) in Total solid at 1.0 yr
Lead (inorganic) in Total solid at 5.0 yr
Lead (inorganic) in Total solid at 10.0 yr
Lead (inorganic) in Total solid at 25.0 yr
Lead (inorganic) in Total solid at 50.0 yr
Lead (inorganic) in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

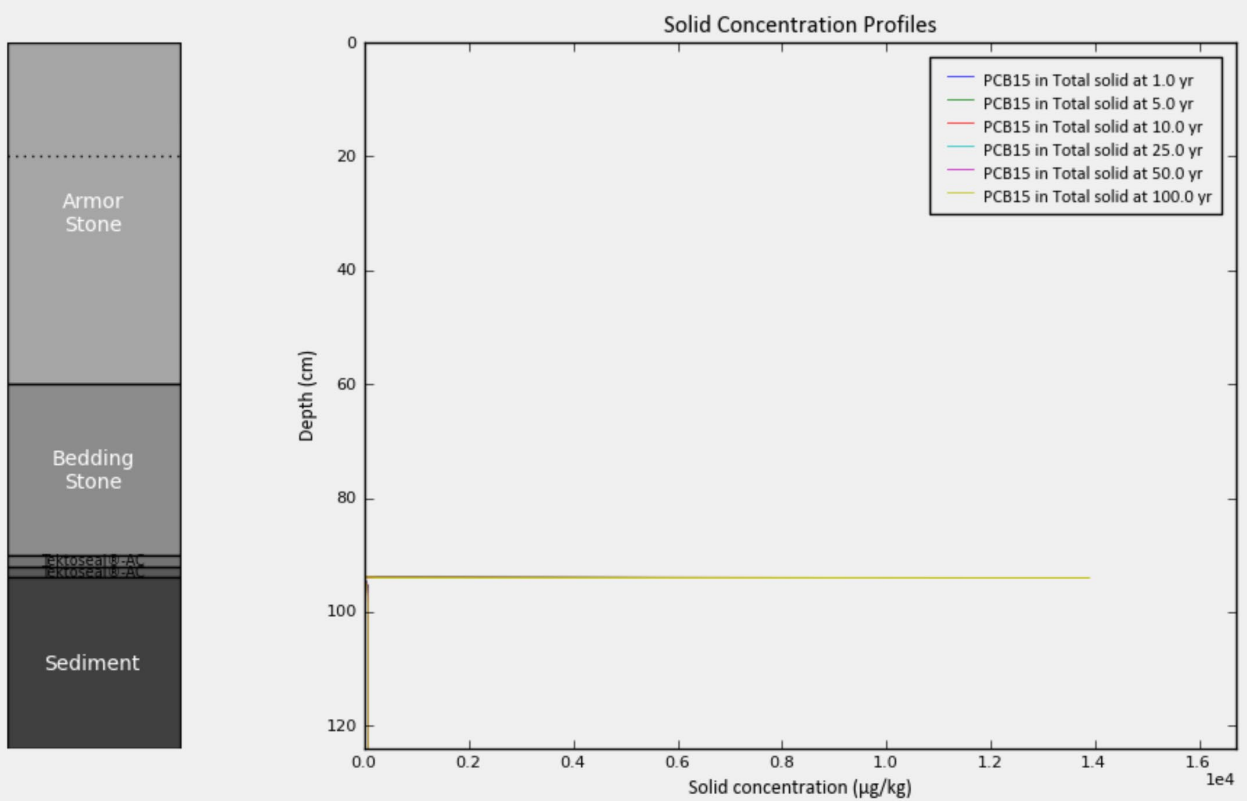

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Lindane in Total solid at 1.0 yr
Lindane in Total solid at 5.0 yr
Lindane in Total solid at 10.0 yr
Lindane in Total solid at 25.0 yr
Lindane in Total solid at 50.0 yr
Lindane in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

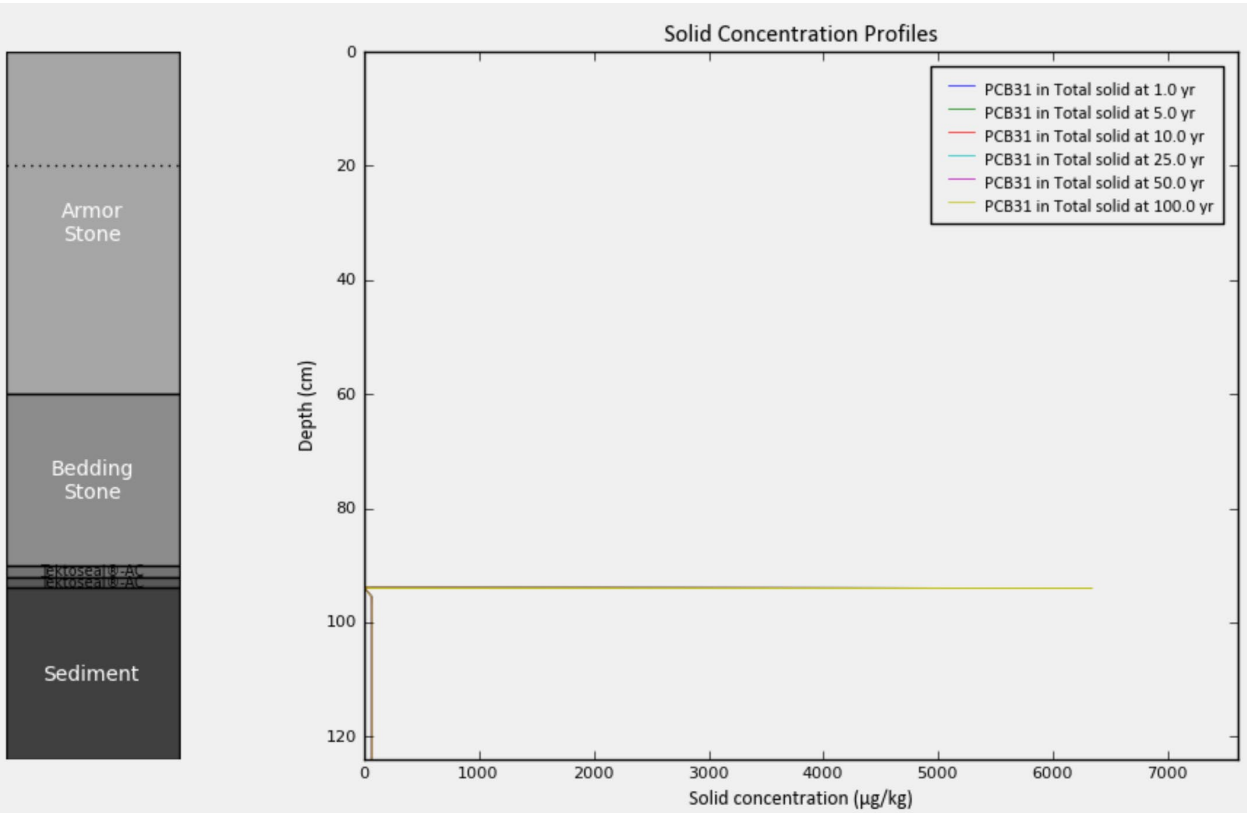

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Manganese in Total solid at 1.0 yr
Manganese in Total solid at 5.0 yr
Manganese in Total solid at 10.0 yr
Manganese in Total solid at 25.0 yr
Manganese in Total solid at 50.0 yr
Manganese in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6

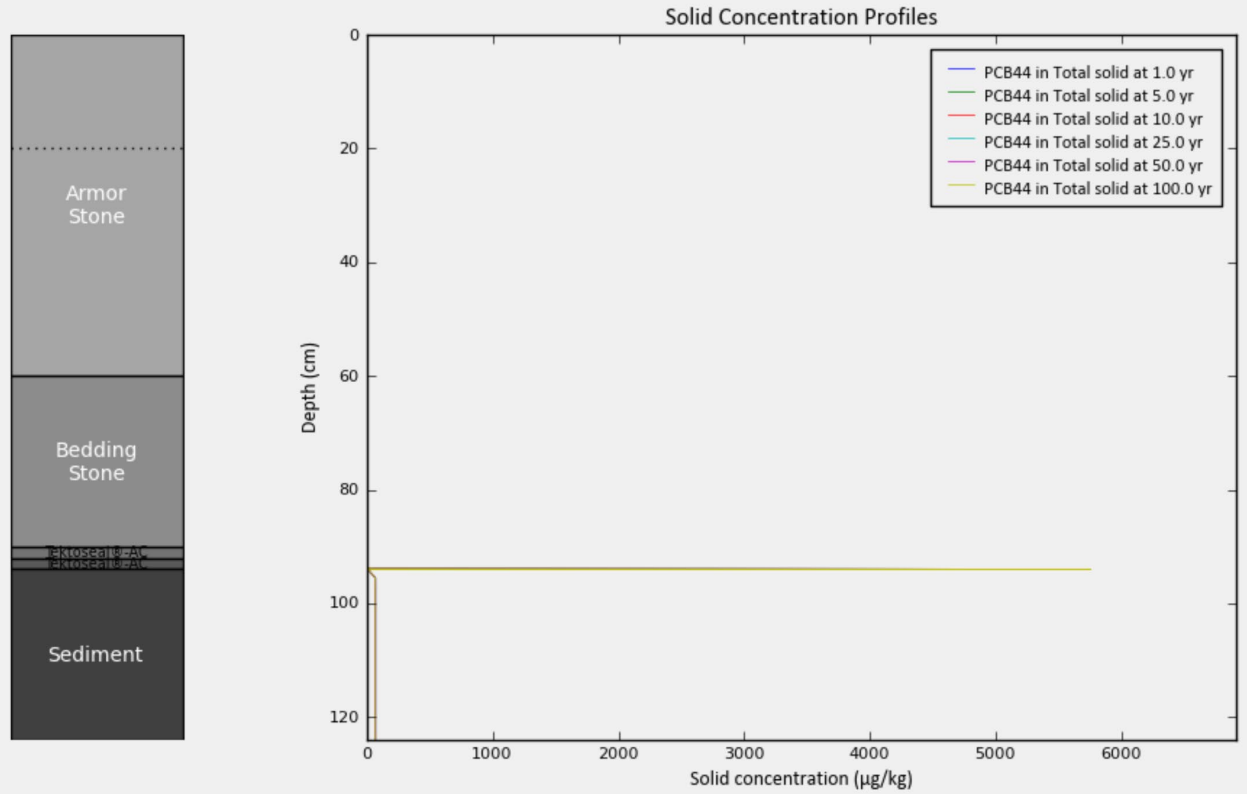

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Mercury in Total solid at 1.0 yr
Mercury in Total solid at 5.0 yr
Mercury in Total solid at 10.0 yr
Mercury in Total solid at 25.0 yr
Mercury in Total solid at 50.0 yr
Mercury in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

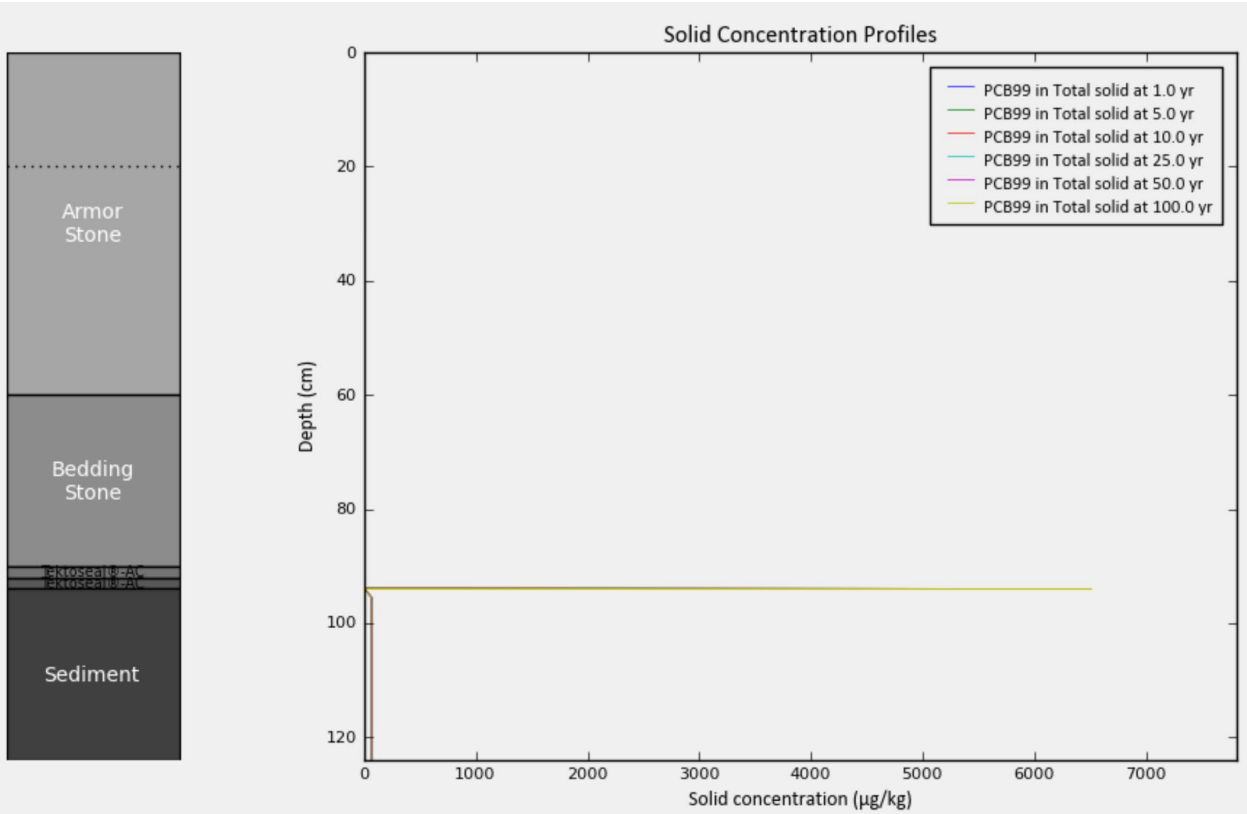

Armor Stone
Bedding Stone
Tekroseal® AC
Tekroseal® AC
Sediment
Solid Concentration Profiles
Naphthalene in Total solid at 1.0 yr
Naphthalene in Total solid at 5.0 yr
Naphthalene in Total solid at 10.0 yr
Naphthalene in Total solid at 25.0 yr
Naphthalene in Total solid at 50.0 yr
Naphthalene in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1e6
Solid concentration (µg/kg)

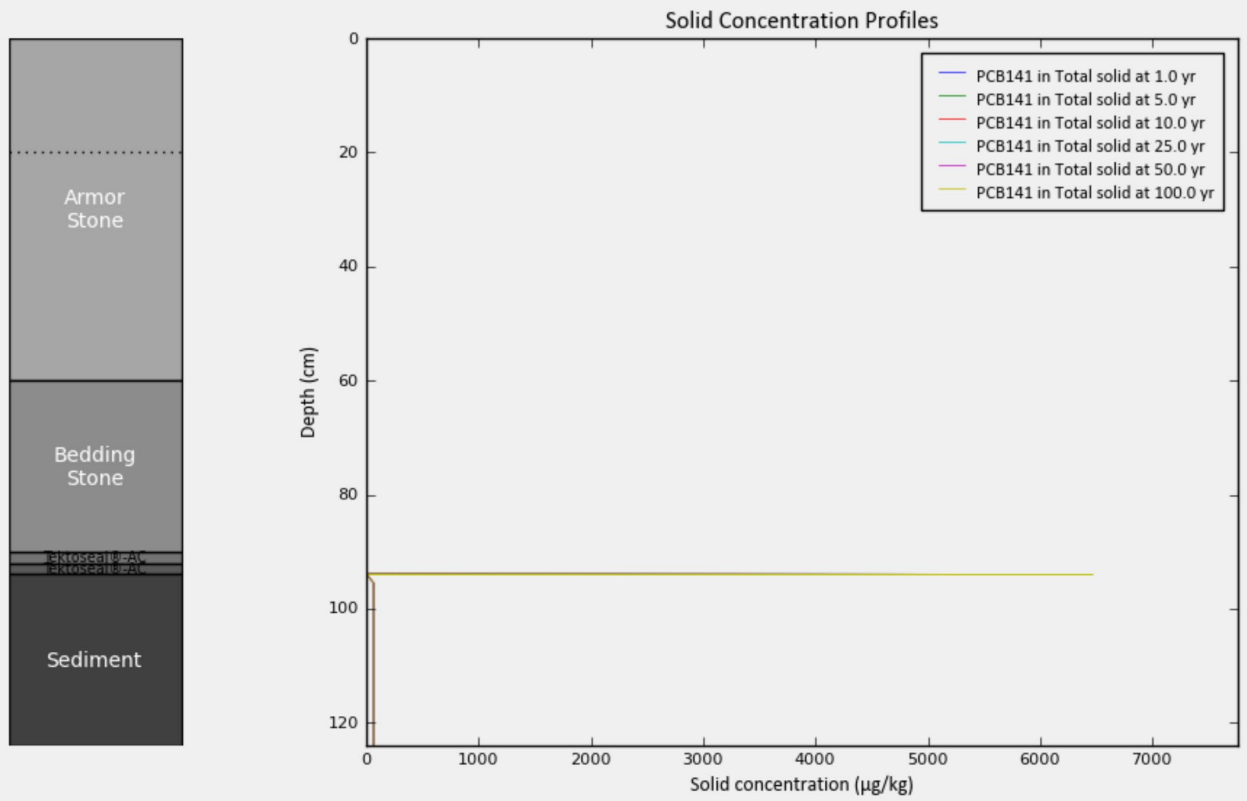

Armor Stone
Bedding Stone
Tekroseal® AC
Tekroseal® AC
Sediment
Solid Concentration Profiles
PCB1 in Total solid at 1.0 yr
PCB1 in Total solid at 5.0 yr
PCB1 in Total solid at 10.0 yr
PCB1 in Total solid at 25.0 yr
PCB1 in Total solid at 50.0 yr
PCB1 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1e5
Solid concentration (µg/kg)

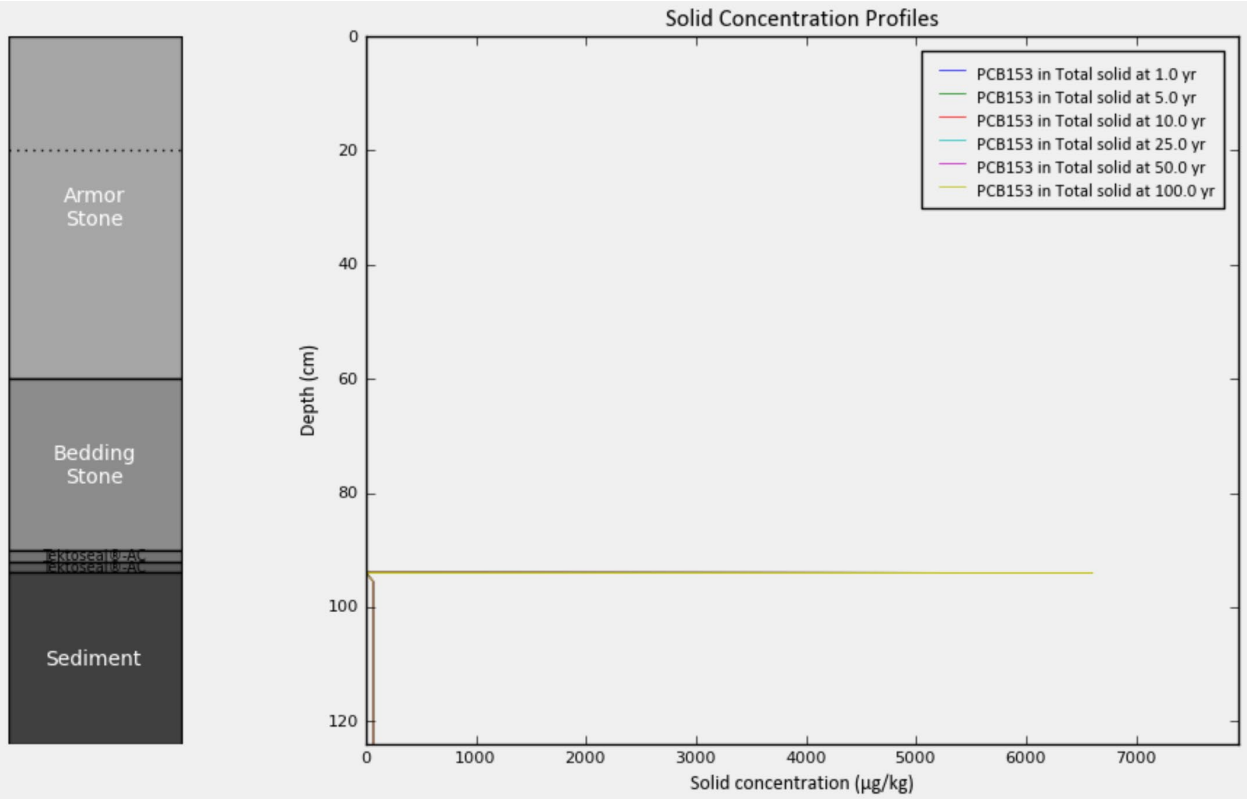

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB15 in Total solid at 1.0 yr
PCB15 in Total solid at 5.0 yr
PCB15 in Total solid at 10.0 yr
PCB15 in Total solid at 25.0 yr
PCB15 in Total solid at 50.0 yr
PCB15 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

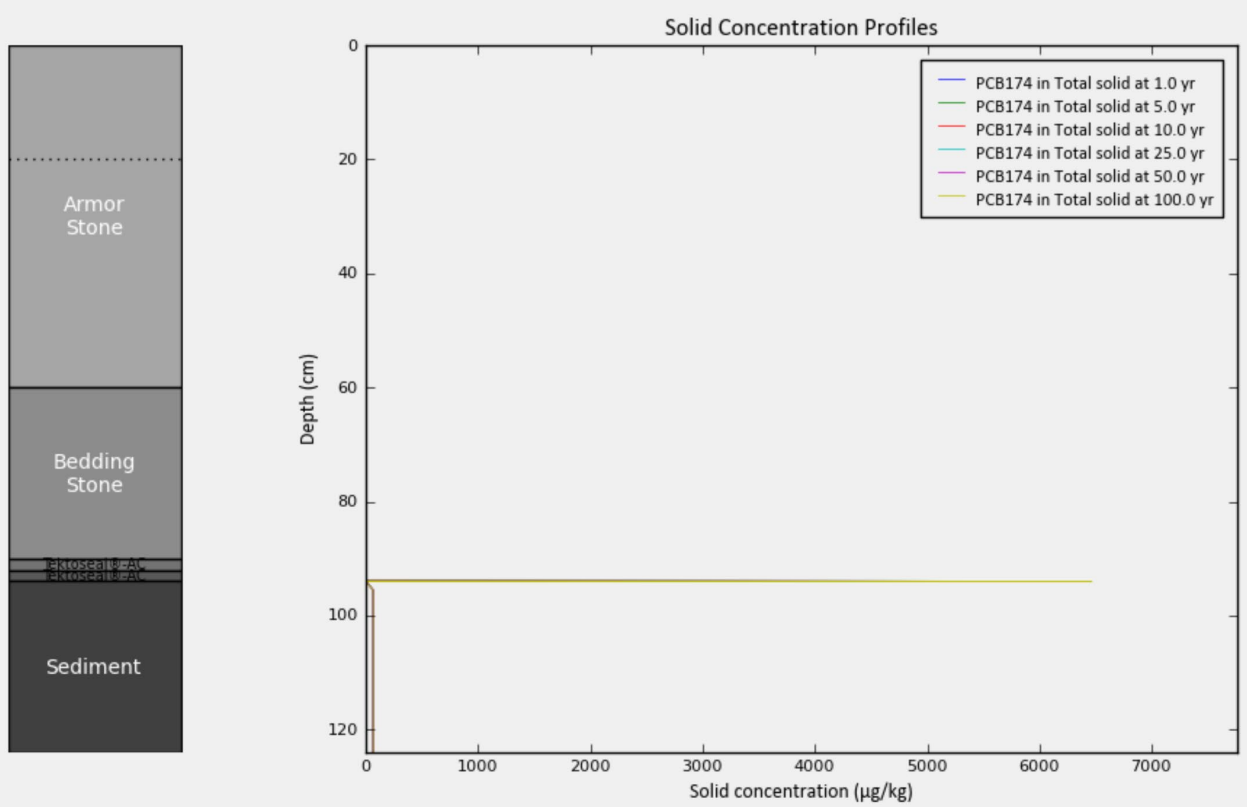

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB31 in Total solid at 1.0 yr
PCB31 in Total solid at 5.0 yr
PCB31 in Total solid at 10.0 yr
PCB31 in Total solid at 25.0 yr
PCB31 in Total solid at 50.0 yr
PCB31 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

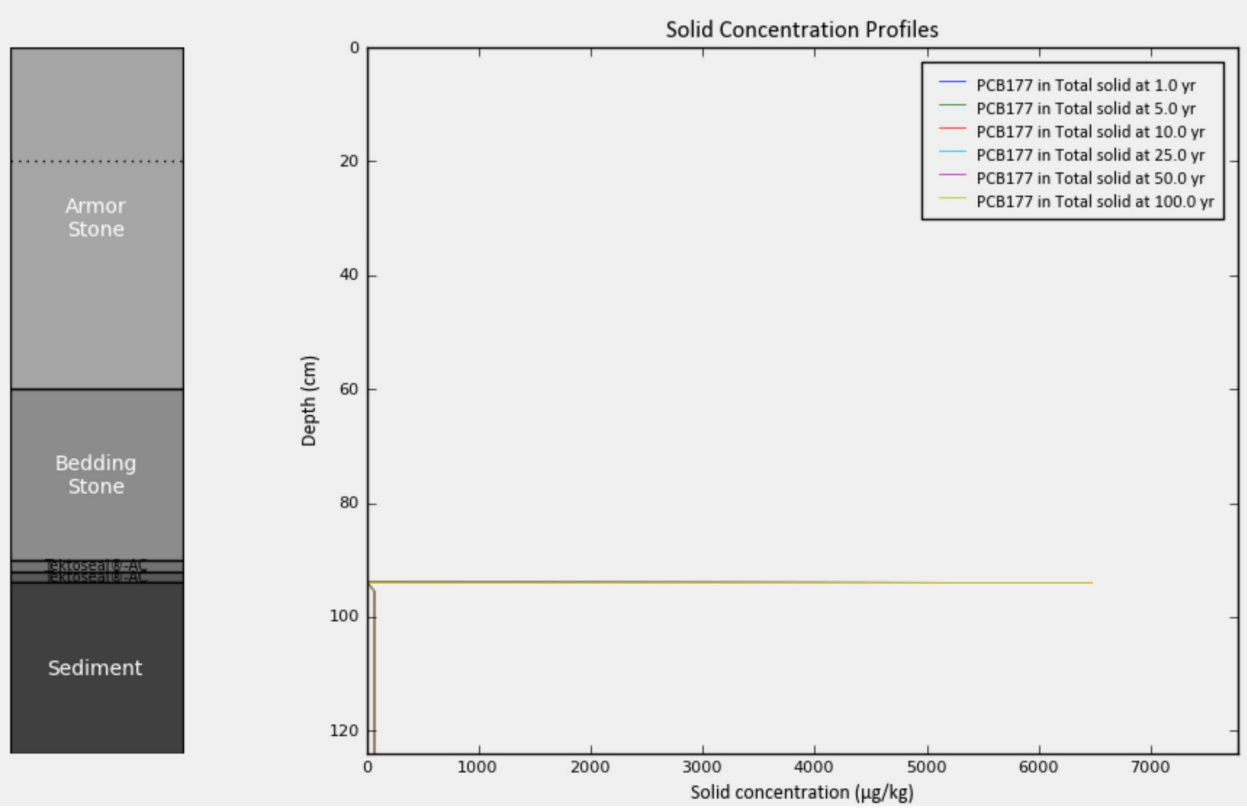

Armor Stone
Bedding Stone
Ekoseal® AC
Ekoseal® AC
Sediment
Solid Concentration Profiles
PCB44 in Total solid at 1.0 yr
PCB44 in Total solid at 5.0 yr
PCB44 in Total solid at 10.0 yr
PCB44 in Total solid at 25.0 yr
PCB44 in Total solid at 50.0 yr
PCB44 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1000
2000
3000
4000
5000
6000
Solid concentration (µg/kg)

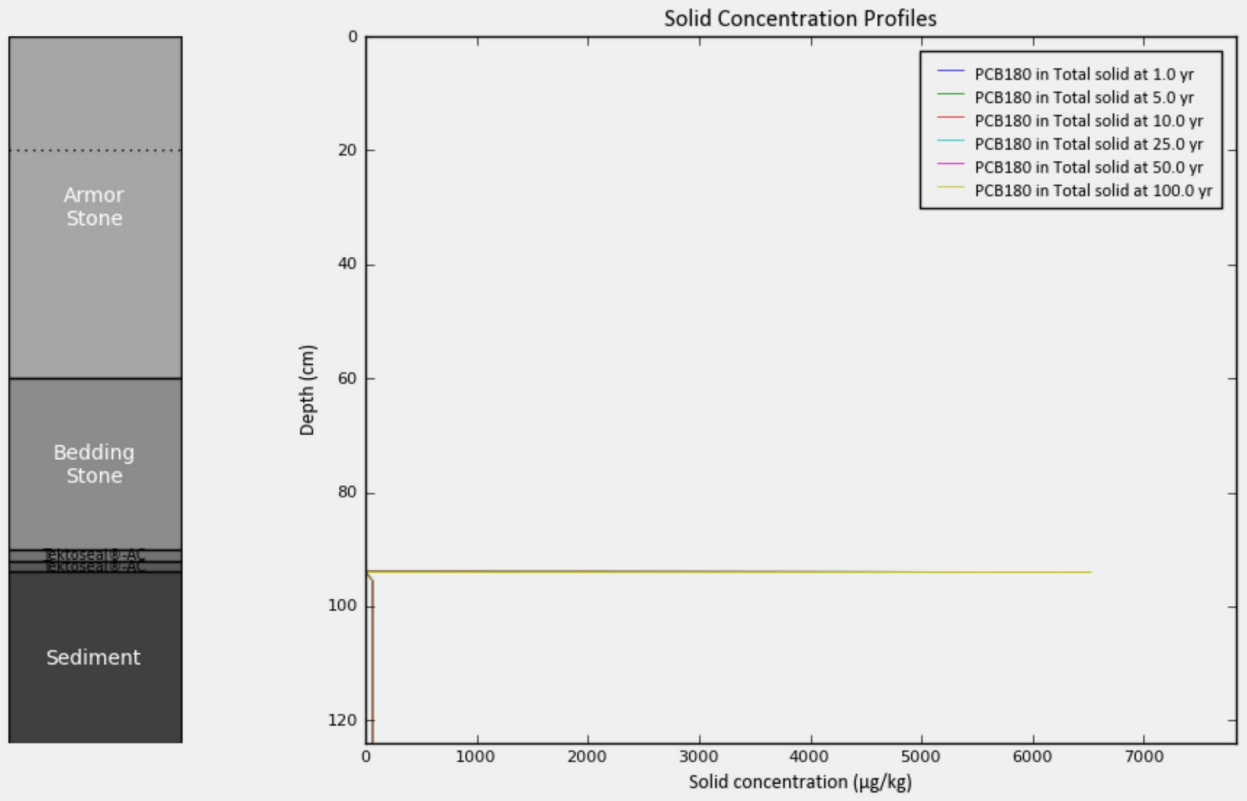

Armor Stone
Bedding Stone
Ekoseal® AC
Ekoseal® AC
Sediment
Solid Concentration Profiles
PCB99 in Total solid at 1.0 yr
PCB99 in Total solid at 5.0 yr
PCB99 in Total solid at 10.0 yr
PCB99 in Total solid at 25.0 yr
PCB99 in Total solid at 50.0 yr
PCB99 in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1000
2000
3000
4000
5000
6000
7000
Solid concentration (µg/kg)

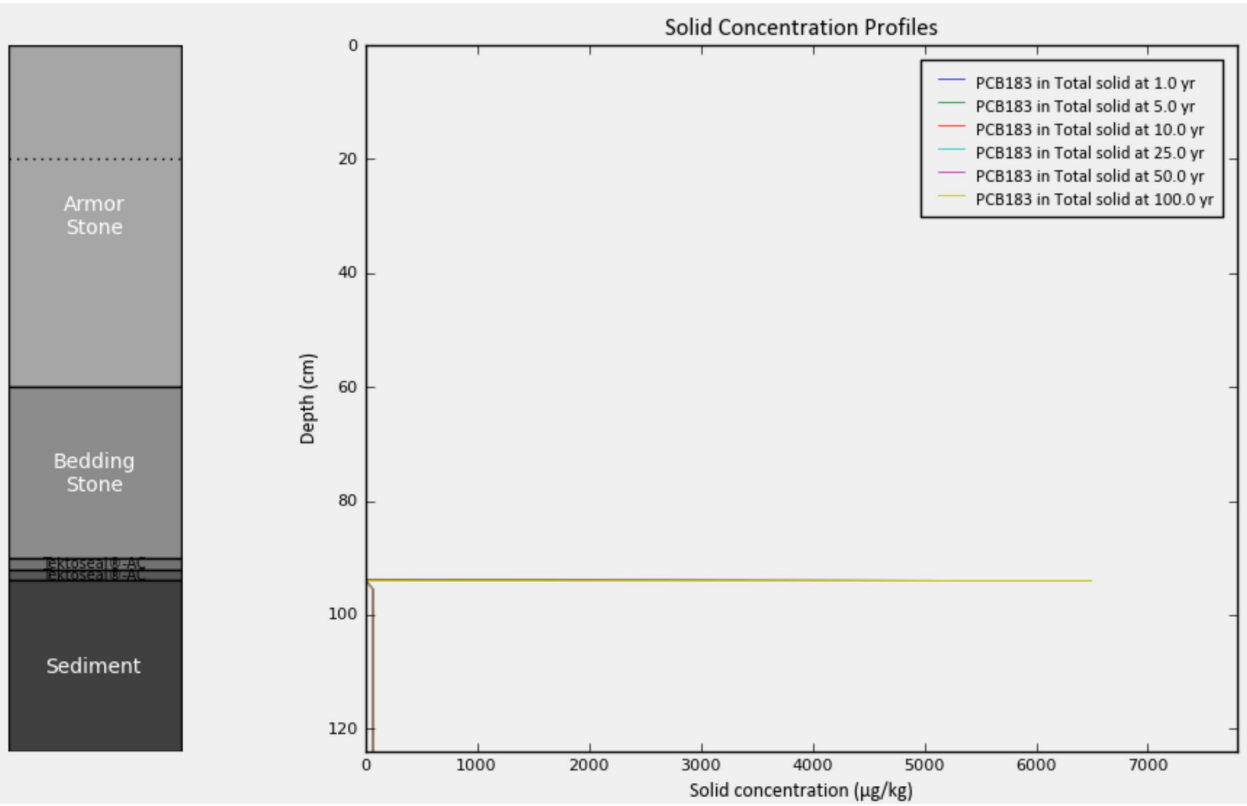

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB141 in Total solid at 1.0 yr
PCB141 in Total solid at 5.0 yr
PCB141 in Total solid at 10.0 yr
PCB141 in Total solid at 25.0 yr
PCB141 in Total solid at 50.0 yr
PCB141 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

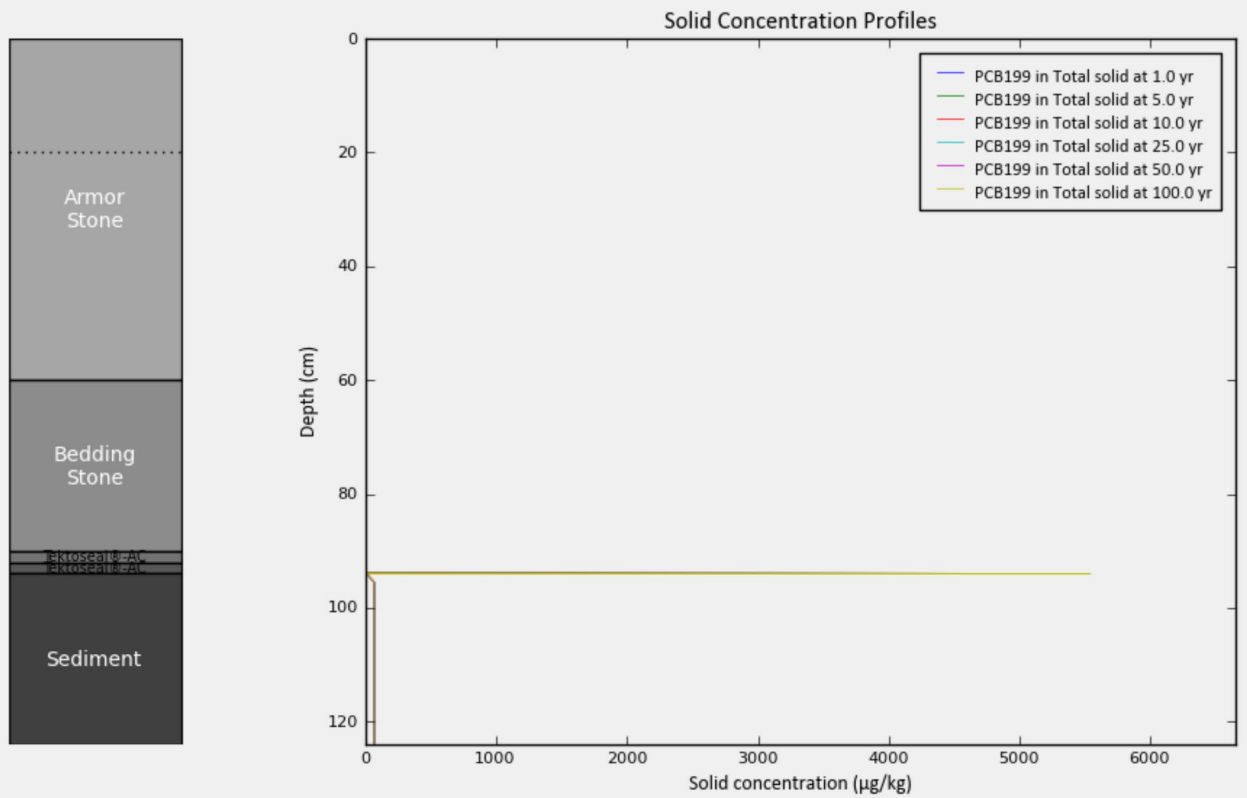

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB153 in Total solid at 1.0 yr
PCB153 in Total solid at 5.0 yr
PCB153 in Total solid at 10.0 yr
PCB153 in Total solid at 25.0 yr
PCB153 in Total solid at 50.0 yr
PCB153 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

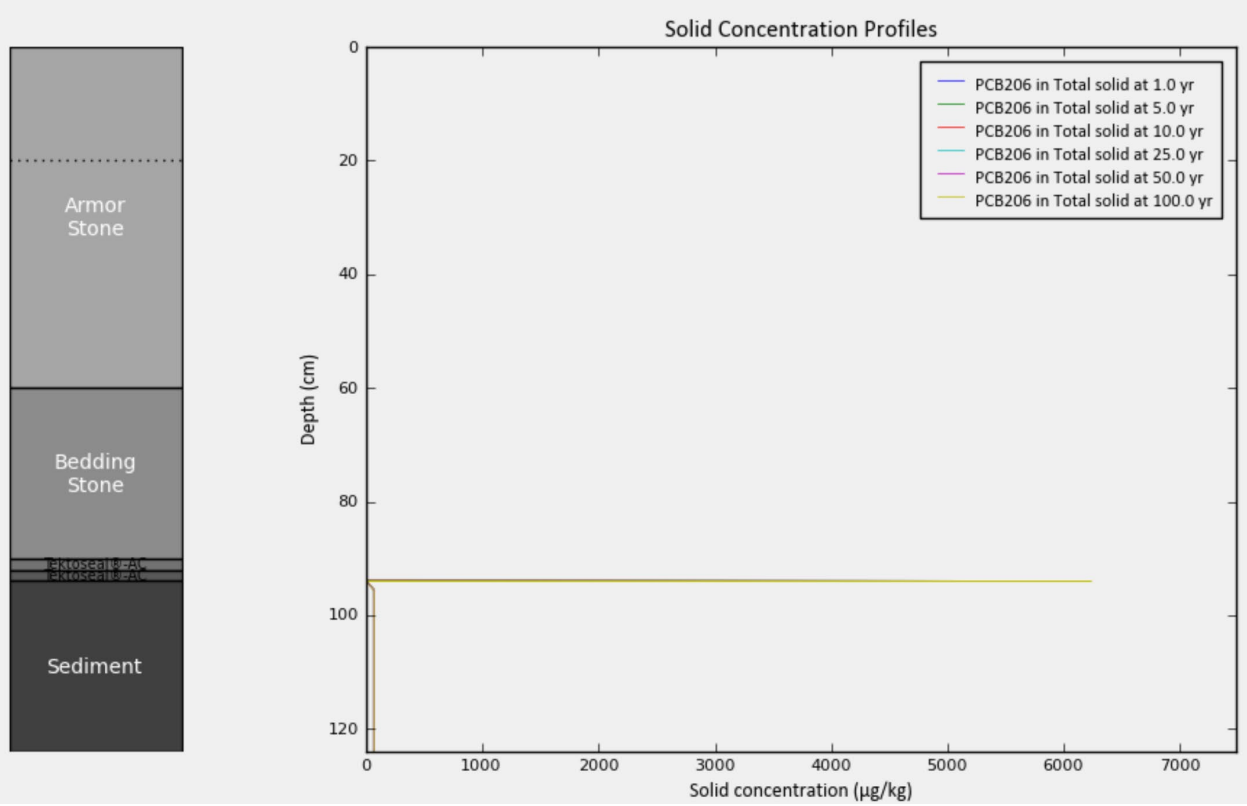

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB174 in Total solid at 1.0 yr
PCB174 in Total solid at 5.0 yr
PCB174 in Total solid at 10.0 yr
PCB174 in Total solid at 25.0 yr
PCB174 in Total solid at 50.0 yr
PCB174 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

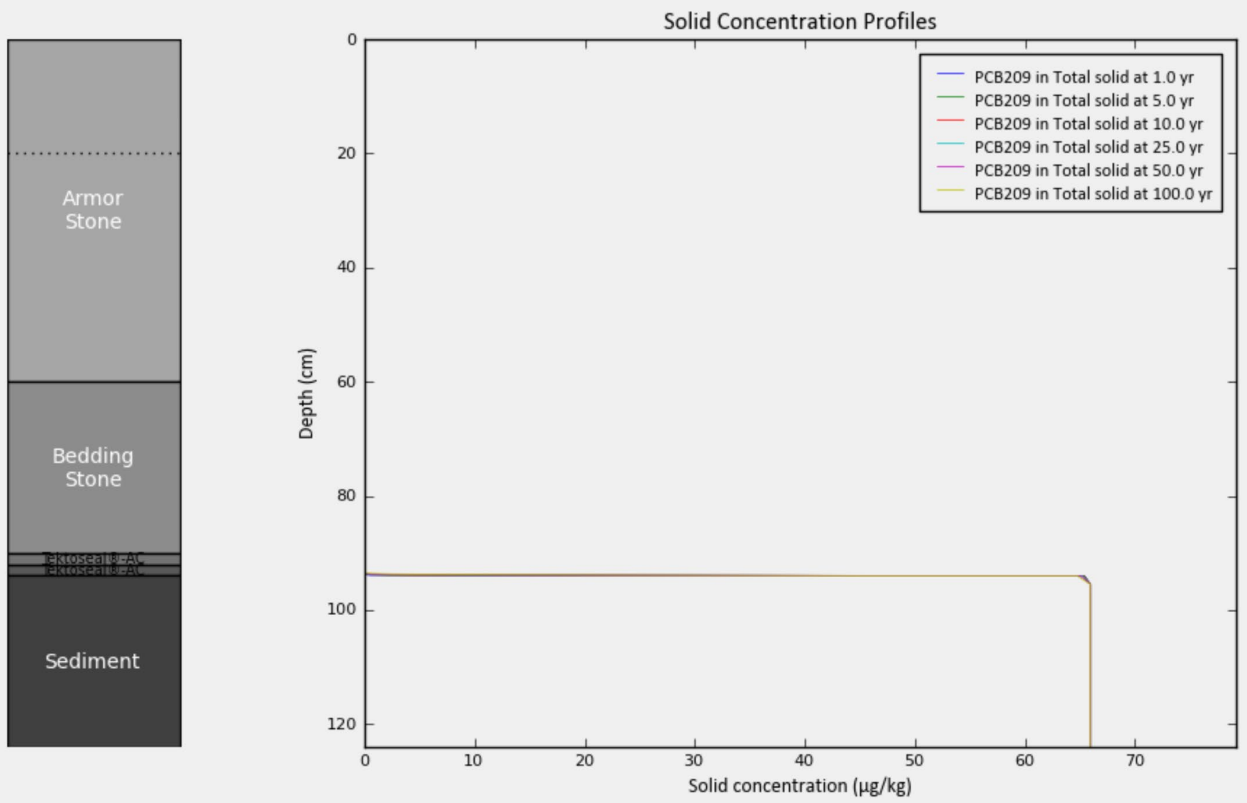

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB177 in Total solid at 1.0 yr
PCB177 in Total solid at 5.0 yr
PCB177 in Total solid at 10.0 yr
PCB177 in Total solid at 25.0 yr
PCB177 in Total solid at 50.0 yr
PCB177 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

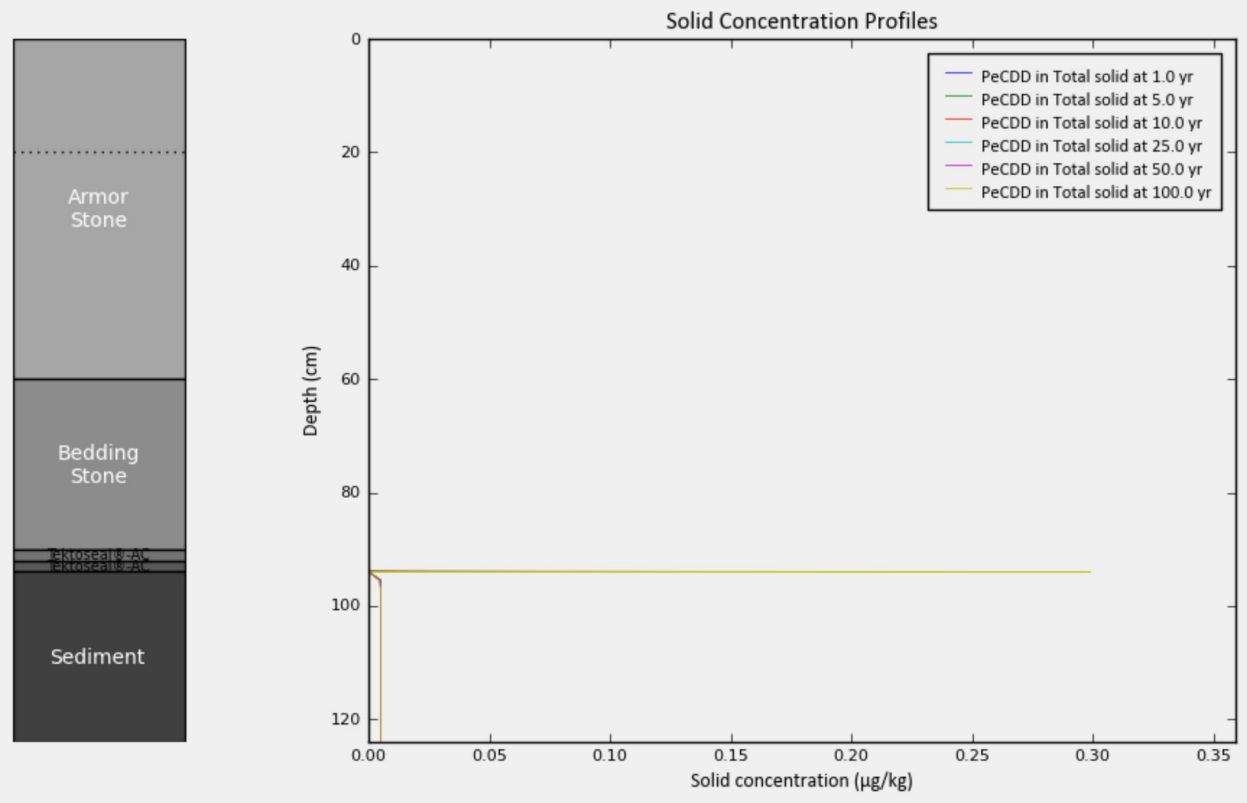

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB180 in Total solid at 1.0 yr
PCB180 in Total solid at 5.0 yr
PCB180 in Total solid at 10.0 yr
PCB180 in Total solid at 25.0 yr
PCB180 in Total solid at 50.0 yr
PCB180 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

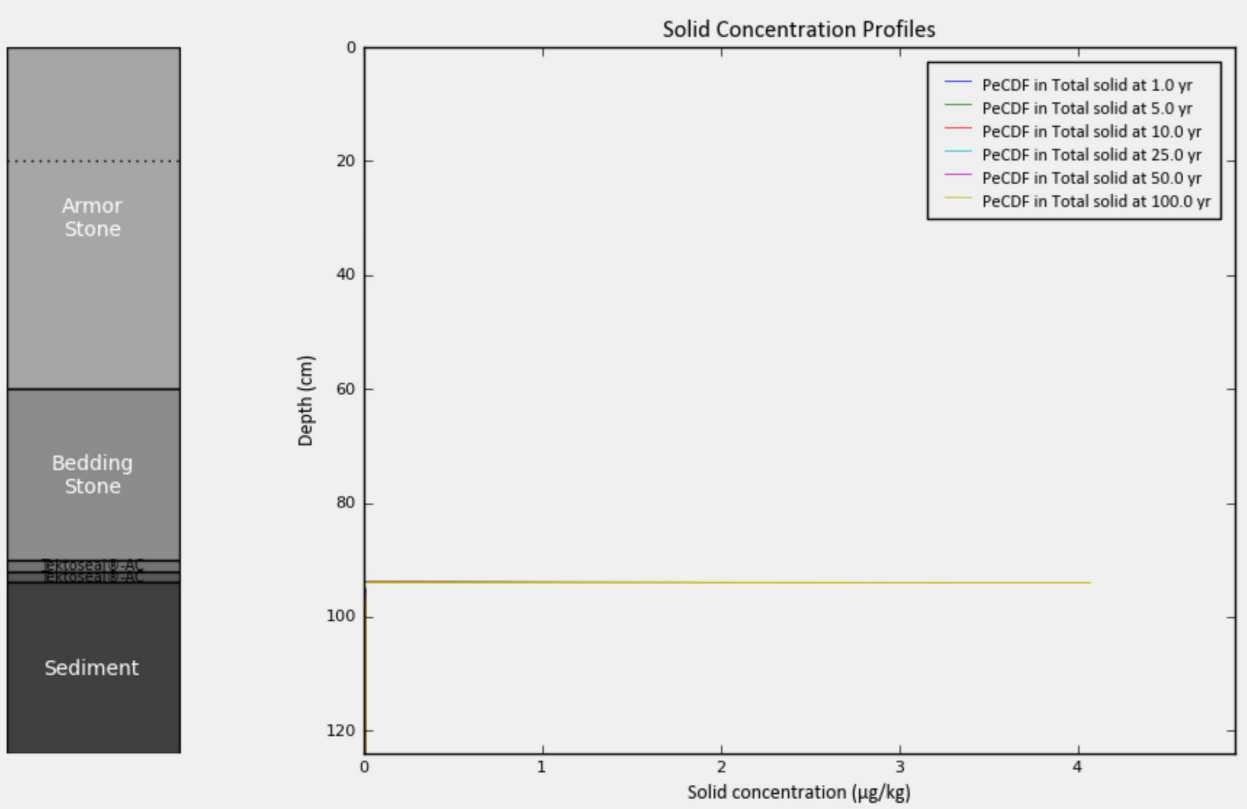

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB183 in Total solid at 1.0 yr
PCB183 in Total solid at 5.0 yr
PCB183 in Total solid at 10.0 yr
PCB183 in Total solid at 25.0 yr
PCB183 in Total solid at 50.0 yr
PCB183 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

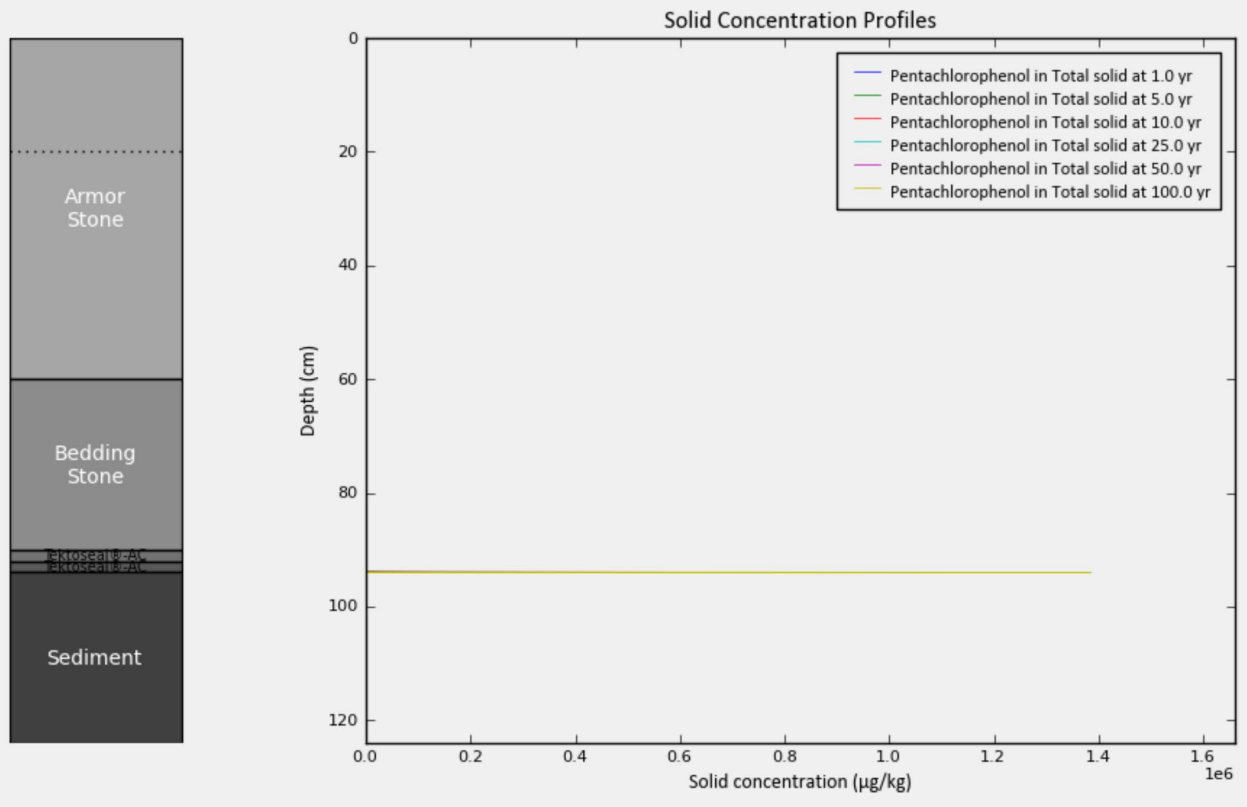

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB199 in Total solid at 1.0 yr
PCB199 in Total solid at 5.0 yr
PCB199 in Total solid at 10.0 yr
PCB199 in Total solid at 25.0 yr
PCB199 in Total solid at 50.0 yr
PCB199 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

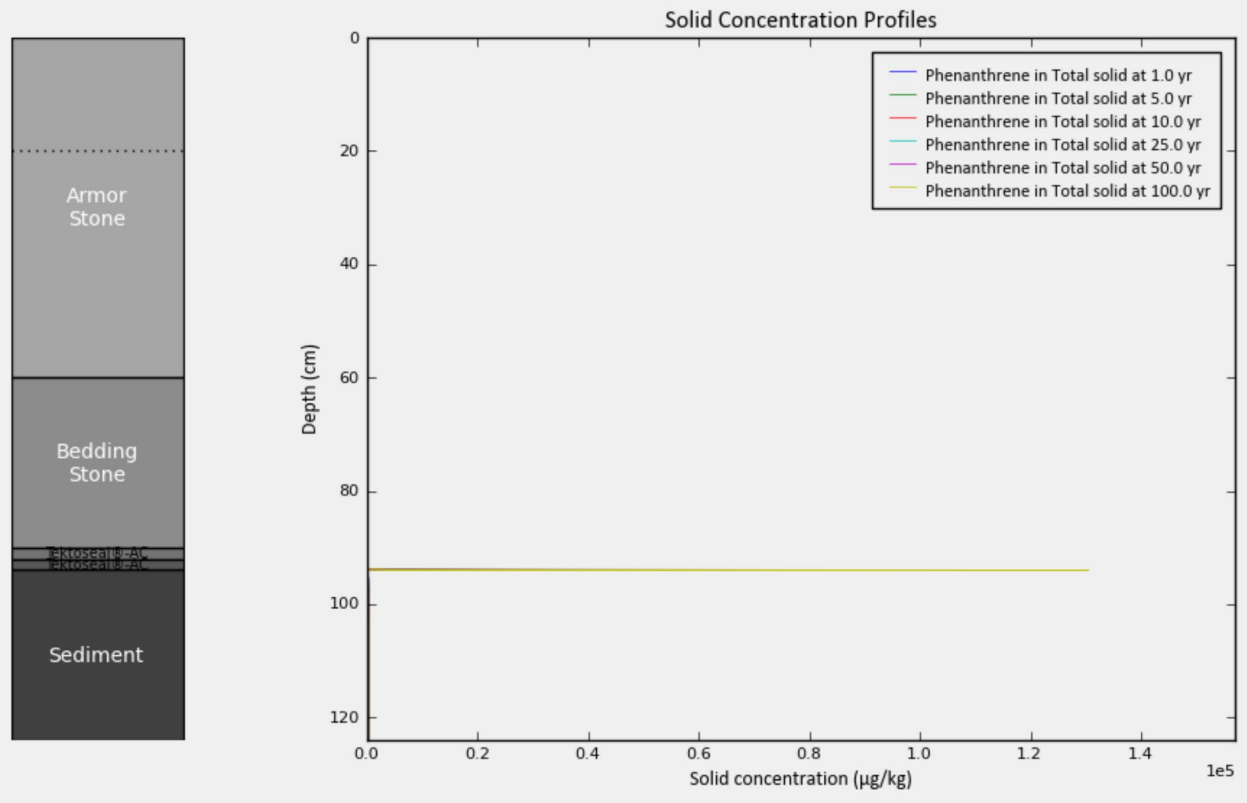

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB206 in Total solid at 1.0 yr
PCB206 in Total solid at 5.0 yr
PCB206 in Total solid at 10.0 yr
PCB206 in Total solid at 25.0 yr
PCB206 in Total solid at 50.0 yr
PCB206 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

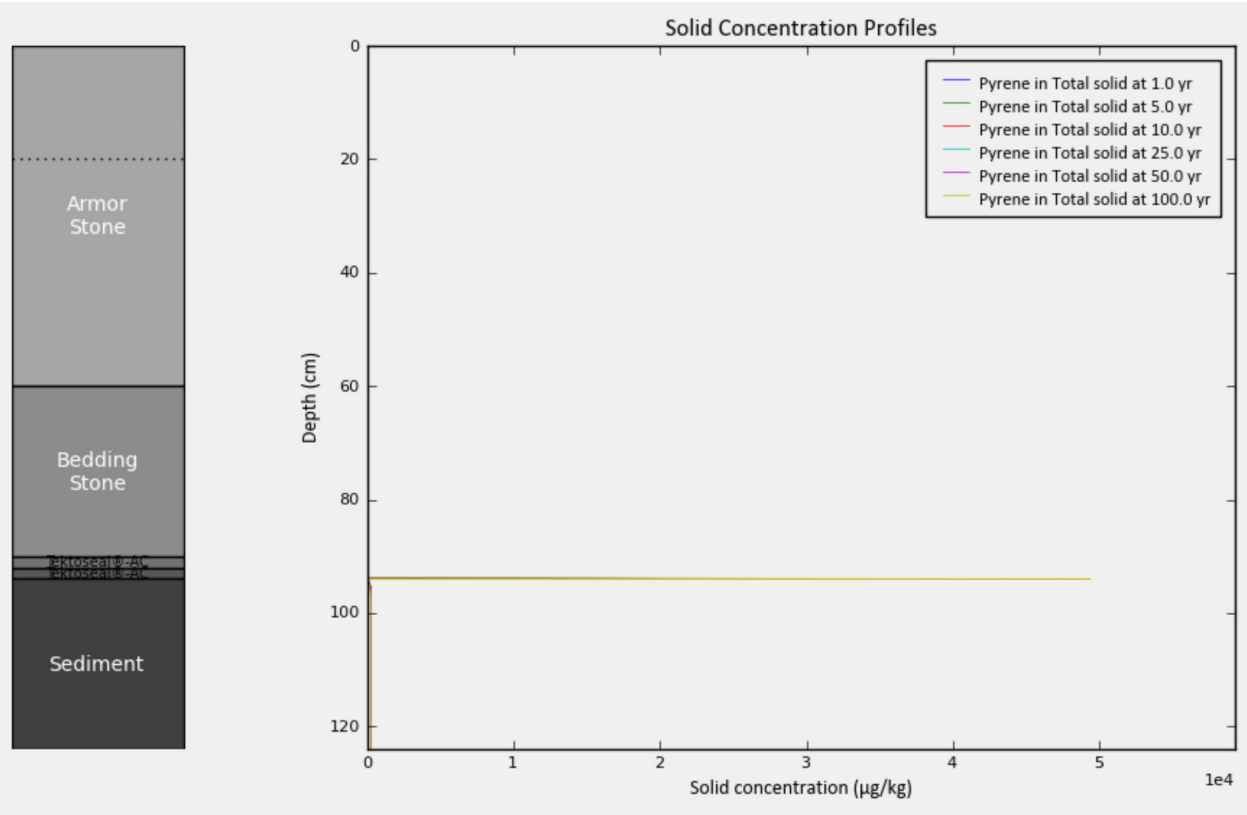

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PCB209 in Total solid at 1.0 yr
PCB209 in Total solid at 5.0 yr
PCB209 in Total solid at 10.0 yr
PCB209 in Total solid at 25.0 yr
PCB209 in Total solid at 50.0 yr
PCB209 in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

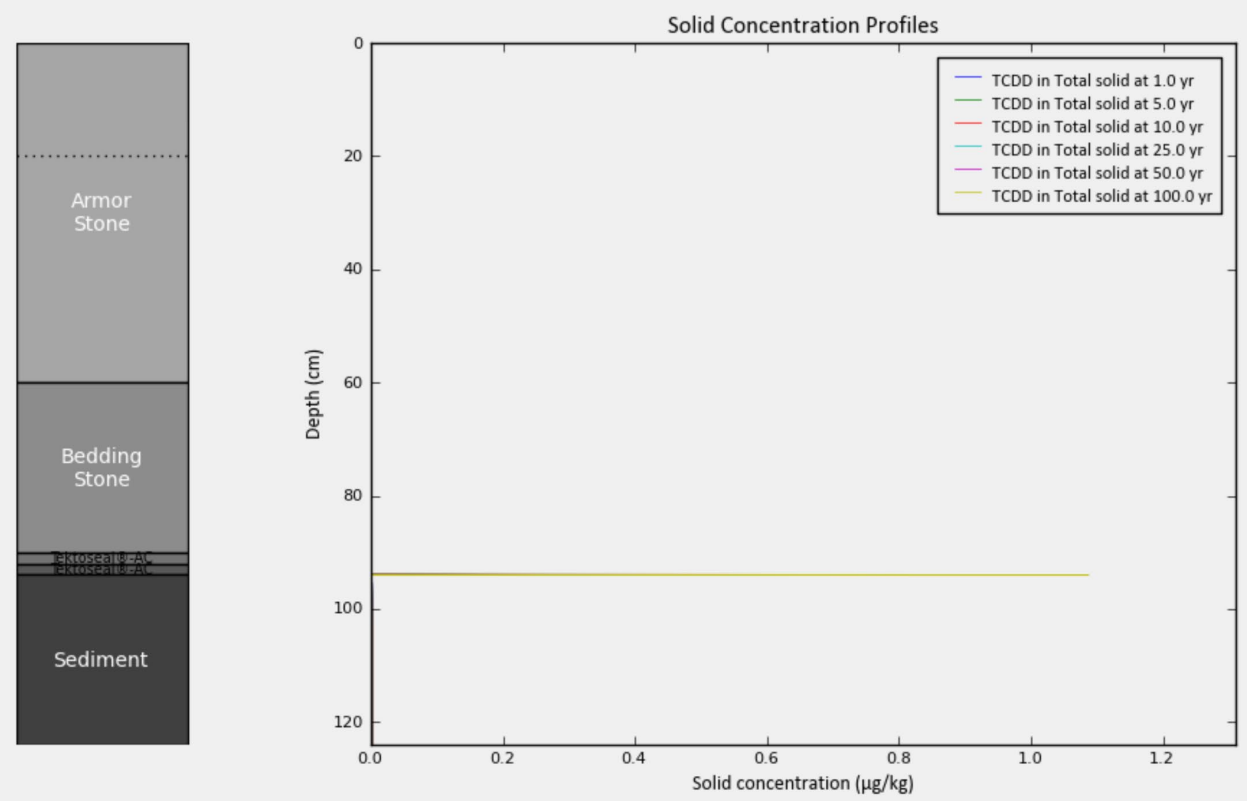

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
PeCDD in Total solid at 1.0 yr
PeCDD in Total solid at 5.0 yr
PeCDD in Total solid at 10.0 yr
PeCDD in Total solid at 25.0 yr
PeCDD in Total solid at 50.0 yr
PeCDD in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)

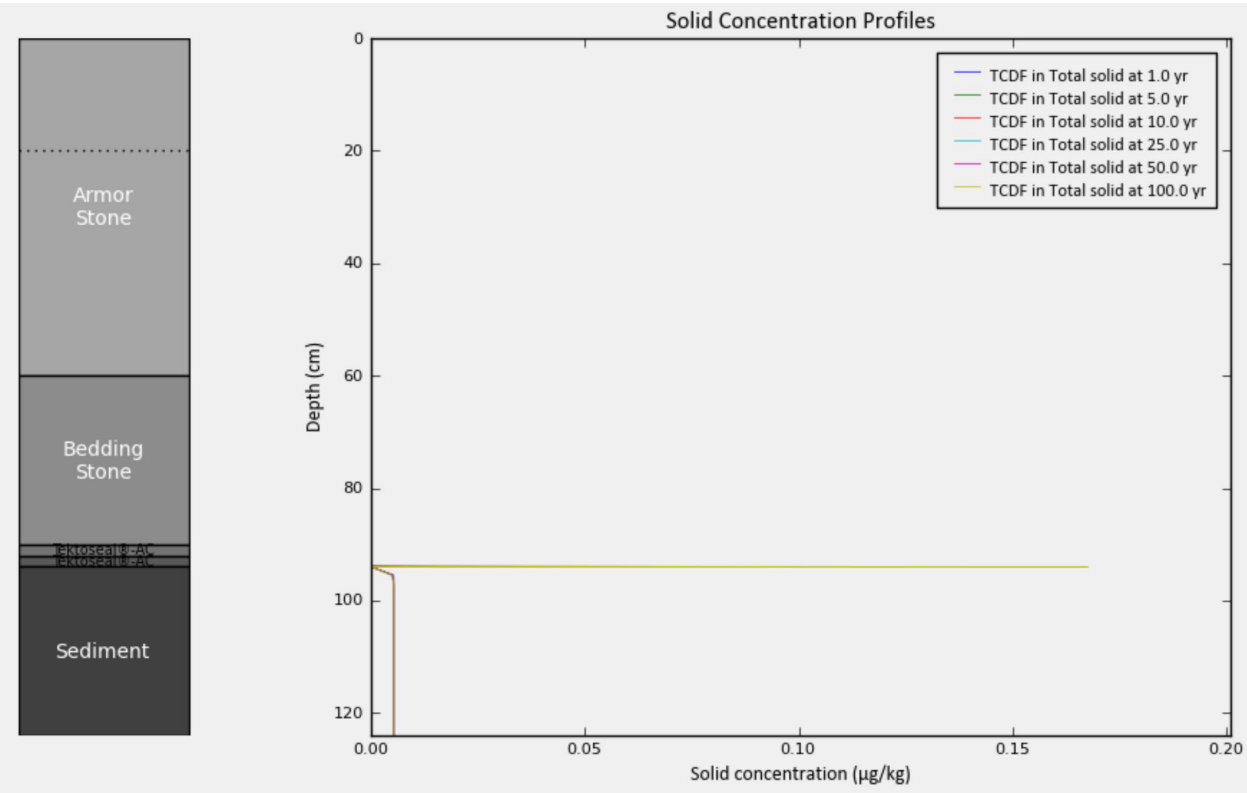

Armor Stone
Bedding Stone
Tektoseal® AC
Tektoseal® AC
Sediment
Solid Concentration Profiles
PeCDF in Total solid at 1.0 yr
PeCDF in Total solid at 5.0 yr
PeCDF in Total solid at 10.0 yr
PeCDF in Total solid at 25.0 yr
PeCDF in Total solid at 50.0 yr
PeCDF in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
1
2
3
4
Solid concentration (µg/kg)

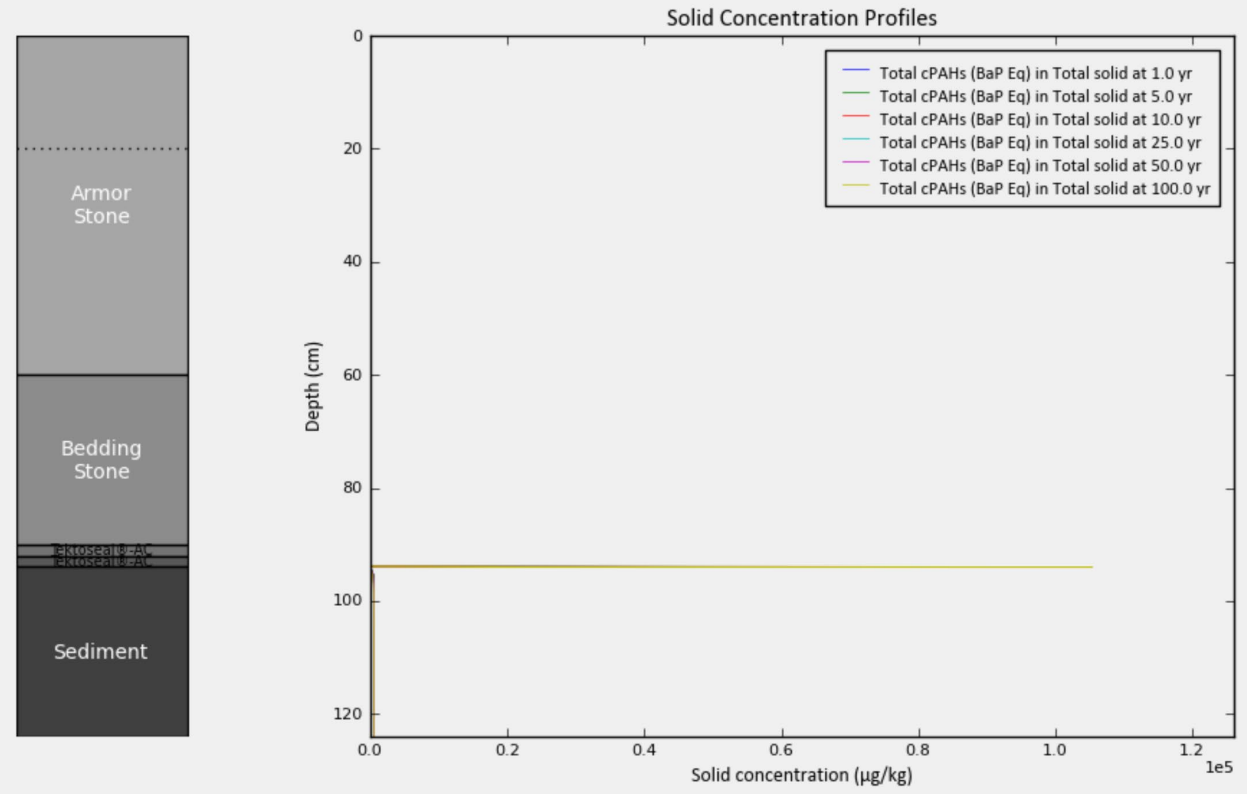

Armor Stone
Bedding Stone
Tektoseal® AC
Tektoseal® AC
Sediment
Solid Concentration Profiles
Pentachlorophenol in Total solid at 1.0 yr
Pentachlorophenol in Total solid at 5.0 yr
Pentachlorophenol in Total solid at 10.0 yr
Pentachlorophenol in Total solid at 25.0 yr
Pentachlorophenol in Total solid at 50.0 yr
Pentachlorophenol in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1e6
Solid concentration (µg/kg)

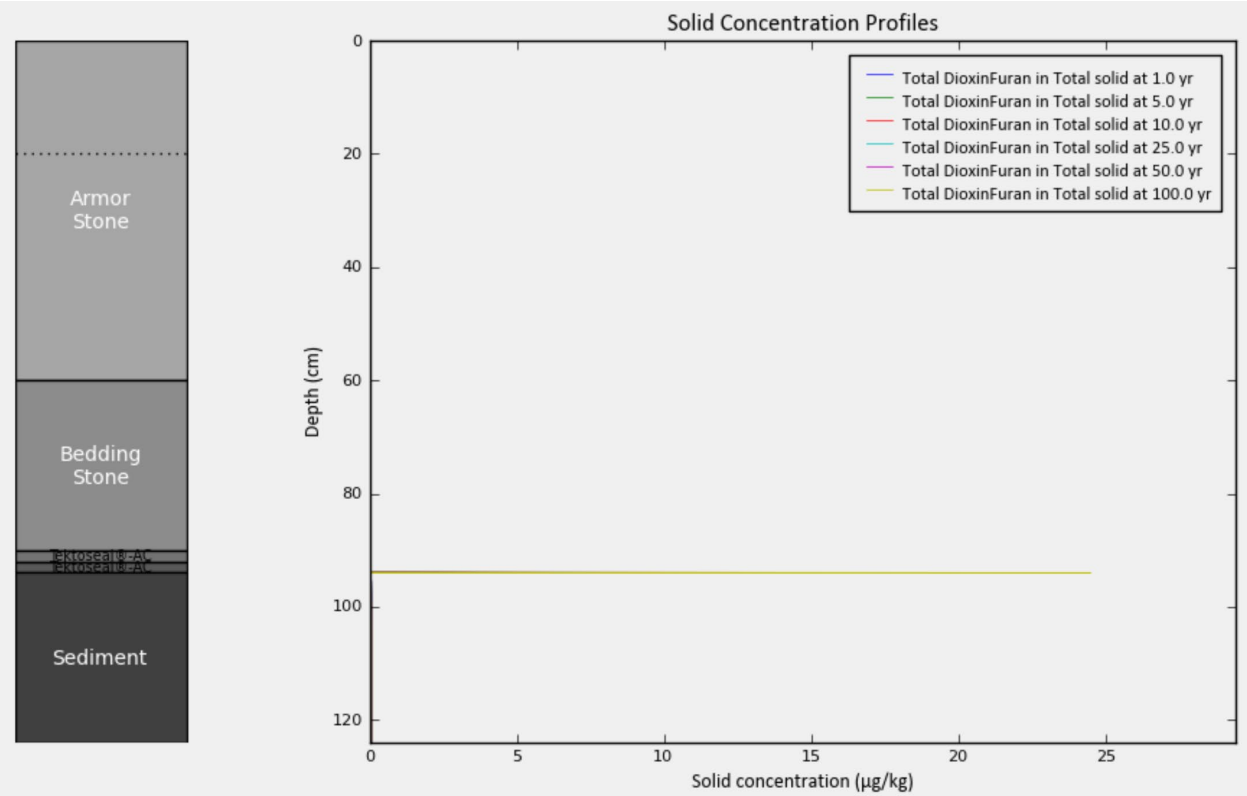

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Phenanthrene in Total solid at 1.0 yr
Phenanthrene in Total solid at 5.0 yr
Phenanthrene in Total solid at 10.0 yr
Phenanthrene in Total solid at 25.0 yr
Phenanthrene in Total solid at 50.0 yr
Phenanthrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

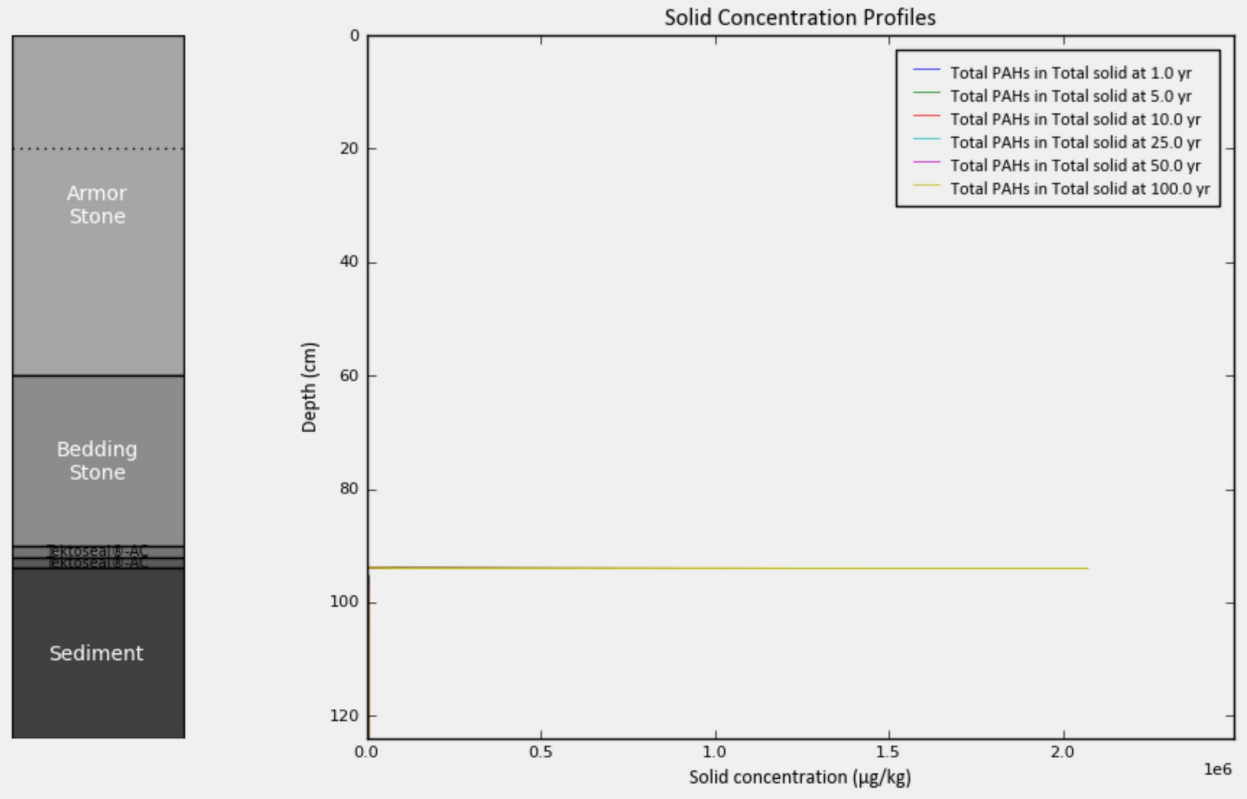

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Pyrene in Total solid at 1.0 yr
Pyrene in Total solid at 5.0 yr
Pyrene in Total solid at 10.0 yr
Pyrene in Total solid at 25.0 yr
Pyrene in Total solid at 50.0 yr
Pyrene in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4

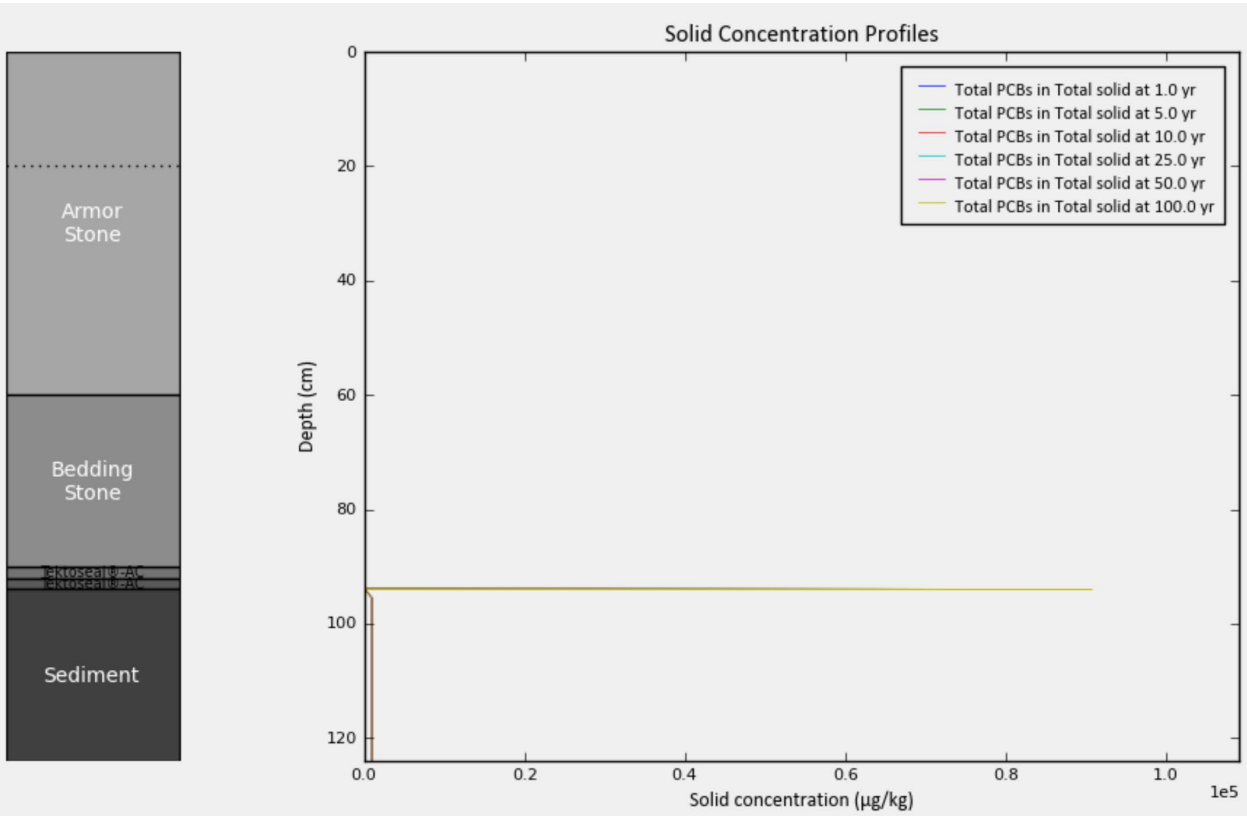

Armor Stone
Bedding Stone
Ekoseal® AC
Ekoseal® AC
Sediment
Solid Concentration Profiles
TCDD in Total solid at 1.0 yr
TCDD in Total solid at 5.0 yr
TCDD in Total solid at 10.0 yr
TCDD in Total solid at 25.0 yr
TCDD in Total solid at 50.0 yr
TCDD in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Solid concentration (µg/kg)

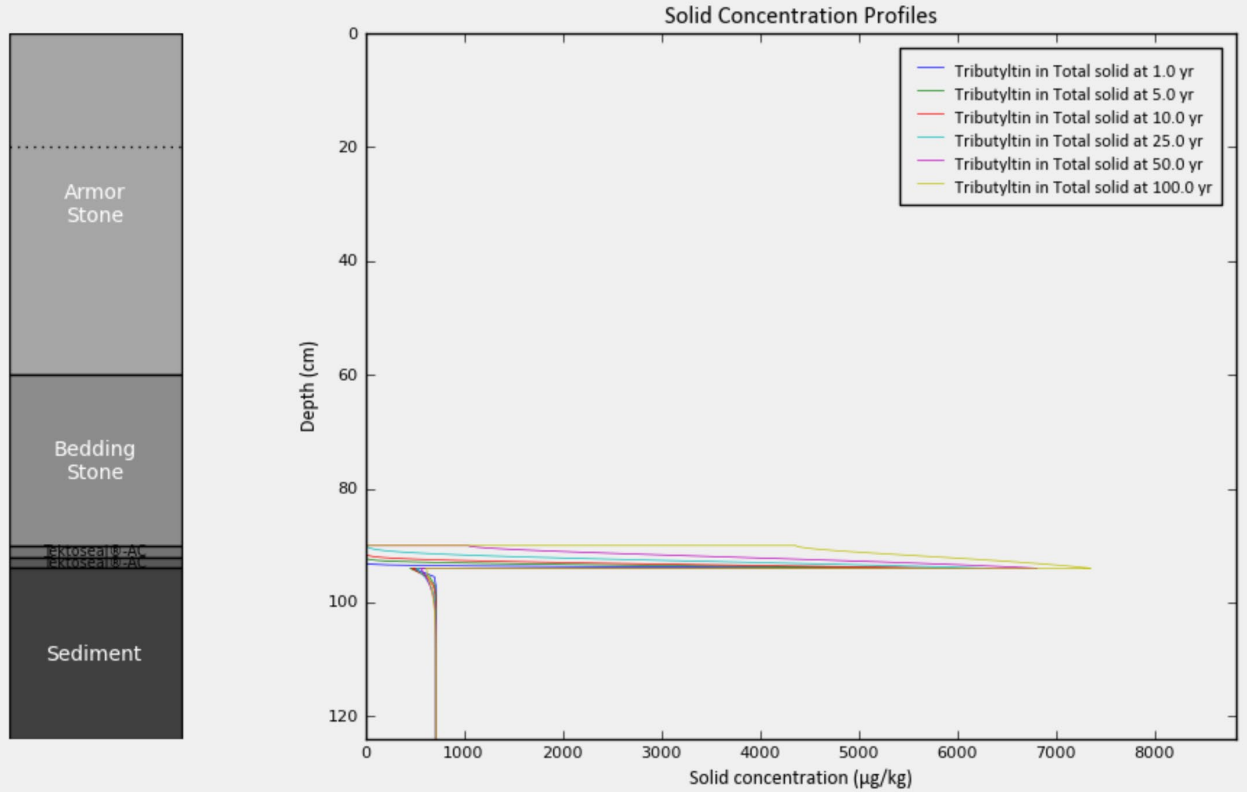

Armor Stone
Bedding Stone
Ekoseal® AC
Ekoseal® AC
Sediment
Solid Concentration Profiles
TCDF in Total solid at 1.0 yr
TCDF in Total solid at 5.0 yr
TCDF in Total solid at 10.0 yr
TCDF in Total solid at 25.0 yr
TCDF in Total solid at 50.0 yr
TCDF in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.00
0.05
0.10
0.15
0.20
Solid concentration (µg/kg)

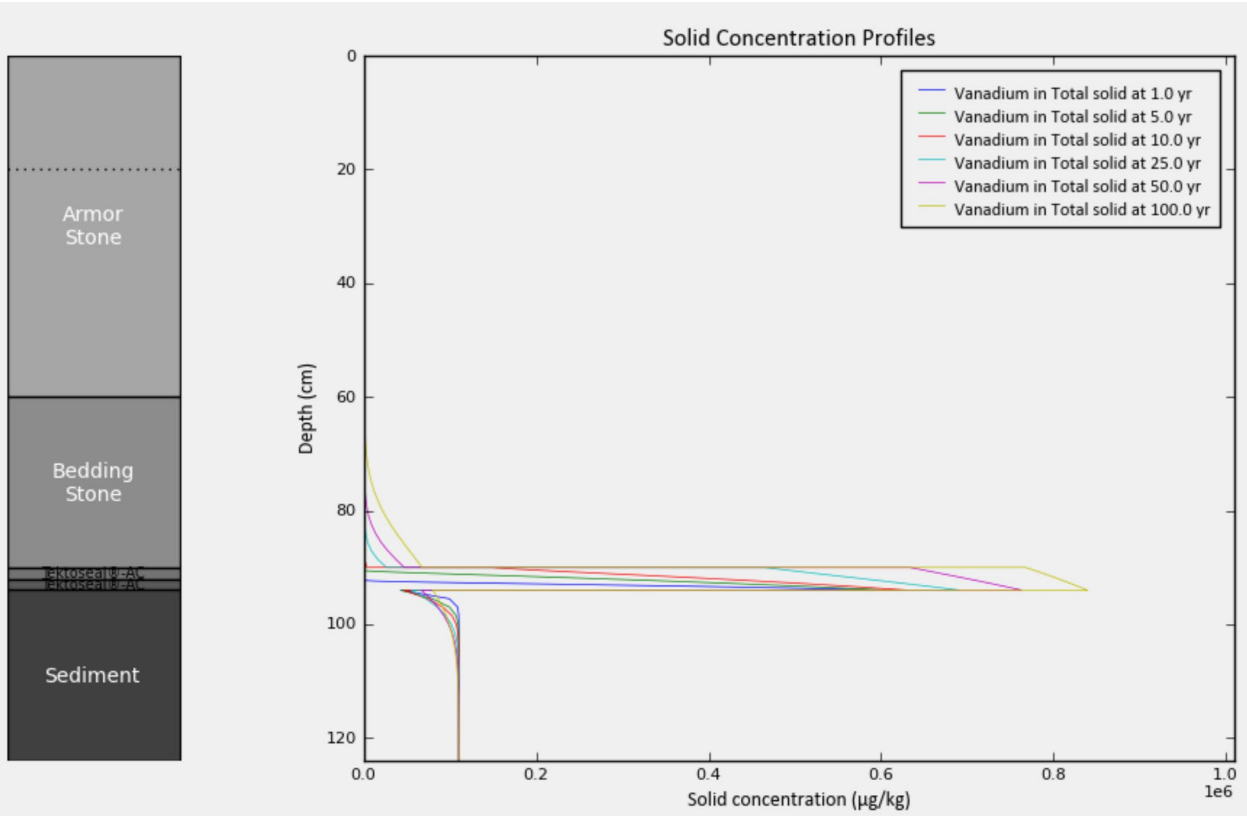

Solid Concentration Profiles
Armor Stone
Bedding Stone
Ekoseal® AC
Ekoseal® AC
Sediment
Total cPAHs (BaP Eq) in Total solid at 1.0 yr
Total cPAHs (BaP Eq) in Total solid at 5.0 yr
Total cPAHs (BaP Eq) in Total solid at 10.0 yr
Total cPAHs (BaP Eq) in Total solid at 25.0 yr
Total cPAHs (BaP Eq) in Total solid at 50.0 yr
Total cPAHs (BaP Eq) in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1e5
Solid concentration (µg/kg)

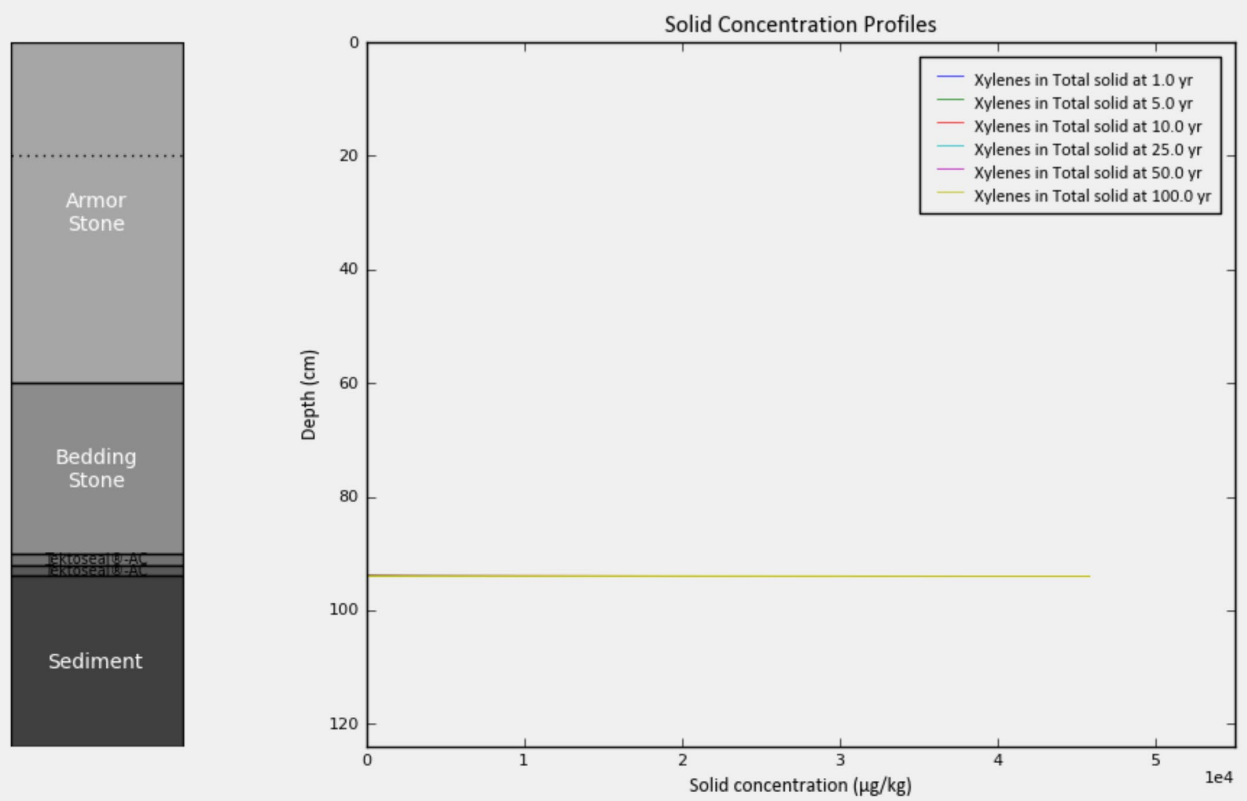

Solid Concentration Profiles
Armor Stone
Bedding Stone
Ekoseal® AC
Ekoseal® AC
Sediment
Total DioxinFuran in Total solid at 1.0 yr
Total DioxinFuran in Total solid at 5.0 yr
Total DioxinFuran in Total solid at 10.0 yr
Total DioxinFuran in Total solid at 25.0 yr
Total DioxinFuran in Total solid at 50.0 yr
Total DioxinFuran in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0
5
10
15
20
25
Solid concentration (µg/kg)

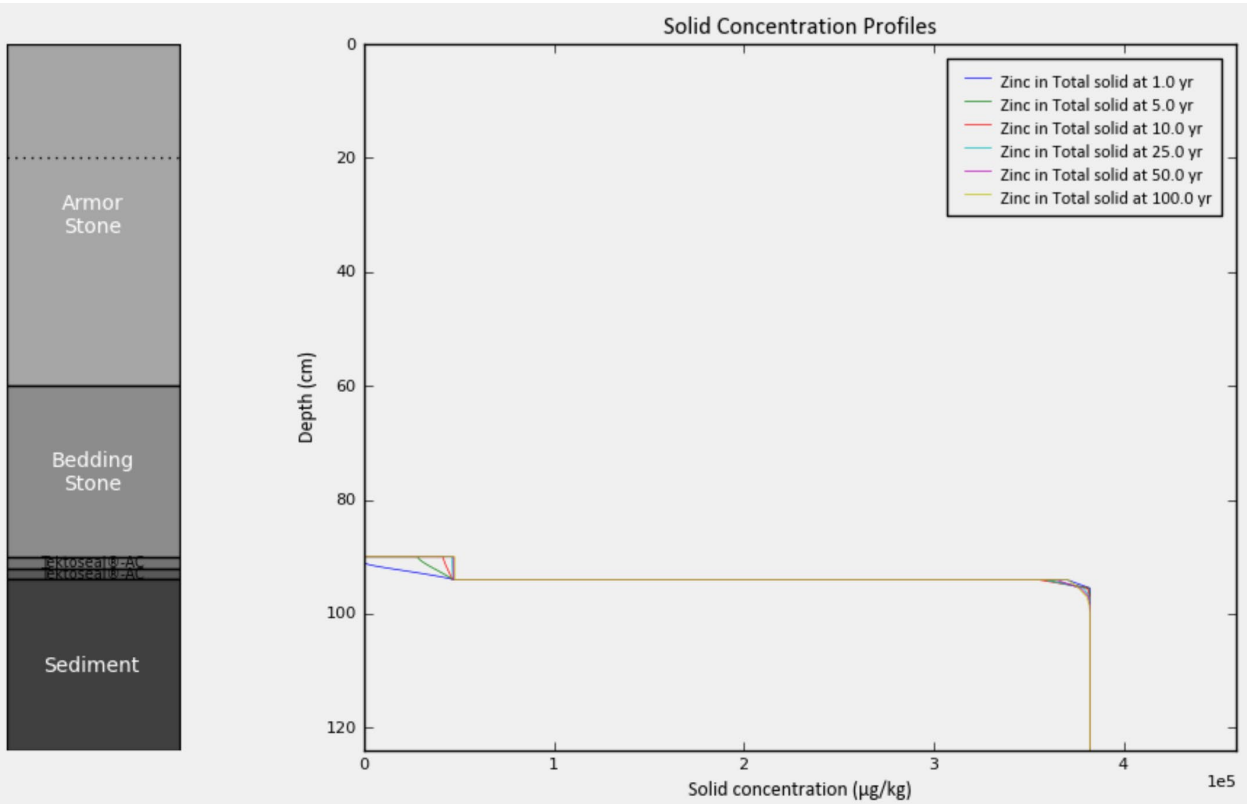

Armor Stone
Bedding Stone
Tekoseal® AC
Tekoseal® AC
Sediment
Solid Concentration Profiles
Total PAHs in Total solid at 1.0 yr
Total PAHs in Total solid at 5.0 yr
Total PAHs in Total solid at 10.0 yr
Total PAHs in Total solid at 25.0 yr
Total PAHs in Total solid at 50.0 yr
Total PAHs in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.5
1.0
1.5
2.0
1e6
Solid concentration (µg/kg)


Armor Stone
Bedding Stone
Tekoseal® AC
Tekoseal® AC
Sediment
Solid Concentration Profiles
Total PCBs in Total solid at 1.0 yr
Total PCBs in Total solid at 5.0 yr
Total PCBs in Total solid at 10.0 yr
Total PCBs in Total solid at 25.0 yr
Total PCBs in Total solid at 50.0 yr
Total PCBs in Total solid at 100.0 yr
Depth (cm)
0
20
40
60
80
100
120
0.0
0.2
0.4
0.6
0.8
1.0
1e5
Solid concentration (µg/kg)

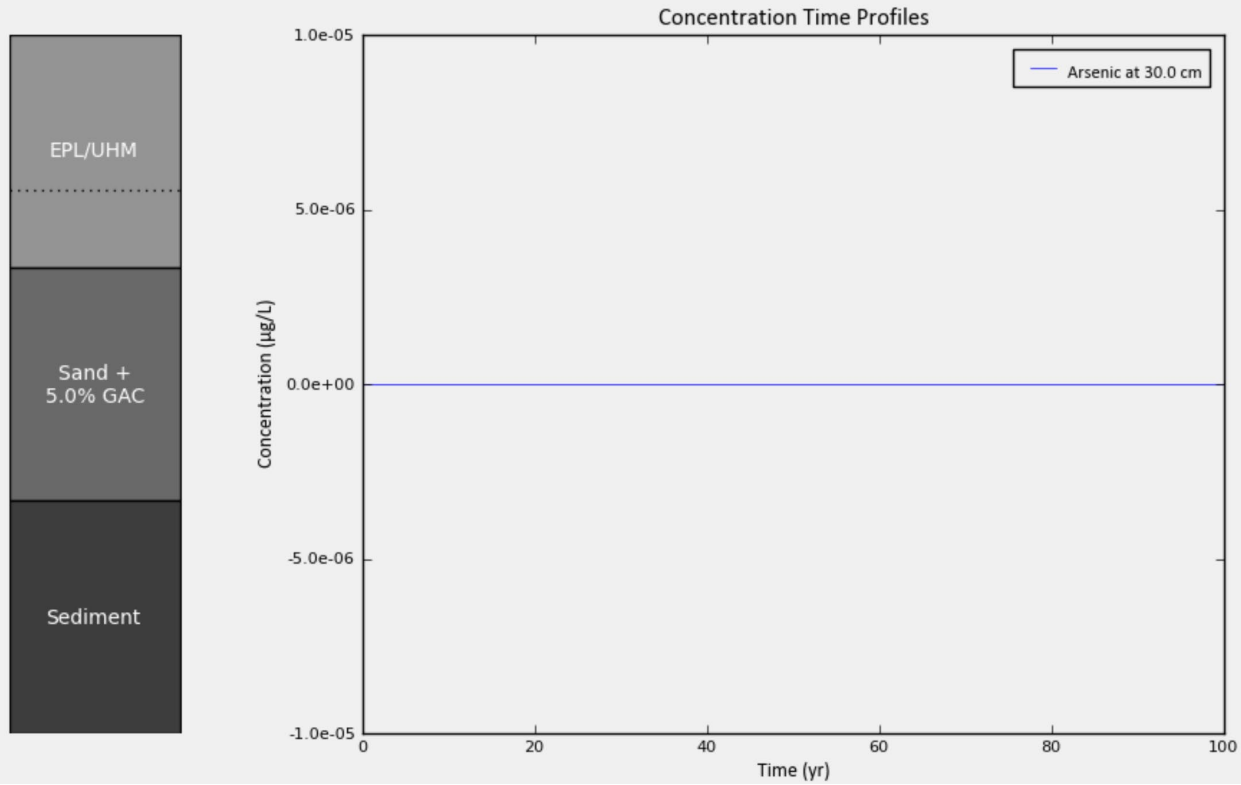

Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Tributyltin in Total solid at 1.0 yr
Tributyltin in Total solid at 5.0 yr
Tributyltin in Total solid at 10.0 yr
Tributyltin in Total solid at 25.0 yr
Tributyltin in Total solid at 50.0 yr
Tributyltin in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)


Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Vanadium in Total solid at 1.0 yr
Vanadium in Total solid at 5.0 yr
Vanadium in Total solid at 10.0 yr
Vanadium in Total solid at 25.0 yr
Vanadium in Total solid at 50.0 yr
Vanadium in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e6


Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Xylenes in Total solid at 1.0 yr
Xylenes in Total solid at 5.0 yr
Xylenes in Total solid at 10.0 yr
Xylenes in Total solid at 25.0 yr
Xylenes in Total solid at 50.0 yr
Xylenes in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e4


Armor Stone
Bedding Stone
Sediment
Solid Concentration Profiles
Zinc in Total solid at 1.0 yr
Zinc in Total solid at 5.0 yr
Zinc in Total solid at 10.0 yr
Zinc in Total solid at 25.0 yr
Zinc in Total solid at 50.0 yr
Zinc in Total solid at 100.0 yr
Depth (cm)
Solid concentration (µg/kg)
1e5

Example 0 micrograms per Liter µg/L porewater concentration at CPP over time: arsenic in Cap Alternative 3



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ATTACHMENT E

CAPSIM MODELING FILES

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APPENDIX F

WASTE DESIGNATION MEMORANDUM

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WASTE DESIGNATION MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

1.0 INTRODUCTION

This Waste Designation Memorandum describes methods for the designation of soil and sediment wastes and presents data needed by the Remedial Action (RA) Performing Parties and their consultants to arrange for the off-site disposal of the wastes generated during RA at the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site (PHSS) in Portland, Multnomah County, Oregon. The HydroGeoLogic, Inc. (HGL) team developed this memorandum on behalf of the SIB Remedial Design (RD) Group based on the requirements of the PHSS Record of Decision (ROD) (EPA, 2017) and the Administrative Settlement Agreement and Order on Consent (ASAOC) (EPA, 2021). This memorandum was developed in accordance with the Remedial Design Work Plan (HGL, 2025) and includes references to the U.S Environmental Protection Agency (EPA)-approved Pre-Design Investigation (PDI) dataset (HGL, 2024).

This memorandum provides a preliminary waste designation screening for soil and sediment within the SIB Project Area to be removed during excavation and dredging performed during RA activities. Water including dredge return water is addressed in the Water Quality Monitoring Plan (Attachment C of the Construction Quality Assurance/Quality Control Plan [Volume II, Appendix N). As part of the preliminary waste screening, existing soil and sediment results collected during the PDI (HGL, 2024b) are screened against Resource Conservation and Recovery Act (RCRA) Landfill Disposal Requirements, Toxic Substances Control Act (TSCA), Oregon Waste Regulations (Oregon Administrative Rule [OAR], Chapter 340, Divisions 93-103, 2025), and Washington Dangerous Waste Regulations (Washington Administrative Code [WAC] 173-303, 2020) to indicate whether material can be managed as nonhazardous waste, or if hazardous (federal or Oregon) or dangerous waste (Washington) regulations may apply. Although the SIB Project Area is located in Oregon, Washington state waste regulations are also included as part of the screening in the event the selected disposal facility is located in Washington. The preliminary waste designation screening results in this memorandum are available to the RA Performing Parties and their consultants to help inform their plans for excavated and dredged material management as part of remedy implementation. If the preliminary waste designation screening results indicate specific excavation areas (EAs) or dredge areas (DAs) may designate as hazardous, additional sampling and analyses may be required, as discussed in Section 3.0. The preliminary waste screening designation should be re-evaluated by the RA Contractor prior to RA in coordination with the selected waste disposal facility, EPA, and relevant state agencies to determine the requirements for final waste designation. It is expected that waste characterization sampling will be performed by the RA Performing Parties on samples in EAs or DAs where material has the potential to be classified as hazardous waste based on the toxicity characteristic to obtain final waste designation prior to RA construction to ensure an efficient and cost-effective remedy implementation.

Corporate Headquarters
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

The RA Performing Parties and their consultants and contractors will be responsible for selecting the specific off-site disposal facility, addressing final waste designation (e.g., additional sampling and analyses) with the disposal facility, EPA, and state agencies, and determining acceptance criteria required for receipt of soil and sediment derived from EAs and DAs during remedy construction. It is expected that final waste designation will be documented in an EPA-approved RA Work Plan prior to the start of remedy implementation.

2.0 EXCAVATION AND DREDGE AREAS

The Pre-Final 90% RD prescribes areas within the SIB Project Area to be excavated or dredged as part of remedy implementation. Those areas and estimated excavation and dredge depths are shown on Figure 2-1. Based on the spatial distribution and lateral extent of excavation and dredging, EAs and DAs have been established to segregate areas for preliminary waste designation based on the most recent soil and sediment data collected as part of the PDI (HGL, 2024b).

The Pre-Final 90% RD approach to riverbanks is a combination of excavation and backfilling to achieve the required slopes for stability. The spatial distribution of excavation versus filling is granular and highly variable across the SIB Project Area. Therefore, riverbank soil samples for the entire SIB Project Area are included in the waste designation screening. Riverbank soil samples are separated spatially into four EAs as shown on Figure 2-1[1]. Similarly, six DAs have been established as shown on Figure 2-1. Excavation and dredge volumes within the EAs and DAs are provided in Table 2-1.Table 2-1 and Figure 2-1 also present the dredge, cap, or riverbank certification units (DCU, CCU, RCU, respectively) associated with each area. Excavation and dredge volumes were calculated based on cross-section details provided in the Drawings (Volume III, Appendix V). Volumes presented in Table 2-1 align with the Probabilistic Cost Model input volumes presented in the Cost Analysis Technical Memorandum (Volume I, Appendix K).

Table 2-1 Estimated Excavation and Dredge Volumes

Dredge Area	Corresponding Certification Unit	Excavation/Dredge Volume (cubic yards)
DA-1	DCUs 19-23	98,700
DA-2	DCUs 13-18 CCUs 63-67 CCUs 87-94	145,400
DA-3	CCUs 68-78	39,000
DA-4	DCUs 7-12 CCUs 49-57 CCU 11	187,600
DA-5	DCUs 1-6 CCUs 26-48	108,000
DA-6	CCUs 18-22	6,700
EA-1	RCUs 28-30	17,430
EA-2	RCUs 16-24	12,850

[1] Riverbank soil beneath the Lagoon Wharf structure is not included in excavation areas. The remedial design for riverbank soil in this area is in progress but as of the 90% RD, does not include excavation and subsequent disposal. Additional details on the disposition of riverbank soil under Lagoon Wharf will be provided in a supplemental appendix to the Pre-Final 90% RD and quantities presented in Table 2-1 will be updated appropriately in the Final 100% RD.

Dredge Area	Corresponding Certification Unit	Excavation/Dredge Volume (cubic yards)
EA-3	RCUs 8-15	61,650
EA-4	RCUs 1-7	29,770
	Total	707,100

Notes:
CCU = Cap Certification Unit
DA = dredge area
DCU = Dredge Certification Unit
EA = excavation area
RCU = Riverbank Certification Unit

3.0 PRELIMINARY SOIL AND SEDIMENT DESIGNATION SCREENING

3.1 EVALUATION OF EXISTING SOIL AND SEDIMENT DATA

Soil and sediment data collected during the PDI (HGL, 2024b) were queried against the EAs and DAs to establish a refined dataset for preliminary waste designation screening evaluation. PDI samples collected outside the EAs and DAs were not included in the preliminary waste designation screening evaluation. The PDI analytical sampling suite was designed to address data gaps identified prior to RD and included contaminants of concern (COCs) listed in the Record of Decision (ROD) Tables 17 (EPA, 2020) and Table 21 (EPA, 2022). Toxicity Characteristic Leaching Procedure (TCLP) analysis was not performed on PDI samples since waste characterization sampling for RA disposal was not an objective of PDI sampling. Although it is unlikely that any material removed during RA will classify as hazardous waste given concentrations for excavated soil and dredge sediment collected to date have not designated as hazardous waste, screening is necessary prior to RA construction activities to meet disposal requirements. COCs listed in ROD Tables 17 and 21 that are regulated under federal and state waste designation criteria (volatile organic compounds [VOCs], semivolatile organic compounds [SVOCs], pesticide/herbicides, metals, polycyclic aromatic hydrocarbons [PAHs], and polychlorinated biphenyls [PCBs]) and within the refined PDI dataset were screened against applicable federal and state characterization criteria to identify EAs and DAs that designate as non-hazardous or warrant additional actions prior to final waste designation. The federal and state waste screening processes are detailed in Sections 3.2 and 3.3, respectively.

3.2 FEDERAL SCREENING

The PDI data were screened against federal waste regulatory requirements listed in RCRA (Listed Wastes, Characteristic Wastes) and TSCA. Results of the preliminary screening are provided in Section 3.2.1. and 3.2.2.

3.2.1 RCRA Hazardous Waste Screening Evaluation

RCRA listed hazardous wastes are identified as wastes derived from common manufacturing and industrial processes (F-list) and wastes derived from specific sectors of industry and manufacturing (K-list). Soil and sediment from excavation and dredging during RA are classified as contaminated environmental media and are not directly derived from manufacturing or industrial waste streams. Therefore, soil and sediment generated during RA do not meet the requirements for listed hazardous waste under RCRA.

Characteristic hazardous wastes are defined under RCRA as wastes that possess characteristics that exceed the established thresholds for ignitability, corrosivity, reactivity, and toxicity. PDI samples were not analyzed for ignitability, corrosivity, and reactivity; however, these characteristics were analyzed in investigative derived waste (IDW) generated during the PDI prior to transport and disposal. IDW samples consisted of excess soil and sediment collected during PDI sampling; therefore, the hazardous waste characteristics of the IDW are assumed to be representative of soil and sediment that will be removed during RA. IDW results indicated that all material was below the respective hazardous waste thresholds for ignitability, corrosivity, and reactivity, and, as a result, these characteristics will not contribute to soil and sediment waste designation within the SIB Project Area.

To determine whether soil and sediment exceed the toxicity characteristic, PDI data were compared to screening levels based on Toxicity Characteristic Regulatory Levels in accordance with Code of Federal Regulations (CFR), Title 40, Part 261.24 (40 CFR 261.24) (EPA, 2025). TCLP analysis (EPA, 1992) for the federal toxicity characteristic, as defined in 40 CFR 261.24, is performed by the analytical laboratory that prepares a simulated landfill leachate by extracting regulated constituents from the waste sample using a weak acid solution. The mass of the extraction fluid is 20 times the mass of the waste sample. Given this dilution, wastes with total constituent concentrations (in milligrams per kilogram [mg/kg]) that are less than 20 times the Toxicity Characteristic Regulatory Levels cannot have TCLP results that exceed the regulatory levels. The dilution factor is used to derive screening levels to identify wastes that have the potential to be hazardous waste based on the toxicity characteristic (referred to as the "20 times screening tool"). Attachment A presents constituents, EAs, DAs, sample locations and depths that exceeded the 20 times screening tool TCLP screening levels for metals. No VOC, SVOC, or pesticide/herbicide constituent concentrations exceeded the TCLP screening levels, and, as a result, are not included in Attachment A.

A total of 268 PDI sediment samples located within DAs 1-6 and 1,340 soil samples located within EAs 1-5 were screened against TCLP screening levels for metals, SVOCs, pesticide/herbicides, and VOCs. Table 3-1 presents the total number of samples screened, number of 20 times screening tool exceedances, and constituent or constituents that exceeded for each of the EA or DA. Figure 3-1 shows the locations for all samples included in the screening and includes samples with TCLP Screening Level exceedances.

Table 3-1 Summary of Toxicity Characteristic Screening Results

DA/EA	Samples Screened	Cubic Yards/Sample	Samples Exceeding 20x Screening Tool	Percent of Samples Exceeding 20x Screening Tool	Constituent(s) Exceeding 20x Screening Tool
DA-1	6	18,575	0	0	--
DA-2	89	1,529	41	46	Mercury, Lead
DA-3	31	1,688	11	35	Mercury, Lead
DA-4	105	1,089	0	0	--
DA-5	29	1,657	1	3	Lead
DA-6	8	1,097	0	0	--
EA-1	114	128	2	2	Lead
EA-2	404	136	3	1	Lead
EA-3	446	146	0	0	--
EA-4	137	178	0	0	--

EPA sample density specifications for pre-remedy construction waste disposal designation that was provided in the Gasco[2] Sediments Site Statement of Work (EPA, 2009) required 1 composite sample for TCLP analysis per 10,000 cubic yards. For all EAs and DAs other than DA-1, the sample density based on estimated excavation and dredging volumes are well below 10,000 cubic yards per sample indicating sufficient data to inform preliminary waste characterization.

All samples screened within DA-1, DA-4, DA-6, and EA-4 were below TCLP 20 times screening tool levels. DA-5, EA-1, and EA-2 had 3 percent or less of samples that exceeded TCLP 20 times screening tool levels, while DA-2 and DA-3 had sample exceedances of 46 and 35 percent, respectively. Based on the absence or minimal percentage of TCLP 20 times screening tool exceedances for DA-4, DA-5, DA-6, EA-1, EA-2, EA-3, and EA-4, no additional waste designation actions are warranted based on RCRA hazardous waste criteria prior to final waste designation. DA-1 has limited PDI data and large estimated dredge volume, resulting in a significantly lower sample density for preliminary waste screening. As a result, additional waste characterization sampling within DA-1 may be needed prior to RA construction to obtain final waste designation. DA-2 and DA-3 had significantly higher percentages for TCLP 20 times screening tool exceedances which may need further waste characterization sampling prior to RA construction.

In order to characterize sediment dredged from DA-1, DA-2, and DA-3 for waste disposal, additional sampling is needed. Based on the estimated dredge volumes and EPA sample density specifications for the Gasco Sediments Statement of Work (EPA, 2009), pre-RA waste characterization sampling will include collection of 11 composite soil samples from DA-1, 14 from DA-2, and 5 from DA-3 to achieve a density of 1 composite sample per 10,000 cubic yards of dredged material. For RA Contractor assumptions, these DAs and sample quantities should be assumed for pre-construction waste designation sampling prior to final waste designation.

3.2.2 TSCA Hazardous Waste Screening Evaluation

PCBs are the only compound regulated under TSCA as it pertains to hazardous waste designation. The hazardous waste threshold for PCBs in soil and sediment under TSCA is 50 mg/kg. Out of the 847 samples analyzed for PCBs within the EA/DAs, the highest concentration of PCBs collected as part of the PDI in soil or sediment was 16.4 mg/kg. Therefore, no further waste designation actions for PCBs are warranted prior to final waste designation.

3.3 STATE SCREENING

3.3.1 Oregon State Hazardous Waste Screening Evaluation

The Oregon State solid and hazardous waste criteria are defined in OAR, Chapter 340, Divisions 93-103 and 109. OAR has adopted 40 CFR 261.24 and federal RCRA and TSCA regulations for waste designation prior to disposal of material in municipal solid waste landfills. Therefore, excavated soil and dredged sediment will be subject to the same preliminary waste screening analysis presented in Section 3.2 above.

[2] Gasco Sediments Project Area, Portland, Oregon

3.3.2 Washington State Dangerous Waste Screening Evaluation

If the RA Contractor chooses to dispose of soil and sediment at a Washington State landfill, WAC 173-303 and its regulatory levels will apply. TCLP screening levels listed in 40 CFR 261.24 are also included in WAC 173-303-090; therefore, additional waste characterization actions discussed in Section 3.2.1 are also applicable to Washington State designation.

According to WAC 173-303-070, if waste is not designated as dangerous waste based on TCLP testing performed in accordance with WAC 173-303-090, waste will need to undergo the Washington state-specific toxicity determination that requires comparison of bulk chemistry concentrations to certain published toxicity data (WAC 173-303-100). Therefore, since TCLP was not been performed on PDI soil and sediment samples, PDI concentrations of metals from discrete samples within each DA and EA were screened against toxicity criteria listed in Registry of Toxic Effects of Chemical Substances (RTECS) (BIOVIA, 2025) to adhere to the requirements of WAC 173-303-100. Maximum concentration percentages by area for metals were calculated for each DA and EA. These values were calculated by converting the maximum metal concentrations to an equivalent percentage of the bulk sediment or soil sample (i.e., 5 mg/kg is converted to 5 parts per million [ppm], then to 0.0005 percent). Equivalent concentrations were then calculated by dividing each maximum metal percentage by a toxic category value as defined by WAC 173-303-100, then summing these results for each area. These equivalent concentrations are compared to the Washington State dangerous waste threshold percentage of 0.001. Results of the Washington state-specific screening for metals in sediment and soil are presented in Tables 3-2 and 3-3, respectively.

WAC 173-303-100 also requires screening of total PAH concentrations for persistent waste determination. Soil and sediment with a total PAH concentration greater than 1.0 percent (10,000 mg/kg) is designated as persistent waste under WAC 173-303-100. The maximum total PAH concentration from PDI samples collected within the DAs and EAs was 0.009 percent (90.8 mg/kg). Therefore, no additional waste designation actions are required to determine Washington State persistent waste criteria prior to final waste designation.

Table 3-2 Summary of Washington State Dangerous Waste Screening Results for Sediment

Constituent	Toxic Category[1]	Maximum Concentration By Area Percentage (%)					
		DA-1	DA-2	DA-3	DA-4	DA-5	DA-6
Arsenic	A	0.000501	0.00666	0.00206	0.0017	0.000928	0.000755
Cadmium	D	0.000025	0.000195	0.000108	0.000071	0.000073	0.0000635
Chromium	D	No Data	No Data	No Data	No Data	No Data	No Data
Copper	D	0.0134	0.206	0.0767	0.0181	0.0154	0.0183
Lead	B	0.00217	0.195	0.0618	0.0095	0.0138	0.00915
Mercury	B	0.0000117	0.00186	0.00102	0.0000582	0.00005	0.00008645
Silver	D	No Data	No Data	No Data	No Data	No Data	No Data
Zinc	D	0.0197	0.138	0.0895	0.0359	0.043	0.0265
Equivalent Concentration[2]		0.000075	0.002669	0.000851	0.000271	0.000237	0.000172
Dangerous Waste Designation[3]		NDW[4]	WT02, special waste	NDW	NDW	NDW	NDW

Notes:
[1] Toxic categories determined from RTECS per WAC 173-303-100(5)(b)(1)

[2] Equivalent Concentration calculated using the formula provided in WAC 173-303-100(5)(b)(1) based on the toxic categories (X, A, B, C, and D)
[3] Dangerous Waste designation determined based on the Equivalent Concentration per WAC 173-303-100(5)(b)(1).
[4] NDW = not a toxic dangerous waste (equivalent concentration below 0.001%)
% = percent

Based on bulk sediment chemistry analysis of metals, DA-1, DA-3, DA-4, DA-5, and DA-6 designate as non-dangerous waste according to the Washington state-specific criteria. However, the absence of chromium and silver data should be noted and considered prior to additional waste characterization sampling as inclusion of chromium and silver, despite not being listed in ROD Table 17, may be a Washington State or landfill requirement. No additional waste designation actions are warranted for DA-1, DA-3, DA-4, DA-5, and DA-6 based on Washington State dangerous waste criteria prior to final waste designation; however, as discussed in Section 3.2.1, additional waste characterization sampling may be needed for DA-1, DA-2, and DA-3 based on RCRA criteria.

Sediment within DA-2 exceeded TCLP screening levels and could classify as WT02 dangerous waste based on bulk sediment chemistry screening. Therefore, based on the bulk sediment chemistry screening, additional discrete sample collection could be needed within DA-2 for final Washington state-only dangerous waste designation, if the selected disposal facility is located in Washington.

Table 3-3 Summary of Washington State Dangerous Waste Screening Results for Soil

Constituent	Toxic Category[1]	Maximum Concentration By Area Percentage (%)			
		EA-1	EA-2	EA-3	EA-4
Arsenic	A	0.00685	0.00162	0.00285	0.00119
Cadmium	D	0.000127	0.00014	0.000049	0.000025
Chromium	D	No Data	No Data	No Data	No Data
Copper	D	0.131	0.0922	0.005	0.00746
Lead	B	0.0222	0.0248	0.00409	0.00357
Mercury	B	2.73E-05	4.54E-05	4.33E-05	1.43E-05
Silver	D	No Data	No Data	No Data	No Data
Zinc	D	0.184	0.059	0.0184	0.0147
Equivalent Concentration[2]		0.000939	0.000426	0.000329	0.000157
Dangerous Waste Designation[3]		NDW	NDW	NDW	NDW

Notes:
[1] Toxic categories determined from RTECS per WAC 173-303-100(5)(b)(1)
[2] Equivalent Concentration calculated using the formula provided in WAC 173-303-100(5)(b)(1) based on the toxic categories (X, A, B, C, and D)
[3] Dangerous Waste designation determined based on the Equivalent Concentration per WAC 173-303-100(5)(b)(1).
[4] NDW = not a toxic dangerous waste (equivalent concentration below 0.001%)
% = percent

Based on bulk soil chemistry analysis of metals, EA soils designate as non-dangerous waste according to the Washington state-specific criteria. However, the absence of chromium and silver data should be noted and considered prior to additional waste characterization sampling as inclusion of chromium and silver, despite not being listed in ROD Table 17, may be a Washington State or landfill requirement.

3.4 PRELIMINARY WASTE DESIGNATION SCREENING RESULTS

Based on the preliminary waste screening, soil and sediment to be excavated and dredged within all EAs and DA-3, DA-4, DA-5, and DA-6 will not designate as hazardous under either federal or state regulations. As discussed in Section 3.2.1, additional composite waste characterization sampling within DA-1, DA-2, and DA-3 may be needed based on RCRA criteria prior to final waste characterization. Similarly, as discussed in Section 3.3.2, additional discrete sampling may be needed in DA-2 based on Washington State criteria if the selected disposal facility is in Washington. As a result, the RA Performing Parties will be required to collect additional composite samples for TCLP analyses for final waste designation prior to RA. If the disposal facility is located in Washington, additional discrete samples for Washington state bulk chemistry screening will also be required. If TCLP analyses results from additional sample collection in DA-1, DA-2, and DA-3 are below RCRA regulatory levels and the waste disposal facility is located in Oregon, no additional actions are required prior to final waste designation. If TCLP analyses results are below regulatory levels and the waste disposal facility is located in Washington, Washington state-specific waste designation screening listed in WAC 173-303-100 will need to be conducted prior to final waste designation.

Additional waste characterization sampling and analyses will be performed by the RA Performing Parties and their consulting experts in coordination with the selected disposal facility, EPA, and relevant state agencies prior to remedy implementation. We understand that the additional waste designation actions and final waste designations will be documented in the RA Work Plan to be submitted and approved by the EPA prior to RA.

4.0 DEBRIS AND CONSTRUCTION AND DEMOLITION WASTE DISPOSAL

In preliminary discussions with a potential Oregon State solid waste disposal facility (Wasco County, 2024), waste designation for debris and construction/demolition materials removed during RA is not anticipated to be needed. If construction and demolition materials are suspected to contain asbestos, sampling will be required in coordination with the selected disposal facility, EPA, and relevant state agencies prior to disposal. Metal debris and materials may be recycled to the extent practicable, as determined by the RA Performing Parties and their consulting experts. Log, piling, or other debris and construction material lengths will need to be less than 8 feet in length prior to disposal.

5.0 REFERENCES

BIOVIA, 2025. *Registry of Toxic Effects of Chemical Substances (RTECS)*. Dassault Systèmes.

HydroGeoLogic, Inc. (HGL), 2024. *Pre-Design Investigation Evaluation Report, Revision 2,* CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Overland Park, Kansas. December.

HGL, 2025. *Remedial Design Work Plan, Revision 1,* CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Overland Park, Kansas. February.

Oregon Secretary of State, 2025. *Oregon Administrative Rules, Chapter 340, Divisions 93–103*.

U.S. Environmental Protection Agency (EPA), 1992. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA Publication SW-846, Method 1311, Toxicity Characteristic Leaching Procedure, Revision 0. July.

EPA, 2009. Statement of Work – Gasco Sediments Project Area. United States Environmental Protection Agency Region 10. September 9, 2009.

EPA, 2017. *Record of Decision, Portland Harbor Superfund Site, Portland Oregon*. United States Environmental Protection Agency Region 10, Seattle, Washington. January.

EPA, 2020. Errata #2 for Portland Harbor Superfund Site Record of Decision ROD, Table 17. Memorandum from Sean Sheldrake to Portland Harbor Site File. January 14.

EPA, 2021. *Administrative Settlement Agreement and Order on Consent for Remedial Design*, Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10. January 20.

EPA, 2022. Errata #3 for Portland Harbor Superfund Site Record of Decision ROD, Table 6 and Table 21. Memorandum from Hunter Young to Portland Harbor Site File. September 7.

EPA, 2025. *Toxicity characteristic (40 CFR § 261.24)*. Electronic Code of Federal Regulations.

Wasco County, 2024. Communications with Don Hansen and Jocelyn Jones of Wasco County Landfill. Phone. December 2 and 3.

Washington State Legislature, 2020. Dangerous waste regulations (Chapter 173-303 WAC), updated September, 30.

List of Tables

Table 2-1 Estimated Excavation and Dredge Volumes (in-text)
Table 3-1 Summary of Toxicity Characteristic Screening Results (in-text)
Table 3-2 Summary of Washington State Dangerous Waste Screening Results for Sediment (in-text)
Table 3-3 Summary of Washington State Dangerous Waste Screening Results for Soil (in-text)

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Figure 2-1 SIB Project Area Pre-Final 90% RD Anticipated Excavation and Dredge Areas and Dredge Area Depths
Figure 3-1 SIB Project Area Sample Locations with TCLP Screening Level Exceedances

Attachment

Attachment A Comparison of SIB Project Area PDI Sediment and Soil Sampling Results to TCLP Screening Levels

FIGURES



Dredging Area (DA)

Excavation Area (EA)

Extent of Dredging

Cap Certification Unit (CCU)*

Dredge Certification Unit (DCU)

Riverbank Certification Unit (RCU)*

Swan Island Basin Project Area Boundary

Notes:
*DA's include only in-water CCUs with a dredging component. CUs not included in EAs or DAs are not shown.

CCU=cap certification unit,
EPL=erosion protection layer
RCU=riverbank certification unit
UHM=unamended habitat mix
USCG=United States Coast Guard

Figure 2-1

SIB Project Area 90% RD Anticipated Excavation and Dredge Areas

Prepared on 10/20/2025
Waste Designation Memo
Swan Island Basin Remedial Design Group

HGL | Mott MacDonald | Coast & Harbor Engineering | Pacific Groundwater Group | Bridgewater Group

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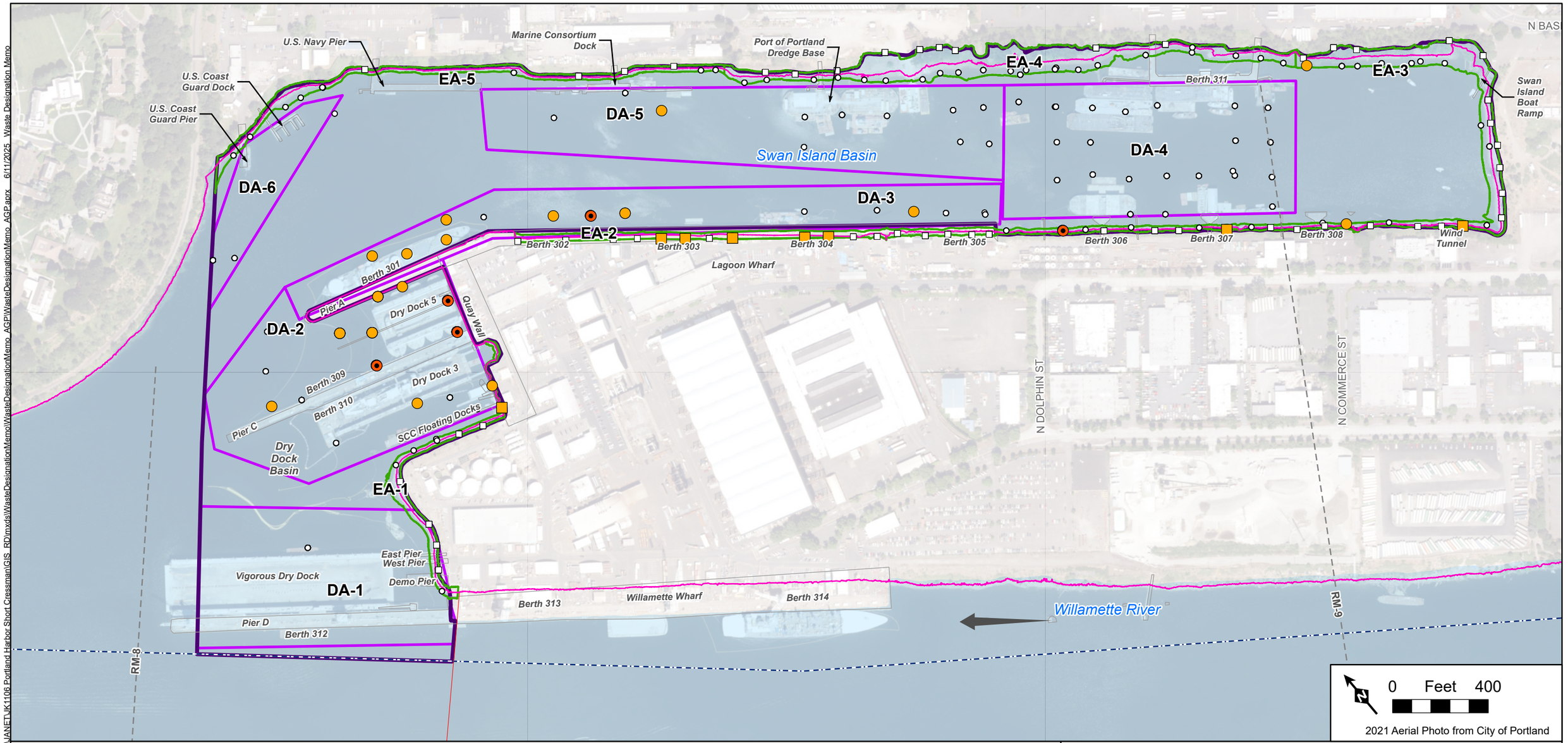

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- Swan Island Sediment Decision Unit (SDU)
- Federal Navigation Channel (USACE, 2020)
- River Mile (RM)
- Docks and Structures
- 13 ft NAVD88 Mean High Water
- River Flow Direction
- Sample Location with More than One TCLP Screening Level Exceedance
- Sample Location with TCLP Screening Level Exceedance
- Sample Location with No TCLP Screening Level Exceedance
- Sample Location above 13 ft NAVD88 with TCLP Screening Level Exceedance
- Sample Location above 13 ft NAVD88 with No TCLP Screening Level Exceedance
- Riverbank Excavation Areas (EA)
- Anticipated Dredge Area (DA)

Notes:
CRD – Columbia River Datum
ft – foot/feet
NAVD88 – North American Vertical Datum of 1988
RD – Remedial Design
SIB – Swan Island Basin
TCLP – Toxicity Characteristic Leaching Procedure

5.28 ft NAVD88 = 0 ft CRD

Figure 3-1

SIB Project Area Sample Locations with TCLP Screening Level Exceedances

Prepared on: 6/11/2025
Waste Designation Memo
Swan Island Basin Remedial Design Group

HGL MOTT MACDONALD COAST & HARBOR ENGINEERING PACIFIC groundwater GROUP BRIDGEWATER GROUP

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ATTACHMENT

Attachment A
Comparison of SIB Project Area PDI Sediment and Soil Sampling Results to TCLP Screening Levels
Waste Designation Memorandum; Swan Island Basin Project Area, Portland, Oregon

Area	Sample Location	Date Sampled	Sample Depth Interval (feet)	Constituent Exceeding Screening Level	TCLP Screening Level (mg/kg)	Concentration (mg/kg) [1]
DA-2	SIB-SC-H06-0-1-07/26/2022	07/26/2022	0 - 1	Lead	100	452
	SIB-SC-H06-1-2-07/26/2022	07/26/2022	1 - 2	Lead	100	109
	SIB-SC-H06-2-3-07/26/2022	07/26/2022	2 - 3	Lead	100	318
	SIB-SC-H06-3-4-07/26/2022	07/26/2022	3 - 4	Lead	100	313
	SIB-SC-H06-4-5-07/26/2022	07/26/2022	4 - 5	Lead	100	104
	SIB-SC-H07-1-2-07/26/2022	07/26/2022	1 - 2	Lead	100	328
	SIB-SC-H08-0-1-07/26/2022	07/26/2022	0 - 1	Lead	100	251
	SIB-SC-H08-1-2-07/26/2022	07/26/2022	1 - 2	Lead	100	338.5
	SIB-SC-H08-2-3-07/26/2022	07/26/2022	2 - 3	Lead	100	529
	SIB-SC-H08-3-4-07/26/2022	07/26/2022	3 - 4	Lead	100	896
	SIB-SC-H08-3-4-07/26/2022	07/26/2022	3 - 4	Mercury	4	5.37
	SIB-SC-H08-4-5-07/26/2022	07/26/2022	4 - 5	Lead	100	1950
	SIB-SC-H08-4-5-07/26/2022	07/26/2022	4 - 5	Mercury	4	7.57
	SIB-SC-I05-0-1-07/28/2022	07/28/2022	0 - 1	Lead	100	225
	SIB-SC-I05-1-2-07/28/2022	07/28/2022	1 - 2	Lead	100	130
	SIB-SC-I05-2-3-07/28/2022	07/28/2022	2 - 3	Lead	100	297
	SIB-SC-I05-3-4-07/28/2022	07/28/2022	3 - 4	Lead	100	291
	SIB-SC-I05-4-5-07/28/2022	07/28/2022	4 - 5	Lead	100	471
	SIB-SC-I05-5-6-07/28/2022	07/28/2022	5 - 6	Lead	100	102
	SIB-SC-I06-2-3-07/26/2022	07/26/2022	2 - 3	Lead	100	185
	SIB-SC-I06-3-4-07/26/2022	07/26/2022	3 - 4	Lead	100	244
	SIB-SC-I06-4-5-07/26/2022	07/26/2022	4 - 5	Lead	100	386
	SIB-SC-I06-5-6-07/26/2022	07/26/2022	5 - 6	Lead	100	251
	SIB-SC-I06-6-7-07/26/2022	07/26/2022	6 - 7	Lead	100	315
	SIB-SC-I08-0-1-07/28/2022	07/28/2022	0 - 1	Lead	100	354
	SIB-SC-I08-1-2-07/28/2022	07/28/2022	1 - 2	Lead	100	1070
	SIB-SC-I08-1-2-07/28/2022	07/28/2022	1 - 2	Mercury	4	8.375
	SIB-SC-I08-2-3-07/28/2022	07/28/2022	2 - 3	Lead	100	409
	SIB-SC-I08-3-4-07/28/2022	07/28/2022	3 - 4	Lead	100	768
	SIB-SC-I08-4-5-07/28/2022	07/28/2022	4 - 5	Lead	100	426
	SIB-SC-I08-4-5-07/28/2022	07/28/2022	4 - 5	Mercury	4	18.6
	SIB-SC-I08-5-6-07/28/2022	07/28/2022	5 - 6	Lead	100	506
	SIB-SC-I08-5-6-07/28/2022	07/28/2022	5 - 6	Mercury	4	8.82
	SIB-SC-J06-10-11-07/26/2022	07/26/2022	10 - 11	Lead	100	684
	SIB-SC-J06-10-11-07/26/2022	07/26/2022	10 - 11	Mercury	4	14.3
	SIB-SC-J06-2-3-07/26/2022	07/26/2022	2 - 3	Lead	100	143
	SIB-SC-J06-3-4-07/26/2022	07/26/2022	3 - 4	Lead	100	177
	SIB-SC-J06-4-5-07/26/2022	07/26/2022	4 - 5	Lead	100	422
	SIB-SC-J06-5-6-07/26/2022	07/26/2022	5 - 6	Lead	100	611
	SIB-SC-K03-2-3-07/27/2022	07/27/2022	2 - 3	Lead	100	116
	SIB-SC-K07-2-3-08/21/2022	08/21/2022	2 - 3	Lead	100	136

Attachment A
Comparison of SIB Project Area PDI Sediment and Soil Sampling Results to TCLP Screening Levels
Waste Designation Memorandum; Swan Island Basin Project Area, Portland, Oregon

Area	Sample Location	Date Sampled	Sample Depth Interval (feet)	Constituent Exceeding Screening Level	TCLP Screening Level (mg/kg)	Concentration (mg/kg) [1]
DA-3	SIB-SC-F08-1-2-07/14/2022	07/14/2022	1 - 2	Lead	100	100
	SIB-SC-F11-2-3-08/06/2022	08/06/2022	2 - 3	Lead	100	142
	SIB-SC-F12-1-2-08/06/2022	08/06/2022	1 - 2	Lead	100	287
	SIB-SC-F12-2-3-08/06/2022	08/06/2022	2 - 3	Lead	100	618
	SIB-SC-F12-2-3-08/06/2022	08/06/2022	2 - 3	Mercury	4	10.2
	SIB-SC-F13-1-2-08/08/2022	08/08/2022	1 - 2	Lead	100	221
	SIB-SC-F13-2-3-08/08/2022	08/08/2022	2 - 3	Lead	100	241
	SIB-SC-F21-3-4-07/13/2022	07/13/2022	3 - 4	Lead	100	101
	SIB-SC-G06-1-2-07/14/2022	07/14/2022	1 - 2	Lead	100	138
	SIB-SC-G07-1-2-07/14/2022	07/14/2022	1 - 2	Lead	100	133
	SIB-SC-G08-2-3-07/14/2022	07/14/2022	2 - 3	Lead	100	109
DA-5	SIB-SC-C14-1-2-08/04/2022	08/04/2022	1 - 2	Lead	100	138
EA-1	SIB-011-OHW-0-1-10172022	10/17/2022	0-1	Lead	100	222
	SIB-012-MLW-0-1-10172022	10/17/2022	0-1	Lead	100	125
EA-2	SIB-028-OHW-0-1-10252022	10/25/2022	0-1	Lead	100	201
	SIB-029-OHW-0-1-10252022	10/25/2022	0-1	Lead	100	170
	SIB-031-OHW-0-1-10252022	10/25/2022	0-1	Lead	100	112
	SIB-034-OHW-0-1-10252022	10/25/2022	0-1	Lead	100	239
	SIB-035-OHW-0-1-10252022	10/25/2022	0-1	Lead	100	203
	SIB-045-OHW-0-1-10242022	10/24/2022	0-1	Arsenic	100	615
	SIB-045-OHW-0-1-10242022	10/24/2022	0-1	Lead	100	852
	SIB-052-OHW-0-1-10202022	10/20/2022	0-1	Lead	100	136
EA-3	SIB-057-MLW-0-1-10192022	10/19/2022	0-1	Lead	100	127
	SIB-062-OHW-0-1-10182022	10/18/2022	0-1	Lead	100	161
	SIB-SC-B32-1-2-07/25/2022	7/25/2022	1-2	Lead	100	248

Notes:

[1] Arsenic and lead concentrations were analyzed by EPA Method 6020B; mercury concentrations were analyzed by EPA Method 7471A.

A total of 268 samples (6 in DA-1, 89 in DA-2, 31 in DA-3, 105 in DA-4, 29 in DA-5, and 8 in DA-6) were screened for potential TCLP exceedances in DAs.

A total of 177 samples (14 in EA-1, 29 in EA-2, 57 in EA-3, 60 in EA-4, and 17 in EA-5) were screened for potential TCLP exceedances in EAs.

mg/kg = milligrams per kilogram TCLP = Toxicity Characterstic Leaching Procedure

DA = Dredge Area EA = Excavation Area

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APPENDIX G

CLEAN WATER ACT ANALYSIS TECHNICAL MEMORANDUM

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CLEAN WATER ACT ANALYSIS TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

1.0 INTRODUCTION AND PURPOSE

This Clean Water Act Analysis presents a Project Area-specific evaluation of Clean Water Act (CWA) Section 404(b)(1) and other applicable sections of the CWA as applied to the Remedial Design (RD) conducted for the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site (PHSS) in Portland, Multnomah County, Oregon. HydroGeoLogic, Inc. (HGL) performed the work on behalf of the SIB RD Group based on the requirements of the PHSS Record of Decision (ROD) (EPA, 2017) and the Administrative Settlement Agreement and Order on Consent (ASAOC) (EPA, 2021a). This CWA analysis uses references to the previously published SIB Project Area Pre-Design Investigation (PDI) Evaluation Report (ER), submitted in December 2024 (HGL, 2024a) and approved by the U.S. Environmental Protection Agency (EPA) in January 2025. References also are made to the Basis of Design Report (BODR) that was submitted to EPA in November 2024 (HGL, 2024b) and approved by EPA in December 2024. This CWA analysis has been revised to address EPA comments on the CWA analysis that was included in the Draft 50% RD.

As required by the ASAOC, the purpose of this CWA analysis is to provide sufficient information to demonstrate that the proposed Remedial Action (RA) at the SIB Project Area complies with the substantive requirements of Section 404(b)(1) and other applicable sections of the CWA. Most of the information necessary to do so was previously compiled and published in the CWA Section 404(b)(1) evaluation in Appendix L of the PHSS Feasibility Study (FS) (EPA, 2016). This CWA analysis supplements that previously published analysis regarding long-term and short-term impacts to Waters of the U.S. resulting from the RA at the SIB Project Area, minimization of adverse effects to Waters of the U.S., compliance with the ROD, and an analysis of the need for any mitigation. In response to EPA comments on the Draft 50% RD, the organization of this CWA analysis has been structured to align with the outline of Appendix L of the PHSS FS. Broadly, the findings of that prior CWA analysis reported in that prior analysis remain applicable to the RD for the SIB Project Area. This CWA analysis amends that prior study by providing greater detail regarding the primary elements of the RD, specific impacts related to the RD in the context of the SIB Project Area, and application of best management practices (BMPs), engineering controls, and other avoidance and minimization measures. This CWA analysis addresses CWA Sections 404 and 401, and Oregon Water Quality Standards. It is not a comprehensive analysis of all Applicable or Relevant and Appropriate Requirements (ARARs) identified in the ROD. The complete analysis of ARARs is included in Section 2.3.1 and Table 2-1 of the Design Criteria Report (DCR).

This CWA analysis provides the basis for the EPA to determine whether compensatory mitigation is needed to satisfy CWA requirements. The Remedial Design Guidelines and Considerations (RDGC), in Appendix B Topic 9 “Habitat Mitigation” (EPA, 2021b), presents EPA guidance on

Corporate Headquarters
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

determining, and if needed, satisfying the requirements for compensatory mitigation during RD at the PHSS. The RDGC (EPA, 2021b) guides remedial designs to be "self-mitigating" to the extent on-site measures to maintain aquatic habitats and ecological functions are feasible. The ROD and the RDGC both provide avenues for additional compensatory mitigation in the event that RD does not achieve a "self-mitigating" outcome.

The ROD identified CWA 404 and State of Oregon Water Quality Standards as ARARs. This analysis determines the applicability of those ARARs to the SIB Project Area RA and identifies the various ways those requirements are addressed within the Pre-Final 90% RD, including the Project Area Monitoring Plan (PAMP) (Volume II, Appendix P) and Water Quality Monitoring Plan (WQMP) (Volume II, Attachment C of Appendix N - Construction Quality Assurance/Quality Control Plan [CQA/QCP]).

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) provides that "no federal, state or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site" (42 United States Code ["USC"] 9621 (e)). This provision of CERCLA does not remove the requirement to equivalently meet or waive the permitting regulations that are identified by EPA to be ARARs. Although CERCLA projects are exempt from securing such permits, the lead agency is responsible for consulting with regulatory stakeholders through the permit equivalency process, which enables regulatory agency and stakeholder review of proposals and applications to achieve a demonstrable level of compliance consistent with the spirit and intent of regulatory guidelines identified as ARARs. The regulatory equivalency analysis summarizes the project, applicable regulations, potential environmental impacts, BMPs, and project monitoring plans to facilitate regulatory engagement, dialog, and guidance. This CWA analysis addresses a substantial portion of the permit equivalency analysis.

EPA is the lead agency for the PHSS. CERCLA stipulates that a remedy that does not attain an ARAR can be selected if it assures the protection of human health and the environment and meets one of six waiver criteria described in CERCLA. At this time, EPA has not waived any of the ARARs identified in the ROD (EPA, 2017).

1.1. PROJECT BACKGROUND

The SIB Project Area is the active cleanup area within the PHSS that lies between approximately river mile (RM) 8.1 and RM 9.2 on the northeast side of the Willamette River. The SIB Project Area is approximately 1.1 miles in length and 117 acres in size and includes riverbanks from the top of the bank to the river. The SIB Project Area is adjacent to a federal navigation channel within the main channel of the Willamette River. The navigation channel has an authorized maintained depth of -45 feet (ft) Columbia River Datum (CRD), extending from the confluence of the Lower Willamette River with the Columbia River to RM 11.6. The U.S. Army Corps of Engineers (USACE) maintains the navigation channel, which does not extend into SIB.

The SIB Project Area is bounded by the uplands of Swan Island and Mocks Bottom to the southwest and northeast, respectively. Land uses within and adjacent to the SIB Project Area are light and heavy industrial and commercial. SIB is an active navigable industrial waterway, and the shoreline hosts many structures supporting light and heavy industrial activities. Except for slopes

along the riverbanks, the basin upland topography is generally flat, with elevations varying between 34 to 44 North American Vertical Datum of 1988 (NAVD88).

The Portland Harbor reach of the Willamette River, including the SIB Project Area, has been redirected, straightened, filled, and deepened by dredging. Most of the riverbank has been filled, stabilized, and engineered for industrial-type operations with riprap, bulkheads, and overwater piers and docks. (City of Portland, 2014).

1.2. PROJECT PURPOSE AND NEED

The purpose and need for the proposed remedy within the SIB Project Area has not changed from the project purpose and need described for the PHSS in Appendix L of the PHSS FS. The PHSS is located within Waters of the U.S. The basic purpose of the proposed remedy is to remove and remediate contaminated sediments within the SIB Project Area. The need for RA arises from unacceptable risks to human health and ecological receptors resulting from exposure to contaminants of concern (COCs) in sediments, groundwater, surface water, fish tissue, and riverbank soils within the SIB Project Area.

1.3. OBJECTIVES

Remedial Action Objectives (RAOs) were developed for the PHSS during the FS phase and published in the ROD. RAOs include media-specific goals for protecting human health and the environment. RAOs are published and detailed in Section 9 of the ROD (EPA, 2017).

1.4. WATER DEPENDENCY DETERMINATION

The Pre-Final 90% RD addresses contaminated sediment and riverbanks located within or adjacent to Waters of the U.S. Therefore, as stated in Appendix L of the FS, the proposed RA is a water-dependent activity (40 CFR Section 230.10).

2.0 DESCRIPTION OF THE PROPOSED REMEDY

2.1. PROJECT LOCATION

Section 1.1. identifies the project location with supporting details and context. The SIB Project Area is located in Portland, Oregon, Multnomah County within the PHSS located on the northeast side of the Willamette River between river mile (RM) 8.1 and RM 9.2.

2.2. PRIMARY ELEMENTS OF THE REMEDY

The Pre-Final 90% RD applies a combination of remedial technologies to achieve RAOs in compliance with the requirements of the ROD and the guidance provided by the RDGC. The proposed remedy predominantly applies dredging and capping to accomplish RAOs. The primary elements of the proposed remedy are listed below in a way that aligns with the applicable remedy components discussed in Appendix L of the PHSS FS:

- Containment
- Sediment/Soil Removal

- Upland (Off-site) Disposal
- Removal and Installation of Piling and Structures

Although discussed in Appendix L of the PHSS FS, the proposed remedy for SIB Project Area does not include monitored natural recovery, enhanced natural recovery, or in situ treatment. Therefore, those technologies are not discussed here.

2.2.1. Containment

The proposed remedy includes engineered caps designed to achieve chemical isolation of contaminated sediments and soils that remain in place at the SIB Project Area. The Pre-Final 90% RD includes multiple cap designs that vary between riverbank application and in-water application. Additional variations arise depending on the need for an erosion protection layer to protect cap performance and the spatial variability of contaminant concentrations within the riverbed.

Details regarding cap design, supporting engineering analysis, and locations for cap placement are found within the Pre-Final 90% RD documents at the following locations:

- DCR, Section 3.2 Cap Design
- DCR, Section 3.3 Riverbank Design
- Volume I (DCR), Appendix D Riverbank Design Technical Memorandum
- Volume I (DCR), Appendix E Cap Design Technical Memorandum
- Volume II (Plans), Appendix N CQA/QCP
  - Section 4.2.3 Clean Material Placement
- Volume III (Specifications/Drawings), Appendix U Specifications (Divisions 31, and 35)
- Volume III (Specifications/Drawings), Appendix V Drawings

2.2.2. Sediment/Soil Removal

The proposed remedy includes dredging and excavation to remove contaminated sediments and riverbank soils from the SIB Project Area. The Pre-Final 90% RD includes in-water sediment removal using mechanical dredging techniques. Riverbank soils remediation includes excavation of contaminated soils prior to placing an engineered cap, backfill, soil for growing medium, and planting with native vegetation.

Details regarding dredge design, riverbank design, supporting engineering analysis, and locations and quantities of dredging are found within the Pre-Final 90% RD documents at the following locations:

- DCR, Section 3.1 Dredging Design
- DCR, Section 3.3 Riverbank Design
- Volume I (DCR), Appendix D Riverbank Design Technical Memorandum
- Volume I (DCR), Appendix H Dredging Design Technical Memorandum
- Volume II (Plans), Appendix N CQA/QCP
  - Section 4.2.1 Dredging/Excavation, Barge Dewatering, and In-Water Transportation

- Volume III (Specifications/Drawings), Appendix U Specifications (Divisions 31, 32, 33, 35)
- Volume III (Specifications/Drawings), Appendix V Drawings

2.2.3. Upland (Off-site) Disposal

There are no available on-site options for transloading or disposal within or near the PHSS. There is one existing transloading facility on the Columbia River located in The Dalles, Oregon. The proposed use of that transloading facility will require barges to travel approximately 97 miles from the SIB Project Area via the Lower Willamette River and the Columbia River.

Details regarding upland (off-site) disposal are found within the Pre-Final 90% RD documents at the following locations:

- DCR, Section 4.1.2 Transportation and Off-Site Disposal Plan
- Volume II (Plans), Appendix N CQA/QCP
  - Section 4.2.1 Dredging/Excavation, Barge Dewatering, and In-Water Transportation,
  - Section 4.2.2 Offload/Disposal of Dredged Materials
- Volume II (Plans), Appendix O Transportation and Off-Site Disposal Plan
- Volume III (Specifications/Drawings), Appendix U Specifications (Division 35)
- Volume III (Specifications/Drawings), Appendix V Drawings

2.2.4. Removal and Installation of Piling and Structures

Removal of derelict piling within the shallow water and active channel margin (ACM) zones of the SIB Project Area is specified as a component of on-site compensatory mitigation and evaluated as part of the Volume 1 (DCR) Appendix C Habitat Impact Evaluation Technical Memorandum. Removal and replacement of the Lagoon Wharf structure is necessary to achieve RAOs. The design for that structural removal and replacement is advancing on a parallel track. Therefore, details about that component of the design are not yet available.

Details regarding removal and installation of piling and structures are found within the Pre-Final 90% RD documents at the following locations:

- DCR, Section 3.5 Structural Design Analysis
- Volume 1 (DCR), Appendix C Habitat Impact Evaluation Technical Memorandum
- Volume I (DCR), Appendix J Structural Design Technical Memorandum
- Volume II (Plans), Appendix N CQA/QCP
  - Section 4.2.5 Structural Monitoring and Inspections
  - WQMP Section 2.9 Removal of Pilings, In-Water Structures, and Debris BMPs
  - WQMP Section 2.10 Installation of Pilings BMPs
- Volume III (Specifications/Drawings), Appendix U Specifications (Division 02 32 00)
- Volume III (Specifications/Drawings), Appendix V Drawings

3.0 POTENTIAL IMPACTS

Appendix L of the PHSS FS includes a discussion of potential impacts of remedial activities. While that discussion addressed potential PHSS-wide impacts associated with the FS alternatives, it remains applicable to the SIB Project Area Pre-Final 90% RD and is incorporated here by reference. SIB Project Area-specific detail is presented here as relevant to supplement the prior discussion of potential impacts presented in Appendix L of the PHSS FS.

3.1. POTENTIAL IMPACTS ON PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE AQUATIC ECOSYSTEM

The proposed remedy for the SIB Project Area will affect the aquatic ecosystem in the following primary ways:

- Removal of contaminated sediment by mechanical dredging and placement of in-water fill material – both activities will discharge contaminants to Waters of the U.S.;
- Placement of engineered caps to contain and isolate in place contaminated sediments. Engineered caps may incorporate activated carbon as an amendment within the chemical isolation layer. The increased concentration of carbon in the sediments may affect chemical processes in the riverbed.

The proposed remedy for the SIB Project Area does not include in-water disposal nor does it include use of a confined disposal facility (CDF).

The potential impacts of the proposed remedy on physical and chemical characteristics of the aquatic ecosystem includes consideration of the following:

- Substrate
- Suspended particulates/turbidity and dissolved oxygen (DO)
- Surface water quality
- Current patterns, water circulation, and normal water fluctuations
- Floodplains

Each of these impact types are discussed in the following sections.

3.1.1. Substrate

Site history and background and existing conditions regarding substrate are discussed in Appendix L of the PHSS FS. That discussion remains relevant and is incorporated here by reference.

The proposed remedy for SIB includes extensive dredging using mechanical dredging equipment. Dredging will change the elevation and material composition of the riverbed substrate, but those changes vary throughout the SIB Project Area. Engineered caps are specified throughout SIB, so dredging impacts on substrate must be considered concurrently with the substrate impacts associated with engineered caps. Dredging will cause a temporary disruption to the substrate throughout most of SIB. Permanent effects of dredging are limited to modification of the riverbed elevation.

Engineered caps are specified for the entire in-water portion of the SIB Project Area. Within the shallow water habitat zone (between water depths of 0 ft [+7.3 ft NAVD88] and 20 ft [-12.7 ft NAVD88] when the river stage is at OLW), final cap surfaces will be constructed by placing a layer of beach mix rounded gravel. This material placement is an impact minimization measure to establish a natural substrate within the shallow water zone. Within the deep water habitat zone (below -12.7 ft NAVD88), engineered caps require an erosion protection layer to prevent erosive forces related to vessel traffic from compromising the integrity and performance of the caps. Gradual deposition of fine sediment will occur within the deep water zone (approximately 1 centimeter per year) restoring some ecological function to deep water benthic habitats. The impacts to deep water substrates will be partially mitigated by placement of clean sand above the erosion protection layer within deep water locations less susceptible to riverbed erosion in response to vessel traffic. Engineered caps will provide a significant beneficial effect on the chemical conditions of the substrate by reducing exposure to contaminants in sediment, porewater, and surface water.

Removal of derelict piles and structures prior to dredging and capping would not significantly alter the substrate. Pile removal within the shallow water zone and ACM is included in the proposed remedy as a component of on-site mitigation.

3.1.2. Suspended Particulates/Turbidity and Dissolved Oxygen

Appendix L of the PHSS FS discussion of RA effects on suspended particulates/turbidity and DO remains current and applicable to the SIB and is incorporated here by reference. Additional details related to SIB-specific observations and design are provided here to supplement the previous discussion.

Remedial activities including dredging, capping, and removal of piles, all have the potential to cause localized, short-term increases in turbidity and decreases in DO. These potential impacts will be managed through implementation of the WQMP included as an attachment to the CQA/QCP (Volume II, Appendix N, Attachment C). The WQMP includes turbidity and DO monitoring during construction and specifies BMPs and contingency corrective measures to address exceedances.

3.1.3. Surface Water Quality

Appendix L of the PHSS FS discussion of RA effects on surface water quality remains current and applicable to the SIB and is incorporated here by reference. Additional details related to SIB-specific observations and design are provided here to supplement the previous discussion.

Remedial activities including dredging, capping, and removal of piles, all have the potential to cause localized, short-term water quality impacts during construction. These potential impacts will be managed through implementation of the WQMP. The WQMP specifies BMPs and contingency corrective measures to address exceedances for standard water quality parameters as well as contaminants potentially released to the water column during dredging and other remedial activities.

Short-term localized effects on water quality are expected during construction. Overall, the remedy will improve long-term water quality by reducing exposure to contaminants in the sediments, porewater, and surface water.

3.1.4. Current Patterns, Water Circulation, and Normal Water Fluctuations

Site history and background and existing conditions regarding current patterns, water circulation, and normal water fluctuations are discussed in Appendix L of the PHSS FS. That discussion remains relevant and is incorporated here by reference. Additional details related to SIB-specific observations and design are provided here to supplement the previous discussion.

The SIB is predominantly a quiescent backwater from the main channel of the Willamette River. Ambient current velocities are driven by tidal exchange and are uniformly less than 0.1 ft per second (ft/sec). The proposed remedy will change the riverbed elevations as a result of dredging and capping. The changes result in a small net increase in the total area of shallow water habitat. Hydrodynamic modeling performed as part of the recontamination analysis determined that the current patterns, water circulation, and normal water fluctuations would be negligibly affected by the changes in riverbed elevation resulting from RA implementation.

3.1.5. Floodplains

The flood impact evaluation (DCR Section 2.2.3) evaluated the potential effects of the proposed remedy on flood rise compared to pre-RA baseline conditions. The evaluation demonstrated that the proposed RA in SIB is not likely to cause unacceptable flood rise based on the specified SIB Project Area post-construction riverbed and riverbank elevations.

Floodplain connectivity is severely degraded throughout the PHSS. The riverbank treatments included in the proposed RA address this to a small degree within the limits of the SIB Project Area by restoring and reconnecting adjacent habitats along much of the SIB shoreline so there is continuity between the riparian zone, ACM, and shallow water zone.

3.2. POTENTIAL IMPACTS ON BIOLOGICAL CHARACTERISTICS OF THE AQAUTIC ECOSYSTEM

Appendix L of the PHSS FS includes a discussion of potential impacts on biological characteristics of the aquatic ecosystem. That discussion remains applicable to the SIB Project Area and is incorporated here by reference. Updated information and SIB Project Area-specific details are provided here to amend and update that prior discussion.

This discussion addresses each of the following components of the biological characteristics of the aquatic ecosystem:

- Threatened and endangered (T&E) species
- Aquatic food web
- Wildlife

3.2.1. Threatened and Endangered Species

EPA completed programmatic consultation with National Oceanographic and Atmospheric Administration (NOAA) National Marine Fisheries Services (NMFS) to address requirements related to Endangered Species Act Section 7(a)(2) (ESA) and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat. The Biological Opinion (BO) was issued by NOAA-NMFS on May 16, 2025, and it covers the PHSS cleanup activities including the proposed remedy for SIB (NOAA 2025). The BO concluded that "the proposed action is not likely to jeopardize the continued existence of the following species, or result in the destruction or adverse modification of their designated critical habitat." The species considered in the consultation are listed below:

1. Lower Columbia River (LCR) Chinook salmon (*Oncorhynchus tshawytscha*)
2. Upper Willamette River (UWR) Chinook salmon
3. Upper Columbia River (UCR) spring-run Chinook
4. Snake River (SR) spring/summer-run Chinook salmon
5. SR fall-run Chinook salmon
6. Columbia River (CR) chum salmon (*O. keta*)
7. LCR coho salmon (*O. kisutch*)
8. SR sockeye Salmon (*O. nerka*)
9. LCR steelhead (*O. mykiss*)
10. UWR steelhead
11. Middle Columbia River steelhead
12. UCR steelhead
13. Snake River Basin (SRB) steelhead
14. Southern distinct population segment Pacific eulachon (*Thaleichthys pacificus*)
15. Southern distinct population segment green sturgeon (*Acipenser medirostris*)
16. Sunflower sea star (*Pycnopodia helianthoides*)

NMFS also concluded that the proposed action is not likely to adversely affect Southern Resident killer whale (*Orcinus orca)* and their designated critical habitat.

The proposed remedy would have short-term and localized effects on T&E species related to turbidity and resuspension of contaminants during construction. The BMPs identified in the BO are incorporated into the Pre-Final 90% RD as documented in the CQA/QCP (Volume II, Appendix N). The CQA/QCP includes a WQMP that specifies BMPs for specific remedial activities. In-water work will take place during approved in-water work periods, and avoidance and minimization measures will be applied in accordance with the WQMP and CQA/QCP.

The proposed remedy does not include in-water disposal or use of a CDF, so the impacts related to those topics discussed in Appendix L of the PHSS FS do not apply to the SIB Project Area.

The proposed remedy incorporates avoidance, minimization, and mitigation measures in keeping with ROD requirements and as guided by the RDGC. Those measures result in a net positive effect on habitats within the SIB Project Area with priority given to restoring riparian vegetation, restoring substrate and slopes within the ACM, applying beach mix as a final surface to caps placed

within the shallow water zone, and placement of large wood in the ACM to provide habitat complexity and protection for wetland pockets along the shoreline fringe.

As noted in Appendix L of the PHSS FS, "Pacific lamprey ammocoetes are not an ESA-listed species, but they are designated as a species of concern by U.S. Fish and Wildlife Service (USFWS) due to their cultural significance and declining populations." Any ammocoetes present within the benthic habitats of SIB would be disrupted during RA construction as the majority of SIB will be dredged and all of the SIB will be capped. Long-term benefits to Pacific lamprey ammocoetes will result from reducing exposure to contaminants in sediments, porewater, and surface water. Suitable benthic habitat for ammocoets will develop over time as fine sediment is deposited and accumulates within SIB post-RA.

3.2.2. Aquatic Food Web

Appendix L of the PHSS FS includes a discussion of potential impacts on the aquatic food web. That discussion remains applicable to the SIB and is incorporated here by reference. The concluding statement in that prior discussion noted the long-term benefits of the RA with respect to the aquatic food web:

> *"Overall, remedial activities will benefit the aquatic ecosystem by reducing exposure to contaminants in sediment, porewater, and surface water. The most significant predicted improvement would be the reduction in fish and invertebrate tissue of PCBs, dioxin/furans, DDx, and other contaminants. This would indirectly result in a minimization of exposure and potential adverse effects to higher trophic level organisms."*

3.2.3. Wildlife

Appendix L of the PHSS FS includes a discussion of potential impact on wildlife. That discussion remains applicable to the SIB Project Area and is incorporated here by reference.

3.3. POTENTIAL IMPACTS ON SPECIAL AQUATIC SITES

Appendix L of the PHSS FS includes a discussion of potential impacts on special aquatic sites. That discussion remains applicable to the SIB and is incorporated here by reference. Updated information and SIB-specific details are provided here to amend and update that prior discussion.

This discussion addresses each of the following kinds of special aquatic sites:

- Sanctuaries and refuges
- Wetlands
- Mudflats
- Vegetated shallows
- Riffle and pool complexes
- Shorelines and riparian habitats
- Floodplains

3.3.1. Sanctuaries and Refuges

Appendix L of the PHSS FS includes a discussion of potential impact on sanctuaries and refuges. That discussion remains applicable to the SIB Project Area and is incorporated here by reference.

3.3.2. Wetlands

Appendix L of the PHSS FS includes a discussion of potential impacts on wetlands. That discussion remains applicable to the SIB Project Area and is incorporated here by reference. Note that the prior discussion (in the PHSS FS) identified no wetlands within the SIB Project Area. The baseline habitat conditions survey conducted as part of the SIB Project Area Pre-Design Investigation (PDI) also did not identify wetlands within the Project Area.

3.3.3. Mudflats

Appendix L of the PHSS FS includes a discussion of potential impacts on mudflats. That discussion remains applicable to the SIB Project Area and is incorporated here by reference. Note that the prior discussion identified no mudflats within the PHSS. Baseline habitat conditions survey conducted as part of the SIB Project Area PDI did not identify mudflats within the Project Area.

3.3.4. Vegetated Shallows

Appendix L of the PHSS FS includes a discussion of potential impacts on vegetated shallows. That discussion remains applicable to the SIB and is incorporated here by reference. Note that the prior discussion identified no vegetated shallows within the PHSS. The baseline habitat conditions survey conducted as part of the SIB Project Area PDI did not identify vegetated shallows within the Project Area.

3.3.5. Riffle and Pool Complexes

Appendix L of the PHSS FS includes a discussion of potential impacts on riffle and pool complexes. That discussion remains applicable to the SIB and is incorporated here by reference. Note that the prior discussion identified no riffle and pool complexes within the PHSS and offered this explanation:

> *"Because the Willamette River within the Site does not have a steep gradient, and because it is channelized and the shoreline contains extensive modifications, including riprap and seawalls, it is highly unlikely that riffle and pool complexes exist within the Site; therefore, no impacts are anticipated."*

The baseline habitat conditions survey conducted as part of the SIB Project Area PDI confirmed that there are no riffle and pool complexes within the Project Area.

3.3.6. Shorelines and Riparian Habitats

Appendix L of the PHSS FS includes a discussion of potential impacts on shorelines and riparian habitats. That discussion remains applicable to the SIB and is incorporated here by reference.

The proposed remedy for the SIB Project Area incorporates shoreline enhancements into the RD through avoidance, minimization, and on-site mitigation. Riverbanks are remediated by a combination of removal of contaminated soil and regrading of the riverbanks to flatter slopes by placement of a cap and additional fill above the cap to provide a growing medium for riparian vegetation restoration. The proposed remedy specifies native riparian vegetation where feasible, resulting in revegetation of over half of the riverbank area. Wherever feasible and compatible with achieving RAOs, the ACM will be graded to slopes flatter than 5H:1V. Beach mix is specified for final substrate on the surfaces of caps within the ACM and shallow water zones, where practicable. The Habitat Impact Evaluation Technical Memorandum (Volume 1, Appendix C) presents a habitat equivalency analysis (HEA) that maps and quantifies each of these treatments and compares pre-RA baseline conditions to post-RA conditions. Over the long term, the proposed remedy will yield a net improvement in riparian and shoreline habitats within the SIB Project Area.

3.3.7. Floodplains

The flood impact evaluation (DCR Section 2.2.3) evaluated the potential effects of the proposed remedy on flood rise compared to pre-RA baseline conditions. The evaluation demonstrated that the proposed RA in SIB is not likely to cause unacceptable flood rise based on the specified SIB Project Area post-construction riverbed and riverbank elevations.

Floodplain connectivity is severely degraded throughout the PHSS. The riverbank treatments included in the proposed RA address this to a small degree within the limits of the SIB Project Area by restoring and reconnecting adjacent habitats along much of the SIB shoreline so there is continuity between the riparian zone, ACM, and shallow water zone.

3.4. TRANSPORT OF CONTAMINATED SEDIMENTS TO TRANSLOADING FACILITY ON THE COLUMBIA RIVER

Section L3.4 of FS Appendix L discusses potential impacts associated with transport of contaminated sediments to a transloading facility on the Columbia River. That discussion remains applicable to the transport and disposal of contaminated sediments as presented in the Pre-Final 90% RD. There is one existing transloading facility on the Columbia River located in The Dalles, Oregon. The proposed use of that transloading facility will require barges to travel approximately 97 miles from the SIB Project Area.

BMPs and avoidance measures outlined in Section L5 of FS Appendix L are incorporated into the Pre-Final 90% RD. Specifically, barges will be sealed to contain sediments and water, and spill-control equipment will be maintained on board the barges to support immediate response to releases. The transload facility will be required to incorporate secondary containment to prevent contaminated materials from leaving the site during transloading. Material stockpiles at the transload facility will be required to have curbing and sumps to facilitate the collection and handling of runoff.

There are no existing transloading facilities or disposal options located within the PHSS, and there are no existing transloading facilities closer than The Dalles. The specifications for the Pre-Final 90% RD provide conditions and requirements that would allow for the use of a newly developed transload facility should one emerge prior to initiating the RA at the SIB Project Area.

Impacts associated with transport of contaminated sediments to transloading facility on the Columbia River would be effectively mitigated by the BMPs described above that would be applied to barge transport and transloading. However, the long-distance barge transit with the large volume of contaminated sediment requiring transport poses a notable risk and is a large cost driver. Both risk and cost would be effectively reduced and mitigated by a closer transloading or disposal option.

4.0 EVALUATION AND TESTING OF DISCHARGE MATERIAL

The term "discharge material" applies to material placed in Waters of the U.S. including remedy construction materials (e.g., capping, in-water fill, erosion protection layers) and dredged material slated for in-water disposal. The proposed remedy does not include any open-water disposal, nor does it include disposal within a CDF.

The CQAQCP (Volume II, Appendix N) includes a WQMP that specifies the following BMPs and testing requirements for discharge material with specific applicability to capping materials and backfill material to be placed in water:

- Prior to placement, materials will be tested and compared against ROD Table 17 cleanup levels (CULs) for sediment and riverbank. Only materials with concentrations below ROD Table 17 CULs will be used for capping. Specification Section 35 37 10 Engineered Caps provides the detailed requirements for inspection and testing of cap materials.
- Prior to placement, materials will be tested and compared against ROD Table 17 CULs for sediment and riverbank. Only materials with concentrations below ROD Table 17 CULs will be used for backfill. Specification Section 31 00 00 - Earthworks provides detailed requirements for inspection and testing of backfill material.
- RA Performing Parties and the RA Contractor will decide if re-use of dredged or excavated materials below Table 17 CULs will be considered for backfill. Dredged material won't be immediately reused as backfill during the same construction window because testing for ROD Table 17 COCs would take time that would likely exceed in-water work window. However, dredged material that's later confirmed to be below CULs and contains higher organic carbon may be reused in subsequent construction phases.

The specified testing requirements are expected to avoid significant adverse impacts on water quality or biota in the short or long term related to placement of these materials.

5.0 IMPACT AVOIDANCE AND MINIMIZATION MEASURES

The Pre-Final 90% RD integrates impact avoidance and minimization measures throughout all the major elements of the design. CWA Section 404(b)(1) requires actions that affect Waters of the U.S. to apply measures to avoid and minimize impacts, BMPs and engineering controls are incorporated into the RD plans, drawings, and specifications in alignment with the findings of the FS, Appendix L CWA 404(b)(1) analysis, the RDGC, and the ROD. Avoidance and minimization measures are applied within the following categories.

- **Specifying Final Surface Materials** – Wherever feasible and compatible with achieving RAOs, the Pre-Final 90% RD specifies ecologically suitable materials for the finished surfaces within the riparian, ACM, and shallow water habitat zones. Ecologically suitable materials in these zones include "beach mix" gravel and clean sand. The HEA presented in DCR, Appendix C Habitat Impact Evaluation Technical Memorandum, provides a quantitative analysis that compares the pre-RA existing "baseline" substrate conditions within the SIB Project Area to the post-RA substrate and final surface conditions specified in the Pre-Final 90% RD.
- **Riparian Vegetation Replacement** – Wherever feasible and compatible with achieving RAOs, the Pre-Final 90% RD specifies the restoration of vegetation (e.g., native plant communities) on the riverbanks within the riparian and ACM zones. The HEA (DCR, Appendix C) provides a quantitative analysis that compares the pre-RA existing "baseline" riparian vegetation conditions within the SIB Project Area to the post-RA riparian vegetation conditions specified in the Pre-Final 90% RD.
- **Grading of Riverbank and Submerged Slopes** – Final grading of the riverbed and riverbanks was informed by the HEA so that ecologically favorable conditions would be achieved wherever feasible and compatible with achieving RAOs. Specifically, riverbank slopes were modified to a flatter grade where space allowed, slopes within the ACM were graded to be flatter than 5H:1V, and final riverbed elevations were designed to produce a net increase in shallow water habitat area. The HEA (DCR, Appendix C) provides a quantitative analysis that compares the pre-RA existing "baseline" topographic/bathymetric conditions within the SIB Project Area to the post-RA topographic/bathymetric conditions specified in the Pre-Final 90% RD.
- **General Handling of Media and Materials** – The effects of dredging, capping, and placement of fill (e.g., erosion protection layers, clean sand, beach mix gravel) are minimized by specific controls applied during RA within the SIB Project Area and during handling and transport.
- **Adherence to In-water Work Windows** – The Pre-Final 90% RD specifies that the timing of in-water work (e.g., dredging, capping, material placement) avoids peaks in salmonid spawning and migration seasons and other biologically critical periods. The specified construction sequence and seasonal timing complies with the in-water construction periods (i.e., "fish windows") specified by Oregon Department of Fish and Wildlife (ODFW), NMFS, and USFWS. Applicable in-water construction periods at the SIB Project Area are July 1 – October 31 and December 1 – January 31 (ODFW, 2008). On a year-by-year and case-by-case basis, regulator agencies may evaluate and approve some limited flexibility on the approved dates for in-water work. Any potential deviations from the specified in-water work period would be reviewed and approved by appropriate agencies to avoid impacts.

Specific avoidance and minimization measures are discussed in the following sections for major elements of the RD. The CQA/QCP (Volume II, Appendix N) includes a WQMP that specifies BMPs for each of the following remedial activities:

- In-water work period
- Containment devices, work area isolation methods, and fish salvage BMPs

- Spill control, fueling, and maintenance
- Vessel operation BMPs
- Dredging BMPs
- Capping BMPs
- Backfill material requirements
- Riverbank excavation, slope setback, material removal/replacement, and capping BMPs
- Removal of pilings, in-water structures, and debris BMPs
- Installation of pilings BMPs
- Barge loading, transport, and transloading of dredged material BMPs

Section 2.0 of the WQMP presents a comprehensive list and description of the BMPs and controls applied to each of these activities. Excerpts from the WQMP are included in the following sections.

5.1. IN-WATER WORK

The primary minimization measure for in-water work is adherence to the Lower Willamette in-water work period between July 1 and October 31 that applies to work in SIB.

The CQA/QCP (Volume II, Appendix N) specifies monitoring, reporting, and corrective actions that will apply during in-water construction. The CQA/QCP includes a WQMP designed to minimize water quality impacts during in-water work. Specific monitoring and controls for in-water work are listed below.

- Turbidity, DO, and initial chemical constituent monitoring.
- Sediment and contaminant dispersion control measures including limited active work area, managed production rates, environmental dredge buckets.
- Contingency measures and notification procedures to address exceedances or observed or dead species.

See the WQMP for additional detail regarding controls, BMPs, monitoring during construction, and contingency measures for exceedances.

5.2. DREDGING BEST MANAGEMENT PRACTICES

The CQA/QCP (Volume II, Appendix N) includes a WQMP that specifies dredging BMPs. The following text is taken from Section 2.5 of the WQMP.

Article 3.04 Conduct of Work of Specification Section 35 24 20 (Remedial Dredging, Barge Dewatering, and In-Water Transportation) includes required and additional BMPs to be considered. As seen in Article 1.05 of the Specification 35 24 20, material handling and processing will be further developed by the RA Contractor in the Dredging and Excavation Plan of the RA Work Plan (RAWP). BMPs consistent with the National Oceanic and Atmospheric Administration (NOAA) – National Marine Fisheries Service (NMFS) Biological Opinion WCRO-2021-01886 (NOAA, 2025) will also include:

- A strategic dredge sequencing plan developed to minimize the spreading of highly contaminated sediment to adjacent areas and use over-dredge allowance to remove targeted material in a single dredge event.
- The operation employing experienced contaminated sediment dredge operators supervised by professionals experienced in ensuring protocol adherence and utilizing 3-dimensional (3D) sediment visualizations. This 3-D sediment visualization will include an accurate digital terrain model of sediment contamination depth that can be viewed by the operator and supervisor. Operators will also utilize GPS located on the bucket with sub-ft accuracy, and stair-step dredge cuts to reduce sediment sloughing along steeper slopes.
- Efforts to limit sediment resuspension, such as the utilization of closed or environmental buckets, avoiding multiple bucket bites, implementing careful bucket control techniques, and utilizing spuds or anchoring systems to limit the resuspension. If the equipment used is found not to be the best suitable for site conditions, adjustments will be made. A procedure will be in place to halt operations if excessive resuspension is observed, as further discussed in Section 3.
- Examples of BMPs for physical sediment dispersion control include sheet piling, silt curtains, and moon pools.

5.3. BEST MANAGEMENT PRACTICES FOR PLACING CAPPING MATERIALS

The CQA/QCP (Volume II, Appendix N) includes a WQMP that specifies BMPs for placement of capping materials. The following text is taken from Section 2.6 of the WQMP.

Consistent with PBA (Section 2.5.3) (EPA, 2021a), BMPs implemented during in-water capping will include the following:

- Prior to placement, materials will be tested and compared against ROD Table 17 CULs for sediment and riverbank. Only materials with concentrations below ROD Table 17 CULs will be used for capping. Specification Section 35 37 10 Engineered Caps provides the detailed requirements for inspection and testing of cap materials;
- Cap Certification Units will be capped in the same sequence as Dredge Certification Units each season, maintaining a minimum 300-foot separation between dredging and capping;
- Capping confirmation monitoring for accurate placement will be completed using set volume, tonnage, lead line measurements, and bathymetry information or similar;
- Cap placement will be done in lifts to minimize disturbance of each placement, lower the residuals in the topmost layer of the cap and minimize cap depth variability;
- Water quality monitoring will be performed as indicated in Section 3. Responses to specific measurements and actions will be set in place to respond to any triggered actions;
- When possible, work will be performed during low river flows; and
- Where possible, vegetation will be incorporated on riverbank caps.

The CQA/QCP further discusses corrective actions and contingency plan for abnormal occurrences.

5.4. ON-SITE MITIGATION MEASURES FOLLOWING DREDGING AND CAPPING

The Pre-Final 90% RD integrates multiple on-site mitigation measures that align with guidance provided in the ROD and the RDGC as described below.

The Pre-Final 90% RD specifies dredging and capping within the shallow zone that maintains approximate pre-RA riverbed elevations wherever feasible and consistent with desired ecological outcomes. The RD includes some final elevations within shallow areas and within the ACM that do not match pre-RA topography and bathymetry. This is largely the result of flattening slopes on riverbanks, within the ACM, and in the shallow water zone to achieve ecological improvements in those habitats (e.g., slopes flatter than 5H:1V, continuity between habitat zones). The remedy will result in a net increase in the total area of the shallow water zone compared to pre-RA baseline conditions.

Engineered beach mix layer is applied as the surface layer for caps placed in the shallow water areas and on the riverbanks within the ACM. Physical stability analysis of the beach mix material was performed as part of cap design, and it was determined that beach mix sufficiently resists the erosive forces of waves and currents within the shallow zone to protect cap performance.

Native riparian vegetation is specified as a final condition in most of the riparian areas within the SIB Project Area. Caps on riverbanks are designed to provide a sufficient layer of soil to support restoration of native riparian vegetation on most riverbank areas within the SIB Project Area with soil depth great enough to prevent roots from compromising the chemical isolation layer performance.

Derelict piling and cross members will be removed from shallow zone and ACM, and those areas will be capped with final surface composed of beach mix.

Large wood will be placed within the ACM at selected locations to provide localized protection of ACM wetland pockets and add habitat complexity.

The HEA (DCR, Appendix C) maps and quantifies each of these components of on-site mitigation and compares them with pre-RA baseline conditions. Section 6.0 discusses the findings of the HEA used to determine whether additional compensatory mitigation is required or if the avoidance, minimization, and mitigation measures integrated into the Pre-Final 90% RD are sufficient to make the remedy "self-mitigating" as envisioned in the ROD and RDGC.

5.5. BARGE LOADING, TRANSPORT, AND TRANSLOADING OF DREDGED MATERIAL

Appendix L of the PHSS FS discusses transport and offloading of contaminated sediments:

> *"Transport and offloading of contaminated sediments to upland disposal facilities will require several measures and BMPs to avoid release of contaminants to surface waters during any step of transport or transloading."*

The CQA/QCP (Volume II, Appendix N) includes a WQMP that specifies BMPs for barge loading, transport, and transloading of dredged material. The following text is taken from Section 2.12 of the WQMP.

As described in Specification Section 35 24 20.01 (Transloading, Upland Transportation, and Disposal), contaminated sediments, debris, and other contaminated wastes will generally be transported by barge to the transload facility and then may be transferred to trucks for transport to upland disposal facilities. Construction methods and BMPs for barge loading and transport operations include the following in accordance with PBA (Section 2.5.7):

- Barge loading and transport will be completed by utilizing double-hulled bin-barges or flat-deck barges with watertight sideboards and covers so that no discharge of water or suspended sediment occurs during transport;
- Water from dredged materials will be routed to barge- and/or land-based water management systems to remove excess sediments and associated contaminants;
- Barges with dredged sediment will be sealed and monitored to prevent over-filling, overflow, and/or direct discharge to water body;
- Barges transport operations will be confined to designated transit routes; and
- Barges will be routinely visually inspected prior to leaving work areas for sediment potentially adhering to the barges.

Construction methods and BMPs for the transload of dredged material include the following in accordance with PBA (Section 2.5.7.2):

- No dewatering will occur from the barge to the river at the transload facility.
- An impermeable lining will be placed under the bucket travel area to capture any spills. Spills occurring outside of the bucket travel area will be addressed immediately.
- A fully welded, watertight steel fabricated box will be used to provide a large target for the equipment used to transfer the sediments. Box walls will be of sufficient height to eliminate potential for splattering sediment outside of the containments to the sides of trucks or the transfer pad as the transfer bucket opens.
- The transfer of dredged material will be completed to minimize splash and splatter of material.
- The transloading equipment will have a spill apron deployed between the barge and shore during offloading operations to prevent the release of spilled material into the water. This apron will be made of impermeable material with no leaking seams. It will also include a collection system for dripper material, sufficient width, and possible wing wall. Containment measures will be used to capture water running down the apron, and the apron will be able to track tidal fluctuations with the barge.
- Decontamination will occur before moving the crane/excavator, the spill apron, and the bucket.

- Loading of the truck/railcars will take place within an exclusion zone, which will be established to contain any spilled material that may occur while loading.
- Loading will occur following lining construction and establishment of haul routes.
- Vehicles will be washed prior to entering the exclusion zone, and vehicle wash wastewater will be properly collected and disposed of.
- Dust suppression with water misting systems will be utilized.
- Stormwater management facility will have NPDES Industrial Stormwater General permit and a Stormwater Pollution Prevention Plan (SWPPP).

As discussed in Section 2.5, barge loading procedures, material handling and processing will be further developed by RA Contractor in the Dredging and Excavation Plan of the RAWP.

6.0 COMPENSATORY MITIGATION

Appendix L of the PHSS FS discusses compensatory mitigation and establishes the expectation that,

> *"During remedial design, remedial activities and avoidance and minimization measures would be fully developed. Based on those detailed plans, the need for compensatory mitigation projects to address the habitat functions potentially impacted by the remedial activities would be determined."*

The RDGC, in Appendix B Topic 9 – Habitat Mitigation (EPA, 2021b), presents EPA guidance on how to apply a HEA model to perform a quantitative comparison of post-RA habitat conditions to pre-RA baseline habitat conditions. NMFS previously prepared a HEA model for the PHSS in cooperation with the Portland Harbor Trustee Council. The purpose of the quantitative HEA is to evaluate whether the RA is "self-mitigating" through the application of avoidance minimization, and mitigation measures integrated into the RD. If the HEA determines that the RA is not "self-mitigating", additional compensatory mitigation would be required, and the quantity and type of additional mitigation would be determined by the ecological deficit calculated by the HEA model. A quantitative analysis of the Pre-Final 90% RD using the HEA model is presented separately in the Habitat Impact Evaluation Technical Memorandum (DCR, Appendix C), which concluded that the habitat improvements incorporated into the Pre-Final 90% RD would result in a negative HEA score supporting a conclusion that the remedy would require additional compensatory mitigation. Between Draft 50% RD and Pre-Final 90% RD, the HEA model was revised to use a model spreadsheet provided by EPA to ensure the appropriate consideration of time as a component of RA impacts. Specifically, the updated model approach considers the duration of impacts during RA construction and the time required for habitats to mature to full function. The quantitative HEA will be further refined, as needed, as part of the Final 100% RD.

The results of the baseline habitat condition survey included in the PDI ER (HGL, 2024a) are used to inform the development of inputs to the HEA model for pre-RA baseline habitat conditions. Those model inputs include the acreage of habitat units within the SIB Project Area, and HEA habitat values for each of those habitat units developed using Table B9-1 in Appendix B of the RDGC (EPA, 2021b).

Inputs to the HEA model for post-RA habitat conditions were developed based on the RD finished surface conditions superimposed on the map of habitat units. In the same approach used for the baseline scenario, the HEA habitat values for post-RA habitat units were developed for the Pre-Final 90% RD using Table B9-1 in Appendix B of the RDGC.

The HEA model was used iteratively throughout the development of the Pre-Final 90% RD to inform the design team of the ecological effects of specific design decisions and to identify opportunities to effectively apply avoidance, minimization, and mitigation measures integrated into the RD. Intermediate results were used to inform the application of avoidance and minimization measures including specifying natural substrates for final surfaces, modifying riverbank and submerged slopes, installing features to provide habitat complexity within the ACM, removing derelict piles, and restoring native vegetation communities in the ACM and riparian zones.

The HEA demonstrates that Pre-Final 90% RD is expected to result in a negative DSAY score that reflects a net impact to aquatic resource functions. Mitigation will be required to address those impacts such that the RA combined with that mitigation would result in "no net loss" of aquatic resource functions. See DCR, Appendix C to review the quantitative HEA. The analysis includes maps and quantities of the areas and locations where avoidance, minimization, and mitigation measures are applied within the RD.

7.0 ANALYSIS OF PRACTICABLE ALTERNATIVES PURSUANT TO SITE CRITERIA

Appendix L of the PHSS FS established that the alternatives evaluation documented in the PHSS fulfilled the CWA Section 404(b)(1) requirement for evaluation of practicable alternatives with respect to the remedial alternatives. The Appendix L discussion of practicable alternatives focused on evaluating disposal alternatives comparing on-site CDF options with transport to upland disposal facilities.

The Pre-Final 90% RD for the SIB Project Area does not include development or use of an on-site CDF. A single existing transload facility located in The Dalles, Oregon, was evaluated and incorporated into the RD as a means of transporting contaminated sediments and soils to an upland disposal facility. The analysis of practicable alternatives in Appendix L of the PHSS FS concluded that the upland landfill options are constructed and operating and are therefore technically feasible and administratively feasible.

8.0 FACUTAL DETERMINATIONS

Factual determinations made for each component of the aquatic ecosystem evaluated are summarized in the following sections. These factual determinations refer back to the preliminary factual determinations published in Appendix L of the PHSS FS and provide SIB Project Area-specific information from the Pre-Final 90% RD to amend and support those determinations as applied to the SIB.

8.1. PHYSICAL SUBSTRATE DETERMINATIONS

Appendix L of the PHSS FS included the following physical substrate determinations:

> *"Remedial activities, including dredging, capping, in-situ treatment, ENR, removal and installation of piles and structures, and disposal of contaminated sediments in a CDF, will alter the material composition, slope, and elevation of the physical substrate. Elevation, slope, and substrate would be restored to the extent possible, and the placement of clean sand residuals cover and/or beach mix will provide an improvement over current physical substrate conditions in some locations by replacing anthropogenic debris or large rock with sand and/or gravel. In areas where armoring is required, adverse impacts to substrate would occur; however, re-deposition of fine-grained material in capped and armored areas is anticipated to occur over time, making the armored areas similar in surface grain size to non-armored areas. Compensatory mitigation to replace lost habitat and forage area from the placement of armor stone would be required to replace lost habitat and forage area and to compensate for other lost functions such as flood capacity. In shallow areas, beach mix will be used as much as possible for armoring and as the top layer of caps to provide appropriate substrate habitat for colonization by benthic organisms."*

The remedial activities specified in the Pre-Final 90% RD include dredging, capping, fill placement, and removal and installation of piles and structures that would alter the material composition, slope, and elevation of the physical substrate. Impacts are avoided, minimized, and mitigated by application of avoidance and minimization measures including specifying natural substrates for final surfaces wherever feasible, modifying riverbank and submerged slopes, installing features to provide habitat complexity within the ACM, removing derelict piles, and restoring native vegetation communities in the ACM and riparian zones. The HEA (DCR, Appendix C) presents a quantitative analysis that compares pre-RA baseline conditions to post-RA conditions and accounts for the effects of time on aquatic resource functions. The HEA demonstrates that Pre-Final 90% RD is expected to result in a negative DSAY score that reflects a net impact to aquatic resource functions. Mitigation will be required to address those impacts such that the RA combined with that mitigation would result in "no net loss" of aquatic resource functions. Although the proposed remedy will alter physical substrates, the specified final surface substrates combined with the other avoidance, minimization, and mitigation measures described above will ensure a net positive effect on physical substrates within the SIB.

8.2. WATER CIRCULATION AND FLUCTUATION DETERMINATIONS

Appendix L of the PHSS FS included the following water circulation and fluctuation determinations:

> *"Following dredging in shallow areas, elevations would be restored to pre-dredge conditions. The analysis presented in Appendix P indicates that impacts from these activities are anticipated to be negligible."*

The Pre-Final 90% RD includes some final elevations within shallow areas and within the ACM that do not match pre-RA topography and bathymetry. This is largely the result of flattening slopes on riverbanks, within the ACM, and in the shallow water zone to achieve ecological improvements in those habitats (e.g., slopes flatter than 5H:1V, continuity between habitat zones). The remedy would result in a net increase in the total area of the shallow water zone. The deviations from restoring shallow water elevations to pre-dredge conditions will have a negligible effect on water circulation and fluctuations.

A flood rise evaluation was performed on the Pre-Final 90% RD to ensure compliance with regulatory requirements for flood rise management. See Section 2.2.3 of the Design Criteria Report. That analysis demonstrated that the proposed RA in SIB is not likely to cause unacceptable flood rise based on the anticipated SIB post-construction elevations.

8.3. SUSPENDED PARTICULATES AND TURBIDITY DETERMINATIONS

Appendix L of the PHSS FS included the following suspended particulates and turbidity determinations:

> *"Impacts on water quality are anticipated to be greatest from debris removal and dredging compared to other remedial activities. Turbidity increases and DO decreases during debris removal and dredging are expected to be limited, short-term, and localized and would be minimized with the implementation of BMPs and avoidance and minimization measures described in Section L5. Water quality parameters would be monitored, corrective measures taken if levels exceed regulatory thresholds established for the proposed remedial alternatives."*

SIB is predominantly a quiescent backwater set back from the main Willamette River channel. Currents within SIB are driven primarily by tidal exchange with ambient current velocities uniformly lower than 0.1 ft/sec. The potential impacts of turbidity and suspended particulates are mitigated by the combination of weak currents, limited active work areas, production rates, dredging BMPs, and water quality monitoring during construction.

The Pre-Final 90% RD specifies water quality monitoring (including turbidity monitoring) during construction with contingency corrective actions defined in the WQMP attachment in the CQA/QCP (Volume II, Appendix N). These elements of the Pre-Final 90% RD ensure that the site-wide suspended particulates and turbidity determinations published in Appendix L of the PHSS FS apply to the SIB Project Area.

8.4. WATER QUALITY DETERMINATIONS

Appendix L of the PHSS FS included the following water quality determinations:

> *"Physical disruption of the contaminated sediments during debris removal and dredging could cause a temporary increase in dissolved phase concentrations of some chemicals in the vicinity of dredging activities, resulting from resuspension of contaminated sediments, desorption of the contaminants from sediment particles to pore water, and release of contaminated pore water into surface water. Short-term increases in water column concentrations is expected to occur intermittently during*

> *the duration of the dredging and dissipate when dredging ceases. Water quality parameters will be monitored corrective actions implemented if levels exceed regulatory thresholds established for the proposed remedial alternatives."*

The Pre-Final 90% RD applies BMPs to protect water quality and specifies water quality monitoring during construction with contingency corrective actions defined in the WQMP attachment in the CQA/QCP (Volume II, Appendix N). These elements of the Pre-Final 90% RD ensure that the site-wide water quality determination published in Appendix L of the PHSS FS applies to the SIB Project Area.

8.5. AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS

Appendix L of the PHSS FS identified temporary and localized adverse impacts on the aquatic ecosystem:

> *"Dredging activities will have temporary and localized adverse impacts on the aquatic ecosystem and organisms in the immediate dredging plume area. Remedial activities that disturb the sediment surface will temporarily remove the biologically active zone and associated benthic communities. Recovery times for benthic communities following remedial activities are expected to be on the order of months. In many areas, the physical and chemical improvement in substrate type as a result of the removal of contamination and placement of the dredge residuals layer may promote a more productive benthic community through recolonization on uncontaminated material."*

The Pre-Final 90% RD specifies placing caps throughout the SIB Project Area. Final substrate surface for caps in shallow water and the ACM will be composed of beach mix to minimize long-term impacts of the remedy in those zones. Caps located in the deep water zone require an erosion protection layer to ensure scour from vessel traffic does not interfere with remedy performance. Much of the deep water zone will have angular rock at the surface upon completion of the RA. Fine sediments are expected to accumulate slowly (~1 centimeter per year) eventually restoring a natural substrate layer within portions of the deep water zone.

The remedy will have short-term and long-term impacts on aquatic habitats and species. However, the Pre-Final 90% RD incorporates avoidance, minimization, and mitigation measures (i.e., final substrate composition, slopes less than 5H:1V, removal of derelict piling, restoration of native vegetation on riverbanks) to offset those impacts. The HEA (DCR, Appendix C) quantitatively evaluated the effects of the remedy on the aquatic ecosystem with final substrate composition acting as a key driver of aquatic impacts. The HEA considered the temporal effects of RA implementation and the time required for habitats to reach full function after RA completion. The HEA demonstrated that the application of avoidance and minimization measures within the SIB Project Area would have a net impact on aquatic resource functions quantified as a negative DSAY score. Mitigation will be required to address those impacts such that the RA combined with that mitigation would result in "no net loss" of aquatic resource functions.

8.6. DETERMINATION OF CUMULATIVE EFFECTS ON THE AQUATIC ECOSYSTEM

Cumulative impacts are defined by 40 CFR 230.11(g)(1) as:

> *"the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems".*

Appendix L of the PHSS FS evaluated cumulative effects and concluded:

> *"The remedial activities will not result in significant detrimental cumulative impacts on the aquatic ecosystem. Although short-term adverse effects from implementation of remedial activities are expected, they would result in long-term benefits to the aquatic ecosystem by reducing exposure to contaminants in sediment, porewater, and surface water. The remedial action and compensatory mitigation, to be defined in the ROD and refined during remedial design, are expected to result in "no net loss" of aquatic resource functions."*

The HEA (DCR, Appendix C) presents a quantitative analysis that compares pre-RA baseline conditions to post-RA conditions and accounts for the effects of time on aquatic resource functions. The HEA was performed iteratively during design development with intermediate results used to inform the application of avoidance and minimization measures including specifying natural substrates for final surfaces, modifying riverbank and submerged slopes, installing features to provide habitat complexity within the ACM, removing derelict piles, and restoring native vegetation communities in the ACM and riparian zones. The HEA demonstrates that Pre-Final 90% RD is expected to result in a negative DSAY score that reflects a net impact to aquatic resource functions. Mitigation will be required to address those impacts such that the RA combined with that mitigation would result in "no net loss" of aquatic resource functions.

8.7. DETERMINATION OF SECONDARY EFFECTS ON THE AQUATIC ECOSYSTEM

Appendix L of the PHSS FS determined that secondary effects on the aquatic ecosystem "are limited to other actions in the aquatic environment that are indirectly related to implementation of the action, such as erosion or downstream sedimentation." The Pre-Final 90% RD presents a remedy designed so that it would not contribute to erosion or downstream sedimentation. SIB is predominantly a quiescent backwater set back from the main Willamette River channel. Currents within SIB are driven primarily by tidal exchange with ambient current velocities uniformly lower than 0.1 ft/sec. The potential for downstream erosion or sedimentation is prevented by the combination of weak currents, limited active work areas, production rates, BMPs, and water quality monitoring during construction.

9.0 REVIEW OF CONDITIONS FOR COMPLIANCE

Appendix L of the PHSS FS reviewed the conditions for compliance. That discussion remains applicable to the SIB Project Area and is incorporated here by reference. The two conditions for compliance are (1) practicability, and (2) compliance with pertinent legislation.

9.1. AVAILABILITY OF PRACTICABLE ALTERNATIVES

Appendix L of the PHSS FS discussed the availability of practicable alternatives and addressed the four general conditions that must be met for compliance:

1. practicability;
2. compliance with the ESA;
3. protections for water quality and human uses; and
4. compliance with the avoidance, minimization, and compensatory mitigation requirements.

The Pre-Final 90% RD for the SIB Project Area was developed in accordance with the ROD and the RDGC in a way that is consistent with the prior discussion in Appendix L of the PHSS FS.

9.2. COMPLIANCE WITH PERTINENT LEGISLATION

Appendix L of the PHSS FS briefly discussed compliance with Executive Orders and pertinent legislation:

> *"Alternatives B through I are expected to comply with the Executive Order 11988 (Floodplain Management) and Executive Order 11990 (Protection of Wetlands) and Oregon Environmental Cleanup Laws."*

The Pre-Final 90% RD for the SIB Project Area was developed in accordance with the ROD and the RDGC in a way that is consistent with the prior discussion. This conclusion is further supported by the Flood Impact Evaluation (Section 2.2.3 of the Design Criteria Report), which concluded that the proposed RA in SIB is not likely to cause unacceptable flood rise based on the post-construction elevations.

10.0 FINDINGS

Appendix L of the PHSS FS found that "the proposed remedial alternatives are the least environmentally damaging practicable alternative that meets the project purpose and need. There are no practicable alternatives that avoid waters of the U.S. due to the location of the contaminated sediments." The Pre-Final 90% RD for the SIB Project Area was developed in accordance with the ROD and RDGC, and is a site-specific component of the overall remedy for PHSS. Specific aspects of the SIB RD are highlighted below to support the applicability of the prior findings.

Avoidance, minimization, and mitigation were integrated into the Pre-Final 90% RD by using the HEA model iteratively during design development. The HEA model was used to evaluate specific design decisions related to surface substrate material specification; riverbank design to accommodate maximum extent of native riparian vegetation restoration; grading of slopes within

riparian, ACM, and shallow water zones; removal of derelict piles; and shoreline wetlands within the ACM. The results of the HEA support the conclusion that this was an ecologically effective application of the ROD and RDGC guidance.

Disposal of dredged sediments will occur at upland locations and will not use a CDF or other in-water disposal. The SIB Project Area Pre-Final 90% RD therefore avoids aquatic impacts associated with a CDF that were contemplated as part of the CWA Section 404(b)(1) analysis reported in Appendix L of the PHSS FS.

A quantitative analysis of the Pre-Final 90% RD using the HEA model is presented separately in the Habitat Impact Evaluation Technical Memorandum (DCR, Appendix C). The HEA concluded that the habitat improvements incorporated into the Pre-Final 90% RD would result in a negative DSAY score supporting the conclusion that the remedy would need additional compensatory mitigation to address unavoidable impacts.

11.0 REFERENCES

HydroGeoLogic, Inc. (HGL), 2024a. *Pre-Design Investigation Evaluation Report, Revision 2.* Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. December.

HGL, 2024b. *Basis of Design Report. Revision 1.* Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. November.

National Oceanic and Atmospheric Administration (NOAA) – National Marine Fisheries Service, 2025. Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Programmatic Consultation on the Portland Harbor Superfund Site Cleanup Activities. Portland, Oregon. May 16.

Oregon Department of Fish and Wildlife (ODFW), 2008. *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources*, at URL: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3825743.pdf

U.S. Environmental Protection Agency (EPA), 2016. *Feasibility* Study, Portland Harbor RI/FS. U.S. Environmental Protection Agency Region10, Seattle, WA.

EPA, 2017. *Record of Decision, Portland Harbor Superfund Site, Portland, Oregon.* United States Environmental Protection Agency Region 10, Seattle, Washington. January.

EPA, 2021a. *Administrative Settlement Agreement and Order on Consent for Remedial Design*. Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10. January 20.

EPA, 2021b. *Remedial Design Guidelines and Considerations*, Portland Harbor Superfund Site. Portland, Oregon. April 23.

APPENDIX H

DREDGING DESIGN TECHNICAL MEMORANDUM

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DREDGING DESIGN TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

This Dredging Design Technical Memorandum (DDTM) presents a summary of dredging design efforts for the Pre-Final 90% Remedial Design (Pre-Final 90% RD) for the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site (PHSS) in Portland, Multnomah County, Oregon. The HydroGeoLogic, Inc. (HGL) team performed the work on behalf of the SIB RD Group based on the requirements of the PHSS Record of Decision (ROD) (EPA, 2017) and the Administrative Settlement Agreement and Order on Consent (EPA, 2021). The data used in this DDTM were collected in accordance with the final Pre-Design Investigation (PDI) Work Plan (HGL, 2022), and were reported in the PDI Evaluation Report (ER), which the U.S. Environmental Protection Agency (EPA) approved in January 2025 (HGL, 2024a).

The objective of this DDTM is to provide an overview of the analysis performed to develop the Pre-Final 90% RD dredging design. Dredging design was driven primarily by information and criteria developed in the Basis of Design Report (BODR) (HGL, 2024b), navigation depth requirements, and capping considerations described in the Pre-Final 90% RD Cap Design Technical Memorandum (CDTM) (Volume I, Appendix E).

Section 1 discusses navigation depth requirements that were incorporated into the dredging design. Section 2 describes the incorporation of cap design considerations into the dredging design. Section 3 presents the evaluation of technology assignments. Section 4 discusses constructability considerations in the dredging design shown in the Pre-Final 90% RD Design Drawings.

1.0 NAVIGATION DEPTHS

Between August 2022 and February 2023, interviews were conducted with shoreline facility owners/operators in the SIB Project Area. The interviews included requests for specific navigation depths adjacent to existing facilities. Navigation depths that generally aligned with historically maintained depths were applied to guide the development of the dredge design. Further analysis of dredging impacts on slopes and structures, as well as further engagement with owners/operators in the SIB Project Area, were conducted in 2025 to develop a refined understanding of appropriate navigation depths. Future maintenance dredging (FMD) would occur in these SIB navigation areas.

The updated information collected in 2025 was incorporated into analysis of dredging and capping extents. After incorporation of the revised navigational and operational needs, the design team modified the navigation area extents presented in the BODR (HGL, 2024b) to include operationally prescribed dredge to remedial action level (RAL) areas, align with current mooring and berthing practices, and reflect input from facility owners and operators. Figure 1-1 shows the

Corporate Headquarters
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

Pre-Final 90% RD navigation depths and maneuvering areas. The purpose of the figure is to demonstrate the minimum navigation depths that must be provided as part of the design.

2.0 CAPPING CONSIDERATIONS AFFECTING DREDGING

Cap design details are provided in the CDTM (Volume I, Appendix E). The Pre-Final 90% dredging design assumes a total 3-ft cap thickness will be placed after dredging in SIB navigation areas, and a 1-ft clearance will be left above the top of the cap to preclude damage to the cap during FMD. Therefore, post-dredging elevations be at least 4 ft below the navigation elevation to accommodate both the cap and the FMD clearance. One foot of FMD clearance above the top of the cap is sufficient to preclude damage to the cap during maintenance dredging, because precision dredging operations with mechanical equipment can be prescribed at tolerances less than 6 inches. This construction tolerance differs from tolerances used in the cost comparison exercise described in Section 3 because the cost comparison exercise is intended to use conservative assumptions for costs of each alternative.

3.0 DREDGING DESIGN

The Pre-Final 90% RD dredging design considered three areas of SIB:

1. Slopes/banks, where geotechnical slope stability and structural stability governed the dredging and capping;
2. Spudding/anchoring areas (ongoing operations), where Dredge to RAL was required because caps cannot accommodate these types of disturbances. Engagements with shoreline facility owners/operators in the SIB Project Area prompted the addition of four such areas; and
3. Open water, where a choice could be made between dredging to remove all sediment with concentrations of contaminants of concern (COCs) exceeding RAL (Dredge to RAL), or placing a cap.

All underwater slopes and riverbanks in the SIB Project Area will undergo active remediation. Slope/riverbank remediation includes removal of debris, riprap, vegetation, and soil and sediment on the slopes as needed to achieve pre-capping design grades. Some places will require backfill to meet pre-capping grades. After necessary excavation or backfill on slopes/riverbanks to meet design grades, the slope/riverbank will be capped (either armored or planted depending on elevation and location).

For the open water areas only, a cost comparison analysis was conducted on a gridded map of the open water areas of the site (flat, in-water areas away from slopes), for three different remedial technology alternatives. The sole purpose of this exercise was to determine the lowest-cost feasible alternative, i.e. whether it was less expensive to install a cap rather than Dredge to RAL. The result of this cost comparison analysis is a map of lowest-cost alternatives in the open water areas; however, this map does not yet represent the actual dredging design.

Alternatives were compared in each cell of a 10-ft by 10-ft regular grid covering the entirety of SIB. The size of these analysis cells does not affect the analysis results. The cost comparison

analysis included two different cap types in the Pre-Final 90% RD which were prescribed based on design requirements (e.g., shallow water, vessel traffic).

Design considerations such as shallow water habitat impacts, flood rise impacts, and PTW threshold exceedances were considered in the design of the alternatives (e.g., the cap layering and materials) prior to this cost comparison being performed, and therefore were not a factor in this open water area cost comparison exercise. After this initial lowest-cost alternatives map was developed for the open water areas, the map was refined further based on additional practical design considerations, primarily slope stability (e.g., avoiding dredging in open water adjacent to slopes and causing instability).

3.1. REMEDIATION TECHNOLOGIES EVALUATED IN OPEN WATER AREAS

Three remediation technologies were evaluated for open water areas during the Pre-Final 90% RD: Dredge to RAL, Dredge and Cap, and Cap Only. There are two cap types in the Pre-Final 90% RD: Cap Type 1 consists of 1 ft of sand amended with granular activated carbon (GAC), followed by 2 ft of rounded gravel (habitat mix) which serves as both erosion protection layer (EPL) and habitat layer. Cap Type 2 consists of 1 ft of sand amended with GAC, followed by 18 inches of angular rock as the EPL, followed by 6 inches of sand as the habitat layer. Additional details regarding the three technologies evaluated in the cost comparison exercise for open water areas are listed below:

1. **Dredge to RAL:** This alternative entails dredging 2 ft below the bottom vertical boundary of the Sediment Management Area (SMA) to remove COCs at concentrations exceeding RALs. Contingency re-dredging was not included in the cost comparison due to uncertainty as to whether it will be required, where it would be required, and to what depth it will be required. Dredging 2 ft below the SMA reduces the risk that this time-consuming re-dredging process will be required in the short time periods available for construction. A 1-ft Residuals Management Layer (RML) of clean sand would be placed after dredging to RAL. Also, after placement of the RML, backfill with imported sand is required in all Dredge to RAL areas besides the dry docks (which are historic deep spots), because leaving deep spots in the final project surface is not allowed by EPA due to future water quality concerns. Backfill creates significant additional costs.
2. **Dredge and Cap:** This alternative entails dredging as needed to achieve appropriate navigation depths and 1-ft FMD clearance. After dredging, the 3-ft cap (either Type 1 or Type 2) will be placed for chemical isolation, erosion protection, and habitat. Material type and assumptions regarding additional material placed within acceptable tolerances are described in Section 3.3. Capping solutions incur additional costs for Operations and Maintenance (O&M), and monitoring, which have been included.
3. **Cap Only:** This alternative entails placing the same 3-ft cap (either Type 1 or Type 2) noted above for the Dredge and Cap alternative. The Cap Only alternative would be applied in areas with sufficient existing depth for cap placement while still accommodating navigation and FMD clearance, or in areas with no navigation depth. No cost comparison was made between Cap Type 1 and 2 because they are intended for different locations. If selected, the Cap Only alternative would apply Cap Type 1 near the head of SIB (shallow

water, minimal vessel traffic), and Cap Type 2 in SIB navigation areas. Capping solutions incur additional costs for O&M, and monitoring, which have been included.

3.2. TECHNOLOGY COST ANALYSIS METHOD FOR OPEN WATER AREAS

The remedial technology cost analysis uses a logic process applied to each cell within a 10-ft by 10-ft grid of the open water areas in the SIB Project Area. For the purposes of this analysis, "open water areas" are defined as in-water areas that are not on the lower riverbank slopes or underneath over-water structures. Figure 3-1 shows the logic process. In each cell, the bed elevation, SMA depth, navigation depth, and unit costs were used to compute the cost of applying each of the three remediation technologies. The lowest-cost technology is then assigned to each cell of the open water areas by applying the following specific logic steps (text description of the process shown in Figure 3-1):

1. Identify cells outside the SIB navigation areas (i.e. cells without FMD). For each cell in this filtered set:
    a. Calculate the total cost of the Cap Only technology based on cap volume, cap area, and unit costs for cap O&M, materials and placement (see Section 3.3).
    b. Calculate the required dredge volume and backfill volume for the Dredge to RAL technology from the existing bed elevation, the SMA depth, and the required clearance and tolerances.
    c. Calculate the total cost of the Dredge to RAL technology based on the required dredge volume (previous step), the required RML volume, the required backfill volume, and the associated unit costs.
    d. Assign whichever technology is more cost-effective. Populate the conceptual technology assignment, cost (per cell), dredge volume, backfill volume, cap volume, cap area, post-dredge bathymetric surface, and post-cap bathymetric surface maps accordingly.

2. Identify cells in SIB navigation areas (cells with FMD). For each cell in this filtered set:
    a. Determine if Cap Only technology is viable by adding the cap thickness and placement tolerance to the existing bed elevation and comparing the resulting depth against the prescribed navigation depth plus the 1 ft FMD clearance. If Cap Only technology is viable:
        i. Calculate the total cost of the Cap Only technology based on cap volume, cap area, and unit costs for cap O&M, materials and placement.
        ii. Calculate the required dredge volume and backfill volume for the Dredge to RAL technology from the existing bed elevation, the SMA depth, the required clearance and tolerances.
        iii. Calculate the total cost of the Dredge to RAL technology based on the required dredge volume (previous step), the required RML volume, the required backfill volume, and the unit costs.

iv. Assign the lower-cost technology. Populate the conceptual technology assignment, cost (per cell), dredge volume, backfill volume, cap volume, cap area, post-dredge bathymetric surface, and post-cap bathymetric surface maps accordingly.

b. If Cap Only technology is not viable:

i. Calculate the required dredge volume for the Dredge and Cap technology based on the existing bed elevation, the required navigation depth, the cap thickness and placement tolerance, and the FMD clearance.

ii. Calculate the total cost of the Dredge and Cap technology based on the required dredge volume (previous step), the cap volume, cap area, and the unit costs for dredging, handling, and cap O&M, materials and placement (Section 3.3).

iii. Calculate the required dredge volume and backfill volume for the Dredge to RAL technology from the existing bed elevation, the SMA depth, and the required clearance and tolerances.

iv. Calculate the total cost of the Dredge to RAL technology based on the required dredge volume (previous step), the required RML volume, the required backfill volume, and the unit costs.

v. Assign whichever is more cost-effective. Populate the conceptual technology assignment, cost (per cell), dredge volume, backfill volume, cap volume, cap area, post-dredge bathymetric surface, and post-cap bathymetric surface maps accordingly.

3. Identify cells (if any exist) where Dredge to RAL technology is selected as the lowest-cost technology (from 2b above), but the resulting surface (SMA - 2ft clearance + 1ft RML) violates the 1-ft FMD clearance. For these cells:

a. Calculate the required dredge volume and backfill volume for the Dredge to RAL technology based on the existing bed elevation, the navigation depth, the RML thickness and placement tolerance, and the 1-ft FMD clearance.

b. Update the cost (per cell), dredge volume, backfill volume, post-dredge bathymetric surface, and post-cap bathymetric surface maps accordingly.

Note that Step 3 above never results in a change in technology assignment that was made during Step 2, since the RML is less expensive than the standard cap (Cap Type 1 or 2).

3.3. ANALYSIS ASSUMPTIONS

The analysis includes the following assumptions for the purposes of the cost calculations when applying each technology option in the in-water areas:

- Cap Type 1 (for Dredge and Cap, and Cap Only technologies):
  - 1-ft layer sand amended with GAC, with 0.5-ft paid over-placement

  - 2-ft layer rounded gravel (habitat mix), with no paid over-placement (assume +6/-6-inch construction tolerance)
  - Total assumed cap thickness for cost comparison purposes: 3.5 ft
- Cap Type 2 (for Dredge and Cap, and Cap Only technologies):
  - 1-ft layer sand amended with GAC, with 0.5-ft paid over-placement
  - 1.5-ft layer angular rock, with no paid over-placement tolerance (assume +6/-6-inch construction tolerance)
  - 0.5-ft layer sand, with no paid over-placement (assume +3/-3-inch construction tolerance)
  - Total assumed cap thickness for cost comparison purposes: 3.5 ft
- RML: 1-ft layer sand, with 0.5-ft paid over-placement tolerance
- Backfill: sand fill required to meet surrounding grade and eliminate isolated deep spots
- FMD Clearance: 1 ft below specified navigation depth
- Dredge to RAL Target Depth: 2 ft below SMA
- Over-Dredge Tolerance: 1-ft paid over-dredging (applies to Dredge to RAL and Dredge and Cap alternatives)
- Cap O&M and monitoring: the Pre-Final 90% RD cost estimate includes approximately $15M for 22 O&M and monitoring events over 100 years, for the entire SIB project. Some items in the O&M costs are not appliable to this in-water technology cost comparison (e.g., vegetation O&M and monitoring), but they were also applied as O&M costs associated with the capping solutions for conservatism. Based on the approximate total cost of $15M for the entire SIB Project Area (approximately 5.8M square feet), the total O&M cost for open water areas (approximately 4.3M square feet) was assumed to be reduced linearly on an area basis for the purposes of this cost comparison, to approximately $11.1M. The $11.1M total O&M and monitoring cost would be incurred if capping was performed everywhere outside the operationally prescribed Dredge to RAL areas (approximately 3.5M square feet), resulting in a unit cost of $3.20 per square foot for O&M and monitoring of a capping alternative. This unit cost for capping was then added to the cost of either Dredge and Cap, or Cap Only, for comparison with costs for the Dredge to RAL alternative.

Unit costs for dredging and capping are listed in Table 3-1. These unit costs were extracted from the cost model reported in the Cost Analysis Technical Memorandum (Volume I, Appendix K).

3.4. RESULTS AND OBSERVATIONS

Results of the cost comparison analysis for the open water areas included dredging volumes, cap material volumes, costs, and COC inventory removed, for each of the three alternatives. Figure 3-2 shows the initial cost-optimized remedial technologies, along with the operationally prescribed Dredge to RAL areas shown in grey (where the cost analysis was not performed). Figure 3-2 shows that Dredge and Cap and Cap Only are the most cost-effective alternatives over most of the open water areas. Dredge to RAL (blue areas in Figure 3-2) is the most cost-effective option only within small slivers less than 100 ft in width, primarily located near the toe of slopes at the U.S. Coast

Guard (USCG) Pier, The Marine Consortium, Inc. (MC) Pier, Lagoon Wharf, and Pier A. After review of these areas outside operationally prescribed Dredge to RAL area, the Dredge to RAL alternative was eliminated from these areas for the following reasons:

1. These narrow slivers are surrounded by capping areas. Areas not shown with a technology assignment in Figure 3-2 (outside the navigation areas) are already being capped (chemical isolation under revetments), so these are small, isolated areas. Separate individual Dredge to RAL designations in these areas creates more construction complexity and inefficiency, and leaves a gap in chemical isolation which creates additional risk;
2. Follow-on construction associated with Dredge to RAL, including contingency re-dredging and the required sampling, testing, and confirmation, combined with potential for the process to be repeated, represents a significant cost risk associated with the Dredge to RAL alternative, especially given the short in-water work period in SIB. Under capping solutions, the removal of requirements for contingency re-dredging and additional sampling and testing reduces the RA implementation schedule, which will result in lower overall cost and impact to businesses operating in SIB; and
3. The design remains protective of human health and the environment.

Figure 3-3 shows the remedial technologies assigned in the Pre-Final 90% RD, after these practical modifications. Figure 3-4 shows the required dredging depths (distances below existing grade) in the Pre-Final 90% RD. Note that in Figure 3-2 through 3-4, slopes/riverbank areas are not represented, since this analysis was performed only in open water areas.

Figure 3-5 shows areas in which the final post-dredging elevations extend to the bottom of the SMA (vertical extent of contamination), potentially removing known sediment with COC concentrations exceeding RALs. However, in the operationally prescribed Dredge to RAL areas, contingency re-dredging may be required in areas where dredging did not completely remove contaminants to the level required. The locations where contingency re-dredging may be needed cannot be reasonably anticipated.

4.0 DREDGING CONSTRUCTION CONSIDERATIONS

This section contains an overview of the various dredging considerations and criteria used to develop the dredging component of the Pre-Final 90% RD. The dredging design is not intended to be prescriptive in terms of RA Contractor means and methods, but provides an overview of the likely dredging methods to be used.

4.1. HYDRAULIC AND MECHANICAL DREDGING

This section discusses methodology for hydraulic and mechanical dredging, including details of how these methods apply to SIB Project Area considerations. The section then provides a rationale for recommending mechanical over hydraulic dredging.

The most common hydraulic dredger is a cutter-head suction dredger. A rotating cutter head breaks up the dredge material and creates a vacuum to force the slurry (composed of only 10 to 20% solids) through a pressurized floating pipeline connected to the transload site. Water entrained in the slurry would require treatment prior to being discharged back into the river or otherwise

disposed of. The floating pipeline, an integral component of hydraulic dredging, poses a barrier to marine vessel traffic. In addition, the cutter head dredger is not designed to operate effectively in the presence of debris which has the potential to create blockages within the pipeline. Even small debris (greater than 6 inches), which would be prohibitive (both financially and technologically) to locate and remove prior to dredging, can plug a smaller hydraulic dredge (USACE, 2008). Debris that is encountered will likely negatively impact on dredging production rates, and cause mechanical failures. In addition, dredging may not commence until a crane with a clamshell bucket, or similar, is used to remove the debris. Hydraulic dredging does have slightly more favorable sediment resuspension and contaminant release controls (sediment controls) than mechanical dredgers. However, this only applies to plain suction, pneumatic, specialty, or diver operated hydraulic dredgers. A conventional cutterhead, swinging ladder cutterhead, and horizontal auger hydraulic dredgers have less favorable performance in the same categories when compared to mechanical dredging.

The hydraulic dredger is connected to the transload site during operation, thus requiring the transload site to be within or close to the SIB Project Area. At the time of the 90% Dredging Design, potentially viable transload sites within or close to the SIB Project Area were not identified. Based on the long-term impact on waterway users, and due to the inability to accommodate encountered debris that is not removed as part of pre-dredge removal efforts, and the lack of availability of a suitable transload site, hydraulic dredging is not currently recommended for the SIB Project Area.

Mechanical dredging removes material with the use of mechanical force using a bucket or excavator. The bucket is lowered down to the sediment bottom and allowed to sink into and grab the sediment, after which the bucket closes and the sediment is lifted up through the water and swung from the extraction location to the adjacent material transport barge where it is opened and releases the dredged material. The dredged material placed on the material transport barge is transported to a transload facility (that does not need to be adjacent to SIB Project Area). The water that is excavated with the dredge material is typically pumped to a connecting water containment barge and treated prior to release to the surrounding water body or other systems (e.g., sanitary sewer systems). Water treatment is addressed in Section 35 59 15 - Temporary Contact Water Treatment.

Mechanical dredgers may use a variety of bucket sizes, making them an effective method for large debris removal. While mechanical dredging has a lower production rate than hydraulic dredging, it causes minimal interference with navigation. In addition, mechanical dredgers have flexibility to conduct work in the upland area (dry excavation). The mechanically removed sediment contains a significantly lower volume of water requiring treatment and disposal.

In summary, mechanical dredging is recommended as the most suitable method for SIB Project Area. While hydraulic dredging remains a possible option depending on the future availability of upland properties and RA Contractor capabilities, hydraulic dredging is not currently recommended at the SIB Project Area due to the following conditions:

- Hydraulic dredging equipment would potentially require the removal of smaller debris (greater than 6 inches) prior to dredging so as to not clog the pipeline, and may face challenges from unidentified buried debris;

- Hydraulic dredging requires the use of slurry pipelines, which would continuously impact waterway users; and
- Significant amounts of slurry would be produced via hydraulic dredging and require dewatering (80 to 90% of the slurry is water), however no space within the SIB Project Area available for dewatering prior to transport and disposal has been identified. Mechanical dredging is anticipated to contain approximately 45% free water based on a bucket fill factor of 0.55 assumed in the mechanical dredging production rate analysis.

4.2. EQUIPMENT RECOMMENDATIONS

As discussed in Section 4.1, mechanical dredging is the recommended dredging methodology. Therefore, this section will discuss the specifics of equipment selection for mechanical dredging. It is of note that the final selection of equipment will be determined by the RA Contractor, based on the requirements of the technical specifications and other factors.

Equipment selection is based on many factors including RA Contractor experience and equipment availability. Additional factors include, but are not limited to, equipment compatibility with project site conditions, mode of transport, transload, and disposal routes. Efficiency of equipment for site conditions including debris, water depth, surface slope, sediment type, applicable performance standards, and presence of structures.

Mechanical dredges are classified into two primary systems, an articulated fixed arm system and a wire supported system. A fixed arm system uses an excavator or backhoe to remove sediment, while a wire supported system is attached to a crane. Mechanical dredgers are further described by the type of bucket used. Wire-supported buckets include a conventional clamshell bucket and enclosed bucket, while an articulated bucket is a fixed arm system (USACE, 2008).

A conventional clamshell bucket is a wire supported system and typically is crane mounted on a barge with buckets that may vary in size from less than 1 to 50 cubic yards (CY). The clamshell bucket is an open system that has teeth that are useful in removing hard sediment surfaces and debris. Due to the open nature, a clamshell bucket releases some sediment during removal but works well for debris removal. An environmental bucket or a closed bucket is a sealed (non-open system) without teeth using rubber gaskets and tongue-in-groove joints to seal it closed. The operation is the same as a conventional clamshell bucket, but its closed nature reduces sediment loss while making it less effective for debris removal (USACE, 2008).

An articulated arm bucket may be a clamshell or environmental bucket and is primarily used on land but may be operated from a barge. However, the bucket size does decrease as the length of the arm needed to dredge or excavate increases. Because of the fixed arm system, the articulated arm bucket is beneficial in areas with steeper slopes.

SIB has unconsolidated sediments that are laden with surface debris and unknown subsurface debris quantities or locations. In addition, there are areas of the dredge prism that have steeper slopes. Keeping the site conditions in mind, the use of a conventional clamshell bucket would be best employed during large debris removal or dredge activities in an identified potential concentrated debris field. An environmental bucket may be best applicable for the main dredging

operation where large debris has been removed, and an articulated fixed-arm bucket would best support dredging on steep slopes and for upland excavation.

4.3. WATER DEPTHS TO ACCOMMODATE CONSTRUCTION EQUIPMENT

This section outlines the limitations of the mechanical dredge equipment discussed in Section 4.2. Determination of appropriate dredge equipment requires an evaluation of the equipment's operational limitations, including water depth.

The ability of equipment to reach designated dredging areas is dependent on the draft of the vessel and local water depth, which varies seasonally. A typical material barge used to store, and transport dredged sediment is a 12 to15 ft side shell barge. The barge will likely have a 3 to 4 ft draft when empty, and approximately a 13-ft draft when fully loaded. A barge used to house the dredger will likely have a draft of approximately 4 to 8 ft.

While a cable crane and shell bucket will have the ability to reach farther inshore, the barges required for the equipment and weight of material are expected to draw more water, likely limiting the use of equipment to depths of approximately 10 ft for the dredge-mounted barge and 15-20 ft depth for a loaded material barge. An excavator mounted on a barge may have a shorter reach, but the barge should be lighter and have a smaller draft permitting the equipment to dredge in shallower areas. The anticipated required water depth to accommodate equipment was applied to the site access constraints assessment in Section 4.4. The RA contractor's knowledge of their equipment will guide the selection of the most applicable combination of equipment for the shallower areas.

4.4. SITE ACCESS CONSTRAINTS

An analysis was conducted to evaluate potential dredge plant site access constraints in the SIB Project Area. While the equipment used for the RA will be determined by the RA Contractor, the assessment conducted for a dredge plant applicable to the project objectives has been applied within the SIB Project Area. The evaluated equipment consisted of the following components:

- 210 ft by 62 ft - 2,500-ton material transport barge;
- 1,500-ton material transport barge;
- 123 ft by 62 ft by 12 ft water management barge;
- 142 ft by 58 ft by 12 ft dredging barge with minimum draft 6 ft (MER, 2024);
- Tug for moving barges; and
- Turbidity control measures (e.g., silt curtains). Turbidity control is described in the Drawings (Sheet DR101, Volume III, Appendix V) and Specification Section 01 35 43 (Environmental Protection Procedures).

The assessment applied the anticipated depth limitation for dredging equipment, dredge mounted barge dimension, and an average dredge arm radius of 100 ft to determine maximum reach. The material barge was placed adjacent to the dredge mounted barge, but its position was shifted to maximize dredger reach.

Based on the applied factors, several locations within the SIB Project Area were identified with access constraints. Areas behind the following structures are outside of the evaluated dredger arm reach radius:

- USCG Floating Dock
- U.S. Navy Pier
- MC Pier
- Berth 311

Dredging and excavation required in these areas will require alternate equipment and methodologies. In addition to the areas listed above, the far southeastern corner of SIB Project Area adjacent to the Wind Tunnel property, may have equipment depth requirement limitations. These potential limitations will depend on RA Contractor equipment and river conditions, and will therefore need to be evaluated by the RA Contractor. Access constraints will decrease the daily dredge production rate. The identified constraint areas within the SIB Project Area may require an amended dredging and/or capping approach from the RA Contractor. A feasible methodology may be for the dredger to place a smaller excavator with a sediment holding box on a flexi-float to dredge the sediment area not reachable by the dredge arm. Once the dredging is complete, the equipment would be removed by the dredger. The dredged material would then be relocated to the material transport barge.

4.5. DEBRIS AND DEBRIS REMOVAL

Large debris, which is defined as debris greater than 6 ft in any dimension, shall be removed prior to the start of dredging activities. It is estimated that SIB contains more than 650 pieces of large debris. Debris may be removed prior to dredging or concurrently, as deemed more appropriate by the RA Contractor for the most efficient means and methods. Debris removal is required to establish appropriate pre-capping surfaces to allow a continuous chemical isolation layer, and prevent differential settlement post-capping. Debris removal methodology will depend on RA Contractor selected means and methods. The initial debris size criterion governing pre-dredging removal will also be determined by the RA Contractor, since it depends on dredging bucket sizes used in different areas of SIB (e.g., open water or around structures). The quantity and types of debris were summarized in the BODR (HGL, 2024b). Although most of the debris is relatively small, some larger debris such as a sunken structure at Berth 308, several sunken small vessels, and larger timber piles/logs must be removed. Subsurface debris types and quantities are unknown but may be similar to surface debris. Removal and disposal of debris is discussed in the Pre-Final 90% RD Transportation and Off-Site Disposal Plan (Volume II, Appendix O).

4.6. SEDIMENT CHARACTERISTICS

The sediments in SIB are likely readily dredged and managed, based on extensive geotechnical investigations described in the PDI ER (HGL, 2024a). Sediment characteristics, geotechnical properties, slope stability under static and seismic conditions, and anticipated settlement post-capping are described in the BODR (HGL, 2024b) and the Geotechnical Design Technical Memorandum (Volume I, Appendix I).

4.7. NON-AQUEOUS PHASE LIQUID CONSIDERATIONS

The RD anticipates that non-aqueous phase liquid (NAPL) will be observed at the river surface during dredging. The process of cutting and drawing material through the water column can result in the release of NAPL entrained within the sediment pore space to the water column, where NAPL less dense than water will float to the surface. However, extensive sampling of SIB has provided relatively few locations where visible NAPL is present in the sediment; only 17 observations of NAPL were noted in more than 1,200 samples collected. Therefore, the areas where NAPL may be observed during dredging are relatively limited. The Water Quality Monitoring Plan (Volume II, Attachment C of Appendix N) provides the required controls (including NAPL controls) to be put in place during dredging activities, as well as the notifications to be made by the RA Contractor when these impacts are encountered. Additionally, the water treatment system required for dredged material water treatment will include a separations step that includes a NAPL adsorbent, so the NAPL releases during the RA will be well controlled. The dredge prisms designed for the SIB Project Area are intended to generally avoid a leave surface containing NAPL-impacted sediments; sample intervals with identified NAPL impacts will either be removed during dredging or remain under feet of sediment that do not contain entrained NAPL, based on the extensive sampling completed for the Project Area. However, as stated in NAPL Tech Memo (Volume I, Appendix B), for two core locations (E24 and E33) with observed NAPL within sample cores that intersect dredge leave surface, 3 inches of organoclay-containing granules will be placed within a 50-ft radius centered on these two locations after dredging and prior to capping to address the potential for NAPL at the post-dredged surface. If any other mobile NAPL is encountered, a 3-inch cap with a small mass of organoclay (2 percent by weight) will be placed post dredging and prior to capping.

Monitoring of the SIB surface water over time after dredging is the primary method of determining the need for the NAPL contingency cap. Observations of surface sheens will be continuously logged during the dredging work. The RA contractor will provide the observation records, including locations mapped of observed sheens. If multiple instances (multiple subsequent days) of discreet NAPL sheens are observed within a previously dredged area, the contractor will mobilize an aerial monitoring contractor (i.e. unmanned aerial vehicle [UAV] imaging) to document the precise locations of the NAPL source and the information will be used to estimate the aerial extent and mass of organoclay absorbent to be used for the contingency capping.

4.8. PRODUCTION RATES

Dredging production rates will vary around the site, primarily based on equipment type and efficiency of sediment removal due to access constraints (e.g., dredging under structures). Production rates may also be affected by sediment and/or water processing/treatment rates, transload rates, and acceptance rates at the disposal facility. Production rate calculations incorporate bucket size, fill factor, cycle time, dredging time (workday duration), and Effective Working Time (EWT) as shown below in Equations 1 and 2 (Webb et al., 2015):

$$Production_{(CY/hr)} = Bucket\ Size\ (CY) \times FillFactor \times \frac{3600\ s}{Cycle\ Time\ (s)} \quad (1)$$

$$Production_{(CY/day)} = Production_{(CY/hr)} \times (\#\ of\ hours\ worked/day) \times \%EWT \qquad (2)$$

Production rate estimates were developed for three types of areas within the SIB Project Area: open water, shallow areas/slopes, and under/around structures. Generally, these production rate scenarios represent different levels of operational difficulty and efficiency, which are largely caused by access constraints. Input parameters for Equations (1) and (2) were chosen based on a range of typical values observed in environmental dredging projects (Webb et al., 2015) and are summarized in Table 4-1.

Dredging in open water areas (low difficulty) was assumed to utilize a larger bucket size and have a lower cycle time. Dredging in shallow areas/slopes (medium difficulty) was assumed to require a moderate or small bucket size (depending on reach distance) and an average cycle time. Dredging under/around structures (high difficulty) was assumed to require a small or medium bucket size and have a higher cycle time.

For all dredging operations, it was assumed that a daily shift would be 12 hours with an EWT of 50% (i.e. 50% of the shift would be spent productively on dredging). A fill factor of 0.55 was assumed for all dredging operations. The resulting production rate values align with productivity data from published dredging studies (Webb et al., 2015). Table 4-1 summarizes the dredging production rate calculation inputs and results. These production rates were used in the development of the 90% RA Schedule (see Figure 3-1 of Volume I, Design Criteria Report). Approximate dredging volumes are also shown in Table 4-1. The approximate volume of dredging for steep slopes and around structures was lumped into a single volume here for simplicity, since the area of influence of structures (zone around a structure in which the structure effects efficiency) varies in size for each facility.

The production rates summarized in Table 4-1 are reasonably conservative and reflect additional care associated with remedial dredging in PHSS. For reference, recent maintenance dredging activities in SIB reported production rates upwards of 2,500 to 3,000 CY per day in open water. However, it should be noted that those maintenance dredging activities are not directly comparable to the remedial dredging due to differing requirements for equipment, procedures, environmental controls, materials handling and disposal.

4.9. DREDGE RETURN WATER MANAGEMENT

Water that contacts sediment on barges (dredge return water) will be removed during dredging for treatment. Water treatment is addressed in Specification Section 35 59 15 (Temporary Contact Water Treatment). The Water Quality Monitoring Plan (Volume II, Attachment C of Appendix N) further discusses treatment, monitoring, and discharge of dredge return water.

5.0 REFERENCES

HydroGeoLogic, Inc. (HGL), 2022. *Pre-Design Investigation Work Plan, Revision 3.* Preliminary Remedial Design Services, Swan Island Basin Project Area, Portland Harbor Superfund Site, Portland, Multnomah County, Oregon. Revision 3. May.

HGL, 2024a. *Pre-Design Investigation Evaluation Report, Revision 2*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. December.

HGL, 2024b. *Basis of Design Report, Revision 1*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. November.

MER Equipment, Inc., 2024. *HME Construction - Sea Horse*. At URL: https://merequipment.com/project/hme-construction-sea-horse/. Accessed November 4, 2024.

U.S Environmental Protection Agency (EPA), 2017. *Record of Decision, Portland Harbor Superfund Site, Portland Oregon*. United States Environmental Protection Agency Region 10, Seattle, Washington. January.

EPA, 2021. *Administrative Settlement Agreement and Order on Consent for Remedial Design. Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10*. January 20.

U.S. Army Corps of Engineers (USACE), 2008. *Technical Guidelines for Environmental Dredging of Contaminated Sediments*. ERDC/EL TR-08-29. September 2008.

Webb, R.S., T.M. Dreher, and P.F. Fuglevand, 2015. *Environmental dredging productivity for precision excavator dredges*. Proceedings of the Western Dredging Association and Texas A&M University Center for Dredging Studies, Dredging Summit and Expo 2015. Houston, Texas, USA, June 22-25, 2015.

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Table 3-1
Unit Costs Used in Remedial Technology Cost Analysis
Dredging Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

	Dredging + In- Transpor	Upland Tra Disp	Total
Dredging	38.51 / CY	$72.82 / TON	$147.74 / CY

	Procurement / Delivery	Placement	Total
Sand + GAC Cap	$385.65 / CY	$80.00 / CY	$465.65 / CY
Sand RML (Backfi	$80.00 / CY	$80.00 / CY	$160.00 / CY
Erosion Pro (Rounded (	$80.00 / CY	$80.00 / CY	$160.00 / CY
Erosion Pro (Rounded (	$80.00 / CY	$80.00 / CY	$160.00 / CY
O&M and Monitoring			$3.20/SF

Notes:
Conversion factor 1.5 TON/CY assumed for both dredged material and capping material
CY = Cubic Yard
SF = Square Foot
GAC = granular activated carbon
O&M = Operations and Maintenance
RML = residuals management layer

Table 4-1
Dredging Production Rates and Volumes
Dredging Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Area	Type	Bucket Size (CY)	Cycle Time (seconds)	EWT (%)	Fill Factor	Daily Production Rate (CY/day)	Approximate Volume (CY)
Open Water	Excavator	6	60	50	0.55	1,150	600,000
	Crane	10	60	50	0.55	2,000	
Shallow/Steep Slopes	Far-Reach	2	75	50	0.55	300	70,000
	Typical	4	75	50	0.55	600	
Under/Around Structures	Narrow	2	90	50	0.55	250	
	Wider	4	90	50	0.55	550	

Notes:
% = percent
CY = Cubic Yard
EWT = Effective Working Time

FIGURES

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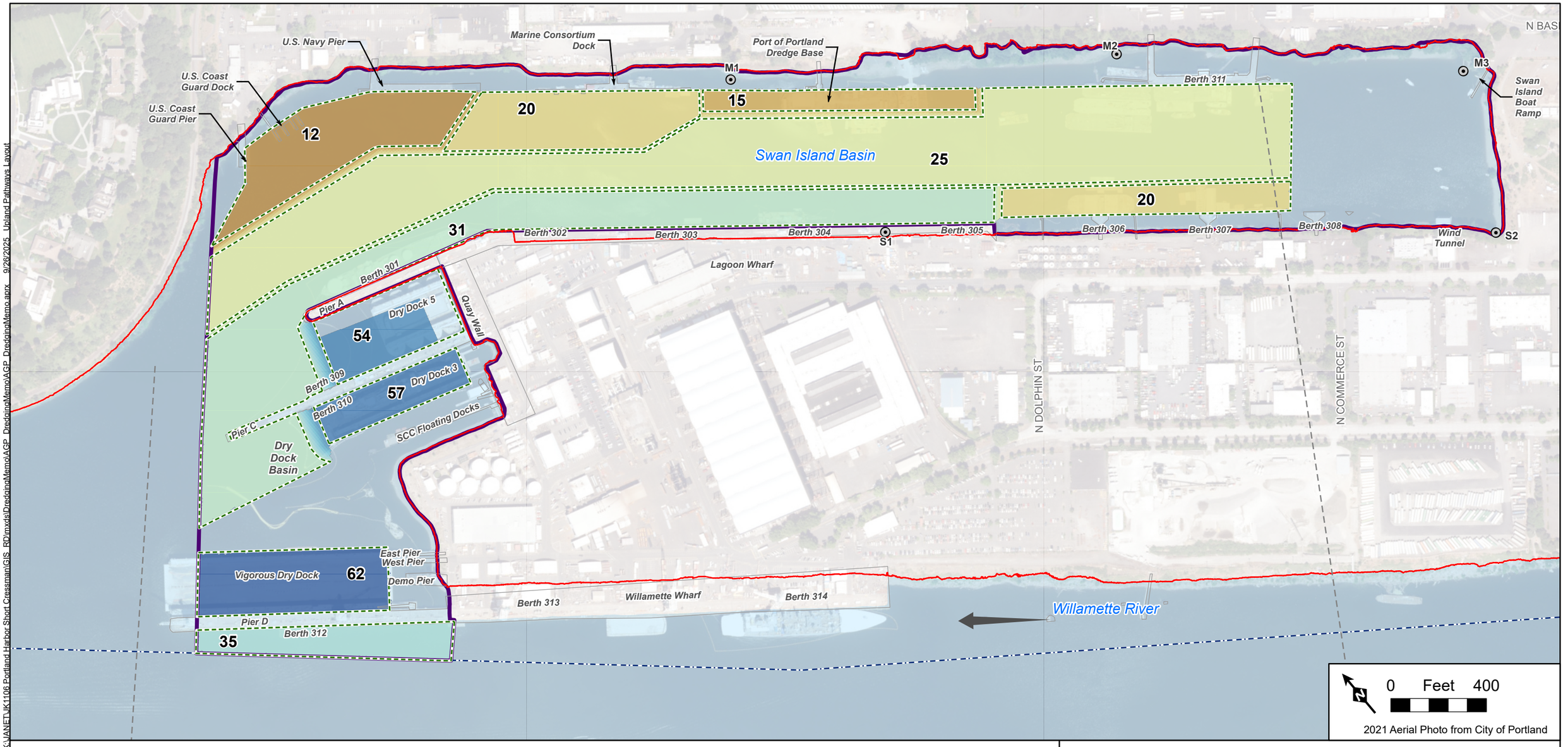


Swan Island Sediment Decision Unit (SDU)

Federal Navigation Channel (USACE, 2020)

River Mile (RM)

Docks and Structures

Ordinary High Water (OHW), +20.08 ft NAVD88

Pre-Final 90% RD Navigation/Future Maintenance Dredge Areas (With Depths in Feet, CRD)

River Flow Direction

Notes:
CRD – Columbia River Datum
ft – feet
NAVD88 – North American Vertical Datum of 1988
RD – Remedial Design

5.28 ft NAVD88 = 0 ft CRD

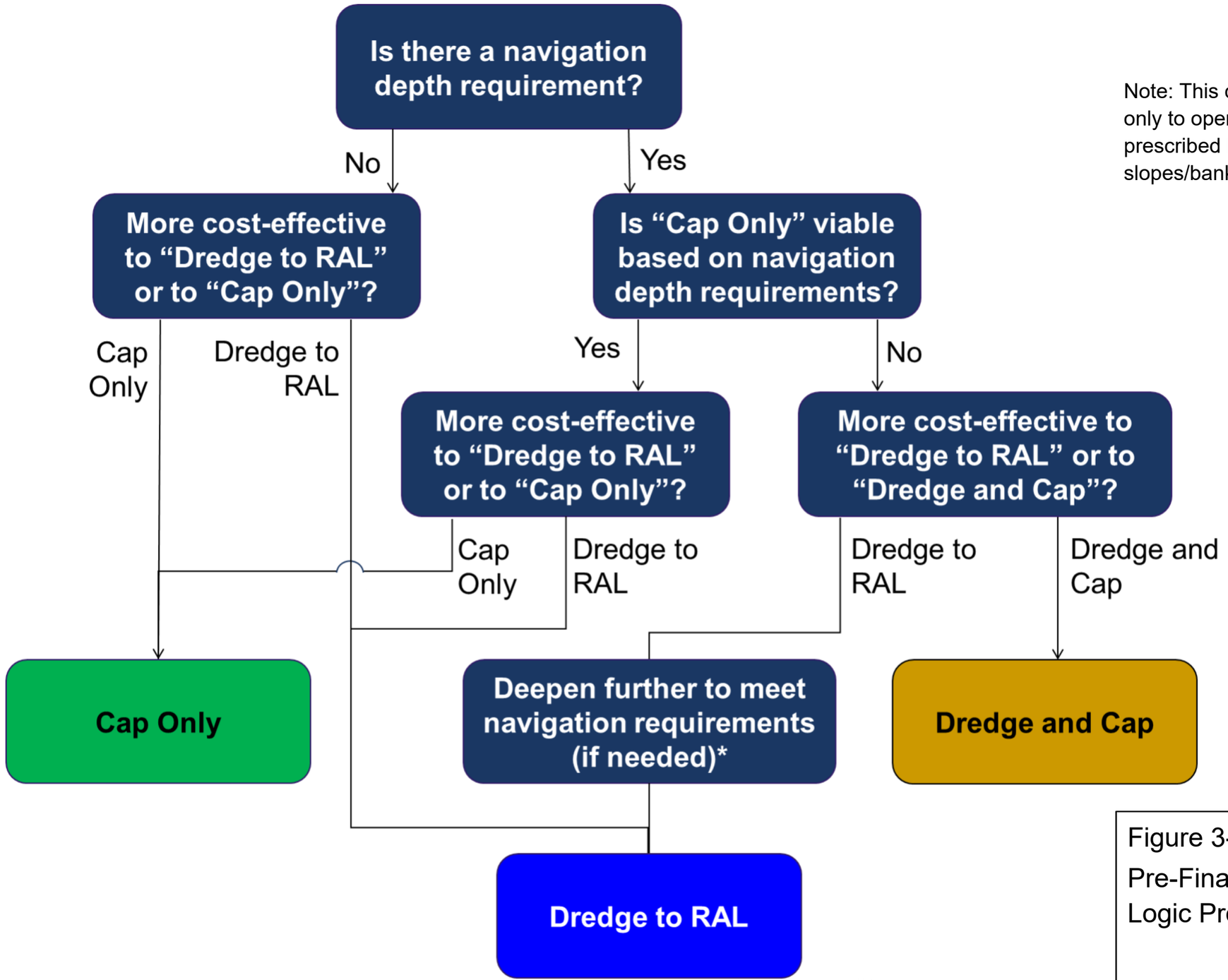
Navigation/Future Maintenance Dredge Depths in Feet, CRD

Figure 1-1

Pre-Final 90% RD Navigation/ Future Maintenance Dredge Areas

Prepared on: 9/26/2025
Dredging Design Technical Memorandum
Swan Island Basin Remedial Design Group

HGL | MOTT MACDONALD | COAST & HARBOR ENGINEERING | PACIFIC groundwater GROUP | BRIDGEWATER GROUP



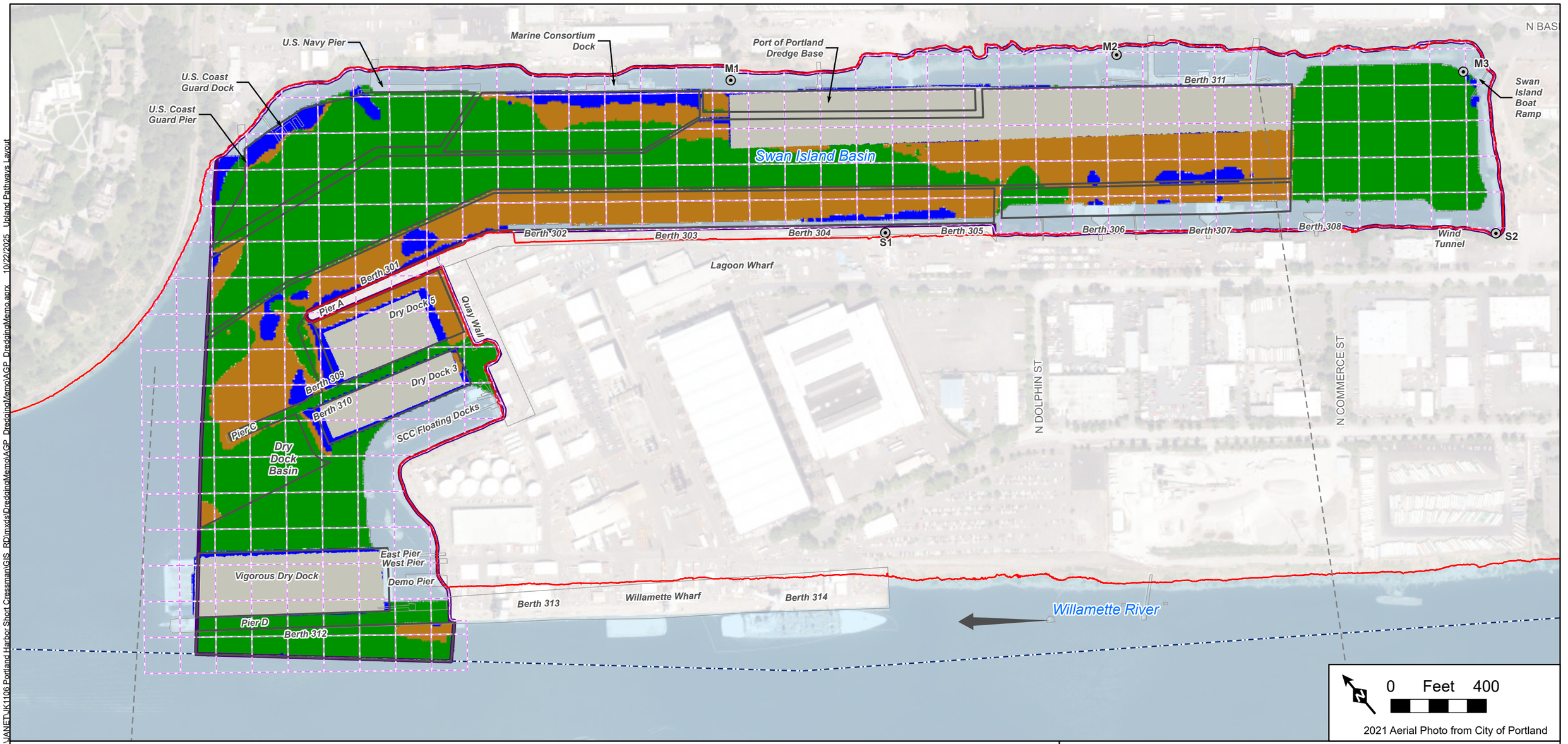
Note: This cost optimization process was applied only to open water areas outside operationally-prescribed Dredge to RAL areas, and away from slopes/banks.

*Including RML and 1-ft FMD Clearance

Notes:
ft – foot
FMD – Future Maintenance Dredge
RAL – Remedial Action Level
RML – Residuals Management Layer

Figure 3-1
Pre-Final 90% RD Cost Optimization Logic Process

Prepared on: 9/26/2025
Dredging Design Technical Memorandum
Swan Island Basin Remedial Design Group



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Swan Island Sediment Decision Unit (SDU)
Federal Navigation Channel (USACE, 2020)
River Mile (RM)
Docks and Structures
Project Area Grid

Ordinary High Water (OHW), +20.08 ft NAVD88
Pre-Final 90% RD Navigation/Future Maintenance Dredge Areas
Cap Only
Dredge and Cap
Dredge to RAL
Dredge to RAL (Operationally Prescribed)
Operationally Prescribed Dredge to RAL Areas Not Included in Cost Optimization Analysis

River Flow Direction

Notes:
CRD – Columbia River Datum
ft – feet
NAVD88 – North American Vertical Datum of 1988
RAL – Remedial Action Level
RD – Remedial Design

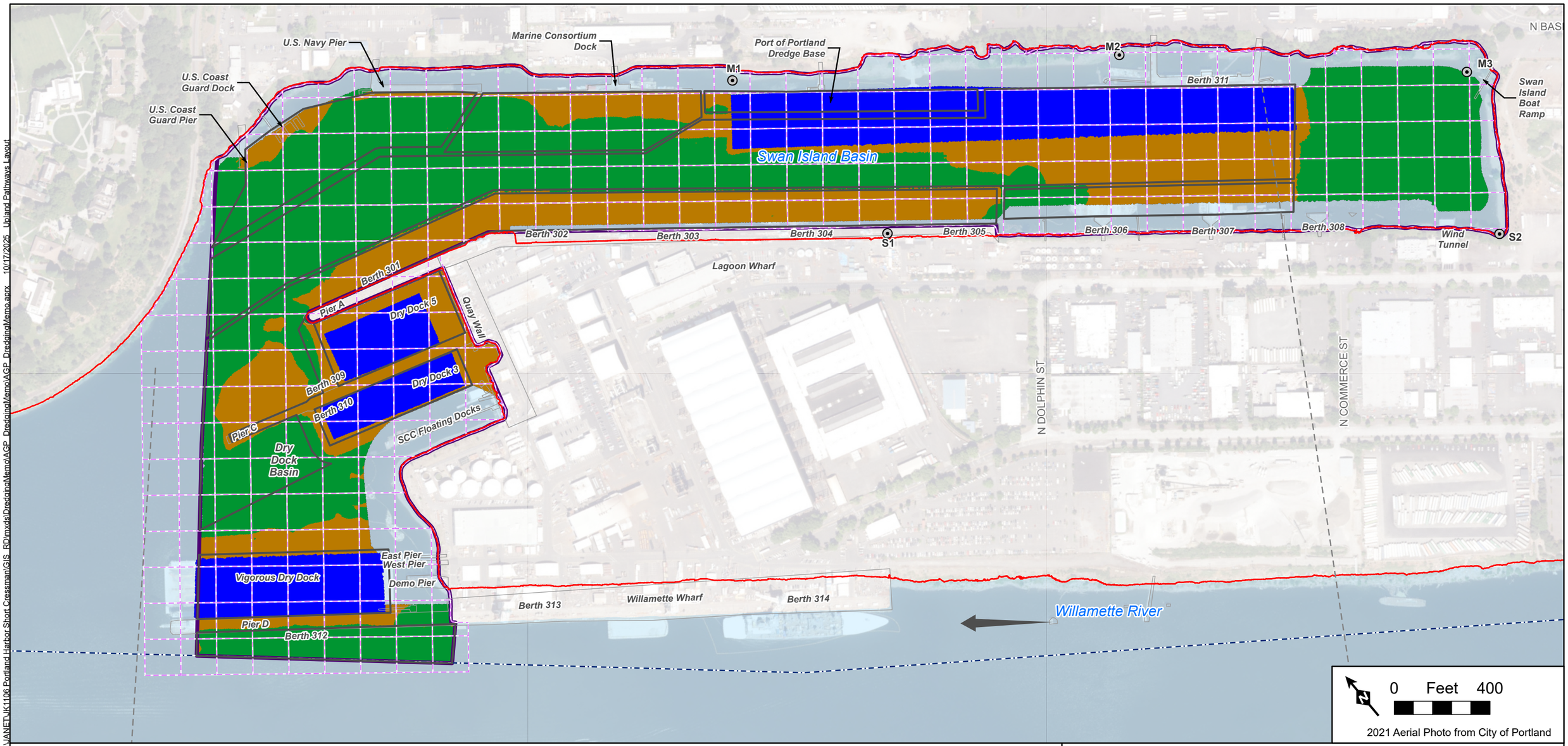
5.28 ft NAVD88 = 0 ft CRD

Figure 3-2

Initial Cost-Optimized Remedial Technologies

Prepared on: 10/22/2025
Dredging Design Technical Memorandum
Swan Island Basin Remedial Design Group

HGL | MOTT MACDONALD | COAST & HARBOR ENGINEERING | PACIFIC groundwater GROUP | BRIDGEWATER GROUP



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- Swan Island Sediment Decision Unit (SDU)
- Federal Navigation Channel (USACE, 2020)
- River Mile (RM)
- Docks and Structures
- Project Area Grid
- Ordinary High Water (OHW), +20.08 ft NAVD88
- Pre-Final 90% RD Navigation/Future Maintenance Dredge Areas
- Cap Only
- Dredge and Cap
- Dredge to RAL (Operationally Prescribed)
- River Flow Direction

Notes:
CRD – Columbia River Datum
ft – feet
NAVD88 – North American Vertical Datum of 1988
RAL – Remedial Action Level
RD – Remedial Design

5.28 ft NAVD88 = 0 ft CRD

Figure 3-3
Pre-Final 90% RD Remedial Technologies

Prepared on: 10/17/2025
Dredging Design Technical Memorandum
Swan Island Basin Remedial Design Group

HGL MOTT MACDONALD COAST & HARBOR ENGINEERING PACIFIC groundwater GROUP BRIDGEWATER GROUP

U.S. Navy Pier
Marine Consortium Dock
Port of Portland Dredge Base
U.S. Coast Guard Dock
U.S. Coast Guard Pier
M1
M2
M3
Swan Island Boat Ramp
Berth 311
Swan Island Basin
Berth 302
Berth 303
Berth 304
Berth 305
Berth 306
Berth 307
Berth 308
S1
S2
Wind Tunnel
Lagoon Wharf
Berth 301
Pier A
Dry Dock 5
Quay Wall
Berth 309
Dry Dock 3
Berth 310
Pier C
SCC Floating Docks
Dry Dock Basin
N DOLPHIN ST
N COMMERCE ST
East Pier
West Pier
Vigorous Dry Dock
Demo Pier
Berth 313
Willamette Wharf
Berth 314
Pier D
Berth 312
Willamette River
0 Feet 400
2021 Aerial Photo from City of Portland

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- Swan Island Sediment Decision Unit (SDU)
- Federal Navigation Channel (USACE, 2020)
- River Mile (RM)
- Docks and Structures
- Project Area Grid
- Ordinary High Water (OHW), +20.08 ft NAVD88
- Pre-Final 90% RD Navigation/Future Maintenance Dredge Areas
- River Flow Direction

Dredge Depth [ft]

19.0
17.0
15.0
13.0
11.0
9.0
7.0
5.0
3.0
1.0

Notes:
CRD – Columbia River Datum
ft – feet
NAVD88 – North American Vertical Datum of 1988
RD – Remedial Design

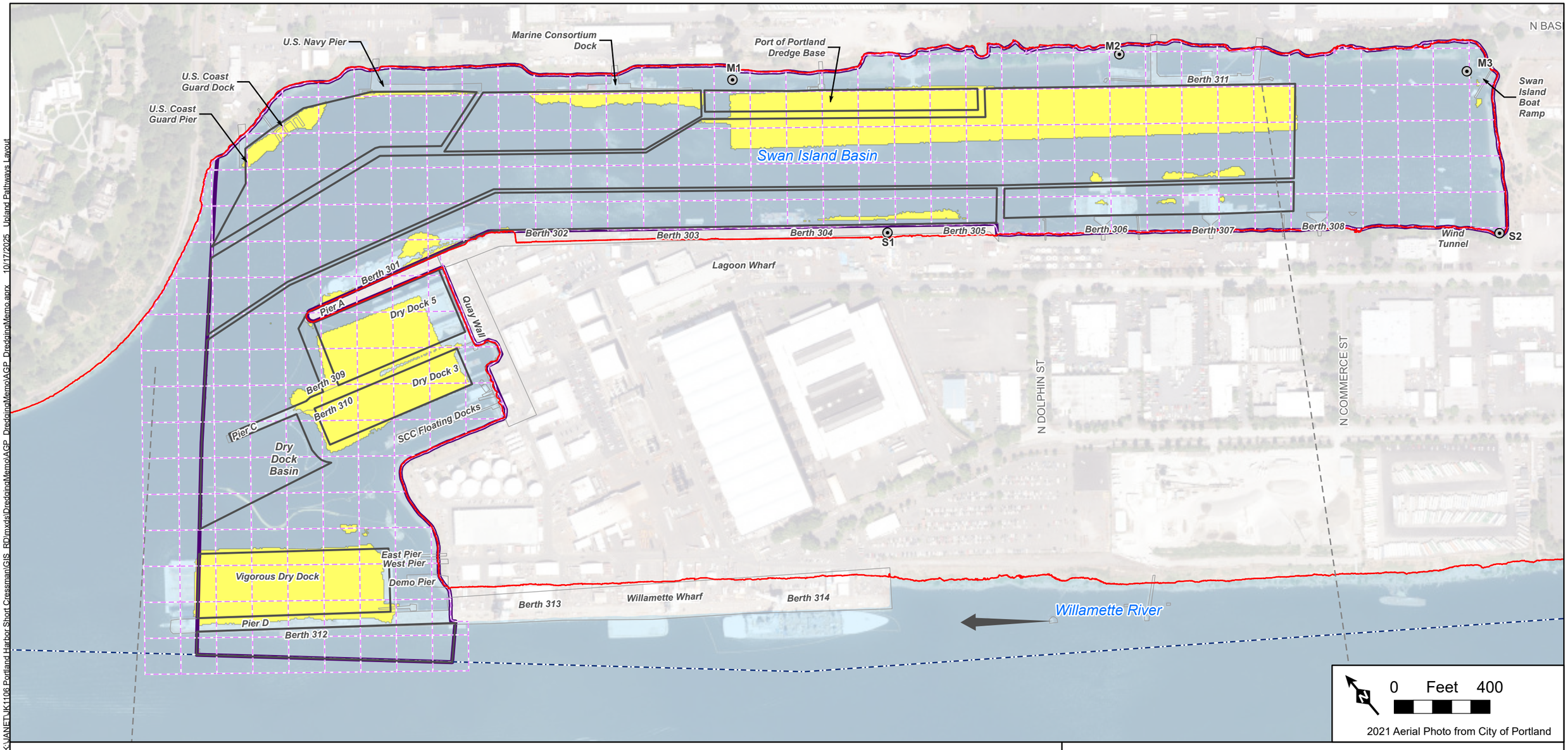
5.28 ft NAVD88 = 0 ft CRD

Figure 3-4

Depths of Dredging Below Existing Riverbed in the Pre-Final 90% RD

Prepared on: 10/17/2025
Dredging Design Technical Memorandum
Swan Island Basin Remedial Design Group

HGL | MOTT MACDONALD | COAST & HARBOR ENGINEERING | PACIFIC groundwater GROUP | BRIDGEWATER GROUP



K:\JANET\JK1106 Portland Harbor Short Cressman\GIS_RD\mxds\DredgingMemo\AGP_DredgingMemo\AGP_DredgingMemo.aprx 10/17/2025 Upland Pathways Layout

- Swan Island Sediment Decision Unit (SDU)
- Federal Navigation Channel (USACE, 2020)
- River Mile (RM)
- Docks and Structures
- Project Area Grid
- Ordinary High Water (OHW), +20.08 ft NAVD88
- Pre-Final 90% RD Navigation/Future Maintenance Dredge Areas
- Areas Dredged Below the SMA
- River Flow Direction

Notes:
CRD – Columbia River Datum
NAVD88 – North American Vertical Datum of 1988
RD – Remedial Design
SMA – Sediment Management Area

5.28 ft NAVD88 = 0 ft CRD

Figure 3-5

Areas Dredged Below the SMA in the Pre-Final 90% RD

Prepared on: 10/17/2025
Dredging Design Technical Memorandum
Swan Island Basin Remedial Design Group

HGL · MOTT MACDONALD · COAST & HARBOR ENGINEERING · PACIFIC groundwater GROUP · BRIDGEWATER GROUP

APPENDIX I

GEOTECHNICAL DESIGN TECHNICAL MEMORANDUM

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GEOTECHNICAL DESIGN TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

This Geotechnical Design Technical Memorandum (GDTM) presents a summary of geotechnical design efforts for the Remedial Design (RD). The RD is conducted for the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site (PHSS) in Portland, Multnomah County, Oregon. The HydroGeoLogic, Inc. (HGL) team performed the work on behalf of the SIB RD Group based on the requirements of the PHSS Record of Decision (ROD) (EPA, 2017a) and the Administrative Settlement Agreement and Order on Consent (EPA, 2021a). The data used in the geotechnical analyses were collected in accordance with the final Pre-Design Investigation (PDI) Work Plan, which the U.S. Environmental Protection Agency (EPA) approved in May 2022 (HGL, 2022), and were reported in the PDI Evaluation Report (ER) (HGL, 2024), which EPA approved in January 2025.

This GDTM refines the geological and seismic ground model presented in the Draft 50% RD, summarizes and outlines the geotechnical analysis performed, and provides commentary regarding the geotechnical analysis and reporting that will be presented in the RD submittal. The geotechnical analyses presented herein support justification or elimination of proposed remedial technologies, and ultimately inform design and construction of the selected remedy. The geotechnical analysis elements presented herein include:

- Subsurface profiles and cross-sections that illustrate soil stratigraphy and include relevant geotechnical design parameters at key locations throughout the project area;
- Bearing resistance evaluation of cap foundation materials;
- Settlement analysis of both cap and cap foundation materials (underlying sediments).
- Seismic design parameters for a Contingency Level Earthquake (CLE), and other seismic hazard levels required for RD;
- Slope stability analysis, static and seismic (pseudo-static), of caps placed on slopes, proposed dredge cuts, and riverbank slopes;
- Seismic hazard analysis, including evaluation of liquefaction triggering, liquefaction induced settlement, and lateral spreading potential; and
- Lateral earth pressures for static and seismic loading conditions.

Section 1.0 summarizes the existing information and defines the geotechnical design areas and reaches. Section 2.0 describes the sub-surface conditions, including project specific engineering soil units. Section 3.0 presents the geotechnical and seismic design parameters for use in design. Section 4.0 summarizes the geotechnical design considerations and analyses, including the evaluation of seismic hazards, sediment cap design, riverbank slope design, and design of retaining

Corporate Headquarters
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

walls. Section 5.0 summarizes construction and monitoring considerations during construction, post construction and after seismic hazard events.

1.0 EXISTING SITE INFORMATION AND GEOTECHNICAL DESIGN AREAS

The following section presents a summary of the existing site information utilized for Pre-Final 90% RD and provides a detailed overview of the sub-areas within the larger SIB Project Area.

1.1 EXISTING GEOTECHNICAL DATA

Existing geotechnical data and information utilized in this technical memorandum are summarized within the Geotechnical Data Report (Appendix F of the PDI ER; HGL, 2024). Section 2.3 of the Geotechnical Data Report (HGL, 2024) presents a detailed summary of publicly available information and existing geotechnical data sources identified in proximity to the SIB Project Area. Information included in the following sections supplements the project-specific data and is utilized in the development of sub-surface profile across the SIB Project Area. The PDI geotechnical investigation comprised:

- 30 exploratory borings, 15 in-water borings, and 15 upland borings;
- 16 cone penetration tests (CPTs), which included pore pressure dissipation and seismic testing, 13 in-water CPTs, and 3 upland CPTs);
- Down-hole geophysical testing, including the in-situ measurement of small strain stress wave velocity (P and S waves) at 4 boring locations; and
- Geotechnical laboratory testing.

Figure 1-1 presents the geotechnical investigation locations undertaken as part of the PDI (HGL, 2024).

1.2 GEOLOGIC AND SEISMIC SETTING

A summary of the geologic and seismic setting as detailed in the PDI ER (HGL, 2024) is provided in the following subsections.

1.2.1 Regional and Site Geology

Regionally, the shallow geology is defined by the glacial outburst floods that scoured the underlying Troutdale Formation, depositing flood sediment. These Missoula Flood deposits are typically well-bedded white or tan sand and silt, with each layer representing individual flood events. These layers vary in thickness from a few inches to a few feet (Waitt, 1985; Benito and O'Connor, 2003; Waitt et al., 2009). The deposits from these floods underlie much of the region, contributing to the area's geological composition and landscape (Wells et al., 2020). In the SIB project area and the adjacent lowlands, sediment and soils above the flood deposits are characterized by unconsolidated, fine-grained alluvial deposits, resulting from sea level rise at the end of the last ice age (Beeson et al., 1991; Brown and Caldwell et al., 2008; Wells et al., 2020).

Artificial fill is considered to cover the entirety of the uplands. Material that covers Swan Island and its vicinity above water level is generally composed of sand, gravel, and rock placed for building foundations (Ma et al., 2012). Fill materials on Mocks Bottom are composed of materials dredged from the Willamette River and gravel and rock placed for construction.

1.2.2 Regional and Site Seismicity

The city of Portland is situated above the Cascadia Subduction Zone (CSZ) and is subject to ground shaking from the intra-slab and megathrust seismicity generated along the subduction zone and seismicity from crustal faults. Past earthquakes along the 600-mile CSZ fault have occurred at highly variable intervals, from decades to centuries, and have ranged widely in magnitude (OSSPAC, 2013). Studies of the geologic record suggest that a CSZ earthquake of magnitude 9.0 has a 7 to 11 percent chance of occurring within the next 50 years (Goldfinger et al., 2012).

Active local crustal faults should also be considered when evaluating potential earthquake impacts or ground motions at the SIB Project Area. The three northwest-trending faults are all mapped within 3 miles of the SIB Project Area.

1.2.3 Geologic and Seismic Hazards

Due to its geological setting and proximity to active faults, the SIB Project Area and uplands are likely to experience geologic and seismic hazards throughout the design life of the Remedial Action (RA). The geologic and seismic hazards of primary concern within the SIB Project Area are related to slope instability and deformation, under both static and seismic loading conditions. Due to the high susceptibility of soils within the SIB Project Area to liquefaction and lateral spreading, careful consideration was given to the design of riverbank slopes, as well as structural mitigation measures, and the incorporation of habitat elements into the RD. Additional detail regarding Project Area-specific geologic and seismic hazards, the geotechnical analyses performed to better understand them, and how the analysis results helped inform the RD are presented in the sections that follow, as well as in the attachments to this memorandum.

1.3 GEOTECHNICAL DESIGN AREAS AND SURFACE CONDITIONS

The SIB Project Area has been broken into three geotechnical design areas (Figure 1-2), and further divided into design reaches, based primarily on the condition and configuration of the riverbank slope, and property ownership (Figure 1-3). Defining both the design areas and reaches will allow specific design objectives and considerations to be addressed and communicated to the design team and project stakeholders. A brief description of each design reach and the surficial conditions is provided in the following sections.

1.3.1 Mocks Bottom – U.S. Coast Guard

The U.S. Coast Guard (USCG) design reach extends, approximately, between station 47+00 and 53+00. The slope runs in a westerly direction in the most northern corner of SIB. The crest of the riverbank varies between elevation 33- and 35-ft North American Vertical Datum of 1988 (NAVD88). The riverbank characterization conducted during the PDI (HGL, 2024) noted that above the ordinary high water (OHW) (20.1 ft NAVD88), the slope is densely vegetated, with an

exposed beach to the west of the pier structure. The slope sits at an approximate 23 degree (°) to 30° angle above the approximate mean low water (MLW) (7.28 ft NAVD88) and 15° to 25° below. Two operating structures are located within the USCG design area: a pier structure and a floating dock. Two buildings are located near the crest of the slope, with an operating yard and access to the pier along the remainder of the slope.

1.3.2 Mocks Bottom – U.S. Navy

The Navy design reach extends approximately between station 41+00 and 47+00. The slope adjacent to the USCG parcel runs in a north westerly direction. The crest of the riverbank varies between 34- and 36- ft NAVD88. The riverbank characterization conducted during the PDI (HGL, 2024) noted that the riverbank was armored and densely vegetated. The slope sits at an approximate 20° to 25° angle, assumed to extend to the toe of the slope. A single operating pier is located within the design area. Buildings are set back from the crest of the slope; however, large storage containers are placed within 20 ft of the top of slope.

1.3.3 Mocks Bottom – The Marine Consortium, Inc.

The Marine Consortium, Inc. (MC) design reach extends approximately between station 32+00 and 41+00. The slope runs in a north westerly direction. The crest of the riverbank varies between 36- and 38- ft NAVD88. The riverbank characterization conducted during the PDI (HGL, 2024) noted the riverbank to be heavily armored. The slope sits at an approximate 25° to 30° angle above the MLW and 10° to 25° below. Access to a single operating pier is located within the design area. Parking and storage containers are located at the crest of the slope.

1.3.4 Mocks Bottom – Port of Portland Dredge Base

The Port of Portland Dredge Base design area extends approximately between station 22+00 and 32+00. The slope runs in a north westerly direction. The crest of the riverbank varies between 34- and 36- ft NAVD88. The riverbank characterization conducted during the PDI (HGL, 2024) noted armoring to be present below the OHW. A sand and gravel beach is present below the MLW. The slope sits at an approximate 20° to 25° angle above the MLW and 10° to 20° below. In addition to a single pier structure leading to the dredge barges, a boat ramp is located at approximate station 25+00. The crest of the slope is mostly vegetated, apart from the pier access point which is used for storage.

1.3.5 Mocks Bottom – ATC Leasing

The ATC Leasing design area extends approximately between station 17+00 and 22+00. The slope runs in a north westerly direction. The crest of the riverbank varies between 32- and 34- ft NAVD88. Above MLW the slope is benched with an upper slope set back from the water sitting at an approximate 30° angle. Below this the slope gradually falls into the water at an approximate 10° angle. The upper slope is mostly vegetated with exposed sandy material in the lower shallow slopes.

1.3.6 Mocks Bottom –Berth 311

The Berth 311 design reach extends approximately between station 8+00 and 17+00. The slope runs in a north westerly direction. The crest of the riverbank varies between 36- and 38- ft NAVD88. Above MLW the slope is benched with heavy vegetation. The upper slope sits at an approximate 30° to 35° angle above the MLW and 10° to 20° below. A large single pier supported on timber piles with two access points is located within the design area. The crest of the slope is vegetated and parking associated with the operator is located more than approximately 10 ft back from the crest of the slope.

The remainder of the Swan Island Dock Company reach extends approximately between the head of the basin and station 8+00. The slope runs in a north westerly direction. The crest of the riverbank varies between 32- and 34- ft NAVD88. Above MLW the slope is benched with an upper slope set back from the water sitting at an approximate 30° to 45° angle. Below this the slope gradually falls into the water at an approximate 10° to 15° angle. The upper slope is mostly vegetated with exposed sandy material in the lower shallow slopes. Storage areas are located close (within 10 ft) to the crest of the slope.

1.3.7 Head of the Basin

This design reach sits at the head of the basin and encompasses the public boat ramp. The riverbank characterization conducted during the PDI (HGL, 2024) noted riprap present adjacent to the public boat ramp. The remainder of the design area comprises mostly sand at surface. The crest of the riverbank varies between 34- and 36- ft NAVD88. The slope is noted to be relatively shallow varying between 10° to 20° angle with localized steeper sections.

1.3.8 Swan Island – Freightliner Wind Tunnel

The design reach adjacent to the head of the basin includes the wind tunnel structure. The crest of the riverbank varies between 34- and 36- ft NAVD88. The slope sits at an approximate 20° to 30° angle above MLW and 10° to 20° below. A small retaining wall is present directly below the wind tunnel. The riverbank characterization conducted during the PDI (HGL, 2024) noted riprap to be present below the OHW.

1.3.9 Swan Island – Berths 306, 307, and 308

This design area extends between station 6+00 and 21+00 on Swan Island. The riverbank encompasses three berth structures and associated timber dolphins. The riverbank characterization conducted during the PDI (HGL, 2024) noted rock/riprap armoring present in areas below OHW. The remainder of the slope above OHW is vegetated. Relic timber piles are present along the slope, approximately at the waterline. Signs of slope failure are noted near Berths 306 and 307 (HGL, 2024). The crest of the riverbank varies between 34 and 36 ft NAVD88. The slope sits at an approximate 20° to 30° angle above MLW and 10° to 20° below.

1.3.10 Swan Island –Lagoon Wharf

This design area spans from Berth 305 to Pier A, covering approximately stations 21+00 to 41+00. The Lagoon Wharf design area includes Berths 302, 303, 304, and 305. The crest of the riverbank varies between elevations of 35- and 37- ft NAVD88. A retaining wall, ranging from 7 to 20 ft in height, sits above MLW, with slope angles between 15° and 30°, featuring localized steeper sections. Below MLW, the slope angles range from 15° to 70°. The Lagoon Wharf structure, supported by timber piles, extends to the retaining wall on the southwest end of the design area. The wharf structure is approximately 52 ft wide on the northwest end (stations 41+00 to 27+00) and about 77 ft wide on the southeast end (stations 27+00 to 21+00).

1.3.11 Swan Island –Pier A and Quay Wall

This design area includes Pier A (Berth 301), located approximately between stations 41+00 and 61+00, and a quay wall situated between stations 61+00 and 67+00. Pier A has a top elevation of approximately 35 ft NAVD88. The pier structure is approximately 930 ft long, with its width gradually increases from 47 ft on the west end to 65 ft on the east end. Built in the 1940s, the pier contains 20 diaphragm cells, 3 circular cells, and 1 closure pile cell (Roth and Ramage, 1975). Originally, Pier A was designed to consist of 28 diaphragm cells. However, eight diaphragm cells failed during construction due to base failures caused by excessive hydrostatic head and impaired drainage during the hydraulic placement of cell fill materials. These eight diaphragm cells were replaced with three circular cells and one closure steel sheet pile cell. The quay wall is an earth-retaining structure consisting of nine circular steel sheet pile cells with connecting arcs, one steel sheet pile closure cell, one diaphragm wall, and a section of anchored steel sheet pile bulkhead (Roth and Ramage, 1975).

1.3.12 Swan Island –Floating Dock and Demo Pier

This design reach is situated at the head of Swan Island, extending from the end of the Quay Wall to the southern extent of the Demo Pier. It includes a riverbank that runs southeast for approximately 430 ft and then south for about 510 ft. The riverbank features an engineered bank with riprap below the OHW and a vegetated bank above OHW in the dry dock basin. The slope angle varies between 28° and 38°. The crest of the riverbank varies approximately between 35- and 37- ft NAVD88.

2.0 SUBSURFACE CONDITIONS

The section provides information on the sequence of strata encountered during the geotechnical investigations to date, and on the anticipated hydrogeological conditions at the Project Area based on the data available.

2.1 ENGINEERING SOIL UNITS

Four geologic unit layers were identified in the SIB Project Area geotechnical investigation during the PDI (HGL, 2024). These materials recorded on-site have been split into several engineering soil units for use in geotechnical analysis in the Pre-Final 90% RD. Interpretation of the engineering soil units identified in the PDI is described in the following sections.

2.1.1 Artificial Fill

Non-native fill deposits were encountered at the ground surface in all on-land borings. The material is generally described as loose to medium dense, poorly graded sand with clay and/or silt. The sand is described as fine to medium with occasional traces of fine gravel. Laboratory classification tests indicate the material to be predominantly coarse with an average particle distribution of 9 percent gravel, 72 percent sand, and 18 percent fines. Standard penetration tests (SPT) N_{60} values recorded values between 4 and 53, with an average of 22, which indicates the variable nature of the material. Fill was not recorded in any of the in-water investigations.

2.1.2 Recent Basin Sediments

Material described as recent basin sediments was recorded in the Swan Island Basin. The material was noted to vary in description between the north and south of the basin. In-water positions adjacent to Mocks Bottom (north) described the recent basin sediment as poorly graded silty sand and soft sandy silt. Factions of both silt and clay were noted within the sand layers. Laboratory classification tests indicate the material in the north of the basin to be predominantly coarse with an average particle distribution of 89 percent sand and 11 percent fines. SPT N_{60} values recorded values between 2 and 14, with an average of 8, indicating the relatively loose nature of the material.

In-water closer positions undertaken in the center of SIB and adjacent to Swan Island (south) described the recent basin sediment as very soft to soft elastic silt. Laboratory classification tests indicate the material in the center and south of the basin to be predominantly fine with average particle distribution of 41 percent sand and 59 percent fines. Atterberg limits recorded the material to be predominantly silts of medium to high plasticity.

2.1.3 Alluvium (Holocene): Sand

Coarse alluvial deposits were recorded directly below the artificial fill layer in the majority of positions across the Project Area. The deposits were described as loose to medium dense poorly graded silty or clayey sand. Laboratory classification tests support the geological descriptions with average particle distribution of 7 percent gravel, 76 percent sand and 17 percent fines. SPT N_{60} values recorded values between 7 and 49, with an average of 24, indicating the layer to be loose to medium dense.

2.1.4 Alluvium (Holocene): Clay

A consistent fine layer was recorded directly below the alluvial sand within Mocks Bottom. This material was described as interbedded layers of lean and fat clay of mixed plasticity. Laboratory classification tests indicate the material to be predominantly fine with average particle distribution of 9 percent gravel, 29 percent sand and 62 percent fines. Atterberg limits testing recorded the material to be predominantly medium to high plasticity clays.

2.1.5 Missoula Flood Deposits (Pleistocene): Silt

Two distinct layers of fine Missoula Flood Deposits were recorded within SIB. The first layer sits directly below the alluvial deposits and above the coarse Missoula Flood Deposits. A second fine

layer was noted below the coarse layers in localized areas. Both layers are typically described as sandy silt with layers of elastic silt. Laboratory classification tests indicate the material to be predominantly fine with average particle distribution of 35 percent sand and 65 percent fines. Atterberg limits testing indicates the material to behave as a medium silt.

2.1.6 Missoula Flood Deposits (Pleistocene): Sand

Coarse Missoula Flood Deposits were recorded directly below the fine clay layer, typically described as layers of loose to medium dense poorly graded sand with silt and silty sand. Occasional traces of fine gravel were noted. Laboratory classification tests support the geological descriptions with average particle distribution of 2 percent gravel, 82 percent sand and 16 percent fines. SPT N_{60} values recorded values between 1 and 65, with an average of 25. The results indicate the material to be predominantly medium dense with a slight increase in relative density with depth.

2.1.7 Troutdale Conglomerate

Troutdale conglomerate is the layer below the Missoula Flood Deposits. This stratum was not encountered within the ground investigations undertaken. The geological mapping (Madin, 2024) describes the material as friable to moderately strong conglomerates with minor interbeds of sandstone, siltstone, and claystone.

2.2 GROUNDWATER CONDITIONS

Based on the geotechnical investigation during the PDI (HGL, 2024) shallow groundwater is controlled by the water level within SIB. Geotechnical drilling and pore pressure dissipation tests from seismic cone penetration testing (sCPT) soundings indicate that groundwater elevations within the SIB Project Area range from approximately 6- to 27- ft NAVD88. This variation in groundwater levels is influenced by several factors, including topography, soil permeability, and seasonal changes.

2.3 VARIATIONS IN SUBSURFACE AND GROUNDWATER CONDITIONS

The subsurface stratigraphy generally follows a consistent sequence, but there are notable variations between Swan Island, the head of the basin, and Mocks Bottom. In the Swan Island on-land positions, fine alluvial deposits were not recorded. At the head of the basin, there is a significant layer of recent basin deposits both in-water and on-land, likely due to the infilling of the main channel of the Willamette River to create SIB. In contrast, fine alluvial deposits are consistently observed in the subsurface explorations at Mocks Bottom. These fine materials typically underlie coarse materials of the same geology. However, it is important to note that the fine alluvial materials and the underlying fine Missoula deposits are similar in field description, making it challenging to delineate the layers. This variation has been considered in the subsurface profiles described in the following section.

Localized zones of perched water are expected, particularly during and following the rainy season. These perched water zones occur due to variations in soil permeability and the presence of less permeable layers that trap water above the main groundwater table. Additionally, soil moisture

content will vary significantly, influenced by rainfall patterns and surface water infiltration. The irrigation of landscaped areas and potential leaks from water infrastructure can further affect groundwater levels and soil moisture content. These activities can create localized areas of higher moisture content and potentially contribute to perched water zones. It is important to consider these factors during the planning and construction phases to mitigate any adverse effects on the project.

Post-flooding, the drawdown of floodwaters could create an imbalance in pore pressures within a slope. The river level may recede faster than the soil drains, leading to excess pore pressure and instability of the existing slopes.

The groundwater conditions are heavily influenced by the water level within SIB. Ground investigations in the northern section of Mocks Bottom recorded groundwater levels between approximately 11 ft and 17 ft NAV88, corresponding to levels between OHW and MLW. The critical groundwater level is dependent on the design scenario and will be assessed on a case-by-case basis.

2.4 SUBSURFACE PROFILES

The following section presents the generalized subsurface profile considered for each of the design areas. The subsurface profiles have been developed across the SIB Project Area and are presented on Figures 2-1a to Figure 2-1r. It should be noted that the stratigraphy presented is generalized for each specific section; localized variation in the stratigraphy may exist and has been considered in the analysis.

2.4.1 Mocks Bottom – U.S. Coast Guard

The upland ground model for the USCG comprises artificial fill from ground level to an approximate depth of 23 ft. The base of the fill layer is considered to be level for design. The fill is underlain by a 10 ft layer of coarse alluvium and sequentially 45 ft of fine alluvium. The alluvium is assumed to thin out as it progresses to the toe of the slope. Missoula sand deposits are then present to depth (greater than 86.5 ft). The base of this layer was not determined.

The in-water ground model comprises approximately 5 ft of recent basin sediments, predominantly fine. This is underlain by 15 ft of alluvial sand. Missoula silt deposits are then present to depth (greater than 80 ft). The base of this layer was not determined.

2.4.2 Mocks Bottom – U.S. Navy

The upland ground model for the Navy comprises artificial fill from ground level to an approximate depth of 25 ft. This is underlain by a 15 ft layer of coarse alluvium and sequentially 10 ft of fine alluvium. The fine alluvium is assumed to thin out as it progresses to the toe of the slope. Missoula silt deposits are then present to depth (greater than 86.5 ft). The base of this layer was not determined.

In-water ground model is considered to be variable across the design area due to past dredging activity and the deposition of recent basin sediments. For the purposes of design, it is assumed a 12 ft layer of coarse recent basin sediments overlies 10 ft of Missoula silt deposits and sequentially Missoula Sand to depth (greater than 61.5 ft).

2.4.3 Mocks Bottom – The Marine Consortium, Inc.

The upland ground model for MC design reach comprises artificial fill from ground level to an approximate depth between of 18 and 23 ft. This is underlain by a 10 to 15 ft layer of coarse alluvium and sequentially 10 to 48 ft of fine alluvium. Both the coarse alluvium and fine alluvium is assumed to thin out as it progressed to the toe of the slope. Missoula silt deposits are then present to a max 78 ft. The base of the Missoula sand deposits was not determined (greater than 98 ft).

In-water ground model is considered to be variable across the design area due to past dredging activity and the deposition of recent basin sediments. A thin layer of coarse alluvium is assumed to be present at surface on the slope (5.5 ft). At the toe of the slope the alluvial deposits are not present and have most likely been removed by dredging. Surface material comprise basin sediments approximately 10 ft in depth, underlain by approximately 14.5 ft of Missoula silt deposits. Missoula sand deposits underlie this layer to a depth greater than 62.5 ft.

2.4.4 Mocks Bottom – Port of Portland Dredge Base

The upland ground model for the Dredge Base comprises artificial fill from ground level to an approximate depth of 28 ft. This is underlain by 20 ft of fine alluvium. The alluvium is assumed to thin out as it progressed to the toe of the slope. Missoula silt deposits are then present to a depth of 73 ft.

The in-water ground model is considered to be variable across the design area due to past dredging activity and the deposition of recent basin sediments. A thin layer (5.5 ft) is assumed to be present as you move towards the center of the basin. It is assumed in design to be present at the toe of the slope.

2.4.5 Mocks Bottom – ATC Leasing

The upland ground model for the ATC Leasing design reach comprises artificial fill from ground level to an approximate depth between of 12 and 21.5 ft. This is underlain by a 6.5 to 13 ft layer of coarse alluvium and sequentially 18 to 20 ft of fine alluvium. Missoula silt deposits are then present to a max 73 ft. The base of the Missoula sand deposits was not determined (greater than 121.5 ft).

The in-water ground model is considered to be variable across the design area due to past dredging activity and the deposition of recent basin sediments. A layer varying in depth (max recorded 16 ft depth) is assumed to be present as you move towards the center of the basin. It is assumed in design to be present at the toe of the slope.

2.4.6 Mocks Bottom –Berth 311

The upland ground model for the Berth 311 comprises artificial fill from ground level to an approximate depth of 12 to 15 ft. This is underlain by a 13-to-15-foot layer of coarse alluvium and sequentially 18 ft of fine alluvium. Missoula silt deposits are then present to a max 86 ft. The base of the Missoula sand deposits was not determined (greater than 121.5 ft).

The in-water ground model is considered to be variable across the design area due to past dredging activity and the deposition of recent basin sediments. A layer varying in depth (max recorded 16 ft depth) is assumed to be present as you move towards the center of the basin. It is assumed in design to be present at the toe of the slope.

2.4.7 Head of the Basin

The upland ground model for the head of the basin design area comprises artificial fill from ground level to an approximate depth of 33 ft. This is underlain by 35 ft of recent basin deposits. Missoula silt deposits are then present to a max 78 ft. The base of the Missoula sand deposits was not determined (greater than 120 ft).

The in-water ground model consists of recent basin deposits to a depth of 37 ft. This is underlain by Missoula Flood Deposits to a depth of 75 ft (base was not determined).

2.4.8 Swan Island – Freightliner Wind Tunnel

The upland ground model for Freightliner Wind Tunnel comprises artificial fill from ground level to an approximate depth of 24 ft. This is underlain by a 15-foot layer of coarse alluvium. Missoula silt deposits are then present to a maximum of depth of 69 ft and are underlain by Missoula sand deposits. The base of the Missoula sand deposits was not determined (greater than 86.5 ft).

The in-water ground model consists of recent basin deposits to a depth of 37 ft. This is underlain by Missoula Flood Deposits to a depth of 75 ft (base was not determined).

2.4.9 Swan Island – Berths 306, 307 and 308

The upland ground model for Berths 306, 307, and 308 comprises artificial fill from ground level to an approximate depth of 24 to 28 ft. This is underlain by a 15-to-20-ft layer of coarse alluvium. Missoula silt deposits are then present to a maximum depth of 69 ft and are underlain by Missoula sand deposits. The base of the Missoula sand deposits was recorded at 118 ft depth B-12. Below this a secondary Missoula silt deposit layer was recorded to a depth of 121.5 ft.

The in-water ground model consists of recent basin deposits to an approximate depth of 6 to 22 ft. This is underlain by Missoula silt deposits to an approximate depth between 12 and 35. Coarse Missoula Flood Deposits are recorded to a max depth of 75.5 ft (base was not determined).

2.4.10 Swan Island –Lagoon Wharf

The upland ground model comprises artificial fill from ground level to an approximate depth of 23 to 29 ft. This is underlain by approximately 20 to 30-ft layer of coarse alluvium. A silt layer is then present around 53 to 55 ft depth for approximately 30 to 35 ft. A Missoula sand deposit underlies the Missoula silt deposit layer with local thin layers of finer material. Then, based on in-water investigations and adjacent Berth 306 investigation data, the Missoula sand deposit layer is assumed to start at approximately 120 ft depth.

The in-water ground model consists of approximately 6-ft thick recent basin deposits at approximately -28 ft NAVD88. This is underlain by approximately 5 ft of coarse alluvium, approximately 10 ft of fine alluvium, and approximately 36 ft of coarse Missoula Flood Deposits, respectively. A fine-grained Missoula Flood deposit with unknown depth starts around -84 ft NAVD88.

2.4.11 Swan Island –Pier A and Quay Wall

The upland ground model comprises an artificial fill layer from ground level (35 ft NAVD88). Based on Swan Island Ship Repair Yard Quay Wall Structure Stability Evaluation Report (Roth and Ramage, 1975), the depth of the artificial fill is approximately 60 ft (at Pier A) and 60 to 70 ft (at Quay Wall). At Pier A, the artificial fill layer is underlain by a course alluvium layer with a thickness of approximately 14 ft. This is underlain by the cohesive Missoula flood deposit layer at approximately -34 to -38 ft NAVD88 with a thickness of approximately 11 to 16 ft. The cohesionless Missoula flood deposit layer starts at approximately -49 ft NAVD88 (the base was not determined).

Roth and Ramage (1975) highlighted that different methods were used during the placement of the artificial fill, namely (1) hydraulic method and (2) clamshell bucket and back dumping, and reported a method-dependent variability in the artificial fill characteristics. It was also stated that the fill material might have not been properly compacted and looser soil zones could be encountered.

The in-water ground model at the west of Quay Wall and south of Pier A consists of recent basin deposits to an approximate depth of 6 ft. This is underlain by the cohesionless Missoula flood deposit layer at approximately -50 ft NAVD88 (the base was not determined).

Similarly, the in-water ground model at the north of Pier A consists of recent basin deposits to an approximate depth of 7 to 8 ft at approximately -30 ft NAVD88. This is underlain by the cohesive Missoula flood deposit layer (approximately 11 ft), and then the cohesionless Missoula flood deposit layer, which starts at approximately -49 ft NAVD88, and its base was not determined.

2.4.12 Swan Island –Floating Dock and Demo Pier

The upland ground model surrounding the Floating Dock/East, West and Demo Pier comprises artificial fill from ground level to an approximate depth of 28.5 ft. This is underlain coarse alluvial deposits to a depth greater than 71.5 ft (base was not determined).

The in-water ground model consists of recent basin deposits to an approximate depth of 5 to 7 ft. This is underlain by coarse alluvial deposits to a maximum depth of 34.5 ft. Missoula flood deposits were recorded to a maximum depth of 57 ft (base was not determined).

3.0 GEOTECHNICAL AND SEISMIC DESIGN PARAMETERS

Geotechnical and seismic design parameters were developed based on the results of the SIB Project Area geotechnical investigation during the PDI (HGL, 2024), including the results of in situ and

laboratory testing, soil descriptions from borehole logs in the SIB Project Area, groundwater data, and published data and historical information from relevant sources.

3.1 GEOTECHNICAL DESIGN PARAMETERS

Geotechnical parameters for RD are detailed in Table 3-1, with the basis of interpretation provided in Attachment A. These parameters have been derived for the geotechnical design of riverbank stability, preliminary lateral pile analysis, and sediment cap design (bearing capacity and settlement). Additional geotechnical parameters, if required, will be included in subsequent sections. Attachment A includes a description of the derivation of the parameters discussed in the following sections.

3.1.1 Bulk Unit Weight

Bulk unit weight represents the weight of a material per unit volume, including the water content. It is required for calculating earth pressures, slope stability and bearing capacity in geotechnical design. Bulk unit weight varies with soil type, moisture content and compaction. Bulk unit weights have been estimated from initial bulk density from test results (Triaxial and direct shear tests), multiplied by g (acceleration due to gravity), these values were compared against parameters presented in published literature based on descriptions and in situ density measurements.

3.1.2 Drained Shear Strength

Drained shear strength parameters, including effective cohesion (c′) and the effective angle of internal friction (ϕ’), are essential for evaluating the long-term stability and behavior of soils. Effective cohesion represents the shear strength due to interparticle forces, while the effective angle of internal friction reflects the shear strength from particle friction. These values have been determined through laboratory tests including triaxial compression and direct shear tests under drained conditions. Drained shear strength has been correlated with SPT and CPT data collected during the field investigation. Empirical correlations are presented in Attachment A.

3.1.3 Undrained Shear Strength

Undrained shear strength (Su) is a key parameter for assessing the short-term stability of soils, particularly in fine soils. Undrained shear strength is independent of normal stress and has been determined through triaxial compression under undrained conditions. Undrained shear strength has been correlated with SPT and CPT. Empirical correlations are presented in Attachment A.

3.1.4 Consolidation Parameters

Consolidation parameters have been determined within SIB to predict the settlement of the material beneath the proposed cap. These parameters are particularly relevant for fine-grained materials. Since the cap will consist entirely of coarse-grained material, consolidation-related settlement of the cap is not anticipated.

The compression index (C'_c) and recompression index (C'_r) are parameters used to define the compressibility of soils. The compression index represents the slope of the virgin compression curve on a plot of void ratio versus the logarithm of effective stress, indicating how much a soil

will compress under a given load. The recompression index, on the other hand, represents the slope of the rebound-recompression curve, which is used for overconsolidated soils. This index describes the soil's behavior when it is unloaded and then reloaded.

Permeability values in addition to the compression indices have been used to determine the coefficient of consolidation for time-dependent settlement analysis. Derivation of consolidation parameters are discussed further in Attachment A.

3.1.5 Lateral Earth Pressure Parameters

Lateral earth pressure parameters are required for designing retaining structures. These parameters include the active earth pressure coefficient (K_a), passive earth pressure coefficient (K_p), and at-rest earth pressure coefficient (K_0). The active earth pressure occurs when a retaining wall moves away from the soil, reducing the lateral pressure exerted by the soil. Conversely, passive earth pressure develops when the wall moves towards the soil, increasing the lateral pressure. The at-rest earth pressure is the lateral pressure exerted by the soil when the wall does not move. At-rest earth pressure has been determined based on correlations with internal friction angle for normally consolidated material. Empirical correlations are presented in Attachment A.

3.2 SEISMIC DESIGN PARAMETERS

The SIB Project Area is located within an active seismic region with the CSZ as the hazard-controlling seismic source capable of generating large-magnitude earthquakes including megathrust interface events. Also, shallow crustal sources including the Portland Hills fault contributes to the seismic hazards at the Project Area, which are shown in Figure 2-5 of Geotechnical Data Report (Appendix F of PDI ER; HGL, 2024).

The design-level earthquakes considered include the CLE and the Design Earthquake (DE), consistent with EPA and U.S. Army Corps of Engineers guidance for critical infrastructure. The CLE is defined in the Remedial Design Guidelines and Considerations (RDGC; EPA, 2021b) while the DE is based on ASCE 61-14 and ASCE 7-22. CLE ground motions are based on a 10 percent probability of exceedance in 50 years (i.e., a return period of 475 years) and represent the appropriate seismic hazard level for the majority of the RD. DE ground motions are defined by two thirds of Risk-targeted Maximum Considered Earthquake (MCER) based on a 2 percent probability of exceedance in 50 years (i.e., a return period of 2,475 years) and should only be used when considering structures designed in accordance with ASCE 61-14. Seismic design parameters were developed based on two unique seismic hazard levels, a CLE as defined in the Remedial Design Guidelines and Considerations (RDGC) (EPA, 2021b), and a Design Earthquake (DE) based on ASCE 61-14 and ASCE 7-22. CLE ground motions are based on a 10 percent probability of exceedance in 50 years (i.e., a return period of 475 years) and represent the appropriate seismic hazard level for the majority of the RD. DE ground motions are based on a 2 percent probability of exceedance in 50 years (i.e., a return period of 2,475 years) and should only be used when considering structures designed in accordance with ASCE 61-14.

The 2018 U.S. Geological Survey (USGS) National Seismic Hazard Model (NSHM; Powers et al., 2021) was employed in the seismic hazard assessment. The coordinates used to represent the

SIB Project Area in the seismic hazard analysis, shown in the World Geodetic System 1984 (WGS84) coordinate system, are:

- Latitude – 45.56617 N
- Longitude – -122.71595 E

3.2.1 Seismic Site Class

Based on shear wave velocity (V_S) data collected during the PDI (HGL, 2024), the SIB Project Area has a time-averaged shear wave velocity in the upper 30 meters or 100 ft (V_{S30}) of 615 ft per second (ft/sec) or 188 meters per second (m/s). This V_{S30} value corresponds to Site Class DE, loose sand or medium stiff clay, based on Table 20.2-1 of ASCE 7-22. Accordingly, CLE and DE ground motions were estimated for Site Class DE (a V_{S30} of 185 m/s). The V_S data used for V_{S30} development include compressional (P) and shear (S) wave suspension logging and Seismic CPT (SCPT) data (HGL, 2024), presented in Figure 5-3 of Geotechnical Data Report (HGL, 2024). Geotechnical investigation locations where P-S suspension logging was performed, and where SCPT data was collected, are shown in Figure 1-1.

It should be noted that Section 20.2.1 of ASCE 7-22 dictates that if the site soil profile includes soils vulnerable to potential failure or collapse under seismic loading, such as liquefiable soils, the site should be classified as Site Class F, and a site response analysis is required. However, this applies only to structures that have fundamental periods of vibration greater than 0.5 sec.

Based on our current understanding of the RD, the estimated fundamental periods of vibration of the new structures and sliding masses are less than 0.5 seconds. If structures or sliding masses with estimated fundamental periods of vibration greater than 0.5 seconds are incorporated into the final design, the seismic site class determination should be reconsidered, and a site response analysis will likely be required.

3.2.2 Earthquake Ground Motions

CLE ground motion parameters were determined with the Uniform Hazard Response Spectrum (UHRS) associated with the 475-year return period from the 2018 USGS NSHM (Powers et al., 2021) using the USGS Earthquake Hazard Toolbox (USGS, 2024). DE ground motion parameters per Section 11.4.5 of ASCE 7-22 were obtained from the ASCE 7 Hazard Tool (ASCE, 2024).

The 5 percent damped design earthquake response spectra for CLE and DE are shown in Figure 3-2 and Figure 3-3, respectively.

3.2.3 Seismic Hazard Disaggregation

A disaggregation of the total seismic hazard per the 2018 USGS NSHM was performed using the USGS Earthquake Hazard Toolbox (USGS, 2024). The disaggregation was performed to identify the principal individual sources contributing to the total seismic hazard at the Project Area.

Disaggregation results for Peak Ground Acceleration (PGA) include modal values of earthquake magnitude (M_W) and source-to-site distance (R) associated with the source most contributing to the seismic hazard at the Project Area. The results for the return periods of 475 years and 2,475

years are presented in Figure 3-4. The hazard-controlling seismic source was determined as the CSZ (interface), with a governing Mw of approximately 9.1 and R of 76 km, and considered in the liquefaction triggering analysis.

4.0 GEOTECHNICAL DESIGN CONSIDERATIONS

The ROD (EPA, 2017) provides a framework for cleanup decisions based on contamination levels and areas needing remediation. The project team has set design goals using this framework and previous investigation results. Key geotechnical considerations include stability of riverbanks and underwater slopes, cap requirements, seismic impacts, and erosion risks. The following sections explains how these considerations have been addressed as part of the Pre-Final 90% RD.

4.1 LIQUEFACTION

Earthquake-induced soil liquefaction can be described as a significant loss of soil strength and stiffness caused by an increase in pore water pressure resulting from cyclic loading during shaking. Liquefaction is most prevalent in loose to medium dense, saturated, granular soils, but can also occur in non-plastic to low-plasticity finer grained soils.

The potential consequences of liquefaction include, but are not limited to, increased lateral earth pressures on retaining walls, liquefaction induced settlement, and lateral spreading or “flow failures” in slopes.

4.1.1 Liquefaction Triggering Evaluation

For layers that met the compositional criteria, liquefaction triggering (factor of safety) analyses was performed using CLiq, Version 3.5.22 (GeoLogismiki 2007) and the procedures proposed by Boulanger and Idriss (2014). The analyses utilized both SPT data, and CPT tip resistance data collected as part of the geotechnical investigation. The SPT-based assessment was performed to supplement the CPT-based analysis by filling spatial gaps between CPT locations, specifically when considering the lateral continuity of identified liquefiable layers. A groundwater elevation of 20 ft (NAVD88), which is consistent with the OHW elevation within the SIB Project Area, was considered during liquefaction triggering analysis.

Peak ground acceleration (PGA) at the ground surface and earthquake magnitude (MW) represent the seismic demand input parameters required for SPT and CPT-based liquefaction triggering evaluation. The PGA and MW for the CLE were considered in the liquefaction triggering analysis presented herein.

The Geotechnical Data Report (HGL, 2024) indicates the liquefaction susceptibility at the Project Area should be considered very high, which was in line with the overall results from the liquefaction triggering analyses for the CLE event. Based on our liquefaction triggering analyses, all SPT and CPT locations analyzed appeared to have potentially liquefiable soils at various depths and thicknesses.

Liquefaction triggering of low plasticity fine-grained soils was also assessed by the procedure per Bray and Sancio (2006) using the Atterberg limits and water contents data from laboratory tests. The used laboratory test data were from all the boreholes considered in the SPT-based simplified

procedure. The data showed most of these fine-grained soils were not susceptible to liquefaction Also, fine-grained soils encountered in the geotechnical borings typically have a plasticity index (PI) of about 7 or higher, indicating clay-like behavior/potentially cyclic softening material (Boulanger and Idriss, 2006).

Liquefaction analysis reports that summarize the input parameters and analysis results for each CPT and SPT location analyzed were generated in CLiq and are presented in Attachment B.

4.1.2 Ground Motions for Liquefaction Analysis

Peak ground acceleration (PGA) at the ground surface and earthquake M represent the seismic demand input parameters required for SPT and CPT based liquefaction triggering evaluation. The PGA and earthquake M considered in Final RD liquefaction triggering analysis were based on CLE and DE seismic events and the seismic hazard disaggregation data described in Section 3.2.3. The analysis presented at this Final RD phase is based on a M of 9.08 and R of 75.5 kilometers, which is associated with a full rupture of the CSZ.

4.1.3 Liquefaction Potential Index

Liquefaction Potential Index (LPI) represents the liquefaction severity (damage potential) based on the cumulative liquefaction response of a given profile (NASEM, 2016). LPI can range from 0 to 100. LPI <5 generally indicates little liquefaction occurred while LPI >15 shows severe liquefaction (Iwasaki et al., 1978). The majority of the LPI values estimated as part of the liquefaction analysis exceed 15, indicating the probable occurrence of severe liquefaction (high liquefaction risk).

4.1.4 Liquefaction Induced Settlement

Liquefaction-related shear and volumetric strains are correlated to the results of liquefaction triggering analyses by Ishihara and Yoshimine (1992) and many others. The Ishihara and Yoshimine (1992) procedure was used to estimate the volumetric strain as a function of factor of safety against liquefaction, relative density, and normalized CPT tip resistance.

Estimated seismic settlement at in-water CPTs ranged from 3.2 to 15.9 inches (8.1 to 40.4 centimeters [cm]), with the maximum estimated seismic settlement of 15.9 inches (40.4 cm) observed at SCPTW-11.

It is noted that the empirical model (Ishihara & Yoshimine, 1992) used herein was developed based on laboratory test data of clean sands and hence, the estimated settlements are generally considered conservative for the in situ soils with fines similar to the Project Area.

Estimates of liquefaction induced settlement are included in each CPT based liquefaction analysis report presented in Attachment B and on Figure 4-1.

4.1.5 Liquefaction Induced Lateral Spreading

Lateral spreading is a potential hazard commonly associated with liquefaction where extensional ground cracking and settlement occurs as a response to lateral migration of subsurface liquefiable

material. These phenomena typically occur adjacent to free faces such as slopes that surround the majority of SIB.

For a given SPT or CPT profile, Lateral Displacement Index (LDI) was computed from maximum shear strains (γ_{max}) by the following equation from Zhang et al. (2004):

$$LDI = \int \gamma_{max}\, dz$$

Youd et al. (2001) suggests the depth threshold of 23 m (about 75 ft) below ground surface as a validated range for CPT-based methodology when computing LDI. Then, the empirical correlations from Zhang et al. (2004) were used to estimate liquefaction-induced lateral displacement from LDI considering topography effects from free face nearby (based on L/H) and site's ground slope (based on S) as follows.

$$LD_{free\ face} = 6\ LDI\ \left(\frac{L}{H}\right)^{-0.8}\ where\ 4 < \frac{L}{H} < 40$$

$$LD_{Ground\ Slope} = LDI\ (S + 0.2)\ where\ 0.2 < S < 3.5$$

where L is the distance between the free face to the location of interest; and H is the depth of free face; S is the site's ground slope (%). The overall trendline from these empirical equations shows that lateral displacement (LD/LDI) decreases with decreasing S (less ground sloping) and increasing distance to height ratio of free face (L/H). It is noted that there are applicable ranges in terms of L/H ratio and S values stemming from the limited case history data based on which the empirical models were developed.

A total of 20 data were used in estimating the lateral spreading displacements: 16 SPTs and 4 SCPTs. However, most of the data were out of the applicable range of the L/H ratio (below 4; i.e., too close to the free face) except for only three SPT data: B-06, B-07, and B-09 with their ratios of 4.5, 4.7, and 6.6, respectively.

It is noted that the Zhang et al. model was developed based on data from free faces without engineered structures (retaining walls, quay walls). With the slopes of this Project Area including engineered structures, the estimates from the Zhang et al. model are considered overly conservative and lower lateral displacements than the model's estimates are anticipated.

4.1.6 Liquefaction and Lateral Spreading Design Considerations

Based on the magnitude and variability of the potential ground deformation associated with both CLE and DE level seismic events, differential horizontal and vertical displacement of sediment caps and riverbank slopes should be anticipated over the design life of the RA and could lead to exposure of contaminated sediment.

Mitigating measures to avoid exposure of capped materials following a CLE have been considered, and where possible have been incorporated into the RD. These measures include slope reconfiguration and reconstruction, structural elements including retaining walls and pinning piles, as well as the use of geotextiles. The incorporation of these mitigating measures into the RD will help limit the potential for exposure of capped materials following a CLE level seismic event, SIB Project Area-wide mitigation of earthquake-induced soil liquefaction, specifically for liquefaction

induced settlement and for ground motions that exceed CLE parameters, is not practical and would likely be ineffective with regard to chemical isolation.

The RA Operations and Maintenance Plan should include a post-seismic event maintenance and repair plan that establishes, at a minimum, a cap monitoring methodology and frequency, proposed ground motion triggers for post-event cap inspections, and target durations for cap repair after damaging earthquake events.

4.2 SEDIMENT CAP DESIGN

Geotechnical aspects of cap design and the underlying sediment were considered as part of the RD. These considerations are crucial in capping because contaminated sediments are typically fine-grained and may have high water content and low shear strength (Palermo et al., 1998a). Geotechnical analysis was driven by the hypothetical chemical isolation and erosion protection layer alternatives presented in the Cap Design Technical Memorandum, and the guidance described in the RDGC (EPA, 2021b) and *Guidance for In-Situ Subaqueous Capping of Contaminated Sediments* (Palermo et al., 1998b). Geotechnical considerations evaluated for cap stability included:

- Representative section development and identification of risks and failure modes;
- Bearing capacity analysis;
- Settlement analysis;
- Filter design;
- Evaluation of liquefaction susceptibility; and
- Static and pseudo-static cap stability analysis.

4.2.1 Bearing Capacity

Bearing capacity of near-surface sediment material was evaluated using methods described in *Guidance for In-Situ Subaqueous Capping of Contaminated Sediments* (Palermo et al., 1998b). The analysis methodology is based on fundamental bearing failure equations (Terzaghi and Peck, 1967) and provides an estimated maximum allowable cap lift thickness based on the unit weight of the proposed cap, the undrained shear strength of the underlying sediment, and includes a factor of safety of 3.0. Further details on the bearing capacity calculation are provided in Attachment C.

Based on the bearing capacity calculation presented in Attachment C, an initial maximum lift thickness of 3.5 ft may be placed while maintaining the target FoS. To ensure stability and mitigate localized bearing failures, the construction team should adopt an observational approach, regularly assessing activities and progress. If bearing capacity issues arise, adjustments such as slower material placement or thinner application layers may be necessary.

4.2.2 Consolidation Settlement

Consolidation settlement of the cap supporting sediment material was evaluated using Settle3 by Rocscience, a commercially available settlement analysis program. The Settle3 model allows for caps loads to be applied in stages, in accordance with the planned construction sequencing and timing, and computes both elastic settlement and heave (rebound), and time-dependent

consolidation settlement. Settlement analysis, based on an assumed uniform cap load applied in a single stage was developed to estimate the approximate, total, post-construction settlement of an engineered sediment cap. The cap settlement model was based on the project ground model and geotechnical design parameters discussed in Section 3.1. The granular composition of the cap material ensures that it does not undergo consolidation settlement itself and therefore not discussed further.

Settlement analysis indicates that, under a load equivalent to a 3.5-ft cap lift, approximately 20 inches of total consolidation settlement (including both primary and secondary settlement) is expected under worst-case ground conditions at the head of SIB, where compressible sediments are thickest. This estimate reflects conservative assumptions and ensures that the design accounts for both immediate and long-term settlement behavior of the underlying soils, supporting cap performance across the Project Area. Additional details on consolidation parameters, assumptions, and calculation methodology are provided in Attachment C

Variations in compressible sediment thickness and net loading changes (dredge thickness versus cap placement) across the Project Area can lead to differential subgrade settlement. The dominant source of variability in the settlement response is the extent dredging occurs prior to cap placement. Dredging directly controls the net vertical effective stress change on the underlying compressible sediments at the time of capping, for example:

- If no dredging is performed, the full cap thickness represents a net load increase on the subgrade, and settlements approach the worst-case consolidated values summarized above (approximately 20 inches under the head-of-SIB model).
- If dredging depth is approximately equal to the cap thickness, the net stress change is reduced, resulting in minimal to moderate consolidation settlement proportional to the residual net load from differences in weight of cap materials to the replaced sediment.
- If dredging exceeds the cap thickness, the net increase in stress on the underlying sediments is zero or negative, and consolidation settlement of the underlying sediments is expected to be negligible.

The differential settlement noted above may result in surficial undulation of the cap. Based on the estimated magnitude of differential subgrade settlement across the Project Area and the dredging geometry presented in the design, the associated undulation of the cap surface is not anticipated to compromise the overall performance or functionality of the cap.

The settlement of the cap and discussed undulation can affect interpretation of bathymetric survey data used to confirm cap thickness. Settlement may be misread as cap “thinning” when surveys are interpreted. Integrating thickness probing with routine bathymetric surveys will help ensure that maintenance decisions are based on accurate interpretations of settlement and cap integrity, supporting long-term stability and effectiveness of the environmental cap.

4.2.3 Filter Design

Grain size compatibility between cap materials and native sediment was evaluated with respect to the potential for vertical migration of both sediment and cap materials. Filter design was evaluated

based on *Gradation Design of Sand and Gravel Filters* (USDA, 2017). Sediment soils evaluated included elastic silt (MH) from BW-15 (sample #2 at 3 ft [90 cm]), which is representative of the controlling material type with respect to grain size compatibility between cap materials and native sediment. Sand cap material was based on Oregon Department of Transportation (ODOT) fine concrete aggregate (based on Table 02690-5). The erosion protection material (gravel) evaluated was based on ODOT coarse concrete aggregate (ODOT, 2024), which is comprised primarily of aggregates with a nominal size of less than 1 inch and greater than the aperture of a #4 sieve. The gravel material evaluated in the filter design is consistent with the erosion protection material for Cap Type 1 (habitat gravel). Erosion protection material for Cap Type 2 (3-inch median diameter angular rock) was also evaluated and determined to be compatible with the underlying sand in the filter analysis. The materials evaluated for the filter design are consistent with erosion protection requirements described in the Cap Design Technical Memorandum (Volume I, Appendix E) and the project specifications.

Filter design analysis results indicate that the anticipated cap material types adequately limit the potential of vertical migration of both sediment and cap materials.

4.2.4 Cap Slope Stability

In-water sediment cap slope stability was evaluated with 2D limit-equilibrium analysis using Slide2 by Rocscience and based on a minimum static factor of safety of 1.5, and a minimum pseudo-static (non-liquefied) factor of safety of 1.1 (ODOT, 2024). Additionally, the potential for liquefaction-induced flow failure (cap material section only) was evaluated using conventional limit equilibrium slope stability analyses and residual undrained shear strength parameters for the liquefied cap material (analysis decoupled from all seismic inertial forces). Static 2D limit-equilibrium analysis results were also checked against infinite slope chart solutions for general agreement.

A horizontal seismic coefficient of 0.12 was used in pseudo-static stability analyses. The horizontal seismic coefficient was estimated as a half of the mapped peak ground acceleration (ODOT, 2024) of 0.234 g (2018 Conterminous U.S. National Seismic Hazard Map) for a CLE seismic event (10 percent probability of exceedance in 50 years, 475-year return period) and does not include a slope height reduction factor.

Design of in-water caps should be based on slope gradients of approximately 3 horizontal to 1 vertical ratio (3H:1V) (±19 degrees) or flatter. Details regarding the stability evaluations performed as part of the riverbank slope design process, including engineered caps on slopes that are steeper than 3H:1V, are discussed in Section 4.3 and Attachment C.

4.3 RIVERBANK SLOPES

The stability of riverbanks, both above and below the water level, has been assessed to evaluate the effectiveness of the RD. This assessment is essential for understanding the localized impacts on the design and implementation of remedial activities.

In most locations within the SIB Project Area, the RD entails the removal, grading, and placement of material on existing riverbanks. The following section outlines the considerations for global slope stability for the Pre-Final 90% RD.

4.3.1 Slope Stability

The slope design has been undertaken based on an RD focused on the removal of soil exceeding remedial action levels, while limiting the impact on existing marine structures (i.e., no net change in loading condition on existing structures).

The existing riverbanks have been assessed to be currently marginally stable, with localized areas of instability. The riverbank reconnaissance conducted during the PDI noted multiple areas of surficial soil movements (HGL, 2024). Slope stability analysis has been undertaken for the existing and proposed remedial conditions and reported in Attachment C. The results of the stability analyses confirmed that some of the existing slopes will require reconfiguration as part of the RD. The aim of the reconfiguration is to flatten the slopes to a stable angle, while limiting the impact on the shoreline and overwater structures.

4.3.2 Riverbank Stability Analysis

Slope stability has been assessed using the factor of safety (FoS), which is the ratio of resisting forces or moments to driving forces or moments. As the FoS nears 1.0, deformation increases and becomes uncontrollable at unity (1.0). Fine-grained soils, being sensitive to loading timing and rate, necessitate categorizing slope stability analyses into short-term and long-term loading. For stability, slopes require a minimum FoS of 1.3 during short-term construction loading, and a minimum FoS of 1.5 during long-term static conditions.

Each design area has been evaluated using existing geometry, stratigraphy, and groundwater conditions. Slope stability analysis details, and analysis output cross-sections for select design reaches are presented in Attachment C.

In general, a maximum slope gradient of 2.5H:1V and 2.75H:1V is recommended for both temporary and permanent unreinforced riverbank slopes. Riverbank slope design recommendations are summarized in Table 4-1 and presented graphically on Figure 4-2.

4.4 SHORELINE AND OVERWATER STRUCTURES

Each structure within the SIB Project Area has been assessed against the RD requirements for dredging, capping, and geotechnical stability. Where applicable, measures have been designed to maintain functionality and mitigate against the risk of damage to the structure. In some cases, to achieve the Remedial Action Objectives (RAOs), toe walls or other slope stabilizing structures have been designed. In cases where slope stabilization methods are not sufficient, the complete removal/replacement of structures has been specified. A detailed summary of the design considerations and design outcomes for all structures within the SIB Project Area is presented in Volume I, Appendix J (Structural Design Technical Memorandum).

The new and existing structures within the SIB Project Area have been assessed for geotechnical stability. The new structures required to achieve both slope stability and RAOs included a new toe

wall at the USCG, slope stabilization pinning walls at the Marine Consortium, rock buttressing at Quay Wall and Pier A, and replacement of functional structures (Berth 306 and Berth 307) (Attachment D). The geotechnical assessment for existing structures impacted by RD requirements, including Pier A and Quay Wall, is presented in detail in Attachment E.

5.0 CONSTRUCTION AND MONITORING CONSIDERATIONS

5.1 CONSTRUCTION

A pre-construction survey should be performed prior to the start of construction to document the existing condition of structures, improvements, walls, and utilities within the SIB Project Area.

The pre-construction survey should include a topographic survey and photographs that adequately document the existing conditions. If appropriate, diagrams and sketches of the distressed areas should be included. The photographs and any supporting documents should be catalogued for each existing facility where data was collected. The pre-construction survey should be performed in accordance with the Project Specifications (Section 02 21 00) and will serve as a baseline for the assessment of slope deformation and structural deflection or distress observed during or following construction.

Construction activities could result in excessive deformations or ground losses that lead to vertical settlements adjacent to excavations, which may affect adjacent structures. Instrumentation should be installed to monitor the response of the ground and adjacent structures, utilities, and pavement to construction activities. Settlement Monitoring Points (SMs) should be installed and monitored in accordance with Specification Section 31 09 00.

5.2 POST CONSTRUCTION

The newly constructed slopes and sediment cap will be exposed to significant hydraulic forces shortly after installation. To establish a reference condition, a baseline survey of the slope erosion protection features and the sediment cap should be conducted immediately following construction. This baseline will serve as a benchmark for future evaluations of slope and cap performance. The same features should be reassessed during each 5-year review cycle to verify continued effectiveness. Slope protection elements should be inspected for signs of damage or degradation after each major storm event.

5.3 SEISMIC HAZARD OPERATION AND MANAGEMENT

Liquefaction-induced deformations resulting from a CLE event could significantly compromise the performance of remedial design measures, including both riverbank slopes and the in-water sediment cap. A common and effective mitigation strategy could involve ground improvement techniques such as deep soil mixing. However, due to the depth and extent of potentially liquefiable materials within the SIB project area, a design that completely mitigates the seismic hazards associated with a CLE event is not practical from a cost and constructability perspective. A more practicable and readily implementable alternative, such as a strategy that uses a timely, post-event inspection and maintenance/repair, should be implemented to identify and then address potential damage following seismic shaking that could trigger liquefaction.

6.0 REFERENCES

American Society of Civil Engineers (ASCE), 2014. Seismic Design of Piers and Wharves, ASCE 61-14. American Society of Civil Engineers, Reston, Virginia

ASCE, 2022. Minimum Design Loads and Associated Criteria for Buildings and Other Structures, ASCE 7-22. American Society of Civil Engineers, Reston, Virginia.

ASCE, 2024. *ASCE 7 Hazard Tool.* At URL https://asce7hazardtool.online/

Beeson, M.H., Tolan, T.L., and Maudin, I.P., 1991. Geologic map of the Portland Quadrangle, Multnomah and Washington counties, Oregon and Clark County, Washington: Portland, Oregon, Oregon Department of Geology and Mineral Industries.

Benito, G., and O'Connor, J.E., 2003. "Number and size of last-glacial Missoula floods in the Columbia River valley between the Pasco Basin, Washington, and Portland, Oregon," *Geological Society of America Bulletin* 115, no. 5, p. 624–638.

Brown and Caldwell, Jacobs Associates, Garry Struthers Associates, 2008. Portsmouth Force Main 100% Design Geotechnical Data Report for Willamette River CSO Program, BES Project No. 6902. Prepared for the City of Portland, June 9.GeoLogismiki, 2007. Geotechnical Software for Analysis and Design: Athens, Greece, GeoLogismiki.

Goldfinger, C., Nelson, C.H., Johnson, J.E., Morey, A.E., Gutierrez-Pastor, J., Karabanov, E., Eriksson, A.T., Gracia, E., Dunhill, G., Patton, J., Enkin, R., Dallimore, A., Vallier, T., and the Shipboard Scientific Parties, 2012. "Turbidite event history: methods and implications for Holocene paleoseismicity of the Cascadia subduction zone," U.S. Geological Survey Professional Paper, Publisher, 1661-F, xx p.

HydroGeoLogic, Inc. (HGL), 2024. Pre-Design Investigation Evaluation Report. Revision 2. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. December.

Idriss, I. M., & Boulanger, R. W., 2008. Soil Liquefaction During Earthquakes. Earthquake Engineering Research Institute, Oakland, California.

Ishihara, K., and Yoshimine, M., 1992. "Evaluation of Settlements in Sand Deposits Following Liquefaction During Earthquakes." Soils and Foundations, Volume 32, Issue 1, Pages 173-188

Ma L., Madin, I.P., Duplantis, S., and Williams, K.J., 2012. Lidar-Based Surficial Geologic Map and Database of the Greater Portland Area, Clackamas, Columbia, Marion, Multnomah, Washington, and Yamhill Counties, Oregon, and Clark County, Washington. Open-File Report O-12-02.

Madin, I.P., 2004, Preliminary digital geologic compilation map of the Greater Portland Urban Area, Oregon: Portland, Oreg., Oregon Dept. of Geology and Mineral Industries Open-File Report O-04-02, scale 1:24,000.

Oregon Department of Transportation (ODOT), Geotechnical Design Manual (GDM), 2024. Oregon Department of Transportation, Salem, Oregon.

Oregon Seismic Safety Policy Advisory Commission (OSSPAC), 2013. The Oregon Resilience Plan: Reducing Risk and Improving Recovery for the Next Cascadia Earthquake and Tsunami. Oregon Seismic Safety Policy Advisory Commission, Salem, Oregon.

Palermo, M.R., Clausner, J.E., Rollings, M.P., Williams, G.L., Myers, T.E., Fredette, T.J., and Randall, R.E., 1998a. Guidance for subaqueous dredged material capping. Technical Report DOER-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, at URL https://semspub.epa.gov/work/HQ/189671.pdf.

Palermo, M., Maynord, S., Miller, J., and Reible, D., 1998b. Guidance for In-situ Subaqueous Capping of Contaminated Sediments, EPA 905-896-004. Great Lakes National Program Office, Chicago, IL. September

Powers, P.M., Rezaeian, S., Shumway, A., Petersen, M.D., Luco, N., Boyd, O.S., Moschetti, M.P., Frankel, A., Thompson, E.M. (2021). "The 2018 update of the US National Seismic Hazard Model: Ground motion models in the western US." Earthquake Spectra, 31(1), S1–S30.

Roth, H.R. and Ramage, J., 1975. *Swan Island Ship Repair Yard Quay Wall Structure Stability Evaluation*, Port of Portland, Oregon, December 1975.

Terzaghi, K., and Peck, R.B., 1967. Soil Mechanics in Engineering Practice, 2nd Edition. John Wiley & Sons, 729 pages

U.S. Department of Agriculture (USDA), 2017. Gradation Design of Sand and Gravel Filters. Chapter 26, Part 633, National Engineering Handbook. United States Department of Agriculture, Natural Resources Conservation Service.

U.S. Geological Survey (USGS). *USGS Earthquake Hazard Toolbox.* At URL https://earthquake.usgs.gov/nshmp/.

U.S. Environmental Protection Agency (EPA), 2017a. Record of Decision, Portland Harbor Superfund Site, Portland Oregon. United States. Environmental Protection Agency Region 10, Seattle, Washington.

EPA, 2021a. Administrative Settlement Agreement and Order on Consent for Remedial Design. Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10. January 20.

EPA, 2021b. Remedial Design Guidelines and Considerations, Portland Harbor Superfund Site. Portland, Oregon. April 23.

Waitt, R.B., 1985. "Case for periodic, colossal jökulhlaups from Pleistocene glacial Lake Missoula," Geological Society of America Bulletin 96, no. 10 (October 1985): pp. 1271–1286.

Waitt, R.B., Denlinger, R.P., and O'Connor, J.E., 2009. "Many monstrous Missoula floods down Channeled Scabland and Columbia Valley," in Volcanoes to Vineyards: Geologic Field Trips through the Dynamic Landscapes of the Pacific Northwest, ed. O'Connor, J.E., Dorsey, R.J., and Madin, I.P. Geological Society of America Field Guide 15, pp. 775–844.

Wells, R.E., Haugerud, R.A., Niem, A.R., Niem, W.A., Ma, L., Evarts, R.C., O'Connor, J.E., Madin, I.P., Sherrod, D.R., Beeson, M.H., Tolan, T.L., Wheeler, K.L., Hanson, W.B., and Sawlan, M.G., 2020. "Geologic Map of the Greater Portland Metropolitan Area and Surrounding Region, Oregon and Washington," U.S. Geological Survey Scientific Investigations Map 3443, pamphlet iv, 55 p., 2 sheets, scale 1:63,360, https://doi.org/10.3133/sim3443.

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Attachment D New Marine Structures
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TABLES

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Table 3-1
Geotechnical Parameters for Design
Geotechnical Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Engineering Soil Unit	Material Behavior	Bulk Unit Weight γ (pcf)	Angle of Internal Friction φ' (degrees)[a]	Cohesion c' (psf)	Undrained Shear Strength Su (psf)	Residual shear strength ratio for liquefied soils	C'c	C'r	k (ft/year)[c]	K0	Poisson's Ratio (v)
Artificial Fill	Cohesionless	110	32 – 36	0	-	0.131	-	-	-	0.45	0.3
Recent Basin Sediment – Mocks Bottom	Cohesionless	105	32 – 34	0	-	0.161	-	-	-	0.45	0.35
Recent Basin Sediment – Swan Island	Cohesive	95	30 – 33	0	200 - 300	0.161	0.9	0.08	0.103 – 10.3	0.47	0.45
Alluvium – Sand	Cohesionless	115 @ EL ≥ 0 ft 120 @ EL < 0 ft	32 – 34 @ EL ≥ -10 ft 34 – 36 @ EL < -10 ft	0	-	0.131	-	-	-	0.45	0.25
Alluvium – Clay	Cohesive	105	24 – 26	0 - 75	800 @ EL ≥ -5 -20(EL+5) + 800 @ EL < -5 (max 1450 psf)	0.131	0.5	0.03	0.103 – 10.3	0.58	0.40
Missoula Flood Deposits – Silt	Cohesive	110	31 – 33	0 - 150	<u>Mocks Bottom</u> 1100 @ EL ≥ -8 -10(EL+8) + 1100 @ EL < -8 (max 1500 psf)	0.131	0.45	0.03	10.3	0.47	0.40
					<u>Swan Island</u> 1500 @ EL ≥ -8 -25(EL+8) + 1500 @ EL < -8 (max 2500 psf)				10.3		
Missoula Flood Deposits - Sand	Cohesionless	120	33 - 35 @ EL ≥ -80 ft 35 - 38 @ EL < -80 ft	0	-	0.131	-	-	-	0.45	0.30

<u>Footnotes:</u>
a) Sensitivity checks - range has been provided for sensitivity analyses based on the potential for variability within the project wide engineering units
b) Parameters have been derived for the geotechnical design of riverbank stability, preliminary lateral pile analysis, and sediment cap design (bearing capacity and settlement).
c) Permeability been used to determine the coefficient of consolidation for time-dependent settlement analysis. Refer to Attachment A for further detail.

<u>Acronyms and Abbreviations:</u>
≥ = greater than or equal to
< = less than
ϕ' = internal friction
c' = effective cohesion
C'c = compression index
C'r = recompression index
k = permeability
EL = Elevation in NAVD88
ft = feet
Ko = at-rest earth pressure coefficient
NAVD88 = North American Vertical Datum of 1988
pcf = pounds per cubic foot
psf = pounds per square foot
Su = Undrained shear strength

Table 4-1
Summary of Slope Design Recommendations
Geotechnical Design Technical Memorandum; Swan Island Basin Project Area, Portland, Oregon

Location Identification	Approximate Station	Existing Slope Conditions	Existing Structures [a]	Max existing slope gradient (approx.)	Max top of Slope elevation (approx.) - ft	Proposed dredge elevation at toe - ft	Proposed On-slope material	Proposed slope gradient [b] (H:V)	Proposed Structures [c]
Mocks Bottom									
USCG	47 – 53	Rooted vegetation, exposed slope at waterline	USCG Pier and Floating Dock	2.2H:1V	34	-6	3 ft riprap and bedding. GAC geotextile	2.75H:1V	Toe wall between USCG pier and floating dock
Navy	41 – 47	Rooted dense vegetation. Riprap from approx. 3ft above OHW to unknown depth	Navy Pier	2.4H:1V	38	-14	3 ft riprap and bedding. GAC geotextile	2.5H:1V	-
MC	32 – 41	Riprap above and below OHW	MC Pier	2.1H:1V	38	-14	3 ft riprap and bedding. GAC geotextile	2.15H:1V	Two rows of pinning piles
								2.5H:1V	-
Port of Portland, Dredge Base	22 – 32	Rooted dense vegetation. Riprap present below OHW	Dredge Base Pier	2.5H:1V	38	-9	3 ft riprap and bedding. GAC geotextile	2.5H:1V	-
ATC Leasing	17 – 22	Heavily vegetated with some riprap. Sand beach present at waterline	-	1.7H:1V	36	-19	3 ft riprap and bedding. GAC geotextile with planting above OHW	3H:1V	-
Swan Island Dock Company, Berth 311	0 – 17	Heavily vegetated with sparse riprap. Sand beach present at waterline	Berth 311 Pier	<3H:1V	38	-19	3 ft riprap and bedding. GAC geotextile with planting above OHW	3H:1V	-
Head of SIB									
Head of SIB	-1 – 0	Sand bank, limited vegetation and riprap	Boat Ramp	<3H:1V	36	Not required	Riprap, GAC geotextile with planting above OHW	3H:1V	-
Swan Island									
Freightliner Wind Tunnel	0 – 6	Wood retaining wall. Riprap present below OHW	Wind tunnel	1.7H:1V	36	Not required	3 ft riprap and bedding. GAC geotextile with planting above OHW	3H:1V	-
Berths 306, 307 & 308	6 – 21	Engineered bank, riprap below OHW	Timber Piers and Dolphins	1.7H:1V	36	-14	3 ft riprap and bedding. GAC geotextile with planting above OHW	2.5H:1V	New berth structure and dolphins
Lagoon Wharf	21 – 41	Sheet pile wall with steep slope in front	Timber piers and slopes	>1H:1V	37	-25	3 ft riprap and bedding. GAC geotextile	2.5H:1V	New berth structure with anchored retaining structures
Pier A and Quay Wall	41 – 67	Sheet pile wall / diaphragm cells	Pier A and Quay Wall	n/a	35	-51	n/a	n/a	-
SCC Floating Dock	67 - 69	Vegetated slope above OHW, riprap below	Floating dock	1.7H:1V	36	-51	3 ft riprap and bedding. GAC geotextile	2.75H:1V	-
Demo Pier	69 -	Vegetated slope above OHW, riprap below	Pier structures	1.6H:1V	37	-56	3 ft riprap and bedding. GAC geotextile	2.75H:1V	-

Notes:
a) For further details on marine structures refer to Structural Design Technical Memorandum.
b) Proposed slope gradients are overall slopes required for global stability.
c) Final slope gradients temporary slopes during construction not to be greater than 1V:2.5H with a slope height limit of 10 ft.

< = less than
ft = feet
GAC = Granular activated carbon
H:V = horizontal to vertical ratio
OHW = ordinary high water
MC = The Marine Consortium, Inc.

NAD83 = North American Datum 1983
NAVD88 = North American Vertical Datum of 1988
SCC = Shipyard Commerce Center
SIB = Swan Island Basin
USCG = U.S. Coast Guard

FIGURES

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- Ordinary High Water (City of Portland, 2013)
- Federal Navigation Channel (USACE, 2020)
- 2-foot Elevation Contour (NAVD88)
- 10-foot Elevation Contour (NAVD88)
- Geotechnical Boring
- Geotechnical Boring with PS-Logging
- Cone Penetration Test
- Seismic Cone Penetration Test

Notes:
NAVD88 - North American Vertical Datum of 1988
RM - River Mile
USACE - U.S. Army Corps of Engineers

Figure 1-1
Geotechnical Investigation Locations

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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River Mile (RM)

Federal Navigation Channel (USACE, 2020)

Head of the Lagoon Design Area

Mocks Bottom Design Area

Swan Island Design Area

Notes:
NAVD88 - North American Vertical Datum of 1988
RM - River Mile
USACE - U.S. Army Corps of Engineers

Figure 1-2

SIB Geotechnical Project Areas

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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Base map: Aerial Photo Summer 2022, City of Portland

- River Mile (RM)
- Federal Navigation Channel (USACE, 2020)
- Project Stationing

Notes:
NAVD88 - North American Vertical Datum of 1988
RM - River Mile
USACE - U.S. Army Corps of Engineers

Figure 1-3

Geotechnical Design Reaches SIB Project Area

Date Prepared: July 2025
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Technical Memorandum
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Cross Section, A-A' (typ.)

River Mile (RM)

Federal Navigation Channel (USACE, 2020)

Notes:
NAVD88 - North American Vertical Datum of 1988
RM - River Mile
USACE - U.S. Army Corps of Engineers

Figure 2-1a

Subsurface Profiles – Profile Locations

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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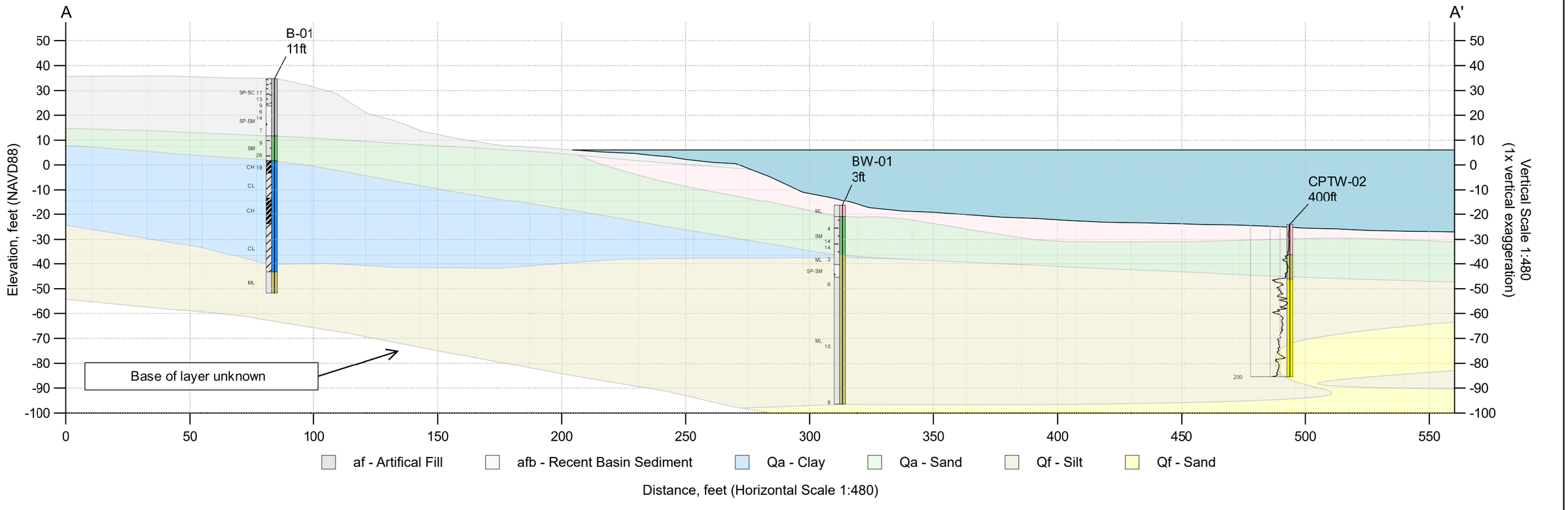




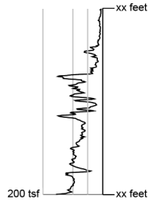
Cross Section, A-A' (typ.)

Geotechnical Boring

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)

Cone Penetration Test Tip Resistance, Qt



USCS Soil Classification, Group Name

- Fat Clay (CH)
- Lean Clay (CL)
- Poorly-graded Gravel (GP)
- Poorly-graded Gravel with Silt (GP)
- Elastic Silt (MH)
- Silt (ML)
- Poorly-graded Sand (SP)
- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1b

Soil Profile A-A'
United States Coast Guard

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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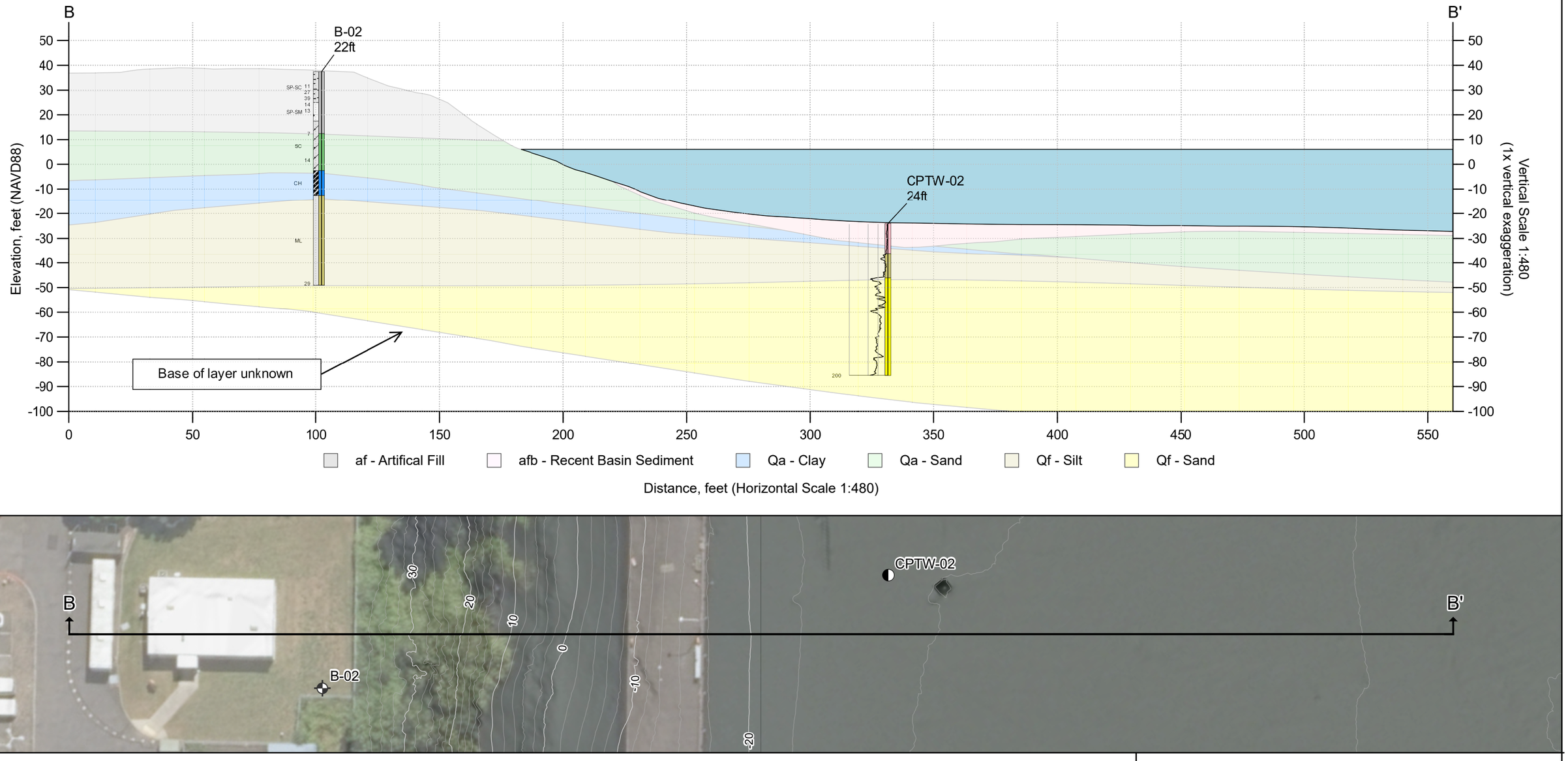


Cross Section, A-A' (typ.)

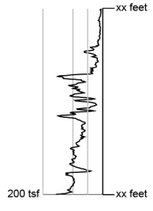
Geotechnical Boring

Cone Penetration Test

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)

Cone Penetration Test Tip Resistance, Qt



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- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1c

Soil Profile B-B'
United States Navy

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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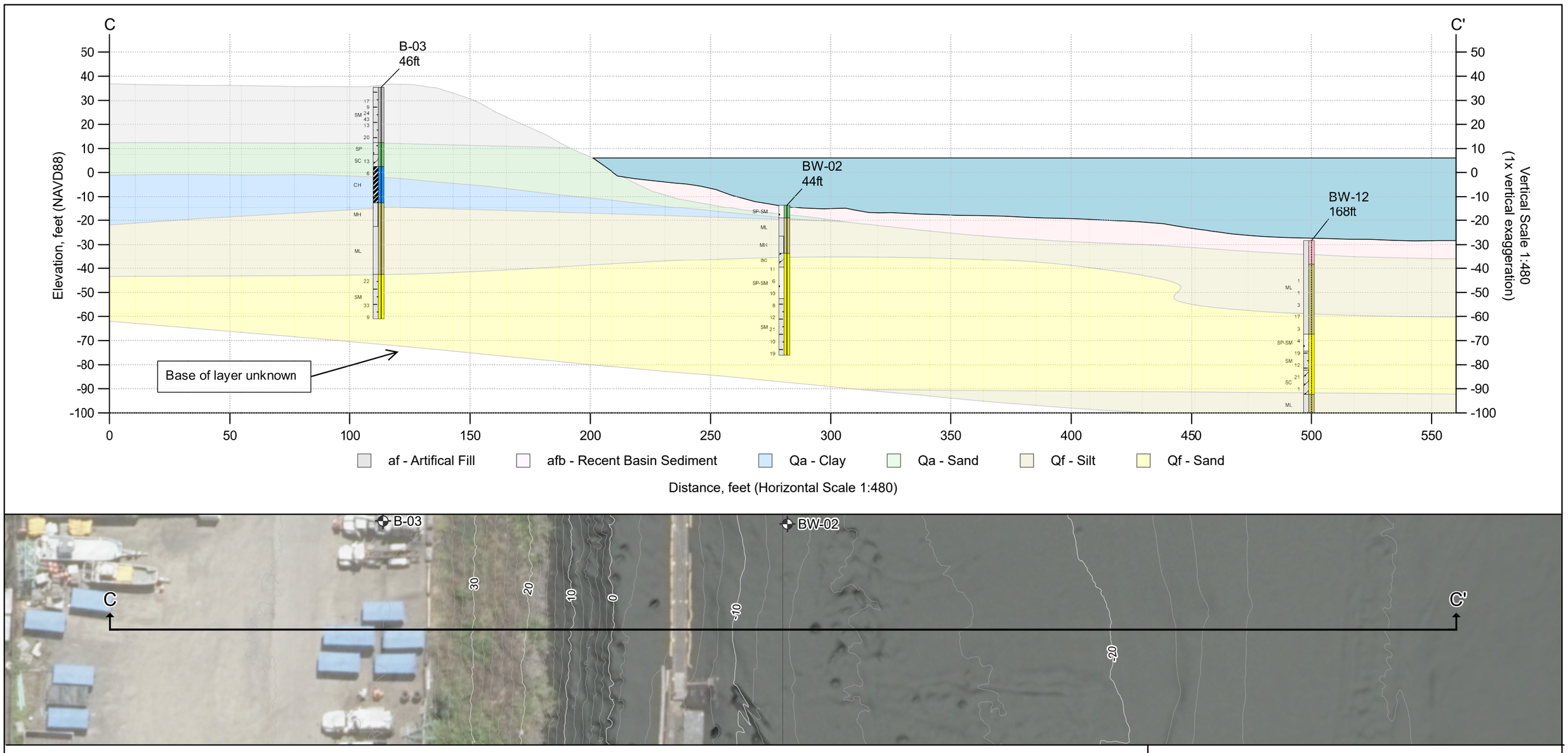


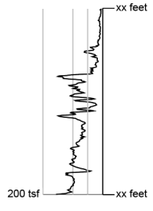
Cross Section, A-A' (typ.)

Geotechnical Boring

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)

Cone Penetration Test Tip Resistance, Qt



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- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1d

Soil Profile C-C'
Marine Consortium

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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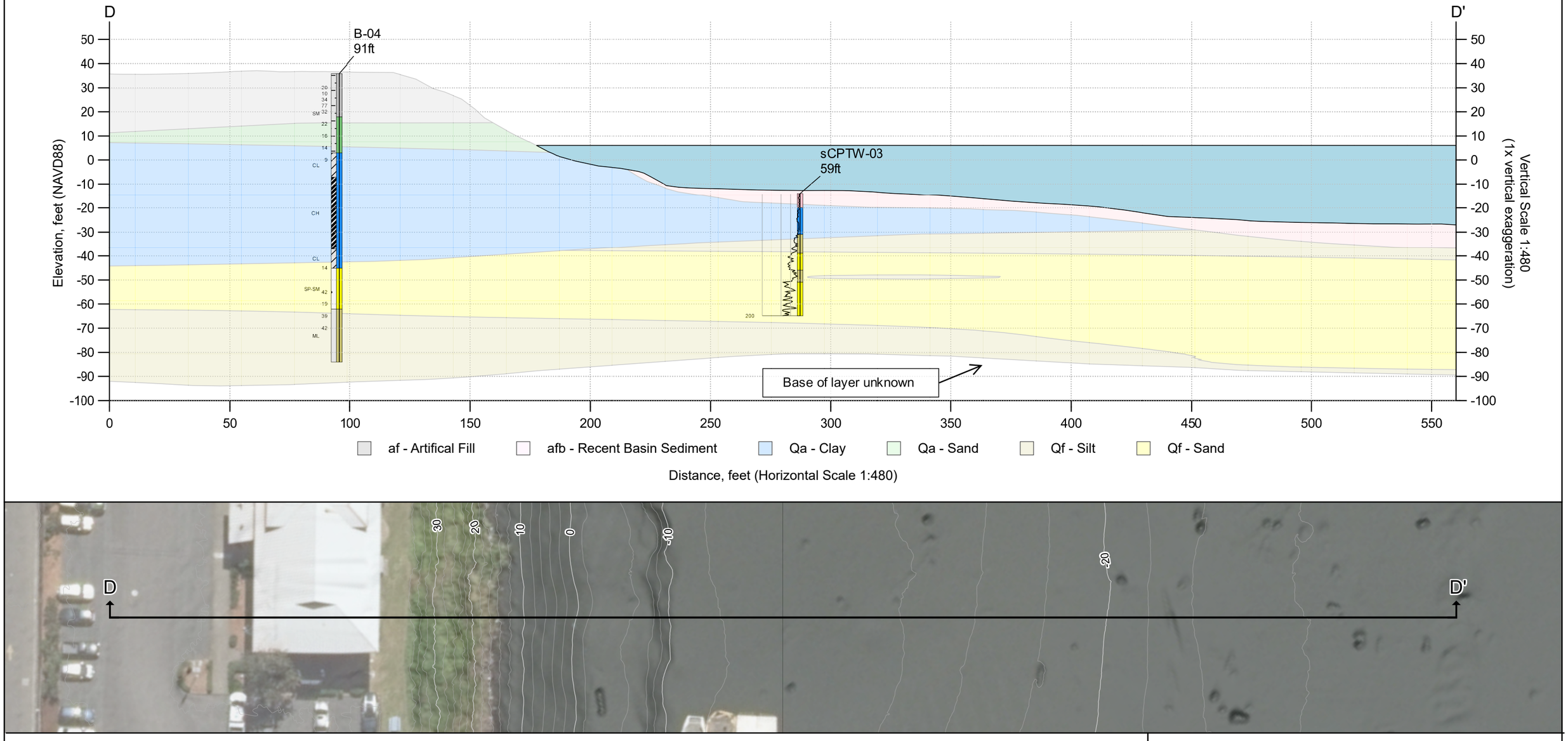
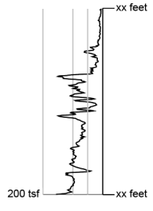


Cone Penetration Test Tip Resistance, Qt

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)



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- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1e

Soil Profile D-D'
Port of Portland, Dredge Base

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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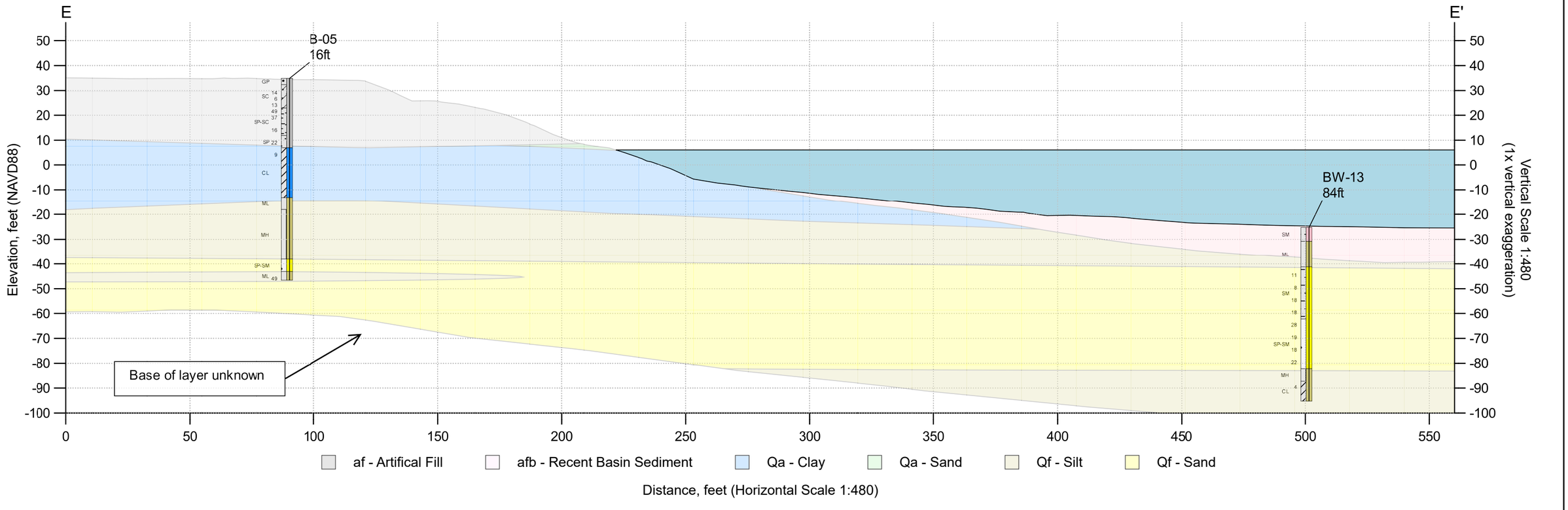
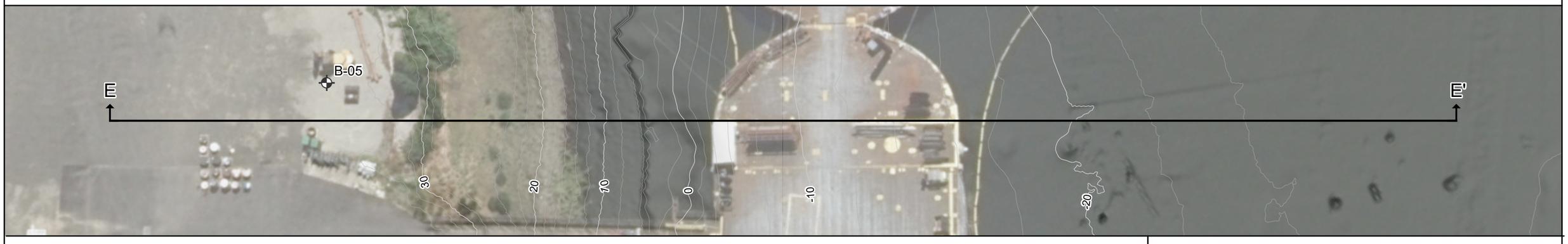




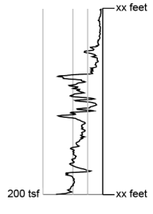
Cross Section, A-A' (typ.)

Geotechnical Boring

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)

Cone Penetration Test Tip Resistance, Qt



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- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1f

Soil Profile E-E'
Port of Portland, Dredge Base

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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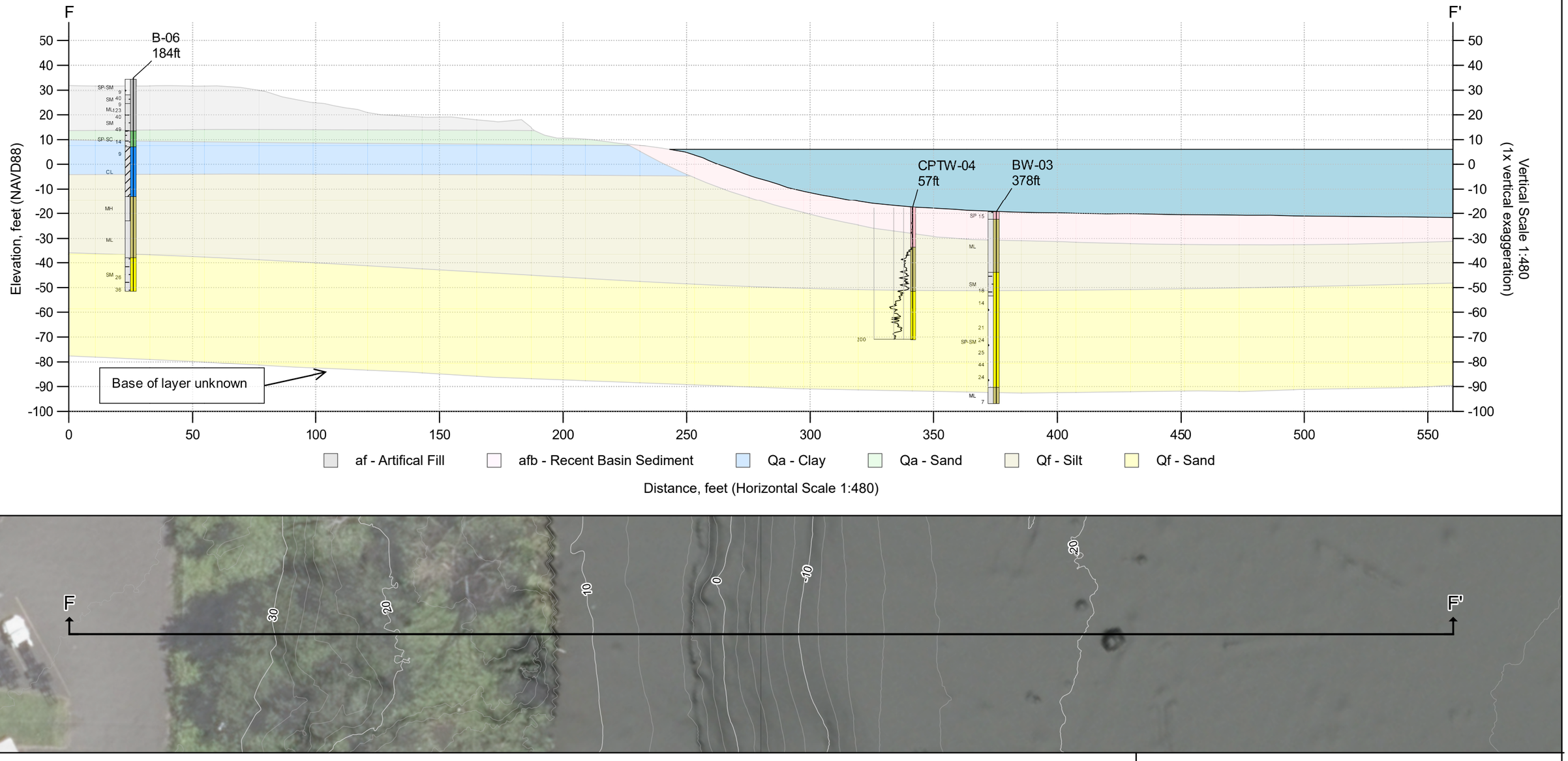

Cone Penetration Test Tip Resistance, Qt

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)

USCS Soil Classification, Group Name

- Fat Clay (CH)
- Lean Clay (CL)
- Poorly-graded Gravel (GP)
- Poorly-graded Gravel with Silt (GP)
- Elastic Silt (MH)
- Silt (ML)
- Poorly-graded Sand (SP)
- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1g

Soil Profile F-F'
ATC Leasing

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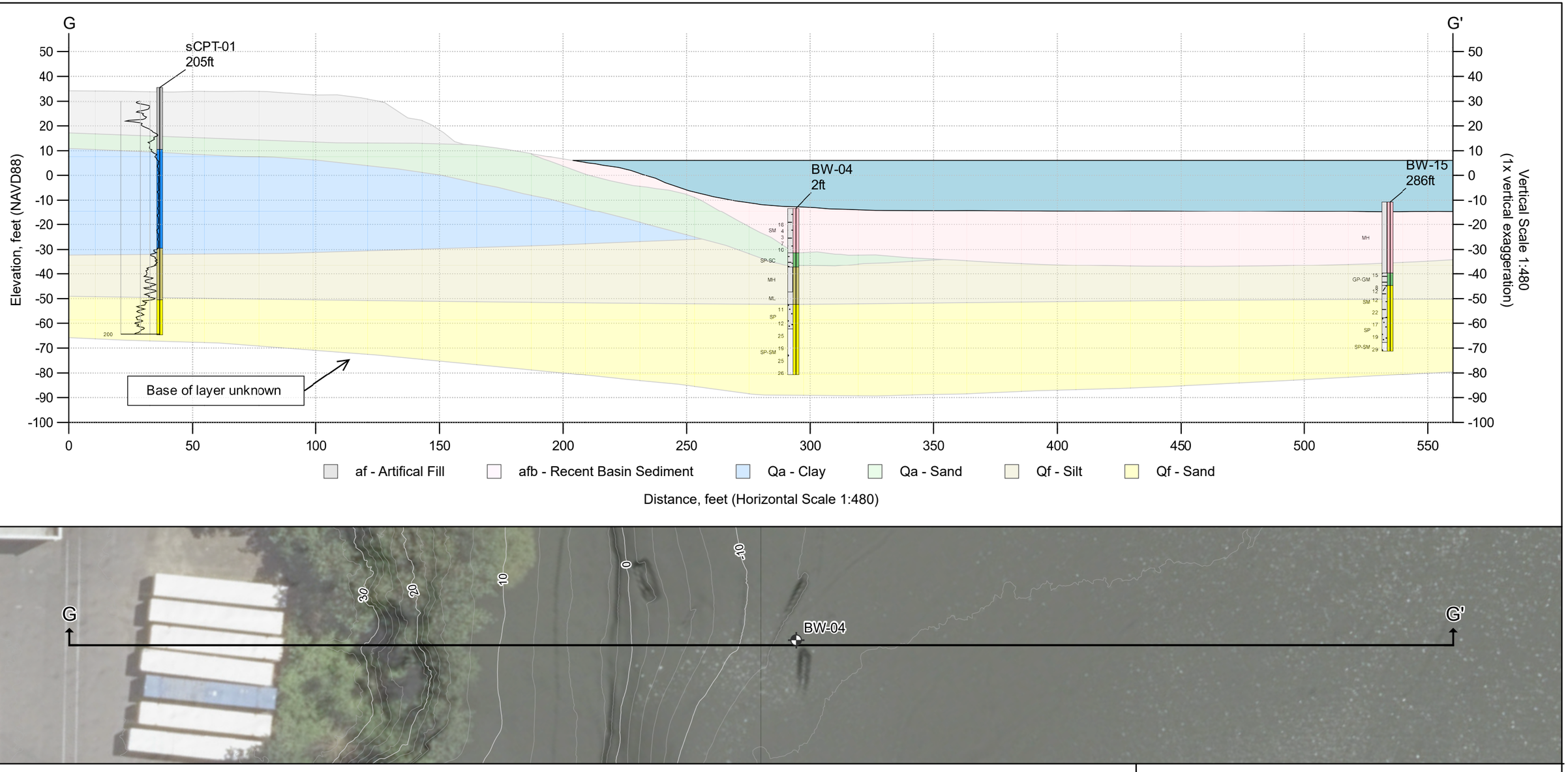
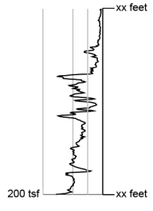


Geotechnical Boring

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)

Cone Penetration Test Tip Resistance, Qt



USCS Soil Classification, Group Name

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- Poorly-graded Sand (SP)
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- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1h

Soil Profile G-G'
Berth 311

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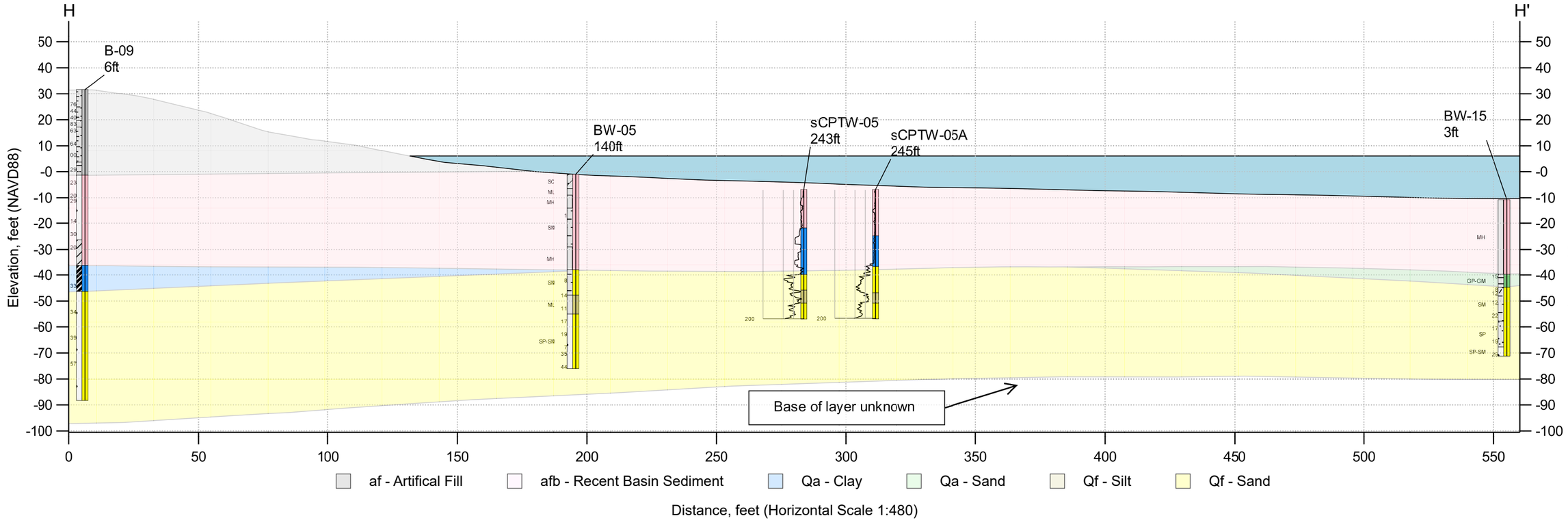
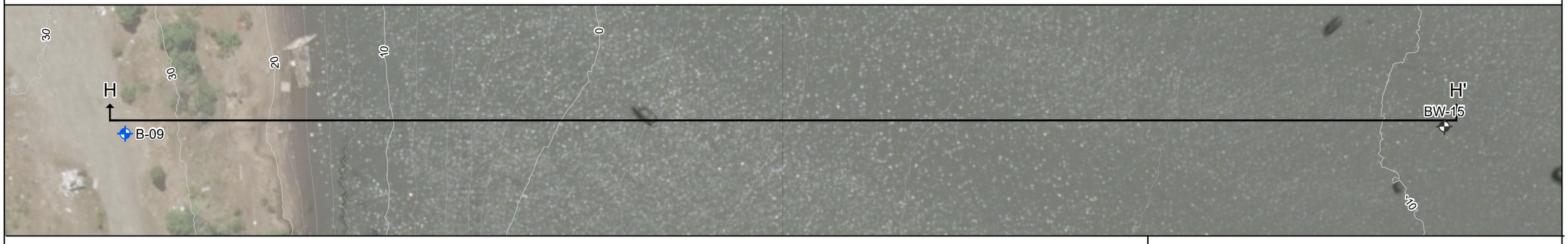




Cross Section, A-A' (typ.)

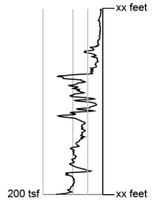
Geotechnical Boring

Geotechnical Boring with PS-Logging

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)

Cone Penetration Test Tip Resistance, Qt



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- Silt (ML)
- Poorly-graded Sand (SP)
- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1i

Soil Profile H-H'
Head of the Lagoon

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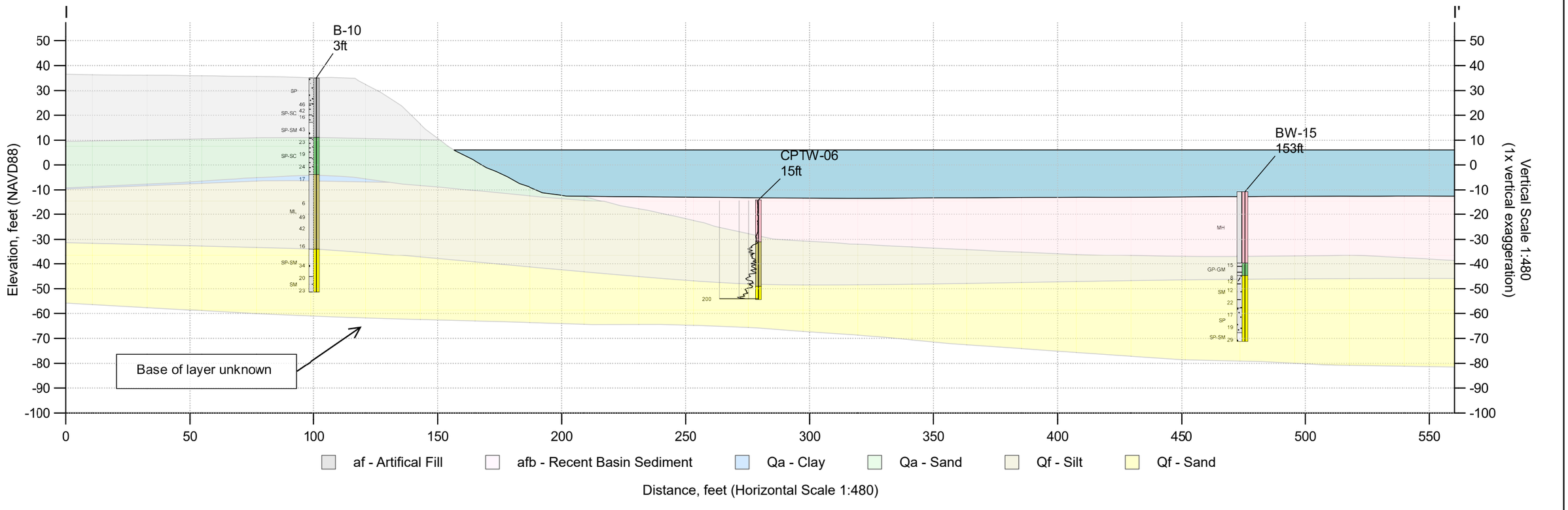




Cross Section, A-A' (typ.)

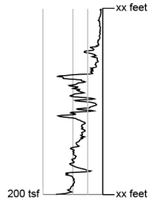
Geotechnical Boring

Cone Penetration Test

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)

Cone Penetration Test Tip Resistance, Qt



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- Silt (ML)
- Poorly-graded Sand (SP)
- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1j

Soil Profile I-I'
Frieghtliner Wind Tunnel

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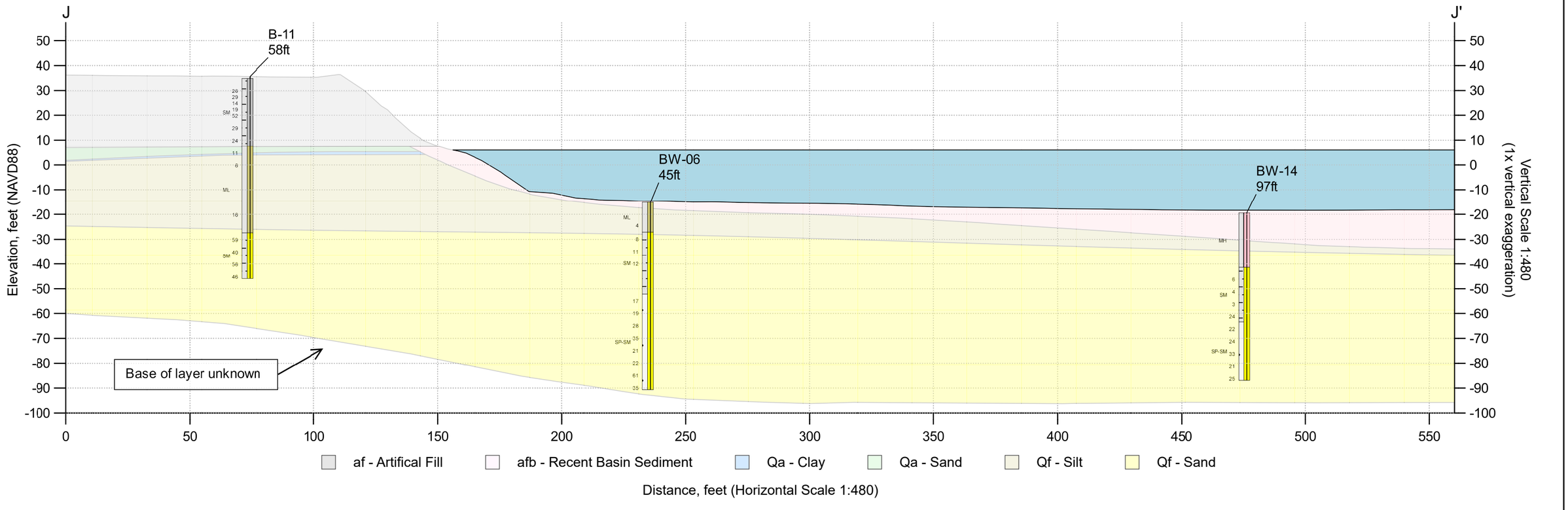




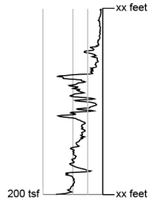
Cross Section, A-A' (typ.)

Geotechnical Boring

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)

Cone Penetration Test Tip Resistance, Qt



USCS Soil Classification, Group Name

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- Silt (ML)
- Poorly-graded Sand (SP)
- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1k

Soil Profile J-J'
Berths 306, 307, and 308

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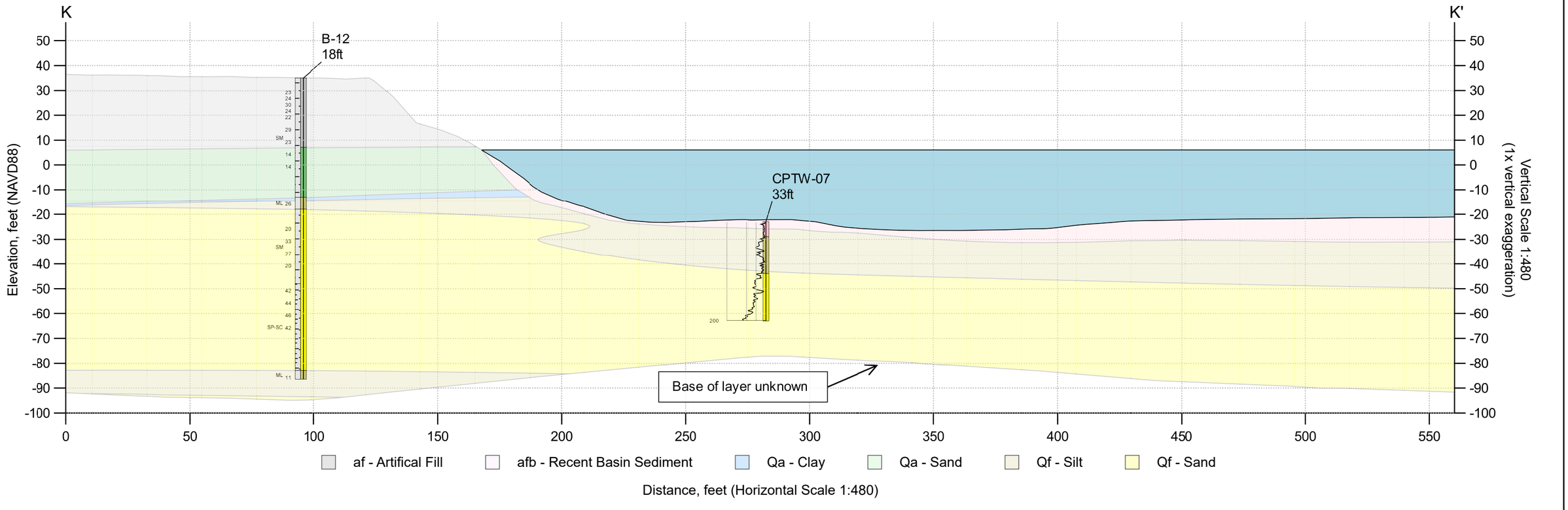
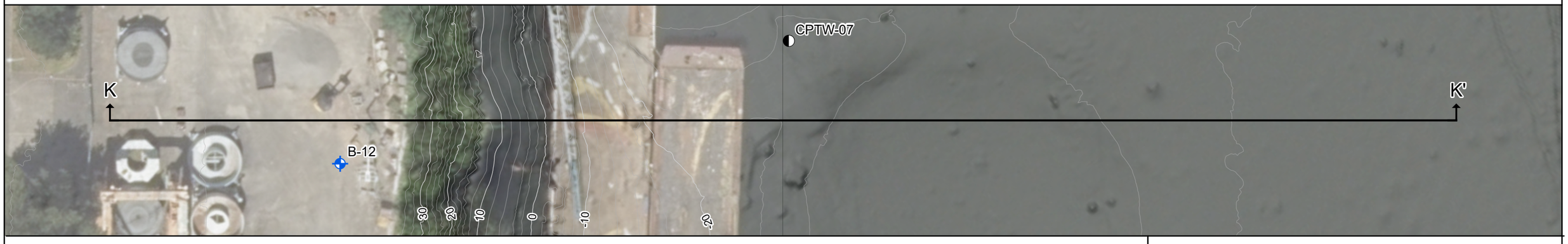
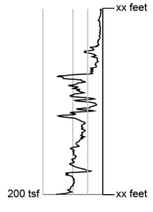




Cone Penetration Test Tip Resistance, Qt



- Geotechnical Boring with PS-Logging
- Cone Penetration Test
- 2-foot Elevation Contour (NAVD88)
- 10-foot Elevation Contour (NAVD88)

USCS Soil Classification, Group Name

- Fat Clay (CH)
- Lean Clay (CL)
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- Poorly-graded Gravel with Silt (GP)
- Elastic Silt (MH)
- Silt (ML)
- Poorly-graded Sand (SP)
- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1l

Soil Profile K-K'
Berths 306, 307, and 308

Date Prepared: July 2025
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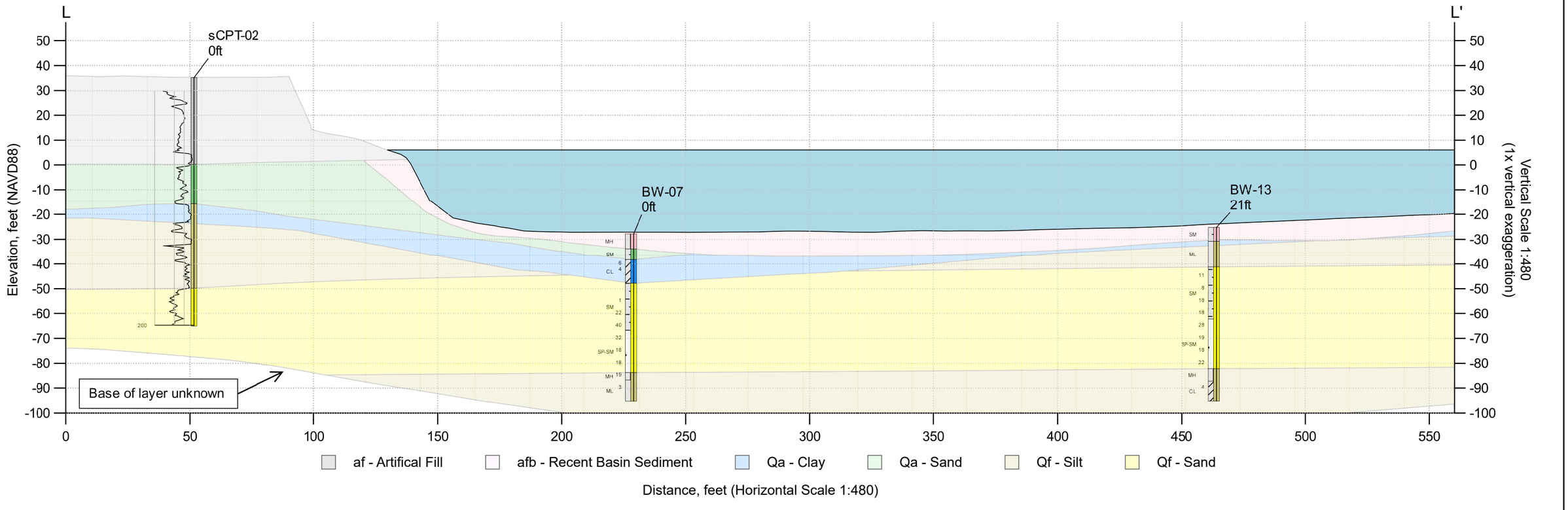
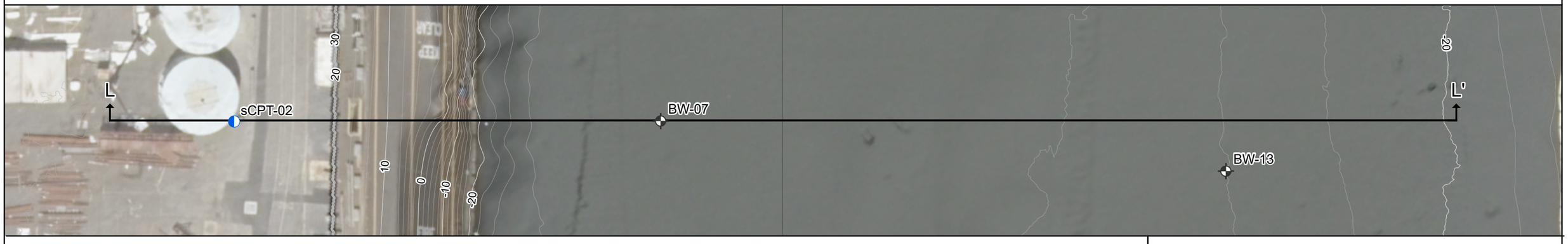




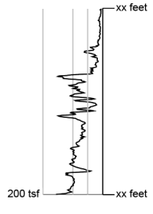
Cone Penetration Test Tip Resistance, Qt

Geotechnical Boring

Seismic Cone Penetration Test

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)



USCS Soil Classification, Group Name

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- Silt (ML)
- Poorly-graded Sand (SP)
- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1m

Soil Profile L-L'
Lagoon Wharf

Date Prepared: July 2025
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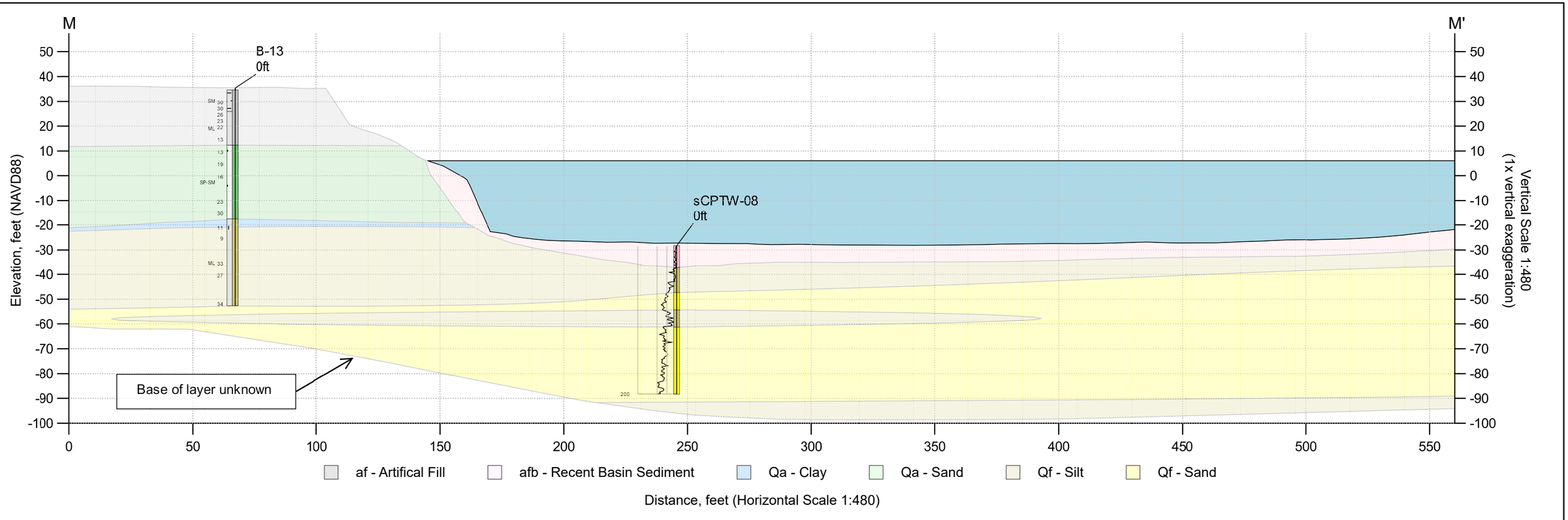
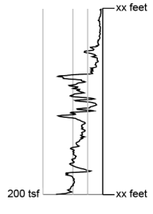




Geotechnical Boring
Seismic Cone Penetration Test

2-foot Elevation Contour (NAVD88)
10-foot Elevation Contour (NAVD88)

Cone Penetration Test Tip Resistance, Qt



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- Silt (ML)
- Poorly-graded Sand (SP)
- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1n

Soil Profile M-M'
Lagoon Wharf

Date Prepared: July 2025
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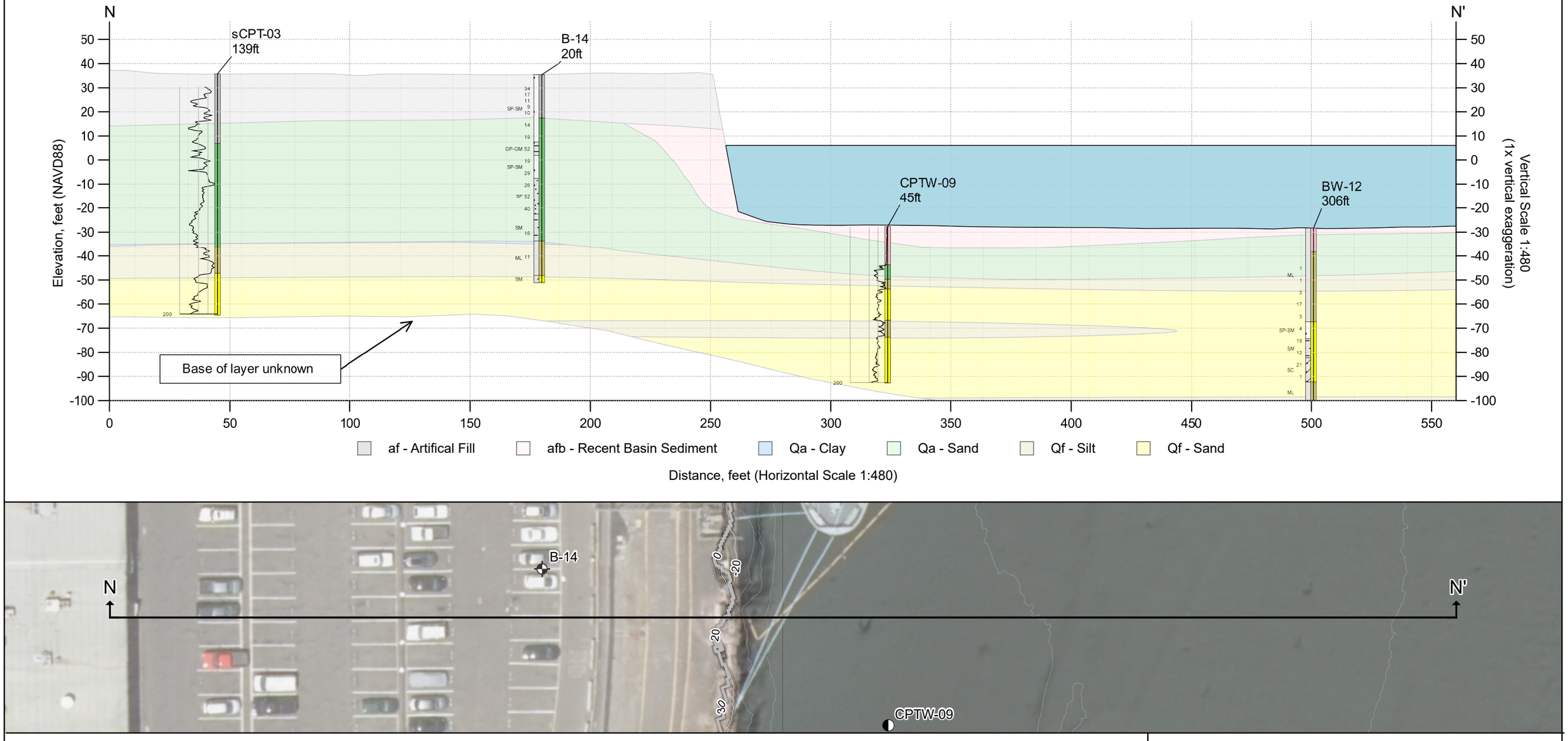


Cross Section, A-A' (typ.)

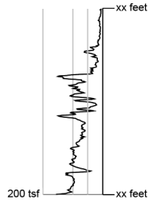
Geotechnical Boring

Cone Penetration Test

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)

Cone Penetration Test Tip Resistance, Qt



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- Silt (ML)
- Poorly-graded Sand (SP)
- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1o

Soil Profile N-N'
Pier A

Date Prepared: July 2025
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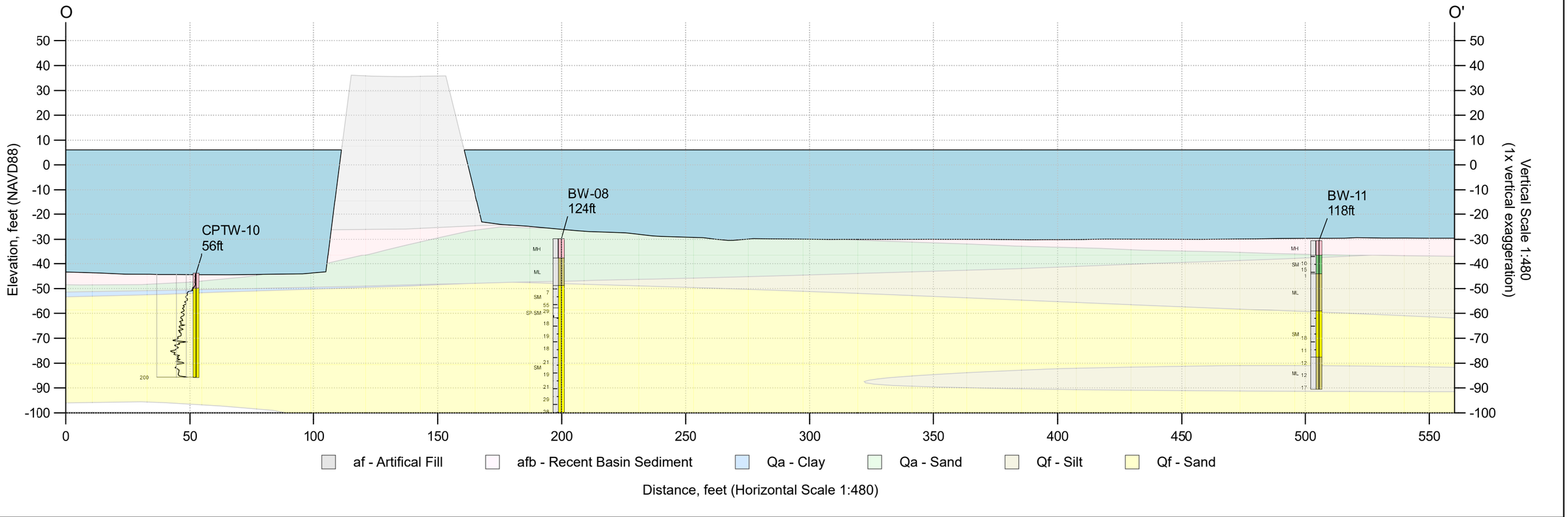
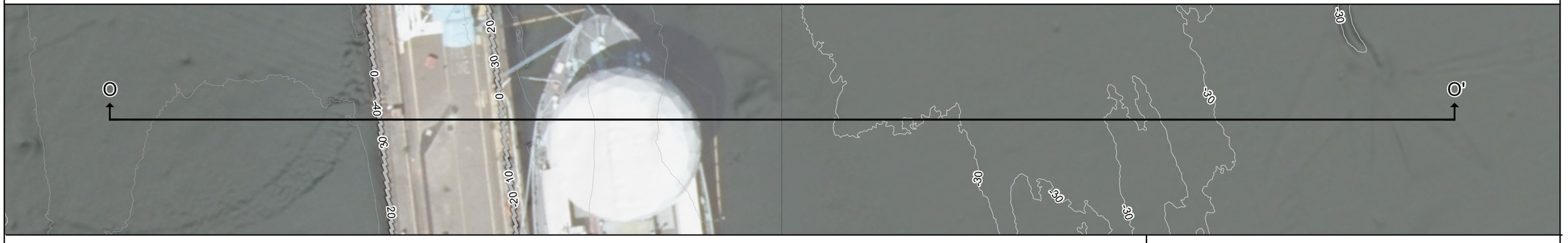
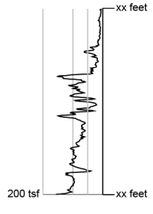




Cone Penetration Test Tip Resistance, Qt

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)



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- Silt (ML)
- Poorly-graded Sand (SP)
- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1p

Soil Profile O-O'
Pier A

Date Prepared: July 2025
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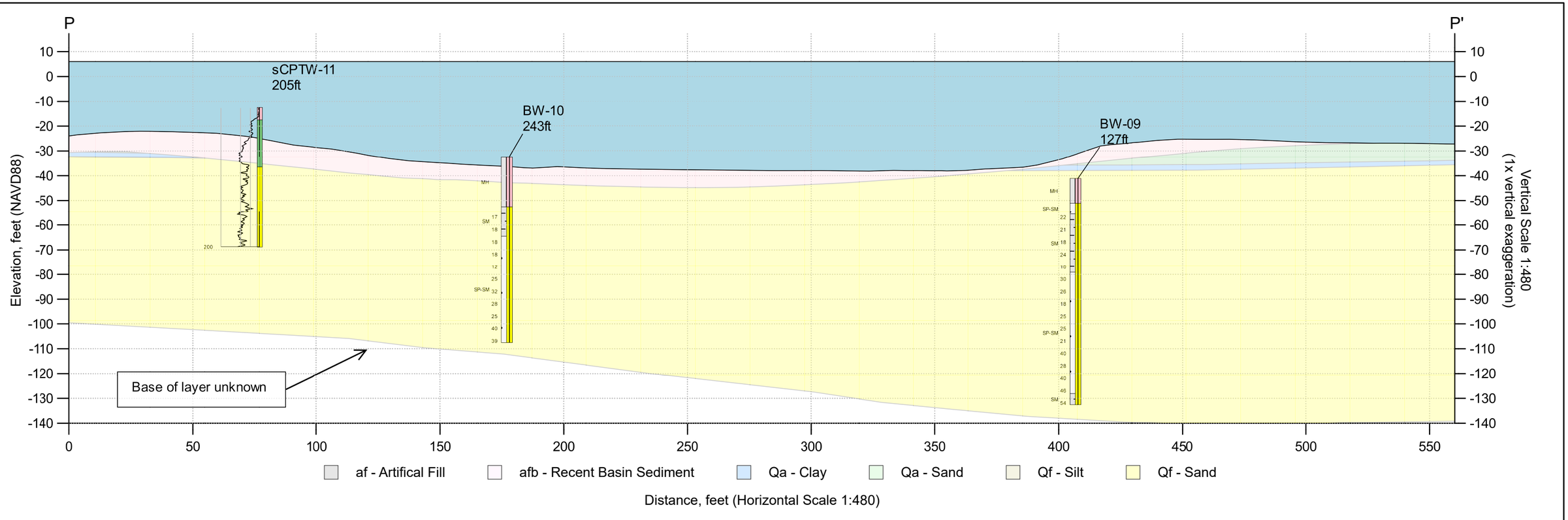
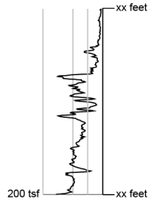




Cone Penetration Test Tip Resistance, Qt

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)



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- Silt (ML)
- Poorly-graded Sand (SP)
- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

N

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1q

Soil Profile P-P'
Pier C

Date Prepared: July 2025
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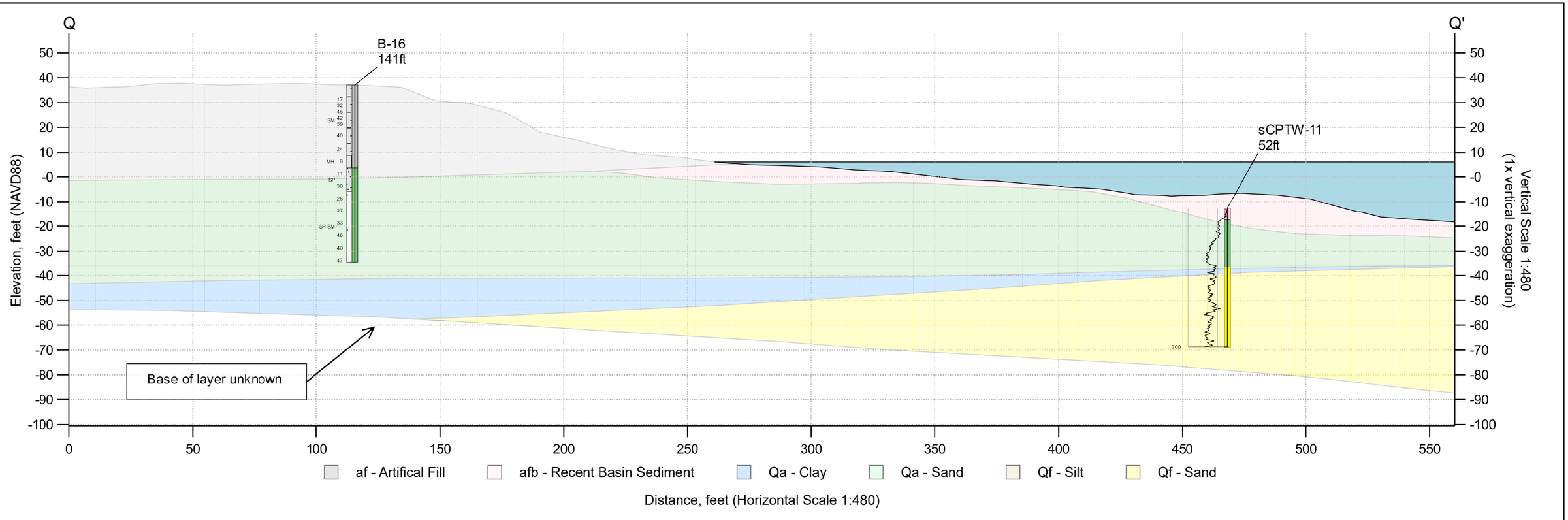
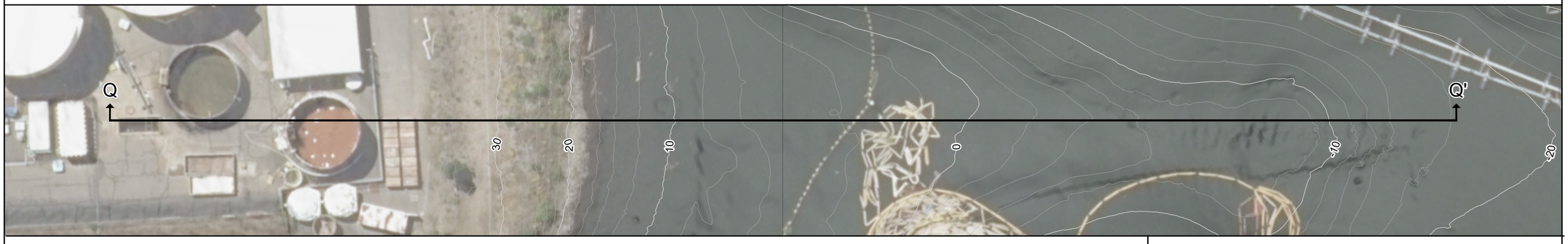


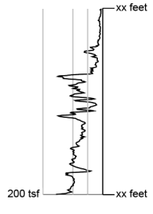


Cross Section, A-A' (typ.)

2-foot Elevation Contour (NAVD88)

10-foot Elevation Contour (NAVD88)

Cone Penetration Test Tip Resistance, Qt



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- Poorly-graded Sand (SP)
- Poorly-graded Sand with Clay (SP-SC)
- Poorly-graded Sand with Silt (SP-SM)
- Clayey Sand (SC)
- Silty Sand (SM)

0 Feet 80

Base map: Aerial Photo Summer 2022, City of Portland
Elevation data source: UnifiedBathy_V3 DEM

Figure 2-1r

Soil Profile Q-Q'
Floating Docks

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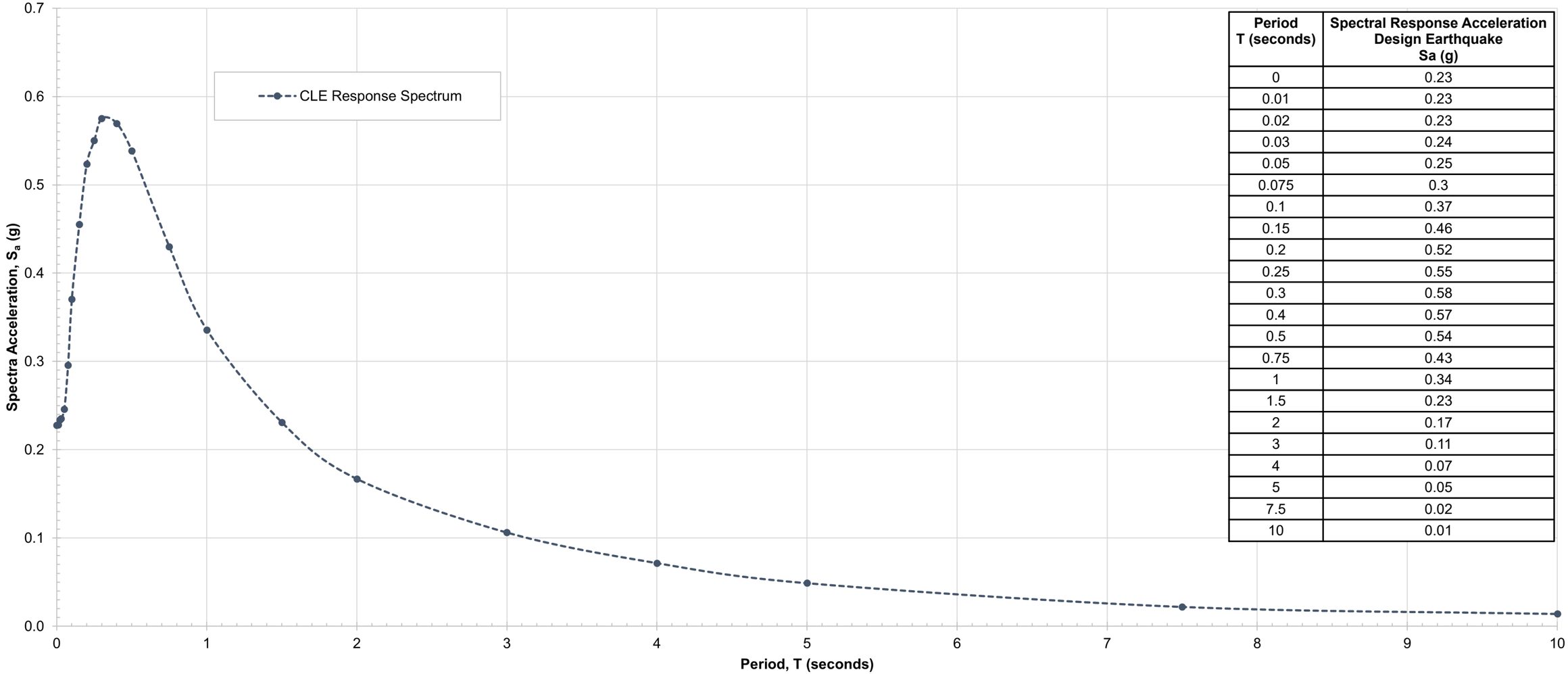
Multi-Period Response Spectrum
USGS Seismic Hazard Map, Site Class DE (V_S30: 185 meters/second)
Return Period: 475 years (10% probability of exceedance in 50 years)



Period T (seconds)	Spectral Response Acceleration Design Earthquake Sa (g)
0	0.23
0.01	0.23
0.02	0.23
0.03	0.24
0.05	0.25
0.075	0.3
0.1	0.37
0.15	0.46
0.2	0.52
0.25	0.55
0.3	0.58
0.4	0.57
0.5	0.54
0.75	0.43
1	0.34
1.5	0.23
2	0.17
3	0.11
4	0.07
5	0.05
7.5	0.02
10	0.01

Data Source: 2018 U.S. Geological Survey (USGS) National Seismic Hazard Model

Figure 3-1

Multi-Period Response Spectra
Contingency Level Earthquake (CLE)
Return Period: 475-years

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Technical Memorandum
Swan Island Basin Remedial Design

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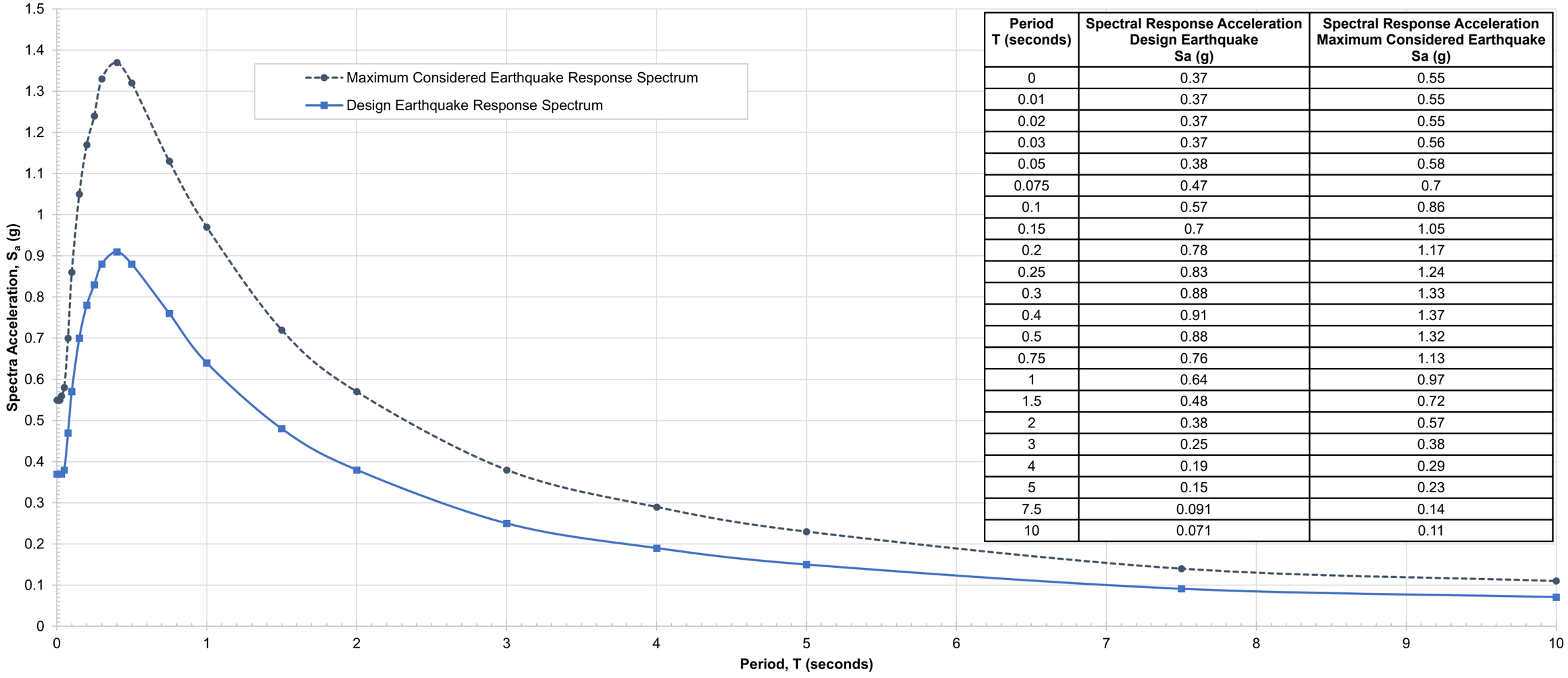
Multi-Period Response Spectrum
ASCE 7-22, Site Class DE (V_S30: 185 meters/second)
Return Period: 2,475 years (2% probability of exceedance in 50 years)



Period T (seconds)	Spectral Response Acceleration Design Earthquake Sa (g)	Spectral Response Acceleration Maximum Considered Earthquake Sa (g)
0	0.37	0.55
0.01	0.37	0.55
0.02	0.37	0.55
0.03	0.37	0.56
0.05	0.38	0.58
0.075	0.47	0.7
0.1	0.57	0.86
0.15	0.7	1.05
0.2	0.78	1.17
0.25	0.83	1.24
0.3	0.88	1.33
0.4	0.91	1.37
0.5	0.88	1.32
0.75	0.76	1.13
1	0.64	0.97
1.5	0.48	0.72
2	0.38	0.57
3	0.25	0.38
4	0.19	0.29
5	0.15	0.23
7.5	0.091	0.14
10	0.071	0.11

Data Source: ASCE 7-22, ASCE 7 Hazard Tool (https://asce7hazardtool.online/)

Figure 3-2

Multi-Period Response Spectra
Design Earthquake (DE)
Return Period: 2475-years

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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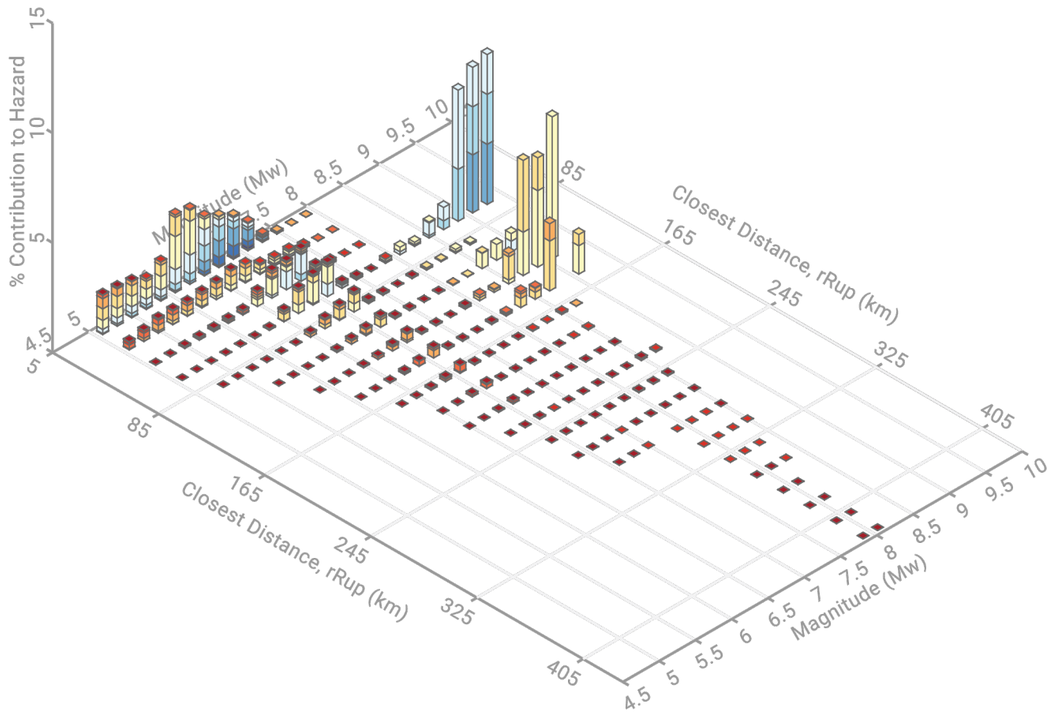
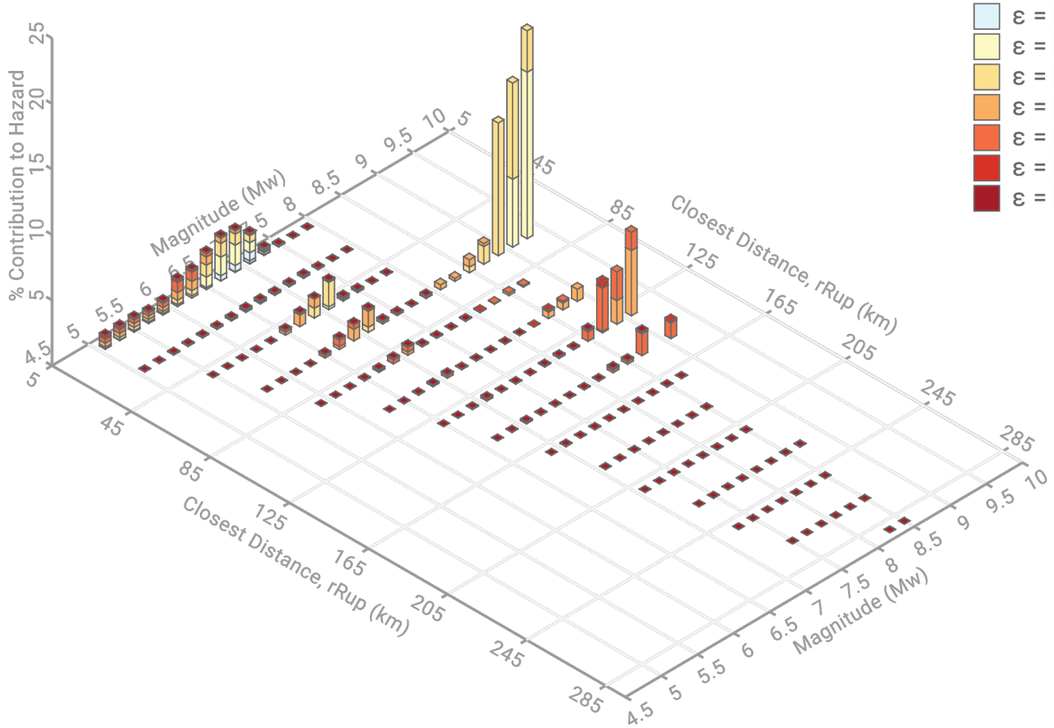
Seismic Hazard Disaggregation
CLE (475 Year Return Period)



Source	Closest Distance, rRup (km)	Magnitude (Mw)	Contribution to Hazard (%)
Cascadia (full, bottom)	75.5	9.08	19.1
Cascadia (full, middle)	124.7	8.91	15.8
Portland Hills	3.1	6.8	5.3
Cascadia (full, top)	142.4	8.81	4.3

Seismic Hazard Disaggregation
DE (2475 Year Return Period)



Source	Closest Distance, rRup (km)	Magnitude (Mw)	Contribution to Hazard (%)
Cascadia (full, bottom)	75.5	9.11	37.8
Cascadia (full, middle)	124.7	8.93	13.6
Portland Hills	2.9	6.82	9.3
Cascadia (full, top)	142.4	8.83	2.9

Data Source: USGS Earthquake Hazard Toolbox (https://earthquake.usgs.gov/nshmp/)

Disaggregation Parameter Summary

Model: NSHM Conterminous U.S. 2018
Latitude: 45.566169°
Longitude: -122.715949°
Site Class: DE (Vs30 185 meters/second)
Intensity Measure Type: PGA
Component: Total

Figure 3-3

Seismic Hazard Disaggregation and Contributing Seismic Hazard Sources

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Base map: Aerial Photo Summer 2022, City of Portland

- Cone Penetration Test
- Seismic Cone Penetration Test
- River Mile (RM)
- Federal Navigation Channel (USACE, 2020)
- 2-foot Elevation Contour (NAVD88)
- 10-foot Elevation Contour (NAVD88)

Estimated Liquefaction Induced Settlement

- 3 to 5 inches
- 5 to 7 inches
- 7 to 9 inches
- 9 to 11 inches
- 11 to 13 inches
- 13 to 16 inches

Notes:
NAVD88 - North American Vertical Datum of 1988
RM - River Mile
USACE - U.S. Army Corps of Engineers

Figure 4-1
Liquefaction Induced Settlement

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River Mile (RM)

Federal Navigation Channel (USACE, 2020)

2-foot Contour

10-foot Contour

Maximum Recommended Slope Gradient

- 2.5H:1V
- 2.75H:1V
- 3H:1V

Notes:
NAVD88 - North American Vertical Datum of 1988
RM - River Mile
USACE - U.S. Army Corps of Engineers

Figure 4-2

Maximum Recommended Gradient of Riverbank Slopes

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ATTACHMENTS

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ATTACHMENT A
GEOTECHNICAL DESIGN PARAMETERS

1.0 INTRODUCTION

The following attachment summarizes the geotechnical information and its interpretations to characterize ground conditions at the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site in Portland, Multnomah County, Oregon. These parameters have been derived for the geotechnical design of riverbank stability, preliminary lateral pile analysis, and sediment cap design (bearing capacity and settlement).

The design parameters have been developed based on the available information, which included: the results of the in situ and laboratory testing from field investigations, soil descriptions from borehole logs in the SIB Project Area, groundwater data, and published case history information from relevant sources.

2.0 PROJECT STRATIGRAPHY

The stratigraphy encountered in the SIB Project Area was divided into seven Engineering Soil Units (ESUs) based on geologic depositional cycles.

- **Artificial Fill**: primarily dredged material consisting of a mixture of recent basin sediments, alluvium sand, alluvium clay, and fine to coarse gravel. Poorly graded sand with silt to silty sand with channels of poorly graded sand with clay to clayey sand. Layers of poorly graded gravel were occasionally encountered.
- **Recent Basin Sediment - Mocks Bottom**: silty sand, low plasticity silt.
- **Recent Basin Sediment - Swan Island**: high plasticity silt.
- **Alluvium - Sand**: poorly graded sand to silty sand.
- **Alluvium - Clay**: sandy lean to fat clay.
- **Missoula Flood Deposits – Silt**: low plasticity silt to sandy silt.
- **Missoula Flood Deposits – Sand**: poorly graded sand to silty sand.

Index properties and gradation for each ESU have been reviewed across the entire SIB Project Area to check consistency of ESUs across the project area. The review indicated that the index properties and gradation of each ESU are generally consistent throughout the project area except for the following trends:

- **Artificial Fill** was not encountered in the in-water basin of the project area.
- **Recent Basin Sediments** were not encountered in upland positions at Mocks Bottom. Silty Sand (SM) and Silt (ML) were primarily encountered along the Mocks Bottom basin waterfront. Elastic Silt (MH) was primarily encountered along the SIB waterfront and west Swan Island piers. Based on these observations the Recent Basin Sediments ESU was divided into two ESUs.
- **Alluvium - Clay** deposits were not encountered at Swan Island.
- **Missoula Flood Deposits – Silt** is generally high plasticity at higher elevations. Plasticity decreases with elevation to about -30 feet (ft) elevation to medium plasticity (PI = 10).

Plasticity decreases and sand content increases from Mocks Bottom to Swan Island.

- **Missoula Flood Deposits – Sand** is generally silty sand above -75 ft elevation and poorly graded sand with silt below -75 ft elevation.

3.0 GEOTECHNICAL PARAMETER DERIVATION

The parameters used in the Remedial Design (RD) are summarized in Table 3-1 of the Geotechnical Design Technical Memorandum (GDTM). This attachment outlines the derivation of key preliminary geotechnical parameters. The parameters presented may not be applicable to all design scenarios.

Table 3-1
Summary of Laboratory Testing

Test		Count	Maximum	Minimum	Average
Moisture Content (%)		340	101.9	1.8	34.2
Total Unit Weight (pcf)		177	132.8	65.3	109.3
Atterberg Limits [a]	Liquid Limit (%)	123	102.0	28.0	50.3
	Plastic Limit (%)	123	60.0	18.0	33.9
	Plasticity Index (%)	123	52.0	1.0	16.4
Particle Size Distribution	Gravel (%)	154	91.0	0.0	3.8
	Sand (%)	156	98.5	1.6	72.4
	Fines (Silt + Clay) (%)	203	99.0	1.5	36.9
	Clay (%)	98	21.1	0.2	5.4
	Silt (%)	98	80.0	1.6	16.9
TXUU – S_u (psf)		52	3750.0	120.0	1180.0
TXCU – Effective Stress φ'		15	36.0	0.0	30.4
DSS – Total Stress φ		11	27.6	18.9	25.0
DS – Effective Stress φ'		17	40.9	22.8	34.3
1D Consolidation (IL)		50	-	-	-

Note:
a) The total number of Atterberg limits tests completed is presented. The maximum, minimum, and average values exclude 37 tests which returned non-plastic results.
% = percent
φ = effective friction angle
pcf = pounds per cubic foot
psf = pounds per square foot
IL = incremental loading

3.1 CLASSIFICATION TESTS

3.1.1 Moisture Content

Moisture content was determined from disturbed and undisturbed samples collected for a variety of laboratory tests (e.g., moisture density, consolidation, triaxial, direct shear).

Table 3-2
Moisture Content Data by ESU

ESU	Count	Maximum (%)	Minimum (%)	Average (%)
Artificial Fill	59	44.7	1.8	15.4
Recent Basin Sediment – Mocks Bottom	8	51.6	24.8	39.7
Recent Basin Sediment – Swan Island	28	101.9	21.0	68.8
Alluvium – Sand	33	50.6	3.9	26.8
Alluvium - Clay	27	72.3	31.8	49.6
Missoula Flood Deposits – Silt	79	67.6	18.0	41.6
Missoula Flood Deposits – Sand	106	54.7	5.7	28.0

Notes:
ESU = Engineering Soil Unit

Moisture content is generally consistent with elevation for each ESU except for recent basin sediments which have a large standard deviation.

3.1.2 Atterberg Limits

Table 3-3
Atterberg Limits Data by ESU

ESU	Test Count	Tests Non-plastic	Liquid Limit (%)			Plasticity Index (%)		
			Max	Min	Avg	Max	Min	Avg
Artificial Fill	10	5	47	29	39	13	4	8
Recent Basin Sediment – Mocks Bottom	1	0	-	-	47	-	-	12
Recent Basin Sediment – Swan Island	23	2	102	35	72	52	5	30
Alluvium – Sand	10	6	44	28	36	10	1	6
Alluvium - Clay	11	0	62	35	51	32	12	24
Missoula Flood Deposits – Silt	52	10	76	30	43	34	1	11
Missoula Flood Deposits – Sand	16	14	29	28	29	3	2	3

Notes:
Avg = average
Max = maximum
Min = minimum

The Unified Soil Classification System (USCS) classification of the material encountered in each ESU was reviewed to validate the ESU.

- **Artificial Fill** is composed primarily of poorly graded sand (SP), with occasional layers of SILT (ML) and poorly graded GRAVEL (GP).
- **Recent Basin Sediment – Mocks Bottom** is composed of poorly graded sand with silt or

clay, occasional layers of Sandy SILT (ML) and CLAY (CL).

- **Recent Basin Sediment – Swan Island** is composed primarily of Elastic SILT (MH) with occasional sand deposits including Silty SAND (SM) and Clayey SAND (SC).
- **Alluvium – Sand** is composed of primarily poorly graded sand. Occasional layers encountered were recorded as Poorly graded GRAVEL (GP-GM)
- **Alluvium - Clay** is composed entirely of medium to high plasticity clay.
- **Missoula Flood Deposits – Silt** is composed of primarily medium plasticity sandy silt. Few layers of Elastic SILT (MH) were also encountered.
- **Missoula Flood Deposits – Sand** is composed entirely of poorly graded sand.

3.1.3 Particle Size Distribution

Table 3-4
Particle Size Distribution Data by ESU

ESU	Test Count [a]	Average Values [a]				
		Gravel (%)	Sand (%)	Fines (%)	Silt (%)	Clay (%)
Artificial Fill	30	9	72	18	13	5
Recent Basin Sediment – Mocks Bottom	24	0	89	11	8	5
Recent Basin Sediment – Swan Island	1	0	41	59	14	6
Alluvium – Sand	21	7	76	17	17	4
Alluvium - Clay	9	9	29	62	50	13
Missoula Flood Deposits – Silt	40	0	35	65	54	13
Missoula Flood Deposits – Sand	78	2	82	16	12	4

Notes:
a) Total number of tests including Grain Size Distribution (ASTM D613), Percent Passing No. 200 Sieve (ASTM D1140) and Hydrometer Analysis (ASTM D7928)
b) The total of silt and clay percentages do not always equal the fines percentage. This occurs because the results shown are an average of both Hydrometer and particle size distribution test results.

Based on the USCS classification of materials encountered, Atterberg limit data, and particle size distribution data, the following USCS classification is representative of each ESU.

- Artificial Fill — Silty SAND (SM)
- Recent Basin Sediment – Mocks Bottom — Silty SAND (SM)
- Recent Basin Sediment – Swan Island — Elastic SILT with SAND (MH)
- Alluvium – Sand — Silty SAND (SM)
- Alluvium – Clay — Fat CLAY with SAND (CH)
- Missoula Flood Deposits – Silt — Sandy SILT (ML)
- Missoula Flood Deposits – Sand — Silty SAND (SM)

3.2 BULK UNIT WEIGHT

Values of bulk unit weight have been determined based on the following:

- Initial bulk density from test results (for example Triaxial and Shear Box testing), multiplied by g (acceleration due to gravity); and
- Comparison against parameters presented in published literature based on descriptions and in situ density measurements.

The laboratory testing and recommended bulk unit weight values are presented for each ESU in Table 3-5.

Table 3-5
Bulk Unit Weight Data by ESU

ESU	Test Count	Maximum (pcf)	Minimum (pcf)	Average (pcf)	Recommended (pcf)
Artificial Fill	29	127.7	80.6	109.4	110
Recent Basin Sediment – Mocks Bottom	5	113.8	86.4	105.6	105
Recent Basin Sediment – Swan Island	21	115.1	65.3	93.6	95
Alluvium – Sand	14	132.8	105.0	117.5	115 @ EL ≥ 0 ft 120 @ EL < 0 ft
Alluvium - Clay	22	116.2	83.6	104.8	105
Missoula Flood Deposits – Silt	49	121.3	96.8	108.8	110
Missoula Flood Deposits – Sand	37	131.4	101.2	118.7	120

Notes:
ft = feet/foot
EL = elevation

3.3 DRAINED SHEAR STRENGTH

Values of effective angle of shearing resistance and effective cohesion have been determined for both the coarse and fine material across the project site.

Coarse material:

- Direct shear test results;
- Direct simple shear test results;
- Cone Penetration Test (CPT) correlations from CPeT-IT per Guide to Cone Penetration Testing for Geotechnical Engineering (Robertson, 2015); and
- Relationship between Standard Penetration Test (SPT) blow count $(N_1)_{60}$ presented in the Caltrans Geotechnical Manual (2021) reproduced from Bowles (1977).

Fine material:

- Consolidated Undrained Triaxial (with pore water pressure measurements) test results

(TXCU); and

- CPT correlations from CPeT-IT per Guide to Cone Penetration Testing for Geotechnical Engineering (Robertson, 2015).

Test results are presented in Tables 3-6 through 3-8.

Table 3-6
TXCU Data by ESU

ESU	Test Count	Effective Cohesion (psf)			Effective Friction Angle φ'		
		Max	Min	Avg	Max	Min	Avg
Artificial Fill	0	-	-	-	-	-	-
Recent Basin Sediment – Mocks Bottom	0	-	-	-	-	-	-
Recent Basin Sediment – Swan Island	1	-	-	0	-	-	32
Alluvium – Sand	0	-	-	-	-	-	-
Alluvium - Clay	6	540	0	200	36	27	32
Missoula Flood Deposits – Silt	8	380	0	165	36	30	33
Missoula Flood Deposits – Sand	0	-	-	-	-	-	-

Table 3-7
Direct Shear Data by ESU

ESU	Test Count	Effective Cohesion (psf)			Effective Friction Angle φ'		
		Max	Min	Avg	Max	Min	Avg
Artificial Fill	1	-	-	250	-	-	35
Recent Basin Sediment – Mocks Bottom	2	250	0	125	40	38	39
Recent Basin Sediment – Swan Island	0	-	-	-	-	-	-
Alluvium – Sand	3	140	0	47	41	37	39
Alluvium - Clay	1	-	-	270	-	-	33
Missoula Flood Deposits – Silt	3	1,860	0	787	34	23	29
Missoula Flood Deposits – Sand	7	1,310	0	427	37	30	33

Table 3-8
Direct Simple Shear Data by ESU

ESU	Test Count	Cohesion (psf)			Friction Angle φ		
		Max	Min	Avg	Max	Min	Avg
Artificial Fill	0	-	-	-	-	-	-
Recent Basin Sediment – Mocks Bottom	1	-	-	140	-	-	24
Recent Basin Sediment – Swan Island	1	-	-	0	-	-	27
Alluvium – Sand	3	270	0	103	28	19	24
Alluvium - Clay	0	-	-	-	-	-	-
Missoula Flood Deposits – Silt	1	-	-	110	-	-	22
Missoula Flood Deposits – Sand	5	0	0	0	28	23	26

The drained shear strength parameters in Table 3-9 are recommended. A range has been provided for sensitivity analyses based on the potential for variability within the project wide engineering units.

Table 3-9
Recommended Drained Shear Strength Parameters

ESU	φ'_{peak} (°)	c' (psf)
Artificial Fill	32 – 36	0
Recent Basin Sediment – Mocks Bottom	32 – 34	0
Recent Basin Sediment – Swan Island	30 – 33	0
Alluvium – Sand (EL ≥ -10 ft)	32 – 34	0
Alluvium – Sand (EL < -10 ft)	34 – 36	0
Alluvium - Clay	24 – 26	0 - 150
Missoula Flood Deposits – Silt	31 – 33	0 - 150
Missoula Flood Deposits – Sand (EL ≥ -80 ft)	33 – 35	0
Missoula Flood Deposits – Sand (EL < -80 ft)	35 – 38	0

Notes:
° = degrees

3.4 UNDRAINED SHEAR STRENGTH

Undrained shear strength for fine soils has been determined from the following tests and relationships.

- Undrained triaxial compressions tests (TXUU); and
- In situ CPT values of undrained shear strengths calculated from the corrected cone resistance (q_c) measured during the CPT's. The undrained shear strength values have been

calculated using the following formula where σ_{v0} is the total vertical stress, and N_{kt} is dependent on both the plasticity index and the structure of the soil. A range of N_{kt} values were used (12 – 14) in the correlation with undrained shear strength.

$$c_u = \frac{q_c \times \sigma_{v0}}{N_{kt}}$$

The laboratory testing and recommended undrained shear strength values are presented for each fine ESU in Table 3-10.

Table 3-10
Undrained Shear Strength Data by ESU

ESU	Test Count	S_u (psf) - TXUU			Design recommendation
		Max	Min	Avg	Undrained Shear Strength (psf)
Artificial Fill	0	-	-	-	-
Recent Basin Sediment – Swan Island	16	2,340	120	486	200 - 300
Alluvium - Clay	8	1,770	480	1,209	800 @ EL ≥ -5 -20(EL+5) + 800 @ EL < -5 (max 1,450 psf)
Missoula Flood Deposits – Silt	24	3,750	720	1,617	<u>Mocks Bottom</u> 1100 @ EL ≥ -8 -10(EL+8) + 1,100 @ EL < -8 (max 1,500 psf) <u>Swan Island</u> 1500 @ EL ≥ -8 -25(EL+8) + 1,500 @ EL < -8 (max 2,500 psf)

3.5 RESIDUAL SHEAR STRENGTH OF LIQUEFIED SOIL

Residual shear strength of liquefied soil was evaluated to support seismic stability assessments in areas underlain by potentially liquefiable soils. Empirical correlations for SPT and CPT data (Idriss and Boulanger, 2008) were used for this evaluations.

Residual Strength Ratio:

- SPT derived normalized residual shear strength ratio of liquefied soil ranged from 0.04 to 0.74.
- CPT-derived residual shear strength ratios ranged from 0.04 to 0.84, with an average of 0.156.
- It is considered that these ranges are consistent with published expectations for liquefied soils and reflect the inherent variability in empirical methods.

Given the depositional and reclamation history of the site, differing values were adopted for on-shore and off-shore areas:

- On-shore areas (e.g., Mocks Bottom or Swan Island slopes), a residual strength ratio of

0.131 was selected.

- In-water soils (e.g., Swan Island Basin), a higher residual strength ratio of 0.161 was applied.

These values reflect the effects of dredging, fill placement, and differences in the material deposition across the site.

3.6 COMPRESSION AND RECOMPRESSION INDICES

Values of compression index (C_c) and recompression index (C_r) have been determined from one-dimensional tests. The determined values were compared against typical values presented in NAVFAC DM 7.1 (NAVFAC, 2022).

The laboratory testing and recommended design values for fine-grained material are presented in Table 3-11 and Table 3-12.

Table 3-11
Compression Indices test results

ESU	Test Count	Cc – OD			Cr – OD		
		Max	Min	Avg	Max	Min	Avg
Recent Basin Sediment	15	1.73	0.15	0.88	0.02	0.18	0.08
Alluvium - Clay	9	0.65	0.41	0.50	0.02	0.03	0.03
Missoula Flood Deposits – Silt	24	0.74	0.14	0.43	0.05	0.01	0.03

Table 3-12
Recommended Design Compression Index by ESU

ESU	Design recommendation	
	Compression index (Cc)	Compression index (Cr)
Recent Basin Sediment – Swan Island	0.9	0.08
Alluvium - Clay	0.5	0.03
Missoula Flood Deposits – Silt	0.4	0.03

3.7 PERMEABILTY

Permeability been used to determine the coefficient of consolidation for time-dependent settlement analysis. Permeability and coefficient of consolidation is a difficult parameter to estimate for design use as the in situ stratigraphy can include varied layers and lenses that influence drainage. Therefore, for the purposes of design the following ranges are recommended for global permeability values in time dependent settlement analysis.

- 0 – 10 ft k = 0.103 ft/year

- 10 – 20 ft k = 1.03 ft/year
- > 20 ft k = 10.3 ft/year

These values are estimations based soil descriptions and published literature.

3.8 PRECONSOLIDATION PRESSURE

The subsurface soils within the Project area are characterized by a sequence of Holocene-age alluvial and marine deposits. The underlying soils are not considered to have experienced significant historical consolidation loads beyond those associated with natural sedimentation, anthropogenic fills, and potential minor overburden from historical dredge spoil or surficial structures.

Within the basin, historical data and bathymetric records indicate that the site has undergone periodic dredging, likely removing up to 15 to 20 feet of overburden. This past removal of overburden suggests that the current vertical effective stress may under-represent the peak historical loading conditions, and therefore some overconsolidation may be present in the upper layers due to unloading. For the underlying materials within the basin it is estimated the overconsolidation ratio (OCR) will range between 1.0 and 2.0 in the upper 20 to 30 feet, consistent with slightly to moderately overconsolidated behavior due to historical unloading. Below these depths, soils generally exhibit normally consolidated behavior with OCRs approaching 1.0.

For materials on land the ESUs are considered to be normally consolidated soils due to their depositional and erosional history.

3.9 LATERAL EARTH PRESSURE COEFFICIENT

In situ earth pressure, K_0, provides a means of quantifying the magnitude of horizontal stress in undisturbed ground.

Jaky (1944) presented the following relationship for normally consolidated soils on level ground.

$$K_0 = 1 - \sin\varphi'$$

Using the drained strength parameters reported in Section 3.3, the following values are recommended for design.

Table 3-13
Earth Pressure Coefficients

ESU	φ'_{peak} (°)	K_0 range	K_0 value
Artificial Fill	32 – 35	0.43 – 0.47	0.45
Recent Basin Sediment – Mocks Bottom	32 – 34	0.44 – 0.47	0.45
Recent Basin Sediment – Swan Island	31 – 33	0.46 – 0.48	0.47
Alluvium – Sand (EL ≥ -10 ft)	32 – 34	0.44 – 0.47	0.45
Alluvium – Sand (EL < -10 ft)	34 – 36	0.41 – 0.47	0.45
Alluvium – Clay	24 – 26	0.56 – 0.59	0.58

ESU	φ'_{peak} (°)	K_0 range	K_0 value
Missoula Flood Deposits – Silt	31 – 33	0.46 – 0.48	0.47
Missoula Flood Deposits – Sand (EL ≥ -80 ft)	34 – 36	0.41 – 0.47	0.45
Missoula Flood Deposits – Sand (EL < -80 ft)	36 – 38	0.38 – 0.41	0.40

3.10 SMALL STRAIN SHEAR MODULUS

The small strain shear modulus (G_0) was evaluated for each project ESU, and for upland and in-water conditions utilizing the following relationship.

$$G_0 = \frac{\gamma}{g} V_s^2$$

Where ϒ is bulk unit weight in pounds per cubic foot, g is the gravitational constant (32.17 ft/s^2), and V_s is shear wave velo city. The bulk unit weight used to derive G_0 is provided in Table 3 14. The bulk unit weight in Table 3 14 is simplified from Table 3 5 due to the low quantity of Recent Basin Sediment V_s data, and V_s profile derivation method (function of depth and overburden).

Table 3-14
Bulk Unit Weight Data by ESU for G_0 Derivation

ESU	Recommended ϒ (pcf)
Artificial Fill	110
Recent Basin Sediment	100
Alluvium – Sand	117.5
Alluvium - Clay	105
Missoula Flood Deposits – Silt	110
Missoula Flood Deposits – Sand	120

Shear wave velocity profiles for each ESU were developed using linear and polynomial regression in accordance with Sykora (1987).

$$V_s = a \times D + b$$

$$V_s = m \times D^s$$

Where D is depth below ground surface in feet, and a, b, m, and s are coefficients determined by curve fitting to field measured V_s data from downhole P- and S-wave logging and seismic cone penetration testing.

Shear wave velocity profile equations are presented in Table 3 15. Upper and lower bound depths included in Table 3 15 represent the maximum and minimum depths an ESU was encountered in the geotechnical investigation. The V_s profile equations should not be extrapolated beyond

boundary conditions. In some cases two sets of values are presented for both Alluvium – Clay and Missoula Flood Deposits – Silt in the upland condition. In these cases the shear wave velocity profiles varies with depth which warrants the use of separate regression equations where material behavior, consistency or data trends differ. The transition depths reflect changes observed in the dataset.

Table 3-15
Shear Wave Velocity Profile Equations

ESU	Location	Depth Upper Bound	Depth Lower Bound	V_s Eq.	Coeff. m or a	Coeff. s or b
Artificial Fill	Upland	0	33	m*Ds	697.71	0.00305
Artificial Fill	In Water	N/A	N/A	N/A	N/A	N/A
Recent Basin Sediment	Upland	26	68	m*Ds	209.49	0.256
Recent Basin Sediment	In Water	0	37	m*Ds	45.61	0.403
Alluvium – Sand	Upland	12	86.5	m*Ds	576.08	0
Alluvium - Sand	In Water	0	34.5	m*Ds	985.258	0
Alluvium - Clay	Upland	25	65	m*Ds	352.717	0.0864
Alluvium - Clay	Upland	65	81	a*D + b	13.2	-352.2
Alluvium - Clay	In Water	6	33	a*D + b	13.2	-38
Missoula Flood Deposits - Silt	Upland	25	75	m*Ds	98.641	0.433
Missoula Flood Deposits - Silt	Upland	75	121.5	m*Ds	250	0.217
Missoula Flood Deposits - Silt	In Water	0	80	m*Ds	220.532	0.256
Missoula Flood Deposits - Sand	Upland	53	121.5	m*Ds	147.4	0.343
Missoula Flood Deposits - Sand	In Water	6	95.5	m*Ds	518.46	0.052

3.11 POISSON'S RATIO

For the SIB Project Area, Poisson's ratio values were estimated based on typical values for similar soil types, laboratory test data where available, and published literature (e.g., NAVFAC DM 7.1, 2022).

The values are summarized by ESU in Table 3-16.

Table 3-16
Recommended Poisson's Ratio

ESU	Recommended Poisson's Ratio (v)
Artificial Fill	0.30
Recent Basin Sediment – Mocks Bottom	0.35
Recent Basin Sediment – Swan Island	0.45
Alluvium - Sand	0.25
Alluvium - Clay	0.40
Missoula Flood Deposits – Silt	0.40
Missoula Flood Deposits - Sand	0.30

These values are consistent with typical ranges:

- Sands and gravels: 0.25 – 0.35
- Silts and clays: 0.30 – 0.50

4.0 REFERENCES

Bowles, J.E. 1996. Foundation Analysis and Design. 5th Edition. McGraw-Hill, New York

Idriss, I. M., & Boulanger, R. W., 2008. Soil Liquefaction During Earthquakes. Earthquake Engineering Research Institute, Oakland, California.

Jaky, J., 1944. The coefficient of earth pressure at rest. Journal of the Society of Hungarian Architects and Engineers, 78(22), pp. 355-358.

Robertson, P. K. and Cabal, K.L. (2010). Estimating soil unit weight from CPT. Second International Symposium on Cone Penetration Testing, Huntington Beach, CA, USA.

Robertson, P. K. and Cabal, K.L. (2015). Guide to Cone Penetration Testing for Geotechnical Engineering, 6th Edition.

NAVFAC (2022). Soil Mechanics (Design Manual 7.1). Naval Facilities Engineering Systems Command, Washington, D.C.

Sykora, D. W. (1987). Examination of Existing Shear Wave Velocity and Shear Modulus Correlations in Soils. Defense Technical Information Center. Retrieved from https://apps.dtic.mil/sti/tr/pdf/ADA214721.pdf.

ATTACHMENT B
SEISMIC ASSESSMENT

1.0 INTRODUCTION

This attachment to the 90% Geotechnical Design Technical Memorandum (GDTM) presents analysis output files of the earthquake-induced soil liquefaction analysis conducted as part of the geotechnical evaluation of the Swan Island Basin (SIB) Project Area, located within the Portland Harbor Superfund Site in Portland, Multnomah County, Oregon.

The Remedial Design (RD), along with estimates of seismic hazards and ground motion parameters, and evaluations of liquefaction susceptibility and its consequences at the project site are presented in the main body of the 90% GDTM. The estimated seismic performance of riverbank slopes under both existing and post-remediation conditions are presented in Attachment C. Liquefaction triggering and consequences assessments for new marine structures are presented in Attachment D.

1.1 LIQUEFACTION TRIGGERING ANALYSES OUTPUT FILES

Liquefaction analysis reports that include the input parameters and analysis results for each cone penetration test and standard penetration test location analyzed were generated in CLiq and are provided as part of this Attachment.

CLiq Analysis Summary Reports

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CPTW-09 results
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Lateral displacements summary report 175

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

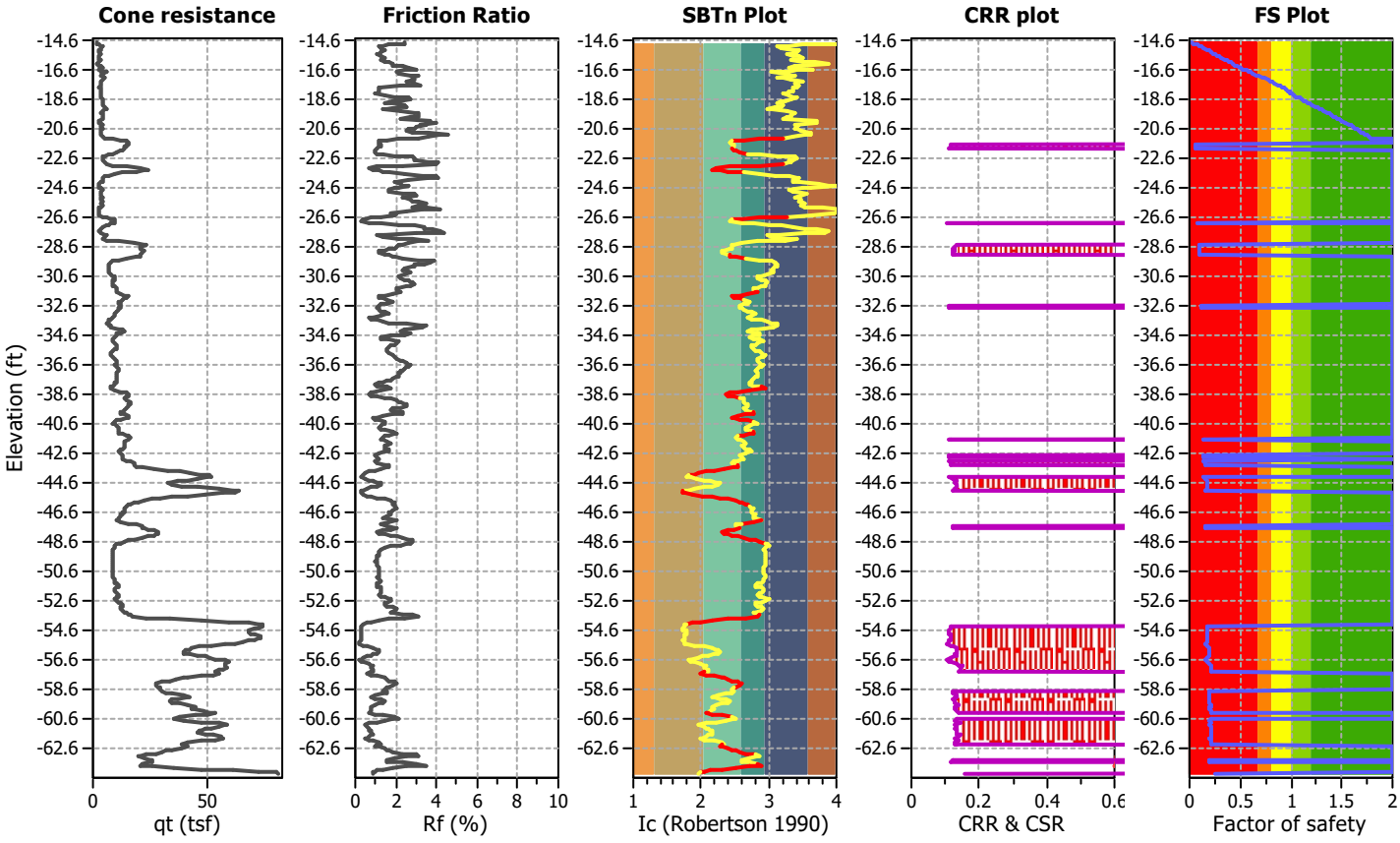
LIQUEFACTION ANALYSIS REPORT

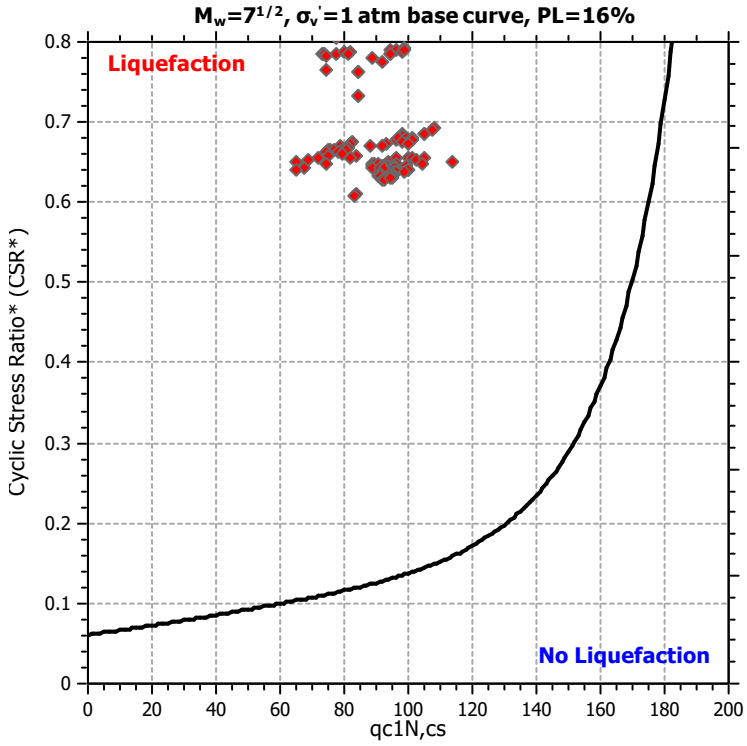
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

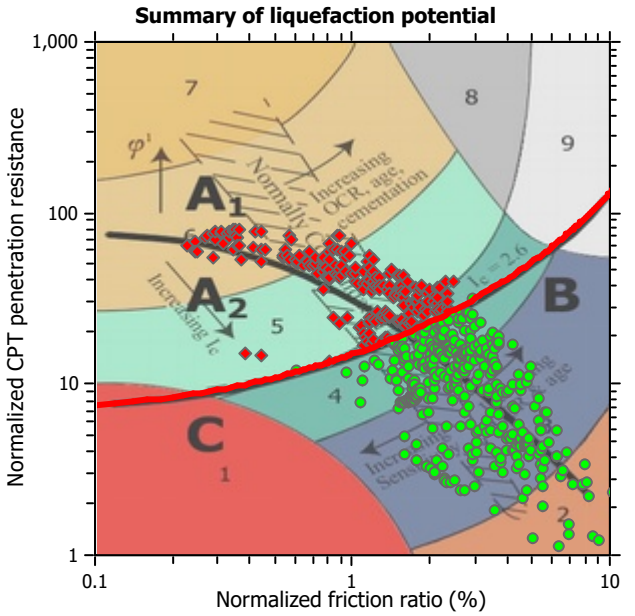
CPT file : CPTW-01

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-34.60 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-34.60 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

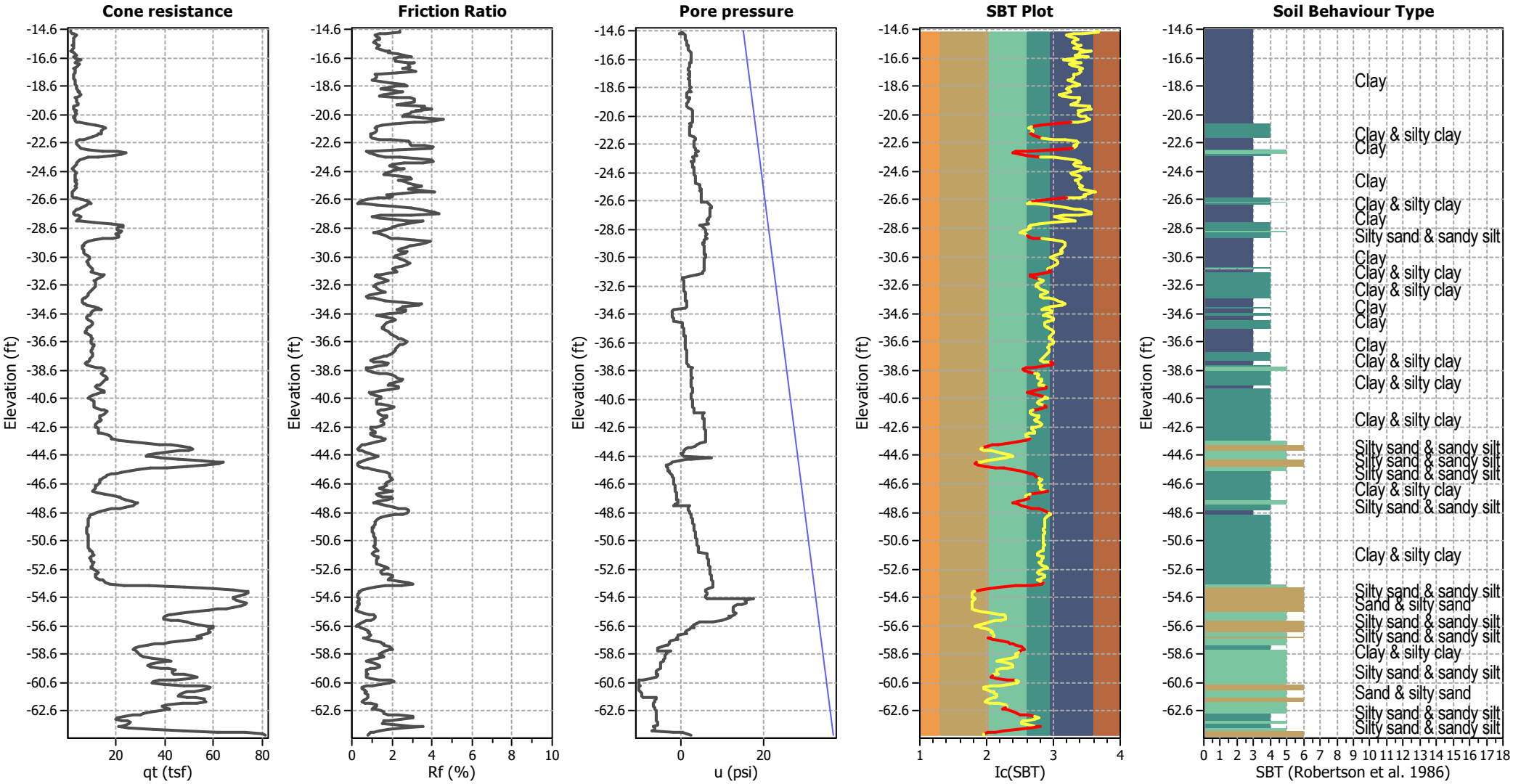






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



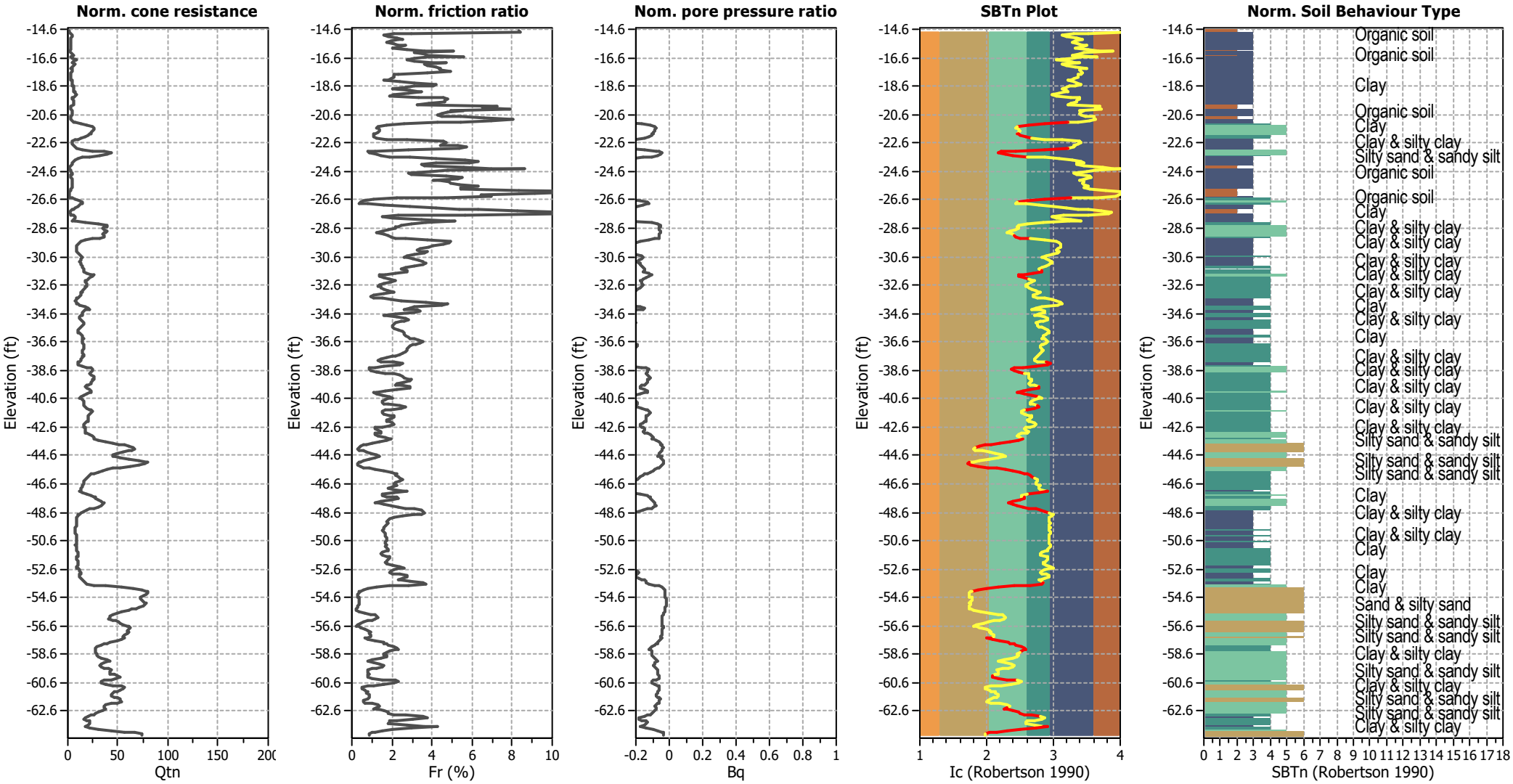
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-34.60 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-34.60 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



Input parameters and analysis data

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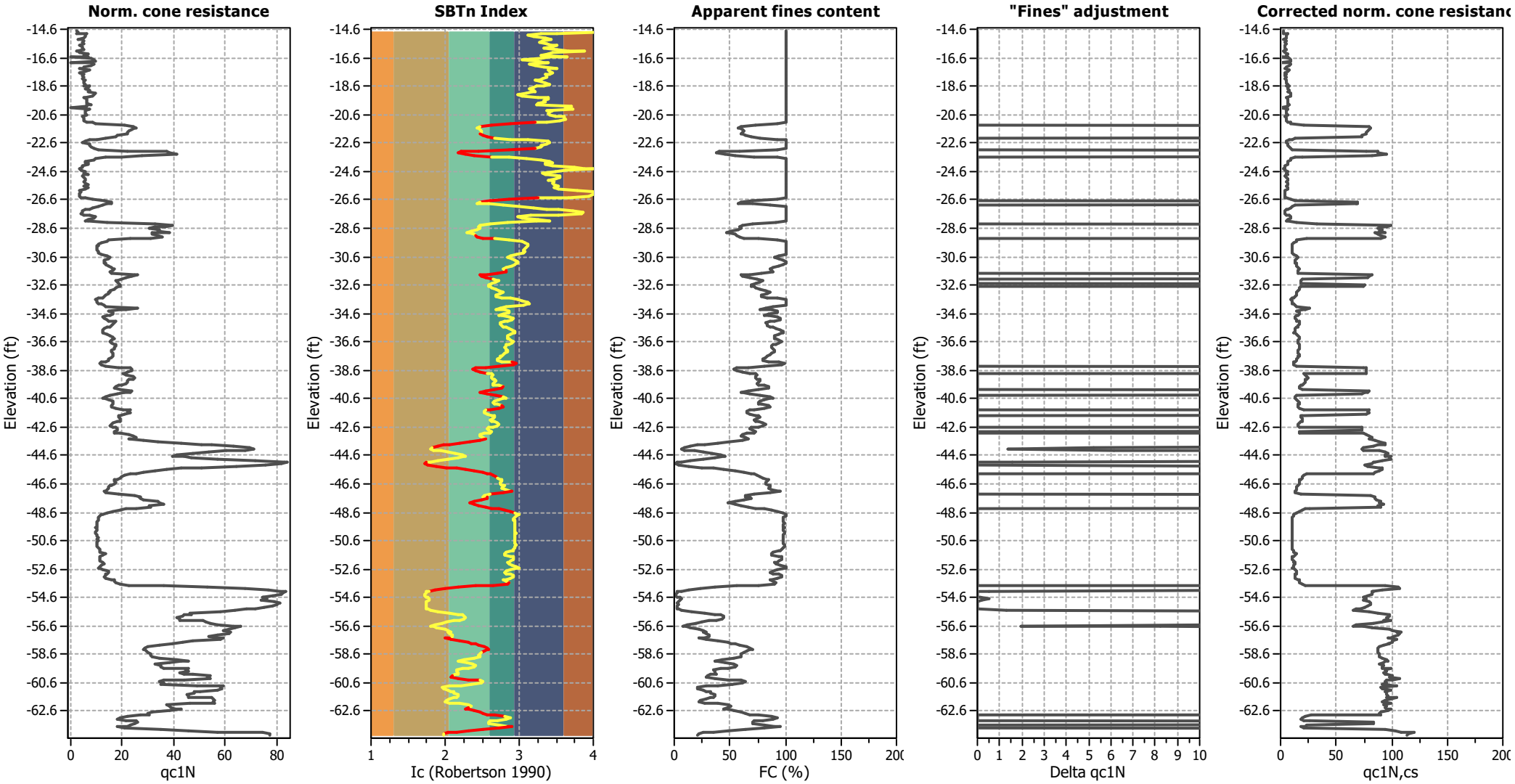
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-34.60 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

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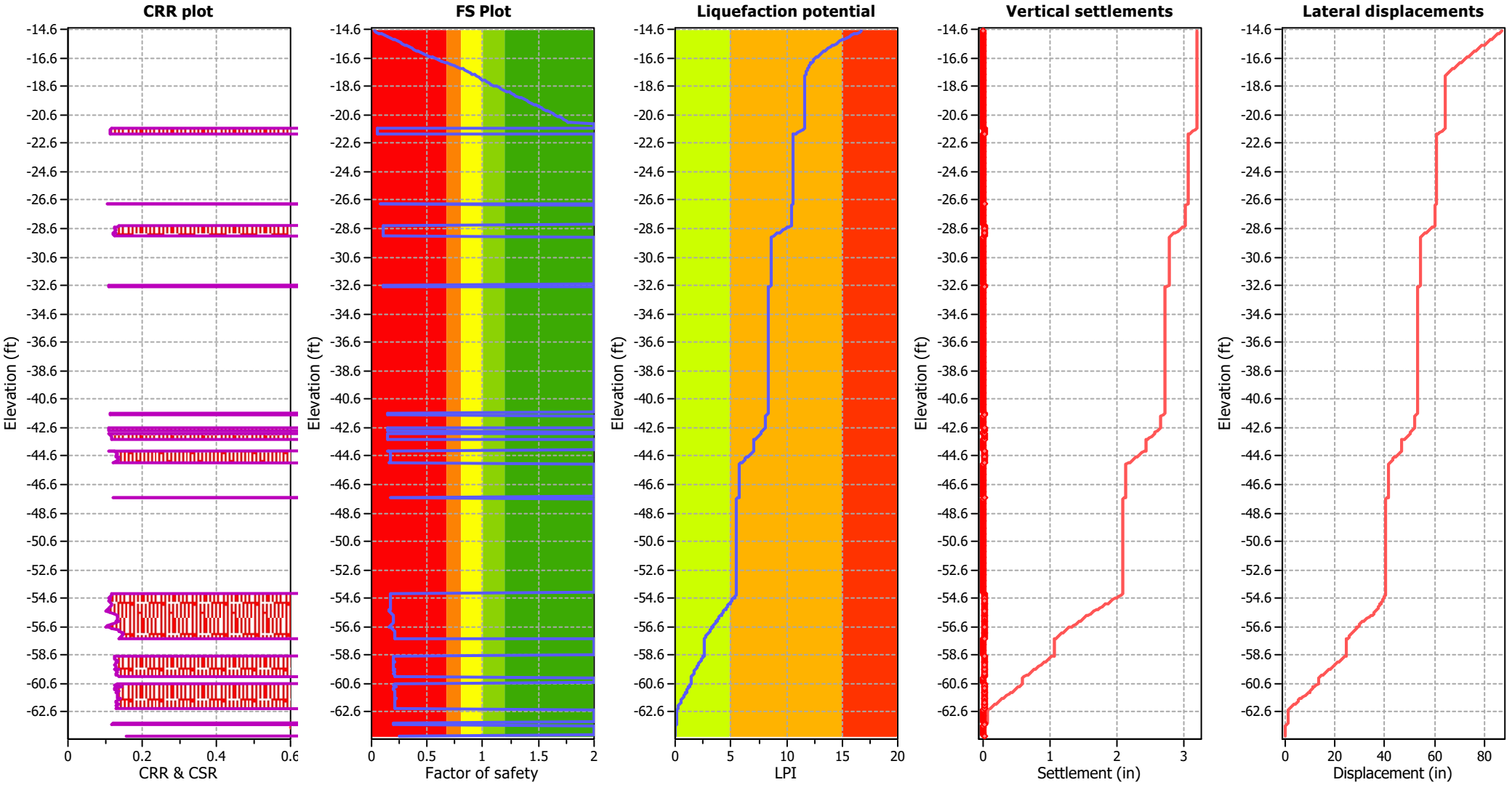
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-34.60 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

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Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-34.60 ft	Fill height:	N/A	Limit depth:	N/A

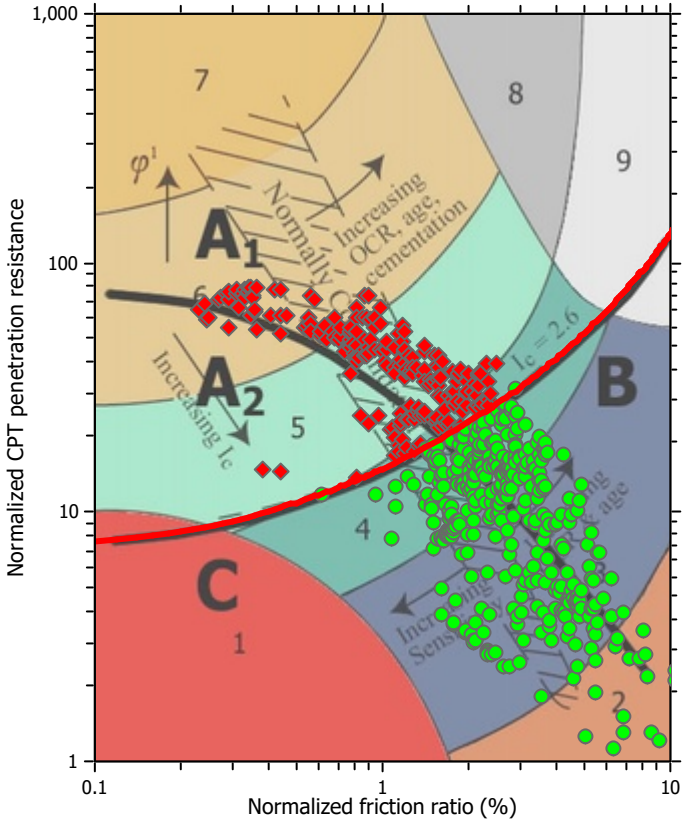
F.S. color scheme

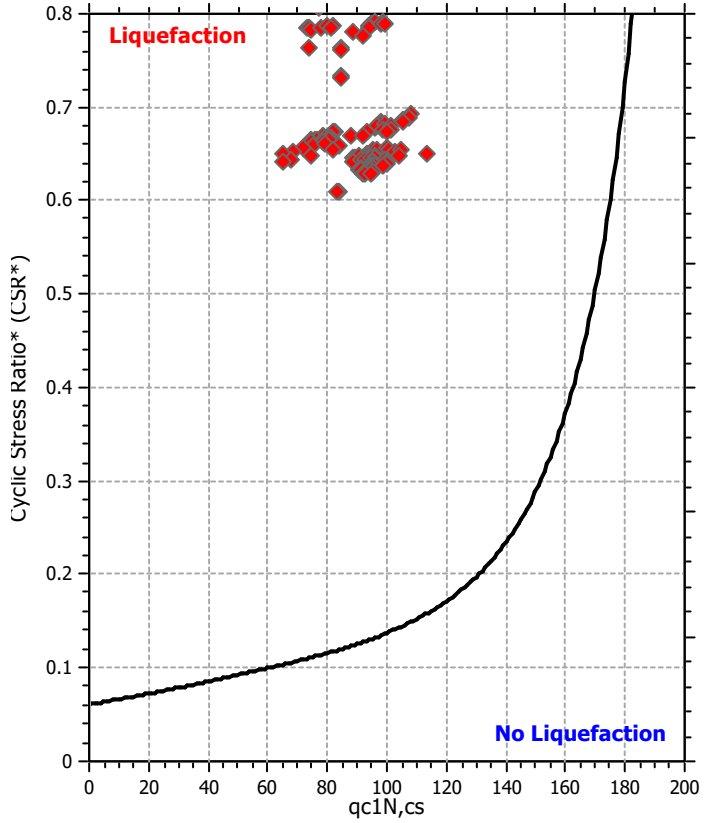
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

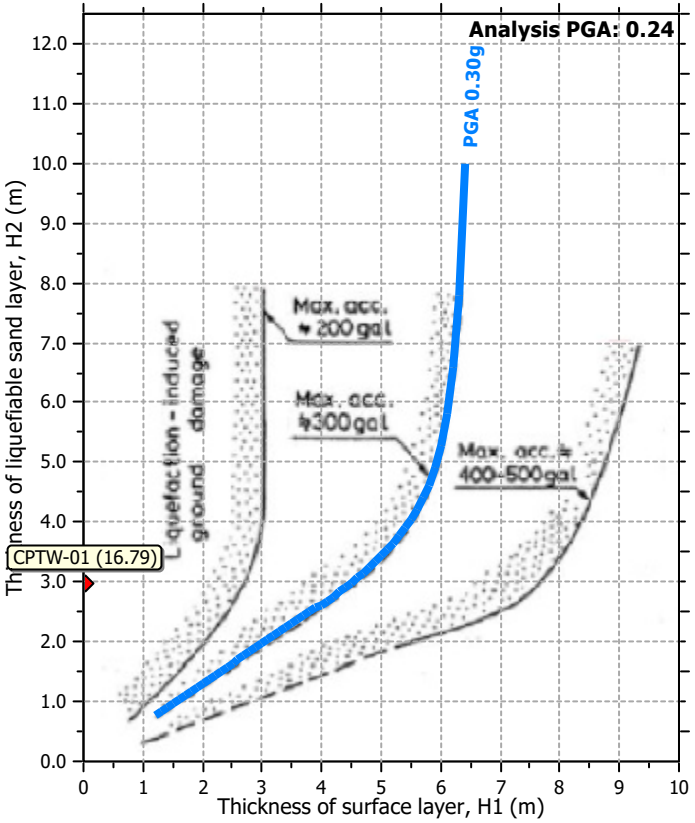
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



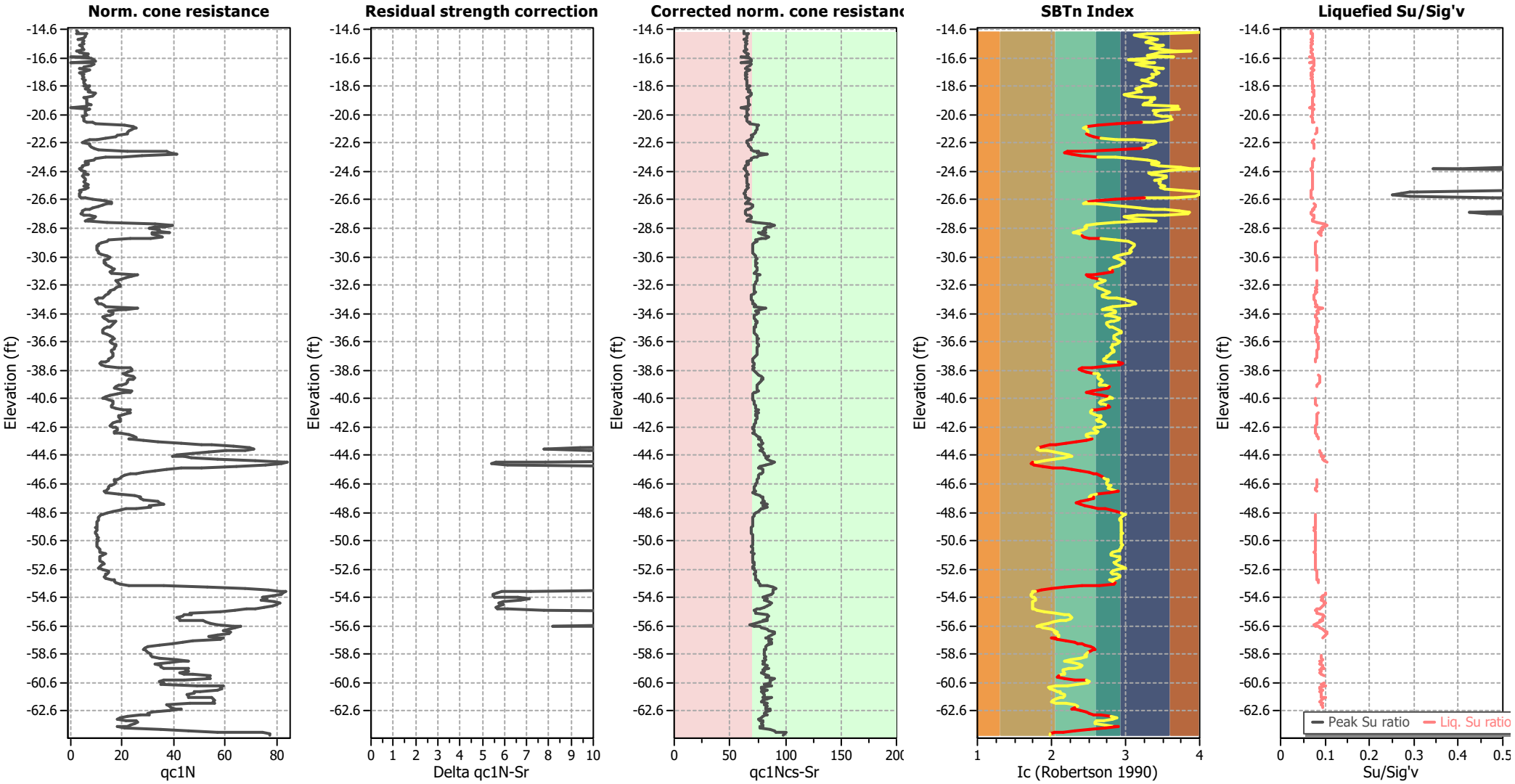




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-34.60 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-34.60 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

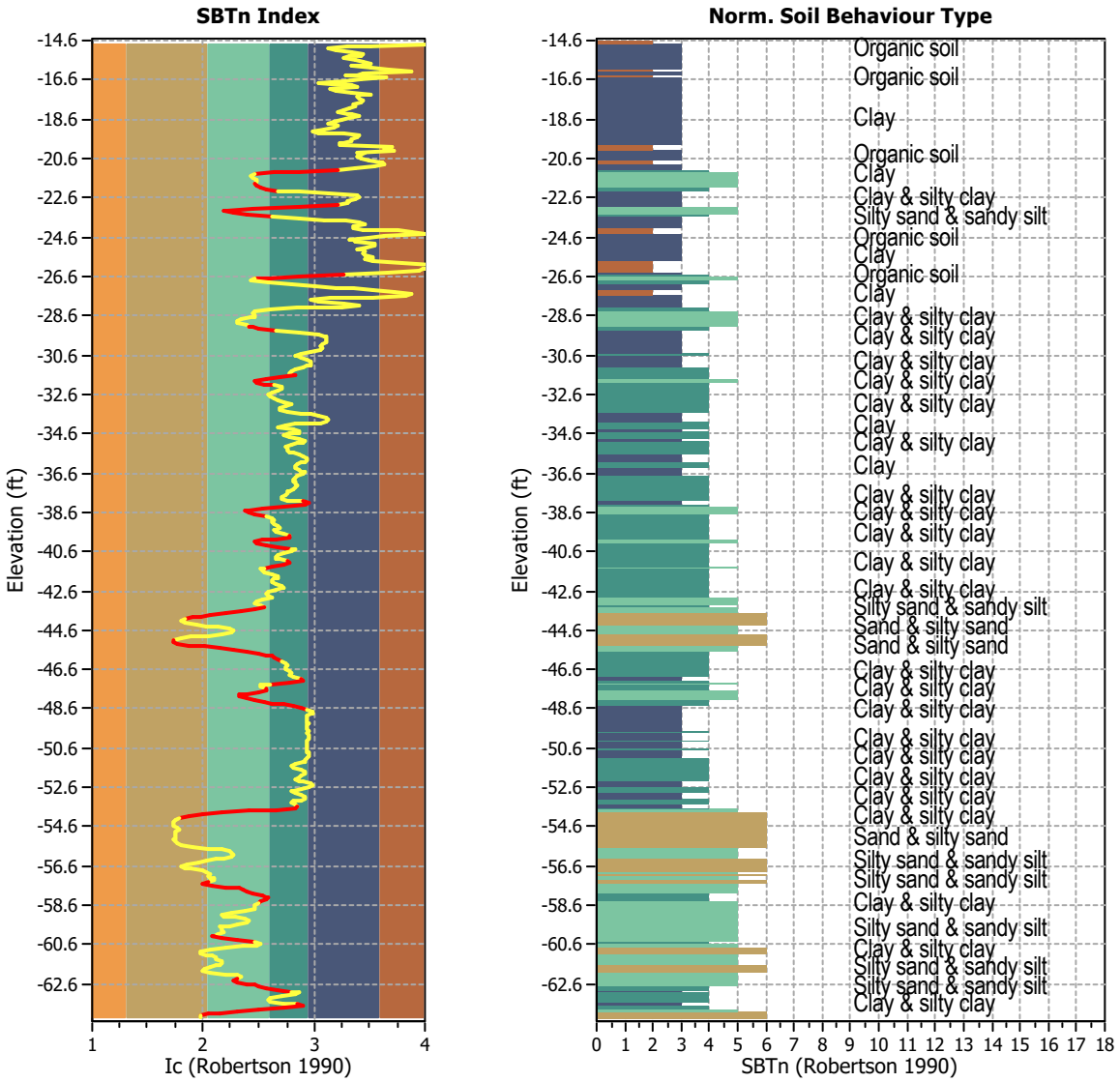
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-34.60 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-34.60 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

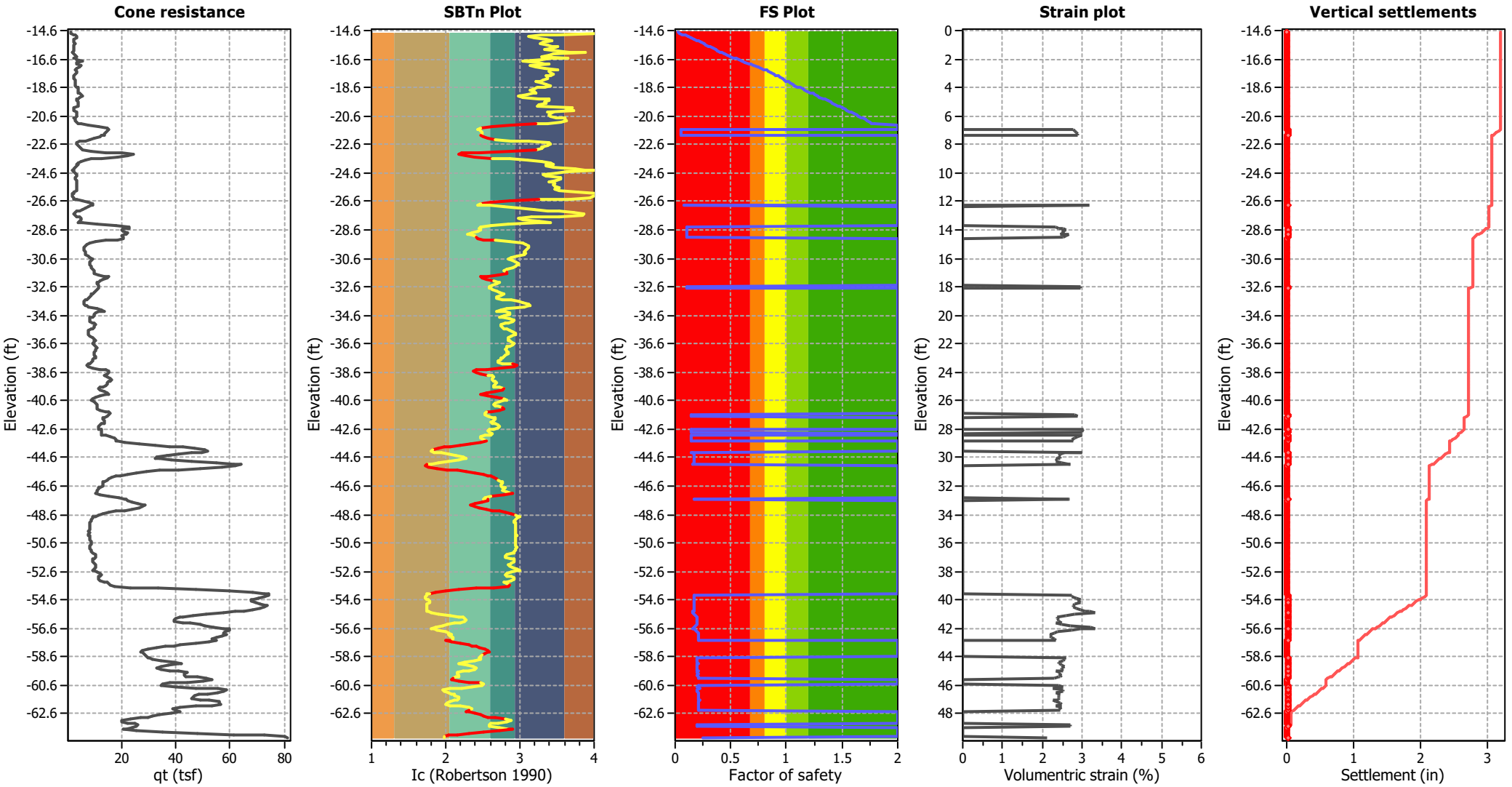
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	606
I_c maximum check value:	3.00	Total points excluded:	143
I_c change ratio value:	0.0250	Exclusion percentage:	23.60%
Minimum number of points in layer:	4	Number of layers detected:	24

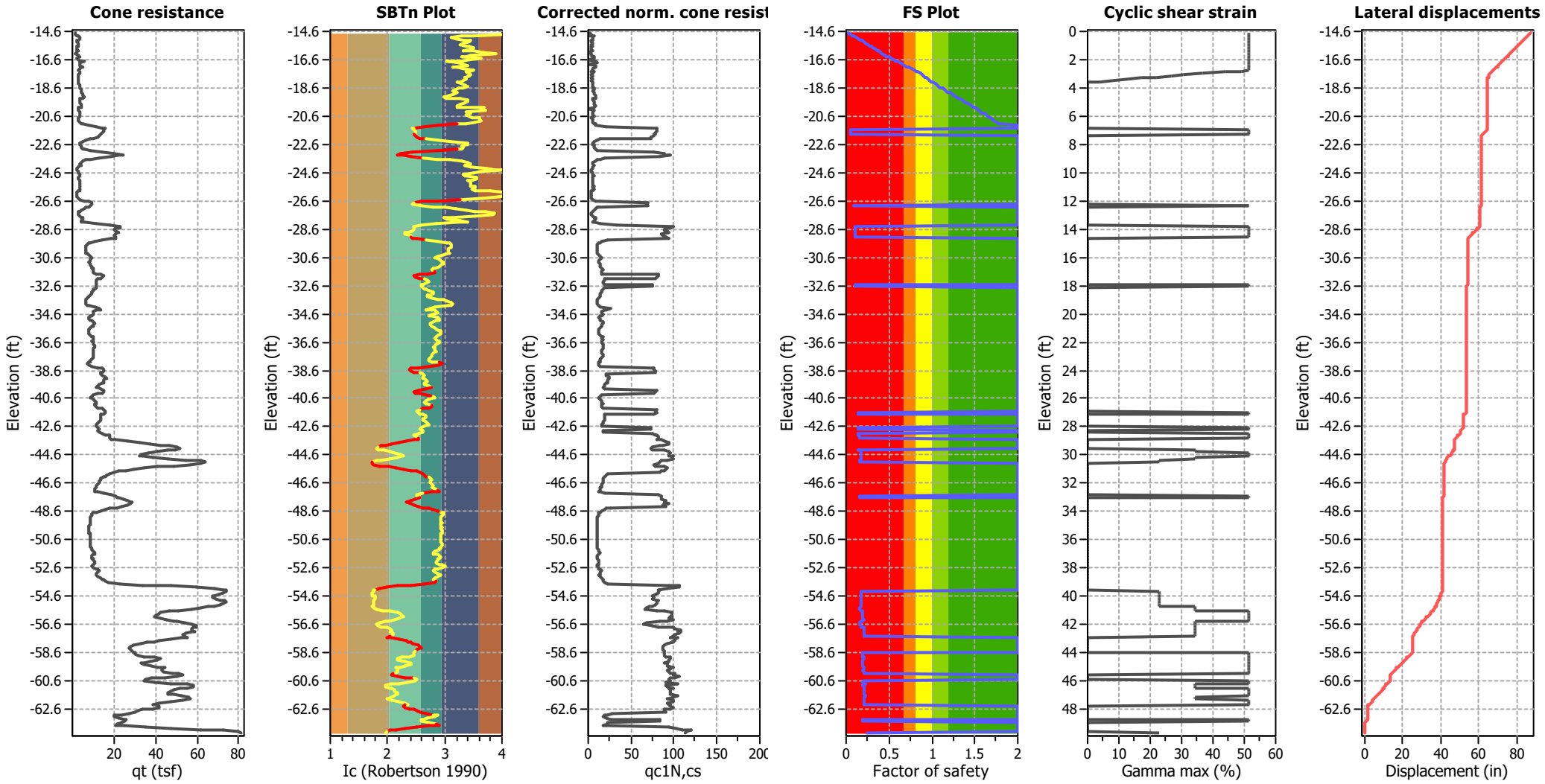
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

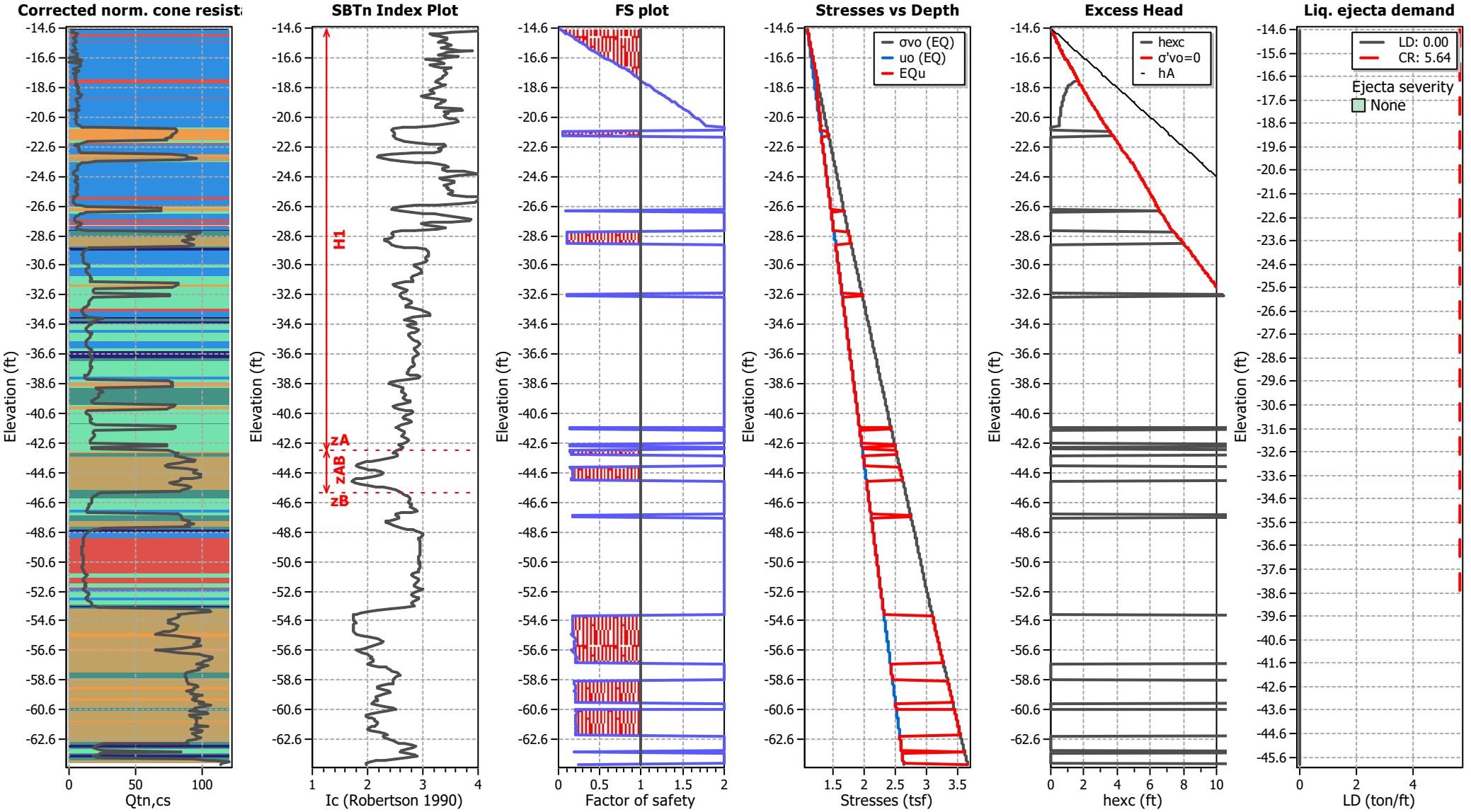
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

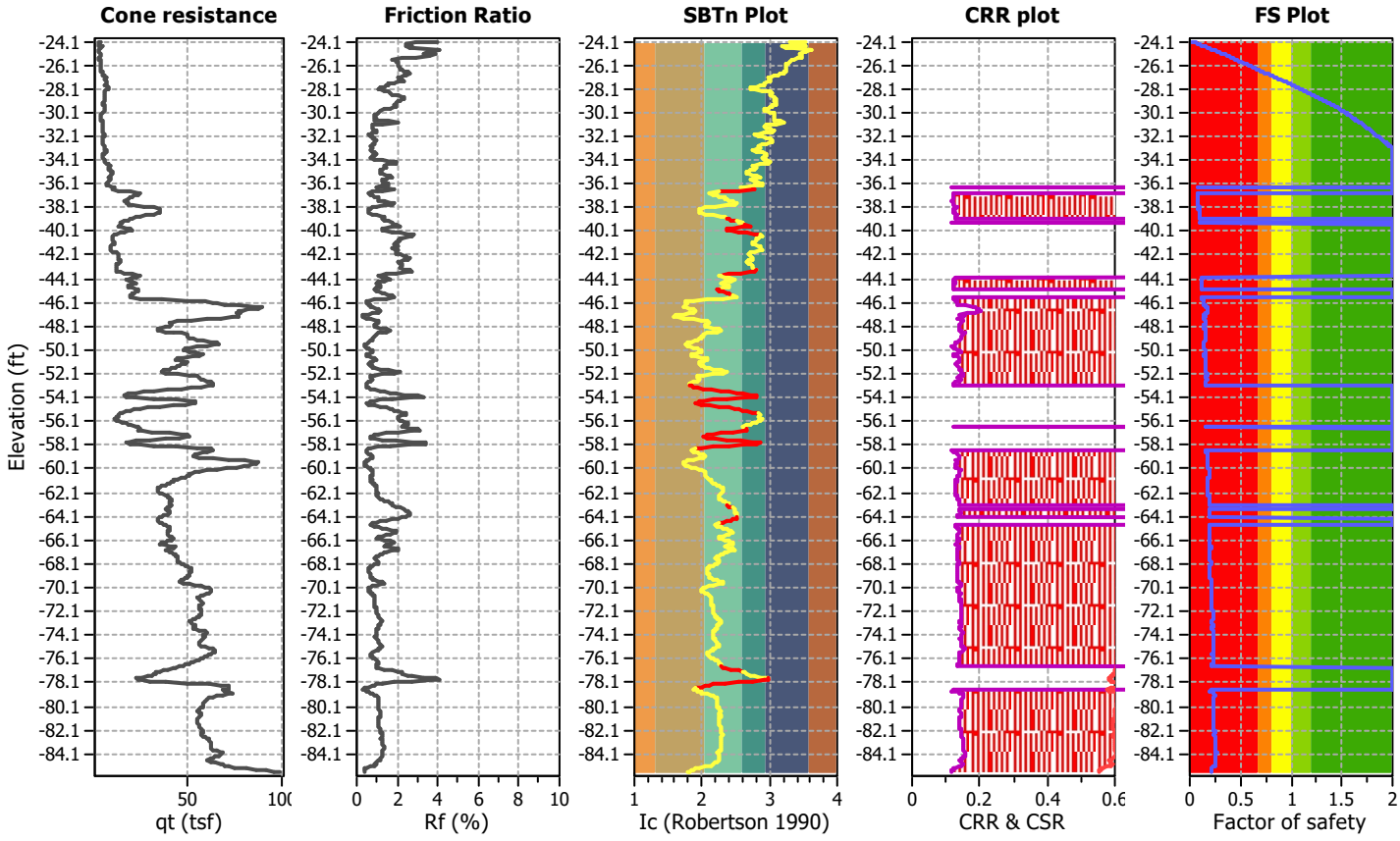
LIQUEFACTION ANALYSIS REPORT

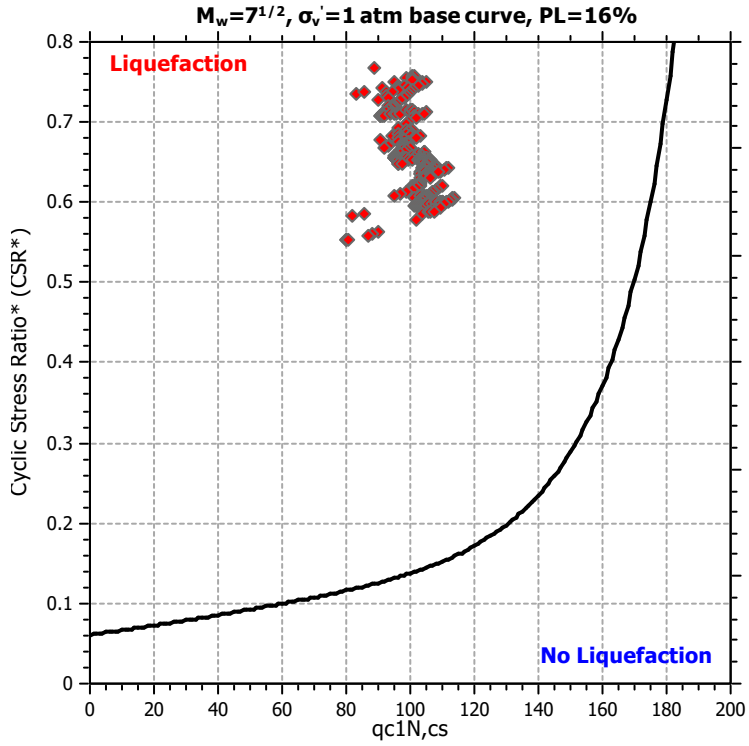
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

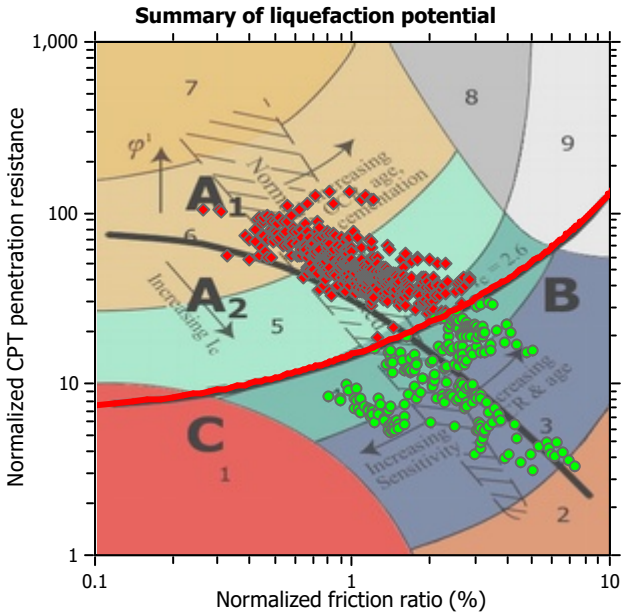
CPT file : CPTW-02

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-44.10 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-44.10 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

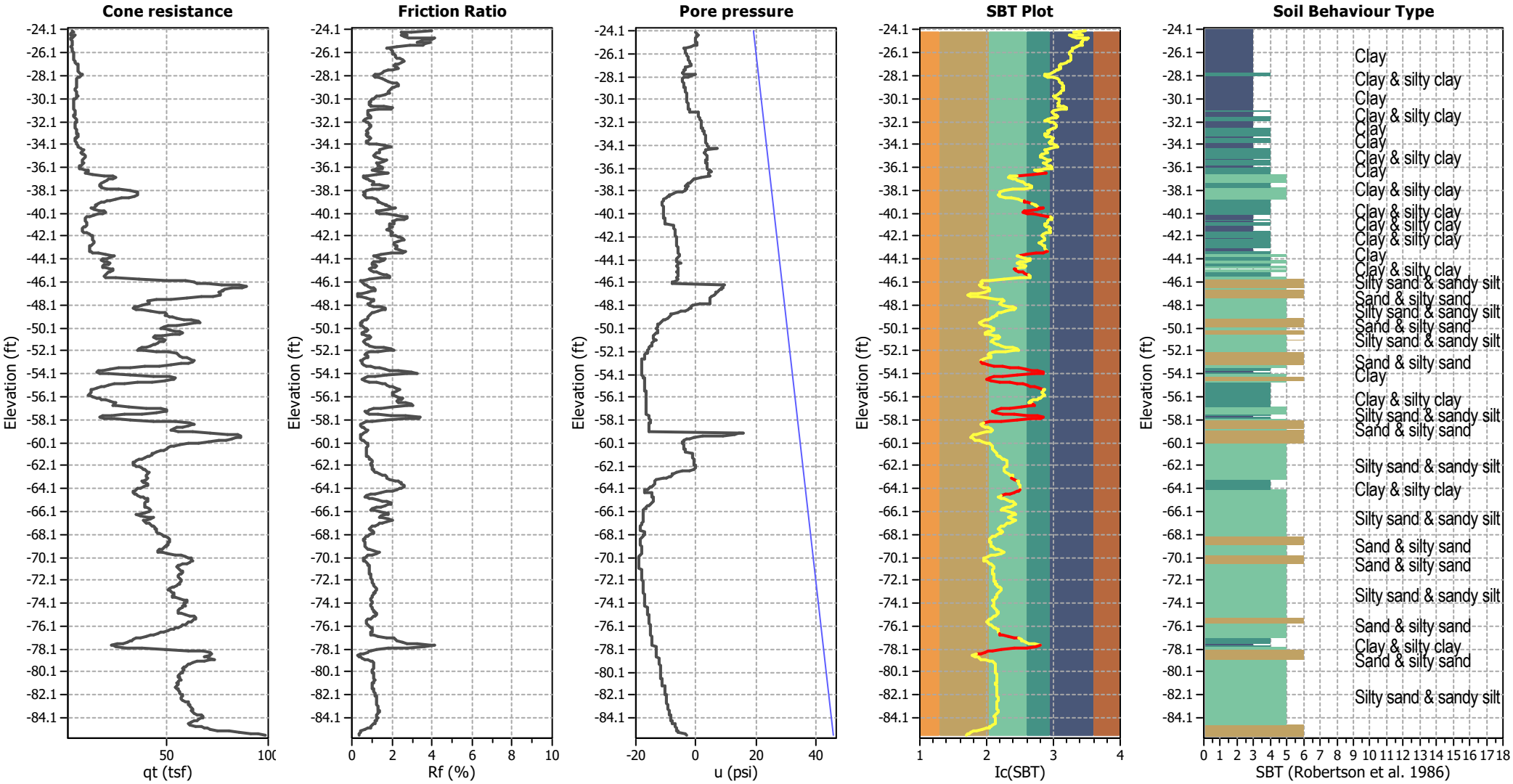






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



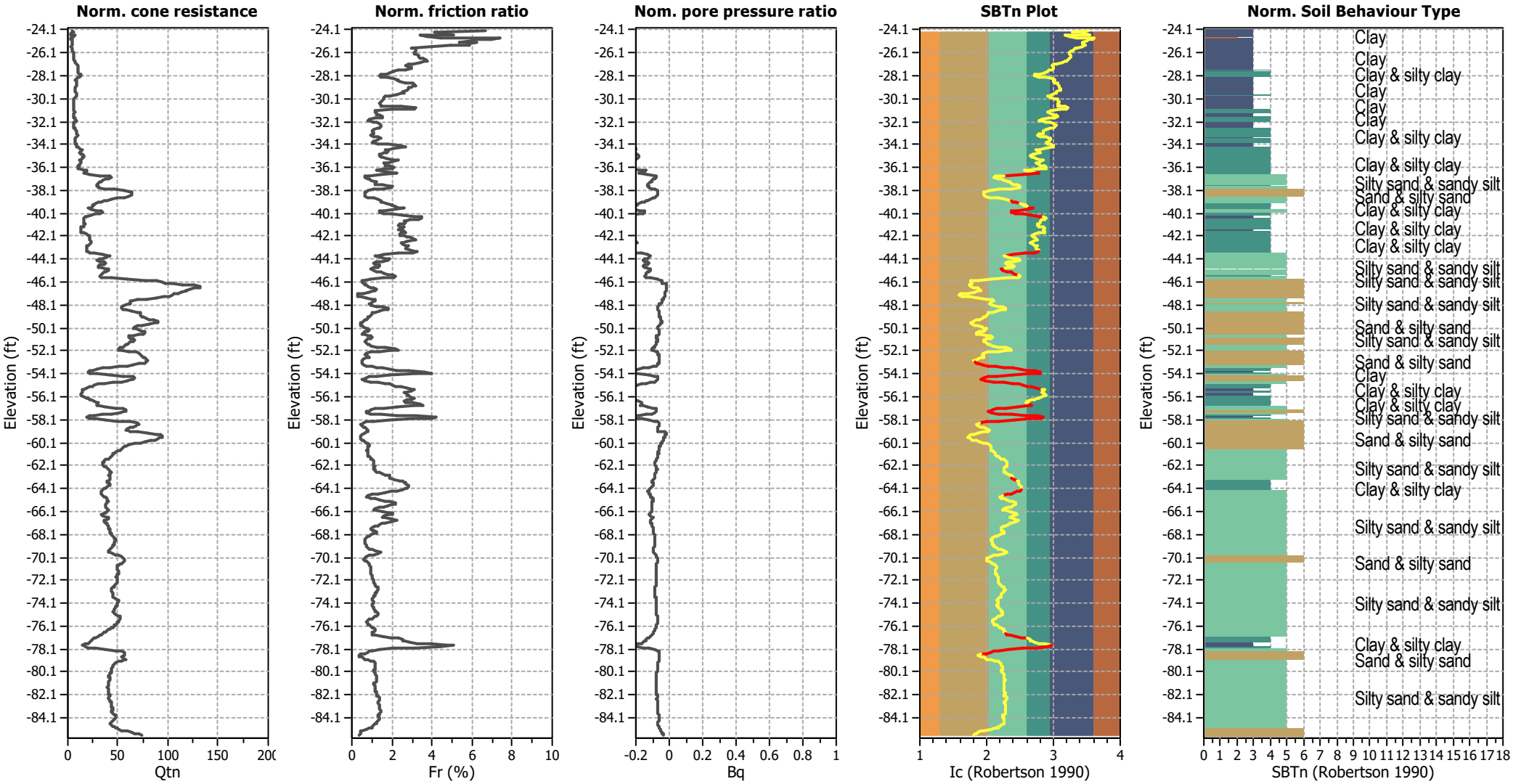
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-44.10 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-44.10 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



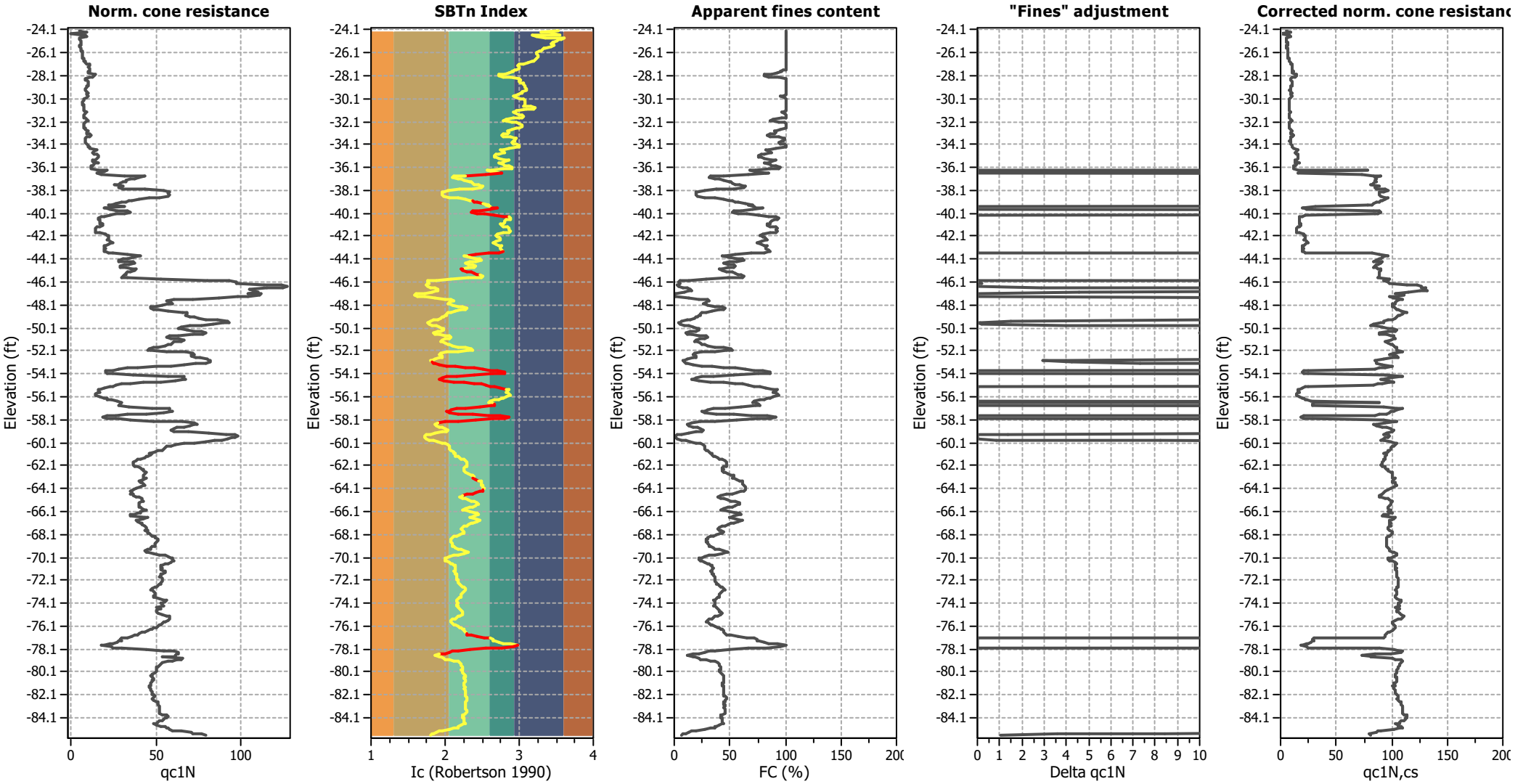
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-44.10 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-44.10 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

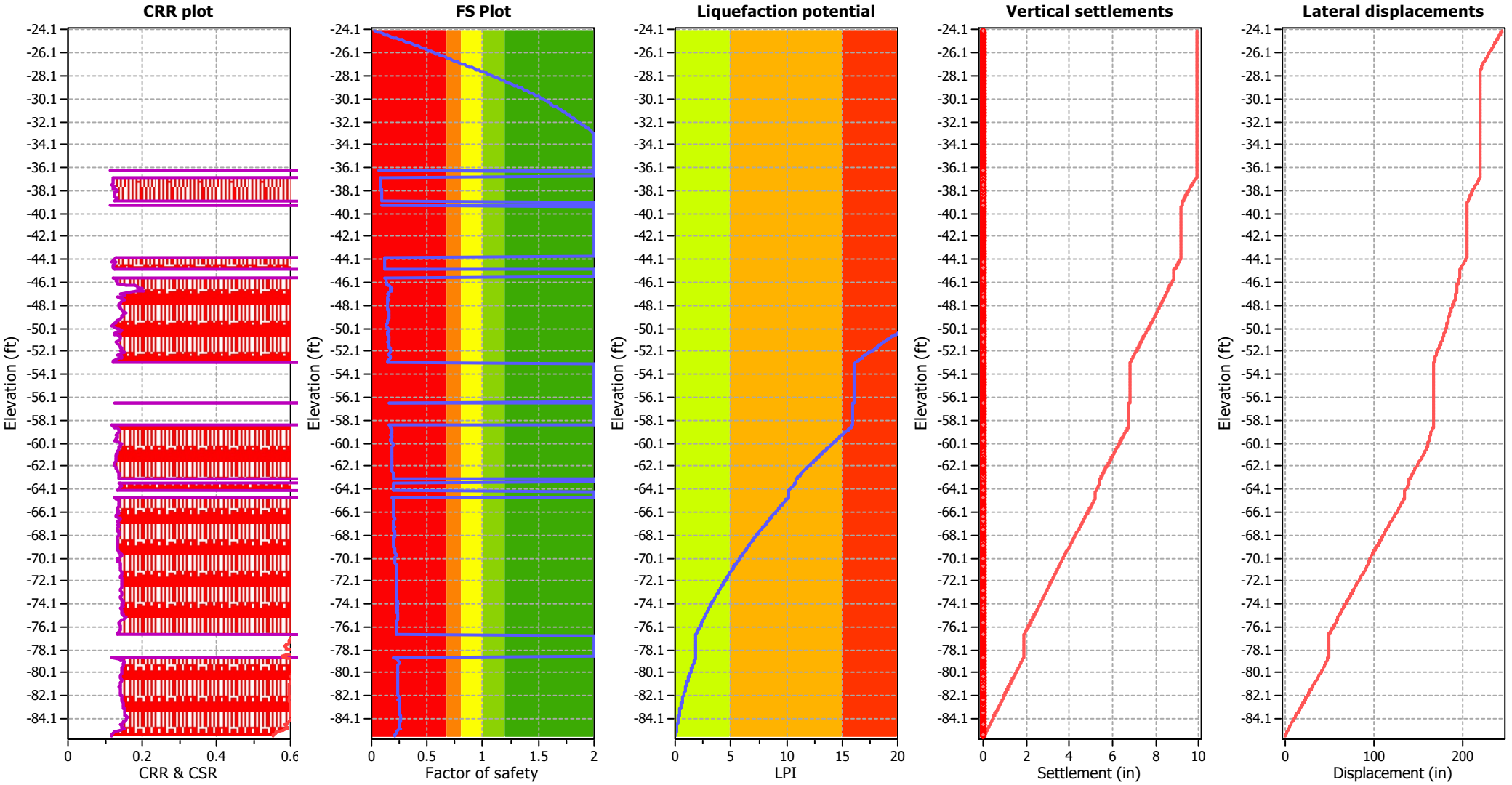
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-44.10 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-44.10 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-44.10 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-44.10 ft	Fill height:	N/A	Limit depth:	N/A

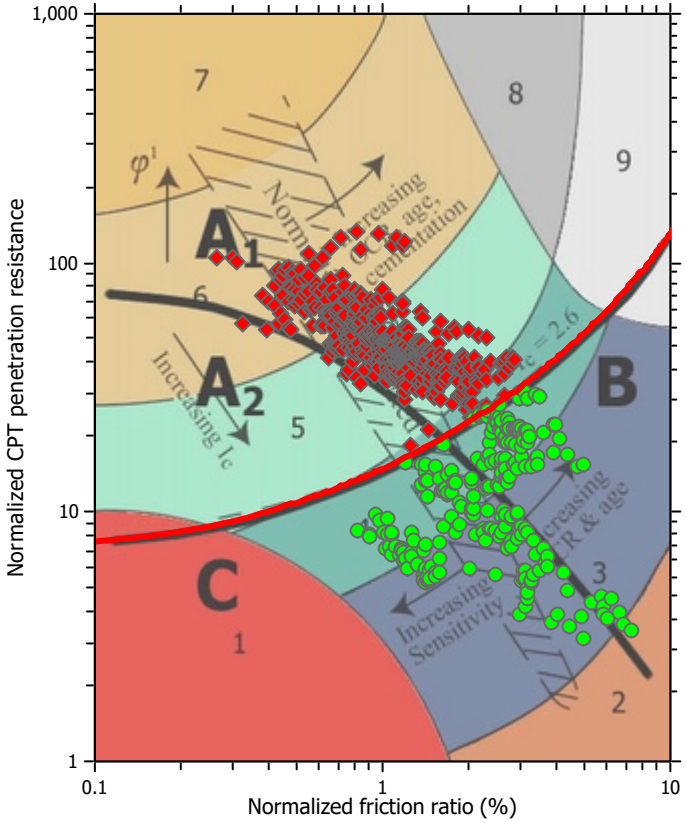
F.S. color scheme

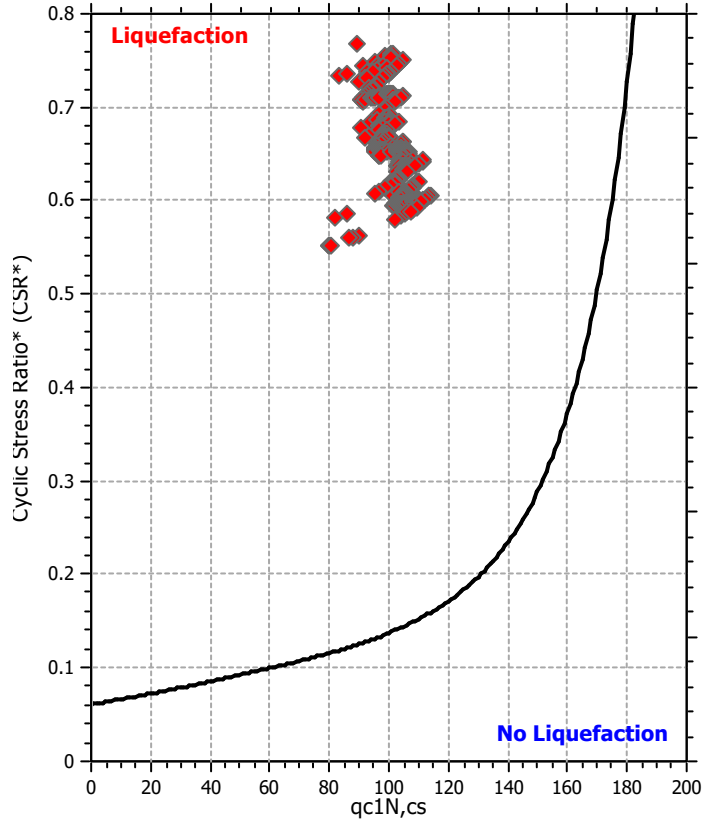
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

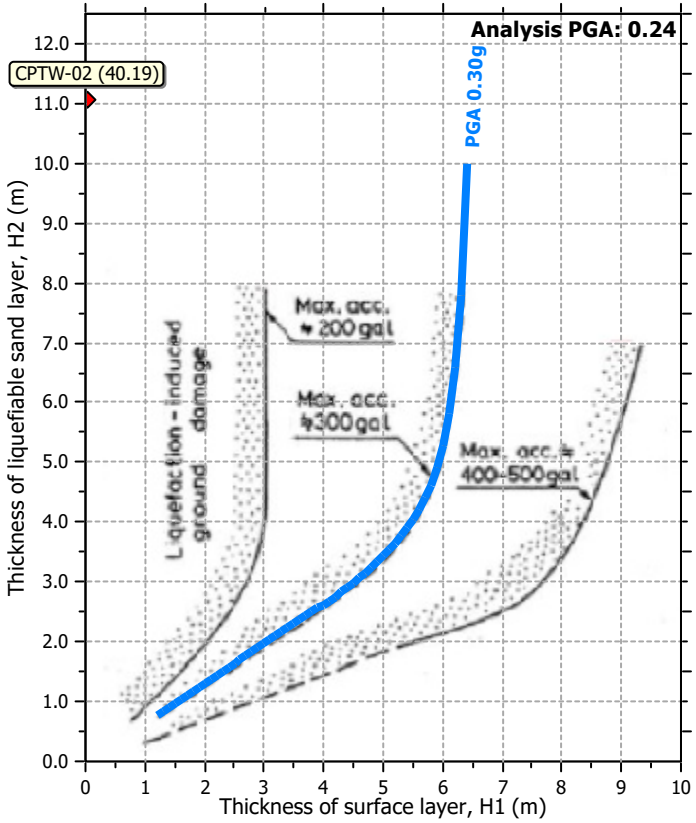
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



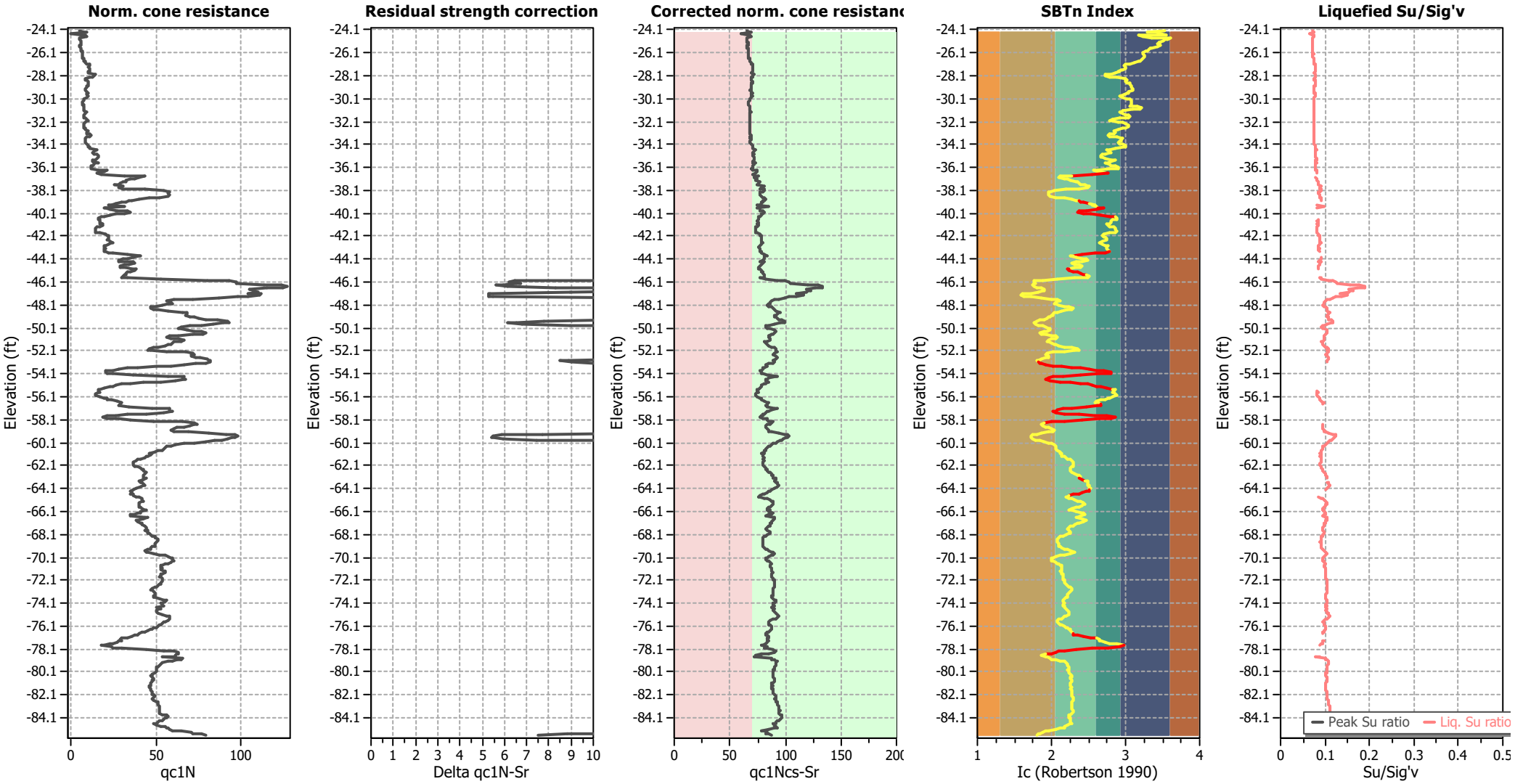




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-44.10 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-44.10 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

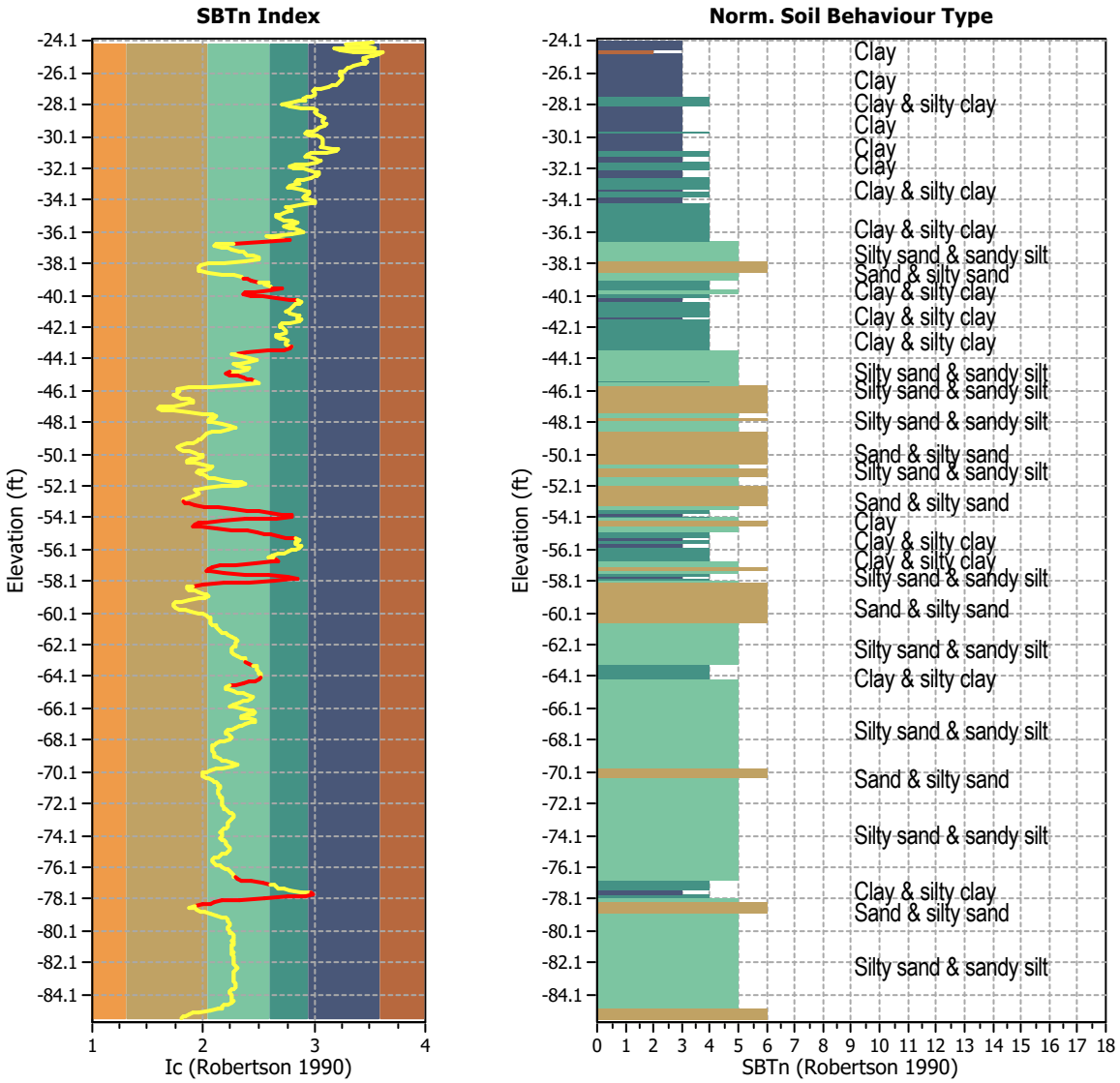
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-44.10 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-44.10 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



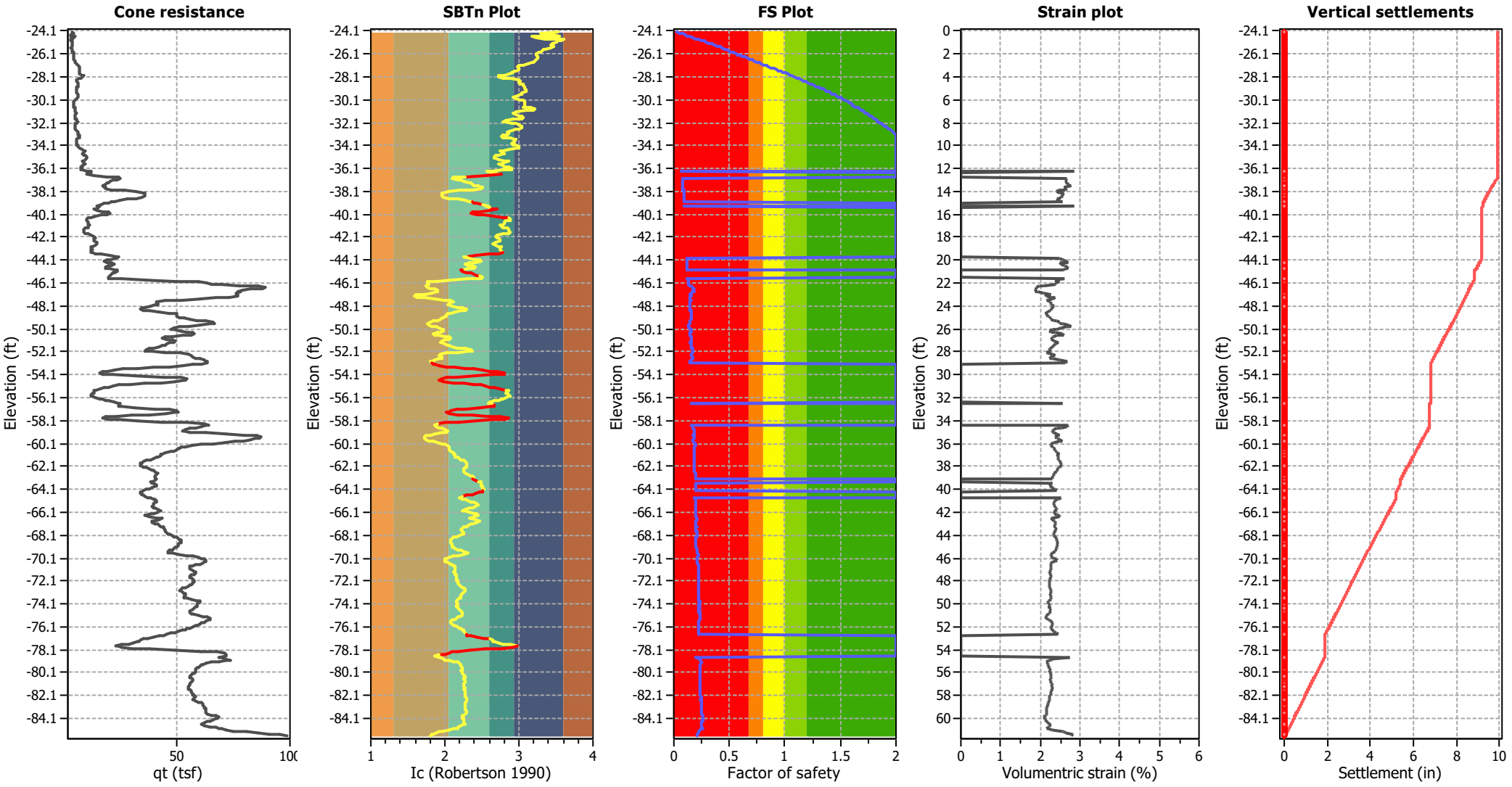
Transition layer algorithm properties

I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0250
Minimum number of points in layer:	4

General statistics

Total points in CPT file:	750
Total points excluded:	114
Exclusion percentage:	15.20%
Number of layers detected:	16

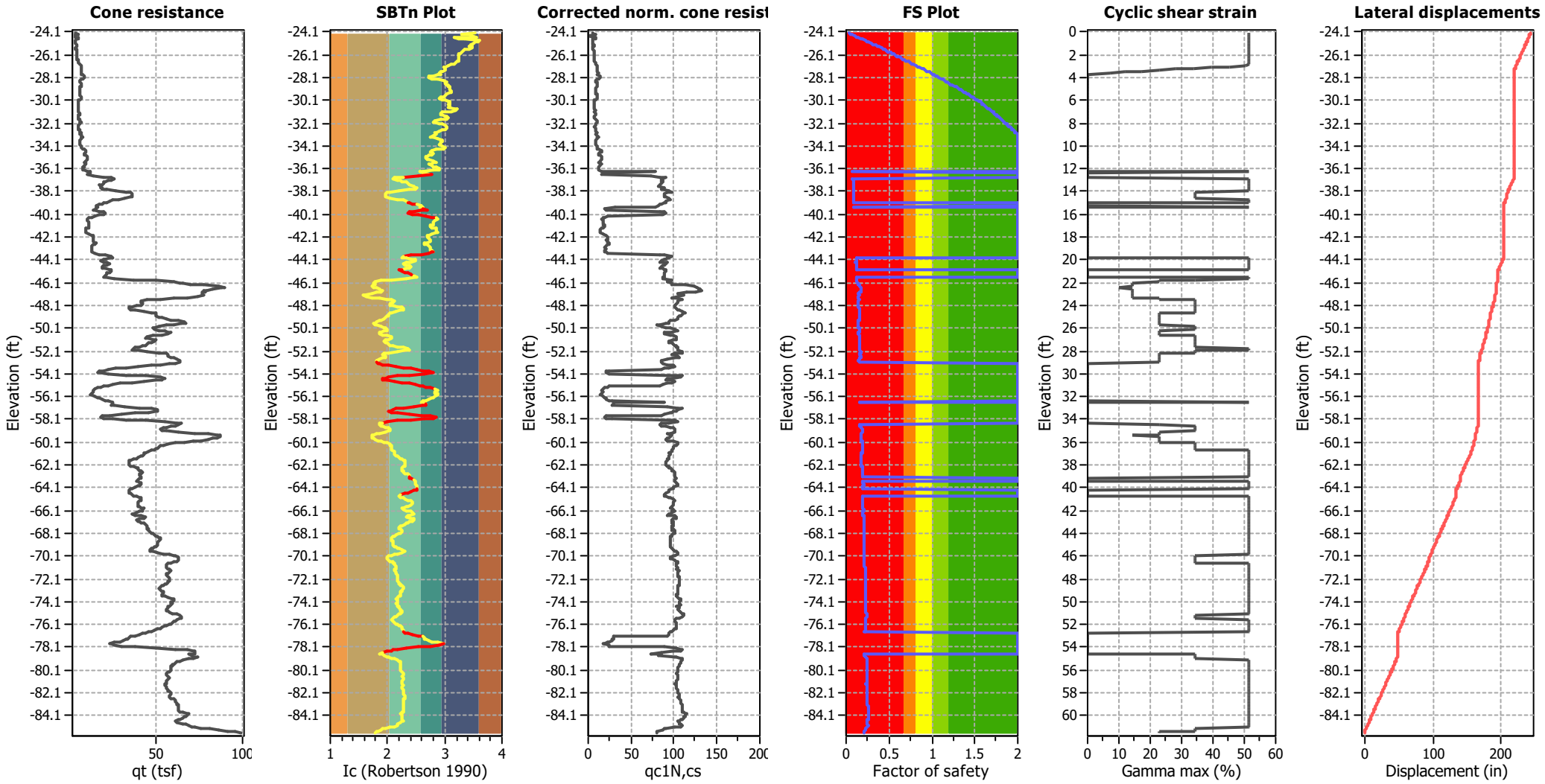
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

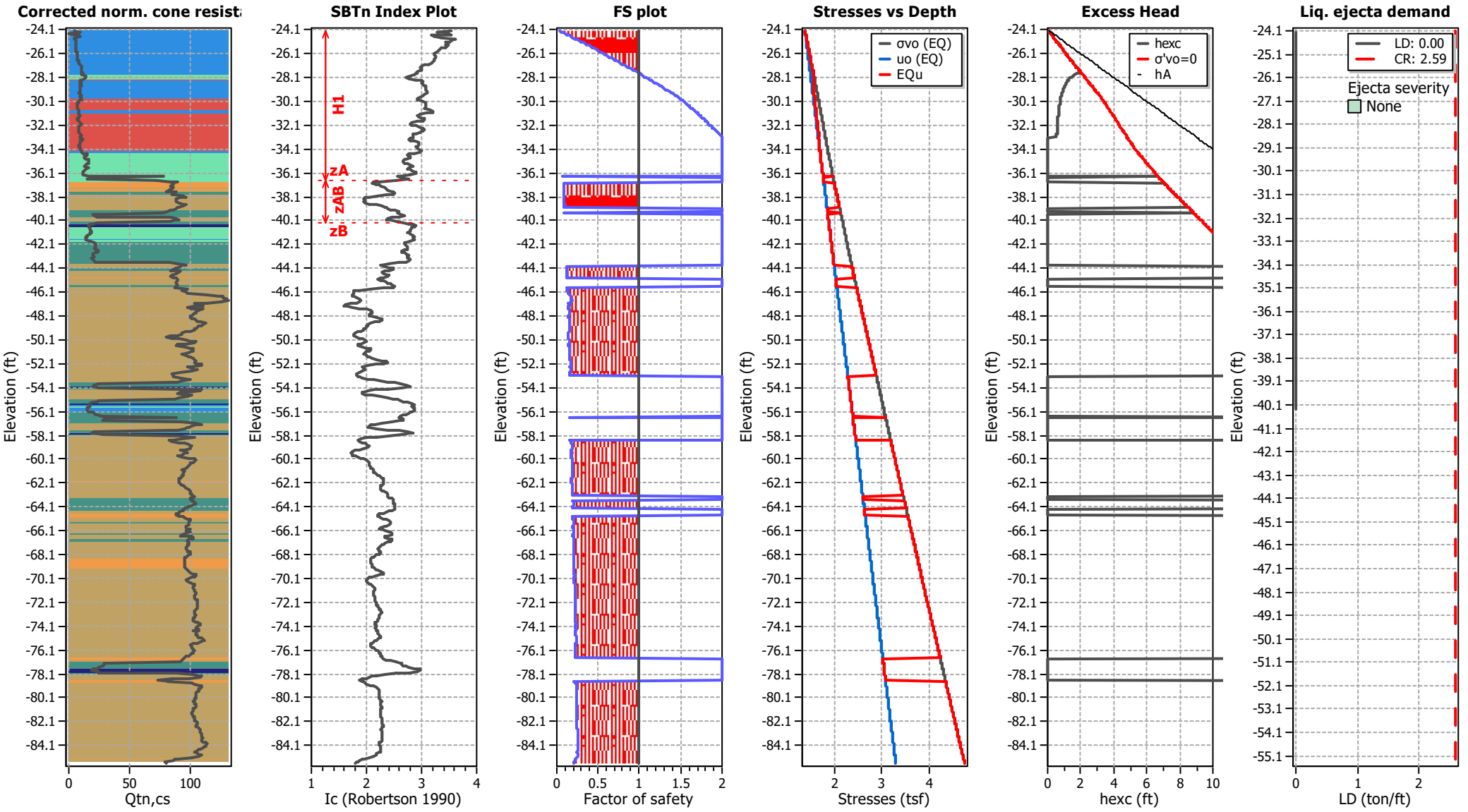
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

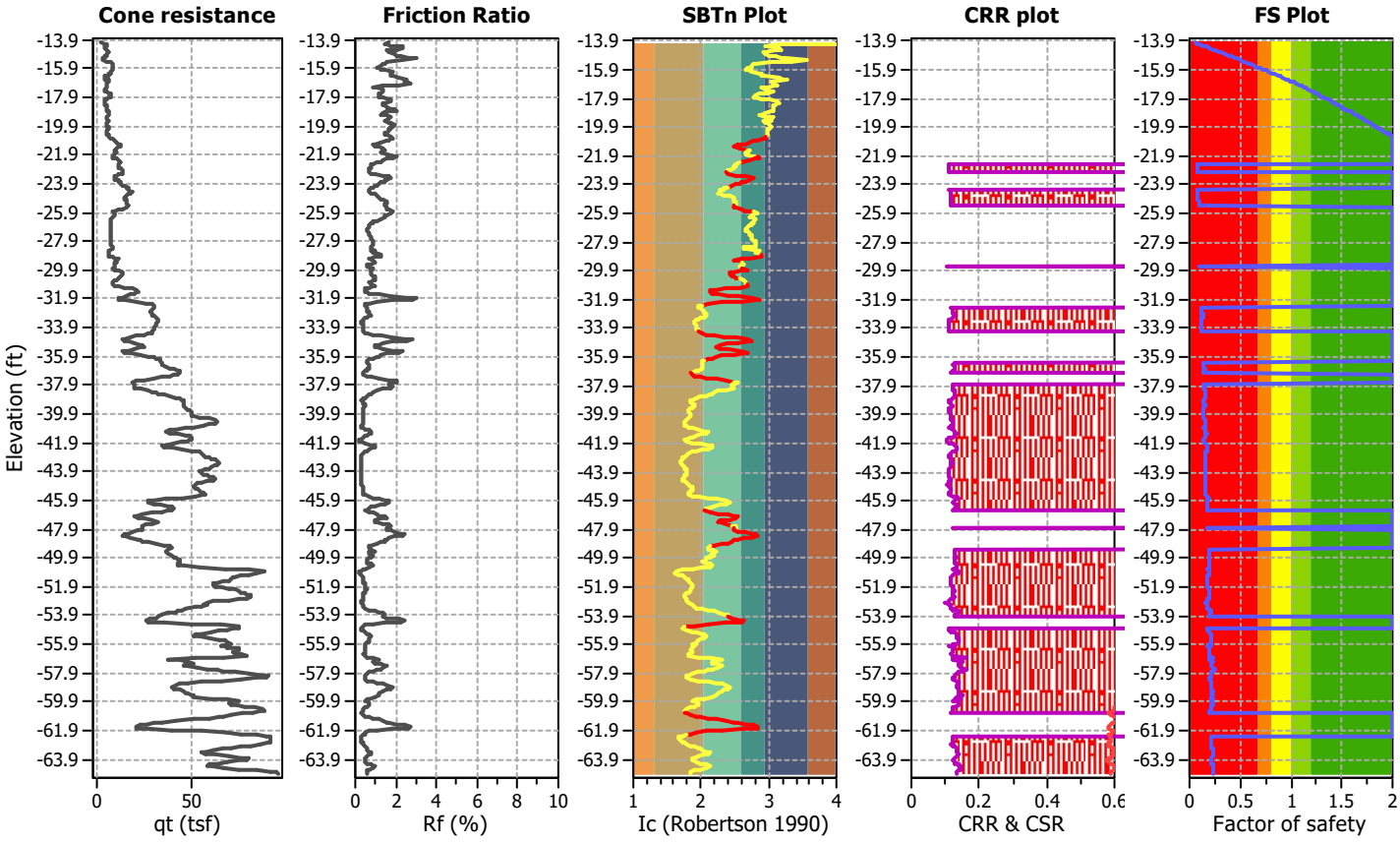
LIQUEFACTION ANALYSIS REPORT

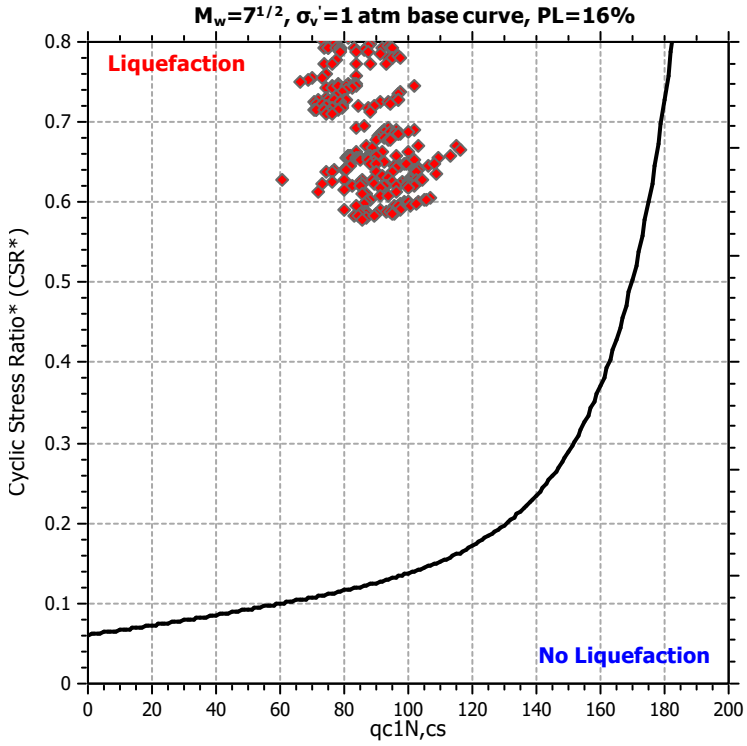
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

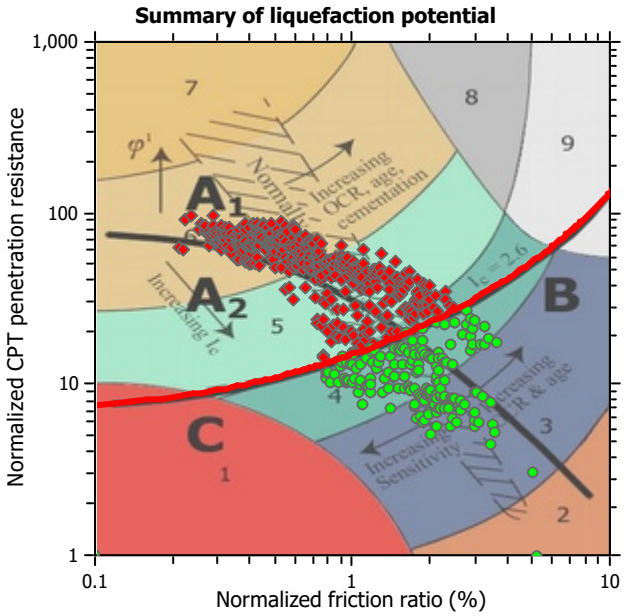
CPT file : sCPTW-03

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-33.90 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-33.90 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

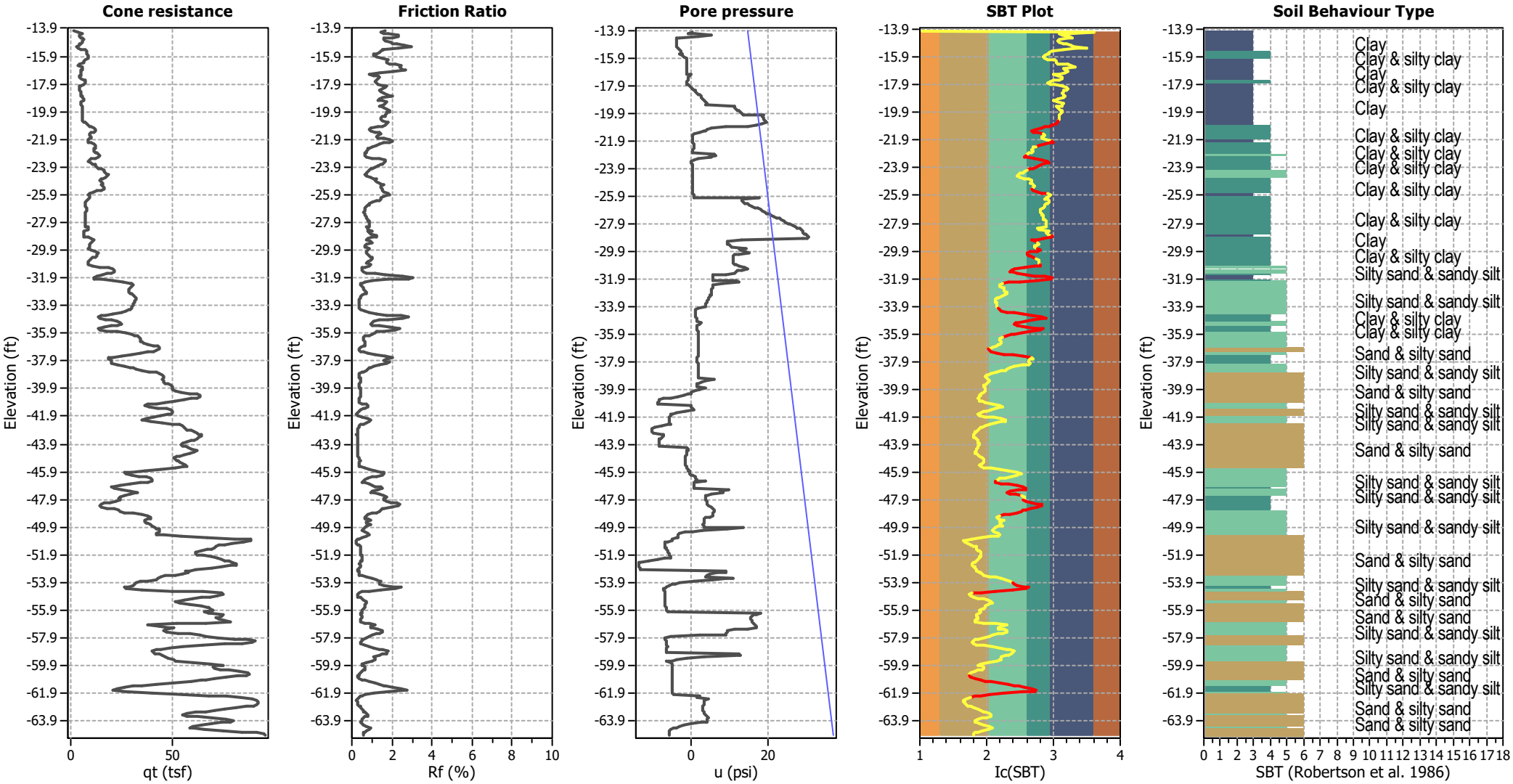






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



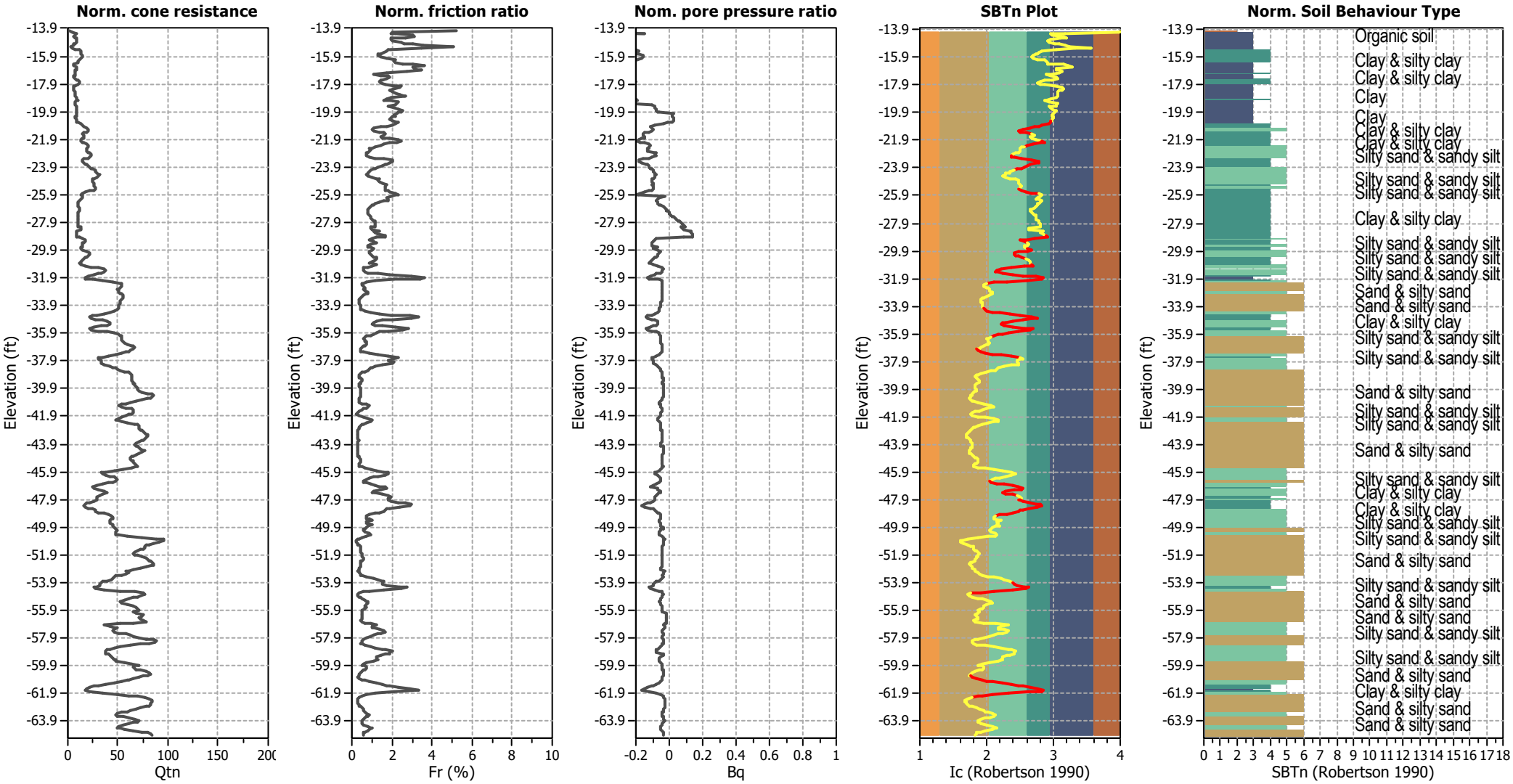
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-33.90 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-33.90 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



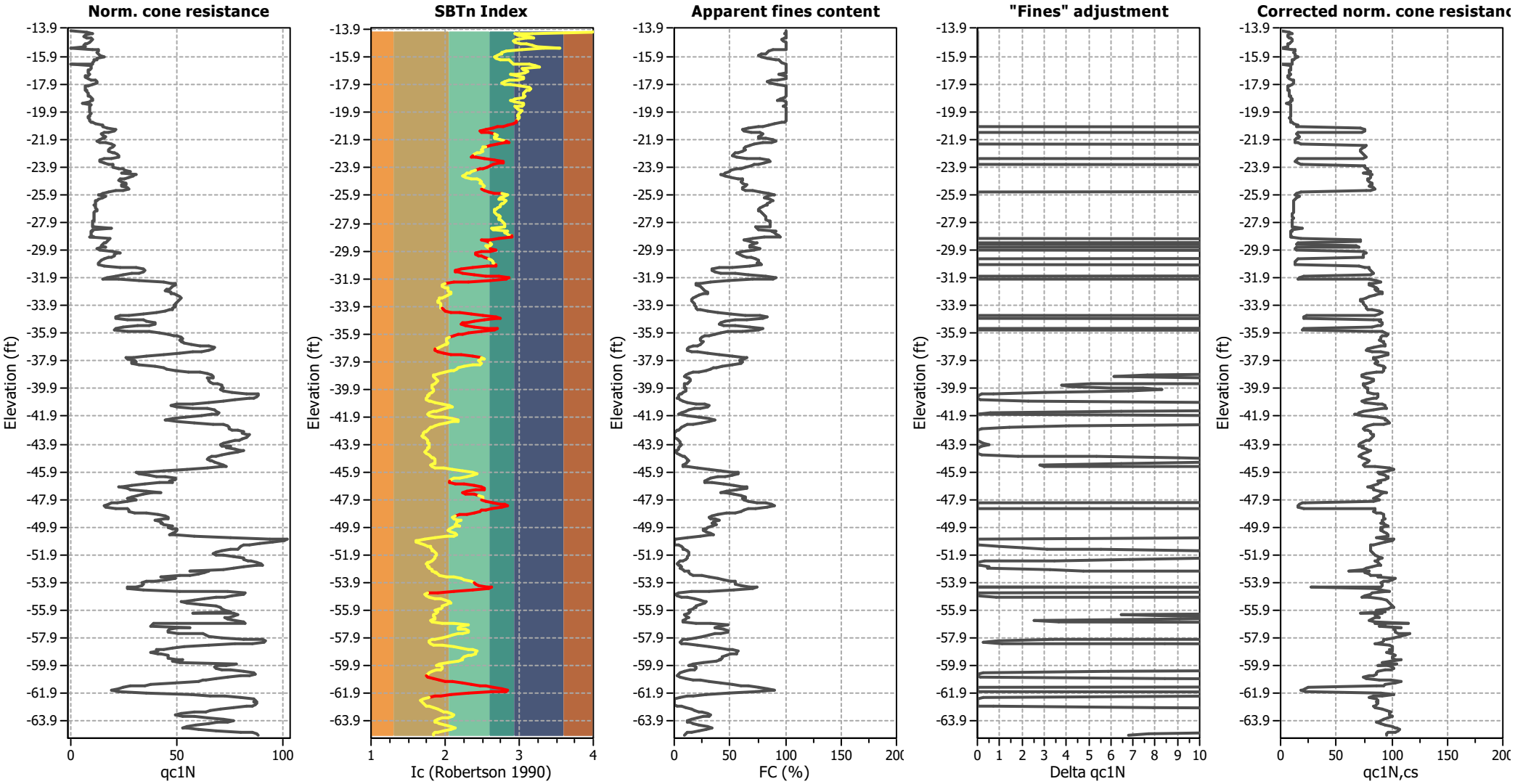
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-33.90 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-33.90 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

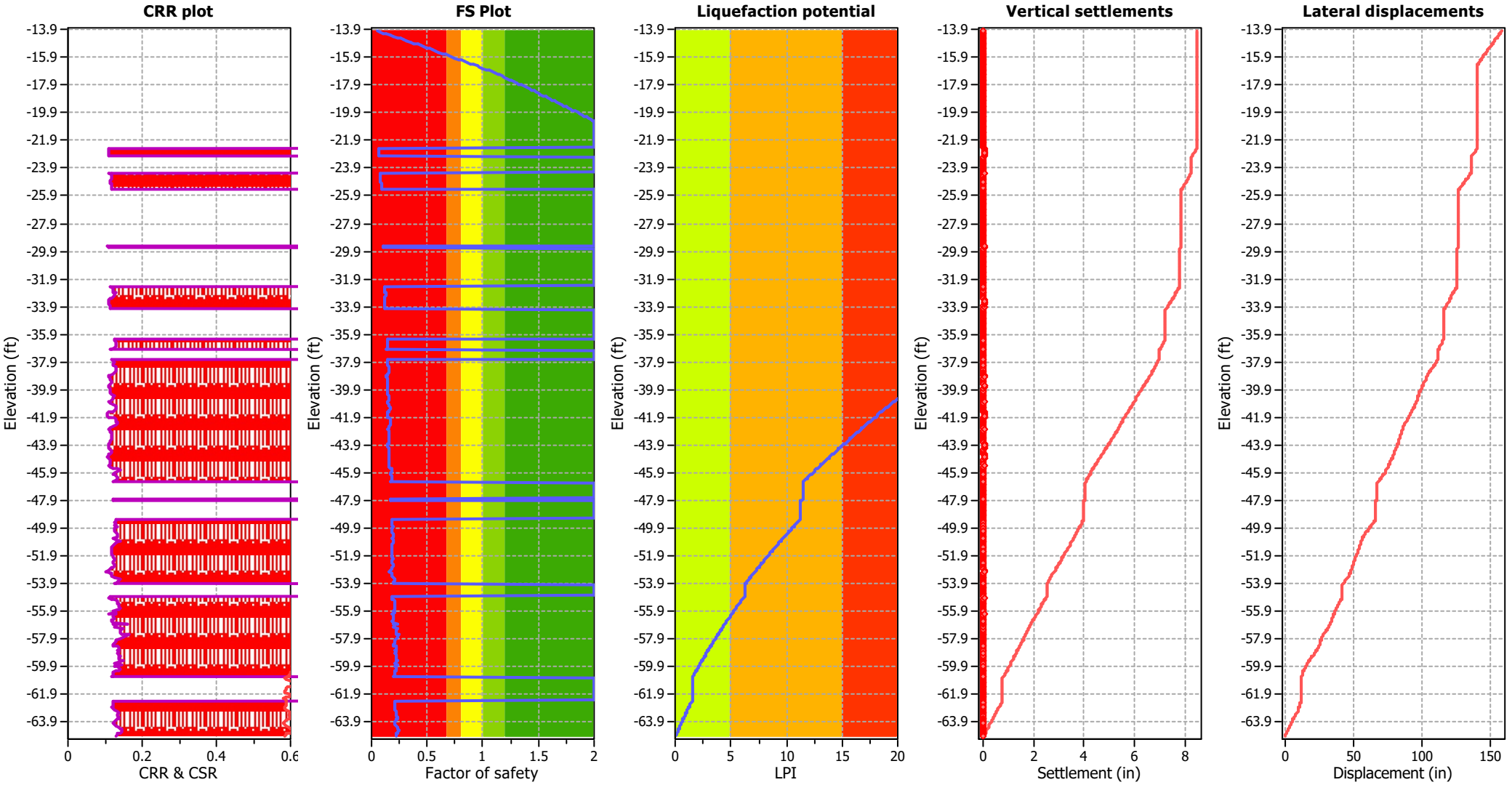
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-33.90 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-33.90 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-33.90 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-33.90 ft	Fill height:	N/A	Limit depth:	N/A

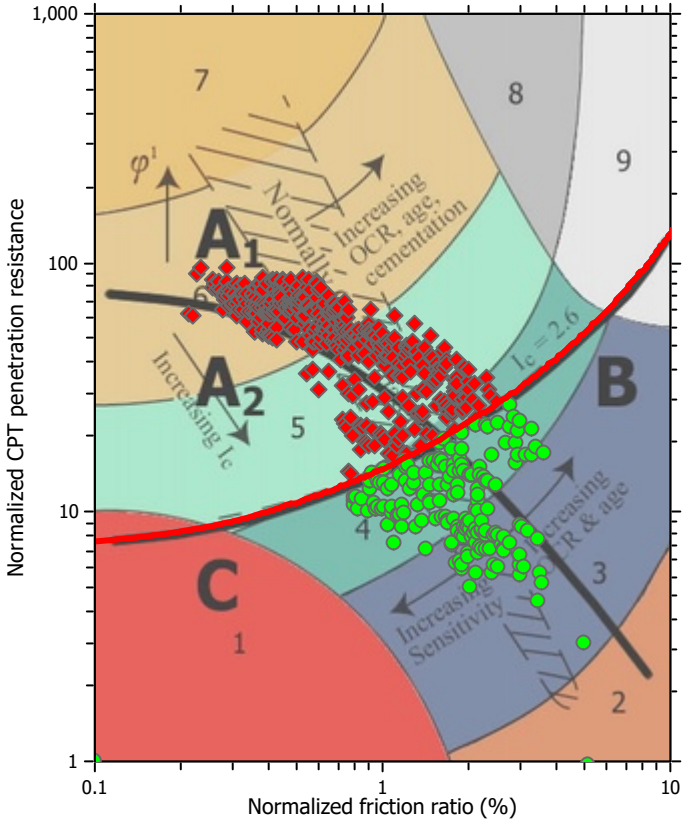
F.S. color scheme

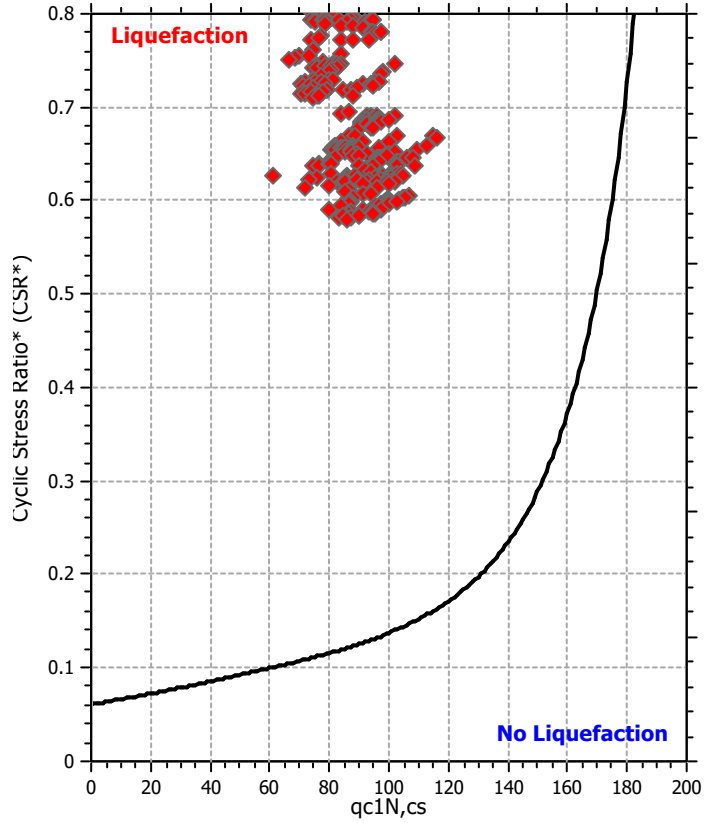
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

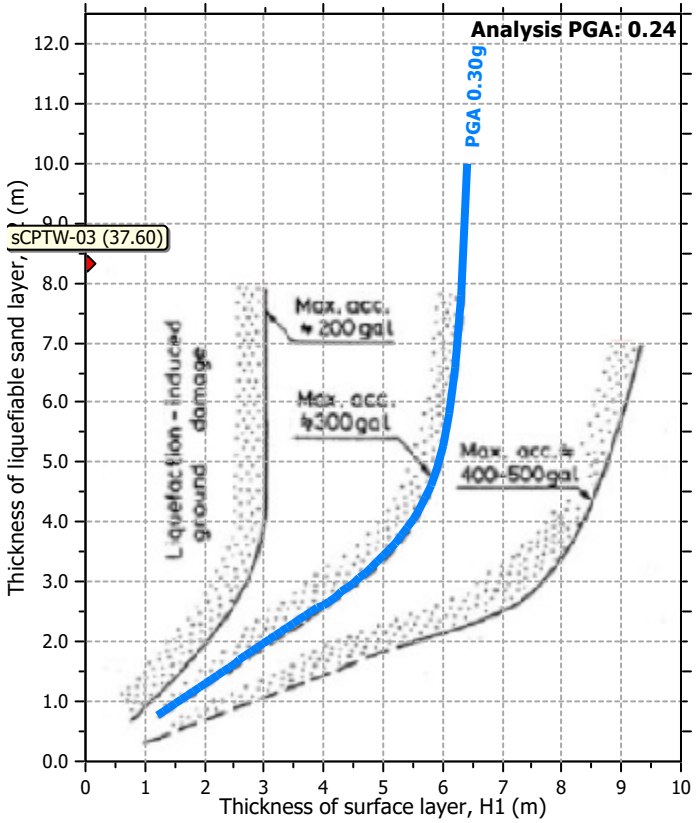
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



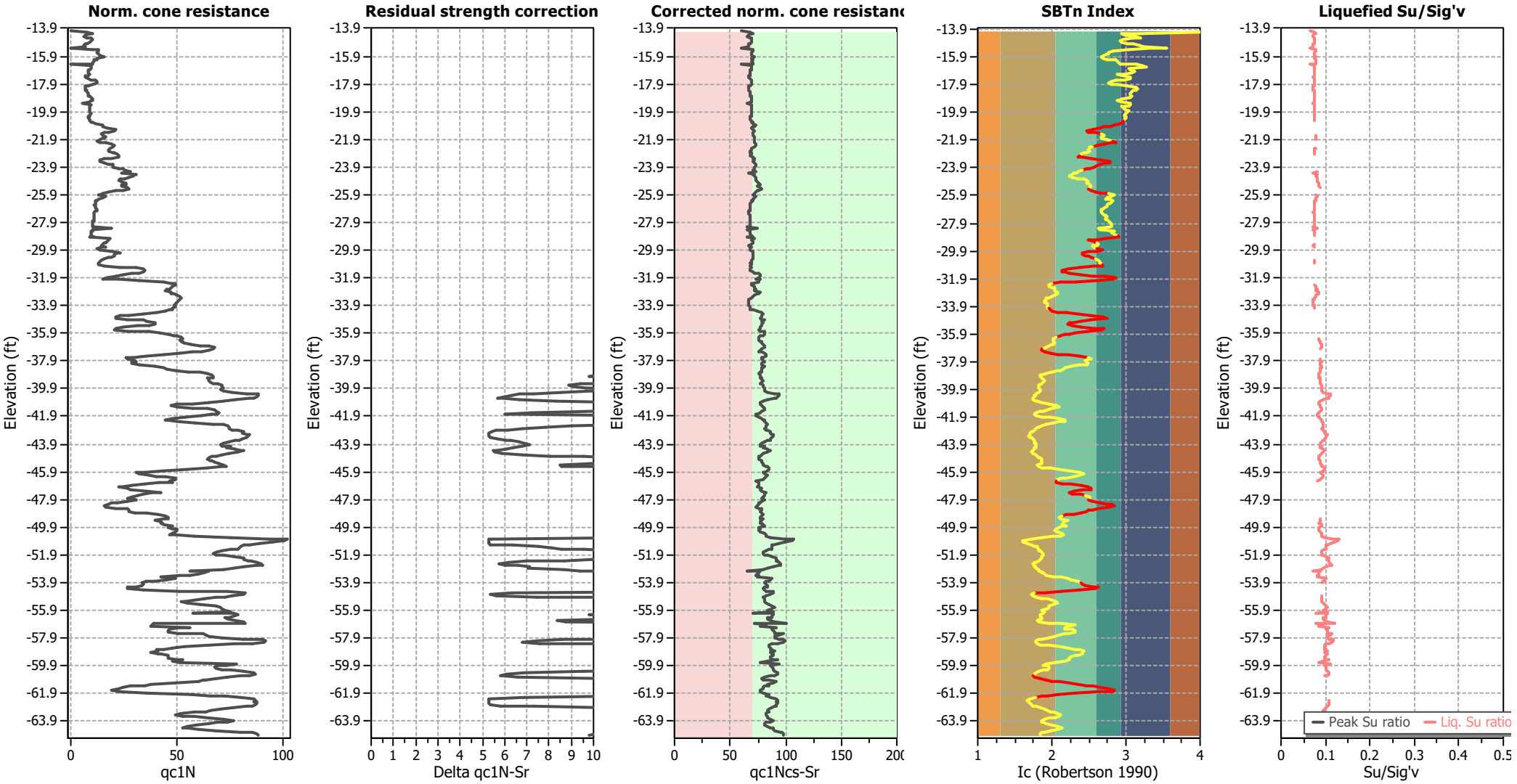




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-33.90 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-33.90 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

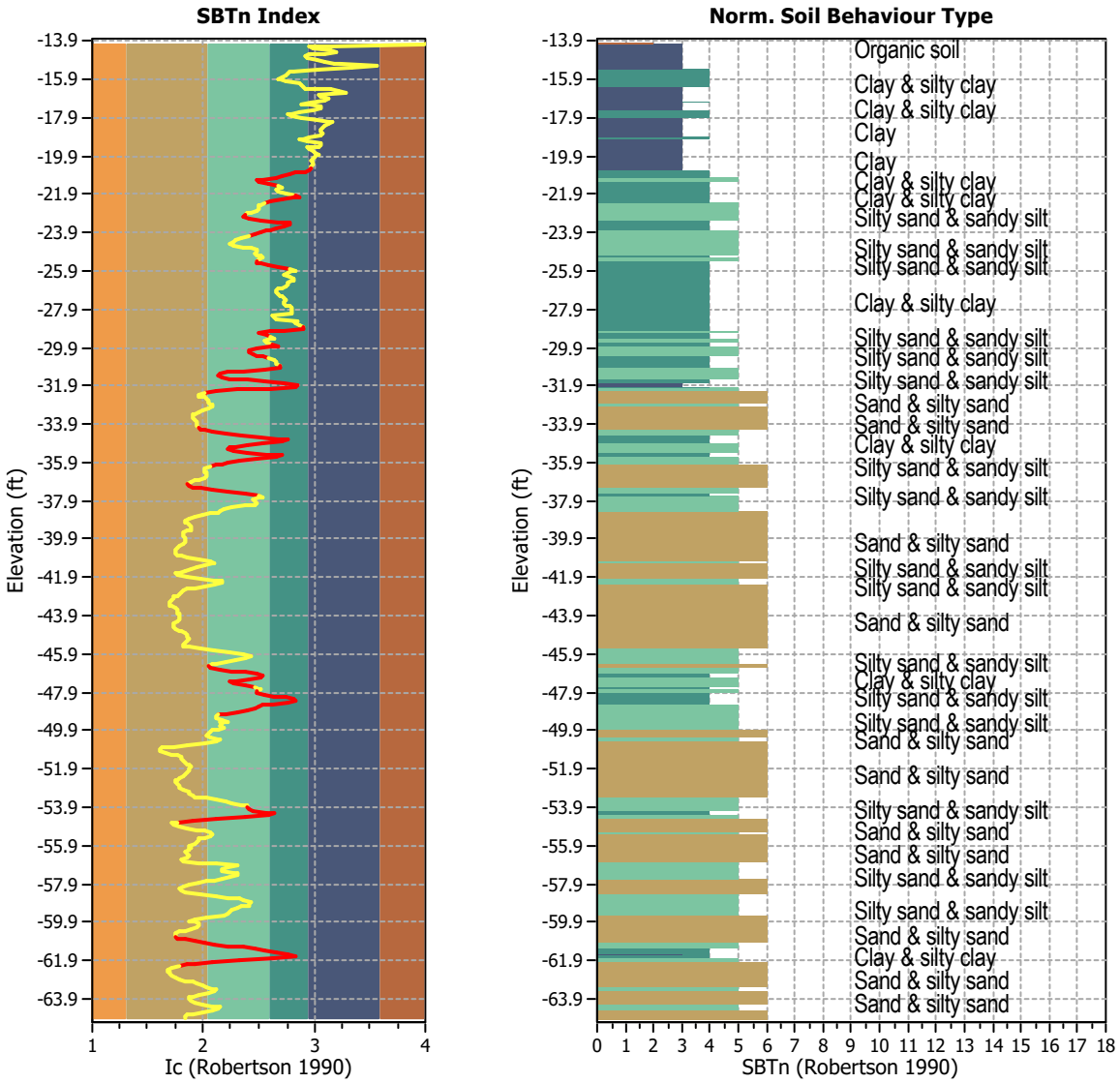
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-33.90 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-33.90 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

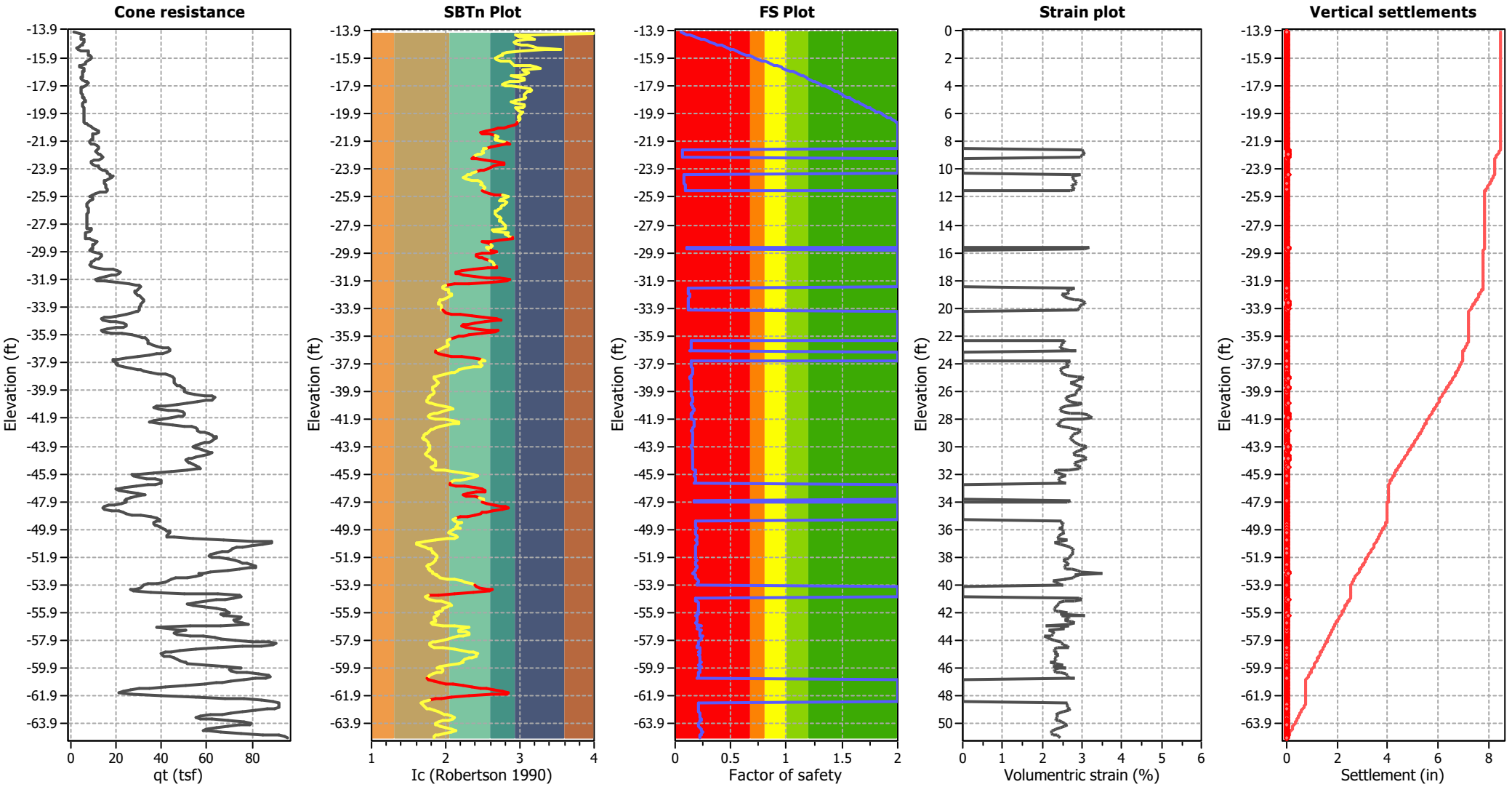
The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties	
I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0250
Minimum number of points in layer:	4

General statistics	
Total points in CPT file:	622
Total points excluded:	173
Exclusion percentage:	27.81%
Number of layers detected:	27

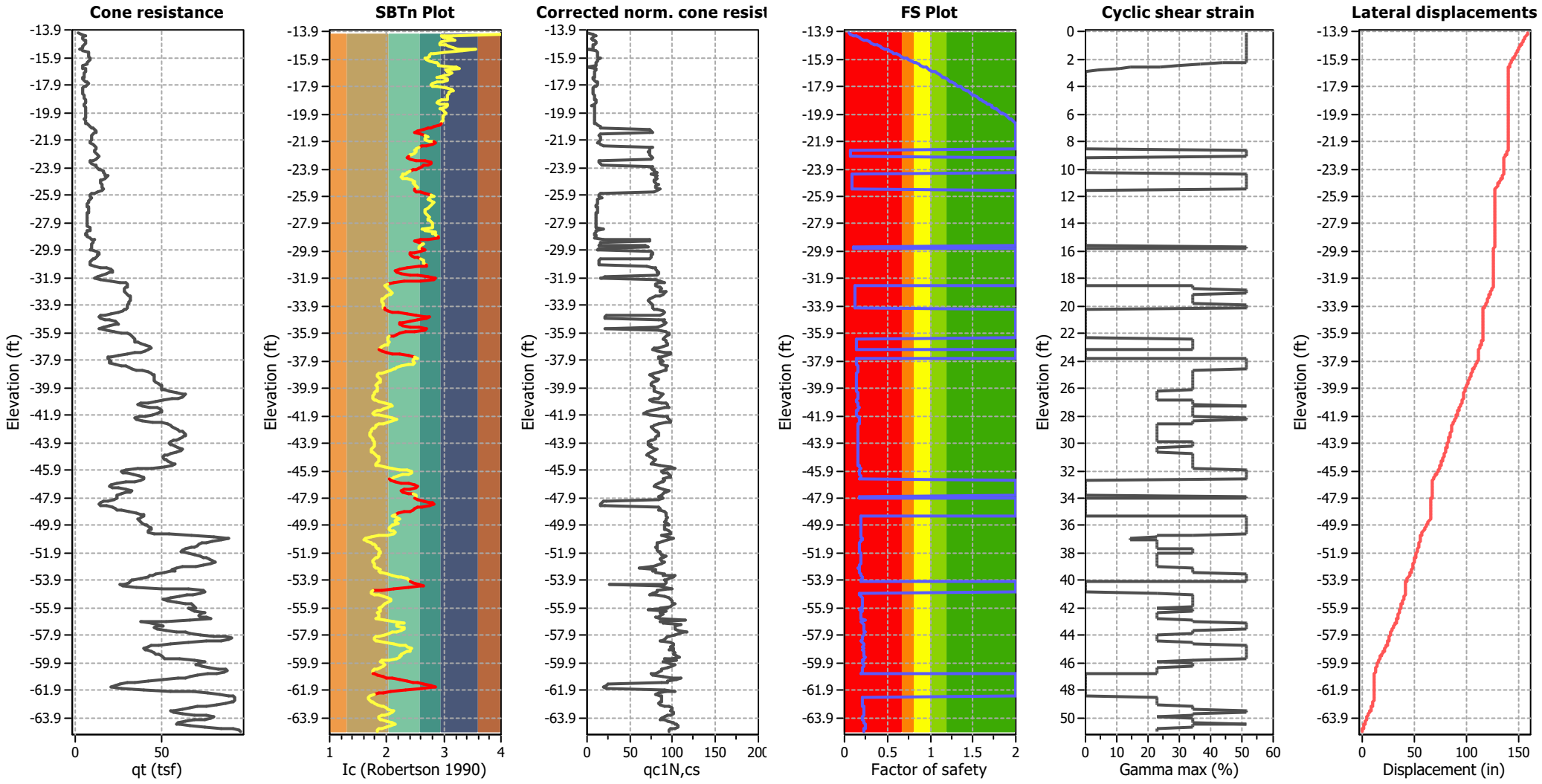
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

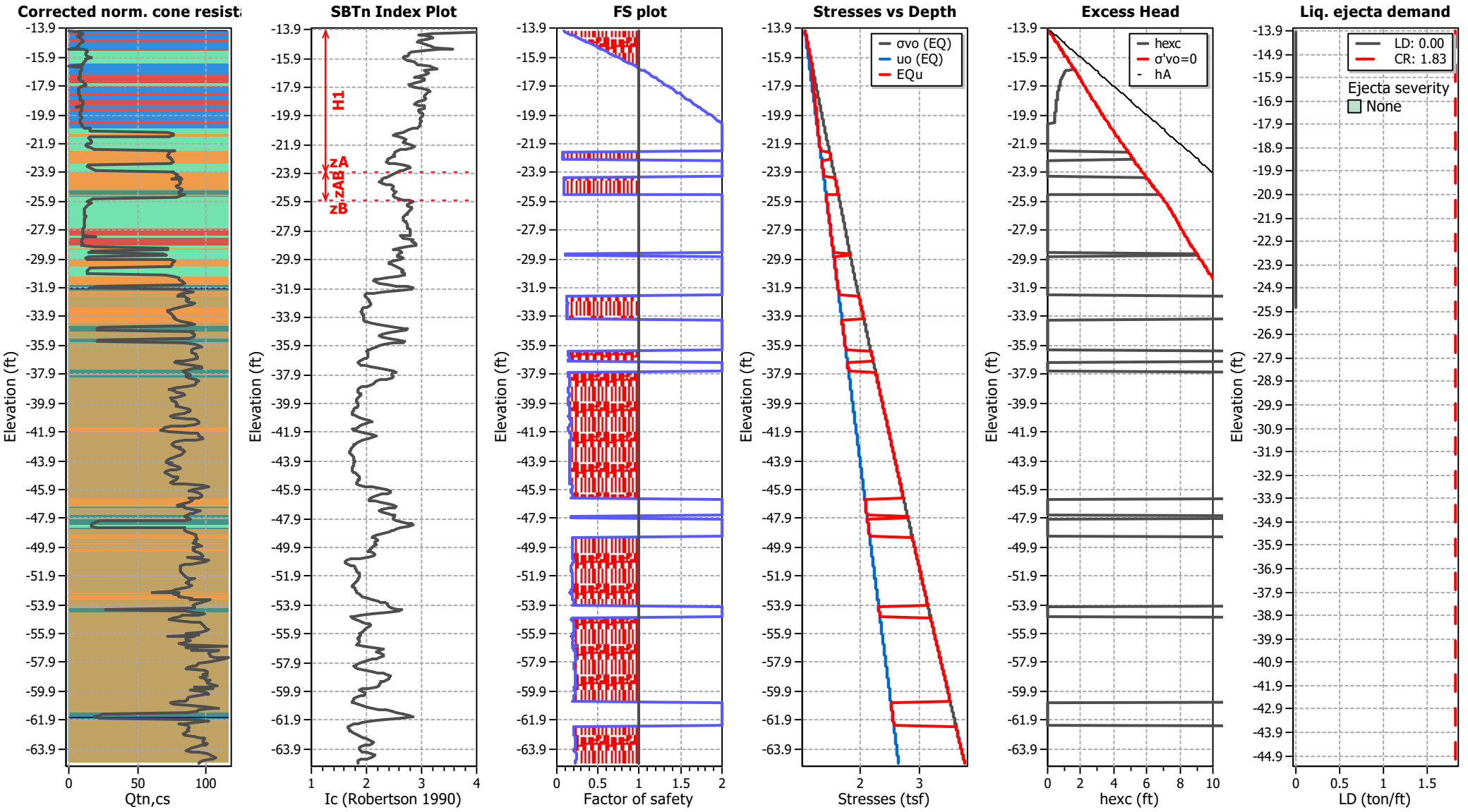
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

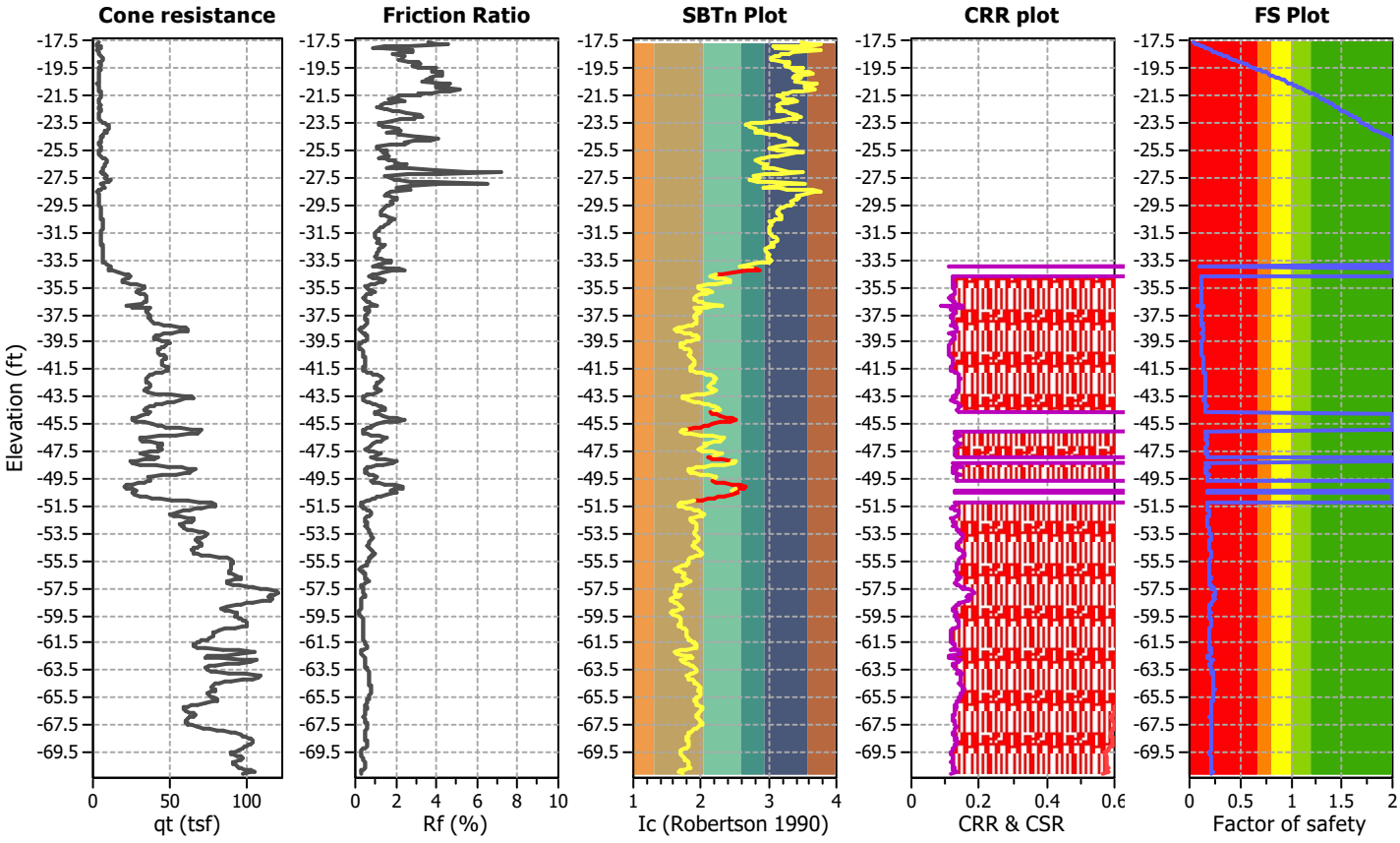
LIQUEFACTION ANALYSIS REPORT

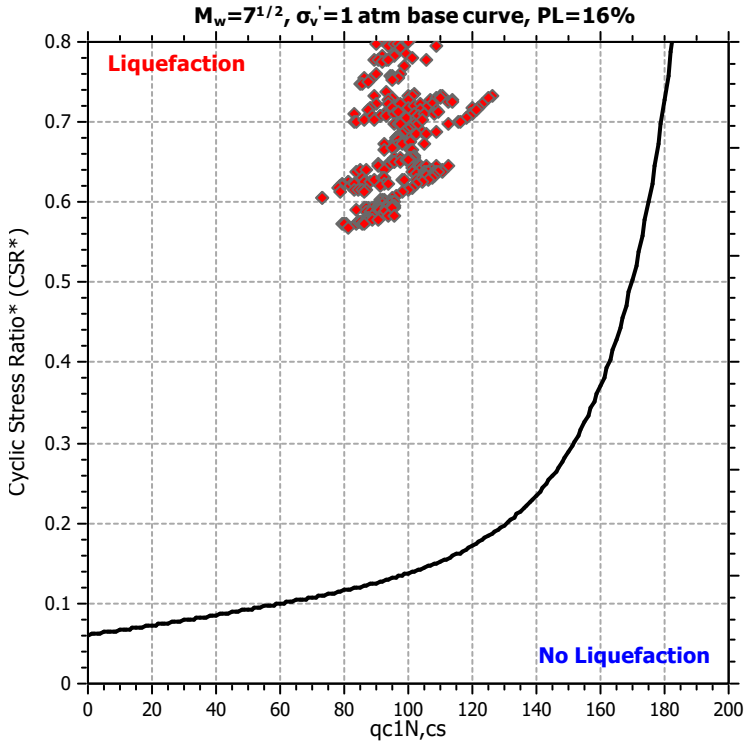
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

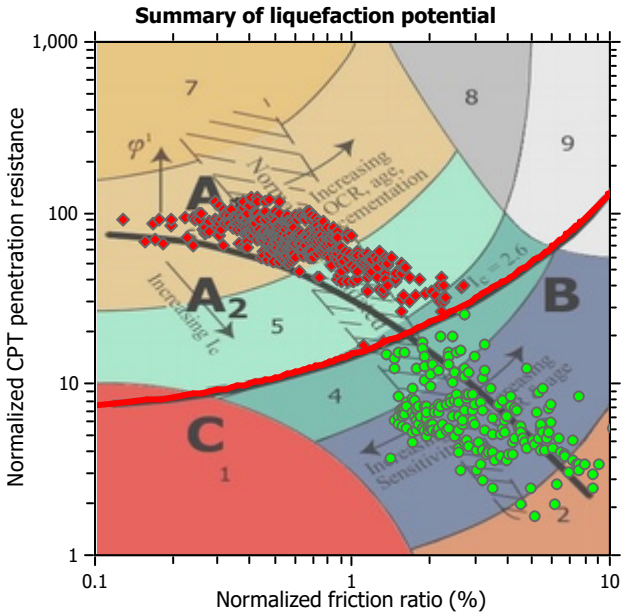
CPT file : CPTW-04

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-37.50 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-37.50 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

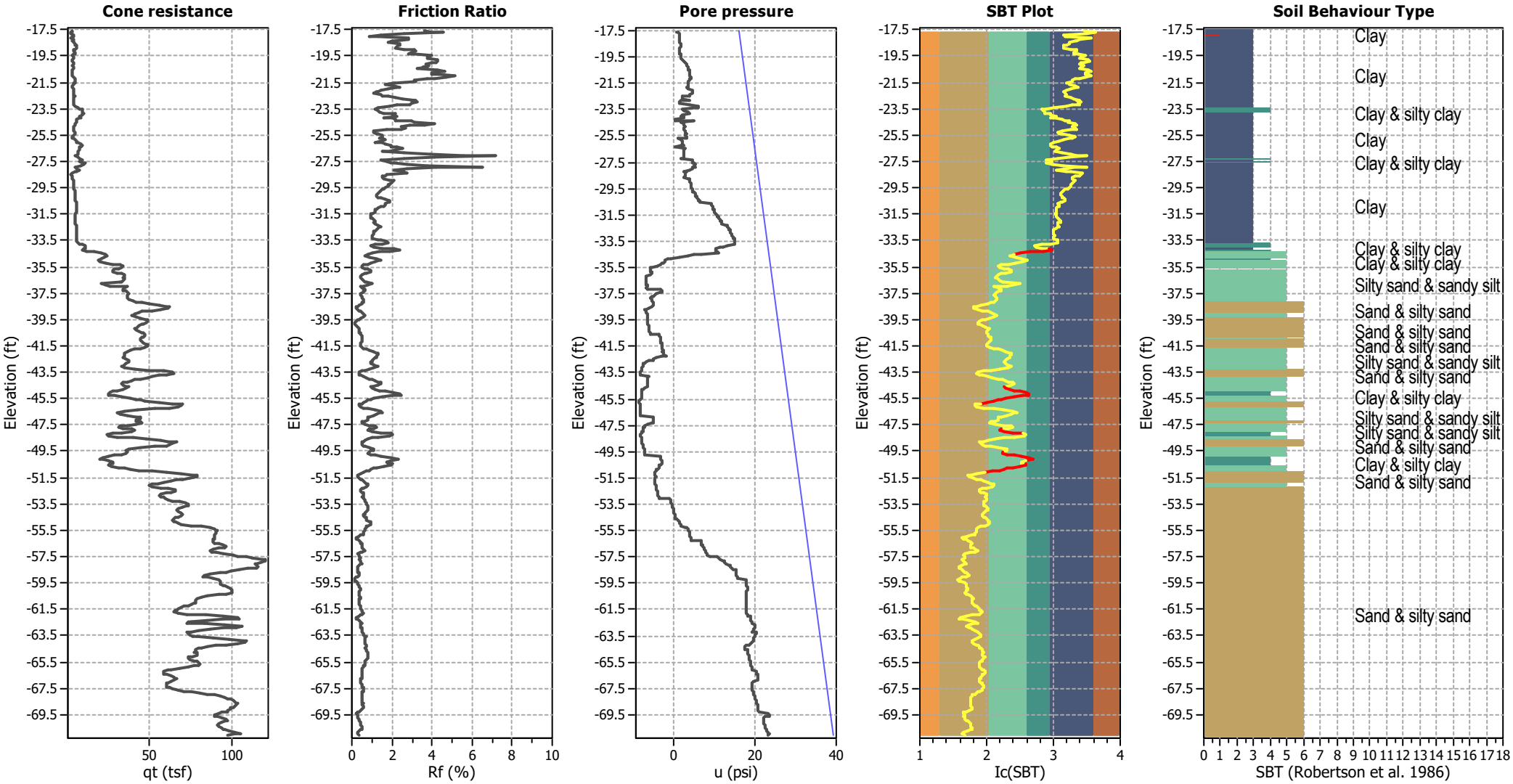






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



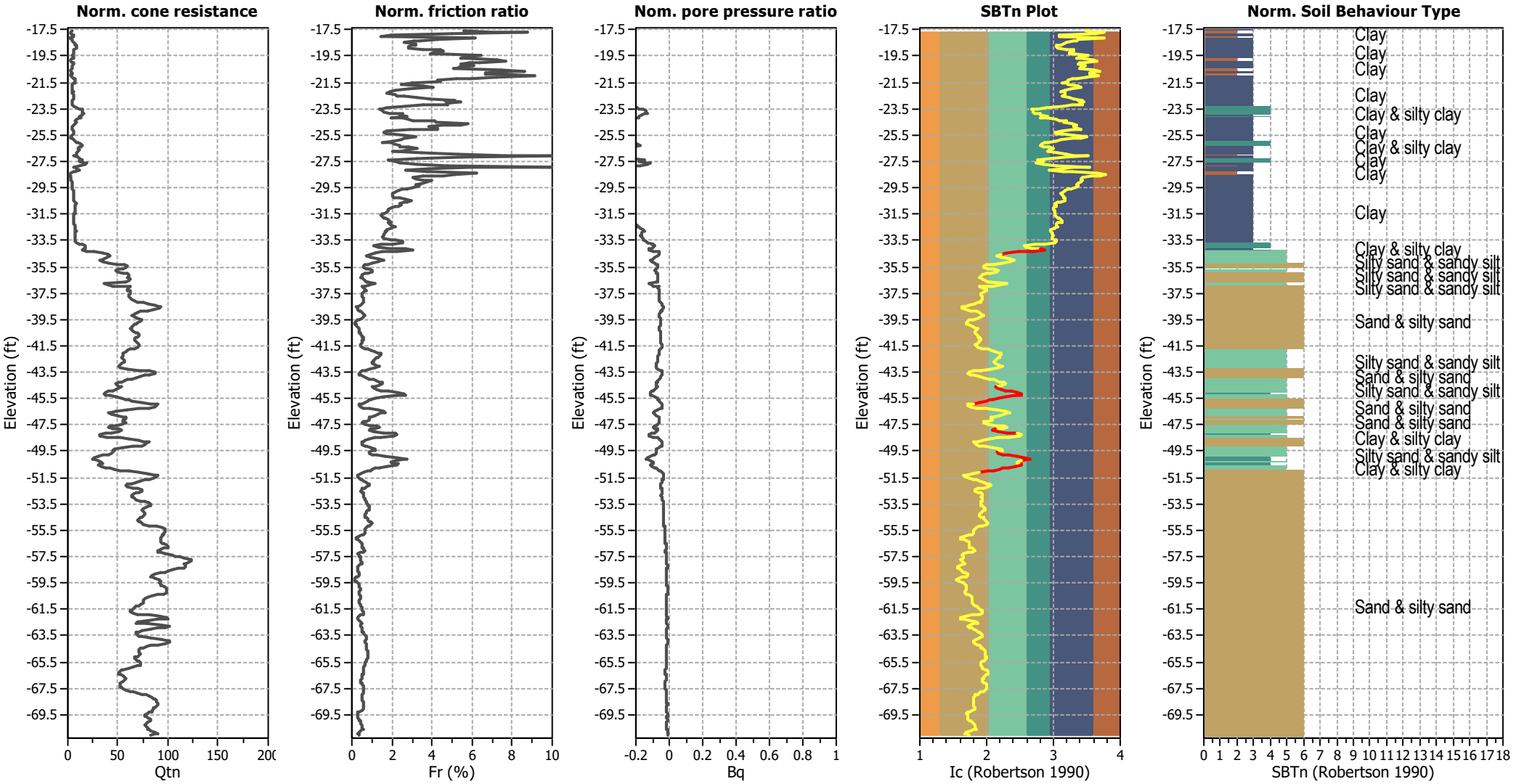
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-37.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-37.50 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



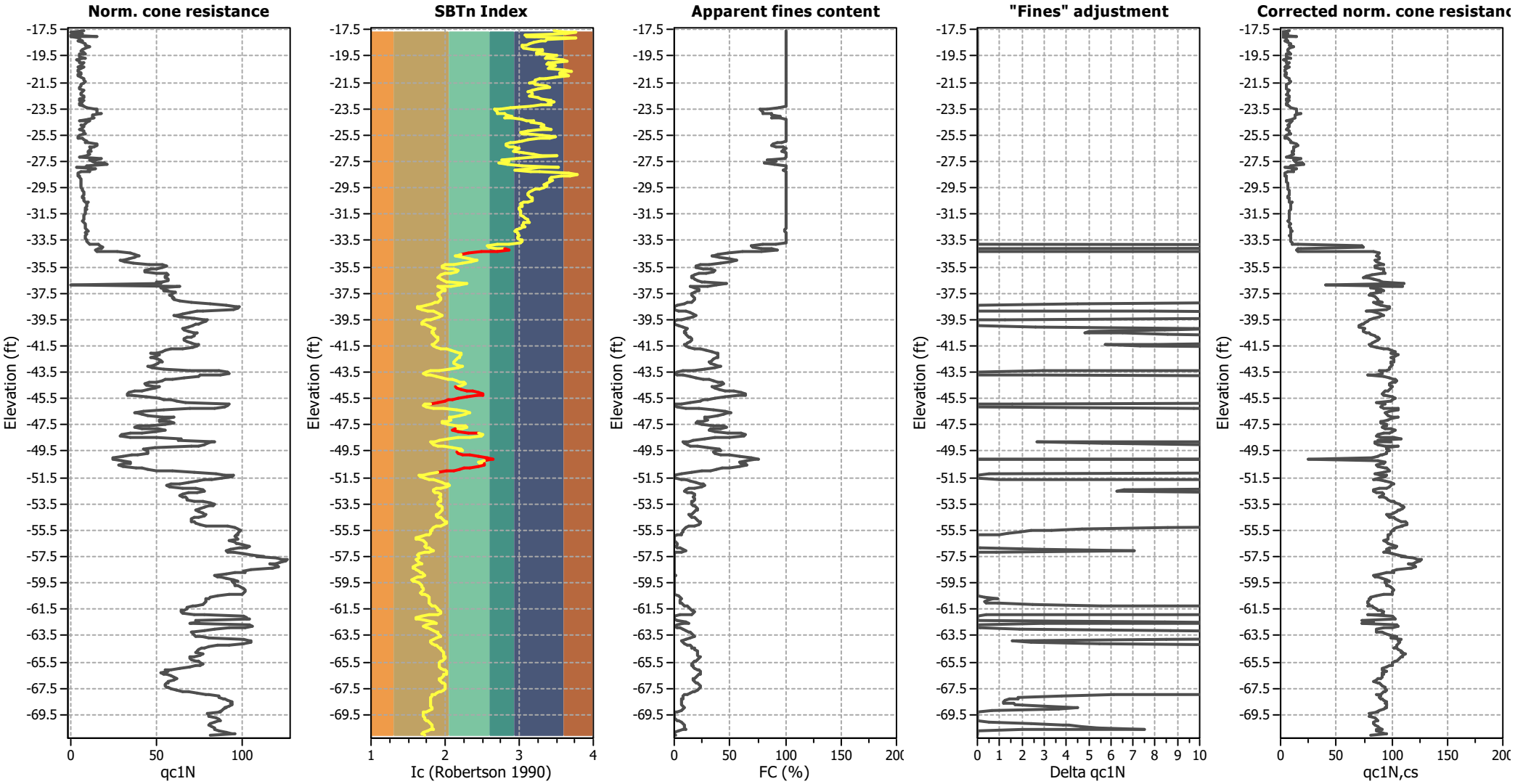
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-37.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-37.50 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

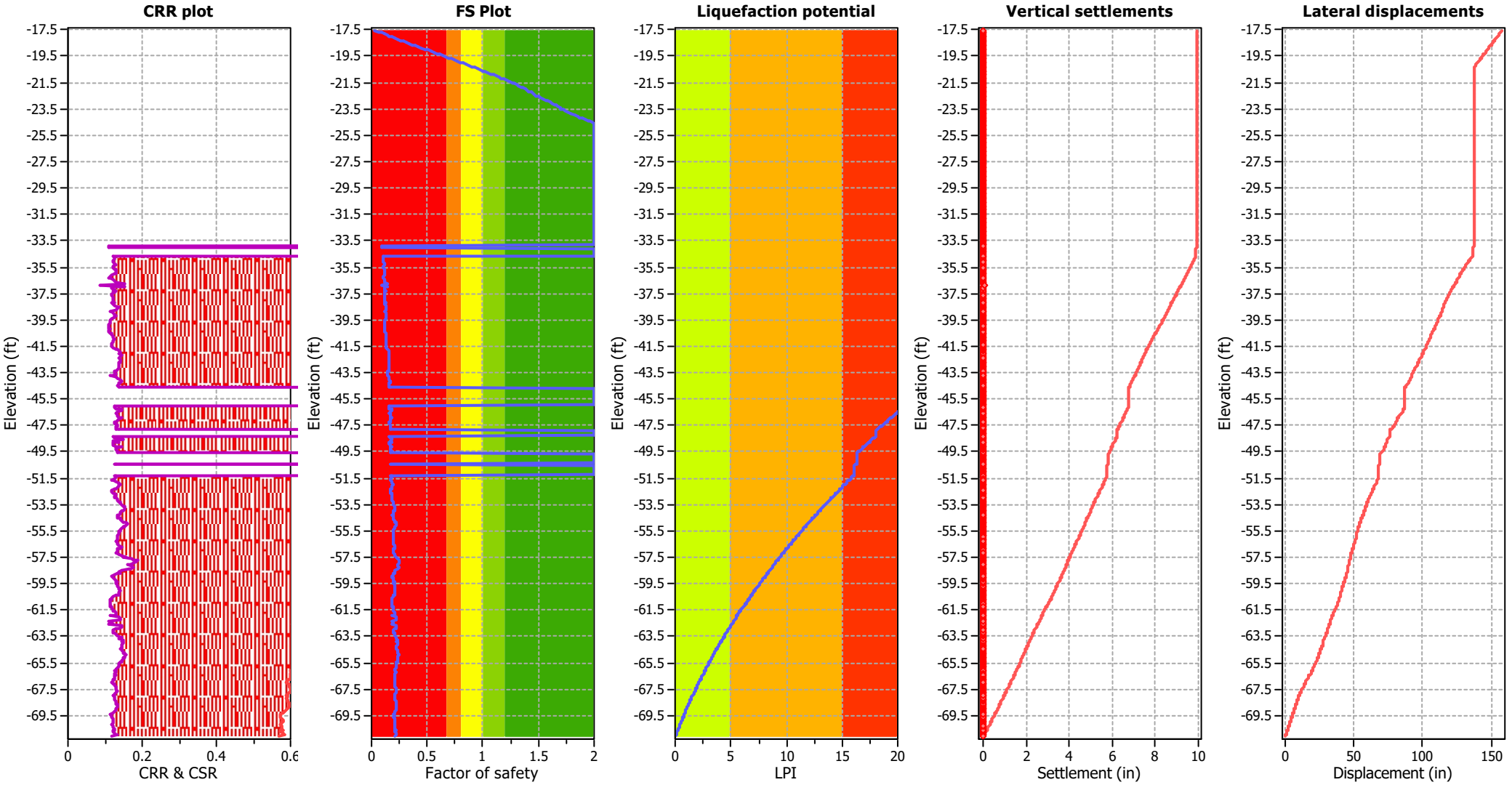
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-37.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-37.50 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-37.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-37.50 ft	Fill height:	N/A	Limit depth:	N/A

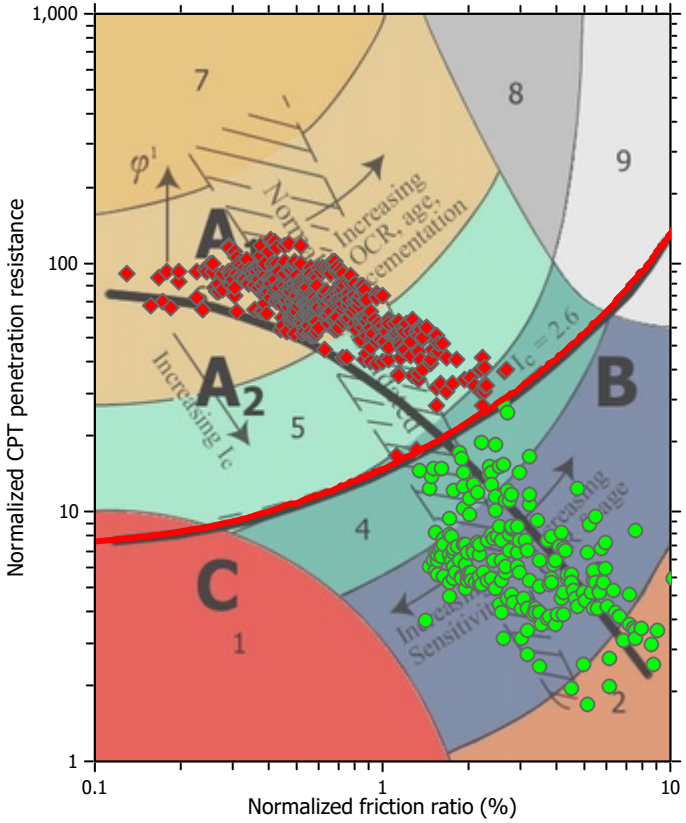
F.S. color scheme

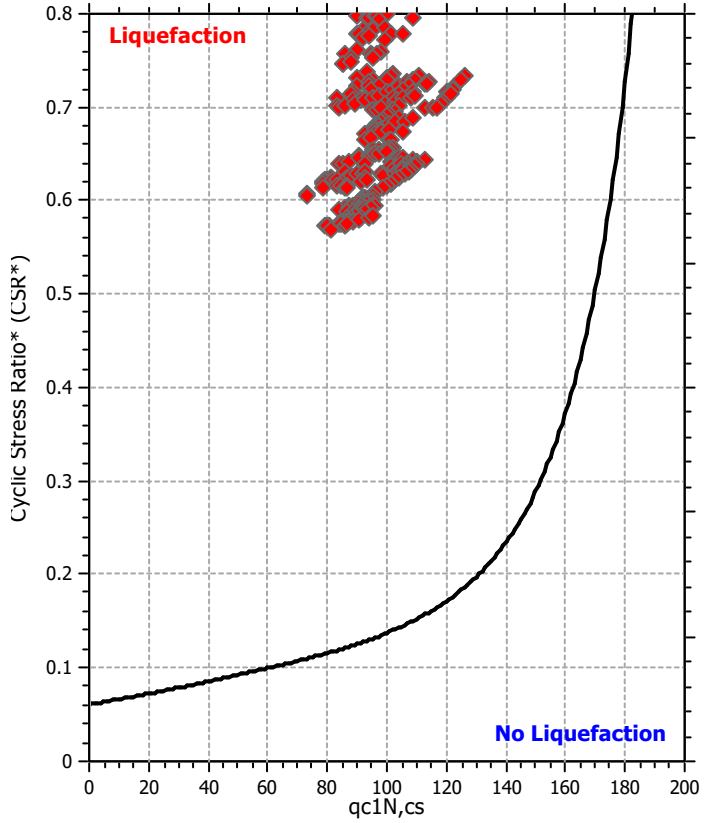
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

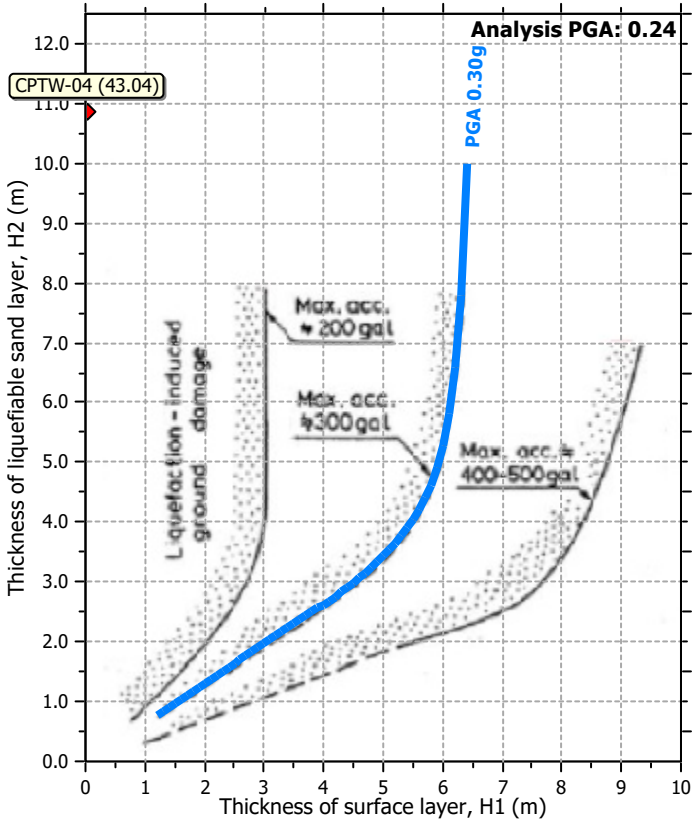
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



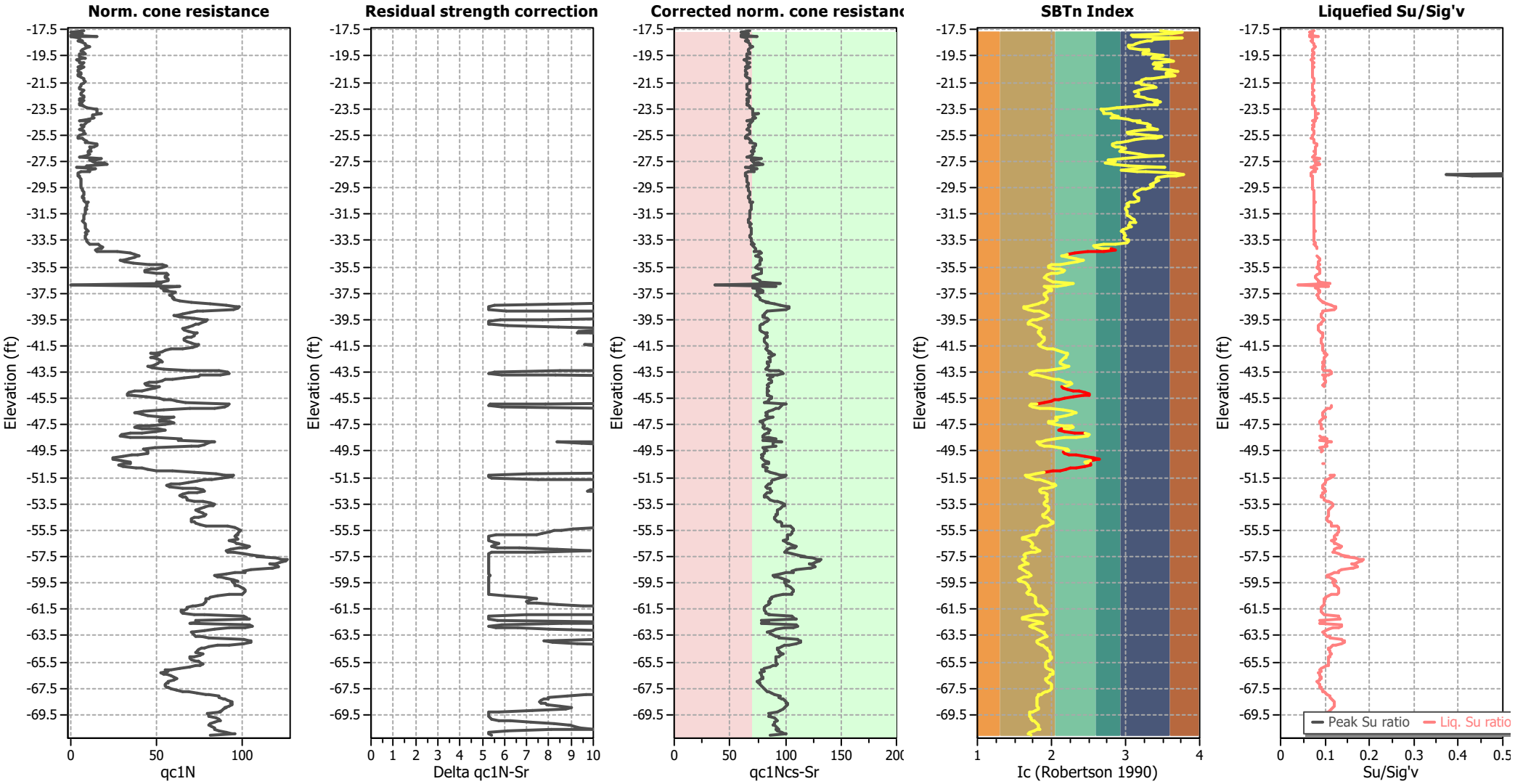




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-37.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-37.50 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

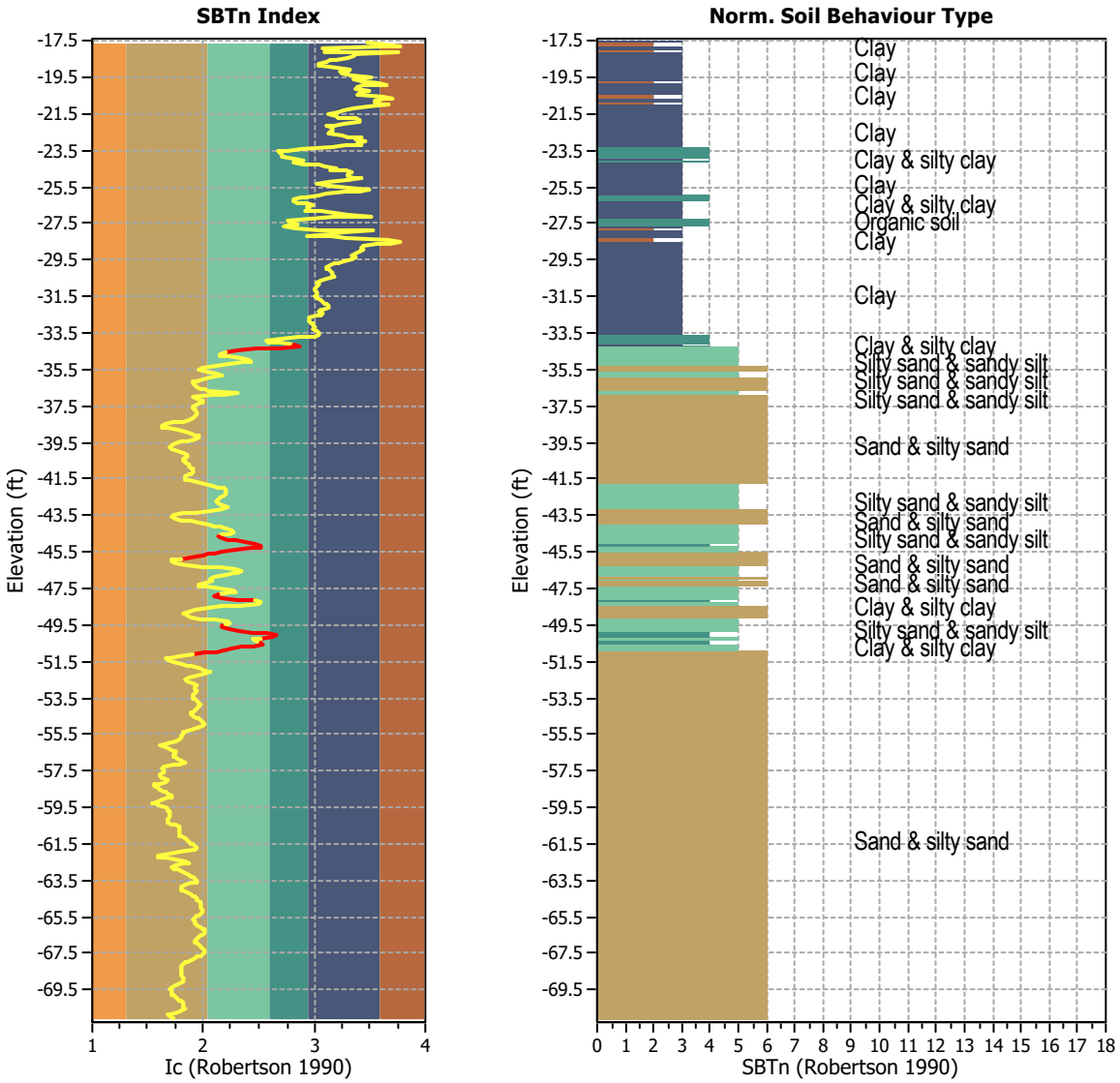
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-37.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-37.50 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

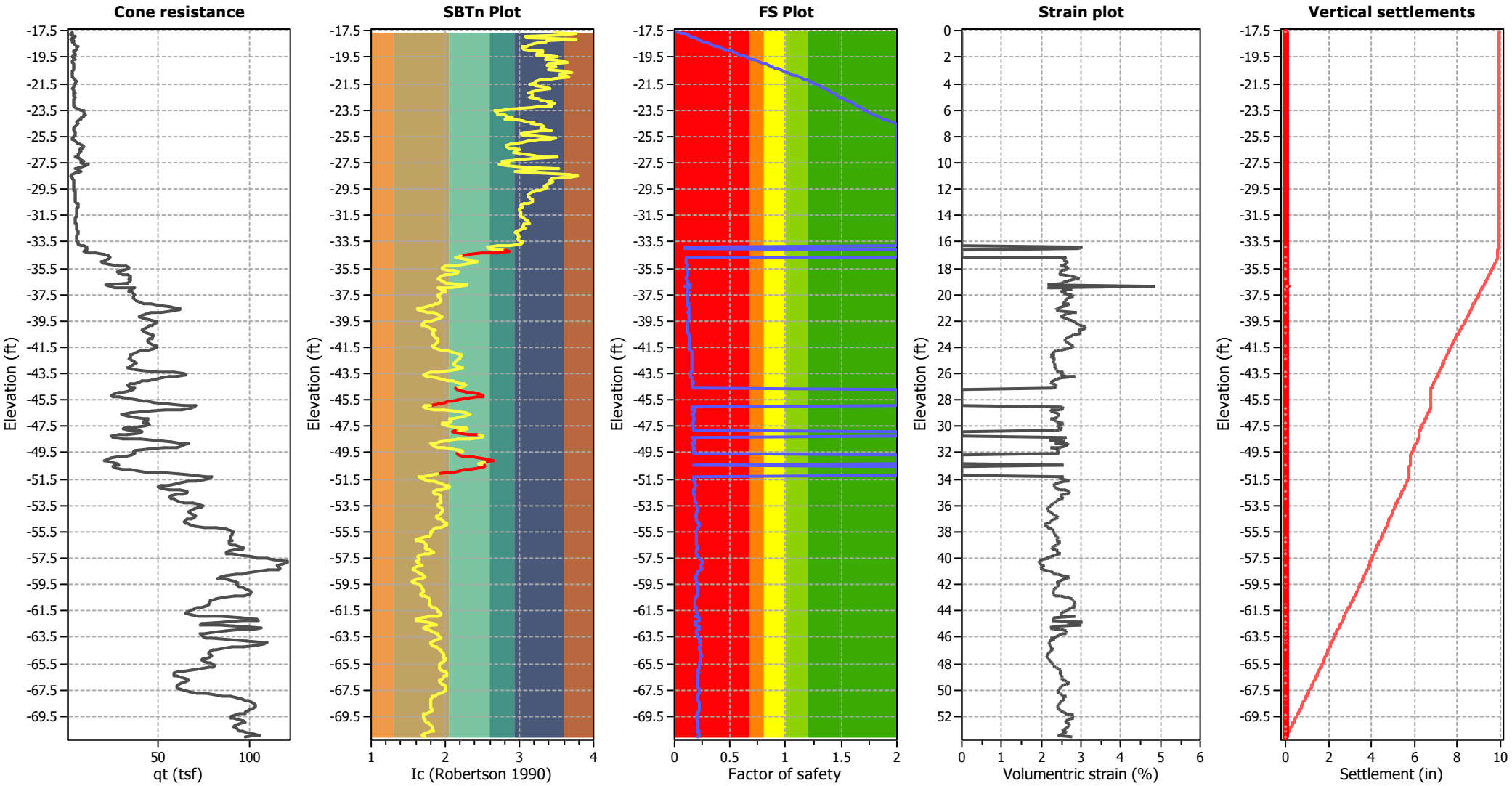
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	653
I_c maximum check value:	3.00	Total points excluded:	46
I_c change ratio value:	0.0250	Exclusion percentage:	7.04%
Minimum number of points in layer:	4	Number of layers detected:	7

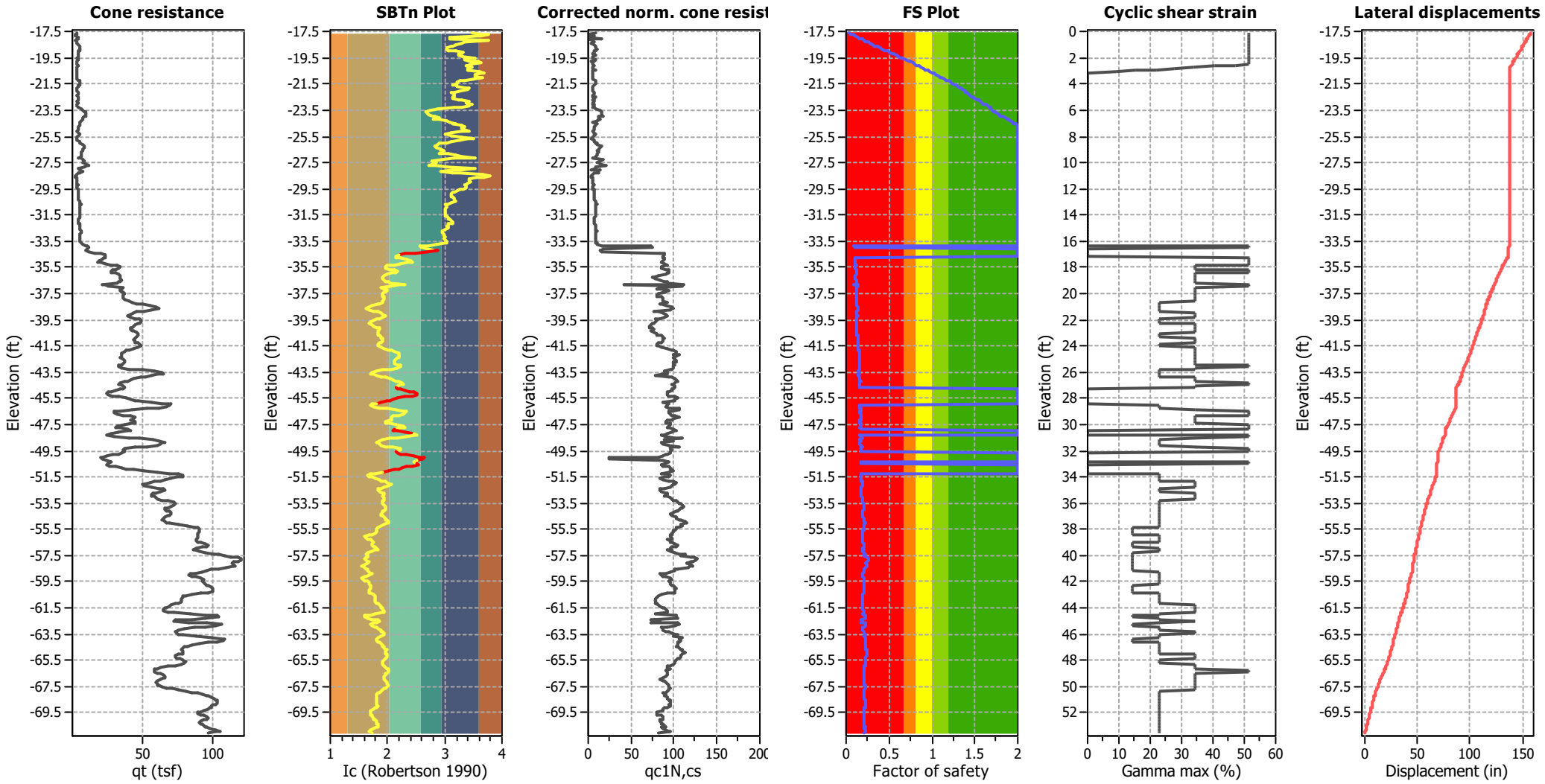
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

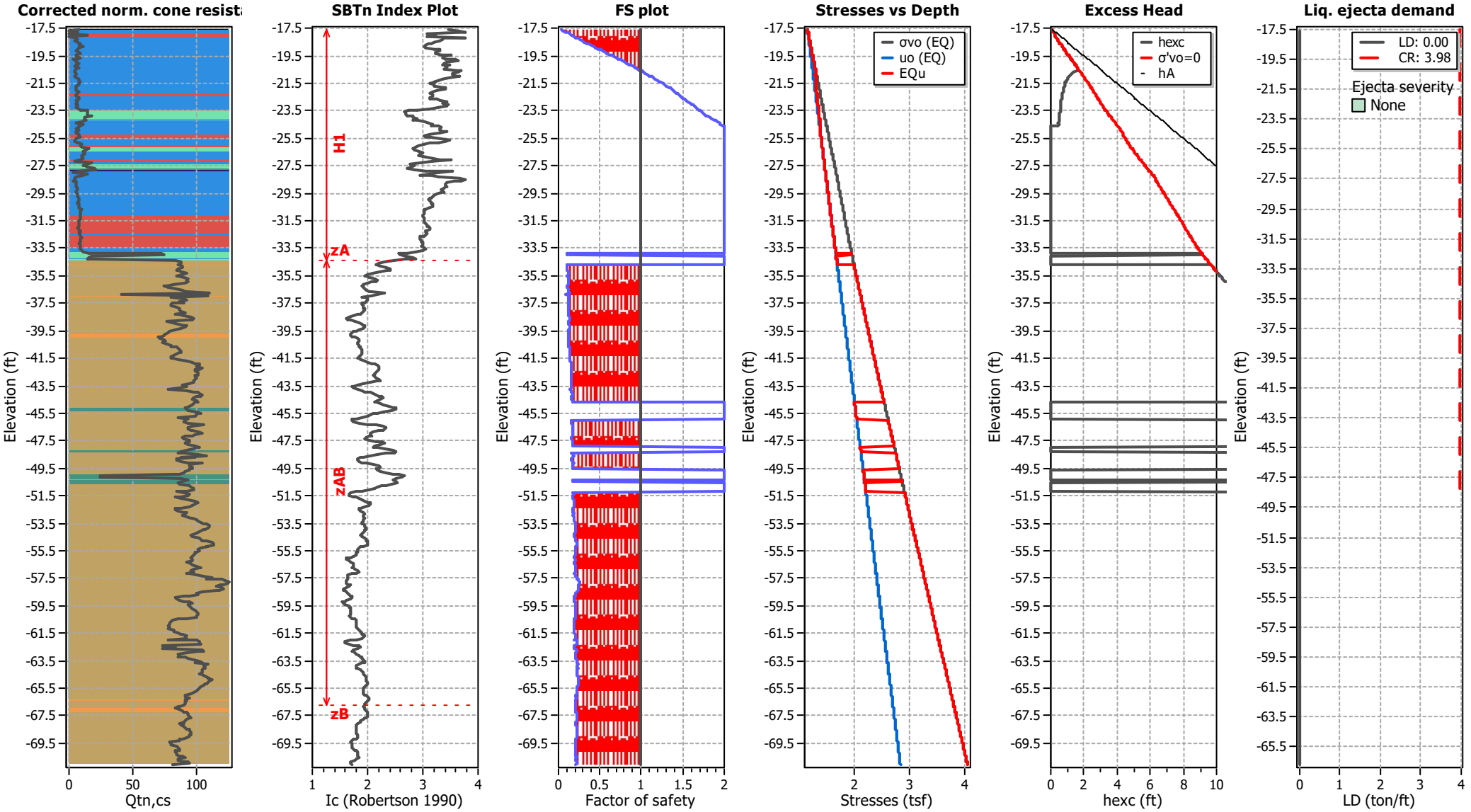
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

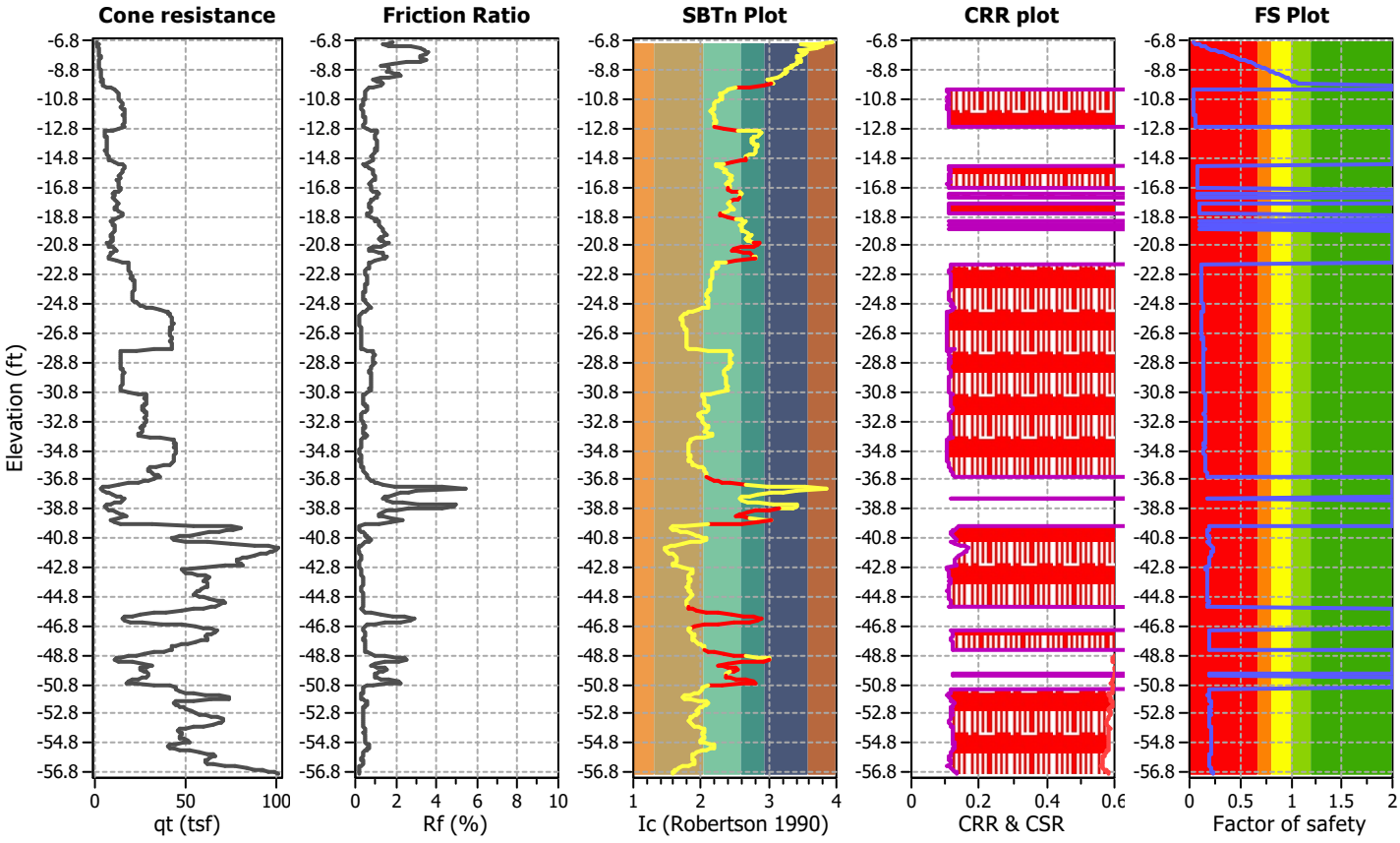
LIQUEFACTION ANALYSIS REPORT

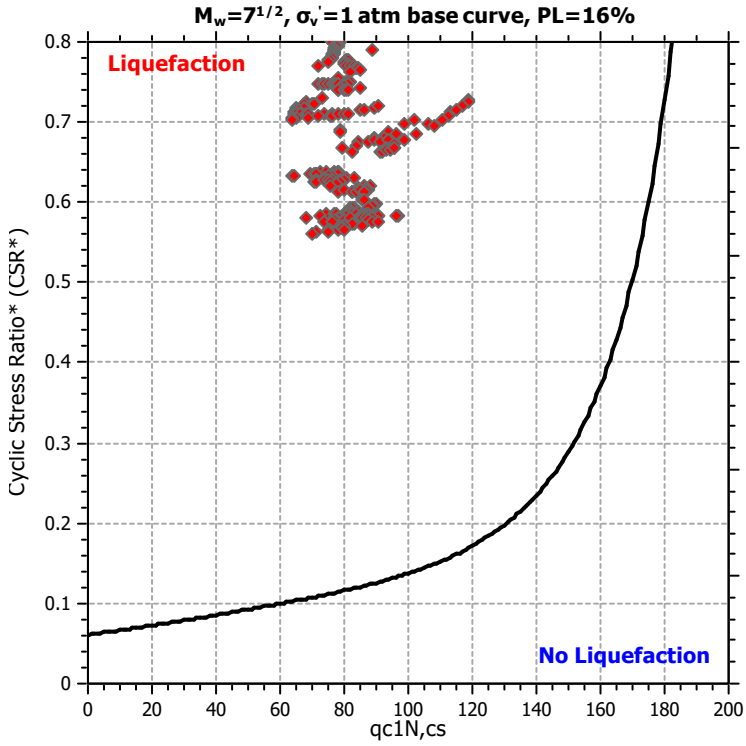
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

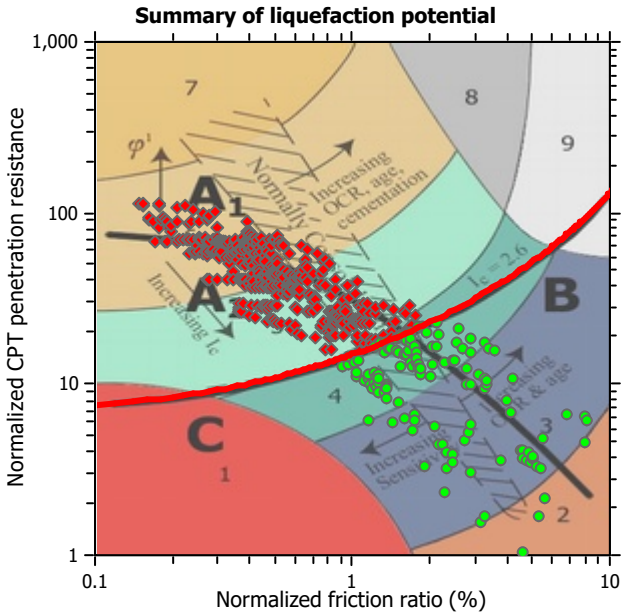
CPT file : sCPTW-05

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-26.80 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-26.80 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

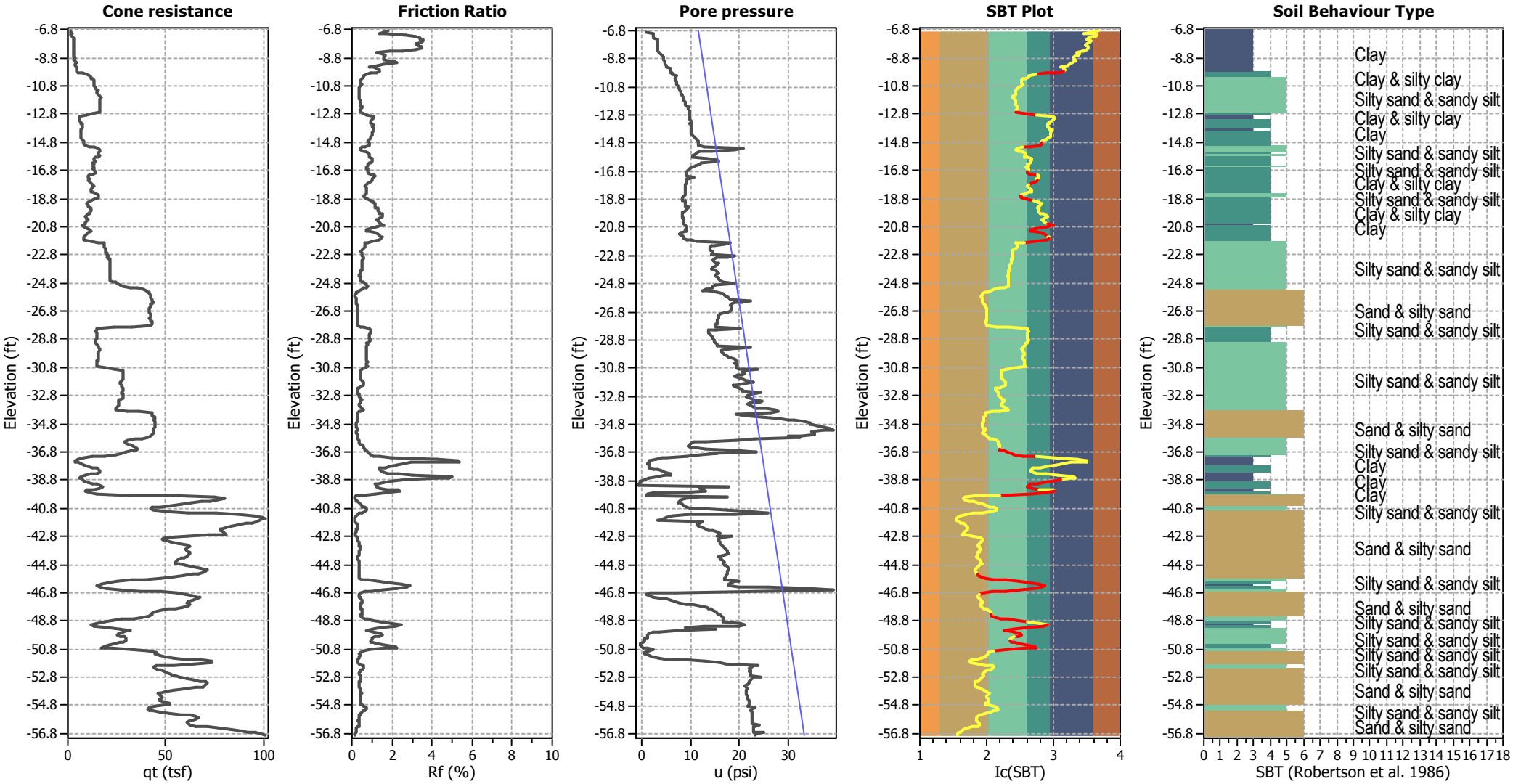






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



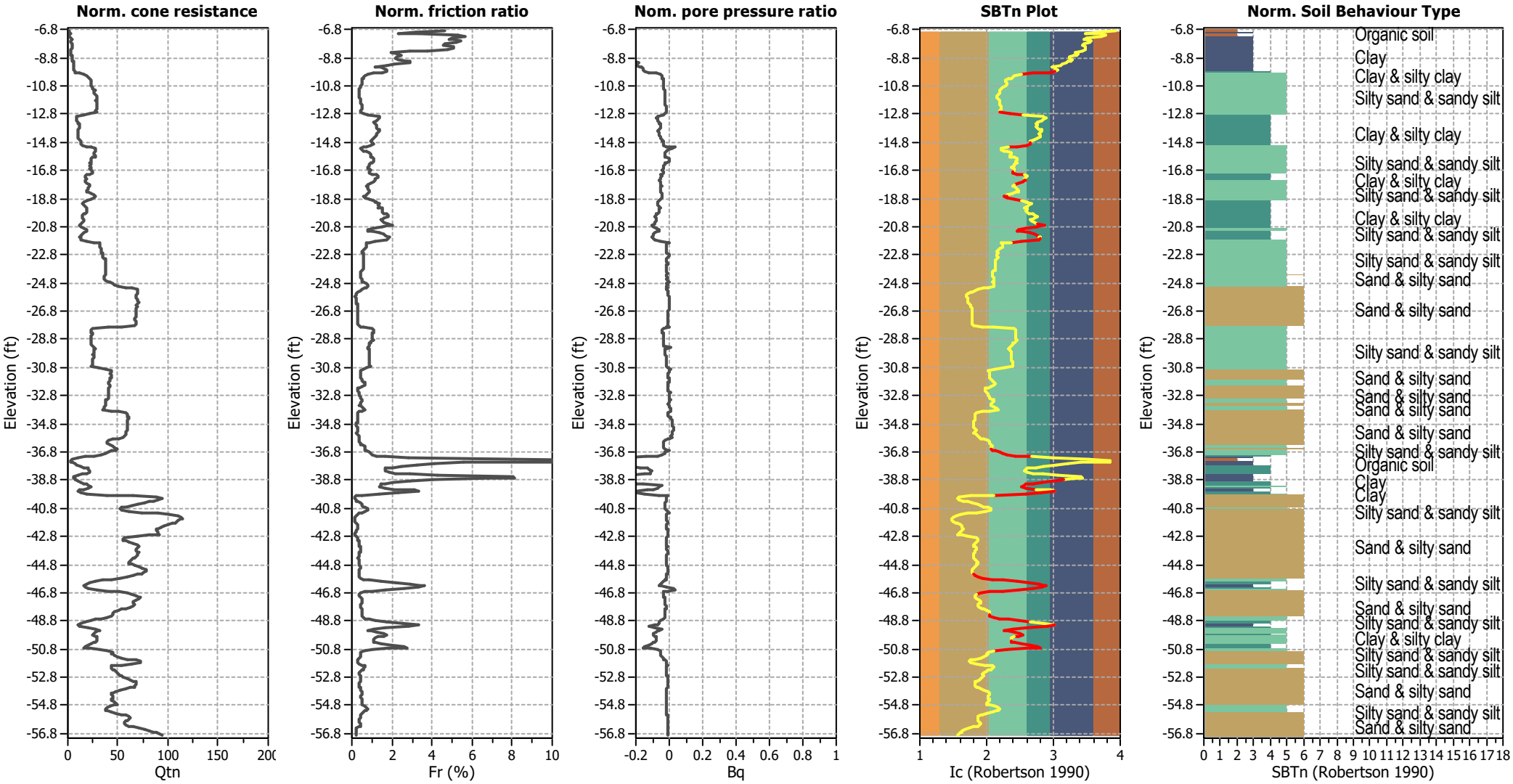
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-26.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-26.80 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



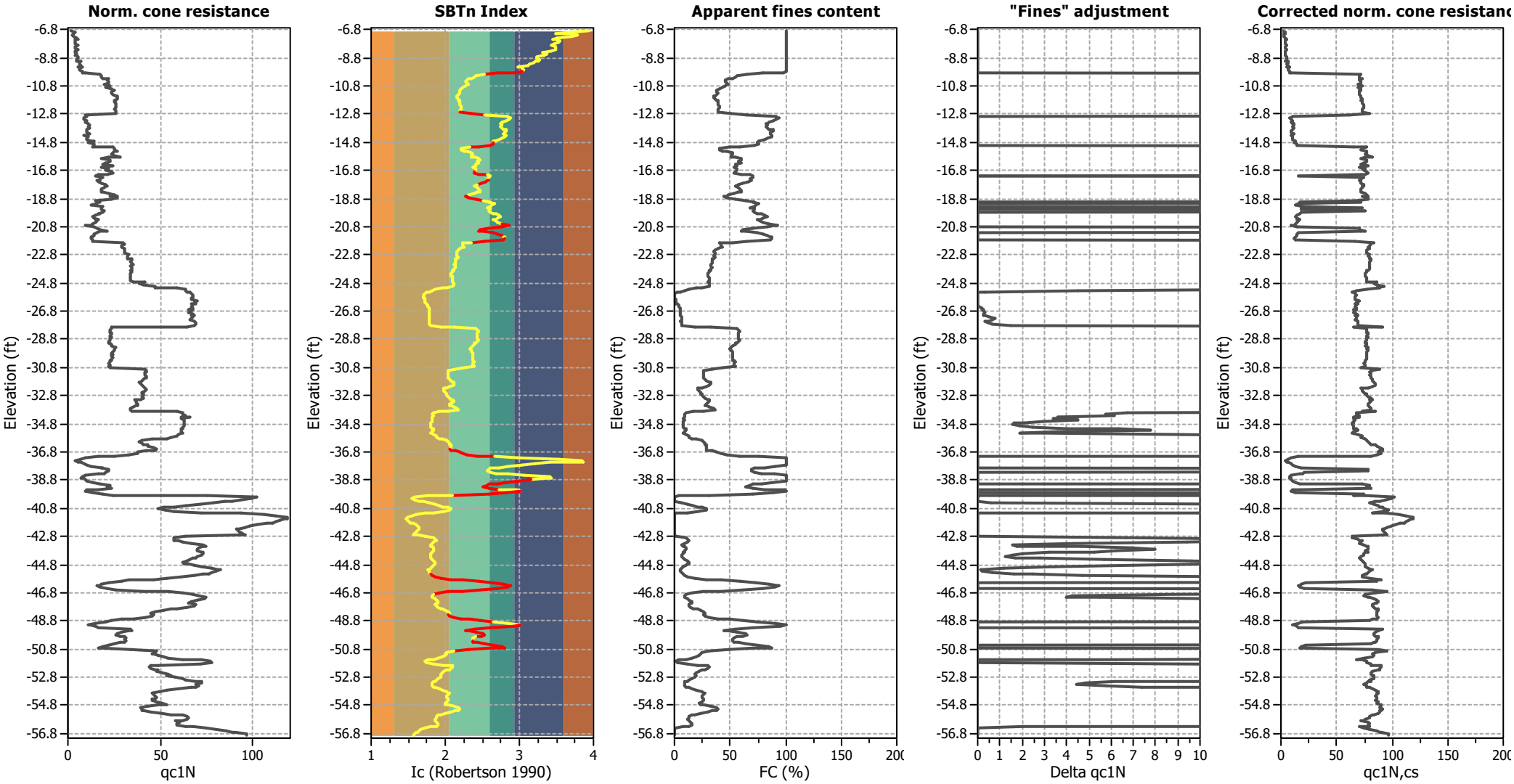
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-26.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-26.80 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

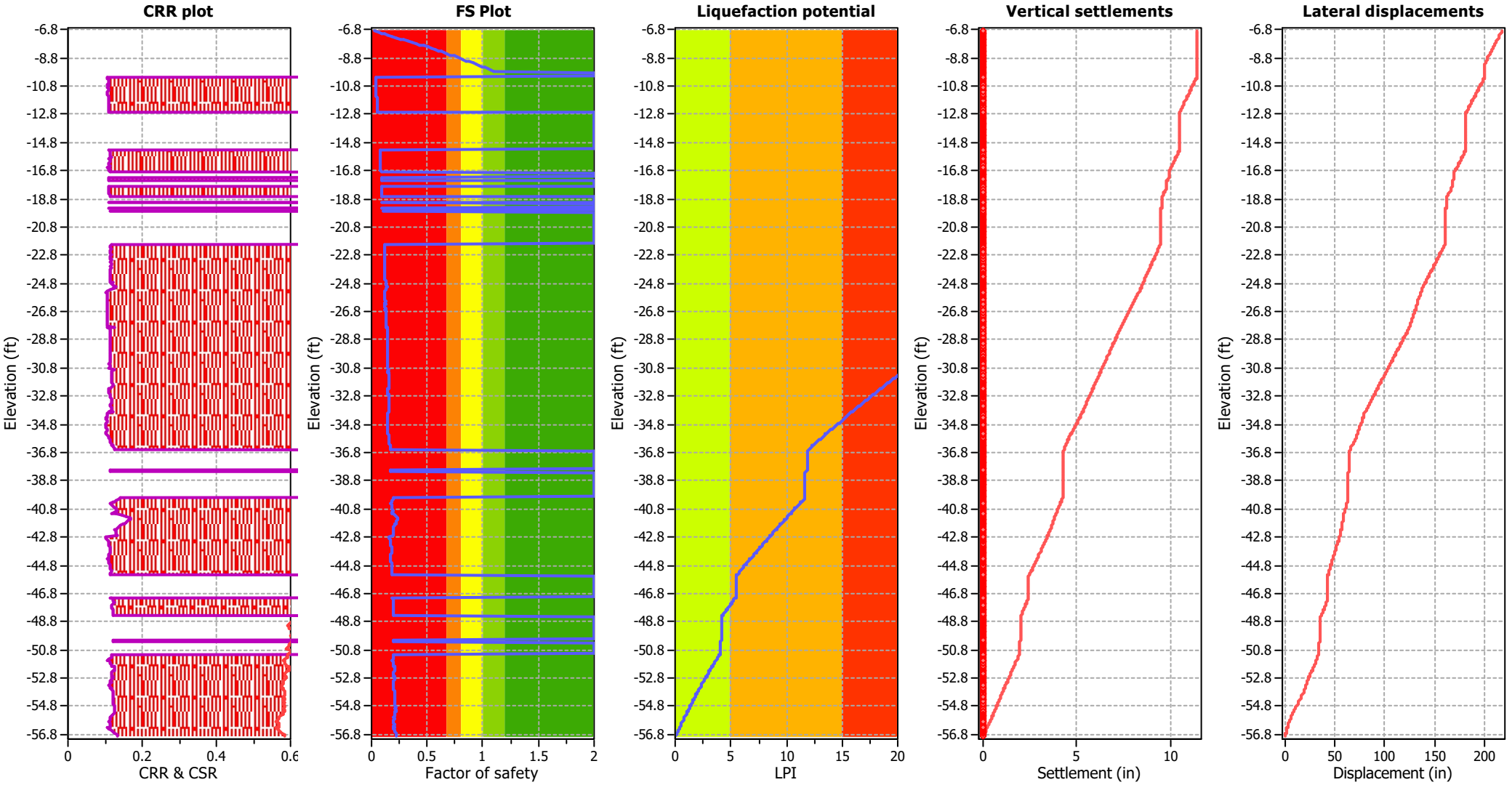
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-26.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-26.80 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-26.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-26.80 ft	Fill height:	N/A	Limit depth:	N/A

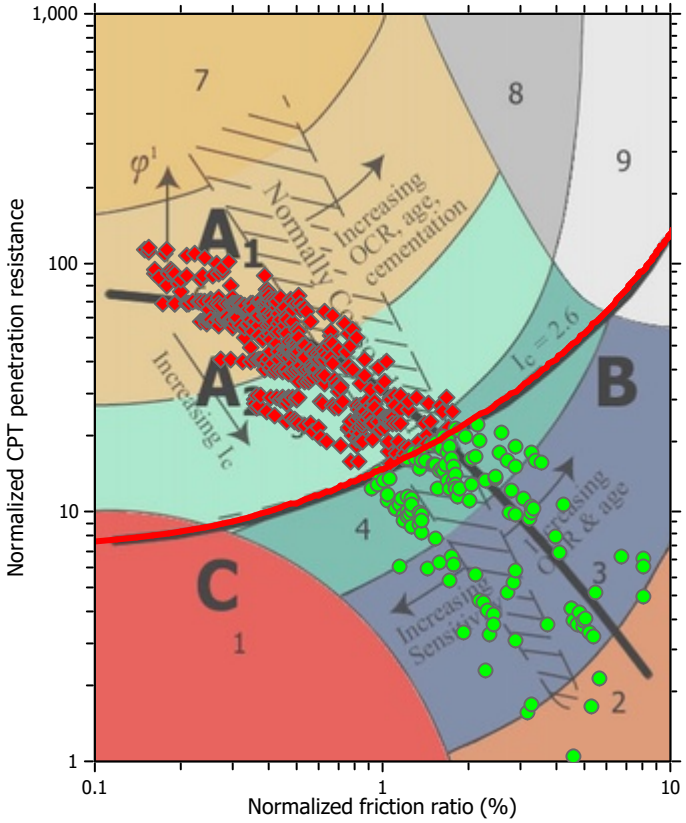
F.S. color scheme

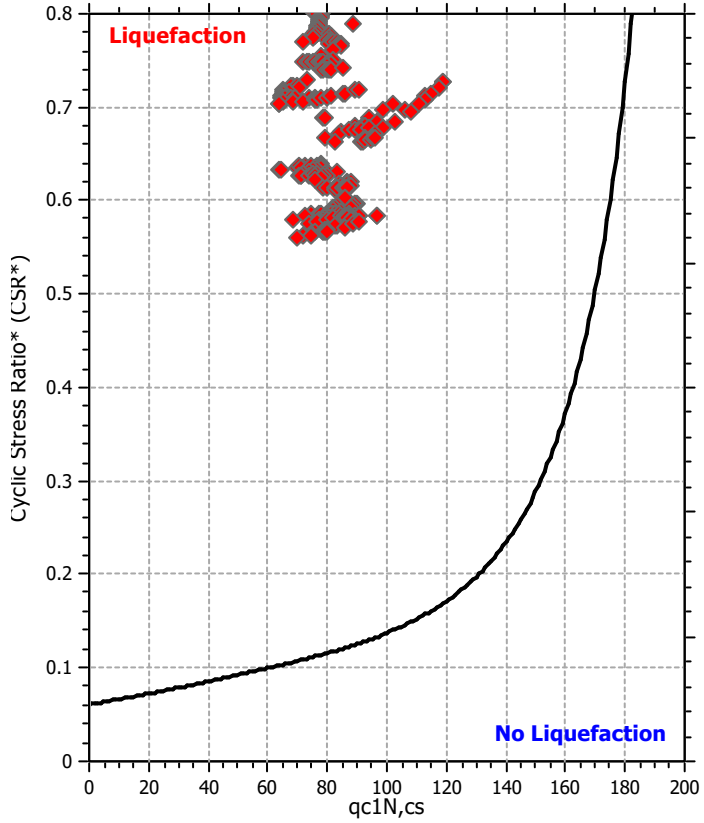
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

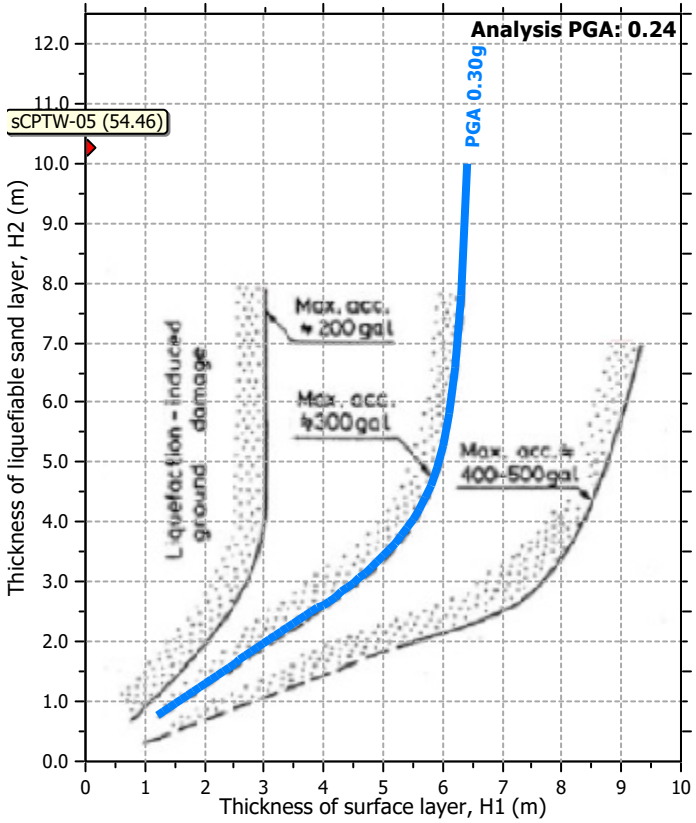
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



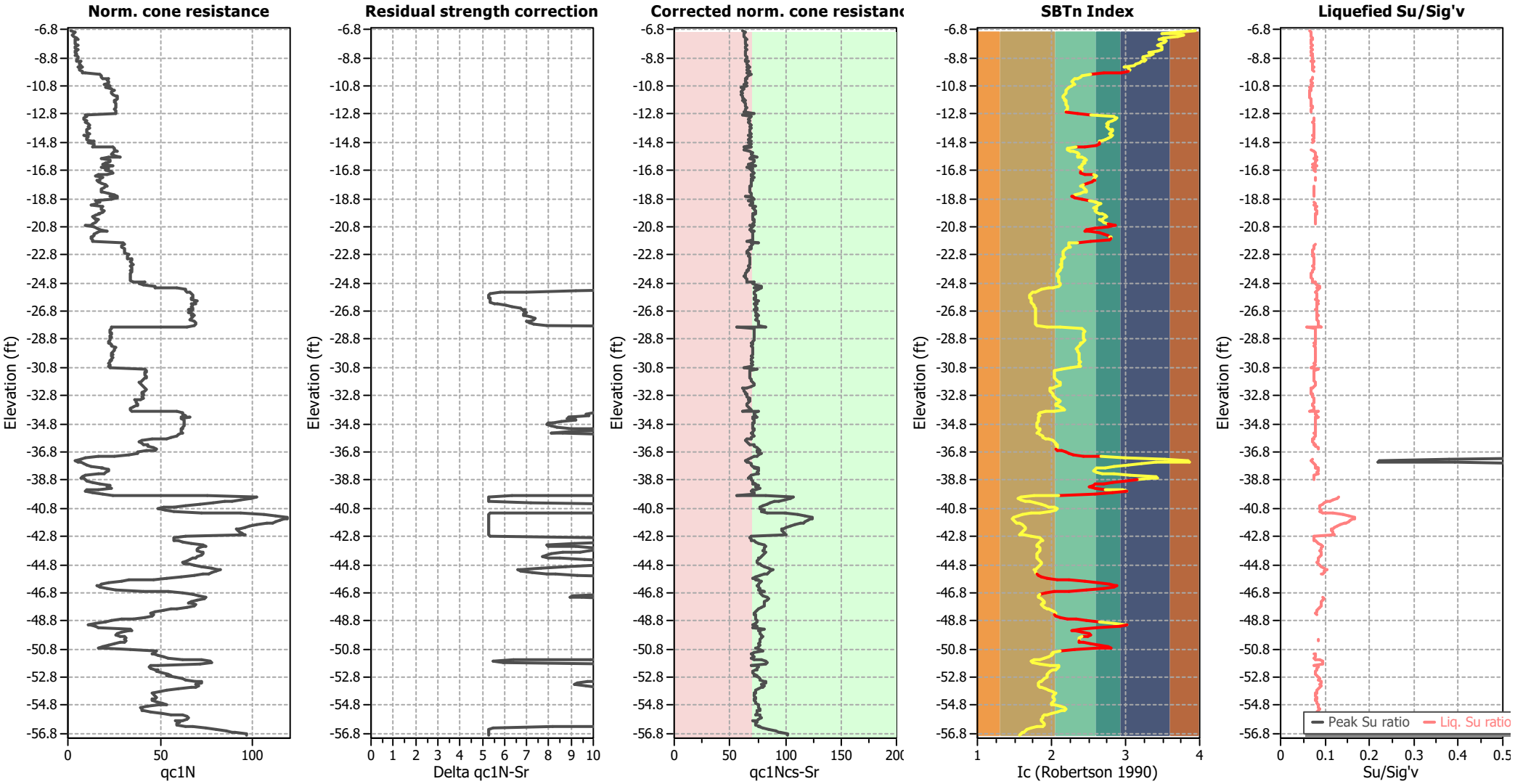




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-26.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-26.80 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

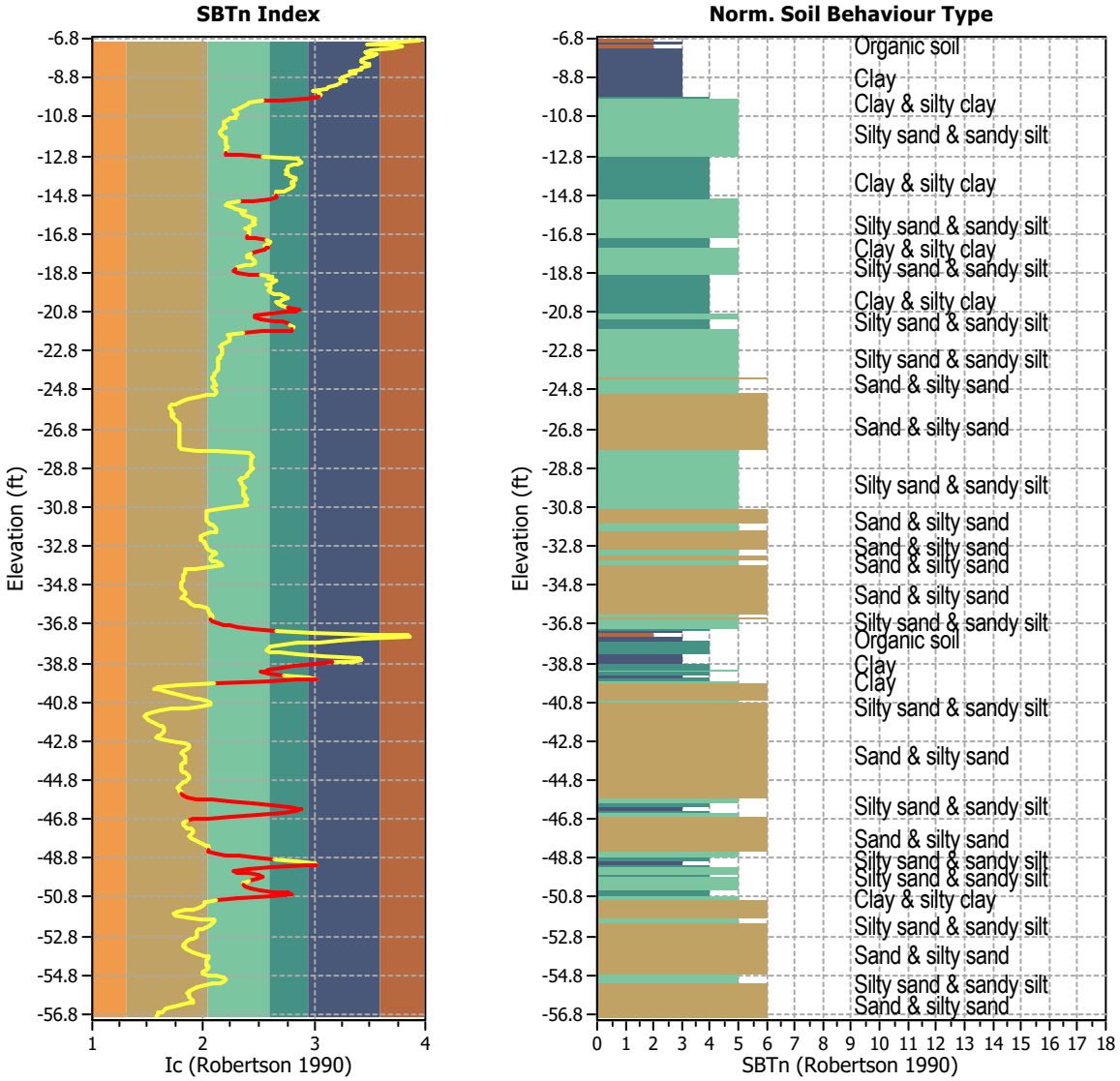
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-26.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-26.80 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

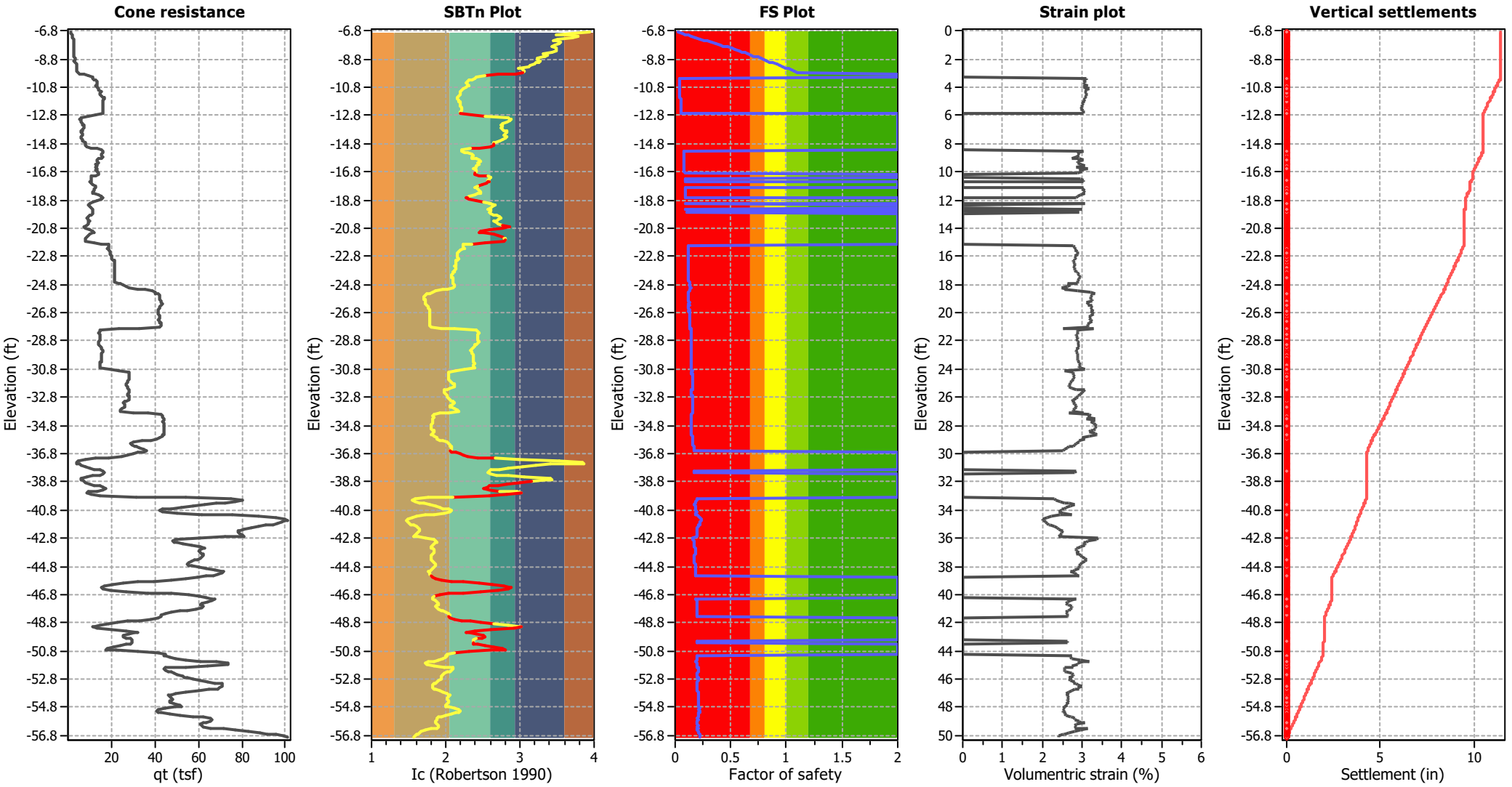
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	611
I_c maximum check value:	3.00	Total points excluded:	114
I_c change ratio value:	0.0250	Exclusion percentage:	18.66%
Minimum number of points in layer:	4	Number of layers detected:	21

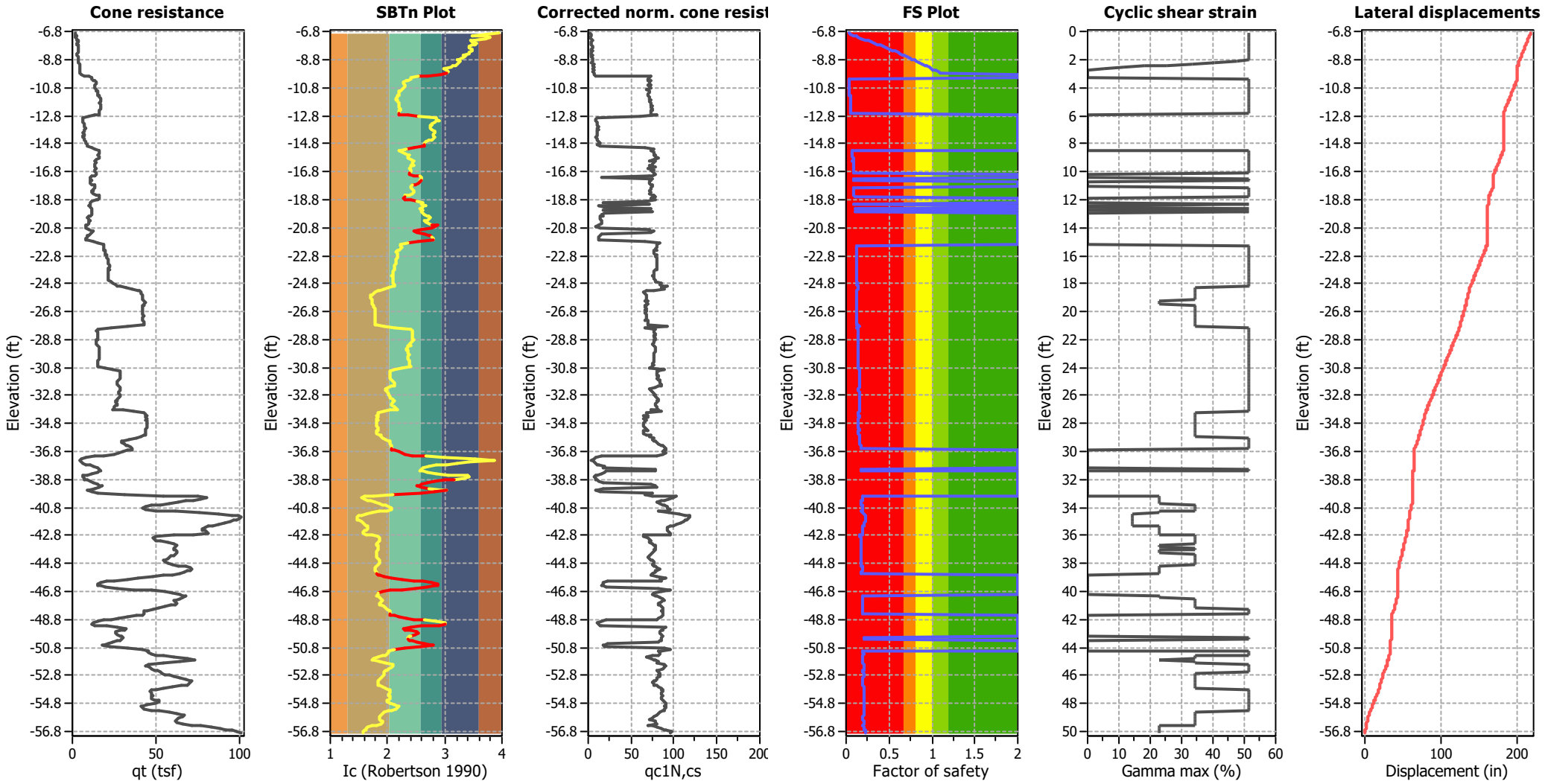
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

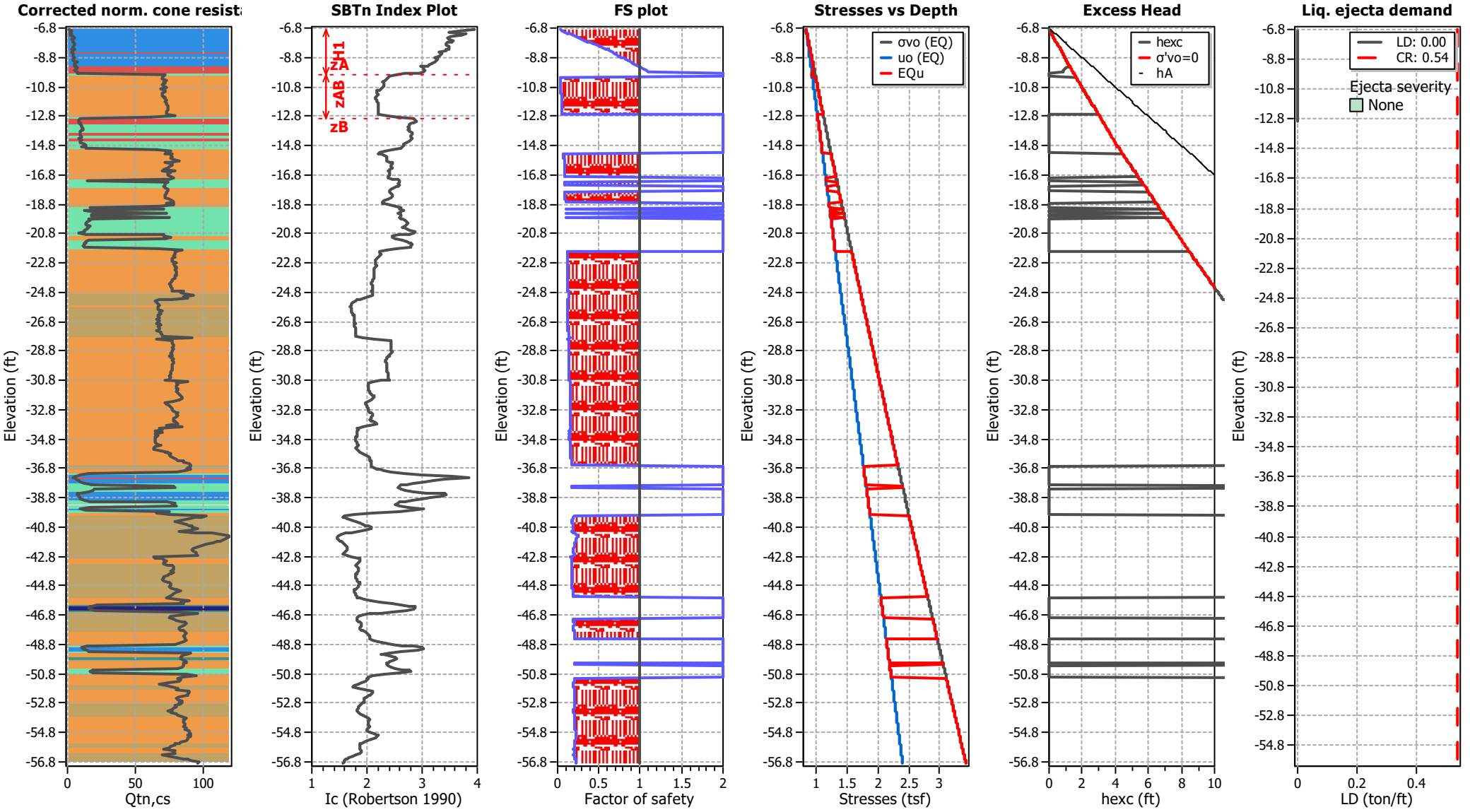
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

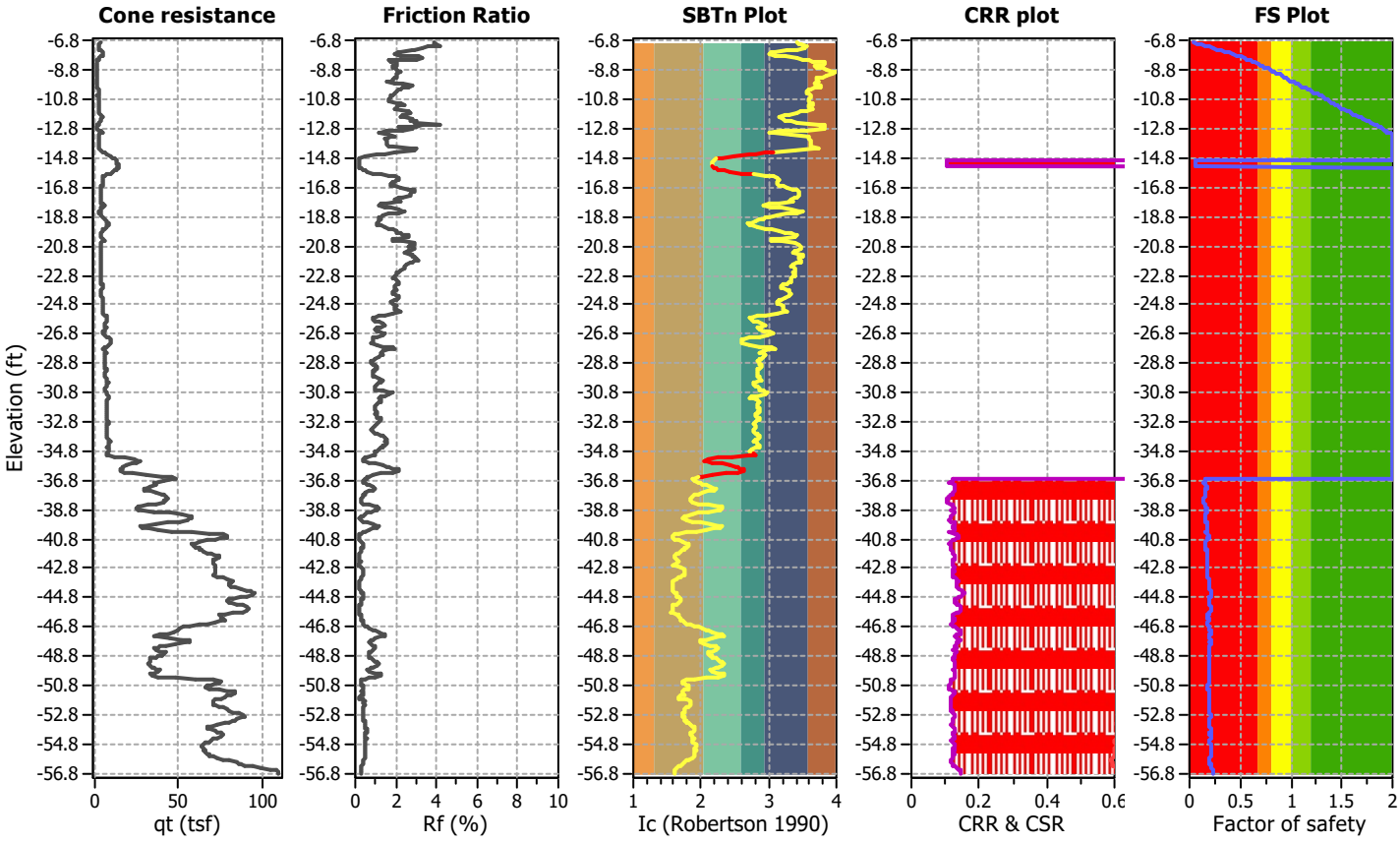
LIQUEFACTION ANALYSIS REPORT

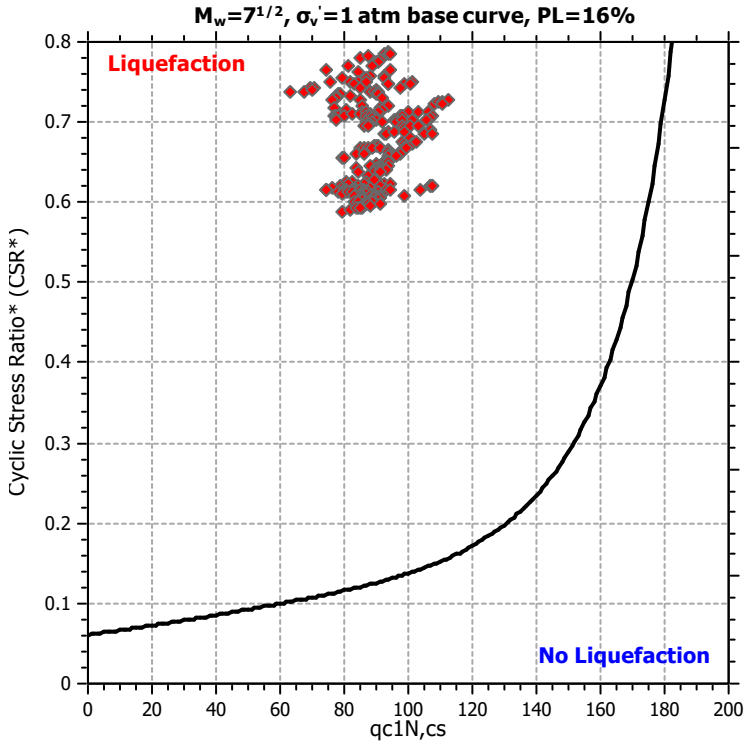
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

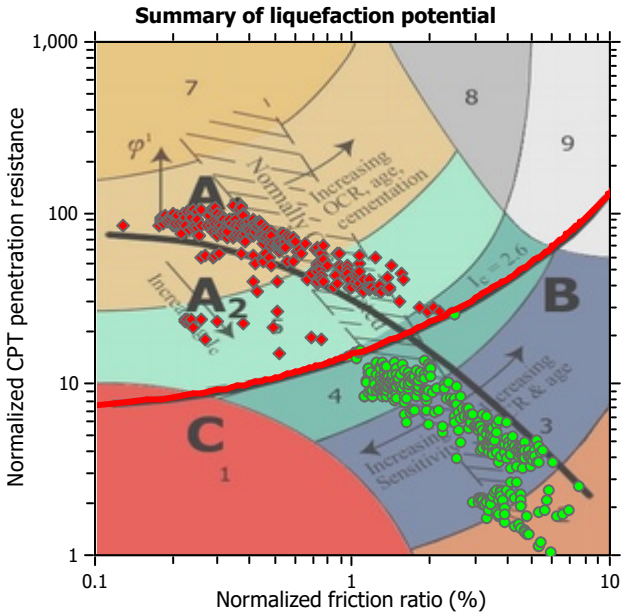
CPT file : sCPTW-05A

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-26.80 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-26.80 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

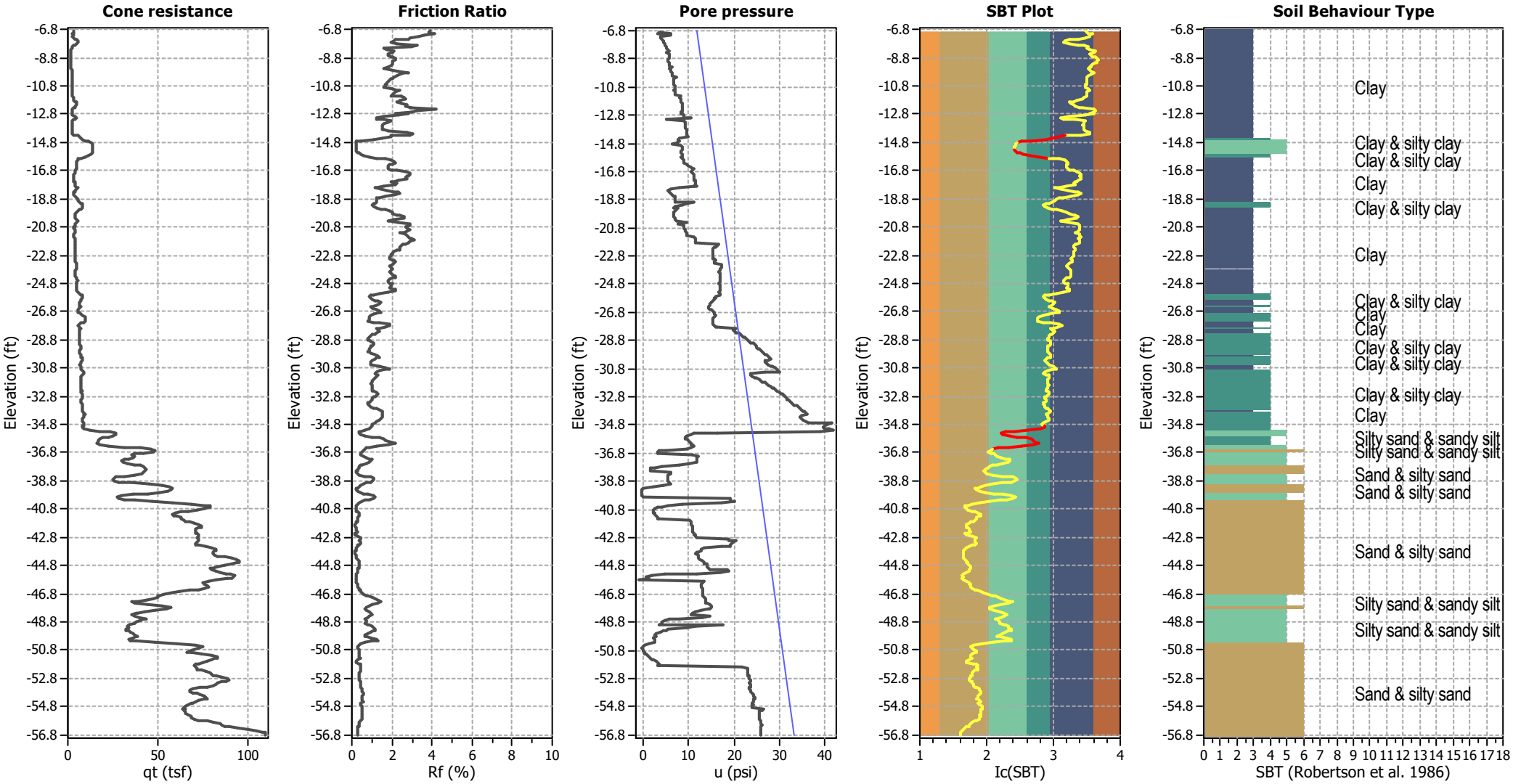






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



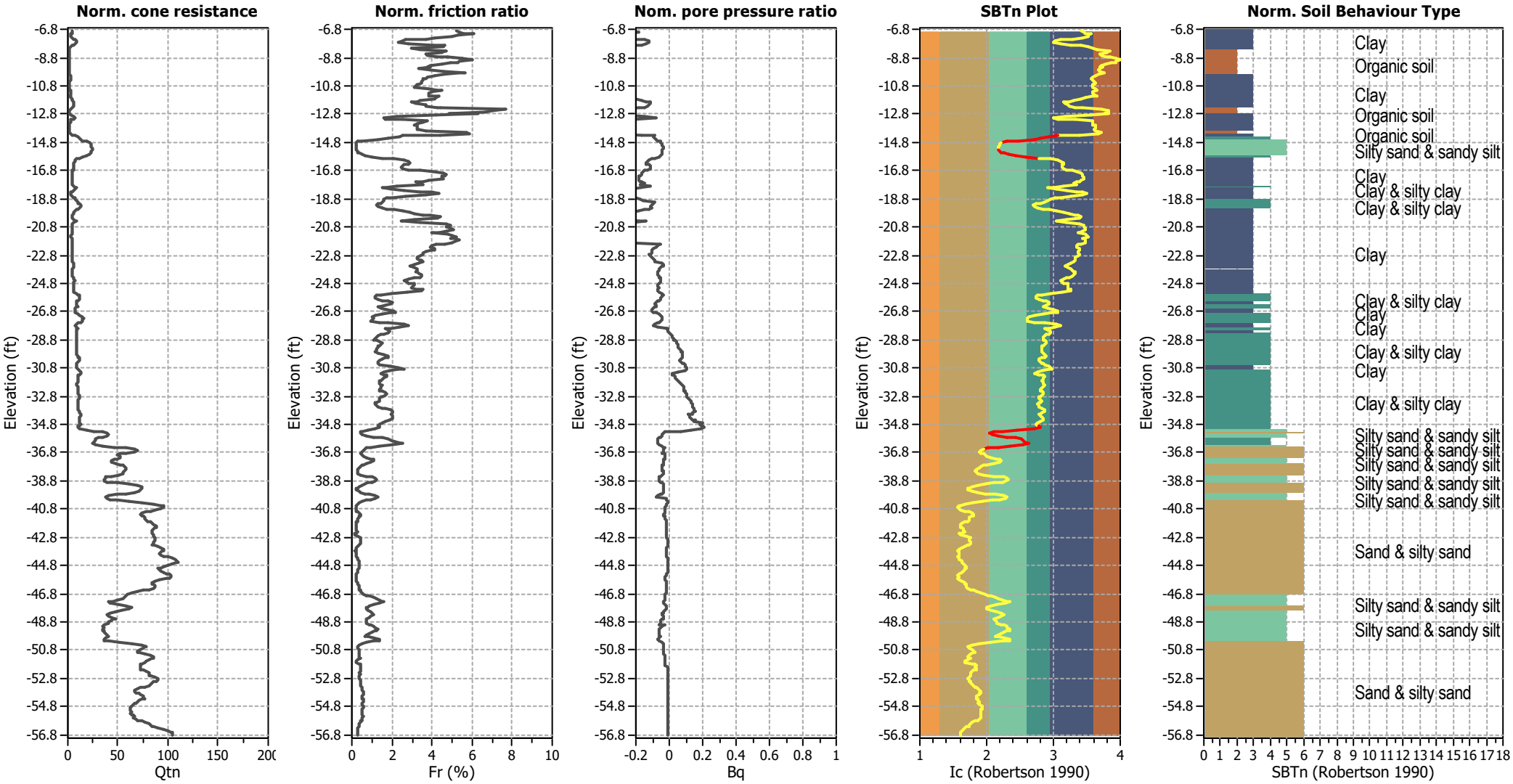
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-26.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-26.80 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



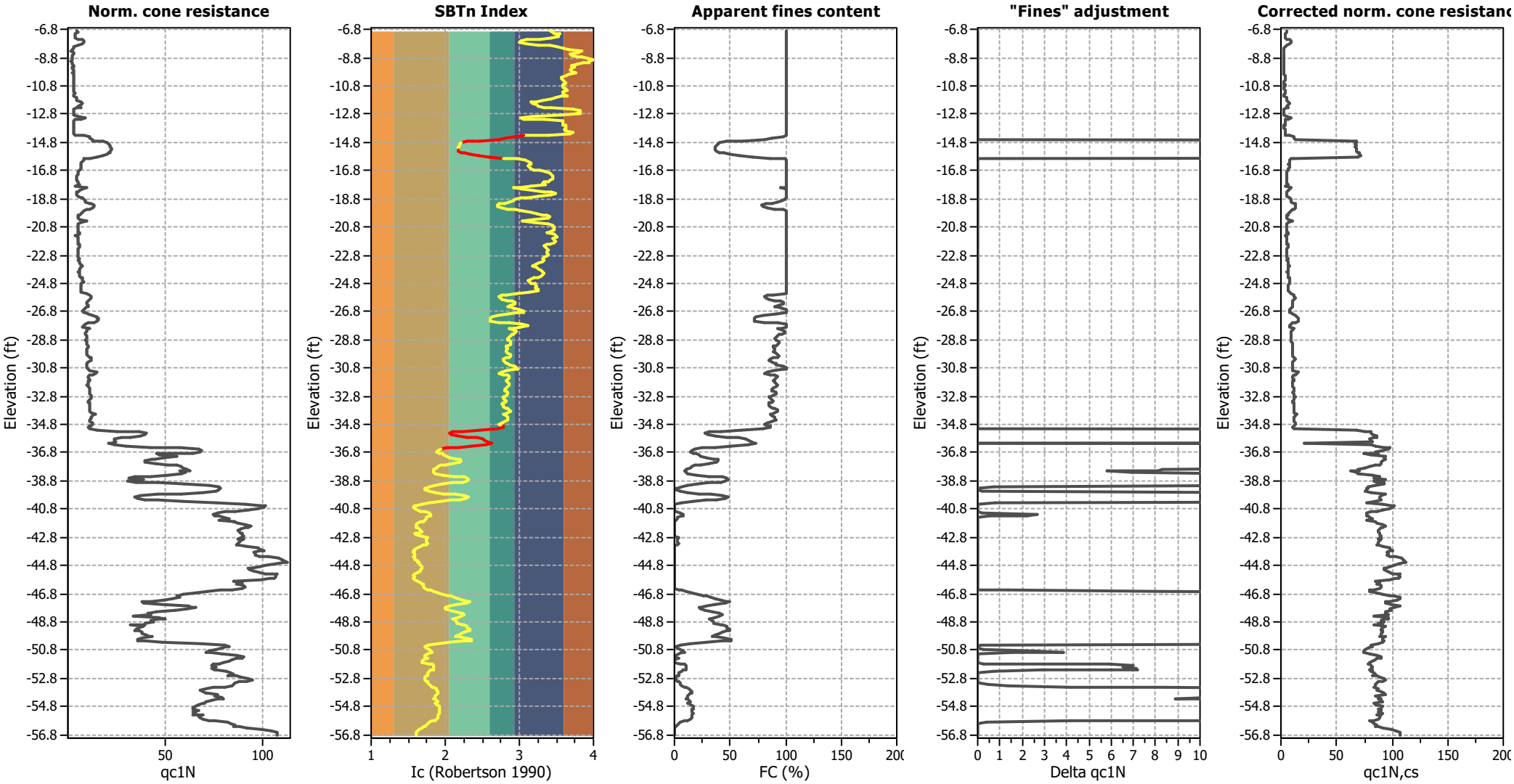
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-26.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-26.80 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

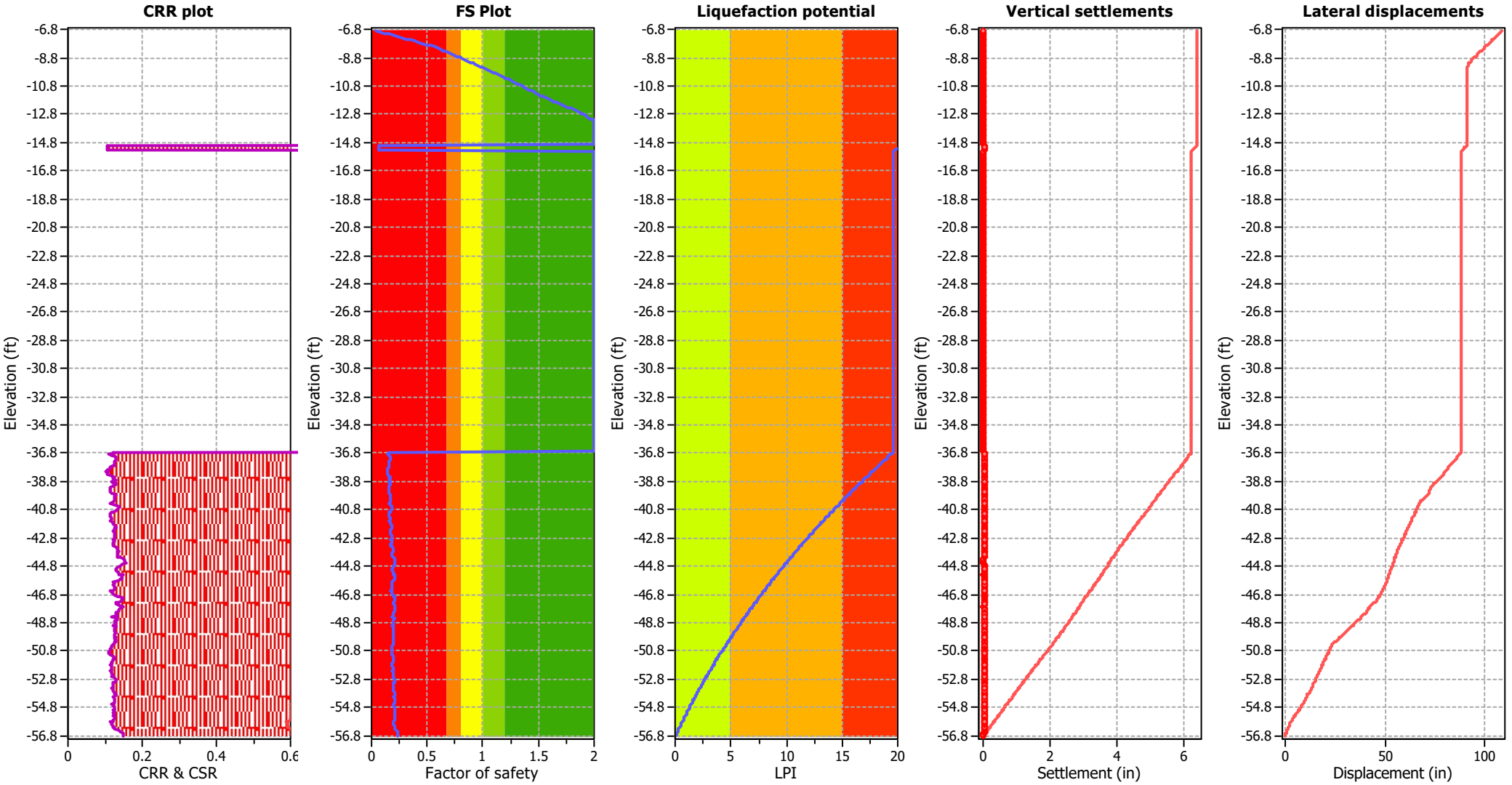
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-26.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-26.80 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-26.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-26.80 ft	Fill height:	N/A	Limit depth:	N/A

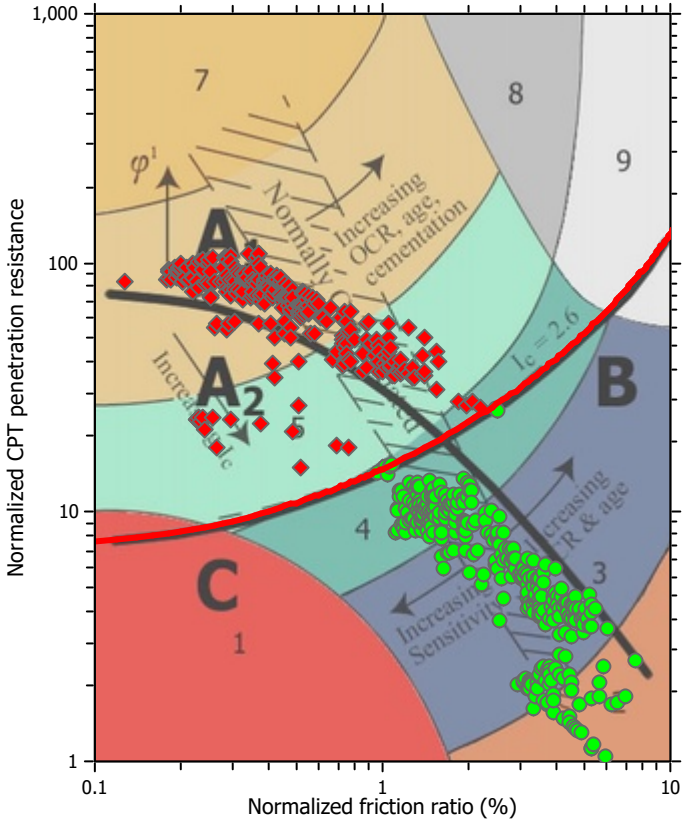
F.S. color scheme

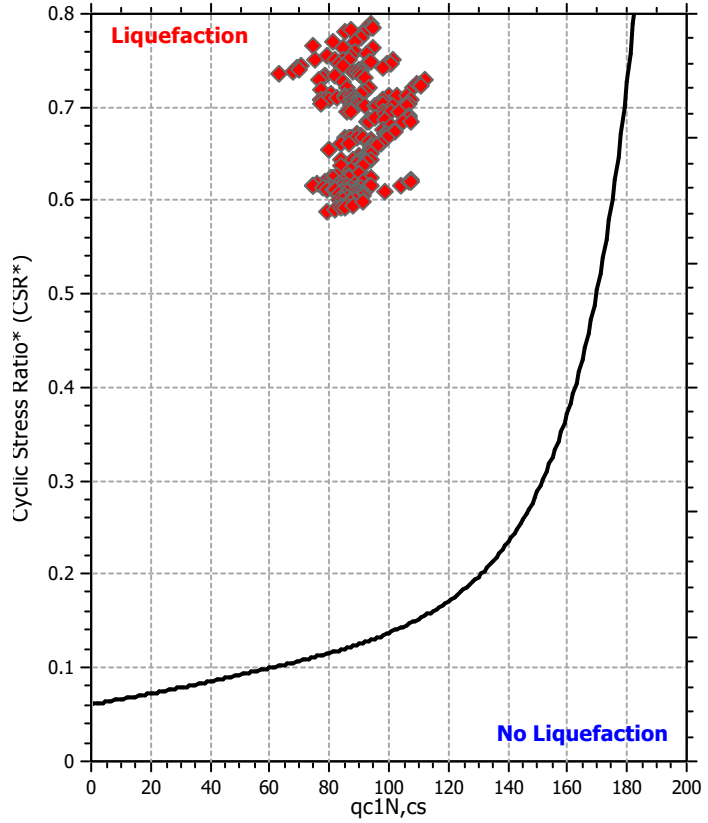
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

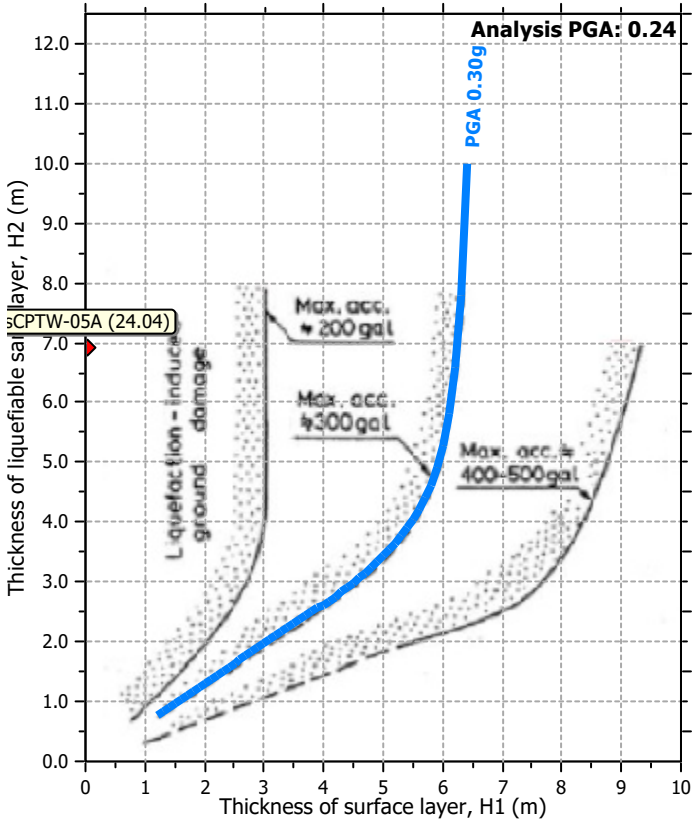
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



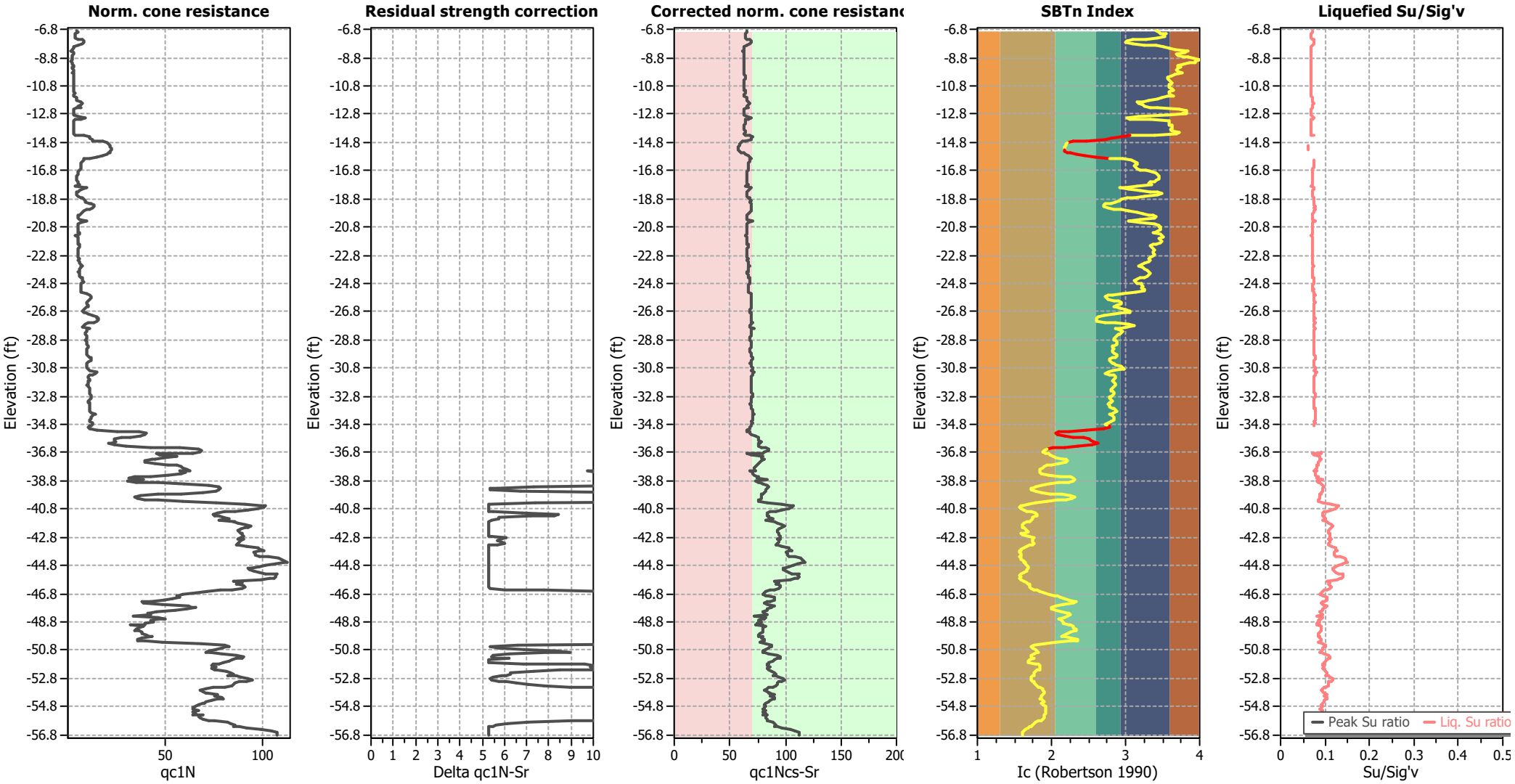




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-26.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-26.80 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

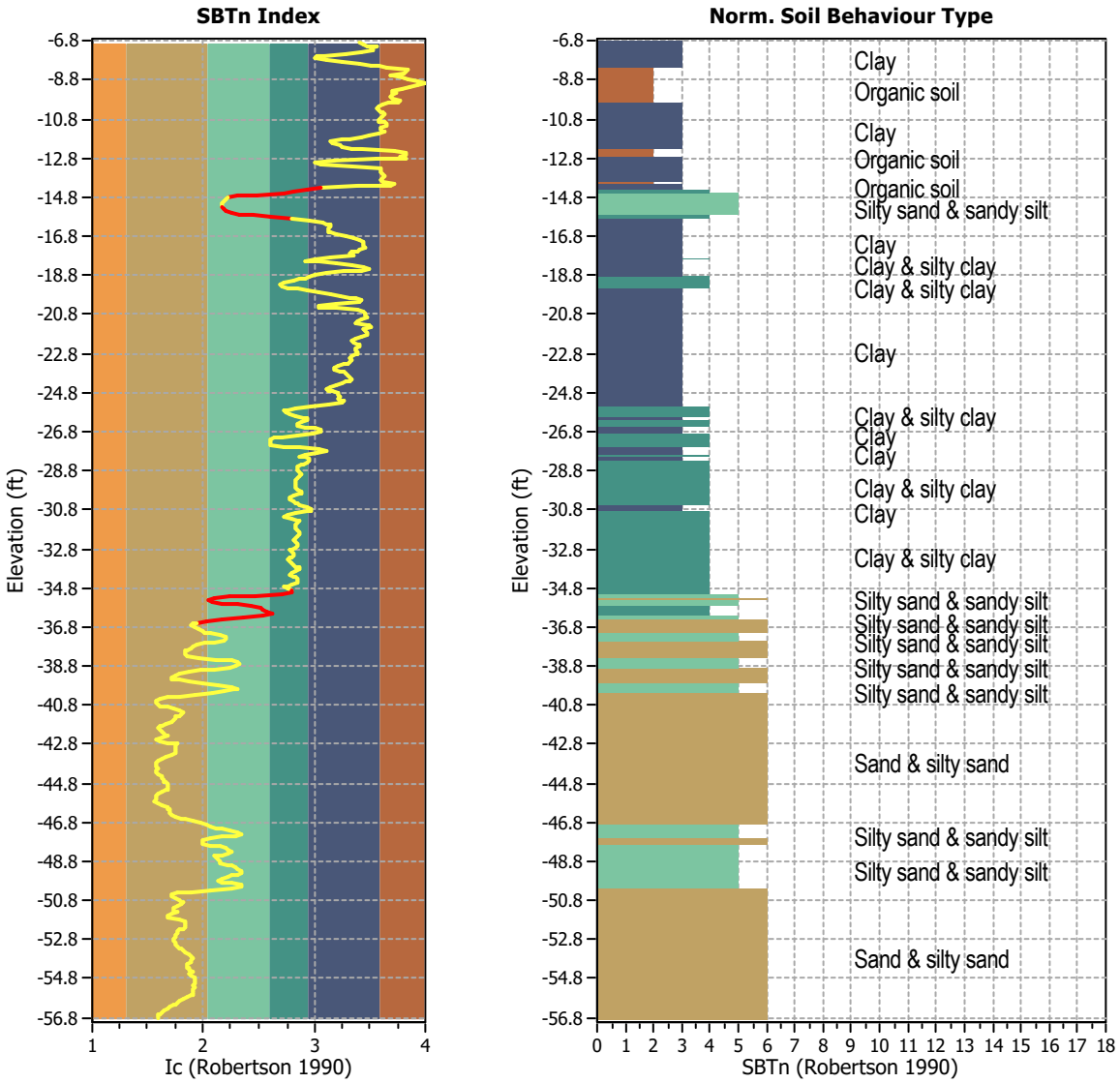
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-26.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-26.80 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

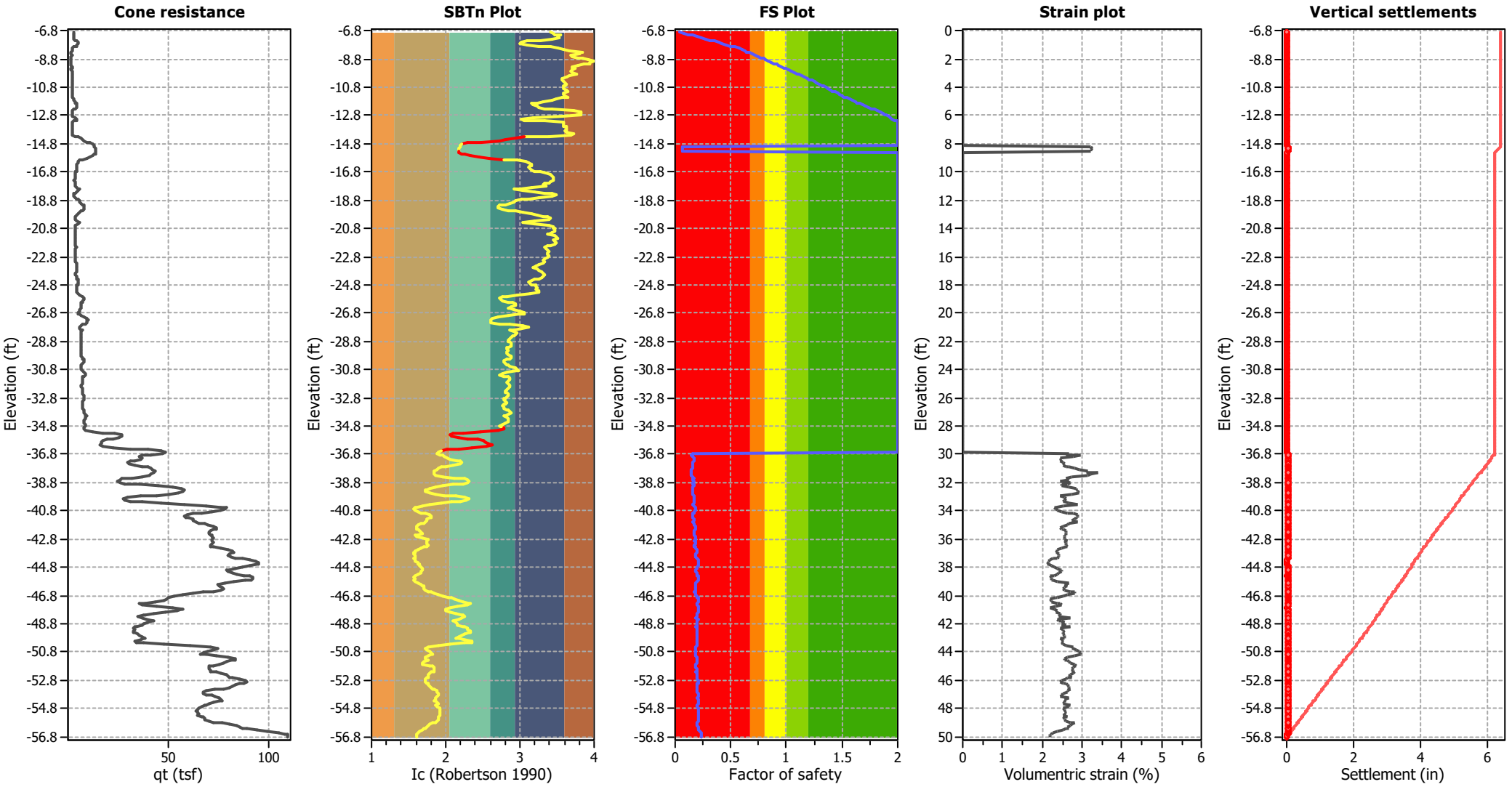
The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties	
I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0250
Minimum number of points in layer:	4

General statistics	
Total points in CPT file:	610
Total points excluded:	37
Exclusion percentage:	6.07%
Number of layers detected:	5

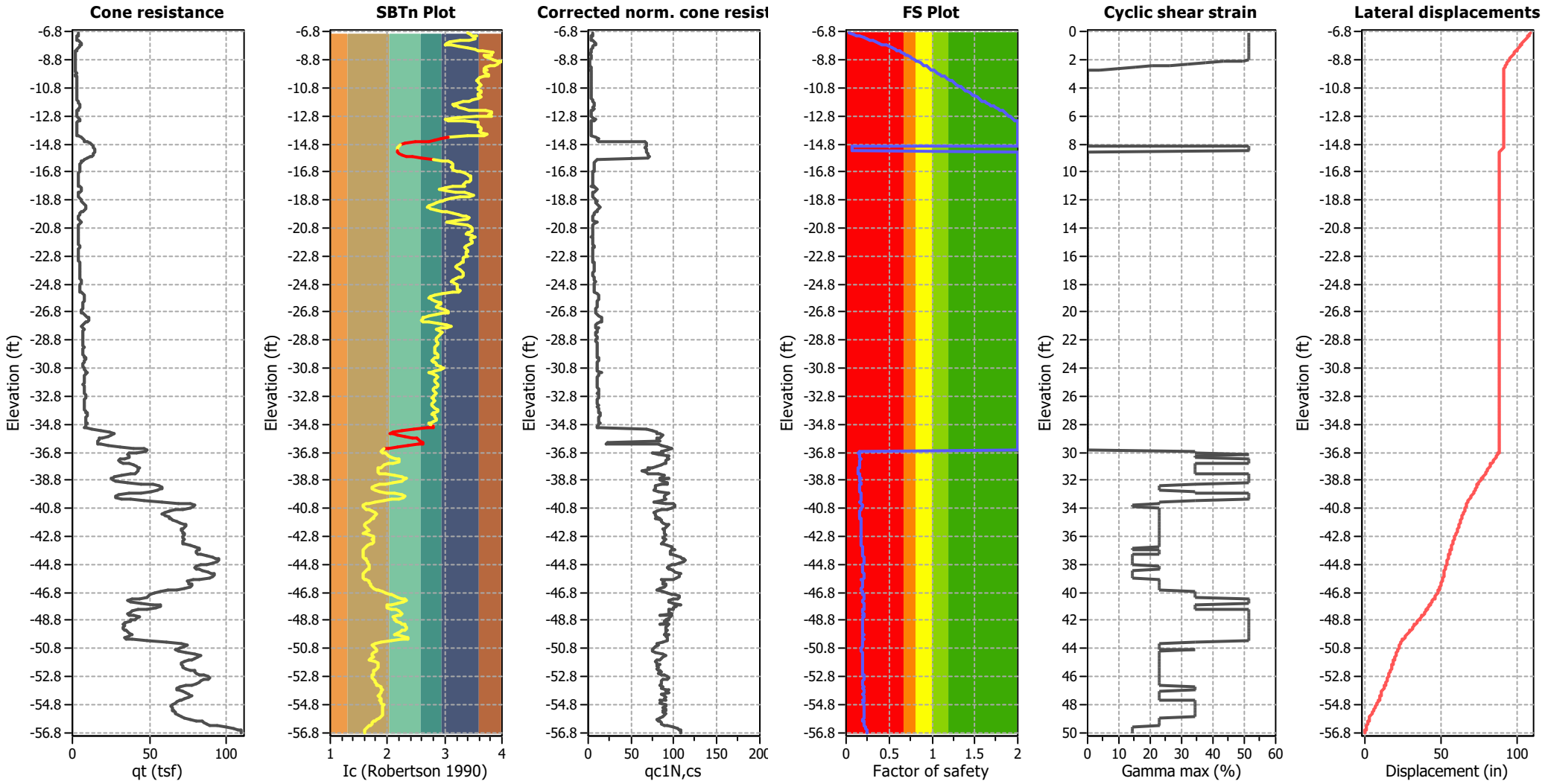
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

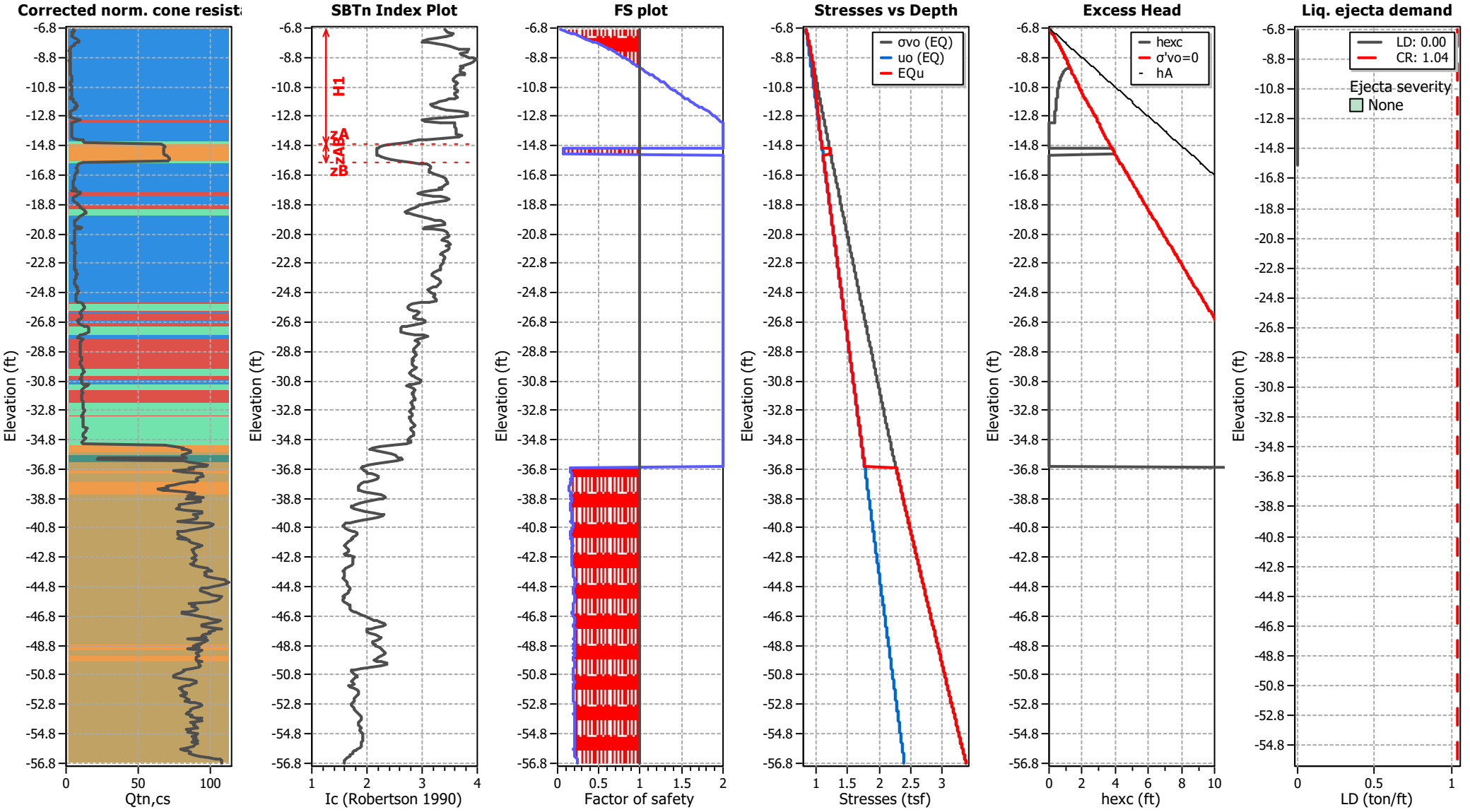
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

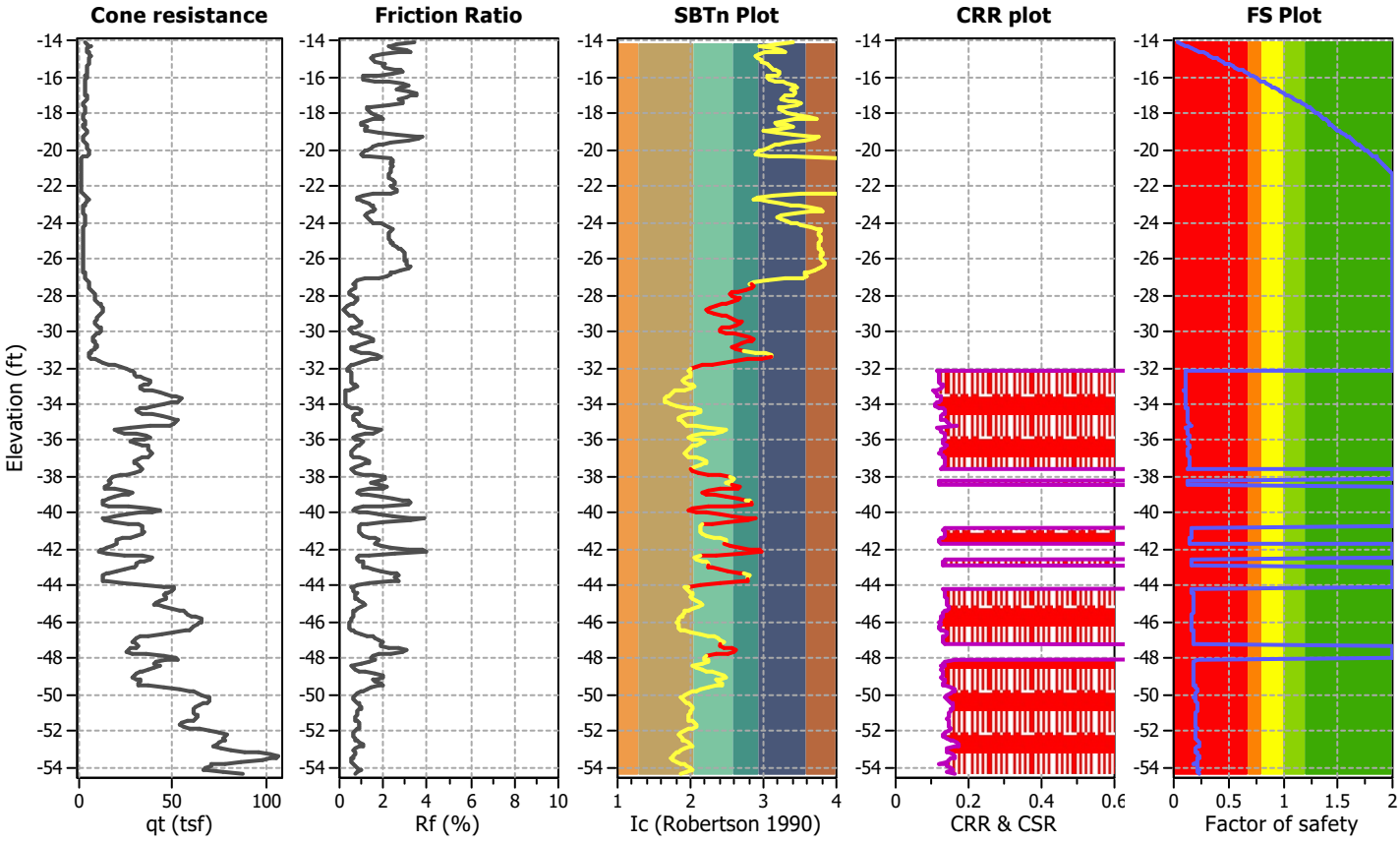
LIQUEFACTION ANALYSIS REPORT

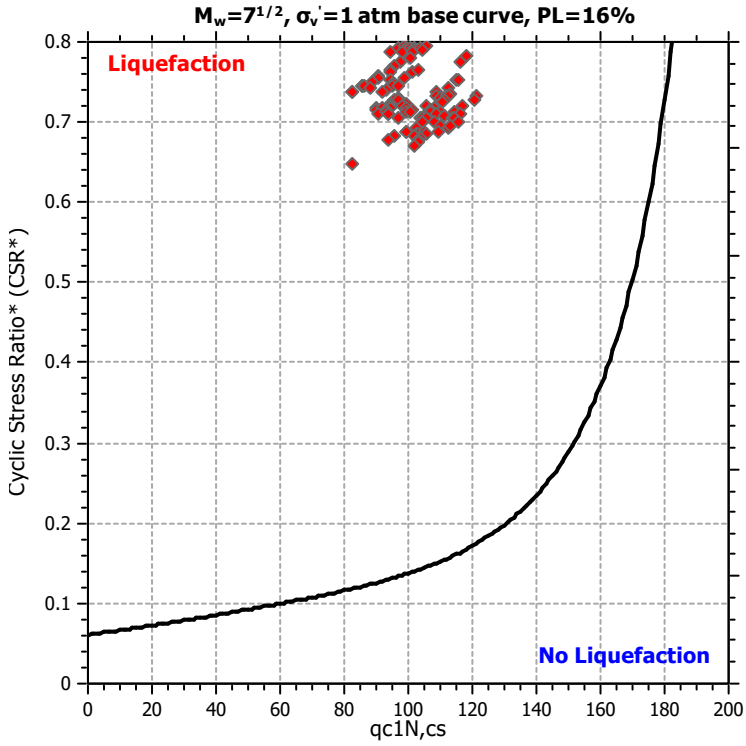
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

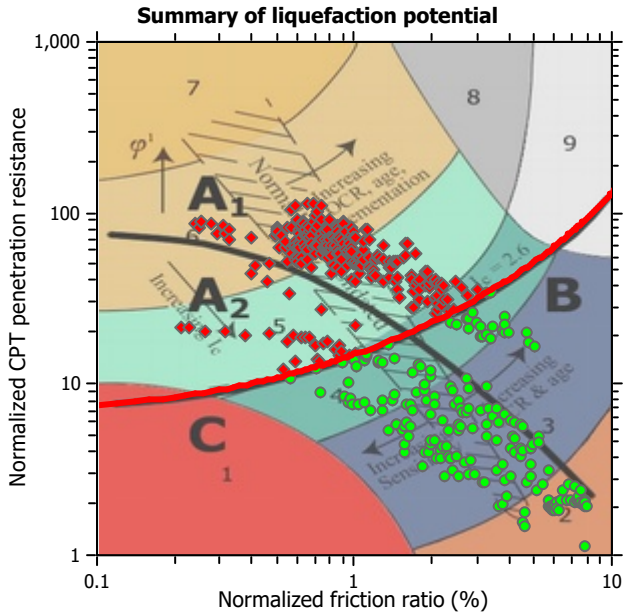
CPT file : CPTW-06

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-34.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-34.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

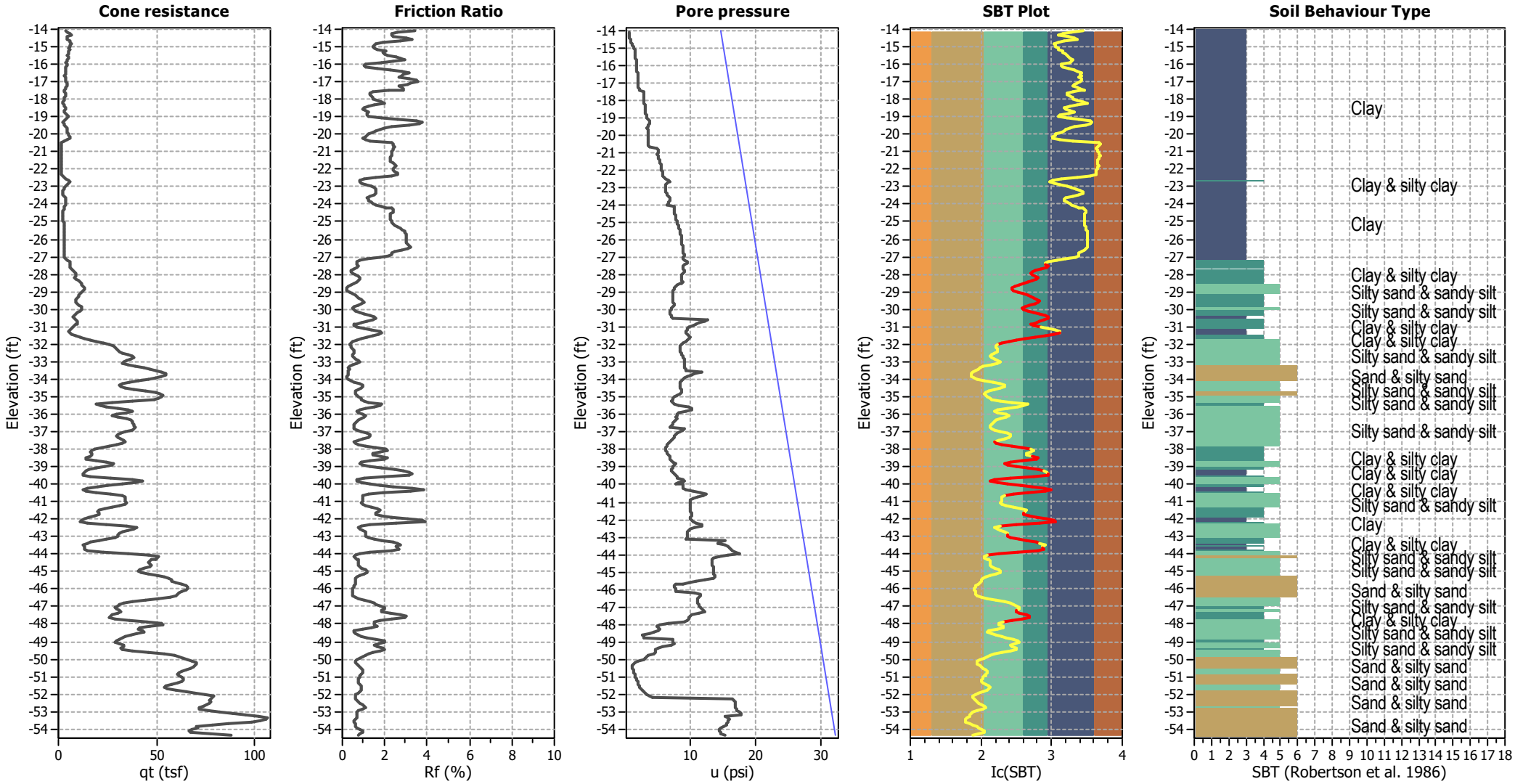






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



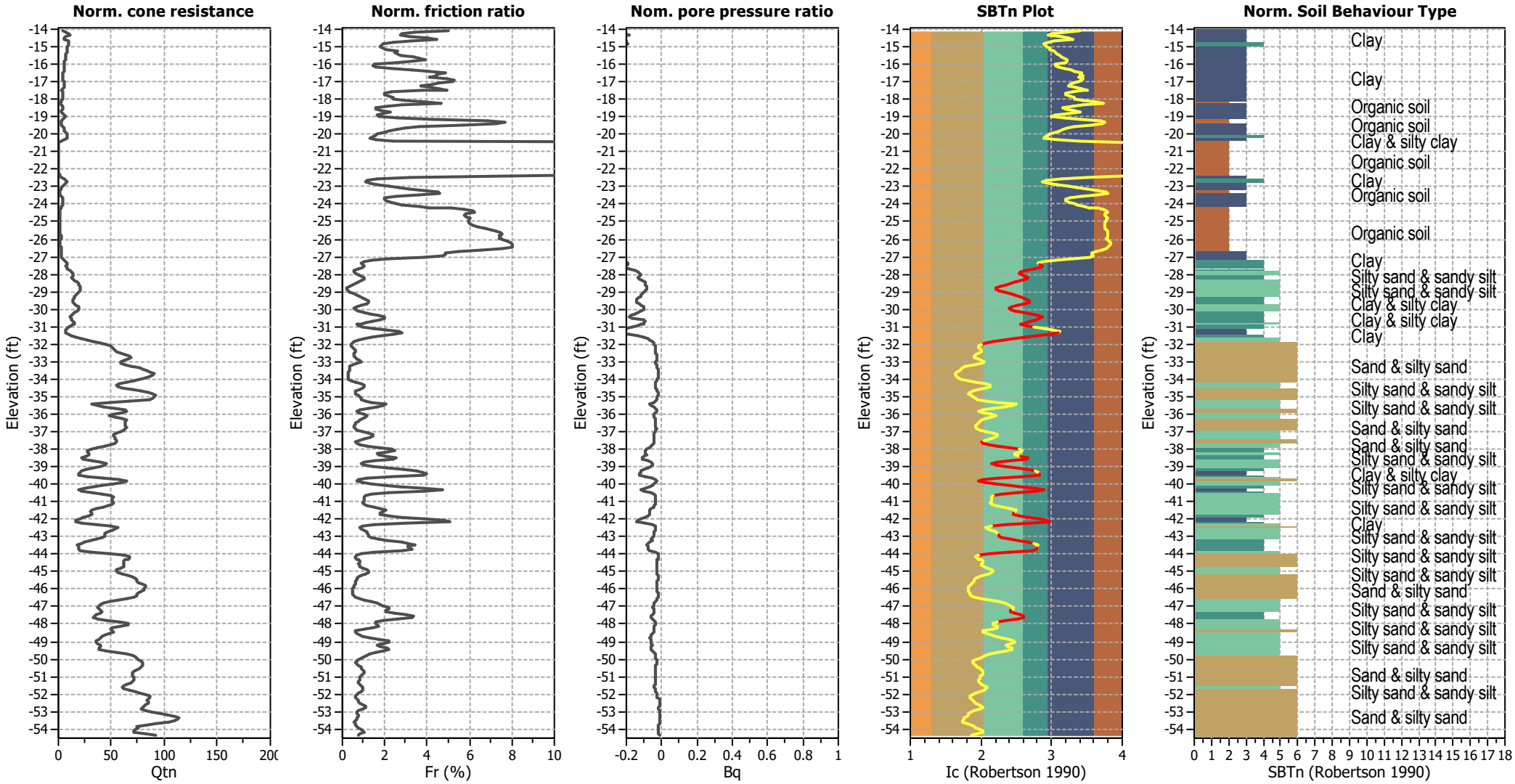
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-34.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-34.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



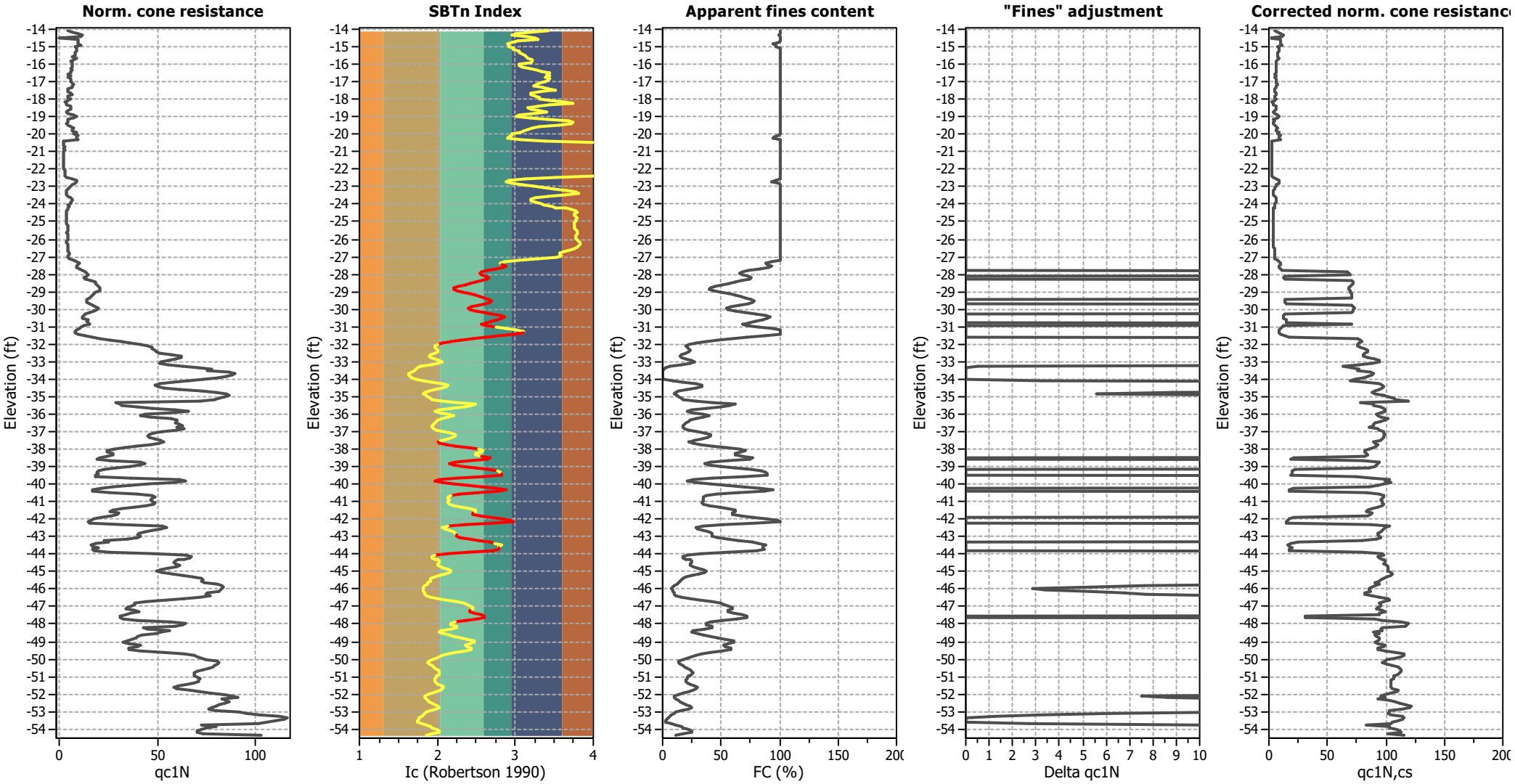
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-34.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-34.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

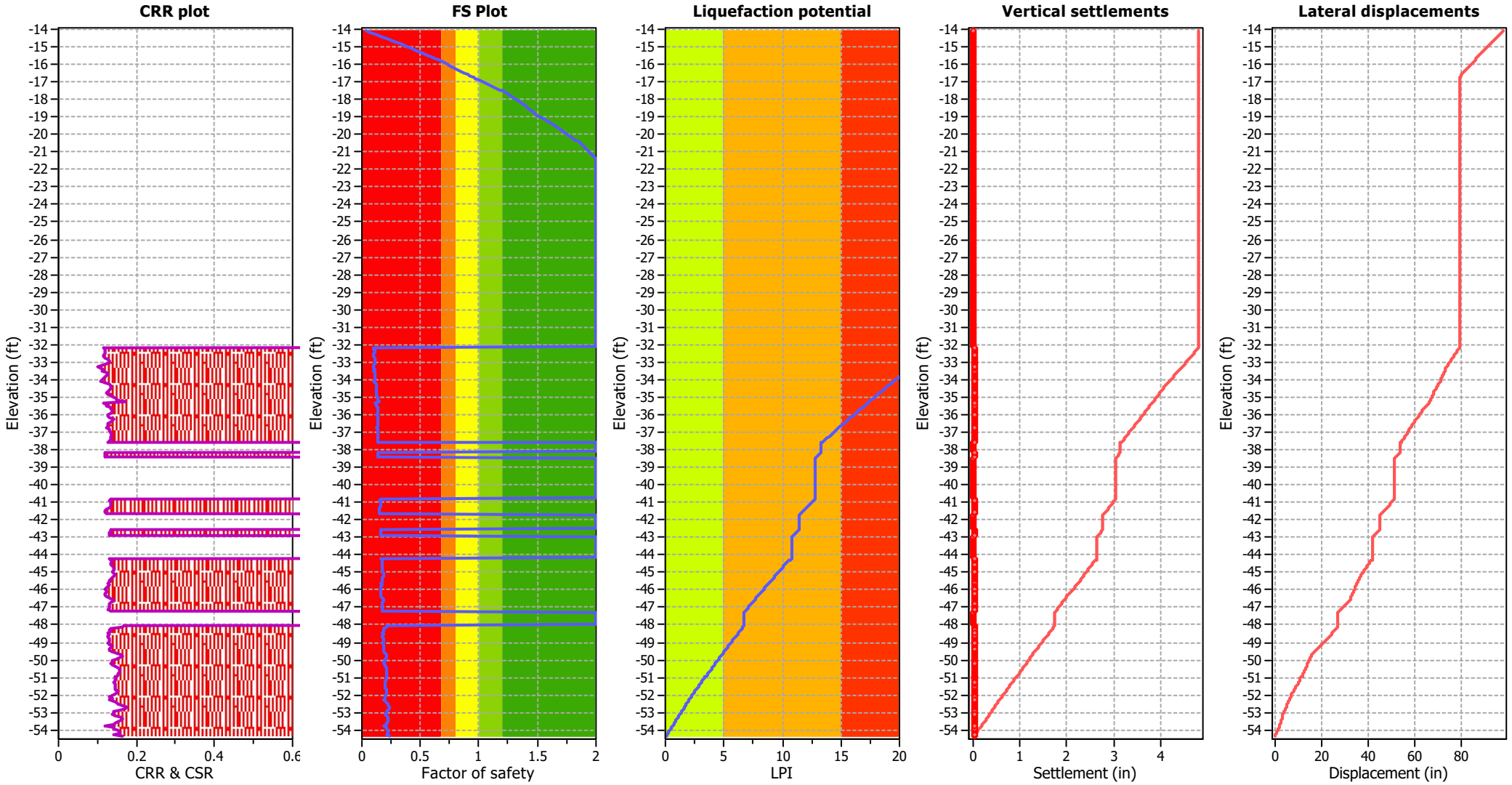
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-34.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-34.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-34.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-34.00 ft	Fill height:	N/A	Limit depth:	N/A

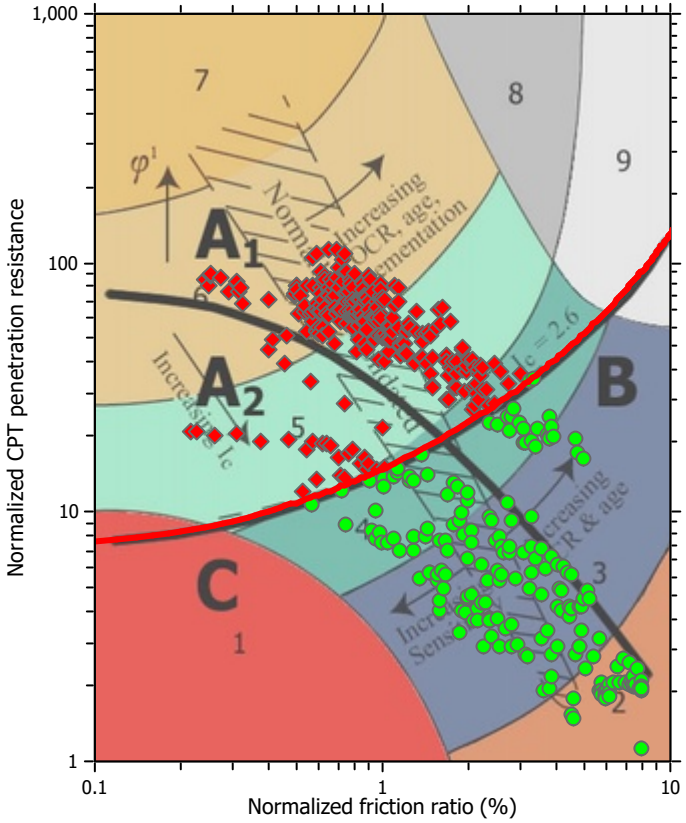
F.S. color scheme

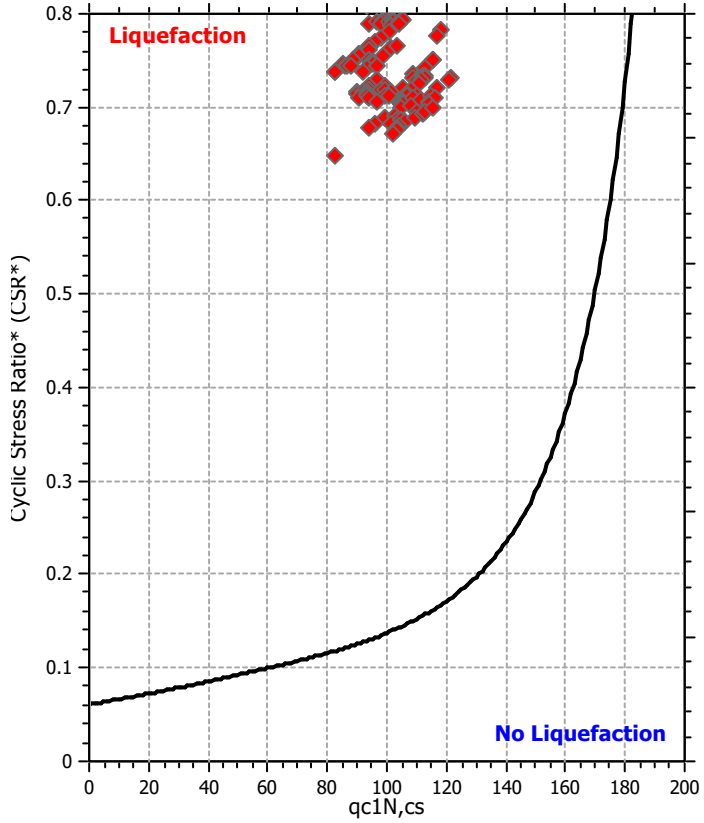
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

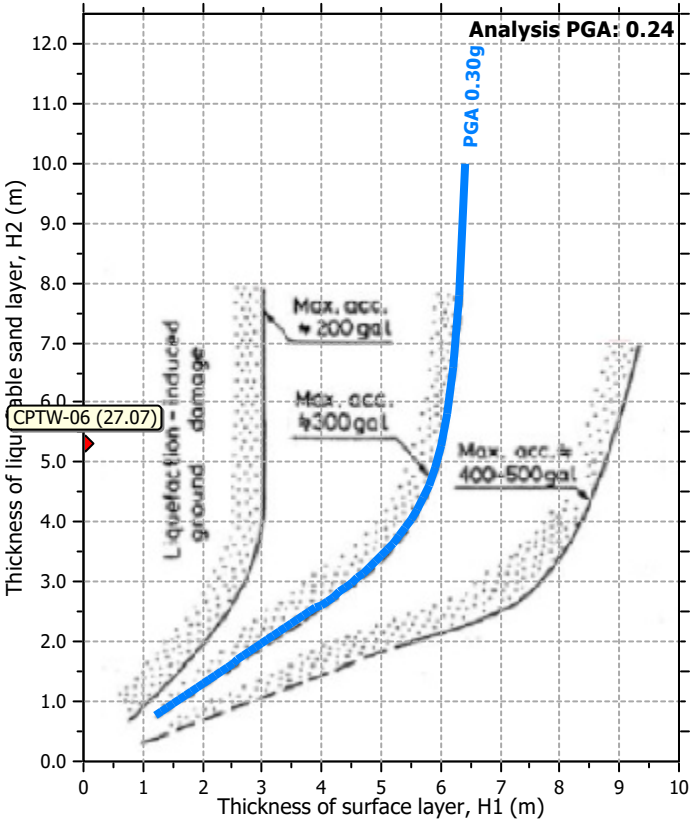
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



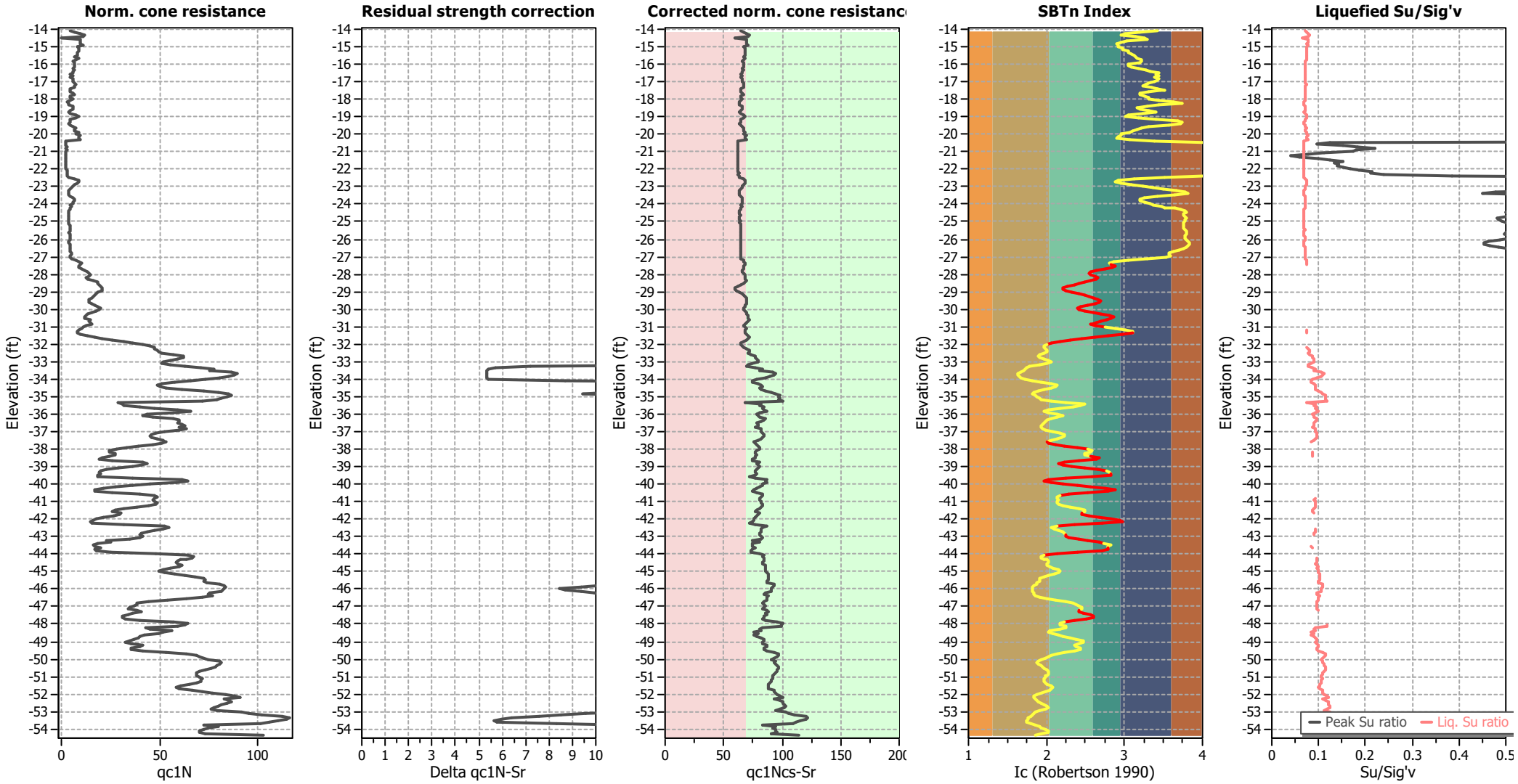




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-34.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-34.00 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

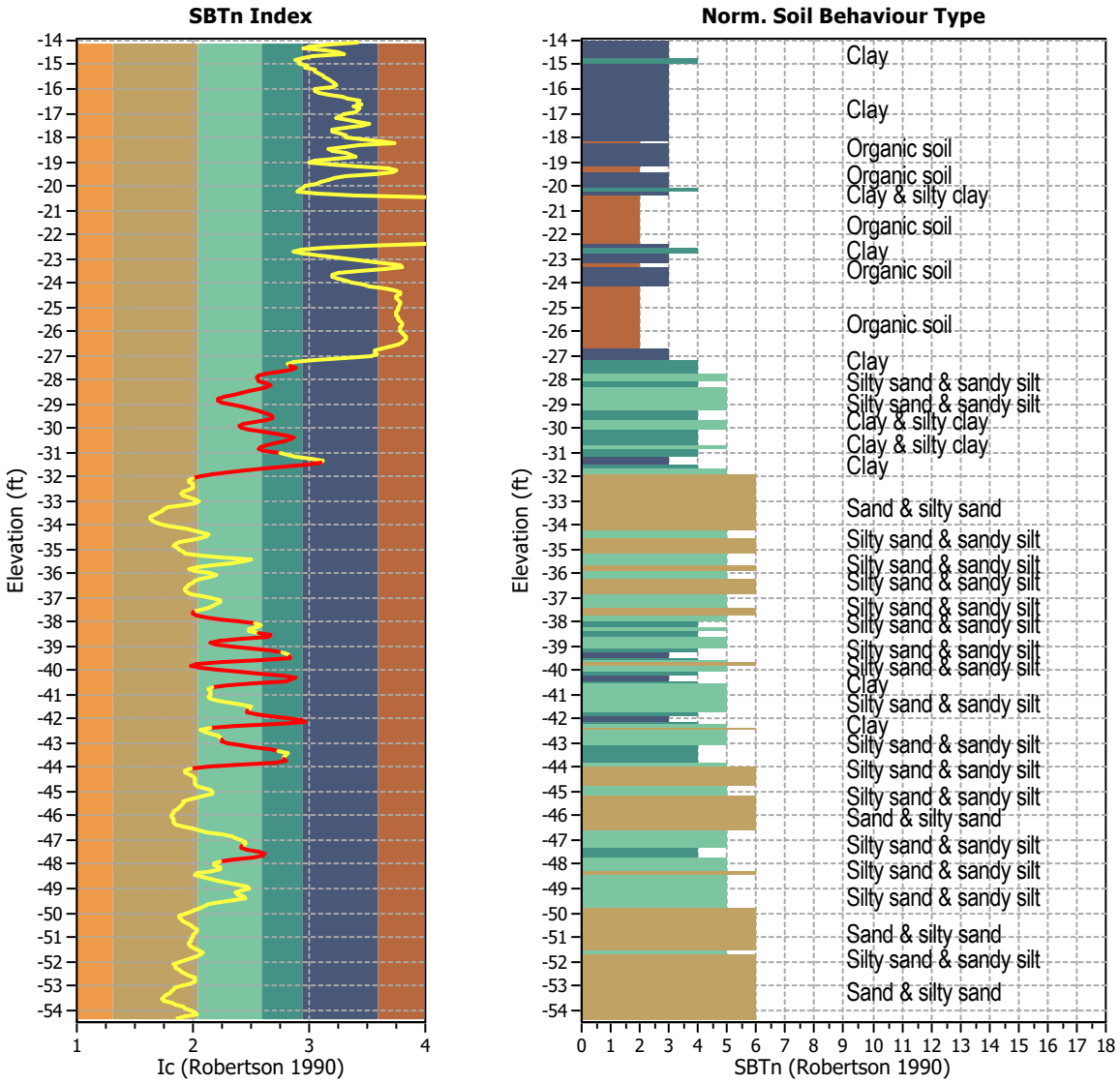
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-34.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-34.00 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

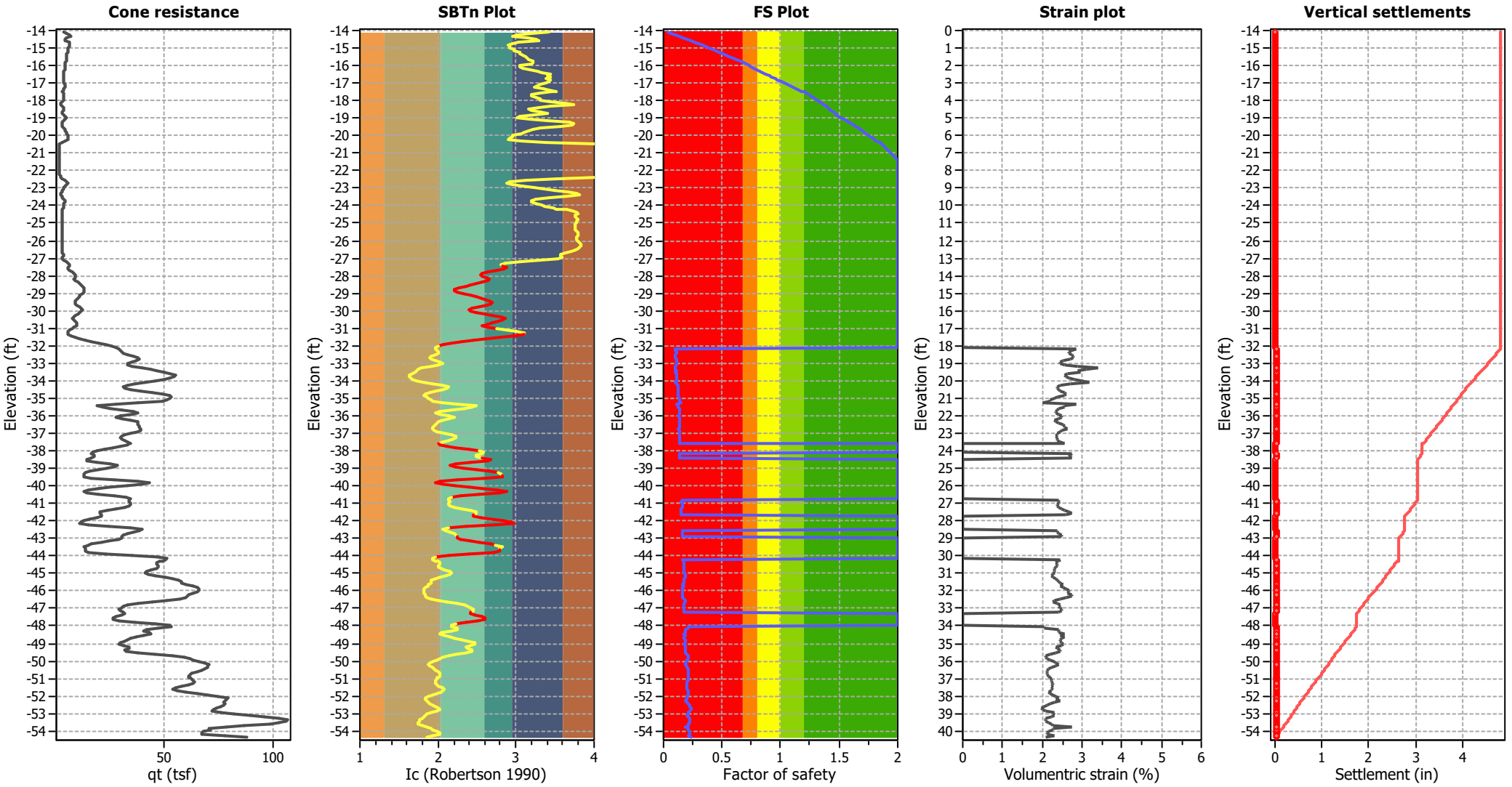
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	492
I_c maximum check value:	3.00	Total points excluded:	126
I_c change ratio value:	0.0250	Exclusion percentage:	25.61%
Minimum number of points in layer:	4	Number of layers detected:	21

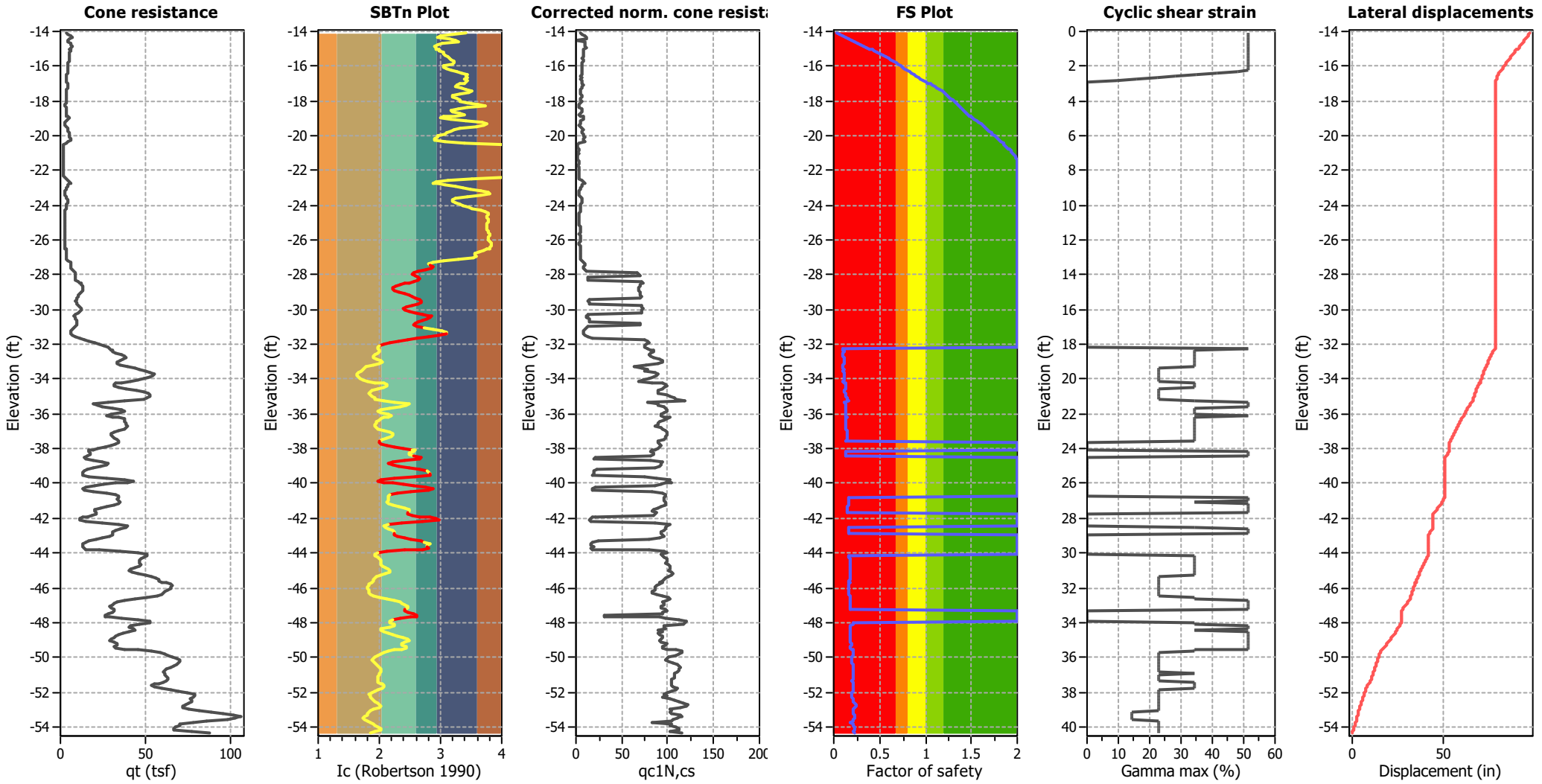
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

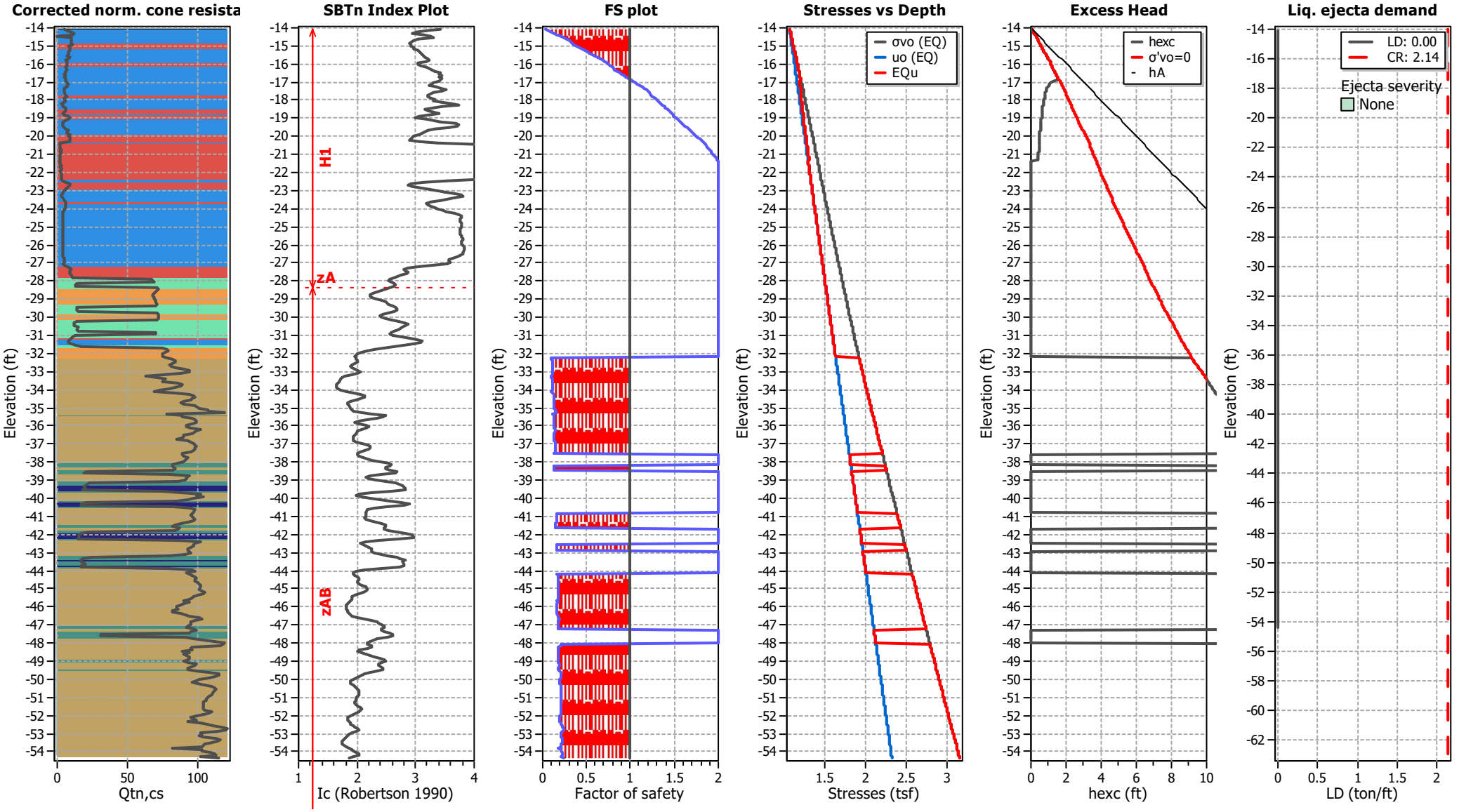
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

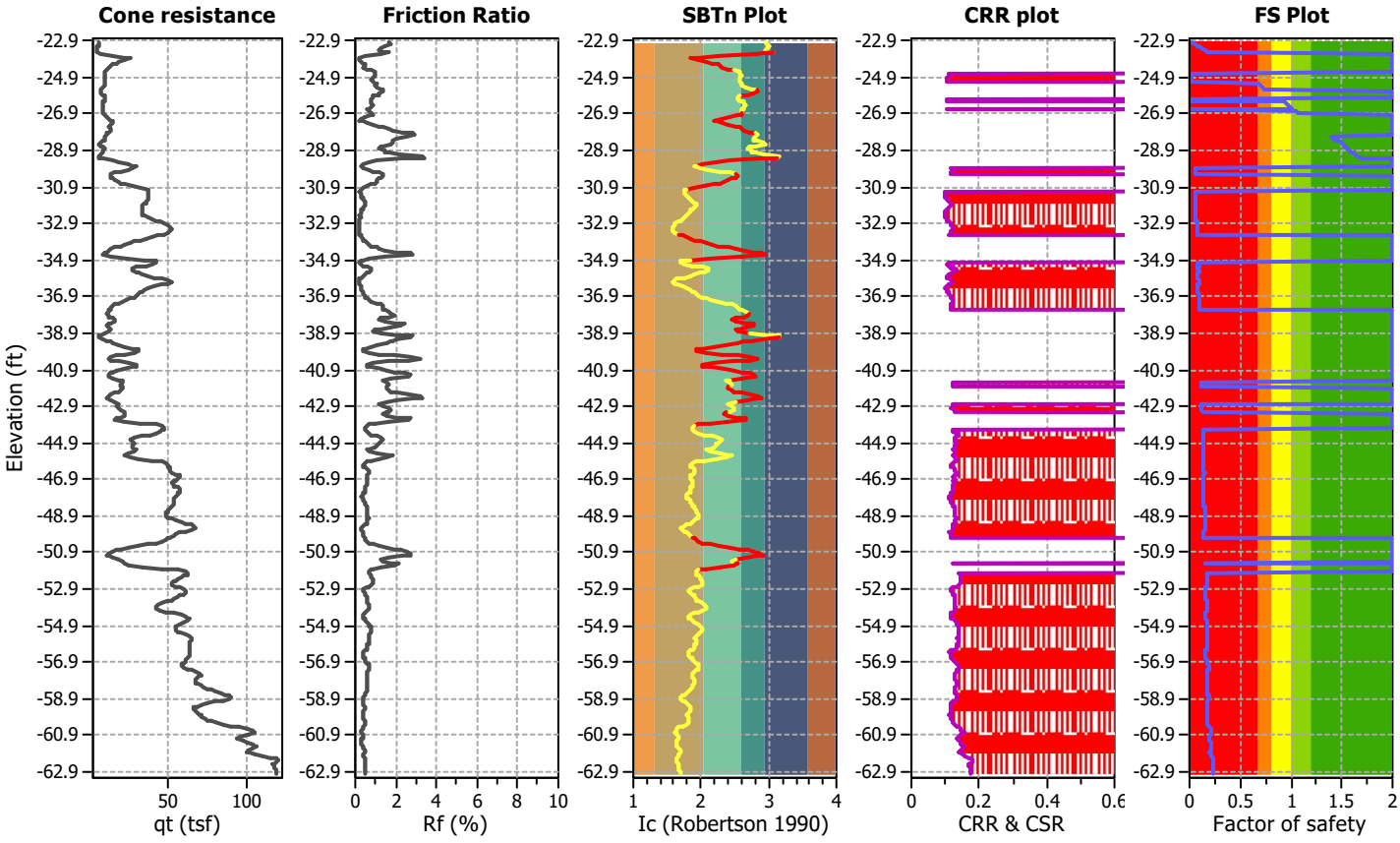
LIQUEFACTION ANALYSIS REPORT

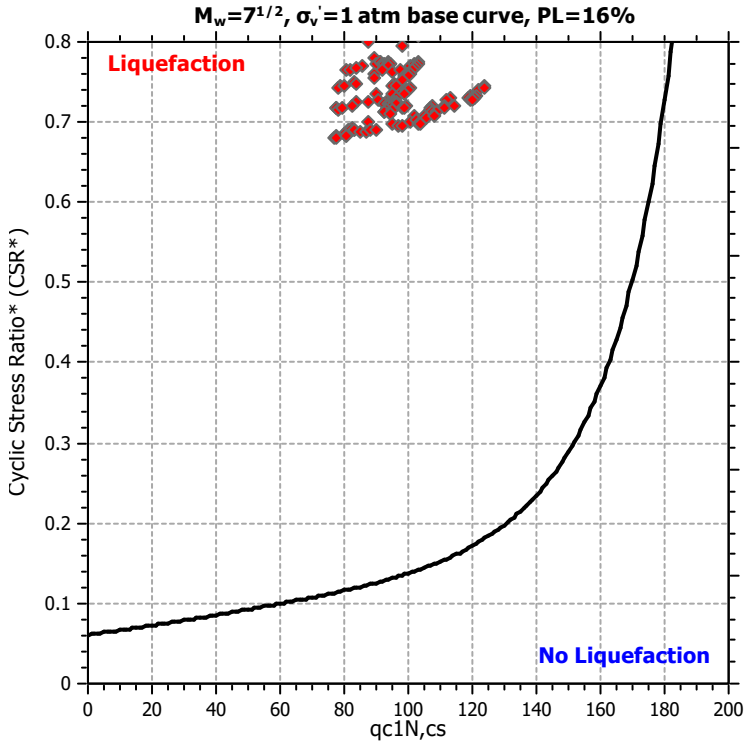
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

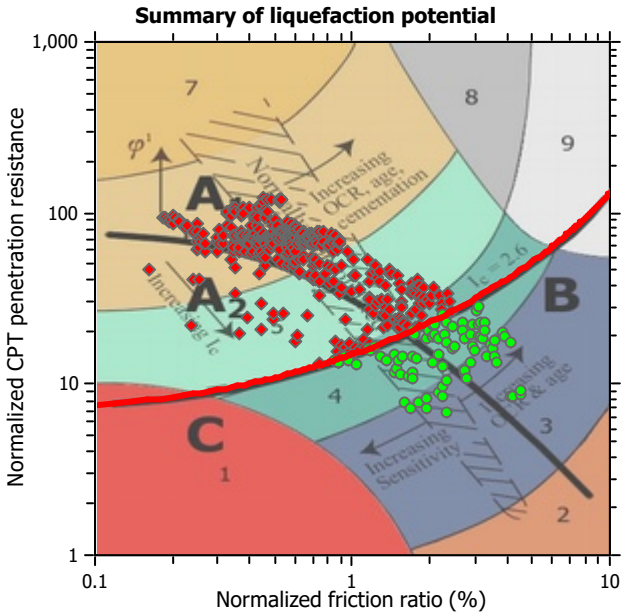
CPT file : CPTW-07

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-42.90 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-42.90 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

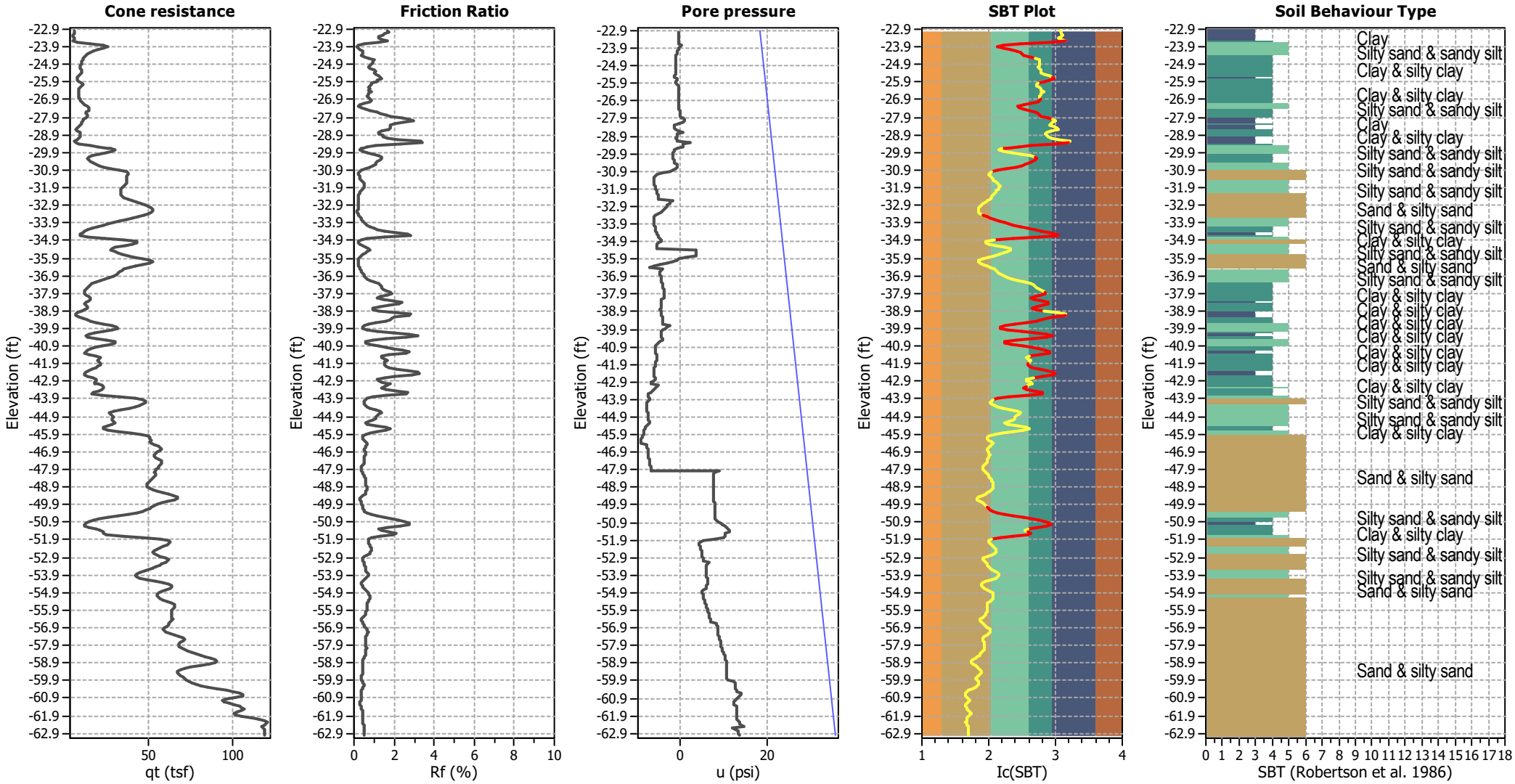






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



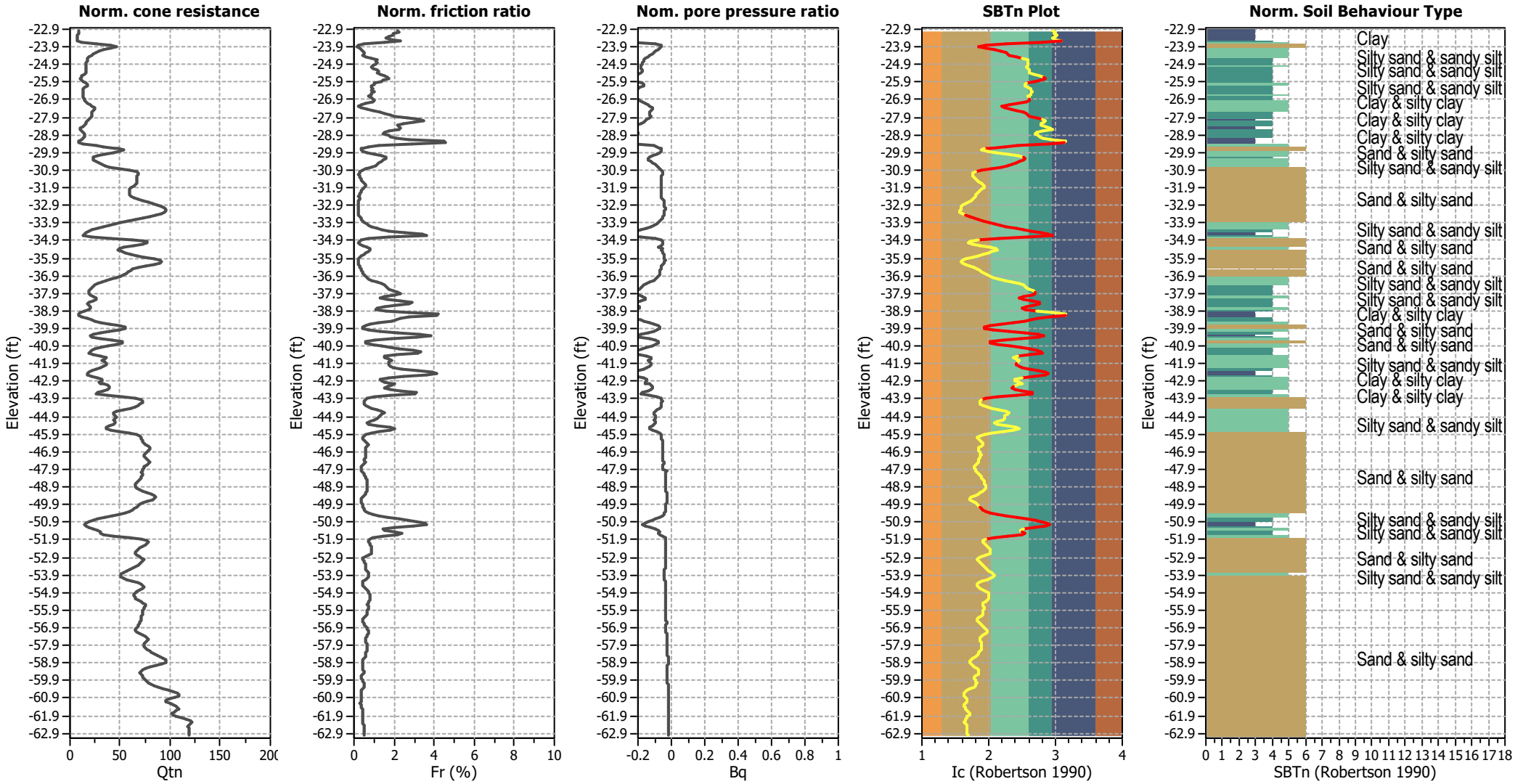
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-42.90 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-42.90 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



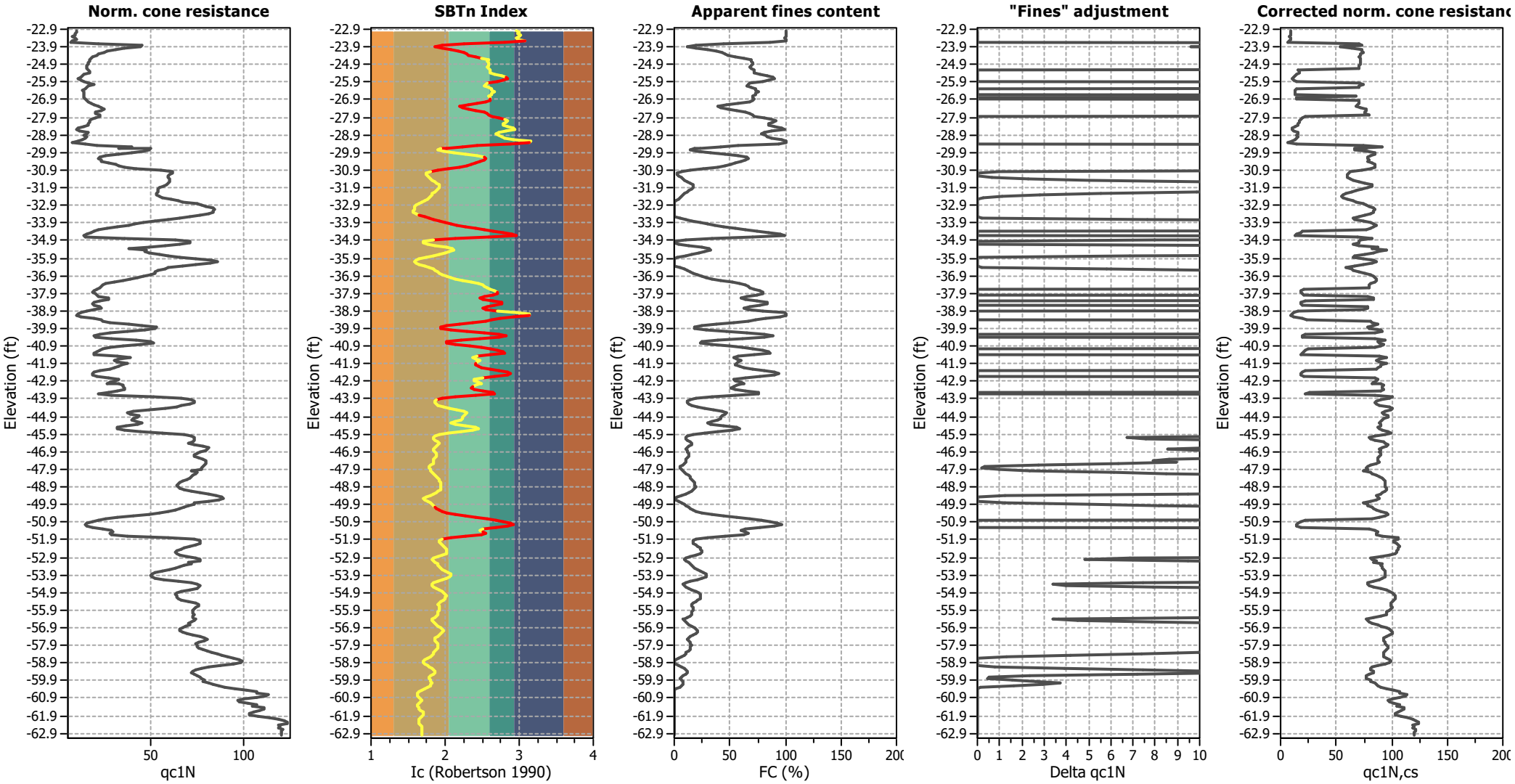
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-42.90 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-42.90 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

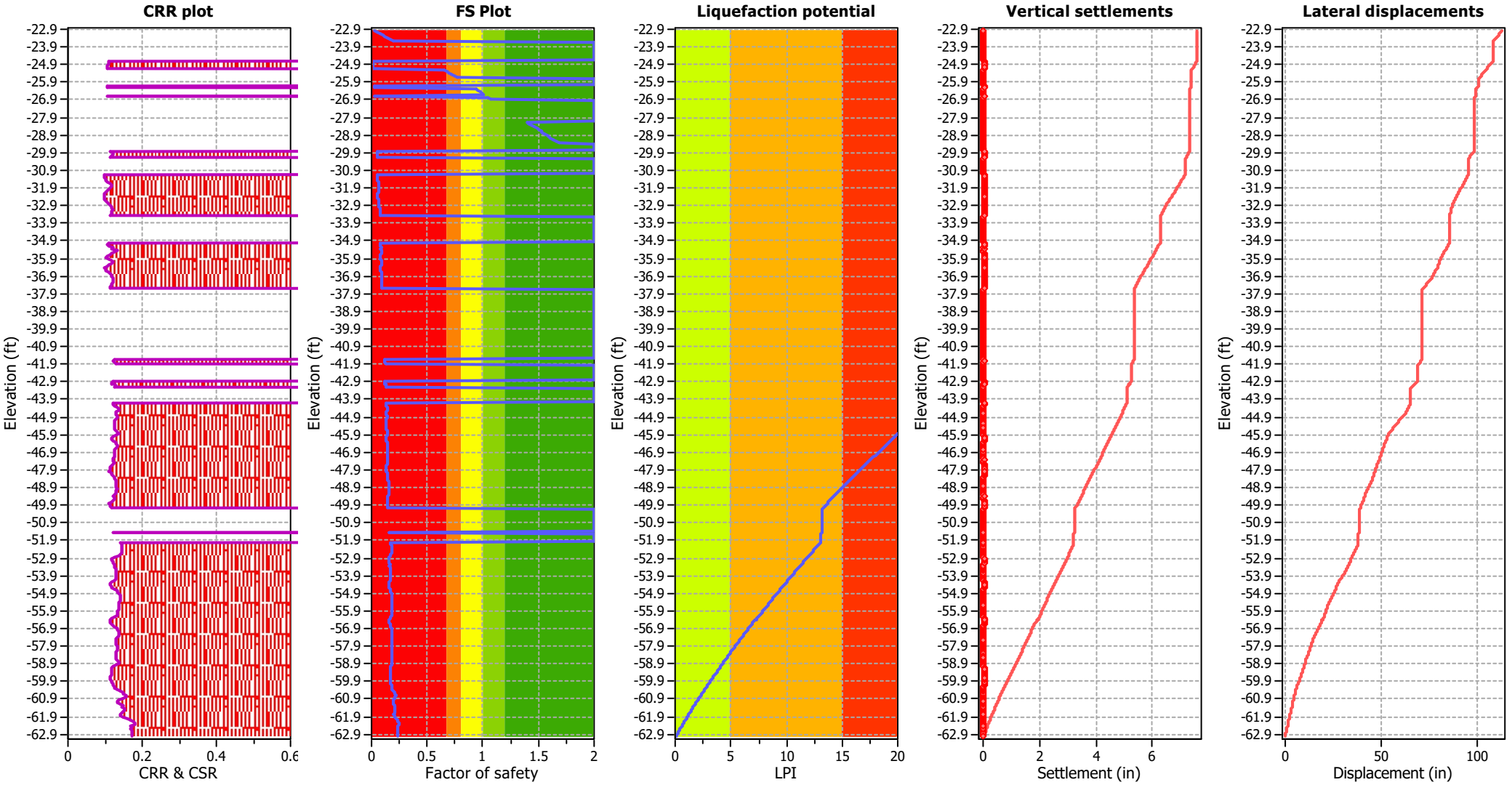
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-42.90 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-42.90 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-42.90 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-42.90 ft	Fill height:	N/A	Limit depth:	N/A

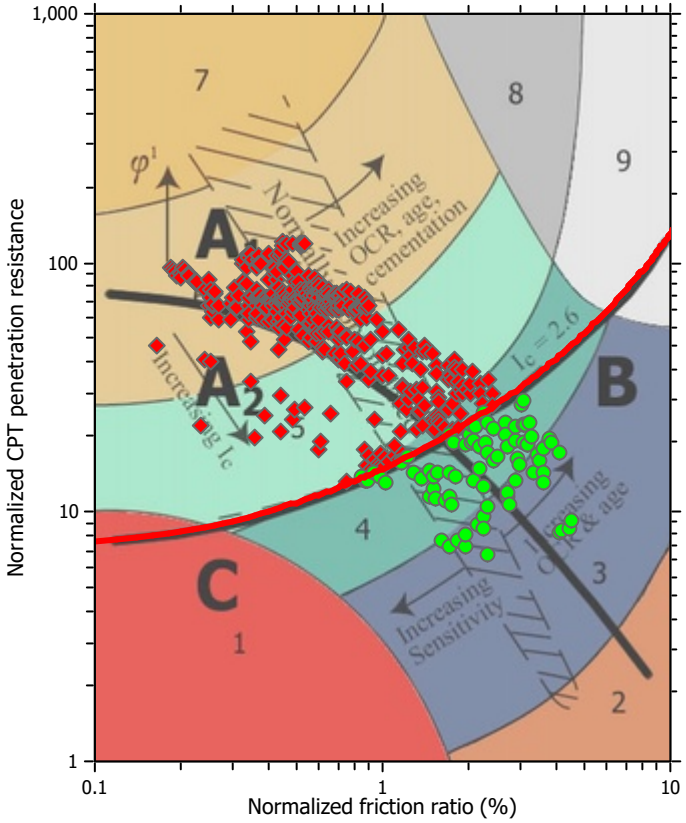
F.S. color scheme

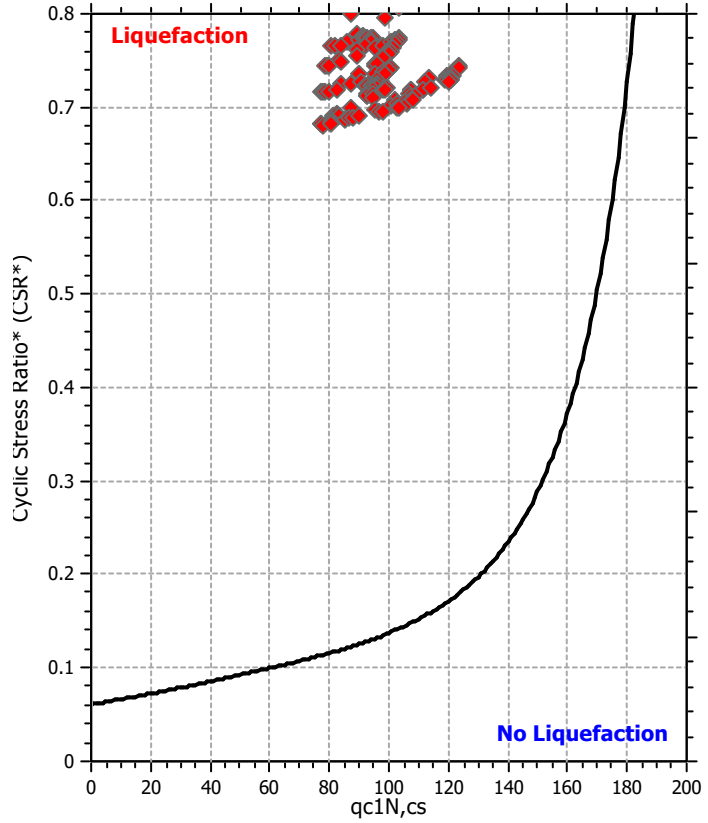
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

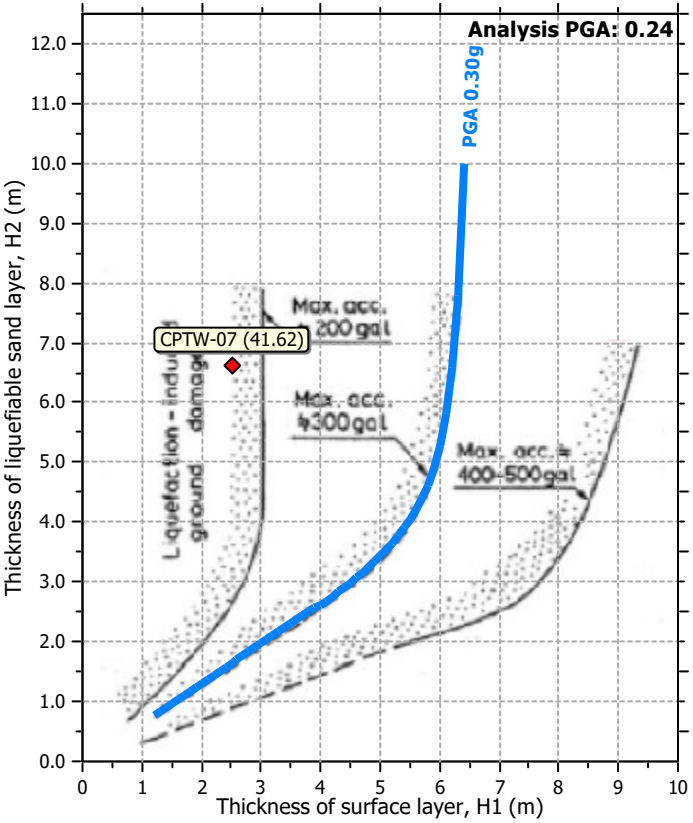
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



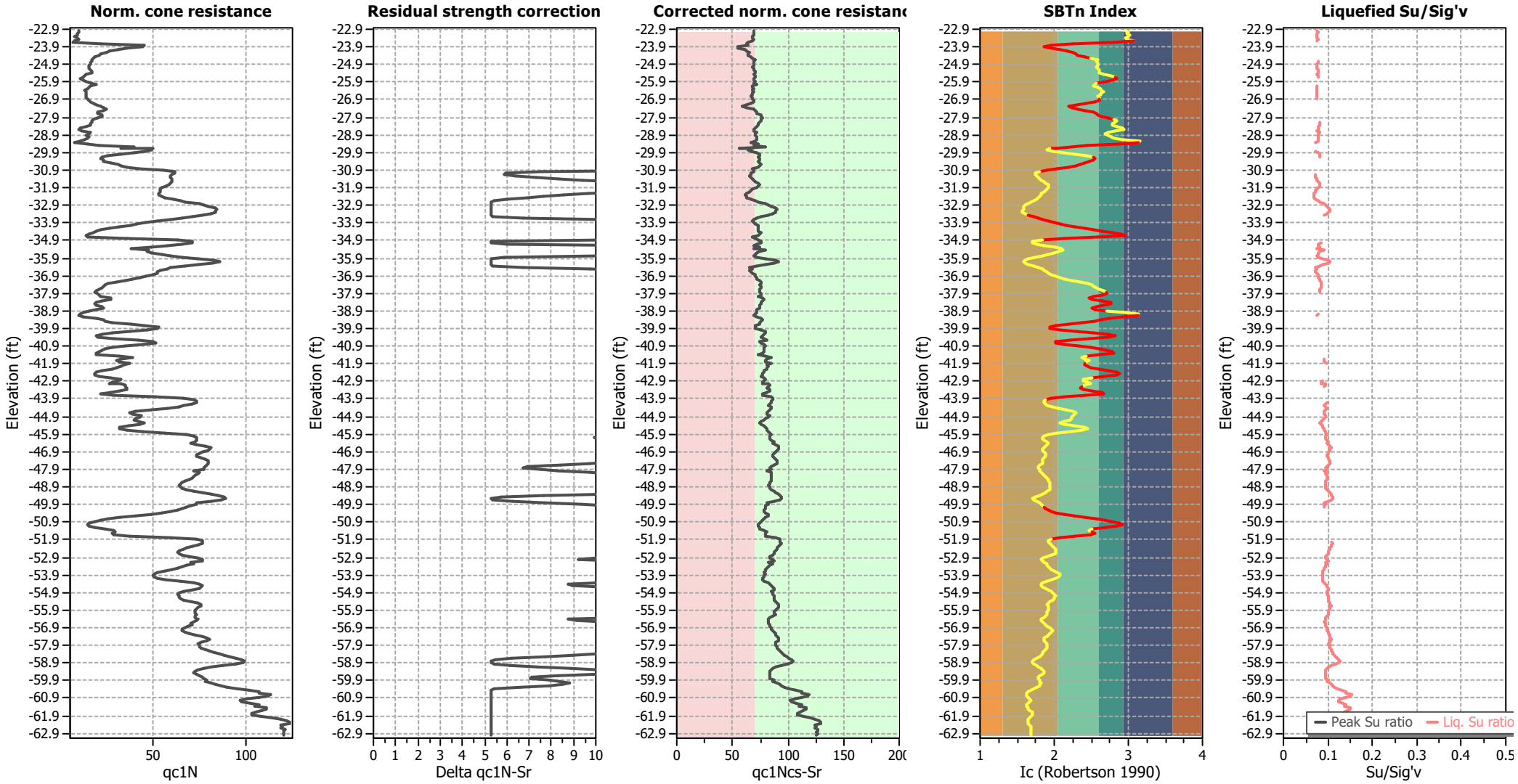




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-42.90 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-42.90 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

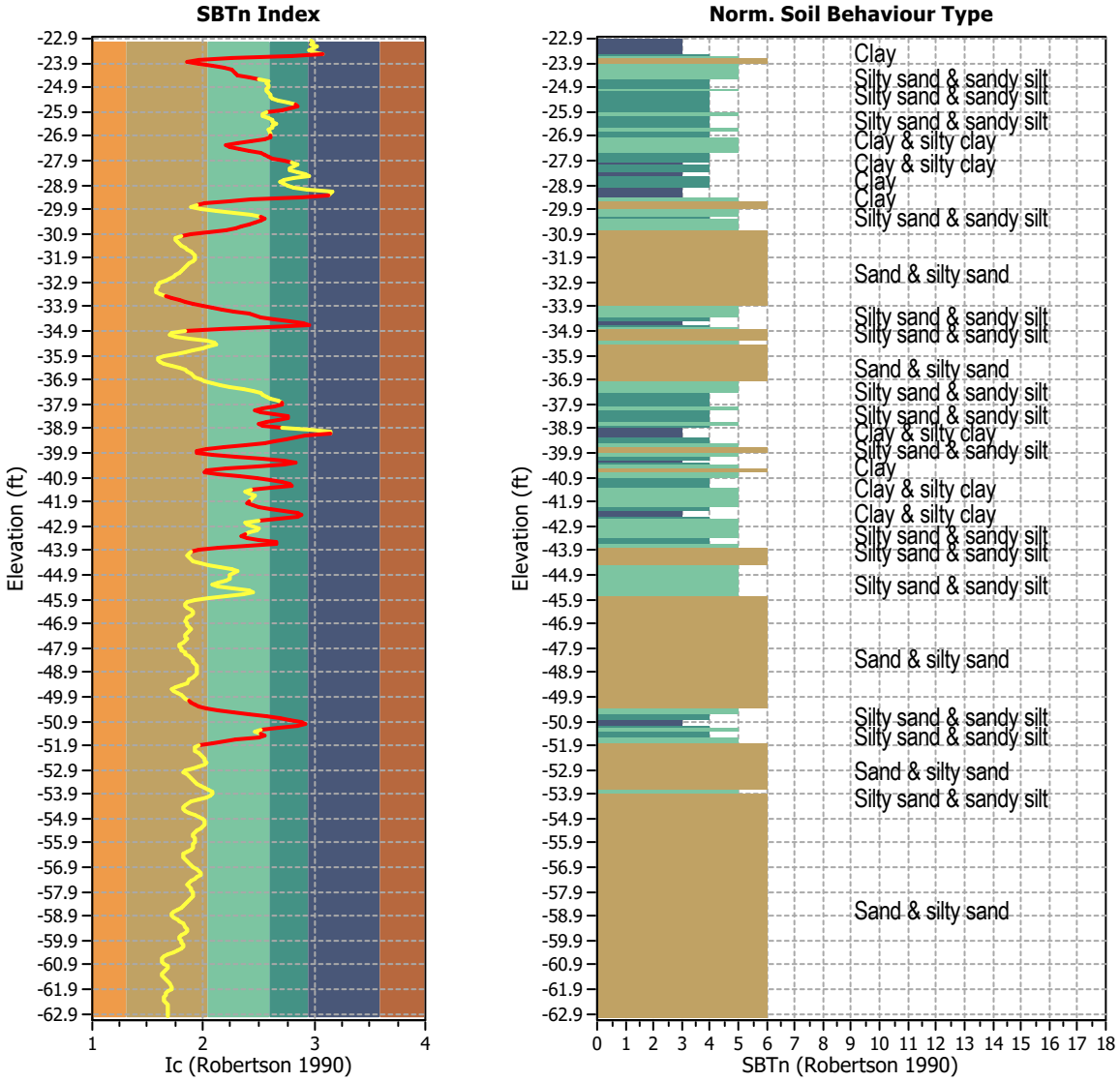
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-42.90 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-42.90 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

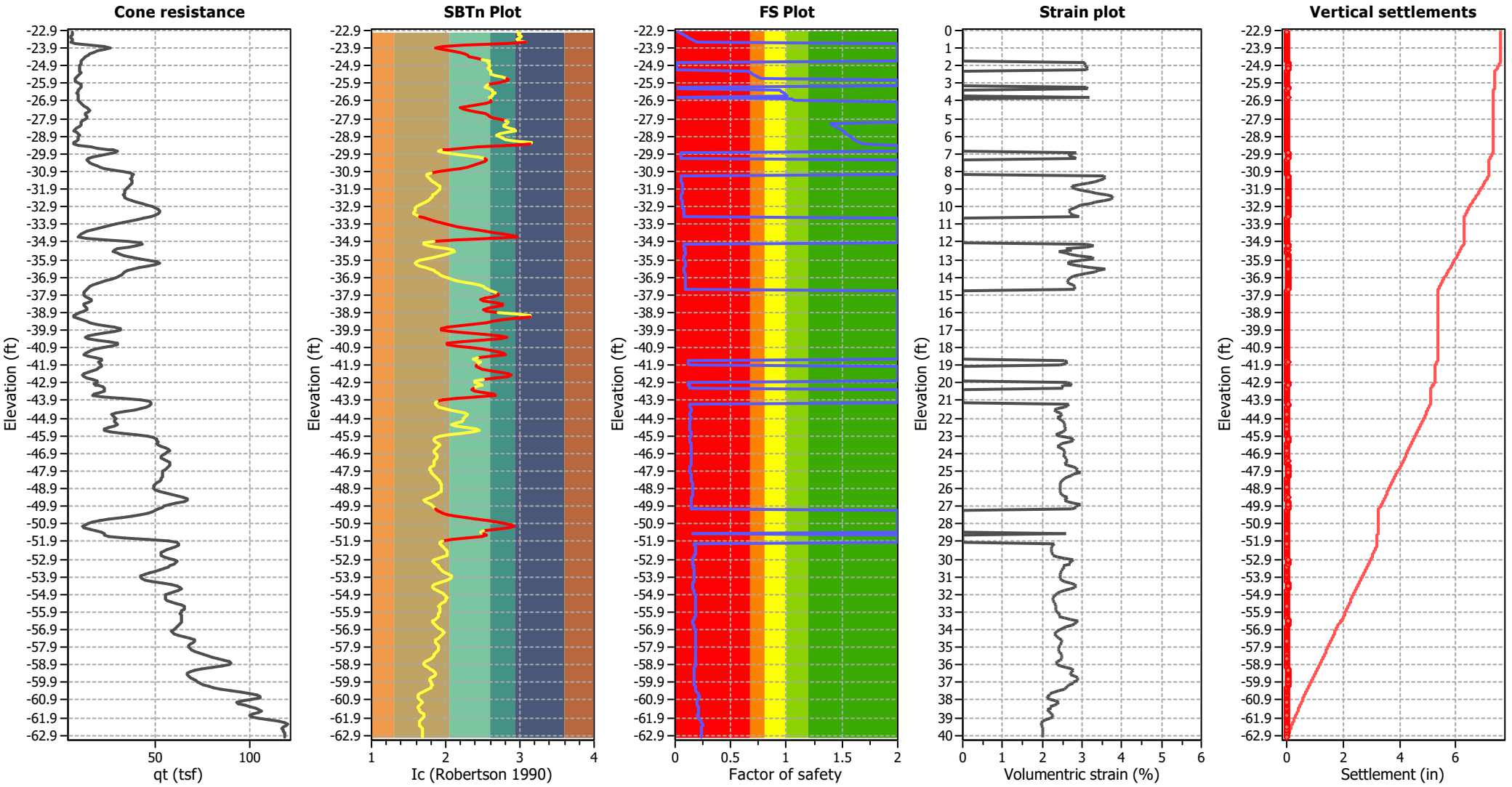
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	489
I_c maximum check value:	3.00	Total points excluded:	162
I_c change ratio value:	0.0250	Exclusion percentage:	33.13%
Minimum number of points in layer:	4	Number of layers detected:	25

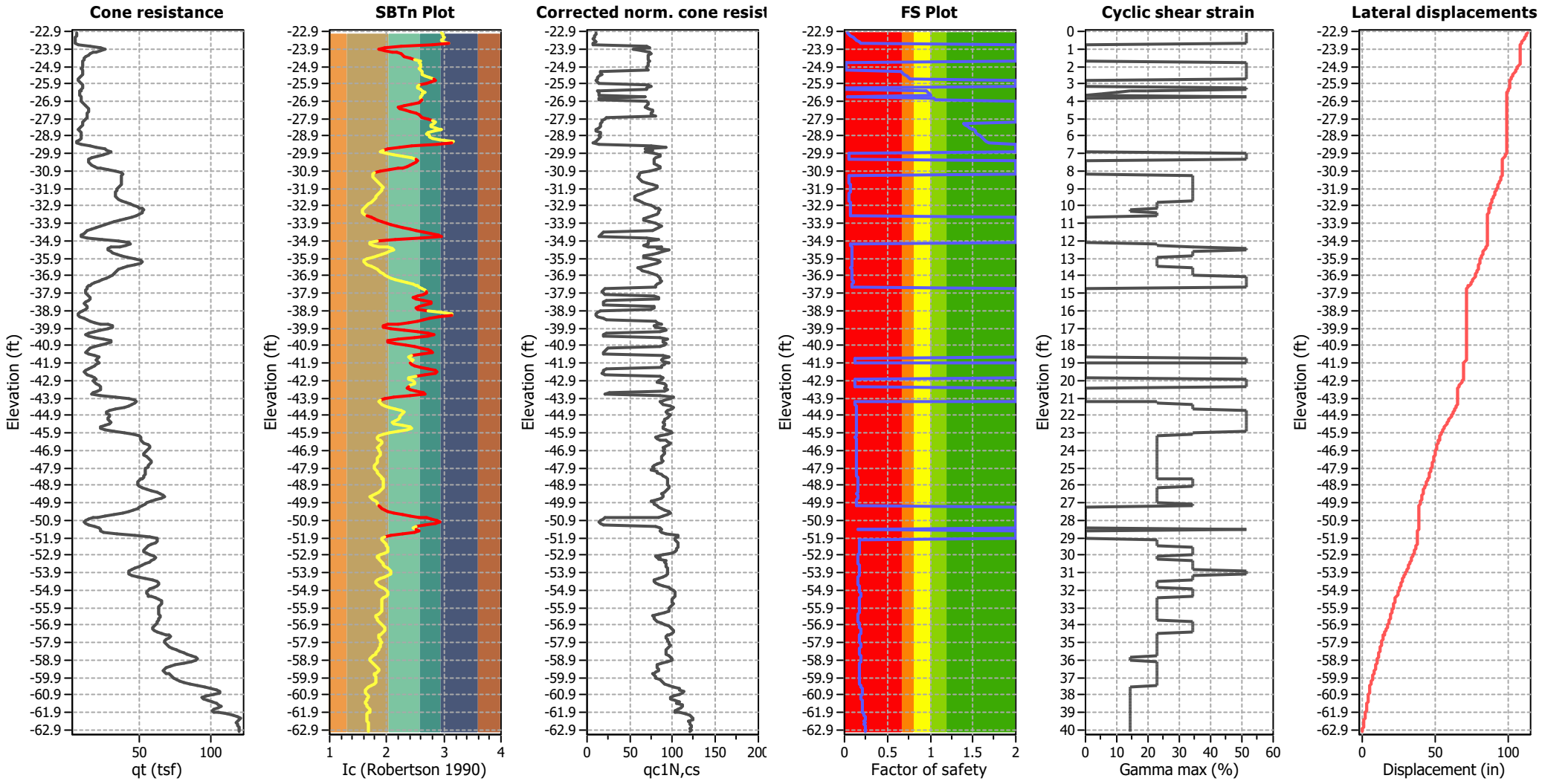
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

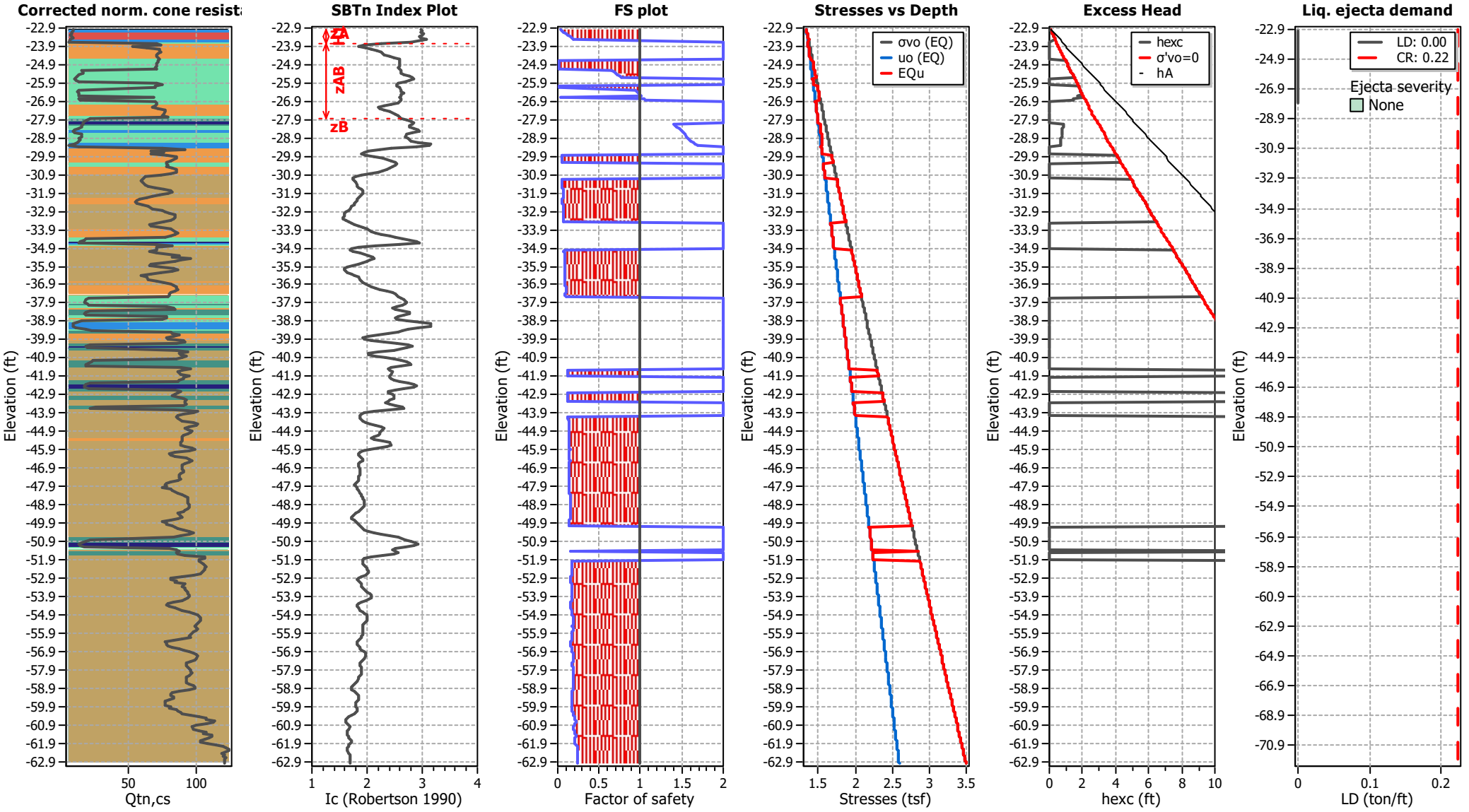
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

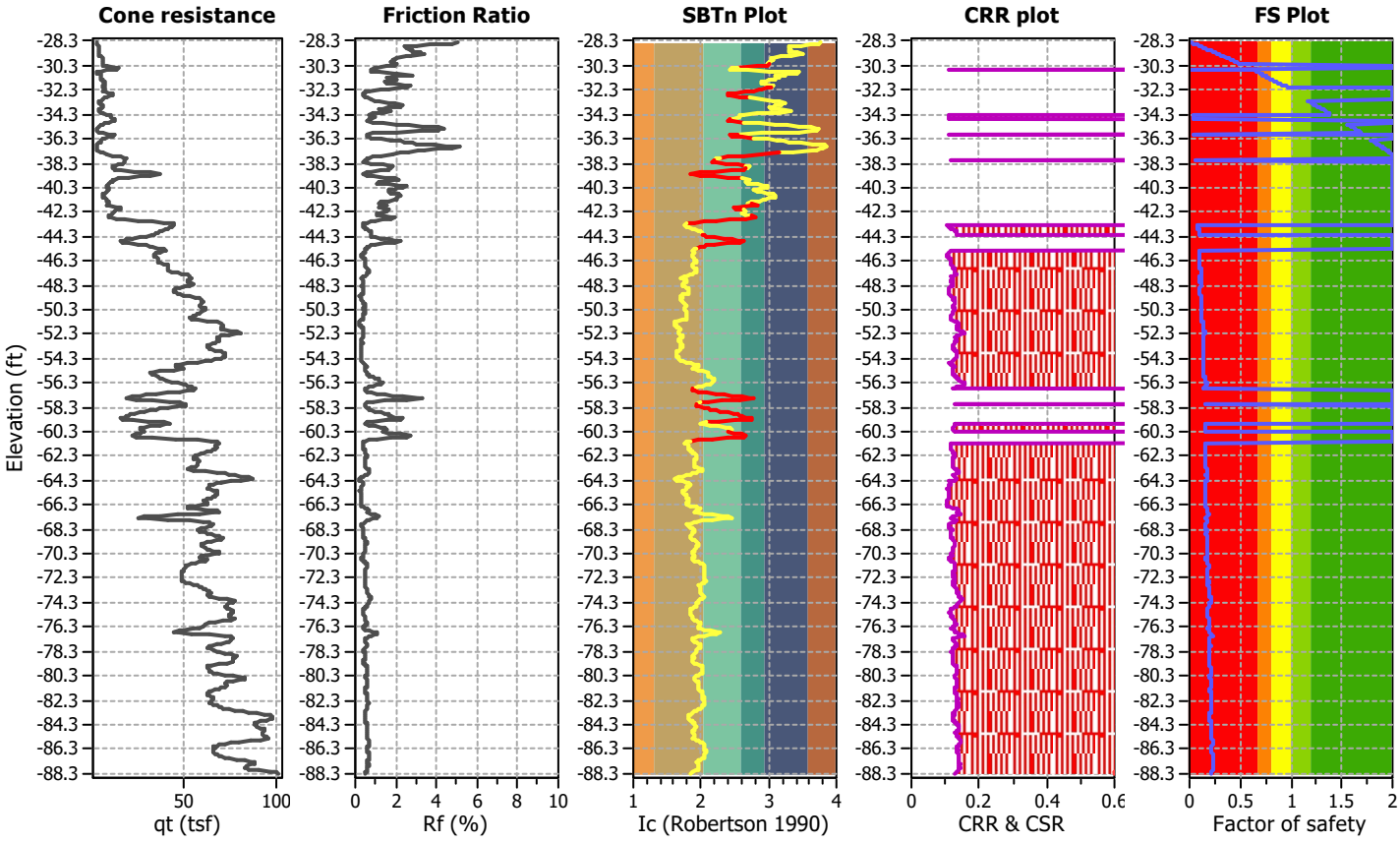
LIQUEFACTION ANALYSIS REPORT

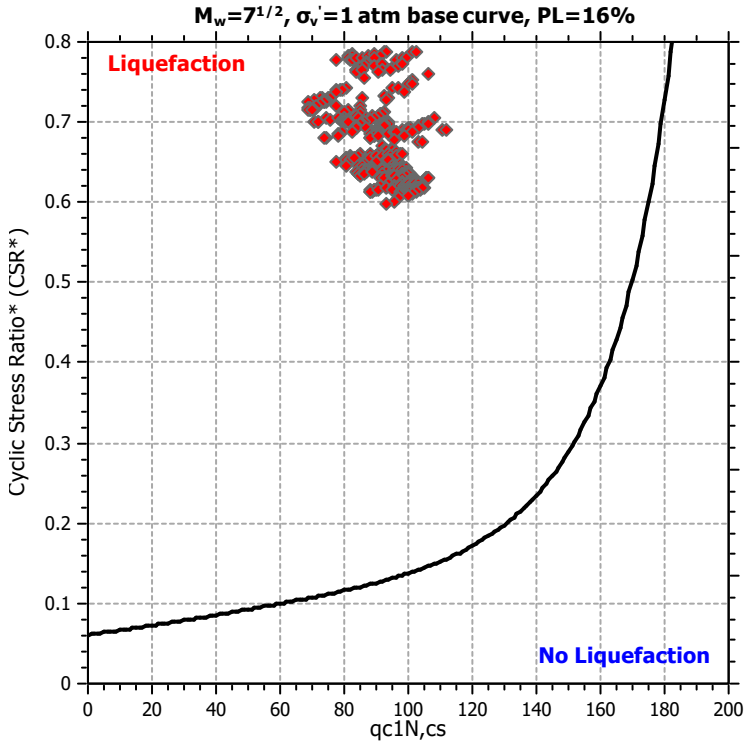
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

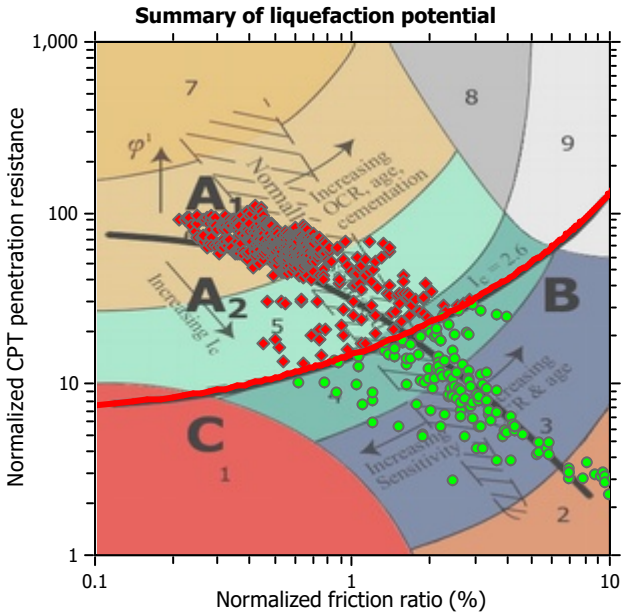
CPT file : sCPTW-08

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-48.30 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-48.30 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

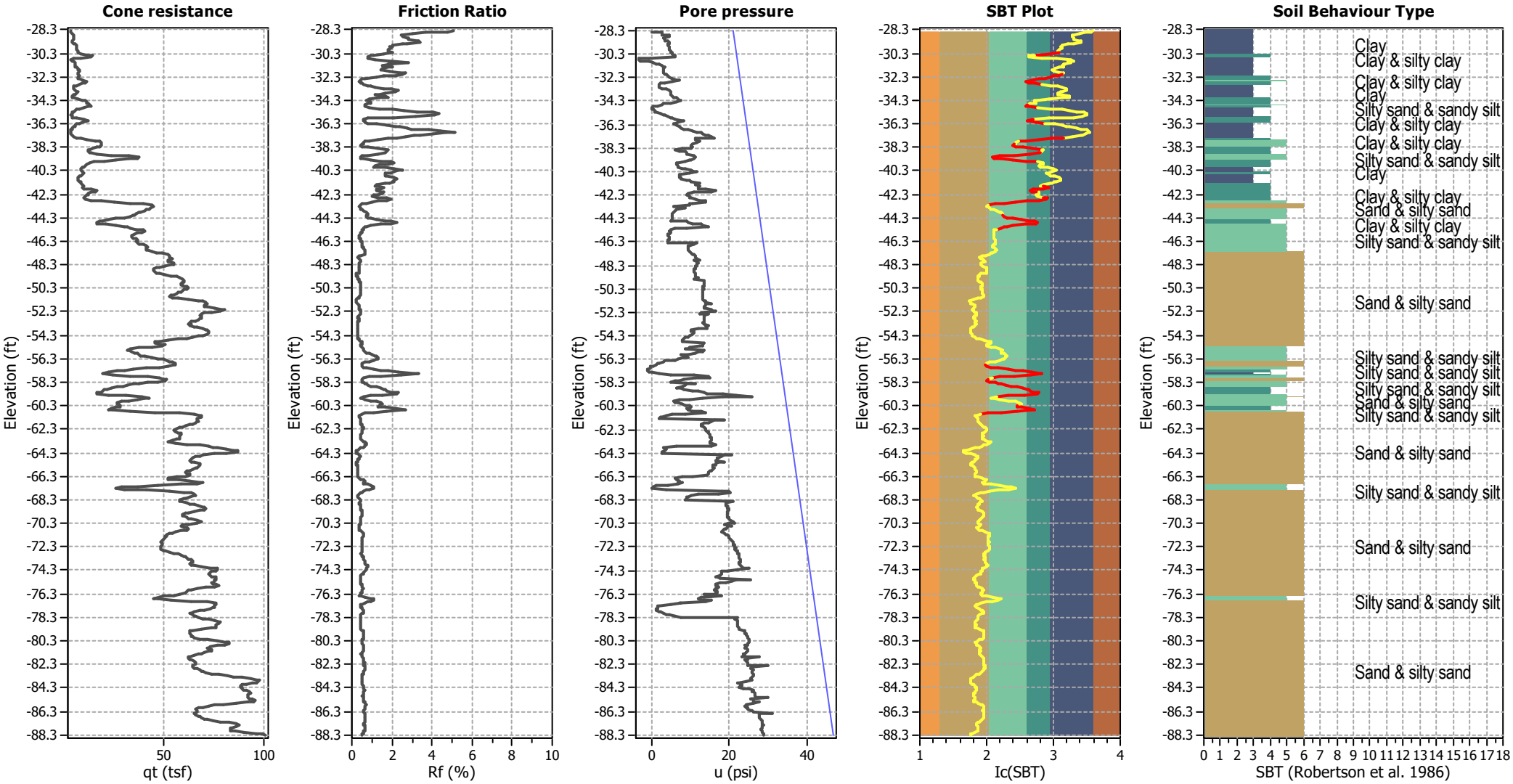






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



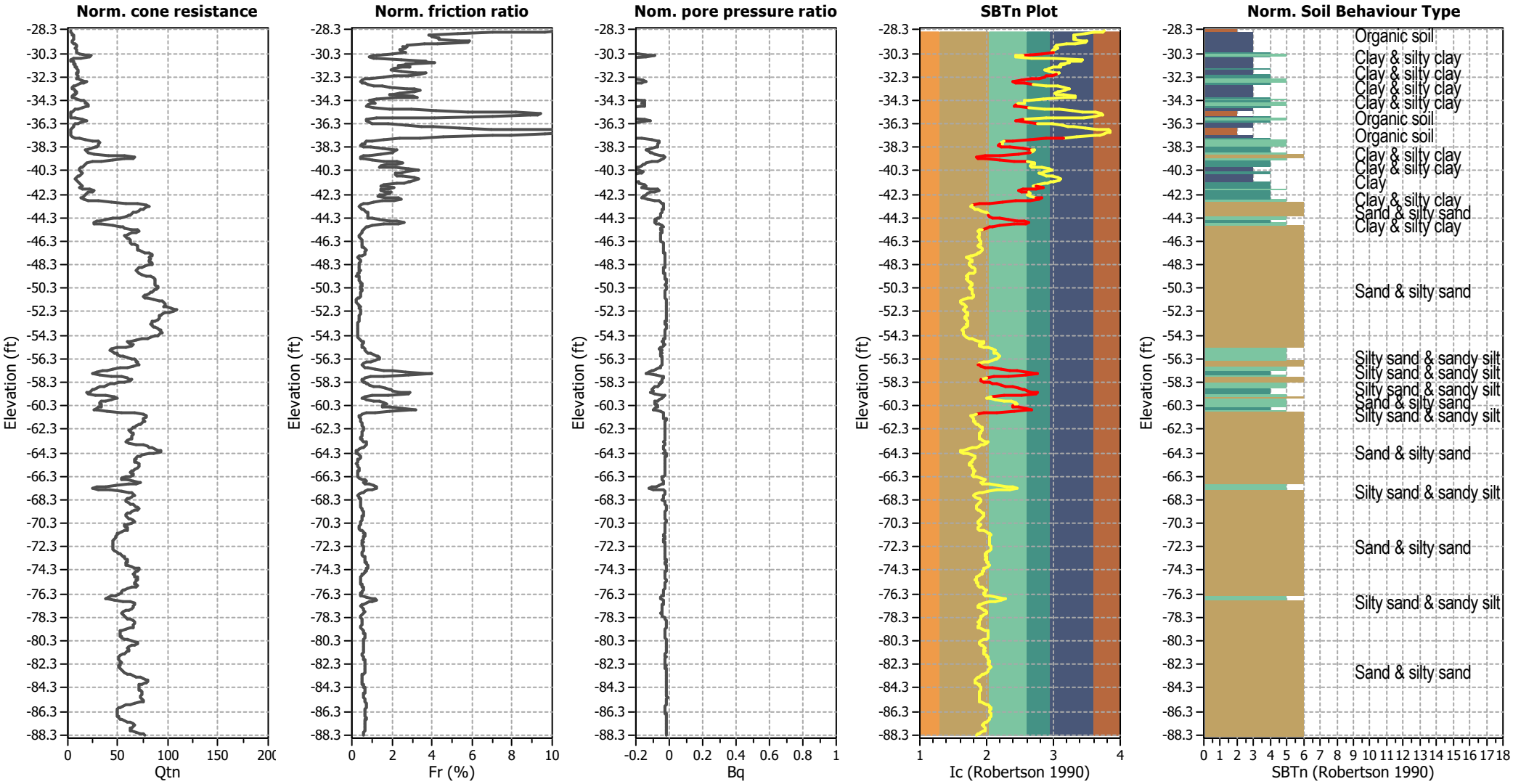
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-48.30 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-48.30 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



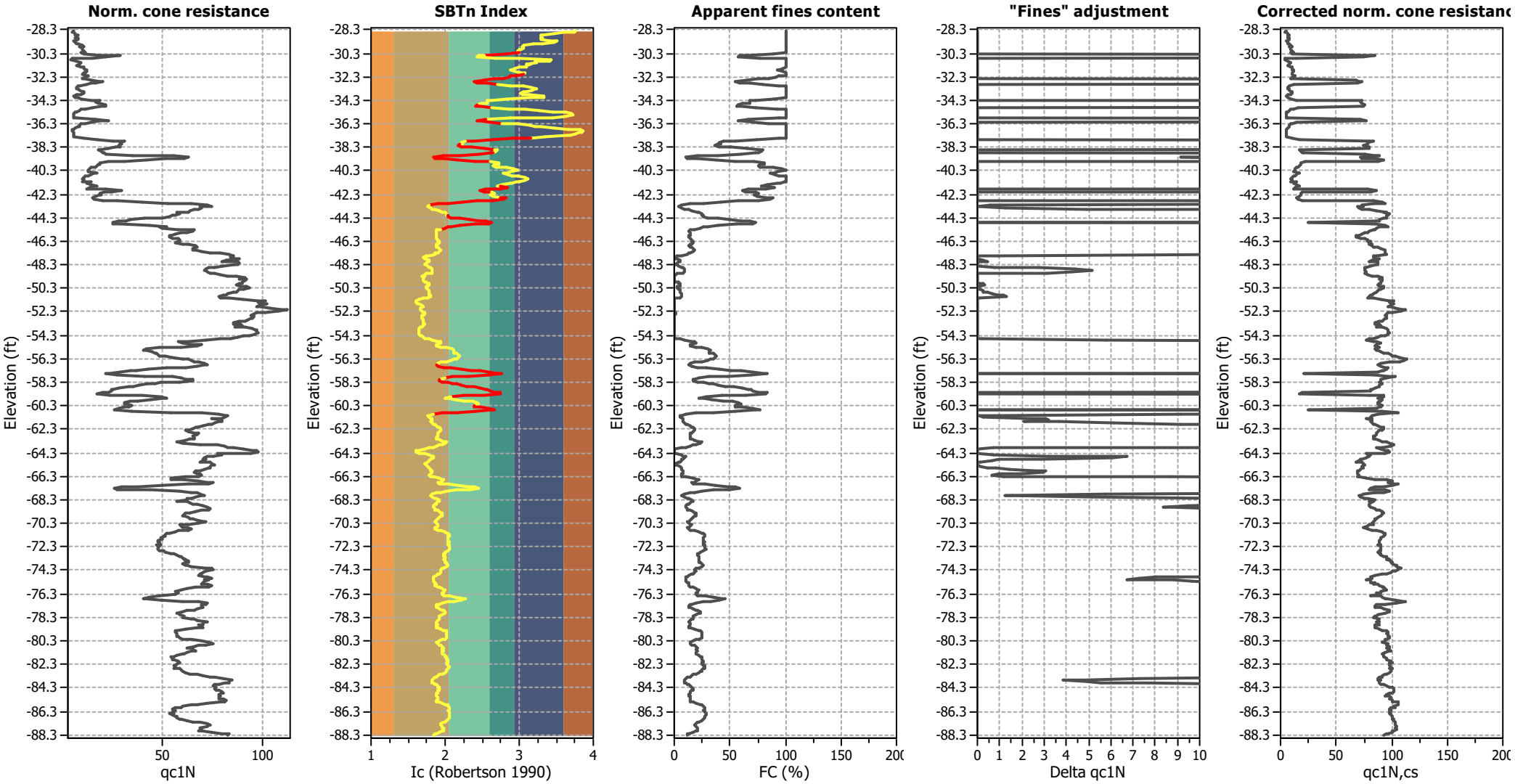
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-48.30 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-48.30 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

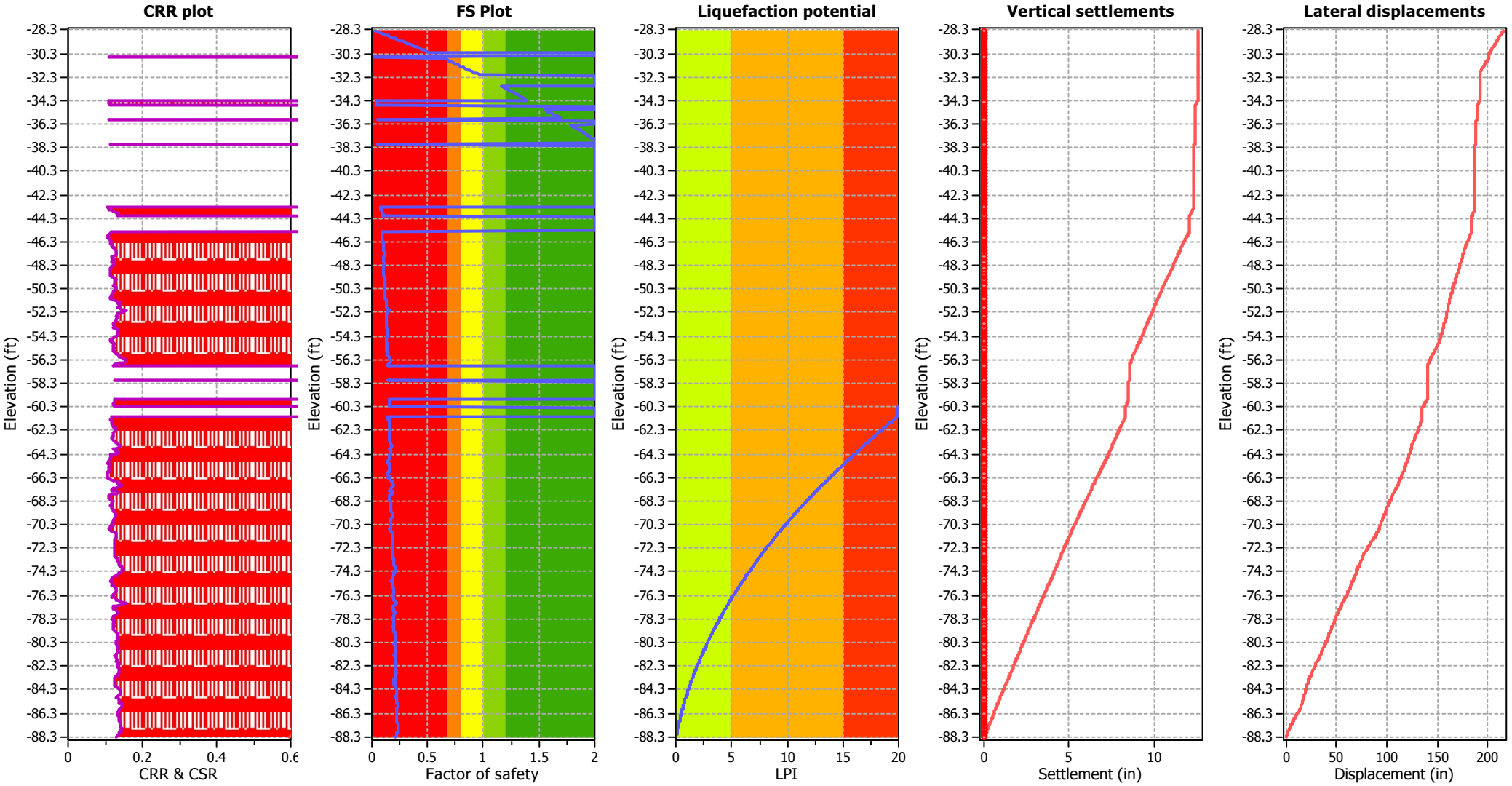
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-48.30 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-48.30 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-48.30 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-48.30 ft	Fill height:	N/A	Limit depth:	N/A

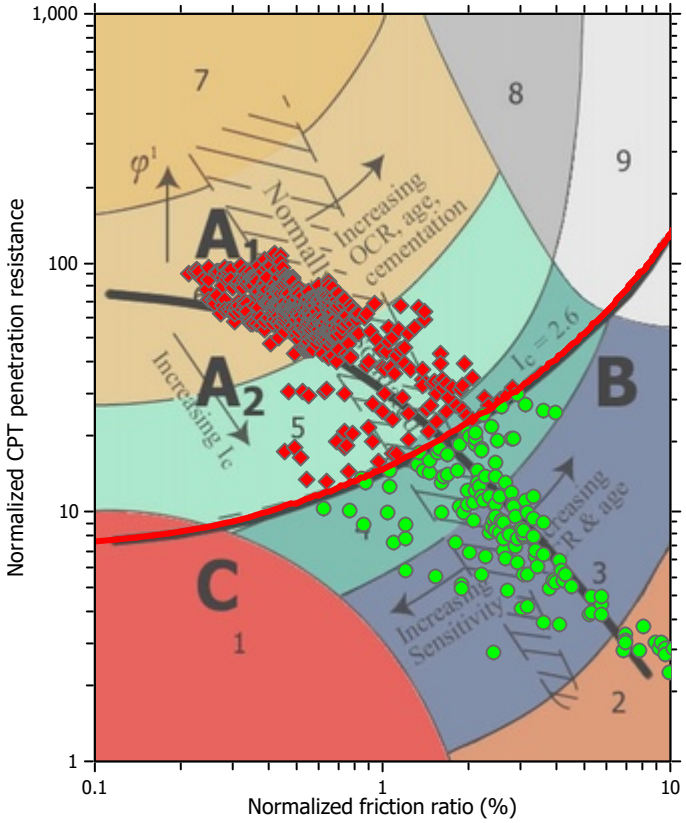
F.S. color scheme

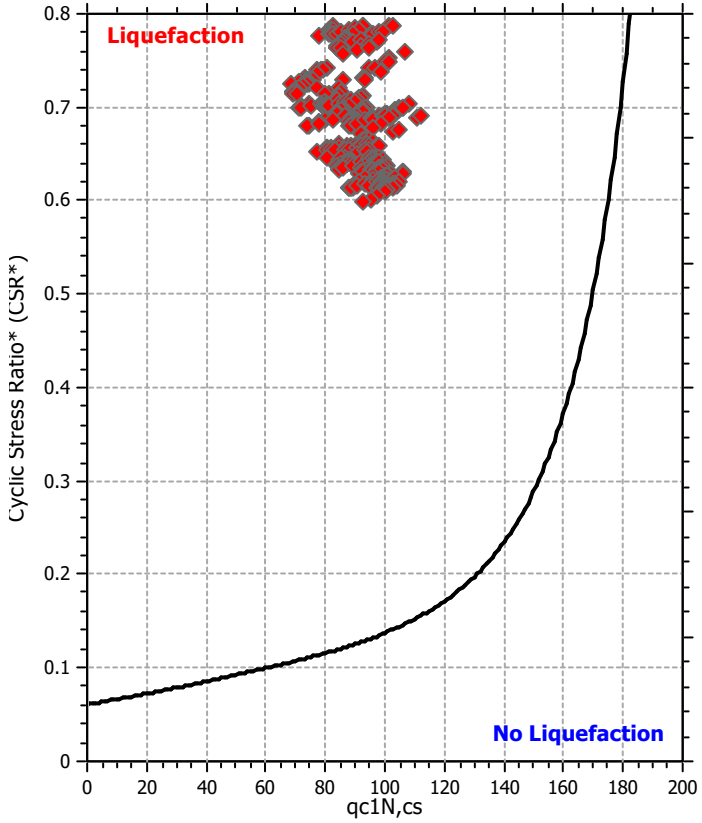
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

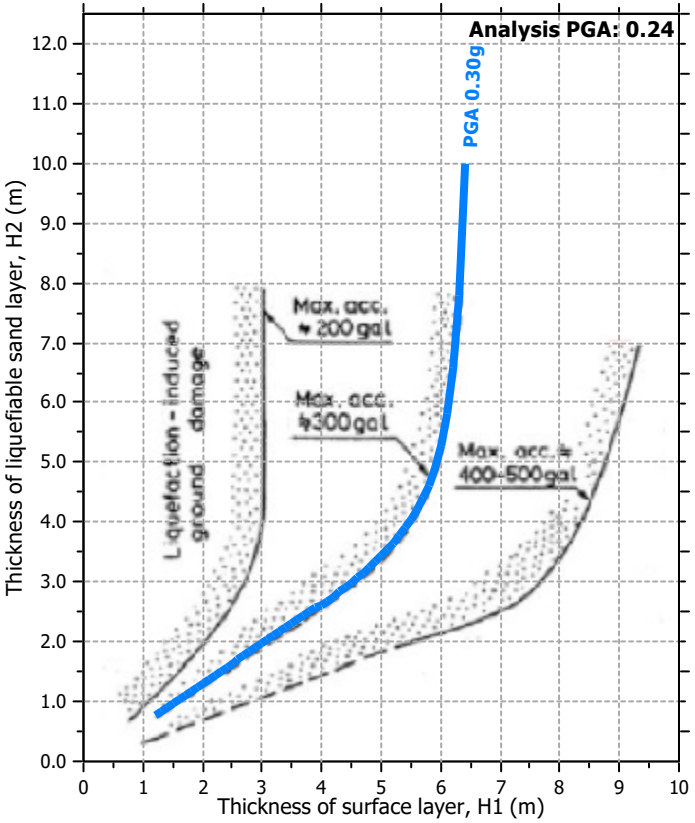
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



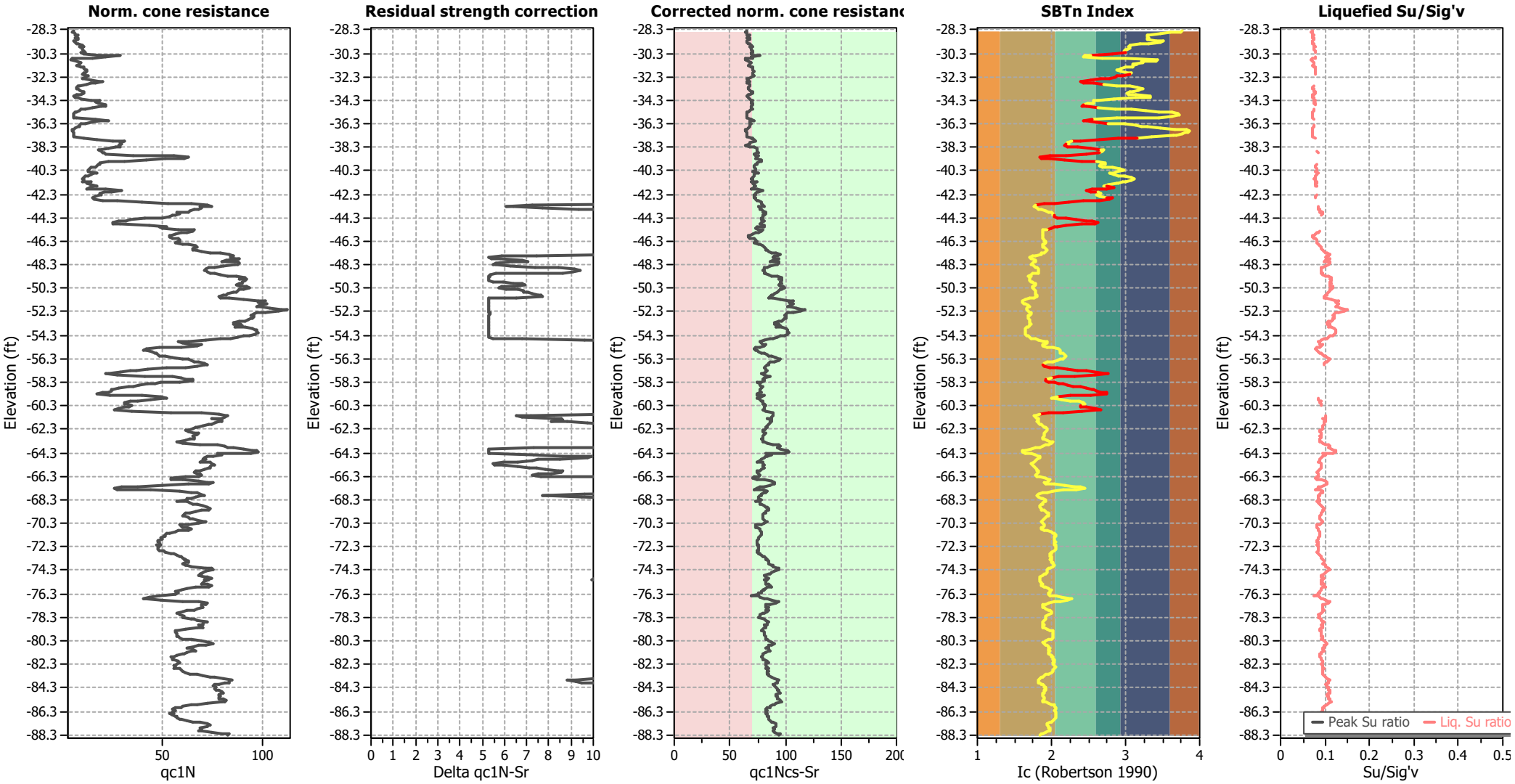




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-48.30 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-48.30 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

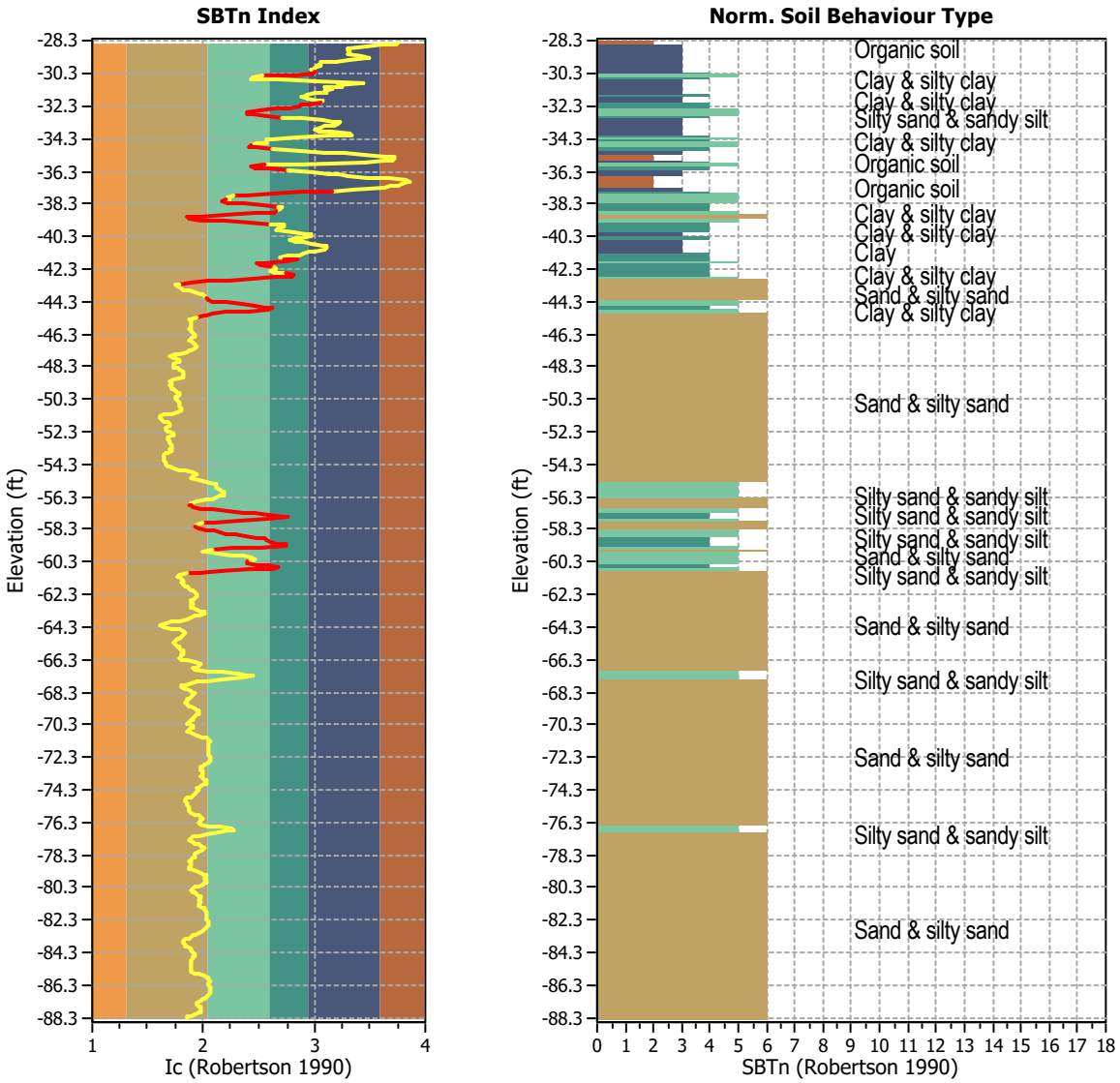
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-48.30 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-48.30 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

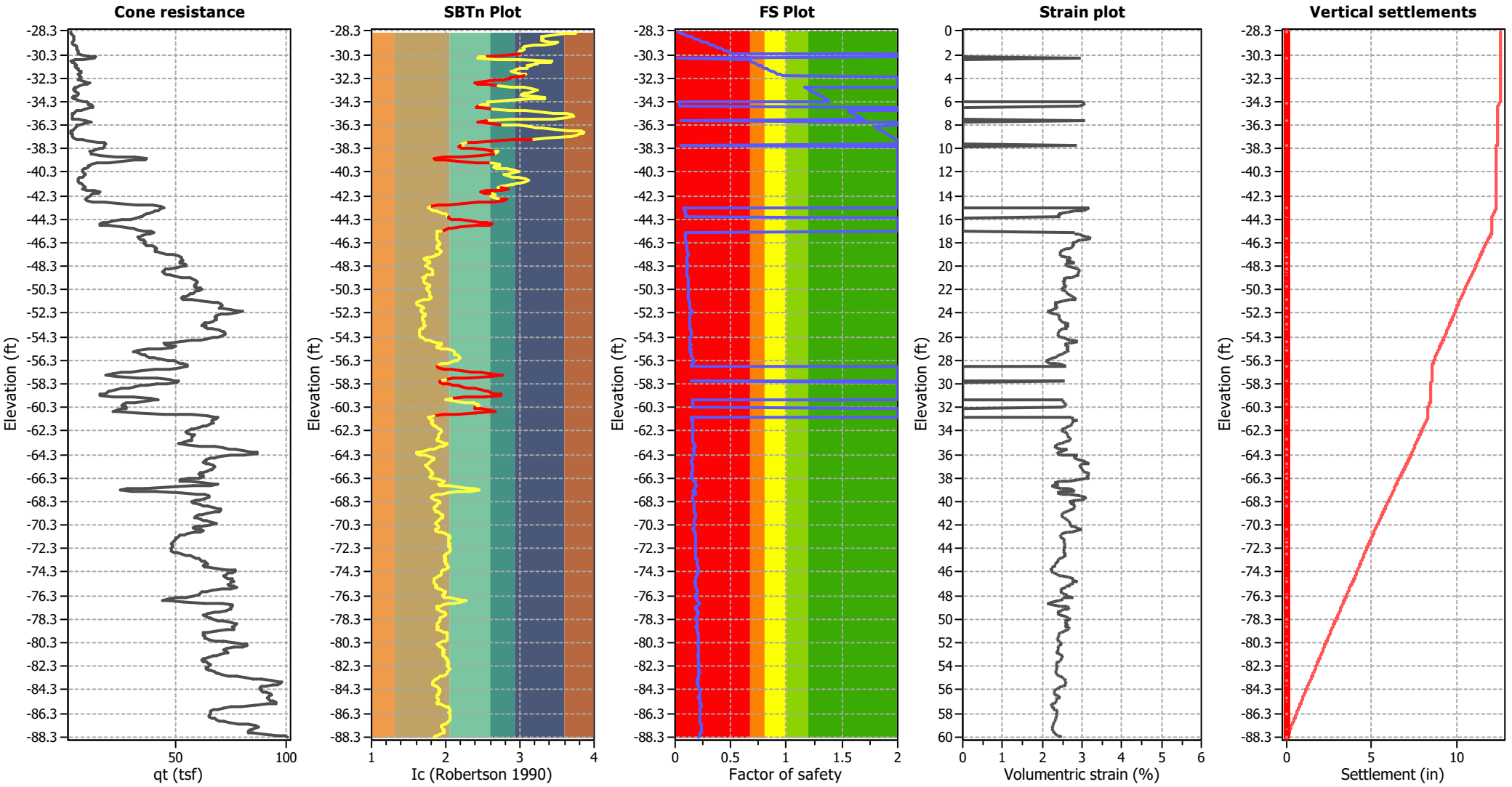
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	732
I_c maximum check value:	3.00	Total points excluded:	126
I_c change ratio value:	0.0250	Exclusion percentage:	17.21%
Minimum number of points in layer:	4	Number of layers detected:	20

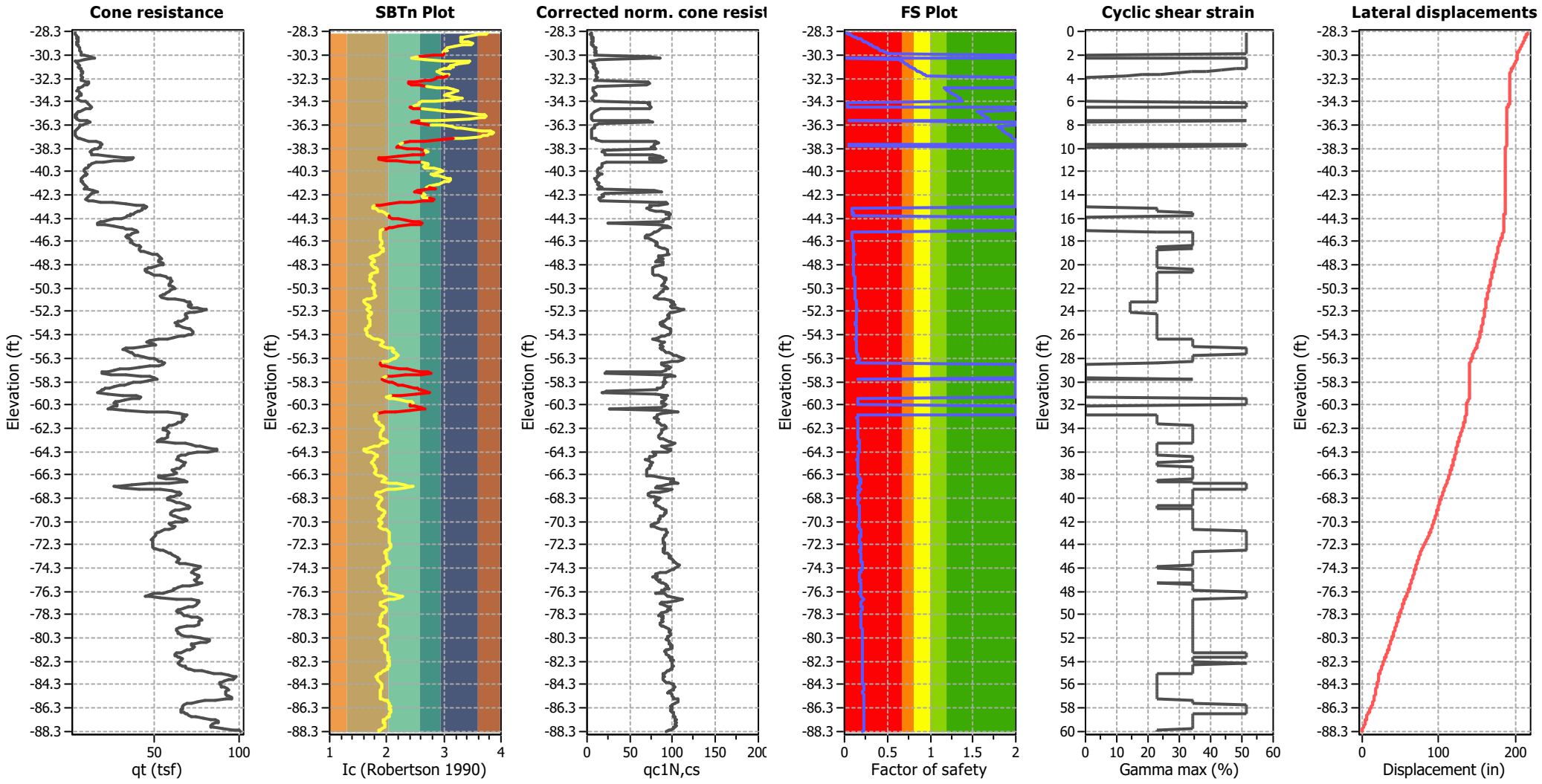
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

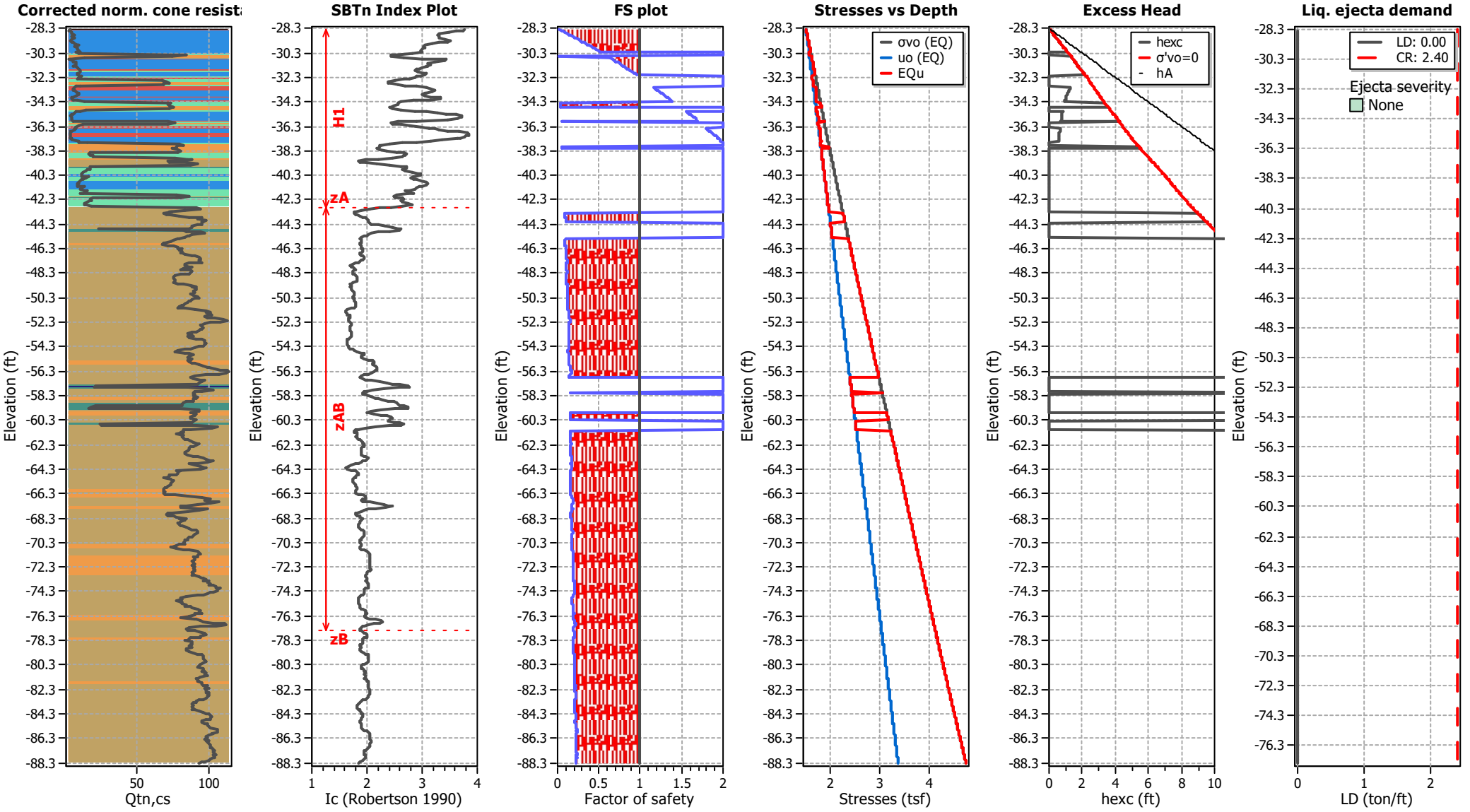
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

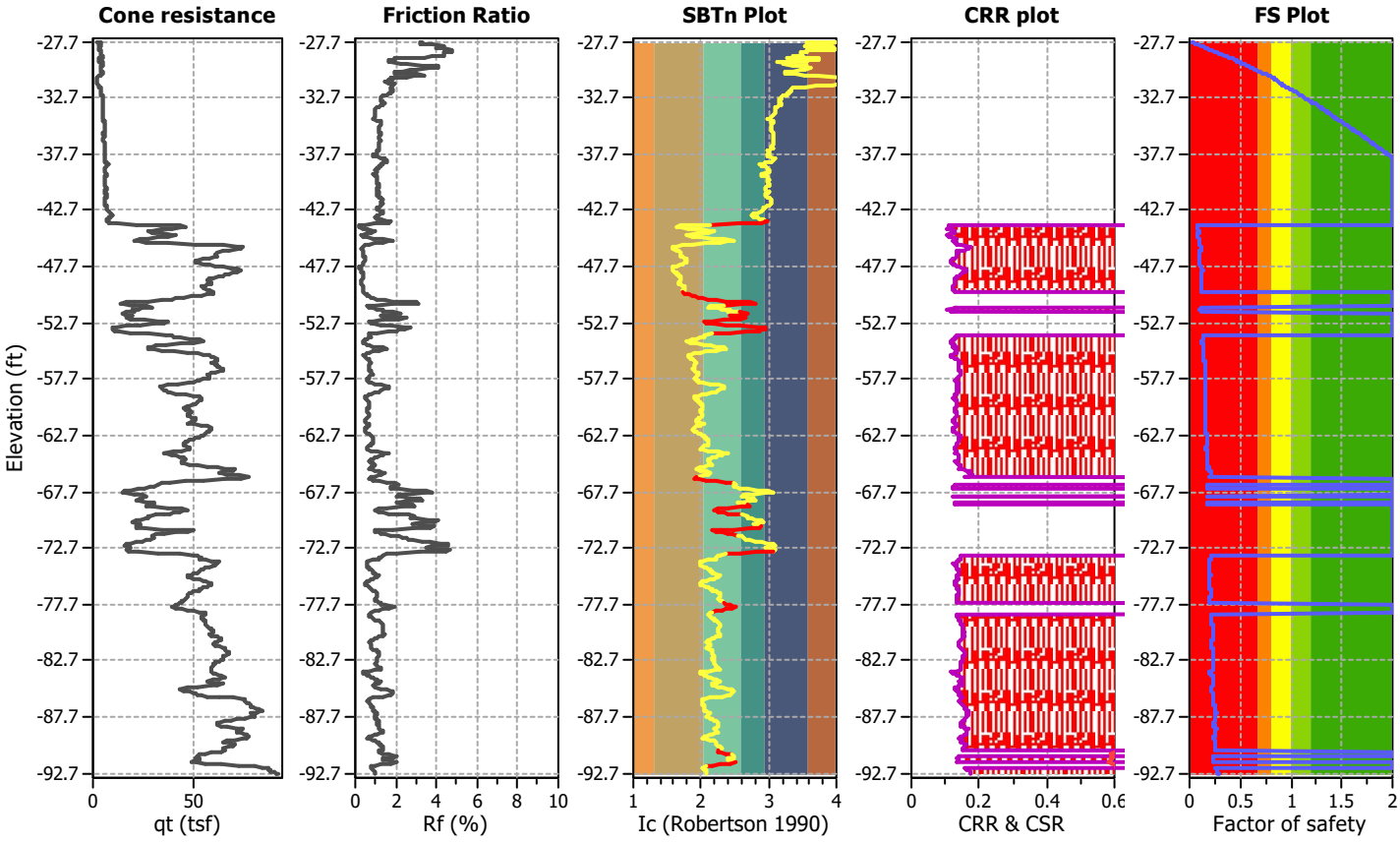
LIQUEFACTION ANALYSIS REPORT

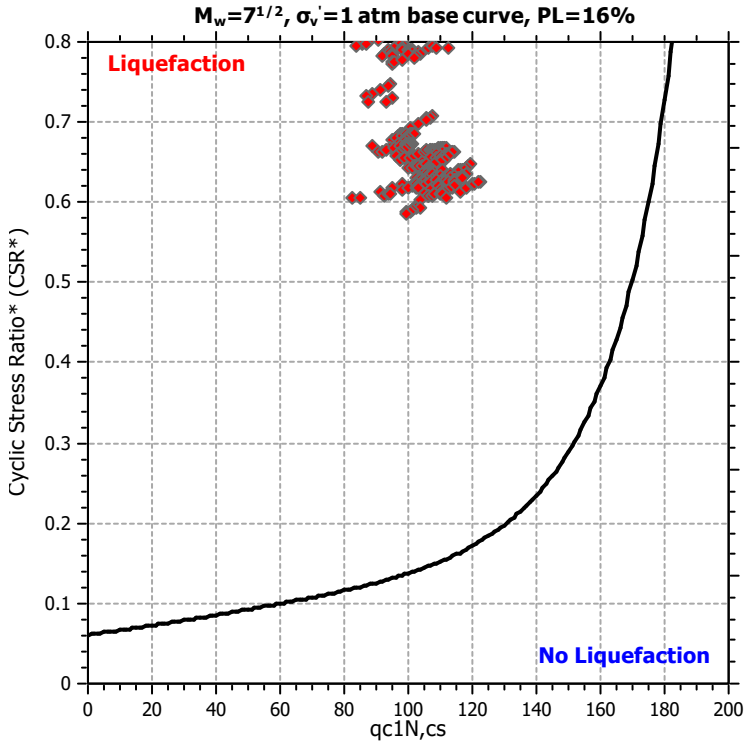
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

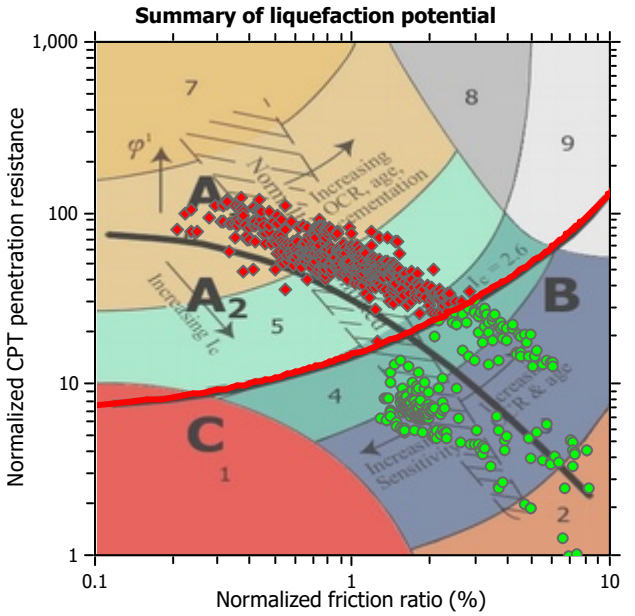
CPT file : CPTW-09

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-47.70 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-47.70 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

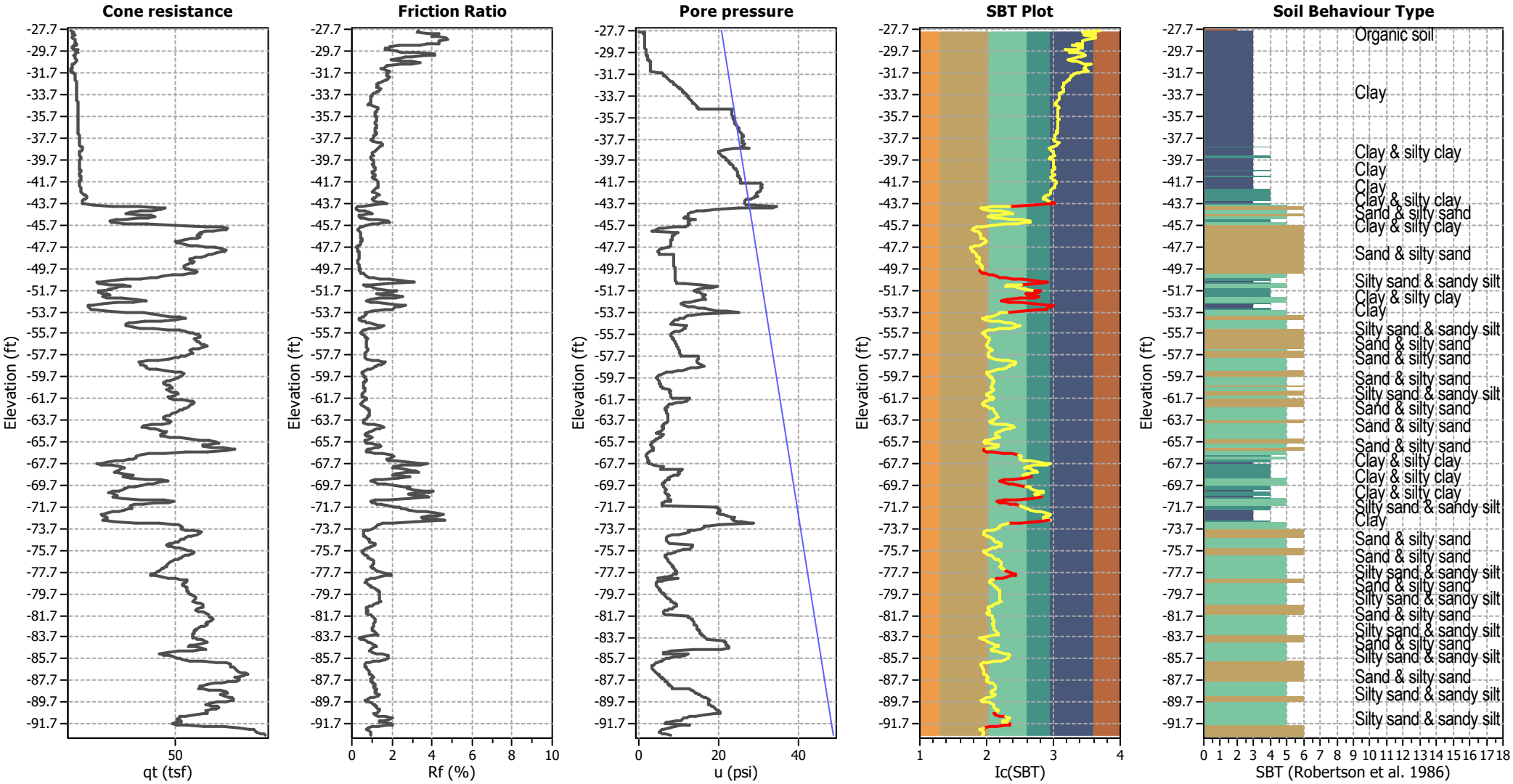






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



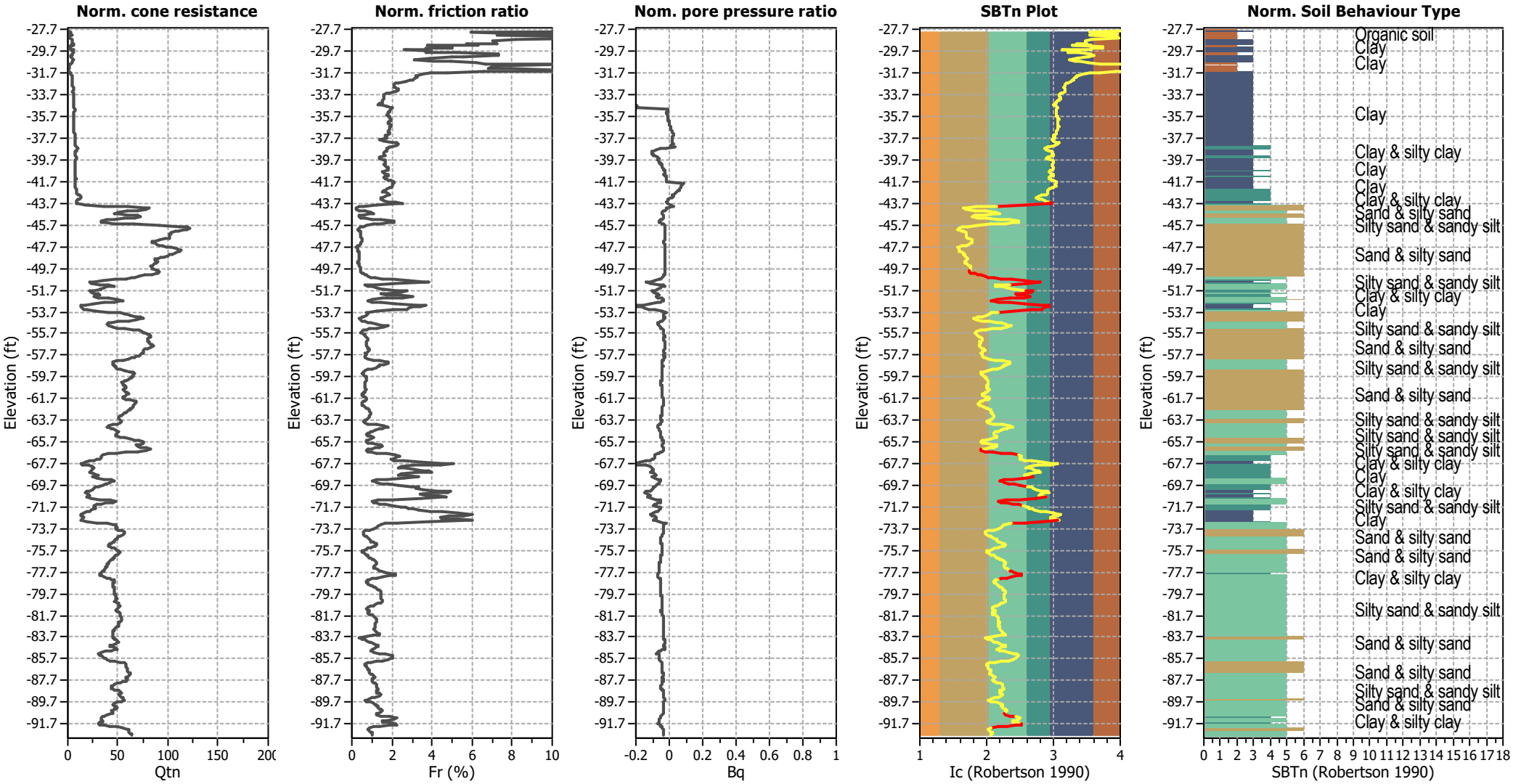
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-47.70 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-47.70 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



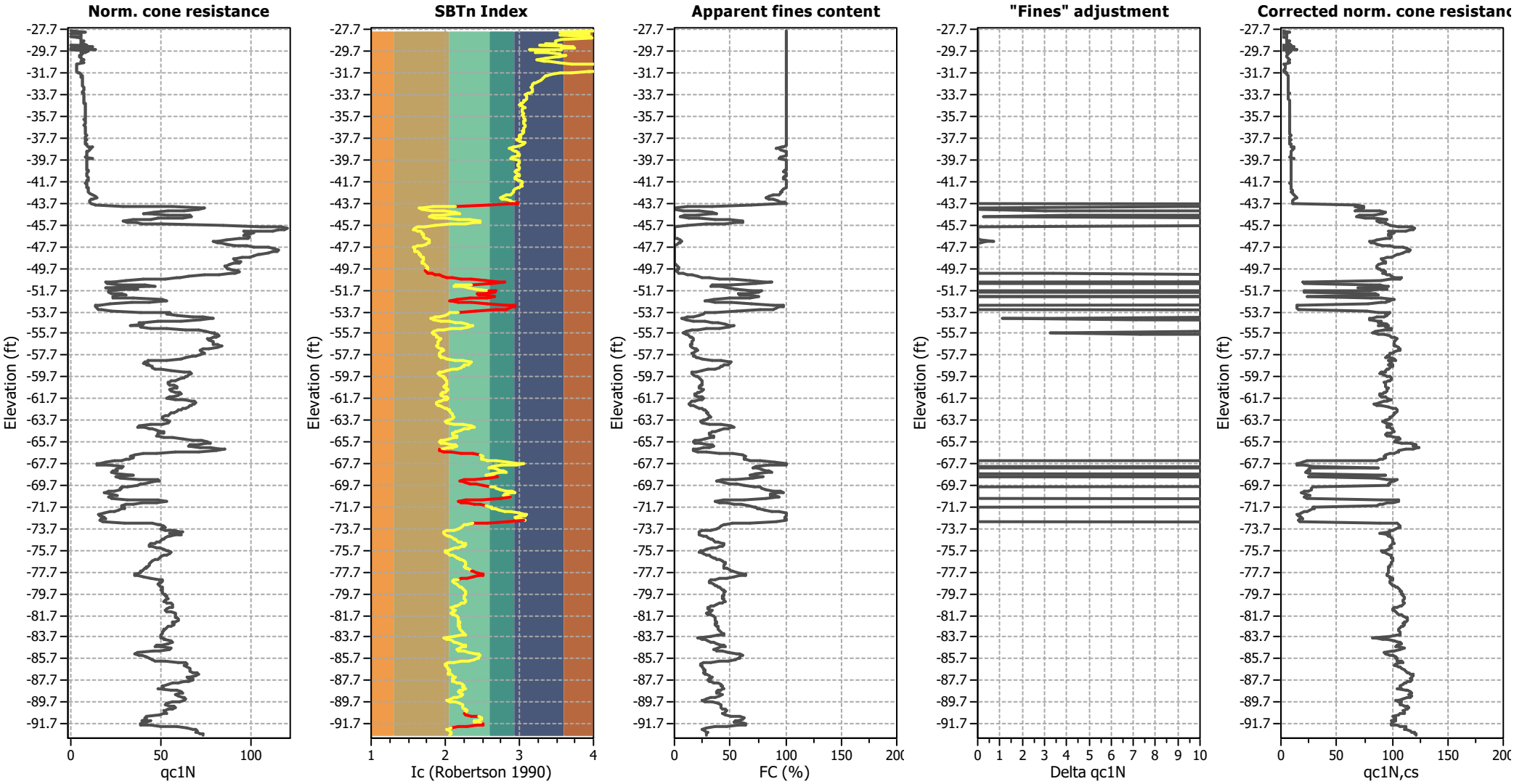
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-47.70 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-47.70 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

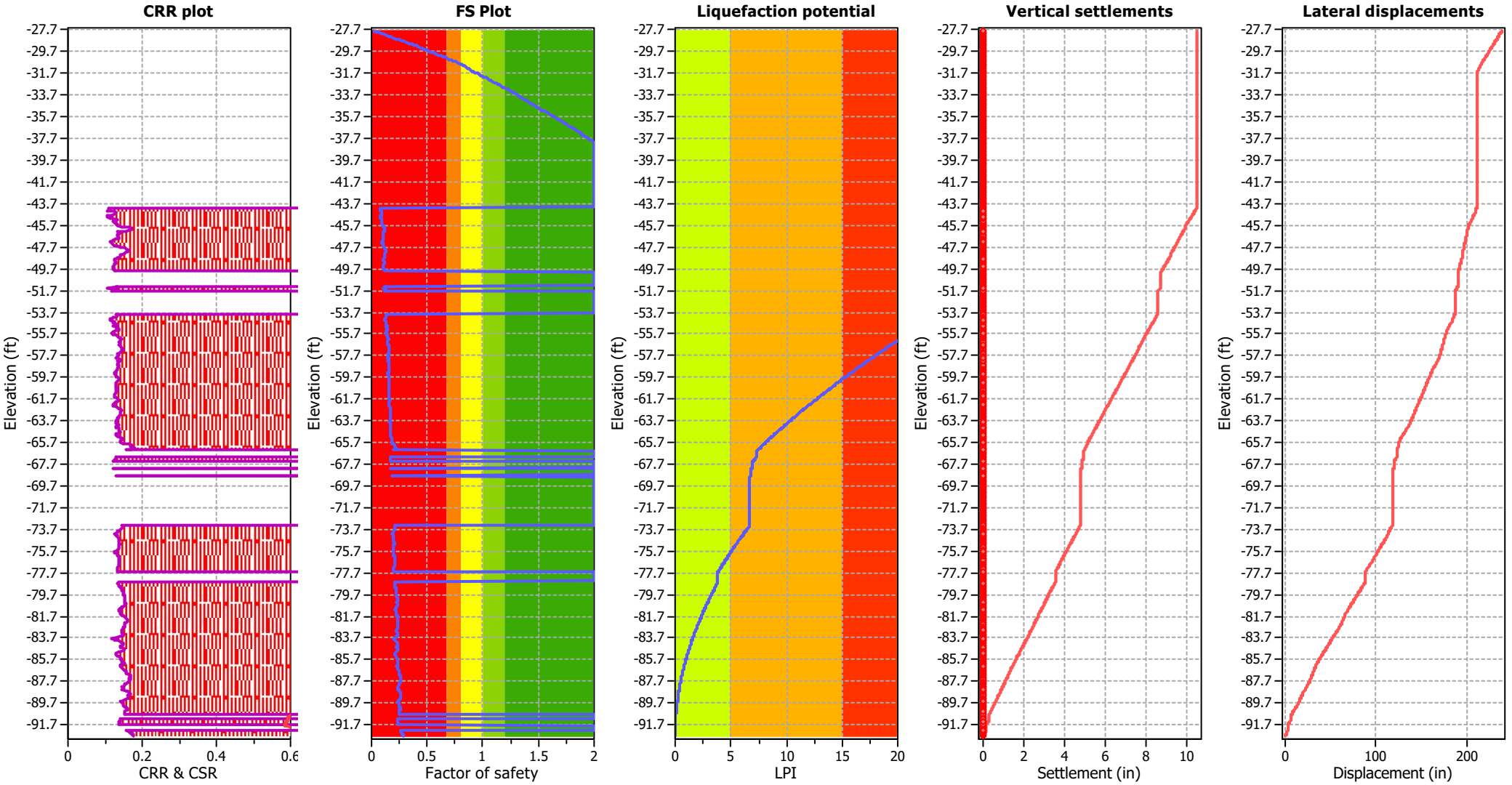
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-47.70 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-47.70 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-47.70 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-47.70 ft	Fill height:	N/A	Limit depth:	N/A

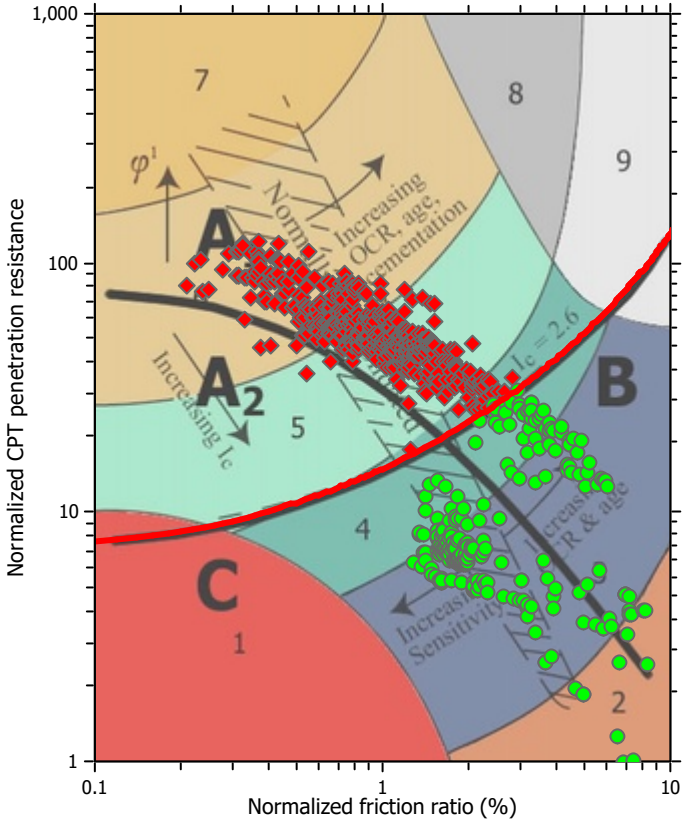
F.S. color scheme

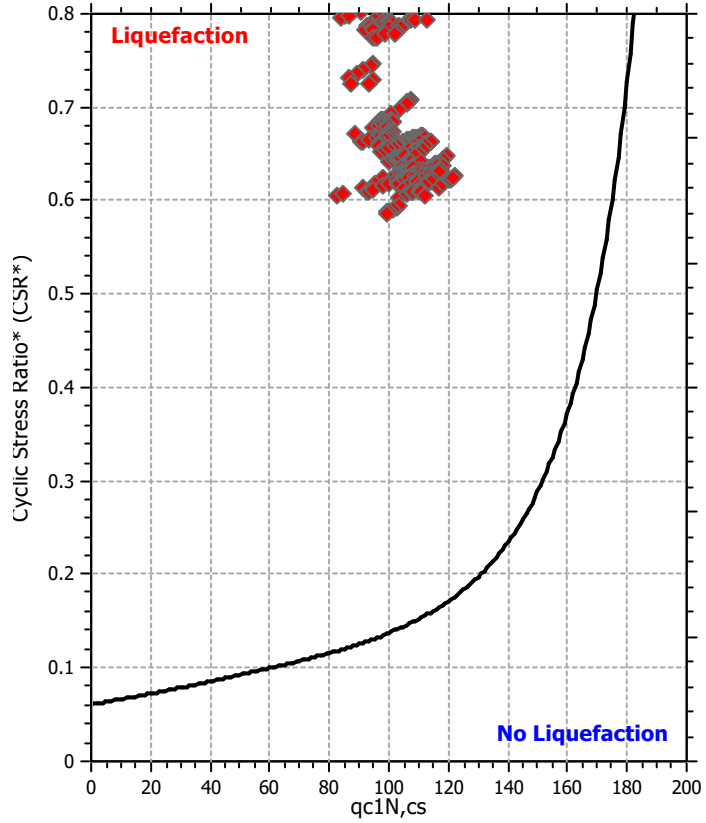
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

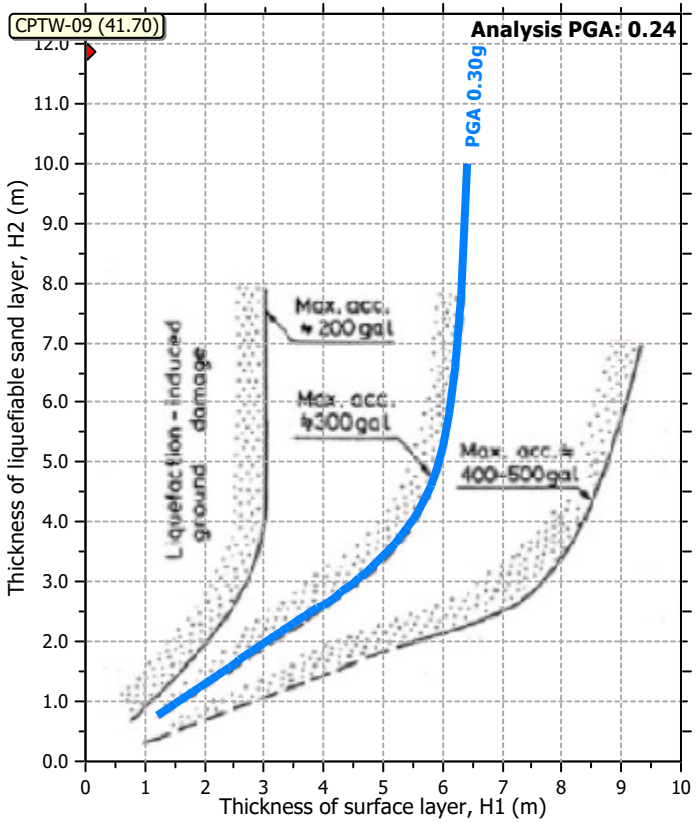
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



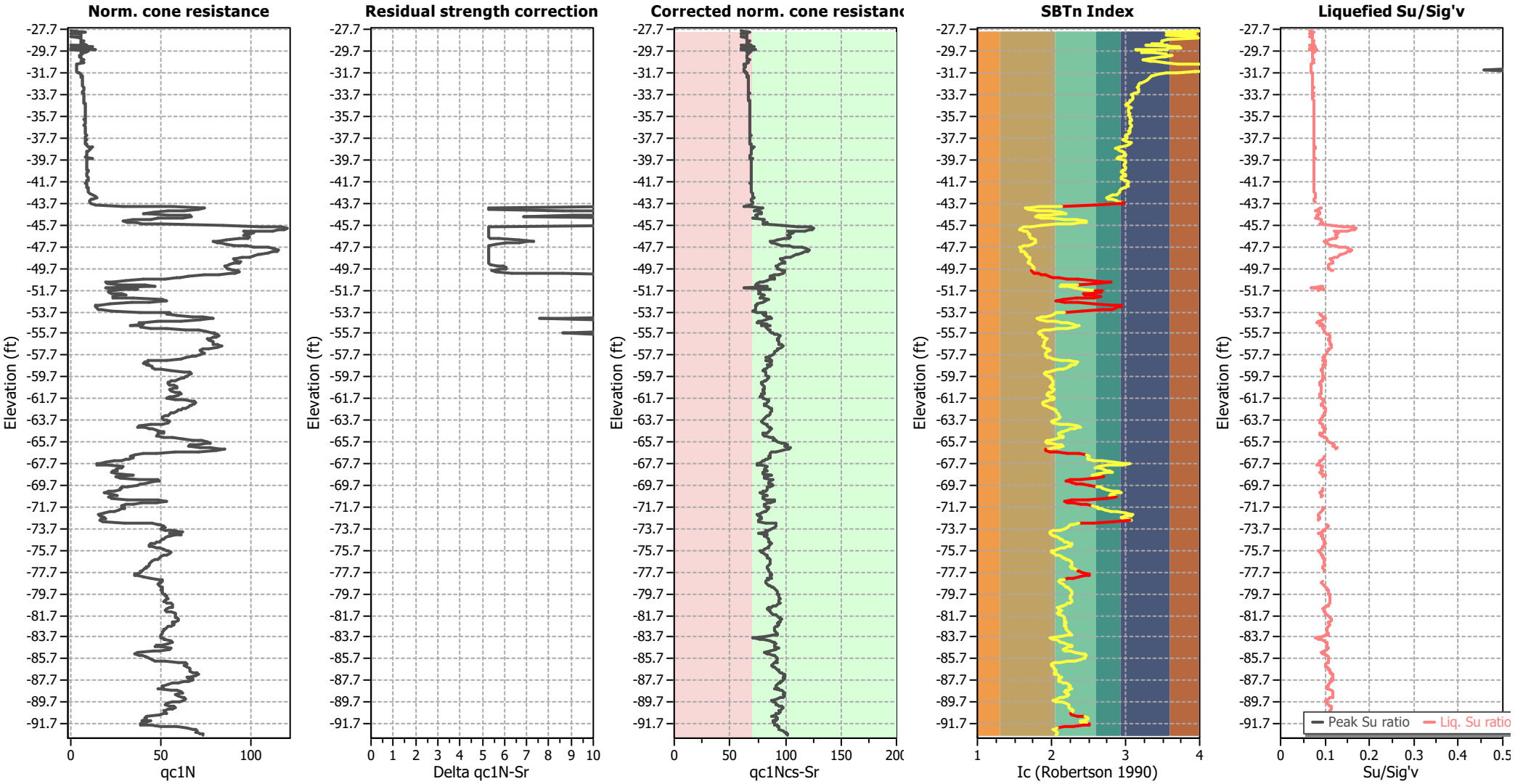




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-47.70 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-47.70 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

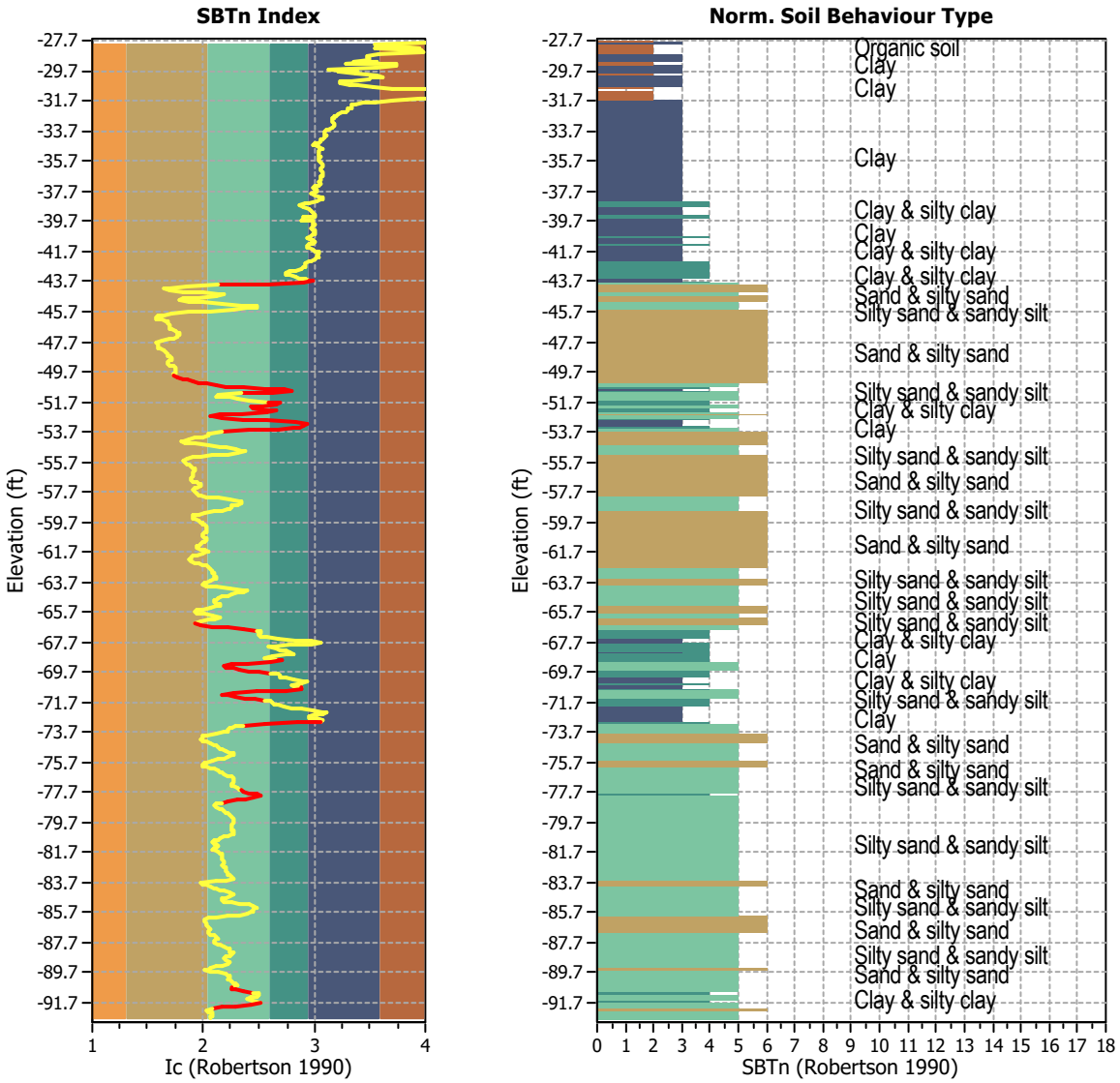
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-47.70 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-47.70 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

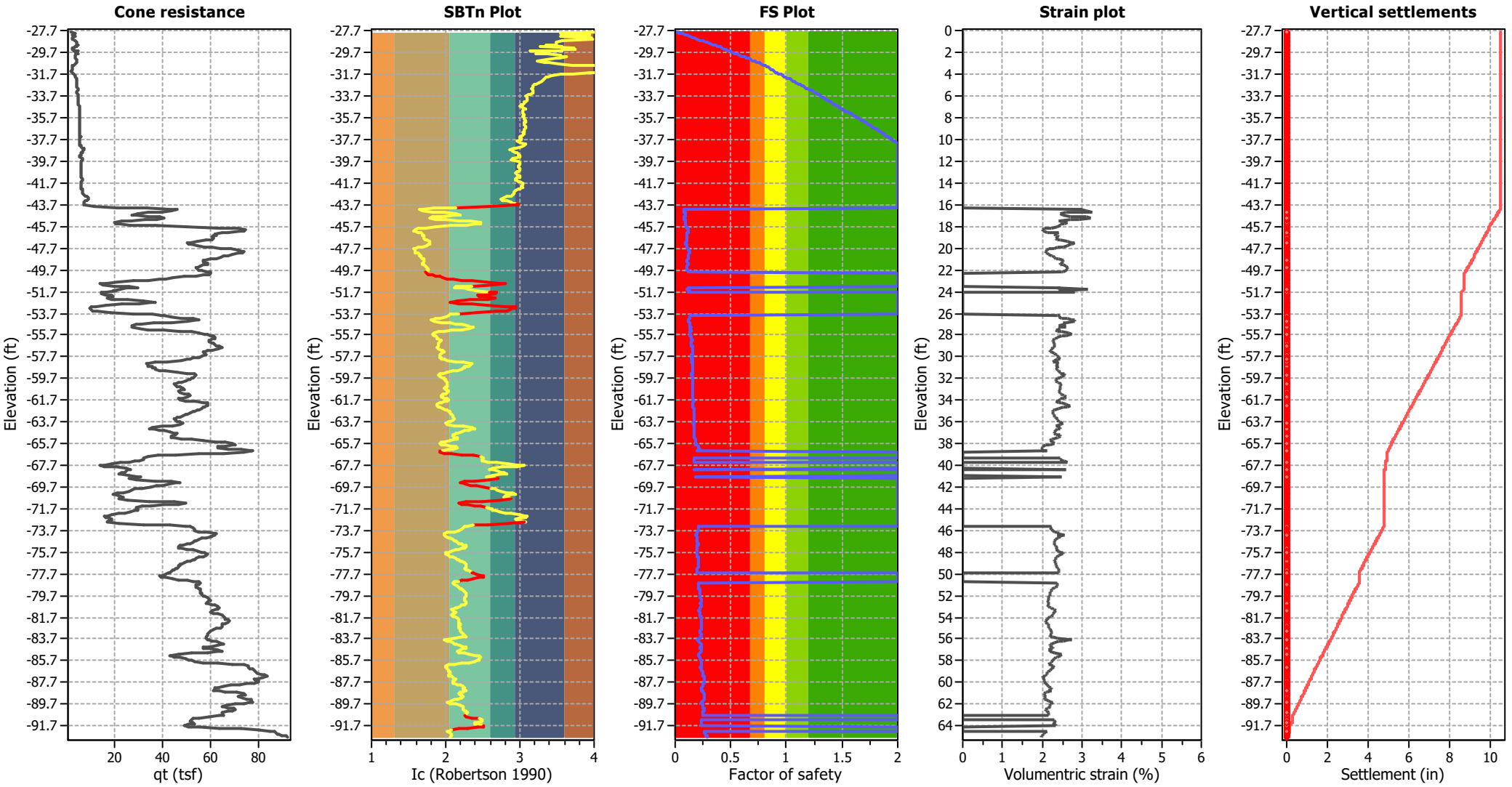
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	793
I_c maximum check value:	3.00	Total points excluded:	107
I_c change ratio value:	0.0250	Exclusion percentage:	13.49%
Minimum number of points in layer:	4	Number of layers detected:	18

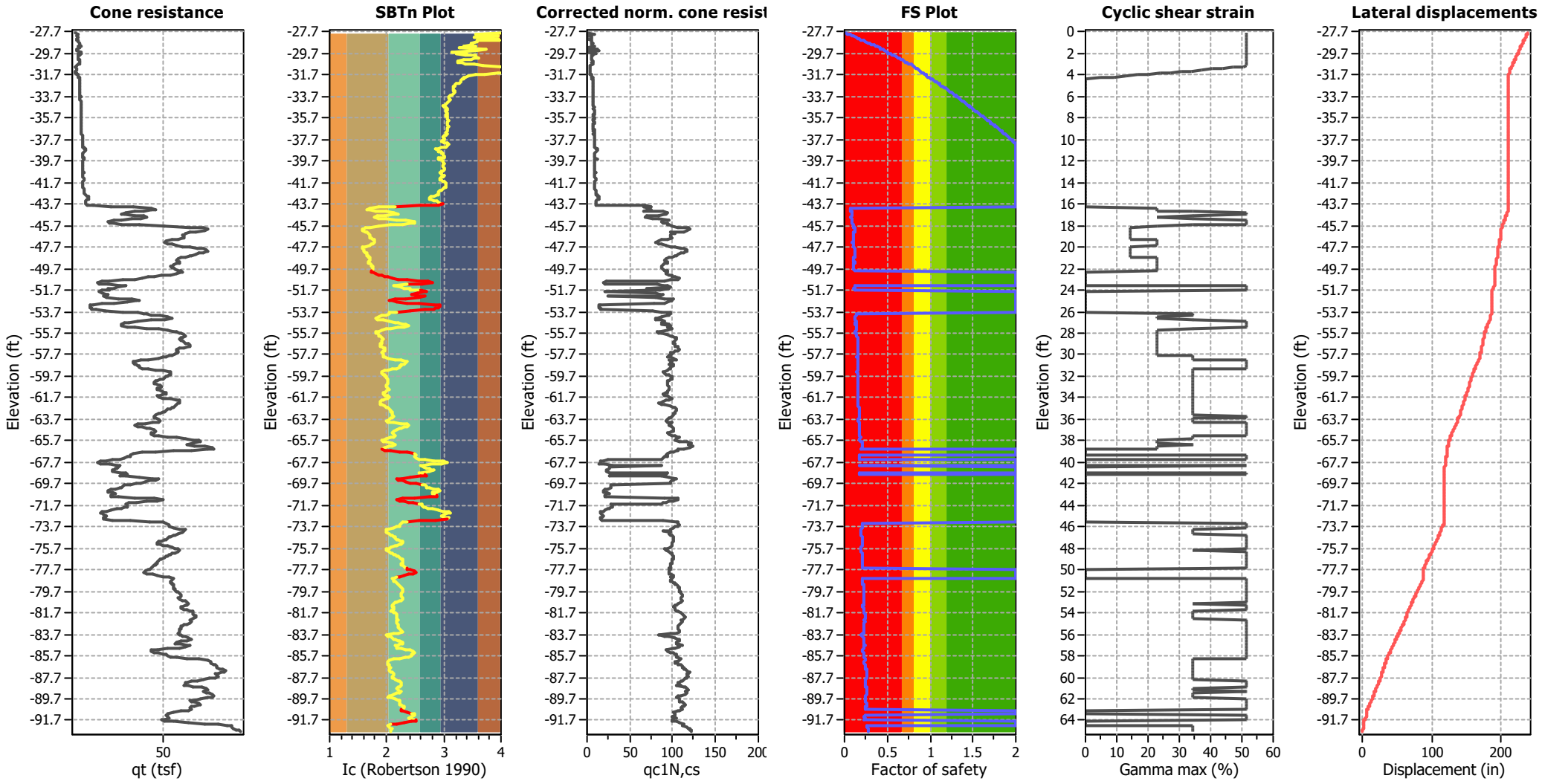
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

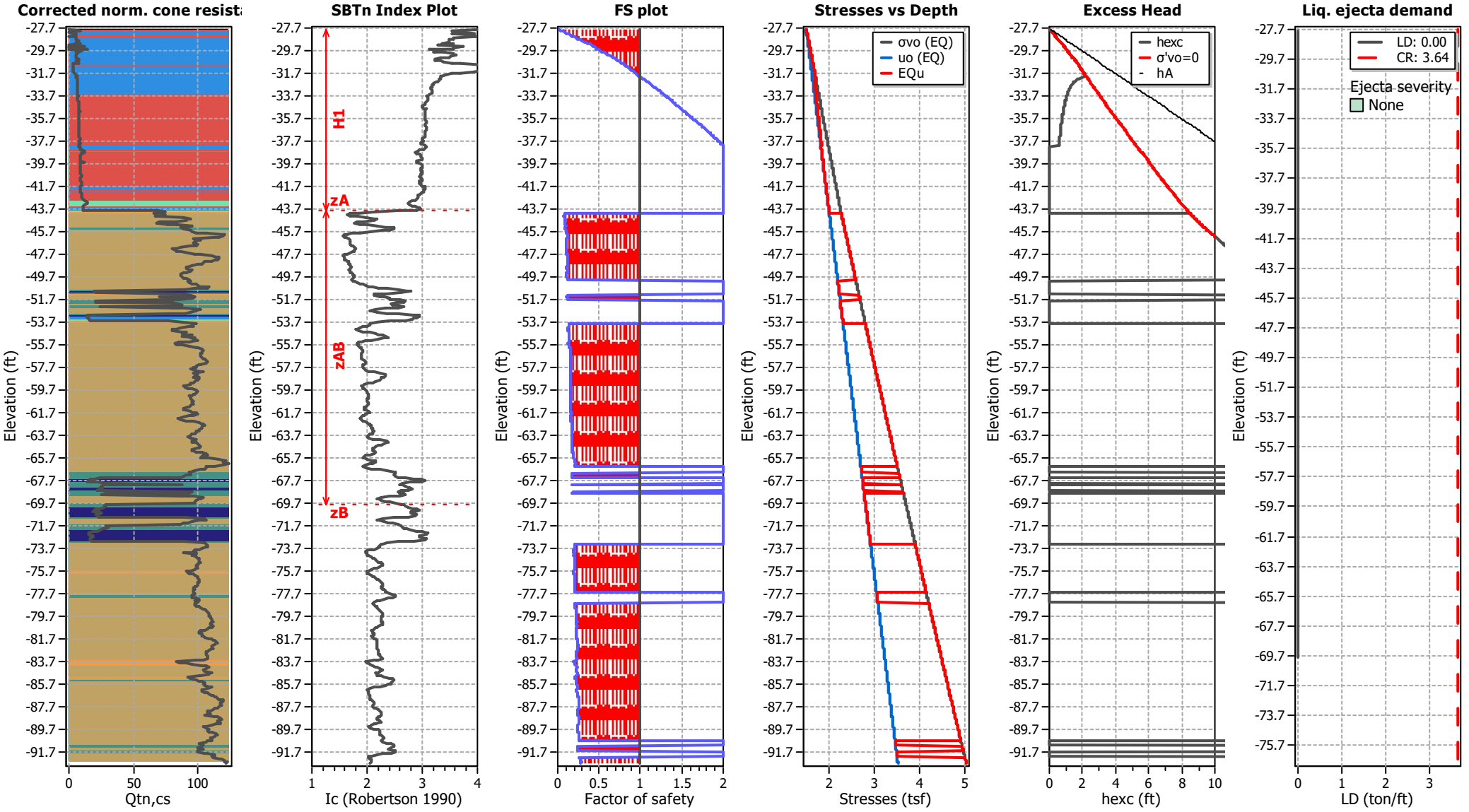
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

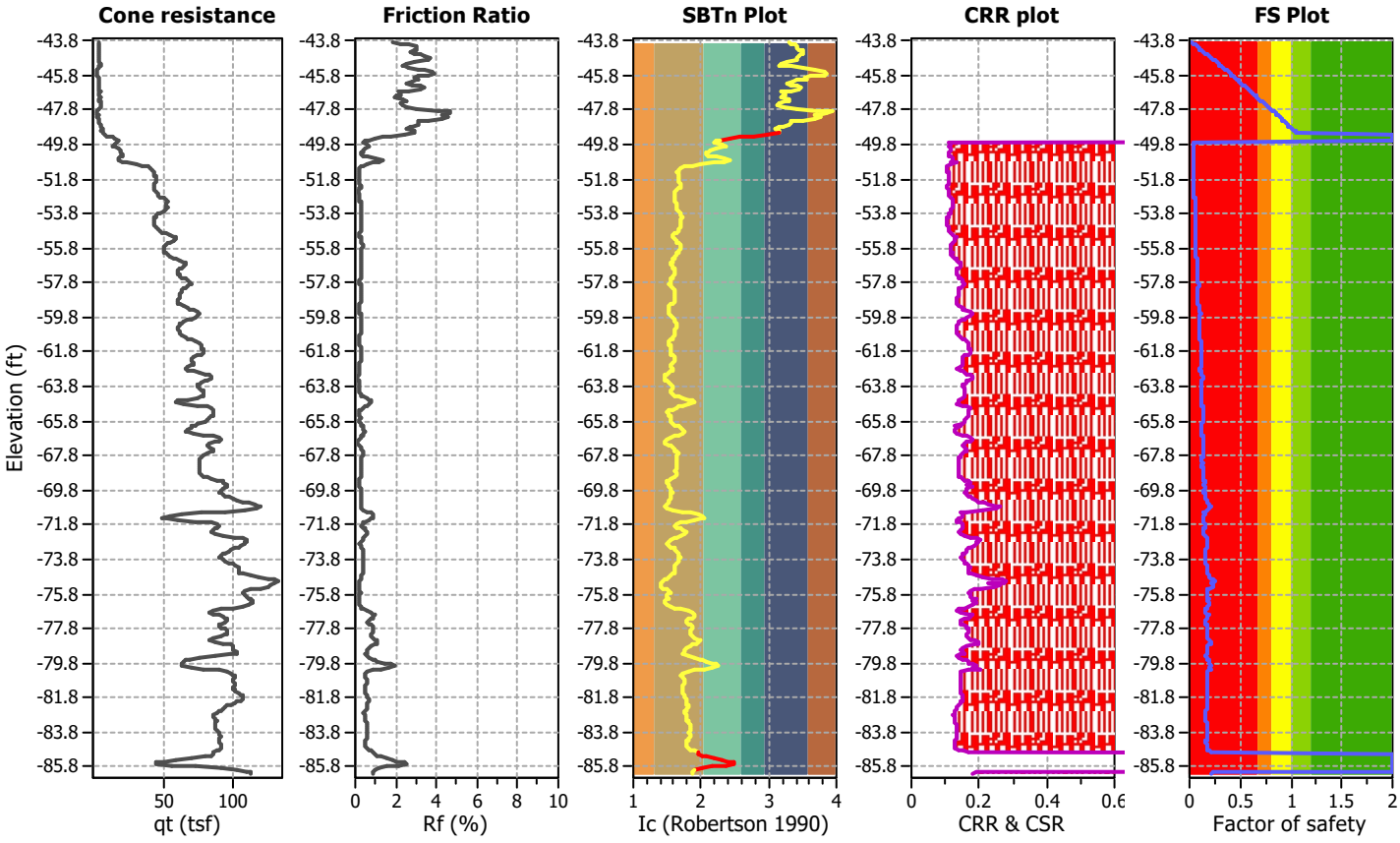
LIQUEFACTION ANALYSIS REPORT

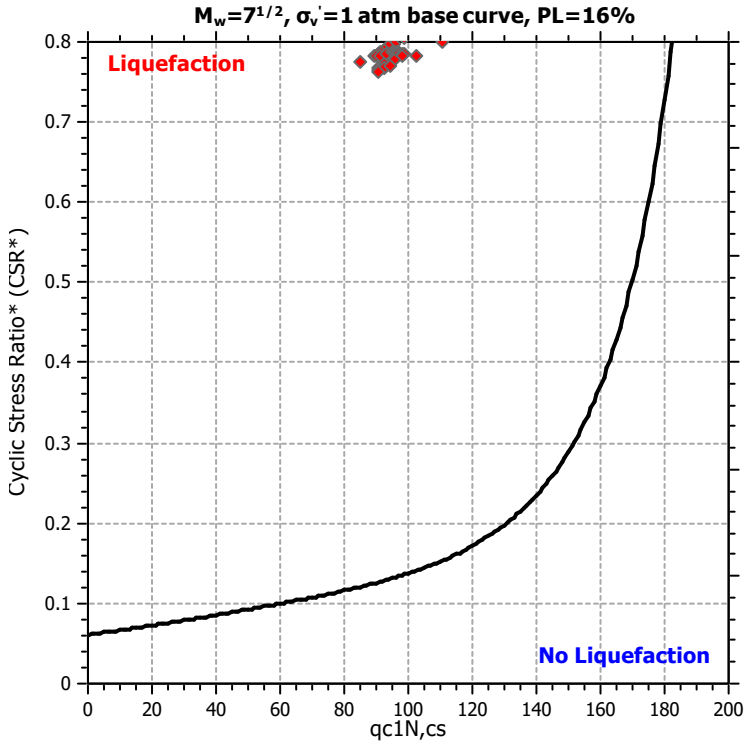
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

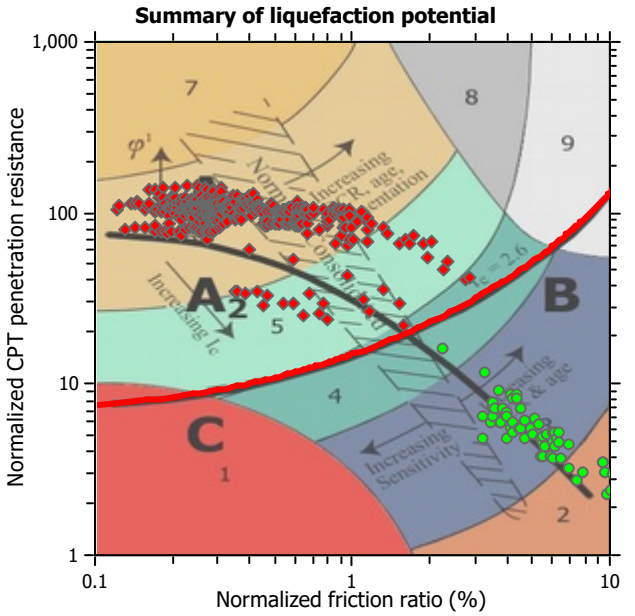
CPT file : CPTW-10

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-63.80 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-63.80 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

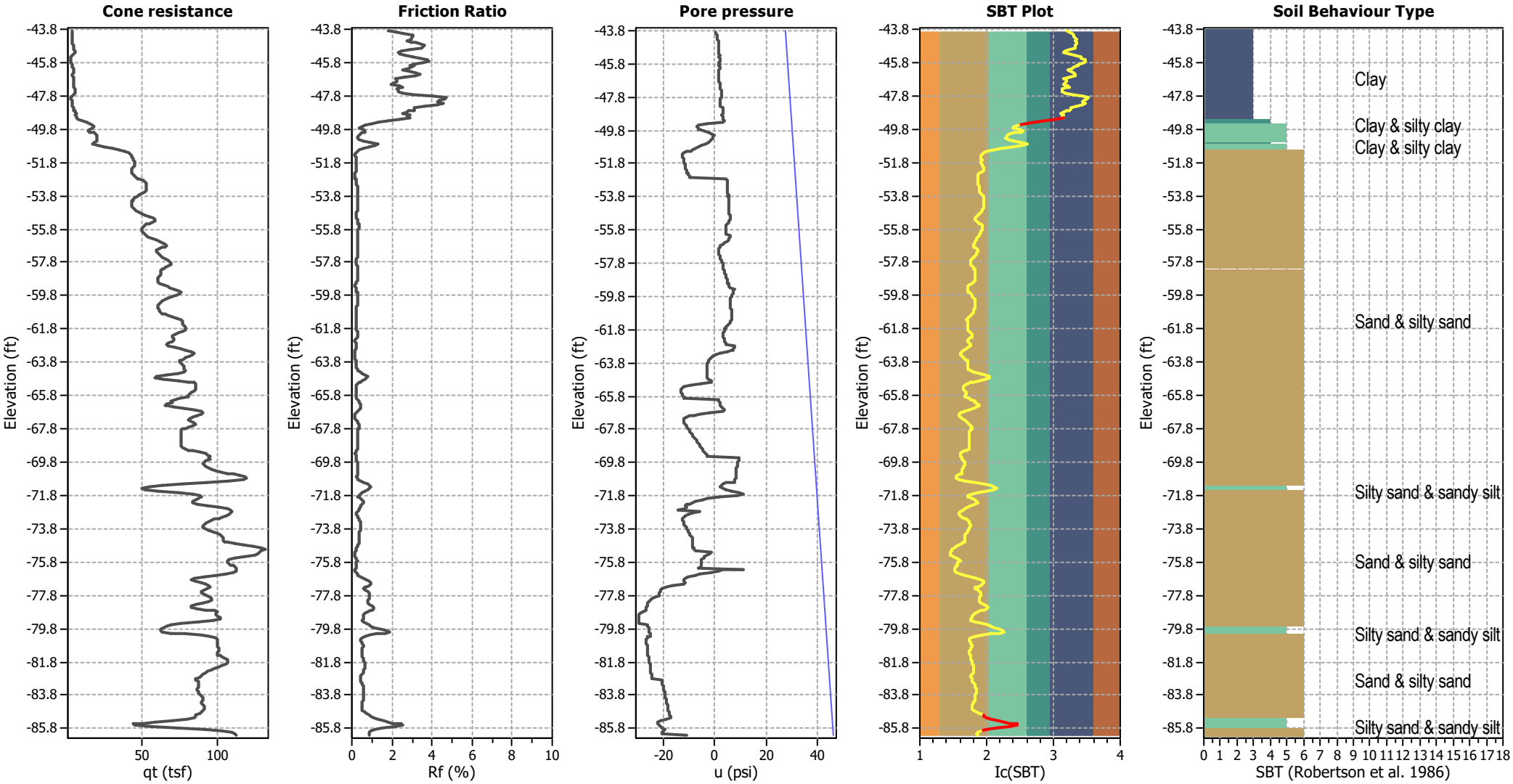






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



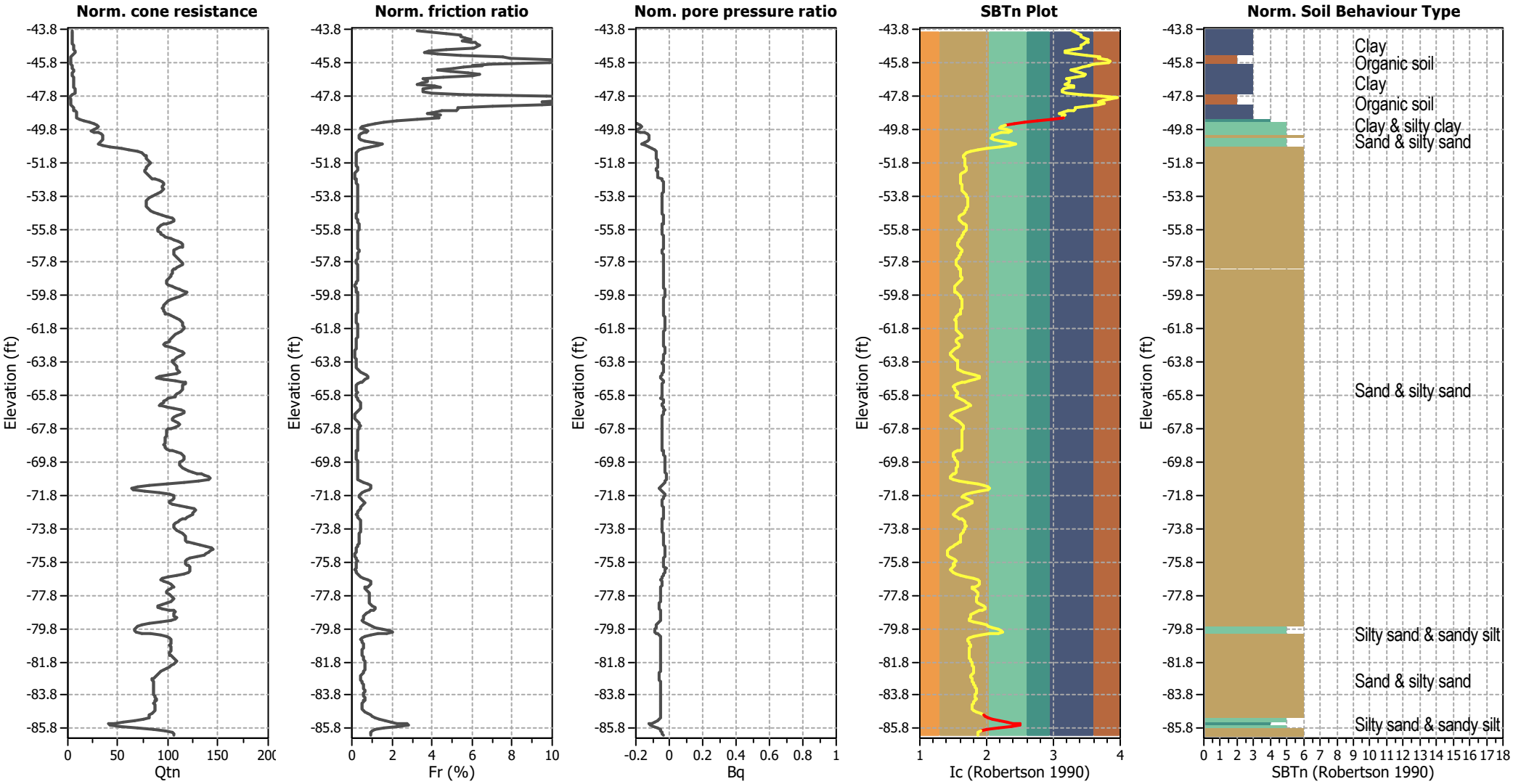
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-63.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-63.80 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



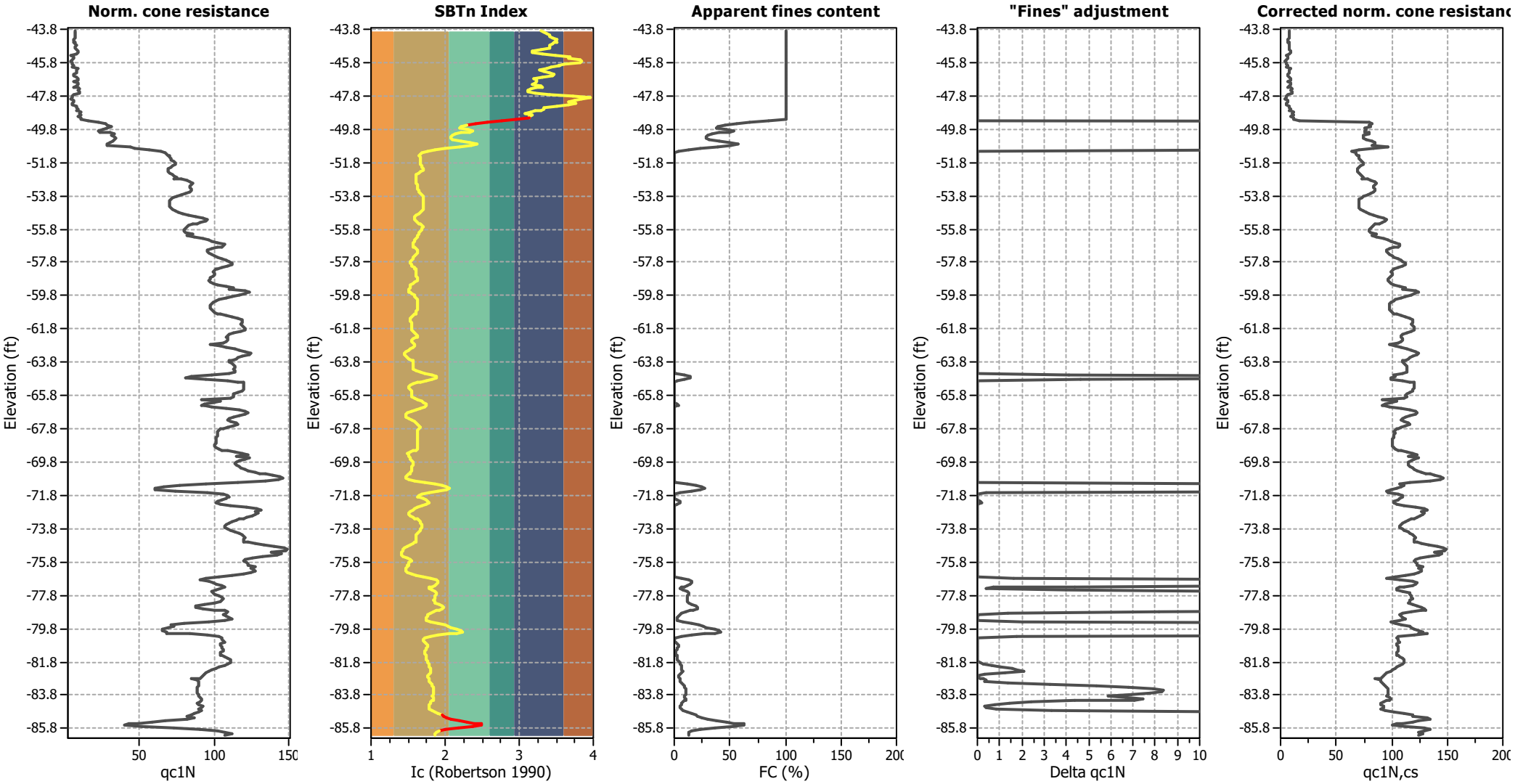
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-63.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-63.80 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

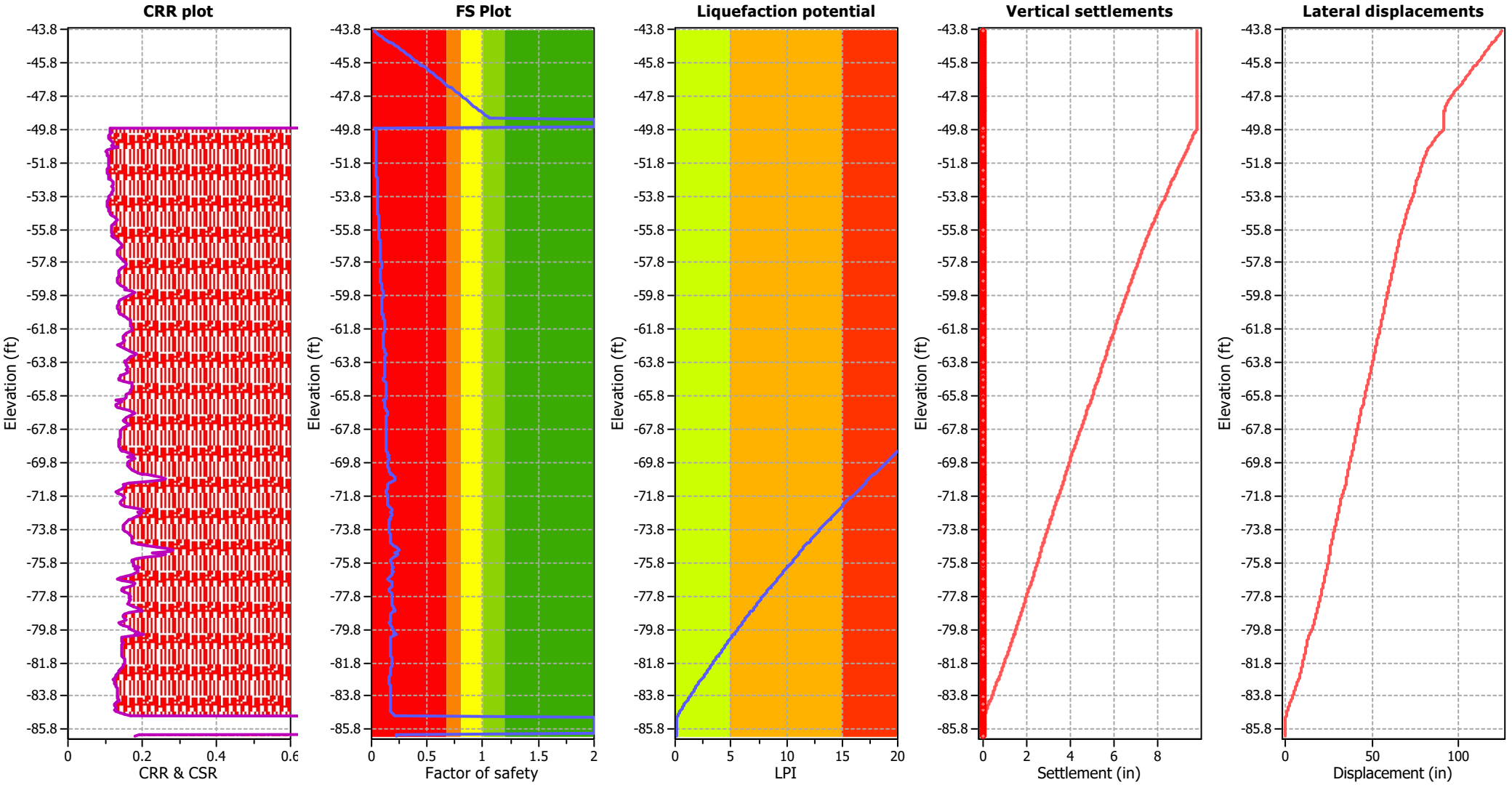
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-63.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-63.80 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-63.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-63.80 ft	Fill height:	N/A	Limit depth:	N/A

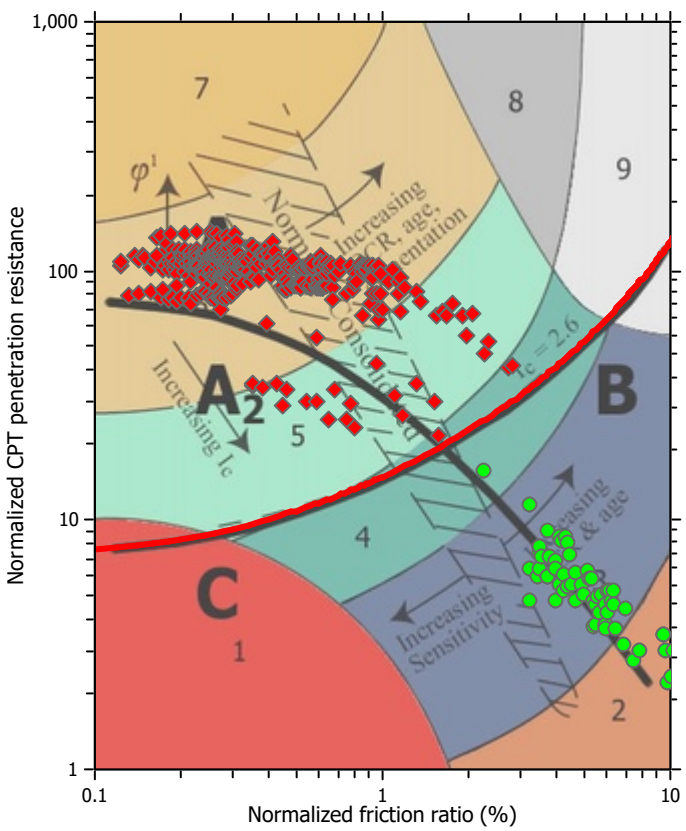
F.S. color scheme

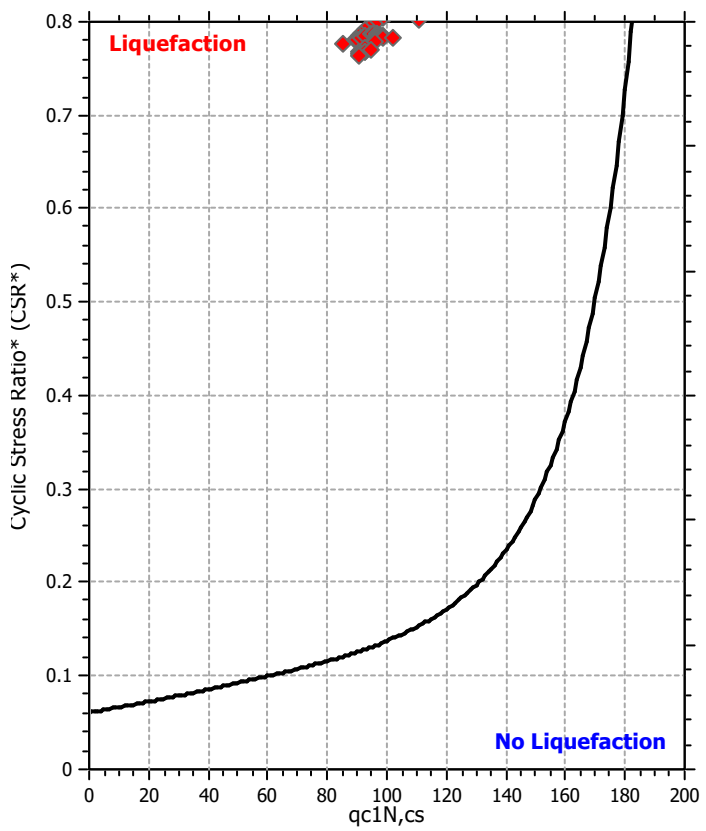
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

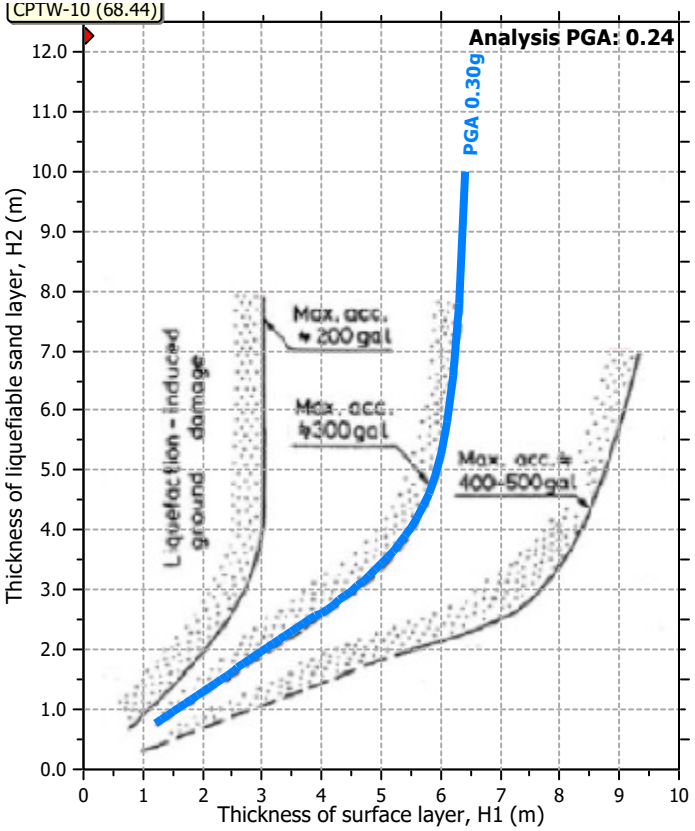
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



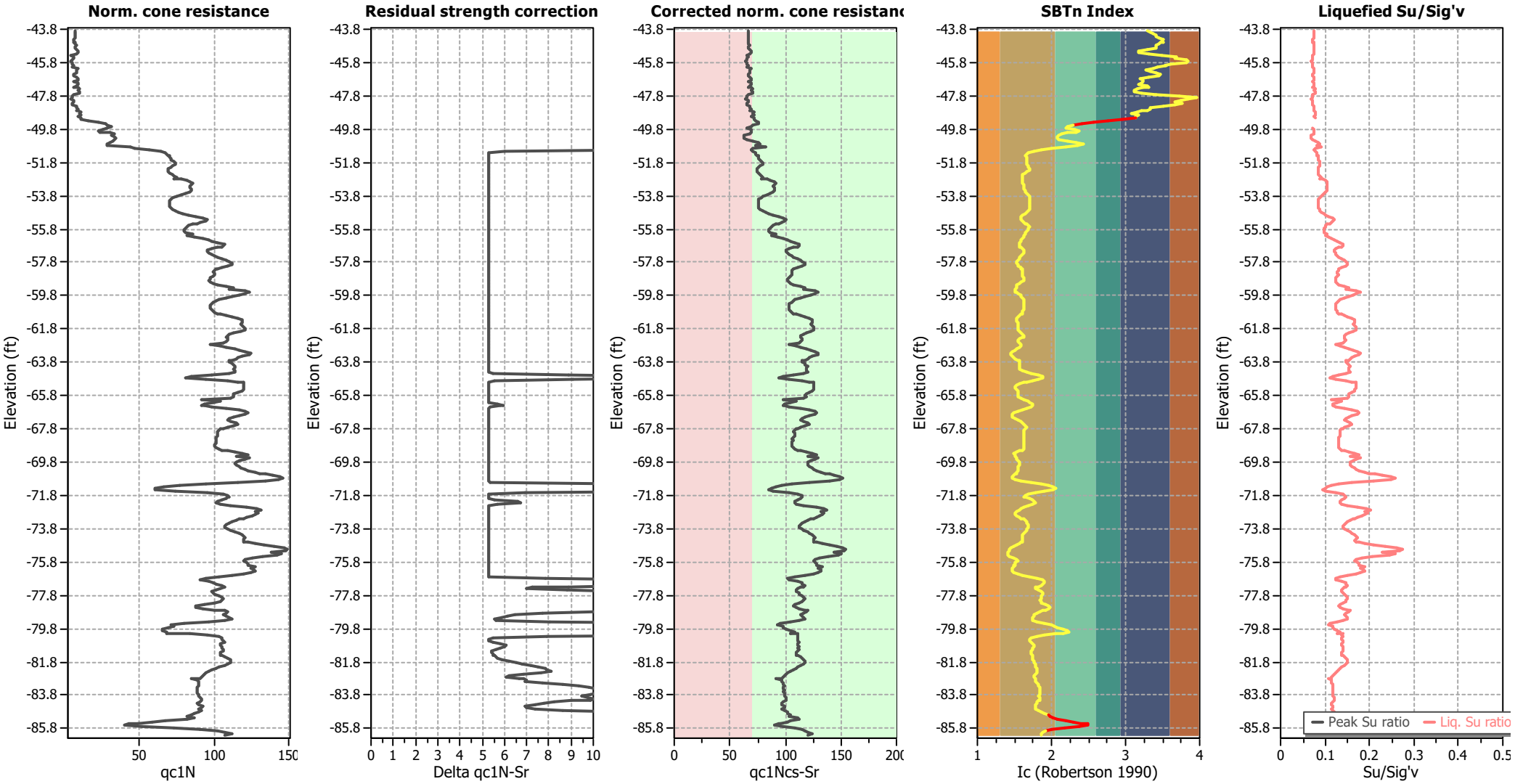




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-63.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-63.80 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

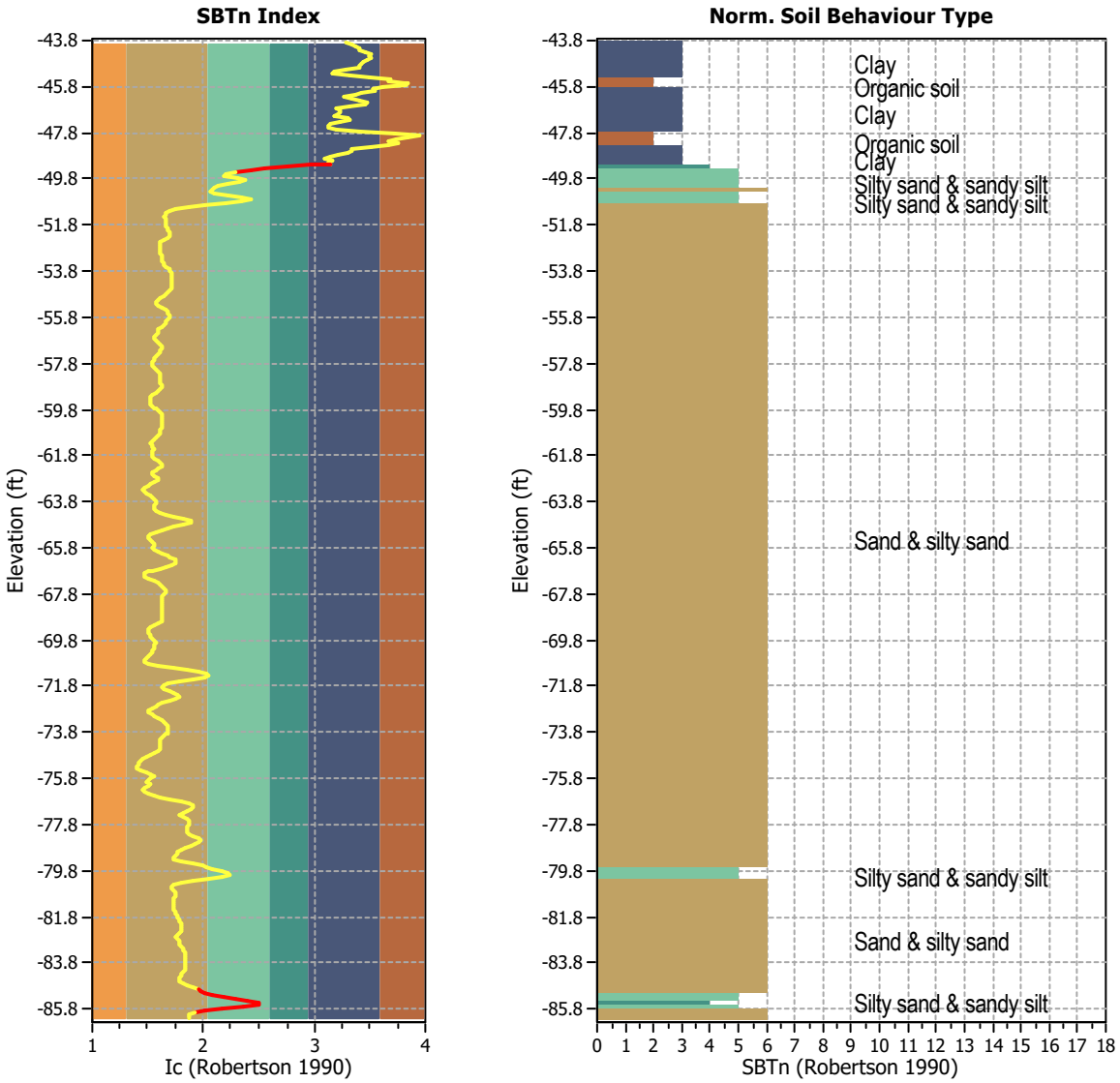
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-63.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-63.80 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

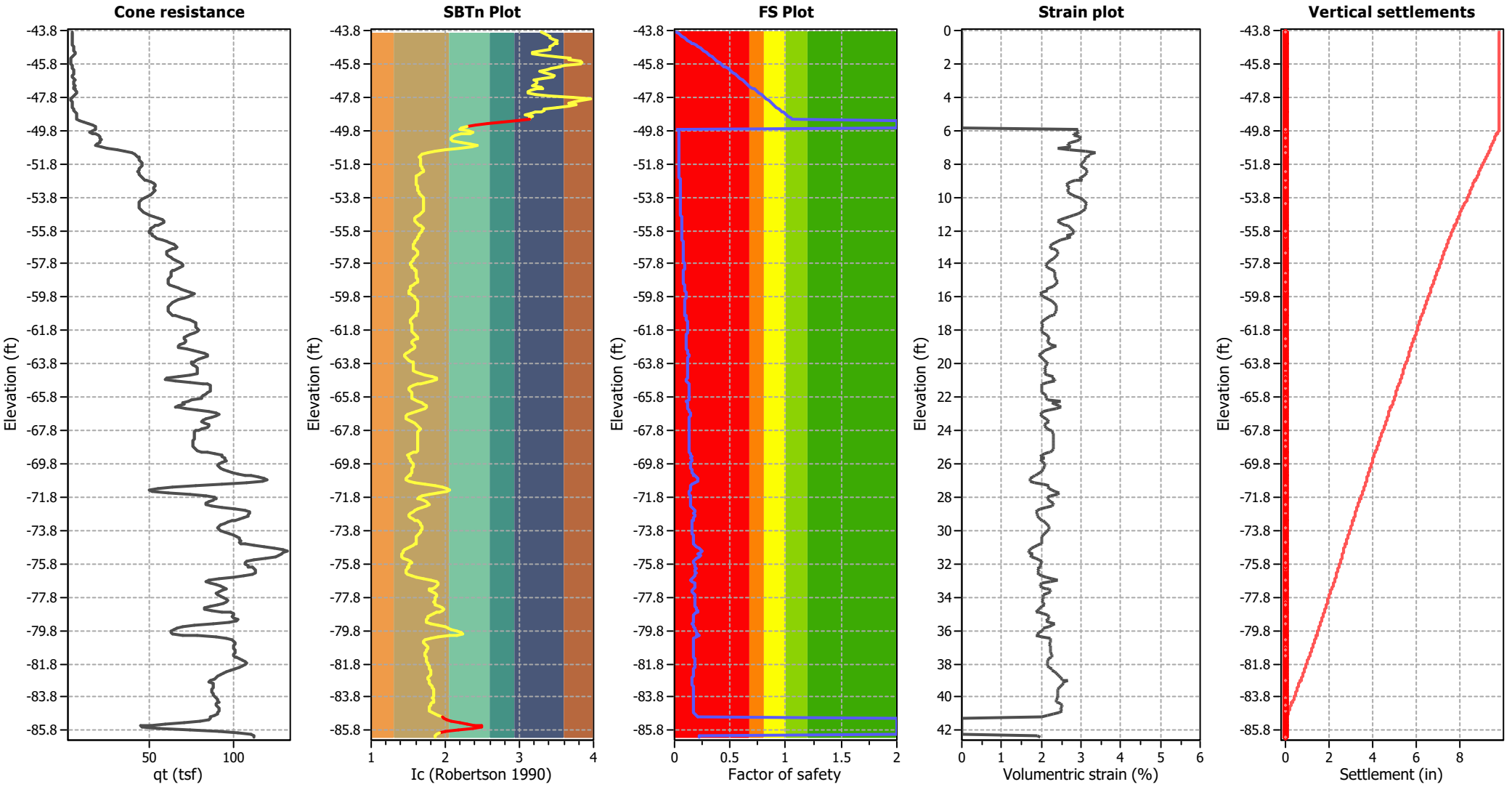
The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties	
I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0250
Minimum number of points in layer:	4

General statistics	
Total points in CPT file:	517
Total points excluded:	19
Exclusion percentage:	3.68%
Number of layers detected:	3

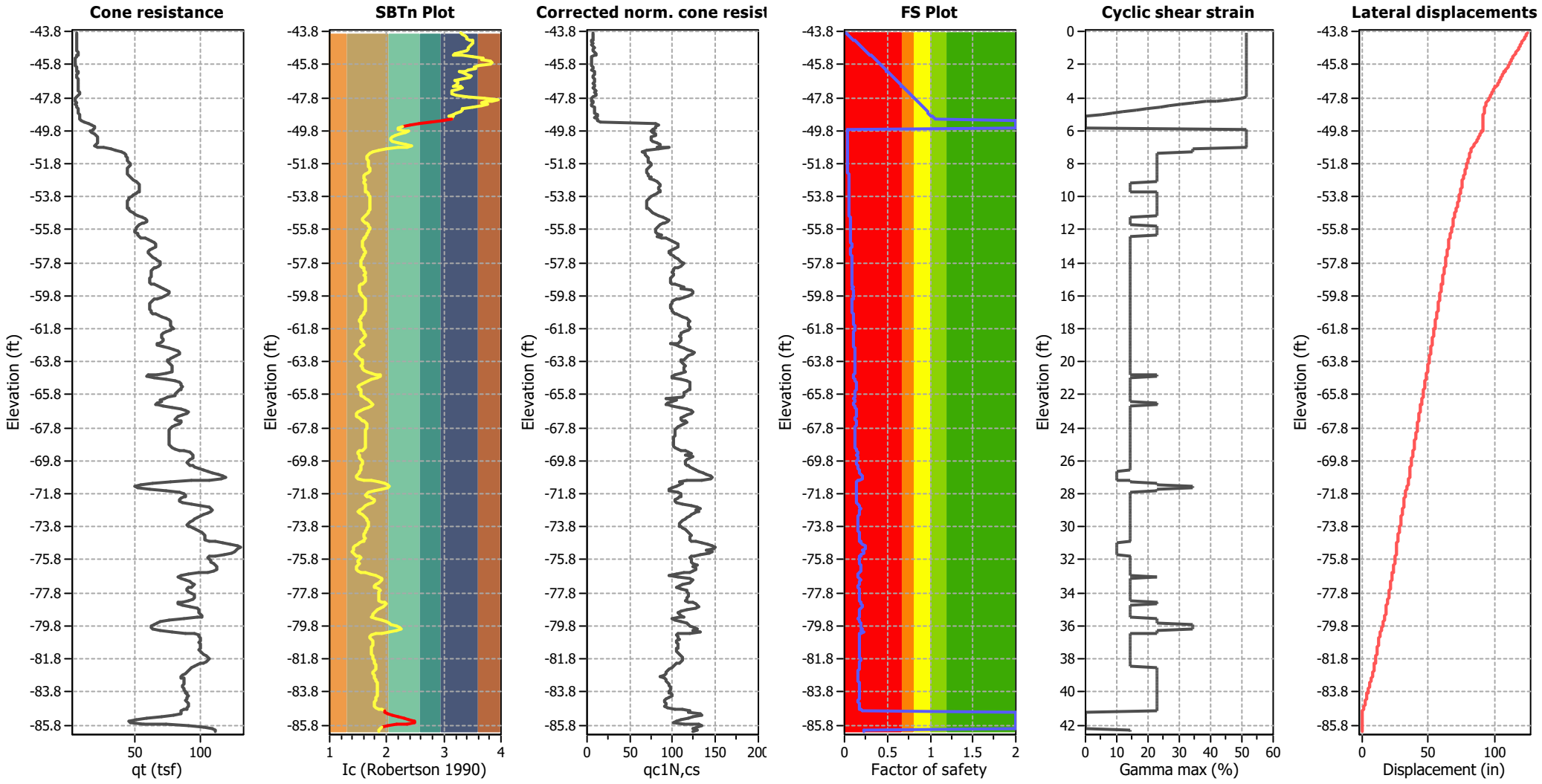
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

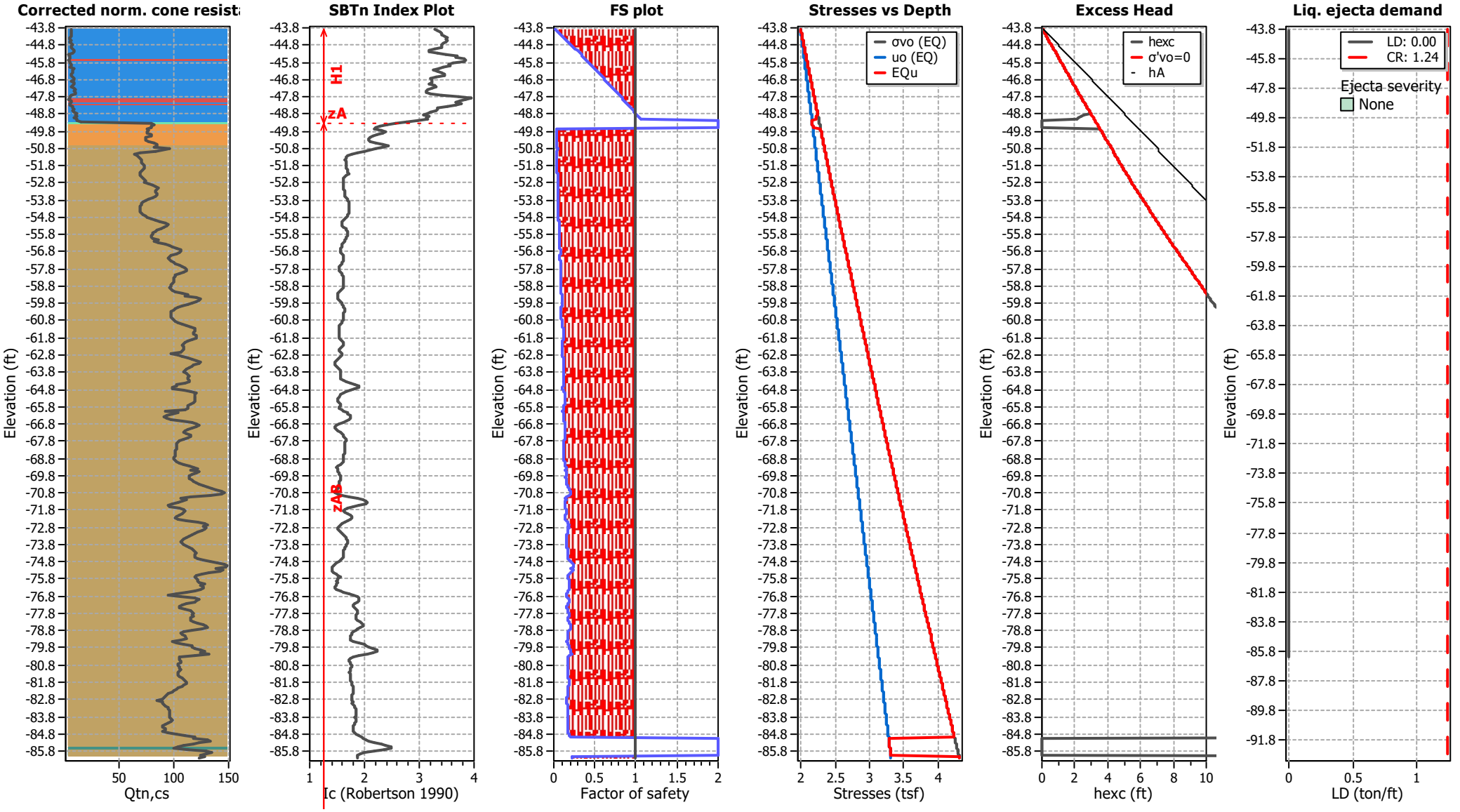
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

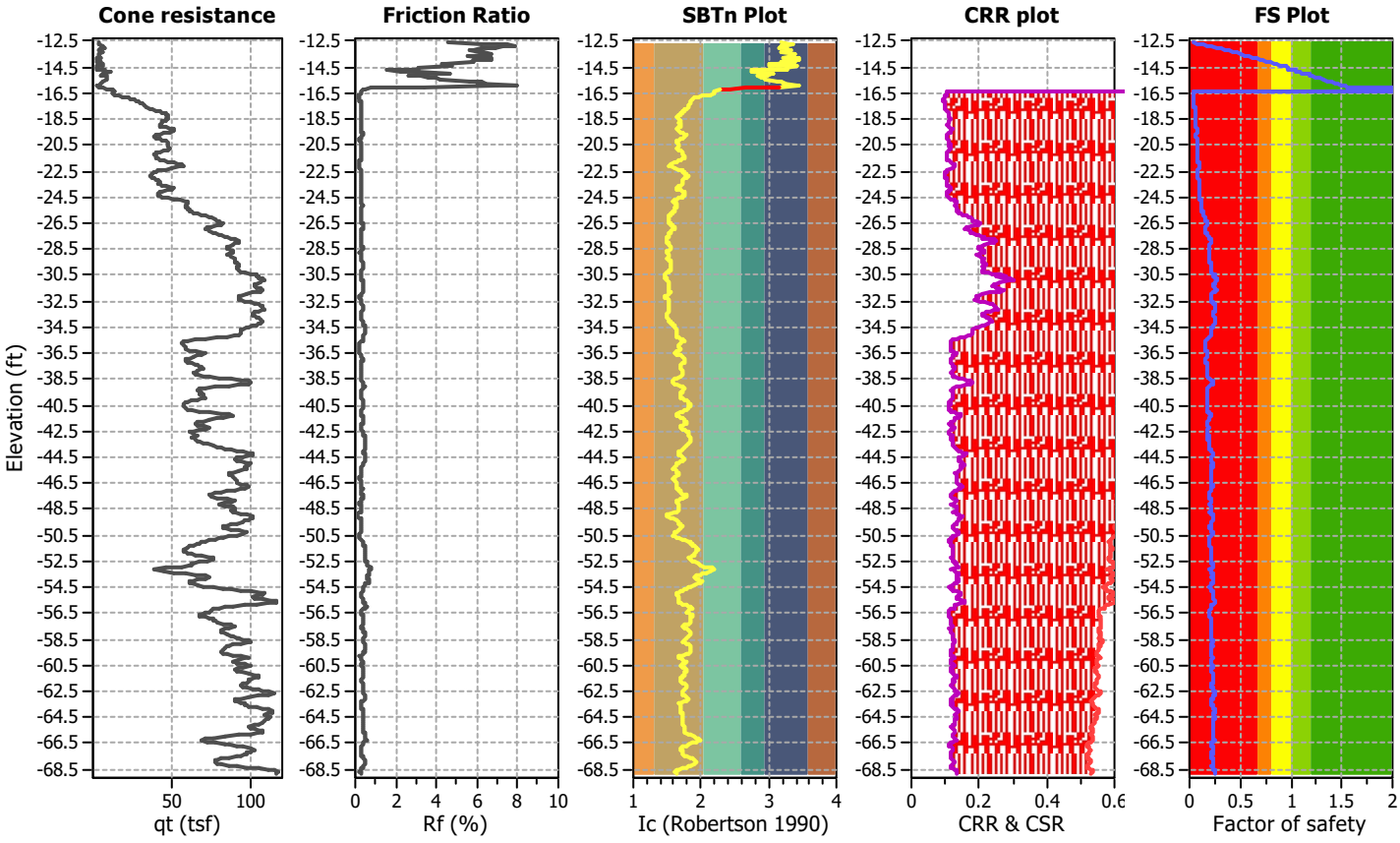
LIQUEFACTION ANALYSIS REPORT

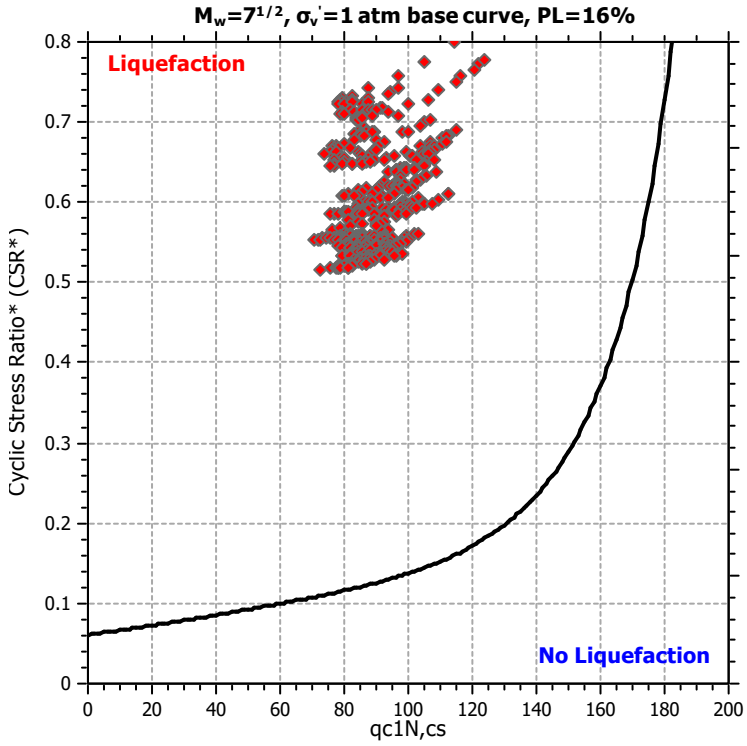
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

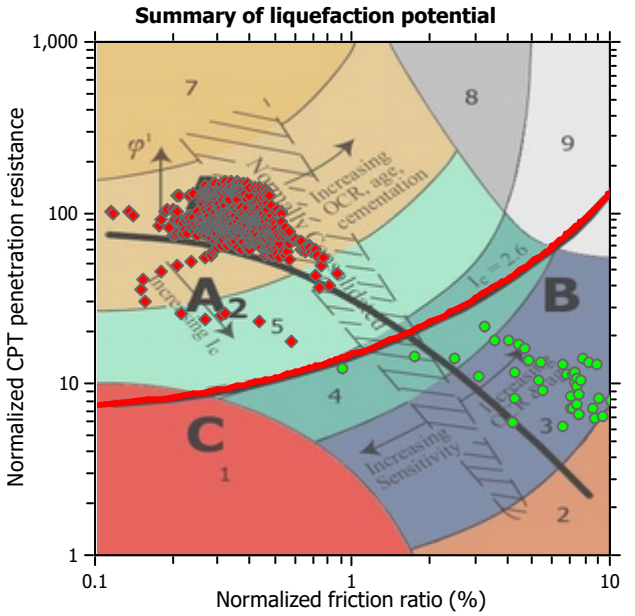
CPT file : sCPTW-11

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-32.50 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-32.50 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

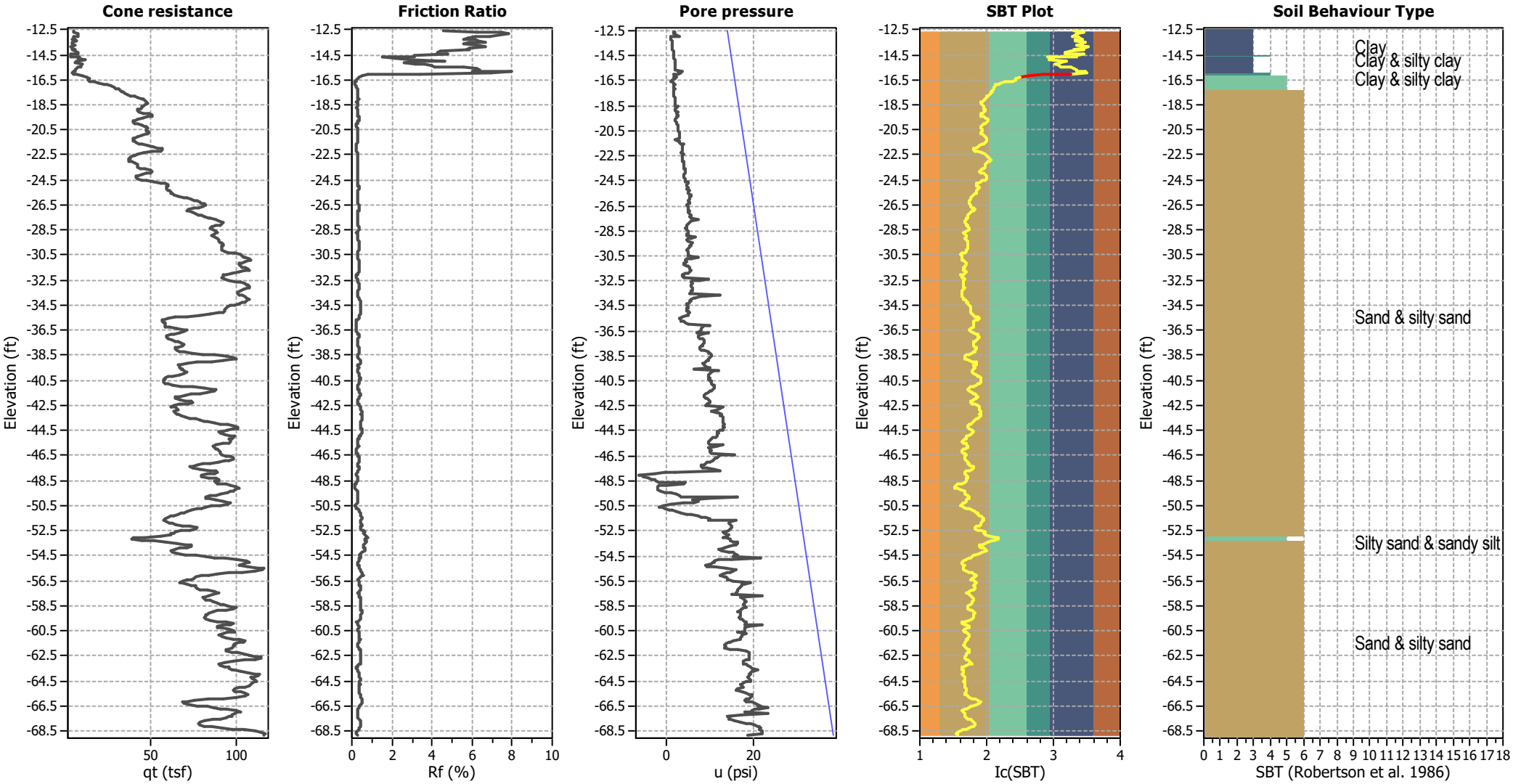






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



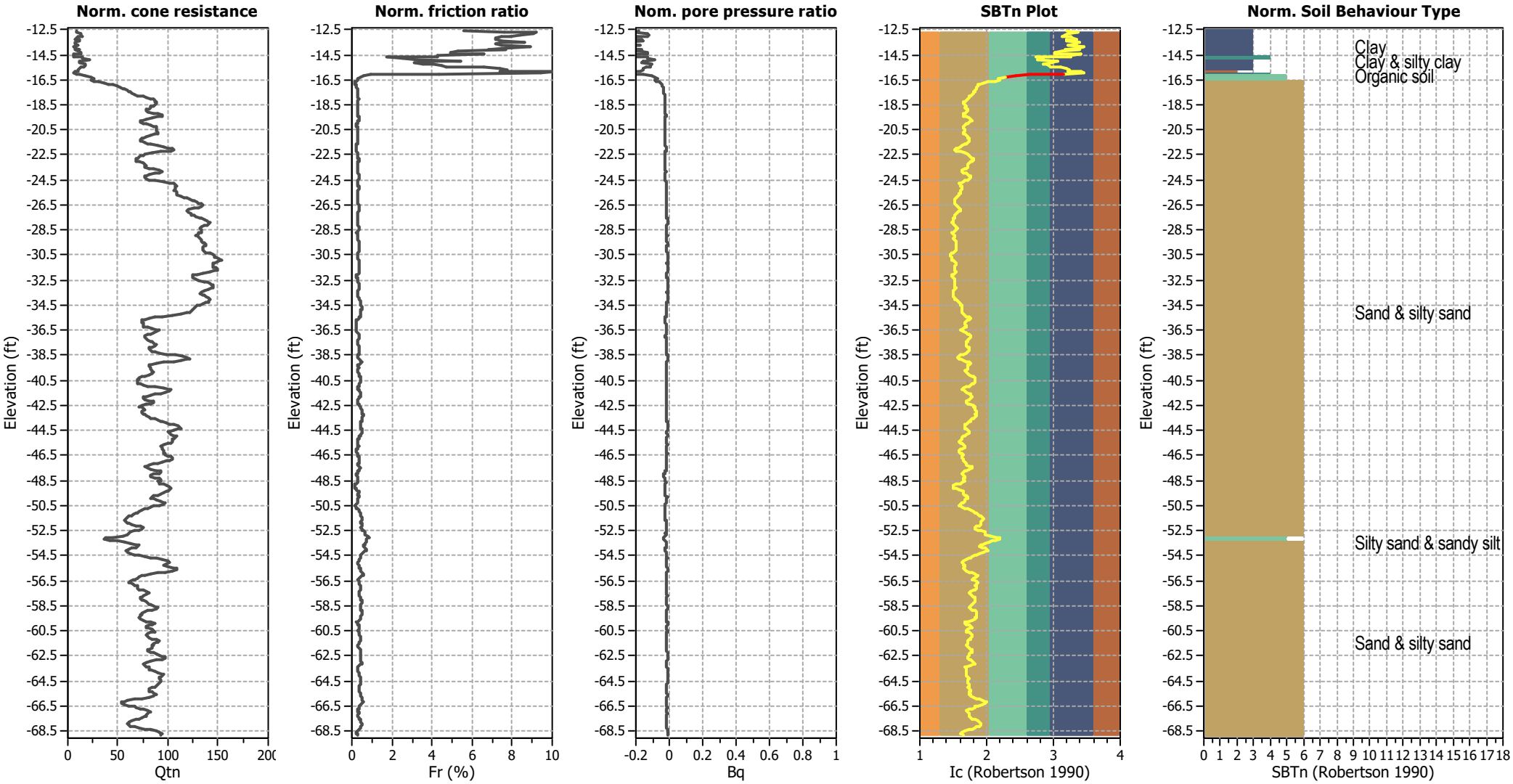
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-32.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-32.50 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



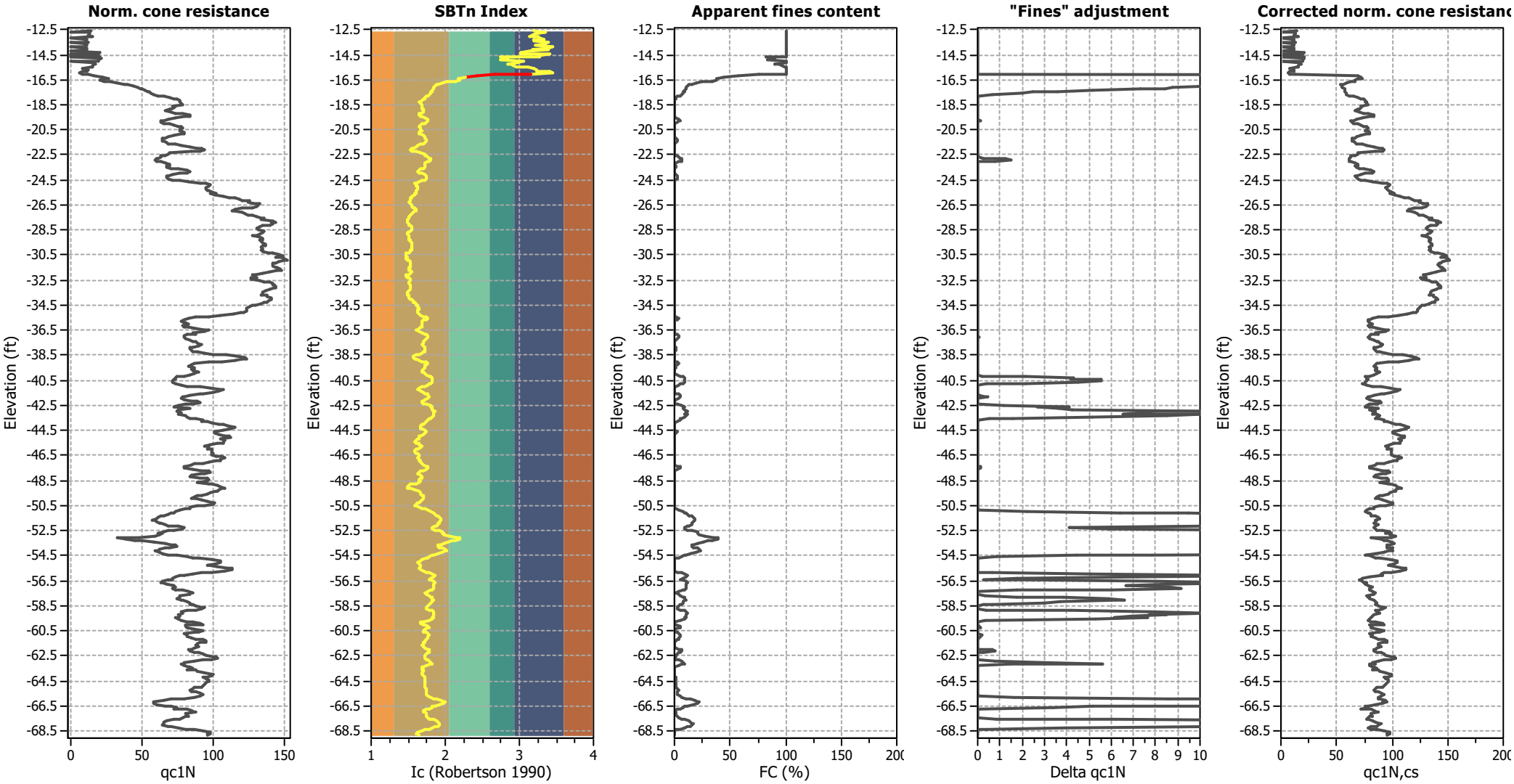
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-32.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-32.50 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

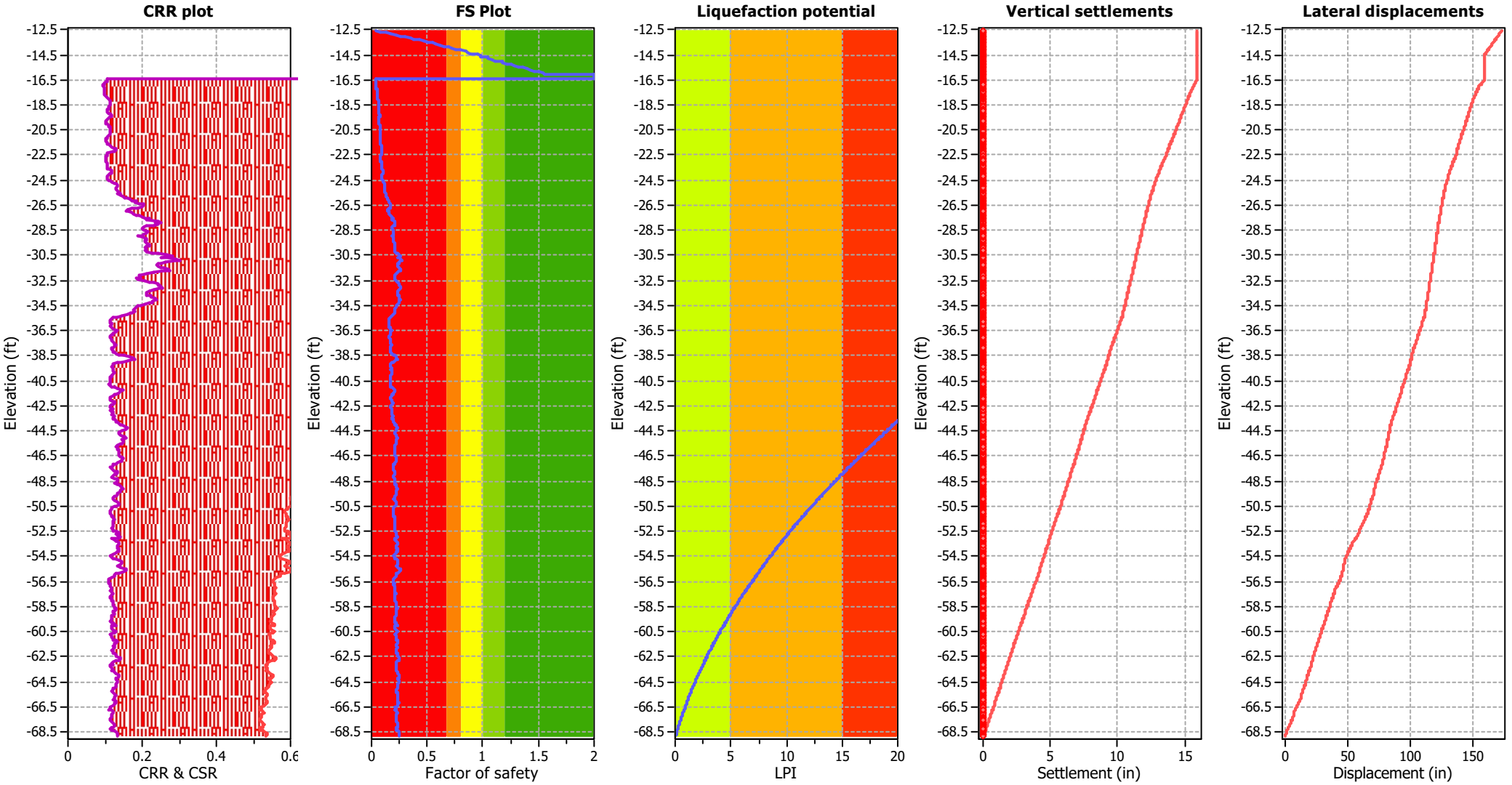
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-32.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-32.50 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-32.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-32.50 ft	Fill height:	N/A	Limit depth:	N/A

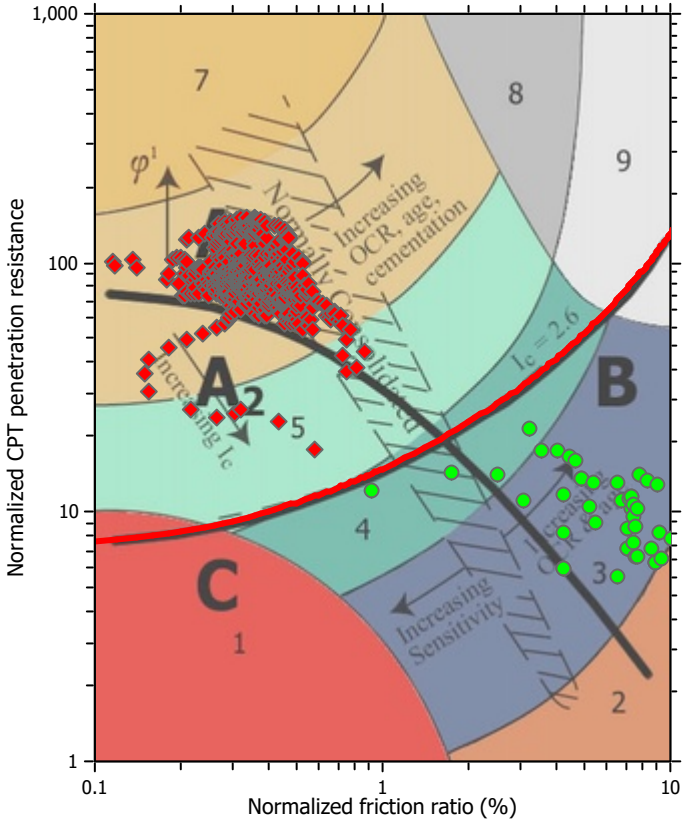
F.S. color scheme

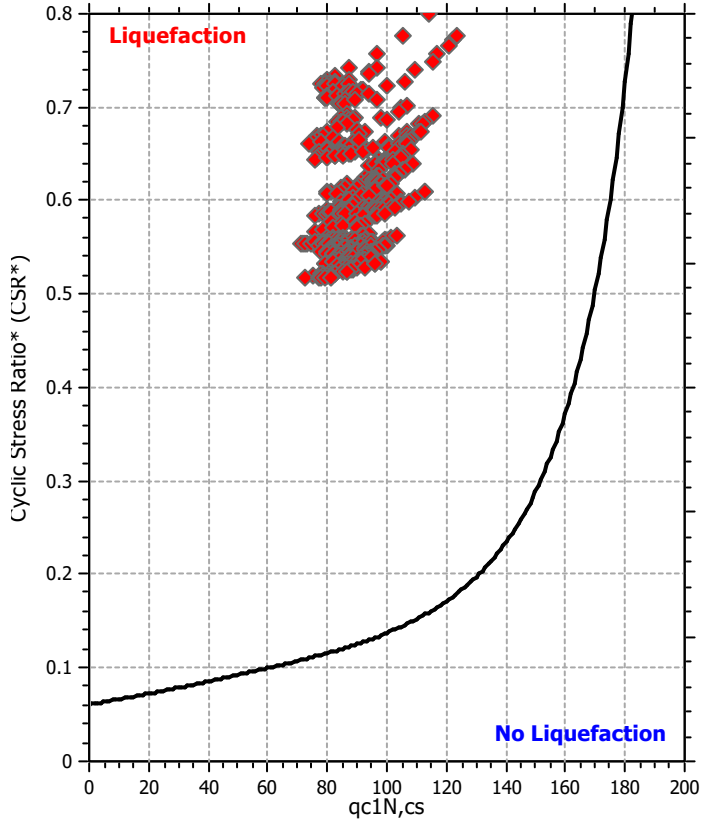
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

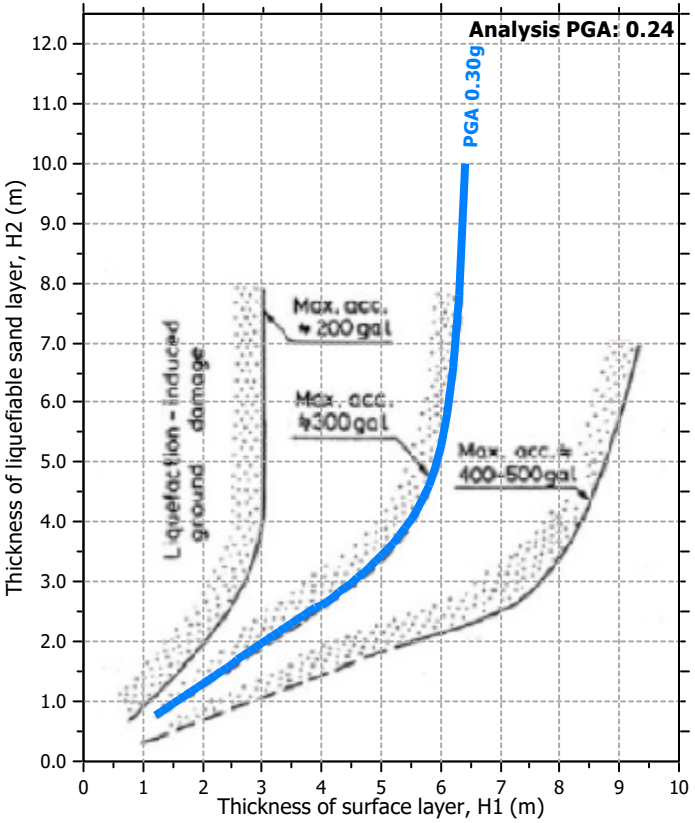
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



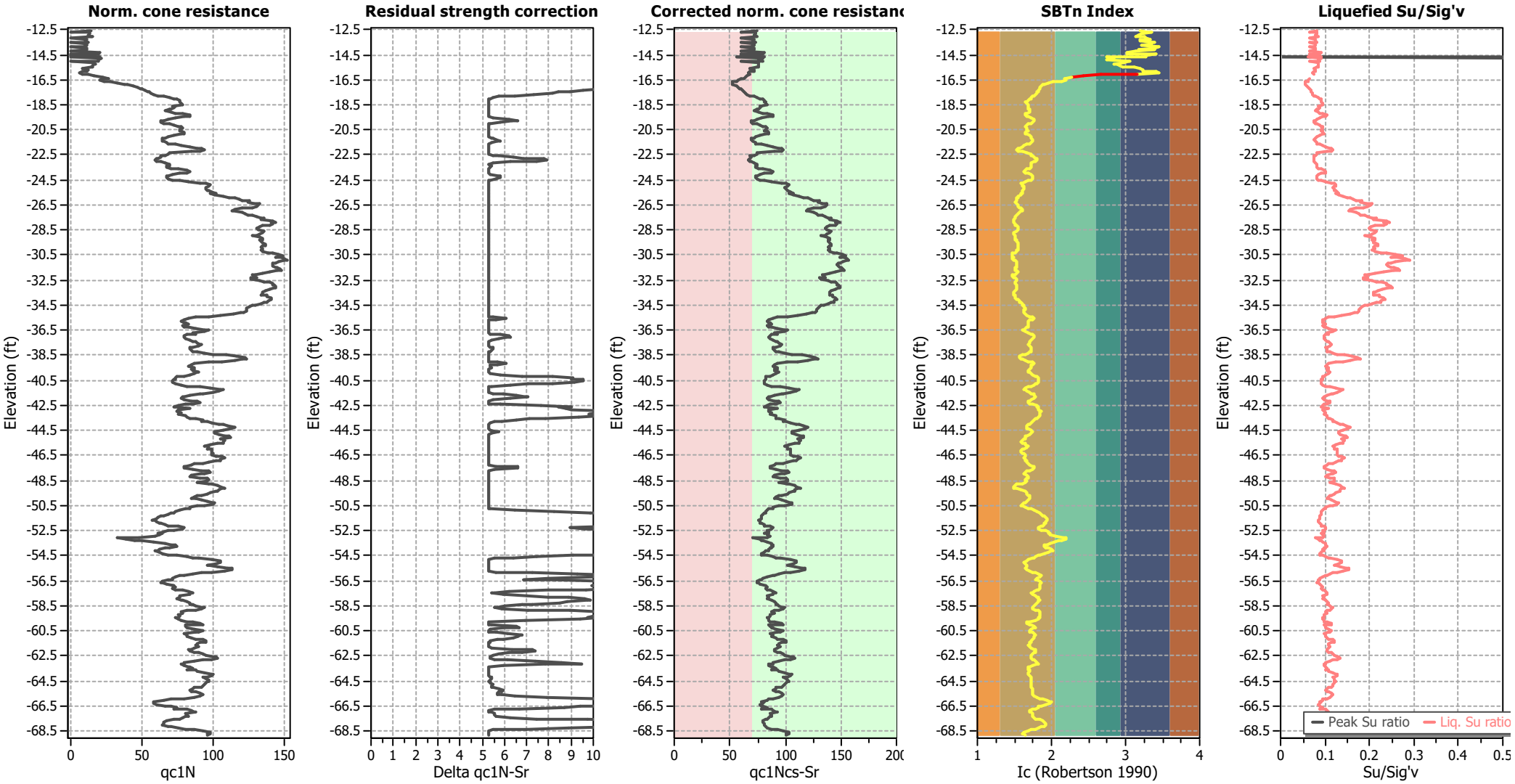




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-32.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-32.50 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

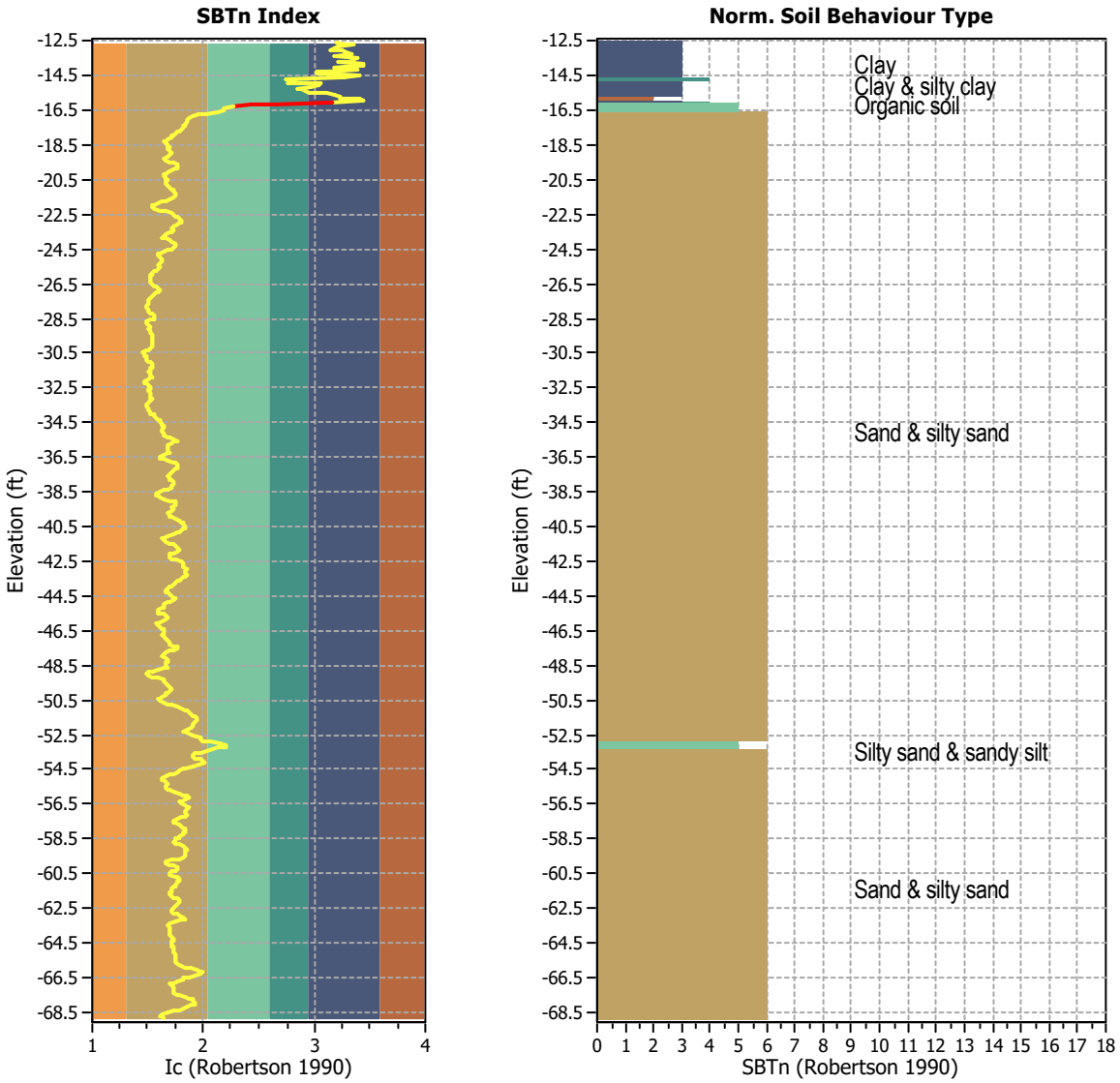
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-32.50 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-32.50 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

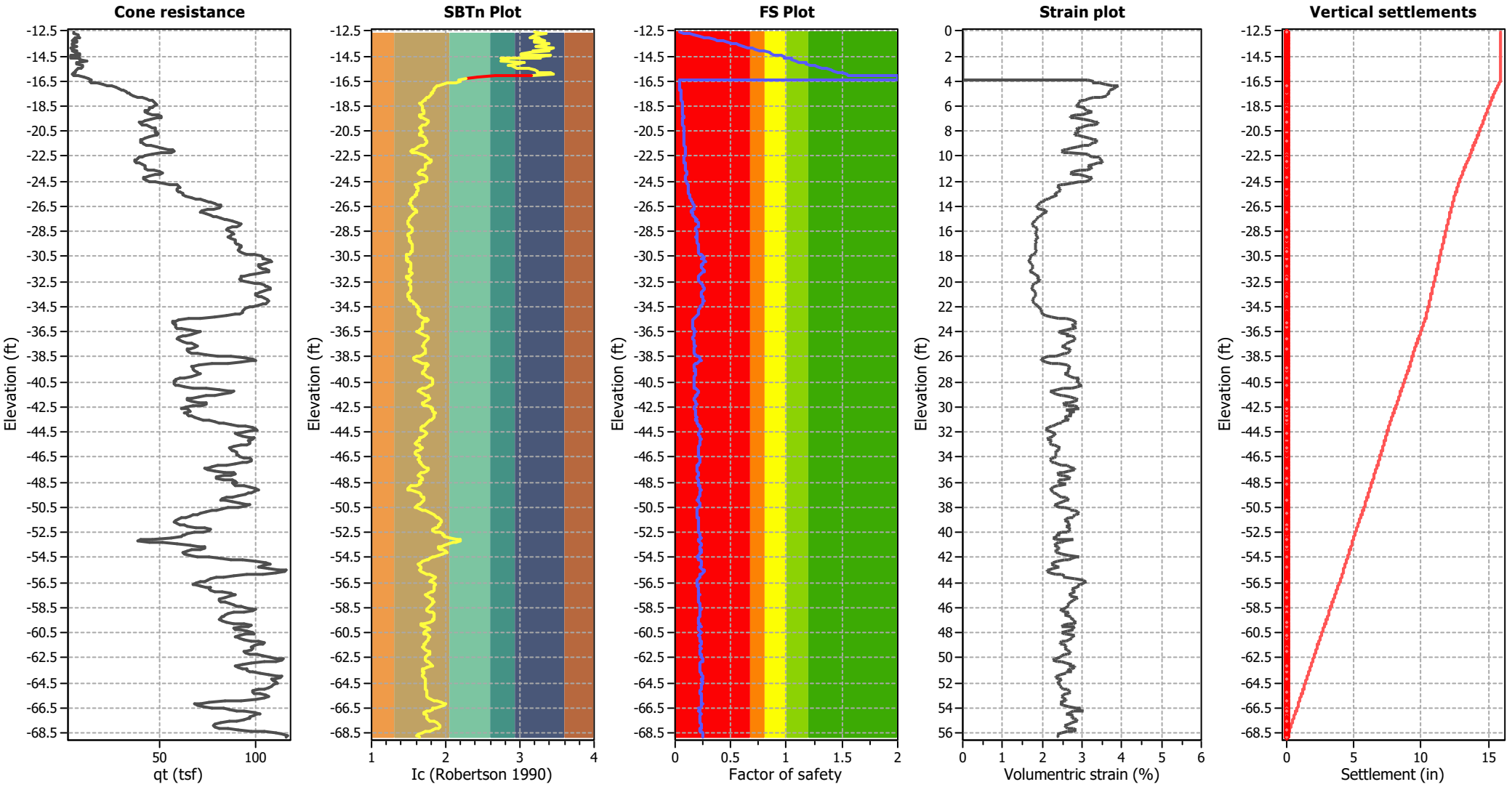
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	687
I_c maximum check value:	3.00	Total points excluded:	4
I_c change ratio value:	0.0250	Exclusion percentage:	0.58%
Minimum number of points in layer:	4	Number of layers detected:	1

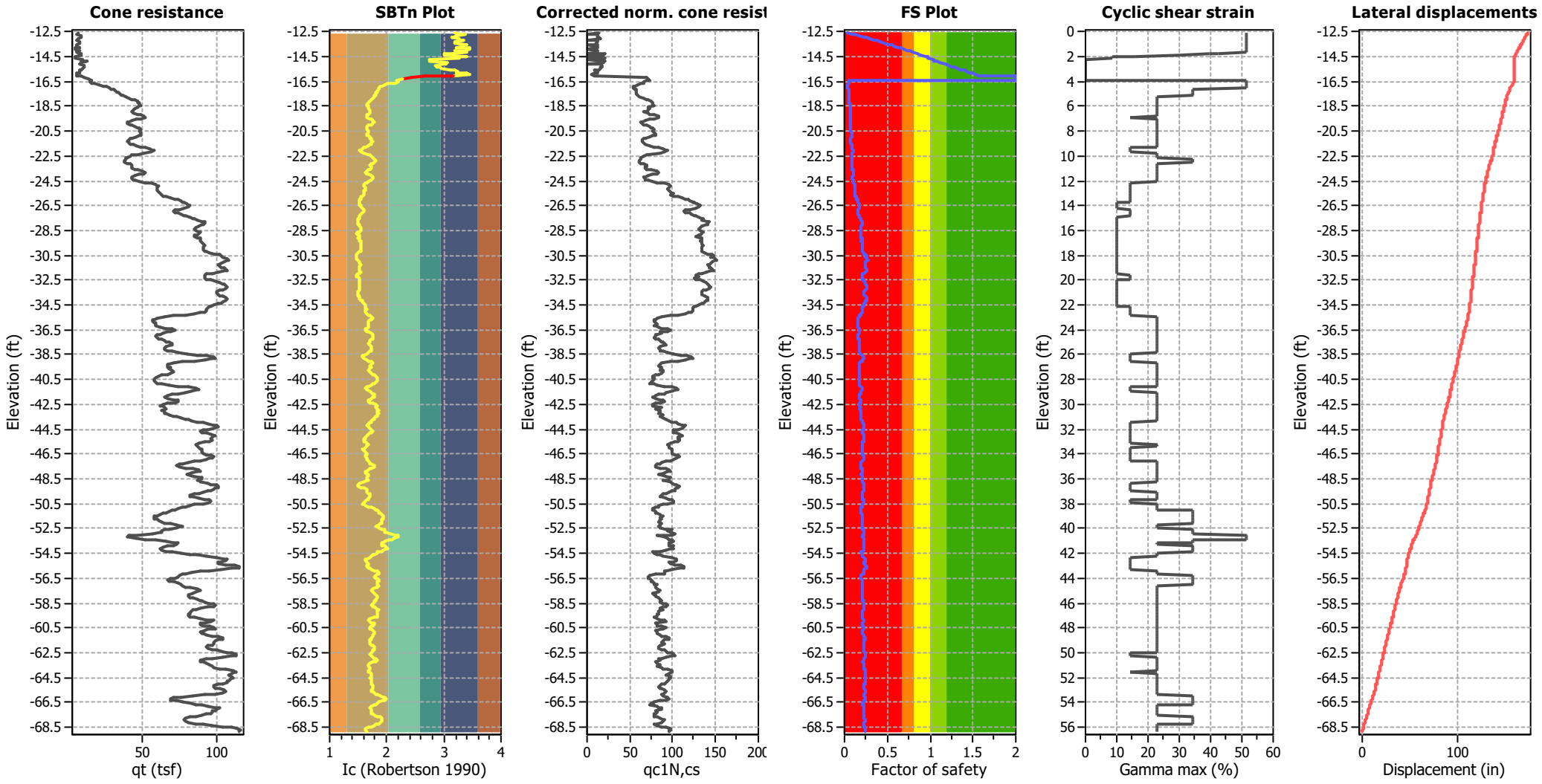
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

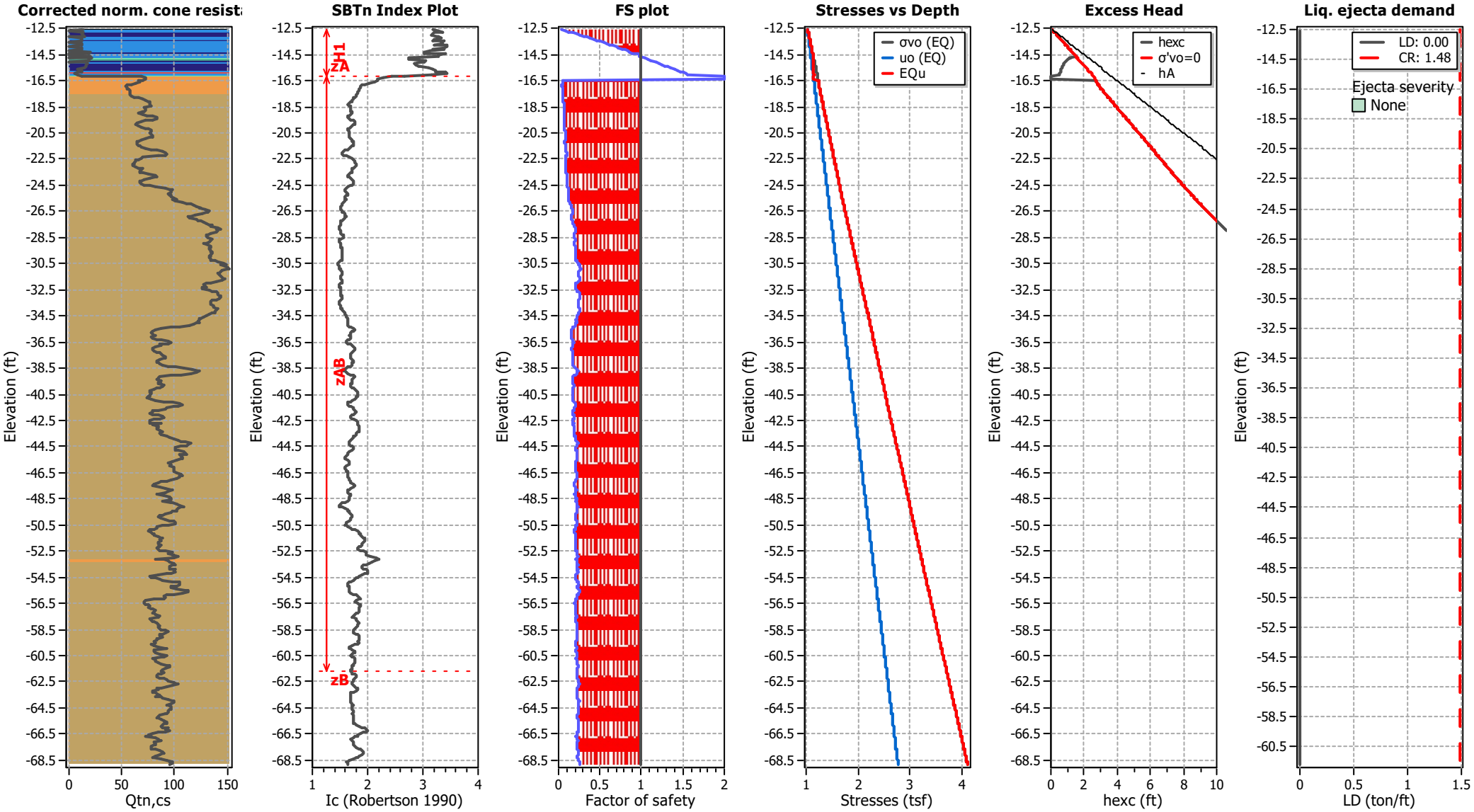
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

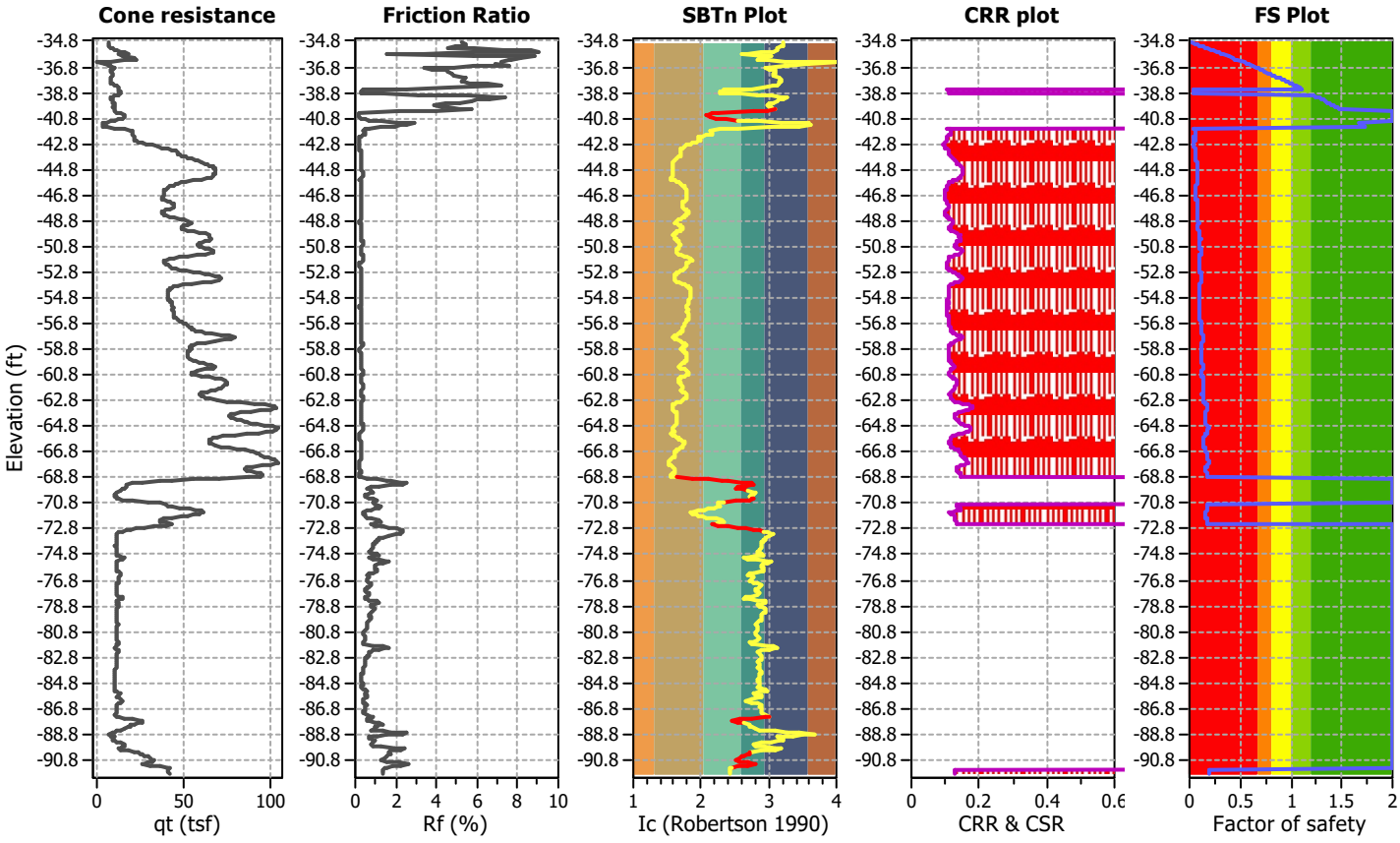
LIQUEFACTION ANALYSIS REPORT

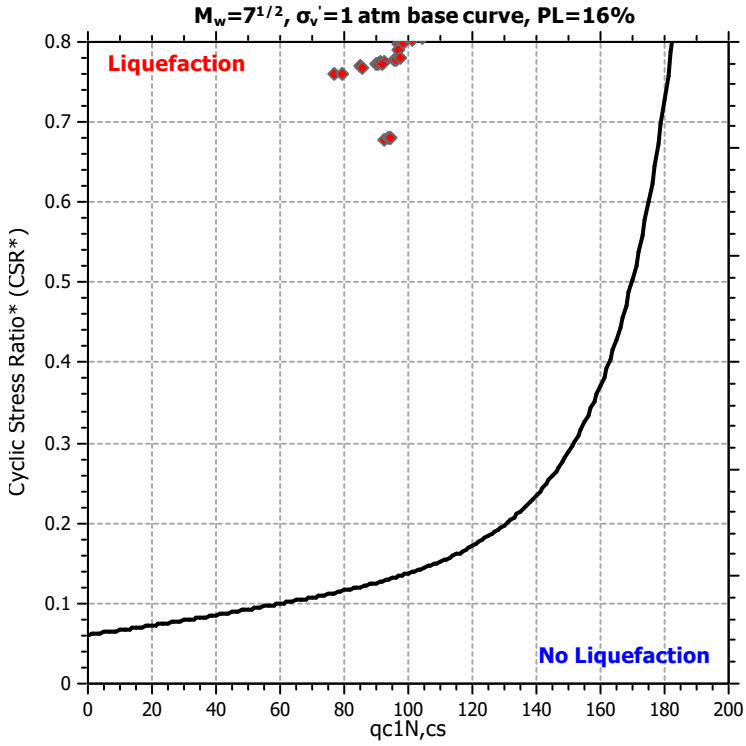
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

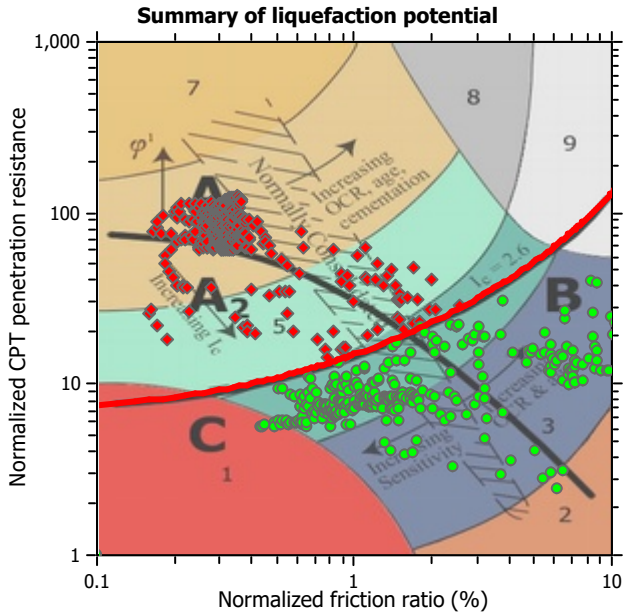
CPT file : CPTW-12

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	-54.80 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	-54.80 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

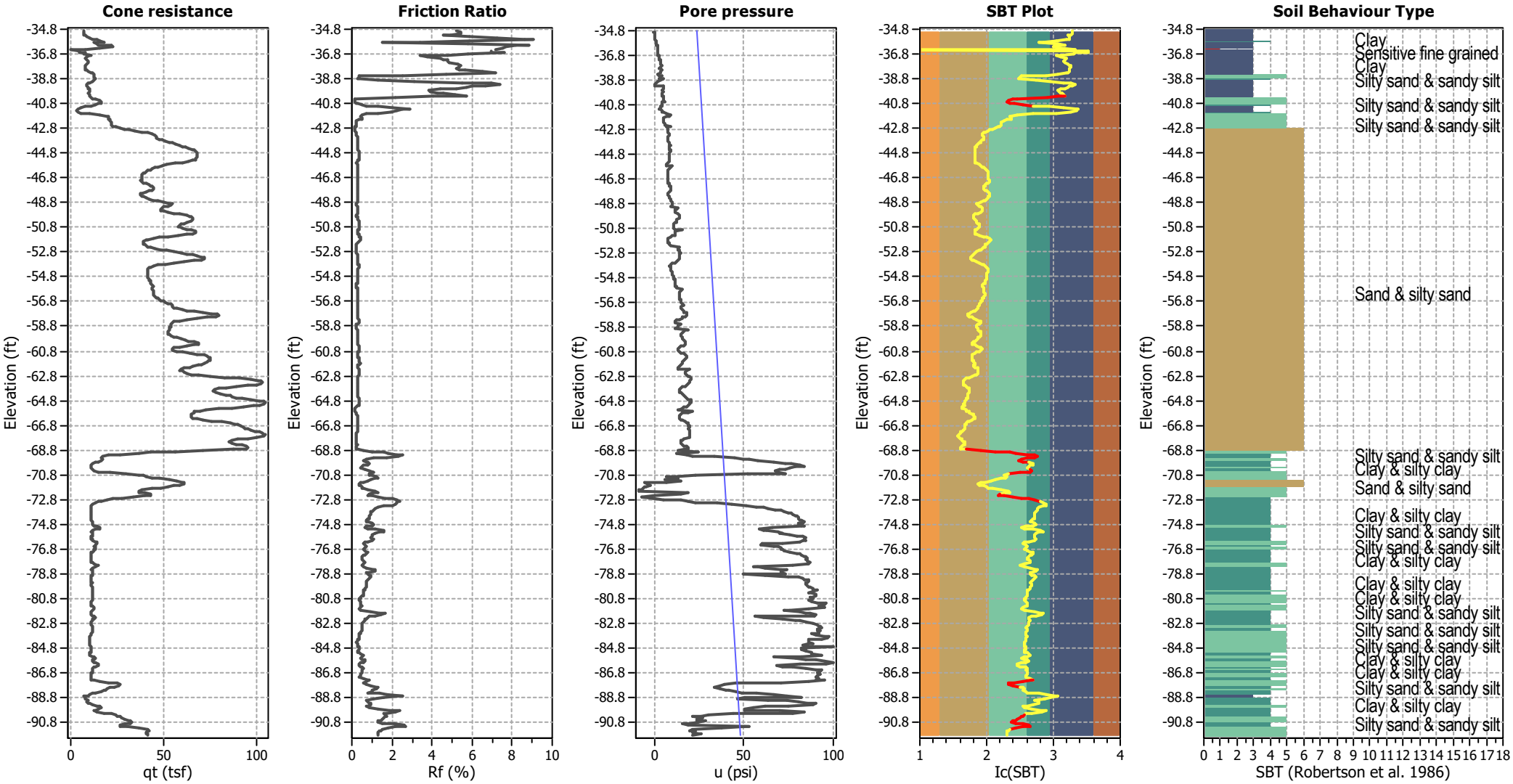






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



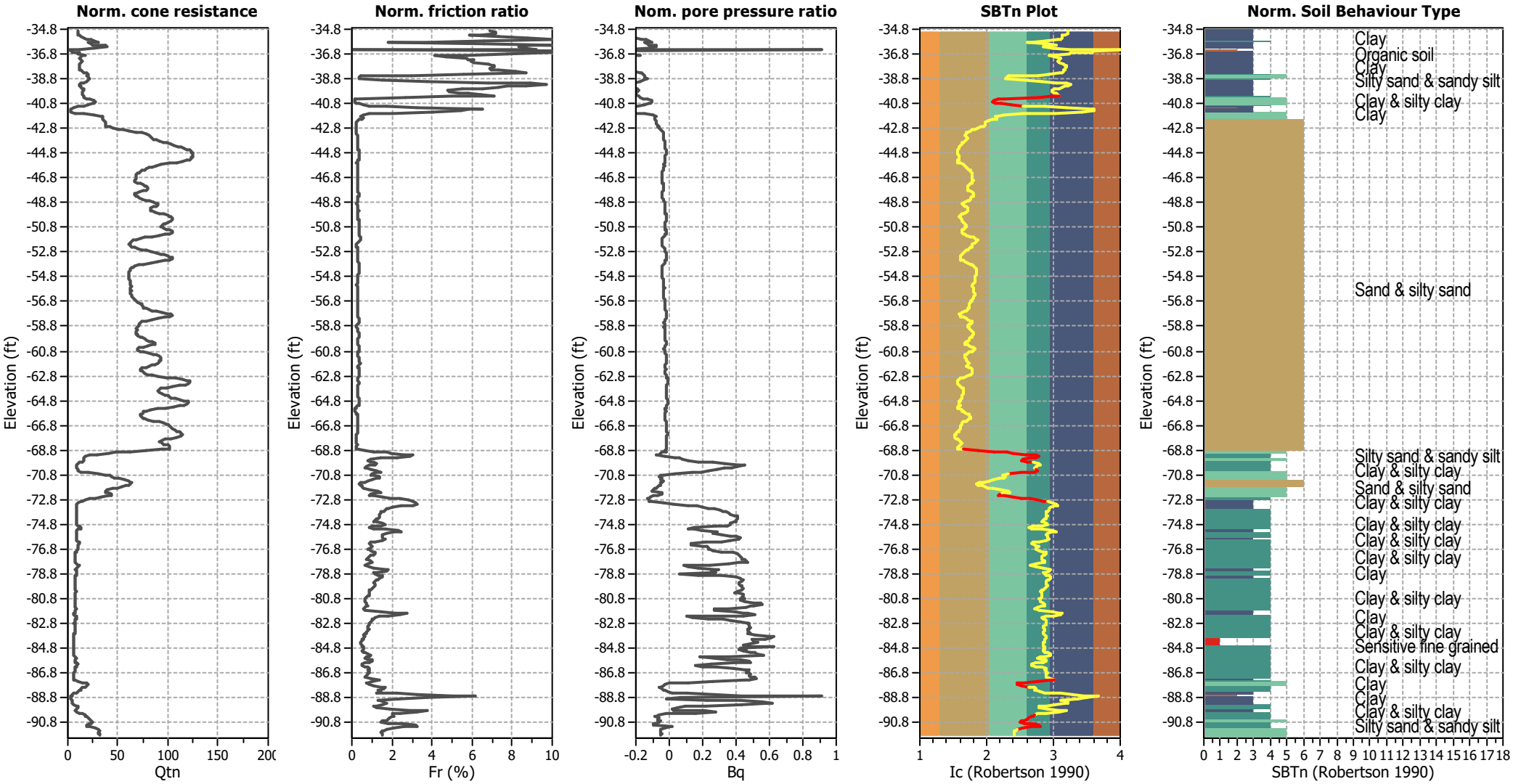
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-54.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-54.80 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



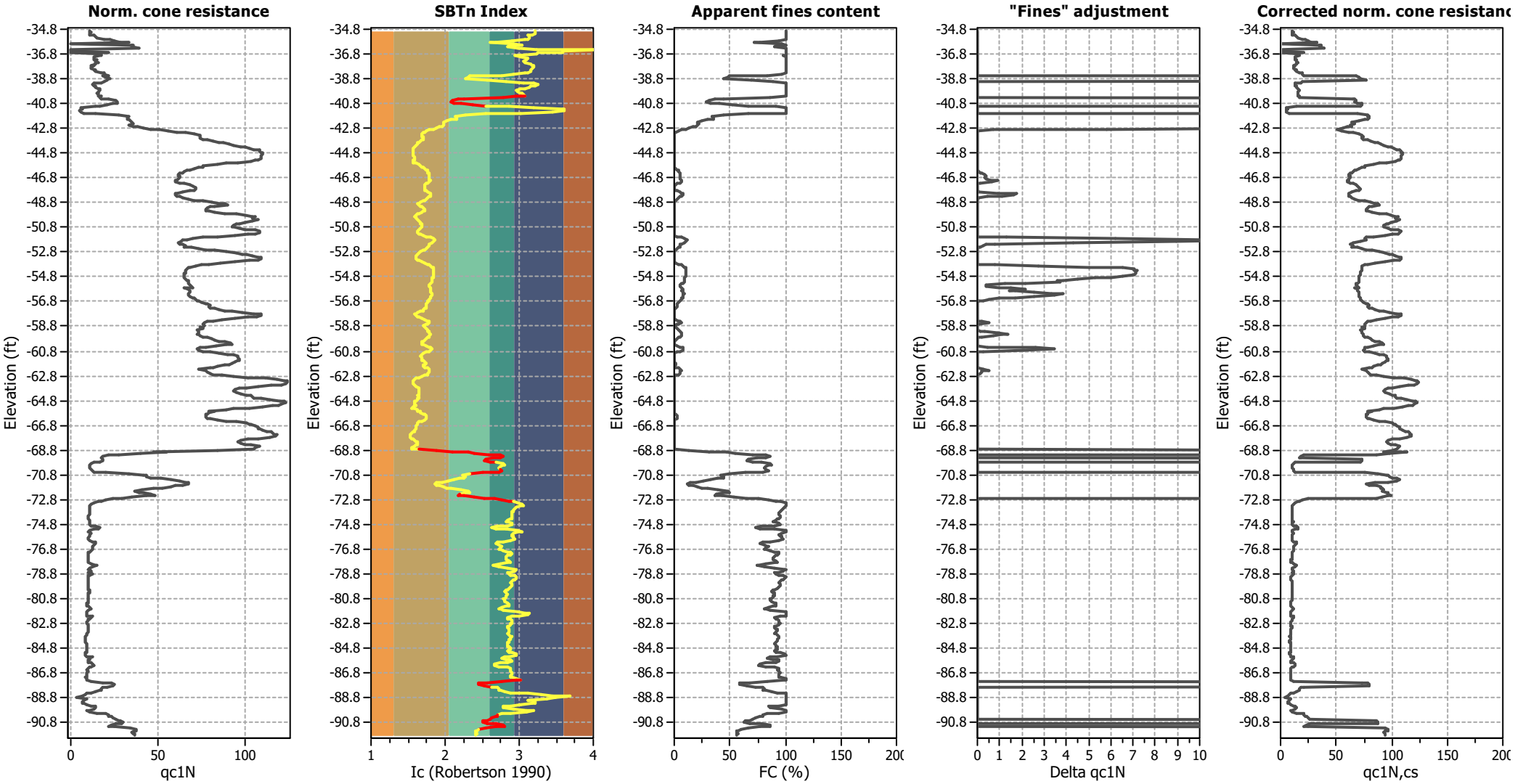
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-54.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-54.80 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

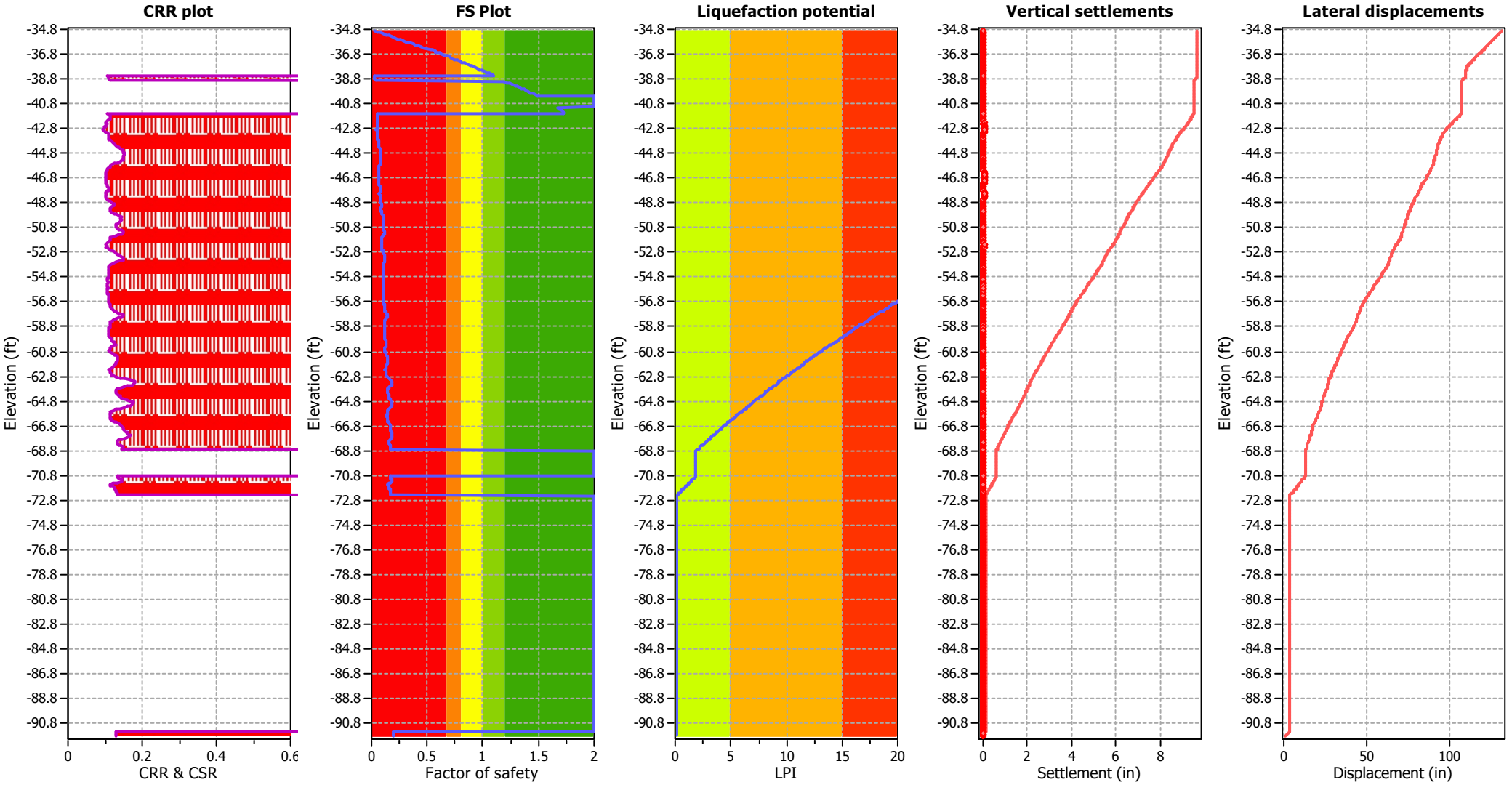
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-54.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-54.80 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-54.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-54.80 ft	Fill height:	N/A	Limit depth:	N/A

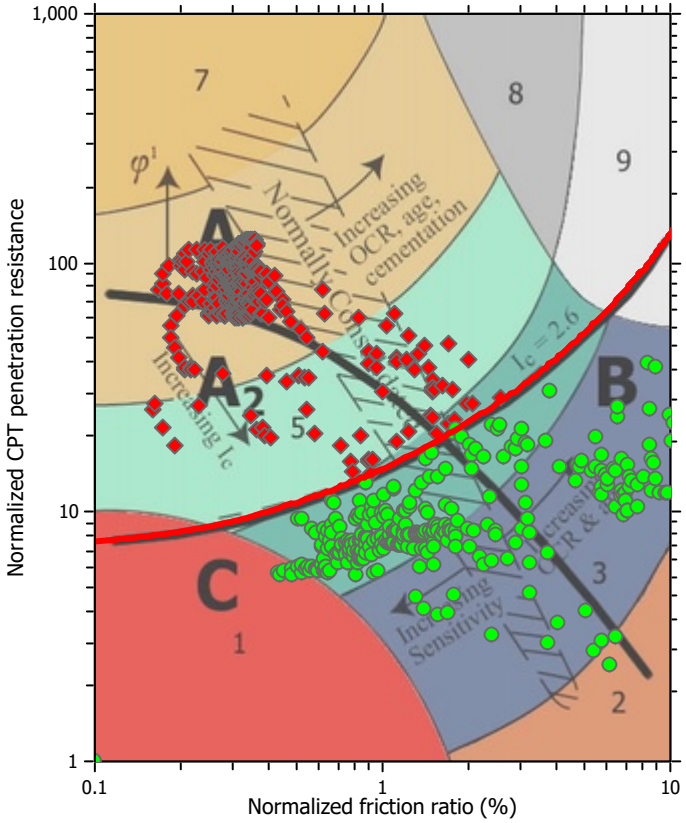
F.S. color scheme

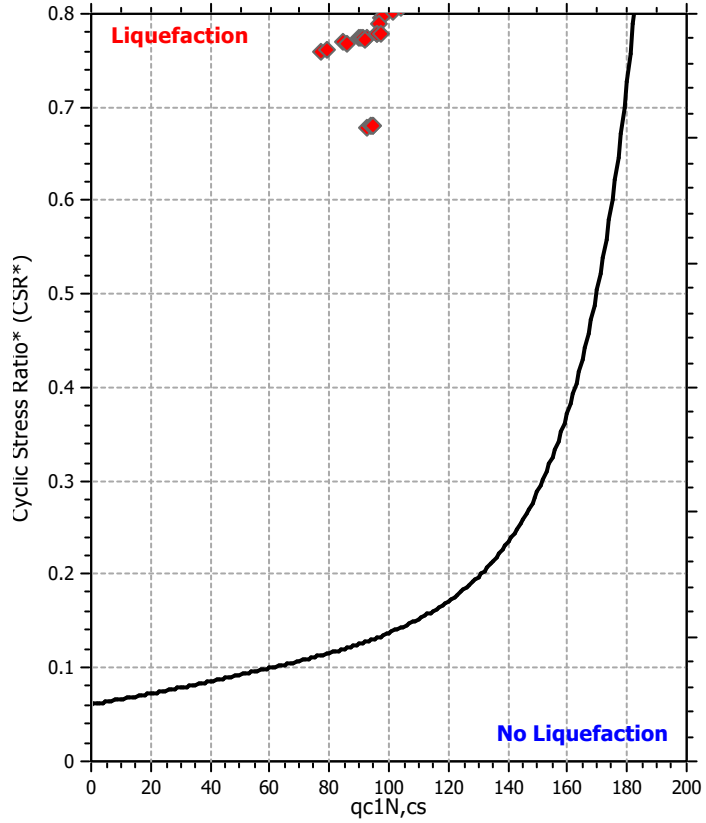
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

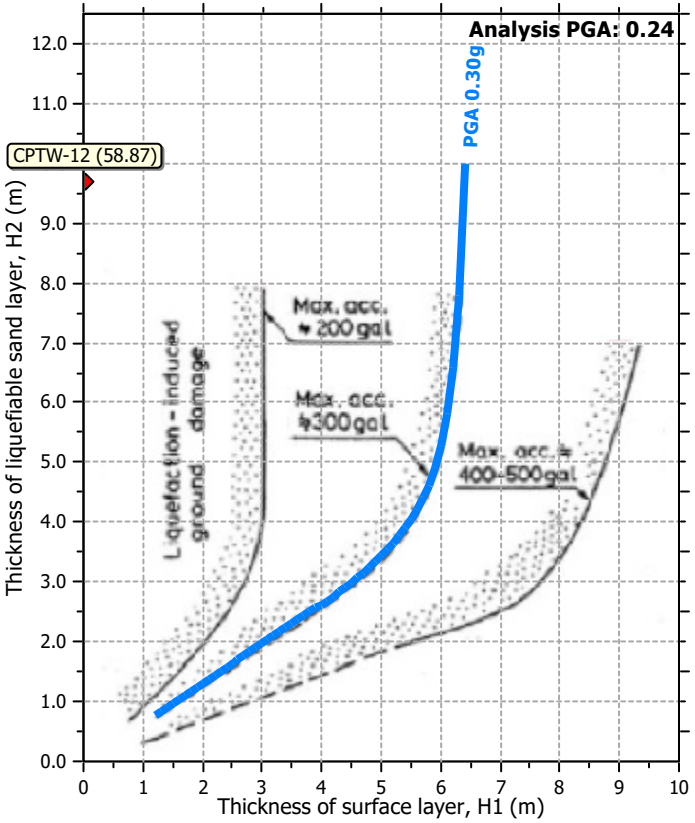
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



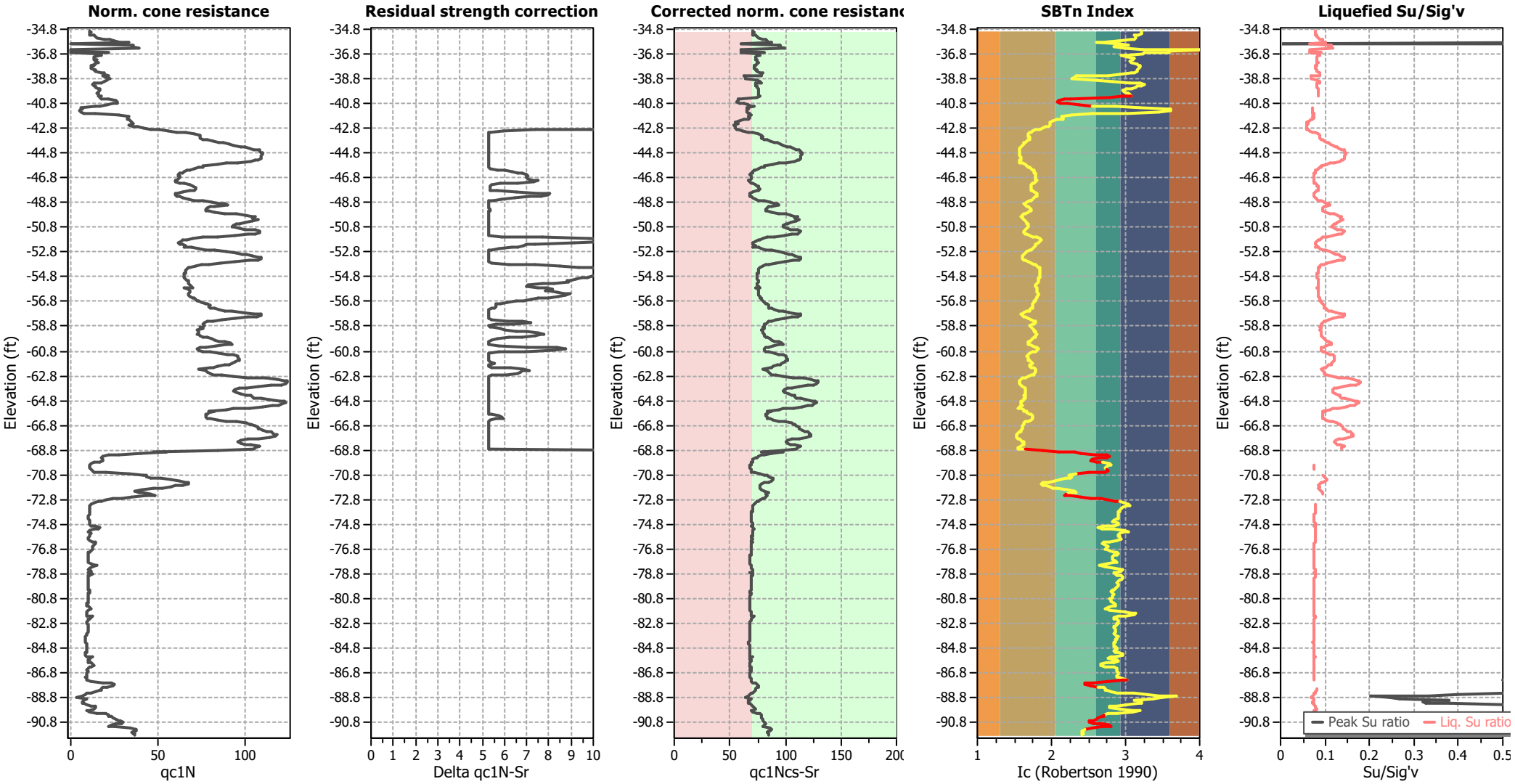




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-54.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-54.80 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

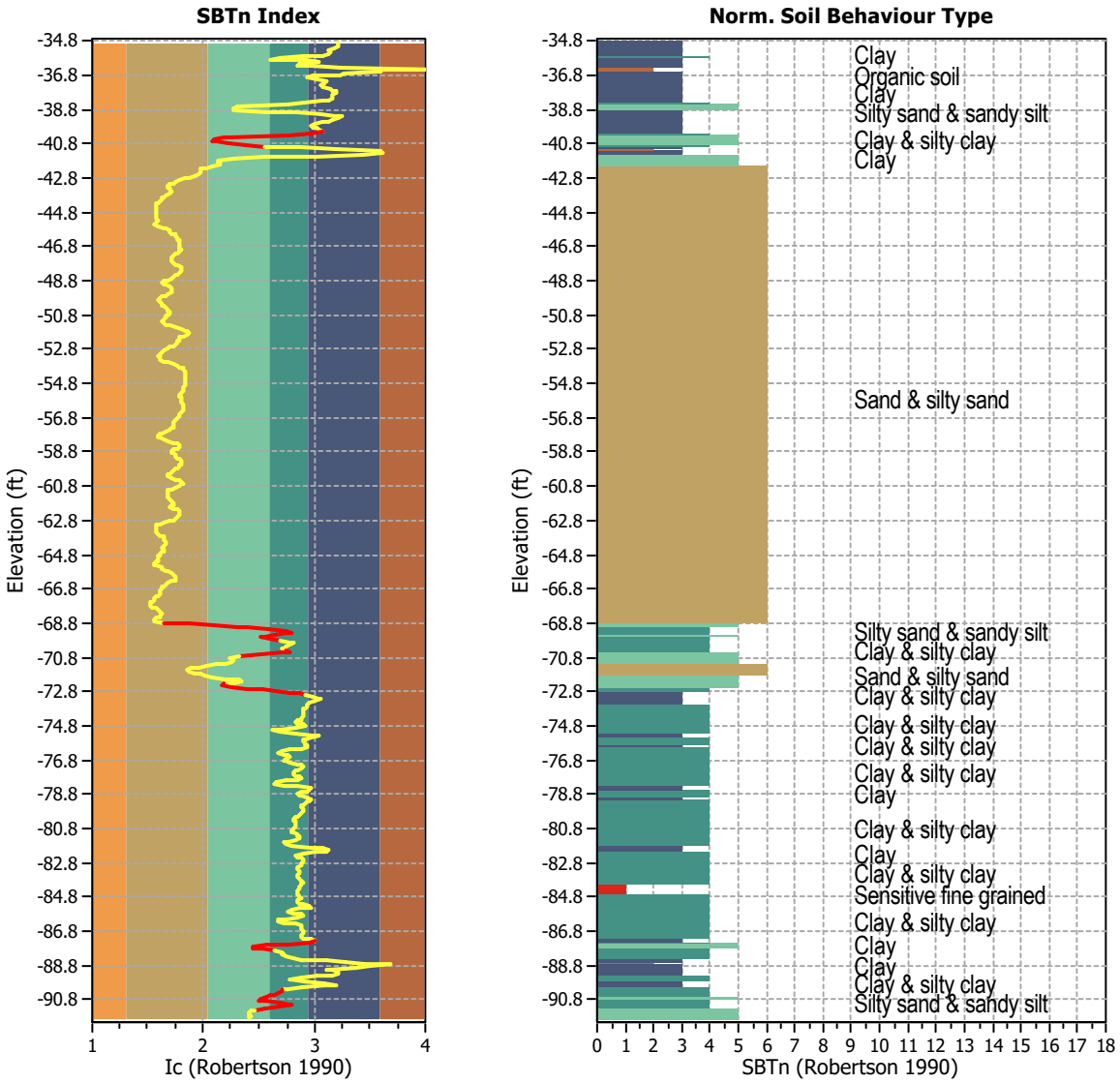
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	-54.80 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	-54.80 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

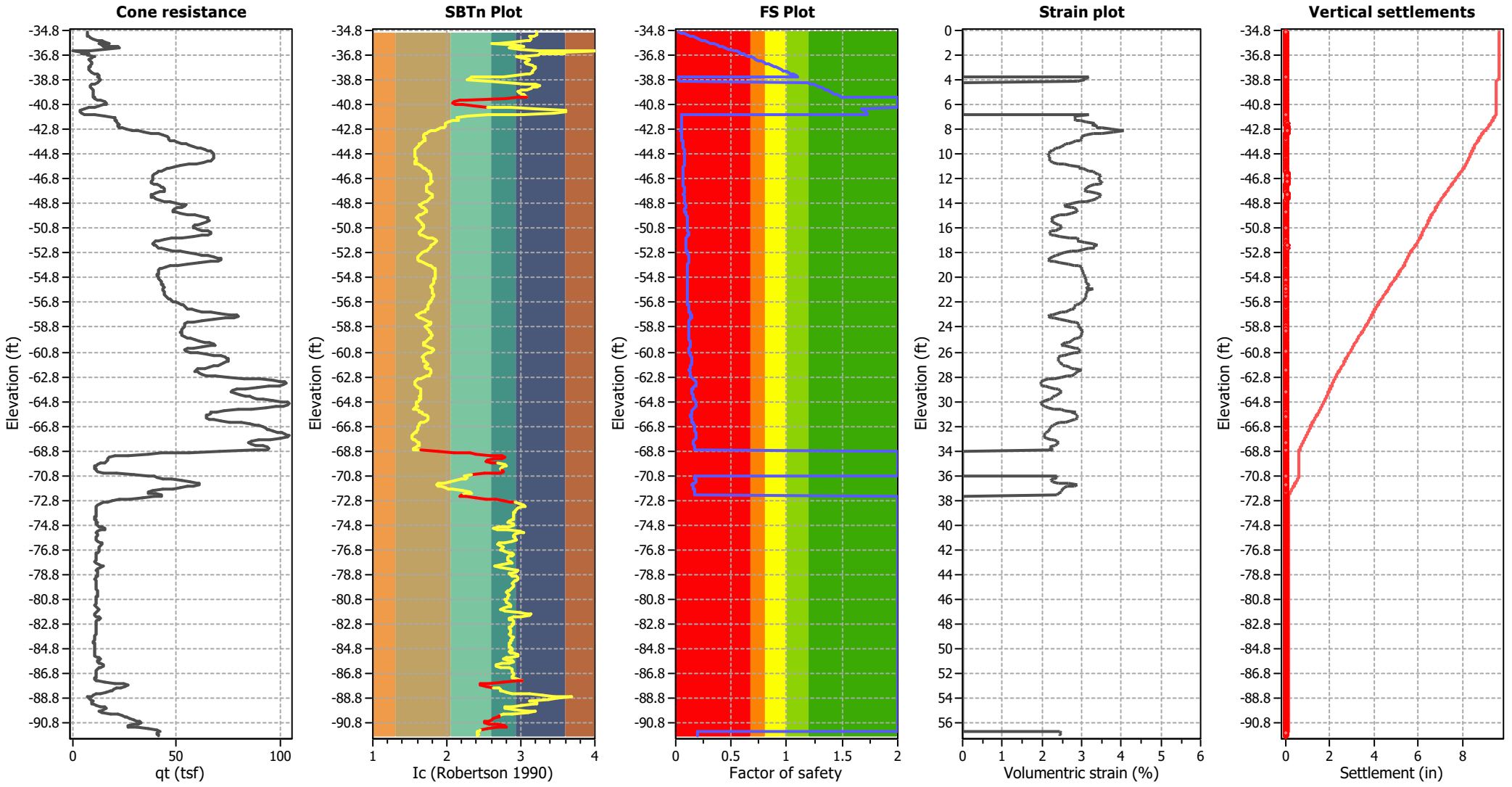
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	696
I_c maximum check value:	3.00	Total points excluded:	65
I_c change ratio value:	0.0250	Exclusion percentage:	9.34%
Minimum number of points in layer:	4	Number of layers detected:	12

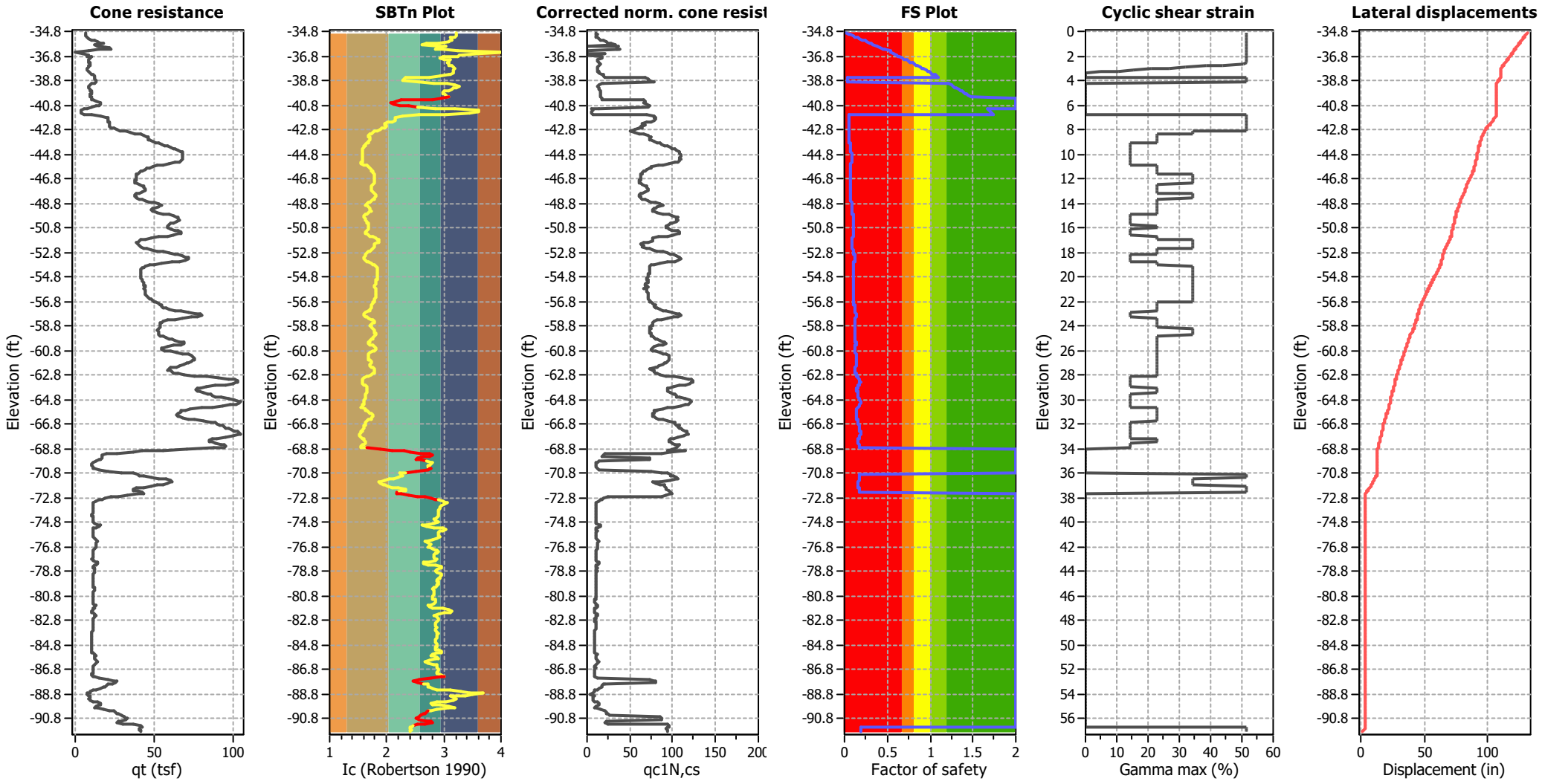
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

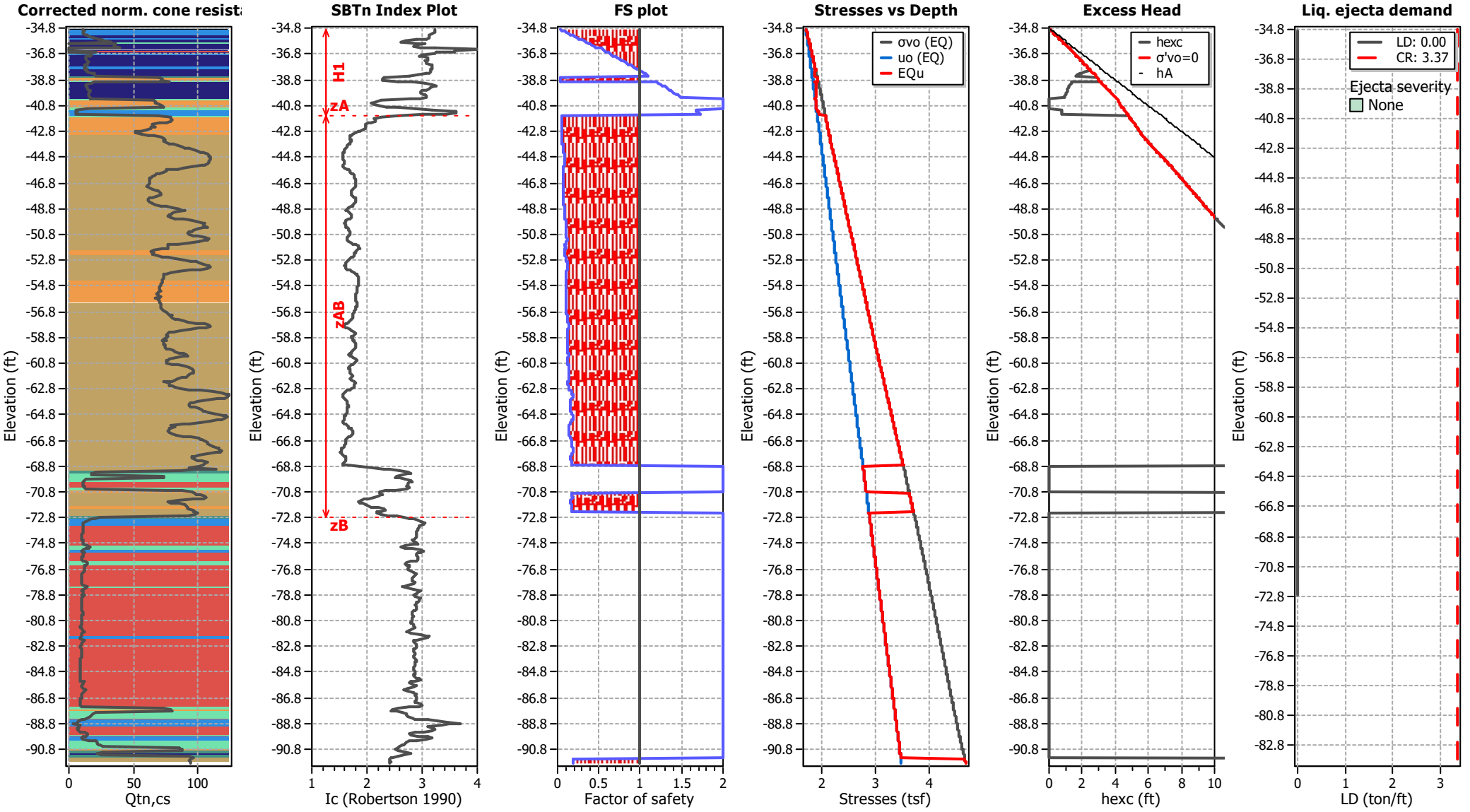
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

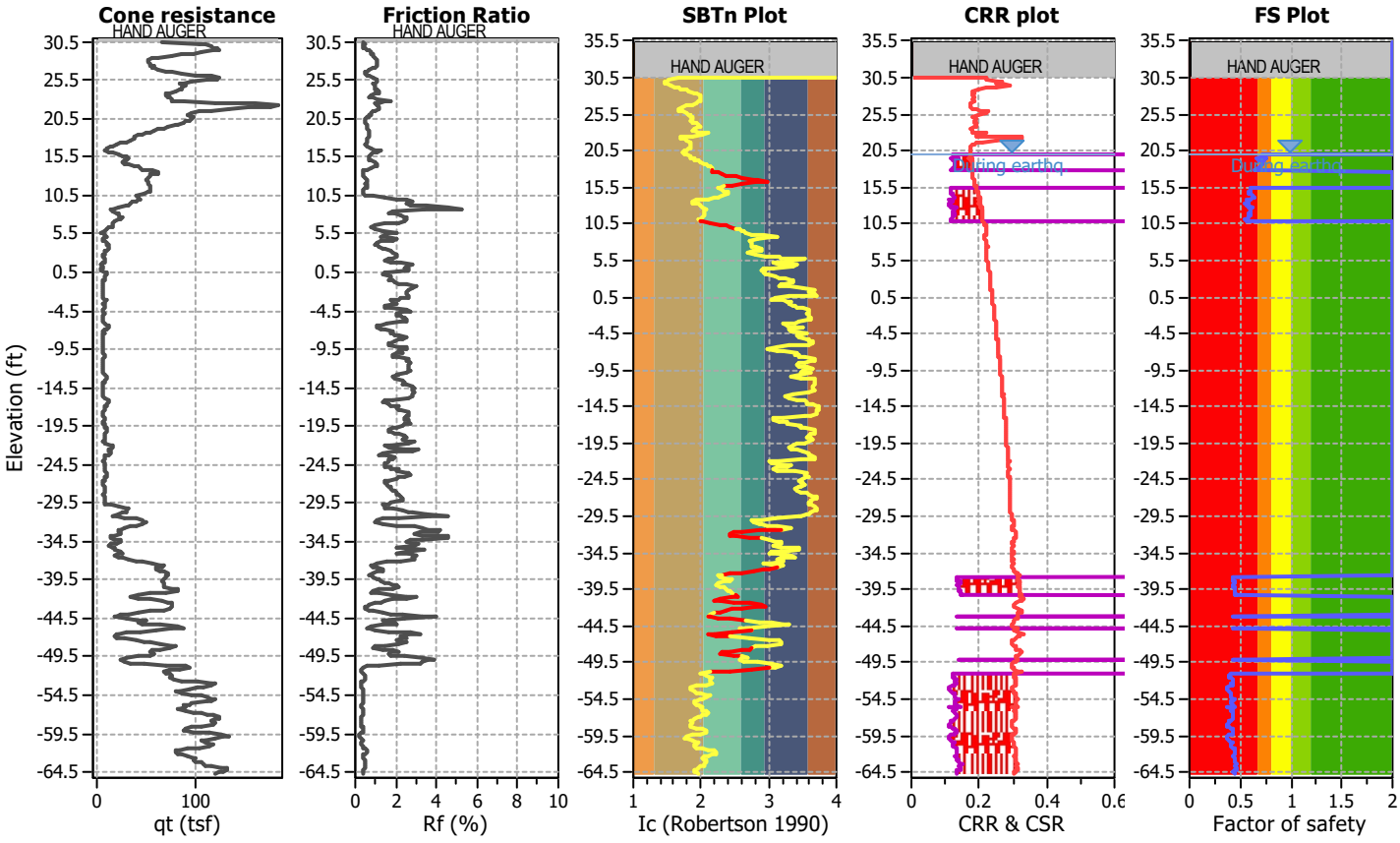
LIQUEFACTION ANALYSIS REPORT

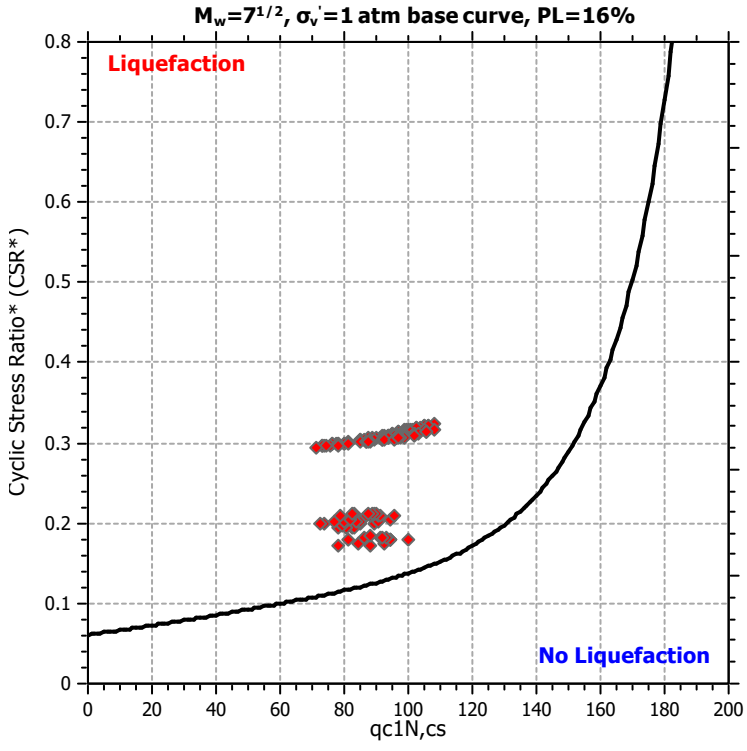
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

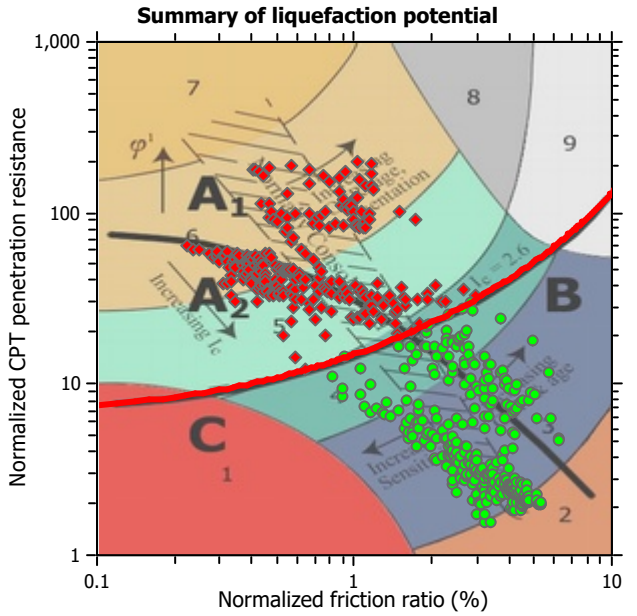
CPT file : SCPT-01

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	15.53 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	15.53 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

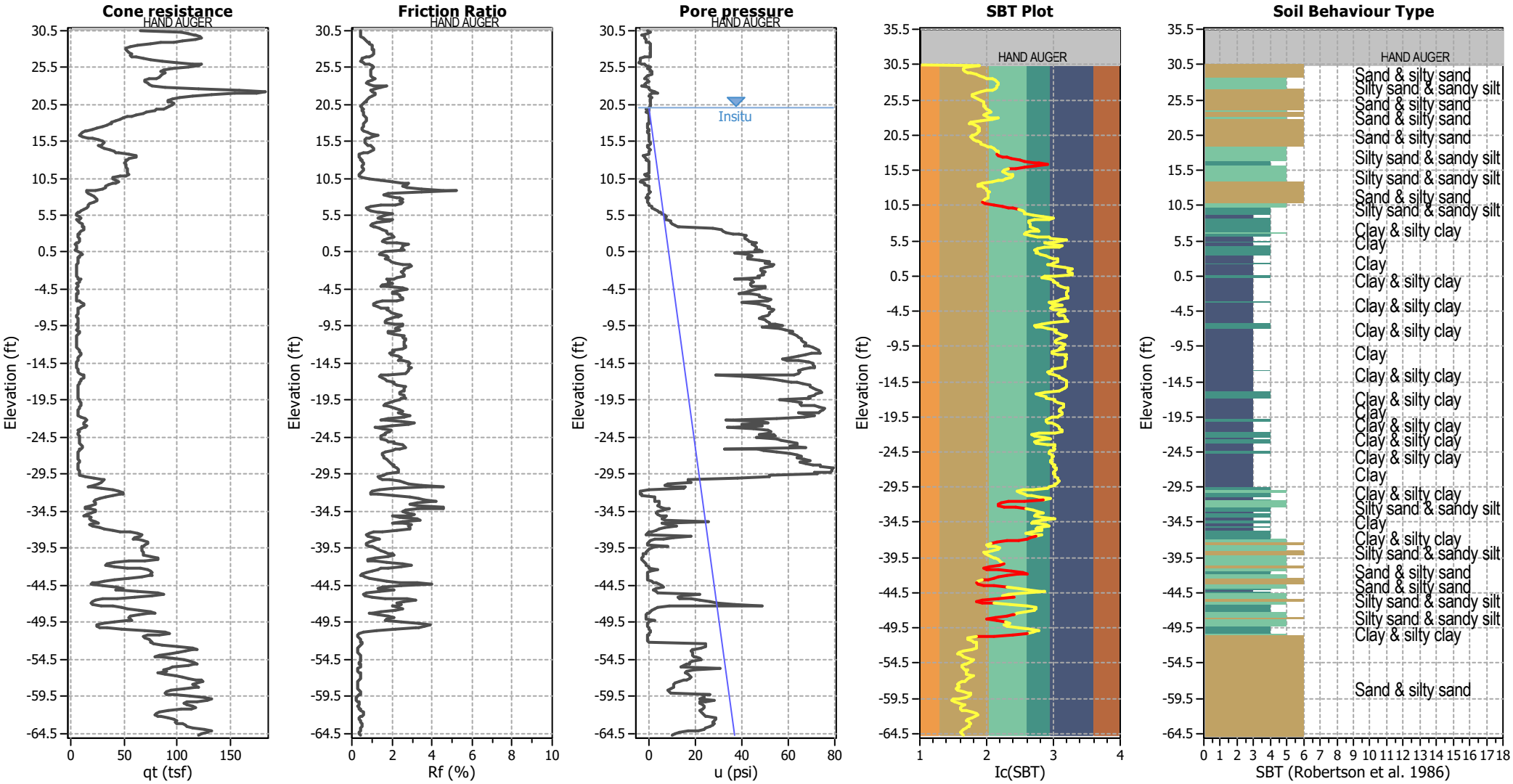






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



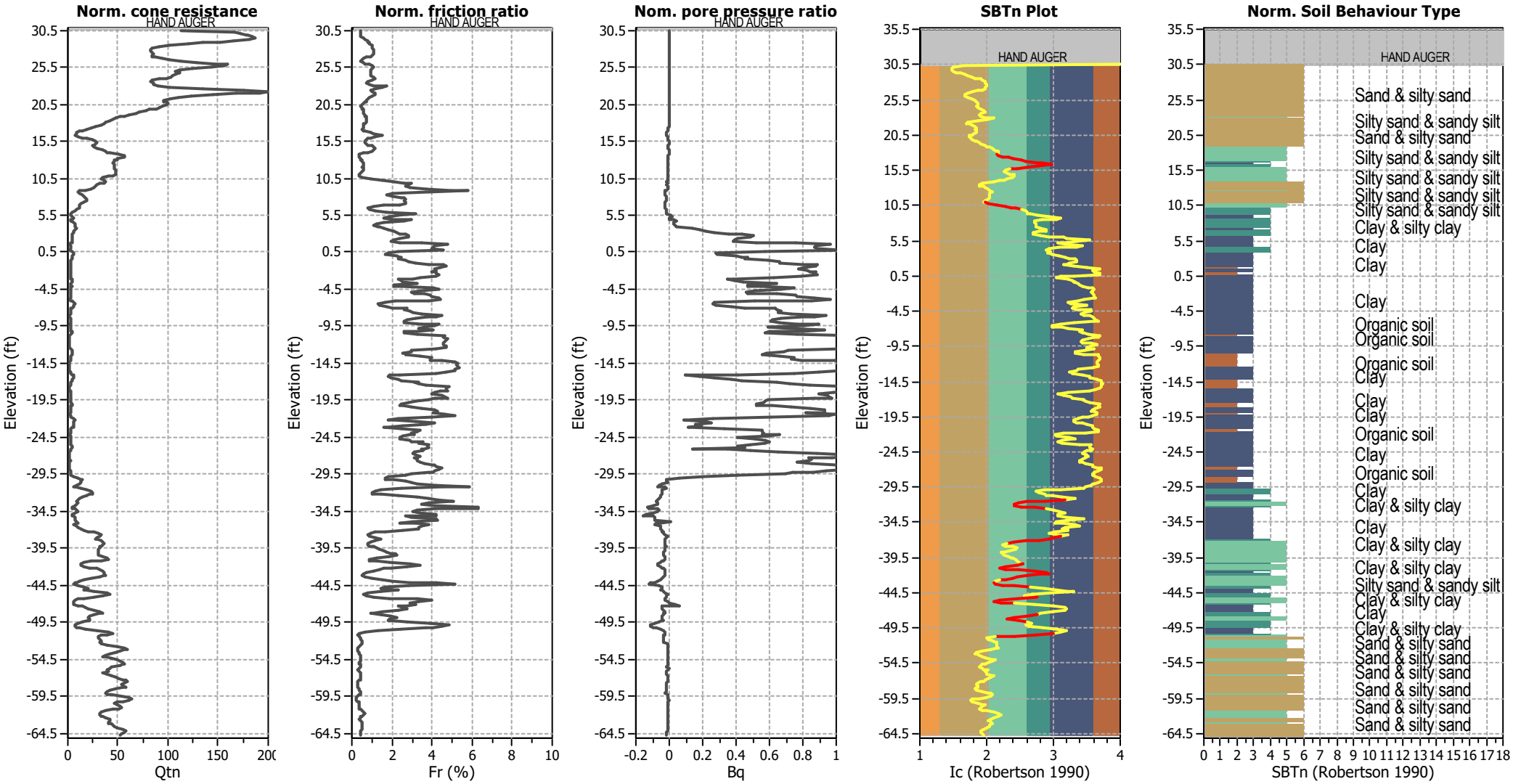
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.53 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.53 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



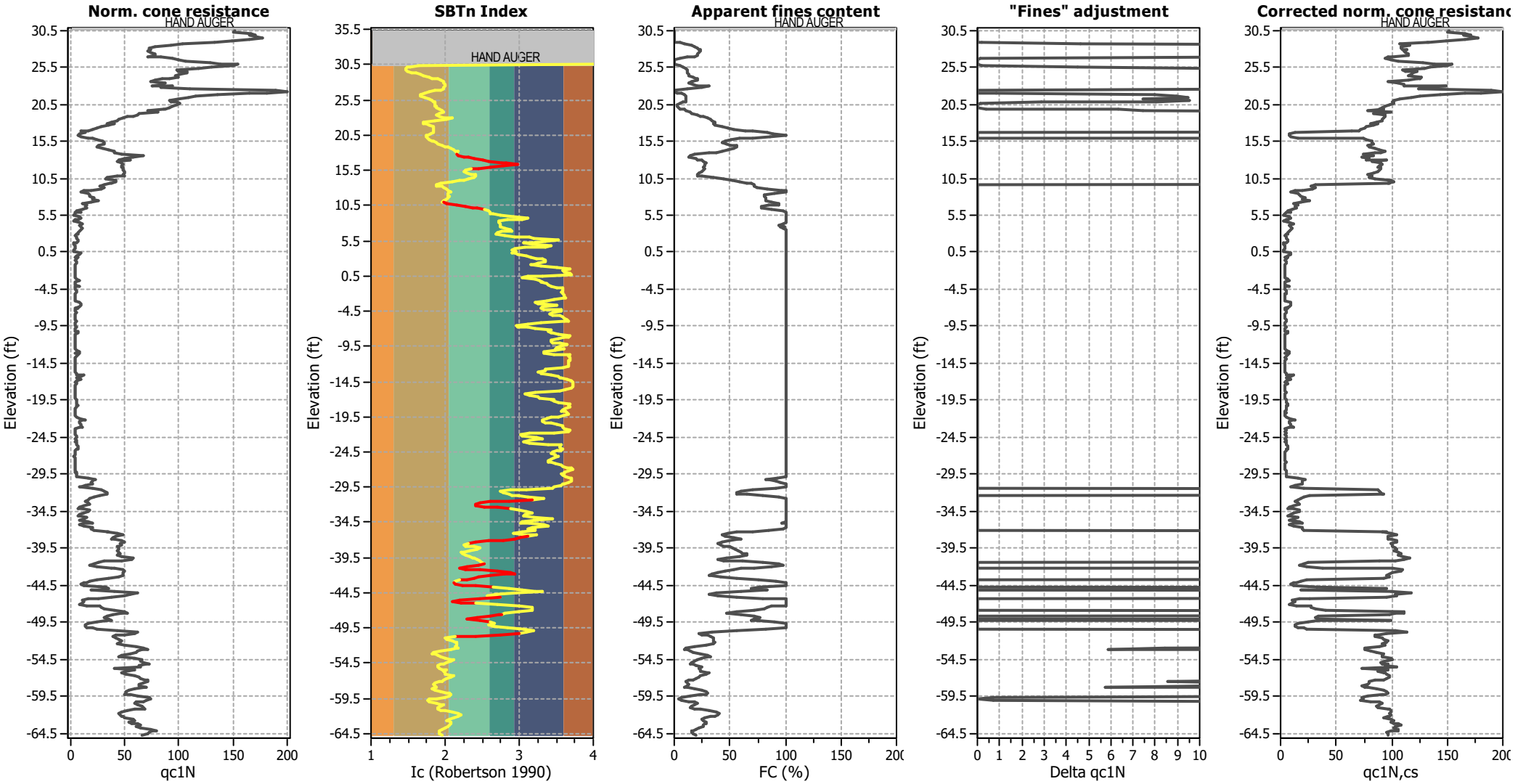
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.53 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.53 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

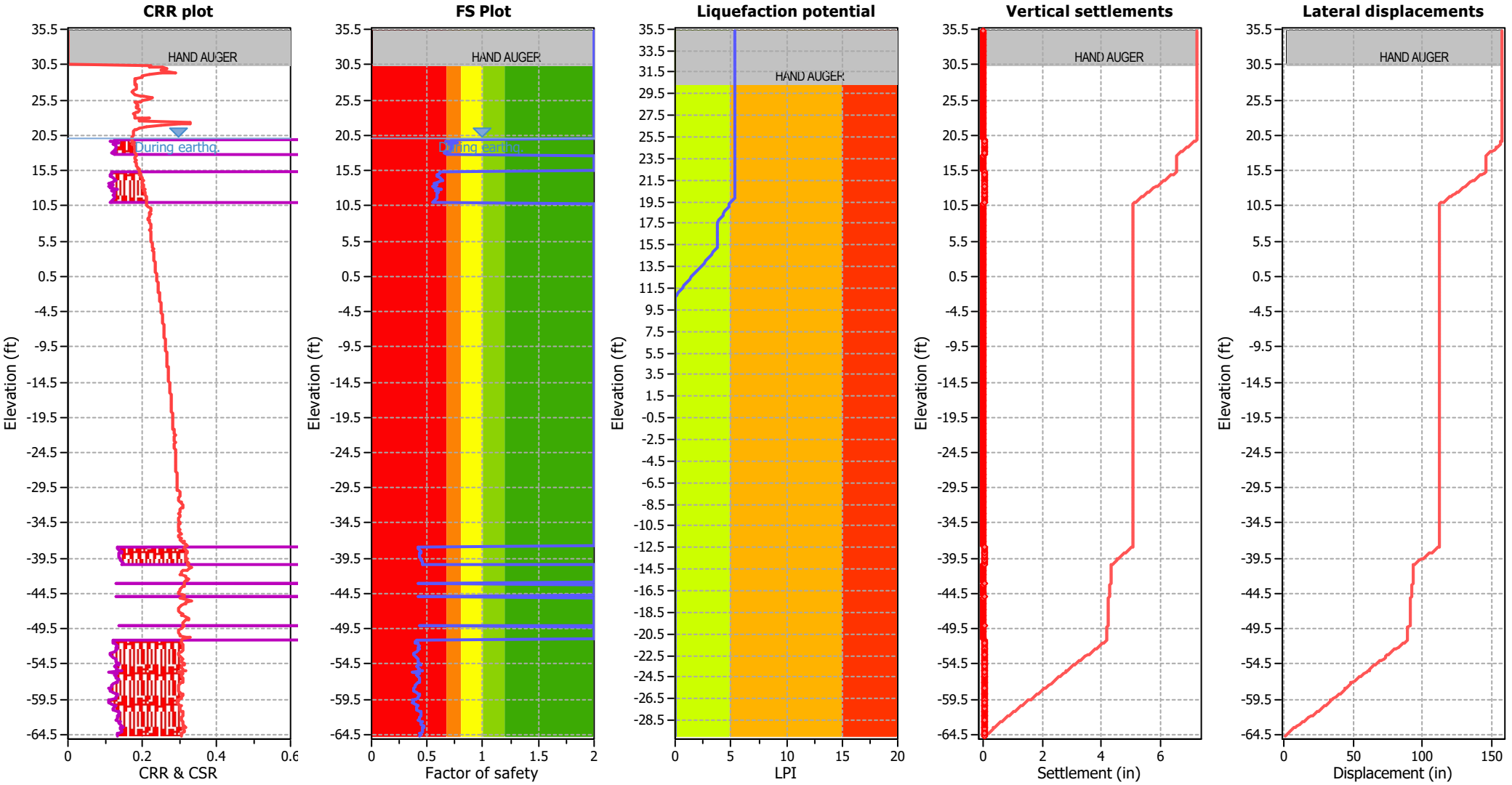
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.53 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.53 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.53 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.53 ft	Fill height:	N/A	Limit depth:	N/A

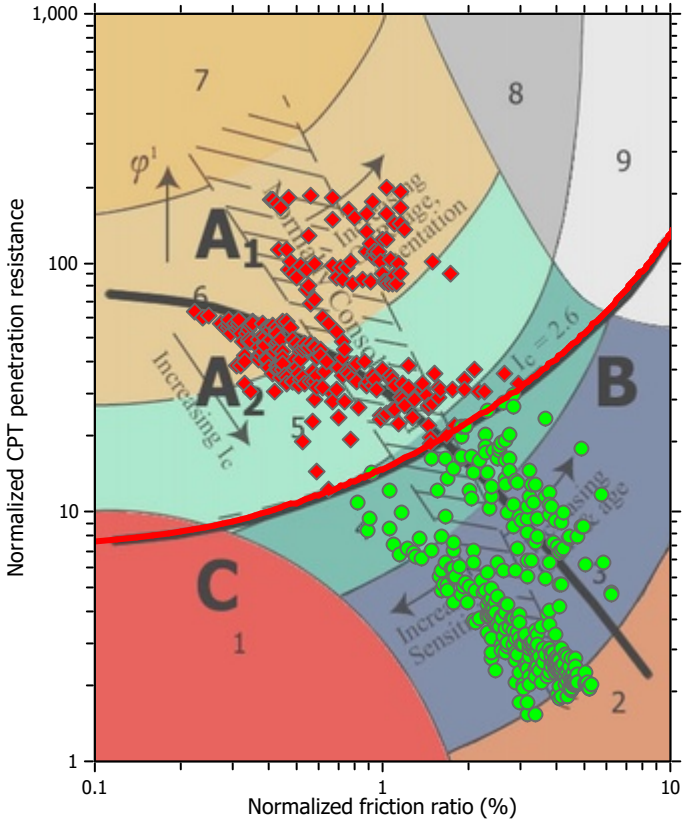
F.S. color scheme

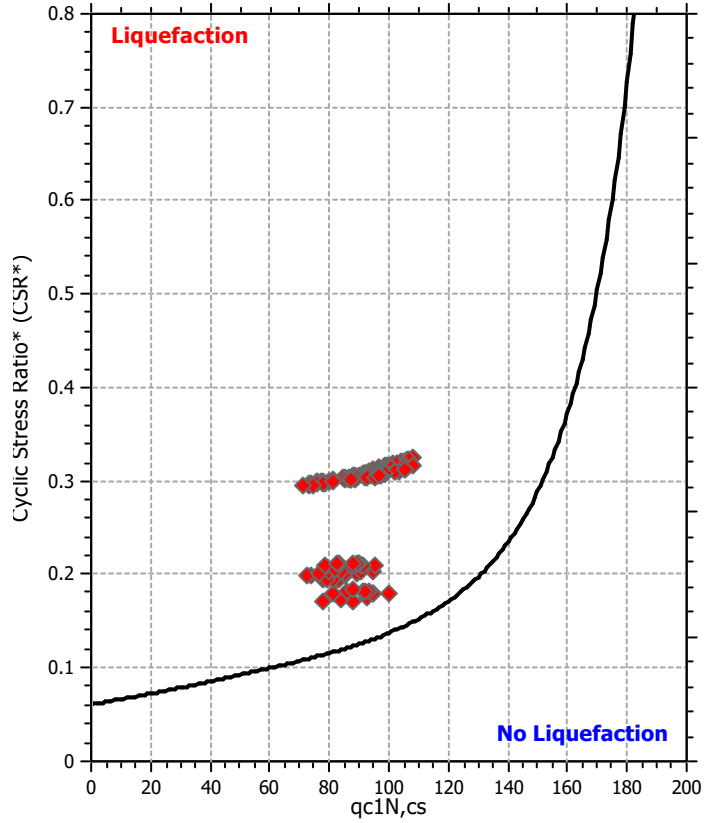
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

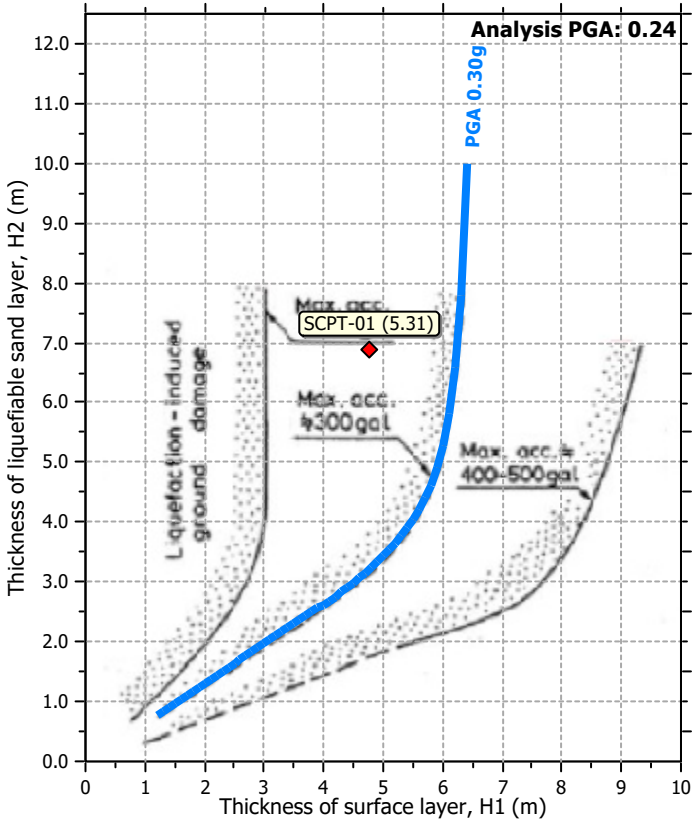
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



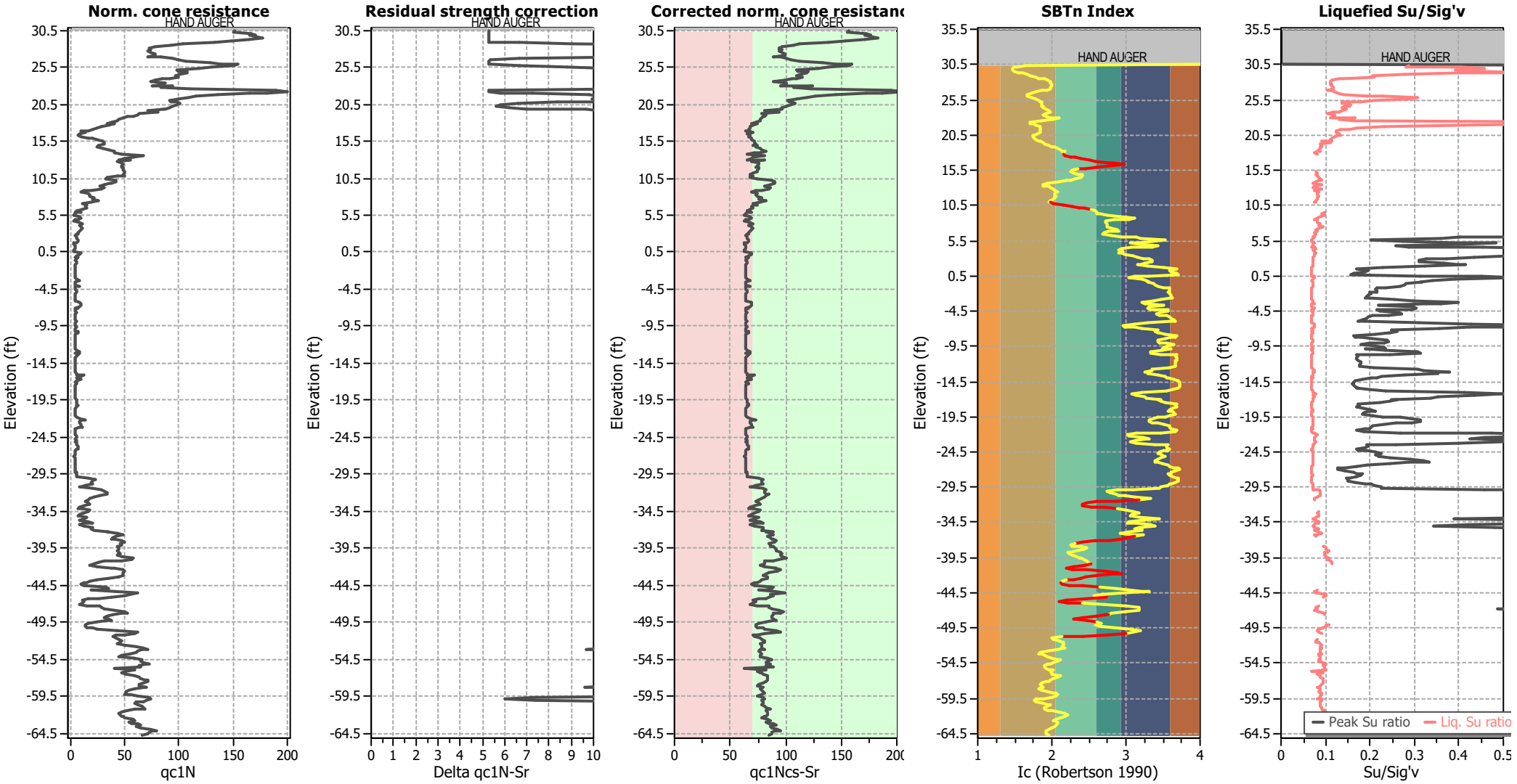




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.53 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.53 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

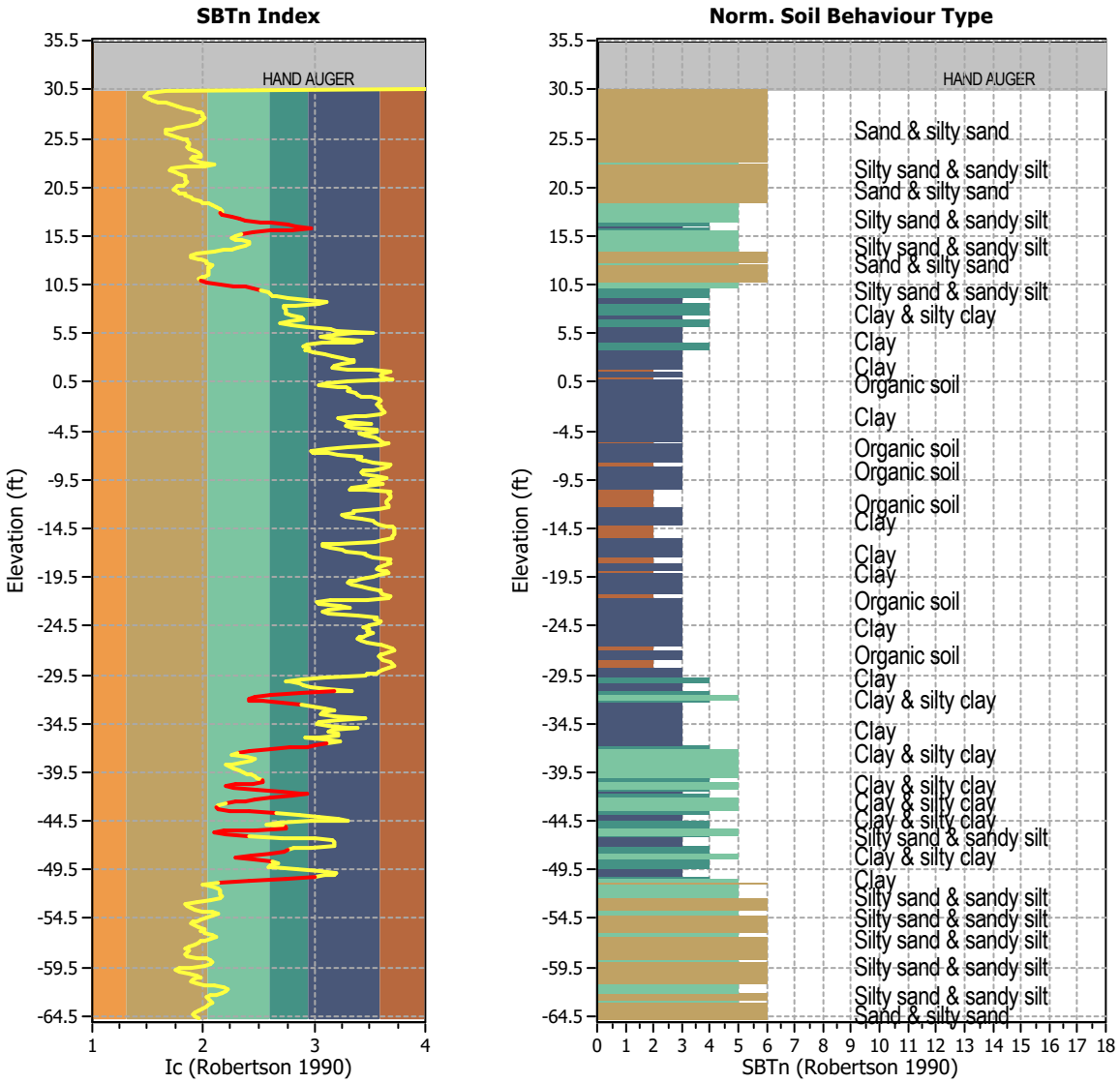
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.53 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.53 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

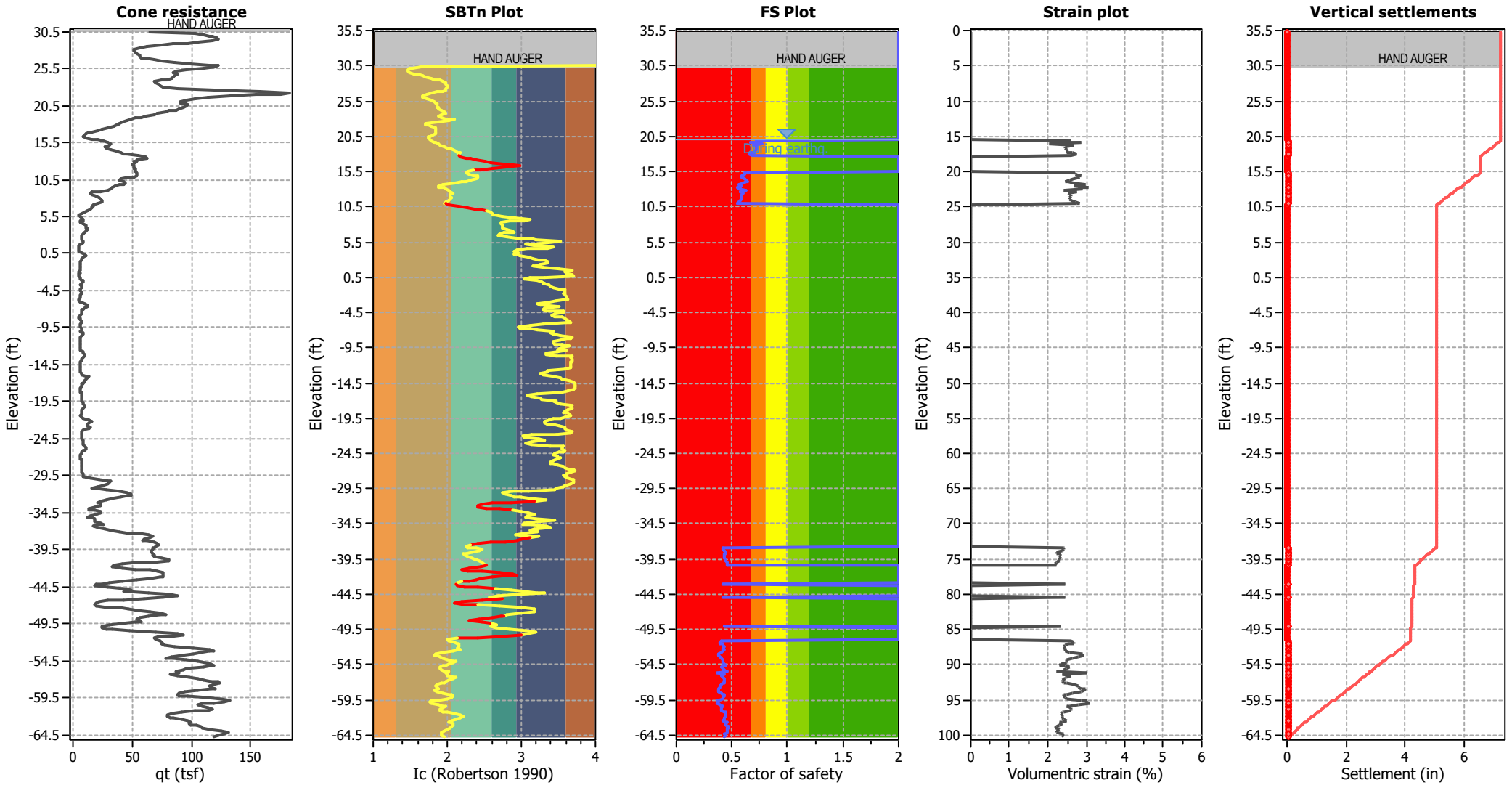
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	611
I_c maximum check value:	3.00	Total points excluded:	81
I_c change ratio value:	0.0250	Exclusion percentage:	13.26%
Minimum number of points in layer:	4	Number of layers detected:	15

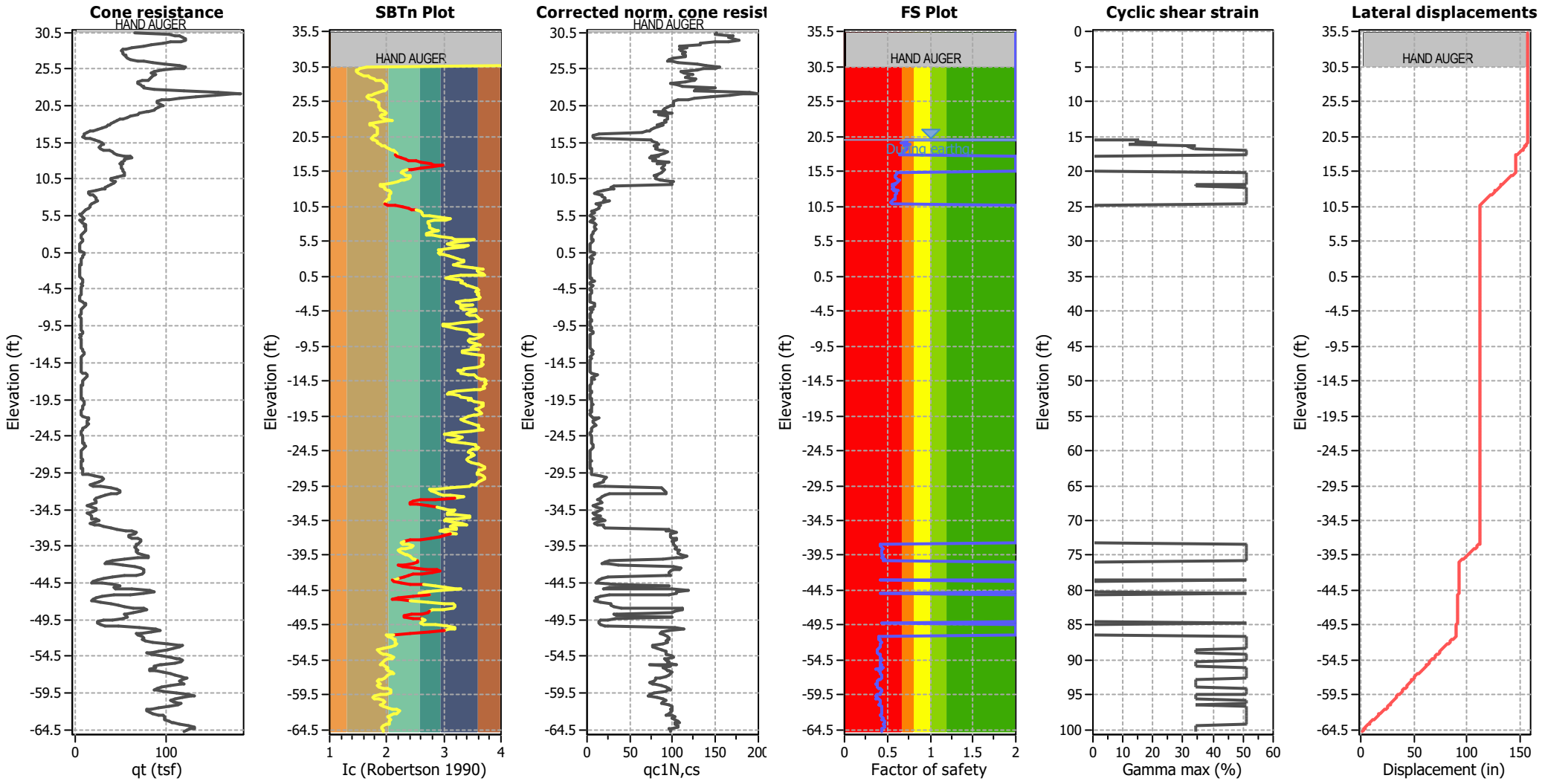
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

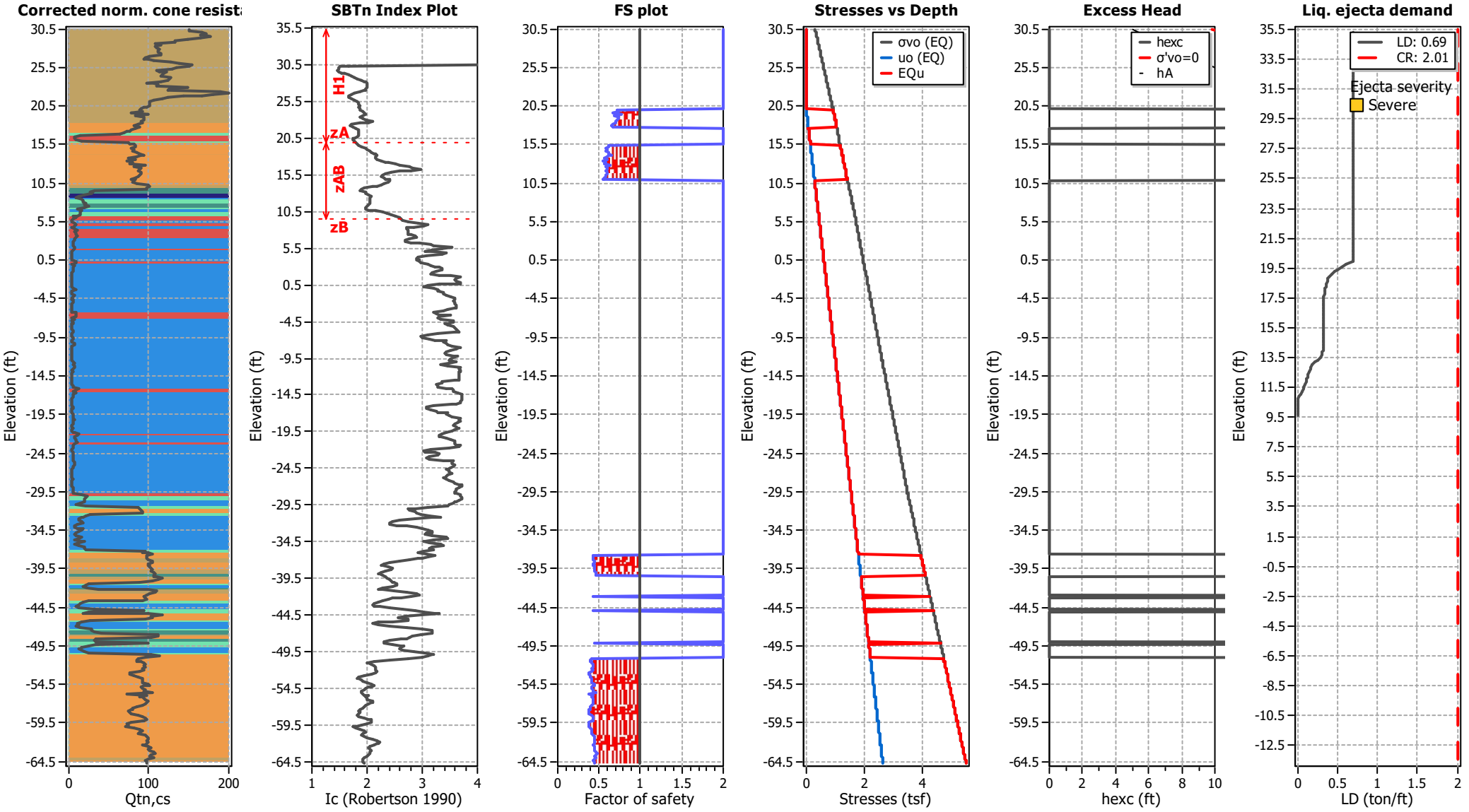
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

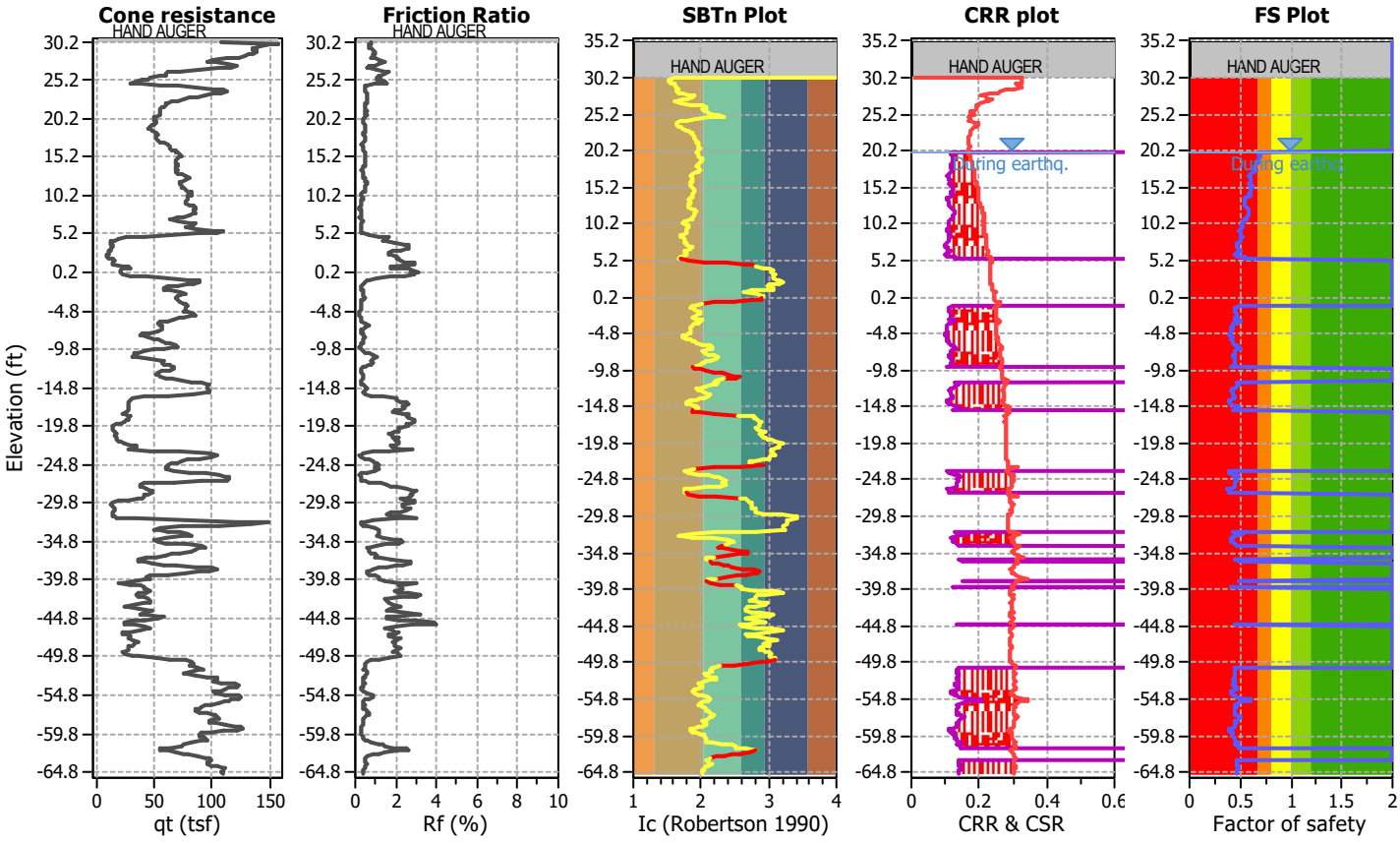
LIQUEFACTION ANALYSIS REPORT

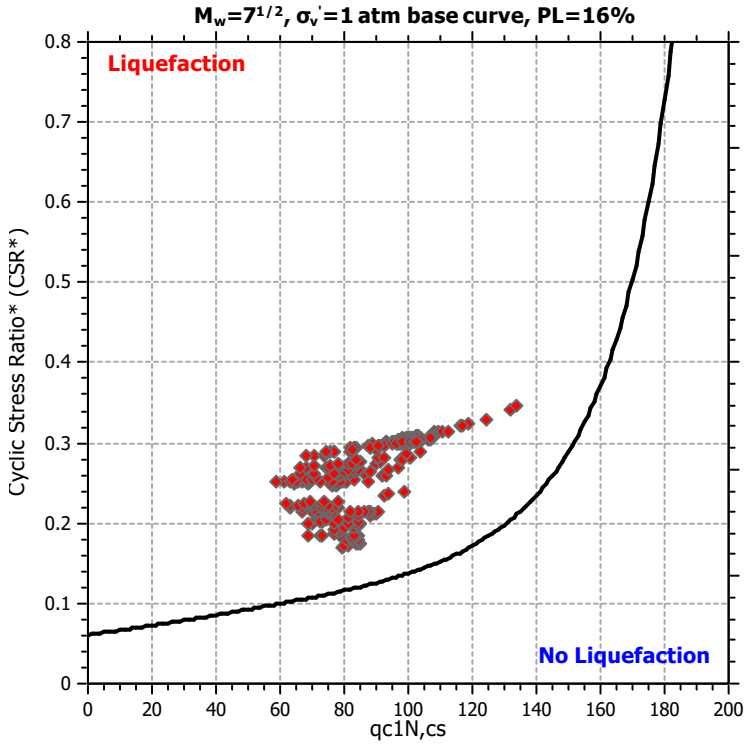
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

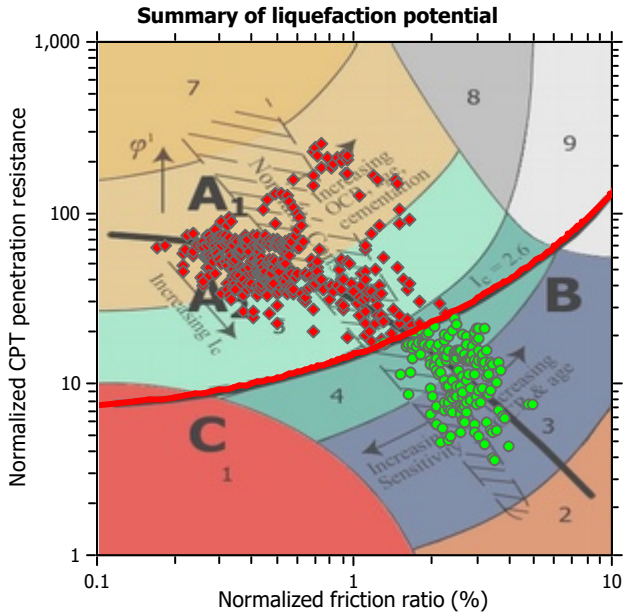
CPT file : SCPT-02

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	15.18 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	15.18 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

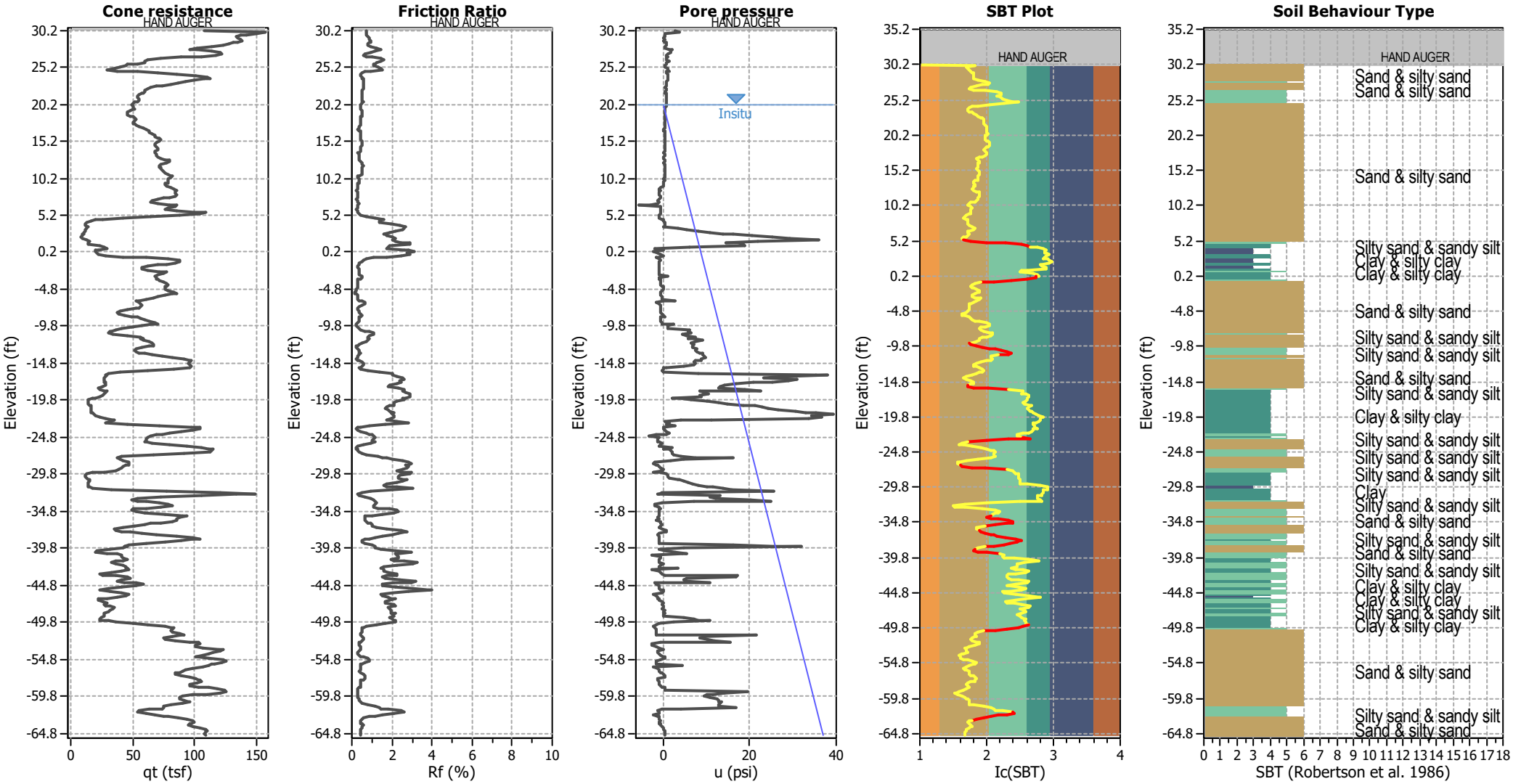






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



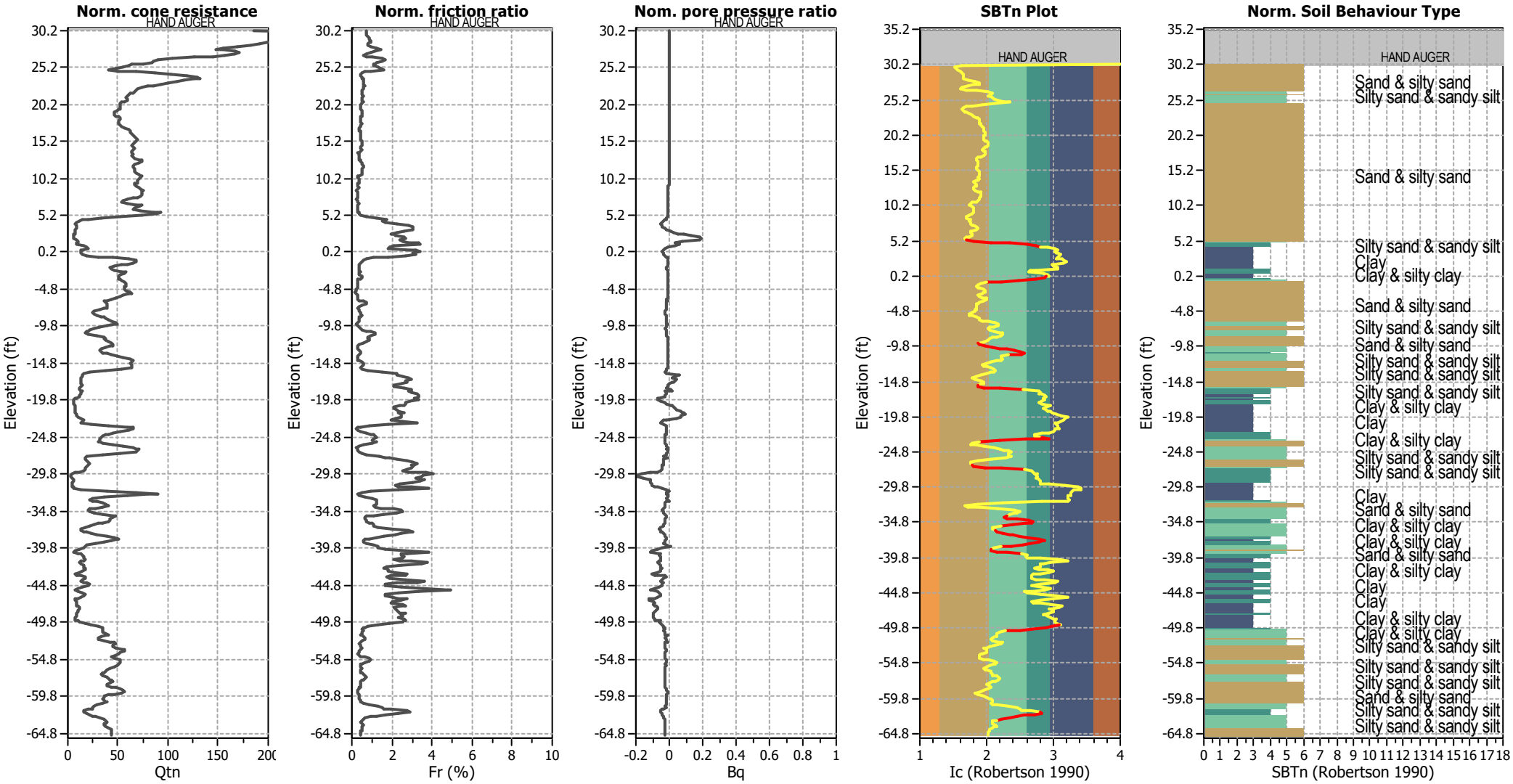
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.18 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.18 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



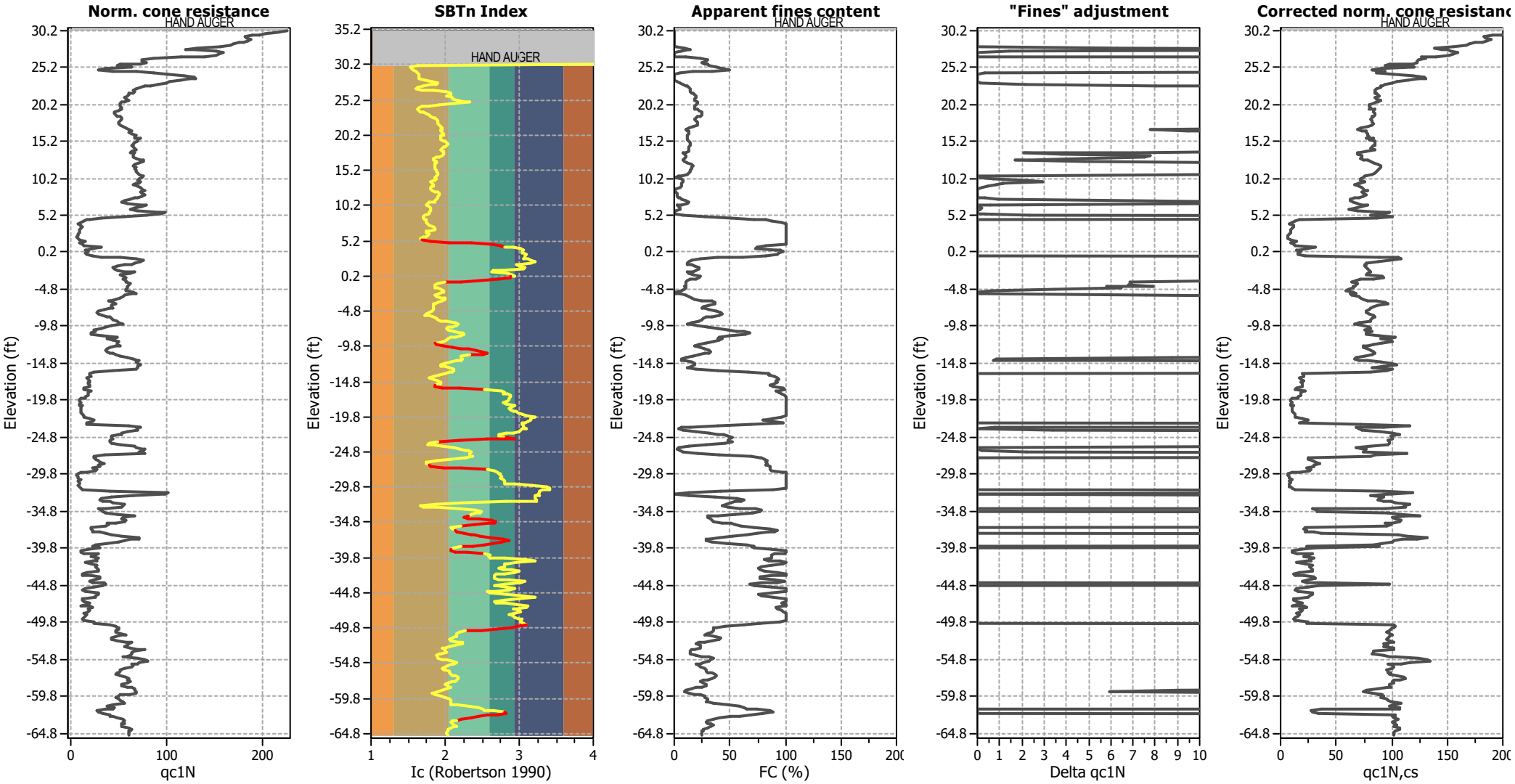
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.18 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.18 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

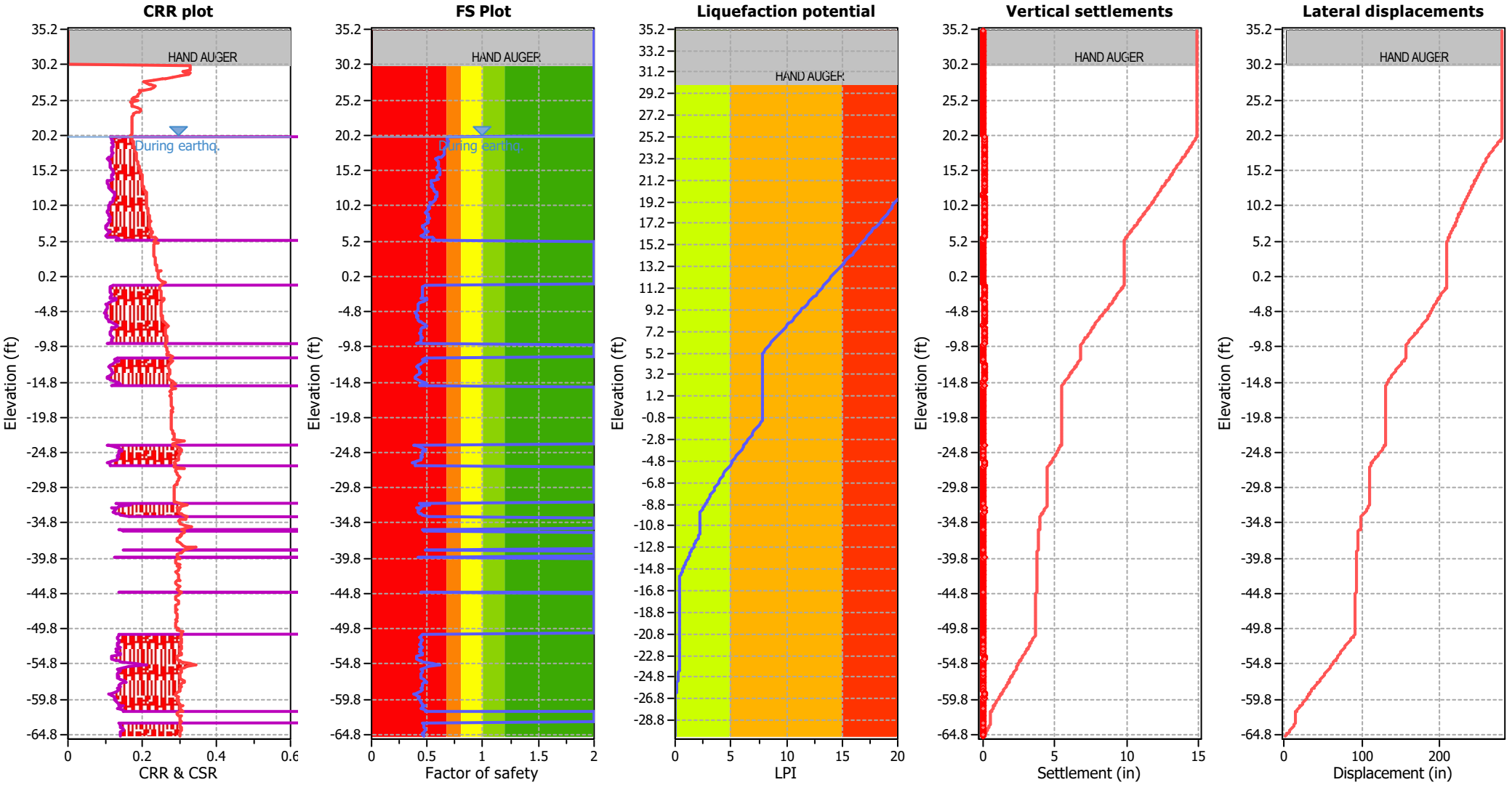
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.18 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.18 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.18 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.18 ft	Fill height:	N/A	Limit depth:	N/A

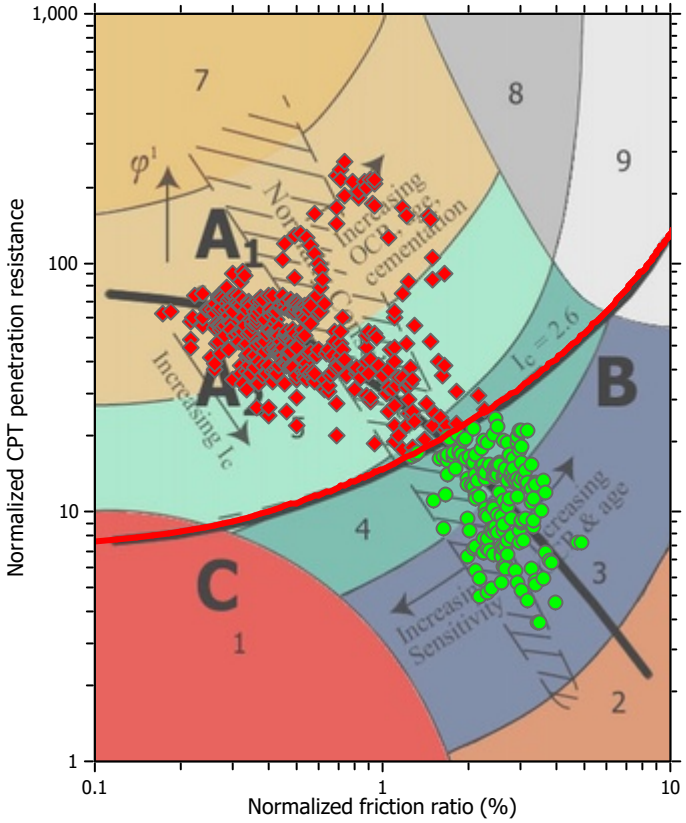
F.S. color scheme

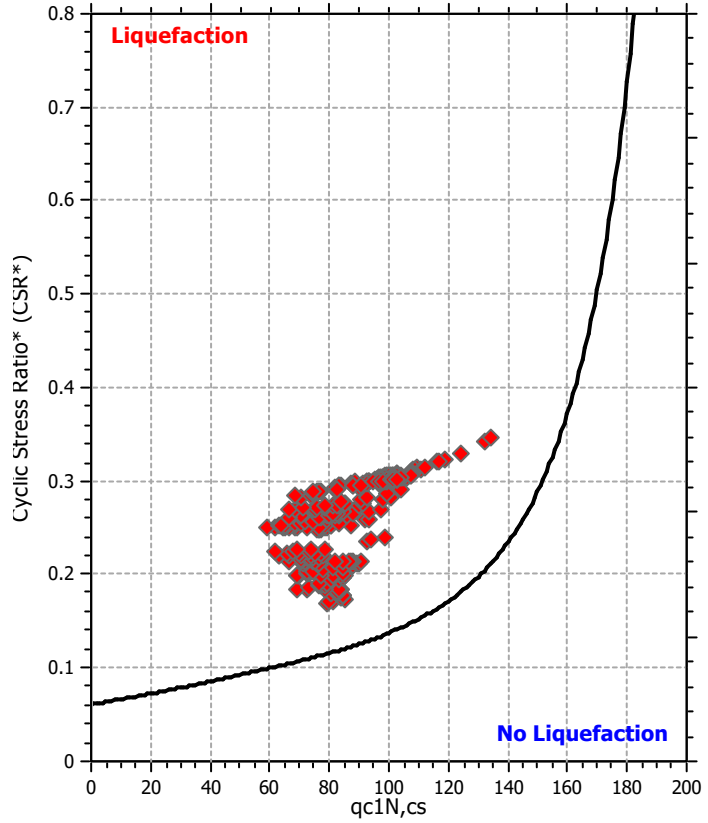
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

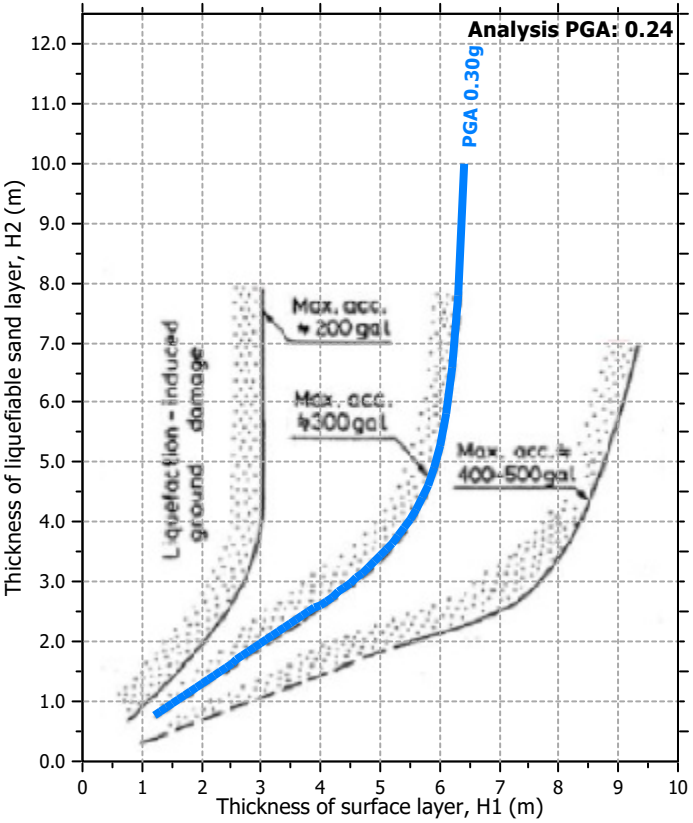
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



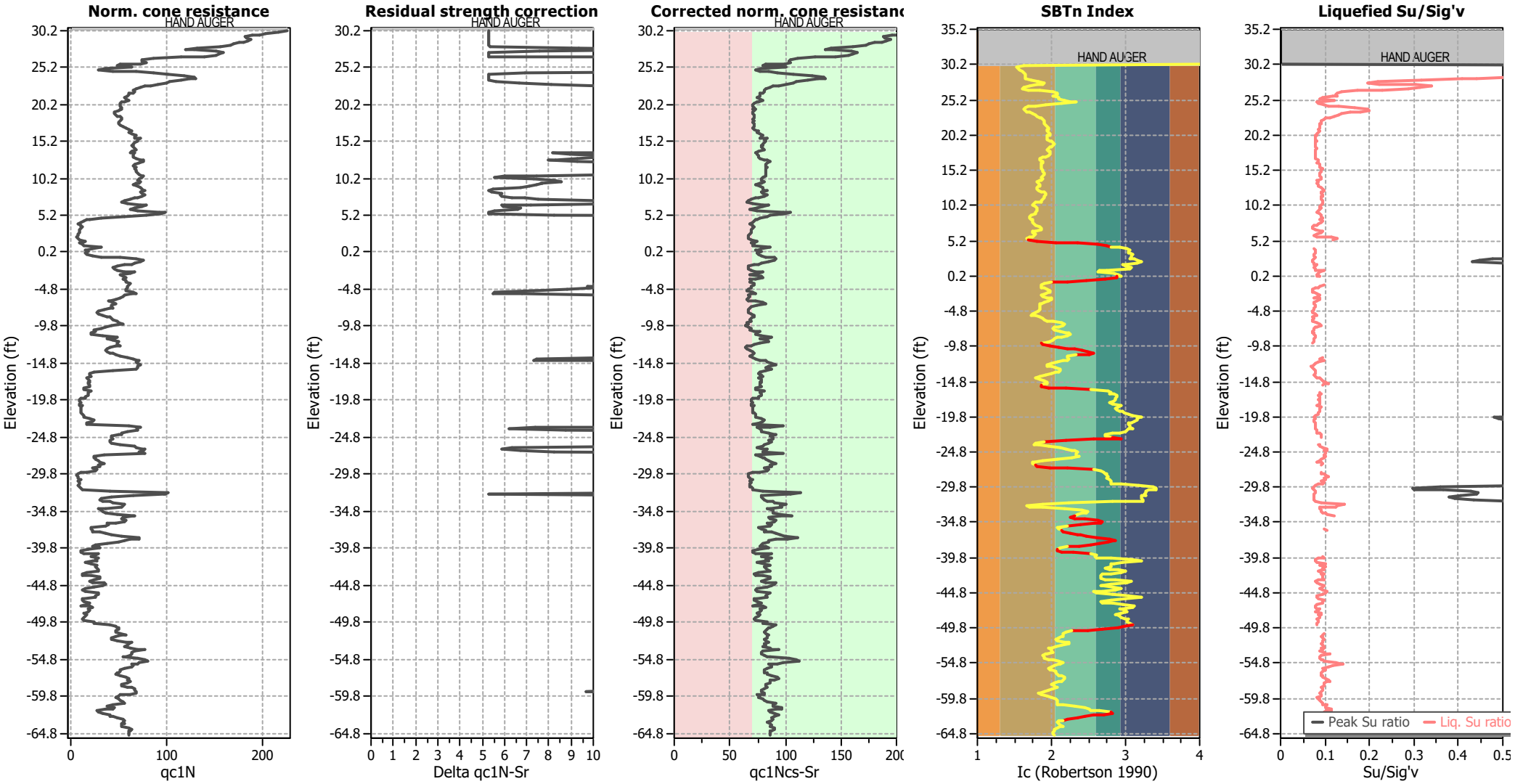




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.18 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.18 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

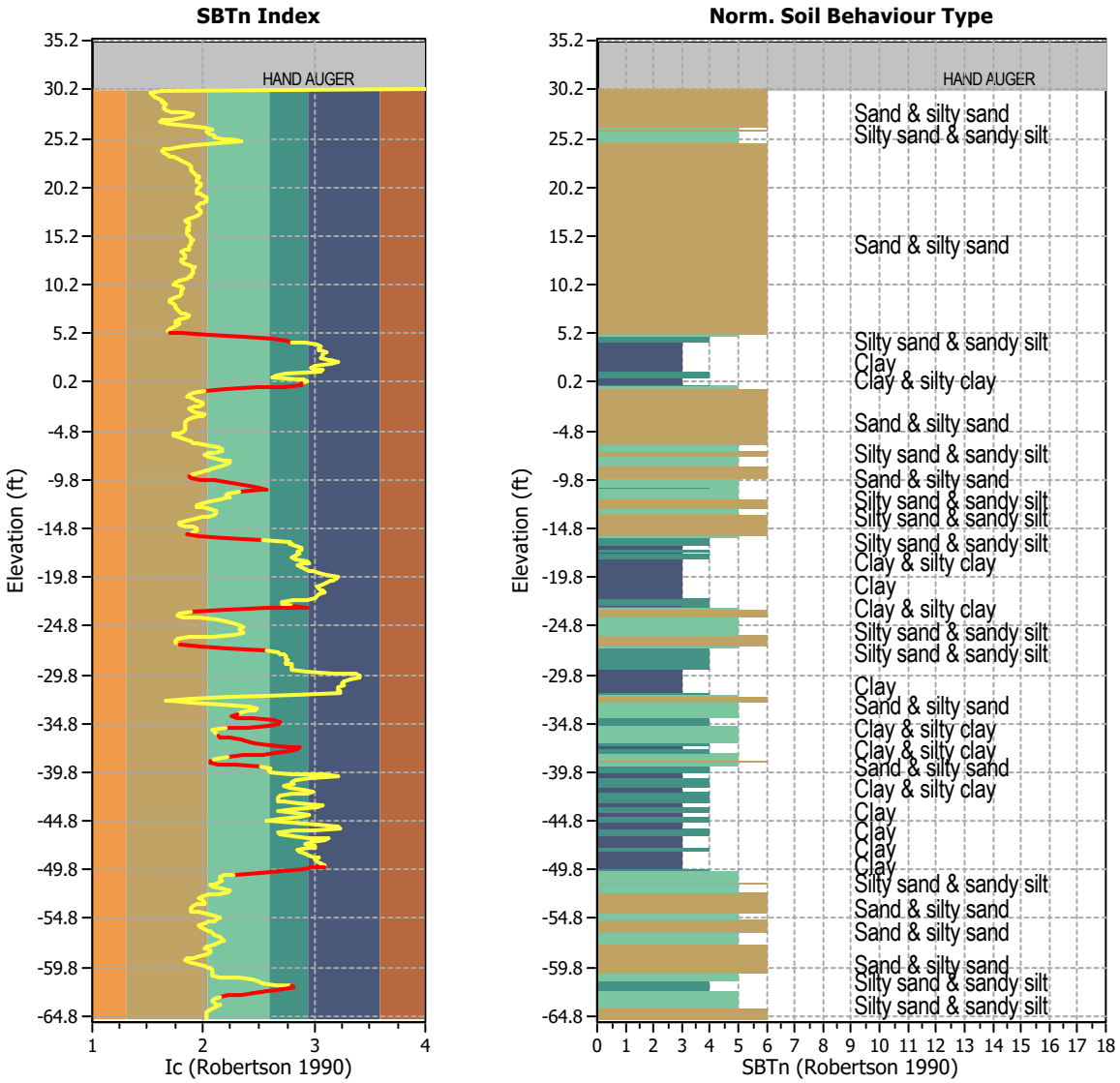
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.18 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.18 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

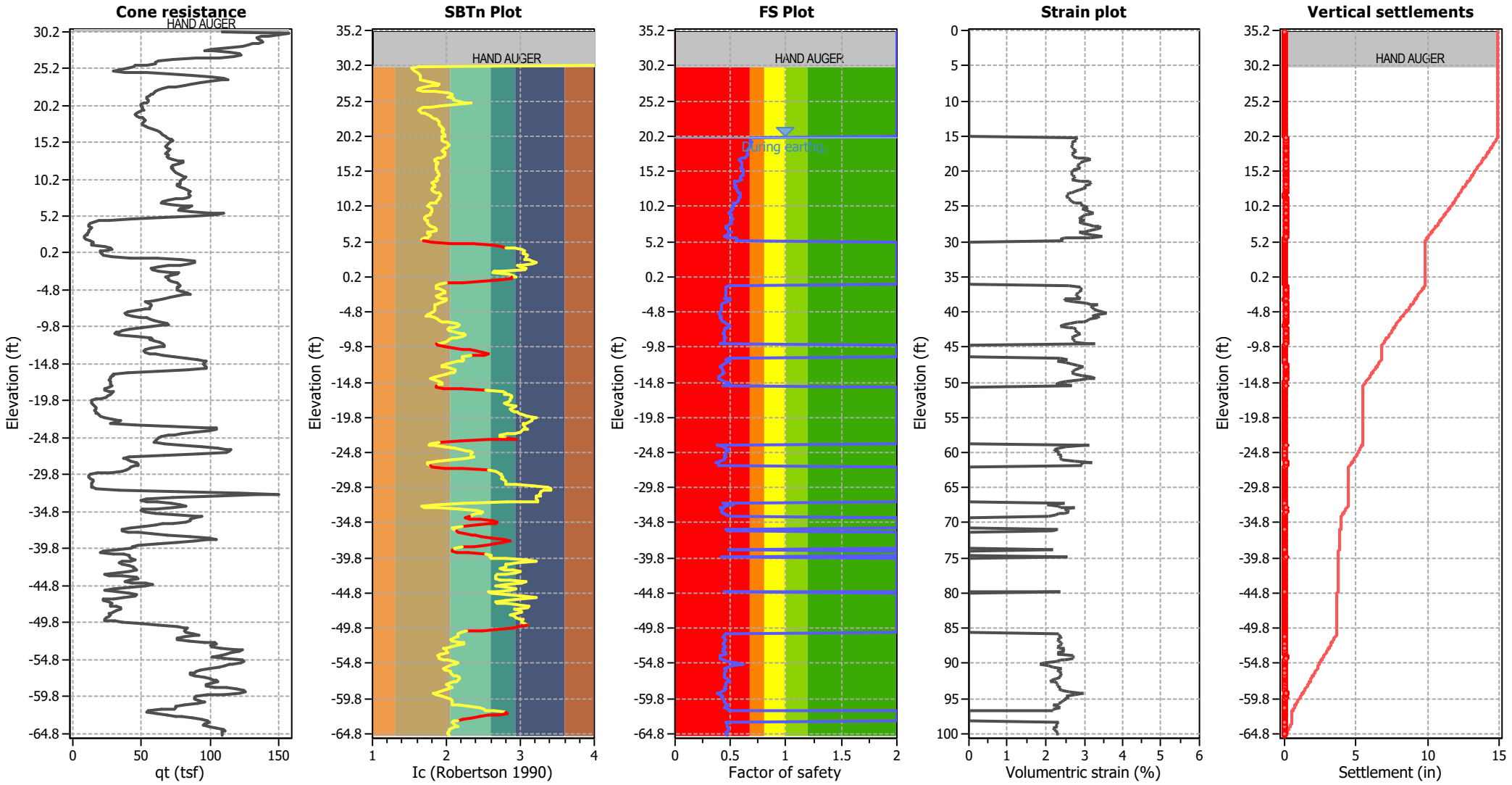
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	611
I_c maximum check value:	3.00	Total points excluded:	84
I_c change ratio value:	0.0250	Exclusion percentage:	13.75%
Minimum number of points in layer:	4	Number of layers detected:	14

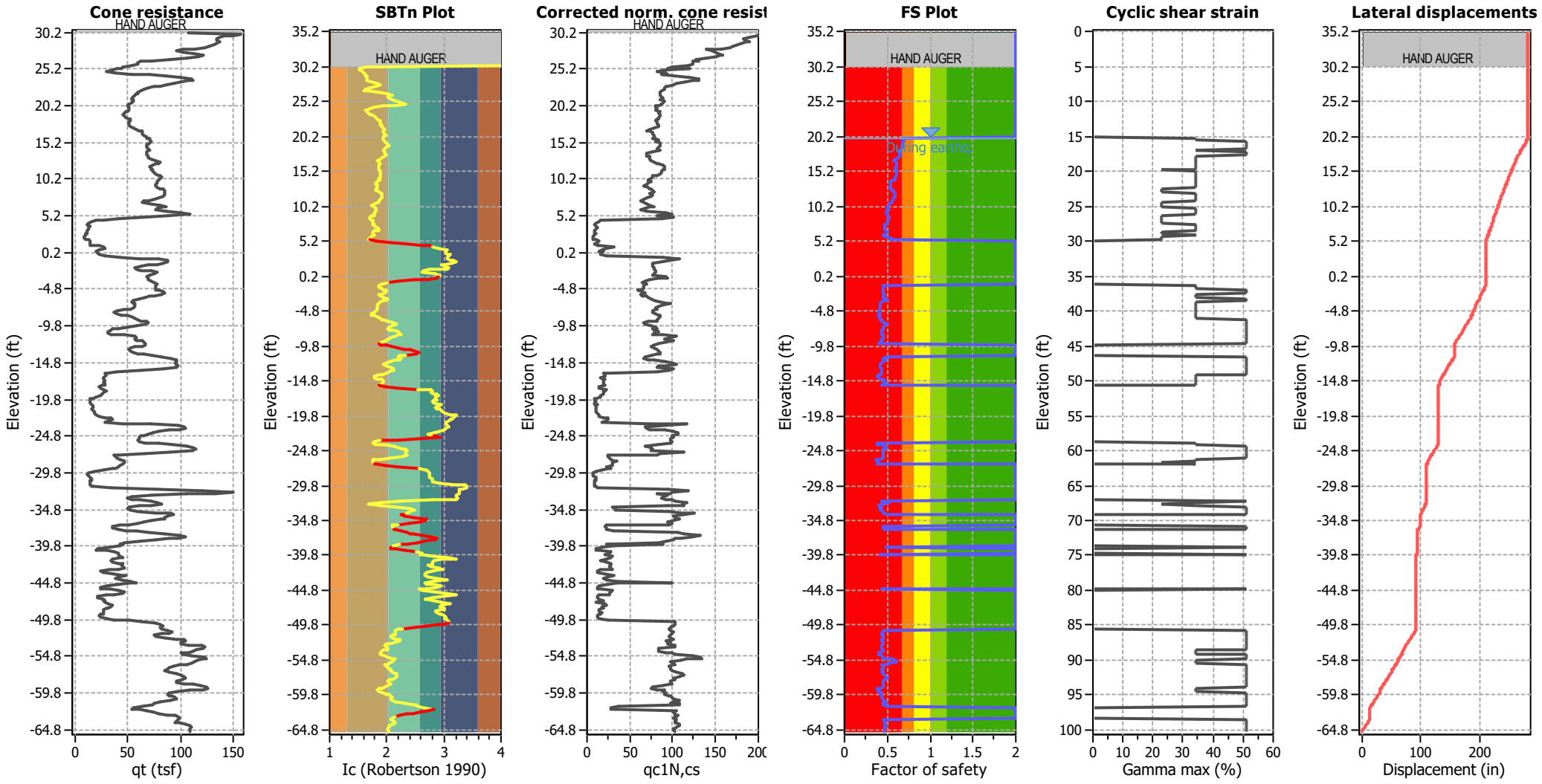
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

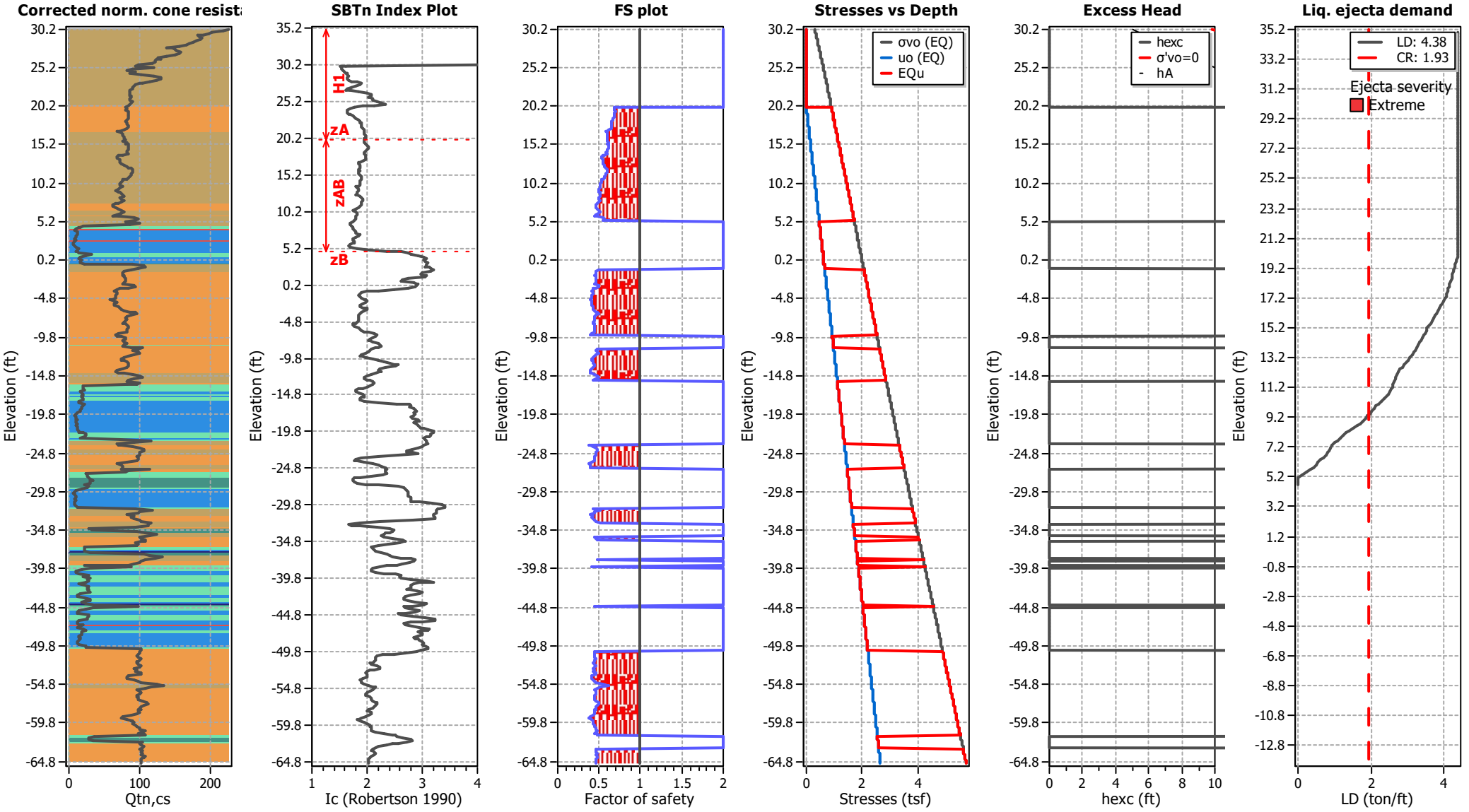
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

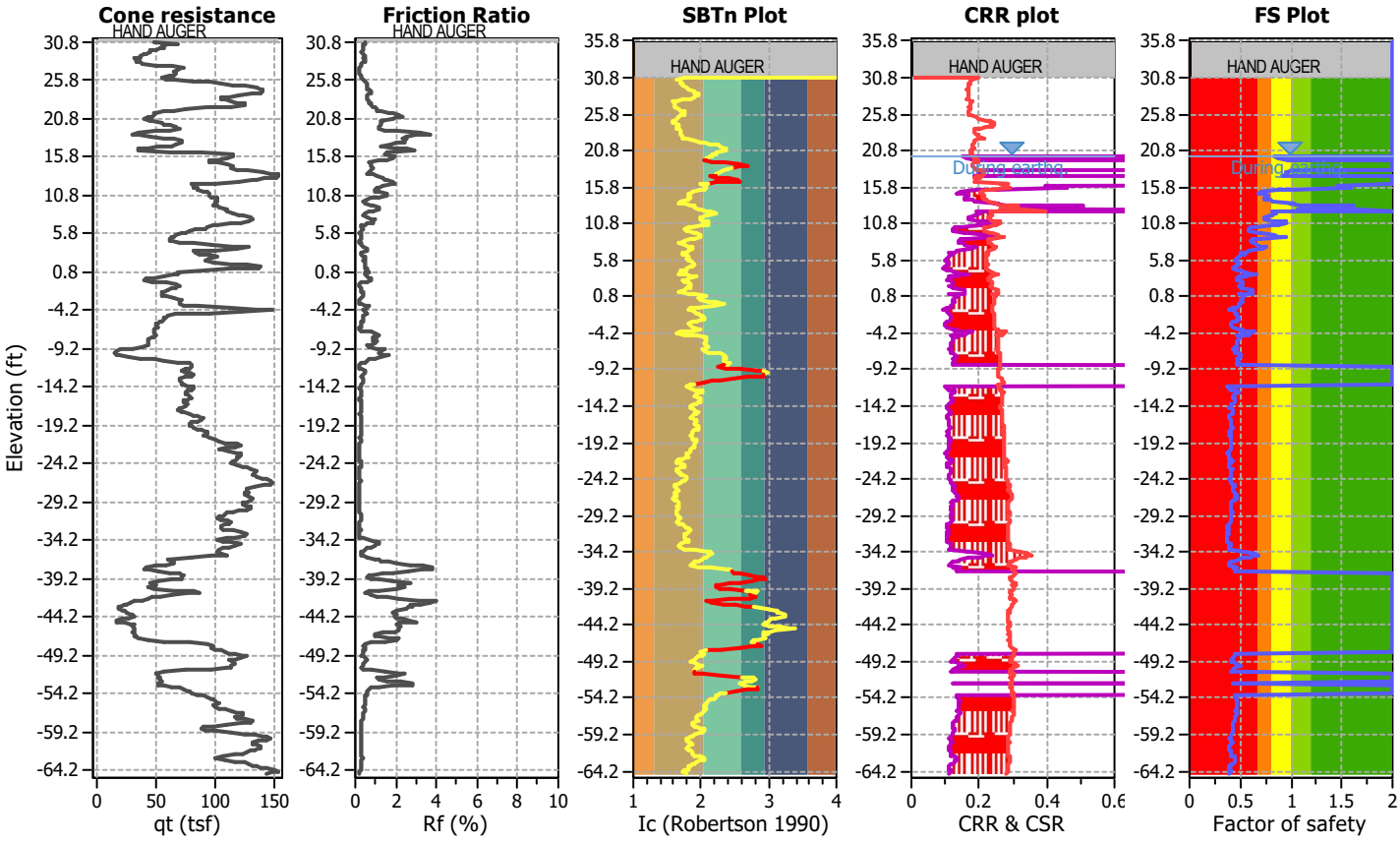
LIQUEFACTION ANALYSIS REPORT

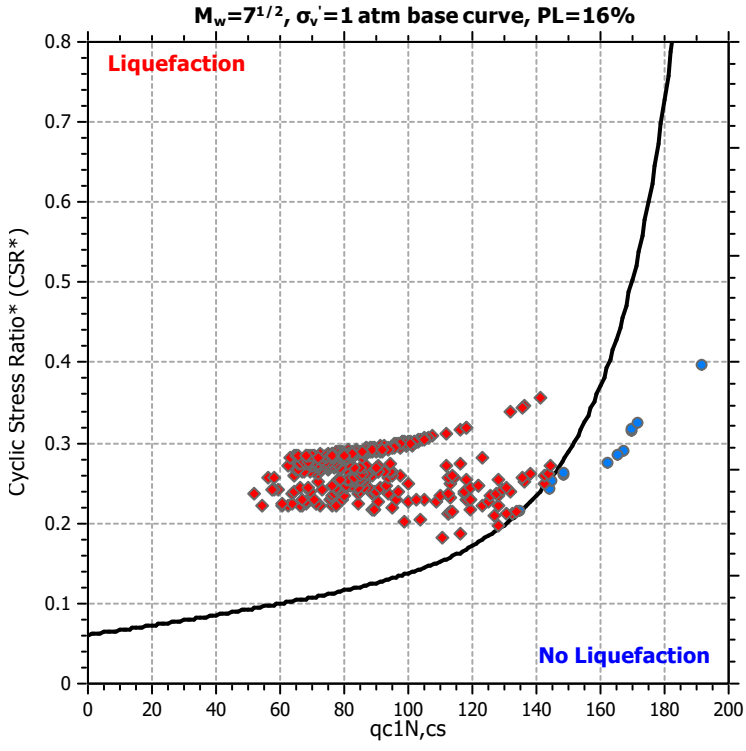
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

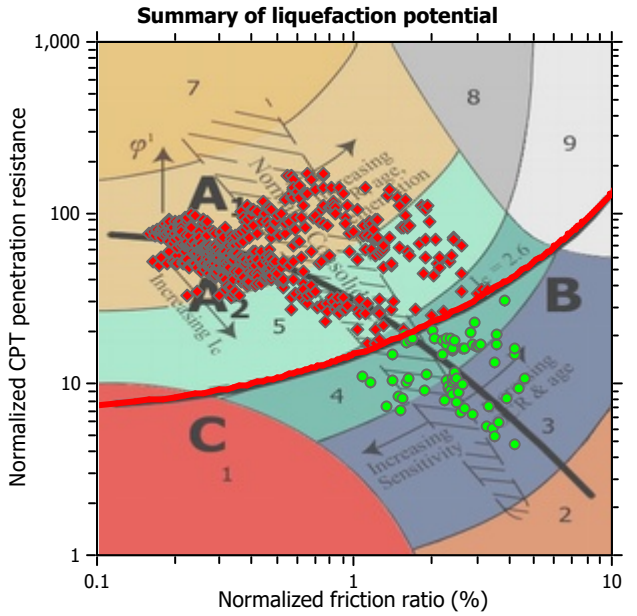
CPT file : SCPT-03

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	15.76 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	15.76 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	9.10	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.24	Unit weight calculation:	Based on SBT	K_σ applied:	No		

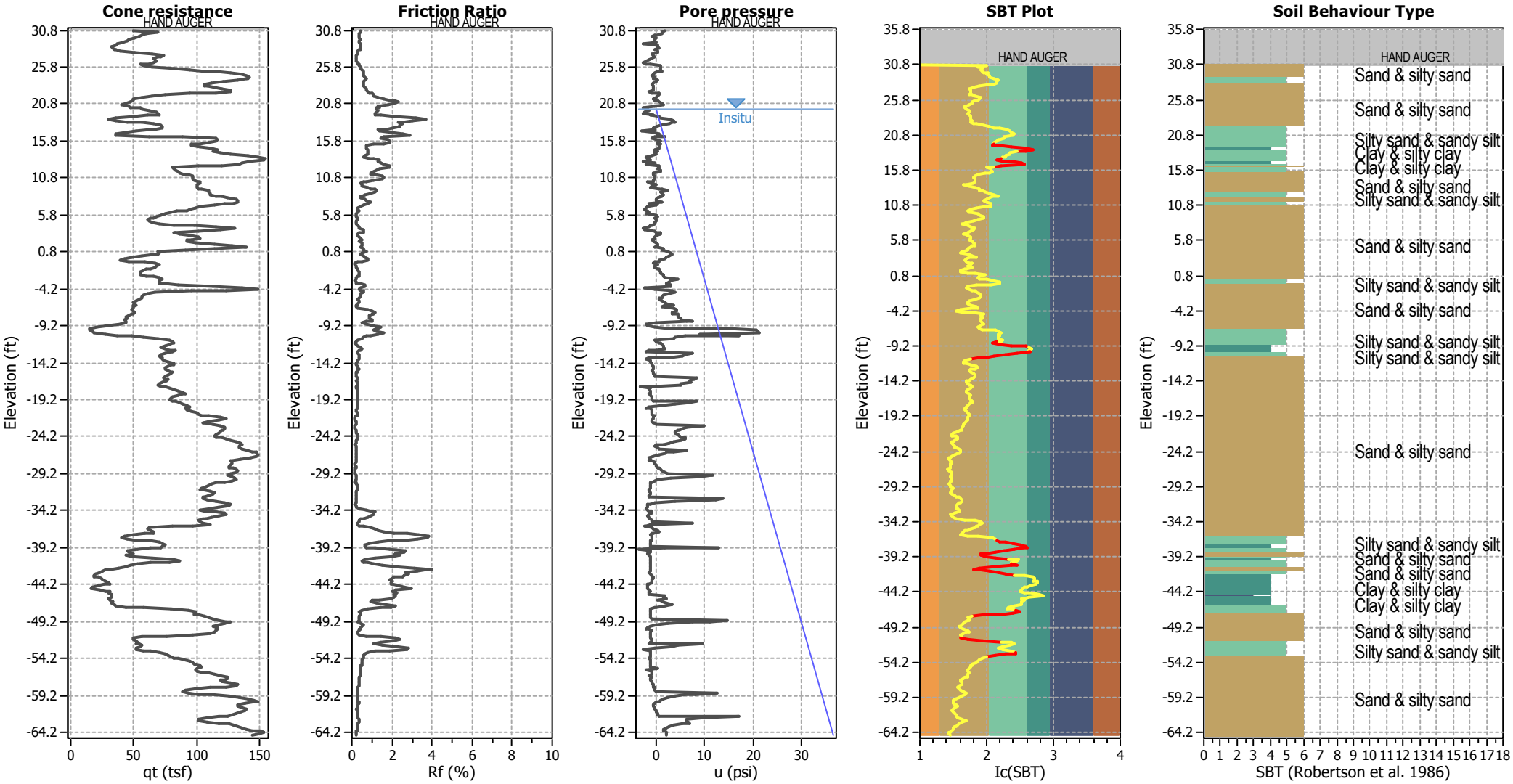






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



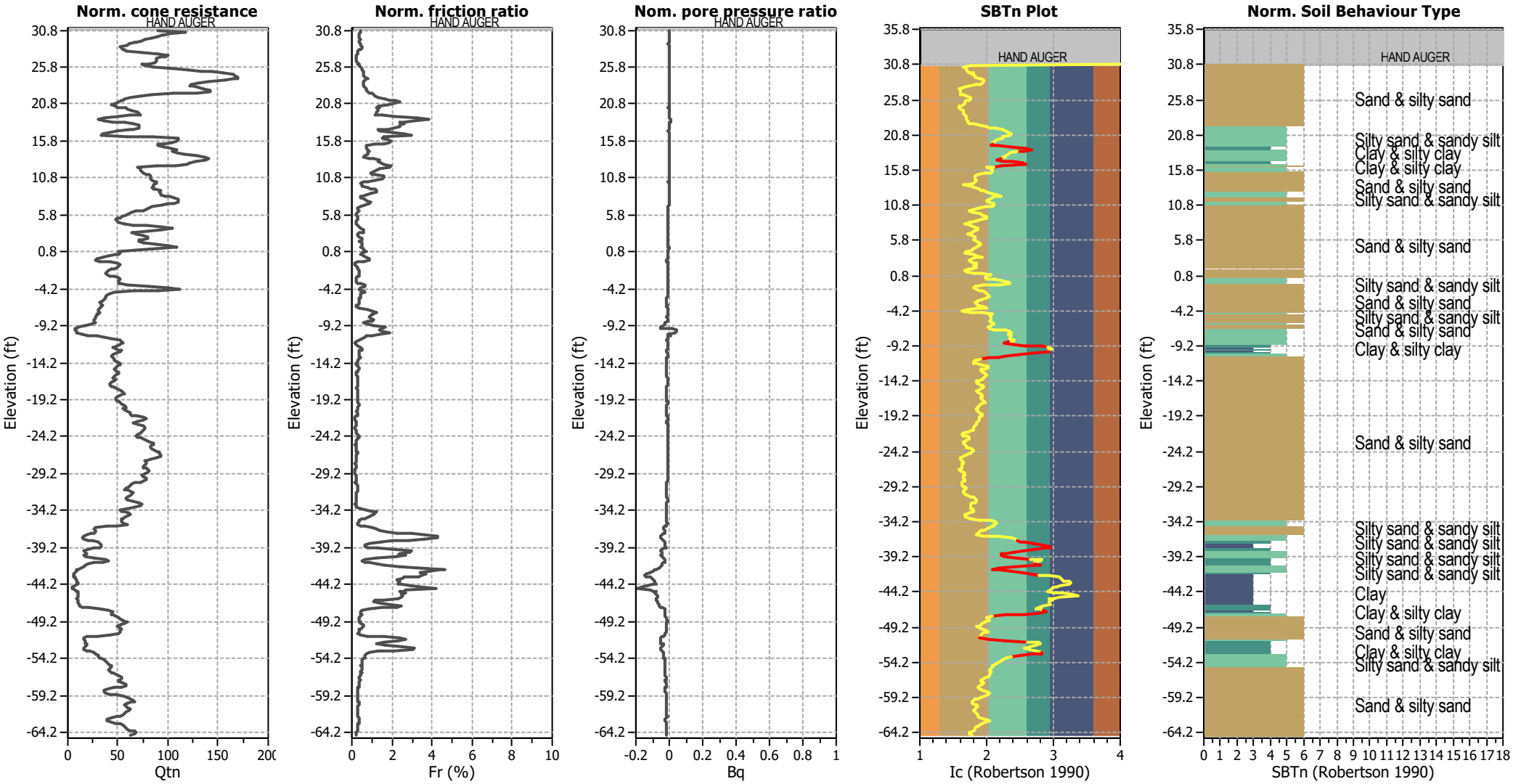
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.76 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.76 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



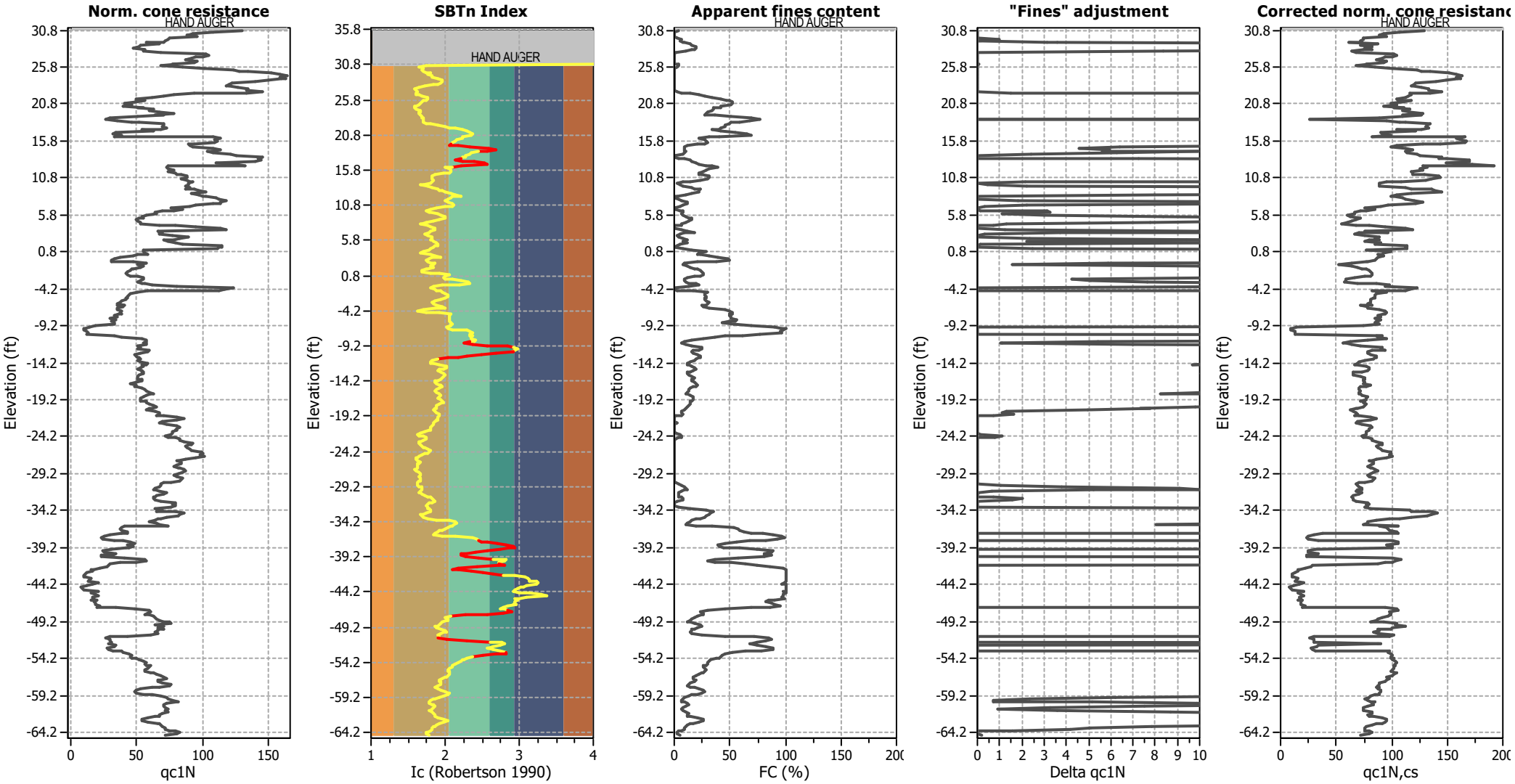
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.76 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.76 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

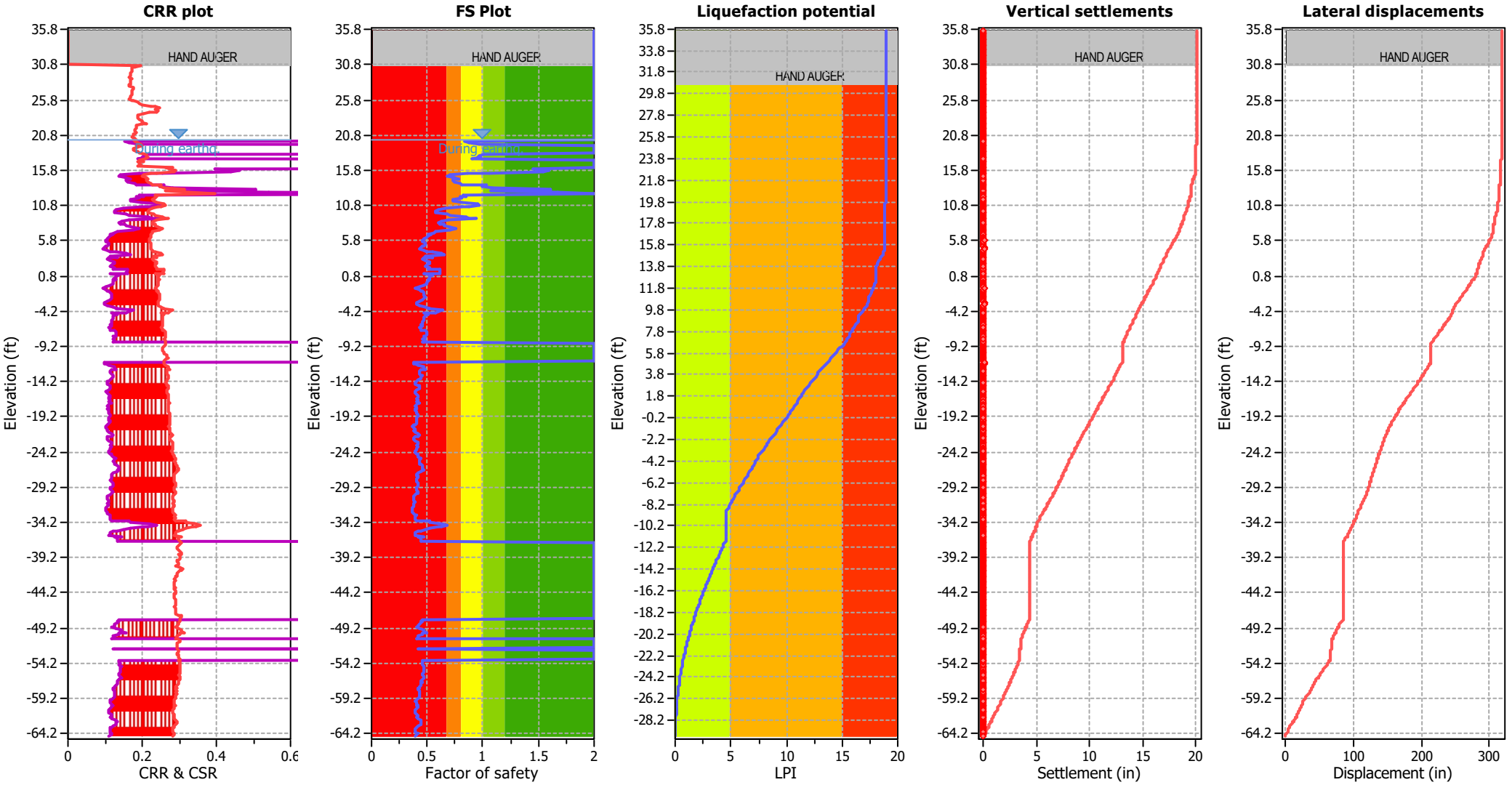
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.76 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.76 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.76 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.76 ft	Fill height:	N/A	Limit depth:	N/A

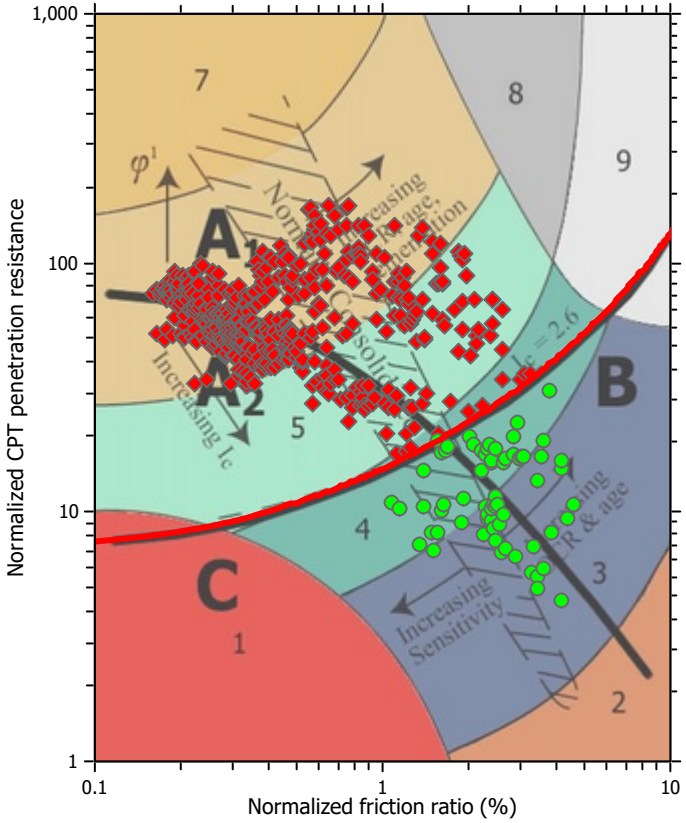
F.S. color scheme

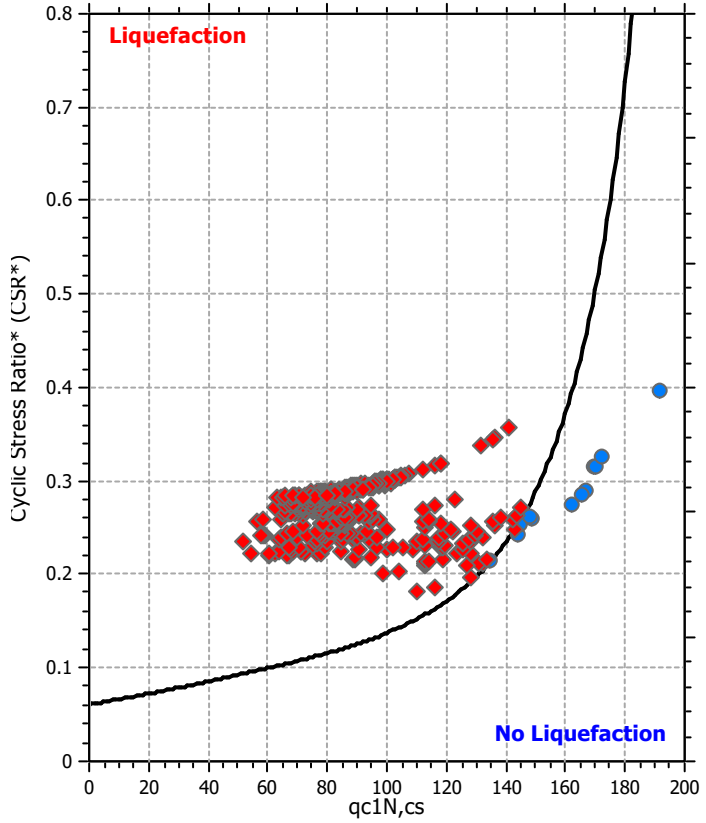
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

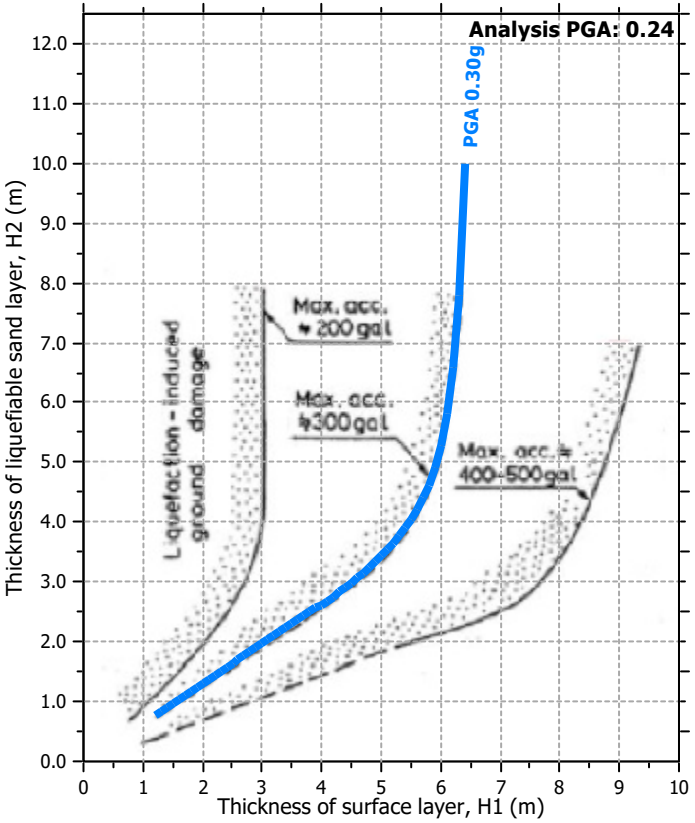
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



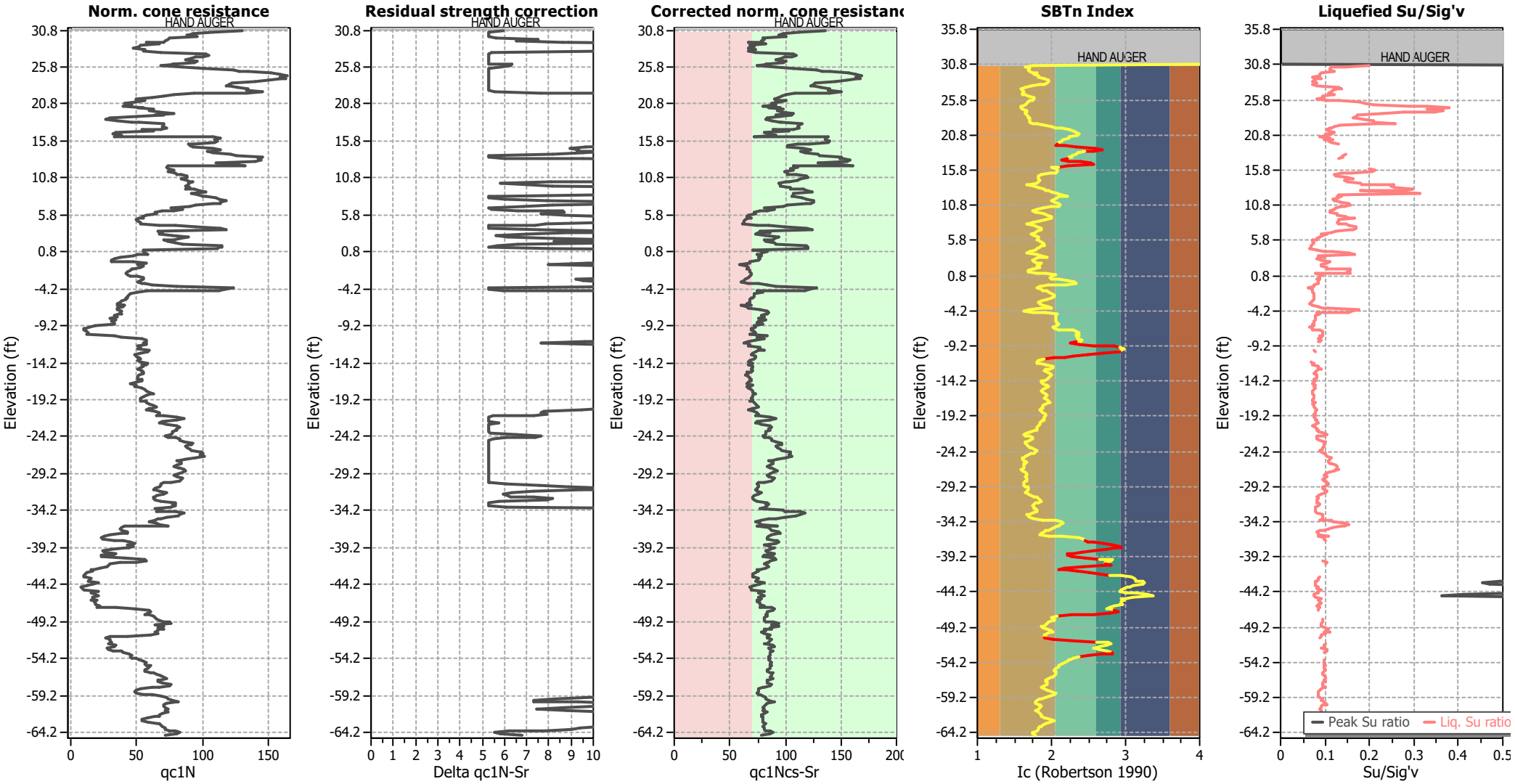




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.76 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.76 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

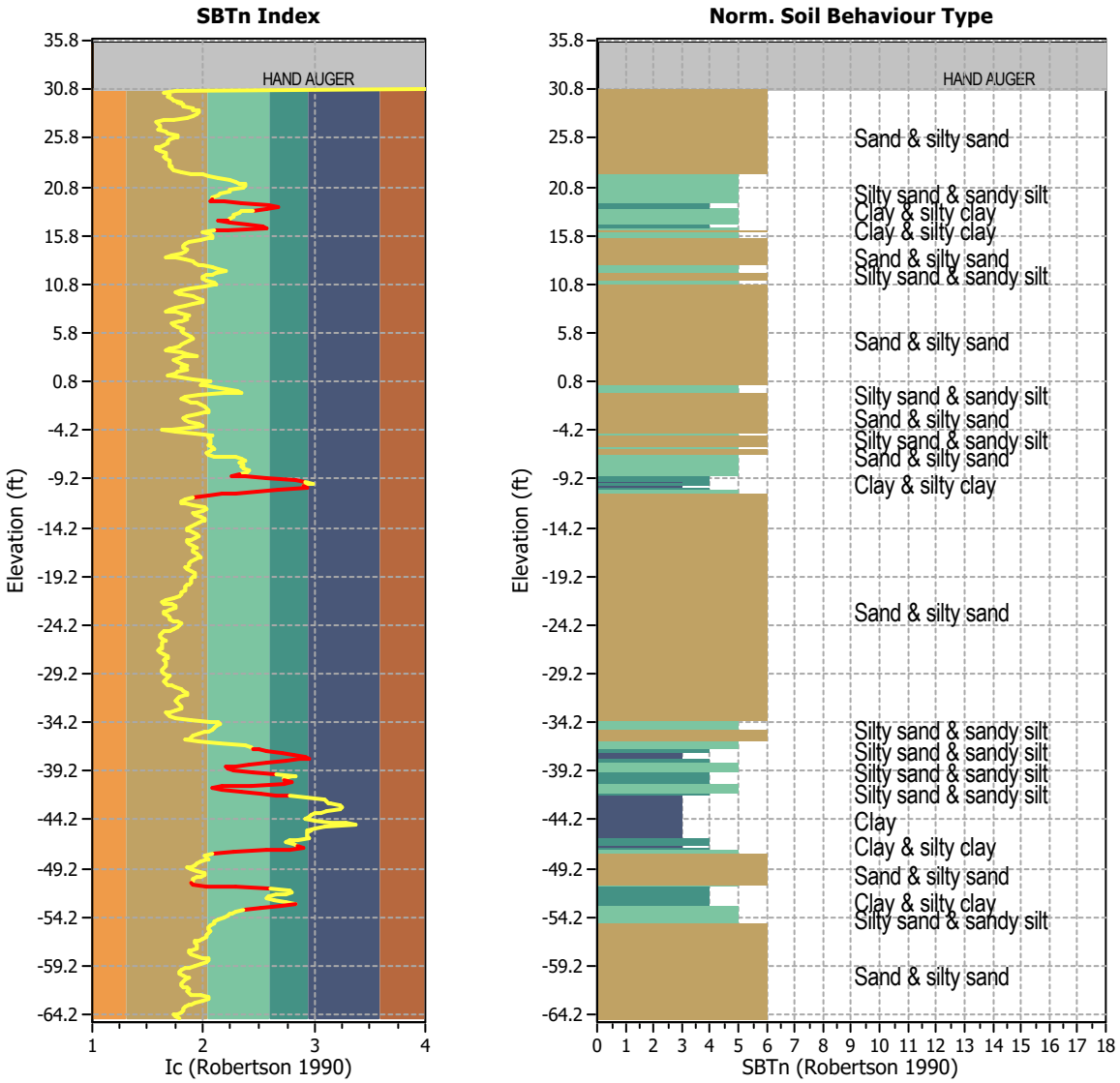
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	15.76 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	9.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.24	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.76 ft	Fill height:	N/A	Limit depth:	N/A

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

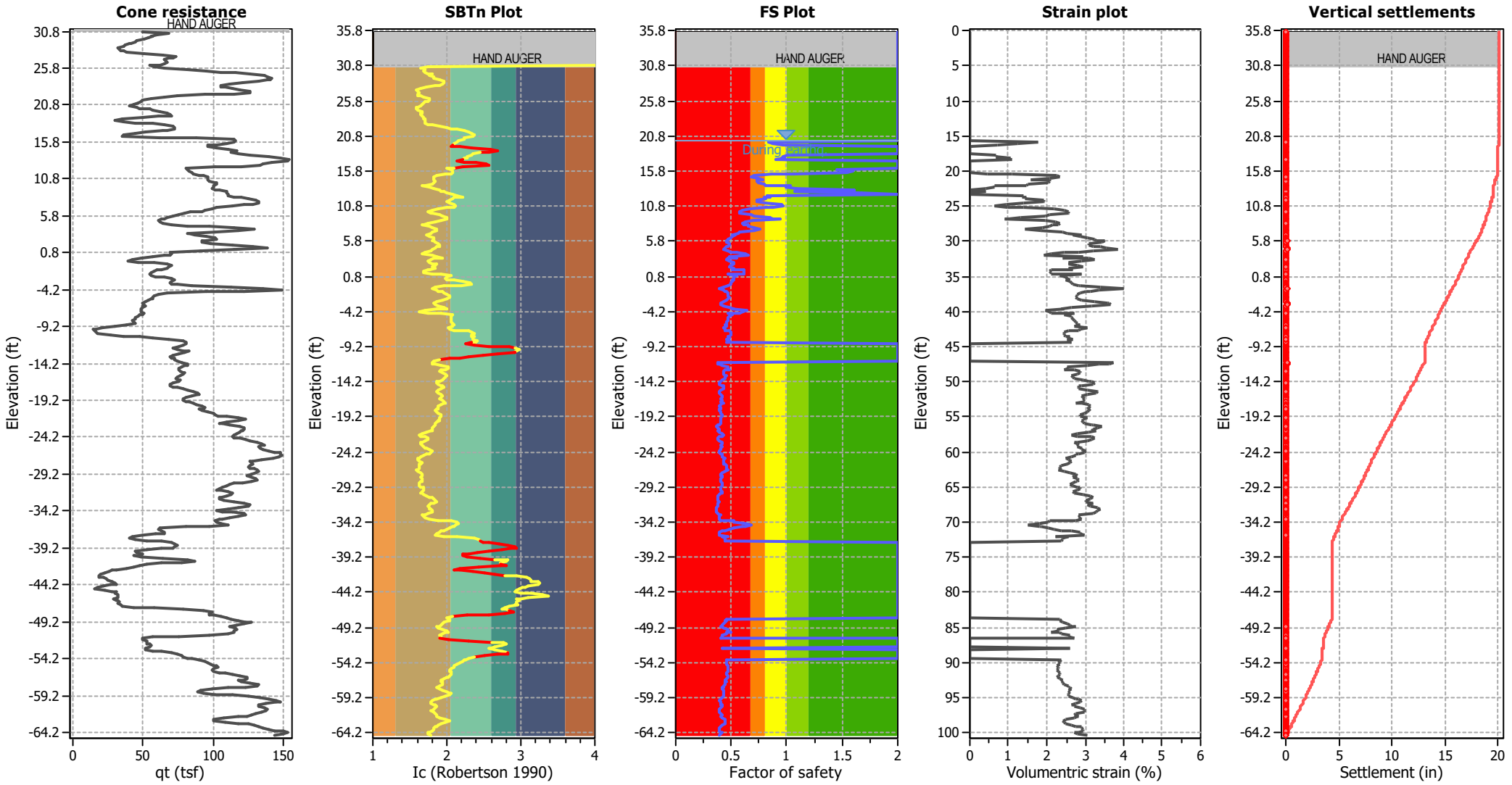
The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties	
I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0250
Minimum number of points in layer:	4

General statistics	
Total points in CPT file:	612
Total points excluded:	76
Exclusion percentage:	12.42%
Number of layers detected:	14

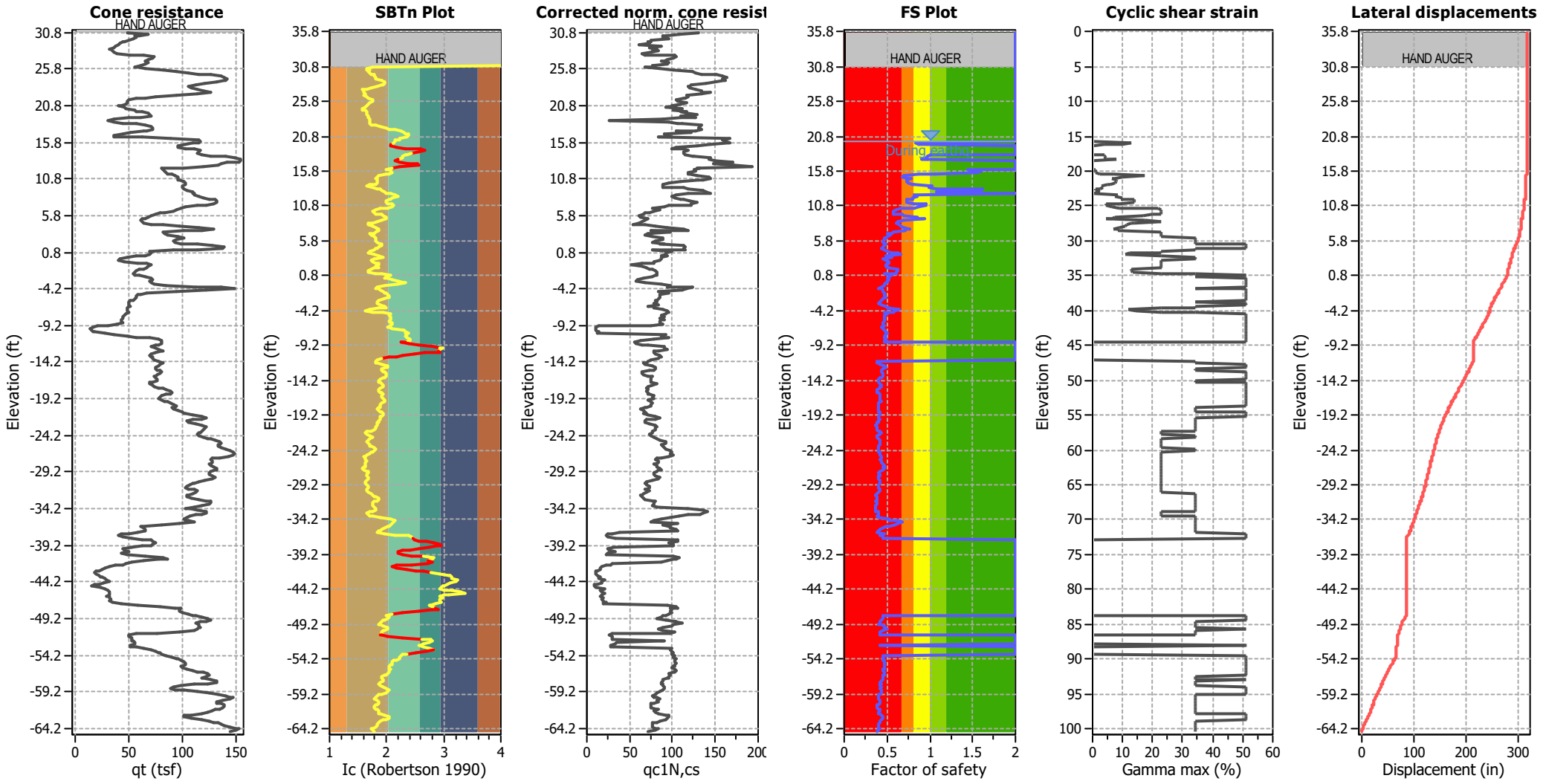
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

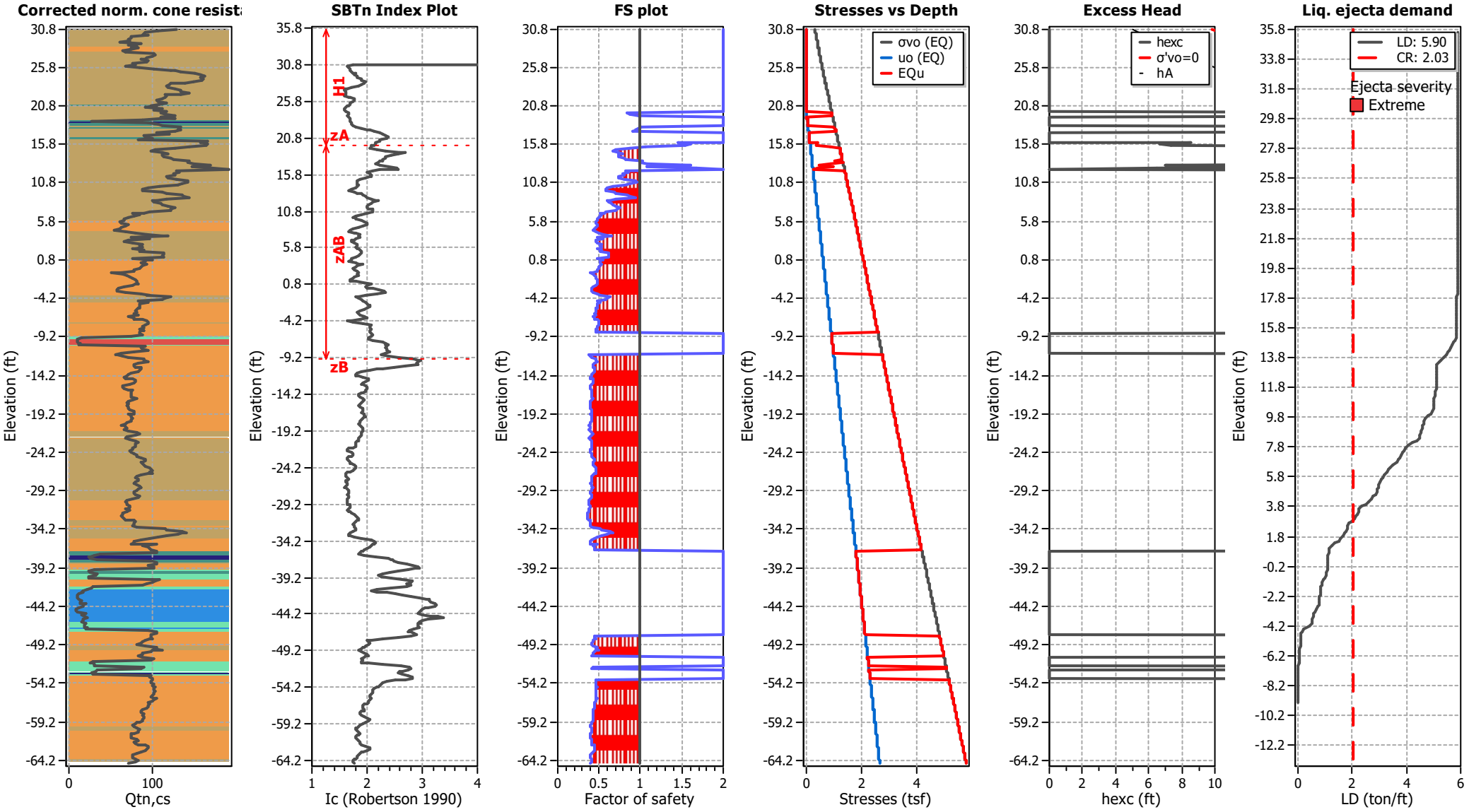
Estimation of post-earthquake lateral Displacements



Abbreviations

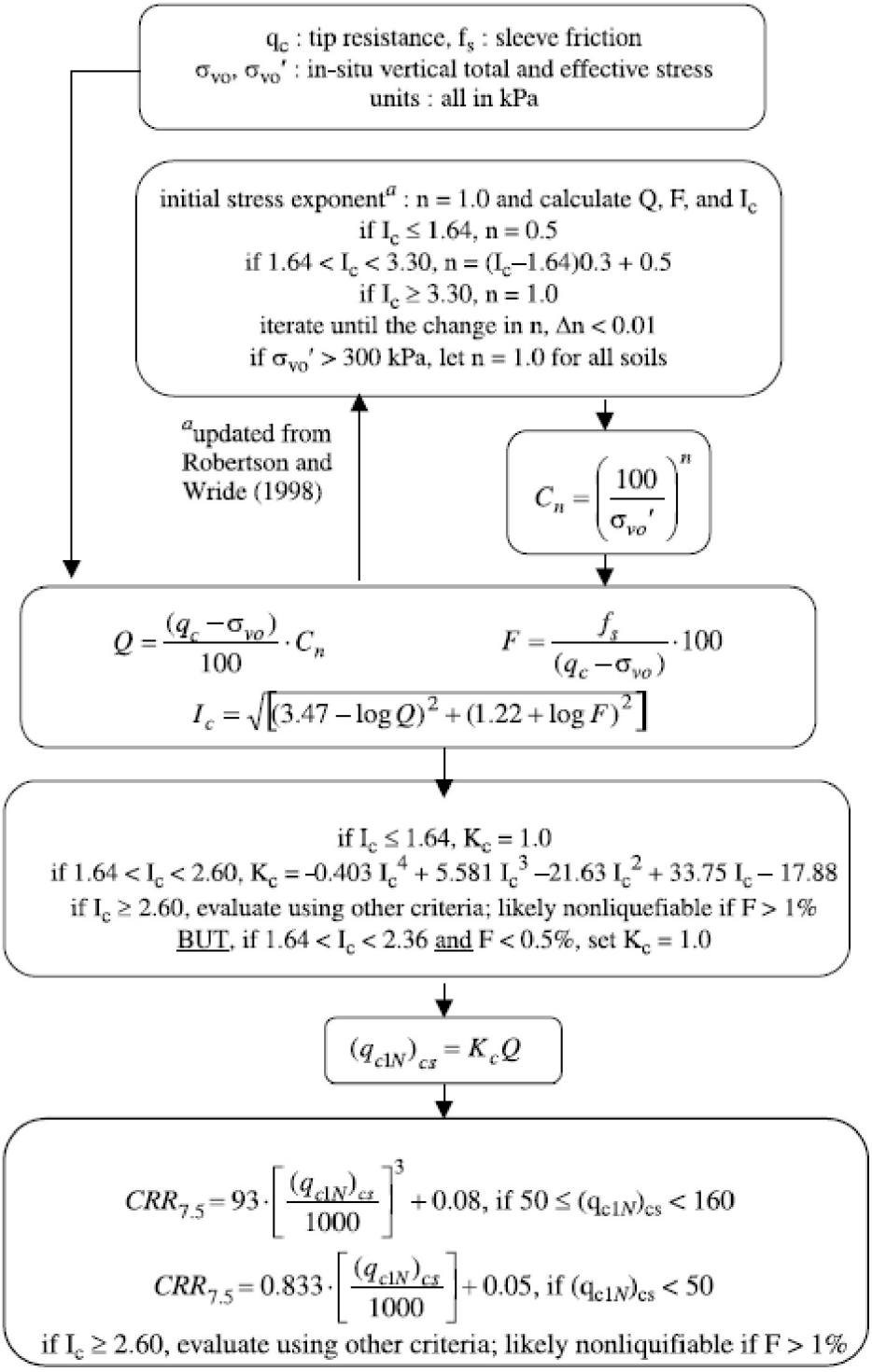
q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

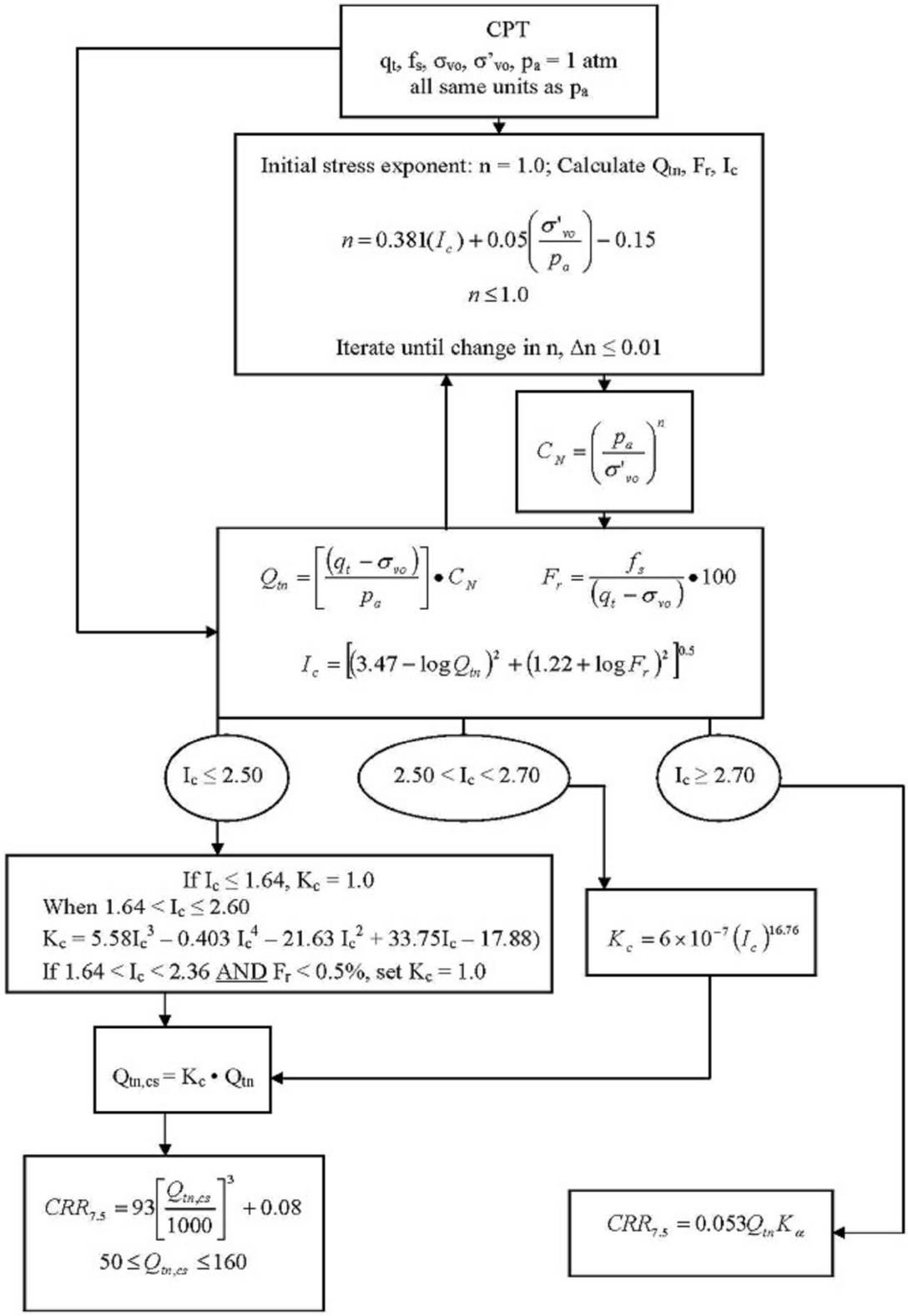
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:



[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

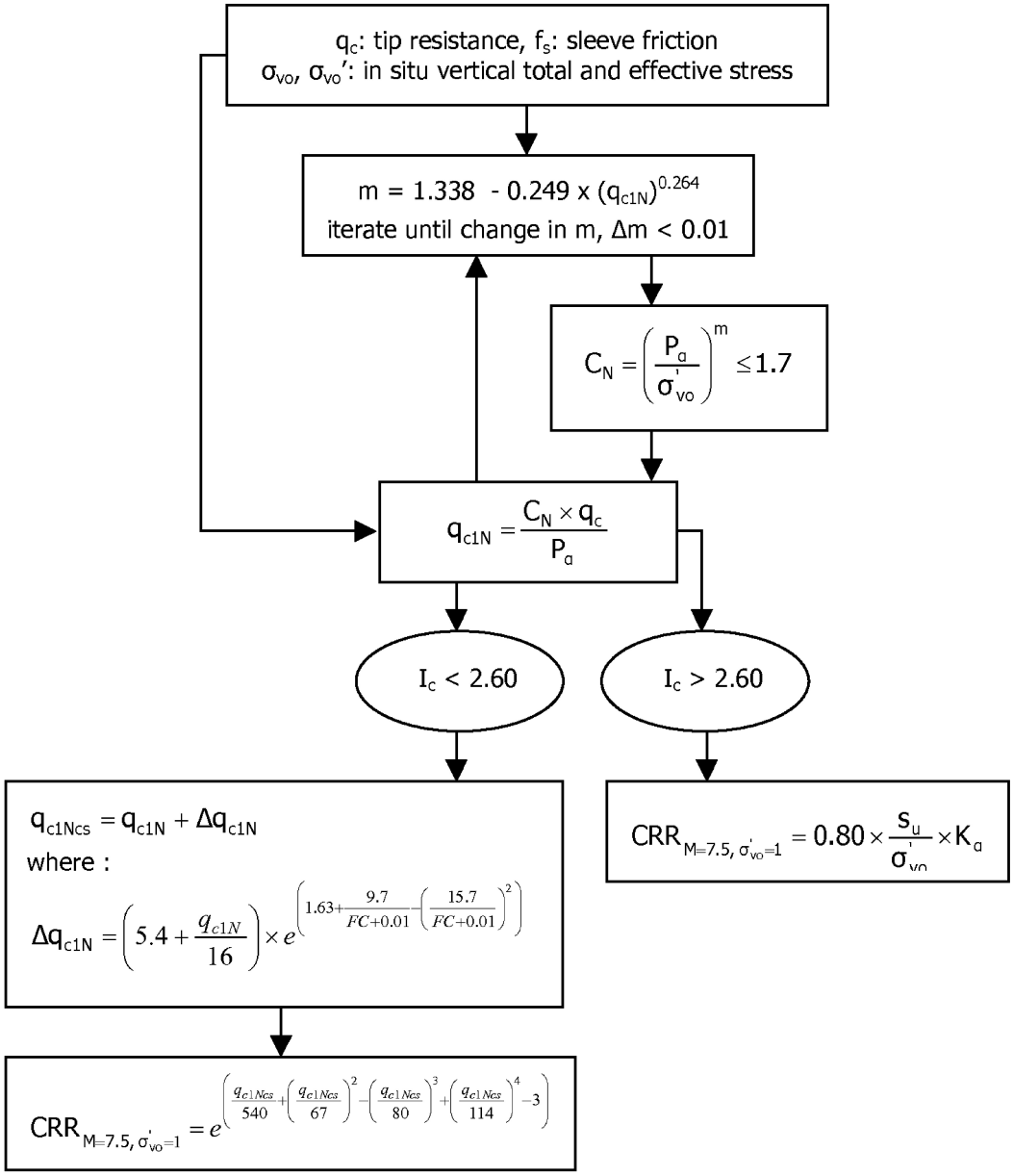
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. This procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:

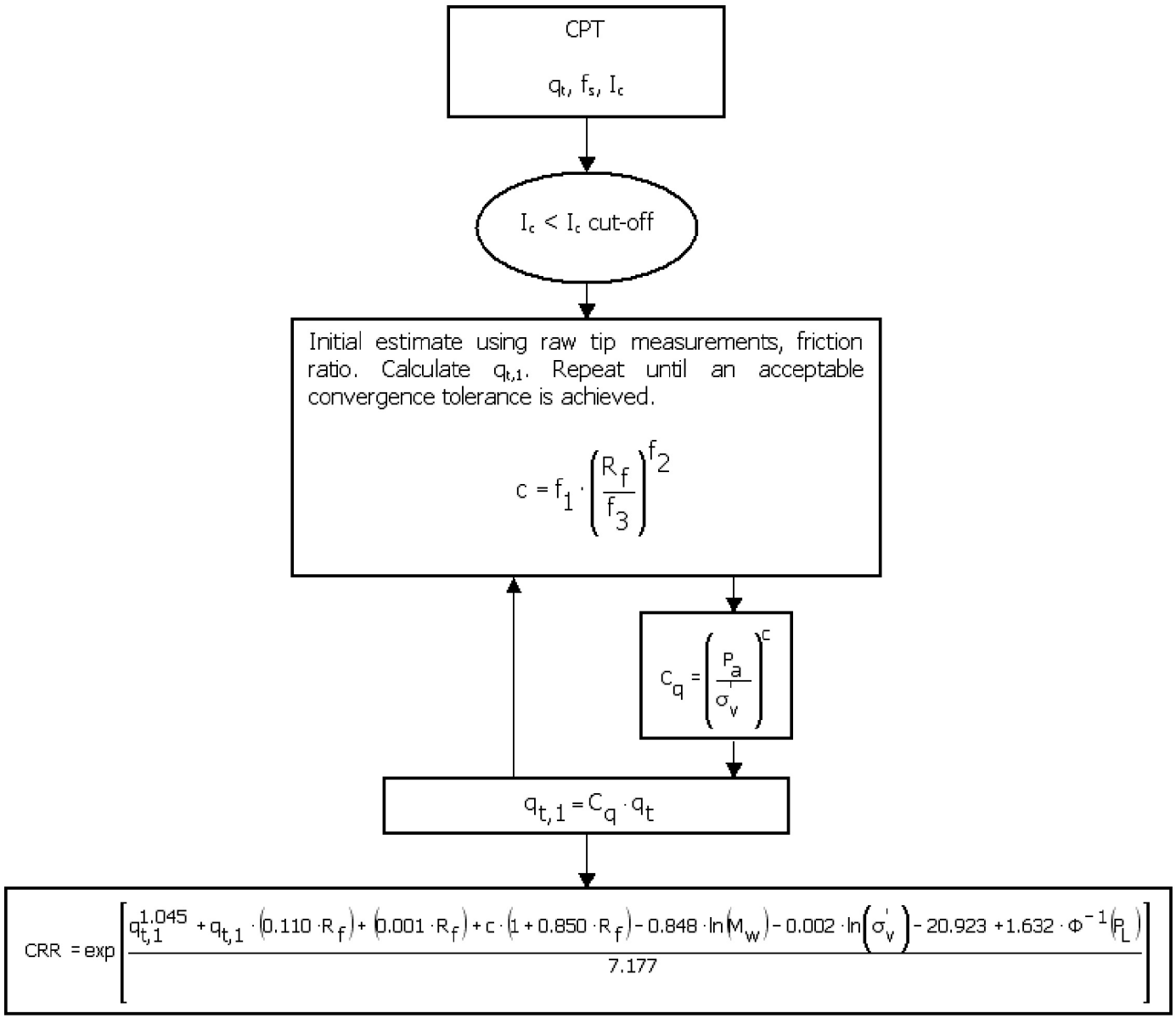


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

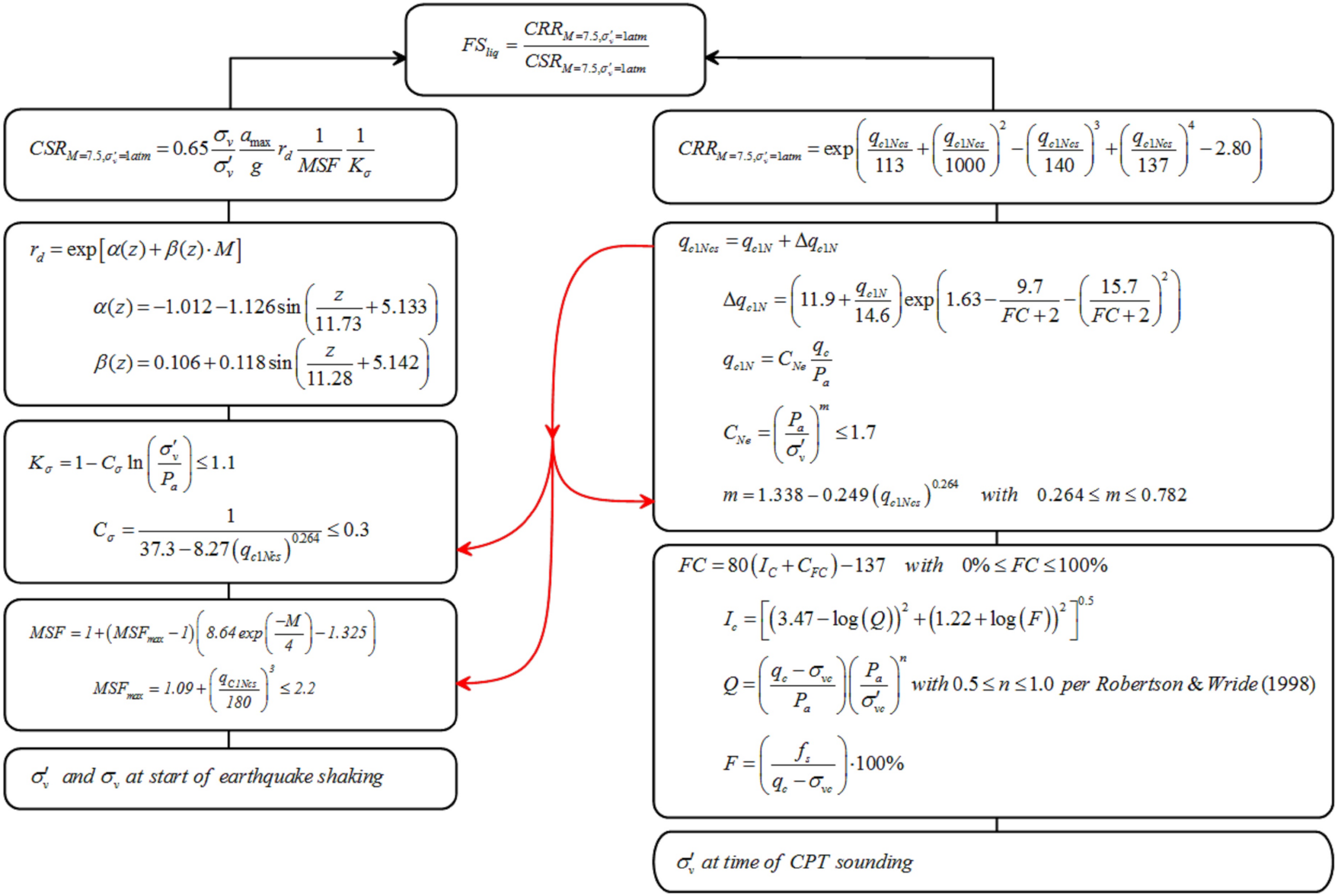
Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)



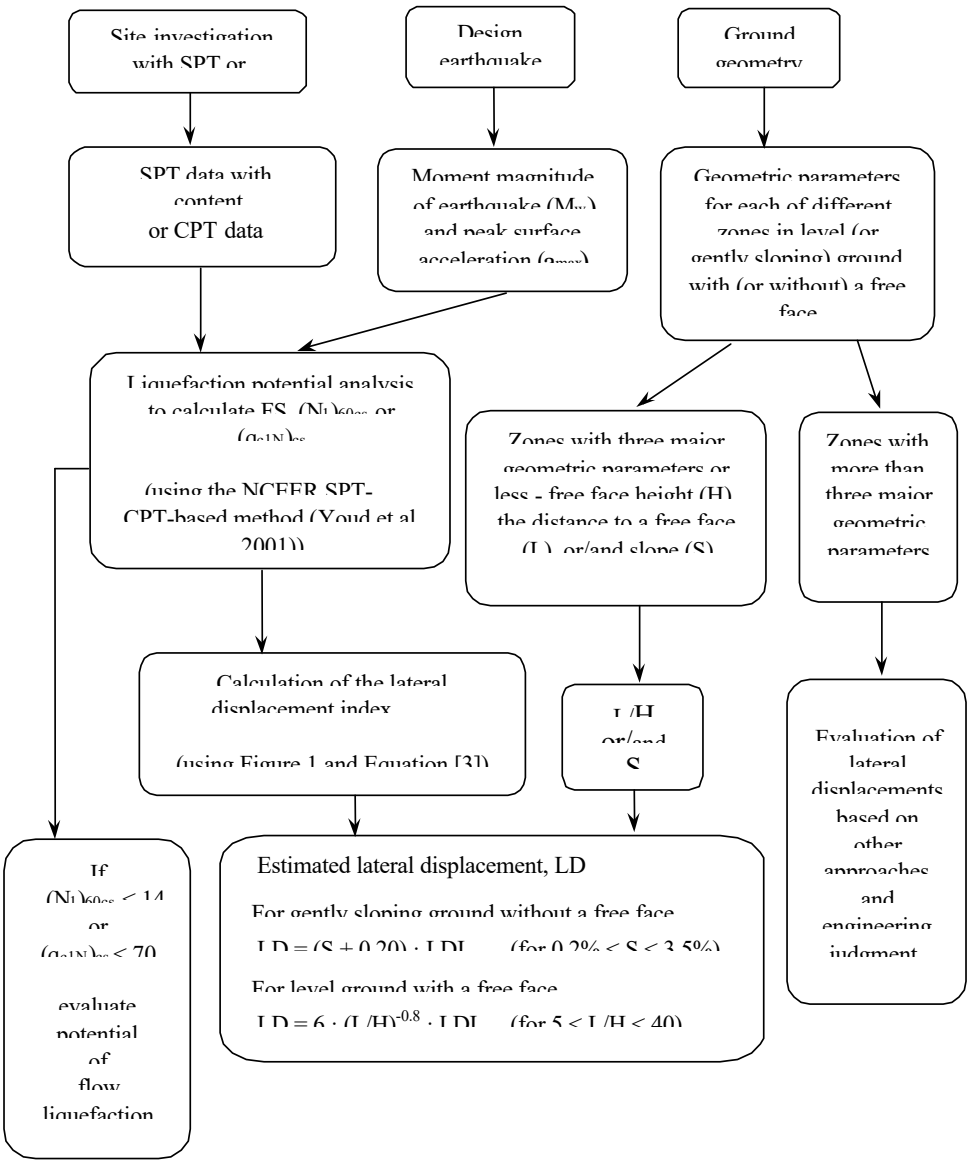
Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)



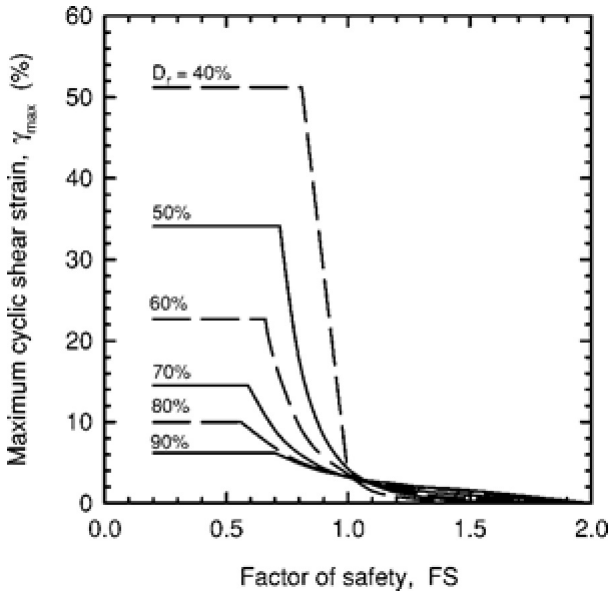
Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)



Procedure for the evaluation of liquefaction-induced lateral spreading displacements



[1] Flow chart illustrating major steps in estimating liquefaction-induced lateral spreading displacements using the proposed approach



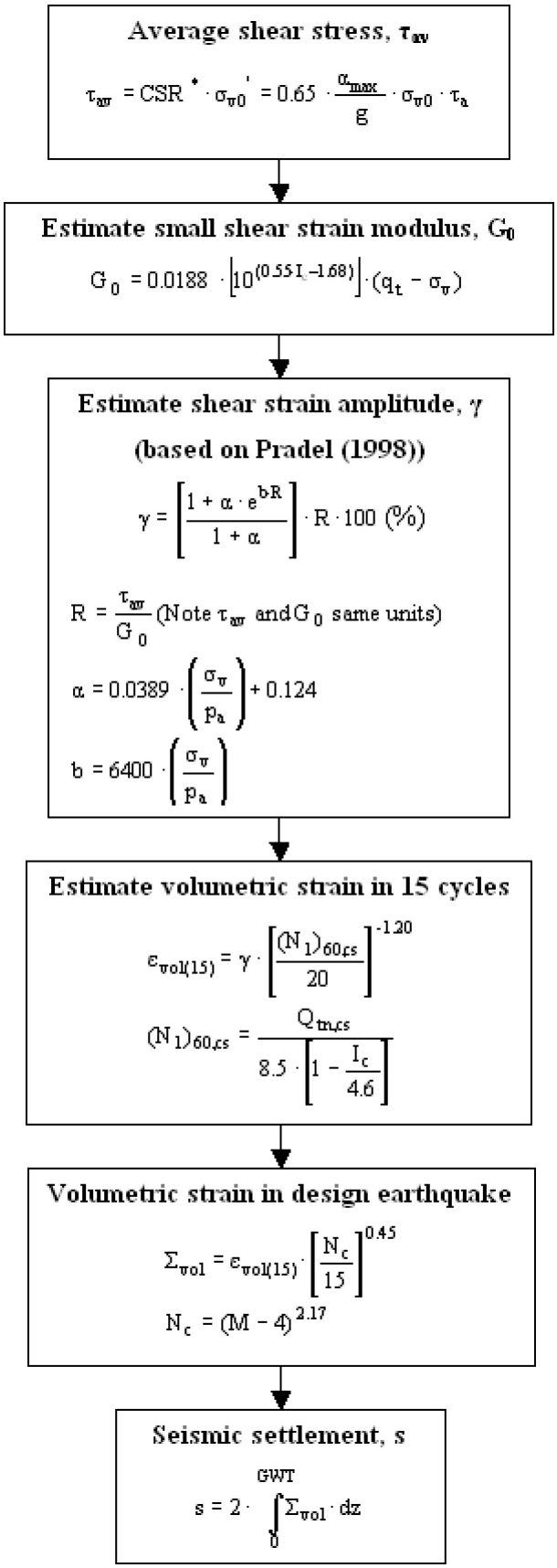
[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[1] **Equation [3]**

[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

Procedure for the estimation of seismic induced settlements in dry sands



Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, Symposium in honor of professor I. M. Idriss, San Diego, CA

Liquefaction Potential Index (LPI) calculation procedure

Calculation of the Liquefaction Potential Index (LPI) is used to interpret the liquefaction assessment calculations in terms of severity over depth. The calculation procedure is based on the methology developed by Iwasaki (1982) and is adopted by AFPS.

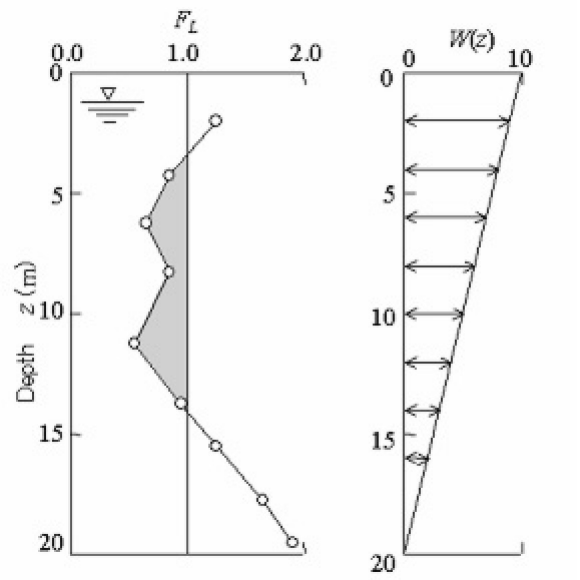
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

where:
F_L = 1 - F.S. when F.S. less than 1
F_L = 0 when F.S. greater than 1
z depth of measurment in meters

Values of LPI range between zero (0) when no test point is characterized as liquefiable and 100 when all points are characterized as susceptible to liquefaction. Iwasaki proposed four (4) discrete categories based on the numeric value of LPI:

- LPI = 0 : Liquefaction risk is very low
- 0 < LPI <= 5 : Liquefaction risk is low
- 5 < LPI <= 15 : Liquefaction risk is high
- LPI > 15 : Liquefaction risk is very high



Graphical presentation of the LPI calculation procedure

Shear-Induced Building Settlement (Ds) calculation procedure

The shear-induced building settlement (Ds) due to liquefaction below the building can be estimated using the relationship developed by Bray and Macedo (2017):

$$Ln(Ds) = c1 + c2 * LBS + 0.58 * Ln\left(Tanh\left(\frac{HL}{6}\right)\right) + 4.59 * Ln(Q) - 0.42 * Ln(Q)^2 - 0.02 * B + 0.84 * Ln(CAVdp) + 0.41 * Ln(Sa1) + \varepsilon$$

where Ds is in the units of mm, c1= -8.35 and c2= 0.072 for LBS ≤ 16, and c1= -7.48 and c2= 0.014 otherwise. Q is the building contact pressure in units of kPa, HL is the cumulative thickness of the liquefiable layers in the units of m, B is the building width in the units of m, CAVdp is a standardized version of the cumulative absolute velocity in the units of g-s, Sa1 is 5%-damped pseudo-acceleration response spectral value at a period of 1 s in the units of g, and ε is a normal random variable with zero mean and 0.50 standard deviation in Ln units. The liquefaction-induced building settlement index (LBS) is:

$$LBS = \sum W * \frac{\varepsilon_{shear}}{z} dz$$

where z (m) is the depth measured from the ground surface > 0, W is a foundation-weighting factor wherein W = 0.0 for z less than Df, which is the embedment depth of the foundation, and W = 1.0 otherwise. The shear strain parameter (ε_shear) is the liquefaction-induced free-field shear strain (in %) estimated using Zhang et al. (2004). It is calculated based on the estimated Dr of the liquefied soil layer and the calculated safety factor against liquefaction triggering (FSL).

References

- Lunne, T., Robertson, P.K., and Powell, J.J.M 1997. Cone penetration testing in geotechnical practice, E & FN Spon Routledge, 352 p, ISBN 0-7514-0393-8.
- Boulanger, R.W. and Idriss, I. M., 2007. Evaluation of Cyclic Softening in Silts and Clays. ASCE Journal of Geotechnical and Geoenvironmental Engineering June, Vol. 133, No. 6 pp 641-652
- Boulanger, R.W. and Idriss, I. M., 2014. CPT AND SPT BASED LIQUEFACTION TRIGGERING PROCEDURES. DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING COLLEGE OF ENGINEERING UNIVERSITY OF CALIFORNIA AT DAVIS
- Robertson, P.K. and Cabal, K.L., 2007, Guide to Cone Penetration Testing for Geotechnical Engineering. Available at no cost at http://www.geologismiki.gr/
- Robertson, P.K. 1990. Soil classification using the cone penetration test. Canadian Geotechnical Journal, 27 (1), 151-8.
- Robertson, P.K. and Wride, C.E., 1998. Cyclic Liquefaction and its Evaluation based on the CPT Canadian Geotechnical Journal, 1998, Vol. 35, August.
- Youd, T.L., Idriss, I.M., Andrus, R.D., Arango, I., Castro, G., Christian, J.T., Dobry, R., Finn, W.D.L., Harder, L.F., Hynes, M.E., Ishihara, K., Koester, J., Liao, S., Marcuson III, W.F., Martin, G.R., Mitchell, J.K., Moriwaki, Y., Power, M.S., Robertson, P.K., Seed, R., and Stokoe, K.H., Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshop on Evaluation of Liquefaction Resistance of Soils, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 127, October, pp 817-833
- Zhang, G., Robertson. P.K., Brachman, R., 2002, Estimating Liquefaction Induced Ground Settlements from the CPT, Canadian Geotechnical Journal, 39: pp 1168-1180
- Zhang, G., Robertson. P.K., Brachman, R., 2004, Estimating Liquefaction Induced Lateral Displacements using the SPT and CPT, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 130, No. 8, 861-871
- Pradel, D., 1998, Procedure to Evaluate Earthquake-Induced Settlements in Dry Sandy Soils, ASCE, Journal of Geotechnical & Geoenvironmental Engineering, Vol. 124, No. 4, 364-368
- Iwasaki, T., 1986, Soil liquefaction studies in Japan: state-of-the-art, Soil Dynamics and Earthquake Engineering, Vol. 5, No. 1, 2-70
- Papathanassiou G., 2008, LPI-based approach for calibrating the severity of liquefaction-induced failures and for assessing the probability of liquefaction surface evidence, Eng. Geol. 96:94–104
- P.K. Robertson, 2009, Interpretation of Cone Penetration Tests - a unified approach., Canadian Geotechnical Journal, Vol. 46, No. 11, pp 1337-1355
- P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering - from case history to practice, IS-Tokyo, June 2009
- Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, *Symposium in honor of professor I. M. Idriss,* SAN diego, CA
- R. E. S. Moss, R. B. Seed, R. E. Kayen, J. P. Stewart, A. Der Kiureghian, K. O. Cetin, CPT-Based Probabilistic and Deterministic Assessment of In Situ Seismic Soil Liquefaction Potential, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 132, No. 8, August 1, 2006
- I. M. Idriss and R. W. Boulanger, 2008. Soil liquefaction during earthquakes, Earthquake Engineering Research Institute MNO-12
- Jonathan D. Bray & Jorge Macedo, Department of Civil & Environmental Engineering, Univ. of California, Berkeley, CA, USA, Simplified procedure for estimating liquefaction-induced building settlement, *Proceedings of the 19th International Conference*

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

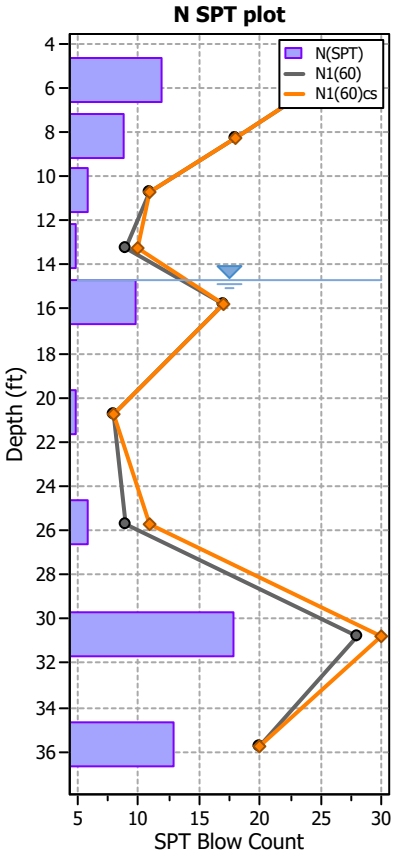
SPT BASED LIQUEFACTION ANALYSIS REPORT

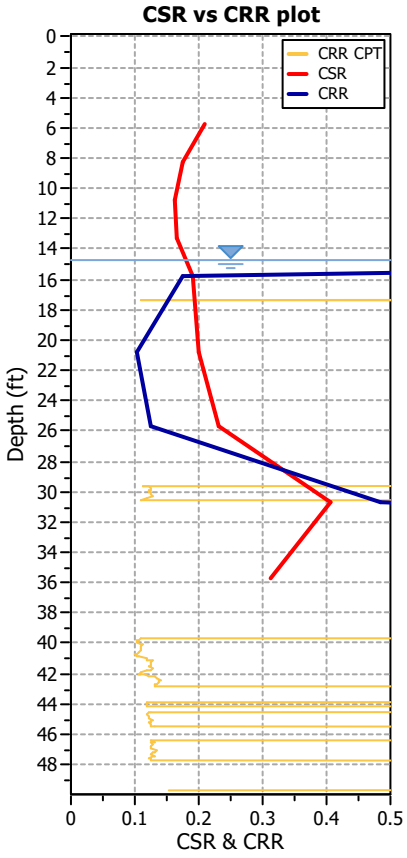
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

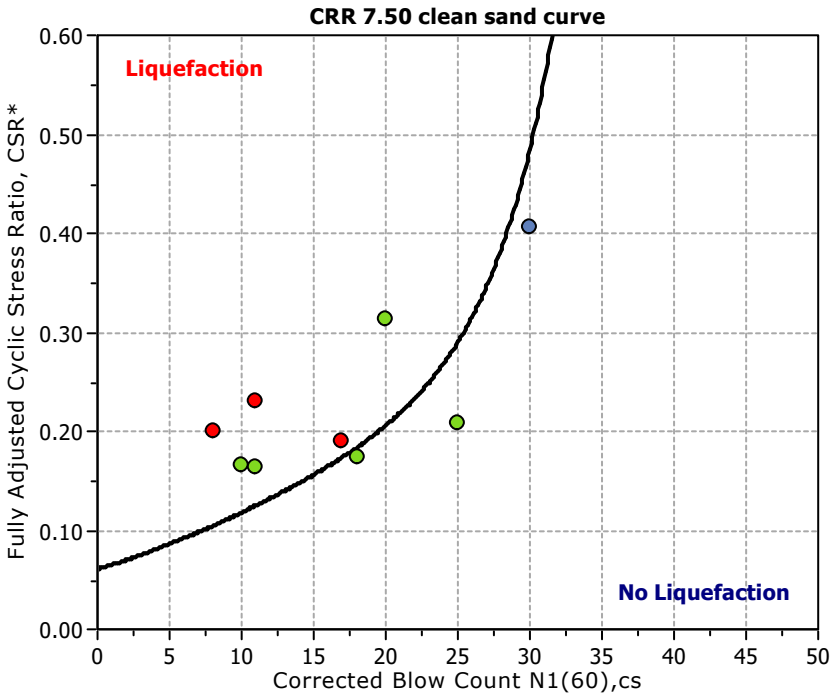
Borehole Name : B-01 (CPTW-01)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	14.73	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	14.73		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	1.72	0.69	2.000
2	8.25	110.00	0.00	0.45	0.00	0.45	1.01	0.157	1.10	1.42	0.82	2.000
3	10.75	110.00	0.00	0.59	0.00	0.59	1.01	0.157	1.06	1.21	0.91	2.000
4	13.25	96.50	0.00	0.71	0.00	0.71	1.01	0.157	1.04	1.19	0.92	2.000
5	15.75	109.80	0.03	0.85	0.00	0.82	1.01	0.163	1.03	1.38	0.83	0.190
6	20.75	110.00	0.19	1.12	0.00	0.94	1.01	0.189	1.01	1.15	0.93	0.201
7	25.75	115.00	0.34	1.41	0.00	1.07	1.01	0.209	1.00	1.21	0.91	0.230
8	30.75	115.00	0.50	1.70	0.00	1.20	1.01	0.224	0.97	2.00	0.56	0.407
9	35.75	83.60	0.66	1.91	0.00	1.25	1.01	0.241	0.98	1.49	0.78	2.000

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	5.00	0.00	0.32	0.32	12	1.61	0.80	1.00	1.20	1.35	25	0.00	25	4.000	2.00
2	8.25	6.00	0.00	0.45	0.45	9	1.48	0.85	1.00	1.20	1.35	18	0.03	18	4.000	2.00
3	10.75	5.00	0.00	0.59	0.59	6	1.36	0.85	1.00	1.20	1.35	11	0.00	11	4.000	2.00
4	13.25	10.00	0.00	0.71	0.71	5	1.25	0.85	1.00	1.20	1.35	9	1.15	10	4.000	2.00
5	15.75	5.00	0.03	0.85	0.82	10	1.13	0.95	1.00	1.20	1.35	17	0.00	17	0.174	0.91
6	20.75	5.00	0.19	1.12	0.94	5	1.07	0.95	1.00	1.20	1.35	8	0.00	8	0.105	0.52
7	25.75	12.00	0.34	1.41	1.07	6	0.99	0.95	1.00	1.20	1.35	9	2.07	11	0.125	0.54
8	30.75	12.00	0.50	1.70	1.20	18	0.95	1.00	1.00	1.20	1.35	28	2.07	30	0.485	1.19
9	35.75	0.00	0.66	1.91	1.25	13	0.93	1.00	1.00	1.20	1.35	20	0.00	20	4.000	2.00

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

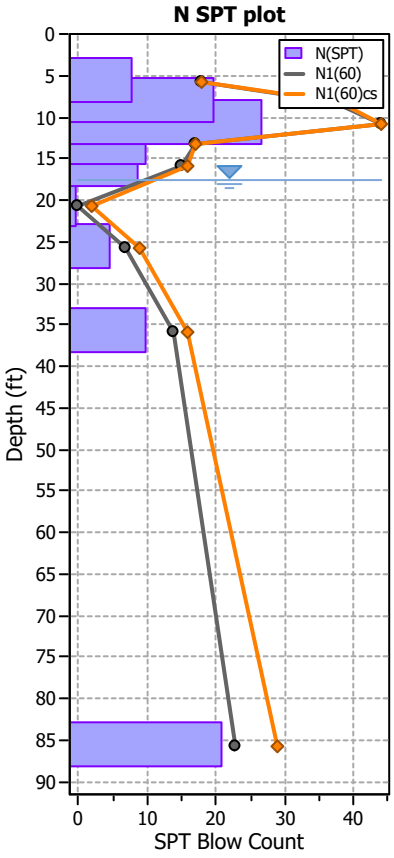
SPT BASED LIQUEFACTION ANALYSIS REPORT

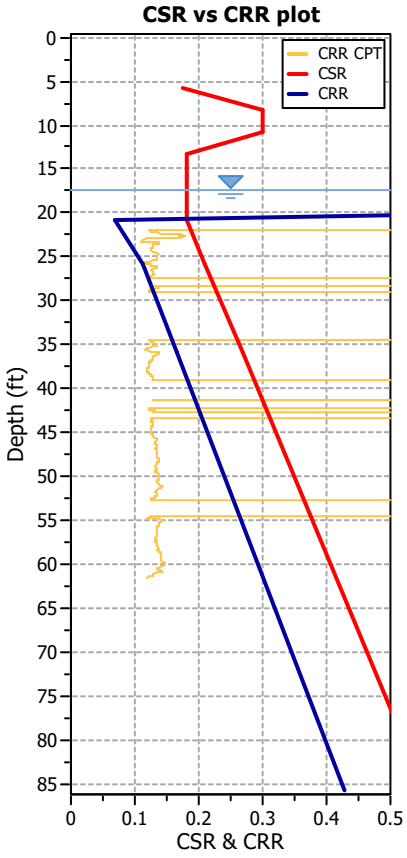
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

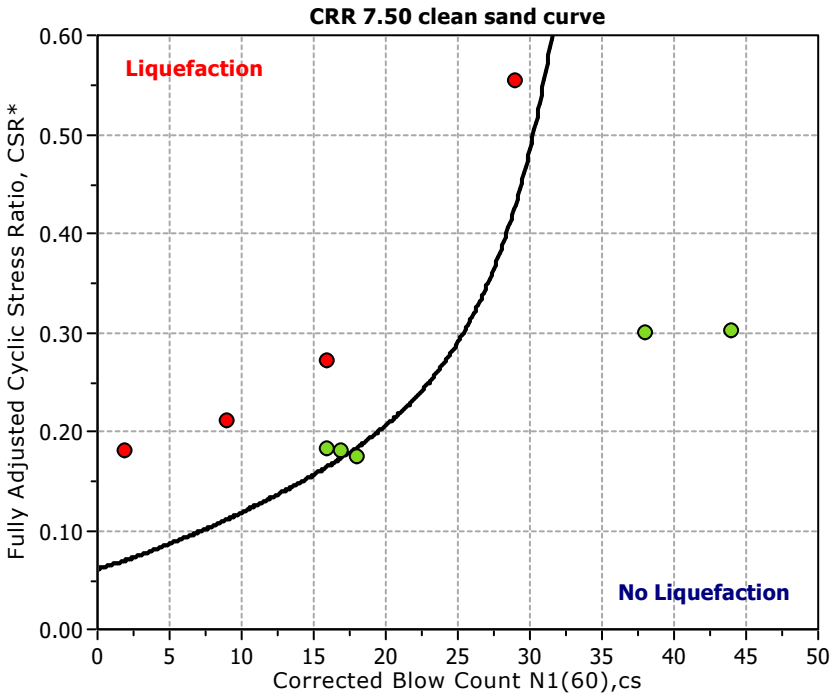
Borehole Name : B-02 (CPTW-02)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	17.45	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	17.45		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	1.42	0.82	2.000
2	8.25	91.60	0.00	0.43	0.00	0.43	1.01	0.157	1.10	2.20	0.48	2.000
3	10.75	110.00	0.00	0.57	0.00	0.57	1.01	0.157	1.10	2.20	0.48	2.000
4	13.25	110.00	0.00	0.71	0.00	0.71	1.01	0.157	1.05	1.38	0.83	2.000
5	15.75	123.00	0.00	0.86	0.00	0.86	1.01	0.157	1.02	1.35	0.85	2.000
6	20.75	110.00	0.10	1.13	0.00	1.03	1.01	0.173	1.00	1.09	0.96	0.180
7	25.75	115.00	0.26	1.42	0.00	1.16	1.01	0.193	0.99	1.17	0.93	0.210
8	35.75	115.00	0.57	2.00	0.00	1.43	1.01	0.221	0.97	1.35	0.85	0.270
9	85.75	110.00	2.13	4.75	0.00	2.62	0.95	0.270	0.82	1.94	0.59	0.554

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	5.00	0.00	0.32	0.32	8	1.70	0.80	1.00	1.20	1.35	18	0.00	18	4.000	2.00
2	8.25	9.00	0.00	0.43	0.43	20	1.33	0.85	1.00	1.20	1.35	37	0.72	38	4.000	2.00
3	10.75	5.00	0.00	0.57	0.57	27	1.19	0.85	1.00	1.20	1.35	44	0.00	44	4.000	2.00
4	13.25	5.00	0.00	0.71	0.71	10	1.21	0.85	1.00	1.20	1.35	17	0.00	17	4.000	2.00
5	15.75	10.00	0.00	0.86	0.86	9	1.11	0.95	1.00	1.20	1.35	15	1.15	16	4.000	2.00
6	20.75	12.00	0.10	1.13	1.03	0	1.02	0.95	1.00	1.20	1.35	0	2.07	2	0.070	0.39
7	25.75	12.00	0.26	1.42	1.16	5	0.95	0.95	1.00	1.20	1.35	7	2.07	9	0.111	0.53
8	35.75	12.00	0.57	2.00	1.43	10	0.86	1.00	1.00	1.20	1.35	14	2.07	16	0.165	0.61
9	85.75	75.00	2.13	4.75	2.62	21	0.69	1.00	1.00	1.20	1.35	23	5.56	29	0.429	0.77

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

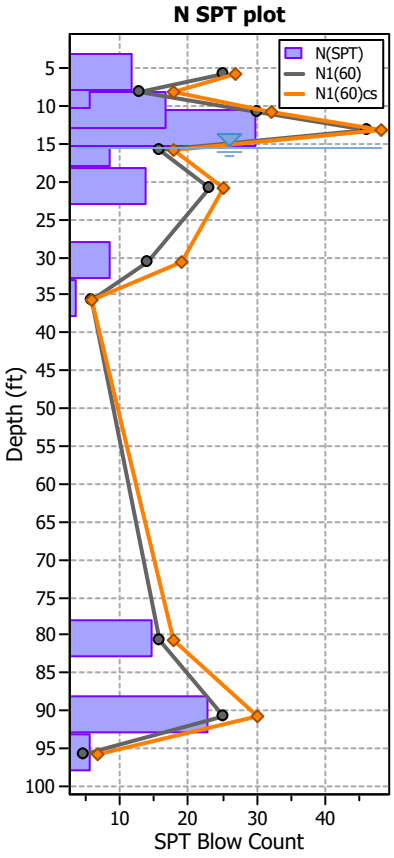
SPT BASED LIQUEFACTION ANALYSIS REPORT

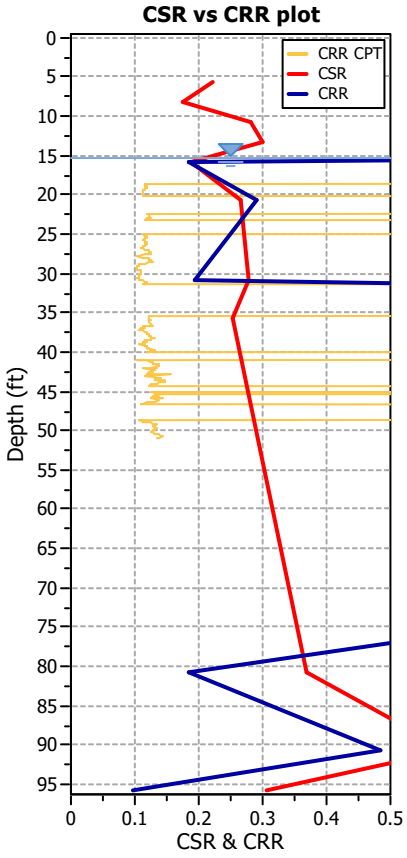
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

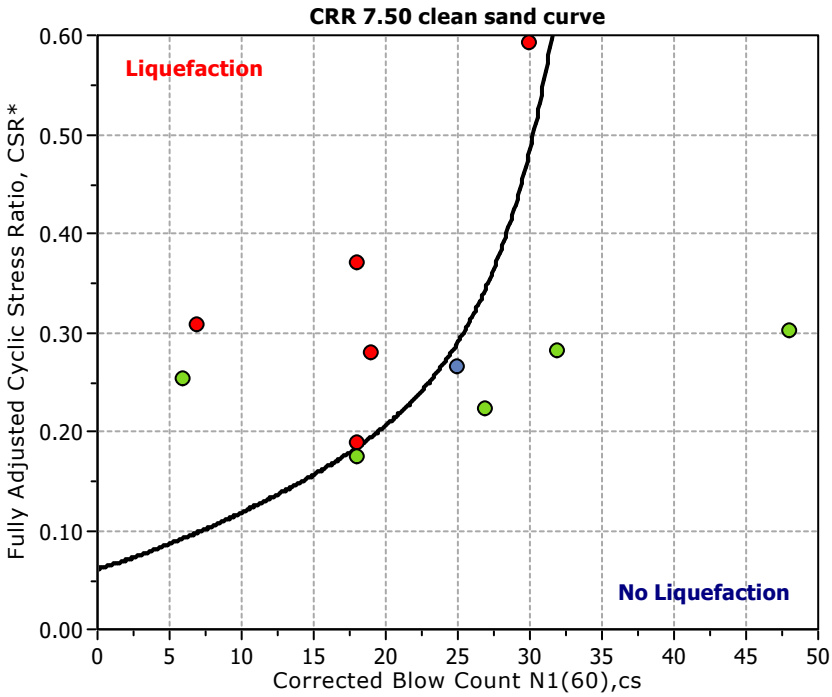
Borehole Name : B-03 (sCPTW-03)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	15.46	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	15.46		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	1.82	0.64	2.000
2	8.25	80.60	0.00	0.42	0.00	0.42	1.01	0.157	1.10	1.42	0.82	2.000
3	10.75	110.00	0.00	0.55	0.00	0.55	1.01	0.157	1.10	2.12	0.51	2.000
4	13.25	110.00	0.00	0.69	0.00	0.69	1.01	0.157	1.10	2.20	0.48	2.000
5	15.75	110.00	0.01	0.83	0.00	0.82	1.01	0.159	1.03	1.42	0.82	0.188
6	20.75	110.00	0.17	1.10	0.00	0.94	1.01	0.185	1.02	1.72	0.69	0.265
7	30.75	115.00	0.48	1.68	0.00	1.20	1.01	0.221	0.98	1.45	0.80	0.280
8	35.75	105.00	0.63	1.94	0.00	1.31	1.01	0.234	0.98	1.13	0.94	2.000
9	80.75	120.00	2.04	4.64	0.00	2.60	0.97	0.268	0.89	1.42	0.82	0.369
10	90.75	120.00	2.35	5.24	0.00	2.89	0.94	0.266	0.80	2.00	0.56	0.591
11	95.75	120.00	2.51	5.54	0.00	3.04	0.93	0.263	0.91	1.14	0.94	0.307

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	12.00	0.00	0.32	0.32	12	1.61	0.80	1.00	1.20	1.35	25	2.07	27	4.000	2.00
2	8.25	30.00	0.00	0.42	0.42	6	1.61	0.85	1.00	1.20	1.35	13	5.36	18	4.000	2.00
3	10.75	12.00	0.00	0.55	0.55	17	1.27	0.85	1.00	1.20	1.35	30	2.07	32	4.000	2.00
4	13.25	12.00	0.00	0.69	0.69	30	1.12	0.85	1.00	1.20	1.35	46	2.07	48	4.000	2.00
5	15.75	12.00	0.01	0.83	0.82	9	1.13	0.95	1.00	1.20	1.35	16	2.07	18	0.184	0.97
6	20.75	12.00	0.17	1.10	0.94	14	1.05	0.95	1.00	1.20	1.35	23	2.07	25	0.290	1.09
7	30.75	30.00	0.48	1.68	1.20	9	0.94	1.00	1.00	1.20	1.35	14	5.36	19	0.194	0.69
8	35.75	0.00	0.63	1.94	1.31	4	0.88	1.00	1.00	1.20	1.35	6	0.00	6	4.000	2.00
9	80.75	12.00	2.04	4.64	2.60	15	0.65	1.00	1.00	1.20	1.35	16	2.07	18	0.184	0.50
10	90.75	23.00	2.35	5.24	2.89	23	0.67	1.00	1.00	1.20	1.35	25	4.88	30	0.485	0.82
11	95.75	12.00	2.51	5.54	3.04	6	0.53	1.00	1.00	1.20	1.35	5	2.07	7	0.098	0.32

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

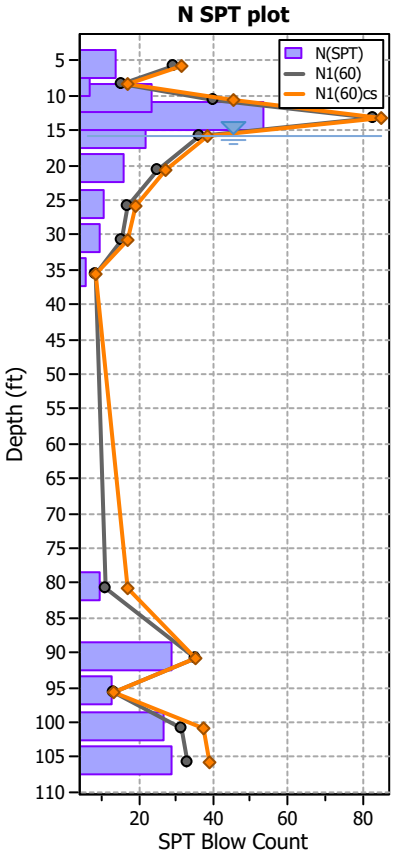
SPT BASED LIQUEFACTION ANALYSIS REPORT

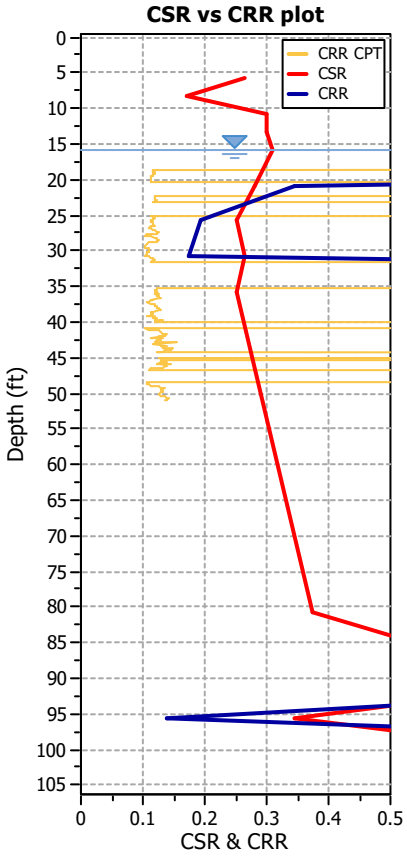
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

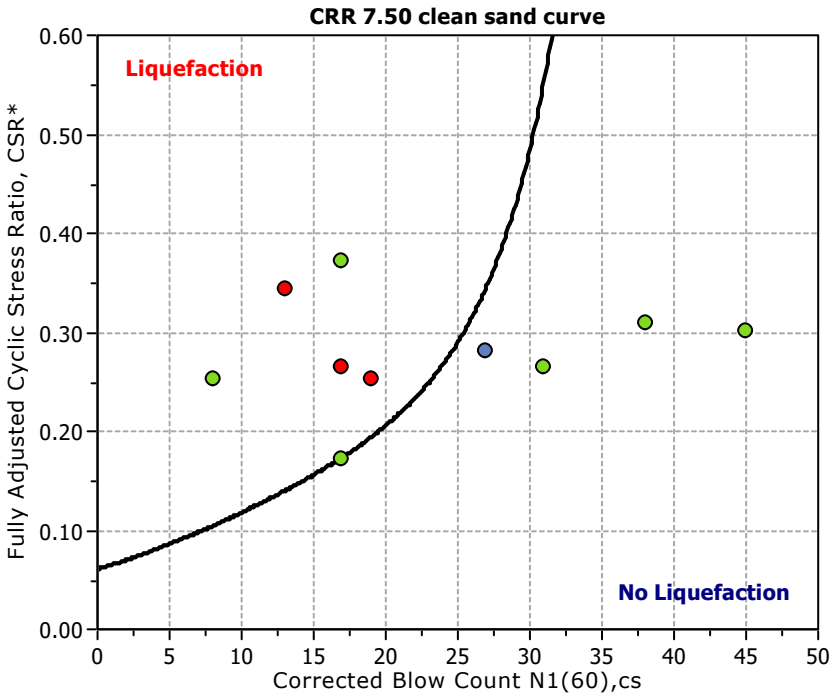
Borehole Name : B-04 (sCPTW-03)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	15.88	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	15.88		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	2.06	0.54	2.000
2	8.25	110.00	0.00	0.45	0.00	0.45	1.01	0.157	1.10	1.38	0.83	2.000
3	10.75	92.80	0.00	0.57	0.00	0.57	1.01	0.157	1.10	2.20	0.48	2.000
4	13.25	110.00	0.00	0.71	0.00	0.71	1.01	0.157	1.10	2.20	0.48	2.000
5	15.75	110.00	0.00	0.84	0.00	0.84	1.01	0.157	1.07	2.20	0.48	2.000
6	20.75	115.00	0.15	1.13	0.00	0.98	1.01	0.182	1.01	1.82	0.64	0.281
7	25.75	115.00	0.31	1.42	0.00	1.11	1.01	0.201	0.99	1.45	0.80	0.253
8	30.75	115.00	0.46	1.71	0.00	1.24	1.01	0.217	0.98	1.38	0.83	0.265
9	35.75	105.00	0.62	1.97	0.00	1.35	1.01	0.231	0.98	1.15	0.93	2.000
10	80.75	105.90	2.02	4.35	0.00	2.33	0.97	0.281	0.91	1.38	0.83	2.000
11	90.75	120.00	2.34	4.95	0.00	2.62	0.94	0.277	0.76	2.20	0.48	0.765
12	95.75	120.00	2.49	5.25	0.00	2.76	0.93	0.275	0.90	1.26	0.89	0.344
13	100.75	110.00	2.65	5.53	0.00	2.88	0.91	0.273	0.70	2.20	0.48	0.813
14	105.75	110.00	2.80	5.80	0.00	3.00	0.90	0.270	0.69	2.20	0.48	0.820

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	12.00	0.00	0.32	0.32	14	1.57	0.80	1.00	1.20	1.35	29	2.07	31	4.000	2.00
2	8.25	12.00	0.00	0.45	0.45	7	1.51	0.85	1.00	1.20	1.35	15	2.07	17	4.000	2.00
3	10.75	22.00	0.00	0.57	0.57	24	1.20	0.85	1.00	1.20	1.35	40	4.77	45	4.000	2.00
4	13.25	12.00	0.00	0.71	0.71	54	1.11	0.85	1.00	1.20	1.35	83	2.07	85	4.000	2.00
5	15.75	12.00	0.00	0.84	0.84	22	1.07	0.95	1.00	1.20	1.35	36	2.07	38	4.000	2.00
6	20.75	12.00	0.15	1.13	0.98	16	1.03	0.95	1.00	1.20	1.35	25	2.07	27	0.347	1.23
7	25.75	12.00	0.31	1.42	1.11	11	0.98	0.95	1.00	1.20	1.35	17	2.07	19	0.194	0.77
8	30.75	12.00	0.46	1.71	1.24	10	0.92	1.00	1.00	1.20	1.35	15	2.07	17	0.174	0.66
9	35.75	0.00	0.62	1.97	1.35	6	0.87	1.00	1.00	1.20	1.35	8	0.00	8	4.000	2.00
10	80.75	75.00	2.02	4.35	2.33	10	0.66	1.00	1.00	1.20	1.35	11	5.56	17	4.000	2.00
11	90.75	5.00	2.34	4.95	2.62	29	0.74	1.00	1.00	1.20	1.35	35	0.00	35	1.108	1.45
12	95.75	5.00	2.49	5.25	2.76	13	0.61	1.00	1.00	1.20	1.35	13	0.00	13	0.140	0.41
13	100.75	56.00	2.65	5.53	2.88	27	0.70	1.00	1.00	1.20	1.35	31	5.61	37	1.750	2.00
14	105.75	51.00	2.80	5.80	3.00	29	0.70	1.00	1.00	1.20	1.35	33	5.61	39	3.025	2.00

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

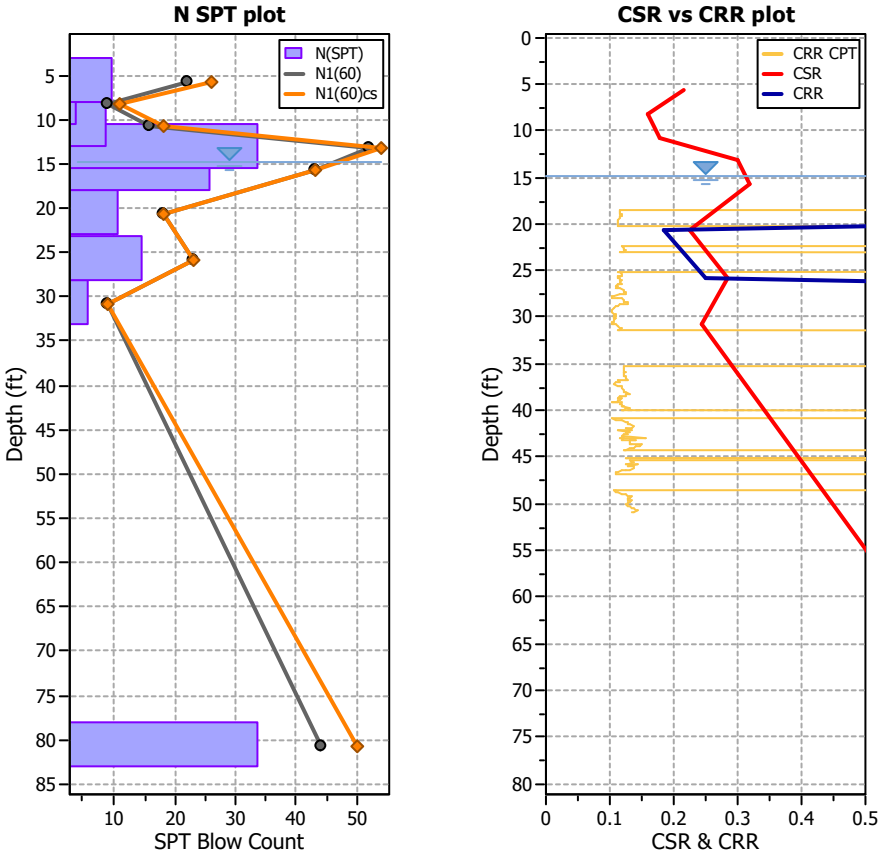
SPT BASED LIQUEFACTION ANALYSIS REPORT

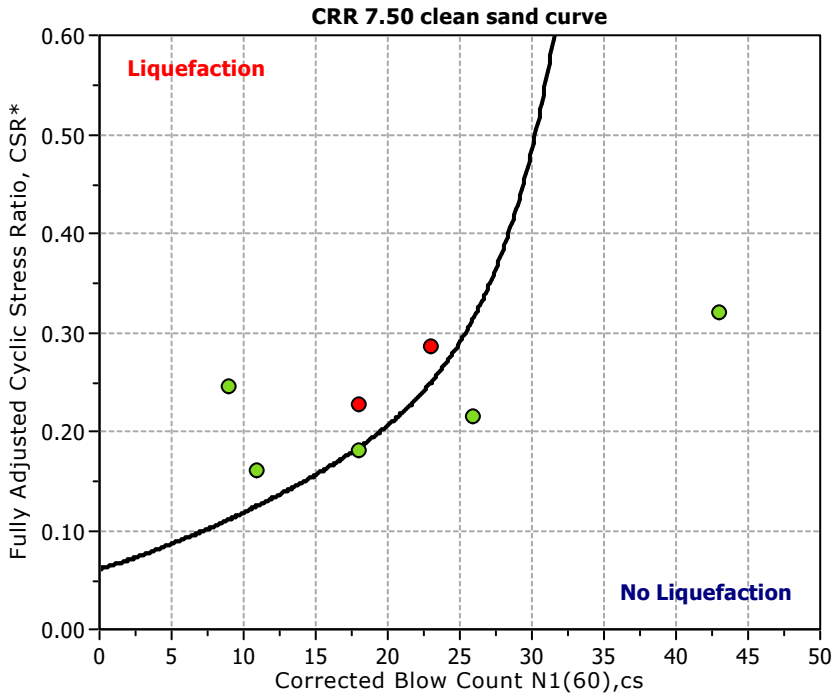
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

Borehole Name : B-05 (sCPTW-03)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	14.89	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	14.89		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				





:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	1.77	0.66	2.000
2	8.25	110.00	0.00	0.45	0.00	0.45	1.01	0.157	1.08	1.21	0.91	2.000
3	10.75	110.00	0.00	0.59	0.00	0.59	1.01	0.157	1.07	1.42	0.82	2.000
4	13.25	107.40	0.00	0.73	0.00	0.73	1.01	0.157	1.10	2.20	0.48	2.000
5	15.75	110.00	0.03	0.86	0.00	0.84	1.01	0.162	1.07	2.20	0.48	2.000
6	20.75	110.00	0.18	1.14	0.00	0.96	1.01	0.188	1.01	1.42	0.82	0.227
7	25.75	118.60	0.34	1.43	0.00	1.10	1.01	0.207	0.99	1.62	0.73	0.285
8	30.75	105.00	0.49	1.70	0.00	1.20	1.01	0.223	0.99	1.17	0.93	2.000
9	80.75	110.00	2.05	4.45	0.00	2.39	0.97	0.280	0.76	2.20	0.48	2.000

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	16.00	0.00	0.32	0.32	10	1.67	0.80	1.00	1.20	1.35	22	3.58	26	4.000	2.00
2	8.25	12.00	0.00	0.45	0.45	4	1.59	0.85	1.00	1.20	1.35	9	2.07	11	4.000	2.00
3	10.75	12.00	0.00	0.59	0.59	9	1.32	0.85	1.00	1.20	1.35	16	2.07	18	4.000	2.00
4	13.25	11.00	0.00	0.73	0.73	34	1.10	0.85	1.00	1.20	1.35	52	1.61	54	4.000	2.00
5	15.75	5.00	0.03	0.86	0.84	26	1.07	0.95	1.00	1.20	1.35	43	0.00	43	4.000	2.00
6	20.75	5.00	0.18	1.14	0.96	11	1.05	0.95	1.00	1.20	1.35	18	0.00	18	0.184	0.81
7	25.75	4.00	0.34	1.43	1.10	15	0.99	0.95	1.00	1.20	1.35	23	0.00	23	0.249	0.87
8	30.75	0.00	0.49	1.70	1.20	6	0.93	1.00	1.00	1.20	1.35	9	0.00	9	4.000	2.00
9	80.75	58.00	2.05	4.45	2.39	34	0.80	1.00	1.00	1.20	1.35	44	5.61	50	4.000	2.00

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

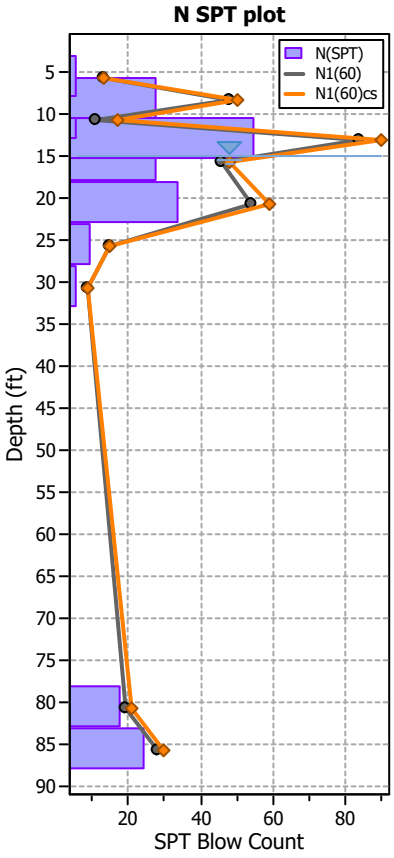
SPT BASED LIQUEFACTION ANALYSIS REPORT

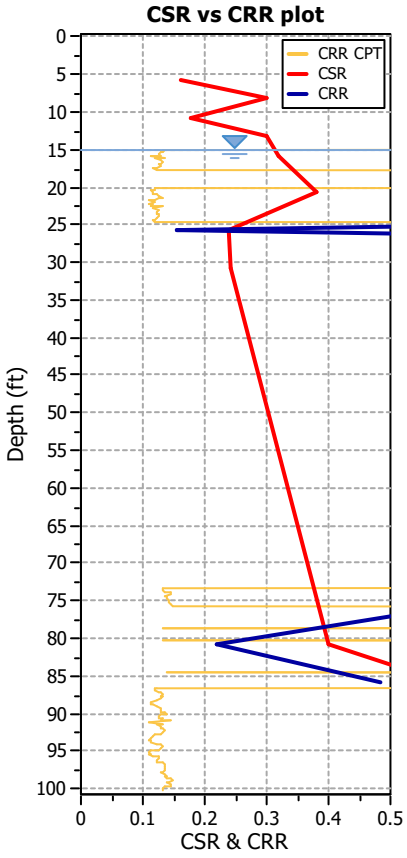
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

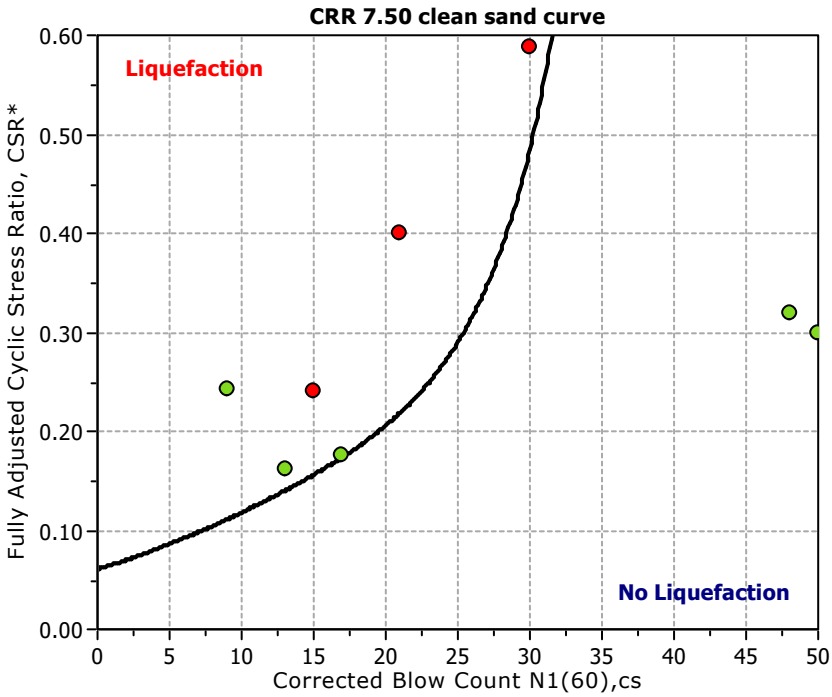
Borehole Name : B-06 (SCPT-01)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	15.00	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	15.00		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	1.26	0.89	2.000
2	8.25	110.00	0.00	0.45	0.00	0.45	1.01	0.157	1.10	2.20	0.48	2.000
3	10.75	110.00	0.00	0.59	0.00	0.59	1.01	0.157	1.07	1.38	0.83	2.000
4	13.13	110.00	0.00	0.72	0.00	0.72	1.01	0.157	1.10	2.20	0.48	2.000
5	15.75	110.00	0.02	0.87	0.00	0.84	1.01	0.162	1.07	2.20	0.48	2.000
6	20.75	110.00	0.18	1.14	0.00	0.96	1.01	0.187	1.03	2.20	0.48	2.000
7	25.75	115.00	0.34	1.43	0.00	1.09	1.01	0.206	1.00	1.32	0.86	0.240
8	30.75	106.40	0.49	1.69	0.00	1.20	1.01	0.222	0.99	1.17	0.93	2.000
9	80.75	120.00	2.05	4.69	0.00	2.64	0.97	0.267	0.87	1.53	0.77	0.400
10	85.75	120.00	2.21	4.99	0.00	2.79	0.95	0.266	0.80	2.00	0.56	0.587

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	5.00	0.00	0.32	0.32	6	1.70	0.80	1.00	1.20	1.35	13	0.00	13	4.000	2.00
2	8.25	12.00	0.00	0.45	0.45	28	1.25	0.85	1.00	1.20	1.35	48	2.07	50	4.000	2.00
3	10.75	51.00	0.00	0.59	0.59	6	1.36	0.85	1.00	1.20	1.35	11	5.61	17	4.000	2.00
4	13.13	51.00	0.00	0.72	0.72	55	1.11	0.85	1.00	1.20	1.35	84	5.61	90	4.000	2.00
5	15.75	12.00	0.02	0.87	0.84	28	1.06	0.95	1.00	1.20	1.35	46	2.07	48	4.000	2.00
6	20.75	22.00	0.18	1.14	0.96	34	1.03	0.95	1.00	1.20	1.35	54	4.77	59	4.000	2.00
7	25.75	5.00	0.34	1.43	1.09	10	0.98	0.95	1.00	1.20	1.35	15	0.00	15	0.156	0.65
8	30.75	0.00	0.49	1.69	1.20	6	0.93	1.00	1.00	1.20	1.35	9	0.00	9	4.000	2.00
9	80.75	12.00	2.05	4.69	2.64	18	0.66	1.00	1.00	1.20	1.35	19	2.07	21	0.219	0.55
10	85.75	12.00	2.21	4.99	2.79	25	0.70	1.00	1.00	1.20	1.35	28	2.07	30	0.485	0.83

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

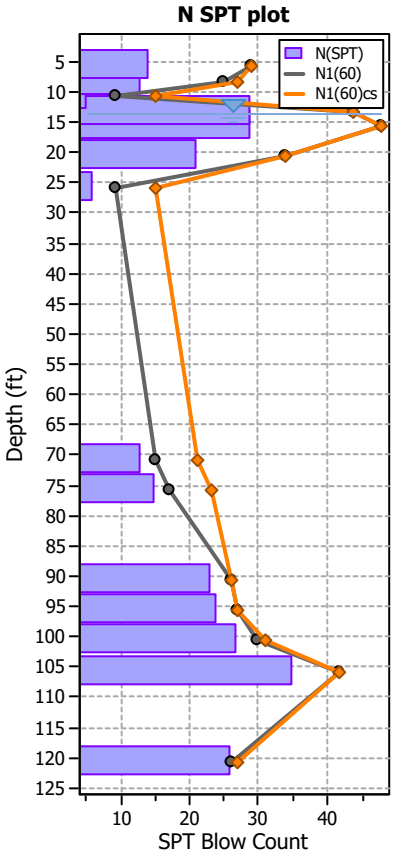
SPT BASED LIQUEFACTION ANALYSIS REPORT

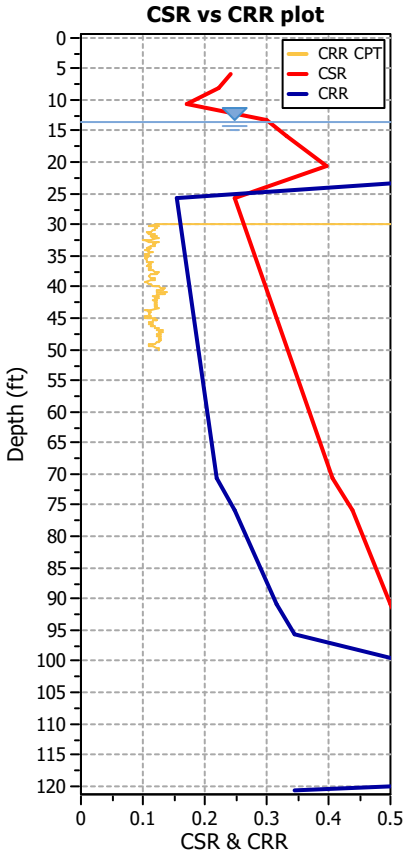
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

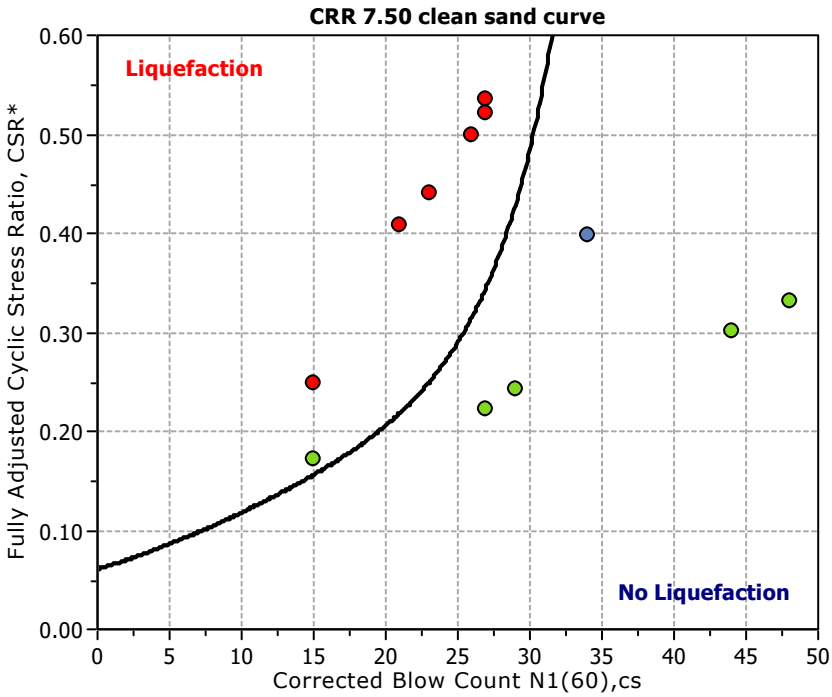
Borehole Name : B-07 (sCPTW-05A)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	13.70	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	13.70		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	1.94	0.59	2.000
2	8.25	110.00	0.00	0.45	0.00	0.45	1.01	0.157	1.10	1.82	0.64	2.000
3	10.75	110.30	0.00	0.59	0.00	0.59	1.01	0.157	1.06	1.32	0.86	2.000
4	13.25	115.00	0.00	0.74	0.00	0.74	1.01	0.157	1.10	2.20	0.48	2.000
5	15.75	115.00	0.06	0.88	0.00	0.82	1.01	0.170	1.08	2.20	0.48	2.000
6	20.75	115.00	0.22	1.17	0.00	0.95	1.01	0.194	1.03	2.20	0.48	0.397
7	25.75	109.00	0.38	1.44	0.00	1.06	1.01	0.214	1.00	1.32	0.86	0.248
8	70.75	110.00	1.78	3.91	0.00	2.13	0.99	0.282	0.90	1.53	0.77	0.407
9	75.75	101.20	1.94	4.17	0.00	2.23	0.98	0.284	0.89	1.62	0.73	0.440
10	90.75	120.00	2.40	5.07	0.00	2.66	0.94	0.279	0.84	1.77	0.66	0.499
11	95.75	120.00	2.56	5.37	0.00	2.81	0.93	0.276	0.83	1.82	0.64	0.522
12	100.75	121.60	2.72	5.67	0.00	2.96	0.91	0.273	0.78	2.06	0.54	0.649
13	105.75	120.00	2.87	5.97	0.00	3.10	0.90	0.269	0.68	2.20	0.48	2.000
14	120.75	120.00	3.34	6.87	0.00	3.53	0.89	0.270	0.79	1.82	0.64	0.536

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	5.00	0.00	0.32	0.32	14	1.57	0.80	1.00	1.20	1.35	29	0.00	29	4.000	2.00
2	8.25	12.00	0.00	0.45	0.45	13	1.40	0.85	1.00	1.20	1.35	25	2.07	27	4.000	2.00
3	10.75	90.10	0.00	0.59	0.59	5	1.37	0.85	1.00	1.20	1.35	9	5.51	15	4.000	2.00
4	13.25	5.00	0.00	0.74	0.74	29	1.10	0.85	1.00	1.20	1.35	44	0.00	44	4.000	2.00
5	15.75	5.00	0.06	0.88	0.82	29	1.07	0.95	1.00	1.20	1.35	48	0.00	48	4.000	2.00
6	20.75	5.00	0.22	1.17	0.95	21	1.04	0.95	1.00	1.20	1.35	34	0.00	34	0.909	2.00
7	25.75	53.00	0.38	1.44	1.06	6	1.00	0.95	1.00	1.20	1.35	9	5.61	15	0.156	0.63
8	70.75	51.00	1.78	3.91	2.13	13	0.71	1.00	1.00	1.20	1.35	15	5.61	21	0.219	0.54
9	75.75	45.00	1.94	4.17	2.23	15	0.71	1.00	1.00	1.20	1.35	17	5.61	23	0.249	0.57
10	90.75	5.00	2.40	5.07	2.66	23	0.69	1.00	1.00	1.20	1.35	26	0.00	26	0.316	0.63
11	95.75	5.00	2.56	5.37	2.81	24	0.69	1.00	1.00	1.20	1.35	27	0.00	27	0.347	0.66
12	100.75	10.00	2.72	5.67	2.96	27	0.69	1.00	1.00	1.20	1.35	30	1.15	31	0.555	0.86
13	105.75	5.00	2.87	5.97	3.10	35	0.73	1.00	1.00	1.20	1.35	42	0.00	42	4.000	2.00
14	120.75	10.00	3.34	6.87	3.53	26	0.62	1.00	1.00	1.20	1.35	26	1.15	27	0.347	0.65

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

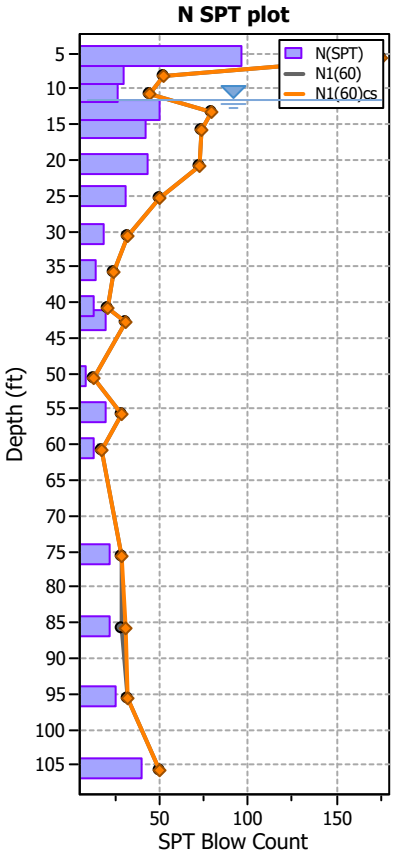
SPT BASED LIQUEFACTION ANALYSIS REPORT

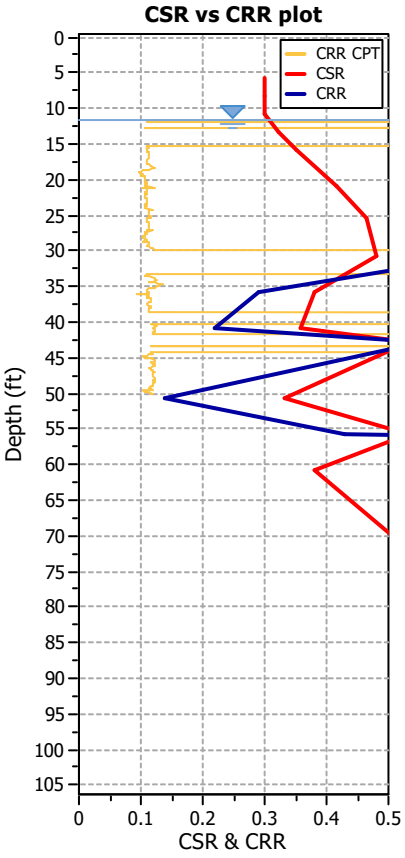
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

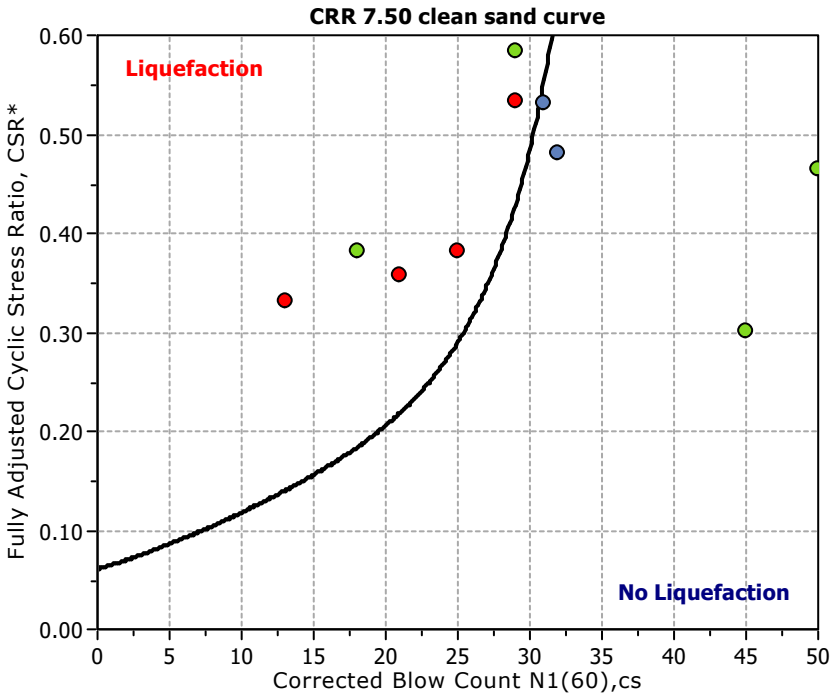
Borehole Name : B-09 (sCPTW-05)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	11.68	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	11.68		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.67	110.00	0.00	0.31	0.00	0.31	1.01	0.157	1.10	2.20	0.48	2.000
2	8.25	110.00	0.00	0.45	0.00	0.45	1.01	0.157	1.10	2.20	0.48	2.000
3	10.75	110.00	0.00	0.59	0.00	0.59	1.01	0.157	1.10	2.20	0.48	2.000
4	13.21	110.00	0.05	0.73	0.00	0.68	1.01	0.168	1.10	2.20	0.48	2.000
5	15.75	110.00	0.13	0.87	0.00	0.74	1.01	0.184	1.10	2.20	0.48	2.000
6	20.75	110.00	0.28	1.14	0.00	0.86	1.01	0.209	1.06	2.20	0.48	2.000
7	25.25	114.50	0.42	1.40	0.00	0.98	1.01	0.226	1.02	2.20	0.48	2.000
8	30.75	110.20	0.59	1.70	0.00	1.11	1.01	0.243	0.99	2.12	0.51	0.481
9	35.75	105.00	0.75	1.96	0.00	1.21	1.01	0.256	0.98	1.72	0.69	0.382
10	40.75	105.00	0.91	2.23	0.00	1.32	1.01	0.266	0.97	1.53	0.77	0.359
11	42.75	105.00	0.97	2.33	0.00	1.36	1.01	0.270	0.95	2.06	0.54	0.531
12	50.75	105.00	1.22	2.75	0.00	1.53	1.01	0.282	0.96	1.26	0.89	0.331
13	55.75	105.00	1.37	3.01	0.00	1.64	1.01	0.288	0.92	1.94	0.59	0.533
14	60.75	105.00	1.53	3.28	0.00	1.75	1.00	0.293	0.94	1.42	0.82	2.000
15	75.75	105.00	2.00	4.06	0.00	2.07	0.98	0.300	0.87	1.94	0.59	2.000
16	85.75	128.70	2.31	4.71	0.00	2.40	0.95	0.292	0.83	2.06	0.54	0.657
17	95.75	120.00	2.62	5.31	0.00	2.68	0.93	0.285	0.79	2.12	0.51	0.707
18	105.75	129.20	2.93	5.95	0.00	3.02	0.90	0.275	0.69	2.20	0.48	2.000

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.67	5.00	0.00	0.31	0.31	98	1.38	0.80	1.00	1.20	1.35	175	0.00	175	4.000	2.00
2	8.25	5.00	0.00	0.45	0.45	31	1.25	0.85	1.00	1.20	1.35	53	0.00	53	4.000	2.00
3	10.75	5.00	0.00	0.59	0.59	28	1.17	0.85	1.00	1.20	1.35	45	0.00	45	4.000	2.00
4	13.21	0.00	0.05	0.73	0.68	52	1.12	0.85	1.00	1.20	1.35	80	0.00	80	4.000	2.00
5	15.75	5.00	0.13	0.87	0.74	44	1.10	0.95	1.00	1.20	1.35	74	0.00	74	4.000	2.00
6	20.75	5.00	0.28	1.14	0.86	45	1.06	0.95	1.00	1.20	1.35	73	0.00	73	4.000	2.00
7	25.25	5.00	0.42	1.40	0.98	32	1.02	0.95	1.00	1.20	1.35	50	0.00	50	4.000	2.00
8	30.75	7.00	0.59	1.70	1.11	20	0.98	1.00	1.00	1.20	1.35	32	0.14	32	0.644	1.34
9	35.75	5.00	0.75	1.96	1.21	16	0.95	1.00	1.00	1.20	1.35	25	0.00	25	0.290	0.76
10	40.75	5.00	0.91	2.23	1.32	14	0.91	1.00	1.00	1.20	1.35	21	0.00	21	0.219	0.61
11	42.75	5.00	0.97	2.33	1.36	21	0.91	1.00	1.00	1.20	1.35	31	0.00	31	0.555	1.05
12	50.75	6.00	1.22	2.75	1.53	10	0.83	1.00	1.00	1.20	1.35	13	0.03	13	0.140	0.42
13	55.75	5.00	1.37	3.01	1.64	21	0.85	1.00	1.00	1.20	1.35	29	0.00	29	0.429	0.80
14	60.75	0.00	1.53	3.28	1.75	14	0.80	1.00	1.00	1.20	1.35	18	0.00	18	4.000	2.00
15	75.75	0.00	2.00	4.06	2.07	23	0.78	1.00	1.00	1.20	1.35	29	0.00	29	4.000	2.00
16	85.75	11.00	2.31	4.71	2.40	24	0.74	1.00	1.00	1.20	1.35	29	1.61	31	0.555	0.84
17	95.75	5.00	2.62	5.31	2.68	27	0.72	1.00	1.00	1.20	1.35	32	0.00	32	0.644	0.91
18	105.75	8.00	2.93	5.95	3.02	41	0.76	1.00	1.00	1.20	1.35	50	0.37	50	4.000	2.00

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

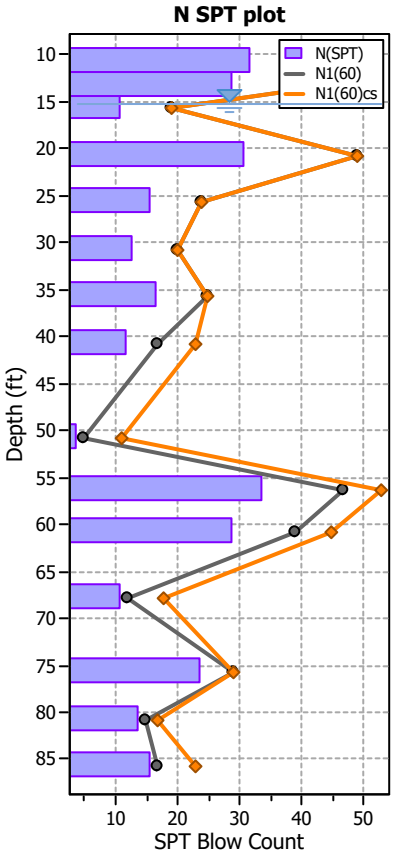
SPT BASED LIQUEFACTION ANALYSIS REPORT

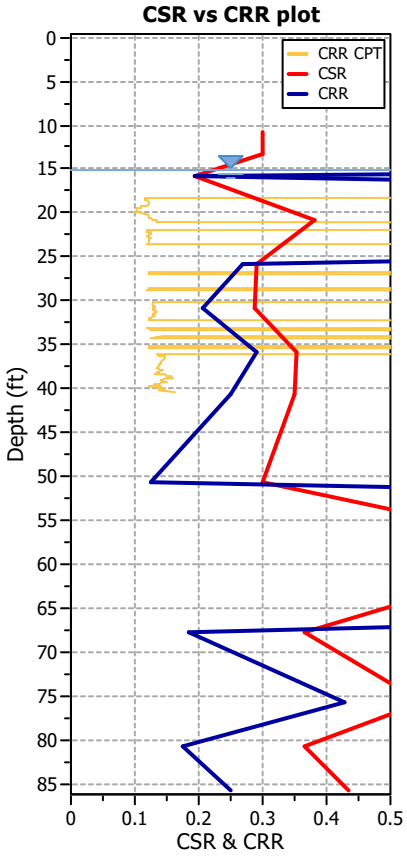
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

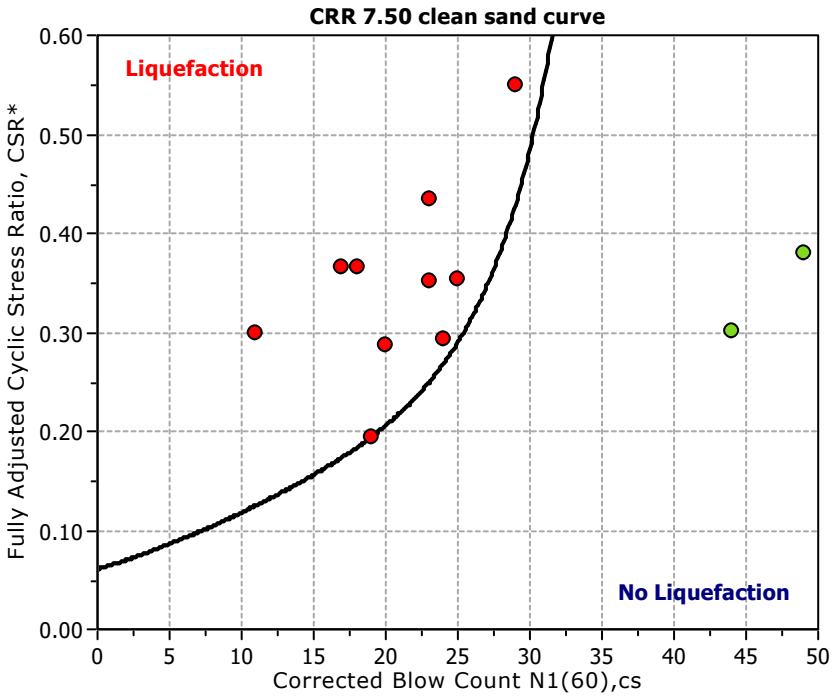
Borehole Name : B-10 (CPTW-06)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	15.16	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	15.16		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	10.75	110.00	0.00	0.59	0.00	0.59	1.01	0.157	1.10	2.20	0.48	2.000
2	13.25	110.00	0.00	0.73	0.00	0.73	1.01	0.157	1.10	2.20	0.48	2.000
3	15.75	110.00	0.02	0.87	0.00	0.85	1.01	0.161	1.03	1.45	0.80	0.195
4	20.75	108.60	0.17	1.14	0.00	0.96	1.01	0.186	1.03	2.20	0.48	2.000
5	25.75	115.00	0.33	1.43	0.00	1.09	1.01	0.205	0.99	1.67	0.71	0.292
6	30.75	115.00	0.49	1.71	0.00	1.23	1.01	0.221	0.98	1.49	0.78	0.287
7	35.75	120.00	0.64	2.01	0.00	1.37	1.01	0.232	0.96	1.72	0.69	0.353
8	40.75	110.00	0.80	2.29	0.00	1.49	1.01	0.243	0.95	1.62	0.73	0.351
9	50.75	110.00	1.11	2.84	0.00	1.73	1.01	0.259	0.95	1.21	0.91	0.299
10	56.25	110.00	1.28	3.14	0.00	1.86	1.00	0.265	0.83	2.20	0.48	2.000
11	60.75	110.00	1.42	3.39	0.00	1.97	1.00	0.269	0.82	2.20	0.48	2.000
12	67.75	110.00	1.64	3.77	0.00	2.13	0.99	0.273	0.91	1.42	0.82	0.366
13	75.75	120.00	1.89	4.25	0.00	2.36	0.98	0.274	0.84	1.94	0.59	0.550
14	80.75	120.00	2.05	4.55	0.00	2.51	0.97	0.273	0.90	1.38	0.83	0.366
15	85.75	115.60	2.20	4.84	0.00	2.64	0.95	0.273	0.86	1.62	0.73	0.434

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	10.75	5.00	0.00	0.59	0.59	32	1.17	0.85	1.00	1.20	1.35	51	0.00	51	4.000	2.00
2	13.25	5.00	0.00	0.73	0.73	29	1.11	0.85	1.00	1.20	1.35	44	0.00	44	4.000	2.00
3	15.75	5.00	0.02	0.87	0.85	11	1.11	0.95	1.00	1.20	1.35	19	0.00	19	0.194	1.00
4	20.75	5.10	0.17	1.14	0.96	31	1.02	0.95	1.00	1.20	1.35	49	0.00	49	4.000	2.00
5	25.75	5.00	0.33	1.43	1.09	16	0.99	0.95	1.00	1.20	1.35	24	0.00	24	0.268	0.92
6	30.75	5.00	0.49	1.71	1.23	13	0.94	1.00	1.00	1.20	1.35	20	0.00	20	0.206	0.72
7	35.75	5.00	0.64	2.01	1.37	17	0.90	1.00	1.00	1.20	1.35	25	0.00	25	0.290	0.82
8	40.75	51.00	0.80	2.29	1.49	12	0.85	1.00	1.00	1.20	1.35	17	5.61	23	0.249	0.71
9	50.75	51.00	1.11	2.84	1.73	4	0.74	1.00	1.00	1.20	1.35	5	5.61	11	0.125	0.42
10	56.25	51.00	1.28	3.14	1.86	34	0.86	1.00	1.00	1.20	1.35	47	5.61	53	4.000	2.00
11	60.75	51.00	1.42	3.39	1.97	29	0.83	1.00	1.00	1.20	1.35	39	5.61	45	4.000	2.00
12	67.75	51.00	1.64	3.77	2.13	11	0.70	1.00	1.00	1.20	1.35	12	5.61	18	0.184	0.50
13	75.75	5.00	1.89	4.25	2.36	24	0.74	1.00	1.00	1.20	1.35	29	0.00	29	0.429	0.78
14	80.75	12.00	2.05	4.55	2.51	14	0.66	1.00	1.00	1.20	1.35	15	2.07	17	0.174	0.48
15	85.75	39.90	2.20	4.84	2.64	16	0.65	1.00	1.00	1.20	1.35	17	5.58	23	0.249	0.57

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

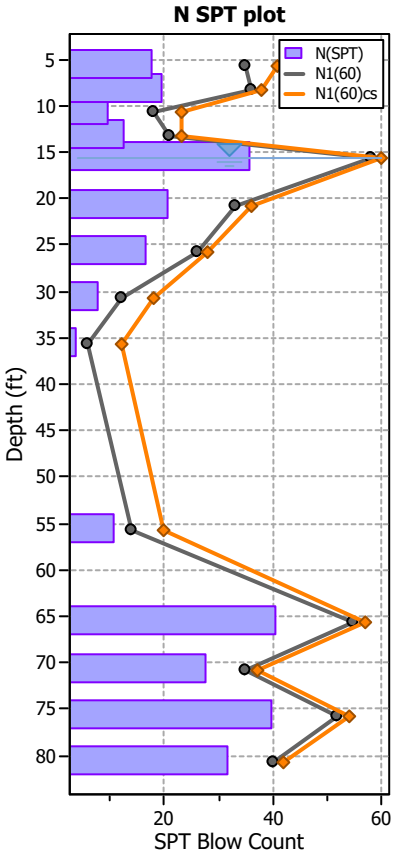
SPT BASED LIQUEFACTION ANALYSIS REPORT

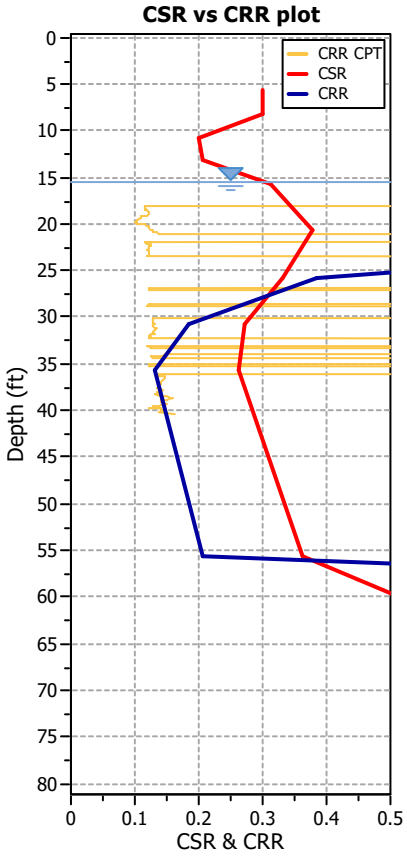
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

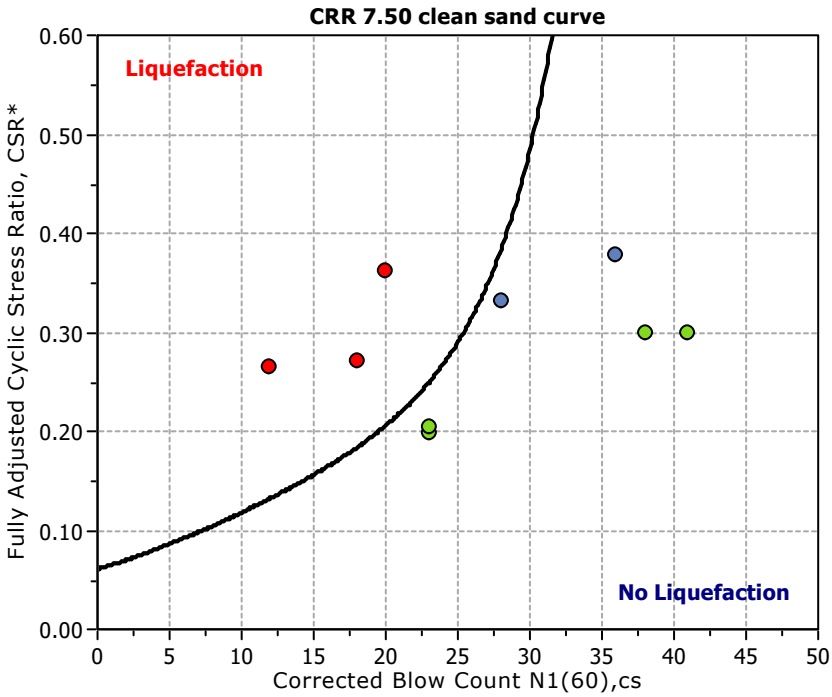
Borehole Name : B-11 (CPTW-06)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	15.60	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	15.60		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	2.20	0.48	2.000
2	8.25	110.00	0.00	0.45	0.00	0.45	1.01	0.157	1.10	2.20	0.48	2.000
3	10.75	114.10	0.00	0.60	0.00	0.60	1.01	0.157	1.09	1.62	0.73	2.000
4	13.25	110.00	0.00	0.73	0.00	0.73	1.01	0.157	1.05	1.62	0.73	2.000
5	15.75	110.00	0.00	0.87	0.00	0.87	1.01	0.158	1.06	2.20	0.48	2.000
6	20.75	116.40	0.16	1.16	0.00	1.00	1.01	0.183	1.02	2.20	0.48	0.378
7	25.75	110.00	0.32	1.44	0.00	1.12	1.01	0.202	0.99	1.88	0.62	0.332
8	30.75	113.20	0.47	1.72	0.00	1.25	1.01	0.218	0.98	1.42	0.82	0.272
9	35.75	110.00	0.63	2.00	0.00	1.37	1.01	0.231	0.97	1.24	0.90	0.264
10	55.75	110.00	1.25	3.10	0.00	1.84	1.01	0.263	0.93	1.49	0.78	0.363
11	65.75	120.00	1.56	3.70	0.00	2.13	0.99	0.269	0.79	2.20	0.48	2.000
12	70.75	120.00	1.72	4.00	0.00	2.27	0.99	0.270	0.77	2.20	0.48	0.733
13	75.75	124.40	1.88	4.31	0.00	2.43	0.98	0.270	0.75	2.20	0.48	2.000
14	80.75	120.00	2.03	4.61	0.00	2.57	0.97	0.269	0.74	2.20	0.48	2.000

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	37.50	0.00	0.32	0.32	18	1.50	0.80	1.00	1.20	1.35	35	5.55	41	4.000	2.00
2	8.25	12.00	0.00	0.45	0.45	20	1.31	0.85	1.00	1.20	1.35	36	2.07	38	4.000	2.00
3	10.75	29.90	0.00	0.60	0.60	10	1.30	0.85	1.00	1.20	1.35	18	5.36	23	4.000	2.00
4	13.25	12.00	0.00	0.73	0.73	13	1.17	0.85	1.00	1.20	1.35	21	2.07	23	4.000	2.00
5	15.75	12.00	0.00	0.87	0.87	36	1.05	0.95	1.00	1.20	1.35	58	2.07	60	4.000	2.00
6	20.75	13.00	0.16	1.16	1.00	21	1.02	0.95	1.00	1.20	1.35	33	2.51	36	1.378	2.00
7	25.75	12.00	0.32	1.44	1.12	17	0.98	0.95	1.00	1.20	1.35	26	2.07	28	0.384	1.15
8	30.75	57.00	0.47	1.72	1.25	8	0.92	1.00	1.00	1.20	1.35	12	5.61	18	0.184	0.68
9	35.75	51.00	0.63	2.00	1.37	4	0.86	1.00	1.00	1.20	1.35	6	5.61	12	0.132	0.50
10	55.75	51.00	1.25	3.10	1.84	11	0.76	1.00	1.00	1.20	1.35	14	5.61	20	0.206	0.57
11	65.75	12.00	1.56	3.70	2.13	41	0.83	1.00	1.00	1.20	1.35	55	2.07	57	4.000	2.00
12	70.75	12.00	1.72	4.00	2.27	28	0.78	1.00	1.00	1.20	1.35	35	2.07	37	1.750	2.00
13	75.75	12.80	1.88	4.31	2.43	40	0.80	1.00	1.00	1.20	1.35	52	2.42	54	4.000	2.00
14	80.75	12.00	2.03	4.61	2.57	32	0.77	1.00	1.00	1.20	1.35	40	2.07	42	4.000	2.00

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

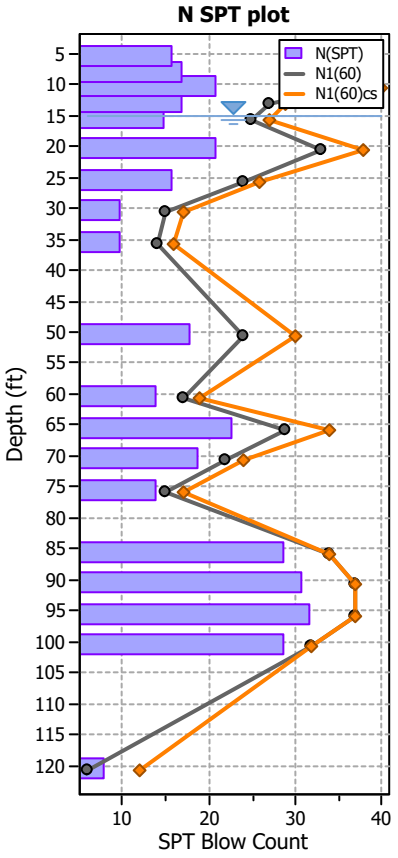
SPT BASED LIQUEFACTION ANALYSIS REPORT

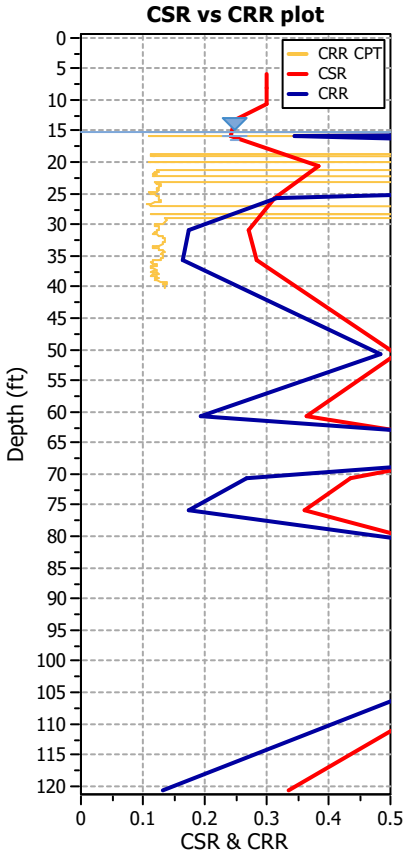
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

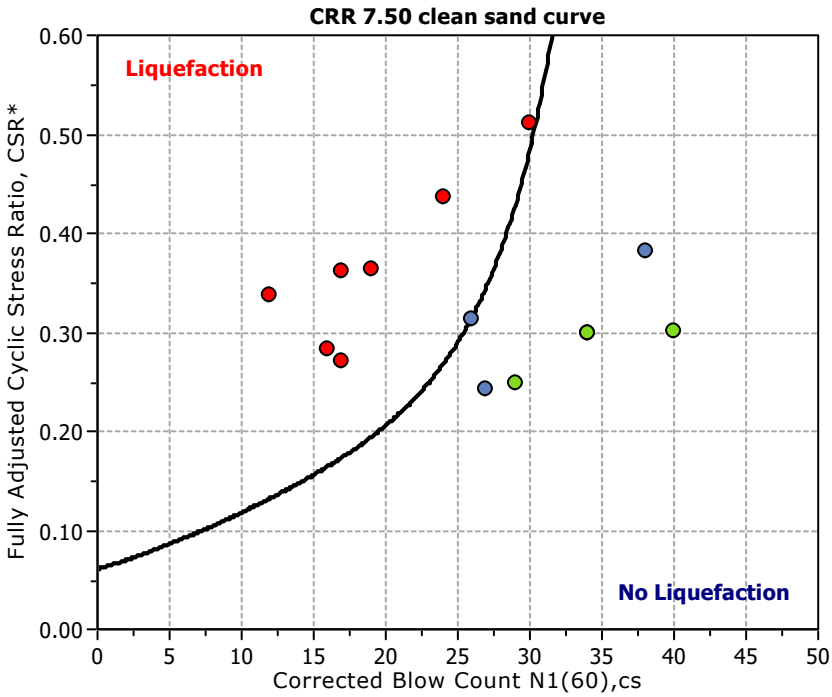
Borehole Name : B-12 (CPTW-07)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	15.04	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	15.04		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	2.20	0.48	2.000
2	8.25	110.00	0.00	0.45	0.00	0.45	1.01	0.157	1.10	2.20	0.48	2.000
3	10.75	115.00	0.00	0.60	0.00	0.60	1.01	0.157	1.10	2.20	0.48	2.000
4	13.25	110.00	0.00	0.73	0.00	0.73	1.01	0.157	1.07	1.94	0.59	2.000
5	15.75	110.00	0.02	0.87	0.00	0.85	1.01	0.161	1.04	1.82	0.64	0.243
6	20.75	112.80	0.18	1.15	0.00	0.98	1.01	0.186	1.02	2.20	0.48	0.382
7	25.75	110.00	0.33	1.43	0.00	1.10	1.01	0.206	0.99	1.77	0.66	0.312
8	30.75	115.00	0.49	1.72	0.00	1.23	1.01	0.221	0.98	1.38	0.83	0.270
9	35.75	110.40	0.65	1.99	0.00	1.35	1.01	0.234	0.97	1.35	0.85	0.284
10	50.75	110.00	1.11	2.82	0.00	1.70	1.01	0.260	0.90	2.00	0.56	0.510
11	60.75	120.00	1.43	3.42	0.00	1.99	1.00	0.268	0.92	1.45	0.80	0.363
12	65.75	117.80	1.58	3.71	0.00	2.13	0.99	0.270	0.83	2.20	0.48	0.687
13	70.75	120.00	1.74	4.01	0.00	2.27	0.99	0.271	0.88	1.67	0.71	0.436
14	75.75	120.00	1.89	4.31	0.00	2.42	0.98	0.271	0.90	1.38	0.83	0.361
15	85.75	120.00	2.21	4.91	0.00	2.71	0.95	0.270	0.77	2.20	0.48	0.739
16	90.75	120.00	2.36	5.21	0.00	2.85	0.94	0.268	0.71	2.20	0.48	0.796
17	95.75	120.30	2.52	5.51	0.00	3.00	0.93	0.266	0.69	2.20	0.48	0.806
18	100.75	120.00	2.67	5.81	0.00	3.14	0.91	0.263	0.76	2.12	0.51	0.682
19	120.75	110.00	3.30	6.91	0.00	3.62	0.89	0.265	0.88	1.24	0.90	0.336

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	12.00	0.00	0.32	0.32	16	1.53	0.80	1.00	1.20	1.35	32	2.07	34	4.000	2.00
2	8.25	12.00	0.00	0.45	0.45	17	1.35	0.85	1.00	1.20	1.35	32	2.07	34	4.000	2.00
3	10.75	20.50	0.00	0.60	0.60	21	1.21	0.85	1.00	1.20	1.35	35	4.56	40	4.000	2.00
4	13.25	12.00	0.00	0.73	0.73	17	1.15	0.85	1.00	1.20	1.35	27	2.07	29	4.000	2.00
5	15.75	12.00	0.02	0.87	0.85	15	1.09	0.95	1.00	1.20	1.35	25	2.07	27	0.347	1.43
6	20.75	30.20	0.18	1.15	0.98	21	1.03	0.95	1.00	1.20	1.35	33	5.37	38	2.273	2.00
7	25.75	12.00	0.33	1.43	1.10	16	0.99	0.95	1.00	1.20	1.35	24	2.07	26	0.316	1.01
8	30.75	12.00	0.49	1.72	1.23	10	0.93	1.00	1.00	1.20	1.35	15	2.07	17	0.174	0.64
9	35.75	12.00	0.65	1.99	1.35	10	0.89	1.00	1.00	1.20	1.35	14	2.07	16	0.165	0.58
10	50.75	54.00	1.11	2.82	1.70	18	0.82	1.00	1.00	1.20	1.35	24	5.61	30	0.485	0.95
11	60.75	12.00	1.43	3.42	1.99	14	0.74	1.00	1.00	1.20	1.35	17	2.07	19	0.194	0.53
12	65.75	23.00	1.58	3.71	2.13	23	0.77	1.00	1.00	1.20	1.35	29	4.88	34	0.909	1.32
13	70.75	12.00	1.74	4.01	2.27	19	0.73	1.00	1.00	1.20	1.35	22	2.07	24	0.268	0.62
14	75.75	12.00	1.89	4.31	2.42	14	0.67	1.00	1.00	1.20	1.35	15	2.07	17	0.174	0.48
15	85.75	5.00	2.21	4.91	2.71	29	0.73	1.00	1.00	1.20	1.35	34	0.00	34	0.909	1.23
16	90.75	5.00	2.36	5.21	2.85	31	0.73	1.00	1.00	1.20	1.35	37	0.00	37	1.750	2.00
17	95.75	7.20	2.52	5.51	3.00	32	0.72	1.00	1.00	1.20	1.35	37	0.17	37	1.750	2.00
18	100.75	5.00	2.67	5.81	3.14	29	0.68	1.00	1.00	1.20	1.35	32	0.00	32	0.644	0.95

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
19	120.75	51.00	3.30	6.91	3.62	8	0.48	1.00	1.00	1.20	1.35	6	5.61	12	0.132	0.39

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

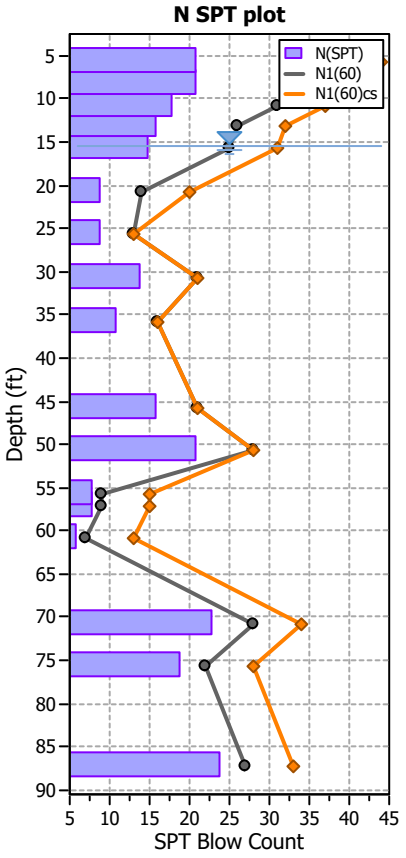
SPT BASED LIQUEFACTION ANALYSIS REPORT

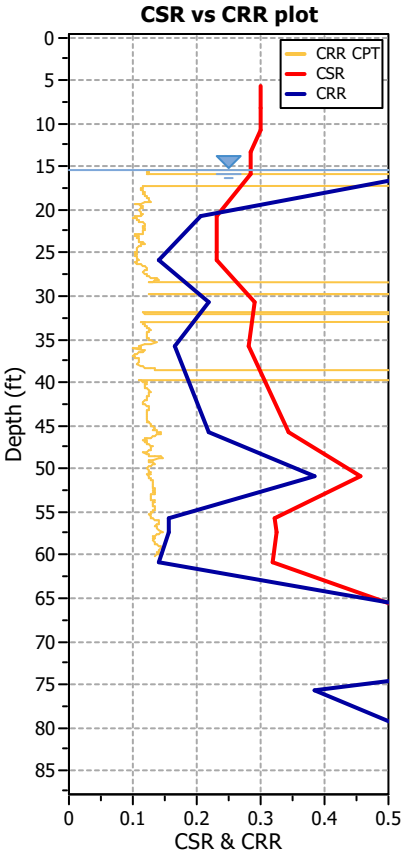
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

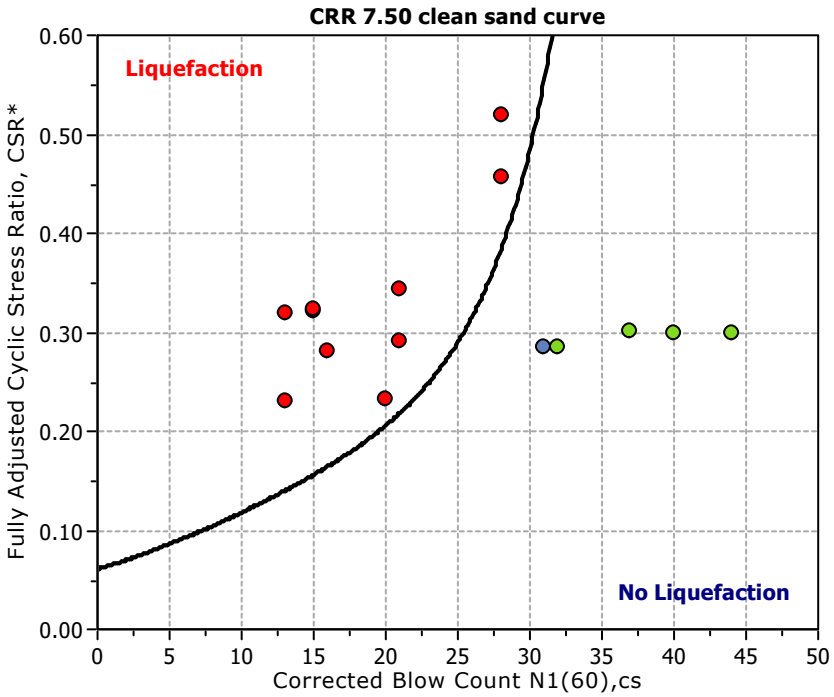
Borehole Name : B-13 (sCPTW-08)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	15.37	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	15.37		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	2.20	0.48	2.000
2	8.25	110.00	0.00	0.45	0.00	0.45	1.01	0.157	1.10	2.20	0.48	2.000
3	10.75	110.00	0.00	0.59	0.00	0.59	1.01	0.157	1.10	2.20	0.48	2.000
4	13.25	110.00	0.00	0.73	0.00	0.73	1.01	0.157	1.08	2.12	0.51	2.000
5	15.75	119.30	0.01	0.88	0.00	0.87	1.01	0.159	1.04	2.06	0.54	0.284
6	20.75	110.00	0.17	1.15	0.00	0.99	1.01	0.184	1.01	1.49	0.78	0.233
7	25.75	115.00	0.32	1.44	0.00	1.12	1.01	0.203	0.99	1.26	0.89	0.231
8	30.75	115.00	0.48	1.73	0.00	1.25	1.01	0.219	0.98	1.53	0.77	0.292
9	35.75	120.00	0.64	2.03	0.00	1.39	1.01	0.230	0.97	1.35	0.85	0.280
10	45.75	120.00	0.95	2.63	0.00	1.68	1.01	0.247	0.94	1.53	0.77	0.344
11	50.75	120.00	1.10	2.93	0.00	1.82	1.01	0.253	0.90	1.88	0.62	0.456
12	55.75	110.00	1.26	3.20	0.00	1.94	1.01	0.258	0.93	1.32	0.86	0.322
13	57.25	114.50	1.31	3.29	0.00	1.98	1.00	0.260	0.93	1.32	0.86	0.324
14	60.75	110.00	1.42	3.48	0.00	2.07	1.00	0.263	0.93	1.26	0.89	0.319
15	70.75	110.00	1.73	4.03	0.00	2.30	0.99	0.269	0.81	2.20	0.48	0.701
16	75.75	110.00	1.88	4.31	0.00	2.42	0.98	0.271	0.85	1.88	0.62	0.519
17	87.25	110.00	2.24	4.94	0.00	2.70	0.95	0.271	0.78	2.19	0.48	0.722

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	20.90	0.00	0.32	0.32	21	1.44	0.80	1.00	1.20	1.35	39	4.62	44	4.000	2.00
2	8.25	12.00	0.00	0.45	0.45	21	1.30	0.85	1.00	1.20	1.35	38	2.07	40	4.000	2.00
3	10.75	51.00	0.00	0.59	0.59	18	1.23	0.85	1.00	1.20	1.35	31	5.61	37	4.000	2.00
4	13.25	51.00	0.00	0.73	0.73	16	1.16	0.85	1.00	1.20	1.35	26	5.61	32	4.000	2.00
5	15.75	54.90	0.01	0.88	0.87	15	1.08	0.95	1.00	1.20	1.35	25	5.61	31	0.555	1.95
6	20.75	51.00	0.17	1.15	0.99	9	1.04	0.95	1.00	1.20	1.35	14	5.61	20	0.206	0.88
7	25.75	5.00	0.32	1.44	1.12	9	0.97	0.95	1.00	1.20	1.35	13	0.00	13	0.140	0.61
8	30.75	5.00	0.48	1.73	1.25	14	0.93	1.00	1.00	1.20	1.35	21	0.00	21	0.219	0.75
9	35.75	5.00	0.64	2.03	1.39	11	0.88	1.00	1.00	1.20	1.35	16	0.00	16	0.165	0.59
10	45.75	5.00	0.95	2.63	1.68	16	0.82	1.00	1.00	1.20	1.35	21	0.00	21	0.219	0.64
11	50.75	5.00	1.10	2.93	1.82	21	0.81	1.00	1.00	1.20	1.35	28	0.00	28	0.384	0.84
12	55.75	51.00	1.26	3.20	1.94	8	0.72	1.00	1.00	1.20	1.35	9	5.61	15	0.156	0.49
13	57.25	68.00	1.31	3.29	1.98	8	0.71	1.00	1.00	1.20	1.35	9	5.58	15	0.156	0.48
14	60.75	51.00	1.42	3.48	2.07	6	0.68	1.00	1.00	1.20	1.35	7	5.61	13	0.140	0.44
15	70.75	51.00	1.73	4.03	2.30	23	0.74	1.00	1.00	1.20	1.35	28	5.61	34	0.909	1.30
16	75.75	51.00	1.88	4.31	2.42	19	0.70	1.00	1.00	1.20	1.35	22	5.61	28	0.384	0.74
17	87.25	51.00	2.24	4.94	2.70	24	0.70	1.00	1.00	1.20	1.35	27	5.61	33	0.759	1.05

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

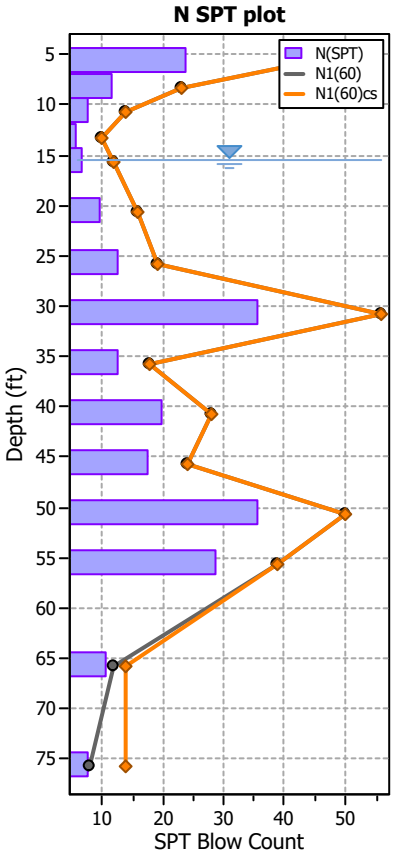
SPT BASED LIQUEFACTION ANALYSIS REPORT

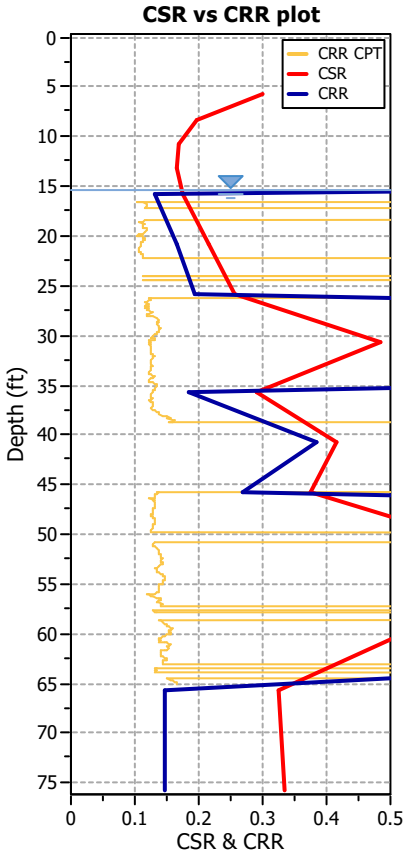
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

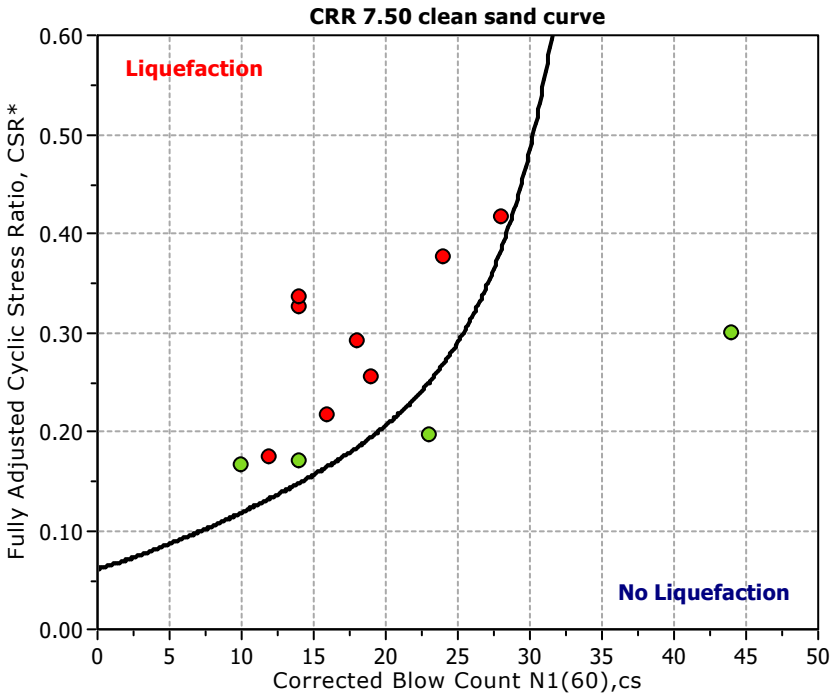
Borehole Name : B-14 (CPTW-09)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	15.40	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	15.40		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	2.20	0.48	2.000
2	8.25	126.30	0.00	0.47	0.00	0.47	1.01	0.157	1.10	1.62	0.73	2.000
3	10.75	110.00	0.00	0.61	0.00	0.61	1.01	0.157	1.06	1.29	0.87	2.000
4	13.25	110.00	0.00	0.75	0.00	0.75	1.01	0.157	1.03	1.19	0.92	2.000
5	15.75	112.20	0.01	0.89	0.00	0.88	1.01	0.159	1.02	1.24	0.90	0.174
6	20.75	115.00	0.17	1.18	0.00	1.01	1.01	0.184	1.01	1.35	0.85	0.215
7	25.75	115.00	0.32	1.46	0.00	1.14	1.01	0.202	0.99	1.45	0.80	0.255
8	30.75	115.00	0.48	1.75	0.00	1.27	1.01	0.217	0.95	2.20	0.48	2.000
9	35.75	120.00	0.63	2.05	0.00	1.42	1.01	0.229	0.96	1.42	0.82	0.290
10	40.75	120.00	0.79	2.35	0.00	1.56	1.01	0.238	0.93	1.88	0.62	0.417
11	45.75	120.00	0.95	2.65	0.00	1.70	1.01	0.245	0.93	1.67	0.71	0.375
12	50.75	120.00	1.10	2.95	0.00	1.85	1.01	0.251	0.84	2.20	0.48	2.000
13	55.75	119.80	1.26	3.25	0.00	1.99	1.01	0.256	0.81	2.20	0.48	0.661
14	65.75	120.00	1.57	3.85	0.00	2.28	0.99	0.262	0.92	1.29	0.87	0.326
15	75.75	110.00	1.88	4.40	0.00	2.52	0.98	0.266	0.91	1.29	0.87	0.335

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	5.00	0.00	0.32	0.32	24	1.40	0.80	1.00	1.20	1.35	44	0.00	44	4.000	2.00
2	8.25	6.20	0.00	0.47	0.47	12	1.39	0.85	1.00	1.20	1.35	23	0.04	23	4.000	2.00
3	10.75	5.00	0.00	0.61	0.61	8	1.31	0.85	1.00	1.20	1.35	14	0.00	14	4.000	2.00
4	13.25	5.00	0.00	0.75	0.75	6	1.21	0.85	1.00	1.20	1.35	10	0.00	10	4.000	2.00
5	15.75	4.70	0.01	0.89	0.88	7	1.10	0.95	1.00	1.20	1.35	12	0.00	12	0.132	0.76
6	20.75	5.00	0.17	1.18	1.01	10	1.02	0.95	1.00	1.20	1.35	16	0.00	16	0.165	0.77
7	25.75	5.00	0.32	1.46	1.14	13	0.97	0.95	1.00	1.20	1.35	19	0.00	19	0.194	0.76
8	30.75	7.30	0.48	1.75	1.27	36	0.95	1.00	1.00	1.20	1.35	56	0.19	56	4.000	2.00
9	35.75	5.00	0.63	2.05	1.42	13	0.88	1.00	1.00	1.20	1.35	18	0.00	18	0.184	0.63
10	40.75	5.00	0.79	2.35	1.56	20	0.86	1.00	1.00	1.20	1.35	28	0.00	28	0.384	0.92
11	45.75	0.00	0.95	2.65	1.70	18	0.82	1.00	1.00	1.20	1.35	24	0.00	24	0.268	0.72
12	50.75	0.00	1.10	2.95	1.85	36	0.86	1.00	1.00	1.20	1.35	50	0.00	50	4.000	2.00
13	55.75	4.40	1.26	3.25	1.99	29	0.82	1.00	1.00	1.20	1.35	39	0.00	39	3.025	2.00
14	65.75	12.00	1.57	3.85	2.28	11	0.67	1.00	1.00	1.20	1.35	12	2.07	14	0.148	0.45
15	75.75	51.00	1.88	4.40	2.52	8	0.61	1.00	1.00	1.20	1.35	8	5.61	14	0.148	0.44

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

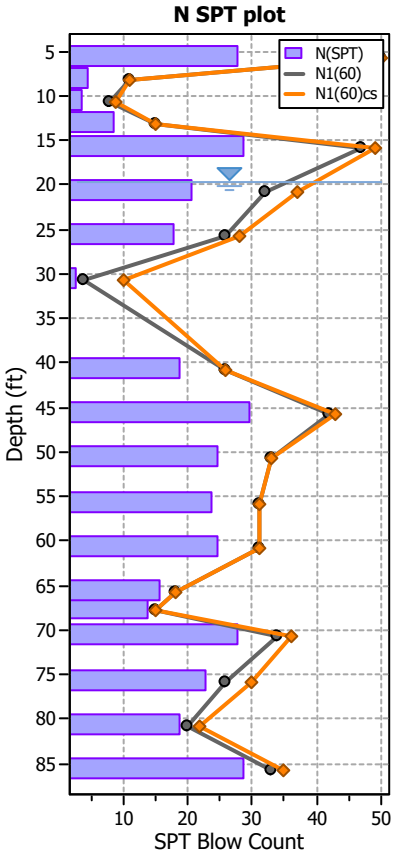
SPT BASED LIQUEFACTION ANALYSIS REPORT

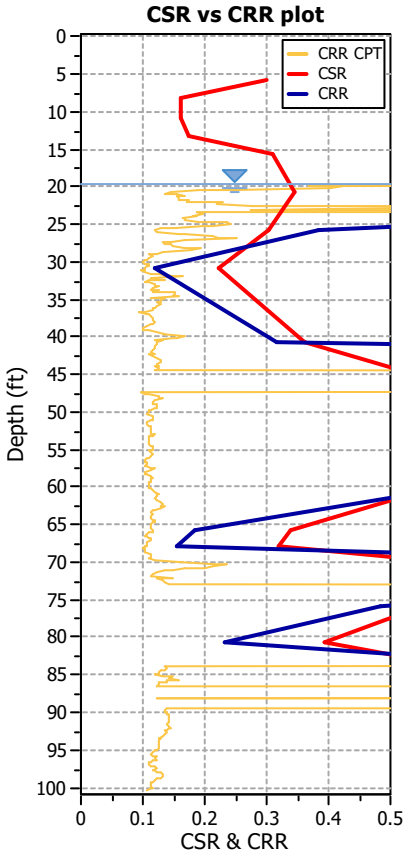
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

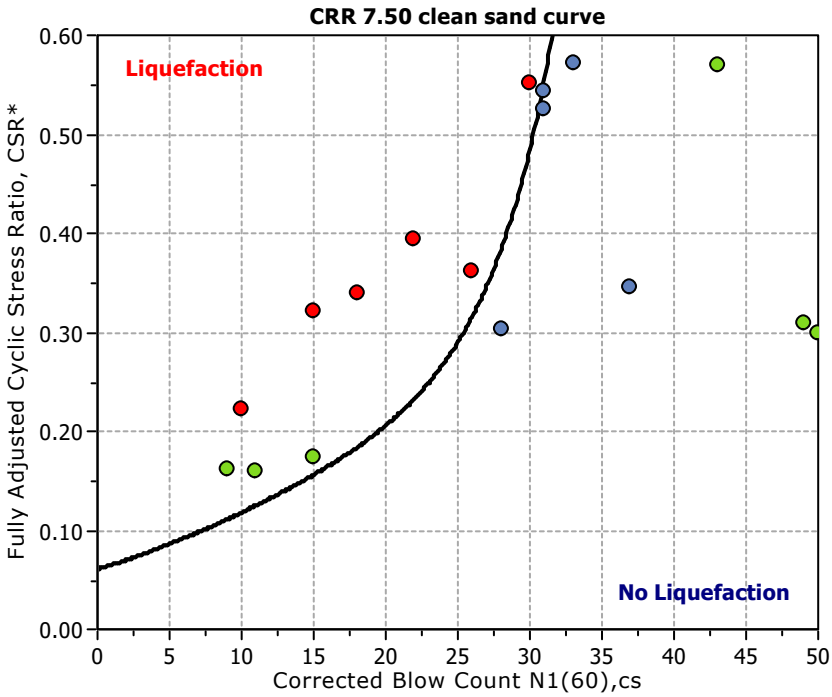
Borehole Name : B-15 (SCPT-03)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	19.71	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	19.71		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	2.20	0.48	2.000
2	8.25	110.00	0.00	0.45	0.00	0.45	1.01	0.157	1.08	1.21	0.91	2.000
3	10.75	93.10	0.00	0.57	0.00	0.57	1.01	0.157	1.05	1.17	0.93	2.000
4	13.25	110.00	0.00	0.71	0.00	0.71	1.01	0.157	1.04	1.32	0.86	2.000
5	15.75	110.00	0.00	0.85	0.00	0.85	1.01	0.157	1.07	2.20	0.48	2.000
6	20.75	120.00	0.03	1.15	0.00	1.11	1.01	0.162	0.99	2.20	0.48	0.346
7	25.75	110.00	0.19	1.42	0.00	1.23	1.01	0.182	0.97	1.88	0.62	0.304
8	30.75	95.00	0.34	1.66	0.00	1.31	1.01	0.199	0.98	1.19	0.92	0.222
9	40.75	120.00	0.66	2.26	0.00	1.60	1.01	0.223	0.93	1.77	0.66	0.361
10	45.75	125.00	0.81	2.57	0.00	1.76	1.01	0.231	0.85	2.20	0.48	2.000
11	50.75	120.00	0.97	2.87	0.00	1.90	1.01	0.237	0.86	2.19	0.48	0.572
12	55.75	120.00	1.12	3.17	0.00	2.05	1.01	0.243	0.86	2.06	0.54	0.526
13	60.75	120.00	1.28	3.47	0.00	2.19	1.00	0.247	0.85	2.06	0.54	0.544
14	65.75	120.00	1.44	3.77	0.00	2.33	0.99	0.250	0.90	1.42	0.82	0.339
15	67.75	120.00	1.50	3.89	0.00	2.39	0.99	0.251	0.91	1.32	0.86	0.321
16	70.75	120.00	1.59	4.07	0.00	2.48	0.99	0.253	0.76	2.20	0.48	0.695
17	75.75	123.90	1.75	4.38	0.00	2.63	0.98	0.253	0.82	2.00	0.56	0.551
18	80.75	120.00	1.90	4.68	0.00	2.78	0.97	0.254	0.86	1.58	0.75	0.394
19	85.75	120.00	2.06	4.98	0.00	2.92	0.95	0.254	0.73	2.20	0.48	0.726

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	5.00	0.00	0.32	0.32	28	1.37	0.80	1.00	1.20	1.35	50	0.00	50	4.000	2.00
2	8.25	5.00	0.00	0.45	0.45	5	1.57	0.85	1.00	1.20	1.35	11	0.00	11	4.000	2.00
3	10.75	8.60	0.00	0.57	0.57	4	1.41	0.85	1.00	1.20	1.35	8	0.57	9	4.000	2.00
4	13.25	5.00	0.00	0.71	0.71	9	1.22	0.85	1.00	1.20	1.35	15	0.00	15	4.000	2.00
5	15.75	12.00	0.00	0.85	0.85	29	1.06	0.95	1.00	1.20	1.35	47	2.07	49	4.000	2.00
6	20.75	30.80	0.03	1.15	1.11	21	0.98	0.95	1.00	1.20	1.35	32	5.39	37	1.750	2.00
7	25.75	12.00	0.19	1.42	1.23	18	0.94	0.95	1.00	1.20	1.35	26	2.07	28	0.384	1.26
8	30.75	51.00	0.34	1.66	1.31	3	0.87	1.00	1.00	1.20	1.35	4	5.61	10	0.118	0.53
9	40.75	5.00	0.66	2.26	1.60	19	0.85	1.00	1.00	1.20	1.35	26	0.00	26	0.316	0.87
10	45.75	8.90	0.81	2.57	1.76	30	0.87	1.00	1.00	1.20	1.35	42	0.68	43	4.000	2.00
11	50.75	5.00	0.97	2.87	1.90	25	0.82	1.00	1.00	1.20	1.35	33	0.00	33	0.759	1.33
12	55.75	5.00	1.12	3.17	2.05	24	0.79	1.00	1.00	1.20	1.35	31	0.00	31	0.555	1.06
13	60.75	5.00	1.28	3.47	2.19	25	0.77	1.00	1.00	1.20	1.35	31	0.00	31	0.555	1.02
14	65.75	5.00	1.44	3.77	2.33	16	0.70	1.00	1.00	1.20	1.35	18	0.00	18	0.184	0.54
15	67.75	5.00	1.50	3.89	2.39	14	0.68	1.00	1.00	1.20	1.35	15	0.00	15	0.156	0.49
16	70.75	12.00	1.59	4.07	2.48	28	0.75	1.00	1.00	1.20	1.35	34	2.07	36	1.378	1.98
17	75.75	18.70	1.75	4.38	2.63	23	0.70	1.00	1.00	1.20	1.35	26	4.24	30	0.485	0.88
18	80.75	12.00	1.90	4.68	2.78	19	0.66	1.00	1.00	1.20	1.35	20	2.07	22	0.233	0.59

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
19	85.75	12.00	2.06	4.98	2.92	29	0.71	1.00	1.00	1.20	1.35	33	2.07	35	1.108	1.53

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

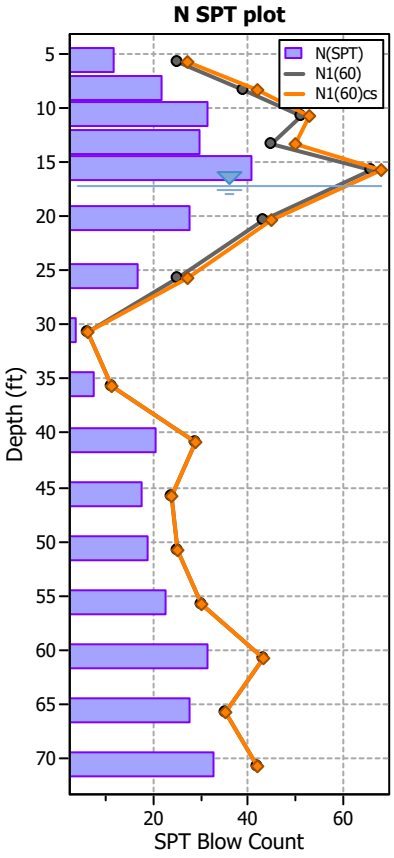
SPT BASED LIQUEFACTION ANALYSIS REPORT

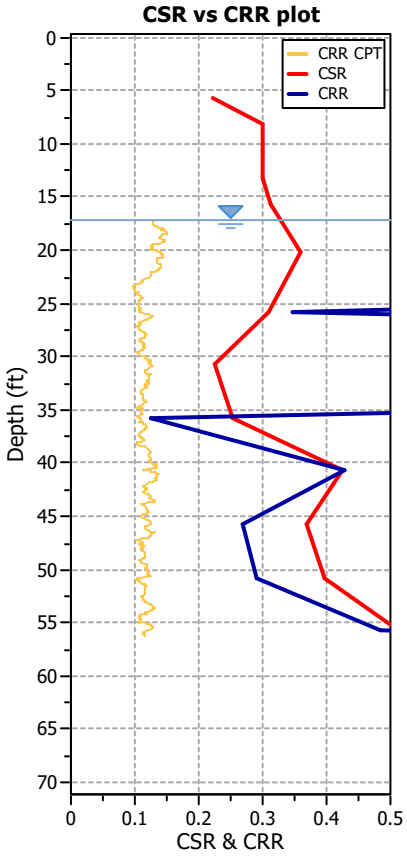
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

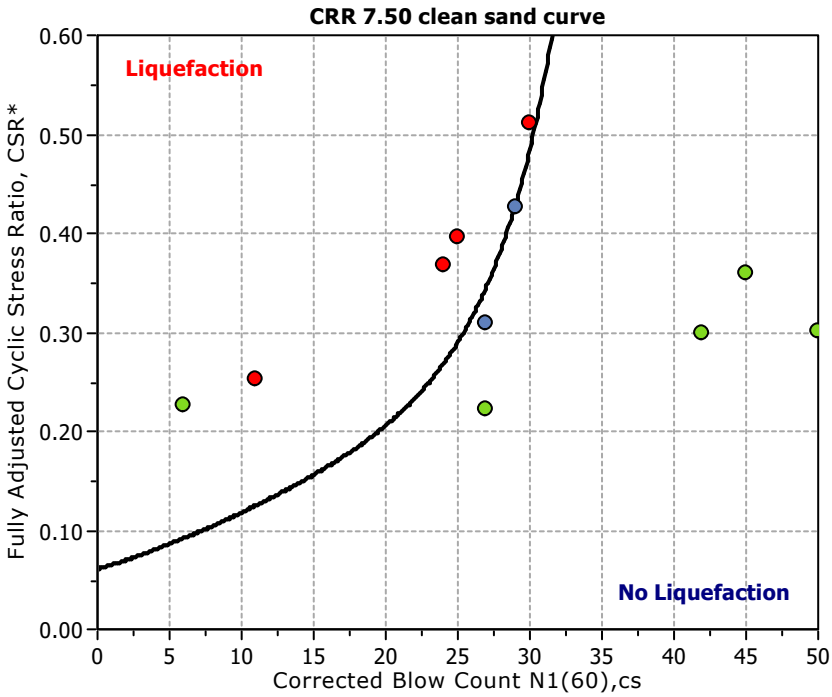
Borehole Name : B-16 (sCPTW-11)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	17.16	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	17.16		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	6.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.35				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	5.75	110.00	0.00	0.32	0.00	0.32	1.01	0.157	1.10	1.82	0.64	2.000
2	8.25	110.00	0.00	0.45	0.00	0.45	1.01	0.157	1.10	2.20	0.48	2.000
3	10.75	110.00	0.00	0.59	0.00	0.59	1.01	0.157	1.10	2.20	0.48	2.000
4	13.25	122.50	0.00	0.74	0.00	0.74	1.01	0.157	1.10	2.20	0.48	2.000
5	15.75	110.00	0.00	0.88	0.00	0.88	1.01	0.157	1.05	2.20	0.48	2.000
6	20.25	110.00	0.10	1.13	0.00	1.03	1.01	0.172	1.01	2.20	0.48	2.000
7	25.75	127.70	0.27	1.48	0.00	1.21	1.01	0.193	0.98	1.82	0.64	0.308
8	30.75	95.00	0.42	1.72	0.00	1.29	1.01	0.210	0.98	1.13	0.94	2.000
9	35.75	115.00	0.58	2.01	0.00	1.43	1.01	0.222	0.97	1.21	0.91	0.252
10	40.75	120.00	0.74	2.31	0.00	1.57	1.01	0.232	0.92	1.94	0.59	0.425
11	45.75	108.60	0.89	2.58	0.00	1.69	1.01	0.241	0.93	1.67	0.71	0.368
12	50.75	120.00	1.05	2.88	0.00	1.83	1.01	0.248	0.91	1.72	0.69	0.396
13	55.75	123.80	1.20	3.19	0.00	1.98	1.01	0.252	0.87	2.00	0.56	0.512
14	60.75	120.00	1.36	3.49	0.00	2.13	1.00	0.256	0.79	2.20	0.48	2.000
15	65.75	120.00	1.52	3.79	0.00	2.27	0.99	0.258	0.80	2.20	0.48	0.679
16	70.75	120.00	1.67	4.09	0.00	2.41	0.99	0.260	0.76	2.20	0.48	2.000

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	5.75	12.00	0.00	0.32	0.32	12	1.61	0.80	1.00	1.20	1.35	25	2.07	27	4.000	2.00
2	8.25	14.10	0.00	0.45	0.45	22	1.29	0.85	1.00	1.20	1.35	39	2.94	42	4.000	2.00
3	10.75	12.00	0.00	0.59	0.59	32	1.17	0.85	1.00	1.20	1.35	51	2.07	53	4.000	2.00
4	13.25	28.40	0.00	0.74	0.74	30	1.10	0.85	1.00	1.20	1.35	45	5.29	50	4.000	2.00
5	15.75	12.00	0.00	0.88	0.88	41	1.05	0.95	1.00	1.20	1.35	66	2.07	68	4.000	2.00
6	20.25	12.00	0.10	1.13	1.03	28	1.01	0.95	1.00	1.20	1.35	43	2.07	45	4.000	2.00
7	25.75	12.00	0.27	1.48	1.21	17	0.95	0.95	1.00	1.20	1.35	25	2.07	27	0.347	1.12
8	30.75	0.00	0.42	1.72	1.29	4	0.88	1.00	1.00	1.20	1.35	6	0.00	6	4.000	2.00
9	35.75	0.00	0.58	2.01	1.43	8	0.85	1.00	1.00	1.20	1.35	11	0.00	11	0.125	0.50
10	40.75	0.00	0.74	2.31	1.57	21	0.87	1.00	1.00	1.20	1.35	29	0.00	29	0.429	1.01
11	45.75	8.10	0.89	2.58	1.69	18	0.83	1.00	1.00	1.20	1.35	24	0.40	24	0.268	0.73
12	50.75	5.00	1.05	2.88	1.83	19	0.80	1.00	1.00	1.20	1.35	25	0.00	25	0.290	0.73
13	55.75	8.00	1.20	3.19	1.98	23	0.79	1.00	1.00	1.20	1.35	30	0.37	30	0.485	0.95
14	60.75	5.00	1.36	3.49	2.13	32	0.82	1.00	1.00	1.20	1.35	43	0.00	43	4.000	2.00
15	65.75	8.10	1.52	3.79	2.27	28	0.78	1.00	1.00	1.20	1.35	35	0.40	35	1.108	1.63
16	70.75	5.00	1.67	4.09	2.41	33	0.79	1.00	1.00	1.20	1.35	42	0.00	42	4.000	2.00

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

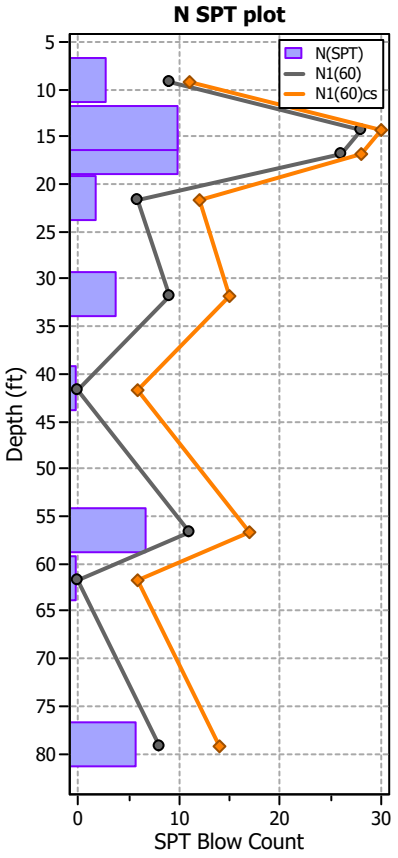
SPT BASED LIQUEFACTION ANALYSIS REPORT

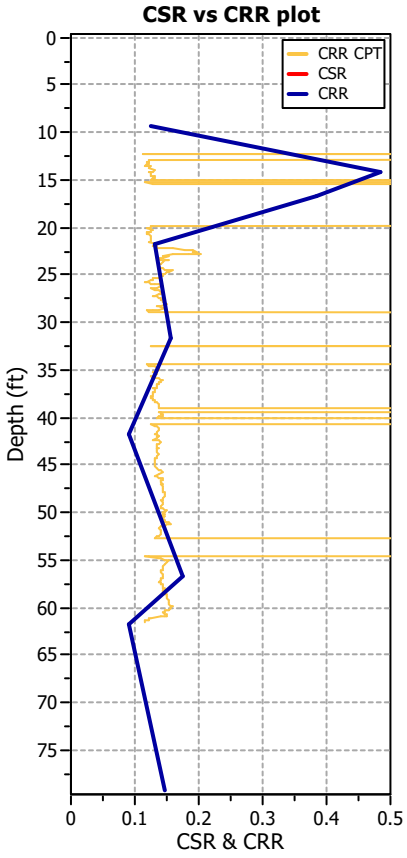
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

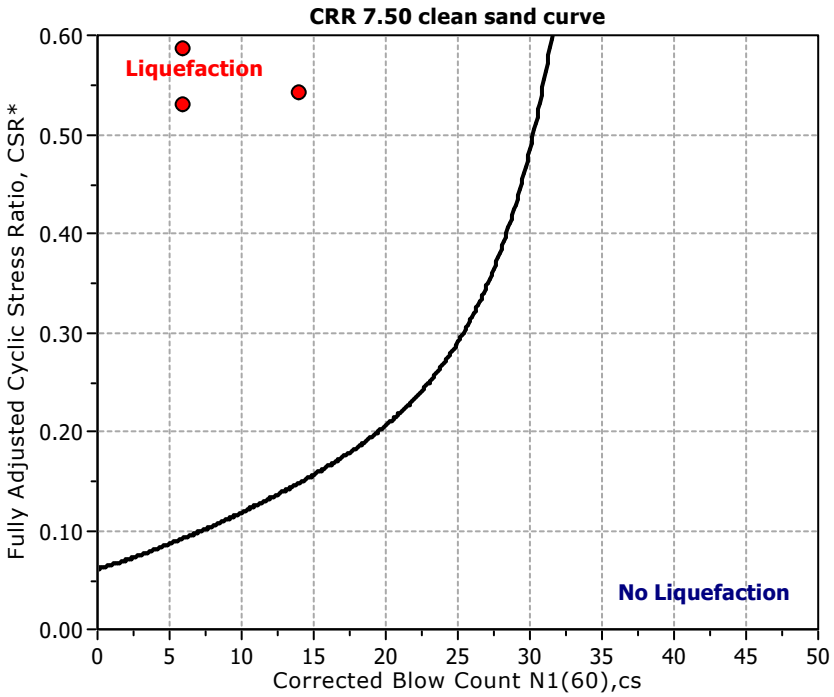
Borehole Name : BW-01 (CPTW-02)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-36.40	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-36.40		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	32.40	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	9.25	105.00	1.42	1.62	0.00	0.20	1.01	1.292	1.10	1.21	0.91	1.294
2	14.25	105.00	1.58	1.88	0.00	0.30	1.01	0.976	1.10	2.00	0.56	1.571
3	16.75	113.80	1.66	2.03	0.00	0.37	1.01	0.867	1.10	1.88	0.62	1.280
4	21.75	110.00	1.81	2.30	0.00	0.49	1.01	0.745	1.08	1.24	0.90	0.771
5	31.75	110.00	2.13	2.85	0.00	0.72	1.01	0.621	1.04	1.32	0.86	0.692
6	41.75	110.00	2.44	3.40	0.00	0.96	1.01	0.558	1.01	1.13	0.94	0.586
7	56.75	110.00	2.91	4.23	0.00	1.32	1.00	0.502	0.97	1.38	0.83	0.618
8	61.75	110.00	3.06	4.50	0.00	1.44	1.00	0.487	0.98	1.13	0.94	0.529
9	79.25	110.00	3.61	5.46	0.00	1.86	0.97	0.445	0.94	1.29	0.87	0.541

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	9.25	12.00	1.42	1.62	0.20	3	1.70	1.00	1.00	1.20	1.47	9	2.07	11	0.125	0.10
2	14.25	12.00	1.58	1.88	0.30	10	1.59	1.00	1.00	1.20	1.47	28	2.07	30	0.485	0.31
3	16.75	12.00	1.66	2.03	0.37	10	1.50	1.00	1.00	1.20	1.47	26	2.07	28	0.384	0.30
4	21.75	51.00	1.81	2.30	0.49	2	1.58	1.00	1.00	1.20	1.47	6	5.61	12	0.132	0.17
5	31.75	51.00	2.13	2.85	0.72	4	1.24	1.00	1.00	1.20	1.47	9	5.61	15	0.156	0.23
6	41.75	51.00	2.44	3.40	0.96	0	1.08	1.00	1.00	1.20	1.47	0	5.61	6	0.092	0.16
7	56.75	51.00	2.91	4.23	1.32	7	0.89	1.00	1.00	1.20	1.47	11	5.61	17	0.174	0.28
8	61.75	51.00	3.06	4.50	1.44	0	0.79	1.00	1.00	1.20	1.47	0	5.61	6	0.092	0.17
9	79.25	84.00	3.61	5.46	1.86	6	0.73	1.00	1.00	1.20	1.47	8	5.53	14	0.148	0.27

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

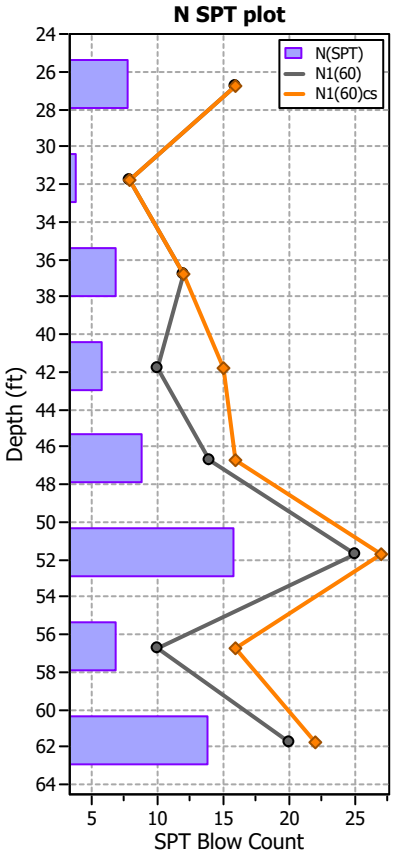
SPT BASED LIQUEFACTION ANALYSIS REPORT

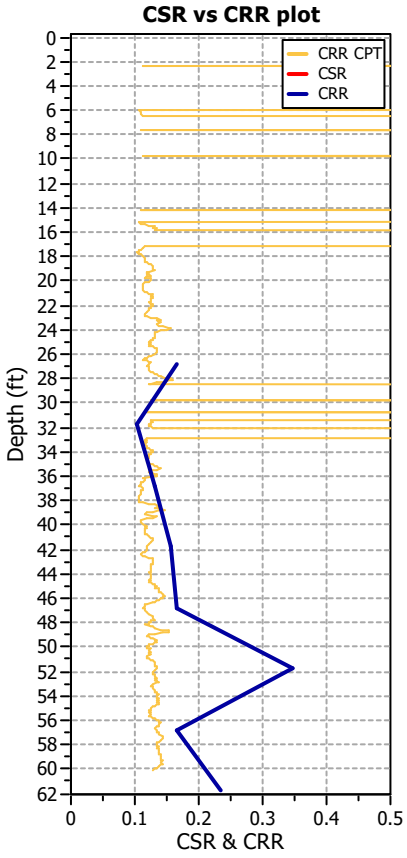
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

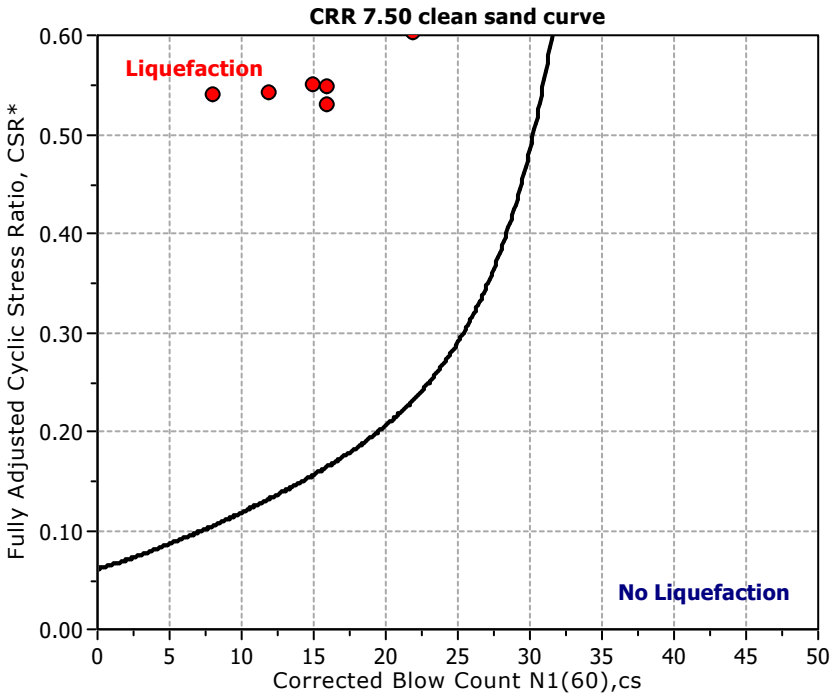
Borehole Name : BW-02 (sCPTW-08)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-33.53	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-33.53		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	29.53	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	26.75	120.00	1.88	2.65	0.00	0.77	1.01	0.543	1.04	1.35	0.85	0.618
2	31.75	120.00	2.04	2.95	0.00	0.91	1.01	0.510	1.01	1.15	0.93	0.540
3	36.75	120.00	2.19	3.25	0.00	1.06	1.01	0.485	1.00	1.24	0.90	0.541
4	41.75	120.00	2.35	3.55	0.00	1.20	1.01	0.466	0.99	1.32	0.86	0.549
5	46.75	120.00	2.50	3.85	0.00	1.35	1.01	0.451	0.97	1.35	0.85	0.547
6	51.75	120.00	2.66	4.15	0.00	1.49	1.01	0.438	0.94	1.82	0.64	0.729
7	56.75	120.00	2.82	4.45	0.00	1.63	1.00	0.427	0.95	1.35	0.85	0.530
8	61.75	120.00	2.97	4.75	0.00	1.78	1.00	0.416	0.93	1.58	0.75	0.602

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	26.75	5.00	1.88	2.65	0.77	8	1.16	1.00	1.00	1.20	1.47	16	0.00	16	0.165	0.27
2	31.75	5.00	2.04	2.95	0.91	4	1.09	1.00	1.00	1.20	1.47	8	0.00	8	0.105	0.19
3	36.75	5.00	2.19	3.25	1.06	7	1.00	1.00	1.00	1.20	1.47	12	0.00	12	0.132	0.24
4	41.75	33.60	2.35	3.55	1.20	6	0.93	1.00	1.00	1.20	1.47	10	5.48	15	0.156	0.28
5	46.75	12.00	2.50	3.85	1.35	9	0.89	1.00	1.00	1.20	1.47	14	2.07	16	0.165	0.30
6	51.75	12.00	2.66	4.15	1.49	16	0.87	1.00	1.00	1.20	1.47	25	2.07	27	0.347	0.48
7	56.75	42.10	2.82	4.45	1.63	7	0.79	1.00	1.00	1.20	1.47	10	5.59	16	0.165	0.31
8	61.75	12.00	2.97	4.75	1.78	14	0.80	1.00	1.00	1.20	1.47	20	2.07	22	0.233	0.39

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

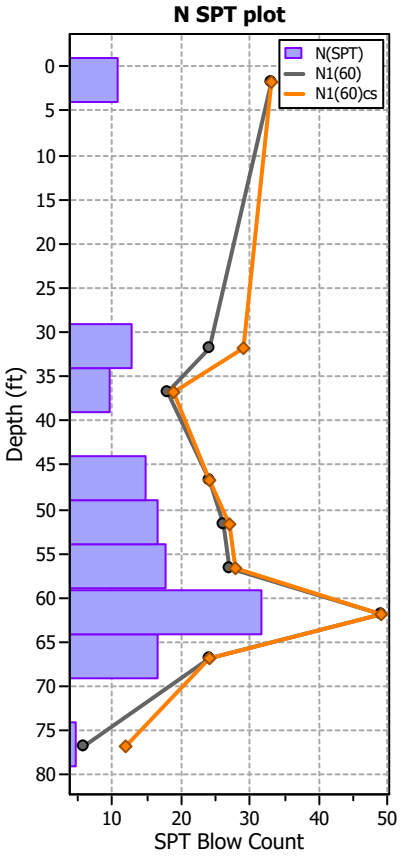
SPT BASED LIQUEFACTION ANALYSIS REPORT

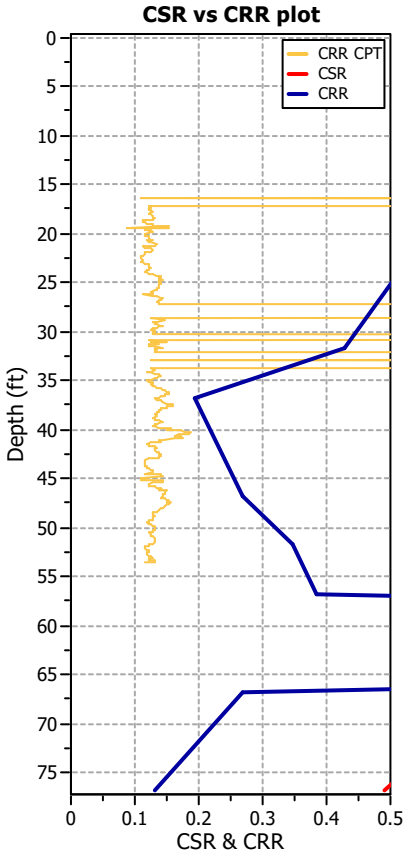
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

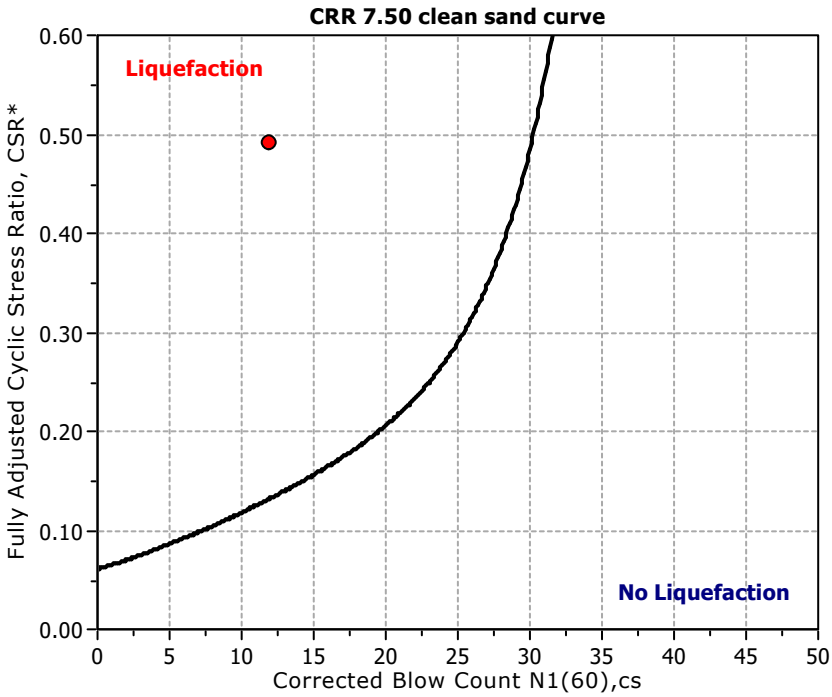
Borehole Name : BW-03 (CPTW-04)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-39.30	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-39.30		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	35.30	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	1.75	105.00	1.28	1.32	0.00	0.04	1.00	5.541	1.10	2.19	0.48	10.467
2	31.75	120.00	2.22	3.12	0.00	0.90	1.01	0.546	1.03	1.94	0.59	0.897
3	36.75	114.70	2.37	3.40	0.00	1.03	1.01	0.521	1.00	1.45	0.80	0.648
4	46.75	120.00	2.68	4.00	0.00	1.32	1.01	0.478	0.97	1.67	0.71	0.701
5	51.75	120.00	2.84	4.30	0.00	1.46	1.01	0.462	0.94	1.82	0.64	0.767
6	56.75	119.00	3.00	4.60	0.00	1.61	1.00	0.449	0.92	1.88	0.62	0.790
7	61.75	120.00	3.15	4.90	0.00	1.75	1.00	0.437	0.85	2.20	0.48	2.000
8	66.75	120.00	3.31	5.20	0.00	1.89	0.99	0.425	0.91	1.67	0.71	0.661
9	76.75	110.00	3.62	5.75	0.00	2.13	0.97	0.410	0.93	1.24	0.90	0.491

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	1.75	0.00	1.28	1.32	0.04	11	1.70	1.00	1.00	1.20	1.47	33	0.00	33	0.759	0.07
2	31.75	22.80	2.22	3.12	0.90	13	1.07	1.00	1.00	1.20	1.47	24	4.86	29	0.429	0.48
3	36.75	10.70	2.37	3.40	1.03	10	1.01	1.00	1.00	1.20	1.47	18	1.47	19	0.194	0.30
4	46.75	5.00	2.68	4.00	1.32	15	0.91	1.00	1.00	1.20	1.47	24	0.00	24	0.268	0.38
5	51.75	9.10	2.84	4.30	1.46	17	0.88	1.00	1.00	1.20	1.47	26	0.76	27	0.347	0.45
6	56.75	10.00	3.00	4.60	1.61	18	0.85	1.00	1.00	1.20	1.47	27	1.15	28	0.384	0.49
7	61.75	5.00	3.15	4.90	1.75	32	0.88	1.00	1.00	1.20	1.47	49	0.00	49	4.000	2.00
8	66.75	5.90	3.31	5.20	1.89	17	0.79	1.00	1.00	1.20	1.47	24	0.02	24	0.268	0.41
9	76.75	73.90	3.62	5.75	2.13	5	0.66	1.00	1.00	1.20	1.47	6	5.56	12	0.132	0.27

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

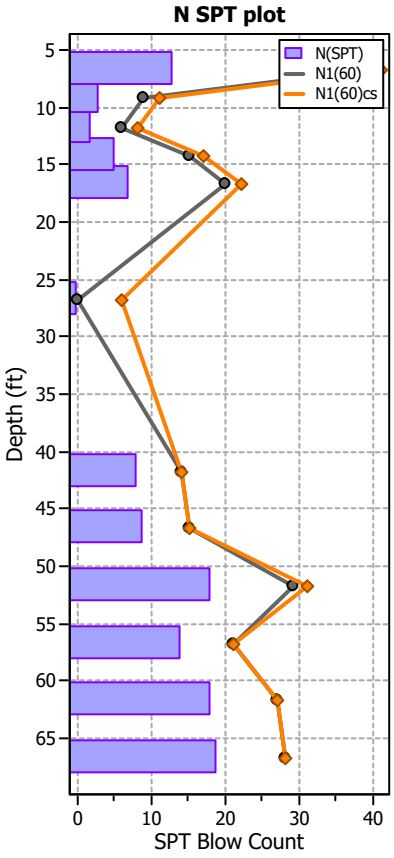
SPT BASED LIQUEFACTION ANALYSIS REPORT

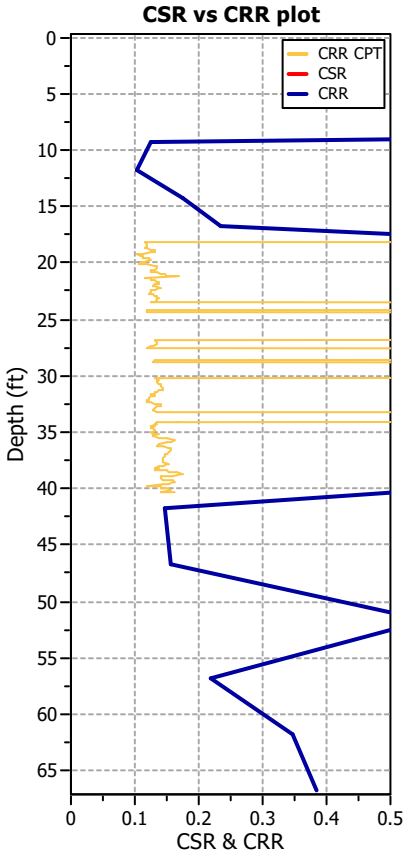
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

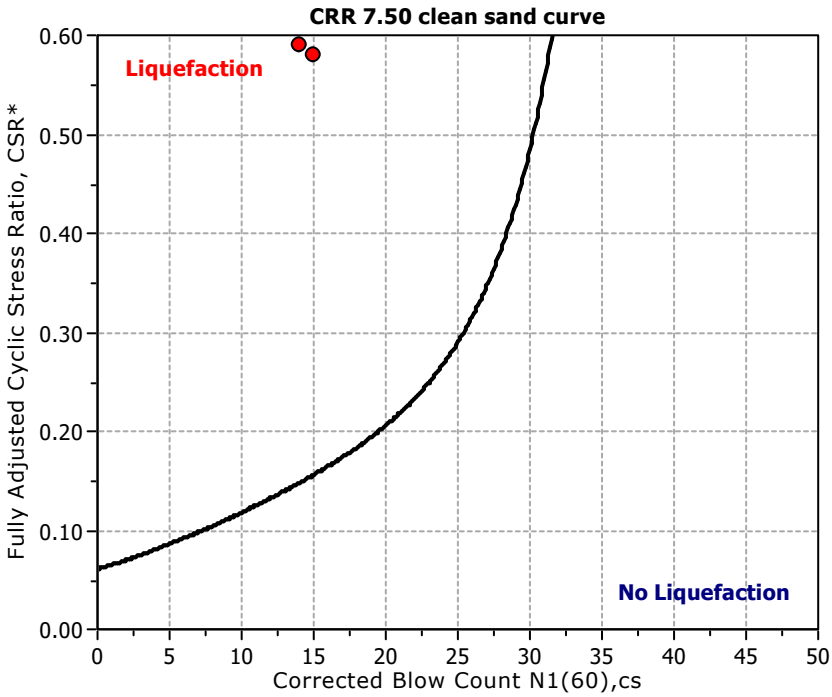
Borehole Name : BW-04 (CPTW-06)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-33.30	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-33.30		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	29.30	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	6.75	105.00	1.25	1.39	0.00	0.14	1.01	1.520	1.10	2.20	0.48	2.000
2	9.25	105.00	1.33	1.52	0.00	0.20	1.01	1.215	1.10	1.21	0.91	1.217
3	11.75	105.00	1.41	1.66	0.00	0.25	1.01	1.039	1.10	1.15	0.93	1.013
4	14.25	105.00	1.48	1.79	0.00	0.30	1.01	0.926	1.10	1.38	0.83	1.010
5	16.75	105.00	1.56	1.92	0.00	0.36	1.01	0.846	1.10	1.58	0.75	1.029
6	26.75	110.00	1.87	2.47	0.00	0.59	1.01	0.655	1.05	1.13	0.94	2.000
7	41.75	120.00	2.34	3.37	0.00	1.03	1.01	0.518	1.00	1.29	0.87	0.590
8	46.75	120.00	2.50	3.67	0.00	1.17	1.01	0.494	0.99	1.32	0.86	0.580
9	51.75	131.40	2.65	4.00	0.00	1.34	1.01	0.468	0.95	2.06	0.54	0.917
10	56.75	120.00	2.81	4.30	0.00	1.49	1.00	0.453	0.95	1.53	0.77	0.620
11	61.75	120.00	2.97	4.60	0.00	1.63	1.00	0.439	0.92	1.82	0.64	0.743
12	66.75	120.00	3.12	4.90	0.00	1.78	0.99	0.427	0.90	1.88	0.62	0.767

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	6.75	12.00	1.25	1.39	0.14	13	1.70	1.00	1.00	1.20	1.47	39	2.07	41	4.000	2.00
2	9.25	12.00	1.33	1.52	0.20	3	1.70	1.00	1.00	1.20	1.47	9	2.07	11	0.125	0.10
3	11.75	12.00	1.41	1.66	0.25	2	1.70	1.00	1.00	1.20	1.47	6	2.07	8	0.105	0.10
4	14.25	12.00	1.48	1.79	0.30	5	1.70	1.00	1.00	1.20	1.47	15	2.07	17	0.174	0.17
5	16.75	12.00	1.56	1.92	0.36	7	1.62	1.00	1.00	1.20	1.47	20	2.07	22	0.233	0.23
6	26.75	64.80	1.87	2.47	0.59	0	1.57	1.00	1.00	1.20	1.47	0	5.59	6	4.000	2.00
7	41.75	1.50	2.34	3.37	1.03	8	1.01	1.00	1.00	1.20	1.47	14	0.00	14	0.148	0.25
8	46.75	0.00	2.50	3.67	1.17	9	0.95	1.00	1.00	1.20	1.47	15	0.00	15	0.156	0.27
9	51.75	11.60	2.65	4.00	1.34	18	0.92	1.00	1.00	1.20	1.47	29	1.89	31	0.555	0.61
10	56.75	5.00	2.81	4.30	1.49	14	0.86	1.00	1.00	1.20	1.47	21	0.00	21	0.219	0.35
11	61.75	5.00	2.97	4.60	1.63	18	0.85	1.00	1.00	1.20	1.47	27	0.00	27	0.347	0.47
12	66.75	7.30	3.12	4.90	1.78	19	0.82	1.00	1.00	1.20	1.47	28	0.19	28	0.384	0.50

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

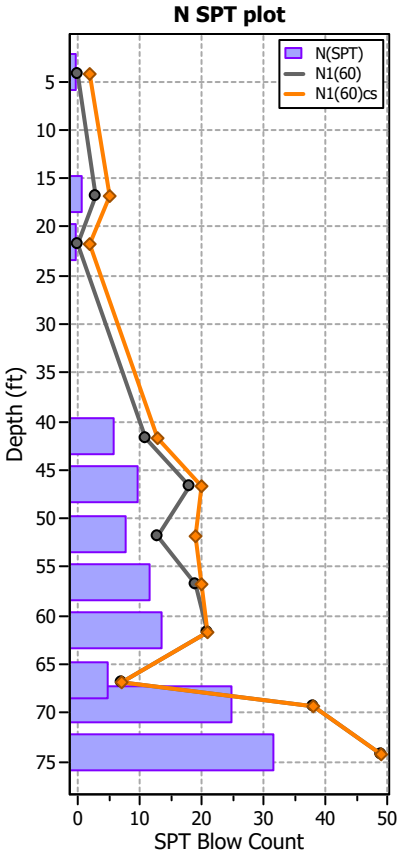
SPT BASED LIQUEFACTION ANALYSIS REPORT

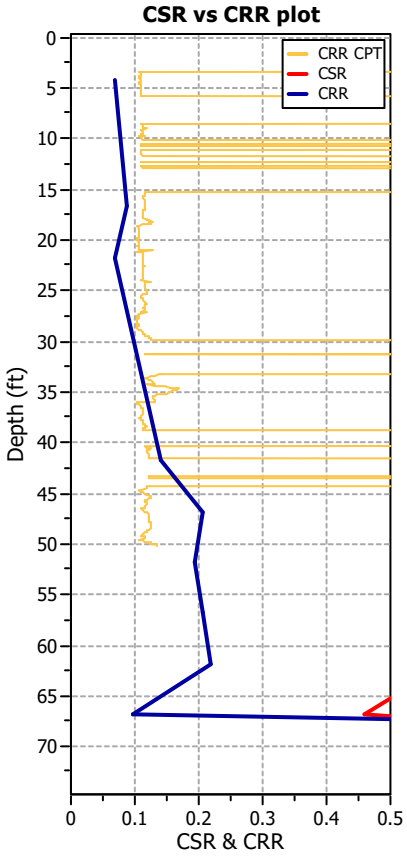
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

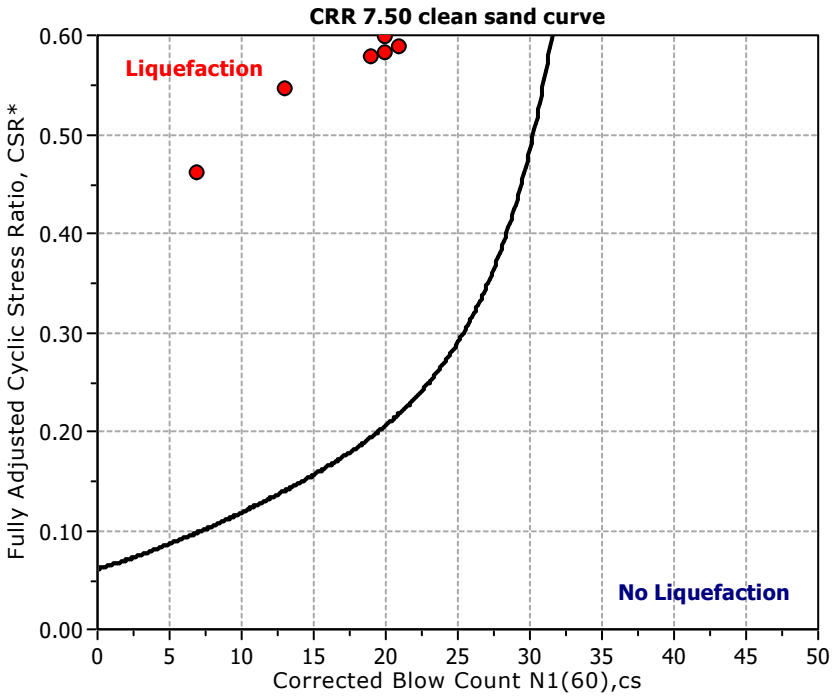
Borehole Name : BW-05 (sCPTW-05)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-21.00	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-21.00		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	17.00	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	4.25	95.00	0.79	0.86	0.00	0.07	1.00	1.940	1.10	1.09	0.96	1.839
2	16.75	95.00	1.18	1.45	0.00	0.27	1.01	0.836	1.10	1.12	0.95	0.800
3	21.75	95.00	1.33	1.69	0.00	0.35	1.01	0.750	1.07	1.09	0.96	0.730
4	41.75	120.00	1.96	2.89	0.00	0.93	1.01	0.490	1.01	1.26	0.89	0.546
5	46.75	120.00	2.11	3.19	0.00	1.07	1.01	0.468	1.00	1.49	0.78	0.598
6	51.75	110.00	2.27	3.46	0.00	1.19	1.01	0.456	0.98	1.45	0.80	0.578
7	56.75	115.60	2.43	3.75	0.00	1.33	1.00	0.443	0.97	1.49	0.78	0.582
8	61.75	120.00	2.58	4.05	0.00	1.47	1.00	0.429	0.95	1.53	0.77	0.587
9	66.75	120.00	2.74	4.35	0.00	1.61	0.99	0.417	0.97	1.14	0.94	0.460
10	69.25	121.70	2.82	4.50	0.00	1.69	0.99	0.411	0.86	2.20	0.48	1.002
11	74.25	120.00	2.97	4.80	0.00	1.83	0.98	0.400	0.84	2.20	0.48	2.000

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	4.25	12.00	0.79	0.86	0.07	0	1.70	0.95	1.00	1.20	1.47	0	2.07	2	0.070	0.04
2	16.75	12.00	1.18	1.45	0.27	1	1.70	1.00	1.00	1.20	1.47	3	2.07	5	0.086	0.11
3	21.75	12.00	1.33	1.69	0.35	0	1.70	1.00	1.00	1.20	1.47	0	2.07	2	0.070	0.10
4	41.75	12.00	1.96	2.89	0.93	6	1.07	1.00	1.00	1.20	1.47	11	2.07	13	0.140	0.26
5	46.75	12.00	2.11	3.19	1.07	10	0.99	1.00	1.00	1.20	1.47	18	2.07	20	0.206	0.34
6	51.75	51.00	2.27	3.46	1.19	8	0.94	1.00	1.00	1.20	1.47	13	5.61	19	0.194	0.34
7	56.75	10.40	2.43	3.75	1.33	12	0.90	1.00	1.00	1.20	1.47	19	1.33	20	0.206	0.35
8	61.75	5.00	2.58	4.05	1.47	14	0.87	1.00	1.00	1.20	1.47	21	0.00	21	0.219	0.37
9	66.75	5.00	2.74	4.35	1.61	5	0.78	1.00	1.00	1.20	1.47	7	0.00	7	0.098	0.21
10	69.25	8.10	2.82	4.50	1.69	25	0.86	1.00	1.00	1.20	1.47	38	0.40	38	2.273	2.00
11	74.25	5.00	2.97	4.80	1.83	32	0.87	1.00	1.00	1.20	1.47	49	0.00	49	4.000	2.00

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

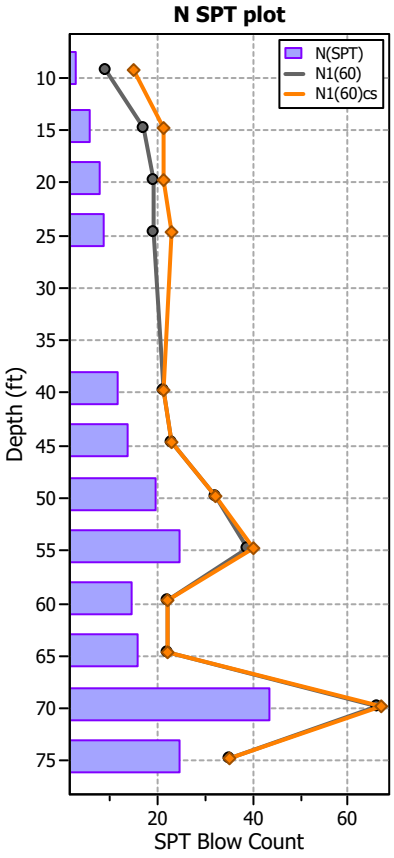
SPT BASED LIQUEFACTION ANALYSIS REPORT

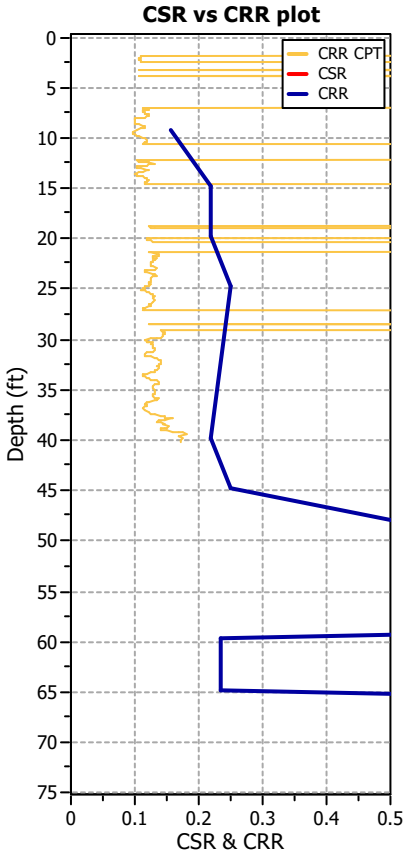
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

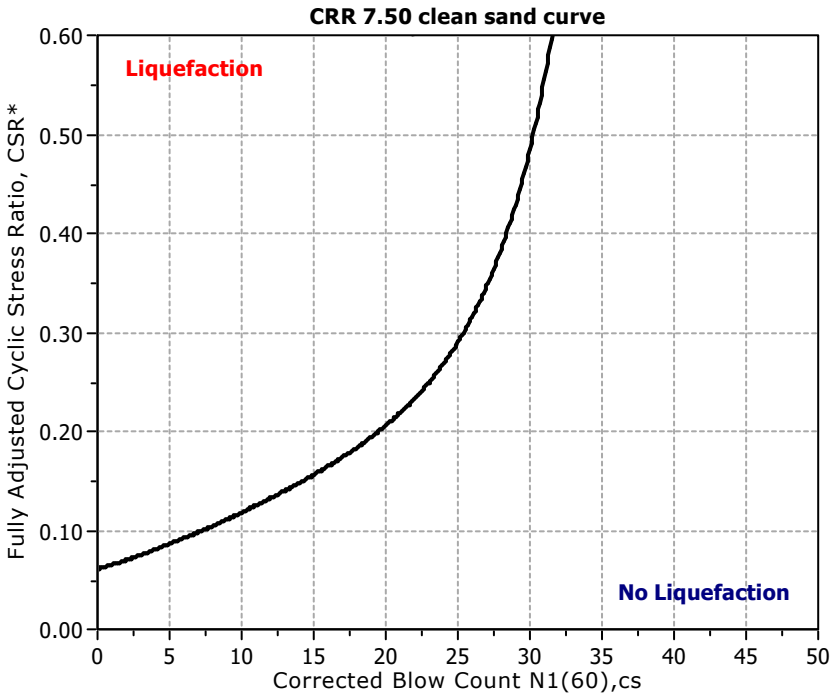
Borehole Name : BW-06 (CPTW-07)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-35.15	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-35.15		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	31.15	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	9.25	110.00	1.39	1.61	0.00	0.22	1.01	1.145	1.10	1.32	0.86	1.208
2	14.75	120.00	1.56	1.94	0.00	0.38	1.01	0.804	1.10	1.53	0.77	0.953
3	19.75	120.00	1.71	2.24	0.00	0.52	1.01	0.674	1.10	1.53	0.77	0.801
4	24.75	124.00	1.87	2.55	0.00	0.68	1.01	0.593	1.07	1.62	0.73	0.764
5	39.75	120.00	2.34	3.45	0.00	1.11	1.01	0.491	0.99	1.53	0.77	0.645
6	44.75	120.00	2.49	3.75	0.00	1.25	1.01	0.472	0.97	1.62	0.73	0.665
7	49.75	120.00	2.65	4.05	0.00	1.40	1.01	0.456	0.94	2.12	0.51	0.954
8	54.75	130.70	2.80	4.37	0.00	1.57	1.01	0.438	0.88	2.20	0.48	2.000
9	59.75	120.00	2.96	4.67	0.00	1.71	1.00	0.426	0.93	1.58	0.75	0.613
10	64.75	120.00	3.12	4.97	0.00	1.86	0.99	0.416	0.92	1.58	0.75	0.605
11	69.75	120.00	3.27	5.27	0.00	2.00	0.99	0.406	0.81	2.20	0.48	2.000
12	74.75	120.00	3.43	5.57	0.00	2.14	0.98	0.397	0.81	2.20	0.48	1.023

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	9.25	51.00	1.39	1.61	0.22	3	1.70	1.00	1.00	1.20	1.47	9	5.61	15	0.156	0.13
2	14.75	19.20	1.56	1.94	0.38	6	1.61	1.00	1.00	1.20	1.47	17	4.34	21	0.219	0.23
3	19.75	12.00	1.71	2.24	0.52	8	1.37	1.00	1.00	1.20	1.47	19	2.07	21	0.219	0.27
4	24.75	20.00	1.87	2.55	0.68	9	1.22	1.00	1.00	1.20	1.47	19	4.48	23	0.249	0.33
5	39.75	5.00	2.34	3.45	1.11	12	0.98	1.00	1.00	1.20	1.47	21	0.00	21	0.219	0.34
6	44.75	6.30	2.49	3.75	1.25	14	0.93	1.00	1.00	1.20	1.47	23	0.05	23	0.249	0.37
7	49.75	5.00	2.65	4.05	1.40	20	0.91	1.00	1.00	1.20	1.47	32	0.00	32	0.644	0.68
8	54.75	8.60	2.80	4.37	1.57	25	0.89	1.00	1.00	1.20	1.47	39	0.57	40	4.000	2.00
9	59.75	5.00	2.96	4.67	1.71	15	0.81	1.00	1.00	1.20	1.47	22	0.00	22	0.233	0.38
10	64.75	5.00	3.12	4.97	1.86	16	0.79	1.00	1.00	1.20	1.47	22	0.00	22	0.233	0.38
11	69.75	10.00	3.27	5.27	2.00	44	0.85	1.00	1.00	1.20	1.47	66	1.15	67	4.000	2.00
12	74.75	5.00	3.43	5.57	2.14	25	0.79	1.00	1.00	1.20	1.47	35	0.00	35	1.108	1.08

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

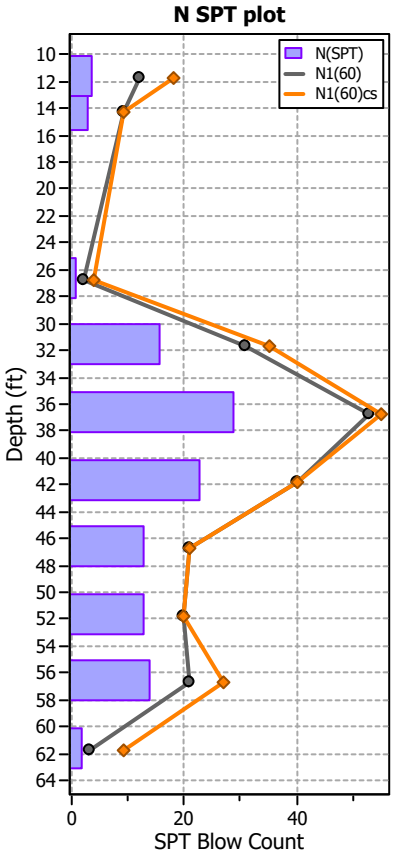
SPT BASED LIQUEFACTION ANALYSIS REPORT

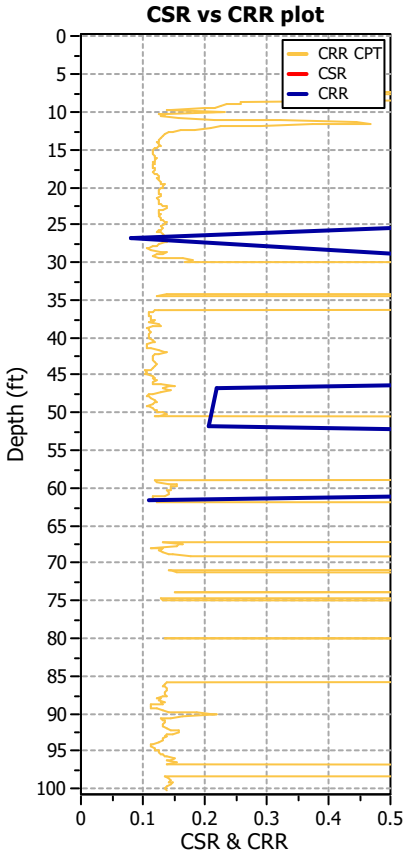
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

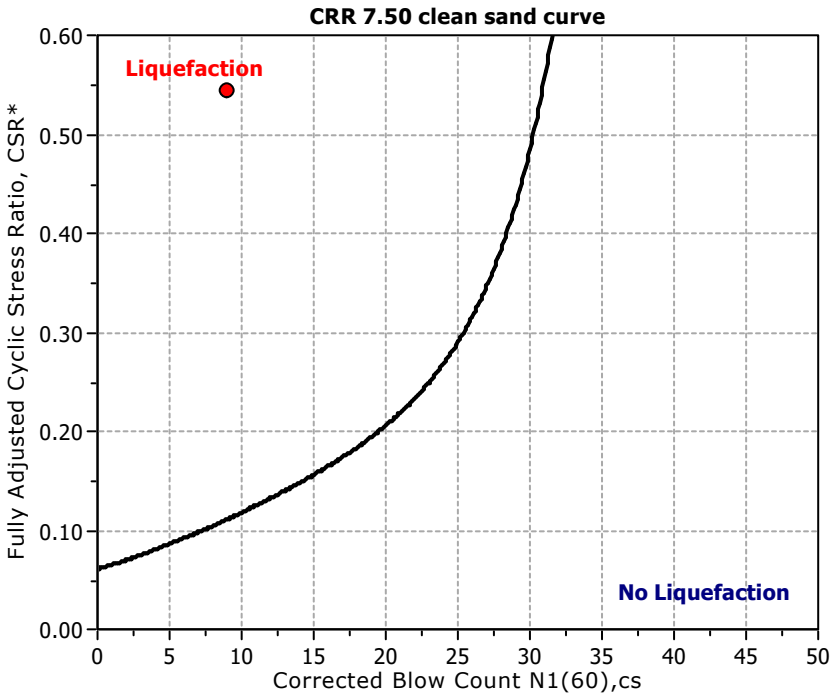
Borehole Name : BW-07 (SCPT-02)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-47.79	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-47.79		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	43.79	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	11.75	105.00	1.86	2.11	0.00	0.25	1.01	1.323	1.10	1.42	0.82	2.000
2	14.25	105.00	1.94	2.24	0.00	0.30	1.01	1.160	1.10	1.17	0.93	2.000
3	26.75	120.00	2.33	2.99	0.00	0.66	1.01	0.711	1.03	1.11	0.95	0.721
4	31.75	120.00	2.48	3.29	0.00	0.81	1.01	0.643	1.07	2.20	0.48	1.262
5	36.75	120.00	2.64	3.59	0.00	0.95	1.01	0.596	1.03	2.20	0.48	2.000
6	41.75	116.50	2.79	3.88	0.00	1.09	1.01	0.564	0.99	2.20	0.48	2.000
7	46.75	120.00	2.95	4.18	0.00	1.23	1.01	0.536	0.98	1.53	0.77	0.714
8	51.75	120.00	3.11	4.48	0.00	1.37	1.01	0.513	0.97	1.49	0.78	0.677
9	56.75	116.10	3.26	4.77	0.00	1.51	1.00	0.495	0.94	1.82	0.64	2.000
10	61.75	110.00	3.42	5.05	0.00	1.63	1.00	0.483	0.96	1.17	0.93	0.543

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	11.75	81.00	1.86	2.11	0.25	4	1.70	1.00	1.00	1.20	1.47	12	5.54	18	4.000	2.00
2	14.25	0.00	1.94	2.24	0.30	3	1.70	1.00	1.00	1.20	1.47	9	0.00	9	4.000	2.00
3	26.75	12.00	2.33	2.99	0.66	1	1.36	1.00	1.00	1.20	1.47	2	2.07	4	0.080	0.11
4	31.75	19.70	2.48	3.29	0.81	16	1.10	1.00	1.00	1.20	1.47	31	4.43	35	1.108	0.88
5	36.75	12.00	2.64	3.59	0.95	29	1.03	1.00	1.00	1.20	1.47	53	2.07	55	4.000	2.00
6	41.75	5.60	2.79	3.88	1.09	23	0.99	1.00	1.00	1.20	1.47	40	0.01	40	4.000	2.00
7	46.75	5.00	2.95	4.18	1.23	13	0.94	1.00	1.00	1.20	1.47	21	0.00	21	0.219	0.31
8	51.75	5.00	3.11	4.48	1.37	13	0.89	1.00	1.00	1.20	1.47	20	0.00	20	0.206	0.30
9	56.75	95.00	3.26	4.77	1.51	14	0.86	1.00	1.00	1.20	1.47	21	5.50	27	4.000	2.00
10	61.75	84.00	3.42	5.05	1.63	2	0.76	1.00	1.00	1.20	1.47	3	5.53	9	0.111	0.20

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

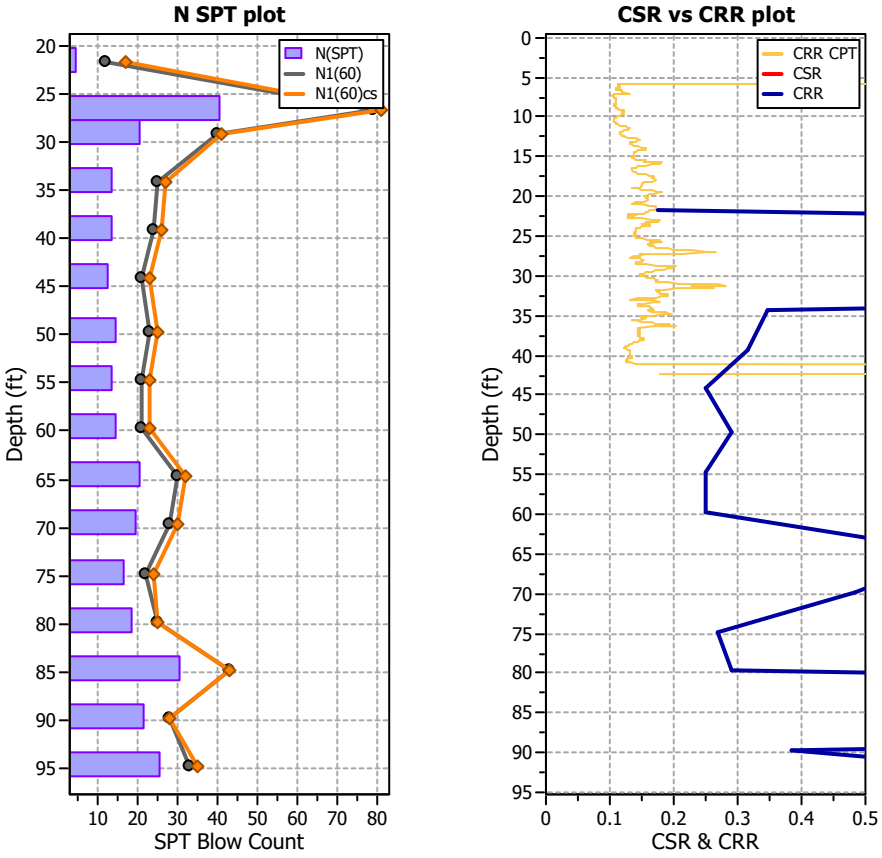
SPT BASED LIQUEFACTION ANALYSIS REPORT

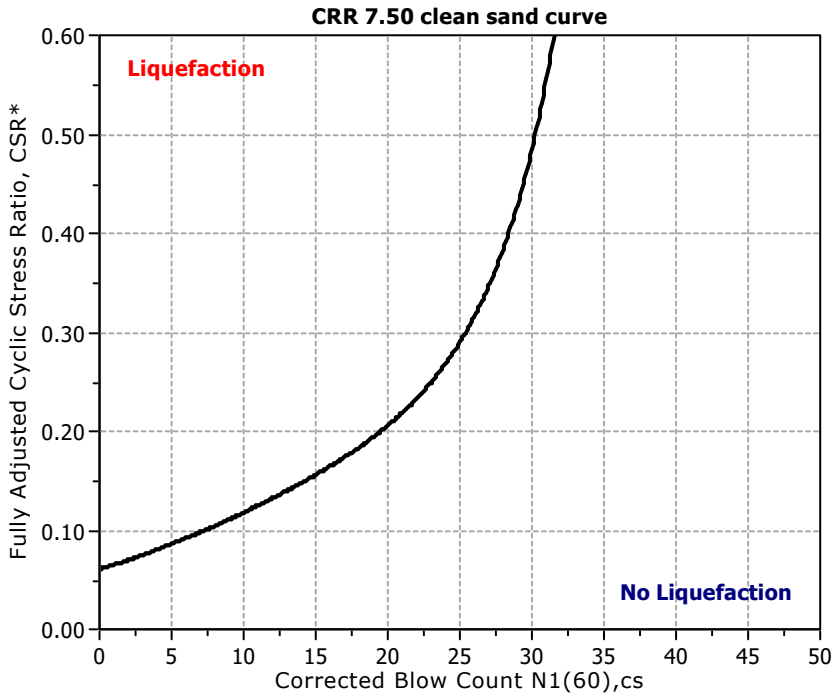
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

Borehole Name : BW-08 (CPTW-10)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-49.80	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-49.80		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	45.80	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				





:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	21.75	120.00	2.23	2.86	0.00	0.63	1.01	0.719	1.06	1.38	0.83	0.812
2	26.75	120.00	2.39	3.16	0.00	0.77	1.01	0.647	1.09	2.20	0.48	2.000
3	29.25	120.00	2.47	3.31	0.00	0.84	1.01	0.620	1.07	2.20	0.48	2.000
4	34.25	120.00	2.62	3.61	0.00	0.99	1.01	0.578	1.01	1.82	0.64	0.892
5	39.25	120.00	2.78	3.91	0.00	1.13	1.01	0.546	0.99	1.77	0.66	0.833
6	44.25	120.00	2.93	4.21	0.00	1.27	1.01	0.521	0.97	1.62	0.73	0.737
7	49.75	120.00	3.11	4.54	0.00	1.43	1.01	0.499	0.95	1.72	0.69	0.765
8	54.75	120.00	3.26	4.84	0.00	1.58	1.01	0.482	0.94	1.62	0.73	0.704
9	59.75	120.00	3.42	5.14	0.00	1.72	1.00	0.466	0.93	1.62	0.73	0.691
10	64.75	120.00	3.57	5.44	0.00	1.86	0.99	0.453	0.87	2.12	0.51	1.017
11	69.75	120.00	3.73	5.74	0.00	2.01	0.99	0.440	0.87	2.00	0.56	0.896
12	74.75	120.00	3.89	6.04	0.00	2.15	0.98	0.428	0.89	1.67	0.71	0.681
13	79.75	120.00	4.04	6.34	0.00	2.30	0.97	0.416	0.87	1.72	0.69	0.695
14	84.75	120.00	4.20	6.64	0.00	2.44	0.96	0.405	0.75	2.20	0.48	2.000
15	89.75	120.00	4.35	6.94	0.00	2.58	0.94	0.395	0.83	1.88	0.62	0.768
16	94.75	120.00	4.51	7.24	0.00	2.73	0.93	0.384	0.75	2.20	0.48	1.074

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	21.75	25.50	2.23	2.86	0.63	5	1.31	1.00	1.00	1.20	1.47	12	5.11	17	0.174	0.21
2	26.75	12.00	2.39	3.16	0.77	41	1.09	1.00	1.00	1.20	1.47	79	2.07	81	4.000	2.00
3	29.25	9.70	2.47	3.31	0.84	21	1.07	1.00	1.00	1.20	1.47	40	1.01	41	4.000	2.00
4	34.25	12.00	2.62	3.61	0.99	14	1.03	1.00	1.00	1.20	1.47	25	2.07	27	0.347	0.39
5	39.25	12.00	2.78	3.91	1.13	14	0.97	1.00	1.00	1.20	1.47	24	2.07	26	0.316	0.38
6	44.25	12.00	2.93	4.21	1.27	13	0.92	1.00	1.00	1.20	1.47	21	2.07	23	0.249	0.34
7	49.75	12.00	3.11	4.54	1.43	15	0.88	1.00	1.00	1.20	1.47	23	2.07	25	0.290	0.38
8	54.75	12.00	3.26	4.84	1.58	14	0.84	1.00	1.00	1.20	1.47	21	2.07	23	0.249	0.35
9	59.75	12.00	3.42	5.14	1.72	15	0.81	1.00	1.00	1.20	1.47	21	2.07	23	0.249	0.36
10	64.75	12.00	3.57	5.44	1.86	21	0.81	1.00	1.00	1.20	1.47	30	2.07	32	0.644	0.63
11	69.75	12.00	3.73	5.74	2.01	20	0.78	1.00	1.00	1.20	1.47	28	2.07	30	0.485	0.54
12	74.75	11.80	3.89	6.04	2.15	17	0.74	1.00	1.00	1.20	1.47	22	1.98	24	0.268	0.39
13	79.75	5.00	4.04	6.34	2.30	19	0.73	1.00	1.00	1.20	1.47	25	0.00	25	0.290	0.42
14	84.75	4.70	4.20	6.64	2.44	31	0.79	1.00	1.00	1.20	1.47	43	0.00	43	4.000	2.00
15	89.75	5.00	4.35	6.94	2.58	22	0.71	1.00	1.00	1.20	1.47	28	0.00	28	0.384	0.50
16	94.75	11.10	4.51	7.24	2.73	26	0.72	1.00	1.00	1.20	1.47	33	1.66	35	1.108	1.03

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

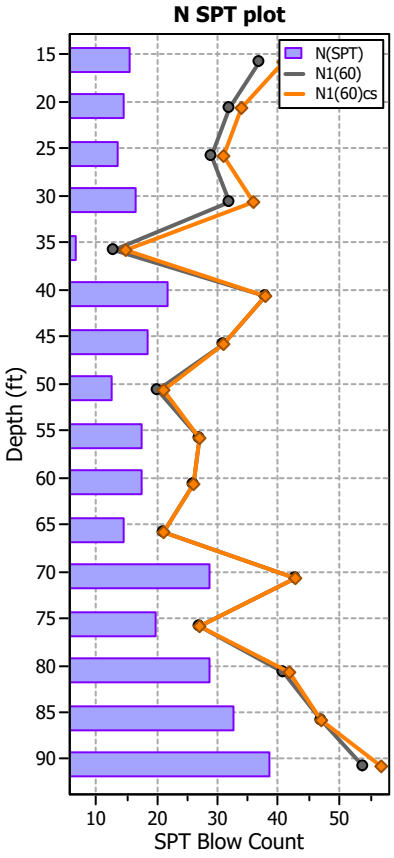
SPT BASED LIQUEFACTION ANALYSIS REPORT

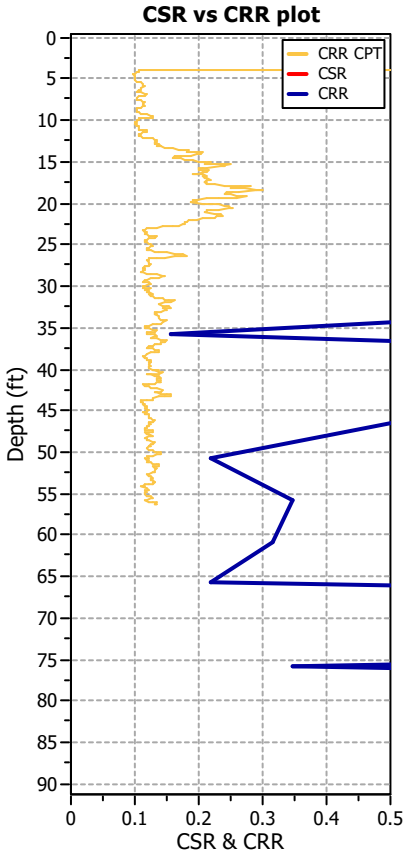
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

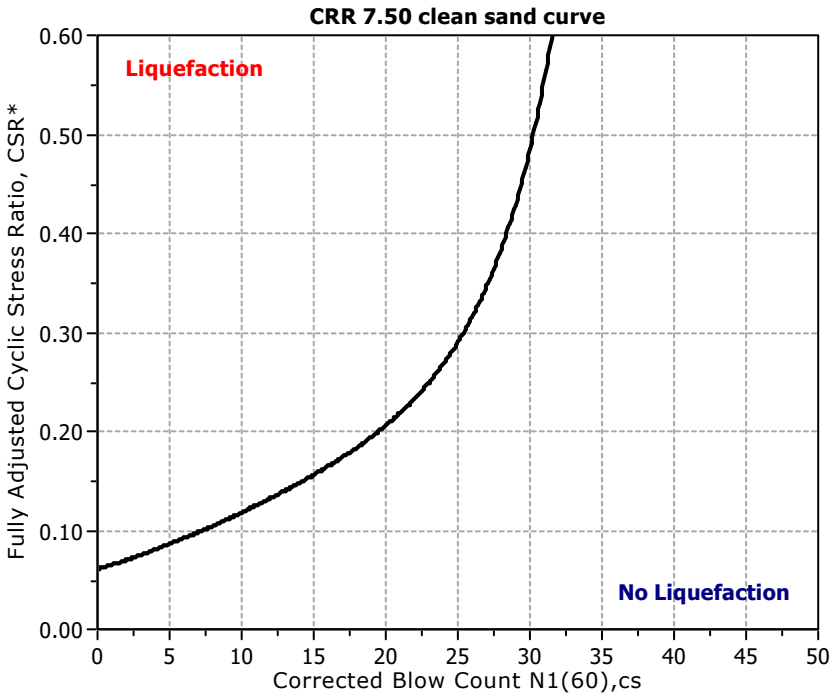
Borehole Name : BW-09 (sCPTW-11)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-61.08	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-61.08		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	57.08	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	15.75	120.00	2.40	2.85	0.00	0.45	1.01	0.988	1.10	2.20	0.48	2.000
2	20.75	120.00	2.55	3.15	0.00	0.60	1.01	0.830	1.10	2.20	0.48	1.587
3	25.75	110.00	2.71	3.43	0.00	0.72	1.01	0.754	1.08	2.06	0.54	1.295
4	30.75	120.00	2.87	3.73	0.00	0.86	1.01	0.684	1.06	2.20	0.48	1.359
5	35.75	120.00	3.02	4.03	0.00	1.00	1.01	0.633	1.01	1.32	0.86	0.730
6	40.75	120.00	3.18	4.33	0.00	1.15	1.01	0.595	0.98	2.20	0.48	1.281
7	45.75	120.00	3.33	4.63	0.00	1.29	1.01	0.564	0.96	2.06	0.54	1.097
8	50.75	120.00	3.49	4.93	0.00	1.44	1.01	0.540	0.96	1.53	0.77	0.735
9	55.75	120.00	3.65	5.23	0.00	1.58	1.01	0.518	0.93	1.82	0.64	0.872
10	60.75	120.00	3.80	5.53	0.00	1.72	1.00	0.500	0.92	1.77	0.66	0.822
11	65.75	120.00	3.96	5.83	0.00	1.87	0.99	0.483	0.92	1.53	0.77	0.684
12	70.75	120.00	4.11	6.13	0.00	2.01	0.99	0.468	0.81	2.20	0.48	2.000
13	75.75	120.00	4.27	6.43	0.00	2.16	0.98	0.454	0.87	1.82	0.64	0.811
14	80.75	120.00	4.43	6.73	0.00	2.30	0.97	0.440	0.77	2.20	0.48	2.000
15	85.75	120.00	4.58	7.03	0.00	2.44	0.95	0.427	0.75	2.20	0.48	2.000
16	90.75	120.00	4.74	7.33	0.00	2.59	0.94	0.415	0.74	2.20	0.48	2.000

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	15.75	17.00	2.40	2.85	0.45	16	1.31	1.00	1.00	1.20	1.47	37	3.85	41	4.000	2.00
2	20.75	12.00	2.55	3.15	0.60	15	1.22	1.00	1.00	1.20	1.47	32	2.07	34	0.909	0.57
3	25.75	12.00	2.71	3.43	0.72	14	1.16	1.00	1.00	1.20	1.47	29	2.07	31	0.555	0.43
4	30.75	18.00	2.87	3.73	0.86	17	1.07	1.00	1.00	1.20	1.47	32	4.09	36	1.378	1.01
5	35.75	12.00	3.02	4.03	1.00	7	1.03	1.00	1.00	1.20	1.47	13	2.07	15	0.156	0.21
6	40.75	5.00	3.18	4.33	1.15	22	0.97	1.00	1.00	1.20	1.47	38	0.00	38	2.273	1.77
7	45.75	5.00	3.33	4.63	1.29	19	0.93	1.00	1.00	1.20	1.47	31	0.00	31	0.555	0.51
8	50.75	10.00	3.49	4.93	1.44	13	0.87	1.00	1.00	1.20	1.47	20	1.15	21	0.219	0.30
9	55.75	5.00	3.65	5.23	1.58	18	0.86	1.00	1.00	1.20	1.47	27	0.00	27	0.347	0.40
10	60.75	5.00	3.80	5.53	1.72	18	0.83	1.00	1.00	1.20	1.47	26	0.00	26	0.316	0.38
11	65.75	5.00	3.96	5.83	1.87	15	0.78	1.00	1.00	1.20	1.47	21	0.00	21	0.219	0.32
12	70.75	5.00	4.11	6.13	2.01	29	0.83	1.00	1.00	1.20	1.47	43	0.00	43	4.000	2.00
13	75.75	5.00	4.27	6.43	2.16	20	0.76	1.00	1.00	1.20	1.47	27	0.00	27	0.347	0.43
14	80.75	10.00	4.43	6.73	2.30	29	0.80	1.00	1.00	1.20	1.47	41	1.15	42	4.000	2.00
15	85.75	5.00	4.58	7.03	2.44	33	0.80	1.00	1.00	1.20	1.47	47	0.00	47	4.000	2.00
16	90.75	13.00	4.74	7.33	2.59	39	0.79	1.00	1.00	1.20	1.47	54	2.51	57	4.000	2.00

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

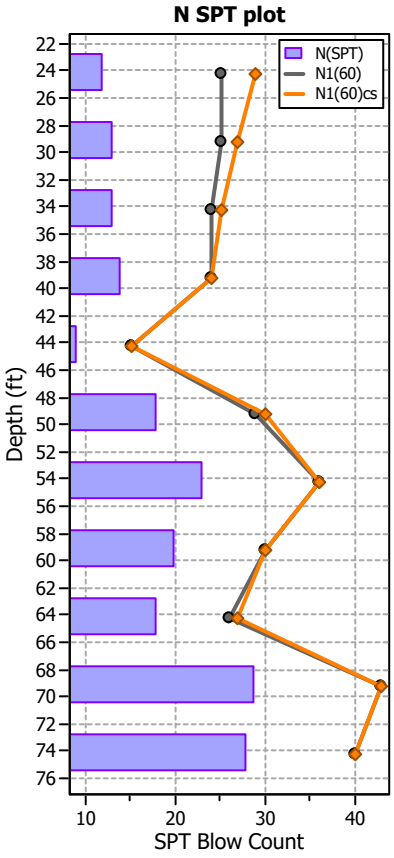
SPT BASED LIQUEFACTION ANALYSIS REPORT

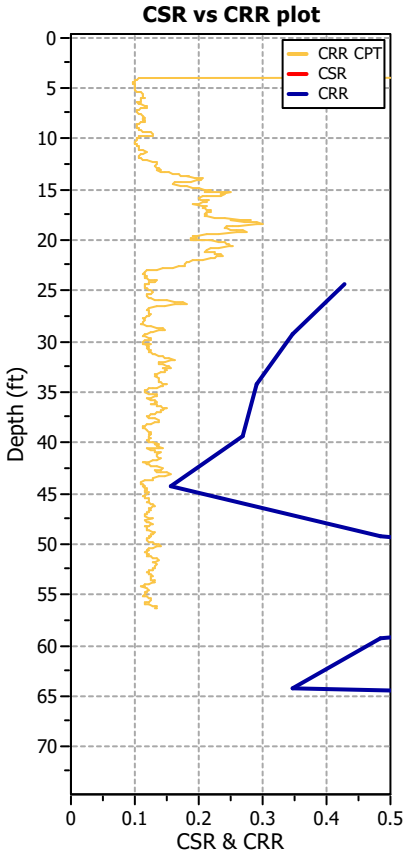
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

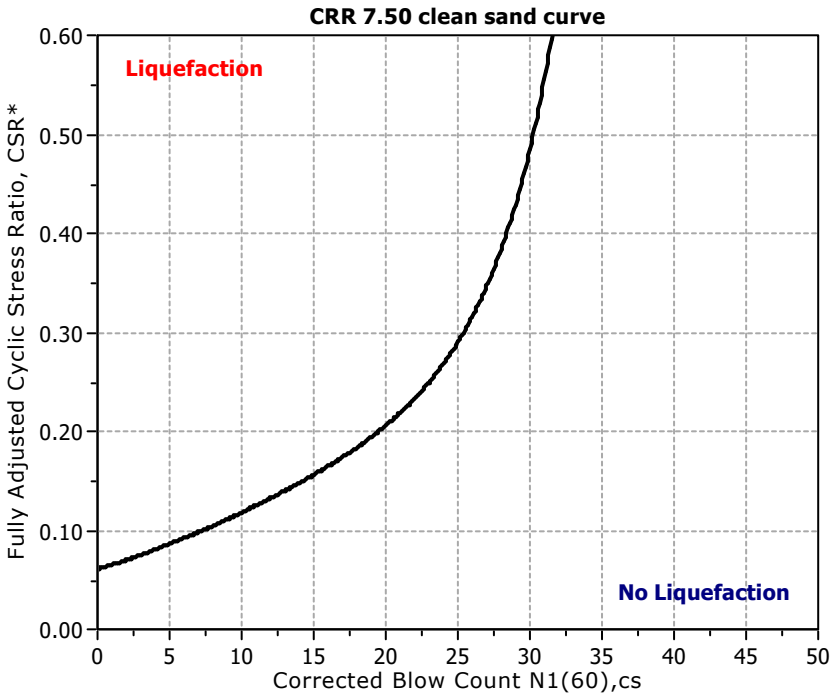
Borehole Name : BW-10 (sCPTW-11)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-52.53	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-52.53		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	48.53	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	24.25	120.00	2.40	3.09	0.00	0.70	1.01	0.698	1.08	1.94	0.59	1.095
2	29.25	120.00	2.55	3.39	0.00	0.84	1.01	0.636	1.04	1.82	0.64	0.956
3	34.25	120.00	2.71	3.69	0.00	0.99	1.01	0.592	1.01	1.72	0.69	0.853
4	39.25	108.90	2.86	3.97	0.00	1.10	1.01	0.568	0.99	1.67	0.71	0.809
5	44.25	120.00	3.02	4.27	0.00	1.25	1.01	0.540	0.98	1.32	0.86	0.638
6	49.25	120.00	3.18	4.57	0.00	1.39	1.01	0.517	0.94	2.00	0.56	0.970
7	54.25	120.00	3.33	4.87	0.00	1.53	1.01	0.498	0.90	2.20	0.48	1.167
8	59.25	120.00	3.49	5.17	0.00	1.68	1.00	0.481	0.91	2.00	0.56	0.940
9	64.25	120.00	3.64	5.47	0.00	1.82	1.00	0.466	0.90	1.82	0.64	0.806
10	69.25	120.00	3.80	5.77	0.00	1.97	0.99	0.452	0.82	2.20	0.48	2.000
11	74.25	120.00	3.96	6.07	0.00	2.11	0.98	0.439	0.80	2.20	0.48	2.000

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	24.25	18.00	2.40	3.09	0.70	12	1.18	1.00	1.00	1.20	1.47	25	4.09	29	0.429	0.39
2	29.25	12.00	2.55	3.39	0.84	13	1.10	1.00	1.00	1.20	1.47	25	2.07	27	0.347	0.36
3	34.25	9.00	2.71	3.69	0.99	13	1.03	1.00	1.00	1.20	1.47	24	0.72	25	0.290	0.34
4	39.25	8.00	2.86	3.97	1.10	14	0.98	1.00	1.00	1.20	1.47	24	0.37	24	0.268	0.33
5	44.25	5.00	3.02	4.27	1.25	9	0.92	1.00	1.00	1.20	1.47	15	0.00	15	0.156	0.24
6	49.25	9.00	3.18	4.57	1.39	18	0.90	1.00	1.00	1.20	1.47	29	0.72	30	0.485	0.50
7	54.25	5.00	3.33	4.87	1.53	23	0.89	1.00	1.00	1.20	1.47	36	0.00	36	1.378	1.18
8	59.25	5.00	3.49	5.17	1.68	20	0.84	1.00	1.00	1.20	1.47	30	0.00	30	0.485	0.52
9	64.25	9.00	3.64	5.47	1.82	18	0.81	1.00	1.00	1.20	1.47	26	0.72	27	0.347	0.43
10	69.25	5.00	3.80	5.77	1.97	29	0.84	1.00	1.00	1.20	1.47	43	0.00	43	4.000	2.00
11	74.25	5.00	3.96	6.07	2.11	28	0.81	1.00	1.00	1.20	1.47	40	0.00	40	4.000	2.00

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

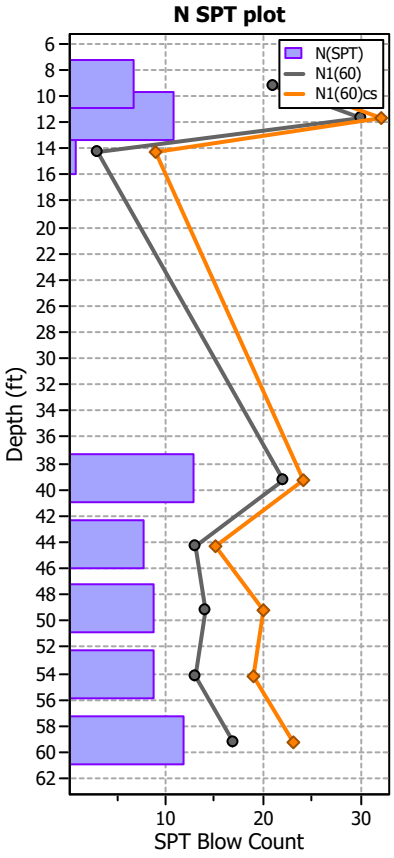
SPT BASED LIQUEFACTION ANALYSIS REPORT

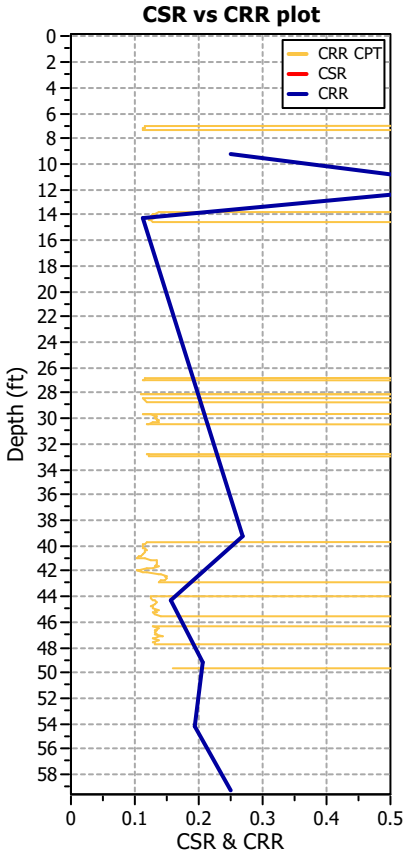
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

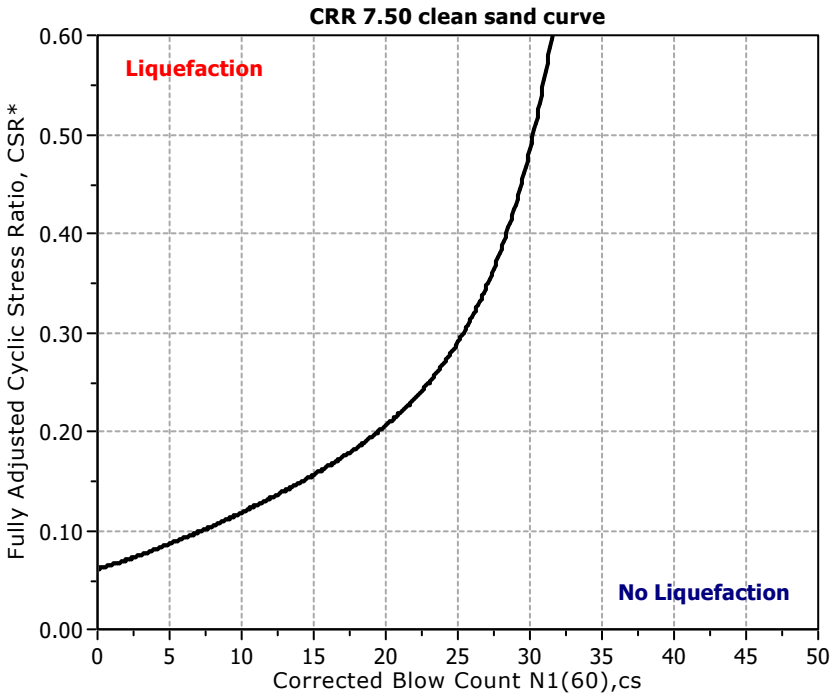
Borehole Name : BW-11 (CPTW-01)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-50.56	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-50.56		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	46.56	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	9.25	120.00	1.87	2.13	0.00	0.27	1.01	1.257	1.10	1.62	0.73	1.570
2	11.75	120.00	1.94	2.28	0.00	0.34	1.01	1.060	1.10	2.12	0.51	1.889
3	14.25	110.00	2.02	2.42	0.00	0.40	1.01	0.956	1.09	1.17	0.93	0.951
4	39.25	120.00	2.80	3.92	0.00	1.12	1.01	0.554	0.99	1.67	0.71	0.790
5	44.25	120.00	2.96	4.22	0.00	1.26	1.01	0.528	0.98	1.32	0.86	0.625
6	49.25	110.00	3.11	4.49	0.00	1.38	1.01	0.513	0.96	1.49	0.78	0.677
7	54.25	110.00	3.27	4.77	0.00	1.50	1.01	0.499	0.96	1.45	0.80	0.652
8	59.25	110.00	3.43	5.04	0.00	1.62	1.00	0.487	0.94	1.62	0.73	0.715

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	9.25	12.00	1.87	2.13	0.27	7	1.70	1.00	1.00	1.20	1.47	21	2.07	23	0.249	0.16
2	11.75	12.00	1.94	2.28	0.34	11	1.53	1.00	1.00	1.20	1.47	30	2.07	32	0.644	0.34
3	14.25	51.00	2.02	2.42	0.40	1	1.70	1.00	1.00	1.20	1.47	3	5.61	9	0.111	0.12
4	39.25	12.00	2.80	3.92	1.12	13	0.98	1.00	1.00	1.20	1.47	22	2.07	24	0.268	0.34
5	44.25	12.00	2.96	4.22	1.26	8	0.91	1.00	1.00	1.20	1.47	13	2.07	15	0.156	0.25
6	49.25	59.90	3.11	4.49	1.38	9	0.88	1.00	1.00	1.20	1.47	14	5.60	20	0.206	0.30
7	54.25	51.00	3.27	4.77	1.50	9	0.84	1.00	1.00	1.20	1.47	13	5.61	19	0.194	0.30
8	59.25	51.00	3.43	5.04	1.62	12	0.82	1.00	1.00	1.20	1.47	17	5.61	23	0.249	0.35

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

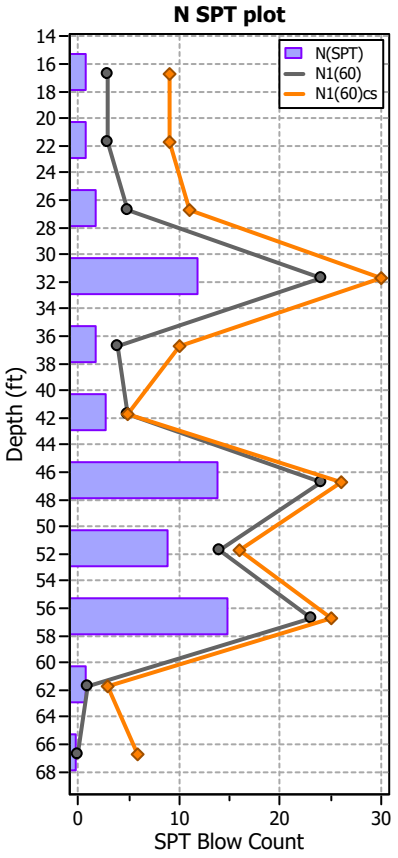
SPT BASED LIQUEFACTION ANALYSIS REPORT

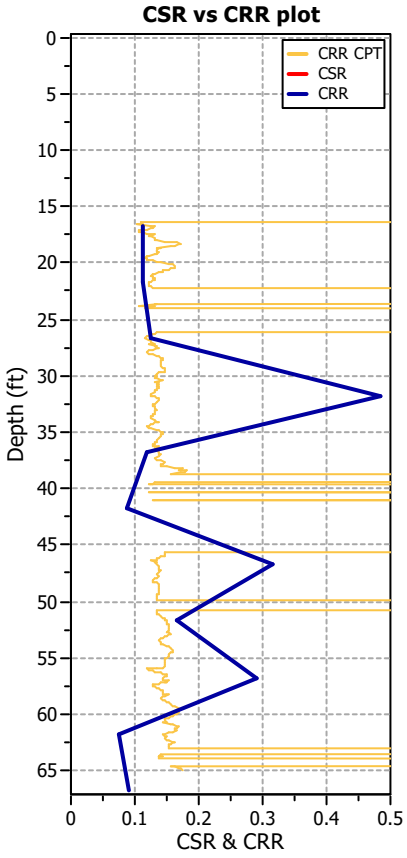
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

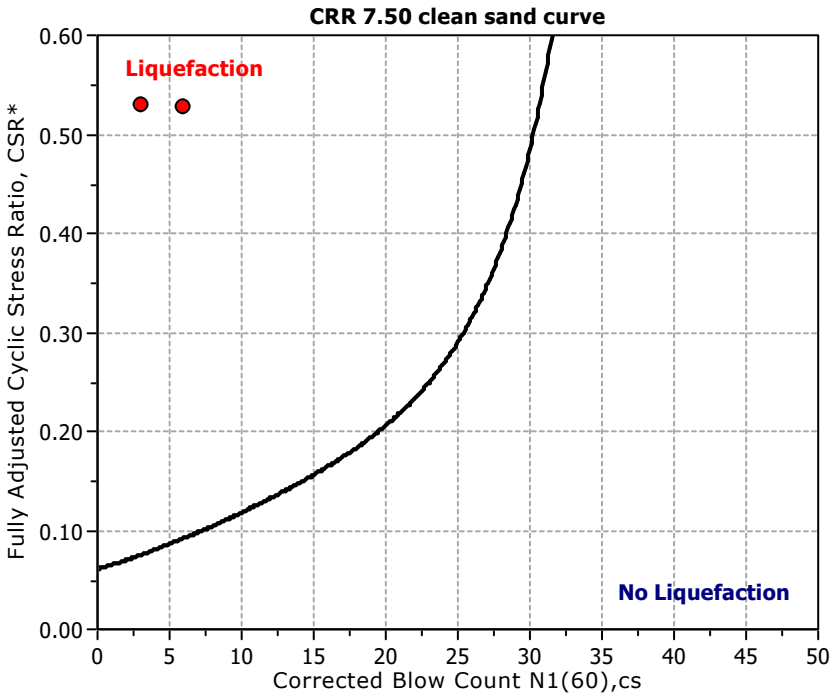
Borehole Name : BW-12 (CPTW-09)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-48.34	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-48.34		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	44.34	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	16.75	110.00	2.03	2.43	0.00	0.40	1.01	0.959	1.09	1.17	0.93	0.954
2	21.75	110.00	2.19	2.70	0.00	0.52	1.01	0.823	1.06	1.17	0.93	0.837
3	26.75	110.00	2.34	2.98	0.00	0.64	1.01	0.738	1.05	1.21	0.91	0.776
4	31.75	110.00	2.50	3.25	0.00	0.76	1.01	0.680	1.07	2.00	0.56	1.128
5	36.75	110.00	2.65	3.53	0.00	0.87	1.01	0.637	1.02	1.19	0.92	0.683
6	41.75	120.00	2.81	3.83	0.00	1.02	1.01	0.594	1.00	1.12	0.95	0.623
7	46.75	120.00	2.97	4.13	0.00	1.16	1.01	0.560	0.98	1.77	0.66	0.858
8	51.75	120.00	3.12	4.43	0.00	1.31	1.01	0.533	0.98	1.35	0.85	0.644
9	56.75	120.00	3.28	4.73	0.00	1.45	1.00	0.511	0.95	1.72	0.69	0.785
10	61.75	120.00	3.43	5.03	0.00	1.59	1.00	0.491	0.97	1.10	0.96	0.529
11	66.75	110.00	3.59	5.30	0.00	1.71	0.99	0.479	0.96	1.13	0.94	0.527

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	16.75	51.00	2.03	2.43	0.40	1	1.70	1.00	1.00	1.20	1.47	3	5.61	9	0.111	0.12
2	21.75	78.40	2.19	2.70	0.52	1	1.59	1.00	1.00	1.20	1.47	3	5.55	9	0.111	0.13
3	26.75	51.00	2.34	2.98	0.64	2	1.36	1.00	1.00	1.20	1.47	5	5.61	11	0.125	0.16
4	31.75	51.00	2.50	3.25	0.76	12	1.15	1.00	1.00	1.20	1.47	24	5.61	30	0.485	0.43
5	36.75	51.00	2.65	3.53	0.87	2	1.13	1.00	1.00	1.20	1.47	4	5.61	10	0.118	0.17
6	41.75	5.00	2.81	3.83	1.02	3	1.02	1.00	1.00	1.20	1.47	5	0.00	5	0.086	0.14
7	46.75	12.00	2.97	4.13	1.16	14	0.96	1.00	1.00	1.20	1.47	24	2.07	26	0.316	0.37
8	51.75	12.00	3.12	4.43	1.31	9	0.90	1.00	1.00	1.20	1.47	14	2.07	16	0.165	0.26
9	56.75	12.00	3.28	4.73	1.45	15	0.88	1.00	1.00	1.20	1.47	23	2.07	25	0.290	0.37
10	61.75	12.00	3.43	5.03	1.59	1	0.75	1.00	1.00	1.20	1.47	1	2.07	3	0.075	0.14
11	66.75	51.00	3.59	5.30	1.71	0	0.69	1.00	1.00	1.20	1.47	0	5.61	6	0.092	0.17

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

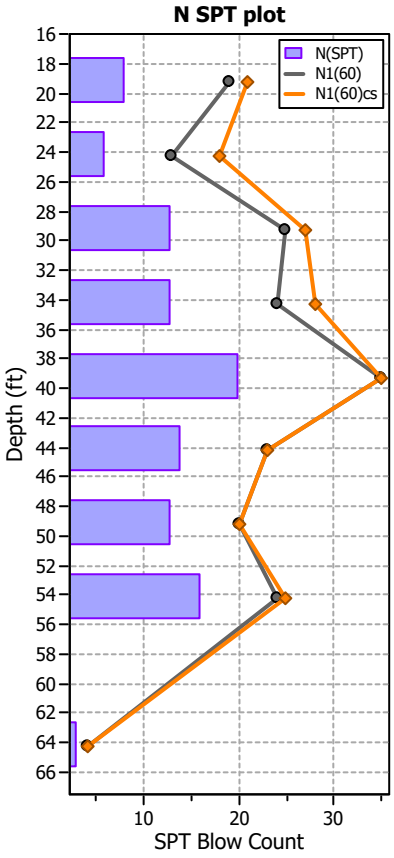
SPT BASED LIQUEFACTION ANALYSIS REPORT

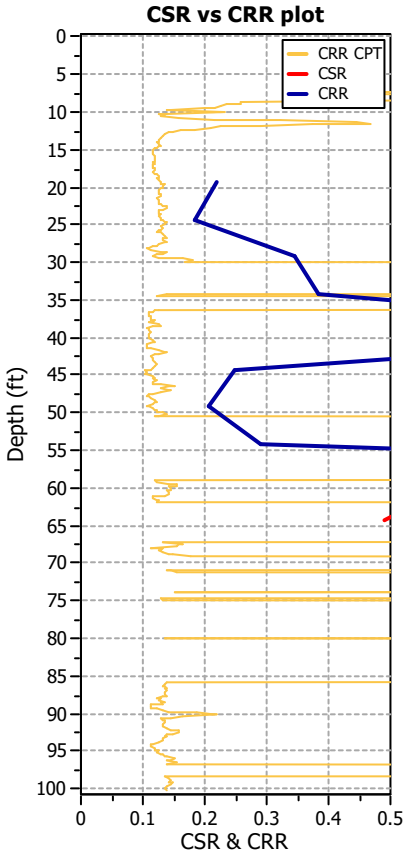
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

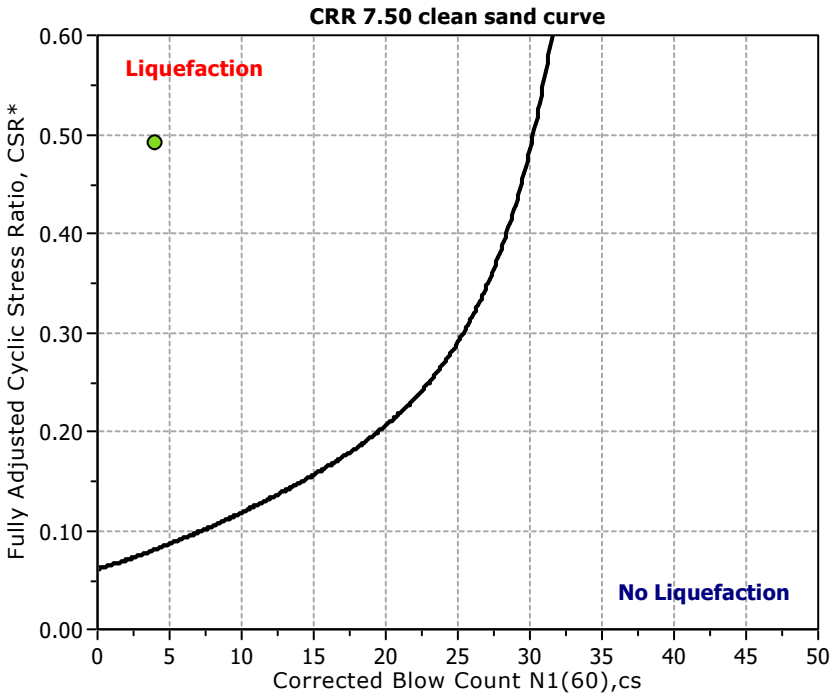
Borehole Name : BW-13 (SCPT-02)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-45.25	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-45.25		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	41.25	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	19.25	120.00	2.01	2.57	0.00	0.55	1.01	0.729	1.09	1.53	0.77	0.873
2	24.25	120.00	2.17	2.87	0.00	0.70	1.01	0.647	1.05	1.42	0.82	0.752
3	29.25	120.00	2.32	3.17	0.00	0.84	1.01	0.593	1.04	1.82	0.64	0.892
4	34.25	120.00	2.48	3.47	0.00	0.99	1.01	0.555	1.01	1.88	0.62	0.890
5	39.25	120.00	2.64	3.77	0.00	1.13	1.01	0.526	0.98	2.20	0.48	1.126
6	44.25	120.00	2.79	4.07	0.00	1.27	1.01	0.504	0.97	1.62	0.73	0.712
7	49.25	120.00	2.95	4.37	0.00	1.42	1.01	0.485	0.96	1.49	0.78	0.643
8	54.25	120.00	3.10	4.67	0.00	1.56	1.01	0.469	0.94	1.72	0.69	0.730
9	64.25	110.00	3.42	5.22	0.00	1.80	1.00	0.450	0.96	1.11	0.95	2.000

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	19.25	12.00	2.01	2.57	0.55	8	1.34	1.00	1.00	1.20	1.47	19	2.07	21	0.219	0.25
2	24.25	30.00	2.17	2.87	0.70	6	1.23	1.00	1.00	1.20	1.47	13	5.36	18	0.184	0.24
3	29.25	12.00	2.32	3.17	0.84	13	1.10	1.00	1.00	1.20	1.47	25	2.07	27	0.347	0.39
4	34.25	16.00	2.48	3.47	0.99	13	1.03	1.00	1.00	1.20	1.47	24	3.58	28	0.384	0.43
5	39.25	7.00	2.64	3.77	1.13	20	0.98	1.00	1.00	1.20	1.47	35	0.14	35	1.108	0.98
6	44.25	5.00	2.79	4.07	1.27	14	0.93	1.00	1.00	1.20	1.47	23	0.00	23	0.249	0.35
7	49.25	5.00	2.95	4.37	1.42	13	0.88	1.00	1.00	1.20	1.47	20	0.00	20	0.206	0.32
8	54.25	10.00	3.10	4.67	1.56	16	0.85	1.00	1.00	1.20	1.47	24	1.15	25	0.290	0.40
9	64.25	0.00	3.42	5.22	1.80	3	0.71	1.00	1.00	1.20	1.47	4	0.00	4	4.000	2.00

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

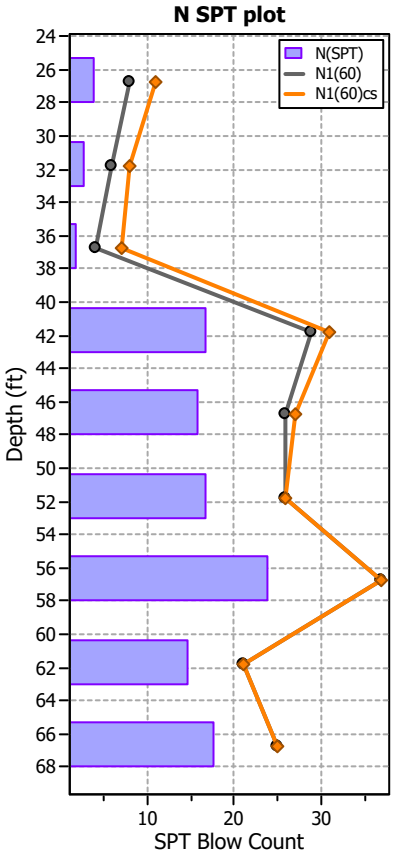
SPT BASED LIQUEFACTION ANALYSIS REPORT

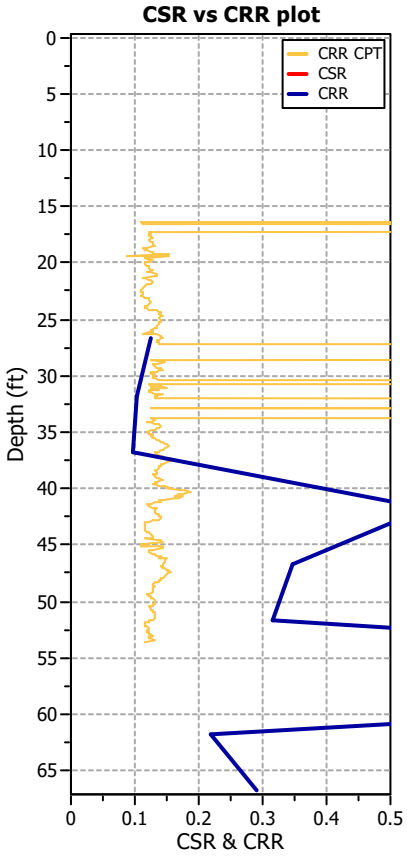
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

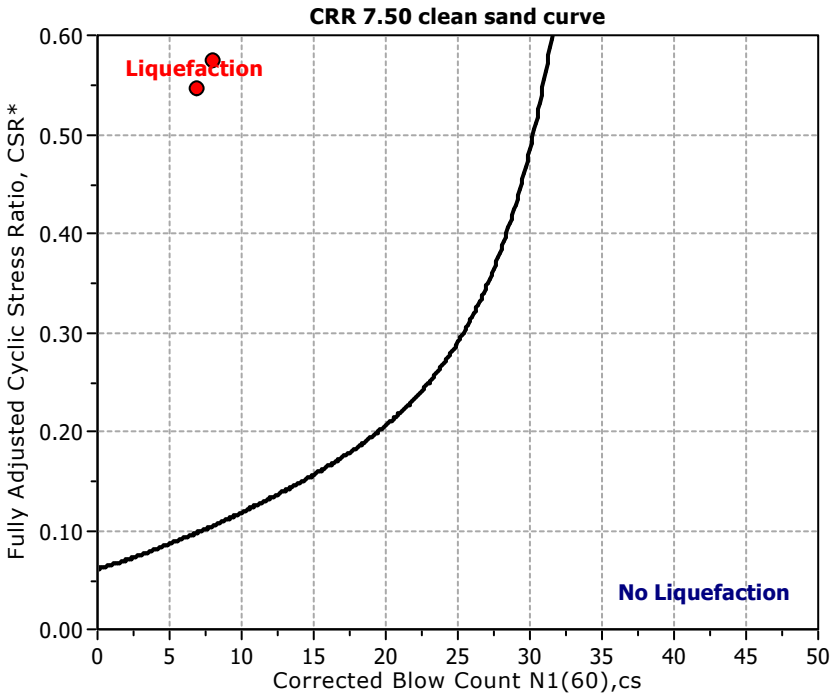
Borehole Name : BW-14 (CPTW-04)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-39.40	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-39.40		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	35.40	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	26.75	120.00	2.06	2.83	0.00	0.77	1.01	0.580	1.03	1.21	0.91	0.621
2	31.75	120.00	2.22	3.13	0.00	0.91	1.01	0.541	1.01	1.15	0.93	0.573
3	36.75	120.00	2.38	3.43	0.00	1.06	1.01	0.513	1.00	1.14	0.94	0.546
4	41.75	120.00	2.53	3.73	0.00	1.20	1.01	0.490	0.97	2.06	0.54	0.938
5	46.75	120.00	2.69	4.03	0.00	1.35	1.01	0.472	0.96	1.82	0.64	0.771
6	51.75	120.00	2.84	4.33	0.00	1.49	1.01	0.457	0.94	1.77	0.66	0.732
7	56.75	117.60	3.00	4.63	0.00	1.63	1.00	0.445	0.87	2.20	0.48	1.072
8	61.75	120.00	3.16	4.93	0.00	1.77	1.00	0.433	0.93	1.53	0.77	0.609
9	66.75	120.00	3.31	5.23	0.00	1.92	0.99	0.422	0.90	1.72	0.69	0.682

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	26.75	14.00	2.06	2.83	0.77	4	1.20	1.00	1.00	1.20	1.47	8	2.91	11	0.125	0.20
2	31.75	12.00	2.22	3.13	0.91	3	1.09	1.00	1.00	1.20	1.47	6	2.07	8	0.105	0.18
3	36.75	15.00	2.38	3.43	1.06	2	1.00	1.00	1.00	1.20	1.47	4	3.26	7	0.098	0.18
4	41.75	12.00	2.53	3.73	1.20	17	0.95	1.00	1.00	1.20	1.47	29	2.07	31	0.555	0.59
5	46.75	10.00	2.69	4.03	1.35	16	0.91	1.00	1.00	1.20	1.47	26	1.15	27	0.347	0.45
6	51.75	5.00	2.84	4.33	1.49	17	0.87	1.00	1.00	1.20	1.47	26	0.00	26	0.316	0.43
7	56.75	6.00	3.00	4.63	1.63	24	0.87	1.00	1.00	1.20	1.47	37	0.03	37	1.750	1.63
8	61.75	5.00	3.16	4.93	1.77	15	0.80	1.00	1.00	1.20	1.47	21	0.00	21	0.219	0.36
9	66.75	8.00	3.31	5.23	1.92	18	0.79	1.00	1.00	1.20	1.47	25	0.37	25	0.290	0.43

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

Mott MacDonald
155 Montgomery Street, Suite 1400
San Francisco, CA 94104

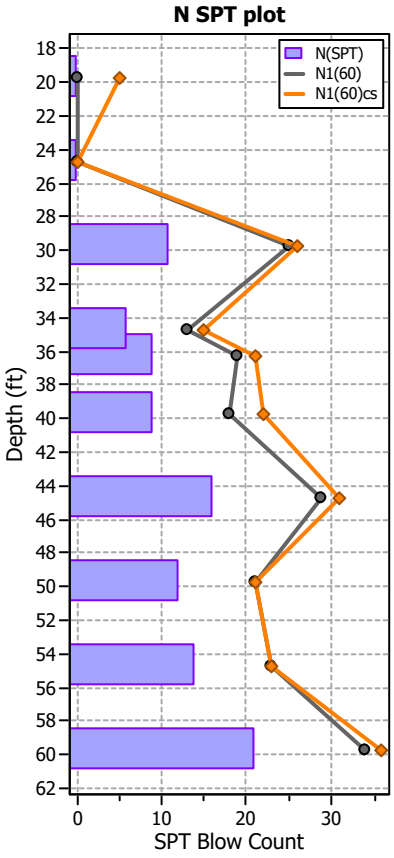
SPT BASED LIQUEFACTION ANALYSIS REPORT

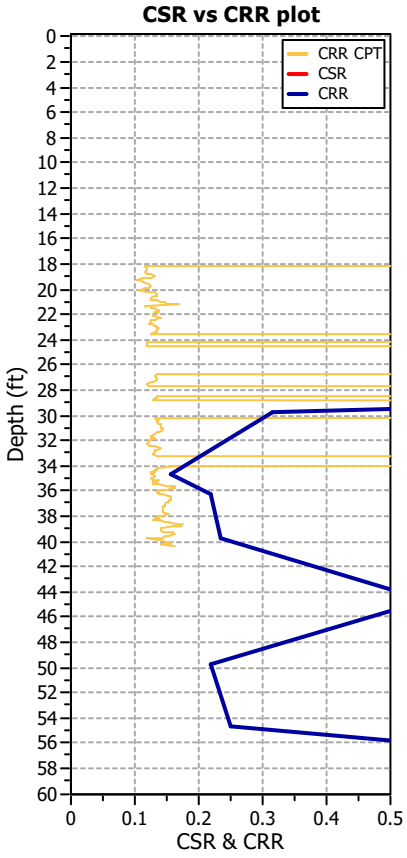
Project title : Swan Island Basin Remedial Design **Location : Portland, Oregon**

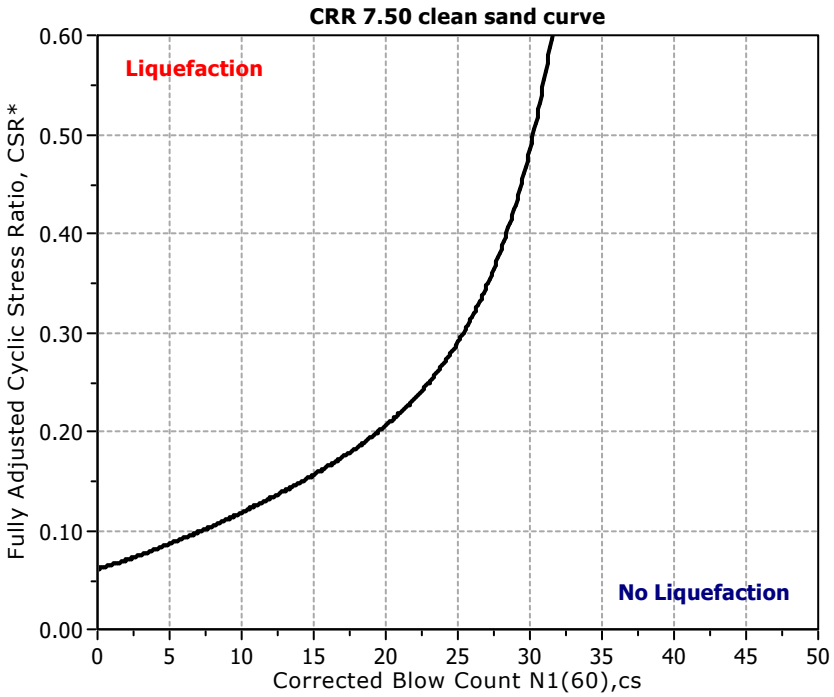
Borehole Name : BW-15 (CPTW-06)

:: Input parameters and analysis properties ::

Analysis method:	Idriss & Boulanger 2014	G.W.T. (in-situ):	-30.72	EQ site conditions:	Same as initial
Fines correction method:	Idriss & Boulanger 2014	G.W.T. (earthq.):	-30.72		
Sampling method:	Sampler wo liners	Earthquake magnitude M_w:	9.10		
Borehole diameter:	65 mm to 11 5mm	Peak ground acceleration:	0.24		
Rod length:	26.72	SPT results rounding mode:	Nearest		
Hammer energy ratio:	1.47				







:: Cyclic Stress Ratio fully adjusted (CSR*) numeric results ::

No	Depth (ft)	Weight (pcf)	u_o (tsf)	σ_v (tsf)	Ext. Load (tsf)	σ'_v (tsf)	r_d	CSR	K_σ	MSF_{max}	MSF	CSR^*
1	19.75	95.00	1.57	1.90	0.00	0.32	1.01	0.928	1.09	1.12	0.95	2.000
2	24.75	95.00	1.73	2.13	0.00	0.40	1.01	0.834	1.05	1.09	0.96	2.000
3	29.75	120.00	1.89	2.43	0.00	0.55	1.01	0.702	1.10	1.77	0.66	0.962
4	34.75	120.00	2.04	2.73	0.00	0.69	1.01	0.625	1.05	1.32	0.86	0.692
5	36.25	120.00	2.09	2.82	0.00	0.73	1.01	0.607	1.05	1.53	0.77	0.754
6	39.75	120.00	2.20	3.03	0.00	0.84	1.01	0.574	1.03	1.58	0.75	0.742
7	44.75	120.00	2.35	3.33	0.00	0.98	1.01	0.537	1.02	2.06	0.54	0.983
8	49.75	120.00	2.51	3.63	0.00	1.12	1.01	0.509	0.99	1.53	0.77	0.670
9	54.75	120.00	2.67	3.93	0.00	1.27	1.01	0.487	0.97	1.62	0.73	0.688
10	59.75	120.00	2.82	4.23	0.00	1.41	1.00	0.469	0.92	2.20	0.48	1.070

Abbreviations

Depth: Depth from free surface where SPT was performed (ft) during eq.
u_0: Water pressure at test point (tsf) during eq.
σ_v: Total overburden pressure at test point (tsf) during eq.
σ_v': Effective overburden pressure based on GWT during earthquake (tsf) during eq.
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Effective overburden stress factor
K_σ: Magnitude Scaling Factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) numeric results ::

No	Depth (ft)	Fines %	u_o (tsf)	σ_v (tsf)	σ'_v (tsf)	N_{SPT}	C_N	C_R	C_B	C_S	C_E	$N_{1(60)}$	$\Delta(N_1)_{60}$	$N_{1(60),cs}$	$CRR_{7.5}$	F.S.
1	19.75	98.60	1.57	1.90	0.32	0	1.70	1.00	1.00	1.20	1.47	0	5.49	5	4.000	2.00
2	24.75	0.00	1.73	2.13	0.40	0	1.70	1.00	1.00	1.20	1.47	0	0.00	0	4.000	2.00
3	29.75	10.00	1.89	2.43	0.55	11	1.30	1.00	1.00	1.20	1.47	25	1.15	26	0.316	0.33
4	34.75	12.00	2.04	2.73	0.69	6	1.24	1.00	1.00	1.20	1.47	13	2.07	15	0.156	0.23
5	36.25	12.00	2.09	2.82	0.73	9	1.18	1.00	1.00	1.20	1.47	19	2.07	21	0.219	0.29
6	39.75	17.00	2.20	3.03	0.84	9	1.11	1.00	1.00	1.20	1.47	18	3.85	22	0.233	0.31
7	44.75	12.00	2.35	3.33	0.98	16	1.03	1.00	1.00	1.20	1.47	29	2.07	31	0.555	0.56
8	49.75	4.00	2.51	3.63	1.12	12	0.97	1.00	1.00	1.20	1.47	21	0.00	21	0.219	0.33
9	54.75	0.00	2.67	3.93	1.27	14	0.93	1.00	1.00	1.20	1.47	23	0.00	23	0.249	0.36
10	59.75	11.00	2.82	4.23	1.41	21	0.91	1.00	1.00	1.20	1.47	34	1.61	36	1.378	1.29

Abbreviations

Depth: Depth from free surface where SPT was performed (ft)
Weight: Soil unit weight from previous test point to current (pcf)
u_0: Water pressure at test point (tsf)
σ_v: Total overburden pressure at test point (tsf)
σ_v': Effective overburden pressure based on in situ GWT (tsf)
N_{SPT}: Number of blows count in the field (blows/feet)
C_N: Overburden pressure factor
C_E: Energy ratio factor
C_B: Borehole diameter factor
C_R: Rod length factor
C_S: Sampling method factor
$N_{1(60)}$: Number of blows corrected for 60% energy
$\Delta N_{1(60),cs}$ Fines correction
$N_{1(60),cs}$: Number of blows corrected for 60% energy and fines
$CRR_{7.5}$: Cyclic Resistance Ratio for M_w 7.50
F.S.: Factor of safety against liquefaction

ATTACHMENT C
CAP AND RIVERBANK STABILITY

1.0 INTRODUCTION

The following attachment to the Geotechnical Design Technical Memorandum presents the geotechnical evaluation specifically relating to the stability of the proposed cap and riverbanks of the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site in Portland, Multnomah County, Oregon.

2.0 DESIGN METHODOLOGY

2.1 GENERAL

Stability checks have been undertaken following the recommendations of the following documents:

- Remedial Design Guidelines and Considerations (EPA, 2021);
- Guidance for In-Situ Subaqueous Capping of Contaminated Sediments (Palermo et al., 1998);
- American Society of Civil Engineers (ASCE), Seismic Design of Piers and Wharves, ASCE 61-14 (ASCE, 2014); and
- Oregon Department of Transportation (ODOT) Geotechnical Design Manual (ODOT, 2024).

The bearing capacity of near-surface sediment was evaluated using methods from Palermo et al. (1998). The analysis, based on Terzaghi and Peck's (1967) bearing failure equations, estimates the maximum allowable cap thickness considering the cap's unit weight, the sediment's undrained shear strength, and a safety factor of 3.0.

Consolidation settlement of the sediment underlying the proposed cap was evaluated using Settle3 by Rocscience, a commercially available software that models time-dependent, one-dimensional consolidation behavior. This analysis is based on classical Terzaghi consolidation theory, which accounts for the gradual dissipation of excess pore water pressure and the resulting volume change in fine-grained soils under load. The evaluation considered the unit weight of the cap materials, the compressibility characteristics of the underlying sediments, and the anticipated loading conditions. The methodology aligns with the guidance provided in EPA's Remedial Design Guidelines and Considerations (2021), Palermo et al. (1998) for in-situ capping of contaminated sediments, and the ODOT Geotechnical Design Manual (2024), ensuring that the predicted settlements are within acceptable limits for long-term cap performance and stability.

Dredge prism and riverbank stability was assessed using two-dimensional limit equilibrium methods implemented in Slide2 by Rocscience. The Spencer method was applied to evaluate circular failure surfaces, with critical slip surfaces analyzed to depths exceeding 5 feet (ft). The slope geometry and soil parameters used in the analysis were derived from site-specific investigations and aligned with the methodologies outlined in EPA's Remedial Design Guidelines and Considerations (2021) and Palermo et al. (1998).

The factor of safety (FoS), defined as the ratio of resisting to driving forces or moments, was used as the primary metric for evaluating slope stability. As FoS approaches 1.0, the potential for deformation increases significantly, with instability occurring at or below unity. Given the time-dependent behavior of fine-grained soils, particularly their sensitivity to loading rate and drainage conditions, analyses were conducted for both short-term (undrained) and long-term (drained) loading scenarios.

For static analysis, a minimum FoS of 1.3 for short-term construction conditions and 1.5 for long-term static conditions is recommended (ODOT, 2024). For pseudo-static (non-liquefied) analysis, a minimum safety factor of 1.1 is recommended (ODOT, 2024). The actual FoS may vary due to uncertainties in soil strength, subsurface geometry, failure surface locations and orientations, and groundwater levels.

2.2 DESIGN INFORMATION

2.2.1 Geometry

The existing riverbank (from top of slope to basin) varies in both height and slope angle. Table 2-1 summarizes the geometry assumed in stability analysis for each of the SIB Project Area-sub areas. The critical cross sections have been selected based on the height and inclination of the slope along the section.

Table 2-1
Riverbank Slope Geometry

SIB Design Areas	Approximate Height of Slope (max)[a]	Existing Gradient of Slope (max)[b]	90% RD Slope Gradient (max)
U.S. Coast Guard	48’	2.2H:1V	2.75H:1V
U.S. Navy	53’	2.4H:1V	2.5H:1V
The Marine Consortium, Inc.	50’	2.1H:1V	2.1H:1V (with pinning piles) 2.5H:1V (no reinforcement)
Port or Portland Dredge Base	45’	2.5H:1V	2.5H:1V
ATC Leasing Co.	49’	1.7H:1V	3H:1V
Berth 311	53’	3H:1V	3H:1V
Berths 306, 307 & 308	49’	1.7H:1V	2.5H:1V (new structures)
SCC Floating Docks	83’	1.7H:1V	2.75H:1V
East, West and Demo Pier	85’	1.6H:1V	2.75H:1V

Notes:
[a] Height of slope taken from approximate top of slope to basin depth
[b] Existing slopes are typically undulating, max gradient taken at steepest portion of slope.
max = maximum
RD = Remedial Design

2.2.2 Ground Model and Geotechnical Parameters

Subsurface ground models are presented in Section 2.4 of the main body of the text. Geotechnical design parameters used in bearing capacity and riverbank stability checks are presented in Table 2-2.

Table 2-2
Geotechnical Parameters for Bearing Capacity and Slope Stability

Engineering Soil Unit	Unit Weight γ (pcf)	Angle of Internal Friction φ' (degrees)	Cohesion c' (psf)	Undrained Shear Strength Su (psf)
Existing material				
Artificial Fill	110	35	0	-
Recent Basin Sediment – Mocks Bottom	105	33	0	-
Recent Basin Sediment – Swan Island	95	33	0	200 - 300
Alluvium – Coarse	115 @ EL ≥ 0 ft 120 @ EL < 0 ft	32 – 34 @ EL ≥ -10 ft 34 – 36 @ EL < -10 ft	0	-
Alluvium – Fine	105	26	150	800 @ EL ≥ -5 -20(EL+5) + 800 @ EL < -5 (max 1,450 psf)
Missoula Flood Deposits – Fine – Mocks Bottom	110	33	150	1,100 @ EL ≥ -8 -10(EL+8) + 1,100 @ EL < -8 (max 1,500 psf)
Missoula Flood Deposits – Fine – Swan Island	110	33	150	1,500 @ EL ≥ -8 -25(EL+8) + 1,500 @ EL < -8 (max 2,500 psf)
Missoula Flood Deposits - Coarse	120	34 @ EL ≥ -80 ft 36 @ EL < -80 ft	0	-
Proposed material				
Revetment - Rock Armor	150[a]	42	0	-
Granular fill	125	36	0	-

Notes:
[a] Unit Weight of Riprap protection as presented in U.S. Army Corps of Engineers Engineering Manual EM 1110-2-1601 Chapter 3 Hydraulic Design of Flood Control Channels.
EL = elevation
pcf = pounds per cubic foot
psf = pounds per square foot

2.2.3 Design Water Levels and Piezometric Line

Groundwater has been observed during the field investigations across the SIB Project Area. The groundwater elevations are generally in accordance with water level in the basin. For the riverbank stability checks, analysis has been undertaken using both Ordinary High Water (+20.1 ft North American Vertical Datum of 1988 [NAVD88]) and +5.1 ft NAVD88 for the full extent of the riverbank. The low water level (+5.1 ft NAVD88) represents an estimate of low water values reached during low tides during the summer, based on measured Willamette River water levels. It

is noted that in the majority of scenarios, a higher surface water level within the basin will provide a stabilizing force to the toe of the slope. Sensitivity analysis was undertaken using to determine the critical analyses and impact of varying design water levels.

2.2.4 Loading Conditions

2.2.4.1 Imposed Loading

Excavation activities will be required along the crest of the riverbank during construction. Typical live load surcharges from construction or traffic may be estimated using a surface pressure of 250 psf as per the ODOT Geotechnical Design Manual (ODOT, 2024).

2.2.4.2 Earthquake Loading

A horizontal seismic coefficient of 0.12 was used in pseudo-static stability analyses. The horizontal seismic coefficient was estimated as a half of the mapped peak ground acceleration of 0.234 g (2018 Conterminous U.S. National Seismic Hazard Map) for a 10 percent probability in 50 years (475-year) return period.

3.0 CAP GEOTECHNICAL DESIGN

3.1 GENERAL

In the majority of locations the proposed cap will be placed on the soft existing sediment and therefore consolidation of the underlying material is expected. The following section details the results of geotechnical analysis for proposed cap design across the site.

3.2 BEARING CAPACITY

Within the SIB Project Area, the existing mud line is primarily composed of soft fine grained basin sediments. The analysis undertaken evaluated the steady-state short-term stability of the cap and soft sediments during construction. The in situ material must have sufficient strength to prevent local shear failure. Ultimate bearing capacity was therefore calculated based on bearing failure equations (Terzaghi and Peck, 1967). A lower bound global undrained shear strength of 200 psf was applied for this analysis.

The ultimate bearing capacity was calculated as follows:

$$q_{ult} = \frac{2}{3} \times 200\ psf\ x\ 5.14 = 685\ psf$$

A factor of safety of 3 was used to calculate the allowable bearing capacity:

$$q_{all} = \frac{q_{ult}}{FoS} = \frac{685}{3} = 228\ psf$$

The initial cap lift thickness (H_{all}) that could be supported by the lower bound in situ sediments at an appropriated FoS was calculated using the allowable bearing capacity and the assumed buoyant weight of the cap material (assumed average of erosion protection layer and sand cap = 65 pcf).

$$H_{all} = \frac{q_{all}}{\gamma'} = \frac{228}{65} = 3.5\ ft$$

The estimated allowable cap lift thickness is 3.5 ft. This is based on dredge areas and where the cap is being placed on top of soft recent basin sediments. It is understood the maximum cap thickness will be 3 ft. The above 0.5 ft allowable overfill should be considered by the construction team. If more fill is required consideration should be made to staged placement.

To ensure the recommended cap lift thickness performs effectively and mitigates the risk of localized bearing failures during construction, an observational approach should be adopted. This approach would involve regular evaluations of contractor activities and progress surveys. Should these evaluations indicate signs of localized bearing capacity issues, adjustments to the construction methods may be required. These adjustments could include slowing the rate of material placement or applying the material in thinner layers to minimize stress on the underlying sediments.

3.3 CONSOLIDATION SETTLEMENT

As the proposed cap is a not a fine grained material (defined as material with less than 50% by weigh passing a #200 sieve), no consolidation of the cap is assumed (EPA, 1998). However, the load from the cap will result in consolidation of the underlying sediments. Consolidation analysis is therefore required to address two items noted in the Guidance for In-situ subaqueous capping of contaminate sediments (EPA,1998):

1) To inform and accurately interpret monitoring data, distinguishing between changes in cap elevation due to consolidation versus erosion.

2) To evaluate the potential for advective contaminant flux resulting from consolidation-induced pore pressure changes.

The compressible layers that exist at the site are the silt and clay layers associated with the recent basin sediments, alluvium and Missoula Flood Deposits. Consolidation properties for the underlying materials have been estimated through laboratory testing and empirical correlations presented in Attachment A.

To assess the consolidation of the cap, ground models were developed based on the in-water field investigation. Consolidation was then evaluated where the compressible materials are expected to be thickest. Following a review of the proposed dredging plan and ground models, it was determined that the post-dredge thickness of compressible basin sediment layers were thicker at the head of the basin. The following worst credible ground model used for settlement analysis is based on field investigation position BW-05 at the head of SIB where no dredging is proposed and recent sediment deposits are at the thickest. Results of the consolidation analysis are presented below.

Table 3-1
Consolidation Analysis Results

Layer	Material	Layer Depth (ft)	Cc	OCR	e_0	K (ft/year)	Consolidation Settlement per layer (inch)
1	Recent Basin Sediment - Silt	0 – 10	0.9	1.5	2	0.103	12
2	Recent Basin Sediment - Silt	10 – 13.25	0.9	1	1.7	1.03	6
3	Recent Basin Sediment - Sand	13.25 - 28	-	-	-	-	-
4	Missoula Flood Deposits - Silt	28 -37.5	0.9	1	1.7	10.03	1
5	Missoula Flood Deposits - Sand	37.5 – 46.5	-	-	-	-	-
6	Missoula Flood Deposits - Silt	47.5 - 54	0.4	1	1.1	10.3	>1

Settlement analysis indicates that, under a load equivalent to a 3.5-foot cap lift, approximately 20 inches of total consolidation settlement (including both primary and secondary settlement) is expected.

The consolidation settlement estimates presented above are based on the worst credible ground model and assume no dredging, representing a net load increase. It is acknowledged that the underlying materials across the project site will respond differently to imposed loading due to spatial variability in sediment type and geometry. To assess this, a sensitivity analysis was conducted considering variations in site geometry (dredge and cap vs. no dredge and cap) and sediment characteristics (predominantly cohesionless vs. predominantly cohesive). The resulting maximum differential settlement across these scenarios is estimated to range between 15 and 25 inches. Importantly, this variation is expected to manifest as a gradual slope in the top surface of the environmental cap, rather than abrupt deformation. Given that the cap is composed of granular materials, which do not undergo consolidation, its structural integrity and performance are not expected to be compromised by the underlying differential settlement.

It is important to note that subgrade consolidation can affect interpretation of bathymetric survey data used to confirm cap thickness. Settlement may be misread as cap “thinning” when surveys are interpreted. Integrating thickness probing with routine bathymetric surveys will help ensure that maintenance decisions are based on accurate interpretations of settlement and cap integrity, supporting long-term stability and effectiveness of the environmental cap.

4.0 RIVERBANK GEOTECHNICAL DESIGN

4.1 GENERAL

The following section details the results of stability analysis for unreinforced riverbank sections across the project site. Global stability analysis for new structures, specifically replacements for Berth 306 and 307, Marine Consortium Pinning Piles and United States Coast Guard Toe Wall are

discussed in Attachment D. Stability analysis for Pier A and Quay Wall are presented in Attachment E.

4.2 STATIC SLOPE STABILITY

The static stability of the riverbank has been assessed based on the current and proposed geometry of critical project-sub areas and sub-surface conditions. The results (FoS) of the stability analyses are presented below and in Figures C-1 to C-7.

Table 4-1
Static Slope Stability

Project-sub area	Geological Section	Existing Condition	Design Slope Angle	Proposed Design - Construction	Proposed Design - Long Term
USCG	A-A'	1.3	2.75H : 1V	1.5	1.7
Navy	B-B'	1.2	2.5H : 1V	1.5	1.6
MC	D-D'	1.2	2.5H : 1V	1.4	1.5
Dredge Base	E-E'	1.4	2.5H : 1V	1.5	1.6
ATC Leasing	F-F'	2.4	3H : 1V	1.5	1.7
Berth 311	G-G'	1.0	3H : 1V	1.6	1.7
Berths 306, 307 & 308	J-J'	1.4	2.5H : 1V	1.7	1.6
Vigor Shipyard	Q-Q'	1.4	2.5H : 1V	1.6	1.7

Notes:
% = percent
SCC = Shipyard Commerce Center
USCG = U.S. Coast Guard

As seen above, the majority of the slopes are marginally stable in the current static condition. This slope instability may manifest as a rotational landslide, extending from the crest of the slope to the low water level within the basin. The remedial design slopes have therefore been configured to target a FoS of 1.5 for slopes.

4.3 PSEUDO-STATIC SLOPE STABILITY

The pseudo-static stability of the riverbank has been assessed based on the current and proposed geometry of each project-sub area and sub-surface conditions. The results (FoS) of the stability analyses are presented below and in Figures C-1 to C-7. The seismic displacement calculation was performed per procedure suggested by Macedo et al. (2023) for the Navy and MC pier slopes (B-B' and D-D') with FoS less than 1.1. The corresponding estimated seismic slope displacements are 0.37 ft and 0.47 ft for subsurface sections B-B' and D-D', respectively.

Table 4-2
Pseudo-Static Slope Stability

Project-sub area	Geological Section	Existing Condition	Proposed Design - Long Term
USCG	A-A'	1.0	1.1
Navy	B-B'	0.9	1.0
MC	D-D'	1.0	1.0
Dredge Base	E-E'	1.0	1.1
ATC Leasing	F-F'	1.3	1.1

Project-sub area	Geological Section	Existing Condition	Proposed Design - Long Term
Berth 311	G-G'	0.9	1.1
Berths 306, 307 & 308	J-J'	0.8	1.1
Vigor Shipyard	Q-Q'	0.6	1.1

4.4 PERFORMANCE OF RIVERBANK SLOPES

Under current conditions, many riverbank slopes within the project area exhibit marginal static stability, with calculated static and pseudo-static FoS ranging from approximately 0.9 to 1.2 and 0.6 to 1.0 respectively. To improve long-term stability, the remedial design includes regrading and flattening the slopes to achieve a minimum static FoS of 1.5 and pseudo-static FoS of 1.1.

Each design area has been analyzed using existing slope geometry, subsurface conditions, and groundwater data. In general, the riverbanks will be regraded to a maximum slope of 2.5 horizontal to 1 vertical (2.5H:1V) without requiring additional reinforcement. Temporary excavations should also not exceed this slope gradient. To further enhance slope resilience and mitigate surface erosion or shallow sloughing, a riprap revetment layer is included in the remedial design.

While the proposed improvements in static and pseudo-static stability significantly enhance slope safety, seismic-induced ground failures, particularly liquefaction and lateral spreading in vulnerable soil layers, remain a concern. These phenomena could result in substantial ground deformation along the riverbank, even after remedial measures are applied. A sensitivity analysis has been conducted to explore whether additional steps, such as further flattening slopes or increasing cap thickness, could enhance seismic performance. However, these measures were deemed to not improve the post-earthquake condition to a satisfactory level. Consequently, while the slope geometry and stability will see notable improvements, additional strategies may be necessary to mitigate liquefaction-related risks during seismic events. Deep soil mixing and stone columns could mitigate these hazards but are not considered applicable on a cost-benefit consideration. Instead, a focus on post-seismic maintenance and repair measures is recommended to manage damage following liquefaction-triggering seismic events.

5.0 REFERENCES

American Society of Civil Engineers (ASCE), 2014. Seismic Design of Piers and Wharves, ASCE/COPRI 61-14. American Society of Civil Engineers, Reston, Virginia.

Macedo, J., Bray, J.D. and Liu, C., 2023. Seismic slope displacement procedure for interface and intraslab subduction zone earthquakes. *Journal of Geotechnical and Geoenvironmental Engineering*, *149*(11), p.04023104

Oregon Department of Transportation (ODOT), Geotechnical Design Manual (GDM), 2024. Oregon Department of Transportation, Salem, Oregon.

Palermo, M., Maynord, S., Miller, J., and Reible, D., 1998. *Guidance for In-situ Subaqueous Capping of Contaminated Sediments,* EPA 905-896-004. Great Lakes National Program Office, Chicago, IL. September.

Terzaghi, K., and Peck, R.B., 1967. Soil Mechanics in Engineering Practice, 2nd Edition. John Wiley & Sons, 729 pages

U.S. Army Corps of Engineers, 2021. Engineering Manual EM 1110-2-1601, Chapter 3: Hydraulic Design of Flood Control Channels. Washington, D.C. January 15.

U.S. Environmental Protection Agency (EPA), 2021. Remedial Design Guidelines and Considerations, Portland Harbor Superfund Site. Portland, Oregon. April 23.

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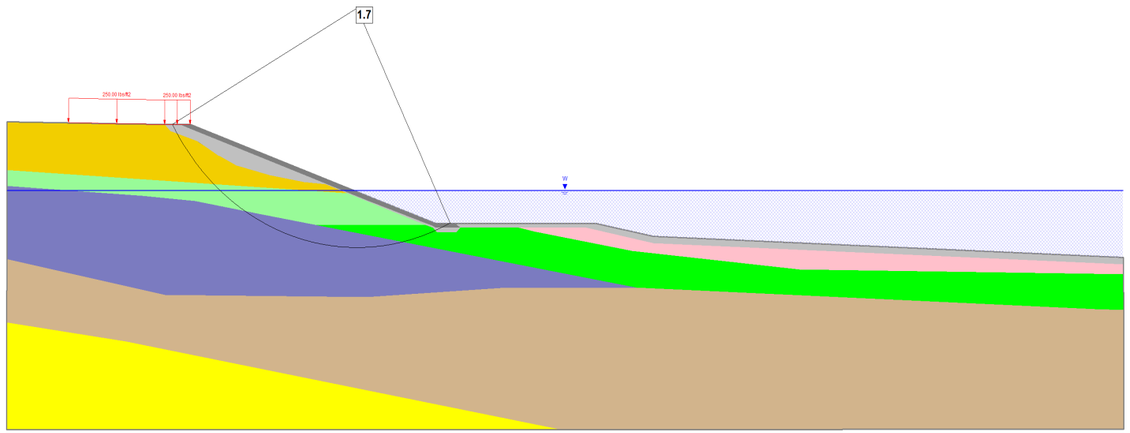
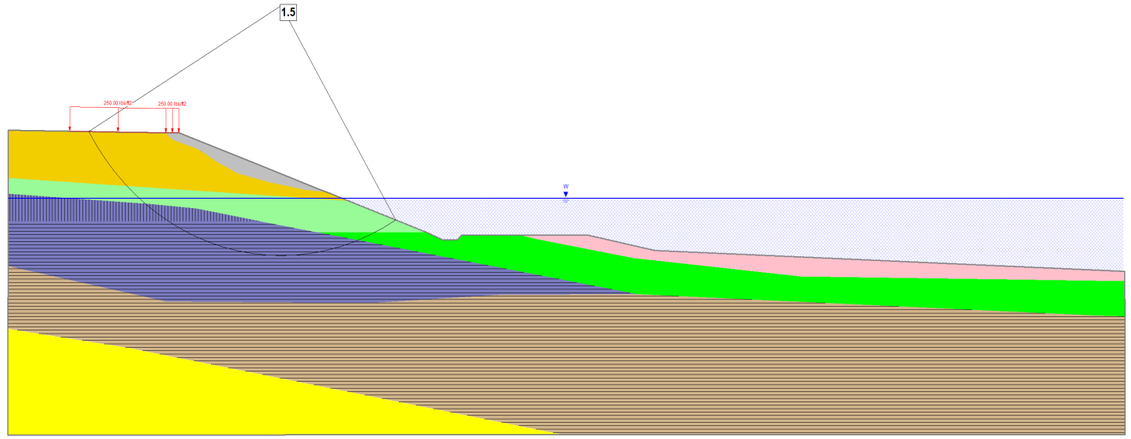
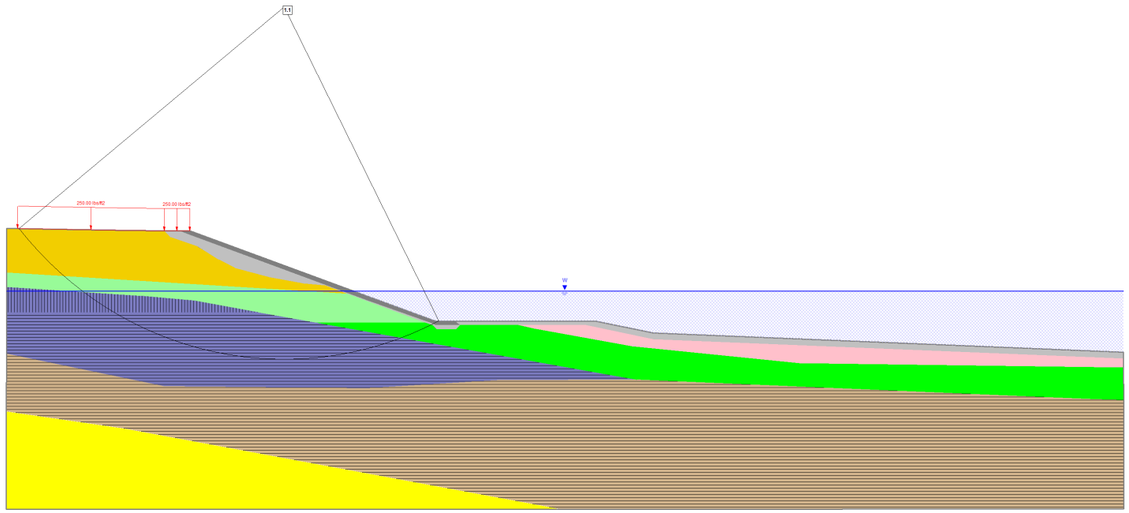
FIGURES



Profile A-A', Static Analysis – Long Term



Profile A-A', Static Analysis – Construction



Profile A-A', Pseudo-Static Analysis

Engineering Soil Unit	Color	Unit Weight (pcf)	Undrained Shear Strength, Su (psf)	Cohesion (psf)	Angle of Internal Friction, φ' (Degrees)
Armor Stone		150	-	0	42
Bedding Stone/Backfill		125	-	0	36
Artificial Fill		118	-	0	35
Recent Basin Sediment – Fine-Grained (Drained)		95	-	0	33
Alluvium – Coarse-Grained (above -10 feet)		115	-	0	33
Alluvium – Coarse-Grained (below -10 feet)		115	-	0	35
Alluvium – Fine-Grained (Drained)		105		150	26
Alluvium – Fine-Grained (above -5 feet)		105	800	-	-
Alluvium – Fine-Grained (below -5 feet)[1]		105	800	-	-
Missoula Flood Deposits - Fine-Grained		110	-	150	32
Missoula Flood Deposits - Fine-Grained (below -8 feet)[2]		110	1100	-	-
Missoula Flood Deposits - Coarse		120	-	0	34



Global Minimum Factor of Safety



Surcharge Load



Horizontal Seismic Coefficient

Notes:
(1) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1450 psf)
(2) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1500 psf)

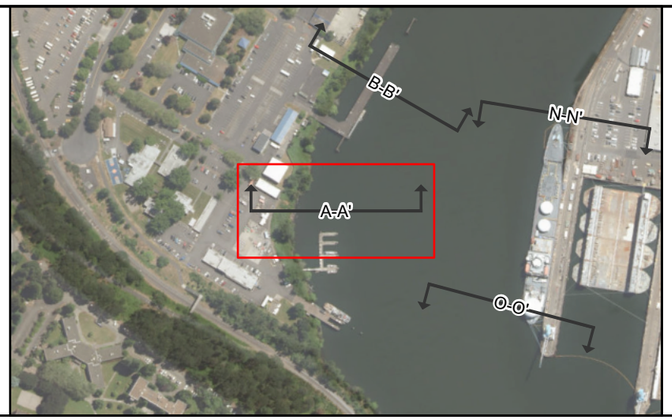


Figure C-1

Slope Stability Analysis
United States Coast Guard
Profile A-A'

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Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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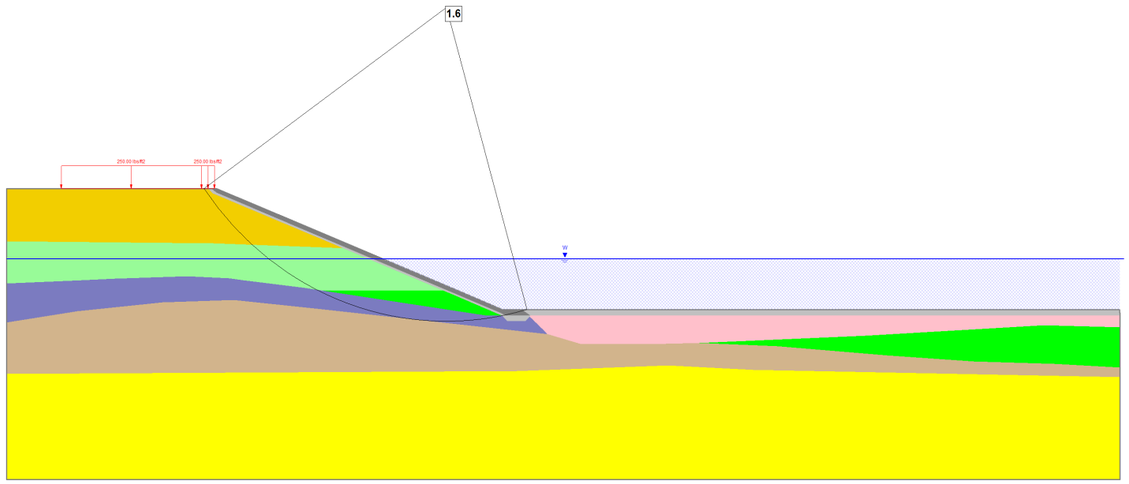
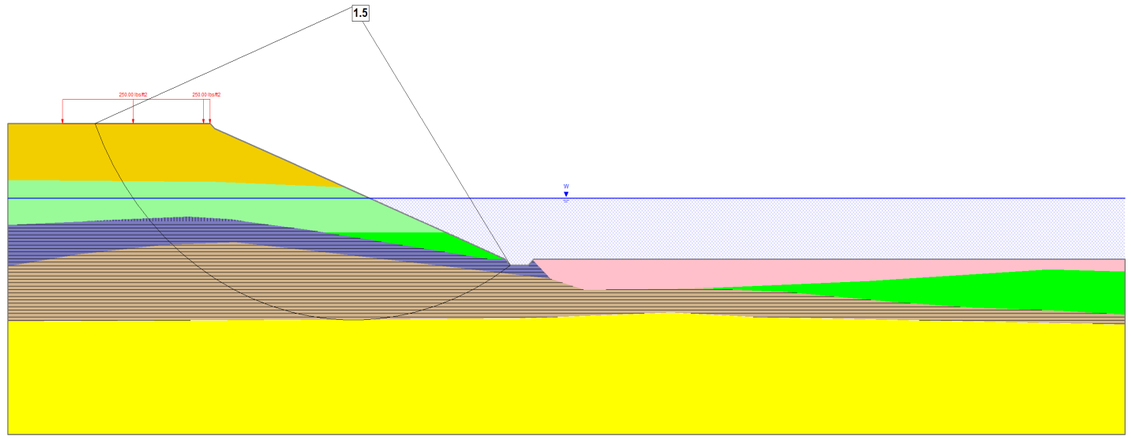
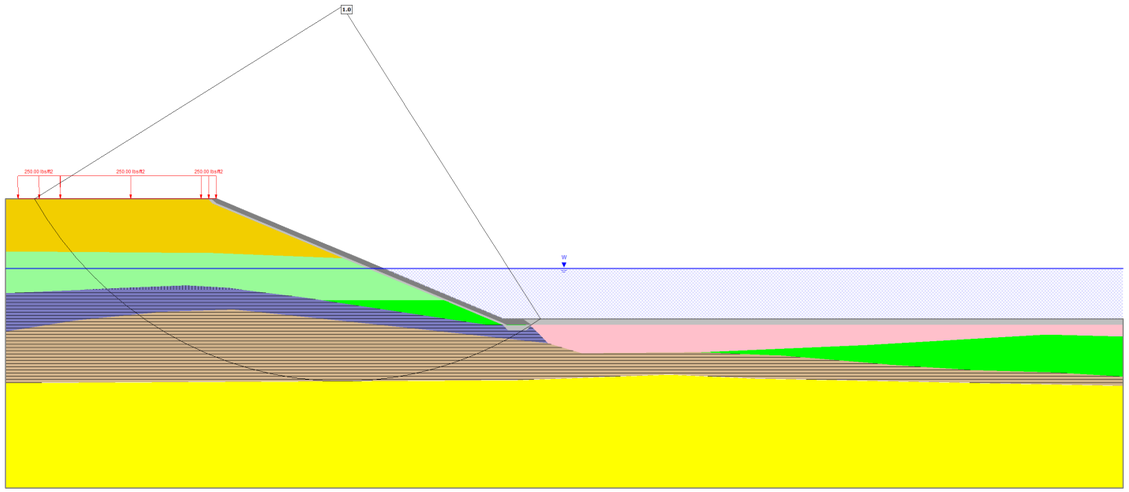


Profile B-B', Static Analysis – Long Term



Profile B-B', Static Analysis – Construction



Profile B-B', Pseudo-Static Analysis

Engineering Soil Unit	Color	Unit Weight (pcf)	Undrained Shear Strength, Su (psf)	Cohesion (psf)	Angle of Internal Friction, φ' (Degrees)
Armor Stone		150	-	0	42
Bedding Stone/Backfill		125	-	0	36
Artificial Fill		118	-	0	35
Recent Basin Sediment – Fine-Grained (Drained)		95	-	0	33
Alluvium – Coarse-Grained (above -10 feet)		115	-	0	33
Alluvium – Coarse-Grained (below -10 feet)		115	-	0	35
Alluvium – Fine-Grained (Drained)		105		150	26
Alluvium – Fine-Grained (below -5 feet)[1]		105	800	-	-
Missoula Flood Deposits - Fine-Grained		110	-	150	32
Missoula Flood Deposits - Fine-Grained (below -8 feet)[2]		110	1100	-	-
Missoula Flood Deposits - Coarse		120	-	0	34



Global Minimum Factor of Safety



Surcharge Load



Horizontal Seismic Coefficient

Notes:
(1) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1450 psf)
(2) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1500 psf)

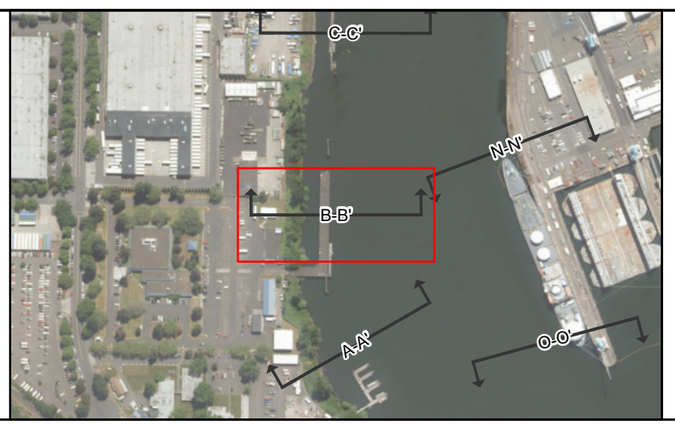


Figure C-2

Slope Stability Analysis
United States Coast Guard
Profile B-B'

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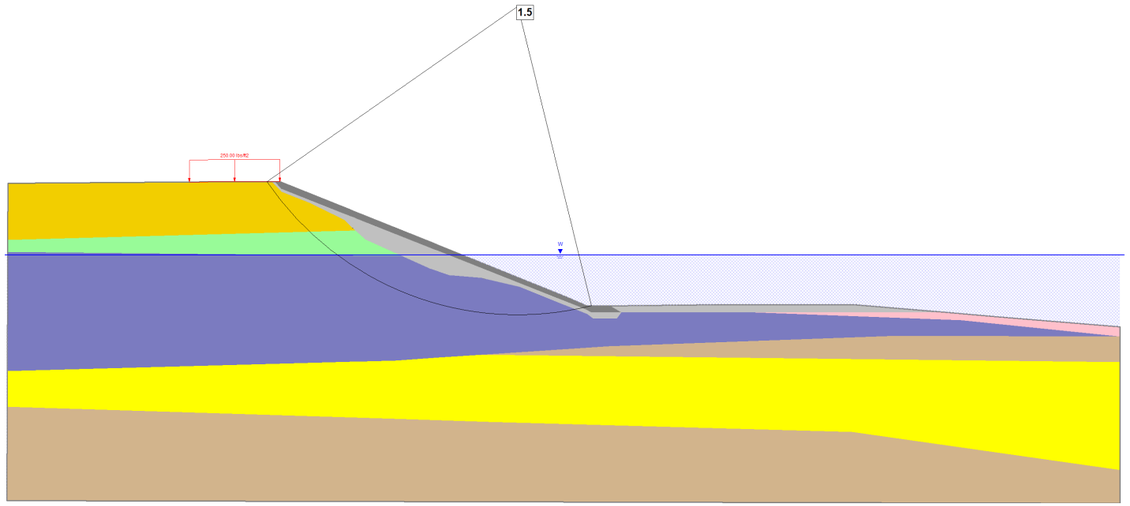
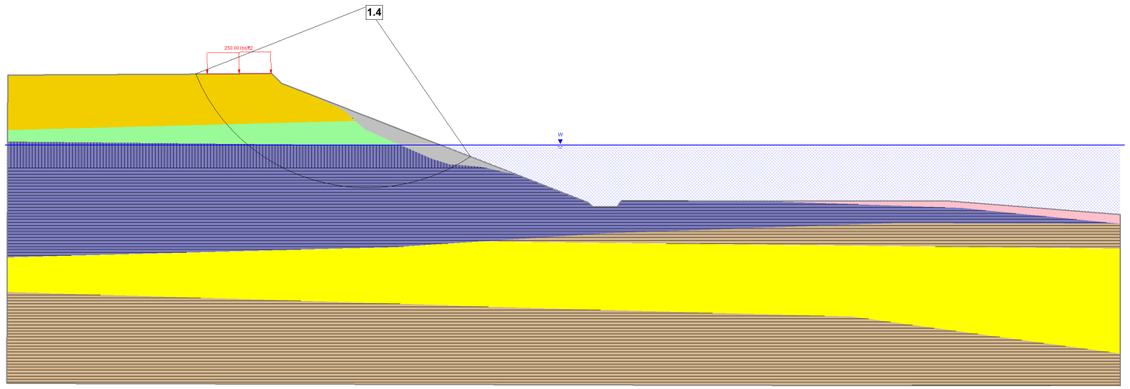
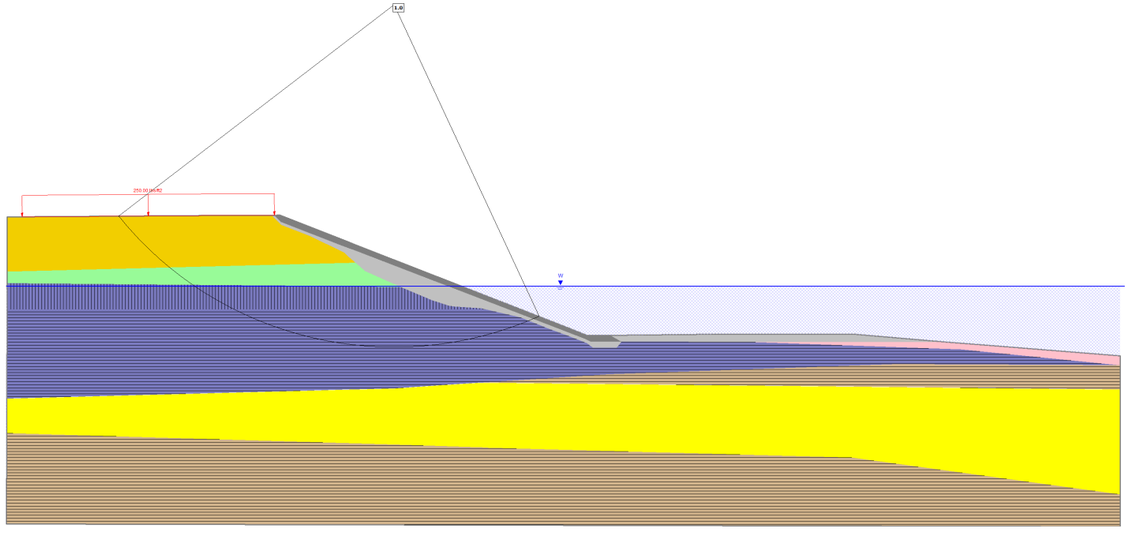


Profile D-D', Static Analysis – Long Term



Profile D-D', Static Analysis – Construction



Profile D-D', Pseudo-Static Analysis

Engineering Soil Unit	Color	Unit Weight (pcf)	Undrained Shear Strength, Su (psf)	Cohesion (psf)	Angle of Internal Friction, φ' (Degrees)
Armor Stone		150	-	0	42
Bedding Stone/Backfill		125	-	0	36
Artificial Fill		118	-	0	35
Recent Basin Sediment – Fine-Grained (Drained)		95	-	0	33
Alluvium – Coarse-Grained (above -10 feet)		115	-	0	33
Alluvium – Fine-Grained (Drained)		105	-	150	26
Alluvium – Fine-Grained (above -5 feet)		105	800		
Alluvium – Fine-Grained (below -5 feet)[1]		105	800	-	-
Missoula Flood Deposits - Fine-Grained		110	-	150	32
Missoula Flood Deposits - Fine-Grained (below -8 feet)[2]		110	1100	-	-
Missoula Flood Deposits - Coarse		120	-	0	34



Global Minimum Factor of Safety



Surcharge Load



Horizontal Seismic Coefficient

Notes:
(1) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1450 psf)
(2) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1500 psf)

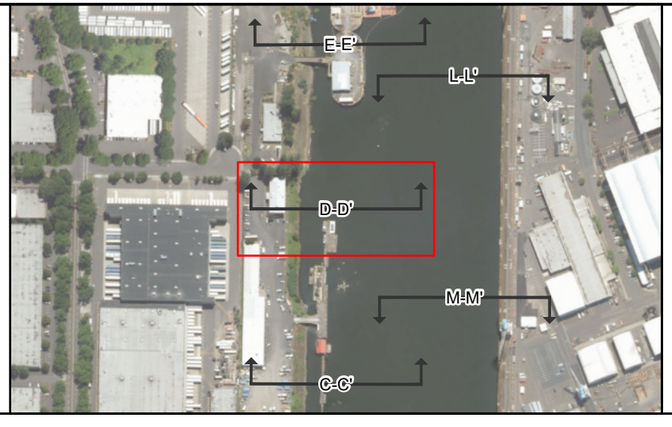


Figure C-3

Slope Stability Analysis
Marine Consortium
Profile D-D'

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Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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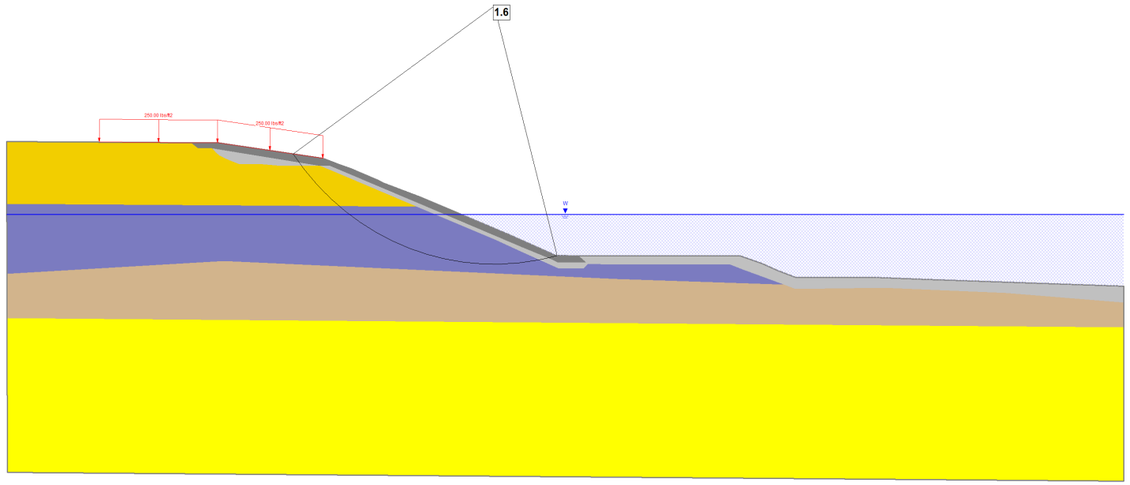
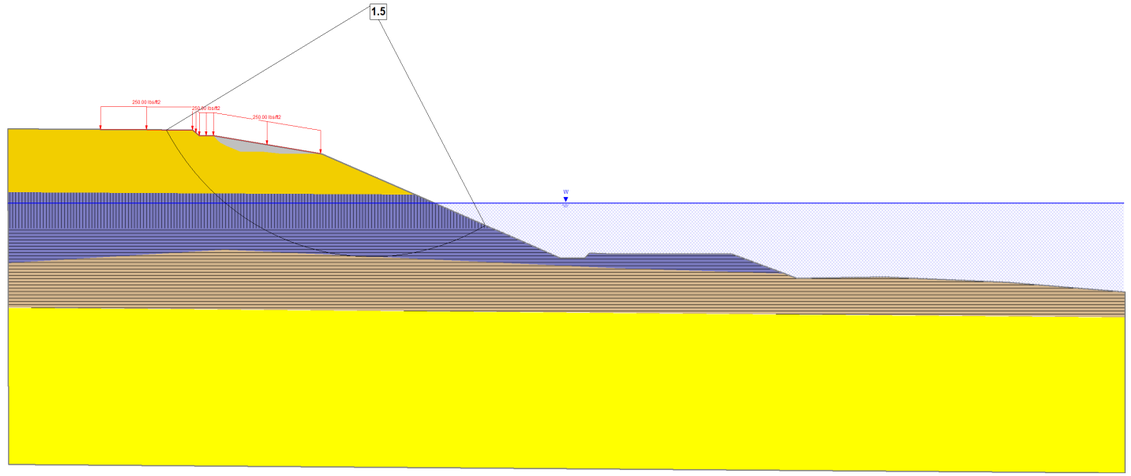
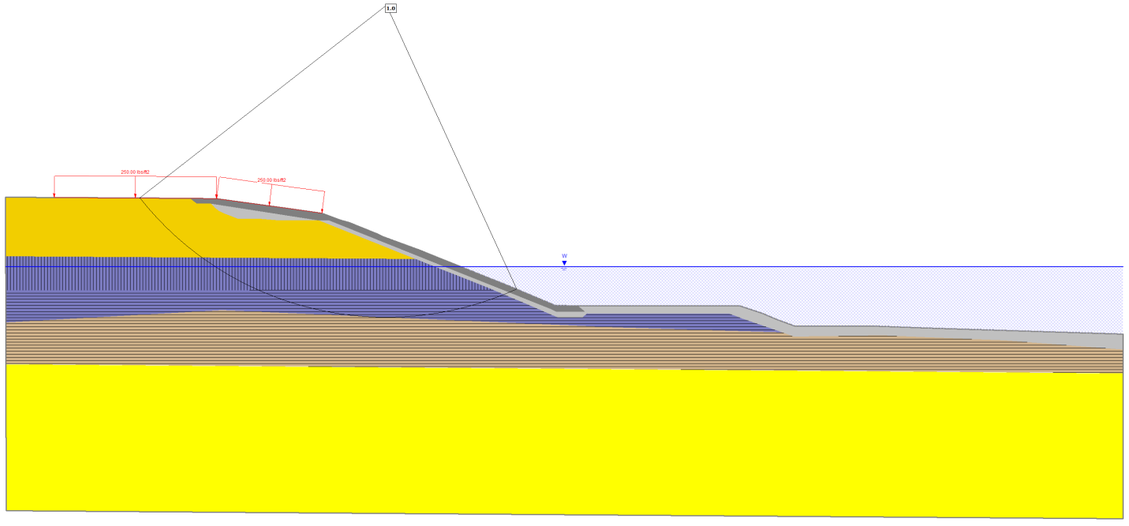
BRIDGEWATER GROUP



Profile E-E', Static Analysis – Long Term



Profile E-E', Static Analysis – Construction



Profile E-E', Pseudo-Static Analysis

Engineering Soil Unit	Color	Unit Weight (pcf)	Undrained Shear Strength, Su (psf)	Cohesion (psf)	Angle of Internal Friction, φ' (Degrees)
Armor Stone		150	-	0	42
Bedding Stone/Backfill		125	-	0	36
Artificial Fill		118	-	0	35
Alluvium – Fine-Grained (Drained)		105	-	150	26
Alluvium – Fine-Grained (above -5 feet)		105	800	-	-
Alluvium – Fine-Grained (below -5 feet)[1]		105	800	-	-
Missoula Flood Deposits - Fine-Grained		110		150	32
Missoula Flood Deposits - Fine-Grained (below -8 feet)[2]		110	1100	-	-
Missoula Flood Deposits - Coarse		120	-	0	34



Global Minimum Factor of Safety



Surcharge Load



Horizontal Seismic Coefficient

Notes:
(1) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1450 psf)
(2) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1500 psf)

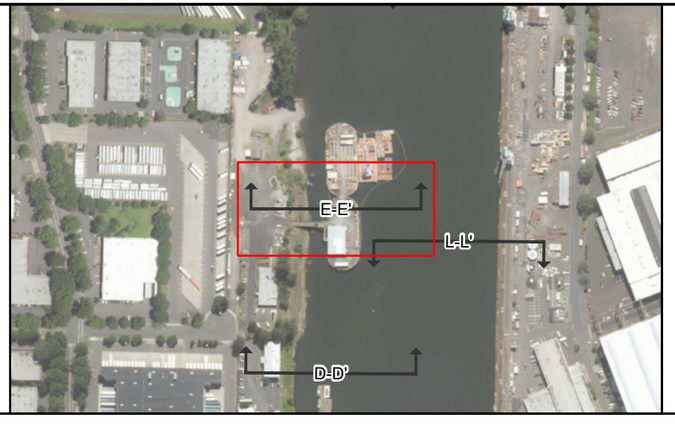


Figure C-4

Slope Stability Analysis
Dredge Base
Profile E-E'

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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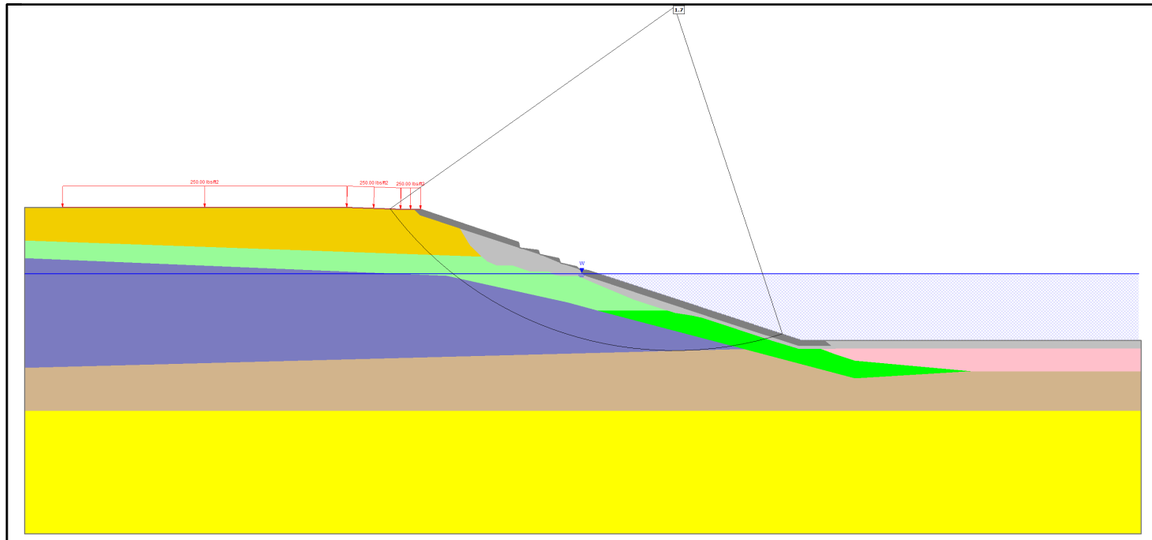
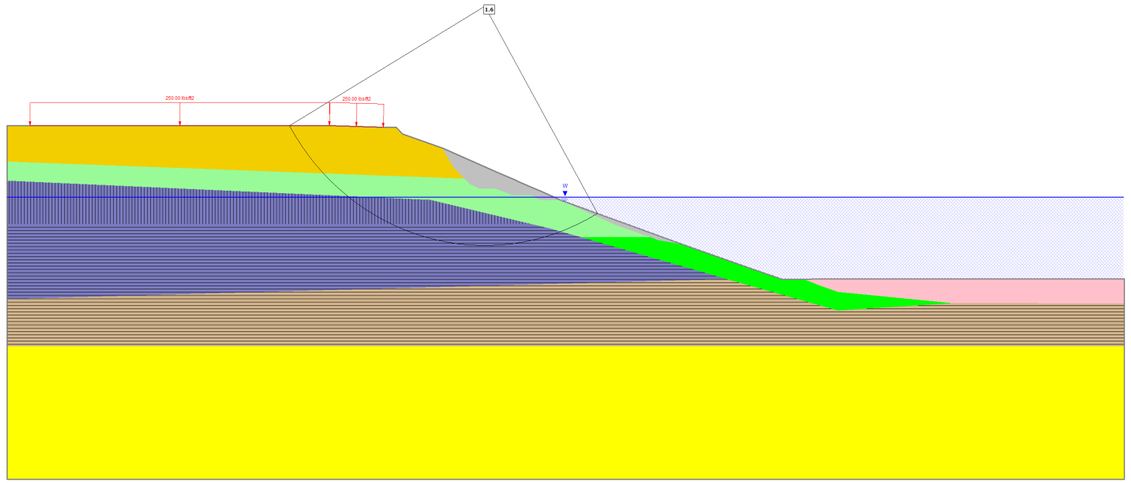
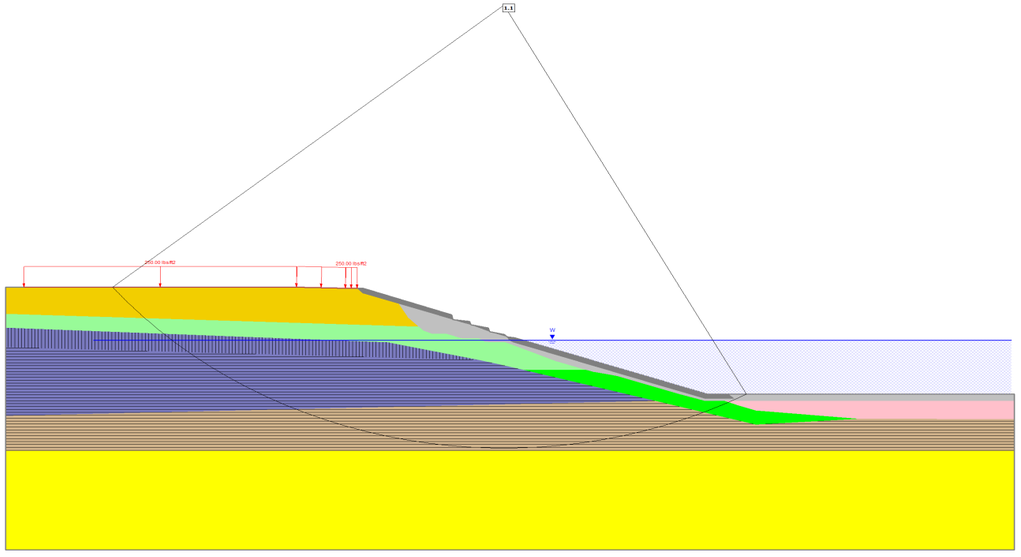


Profile G-G', Static Analysis – Long Term



Profile G-G', Static Analysis – Construction



Profile G-G', Pseudo-Static Analysis

Engineering Soil Unit	Color	Unit Weight (pcf)	Undrained Shear Strength, Su (psf)	Cohesion (psf)	Angle of Internal Friction, φ' (Degrees)
Armor Stone		150	-	0	42
Bedding Stone/Backfill		125	-	0	36
Artificial Fill		118	-	0	35
Recent Basin Sediment – Fine-Grained (Drained)		95	-	0	33
Alluvium – Coarse-Grained (above -10 feet)		115	-	0	33
Alluvium – Coarse-Grained (below -10 feet)		115	-	0	35
Alluvium – Fine-Grained (Drained)		105		150	26
Alluvium – Fine-Grained (above -5 feet)		105	800	-	-
Alluvium – Fine-Grained (below -5 feet)[1]		105	800	-	-
Missoula Flood Deposits - Fine-Grained		110	-	150	32
Missoula Flood Deposits - Fine-Grained (below -8 feet)[2]		110	1100	-	-
Missoula Flood Deposits - Coarse		120	-	0	34



Global Minimum Factor of Safety



Surcharge Load



Horizontal Seismic Coefficient

Notes:
(1) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1450 psf)
(2) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1500 psf)

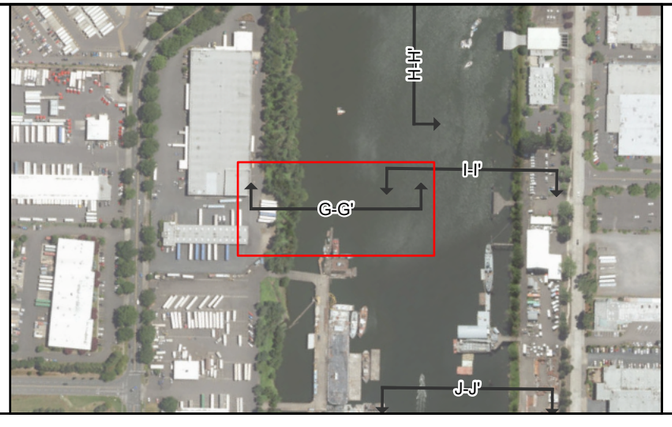


Figure C-5

Slope Stability Analysis
Swan Island Dock Company
Profile G-G'

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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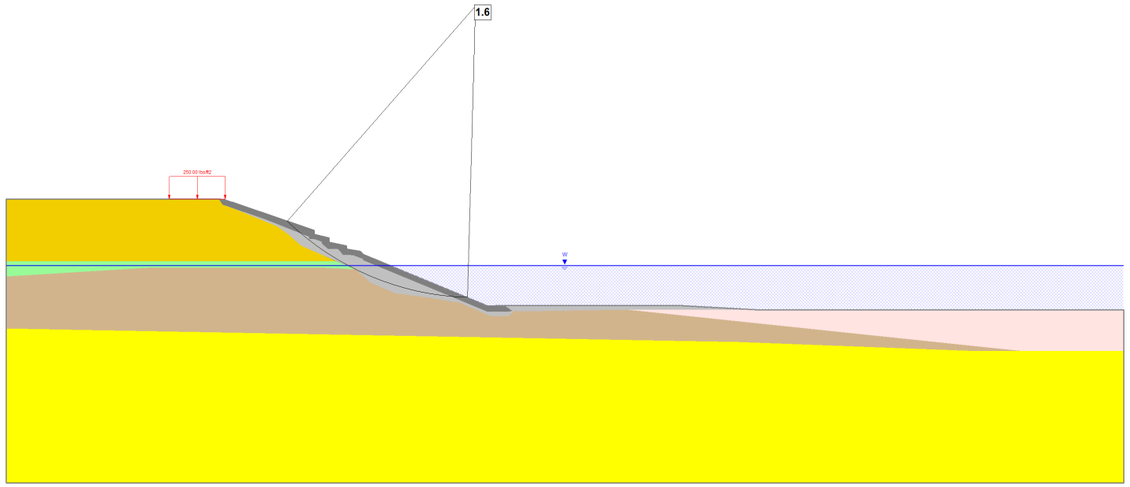
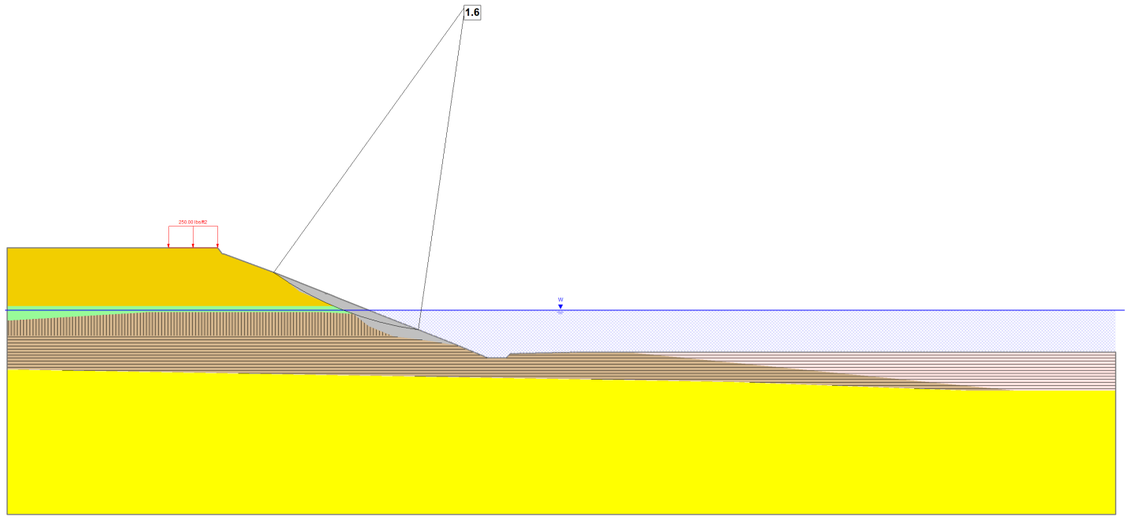
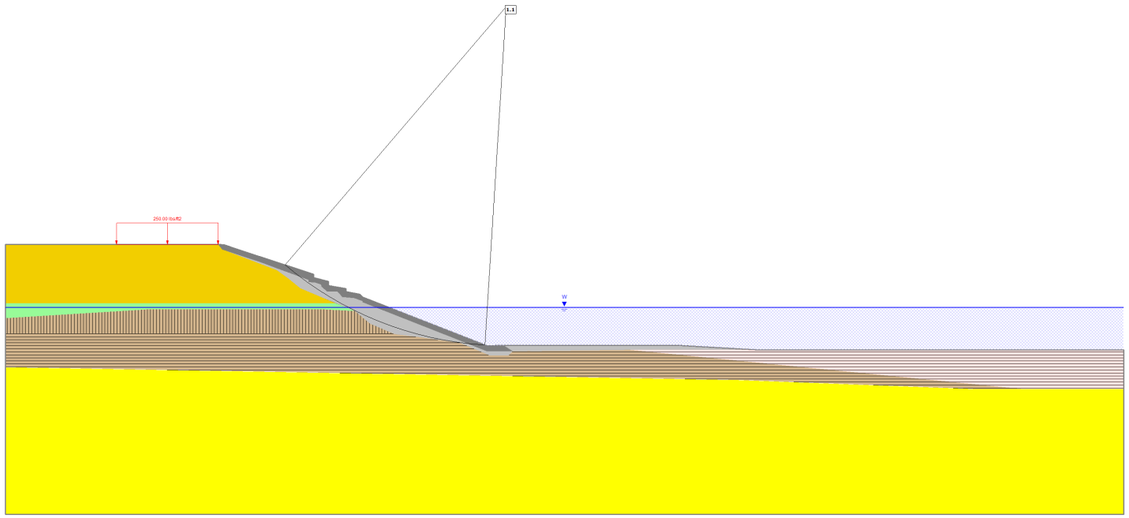


Profile J-J', Static Analysis – Long Term



Profile J-J', Static Analysis – Construction



Profile J-J', Pseudo-Static Analysis

Engineering Soil Unit	Color	Unit Weight (pcf)	Undrained Shear Strength, Su (psf)	Cohesion (psf)	Angle of Internal Friction, φ' (Degrees)
Armor Stone		150	-	0	42
Bedding Stone/Backfill		125	-	0	36
Artificial Fill		118	-	0	35
Recent Basin Sediment – Fine-Grained (Drained)		95	-	0	33
Recent Basin Sediment – Fine-Grained		95	300	-	-
Alluvium – Coarse-Grained (above -10 feet)		115	-	0	33
Missoula Flood Deposits - Fine-Grained		110		150	32
Missoula Flood Deposits - Fine-Grained (above -8 feet)		110	1500	-	-
Missoula Flood Deposits - Fine-Grained (below -8 feet)[1]		110	1100	-	-
Missoula Flood Deposits - Coarse		120	-	0	34



Global Minimum Factor of Safety



Surcharge Load



Horizontal Seismic Coefficient

Notes:
(1) Undrained shear strength increasing with depth (+25 psf/ft, maximum 2500 psf)

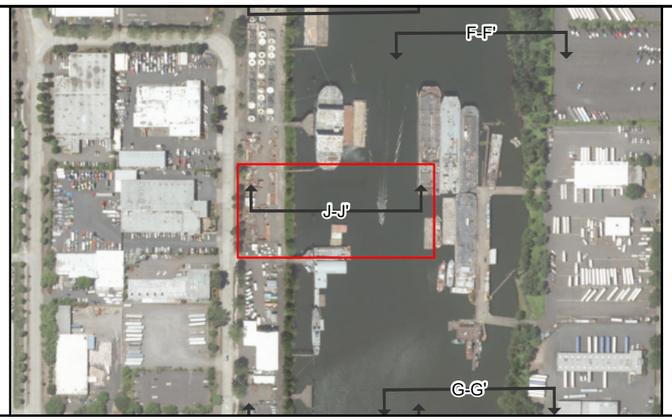


Figure C-6

Slope Stability Analysis
Berth 306 & 307
Profile J-J'

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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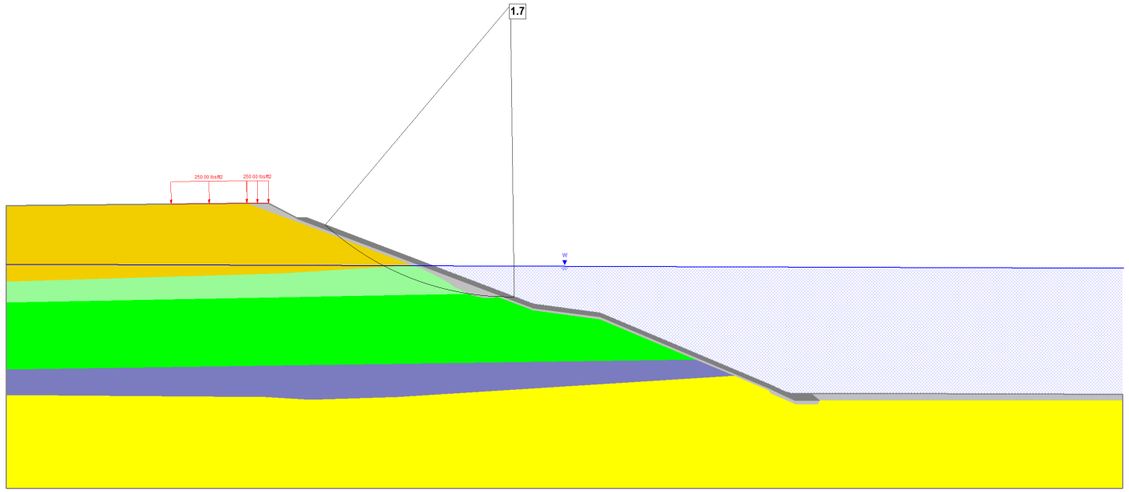
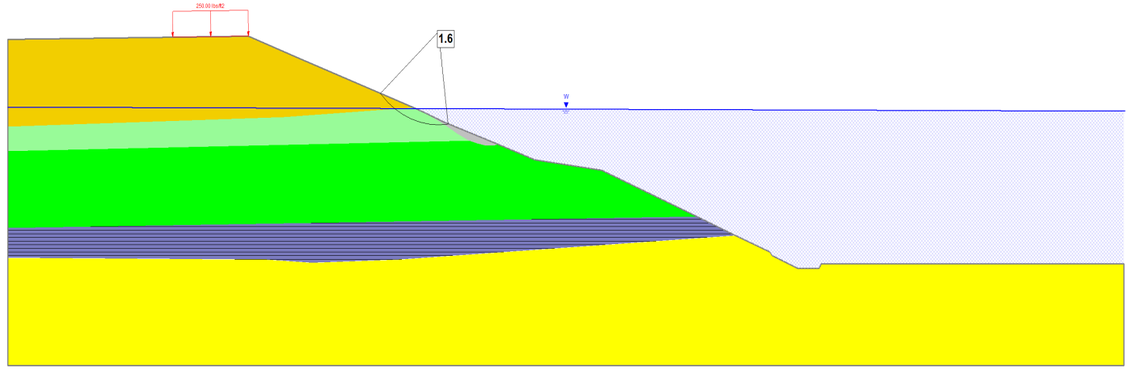
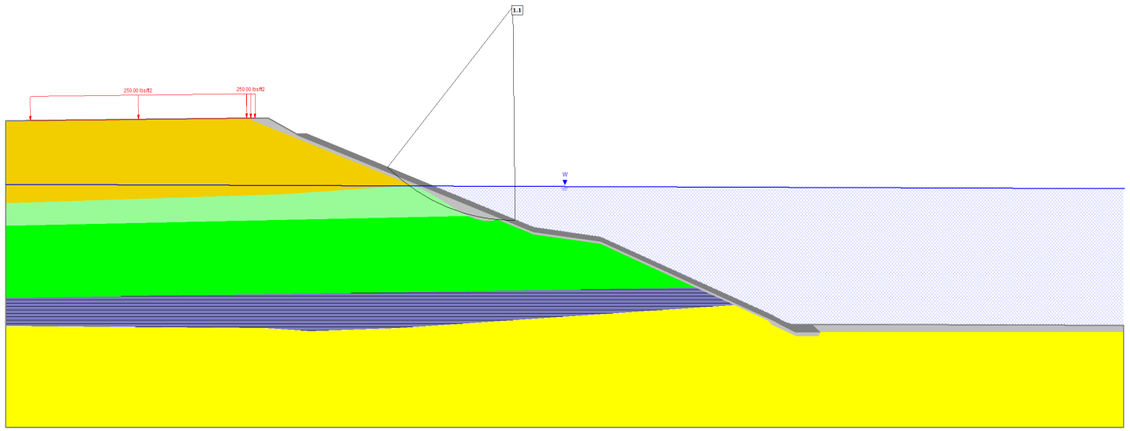


Profile Q-Q', Static Analysis – Long Term



Profile Q-Q', Static Analysis – Construction



Profile Q-Q', Pseudo-Static Analysis

Engineering Soil Unit	Color	Unit Weight (pcf)	Undrained Shear Strength, Su (psf)	Cohesion (psf)	Angle of Internal Friction, φ' (Degrees)
Armor Stone		150	-	0	42
Bedding Stone/Backfill		125	-	0	36
Artificial Fill		118	-	0	35
Alluvium – Coarse-Grained (above -10 feet)		115	-	0	33
Alluvium – Coarse-Grained (below -10 feet)		115	-	0	35
Alluvium – Fine-Grained (Drained)		105	-	150	26
Alluvium – Fine-Grained (below -5 feet)[1]		105	800		
Missoula Flood Deposits - Coarse		120	-	0	34



Global Minimum Factor of Safety



Surcharge Load



Horizontal Seismic Coefficient

Notes:
(1) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1450 psf)



Figure C-7

Slope Stability Analysis
Floating Dock
Profile Q-Q'

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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ATTACHMENT D
NEW MARINE STRUCTURES

1.0 INTRODUCTION

The following attachment to the Geotechnical Design Technical Memorandum (GDTM) presents the geotechnical stability evaluation specifically relating to the new marine structures required as part of the Remedial Design (RD).

It is important to note that the design of new structures is at a 30% design maturity, and as such, all recommendations provided within this document reflect that level of development.

2.0 U.S. COAST GUARD RETAINING WALL

2.1 GENERAL

A cantilever sheet pile wall will be constructed as part of the RD at the U.S. Coast Guard (USCG). The sheet pile will be constructed between the USCG pier and the floating dock structures. The sheet pile wall is required to enable dredging to specified navigation depths around the USCG pier and floating dock while maintaining stability of the sloping ground above.

2.2 DESIGN INFORMATIOON

2.2.1 Geometry

The geometry of the proposed sheet pile wall is presented below. Further details on the location and geometry of the sheet pile wall section is described in Structural Design Technical Memorandum (Volume I, Appendix J). The below geometry represents the critical section used for the geotechnical analysis.

Table 2-1
USCG Toe Wall Geometry

Design Element	Value
Sheet pile section	NZ38
Total Length	50 ft
Retained Height – construction during dredging	17 ft
Retained Height – final condition with cap	12 ft
Min embedment depth – construction during dredging	33 ft
Min embedment depth – final condition with cap	38 ft
Slope angle above wall	2.75H : 1V
Top of wall elevation	5.6 ft NAVD88

Notes:
ft = feet/foot
Min = minimum
NAVD88 = North American Vertical Datum of 1988

2.2.2 Ground Model and Geotechnical Parameters

The stratigraphy is based on Subsurface Profile A-A (Figure 2-1b, of the GDTM). The design ground model is summarized below, geotechnical parameters have been applied based on Table 3-1 in the GDTM. The water level considered in the model is at the elevation +5.1 ft NAVD88, which represents an estimate of low water values reached during low tides during the summer, based on measured Willamette River water levels.

Table 2-2
USCG Toe Wall – Design Ground Model

Stratigraphy	Layer Top Depth (ft)	Layer Bottom Depth (ft)	Total Unit Weight (pcf)	Friction angle (°)	Cohesion (psf)	Undrained Shear Strength (psf)
Artificial Fill	0	3.1	110	34	-	-
Alluvium – Sand	3.1	27.5	115	33	-	-
Alluvium – Clay	27.5	45.2	105	24	75	1,300[a]
Missoula Flood Deposits - Silts	45.2	-	110	32	150	1,500

Notes:
a) Averaged undrained shear strength over layer.
° = degrees
pcf = pounds per cubic foot
psf = pounds per square foot

2.2.3 Seismic Parameters

The sheet pile wall is being constructed to satisfy the Remedial Action (RA), specifically enable the capping design requirements of the project. Therefore, in accordance with Remedial Design Guidelines and Considerations, Portland Harbor Superfund Site (EPA, 2021), the design of the sheet pile wall considers the seismic shaking demands of the Contingency Level Earthquake (CLE) only.

The CLE is defined as a seismic event associated with a 475-year return period. This corresponds to a peak ground acceleration (PGA) of 0.23g, according to the U.S. Geological Survey (USGS) hazard tool. In accordance with guidelines from Oregon Department of Transportation (ODOT, 2024) and American Association of State Highway and Transportation Officials (AASHTO, 2020), this was applied in a pseudo-static analysis using a horizontal acceleration factor kh = 50% PGA (0.12).

2.2.4 Loading Conditions

Typical live load surcharges have been estimated using a surface pressure of 250 psf as per the ODOT Geotechnical Design Manual (ODOT, 2024). This has been applied to the top of the slope during construction and operation.

2.3 EARTH PRESSURES

Static earth pressures acting on the sheet pile wall have been estimated using the Coulomb wedge method on the active side and Caquot and Kerisel (1948) method on the passive side. Both methods calculate the active and passive pressures based on the wall-soil friction angle ($\delta = 0.67\varphi'$), the internal friction angle of the soil (φ') and the sloping backfill.

Mononobe-Okabe (M-O) method (Mononobe and Matsuo 1929; Okabe 1924) has been used to estimate the seismic earth pressures acting on the sheet pile wall. The M-O method is one of the simplest methods to estimate seismic earth pressure. The method can be implemented in limit equilibrium modelling by applying a horizontal acceleration (k_h) to the model. The resulting active seismic earth pressure was distributed above the excavation level as shown in AASHTO Figure 11.8.6.2-1, Section 11.8.6. In the determination of seismic passive pressures, a reduction factor of 0.67 has been applied to limit displacement required to mobilize the passive earth pressure.

2.4 LIMIT STATES

The sheet pile wall has been designed in accordance with AASHTO (2020). The geotechnical design of the cantilever sheet pile wall has been undertaken following the limit states defined by Load and Resistance Factor Design (LRFD) design methodology stated below.

- Strength Limit State (AASHTO Article 11.8.4):
    - Global stability of the slope / soil mass.
    - Soil passive failure due to insufficient embedment of the sheet pile wall.
- Extreme Limit State (AASHTO Articles 11.8.6):
    - Global stability of the slope / soil mass.
    - Soil passive failure due to insufficient embedment of the sheet pile wall.

Global stability of the soil mass has been evaluated with 2D limit-equilibrium analysis (Spencer Method) using Slide2 (Version 9.03) by Rocscience. Global stability is assessed using the factor of safety (FoS), which is the ratio of resisting forces or moments to driving forces or moments. The Global stability relating to the embedment depth has been evaluated with 2D limit-equilibrium analysis using DeepEX (Version 24.03) by Deep Excavation LLC.

Structural design of the Sheet pile wall is addressed in Appendix J of the RD.

2.5 RESULTS

2.5.1 Stability

The FoS values obtained from stability analyses carried out in Slide2 and DeepEX are shown in **Table 2-3**.

Table 2-3
Factor of Safety (FoS) Values for Global and Embedment Depth of Sheet Pile Wall

Stage	Limit State	Design check	Recommended FoS	Design FoS
Construction	Strength Limit State	Global Slope Stability	1.3	1.4
		Wall Embedment depth		1.5
Final	Strength Limit State	Global Slope Stability	1.5	1.9
		Wall Embedment depth		2.0
Final	Extreme Limit State [a]	Global Slope Stability	1.1	1.2
		Wall Embedment depth		1.5

Notes:
a) Does not include liquefaction case – refer to Section 2.2.3

3.0 THE MARINE CONSORTIUM, INC. – SLOPE STABILIZATION

3.1 GENERAL

In order to stabilize the cap and associated slopes at the Marine Consortium riverbank, two rows of sheet pile wall are proposed in slopes steeper than 2.5H:1V. The sheet piles will act to resist lateral soil movements, intercepting potential failure surfaces and therefore enhancing the global stability of the retained soil mass.

The below section details the geotechnical design of the slope stabilization measures. The structural design approach is presented in Structural Design Technical Memorandum (Volume I, Appendix J).

3.2 DESIGN INFORMATION

3.2.1 Geometry

The geometry of the proposed slope stabilization walls is presented below. Further details on the location and geometry of the sheet pile wall section are described in Appendix J – Structural Design Technical Memo. The below geometry represents the critical section used for the geotechnical analysis.

Table 3-1
Marine Consortium Slope Stabilization Walls – Geometry

Design Element	Value
Sheet pile section	NZ 38
Total wall length (section)	80 - 100 ft
Total wall length (linear length)	500 ft (approximate)
Global Slope angle of slope	2.15H : 1V
Approximate elevation of top row	19 ft NAVD88
Approximate elevation of top row	3 ft NAVD88

3.2.2 Ground Model and Geotechnical Parameters

The ground strata and properties for the analyses were derived from the Geotechnical Data Report (Appendix F of the PDI ER; HGL, 2024). Stratigraphy is shown in subsurface Profiles C-C and D-D (Figure 2-1d and e, GDTM). Profile D-D was deemed more critical following sensitivity analysis, forming the basis of the design ground model summarized below. Geotechnical parameters follow Table 3-1 in the GDTM. The water level considered is elevation +5.1 ft NAVD88, which represents an estimate of low water values reached during low tides during the summer, based on measured Willamette River water levels.

Table 3-2
Marine Consortium – Design Ground Model – Upper Pile Row

Stratigraphy	Layer Top Depth (ft)	Layer Bottom Depth (ft)	Total Unit Weight (pcf)	Friction angle (°)	Cohesion (psf)	Undrained Shear Strength (psf)
Revetment	19	16	150	42	-	-
Alluvium – Sand	16	5	115	33	-	-
Alluvium – Clay	5	-5	105	24	75	800
Alluvium – Clay	-5	-39	105	24	75	-20(EL+5) + 800 (max 1,450)
Missoula Flood Deposits - Sand	-39	-64	120	34	-	-
Missoula Flood Deposits - Silts	-64	-100	110	32	150	-10(EL+8) + 1,100 (max 1,500)

Notes:
EL = elevation
max = maximum

Table 3-3
Marine Consortium – Design Ground Model – Lower Pile Row

Stratigraphy	Layer Top Depth (ft)	Layer Bottom Depth (ft)	Total Unit Weight (pcf)	Friction angle (°)	Cohesion (psf)	Undrained Shear Strength (psf)
Revetment	3	0	150	42	-	-
Alluvium – Clay	0	-38	105	24	75	800
Missoula Flood Deposits - Silts	-38	-40	110	32	150	-10(EL+8) + 1,100 (max 1,500)
Missoula Flood Deposits - Sand	-40	-65	120	34	-	-
Missoula Flood Deposits - Silts	-65	-100	110	32	150	-10(EL+8) + 1,100 (max 1,500)

3.2.3 Seismic Parameters

The sheet pile wall is being constructed to satisfy the RA, specifically to enable the capping design requirements of the project. Therefore, in accordance with Remedial Design Guidelines and

Considerations (EPA, 2021), the design of the sheet pile wall considers the seismic shaking demands of the CLE only.

The CLE is defined as a seismic event associated with a 475-year return period. This corresponds to a PGA of 0.23g, according to the USGS hazard tool. In accordance with guidelines from ODOT (ODOT, 2024) and AASHTO (AASHTO, 2020), this was applied in a pseudo-static analysis using a horizontal acceleration factor kh = 50% PGA (0.12).

3.2.4 Loading Conditions

Typical live load surcharges have been estimated using a surface pressure of 250 psf as per the ODOT Geotechnical Design Manual (ODOT, 2024). This has been applied to the top of the slope during construction and operation.

3.3 LIMIT STATES

The geotechnical design of the slope stabilization wall has been undertaken following the limit states defined by LRFD design methodology, presented in ODOT, 2024 Section 7.

Table 3-4
Minimum Required FoS and Maximum Required Resistance Factors Reproduced from Section 7 and in ODOT, 2024

Geotechnical Item under consideration	Limit State	Minimum Factor of Safety	Maximum LRFD Resistance Factor	Load Factor
Slopes that Support Structures	Strength Limit State	1.5	0.65	1
	Extreme Limit State [a]	1.1	0.9	1

Notes:
a) Does not include liquefaction case – refer to Section 3.2.3

3.4 STABILITY ANALYSIS

An iterative soil-structure interaction (SSI) approach was employed to design the slope stabilization walls. The process integrated geotechnical and structural analyses to achieve a performance-based design under static and CLE loading conditions.

Initial slope stability analyses were conducted to estimate free-field displacements of the 2.15H:1V slope under the CLE. The pseudo-static slope stability analysis and seismic slope displacement calculation were performed using the kh and PGA values presented in Section 3.2.3. A procedure suggested by Macedo et al. (Macedo, 2023) was used to estimate the seismic slope displacement for subduction zone case model resulting in predicted displacements of approximately 0.67 ft.

Following the above, structural modeling was undertaken as detailed in Structural Design Technical Memo (Appendix J). To support this analysis, non-linear p-y curves were developed and provided to the Structural Designers. The p-y curve is a widely used nonlinear analysis method to evaluate the response of laterally loaded piles, where the soil resistance to lateral load is modeled as a series of nonlinear springs. The American Petroleum Institute (API) sand model was chosen for the granular soils. The cohesive soils were modeled using the soft clay (Matlock) and the stiff

clay with free water (Reese) based on the S_u values. These soil models were available in RSPile v.3.031, 2025 software (Rocscience, 2025) and were utilized to generate the p-y curves for the soil type and depth of interest.

The structural engineer's shear resistance output was incorporated into the slope stability model, applying shear resistance perpendicular to the critical slip circle to stabilize the wall. This raised the yield coefficient needed for a safety factor of 1.0 and reduced predicted slope displacement to approximately 0.50 ft (Macedo et al., 2023).

The above analysis was then repeated iteratively until convergence was achieved between the geotechnical and structural models. Final pinned slope displacements were approximately 0.60 ft.

The final global stability (FoS) of the soil mass was confirmed for the static and pseudo static cases with 2D limit-equilibrium analysis (Spencer Method) using Slide2 (Version 9.03) by Rocscience. Stability results are presented below.

Table 3-5
Marine Consortium Global Stability Results

Limit State	Minimum FoS	Design FoS
Strength Limit State	1.5	1.8
Extreme Limit State [a]	1.1	1.1

Notes:
a) Does not include liquefaction case – refer to Section 3.2.3

4.0 BERTHS 306 AND 307

4.1 GENERAL

The slope stability and pile analyses were performed at Berths 306 and 307 to evaluate the performance of proposed pile foundations and adjacent riverbank slopes. The seismic slope deformation and potential requirements for any mitigation such as ground improvement are also presented in this technical memorandum. Note it is the responsibility of the design and build contractor to confirm the requirement for ground improvement as part of the final design.

The analysis outputs presented in this section will be utilized as design inputs for the new Berth and Breasting Dolphin structures presented separately in Structural Design Technical Memorandum (Volume I, Appendix J).

4.2 DESIGN INFORMATION

4.2.1 Slope, Earthwork Geometry, and Pile Foundation

The proposed slope for the new marine structures will be based on the 2.5H:1V gradient (approximately 22˚) at Berth 306 and 307. The rock revetment is considered as the slope protection layer, which consists of 2-ft thick armor stone overlying 1-ft thick bedding stone layer. The granular fill (backfill) material is chosen to fill the gap between the existing ground and the bedding stone layer.

An open-ended steel pipe pile was considered as the proposed foundation with 2.5-ft and 2-ft diameter for Berth (P-R1 to P-R6) and Dolphin structures, respectively. The pile will be driven in a vertical direction for Berth while batter pile with 1H:4V (approximate 14˚) inclination is considered for Dolphin.

4.2.2 Ground Model and Geotechnical Parameter

The stratigraphy is based on relevant subsurface models close to the proposed marine structures: J-J' and K-K' (Figure 2-1k and Figure 2-1l, GDTM). The site-specific geotechnical parameters including the undrained and drained conditions are summarized in **Table 4-1** based on Table 3-1 in the GDTM. The water level considered in the analysis is at elevation +5.1 ft NAVD88, which represents an estimate of low water values reached during low tides during the summer, based on measured Willamette River water levels.

The potentially liquefiable layers were adopted in the slope models based on the liquefaction triggering assessment results at the crest and toe area (Cone Penetration Test and Standard Penetration Test, presented in Attachment B of the GDTM). Residual shear strength of liquefied soil was considered to represent the shear resistance of potentially liquefiable deposits (Idriss and Boulanger, 2008).

The site-specific ground strata with their potentially liquefiable soils for pile analysis are visualized in Figure D-2 to Figure D-5. The summary of input parameters for lateral pile analysis (e.g. ε_{50}, k, and k_{py}) is also provided in Table 4-1. For axial pile analysis, the coefficient of lateral earth pressure (K_δ) of 1 was used for plugged condition assumption and adhesion factor (α) for cohesive soils was estimated based on the S_u values. Other relevant inputs for axial-based analysis including soil-pile friction angle (δ), N_q, and the limit of side and tip unit resistances for granular soil were estimated based on Table 7-8 of the Federal Highway Administration (FHWA) Design and Construction of Driven Pile Foundations – Volume 1 (FHWA, 2016).

Table 4-1
Site-specific Geotechnical Parameters for Slope Stability Assessment and Lateral Pile Analysis at Berth 306 and 307

Engineering Soil Unit	Unit Weight, γ (pcf)	Angle of Internal Friction, φ' (°)	Cohesion, c' (psf)	Undrained Shear Strength, Su (psf)	Strain Factor, ε_{50}	k_{py} Static (pcf)	k_{py} Cylic (pcf)	$k_{\{above\ water\}}$ (pcf)	$k_{\{below\ water\}}$ (pcf)
Existing material									
Artificial Fill (af)	110	34	0	-	-	-	-	210631	129740
Recent Basin Sediment – Swan Island (afb)	95	31	0	300	0.02	-	-	-	-
Alluvium – Coarse (Qa)	115 - 120	33	0	-	-	-	-	176417	111945
Alluvium – Fine (Qa)	105	25	0 - 75	800	0.02	-	-	-	-
Missoula Flood Deposits – Fine – Swan Island (Qf)	110	32	0 - 150	1500 - 2000	0.007	859394	350123	-	-
Missoula Flood Deposits – Coarse (Qf)	120	34	0	-	-	-	-	210631	129740
Proposed Material									
Armor Stone	150	42	0	-	-	-	-	536206	304049
Bedding Stone and Backfill (Granular Fill)	125	36	0	-	-	-	-	283382	166959
Post-earthquake condition material									
Residual Shear Strength of Liquefied Soil	110 – 120	-	-	0.13 to 0.16 σ'_v	0.05	-	-	-	-

4.2.3 Imposed Loading

The imposed loading for pile foundation was determined based on the load combination and factors in accordance with LRFD method: ASCE 61-14 (ASCE, 2014) and the LRFD Bridge Design Specification (AASHTO, 2020). The loading condition for pile will be analyzed with the pile resistances computed from this technical memorandum in a separate documentation: Structural Design Technical Memo (Appendix J).

Typical live load surcharges from construction or traffic relevant for slope analysis may be estimated using a surface pressure of 250 psf as per the ODOT Geotechnical Design Manual (ODOT, 2024) and Port of Long Beach Wharf Design Criteria (POLB, 2012).

4.2.4 Horizontal Seismic Coefficient and Peak Ground Velocity

The horizontal seismic coefficient (k_h) and peak ground velocity (PGV) are the inputs to perform pseudo-static slope stability and seismic slope displacement calculation. In accordance with ASCE 7-22, the multi-period response spectra were generated based on the probabilistic seismic hazard analysis conducted in USGS web-based tool (USGS, 2018) for CLE and Design Earthquake (DE), taken as 2/3 of Maximum Considered Earthquake (MCE). The peak ground accelerations (PGA) are 0.23 g and 0.37 g for CLE and DE levels, respectively.

The horizontal seismic coefficient was determined as one-half of the PGA for the hazard level of interest per ASCE 61-14. Thus, k_h values are approximately 0.12 g and 0.19 g for CLE and DE levels, respectively. The PGV of about 9 inches per second (inch/s) (22.5 centimeters [cm]/s) was estimated for CLE while 24 inch/s (60.7 cm/s) was considered for MCE.

4.3 SLOPE STABILITY ANALYSIS

The Berth 306 and 307 riverbank slopes were evaluated based on two selected subsurface sections: J-J' and K-K' in accordance with the procedure provided in ASCE 61-14. The slope stability assessment was performed using the proprietary limit equilibrium software package Rocscience Slide2 v.9.030, 2023 (Rocscience, 2023). The Spencer approach was selected to satisfy both force and moment equilibrium. The circular slip surface was considered to perform the slope assessment.

The pseudo-static slope stability analysis and seismic slope displacement calculation were performed using the k_h and PGV values presented in Section 4.2.4. A procedure was used to estimate the seismic slope displacement for subduction zone case model (Macedo, 2023). The slope analysis results are summarized in **Table 4-2**. The FoS in each considered cross-section and loading case is presented for Berth 306 (K-K') and Berth 307 (J-J') in Figure D-2 to Figure D-5.

The FoS ranges approximately from 1.5 to 1.7 under static condition, which satisfies the minimum FoS requirement. The J-J' slope is observed to be stable (FoS = 1.1) under post-earthquake conditions while ground improvement is needed at the crest and toe of the slope to stabilize K-K' slope or Berth 306 area.

The seismic slope displacement calculation for J-J' slope was then conducted under DE case since the computed FoS is lower than 1.1 for pseudo-static case, which informed free-field lateral movement at about 1.1 ft. Considering the ground improvement installed at the crest and toe area

of K-K' slope, the estimated FoS was observed to be lower than 1.1 for both design earthquake levels. The corresponding seismic slope displacements were estimated at approximately 0.33 ft and 1.2 ft under CLE and DE, respectively. The presence of ground improvement at Slope K-K' (Berth 306 area) reduced the estimated seismic slope displacement by approximately 40 to 50 percent under pseudo-static case while this effect was insignificant for the computed FoS values.

Table 4-2
Summary of the Factor of Safety and Estimated Seismic Slope Displacement at Berth 306 and 307 Slopes

Slope/ Subsurface Section	FoS Static		FoS Post-Earthquake		FoS Pseudo-static (CLE and DE)		Pseudo-static Slope Displacement (CLE and DE)	
	Short-term	Long-term	No Ground Improvement	With Ground Improvement	No Ground Improvement	With Ground Improvement	No Ground Improvement	With Ground Improvement
K-K' Berth 306	1.5	1.55	0.75	1.1	0.96 and 0.81	1.05 and 0.85	0.56 ft and 2.5 ft (17 cm and 75 cm)	0.33 ft and 1.2 ft (10 cm and 36 cm)
J-J' Berth 307	1.66	1.66	1.1	-	1.1 and 0.88	-	1.1 ft for DE (33 cm for DE)	-

4.4 LATERAL PILE ANALYSIS

The p-y curve is a widely used nonlinear analysis method to evaluate the response of laterally loaded piles, where the soil resistance to lateral load is modeled as a series of nonlinear springs. The API sand model was chosen for the granular soils. The cohesive soils were modeled using the soft clay (Matlock) and the stiff clay with free water (Reese) based on the S_u values. The hybrid liquefied sand model (Franke and Rollins, 2013) was considered to model the potentially liquefiable soils. These soil models were available and implemented in RSPile v.3.031, 2025 software (Rocscience, 2025) to generate the p-y curves for the soil type and depth of interest.

The site-specific ground profiles were developed for lateral pile analysis with geotechnical parameters summarized in Table 4-1. The site-specific ground strata are presented in Figure D-2 to Figure D-3 which are also used for axial resistance calculation presented in the next section (Section 4.5). The lateral resistance of single pile in the slope was then scaled with the p-multipliers to account relation between lateral resistance and the slope angle (sloping ground effect) (Reese and Van Impe, 2011). The p-multipliers for pile in the sloping ground with a gradient of 2.5H:1V (approximately 22˚) are 0.5 for out of slope direction and 1.8 for into slope direction.

The group p-multiplier method (Hannigan et al., 2006) was implemented to estimate the reduction in lateral resistance due to group pile effect with center-to-center (CTC) spacings equal and less than 5B. Linear interpolation is allowed for CTC pile spacing case between 3B and 5B. The structural engineers may adjust the single pile p-y curves with the p-multipliers suggested per **Table 4-3** to account for the group pile configuration.

The p-y curves have been prepared for the structural engineers considering the proposed pile information provided in Section 4.2.1 to further evaluate the lateral performance of the structures. The detail of structural analysis output is presented in Attachment J.

Table 4-3
Pile p-multipliers (Pm) for Multiple Row Shading per FHWA/AASHTO

Pile CTC spacing (in the direction of loading)	p-multipliers, P_m		
	Row 1 (Lead Row)	Row 2	Row 3 and higher
3B	0.8	0.4	0.3
5B	1.0	0.85	0.7

4.5 GEOTECHNICAL AXIAL PILE RESISTANCE

The axial resistance of piles was calculated based on the procedure suggested in P2A Method-Mixed Soil Profiles (FHWA, 2016). This method is based on API for offshore steel pipe pile foundation. The calculation was performed with the assumptions of plugged condition achieved at the pile tip and without group pile effect since the pile spacing was greater than 3B.

The estimated axial pile resistances for the proposed pile foundations are presented with the corresponding site-specific ground strata in Figure D-4 to Figure D-10. Each figure presents both nominal (unfactored) and factored axial resistance profiles under strength limit and extreme limit events. The resistance factors were determined as suggested per the API method, which gave values of 0.65 for compression and 0.5 for tension assuming dynamic field-testing consideration for strength limit event (AASHTO, 2020). For extreme limit event, resistance factors of 1 and 0.8 are allowed for compression and tension, respectively.

The side resistance above the neutral axis identified within the potentially liquefiable deposit was neglected for the axial resistance calculation during extreme limit event. This assumes that the surface manifestation occurs due to insufficient layer thickness of overlying non-liquefied soil.

4.6 SETTLEMENT INDUCED DOWNDRAG LOADS

Downdrag is a phenomenon when a pile or pile-group is imposed to negative (downward) side shear stresses manifested in the ground surrounding the pile length when settling more than the pile. The downdrag loads were estimated based on the presence of consolidating soils (compressible soils) and potentially liquefiable soils identified along the pile length. The negative skin friction for liquefiable soil was calculated using the residual shear strength of liquefied soil ratio suggested per Section 4.2.2, which gave approximately 40 to 50 percent of the positive skin friction, consistent with the conclusion of a full-scale test study (NCHRP, 2019). The consolidation and liquefaction induced downdrag loads calculated for Berth P-R1 to P-R6 and Dolphin piles are tabulated in Table 4-4.

Table 4-4
Consolidation and Liquefaction Induced Downdrag Loads

Pile	Ground Surface Elevation (ft NAVD88)	Consolidation Case		Liquefaction Case	
		Depth to bottom of compressible layer (ft bgs)	Consolidation induced downdrag (kips)	Depth to bottom of potentially liquefiable layer (ft bgs)	Liquefaction induced downdrag (kips)
P-R1	28	55	405	49	210
P-R2	25	52	380	46	185
P-R3	13.5	43	225	79	270
P-R4	3	32	140	68	230
P-R5	-8	21	75	57	145
P-R6	-15	14	40	50	115
Dolphin	-15	14	40	50	245

5.0 FURTHER DESIGN AND CONSTRUCTION CONSIDERATIONS

The above design recommendations are based on the current scope of field investigation and available project details at the time of writing. It is anticipated that further geotechnical design will be carried out by the appointed design and build contractor.

It is recommended that the design and build team undertake:

- Additional site-specific investigations as required to confirm key geotechnical parameters;
- Finalization of design in accordance with applicable codes, standards, and project specifications; and
- Drivability assessment as part of the detailed design; where dense soils or obstructions are encountered, pre-drilling may be required to facilitate pile installation.

6.0 REFERENCES

American Association of State Highway and Transportation Officials (AASHTO), 2020. LRFD Bridge Design Specification, Ninth Edition.

American Society of Civil Engineers (ASCE), 2014. Seismic Design of Piers and Wharves, ASCE/COPRI 61-14. American Society of Civil Engineers, Reston, Virginia.

Caquot, A. and Kerisel, F. 1948. Tables for the Calculation of Passive Pressure, Active Pressure and Bearing Capacity of Foundations, Gauthier-Villars, Paris.

Deep Excavation LLC., 2024. DeepEX v.24.03. https://www.deepexcavation.com/.

Federal Highway Administration (FHWA), 2016. Design and Construction of Driven Pile Foundations – Volume 1.

Franke, K.W. and Rollins, K.M., 2013. Simplified hybrid p-y spring model for liquefied soils. *Journal of geotechnical and geoenvironmental engineering*, *139*(4), pp.564-576.

Hannigan, P.J., G. G. Goble, G. Thendean, G. E. Likins, and F. Rausche, 2006. Design and Construction of Driven Pile Foundations. FHWA-NHI-05-042 and NHI-05-043, Federal Highway Administration, U.S. Department of Transportation, Washington, DC. Vols. I and II.

Idriss, I. M., & Boulanger, R. W., 2008. Soil Liquefaction During Earthquakes. Earthquake Engineering Research Institute, Oakland, California.

Macedo, J., Bray, J.D. and Liu, C., 2023. Seismic slope displacement procedure for interface and intraslab subduction zone earthquakes. *Journal of Geotechnical and Geoenvironmental Engineering*, *149*(11), p.04023104.

Mononobe, N., & Matsuo, H. (1929). On the determination of earth pressures during earthquakes. Proceedings of the Japan Society of Civil Engineers.

National Cooperative Highway Research Program (NCHRP), 2019. Proposed AASHTO Specifications for Design of Piles for Downdrag, NCHRP12-116.

Okabe, S. (1924). General theory on earth pressure and seismic stability of retaining wall. Journal of the Japanese Society of Civil Engineers.

Oregon Department of Transportation (ODOT), Geotechnical Design Manual (GDM), 2024. Oregon Department of Transportation, Salem, Oregon.

Port of Long Beach (POLB), 2012. Wharf Design Criteria, Version 3.0. February 29.

Reese, L.C. and Van Impe, W., 2011. Single Piles and Pile Groups Under Lateral Loading. 2nd.

Rocsicence, 2025. RSPile v.3.031. 3D Pile Analysis Software. Rocscience Inc.

Rocsicence 2023. Slide2 v.9.030, 2D Slope Stability Analysis Software. Rocscience Inc.

U.S. Environmental Protection Agency (EPA), 2021. Remedial Design Guidelines and Considerations, Portland Harbor Superfund Site. Portland, Oregon. April 23.

U.S. Geological Survey (USGS), 2018. *USGS Earthquake Hazard Toolbox.* At URL https://earthquake.usgs.gov/nshmp/.

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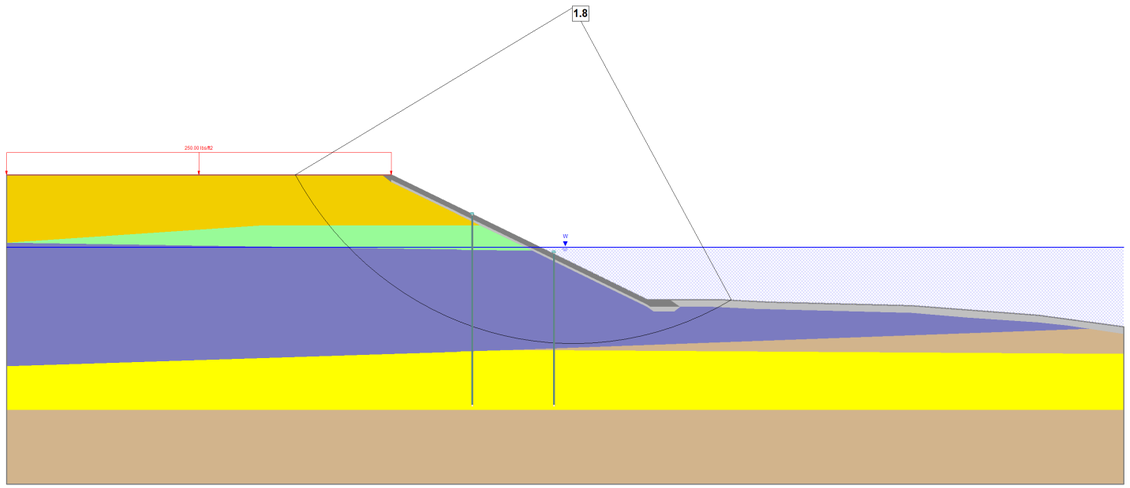
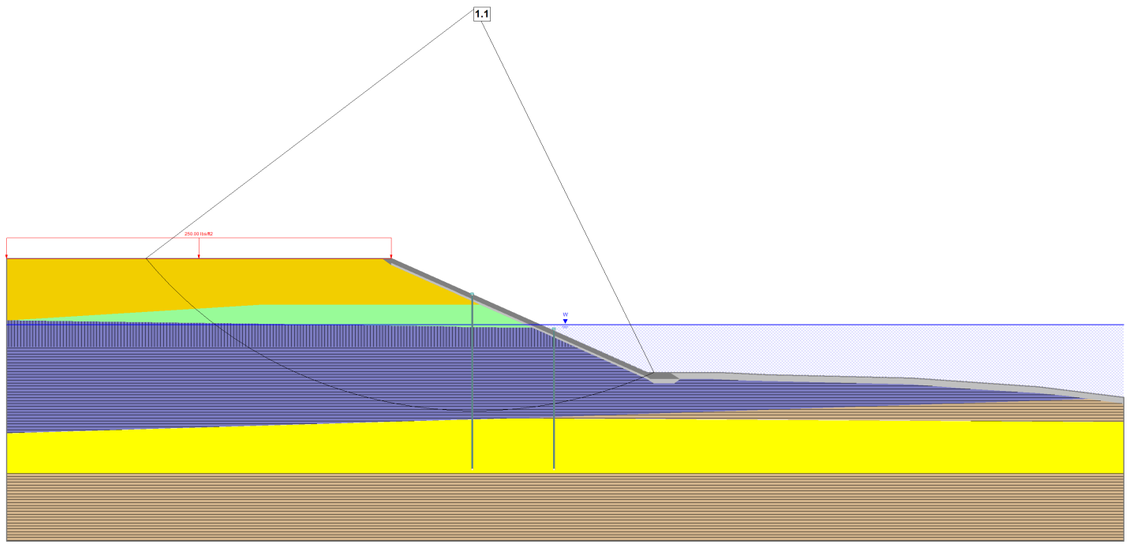
FIGURES



Profile D-D', Static Analysis – Long Term with Piles



Profile D-D', Pseudo-Static Analysis with Piles

Engineering Soil Unit	Color	Unit Weight (pcf)	Undrained Shear Strength, Su (psf)	Cohesion (psf)	Angle of Internal Friction, φ' (Degrees)
Armor Stone		150	-	0	42
Bedding Stone/Backfill		125	-	0	36
Artificial Fill		118	-	0	35
Alluvium – Coarse-Grained (above -10 feet)		115	-	0	33
Alluvium – Fine-Grained (Drained)		105	-	150	26
Alluvium – Fine-Grained (above -5 feet)		105	800	-	-
Alluvium – Fine-Grained (below -5 feet)[1]		105	800		
Missoula Flood Deposits - Fine-Grained		110	-	150	32
Missoula Flood Deposits - Fine-Grained (below -8 feet)[2]		110	1100	-	-
Missoula Flood Deposits - Coarse		120	-	0	34



Global Minimum Factor of Safety



Surcharge Load



Horizontal Seismic Coefficient

Notes:
(1) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1450 psf)
(2) Undrained shear strength increasing with depth (+20 psf/ft, maximum 1500 psf)

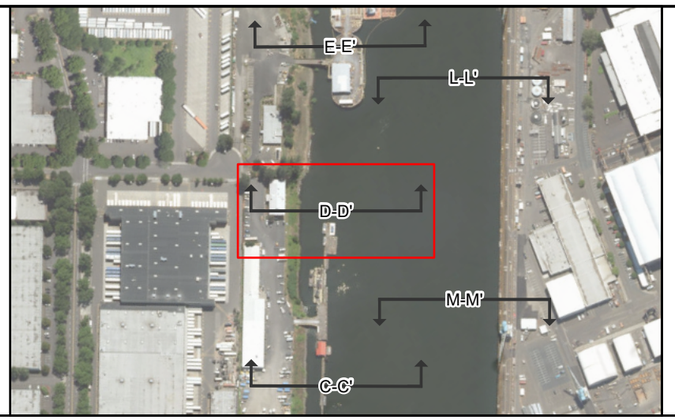
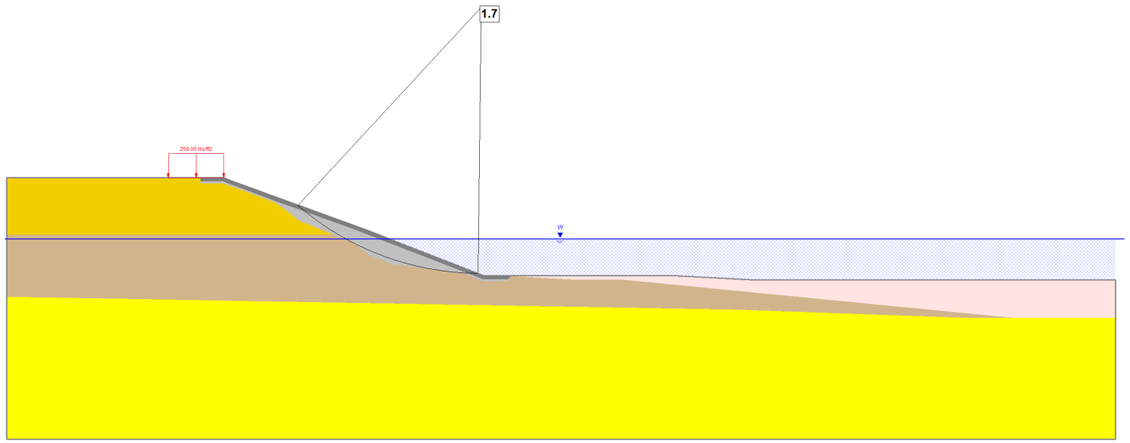


Figure D-1

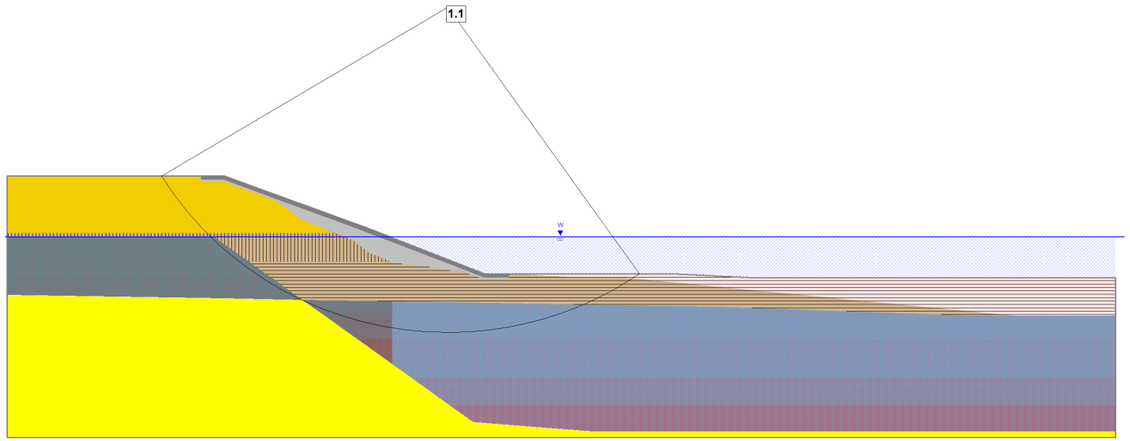
Slope Stability Analysis
Marine Consortium
Profile D-D'
with Pinning Piles

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

PACIFIC groundwater GROUP
HGL
MOTT MACDONALD
BRIDGEWATER GROUP



Profile J-J', Static Analysis – Long Term at Berth 307



Profile J-J', Static Analysis – Post Earthquake at Berth 307

Engineering Soil Unit	Color	Unit Weight (pcf)	Undrained Shear Strength, Su (psf)	Cohesion (psf)	Angle of Internal Friction, φ' (Degrees)
Armor Stone		150	-	0	42
Bedding Stone/Backfill		125	-	0	36
Artificial Fill		118	-	0	35
Recent Basin Sediment – Fine-Grained (Drained)		95	-	0	33
Recent Basin Sediment – Fine-Grained		95	300	-	-
Missoula Flood Deposits - Fine-Grained		110	-	150	32
Missoula Flood Deposits - Fine-Grained (above -8 feet)		110	1500		
Missoula Flood Deposits - Fine-Grained (below -8 feet)[1]		110	1500	-	-
Missoula Flood Deposits - Coarse		120	-	0	34
Liquefiable Soil Upland 1		115	0.13 σ'v	-	-
Liquefiable Soil In Water 1		115	0.16 σ'v	-	-



Global Minimum Factor of Safety



Surcharge Load



Horizontal Seismic Coefficient

Notes:
(1) Undrained shear strength increasing with depth (+25 psf/ft, max 2500 psf)

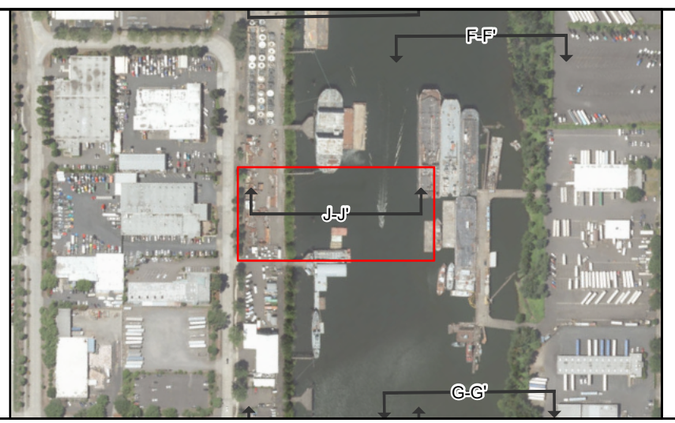


Figure D-2a

Slope Stability Analysis
Berth 307
Profile J-J'

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Technical Memorandum
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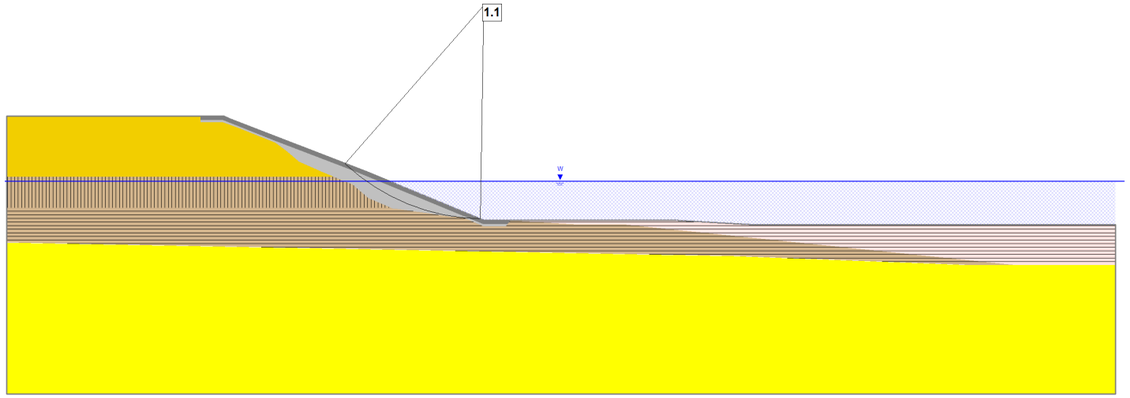
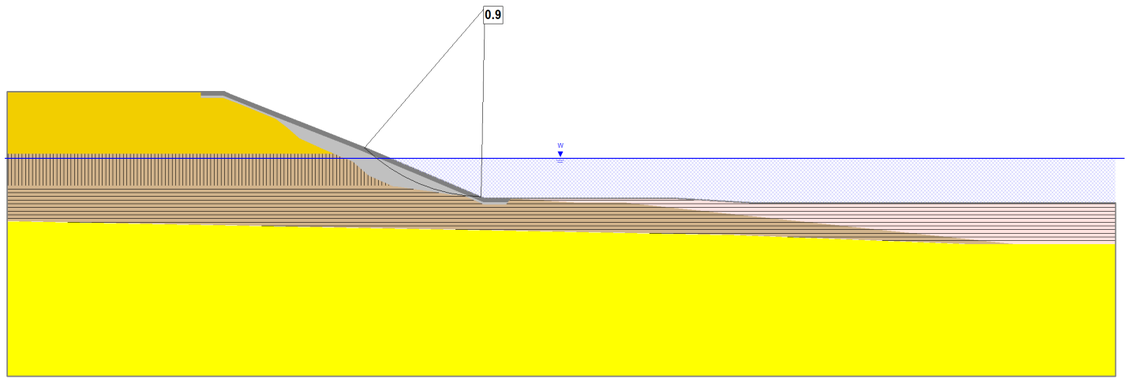
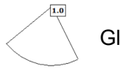


Profile J-J', Pseudo-Static Analysis - CLE at Berth 307



Profile J-J', Pseudo-Static Analysis - DE at Berth 307

Engineering Soil Unit	Color	Unit Weight (pcf)	Undrained Shear Strength, Su (psf)	Cohesion (psf)	Angle of Internal Friction, φ' (Degrees)
Armor Stone		150	-	0	42
Bedding Stone/Backfill		125	-	0	36
Artificial Fill		118	-	0	35
Recent Basin Sediment (SI) – Fine-Grained		95	300	-	-
Missoula Flood Deposits - Fine-Grained (above -8 feet)		110	1500	-	-
Missoula Flood Deposits - Fine-Grained (below -8 feet)[1]		110	1500	-	-
Missoula Flood Deposits - Coarse		120		0	34



Global Minimum Factor of Safety



Surcharge Load



Horizontal Seismic Coefficient

Notes:
(1) Undrained shear strength increasing with depth (+25 psf/ft, max 2500 psf)

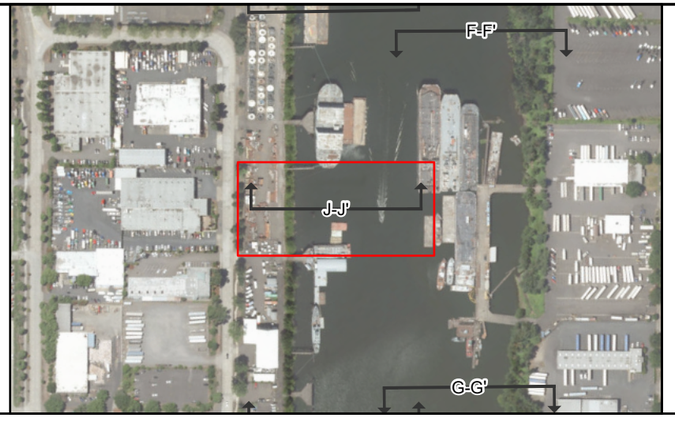


Figure D-2b

Slope Stability Analysis
Berth 307
Profile J-J'

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Technical Memorandum
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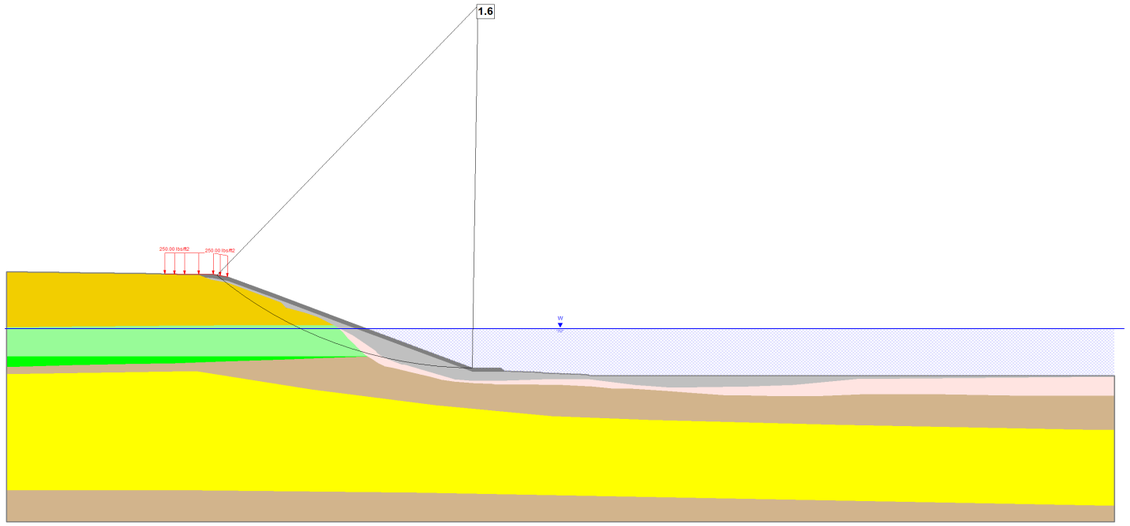
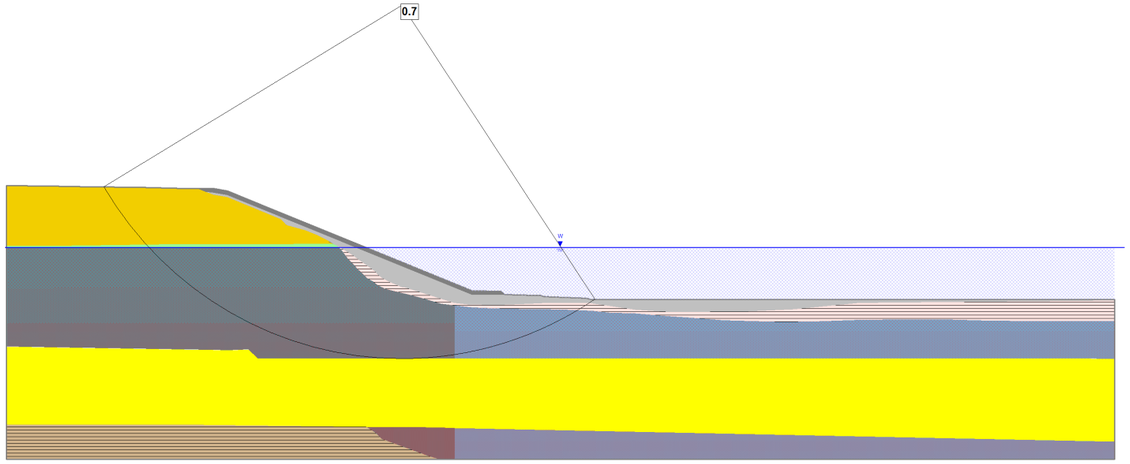
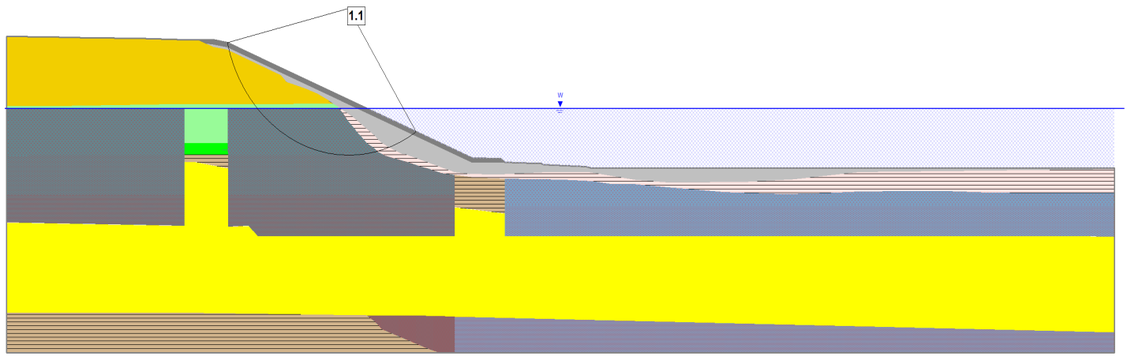


Profile K-K', Static Analysis – Long Term at Berth 306



Profile K-K', Static Analysis – Post Earthquake at Berth 306



Profile K-K', Static Analysis – Post Earthquake with Ground Improvement at Berth 306

Engineering Soil Unit	Color	Unit Weight (pcf)	Undrained Shear Strength, Su (psf)	Cohesion (psf)	Angle of Internal Friction, φ' (Degrees)
Armor Stone		150	-	0	42
Bedding Stone/Backfill		125	-	0	36
Artificial Fill		118	-	0	35
Recent Basin Sediment – Fine-Grained (Drained)		95	-	0	33
Recent Basin Sediment – Fine-Grained		95	300	-	-
Alluvium – Coarse-Grained (above -10 feet)		115	-	0	33
Alluvium – Coarse-Grained (below -10 feet)		115		0	35
Missoula Flood Deposits - Fine-Grained		110	-	150	32
Missoula Flood Deposits - Fine-Grained (below -8 feet)[1]		110	1500	-	-
Missoula Flood Deposits - Coarse		120	-	0	34
Liquefiable Soil Upland 1		115	0.13 σ'v	-	-
Liquefiable Soil In Water 1		115	0.16 σ'v	-	-



Global Minimum Factor of Safety



Surcharge Load



Horizontal Seismic Coefficient

Notes:
(1) Undrained shear strength increasing with depth (+25 psf/ft, max 2500 psf)

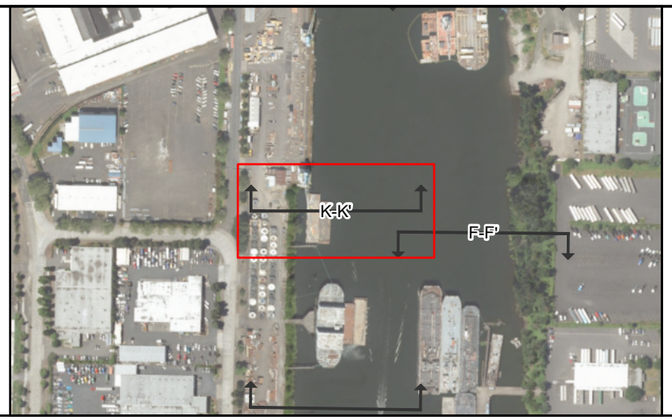


Figure D-3a

Slope Stability Analysis
Berth 306
Profile K-K'

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Technical Memorandum
Swan Island Basin Remedial Design

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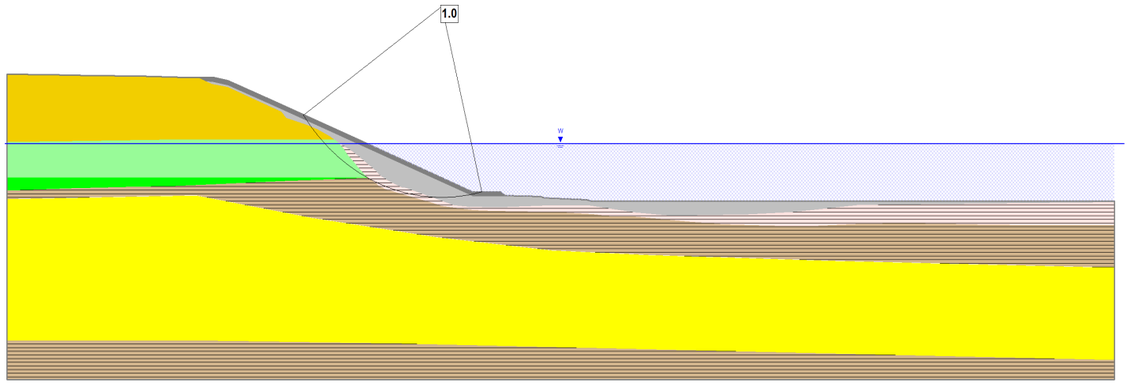
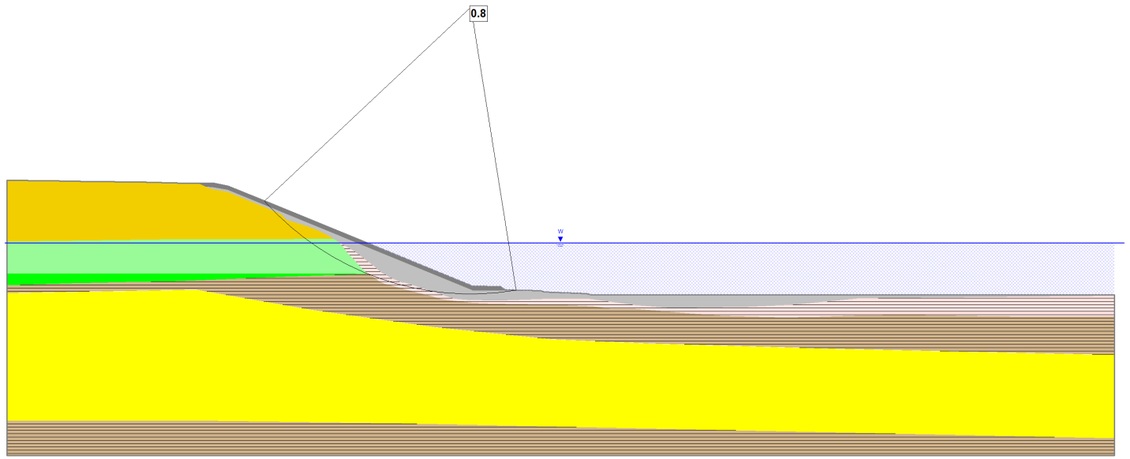
BRIDGEWATER GROUP



Profile K-K', Pseudo-Static Analysis - CLE at Berth 306



Profile K-K', Pseudo-Static Analysis - DE at Berth 306

Engineering Soil Unit	Color	Unit Weight (pcf)	Undrained Shear Strength, Su (psf)	Cohesion (psf)	Angle of Internal Friction, φ' (Degrees)
Armor Stone		150	-	0	42
Bedding Stone/Backfill		125	-	0	36
Artificial Fill		118	-	0	35
Recent Basin Sediment – Fine-Grained		95	300	-	-
Alluvium – Coarse-Grained (above -10 feet)		115	-	0	33
Alluvium – Coarse-Grained (below -10 feet)		115	-	0	35
Missoula Flood Deposits - Fine-Grained (below -8 feet)[1]		110	1600		
Missoula Flood Deposits - Coarse		120	-	0	34



Global Minimum Factor of Safety



Surcharge Load



Horizontal Seismic Coefficient

Notes:
(1) Undrained shear strength increasing with depth (+25 psf/ft, max 2500 psf)

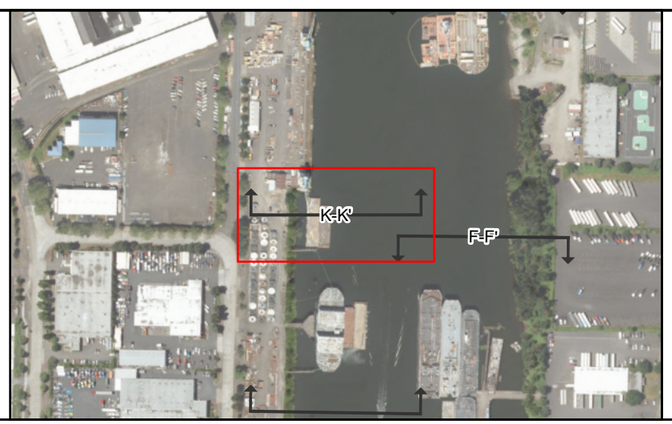


Figure D-3b

Slope Stability Analysis
Berth 306
Profile K-K'

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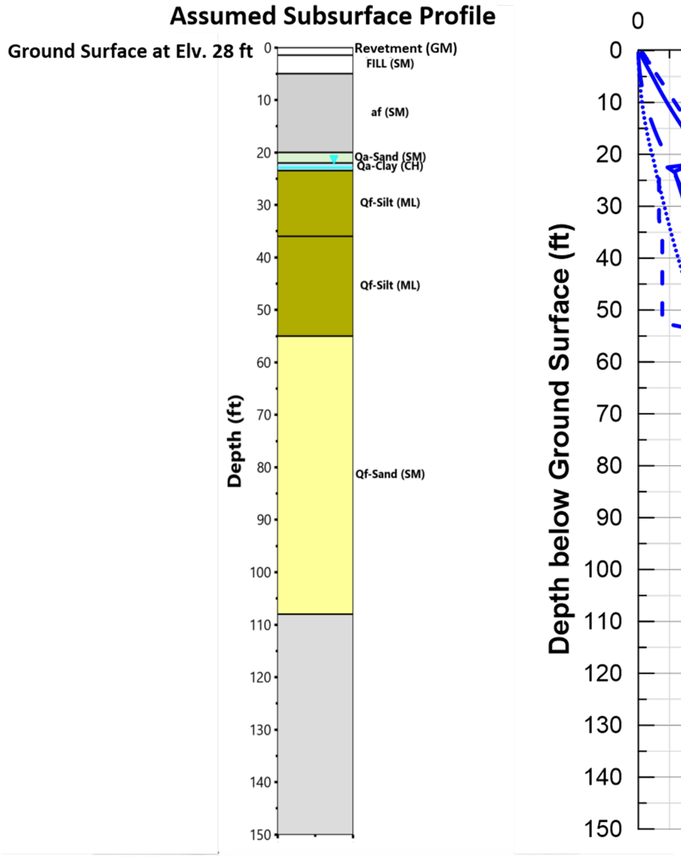

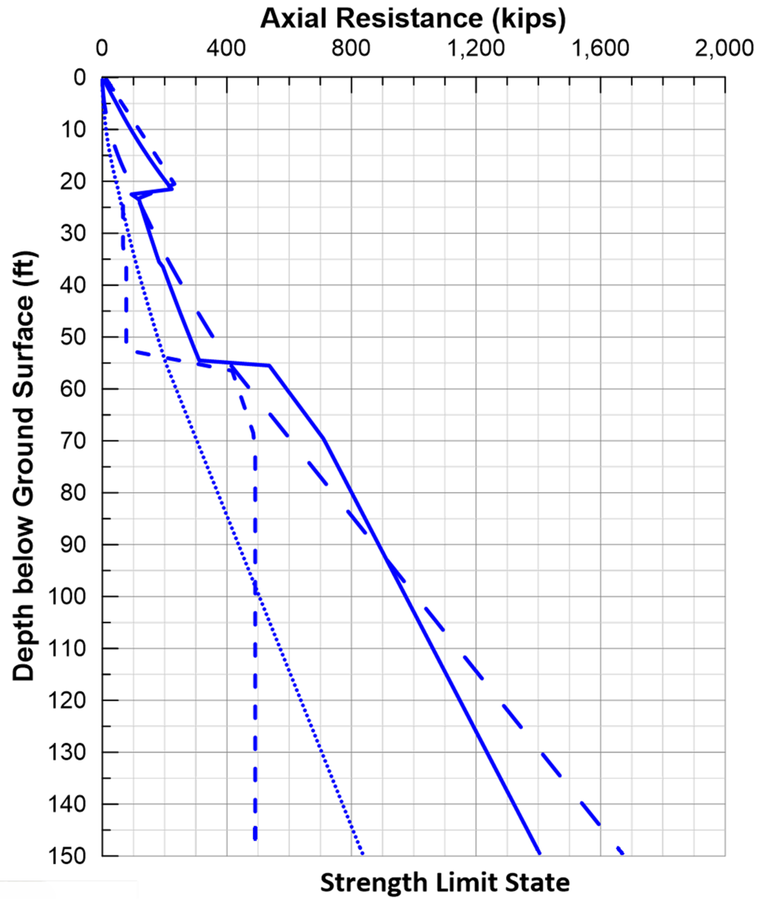

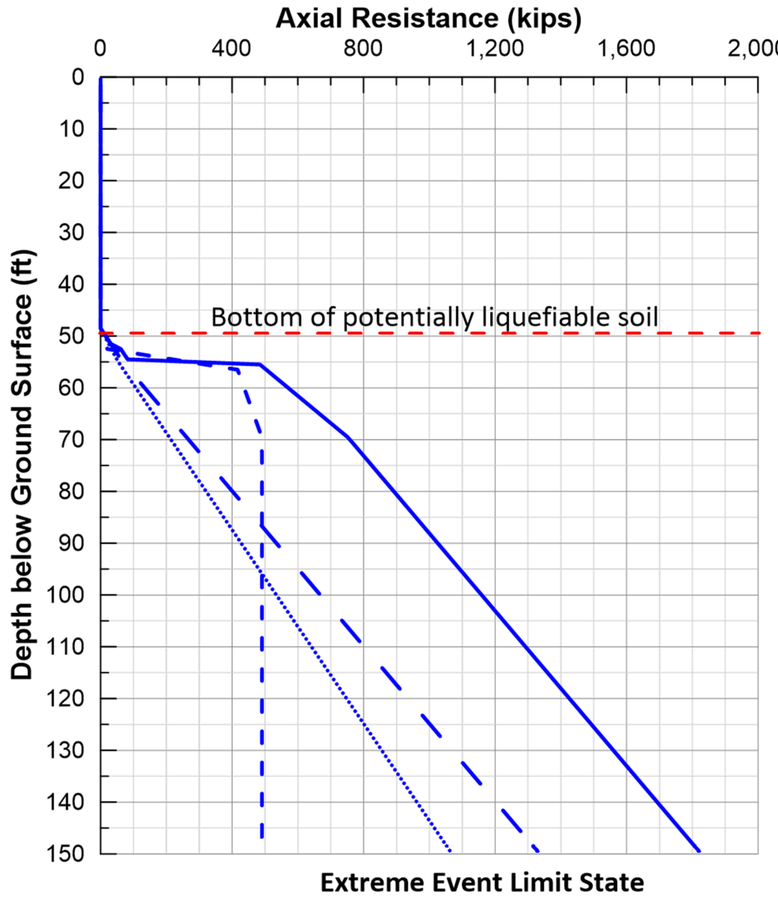

Assumed subsurface profile based on Soil Profile J-J'. At this design stage the Qf-Sand (SM) layer is assumed to extend below the bottom of the ground investigation data. Additional ground investigation data will likely be required to support final design. The scope and type of subsurface data required to complete the final design should be determined by the design-build contractor.

- Nominal Skin Resistance
- Nominal Base Resistance
- Factored Total Resistance (Compression)
- Factored Total Resistance (Uplift)

Notes:

Axial resistance values are based on preliminary foundation design developed to a 30% level in the 90% RD (refer to Structural Design Technical Memorandum – Appendix H) . Final design will be completed by the contracted Final Designer under a performance-based model.

Axial resistance of piles calculated per FHWA (2016), Design and Construction of Driven Pile Foundations – Volume 1.

Calculated axial resistance applies to single piles only; group effects not considered for piles spaced <3.0 diameters (center-to-center).

Factored total pile resistance shown on plots combines unfactored side and base resistances, multiplied by resistance factors:

- Strength limit state: 0.65 (compression), 0.5 (tension), assuming dynamic testing on ≥2% of production piles (Table 7-2, FHWA 2016).

- Extreme event limit: 1.0 (compression), 0.8 (tension), per AASHTO LRFD Bridge Design Spec (2020, Sec. 10.5.5.3.3).

Refer to Geotechnical Design Technical Memorandum, Attachment D, Table 4-4 for estimated consolidation and liquefaction induced down-drag loads.

Figure D-4

Estimated Axial Pile Resistance
Berth 306 & 307, Profile J-J'
Pile Location P-R1

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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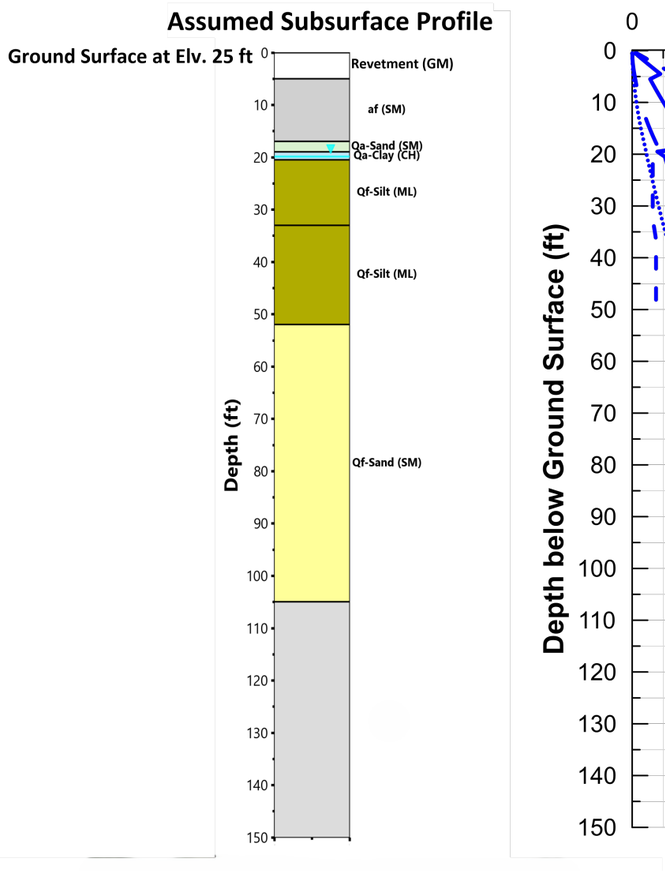

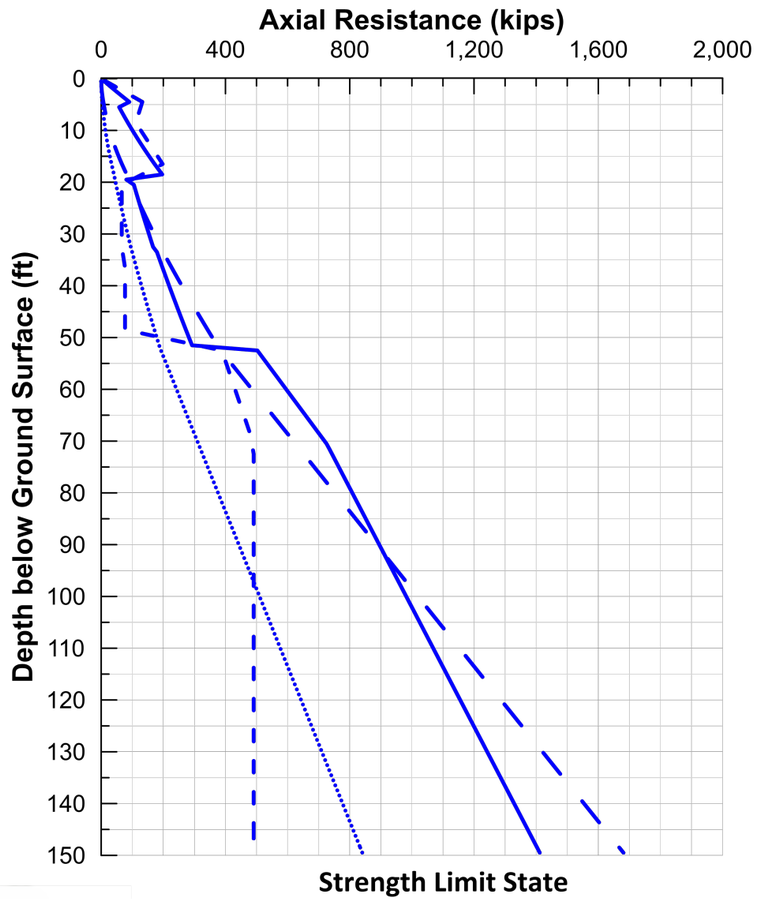

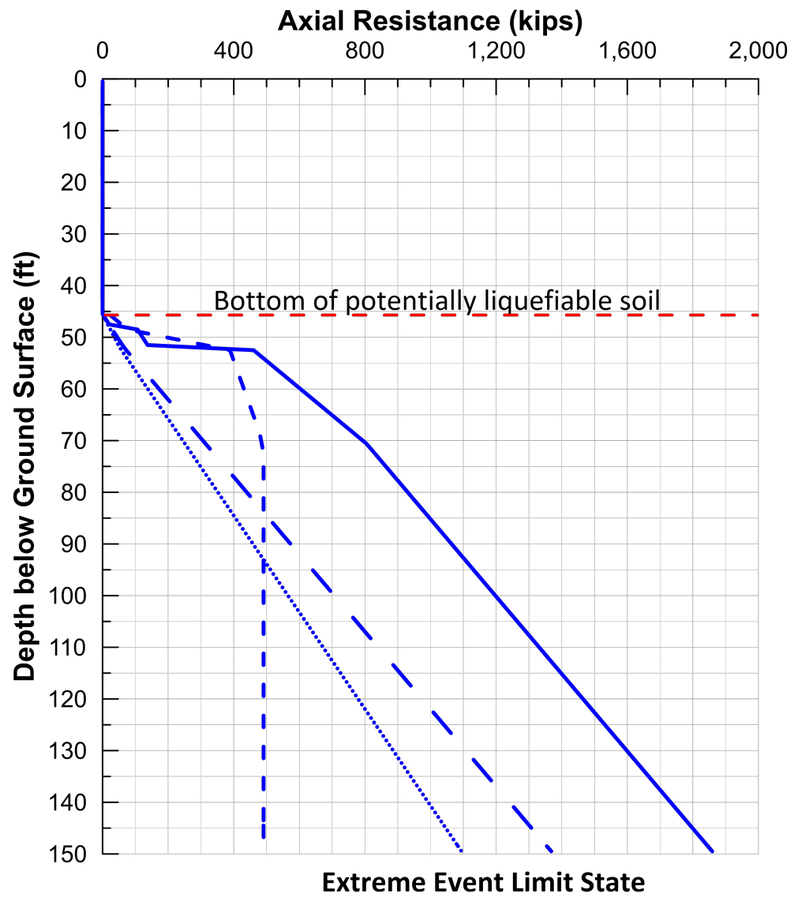

Assumed subsurface profile based on Soil Profile J-J'. At this design stage the Qf-Sand (SM) layer is assumed to extend below the bottom of the ground investigation data. Additional ground investigation data will likely be required to support final design. The scope and type of subsurface data required to complete the final design should be determined by the design-build contractor.

- Nominal Skin Resistance
- Nominal Base Resistance
- Factored Total Resistance (Compression)
- Factored Total Resistance (Uplift)

Notes:

Axial resistance values are based on preliminary foundation design developed to a 30% level in the 90% RD (refer to Structural Design Technical Memorandum – Appendix H) . Final design will be completed by the contracted Final Designer under a performance-based model.

Axial resistance of piles calculated per FHWA (2016), Design and Construction of Driven Pile Foundations – Volume 1.

Calculated axial resistance applies to single piles only; group effects not considered for piles spaced <3.0 diameters (center-to-center).

Factored total pile resistance shown on plots combines unfactored side and base resistances, multiplied by resistance factors:

- Strength limit state: 0.65 (compression), 0.5 (tension), assuming dynamic testing on ≥2% of production piles (Table 7-2, FHWA 2016).
- Extreme event limit: 1.0 (compression), 0.8 (tension), per AASHTO LRFD Bridge Design Spec (2020, Sec. 10.5.5.3.3).

Refer to Geotechnical Design Technical Memorandum, Attachment D, Table 4-4 for estimated consolidation and liquefaction induced down-drag loads.

Figure D-5

Estimated Axial Pile Resistance
Berth 306 & 307, Profile J-J'
Pile Location P-R2

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Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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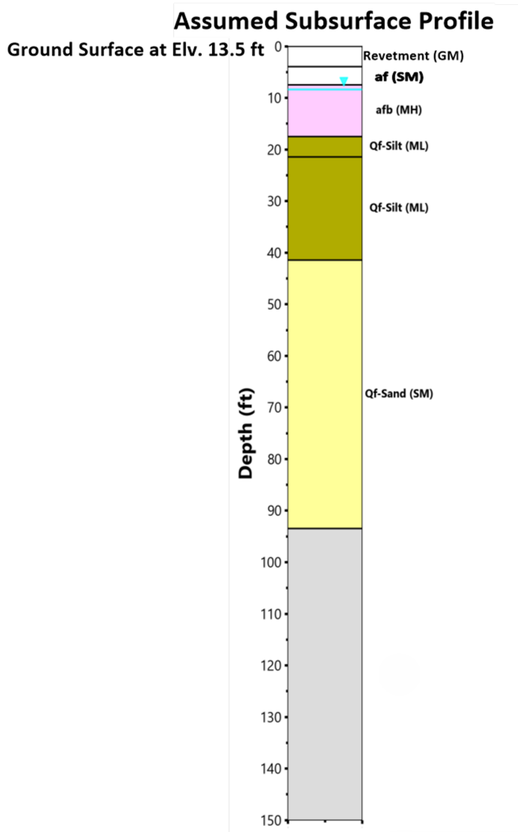

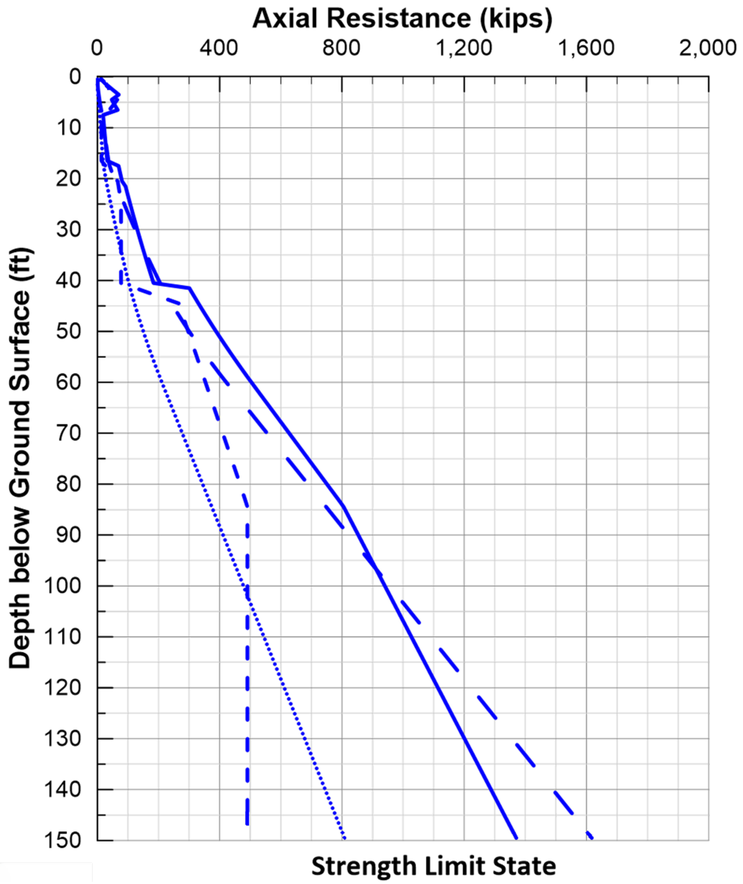

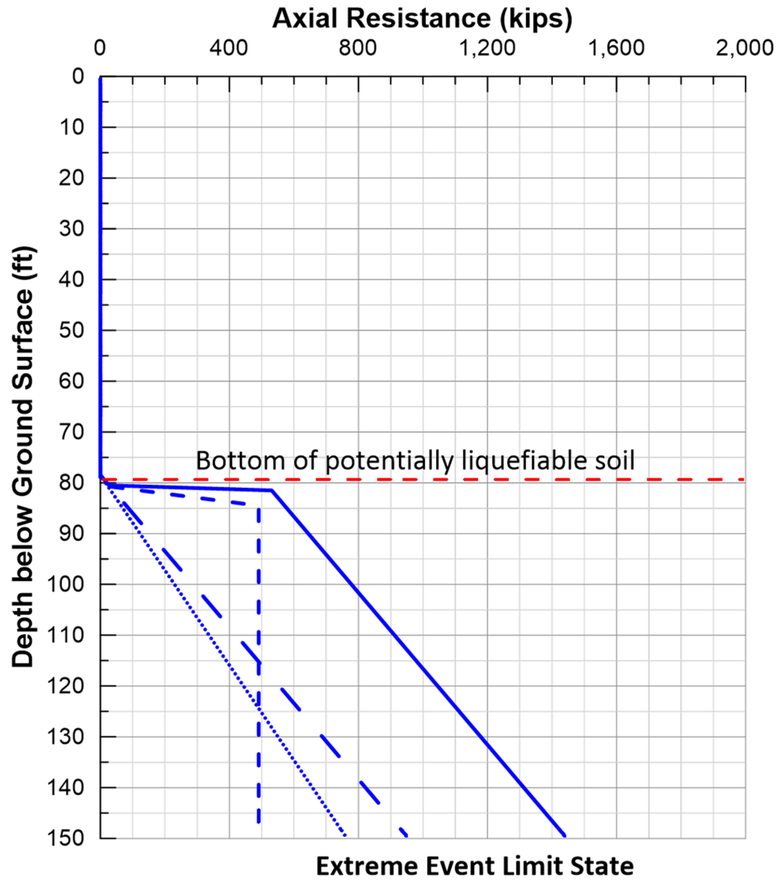

Assumed subsurface profile based on Soil Profile J-J'. At this design stage the Qf-Sand (SM) layer is assumed to extend below the bottom of the ground investigation data. Additional ground investigation data will likely be required to support final design. The scope and type of subsurface data required to complete the final design should be determined by the design-build contractor.

- Nominal Skin Resistance
- Nominal Base Resistance
- Factored Total Resistance (Compression)
- Factored Total Resistance (Uplift)

Notes:

Axial resistance values are based on preliminary foundation design developed to a 30% level in the 90% RD (refer to Structural Design Technical Memorandum – Appendix H) . Final design will be completed by the contracted Final Designer under a performance-based model.

Axial resistance of piles calculated per FHWA (2016), Design and Construction of Driven Pile Foundations – Volume 1.

Calculated axial resistance applies to single piles only; group effects not considered for piles spaced <3.0 diameters (center-to-center).

Factored total pile resistance shown on plots combines unfactored side and base resistances, multiplied by resistance factors:

- Strength limit state: 0.65 (compression), 0.5 (tension), assuming dynamic testing on ≥2% of production piles (Table 7-2, FHWA 2016).
- Extreme event limit: 1.0 (compression), 0.8 (tension), per AASHTO LRFD Bridge Design Spec (2020, Sec. 10.5.5.3.3).

Refer to Geotechnical Design Technical Memorandum, Attachment D, Table 4-4 for estimated consolidation and liquefaction induced down-drag loads.

Figure D-6

Estimated Axial Pile Resistance Berth 306 & 307, Profile J-J' Pile Location P-R3

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Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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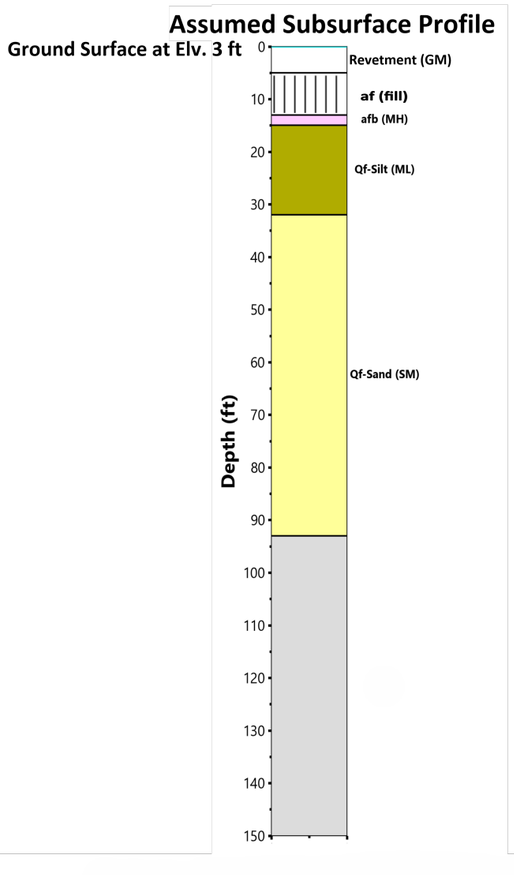

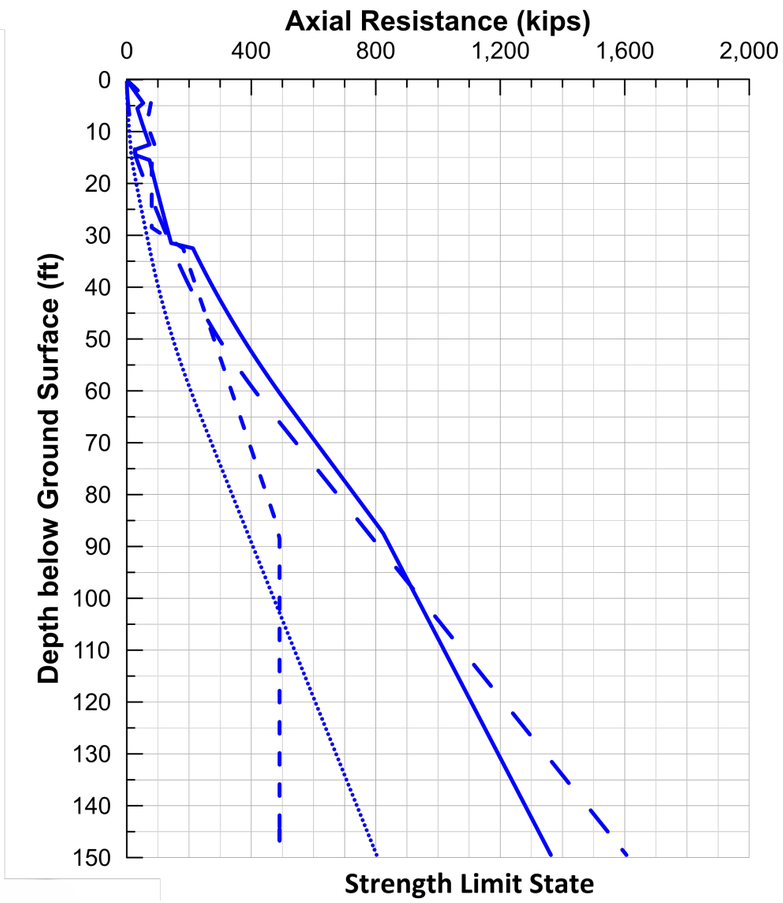

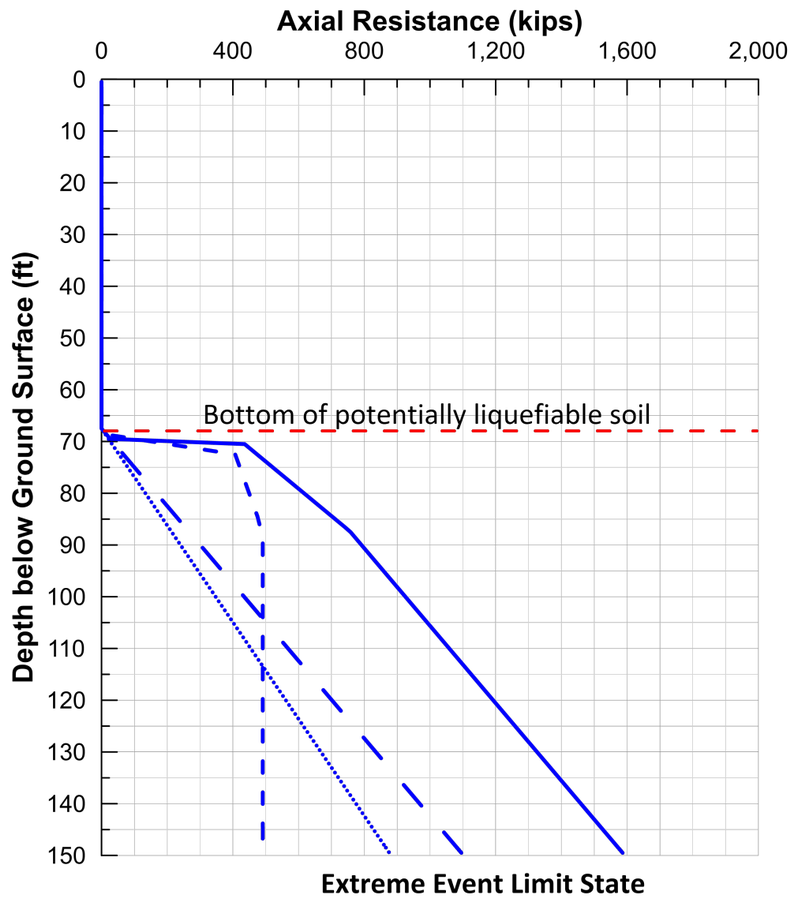

Assumed subsurface profile based on Soil Profile J-J'. At this design stage the Qf-Sand (SM) layer is assumed to extend below the bottom of the ground investigation data. Additional ground investigation data will likely be required to support final design. The scope and type of subsurface data required to complete the final design should be determined by the design-build contractor.

- Nominal Skin Resistance
- Nominal Base Resistance
- Factored Total Resistance (Compression)
- Factored Total Resistance (Uplift)

Notes:

Axial resistance values are based on preliminary foundation design developed to a 30% level in the 90% RD (refer to Structural Design Technical Memorandum – Appendix H) . Final design will be completed by the contracted Final Designer under a performance-based model.

Axial resistance of piles calculated per FHWA (2016), Design and Construction of Driven Pile Foundations – Volume 1.

Calculated axial resistance applies to single piles only; group effects not considered for piles spaced <3.0 diameters (center-to-center).

Factored total pile resistance shown on plots combines unfactored side and base resistances, multiplied by resistance factors:

- Strength limit state: 0.65 (compression), 0.5 (tension), assuming dynamic testing on ≥2% of production piles (Table 7-2, FHWA 2016).

- Extreme event limit: 1.0 (compression), 0.8 (tension), per AASHTO LRFD Bridge Design Spec (2020, Sec. 10.5.5.3.3).

Refer to Geotechnical Design Technical Memorandum, Attachment D, Table 4-4 for estimated consolidation and liquefaction induced down-drag loads.

Figure D-7

Estimated Axial Pile Resistance
Berth 306 & 307, Profile J-J'
Pile Location P-R4

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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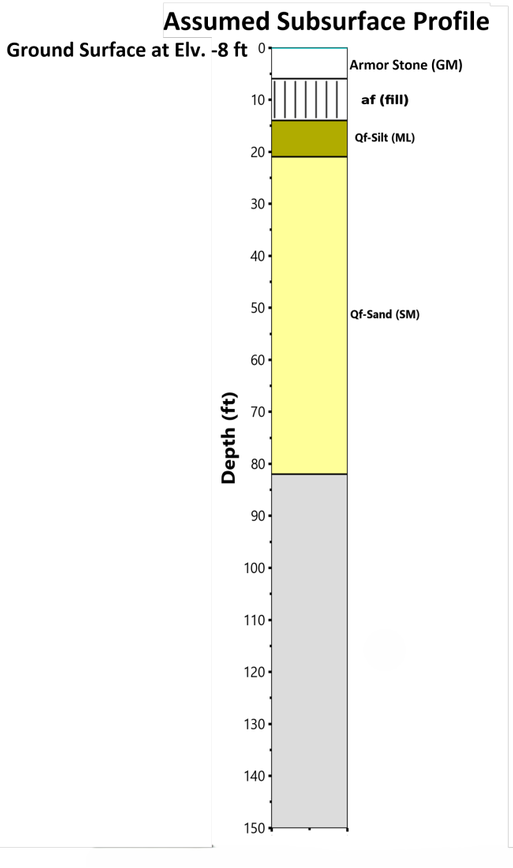
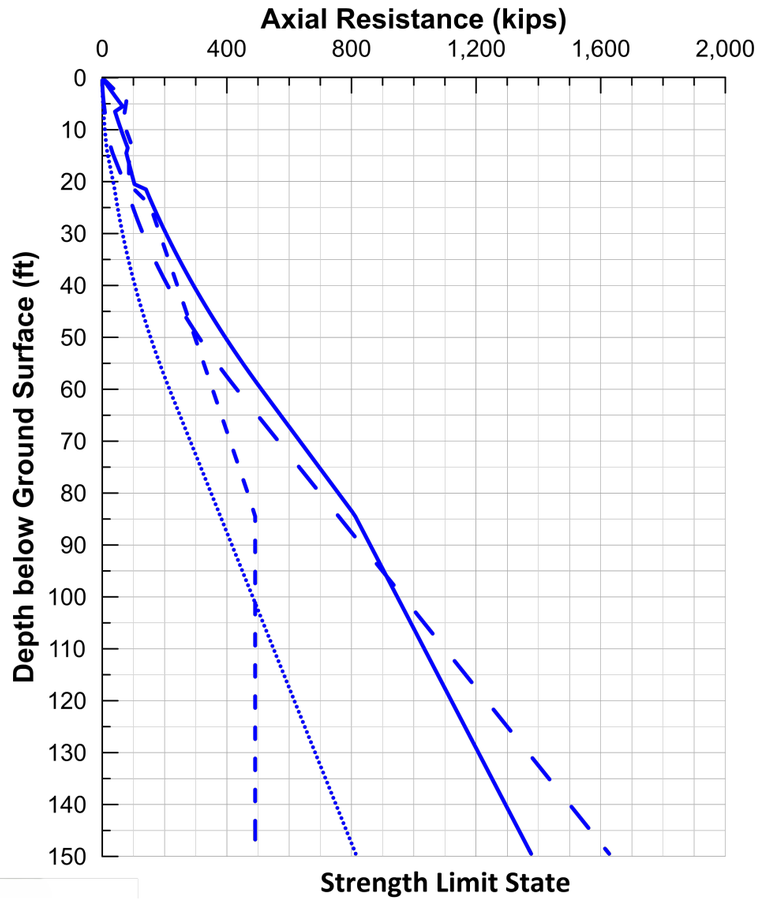
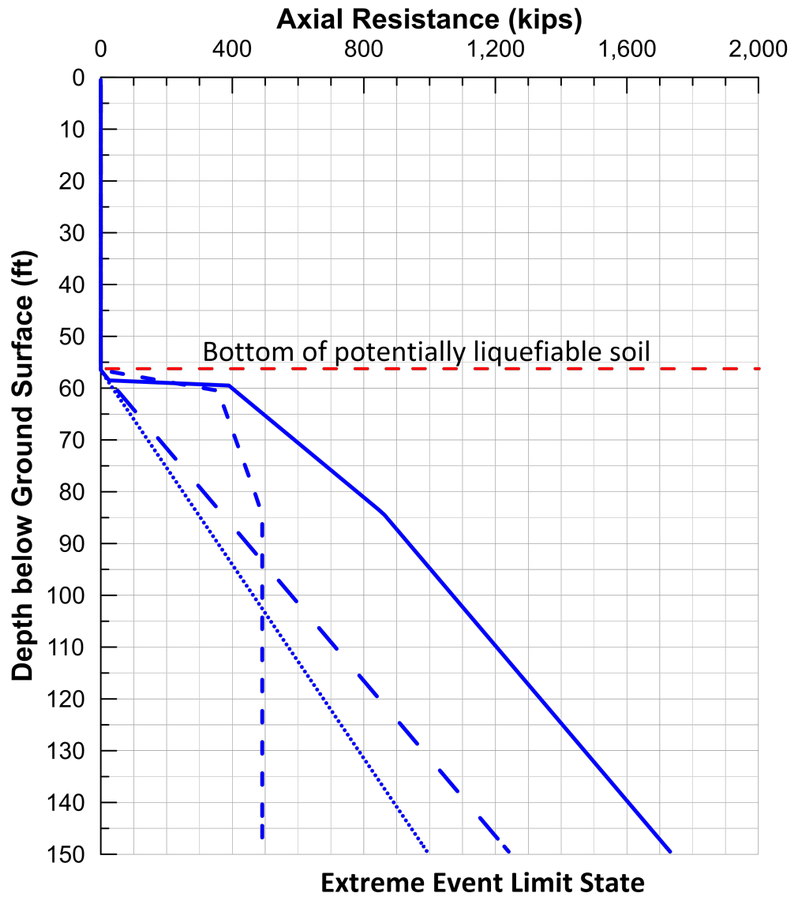
BRIDGEWATER GROUP







Assumed subsurface profile based on Soil Profile J-J'. At this design stage the Qf-Sand (SM) layer is assumed to extend below the bottom of the ground investigation data. Additional ground investigation data will likely be required to support final design. The scope and type of subsurface data required to complete the final design should be determined by the design-build contractor.

- Nominal Skin Resistance
- Nominal Base Resistance
- Factored Total Resistance (Compression)
- Factored Total Resistance (Uplift)

Notes:

Axial resistance values are based on preliminary foundation design developed to a 30% level in the 90% RD (refer to Structural Design Technical Memorandum – Appendix H) . Final design will be completed by the contracted Final Designer under a performance-based model.

Axial resistance of piles calculated per FHWA (2016), Design and Construction of Driven Pile Foundations – Volume 1.

Calculated axial resistance applies to single piles only; group effects not considered for piles spaced <3.0 diameters (center-to-center).

Factored total pile resistance shown on plots combines unfactored side and base resistances, multiplied by resistance factors:

- Strength limit state: 0.65 (compression), 0.5 (tension), assuming dynamic testing on ≥2% of production piles (Table 7-2, FHWA 2016).

- Extreme event limit: 1.0 (compression), 0.8 (tension), per AASHTO LRFD Bridge Design Spec (2020, Sec. 10.5.5.3.3).

Refer to Geotechnical Design Technical Memorandum, Attachment D, Table 4-4 for estimated consolidation and liquefaction induced down-drag loads.

Figure D-8

Estimated Axial Pile Resistance
Berth 306 & 307, Profile J-J'
Pile Location P-R5

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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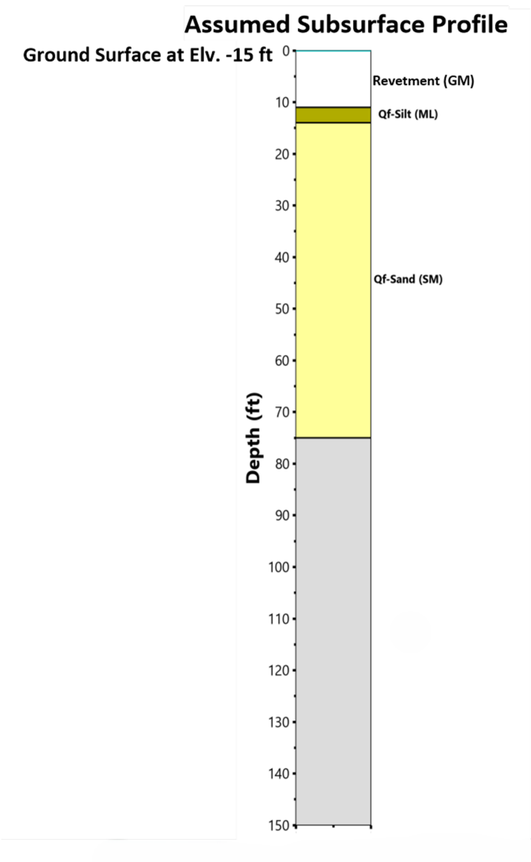
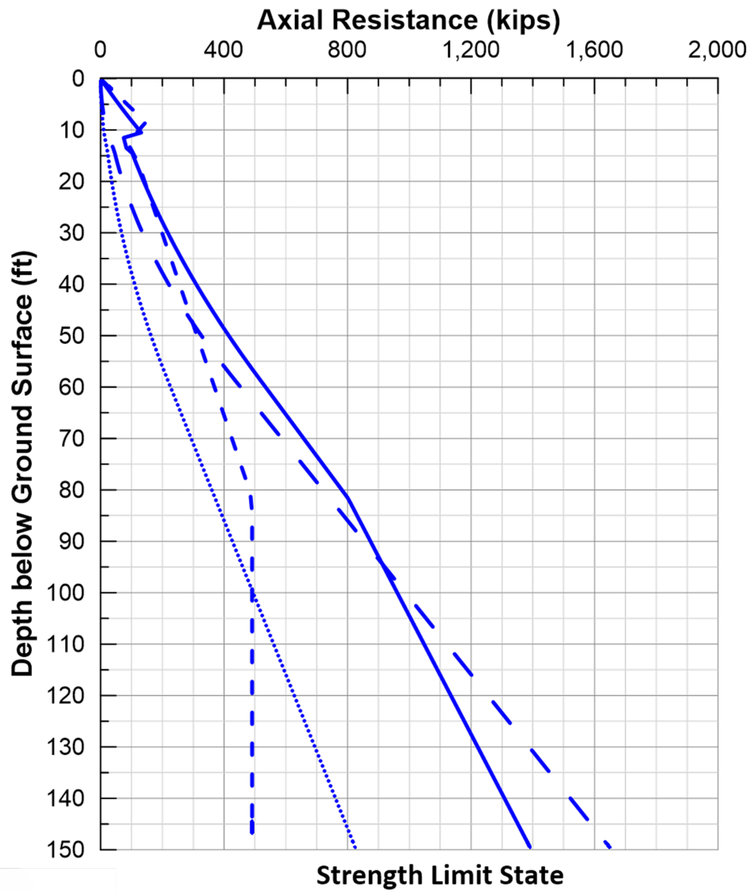
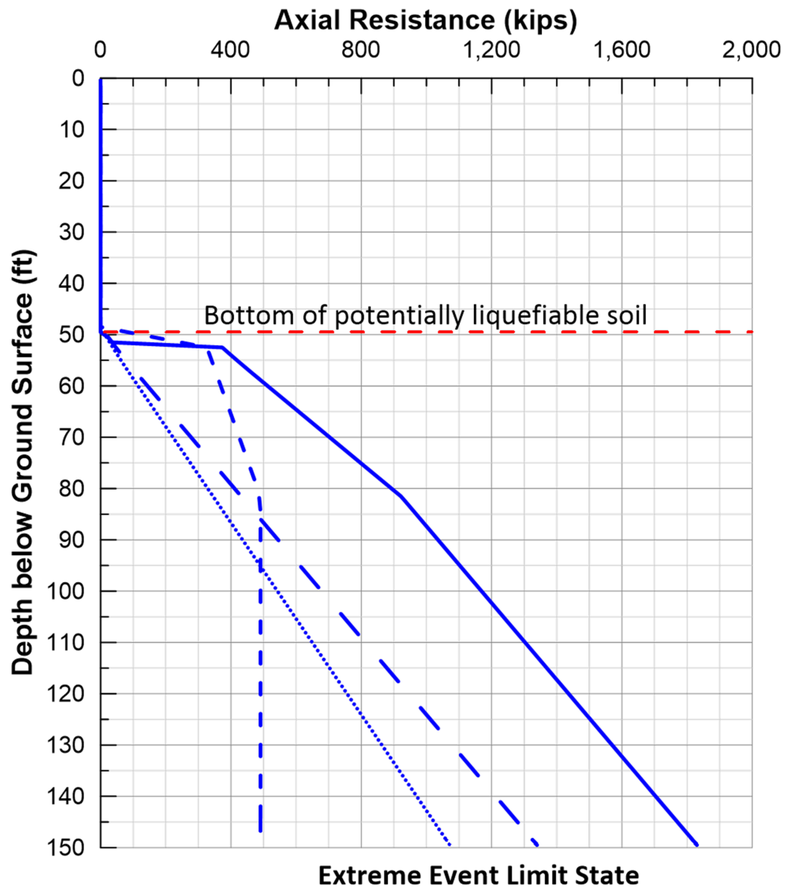
BRIDGEWATER GROUP







Assumed subsurface profile based on Soil Profile J-J'. At this design stage the Qf-Sand (SM) layer is assumed to extend below the bottom of the ground investigation data. Additional ground investigation data will likely be required to support final design. The scope and type of subsurface data required to complete the final design should be determined by the design-build contractor.

- Nominal Skin Resistance
- Nominal Base Resistance
- Factored Total Resistance (Compression)
- Factored Total Resistance (Uplift)

Notes:

Axial resistance values are based on preliminary foundation design developed to a 30% level in the 90% RD (refer to Structural Design Technical Memorandum – Appendix H) . Final design will be completed by the contracted Final Designer under a performance-based model.

Axial resistance of piles calculated per FHWA (2016), Design and Construction of Driven Pile Foundations – Volume 1.

Calculated axial resistance applies to single piles only; group effects not considered for piles spaced <3.0 diameters (center-to-center).

Factored total pile resistance shown on plots combines unfactored side and base resistances, multiplied by resistance factors:

- Strength limit state: 0.65 (compression), 0.5 (tension), assuming dynamic testing on ≥2% of production piles (Table 7-2, FHWA 2016).

- Extreme event limit: 1.0 (compression), 0.8 (tension), per AASHTO LRFD Bridge Design Spec (2020, Sec. 10.5.5.3.3).

Refer to Geotechnical Design Technical Memorandum, Attachment D, Table 4-4 for estimated consolidation and liquefaction induced down-drag loads.

Figure D-9

Estimated Axial Pile Resistance
Berth 306 & 307, Profile J-J'
Pile Location P-R6

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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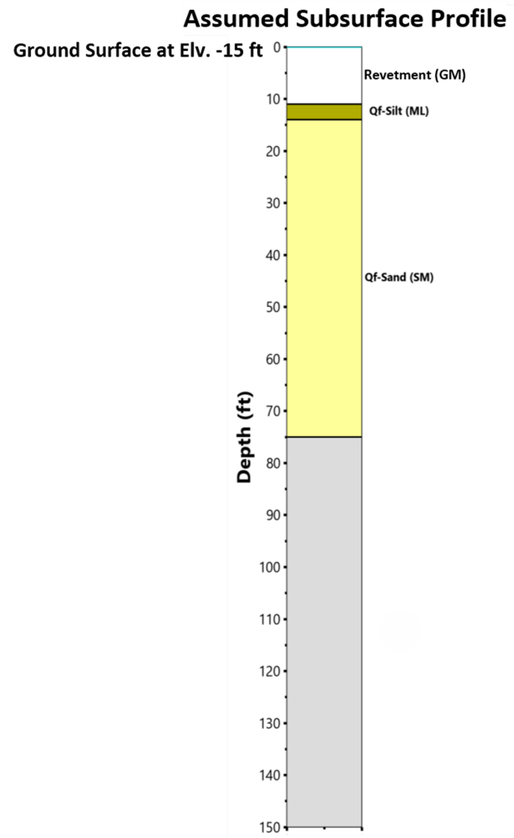

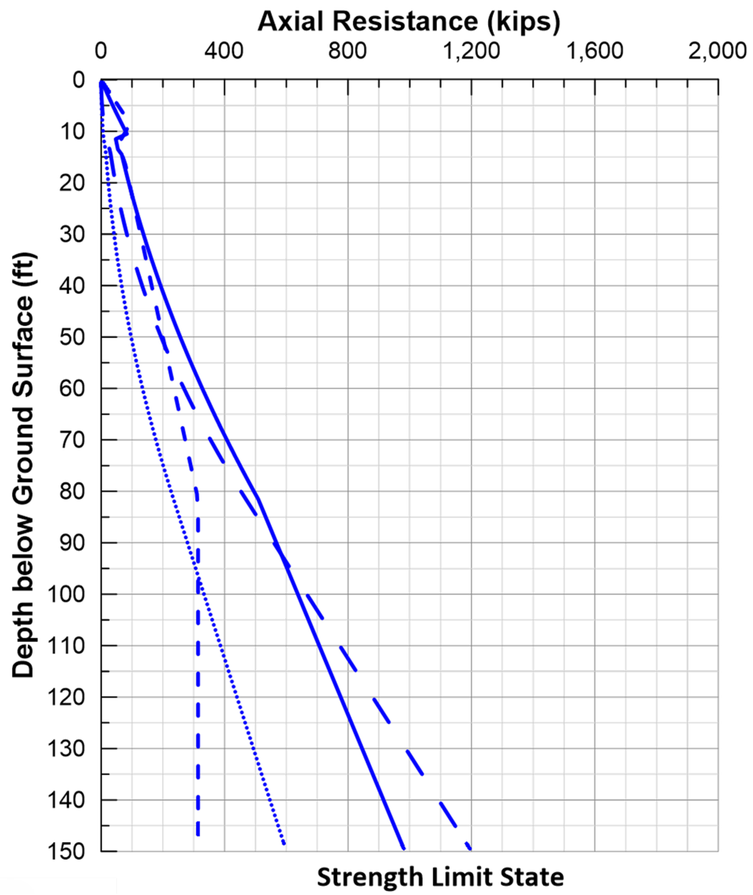

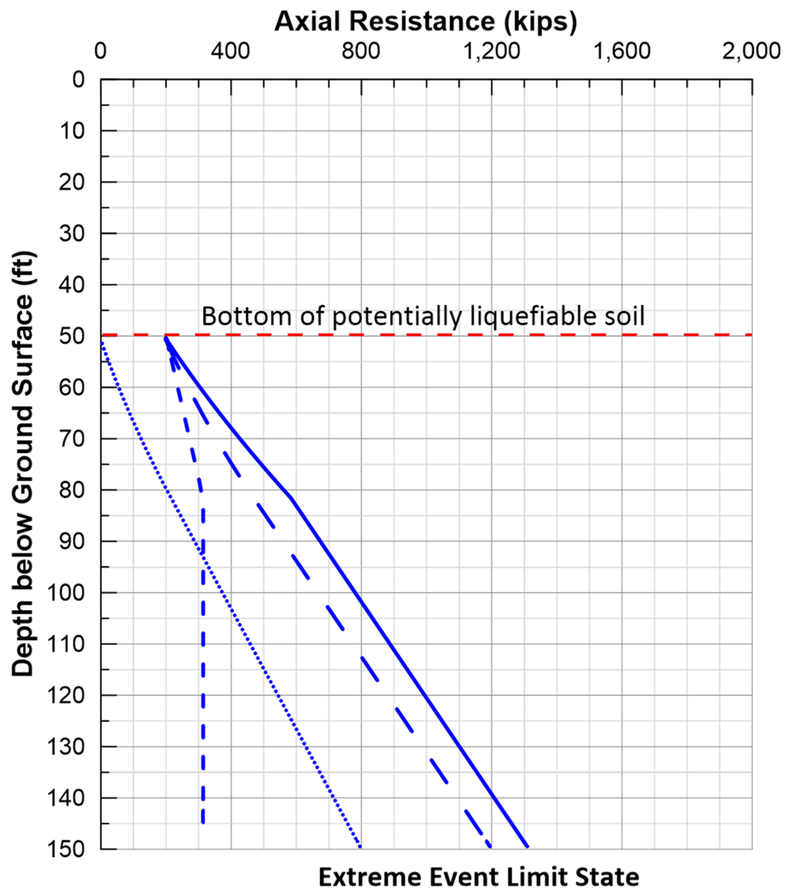

Assumed subsurface profile based on Soil Profile J-J'. At this design stage the Qf-Sand (SM) layer is assumed to extend below the bottom of the ground investigation data. Additional ground investigation data will likely be required to support final design. The scope and type of subsurface data required to complete the final design should be determined by the design-build contractor.

- Nominal Skin Resistance
- Nominal Base Resistance
- Factored Total Resistance (Compression)
- Factored Total Resistance (Uplift)

Notes:

Axial resistance values are based on preliminary foundation design developed to a 30% level in the 90% RD (refer to Structural Design Technical Memorandum – Appendix H) . Final design will be completed by the contracted Final Designer under a performance-based model.

Axial resistance of piles calculated per FHWA (2016), Design and Construction of Driven Pile Foundations – Volume 1.

Calculated axial resistance applies to single piles only; group effects not considered for piles spaced <3.0 diameters (center-to-center).

Factored total pile resistance shown on plots combines unfactored side and base resistances, multiplied by resistance factors:

- Strength limit state: 0.65 (compression), 0.5 (tension), assuming dynamic testing on ≥2% of production piles (Table 7-2, FHWA 2016).
- Extreme event limit: 1.0 (compression), 0.8 (tension), per AASHTO LRFD Bridge Design Spec (2020, Sec. 10.5.5.3.3).

Refer to Geotechnical Design Technical Memorandum, Attachment D, Table 4-4 for estimated consolidation and liquefaction induced down-drag loads.

Figure D-10

Estimated Axial Pile Resistance Berth 306 & 307, Profile J-J' Dolphin Pile

Date Prepared: July 2025
Geotechnical Design
Technical Memorandum
Swan Island Basin Remedial Design

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ATTACHMENT E
EXISTING MARINE STRUCTURES (PIER A AND QUAY WALL)

1.0 INTRODUCTION AND HISTORICAL BACKGROUND

The following attachment summarizes the stability and geotechnical analysis of the Pier A (also referred to as Berth 301) and the Quay Wall design area. The analysis presented herein was completed for the existing conditions and towards the 90% remedial design (RD). The purpose of this study is to examine the failure modes and document the analysis for the existing condition and the proposed solutions.

1.1 HISTORICAL BACKGROUND

Pier A was constructed in the mid-1940s and originally consisted of 28 diaphragm cells. However, the final structure included 20 diaphragm cells, 3 circular cells, and 1 closure steel sheet pile cell. During construction, eight diaphragm cells failed due to base failures caused by sliding and piping, which resulted from excessive hydrostatic head and impaired drainage during the hydraulic placement of fill material. These failures were documented in the "Swan Island, Dry Dock Basin, Foundation Failure" report. Consequently, the eight failed diaphragm cells were replaced with three circular cells and one closure steel sheet pile cell (CH2M Hill, 1975).

Variability was noted in the characteristics of the artificial fill depending on the method used and the variability is attributed to different methods used for placing the artificial fill, namely: the hydraulic method and the clamshell bucket and back dumping method. Additionally, the fill material might not have been properly compacted, leading to the presence of looser soil zones (CH2M Hill, 1975).

The failure and collapse were concluded as due to the splitting of the cell and the release of hoop pressure. The failure and collapse took place entirely above the mud line through a vertical split in the cell. No interlock failures occurred, although one tear was observed below the waterline. Additionally, several tears resulting from the bullrail collapse were observed above the waterline. The tear in the collapsed cell was identified at the welded connection between the base sheet and the outstanding leg of the connecting tee piece (CH2M Hill, 1975).

A metallurgical investigation was conducted as part of the 1975 failure investigation. The results indicated that the tear in the connecting tee was caused by poor penetration and fusion during the welding process. Conceptually, the internal failure process was interpreted to consist of several steps: (1) preexisting crack, (2) corrosion, (3) stress concentration, (4) crack propagation, and (5) further corrosion. These factors collectively reduced the section area to a level that could not support the design loads, ultimately leading to total failure (CH2M Hill, 1975).

The study analysed the effects of dredging at Pier A for feasibility purposes. Key findings include:

- **Dredging not recommended** riverward of the circular sheet pile cells at Pier A.
- **Dredge line** should stay at elevation -30 ± (SISRY datum) along the diaphragm cells.
- **Feasibility** of dredging in Berth 301 (diaphragm cells) if a 3H:1V slope is maintained.
- **Slope protection** with riprap recommended to prevent erosion and adverse conditions.
- **Drydock support** in Berth 301 should be supported independently of the diaphragm cells.

1.1.1 Pier A

The RD for the Swan Island Basin (SIB) Project Area is within the Portland Harbor Superfund Site in Portland, Multnomah County, Oregon. The Pier A design area, (Figure 1-1, Plan Area 7 and partial Plan Area 8) is located to the west of the Port of Portland Berth 302 (Lagoon Wharf, Partial Plan Area 8). Pier A was also referred to as Berth 301 in the 1975 and 1981 dated historical reports (#SR SI 1975 0026 00 and #SR SI 1981 0041 00). Pier A was built in 1944 and 1945 and is constructed of 20 diaphragm cells, 3 circular cells, and 1 closure steel sheet pile cell. The width of the Pier A structure is approximately 52 feet (ft) from the stations 52+00 to 43+00. The sheet piles are approximately 105 ft long and embedded to the elevation of -68 on the waterfront side, and approximately 87 ft long, embedded to elevation of -55 on the landward side of the Pier A.

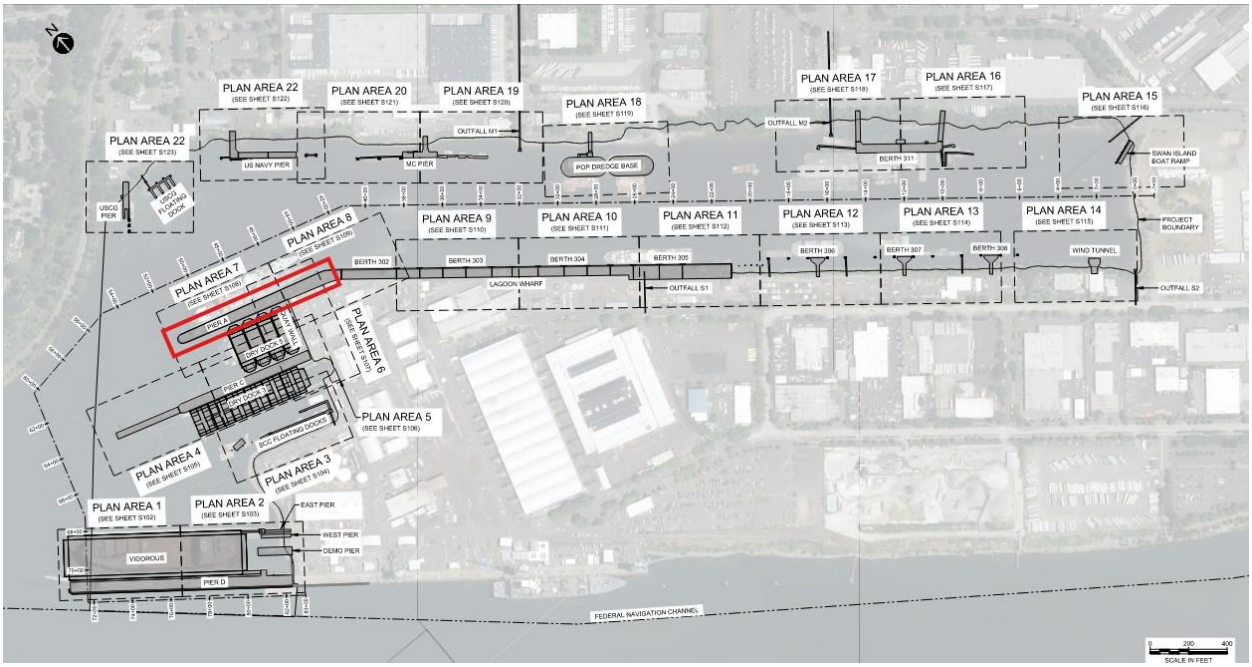

Figure 1-1 Pier A Layout

1.1.2 Quay Wall

The Quay Wall design area, (Figure 1-2, Plan Area 6) is located between the span of Pier A and Pier C. The Quay wall (also referred to as Dry Dock 5) is an earth-retaining structure and consists of a series of nine circular steel sheet pile cells with connecting arcs, one steel sheet pile closure cell, one diaphragm wall, and a section of anchored steel sheet pile bulkhead. The circular sheet cells are constructed of 172 pieces of SP-6 flat-web interlocking sheet piling (15 inch [in] wide with a 3/8 in thick web) with a diameter of 68.42 ft. The sheet piles are approximately 105 ft long and consist of two sheets spliced together with a steel plate and bolts. The splice is generally between the elevation -20 ft and elevation -35 ft. The structure lies between the stations 61+00 to 63+00.

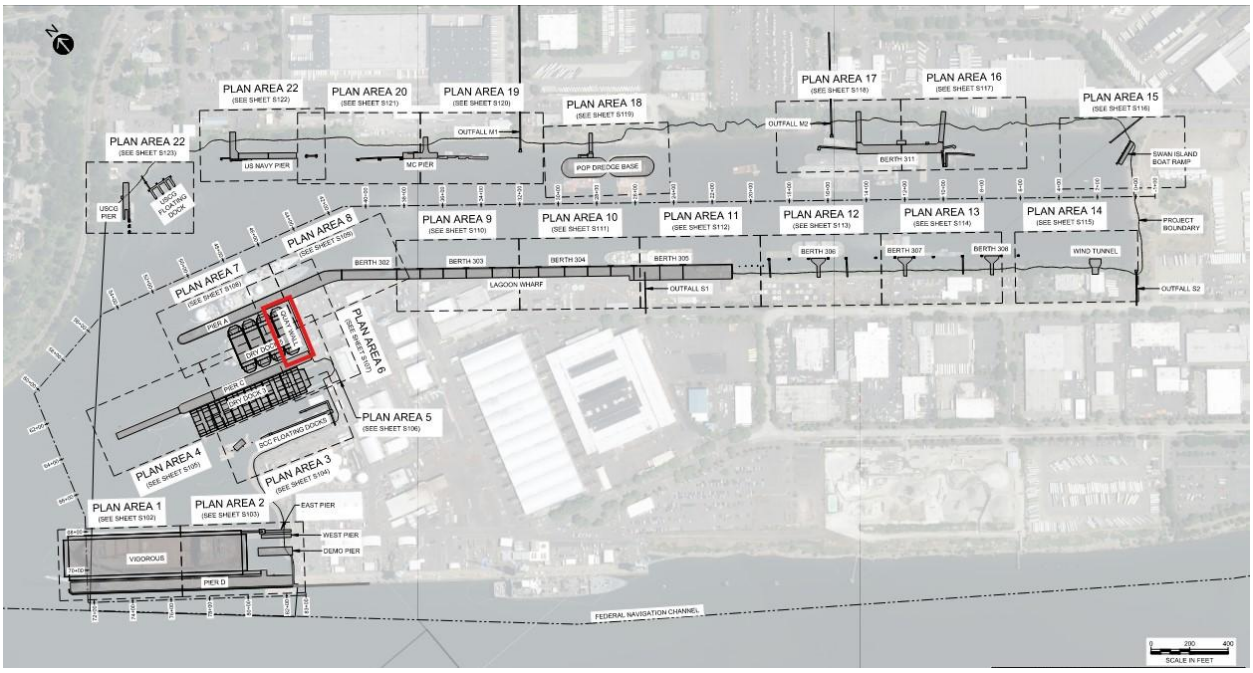

Figure 1-2 Quay Wall Layout

2.0 ANALYSIS METHODOLOGY

The objective of the analyses carried out for this study is to assess the stability of Pier A and the Quay Wall. The procedure taken to achieve this is as follows:

1) Review Foundation Failure Report (CH2M Hill, 1975) and reproduce safety factors for various failure modes associated with the static existing conditions.
    a. Leverage more modern analytical techniques where possible.
    b. Include sensitivity cases to address uncertainty in the engineering soil parameters.
2) Carry out additional analyses of the existing condition which consider the dynamic thrust from the Contingency Level Earthquake (CLE). These are used to verify the overall adequacy of the systems in the existing condition.
    a. Preliminary analyses suggest that both systems are adequate in the existing condition, so long as the structural integrity of the walls have not been compromised (i.e. properly installed/maintained welds, etc.).
3) Optimize revetment geometries which enable deeper dredge depths to some distance from the face of the cells but preserve the stress states adjacent to the walls.
    a. Requires estimation of back of wall pressures before and after implementing proposed revetment solutions.
    b. Facilitated with the implicit Finite Element software Plaxis 2D (v 2024.2 by Bentley).

2.1 SCOPE

The primary goal of the analyses discussed herein is to assess the existing stability of the Pier A and Quay Wall structures under static, CLE, and post-seismic conditions. Furthermore, the analysis models developed for this purpose are also leveraged to optimize revetment solutions which will enable as much dry dock working area as possible through additional dredging without compromising stability. Failure modes of concern for structures such as these include bearing capacity, interlock splitting, internal shear, foundation sliding, and overturning. While interlock failure was found to be the governing Factor of Safety (FoS) in the existing condition, bearing capacity is observed to be the most sensitive failure mode to the effects of additional dredging. The mode of failures and limit equilibrium calculation approaches are presented in Section 2.7.

2.2 GEOMETRY

2.2.1 Pier A

The crest of the riverbank varies between elevations of -35 to -40 ft North American Vertical Datum of 1988 (NAVD88). Pier A is supported by steel sheet piles, ranging from 36 ft to -68 ft in height towards the river. Similarly, towards the landward the piles range from 36 ft to -55 ft high. The water level considered in the model is at the elevation +5.1 ft NAVD 88, which represents an estimate of low water values reached during low tides during the summer, based on measured Willamette River water levels.

2.2.2 Quay Wall

Each cell of the Quay Wall consists of interlocking steel sheet piles driven into the riverbed in a circular configuration, typically measuring approximately 60 ft in diameter. The sheet piles extend to depths of about 70 to 80 ft below the top of the wall, depending on the riverbed elevation and the required embedment for stability. The exposed height of the cells, from the dredged riverbed to the working surface, is generally between 40 and 50 ft.

2.3 GROUND MODEL AND GEOTECHNICAL PARAMETERS

The Pier A and Quay Wall project site comprises of a simplified ground model. Both these structures consist of circular cellular cofferdams. The fill material inside these cells is referred to as ‘cofferdam fill’ and exists from +36 ft NAVD88 to an approximate depth of -68 ft (riverward) and -55 ft (landward). An alluvium layer consisting of sand underlying the cofferdam fill and the dredge surface is observed to extend up to approximately 20 to 30 ft deep. The water level considered in the model is at the elevation +5.1 ft NAVD 88.

The ground model implemented in the finite element analysis (FEA) is based on the soil stratigraphy obtained from the geotechnical field investigations at the project site. Figure 2-1 presents the geotechnical section N-N` from the Geotechnical Design Technical Memorandum (GDTM).

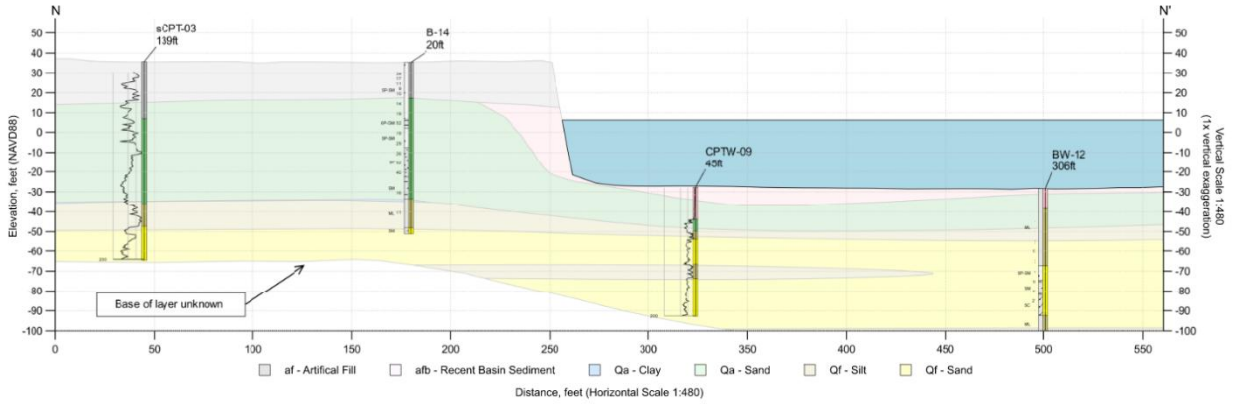

Figure 2-1 Geotechnical section showing the stratification for Pier A and Quay Wall

The baseline soil properties and material models implemented in the Finite Element (FE) models are presented in **Table 2-1**.

Table 2-1
Soil Material and Properties Implemented in FEA

Soil	Material Model[1]	c' [psf]	φ'[2] [deg]	Unit weight [pcf]	E [ksf]	υ [unitless]	κ/λ [unitless]
Alluvium	MC	500	30	120.0	300	0.30	-
Cofferdam Fill	MC	1.0	33	110.0	600	0.30	-
Rip Rap	MC	1.0	44	140.0	3.13E+06	0.30	-

Notes:
[1] MC: Mohr-Coulomb Model
[2] Critical State Friction Angle

2.3.1 Seismic Parameters

Since no new structures are to be built to satisfy the Remedial Action (RA) for Pier A and/or the Quay Wall, the only seismic shaking demand considered herein is the CLE (i.e. the systems may not remain operational after a 475-year event).

The CLE is defined as a seismic event associated with a 475-year return period. This corresponds to a peak ground acceleration (PGA) of 0.23g, according to the U.S. Geological Survey (USGS) hazard tool. This was implemented in a pseudo-static fashion in Plaxis 2D using a horizontal acceleration factor k_h = 50% PGA (ODOT, 2024; AASHTO, 2020).

2.3.2 Post-Seismic Liquefaction Parameters

Triggering assessments based on the assumed ground parameters and CLE demands suggest that the Pier A and Quay Wall cellular cofferdam backfill material may liquefy during a CLE seismic event. Screening level 2D FEA was carried out assuming material within the cells liquefied with a resulting vertical stress ratio of 20 percent. Based on the assumed ground parameters, CLE demands, and liquefied cellular cofferdam backfill material, the 2D FEA results indicate a FoS of greater than 1.1 at both Pier A and Quay Wall. Considering the screening analysis results, no additional analyses considering liquefied cellular cofferdam backfill material were carried out.

2.4 SENSTIVITY STUDIES ON EXISTING CONDITION

To observe the influence of soil property variations on the stability and performance of the Pier A structure, a comprehensive parametric analysis was undertaken.

The soil properties used for the parametric study with 15% increased and 10% decreased soil parameters analysis are given in Table 2-2 and Table 2-3, respectively.

Table 2-2 Soil Material Properties for Pier A parametric study with 15% increase

Soil	Material Model[1]	+ 15% (Case 1.2 and Case 2.2)					
		c'	φ'[2]	E	κ/λ	M	c'_{ref}
		[psf]	[deg]	[ksf]	[unitless]	[unitless]	[ksf]
Alluvium	MC	575	35	345	-	-	0.575
Cofferdam Fill	MC	1.15	38	690	-	-	0.00115
Rip Rap	MC	1.0	51	3.60E+06	-	-	0.001

Notes:
[1] MC: Mohr-Coulomb Model
[2] Critical State Friction Angle

Table 2-3 Soil Material Properties for Pier A parametric study with 10% decrease

Soil	Material Model[1]	+ 15% (Case 1.3 and Case 2.3)					
		c'	φ'[2]	E	κ/λ	M	c'_{ref}
		[psf]	[deg]	[ksf]	[unitless]	[unitless]	[ksf]
Alluvium	MC	450	27	345	-	-	0.450
Cofferdam Fill	MC	0.9	30	690	-	-	0.0009
Rip Rap	MC	1.0	40	3.60E+06	-	-	0.001

Notes:
[1] MC: Mohr-Coulomb Model
[2] Critical State Friction Angle

2.5 REVETMENT GEOMETRY OPTIMIZATION

To develop an efficient and stable revetment configuration for Pier A, a series of design iterations were conducted using the existing 2D Plaxis model (refer to Figure 2-2). The primary objective was to identify the minimum revetment lengths that would maintain structural stability while maximizing the available dry dock working area through additional dredging. These iterations focused on optimizing the geometry of riprap buttressing on both the north (riverward) and south (landward) sides of Pier A, without altering the structural configuration of the pier itself.

Each optimization trial involved systematic adjustments to the revetment lengths and, in some cases, the slope geometry. The performance of each configuration was evaluated based on the resulting back-of-wall pressures, which served as an evaluation for structural demand and overall stability.

2.5.1 Summary of Trial Geometries

For each successful baseline trial listed below (i.e. all except trial 3), 100 stochastic iterations were carried out in an automated fashion, assuming coefficients of variation of 5% for listed mean/baseline geometric parameters and 25% on engineering soil parameters. The commentary on resulting back-of-wall pressures in the list below only pertain to the mean/baseline values for each optimization trial. While back-of-wall pressures did vary slightly between stochastic runs associated with the same baseline trial, stability was checked and found to be adequate for all

iterations except those associated with trial 3. In total, 500 of the attempted 600 Plaxis 2D simulations were carried out to completion as part of this optimization exercise.

1) Trial 1:

   Note: For Trials 1 to 4, top of revetment was modeled horizontally to match the historic mudline at -42 ft elevation.

   a. Baseline configuration with 30 ft (north) and 15 ft (south) revetment lengths.
   b. Slopes of 20.7° (north) and 31° (south).
   c. Back-of-wall pressures: -3463 lbf/ft² (north), -4292 lbf/ft² (south).

2) Trial 2:

   a. Revetment lengths: reduced north revetment to 22 ft; south remained at 15 ft.
   b. Slopes unchanged.
   c. Back-of-wall pressures: -3352 lbf/ft² (north), -3710 lbf/ft² (south).

3) Trial 3:

   a. Revetment lengths: reduced north revetment to 17 ft; south remained at 13 ft.
   b. Slopes unchanged.
   c. Model failed to converge due to instability.

4) Trial 4:

   a. Revetment lengths: increased north revetment to 20 ft; south remained at 15 ft.
   b. Slopes unchanged.
   c. Back-of-wall pressures: -3974 lbf/ft² (north), -3770 lbf/ft² (south).

5) Trial 5:

   Note: Trials 5 and 6 introduced a sloped transition at the top of the revetment to evaluate its influence on wall pressures. However, these modifications did not yield significant changes in the pressures.

   a. Revetment lengths: 20.1 ft (north), 15 ft (south)
   b. Slopes: 20.7° (north) and 31° (south) from historic mudline to dredge depth; 4.7° slope added at the top of the north revetment.
   c. Back-of-wall pressures: -3945 lbf/ft² (north), -3740 lbf/ft² (south).

6) Trial 6:

   a. Revetment lengths: 20.5 ft (north), 15 ft (south).
   b. Slopes: 20.7° (north) and 31° (south) from historic mudline to dredge depth; 13.1° slope added at the top of the north revetment.
   c. Back-of-wall pressures: -3874 lbf/ft² (north), -3592 lbf/ft² (south).

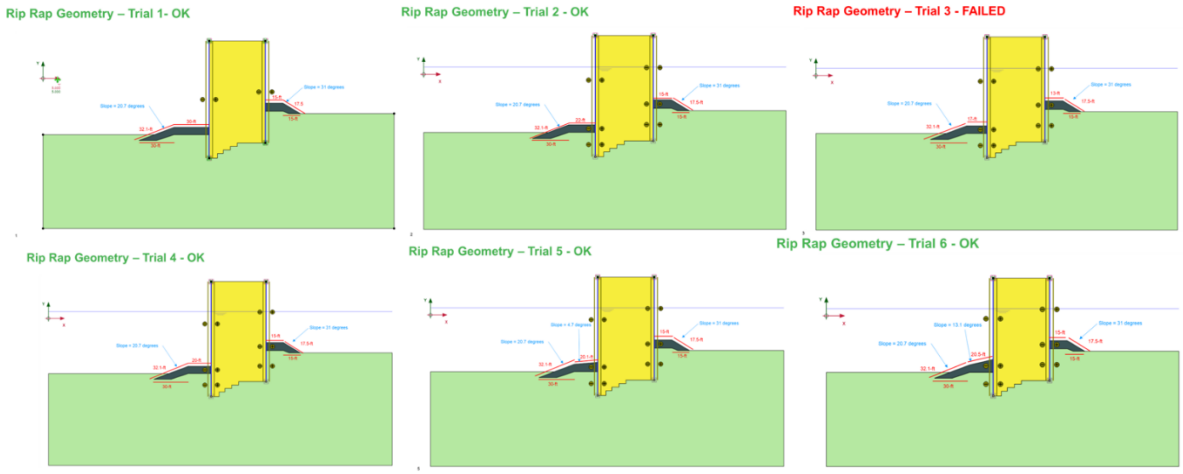

Figure 2-2 Range of revetment solutions considered

2.5.2 Conclusion and Final Optimized Geometry

Based on the comparative performance of all configurations, Trial 4 was adopted as the final design. This geometry offers a balance between structural stability, maximum dry dock, and material efficiency. The optimized revetment geometry consists of a 20 ft length on the north side and 15 ft on the south side, with slopes of 20.7° and 31°, respectively.

The revetment design for the Quay Wall was subsequently developed based on optimized geometry from the Pier A analysis.

2.6 STRUCTURAL ELEMENTS PROPERTIES

Initially, closed form solutions were carried out to determine the factors of safety against the failure modes defined in the next section. The outcome of that exercise confirmed the findings from the historical report (CH2M Hill) for the static condition and provided the first quantitative indication that the system is acceptable stable under CLE demands. With this knowledge, revetment geometries were then optimized to enable deeper dredge depths some distance away from the cell walls by ensuring the stress state on the inside of the wall did not change in an unfavorable way as a result of installing the revetment. Since this framework only requires models to capture internal wall pressures (as opposed to accurate global factors of safety), simplifications were made to expedite model development and run time. One of these pertains to the cell walls, which were modeled as rigid to ensure conservative estimates of back of wall pressures. The Figure 2-3 below illustrates the nature of the structural aspects of the model.

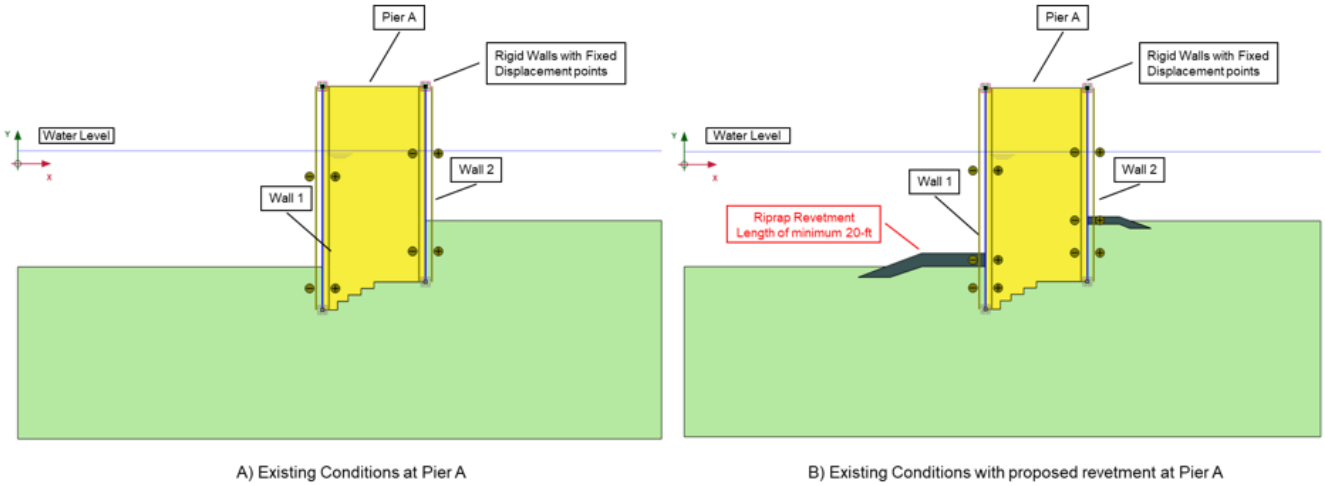

Figure 2-3 Structural Elements for Pier A

2.7 LIMIT STATES

Due to the complex interactions between cellular cofferdam geometry, sheet piles, and cell fill, there are no theoretical solutions for these FoS. The analysis might be further complicated due to fluctuation of water levels and the possibility of flooding in river environments. Thus, cofferdam design relies on semi-empirical methods, with three main approaches having a history of reasonable success: (1) Former Tennessee Valley Authority (TVA) methods (a.k.a., Terzaghi's method), (2) Cummings method, and (3) Hansen's (Danish) method. The current study followed TVA Method (Terzaghi's Method) for semi-empirical approach (Bowles, 1997).

Based on the TVA Method, the following internal and external FoS checks for cofferdams are recommended for limit state calculations for stability and design of a cofferdam (Bowles 1997; U.S. Army Corps of Engineers, Engineering Manual 1110-2-2503):

(a) Cell sliding (external stability)
(b) Cell overturning (external stability)
(c) Cell bursting (internal stability)
(d) Cell shear along the centerline (internal stability)
(e) Bearing capacity and settlement (external stability)

Figure 2-4 shows the failure modes and Figure 2-5 shows the pressure profile and terminology used for the dimensions.

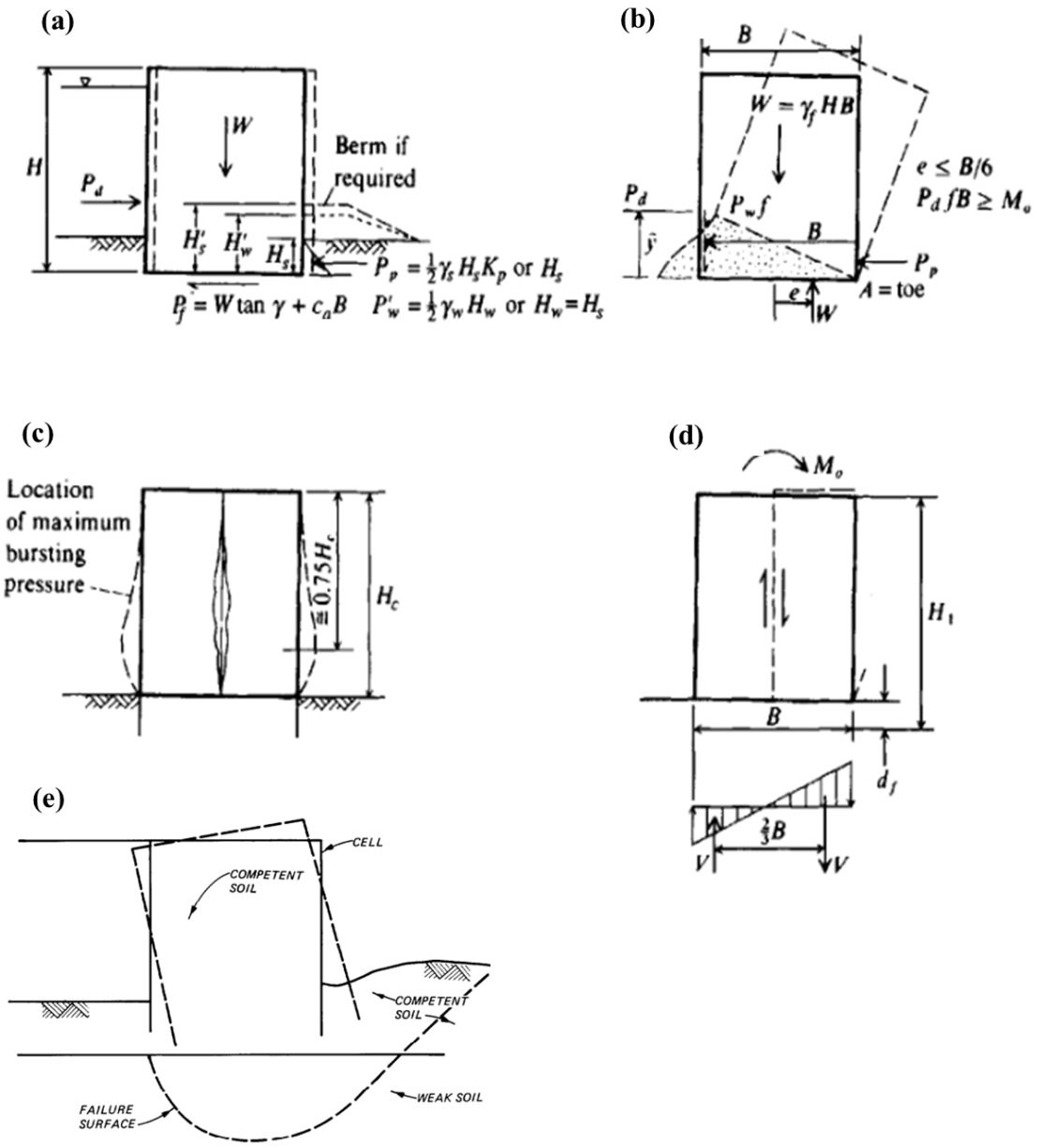

Figure 2-4 External (a) sliding, (b) overturning, and internal (c) interlock tension (d) shear (After Bowles, 1996) and external (e) bearing capacity (After USACE, 1989) failure modes considered for Pier A and Quay Wall structures

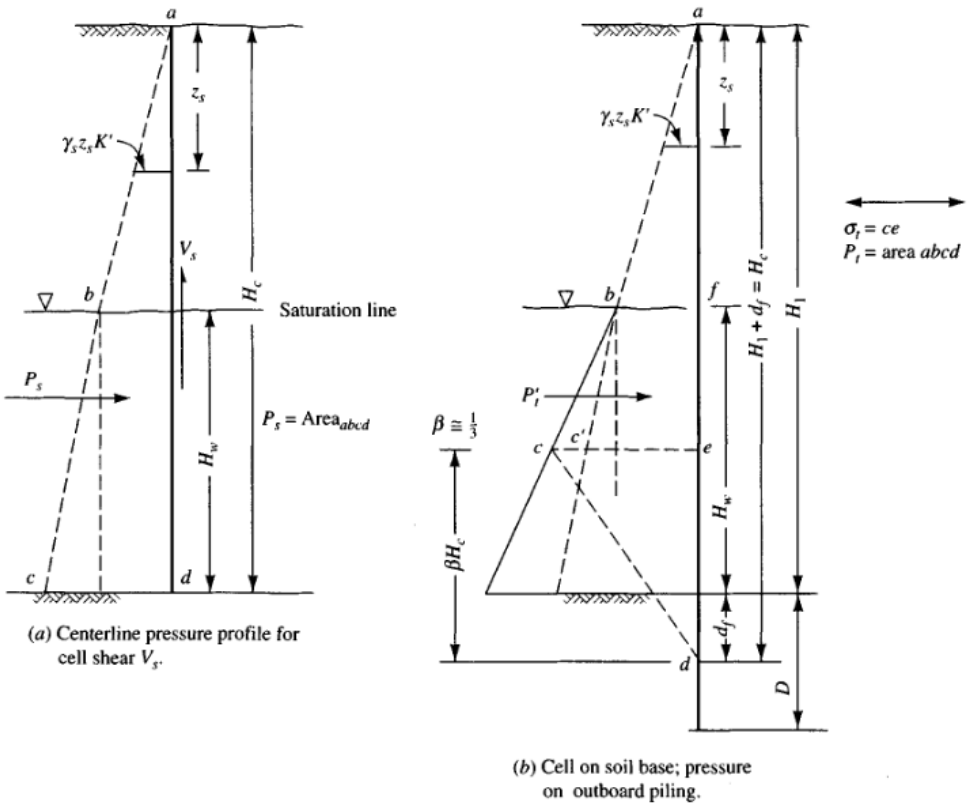

Figure 2-5 Pressure profiles for centerline shear, interlock friction and interlock tension (After Bowles, 1996)

For Pier A and Quay Wall structures, the recommended internal (i.e. cell bursting and cell shear) and external failure (i.e. cell sliding, cell overturning and bearing capacity) modes were investigated. The results are compared with the factor of safety results given in 1975 dated CH2M Hill report (Roth and Ramage, 1975) and presented in Section 3.0.

2.7.1 Cell Sliding Failure

It is essential to consider the structural behavior, how compressive and shearing loads are transmitted to the foundation, the foundation's response to these loads, and the secondary effects on the structure to properly assess sliding stability. As an external failure analysis, sliding is grounded in the principles of structural and geotechnical mechanics.

In this analysis, only force equilibrium is considered, and moment equilibrium is not applied. The shearing force parallel to the interface of any two wedges is assumed to be negligible. Therefore, the failure surface at the bottom of each wedge is influenced only by the forces directly above or below it, with no vertical interaction between wedges. Displacement considerations are excluded in the limit equilibrium approach (USACE, 1989).

Based on horizontal forces applied to the section, sliding stability number, N_s, is calculated as follows (Bowles 1996):

$$N_s = \frac{P_p + P_f + P'_w}{P_d + P_a} > 1.10 \quad \text{(Eq.1)}$$

$$P_f = W\ tan\delta + c_a\ B \quad \text{(Eq.2)}$$

$$P_d = P_w = \frac{1}{2}\ \gamma_w\ H_w^2 \quad \text{(Eq.3)}$$

$$P_p = \frac{1}{2}\ \gamma'_s\ H_s^2 K_P \quad \text{(Eq.4)}$$

$$P_a = \frac{1}{2}\ \gamma'_s\ D^2 K_a \quad \text{(Eq.5)}$$

$$P'_w = \frac{1}{2}\ \gamma_w\ H'^2_w \quad \text{(Eq.6)}$$

where, P_p is passive resistance, P_f is friction on base, P'_w is berm water force, H'_w is the water depth on basin side, and, P_d is driving force which is generally outside water (P_w) (Figure 2-4[a]). In Eq. (1) active earth force, P_a , is neglected unless the embedment depth, D, is more than about 5.74 ft.

2.7.2 Cell Overturning Failure

Cofferdams, as a soil-filled cellular structure are not rigid gravity structures prone to overturning at the toe of the inboard side. Overturning would only occur after failures like sheet pile pullout at the heel and loss of cell fill. However, a gravity-block analysis can help determine the necessary cell diameter. Since the cell fill cannot resist tension, the cell should be designed so that the resultant forces fall within the middle third of the equivalent rectangular (Figure 2-6) base (USACE, 1989). To prevent overturning, and considering that soil cannot withstand tension forces, the resultant weight, W, should be positioned within the middle one-third of the base (Figure **2-**2-4[b]).

$$e = \frac{P_d\,\bar{y}}{\gamma HB} \quad \text{(Eq.7)}$$

As the second possibility, in case, the cell tip over and the soil will pour out at the heel, the friction resistance between the cell fill and the water-side sheet-piling must develop from the water force $P_d = P_w$. Required average cell width, B, can be calculated from the total moment about the toe of the cell (Figure 2-[b]).

$$B = \frac{\bar{y}}{\tan\delta} \quad \text{(Eq.8)}$$

where is the angle of friction between cell fill and steel and may be estimated at about 0.6 to 0.70 Ø. Depends on the size of the embedment depth, the active and passive soil pressures (Figure 2-7) on the overturning moment and friction resistance should be included to total moment about point A in Eq. (8).

The stability number for overturning, N_{ot}, is calculated as follows:

$$N_{ot} = \frac{B \tan\delta}{\bar{y}} \qquad \text{(Eq.9)}$$

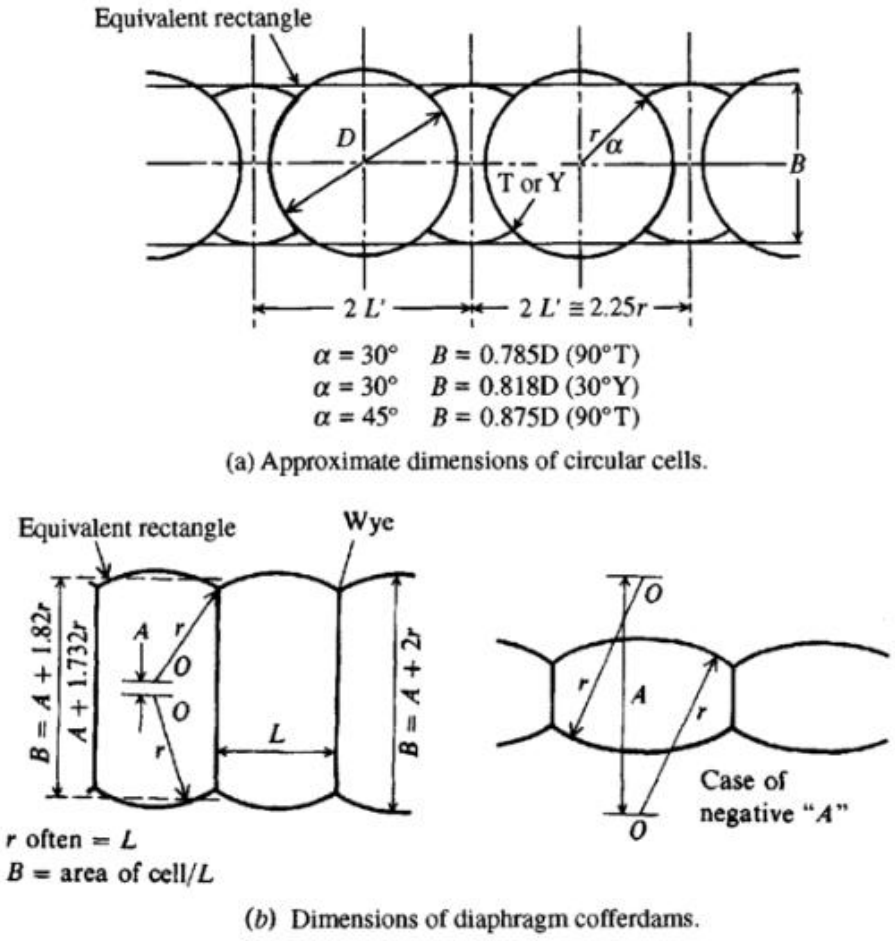

Figure 2-6 Equivalent rectangle dimensions for (a) circular cells and (b) diaphragm cofferdams (Bowles, 1996)

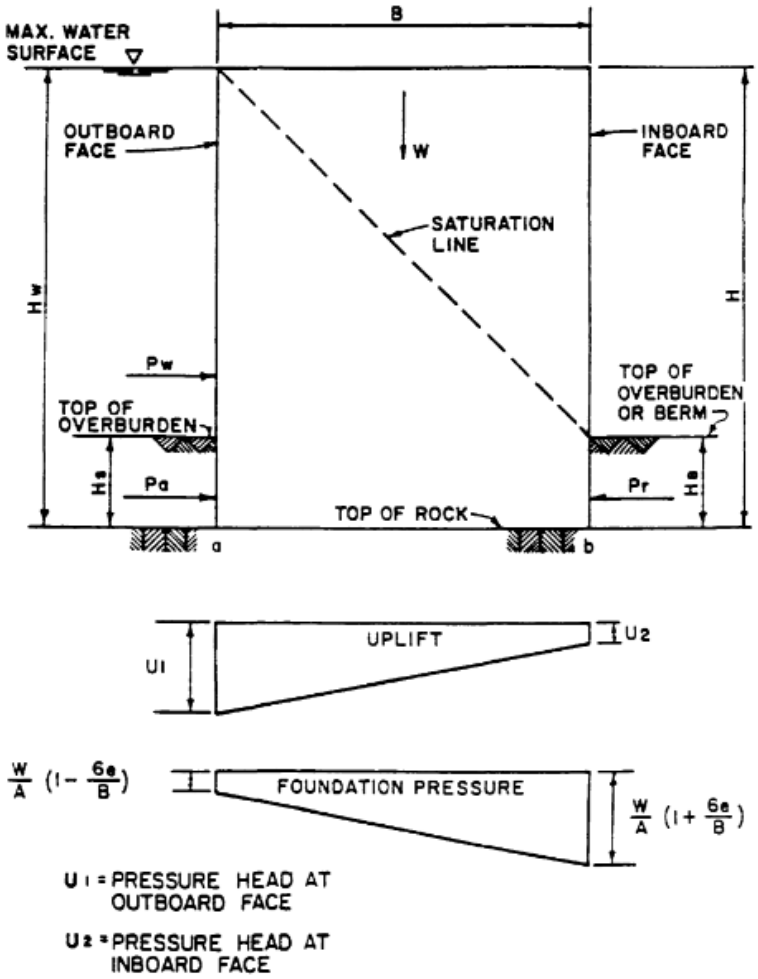

Figure 2-7 Typical loading and nomenclature for overturning stability of cells (USACE, 1989)

2.7.3 Cell Bursting- Sheet Pile Interlock Tension Failure

Cofferdam cells must be stable against bursting pressures, which can cause the piles to pull apart at the joints. During filling, lateral pressures develop and increase over about 10 days as the fill consolidates. The cell expands in response to these pressures, with the extent of expansion depending on whether the base is restrained by rock or embedded in the ground. The expanded cell takes on a bulged shape, most pronounced at one-fifth to one-third of the cell's free height above the dredge line or rock.

The point corresponds to $H_c/4$ (Figure **2**-2-4[c] and Figure 2-5) for cells is most critical for interlock tension evaluation. Maitland and Schroeder (1979) suggest finding this point as one-third of the modified cell height, H, based on the depth of fixity, d_f, below the dredge line when the cell is embedded in soil.

Estimated point of fixity in sand as the point of zero pressure and zero deflection is computed following equations (Eq.s 9 and 10). If the dredge line soil has $\emptyset = 0$, a depth of fixity (d_f) value between 1 and 1.65ft is recommended (Bowles, 1996).

$$H_1 = H_c + d_f \quad \text{(Eq.9)}$$

$$d_f = \frac{P_a}{\gamma'(K_p - K_a)} \quad \text{(Eq.10)}$$

Where, $H_c$is free cell height (Figure 2-5[b]), γ' is effective unit weight below the outside dredge line, K_o is passive and K_a active Rankine earth pressure coefficients for the soil below the dredge line.

The depth of $H_c/4$ (Figure 2-5[b]) can be used to estimate the lateral subgrade modulus in the embedded part of the pile. This estimation is generally as accurate as using and γ. The design results are similar whether $H_c/4$ or $H_c/3$ is used or $H_1=H_c$ can be used in case it is chosen not to determine d_f.

The pressure intensity q_t (Figure 2-5[b]) is used to calculate the critical interlock tension t_i.

$$t_i = \frac{q_t r}{C_l} \leq \frac{t_u}{FoS} \quad \text{(Eq. 11)}$$

where, q_t is pressure intensity (Figure 2-5[b]) in kPa or k/ft^2; C_l is constant (use 1 if q_t in kPa or use 12 if q_t in k/ft^2); t_u is ultimate interlock value (given in Table 3-1 and Table 3-2) in kN/m or k/in.; FoS values are given in Table 3-1 and Table 3-2.

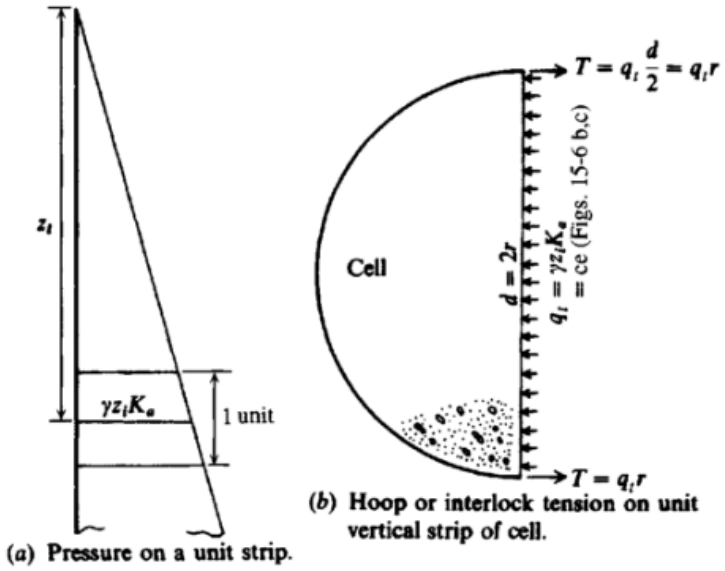

Figure 2-8 Calculation of cell interlock tension force. Using K` = Ka is suggested to calculate force Ps given in Figure 2-5(b)(Bowles, 1996)

Based on TVA (1966), the interlock tension of the connection pieces can be computed from the free body of the cell as given in Figure 2-9. The interlock tension in the connection is calculated using total force as follows:

$$T_{it} = \frac{q_t L}{\cos \alpha} \quad \text{(Eq. 12)}$$

where, L = 0.5 L` (Figure 2-9). The maximum interlock tension is depended on to use of a 30° Y or of a 90° T connection.

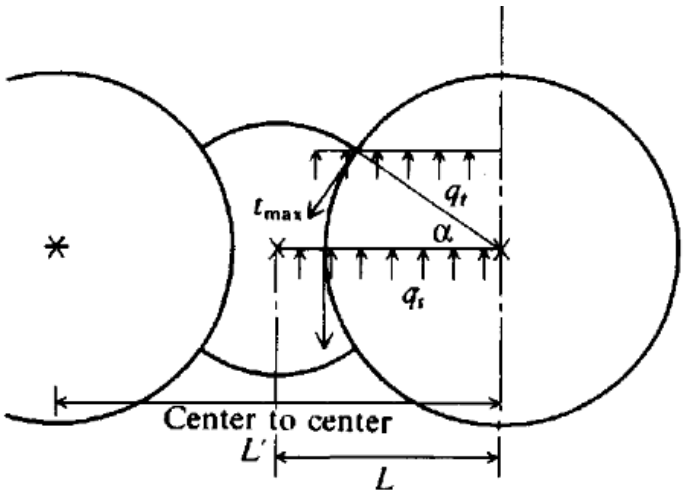

Figure 2-9 Y or T connection stresses based on TVA (Bowles, 1996)

2.7.4 Cell Shear Failure

To ensure stability against shear failure along the centerline of the cell, the combined shear resistance from the soil and interlocks must be at least equal to the shear caused by overturning. Assuming a linear pressure distribution across the cell's base, we can analyze this scenario. With the assumption of linear pressure distribution across the cell base (Figure 2-4[d]), the moment about the center of the cell:

$$M_o = \frac{2}{3} BV \quad \text{(Eq. 13)}$$

and V is driven from Eq. 13:

$$V = \frac{3}{2} M_o / B \quad \text{(Eq. 14)}$$

$$V_r = V_s + R_{il} \quad \text{(Eq. 15)}$$

$$V_s = P_s \tan \delta \quad \text{(Eq. 16)}$$

where, V_r is resisting shear; V_s is soil shear resistance; R_{il} is interlock resistance; P_s total shear force applied by soil.

For the stability, the total shear resistance force must be greater than total vertical shear force calculated by Eq. 14:

$$V_r \gg V \quad \text{(Eq. 17)}$$

There are different suggestions for the earth-pressure coefficient value, K' in the literature. While K' may be computed using the Mohr's circle construction, Maitland and Schroeder (1979), suggested using the K' value of 1, and Bowles suggested to use the value of 0.56.

2.7.5 External Bearing Capacity Failure

Bearing capacity (Figure 2-4[e]) recommended to be considered when cofferdams are based on soil. For the limit state calculations, first the cofferdam is converted to an equivalent rectangle (Figure 2-6). A unit width B (=1) and an initial L qual to the equivalent rectangle B are used for the calculations. The base eccentricity, e, is calculated using overturning failure considerations. Then, the effective foundation $L' = L - 2e$ is calculated. Then bearing capacity is calculated using Hansen bearing capacity equations with the effective base dimensions of $B \times L'$. this value is compared with the bearing capacity value under the toe half of the base (Bowles, 1996).

In the current study, bearing capacity was evaluated using Plaxis 2D, with empirically derived closed-form solutions serving as validation. Closed-form assessments followed traditional Terzaghi bearing capacity theory and generally matched well with outcomes from FE modeling, but it is noted that the ability of the FE models to capture eccentricity with greater accuracy likely led to slightly lower FoS from those simulations. Hence, the FoS from the Plaxis FE models are reported in the results sections for both Pier A (3.1) and Quay Wall (3.2).

3.0 RESULTS

3.1 PIER A

3.1.1 Stability

The FoS values obtained from stability analyses carried out in Plaxis 2D for Pier A are shown in the Table 3-1 below. These values are associated with the most onerous cross section determined through a preliminary taxonomic assessment. Based on the analyses carried out, the minimum embedment depth along the North side of Pier A must be at least 26.7 ft whereas along the South side it must be at least 24.5 ft.

Table 3-1
FoS values of internal and external failure modes obtained from current study and CH2M (1975) for Pier A.

Mode of Failure	FoS for Pier A				
	CH2M 1975 as-built	MM as-built [4]	Recommended FoS [1]	MM, as-built	Recommended FoS [1]
	Static			CLE[6]	
Internal – Tension [5]	1.70	1.73[3]	1.50	1.56	1.30
Internal - Shear	1.60	1.61	1.50	1.41	1.30
External – Bearing Capacity	3.20	3.30	3.00	2.14	1.50
External - Sliding	1.60	1.60[2]	1.50	1.39	1.10
External - Overturning	2.50	2.50[2]	3.00	2.18	1.30

[1] Based on Department of the Army U.S. Army Corps of Engineers, 1989. Engineering Manual 1110-2-2503

[2] Assumes water is only present on one side (true FoS would be much higher or indeterminate for symmetrical structure)

[3] Assumes that soil outside cell below dredge line is purely frictional (likely overconservative)

[4] Framework for revetment optimization and validation against as-built is given Section 2.5.

[5] Sheet pile interlock failure

[6] Contingency Level Earthquake

3.1.2 Revetment Geometry

Figure 3-1 below shows a comparison of back of wall pressures before and after adding the optimized revetment solution. The close match between the two curves for each side of Pier A validates the assumption that the addition of the revetment does not impact the computed factors of safety and can therefore be safely adopted.

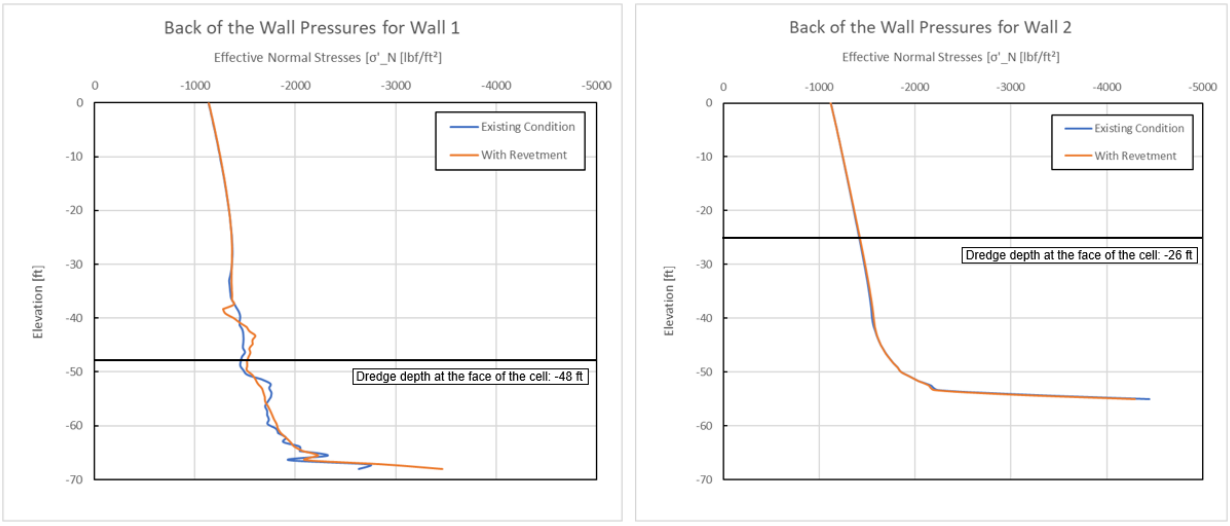

Figure 3 Stability Check for the back of the walls

3.2 QUAY WALL

3.2.1 Revetment Geometry

The optimized Quay Wall revetment geometry optimization in this study is based on the outcomes from the analyses carried out for Pier A. This approach is valid since the strategy for revetment optimization involved ensuring the stress state on the back of the wall remains unchanged from the existing condition. Hence, the geometry on the dry dock side of the Pier A cell is adopted for the Quay Wall.

3.2.2 Stability

The FoS values obtained from stability analyses carried out in Plaxis 2D for Quay Wall are shown in the Table 3-2 below. Based on the analyses carried out, the minimum embedment depth along the Quay Wall must be at least 26.7 ft.

Table 3-2
FoS values of internal and external failure modes obtained from current study and CH2M (1975) for Quay Wall

Mode of Failure	FoS for Quay Wall				
	CH2M 1975 as-built	MM as-built (2)	Recommended FoS (1)	MM as-built	Recommended FoS (1)
	static			CLE(4)	
Internal- Tension (3)	1.40	1.41	1.50	1.26	1.30
Internal - Shear	1.30	1.34	1.50	1. 17	1.30
External – Bearing Capacity	3.00	3.10	3.00	2.00	1.50
External - Sliding	1.40	1.50	1.50	1.21	1.10
External - Overturning	2.30	2.20	3.00	1.82	1.30

(1) Based on Department of the Army U.S. Army Corps of Engineers, 1989. Engineering Manual 1110-2-2503

(2) Assumes that soil outside cell below dredge line is purely frictional (likely overconservative)

(3) Sheet pile interlock failure

(4) Contingency Level Earthquake

4.0 DISCUSSION

The stability analyses of Pier A and the Quay Wall presented in this report provide a comprehensive evaluation of both existing conditions and proposed remedial designs. The findings are grounded in historical context, modern geotechnical modeling, and rigorous FoS assessments, offering a robust framework for decision-making in the RD for the SIB Project Area.

4.1 HISTORICAL CONTEXT AND STRUCTURAL INTEGRITY

The historical failures of diaphragm cells at Pier A due to base sliding and piping underscore the importance of understanding past construction methods and material variability. The 1975 CH2M

Hill report highlighted issues such as poor compaction, welding defects, and corrosion, which contributed to structural failures. These insights informed the current analysis, particularly in identifying interlock tension as a critical failure mode.

4.2 ANALYTICAL APPROACH AND METHODOLOGY

The use of both traditional semi-empirical methods (e.g., Terzaghi's TVA method) and modern FEA via Plaxis 2D allowed for a nuanced understanding of failure mechanisms. The integration of CLE conditions and post-seismic liquefaction scenarios further enhanced the robustness of the analysis. Notably, the models demonstrated that both Pier A and the Quay Wall maintain acceptable stability under CLE demands, provided structural integrity is preserved.

4.3 KEY FINDINGS ON STABILITY

The FoS values for both structures generally exceed the minimum recommended thresholds, with bearing capacity consistently showing the highest safety margins. However, interlock tension and internal shear remain the most sensitive failure modes, particularly under seismic loading. The parametric sensitivity studies confirmed that even with conservative variations in soil properties, the structures remain within acceptable safety limits. While some modes fell below the recommended FoS for both Pier A and the Quay Wall, there are no instances for which instability (i.e., the FoS was less than 1.1) is expected under either static or CLE demands. Furthermore, the remedial actions recommended herein do not impact the FoS of any failure mode considered.

4.4 REVETMENT OPTIMIZATION AND DREDGING FEASIBILITY

A significant contribution of this study is the optimization of revetment geometries to facilitate deeper dredging without compromising structural stability. The analysis confirmed that the proposed revetment designs do not adversely affect back-of-wall pressures, validating their implementation. This optimization is crucial for maximizing dry dock utility while maintaining safety.

4.5 IMPLICATIONS FOR DESIGN AND MAINTENANCE

The findings emphasize the importance of ongoing structural maintenance, particularly regarding weld integrity and corrosion control. The historical failures due to welding defects and corrosion-induced crack propagation highlight the need for rigorous inspection protocols. Additionally, the study supports the feasibility of limited dredging activities, provided slope protection measures such as riprap are implemented.

5.0 REFERENCES

Bowles, J.E., 1996. Foundation analysis and design, USA, Fifth. Edition.

Bray, J.D., Macedo, J., Travasarou, T., 2018. "Simplified procedure for estimating seismic slope displacements for subduction zone earthquakes," *ASCE Journal of Geotechnical and Geoenvironmental Engineering* 144, no. 3.

CH2M Hill, 1975. *Swan Island Ship Repair Yard Quay Wall Structure Stability Evaluation*, Port of Portland, SR SI 1975 0026 00, Roth, H.R. and Ramage, J., Oregon, December 1975.

U.S. Army Corps of Engineers (USACE), 1989. Engineering Manual 1110-2-2503: *Design of Sheet Pile Cellular Structures Cofferdams and Retaining Structures*. Washington, D.C.: Department of the Army U.S. Army Corps of Engineers

EPA, 2021b. *Remedial Design Guidelines and Considerations, Portland Harbor Superfund Site*. Portland, Oregon. April 23.

Maitland, J.K. and Schroeder, W.L., 1979. Model study of circular sheetpile cells. *Journal of the Geotechnical Engineering Division*, *105*(7), pp.805-821.

Matlock, H. and Reese, L.C., 1960. Generalized solutions for laterally loaded piles. *Journal of the Soil Mechanics and foundations Division*, 86(5), pp.63-92.

Terzaghi, K., 1943. *Theoretical Soil Mechanics*.

U.S. Geological Survey (USGS), 2020. *Quaternary Fault and Fold Database for the Nation.* Available at https://doi.org/10.5066/P9BCVRCK

Wagner, N. and Sitar, N., 2016, February. Seismic Earth Pressures on Deep Stiff Walls. In *Geotechnical and Structural Engineering Congress 2016* (pp. 499-508).

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APPENDIX J

STRUCTURAL DESIGN TECHNICAL MEMORANDUM

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STRUCTURAL DESIGN TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

This Structural Design Technical Memorandum (SDTM) presents a summary of the structural analyses and design[1] of marine structures in the Swan Island Basin (SIB) Project Area required to accommodate remedial actions (RA) that are part of the 90% Remedial Design (RD). The Pre-Final 90% RD is conducted for the SIB Project Area within the Portland Harbor Superfund Site (PHSS) in Portland, Multnomah County, Oregon. The HydroGeoLogic, Inc. (HGL) team performed the work on behalf of the SIB RD Group based on the requirements of the PHSS Record of Decision (ROD) (EPA, 2017) and the Administrative Settlement Agreement and Order on Consent (ASAOC) at the SIB Project Area (EPA, 2021a).

Information presented in this SDTM has been:

- Collected in accordance with the final Pre-Design Investigation (PDI) Work Plan – approved by the U.S. Environmental Protection Agency (EPA) in May 2022 (HGL, 2022)
- Presented in the PDI Evaluation Report (ER) – approved by the EPA in January 2024 (HGL, 2024a)
- Presented in the Basis of Design Report (BODR) – approved by the EPA in December 2024 (HGL, 2024b)

The SIB Project Area has extensive infrastructure that will be impacted by implementation of the RA. The RD evaluated structures to determine if any required removal, replacement, or mitigation measures to accommodate the RA. All structures within the SIB Project Area, except for the Port of Portland Berth 308, were determined to be functional based on the definitions set by previously published EPA documents related to the PHSS (see Section 3.0.)

Analyses supporting the design of the RA structural mitigation measures, where required, are summarized herein and described in Attachments A, B, and C. The RD design for Project Area structures employs a performance-based specification design approach. Section 1.1 provides a detailed explanation of this design approach.

Section 1.0 provides overall general project information and outlines individual structures and elements of the RD. Section 2.0 describes the structural evaluation approach to be consistent with the overall PHSS design requirements. Section 3.0 defines functionality determination of each structure within the SIB Project Area and summarizes the functionality of each structure. Section

[1] This document is the 90% Design Submittal, but it is anticipated that additional detailed design will be carried out by the Remedial Action Contractor as part of the Remedial Action phase.

Corporate Headquarters
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

4.0 outlines the structural design criteria that apply to both existing and new structures. Section 5.0 summarizes key considerations for each structure.

1.0 GENERAL INFORMATION

This section provides an overview of general SIB Project Area information that informs the structural analyses completed as part of the RD. This section includes project data, provides a summary of existing structures, and gives an overview of the relevant elements of the remedial design.

1.1 DESIGN APPROACH

Two types of design approaches are typically used for RD as defined in the EPA's Remedial Design/Remedial Action Handbook (1995). Per Section 3.10.2 of the handbook:

> *Specifications, a generic term that includes drawings, are developed by the remedial designer and included in the RD package. Specifications contain a description of the technical requirements the constructor must meet to implement the RA and the criteria for determining whether these requirements are met. Two types of design specifications typically used in Superfund are detailed design and performance-based specifications.*

For this project, a performance-based specifications design approach was used by the RD team to develop design documents for every new or modified structure. The RD documents illustrate and specify the performance requirements for each structural design, and the RA Performing Parties or the RA Contractor (on behalf of the RA Performing Parties) will develop a final detailed design that meets the performance requirements shown in the RD documents.

The performance-based specifications design approach enables the creation of a cost-effective and detailed design by allowing the RA Contractor to determine how to meet the requirements set by the RD documents. This approach also enables the RA Contractor to implement innovative or proprietary construction methods and technologies.

1.2 PROJECT UNIT STANDARDS AND DATUM

Below is a summary of the units, vertical datum, elevations, and river levels referred to and utilized within the structural analysis across the SIB Project Area:

- Units: Imperial US units, unless noted otherwise
- Vertical Datum: North American Vertical Datum of 1988 (NAVD88)
- Elevations: All elevations reference NAVD88, unless noted otherwise
- River Levels: See Table 1-1

1.3 EXISTING STRUCTURES

Numerous different structures can be found throughout the SIB Project Area. Table 1-2 provides a summary of the existing structures. Impacts due to implementation of the RA were evaluated prior to commencement of the RD and are presented in the BODR (HGL, 2024b). Table 1-2

identifies key structural characteristics including structure type, age, estimated remaining design life, assessed condition, and under-structure slope profile.

It will be incumbent on the RA Performing Parties or the RA Contractor (on behalf of the RA Performing Parties) to complete Pre-Remedial Action (Baseline) Structural Condition Assessments of all existing structures prior to implementation of the RA to establish the condition of each structure at the time of construction. Baseline conditions will inform the RA Performing Parties' final detailed design and be compared to Post-Remedial Action (Final) Structural Conditions to identify damage caused during construction, if necessary.

1.4 REMEDIAL DESIGN OVERVIEW

For the structures, the RD considers RA work being done beneath and around structures. As presented in the Technology Application Decision Tree of the ROD (EPA, 2017), if a structure is functional and permanent then the RA may include the placement of a cap only or dredging and the placement of a cap.

The structural design uses geotechnical engineering information and requirements along with specific design criteria provided by the Remedial Design Guidelines and Considerations (RDGC) (EPA, 2021b) document. These design criteria include requirements for the structures and supporting soils for both static and seismic loading conditions. Both the design criteria provided by the RDGC and the geotechnical requirements were considered when the existing structures were evaluated, and the RA measures were determined. For detailed geotechnical information, refer to the Geotechnical Design Technical Memorandum (GDTM) (Volume I, Appendix I).

Slopes that support new caps, including those near or under structures, were assessed using geotechnical information and criteria that considered the cap construction and navigation needs. Where required to meet geotechnical requirements, existing slopes are shown to be regraded and/or stabilized to accommodate the RA. The impact on structures from slope changes near or under structures was assessed in accordance with The Structural Design Philosophy (Section 2.1) and Structural Design Criteria (Section 4.0).

For detailed information on cap design, dredging design, slope modifications, and geotechnical requirements, refer to the Cap Design Technical Memorandum (Volume I, Appendix E), Dredging Design Technical Memorandum (Volume I, Appendix H) and Geotechnical Design Technical Memorandum (Volume I, Appendix I).

1.5 SELECTED DREDGING AND CAP CONSTRUCTION

Refer to the Pre-Final 90% RD Drawings for sediment dredging and capping details included in the RD. Generally, the RD includes the dredging of sediment under and adjacent to structures and possible regrading of the existing slopes before placement of a cap.

2.0 STRUCTURAL EVALUATION APPROACH

This section details the evaluation method for structures in the SIB Project Area, focusing on achieving RAOs as specified in the ROD (EPA, 2017). Each structure poses distinct challenges and can be addressed by different methods, each affecting cost and complexity.

During the 50% RD Phase, conflicts between RDGC (EPA, 2021b) requirements and ROD Technology Application Decision Tree assignments were identified, particularly where capped slopes beneath structures failed to meet geotechnical criteria or where a stabilized slope supporting a cap was not compatible with protection of a structure's functionality. An SIB Project Area Design Philosophy and a Structural Action Decision Tree were developed to resolve these issues (reference Attachment A for more information).

2.1 STRUCTURAL DESIGN PHILOSOPHY

A design philosophy was developed in conjunction with the RD Project Coordinator to help guide the approach to structures within the SIB Project Area. Selection of structural design measures at each shoreline and overwater structure follows this design philosophy:

1. The RD should focus primarily on achievement of the RAOs.
2. The RD should be consistent with the ROD Technology Application Decision Tree (ROD Figure 28; EPA, 2017).
3. The RD should be consistent with EPA's RD guidance.
4. To achieve the RAOs, it is necessary to work near existing structures and on riverbank slopes, which may impact the existing structures. This impact needs to be mitigated for structures considered to be functional.
5. If, to achieve the RAOs, modification to or replacement of an existing structure is required, the RD team will seek a solution that balances construction cost and facility impacts and that is consistent with the applicable or relevant and appropriate requirements (ARARs) (EPA, 2017).

2.2 STRUCTURAL ACTION DECISION TREE

The treatment of existing structures is guided by the ROD. ROD Section 14.2.9.2 states, "Structures may be removed to access contaminated media unless it can be demonstrated that the structure is permanent (e.g., not floating or movable), functional (e.g., not beyond its design life and/or in disrepair), or needed for current or future property and waterway use." The use of the word "or" indicates that RA work needs to be done around existing structures if they are one of the following: permanent, functional, needed. Based on this, most structures within the SIB Project Area will remain and the remedial technology will be applied below and around structures. However, there may be a need to replace a permanent, functional, or needed structure if the presence of that structure prevents achievement of the RAOs. For example, if a structure is currently located on an over-steepened slope that requires regrading to achieve a stable cap, the structure may need to be removed or replaced.

In addition, the remedial design considers that the implementation of the RA must not compromise the structural integrity of any existing structure, and the effects of the RA on an existing structure must be mitigated if the RA negatively impacts a structure's integrity. The structure may need to be strengthened to accommodate the RA.

A structural action decision tree was adopted to evaluate each structure. This decision tree is shown in Figure 2-1 and summarized below:

1. Where the RAOs can be achieved with an existing structure in place, the structure is left in-place.
    a. Where the function or structural integrity of an existing structure is not adversely impacted, no further action is required. (Solution A/D)
    b. Where the function or structural integrity of an existing structure is adversely impacted by the RA, mitigation measures are needed to preserve the function and/or structure. (Solution B)
2. Where the presence of a structure prevents achievement of the RAOs, the structure is removed to enable the achievement of the RAOs.
    a. Where the structure is deemed **functional** (as defined in Section 3.0 below)**,** the structure is replaced with an equivalent structure following implementation of the RA. (Solution C)
    b. Where the structure is deemed **non-functional**, the structure is permanently removed. (Solution E)

3.0 FUNCTIONALITY DETERMINATION

The determination of functionality for existing structures is guided by both the RDGC (EPA, 2021b) and the ROD (EPA, 2017). These documents provide criteria for evaluating whether a structure is considered functional or non-functional in the context of remedial activities.

The RDGC document (EPA, 2021b) includes the language quoted here:

- Section 3.3 – Technology Assignment Application Flexibility
  Functional structures are defined as those structures that are currently in operation or are being used to stabilize the riverbank and expected to have a service life greater than 50 years. Nonfunctional or movable structures are expected to be removed or moved to allow access to contaminated material and implementation of the Technology Application Decision Tree as if no structure was present.
- Section 5.2.9 – Functional Structures Evaluation
  ROD Section 14.2.9.2. states, "Structures may be removed to access contaminated media unless it can be demonstrated that the structure is permanent (e.g., not floating or movable), functional (e.g., not beyond its design life and/or in disrepair) or needed for current or future property and waterway use." This determination shall be made by the [Performing Parties] for each structure within the remedy footprint, and the effects of such structures on the remedy implementability and effectiveness shall be evaluated. Any impacts to the permanent, functional, or

> *needed structures should also be considered during remedial design. Each shoreline and in-water structure shall be reviewed to determine if it is to be removed or not.*

The ROD (EPA, 2017) states in Section 14.2.9.2:

> *Structures may be removed to access contaminated media unless it can be demonstrated that the structure is permanent (e.g., not floating or movable), functional (e.g., not beyond its design life and/or in disrepair), or needed for current or future property and waterway use.*

Importantly, the terms "design life" and "service life" are distinct in engineering practice. As defined by the American Society of Civil Engineers *Manual of Practice (MOP) 130 – Waterfront Facilities Inspection and Assessment:*

- **Design life** refers to the theoretical life span estimated during the planning and design.
- **Service life** refers to the actual duration a structure performs its intended function, which may exceed the original design life through maintenance activities and repairs.

In evaluating functionality for RD, the following considerations were applied:

- Design life is a planning benchmark and does not reflect the actual operability or usefulness of a structure. Many structures continue to function well beyond their design life by implementing inspection routines, routine maintenance, and rehabilitation.
- Condition and use are both critical in assessing whether a structure is "in disrepair." A structure showing signs of deterioration may still be operable and fulfill a current need.
- Service life can be extended through regular inspection, maintenance, and repairs.

Therefore, the RD did not rely solely on design life, service life, or current condition to determine functionality. Instead, a structure was considered **functional** if it met the following criteria:

- **Permanent** (not floating or movable),
- **Operational** (currently used or capable of being used), and
- **Necessary** for current or anticipated future use.

Each structure was assessed prior to commencement of RD, in coordination with shoreline facility owners/operators, to determine their functionality. Information from this coordination is shown in Table 6-4, Section 6.2.1.2 of the BODR (HGL, 2024b.) During the Draft 50% RD phase, the functionality of each structure was reevaluated during shoreline facility owner/operator consultation workshops which resulted in the following additional information or changes to the functionality shown in the BODR:

- Berth 308: The designation in the "necessary" column was amended from "unknown" to "no." The structure is now considered non-functional.
- U.S. Navy Pier: The designation in the "necessary" column was discussed with the U.S. Navy. The U.S. Navy has classified the pier as in 'Layup' status meaning they are not

allocating funding for maintenance or upkeep of the pier. However, the U.S. Navy has not listed the pier for demolition. Therefore, the designation in the "necessary" column remains "unknown." Additionally, the RD has determined that this structure does not need to be removed to achieve RAOs. The structure is classified as functional.

- Lagoon Wharf (Berth 302 - 305): Although considered functional, the RD process has determined that RAOs cannot be achieved with the existing Lagoon Wharf structure in place. Geotechnical issues related to the riverbank (global and local slope stability, liquefaction, and lateral spreading) require a larger solution than modifying or shoring up the existing structure.
    - The global stability of the riverbank beneath the existing structure does not meet project design requirements, as the safety factor is well below the required level.
    - Similarly, the local stability of the ground beneath the existing structure falls short of project design requirements. Modifying the material beneath the structure—whether adding or removing and replacing—does not result in a stable slope that satisfies design requirements.
    - Additionally, the present riverbank configuration fails to meet seismic design standards, and both soil liquefaction and movement towards the water are likely during an earthquake. The existing structure lacks sufficient capacity to withstand these forces.

  To mitigate the geotechnical issues while implementing the remedy, the area will require ground improvements and new structures that can stabilize this area. Upon determining that the Lagoon Wharf needed to be removed and replaced, the facility operator (Vigor) hired their own engineering firm (KPFF) to review the RD team's findings. This firm's role was expanded to create a cost-effective wharf design that minimizes short- and long-term effects on operations due to implementing the remedy, which requires removing and replacing the existing structure. More detailed information regarding the RD team's approach and evaluation of alternatives is provided in Attachment C.

For each structure, a determination was made related as to whether a structure is permanent, operational, or necessary. Depending on the answers, each structure was given a functionality classification. These considerations and the results of the classification are shown in Table 3-1.

4.0 SHORELINE AND OVERWATER STRUCTURES DESIGN CRITERIA

The Shoreline and Overwater Structures Design Criteria is presented in Attachment A and includes the design criteria for assessment of existing structures, the criteria for design of new structures, and the material and durability requirements of the Pre-Final 90% RD components. This attachment includes the standards referenced, general design principles, the design criteria for soil structure analysis, and design to be implemented during the RA.

Additionally, the design criteria used to analyze and design new structures (functionally equivalent structures) in the SIB Project Area have been outlined in Attachment A. The new structures within the SIB Project Area presented herein include toe walls, mid-slope pinning walls to stabilize steep

slopes, and replacement of functional structures including pier structures and mooring infrastructure. The design life of new structures and their components have been specified, noting the desired service life and means of achieving the desired service life (reference Attachment A for additional information).

5.0 SUMMARY OF STRUCTURAL ASSESSMENTS AND STRUCTURAL DESIGN MEASURES TO ACCOMMODATE REMEDIAL ACTION

Each structure within the SIB Project Area has been assessed against the RD requirements for dredging, capping, and geotechnical slope stability under both static and seismic conditions. Where needed, measures have been designed to maintain functionality and mitigate against the risk of damage to or changed conditions for the structure. In some cases, to achieve the RAOs, toe walls or other slope stabilizing structures have been designed. In cases where slope stabilization methods are not sufficient, the complete removal/replacement of structures has been specified. For existing structures, the design was developed so that existing structures and elements of structures do not experience loads greater than those applied before the RA measures were implemented.

A detailed summary of the design considerations and design outcomes for all structures within the SIB Project Area is provided in Attachments B and C.

6.0 REFERENCES

HydroGeoLogic, Inc. (HGL), 2022. *Pre-Design Investigation Work Plan, Revision 3*. Preliminary Remedial Design Services, Swan Island Basin Project Area, Portland Harbor Superfund Site, Portland, Multnomah County, Oregon. Revision 3. May.

HGL, 2024a. *Pre-Design Investigation Evaluation Report, Revision 2*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. December.

HGL, 2024b. *Basis of Design Report, Revision 1*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. November.

U.S. Environmental Protection Agency (EPA), 1995 *Remedial Design/Remedial Action Handbook*, EPA 540/R-95/059. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. June.

EPA, 2017. *Record of Decision, Portland Harbor Superfund Site, Portland Oregon.* United States Environmental Protection Agency Region 10, Seattle, Washington. January.

EPA, 2021a. *Administrative Settlement Agreement and Order on Consent for Remedial Design. Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10.* January.

EPA, 2021b. *Remedial Design Guidelines and Considerations, Portland Harbor Superfund Site, Portland, Oregon.* United States Environmental Protection Agency Region 10, Seattle, Washington. April.

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Attachment A – Shoreline and Overwater Structures – Structural Design Criteria
Attachment B – Structure-Specific Analyses
Attachment C – Shoreline and Overwater Structures – Analysis and Design Methodology

TABLES

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Table 1-1
River Levels
Structural Design Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

River Level	Elevation (feet NAVD88[1])
Ordinary High Water (OHW)	+20.08
Mean High Water (MHW)	+13.00
Ordinary Low Water (OLW)[2]	+7.30
Columbia River Datum (CRD)	-5.28

Notes:
[1] NAVD88 = North American Vertical Datum of 1988
[2] The Mean Low Water elevation of +7.30 feet NAVD88, as measured at the U.S. Geological Survey 14211720, Morrison Street Bridge gage, is used as an approximation of OLW for Swan Island Basin.

Table 1-2
Existing Structures Summary
Structural Design Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Structure	Structure Type	Age	Estimated Remaining Design Life (years)[1]	Assessed Condition	Under-Structure Slope Profile
U.S. Coast Guard Pier	Timber pier	50	30-40	Fair	Flat to 2H:1V
U.S. Coast Guard Dock	Floating Dock	50	30-40	Fair	Flat to 2H:1V
U.S. Navy Pier	Timber pier/wharf	51	30-40	Fair	1.25H:1V to 6H:1V
Marine Consortium Pier	Timber pier/wharf	Unk	30-40	Fair	1H:1V to 4H:1V
Dredge Base	Timber pier	54	0-10	Serious	1.5H:1V to 11.5H:1V
Berth 311	Timber wharf	58	0-10	Serious	2.5H:1V to near flat
Swan Island Boat Ramp	Boat Ramp	37	30-40	Fair	3.5H:1V to 8H:1V
Wind Tunnel	Steel piled sub-structure	22	45-50	Satisfactory	0.75H:1V to 3.5H:1V
Berth 308	Timber pier	53	15-25	Poor	1.5H:1V
Berth 307	Timber pier	53	15-25	Poor	1H:1V to 1.5H:1V
Berth 306	Timber pier	53	30-40	Fair	1H:1V to 7H:1V
Lagoon Wharf (Berths 302 – 305)	Timber marginal wharf	74	15-25	Poor	0.5H:1V to 3H:1V 0.9H:1V to 3H:1V 0.5H:1V to 4.5H:1V 0.7H:1V to 3H:1V
Pier A	Cofferdam pier	62	0-10	Serious	3.5H:1V
Pier C	Piled steel/reinforced concrete pier	62	30-40	Fair	5H:1V to nearly flat
Quay Wall	Cofferdam Quay Wall	62	0-10	Serious	2H:1V to 4.5H:1V 2H:1V to 16H:1V
SCC Floating Dock	Floats with piles	Unk	35-50	Satisfactory	3.5H:1V to 10H:1V 4H:1V to 15.5H:1V
East Pier	Tabletop pier with gangways	45	30-40	Fair	1.5H:1V to 10H:1V
West Pier	Steel/RC piled pier	45	15-25	Poor	1.5H:1V to 10H:1V
Demo Pier	Steel/RC piled pier	38	30-40	Fair	1.5H:1V to 7.5H:1V
Pier D	Steel/RC piled pier	45	>50	Fair	Flat

Notes:
[1] Estimated remaining design life established at the time of Basis of Design Report (HGL, 2024b) preparation based on available data and observable structural elements, and assumes ongoing inspection, maintenance and repair/replacement of structural elements is performed on a routine basis.

H:V = horizontal to vertical ratio
RC = Reinforced concrete
SCC = Shipyard Commerce Center
Unk = Unknown

Table 3-1
Functionality Classification
Structural Design Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Structure	Permanent (Y/N)	Floating (Y/N)	Necessary (Y/N)	Operational (Y/N)	Functionality Determination
U.S. Coast Guard Pier	Y	N	Y	Y	Functional
U.S. Coast Guard Dock	Y	Y	Y	Y	Functional
U.S. Navy Pier	Y	N	Unknown	Y	Functional
Marine Consortium Pier	Y	N	Y	Y	Functional
Dredge Base	Y	N	Y	Y	Functional
Berth 311	Y	N	Y	Y	Functional
Swan Island Boat Ramp	Y	Y	Y	Y	Functional
Wind Tunnel	Y	N	Y	Y	Functional
Berth 308	Y	N	N	N	Non-Functional
Berth 307	Y	N	Y	Y	Functional
Berth 306	Y	N	Y	Y	Functional
Lagoon Wharf (Berths 302 – 305)	Y	N	Y	Y	Functional
Pier A	Y	N	Y	Y	Functional
Pier C	Y	N	Y	Y	Functional
Quay Wall	Y	N	Y	Y	Functional
SCC Floating Dock	Y	Y	Y	Y	Functional
East Pier	Y	N	Y	Y	Functional
West Pier	Y	N	Y	Y	Functional
Demo Pier	Y	N	Y	Y	Functional
Pier D	Y	N	Y	Y	Functional

Notes:
N = No
SCC = Shipyard Commerce Center
Y = Yes

FIGURE

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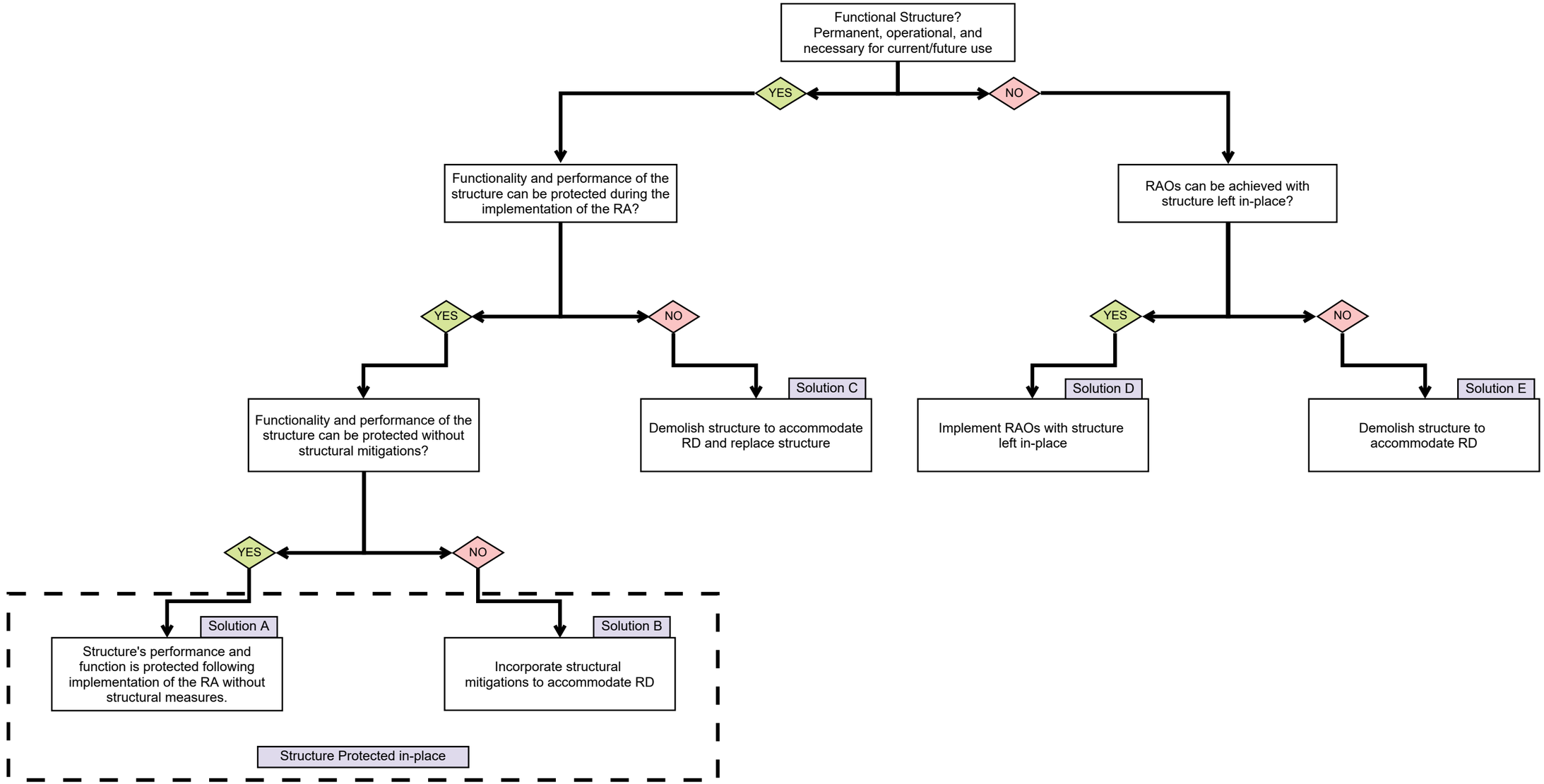

Figure 2-1

Structural Action Decision Tree

Date Prepared: 10/03/2025
Structural Design
Technical Memorandum
Swan Island Basin Remedial Design

ATTACHMENTS

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ATTACHMENT A
SHORELINE AND OVERWATER STRUCTURES
STRUCTURAL DESIGN CRITERIA

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1.0 INTRODUCTION

This document outlines the structural design criteria employed to assess potential effects on the overwater structures within the SIB Project Area resulting from Remedial Action (RA) activities. It details specific evaluation standards for each structure that supplement the Structural Design Philosophy defined in Section 2.1 of the Structural Design Technical Memorandum and supports the selection of appropriate structural solutions to advance RAs and achieve Remedial Action Objectives (RAOs).

The organization of this attachment aligns with the Structural Action Decision Tree described in Section 2.2 and illustrated in Figure 2-1 of the Structural Design Technical Memorandum. This document lists pertinent federal, state, local, and private standards and requirements that must be followed throughout the structural design process. Additionally, this document includes adopted decisions regarding design requirements and interpretations of design standards.

2.0 DETAILED EVALUATION MATRIX

A comprehensive evaluation matrix was implemented to analyze each structure within the SIB Project Area, utilizing the Structural Action Decision Tree to identify the appropriate solution. The following points summarize the approach as shown in Figure A-1:

1. Evaluate existing or as-built slope stability for the static and Contingency Level Earthquake (CLE) conditions.
2. Assess remediated slope stability (existing slope incorporating chemical isolation cap) for the static and CLE conditions. Determine *Initial Conforming Slope* geometry and composition that meets Design Criteria for Slope Stability and RAOs.
3. Compare the *Initial Conforming Slope* to the as-built ground conditions around piles or the existing conditions around piles where as-built information is not available.
    a. Where the *Initial Conforming Slope* is similar to the as-built/existing condition and the impacts on structural performance are determined to be negligible, adopt **Solution A/D**.
        i. **Solution A** applies where the structure is functional and the RAOs can be achieved/constructed with the structure left in place
        ii. **Solution D** applies where the structure is not functional and the RAOs can be achieved/constructed with the structure left in place
    b. Where the *Initial Conforming Slope* differs significantly from the as-built or existing condition and where the impacts of achieving the RAOs could be detrimental to a structure and/or implementation of the RAOs are not achievable with the structure left in place, then:
        i. If the structure is not functional, adopt **Solution E**.
        ii. If the structure is functional, perform structural analysis to determine the impacts on the structure's performance when subjected to static and CLE demands, then:

1. If the impacts are not considered significant to the structure's performance, adopt **Solution A**.
2. If the impacts are detrimental to the structural performance, evaluate options to strengthen the existing slope and maintain as-built slope angles. Options to evaluate include retaining walls, mid-slope pinning walls, or the use of toe walls.
3. High-level material cost estimates of slope strengthening over the length of impacted shoreline are compared against estimates of structural replacement and flattening of the slope.
    a. Where slope strengthening is considered more efficient, adopt **Solution B**.
    b. Where the *Initial Conforming Slope* is considered incompatible with the existing structure or where structural replacement and slope flattening is considered more efficient, adopt **Solution C**.

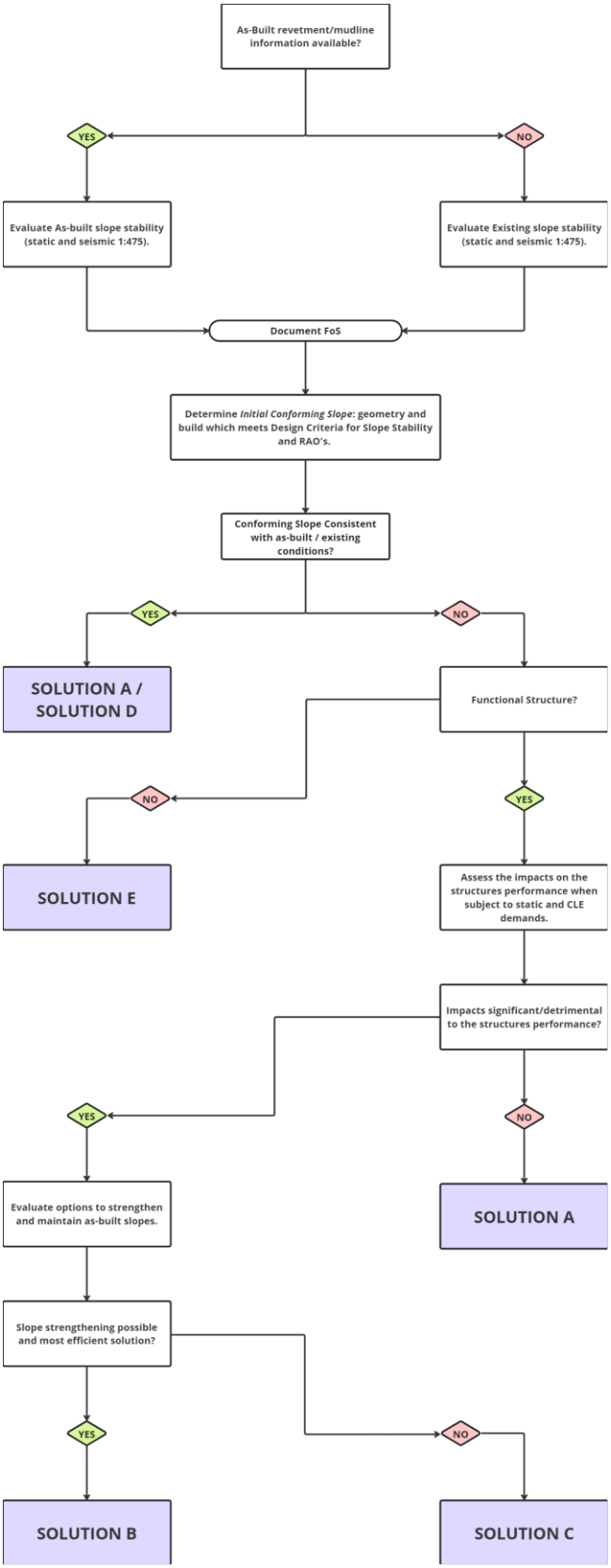

Figure A-1 – Detailed Evaluation Matrix

3.0 STANDARDS OF REFERENCE

Table A-1 lists standards referenced for the analysis and design of new structures and structural elements for the RD. This table also identifies design criteria for which the standard relies upon. All standards of reference listed are to be the latest editions released for industry use unless noted otherwise.

Table A-1: Standards of Reference

Standard	Requirement specified
Oregon Structural Specialty Code (OSSC) 2022	General Principles applied to existing and new structures
International Building Code (IBC) 2021	General Principles applied to existing and new structures
International Existing Building Code (IEBC) 2021	General Principles applied to existing structures
City of Portland Title Codes: Title 24 Building Regulations – Chapter 24.85 Seismic Design Requirements for Existing Buildings Title 28 Floating Structures	General Principles applied to existing structures
Port of Long Beach (POLB) Wharf Design Criteria, May 20, 2015 (POLB, 2015)	General design requirements and loading standard specific for new wharf structures
Unified Facilities Criteria (UFC) Piers and Wharves (UFC 4-152-01), August 2024.	General design requirements and loading standard specific for new wharf structures
California Building Code (CBC) (2022) "Chapter 31F [For SLC], Marine Oil Terminals," January 2023 (MOTEMS, 2022).	General design requirements and loading standard specific for new and existing terminal structures. Design of mooring forces/systems for new structures
AASHTO LRFD Bridge Design Specifications 10th Edition, 2024 (AASHTO, 2024).	Design life of new structures, components and durability requirements.
American Society of Civil Engineers (ASCE) 7-22 Minimum Design Loads for Buildings and Other Structures 2022	National Loading Standard, conformance with achieves Building Code Compliance
ASCE 41 2017 – Seismic Evaluation and Retrofit of Existing Buildings	Evaluation of seismic performance of existing structures to remain
ASCE 61-14 – Seismic Design of Piers and Wharves	Analysis and design of new structures for seismic effects
PIANC Guidelines for the Design, Manufacturing and Testing of Fender Systems, 2024 (PIANC, 2024).	Analysis and design of berthing and mooring systems for new wharf structures
ACI 318 – Building Code Requirements for Structural Concrete	Standard for design of structural concrete

4.0 STRUCTURES DEMOLISHED TO ACCOMODATE THE REMEDIAL DESIGN (SOLUTION C AND E)

In accordance with Figure A-1, where slope stability criteria cannot be achieved and where the existing structure is not compatible with a stable slope the structure is removed to accommodate the RA. Where a structure is functional, an equivalent structure is reconstructed following implementation of the RA. Where structures are not considered functional the structures are removed permanently.

Shoreline facility owner/operator consultation was conducted during the 50% RD phase in which the functionality of structures was confirmed. Structures that are required for current or future use or which have not been officially removed from service were classified as functional.

5.0 EXISTING STRUCTURES PROTECTED IN PLACE (SOLUTIONS A, B, AND D)

The following outlines the overarching design principles and criteria applied in evaluating each existing structure within the SIB Project Area. This assessment also includes the slopes located beneath and adjacent to these structures, which are preserved in their current state under Solutions A and B.

5.1 GENERAL PRINCIPLES

The following general principles were derived as a basis of analysis for existing structures within the SIB Project Area which are designated as protected in-place.

1. Following implementation of the RA, slopes subject to RA will have geotechnical factors of safety (FoS) greater than or equal to those before RA.
2. Following implementation of the RA, any modifications to structures required to meet changed conditions due to the RA will comply with the relevant codes (i.e., current) and standards of reference. However, where a structure is isolated from the impact of implementation of the RA through means of toe walls or pile isolation measures, existing structures will be deemed to have “code compliance not impacted” and assumed to be in compliance with the relevant codes at the time of their construction.
3. It is assumed that all structures and structural elements are in a serviceable condition.
4. As-built ground profiles are based on existing as-built structural drawings and are assumed to represent actual as-built structural and geotechnical configurations. It is assumed that structures will perform as originally intended when ground conditions are returned to profiles shown on the as-built drawings.

5.2 DESIGN CRITERIA – STRUCTURES AND SLOPES SUPPORTING STRUCTURES

The following design criteria were used to assess existing structures and slopes beneath structures in accordance with the Detailed Evaluation Matrix (Figure A-1). Table A-2 summarises the development of solutions based on the initial conforming slope and the impacts on the structure.

Table A-2 Development of Structural Solutions

Design Criteria Achieved?		Solution	
Slope Stability (Section 5.2.1)	**Impacts on Structure (Section 5.2.2)**	**Type**	**Mitigations**
Yes	No	Solution A	Not applicable
Yes	Yes	Solution B	Structural modification
No	Yes	Solution B	Ground improvements

5.2.1 Slope Stability

The following design criteria applies to under-structure and structure adjacent slopes, ground improvements required to stabilize slopes, and toe walls or retaining walls:

1. FoS Performance Requirements:
    a. Minimum static FoS: 1.5
    b. Minimum CLE FoS (under structures): 1.1
2. Comparative Performance Requirements:
    a. The calculated static FoS following RA shall be greater than or equal to the calculated static FoS for the existing condition and the as-built condition before RA.
    b. The calculated seismic CLE FoS following RA shall be greater than or equal to the seismic CLE FoS for the existing condition and the as-built condition before RA.

5.2.2 Structural Impact

The following design criteria apply to structures that are impacted by the RA. Following implementation of the RA, protected in-place structures will meet the requirements of City of Portland Building Code Title 24. This is achieved by demonstrating:

1. The demand to capacity (D/C) ratio for any structural element of an existing structure following RA shall be within 10% of the D/C predicted for the existing or as-built before RA. This is achieved by:
    a. Subjecting structures to earth pressures (static and seismic) no greater than before RA,
    b. Providing structures with geotechnical resistances following RA which achieves D/C criteria (above), and
    c. Not subjecting structures to detrimental loads such as down drag on piles or additional horizontal soil loads.

5.3 TEMPORARY CONDITION (DURING REMEDIATION)

The RA Contractor's chosen means and methods for construction have the potential to cause temporary conditions that result in impacts to structures. As means and methods are incumbent on the RA Contractor to determine, impacts from temporary conditions have not been contemplated as part of the RD. The RA Contractor is responsible for any temporary conditions and must execute their work without destabilizing structures during remediation activities.

6.0 DEMOLITION AND FUNCTIONAL-EQUIVALENT REPLACEMENT (SOLUTION C)

In accordance with Figure A-1, where slope stability criteria cannot be achieved and the existing structure is not compatible with a stable slope, the structure is removed to accommodate the RA and a functionally equivalent structure is constructed. All new structures are designed in accordance with Section 7.0.

7.0 DESIGN CRITERIA – NEW STRUCTURES

The following describes the design criteria used to analyse and design new structures in the SIB Project Area including design loads and material parameters for structural components. New structures within the SIB Project Area include:

- Functional-equivalent replacement structures (Solution C),
- Ground improvement structures (Solution B) including toe walls or mid-slope pinning walls to support stable slopes, and
- Structural mitigations (Solution B) to address detrimental impacts on structures protected in-place.

7.1 UTILITIES, FURNITURE, APPURTENANCES

7.1.1 Safety Ladders

Safety ladders are provided on replacement, accessible overwater structures in accordance with UFC 2024. Ladders are located at 100-foot centers maximum, to a depth of +2.10 feet.

7.1.2 Bull rails

Bull rails are provided on the edges of replacement, accessible, overwater structures for the protection of mooring lines.

7.1.3 Gangways

New gangways are provided for access to new structures where existing gangways are unable to be re-utilized.

7.2 DESIGN LOADS

7.2.1 Structure Risk Category

Structure risk categories used to determine environmental loads (flood, snow, ice, and earthquake) were established in accordance with ASCE 7-22, clause 1.5 as follows:

- Berth 306 and 307 pier structures: II
- Berth 306 and 307 accessible dolphins: II
- All other structures: I

7.2.2 Seismic Performance Requirements

7.2.2.1 Design Classification

Design classifications were established in accordance with ASCE 61-14, clause 2.2. Classifications were assigned as one of the following:

- High: "Essential to the region's economy or post-event recovery"
- Moderate: "Secondary importance to the regional economy, not essential to post-event recovery, however, require performance greater beyond life safety"
- Low: "Not assigned a "High" or "Moderate" classification.

All structures are considered Design Classification **Low**.

7.2.2.2 Performance Levels

The following Performance Levels were applied in accordance with ASCE 61-14, clause 2.4:

- All structures: Life Safety Protection

ASCE 61-14 defines performance meeting the requirements for Life Safety Protection as:

- The post-earthquake damage state is such that the structure continues to support gravity loads,
- Damage that does occur does not prevent egress, and
- There is no loss of containment of materials in a manner that would pose a public hazard

7.2.3 Seismic Analysis/Design

Seismic analysis and design of new structures were in accordance with ASCE 61-14 incorporating the following:

- Where necessary, kinematic loads on piles (Clause [cl.] 4.5.5)
- Displacement-based design using a 2-D or 3-D non-linear static pushover (cl. 6.7.2)
- Steel pipe piles and concrete pile plugs are allowed to yield. All other elements are capacity protected (6.9)

- Design and detailing to meet the requirements of cl. 7

7.2.4 Seismic Response Spectrum

A site-specific seismic response spectrum was determined for the SIB Project Area and is defined in the GDTM.

7.2.5 Dead Loads

The dead loads of structures included the weight of all construction materials and permanent fixtures/furniture. Dead Loads were derived in accordance with construction material densities and their geometries. Material densities were in accordance with UFC 4-152-01, clause 3-2.2 as follows:

- Reinforced/precast concrete 160 pounds per cubic foot (lb/ft3)
- Steel 490 lb/ft3
- Asphalt paving 140 lb/ft3
- Engineered backfill (compacted) 150 lb/ft3
- Rock/riprap 125 lb/ft3

7.2.6 Superimposed Dead Loads

The following superimposed dead load (SDL) were applied over the plan area of new structures to account for services, fixtures and furniture:

- Berth 306 and 307 piers: 5.5 pounds per square foot (psf)

7.2.7 Shrinkage Loads

Shrinkage strains were considered in accordance with The Precast/Prestressed Concrete Institute (PCI) Design Handbook cl. 4.11.13 as reference in UFC 2024. The following applies:

- Final shrinkage strain: 560x10-6 inch/inch
- Correction for relative humidity (RH) of 80%: 0.86
- Correction for Volume to Surface Ratio (V/S ~14-16): 0.54
- Final corrected shrinkage strain: 260x10-6 inch/inch

7.2.8 Creep

Creep loads were assessed to be non-critical since prestressed and post-tensioned concrete are not utilized in the project.

7.2.9 Thermal Loads:

Thermal expansion and contraction strains were assessed in accordance with AASHTO 2024 cl. 3.12.2.2 for the Portland Harbor location as follows:

- Design minimum temperature (Figure 3.12.2.2-2): 10ºF (-12ºC)

- Design maximum temperature (Figure 3.12.2.2-1): 110ºF (43ºC)
- Construction temperature: 59ºF (15ºC)

7.2.10 Live Loads

Live load considerations for the structural design of new structures are detailed below.

7.2.10.1 Berth 306/307 Piers:

In lieu of more detailed information from the property owner/operator, Live Loads were in accordance with UFC 4-152-01, cl. 3-3 for **Berthing (all others)** classification.

7.2.10.1.1 Uniformly Distributed Load

The existing berth capacity, based on a 1989 assessment, is as follows:

- 225 psf uniformly distributed load (UDL), although original intent may have been 600 psf
- 12 kips concentrated load

Adopted Design Loads

- 600 psf applied over any/all areas to produce the most adverse effect.
- UDL was placed directly surrounding point load plant, however not in combination over the same area.
- Impact factors were not applied with UDL

7.2.10.1.2 Road-going vehicular loading

- *Design Truck* and *Design Tandem* to AASHTO LRFD (Refer UFC 4-152-01 Figure 3-1)
- Impact Factor of 1.15 applied to superstructure elements

7.2.10.1.3 Rail-Mounted Quay Crane

Not applicable for Berth 306/307 piers.

7.2.10.1.4 Mobile Crane

- 90-ton capacity mobile crane (Refer UFC 4-152-01 Figure 3-4)
- Outrigger Float Loads:
    - 160,000 lbs per float (boom over corner)
    - 144,000 lbs per float (boom over back or side)
    - Minimum float area 400 square inches (in^2)
- Impact Factor of 1.15 applied to superstructure elements

7.2.10.1.5 Fork Hoist

- 20-Ton fork hoist. Refer UFC 4-152-01 Figure 3-4
- Max Wheel Loads:
    - Each Rear Single Tire: 2,500 lbs
    - Each Front Dual Tire: 49,000 lbs
- Impact Factor of 1.15 applied to superstructure elements

7.2.10.2 Berth 306/307 Dolphins, POP Dredge Base Dolphins:

7.2.10.2.1 Uniformly Distributed Load

- 105 psf applied over any/all areas to produce the most adverse effect.
- Impact factors were not applied with UDL.

7.2.11 Berthing Loads

Berthing and mooring loads relating to the structural design of new structures are detailed below.

In lieu of more detailed information from shoreline facility owners/operators, vessel characteristics were evaluated based on vessels which are known to have berthed at the existing structures.

7.2.11.1 General

7.2.11.1.1 Berthing Impact Load

Berthing impact loads were determined in accordance with PIANC, 2024, using berthing energies evaluated from site specific vessel characteristics for each structure (detailed below).

7.2.11.1.2 Heave and Surge Loads

Heave (vertical component of force) and surge (longitudinal component of force) actions acting on fendering systems were calculated as the product of the berthing impact loads and the coefficient of friction assumed between the ship's hull and fendering system using the following friction coefficients (UFC 4-152-01):

- Steel Hull to timber fendering: 0.60
- Steel Hull to steel fendering: 0.25
- Steel Hull to Ultra-High Molecular Weight (UHMW) fendering: 0.20
- Steel Hull to Rubber fendering: 0.70

7.2.11.2 Berths 306 and 307 Dolphins, POP Dredge Base Mooring Piles, Berth 311 Dolphin:

The following design vessel information was considered to apply:

Table A-3 Design Vessel Information

Structure	Berth 306 & 307	Berth 311
Vessel Characteristic	**Design Vessel**	**Design Vessel**
Design Vessel	Suezmax Oil Tanker	400-ft LOA Barge
Length Overall (LOA)	958 feet (ft)	400 ft
Maximum Displacement	144,461 Tons (T)	29,366 T
Beam, B	179 ft	100 ft
Max Draft	35 feet (at ordinary high water, depth-limited)	24 feet
Length between perpendiculars (LBP)	912 feet	400 feet
Allowable Hull Pressure	46.4 pounds per square inch (psi) (PIANC 2024, Table 6-6)	29 psi (PIANC 2024, Table 6-6)
Friction Coefficient	PIANC 2024, Table 8-2	PIANC 2024, Table 8-2
Approach Velocity Normal to Fender Line, v	0.18 feet per second (ft/s)	0.33 ft/s
Hull Fender Contact Point Distance From Bow Perpendicular to Point of Initial Impact	¼ Point	¼ Point
Maximum Approach angle, α	6º (PIANC, 2024, Table 5-5)	6º (PIANC, 2024, Table 5-5)
Partial Energy Factor	1.15	1.15

7.2.11.2.1 Berthing Energy and Fender Reactions

The berthing energy demand induced by the design vessel and to be absorbed by the proposed fender was calculated using the methodology outlined in PIANC (2024). The berthing analysis considered several factors, including vessel displacement, berthing velocity, vessel approach angle, eccentricity coefficient, virtual mass factor and partial energy factor. The analysis included the following assumptions.

- The dock was prescribed in the analysis as a continuous wharf with partially closed support structures that allow water to flow underneath.
- Berthing of the design vessel was assumed to be in "favorable" conditions as defined in PIANC (2024).
- Quarter-point berthing configuration was assumed, considering the first point of contact on the vessel during berthing will be at a distance of one quarter of the Length Overall (LOA) from the bow of the vessel.

Berths 306 and 307 Dolphins:

The berthing analysis results indicated that the existing fenders should be replaced with new Trelleborg Cell Fender SCK 1150 E1.4 (or equivalent). The computed FoS in the energy absorption capacity was above 1.0 under the assumptions listed above. Under the favorable environmental conditions during vessel operations, pilots can exercise a high level of control for large vessels; during the berthing process they tend to impinge on the fenders very slowly, and parallel to the berth such that more than one fender absorbs the berthing energy. In addition, the

anticipated berthing frequency will be relatively low. Therefore, the calculated factor of safety in energy absorption capacity for the selected fender is conservative. Final design energies and reactions applied to structures are summarized below:

- Kinetic energy absorbed by fendering system: 176 kip-ft
- Design fender reaction: 187 kips

7.2.12 Mooring Loads

Berths 306 and 307 Dolphins:

Static mooring analysis was conducted at Berths 306 and 307 using the mooring analysis software OPTIMOOR (TensionTech, 2024) to evaluate maximum bollard and fender loads under 100-year return period wind conditions. Historical aerial imagery was reviewed to identify the largest vessel historically moored at the berth(s) revealing ships up to 958 ft (292 meters) in length and 179 ft (54.5 meters) in beam—dimensions consistent with a Suezmax-class crude oil tanker.

Based on these findings, the Suezmax tanker *DONAT* was selected as the representative design vessel. The vessel model was scaled to the observed maximum dimensions (length overall: 292 m; beam: 54.5 m). Windage areas (side-on and end-on) were estimated by delineating scaled polygons using the vessel's CAD design drawings. The vessel mooring configuration was analyzed in OPTIMOOR using a standard mooring layout portside with a maximum of two lines per bollard. Bollard and fender locations were based on proposed site configurations. Due to the vessel's size, it was positioned between Berths 306 and 307, which is consistent with historical mooring patterns in the aerials. In lieu of more detailed analysis, mooring points are provided along the berthing line of each structure to match the existing berth configuration.

Simulations were run for wind loads from all directions at ordinary high water (OHW) and included wind shielding effects from surrounding topography. Analysis results indicate that bollards and fenders are subject to maximum loads of approximately 75 metric tons (MT) and 76 MT, respectively, under these conditions.

- Off-berth mooring load: 75 MT (168 kips)
- Design fender reaction: 76 MT (170 kips)
- One 75 MT safe working load (SWL) double bitt bollard will be provided on each structure. For the design of each structure, each bollard will be loaded to its SWL.

Dredge Base Mooring Piles:

- Off-berth mooring load: 14 MT (31 kips)
- On-berth mooring load: 15 MT (32 kips)

Berth 311 Dolphin:

- Off-berth mooring load: 14 MT (31 kips)

- On-berth mooring load: 15 MT (32 kips)

7.2.12.1 Mooring Load Application:

Design for mooring considers application of mooring loads as follows:

- Case 1: Horizontal load, perpendicular to the berth
- Case 2: at 45º to horizontal, perpendicular to the berth
- Case 3: Horizontal load, at 45º to berth

7.2.13 Current Loads

Current loads were evaluated in accordance with the project Metocean analysis. Modeled hydrodynamics per the Remedial Design Work Plan (RDWP) (HGL, 2025) demonstrates relatively quiescent conditions in the vicinity of all berths, resulting in current-induced forces that are negligible relative to other design loads acting on the vessel. Therefore, current loads were neglected in the mooring analysis.

7.2.14 Wind Loads

Wind loads were calculated in accordance with OCIMF (2019) guidelines and adjusted for 30-second gust conditions. The analysis utilized 100-year return period wind data from the Remedial Investigation/Feasibility Study (RI/FS) (EPA, 2016) for wind load calculations.

7.2.15 Wave Loads

Wave loads were evaluated in accordance with the project Metocean analysis. Wind wave modeling described in the RDWP (HGL, 2025) indicated relatively minimal wave activity in the berth vicinity, resulting in wave-induced forces that are negligible compared to other design loads acting on the design vessel. Therefore, wave loads were neglected in the mooring analysis.

7.2.16 Buoyancy Loads

Buoyancy loads were not determined to be critical for any of the new structures.

7.3 LOAD COMBINATIONS

Loads were combined in accordance with the following reference standards and clauses:

- SLS Static Loads for evaluation of stress and crack control: AASHTO, 2024 cl. 3.4.1 (Service I)
- ULS Static Loads for evaluation of strength: POLB, 2015 Table 3-4
- Seismic Loads: ASCE 61-14 cl. 3.6

8.0 MATERIALS AND DURABILITY

This section describes the minimum construction material requirements from which new structures in the SIB Project Area are designed, the required service life, and means of achieving the required service life.

8.1 DESIGN LIFE

All new structures and structural elements will have a design life of 75-years in accordance with AASHTO 2024, unless reduced by the shoreline facility owner/operator having jurisdiction.

The durability design life of structural components will be as follows:

- Reinforced concrete: 75-years
- Steel pipe piles: 75-years
- Steel sheet piles: 75-years
- Structural steel: 75-years*
- Timber: 25-years with provision for repair/replacement
- Miscellaneous steel: 25-years with provision for repair/replacement
- Proprietary components: Per manufacturers specifications

*All structural steel shall be hot-dip galvanized in accordance with ASTM A123/A123M and will require maintenance to achieve the prescribed design life.

Requirements for materials used in the structural components are provided in Section 8.2.

8.2 STRUCTURAL MATERIALS

Minimum material requirements for new structures are outlined below.

8.2.1 Reinforced Concrete

All concrete shall meet the requirements of exposure class C1 to ACI 318 Table 4.3.1.

All concrete shall have a minimum compressive strength at 28-days as follows:

- Cast-in-place concrete: 5000 pounds per square inch (psi)
- Precast concrete: 5000 psi

Maximum water to cement (w/c) ratios vary by structure type, reference the specifications.

All reinforcing steel shall be deformed steel bars conforming to ASTM A615, Grade 60

All reinforcement cover will be 3.0” (75mm) minimum in accordance with Table 5.10.1-1 of AASHTO for a Coastal Environment

Reinforced concrete elements will be designed to meet crack control criteria to AASHTO, 2024 cl. 5.6.7 for the SERVICE I. SLS load combination outlined in section 7.3.

8.2.2 Steel Sheet Piles

Steel sheet piles shall conform to ASTM A690/A690M, or ASTM A572/A572M, Grade 50.

8.2.3 Steel Pipe Piles

Steel pipe piles shall conform to ASTM A252, Grade 3 or similar and shall have a minimum yield strength of 45 kilo pounds per square inch (ksi) (290 megapascals [MPa]) and a maximum yield strength of 52 ksi (360 MPa). Parent metal shall achieve a minimum elongation of 20% and a minimum Charpy V-Notch (CVN) energy of 27J at 32ºF (0ºC).

Corrosion of structural steel pipe piles and steel sheet piles shall be in accordance with ASCE MOP 130, Table 4-5 as follows:

- Common Fresh Water (River, Ship canal, etc.) for a 75-year design life.
- Steel pipe piles will be designed with a corrosion allowance of 1.15 mm from the internal and external faces (2.30 mm total).
- Steel sheet piles will be designed with a corrosion allowance of 1.15 mm from both faces (2.30 mm total).

8.2.4 Structural Steel

All structural steel shall have a minimum yield strength of 45 ksi (290 MPa) and a maximum yield strength of 52 ksi (360 MPa).

8.2.5 Miscellaneous Steel

- All miscellaneous steel shapes, plates, bolts, nuts, and washers shall be stainless steel unless otherwise noted;
- All stainless steel shall be type 316;
- All bolts and nuts not required to be stainless steel shall conform to ASTM A307;
- All other miscellaneous steel not stainless steel shall be A36;
- Threaded rod shall be ASTM F1554 GR. 105 ksi;
- All miscellaneous pipe shall conform to ASTM A53, Grade B; and
- Headed studs shall conform to ASTM A108.

8.2.6 Timber

All sawn lumber shall be minimum #1 West Coast Douglas-Fir.

All sawn lumber not in contact with water shall be incised and pressure-treated with ammoniacal copper zinc arsenate (AZCA) to 0.6 lb/ft3 in accordance with the American Wood Protection Association standard U1, Use Category 4C.

9.0 REFERENCES

American Association of State Highway and Transportation Officials (AASHTO), LRFD Bridge Design Specifications 10th Edition, 2024

American Concrete Association (ACI), Standard 318-19 Building Conde Requirements for Structural Concrete

American Society of Civil Engineers (ASCE), Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE/SEI 7-22)

ASCE, Seismic Design of Piers and Wharves (ASCE/COPRI 61-14)

ASCE, Seismic Evaluation and Retrofit of Existing Buildings (ASCE/SEI 41-17)

American Wood Protection Association (AWPA), Standard U1 2024 - primary standard for preservative treated wood products

ASTM International, Standard A108-18, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished

ASTM International, Standard A123/A123M-24 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM International, Standard A252/A252M-19 Standard Specification for Welded and Seamless Steel Pipe Piles

ASTM International, Standard A307-21, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

ASTM International, Standard A53/A53M-22, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM International, Standard A615/A615M-24 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM International, Standard F1554-20, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

California Building Code (CBC) (2022), Chapter 31F [For SLC], Marine Oil Terminals, January 2023 (MOTEMS, 2022).Chapter 31F – Marine Oil Terminals

City of Portland Title Codes: Title 24 – Building Regulations, Effective January 1, 2025, at URL: https://www.portland.gov/code/24

City of Portland Title Codes: Title 28 – Floating Structures, Effective January 10, 2025, at URL: https://www.portland.gov/code/28

City of Portland, 2025. City of Portland Stormwater Management Manual. Appendix B, Section B.3.2.

HydroGeoLogic, Inc. (HGL), 2025. *Remedial Design Work Plan, Revision 1*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. February.

International Code Council, Inc., 2021 International Building Code, at URL: https://codes.iccsafe.org/content/IBC2021P1

International Code Council, Inc., 2021 International Existing Building Code (IEBC), April 2022, at URL: 2018 International Existing Building Code (IEBC)

International Code Council, Inc., 2022 Oregon Structural Specialty Code, at URL: https://codes.iccsafe.org/content/ORSSC2022P1

PIANC, MarCom WG 33, 2002, Guidelines for the Design of Fender Systems

Port of Long Beach (POLB), Wharf Design Criteria, May 20 (POLB WDC Version 4.0)

Unified Facilities Criteria (UFC), Piers and Wharves (UFC 4-152-01), August 2024

Oil Companies Marine Forum (OCIMF). 2019. Mooring Equipment Guidelines. OCIMF 2019.

U.S. Environmental Protection Agency (EPA), 2016. Portland Harbor RI/FS, Final Remedial Investigation Report, Portland Oregon. U.S. Environmental Protection Agency Region 10, Seattle, Washington. February 8.

LIST OF TABLES

Table A-1 Standards of Reference (in-text)
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FIGURE

Figure A-1 Detailed Evaluation Matrix (in-text)

ATTACHMENT B
STRUCTURE-SPECIFIC ANALYSES

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Attachment B
Structure-Specific Analyses
Structural Design Technical Memorandum, Swan Island Basin Project Area, Portland, Oregon

Structure	Solution	Functionality	Existing Structure/Condition Description	Key Issues		
				Geotechnical[1], Capping[2], and Riverbank[3]	Structural	Operational/Functional
U.S. Coast Guard Pier	B	Functional	• The U.S. Coast Guard (USCG) Pier is a timber pier approximately 190 feet (ft) long by 30 ft wide located on the northwestern shoreline of the SIB Project Area constructed in the 1970s. The structure comprises rows of braced vertical timber piles supporting a timber deck and incorporates a 50 ft long skiff bay at the southern end. This skiff bay has been removed from service. The pier is currently owned and operated by the USCG and is used to moor a buoy tender vessel (the Bluebell) along the eastern berth (100 ft length overall [LOA]). • As-built information for the pier and original mudline is not available. • Soil stratigraphy at the pier varies; generally comprising 25 ft of artificial fills placed landward of the pier, overlying 10 to 15 ft of medium-dense sands above 50 to 60 ft of silts/silty clay overlying a deep layer of silts.	• Existing embankment slopes do not meet the Design Criteria for slope stability. • Steeper slopes, cut to maintain the historically designed eastern berth pocket depth, would not meet the Design Criteria for slope stability.	• The pier is a timber structure. • The impacts of constructing riprap armored cap above existing sediment include increased pile shear forces by up to 65 percent when subject to 1:475 seismic inertial shaking and increased pile shear forces and bending moments by more than 200 percent when subject to a berthing impact load from the Bluebell vessel.	• The eastern berth, which services the Bluebell requires a dredge depth of -7 ft for continued operation as required by the USCG.
U.S. Navy Pier	A	Functional	• The U.S. Navy (USN) Pier is a timber berthing structure approximately 350 ft long by 30 ft wide connected to the northern shoreline of Swan Island Basin (SIB) by a 110 ft long land span constructed in the 1970s. The structure comprises rows of vertical and battered timber piles supporting a timber deck. The land span comprises vertical timber piles supporting the timber deck. The pier is currently owned by the USN and has been classified as in "Layup" status by the USN. • Limited as-built information indicates an original variable-angle riprap armored revetment with an average slope of 2.5 horizontal to vertical ratio (H:V) beneath the structure extending to a berth pocket depth of approximately -20 ft. • Soil stratigraphy at the pier varies generally comprising 25 ft of artificial fills placed landward of the pier overlying 10 to 15 ft of medium-dense sands above 50 to 60 ft of silts/silty clay overlying a deep layer of silts.	• Existing embankment slopes generally meet the Design Criteria for slope stability, however there are areas that require re-grading.	• The pier is a timber structure. • Constructing riprap armored cap above existing sediment increases land span pile shear and bending demands by 10-25percent and batter pile demands by more than 30percent when subject to 1:475 seismic inertial shaking.	• The existing pier is currently classified by USN as in "Layup" status.
Marine Consortium Pier	B	Functional	• The Marine Consortium, Inc. (MC) Pier is a timber pier approximately 80 ft long by 24 ft wide with a 124 ft wide by 30 ft long pier-head located on the northern shoreline of SIB estimated to have been constructed in the 1970s. The pier comprises rows of braced vertical timber piles supporting a timber deck. The pier is currently owned and operated by the Marine Consortium, Inc. and is used by vessels ranging from 26 to 36 ft LOA, two aluminum barges, and floating docks east and west of the fixed pier-head for the moorage of smaller vessels. • As-built information for the pier and original mudline is not available. Existing ground levels indicate that original ground profiles were likely graded to approximately 2.15H:1V extending to an existing berth pocket depth of approximately -15 ft. • Soil stratigraphy at the pier varies generally comprising 25 ft of artificial fills placed landward of the pier overlying 10 to 15 ft of medium-dense sands above 50 to 60 ft of silts/silty clay overlying a deep layer of silts.	• Existing steep embankment slopes do not meet the Design Criteria for slope stability. • Regrading of slopes to meet the Design Criteria for slope stability would negatively impact the operations of the structure.	• The pier is a timber structure. • The impacts of flattening the slope to improve slope stability by backfilling and armoring around the existing piles include increased shear demands in timber piles when subject to 1:475 seismic inertial shaking and berthing impacts.	• The existing berth pocket depth is approximately -15 ft at the existing berth line.

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Dredge Base	B	Functional	• The Dredge Base is a timber approach trestle approximately 100 ft long by 16 ft wide with a 24 ft wide by 18 ft long end platform located on the northern shoreline of SIB. The timber structure was constructed in the 1970s and provides access to two large floating docks. The structure comprises rows of braced vertical timber piles supporting a precast concrete deck with an asphaltic topping. The pier is currently owned and operated by the Port of Portland and the associated floating docks are used to moor vessels from Dredge Oregon, support barges, and tugboats. • Limited as-built information indicates an original dual-sloped, rock armored revetment at 2.5H:1V beneath the pier extending to a berth pocket depth of approximately -10 ft. • Soil stratigraphy at the pier varies generally comprising 25 ft of artificial fills placed landward of the pier overlying 10 to 15 ft of medium-dense sands above 50 to 60 ft of silts/silty clay overlying a deep layer of silts.	• Existing embankment slopes generally meet the Design Criteria for slope stability, however there are small areas that require re-grading.	• The pier is a timber structure. • Existing breasting dolphins are derelict and the existing floating docks use spud piles to hold their position. • Condition and capacity of existing up-slope mooring points is unknown.	• The berth supports two floating docks that require a dredge depth of -10 ft. • Existing breasting dolphins and up-slope mooring points require removal to implement the RA.
Berth 311	B	Functional	• Berth 311 is a timber structure approximately 450 ft long by 45 ft wide connected to the northern shoreline of SIB by two 170 ft long by 24 ft wide land spans constructed in the 1960s. The structure has rows of timber frames at 15 ft centers each comprised of vertical piles with diagonal bracing that supports a reinforced concrete deck over timber beams and joists. Unidirectional batter piles extend from mid-level frame elements to provide lateral stiffness to berthing impact loads. Land spans comprise bents of near vertical batter piles set apart at regular spacings along the length of the land spans with mid-height bracing providing longitudinal resistance. The berth is currently owned and operated by Swan Island Dock Company and is used to moor multiple vessels associated with their barge related work. • Limited as-built information indicates an original revetment slope of 3H:1V, extending to the berth pocket. • Soil stratigraphy at the pier varies, generally comprising 25 ft of artificial fills placed landward of the berth overlying 10 to 15 ft of medium-dense sands above 50 to 60 ft of silts/silty clay overlying a deep layer of silts.	• A constant slope graded to 3H:1V to match the as-built slope meets the Design Criteria for slope stability.	• The pier is a timber structure. • The impacts of constructing a capping layer above existing sediment include increased vertical pile bending demands by 15-45percent and increased batter pile bending demands by 20-25percent when subject to 1:475 seismic inertial shaking.	• The berth services barges that a navigation depth of -20 ft.
Swan Island Boat Ramp	A	Functional	• The Swan Island Boat Ramp is a 20 ft wide reinforced concrete boat ramp approximately 140 ft long located on the southeastern most bank of SIB. There are seven boarding floats located on the northwestern side of the ramp, each 20 ft long by 6 ft wide, constructed of precast reinforced concrete and moored in place by five plumb timber mooring piles. • As-built information is not available, however the ramp terminates at approximately +4 ft and the slope of the ramp and adjacent shoreline is approximately 7H:1V.	• Existing embankment slopes are stable.	• Boarding floats will need to be temporarily relocated to accommodate the RA.	• Boarding floats will need to be temporarily relocated to accommodate the RA.

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				Geotechnical[1], Capping[2], and Riverbank[3]	Structural	Operational/Functional
Wind Tunnel	A	Functional	• The Wind Tunnel is a testing facility located at the end of the basin on the southeast inland side of Swan Island constructed in the early 2000s. The facility is supported on three steel frames/pile bents consisting of either two or four steel pipe piles and steel girders spanning east-west between piles in each bent. • As-built information for the structure and original mudline is not available. However, existing ground-levels indicate that original ground profiles were likely graded to approximately 3H:1V extending from a steel H-pile retaining wall near the crest of the slope to a depth of approximately -5 ft. • Soil stratigraphy comprises 20 to 25 ft of artificial fills placed landward of the pier, overlying 5 to 20 ft of medium-dense sands above 20 to 25 ft of silts/silty clay overlying a deep layer of sands.	• Existing embankment slopes are marginal and require re-grading to meet the Design Criteria for slope stability.	• Condition and capacity of the existing up-slope retaining wall is unknown and excavation in front of the wall should be avoided.	• There is no navigational depth requirement, and it is understood there has not been a depth requirement for this location in SIB.
Berth 308	E	Non-Functional	• The existing Berth 308 pier is a timber structure 84 ft long by 16 ft wide with a 72 ft wide by 14 ft deep pier-head at their northern-most extent. The pier is located on northeastern bank of Swan Island approximately equally spaced between Pier 307 and the Wind Tunnel. The structure comprises vertical timber piles with mid-height bracing supporting a concrete deck. Berth 308 is owned by the Port of Portland and is understood to not be in use. The pier includes four separate breasting dolphins constructed from timber batter piles and a number of up-slope mooring points shared between Berth 307 and Berth 308. • Limited as-built information indicates that the berth had an original riprap armored revetment with an average slope of 1.75H:1V extending to a berth pocket depth of approximately -15 ft. • Soil stratigraphy varies, and generally comprises 20 to 25 ft of artificial fills placed landward of each pier, overlying 5 to 20 ft of medium-dense sands above 20 to 25 ft of silts/silty clay overlying a deep layer of sands.	• Existing embankment slopes are over steep and do not meet the Design Criteria for slope stability. • Regrading of slopes to meet the Design Criteria for slope stability would require the existing berth line to move waterward by approximately 45 ft.	• The berth and dolphins are timber structures.	• Structure is non-functional. • Slope crest is constrained with existing buildings and parking/operational areas.
Berth 306 and Berth 307	C	Functional	• The existing Berth 306 and Berth 307 piers are identical timber structures each 84 ft long by 16 ft wide with a 72 ft wide by 14 ft deep pier-head at their northern-most extent. The piers are located on the northeastern bank of Swan Island approximately equally spaced between Lagoon Wharf and Berth 308. Each structure comprises vertical timber piles with mid-height bracing supporting a concrete deck. Berths 306 and 307 are owned by Project Fleet Owner LLC and operated by Vigor and are regularly used. Each pier is accompanied by four breasting dolphins constructed from timber batter piles and a number of up-slope mooring points shared between the two berths. • Limited as-built information indicates that each berth had an original riprap armored revetment with an average slope of 1.75H:1V extending to a berth pocket depth of approximately -15 ft. • Soil stratigraphy for each pier varies and generally comprises 20 to 25 ft of artificial fills placed landward of each pier overlying 5 to 20 ft of medium-dense sands above 20 to 25 ft of silts/silty clay overlying a deep layer of sands.	• Existing embankment slopes are over steep and do not meet the Design Criteria for slope stability. • Regrading of slopes to meet the Design Criteria for slope stability would require the existing berth line to move waterward by approximately 45 ft.	• The berth and dolphins are timber structures. • The impacts of flattening the slope to meet the Design Criteria would increase the shear demands in the timber piles beyond acceptable limits and would include the use of an upland bulkhead retaining wall. Alternatively, if the slope is regraded to meet the Design Criteria, the berth line would move waterward by approximately 45 ft and would remove the needed navigation depth of the existing structure.	• A navigation depth of -15 ft is required for the berths to operate. • Slope crest is constrained with existing buildings and operational areas.

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				Geotechnical[1], Capping[2], and Riverbank[3]	Structural	Operational/Functional
Lagoon Wharf (Berths 302 - 305)	C	Functional	• The Lagoon Wharf includes Berths 302, 303, 304, and 305. The structure is a marginal wharf approximately 2,030 ft in length, located on the northern shoreline of Swan Island, originally constructed in 1955 with various alterations and extensions made over the years. The wharf comprises an original 52 ft wide by 1,500 ft long structure, constructed in 1955, and a 76 ft wide by 530 ft long extension constructed in 1965. Both structures comprise bents of vertical and batter timber piles spaced at 15 ft centers along the wharf's length, supporting a timber deck finished with asphaltic concrete. The wharf supports elevated quay cranes which operate over its full length. The structure is currently owned by Project Fleet Owner LLC and operated by Vigor. The cranes transfer equipment used in ship repair or vessel equipment, such as turbines, generators, motors, shafts, screws, etc. to be repaired or refurbished in Vigor shops. • Limited as-built drawings show the original foundation comprising a vertical sheet piled bulkhead wall at the back of the wharf supporting a retained height of approximately 13.5 ft, an under-wharf embankment slope of approximately 1.75H:1V, a sheet-pile toe wall accommodating a vertical step of approximately 11.5 ft, and a 1.75H:1V slope extending to a berth pocket depth of -26 ft. • Soil stratigraphy across the SIB Project Area varies and generally comprises 25 ft of artificial fills placed landward of the wharf, overlying 10 ft of medium-dense sands above 30 ft of silts/silty clay overlying a deep layer of medium to dense sands.	• As-built and current under-wharf slopes are over steep and do not meet the Design Criteria for slope stability. • A deep-seated slope failure surface exists, which does not meet the Design Criteria for slope stability in the static or seismic conditions (global stability). • Under-wharf embankment slopes, sheet-piled toe-walls, and sheet-piled bulkhead walls are unstable when subject to the CLE seismic event, when both global and local stability checks are examined. • Liquefaction and lateral spreading issues exist for the fill and sand layers that would cause slope failure, failure of the bulkhead walls,	• The wharf is a timber structure with a concrete deck.	• The wharf is operational and used by Vigor for their ship building and repair operations. A navigation depth of -26 ft is required at the existing berth line of Lagoon Wharf.

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Structure	Solution	Functionality	Existing Structure/Condition Description	Key Issues		
				Geotechnical[1], Capping[2], and Riverbank[3]	Structural	Operational/Functional
Pier A	A	Functional	• Pier A is a closed-cell cofferdam pier approximately 940 ft in length located on the northern shoreline of Swan Island constructed in the 1940s. The structure comprises a finger pier approximately 635 ft in length that extends beyond the Quay Wall with the remaining ~305 ft of structure functioning as a continuous Quay Wall berth between Pier A and Lagoon Wharf. The structure is currently owned by Project Fleet Owner LLC and operated by Vigor. It is used to moor Drydock 5 on the southern berth and as a general ship berth to the north. The pier supports elevated quay cranes which operate over the length of the structure. • The pier comprises 19 closed diaphragm-cells, 3 circular closed-cells and 2 closed-cells all constructed from sheet piles. It is understood that the original design included 28 diaphragm cells, 8 of which failed during construction and were replaced with 3 circular cells. • The finger pier comprises 18 closed diaphragm cells each approximately 33.6 ft in length. A closure cell with a theoretical diameter of approximately 44 ft closes the western end of the finger pier. • The Quay Wall berth is constructed from three circular sheet-piled cells, each with a theoretical diameter of approximately 70 ft, spaced at 75 ft on center with intermediate cells arching between primary cells (one diaphragm cell and a closer cell.) • All cells are backfilled and support a cast-in-place reinforced concrete deck. Timber fender piles are present along each berth line to allow for berthing/mooring of vessels. • Limited as-built drawings indicate an original berth pocket depth of approximately -25 ft along the northern berth line and an original berth pocket depth of approximately -42 ft along the southern berth line. • Soil stratigraphy across the SIB Project Area varies, generally comprising 25 ft of artificial fills overlying 10 ft of medium-dense sands above 30 ft of silts/silty clay overlying a deep layer of medium to dense sands.	• Liquefaction potential of the backfill within the closed-cell structures could cause instability of the pier. • Cell structures are shallow, marginally stable and will not accommodate dredging against the structure deeper than originally designed.	• Dredging to a depth below the original design cannot be accommodated. Cap placement against the structure is acceptable. • The design includes monitoring the structure during construction.	Required operational depths are as follows: • Northern berth: -26 ft, • Southern berth: -49 ft (Drydock 5), and • Drydock 5 will be relocated ~50 ft southwest of Pier A and ~175 ft northwest of Quay wall.
Pier C	A	Functional	• Pier C is a finger pier approximately 1,080 ft long extending northwest from the Quay Wall. Constructed in 1952 in two segments, the east segment is 580 ft long by 50 ft wide and the west segment is 507 ft long by 34 ft wide. The two segments are integral and both comprise vertical steel pipe piles supporting a cast-in-place reinforced concrete deck constructed from a grillage of longitudinal and transverse beams supporting a topping slab. Steel H-Pile batter piles in both the longitudinal and transverse directions provide lateral restraint to berthing and mooring forces. The pier supports quay cranes and is currently owned by Project Fleet Owner LLC and operated by Vigor and used to moor Drydock 5 to the north and Drydock 3 to the south. • As-built drawings indicate original dredge depths of -45 ft beneath the 50 ft pier section and -25 ft beneath the 34 ft wide section. Retrofit drawings, dated 1962, indicate that the southern berth of the 50 ft section was deepened to -51 ft .	The existing grade is at a higher elevation than shown on the as-built drawings.	• Because the existing grade is at a higher elevation than shown on the as-built drawings, removing soil around pier piles to the originally designed soil elevation will not impact the existing structure. • Support piles extend to a deep level in the underlying soil. As such, the structure is not sensitive to minor changes in ground levels around batter piles.	Required operational depths are as follows: • -49 ft at the northeastern berth (Drydock 5), • -33 ft at the northwestern berth, • -52 ft at the southwestern berth (Drydock 3), and • -26 ft at the narrow 34 ft pier.

Attachment B
Structure-Specific Analyses
Structural Design Technical Memorandum, Swan Island Basin Project Area, Portland, Oregon

Structure	Solution	Functionality	Existing Structure/Condition Description	Key Issues		
				Geotechnical[1], Capping[2], and Riverbank[3]	Structural	Operational/Functional
Quay Wall	A	Functional	• The Quay Wall is approximately 725 ft long comprising approximately 685 ft of circular closed-cell structures and 50 ft of single sheet piles, located on the northern shoreline of Swan Island, constructed in the 1940s and 1950s. The wall retains the northern-most area of Swan Island, provides navigation depth to Drydocks 5 and 3, and the Shipyard Commerce Center (SCC) Floating Docks, and provides access to Piers A and C. • The structure includes 9 circular backfilled closed-cells constructed from sheet piles, each with an approximate diameter of 70 ft spaced at 75 ft on center, with intermediate cells arching between primary cells. Limited information is available about the original construction. • The northernmost three cells (cells A-C) were constructed in the 1940s with Pier A. At the time, four cells were constructed, originally labelled cells CC, DD, EE, and FF. • The remaining six cells (cells D through I) were constructed in the early 1950s. At this time, the original cell FF was removed to accommodate the construction of Cell D. • Cell heights vary most being approximately 105 ft in length. However, cell C is approximately 99 ft in length and cell I is approximately 70 ft in length. • Original ground levels varied from -42 ft adjacent Pier A to -18 ft adjacent cell FF to approximately 0 ft at cell I to maintain consistent cell embedment depths. • Ground levels were graded at 10H:1V from Quay Wall levels to the original drydock berth depth of -50 ft. • Existing information is contradictory. Some sources indicate original depths adjacent Pier A as low as -42 ft (80 ft total depth); other sources indicate -34 ft (72 ft total depth). • Soil stratigraphy across the SIB Project Area varies, generally comprising 25 ft of artificial fills, overlying 10 ft of medium-dense sands above 30 ft of silts/silty clay overlying a deep layer of medium to dense sands.	• Liquefaction potential of the backfill within the closed-cell structures could cause instability of the pier. • Cell structures are shallow, marginally stable and will not accommodate dredging against the structure deeper than originally designed.	• Dredging to a depth below the original design cannot be accommodated. Cap placement against the structure is acceptable. • The design includes monitoring the structure during construction.	Required operational depths are as follows: • Drydock 3: -52 ft, • Adjacent the Quay Wall between Pier A and Pier C (within Drydock 5): -49 ft, and • Drydock 5 can be relocated ~50 ft southwest of Pier A and ~175 ft northwest of Quay wall.
SCC Floating Dock	A	Functional	• The SCC Floating Dock is located to the south of Pier C directly adjacent the southern extents of the Quay Wall and provide moorage to Vigor's small craft fleet. The northernmost dock is approximately 160' long and the southernmost is approximately 400 ft long; both docks are 8 ft wide. 14 steel pipe mooring piles are used to moor the docks in position and access is provided by an aluminum gangway hinged from a bulkhead wall supporting the embankment. • Existing slopes beneath the floating docks, which extend from the crest adjacent the existing silo area, vary between approximately 1.75H:1V to 4H:1V.	• A regraded constant slope, graded to 2.75H:1V would suit the navigation requirements and existing crest levels and would meet the Design Criteria for slope stability if constructed using new riprap armor.	• Boarding floats will need to be temporarily relocated to accommodate the RA. • Guide piles can remain and RA work can be done around them.	• No specific navigation requirements exist for the floating docks above maintaining the existing drafts.

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Structure	Solution	Functionality	Existing Structure/Condition Description	Key Issues		
				Geotechnical[1], Capping[2], and Riverbank[3]	Structural	Operational/Functional
East Pier	A	Functional	• East Pier is an elevated gangway structure connected to the bank of Swan Island and extending waterward to the northwest. The structure was constructed in the 1970s. The structure comprises a two-span fixed steel truss gangway connecting the shore to a small pier and an articulating steel truss gangway connecting the small pier to the Vigorous Drydock. The pier is currently owned by Project Fleet Owner LLC and operated by Vigor. The structures impacted by the RD are an intermediate pier which supports the two-span fixed gangway and the small pier. The intermediate pier is a reinforced concrete pile cap supported by four rectangular precast batter piles. The small pier is a rectangular cast-in-place pile cap approximately 30 ft long by 22 ft wide supported on four vertical steel pipe piles. • As-built drawings are not available; however, current ground levels beneath West Pier and East Pier indicate a likely original embankment slope of approximately 2.75H:1V extending to the Vigorous Drydock berth pocket.	• Existing slopes are approximately 2.75H:1V and meet the Design Criteria for slope stability with the addition of riprap armor.	• Regrading of under-pier slopes can be tailored to maintain existing depths around pier piles and allow requested depths to be achieved outside the area of structural impact. • The structural form is not sensitive to minor changes in ground levels around batter piles.	Operational depth within the Vigorous Drydock is -56 ft; however, based on discussions with Vigor during owner/operator consultation meetings, it is understood that the existing revetment toe could move northwest if required.
West Pier	A	Functional	• West Pier is a 155 ft long by 18.5 ft wide fixed ramp structure connected to the bank of Swan Island and extending waterward to the northwest. The structure was constructed in the 1970s. The pier supports an articulating steel ramp providing vehicular access to the Vigorous Drydock. The fixed pier is a four-span reinforced concrete deck supported by and cast integrally with the three landward-most piers and is bearing supported on the fourth (western-most) pier. The pier is currently owned by Project Fleet Owner LLC and operated by Vigor. Each structural pier comprises a cast-in-place concrete pile cap supported on vertical and batter piles; the landward most two being precast rectangular piles, and the seaward two being steel pipe piles. • As-built drawings are not available; however, current ground levels beneath West Pier and East Pier indicate a likely original embankment slope of approximately 2.75H:1V extending to the Vigorous Drydock berth pocket.	• Existing slopes are approximately 2.75H:1V and meet the Design Criteria for slope stability with the addition of riprap armor.	• Regrading of under-pier slopes can be tailored to maintain existing depths around pier piles and allow requested depths to be achieved outside the area of structural impact. • The structural form is not sensitive to minor changes in ground levels around batter piles.	Depth within the Vigorous Drydock is -56 ft; however, based on discussions with Vigor during owner/operator consultation meetings, it is understood that the existing revetment toe could move northwest if required.
Demo Pier	A	Functional	• Demo Pier is a 200 ft long by 42 ft wide finger pier structure connected to the bank of Swan Island and extending waterward to the northwest. The structure was constructed in the early 1990s as an access bridge/loadout bridge to the Vigorous Drydock. The pier is currently owned by Project Fleet Owner LLC and operated by Vigor. The structure comprises eight cast-in-place reinforced concrete piers supported on vertical and batter steel pipe piles, each spaced at approximately 25 ft centers supporting, ad a cast-in-place buried abutment structure of similar construction. The superstructure comprises a grillage of steel I-girders spanning longitudinally, simply supported between piers, supporting timber decking spanning transversely across girders. A ninth superstructure span connects the ninth pier to the Drydock. • Limited as-built drawings indicate variable riprap armored under-pier ground levels, with slopes ranging from approximately 2H:1V near the abutment, 10H:1V near the middle of the, pier and 1.5H:1V at the toe.	• Existing slopes are approximately 2.75H:1V and meet the Design Criteria for slope stability with the addition of riprap armor.	• Regrading of under-pier slopes can be tailored to achieve depths around pier piles similar to as-built depths and allow requested depths to be achieved outside the area of structural impact. • The structural form is not sensitive to minor changes in ground levels around batter piles.	Operational depth within the Vigorous Drydock is -56 ft; however, based on discussions with Vigor during owner/operator consultation meetings, it is understood that the existing revetment toe could move northwest if required.

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Structure	Solution	Functionality	Existing Structure/Condition Description	Key Issues		
				Geotechnical[1], Capping[2], and Riverbank[3]	Structural	Operational/Functional
Pier D	A	Functional	•Pier D is a 1,000 ft long by 56 ft wide finger pier connected to the bank of Swan Island and extending waterward to the northwest. The structure is constructed integrally with the adjoining Willamette Wharf (2,000 ft long marginal wharf) in 1979. The pier is currently owned by Project Fleet Owner LLC and operated by Vigor. This project considers the finger pier (Berth 312) only and Willamette Wharf (Berths 313 and 314) are excluded. •Pier D is a reinforced concrete structure comprising 52 bents of vertical and batter piles spaced at approximately 22.33 ft longitudinally supporting a reinforced concrete deck. Pile bents typically comprise 24-inch hollow octagonal precast concrete piles supporting cast-in-place pile caps. Piles bents comprise either vertical piles only or both vertical and transverse batter piles. Longitudinal steel battered H-Piles, located approximately every 12-15 pile bents, provide resistance to longitudinal loads. The superstructure is constructed of precast concrete deck panels spanning approximately 20 ft between cast-in-place pile caps with an 8-inch cast-in-place topping slab poured monolithically with pile caps. • Limited as-built drawings indicate a variable dredge depth along the southern berth, although indicated as typically -35 ft at the marginal wharf. Original northern berth depths appear a constant -60 ft within and west of the drydock berth. Original ground levels adjacent to Demo Pier are assumed to vary between a depth of -60 ft tending to a 2.5H:1V riprap armored revetment slope beneath the marginal wharf.	• The existing grade is at a higher elevation than shown on the as-built drawings. • Protect in place functional capacity of infrastructure.	• Regrading of berth pocket sediment can be tailored to achieve depths around pier piles similar to original depths and allow requested depths to be achieved outside the area of structural impact. • The structural form is not sensitive to minor changes in ground levels around batter piles.	Required operational depth within the northern berth pocket is -57 ft and southern berth pocket depth (Berth 312) is -30 ft. Both are approximately 3 to 5 ft shallower than as-built depths.
City of Portland Stormwater Outfalls	C	Functional	• The City of Portland's stormwater outfalls impacted by the RA include M1, M2, M3, S1, and S2. Outfall S1 is a 36-inch corrugated metal pipe through a sheet pile headwall under Lagoon Wharf. All other outfalls are concrete pipes, ranging from 36 to 60 inches in diameter, terminating with reinforced concrete headwalls around the SIB embankment. Existing concrete pipes are expected to have been manufactured in segments 7 to 8 ft long and bell-end/spigot connected on site. • Existing embankment slopes surrounding/above exiting outfalls are typically 3H:1V or shallower, except outfall S2 which is approximately 1.25H:1V to 1.5H:1V above the outfall and outfall S1 (refer to Lagoon Wharf, above).	•The existing steep embankment slope above outfall S2 does not meet the Design Criteria for slope stability.	• Outfall M3 was constructed in the late 1980s, has been observed to be in moderate condition. • All other outfalls were constructed in the 1960s are in moderate to poor condition, typically observing concrete spalling at the wingwalls and cracking with undermining of outfall toes.	Outfall piping to be extended to maintain current function along with addition of a new armored splashpad and wingwalls to accommodate grades.

Attachment B
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Structure	Solution	Required Remedial Design[1,2,3]	Adopted Remedial Design to achieve RAOs and Structural Solution to accommodate RD		
			Description	Impacts	Analysis and Design Methodology
U.S. Coast Guard Pier	B	• Dredge the eastern berth pocket to its historical navigation depth as originally designed. • Cap existing shallow slope sediments surrounding the structure. • Install riprap armor on steeper slopes. • Grade under-structure slopes to meet Design Criteria for slope stability. • Protect the structure to preserve its operational functionality.	• New riprap armored revetment slopes installed in accordance with the selected constructible alternative at a maximum slope of 2.75H:1V • New sheet-piled toe wall constructed directly adjacent the structure to accommodate historically designed eastern berth dredge depths • Pile isolation sleeves to isolate existing pier piles from new riprap • New fender pile system, constructed seaward of the new toe wall to accommodate the Bluebell vessel	Construction of the structural remedial design measures will allow the structural performance and functionality to be maintained	• Refer to Attachment C for detailed analysis and design methodology for: o Berth pocket toe walls o Pile isolation sleeves o Relocated fender system
U.S. Navy Pier	A	• Cap existing shallow slope sediments beneath the structure. • Install riprap armor on steeper slopes. • Grade under-structure slopes to meet Design Criteria for slope stability. • Protect the structure to preserve its operational functionality.	• Selected constructible alternative installed at a maximum slope of 2.5H:1V.	The existing pier structure following implementation of the RA will perform and function as it did in the as-built configuration without the need for structural measures.	NA
Marine Consortium Pier	B	• Maintain navigational depth to allow for continued operations at the structure. • Cap existing shallow slope sediments beneath the structure. • Install riprap armor on steeper slopes. • Protect the structure to preserve its operational functionality.	• New riprap armored revetment slopes installed in accordance with the selected constructible alternative at a slope of 2.15H:1V • New mid-slope pinning walls constructed through the slope to provide static and seismic slope stability	Construction of the mid-slope pinning walls will allow the structural performance and functionality to be maintained	Refer Attachment C for detailed analysis and design methodology for the new mid-slope pinning walls

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Structure	Solution	Required Remedial Design[1,2,3]	Adopted Remedial Design to achieve RAOs and Structural Solution to accommodate RD		
			Description	Impacts	Analysis and Design Methodology
Dredge Base	B	• Maintain existing navigation depth beneath the floating docks and at the berth line. • Dredge to RAL in front of the structure to remove contaminated sediment and allow for vessel spudding. • Grade under-structure slopes to meet Design Criteria for slope stability. • Protect the structure to preserve its operational functionality.	• New riprap armored revetment slopes installed in accordance with the selected constructible alternative at a maximum slope of 2.5H:1V to match as-built profile • Four new mooring piles with pile hoops to maintain the floating dock mooring functionality • Dredge to RAL in front of the structure to allow for spudding of vessels to maintain operational requirements	Construction of the structural remedial design measures, will allow the structural performance and functionality to be maintained	Refer Attachment C for detailed analysis and design methodology for the mooring infrastructure.
Berth 311	B	• Cap existing shallow slope sediments beneath the structure. • Install riprap armor on steeper slopes. • Dredge to RAL in front of the structure to remove contaminated sediment and allow for vessel spudding. • Grade under-structure slopes to meet Design Criteria for slope stability. • Protect the structure to preserve its operational functionality.	• New riprap armored revetment slopes installed in accordance with the selected constructible alternative at a slope of 3H:1V, to match as-built profiles beneath land spans. • New capping placed beneath the berth structure at a shallow slope constructed below existing mudline levels, closer to as-built profiles. • Dredge to RAL in front of the structure to allow for spudding of vessels to maintain operational requirements. • New breasting dolphin to accommodate barges moored alongside existing mooring dolphin to maintain barge mooring functionality and provide continuity of existing operations.	Construction of the structural remedial design measures, will allow the structural performance and functionality to be maintained	Refer Attachment C for detailed analysis and design methodology for the mooring infrastructure.
Swan Island Boat Ramp	A	• Cap existing shallow slope sediments beneath boarding floats and surrounding the ramp with selected constructible alternatives as specified in RDTM Figure 3-1 (Volume I, Appendix D). • Provide erosion protection to toe of the boat ramp.	• Selected constructible alternative placed in areas surrounding concrete ramp.	The existing ramp and boarding floats following implementation of the RA will perform and function as it does currently without the need for structural measures.	NA

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Structure	Solution	Required Remedial Design[1,2,3]	Adopted Remedial Design to achieve RAOs and Structural Solution to accommodate RD		
			Description	Impacts	Analysis and Design Methodology
Wind Tunnel	A	• Cap existing shallow slope sediments beneath the structure. • Protect the structure to preserve its operational functionality.	• New riprap armored revetment slopes installed in accordance with the selected constructible alternative at a slope of 2.15H:1V.	The existing structure following implementation of the RA will perform and function as it does currently without the need for structural measures.	NA
Berth 308	E	• Cap existing shallow slope sediments. • Install riprap armor on steeper slopes.	• Demolition of existing pier and dolphin structures. • Newly graded riprap armored revetment slopes installed in accordance with the selected constructible alternative at a maximum slope of 2.5H:1V.	As the existing structure is non-functional, it will be removed to accommodate the RA.	NA
Berth 306 and Berth 307	C	• Cap existing shallow slope sediments beneath the structure. • Install riprap armor on steeper slopes. • Grade under-structure slopes to meet Design Criteria for slope stability. • Replace functional capacity of infrastructure.	• Remove and replace existing pier and dolphin structures at a new berth line further into SIB to accommodate a newly graded slope. • Newly graded riprap armored revetment slopes installed in accordance with the selected constructible alternative at a maximum slope of 2.5H:1V with berth line pushed waterward to the north • Functionally-equivalent reconstruction of Berths 306 and 307 piers with accompanying breasting dolphins and up-slope mooring points to accommodate new slope toe and berth line.	Replacement of the structures on a shallower slope will allow the current operations to continue after RA activities.	• Refer Attachment C for detailed analysis and design methodology for: o Replacement Berth Piers o Replacement Berth dolphins o Replacement Berth mooring points

Attachment B
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Structure	Solution	Required Remedial Design[1,2,3]	Adopted Remedial Design to achieve RAOs and Structural Solution to accommodate RD		
			Description	Impacts	Analysis and Design Methodology
Lagoon Wharf (Berths 302 - 305)	C	• Cap existing shallow slope sediments waterward of the new structure. • New structure to meet Design Criteria for slope stability. • Install riprap armor on steeper slopes.	• Remove and replace existing structure that is designed to meet the Design Criteria for both slope stability and achievement of RAOs. • Waterward of new structure, selected constructible alternatives as specified in RDTM Figure 3-1 (Volume I, Appendix D) will be placed waterward of the berthing line.	RAOs cannot be achieved unless the structure is removed and replaced due to over steep slopes and global stability issues.	• Refer Attachment C for analysis and design methodology and the determination that the Lagoon Wharf structure requires replacement.

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Structure	Solution	Required Remedial Design[1,2,3]	Adopted Remedial Design to achieve RAOs and Structural Solution to accommodate RD		
			Description	Impacts	Analysis and Design Methodology
Pier A	A	• Rock revetment with selected installed on either side of the structure on the existing mudline. • Protect the structure to preserve its operational functionality.	• New riprap armored buttressing installed in accordance with selected constructible alternative along the northern and southern berth line. • Relocation of Drydock 5 and modification of drydock sponsons.	The existing pier structure following implementation of the RA will perform and function as it did prior to RA activities without the need for structural modifications.	NA
Pier C	A	• Cap existing shallow slope sediments. • Dredge to RAL in front of the structure to remove contaminated sediment. • Protect the structure to preserve its operational functionality.	• Regrading of existing berth pocket and under pier slopes and construction of cap to a maximum slope of 3H:1V. • Dredge to RAL in front of the structure.	The existing pier structure following implementation of the RA will perform and function as it did prior to RA activities without the need for structural modifications.	NA

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Structure	Solution	Required Remedial Design[1,2,3]	Adopted Remedial Design to achieve RAOs and Structural Solution to accommodate RD		
			Description	Impacts	Analysis and Design Methodology
Quay Wall	A	• Rock revetment on the existing mudline. • Protect the structure to preserve its operational functionality.	• New riprap armored buttressing incorporated into selected constructible alternative and placed along the edge of Quay Wall at approximate original levels sloping to the bottom of the existing berth pocket. • Relocation of Drydock 5 and modification of drydock sponsons. • Newly graded riprap armored revetment slopes installed in accordance with the selected constructible alternative at a maximum slope of 4H:1V.	The existing Quay Wall following implementation of the RA will perform and function as it did prior to RA activities without the need for structural modifications.	NA
SCC Floating Dock	A	• Rock revetment to be placed in this area. • Protect the structure to preserve its operational functionality.	• Newly graded riprap armored revetment slopes installed in accordance with the selected constructible alternative at a maximum slope of 2.75H:1V, including around existing mooring piles.	The existing floating docks following implementation of the RA will perform and function as it does in the current configuration without the need for structural measures.	NA

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Structure	Solution	Required Remedial Design[1,2,3]	Adopted Remedial Design to achieve RAOs and Structural Solution to accommodate RD		
			Description	Impacts	Analysis and Design Methodology
East Pier	A	• New rock revetment on the existing slope. • Protect the structure to preserve its operational functionality.	• Newly graded riprap armored revetment slopes installed in accordance with the selected constructible alternative at a maximum slope of 2.75H:1V, to match existing profiles.	The existing pier structure following implementation of the RA will perform and function as it does in the current configuration without the need for structural measures.	NA
West Pier	A	• New rock revetment on the existing slope. • Protect the structure to preserve its operational functionality.	• Newly graded riprap armored revetment slopes installed in accordance with the selected constructible alternative at a maximum slope of 2.75H:1V, to match existing profiles.	The existing pier structure following implementation of the RA will perform and function as it does in the current configuration without the need for structural measures.	NA
Demo Pier	A	• New rock revetment on the existing slope. • Protect the structure to preserve its operational functionality.	• Newly graded riprap armored revetment slopes installed in accordance with the selected constructible alternative at a maximum slope of 2.75H:1V, to closely match existing profiles.	The existing pier structure following implementation of the RA will perform and function as it does in the current configuration without the need for structural measures.	NA

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Structure	Solution	Required Remedial Design[1,2,3]	Adopted Remedial Design to achieve RAOs and Structural Solution to accommodate RD		
			Description	Impacts	Analysis and Design Methodology
Pier D	A	• New rock revetment on the existing slope. • Dredge to RAL in front of the structure to remove contaminated sediment. • Protect the structure to preserve its operational functionality.	• Regrading of existing berth pocket and under pier slopes and construction of cap in accordance with selected constructible alternative to a maximum slope of 3H:1V. • Dredge to RAL in front of the structure.	The existing pier structure following implementation of the RA will perform and function as it did prior toe RA activities without the need for structural measures.	NA
City of Portland Stormwater Outfalls	C	• Cap existing sediments around structures. • Provide erosion protection to the cap structure directly downstream and surrounding outfalls. • Protect in place the existing outfall pipes and rebuild splashpad and wingwalls.	• Incorporate a concrete mattress into selected constructible alternative directly surrounding outfalls. • New functionally equivalent outfalls where existing cannot be reinstated, including new wingwalls.	Construction of the structural remedial design measures will accommodate slope remediation and will restore the splashpad and wingwalls of the outfalls.	• Refer Attachment C for detailed analysis and design methodology for: o Replacement outfall wingwalls

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Notes:

[1]Refer to the Geotechnical Design Technical Memorandum for further information

[2]Refer to the Capping Design Technical Memorandum for further information

[3]Refer to the Riverbank Technical Memorandum for further information

CLE = contingency level earthquake

H:V = horizontal to vertical ratio

RAL = remedial action level

RAO = Remedial Action Objectives

ft = feet/foot

NA = not applicable Non-Functional

SCC = Shipyard Commerce Center

ATTACHMENT C
SHORELINE AND OVERWATER STRUCTURES ANALYSIS AND DESIGN METHODOLGY

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1.0 INTRODUCTION

This attachment describes the analysis and design methodology used to design structures to accommodate the Remedial Design (RD) for the Swan Island Basin (SIB) Project Area. Additionally, it outlines the evaluation of overwater structures, conducted according to the Structural Action Decision Tree (Figure 2-1 in the Structural Design Technical Memorandum), which determined the necessity for structural design (Solutions B and C).

Where the Structural Design Criteria (Attachment A) details standards of reference and performance requirements to be adhered to during design of new structures, this attachment describes the analysis methods employed to achieve compliance with the performance objects and standards identified. This attachment follows the Structure-Specific Analyses (Attachment B) which identifies the following structures to be constructed as part of and to support the Remedial Action (RA):

- U.S. Coast Guard (USCG) Pier
    - Berth pocket toe wall
    - Pile isolation sleeves
    - Functional-equivalent fender system
- Marine Consortium (MC) Pier
    - Mid-slope pinning walls
- Dredge Base
    - Functionally equivalent mooring infrastructure (mooring piles)
- Berth 306 and Berth 307
    - Functionally equivalent berth infrastructure:
        - Piers
        - Breasting Dolphins
        - Up-slope Mooring Points
- Berth 311
    - Functionally equivalent mooring infrastructure (breasting dolphin)
- City of Portland (COP) Stormwater Outfalls
    - Outfall Pipe Headwall structures
- Lagoon Wharf (Berths 302 - 305)
    - Functionally equivalent wharf infrastructure

2.0 STRUCTURAL ANALYIS MODELING INPUTS

2.1 SECTION/MATERIAL PROPERTIES

Structural analysis models were created in SAP2000 using shell elements for reinforced concrete pile caps and decks and line elements for piles. Cracking of concrete elements are accounted for by assuming cracked section properties. Steel sections are considered gross and are designed for

sacrificial corrosion loss per Attachment A. Section and material properties used are listed in Table C-1.

Table C-1 Modeling Section Properties

Element	E (Modulus of Elasticity)	Moment of Inertia $I_{x.eff}$	Moment of Inertia $I_{y.eff}$
RC pile plug	4,000 ksi	0.50 I_g	0.50 I_g
RC deck	4,000 ksi	0.50 I_g	0.50 I_g
Steel Pipe Piles	29,000 ksi	I_g	I_g

Notes:
E = Modulus of Elasticity
RC = reinforced concrete
ksi = Kilopounds per square inch
I_g = Moment of inertia (gross)
$I_{x.eff}$ = Effective moment of inertia about the x-axis
$I_{y.eff}$ = Effective moment of inertia about the y-axis

2.2 SOIL RESTRAINT TO PILES

Reference the Geotechnical Design Technical Memorandum (GDTM) (Volume I, Appendix I) for soil parameters and information related to foundation elements.

Lateral restraint to embedded piles was modeled with non-linear Winkler springs using force-displacement (P-Y) curves provided in the GDTM. Non-linear two-joint links in SAP2000 were placed at 3-foot intervals along the pile height. Static soil springs were used to assess gravity load conditions including dead, live, berthing, and mooring loads. Cyclic soil springs were used to assess seismic effects. Bilinear soil springs accounted for piles on slopes that varied stiffness and capacity by load direction. Pile group effects on spring stiffnesses and capacities followed GDTM guidelines.

Vertical restraint to embedded piles was modeled using a roller pinned connection. Torsional restraint was excluded except for single-pile models.

3.0 DESIGN OF STRUCTURAL ELEMENTS

Structural elements were designed to withstand the load and force demands developed by the structural analyses.

3.1 STEEL PILE PIPES

Steel pipe piles were designed per AASHTO Section 6.9.2.2.1 for the combined action of axial and flexural effects. Piles are designed as elastic when subject to all static load combinations and designed as yielding elements when subject to the Design Earthquake (DE). The following non-linear properties were used in accordance with ASCE 61-14:

- F_{ye} = 55,000 pounds per square inch (psi)
- Φ = 1.0
- Strain limit for the DE = 0.05 inch/inch

3.2 STEEL SHEET PILES

Sheet pile walls were designed using the U.S. Army Corps of Engineers Engineer Manual: Design of Sheet Pile Walls (USACE EM 1110-2-2504). Sheet piles are designed to be elastic when subject to static and Contingency Level Earthqauke (CLE) load combinations.

3.3 REINFORCED CONCRETE PILE PLUGS

Reinforced concrete pile plugs at the top of steel pipe piles were designed to ACI 318 Section 22.4 for combined actions of axial and flexural effects. Piles are designed to be elastic when subject to static load combinations and designed as yielding elements when subject to the DE. The following non-linear properties were used in accordance with ASCE 61-14:

- F'_{ce} = 6,500 psi
- F_{ye} = 66,000 psi
- Φ = 1.0
- Strain limit for DE (concrete) = No limit
- Strain limit for DE (reinforcement) = 0.064 inch/inch

3.4 REINFORCED CONCRETE PILE CAP AND DECKS

Reinforced concrete pile cap elemtns and deck were designed to AASHTO Section 5.6 for combined actions of axial and flexural effects. Concrete geometry and steel reinforcement was sized for the flexural tension stress limits of AASHTO clause 5.6.7 when subject to SLS load combinations. Elements were designed to remain elastic for all static ULS load effects and were designed as capacity protected in accordance with ASCE 61 using overstrength actions from yielding elements.

4.0 U.S. COAST GUARD PIER

4.1 EVALUATION OF OVERWATER STRUCTURE

- Geotechnical slope stability analysis was conducted for the under-structure and structure adjacent slopes. It was concluded that a maximum slope angle of 2.75H:1V is necessary to meet the design criteria for slope stability.
- Given the navigation requirement to provide a berth depth of approximately -6.75 ft in the eastern berth pocket for the Bluebell vessel, a constant slope from berth pocket depth to the existing crest level would be approximately 2H:1V, which does not satisfy slope stability requirements.
- To meet slope stability requirements, a final capped slope of 2.75H:1V was adopted from the top of the existing crest and combined with a new toe wall constructed along the berth line of the pier to accommodate a vertical cut to meet navigation needs.
- To accommodate a 2.75:1V slope, up to 4 ft of fill and riprap armor layers are added on top of the current slope.

- The effects on the existing structure of the additional fill material were examined by performing comparative structural analyses of the pier structure in both the current and final condition.
    - A three-dimensional (3-D) analysis model was created using SAP2000 (Figure C-1), modeling all primary timber elements as line elements and the geotechnical support conditions as an equivalent depth-to-fixity.
    - The depth to fixity was determined to be 6 ft within the existing clay layers and 5 ft within existing fill layers. Following the completion of the RA, the depth to fixity was estimated to be within 4 ft from the top of the finished riprap surface.
    - Each model was analyzed for the effects of uniformly applied lateral loads, berthing impact point loads, and seismic inertial forces using a response spectrum analysis adopting the site-specific CLE response spectra.
    - Impacts on the structure included increased pile shear forces by up to 65% due to CLE inertial shaking and increased pile shear forces and bending moments by more than 200% due to a berthing impact point load.
- To mitigate the negative impacts to the existing structure, it was determined that piles will need to be isolated from the new cap layer using pile sleeves. Details for these pile sleeves are included in the RD drawings.

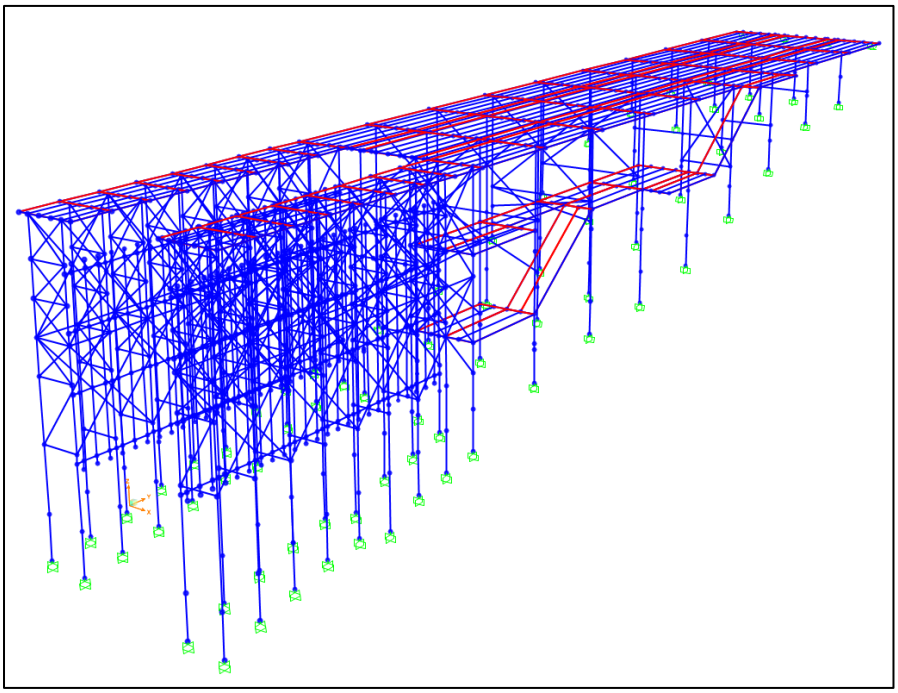

Figure C-1. Analysis model of USCG Pier

4.2 BERTH POCKET TOE WALL

A new toe wall is required to maintain the functionality and operability of the pier, which is used by the Bluebell vessel, while ensuring that the surrounding slopes remain stable per the project's design criteria. To accommodate the navigation depth, the thickness of the chemical isolation cap,

future dredge allowance within the berth pocket, and finished riprap elevation above the wall, a maximum retained height of 17 ft for a temporary condition prior to cap placement and a final retained height of 12 ft were considered for the wall design.

4.2.1 Structural Form

The new toe wall is a driven sheet pile wall constructed from pre-manufactured mild steel sheet pile sections, driven and clutched together to form a continuous wall. The wall cantilevers from the underlying strata and the ratio of the embedded length of wall to free length in approximately 2:1.

4.2.2 Analysis and Design

The wall was analyzed using the DeepEx software program for static, CLE, and DE load combinations with analysis results provided for structural design. The wall was engineered to limit maximum static displacement to 2 inches, thereby safeguarding and mitigating adverse impacts on the existing pier piles.

Sheet piles were designed for the flexural and shear demands provided by the DeepEx analysis. Hot-rolled steel ‘Z’ Section sheet piles, like Nucor NZ 38, were found to be adequate for the toe wall.

4.3 PILE SLEEVES

Pile sleeves are added to separate existing pier piles from the new riprap revetment. These sleeves prevent the added revetment from putting loads on the timber piles and help mitigate adverse effects associated with increased effective depth to pile fixity. Furthermore, pile sleeves serve to isolate the piles from passive loads resulting from any lateral movement of the cap during seismic events.

4.3.1 Structural Form

Pile sleeves are designed as steel pipe sections conforming to standardized Schedule 40 pipe specifications. These sleeves are fabricated in two halves, complete with bottom flanges, that are anchored into the existing grade surface, to allow for fitting around existing pier piles prior to the placement of new riprap armoring.

4.3.2 Analysis and Design

The following details the design of the pile sleeves:

- Each sleeve is held in place by the riprap armor layer.
- The pile sleeves are dimensioned to provide a minimum clear annulus of 1.25 times the expected long-term toe wall displacement (2 inches), providing isolation from the riprap should the anticipated movements of the toe wall occur.
- Each sleeve is anchored to the excavated slope face and separated from the pier piles with temporary spacers during the construction of the riprap armoring. Upon completion of the

riprap placement, the temporary spacers will be removed and a debris cap installed at the top to keep debris out of the annular space. Drawdown due to sheet pile installation was not considered, but the RA Contractor should include drawdown effects in the final design and analysis.

4.4 FENDER SYSTEM

To accommodate construction of the new toe wall, existing timber fender piles will be removed. New fender piles will be installed seaward of the new toe wall for fendering operations.

4.4.1 Structural Form

New steel pipe fender piles have been designed to provide energy absorption characteristics equal to or greater than what is expected to be provided by the existing timber fender piles. New extruded rubber fendering is provided along the berth line, provide a loading path between fender piles and the pier similar to the existing condition, and provide energy absorption.

4.4.2 Analysis and Design

The energy absorption capacity of existing timber fender piles was evaluated by determining the flexural resistance of the piles and expected displacement when loaded with a point load near their mid-height. Existing piles were evaluated as propped cantilevers, assuming a nominal depth to fixity within the existing strata.

New steel pipe piles were evaluated using the same methodology to determine the energy absorption capacity assuming a deeper depth to fixity accounting for the dredge berth pocket and larger pile diameter. The spacing of new fender piles was selected to match existing pile spacings to accommodate the Bluebell's hull shape and various berthing conditions.

5.0 MARINE CONSORTIUM PIER

5.1 EVALUATION OF OVERWATER STRUCTURE

- Geotechnical slope stability analysis was conducted for the under-structure and structure adjacent slopes, concluding that a maximum slope angle of 2.75H:1V is necessary to meet the design criteria for slope stability.
- Given the navigation requirement to provide a berth depth of approximately -18.75 ft in front of the pier and along the adjacent shoreline, a constant slope from berth pocket depth to the existing crest level would be approximately 2.15H:1V, which does not satisfy slope stability requirements.
- Existing grades beneath the pier are close to and indicate an original slope angle of 2.15H:1V. Therefore, functionality and performance of the structure can be maintained by maintaining a 2.15H:1V slope angle.
- To accommodate a slope of 2.15H:1V, ground improvements are required to avoid slope instability in both the static and seismic conditions. Geotechnical analysis conducted with the slope stability software package Slide concluded that both deep-seated failure and

shallow failure of the 2.15H:1V slope is possible in each of the events. Refer to the GDTM for further information.

- Additional geotechnical analysis was completed using Slide which demonstrated that deep-seated failure could be mitigated by a single row of mid-slope pinning walls, however shallow failure was still possible in front of or behind a single wall. Therefore, two rows of mid-slope pinning walls were adopted.
- Refer to the GDTM for further information regarding the geotechnical analyses.

5.2 MID-SLOPE PINNING WALLS

5.2.1 Structural Form

New mid-slope pinning walls are driven sheet pile walls constructed from pre-manufactured mild steel sheet pile sections, driven and clutched together to form a continuous wall. Each wall is approximately 80 to 100 ft in length and resists kinematic forces from slope movements through out-of-plane flexural action.

5.2.2 Analysis and Design

An iterative soil-structure interaction analysis and design process was employed to develop the pinning walls as follows:

- Detailed geotechnical analyses of the proposed mid-slope pinning walls were conducted using the software package Slide. These analyses determined free-field slope displacements of the 2.15H:1V slope following the CLE, which were approximately 0.67 ft. Refer to the GDTM for additional details.
- A two-dimensional analysis model was created using SAP2000 software (Figure C-2) with each wall modeled as a line element representing a linear foot width of the wall. Geotechnical restraint was modeled using non-linear PY-links developed by the geotechnical team.
- Free-field slope displacements were applied to non-linear links above the elevation of the expected slip surface as predicted by the Slide analysis. The resulting design displacements and flexural actions of the wall were summarized.
- Shear resistance values obtained from the SAP2000 analysis were incorporated into the Slide analysis model to provide resistance against slope failure. This resulted in a pinned slope displacement of approximately 0.5 ft.
- The analysis and design process was repeated iteratively until convergence between displacements and pinning resistances was achieved, with final displacements being approximately 0.6 ft.
- Sheet piles were designed in accordance with Section 3.0 utilizing the flexural and shear demands derived from the SAP2000 analysis for a 0.60 ft displacement. Hot-rolled steel ‘Z’ section sheet piles, like Nucor NZ 38, were found to be adequate for the pinning wall.

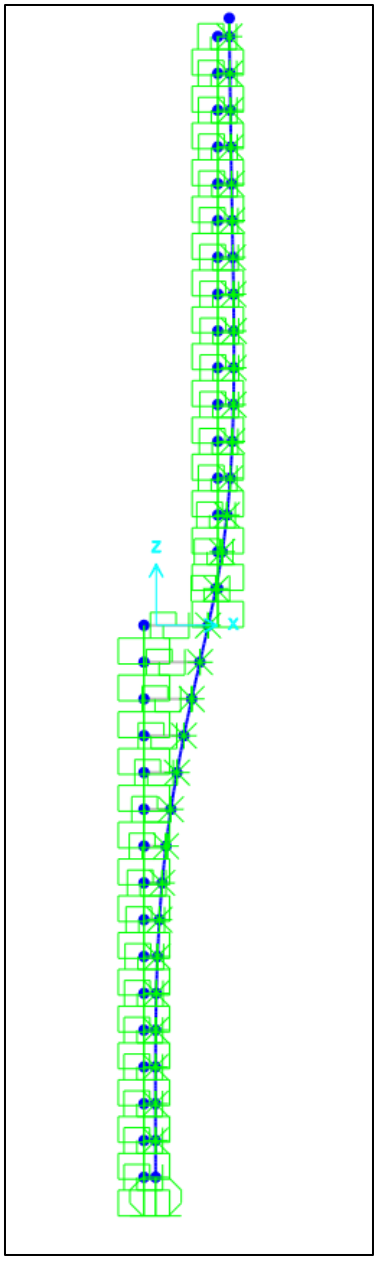

Figure C-2. SAP2000 model of mid-slope pinning wall displaced shape

6.0 DREDGE BASE

6.1 EVALUATION OF OVERWATER STRUCTURE

- Geotechnical slope stability analysis was conducted for the under-structure and structure adjacent slopes concluding that a maximum slope angle of 2.50H:1V is necessary to meet the design criteria for slope stability.
- Given the navigation requirement to provide a berth depth of approximately -10 ft in front of the fixed pier and along the adjacent shoreline, a constant slope from berth pocket depth to the existing crest level would be approximately 2.50H:1V.

- As-built grades beneath the pier structure indicate an original slope angle of 2.50H:1V with a mid-slope bench, and current bathymetry indicates only minor sedimentation directly beneath the pier. Therefore, functionality and performance of the pier structure can be maintained by maintaining a 2.50H:1V slope angle.
- The current mooring infrastructure for the Dredge Base's two floating docks that are permanently moored at the Dredge Base includes spud piling of the dredge base floats, damaged breasting dolphins, and up-slope mooring points.
- Existing up-slope mooring points and breasting dolphins need to be removed to allow for clearing, grubbing, dredging, and regrading of the slopes at and on either side of the pier.
- Functionally equivalent mooring infrastructure has been designed to replace the existing breasting dolphins and up-slope mooring points.

6.2 FUNCTIONALLY EQUIVALENT MOORING INFRASTRUCTURE

A mooring analysis was completed in accordance with Attachment A to determine mooring geometry requirements and mooring forces for the design of functionally equivalent mooring infrastructure.

Final infrastructure geometry includes provision of four new permanent mooring piles complete with pile hoops retrofitted to the existing floats.

6.2.1 Structural Form

New mooring piles are plumb steel pipe piles driven into the underlying soil located directly landward of the existing dredge floats. Two mooring piles are provided per float. Pile hoops will be designed and fabricated to suit the existing barge hulls and pile hoops will be releasable to accommodate future movement/relocation of the barges, if required.

6.2.2 Analysis and Design

A 3-D analysis model was created using SAP2000. The steel pile was modeled using line elements. Material and section properties adhere to Table C-1. The typical elevation at the top of the pile is approximately +35 ft, where the ground elevation is approximately -10 ft.

Mooring loads were applied to the analysis model in accordance with Attachment A using concentrated loads applied at various horizontal and vertical angles. Dead loads were included in the analysis model using the SAP2000 built-in self-weight function which calculates dead loads based on element geometry and material densities. Seismic effects do not control by inspection.

The design of structural elements follows Section 3.0 utilizing the flexural and shear demands derived from the SAP2000 analysis.

7.0 BERTH 306 AND BERTH 307

7.1 EVALUATION OF OVERWATER STRUCTURE

- A geotechnical slope stability analysis was conducted for the embankment slope extending from Lagoon Wharf to Wind Tunnel, which includes Berth 306 and Berth 307. It concluded that a maximum slope angle of 2.50H:1V is needed to adhere to the design criteria for slope stability.
- The existing embankment slope varies along its length but has an average slope angle of 1.75H:1V. To maintain operation of Berth 306 and Berth 307, a navigation depth of -14.75 ft extending approximately 1,200 ft east of Lagoon Wharf is required.
- To accommodate a steeper slope of 1.75H:1V, significant ground improvements are required to mitigate global and local slope instability under both static and CLE conditions. Geotechnical analysis using the Slide software package concluded that both deep-seated and shallow failure of the 1.75H:1V slope are likely in each event.
- Geotechnical analysis was performed using the Slide software to evaluate ground improvement concepts including mid-slope pinning walls and stepped retaining walls. However, given the oversteep slope and extent requiring improvement, preliminary cost comparisons demonstrated that flattening the slope is more economical.
- To accommodate a flatter slope while meeting navigation requirements, the existing berth and dolphin structures will need to be demolished and reconstructed at the new berth line of the flatter slope to maintain functionality.

7.2 FUNCTIONALLY EQUIVALENT REPLACEMENT STRUCTURES

The geometry and arrangement of replacement piers, breasting dolphins, and up-slope mooring points were designed to correspond with the existing structures' locations and functions. The developments include:

- Two new pier structures (Berths 306 and 307) located at the new berth line
- Nine new breasting dolphins (five at Berth 306 and four at Berth 307) each furnished with conventional mooring bollards and vertical fendering. Two dolphins include shore access provided by two-span gangways
- Nine new up-slope mooring points furnished with conventional mooring bollards and distributed along the crest of the embankment slope.

Mooring and berthing analyses were conducted in accordance with Attachment A to determine the forces for the design of the replacement breasting dolphins and mooring points.

7.3 BERTH 306 AND BERTH 307 PIERS

7.3.1 Structural Form

The replacement Berth 306 and Berth 307 structures are pile supported structures which extend from the crest of the flattened embankment slope towards the new berth line that is approximately 45 ft waterward of the existing berth line. Each berth comprises 16 vertical steel pipe piles, approximately 30-inches in diameter that support a variable thickness cast-in-place reinforced concrete deck. Each pier is approximately 112 ft long by 16 ft wide with a 17 ft long by 70 ft wide pier head at the berth line. A uniform thickness deck, approximately 18 inches thick spans between pile bents, and thickened pile caps span east-west over pile bents. Landside structures include a cast-in-place concrete retaining wall supporting engineered backfill beneath a deck-supported concrete approach slab.

7.3.2 Analysis and Design

A 3-D analysis model was created using SAP2000 (Figure C-3). The model represents both Berth 306 and Berth 307 due to the similarity in subsurface soil conditions and geometry. The deck structure is modeled using shell elements connected to concrete plug elements and steel pipe piles via rigid links from the mid-depth to the soffit of the deck. Pile plugs and steel pipe pile elements are modeled using line elements. Material and section properties adhere to Table C-1. The typical elevation at the top of the deck is approximately +38.5 ft. The revetment elevation ranges from +36 ft at the landward most pile row to –15 ft at the seaward most pile row. Note, the basin depth is approximately 15 ft to 17.5 ft at Berths 306 and 307.

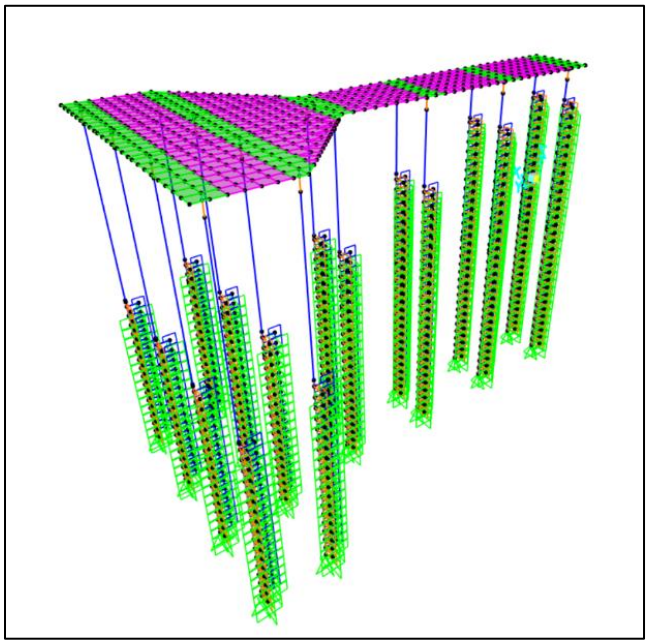

Figure C-3. SAP2000 model screenshot of Berths 306 and 307

Live loads were applied to the analysis model in accordance with Attachment A using pressure and concentrated load assignments. Dead loads were included in the analysis model using the

SAP2000 built-in self-weight function which calculates dead loads based on element geometry and material densities.

Seismic effects from the DE were assessed in SAP2000 using the ASCE-61 displacement-based design method B as follows:

- Plastic hinge properties were calculated and modelled in SAP2000.
- Pile plugs were expected to form plastic hinges at the underside of the deck when subject to inertial and kinematic demands.
- Steel pipe pile plastic hinges were expected to form deep in the ground when subject to kinematic demands.
- A capacity curve (base shear – displacement) was created for the berth structure utilizing a non-linear static pushover analysis. The capacity curve plots the change in base shear versus the structure's center of mass displacement when subject to an increasing horizontal acceleration, and accounts for elastic and inelastic deformation of the ground conditions and hinging elements.
- The DE event response spectrum was used to determine the performance point through iteration. From this analysis, a design displacement is created which can be applied to the structure.
- This process was repeated in both orthogonal plan directions (i.e., north-south and east-west in plan).
- Design displacements in both orthogonal directions were combined in accordance with ASCE 61-14.

The detailed geotechnical slope stability analysis of the new 2.5H:1V embankment slope has indicated that the pseudo-static slope stability factor of safety is less than 1.0. This suggests that earthquake-induced lateral ground deformations of the embankment are likely, and the new berths need to be designed accordingly. A free-field displacement of 2 ft is anticipated at a maximum depth of -40 ft. The typical pushover curve from SAP2000 model of Berths 306 and 307 can be seen in Figure C-4. For further information, please refer to the GDTM and Figure C-5 for a cross-section showing the embankment slip surface and pier structure.

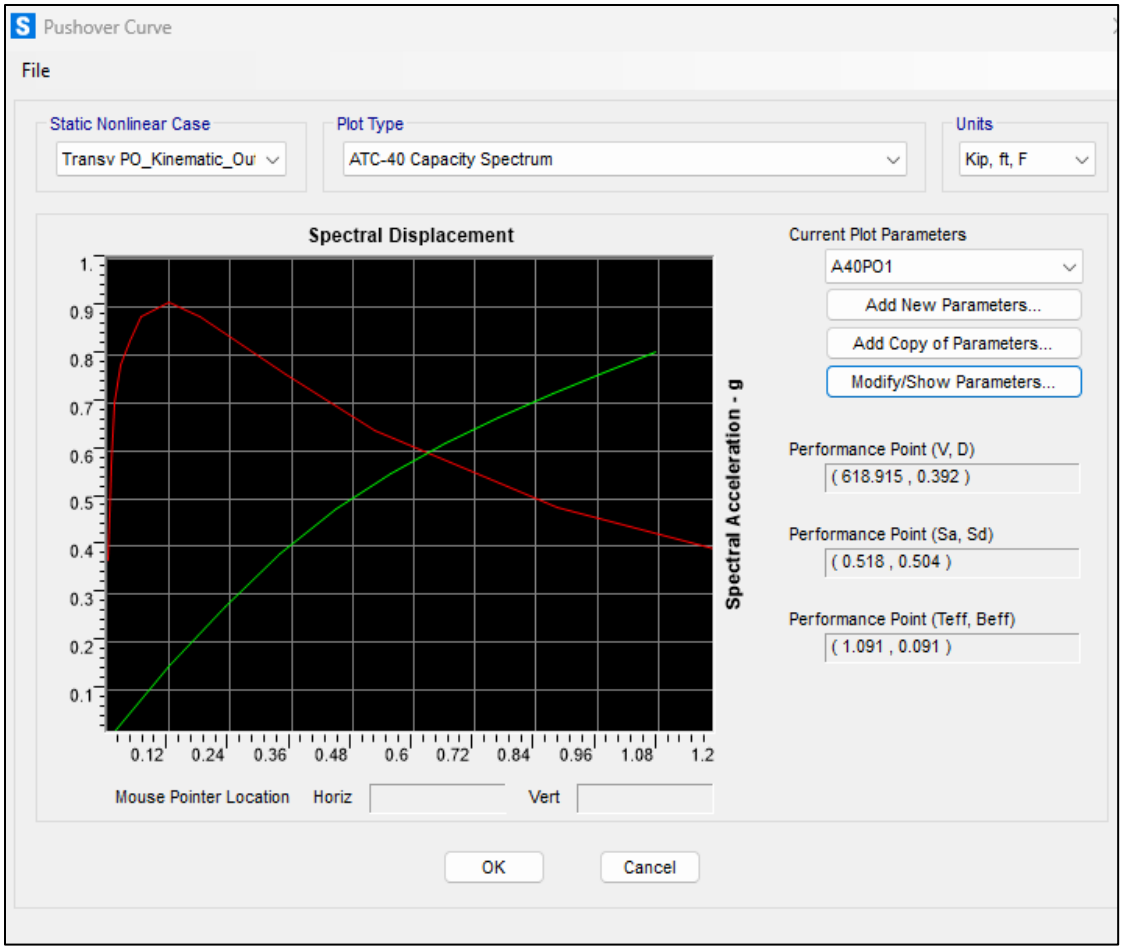

Figure C-4. Typical pushover curve from SAP2000 model of Berths 306 and 307

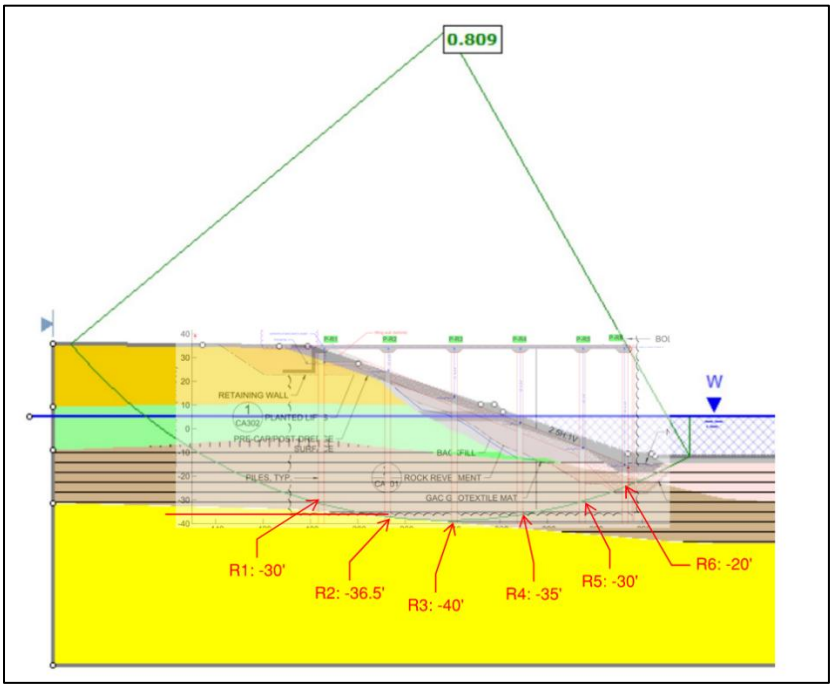

Figure C-5. Approximate modeled slip plane under Berths 306 and 307

Lateral ground deformations were modeled in SAP2000 as kinematic loads. Free-field slope displacements were applied to non-linear links above the elevation of the predicted slip surface determined by the Slide analysis. The analysis software calculates the kinematic load based on the relationship between slope displacement and pile displacement. Due to the narrow width of piers relative to the total length of the embankment, pile resistances do not significantly impact slope failure resistance or displacement reduction.

Further pushover analyses were completed for the post-lateral spreading event in accordance with ASCE 61-14. For the design, 100% of kinematic actions were combined with 100% of inertial actions. Design displacements in both orthogonal plan directions were combined in accordance with ASCE 61-14. Pile rotations, curvatures and strains were evaluated against codified limits for the DE and deck elements were designed to remain elastic in accordance with Section 3.1. Figure C-6 shows a screenshot of the analysis model in its final displaced state, highlighting plastic hinge locations.

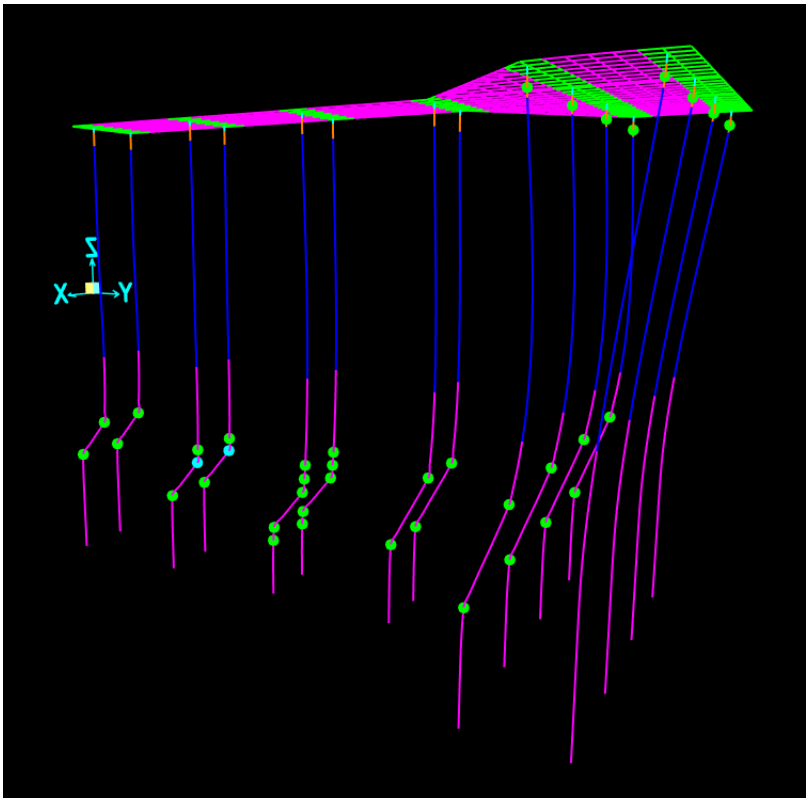

Figure C-6. Typical final displaced shape profile of pier highlighting pile hinge locations

The design of structural elements was in accordance with Section 3.0 utilizing the flexural and shear demands derived from the SAP2000 analysis.

7.4 BREASTING DOLPHINS

7.4.1 Structural Form

Replacement breasting dolphins are piled structures located at the toe of the new revetment slope to resist berthing and mooring actions of the design vessel. Each dolphin comprises six battered steel pipe piles approximately 2-ft in diameter battered at approximately 1:4 to resist lateral loads supporting a cast-in-place reinforced concrete pile cap approximately 5-ft thick. A vertical fendering system is constructed seaward of the pile cap consisting of a rubber cell fender and a pile supported fender panel located along the berth line. A single bollard with a safe working load of approximately 75 metric tons is located centrally on the pile cap. Two dolphins are furnished with access gangways to provide shore access for line handling.

7.4.2 Analysis and Design

A 3-D analysis model was created using SAP2000 (Figure C-7). The model represents all dolphins due to the similarity in subsurface soil conditions, geometry, and design loads. The pile cap is modeled using shell elements connected to concrete plug elements and steel pipe piles via rigid links from the mid-depth to the soffit of the pile cap. Pile plugs and steel pipe pile elements are modeled using line elements. Material and section properties adhere to Table C-1. The typical elevation at the top of the pile cap is approximately +36 ft. The revetment elevation at the seaward most pile location is approximately -15 ft.

Mooring loads were applied to the analysis model in accordance with Attachment A using concentrated loads applied at various horizontal and vertical angles. Berthing reactions were applied directly to the seaward side of the dolphin ignoring the resistance provided by vertical fender piles. Dead loads were included in the analysis model using the SAP2000 built-in self-weight function which calculates dead loads based on element geometry and material densities. Seismic effects were calculated to not be critical given the structures low seismic mass compared to factored berthing/mooring demands.

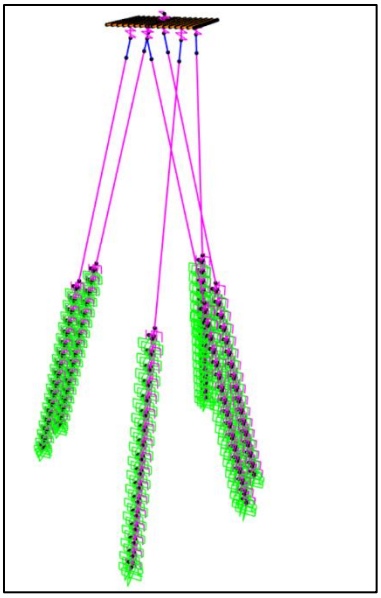

Figure C-7. SAP2000 model screenshot of typical dolphin at Berths 306 and 307

The design of structural elements was in accordance with Section 3.0 utilizing the flexural and shear demands derived from the SAP2000 analysis.

7.5 UP-SLOPE MOORING POINTS

7.5.1 Structural Form

Replacement up-slope mooring points are single-pile structures located at the crest of the revetment slope which resist mooring forces from the design vessel. Each mooring point comprises a 75 metric ton safe working load bollard anchored into steel pipe pile, approximately 3-ft in diameter driven into the upper slope with reinforced concrete infill over its upper extents.

7.5.2 Analysis and Design

A 3-D analysis model representative of all mooring points was created using SAP2000 (Figure C-8). Steel pile and pile infill elements are modeled using line elements. Rigid links were used to model the upstanding height of the bollard above the reinforced concrete infill at the top of the pile. Material and section properties adhere to Table C-1. The typical elevation at the top of the pile is approximately +36 ft, where the ground elevation is approximately +35 ft.

Mooring loads were applied to the analysis model in accordance with Attachment A using concentrated loads applied at various horizontal and vertical angles. Dead loads were included in the analysis model using the SAP2000 built-in self-weight function which calculates dead loads based on element geometry and material densities. By inspection, seismic loads do not control.

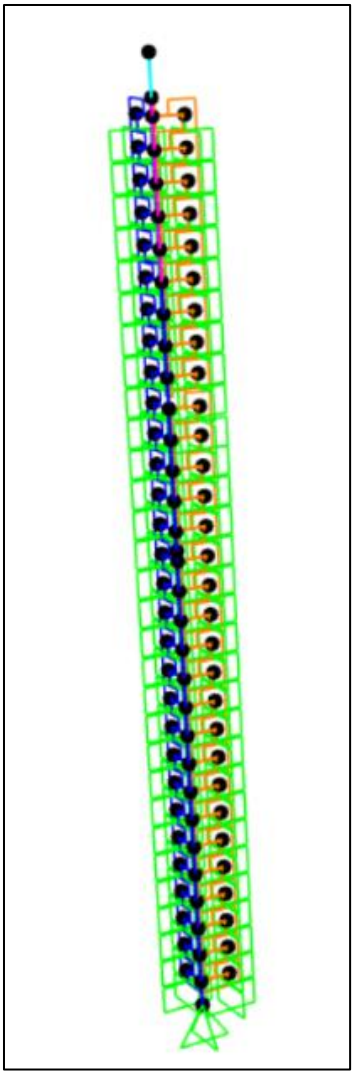

Figure C-8. SAP2000 model screenshot of typical landside mooring point near Berths 306 and 307

The design of structural elements was in accordance with Section 3.0 utilizing the flexural and shear demands derived from the SAP2000 analysis.

8.0 BERTH 311

8.1 EVALUATION OF OVERWATER STRUCTURE

- Geotechnical slope stability analysis was conducted for the under-structure and structure adjacent slopes, concluding that a maximum slope angle of 2.75H:1V is necessary to meet the design criteria for slope stability.
- Given the navigation requirement to provide a berth depth of approximately -20 ft in front of the berth, shoreline slopes of approx. 7H:1V beneath the berth apron and 3H:1V beneath the land spans are possible. These slopes meet geotechnical requirements.
- As-built grades beneath the land spans and the structure indicate an original slope angle of 3.0H:1V continuing to the berth pocket. Required slope geometry to achieve Remedial

Action Objectives and navigation depths include:

  - Maintaining a 3H:1V riprap armored slope beneath land spans and matching the as-built condition.
  - A 7H:1V slope beneath the berth, reducing elevated soil levels around piles which have occurred due to sedimentation over time.

- The current mooring infrastructure for Berth 311 includes using spud piles for vessels beyond the northwestern end of the berth. An existing mooring dolphin is understood to provide mooring restraint to these vessels but it does not provide adequate breasting restraint.
- A breasting dolphin has been designed to provide adequate breasting restraint to maintain operability of the berth.

8.2 FUNCTIONALLY EQUIVALENT MOORING INFRASTRUCTURE

Sufficient operational requirements were not available during the RD phase and will need to be obtained from and coordinated with SIDC to establish final breasting requirements. For planning purposes and the RD, a pile-supported breasting dolphin structure was designed using typical barge berthing loads to meet likely breasting requirements.

8.2.1 Structural Form

The new breasting dolphin evaluated for Pre-Final 90%RD includes a cast-in-place concrete pile cap supported on two vertical steel pipe piles driven into the underlying strata which resist a new steel pipe pile supported rubber fender system located along an extended berth line from Berth 311. The new dolphin is located north-west of the main berth, seaward of the existing mooring dolphin.

9.0 CITY OF PORTLAND STORMWATER OUTFALLS

9.1 EVALUATION OF STRUCTURES

- Five City of Portland stormwater outfalls—M1, M2, M3, S1, and S2—are impacted by the RA. The operational function of each outfall will be maintained.
- At each outfall location, embankment slopes will be excavated, regraded, and reconfigured to allow for the placement of capping layers, riprap revetment, and scour protection.
- Excavation at outfalls M1, M2, M3, and S2 will expose bell-end/spigot connections and regrading will require the removal of existing headwalls.
- Outfall S1 is located beneath the existing Lagoon Wharf structure, which will be removed and replaced.

9.2 FUNCTIONALLY EQUIVALENT REPLACEMENT STRUCTURES

Precast concrete pipe segments will be added as necessary to outfalls M1, M2, M3, and S2 to extend the existing outfall pipes, some up to 8 ft, to meet new slope grades and engineered cap

requirements. Precast concrete mitered headwalls, designed to align with the finished embankment slope profiles, will be installed.

The final design for outfall S1, which is located beneath the Lagoon Wharf structure will be incorporated into the design of the replacement structure.

10.0 LAGOON WHARF (BERTHS 302 - 305)

10.1 EVALUATION OF OVERWATER STRUCTURES

- The existing wharf is a timber wharf structure with a concrete deck. The structure is approximately 75 years old.
- The Design Criteria for the project require that riverbank slopes maintain a static factor of safety (FoS) greater than 1.5 and a seismic FoS greater than 1.0.
- Slope stability includes two components:
    - **Global Slope Stability** – related to the overall stability of a slope when considering the entire structure
    - **Local Slope Stability** – related to the stability of individual sections of a slope surface
- When looking at the global slope stability, the existing slope beneath the structure has a global static FoS near to 1.0, which is much less than the required FoS greater than 1.5. The existing global FoS has been validated multiple times in the past as well as through recent analysis performed by the RD team. In Figure C-9, the top cross-section is part of a 1981 geotechnical report, and the bottom cross-section is a similar evaluation performed by the RD team. The global slope failure or slip plane is indicated by the curved line beneath the structure and indicates that both the riverbank and the bottom of the basin in front of the structure.

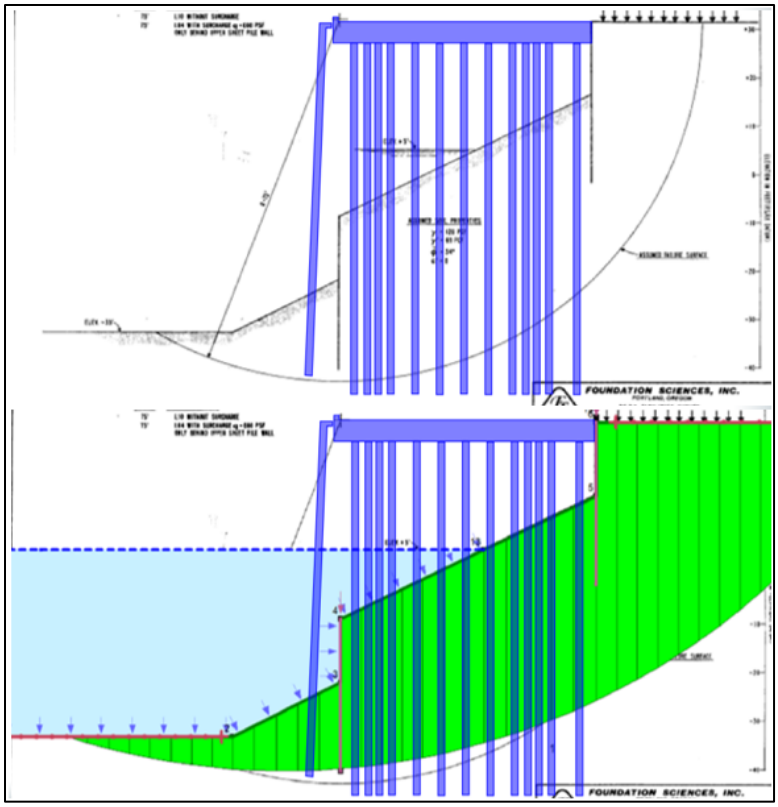

Figure C-9. Lagoon Wharf Global Slope Stability Checks

- The current structure—including the pier, bulkhead wall, and toe wall—does not satisfy the project's seismic design criteria and is anticipated to sustain damage during the defined seismic event. Furthermore, soil liquefaction and lateral movement toward the water are expected in such conditions, and the existing structure lacks sufficient capacity to withstand these forces.
- When looking at local slope stability, the ground surface below the existing structure is oversteep with a local static FoS near 1.0, which is much less than the required FoS greater than 1.5. Adding, removing, or replacing material will not create a stable slope that meets design criteria. This impacts the ability to implement a riverbank remedy that effectively reduces migration of contaminants of concern in riverbanks to sediment and surface water such that levels are acceptable for human health and ecological exposure (RAO 9).
- Several options were evaluated to achieve RAO 9 while keeping the existing structure. Although these alternatives improved local slope stability beneath the wharf, they did not address global slope stability to accepted standards. Additionally, installing new structural elements has the potential to damage the current wharf. Figures C-10 and C-11 show two of the alternatives considered.
    - Installation of a new toe wall with head restraint:

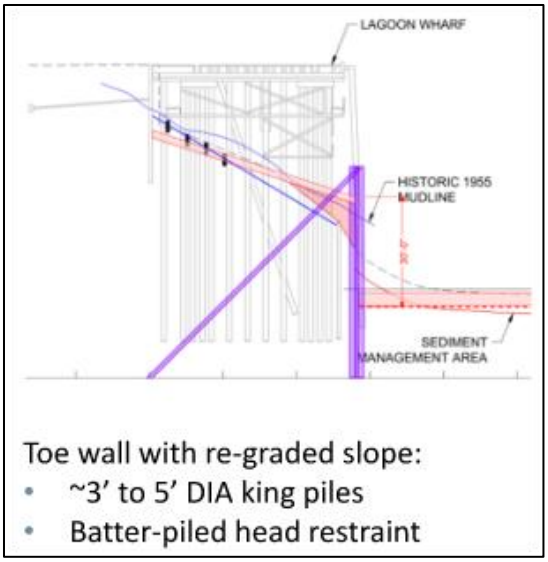

Figure C-10. New Toe Wall Alternative Considered

- Installation of a new toe wall with an anchored slope:

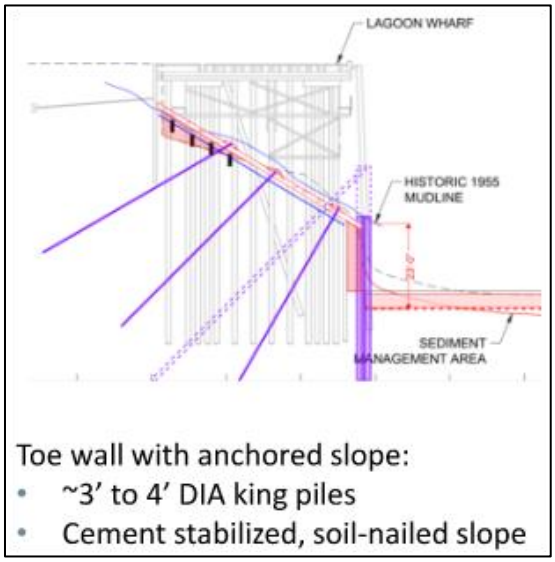

Figure C-11. New Pinned Slope Alternative Considered

- Conclusions:
  - The global stability of a reconfigured slope beneath the existing structure cannot be achieved with the existing structure in place.
  - The installation of new structural elements near the wharf has the potential to damage the existing timber structure. The construction of a large toe wall to allow for slope adjustments beneath the structure has the potential to affect the wharf's function and stability due to vibrations and existing pile down-drag caused by installation of the new elements. Working around older structures is often costly, labor-intensive, and presents additional safety risks.
  - Achievement of the RAOs is incompatible with protection of the existing structure.

- Replacement of the existing structure is the only feasible option to achieve RAOs under and around the Lagoon Wharf structure.

10.2 FUNCTIONALLY EQUIVALENT REPLACEMENT STRUCTURES

To achieve RAOs it was determined that the oversteep slope beneath the existing structure needs to be regraded or reinforced to avoid slope stability, liquefaction, and lateral spreading failures. Geotechnical analysis on the existing slope indicated that work beneath the current structure would be difficult to impossible without affecting slope stability. Given that achieving slope stability is not feasible with the existing structure in place, it was concluded that the current structure needs to be removed and replaced with a functionally equivalent structure to meet the RAOs of the project.

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APPENDIX K

COST ANALYSIS TECHNICAL MEMORANDUM

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COST ANALYSIS TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

1.0 INTRODUCTION

This memorandum provides a cost estimate for the Pre-Final 90% Remedial Design (RD) within the Swan Island Basin (SIB) of the Portland Harbor Superfund Site (PHSS) in Portland, Multnomah County, Oregon. The HydroGeoLogic, Inc. (HGL) team performed the work on behalf of the SIB RD Group based on the requirements of the PHSS Record of Decision (ROD) (EPA, 2017) and the Administrative Settlement Agreement and Order on Consent (EPA, 2021). The data presented in this memorandum were collected in accordance with the final Pre-Design Investigation (PDI) Work Plan (HGL, 2022) and were reported in the PDI Evaluation Report (ER) (HGL, 2024a) and the Basis of Design Report (BODR) (HGL, 2024b).

This memorandum includes a Pre-Final 90% RD cost summary (Table 1-1) and documents the basis for line-item unit costs and quantities, including a discussion of methodology and approach. Attachment A includes tables that list line-item detail containing cost data (Table A-1), line-item notes and rationale (Table A-2), estimated annual budget expenditures (Tables A-3 and A-4), and assumptions applied to a probabilistic model performed on cost data to assess a range of project total cost within a 90% certainty (Table A-5).

This Cost Analysis was performed to meet Association for the Advancement of Cost Engineering (AACE) Class 1 estimating standards. The maturity level of project deliverables is estimated to be within 65-75%, which is near the lower end of a typical Class 1 estimation (65% to 100%). This is because of the ongoing development of structural elements and because of uncertainties related to key elements at the commencement of RA. The estimate retained the stochastic methodology, versus wholly deterministic, because of these considerations, and the expected accuracy range is estimated to be +10/-5%.

2.0 METHODOLOGY AND APPROACH

2.1 GENERAL COST ASSUMPTIONS

2.1.1 Project Scope Description

This memorandum presents the cost estimate to implement the Pre-Final 90% RD which, in summary, includes the following core work elements to complete the remediation:

- Selective dredge and/or cap of submerged sediments;
- Riverbank clearing and excavation to the project limits at the top of bank;

CORPORATE HEADQUARTERS
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

- Dredge water processing and treatment;
- Transport to a transload facility;
- Transload processing, upland transport to a disposal site, and disposal;
- Geotechnical stability of all riverbanks;
- Structure replacement and/or removal, where necessary to remediate localized sediments:
    - Lagoon Wharf (removal and new replacement),
    - Berth 306 (removal and new replacement),
    - Berth 307 (removal and new replacement),
    - Berth 308 (removal),
    - U.S. Coast Guard (toe wall, pile sleeves),
    - The Marine Consortium, Inc. Pier (mid-slope pinning walls),
    - Berth 311 (new breasting dolphin),
    - Shipyard Commerce Center Floating Dock Bulkhead Wall,
    - Port of Portland Dredge Base structural modifications;
- Native vegetation planting on riverbanks where slope stability can be retained to minimum of 3H:1V slope;
- Revetment construction on steep banks unable to support vegetation; and
- Soft costs (engineering, monitoring, administration).

2.1.2 Foundational Design Assumptions

The following are the design assumptions that establish the essential framework for the approach to the design and to the subsequential development the cost estimate.

A single process flow for disposal of contaminated material – The estimate assumes the following process flow.

1. All dredged and upland excavation materials are to be placed on a barge for transport to transload.
2. All riverbank excavation, fill, and planting will be performed from the water without upland access.
3. Free water from dredging operations is treated and discharged locally to the river such as with the use of Electrocoagulation or Chitosan Enhanced Sand Filtration. The methodology used during Remedial Action (RA) will be determined by the contractor. Specifics of this component are addressed in the Dredge Design Technical Memorandum (Volume I, Appendix H) and in the Specification Section 35 59 15 Temporary Contact Water Treatment (Volume III, Appendix U).
4. The remaining solids and porewater are transported by barge from the Project Area to a transload location in The Dalles upstream on the Columbia River (15 hours upstream and 8 hours return).

5. Following dewatering and stabilization during transload, the remaining solids are transported by truck to the Wasco County Landfill.

This singular process flow assumption is based on a viable set of activities that will meet design objectives. However, the following are key uncertainties that persist that can have an outsized effect on the total cost estimate.

1. Location of the transload and disposal sites at RA commencement:
    a. Both the use of The Dalles location as a transload site and Wasco County Landfill for disposal are considered viable options because they were used in disposal of contaminated dredge material from SIB in 2016. However, prior to commencement of the RA, the use of alternate locations may present cost-saving opportunities. Or, if the disposal facility must change because Wasco County can no longer accept material, costs could increase.
2. Upland access is currently unavailable:
    a. Communications with shoreline facility owners/operators to-date indicate that construction access for material delivery or staging is not available. Therefore, the design assumes all riverbank activity will be performed from the water (assuming a contractor work area elsewhere in Portland Harbor). However, future negotiations between shoreline owners/operators and the RA Contractor may result in agreements for upland access, notably for higher elevation riverbank activities that could achieve cost savings.

Remediation of sediment throughout SIB – The PDI ER (HGL, 2024a) reported exceedances of ROD contaminants of concern (COCs) in sediment and riverbank samples throughout the SIB Project Area. The PDI ER presents a more comprehensive and higher resolution characterization of the horizontal and vertical extent of COCs compared to the characterization published in the ROD (EPA, 2017). As reported in the BODR (HGL, 2024b), the sampling data indicates that riverbank subsurface soils throughout the SIB Project Area boundary exceed cleanup levels. Therefore, a combination of dredge/excavation and capping/soil cover was determined to be necessary to remediate submerged sediments and all riverbank soils.

Chemical isolation where dredge to remedial action level (RAL) infeasible – The removal of contaminated sediments/soils to concentrations below RALs was evaluated as a priority response. Where removal to RAL was infeasible because of excessive depth of material, different categories of caps were developed to chemically isolate subsurface contaminated sediment and the appropriate cap technologies were assigned based on spatially variable conditions. In the design plans (sheets CA102 to CA106), all areas identified as “Cap Type 1” and “Cap Type 2” are to be capped and areas identified as “Dredge to RAL” will be dredged to depths necessary to remove contaminate concentrations that exceed RALs.

Chemical isolation by capping is not proposed for areas where barge and ship spudding is required for continued operations. In these locations (identified in the design plans), capping technologies would be compromised by spudding, therefore, dredging to concentrations below RAL is the only most suitable option in these areas.

Compensatory Mitigation – The habitat impact evaluation was updated for the Pre-Final 90% RD and concluded that the overall impact and restoration to habitat conditions will be net negative. While the RD includes riverbank plantings with native vegetation to replace riprap and non-native vegetation, the extent of this habitat improvement on the riverbanks is insufficient to fully mitigate for the ecological impact anticipated by the RA. This means that compensatory mitigation will be required. An estimate for compensatory mitigation is included in the cost estimate obtained from mitigation credits available within the Alder Creek Restoration Project located on Sauvie Island. The habitat evaluation analysis completed for the Pre-Final 90% RD determined a habitat loss of -36.41 Discounted Service Acre Years (DSAYs). Mitigation credits from the Alder Creek Restoration Project are currently estimated at $62,000 per DSAY. Therefore, the mitigation cost is estimated at $2.26 million for habitat impacts. Details of the analysis and the considerations related to mitigation options are discussed in Habitat Impact Evaluation Technical Memorandum (Volume I, Appendix C).

2.2 COST CATEGORIES

Costs are grouped into three primary categories:

1. Bid costs – These are costs for tasks that a RA contractor will bid and bear responsibility for completion.
2. Additive bid costs – Unit costs for work not anticipated to be required but must be performed by the RA contractor if warranted.
3. RA Performing Party Costs – This category includes cost items that the RA Performing Party, and their designated representative, will assume responsibility and coordinate completion to provide essential oversight and monitoring. This category also includes actions that must be managed by the RA Performing Party to prevent avoidable interruptions in shoreline facility owner/operator operations.

2.3 ESTIMATED COSTS IN CURRENT DOLLARS

The costs included in this estimate are reported in current year (2025) dollars; escalation based on future value and inflation are not included. The total cost is intended to provide a platform to compare the line item elements of the total cost (and, subsequently, the design) and outline the apportionment of costs throughout RA period. As the remedial design advances into contracting development, a timeline can be determined from which cost escalation analysis can be reliably applied to the cost estimate.

2.4 SPECIFIC COST ITEM BACKGROUND AND RATIONALE

This section presents expanded rationale and background that provided the basis for the assignment of unit cost and quantities for selected line items. Table A-2 within Attachment A report the basis for items not specifically listed in this section. Additional tables include background and rationale related to unit prices, quantities, and to the probability distribution range applied to values modeled by Monte Carlo analysis.

2.4.1 Mobilization/Demobilization for Direct Construction Except Designated Structures

Mobilization costs are estimated as 10% of direct construction costs. The central work and output items that are part of mobilization costs include:

- Financial assurance and bonding;
- Development of closeout submittals and project record documents;
- Contractual overhead; and
- Work site establishment:
    - Operations facilities;
    - Fencing, lighting, security;
    - Stormwater management;
    - Pier/dock; and
    - On-site water treatment for daily decontamination during site operations related to sampling and measurement equipment.

The following categories of cost items are not included in the project-level mobilization:

- Structural implementations (mobilization is included in each of the structural costs);
- Procedural submittals;
- Remedial Action Work Plan;
- Standby times; and
- Additive and RA Performing Party Costs.

The estimated mobilization cost anticipates costs related to the establishment of upland work areas, the potential of a terminal for material import, piers or docks for ships and barges, and to potential adjustments likely to be needed to outfit a transload site to meet anticipated production rates.

A comparative basis for this proportional estimate is derived from the 2014 Passaic River project with similarly minimal access to adjacent upland areas. That project assigned 10% mobilization of construction costs to account for establishment of working areas both in the water and upland. The SIB Project Area lacks identifiable upland work area and it is anticipated that the RA Contractor will need to establish an upland area for operations, security, and possibly staging. The scope of mobilization tasks between the Passaic River project and SIB are similar and align with engineer judgement that 10% of construction costs is a reliable estimate.

Because the RA schedule predicts an annual work period of 4 months out of each year, additional mobilization costs are expected to allow for partial demobilization at the end of each construction season and then remobilization at the beginning of the next.

Mobilization costs are assumed to be apportioned among multiple construction years with more spent during the first year and less spent in subsequent years.

2.4.2 Procedural Costs and Agency Submittals

This work includes the development of RA Contractor submittals required for their Environmental Records Binder:

- Water Quality Protection Plan
- Temporary Erosion and Sediment Control Plan
- Stormwater Management Plan
- Spill Prevention, Control, and Countermeasure Plan
- Air Pollution, Noise, and Light Control Plan
- Traffic Control Plan
- Water Management Plan
- Health and Safety and Emergency Response Plans
- Green Remediation Plan

The cost for the submittals assumes 5 people x $150/hour x 8 hours x 6 months. The cost assumes additional time for stakeholder review for which uncertainty is considered high for the evolution and ultimate approval of each plan.

2.4.3 Utilities Protection and Restoration

Costs are included for performance of a specific survey of adjacent utilities infrastructure prior to the commencement of construction. Available design data to-date indicates that buried Lumen optical cable may be impacted by the RA; however, the full extent of utilities infrastructure is not fully known. The judgement of the design team is that the presence of utilities infrastructure not yet known is likely considering the extent of early development in SIB. However, such utilities are expected to require only protective measures because the project limits extend only to the top of bank throughout the basin. Therefore, it is likely that the cost for utilities protection and restoration may trend lower than the estimate. This probability was reflected in the cost model for this cost item.

2.4.4 Lagoon Wharf (New Structure)

The SIB RA cost estimate includes the cost for replacement of Lagoon Wharf (Berths 302-305). Replacement of the wharf is the largest cost item due to its size and configuration for use in large marine industrial activities. The requirement to replace the wharf is the result of two conclusions:

1) The COCs detected in riverbank soils throughout the length the wharf exceed RALs. Remedial Action Objective (RAO) 9 of the ROD requires reduction in concentration and exposure to COCs in the riverbank.
2) Geotechnical stability of the structure was determined to be insufficient to accommodate remedial methods such as capping without imposing a risk of failure to the structure.

The geotechnical analysis of the 75-year-old wharf structure assessed both the global slope stability (effecting the entire structure) and local slope stability (effecting individual sections). In assessing global stability, the structure does not satisfy design criteria for withstanding the defined seismic event and was assessed to have a Factor of Safety (FoS) of 1.0, lower than the required FoS 1.5. Underneath the structure, the ground surface is oversteep such that local static FoS is 1.0, also lower than the required FoS of 1.5.

Several alternatives were evaluated in place of structure removal; all options were insufficient in meeting structural design standards either because they were unable to achieve geotechnical stability requirements or that the installation had an unacceptable elevated risk of causing

catastrophic failure to the existing wharf structure. Therefore, to meet RAO 9 and remediate the high COC concentrations under and adjacent to this structure, the design team concluded that replacement is necessary. Further description of the analysis and conclusions are in Section 3.0 (Functionality Determination) of the Structure Design Technical Memorandum (DCR, Volume I, Appendix J); and details of the stability evaluation and alternatives assessment are discussed in the Section 10.1 (Evaluation of Overwater Structures) in Attachment C of the Structure Design Technical Memorandum (Volume I, Appendix J).

The design for the replacement of the wharf has been advanced to a conceptual stage by the structural design firm, KPFF Consulting Engineers (KPFF). Details and background are included in the design study (KPFF, 2025). The conceptual design analysis in the study identified two potential alternatives: 1) a bulkhead option, and 2) a pile-supported option. The study concluded that the bulkhead option meets design goals, would require approximately 65% of the pile-supported construction duration and cost 25% less. To evaluate a total cost for the SIB Project Area RA, the cost of the bulkhead option was used as the likely cost for replacement of the wharf.

Other technical considerations may surface as the replacement wharf design progresses that could require a re-evaluation of the alternatives such as the pile-supported option. To accommodate the possibility, the cost of the wharf is included in the cost model and assigned a “maximum extreme” distribution with a maximum value equal to 150% of the likely cost of the bulkhead option ($396M). This upper value exceeds the likely estimate for the pile-supported option ($346M). Configured for the lagoon wharf total cost, this distribution assignment establishes a probability curve (Figure 2-3) that assigns costs between $240M and $300M a greater than 50% probability. And the probability of costs more than $300M exponentially lower to the maximum possible value ($346M).

2.4.5 Outfall Rebuilds

The quantity of outfall rebuilds (small and large) includes only those outfalls that do not outlet under the Lagoon Wharf. Costs for all outfalls currently under the wharf are to be included in the design for the wharf by the third-party design team.

2.4.6 Structural Engineering Design Plan Submittals

The submittals developed for structural designs are separate from the procedural and agency plans and submittals. This separation anticipates that separate contractors are likely to complete these different sets of reports.

2.4.7 Material T2C: (Sand with 5 percent Granular Activated Carbon)

Material T2C is a sand and 5% granular activated carbon (GAC) blended mix. The “T2C” is a RD designator used to differentiate the collection of the project material imports. The following table outlines the calculations used to estimate the unit cost (per cubic yard [CY]). Because the source for GAC can have a significant effect on the final unit cost of the sand/GAC mix, the distribution variability was assigned a range of 80-140% of the cost estimate.

Cost Category	Cost	Unit	Notes
GAC (escalated):	$1.79 $3,587.44	lb ton	From EPA GAC planning worksheet (2023) for high volume purchases (>40 tons) and escalated to 2025 dollars using CWCCIS "Beach Replenishment" category.
GAC cost per ton of sand/GAC mix:	$179.37	ton	5% GAC
Sand	$80.00 $53.33	CY ton	Sand procurement cost based on 1/2 of Vigor cost of "fish mix"
Estimated Sand/GAC blend surcharge:	+0.15	%	
Total Sand/GAC mix cost (+blend)	$267.61	ton	Combined sand and GAC cost times blend surcharge
Sand/GAC mix mass/volume conversion:			
GAC density	0.5	g/cm3	Mean bulk density from typical range of 0.4 to 0.6 g/cm3
GAC	0.4215	ton/cy	Conversion using 0.843 tn/cy per g/cm3
Sand weight/volume conversion	1.5	ton/cy	
Sand/GAC(5%) mix weight/volume conversion	1.446	ton/cy	
Total Sand/GAC mix cost by volume:	**$386.99**	CY	Combined sand and GAC cost (+blend surcharge), using weight/vol conversion for sand/GAC mix

Notes:
% = percent
CY = cubic yard
GAC = granular activated carbon
lb = pound

2.4.8 Dredge/Excavation, Transload, Upland Transport, and Disposal

2.4.8.1 Description

The dredging/excavation and ultimate disposal of materials within SIB is performed by a collection of successive tasks. The bid items addressed by this section (except for the treatment of water from dredging operations which is discussed separately) include:

Cost ID	Cost Item Description
01.25.01	Required Dredging and In-Water Transportation (Open-Water) - Clamshell
01.25.02	Required Dredging and In-Water Transportation (Nearshore, below El 8 ft NAVD88) - Clamshell
01.25.03	Required Dredging and In-Water Transportation (Restricted Access) - Clamshell/Excavator
01.25.04	Free Water Decant/Treatment/Discharge from Dredging Operations
01.25.05	Riverbank excavation (above El 8ft NAVD88) and in-water transport.
01.25.09	Dredged/Excavated Material Transload
01.25.10	Dredged/Excavated Material Upland Transportation, and Disposal (Subtitle D)

Notes:
NAVD88 = North American Vertical Datum of 1988

These cost items address a collection of successive activities that are selectively grouped into cost items. The joining of tasks into singular bid items addresses two related conditions: 1) the cost source includes similar grouping (the same tasks were bid as a single item), and 2) an anticipation that bundled tasks could be performed by separate contractors. The following table includes a description of the activities and the Cost IDs that include each activity. A Cost ID is repeated when

that cost item includes multiple activities. For example, Cost ID 01.25.01 includes 1) dredging, 4) transport to transload, and 5) stabilization of material.

Activity Description (in sequence)	Associated Cost ID
1. Dredging of sediment in submerged and submersible areas	01.25.01 01.25.02 01.25.03
2. Excavation of upland areas	01.25.05
3. Treatment of dredge return water and subsequent discharge locally;	01.25.04
4. Transportation of material (following removal/treatment of free water) by barge to a transload facility located at The Dalles on the Columbia River;	01.25.01 01.25.02 01.25.03 01.25.05
5. Stabilization of material in-transit;	01.25.01 01.25.02 01.25.03 01.25.05
6. At the transload facility, relocate material from barge to trucks;	01.25.09
7. Upland transport from transload to disposal facility;	01.25.10
8. Dewatering treatment and solids disposal in EPA-approved facility.	01.25.10

2.4.8.2 Unit Cost Basis

A dredge project was completed for Vigor's Dry Dock 6 in 2015 in which the sequence of activities was analogous to those expected to be performed in SIB. The sediment removal included dredging, in-water transport to The Dalles transload location, transload, and upland transport to Waste Connections disposal facility for wastewater processing and disposal. The cost estimate for the SIB project assumes a similar sequence of activities including the use of The Dalles for transload and Waste Connection for disposal.

The contractor for the 2015 dredging project developed cost estimates prior to construction. Assuming similar activities, that dredging is to be performed on the same site and that the disposal pathway was the same, the 2015 costs were used as the basis for SIB costs, following escalation to 2025 dollars using the U. S. Army Corps of Engineers (USACE) Civil Works Construction Cost Index System (CWCCIS) Cost Escalation.

Open-water, nearshore, and restricted dredging production rates – The 2015 cost for open-water dredging was adopted directly for open-water dredging and escalated as the unit cost for open-water dredging in SIB. The table below outlines the sequential calculation for open-water dredging and in-water transport to the transload facility:

Cost basis for open-water dredge and transport		
2015 Dry Dock 6 dredge and transport cost:	$17.60	$/ton
CWCCIS escalation factor (2015 to 2025):	1.459	
Open-water dredge/transport cost 2025 dollars (* escalation):	$25.67	ton
Sediment density	1.5	ton/CY
Open-water dredge/transport cost, per CY, 2025 dollars (* sediment density)	**$38.51**	$/CY

Nearshore dredging refers to the removal of material in shallow waters. Nearshore dredging differs from open-water dredging in that different equipment and methods are anticipated. A key characteristic of nearshore dredging is that the draft of the equipment barge will limit operation within shallow waters and require equipment with an extended reach. Therefore, the production rate of nearshore dredging is estimated to be lower compared with open-water. The table below outlines the basis of cost for nearshore dredging.

Cost calculation for nearshore dredging and transport		
Open-water dredge/transport cost, per cy, 2025 dollars	$38.51	$/cy
Estimated open-water production rate	1,150	cy/day
Estimated nearshore production rate	300	cy/day
Nearshore production rate ratio (nearshore/open-water)	0.26	
Nearshore dredge/transport cost, per cy, 2025 dollars (open-water dredge/nearshore rate ratio)	**$147.62**	$/cy

Restricted dredging is nearshore dredging performed near protected infrastructure such as pilings. The equipment needed to complete this type of dredging is anticipated to be similar; however, the production rate is expected to be lower than nearshore to account for access challenges. The table below outlines the basis of cost for restricted dredging.

Cost calculation for restricted dredging and transport		
Open-water dredge/transport cost, per cy, 2025 dollars	$38.51	$/cy
Estimated open-water production rate	1,150	cy/day
Estimated restricted production rate	250	cy/day
Restricted production rate ratio (nearshore/open-water)	0.22	
Restricted dredge/transport cost, per cy, 2025 dollars (open-water dredge/restricted rate ratio)	**$177.14**	$/cy

See Table 4-1 in the Dredge Design Technical Memorandum (Volume I, Appendix H) for the basis of the estimated production rates.

2.4.9 Dredge Return Water Treatment and Discharge

This activity refers to the treatment of excess water collected during dredging operations. The cost assumes a localized system that treats dredge return water either on an in-water barge or within a landside facility and can discharge effluent directly into the Willamette River. The treatment effluent must be monitored and meet applicable State and EPA requirements for water quality parameters.

The 2015 Dry Dock 6 dredging project also required dredge return water treatment; however, excess water was pumped upland to Vigor's wastewater treatment system. Therefore, water treatment was not a component of that project's cost. The use of Vigor's wastewater system or other upland wastewater systems were concluded to not be viable for SIB dredging because 1) dredging operations are required throughout the basin, limiting access to upland inlet locations, 2) pump line infrastructure would impede marine operations, and 3) that dredge water volumes would likely exceed any of the wastewater system capacities.

The cost and method of water treatment is based on pilot systems implemented for Early Action Areas in 2013 within the Lower Duwamish Waterway. Two sites were established to implement Electrocoagulation (EC) treatment and Chitosan Enhance Sand Filtration (CESF). Like conditions at SIB, traditional dewatering systems were not viable in the Lower Duwamish River because of the presence of heavy metals and polychlorinated biphynels. Both systems achieved target water processing volume rates and produced effluent that exceeded water quality levels allowing local discharge. The details and cost from these implementations were obtained from a dredging study by L.M. Doty (Doty, L. 2015). Specifics and requirements for the implementation of a similar system for SIB are included in Specification Section 35 59 15 (Volume III Appendix V).

The reported average cost of 10M gallons from both sites was $.0395/gallon. This cost was escalated to 2025 dollars and is the basis of cost for in-water dredge return water treatment ($0.0563/gallon). Because of the uncertainty of implementing a similar system based on a 12-year old pilot implementation, the probability distribution in the cost model varied the unit cost from 85% to 170% of the estimate.

2.4.10 Environmental Compliance Monitoring (Water Quality Monitoring, Air Pollution/Noise/Light)

The following outlines the sub-elements that contribute to monthly cost estimate for this task element.

Turbidity monitoring	It is assumed these are done by multi-parameter sondes provided with the sampling vessel, 1 per vessel, plus labor costs including the sondes. For background turbidity, hardness, DO and pH two sondes at $2,000 each is estimated for duration of the project.
Analytical Costs	For COCs, 1 sample per day x 6 days per week of dredging x 4 weeks per month =24 samplings per month x 14 Samples for analyses = 336 samples for analysis. Samples are analyzed for 14 analytical sample groups. Analytical costs for these Total and Dissolved sample groups are $348,000 per month based on Monterey Labs Fee Schedule for 2025.
Sample Processing	336 analytical samples /3 per hour x $130 per hour= $14,560 per month
Sample Shipping	336 samples/4 per cooler=84 coolers x $100 per cooler=$8,400 per month.
Quality of Life Monitoring	Quality of Life monitoring is done at the dredge (Air Pollution, Noise, Odors) -estimate is $5,000 per month per dredge (labor, sampling, analysis). From Passaic River 2014 Remediation Estimate.

2.4.11 Long-Term Monitoring

The activities performed for long-term monitoring within the SIB Project Area are detailed in the Project Area Monitoring Plan (Volume II, Appendix P). This cost includes monitoring activities specific to periodic porewater and sediment sampling, sediment profile imaging, and physical observations. The monitoring program is composed of two main components: (1) a baseline dataset of post-RA conditions and (2) periodic performance sampling, sediment profile imaging, and physical observations.

Porewater sampling will include multi-depth passive sampling to collect a minimum of two intervals at each sampling port opening – one within chemical isolation layer (CIL), and one above CIL. This cost estimate includes three intervals to account for additional sampling needs.

Sediment cores will be collected from both the armor layer and deposited sediment above CIL, if available, with each core analyzed at a minimum of two depth intervals (above and below the bioturbation layer). The cost estimate includes three depth intervals per core to account for additional sampling needs.

The monitoring schedule includes three initial post-RA periodic sampling events: once within the first year and two between years 1 through 4 post-construction. After year 5, sampling events will occur once every five years for 95 years.

Table 2-1 outlines the specific calculations and subitem costs used to calculate the lump sum cost for long-term monitoring.

2.4.12 Toxicity Characteristic Leaching Procedure Metals Analysis for Waste Characterization

This is a component of pre-dredging landfill and regulatory acceptance of the sediment for disposal and will occur during the RA planning stage before dredging commences. The estimated number of samples meets standard landfill sampling frequency for waste designation and disposal. Cost components are as follows:

- Toxicity Characteristic Leaching Procedure (TCLP) metals analyses: $8,400 ($280 per sample, 30 samples)
- Vessel costs: $56,000 ($7,000 per day, 8 days)
- Field staff (3): $52,600 ($200 per hour, 10-12 hours per day, 8 days)
- Supplies/Equipment: $2,000 (rough estimate, includes miscellaneous expenses)
- Field preparation: $3,000 (creating/printing labels, field sheets, sample map, preparing supplies, preparatory meetings, etc.)
- Travel-related expenses: $6,000 (rough estimate, 3x per diem for 9 days, travel reimbursement)

2.4.13 Sampling Ports

The procurement and assembly of the sampling ports for cap monitoring is based on costs related to concrete septic tank with sizes similar to port structures in open water and those intended for revetment areas. The ¾ inch steel plates were priced at $76 per square foot (ft).

- Large sampling port: $2,000 for concrete and $1,254 for steel plate = $3,254 per port
- Smaller sampling port: $480 for the concrete and $456 for the steel plate = $938 per port

The installation of the sampling ports was based on costs to install boat moorings: $8,000 (labor and vessel with barge and crane) to install a maximum of 10 ports per day.

2.4.14 Temporary Relocation of Floating Structures

The temporary relocation costs (items 10.10.02-11) were based on the following work elements:

- Floating boom relocation
- Floating dock relocation
- Dry dock relocation

Each floating structure can require a combination of these items.

The cost centers on crew size and judgement of time required for the different work elements. Production was assigned and limited to full work shifts or half shifts for the smaller work locations. All relocations are assumed to occur within the basin and during the phased construction.

Item cost also includes specific estimated contingency, indirect costs, contractor markup.

2.4.15 Unexploded Ordinance Disposal (Additive)

The disposal of unexploded ordnance (UXO) is included as an additive line item because of the military industrial history of the SIB Project Area. Data available about debris is not sufficient to definitely exclude UXO; therefore, it is included as an additive bid item with a quantity of one (1).

The cost is estimated at $18,500 per demolition event, the minimum required for any single ordinance item (considered either Munitions and Explosives of Concern [MEC] or Material Potentially Possessing an Explosive Hazard [MPPEH]). Each event will require a minimum of 3 people (1 Senior UXO Supervisor, 1 UXO Safety Officer, and 1 UXO Technician II) who would mobilize for a single day. Each demolition event includes 16 hours of mobilization/demobilization travel, and 10 hours of time for demolition operations. If multiple UXOs are found, the cost is likely to reduce if items discovered are safe to move as part of a single event.

2.4.16 Oregon Department of State Lands Division 145 Cost Estimation

Oregon Administrative Rules Chapter 141 Division 145 governs the management of state-owned submerged and submersible lands subject to remediation and habitat restoration activities. EPA established their position with respect to potential Division 145 costs in the ROD (EPA, 2017) in response to comments from Oregon Department of Environmental Quality (DEQ):

"*Department of State Lands propriety authorizations, which include lease fees, were not included in the cost estimates. EPA acknowledges that the State Land Board through the Department of State Lands promulgated rules for granting and renewal of access authorizations, leases, and easements issued to facilitate remediation conducted pursuant to an order issued by DEQ or EPA and habitat restoration activities in, on, under or over state-owned submerged and submersible land. However, Section 104 of CERCLA, 42 U.S.C. § 9604 provides the President with broad authority to take response actions determined necessary to protect the public welfare and the environment from releases or the potential threat of a release of hazardous substances or pollutants and contaminants to the environment presenting an imminent and substantial endangerment to public health and welfare.*"

"If EPA were to perform the remedy, the United States would not be required to pay state fees. However, EPA expects most, if not all, of the remedy (cleanup actions) will be performed by PRPs and EPA anticipates that PRPs will negotiate reasonable terms and conditions of access to private and state-owned property to implement the remedy likely with landowners and Department of State Lands."

The cost analysis for the Pre-Final 90% RD includes a line item for potential Division 145 costs. As part of coordination, the Oregon Department of State Lands (DSL) provided its draft "Portland Harbor Superfund Site Oregon DSL Division 145 Remedial Design Cost Estimator" spreadsheet calculator to SIB RD team for use in the cost analysis. The calculator worksheet and parameter definitions are included in Attachment E. The calculator produces an estimated easement cost based on the anticipated temporary and long-term impacts of the remedy on public trust uses and management of state submerged or submersible lands, using inputs selected by the user. The SIB RD Team utilized the calculator to estimate Division 145 costs for the RA anticipated in the SIB Project Area, incorporating the following information that was derived from the Pre-Final 90% RD:

- Area inaccessible or only partially accessible during the active construction period
- Length of the active construction period
- Areas of buried contamination, cap, and/or other permanent in-water structures constructed as part of the remedy
- Additional areas of institutional controls

The calculator also considers the assessed value of upland properties adjacent to the state submerged or submersible lands within the SIB Project Area.

The Pre-Final 90% RD includes a total area of 79.09 acres of cap and/or other permanent structures constructed as part of the remedy. The resulting estimated cost for two consecutive 30-year easements for these aspects of the remedy is $39.3 million; with costs associated with construction estimated around $1 million and post-construction costs around $38 million. This estimated cost, included herein, was derived using the August 2025 draft calculator developed by Oregon DSL. Uncertainty around this line item is characterized by using a triangle distribution with a low value of 0.8 and a high value of 1.2 times the estimated cost. The SIB RD Team anticipates that the actual cost will be negotiated between the RA Performing Parties and Oregon DSL.

2.5 TOTAL PROJECT COST VARIABILITY

The total project cost estimate for the SIB Project Area includes potential lower and upper costs establishing a probable range produced from a probabilistic model employing a Monte Carlo simulation. The lower and upper possible costs fall within a 90% confidence level predicted by the results of the simulation. This approach to estimating costs related to inherent uncertainty was preferred instead of the deterministic method that addresses uncertainty with a single fixed contingency typically estimated as a percentage of the project total cost. The use of the model allowed varying uncertainties in specific cost item values to be represented individually and to highlight variability in unit costs and quantities that have a more significant impact on the total project cost.

The summary of project costs presented in Table 1-1 includes the potential lower and upper limits of possible project cost within a 90% certainty calculated in the Monte Carlo simulation. This total cost range is also depicted graphically in Figure 2-1.

2.5.1 Addressing Uncertainties with Probabilistic Modeling

To account for uncertainty of costs, the probabilistic model was employed to capture the uncertainty in each item and represent the relative effect of each item on the total cost. Microsoft Excel-based Crystal Ball software, developed by Oracle®, was selected to perform the probabilistic modeling. Crystal Ball is designed to model uncertainty based on variability within the input variables during randomized trials using the Monte Carlo method.

The model simulation performed 10,000 trials wherein a range of values are randomly generated for probability assumptions assigned to each unit cost and quantity value having an inherent uncertainty. At model completion, the total cost is forecasted using the full range of possible outcomes from the contribution of individual cost items and their relative uncertainty.

The uncertainty in unit costs and quantities is represented as a range of potential values from a probable minimum value to a probable maximum value. The range in values is typically assigned using a factor applied to the estimated cost or quantity. The factors used to calculate possible minimum and maximum values in the model are listed in Table A-4 within Attachment A. A larger variability (relative to the initial value) reflects a higher uncertainty while a narrow range would imply more certainty in the value.

Values in the cost model were assigned the following probability distributions:

1. ***Triangle probability distribution*** – The triangle distribution is the most common assumption for value variability. The probability of a value selected during the cost simulation increases linearly from both the possible minimum and maximum values, where the probability at these extents are near zero, to the likely value, a near 100% probability. The minimum and maximum values are set from assigned factors of the initial value estimate (for example, a factor of 1.2 will establish a model value maximum that is 120% of the initial estimate value). The following outlines the range of possible values used to assign the lower and upper values in the triangle distribution (the factor is multiplied with the line item unit cost).
    - Unit costs from 5+ year sources: -20% – +50%.
        - Unit costs derived from Vigor, Lower Passaic, Stratford (discussed in Section2.6) align well with the line items; however, they are 10-year-old costs; therefore the maximum factor variability is expected to be high.
    - Typical unit costs: -15% – +30%.
        - A review of Oregon Department of Transportation bid data shows costs show a variability of 30% around an average. It is applied to most unit cost values. The variability leans upward (the low value factor being 0.85) considering the costs are in 2025 dollars for estimated construction start 8-10 years in the future.

- Low certainty values: -30% – +50%.
    - For values (unit costs or quantities) from which an applicable background is insufficient to provide a higher confidence estimate value.
- Custom variability
    - Values may be assigned a custom variability range to reflect judgement about inherent uncertainty specific to that item (and value) and documented in the unit cost or quantity rationale.

2. ***Gamma distribution*** – The gamma distribution was assigned to the following structure costs:

    - Berth 306 (new structure)
    - Berth 307 (new structure)
    - U.S. Coast Guard (toe wall, pile sleeves)
    - The Marine Consortium, Inc. Pier (mid-slope pinning walls)
    - Berth 311 (seismic restraint)
    - Port of Portland Dredge Base structural modifications

    The gamma distribution (illustrated in an example chart shown in Figure 2-2) is a continuous probability distribution with a probability density function with shape and scale parameters that allow for flexible skewing of values. Using a scale of 20 and 4% of the maximum/minimum cost difference, this distribution skews the probability that the structure cost is at, or above, the initial estimated cost.

    The estimated structure cost contains contractor direct costs and anticipated known, and design, contingencies. The possible maximum cost accounts for an estimation of unknown contingency. The gamma distribution was selected because it more appropriately represents the higher probability of a structure cost to include a partial, or all, of the unknown contingency and that a structure cost not requiring any unknown contingency is much less probable.

3. ***Maximum extreme distribution*** – This distribution was assigned only to the Lagoon Wharf. The maximum extreme probability distribution is commonly used for breaking strengths of materials, loads and tolerances. This distribution favors values in the upper range, but the probability of extreme values drops exponentially. Applied to the conceptual-level costs for the Lagoon Wharf, a higher probability is assigned to costs exceeding the likely cost. This probability assignment configuration captures the possibility that the wharf replacement could require a higher cost alternative such as the pile-supported option. However, this distribution also assigns a rapidly lower probability that the more expensive option will be required.

    Encompassed within the probabilistic cost range is that the likely cost estimate additionally includes contingency, meaning that the probabilistic assumption varies the cost, with contingency. In the model, the contingency is assumed to be generic, and that the probability is elevated that the structure cost will require most of the stated contingency. However, assigned the maximum extreme distribution, the probability that unknown costs will be required will exponentially lower at the more extreme cost values.

All remaining values that are known to not deviate are assigned a static value that is unchanged in the model. This would include, for example, values of '1' for lump sum items or for quantities that are calculated and are wholly dependent on other values.

2.6 SOURCES OF UNIT COSTS

The following lists the sources used as a basis for the unit costs included in the SIB Project Area cost estimate. The source abbreviation appears in the column "Unit Cost Source" in the cost estimate workbook (Attachment A).

Source Abbreviation	Source Year	Source Description
Terminal 1	2024	Bids for Port of Vancouver Terminal 1 bulkhead project. Key related items included pile removal, slope excavation, and material acquisition.
Vigor Dredge	2016	Vigor dry dock dredge project. The Vigor dredge project established the viability of dredge material transport, transload (to the Dalles), and disposal.
Passaic	2014	Lower Eight Miles of the Lower Passaic River Study Area of the Diamond Alkali Superfund Site The Passaic River project was a similar large-volume project exceeding SIB volumes wherein Passaic required dredging 10 million CY of sediment and placement of 1.8 million cubic yards of capping. Costs obtained from this project were evaluated as part of a Focused Feasibility Study (FFS) of dredging and capping, including long term monitoring and operation and maintenance. The FFS estimate was done by Louis Berger Engineers in 2014.
Stratford	2018	Stratford Army Engine Plant Superfund This site is a former aircraft manufacturing facility. After closure the facility was investigated and found to contain shoreline sediments contaminated with polychlorinated biphenyls, metals and polycyclic aromatic hydrocarbons. The Connecticut Department of Energy and Environmental Protection has required cleanup of over 170,000 cy of sediment and placement of over 111,000 cy of clean backfill. J. Lally Associates performed a Focused Feasibility Study (FFS) and cost estimate evaluating remedial alternatives for the sediment cleanup from which costs related to SIB were derived. The Stratford FFS was done in 2018 for the USACE New England District who is responsible for the cleanup.
LDW	2023	100% Final Design Report, Appendix O, Lower Duwamish Waterway (LDW) Group.
Doty	2015	Electrocoagulation and Chitosan Enhanced Sand Filtration treatment study in LDW. This study by L.M. Doty included pilot implementations of in-barge free water treatment methods that could be adopted for SIB Project Area.
Monterey	2025	Monterey Labs Fee Schedule for sample analysis
Vendor	2025	Vendor quote specific to the product item listed.
Alder Creek	2025	Alder Creek Mitigation Bank Alder Creek is the source for mitigation cost to address habitat impacts and is based on communication with Wildlands that included cost estimates for to purchase DSAY mitigation credits.
ODOT	2024	Oregon State Department of Transportation (ODOT) bid item database
WSDOT	2024	Washington State Department of Transportation (WSDOT) bid item database

Source Abbreviation	Source Year	Source Description
EPJ	2025	Engineer professional judgement.
PH RI/FS	2016	Portland Harbor (PH) Remedial Investigation/Feasibility Study (RI/FS), Appendix G – Update, Detailed Analysis Cost Estimate, November 16, 2016, EPA Team; Present Value Analysis and Detailed Cost Estimate Summary, Alternative F Modified; Table CS-F (MOD) Detailed Cost Estimate Summary, pp 19-22 (alt. sub-memo pp 2-5)

2.6.1 Escalation of Earlier Cost Sources

Unit costs derived from earlier sources were escalated to current 2025 dollars in the State of Oregon using the U.S. Army Corps of Engineers Civil Works Construction Cost Index System (CWCCIS), with index tables updated September 2024.

A key element of using the CWCCIS is the selection of the Civil Works Breakdown Structure (CWWBS) feature codes. The 20 codes included in the CWCCIS are broad categories requiring interpretation of the codes that are applicable to a particular SIB Project Area cost item. The following feature codes were the basis of most cost escalations:

CWWBS Feature Codes	Unit Cost Item Applications
18 - Cultural Resource Preservation	Administrative, community coordination, easements
20 - Channels and Canals	Dredging, excavation, and debris removal activities
20 - Permanent Operating Equipment	Transload, Transport, Disposal

2.7 GUIDANCE

The cost analysis was completed following guidance outlined in *Appendix G - Methodology and Organization of Selected Remedy Cost Estimate* (EPA, 2016) and in *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA, 2000). Initial cost data was referenced in *Appendix IV Updated FS Information and Supplemental Information for Alternative F Modified* (EPA, 2017).

3.0 RISK REGISTER

Attachment D includes a register of potential project risks that have a low probability of occurring but could have a substantive effect on the total project cost. The attached register documents the conditions under which each risk element would occur, the potential range of cost impact, and mitigation measures to minimize the potential for the risk to be realized.

While the register of risks could be feasibly included in the probabilistic cost model, the conditions that would trigger the risk items are improbable and the scope of possible cost effect is too varied to assign a meaningful probability distribution in a similar way compared to the probabilities assigned to other cost element values. Therefore, the risk items listed on the register of risks were not included in the probabilistic model but instead listed as remote, but possible, risks to the project. The utility of the register of risks therefore focuses on establishing awareness and motivating mitigation of low-probability risks that could affect the RA cost.

4.0 COST ASSUMPTIONS

The cost estimate assumes the following:

No tax – Tax is not included in any costs. This is concluded to be a reasonable assumption at this stage because the project is performed in Oregon which does not charge sales tax. However, some elements of the project are likely to be performed or purchased within other states and tax assessed. This cost is dependent on the RA Contractor and methods chosen; therefore, potential tax is assumed to be within the range of uncertainty.

10-year construction period – The Pre-Final 90% RD cost estimate includes an annual budget derived from assumptions in the proposed RA schedule. All line-item costs are apportioned throughout the RA period based on the RA schedule.

5.0 COST ANALYSIS SUMMARY

Table 1-1 summarizes the cost estimate including the primary cost categories, the most probable projected cost, and the range of possible total costs within a 90% certainty as forecast by the cost model. The most probable cost projected by the probabilistic cost model is $930,308,019. The 90% certainty range has a low value of $874,607,352 and a high value of $997,611,332.

The following sections discuss the major divisions of the cost estimate, overview of the cost range reported by the model, and an overview of cost item sensitivity.

5.1 MAJOR DIVISIONS OF THE COST ESTIMATE

Table 1-1 shows the major divisions of the cost estimate organized by bid costs and RA Performing Party Costs. Bid costs are further subdivided into direct construction costs and indirect construction costs. Direct construction costs include the following major categories:

- Mobilization/demobilization
- Site preparation
- Surveys
- Structural
- Dredging, excavation, transportation and disposal
- Material procurement
- Material placement
- Riverbank habitat installation

Indirect construction costs include management, technical support and compliance monitoring, and site administration costs.

RA Performing Party Costs include agency oversight, operations and management, long-term monitoring costs, and structure relocations. RA Performing Party Costs are included in the Pre-Final 90% RD cost analysis as integrated components of the RA cost. It is recommended to consider extracting the RA Performing Party Costs from the RA construction cost based on the fact that the construction duration is approximately 10 years while the RA Performing Party Costs extend out to 100 years post construction.

5.2 COST RANGE REPORTED BY THE MODEL

The cost range reported by the model represents the 90% certainty range accounting for variability in unit costs and quantities. Each unit cost was assigned a range of variability to account for changes in price driven by economic conditions including changes in supply and demand for materials and services. Similarly, each unit quantity derived from the Pre-Final 90% RD was assigned a variability to account for uncertainty related to potential changes in site conditions between design and construction and uncertainties related to the spatial resolution of the site characterization data set on which the RD is based. The 90% certain range reported by the model shows a range of approximately -5.99% to +6.75% from the probable cost.

The probabilistic cost modeling approach projects a "most probable cost" in the context of a continuous probability distribution of potential costs. The probability distribution of costs informs risk-based planning decisions about cost contingency. The 90% certainty range reported on Table 1-1 and shown on Figure 2-1 indicates that there is a 90% certainty that the RA cost will be less than $997,611,332. The corollary to this is that there is a 10% certainty that the RA cost could exceed that value. The probabilistic cost estimate does not specify a contingency as an assumed percentage of total project cost. Instead, it provides the basis for cost managers to plan a cost contingency based on risk tolerance. If a 10% chance of cost exceedance is determined by cost managers to be an acceptable risk, then cost planning would establish a budget based on the 90% certainty range. The effective contingency in this example would be +6.75% of the most probable cost value.

5.3 COST ITEM SENSITIVITY

Figure 5-1 is a cost sensitivity chart of the top 10 cost items with the highest contribution to cost variance. Replacement of the Lagoon Wharf is shown as the largest contributor to potential variance of the overall RA cost. The second highest driver of potential cost variability relates to transport and disposal of dredged/excavated material. The cost sensitivity data support analysis of potential ways to reduce RA costs. For example, the cost effects of the Lagoon Wharf replacement motivated a focused analysis during design development of the Pre-Final 90% RD to evaluate alternative approaches to the remedy around the structure as well as alternative ways to replace the structure. As another example, the cost of transport and disposal of contaminated soil and sediment is magnified by the distance to the nearest available transload facilities and upland disposal sites. This highlights the potential for savings should a closer transload facility and/or disposal option become available between RD completion and RA construction.

6.0 REFERENCES

Doty, L. 2015. "Electrocoagulation (EC) and chitosan enhanced sand filtration (CESF) treatment technologies for dredge return water: two case studies on the lower Duwamish waterway in Seattle, Washington," Proceedings of the Western Dredging Association and Texas A&M University Center for Dredging Studies' "Dredging Summit and Expo 2015", Houston, Texas, June 22-25.

HGL, 2022. Pre-Design Investigation Work Plan, Revision 3. Preliminary Remedial Design Services, Swan Island Basin Project Area, Portland Harbor Superfund Site, Portland, Multnomah County, Oregon. Revision 3. May.

HGL, 2024a. *Pre-Design Investigation Evaluation Report, Revision 2*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. December.

HGL, 2024b. *Basis of Design Report, Revision 1*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. November.

KPFF, 2025. *B302 to B305 Replacement Study*. KPFF. Memorandum, September 4.

U.S. Environmental Protection Agency (EPA), 2000. *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study*. United States Environmental Protection Agency. EPA 540-R-00-002, OSWER 9355.0-75. July.

EPA, 2016. *Methodology and Organization of Selected Remedy Cost Estimate, Record of Decision, Portland Harbor Superfund Site.* United States Environmental Protection Agency. Memorandum, November 16.

EPA, 2017. *Record of Decision, Portland Harbor Superfund Site, Portland Oregon.* United States Environmental Protection Agency Region 10, Seattle, Washington. January.

EPA, 2021. Administrative Settlement Agreement and Order on Consent for Remedial Design. Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10. January.

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Attachment A Pre-Final 90% RD Cost Estimate Workbook
- Table A-1 Line Item Cost Estimate
- Table A-2 Line Item Sources and Rationale Notes
- Tabel A-3 Line Item Annual Expenditure
- Table A-4 Annual Expenditure Summary
- Table A-5 Cost Model Variability Assignment

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Attachment C	Structure Cost Detail
Attachment D	Risk Register and Status
Attachment E	Oregon Division of State Lands Division 145 Remedial Design Cost

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Table 1-1
Project Cost Category Summary (2025 Dollars)
Cost Analysis Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Cost Categories		Costs		Variance
Direct Construction Costs (Bid)				
	Mobilization / Demobilization	$	43,566,200	
	Site Preparation	$	2,533,254	
	Surveys	$	11,174,525	
	Structural	$	315,414,054	
	Dredging, Excavation, Transportation and Disposal	$	142,313,465	
	Material Procurement	$	144,805,394	
	Material Placement	$	79,794,326	
	Riverbank Habitat Installation	$	51,512,319	
	Subtotal - Direct Construction Costs (Bid):	**$**	**791,113,537**	
Indirect Construction Costs (Bid)				
	Management, Technical Support and Compliance Monitoring	$	20,322,716	
	Site Administration Costs	$	1,203,539	
	Subtotal - Indirect Construction Costs (Bid):	**$**	**21,526,255**	
Additive Items (Bid)		**$**	**18,500**	
	Total Bid Costs	***$***	***812,658,292***	
RA Performing Party Costs				
	Oversight, Regulatory, and Long-Term Costs	$	63,010,995	
	Structure Relocations	$	1,071,800	
	Total - RA Performing Party Costs:	**$**	**64,082,795**	
	Total Engineer Estimate:	**$**	**876,741,086**	
	Lower Model Forecasted Project Cost (90% Certainty):	**$**	**874,607,352**	-5.99%
	Total Probable Project Cost:	**$**	**930,308,019**	
	Upper Model Forecasted Project Cost (90% Certainty):	**$**	**997,611,332**	+6.75%

Notes:
O&M = operations and maintenance

Table 2-1
Long-Term Monitoring Breakdown
Cost Analysis Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Description	Quantity or Cost
Number of Performance Units to Monitor	18
Porewater Collections, Per Event:	
Number of units to perform QC collections	4
Number of units to perform standard collection (non-QC)	14
Number of porewater collections at QC units	3
Number of porewater collections at standard units	1
Total number of porewater collections (standard plus QC), per event	**26**
Number of depth interval samples per collection	3
Total number of porewater samples (number of depth samples x number of collections)	**78**
Sediment Cores, Per Event:	
Number of units to perform QC collections	1
Number of units to perform standard collection (non-QC)	17
Number of sediment cores at QC units	3
Number of sediment cores at standard units	1
Total number of sediment core collections, per event	**20**
Number of depth interval samples per sediment core collection	3
Total number of sediment samples (number of depth intervals x number of collections)	**60**
Porewater Collection Cost, Per Event	
Total number of porewater collections, per event	26
Number of porewater collections that can be collected, per day	20
Total days for all porewater collections, per event	2
Four vessels cost plus labor, per day	$ 11,968
Cost per porewater collection event (Vessel/labor cost per day x number of days):	$ 23,936
Sediment Core Collection Cost, Per Event	
Total number of porewater collections, per event	20

Table 2-1
Long-Term Monitoring Breakdown
Cost Analysis Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Description	Quantity or Cost
Number of cores that can be processed, per day	10
Total number of days to process all cores, per collection event	2
Cost for vessel, labor, equipment, per day	6,000.00
Cost for collections of all cores, per sampling event	$ 12,000
Sample Processing Cost, Per Event	
Total number of sediment samples, per event	60
Total number of porewater samples, per event	78
Number of samples, per event	**138**
Max number of sample containers processed per hour	3
Total number of hours to process all sample containers	46
Processing cost per hour	$ 176.00
Sample processing cost, per event (Total hours x hourly rate)	$ 8,096
Sample Shipping Cost, Per Event	
Total number of samples/containers, per event	138
Number of sample containers per shipping cooler	4
Total number of shipping coolers (total containers / containers per cooler)	35
Shipping cost per cooler	135.00
Shipping cost per sampling event:	$ 4,725
Sediment Profile Imaging Cost, Per Event	
Total number of CCU/RCU images, per event	160
Max number of images processed, per day	10
Total number of days to process all images	16
Cost for vessel, labor, equipment, per day	6,000
Cost for sediment profile imaging, per event:	$ 96,000
Sediment and Porewater Analytical Cost, Per Event	
Total number of samples/containers, per event	138
Cost per sediment or porewater sample analysis (Costs from Monterey Bay Analytical Services Fee Schedule 2025)	$ 3,071.00
Cost for sampling analysis, per event (cost per sample analysis x number of samples):	$ 423,798
Summary of Costs for Each Performance Monitoring Event	
Sediment core collection	$ 12,000
Porewater collection	$ 23,936

Table 2-1
Long-Term Monitoring Breakdown
Cost Analysis Technical Memorandum, Swan Island Basin Project Area, Portland Oregon

Description	Quantity or Cost
Sample processing	$ 8,096
Sample shipping	$ 4,725
Sediment profile imaging	$ 96,000
Sediment and porewater analysis	$ 423,798
Total cost per sampling event	***$ 568,555***
Number of Performance Sampling Events (100 Years, Post-RA)	
Number of performance samples in first 5 years	3
Number of performance samples in following 95 years, once every 5 years	19
Total number of performance sampling events	**22**
Total cost for all performance sampling events (in 2025 dollars)	**$ 12,508,210**

Notes:
CCU = cap certification unit
QC = quality control
RA = remedial action
RCU = riverbank certification unit
x = multiplied by
The definition and location of CCUs and RCUs are included in the Cap Design Technical Memorandum.

FIGURES

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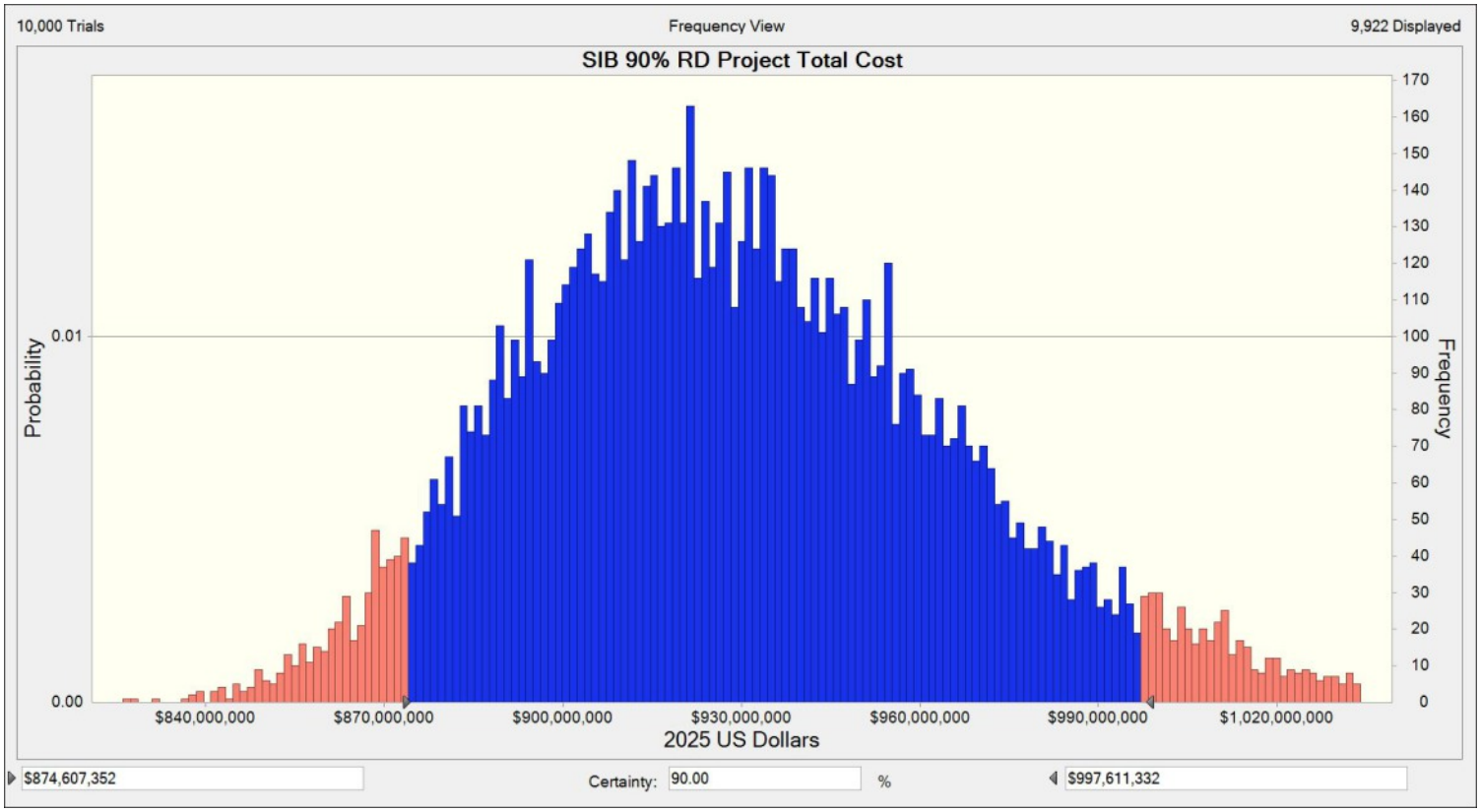

Prepared on 10/23/2025

Cost Analysis Technical Memorandum
Swan Island Basin Project Area

PACIFIC groundwater GROUP
HGL
M MOTT MACDONALD
BRIDGEWATER GROUP

Figure 2-1
Total Project Cost Certainty Chart Highlighting the 90% Certainty of Lower and Upper Project Cost

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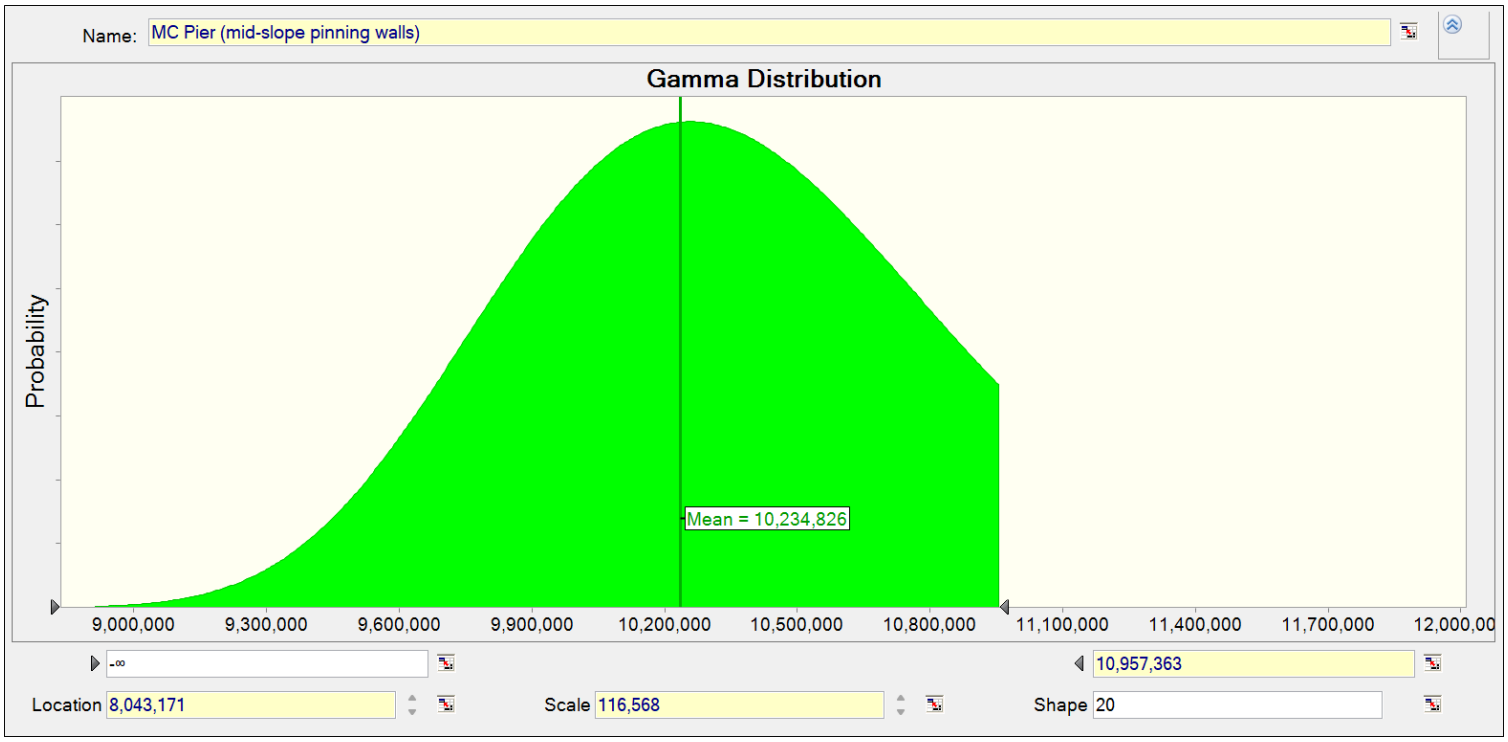

Figure 2-2
Example Chart of the Gamma Probability Distribution Assumption Used in Structure Costs

Prepared on 9/30/2025

Cost Analysis Technical Memorandum
Swan Island Basin Project Area

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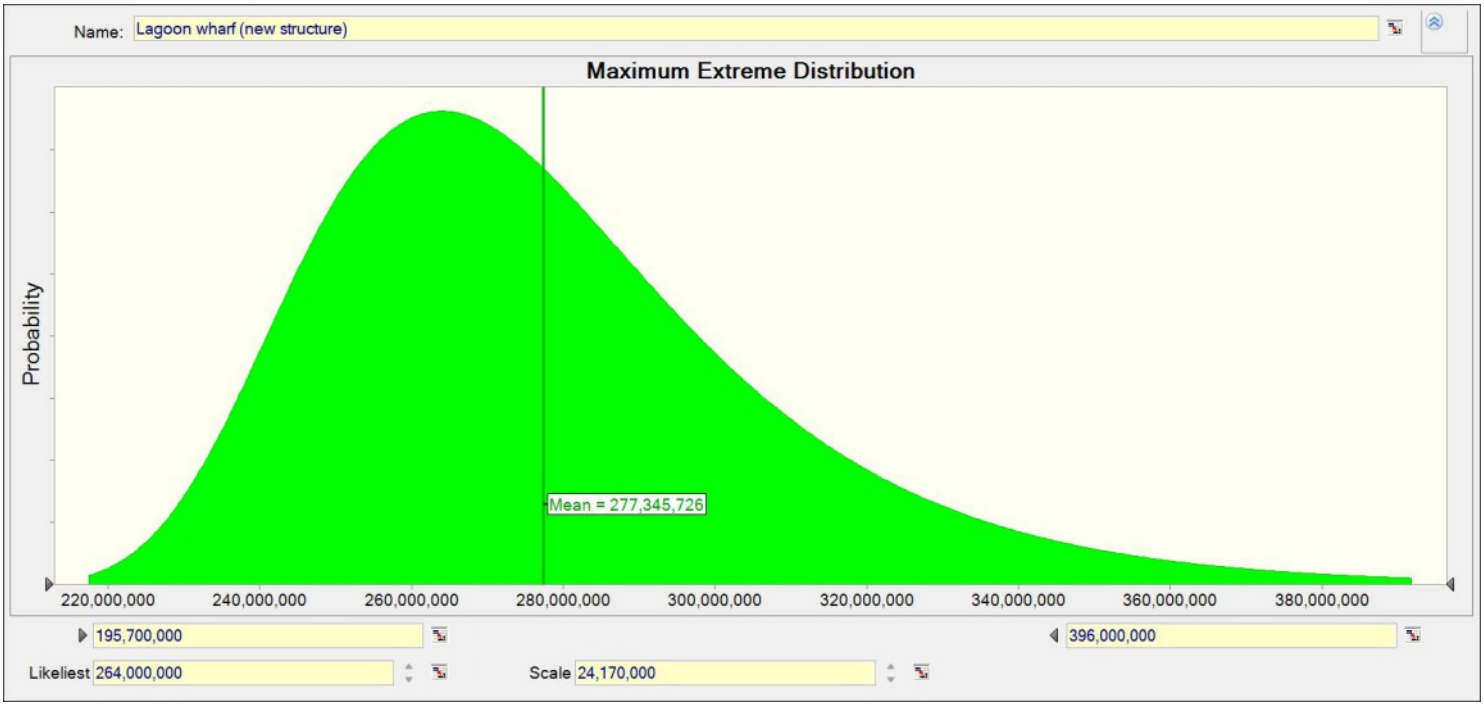

Figure 2-3
Chart of the Maximum Extreme Probability Distribution Used for the Lagoon Wharf

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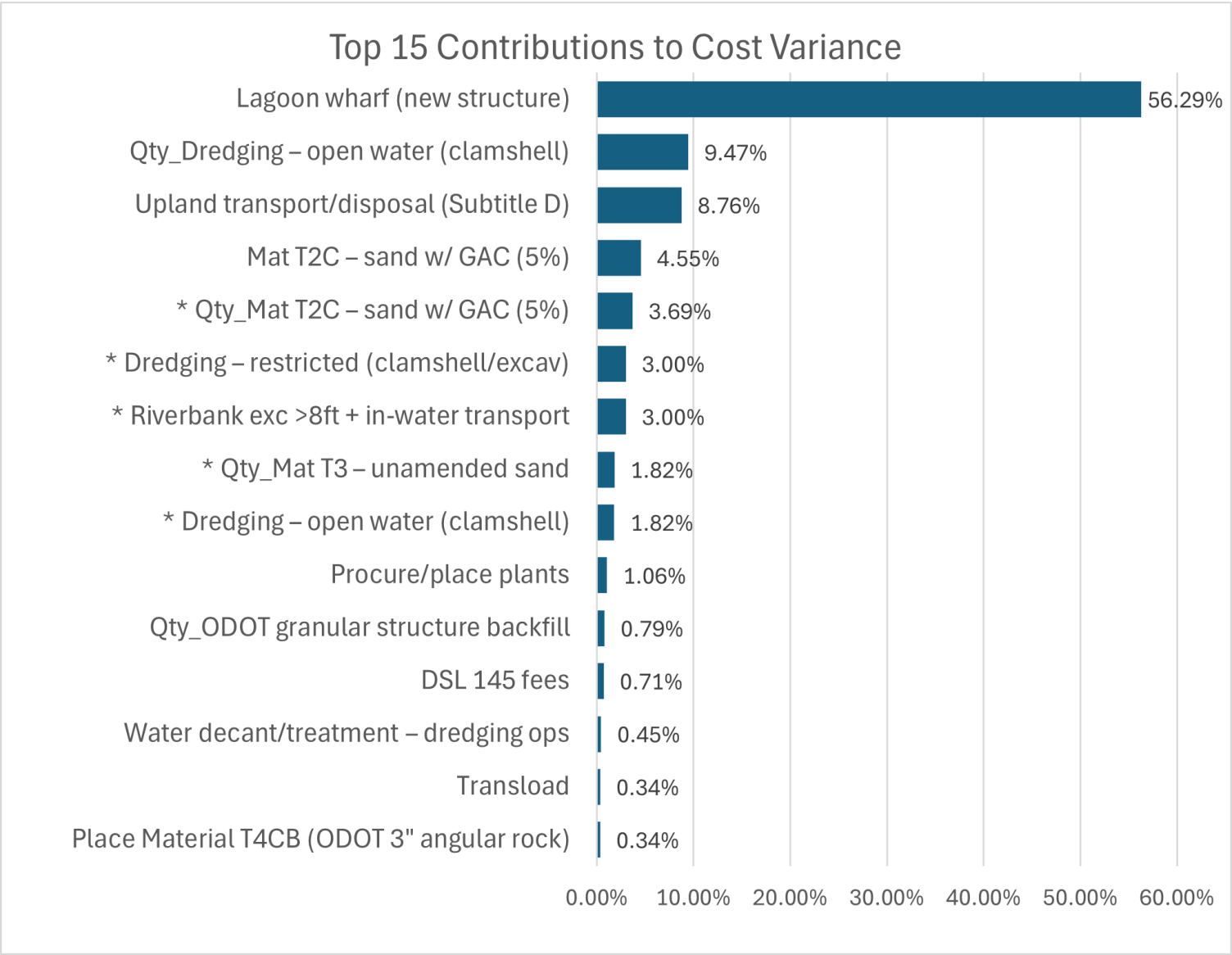

Figure 5-1
Cost Sensitivity Chart of Top 10 Cost Elements

Prepared on 10/23/2025

Cost Analysis Technical Memorandum
Swan Island Basin Project Area

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ATTACHMENTS

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ATTACHMENT A

PRE-FINAL 90% RD COST ESTIMATING WORKBOOK

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Attachment A – 90% RD Cost Estimate Workbook

Table A-1: Line Item Cost Estimate

Cost ID	Cost Item Description	Unit Cost	Units	Quantity	Line Item Cost
01	Direct Construction Costs (Bid)				
05	Mobilization / Demobilization				
01.05.01	Mobilization/Demobilization for Direct Construction Except Designated Structures (10% construction cost)	10%	%		$43,019,000
01.05.02	Procedural Costs and Agency Submittals	424,800.00	LS	1	$424,800
01.05.03	Remedial Action Work Plan	122,400	LS	1	$122,400
(Subtotal)			Subtotal - Mobilization / Demobilization:		$43,566,200
10	Site Preparation				
01.10.04	Utilities protection and restoration	250,000.00	LS	1	$250,000
01.10.05	Site restoration	2,283,254.00	LS	1	$2,283,254
(Subtotal)			Subtotal - Site Preparation:		$2,533,254
15	Surveys				
01.15.01	Initial Site Survey and Establish Controls	9,200.00	LS	1	$9,200
01.15.02	Preconstruction structural condition survey	1,838,819.00	LS	1	$1,838,819
01.15.03	Existing utilities survey	1,242,550.00	LS	1	$1,242,550
01.15.04	Progress and dredge/cap certification surveys	223,040.00	MO	36	$8,029,440
01.15.07	As-Built Survey	54,516.12	LS	1	$54,516
(Subtotal)			Subtotal - Surveys:		$11,174,525
20	Structural				
01.20.03	Limit Load and Temporary Support/Shoring of Existing Structures	566,109	LS	1	$566,109
01.20.05	Outfall Rebuild, large	547,770	EA	4	$2,191,079
01.20.06	Outfall Rebuild, small	10,885	EA	22	$239,470
01.20.07	Lagoon wharf (new structure)	264,000,000	LS	1	$264,000,000
01.20.08	Berth 306 (new structure)	14,605,942	LS	1	$14,605,942
01.20.09	Berth 307 (new structure)	11,767,492	LS	1	$11,767,492
01.20.10	USCG (toe wall, pile sleeves)	4,294,491	LS	1	$4,294,491
01.20.11	MC Pier (mid-slope pinning walls)	10,257,957	LS	1	$10,257,957
01.20.12	Berth 311 (breasting dolphin)	489,733	LS	1	$489,733
01.20.13	Berth 306 removal	1,140,240	LS	1	$1,140,240
01.20.14	Berth 307 removal	909,324	LS	1	$909,324
01.20.15	Berth 308 removal	757,714	LS	1	$757,714
01.20.18	PoP dredge Base structural modifications	913,289	LS	1	$913,289

Cost ID	Cost Item Description	Unit Cost	Units	Quantity	Line Item Cost
01.20.19	Structure &Upland monitoring	1,297,613	LS	1	$1,297,613
01.20.20	Structural engineering design plan submittals	1,983,600	LS	1	$1,983,600
(Subtotal)				Subtotal - Structural:	$315,414,054
25	Dredging, Excavation, Transportation &Disposal				
01.25.01	Required Dredging and In-Water Transportation (Open-Water) - Clamshell	38.51	CY	585,400	$22,543,391
01.25.02	Required Dredging and In-Water Transportation (Nearshore, below El 8 ft NAVD88) - Clamshell	147.62	CY	34,800	$5,137,151
01.25.03	Required Dredging and In-Water Transportation (Restricted Access) - Clamshell/Excavator	177.14	CY	34,800	$6,164,582
01.25.04	Dredge Return Water Treatment and Discharge	0.057	GAL	172,265,000	$9,833,693
01.25.05	Riverbank excavation (above El 8ft NAVD88) and in-water transport.	88.25	CY	52,100	$4,597,825
01.25.06	Water quality and turbidty control	3,600,000	LS	1	$3,600,000
01.25.07	TESC of upper riverbank excavation	30,000	AC	16.0	$480,000
01.25.09	Dredged/Excavated Material Transload	14.00	TON	1,131,360	$15,842,902
01.25.10	Dredged/Excavated Material Upland Transportation, and Disposal (Subtitle D)	58.81	TON	1,131,360	$66,540,347
01.25.11	Identified Debris Removal (Subtitle D)	38.14	TON	7000	$267,004
01.25.12	Identified Debris Upland Transportation and Disposal (Subtitle D) - Allowance	165.40	TON	7000	$1,157,774
01.25.13	Contingency Re-Dredging - Allowance	38.51	CY	62,020	$2,388,352
01.25.14	Standby Time - Allowance	19,388.42	DAY	100	$1,938,842
01.25.15	Removal derelict Timber Piles, Incl. Dolphins &Groins	828.00	EA	2200	$1,821,600
(Subtotal)				Subtotal - Dredging, Excavation, Transportation &Disposal:	$142,313,465
30	Material Procurement				
01.30.01	Procure &Deliver Material T1C: <2.5" rounded gravel)	80.00	CY	39,172	$3,133,748
01.30.02	Procure &Deliver Material T2C: (Sand with GAC, 5%)	386.99	CY	153,762	$59,503,612
01.30.03	Procure &Deliver Material T3: (unamended sand)	80.00	CY	202,697	$16,215,796
01.30.04	Procure &Deliver Material T4CB (ODOT 3" angular rock)	80.00	CY	206,894	$16,551,526
01.30.06	Procure &Deliver Material T6C (ODOT Class 50 Riprap)	100.00	CY	450	$45,000
01.30.07	Procure &Deliver Material T7A (ODOT Class 100 Riprap)	100.00	CY	8,805	$880,450
01.30.08	Procure &Deliver Material T8A (ODOT Class 200 Riprap)	100.00	CY	62,803	$6,280,345
01.30.10	Procure &Deliver Material T10R, ODOT 1.5" Dense Graded Aggregate	69.36	TON	1,179	$81,789
01.30.11	Procure &Deliver Planting Soil P1 (silt loam, 2% organic)	55.34	CY	22,587	$1,250,040
01.30.12	Procure &Deliver Compost P2 (silt loam, 10% organic)	66.41	CY	22,587	$1,500,048
01.30.13	Procure &Deliver GAC geotextile	58.57	SY	270,978	$15,870,735
01.30.14	Procure &Deliver slope reinforcement bag lift materials	45.00	CY	685	$30,825
01.30.15	Procure &Deliver slope reinforcement Envirolock bags	7.45	EA	147,430	$1,098,354

Cost ID	Cost Item Description	Unit Cost	Units	Quantity	Line Item Cost
01.30.16	Procure &Deliver ODOT00510.13 Granular Structure Backfill	94.78	CY	213,000	$20,188,140
01.30.17	Procure &Deliver Geofabric Material	2.75	SY	75,333	$207,399
01.30.18	Procure &Deliver jute netting	4.50	SY	16940	$76,230
01.30.19	Procure/Deliver Mulch	72.00	CY	4,517	$325,248
01.30.20	Procure Sampling Port Boxes, large for open water	3,254.00	EA	36	$117,144
01.30.22	Procure &Deliver Planting Soil P3 (2% organic silt loam amended with 3% biochar)	64.15	CY	22,587	$1,448,966
(Subtotal)				Subtotal - Material Procurement:	$144,805,394
40	Material Placement				
01.40.01	Place Material T1C: <2.5" rounded gravel)	80.00	CY	39,172	$3,133,748
01.40.03	Place Material T2C: (Sand with GAC, 5%)	80.00	CY	153,762	$12,300,948
01.40.05	Procure &Deliver Material T3: (unamended sand)	80.00	CY	202,697	$16,215,796
01.40.07	Place Material T4CB (ODOT 3" angular rock)	80.00	CY	206,894	$16,551,526
01.40.09	Place Material T6C (ODOT Class 50 Riprap)	100.00	CY	450	$45,000
01.40.11	Place Material T7A (ODOT Class 100 Riprap)	100.00	CY	8,805	$880,450
01.40.11	Place Material T8A (ODOT Class 200 Riprap)	100.00	CY	62,803	$6,280,345
01.40.13	Place Granular Structure Backfill	80.00	CY	213,000	$17,040,000
01.40.14	Place GAC geotextile	26.67	SY	270,978	$7,226,074
01.40.25	PoP dredge base boat ramp aggregate placement	120.00	CY	737	$88,440
01.40.30	Place Sampling Port Boxes	32,000.00	LS	1	$32,000
(Subtotal)				Subtotal - Material Placement:	$79,794,326
50	Riverbank Habitat Installation				
01.50.01	Install slope reinforcement wrapped soil lifts	35.00	SF	174300	$6,100,500
01.50.02	Place Planting Soil P1 (silt loam, 2% organic)	80.00	CY	22,587	$1,806,933
01.50.03	Place Compost P2 (silt loam, 30% organic)	80.00	CY	22,587	$1,806,933
01.50.05	Place Planting Soil P3 (2% organic silt loam amended with 3% biochar)	80.00	CY	22,587	$1,806,933
01.50.08	Place Geofabric for Riverbanks	16.00	SY	75333	$1,205,328
01.50.15	Procure/Deliver/Place Plants	53.81	EA	651,100	$35,035,691
01.50.20	Riverbank vegetation irrigation	3,750,000.00	LS	1	$3,750,000
(Subtotal)				Subtotal - Riverbank Habitat Installation:	$51,512,319
(Subtotal)				Subtotal - Direct Construction Cost:	$791,113,537
02	Indirect Construction Costs (Bid)				
01	Management, Technical Support and Compliance Monitoring				
02.01.01	Project Management	84,527	MO	48	$4,057,282
02.01.03.10	Independent Quality Assurance Team	64,800	MO	36	$2,332,800

Cost ID	Cost Item Description	Unit Cost	Units	Quantity	Line Item Cost
02.01.06	Environmental Compliance Monitoring (Water Quality Monitoring, Air/Noise/Light, and Inadvertent Discovery)	381,462	MO	36	$13,732,634
02.01.06 (s1)	Turbidity monitoring	4,000	MO		
02.01.06 (s2)	Analytical Costs	348,000	MO		
02.01.06 (s3)	Sample Processing	14,560	MO		
02.01.06 (s4)	Sample Shipping	8,400	MO		
02.01.06 (s5)	Quality of Life Monitoring	6,502	MO		
02.01.10	TCLP metals analysis for Waste Characterization	200,000	LS	1	$200,000
(Subtotal)	Subtotal - Management, Technical Support and Compliance Monitoring:				$20,322,716
20	Site Administration Costs				
02.20.02	Real estate access coordination	10,000	MO	108	$1,080,000
02.20.04	Institutional Controls (initial and periodic) including Covenants, Easements, Advisories, Permit review	123,539	LS	1	$123,539
(Subtotal)	Subtotal - Site Administration Costs:				$1,203,539
(Subtotal)	Subtotal - Indirect Construction Cost:				$21,526,255
03	Additive Items (Bid)				
01	Additive Items				
03.01.01	Unexploded ordiances removal and disposal, per event	18,500	EA	1	$18,500
(Subtotal)	Subtotal - Additive Items:				$18,500
(Subtotal)	Subtotal - Contractor Bid Cost:				$812,658,292
10	RAPerforming Party Costs				
05	Oversight, Regulatory, and Long-Term Costs				
10.05.02	Contractor Pre-Qualification and Procurement	771,700	LS	1	$771,700
10.05.03	Community Outreach and Communications	28,175	MO	24	$676,193
10.05.04	DSL Division 145 Costs	39,300,000	LS	1	$39,300,000
10.05.05	Engineering Support Services	35,000	MO	18	$630,000
10.05.05	Construction Management (Inspection and Oversight)	71,523	MO	36	$2,574,813
10.05.10	Operations and Maintenance (O&M)	1,948,980	LS	1	$1,948,980
10.05.15	Long Term Monitoring	12,508,210	LS	1	$12,508,210
10.05.17	Long Term Monitoring, Five Year Review Reports	526,014	LS	1	$526,014

Cost ID	Cost Item Description	Unit Cost	Units	Quantity	Line Item Cost
10.05.20	Agency and Tribal Oversight	50,491	MO	36	$1,817,664
10.05.25	Off-site mitigation for temporary and permanent impacts	2,257,420	LS	1	$2,257,420

(Subtotal) Subtotal - Oversight, Regulatory, and Long-Term Costs: $63,010,995

10	Structure Relocations				
10.10.02	Temporary Relocation of Floating Structures - DD5	171,400	LS	1	$171,400
10.10.03	Temporary Relocation of Floating Structures - DD3	185,100	LS	1	$185,100
10.10.04	Temporary Relocation of Floating Structures - Vigorous	251,800	LS	1	$251,800
10.10.05	Temporary Relocation of Floating Structures - USCG floating dock	58,500	LS	1	$58,500
10.10.06	Temporary Relocation of Floating Structures - SCC Floating dock	96,800	LS	1	$96,800
10.10.07	Temporary Relocation of Floating Structures - MC Pier floating	115,600	LS	1	$115,600
10.10.08	Temporary Relocation of Floating Structures - PoP Dredge Base floating barges	100,700	LS	1	$100,700
10.10.09	Temporary Relocation of Floating Structures - Berth 311, misc.	55,300	LS	1	$55,300
10.10.10	Temporary Relocation of Floating Structures - Floating Dock, City Boat Ramp	27,000	LS	1	$27,000
10.10.11	Temporary Relocation of Floating Structures - US Navy Pier	9,600	LS	1	$9,600

(Subtotal) Subtotal - Structure Relocations: $1,071,800

(Subtotal) Subtotal - RA Performing Party Cost: $64,082,795

Total Estimated Project Cost: $876,741,086

Table A-2: Line Item Sources and Rationale Notes

Cost ID	Cost Item Description	Unit Cost Source	Unit Cost Notes
01	Direct Construction Costs (Bid)		
05	Mobilization / Demobilization		
01.05.01	Mobilization/Demobilization for Direct Construction Except Designated Structures	Passaic, EPJ	Estimated 10% of construction costs with procedural items listed separately. Apportioned mobilization for multiple construction years; more spent first year, less subsequent years. Uncertainty elevated because project will require annual mob/demob. Includes financial assurance and bonding, contractual overhead, development of closeout submittals, project record docs, bonds and insurance. This mobilization is based on construction costs that exclude stucture costs because each structure cost includes moblization individually. 10% of construction aligns with Passaic River. Notes below contain activities similar to those likely to be needed in SIB to characterize areas that mobilization cost may be needed.
01.05.01 (s1)	Pre-construction support facility		Pre-construction to include support facility-job trailers,sampling facility, equipment storage, employee parking. Est $10,000 per month.
01.05.01 (s2)	Upland Support Facility with Water Access		Estimated: Upland Support Facility with Water Access 5 acres-$510,000 per acre, escalated from 2014
01.05.01 (s3)	Fencing, Exterior Lighting, Security. Buildings		10,000 sf @$100 per sf, escalated from 2014
01.05.01 (s4)	Amenities		Amenities-lab , shower , locker rooms-$125,000;Guard shack, truck wash,sewer,water,electric-$110,000, escalated from 2014
01.05.01 (s5)	Stormwater Mgt. ,Paving, Pier/Dock		Stormwater Mgt. ,Paving, Pier/Dock@15,000 sf $2,740,000, escalated from 2014
01.05.01 (s6)	Water treatment for Decon Water		
01.05.02	Procedural Costs and Agency Submittals	Passaic	Incidental reports and procedural costs. RAWP and related plans, and structural submissions not included. Aligns with approach adopted in Passaic River project. Cost basis: 3 people working 6 months at contract start (3*$150/hr*8hrs*6mos (workdays)) Small comparative cost for indiv submissions; but retain as lump sum to account for stakeholder review process during development; has high uncertainty (elevated upper cost).
01.05.02 (s1)	Water Quality Monitoring Plan (WQMP)		
01.05.02 (s2)	Data Management Plan (DMP)		
01.05.02 (s3)	Temporary Erosion and Sediment Control Plan		
01.05.02 (s4)	Stormwater Management Plan		

Cost ID	Cost Item Description	Unit Cost Source	Unit Cost Notes
01.05.02 (s5)	Spill Prevention, Control, and Countermeasure Plan (SPCC)		
01.05.02 (s6)	Air Pollution, Noise, and Light Monitoring Plan (ANLMP)		
01.05.02 (s7)	Archaeological and Inadvertent Discovery Plan (AIDP)		
01.05.02 (s8)	Traffic Control Plan		
01.05.02 (s9)	Operations and Maintenance Plan		
01.05.02 (s10)	Water Management Plan		
01.05.02 (s11)	Health and Safety and Emergency Response Plans		
01.05.02 (s12)	Other ancillary plans		
01.05.03	Remedial Action Work Plan	Passaic	The development of all subordinate plans that comprise the Remedial Action Work Plan assume 60 hours of total development time for each report with a $40 hourly rate and 3.0 multiplier. Uncertainty of RAWP assembly remains elevated due to considerations regarding access, transload and disposal locations, work area establishment; all of which much be determined and documented in the Work Plan.
10	Site Preparation		
01.10.04	Utilities protection and restoration	EPJ	Limited utility survey data. Currently known utilities potentially within project site boundaries: Lumen optical. Variability in cost is high to account for uncertainties but weighed to lower cost due to available data suggesting limited utilities within project limits.
01.10.05	Site restoration	EPJ	Upland restoration such as asphalt, curbs, fences, etc. Because majority of work will be performed from the water, upland restoration requirements may trend lower; probability distribution weighs to lower cost.
(Subtotal)			
15	Surveys		
01.15.01	Initial Site Survey and Establish Controls	EPJ	Survey cost =$500 /acre Estimate 30 Riverbank Certification Units (RCUs) for the land part of the site. The water survey is part of pre dredging surveys. 30 RCUs x 0.48 acres per RCU ave. x $500 per acre =$7,200. Add $2,000 for survey plans. The definition and location of RCUs are specified in the Cap Design Technical Memorandum.
01.15.02	Preconstruction structural condition survey	EPJ	Divers to inspect underwater, engineer inspection by boat, and visual inspection of Pier decks + preparation of report. Direct Costs + Contingencies (therefore not included in probabilistic model) + Contractor Costs
01.15.03	Existing utilities survey	EPJ	Visual inspection/ GPR survey as required/EML survey as required + report and adjustment of baseline utilities as required

Cost ID	Cost Item Description	Unit Cost Source	Unit Cost Notes
			Direct Costs + Contingencies (therefore not included in probabilistic model)+ Contractor Costs
01.15.04	Progress and dredge/cap certification surveys	Passaic	Estimate 20 days per month (pre dredge, post dredge, post cap surveys) x $11,152 (escalated cost, per day)
01.15.07	As-Built Survey	EPJ	CCUs 1.32 river miles x 2 for coverage x 1 rm per day x $8,200 per day= 21648 > Escalated: 28116.12 RCUs 30 RCUs x 0.48 acres per RCU x $1,000 per acre = $ 14, 400 Reporting 40 Hours x 2 people x $150 per hour =$12,000 Total for As Built survey = $54,515.12
(Subtotal)			
20	Structural		
01.20.03	Limit Load and Temporary Support/Shoring of Existing Structures	EPJ	Temporary support/shoring/bracing or removal of existing bracing for access underneath existing structures. Structural steel piled structures will require little temporary work under this item. Timber structures will require removal of existing bracing and possible temporary bracing while the existing member is removed temporarily. Includes allowance to replace existing bracing with new due to deterioration.
01.20.05	Outfall Rebuild, large	EPJ	5% mobilization included
01.20.06	Outfall Rebuild, small	EPJ	5% mobilization included
01.20.07	Lagoon wharf (new structure)	EPJ	The unit cost was obtained from the 2025 KPFF estimate for the wharf that includes contractor direct costs and contingency.
01.20.08	Berth 306 (new structure)	EPJ	Direct Costs + Contingencies + Contractor Costs
01.20.09	Berth 307 (new structure)	EPJ	Direct Costs + Contingencies + Contractor Costs
01.20.10	USCG (toe wall, pile sleeves)	EPJ	Direct Costs + Contingencies + Contractor Costs
01.20.11	MC Pier (mid-slope pinning walls)	EPJ	Direct Costs + Contingencies + Contractor Costs
01.20.12	Berth 311 (breasting dolphin)	EPJ	Direct Costs + Contingencies + Contractor Costs
01.20.13	Berth 306 removal	EPJ	Berth 306 + 2 EA Walkways + 5 EA Dolphins Direct Costs + Contingencies + Contractor Costs
01.20.14	Berth 307 removal	EPJ	Berth 307 + 1 EA Walkway + 4 EA Dolphins Direct Costs + Contingencies + Contractor Costs
01.20.15	Berth 308 removal	EPJ	Berth 308 + 4 EA Dolphins Direct Costs + Contingencies + Contractor Costs
01.20.18	PoP dredge Base structural modifications	EPJ	Direct Costs + Contingencies + Contractor Costs
01.20.19	Structure &Upland monitoring	EPJ	Active monitoring of structures; settlement monitoring Direct Costs + Contingencies + Contractor Costs
01.20.20	Structural engineering design plan submittals	EPJ	Estimate: 5 people*$190/hr*8hrs*1yr (workdays) Hourly rate confirmed with Brain Maxwell 2025-08-22 Model range elevated to account for potential of additional geotechnical and civil engineering design elements.
(Subtotal)			

Cost ID	Cost Item Description	Unit Cost Source	Unit Cost Notes
25	Dredging, Excavation, Transportation &Disposal		
01.25.01	Required Dredging and In-Water Transportation (Open-Water) - Clamshell	VigorDredge	Estimate based on escalated 2015 Vigor dredging base cost which includes transport to Dalles but does not include free water processing (free water was pumped upland into Vigor drainage water treatment). Incidental: debris boom, silt curtain, related equipent. Assumes production rate of 1,150 cy/day.
01.25.02	Required Dredging and In-Water Transportation (Nearshore, below El 8 ft NAVD88) - Clamshell	VigorDredge	Based on open-water unit price then scaled to account for slower production rate (300 cy/day). Rate increase factor: 1150/300 cy/day = 3.8). Cost assumes that necessary water management controls will be included.
01.25.03	Required Dredging and In-Water Transportation (Restricted Access) - Clamshell/Excavator	VigorDredge	Dredging under structures Based on open-water unit price then scaled to account for slower production rate (250 cy/day). Rate increase factor: 1150/250 cy/day = 4.6) Cost assumes that necessary water management controls will be included.
01.25.04	Dredge Return Water Treatment and Discharge	Doty	Basis: avg cost from Electrocoagulation (EC) and Chitosan Enhanced Sand Filtration (CESF) pilot dredging in the Lower Duwamish Waterway, 2015. Average $/GAL escalated to 2025 using CWCCIS. Cost variability increased (0.85 - 1.7) to account for cost derived from 2015 pilot study.
01.25.05	Riverbank excavation (above El 8ft NAVD88) and in-water transport.	ODOT	Riverbank ex from ToB to El 13' (MLW). Covers both excavation using above-water earthwork machines placed on riverbank slopes, nearshore dredging during optimal tidal periods, and excavated material loading on barge via derrick. Majority of excavation work will be upland with above-water earthwork; therefore, the unit cost is based on ODOT common bank excavation bids. Unit cost obtained from average of large volume bids in 2025 ODOT data.
01.25.06	Water quality and turbidty control	VigorDredge	Estimate of 30 implementations of turbidity control measures at $120K per 1,000 lf at each typical implementation. Basis of typical cost derived from 2015 VigorDredge bid. Uncertainty of extent of required water quality control management remains elevated; assigned wider probability distribution.
01.25.07	TESC of upper riverbank excavation	EPJ	Coarse estimate of application of appropriate BMPs during riverbank excavation.
01.25.09	Dredged/Excavated Material Transload	VigorDredge	
01.25.10	Dredged/Excavated Material Upland Transportation, and Disposal (Subtitle D)	VigorDredge	Price combines 2015 costs for upland transport &disposal ($37.88/tn), and water removal and disposal ($122/tn on 20% of incoming material and escalated to 2025 dollars.
01.25.11	Identified Debris Removal (Subtitle D)	Stratford	
01.25.12	Identified Debris Upland Transportation and Disposal (Subtitle D) - Allowance	Stratford	
01.25.13	Contingency Re-Dredging - Allowance	VigorDredge	Same as open-water cost.
01.25.14	Standby Time - Allowance	LDW 90%	Allowance for situations in which the contractor is directed not to work.
01.25.15	Removal derelict Timber Piles, Incl. Dolphins & Groins	Terminal 1	Terminal 1 bids: $700 and $900 each. However, other sources suggest high variability; higher range of variability assigned to probability distribution.
(Subtotal)			

Cost ID	Cost Item Description	Unit Cost Source	Unit Cost Notes
30	Material Procurement		
01.30.01	Procure &Deliver Material T1C: <2.5" rounded gravel)	Terminal 1	Cost is based on Terminal 1 bid for granular "Fish Mix" which includes the combined tasks of procurement, delivery, and placement. The granular material price was based on quarry sourcing. The unit price for procurement and delivery is assumed to be approximately 1/2 of combined cost with the balance covering the cost of placement.
01.30.02	Procure &Deliver Material T2C: (Sand with GAC, 5%)	EPJ	(Addressed in Specific Cost Item Bases section)
01.30.03	Procure &Deliver Material T3: (unamended sand)	Terminal 1	Cost is based on Terminal 1 bid for granular "Fish Mix" which includes the combined tasks of procurement, delivery, and placement. The granular material price was based on quarry sourcing; however, it is anticipated that potential sand sources may expand at RAstart. The unit price for procurement and delivery is assumed to be approximately 1/2 of combined cost with the balance covering the cost of placement.
01.30.04	Procure &Deliver Material T4CB (ODOT 3" angular rock)	Terminal 1	Cost is based on Terminal 1 bid for granular "Fish Mix" which includes the combined tasks of procurement, delivery, and placement. The granular material price was based on quarry sourcing. The unit price for procurement and delivery is assumed to be approximately 1/2 of combined cost with the balance covering the cost of placement.
01.30.06	Procure &Deliver Material T6C (ODOT Class 50 Riprap)	Terminal 1	Cost is based on Terminal 1 bid for "Riprap" which includes the combined tasks of procurement, delivery, and placement. The combined price is then escalated 18% to 2025 dollars following an assessment of ODOT bid data. The unit price for procurement and delivery is assumed to be approximately 1/2 of combined cost with the balance covering the cost of placement.
01.30.07	Procure &Deliver Material T7A (ODOT Class 100 Riprap)	Terminal 1	Cost is based on Terminal 1 bid for "Riprap" which includes the combined tasks of procurement, delivery, and placement. The combined price is then escalated 18% to 2025 dollars following an assessment of ODOT bid data. The unit price for procurement and delivery is assumed to be approximately 1/2 of combined cost with the balance covering the cost of placement.
01.30.08	Procure &Deliver Material T8A (ODOT Class 200 Riprap)	Terminal 1	Cost is based on Terminal 1 bid for "Riprap" which includes the combined tasks of procurement, delivery, and placement. The combined price is then escalated 18% to 2025 dollars following an assessment of ODOT bid data. The unit price for procurement and delivery is assumed to be approximately 1/2 of combined cost with the balance covering the cost of placement.
01.30.10	Procure &Deliver Material T10R, ODOT 1.5" Dense Graded Aggregate	ODOT	ODOT Average 2024 Bids, large volume
01.30.11	Procure &Deliver Planting Soil P1 (silt loam, 2% organic)	LDW 100%	100% LDW estimates $36.25/ton. Converted to CY and escalated to 2025 using inflation rate (3.5%).
01.30.12	Procure &Deliver Compost P2 (silt loam, 10% organic)	EPJ	Estimated 20% increase of LDW unit cost for 2% organic silt loam (Planting Soil P1). 10% organic silt loam derived from mix of standard silt loam mixes, 1) 2% organic silt loam (75%), 2) 30% organic silt loam (25%).
01.30.13	Procure &Deliver GAC geotextile	Huesker	Tektoseal AC being assigned to explicit CCU's (Tea data). Scaled +8% to account for higher GAC loading that will be needed above the type in Huesker's estimate.
01.30.14	Procure &Deliver slope reinforcement bag lift materials	Vendor	Each bag is filled 1.25 cf of 70-80% granular sand/ 20-30 shredded topsoil mix. Unit price includes material procurement, delivery, and installation.

Cost ID	Cost Item Description	Unit Cost Source	Unit Cost Notes
01.30.15	Procure &Deliver slope reinforcement Envirolock bags	Vendor	Vendor (Envirolok) quote received 2025-08-01 for bulk unit purchase >5400 units.
01.30.16	Procure &Deliver ODOT00510.13 Granular Structure Backfill	ODOT	ODOT Average 2024 Bids, large volume, Portland region.
01.30.17	Procure &Deliver Geofabric Material	ODOT	ODOT2024 Bid data
01.30.18	Procure &Deliver jute netting	ODOT	ODOT2024 Bid data
01.30.19	Procure/Deliver Mulch	ODOT	ODOT2024 Bid data
01.30.20	Procure Sampling Port Boxes, large for open water	EPJ	Large Ports -$3254 per port x 105 CCUs=$341,670 Small Ports for Revetment areas -11 CCUs x$988=$10,868 Installation of Ports =$8,000 per day for 10 ports =116/10 =$92,800.
01.30.22	Procure &Deliver Planting Soil P3 (2% organic silt loam amended with 3% biochar)	EPJ	[LDW Topsoil ($54/cy)]+[Biochar ($70/cy) vendor quote]*1.15 factor for blending surcharge.
(Subtotal)			
40	Material Placement		
01.40.01	Place Material T1C: <2.5" rounded gravel)	Terminal 1	Cost is based on Terminal 1 bids for procure, deliver, and placement of small grain material wherein 1/2 of cost is estimated for placement only.
01.40.03	Place Material T2C: (Sand with GAC, 5%)	Terminal 1	Cost is based on Terminal 1 bids for procure, deliver, and placement of small grain material wherein 1/2 of cost is estimated for placement only.
01.40.05	Procure &Deliver Material T3: (unamended sand)	Terminal 1	Cost is based on Terminal 1 bids for procure, deliver, and placement of small grain material wherein 1/2 of cost is estimated for placement only.
01.40.07	Place Material T4CB (ODOT 3" angular rock)	Terminal 1	Cost is based on Terminal 1 bids for procure, deliver, and placement of small grain material wherein 1/2 of cost is estimated for placement only.
01.40.09	Place Material T6C (ODOT Class 50 Riprap)	Terminal 1	Cost is based on Terminal 1 bids for procure, deliver, and placement of riprap wherein 1/2 of cost is estimated for placement only. Cost escalated 18% following assessment of ODOT2024 bid data.
01.40.11	Place Material T7A (ODOT Class 100 Riprap)	Terminal 1	Cost is based on Terminal 1 bids for procure, deliver, and placement of riprap wherein 1/2 of cost is estimated for placement only. Cost escalated 18% following assessment of ODOT2024 bid data.
01.40.11	Place Material T8A (ODOT Class 200 Riprap)	Terminal 1	Cost is based on Terminal 1 bids for procure, deliver, and placement of riprap wherein 1/2 of cost is estimated for placement only. Cost escalated 18% following assessment of ODOT2024 bid data.
01.40.13	Place Granular Structure Backfill	Terminal 1	Cost is based on Terminal 1 bids for procure, deliver, and placement of small grain material wherein 1/2 of cost is estimated for placement only.
01.40.14	Place GAC geotextile	RSMeans	Placement estimate: 12 sy/hour, $320/hr for machine, operator, and two laborers.
01.40.25	PoP dredge base boat ramp aggregate placement	Terminal 1	Based on Terminal 1 bids and an estimated lower production rate anticipated for material on the boat ramp.
01.40.30	Place Sampling Port Boxes		Installation of Ports =$8,000 per day (similar to cost of mooring placement) for max of 10 ports/day for 36 ports in 18 performance units. Installation of sampling port similar is not a direct match to mooring placement; therefore, probability distribution spread is elevated.
(Subtotal)			

Cost ID	Cost Item Description	Unit Cost Source	Unit Cost Notes
50	Riverbank Habitat Installation		
01.50.01	Install slope reinforcement wrapped soil lifts	EPJ	Average of SF of installation face provided by Envirolok vendor.
01.50.02	Place Planting Soil P1 (silt loam, 2% organic)	EPJ	Estimated T&M unit cost equal to land-based placement of small-grained granular material ($80/cy)
01.50.03	Place Compost P2 (silt loam, 30% organic)	EPJ	Estimated T&M unit cost equal to land-based placement of small-grained granular material ($80/cy)
01.50.05	Place Planting Soil P3 (2% organic silt loam amended with 3% biochar)	EPJ	Cost is estimated to increase 50% to accommodate higher organic requirement.
01.50.08	Place Geofabric for Riverbanks	EPJ	Typical installed cost estimated to be 50% of material procurement and delivery
01.50.15	Procure/Deliver/Place Plants	ODOT	Average container installation of groundcover, shrub, and trees from ODOT bid data.
01.50.20	Riverbank vegetation irrigation	EPJ	Estimated 50,000 equivalent plant units (4 clumps of 4 emergent equated to 1 shrub or tree) at ~$15 (2025 $ for hand water via trucks – most costly) per plant = $750,000 (2025); 5 years (2025 $) is $3.75 million for irrigation
(Subtotal)			
	Sales Tax (may not be applicable - no sales tax in Oregon)		
(Subtotal)			

02	Indirect Construction Costs (Bid)		
01	Management, Technical Support and Compliance Monitoring		
02.01.01	Project Management	Passaic	PM $204,000 per year Three Operations Leaders- Dredging, Transload, Capping $131,000 per year x 3=$393,000 Quality Control Lead-$204,000 Support Staff -3 at $80,000 per year Costs include 40 % for Benefits Cost = $65,000 per month (before inflation)
02.01.03.10	Independent Quality Assurance Team	Passaic	IQAT-3 People 160 hours per month-CQA officer, Field Team Lead and H&S Officer $64,800 per month. 3.0 multiplier on raw labor $ per hour.
02.01.06	Environmental Compliance Monitoring (Water Quality Monitoring, Air/Noise/Light, and Inadvertent Discovery)	Monterey, Passaic	Basis-Monthly Cost Reference Document -SIB WQMP-Appendix to SIB CQA/QCP March 2025 During Dredging-Turbidity, Hardness, DO, pH with one year of Table 1-2 parameters for background via sondes. For turbidity measure one hour before active dredging starts, then 1 every 2 hours , including background For COCs Table 1-3 or "Focused list" -Assume Table 1-3 analytes , Total and Dissolved one sample per day during active dredging. Two water quality vessels one upstream, one downstream for turbidity measurements 6 days per week of active dredging, 4 weeks per month

Cost ID	Cost Item Description	Unit Cost Source	Unit Cost Notes
			Assume reporting of Compliance Sampling is done as part of weekly and monthly constriction reporting
02.01.06 (s1)	Turbidity monitoring	Passaic	Assume these are done by multi-parameter sondes that are provided with the sampling vessel 1 per vessel plus labor costs including the sondes. For Background Turbidity, hardness, DO and pH purchase two sondes at $2,000 each =$4,000 for duration of the project
02.01.06 (s2)	Analytical Costs	Monterey	For COCs 1 sample per day x 6 days per week of dredging x 4 weeks per month =24 samplings per month x 14 Samples for analyses = 336 samples for analysis Samples are analyzed for PAHs,metals,phthalates,VOCs, SVOCs,PCBs,Dioxins/Furans,Pesticides, Petro Hydrocarbons, 5 others per Table 1-3 WQMP (14 analytical sample groups) Analytical costs for these Total and Dissolved sample groups are $348,000 per month based on Monterey Labs Fee Schedule for 2025
02.01.06 (s3)	Sample Processing	Passaic	Sample processing costs-336 analytical samples /3 per hour x $130 per hour= $14,560 per month
02.01.06 (s4)	Sample Shipping	Passaic	336 samples/4 per cooler=84 coolers x $100 per cooler=$8,400 per month.
02.01.06 (s5)	Quality of Life Monitoring	Passaic	Quality of Life monitoring is done at the dredge (Air, Noise, Odors) -estimate is $5,000 per month per dredge (labor, sampling, analysis). From Passaic River 2014 Remediation Estimate.
02.01.10	TCLP metals analysis for Waste Characterization	EPJ	This is a component of pre-dredging landfill and regulatory acceptance of the sediment for disposal. Occurs during the RAplanning stage before dredging commences. The number of samples is standard landfill sampling frequency for waste designation and disposal. Vessel costs: $56,000 ($7,000 per day, 8 days) Field staff x3: $52,600 ($200 per hour, 10-12 hours per day, 8 days) Supplies/Equipment: $2,000 Field prep: $3,000 (creating/printing labels, field sheets, sample map, preparing supplies, prep meetings, etc) Travel &expenses: $6,000 (rough estimate, 3x per diem for 9 days, travel reimbursement) TCLP metals analysis of samples collected (30 samples * $280/sample) Total cost estimated $200K
(Subtotal)			
20	Site Administration Costs		
02.20.02	Real estate access coordination	EPJ	Consulting for real estate specialist to coordinate rental/leasing to include negotiation with owner-operators and with associated agencies.
02.20.04	Institutional Controls (initial and periodic) including Covenants, Easements, Advisories, Permit review	Passaic	Basis is lump sum of $95,000 per year estimated for the Lower Passaic project and escalated to Oregon, 2025 dollars. The initial phase would probably be the busiest as the RAcontractor is getting prepared to start active remediation and is preparing

Cost ID	Cost Item Description	Unit Cost Source	Unit Cost Notes
			plans. The estimate notes say one community involvement coordinator and two support staff which sound reasonable to me as the project starts. One or two people after that could make sense also.
(Subtotal)			
(Subtotal)			
03	Additive Items (Bid)		
01	Additive Items		
03.01.01	Unexploded ordiances removal and disposal, per event	EPJ	(Addressed in Specific Cost Item Bases section)
(Subtotal)			
(Subtotal)			
(Subtotal)			
10	RA Performing Party Costs		
05	Oversight, Regulatory, and Long-Term Costs		
10.05.02	Contractor Pre-Qualification and Procurement	Passaic	Part 1 Pre Qualification of up to six Contractor Teams - $153,000 Part 2 RA Contractor Bid and Proposal Prep and Review - $566,400 Part 3 Contract Award - $52,300
10.05.03	Community Outreach and Communications	Passaic	Community Involvement Coordinator-$100,000 Support Staff 2 -$80,000 per year -$160,000 Cost includes 40% for benefits Cost = $21,666 per month (cost prior to escalation)
10.05.04	DSL Division 145 Costs	DSL	Includes lease Division 145 easements for a total of 60 years (two consecutive 30-year easements); during construction and post-construction. Calculation based on updated DSL calculation methodology SIB RD performing party-selected inputs to a calculator developed by DSL to facilitate early cost estimates during in-progress Portland Habor remedial design.
10.05.05	Engineering Support Services	LDW 100%	Activities include "design interpretation, contingency action decision coordination, change order negotiation support, and construction completion and closeout reports preparation" (mirrors activities outlined in LDW)
10.05.05	Construction Management (Inspection and Oversight)	EPJ	Remediation Construction Manager $204,000 per year Three Construction Inspectors $100,000 per Year -Dredging, Transload, Capping Two Support Staff-$80,000 per year Cost includes 40% for benefits Cost = $55,000 per month
10.05.10	Operations and Maintenance (O&M)	EPJ	<u>Photography</u> Vessel plus Labor, SPI or something similar for photos-$7,600 per day 160 locations at 10 per day -2 times in 1st 5 years +19 (1 per five years) for 100 yrs total=$2,553,600 x1.36 inflation adjustment=$3,472,896

Cost ID	Cost Item Description	Unit Cost Source	Unit Cost Notes
			Processing (imaging, processing, reporting) -$2300 per location x 160 x 2+19 = $7,728,000 x 1.36=$10,510,080 <u>Diver Inspections</u> Three person team $3,475 per day Vessel -$2,800 per day SIB Locations for diving are deeper CCUs > 20 Ft deep 117CCUs /10 per day=12 x $6275 x 21=$1,581,300 x 1.36 Inflation Adjustment =$2,150,568 <u>Vegetation Surveys</u> 30 RCUs and 40 CCUs 8 per day x 16 hours x $45 /hr x 3.0 =$17280 9 days for 70CUs x $17,280 per day x 24 times = $3,732, 480 Increased upper unit cost factor (to 1.8) to account for potential of sand replacement activities.
10.05.15	Long Term Monitoring	Passaic	(Addressed in Specific Cost Item Bases section)
10.05.17	Long Term Monitoring, Five Year Review Reports	BOL	Data validation and report generation, 200 hours, for each report, performed 20 times during a 100-year post-RA period.
10.05.20	Agency and Tribal Oversight	EPJ TIG	
10.05.25	Off-site mitigation for temporary and permanent impacts	Alder Creek	Compensatory mitigation for loss in Discounted Service Acre Years (DSAYs) via habitat equivalency analysis. Mitigation cost estimated $62,000 per DSAY loss * ~~44.13~~ 36.41 assessed DSAY loss from RA.

(Subtotal)

10	Structure Relocations		
10.10.02	Temporary Relocation of Floating Structures - DD5	EPJ	(Addressed in Specific Cost Item Bases section)
10.10.03	Temporary Relocation of Floating Structures - DD3	EPJ	(Addressed in Specific Cost Item Bases section)
10.10.04	Temporary Relocation of Floating Structures - Vigorous	EPJ	(Addressed in Specific Cost Item Bases section)
10.10.05	Temporary Relocation of Floating Structures - USCG floating dock	EPJ	(Addressed in Specific Cost Item Bases section)
10.10.06	Temporary Relocation of Floating Structures - SCC Floating dock	EPJ	(Addressed in Specific Cost Item Bases section)
10.10.07	Temporary Relocation of Floating Structures - MC Pier floating	EPJ	(Addressed in Specific Cost Item Bases section)
10.10.08	Temporary Relocation of Floating Structures - PoP Dredge Base floating barges	EPJ	(Addressed in Specific Cost Item Bases section)
10.10.09	Temporary Relocation of Floating Structures - Berth 311, misc.	EPJ	(Addressed in Specific Cost Item Bases section)
10.10.10	Temporary Relocation of Floating Structures - Floating Dock, City Boat Ramp	EPJ	(Addressed in Specific Cost Item Bases section)

Cost ID	Cost Item Description	Unit Cost Source	Unit Cost Notes
10.10.11	Temporary Relocation of Floating Structures - US Navy Pier	EPJ	(Addressed in Specific Cost Item Bases section)

Notes
*1 – The text included in the Unit Cost Source column is the short form of the cost source. Longer descriptions of each source are listed in Section 2.6.

Table A-3: Line Item Annual Expenditure

Cost ID	Cost Item Description	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
01	Direct Construction Costs (Bid)												
05	Mobilization / Demobilization												
01.05.01	Mobilization/Demobilization for Direct Construction Except Designated Structures		6,452,850	6,452,850	3,764,163	3,764,163	3,764,163	3,764,163	3,764,163	3,764,163	3,764,163	3,764,163	
01.05.02	Procedural Costs and Agency Submittals	339,840	84,960										
01.05.03	Remedial Action Work Plan	97,920	24,480										
10	Site Preparation												
01.10.04	Utilities protection and restoration	150,000	50,000										50,000
01.10.05	Site restoration											684,976	1,598,278
15	Surveys												
01.15.01	Initial Site Survey and Establish Controls	7,360	1,840										
01.15.02	Preconstruction structural condition survey	1,471,055	367,764										
01.15.03	Existing utilities survey	994,040	248,510										
01.15.04	Progress and dredge/cap certification surveys		802,944	802,944	802,944	802,944	802,944	802,944	802,944	802,944	802,944	802,944	
01.15.07	As-Built Survey											10,903	43,613
20	Structural												
01.20.03	Limit Load and Temporary Support/Shoring of Existing Structures			70,764	70,764	70,764	70,764	70,764	70,764	70,764	70,764		
01.20.05	Outfall Rebuild, large		547,770	1,095,540	547,770								
01.20.06	Outfall Rebuild, small				39,912	39,912	39,912	39,912	39,912	39,912			
01.20.07	Lagoon wharf (new structure)				52,800,000	52,800,000	52,800,000	52,800,000	52,800,000				
01.20.08	Berth 306 (new structure)		7,302,971	7,302,971									
01.20.09	Berth 307 (new structure)		5,883,746	5,883,746									
01.20.10	USCG (toe wall, pile sleeves)						4,294,491						
01.20.11	MC Pier (mid-slope pinning walls)					10,257,957							
01.20.12	Berth 311 (breasting dolphin)		489,733										
01.20.13	Berth 306 removal		1,140,240										
01.20.14	Berth 307 removal		909,324										
01.20.15	Berth 308 removal		757,714										
01.20.18	PoP dredge Base structural modifications				913,289								
01.20.19	Structure &Upland monitoring			162,202	162,202	162,202	162,202	162,202	162,202	162,202	162,202		
01.20.20	Structural engineering design plan submittals		1,586,880	396,720									

Cost ID	Cost Item Description	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
25	Dredging, Excavation, Transportation & Disposal												
01.25.01	Required Dredging and In-Water Transportation (Open-Water) - Clamshell		2,254,339	2,254,339	2,254,339	2,254,339	2,254,339	2,254,339	2,254,339	2,254,339	2,254,339	2,254,339	
01.25.02	Required Dredging and In-Water Transportation (Nearshore, below El 8 ft NAVD88) - Clamshell		513,715	1,027,430	1,027,430	366,939	366,939	366,939	366,939	366,939	366,939	366,939	
01.25.03	Required Dredging and In-Water Transportation (Restricted Access) - Clamshell/Excavator		924,687	1,849,374	1,849,374	616,458	616,458	308,229					
01.25.04	Dredge Return Water Treatment and Discharge		983,369	983,369	983,369	983,369	983,369	983,369	983,369	983,369	983,369	983,369	
01.25.05	Riverbank excavation (above El 8ft NAVD88) and in-water transport.		229,891	459,783	919,565	919,565	919,565	459,783	459,783	229,891			
01.25.06	Water quality and turbidty control		360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	
01.25.07	TESC of upper riverbank excavation		24,000	48,000	96,000	96,000	96,000	48,000	48,000	24,000			
01.25.09	Dredged/Excavated Material Transload		1,584,290	1,584,290	1,584,290	1,584,290	1,584,290	1,584,290	1,584,290	1,584,290	1,584,290	1,584,290	
01.25.10	Dredged/Excavated Material Upland Transportation, and Disposal (Subtitle D)		6,654,035	6,654,035	6,654,035	6,654,035	6,654,035	6,654,035	6,654,035	6,654,035	6,654,035	6,654,035	
01.25.11	Identified Debris Removal (Subtitle D)		53,401	106,802	106,802								
01.25.12	Identified Debris Upland Transportation and Disposal (Subtitle D) - Allowance		231,555	463,110	463,110								
01.25.13	Contingency Re-Dredging - Allowance				716,506	1,194,176	477,670						
01.25.14	Standby Time - Allowance			193,884	387,768	387,768	193,884	193,884	193,884	193,884	193,884		
01.25.15	Removal derelict Timber Piles, Incl. Dolphins & Groins		91,080	182,160	455,400	546,480	364,320	182,160					
30	Material Procurement												
01.30.01	Procure & Deliver Material T1C: <2.5" rounded gravel)				156,687	156,687	470,062	626,750	783,437	313,375	313,375	313,375	
01.30.02	Procure & Deliver Material T2C: (Sand with GAC, 5%)				2,975,181	2,975,181	8,925,542	11,900,722	14,875,903	5,950,361	5,950,361	5,950,361	
01.30.03	Procure & Deliver Material T3: (unamended sand)				810,790	810,790	2,432,369	3,243,159	4,053,949	1,621,580	1,621,580	1,621,580	
01.30.04	Procure & Deliver Material T4CB (ODOT 3" angular rock)				827,576	827,576	2,482,729	3,310,305	4,137,881	1,655,153	1,655,153	1,655,153	
01.30.06	Procure & Deliver Material T6C (ODOT Class 50 Riprap)				2,250	2,250	6,750	9,000	11,250	4,500	4,500	4,500	

Cost ID	Cost Item Description	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
01.30.07	Procure &Deliver Material T7A(ODOT Class 100 Riprap)				44,023	44,023	132,068	176,090	220,113	88,045	88,045	88,045	
01.30.08	Procure &Deliver Material T8A(ODOT Class 200 Riprap)				314,017	314,017	942,052	1,256,069	1,570,086	628,034	628,034	628,034	
01.30.10	Procure &Deliver Material T10R, ODOT 1.5" Dense Graded Aggregate				4,089	4,089	12,268	16,358	20,447	8,179	8,179	8,179	
01.30.11	Procure &Deliver Planting Soil P1 (silt loam, 2% organic)				62,502	62,502	187,506	250,008	312,510	125,004	125,004	125,004	
01.30.12	Procure &Deliver Compost P2 (silt loam, 10% organic)				75,002	75,002	225,007	300,010	375,012	150,005	150,005	150,005	
01.30.13	Procure &Deliver GAC geotextile				793,537	793,537	2,380,610	3,174,147	3,967,684	1,587,073	1,587,073	1,587,073	
01.30.14	Procure &Deliver slope reinforcement bag lift materials				1,541	1,541	4,624	6,165	7,706	3,083	3,083	3,083	
01.30.15	Procure &Deliver slope reinforcement Envirolock bags				54,918	54,918	164,753	219,671	274,588	109,835	109,835	109,835	
01.30.16	Procure &Deliver ODOT 00510.13 Granular Structure Backfill				1,009,407	1,009,407	3,028,221	4,037,628	5,047,035	2,018,814	2,018,814	2,018,814	
01.30.17	Procure &Deliver Geofabric Material				10,370	10,370	31,110	41,480	51,850	20,740	20,740	20,740	
01.30.18	Procure &Deliver jute netting					7,623	7,623	22,869	22,869	15,246			
01.30.19	Procure/Deliver Mulch					32,525	32,525	97,574	97,574	65,050			
01.30.20	Procure Sampling Port Boxes, large for open water		23,429	29,286	23,429	17,572	11,714	5,857	5,857				
01.30.22	Procure &Deliver Planting Soil P3 (2% organic silt loam amended with 3% biochar)		289,793	289,793	289,793	289,793	289,793						
40	Material Placement												
01.40.01	Place Material T1C: <2.5" rounded gravel)		156,687	156,687	470,062	626,750	783,437	313,375	313,375	313,375			
01.40.03	Place Material T2C: (Sand with GAC, 5%)		615,047	615,047	1,845,142	2,460,190	3,075,237	1,230,095	1,230,095	1,230,095			
01.40.05	Procure &Deliver Material T3: (unamended sand)		810,790	810,790	2,432,369	3,243,159	4,053,949	1,621,580	1,621,580	1,621,580			
01.40.07	Place Material T4CB (ODOT 3" angular rock)		827,576	827,576	2,482,729	3,310,305	4,137,881	1,655,153	1,655,153	1,655,153			
01.40.09	Place Material T6C (ODOT Class 50 Riprap)		2,250	2,250	6,750	9,000	11,250	4,500	4,500	4,500			
01.40.11	Place Material T7A(ODOT Class 100 Riprap)		44,023	44,023	132,068	176,090	220,113	88,045	88,045	88,045			
01.40.11	Place Material T8A(ODOT Class 200 Riprap)		314,017	314,017	942,052	1,256,069	1,570,086	628,034	628,034	628,034			
01.40.13	Place Granular Structure Backfill		852,000	852,000	2,556,000	3,408,000	4,260,000	1,704,000	1,704,000	1,704,000			
01.40.14	Place GAC geotextile		361,304	361,304	1,083,911	1,445,215	1,806,519	722,607	722,607	722,607			

Cost ID	Cost Item Description	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
01.40.25	PoP dredge base boat ramp aggregate placement			13,266	30,954	17,688	13,266	8,844	2,211	2,211			
01.40.30	Place Sampling Port Boxes			6,400	8,000	6,400	4,800	3,200	1,600	1,600			
50	Riverbank Habitat Installation												
01.50.01	Install slope reinforcement wrapped soil lifts			610,050	1,830,150	1,830,150	1,220,100	610,050					
01.50.02	Place Planting Soil P1 (silt loam, 2% organic)			90,347	271,040	542,080	542,080	361,387					
01.50.03	Place Compost P2 (silt loam, 30% organic)			90,347	271,040	542,080	542,080	361,387					
01.50.05	Place Planting Soil P3 (2% organic silt loam amended with 3% biochar)			90,347	271,040	542,080	542,080	361,387					
01.50.08	Place Geofabric for Riverbanks			60,266	180,799	361,598	361,598	241,066					
01.50.15	Procure/Deliver/Place Plants			1,751,785	5,255,354	10,510,707	10,510,707	7,007,138					
01.50.20	Riverbank vegetation irrigation			187,500	562,500	937,500	937,500	750,000	375,000				
02	Indirect Construction Costs (Bid)												
01	Management, Technical Support and Compliance Monitoring												
02.01.01	Project Management	81,146	397,614	397,614	397,614	397,614	397,614	397,614	397,614	397,614	397,614	397,614	
02.01.03.10	Independent Quality Assurance Team		116,640	233,280	349,920	349,920	349,920	349,920	233,280	116,640	116,640	116,640	
02.01.06	Environmental Compliance Monitoring (Water Quality Monitoring, Air/Noise/Light, and Inadvertent Discovery)		686,632	686,632	686,632	2,059,895	2,059,895	2,059,895	2,059,895	1,373,263	1,373,263	686,632	
02.01.10	TCLP metals analysis for Waste Characterization		60,000	50,000	30,000	20,000	12,000	10,000	10,000	4,000	4,000		
20	Site Administration Costs												
02.20.02	Real estate access coordination	378,000	270,000	162,000	108,000	54,000	32,400	21,600	21,600	10,800	10,800	10,800	
02.20.04	Institutional Controls (initial and periodic) including Covenants, Easements, Advisories, Permit review		49,416	24,708	12,354	7,412	6,177	6,177	6,177	3,706	3,706	3,706	
03	Additive Items (Bid)												
01	Additive Items												
03.01.01	Unexploded ordiances removal and disposal, per event	(Not included in budget)											
10	RAPerforming Party Costs												
05	Oversight, Regulatory, and Long-Term Costs												

Cost ID	Cost Item Description	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
10.05.02	Contractor Pre-Qualification and Procurement	540,190	231,510										
10.05.03	Community Outreach and Communications		61,472	61,472	61,472	61,472	61,472	61,472	61,472	61,472	61,472	61,472	61,472
10.05.04	DSL Division 145 Costs		655,000	655,000	655,000	655,000	655,000	655,000	655,000	655,000	655,000	655,000	655,000
10.05.05	Engineering Support Services		63,000	63,000	126,000	94,500	94,500	63,000	63,000	15,750	15,750	15,750	15,750
10.05.05	Construction Management (Inspection and Oversight)		386,222	386,222	514,963	514,963	386,222	180,237	51,496	51,496	102,993		
10.05.10	Operations and Maintenance (O&M)	(Post-construction item; not included in construction budget)											
10.05.15	Long Term Monitoring	(Post-construction item; not included in construction budget)											
10.05.17	Long Term Monitoring, Five Year Review Reports	(Post-construction item; not included in construction budget)											
10.05.20	Agency and Tribal Oversight	181,766	181,766	181,766	181,766	181,766	181,766	181,766	136,325	136,325	136,325	136,325	
10.05.25	Off-site mitigation for temporary and permanent impacts	(Post-construction item; not included in construction budget)											
10	Structure Relocations												
10.10.02	Temporary Relocation of Floating Structures - DD5		51,420	68,560	51,420								
10.10.03	Temporary Relocation of Floating Structures - DD3		55,530	74,040	55,530								
10.10.04	Temporary Relocation of Floating Structures - Vigorous		75,540	100,720	75,540								
10.10.05	Temporary Relocation of Floating Structures - USCG floating dock				17,550	23,400	17,550						
10.10.06	Temporary Relocation of Floating Structures - SCC Floating dock		29,040	38,720	29,040								
10.10.07	Temporary Relocation of Floating Structures - MC Pier floating				23,120	52,020	40,460						
10.10.08	Temporary Relocation of Floating Structures - PoP Dredge Base floating barges		20,140	40,280	40,280								
10.10.09	Temporary Relocation of Floating Structures - Berth 311, misc.		16,590	22,120	16,590								
10.10.10	Temporary Relocation of Floating Structures - Floating Dock, City Boat Ramp		8,100	10,800	8,100								
10.10.11	Temporary Relocation of Floating Structures - US Navy Pier		2,880	3,840	2,880								

Table A-4 Annual Expenditure Summary

Construction Year	Estimated Expenditure (2025 dollars)	Portion of Project Cost Total
2032	4,241,317	0.5%
2033	48,277,067	5.5%
2034	48,801,866	5.6%
2035	108,491,723	12.4%
2036	127,049,637	14.5%
2037	137,461,256	15.7%
2038	121,388,326	13.8%
2039	118,423,358	13.5%
2040	42,652,999	4.9%
2041	34,359,197	3.9%
2042	33,834,603	3.9%
2043	2,424,113	0.3%

Table A-5: Cost Model Variability Assignment

The following table includes the factors assigned to individual line item values and the upper and lower values calculated from the initial estimate that were then assigned to the probability distribution for each value. Select structure costs were assigned alternative probability distributions. The lagoon wharf (highlighted in yellow) was assigned a maximum extreme distribution and structures highlighted in blue were assigned gamma distributions. With All remaining values assigned lower and upper limits were assigned a triangle probability distribution that ranged between the low value and the upper value with the unit cost or quantity assigned as the most probable. Values lacking a minimum or maximum factor are fixed and unchanged in the model.

Cost ID	Cost Item Description	Lower Unit Cost Factor	Lower Unit Cost (by factor)	Unit Cost 90% RD	Units	Upper Unit Cost Factor	Upper Unit Cost (by factor)	Qty Min Factor	Qty, Min	Qty 90% RD	Qty Max Factor	Qty, Max
01	Direct Construction Costs (Bid)											
05	Mobilization / Demobilization											
01.05.01	Mobilization/Demobilization for Direct Construction Except Designated Structures			10%	%							
01.05.02	Procedural Costs and Agency Submittals	0.80	339,840.00	424,800.00	LS	1.50	637,200.00			1		
01.05.03	Remedial Action Work Plan	0.90	110,160.00	122,400	LS	1.80	220,320.00			1		
10	Site Preparation											
01.10.04	Utilities protection and restoration	0.50	125,000.00	250,000.00	LS	1.60	400,000.00			1		
01.10.05	Site restoration	0.50	1,141,627.00	2,283,254.00	LS	1.60	3,653,206.40			1		
15	Surveys											
01.15.01	Initial Site Survey and Establish Controls	0.80	7,360.00	9,200.00	LS	1.50	13,800.00			1		
01.15.02	Preconstruction structural condition survey	0.80	1,471,055.20	1,838,819.00	LS	1.30	2,390,464.70			1		
01.15.03	Existing utilities survey	0.80	994,040.00	1,242,550.00	LS	1.30	1,615,315.00			1		
01.15.04	Progress and dredge/cap certification surveys	0.80	178,432.00	223,040.00	MO	1.30	289,952			36		
01.15.07	As-Built Survey	0.80	43,612.90	54,516.12	LS	1.30	70,871			1		
20	Structural											
01.20.03	Limit Load and Temporary Support/Shoring of Existing Structures	0.80	452,887	566,109	LS	1.30	735,942			1		
01.20.05	Outfall Rebuild, large	0.80	438,216	547,770	EA	1.30	712,101			4		
01.20.06	Outfall Rebuild, small	0.80	8,708	10,885	EA	1.30	14,151			22		
01.20.07	Lagoon wharf (new structure)		195,700,000	264,000,000	LS	1.50	396,000,000			1		

Cost ID	Cost Item Description	Lower Unit Cost Factor	Lower Unit Cost (by factor)	Unit Cost 90% RD	Units	Upper Unit Cost Factor	Upper Unit Cost (by factor)	Qty Min Factor	Qty, Min	Qty 90% RD	Qty Max Factor	Qty, Max
01.20.08	Berth 306 (new structure)		11,452,386	14,605,942	LS		15,601,801			1		
01.20.09	Berth 307 (new structure)		9,226,784	11,767,492	LS		12,569,822			1		
01.20.10	USCG (toe wall, pile sleeves)		3,367,272	4,294,491	LS		4,587,297			1		
01.20.11	MC Pier (mid-slope pinning walls)		8,043,171	10,257,957	LS		10,957,363			1		
01.20.12	Berth 311 (breasting dolphin)		383,996	489,733	LS		523,124			1		
01.20.13	Berth 306 removal	0.80	912,192	1,140,240	LS	1.30	1,482,312			1		
01.20.14	Berth 307 removal	0.80	727,459	909,324	LS	1.30	1,182,121			1		
01.20.15	Berth 308 removal	0.80	606,171	757,714	LS	1.30	985,028			1		
01.20.18	PoP dredge Base structural modifications		716,101	913,289	LS		975,559			1		
01.20.19	Structure &Upland monitoring	0.80	1,038,090	1,297,613	LS	1.30	1,686,897			1		
01.20.20	Structural engineering design plan submittals	0.80	1,586,880	1,983,600	LS	1.50	2,975,400.00			1		
25	Dredging, Excavation, Transportation &Disposal											
01.25.01	Required Dredging and In-Water Transportation (Open-Water) - Clamshell	0.80	30.81	38.51	CY	1.50	57.76	0.85	497,590.00	585,400	1.30	761,020.00
01.25.02	Required Dredging and In-Water Transportation (Nearshore, below El 8 ft NAVD88) - Clamshell	0.80	118.10	147.62	CY	1.50	221.43	0.85	29,580.00	34,800	1.30	45,240.00
01.25.03	Required Dredging and In-Water Transportation (Restricted Access) - Clamshell/Excavator	0.80	141.71	177.14	CY	1.50	265.71	0.85	29,580.00	34,800	1.30	45,240.00
01.25.04	Dredge Return Water Treatment and Discharge	0.85	0.05	0.057	GAL	1.70	0.097			172,265,000		
01.25.05	Riverbank excavation (above El 8ft NAVD88) and in-water transport.	0.85	75.01	88.25	CY	1.30	114.73	0.85	44,285.00	52,100	1.30	67,730.00
01.25.06	Water quality and turbidty control	0.60	2,160,000.00	3,600,000	LS	1.50	5,400,000.00			1		
01.25.07	TESC of upper riverbank excavation	0.70	21,000.00	30,000	AC	1.50	45,000.00	0.80	12.80	16.0	1.30	20.80
01.25.09	Dredged/Excavated Material Transload	0.80	11.20	14.00	TON	1.50	21.01			1,131,360		

Cost ID	Cost Item Description	Lower Unit Cost Factor	Lower Unit Cost (by factor)	Unit Cost 90% RD	Units	Upper Unit Cost Factor	Upper Unit Cost (by factor)	Qty Min Factor	Qty, Min	Qty 90% RD	Qty Max Factor	Qty, Max
01.25.10	Dredged/Excavated Material Upland Transportation, and Disposal (Subtitle D)	0.80	47.05	58.81	TON	1.50	88.22			1,131,360		
01.25.11	Identified Debris Removal (Subtitle D)	0.80	30.51	38.14	TON	1.50	57.22	0.70	4,900.00	7000	1.50	10,500.00
01.25.12	Identified Debris Upland Transportation and Disposal (Subtitle D) - Allowance	0.80	132.32	165.40	TON	1.50	248.09			7000		
01.25.13	Contingency Re-Dredging - Allowance	0.80	30.81	38.51	CY	1.50	57.76			62,020		
01.25.14	Standby Time - Allowance	0.80	15,510.74	19,388.42	DAY	1.30	25,204.95	0.50	50.00	100	1.20	120.00
01.25.15	Removal derelict Timber Piles, Incl. Dolphins & Groins	0.60	496.80	828.00	EA	1.30	1,076.40	0.50	1,100.00	2200	1.50	3,300.00
30	Material Procurement											
01.30.01	Procure &Deliver Material T1C: <2.5" rounded gravel)	0.80	64.00	80.00	CY	1.30	104.00	0.80	31,337.48	39,172	1.20	47,006.22
01.30.02	Procure &Deliver Material T2C: (Sand with GAC, 5%)	0.80	309.59	386.99	CY	1.40	541.78	0.80	123,009.48	153,762	1.20	184,514.22
01.30.03	Procure &Deliver Material T3: (unamended sand)	0.80	64.00	80.00	CY	1.30	104.00	0.80	162,157.96	202,697	1.20	243,236.93
01.30.04	Procure &Deliver Material T4CB (ODOT 3" angular rock)	0.80	64.00	80.00	CY	1.30	104.00	0.80	165,515.26	206,894	1.20	248,272.88
01.30.06	Procure &Deliver Material T6C (ODOT Class 50 Riprap)	0.80	80.00	100.00	CY	1.30	130.00	0.80	360.00	450	1.20	540.00
01.30.07	Procure &Deliver Material T7A (ODOT Class 100 Riprap)	0.80	80.00	100.00	CY	1.30	130.00	0.80	7,043.60	8,805	1.20	10,565.40
01.30.08	Procure &Deliver Material T8A (ODOT Class 200 Riprap)	0.80	80.00	100.00	CY	1.30	130.00	0.80	50,242.76	62,803	1.20	75,364.14
01.30.10	Procure &Deliver Material T10R, ODOT 1.5" Dense Graded Aggregate	0.80	55.49	69.36	TON	1.30	90.17	0.80	943.36	1,179	1.20	1,415.04
01.30.11	Procure &Deliver Planting Soil P1 (silt loam, 2% organic)	0.80	44.28	55.34	CY	1.40	77.48	0.80	18,069.33	22,587	1.20	27,104.00
01.30.12	Procure &Deliver Compost P2 (silt loam, 10% organic)	0.80	53.13	66.41	CY	1.50	99.62	0.80	18,069.33	22,587	1.20	27,104.00
01.30.13	Procure &Deliver GAC geotextile	0.90	52.71	58.57	SY	1.20	70.28			270,978		

Cost ID	Cost Item Description	Lower Unit Cost Factor	Lower Unit Cost (by factor)	Unit Cost 90% RD	Units	Upper Unit Cost Factor	Upper Unit Cost (by factor)	Qty Min Factor	Qty, Min	Qty 90% RD	Qty Max Factor	Qty, Max
01.30.14	Procure &Deliver slope reinforcement bag lift materials	0.70	31.50	45.00	CY	1.30	58.50	0.80	548.00	685	1.20	822.00
01.30.15	Procure &Deliver slope reinforcement Envirolock bags	0.90	6.71	7.45	EA	1.15	8.57	0.80	117,944.00	147,430	1.20	176,916.00
01.30.16	Procure &Deliver ODOT 00510.13 Granular Structure Backfill	0.80	75.82	94.78	CY	1.30	123.21	0.80	170,400.00	213,000	1.20	255,600.00
01.30.17	Procure &Deliver Geofabric Material	0.80	2.20	2.75	SY	1.30	3.58	0.80	60,266.40	75,333	1.20	90,399.60
01.30.18	Procure &Deliver jute netting	0.80	3.60	4.50	SY	1.30	5.85	0.80	13,552.00	16940	1.20	20,328.00
01.30.19	Procure/Deliver Mulch	0.80	57.60	72.00	CY	1.30	93.60	0.80	3,613.87	4,517	1.20	5,420.80
01.30.20	Procure Sampling Port Boxes, large for open water	0.80	2,603.20	3,254.00	EA	1.50	4,881.00			36		
01.30.22	Procure &Deliver Planting Soil P3 (2% organic silt loam amended with 3% biochar)	0.80	51.32	64.15	CY	1.40	89.81	0.80	18,069.33	22,587	1.20	27,104.00
40	Material Placement											
01.40.01	Place Material T1C: <2.5" rounded gravel)	0.80	64.00	80.00	CY	1.30	104.00			39,172		
01.40.03	Place Material T2C: (Sand with GAC, 5%)	0.80	64.00	80.00	CY	1.30	104.00			153,762		
01.40.05	Procure &Deliver Material T3: (unamended sand)	0.80	64.00	80.00	CY	1.30	104.00			202,697		
01.40.07	Place Material T4CB (ODOT 3" angular rock)	0.80	64.00	80.00	CY	1.30	104.00			206,894		
01.40.09	Place Material T6C (ODOT Class 50 Riprap)	0.80	80.00	100.00	CY	1.30	130.00			450		
01.40.11	Place Material T7A(ODOT Class 100 Riprap)	0.80	80.00	100.00	CY	1.30	130.00			8,805		
01.40.11	Place Material T8A(ODOT Class 200 Riprap)	0.80	80.00	100.00	CY	1.30	130.00			62,803		
01.40.13	Place Granular Structure Backfill	0.80	64.00	80.00	CY	1.30	104.00			213,000		
01.40.14	Place GAC geotextile	0.90	24.00	26.67	SY	1.50	40.00			270,978		
01.40.25	PoP dredge base boat ramp aggregate placement	0.90	108.00	120.00	CY	1.10	132.00			737		
01.40.30	Place Sampling Port Boxes	0.80	25,600.00	32,000.00	LS	1.50	48,000.00			1		
50	Riverbank Habitat Installation											

Cost ID	Cost Item Description	Lower Unit Cost Factor	Lower Unit Cost (by factor)	Unit Cost 90% RD	Units	Upper Unit Cost Factor	Upper Unit Cost (by factor)	Qty Min Factor	Qty, Min	Qty 90% RD	Qty Max Factor	Qty, Max
01.50.01	Install slope reinforcement wrapped soil lifts	0.80	28.00	35.00	SF	1.30	45.50	0.80	139,440.00	174300	1.20	209,160.00
01.50.02	Place Planting Soil P1 (silt loam, 2% organic)	0.80	64.00	80.00	CY	1.30	104.00			22,587		
01.50.03	Place Compost P2 (silt loam, 30% organic)	0.80	64.00	80.00	CY	1.30	104.00			22,587		
01.50.05	Place Planting Soil P3 (2% organic silt loam amended with 3% biochar)	0.80	64.00	80.00	CY	1.30	104.00			22,587		
01.50.08	Place Geofabric for Riverbanks	0.90	14.40	16.00	SY	1.50	24.00	0.80	60,266.40	75333	1.20	90,399.60
01.50.15	Procure/Deliver/Place Plants	0.80	43.05	53.81	EA	1.30	69.95			651,100		
01.50.20	Riverbank vegetation irrigation	0.70	2,625,000.00	3,750,000.00	LS	1.50	5,625,000.00			1		
02	Indirect Construction Costs (Bid)											
01	Management, Technical Support and Compliance Monitoring											
02.01.01	Project Management	0.70	59,168.69	84,527	MO	1.40	118,337.38			48		
02.01.03.10	Independent Quality Assurance Team	0.70	45,360.00	64,800	MO	1.40	90,720.00			36		
02.01.06	Environmental Compliance Monitoring (Water Quality Monitoring, Air/Noise/Light, and Inadvertent Discovery)	0.70	267,023.44	381,462	MO	1.40	534,046.88			36		
02.01.10	TCLP metals analysis for Waste Characterization	0.80	160,000.00	200,000	LS	1.40	280,000.00			1		
20	Site Administration Costs											
02.20.02	Real estate access coordination	0.60	6,000.00	10,000	MO	2.00	20,000.00			108		
02.20.04	Institutional Controls (initial and periodic) including Covenants, Easements, Advisories, Permit review	0.80	98,831.22	123,539	LS	1.50	185,308.54			1		
03	Additive Items (Bid)											
01	Additive Items											
03.01.01	Unexploded ordiances removal and disposal, per event	0.50	9,250.00	18,500	EA	1.50	27,750.00			1		
10	RA Performing Party Costs											

Cost ID	Cost Item Description	Lower Unit Cost Factor	Lower Unit Cost (by factor)	Unit Cost 90% RD	Units	Upper Unit Cost Factor	Upper Unit Cost (by factor)	Qty Min Factor	Qty, Min	Qty 90% RD	Qty Max Factor	Qty, Max
05	Oversight, Regulatory, and Long-Term Costs											
10.05.02	Contractor Pre-Qualification and Procurement	0.80	617,360.00	771,700	LS	1.30	1,003,210.00			1		
10.05.03	Community Outreach and Communications	0.80	22,539.76	28,175	MO	1.30	36,627.11			24		
10.05.04	DSL Division 145 Costs	0.80	31,440,000.00	39,300,000	LS	1.20	47,160,000.00			1		
10.05.05	Engineering Support Services	0.80	28,000.00	35,000	MO	1.50	52,500.00			18		
10.05.05	Construction Management (Inspection and Oversight)	0.60	42,913.56	71,523	MO	1.50	107,283.89			36		
10.05.10	Operations and Maintenance (O&M)	0.80	1,559,184.00	1,948,980	LS	1.80	3,508,164.00			1		
10.05.15	Long Term Monitoring	0.80	10,006,568.00	12,508,210	LS	1.30	16,260,673.00			1		
10.05.17	Long Term Monitoring, Five Year Review Reports	0.80	420,811.46	526,014	LS	1.30	683,818.62			1		
10.05.20	Agency and Tribal Oversight	0.60	30,294.40	50,491	MO	1.50	75,736.00			36		
10.05.25	Off-site mitigation for temporary and permanent impacts	0.90	2,031,678.00	2,257,420	LS	1.10	2,483,162.00			1		
10	Structure Relocations											
10.10.02	Temporary Relocation of Floating Structures - DD5	0.80	137,120.00	171,400	LS	1.30	222,820.00			1		
10.10.03	Temporary Relocation of Floating Structures - DD3	0.80	148,080.00	185,100	LS	1.30	240,630.00			1		
10.10.04	Temporary Relocation of Floating Structures - Vigorous	0.80	201,440.00	251,800	LS	1.30	327,340.00			1		
10.10.05	Temporary Relocation of Floating Structures - USCG floating dock	0.80	46,800.00	58,500	LS	1.30	76,050.00			1		
10.10.06	Temporary Relocation of Floating Structures - SCC Floating dock	0.80	77,440.00	96,800	LS	1.30	125,840.00			1		
10.10.07	Temporary Relocation of Floating Structures - MC Pier floating	0.80	92,480.00	115,600	LS	1.30	150,280.00			1		
10.10.08	Temporary Relocation of Floating Structures - PoP Dredge Base floating barges	0.80	80,560.00	100,700	LS	1.30	130,910.00			1		
10.10.09	Temporary Relocation of Floating Structures - Berth 311, misc.	0.80	44,240.00	55,300	LS	1.30	71,890.00			1		

Cost ID	Cost Item Description	Lower Unit Cost Factor	Lower Unit Cost (by factor)	Unit Cost 90% RD	Units	Upper Unit Cost Factor	Upper Unit Cost (by factor)	Qty Min Factor	Qty, Min	Qty 90% RD	Qty Max Factor	Qty, Max
10.10.10	Temporary Relocation of Floating Structures - Floating Dock, City Boat Ramp	0.80	21,600.00	27,000	LS	1.30	35,100.00			1		
10.10.11	Temporary Relocation of Floating Structures - US Navy Pier	0.80	7,680.00	9,600	LS	1.30	12,480.00			1		

Value assigned triangle probability distribution using the lower and upper unit costs
Value assigned Maximum Extreme probability distribution
Value assigned Gamma probability distribution
Values uncolored are fixed and are unchanging in the cost model

ATTACHMENT B

LAGOON WHARF REPLACEMENT COST

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Attachment B – Lagoon Wharf Replacement Cost

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST - CONCEPT DESIGN

Vigor Portland Berth 302 to 305 Wharf Replacement - Bulkhead Option

By: Elie Hasso, Marty Gomez, Kelvin Kong

9/3/2025

Item Number	Description of Item	Quantity	Unit of Measurement	Unit Price	EXTENDED PRICE (QTY. x UNIT PRICE)	Notes
1	Mobilization / Demobilization	1	LS	$17,790,000	$17,800,000	1, 8
2	Existing Pier Demolition	1	LS	$5,300,000	$5,300,000	
3	Bulkhead Wall and Anchorage	1	LS	$93,100,000	$93,100,000	
4	Crane Rail Support Structure	1	LS	$3,300,000	$3,300,000	
5	Fender System	1	LS	$4,700,000	$4,700,000	
6	Temporary Shoring	1	LS	$3,500,000	$3,500,000	2
7	Ground Improvements	183,000	CY	$265	$48,500,000	7
8	Structural Infill	10,000	CY	$50	$500,000	
9	Earthwork	1	LS	$3,400,000	$3,400,000	3
10	Utilities	1	LS	$7,000,000	$7,000,000	5, 6
11	Electrical Utilities	1	LS	$5,200,000	$5,200,000	5, 6
12	Flexible Pavement	16,000	TON	$150	$2,400,000	4
13	Base Course	19,000	TON	$55	$1,000,000	4
				CONTRACTOR SUBTOTAL	**$195,700,000**	
				CONTINGENCY 35%	$68,500,000	
				OREGON STATE SALES TAX ON SUBTOTAL 0.00%	$0	
				ANTICIPATED CONSTRUCTION TOTAL IN 2025 US DOLLARS	**$264,000,000**	

Notes:

1 Mob / De-Mob Assumed ~10% of subtotal (assumes coverage for extended phasing duration of 6 in water work windows). Cost savings to mob / demob / management & yearly escalation (not captured) can be seen if an accelerated construction schedule is executed.

2 Temporary shoring is assumed to be purchased and not borrowed. Cost based on appx 2200ft of shoring length.

It is assumed that the majority of infill will be achieved using existing onsite materials, quarry spall to provide a working surface for

3 equipment, and ground improvements spoils. Additional fill required is captured in line item 8.

4 Pavement section assumes a 9 inch asphalt section over 12 inches base course

5 Includes Utilities Demolition.

6 Utility costs have been developed based on existing utility linear footages and analogous project unit costs.

7 Ground improvement consists of 100ft of DSM ($230/CY) and 20ft of Jet Grout ($500/CY). Weighted Avg ($265 / CY)

8 The costs presented in this estimate represent the baseline schedule which includes 6 in water work windows.

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST - CONCEPT DESIGN

Vigor Portland Berth 302 to 305 Wharf Replacement - Pile Supported Wharf Option

By: Elie Hasso, Marty Gomez, Kelvin Kong

9/3/2025

Item Number	Description of Item	Quantity	Unit of Measurement	Unit Price	EXTENDED PRICE (QTY. x UNIT PRICE)	Notes
1	Mobilization / Demobilization	1	LS	$26,200,000	$26,200,000	1,9
2	Existing Pier Demolition	1	LS	$5,300,000	$5,300,000	
3	Bulkhead Wall	1	LS	$44,800,000	$44,800,000	
4	Plumb Piles and deck	1	LS	$75,600,000	$75,600,000	
5	Fender System	1	LS	$4,700,000	$4,700,000	
6	Temporary Shoring	1	LS	$3,500,000	$3,500,000	2
7	Ground Improvements	191,000	CY	$275	$52,500,000	8
8	Structural Export	109,000	CY	$110	$12,000,000	3
9	Earthwork	1	LS	$2,100,000	$2,100,000	4
10	Utilities	1	LS	$7,300,000	$7,300,000	6, 7
11	Electrical Utilities	1	LS	$5,900,000	$5,900,000	6, 7
12	Flexible Pavement	21,000	TON	$150	$3,200,000	5
13	Base Course	25,000	TON	$55	$1,400,000	5
14	Revetment Section	1	LS	$ 11,730,000	$11,700,000	
				CONTRACTOR SUBTOTAL	**$256,200,000**	
				CONTINGENCY 35%	$89,700,000	
				OREGON STATE SALES TAX ON SUBTOTAL 0.00%	$0	
				ANTICIPATED CONSTRUCTION TOTAL IN 2025 US DOLLARS	**$346,000,000**	

Notes:

1 Mob / De-Mob Assumed ~12% of subtotal (assumes coverage for extended phasing duration of 9 in water work windows). Cost savings to mob / demob / management & yearly escalation (not captured) can be seen if an accelerated construction schedule is executed.

2 Temporary shoring is assumed to be purchased and not borrowed. Cost based on appx 2200ft of shoring length.

3 Unit cost assumes mix of disposal subtitle D and conventional facilities.

4 It is assumed that the majority of infill will be achieved using existing onsite materials, quarry spall to provide a working surface for equipment, and ground improvements spoils. Export is captured in line item 8.

5 Pavement section assumes a 9 inch asphalt section over 12 inches base course

6 Includes Utilities Demolition.

7 Utility costs have been developed based on existing utility linear footages and analogous project unit costs.

8 Ground improvement consists of 100ft of DSM ($230/CY) and 20ft of Jet Grout ($500/CY). Weighted Avg ($275 / CY)

9 The costs presented in this estimate represent the baseline schedule which includes 9 in water work windows.

ATTACHMENT C

STRUCTURE COST DETAIL

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Attachment C – Structure Cost Detail

The tables included in this attachment detail the cost items for the following structures:

Cost Line Item #	Structure Description
01.20.08	Berth 306 (new structure)
01.20.09	Berth 307 (new structure)
01.20.12	Berth 311 (seismic restraint)
01.20.18	PoP dredge Base structural modifications
01.20.11	MC Pier (mid-slope pinning walls)
01.20.10	USCG (toe wall, pile sleeves)

Berth 306 (new structure)				
Item Description	Quantity	Unit	Unit Rate	Cost
Mob/Demob	1	LS	$ 162,700.00	$162,700
Earthworks	-			
Abutment Excavation	1,235	CY	$ 100.00	$123,500
Abutment Backfill	1,094	CY	$ 115.00	$125,810
Pier Construction	-			
Supply Steel Pipe Piles - 30" Dia x 1" Wall	497,263	LBS	$ 1.50	$745,894
Supply & Install Shear Rings	599	LBS	$ 10.00	$5,986
Install Steel Pipe Piles - 30" Dia	16	EA	$ 14,275.00	$228,400
Pile Load Test	1	EA	$ 20,000.00	$20,000
Pile Concrete (Rebar/Pour)	30	CY	$ 1,800.00	$54,000
Abutment Wall /Wingwall Concrete (Form/Rebar/Pour)	58	CY	$ 2,500.00	$145,000
Abutment Approach Slab Concrete (Form/Rebar/Pour)	5	CY	$ 2,000.00	$10,000
Abutment Bearing Strip	16	LF	$ 150.00	$2,400
Deck Concrete Form/Rebar/Pour	254	CY	$ 3,000.00	$762,000
Ladders (L=35 LF)	2	EA	$ 11,150.00	$22,300
Bull Rail - 6" Dia Sch. 40 Pipe (36 ea connection points)	365	LF	$ 239.32	$87,350
Dolphin Construction	-			
Supply Steel Pipe Piles - 24" Dia x 1" Wall	1,293,472	LBS	$ 1.50	$1,940,207
Supply Steel Pipe Piles - 24" Dia x 3/4" Wall	0	LBS	$ 1.50	$0
Install Steel Pipe Piles - 24" Dia Battered	30	EA	$ 27,891.80	$836,754
Pile Load Test	1	EA	$ 20,000.00	$20,000
Pile Concrete (Rebar/Pour)	31	CY	$ 1,800.00	$55,800
Supply H Piles - 12" x 12" (Fender Piles)	59,200	LBS	$ 1.60	$94,720
Install H Piles (Fender Piles)	10	EA	$ 6,200.00	$62,000
Deck Concrete Form/Rebar/Pour	187	CY	$ 3,000.00	$561,000
Ladders (L=35 LF)	5	EA	$ 11,150.00	$55,750
Bull Rail - 6" Dia Sch. 40 Pipe (10 ea connection points per Dolphin)	195	LF	$ 318.21	$62,050
1150 SCK Cell Fender @ Mounting Accessories	5	EA	$ 12,500.00	$62,500
Structural Steel Steel Fender Frame	40,000	LBS	$ 7.50	$300,000
UHMW Pads for Fender	1,206	SF	$ 250.00	$301,600
Double Bitt Bollard	5	EA	$ 25,000.00	$125,000
Access Gangway Construction	-			
Supply Steel Pipe Piles - 24" Dia x 3/4" Wall	74,564	LBS	$ 1.50	$111,846

Berth 306 (new structure)				
Item Description	Quantity	Unit	Unit Rate	Cost
Install Steel Pipe Piles - 24" Dia	4	EA	$ 11,890.00	$47,560
Supply Helical Anchor Pile (Assume 18" Dia)	26	LF	$ 85.00	$2,210
Install Helical Anchor Pile (Assume 18" Dia)	4	EA	$ 750.00	$3,000
Intermediate Pier Structural Steel Cap	4,840	LBS	$ 7.50	$36,300
Abutment Footing & Approach Slab Concrete (Form/Rebar/Pour)	8	CY	$ 2,000.00	$16,000
Aluminum Prefabricated Gangway - 4' Wide	244	LF	$ 1,500.00	$366,000
SEE NEXT SHEET				
Upland Mooring Point Construction	-			
Supply Steel Pipe Piles - 36" Dia x 1" Wall	149,662	LBS	$ 1.50	$224,493
Install Steel Pipe Piles - 36" Dia	4	EA	$ 18,200.00	$72,800
Pile Load Test	1	EA	$ 20,000.00	$20,000
Pile Concrete (Rebar/Pour)	18	CY	$ 1,800.00	$32,400
Double Bitt Bollard	4	EA	$ 25,000.00	$100,000
Pier Utilities	-			
Potable Water				
6" Water Pipe c/w Hangers Under Pier Deck	140	LF	$ 500.00	$70,000
6" Water Pipe Buried	20	LF	$ 300.00	$6,000
Water Inlet Cabinet	1	EA	$ 20,000.00	$20,000
Water Connection Valves	2	EA	$ 5,000.00	$10,000
Water Inspection Chamber c/w Equipment	1	EA	$ 15,000.00	$15,000
Compressed Air	-			
2" Line Attached to Underside of Deck	140	LF	$ 200.00	$28,000
2" Line Buried	20	LF	$ 100.00	$2,000
Standpipe & Connections @ Deck	1	EA	$ 7,500.00	$7,500
Valve	1	EA	$ 3,500.00	$3,500
Electrical	-			
Conduit & Wire Attached to Underside of Deck	280	LF	$ 300.00	$84,000
Electrical Ductbank Burried	20	LF	$ 500.00	$10,000
Light Pole & Luminaire	1	EA	$ 7,500.00	$7,500
Shorepower Connection Cabinet	1	EA	$ 30,000.00	$30,000
Subtotal - Direct Costs				**$8,298,830**
Contingencies	-			

Berth 306 (new structure)				
Item Description	**Quantity**	**Unit**	**Unit Rate**	**Cost**
Contingency - Known	1	LS	$ 746,894.74	$746,895
Contingency - Unknown	1	LS	$ 1,493,789.47	$1,493,789
Contingency - Design	1	LS	$ 248,964.91	$248,965
Escalation	1	LS	$ -	$0
Risk	1	LS	$ 414,941.52	$414,942
Subtotal - Contingencies				**$2,904,591**
Contractor Additional Costs	-			
Indirect Costs	1	LS	$ 1,244,824.56	$1,244,825
Contractor Overhead and Markup	1	LS	$ 2,157,695.90	$2,157,696
Subtotal - Contractor Additional Costs				**$3,402,520**
Total Budget Price - Berth 306 Structure			**$**	**14,605,942**

Notes:

- GAC Geotextile Mat and Rock Revetment not included - must be included in Material Placement Items

- No Class 3 Estimate Contingency Included (Accuracy Range 80% to 130%)

Berth 307 (new structure)				
Item Description	Quantity	Unit	Unit Rate	Total
Mob/Demob	1	LS	$ 131,100.00	$131,100
Earthworks	-			
Abutment Excavation	1,235	CY	$ 100.00	$123,500
Abutment Backfill	1,094	CY	$ 115.00	$125,810
Pier Construction	-			
Supply Steel Pipe Piles - 30" Dia x 1" Wall	497,263	LBS	$ 1.50	$745,894
Supply & Install Shear Rings	599	LBS	$ 10.00	$5,986
Install Steel Pipe Piles - 30" Dia	16	EA	$ 14,275.00	$228,400
Pile Load Test	1	EA	$ 20,000.00	$20,000
Pile Concrete (Rebar/Pour)	30	CY	$ 1,800.00	$54,000
Abutment Wall /Wingwall Concrete (Form/Rebar/Pour)	58	CY	$ 2,500.00	$145,000
Abutment Approach Slab Concrete (Form/Rebar/Pour)	5	CY	$ 2,000.00	$10,000
Abutment Bearing Strip	16	LF	$ 150.00	$2,400
Deck Concrete Form/Rebar/Pour	254	CY	$ 3,000.00	$762,000
Ladders (L=35 LF)	2	EA	$ 11,150.00	$22,300
Bull Rail - 6" Dia Sch. 40 Pipe (10 ea connection points)	365	LF	$ 239.32	$87,350
Dolphin Construction	-			
Supply Steel Pipe Piles - 24" Dia x 1" Wall	1,034,777	LBS	$ 1.50	$1,552,166
Supply Steel Pipe Piles - 24" Dia x 3/4" Wall	0	LBS	$ 1.50	$0
Install Steel Pipe Piles - 24" Dia Battered	24	EA	$ 27,891.80	$669,403
Pile Load Test	1	EA	$ 20,000.00	$20,000
Pile Concrete (Rebar/Pour)	25	CY	$ 1,800.00	$45,000
Supply H Piles - 12" x 12" (Fender Piles)	47,360	LBS	$ 1.60	$75,776
Install H Piles (Fender Piles)	8	EA	$ 6,200.00	$49,600
Deck Concrete Form/Rebar/Pour	150	CY	$ 3,000.00	$450,000
Ladders (L=35 LF)	4	EA	$ 11,150.00	$44,600
Bull Rail - 6" Dia Sch. 40 Pipe (10 ea connection points per Dolphin)	156	LF	$ 318.21	$49,640
1150 SCK Cell Fender @ Mounting Accessories	4	EA	$ 12,500.00	$50,000
Structural Steel Steel Fender Frame	32,000	LBS	$ 7.50	$240,000
UHMW Pads for Fender	965	SF	$ 250.00	$241,280
Double Bitt Bollard	4	EA	$ 25,000.00	$100,000
Access Gangway Construction	-			
Supply Steel Pipe Piles - 24" Dia x 3/4" Wall	0	LBS	$ 1.50	$0

Berth 307 (new structure)				
Item Description	Quantity	Unit	Unit Rate	Total
Install Steel Pipe Piles - 24" Dia	0	EA	$ 11,890.00	$0
Supply Helical Anchor Pile (Assume 18" Dia)	0	LF	$ 85.00	$0
Install Helical Anchor Pile (Assume 18" Dia)	0	EA	$ 750.00	$0
Intermediate Pier Structural Steel Cap	0	LBS	$ 7.50	$0
Abutment Footing & Approach Slab Concrete (Form/Rebar/Pour)	0	CY	$ 2,000.00	$0
Aluminum Prefabricated Gangway - 4' Wide	0	LF	$ 1,500.00	$0
Upland Mooring Point Construction	-			
Supply Steel Pipe Piles - 36" Dia x 3/4" Wall	112,246	LBS	$ 1.50	$168,370
Install Steel Pipe Piles - 36" Dia	3	EA	$ 18,200.00	$54,600
Pile Load Test	1	EA	$ 20,000.00	$20,000
Pile Concrete (Rebar/Pour)	13	CY	$ 1,800.00	$23,400
Double Bitt Bollard	3	EA	$ 25,000.00	$75,000
SEE NEXT SHEET				
Pier Utilities	-			
Potable Water				
6" Water Pipe c/w Hangers Under Pier Deck	140	LF	$ 500.00	$70,000
6" Water Pipe Buried	20	LF	$ 300.00	$6,000
Water Inlet Cabinet	1	EA	$ 20,000.00	$20,000
Water Connection Valves	2	EA	$ 5,000.00	$10,000
Water Inspection Chamber c/w Equipment	1	EA	$ 15,000.00	$15,000
Compressed Air	-			
2" Line Attached to Underside of Deck	140	LF	$ 200.00	$28,000
2" Line Buried	20	LF	$ 100.00	$2,000
Standpipe & Connections @ Deck	1	EA	$ 7,500.00	$7,500
Valve	1	EA	$ 3,500.00	$3,500
Electrical	-			
Conduit & Wire Attached to Underside of Deck	280	LF	$ 300.00	$84,000
Electrical Ductbank Burried	20	LF	$ 500.00	$10,000
Light Pole & Luminaire	1	EA	$ 7,500.00	$7,500
Shorepower Connection Cabinet	1	EA	$ 30,000.00	$30,000
Subtotal - Direct Costs				**$6,686,075**

Berth 307 (new structure)				
Item Description	**Quantity**	**Unit**	**Unit Rate**	**Total**
Contingencies	-			
Contingency - Known	1	LS	$ 601,746.77	$601,747
Contingency - Unknown	1	LS	$ 1,203,493.55	$1,203,494
Contingency - Design	1	LS	$ 200,582.26	$200,582
Escalation	1	LS	$ -	$0
Risk	1	LS	$ 334,303.76	$334,304
Subtotal - Contingencies				**$2,340,126**
Contractor Additional Costs	-			
Indirect Costs	1	LS	$ 1,002,911.29	$1,002,911
Contractor Overhead and Markup	1	LS	$ 1,738,379.57	$1,738,380
Subtotal - Contractor Additional Costs				**$2,741,291**
Total Budget Price - Berth 307 Structure			**$**	**11,767,492**

Berth 311 Work				
Item Description	Quantity	Unit	Unit Rate	Total
Mob/Demob	1	LS	13,200.00	$13,200
Dolphin Construction	-			
Supply Steel Pipe Piles - 30" Dia x 5/8" Wall	39,351	LBS	1.50	$59,026
Install Steel Pipe Piles - 30" Dia	2	EA	16,475.00	$32,950
Pile Load Test	1	EA	20,000.00	$20,000
Pile Concrete (Rebar/Pour)	4	CY	1,800.00	$7,200
Supply Steel Pipe Piles - 24" Dia x 5/8" Wall (Fender Pile)	12,494	LBS	1.50	$18,741
Install Steel Pipe Piles - 24" Dia (Fender Pile)	1	EA	8,765.00	$8,765
Deck Concrete Form/Rebar/Pour	8	CY	3,000.00	$24,000
MV 1450 x 1000 Leg Fender @ Mounting Accessories	1	EA	12,500.00	$12,500
Structural Steel Steel Fender Frame	3,500	LBS	10.00	$35,000
UHMW Pads for Fender	188	SF	250.00	$46,875
Subtotal - Direct Costs				**$278,258**
Contingencies	-			
Contingency - Known	1	LS	25,043.19	$25,043
Contingency - Unknown	1	LS	50,086.38	$50,086
Contingency - Design	1	LS	8,347.73	$8,348
Escalation	1	LS	0.00	$0
Risk	1	LS	13,912.88	$13,913
Subtotal - Contingencies				**$97,390**
Contractor Additional Costs	-			
Indirect Costs	1	LS	41,738.65	$41,739
Contractor Overhead and Markup	1	LS	72,346.99	$72,347
Subtotal - Contractor Additional Costs				**$114,086**
Total Budget Price - Berth 311 Work			**$**	**489,733**

Port of Portland Dredge Base Work					
Item Description	**Quantity**	**Unit**	**Comments**	**Unit Rate**	**Total**
Mob/Demob	1	LS	Assume to be 5% of Direct Cost less Mobilization $	22,600.00	$22,600
Existing Mooring Pile Cluster Demo	-		4 Sets of 13 timber piles		
Remove Existing Timber Piles & Fender System	52	EA	Assume marine work - pulled by vibrating out	837.54	$43,552
Mooring Pile Construction	-		4 EA		
Supply Steel Pipe Piles - 36" Dia x 1" Wall	194,935	LBS	130 LF/EA	1.50	$292,402
Install Steel Pipe Piles - 36" Dia	4	EA	Barge Work - Including driving shoe + setup + piling jig (assume 80 LF embedment)	23,840.00	$95,360
Pile Load Test	1	EA	Assume production pile	25,000.00	$25,000
Steel Pile Hoop Assembly	4	EA	Currently no details - Allowance	10,000.00	$40,000
Subtotal - Direct Costs					**$518,914**
Contingencies	***Percentage of Direct Costs***				
Contingency - Known	9%	LS			$46,702
Contingency - Unknown	18%	LS			$93,405
Contingency - Design	3%	LS			$15,567
Escalation	0%	LS	Not included in this estimate		$0
Risk	5%	LS			$25,946
Subtotal - Contingencies					**$181,620**
Contractor Additional Costs	***Percentage of Direct Costs***				
Indirect Costs	15%	LS	Assume 15% (Small Project) for Schedule Based Costs (such as Project Staff) & Temporary Construction Costs (such as Site Preparation, Site offices/facilities, etc)		$77,837
Contractor Overhead and Markup	5%	LS	Assume 5% Overheads + 10% Markup on Overall Costs (approx. 26% on Direct Costs)		$25,946
Subtotal - Contractor Additional Costs					**$103,783**
Total Budget Price - PoP Dredge Base				**$**	**804,317**

MC Pier Work				
Item Description	Quantity	Unit	Unit Rate	Total
Mob/Demob	1	LS	146,300.00	$146,300
Remove Parts of Access Trestle	-			
Bay 3	-			
Labour & Equipment to Dismantle Trestle	56	Crew Hrs	750.00	$42,000
Timber Disposal Costs	9	TON	250.00	$2,250
Bay 6	-			
Labour & Equipment to Dismantle Trestle	48	Crew Hrs	750.00	$36,000
Timber Disposal Costs	8	TON	250.00	$2,000
Rebuild Parts of Access Trestle	-			
Bay 3	-			
Labour & Equipment to Rebuild Trestle	56	Crew Hrs	750.00	$42,000
Pressure Treated Timber + Hardware	349	CF	30.00	$10,470
Bay 6	-			
Labour & Equipment to Rebuild Trestle	48	Crew Hrs	750.00	$36,000
Pressure Treated Timber + Hardware	311	CF	30.00	$9,330
Temporary Access for Sheet Pile Installation				
Clearing of Vegetation	9,600	SF	5.00	$48,000
Excavate for Access Road and Crane Pads	715	CY	110.00	$78,650
Geotextile	9,600	SF	2.00	$19,200
Place Granular for Access Road and Crane Pads	850	CY	125.00	$106,250
Sheet Pile Pinning Walls	-			
Supply Steel Sheet Piles - NZ-38	3,745,000	LBS	1.10	$4,119,500
Install Steel Sheet Piles - NZ-38	100,000	SF	11.30	$1,130,435
Subtotal - Direct Costs				**$5,828,385**
Contingencies	-			
Contingency - Known	1	LS	524,554.63	$524,555
Contingency - Unknown	1	LS	1,049,109.26	$1,049,109
Contingency - Design	1	LS	174,851.54	$174,852
Escalation	1	LS	0.00	$0
Risk	1	LS	291,419.24	$291,419
Subtotal - Contingencies				**$2,039,935**

MC Pier Work				
Item Description	Quantity	Unit	Unit Rate	Total
Contractor Indirect Costs	-			
Indirect Costs	1	LS	874,257.72	$874,258
Contractor Overhead and Markup	1	LS	1,515,380.04	$1,515,380
Subtotal - Contractor Additional Costs				**$2,389,638**
Total Budget Price - MC Pier			**$**	**10,257,957**

USCG Pier Work				
Item Description	Quantity	Unit	Unit Rate	Total
Mob/Demob	1	LS	71,200.00	$71,200
New Fendering System	-			
Remove Existing Timber Piles & Fender System	15	EA	907.33	$13,610
Supply Steel Pipe Piles - 24" Dia x 5/8" Wall (Fender Pile)	187,412	LBS	1.50	$281,117
Install Steel Pipe Piles - 24" Dia (Fender Pile)	15	EA	12,275.00	$184,125
Supply H Piles - 12" x 12" + Connection Plates @ Fender Piles	8,325	LBS	1.60	$13,320
Install H Pile Horizontal Member	90	LF	450.00	$40,500
Trelleborg DD500 Extruded Fendering System - Supply	90	LF	1,200.00	$108,000
Trelleborg DD500 Extruded Fendering System - Install	72	HR	750.00	$54,000
Schuyler Type C Pile Fender System - Supply	525	LF	300.00	$157,500
Schuyler Type C Pile Fender System - Install	15	EA	2,700.00	$40,500
Trestle Pile Sleeves Through Rock Revetment	-			
Fabricate & Supply Pile Sleeves & Accessories	59,000	LBS	12.00	$708,000
Excavate Existing Slope around Piles	370	CY	200.00	$74,000
Pipe Sleeves - Handle & Deliver	28	EA	1,000.00	$28,000
Pipe Sleeves - Install	28	EA	5,000.00	$140,000
Granular Backfill	230	CY	250.00	$57,500
Sheet Pile Pinning Walls	-			
Supply Steel Sheet Piles - NZ-38	303,345	LBS	1.10	$333,680
Install Steel Sheet Piles - NZ-38	8,100	SF	16.67	$135,000
Subtotal - Direct Costs				**$2,440,052**
Contingencies	-			
Contingency - Known	1	LS	219,604.66	$219,605
Contingency - Unknown	1	LS	439,209.33	$439,209
Contingency - Design	1	LS	73,201.55	$73,202
Escalation	1	LS	0.00	$0
Risk	1	LS	122,002.59	$122,003
Subtotal - Contingencies				**$854,018**
Contractor Indirect Costs	-			
Indirect Costs	1	LS	366,007.77	$366,008

USCG Pier Work				
Item Description	Quantity	Unit	Unit Rate	Total
Contractor Overhead and Markup	1	LS	634,413.47	$634,413
Subtotal - Contractor Additional Costs				**$1,000,421**
Total Budget Price - USCG Pier			**$**	**4,294,491**

ATTACHMENT D

RISK REGISTER AND STATUS

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Attachment D – Risk Register and Status

ID	Risk Category / Name	Description	Status	Risk Quantification			Notes/ Assumptions	Mitigation/Avoidance Measures
				Cost Impact ($MM)	Schedule Impact (months)	Likelihood		
Design Phase Risks								
	EPA/State Regulatory Approvals/Licenses	1. Final approved remedy (dredging vs capping) 2. Extended periods required to obtain and comply with approvals, permits or licenses for land access and operations	Queued	2-10	6-12	Low		1. Determine regulators' preferred approach to streamline permits, licenses and/or approvals to meet project timelines
	Contracting Strategy	Sub-optimal contracting strategy, contractor selection and ongoing management of activities, costs, and time	Queued	1-5	3-12	Moderate		Identify optimal strategy for contractor selection, contracting and management based on experience of designer and owners, noting any downside risks and fallback strategies
	Sediment Removal	1. Higher volume associated with selected remedial approach 2. Latent conditions associated with removal of the sediment	Partially complete	10-50	12-24	Low	50% RD includes a combined dredge/cap strategy that will either remove to clean sediment or sufficiently cap to isolate CoCs. This strategy has significantly reduced removal quantities compared with early estimates.	1. Designer to evaluate a range of possible approaches and propose a preferred approach to optimize removal volumes to meet requirements at lowest cost and/or highest effectivity of operations 2. Complete thorough on-site characterization of sediment to reduce risk of unknown latent conditions
	Capping	1. Larger capping area associated with selected remedial approach 2. Configuration/thickness of cap(s)	Partially complete	10-50	12-24	Low		Designer to evaluate a range of possible approaches and propose a preferred capping area and cap thickness design to meet requirements at lowest cost and/or highest effectivity of operations
	Shoreline Remediation	1. Larger extent of remediation required 2. Complex configuration of backfill/cap	In process	2-10	12-24	Low	Most of the shoreline is to be remediated with a beach mix cap up to a rock revetment to stabilize from slope failure and wave dissipation.	1. Site assessment shall fully characterize limits of required shoreline contamination. 2. Designer shall evaluate how to optimize tradeoff between excavation and capping to meet remediation requirements.

ID	Risk Category / Name	Description	Status	Risk Quantification			Notes/ Assumptions	Mitigation/Avoidance Measures
				Cost Impact ($MM)	Schedule Impact (months)	Likelihood		
	Contractor Management	Poor Contractor(s) selection or ongoing HSEC management	Queued	1-10	12-24	Moderate	Project special provisions will include language to qualify potential contractors.	1. Performance record qualifications and references shall be clearly identified in solicitation documents and verified during bid review. Contractors shall be disqualified for not meeting bid requirements. 2. Contractor performance requirements shall be fully spelled out in contract documents with financial penalties and/or rationale for dismissal for non-performance. Performance shall be reviewed monthly with reporting and discussion with Contractor for any non-performance issues and ramifications for continued non-compliance.
Construction Phase Risks – Intrinsic		*Risks that are potentially within the control of the design team or the RA contractor to minimize.*						
Internal Risks								
	Procurement	Unable to source sufficient quantities of equipment, construction materials or consumables (dredges, barges, transportation, etc.)	90% RD	1-20	12-24	High		In specs, require Contractor to designate a Procurement Lead responsible for developing a procurement plan for all major materials, equipment, and consumables using early-finish scheduling approach with monthly reporting on acquisition and stockpile status. Establish a required minimum lead time for critical elements during design phase and include as part of contract documents.
	Staging	Insufficient area for staging and/or storage	90% RD	1-2	6-12	Moderate	The project team is pursuing the use of City property at the south end of the lagoon for staging and ex-situ processing.	Alternative locations adjacent to SIB will be investigated.
	Dredging Operations	Failure to undertake dredging of contaminated sediment in an effective and timely manner	Queued	5-20	12-36	Low	Specs will include viable performance specifications that must be met.	Require Contractor to submit dredging schedule as a part of the operations plan and include daily penalties for inability to meet schedule.

ID	Risk Category / Name	Description	Status	Risk Quantification			Notes/ Assumptions	Mitigation/Avoidance Measures
				Cost Impact ($MM)	Schedule Impact (months)	Likelihood		
	Dredging Operations	Unexploded ordnance (UXO) is identified among debris to be removed.	Queued				Specs to include requirements to identify and dispose.	
	Sediment Processing	Process facility unavailable or method fails to meet treatment requirements	90% RD	10-50	12-36	Moderate	90% RD will consider dedicated processing site.	Define performance requirements within design documents with Contractor daily penalties for inability to meet performance requirements.
	Disposal Facilities	Insufficient capacity or failure of disposal facility during period of remediation	90% RD	10-50	12-48	Low	Consider secondary sites, potential reserved with retainer.	Ensure design identifies disposal facility with volumetric capacity and daily operational characteristics in excess of anticipated need.
	Transload	Insufficient capacity of transload site either from limited volume rate for the SIB project, but also that production rate may be further limited if the transload site is shared by other sites concurrently active within PHSS.	Queued	50-200	36-60	High		Transload sites will be investigated for compliance and capacity. Additionally, the creation of a new transload site will be evaluated.
	Disposal Facilities	Unknown contaminants in disposal material that preclude previously viable disposal facilities and/or require additional pre-disposal processing not included in design and cost.	Queued	10-200	36-60	Moderate		An expansion of selective sampling will be evaluated prior to RA to determine likelihood.
	Transportation	Insufficient capability or effective means to transport sediment to the processing and/or disposal facility	In process	10-200	36-60	Low	The cost estimate attempts to capture the economic risk of this requirement. It further highlights weight this risk imparts on the project. 90% RD will include an expanded exploration of transportation options.	Require Contractor to provide transportation plan sufficient to transport all materials to processing / disposal site with daily penalties for inability to meet performance requirements.

ID	Risk Category / Name	Description	Status	Risk Quantification			Notes/ Assumptions	Mitigation/Avoidance Measures
				Cost Impact ($MM)	Schedule Impact (months)	Likelihood		
	Existing Shoreline Structures Integrity	Damage/Failure of the existing shoreline structures	In process	10-250	24-60	Low		Identify during the design phase all sensitive shoreline structures with construction setback limits that are protective of structures and include daily checks by construction inspection staff to confirm setbacks are being honored. Include penalties for Contractor activities which encroach within setback limits and/or damage shoreline structures.
	Loss of Containment	Unacceptable or excessive in-situ movement, spillage or leakage of material during sediment removal or treatment operations	Queued	1-10	12-24	Moderate		Designer to identify containment requirements in design documents. Require Contractor to develop a containment plan which is inspected on a daily basis during construction, with weekly reporting.
	Construction Safety	Safety-related events arising from construction of project establishment, infrastructure facilities, and key treatment & disposal facilities	In process	0.5-1	6-12	Low		Require Contractor to develop and maintain a site safety plan that meets or exceeds OSHA requirements, with daily reporting of safety events.
	Occupational Health & Hygiene	Exposure to contaminant's during all operations	In process	0.2-0.5	3-6	Low		Require Contractor to develop and maintain a site safety plan that meets or exceeds OSHA requirements, with daily reporting of safety events.
	Emergency Response	Inadequacy of response to a major river or land based HSEC event	In process	1-20	6-12	Low		Require Contractor to develop and maintain an emergency response plan, with at least weekly confirmation of readiness of response materials by construction inspector.
	Demobilization & Disposal	Construction materials are not removed from site in a timely manner and/or improperly disposed	90% RD	0.1-0.5	3-6	Low		Require Contractor to develop a materials disposal plan identifying the materials to be disposed with allowable on-site quantities and an approved off-site disposal facility for each type of material to be disposed of off-site.

ID	Risk Category / Name	Description	Status	Risk Quantification			Notes/ Assumptions	Mitigation/Avoidance Measures
				Cost Impact ($MM)	Schedule Impact (months)	Likelihood		
	Compensatory Habitat	Compensatory habitat fails to meet regulatory requirements	90% RD	1-10	12-24	Moderate		Require Contractor to submit all materials, means and methods for creation, establishment and maintenance of the mitigation measures. Inspect at specified intervals to ensure compliance.
		Expanded utilities protection, relocate and/or restoration required.						Utilities survey at start of RA discovers presence of utilities outside of design estimate that would be impacted by construction activities requiring protection and/or restoration.
	Floating structure staging	Rental of storage space for floating structures that are temporarily relocated	90% RD	0.2-1	0	Moderate	This will occur if the operator of the structure needing relocation has no option for temporary placement.	The expectation is that all operators around the basin will impose preferential handling of any structures and that the cost of doing so is included in the estimated cost for the specific relocation.
Community Risks								
	Site Security	Incident or accident arising from unauthorized access to land or river operations	90% RD	0.1-0.3	3-6	Low		Require Contractor to develop a site security plan which includes onsite security personnel and video monitoring prior to start of construction and re-visit effectivity at least monthly during construction
	Owner-Operator Business Interruption	An owner/operator reports an interruption in business operations that was unanticipated in design conditions.	90% RD	5-10	1-3	High	(Added 2025-06-24)	In project specifications, insert contractor performance requirement to establish a real estate specialist as a liaison to communicate construction activity and coordinate potential impact business operations.
	River Operations	Accident between vessels, vessel and shore structure, or vessel and services	In process	0.2-2	3-6	Low		Require Contractor to develop a river operations safety plan
	Dust and/or Odor	Sub-optimal management of off-site dust or odor-related impacts arising from construction activities	90% RD	0.1-0.3	1-3	Low		Perform pre-construction baseline air quality monitoring and continuous monitoring during construction to provide early detection and control of possible exceedances

ID	Risk Category / Name	Description	Status	Risk Quantification			Notes/ Assumptions	Mitigation/Avoidance Measures
				Cost Impact ($MM)	Schedule Impact (months)	Likelihood		
	Transportation	Safety-related accident or environmental incident arising from offsite transportation of materials between sites and/or to disposal facility	90% RD	0.1-0.3	1-3	Low		Require Contractor's transportation safety plan to incorporate all possible interactions with offsite vehicles and/or community members
	Community/3rd Party Stakeholders	Disruption to and/or loss of amenity for the local community and/or loss of trust/reputation	90% RD	0.1-0.3	1-3	Low		Identify all possible amenity loss/disruptions during design phase and public outreach process and develop requirements for Contractor to pro-actively manage and limit activities which could cause possible loss / disruption
Construction Phase Risks – Extrinsic		*Risks that are outside the control of the RA contractor.*						
	Major Utilities Outage	Disruption in supply of power and/or water	90% RD	1-3	3-12	Low	Storm and/or offsite activities severs utilities feed(s) to site	Prepare contingency plan to supply utilities to critical site operations in case of outage
	Archaeological find	Encounter archaeological materials during streambank excavation	90% RD	0.1-0.5	1-3	Low	Need to pause excavation – relocate crew to next sequential excavation area	Archaeological analysis complete and reviewed by stakeholders > 6 months prior to excavation. Have archaeologist on site during excavation in high-risk areas. Have two or more work areas prepped at excavation start.
	Diesel fuel cost increase	Disruption in national supply causes >20% increase in cost of diesel fuel	90% RD	1-5	3-12	Low	Cost impact only significant during peak construction	Identify peak construction period, identify alternate suppliers and/or obtain fuel supply in advance via negotiated fixed price or create stockpile
	Heavy summer downpour	2-week long heavy rainstorm during summer construction	90% RD	0.1-0.3	1-3	High	Heavy long rainstorm will shut down upland excavation activities and slow in-water dredging due to complications in managing dredge materials	Investigate opportunities to perform dredge materials management in facility that is not impacted by rain, consider how upland excavation can be sequenced and/or erosion control options to allow excavation to move forth in heavy rain
	Undetonated Explosives	Discovery of historical explosives/ undetonated explosives	Active	0.1-0.3	1-3	Low	Pause local excavation, relocate equipment to safe work area	Survey site for unexploded ordinance ahead of contractor mobilization

ID	Risk Category / Name	Description	Status	Risk Quantification			Notes/ Assumptions	Mitigation/Avoidance Measures
				Cost Impact ($MM)	Schedule Impact (months)	Likelihood		
	Smoke Delay	Hazardous air quality due to wildfire smoke	Active	0.1-0.2	1-3	Low	Need to issue masks, shut down if extreme heat and/or low visibility	Monitor weather, fire index and air quality
	Public Process	Public opposition/ litigation	Active	0.2-0.4	3-12	Low	Possible shut-down of cleanup activities if public process identifies lack of sufficient/correct public process per EPA protocol	Ensure thorough public process is completed prior to advertisement of Remedial Action documents

ATTACHMENT E

OREGON DEPARTMENT OF STATE LANDS
DIVISION 145 REMEDIAL DESIGN COST

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Attachment E – Oregon Division of State Lands Division 145 Remedial Design Cost

The following includes the completed calculator worksheet supplied by Division of State Lands used to estimate the DSL 145 cost. The parameters and definitions of inaccessible areas and land values follow the worksheet.

DSL 145 Calculator Worksheet

Project Area Name	SWAN ISLAND BASIN PROJECT AREA, CERCLA DOCKET NO. 10-2021-001 PORTLAND HARBOR SUPERFUND SITE PORTLAND, MULTNOMAH COUNTY, OREGON
Easement period (years)	60
Flat Rate (per sq ft)	0.7559
AV for land area in question (see adjacent land values table)	$13.11
Total days of construction (=active + inactive construction days)	3359
Area accessible during inactive construction period	399,158

Cost Formula = [(AV*Area*SDI)/30]*years authorized

This tool was developed solely to facilitate estimation of D145 costs during Portland Harbor remedial design. It does not establish or guarantee those costs, which will be based on the specifics of the final remedial design and actual use for which a D145 authorization is sought.

Color Key		These cells require project-specific inputs (see ReadMe tab for details). All orange cells have to be filled to get an accurate total cost for Division 145 costs.
		These cells represent fixed values for use in remedial design level estimates (see ReadMe tab for details)
		These cells represent results that are calculated based on the relevant inputs (see ReadMe tab for details)

Construction cost: first 30-year easement

	Area (sq ft)	SDI	Length of period (days)	Subtotal
Area inaccessible during active construction period	399,158	1	1220	$582,694.16

Area inaccessible during inactive construction period	0	1	2139	$0
Area accessible during inactive construction period	399,158	0.5	2139	$512,215

$1,094,909.34	Construction cost total: first 30-year easement

Post-construction cost: first 30-year easement

	Area (sq ft)	SDI	Years post construction	Subtotal
Buried contamination, cap, and/or other permanent in-water structures constructed as part of the remedy	3,445,355	0.5	20.78	$15,640,640.58
Additional area to which restrictions would apply	0	0.01	20.78	$0

$15,640,640.58	Post-construction cost: first 30-year easement total

Post-construction cost: second 30-year easement

	Area (sq ft)	SDI	Years post construction	Subtotal
Buried contamination, cap and/or other permanent in-water structures constructed as part of the remedy (sq ft)	3,445,355	0.5	30	$22,583,538.92
Additional area to which restrictions would apply (sq ft)	0	0.01	30	$0

$22,583,538.92	Post-construction cost: second 30 year easement total

Total Cost		
Construction cost (total days construction)	$1,094,909.34	
Post-construction cost (remainder of first 30-year easement period)	$15,640,640.58	
Post-construction cost (second 30-year easement period)	$22,583,538.92	
Total Cost	$39,319,088.84	

Adjacent Land Values for Assessed Value (AV) Calculation			
Tax Lot	Size (sq ft)	Land Value ($)	Cost per sq ft
R315695	301,000	$4,728,320	$16
R315697	484,387	$5,725,080	$12
R315704	185,566	$3,808,870	$21
R315705	126,324	$1,532,080	$12
R315711	151,589	$2,272,050	$15
R315626	193,406	$4,104,040	$21
R315728	223,463	$4,195,070	$19
R673573	18,295	$258,220	$14
R592199	312,761	$3,452,510	$11
R238891	172,498	$2,587,470	$15
R315949	65,340	$980,850	$15
R543792	28,733	$541,420	$19
R731034	2,806,135	$32,272,880	$12
TOTALS	5,069,497		

Rationale for Calculator Inputs

Construction Cost: First 30-Year Easement

Area Inaccessible During Active Construction Period

- The area that will be inaccessible during the active construction period is 399,158 square feet, calculated by dividing the total construction area (Cap Certification Units, Riverbank Certification Units, and Dredge Certification Units) into ten equal parts, with one tenth constructed each year over ten construction seasons.
- Areas were calculated using GIS and relying on the boundaries of Oregon State Submerged lands within the SIB Project Area, the area of Dredge Certification Units, the area of cap certification units, and the area of Riverbank Certification Units.
- Construction period is based on the RA construction schedule in the Pre-Final 90% RD as published in the Design Criteria Report (DCR), Figure 3-1 RA Schedule.
- The duration of inaccessibility is 1,220 days, which is calculated as 122 days per construction season over 10 construction seasons (July 1 – October 31, 2033 through 2042 inclusive).

Area Inaccessible During Inactive Construction Period

- The area that will be inaccessible during the inactive construction period is zero. The analysis assumes that in-water construction equipment will demobilize at the end of each in-water construction window and the SIB Project Area will remain accessible during the interim periods (Nov 1 through June 30).
- The duration of the inactive construction period is 2,139 days, which is the total construction period (3,359 days from July 1, 2033 – September 11, 2042) minus the active construction period total (1,220 days).

Area Accessible During Inactive Construction Period

- The area that will be accessible during the inactive construction period is calculated as the total parcel area minus the inaccessible areas.
- The duration of this condition is 2,139 days, which is determined as the total construction duration minus the cumulative duration of active construction (i.e., ten in-water work windows).

Post-Construction Cost: First 30-Year Easement

Buried Contamination, Cap, and/or Other Permanent In-Water Structures

- The affected area is 3,445,335 sq ft, which is based on GIS analysis of Cap Certification Units (77.696 acres) and Riverbank Certification Units (1.397 acres) located within the SIB Project Area and located on Oregon State Submerged Lands.
- The number of years after construction is calculated as the portion of a 30-year lease left after the construction period is complete. The calculator automatically determines this duration – value in this analysis is 20.78 years post construction.

Additional Area to Which Restrictions Would Apply

- The additional area to which restrictions would apply is assumed to be zero.

Adjacent Land Values for Assessed Value (AV) Calculation

- The tax lot information was obtained from *portlandmaps.com*.
- The parcel size was obtained in acres from portlandmaps.com and then converted to square feet using the standard conversion factor of 43,560 square feet per acre.
- The land value in dollars was obtained from the "Land Assessment" section on portlandmaps.com.
- The cost per square foot was calculated as the fair market value per square foot, weighted by the lot size across all adjacent riparian parcels.
- The basis of this calculation is unimproved land value only, with no site improvements considered.

Address	Property	Area (acres)	Area (sq ft)	Value (2024)
6767 N Basin Ave	R315695	6.91	300999.6	$4,728,320.00
6735 N Basin Ave	R315697	11.12	484387.2	$5,725,080.00
6211 N Ensign St	R315704	4.26	185565.6	$3,808,870.00
6208 N Ensign St	R315705	2.9	126324	$1,532,080.00
6208 S/ N Ensign St	R315711	3.48	151588.8	$2,272,050.00
6147 N Basin Ave	R315626	4.44	193406.4	$4,104,040.00
6135 N Basin Ave	R315728	5.13	223462.8	$4,195,070.00
5949 E/ N Basin Ave	R673573	0.42	18295.2	$258,220.00
3737 N Emerson St	R592199	7.18	312760.8	$3,452,510.00
5036 N Lagoon Ave	R238891	3.96	172497.6	$2,587,470.00
5160 N Lagoon Ave	R315949	1.5	65340	$980,850.00
5555 N Channel Ave	R731034	64.42	2806135.2	$32,272,880.00

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APPENDIX L

VALUE ENGINEERING SCREENING STUDY TECHNICAL MEMORANDUM

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Value Engineering Study
SWAN ISLAND BASIN PROJECT AREA,
CERCLA DOCKET NO. 10-2021-001
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

Prepared by:

Michael R. Palermo, PhD, PE
Mike Palermo Consulting, Inc.
10030 Green Level Church Rd, Ste 802-1280
Cary, NC 27519-8168

Prepared for:

HydroGeoLogic, Inc.
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190

October 21, 2025

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EXECUTIVE SUMMARY

This Value Engineering Study provides proposed Value Improvement Proposals for the Swan Island Basin Project Area (SIB) of the Portland Harbor Superfund Site.

The study effort focused on the following aspects of the design:

- Structures - A general review of the approach to protection or demolition of structures.
- Riverbanks - Riverbank stabilization, remediation and restoration.
- Dredging - Debris and sediment material dredging and management; and,
- Capping - Engineered capping material procurement and placement.

A total of 12 Value Improvement Proposals are described in the study. The proposals were developed based on the review and analysis of the Draft 50% Design and several updated deliverables for the Pre-Final 90% Design for the project.

The site conditions for the SIB are complex, and the design effort was tailored to match specific remedy approaches to the varied conditions across the site. The resulting Proposals were both specific to each of the above design components and of a more general nature related to the overall remedy.

Introduction

Background

The Swan Island Basin Project Area (SIB) of the Portland Harbor Superfund Site is an industrialized lagoon located between river miles 8.1 to 9.2 of the Willamette River. The SIB was developed and industrialized over many decades and is now considered an "active navigable industrial waterway". In-water structures, developed riverbanks, and varied water depths are found within the site. Contaminants of concern are present in the SIB sediments to include dioxins/furans, TPH-Dx, PAHs, PCBs, metals, and tributyltin (HGL 2025c).

EPA Region 10 issued a Record of Decision (ROD) for the Portland Harbor Superfund Site in January 2017 (EPA 2017). The selected remedy for the overall site calls for combinations of dredging/excavation, capping, in-situ/ex-situ treatment, enhanced and/or monitored natural recovery, and institutional controls. Certain riverbanks would be remediated by a combination of soil excavation, chemical isolation in place, stabilization, and restoration. A portion of the Swan Island riverbanks will be addressed through the reconstruction of the Lagoon Wharf.

The Remedial Design (RD) for the SIB project is currently being conducted by HydroGeoLogic, Inc. (HGL). The draft 50% RD for SIB calls for a combination of dredging, capping, natural recovery, and riverbank restoration, consistent with the overall ROD-selected remedy approach.

HGL engaged Mike Palermo Consulting, Inc. to conduct this Value Engineering (VE) study for the SIB as part of the ongoing RD effort. I was engaged as a Value Engineering Consultant, solely responsible for conduct of the study. My credentials are summarized in Appendix A. Please note that all first-person language used in this report refers to Dr. Michael R. Palermo, the sole employee of Mike Palermo Consulting, Inc.

This report documents the results of the VE Study to include considerations in developing proposals for potential cost savings and descriptions of those proposals.

VE Process and Participants

The parameters for conducting a VE Study are documented in EPA memoranda and documents (EPA 1995 and EPA 2005). In accordance with these documents, HGL conducted a VE Screening for the 50% RD effort in March 2025 (HGL 2025b). Based on the relatively high cost of several components of the design, the VE Screening report established the need for this formal VE Study.

The VE Screening effort and the Scope of Work for this VE study identified the following design components as the focus of the study:

- Structures - A general review of the approach to protection or demolition of structures;
- Riverbanks - Riverbank stabilization, remediation and restoration;
- Dredging - Debris and sediment material dredging and management; and,
- Capping - Engineered capping material procurement and placement.

The development of the dredging prism for SIB was also evaluated in the VE Screening effort but was not recommended as an area of evaluation in this VE Study.

The Scope of Work for the VE study originally defined by HGL called for a timeline of 7 weeks for the study. Materials initially provided to me for review and analysis was the Draft 50% Design. Additional products of the on-going 90% design effort were in development concurrent with the VE study, and the timeline was extended as additional products were made available.

Preliminary Value Improvement Proposals were sent to HGL at the beginning of week 4 of the study and discussed in a mid-point virtual meeting in week 5 of the study. Several 90% design products were provided to me following the mid-point meeting, and those products were considered in updating the VE proposals as the study progressed. Therefore, some aspects of the design addressed in the Preliminary Proposals were undergoing modifications in the 90% design work. Any updates of the proposals resulting from these 90% inputs are appropriately noted in the Proposals.

Throughout the study, HGL staff interacted with me to resolve questions and details on issues as needed.

Documents Reviewed and Summary of Key Design Elements

Documents Reviewed

This study required review and analysis of a number of documents. The sheer volume of information needed for the design was huge, with several thousands of pages of text, data tables, figures, drawings, etc. Obviously, I did not review and analyze all the information and data in detail. But that type of extensive review was not needed for this VE study. I focused my effort on those design components identified by the VE Screening, and for these components, further focused on the details I saw as needed to identify proposals. The process of review and analysis of the documents continued throughout the study timeframe as proposals were identified and described, additional documents were made available, and the report prepared and finalized.

Documents reviewed and analyzed for the study are listed as follows:

- Value Engineering Study Documents:
    - Value Engineering Screening (HGL 2025b)

  - EPA Guidance on VE Studies (EPA 1995 and EPA 2005)

- Pre-50% Documents:
  - Record of Decision (ROD) (EPA 2017)
  - Final Sufficiency Assessment Report (SAR) Revision 1 (HGL 2025a)
  - EPA and State of Oregon comments regarding the SAR (EPA 2025 and State of Oregon 2025).

- 50% Design Documents:
  - 50% Design Criteria Report Volume 1 (HGL 2025c)
  - Plans Volume II (HGL 2025d)
  - Preliminary Specifications and Drawings Volume III (HGL 2025e)

- Pre-Final 90% RD Documents:
  - 90% Design Criteria Report (HGL 2025f)
  - Cap Design Technical Memorandum (Volume I, Appendix E [formerly D])
  - Riverbank Design Technical Memorandum (Volume I, Appendix D)
  - Dredging Design Technical Memorandum (Volume I, Appendix H [formerly G])
  - Geotechnical Design Technical Memorandum (Volume I, Appendix I [formerly H])
  - Structural Design Technical Memorandum (Volume I, Appendix J [formerly I])
  - 90% Specifications and Drawings

The full citations for the above documents are listed in the References section of this report.

Key Design Elements

The 50% Design documents initially provided for review and analysis for this report included Text, Figures, Plans, Drawings and Specifications. The Design Criteria Report (DCR) with Appendices (HGL 2025c) is the main document describing the various components of the design. As would be expected, some specifics were not fully developed in the Draft 50% Design documents. Key documents developed as part of the Pre-Final 90% Design were also provided for review and analysis after the mid-point of the VE study. These included updated Technical Memoranda for Dredging and Capping and the Technical Memorandum for Riverbanks.

The scale of the SIB and the variability of site conditions dictated an extensive design effort. My focus was on the four design components identified in the VE Screening, and the key design elements for these design components are summarized below.

Structural Design

The Structural Design is concerned with implementing the remedy in areas adjacent to and in some cases underneath existing structures within the SIB. The Structural Design Technical Memo in Appendix J of the DCR states that structural design utilizes a Performance-Based

Design approach. Appendix J of the DCR contains the results of an evaluation of each of the 23 structures within the SIB, including details of the solutions for each structure and drawings for each structure. Four of the structures are slated for demolition, including the Lagoon Wharf. Slope stability considerations remain an issue, since some of these structures are at the limit of acceptable factors of safety.

An important issue is the potential for damage to the structures during the implementation of the remedy in areas around and beneath the structures. The design did not include any specifics regarding the potential risk of such damage, but local damage, slope stability, and capping integrity are concerns due to the confined spaces between and under the structures. The responsibility to implement the RD without damaging the existing structures is placed on the contractor and the final design that they will develop.

Riverbanks Design

The Riverbanks design component was described in the Riverbank Design Technical Memo prepared as part of the Pre-Final 90% Design documents (HGL 2025h). This memo lays out an essentially prescriptive design component for restoration of the 2.3 miles of riverbanks surrounding SIB. The riverbanks are defined as extending from the top of bank (at various elevations) to the mean high water level at +13 feet datum. The riverbanks are presently armored with stone or covered in vegetation, and the underlying soils are contaminated similar to the sediments. The ROD requires the remediation of the riverbanks to protect the in-water remedy of the sediments in the SIB.

The remedy for the riverbanks consists of a conventional approach to remove contaminated armor stone and surface soils and replace with clean materials. Some areas will require flattening the slopes due to seismic stability concerns.

The requirements for excavation and grading are straightforward and would require conventional equipment. This is all work “in the dry”, so this remedy component consists of excavation of contaminated soils and subsequent placement of a new chemical isolation layers for seepage-based migration to include chemical barriers of topsoil amended with biochar where vegetation is planted. Where no vegetation is planted (i.e. where erosional or structural concerns prevent vegetative cover), reactive core mat will be used on slopes steeper than 3H:1V up to a maximum design slope of 2.15H:1V. The VE Screening identified construction access, materials management, and work sequencing as areas of concern for implementation of this remedy component.

Dredging Design

The Draft 50% Dredging Design Technical Memo is Appendix G of the DCR. That memo was updated as part of the Pre-Final 90% RD. Key elements of the Dredging Design include the definition of the dredging prism, the determination of a preferred dredging method, the methodology for selection of the remedy option for specific areas within the SIB, and the

logistics of transloading and transport of dredged sediments for landfill disposal. The design calls for disposal in approved landfills, which will be at distance from Portland Harbor.

The dredging design defined the dredging depths across the SIB, essentially the dredging prism. But the equipment and approaches for dredging, transload, transport and disposal will be left to the Contractor.

The dredging prism was defined across the SIB in 10 ft by 10 ft grid cells. Three options for a remedy approach were considered for each grid cell, Dredge to RAL, Dredge and Cap, and Cap only. For the Draft 50% design, the Dredge to RAL option was removed from consideration due to deeper required depths near structures, resulting irregularity in required depths and requirements for transition, and time required for confirmation sampling and testing. For the 90% design, the Dredge to RAL option was restored, but only to specified areas subject to disturbance by spudding.

The concentrations of contaminants and depth of contamination vary across the grid cells, so a decision-tree approach was defined and used for selection of the remedy for each of the grid cells. As would be expected, the selected remedy approach by grid cell resulted in a tight-knit patchwork for remedy approach across the site, that would be difficult to apply to the dredging and capping operations. So, the tight-knit map was converted to larger Dredging Certification Units (DCUs) for the Dredge to RAL and Capping Certification Units (CCUs) for the Dredge and Cap and Cap Only remedy approaches.

Large debris will be identified and removed prior to dredging. Mechanical dredging was the recommended sediment dredging approach. I fully agree that this is the best dredging approach, especially considering the requirement for landfill disposal. Hydraulic dredging would require removal of additional small debris prior to dredging, would require dredging pipelines within the basin with potential obstruction to navigation, and would require significant dewatering requirements associated with landfill disposal.

The VE screening identified the materials management aspect of the dredging design component as a key element. The requirement for landfill disposal presents challenges due to the lack of nearby landfill facilities with the capacity needed for the SIB project and/or the overall PHSS. Also, there are no existing transloading facilities within or near the PHSS with adequate throughput for such a large project.

Capping Design

The Draft 50% Capping Design Technical Memo was updated as part of the Pre-Final 90% RD (HGL 2025f). The Capping Design is understandably the most complex design component. Capping is the principal mode of achieving the remedial goals and is applied to the majority of the SIB site area. EPA and USACE guidance on capping design requires evaluation of multiple aspects of the design to include defining design objectives, selecting capping materials, defining

required cap materials and thicknesses for chemical isolation and physical stability, and more. These were appropriately evaluated in this cap design.

The CAPSIM software was the tool applied for determining the chemical isolation requirements for the caps, and was applied to specific Cap Certification Units (CCUs) defined as subareas of the overall site. CAPSIM is perhaps the most developed cap design tool available for evaluating the chemical isolation aspect of cap design. This application was the most detailed I have seen, and required an extensive number of simulations to address the size of the SIB and variability of the contaminant concentrations.

The design for physical stability of the caps included evaluation of several drivers for potential erosion of the cap to include currents, wind waves, prop wash, dry dock activities, and outfalls. These drivers were mapped for the SIB area to determine the requirements for the armor layer of the cap. The resulting design called for application of cap designs applied to the specific conditions across the site.

A total of 5 alternative cap designs were developed to meet the various needs for chemical isolation and physical stability and were assigned to the respective CCUs and RCUs. But, as with the Dredging component, the equipment and approaches for placement of the caps will be left to the Contractor.

The VE Screening identified material availability, quarry production of cap material, and competition for transloading capacity as issues of concern. These are concerns related to importing needed materials for the caps, and these concerns are the mirror image of those concerns for taking dredged sediments off site for disposal in the Dredging component.

Value Improvement Proposals

Considerations for Development of Value Engineering Proposals

Several considerations influenced the identification of VE Proposals and the level of detail describing the proposals:

- **Complexity of the Design and Implementation** - The RD effort included quite complex design efforts (especially for capping) as well as more straightforward design elements. The complex design effort yielded a surprisingly straightforward design for the capping and dredging RD components. Overall, I found the design to be soundly based in accepted approaches and tools we see in agency guidance and the state of the practice. However, the implementation, essentially how to build it, will again be quite complex and presents significant logistical issues. So, the identified Proposals mostly pertain to the implementation of the RA.

- **Design vs. Construction** – The design lays out the dredging prism and the cap components in detail. The means and methods for construction are largely left to the contactor. So, the lion's share of the specific equipment and approaches for construction will be left to the RA Contractor, with plans to be submitted in the RAWP process. This limits the opportunities in the VE study to identify specific recommendations for improvements in effectiveness and/or reductions in cost for many of the construction specifics, at least at this point. Also, a close review of the Specifications was useful to identify possible changes that would result in saving of time and costs related primarily to the construction. For me, the draft Specifications were the most fertile ground for identifying possible cost savings.
- **VE Study Consultant Role** – My prior experiences with formal VE studies each involved a VE study panel with several participants with diverse technical backgrounds. For this VE Study, I was engaged as a Value Engineering Consultant, solely responsible for the study. This limited the level of detail and precluded specific estimations of potential cost savings for the Value Savings Proposals that were identified. For example, I am not a cost estimator, so my experience with costing is limited to a more general knowledge of cost drivers. These limitations of working solo were to a degree mitigated by prompt feedback from the HGL team to answer questions and provide requested information.

The Value Improvement Proposals that follow include those specific to each of the above design components followed by proposals of a more general nature. These general proposals focus on both potential cost savings and the overall success of the RA.

Several of these proposals were developed as preliminary proposals based on review and analysis of the 50% design documents available at the start of the VE Study. After the mid-point meeting in week 4 of the study, HGL provided additional deliverables for the 90% Design. In these instances, the Proposals were updated to reflect the 90% design information.

Structures – Protection/ Demolition of Structures

Proposal #Structures 1 – Ensure the specs allow for use of small-scale spreader or conveyor approaches for placement of capping materials and armor/habitat stone beneath and around structures.

The 90% Specifications require that Contractor means and methods for placing materials under existing structures should be selected such that damage to any portion of the existing structures should be prevented. The Specs do not include any further details on how this could be accomplished.

The work around and beneath the structures is going to be tedious and slow-going compared to the work on more open riverbanks. Use of conventional earth moving equipment may not be possible in some cases. And, use of such equipment may present higher risk of damage in some cases. Some hand-labor work may be required.

The use of spreader or conveyor approaches for material placement may provide added protection to structural components and allow for material placement at lower cost as compared to direct bucket placement. For placement in tight areas, smaller versions of these spreaders could be sized to operate from Flexifloats. For some areas under structures, placement using a rainbowing approach may be feasible. Illustrations of several types of small scale spreaders, both mechanical and hydraulic, are shown in Appendix B, Figures 1 through 4. See also Proposal #Capping 2 to follow that includes a brief description of several spreading equipment types and how they operate.

For placement of larger armor/habitat stone around structures, use of Flexifloats with small front-end loaders for spreading may achieve similar savings and lower risks to structures as compared to direct placement from larger mechanical equipment.

Once selected, the Contractor should provide details in the RAWP describing how the reconstruction of the slopes and placement of the caps will be performed without potentially damaging the structures.

Riverbanks – Riverbank stabilization, remediation and restoration

Proposal #Riverbanks 1 – Establish an On-Site or Near-Site Combined Materials Staging and Processing Facility for Receipt, Processing, and Distribution of Materials for both Riverbanks and Capping

Note that this proposal in some aspects may apply to both the Riverbanks and Capping design components, since both of these components require large volumes of clean materials imported to the site for use in restoration of the riverbanks and for cap placement. The possible means of transport of such large volumes include by water, barging the materials directly to the SIB, and by land by trucking or rail. The selection of a transport mode will depend on the means of placement, which will differ for the riverbank work as compared to the sediment capping work. This proposal is focused on a potential land-based facility located at SIB and used only for incoming clean materials, primarily those needed for the land-based river bank restoration work.

Sand, GAC, armor stone, and habitat stone are materials that will be sourced from locations at distance from the site and in large quantities. The materials handling requirements for the Riverbank work and the Capping components are similar. Importation of materials for Riverbank restoration, and perhaps for sediment capping, could be transported to a staging facility at SIB by rail or by truck, depending on the source and quantities. Materials could be stockpiled, blended, and distributed from one central facility on site at or nearby SIB. A combined materials facility would reduce duplication and potential interference between the two components of Riverbanks and Capping.

The use of such a facility for the Capping component would be efficient if a shore-based supply of capping material could be distributed hydraulically from shore to the on-water capping

placement equipment. If not, the capping material would likely be directly transported by barge directly to the placement equipment.

In future years, a centrally located facility at the SIB could also be utilized for the wider Portland Harbor site, with other Performing Parties potentially reaping some cost savings by not requiring construction of other similar facilities for multiple projects. And, the SIB parties could possibly reap cost savings in the form of income from use of the facility by the other projects.

This proposal also mirrors the Consortium concept described in Proposal #Dredging 2. That proposal pertains to contaminated materials going out from the SIB to transloading and subsequent transport to landfills for disposal.

Dredging – Debris and sediment material dredging and management

Proposal #Dredging 1 – Modify the Specs to clarify that contingency dredging requirements only apply to Dredge to RAL DCUs.

Note that this proposal was initially developed based on review and analysis of the 50% design documents available at the start of the VE Study. The Draft 50% Design called for dredging portions of the SIB, followed by capping of these dredged areas. Other areas would be capped with no prior dredging. The caps to be placed over the entire site are isolation caps, not merely post-dredging residuals caps. If the caps are effective for CCUs, the caps would be effective as well in DCUs post dredging. Therefore, I saw no technical basis for requiring a contingency Re-Dredging step for any CCUs that were dredged and then capped based on the 50% design and 50% specifications.

Re-dredging for a DCU as defined in the specs would require more than 2 weeks of time to sample and analyze plus the time required to actually accomplish the re-dredging. Limiting this re-dredging requirement would save significant time and costs. Therefore, I had recommended that the Specifications should be revised to clarify that contingency dredging requirements would apply only to Dredge to RAL DCUs.

At the mid-point meeting in week 4 of this VE study, HGL indicated that the ROD-selected remedy had been updated in the Pre-Final 90% RD to reflect that even though the ROD selected remedy for SIB was predominantly a Dredge and Cap approach, there will be some DCUs that will be Dredged to RAL. Subsequently, the 90% Dredging Technical Memorandum identified specific DCUs that would be Dredge-to-RAL. The contingency dredging requirement would therefore be appropriate for those DCUs only, and would not be applied for the majority of the DCUs within the SIB. Based on these changes, this proposal can be considered as adopted.

Proposal #Dredging 2 – Pursue Site-Wide Consortium for Transloading and Transport of Dredged Sediments for Disposal

The Dredging design now calls for Contractor identification of an off-site facility for transloading and transport of contaminated sediments removed by the dredging from the SIB. This facility would be intended to receive contaminated materials from the SIB for transport to a designated and approved landfill.

There is no design per se for the transloading and transport to landfill requirements for the SIB unit. The selection of landfills, transloading, and transport requirements are left to the contractor.

The SIB Project Area is the first in line for the PHSS. The cost estimate at this point references a timeline of 4 years from completion of the RD to bidding, an additional year for preparations post-award, and 8 years for open water construction. This is potentially a 13 year or greater timeframe to completion. The SIB contractor is tasked to identify facilities and landfills from those now existing, but there are multiple Project Areas in the Portland Harbor site. All the Performing Parties associated with these units will face the same needs with respect to transloading and transport. But assuming the Contractor selection approach for each unit of the Portland Harbor site seems inefficient.

This proposal is a suggestion to potentially save time and costs for both the SIB Project Area and the other such units to come. If the RPs for all Portland Harbor units would or could work together, forming a Consortium of sorts to forge cooperative arrangements, more efficient use of facilities, staging, materials, etc. could be pursued. With more RPs working together, the costs for these remedy components could be reduced over time, based on economy of scale, considering the huge increase in material volumes to come in future years. Cost participation in such a venture could be settled within the framework of the Cost Allocation Process.

The timeframe for SIB may not allow for the Consortium process to address the needs in the early phases of SIB work, but savings could be realized for the later phases for SIB. HGL has indicated that there are no orders currently in place for any other Areas of the Site, so the Performing Parties are still in the early stages of "working together". But this could change if significant cost savings could be gained by all parties.

Proposal #Dredging 3 – Require consideration of Redundancy for critical pieces of equipment in all materials handling operations.

Redundancy for critical pieces of equipment or components for the materials transloading and transport is crucial. If a dredge is idled due to a breakdown somewhere in the chain of operations, the cost is significant. I refer here to off-loading equipment such as cranes, front loaders, numbers of barges, towboats, etc. This is not a direct cost savings item. Rather it is an

important cost avoidance item. Hard lessons related to this topic were learned for the Hudson River site regarding redundancy for off-loading. This proposal applies to both the transloading and transport of dredged sediment and debris from the site as well as capping materials to the site for placement. The inclusion of redundancy provisions of this nature could be included in the specifications or could be included as a proposal requirement in the bidding process.

Capping – Engineered capping material procurement and placement

Proposal #Capping 1 – Modify the Cap Placement Tolerances for the CIL cap layer and apply all tolerances on an area-wide basis for Performance Monitoring Units

The Preliminary 50% Specifications and 90% Snapshot Specifications included a table of cap placement tolerances for both CIL and EPL components for the caps. When I first reviewed those specifications, my initial impression was that the +3/-0 inches tolerance for the CIL cap layer was "tight". These specs also stated that "Placement tolerances will be measured using analysis of high-resolution multibeam hydrographic survey data…" These multibeam data would be processed to produce a grid with 3x3 foot grid cells. The specs also state that "the Contractor shall correct placement deficiencies and conduct additional associated Placement Post-Construction Surveys to the satisfaction of the Project Representative and at no extra cost …"

In my subsequent review of the 90% Specifications, I saw that the same table of tolerances and the same language was included for measurement and addressing deficiencies. After again considering the "tight" tolerance of +3/-0 inches for the CIL, and the method of determining the results by small grid cells, I now believe that these tolerances are overly constraining, and that it would be very difficult to efficiently and economically construct these caps on the scale required for the SIB.

The -0 inches tolerance as now described in the specs means that the CIL layer thickness must meet the 12-inch thickness with no tolerance for under-placement. If the 12 inch thickness is not met, additional material would be required. The +3 inches tolerance would allow for a maximum of 3-inches overplacement for payment, with a 6-inch allowable overplacement. If the overplacement exceeds 6 inches, the material would require removal. The specs are defined such that these tolerances must be met for every 3x3 foot grid cell.

I have two recommended modifications regarding these tolerances, one being a direct change of the tolerance for the CIL layer, and the second being a change in the approach to confirm successful cap placement.

First, modify the cap placement tolerances for the CIL layer to +3/-3 inches.

With a -0 inch tolerance requirement, the contractor is incentivized to place more cap material to meet the 12-inch thickness or greater 100% of the time. This means there will be a significant net surplus of cap material placed overall. This equates to more time spent to accomplish the

placement. More cap material is a good thing with respect to cap performance. But more time equates to more cost to the contractor. The basis of payment for this part of the work is paid by the area capped, not the volume of cap material placed. So, the contractor bears a higher cost for the time spent to do the work plus the higher cost of the additional volume of cap material the contractor must purchase and transport to do the work. Also, the tendency to place additional material to meet the minimum required thickness can result in a higher risk to the contractor to place material at thickness above the maximum allowed overplacement. This would require remedial work at high cost to the contractor. I believe these multiple factors would result in higher bids.

Second, evaluate compliance with the tolerances on an area wide basis for each Performance Monitoring Unit (PMU).

In the most recent 90% documents, the concept of CCUs for capping certification has been altered to aggregating the 130 CCUs into 18 Performance Monitoring Units (PMUs) for the purpose of monitoring cap performance.

Each PMU would be comprised of a large number of the 3x3 foot grid cells. As the specs are written now, if the tolerances are not met in a given grid cell, remedial work is required to correct that specific grid cell. It would be very expensive to re-mobilize equipment to add material or remove material over small surface areas. This approach would lead to higher bids.

With an area wide approach, the survey results for each grid cell would be evaluated as a group for the entire area of the PMU. A benchmark level of success would dictate success or failure for the entire PMU. Other large scale sediment sites, the most notable being the Hudson River, have used 90% of the area within the tolerances as the benchmark required for a "pass" with no requirement for remedial work. If more than 10% of the area did not meet the benchmark, remedial work would be required for that PMU. This area-wide approach is recommended for all the cap layers, both CIL and EPL.

This proposal is made assuming that an efficient method of placement of the capping materials is used as discussed in proposal #Capping 2. Specialized spreading equipment has been utilized at several large capping sites for spreading of cap layers in an acceptably efficient rate of progress and at acceptably consistent layer thicknesses. Examples of these equipment types are described in Proposal #Capping 2.

If the tolerances remain as "tight" as they are now, I believe bidders will substantially increase their bids due to the potential slow down of the work and the higher potential need for remedial actions, and/or there will be fewer bidders submitting bids for the project.

Proposal #Capping-2 – Modify the Specifications to allow for use of large-scale spreaders for placement of capping materials.

This proposal is similar to Proposal #Structures1. Both the 50% and 90% Specifications as written imply bucket placement as the approach for placement of the isolation cap layers (mixtures of sand and GAC and bedding stone). Cap placement by the bucket load will be a slow process with higher costs. With the exception of tight areas such as around structures, large scale spreading equipment would be efficient in spreading the materials at a much faster rate over most of the large open water area of the SIB, with potentially large cost savings.

Such spreaders include both mechanical spreaders that employ gravity release of material through manifold arrangements or direct hydraulic feed to spreaders for placement of sand/GAC cap layers. Such spreaders have been very effective for capping large areas at sites such as Fox River WI, Onondaga Lake NY, and Gowanus Canal NY. The nature of these equipment types also allows for real-time monitoring of cap layer thicknesses directly from the floating plant, providing a more consistent placement of layer thickness. Also, some of these spreaders allow for direct hydraulic feed of the cap material to the spreader from the shore, eliminating the need for barges to shuttle material to the spreaders as would be required for bucket placement.

Depending on the size requirements for the bedding stone component of the caps, the manifold equipment type may be a possibility for the bedding stone placement. The bedding stone is characterized as a 2 to 3 inches diameter stone, and larger scale manifold equipment could be efficient for spreading this layer.

Examples of large-scale spreaders are shown in this Report's Appendix B, Figures 5 through 7.

This proposal would also involve reconsideration of the requirement for a Verification Placement above water to demonstrate the equipment is effective. Such a practice placement demo above water would be impractical for large equipment spreaders as described in this proposal. These spreaders have a proven track record, but an in-water demo could be conducted.

Proposal #Capping 3 – Modify the Specifications to allow for Use of Compartmented Bottom Dump Barges or other alternative spreading approaches for placement of armor stone or Habitat stone

There are significant requirements for armor stone placement in the project. Both the 50% and 90% Specifications implied the use of bucket placement for the stone. Barge-based placement of armor stone has been done for placement of large armor stone. These barges are compartmented such that the compartments can be uniformly loaded and simultaneously opened such that a larger surface area, on the order of 20 by 60 feet can be covered with a single load. Applications of such equipment should be allowed in the Specifications. A requirement for a demonstration of their effectiveness should be considered, as is now mentioned in the 50% Specifications.

Figure 8 in Appendix B is a photo of one type of compartmented bottom-dump barge.

Proposal #Capping 4 – Optimize Multi-Purpose Monitoring Stations for Cap Performance Assessment

Appendix N of the DCR deals with the Project Area Monitoring Plan (PAMP), and the PAMP at this 50% Design stage was focused for the most part on the Cap Performance Assessment. The topics for that assessment include porewater sampling, depositional sediment monitoring and physical integrity of the armor and habitat cap layers.

The PAMP calls for collection of pore water samples, sediment surface samples, and elevation surveys to determine cap integrity. Passive samplers are recommended for the pore water data. In the 50% documents, these pore water data would be collected for every CCU located in an upwelling area. So, the numbers of stations would have been significant.

This Proposal was included in the first draft of this report submitted in week 5 of this VE study. That draft proposal dealt with the concept of using multi-purpose monitoring stations for collection of the required data for pore water and cap integrity. Using a multi-purpose station will save time and cost by meeting multiple requirements with the same monitoring event.

In my original proposal, the settling plates would be composed of a plate with a marked vertical riser. The plate would be set on the sediment surface prior to cap material placement. They would need to be heavy to avoid damage during armor stone placement. It is important to monitor consolidation with the settlement plates to distinguish between consolidation of the underlying sediment versus the erosion or movement of the overlying capping layers. These same stations could be used to observe and sample any surface sediment accumulation by adding a sediment trap to the station.

In week 7 of the study, the 90% Pre-Final Specifications (HGL 2025i) and 90% drawings (HGL 2025j) were made available for my review. The 90% specs provided a description of a more robust concept for cap monitoring "ports", essentially large cast concrete frames with steel "lids", each about 10 feet square and each with 12 openings for housing the peepers. Each peeper would be analyzed at 3 depth intervals in the CIL. Figure 126 of the 90% drawings shows the configuration of the ports. The specs call for three of these ports to be placed in each of 130 CCUs. The sampling data would be collected in year 1 following the remedy construction and in 5 year intervals thereafter for 15 years.

The scope of the monitoring effort as laid out in the 90% specs can be summarized as:
130 CCUs x 3 ports x 12 openings x 3 sampling intervals at depth = 14,040 samples.

The concept seems workable, but would be expensive to construct and place properly. In my view, the scope of the effort as originally described is unnecessarily excessive. I propose that the scope of this effort be optimized and should focus on a lesser number of port locations, concentrating on those locations with the higher underlying concentrations of COCs and with the higher upwelling rates. I would recommend the scope be reduced to perhaps 20 to 30 ports.

The scope would then be summarized as:
Between 20 to 30 ports x 12 openings x 3 sampling intervals at depth = Between 720 to 1080 samples.

Fewer ports would reduce the construction and installation cost substantially. And, reducing the number of samples for analysis would reduce the analytical costs substantially. I would note that even with this reduction in scope, the SIB program would be the largest scope of cap performance monitoring ever undertaken, at least to my knowledge.

I believe the location/configuration of the PMUs and the specific locations and numbers of ports in the PMUs should be clearly defined in the drawings, essentially as part of the design. These locations should not be left to the Contractor. As mentioned above, these locations and numbers of ports should be defined considering areas of higher underlying concentrations of COCs and with the higher upwelling rates.

Also, note that such heavy ports will likely induce localized consolidation due to their weight, unlike a lighter settling plate arrangement. So, the ports may not provide a good base from which to evaluate consolidation.

General Proposals

Proposal #General 1 – Clarify the general sequencing of work.

The Draft 50% RD Specifications contain a sequencing section in Part 2, but this section covers only a general sequence of work. This proposal addresses the need to clarify the sequence of work that would be allowed on a site wide basis, considering the size of the site and the scheme of DCUs, CCUs and RCUs.

HGL indicated there is a 300 ft buffer to be maintained between dredging while capping is on-going. But this raises the question as to how many locations within the SIB could be active with dredged and/or capping activity. It is a large site and different schemes could be considered with respect to sequencing dredging and capping concurrently in multiple CCUs/DCUs.

The simple rule of thumb, dredging from upstream to downstream, applies to unidirectional flow conditions (as for the main stem river), and may have application within DCUs depending on the size of the DCU. But this rule of thumb has limited application for SIB at large, which is a dead end offshoot of the river channel. The capping rule of thumb is to cap from downslope to upslope. This would apply for work within any of the CCUs.

Clarification is needed on sequencing to address these related questions:

- That dredging could occur in multiple DCUs concurrently;
- That structural work be completed prior to riverbank restoration in a given RCU;

- That riverbanks can be worked concurrently with adjacent dredging DCUs;
- That any set of DCUs must be done prior to any capping within or adjacent;
- That capping could occur in multiple CCUs concurrently; and,
- That it is possible to identify a sequence of DCUs and CCUs area wide most favorable for reducing impacts.

Proposal #General 2 – Advocate for increase in the in-water work window or outright elimination of the window restrictions based on a cost comparison plus suggested mitigation and enhancement incentives.

Fish Windows are a major influence on the cost of this remedy as proposed in the 50% design. I know protection of resources is a concern for both the tribes and communities at large. However, I would advocate for further discussion on that issue with all the stakeholders, focusing on an additional cost estimate comparing the window parameters now being considered with expansion and/or elimination of the window restrictions. Considering we are now looking at a 13-year or longer project overall, a generous increase in the work window or an outright elimination of the restriction would equate to large cost savings, based on inflation considerations alone. Increasing work windows would also result in direct cost savings on reduced mob/demob. With an extension, the total time of exposure of resources to in-water work across the total span of the remedy would be the same, just compressed into a reduced overall timeline. With outright elimination of the restrictions, the timeline for completion of the remedy could possibly be cut in half, with the environmental benefits of the completed remedy gained over an additional 5 years or more.

Consideration of changes in the window restrictions should include supporting issues and/or arguments that should be added to discussions or negotiations. The work windows are normally applied to in-water construction activities that support commercial or governmental requirements to support navigation improvements or harbor development and maintenance. In the case of Portland Harbor Superfund, the in-water activities at issue here are based on the improvement of the environment of the site. If restrictions are eased, Portland Harbor would benefit from years of restored environmental quality, coming to fruition in a few years as compared to the lengthy timeline of 13 years with the restrictions.

In addition to the environmental quality benefits, other mitigation measures or enhancements could be considered. Habitat creation or improvements in upstream reaches either within the overall PHSS or upstream from the site would be a possibility. Considering that the overall cost for the full Portland Harbor site may be on the order of several billion dollars, an enhancement related to public outreach and education would be appropriate for such an immensely large environmental project. One possibility is a publicly accessible visitor center and environmental outreach center for education of the public (especially young people) on how the restoration was accomplished and what the restoration means to the Portland community.

Proposal #General 3 – Source Control issues should be resolved by convening an outside expert panel to assess 1) the findings of the SAR as compared to the EPA and State of Oregon comments on the SAR, and 2) the risk of recontamination of the SIB from existing sources. Based on the findings of such a panel, any needed source controls should be implemented and confirmed to be effective prior to initiating any RA in the SIB.

This proposal is not linked to any direct cost savings for the RA. Rather, the proposal is in direct response to a critical issue related to the overall integrity of the RA.

The principle "Control Sources Early" is stated clearly in the EPA Superfund Sediment Guidance (see P 2-21 of EPA 2005) and in EPA OSWER Directive 928.6-08, Appendix A of that same EPA 2005 document.

HGL conducted a *Final Sufficiency Assessment Report* (SAR) in January of 2025 (HGL 2025a). This SAR report was conducted by HGL as required by the Administrative Settlement Agreement on Consent (ASAOC) between the U.S. Environmental Protection Agency (EPA) and the Performing Parties. The SAR is an extensive study, at over 2000 pages, of contaminant sources and the potential of those sources compromising and RA in the SIB and other areas of the overall Portland Harbor site.

The Executive Summary of the SAR states:

> This SAR identifies the presence of a substantial risk of post-RA recontamination attributable to a combination of sources. The dominant risk of recontamination is the downriver transport of sediments containing contaminants of concern (COC) into the SIB with a notable but much less significant secondary contribution from ongoing stormwater discharges to the SIB. These recontamination risks support the need for EPA and the Oregon Department of Environmental Quality to pursue characterization of uncontrolled sources associated with the identified potential risk of recontamination pathways followed by implementation of additional source control measures before proceeding with RA.

EPA and the State of Oregon presented detailed comments on the SAR to support the position that Source Controls now in place were adequate and that RD should not be delayed based on source control issues (EPA 2025 and Oregon DEQ 2025).

This proposal is to further evaluate this issue by convening an outside expert panel to review the information from both sides and provide recommendations. There is time to do this, and the issue is of such importance that we cannot leave this hanging with a disagreement on the facts of the matter.

REFERENCES

U.S. Environmental Protection Agency (EPA), 1995. *Remedial Design/Remedial Action Handbook.* U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. June.

EPA, 2005. *Value Engineering (For Fund-Financed Superfund Remedial Design/Remedial Action Projects)*, OSWER 9355.5-24FS. November.

EPA 2005. *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*. EPA-540-R-05-012. December 2005.

EPA, 2017. *Record of Decision, Portland Harbor Superfund Site, Portland, Oregon*. United StatesEnvironmental Protection Agency Region 10, Seattle, Washington. January.

EPA, 2021. *Remedial Design Guidelines and Considerations, Portland Harbor Superfund Site*. Portland, Oregon. April 23.

EPA 2025. *EPA Comments and Responses on Sufficiency Assessment Report Revision 0* (August 2024) and Sufficiency Assessment Report Revision 1 (February 3, 2025), Swan Island Basin Project Area. Comments dated March 28, 2025.

HydroGeoLogic, Inc. (HGL). 2025a. *Final Sufficiency Assessment Report Revision 1*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. January.

HGL. 2025b. *Value Engineering Screening – Draft 50% Remedial Design*, Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Reston, Virginia. March.

HGL. 2025c1. *Design Criteria Report – Draft 50% Remedial Design,* Swan Island Basin Project Area*,* CERCLA Docket No. 10-2021-001. Volume I. Prepared for the Swan Island Remedial Design Group, Reston, Virginia. March.

HGL. 2025c2. *Design Criteria Report* – Pre-Final 90% Remedial Design, Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Reston, Virginia. August.

HGL. 2025d. *Volume II Plans – Draft 50% Remedial Design*, Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Reston, Virginia. March.

HGL. 2025e. *Volume III Preliminary Specifications and Drawings - Draft 50% Remedial Design,* Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. Swan Island Basin

Project Area CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Reston, Virginia. March.
HGL. 2025f1. *Cap Design Technical Memorandum Pre-Final 90% RD with attachments.* Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Reston, Virginia. August.
HGL. 2025g. *Dredging Design Technical Memorandum Pre-Final RD 90%*, Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Reston, Virginia. August.

HGL. 2025h1. *Riverbank Design Technical Memorandum Pre-Final RD 90%*, Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Reston, Virginia. August.

HGL. 2025i. Geotechnical Design Technical Memorandum Pre-Final RD 90%, Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Reston, Virginia. August.

HGL. 2025j. Structural Design Technical Memorandum Pre-Final RD 90%, Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. Prepared for the Swan Island Remedial Design Group, Reston, Virginia. August.

Oregon Department of Environmental Quality. 2025. *DEQ Comment on the Final Sufficiency Assessment Report – Revision -1*, Swan Island Basin Project Area, Portland Harbor Superfund Site.

Appendix A: Qualifications for Dr. Michael R. Palermo

I am a consulting engineer with experience in Dredged Material Management and Contaminated Sediment Remediation since 1974, serving both private sector and government clients. I was employed as a civilian with the U.S. Army Corps of Engineers (USACE) from 1967 to 2003. While with USACE, I served as a Research Civil Engineer and Director of the Center for Contaminated Sediments at the Engineer Research and Development Center (ERDC) at the Waterways Experiment Station (WES), where I managed and conducted both research and applied studies for the USACE, EPA, Department of Justice (DOJ), National Oceanic and Atmospheric Administration (NOAA), U.S. Navy, and others. I also managed the WES/ERDC research focus area for contaminated sediments. Since entering private practice in 2003, I have provided design services, technical review and oversight for clients, both in the U.S. and abroad, on a wide range of sediment remediation and navigation projects.

I received my Bachelor of Science (BS) and Master of Science (MS) degrees in Civil Engineering from Mississippi State University and a PhD degree in Environmental and Water Resources Engineering from Vanderbilt University. I am a Registered Professional Engineer (Mississippi and North Carolina) and a member of the Western Dredging Association (WEDA) and the American Society of Civil Engineers (ASCE). I have served as an adjunct professor at Texas A&M University and Mississippi State University. I also serve as Associate Editor for the Journal of Dredging Engineering, a peer-review publication of WEDA.

I have authored or co-authored well over 200 publications in the area of dredging and dredged material disposal technology and remediation of contaminated sediments. These include the USACE 1987 Engineer Manual Confined Disposal of Dredged Material, USEPA 1998 Guidance for In-Situ Subaqueous Capping of Contaminated Sediment, USACE 1998 Guidance for Subaqueous Dredged Material Capping, USEPA 2005 Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, commonly known as the “Superfund Sediment Guidance”, USACE/USEPA 2008 Technical Guidelines for Environmental Dredging of Contaminated Sediments and USACE 2015 Engineer Manual Dredging and Dredged Material Management.

I have participated in a number of Value Engineering Studies in past years to include Grand Calumet River 201; Boeing Plant 2 Duwamish River 2012; Waukegan Harbor 2016; and Spirit Lake MN 2018.

I have had prior experience related to the Portland Harbor Superfund Site, acting as a consultant for the Port of Portland during the Feasibility Study stage 2016-2017 and later as an expert for the Port during the Design Cost Allocation Process in 2024.

Appendix B: Illustrations for Equipment Cited in VE Proposals



Figure 1. Small scale hydraulic Spreader mounted on flexi-float, placing cap material.



Figure 2. Small scale mechanical manifold spreader placing cap material.



Figure 3. Mudcat dredge, reverse discharge, spreading cap material.



Figure 4. Mudcat dredge, reverse discharge, rainbowing for cap placement, Soda Lake WY.



Figure 5. Large Scale manifold spreader, placing cap material.



Figure 6. Large Scale hydraulic spreader, placing cap material, Onondaga Lake, NY



Figure 7. Large scale rotary spreader, hydraulic feed, spreading cap material, Fox River WI.

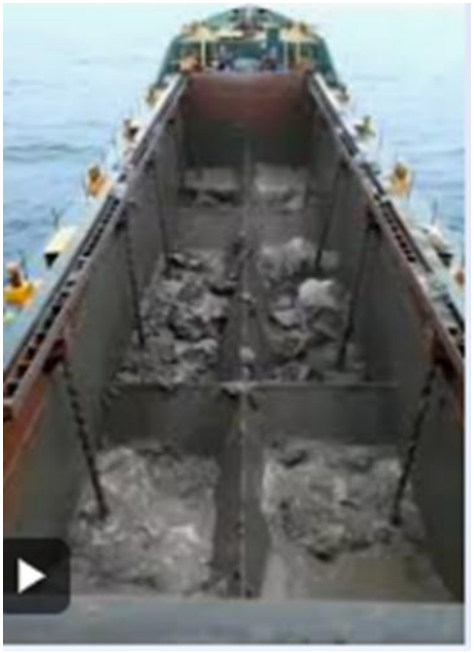

Figure 8. Compartmented bottom-dump barge.

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APPENDIX M

CONSTRUCTABILITY ASSESSMENT TECHNICAL MEMORANDUM

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CONSTRUCTABILITY ASSESSMENT TECHNICAL MEMORANDUM
PRE-FINAL 90% REMEDIAL DESIGN
SWAN ISLAND BASIN PROJECT AREA
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, MULTNOMAH COUNTY, OREGON

The Constructability Assessment Technical Memorandum presents a summary of constructability assessment efforts for the Pre-Final 90% Remedial Design (RD) for the Swan Island Basin (SIB) Project Area within the Portland Harbor Superfund Site (PHSS) in Portland, Multnomah County, Oregon. The HydroGeoLogic, Inc. (HGL) team (RD Team) performed the work on behalf of the SIB RD Group based on the requirements of the PHSS Record of Decision (ROD) (EPA, 2017a) and the Administrative Settlement Agreement and Order on Consent (EPA, 2021a). This memorandum includes references to the previously published Basis of Design Report (BODR) (HGL, 2024a) that was approved by EPA in December 2024. References are also made to the previously published Pre-Design Investigation (PDI) Evaluation Report (ER), (HGL, 2024b) which was approved by the U.S. Environmental Protection Agency (EPA) in January 2025.

This memorandum follows the work completed in Section 6.0 Remediation Implementability Assessment of the BODR (HGL, 2024b). This assessment identified and evaluated factors that were important to consider for the timely, cost effective and successful conclusion of this remediation project. These factors informed the Draft 50% RD and prompted the constructability review as part of the progression to the Pre-Final 90% RD to produce a constructable design.

Section 1.0 presents the process for the constructability review of the RD. Section 2.0 describes the constructability considerations for technology assignments outlined in Section 6.1.1 of the BODR (HGL, 2024a) that were made in the Pre-Final 90% RD. Section 3.0 summarized construction activity considerations that have informed elements of the RD, along with resulting particulars outlined in the specifications.

1.0 CONSTRUCTABILITY REVIEW

A constructability review of the Draft 50% RD was completed as an important design quality assurance milestone. Led by the contractor specialists, the review focused on providing a design that could be built efficiently, safely, and in accordance with regulatory and environmental standards. It prompted targeted updates to the Pre-Final 90% RD that enhanced buildability without compromising the complex technical decisions that informed the original Draft 50% RD development.

Table 1-1 summarizes the key tasks completed during the constructability review for the Pre-Final 90% RD, along with a general description of the review and the specific design deliverables where the outcome of the review is detailed.

Corporate Headquarters
11107 Sunset Hills Road, Suite 400
Reston, Virginia 20190
703-478-5186

Table 1-1 Constructability Review Tasks Summary

Constructability Review Task	Description	Deliverable Informed
Review of Draft 50% RD Documents	Identified constructability issues in specifications and drawings.	90% RD Drawings and Specifications
Evaluation of Dredging and Material Handling	Informed TODP; addressed equipment, access, sediment removal, and logistics.	TODP (Volume II, Appendix O), Specifications 35 24 20, 35 24 20.01
Construction Sequencing and Scheduling	Structured to minimize rework and environmental impacts; informed RA schedule.	90% RA Schedule (Volume I – Design Criteria Report, Figure 3-1), RAWP (to be prepared by RA Contractor)
Technology Assignment Consideration Review	Reassessed the considerations made in BODR (HGL, 2024a) Section 6.1.1; confirmed feasibility in the Pre-Final 90% RD.	90% RD Drawings and Specifications
Debris and Structure Considerations	Integrated debris removal and structural access limitations into design.	Drawings, Specification Section 35 24 20, Structural Design TM (Volume I, Appendix J)
Waterway Use Authorizations and Remedial Use Authorizations	Addressed Oregon DSL waterways use authorizations modifications and remedial activity authorizations (OAR 141-145).	90% Cost Estimate, Specification Sections 0135 43, 01 41 00, 01 41 26
Habitat and Riverbank Restoration	Incorporated restoration to meet RAO 9; ensured constructability of excavation, fill, and planting of riverbanks.	Riverbank Design TM (Volume I, Appendix D), 90% RD Drawings and Specifications
Construction Equipment and Facilities	Identified required equipment (e.g., dredges, barges, cranes) and support infrastructure (e.g., field offices, docks).	Specification Sections 01 52 00, 35 24 20
Material Procurement and Handling	Aligned specs with ODOT standards; planned for specialty materials and transloading logistics.	TODP and Material Specifications including Sections 31 00 00, 31 05 19, 31 34 19, 31 37 00, 31 62 10 31 62 16.19, 32 90 00, 33 05 25, 35 37 10.
Logistics and Constraints	Considered in-water work periods, utilities, environmental protection, and facility operations; emphasized Facility Owner/Operator coordination.	90% RA Schedule and Specification Sections 01 14 00, 01 31 00, 01 35 43, 01 41 00
Facility Owner/Operator Engagement	Integrated feedback from facility owners/operators; recommended approach for continued engagement with Facility Owner/Operators.	90% RA Schedule and RAWP
Dredging Productivity and Equipment Availability	Estimated production rates by equipment and site conditions; evaluated availability of barges, cranes, and haul trucks.	Dredging Design TM (Volume I, Appendix H), 90% RA Schedule
Risk Identification and Mitigation	Identified risks and developed mitigation strategies.	Risk Register (Volume I, Appendix K), 90% RD Drawings and Specifications

Notes:
DSL = Department of State Lands
OAR = Oregon Administrative Rules
ODOT = Oregon Department of Transportation
RA = Remedial Action
RAO = Remedial Action Objective
RAWP = Remedial Action Work Plan
TM = Technical Memorandum
TODP = Transportation and Off-Site Disposal Plan

Discussion of review tasks and their impact on deliverables is summarized in the following sections.

2.0 TECHNOLOGY ASSIGNMENT CONSIDERATIONS

All technology assignment considerations identified in Section 6.1.1 of the BODR (HGL, 2024a) were thoroughly evaluated during the development of the Draft 50% RD. As the design progressed to the Pre-Final 90%, those technology assignment considerations that remained relevant following the 50% constructability review have been further addressed and are discussed in the section below. The Pre-Final 90% RD includes measures to support a constructable design in relation to the following technology assignment considerations and none of the following items are considered obstacles to executing the remedy as designed.

2.1 DEBRIS

Classification and identification of the debris has been described in the BODR (HGL, 2024a) and the PDI ER (HGL, 2024b). Known items of debris have been noted in the Debris Removal and Demolition series in the drawings; however, the RA Contractor will be responsible for confirming debris during the RA.

The RA Contractor is responsible for debris removal, as specified in Section 35 24 20 – Remedial Dredging, Barge Dewatering, and In-Water Transportation. Dredge productivity analysis has indicated that performing a separate, pre-dredge debris-removal effort would be an inefficient overall approach to the work. The RA Contractor will equip sediment barges with ecology block debris bins to sort and contain debris larger than 6 feet (ft), to meet the bid item specified in Specification Section 35 24 20*,* that pays by the ton for debris larger than 6 ft. While a full-scale pre-dredge debris removal effort would not efficient, certain large debris items identified during the PDI, such as potential vessels, may require a specific removal operation prior to dredging. It is anticipated that this removal effort for large, isolated items will occur prior to the production dredging of a specific grid prism. Removal of debris prior to placement of cap material will be required in areas where no dredging is planned.

Informed by selections made during the 90% RD, the debris removal is not expected to pose an impediment to successful RA construction.

2.2 WORK AROUND STRUCTURES

A structure-by-structure review has been performed, summarized in the Structural Design Technical Memorandum, (Volume I, Appendix J), and consideration given to the physical constraints and challenges the RA Contractor would face when attempting to dredge underneath each structure. To the extent feasible, only capping is proposed under structures in the Pre-Final 90% RD. These design elements also consider the geotechnical considerations made throughout the RD, summarized in the Geotechnical Design Technical Memorandum, (Volume I, Appendix I).

Constructability of capping and erosion protection was addressed in terms of RA Contractor access and equipment limitations. Capping material size has also been reviewed and adapted, generally resulting in smaller material size; this supports multiple placement methods that may be required due to restricted access, such as excavator buckets, conveyor systems, stand shooters, or if

necessary, placement by hand. No concerns regarding general revetment constructability were noted within the review except for within pile fields under structures. Revetment construction under structures is unavoidable in some of the more energetic areas; therefore, alternative placement methods (e.g., conveyor systems) and less efficient construction are anticipated.

2.3 WATERWAYS USE AUTHORIZATIONS AND REMEDIAL USE AUTHORIZATION REQUIREMENTS

The Oregon Department of State Lands (DSL) requires waterway use authorizations for most docks and other structures in or over Oregon state-owned lands. These include most docks, floats, and other structures 2,500 square ft and larger that are not in wharf use. Change of ownership requires an assignment of the waterway use authorization.

The RD Team has engaged with shoreline facility owner/operators at several stages throughout the RD process to obtain information on their structures for assessing impacts from excavation, dredging, and capping beneath and adjacent to the in-and-over water structures. Impacts to structures or related uses caused by implementation of RA, including structure removal, modification or replacement, may result in modification of a DSL waterway use authorization.

Remediation conducted under an EPA administrative order and subsequent associated habitat restoration require remedial activity authorization in accordance with Oregon Administrative Rules (OAR) Chapter 141, Division 145. The proposed RA includes environmental dredging, capping, and habitat restoration activities that are subject to the requirements of OAR 141-145. Although, standing alone, different types of remedial activity might qualify for different types of OAR 141-145 remedial authorizations, DSL will generally evaluate the proposed RA as a whole and may use the form of authorization that accommodates the longer-term use. For example, these rules consider soil and sediment caps to be permanent structures. Permanent structures require an Easement. Obtaining the necessary remedial activity authorizations required by OAR 141-145 will be the responsibility of the RA Performing Parties.

2.4 HABITAT CONSIDERATIONS

Riverbanks in the SIB Project Area include riparian and aquatic habitat. Contamination within riverbanks must be controlled to achieve the goals of Remedial Action Objective (RAO) 9 which is to “reduce migration of contaminants of concern (COCs) in riverbanks to sediment and surface water such that levels are acceptable for human health and ecological exposures” (EPA, 2017a).

Soil excavation and dredging is required to regrade riverbanks for structural purposes, to stabilize over water and shoreline structures, and to prevent erosion of shoreline surface and subsurface soils to achieve RAO 9. Excavation along the riverbanks will also remove existing vegetation. Following the excavation and dredging, fill, capping materials, and shoreline protection materials will be placed to complete the RA.

The design of the fill, capping, and shoreline protection includes replacing and creating habitat. Riverbank habitat restoration will be the last step in completing the SIB Project Area RA construction and can be completed with standard landscaping equipment and procedures for planting on riverbank slopes. See the Riverbank Design Technical Memorandum, Appendix D of the DCR.

3.0 CONSTRUCTION ACTIVITY CONSIDERATIONS

Construction equipment for the RA will, at a minimum, consist of floating plant, excavators, material barges, a hydrographic survey boat, and tugboat. The RA Contractor will need to use multiple floating plants that will be tasked with different operations that will vary from season to season. This work will include deep water dredging, shallow dredging, support of bank excavation and material removal, placement of cap materials (of various depths and design functions) and backfill, demolition activities, and structural improvements.

Outside of the immediate Project Area, the RA Contractor will require access to sediment and debris transload facility(ies) and a separate location for transloading fill, riverbank habitat substrate, and capping material to load barges. Specific information regarding the transload facility and its requirements (including permits) are summarized in the Transportation and Off-Site Disposal Plan (Volume II, Appendix O) and Specification Section 35 24 20 – Remedial Dredging, Barge Dewatering, and In-Water Transportation and Section 35 24 20.01 – Transloading, Upland Transportation, and Disposal.

The RA Contractor will require space for a field office and access to a floating dock to moor work skiffs, hydrographic survey vessel(s), and full-time tugboat. The field office will need to have parking for personnel and an adequate laydown area to operate equipment for delivery offloads, and storage of miscellaneous construction supplies. All permits applicable to the RA Contractor's upland activities would need to be obtained. Refer to Specification Section 01 52 00 – Construction Facilities.

3.1 CONSTRUCTION MATERIAL

The RD for the SIB Project Area includes a significant quantity of backfill, rock, habitat substrate, and erosion protection/chemical isolation material. These materials will be used to construct the cap erosion protection layer (EPL) and chemical isolation layer (CIL), shoreline revetments, vegetated soil covers on riverbanks, and outfall scour protection systems. Allowing for timely material procurement and supply of erosion protection materials has been a key consideration for the RD Team. To help alleviate this concern, where feasible, materials have been conformed to Oregon Department of Transportation (ODOT) standard material specifications. This is expected to broaden the number of suppliers with material readily available, reduce the cost of producing the materials, and reduce supply and delivery times. In addition, if suppliers are requested to produce large amounts of materials in anticipation of each In-Water Work Period, they will also have more confidence that the materials could be sold to others/elsewhere if the project cannot utilize the material or requires less material than anticipated.

Habitat mix materials (rounded gravel), which are required to be placed as cap EPL/leave surface material in shallow water, will be a specialty item for suppliers that will need to be produced for SIB Project Area RA and other RA projects in PHSS. Use of this specialty material cannot be avoided. However, the required volume of habitat mix for the SIB Project Area is relatively low and rounded gravel is available in the region. Advanced warning should be given to the suppliers so that sufficient supply can be generated prior to the In-Water Work Period.

Material sourcing, and the sequential handling of this material, will be a critical activity for the success of the project. Outlined below are key considerations for the RA Contractor in both procurement and handling of construction material required for the RA:

- Finalizing required quantities and estimated delivery schedule.
- Coordinating with suppliers on the estimated delivery schedule to identify if suppliers need to begin producing and stockpiling materials prior to the start of each In-Water Work Period.
- Understanding materials needed to complete work and need for potential third party transloading or stockpiling facility, to allow material to be barged directly to Project Area.
- Understanding how many suppliers are required to meet the project requirements.
- Understanding each supplier's stockpile and trucking/hauling capability and willingness.
    - Number of dump trucks and haul trucks available
    - Haul routes and possible cycle times
- Identifying a location to transload materials to a barge and subsequent coordination with the facility operator.
- Understanding how the transload facility receives and loads barges, onsite stockpiling capabilities, other project commitments and how these factors may impact barge loading schedules.
- Identifying where in the loading sequence amendment mixtures will be mixed in and developing a plan to execute.
- Evaluating where amendments will be added and mixed.
    - Quarry, transload facility, or material replacement barge
    - Wherever mixed, the RA Contractor will need to demonstrate that they will be able to mix the added material satisfactorily

3.2 CONSTRUCTION EQUIPMENT

The selected RA Contractor will determine many of the means and methods used on the project. Multiple floating plants will be required to accomplish the RA. It is anticipated that at least one dredge crane will be required for the deep-water dredging. Additional dredge plant(s) may either use crane(s) or excavator(s).

The placement of cap materials is expected to be completed with either a crane barge or excavator barge. A crane barge may be more efficient due to its larger bucket and swing radius. For some In-Water Work Periods, the RA Contractor may elect to have a third or fourth floating plant depending on schedule and work requirements. It is common in industry for these floating plants to be made up of a modular system such as “flexi floats.” Once assembled the RA Contractor would walk either a crane or excavator onto the barge. These modular barge systems can be assembled to use either spuds or anchors.

It is anticipated that the RA Contractor will have a separate, additional floating crane plant that can be used for capping, pile driving, demolition work and other related work. It is standard working procedure for cranes to be rented and walked onto a work barge. If a crane is used, a key requirement is to confirm the use of an appropriate crane chart for working on water. This applies to both rented and owned cranes.

Material barge needs will be high for SIB Project Area and PHSS overall. It is uncertain if the rental market in the region will be able to meet the demand, particularly if other projects are underway. The RA Contractor may have to source barges from outside the local market area. If the barges are leased and require mobilization along the coast to reach the Project Area, then the leased barges will need to be load-line American Bureau of Shipping (ABS) barges. Typically, these types of barges have a higher lease rate. It should be noted that modular barges are not typically used as material barges due to the configuration.

It is expected that many of the ancillary equipment items will be available for rent and purchase as needed. Ancillary equipment items anticipated to be needed for the project include excavators, environmental buckets, hydraulic buckets for excavators, work skiffs, and survey boats and equipment.

Depending on the other projects occurring at the same time in the PHSS, dump trucks and haul trucks may be at a premium. Haul routes and cycle times will influence the number of trucks needed. If other projects are underway, there is a risk that securing on-road haul trucks will be difficult and could make trucking a critical path activity.

Risk factors associated with equipment availability are influenced by market conditions. These risks, and mitigations, are summarized in the Current Risk Register and Status in Attachment D of the Cost Analysis Technical Memorandum (Volume I, Appendix K).

3.3 LOGISTICS AND CONSTRAINTS

Logistics for the successful execution of the SIB Project Area RA will require involvement and flexibility from all parties including but not limited to; the RA Contractor, shoreline facility owners/operators, material suppliers, equipment suppliers, other parties working in other areas of PHSS, transload facilities, and disposal facilities. The RA Contractor will develop an overall project schedule that shows the planned work sequence for the project, broken down by work periods. Shoreline facility owner/operators will need to share their critical operation information and schedules at the start of the project so the RA Contractor can incorporate it into the project schedule, where feasible.

Along with logistical requirements, the successful delivery of the RA must account for several constraints. These constraints include, but are not limited to:

- Design criteria for work operation separation and sequencing in order to minimize cross contamination, as required within the following plans (and reference specification sections):
    - Temporary Erosion and Sediment Control Plan (31 25 00 – Erosion and Sedimentation Control)
    - Dredging and Excavation Plan (35 24 20 – Remedial Dredging, Barge Dewatering, and In-water Transportation)
- Constraints associated with the protection of property and structures (01 19 50 – Protection and Maintenance of Property and Work);

- Water quality requirements, (addressed by the Water Quality Monitoring Plan [WQMP] and RA Contractors Water Quality Protection Plan within the Environmental Records Binder [ERB], 01 35 43 – Environmental Protection Procedures);
- Existing utilities (both in-water and riverbank) that may restrict/impact work operations (presented in the Drawings);
- Coordination with Oregon DSL for state-owned submerged or submersible lands that may or may not have waterway use authorizations in place (described in 01 31 00 – Project Management and Coordination);
- Shoreline facility owners/operators operational constraints (described in 01 31 00 – Project Management and Coordination); and
- In-Water Work Periods (01 14 00 – Work Restrictions).

The design constraints will need to be addressed in the RA Contractor's project schedule and RA Work Plan (RAWP) submittals. The project schedule will need to sequence and organize work in such an order to comply and satisfy all design constraints, including separating operations by a physical distance to minimize cross contamination risks or sequencing the work to accomplish structural improvements/changes required prior to the RA work. The RA Contractor will also need to address these design constraints in their RAWP to demonstrate their understanding of the contract documents and permit-equivalency requirements. The RAWP will also communicate the RA Contractor's plans for coordination with Oregon DSL, the City of Portland and other entities, as necessary, when restricting vessel movement through the Project Area.

See Specification Sections 01 31 00 for Project Management and Coordination (including Vessel Management Plan requirements); 01 32 00 for Construction Progress Documentation Requirements, 01 35 43 Environmental Protection Procedures; 01 41 00 Environmental Regulatory Requirements; and 01 41 26 Permits, Easements, and Right-of-Entry Requirements.

3.3.1 Impact of Vessel Traffic and Facility Operations

The SIB is an active waterway with multiple business facilities and varieties of operations. All of these will be impacted by RA implementation. Active and early communication between the RA Contractor and facility operators will be crucial to minimize this impact. Developing the overall project schedule will allow all parties to plan for operation to occur when RA work is not occurring at their property. Communication of any changes to the planned construction activities, facility operations, or the vessel schedule (both operational and construction), will also be critical to minimize impacts.

The RA Contractor will need to provide vessel notification as required by the U.S. Coast Guard, issue a Notice to Mariners, and provide the notification required by Oregon DSL. These notifications will state the names of the vessels that will be operating within the SIB, that the vessels are not self-propelled, and which marine channel is being monitored for communication.

Table 3-1 provides the RA Contractor with information to help plan and schedule the RA in the vicinity of each business. This information was obtained from surveys sent to each shoreline facility owner/operator in 2022, as described in the PDI ER (HGL, 2024b), and periodic follow up discussions during the RD.

Table 3-1 Shoreline and Overwater Structure Summary

Property/Facility/Status	Operations	Impacts Mitigation
Shipyard Commerce Center • Existing berths 306, 307 to be removed and replaced • Lagoon Wharf structure to be replaced, design by other party. • Dry dock has permanent anchor for security fence	Active year round	• Coordinate all RA activities with owner/operators. • RA needs to be completed prior to new pier construction.
Port of Portland • Existing dolphins and upslope mooring points removed • New permanent mooring piles • Berth 308 to be removed	• Base for Operating Dredge (Ocean) • Dredge deployed July-November	• Coordinate RA around dredge deployment • Temporary relocation of historic vessel.
Daimler Truck North America LLC Wind Tunnel supported by 4 steel pilings on shoreline	Year-round wind tunnel testing	Maintain 150-ft clearance on both sides of the facility during operations.
Anchor Park LLC	Upland Operations	Minimal Impacts
Swan Island Boat Ramp • City property, currently for sale • City Boat Ramp	Currently closed	Coordinate with the City of Portland's Harbor Master and Bureau of Environmental Services
Swan Island Dock Co. New breasting dolphin at Berth 311	Active marine terminal for barge deliveries, most active May to October	With coordination, potentially willing to support RA needs.
ATC Leasing No water access	Upland vehicle storage	No impacts if parking area is not impacted.
The Marine Consortium, Inc. • Marine response vessels • New mid-slope pinning walls constructed through existing pier	Full-time moorage and water access needed.	• Temporary relocation during RA work. • Coordinate partial demolition of pier with owner/operators. Incremental demolition/reconstruction could be accommodated
U.S. Navy Existing pier, may be removed in future	No waterfront operations	Access may be available with coordination.
U.S. Coast Guard • Pier and dock • Removal and replacement of existing fender piles • New toe wall • Mooring areas need dredging	Marine Safety Unit full-time moorage and access needed	• Temporary mooring relocation during RA • Shoreline access may be available with coordination.

3.3.2 Transloading

The logistics with the sediment/debris transload facility is another key element to the success of the project. The logistical considerations have been summarized in the Transportation and Off-Site Disposal Plan, Volume II, Appendix O.

3.4 DREDGING PRODUCTIVITY

Dredging production rates were estimated in the Dredging Design Technical Memorandum (DDTM) for a range of bucket sizes, equipment types (excavator and crane), and for different areas

of SIB with different accessibility. Dredging in open water has higher production rates, whereas dredging in shallow water areas, bank excavation, and work around structures have lower production rates. Refer to the DDTM (Volume I, Appendix H) for more information regarding production rates.

3.5 SEQUENCING OF REMEDIAL ACTION

The sequencing of the RA will be a critical item that will require coordination between all parties involved. Parties include, but are not limited to the RA Contractor, shoreline facility owners/operators, transload site operators, entity receiving treated water (if applicable), testing laboratories, material suppliers, and disposal sites. Coordination between parties performing concurrent remediation activities in the PHSS could help reduce potential conflicts and competition for resources. As mentioned in Section 3.3.1, the RA schedule aims to incorporate feedback from the shoreline facility owners/operators regarding times of year that will cause the least impact, when feasible. Constructability considerations that informed this review were also considered when refining the RA Schedule from Draft 50% to Pre-Final 90%.

The 90% RA Schedule has been developed to consider the sequencing of the RA and can be found in Figure 3-1 of the DCR.

4.0 REFERENCES

HydroGeoLogic, Inc. (HGL), 2024a. *Basis of Design Report. Revision 1*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. November.

HGL, 2024b. *Pre-Design Investigation Evaluation Report. Revision 2*. Preliminary Remedial Design Services Swan Island Basin Project Area CERCLA Docket No. 10-2021-001. December.

U.S. Environmental Protection Agency (EPA), 2017. *Record of Decision, Portland Harbor Superfund Site, Portland Oregon. United States.* Environmental Protection Agency Region 10, Seattle, Washington.

EPA, 2021a. *Administrative Settlement Agreement and Order on Consent* (ASAOC) for Remedial Design. Swan Island Basin Project Area, CERCLA Docket No. 10-2021-001 - 7, Region 10. January 20.

EPA, 2021b. *Remedial Design Guidelines and Considerations* (RDGC), Portland Harbor Superfund Site. Portland, Oregon. April 23.

List of Tables

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Table 3-1 Shoreline and Overwater Structure Summary